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STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

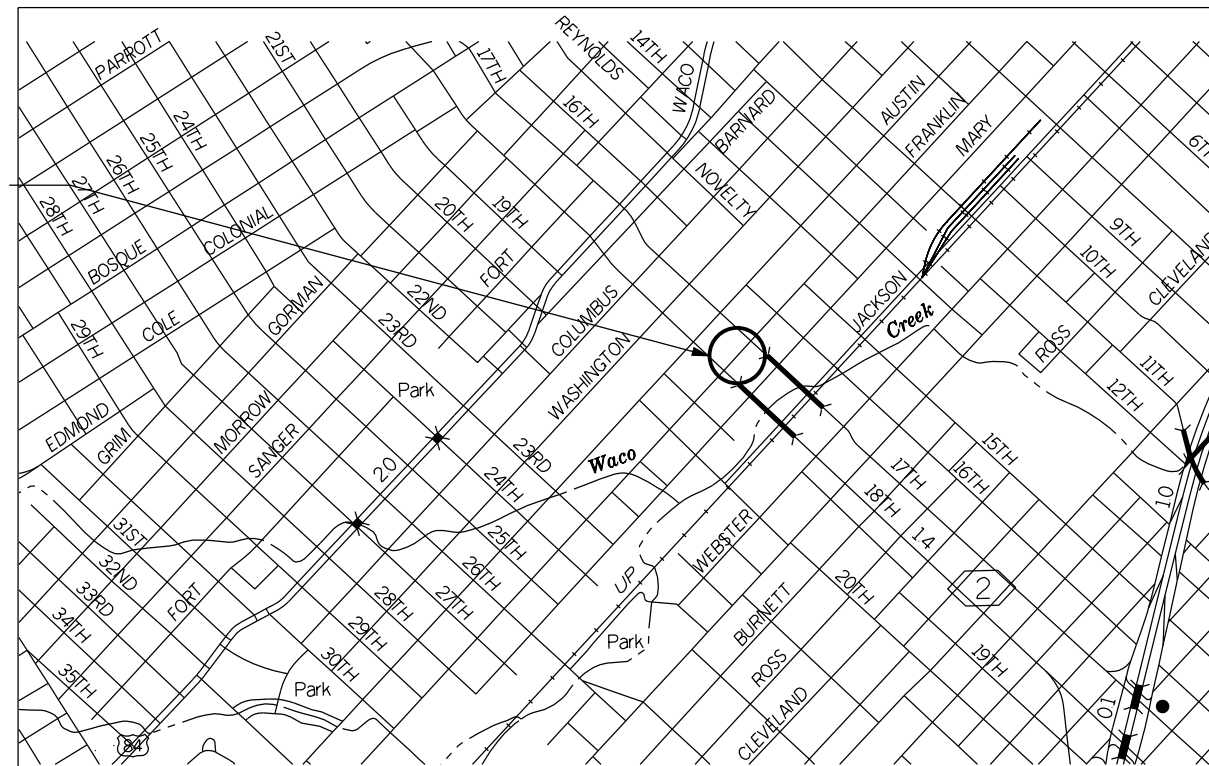
FEDERAL AID PROJECT: STP 2024(653)HES
MCLENNAN COUNTY
CS

	CSJ 0909-22-197		PROJECT NET	
ROADWAY:	FT= 420.00	MI.= 0.080	FT= 420.00	MI.= 0.080
BRIDGE:	FT= 0.00	MI.= 0.000	FT= 0.00	MI.= 0.000
TOTAL:	FT= 420.00	MI.= 0.080	FT= 420.00	MI.= 0.080

CSJ 0909-22-197 LIMITS: FROM: S 17TH ST TO S 18TH ST

FOR THE CONSTRUCTION OF TRAFFIC SIGNAL IMPROVEMENTS
CONSISTING OF IMPROVE TRAFFIC SIGNALS, INSTALL PEDESTRIAN SIGNALS,
INSTALL SIDEWALKS

FRANKLIN AVE FROM
S 17TH ST TO S 18TH ST



1" = 1,900.0

EXCEPTIONS: NONE
EQUATIONS: NONE
RR CROSSINGS: NONE
SCALE: 1" = 40'

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION,
NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS,
WILL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL
FEDERAL - AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER, 2023.

DESIGN LJC	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
	6	STP 2024(653)HES		CS
GRAPHICS DBW	STATE	DISTRICT	COUNTY	
	TEXAS	WAC	MCLENNAN	
CHECK BAS	CONTROL	SECTION	JOB	
	0909	22	197	
				1

DESIGN SPEED = 35 MPH

YEAR	ADT
2021	5,975
2041	8,365

REGISTERED ACCESSIBILITY SPECIALIST
(RAS) INSPECTION REQUIRED. TDLR NO.
EABPRJ TABS2024002613

SUBMITTED FOR LETTING 10/23/2023
Larry Robinson, P.E.
SENIOR PRJ MANAGER, MALDONADO-BURKETT, LLP

Texas Department of Transportation

Recommended for Letting 10/23/2023
DocuSigned by:
Cheryl R. P.E.
6D9791C615CF49B...
Area Engineer

Recommended for Letting 10/24/2023
DocuSigned by:
Victor Jankel, P.E.
9AD8C743F95E4E3...
Director of Transportation Planning & Development

Approved for Letting 10/24/2023
DocuSigned by:
Stanley Swiatek
B69BD796DD564C9...
District Engineer

S:\4.0.0.0. Engineering Operations\4.2.0.0.0. Project Files\2022\22049 - COW HSIP Projects\cad\sheets\2023 & 18th\1A TxDOT TitleSheet.dgn

NODE

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THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH AN (*), HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

Larry J. Colclasure, PE.
 LARRY J. COLCLASURE, PE 10/23/2023
 DATE

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MALDONADO - BURKETT
 Engineers | Contractors
 TBPE # 10258
 www.maldonado-burkett.com

INDEX OF SHEETS

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STATE	DIST.	COUNTY			
TEXAS	WAC	MCLENNAN			
CONT.	SECT.	JOB	HIGHWAY NO.		
0909	22	197	CS		

BASIS OF ESTIMATE TABLES

Table 1: Basis of Estimate for Asphalt Pavements				
Item	Description	Rate	Basis	Quantities
3076	TY-B PG 64-22	110 LB / SY / IN	2,032 SY	112 TON

GENERAL

The construction, operation and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality.

The disturbed area for this project, as shown on the plans is 0.2 acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

Contractor questions on this project are to be emailed to the Waco District at the following address:

Bill Compton - Wacoprebid@txdot.gov, 254-867-2707, 100 S. Loop Dr., Waco, TX
 Carmen Chau - Wacoprebid@txdot.gov, 254-867-2794, 100 S. Loop Dr., Waco, TX

Or Via phone or in person to the following individual(s):
 Area Engineer's: 254-772-2890
 Assistant Area Engineer's: 254-772-2890

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.

Paper copies of cross-sections may be produced by using the provided .pdf file located on the above FTP Website at the bidders' expense and at copying companies. This data is for non-construction purposes only and it is the responsibility of the prospective bidder to validate the enclosed data with appropriate plans, specifications and estimate for the project(s).

GENERAL NOTES

ITEM 5: CONTROL OF THE WORK

Provide the Engineer with a weekly work schedule of planned activities including anticipated quantities of materials to be placed daily (CY of each concrete placement, tons of HMA to be placed daily, etc.). Schedules will be provided for the following week as part of each week's project meetings or by 5PM on Thursday as approved by the Engineer. Failure to provide notifications are required here may be deemed as insufficient notice per item 5.10.

Submit all fabrication and shop drawings per TxDOT's online shop drawing submittal system and copy the Area Engineer on the email submittal, unless otherwise directed.

Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way on this project. For signal, illumination, surveillance, and communications & control maintained by TxDOT, call the TxDOT Traffic Signal Office (254)867-2808 for locates a minimum of 48 hours in advance of excavation. For irrigation systems, call TxDOT Landscape Office (254)867-2726 for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages when utilities are damaged due to Contractor's negligence including, but not limited to, repair or replacement at the Contractor's expense.

There is a fiber optic line directly beneath the proposed sidewalk on the north side of the roadway between S 17th St and S 18th St that belongs to Zayo. According to the design plans, the line is approximately 10 feet below the existing sidewalk. The cable should be pot holed to determine the location and the depth prior to excavation work. Contact Russell Lytle with Zayo, 817-665-4689 and notify him prior to performing any work in this area.

ITEM 6: CONTROL OF MATERIALS

To comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit an original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for materials classified as a manufactured product.

Refer to the Buy America Material Classification Sheet for clarification on material categorization.

The Buy America Material Classification Sheet is located at the below link.
<https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html> for clarification on material categorization.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only and the contractor will be permitted to furnish like materials of other manufacturers provided they are of equal quality and comply with specifications for this project.

ITEM 7: LEGAL RELATIONS AND RESPONSIBILITIES

Roadway closures during the following key dates and / or special events are prohibited:

- All Federal Holidays
- The Saturday of the Baylor Homecoming Parade
- The day after Thanksgiving

If utilizing private property for waste disposal sites, field office sites, equipment storage sites or for any other purpose involved with this project, provide to the Engineer written proof of the property owner's approval of the use of this property. This proof may be in the form of a letter or agreement signed by the property owner or other documents acceptable to the Engineer. Provide such proof prior to occupying the site.

Personal vehicles of the contractor's employees will not be parked within the right of way at any time including any section closed to public traffic, unless the vehicle is being utilized for construction procedures. However, the contractor's employees may park on the right of way at the sites where the contractor has his office, equipment and materials storage yard.

Law Enforcement Personnel.

As approved by the Engineer, provide uniformed off duty police officers and squad cars during the following activities:

- Lane closures on controlled access facilities or 4 lane divided facilities with speed limits above 55mph,
- Ramp closures,
- Roadway closures,
- Support of phase construction traffic switches,
- Nighttime work, or,
- Other situations that indicate a need for additional traffic control to protect the traveling public or the construction workforce.

Law Enforcement Personnel must have jurisdictional authority to act in the area of the project.

Law Enforcement Personnel will be paid when use is approved by the Engineer. The Contractor retains the right to have law enforcement personnel on sight at their own cost and discretion when note approved by the Engineer.

Submit charge summary and invoices 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.

No payment will be made for law enforcement personnel needed for moving equipment or payment for drive time to/from the event site. A minimum number of hours is not guaranteed. Payment is for work performed. If the Contractor has a field office, provide an office location for a supervisory officer when event requires a supervising officer. This work is subsidiary.

A maximum combined rate of \$65 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.

ITEM 8: PROSECUTION AND PROGRESS

This Project will be a Standard Workweek in accordance with Article 8.3.1.4.

Nighttime work is allowed in accordance with Article 8.3.3.

For this project, provide a Bar Chart progress schedule.

ITEMS 105: REMOVING TREATED AND UNTREATED BASE AND ASPHALT PAVEMENT

Saw existing asphalt along neat lines where portions are to be left in place temporarily or permanently. Sawing is not paid for directly but is subsidiary to this item.

To remove dirt and debris, and assure reclaimable material is not contaminated per the specification, blade or otherwise make a neat cut along the existing pavement edge to a depth approx. 1" below the milling limits. This work will be required prior to milling operation and is subsidiary to these items.

Take possession of recycled asphalt pavement from the project and recycle the material.

Properly dispose of unsalvageable material at Contractor's expense.

Remove the loose material from the roadway before opening to traffic.

ITEMS 3076: DENSE-GRADED HOT-MIX ASPHALT (SQ) & DENSE-GRADED HOT-MIX ASPHALT

Use aggregate that meets the Surface Aggregate Classification (SAC) requirement of Class B.

Maximum stripping of 0% is required.

ITEM 354: PLANING AND TEXTURING PAVEMENT

Patch pavement cut to excessive depth by equipment failure with an approved epoxy material. Re-plane patched area to an acceptable approved ride quality. Payment for these corrections is subsidiary to this item

ITEM 416: DRILLED SHAFT FOUNDATIONS

Provide a minimum of one core per bent, regardless of placement method.

All drill shaft locations are based on utilities marked by the city and Texas one call system. Utilities shall be verified by the contractor prior to construction. Any adjustments shall be approved by the engineer.

Signal poles located under overhead electric lines shall be installed as per location on the plan sheets. Contractor shall be responsible for providing any special drilling equipment to accomplish the installation at no additional cost.

Soil from foundation drilling will be removed immediately from the stream channel area to higher ground above the ordinary high-water marks. No earth drill spoil material will be deposited into water of a stream. If used, drilling mud will not be allowed to enter into any stream.

ITEM 420 CONCRETE SUBSTRUCTURES

Supply drainage aggregate meeting the requirements of this item for use as filter material with the retaining wall.

Cement-Stabilized Backfill (CSB) is not permitted.

For cut walls, the backfill between the select fill zone and the existing ground shall be either select material as required for the select fill zone or backfill meeting or exceeding the requirements of Item 132, type C2. Place material in accordance with Item 132, Type C2 requirements. If existing ground is laid back (i.e. not vertical), the lay back shall be done as a series of equal height benches so as to prevent the formation of a smooth surface at the material interface.

Avoid distinct vertical joints between select backfill and embankment (Non-Select) backfill as required by Section 423.3.4. This may be conveniently done by providing a zone of material behind the strap zone (1' min width) in which alternating lifts of select and non-select materials are interlaced.

ITEM 421: HYDRAULIC CEMENT CONCRETE

Furnish mix designs to the Engineer in a format compatible to the latest version of the Department's Construction Management System (Site Manager). Mix Design templates will be provided by the Engineer.

ITEM 440: REINFORCEMENT FOR CONCRETE

Fiber Reinforced Concrete (FRC) can be used as a substitute for Non-Structural Class Reinforced Concrete in Mow-Strips for MBGF and Sidewalks. FRC may also be used for other Non-Structural Class Reinforced Concrete Items as approved by the Engineer.

For rip rap slope protection wire mesh will not be allowed. Rebar reinforcing will be required per the Standard Details.

ITEM 500: MOBILIZATION

Material On Hand (MOH) will not be used in calculating partial payments for Mobilization.

ITEM 502: BARRICADES, SIGNS, AND TRAFFIC HANDLING

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.

A meeting between the contractor and Engineer to discuss upcoming changes in construction phasing and traffic switches is required at least fourteen (14) days prior to the phase change. Items to be discussed at this meeting include temporary signing, traffic control, pavement markings, the processes necessary for the phase change and subcontractor scheduling.

Provide written proposed lane closure information by 1:00 pm on the business day prior to the proposed closures. Do not close lanes when this requirement is not met.

Place barricades and signs in locations that do not obstruct the sight distance of drivers entering the highway from driveways or side streets.

The Contractor Responsible Person(s) (CRP) for Work Zone Traffic Controls will inspect and ensure any deficiencies are corrected each and every day throughout the duration of this contract. Any misaligned or damaged traffic control devices will be repaired as soon as practical after deficiency is discovered.

ITEM 506: TEMPORARY EROSION, SEDIMENTATION AND ENVIRONMENTAL CONTROLS

Leave all right of way areas undisturbed until actual construction is to be performed in said areas.

No soil disturbing activities will begin on any section of TxDOT ROW without adequate sedimentation controls first being installed and functioning at adjacent drainage outfalls. Begin and continuously prosecute the repairs, additions and maintenance of erosion and sedimentation control devices within seven days after the Contractor receives each Form 2118, Field Inspection and Maintenance Report, from the Engineer. Failure of the Contractor to fulfill either of the above requirements places TxDOT in potential non-compliance with permit requirements and may result in withholding estimates or stopping work or both until all environmental permit requirements are fulfilled.

Cleaning and sweeping of open roadways due to material spillage or loss from Contractor equipment or tires will be the responsibility of the Contractor at no cost to TxDOT. This work will not be charged as Item 738, "Cleaning and Sweeping Highways". Cleaning and sweeping of roadways will be completed as directed, including multiple times per day if necessary, to maintain acceptable roadways for the traveling public and to meet environmental regulations. Construction activities will cease when material deposited on the roadway is not properly removed or when equipment is not available as needed. Adequate construction exits will be planned, constructed and maintained by the Contractor per Item 506, "Temporary Erosion, Sedimentation, and Environmental Controls".

ITEM 529: CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER

For Curb and Gutter sections, provide grooved joints at 10-foot intervals and ¾ inch expansion joint material at a maximum of 50-foot centers and at all radius points and inlets.

Curb and Gutter transitions will be paid for by the foot at the unit price for the corresponding curb or curb and gutter section.

Saw joints at the same location as on the existing pavement.

ITEM 530: INTERSECTIONS, DRIVEWAYS AND TURNOUTS

Provide Class "HES" concrete for concrete driveways shown on the plans.

ITEM 618: CONDUIT

The locations of conduit as shown are for diagrammatic purposes only and may be varied to meet local conditions, subject to approval.

When backfilling bore pits, ensure that the conduit does not become damaged during installation or due to any settling of the backfill material. Compact select backfill in three equal lifts to the bottom of the conduit or if sand is used, place to a point two (2) inches above the conduit. Backfill density will be equal to the existing soil. Be careful to prevent any material from entering the conduit.

Backfill all open trenches before the end of the workday and do not leave any trench open overnight.

All conduits under unpaved surfaces may be trenched and buried; however, the contractor shall backfill, compact and restore trenched area to original conditions and match existing surface conditions to the density of the adjacent area.

Remove all abandoned conductor and conduit to one (1) ft. below ground level. This work will not be paid for directly but will be subsidiary to the pertinent items.

After the cables have been installed in the conduit system, seal all open ends of the conduit (i.e., in ground box) with an approved compound.

Use materials from prequalified material producers list as shown on the Texas Department of Transportation (TxDOT) - Construction Division's (CST) Materials Producers List.

For a list of pre-qualified manufacturers. Category is "Roadway Illumination and Electrical Supplies."

ITEM 620: ELECTRICAL CONDUCTORS

Place the communications and/or coaxial cables in a separate conduit from the 120 or 240-volt electrical conductors.

Any damage to any wire or any cable is cause for immediate rejection of the entire cable being tested. Remove and replace the entire cable at the Contractor's expense.

For both transformer and shoe-base type illumination poles, provide double-pole breakaway fuse holder from manufacturers pre-qualified by the Traffic Operations Division.

Provide ten (10) amp time delay fuses.

ITEM 624: GROUND BOXES

Ground box locations shown on the plans are approximate locations. Actual locations are as directed.

ITEM 636: SIGNS

Verify all dimensions at the actual proposed sign location in order to maintain dimensions as shown on the Sign Mounting Details.

Stake the location of the new signs a minimum of 7 days in advance of anticipated installation. The Engineer will review and approve the final installation locations.

For freeway sections, keep the advance guide sign or the exit direction sign for an exit in place at all times, unless written approval is given. Replace any signs that have been removed before the end of the workday, unless written approval is given.

ITEM 656: FOUNDATIONS FOR TRAFFIC CONTROL DEVICES

Locations shown on the plans are for diagrammatic purposes only and may be varied to meet local conditions, subject to approval. Stake these locations and have them approved before installation of foundations.

Consult with the Engineer to ensure proper location and orientation of the signal controller before construction.

Backfill all open foundation holes before the end of the workday and do not leave any holes open overnight.

Clean up and remove from all work areas all loose material resulting from contract operations each day before suspending work for the day.

Paint and beads may be used for non-removable pavement markings.

ITEM 666: RETROREFLECTORIZED PAVEMENT MARKINGS

The Contractor will layout the proposed striping in accordance with TxDOT Traffic Control Plan Standards and latest version Texas Manual on Uniform Traffic Control Devices (TMUTCD) and project striping layout sheets. The Engineer will verify proposed striping layout prior to the beginning of striping operations.

ITEM 668: PREFABRICATED PAVEMENT MARKINGS

Use Type C prefabricated pavement markings.

ITEM 677: ELIMINATING EXISTING PAVEMENT MARKINGS AND MARKERS

Water blasting method will be used on all final pavement surfaces for removal of temporary or permanent pavement markings.

The following are considered acceptable Pavement Marking Removal methods on this project for non-final pavement surfaces:

Water blasting
Mechanical Method

ITEM 680: HIGHWAY TRAFFIC SIGNALS

If there are existing traffic signals presently in operation within the project limits, keep the existing signals in operation until the proposed signals are in operation, or as directed. Remove the old signals and equipment.

Maintain the integrity and function of each existing signalized intersection. Once the integrity or function of the signal is altered, continue work at that location without delay or interruption until restoring to the original or final operational design.

Provide a Siemens 8132-000-*** (M60 NEMA Linux) Type 2 Controller Unit: The specified equipment is requested as a significant percentage of intersections within the City are currently operated with the Siemens M60 NEMA Linux Controller Unit. Additionally, the need for compatibility is required as the City moves toward a centralized signal software system.

Provide an Eagle 2562101213 (16-loadbay, TS2-Type 1) Cabinet Assembly: The specified equipment is requested as a significant percentage of intersections are currently operated with the Eagle Cabinet Assembly across the City.

ITEM 682: VEHICLE AND PEDESTRAIN SIGNAL HEADS

Provide new signal head housings with black aluminum housings and back plates. Cover all signal heads installed, but not in operation, in an approved manner from the time of installation until the signal is placed in operation. This will not be paid for directly, but will be subsidiary to Item 682, "Vehicle and Pedestrian Signal Heads".

Provide and install standard detachable tunnel visors on all signal heads. Provide and install all necessary mounting hardware to insure proper mounting of all signal heads. The mounting hardware and attachments will be new (no reuse of old existing attachment hardware) and the same color as the signal head housings. Use signal heads made of aluminum with 12 inch LED indications and aluminum back plates.

Install signal heads mounted on mast arms, as described on the Traffic Signal Support Structures Details, or as approved. Mount signal heads mounted on end of arm with a 90 degree mast arm elbow fitting as shown on the Structure Assembly on the Traffic Signal Support Structures Details.

Use standard 1 1/2-inch diameter steel pipe side pole mount for pedestrian signal heads.

Ensure that each signal head has a minimum vertical clearance of 18.5 feet and a maximum vertical clearance of 19 feet between the bottom edge of the signal head and the surface of the roadway.

ITEM 686: TRAFFIC SIGNAL POLE ASSEMBLIES (STEEL)

No exposed signal cable on the mast arm assemblies will be allowed. Install the signal cable so it will exit the mast arm directly behind each signal head as directed. This will require drilling holes in the mast at the exact location for each signal head. Drip loops are not allowed.

ITEM 688: PEDESTRIAN DETECTORS AND VEHICLE LOOP DETECTORS

Install pedestrian push button signs (R10-4B) directly above the push buttons.

Installation of pedestrian push buttons signs, electrical connections and all mounting hardware will not be paid for directly, but considered subsidiary to Item 688, "Pedestrian Detectors and Vehicle Loop Detectors."

Ensure that the Contractor's Responsible Person for traffic control can revise messages within thirty (30) minutes of notification.

Supply portable changeable message sign(s) in accordance with the Traffic Control Plan standard sheets and Article 6f.55 of the Texas Manual on Uniform Traffic Control Devices for Streets and Highways Part VI.

ITEM 3076: DENSE-GRADED HOT-MIX ASPHALT

Use aggregate that meets the Surface Aggregate Classification (SAC) requirement of Class B.

Maximum stripping of 0% is required.

ITEM 6001: PORTABLE CHANGEABLE MESSAGE SIGN

Ensure that the Contractor's Responsible Person for traffic control can revise messages within thirty (30) minutes of notification.

Supply portable changeable message sign(s) in accordance with the Traffic Control Plan standard sheets and Article 6f.55 of the Texas Manual on Uniform Traffic Control Devices for Streets and Highways Part VI.

ITEM 6185: TRUCK MOUNTED ATTENUATORS

The total number of truck mounted attenuators (TMA) required when utilizing the traffic control standards are shown in the tables below.

TCP 2 Series	Scenario	Required TMA
(2-4)-23	All	1

TCP 3 Series	Scenario	Required TMA
(3-1)-13	All	2
(3-3)-14	A B D	2
	C	3

Shadow vehicles equipped for truck mounted attenuators (TMA) for stationary operations will be paid for by the day and must be available for use at any time as determined by the Engineer.

Mobile operations will be paid for by the hour, per specifications. For mobile operations, payment will be made only while the TMA is in use.

For mobile operations requiring multiple TMA's, judgement may be applied in lower speed, urban / in town traffic environments to reduce the numbers of TMA in use where the added TMA may pose a hazard for traffic entering and exiting driveways, side streets, etc.

The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA needed for the project for those times per plan requirements. Additional TMAs used that are not specified in the plans in which the contractor expects compensation will require prior approval from the Engineer.

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Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0909-22-197

DISTRICT Waco
HIGHWAY FRANKLIN AVE

COUNTY McLennan

CONTROL SECTION JOB				0909-22-197		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00184077			
COUNTY				McLennan			
HIGHWAY				FRANKLIN AVE			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	104-6015	REMOVING CONC (SIDEWALKS)	SY	707.000		707.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	114.000		114.000	
	104-6022	REMOVING CONC (CURB AND GUTTER)	LF	334.000		334.000	
	354-6002	PLAN & TEXT ASPH CONC PAV(0" TO 2")	SY	2,032.000		2,032.000	
	416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	LF	8.000		8.000	
	416-6031	DRILL SHAFT (TRF SIG POLE) (30 IN)	LF	48.000		48.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	28.000		28.000	
	420-6062	CL C CONC (RETAINING WALL)	CY	6.000		6.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	6.000		6.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	100.000		100.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	100.000		100.000	
	506-6040	BIODEG EROSN CONT LOGS (INSTL) (8")	LF	30.000		30.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	30.000		30.000	
	529-6008	CONC CURB & GUTTER (TY II)	LF	334.000		334.000	
	530-6017	DRIVEWAYS (CONC) (HES)	SY	114.000		114.000	
	531-6001	CONC SIDEWALKS (4")	SY	707.000		707.000	
	531-6004	CURB RAMPS (TY 1)	EA	7.000		7.000	
	531-6008	CURB RAMPS (TY 5)	EA	2.000		2.000	
	531-6010	CURB RAMPS (TY 7)	EA	2.000		2.000	
	610-6214	IN RD IL (TY SA) 40T-8 (250W EQ) LED	EA	1.000		1.000	
	618-6023	CONDT (PVC) (SCH 40) (2")	LF	565.000		565.000	
	618-6024	CONDT (PVC) (SCH 40) (2") (BORE)	LF	355.000		355.000	
	618-6029	CONDT (PVC) (SCH 40) (3")	LF	370.000		370.000	
	618-6030	CONDT (PVC) (SCH 40) (3") (BORE)	LF	355.000		355.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	1,050.000		1,050.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	1,530.000		1,530.000	
	620-6009	ELEC CONDR (NO.6) BARE	LF	40.000		40.000	
	620-6010	ELEC CONDR (NO.6) INSULATED	LF	80.000		80.000	
	624-6008	GROUND BOX TY C (162911)W/APRON	EA	14.000		14.000	
	624-6028	REMOVE GROUND BOX	EA	4.000		4.000	
	662-6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	32.000		32.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	184.000		184.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	165.000		165.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	701.000		701.000	
	666-6117	REFL PAV MRK TY I (W)(BIKE DOT)(100MIL)	EA	46.000		46.000	
	666-6132	REFL PAV MRK TY I (Y)6"(DOT)(100MIL)	LF	45.000		45.000	

DISTRICT	COUNTY	CCSJ	SHEET
Waco	McLennan	0909-22-197	4



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0909-22-197

DISTRICT Waco
HIGHWAY FRANKLIN AVE

COUNTY McLennan

CONTROL SECTION JOB				0909-22-197		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00184077			
COUNTY				McLennan			
HIGHWAY				FRANKLIN AVE			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	666-6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF	87.000		87.000	
	666-6225	PAVEMENT SEALER 6"	LF	2,342.000		2,342.000	
	666-6226	PAVEMENT SEALER 8"	LF	165.000		165.000	
	666-6230	PAVEMENT SEALER 24"	LF	476.000		476.000	
	666-6231	PAVEMENT SEALER (ARROW)	EA	3.000		3.000	
	666-6232	PAVEMENT SEALER (WORD)	EA	3.000		3.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	360.000		360.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	1,845.000		1,845.000	
	668-6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	3.000		3.000	
	668-6085	PREFAB PAV MRK TY C (W) (WORD)	EA	3.000		3.000	
	672-6007	REFL PAV MRKR TY I-C	EA	26.000		26.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	44.000		44.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	10.000		10.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF	2,342.000		2,342.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF	165.000		165.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	165.000		165.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	3.000		3.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	3.000		3.000	
	680-6003	INSTALL HWY TRF SIG (SYSTEM)	EA	2.000		2.000	
	680-6004	REMOVING TRAFFIC SIGNALS	EA	2.000		2.000	
	682-6001	VEH SIG SEC (12")LED(GRN)	EA	14.000		14.000	
	682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	2.000		2.000	
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	14.000		14.000	
	682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	6.000		6.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	15.000		15.000	
	682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	2.000		2.000	
	682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	16.000		16.000	
	682-6051	BACKPLATE W/REFL BRDR(3 SEC)ALUM	EA	15.000		15.000	
	682-6052	BACKPLATE W/REFL BRDR(4 SEC)ALUM	EA	2.000		2.000	
	684-6030	TRF SIG CBL (TY A)(14 AWG)(4 CONDR)	LF	1,591.000		1,591.000	
	684-6033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	98.000		98.000	
	684-6042	TRF SIG CBL (TY A)(14 AWG)(16 CONDR)	LF	910.000		910.000	
	684-6079	TRF SIG CBL (TY C)(12 AWG)(2 CONDR)	LF	2,660.000		2,660.000	
	686-6025	INS TRF SIG PL AM (S)1 ARM(24')	EA	1.000		1.000	
	686-6033	INS TRF SIG PL AM(S)1 ARM(32')	EA	1.000		1.000	
	686-6035	INS TRF SIG PL AM(S)1 ARM(32')LUM	EA	1.000		1.000	
	686-6039	INS TRF SIG PL AM(S)1 ARM(36')LUM	EA	1.000		1.000	

DISTRICT	COUNTY	CCSJ	SHEET
Waco	McLennan	0909-22-197	4A



Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0909-22-197

DISTRICT Waco
HIGHWAY FRANKLIN AVE

COUNTY McLennan

CONTROL SECTION JOB				0909-22-197		TOTAL EST.	TOTAL FINAL
PROJECT ID				A00184077			
COUNTY				McLennan			
HIGHWAY				FRANKLIN AVE			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	686-6041	INS TRF SIG PL AM(S)1 ARM(40')	EA	1.000		1.000	
	686-6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	1.000		1.000	
	687-6001	PED POLE ASSEMBLY	EA	8.000		8.000	
	688-6001	PED DETECT PUSH BUTTON (APS)	EA	16.000		16.000	
	688-6003	PED DETECTOR CONTROLLER UNIT	EA	2.000		2.000	
	3076-6071	D-GR HMA TY-D PG 64-22 (EXEMPT)	TON	112.000		112.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	6.000		6.000	
	6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	8.000		8.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	8.000		8.000	
	6306-6001	VIVDS PROSR SYS	EA	2.000		2.000	
	6306-6002	VIVDS CAM ASSY FXD LNS	EA	6.000		6.000	
	6306-6007	VIVDS CABLING	LF	1,123.000		1,123.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

PAVEMENT MARKING SUMMARY 1 OF 2

PLAN SHEET NO.	0662 6109	0662 6111	0666 6036	0666 6048	0666 6117	0666 6132	0666 6147	0666 6225	0666 6226	0666 6230	0666 6231	0666 6232	0666 6306	0666 6321
	WK ZN PAV MRK SHT TERM (TAB) TY W	WK ZN PAV MRK SHT TERM (TAB) TY Y-2	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	REFL PAV MRK TY I (W) (BIKE DOT) (100MIL)	REFL PAV MRK TY I (Y) 6" (DOT) (100MIL)	REFL PAV MRK TY I (Y) 24" (SLD) (100MIL)	PAVEMENT SEALER 6"	PAVEMENT SEALER 8"	PAVEMENT SEALER 24"	PAVEMENT SEALER (ARROW)	PAVEMENT SEALER (WORD)	RE PM W/RET REQ TY I (W) 6" (BRK) (100MIL)	RE PM W/RET REQ TY I (Y) 6" (SLD) (100MIL)
	EA	EA	LF	LF	EA	LF	LF	LF	LF	LF	EA	EA	LF	LF
56	8	56	65				12	635	65		1	1	90	545
57	8	104	100	300	24		75	1288	100	75	1	1	190	1050
58	16	24		401	22	45		419		401	1	1	80	250
PROJECT TOTALS	32	184	165	701	46	45	87	2342	165	476	3	3	360	1845

PAVEMENT MARKING SUMMARY 2 OF 2

PLAN SHEET NO.	0668 6077	0668 6085	0672 6007	0672 6009	0678 6002	0678 6004	0678 6008	0678 6009	0678 6016
	PREFAB PAV MRK TY C (W) (ARROW)	PREFAB PAV MRK TY C (W) (WORD)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (6")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (24")	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (WORD)
	EA	EA	EA	EA	LF	LF	LF	EA	EA
56	1	1	4	14	635	65		1	1
57	1	1	13	24	1288	100	75	1	1
58	1	1	9	6	419		401	1	1
PROJECT TOTALS	3	3	26	44	2342	165	476	3	3

SUMMARY OF REMOVAL ITEMS

PLAN SHEET NO.	0624 6028	0677 6007	0680 6004
	REMOVE GROUND BOX	ELIM EXT PAV MRK & MRKS (24")	REMOVING TRAFFIC SIGNALS
	EA	LF	EA
FRANKLIN AVE AT S 18TH ST	2	10	1
FRANKLIN AVE AT S 17TH ST	2		1
PROJECT TOTALS	4	10	2

SUMMARY OF ROADWAY ITEMS

PLAN SHEET NO.	0104 6015	0104 6017	0104 6022	0354 6002	0420 6062	0529 6008	0530 6017	0531 6001	0531 6004	0531 6008	0531 6010	3076 6071
	REMOVING CONC (SIDEWALKS)	REMOVING CONC (DRIVEWAYS)	REMOVING CONC (CURB AND GUTTER)	PLAN & TEXT ASPH CONC PAV (0" TO 2")	CL C CONC (RETAINING WALL)	CONC CURB & GUTTER (TY II)	DRIVEWAYS (CONC) (HES)	CONC SIDEWALKS (4")	CURB RAMPS (TY 1)	CURB RAMPS (TY 5)	CURB RAMPS (TY 7)	D-GR HMA TY-D PG64-22 (EXEMPT)
	SY	SY	LF	SY	CY	LF	SY	SY	EA	EA	EA	TON
31	381	65	192	1090	4.7	192	65	381				60
32	326	49	142	942	1.3	142	49	326	7	2	2	52
PROJECT TOTALS	707	114	334	2032	6	334	114	707	7	2	2	112



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CONSOLIDATED SUMMARIES

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		5
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS

TRAFFIC SIGNAL SUMMARY 1 OF 3

PLAN SHEET NO.	0416 6031 DRILL SHAFT (TRF SIG POLE) (30 IN)	0416 6032 DRILL SHAFT (TRF SIG POLE) (36 IN)	0618 6023 CONDT (PVC) (SCH 40) (2")	0618 6024 CONDT (PVC) (SCH 40) (2") (BORE)	0618 6029 CONDT (PVC) (SCH 40) (3")	0618 6030 CONDT (PVC) (SCH 40) (3") (BORE)	0620 6007 ELEC CONDR (NO. 8) BARE	0620 6008 ELEC CONDR (NO. 8) INSULATED	0620 6009 ELEC CONDR (NO. 6) BARE	0620 6010 ELEC CONDR (NO. 6) INSULATED	0624 6008 GROUND BOX TY C (162911) W/APRON	0636 6001 ALUMINUM SIGNS (TY A)	0636 6003 ALUMINUM SIGNS (TY O)	0680 6003 INSTALL HWY TRF SIG (SYSTEM)
	LF	LF	LF	LF	LF	LF	LF	LF	LF	LF	EA	SF	SF	EA
FRANKLIN AVE AT S 18TH ST	24	14	340	180	155	180	595	900	20	40	7	48.0	35.3	1
FRANKLIN AVE AT S 17TH ST	24	14	225	175	215	175	455	630	20	40	7	33.8	55.5	1
PROJECT TOTALS	48	28	565	355	370	355	1050	1530	40	80	14	81.8 *	90.8 *	2

TRAFFIC SIGNAL SUMMARY 2 OF 3

PLAN SHEET NO.	0682 6001 VEH SIG SEC (12") LED (GRN)	0682 6002 VEH SIG SEC (12") LED (GRN ARW)	0682 6003 VEH SIG SEC (12") LED (YEL)	0682 6004 VEH SIG SEC (12") LED (YEL ARW)	0682 6005 VEH SIG SEC (12") LED (RED)	0682 6006 VEH SIG SEC (12") LED (RED ARW)	0682 6018 PED SIG SEC (LED) (COUNTDOWN)	0682 6051 BACKPLATE W/REFL BRDR (3 SEC) ALUM	0682 6052 BACKPLATE W/REFL BRDR (4 SEC) ALUM	0684 6030 TRF SIG CBL (TY A) (14 AWG) (4 CONDR)	0684 6033 TRF SIG CBL (TY A) (14 AWG) (7 CONDR)	0684 6042 TRF SIG CBL (TY A) (14 AWG) (16 CONDR)	0684 6079 TRF SIG CBL (TY C) (12 AWG) (2 CONDR)	0686 6025 INS TRF SIG PL AM (S) 1 ARM (24')	0686 6033 INS TRF SIG PL AM (S) 1 ARM (32')	0686 6035 INS TRF SIG PL AM (S) 1 ARM (32') LUM
	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	LF	LF	EA	EA	EA
FRANKLIN AVE AT S 18TH ST	7	1	7	2	7	1	8	7	1	595	47	535	1298		1	1
FRANKLIN AVE AT S 17TH ST	7	1	7	4	8	1	8	8	1	996	51	375	1362	1		
PROJECT TOTALS	14	2	14	6	15	2	16	15	2	1591	98	910	2660	1	1	1

TRAFFIC SIGNAL SUMMARY 3 OF 3

PLAN SHEET NO.	0686 6039 INS TRF SIG PL AM (S) 1 ARM (36') LUM	0686 6041 INS TRF SIG PL AM (S) 1 ARM (40')	0686 6043 INS TRF SIG PL AM (S) 1 ARM (40') LUM	0687 6001 PED POLE ASSEMBLY	0688 6001 PED DETECT PUSH BUTTON (APS)	0688 6003 PED DETECTOR CONTROLLER UNIT	6058 6001 BBU SYSTEM (EXTERNAL BATT CABINET)	6306 6001 VIVDS PROSR SYS	6306 6002 VIVDS CAM ASSY FXD LNS	6306 6007 VIVDS CABLING
	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF
FRANKLIN AVE AT S 18TH ST		1		3	8	1	1	1	3	625
FRANKLIN AVE AT S 17TH ST	1		1	5	8	1	1	1	3	498
PROJECT TOTALS	1	1	1	8	16	2	2	2	6	1123

SUMMARY OF ILLUMINATION ITEMS

PLAN SHEET NO.	0416 6029 DRILL SHAFT (RDWY ILL POLE) (30 IN)	0610 6214 IN RD IL (TY SA) 40T-8 (250W EQ) LED
	LF	EA
42	8	1
PROJECT TOTALS	8	1

SUMMARY OF SW3P ITEMS

LOCATION	0506 6038 TEMP SEDM CONT FENCE (INSTALL)	0506 6039 TEMP SEDM CONT FENCE (REMOVE)	0506 6040 BIODEG EROSN CONT LOGS (INSTL) (8")	0506 6043 BIODEG EROSN CONT LOGS (REMOVE)
	LF	LF	LF	LF
FRANKLIN AVE	100	100	30	30
PROJECT TOTALS	100	100	30	30

SUMMARY OF TCP ITEMS

LOCATION	6001 6001 PORTABLE CHANGEABLE MESSAGE SIGN	6185 6002 TMA (STATIONARY)	6185 6003 TMA (MOBILE OPERATION)
	DAY	DAY	HR
FRANKLIN AVE	6	8	8
PROJECT TOTALS	6	8	8

* NOTE: QUANTITIES ARE SUBSIDIARY TO ITEM 680 6003 - INSTALL HWY TRAFFIC SIGNAL (SYSTEM)



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CONSOLOATED SUMMARIES

SHEET 2 OF 2

FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 6
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197
HIGHWAY NO. CS		

TRAFFIC CONTROL PLAN SEQUENCE OF WORK

- (1) THIS PROJECT WILL BE CONSTRUCTED IN THREE PHASES. BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/ APPROVED BY THE ENGINEER. DAILY LANE CLOSURES WILL BE USED IN ACCORDANCE WITH STATE TCP STANDARDS.
- (2) PREPARING ROW / REMOVAL OF EXISTING ITEMS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURRING, AS PER THE PHASES NOTED BELOW.
- (3) PLANING AND OVERLAYS SHALL BE PERFORMED IN THE DIRECTION OF TRAFFIC. BEGIN SURFACE CONSTRUCTION ON HIGH SIDE OF ROAD TO AVOID WATER PONDING ISSUES.
- (4) THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC" AND ITEM 502, "BARRICADES, SIGNS, AND TRAFFIC HANDLING", OF THE STANADARD SPECIFICATIONS, AND TO THE GENERAL NOTES.
- (5) THE CONTRACTOR MAY PROPOSE/RECOMMEND MODIFICATION TO THE SEQUENCE OF WORK FOR CONSIDERATION BY THE ENGINEER. ANY MAJOR RECOMMENDED MODIFICATION BY THE CONTRACTOR SHALL INCLUDE ANY CHANGES TO THE VARIOUS BID ITEMS, IMPACT TO TRAFFIC, EFFECT OF OVERALL PROJECT IN TIME AND COST, ETC. IF THE PROPOSAL IS IMPLEMENTED. THE CONTRACTOR WILL BE RESPONSIBLE FOR DEVELOPING DETAILED PLAN SHEETS TO BE SEALED BY A LICENSED PROFESSIONAL ENGINEER FOR INCLUSION WITH THE CHANGE ORDER. THE CONTRACTOR CANNOT PROCEED WITH ANY CONSTRUCTION OPERATIONS BASED ON A REVISED PHASE/SEQUENCE UNTIL WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER. IF AT ANY TIME DURING CONSTRUCTION THE CONTRACTOR'S PROPOSED PLAN OF OPERATION FOR HANDLING TRAFFIC DOES NOT PROVIDE FOR SAFE AND COMFORTABLE MOVEMENT, THE CONTRACTOR WILL IMMEDIATELY CHANGE THEIR OPERATION TO CORRECT THE UNSATISFACTORY CONDITION.
- (6) DO NOT STORE ANY CONSTRUCTION MATERIAL OR EQUIPMENT AT ANY LOCATION THAT WILL CONSTITUTE A HAZARD AND WILL ENDANGER TRAFFIC.
- (7) THE CONTRACTOR WILL PROVIDE ADVANCE NOTIFICATION TO THE ENGINEER OF IMPENDING/UPCOMING LANE CLOSURES.
- (8) ACCESS TO ADJOINING PROPERTY MUST BE MAINTAINED AT ALL TIMES.
- (9) UNLESS OTHERWISE NOTED IN THE PLANS AND/OR AS DIRECTED BY THE ENGINEER, DAILY LANE CLOSURES SHALL BE LIMITED ACCORDING TO THE FOLLOWING RESTRICTIONS:
 - DAYTIME: 8:30AM TO 4:00PM.
 - NIGHTTIME: 9:00PM TO 5:00AM, UNLESS OTHERWISE SPECIFIED IN WRITING.
 - WEEKEND CLOSURES WHEN APPROVED BY THE ENGENNER: 9:00PM TO 5:00AM, UNLESS OTHERWISE SPECIFIED IN WRITING.
 - NO LANE CLOSURES WILL BE PERMITTED DURING THE FOLLOWING DATES:
 - BETWEEN DECEMBER 15 AND JANUARY 1.
 - WEDNESDAY BEFORE THANGSGIVING THRU THE SUNDAY AFTER THANKSGIVING.
 - SATURDAY AND SUNDAY BEFORE MEMORIAL DAY AND LABOR DAY.
 - SATURDAY OR SUNDAY WHEN JULY 4 FALL ON A FRIDAY OR MONDAY.
 - EASTER WEEKEND.
- (10) COVER PERMANENT SIGNS IF THEY CONFLICT WITH THE CONSTRUCTION SIGNING.
- (11) A BRIEF DESCRIPTION OF THE PHASES IS AS FOLLOWS:

PHASE I

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE TRAFFIC SIGNALS.

- (1) PLACE NEW PROJECT BARRICADES AND INSTALL ADVANCE WARNING SIGNS (USE TXDOT BC STANDARDS AND TCP (2-4)-18).
- (2) INSTALL TEMPORARY EROSION CONTROL MEASURES.
- (3) CONSTRUCT THE PROPOSED TRAFFIC SIGNALS AND REMOVE EXISTING SIGNALS USING TXDOT WZ(BTS-1)-13 & WZ(BTS-2)-13.
- (4) PHASE II WORK MAY BEGIN PRIOR TO THE COMPLETION OF PHASE I IMPROVEMENTS, UNLESS OTHERWISE NOTED BY THE ENGINEER.

PHASE II

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE CURB & GUTTER, SIDEWALKS, DRIVEWAYS AND RETAINING WALL.

- (1) ADJUST PROJECT BARRICADES AND INSTALL ADVANCE WARNING SIGNS AS NECESSARY.
- (2) INSTALL TEMPORARY EROSION CONTROL MEASURES.
- (3) REPLACE EXISTING CURB & GUTTER, SIDEWALKS, DRIVEWAYS AND RETAINING WALL AS SHOWN IN PLANS, USING TXDOT TCP (2-4)-18.
- (4) DO NOT CONSTRUCT FINAL SURFACE TREATMENT UNTIL NORTHBOUND SHOULDER WIDENING AND METAL BEAM GUARD FENCE INSTALLATION IS COMPLETE.
- (5) COMPLETE ALL PHASE II IMPROVEMENTS PRIOR TO STARTING PHASE III, UNLESS OTHERWISE ALLOWED BY THE ENGINEER.

PHASE III

THE INTENT OF THIS PHASE IS TO PERFORM PAVING AND PAVEMENT MARKING OPERATIONS.

- (1) PLACE PROJECT BARRICADES AND INSTALL ADVANCE WARNING SIGNS (USE TXDOT BC STANDARDS AND TCP (2-4)-18).
- (2) MILL AND INLAY PAVEMENT AS SHOWN IN PLANS, USING PROJECT SPECIFIC TRAFFIC CONTROL PLAN. PLACE TEMPORARY PAVEMENT MARKINGS.
- (3) PLACE PERMANENT PAVEMENT MARKINGS AND SIGNING.

FINAL CLEAN UP

- (1) UPON COMPLETION OF THE WORK AND BEFORE FINAL ACCEPTANCE AND FINAL PAYMENT IS MADE, THE CONTRACTOR SHALL CLEAR AND REMOVE FROM THE SITE ALL SURPLUS AND DISCARDED MATERIALS AND DEBRIS OF EVERY KIND AND LEAVE THE ENTIRE PROJECT IN A SMOOTH, NEAT AND SIGHTLY CONDITION.

PAYMENT

- (1) ALL BARRICADES, SIGNS, AND FLAGGERS SHALL BE SUBSIDIARY TO ITEM 502 BARRICADES, SIGNS AND TRAFFIC HANDLING. ALL EROSION AND SEDIMENT CONTROL DEVICES WILL BE PAID FOR UNDER ITEM 506 TEMPORARY EROSION, SEDIMENTATION, AND ENVIRONMENTAL CONTROLS. ALL WORK ZONE PAVEMENT MARKINGS WILL BE PAID FOR UNDER ITEM 662 WORK ZONE PAVEMENT MARKINGS. ALL OTHER WORK AND MATERIALS SHALL BE SUBSIDIARY TO THE VARIOUS BID ITEMS UNLESS OTHERWISE INDICATED IN THE PLANS.

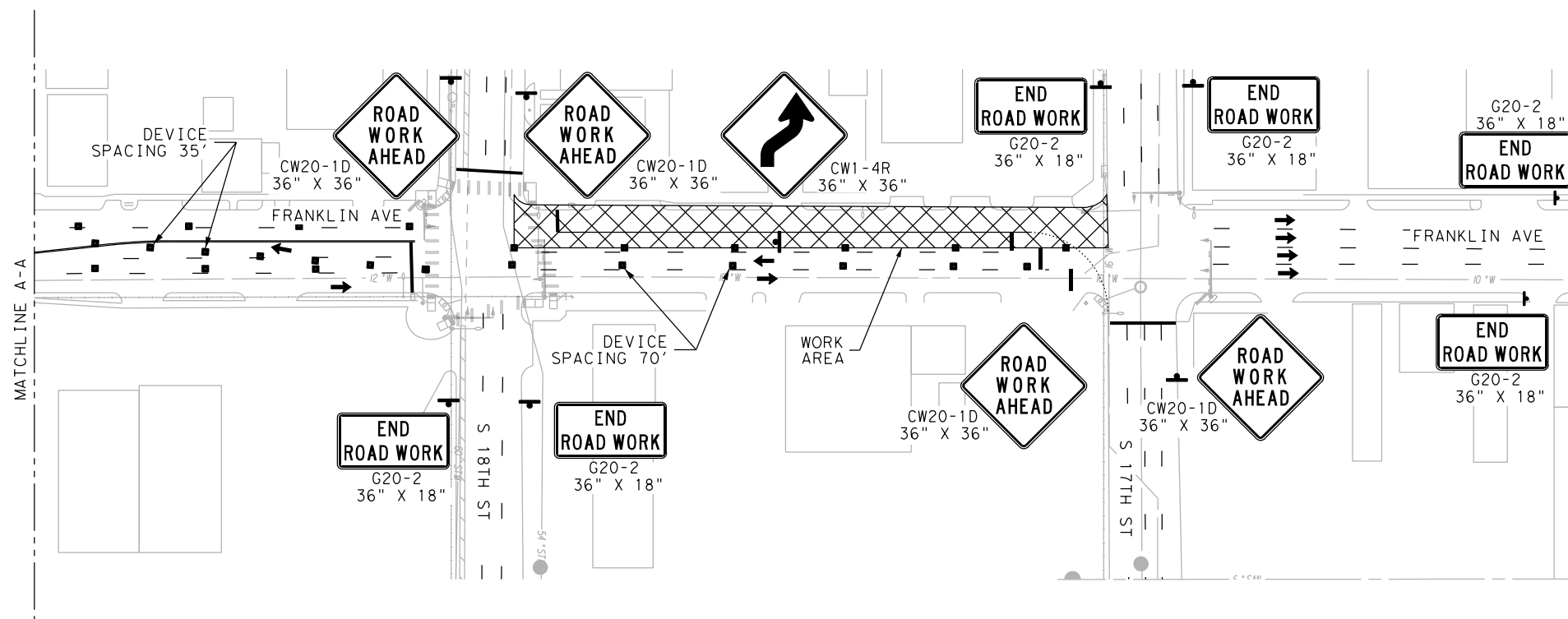
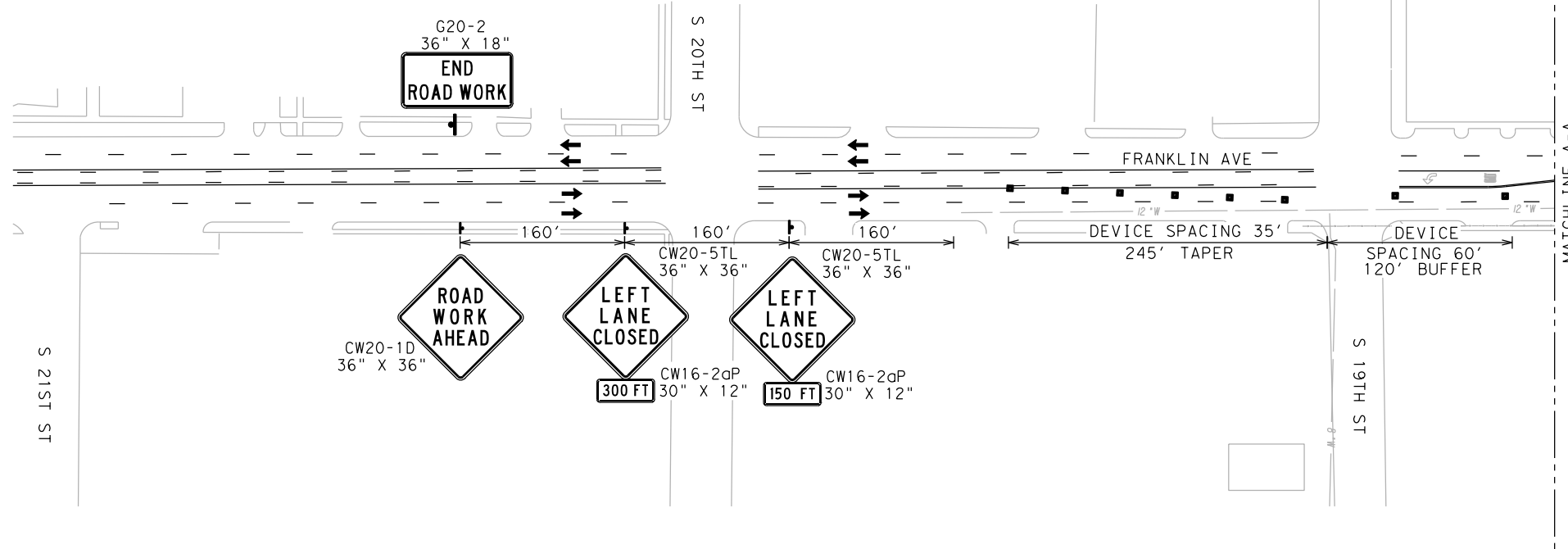


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TRAFFIC CONTROL SEQUENCE OF OPERATIONS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		7
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS

1. PLACE A PORTABLE CHANGEABLE MESSAGE SIGN IN ADVANCE OF PROJECT SIGNING 3 DAYS BEFORE THE MILL AND INLAY WORK.



S:\4.0.0.0.0. Engineering Operations\4.2.0.0.0. Project Files\2022\22049 - COW HSIP Projects\cad\sheets\1 17th & 18th\12A Traffic Control Plan.dgn



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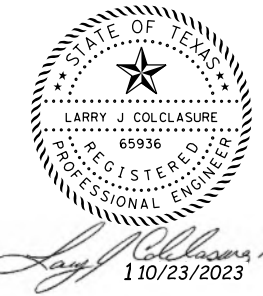
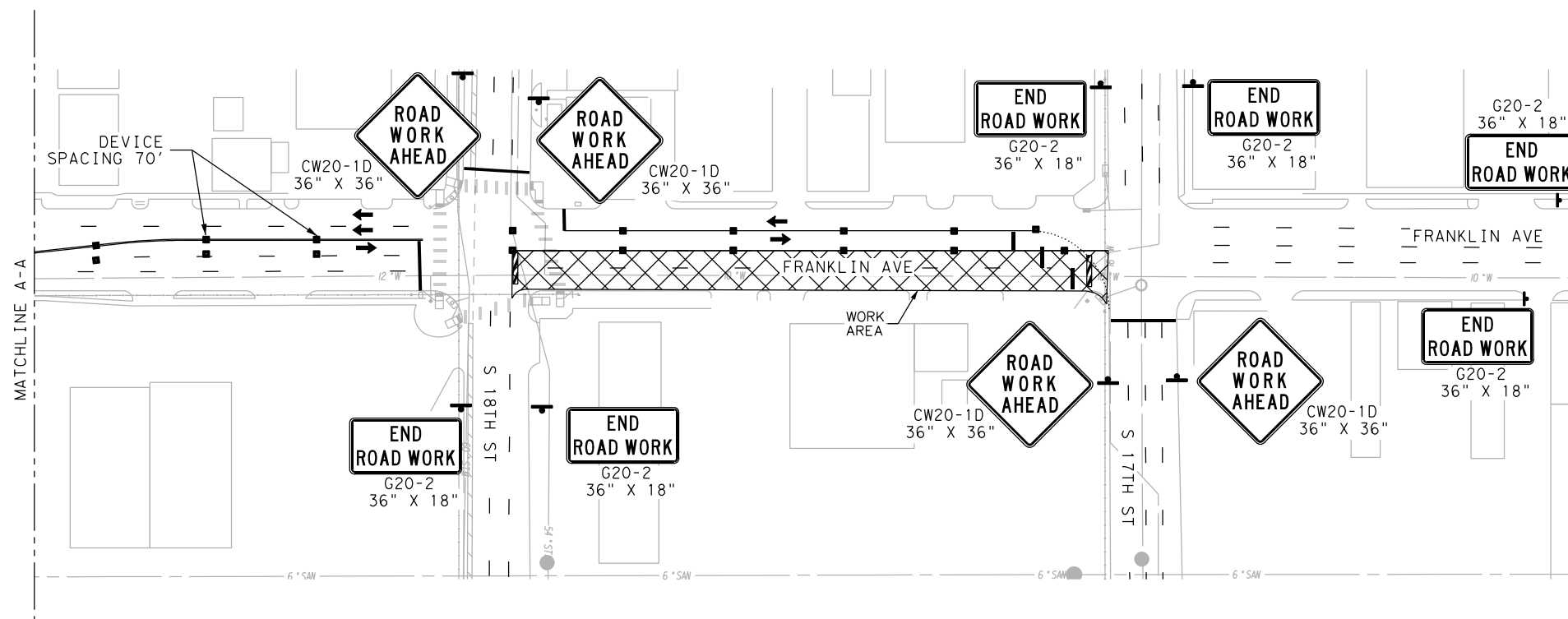
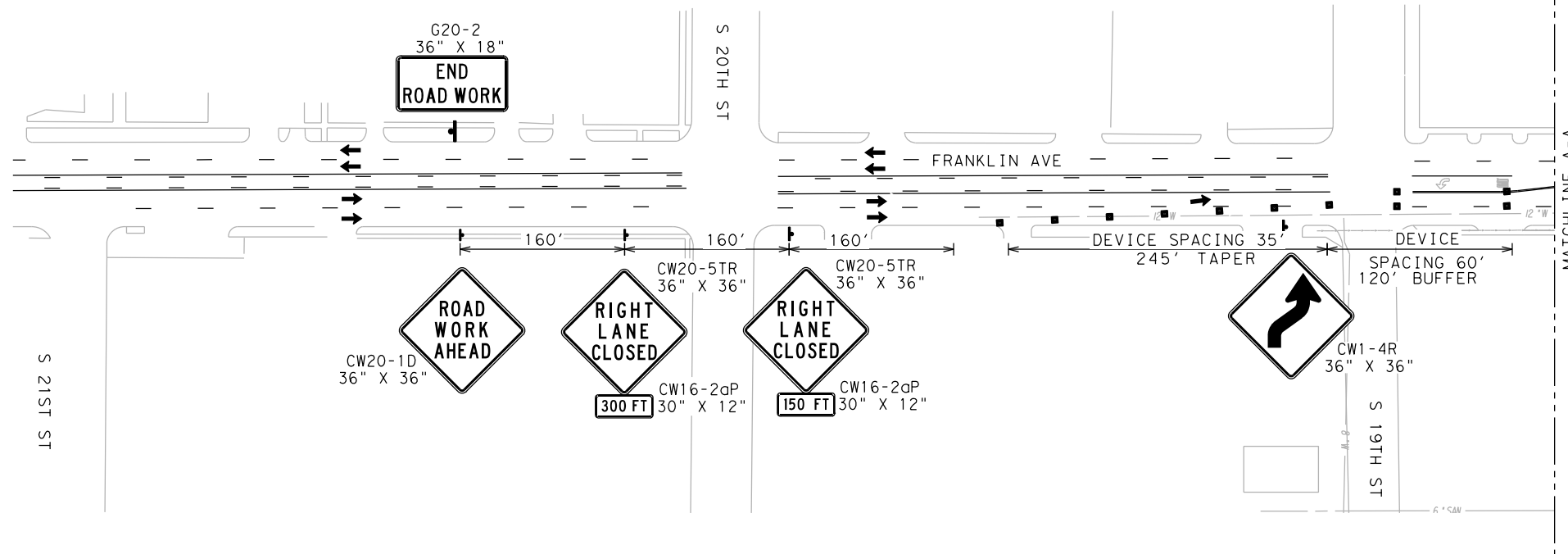
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TRAFFIC CONTROL PLAN MILLING AND PAVING PHASE I

SHEET 1 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.	
6	SEE TITLE SHEET	8	
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS

1. PORTABLE CHANGEABLE MESSAGE SIGN TO REMAIN FOR THE DURATION OF THE MILL AND INLAY WORK.



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**TRAFFIC CONTROL PLAN
MILLING AND PAVING
PHASE II**

SHEET 2 OF 2

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.	
6	SEE TITLE SHEET	9	
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS

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DATE: 10/23/2023 \$TIME\$
 FILE: S:\4.0.0.0.0_Engineering Operations\4.2.0.0.0.0. Project Files\2022\2049 - Cow Hill Pt of Hwy 281\BC Standard Sheets\StandardGS\BC-21.dgn

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).

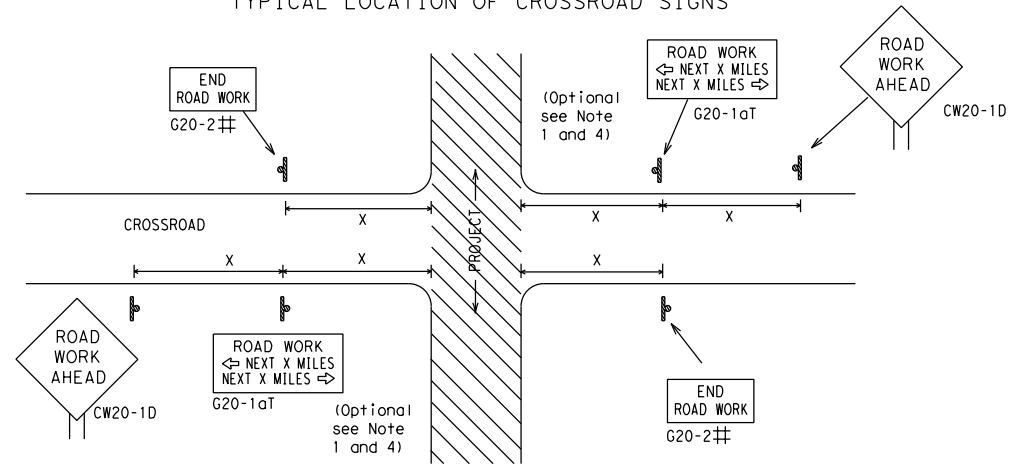
THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS) "
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
TEXAS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

SHEET 1 OF 12

Texas Department of Transportation		Traffic Safety Division Standard	
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS			
BC (1) - 21			
FILE:	bc-21.dgn	DN:	TxDOT
© TxDOT	November 2002	CONT:	0909
REVISIONS	22	JOB:	197
HIGHWAY	CS	DIST:	COUNTY
4-03	7-13	SHEET NO.:	10
9-07	8-14	WAC:	MCLENNAN
5-10	5-21		
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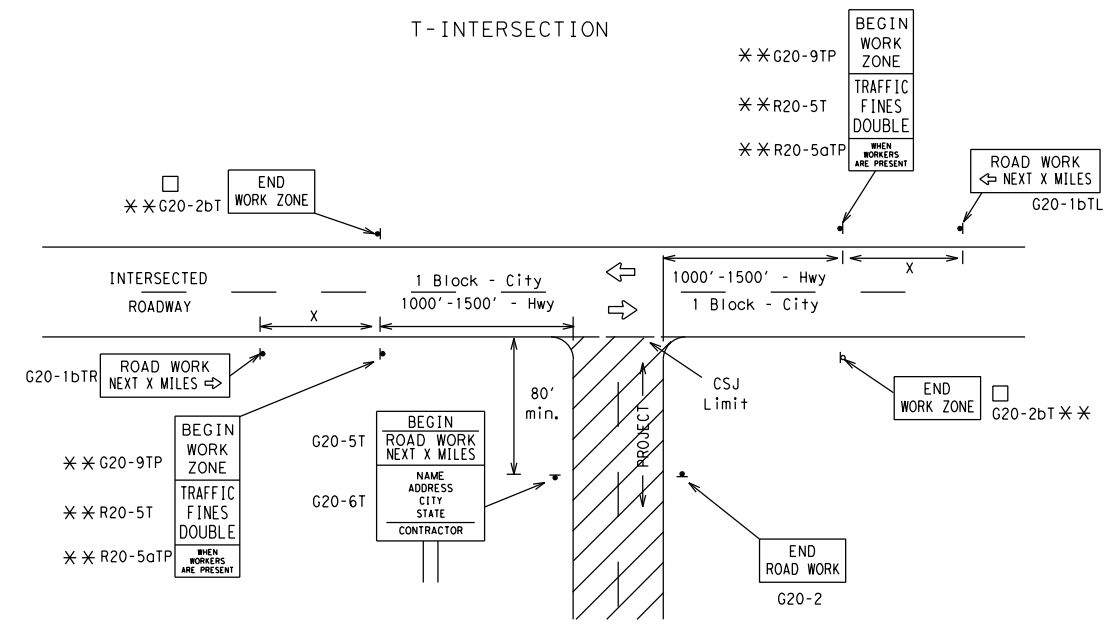
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TYPICAL LOCATION OF CROSSROAD SIGNS



- # 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^{1,5,6}

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Δ Spacing "x" Feet (Apprx.)
CW20 ⁴	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 ²
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 ²
			65	700 ²
			70	800 ²
			75	900 ²
			80	1000 ²
			*	* ³

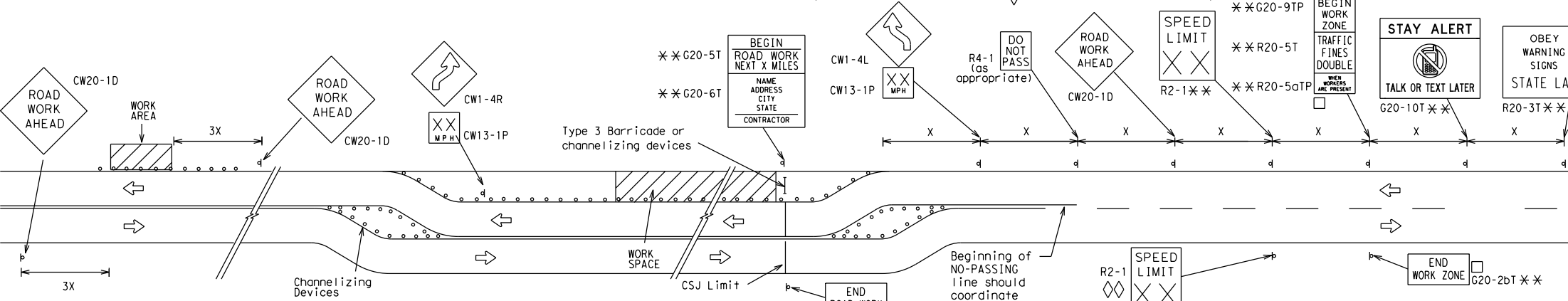
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

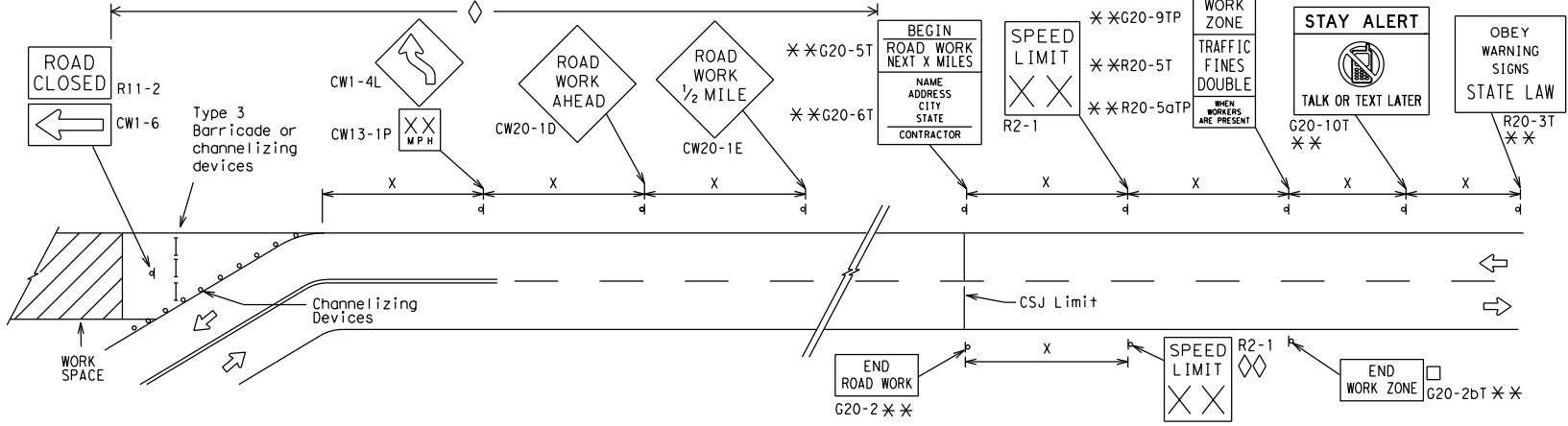
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be 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

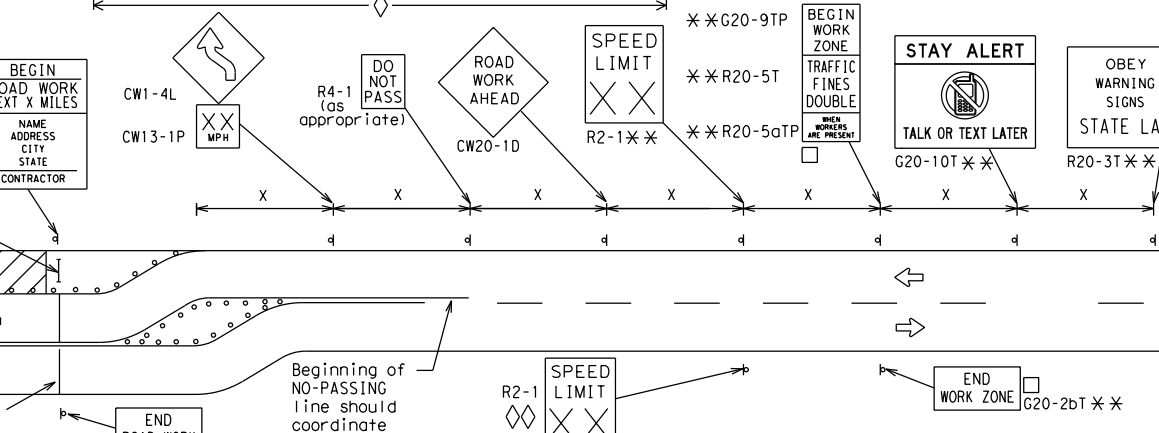


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT 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

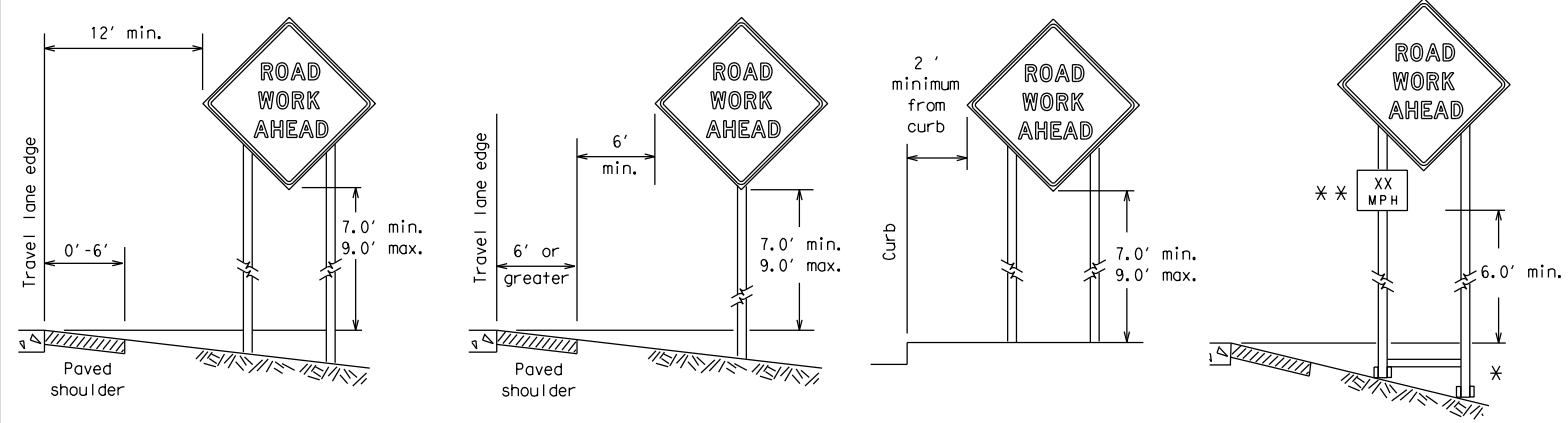
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© TxDOT	November 2002	CONT:	SECT:	JOB:	197	HIGHWAY:	CS		
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9-07	8-14	DIST:	WAC	COUNTY:	MCLENNAN	SHEET NO.:	11		
7-13	5-21								

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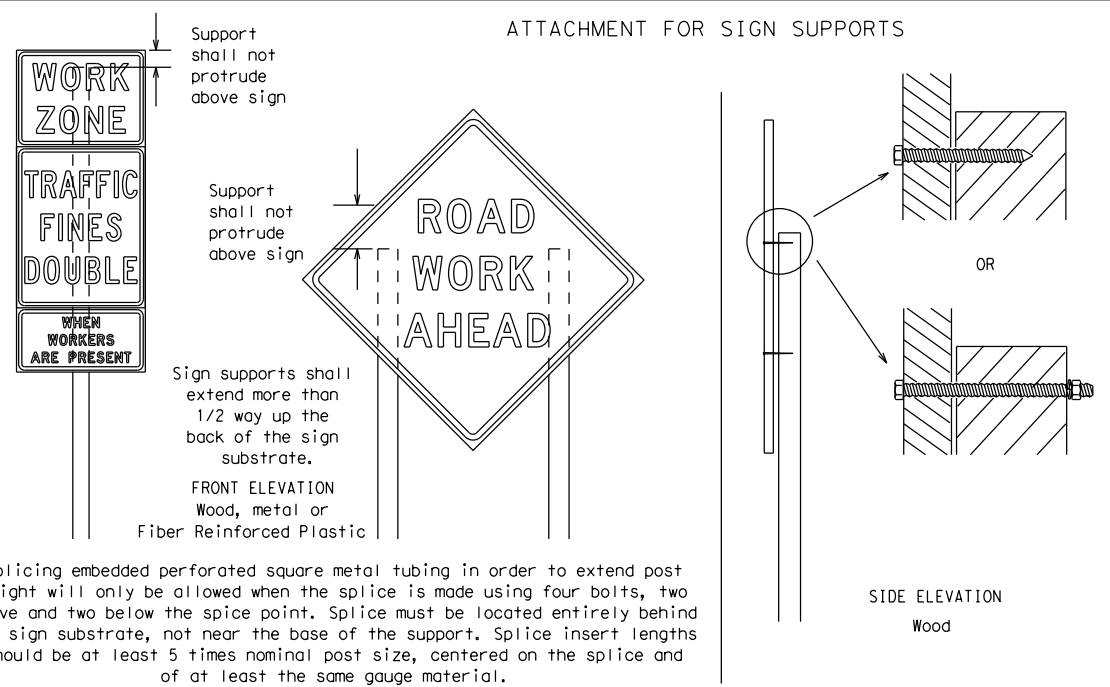
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



* 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



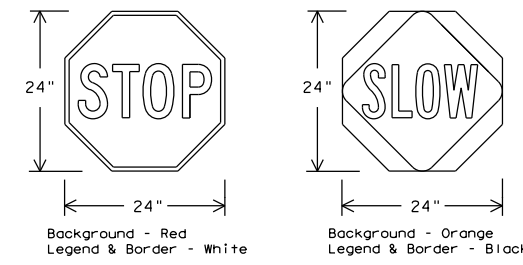
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflectORIZED when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 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 _{FL} OR C _{FL} 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

- 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.
- 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.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 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.
- 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 CWZTCD 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.
- 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

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- 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.
- 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.
- The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD) 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.
- 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.
- 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.
- 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)

- 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.
 - Long-term stationary - work that occupies a location more than 3 days.
 - 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.
 - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
 - Short, duration - work that occupies a location up to 1 hour.
 - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

- 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.
- 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.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- 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

- 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

- 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 CWZTCD lists each substrate that can be used on the different types and models of sign supports.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- 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

- 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).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- Orange sheeting, meeting the requirements of DMS-8300 Type B_{FL} or Type C_{FL}, shall be used for rigid signs with orange backgrounds.

SIGN LETTERS

- 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

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- 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.
- 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.
- 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 shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

- 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.



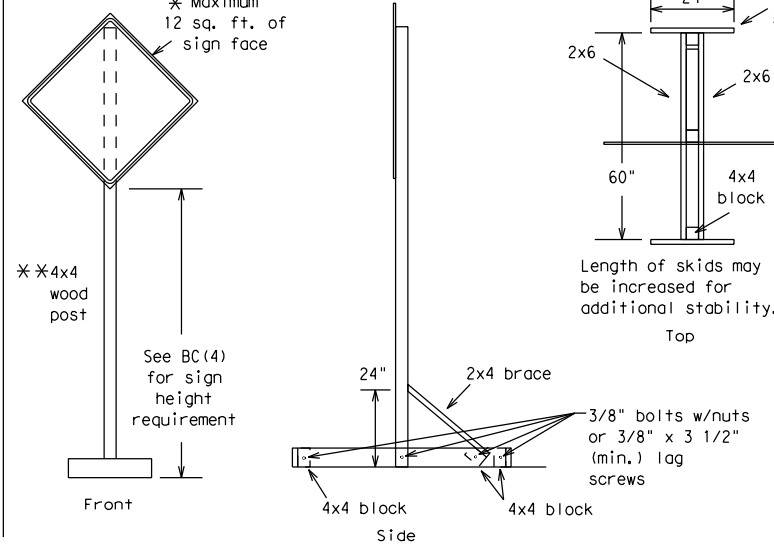
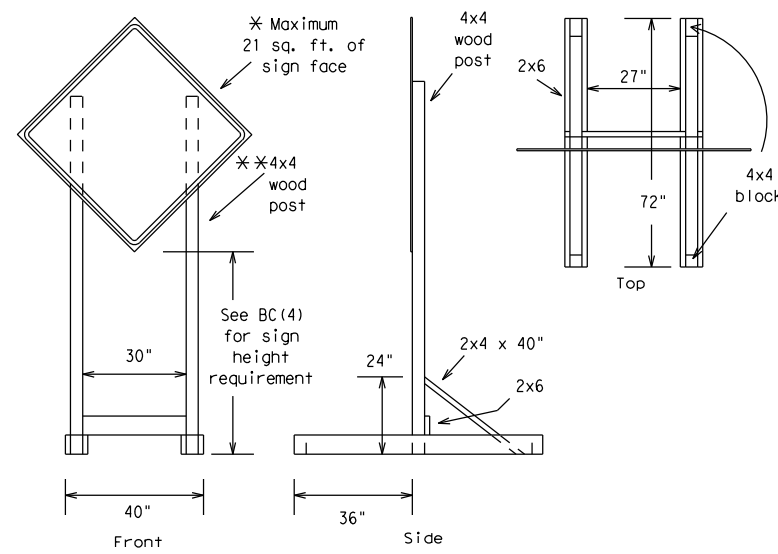
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

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©TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0909	22	197	CS				
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7-13	5-21	WAC		MCLENNAN	13				

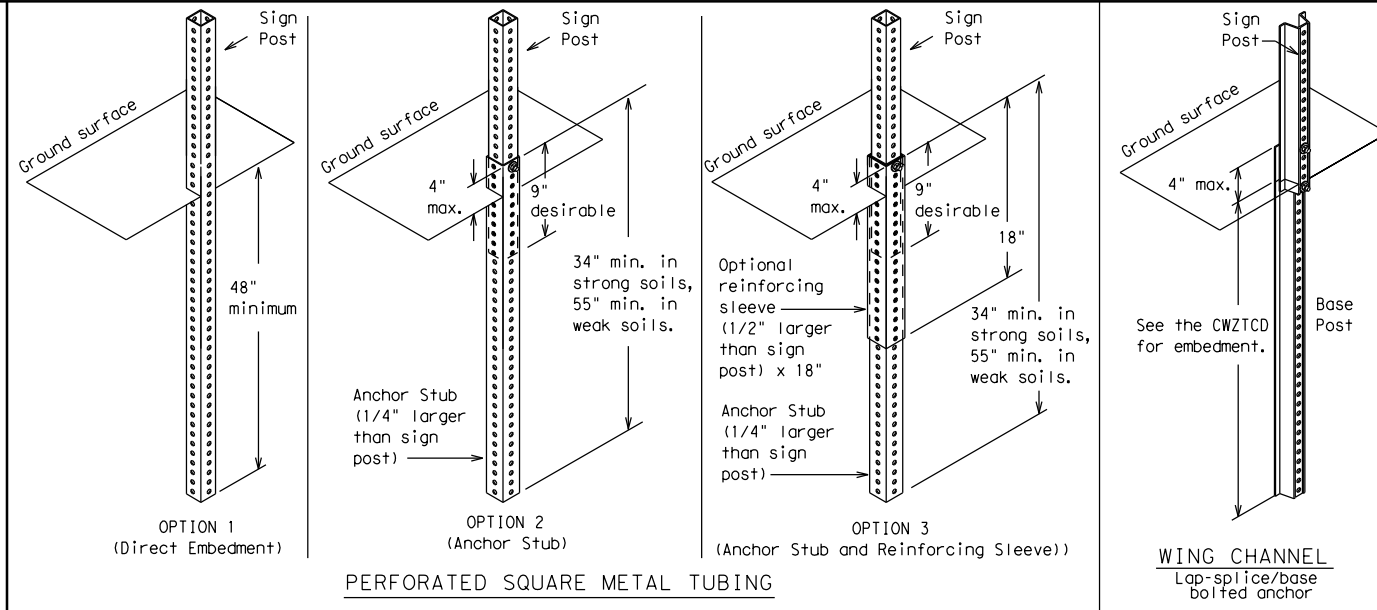
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DATE: 10/23/2023 \$TIME\$ FILE: S:\4.0.0.0.0_Engineering Operations\4.2.0.0.0_Project Files\2022\2049 - COW_HSTP_P\Projects\Cad\Sheet Standards\bc-21.dgn



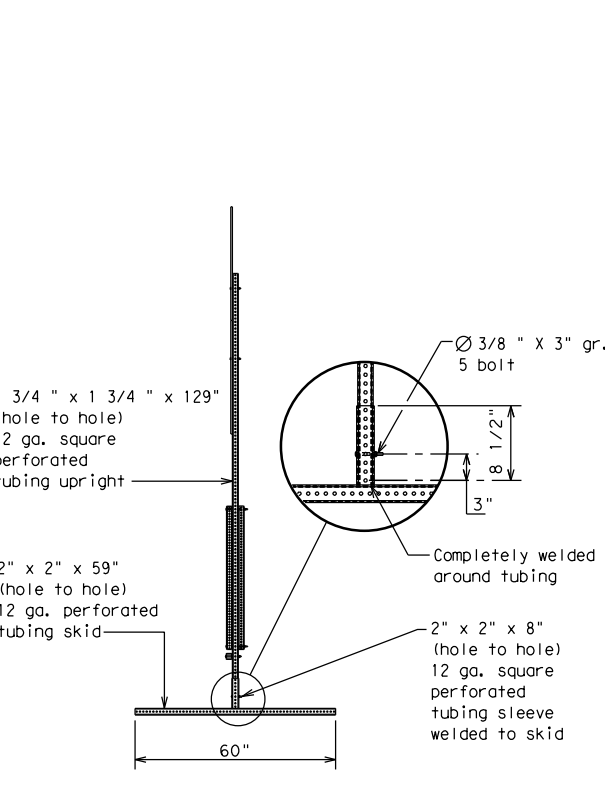
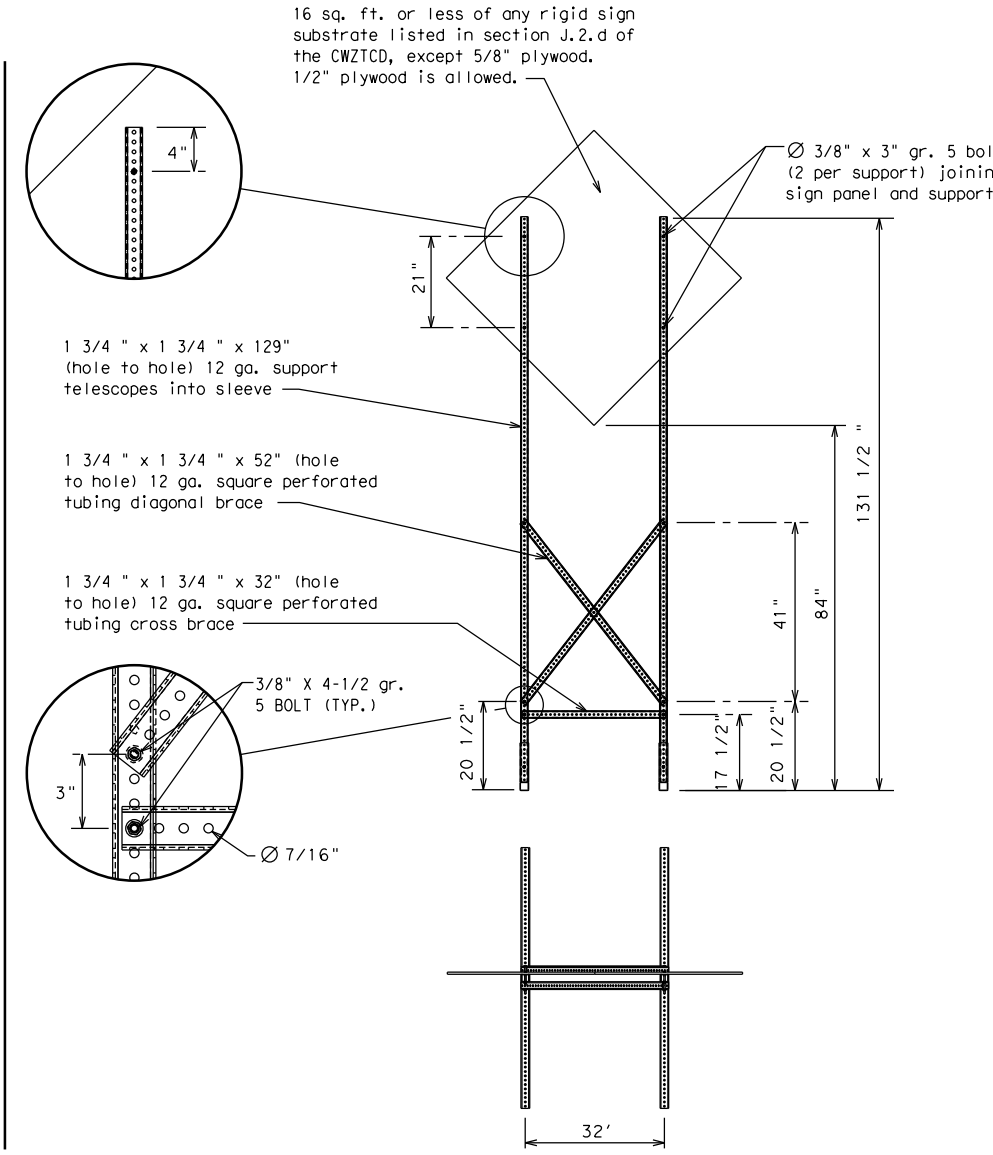
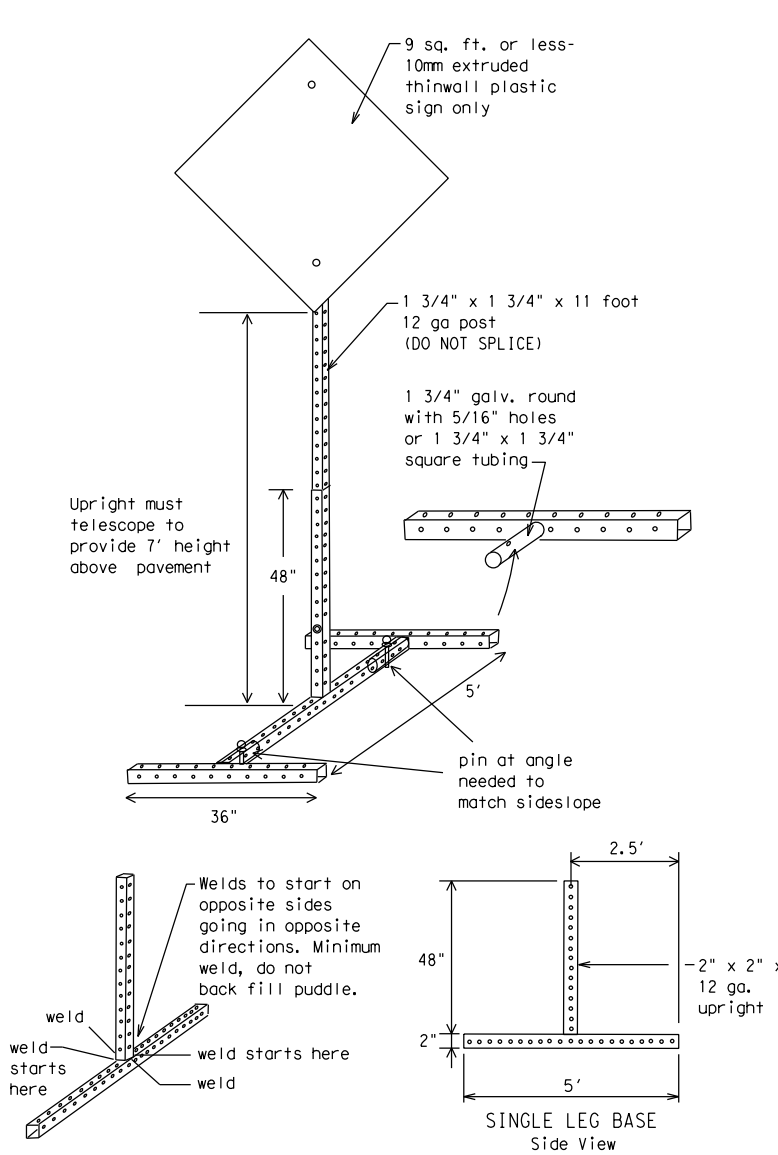
SKID MOUNTED WOOD SIGN SUPPORTS

* 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.

SHEET 5 OF 12



BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC (5) - 21

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7-13	5-21	WAC	MCLENNAN	14					

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.

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 *
FORM X LINES RIGHT
USE XXXXX RD EXIT
USE EXIT I-XX NORTH
USE I-XX E TO I-XX N
WATCH FOR TRUCKS
EXPECT DELAYS
END SHOULDER USE
WATCH FOR WORKERS

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.

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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
Cannot	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	TRVLRS
High-Occupancy	HOV	Tuesday	TUES
Vehicle	VEH	Time Minutes	TIME MIN
Highway	HWY	Upper Level	UPR LEVEL
Hour(s)	HR, HRS	Vehicles (s)	VEH, VEHS
Information	INFO	Warning	WARN
It Is	ITS	Wednesday	WED
Junction	JCT	Weight Limit	WT LIMIT
Left	LFT	West	W
Left Lane	LFT LN	Westbound	(route) W
Lane Closed	LN CLOSED	Wet Pavement	WET PVMT
Lower Level	LWR LEVEL	Will Not	WONT
Maintenance	MAINT		

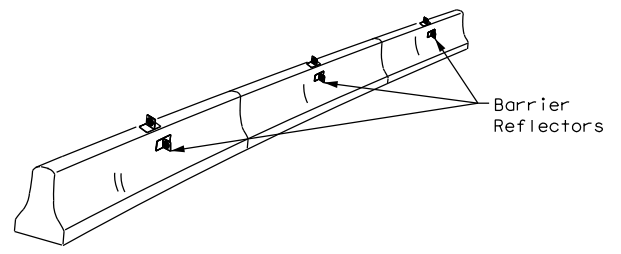
Roadway designation # IH-number, US-number, SH-number, FM-number

<h3>BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)</h3>			
<h2>BC (6) - 21</h2>			
FILE:	bc-21.dgn	DN:	TxDOT
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REVISIONS	CON:	SECT:	JOB:
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7-13 5-21	DIST:	COUNTY:	SHEET NO.
	WAC:	MCLENNAN	15

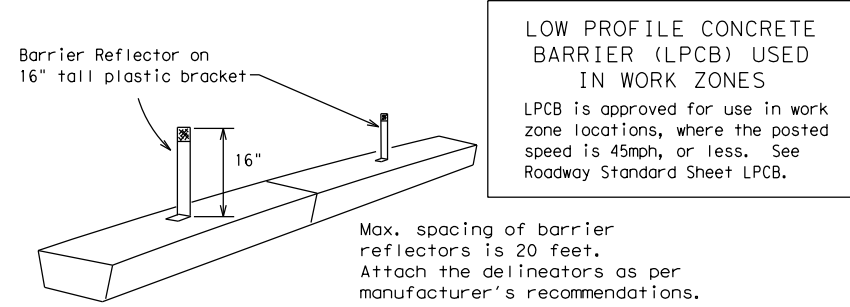
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



CONCRETE TRAFFIC BARRIER (CTB)

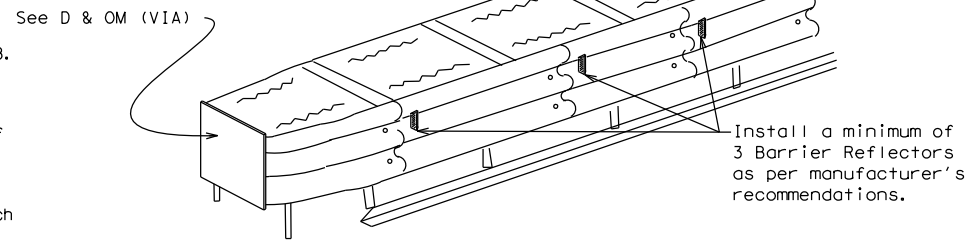


LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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)

- 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.



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

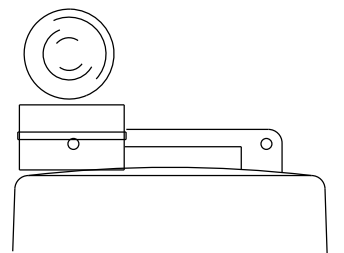
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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_{PL} or C_{FL} 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

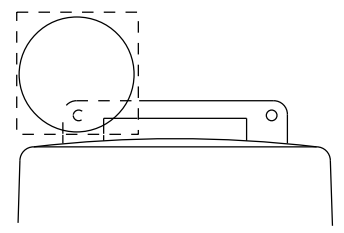
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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.



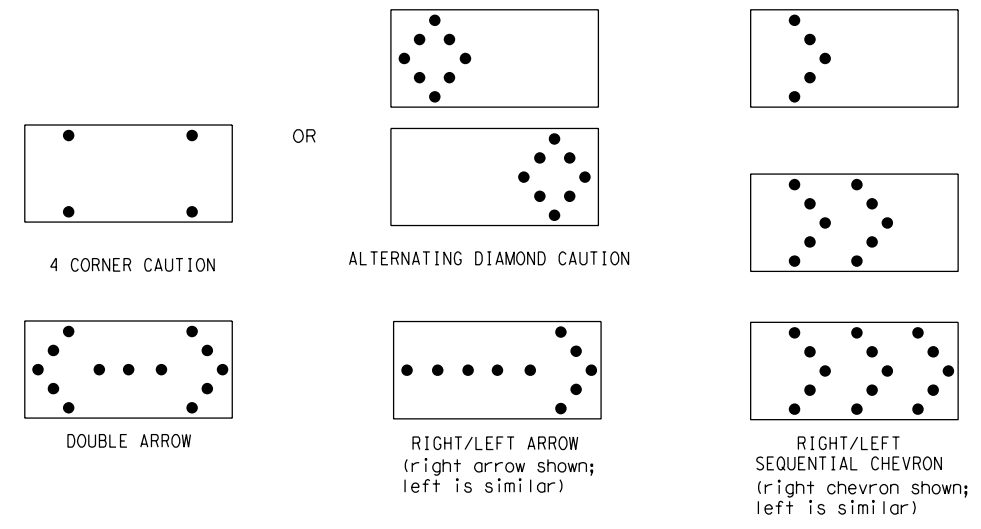
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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.



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

BC (7) - 21

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9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	WAC	MCLENNAN	16					

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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:

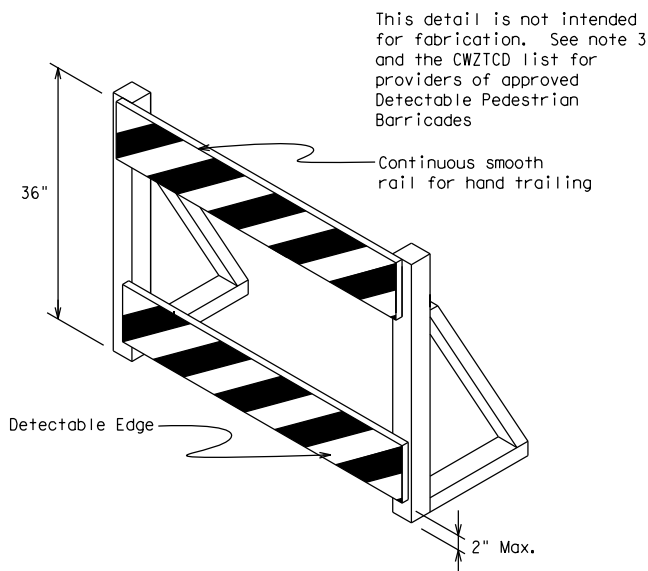
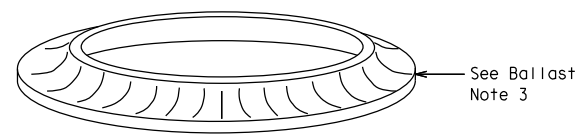
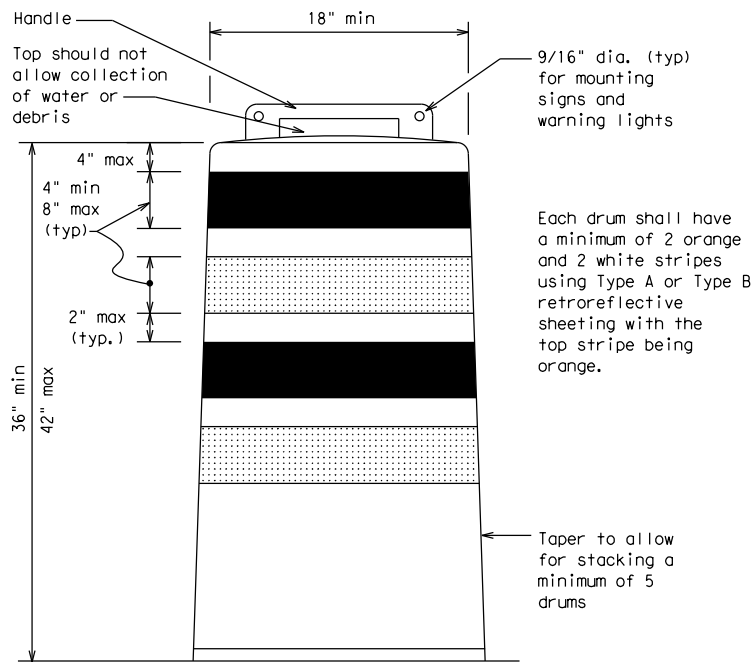
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents 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.

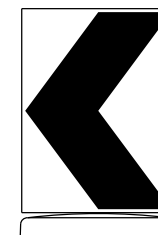
BALLAST

- 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.

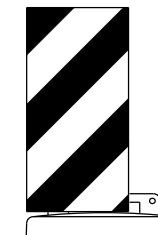


DETECTABLE PEDESTRIAN BARRICADES

- 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_{FL} or Type C_{FL} 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



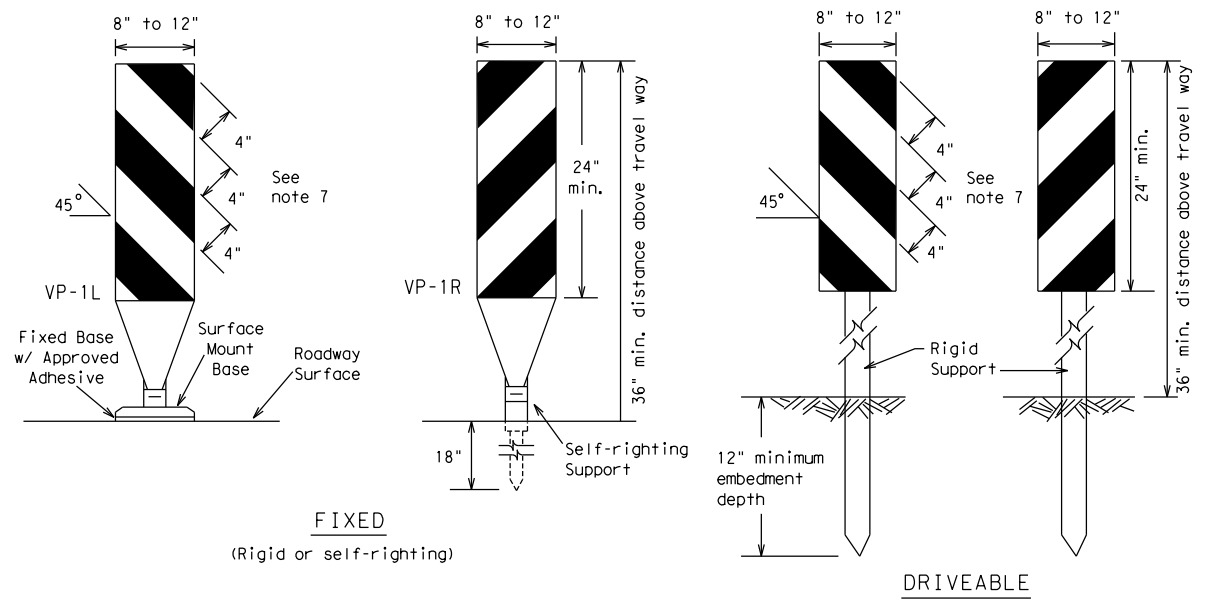
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 21

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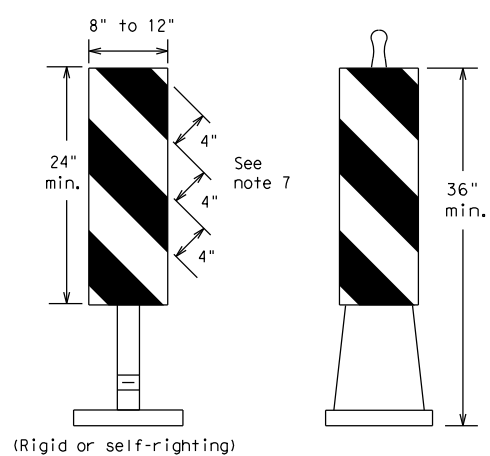
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FIXED
(Rigid or self-righting)

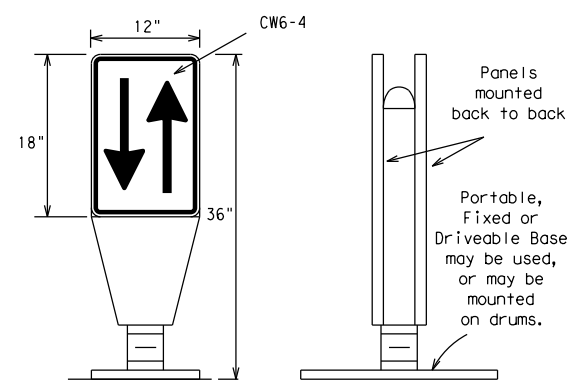
DRIVEABLE



PORTABLE

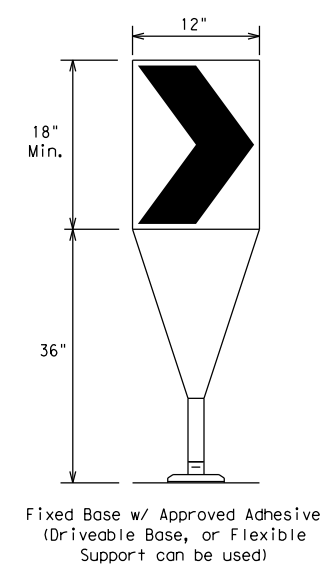
VERTICAL PANELS (VPs)

- 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.



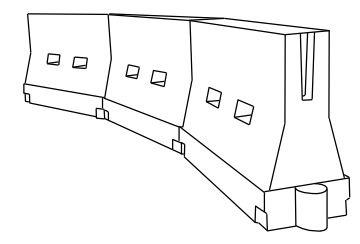
OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

- 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_{FL} or Type C_{FL} conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.



CHEVRONS

- 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_{FL} or Type C_{FL} 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.



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 ² / 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

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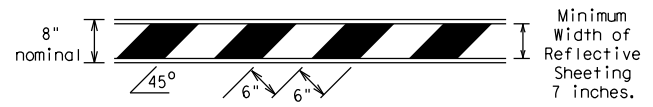
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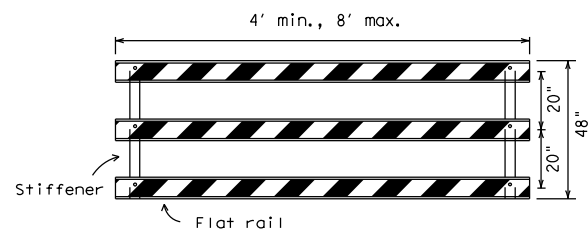
TYPE 3 BARRICADES

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.

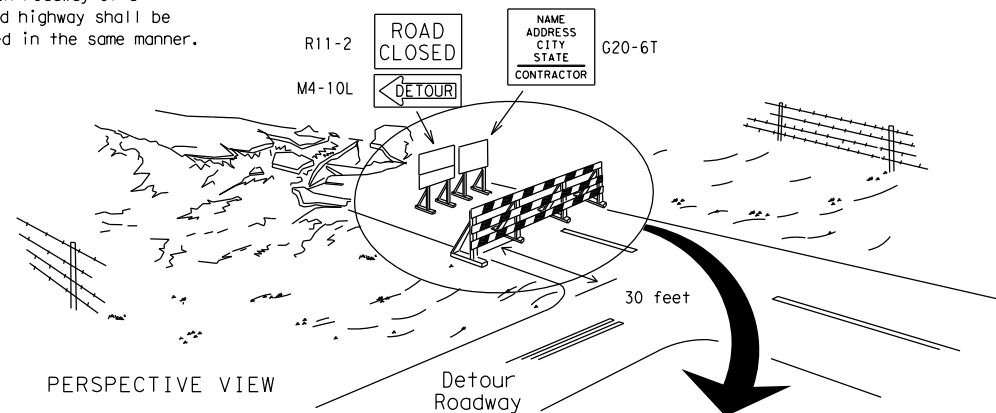


TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



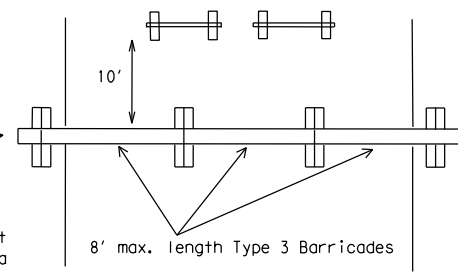
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

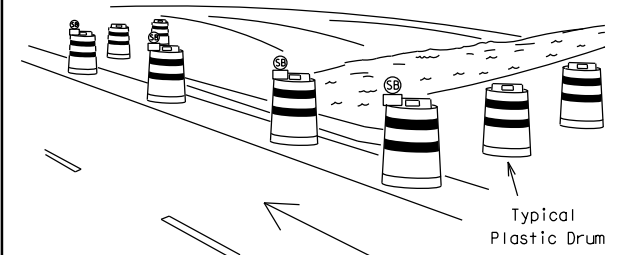
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



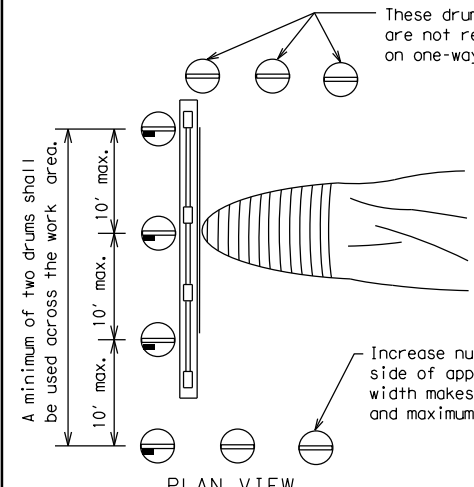
PLAN VIEW

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.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

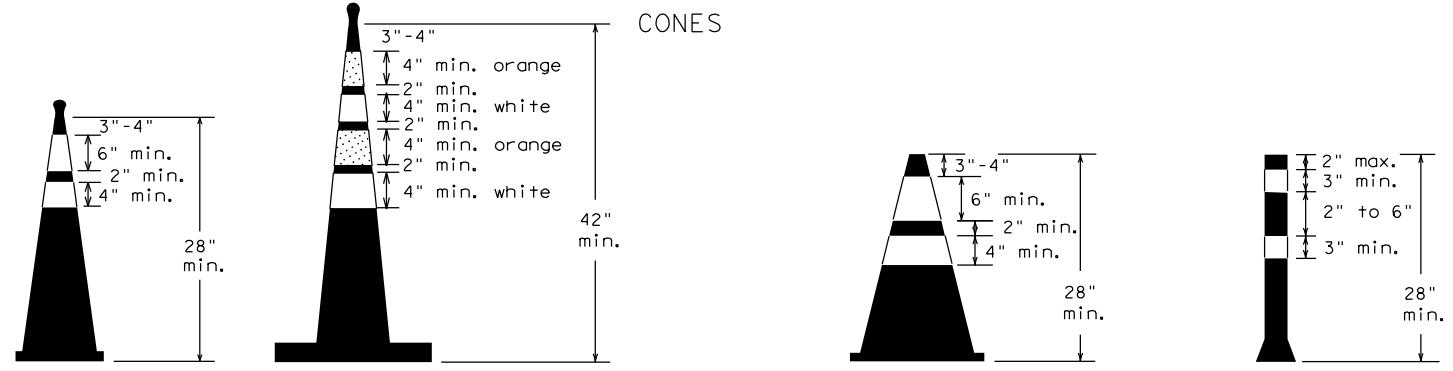


PLAN VIEW

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

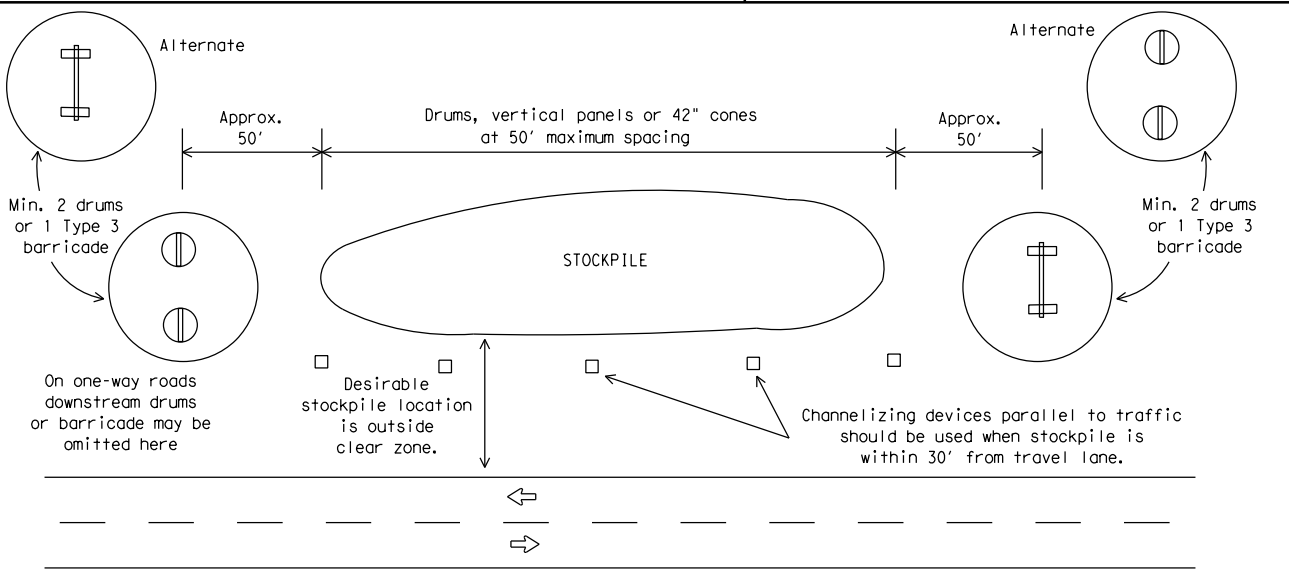


Two-Piece cones

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.



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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

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7-13 5-21	WAC	MCLENNAN	19	

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.

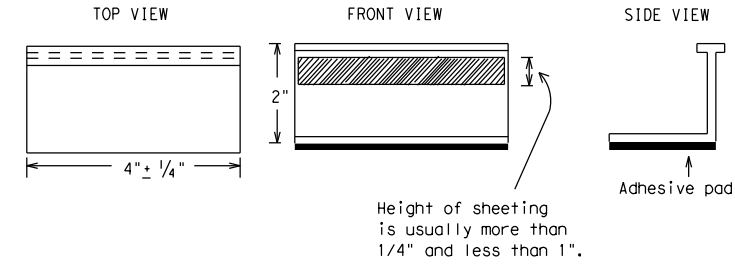
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- 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

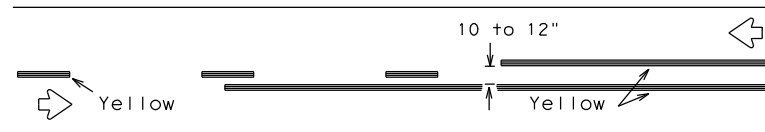
BC(11)-21

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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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1-02	7-13			
11-02	8-14			
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	WAC	MCLENNAN		20

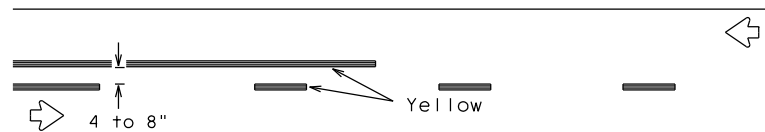
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PAVEMENT MARKING PATTERNS

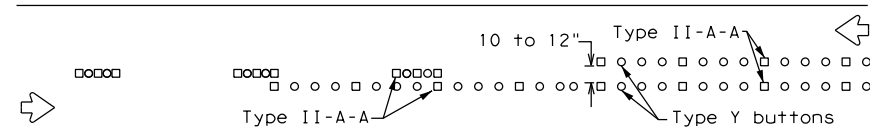


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

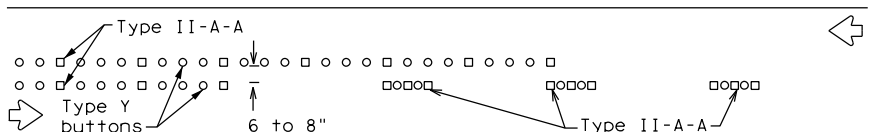


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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.

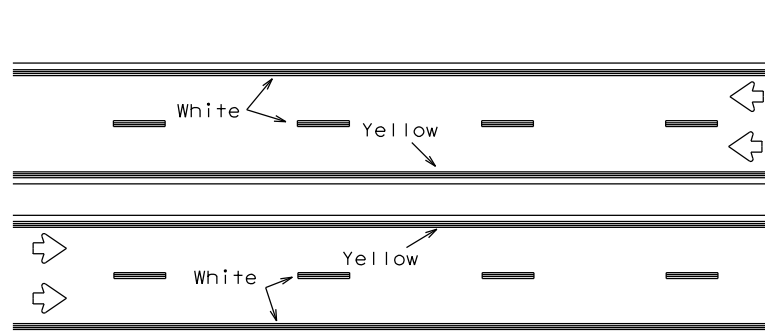


RAISED PAVEMENT MARKERS - PATTERN A



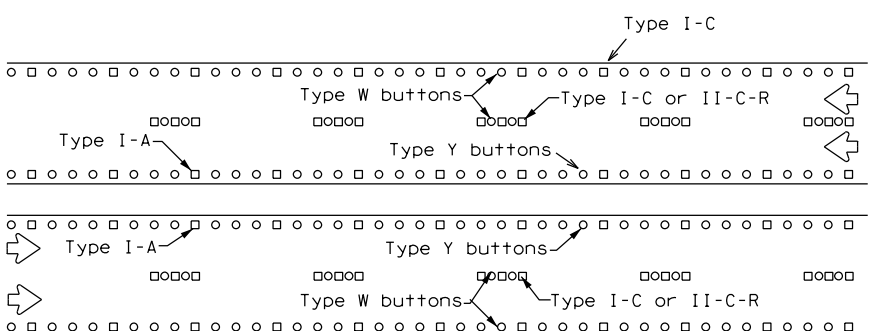
RAISED PAVEMENT MARKERS - PATTERN B

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



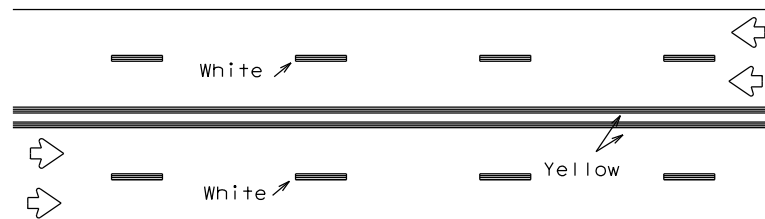
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



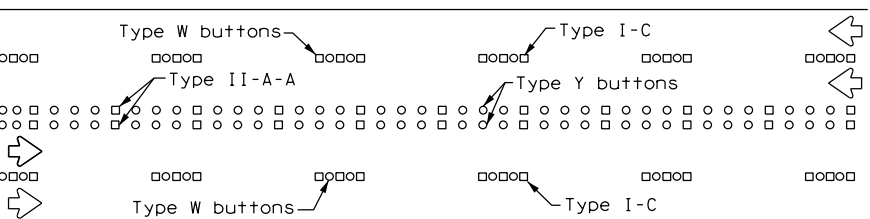
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



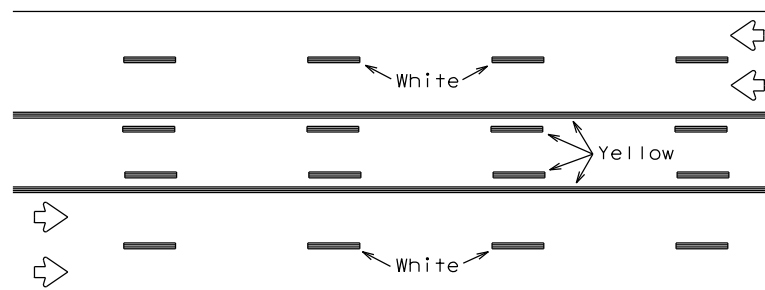
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectorized pavement markings.



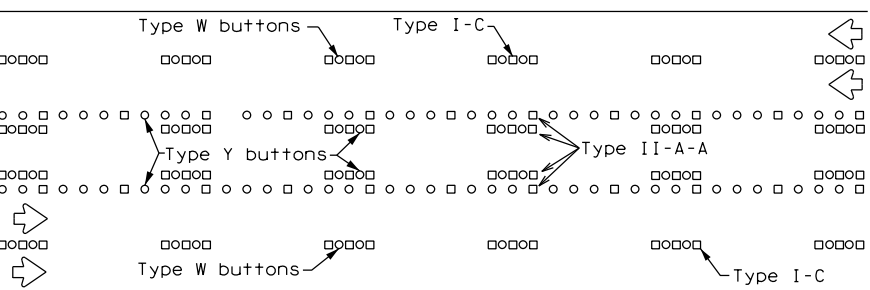
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

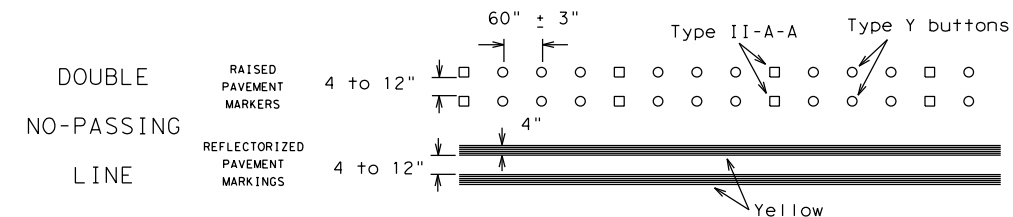
Prefabricated markings may be substituted for reflectorized pavement markings.



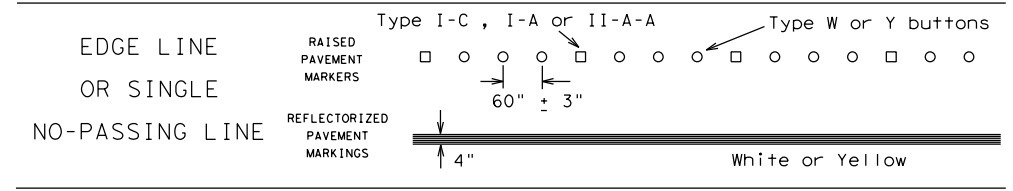
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

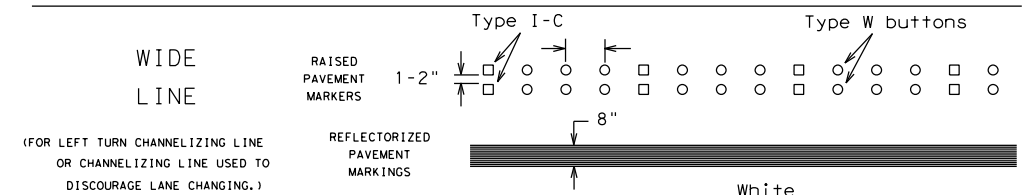
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



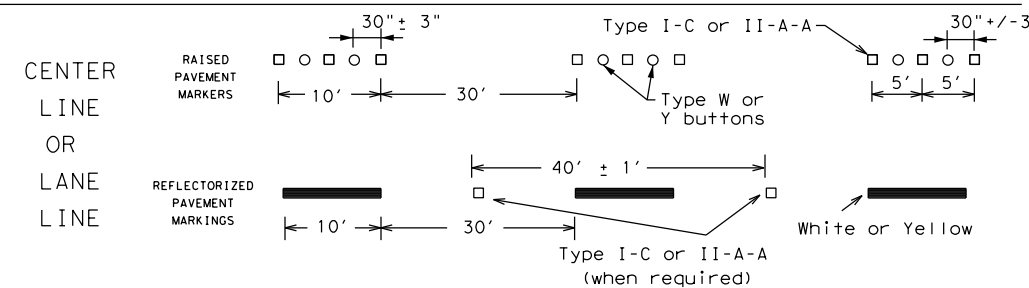
SOLID LINES



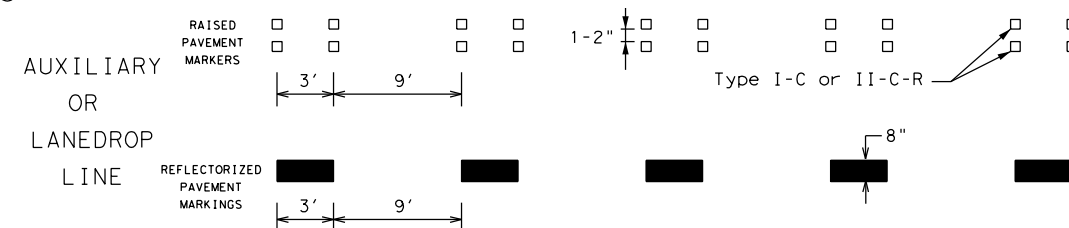
WIDE LINE



CENTER LINE OR LANE LINE

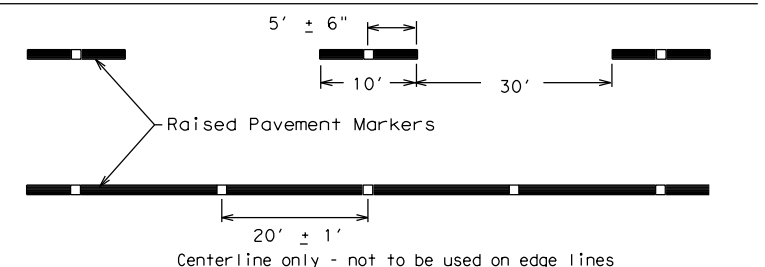


BROKEN LINES



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

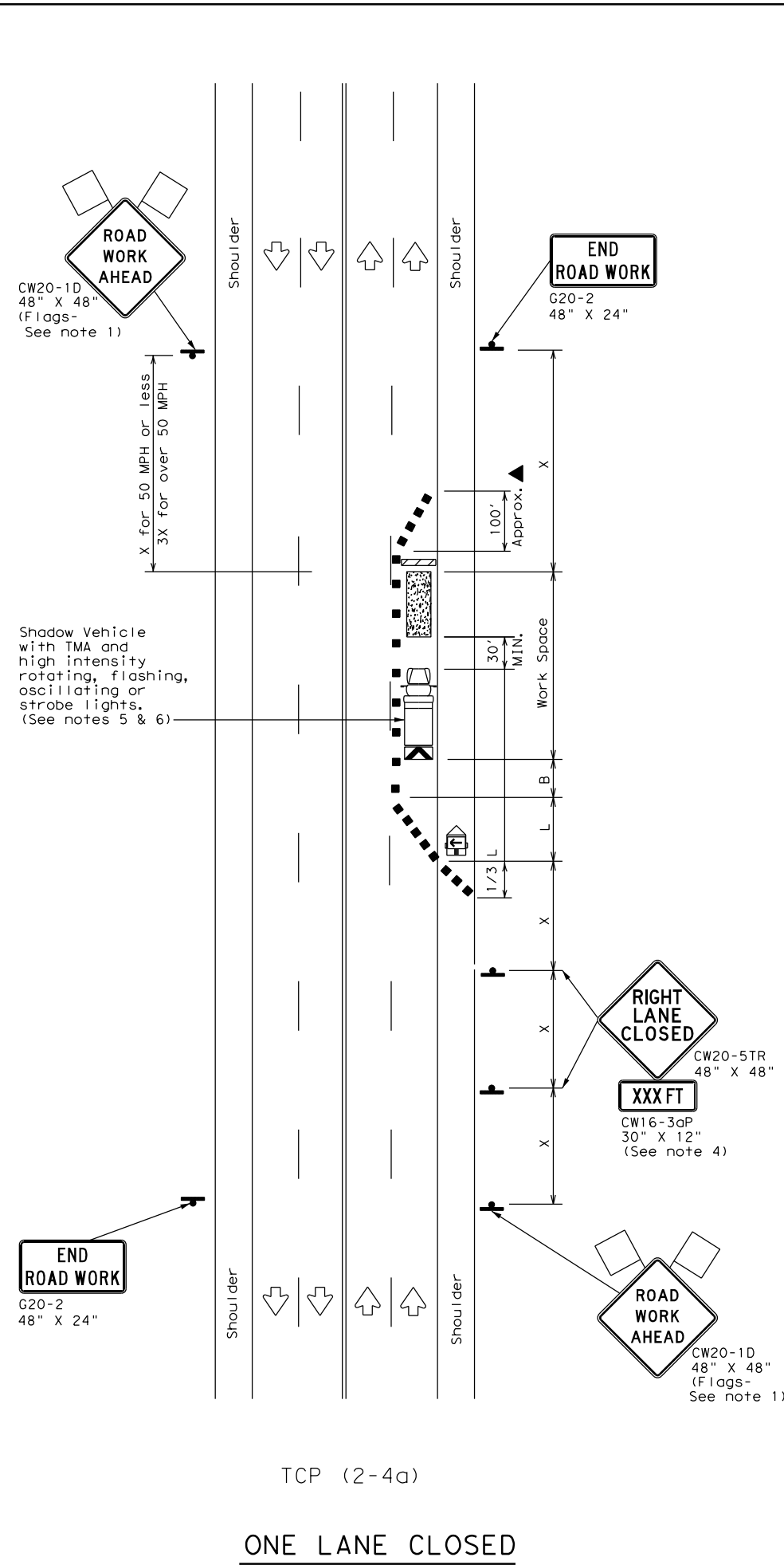
BC (12) - 21

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."

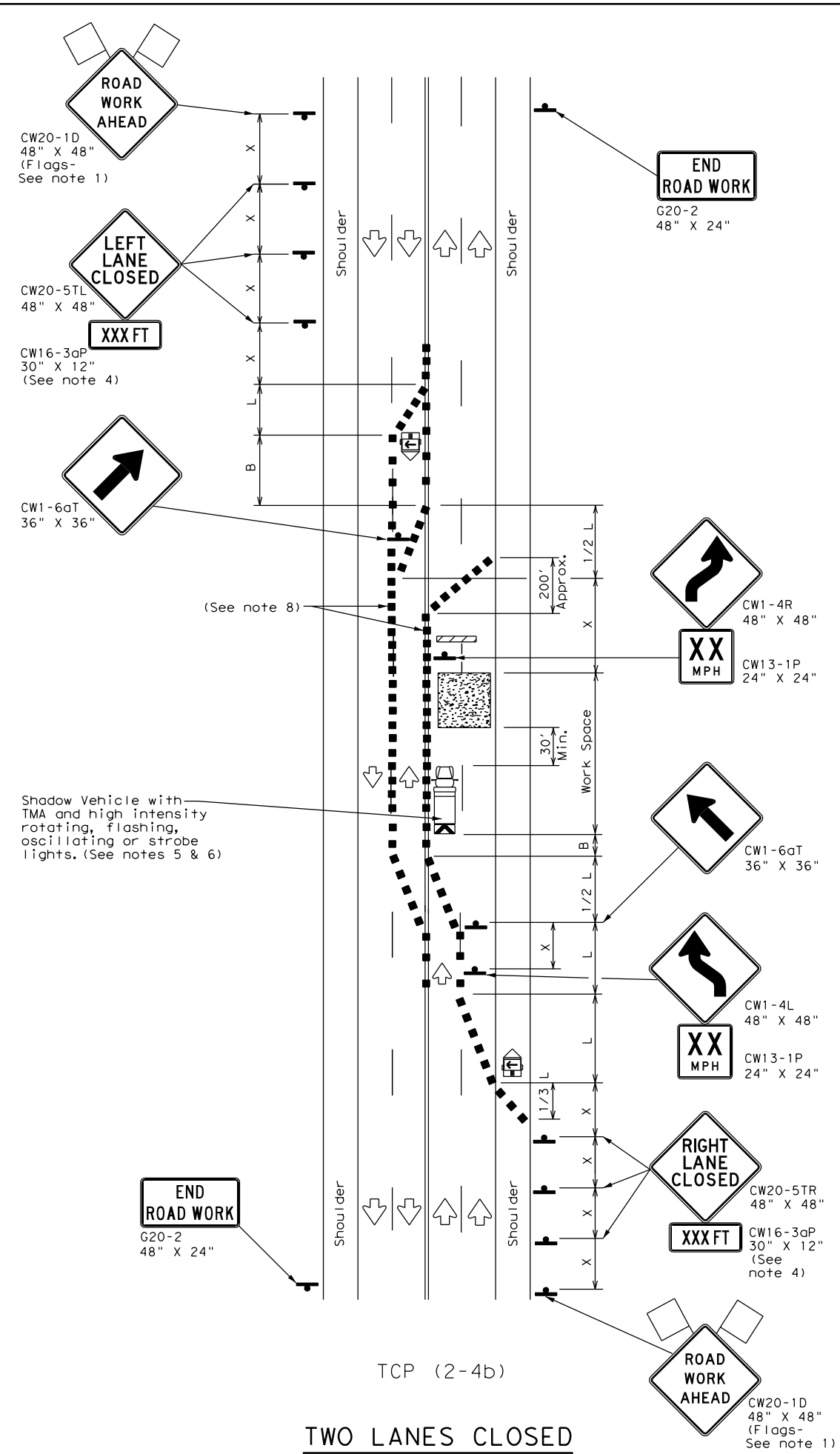
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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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2-98 7-13	WAC	MCLENNAN	21	
11-02 8-14				

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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 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 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.

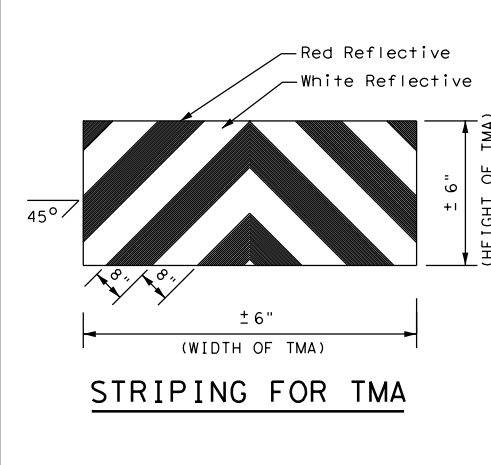
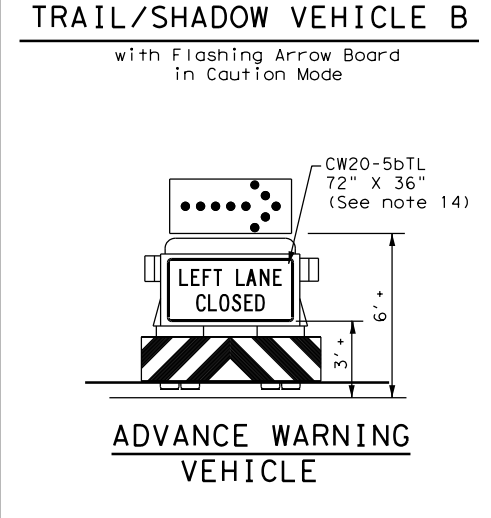
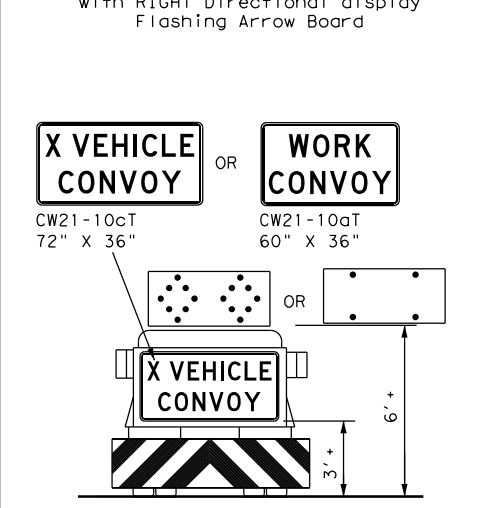
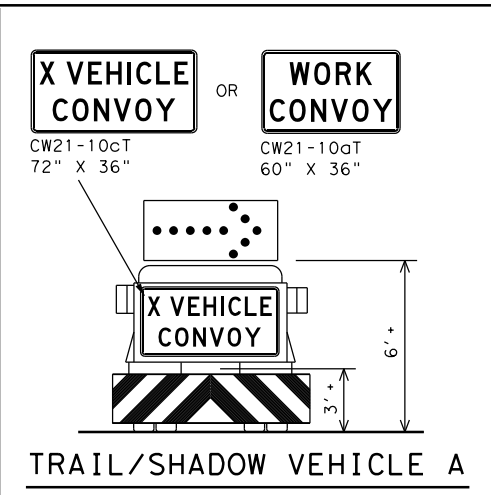
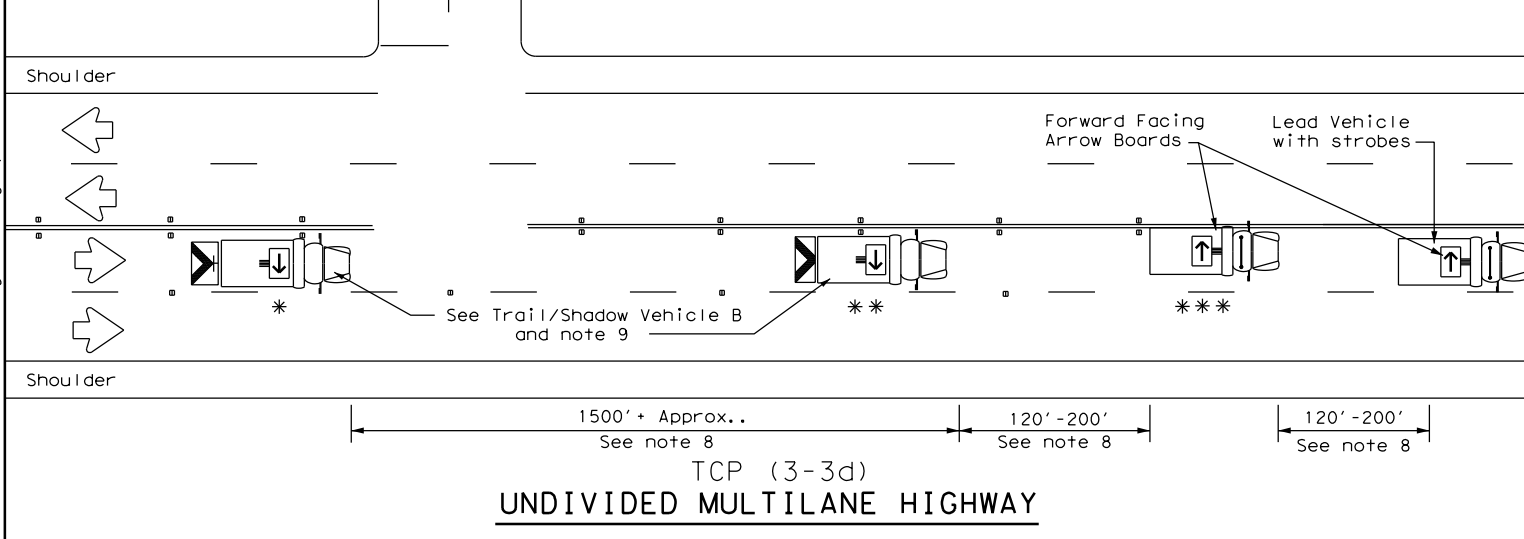
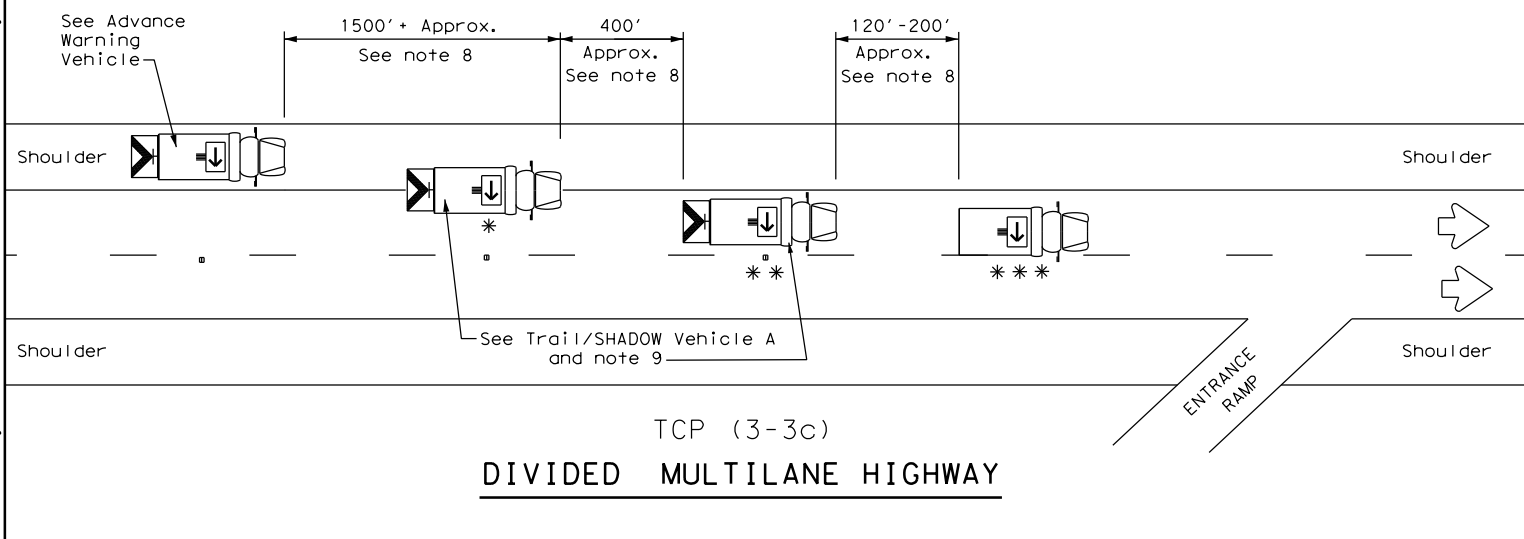
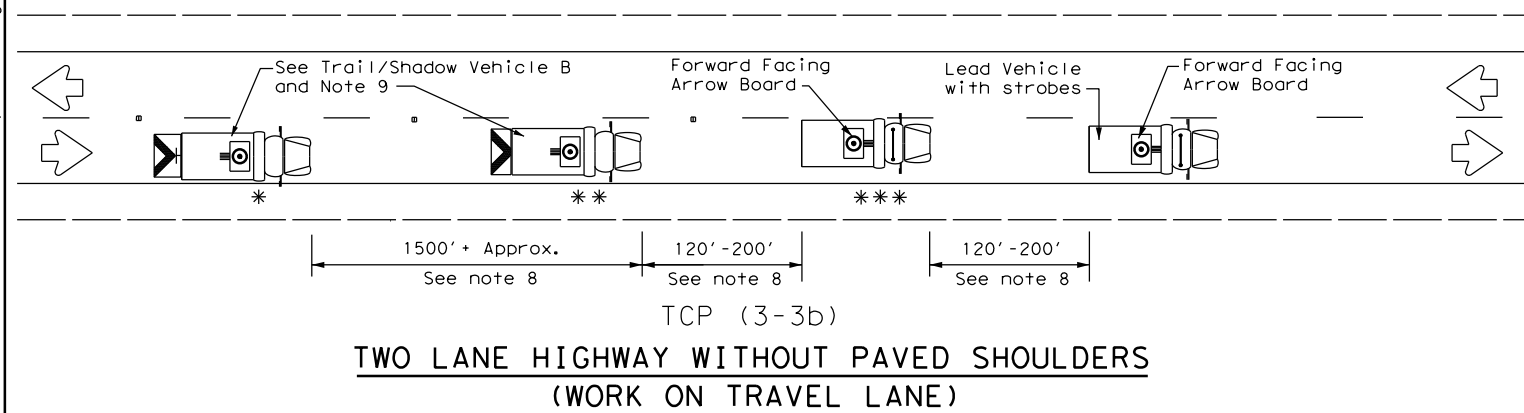
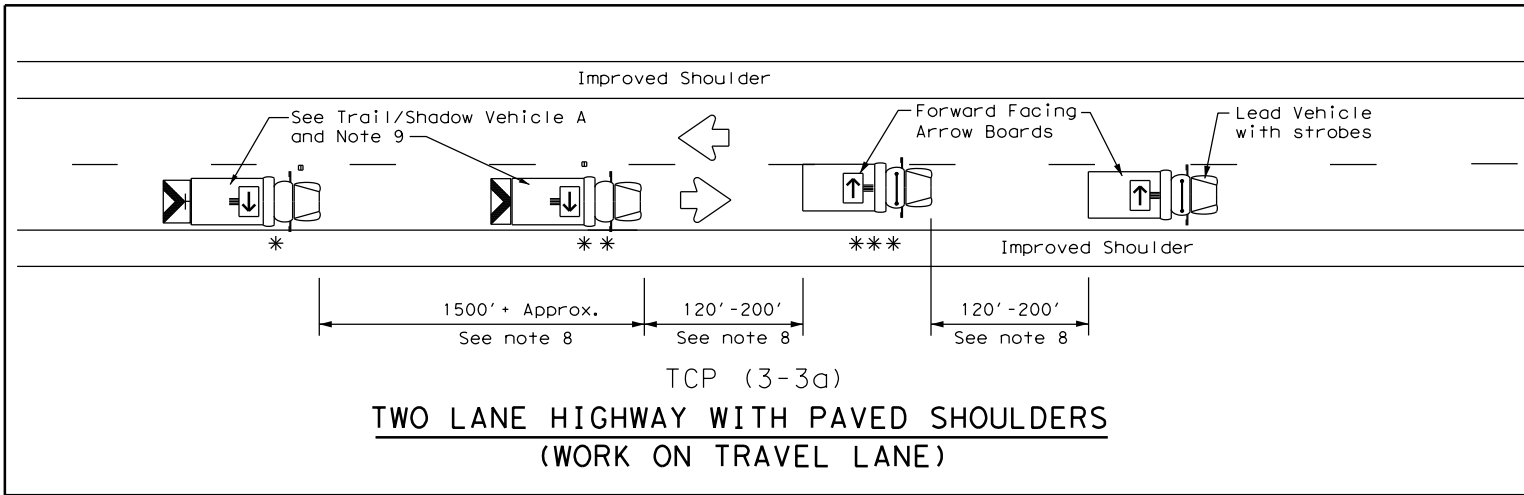


TRAFFIC CONTROL PLAN
LANE CLOSURES ON MULTILANE
CONVENTIONAL ROADS

TCP (2-4) - 18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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8-95 3-03	DIST	COUNTY	SHEET NO.	
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4-98 2-18				

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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
✓				

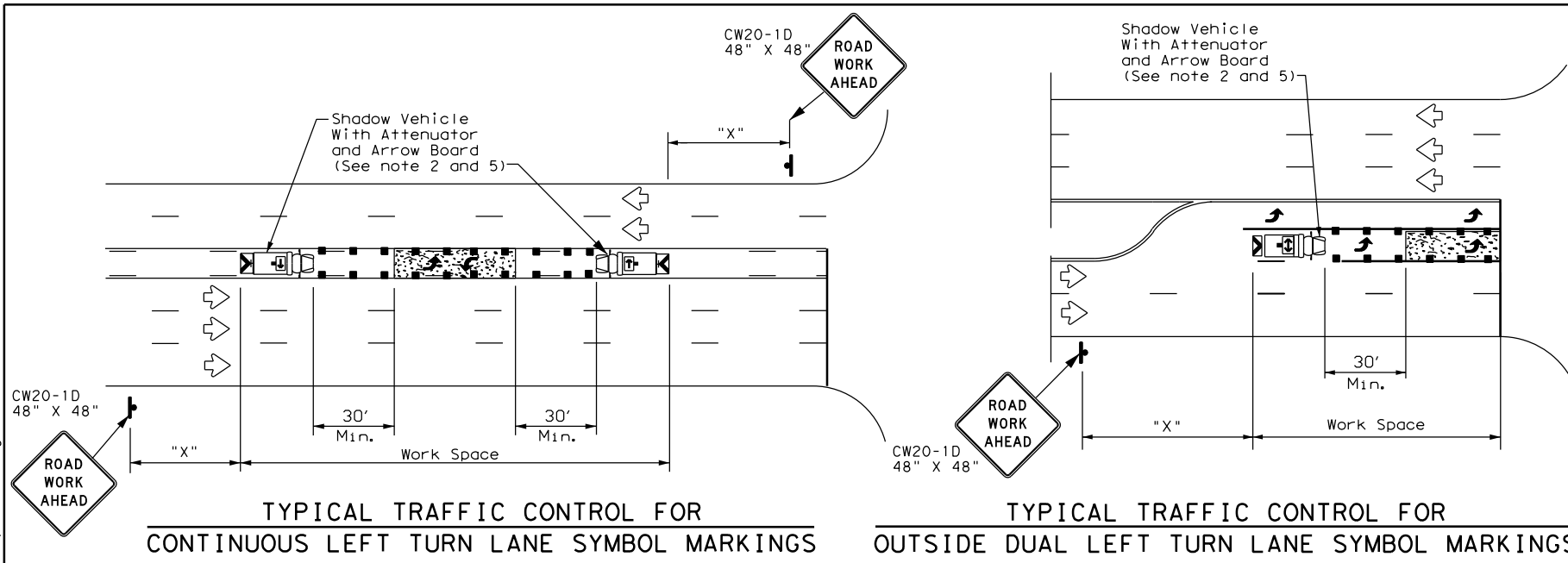
GENERAL NOTES

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.

		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL TCP (3-3) - 14			
FILE: fcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT September 1987	CONT	SECT	JOB
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8-95 7-13	DIST	COUNTY	SHEET NO.
1-97 7-14	WAC	MCLENNAN	24

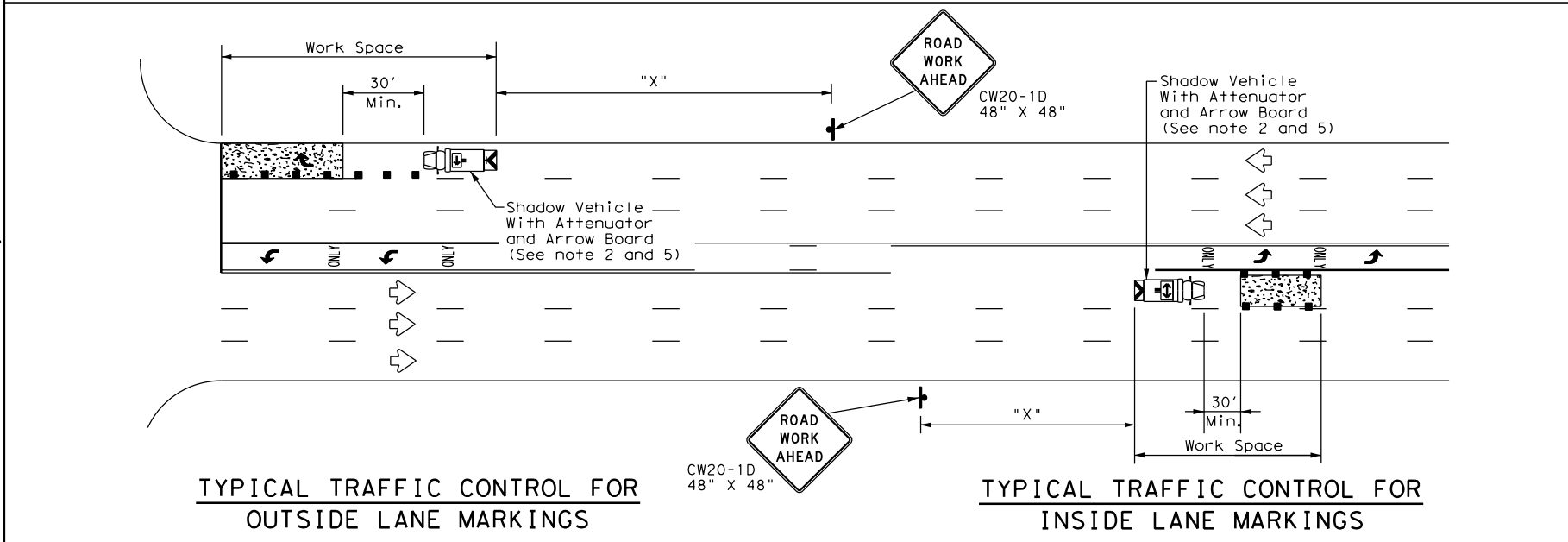
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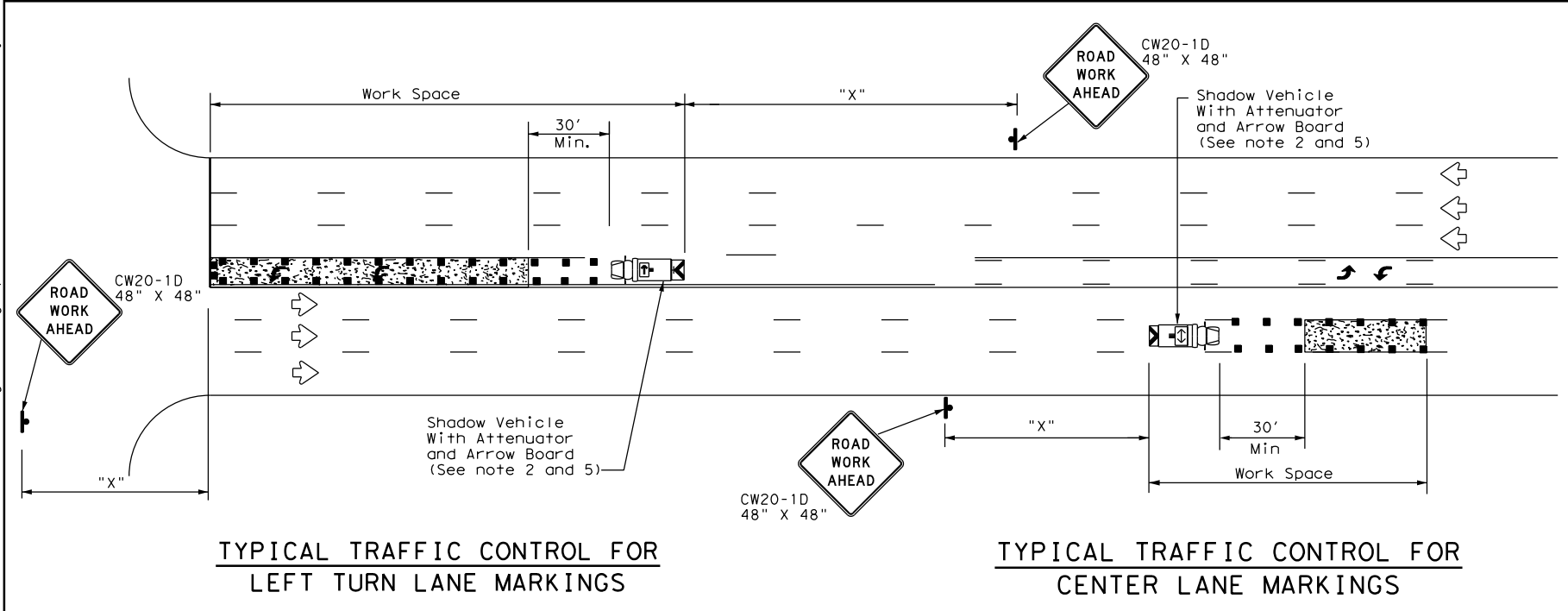
TYPICAL TRAFFIC CONTROL FOR CONTINUOUS LEFT TURN LANE SYMBOL MARKINGS

TYPICAL TRAFFIC CONTROL FOR OUTSIDE DUAL LEFT TURN LANE SYMBOL MARKINGS



TYPICAL TRAFFIC CONTROL FOR OUTSIDE LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR INSIDE LANE MARKINGS



TYPICAL TRAFFIC CONTROL FOR LEFT TURN LANE MARKINGS

TYPICAL TRAFFIC CONTROL FOR CENTER LANE MARKINGS

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

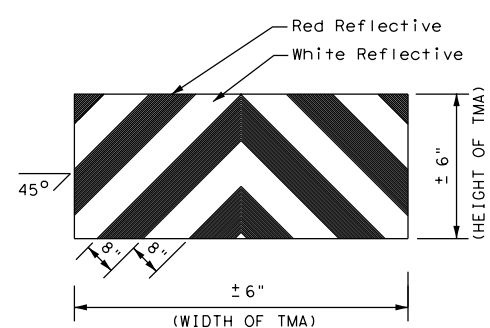
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS ² / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	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

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.

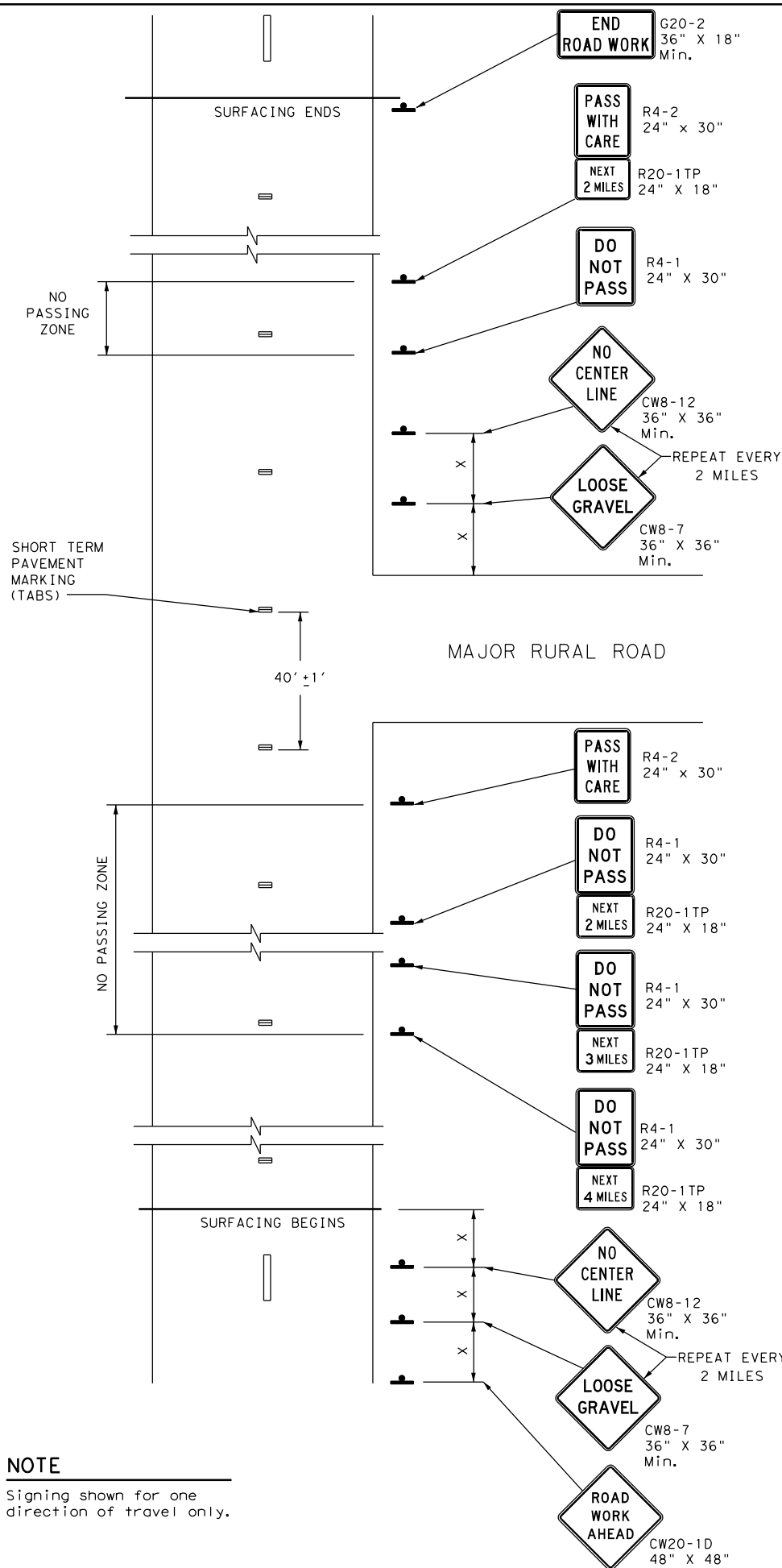


STRIPING FOR TMA

		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN MOBILE OPERATIONS FOR ISOLATED WORK AREAS UNDIVIDED HIGHWAYS			
TCP (3-4) - 13			
FILE: tcp3-4.dgn	DN: TxDOT	CK: TxDOT	CR: TxDOT
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REVISIONS	DIST: WAC	COUNTY: MCLENNAN	SHEET NO.: 25

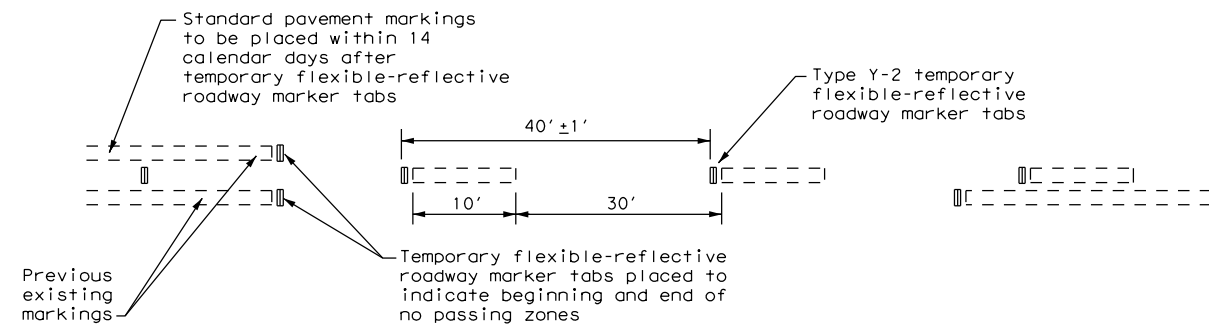
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NOTE
 Signing shown for one direction of travel only.

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.



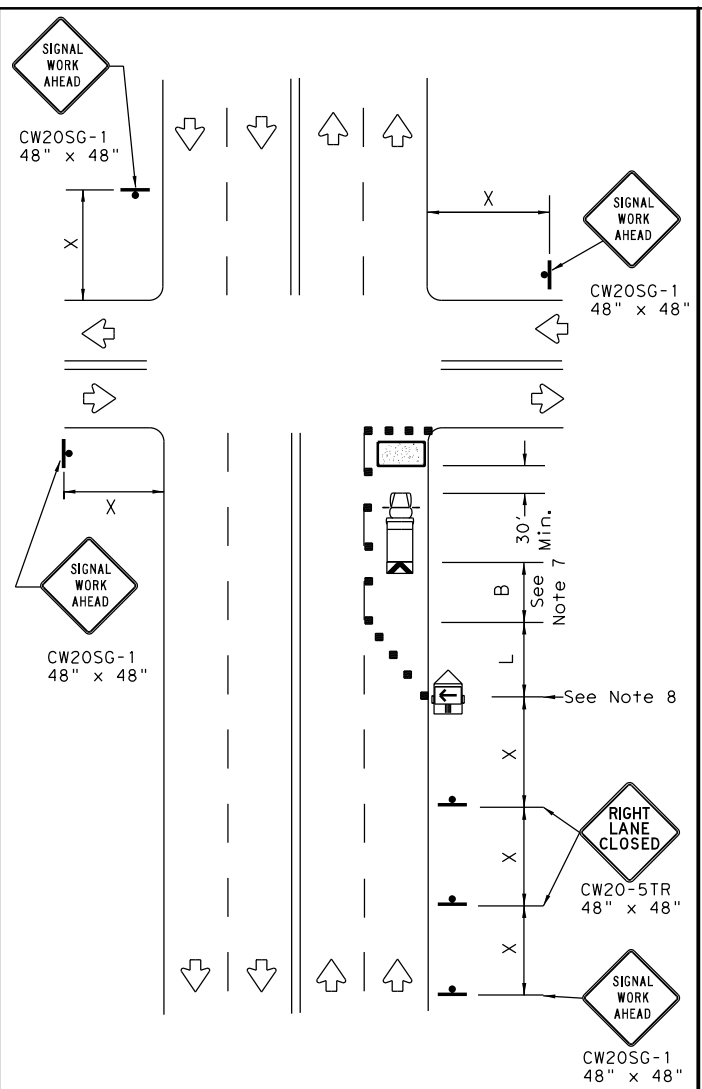
TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP (7-1) - 13

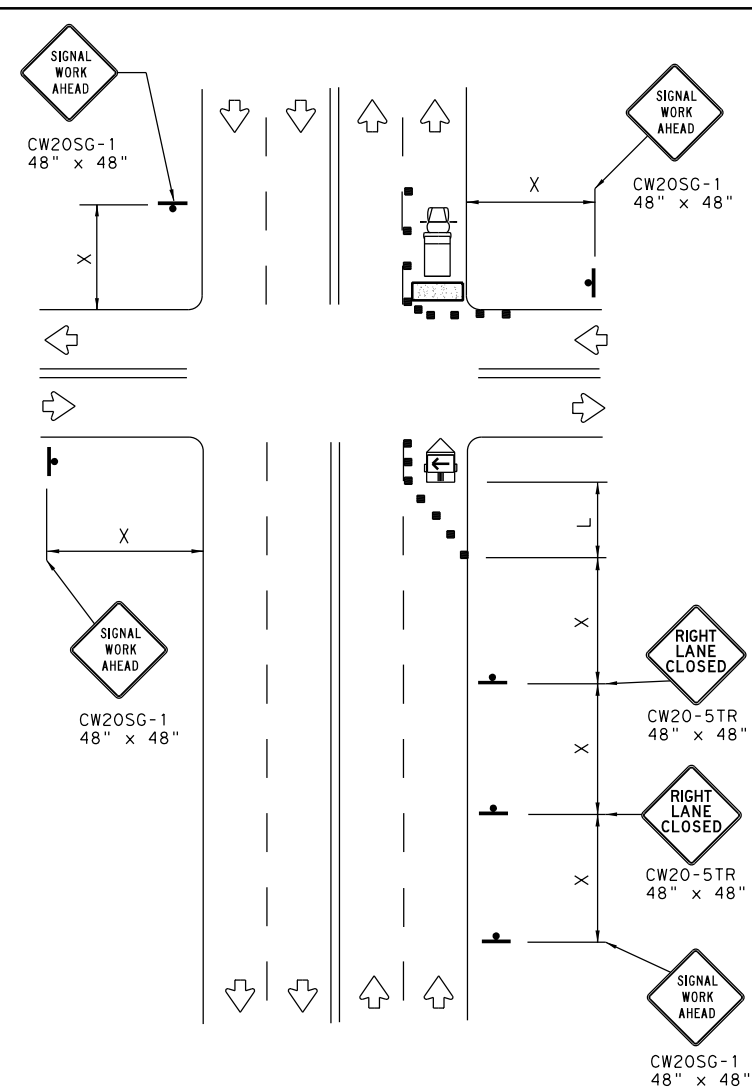
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1-97	7-13	WAC:		MCLENNAN		26			

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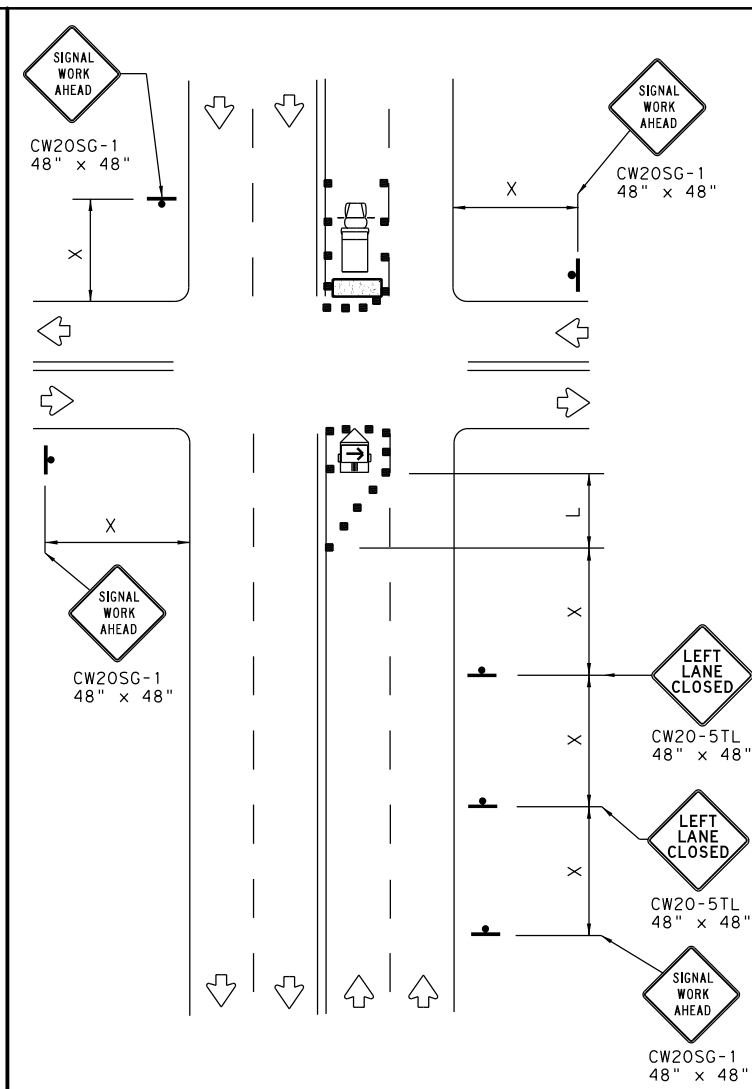
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NEAR SIDE LANE CLOSURE
 SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE
 SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE LEFT LANE CLOSURE
 SHORT DURATION OR SHORT TERM STATIONARY

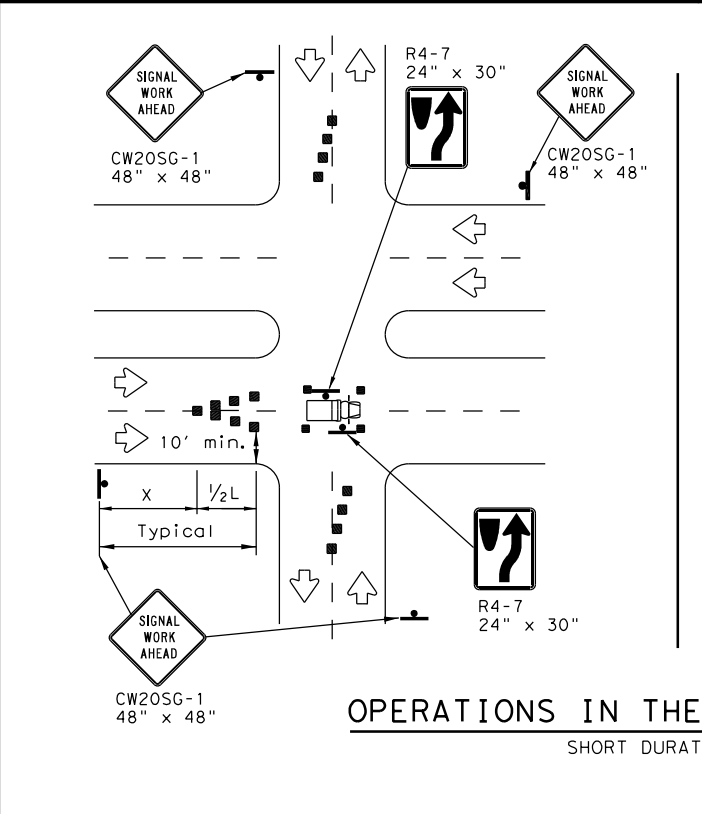
LEGEND

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

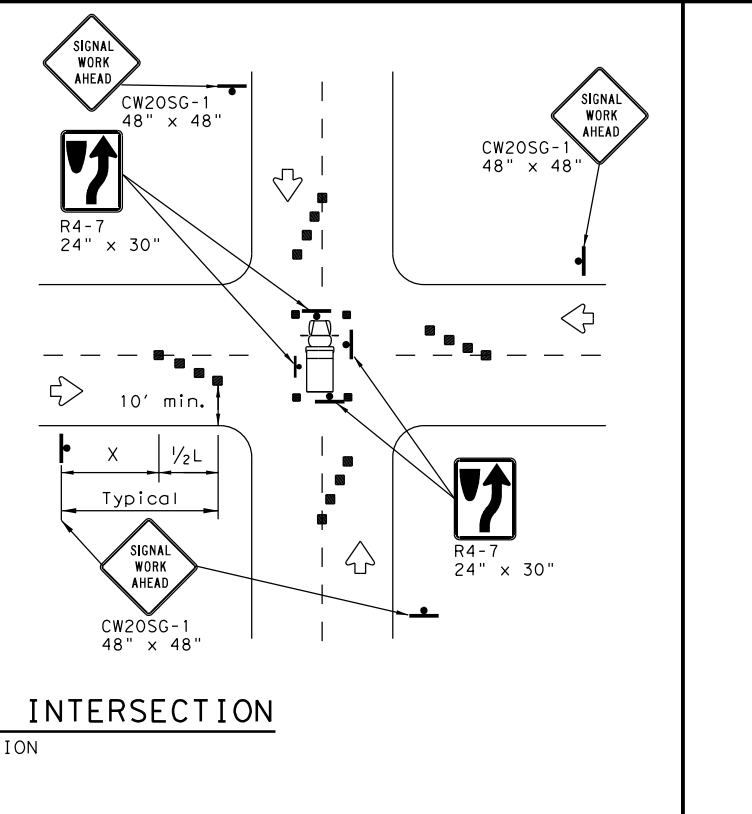
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "x" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'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

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

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



OPERATIONS IN THE INTERSECTION
 SHORT DURATION



GENERAL NOTES

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

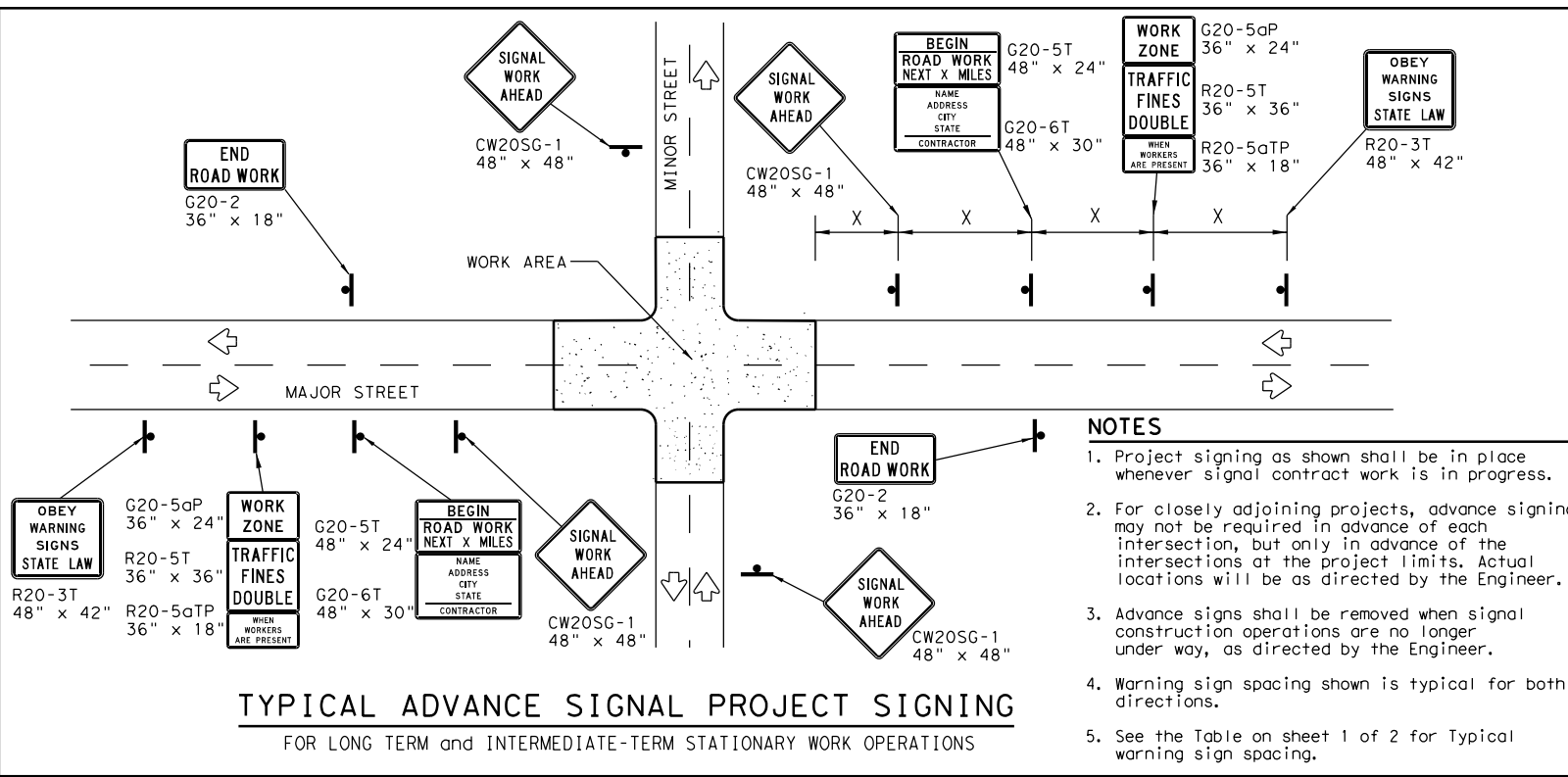
Texas Department of Transportation Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ (BTS-1) - 13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
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REVISIONS	0909	22	197	CS
2-98 10-99 7-13	DIST	COUNTY	SHEET NO.	
4-98 3-03	WAC	MCLENNAN	27	

DATE: 10/23/2023 \$TIME\$
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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

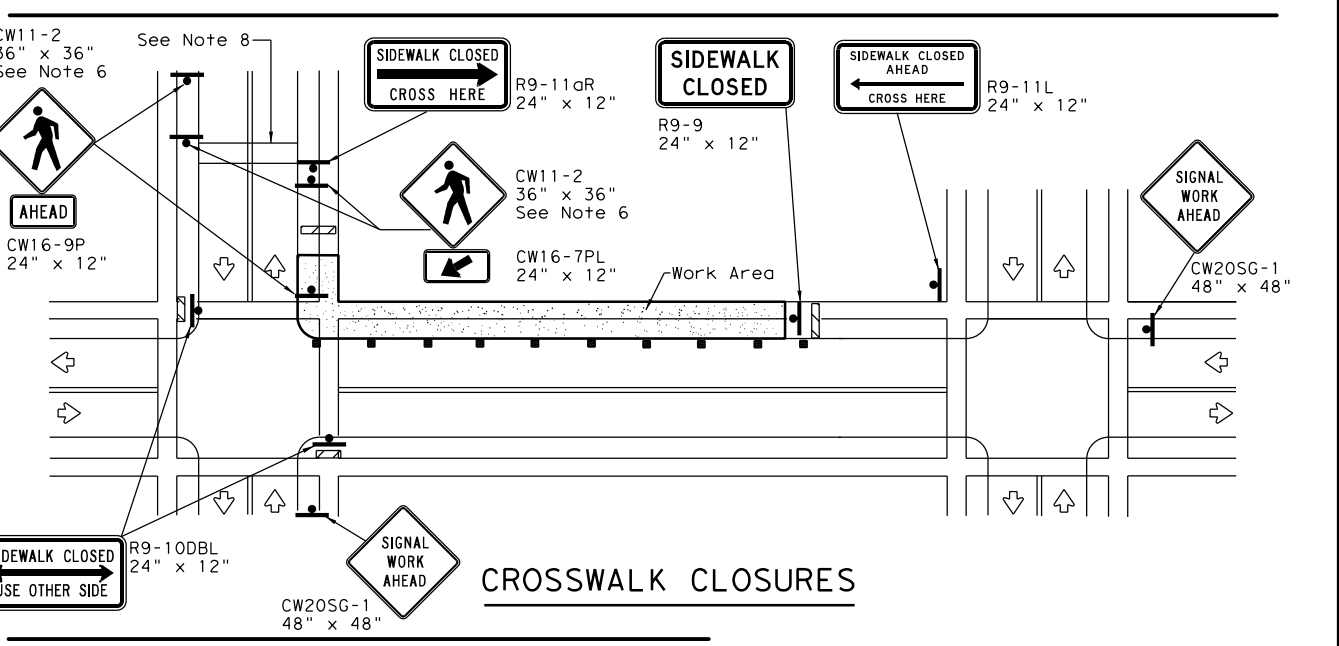
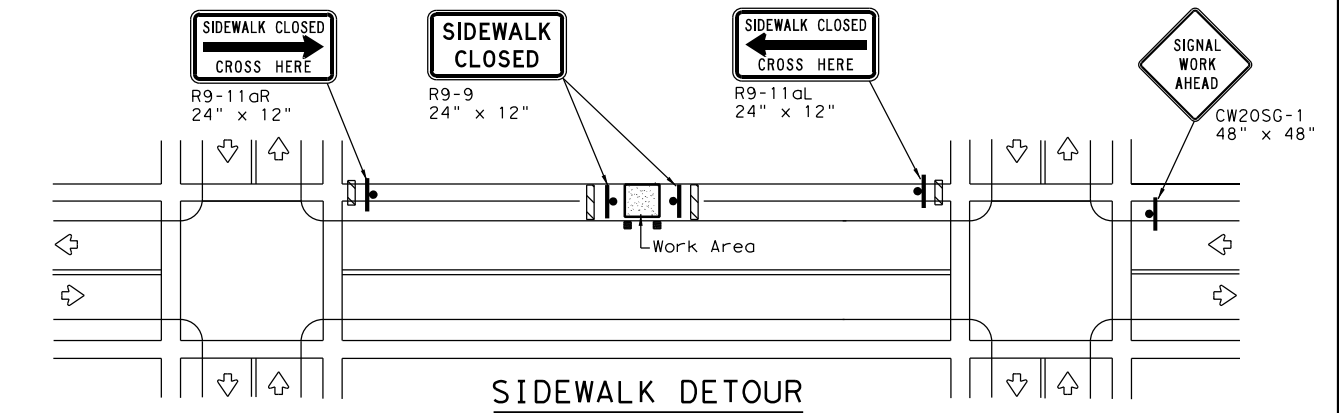
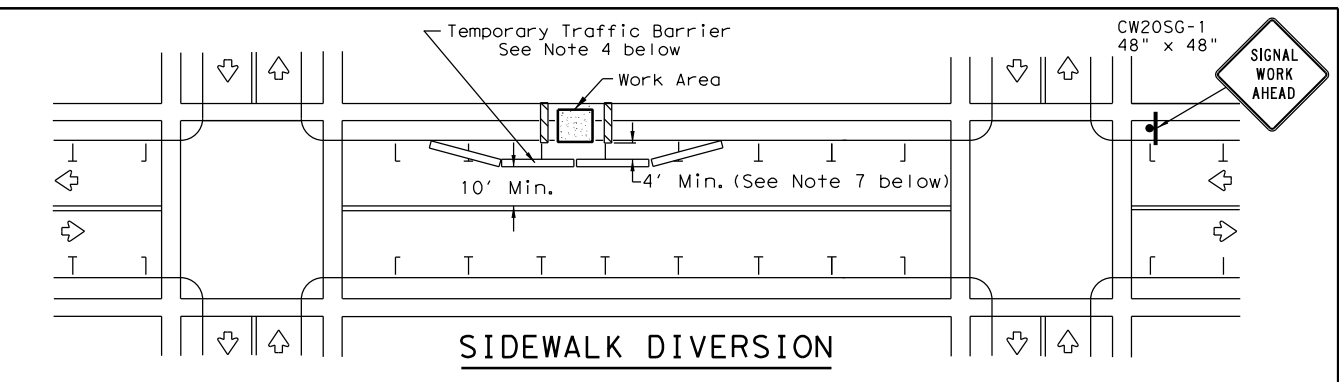
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support 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 _{FL} OR TYPE C _{FL} SHEETING
WHITE	BACKGROUND	TYPE A SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

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



PEDESTRIAN CONTROL

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

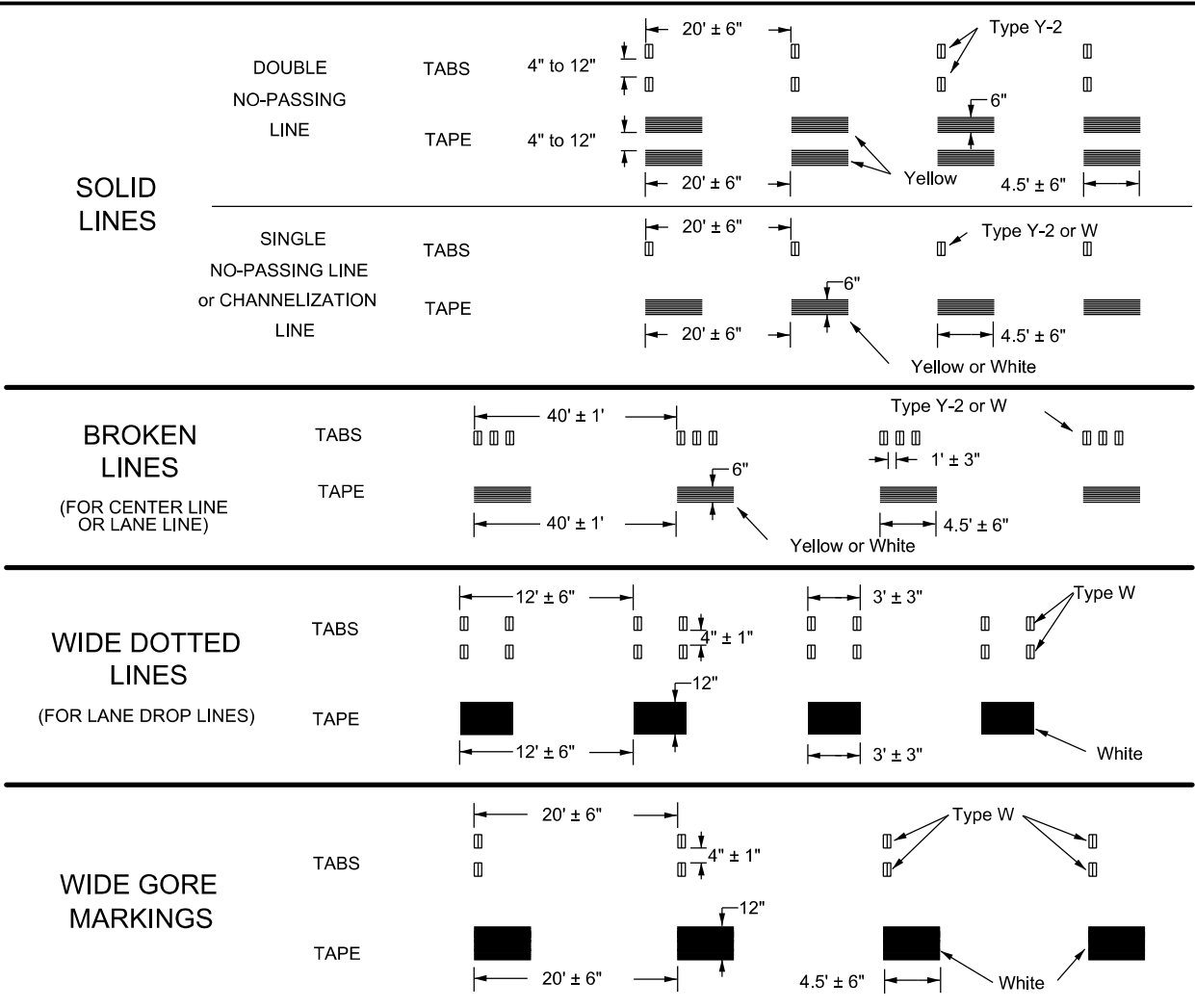
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2-98	10-99	7-13	DIST		COUNTY	SHEET NO.			
4-98	3-03	WAC		MCLENNAN	28				

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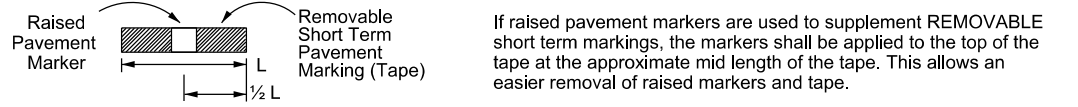
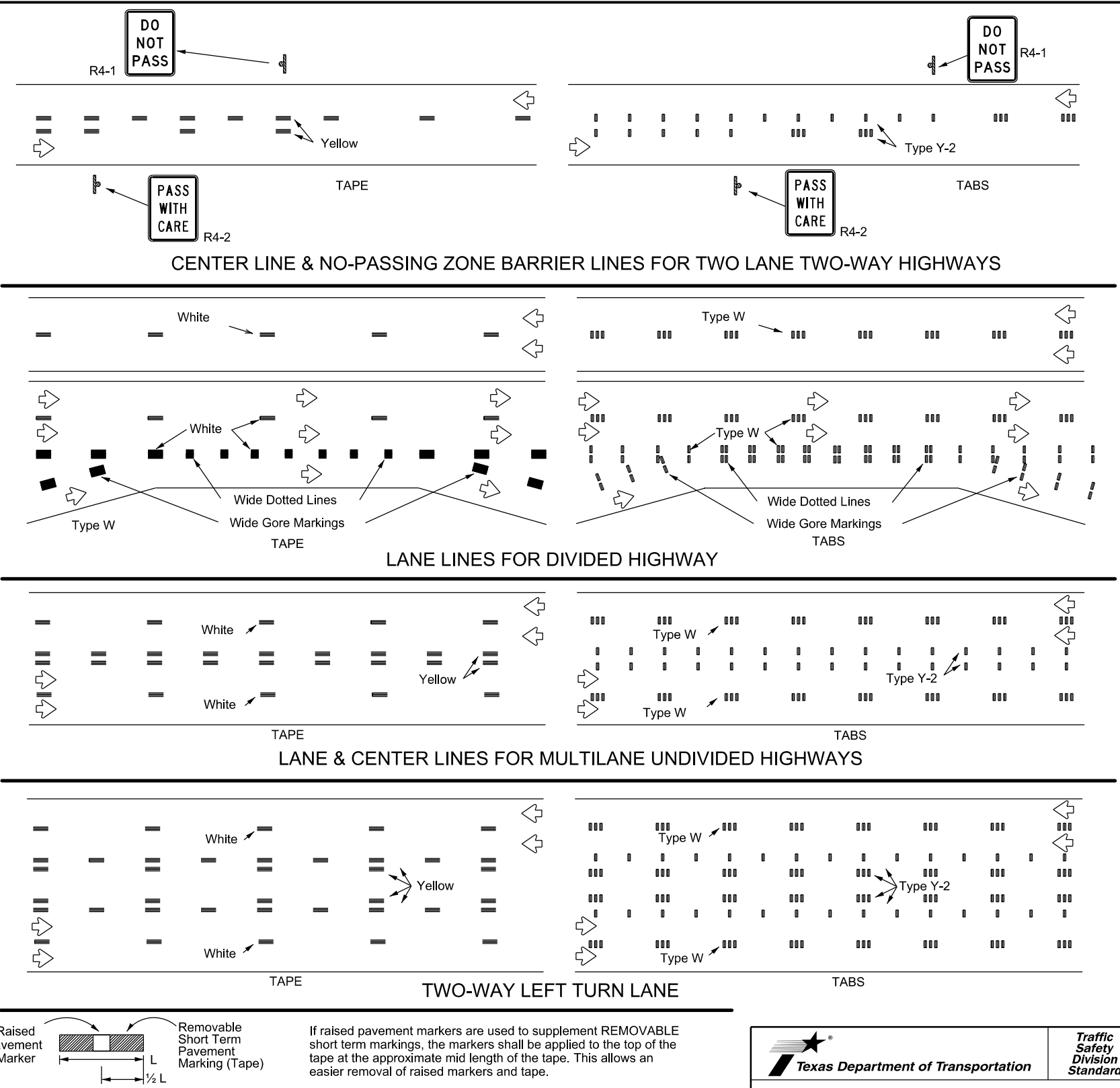
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



- NOTES:**
- Short term pavement markings may be prefabricated markings (stick down tape) or temporary flexible reflective roadway marker tabs unless otherwise specified elsewhere in plans.
 - Short term pavement markings shall NOT be used to simulate edge lines.
 - Dimensions indicated on this sheet are typical and approximate. Variations in size and height may occur between markers or devices made by manufacturers, by as much as 1/4 inch, unless otherwise noted.
 - Temporary flexible-reflective roadway marker tabs will require normal maintenance replacement when used on roadways with an ADT per lane of up to 7500 vehicles with no more than 10% truck mix. When roadways exceed these values, additional maintenance replacement of devices should be planned.
 - No segment of roadway open to traffic shall remain without permanent pavement markings for a period greater than 14 calendar days. The Contractor will be responsible for maintaining short term pavement markings until permanent pavement markings are in place. When the Contractor is responsible for placement of permanent pavement markings, no segment of roadway shall remain without permanent pavement markings for a period greater than 14 calendar days unless weather conditions prohibit placement. Permanent pavement markings shall be placed as soon as weather permits.
 - For two lane, two-way roadways, DO NOT PASS signs shall be erected to mark the beginning of sections where passing is prohibited and PASS WITH CARE signs shall be erected to mark the beginning of sections where passing is permitted. Signs shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and may be used to indicate the limits of no-passing zones for up to 14 calendar days. Permanent pavement markings should then be placed.
 - For low volume two lane, two-way roadways of 4000 ADT or less, no-passing lines may be omitted when approved by the Engineer. DO NOT PASS and PASS WITH CARE signs shall be erected (see note 6).
 - For exit gores where a lane is being dropped place wide gore markings or retroreflective channelizing devices to guide motorist through the exit. If channelizing devices are to be used it should be noted elsewhere in the plans. One piece cones are not allowed for this purpose.

- TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)**
- Temporary flexible-reflective roadway marker tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with yellow body); Type Y (one amber reflective surface with yellow body); and Type W (one white or silver reflective surface with white body). Additional details may be found on BC(11).
 - Tabs shall meet requirements of Departmental Material Specification DMS-8242.
 - When dry, tabs shall be visible for a minimum distance of 200 feet during normal daylight hours and when illuminated by automobile low-beam head light at night, unless sight distance is restricted by roadway geometrics.
 - No two consecutive tabs nor four tabs per 1000 feet of line shall be missing or fail to meet the visual performance requirements of Note 3.

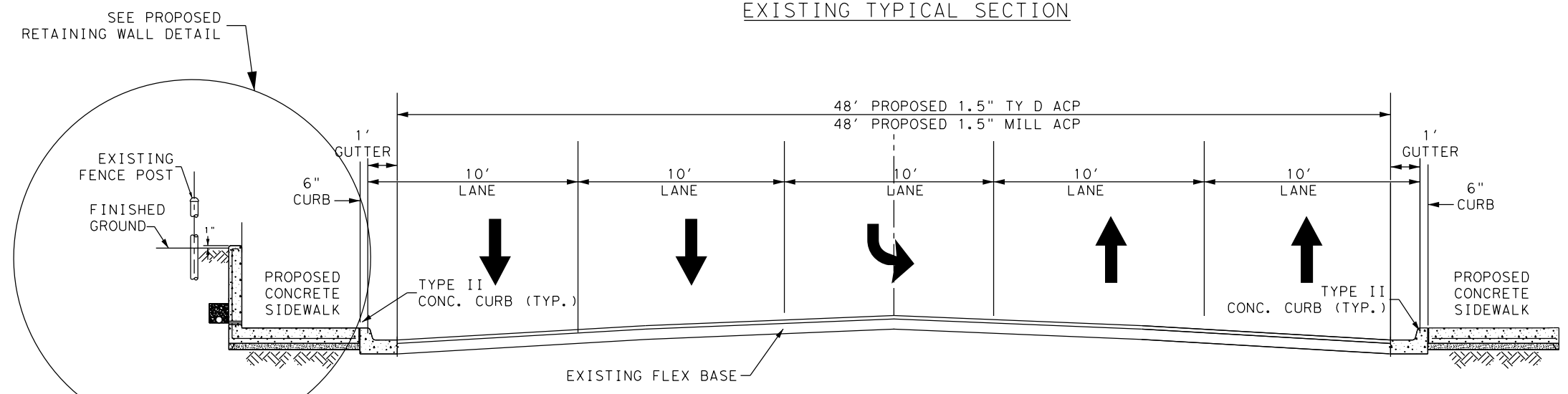
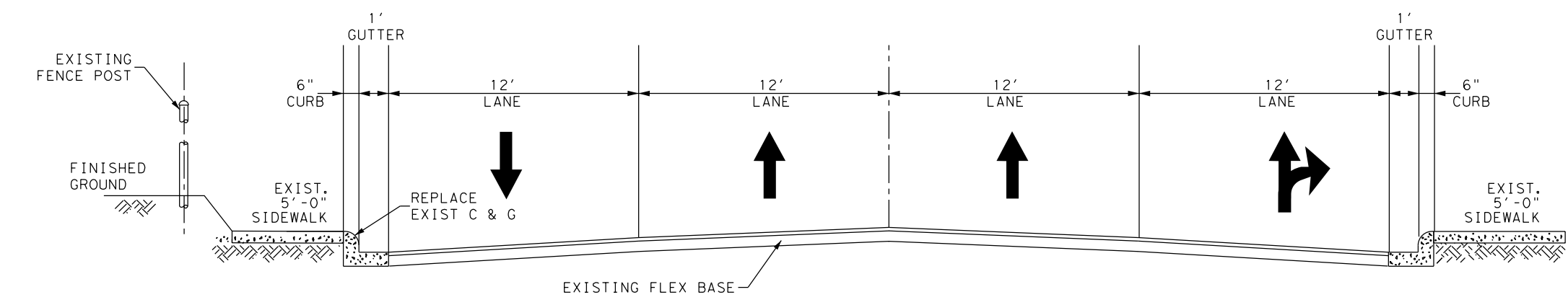
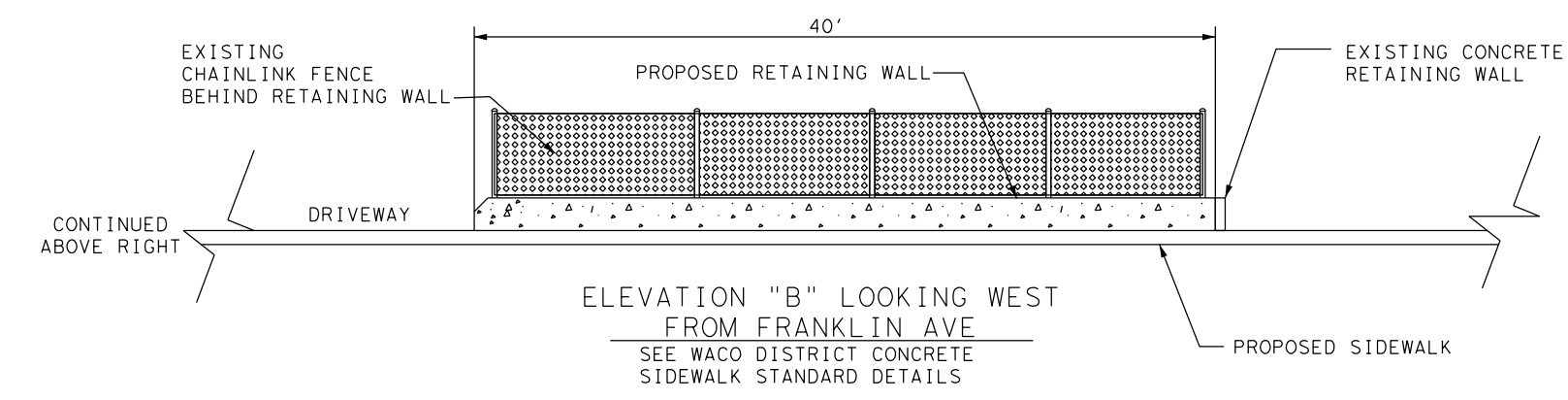
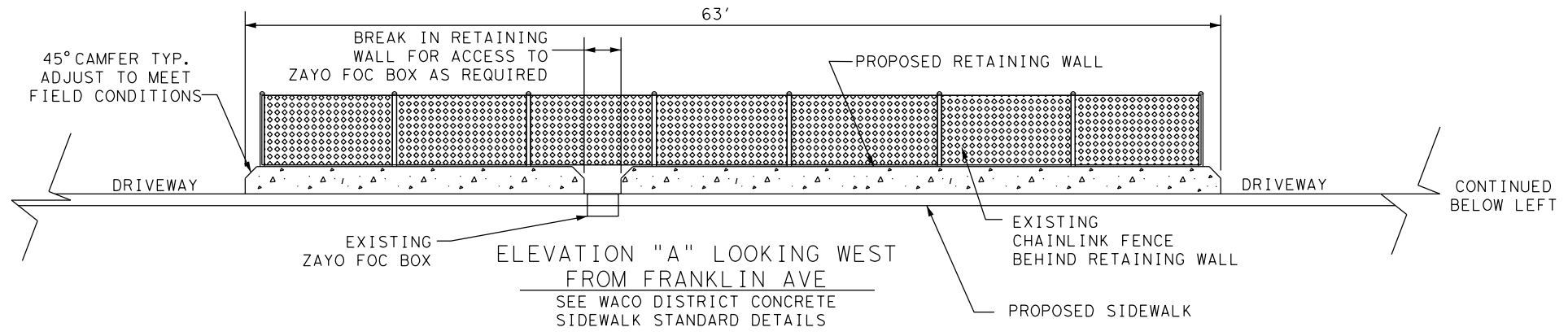
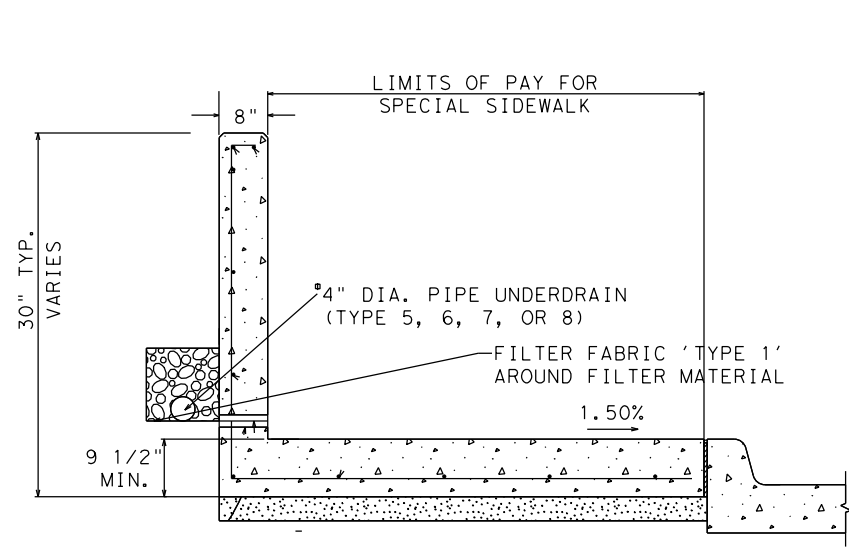
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



- PREFABRICATED PAVEMENT MARKINGS**
- Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
 - Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Construction-Grade Prefabricated Pavement Markings."
- RAISED PAVEMENT MARKERS**
- All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.
- DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)**
- DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:
http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm








WORK ZONE SHORT TERM PAVEMENT MARKINGS			
WZ(STPM)-23			
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DST: WAC		COUNTY: MCLENNAN	SHEET NO.: 29

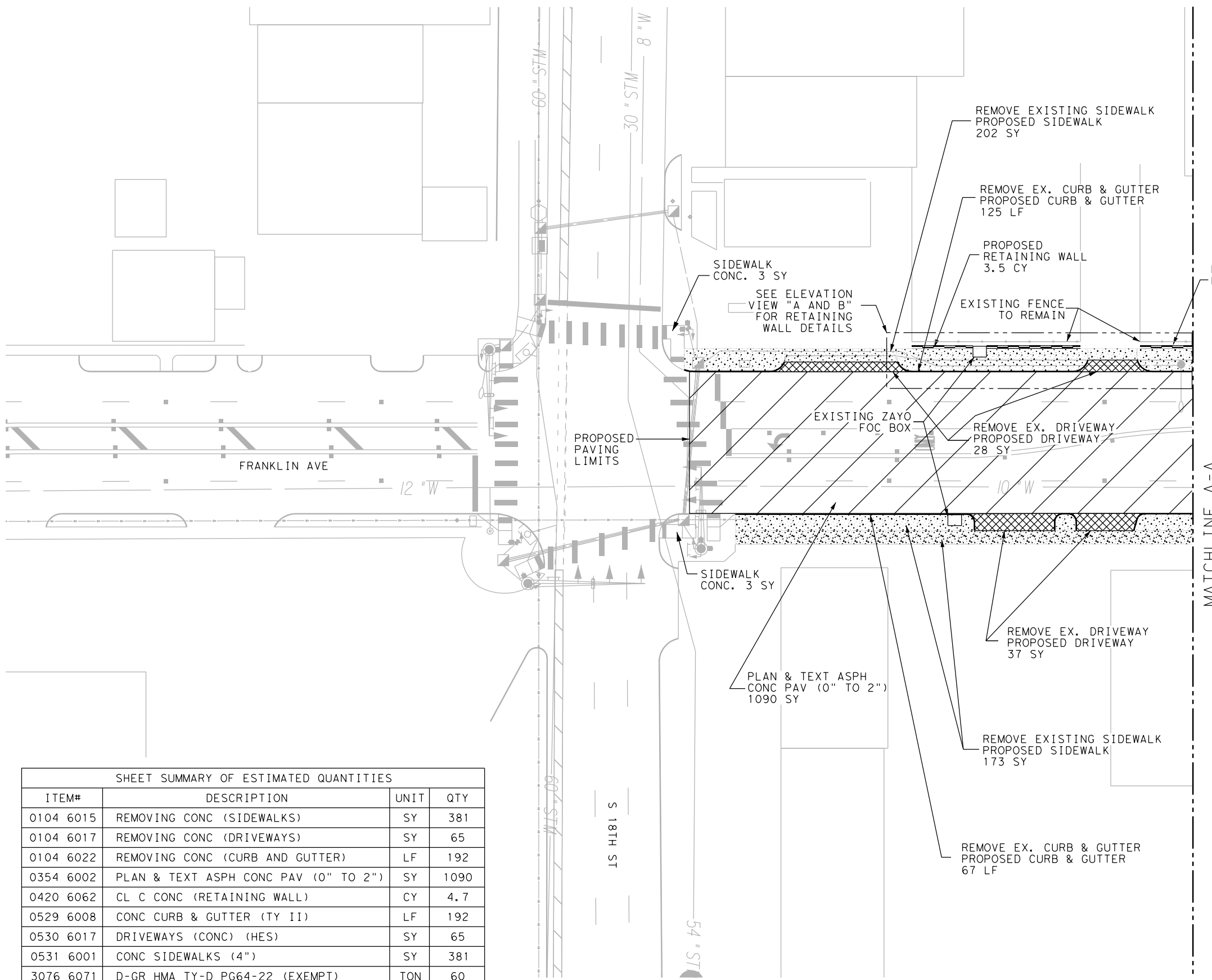
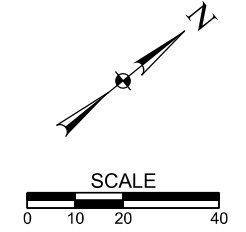


TYPICAL SECTIONS & RETAINING WALL


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6	SEE TITLE SHEET		
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS

LEGEND:


-  PAVEMENT LIMITS
-  SIDEWALK
-  DRIVEWAY
-  RETAINING WALL
-  CURB AND GUTTER




SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	381
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	65
0104 6022	REMOVING CONC (CURB AND GUTTER)	LF	192
0354 6002	PLAN & TEXT ASPH CONC PAV (0" TO 2")	SY	1090
0420 6062	CL C CONC (RETAINING WALL)	CY	4.7
0529 6008	CONC CURB & GUTTER (TY II)	LF	192
0530 6017	DRIVEWAYS (CONC) (HES)	SY	65
0531 6001	CONC SIDEWALKS (4")	SY	381
3076 6071	D-GR HMA TY-D PG64-22 (EXEMPT)	TON	60



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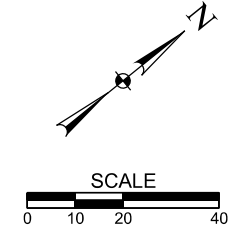


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




PAVING AND SIDEWALK LAYOUT

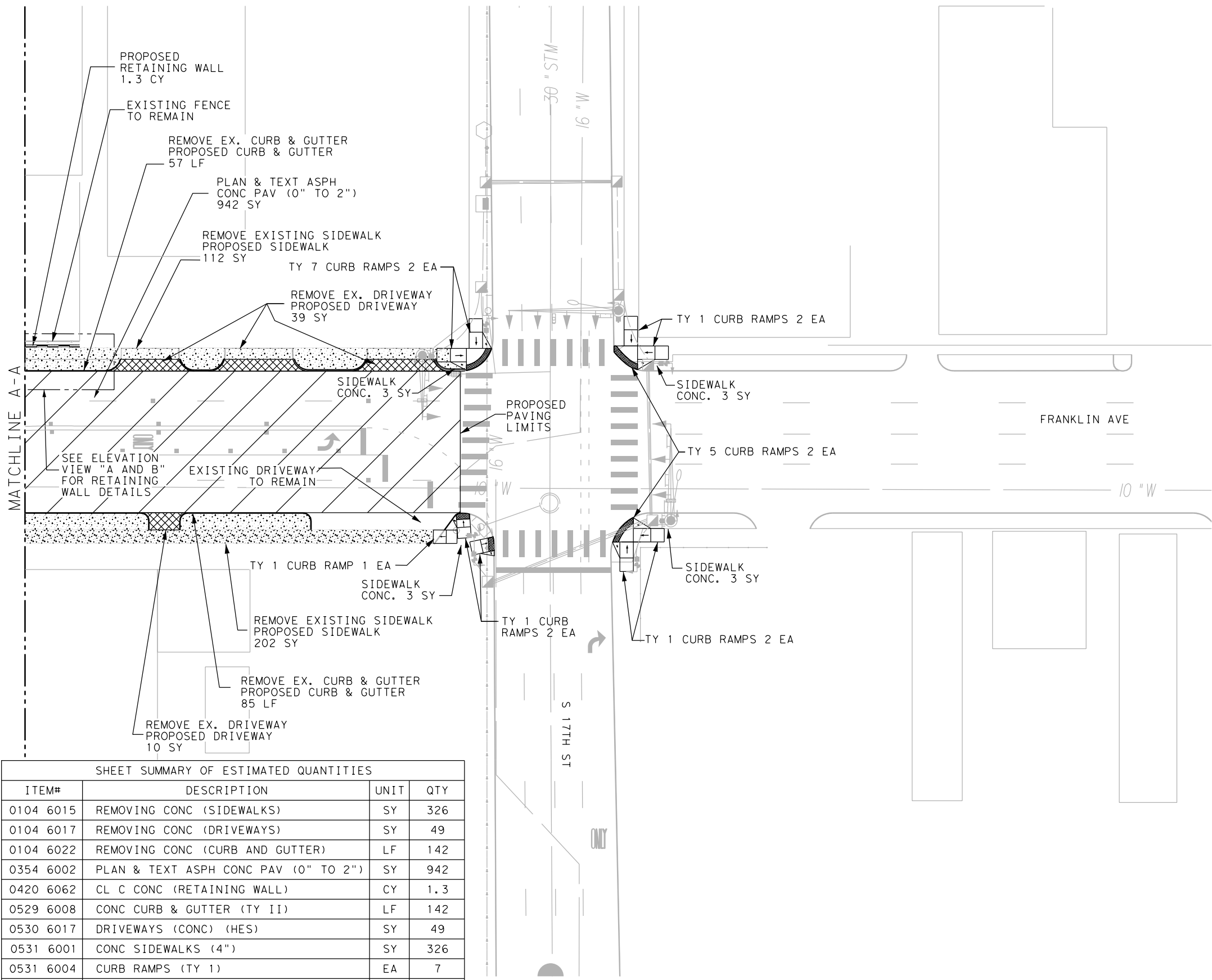
SHEET 1 OF 2

FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 31
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197
		HIGHWAY NO. CS




LEGEND:


-  PAVEMENT LIMITS
-  SIDEWALK
-  DRIVEWAY
-  RETAINING WALL
-  CURB AND GUTTER




SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
0104 6015	REMOVING CONC (SIDEWALKS)	SY	326
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	49
0104 6022	REMOVING CONC (CURB AND GUTTER)	LF	142
0354 6002	PLAN & TEXT ASPH CONC PAV (0" TO 2")	SY	942
0420 6062	CL C CONC (RETAINING WALL)	CY	1.3
0529 6008	CONC CURB & GUTTER (TY II)	LF	142
0530 6017	DRIVEWAYS (CONC) (HES)	SY	49
0531 6001	CONC SIDEWALKS (4")	SY	326
0531 6004	CURB RAMPS (TY 1)	EA	7
0531 6008	CURB RAMPS (TY 5)	EA	2
0531 6010	CURB RAMPS (TY 7)	EA	2
3076 6071	D-GR HMA TY-D PG64-22 (EXEMPT)	TON	52



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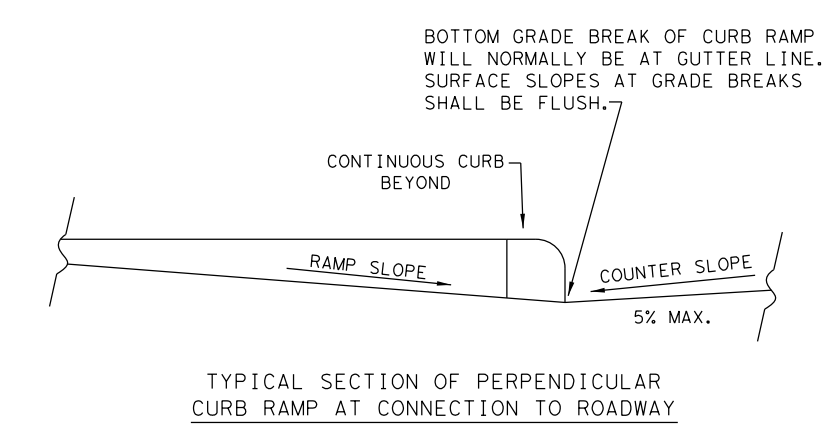
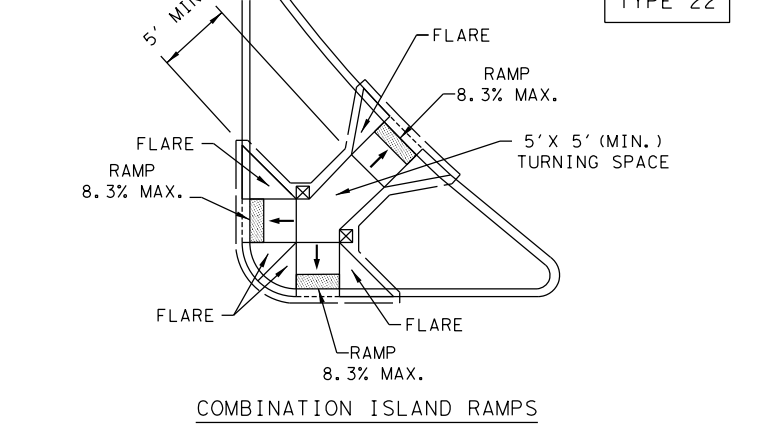
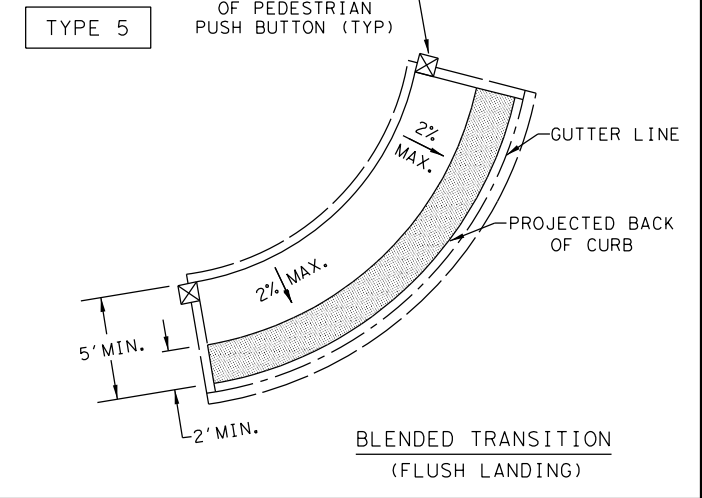
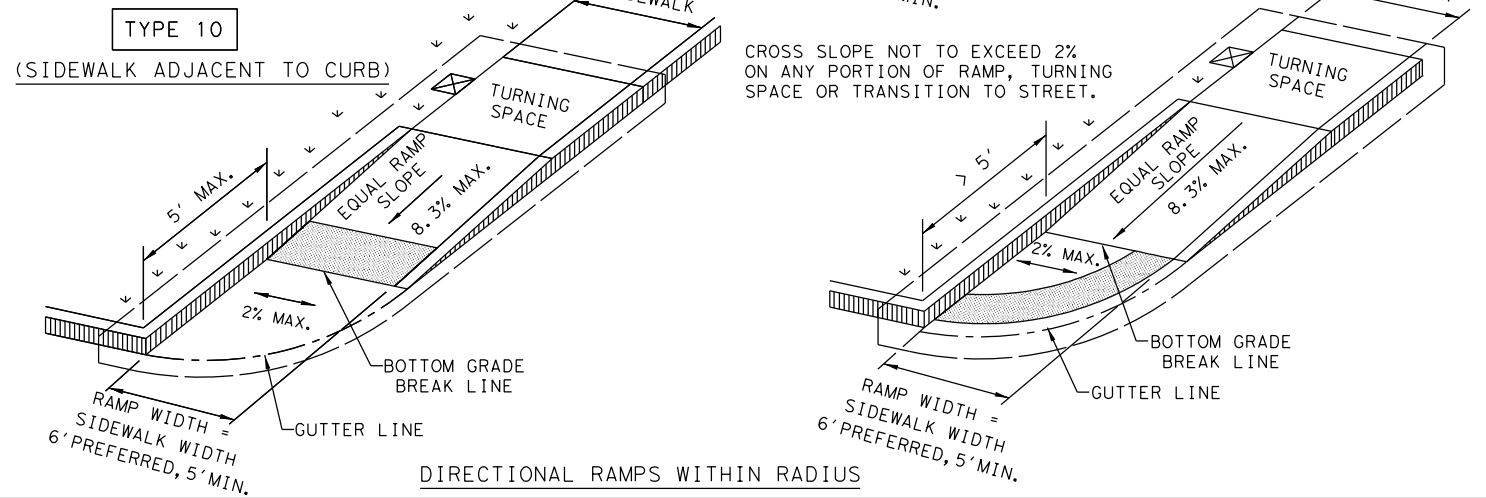
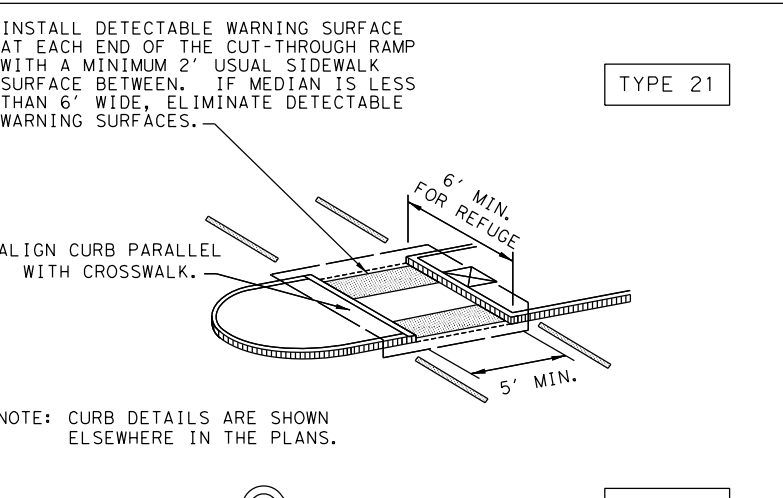
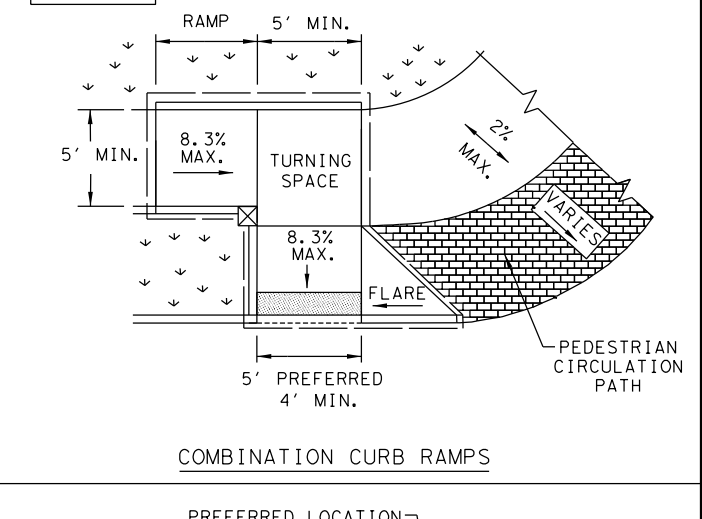
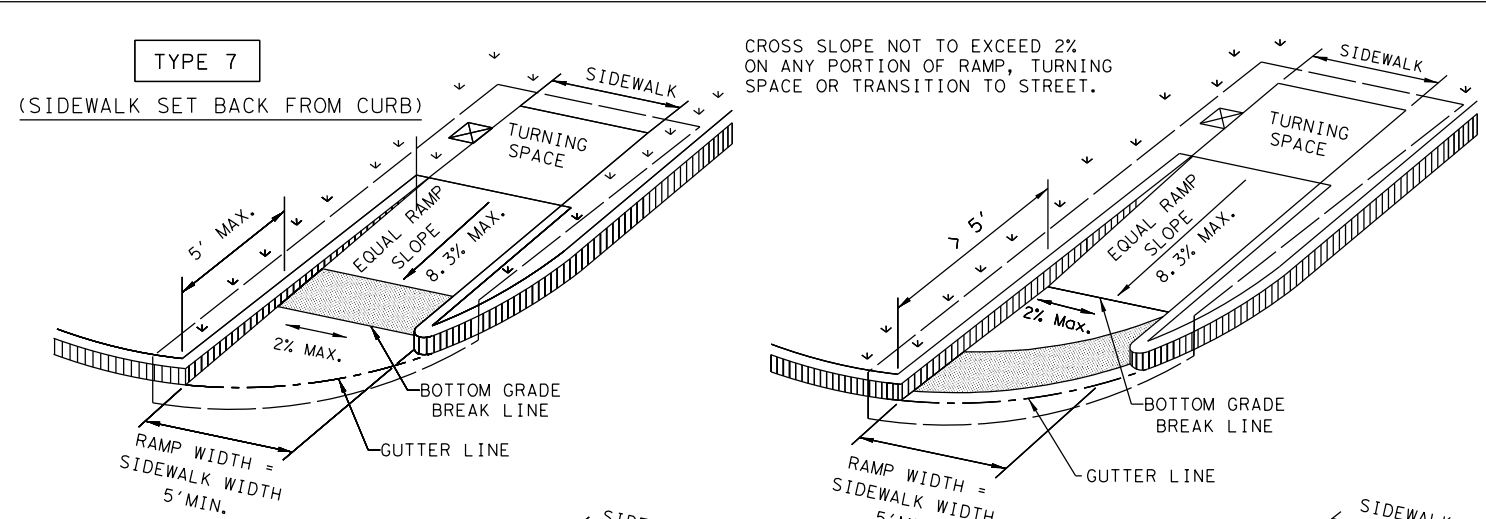
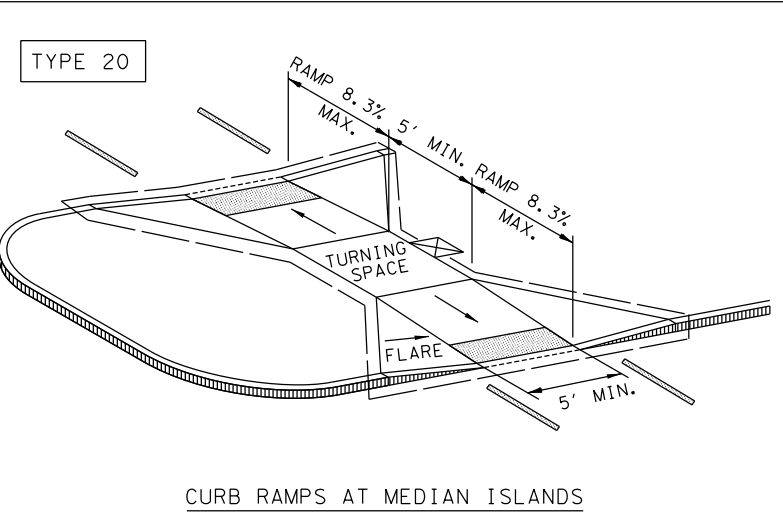
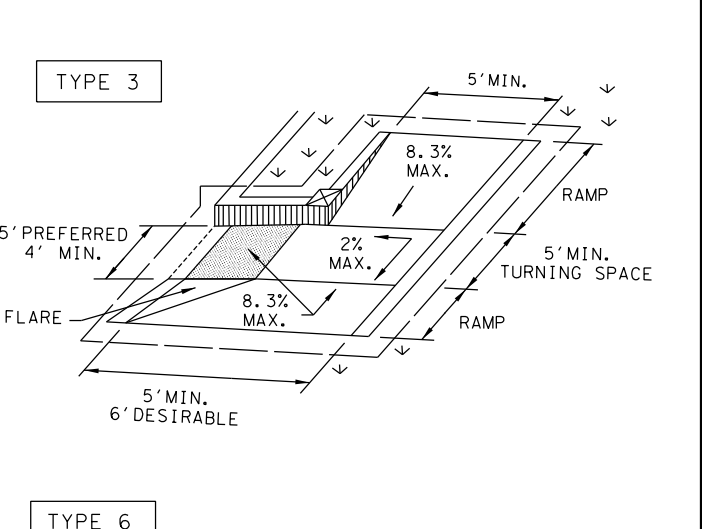
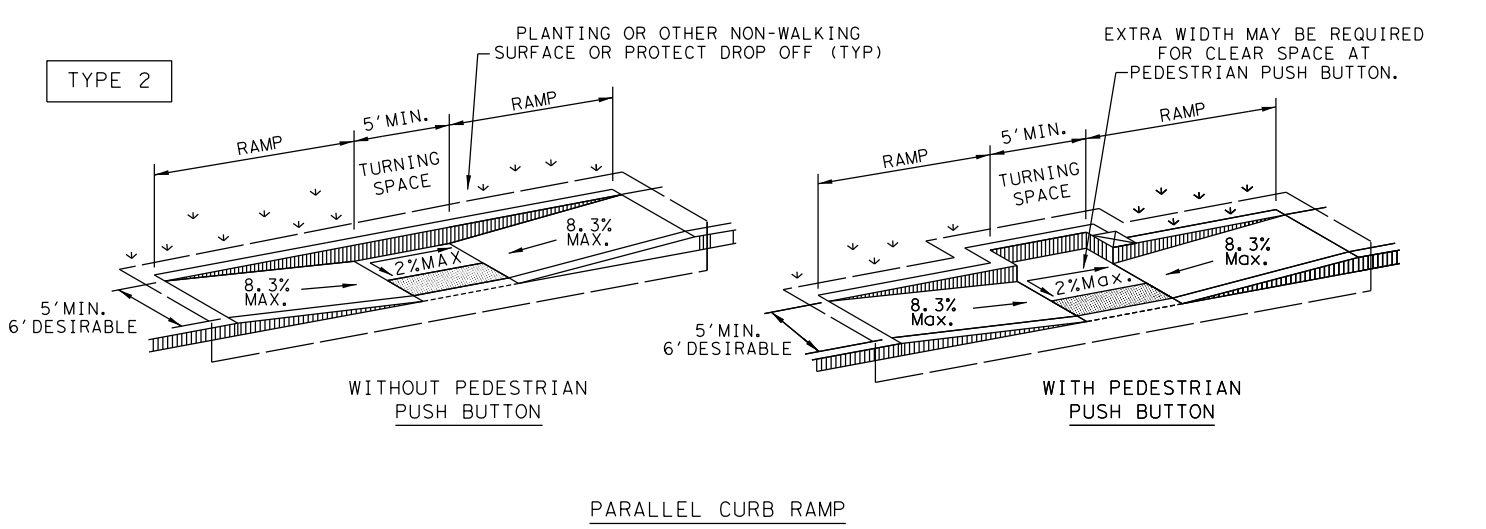
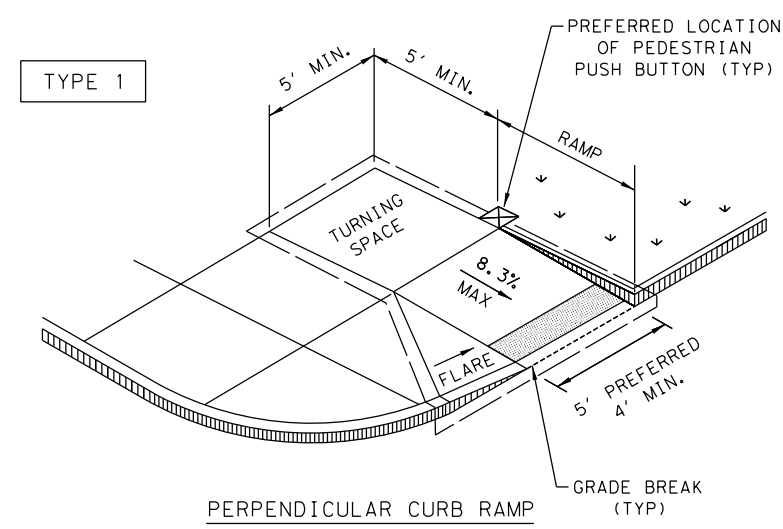
PAVING AND SIDEWALK LAYOUT

SHEET 2 OF 2

FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 32
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197
		HIGHWAY NO. CS

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DATE: 10/23/2023
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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. GUTTER LINE GUTTER LINE
 DETECTABLE WARNING SURFACE GRADE BREAK GRADE BREAK
 DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE. RAMP LIMITS OF PAYMENT RAMP LIMITS OF PAYMENT

SHEET 1 OF 4

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	
REVISED 08, 2005	REVISIONS	0909	22	197	CS
REVISED 06, 2012	DIST	COUNTY	SHEET NO.		
REVISED 01, 2018	WAC	MCLENNAN	33		

10/23/2023
 DATE: 10/23/2023
 FILE: S:\4.0.0.0.0. Engineering Operations\4.2.0.0.0. Project Files\2022\22049 - COW HSIP Projects\cdd\sheet\standards\ped18.dgn
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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

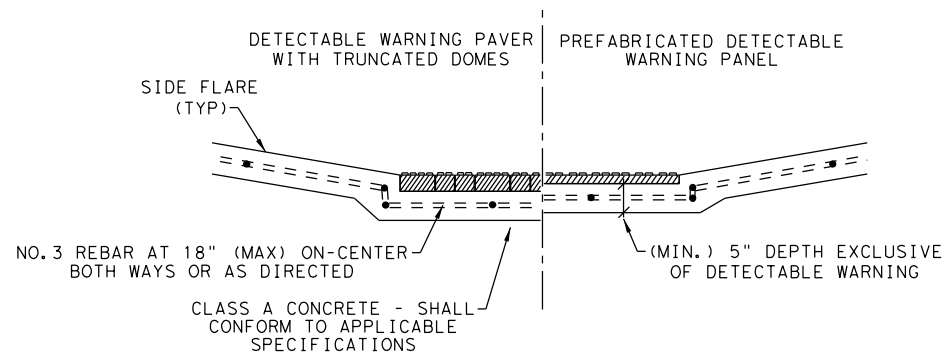
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material 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.

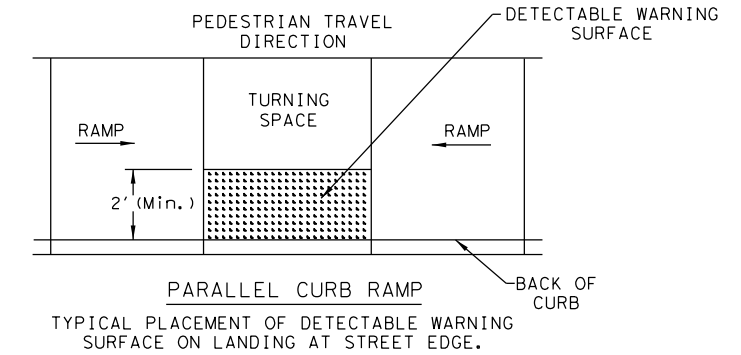
SIDEWALKS

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.

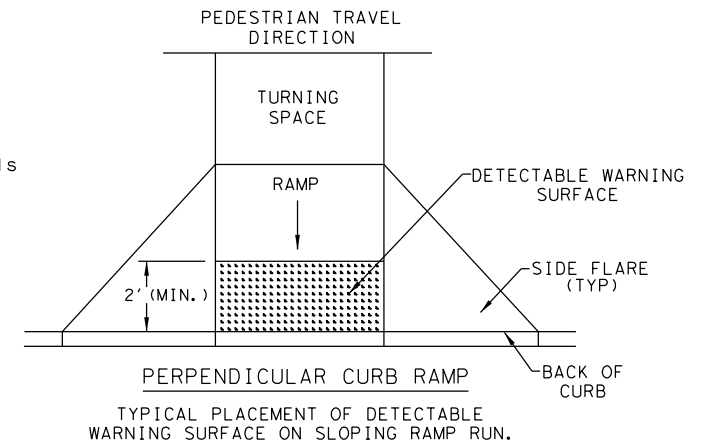


**SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS**

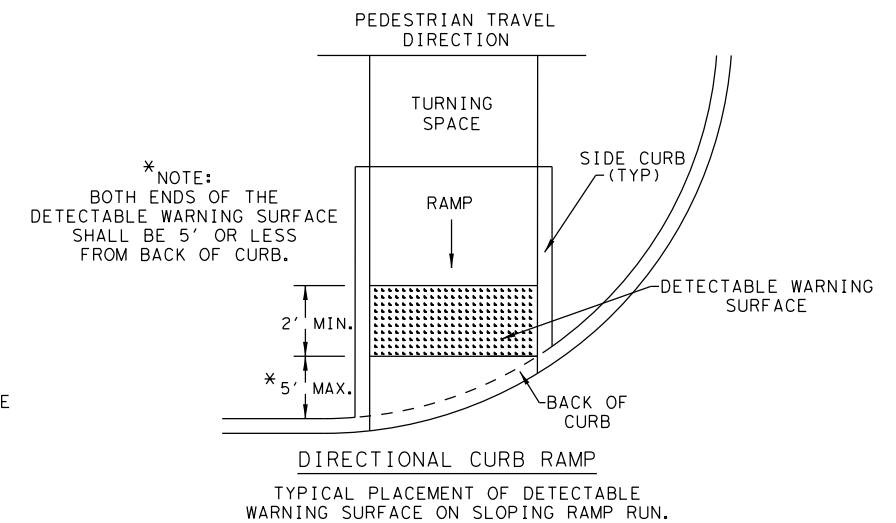
DETECTABLE WARNING SURFACE DETAILS



**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.**



**DIRECTIONAL 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.

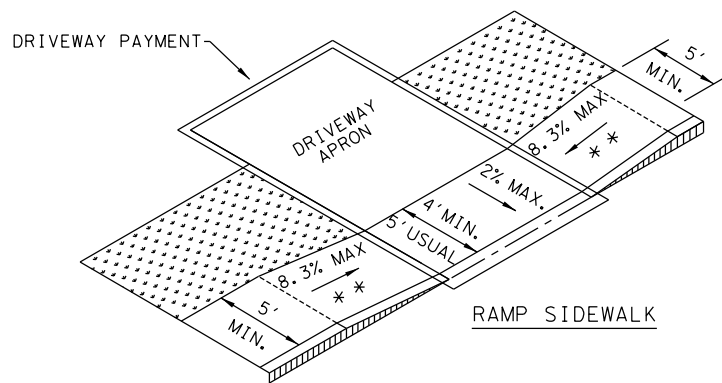
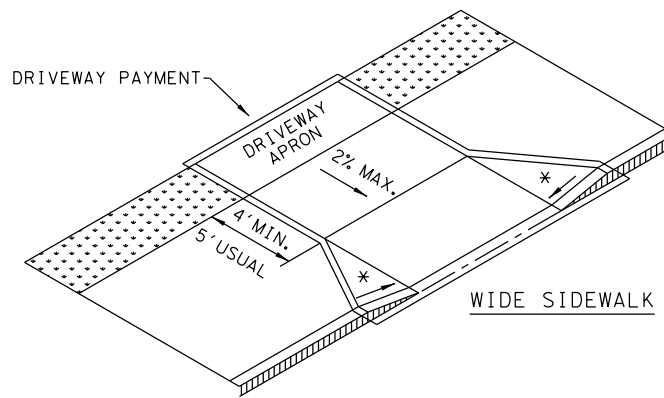
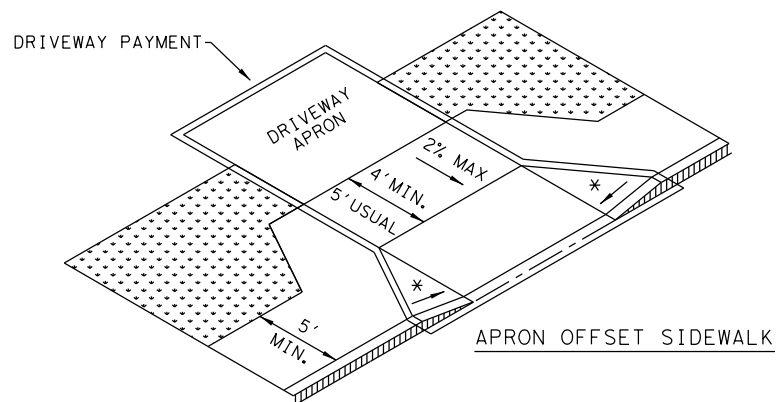
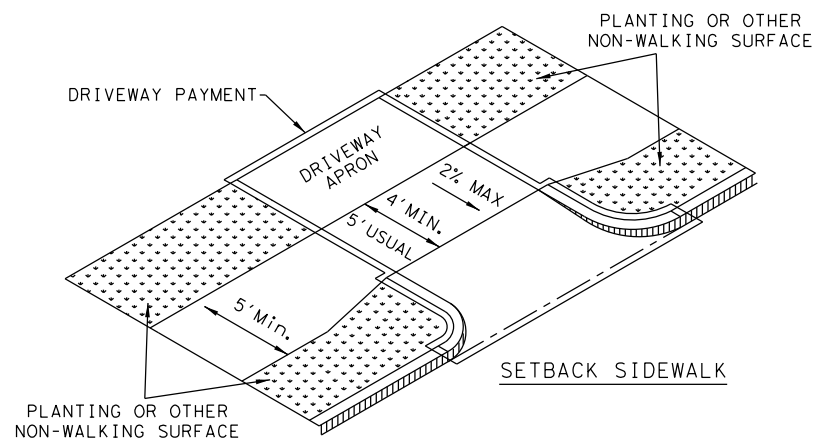
SHEET 2 OF 4

		Design Division Standard	
PEDESTRIAN FACILITIES CURB RAMPS			
PED-18			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT: 0909	SECT: 22	JOB: 197
REVISIONS	DIST: COUNTY		SHEET NO.
REVISED 08, 2005	WAC: MCLENNAN		34
REVISED 06, 2012			
REVISED 01, 2018			

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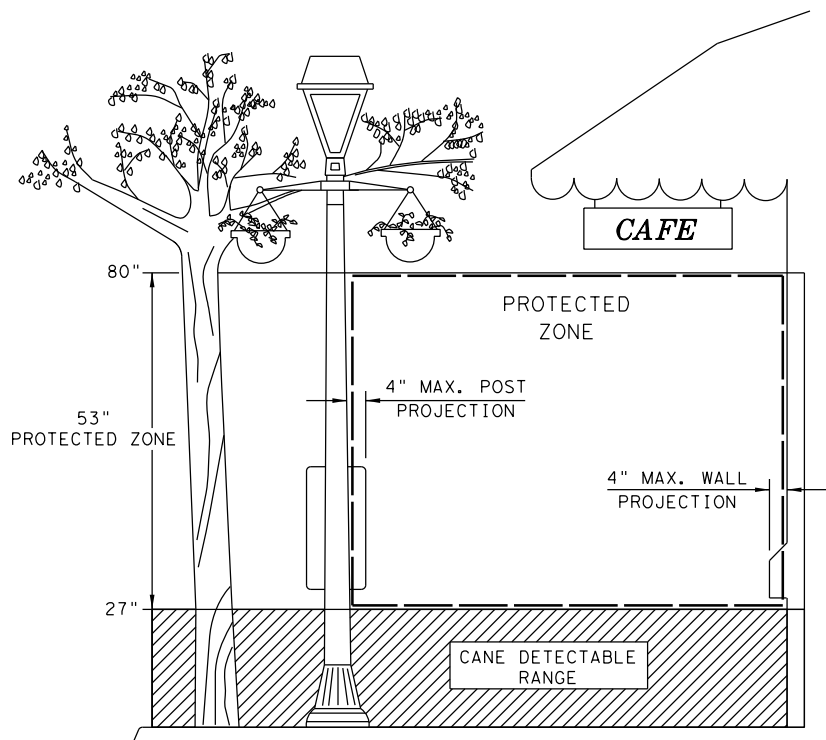
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SIDEWALK TREATMENT AT DRIVEWAYS



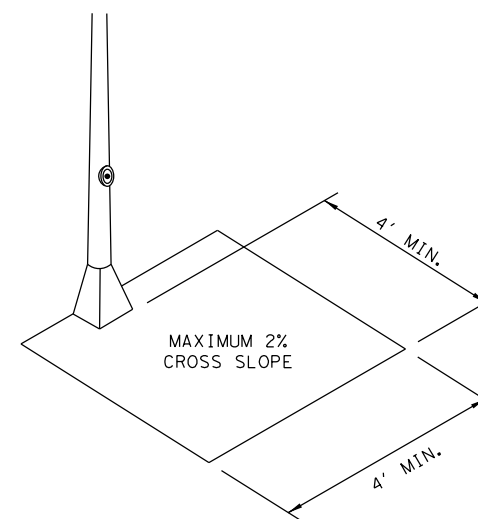
NOTES:

- * 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.

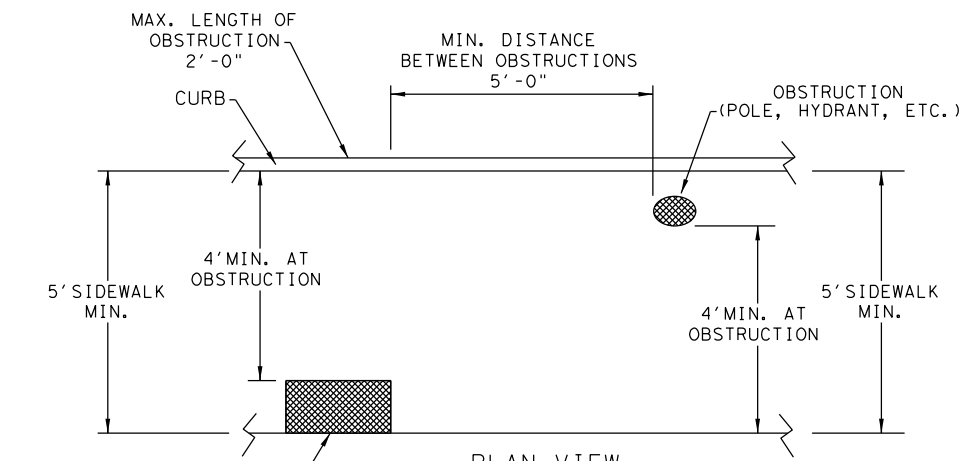


PROTECTED ZONE

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

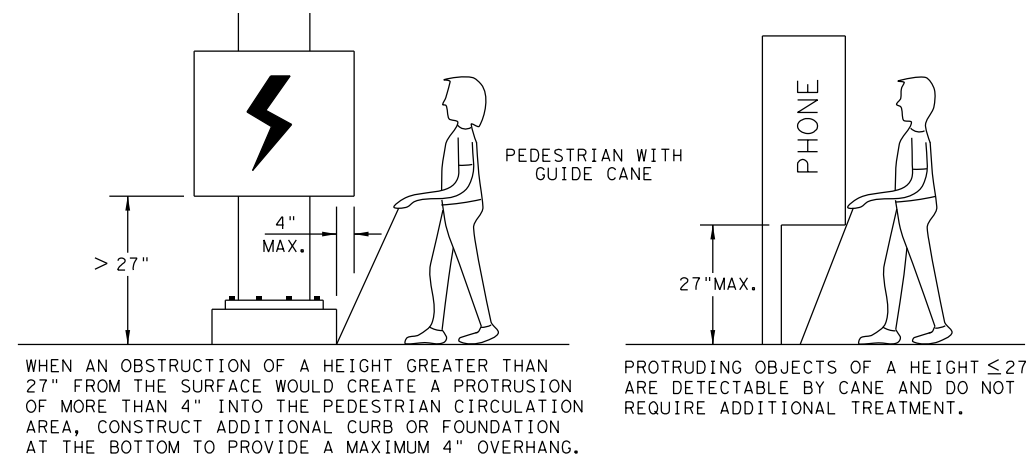


CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



PLAN VIEW
PLACEMENT OF STREET FIXTURES

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



DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

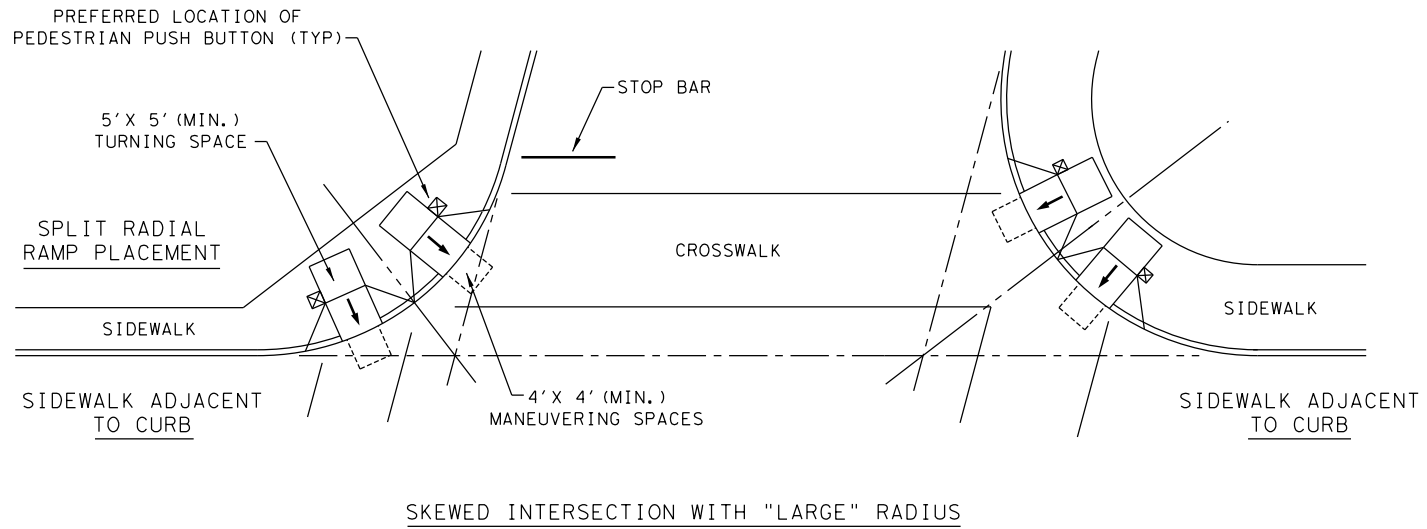
SHEET 3 OF 4

		Design Division Standard	
<h1>PEDESTRIAN FACILITIES</h1> <h2>CURB RAMPS</h2> <h3>PED-18</h3>			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT: 0909	SECT: 22	JOB: 197
REVISIONS	REVISIONS REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018		HIGHWAY CS
DIST: WAC	COUNTY: MCLENNAN	SHEET NO.: 35	

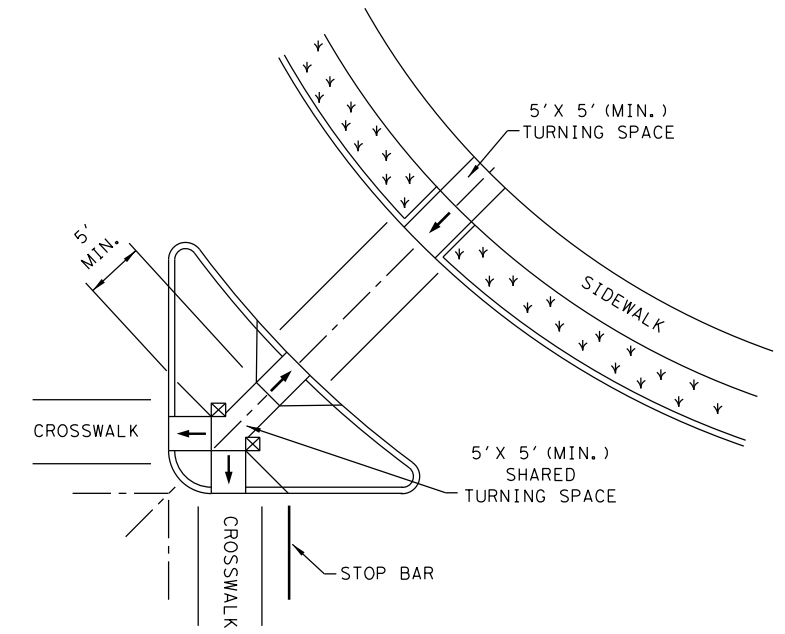
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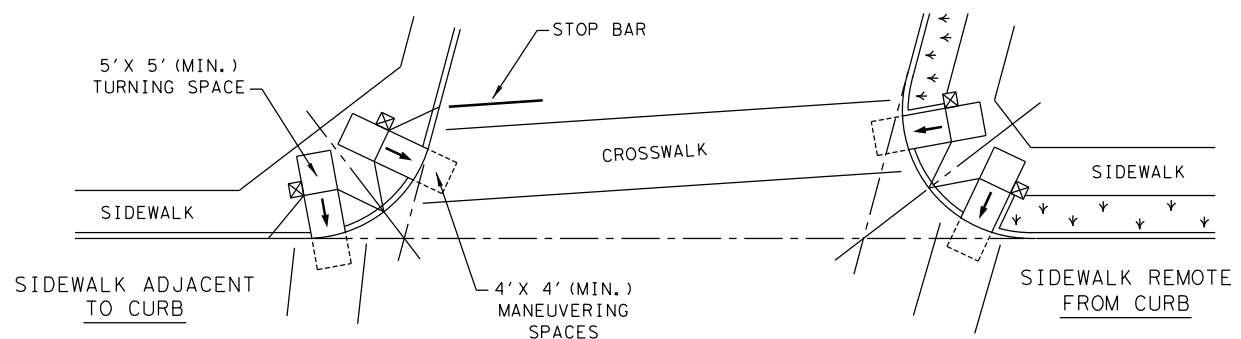
TYPICAL CROSSING LAYOUTS
 SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



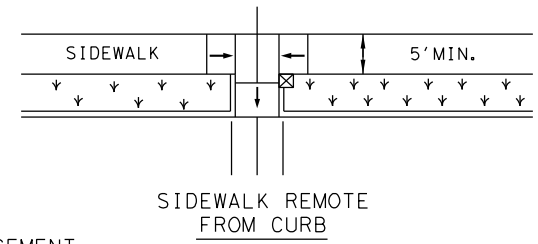
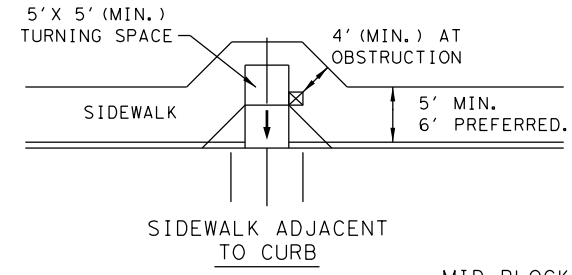
SKewed INTERSECTION WITH "LARGE" RADIUS



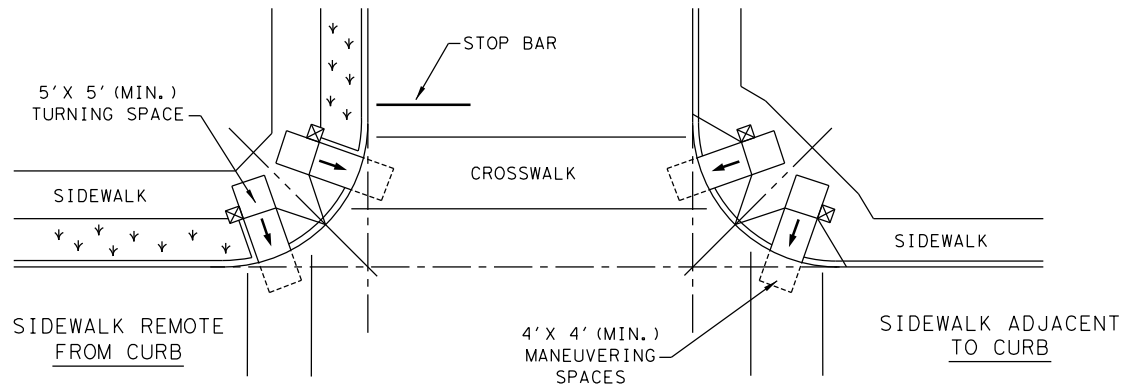
AT INTERSECTION
 W/FREE RIGHT TURN & ISLAND



SKewed INTERSECTION WITH "SMALL" RADIUS



MID-BLOCK PLACEMENT
 PERPENDICULAR RAMPS



NORMAL INTERSECTION WITH "SMALL" RADIUS

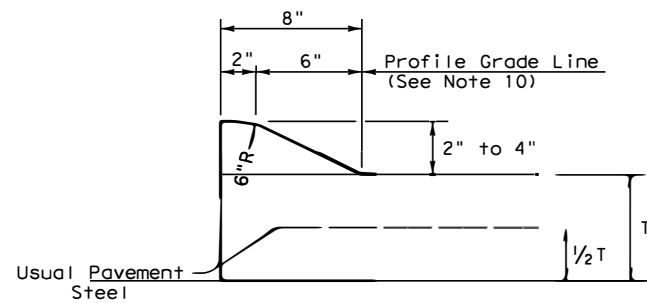
LEGEND:

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

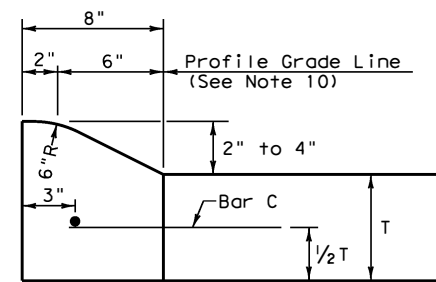
		Design Division Standard	
<h2>PEDESTRIAN FACILITIES CURB RAMPS</h2> <h3>PED-18</h3>			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT: 0909	SECT: 22	JOB: 197
REVISIONS	DIST: WAC		COUNTY: MCLENNAN
REVISED 08, 2005	SHEET NO. 36		HIGHWAY: CS
REVISED 06, 2012			
REVISED 01, 2018			

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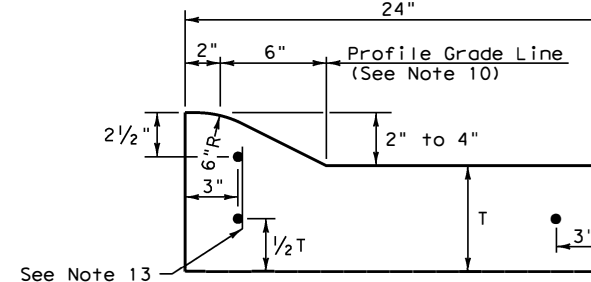
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FILE:



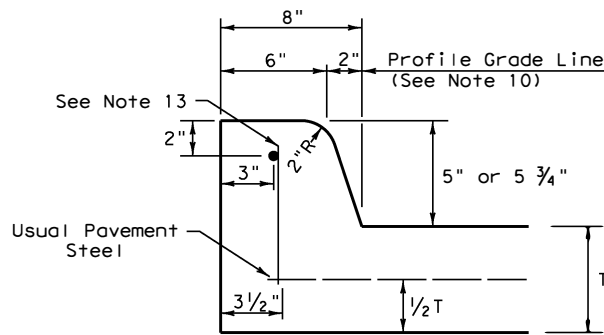
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



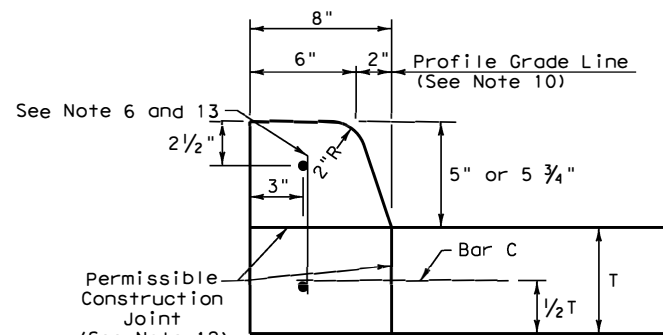
TYPE I CURB
2" - 4" HEIGHT



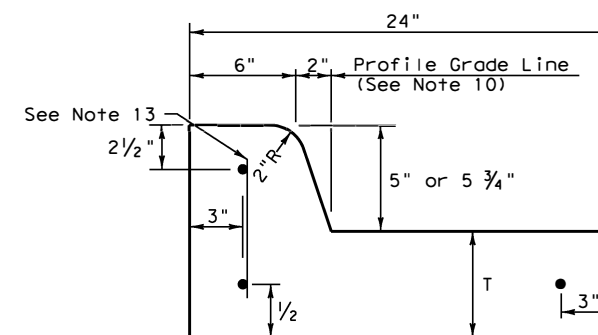
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



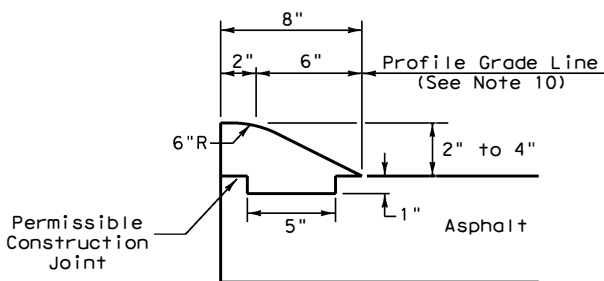
TYPE II CURB (MONOLITHIC)
5" - 5 3/4" HEIGHT



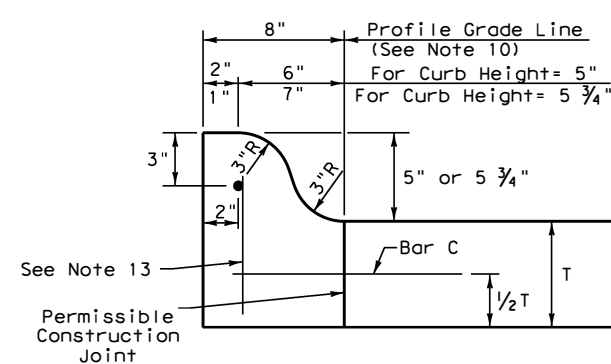
TYPE II CURB
5" - 5 3/4" HEIGHT



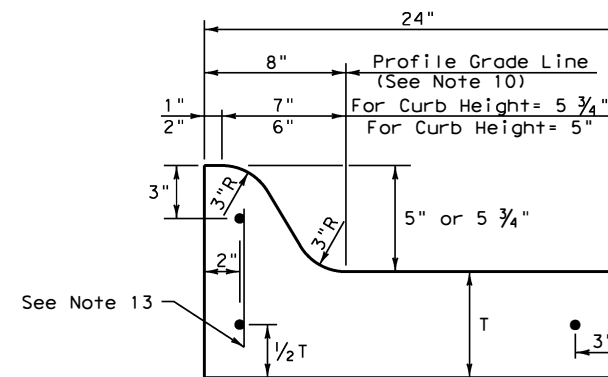
TYPE II CURB AND GUTTER
5" - 5 3/4" HEIGHT



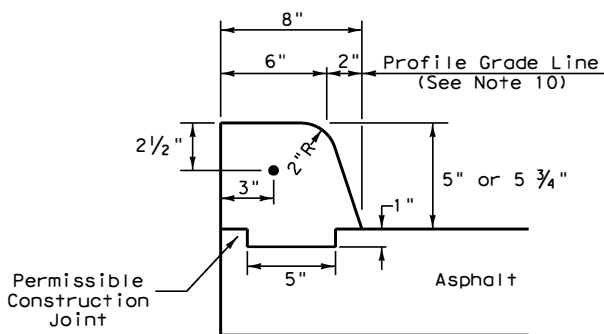
TYPE III CURB (KEYED)
2" - 4" HEIGHT



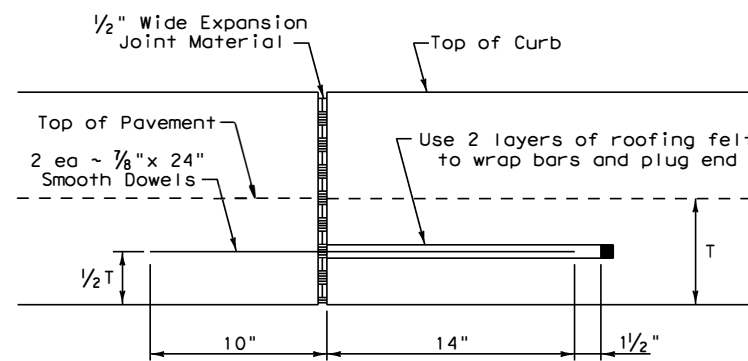
TYPE IIa CURB
5" - 5 3/4" HEIGHT



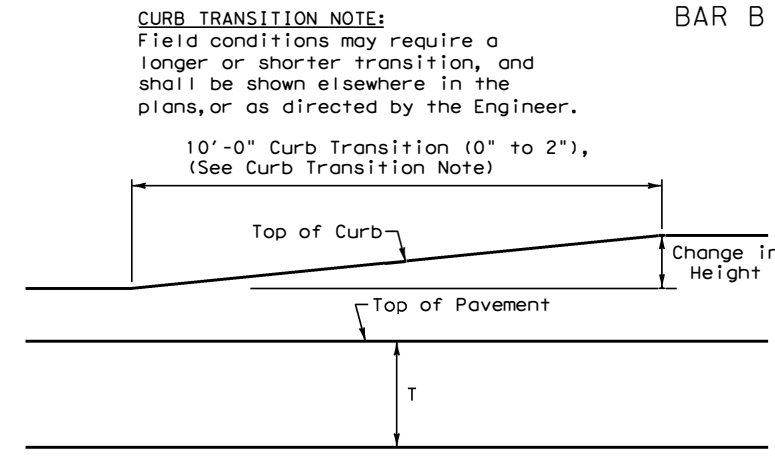
TYPE IIa CURB AND GUTTER
5" - 5 3/4" HEIGHT



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



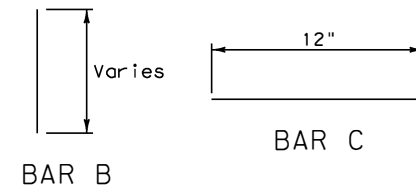
EXPANSION JOINT DETAIL



CURB TRANSITION
Note: To be paid for as Highest Curb

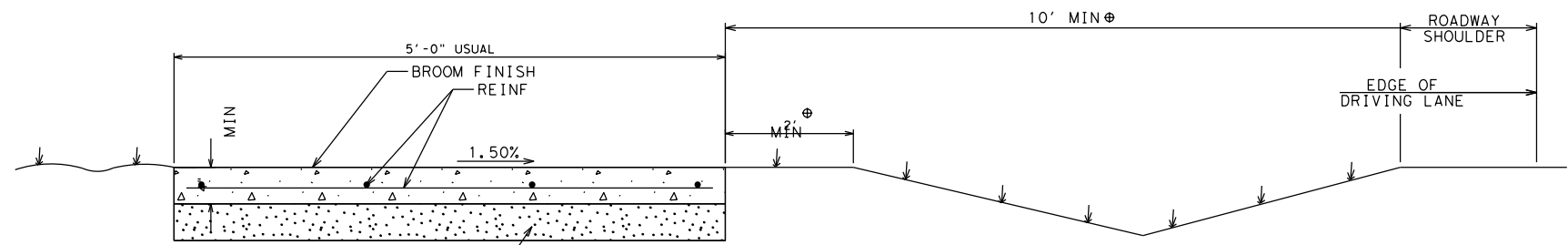
GENERAL NOTES

- 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.



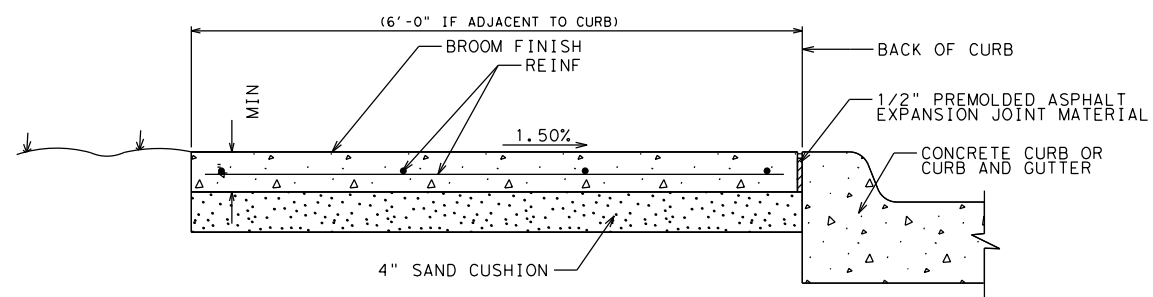
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.

		Design Division Standard	
<h2>CONCRETE CURB AND GUTTER</h2>			
<h3>CCCG-22</h3>			
FILE: cccg21.dgn	DN: TxDOT	CK: AN	DW: CS
©TxDOT: JUNE 2022	CONT	SECT	JOB
REVISONS	0909	22	197
DIST	COUNTY		SHEET NO.
WAC	MCLENNAN		37

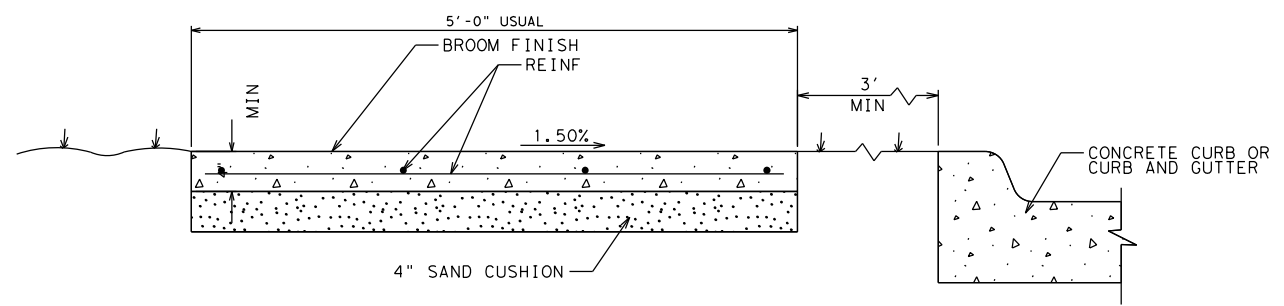


CONCRETE SIDEWALK
(ROADWAY W/O CURB)

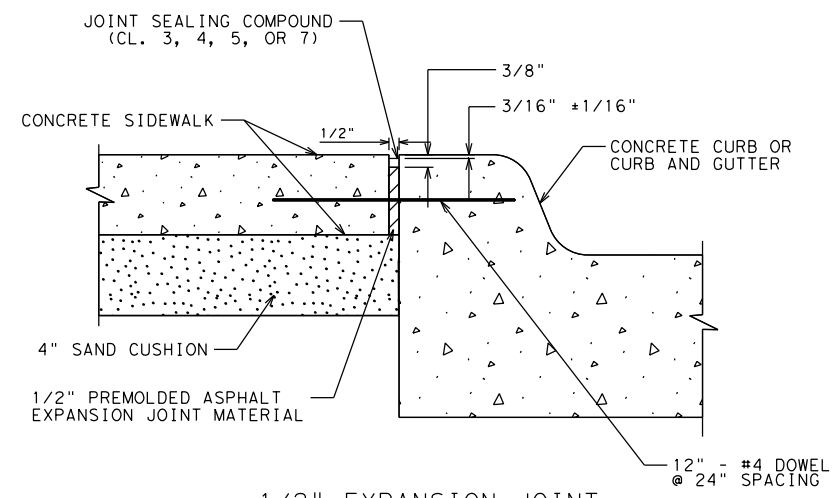
⊕ SIDEWALK TO BE 10' MIN. FROM EDGE OF SHOULDER OR 2' MIN FROM TOP OF DITCH BACK SLOPE, WHICHEVER IS GREATER (10' MIN. FROM EDGE OF SHOULDER IF NO DITCH.)



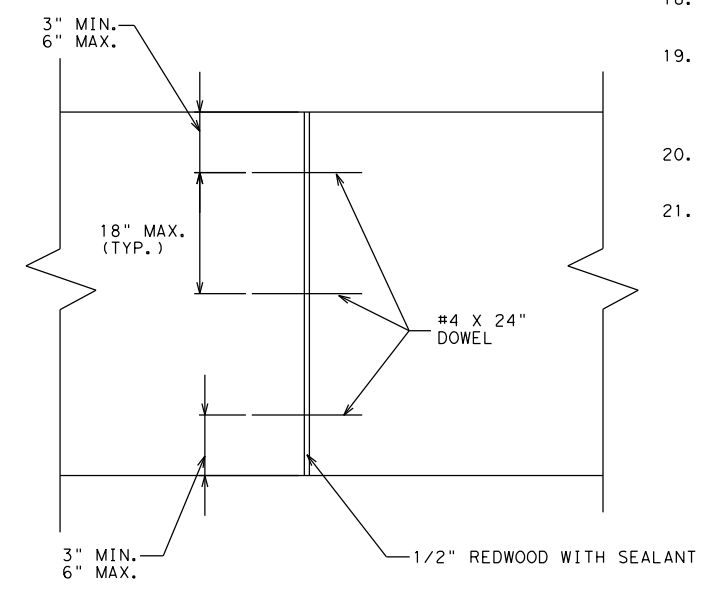
CONCRETE SIDEWALK
(ADJACENT TO CURB)



CONCRETE SIDEWALK
(OFFSET FROM CURB)



1/2" EXPANSION JOINT
(SIDEWALK ADJACENT TO CURB)



TRANSVERSE EXPANSION JOINT

GENERAL NOTES

1. SEE PLAN SHEETS FOR LOCATIONS OF SIDEWALKS AND RETAINING WALLS.
2. SEE TXDOT PED STANDARD FOR ADDITIONAL PEDESTRIAN ELEMENT CRITERIA.
3. CONSTRUCT SIDEWALK IN ACCORDANCE WITH ITEM #531.
4. UNLESS SPECIFIED ELSEWHERE IN THE PLANS TO BE ONLY REINFORCING BARS, THE REINFORCEMENT MAY BE COMPOSED OF REINFORCING BARS, WELDED WIRE REINFORCEMENT (WWR) OR ANY SUITABLE COMBINATION OF BOTH TYPES. UNLESS SPECIFIED ELSEWHERE IN THE PLANS, REINFORCING BARS SHALL BE #3 @ 18" C-C, GRADE 40 WITH LAP SPLICES 40 BAR DIAMETERS LONG. WELDED WIRE REINFORCEMENT (WWR) SHALL BE 6x6-#6 WIRE MESH.
5. ALL DOWELS SHALL BE ADEQUATELY SUPPORTED TO RETAIN PROPER ALIGNMENT.
6. REBAR CHAIRS SHALL BE PLACED ON 4" MAXIMUM SPACING EACH WAY.
7. DRILL & DOWEL INTO EXISTING CURB & GUTTER #4 BARS, 12" @ 24" SPACING.
8. CURING MEMBRANE SHALL BE APPLIED ACCORDING TO MANUFACTURER'S RECOMMENDATIONS.
9. PLACE EXPANSION JOINTS EVERY 40'.
10. EXPANSION JOINTS SHALL ALIGN WITH CURB AND GUTTER JOINTS.
11. PLACE CONTRACTION OR DUMMY JOINTS AT A SPACING EQUAL TO THE WIDTH OF THE WALK.
12. TYPICAL SIDEWALKS SHALL BE FORMED AND POURED AT A MAXIMUM CROSS-SLOPE OF 1.5%. ANY CROSS-SLOPES EXCEEDING 2% WILL NOT BE ACCEPTED.
13. LONGITUDINAL SLOPE OF SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF SIDEWALKS MAY MATCH THAT OF ROADWAY.
14. CHANGES IN LEVEL GREATER THAN 1/4 INCH ARE NOT PERMITTED ALONG SIDEWALKS.
15. NEW SIDEWALK SHALL BE CONNECTED TO ALL EXISTING ADJACENT WALKS AND STEPS.
16. MINIMUM COVER OVER REINF SHOULD BE 2". MAXIMUM LATERAL COVER OVER REINF IS 3".
17. WHERE SIDEWALK OR WHEELCHAIR RAMP ADJOINS BACK OF CURB, INLET, POLE OR ANY STRUCTURE, APPROVED EXPANSION MATERIAL SHALL BE USED.
18. IF SIDEWALK WIDTH IS LESS THAN 5', PROVIDE 5' X 5' PASSING AREAS AT INTERVALS NOT TO EXCEED 200' SPACING.
19. WHERE SIDEWALK WITH RETAINING WALL IS SPECIFIED, RETAINING WALL WILL BE SUBSIDIARY TO THE ITEM, "CONCRETE SIDEWALK (SPECIAL) (RETAINING WALL)", WITH LIMITS OF PAY AS SHOWN HEREON.
20. SIDEWALK EXPANSION JOINTS SHOULD EXTEND THROUGH ADJACENT CONCRETE STRUCTURES SUCH AS CURB AND CURB AND GUTTERS.
21. BRICK SAND UNDER SIDEWALK WILL BE UNACCEPTABLE.

CONCRETE SIDEWALK DETAILS

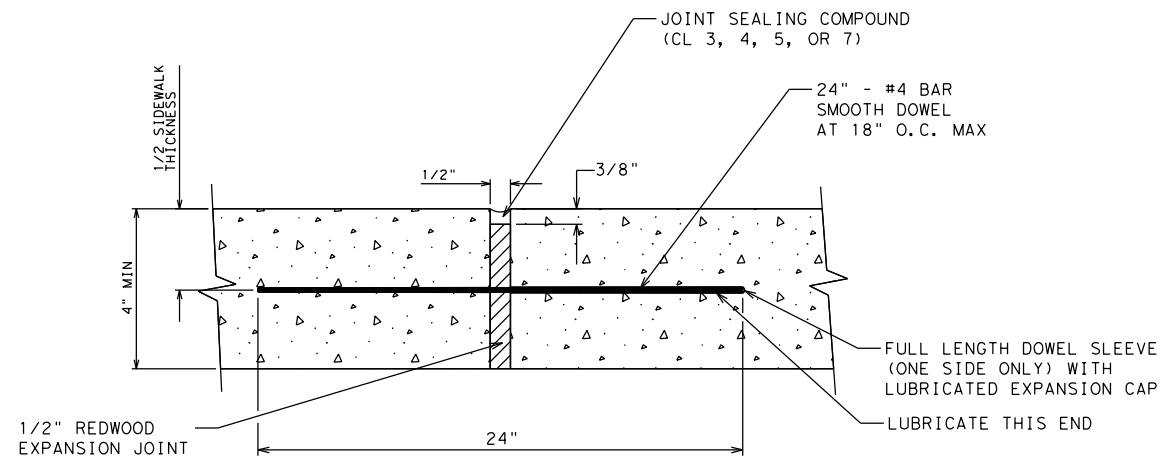
Texas Department of Transportation
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WACO DISTRICT STANDARD

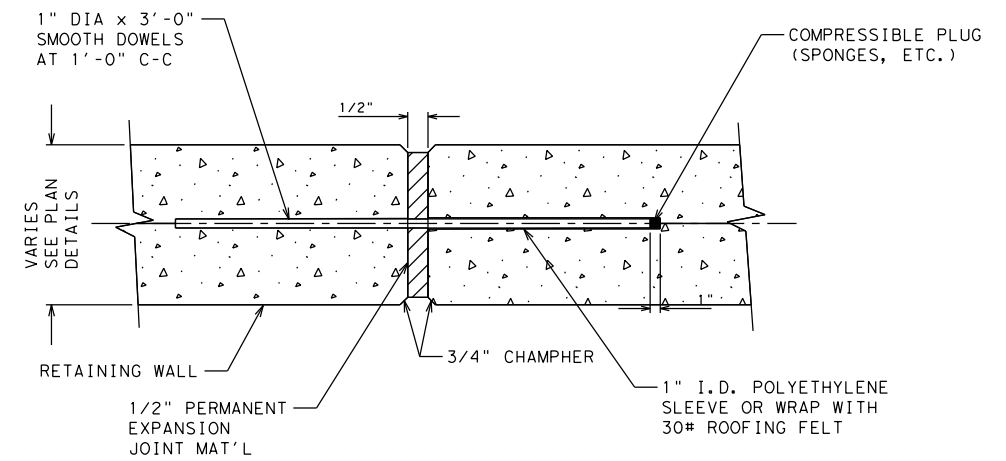
CONCRETE SIDEWALK DETAILS

SHEET 1 OF 3

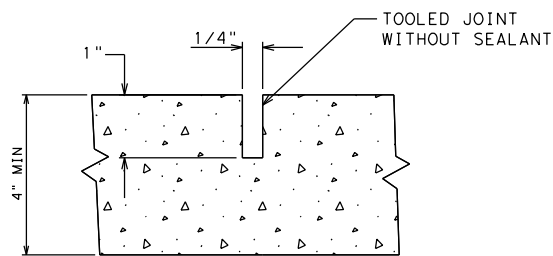
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			38
STATE	DIST.	COUNTY	
TEXAS	WACO	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS



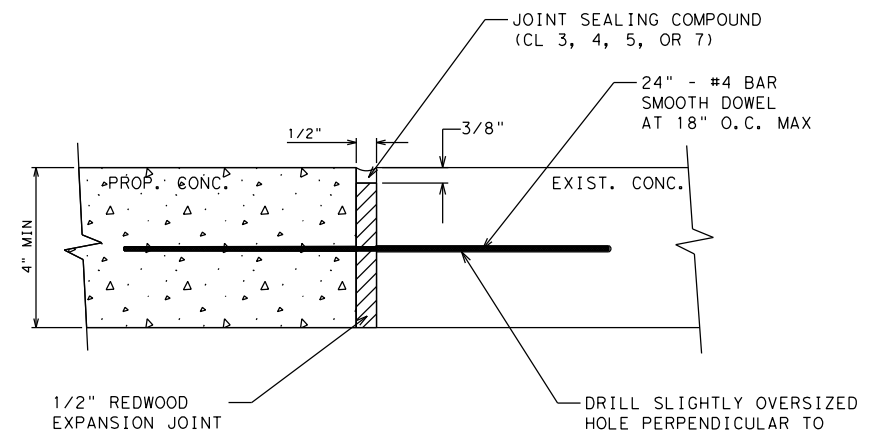
EXPANSION JOINT (SIDEWALK)



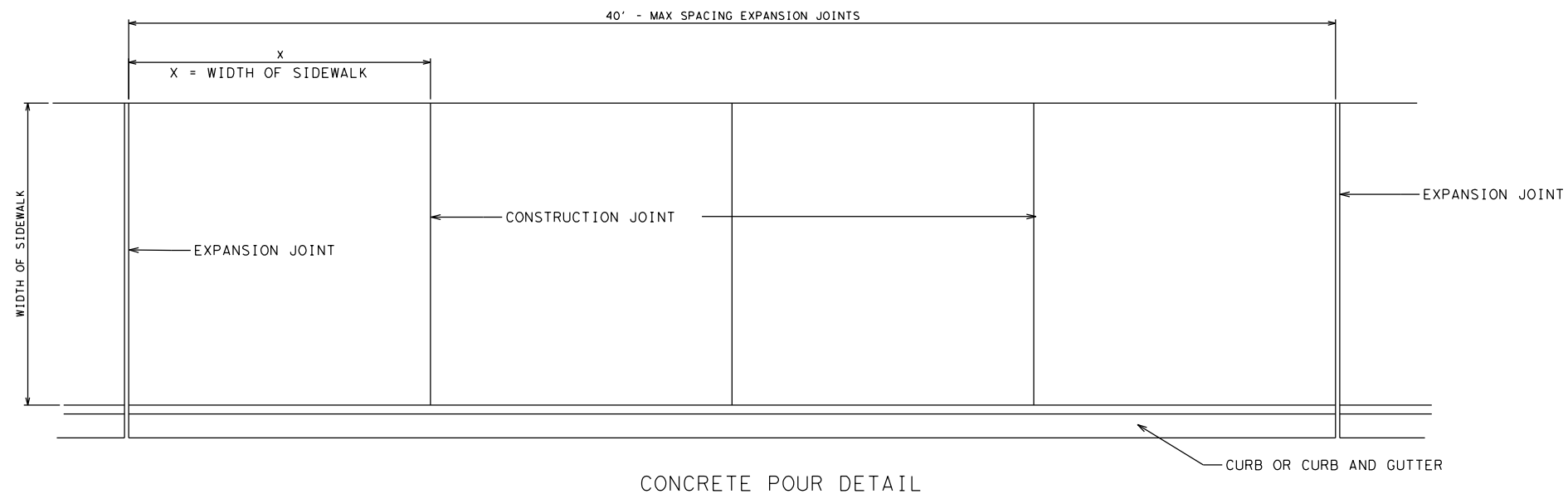
EXPANSION JOINT (RETAINING WALL)



CONTRACTION JOINT



DOWEL TO EXISTING DETAIL



CONCRETE POUR DETAIL

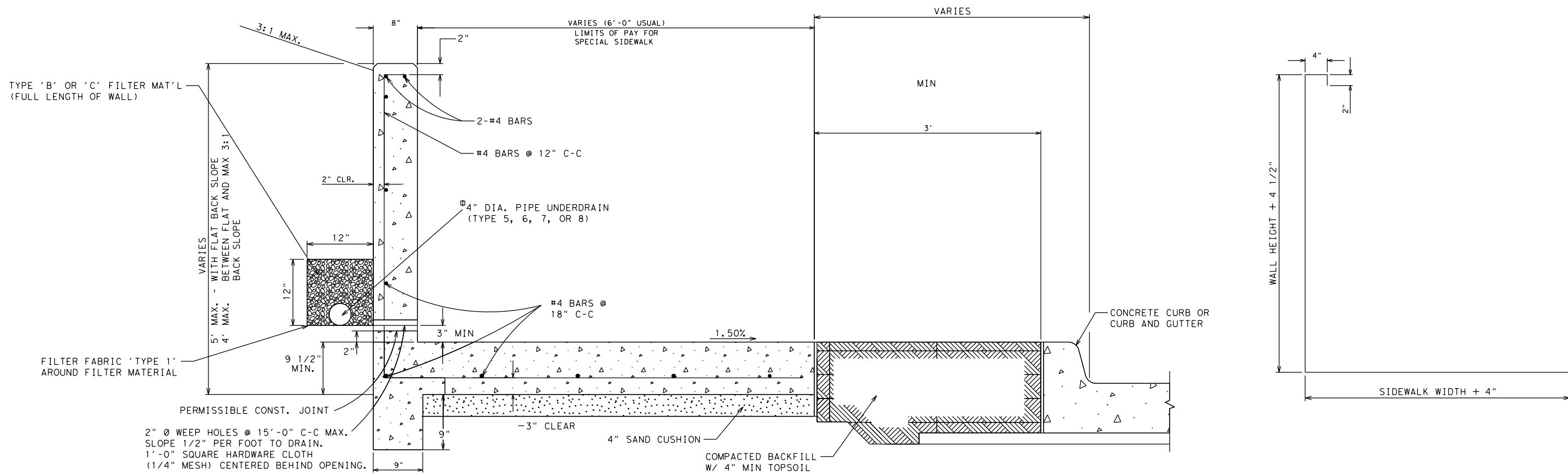
Texas Department of Transportation
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WACO DISTRICT STANDARD

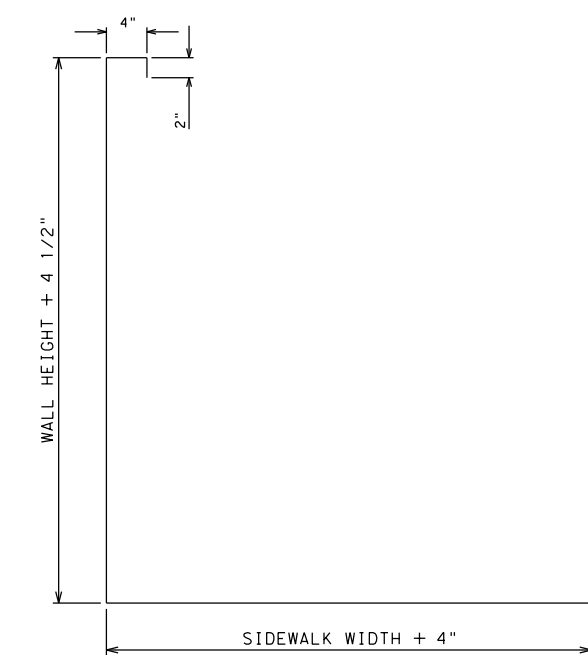
CONCRETE
SIDEWALK DETAILS

SHEET 2 OF 3

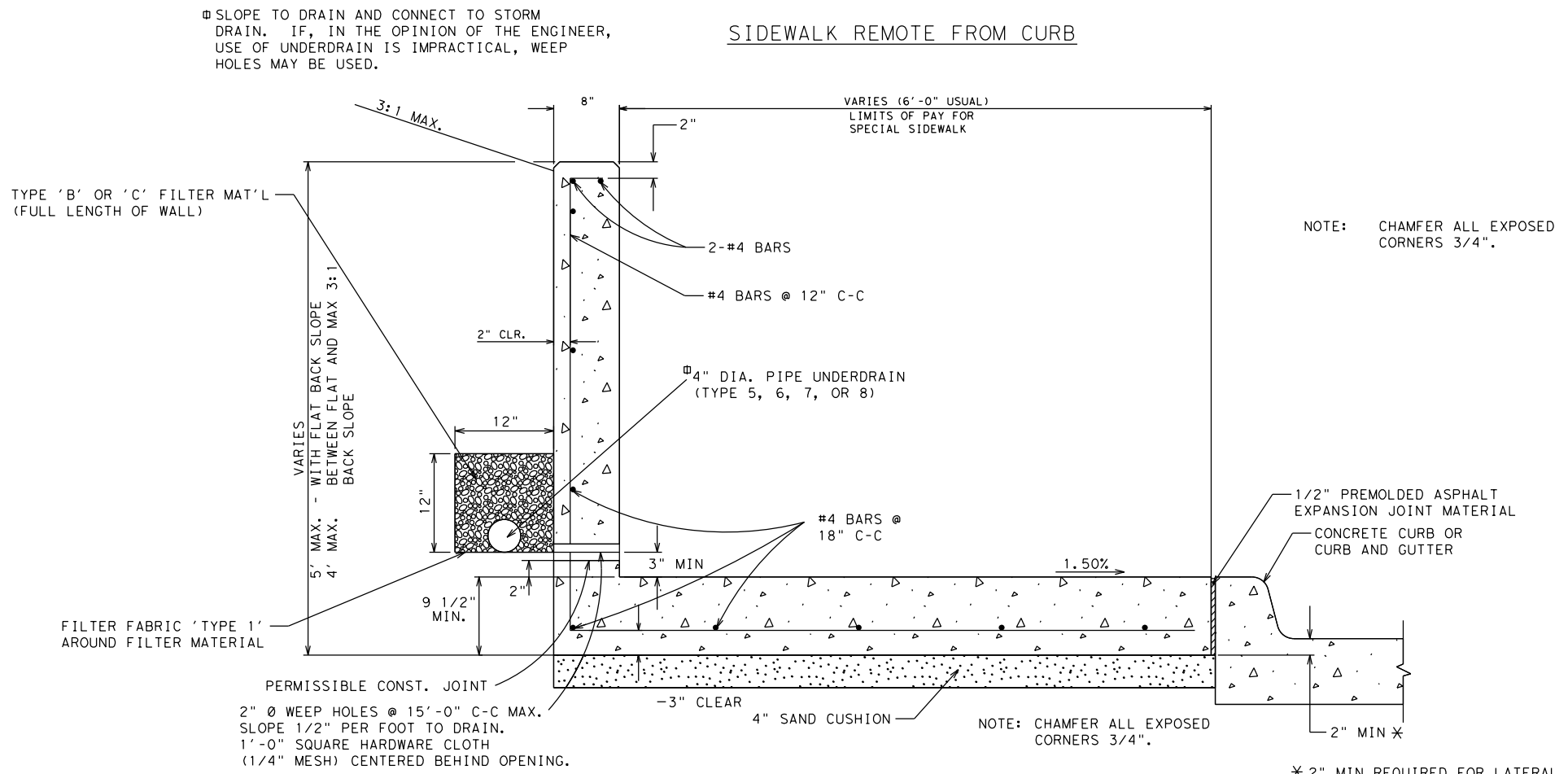
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			39
STATE	DIST.	COUNTY	
TEXAS	WACO	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS



SIDEWALK REMOTE FROM CURB



REINFORCING STEEL DETAIL



SIDEWALK ADJACENT TO CURB

NOTE: CHAMFER ALL EXPOSED CORNERS 3/4".

* 2" MIN REQUIRED FOR LATERAL SUPPORT.

SPECIAL CONCRETE SIDEWALK W/RETAINING WALL

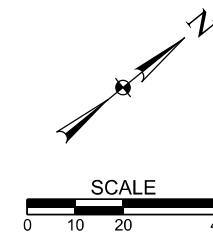
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WACO DISTRICT STANDARD

CONCRETE SIDEWALK DETAILS

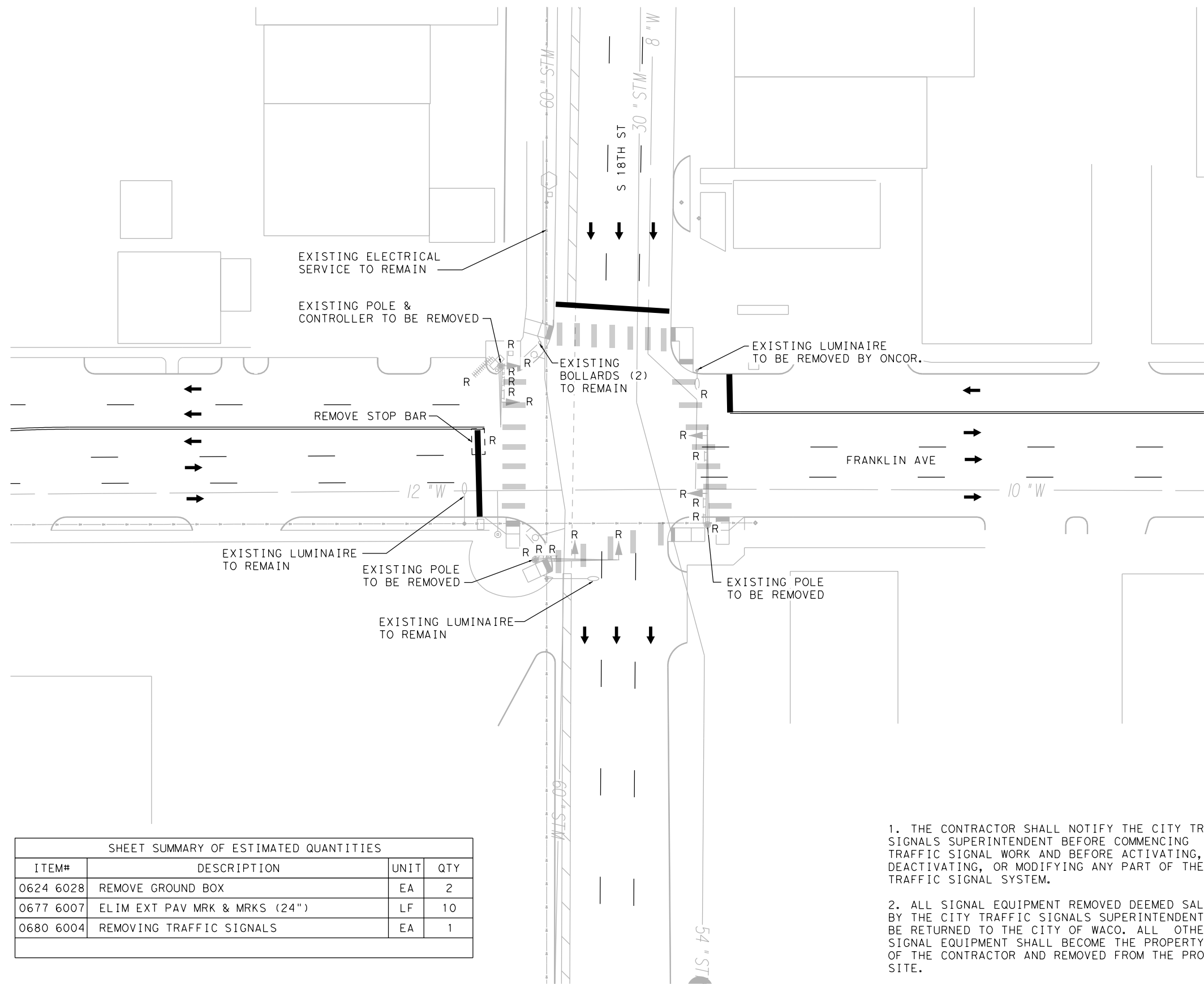
SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6			40
STATE	DIST.	COUNTY	
TEXAS	WACO	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS



LEGEND

- EXIST SIGNAL POLE
- EXIST HORIZONTAL SIGNAL HEAD
- EXIST POLE MTD CONTROLLER CABINET
- EXIST OVERHEAD SIGN
- EXIST GROUND BOX
- EXIST LUMINAIRE
- EXIST ELECTRICAL SERVICE
- EXIST VIDEO CAMERA
- EXIST ANTENNA
- TRAFFIC FLOW
- R ITEM TO BE REMOVED



MATCHLINE A-A

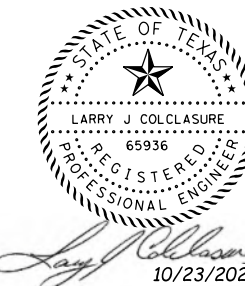
SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
0624 6028	REMOVE GROUND BOX	EA	2
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	10
0680 6004	REMOVING TRAFFIC SIGNALS	EA	1

1. THE CONTRACTOR SHALL NOTIFY THE CITY TRAFFIC SIGNALS SUPERINTENDENT BEFORE COMMENCING TRAFFIC SIGNAL WORK AND BEFORE ACTIVATING, DEACTIVATING, OR MODIFYING ANY PART OF THE TRAFFIC SIGNAL SYSTEM.

2. ALL SIGNAL EQUIPMENT REMOVED DEEMED SALVAGEABLE BY THE CITY TRAFFIC SIGNALS SUPERINTENDENT SHALL BE RETURNED TO THE CITY OF WACO. ALL OTHER SIGNAL EQUIPMENT SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND REMOVED FROM THE PROJECT SITE.

3. COORDINATE WITH THE CITY OF WACO TRAFFIC ENGINEER JAMES BAILEY AT 254-750-6639 FOR THE REMOVAL OF THE LUMINAIRE POLES BY ONCOR.

4. THE LOCATION OF UTILITIES ARE APPROXIMATE AND SHALL BE FIELD VERIFIED PRIOR TO CONSTRUCTION.



EXISTING CONDITION LAYOUT FRANKLIN AVE AT S 18TH ST

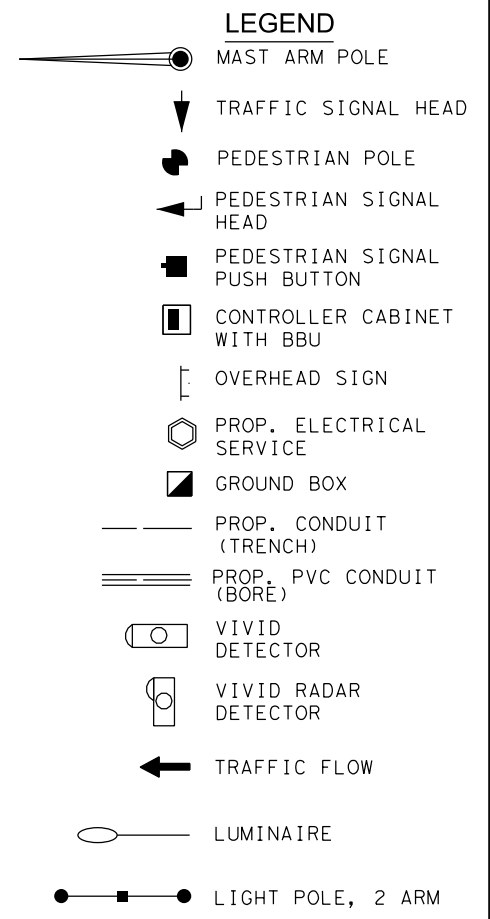
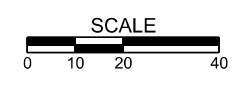
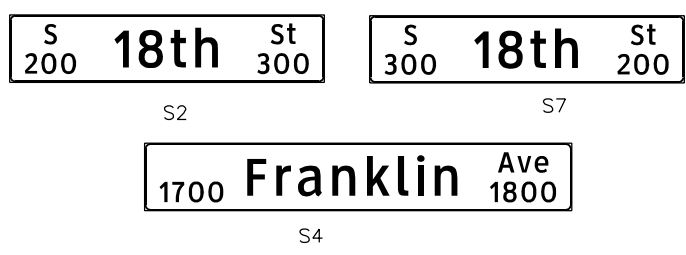
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.	
6	SEE TITLE SHEET	41	
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS

SPLTDRVSS
 \$TIMES 10/23/2023
 \$USERS
 S:\4.0.0.0.0. Engineering Operations\4.2.0.0.0. Project Files\2022\22049 - COW HSFP Projects\cad\signals\17th & 18th\5B Proposed_18th St Signals.dgn

DN: LJC CK: BAS DW: DBW CK: LJC

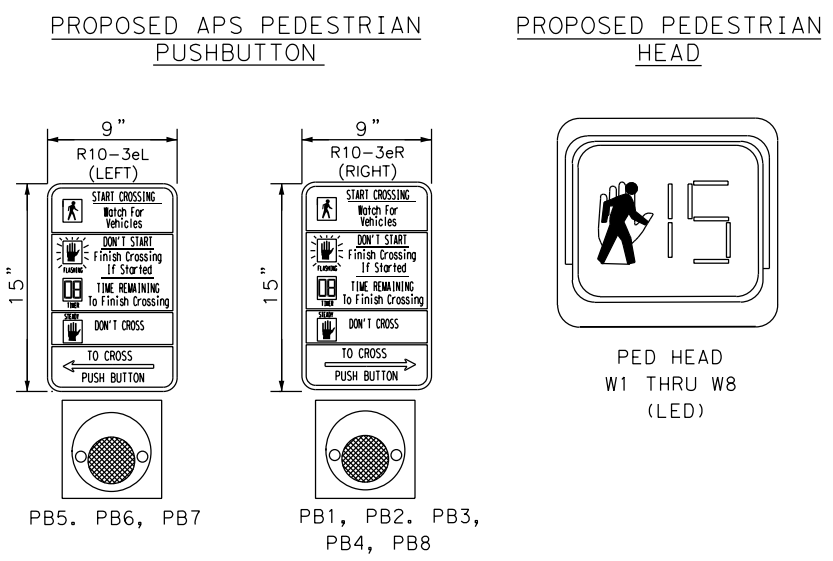
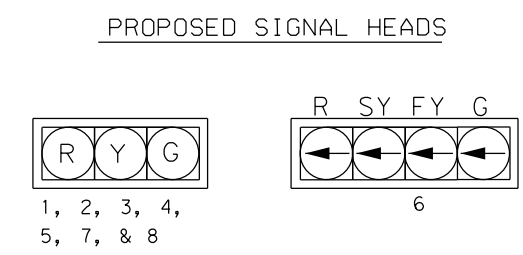


S1, S3 R6-2R 30" X 36"
 S6, S8 R6-2L 30" X 36"
 S5 R10-17T 36" X 42"



POLE DESCRIPTION

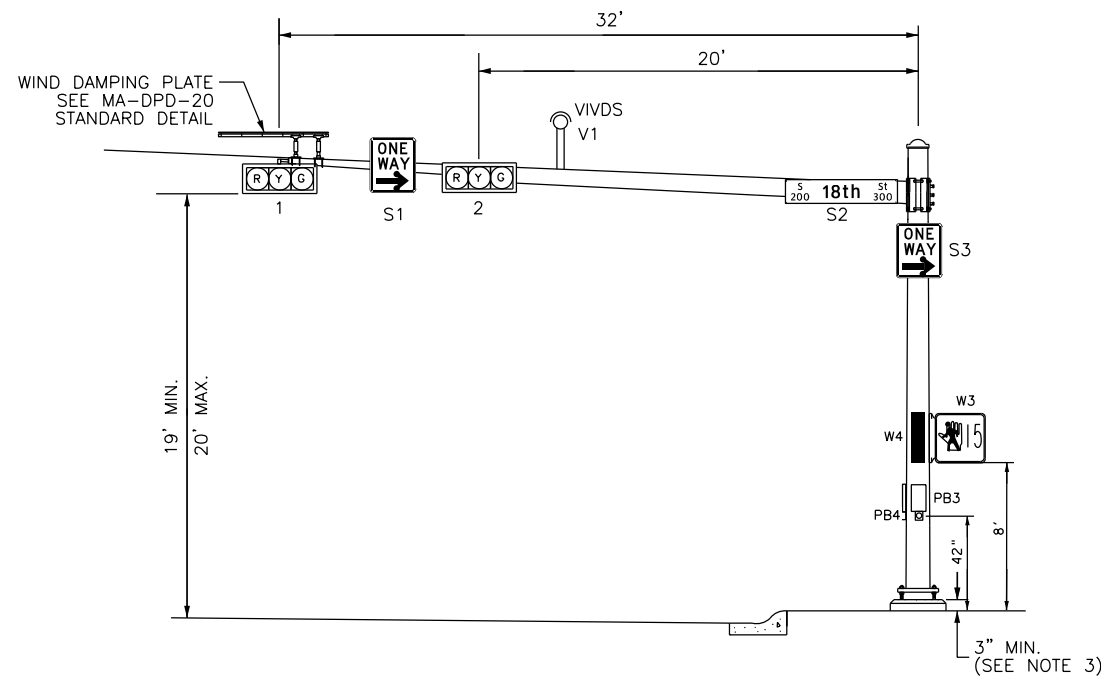
- A** PROP. POLE "A"
 -PROP. 32' MAST ARM W/ LUMINAIRE
 -PROP. VIVDS DETECTOR (1)
 -PROP. MAST ARM SIGNS (3)
- B** PROP. POLE "B"
 -PROP. 40' MAST ARM W/ LUMINAIRE
 -PROP. VIVDS DETECTOR (1)
 -PROP. MAST ARM SIGNS (1)
- C** PROP. POLE "C"
 -PROP. 32' MAST ARM
 -PROP. VIVDS DETECTOR (1)
 -PROP. MAST ARM SIGNS (4)
- D** THRU **H** PROP. PEDESTAL POLE



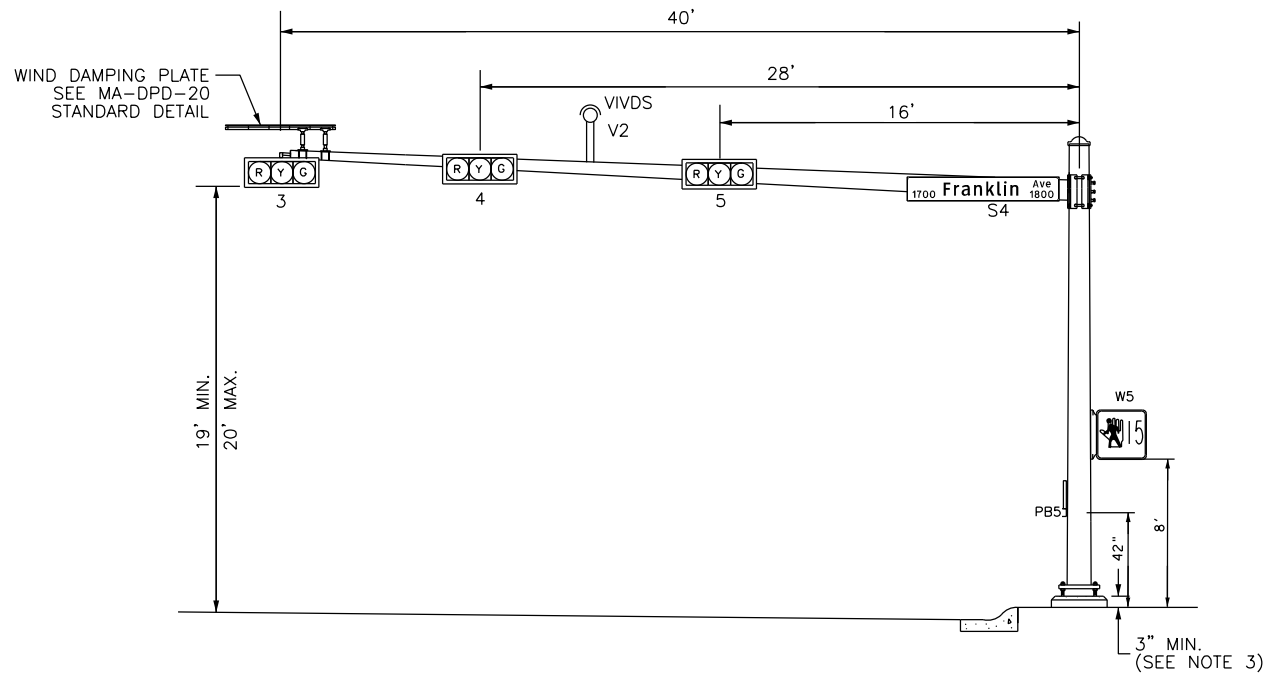
MALDONADO - BURKETT
 Engineers | Contractors
 TBPE # 10258
 www.maldonado-burkett.com

PROPOSED SIGNAL LAYOUT FRANKLIN AVE AT S 18TH ST

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.	
6	SEE TITLE SHEET	42	
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS



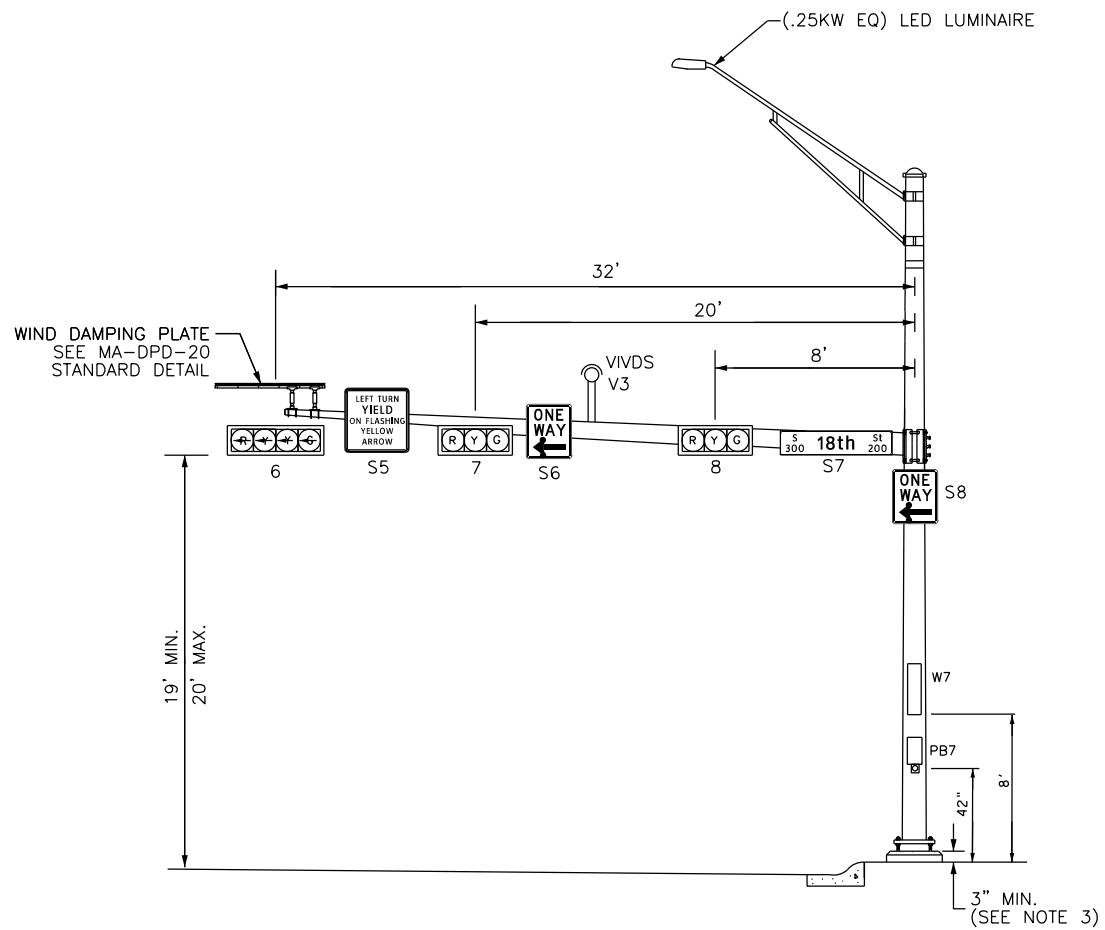
LOOKING NORTH ON FRANKLIN AVE
PROP. POLE "A" 32' MAST ARM
N.T.S



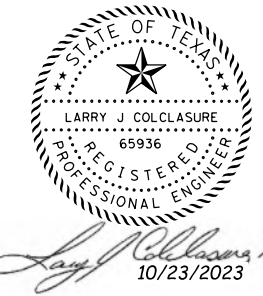
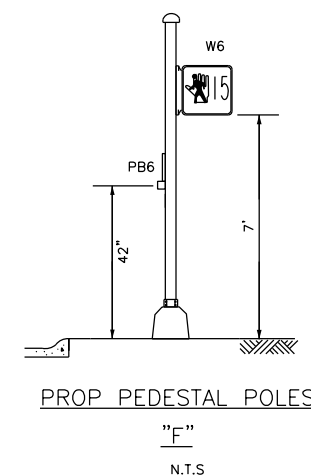
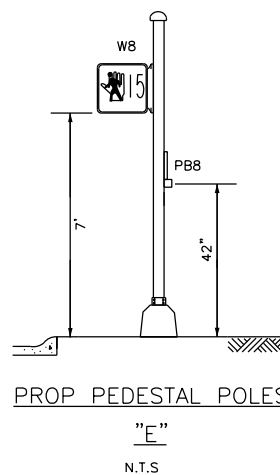
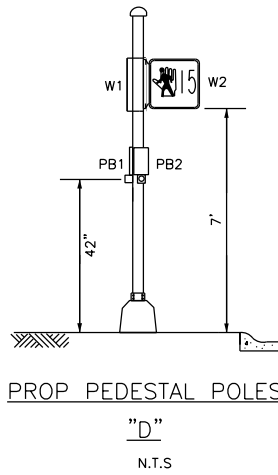
LOOKING EAST ON S. 18th ST.
PROP. POLE "B" 40' MAST ARM
N.T.S

NOTES:

1. SEE CONSTRUCTION DETAIL SHEETS FOR POLE MOUNTED SIGNAL HEAD, PEDESTRIAN HEADS, SIGNS AND PUSH BUTTON INSTALLATION REQUIREMENTS.
2. SIGNAL HEADS TO BE CENTERED OVER APPROACHING LANES UNLESS APPROVED BY THE ENGINEER. DISTANCES ALONG MAST ARMS ARE APPROXIMATE AND WILL BE ADJUSTED IN THE FIELD AS NEEDED.
3. CONTRACTOR TO ADJUST FOUNDATION HEIGHT ABOVE GROUND AS NEEDED TO PROVIDE SIGNAL HEAD MOUNTING HEIGHT, NOT TO EXCEED 12" ABOVE GROUND.



LOOKING SOUTH ON FRANKLIN AVE
PROP. POLE "C" 32' MAST ARM
N.T.S



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**SIGNAL POLE
ELEVATION DETAILS
FRANKLIN AVE AT
S 18TH ST**

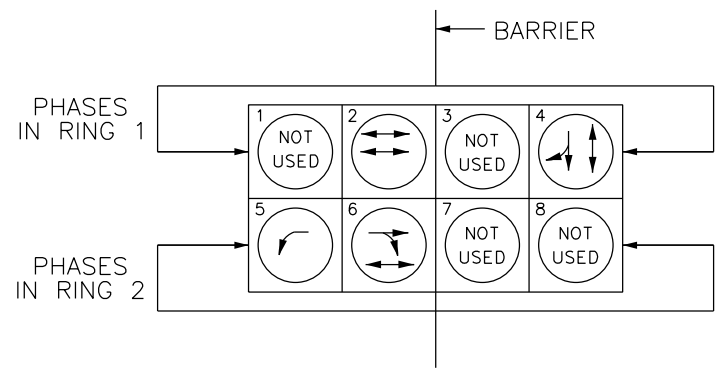
FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 43
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197
		HIGHWAY NO. CS

SIGNAL TIMING									
PHASE	MIN GREEN	GAP	RECALL	MAX GREEN	AVG APP SPEED	APPR GRADE	INT WIDTH	YELLOW CLEAR	RED CLEAR
2	10	2	ON	40	30		90	4	2.0
4	10	2	OFF	30	30		95	4	2.2
5	5	2	OFF	30	30		100	4	2.3
1	10	2	ON	40	30		90	4	2.0

NOTE: CLEARANCE TIMES BASED ON ITE GUIDELINES

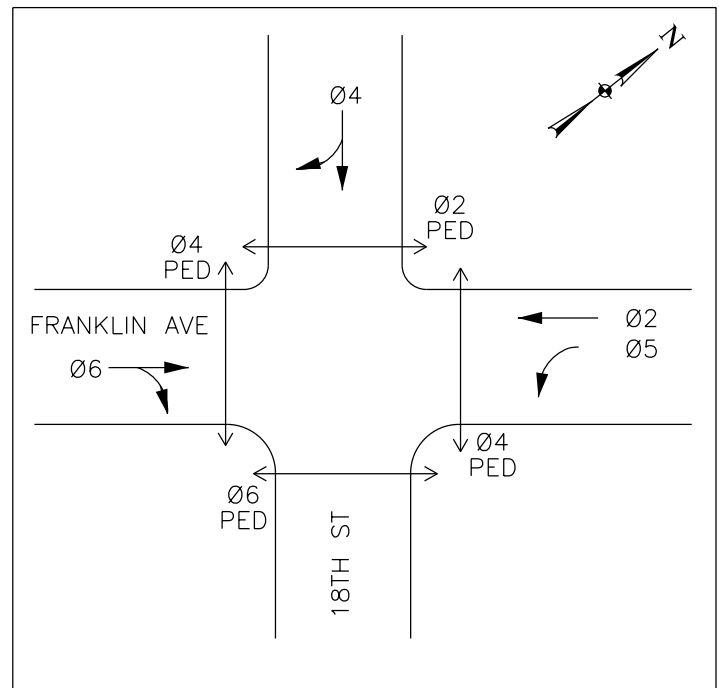
APS MESSAGE INFORMATION			
APS UNIT #	ACKNOWLEDGEMENT DEFAULT "WAIT"	EXTENDED PRESS MESSAGE	WALK PHASE MESSAGE
		"WAIT TO CROSS (STREET NAME) "	"WALK SIG IS ON TO CROSS (STREET NAME) "
1	YES	18TH STREET	18TH STREET
2	YES	FRANKLIN AVENUE	FRANKLIN AVENUE
3	YES	FRANKLIN AVENUE	FRANKLIN AVENUE
4	YES	18TH STREET	18TH STREET
5	YES	18TH STREET	18TH STREET
6	YES	FRANKLIN AVENUE	FRANKLIN AVENUE
7	YES	FRANKLIN AVENUE	FRANKLIN AVENUE
8	YES	18TH STREET	18TH STREET

PEDESTRIAN TIMINGS			
PEDESTRIAN PHASE	PEDESTRIAN HEADS	WALK	FLASHING DON'T WALK
2	1 & 8	7	13
4	2, 3, 6 & 7	7	16
6	4 & 5	7	13

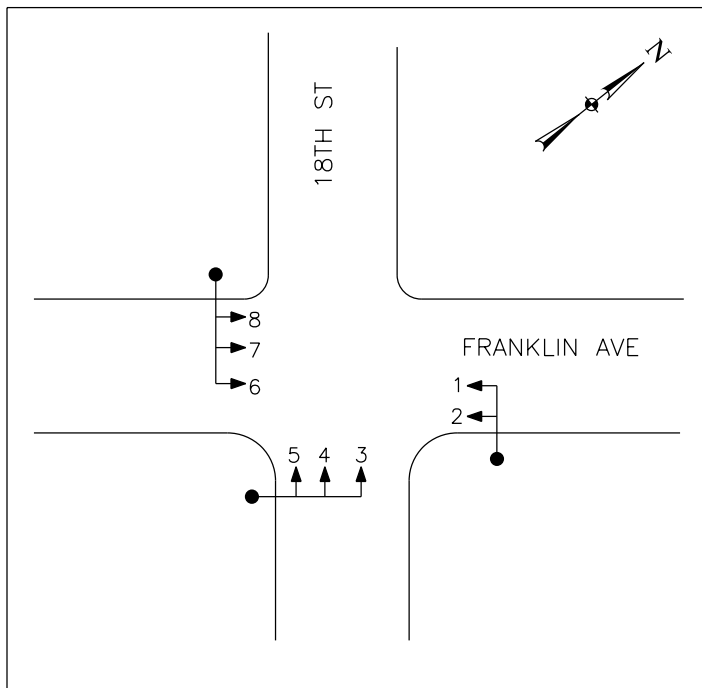


NOTES:

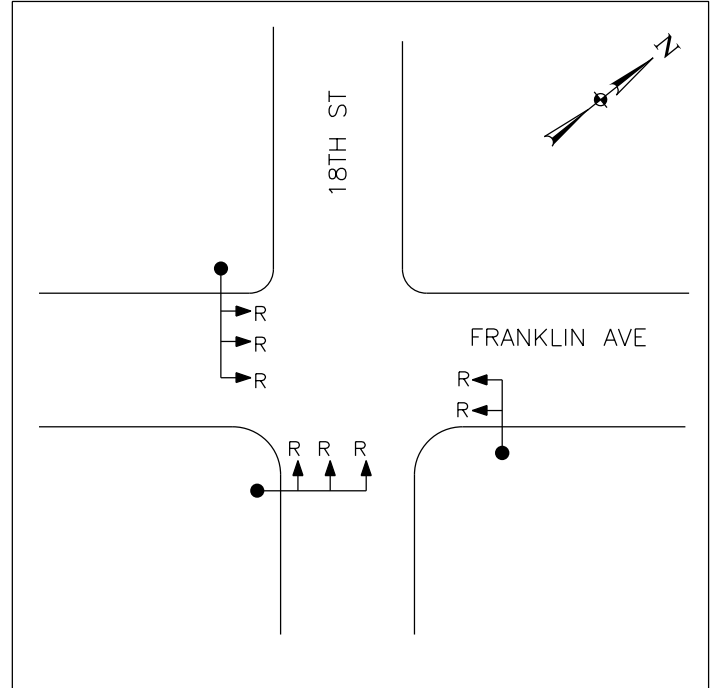
1. ANY PHASE IN ONE RING MAY BE SERVICED WITH ANY PHASE IN THE OTHER RING ON THE SAME SIDE OF THE BARRIER.
2. SIGNAL TIMING TO BE VERIFIED AND APPROVED BY TXDOT.



PHASE DESIGNATION



SIGNAL HEAD LAYOUT



EMERGENCY & CONFLICT FLASH




**PHASING DIAGRAM
FRANKLIN AVE AT
S 18TH ST**


FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 44
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197
		HIGHWAY NO. CS

CONDUIT AND CONDUCTOR RUNS																												
RUN NO.	RUN LENGTH	CONDUIT SIZE / TYPE								STATUS	ELECTRICAL CONDUCTORS								TRAFFIC SIGNAL CABLES								DETECTION	
		2" PVC (SCH 40)		2" PVC (SCH 80) (BORE)		3" PVC (SCH 40)		3" PVC (SCH 80) (BORE)			GROUND		LUMINARE		POWER				SIGNAL				PEDESTRIAN		VIVDS COM CABLE (COAX)			
		618-6023		618-6024		618-6029		618-6030			#8 BARE		#8 INSULATED		#6 BARE		#6 INSULATED		#14 /4C		#14 /7C		#14 /16C		#12 /2C		6306-6007	
		EA	LF	EA	LF	EA	LF	EA	LF		EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF
1	5	2	5							I					1	5	2	10										
2	5	1	5							I													6	30	3	15		
2	5					1	5			I	2	10			1	5	2	10	2	10			2	10				
3	50			1	50					I													6	300	2	100		
3	50							1	50	I	1	50	2	100					2	100			2	100				
4	55	1	55							I													6	330	2	110		
4	55					1	55			I	1	55	2	110					2	110			2	110				
5	175	1	175							I	1	175	2	350														
6	15	1	15							I													2	30				
6	15					1	15			I	1	15						2	30									
7	60			1	60					I													4	240	2	120		
7	60							1	60	I	1	60									2	120						
8	10	1	10							I													2	20	1	10		
8	10					1	10			I	1	10									1	10						
9	70			1	70					I													2	140	1	70		
9	70							1	70	I	1	70									1	70						
10	10	1	10							I													1	10	1	10		
10	10					1	10			I	1	10						1	10			1	10					
11	5	1	5							I													1	5				
11	5					1	5			I	1	5						1	5									
12	20	1	20							I			2	40									2	40	1	20		
12	20					1	20			I	1	20						1	20			1	20					
13	5	1	5							I													1	5				
13	5					1	5			I	1	5						1	5									
14	25	1	25							I			2	50									1	25	1	25		
14	25					1	25			I	1	25									1	25						
15	5	1	5							I													1	5	1	5		
15	5					1	5			I	1	5	2	10								1	5					
CABLE IN POLES & ARMS																												
POLE A										I	1	4	2	80					2	30			1	5	2	8	1	20
ARM A										I									2	52							1	20
POLE B										I	1	4	2	80					4	50			1	5	1	4	1	20
ARM B										I									3	84							1	25
POLE C										I	1	4	2	80					2	30	1	15	1	5	1	4	1	20
ARM C										I									2	28	1	32					1	15
PED POLE D										I	1	2							1	7				1	4			
PED POLE E										I	1	2							1	5				1	5			
PED POLE F										I	1	2							1	7				1	4			
PED POLE G										I	1	2							1	5				1	5			
PED POLE H										I	1	2							1	7				1	4			
CABLE IN SIGNAL CABINET																												
CABINET										I	1	10			1	10	2	20					4	40	8	80	2	20
TOTAL (LF)		340	180			155	180			-	547	900			20	40			595			47	535	1298		625		

STATUS: I=INSTALL; E=EXISTING; REL=RELOCATE REM=EXISTING TO BE REMOVED;



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SIGNAL SUMMARY SHEET
FRANKLIN AVE AT
S 18TH ST

SHEET 1 OF 3

FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 45
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197
		HIGHWAY NO. CS

SUMMARY OF MISCELANEOUS ITEMS			
ITEM NO.	DESCRIPTION	UNIT	QUANTITY
0416-6029	DRILL SHAFT (RDWY ILL POLE) (30 IN)	EA	8
0610-6214	IN RD IL (TY SA) 40T-8 (250W EQ) LED	EA	1
0624-6008	GROUND BOX TY C (162911)W/APRON	EA	7
0680-6003	INSTALL HWY TRF SIG (SYSTEM)	EA	1
*	CONTROLLER FOUNDATION	EA	1
*	TRAFFIC SIGNAL CONTROLLER	EA	1
*	TRAFFIC SIGNAL CABINET	EA	1
*	.25KW EZ LED LUMINAIRE (TRAFFIC SIGNAL)	EA	1
*	STREET NAME ALUMINUM SIGNS (TY O)	SF	35.3
*	REGULATORY ALUMINUM SIGNS (TY A)	SF	48.0
*	MAST ARM DAMPING PLATES	EA	3
0680-6004	REMOVING TRAFFIC SIGNALS	EA	1
0682-6001	VEH SIG SEC (12 IN) LED (GRN)	EA	7
0682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	1
0682-6003	VEH SIG SEC (12 IN) LED (YEL)	EA	7
0682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	2
0682-6005	VEH SIG SEC (12 IN) LED (RED)	EA	7
0682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	1
0682-6018	PED SIG SEC (LED) (COUNTDOWN)	EA	8
0682-6051	BACKPLATE W/REFL BRDR (3 SEC) ALUM	EA	7
0682-6052	BACKPLATE W/REFL BRDR (4 SEC) ALUM	EA	1
0686-6033	INS TRF SIG PL AM(S) 1 ARM (32')	EA	1
0686-6035	INS TRF SIG PL AM(S) 1 ARM (32') LUM	EA	1
0686-6041	INS TRF SIG PL AM(S) 1 ARM (40')	EA	1
0687-6001	PED POLE ASSEMBLY	EA	3
*	DRILL SHAFT (PED POLE FOUNDATION) (24 IN)	LF	30
0688-6001	PED DETECT PUSH BUTTON (APS)	EA	8
0688-6003	PED DETECTOR CONTROLLER UNIT	EA	1
6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6306-6001	VIVDS PROSR SYS	EA	1
6306-6002	VIVDS CAM ASSY FXD LNS	EA	3
6306-6007	VIVDS CABLING	EA	625

* SUBSIDIARY TO THE ABOVE BID ITEM

* SIGN SUMMARY					
SIGN*	SIGN TYPE	SIGN LEGEND	TYPE ALUMINUM	SUPPORT	SIGN DIMENSION (in X in)
S1	R6-2R	RIGHT ONE WAY	A	Pole A Mast Arm	30 X 36
S2	D3-1G	18TH ST	O	Pole 1 Mast Arm	84 X 18
S3	R6-2R	RIGHT ONE WAY	A	Pole 1 Mast Arm	30 X 36
S4	D3-1G	FRANKLIN AVE	O	Pole B Mast Arm	114 X 18
S5	R10-17T	LEFT TURN YIELD ON FLASHING YELLOW ARROW	A	Pole C Mast Arm	36X 42
S6	R6-2L	LEFT ONE WAY	A	Pole C Mast Arm	30 X 36
S7	D3-1G	18TH ST	O	Pole C Mast Arm	84 X 18
S8	R6-2L	LEFT ONE WAY	A	Pole C Mast Arm	30 X 36

* SIGNS ARE SUBSIDIARY TO ITEM 680, "INSTALL HIGHWAY TRAFFIC SIGNALS"



SIGNAL SUMMARY SHEET
FRANKLIN AVE AT
S 18TH ST

SHEET 2 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.	
6	SEE TITLE SHEET	46	
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS

TRAFFIC SIGNAL POLES, ARMS AND FOUNDATIONS									
SIGNAL POLE	STATUS	DESIGN STANDARD	DESCRIPTION	ITEM NO.	NO. OF HEADS (EA)	LUM	DRILL SHAFT (TRF SIG POLE) (30 IN)	DRILL SHAFT (TRF SIG POLE) (36 IN)	DRILL SHAFT (PED POLE ASSM) (24 IN) *
							0416-6031 (LF)	0416-6032 (LF)	0687 - **** (LF)
A	I	SMA-80	INS TRF SIG PL AM(S)1 ARM(32')	0686 - 6033	2	N	12		
B	I	SMA-80	INS TRF SIG PL AM(S)1 ARM(40')	0686 - 6041	3	N		14	
C	I	SMA-80	INS TRF SIG PL AM(S)1 ARM(32')LUM	0686 - 6035	3	Y	12		
D	I		PED POLE ASSEMBLY	0687 - 6001	1	-			6
E	I		PED POLE ASSEMBLY	0687 - 6001	1	-			6
F	I		PED POLE ASSEMBLY	0687 - 6001	1	-			6
TOTALS:							24	14	18

STATUS I=INSTALL; E= EXISTING; REM=EXISTING TO BE REMOVED; REL=EXISTING TO BE RELOCATED
 * FOUNDATION SUBSIDIARY TO PED POLE ASSEMBLY, FOR CONTRACTORS INFORMATION ONLY

SIGNAL HEAD INDICATIONS										
SIGNAL HEAD NUMBER	SIGNAL HEAD TYPE	VEH SIG SEC (12")LED						PED SIG SEC	BACKPLATE W/ REFL BRDR	
		(GRN)	(GRN ARW)	(YEL)	(YEL ARW)	(RED)	(RED ARW)	(LED) (COUNTDOWN)	(3 SEC)	(4 SEC)
		0682-6001	0682-6002	0682-6003	0682-6004	0682-6005	0682-6006	0682-6018	0682-6051	0682-6052
		EA	EA	EA	EA	EA	EA	EA	EA	
1	H3	1		1		1			1	
2	H3	1		1		1			1	
3	H3	1		1		1			1	
4	H3	1		1		1			1	
5	H3	1		1		1			1	
6	H4FS		1		2		1			1
7	H3	1		1		1			1	
8	H3	1		1		1			1	
W1 - W8	PED						8			
TOTAL		7	1	7	2	7	1	8	7	1

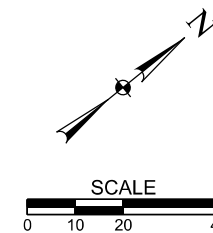
STATUS: I=INSTALL; E=EXISTING; REL=RELOCATE; REM=EXISTING TO BE REMOVED.



SIGNAL SUMMARY SHEET
FRANKLIN AVE AT
S 18TH ST

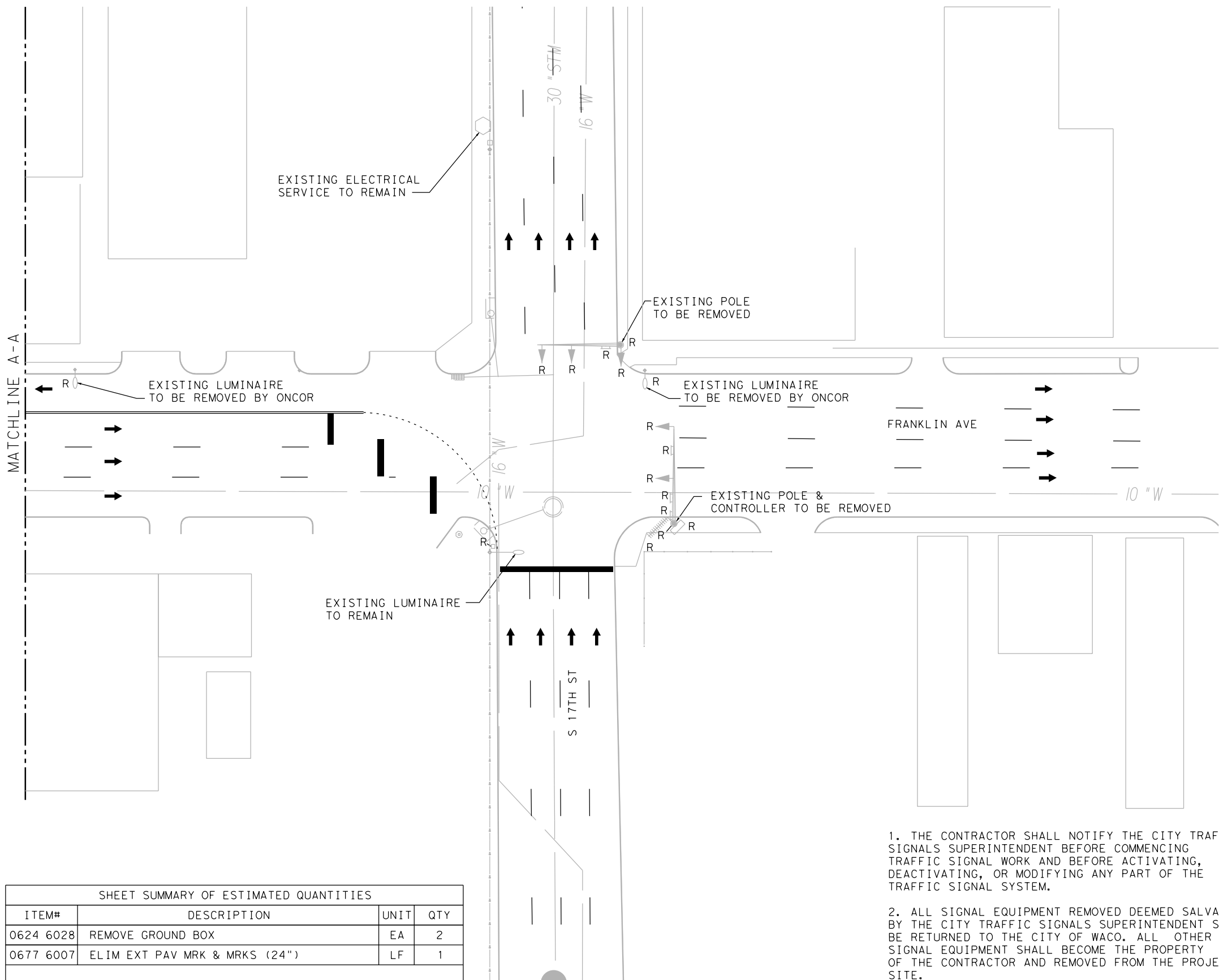
SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		47
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS



LEGEND

- EXIST SIGNAL POLE
- EXIST HORIZONTAL SIGNAL HEAD
- EXIST POLE MTD CONTROLLER CABINET
- EXIST OVERHEAD SIGN
- EXIST GROUND BOX
- EXIST LUMINAIRE
- EXIST ELECTRICAL SERVICE
- EXIST VIDEO CAMERA
- EXIST ANTENNA
- TRAFFIC FLOW
- R ITEM TO BE REMOVED



SHEET SUMMARY OF ESTIMATED QUANTITIES			
ITEM#	DESCRIPTION	UNIT	QTY
0624 6028	REMOVE GROUND BOX	EA	2
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	1

1. THE CONTRACTOR SHALL NOTIFY THE CITY TRAFFIC SIGNALS SUPERINTENDENT BEFORE COMMENCING TRAFFIC SIGNAL WORK AND BEFORE ACTIVATING, DEACTIVATING, OR MODIFYING ANY PART OF THE TRAFFIC SIGNAL SYSTEM.
2. ALL SIGNAL EQUIPMENT REMOVED DEEMED SALVAGEABLE BY THE CITY TRAFFIC SIGNALS SUPERINTENDENT SHALL BE RETURNED TO THE CITY OF WACO. ALL OTHER SIGNAL EQUIPMENT SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND REMOVED FROM THE PROJECT SITE.
3. COORDINATE WITH THE CITY OF WACO TRAFFIC ENGINEER JAMES BAILEY AT 254-750-6639 FOR THE REMOVAL OF THE LUMINAIRE POLES BY ONCOR.
4. THE LOCATION OF UTILITIES ARE APPROXIMATE AND SHALL BE FIELD VERIFIED PRIOR TO CONSTRUCTION.

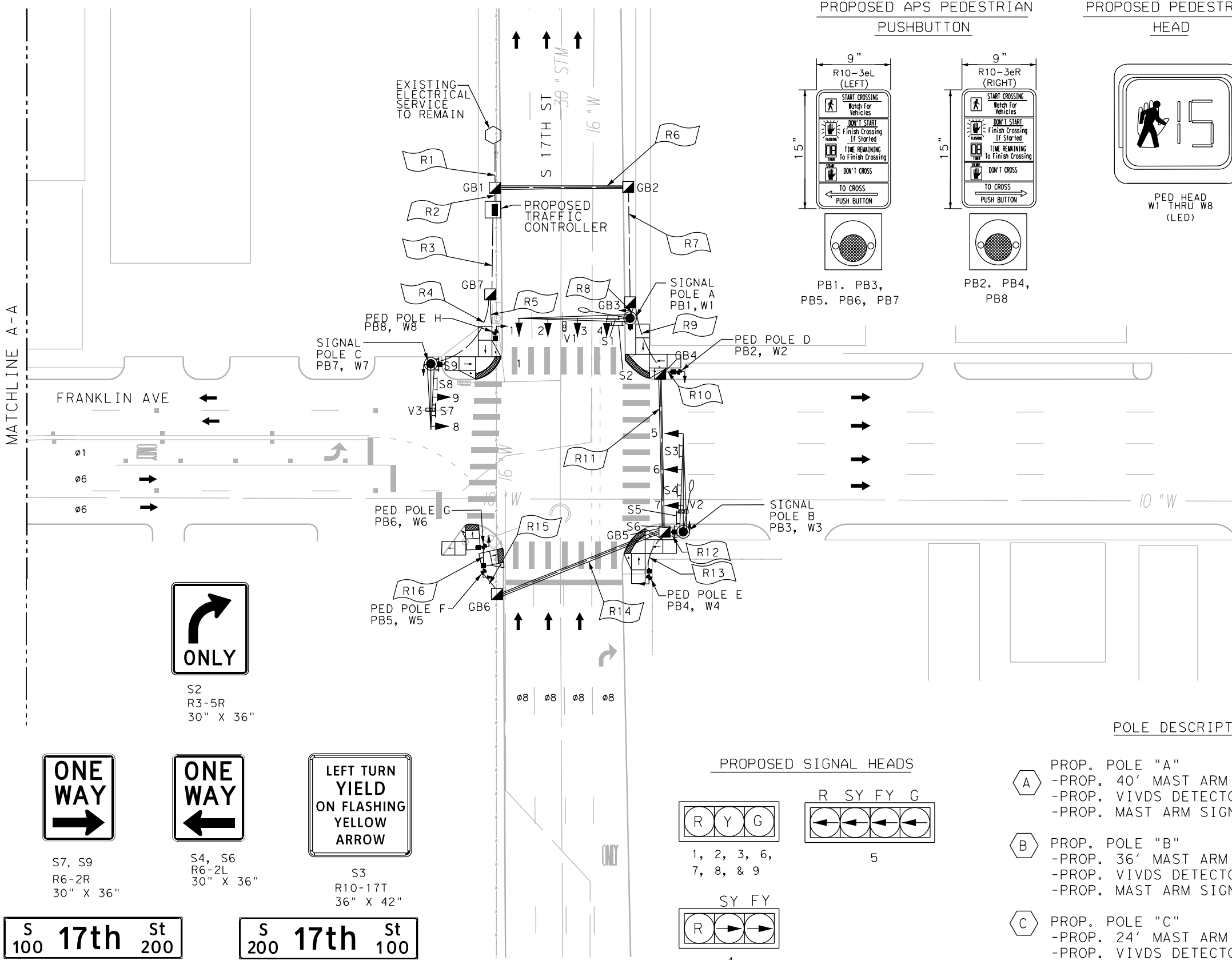
Larry J. Colclasure, P.E.
10/23/2023

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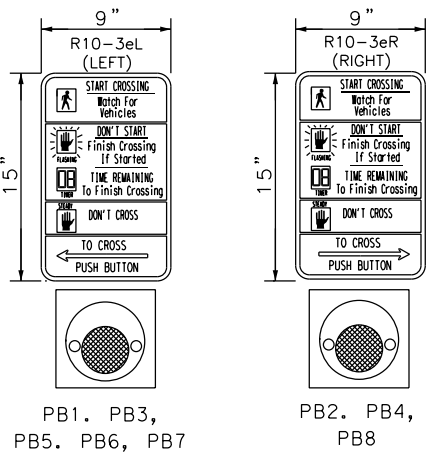
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EXISTING CONDITION
LAYOUT
FRANKLIN AVE AT
S 17TH ST

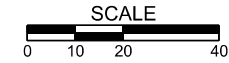
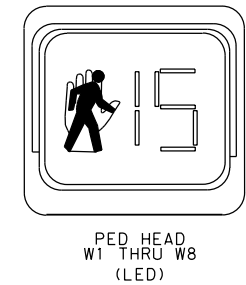
FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 48
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197
		HIGHWAY NO. CS



PROPOSED APS PEDESTRIAN PUSHBUTTON



PROPOSED PEDESTRIAN HEAD



LEGEND

- MAST ARM POLE
- TRAFFIC SIGNAL HEAD
- PEDESTRIAN POLE
- PEDESTRIAN SIGNAL HEAD
- PEDESTRIAN SIGNAL PUSH BUTTON
- CONTROLLER CABINET WITH BBU
- OVERHEAD SIGN
- PROP. ELECTRICAL SERVICE
- GROUND BOX
- PROP. CONDUIT (TRENCH)
- PROP. PVC CONDUIT (BORE)
- VIVID DETECTOR
- VIVID RADAR DETECTOR
- TRAFFIC FLOW
- LUMINAIRE
- LIGHT POLE, 2 ARM



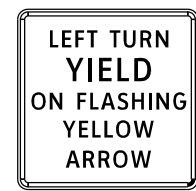
S2
R3-5R
30" X 36"



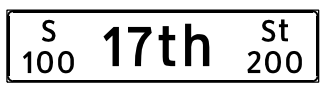
S7, S9
R6-2R
30" X 36"



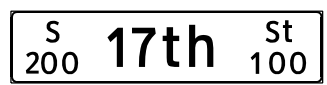
S4, S6
R6-2L
30" X 36"



S3
R10-17T
36" X 42"



S5

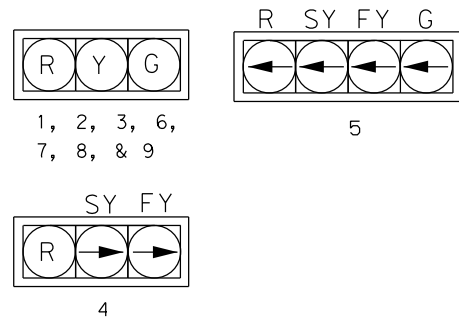


S8



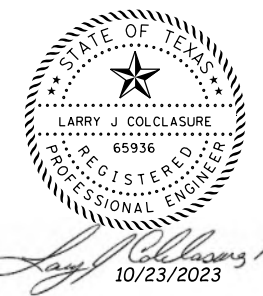
S1

PROPOSED SIGNAL HEADS



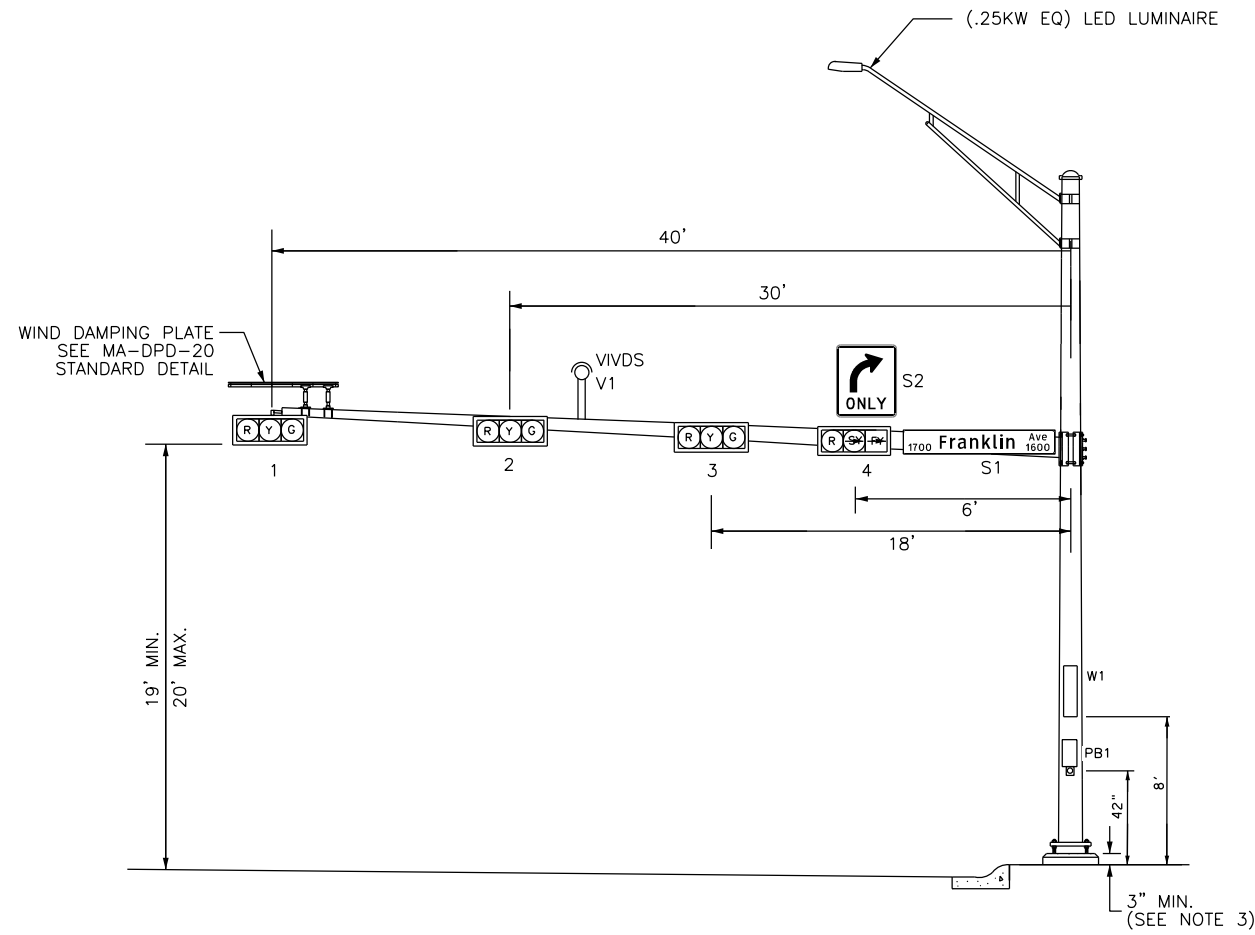
POLE DESCRIPTION

- A PROP. POLE "A"
-PROP. 40' MAST ARM W/ LUMINAIRE
-PROP. VIVDS DETECTOR (1)
-PROP. MAST ARM SIGNS (2)
- B PROP. POLE "B"
-PROP. 36' MAST ARM W/ LUMINAIRE
-PROP. VIVDS DETECTOR (1)
-PROP. MAST ARM SIGNS (4)
- C PROP. POLE "C"
-PROP. 24' MAST ARM
-PROP. VIVDS DETECTOR (1)
-PROP. MAST ARM SIGNS (3)
- D THRU H PROP. PEDESTAL POLE

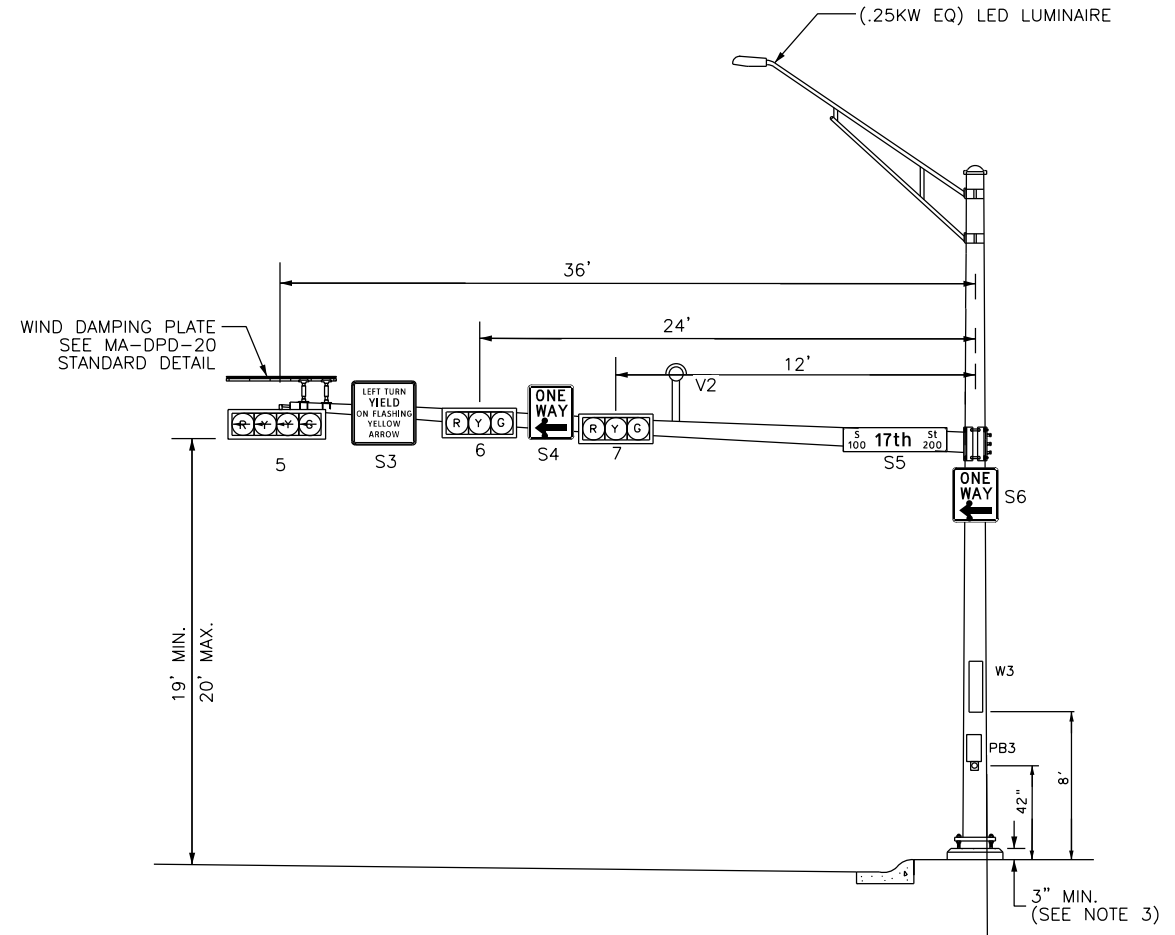


PROPOSED SIGNAL LAYOUT
FRANKLIN AVE AT
S 17TH ST

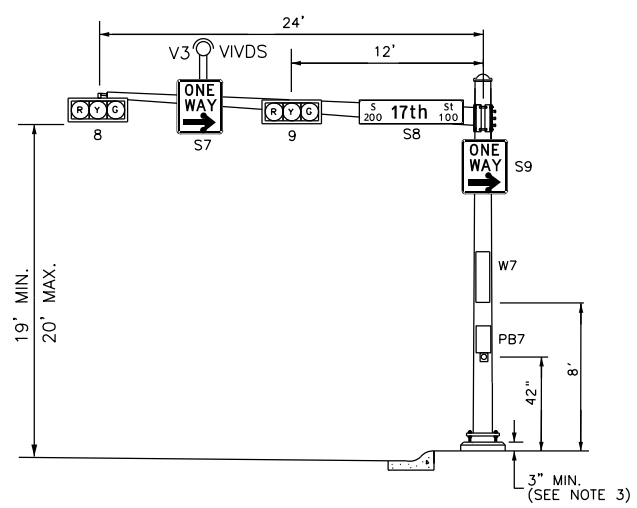
FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 49
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197
		HIGHWAY NO. CS



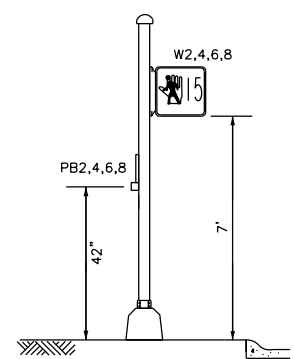
LOOKING WEST ON S. 17TH ST.
PROP. POLE "A" 40' MAST ARM
N.T.S



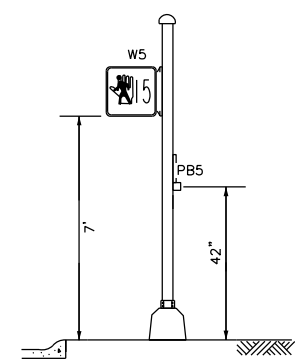
LOOKING NORTH ON FRANKLIN AVE.
PROP. POLE "B" 36' MAST ARM
N.T.S



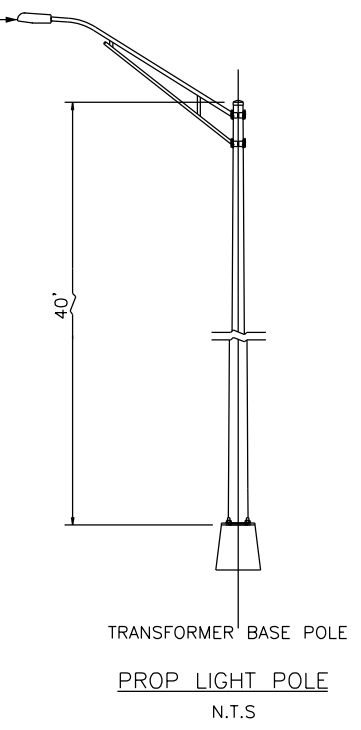
LOOKING NORTH ON FRANKLIN AVE.
PROP. POLE "C" 24' MAST ARM
N.T.S



PROP PEDESTAL POLES
"D", "E", & "H"
N.T.S



PROP PEDESTAL POLES
"G", "F"
N.T.S



- NOTES:
- SEE CONSTRUCTION DETAIL SHEETS FOR POLE MOUNTED SIGNAL HEAD, PEDESTRIAN HEADS, SIGNS AND PUSH BUTTON INSTALLATION REQUIREMENTS.
 - SIGNAL HEADS TO BE CENTERED OVER APPROACHING LANES UNLESS APPROVED BY THE ENGINEER. DISTANCES ALONG MAST ARMS ARE APPROXIMATE AND WILL BE ADJUSTED IN THE FIELD AS NEEDED.
 - CONTRACTOR TO ADJUST FOUNDATION HEIGHT ABOVE GROUND AS NEEDED TO PROVIDE SIGNAL HEAD MOUNTING HEIGHT, NOT TO EXCEED 12" ABOVE GROUND.

LARRY J. COLCLASURE
65936
REGISTERED PROFESSIONAL ENGINEER
10/23/2023

Texas Department of Transportation
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**SIGNAL POLE
ELEVATION DETAILS
FRANKLIN AVE AT
S 17TH ST**

FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 50
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197
		HIGHWAY NO. CS

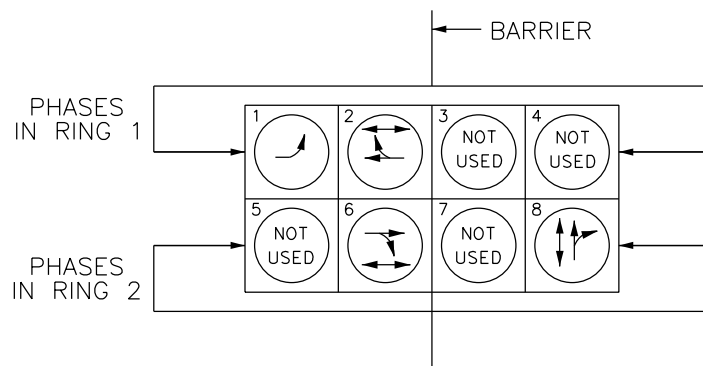
\$TIMES 10/23/2023 \$USERS\$

SIGNAL TIMING									
PHASE	MIN GREEN	GAP	RECALL	MAX GREEN	AVG APP SPEED	APPR GRADE	INT WIDTH	YELLOW CLEAR	RED CLEAR
1	5	2	OFF	40	30		100	4	2.3
6	10	2	ON	40	30		95	4	2.2
8	10	2	OFF	30	30		85	4	1.9

NOTE: CLEARANCE TIMES BASED ON ITE GUIDELINES

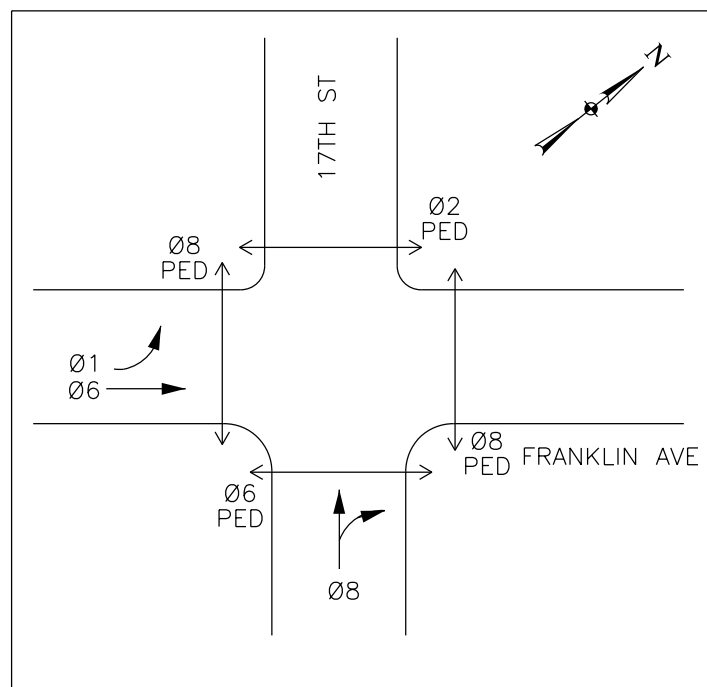
APS MESSAGE INFORMATION			
APS UNIT #	ACKNOWLEDGEMENT DEFAULT "WAIT"	EXTENDED PRESS MESSAGE	WALK PHASE MESSAGE
		"WAIT TO CROSS (STREET_NAME) "	"WALK SIG IS ON TO CROSS (STREET_NAME) "
1	YES	17TH STREET	17TH STREET
2	YES	FRANKLIN AVENUE	FRANKLIN AVENUE
3	YES	FRANKLIN AVENUE	FRANKLIN AVENUE
4	YES	17TH STREET	17TH STREET
5	YES	17TH STREET	17TH STREET
6	YES	FRANKLIN AVENUE	FRANKLIN AVENUE
7	YES	FRANKLIN AVENUE	FRANKLIN AVENUE
8	YES	17TH STREET	17TH STREET

PEDESTRIAN TIMINGS			
PEDESTRIAN PHASE	PEDESTRIAN HEADS	WALK	FLASHING DON'T WALK
2	1 & 8	7	13
6	4 & 5	7	13
8	2, 3, 6 & 7	7	15

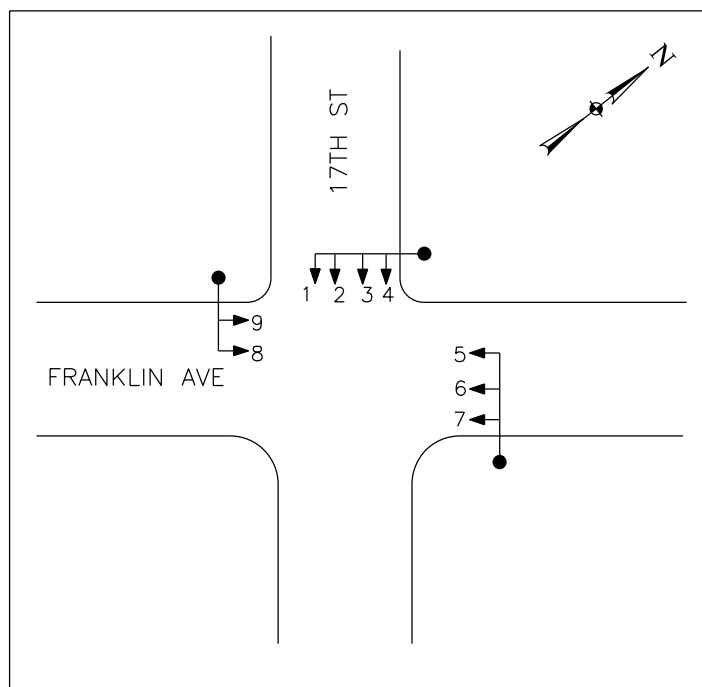


NOTES:

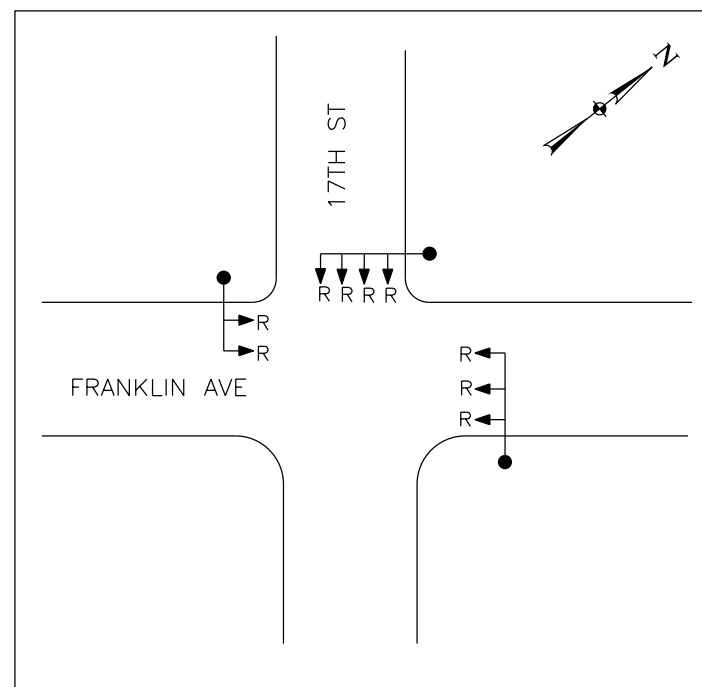
1. ANY PHASE IN ONE RING MAY BE SERVICED WITH ANY PHASE IN THE OTHER RING ON THE SAME SIDE OF THE BARRIER.
2. SIGNAL TIMING TO BE VERIFIED AND APPROVED BY TXDOT.



PHASE DESIGNATION



SIGNAL HEAD LAYOUT



EMERGENCY & CONFLICT FLASH

Larry J. Colclasure P.E.
11/02/2023

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**PHASING DIAGRAM
FRANKLIN AVE AT
S 17TH ST**

FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 51
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197
		HIGHWAY NO. CS


S:\4.0.0.0. Engineering Operations\4.2.0.0.0. Project Files\2022\22049 - COW HSJP Projects\cad\isheets\1 17th & 18th\7 Cond Tables.dgn

CONDUIT AND CONDUCTOR RUNS																												
RUN NO.	RUN LENGTH	CONDUIT SIZE / TYPE								STATUS	ELECTRICAL CONDUCTORS								TRAFFIC SIGNAL CABLES								DETECTION	
		2" PVC (SCH 40)		2" PVC (SCH 80) (BORE)		3" PVC (SCH 40)		3" PVC (SCH 80) (BORE)			GROUND		LUMINARE		POWER				SIGNAL				PEDESTRIAN		VIVDS COM CABLE (COAX)			
		618-6023		618-6024		618-6029		618-6030			#8 BARE		#8 INSULATED		#6 BARE		#6 INSULATED		#14 /4C		#14 /7C		#14 /16C		#12 /2C		6306-6007	
		EA	LF	EA	LF	EA	LF	EA	LF		EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	LF	EA	1	EA	LF
1		2	5							I					1	5	2	10										
2		1	5							I													6	30	2	10		
2						1	5			I					1	5	2	10	2	10			2	10				
3		1	40							I													2	80	1	40		
3						1	40			I	1	40											1	40				
4		1	30							I													1	30	1	30		
4						1	30			I	1	30							1	30			1	30				
5		1	15							I													1	15				
5						1	15			I	1	15							1	15								
6				1	45					I													6	270	2	90		
6								1	45	I	1	45	2	90					2	90			2	90				
7		1	40							I													6	240	2	80		
7						1	40			I	1	40	2	80					2	80			2	80				
8		1	5							I													1	5	1	5		
8						1	5			I	1	5	2	10					1	5			1	5				
9		1	25							I													5	125	1	25		
9						1	25			I	1	25	2	50					3	75			1	25				
10		1	10							I													1	10				
10						1	10			I	1	10							1	10								
11				1	70					I													4	280	1	70		
11								1	70	I	1	70	2	140					2	140			1	70				
12		1	10							I													1	10	1	10		
12						1	10			I	1	10	2	20					1	10			1	10				
13		1	5							I													1	5				
13						1	5			I	1	5							1	5								
14				1	60					I													2	120				
14								1	60	I	1	60							2	120								
15		1	10							I													1	10				
15						1	10			I	1	10							1	10								
16		1	20							I													1	20				
16						1	20			I	1	20							1	20								
CABLE IN POLES & ARMS																												
POLE A										I	1	4	2	80					5	65			1	5	1	4	1	20
ARM A										I									4	94						1	28	
POLE B										I	1	4	2	80					3	35	1	15	1	5	1	4	1	20
ARM B										I									2	36	1	36					1	10
POLE C										I	1	4	2	80					3	35			1	5	1	4	1	20
ARM C										I									2	36							1	20
PED POLE D										I	1	2							1	7					1	4		
PED POLE E										I	1	2							1	7					1	4		
PED POLE F										I	1	2							1	7					1	4		
PED POLE G										I	1	2							1	7					1	4		
PED POLE H										I	1	2							1	7					1	4		
CABLE IN SIGNAL CABINET																												
CABINET										I					1	10	2	20	4	40				8	80	2	20	
TOTAL (LF)		225	175			215	175			-	407	630			20	40			996	51			375	1362		498		

STATUS: I=INSTALL; E=EXISTING; REL=RELOCATE REM=EXISTING TO BE REMOVED;



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SIGNAL SUMMARY SHEET
FRANKLIN AVE AT
S 17TH ST

SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	SEE TITLE SHEET	52
STATE	DIST.	COUNTY
TEXAS	WAC	MCLENNAN
CONT.	SECT.	JOB
0909	22	197
		HIGHWAY NO.
		CS

SUMMARY OF MISCELANEOUS ITEMS			
ITEM NO.	DESCRIPTION	UNIT	QUANTITY
0624-6008	GROUND BOX TY C (162911)W/APRON	EA	7
0680-6003	INSTALL HWY TRF SIG (SYSTEM)	EA	1
*	CONTROLLER FOUNDATION	EA	1
*	TRAFFIC SIGNAL CONTROLLER	EA	1
*	TRAFFIC SIGNAL CABINET	EA	1
*	.25KW EZ LED LUMINAIRE (TRAFFIC SIGNAL)	EA	3
*	STREET NAME ALUMINUM SIGNS (TY O)	SF	33.8
*	REGULATORY ALUMINUM SIGNS (TY A)	SF	55.5
*	MAST ARM DAMPING PLATES	EA	2
0682-6001	VEH SIG SEC (12 IN) LED (GRN)	EA	7
0682-6002	VEH SIG SEC (12")LED (GRN ARW)	EA	1
0682-6003	VEH SIG SEC (12 IN) LED (YEL)	EA	7
0682-6004	VEH SIG SEC (12")LED (YEL ARW)	EA	4
0682-6005	VEH SIG SEC (12 IN) LED (RED)	EA	8
0682-6006	VEH SIG SEC (12")LED (RED ARW)	EA	1
0682-6018	PED SIG SEC (LED) (COUNTDOWN)	EA	8
0682-6051	BACKPLATE W/REFL BRDR (3 SEC) ALUM	EA	8
0682-6052	BACKPLATE W/REFL BRDR (4 SEC) ALUM	EA	1
0686-6025	INS TRF SIG PL AM(S)1 ARM (24')	EA	1
0686-6039	INS TRF SIG PL AM(S)1 ARM (36') LUM	EA	1
0686-6043	INS TRF SIG PL AM(S)1 ARM (40') LUM	EA	1
0687-6001	PED POLE ASSEMBLY	EA	5
*	DRILL SHAFT (PED POLE FOUNDATION) (24 IN)	LF	30
0688-6001	PED DETECT PUSH BUTTON (APS)	EA	8
0688-6003	PED DETECTOR CONTROLLER UNIT	EA	1
6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1
6306-6001	VIVDS PROSR SYS	EA	1
6306-6002	VIVDS CAM ASSY FXD LNS	EA	3
6306-6007	VIVDS CABLING	EA	498

* SUBSIDIARY TO THE ABOVE BID ITEM

* SIGN SUMMARY					
SIGN*	SIGN TYPE	SIGN LEGEND	TYPE ALUMINUM	SUPPORT	SIGN DIMENSION (in X in)
S1	D3-1G	FRANKLIN AVE	O	Pole A Mast Arm	114 X 18
S2	R3-5R	RIGHT ONLY	A	Pole A Mast Arm	30 X 36
S3	R10-17T	LEFT TURN YIELD ON FLASHING YELLOW ARROW	A	Pole B Mast Arm	36X 42
S4	R6-2L	LEFT ONE WAY	A	Pole B Mast Arm	30 X 36
S5	D3-1G	17TH ST	O	Pole B Mast Arm	78 X 18
S6	R6-2L	LEFT ONE WAY	A	Pole B Mast Arm	30 X 36
S7	R6-2R	RIGHT ONE WAY	A	Pole C Mast Arm	30 X 36
S8	D3-1G	17TH ST	O	Pole C Mast Arm	78 X 18
S9	R6-2R	RIGHT ONE WAY	A	Pole C Mast Arm	30 X 36

* SIGNS ARE SUBSIDIARY TO ITEM 680, "INSTALL HIGHWAY TRAFFIC SIGNALS"



SIGNAL SUMMARY SHEET
FRANKLIN AVE AT
S 17TH ST

SHEET 2 OF 3


FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.	
6	SEE TITLE SHEET	53	
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS

TRAFFIC SIGNAL POLES, ARMS AND FOUNDATIONS										
SIGNAL POLE	STATUS	DESIGN STANDARD	DESCRIPTION	ITEM NO.	NO. OF HEADS (EA)	LUM	DRILL SHAFT (TRF SIG POLE) (30 IN)	DRILL SHAFT (TRF SIG POLE) (36 IN)	DRILL SHAFT (PED POLE ASSM) (24 IN) *	
							0416-6031 (LF)	0416-6032 (LF)	0687 - **** (LF)	
A	I	SMA-80	INS TRF SIG PL AM(S)1 ARM(40')LUM	0686 - 6043	4	Y		14		
B	I	SMA-80	INS TRF SIG PL AM(S)1 ARM(36')LUM	0686 - 6039	3	Y	12			
C	I	SMA-80	INS TRF SIG PL AM(S)1 ARM(24')	0686 - 6025	2	N	12			
D	I		PED POLE ASSEMBLY	0687 - 6001	1	-			6	
E	I		PED POLE ASSEMBLY	0687 - 6001	1	-			6	
F	I		PED POLE ASSEMBLY	0687 - 6001	1	-			6	
G	I		PED POLE ASSEMBLY	0687 - 6001	1	-			6	
H	I		PED POLE ASSEMBLY	0687 - 6001	1	-			6	
TOTALS:								24	14	30


STATUS I=INSTALL; E= EXISTING; REM=EXISTING TO BE REMOVED; REL=EXISTING TO BE RELOCATED
 * FOUNDATION SUBSIDIARY TO PED POLE ASSEMBLY, FOR CONTRACTORS INFORMATION ONLY

SIGNAL HEAD INDICATIONS										
SIGNAL HEAD NUMBER	SIGNAL HEAD TYPE	VEH SIG SEC (12")LED						PED SIG SEC	BACKPLATE W/ REFL BRDR	
		(GRN)	(GRN ARW)	(YEL)	(YEL ARW)	(RED)	(RED ARW)	(LED) (COUNTDOWN)	(3 SEC)	(4 SEC)
		0682-6001	0682-6002	0682-6003	0682-6004	0682-6005	0682-6006	0682-6018	0682-6051	0682-6052
		EA	EA	EA	EA	EA	EA	EA	EA	
1	H3	1		1		1			1	
2	H3	1		1		1			1	
3	H3	1		1		1			1	
4	H3				2	1			1	
5	H4FS		1		2		1			1
6	H3	1		1		1			1	
7	H3	1		1		1			1	
8	H3	1		1		1			1	
9	H3	1		1		1			1	
W1 - W8	PED						8			
TOTAL		7	1	7	4	8	1	8	8	1

STATUS: I=INSTALL; E=EXISTING; REL=RELOCATE; REM=EXISTING TO BE REMOVED.



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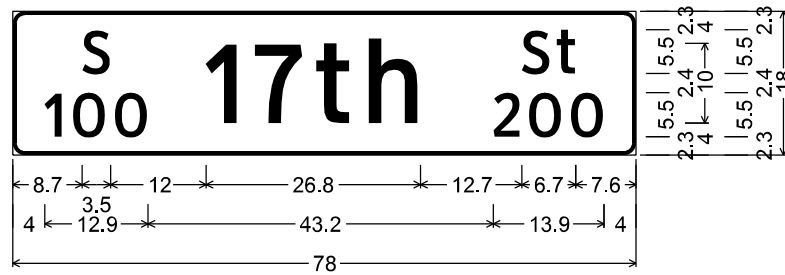


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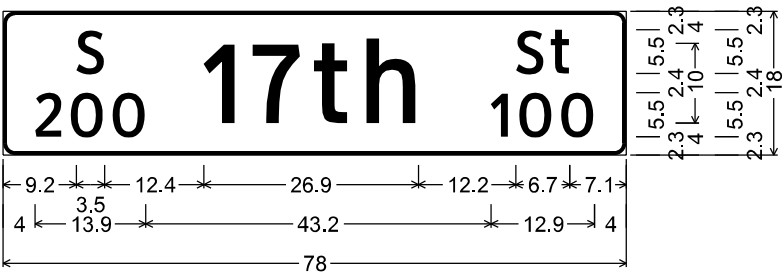
SIGNAL SUMMARY SHEET
FRANKLIN AVE AT
S 17TH ST

SHEET 3 OF 3

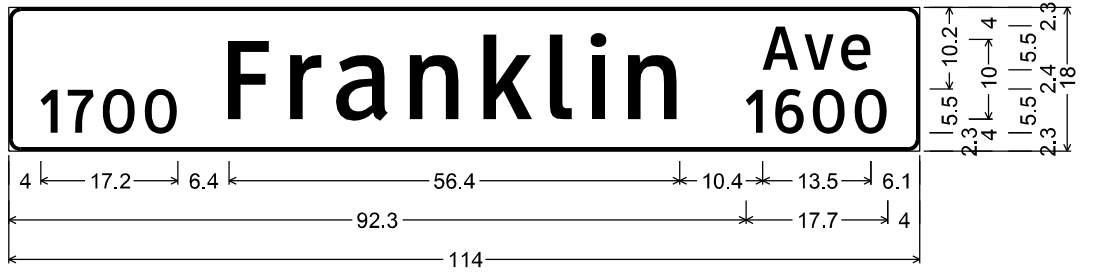
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	SEE TITLE SHEET	54
STATE	DIST.	COUNTY
TEXAS	WAC	MCLENNAN
CONT.	SECT.	JOB
0909	22	197
		HIGHWAY NO.
		CS



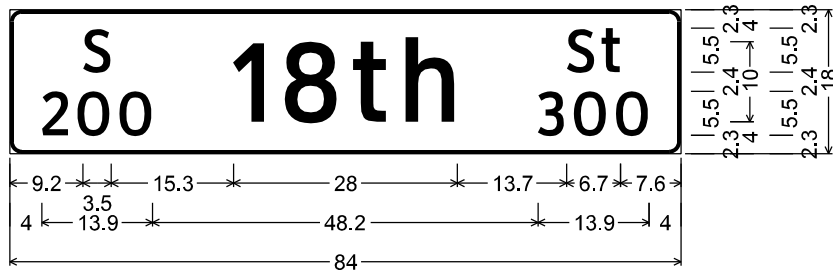
D3-1G;
 1.5" Radius, 0.5" Border, White on Green;
 "S", ClearviewHwy-3-W; "100", ClearviewHwy-3-W;
 "17th", ClearviewHwy-3-W; "St", ClearviewHwy-3-W;
 "200", ClearviewHwy-3-W;
 SIGN: 5
 AT S 17TH ST



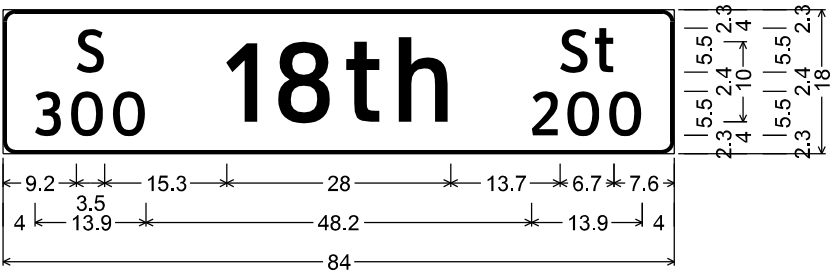
D3-1G;
 1.5" Radius, 0.5" Border, White on Green;
 "S", ClearviewHwy-3-W; "200", ClearviewHwy-3-W;
 "17th", ClearviewHwy-3-W; "St", ClearviewHwy-3-W;
 "100", ClearviewHwy-3-W;
 SIGN: 8
 AT S 17TH ST



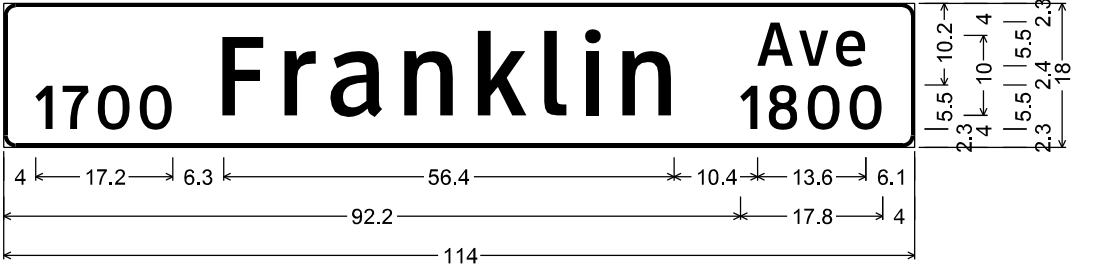
D3-1G;
 1.5" Radius, 0.5" Border, White on Green;
 "1700", ClearviewHwy-3-W; "Franklin", ClearviewHwy-3-W; "Ave", ClearviewHwy-3-W;
 "1600", ClearviewHwy-3-W;
 SIGN: 1
 AT S 17TH ST



D3-1G;
 1.5" Radius, 0.5" Border, White on Green;
 "S", ClearviewHwy-3-W; "200", ClearviewHwy-3-W;
 "18th", ClearviewHwy-3-W; "St", ClearviewHwy-3-W;
 "300", ClearviewHwy-3-W;
 SIGN: 2
 AT S 18TH ST



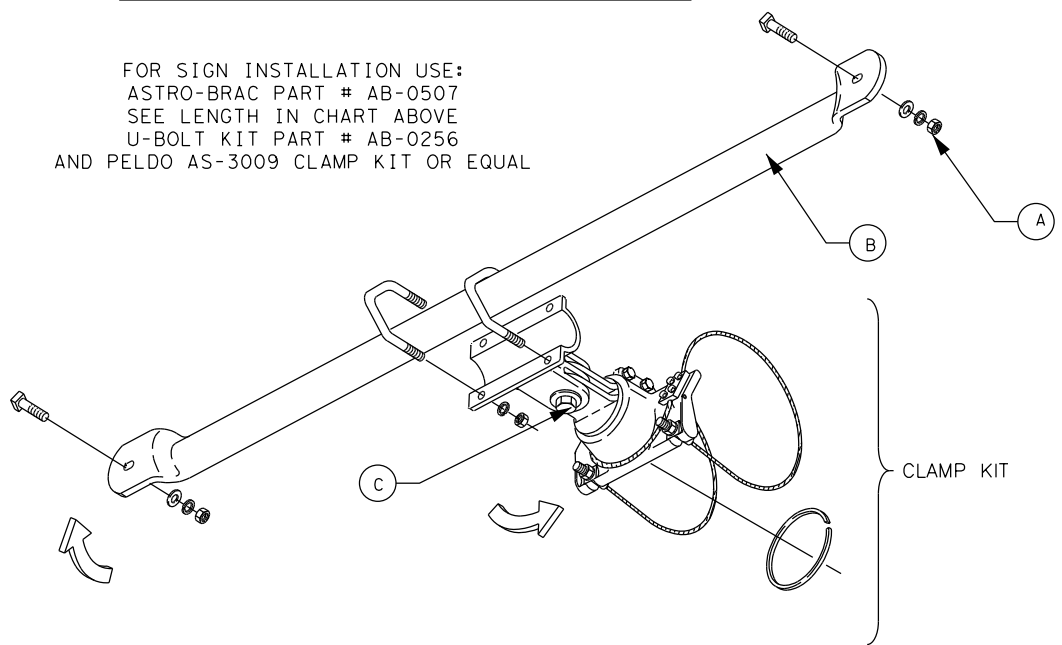
D3-1G;
 1.5" Radius, 0.5" Border, White on Green;
 "S", ClearviewHwy-3-W; "300", ClearviewHwy-3-W;
 "18th", ClearviewHwy-3-W; "St", ClearviewHwy-3-W;
 "200", ClearviewHwy-3-W;
 SIGN: 7
 AT S 18TH ST



D3-1G;
 1.5" Radius, 0.5" Border, White on Green;
 "1700", ClearviewHwy-3-W; "Franklin", ClearviewHwy-3-W; "Ave", ClearviewHwy-3-W;
 "1800", ClearviewHwy-3-W;
 SIGN: 4
 AT S 18TH ST

MAST ARM SIGN MOUNT DETAIL

FOR SIGN INSTALLATION USE:
 ASTRO-BRAC PART # AB-0507
 SEE LENGTH IN CHART ABOVE
 U-BOLT KIT PART # AB-0256
 AND PELDO AS-3009 CLAMP KIT OR EQUAL



EXTRUDED ALUMINUM SIGN BRACKET, FORMED TUBE
 HORIZONTAL ARTICULATED CABLE MOUNT,

STREET NAME SIGN BRACKETS AND TUBES						
SIGN #	CROSS STREET	SIGN WIDTH FT	SIGN HEIGHT FT	AREA SF	BRACKETS EA	TUBE LENGTH IN
SN2	FRANKLIN AVE	9.50	1.50	14.25	1	78
SN 4	S 17TH ST	7.00	1.50	10.50	1	60
SN 5	S 17TH ST	7.00	1.50	10.50	1	60
SN 1	S 18TH ST	7.00	1.50	10.50	1	60
SN 2	FRANKLIN AVE	9.50	1.50	14.25	1	78
SN 4	S 18TH ST	7.00	1.50	10.50	1	60

- A. TYPE 0 EXTRUDED ALUMINUM PANEL IS FASTENED TO FORMED TUBE WITH 3/8" SQUARE HEAD BOLT AND SELF LOCKING WASHER AND HEX NUT.
- B. FORMED TUBE AVAILABLE SIZES: 9/15/18/24/30/36/42/48/60/66/72 AND 78 INCHES.
- C. USE ONE BRACKET FOR 16 SF OF SIGN FACE OR FRACTION THEREOF OR AS PER ENGINEER, STAINLESS STEEL OPTION FOR SWIVEL BOLT IS REQUIRED.

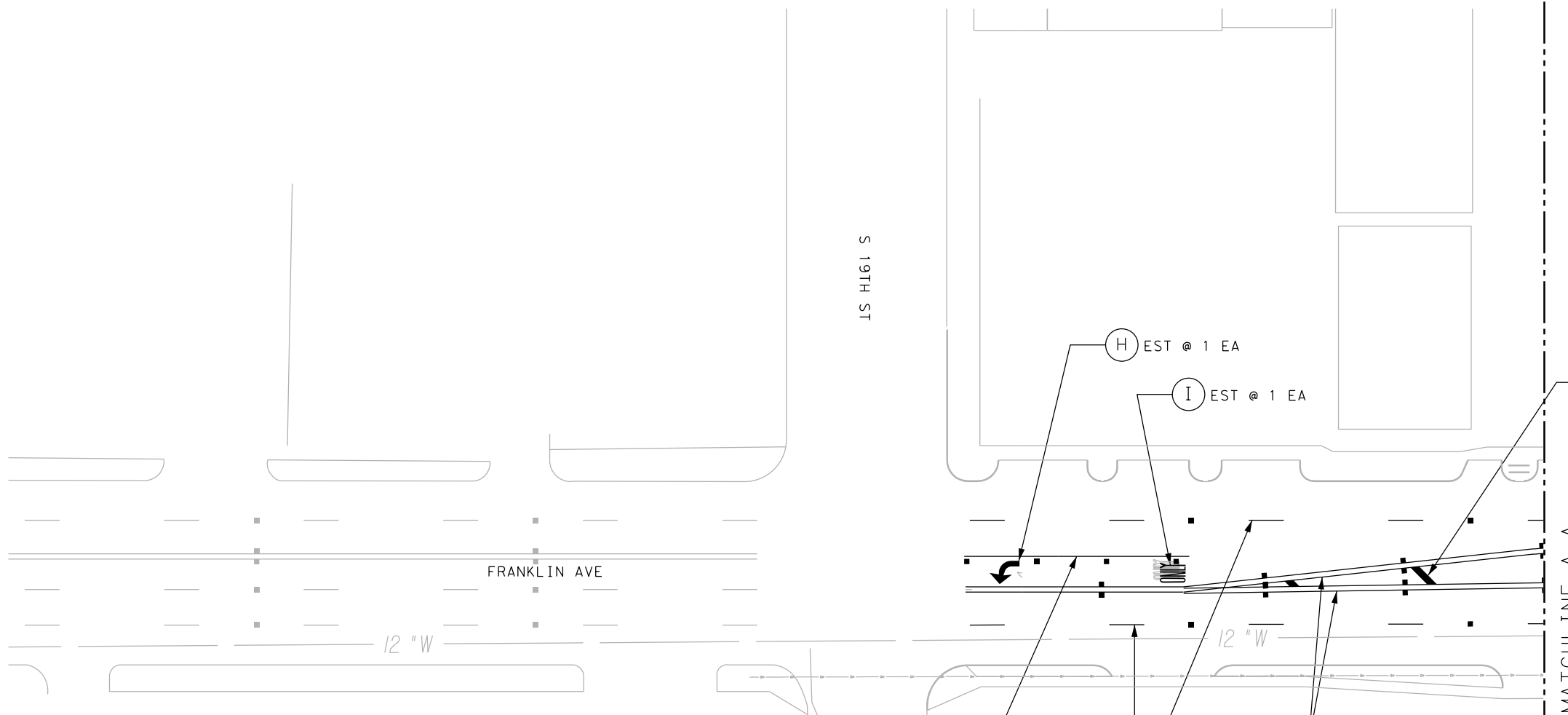
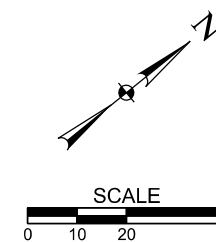


SIGN DETAILS

FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 55
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197
		HIGHWAY NO. CS

LEGEND:
PAVEMENT MARKINGS

- (A) RE PM W/RET REQ TY I (Y) 6" (SLD) (100MIL)
- (B) REFL PAV MRK TY I (Y) 6" (DOT) (100MIL)
- (C) REFL PAV MRK TY I (Y) 24" (SLD) (100MIL)
- (D) RE PM W/RET REQ TY I (W) 6" (BRK) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)
- (F) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (G) PREFAB PAV MRK TY C (W) (DBL ARROW)
- (H) PREFAB PAV MRK TY C (W) (ARROW)
- (I) PREFAB PAV MRK TY C (W) (WORD)
- (J) RAISED PAV MRK TY I-C
- (K) RAISED PAV MRK TY II-A-A
- (L) REFL PAV MRK TY I (W) (BIKE DOT) (100MIL)



ITEM#	DESCRIPTION	UNIT	QTY
	0662 6109 WK ZN PAV MRK SHT TERM (TAB) TY W	EA	8
	0662 6111 WK ZN PAV MRK SHT TERM (TAB) TY Y-2	EA	56
E	0666 6036 REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	65
C	0666 6147 REFL PAV MRK TY I (Y) 24" (SLD) (100MIL)	LF	12
	0666 6225 PAVEMENT SEALER 6"	LF	635
	0666 6226 PAVEMENT SEALER 8"	LF	65
	0666 6231 PAVEMENT SEALER (ARROW)	EA	1
	0666 6232 PAVEMENT SEALER (WORD)	EA	1
D	0666 6306 RE PM W/RET REQ TY I (W) 6" (BRK) (100MIL)	LF	90
A	0666 6321 RE PM W/RET REQ TY I (Y) 6" (SLD) (100MIL)	LF	545
H	0668 6077 PREFAB PAV MRK TY C (W) (ARROW)	EA	1
I	0668 6085 PREFAB PAV MRK TY C (W) (WORD)	EA	1
J	0672 6007 REFL PAV MRKR TY I-C	EA	4
K	0672 6009 REFL PAV MRKR TY II-A-A	EA	14
	0678 6002 PAV SURF PREP FOR MRK (6")	LF	635
	0678 6004 PAV SURF PREP FOR MRK (8")	LF	65
	0678 6009 PAV SURF PREP FOR MRK (ARROW)	EA	1
	0678 6016 PAV SURF PREP FOR MRK (WORD)	EA	1



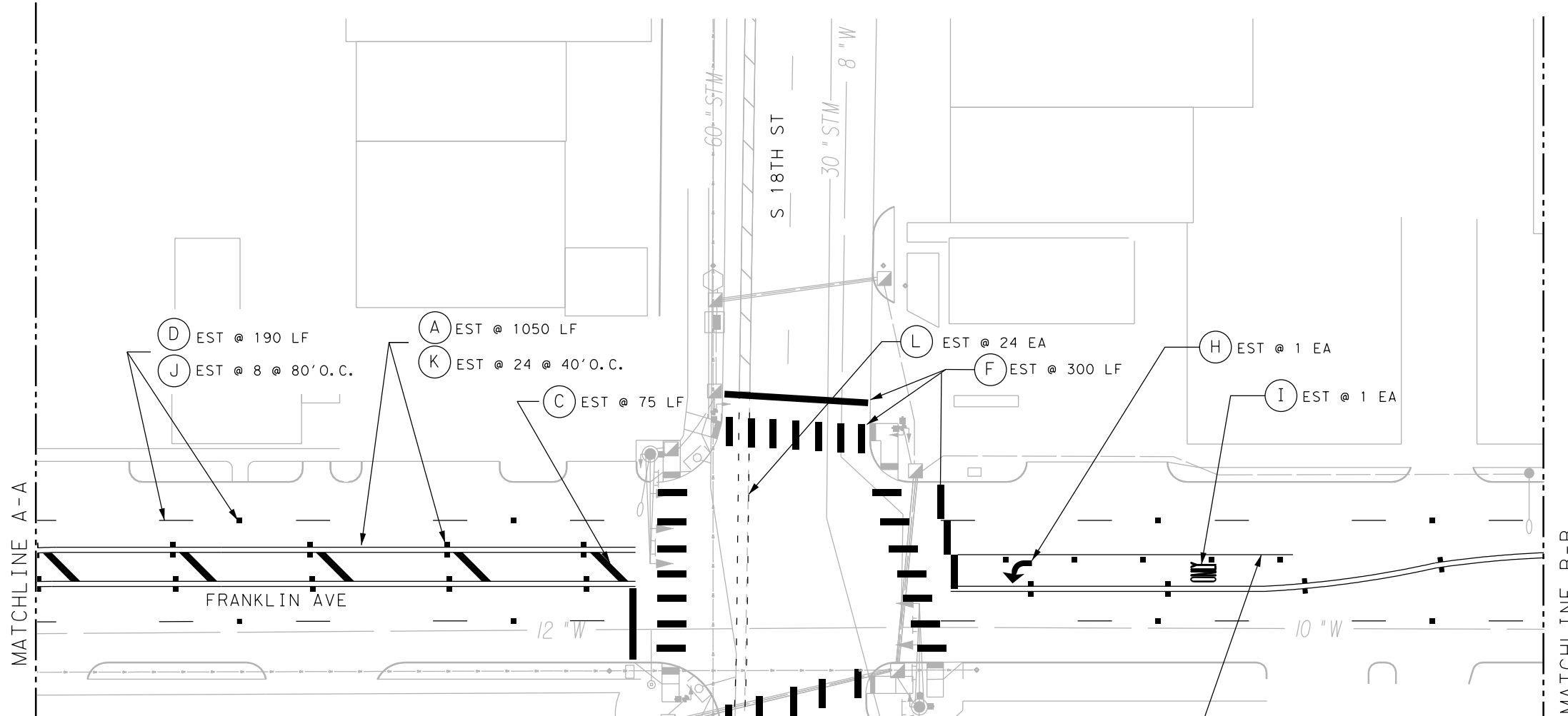
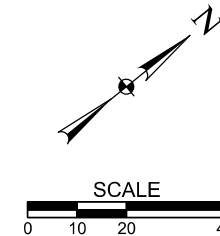
PAVEMENT MARKING LAYOUTS

SHEET 1 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.	
6	SEE TITLE SHEET	56	
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS

LEGEND:
PAVEMENT MARKINGS

- (A) RE PM W/RET REQ TY I (Y) 6" (SLD) (100MIL)
- (B) REFL PAV MRK TY I (Y) 6" (DOT) (100MIL)
- (C) REFL PAV MRK TY I (Y) 24" (SLD) (100MIL)
- (D) RE PM W/RET REQ TY I (W) 6" (BRK) (100MIL)
- (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)
- (F) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
- (G) PREFAB PAV MRK TY C (W) (DBL ARROW)
- (H) PREFAB PAV MRK TY C (W) (ARROW)
- (I) PREFAB PAV MRK TY C (W) (WORD)
- (J) RAISED PAV MRK TY I-C
- (K) RAISED PAV MRK TY II-A-A
- (L) REFL PAV MRK TY I (W) (BIKE DOT) (100MIL)



SHEET SUMMARY OF ESTIMATED QUANTITIES

ITEM#	DESCRIPTION	UNIT	QTY
0531 6001	CONC SIDEWALKS (4")	SY	6
0662 6109	WK ZN PAV MRK SHT TERM (TAB) TY W	EA	8
0662 6111	WK ZN PAV MRK SHT TERM (TAB) TY Y-2	EA	104
E 0666 6036	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	LF	100
F 0666 6048	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	LF	300
L 0666 6117	REFL PAV MRK TY I (W) (BIKE DOT) (100MIL)	EA	24
C 0666 6147	REFL PAV MRK TY I (Y) 24" (SLD) (100MIL)	LF	75
0666 6225	PAVEMENT SEALER 6"	LF	1288
0666 6226	PAVEMENT SEALER 8"	LF	100
0666 6230	PAVEMENT SEALER 24"	LF	75
0666 6231	PAVEMENT SEALER (ARROW)	EA	1
0666 6232	PAVEMENT SEALER (WORD)	EA	1
D 0666 6306	RE PM W/RET REQ TY I (W) 6" (BRK) (100MIL)	LF	190
A 0666 6321	RE PM W/RET REQ TY I (Y) 6" (SLD) (100MIL)	LF	1050
H 0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	1
I 0668 6085	PREFAB PAV MRK TY C (W) (WORD)	EA	1
J 0672 6007	REFL PAV MRKR TY I-C	EA	13
K 0672 6009	REFL PAV MRKR TY II-A-A	EA	24
0678 6002	PAV SURF PREP FOR MRK (6")	LF	1288
0678 6004	PAV SURF PREP FOR MRK (8")	LF	100
0678 6008	PAV SURF PREP FOR MRK (24")	LF	75
0678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	1
0678 6016	PAV SURF PREP FOR MRK (WORD)	EA	1



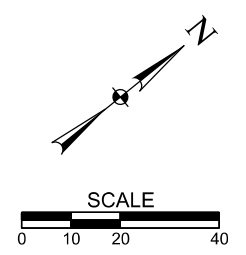
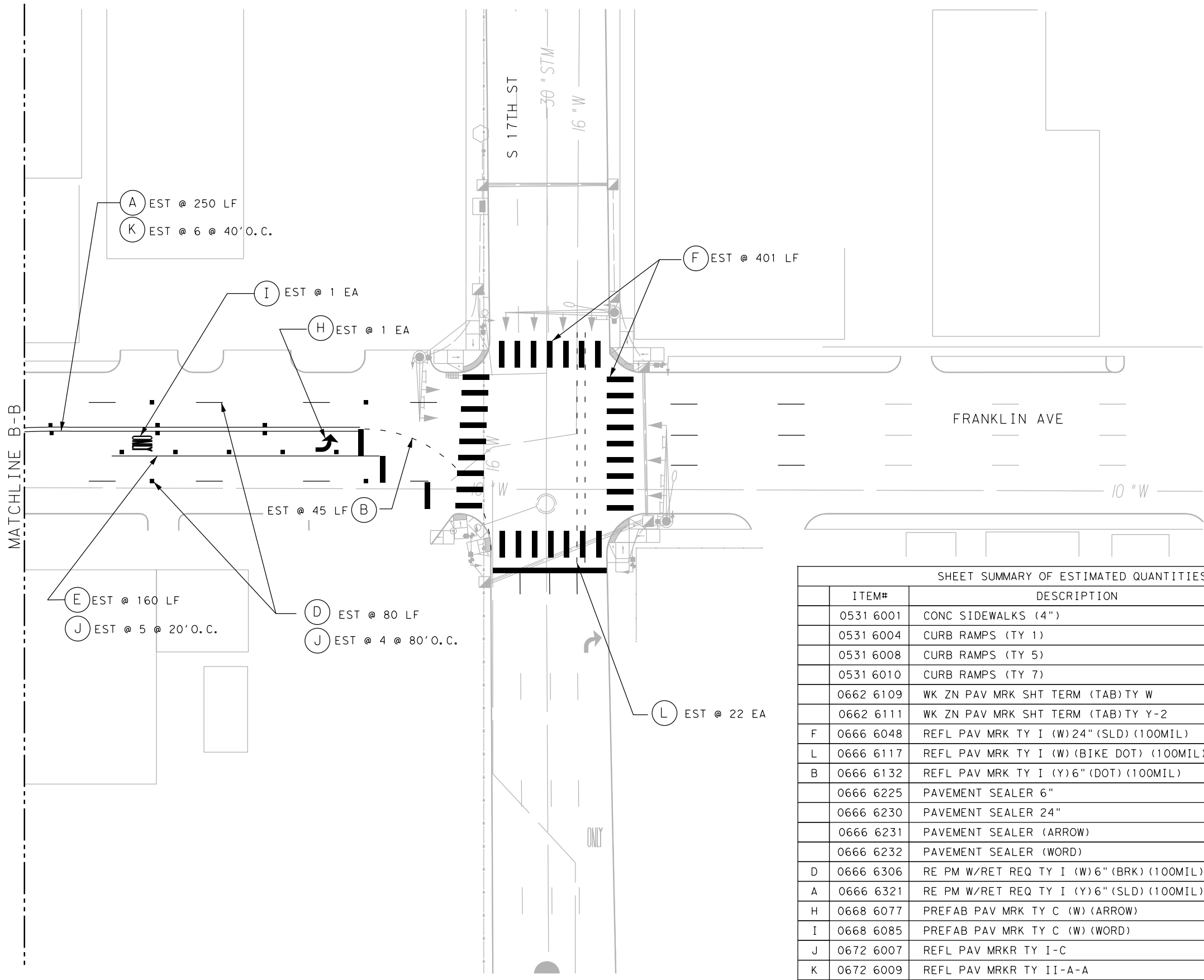
PAVEMENT MARKING LAYOUTS

SHEET 2 OF 3

FED. RD. DIV. NO. 6	FEDERAL AID PROJECT NO. SEE TITLE SHEET	SHEET NO. 57
STATE TEXAS	DIST. WAC	COUNTY MCLENNAN
CONT. 0909	SECT. 22	JOB 197 HIGHWAY NO. CS

SPLTDRVSS
 \$TIMES 10/23/2023
 \$USERS\$
 S:\4.0.0.0. Engineering Operations\4.2.0.0.0. Project Files\2022\22049 - COW HSJP Projects\cad\sheets\1 17th & 18th\9C Proposed_17th St ADA.dgn

DN: LJC CK: BAS DW: DBW CK: LJC



- LEGEND:**
PAVEMENT MARKINGS
- (A) RE PM W/RET REQ TY I (Y) 6" (SLD) (100MIL)
 - (B) REFL PAV MRK TY I (Y) 6" (DOT) (100MIL)
 - (C) REFL PAV MRK TY I (Y) 24" (SLD) (100MIL)
 - (D) RE PM W/RET REQ TY I (W) 6" (BRK) (100MIL)
 - (E) REFL PAV MRK TY I (W) 8" (SLD) (100MIL)
 - (F) REFL PAV MRK TY I (W) 24" (SLD) (100MIL)
 - (G) PREFAB PAV MRK TY C (W) (DBL ARROW)
 - (H) PREFAB PAV MRK TY C (W) (ARROW)
 - (I) PREFAB PAV MRK TY C (W) (WORD)
 - (J) RAISED PAV MRK TY I-C
 - (K) RAISED PAV MRK TY II-A-A
 - (L) REFL PAV MRK TY I (W) (BIKE DOT) (100MIL)

SHEET SUMMARY OF ESTIMATED QUANTITIES				
ITEM#	DESCRIPTION	UNIT	QTY	
0531 6001	CONC SIDEWALKS (4")	SY	12	
0531 6004	CURB RAMPS (TY 1)	EA	7	
0531 6008	CURB RAMPS (TY 5)	EA	2	
0531 6010	CURB RAMPS (TY 7)	EA	2	
0662 6109	WK ZN PAV MRK SHT TERM (TAB) TY W	EA	16	
0662 6111	WK ZN PAV MRK SHT TERM (TAB) TY Y-2	EA	24	
F 0666 6048	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	LF	401	
L 0666 6117	REFL PAV MRK TY I (W) (BIKE DOT) (100MIL)	EA	22	
B 0666 6132	REFL PAV MRK TY I (Y) 6" (DOT) (100MIL)	LF	45	
0666 6225	PAVEMENT SEALER 6"	LF	419	
0666 6230	PAVEMENT SEALER 24"	LF	401	
0666 6231	PAVEMENT SEALER (ARROW)	EA	1	
0666 6232	PAVEMENT SEALER (WORD)	EA	1	
D 0666 6306	RE PM W/RET REQ TY I (W) 6" (BRK) (100MIL)	LF	80	
A 0666 6321	RE PM W/RET REQ TY I (Y) 6" (SLD) (100MIL)	LF	250	
H 0668 6077	PREFAB PAV MRK TY C (W) (ARROW)	EA	1	
I 0668 6085	PREFAB PAV MRK TY C (W) (WORD)	EA	1	
J 0672 6007	REFL PAV MRKR TY I-C	EA	9	
K 0672 6009	REFL PAV MRKR TY II-A-A	EA	6	
0678 6002	PAV SURF PREP FOR MRK (6")	LF	419	
0678 6008	PAV SURF PREP FOR MRK (24")	LF	401	
0678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	1	
0678 6016	PAV SURF PREP FOR MRK (WORD)	EA	1	



PAVEMENT MARKING LAYOUTS

SHEET 3 OF 3

FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.	
6	SEE TITLE SHEET	58	
STATE	DIST.	COUNTY	
TEXAS	WAC	MCLENNAN	
CONT.	SECT.	JOB	HIGHWAY NO.
0909	22	197	CS

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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

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

C. TEMPORARY WIRING

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

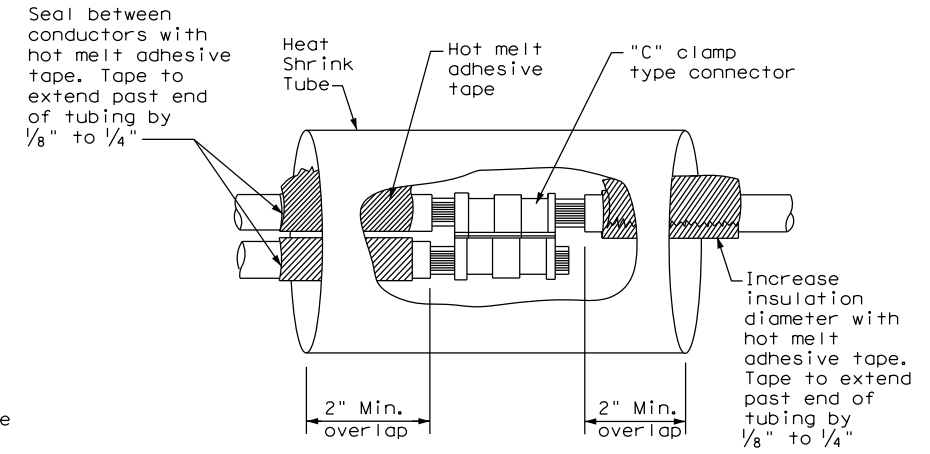
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

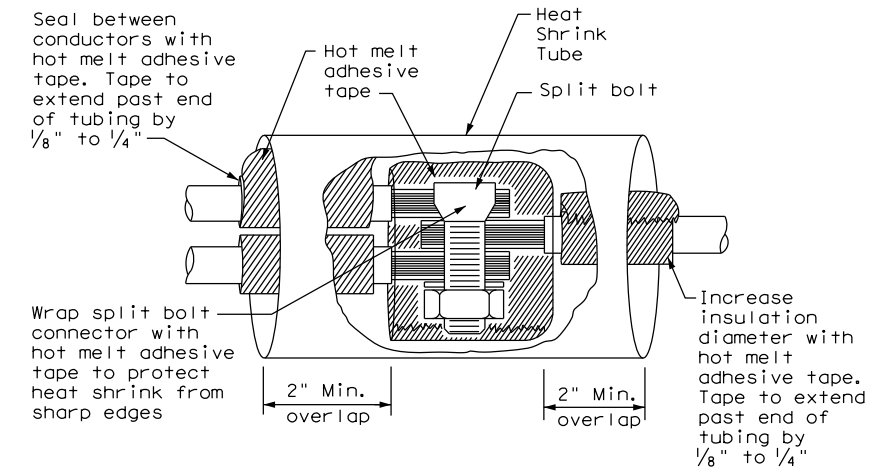
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in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

B. CONSTRUCTION METHODS

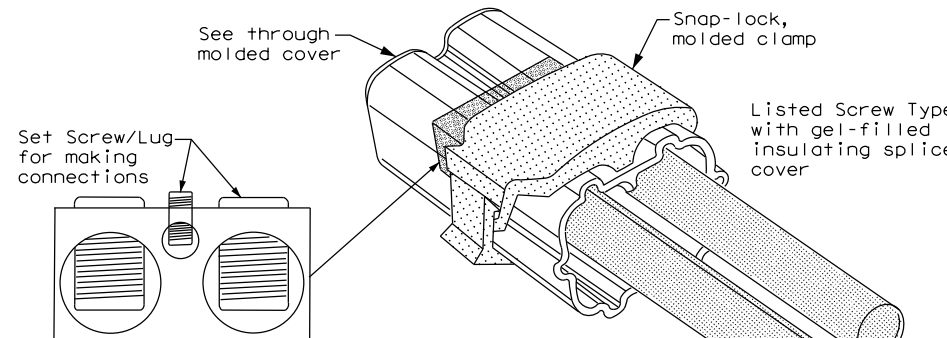
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil,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



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

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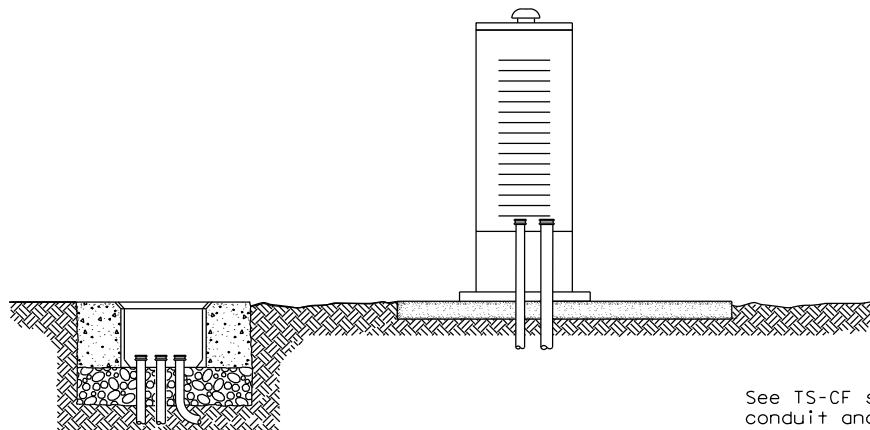
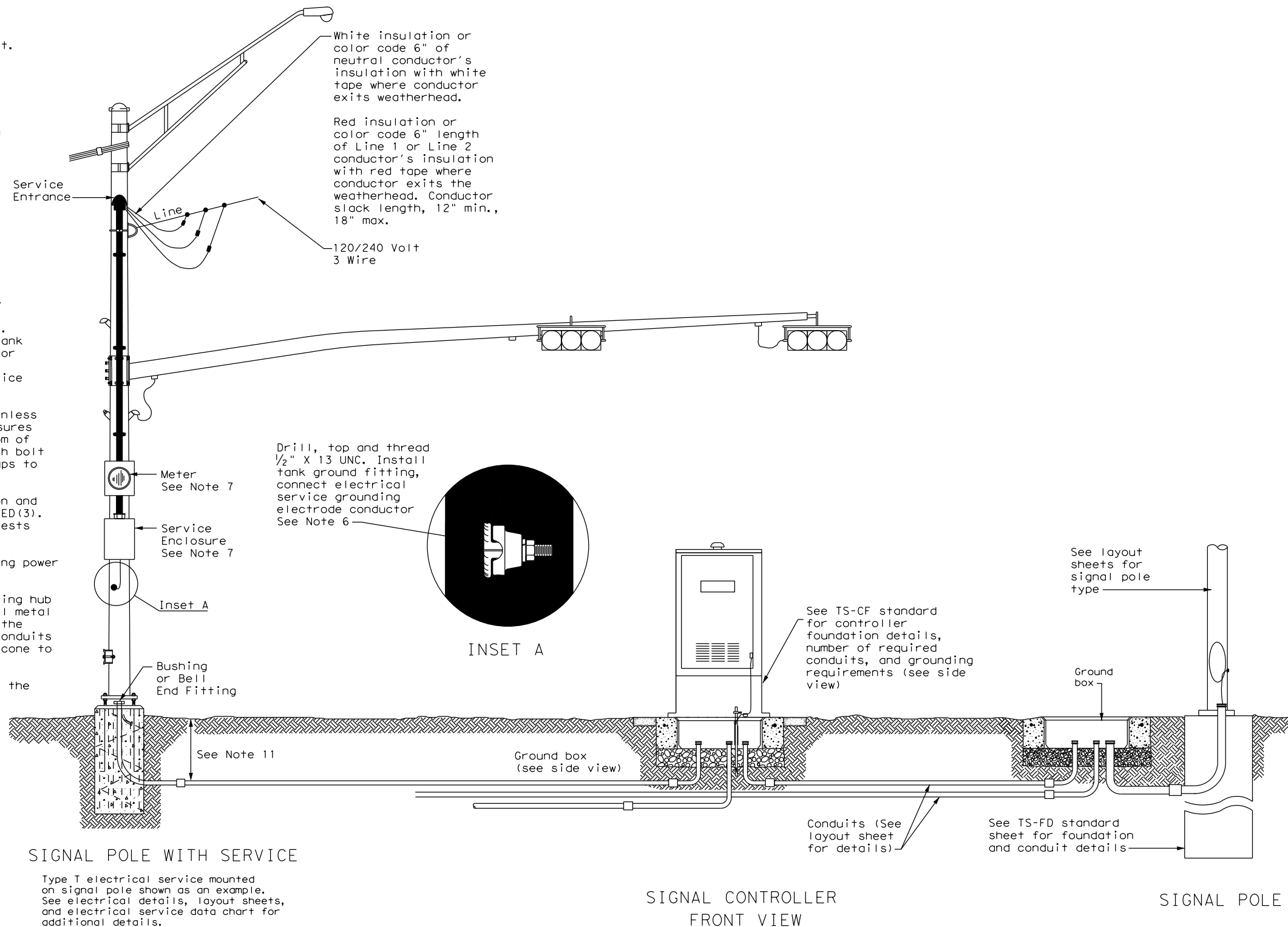
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		Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS CONDUCTORS</h2>			
<h3>ED(3) - 14</h3>			
FILE:	ed3-14.dgn	DW:	TxDOT
© TxDOT	October 2014	CON:	0909
REVISIONS		SECT:	22
		JOB:	197
		HIGHWAY:	CS
		DIST:	WAC
		COUNTY:	MCLENNAN
		SHEET NO.:	60

DATE: 10/23/2023 \$TIME\$
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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 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.

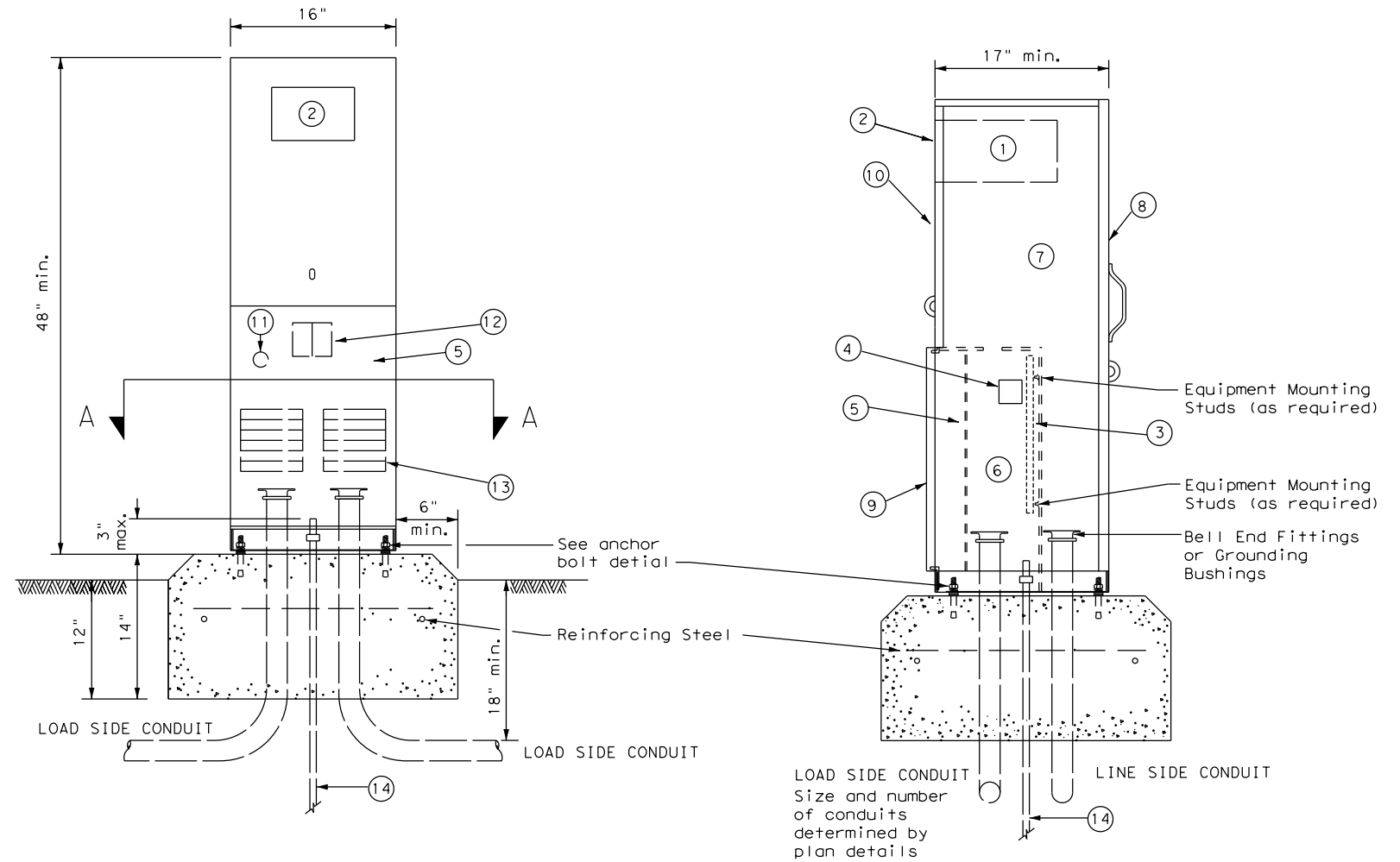
				Traffic Operations Division Standard	
ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS					
ED(8) - 14					
FILE:	ed8-14.dgn	DN:	TxDOT	CK:	TxDOT
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		0909	22	197	CS
DIST	COUNTY	SHEET NO.			
WAC	MCLENNAN	62			

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PEDESTAL SERVICE NOTES

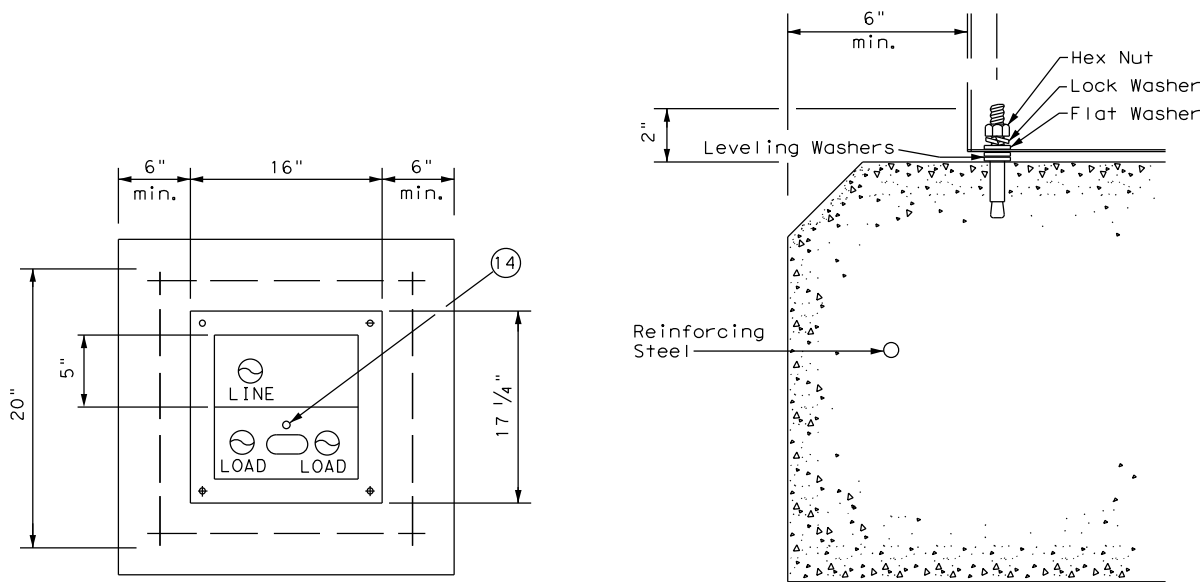
1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS)11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 628 "Electrical Services." Provide pedestal electrical services as listed on the Material Producers list (MPL) on the 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 1/6 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'



**ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS**

ED(9) - 14

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		DIST	COUNTY		SHEET NO.				
		WAC	MCLENNAN		63				

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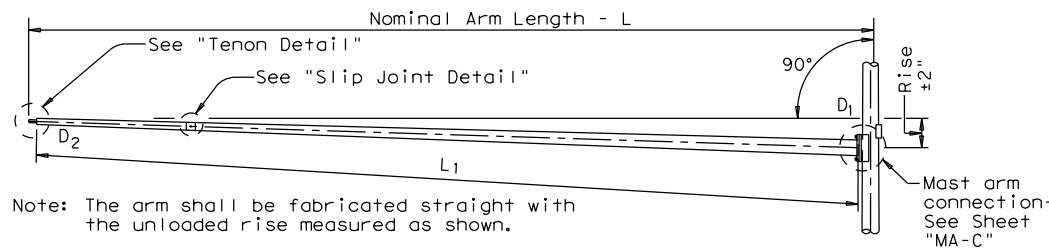
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Arm Length ft.	ROUND POLES					POLYGONAL POLES					Foundation Type
	D _B in.	D ₁₉ in.	D ₂₄ in.	D ₃₀ in.	① thk in.	D _B in.	D ₁₉ in.	D ₂₄ in.	D ₃₀ in.	① thk in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2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

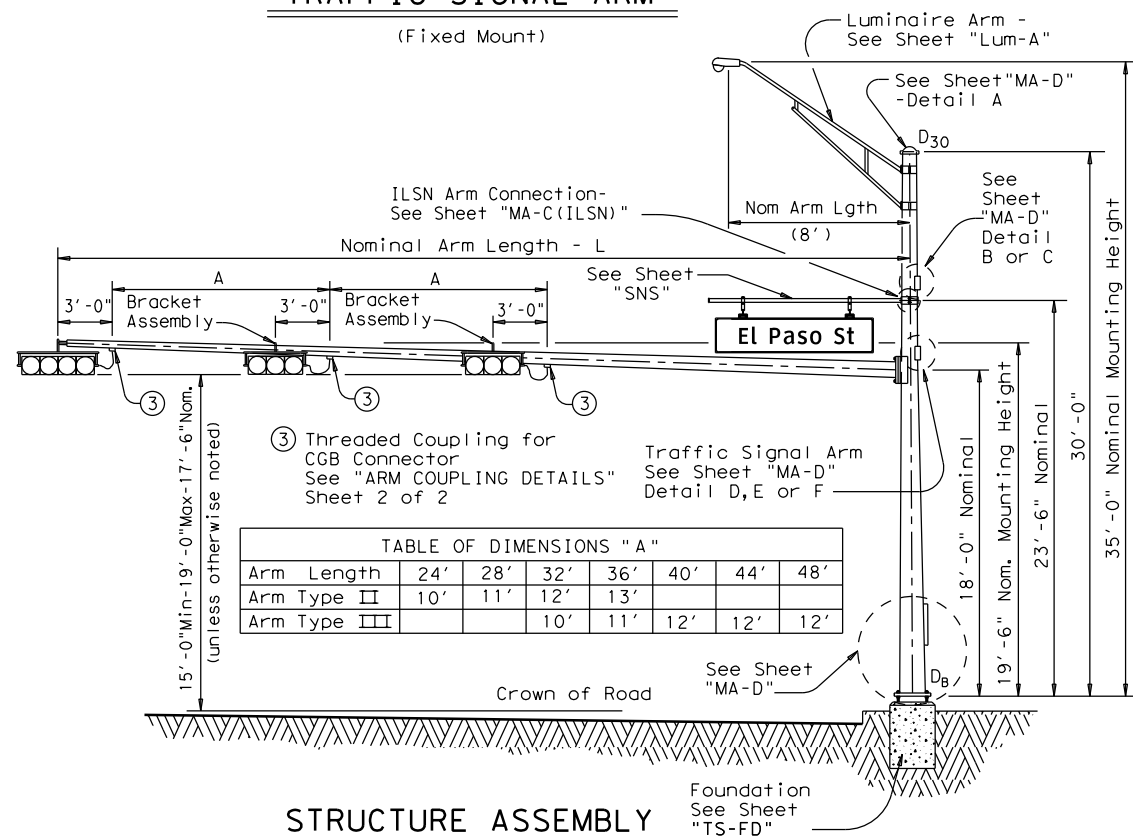
Arm Length ft.	ROUND ARMS					POLYGONAL ARMS				
	L ₁ ft.	D ₁ in.	D ₂ in.	① thk in.	Rise	L ₁ ft.	D ₁ in.	② D ₂ in.	① thk in.	Rise
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7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

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

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



TRAFFIC SIGNAL ARM
(Fixed Mount)



STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

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

Nominal Arm Length	30' Poles With Luminaire		24' Poles With ILSN		19' Poles With No Luminaire and No ILSN	
	Designation	Quantity	Designation	Quantity	Designation	Quantity
ft	20L-80		20S-80		20-80	
24	24L-80	2	24S-80		24-80	
28	28L-80	1	28S-80		28-80	
32	32L-80	1	32S-80	1	32-80	1
36	36L-80	1	36S-80		36-80	
40	40L-80	1	40S-80		40-80	1
44	44L-80		44S-80		44-80	
48	48L-80		48S-80		48-80	

Traffic Signal Arms (1 per Pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	Designation	Quantity	Designation	Quantity	Designation	Quantity
ft	20I-80		20II-80		20III-80	
24	24I-80		24II-80	2	24III-80	
28	28I-80		28II-80	1	28III-80	
32			32II-80	1	32III-80	2
36			36II-80		36III-80	
40			40II-80		40III-80	
44					44III-80	
48					48III-80	

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	7

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"	6
1 3/4"	3'-10"	

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

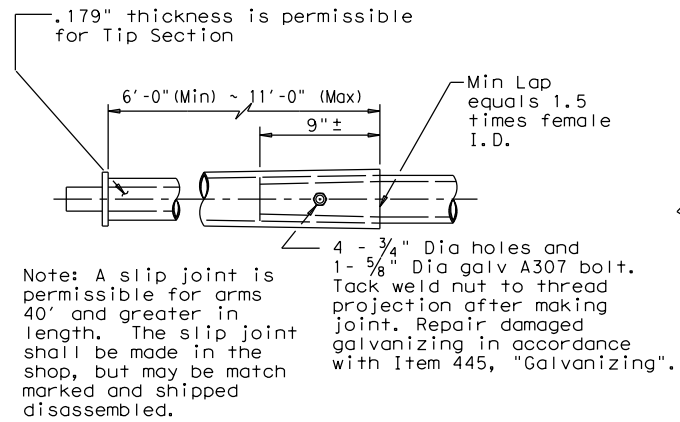
**TRAFFIC SIGNAL
SUPPORT STRUCTURES**

**SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)**

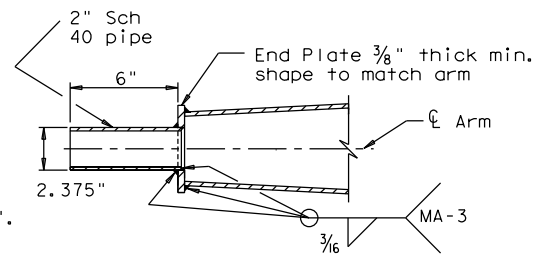
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1-12		WAC	MCLENNAN	64	

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 DATE: 10/23/2023 \$TIME\$
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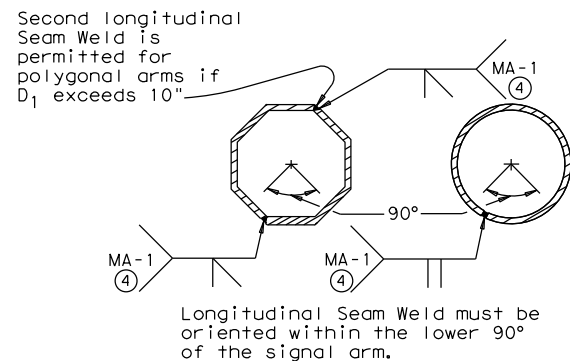
SLIP JOINT DETAIL



TENON DETAIL

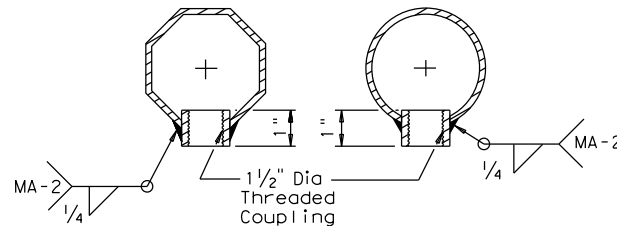
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 1/2" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

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



ARM COUPLING DETAILS

VIBRATION WARNING

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

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

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

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

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

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

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

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

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

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



**TRAFFIC SIGNAL
 SUPPORT STRUCTURES
 SINGLE MAST ARM ASSEMBLY**

(80 MPH WIND ZONE)

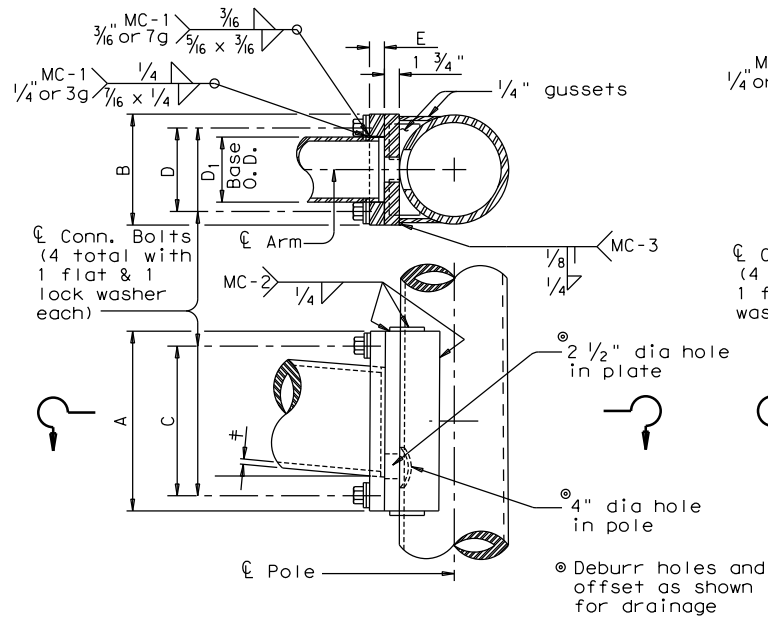
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	DIST	COUNTY	SHEET NO.			
	WAC	MCLENNAN	65			

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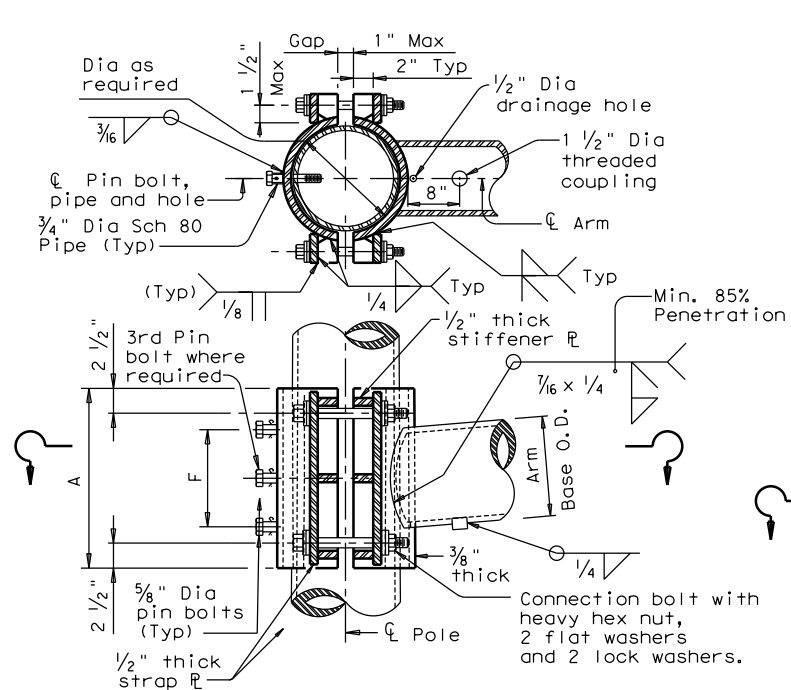
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ARM SIZE		A	B	C	D	E	CONN BOLT DIA
D ₁	Ø	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15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



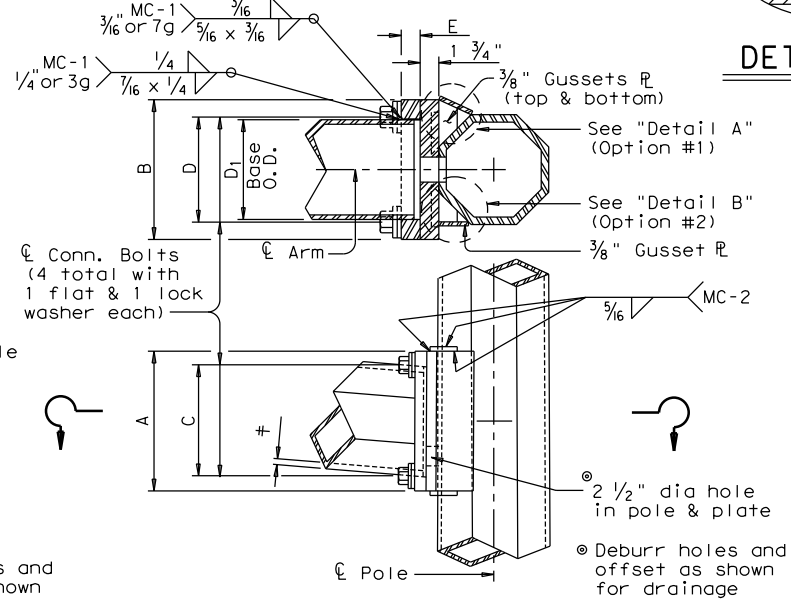
FIXED MOUNT DETAIL 1

ARM SIZE		A	F	CONN. BOLTS	PIN BOLTS
D ₁	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



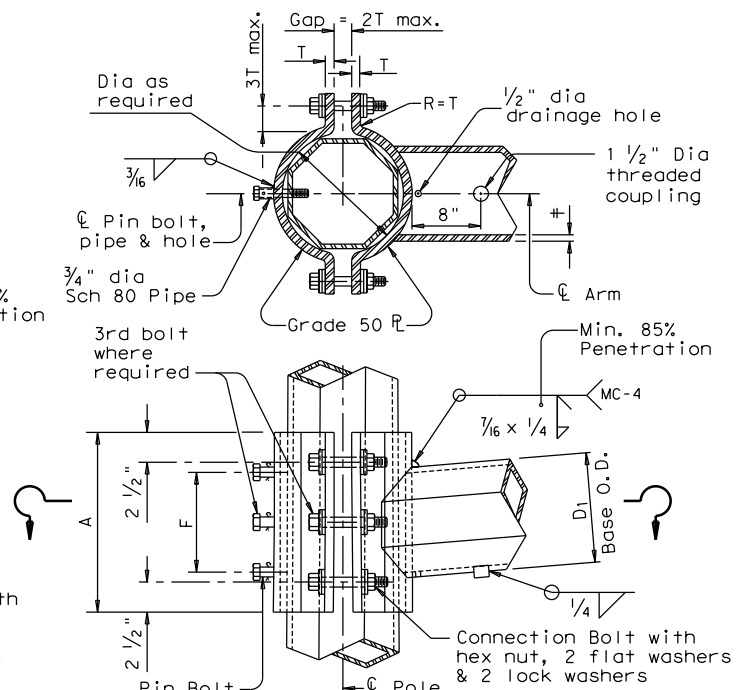
CLAMP-ON DETAIL 1

ARM SIZE		A	B	C	D	E	CONN BOLT DIA
D ₁	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

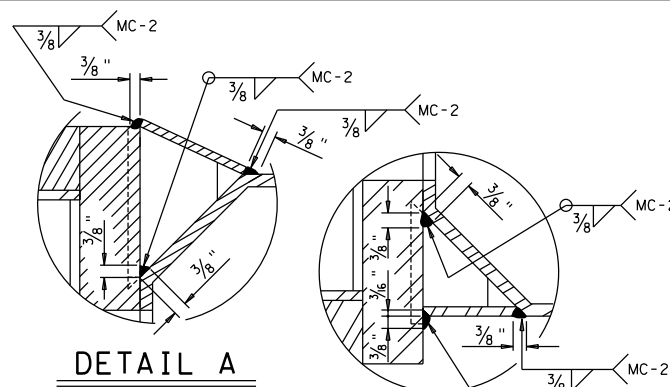


FIXED MOUNT DETAIL 2

ARM SIZE		A	F	T	CONN. BOLTS	PIN BOLTS
D ₁	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

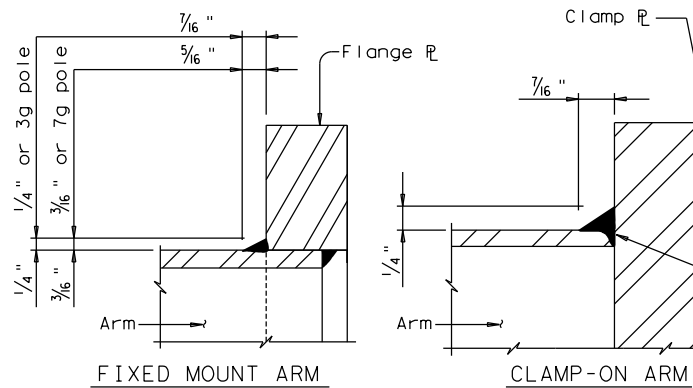


CLAMP-ON DETAIL 2



DETAIL A

DETAIL B

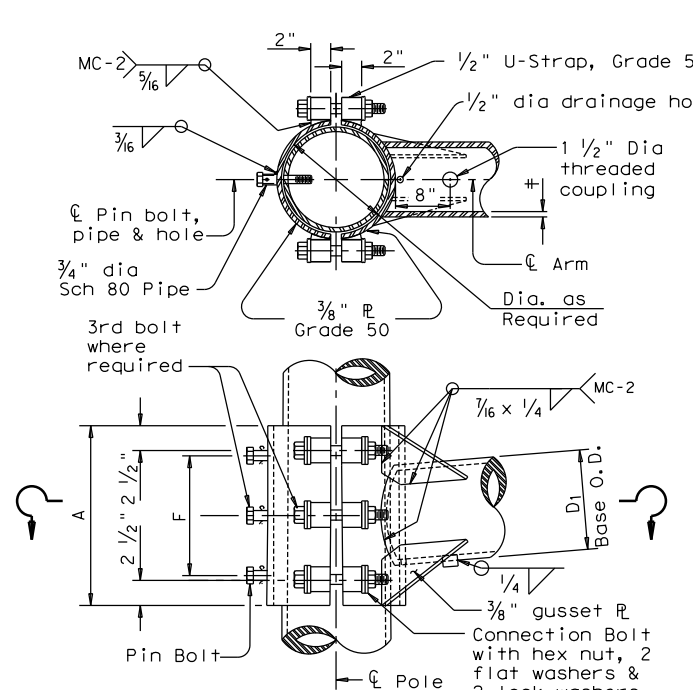


FIXED MOUNT ARM

CLAMP-ON ARM

ARM BASE WELD DETAILS

ARM SIZE		A	F	CONN. BOLTS	PIN BOLTS
D ₁	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



CLAMP-ON DETAIL 3

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

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

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 1/2 inch 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 inch.

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 inch dia pipe shall have 3/16 inch dia holes for a 1/8 inch dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4 inch dia hole for each pin bolt. An 1/16 inch 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

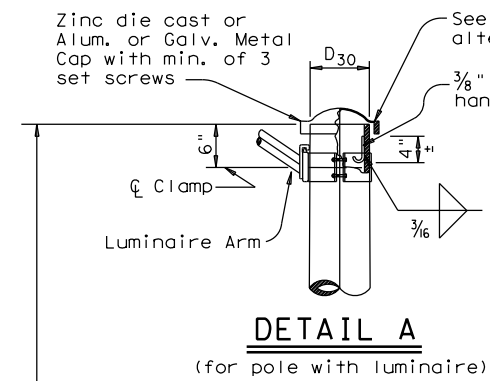
STANDARD ASSEMBLY
FOR TRAFFIC SIGNAL
SUPPORT STRUCTURES

MAST ARM CONNECTIONS

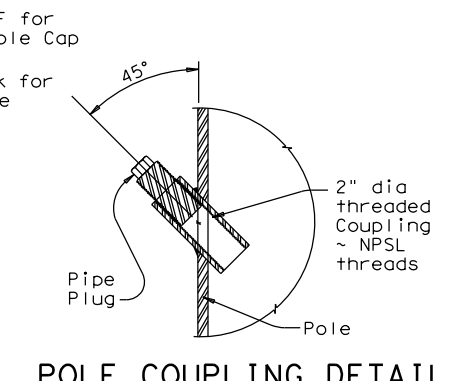
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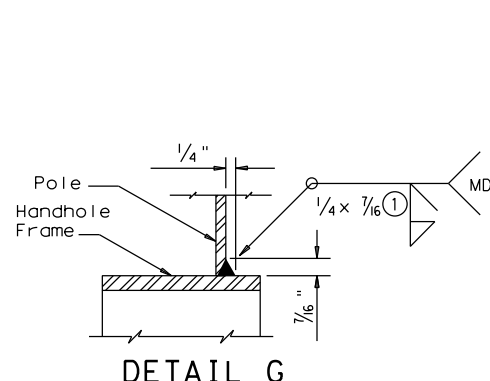
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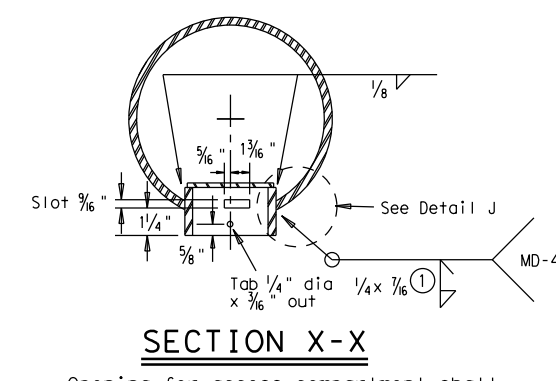
DETAIL A
(for pole with luminaire)



POLE COUPLING DETAIL

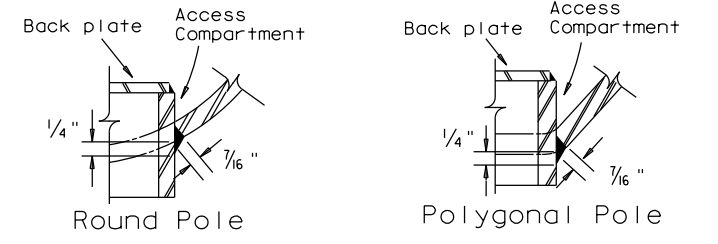


DETAIL G

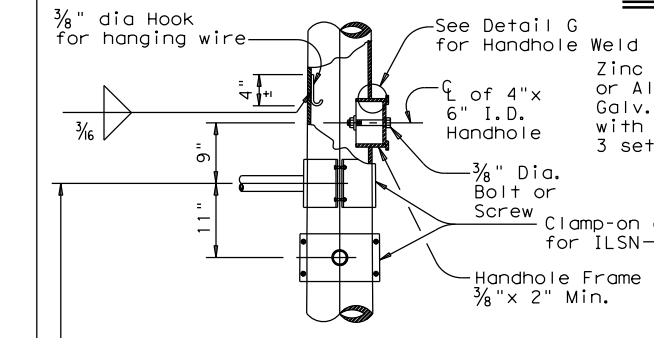


SECTION X-X

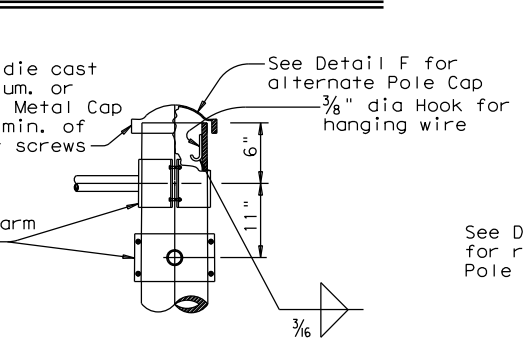
Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.



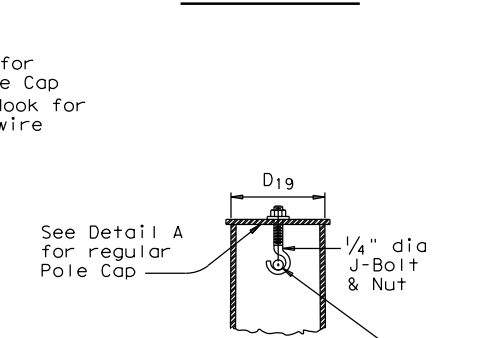
DETAIL J



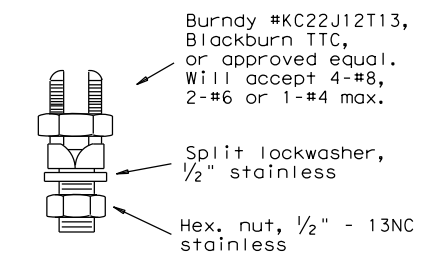
DETAIL B
(If ILSN applied)



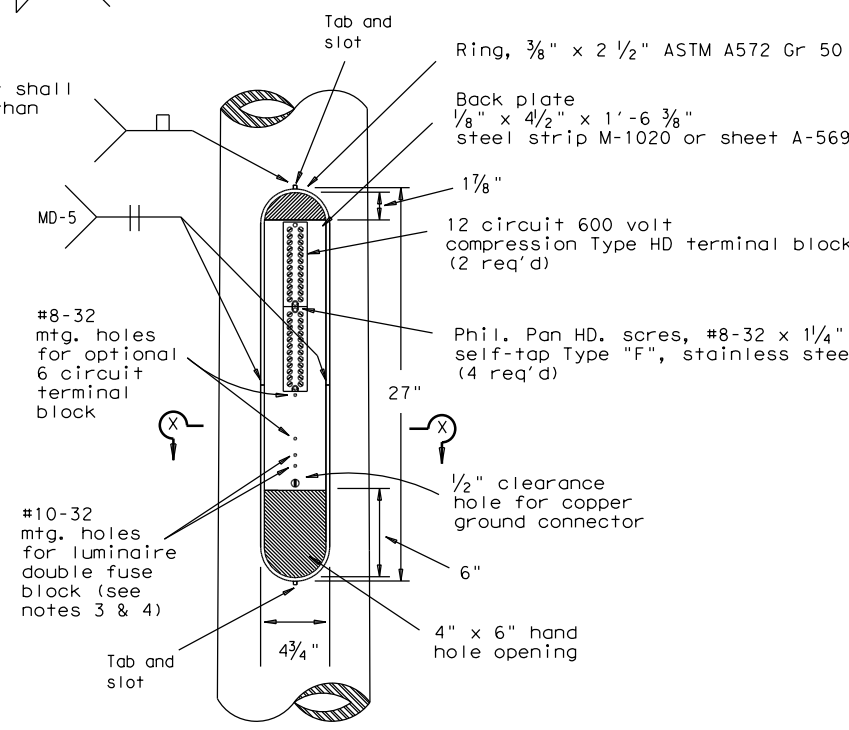
DETAIL C



SECTION Y-Y



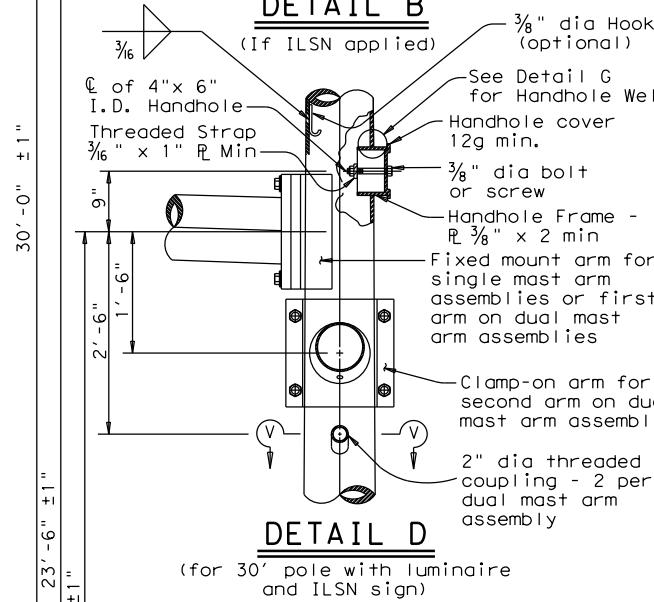
COPPER GROUND CONNECTOR



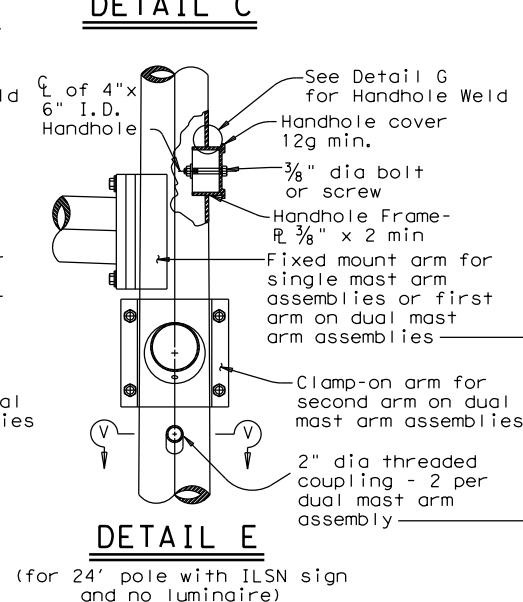
ACCESS COMPARTMENT

NOTES:

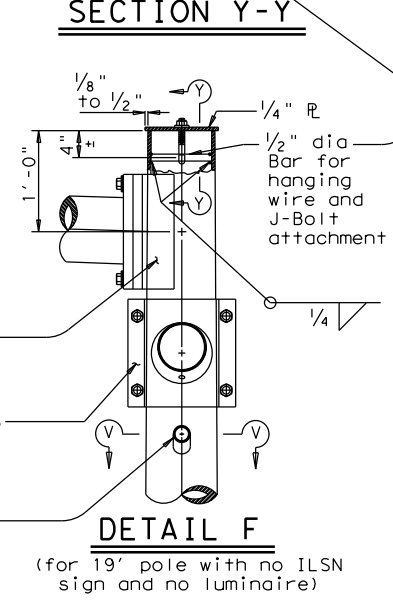
- The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 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.



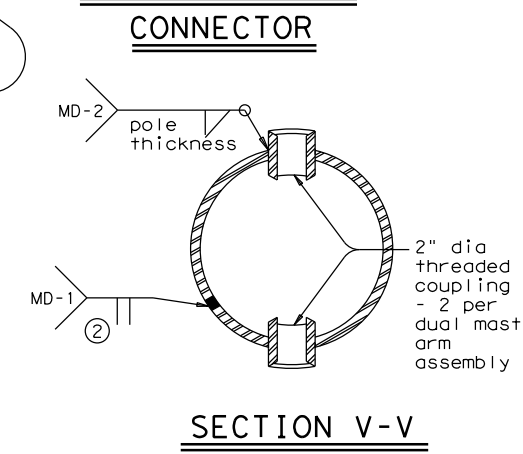
DETAIL D
(for 30' pole with luminaire and ILSN sign)



DETAIL E
(for 24' pole with ILSN sign and no luminaire)

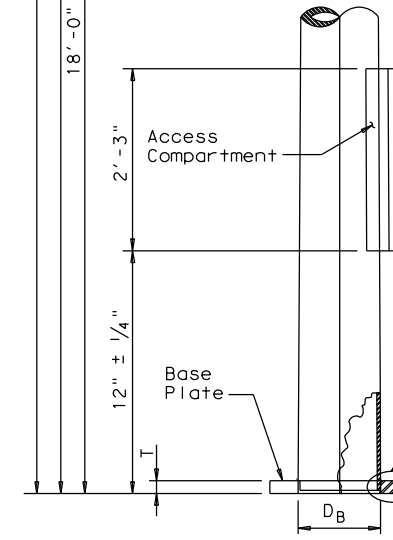


DETAIL F
(for 19' pole with no ILSN sign and no luminaire)

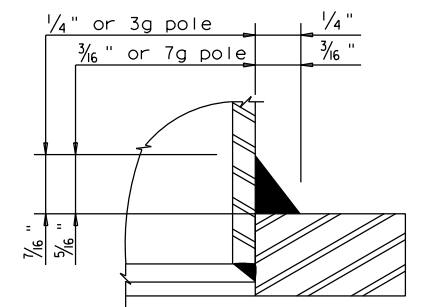


SECTION V-V

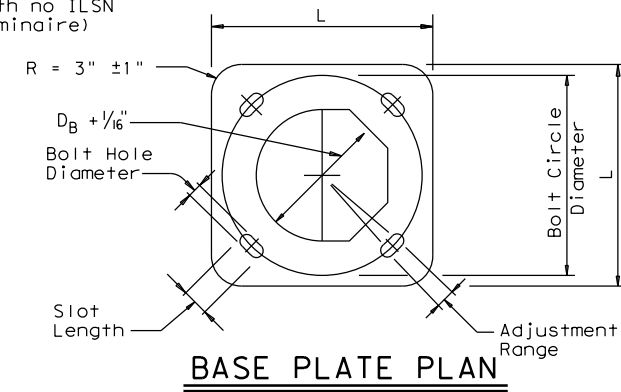
Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base R Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°



POLE ELEVATION



DETAIL H



BASE PLATE PLAN

- ① 85% Min. penetration
- ② 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**

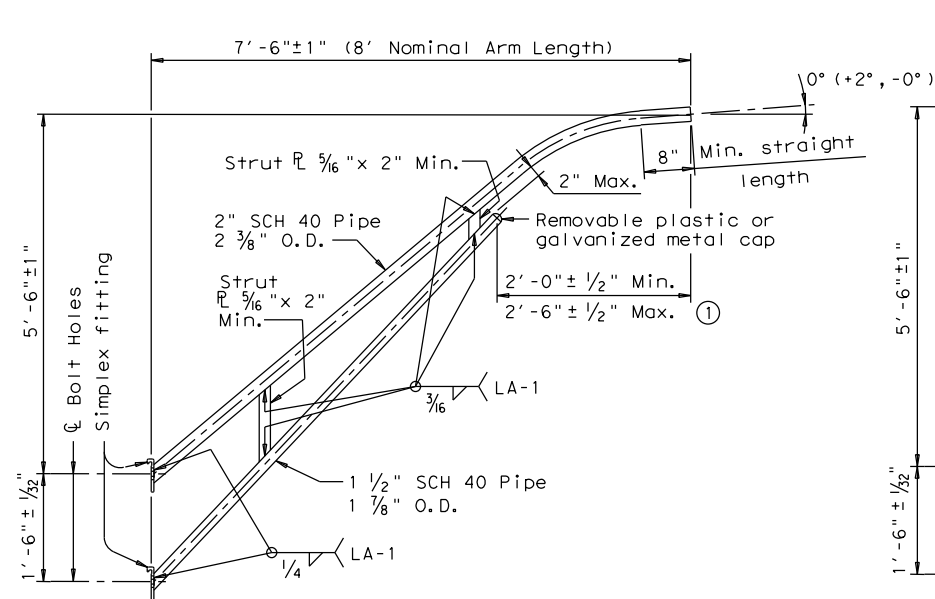
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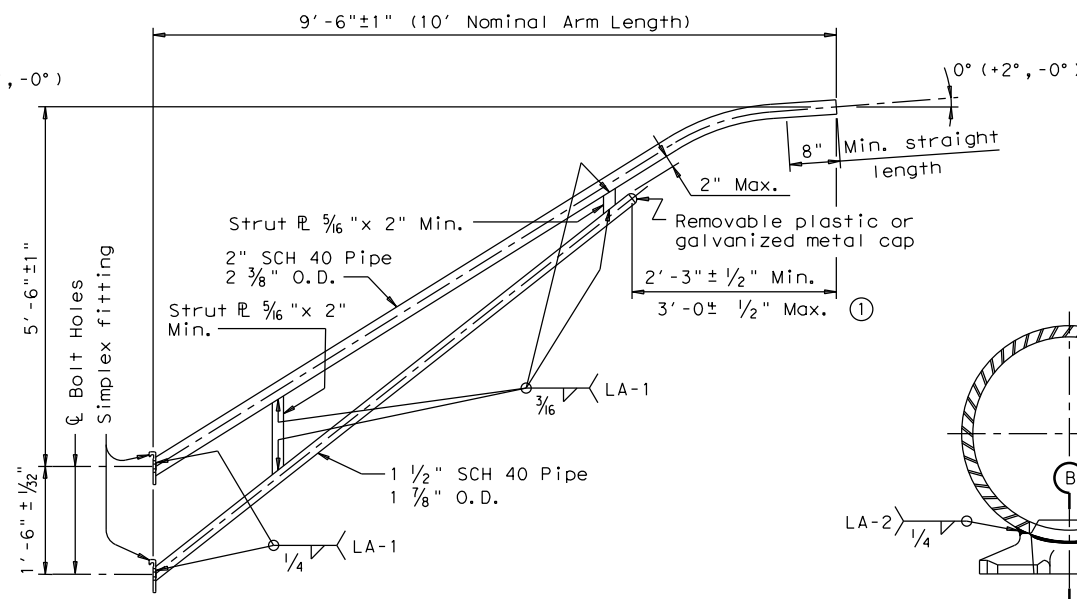
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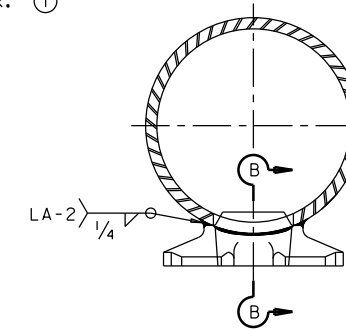
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8-FOOT LUMINAIRE ARM



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 Signs 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.

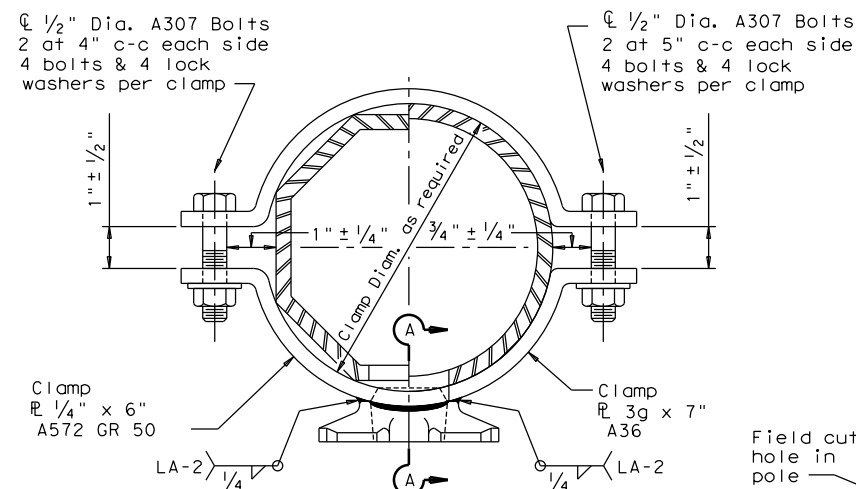
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified 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.

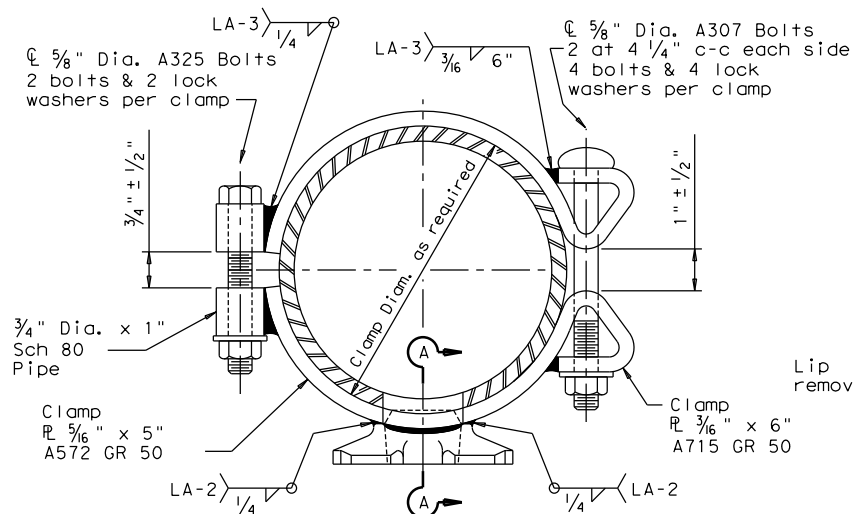
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly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



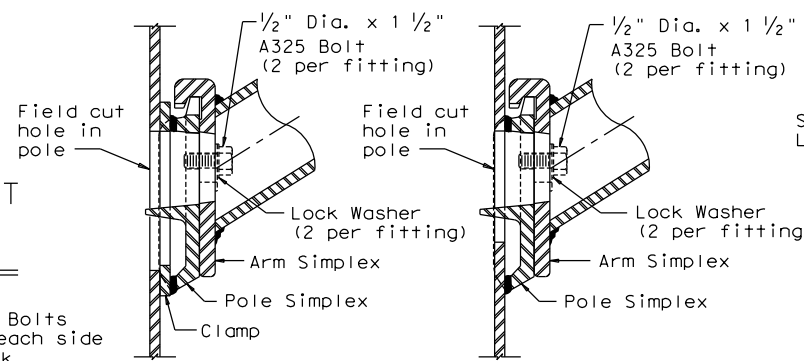
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CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



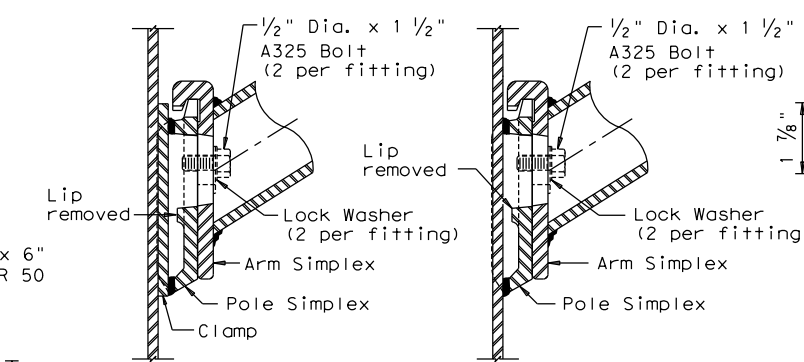
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CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)



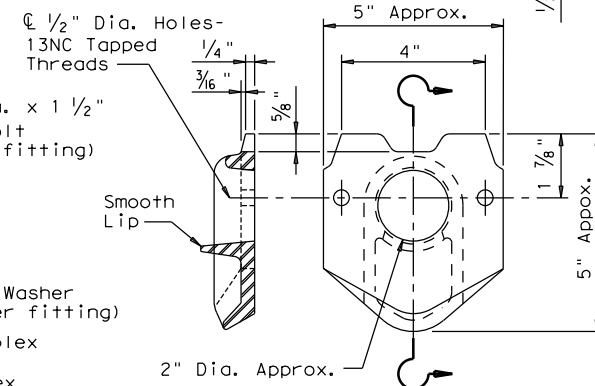
UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING

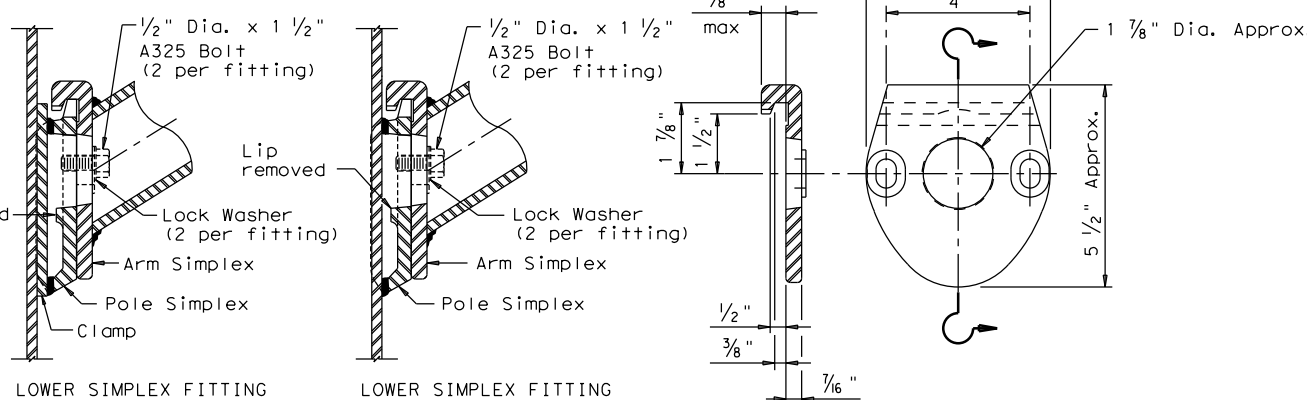


LOWER SIMPLEX FITTING

LOWER SIMPLEX FITTING

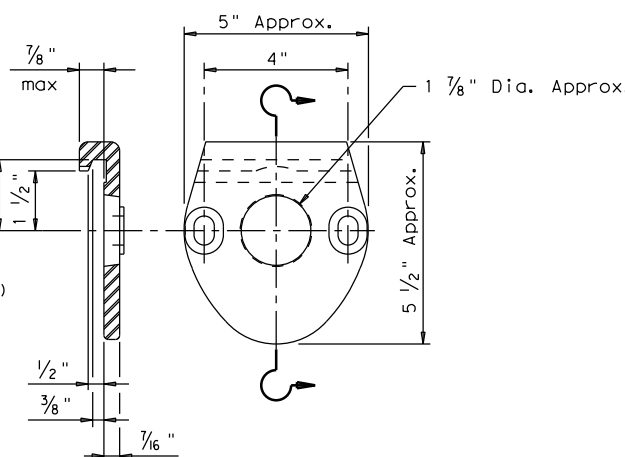


POLE SIMPLEX DETAIL



SECTION A-A

SECTION B-B



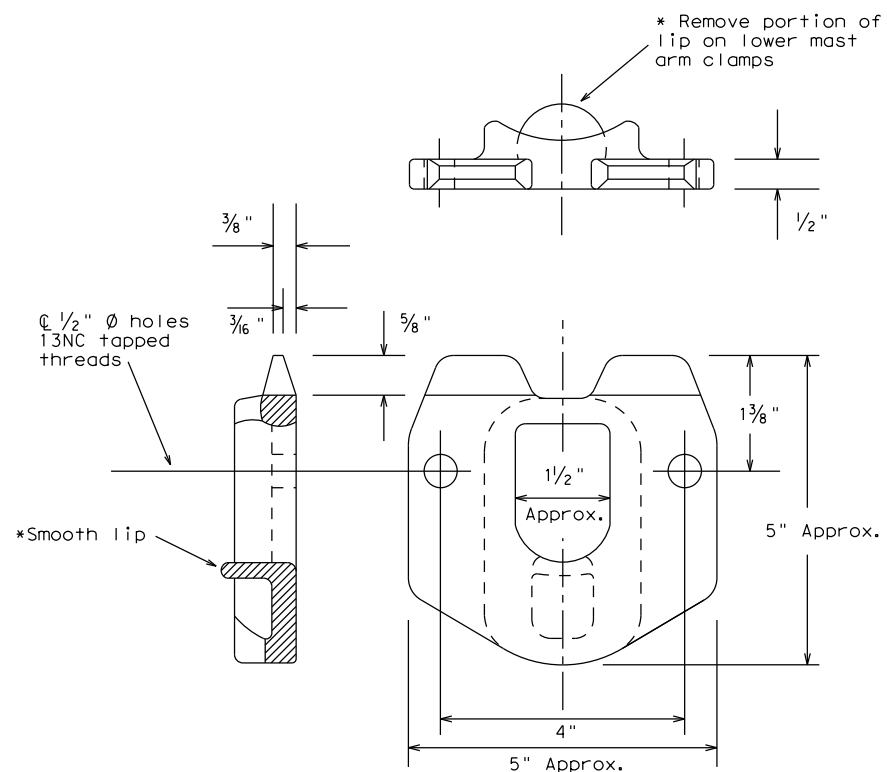
ARM SIMPLEX DETAIL

Texas Department of Transportation
Traffic Operations Division
STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES
ARM DETAILS
LUM-A-12

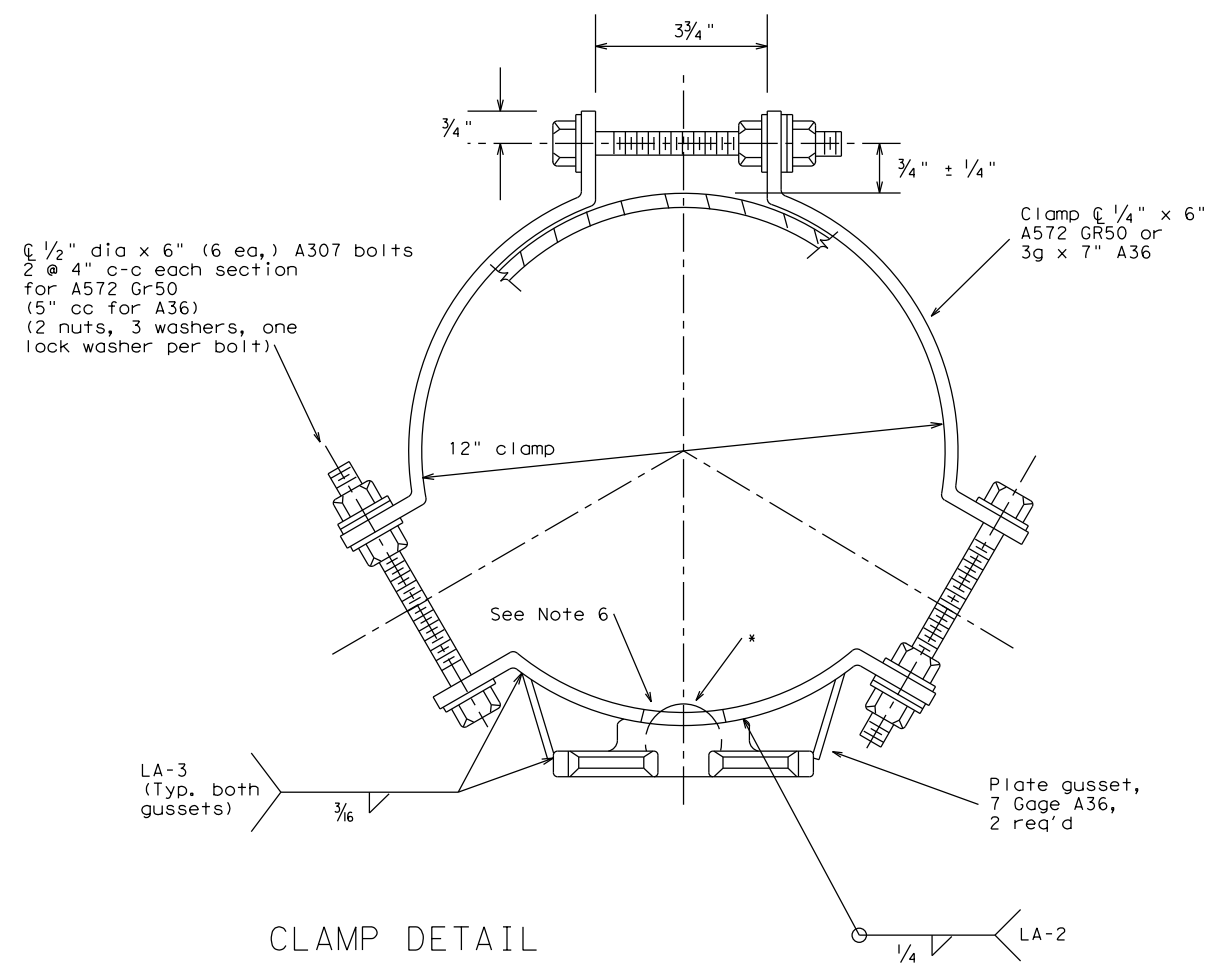
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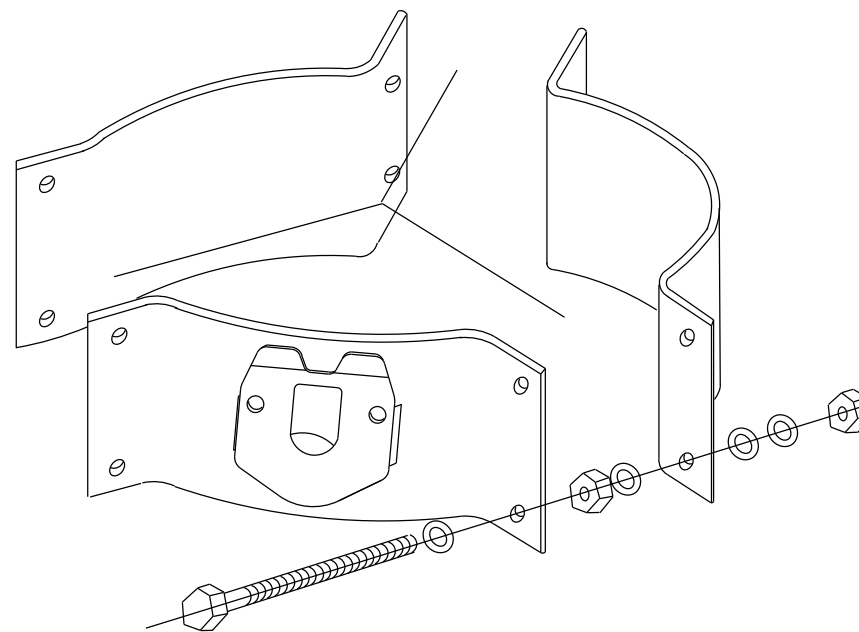
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POLE SIMPLEX DETAILS



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

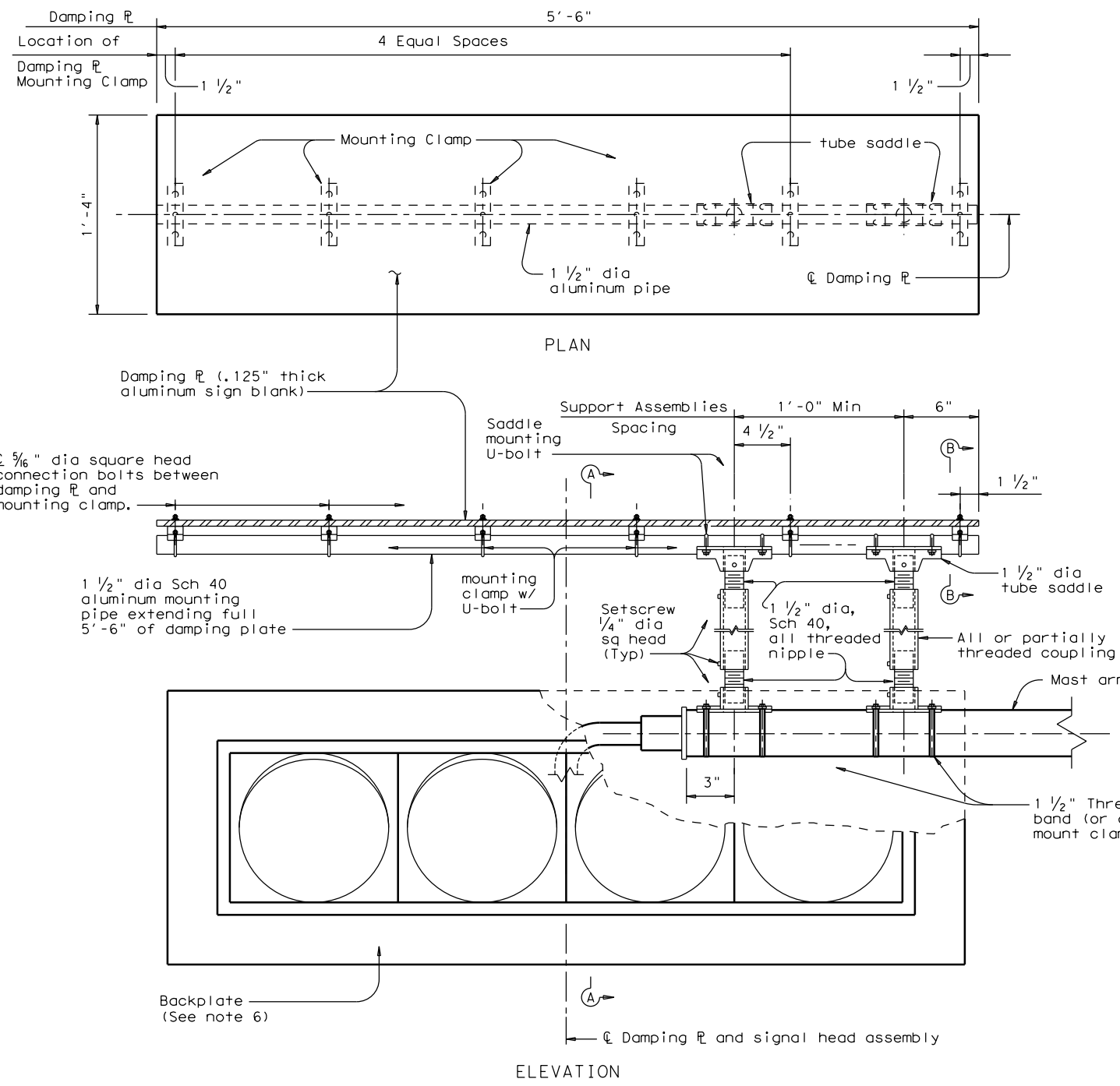
CLAMP ON
 FITTING ASSEMBLY FOR
 LUMINAIRE MAST ARM

CFA-12

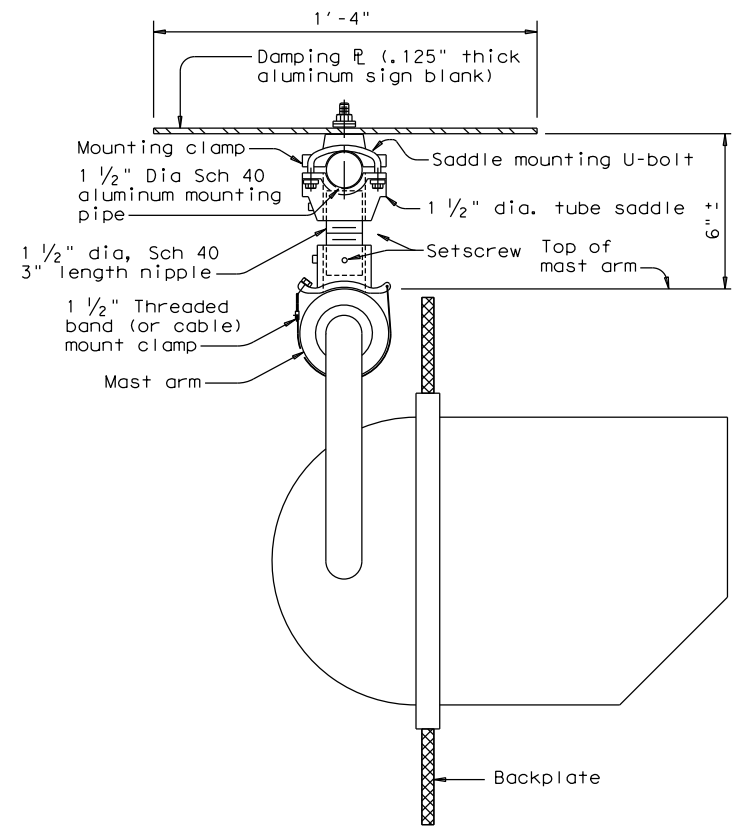
© TxDOT		DN: KAB	CK: RES	DW: FDN	CK: CAL
11-99 1-12	REVISIONS		CONT	SECT	JOB
			0909	22	197
			DIST	COUNTY	SHEET NO.
		WAC	MCLENNAN	69	

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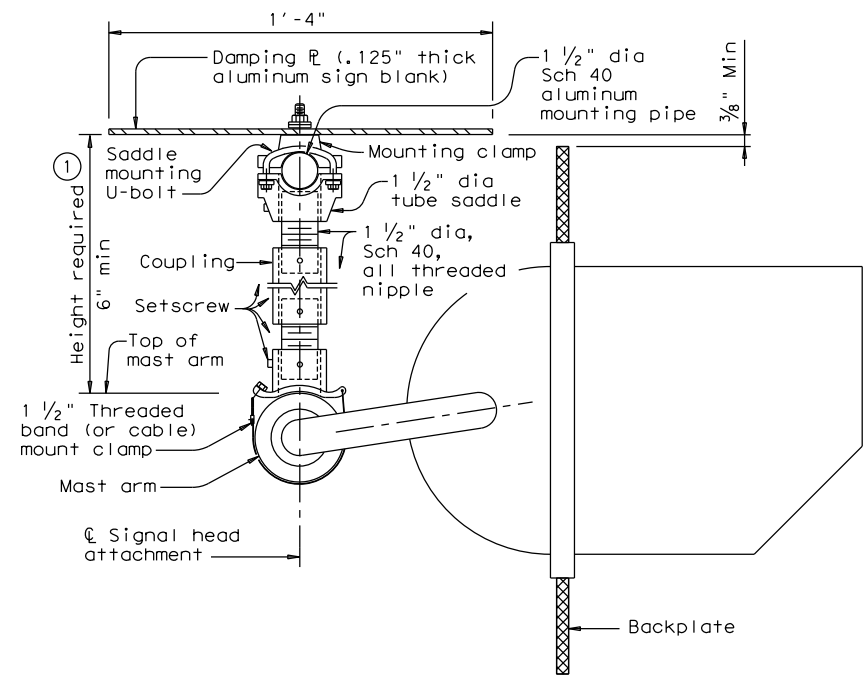
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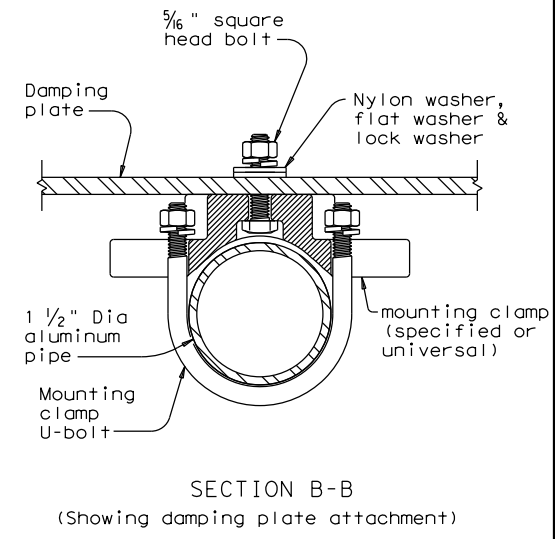
DAMPING PLATE MOUNTING DETAILS
 (Showing alternate placement of signal head)



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



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



SECTION B-B
 (Showing damping plate attachment)

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.

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"

Texas Department of Transportation Traffic Safety Division Standard

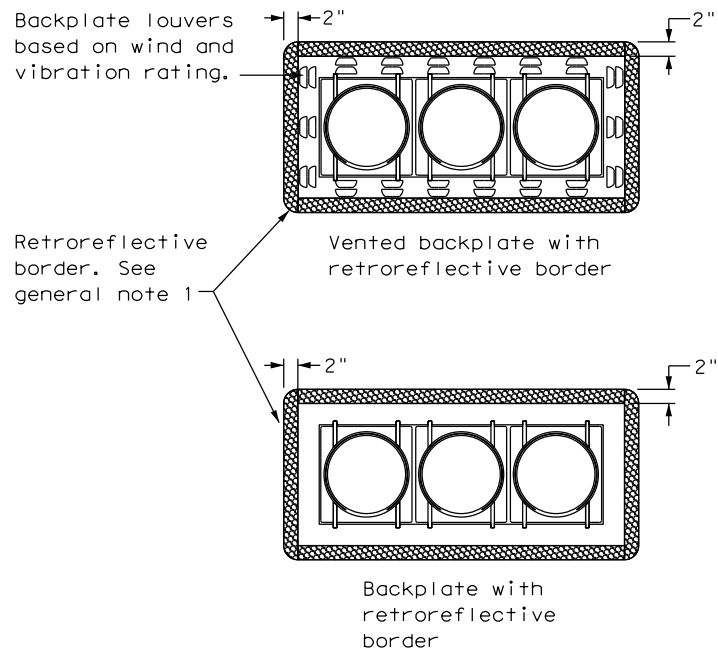
MAST ARM DAMPING PLATE DETAILS

MA-DPD-20

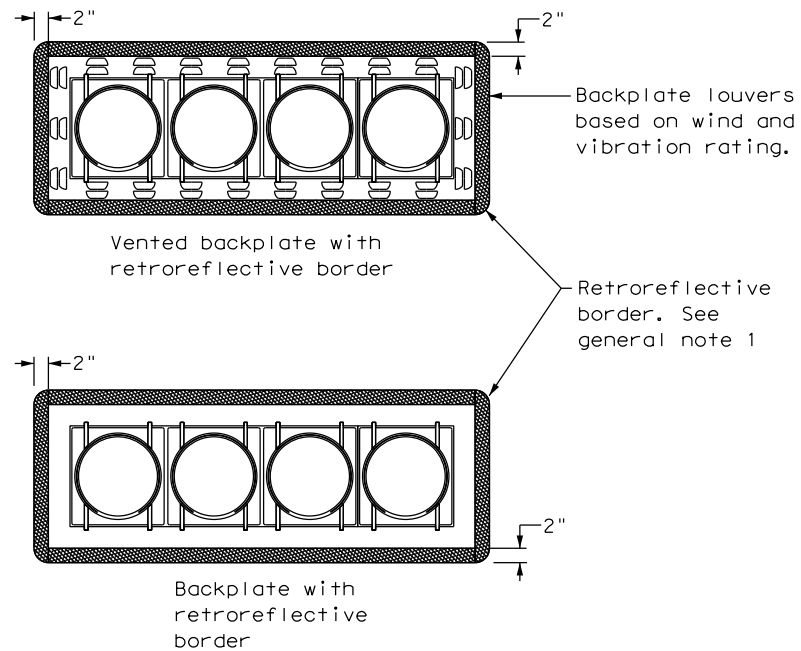
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© TxDOT January 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0909	22	197	CS
6-20	DIST	COUNTY	SHEET NO.	
	WAC	MCLENNAN	70	

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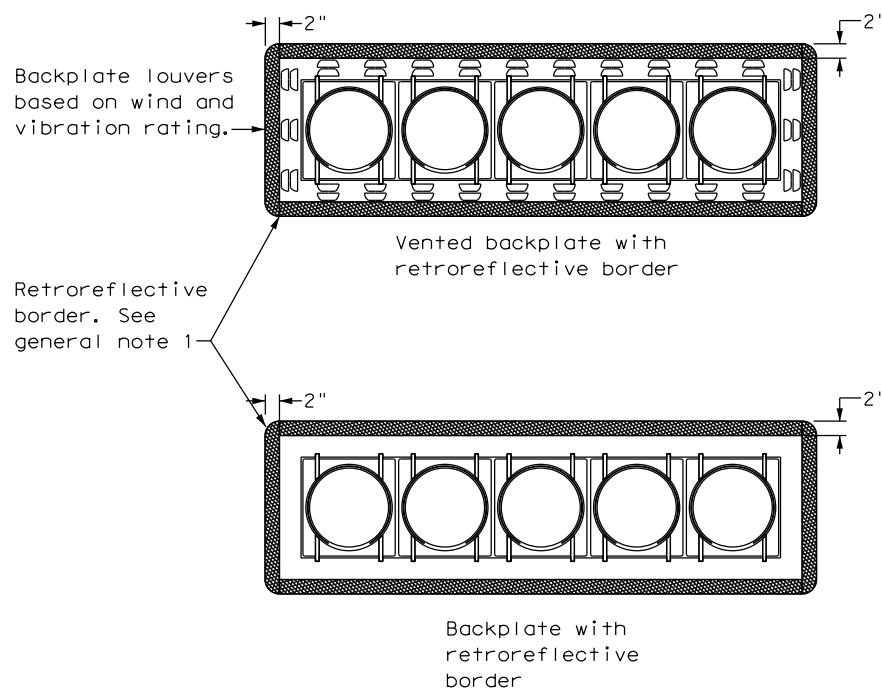
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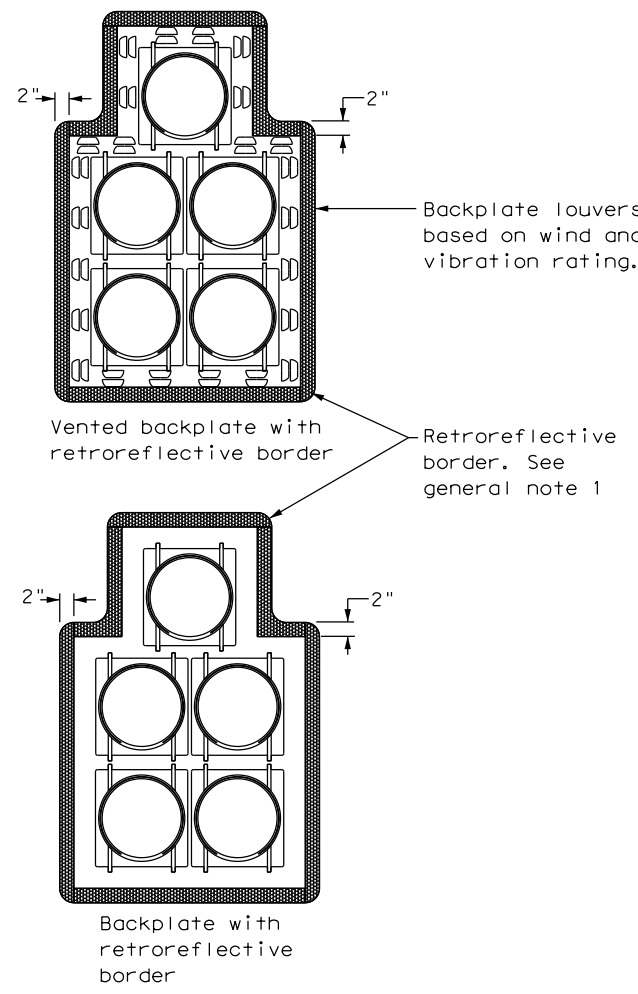
THREE-SECTION HEAD
 HORIZONTAL OR VERTICAL



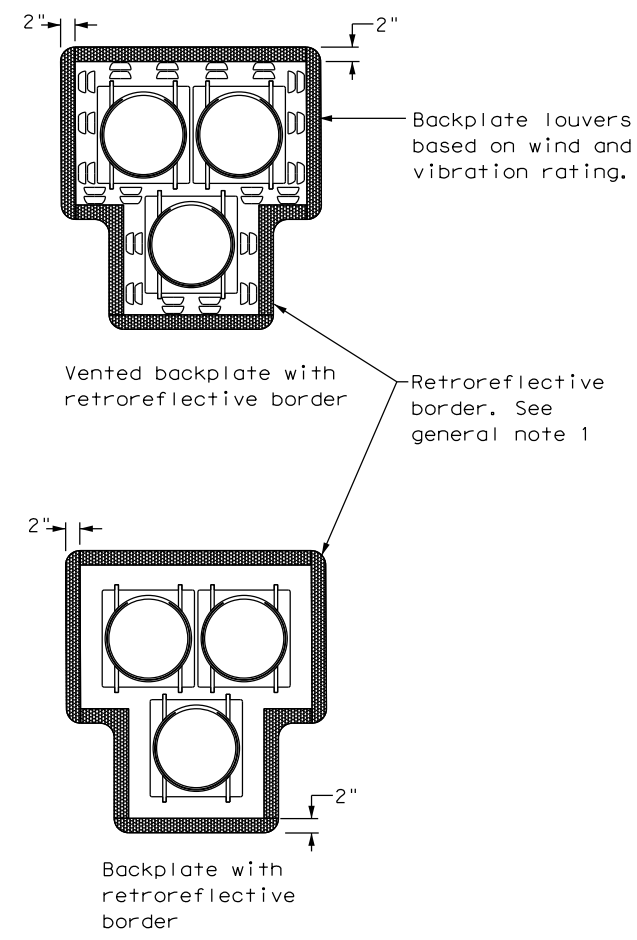
FOUR-SECTION HEAD
 HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
 HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
 CLUSTER



PEDESTRIAN HYBRID
 BEACON

GENERAL NOTES:

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

				Traffic Safety Division Standard	
TRAFFIC SIGNAL HEAD WITH BACKPLATE TS-BP-20					
FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0909	22	197	CS	
	DIST	COUNTY		SHEET NO.	
	WAC	MCLENNAN		71	

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FOUNDATION DESIGN TABLE

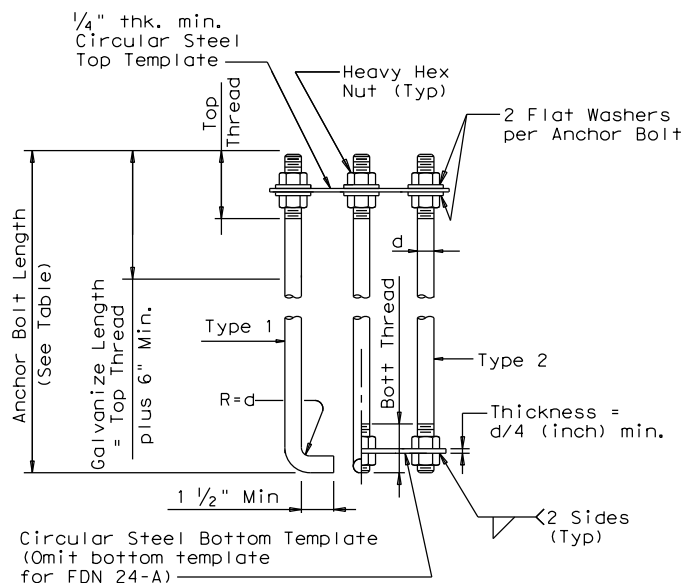
FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft (4), (5), (6)			ANCHOR BOLT DESIGN (1)				FOUNDATION DESIGN LOAD (2)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR 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)

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
		24' X 24'			
MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	28' X 28'				
	32' X 28'				
	36' X 36'				
	40' 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 24'			32' X 32'		
			36' X 36'		
			40' X 24'		
				40' X 36'	
				44' X 36'	

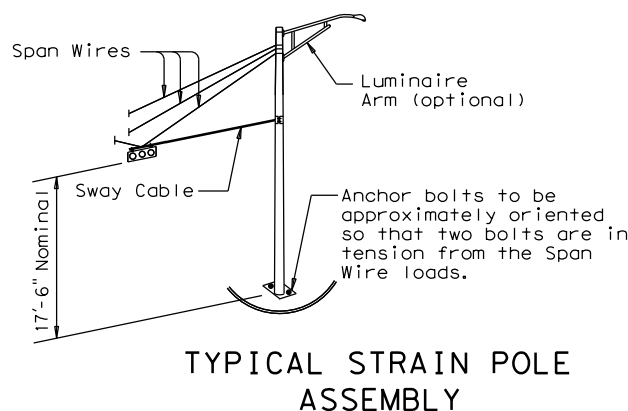
EXAMPLE:

- 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.

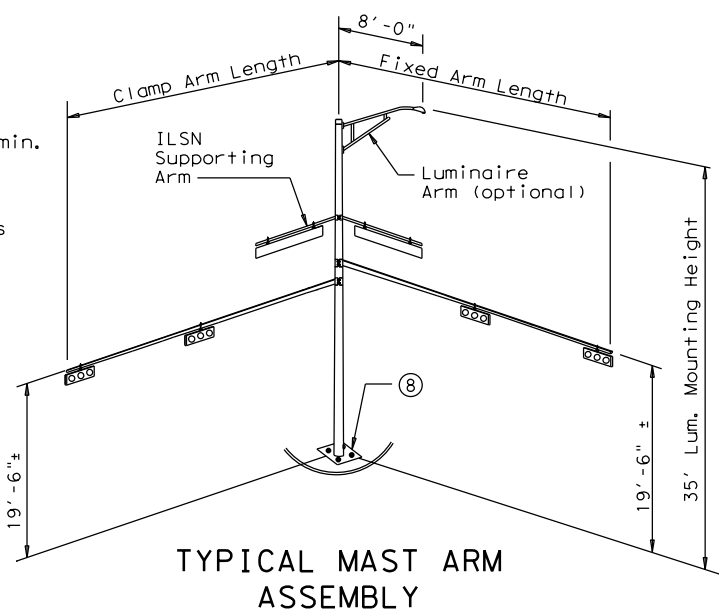


ANCHOR BOLT ASSEMBLY

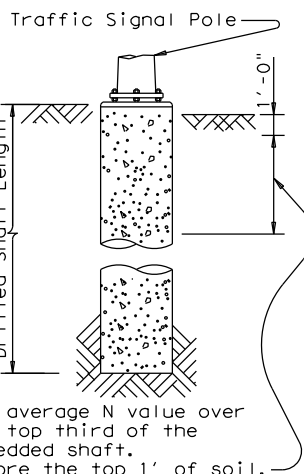
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL STRAIN POLE ASSEMBLY



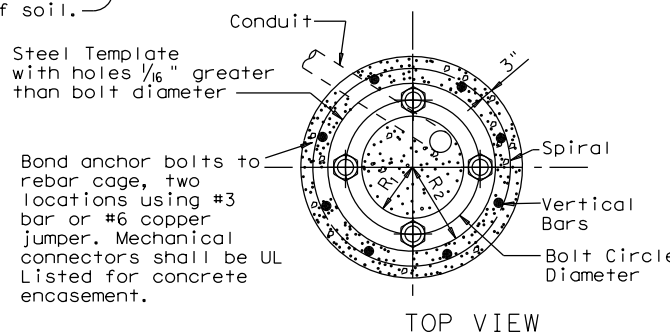
TYPICAL MAST ARM ASSEMBLY



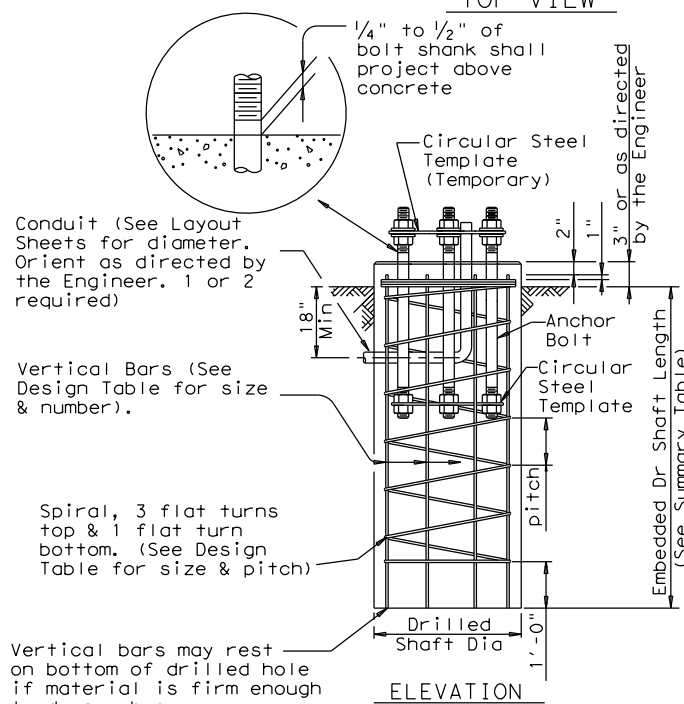
Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

ANCHOR BOLT & TEMPLATE SIZES						
BOLT DIA IN.	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.



TOP VIEW



ELEVATION

FOUNDATION DETAILS

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
FRANKLIN AVE AT S 18TH ST								
POLE A	10	30-A	1		12			
POLE B	10	36-A	1			14		
POLE C	10	30-A	1		12			
POLE D	10	24-A	1	6				
POLE E	10	24-A	1	6				
POLE F	10	24-A	1	6				
FRANKLIN AVE AT S 17TH ST								
POLE A	10	30-A	1			14		
POLE B	10	36-A	1			14		
POLE C	10	30-A	1		12			
POLE D	10	24-A	1	6				
POLE E	10	24-A	1	6				
POLE F	10	24-A	1	6				
POLE G	10	24-A	1	6				
TOTAL DRILLED SHAFT LENGTHS				* 24	12	28		

* 24" FOUNDATIONS ARE SUBSIDIARY TO ITEM 687-6001 "PED POLE ASSEMBLY"

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.

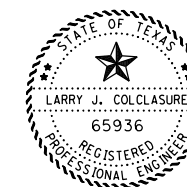
Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise 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



Larry J. Colclasure, P.E.

10/04/2023

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REVISIONS		CONT	SECT	JOB	HIGHWAY
		0909	22	197	CS
		DIST	COUNTY	SHEET NO.	
		WAC	MCLENNAN	72	

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DATE: FILE:

APPLICABLE STANDARDS SHEETS

OVERHEAD SIGN BRIDGE STANDARDS:

- OSB-SE
- OSB-Z#
- OSB-Z#1
- HOSB-Z#
- HOSB-Z1L
- HOSB-Z#1
- OSBT
- OSBC
- OSBC-SC-Z#
- OSBS-SC
- OSB-FD
- OSB-FD-SC

CANTILEVER OVERHEAD SIGN SUPPORT STANDARDS:

- COSS-SE
- COSS-Z#-10
- HCOSS-Z#-10
- COSS-Z21-10
- COSS-Z#&Z#1-10
- COSSD
- COSSF
- COSS-FD

Note: # = Wind Zone number 1, 2, 3 or 4

HIGH MAST ILLUMINATION POLE STANDARDS:

- HMIP-98
- HMIF-98

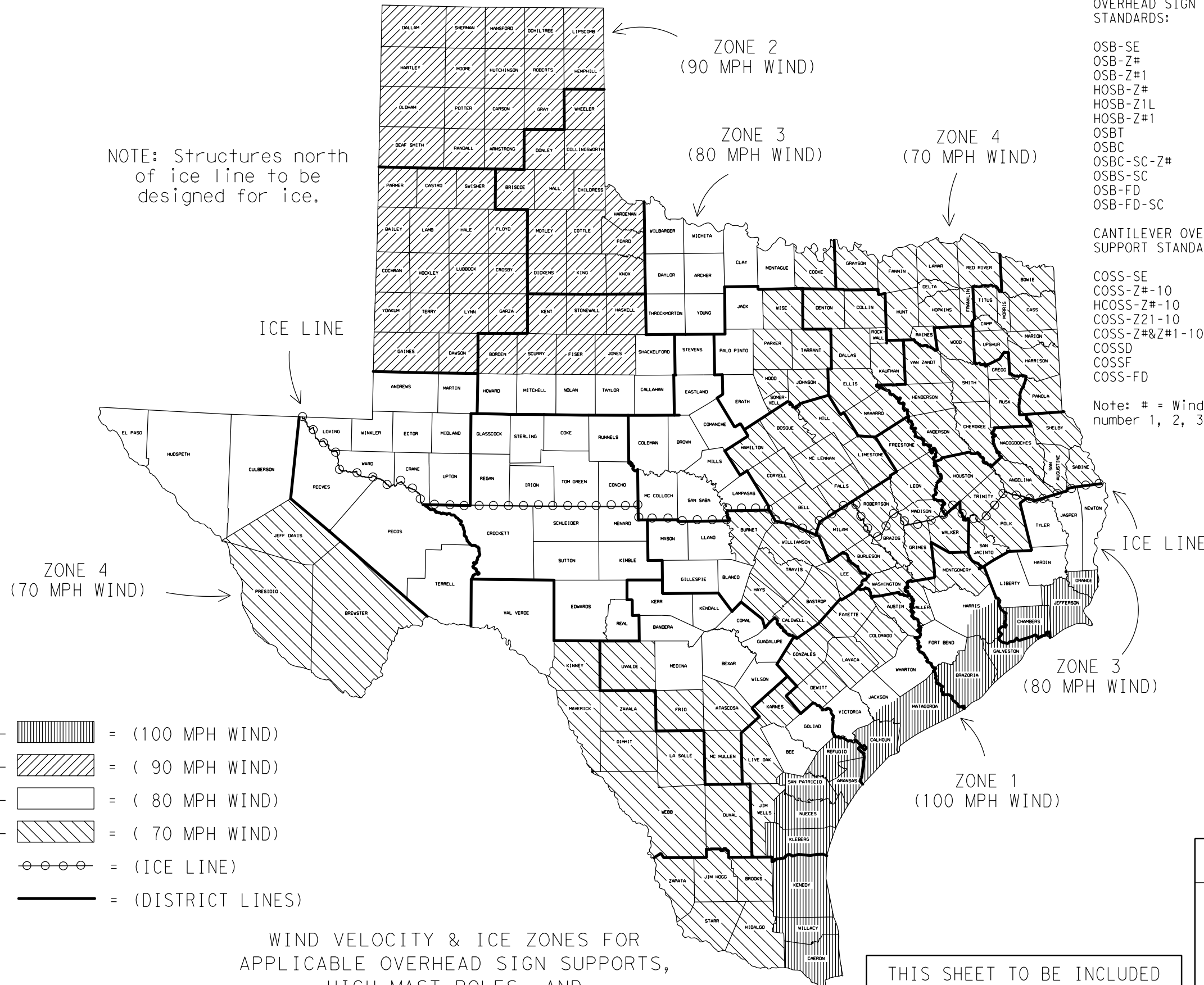
WALKWAYS AND BRACKETS STANDARDS:

- SWW
- SB(SWL-1)

TRAFFIC SIGNAL POLE STANDARDS:

- SP-80
- SP-100
- SMA-80
- SMA-100
- DMA-80
- DMA-100
- MA-C
- MAC(ILSN)
- MAD-D
- TS-FD
- LUM-A
- CFA
- LMA
- TS-C
- MA-DPD

NOTE: Structures north of ice line to be designed for ice.



LEGEND

- ZONE 1 - [diagonal lines] = (100 MPH WIND)
- ZONE 2 - [diagonal lines] = (90 MPH WIND)
- ZONE 3 - [white box] = (80 MPH WIND)
- ZONE 4 - [diagonal lines] = (70 MPH WIND)
- = (ICE LINE)
- = (DISTRICT LINES)

WIND VELOCITY & ICE ZONES FOR APPLICABLE OVERHEAD SIGN SUPPORTS, HIGH MAST POLES, AND TRAFFIC SIGNAL POLES

Based on 50 Year Mean Recurrence Interval of Fastest Mile Wind Velocity at 33 feet height.

THIS SHEET TO BE INCLUDED IN ALL P.S.&E. PACKAGES CONTAINING ONE OR MORE OF THE APPLICABLE STANDARD SHEETS LISTED HEREON

FOR HARRIS CO. ONLY
Zone line is just North of US 90, around the North, West and South sides of IH 610 and down the West side of SH 288.

FOR JACKSON CO. ONLY
Zone line is just North of SH 616.

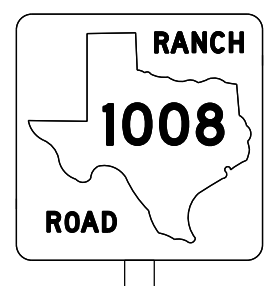
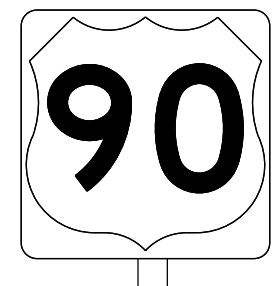
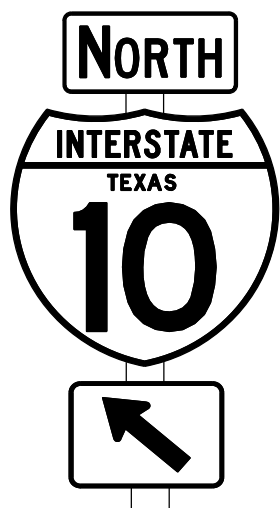
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<h2>WIND VELOCITY AND ICE ZONES</h2> <h3>WV & IZ-14</h3>			
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© TxDOT	April 1996	CONT	SECT
REVISIONS		0909	22
8-14-Added list of applicable standards, restricting use to structures designed for Fastest Mile wind speeds.		197	CS
DIST	COUNTY	SHEET NO.	
WAC	MCLENNAN	73	

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REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

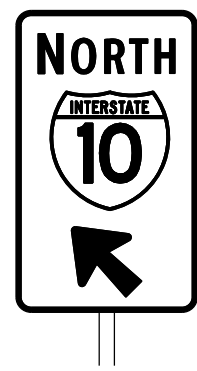
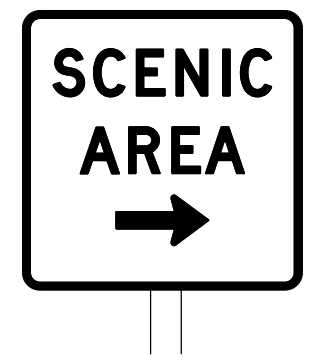
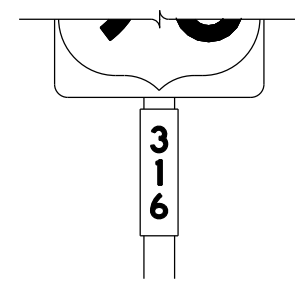
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



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

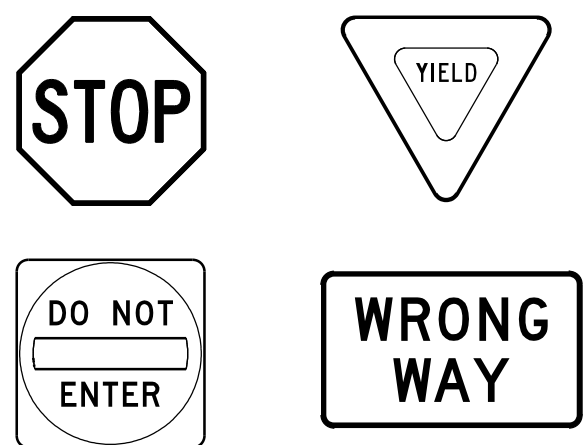
The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website:
<http://www.txdot.gov/>

				Traffic Operations Division Standard	
<h3>TYPICAL SIGN REQUIREMENTS</h3> <h4>TSR(3) - 13</h4>					
FILE:	tsr3-13.dgn	DN:	TxDOT	CK:	TxDOT
©TxDOT	October 2003	CON:	SECT:	JOB:	HIGHWAY:
REVISIONS		0909	22	197	CS
12-03	7-13	DIST:	COUNTY:		SHEET NO.
9-08		WAC:	MCLENNAN		74

DATE: 10/23/2023 \$TIME\$
 FILE: S:\4.0.0.0.0_Engineering Operations\4.2.0.0.0_Project Files\2022\2024\Highway Signs\Signs\Sheet\TSR(4)-13.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

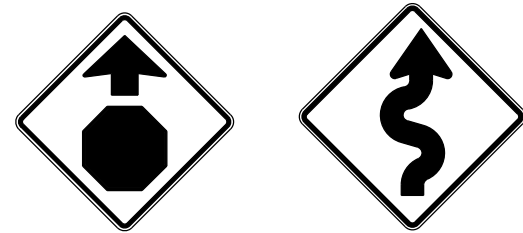
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



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 _{FL} OR C _{FL} 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 _{FL} OR C _{FL} 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/>

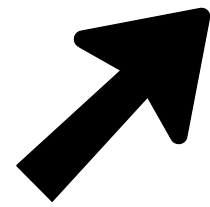
				Traffic Operations Division Standard	
<h2>TYPICAL SIGN REQUIREMENTS</h2>					
<h3>TSR(4) - 13</h3>					
FILE:	tSr4-13.dgn	DN:	TxDOT	CK:	TxDOT
©TxDOT	October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS		0909	22	197	CS
12-03	7-13	DIST	COUNTY		SHEET NO.
9-08		WAC	MCLENNAN		75

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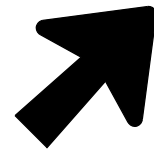
DATE: 10/23/2023 \$TIME\$
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ARROW DETAILS

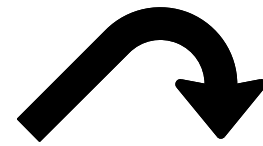
for Large Ground-Mounted and Overhead Guide Signs



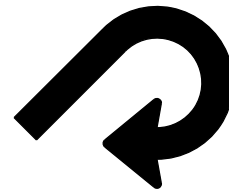
Type A



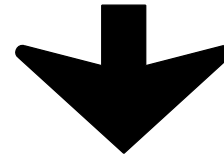
Type B



E-3



E-4



Down Arrow

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

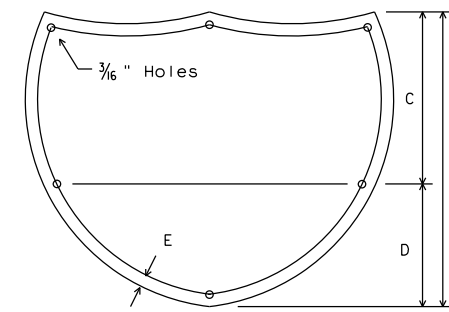
NOTE

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.

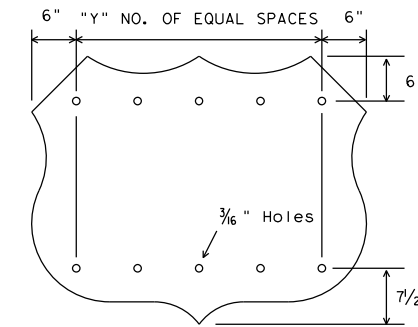
<http://www.txdot.gov/>

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



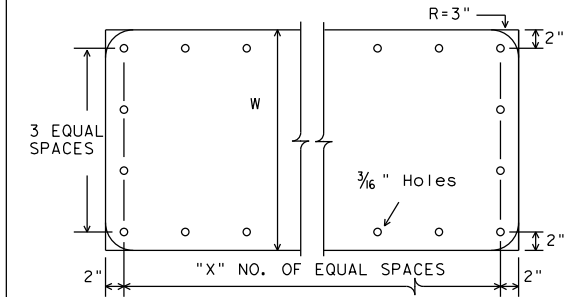
INTERSTATE ROUTE MARKERS

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



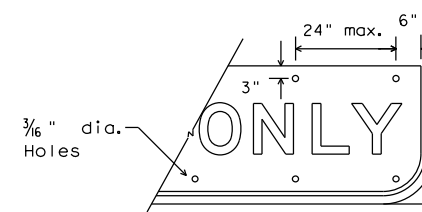
U.S. ROUTE MARKERS

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



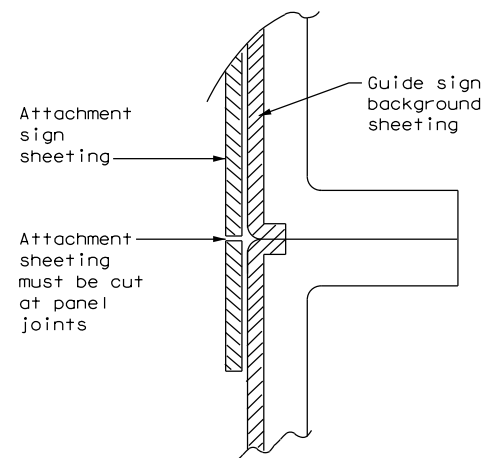
STATE ROUTE MARKERS

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



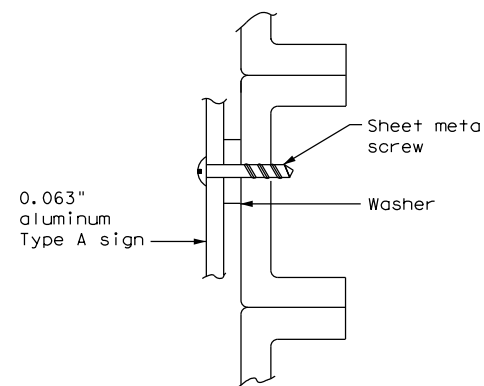
EXIT ONLY PANEL

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

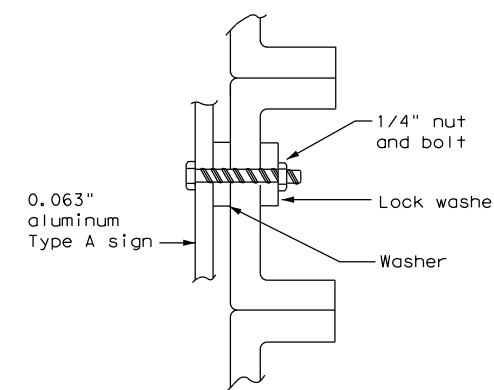


DIRECT APPLIED ATTACHMENT

- 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".



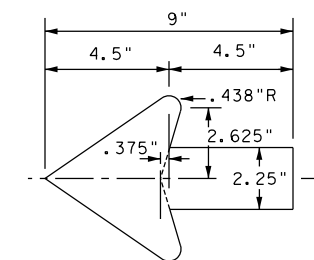
SCREW ATTACHMENT



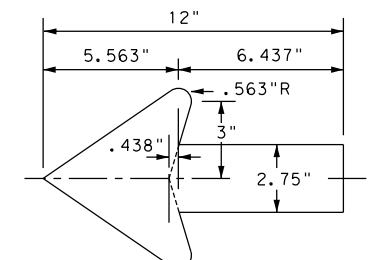
NUT/BOLT ATTACHMENT

- 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.



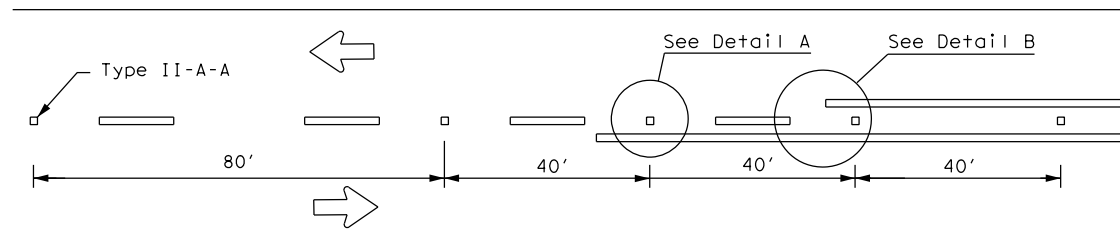
TYPICAL SIGN REQUIREMENTS

TSR (5) - 13

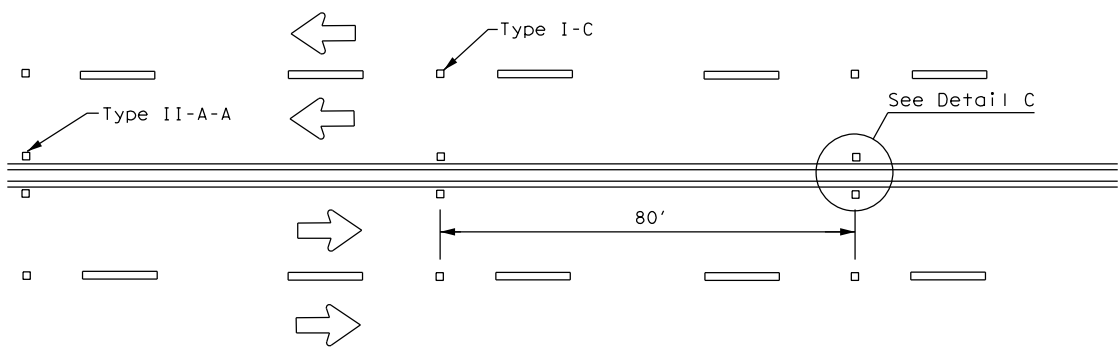
FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0909	22	197	CS
12-03 7-13	DIST	COUNTY	SHEET NO.	
9-08	WAC	MCLENNAN	76	

REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

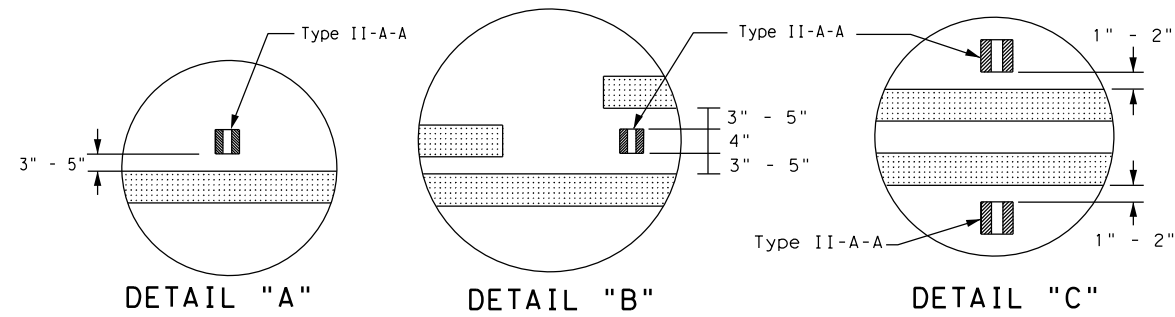
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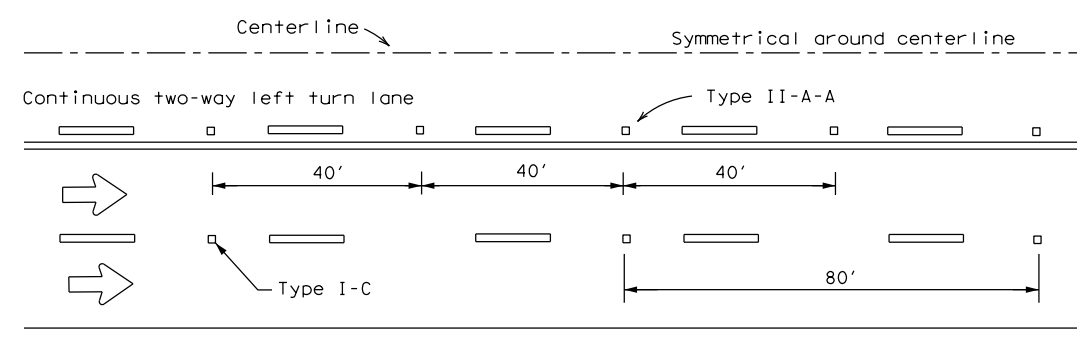
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



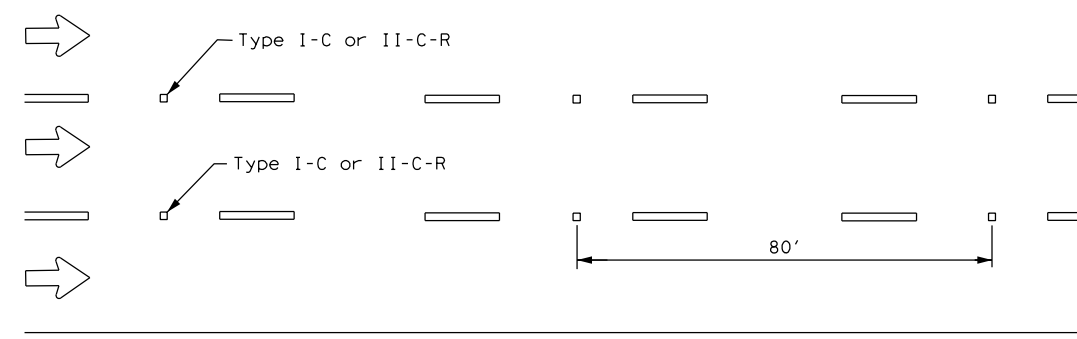
CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS



DETAIL "A" DETAIL "B" DETAIL "C"

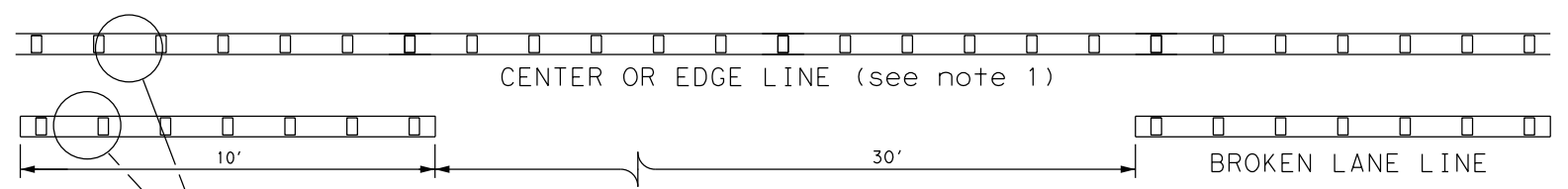


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



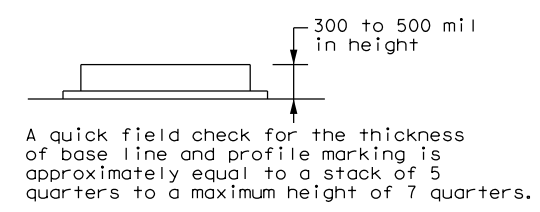
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

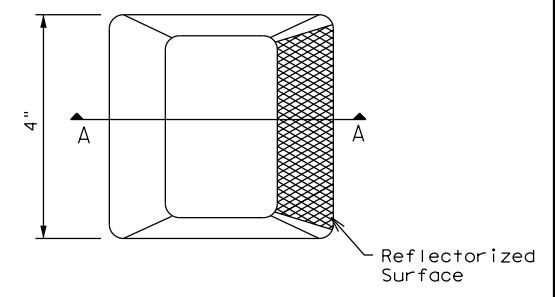
6" EDGE LINE, 6" CENTERLINE
 OR 6" LANE LINE



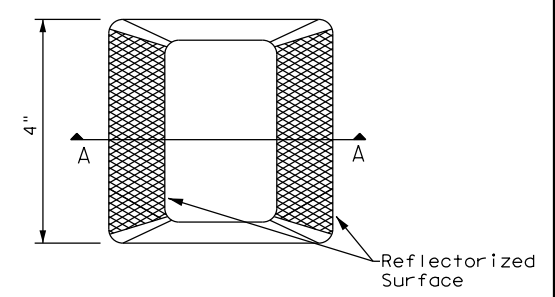
- NOTES**
- Edge lines should typically be 6" wide and the materials shall be specified in the plans.
 - Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

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

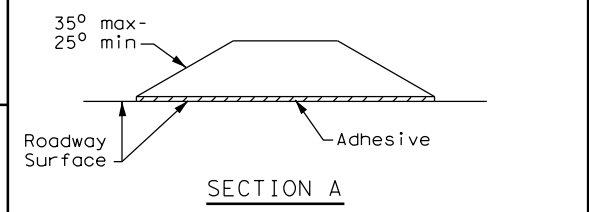
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



RAISED PAVEMENT MARKERS



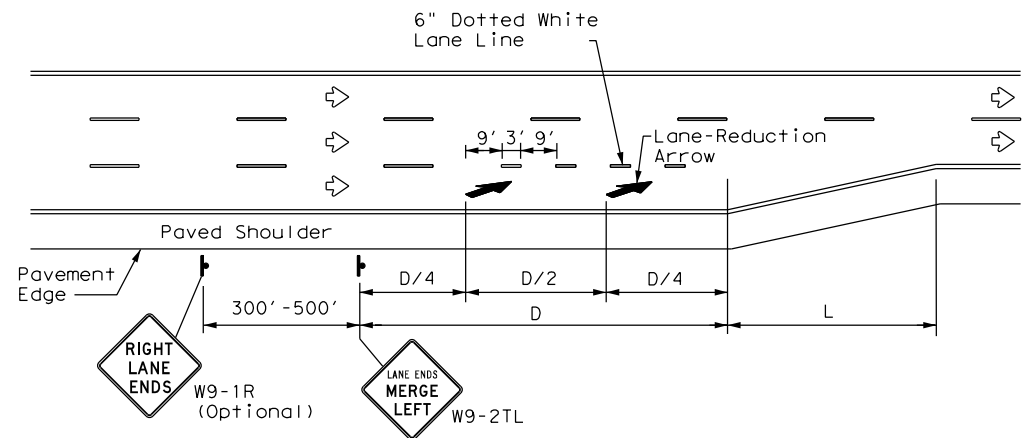
POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2) - 22

FILE: pm2-22.dgn	DWG:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0909	22	197	CS
4-77 8-00 6-20	DIST	COUNTY		SHEET NO.
4-92 2-10 12-22	WAC	MCLENNAN		78
5-00 2-12				

DATE: 10/23/2023 \$TIME\$
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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.

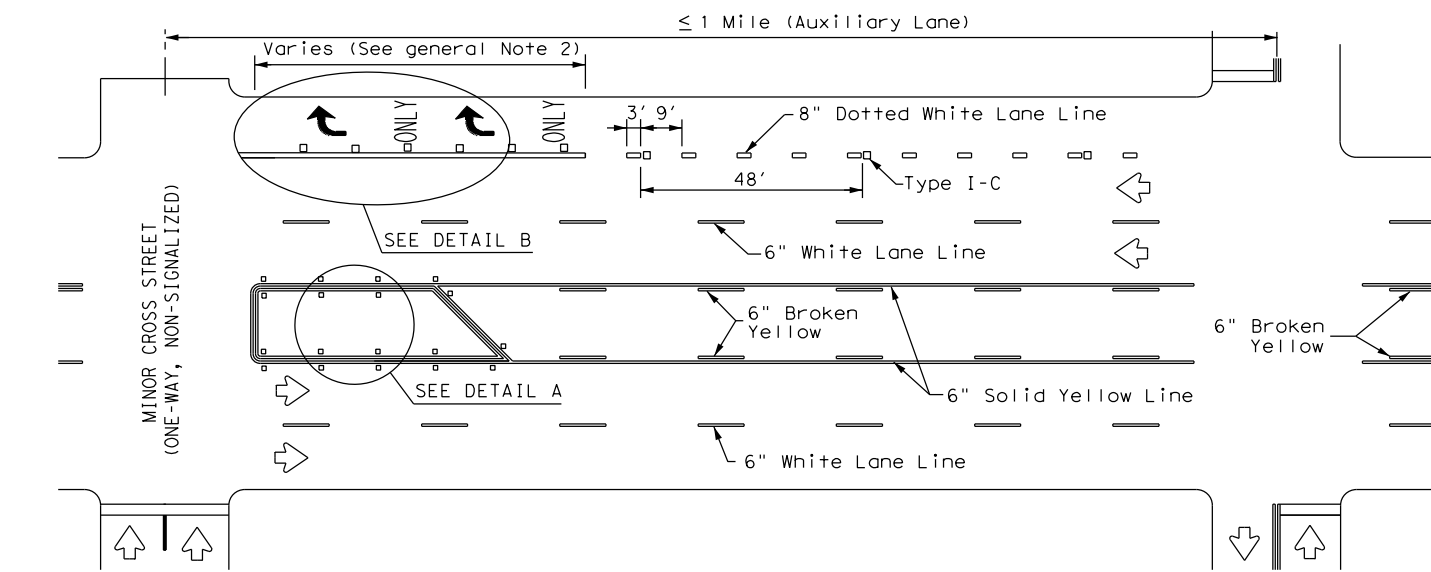
Posted Speed	D (ft)	L (ft)
30 MPH	460	L = $\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L = WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

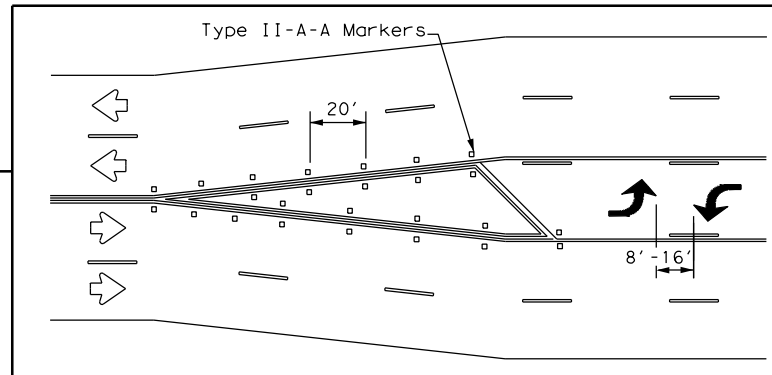
- Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn 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.

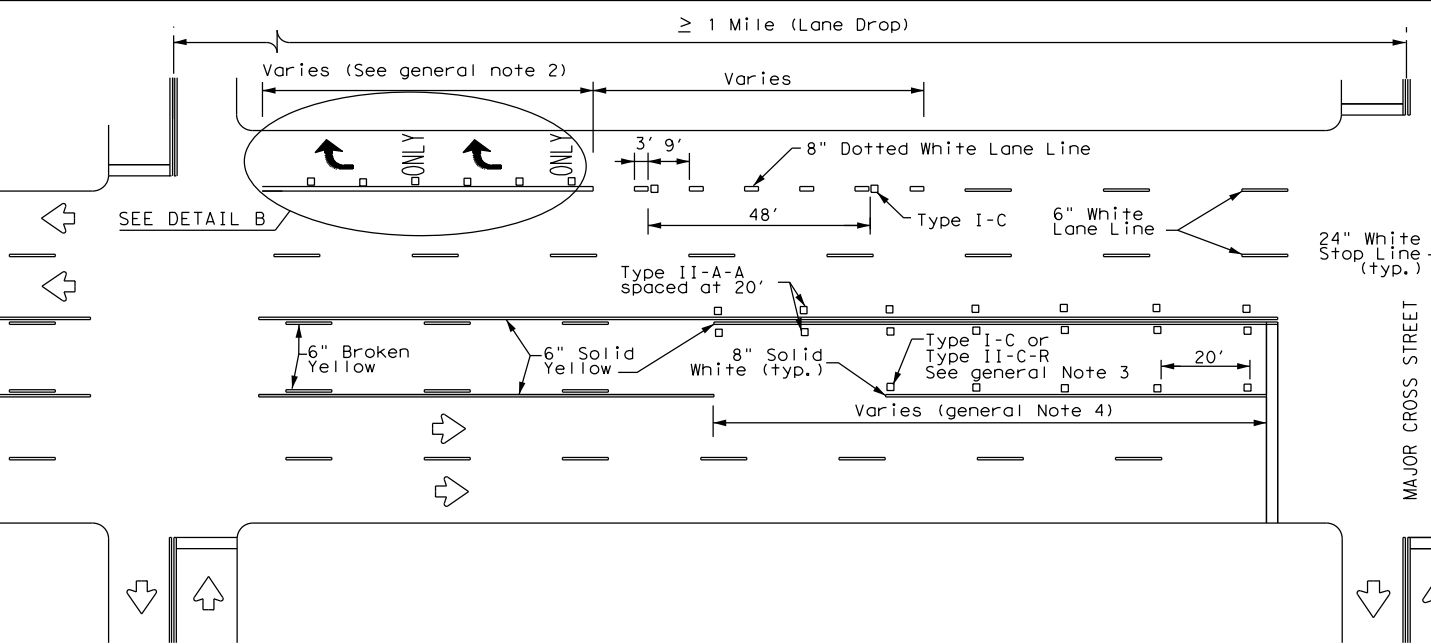


TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE

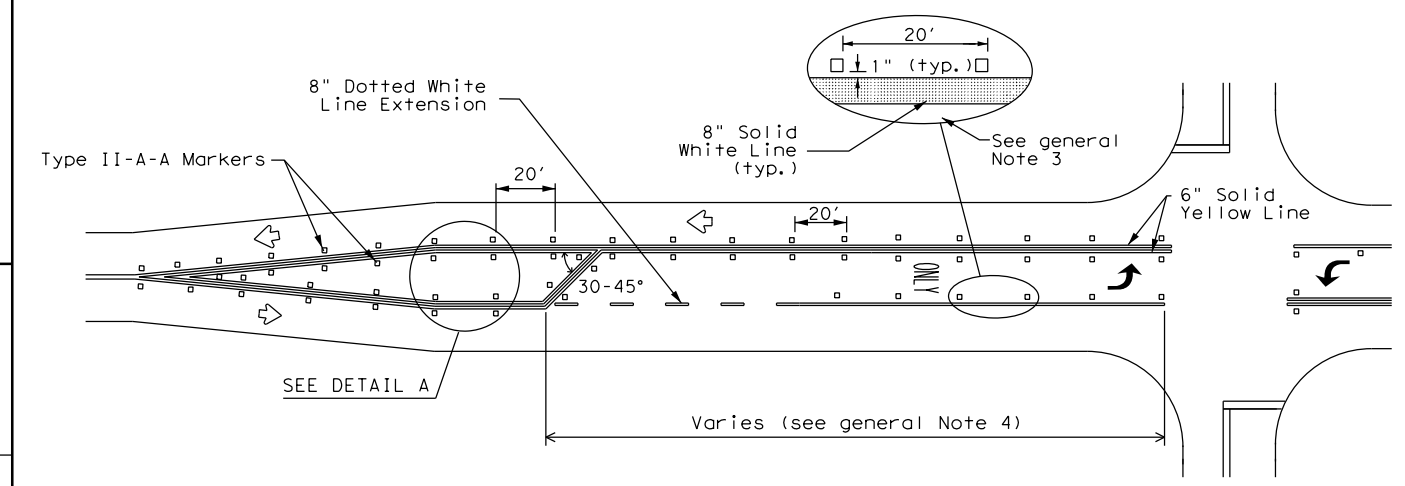


A two-way left-turn (TWLTL) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

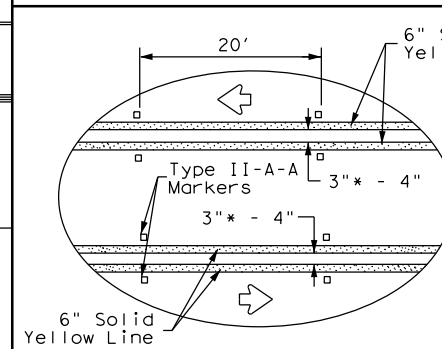
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY



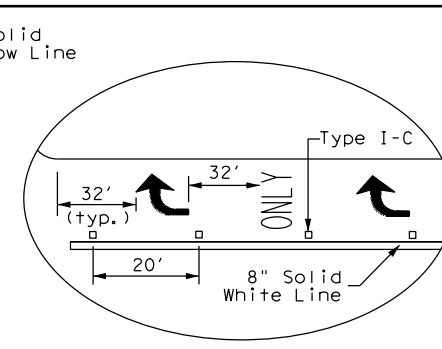
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



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
 Traffic Safety Division Standard

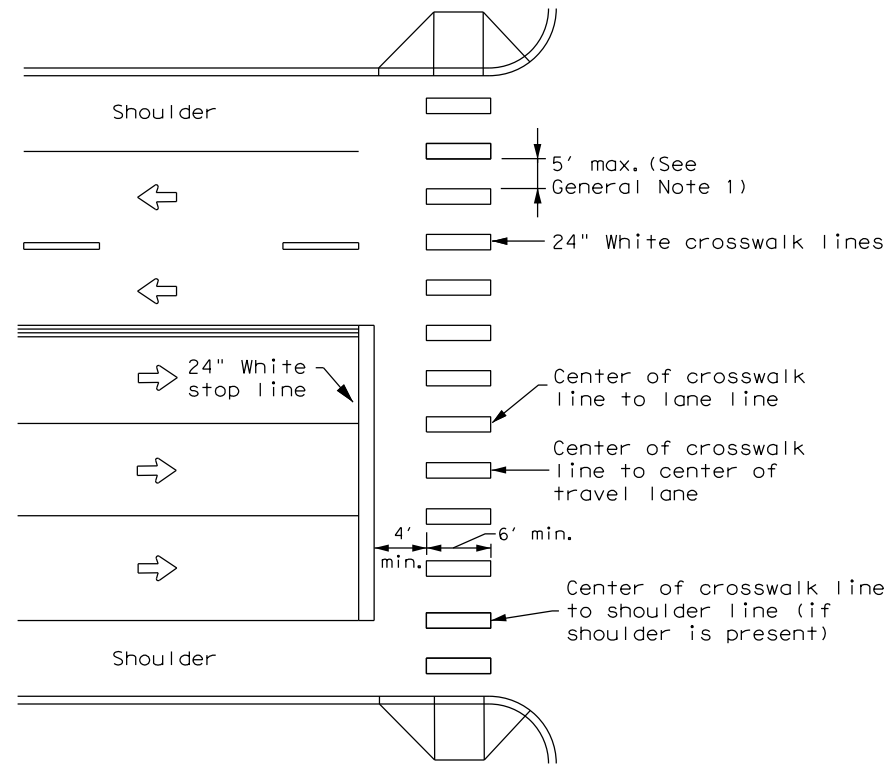
TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3) - 22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
4-98	3-03	6-20	0909 22	197
5-00	2-10	12-22	DIST	COUNTY
8-00	2-12		WAC	MCLENNAN
				SHEET NO. 79

22C

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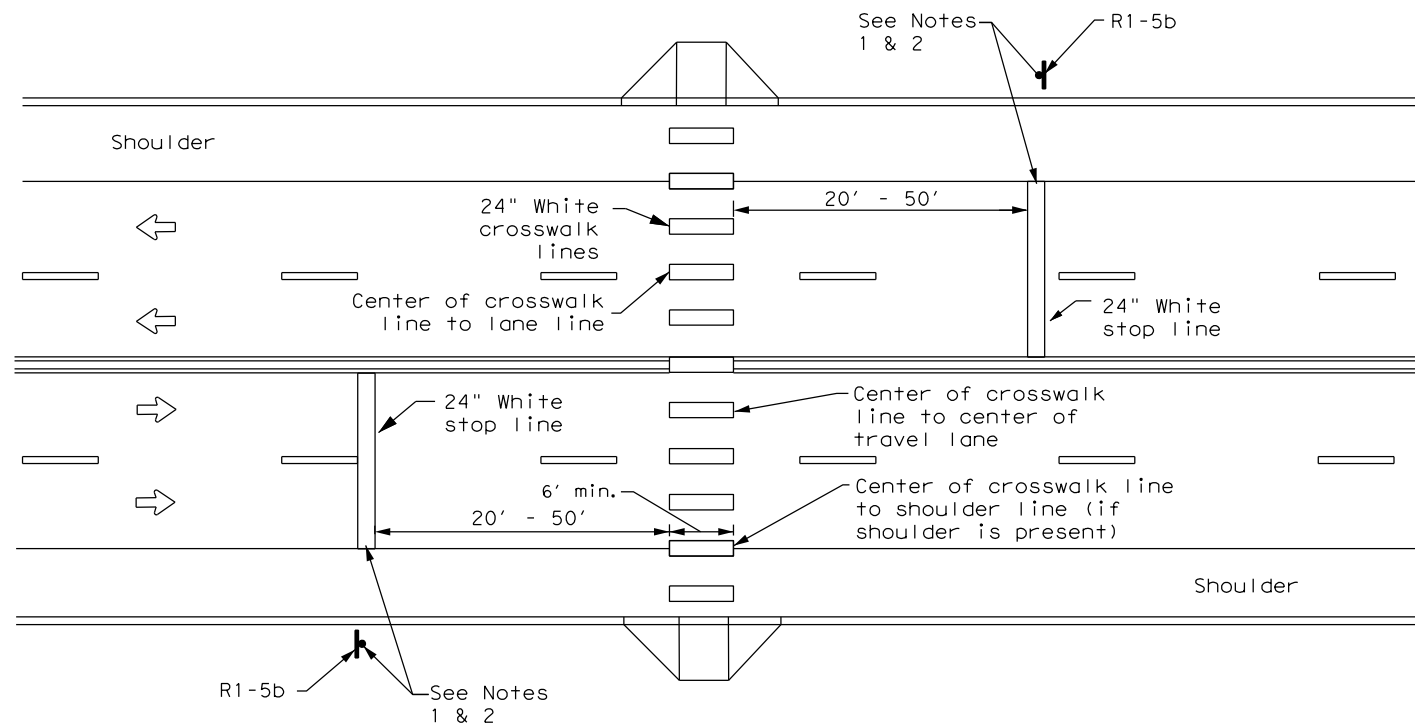
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

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

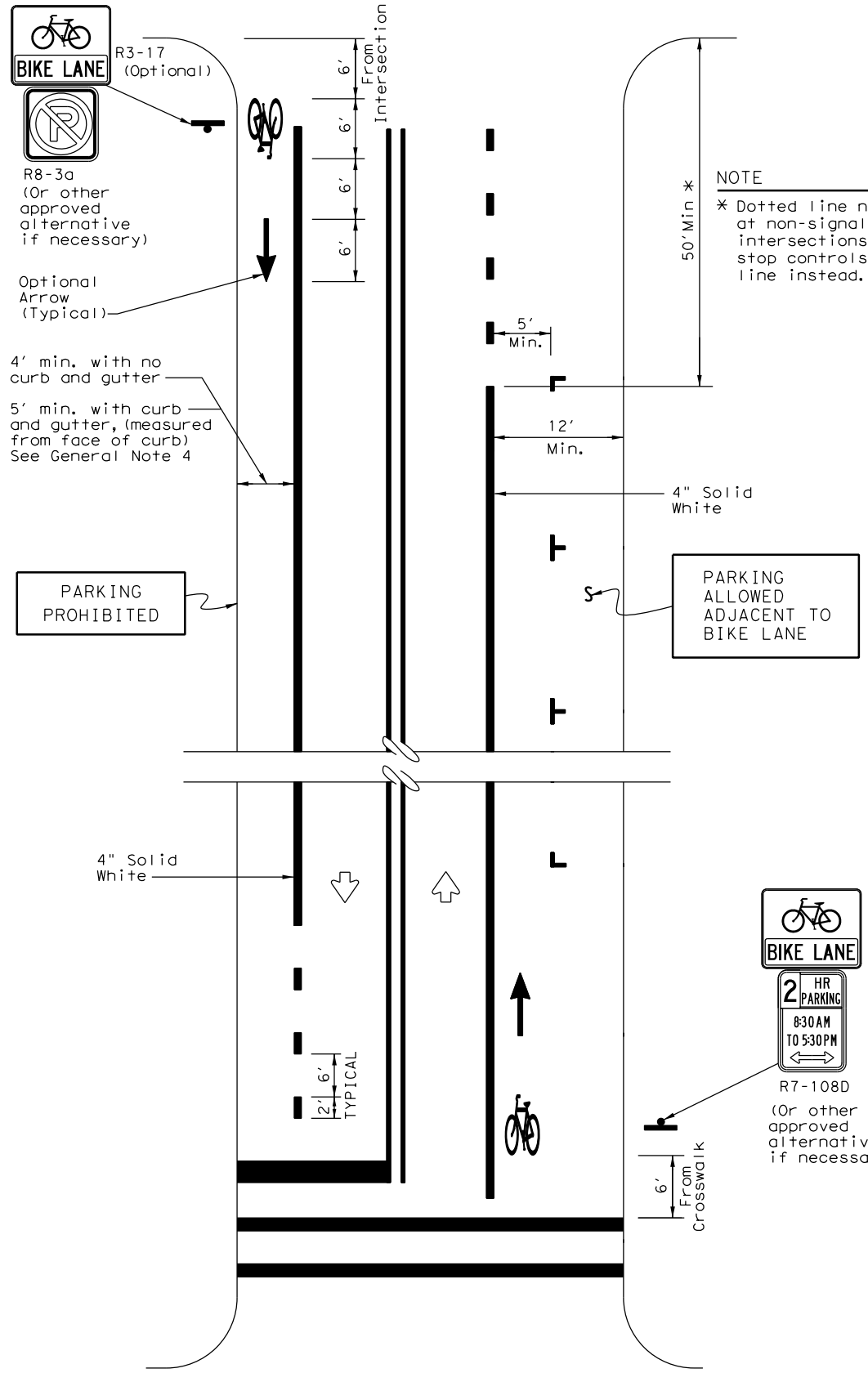
NOTES:

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

		Traffic Safety Division Standard	
<h2>CROSSWALK PAVEMENT MARKINGS</h2> <h3>PM(4) - 22A</h3>			
FILE:	pm4-22a.dgn	DN:	CK:
© TxDOT	December 2022	CONT:	SECT:
REVISIONS		JOB: 0909 22 DIST: 197 WAC: MCLENNAN	HIGHWAY: CS SHEET NO.: 80
6-20			
6-22			
12-22			
22D			

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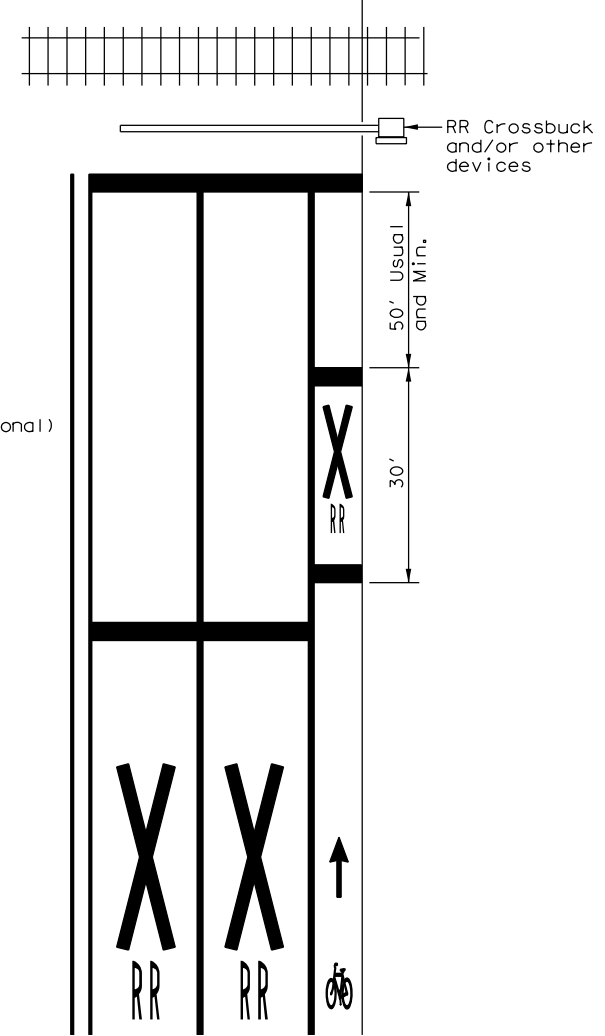


- NOTES**
- Bicycle lane pavement markings typically repeated after each intersection or signalized driveway.
 - On uninterrupted sections of roadway, bicycle lane pavement markings typically repeated as follows:
 -1200' for 45 MPH or less roads
 -2500' for 50 MPH and greater roads.

TWO-WAY STREET

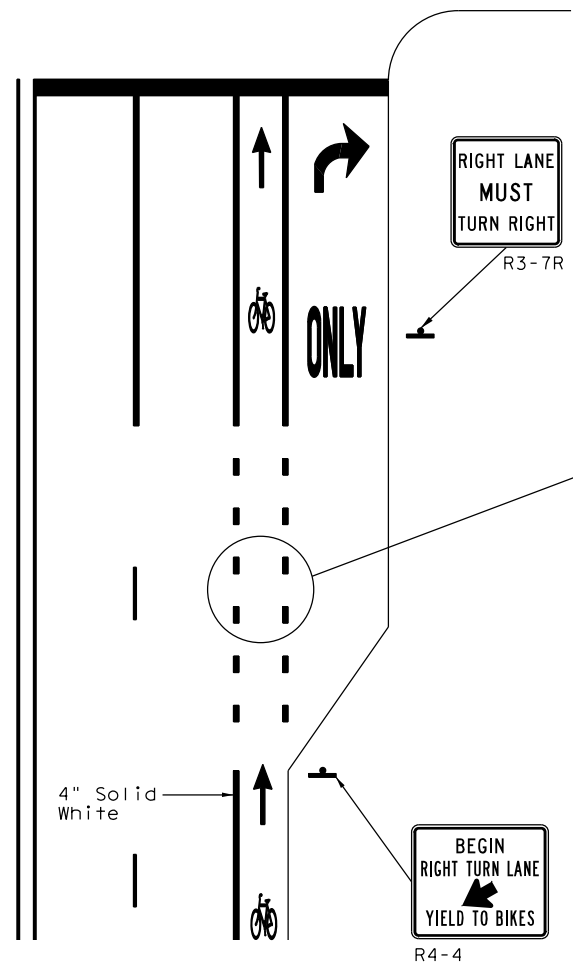
- GENERAL NOTES**
- All bicycle lane pavement markings shall be white unless otherwise noted.
 - All pavement marking materials shall meet the required Department Material Specifications as specified by the plans.
 - Exact sign placement and details are shown elsewhere in the plans.
 - The current edition of AASHTO'S Guide for the Development of Bicycle Facilities should be referenced for variations in design, other geometric conditions, and lane width options.
 - Other bicycle lane symbol or word markings as shown in the Texas Manual on Uniform Traffic Control Devices may be used. Details for words, arrows and symbols as shown in the Standard Highway Sign Designs for Texas.
 - The "BIKE LANE" (R3-17) sign with the "AHEAD" (R3-17a) sign mounted directly below should be installed in advance of the beginning of a marked bike lane.
 - The "BIKE LANE" (R3-17) sign with the "END" (R3-17b) sign mounted directly below should be installed at the end of marked bicycle lane.

NOTE
 * Dotted line not necessary at non-signalized minor intersections with no stop controls; Use solid line instead.



(See RCPM Standard for travel lane details)

RAILROAD CROSSING APPROACH



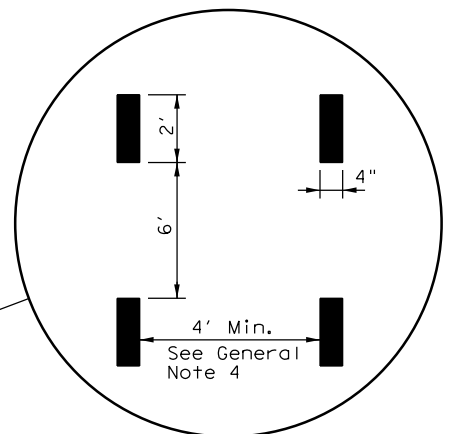
RIGHT TURN ONLY LANE

LEGEND

	Sign
	Traffic Flow

SPECIFICATION REFERENCE TABLE

Traffic Paint	DMS-8200
Hot Applied Thermoplastic	DMS-8220
Permanent Prefabricated Pavement Markings	DMS-8240
Glass Traffic Beads	DMS-8290



DETAIL "A"

Texas Department of Transportation
 Traffic Operations Division

BICYCLE LANE PAVEMENT MARKINGS

BLPM-10

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REVISIONS		CONT	SECT	JOB	HIGHWAY
		0909	22	197	CS
		DIST	COUNTY		SHEET NO.
		WAC	MCLENNAN		81

ROADWAY ILLUMINATION ASSEMBLY NOTES

DATE: 10/23/2023 \$TIME\$
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1. Details apply to roadway lighting installations bid or referenced under Item 610, "Roadway Illumination Assemblies." Provide, furnish, and install all other materials not shown on the plans which may be necessary for complete and proper construction. Where manufacturers provide warranties or guarantees as a customary trade practice, furnish to the State such warranties or guarantees.
2. The locations of poles and fixtures may be shifted by the Engineer to accommodate local conditions. Install or remove poles and luminaires located near overhead electrical lines using established industry and utility safety practices and in accordance with laws governing such work. Consult with the appropriate utility company prior to beginning such work.
3. 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, Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection.
4. Provide Roadway Illumination Light Fixtures as per TxDOT Departmental Material Specification (DMS) 11010, Item 610, and as shown on the Material Producers List (MPL) for Roadway Illumination and Electrical Supplies.
5. Fabricate steel roadway illumination poles in accordance with Roadway Illumination Poles (RIP) standards and Item 610. Poles fabricated according to RIP standards do not require shop drawing submittals.
 - a. Alternate designs to RIP standards or the use of aluminum to fabricate poles will require the submission of shop drawings electronically. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" on the TxDOT web site.
 - b. Limitations on use of the RIP standard: The RIP standard details were developed for installations in locations where the 3-second gust basic maximum wind speed is 110 mph, and where the elevation of the base of the pole is less than (i.e. not more than) 25' above the elevation of the surrounding terrain, in accordance with the "AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals," 6th Edition (2013) of the AASHTO Design Specifications. For poles to be installed in regions where the maximum basic wind speed exceeds 110 mph or to be mounted more than 25' above the surrounding terrain, provide poles meeting the following requirements:
 - i. Submittals. Following the electronic shop drawing submittal process (see Guide to Electronic Shop Drawing Submittal on the TxDOT web site), submit to the Engineer for approval fabrication drawings and calculations for the poles, sealed by a Texas licensed professional engineer (P.E.).
 - ii. Luminaire Structural Support Requirements. Provide light poles, arms, and anchor bolt assemblies with a 25 year design life to safely resist dead loads, ice loads and the required basic wind speeds at the location of installation in accordance with the 6th edition (2013) of the AASHTO Design Specifications. For transformer base poles, include transformer base and connecting hardware in calculations and shop drawing submittals. Structurally test all transformer bases to resist the theoretical plastic moment capacity of the pole. Submit certification of the plastic moment load test and FHWA breakaway requirement test of the model of base being furnished with the shop drawings. Show breakaway base model number, manufacturer's name, and logo on shop drawings. Include on manufacturer's shop drawings the ASTM designations for all materials to be used.
6. For both transformer and shoe-base type illumination poles, provide and install double-pole breakaway fuse holders as specified by DMS-11040. Breakaway fuse holders are listed on the MPL for Roadway Illumination and Electrical Supplies under Items 610 & 620. Provide 10 amp time delay fuses for breakaway connectors in light poles, or inside the light fixture for underpass luminaires. In each pole, connect luminaires to the breakaway connector with continuous stranded 12 AWG copper conductors as listed on the MPL. Bond all equipment grounding conductors together and to the ground lug in the transformer base or hand hole.
7. Tighten anchor bolts for shoe base, concrete traffic barrier base, and bridge mount roadway illumination poles, in accordance with Item 449.
8. Install T-Base with following procedure:
 - a. Anchor Bolt Tightening.
 - i. Coat the threads of the anchor bolts with electrically conductive lubricant.
 - ii. Place the T-base over the anchor bolts. Foundation must be level and flat. The maximum permissible gap under any one corner of the t-base is 1/8" before nuts are tightened.
 - iii. Coat the bearing surfaces of the nuts and washers with electrically conductive lubricant. Install (1) 1/2" hold down washer, (1) lock washer, and (1) nut on each anchor bolt. Turn the nuts onto the bolts so that each is hand-tight against the washer.
 - iv. Using a torque wrench, tighten each nut to 150 ft-lb. Uniform contact is required between the foundation and the T-base in the corner regions of the T-base, and all corner gaps must be closed after applying torque. If a gap still exists after torquing to 150 ft-lbs, continue torquing each bolt incrementally until gap is closed or maximum allowable torque of 250 ft. pound is reached, whichever comes first. If 250 ft-lbs is not enough to close the gap the foundation must be leveled. Gaps along the straight sides of the T-bases and the foundation are permissible. Ensure that no high point of contact occurs between the straight sides of the T-base and the foundation.
 - v. Check top of T-base for level. If not level then foundation must be leveled.
 - b. Top Bolt Procedure
 - i. Erect pole over T-base with crane. Coat bolts, nuts, washers, and lock washers with electrically conductive lubricant.

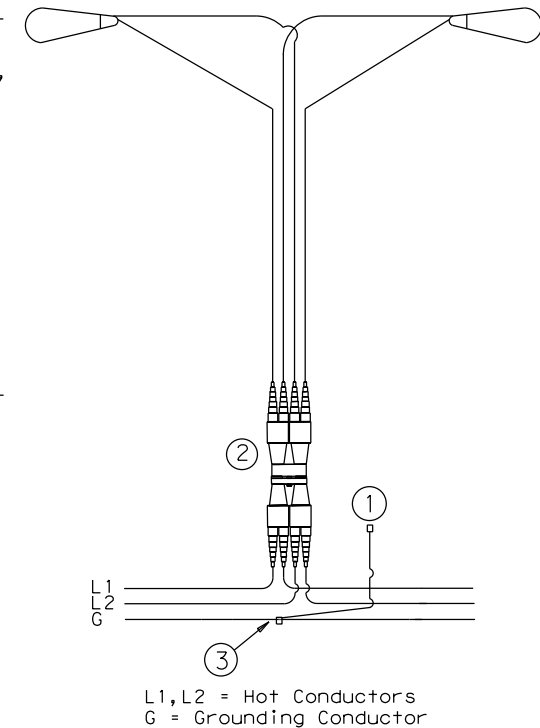
- ii. Install bolts and 1/2" connecting washers from the inside of the T-base, thread up through the pole base. Install flat washers, lock washers and nuts snug tight according to Item 447, "Structural Bolting."
 - iii. Tighten each nut to 150 ft-lb. using a torque wrench.
- c. Level and Plumb
- i. Ensure pole is plumb and mast arm is perpendicular to the roadway according to plans to within 5 degrees.
9. Construct luminaire pole foundations in accordance with Item 416, "Drilled Shaft Foundations," and TxDOT standard sheet RID(2).
 10. Provide and install underpass luminaires in accordance with Item 610, DMS-11010, and TxDOT standard sheet RID(3). Typical luminaire size for underpass luminaires is 150W HPS or 150W EQ LED.
 11. Mount luminaires on arms level as shown by the luminaire level indicator.
 12. Orient luminaires perpendicular to the roadway intended to be lit unless otherwise shown on the plans.

Wiring Diagram Notes:

- ① Use 1/2 in. -13 UNC threaded, copper or tin-plated copper, pole bonding connector, sized appropriately for conductors, bonded to T-base, or use ground lug in handhole as available.
- ② Use pre-qualified two-pole breakaway connectors for all luminaire pole installations. For luminaires fed by a circuit with a neutral conductor, use double pole breakaway connectors with the neutral side unfused and marked white.
- ③ Split Bolt or other connector.

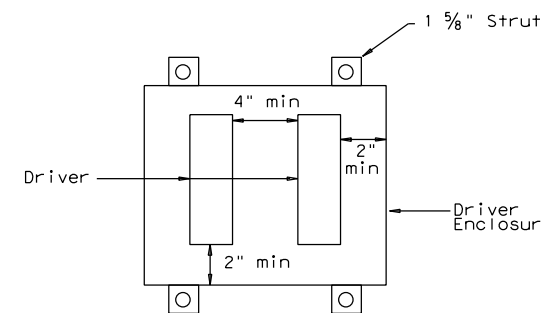
Decorative LED Lighting Notes:

1. LED Drivers in Remote Outdoor enclosures (for drivers that do not include an enclosure as part of a factory assembly):
 - a. Provide NEMA 3R outdoor enclosure or as approved.
 - b. Install enclosure at least 12" above ground or other horizontal surface. Mount vertically or on ceiling, and avoid direct sun where possible.
 - c. Install drivers with at least 2 inches of space from enclosure walls.
 - d. For multiple drivers in an enclosure, provide at least 4 inches side to side and 1 inch end to end from other drivers or electronic equipment
 - e. For drivers mounted on back wall of enclosure, mount enclosure on 1 5/8" strut or other standoff to dissipate heat, or mount driver to side of the enclosure or to the metal cover.
 - f. Provide remote drivers with a maximum of 100 watts
 - g. Provide drivers with documentation of 100,000 hr lifetime at Tcase of 65C or higher.



TYPICAL WIRING DIAGRAM

LUMINAIRES SERVED AT 480V ON 240/480 VOLT SERVICE OR LUMINAIRES SERVED AT 240V FOR 120/240 VOLT SERVICE.

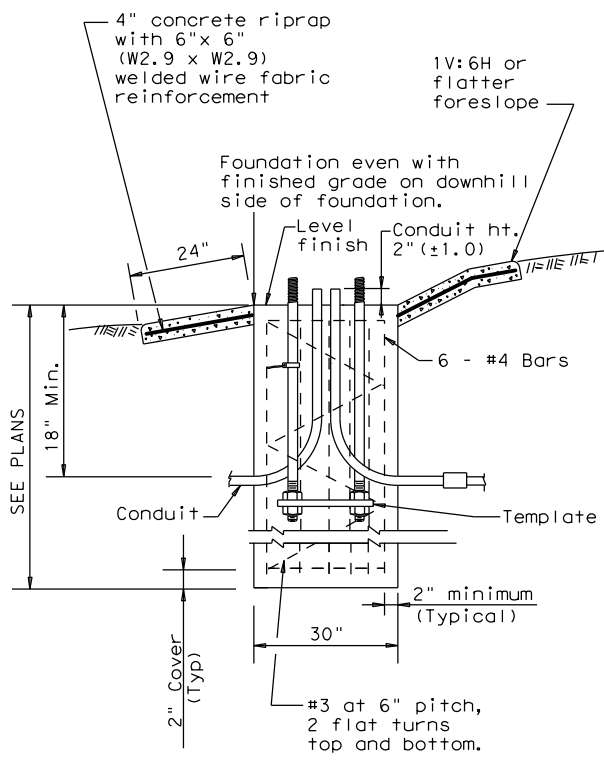


Driver Spacing In Remote Enclosure

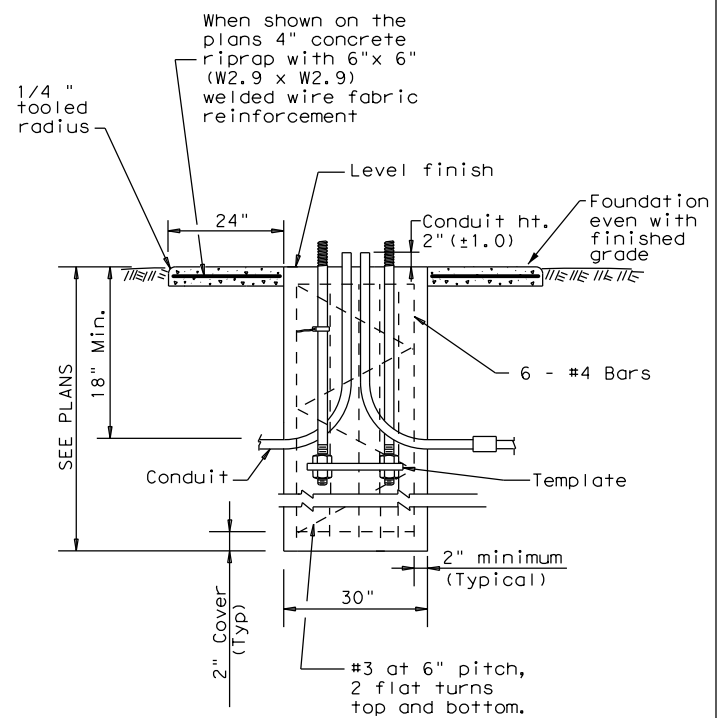
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ROADWAY ILLUMINATION DETAILS RID(1)-20						
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© TxDOT January 2007		CONT	SECT	JOB	HIGHWAY	
		0909	22	197	CS	
7-17		DIST	COUNTY		SHEET NO.	
12-20		WAC	MCLENNAN		82	
72A						

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SECTION A-A
SHOWING SLOPED GRADE



SECTION A-A
SHOWING CONSTANT GRADE

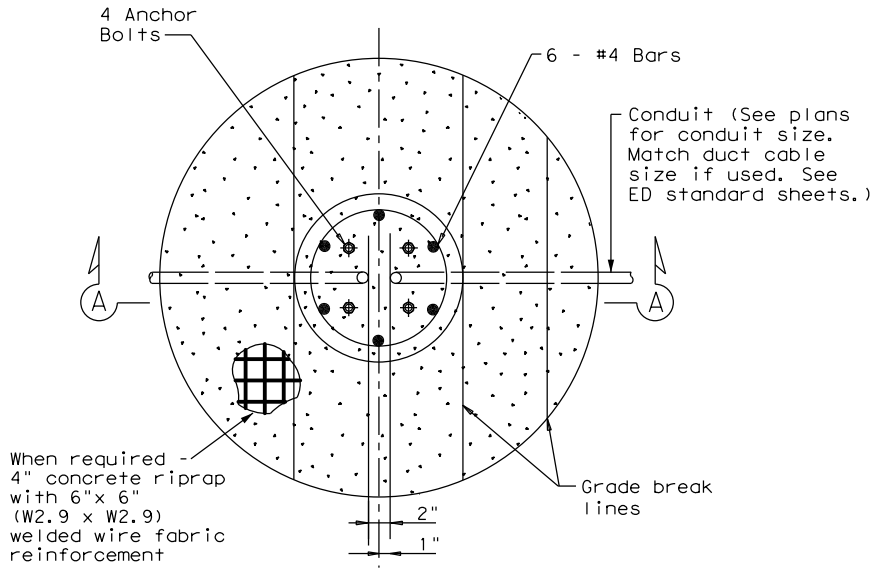
TABLE 1			
ANCHOR BOLTS			
POLE MOUNTING HEIGHT	BOLT CIRCLE		ANCHOR BOLT SIZE
	Shoe Base	T-Base	
< 40 ft.	13 in.	14 in.	1 in. x 30 in.
40-50 ft.	15 in.	17 1/4 in.	1 1/4 in. x 30 in.

TABLE 2			
RECOMMENDED FOUNDATION LENGTHS (See note 1)			
MOUNTING HEIGHT	TEXAS CONE PENETROMETER N Blows/ft		
	10	15	40
≤ 20 ft.	6'	6'	6'
> 20 ft. to 30 ft.	8'	6'	6'
> 30 ft. to 40 ft.	8'	8'	6'
> 40 ft. to 50 ft.	10'	8'	6'

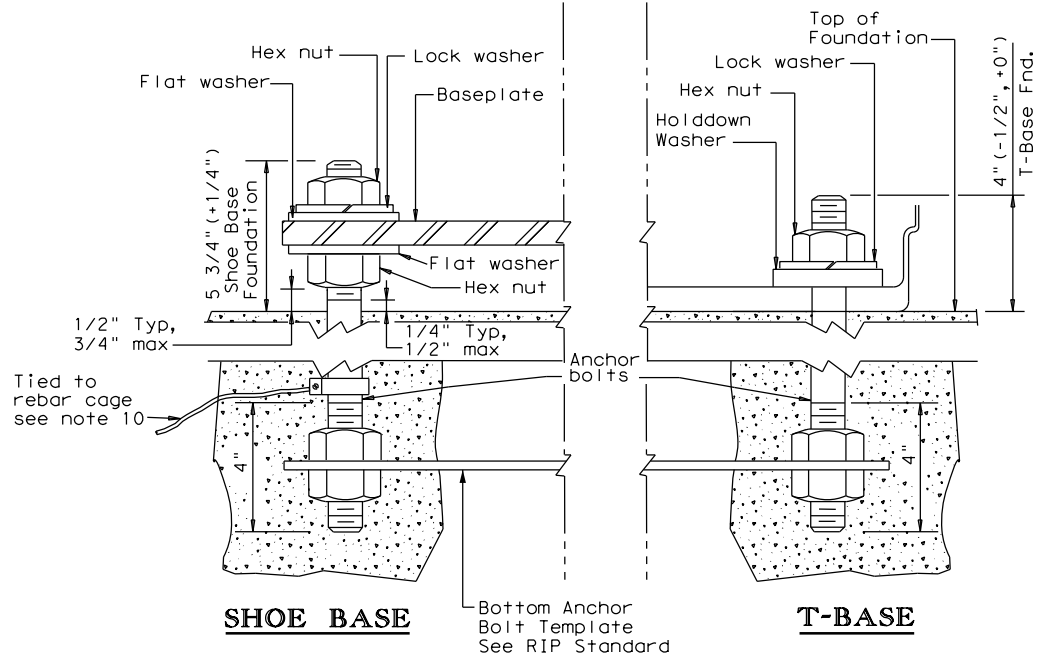
TABLE 3		
PAY QUANTITY OF RIPRAP PER FOUNDATION (Install only when shown on the plans)		
Foundation Diameter	RIPRAP DIAMETER	RIPRAP (CONC) (CL B)
30 in.	78 in.	0.35 CY

GENERAL NOTES:

- "Recommended Foundation Lengths" table is for information purposes only. Foundation lengths shall be as shown on the plans, or as directed by the Engineer. Foundations will be paid for under Item 416, "Drilled Shaft Foundations," unless otherwise shown on the plans.
- Erect roadway illumination assembly poles plumb and true. Form and level the top 6" of the foundation so the pole will be plumb. Use leveling nuts to plumb shoe base poles. Do not use shims or leveling nuts under transformer bases. Do not grout between baseplate and the foundation.
- Ensure Class 2A and 2B fit for anchor bolts and nuts. Tap and chase nuts after galvanizing. Anchor bolt body with rolled threads need not be full size.
- Use appropriate class of concrete as specified in Items 416 and 432. Concrete for riprap may be upgraded to Class C at no extra cost to the Department.
- Place riprap around the foundation when called for elsewhere in the plans. Riprap will be paid for under Item 432.
- Locate breakaway roadway illumination assemblies as shown in the placement table, unless otherwise dimensioned on the plans. Protect non-breakaway illumination assemblies from vehicular impact (i.e. 2.5 ft. behind guard rail or mounted on traffic barrier), or located outside the clear zone, except that 2.5 ft. from curb face is minimum desired for light poles on city streets, 45 mph or less. See Roadway Design Manual for further information.
- Use 4 hold down and 4 connecting washers on transformer base poles as recommended by the manufacturer and supplied with base.
- Install a minimum of 2 conduits in each foundation. See lighting layout sheets for locations of foundations with more than 2 conduits. Cap unused conduits in foundations on both ends.
- Conduit location in foundations is critical for breakaway devices. Place conduits 2 in. apart on centerline as shown.
- Bond anchor bolt to rebar cage with #6 bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. The bonded steel in the foundation creates a concrete encased grounding electrode which replaces the ground rod.
- Grade earthwork around T-base foundations even with the finished grade as shown in Section A-A to ensure proper function of the breakaway device. Use riprap on T-base foundations that are located on sloped grades, and as shown on the plans for level grades.



FOUNDATION DETAIL



ANCHOR BOLT DETAIL

TABLE 4	
BREAKAWAY POLE PLACEMENT (See note 6)	
ROADWAY FUNCTIONAL CLASSIFICATION	** POLE OFFSET (DISTANCE TO FACE OF TRANSFORMER BASE)
Freeway Mainlanes (roadway with full control of access)	15 ft. (minimum and typical) from lane edge
All curbed, 45 mph or less design speed	2.5 ft. minimum (15 ft. desirable) from curb face
All others	10 ft. minimum*(15 ft. desirable) from lane edge

* or as close to ROW line as is practical

** provide 2/5 of the luminaire mounting height behind the pole for "falling area" to prevent encroachment on the other travel lanes. See design guidelines.

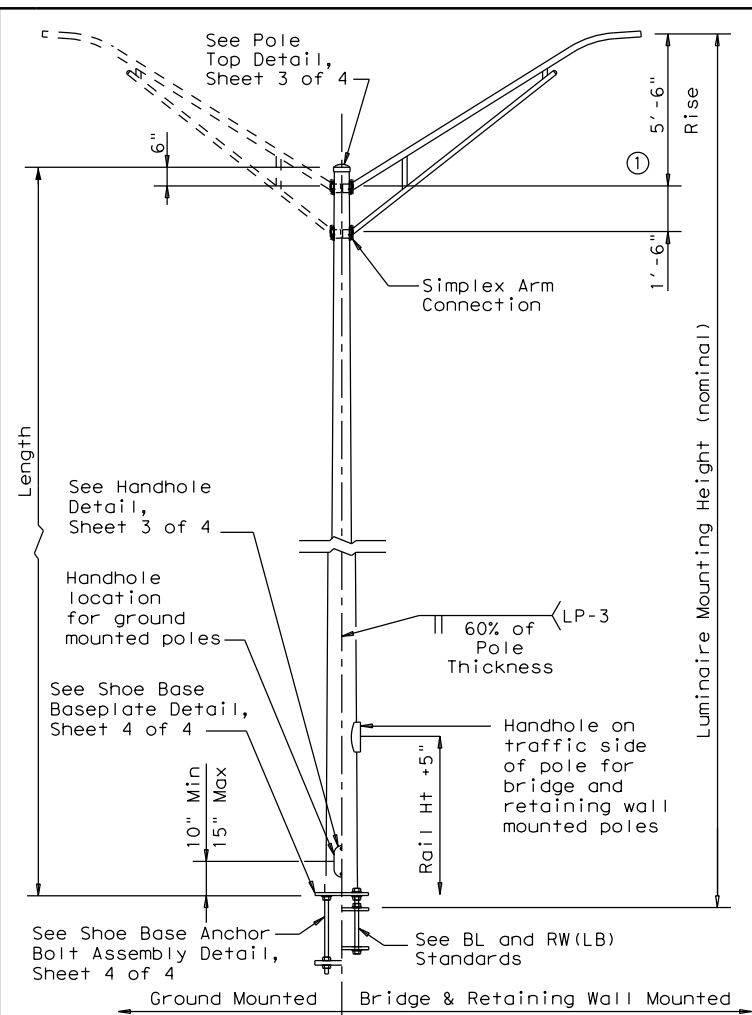


ROADWAY ILLUMINATION DETAILS
(RDWY ILLUM FOUNDATIONS)
RID(2) - 20

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© TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
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1-11	DIST	COUNTY	SHEET NO.	
7-17	WAC	MCLENNAN	83	
12-20				

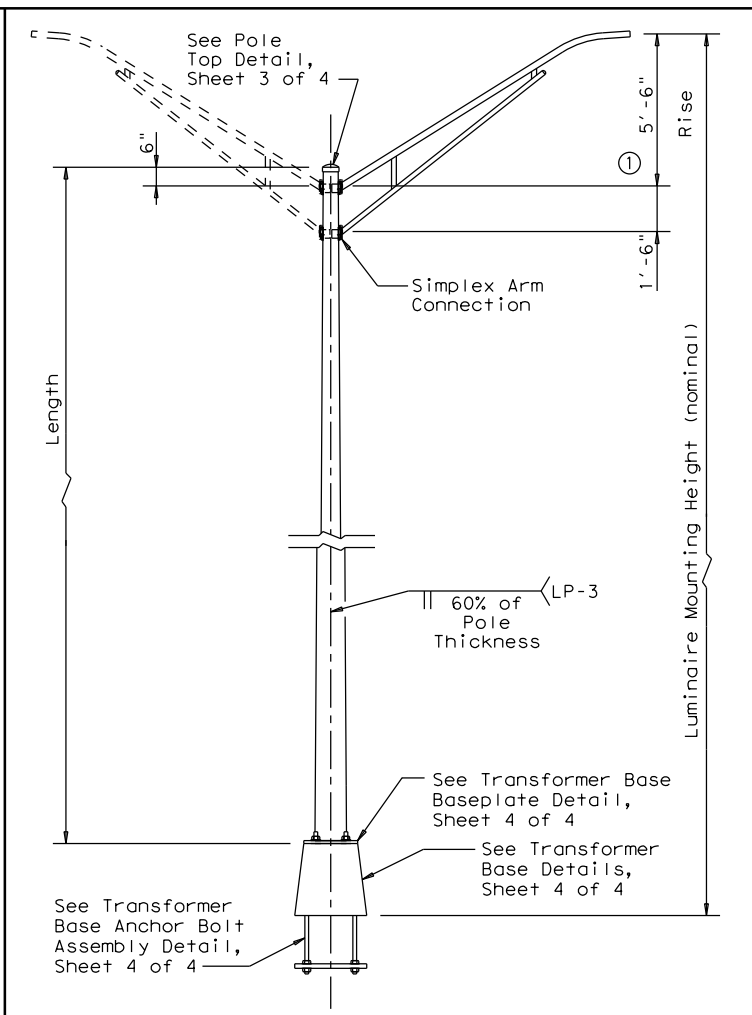
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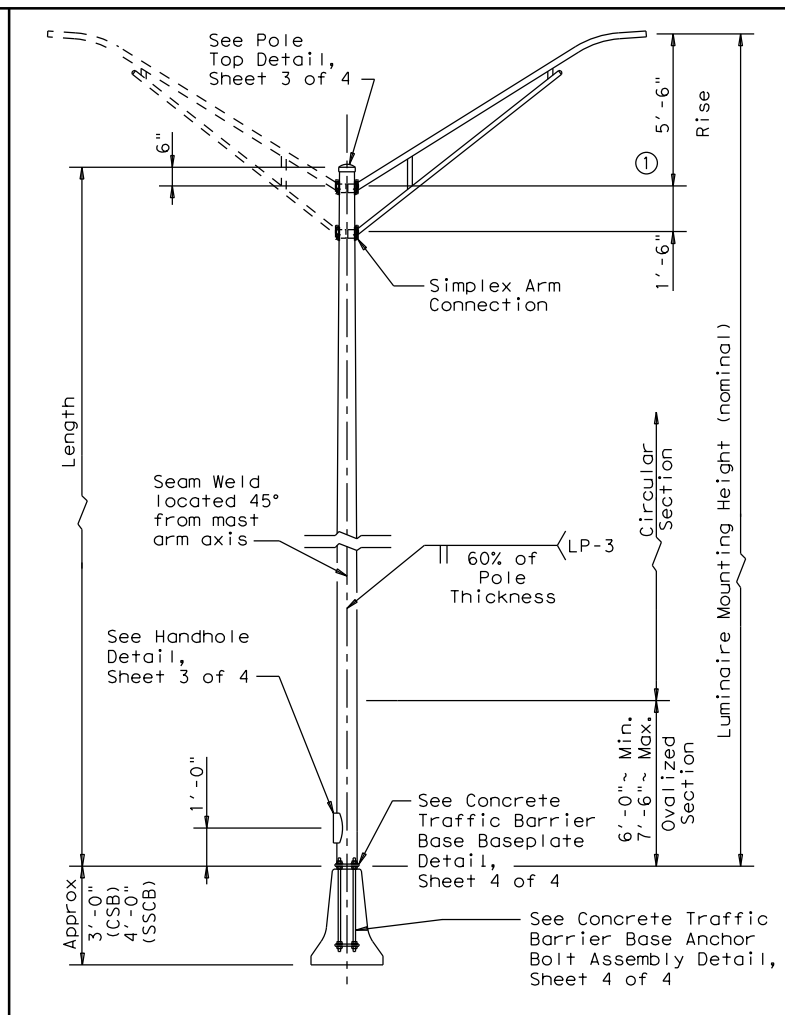
SHOE BASE POLE

SHOE BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	4.90	15.00	0.1196	7.1
30.00	7.50	4.00	25.00	0.1196	13.2
31.00-39.00	8.00	4.36-3.24	26.00-34.00	0.1196	20.7
40.00	8.50	3.60	35.00	0.1196	20.7
50.00	10.50	4.20	45.00	0.1196	30.3



TRANSFORMER BASE POLE

TRANSFORMER BASE POLE					
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)
20.00	7.00	5.11	13.50	0.1196	7.1
30.00	7.50	4.21	23.50	0.1196	13.2
31.00-39.00	8.00	4.57-3.45	24.50-32.50	0.1196	20.7
40.00	8.50	3.81	33.50	0.1196	20.7
50.00	10.00	3.91	43.50	0.1196	30.3



CONCRETE TRAFFIC BARRIER BASE POLE

CONCRETE TRAFFIC BARRIER BASE POLE (CSB/SSCB)						
Luminaire Mounting Height (Nominal) (ft)	Base Diameter (in)	Top Diameter (in)	Length (ft)	Pole Thickness (in)	Design Moment (K-ft)	
					About of Rail	Perp. to Rail
28.00	9.00	5.78	23.00	0.1196	10.3	13.2
38.00	9.00	4.38	33.00	0.1196	16.6	20.8
48.00	10.50	4.48	43.00	0.1345	25.1	30.5

GENERAL NOTES:

- Designs conform to AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto. Design 3-Second Gust Wind Speed equals 110 mph with a 1.14 gust factor. A wind importance factor of 0.80 is applied to adjust the wind speed to a 25 year recurrence interval. Design moments listed in tables assume base of pole is 25' above natural ground level.
- Structures are designed to support two 12' luminaire mast arms and luminaires. Mast arms are designed to support a 60-pound luminaire having an effective projected area of 1.6 square feet.
- Fabrication shall be in accordance with the Specifications and with the details, dimensions, and weld procedures shown herein. Do not submit shop drawings for roadway illumination pole assemblies fabricated in accordance 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 these sheets and the Specifications. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
- For mounting heights between values shown in the tables, use base diameter and thickness values for the larger height.
- Unless otherwise noted, all steel parts shall be galvanized in accordance with Item 445, "Galvanizing."
- Steel poles shall be fabricated in accordance with Item 441, "Steel Structures." Longitudinal seam welds for pole sections shall have 60% minimum penetration. All welding shall be in accordance with AWS D1.1, Structural Welding Code-Steel.
- Two-section poles joined by circumferential welds will not be permitted, unless otherwise shown on the plans. Poles may be fabricated in two sections and field-assembled by the lap-joint method. The two sections shall telescope together with a lap length of not less than 1-1/2 times the shaft diameter at the lap joint.
- Alternate material equal to or better than material specified may be substituted with the approval of the Engineer.
- Lubricate and tighten anchor bolts, when erecting shoe base poles and concrete traffic barrier base poles, in accordance with Item 449, "Anchor Bolts."
- All poles, except Transformer Base Poles, shall have hand holes with reinforcing frames and covers. For ground mounted shoe base poles, hand holes shall be placed 90 degrees to mast arm unless otherwise noted on the plans. For poles mounted on a concrete traffic barrier with one luminaire arm, hand holes shall be located 180 degrees from luminaire arm. For poles mounted on a concrete traffic barrier with two luminaire arms, all hand holes shall be on the same side of the barrier. For poles mounted on a bridge lighting bracket or a retaining wall lighting bracket, hand hole shall be on traffic side of the pole, at a height that will clear the barrier.
- The finished pole shall have a smooth, uniform finish free of pits, blisters, or other defects. Scratched, chipped, and other damaged galvanized areas on poles and mast arms shall be repaired in accordance with Item 445, "Galvanizing."
- Pole length is based on a 5'-6" luminaire arm rise. 4 ft. luminaire arms have a 2'-6" rise. A pole with 4 ft. luminaire arms will have an actual mounting height 3'-0" less than the nominal mounting height. Increasing the pole length to meet the nominal mounting height is allowed, but unnecessary unless otherwise directed by the engineer.
- Erect transformer base poles in accordance with sheet RID(1).

MATERIAL DATA

COMPONENT	ASTM DESIGNATION	MIN. YIELD (ksi)
Pole Shaft (0.14"/ft. Taper)	A572 Gr 50, A595 Gr A, A1011 HSLAS Gr 50 Cl 2 ③, or A1008 HSLAS Gr 50 Cl 2	50
Base Plate and Handhole Frame	A572 Gr.50, or A36	36
T-Base Connecting Bolts	F3125 Gr A325	92
Anchor Bolts	F1554 Gr 55, A193-B7 or A321	55 105
Anchor Bolt Templates	A36	36
Heavy Hex (H.H.) Nuts	A194 Gr 2H, or A563 Gr DH	
Flat Washers	F436	

NOTES:

- 2'-6" rise for 4 ft. luminaire arms.
- Before ovalized as shown on Concrete Traffic Barrier Base Baseplate details, Sheet 4 of 4.
- A1011 SS Gr 50 may be used instead of HSLAS, provided the material meets the elongation requirements for HSLAS.

POLE ASSEMBLY FABRICATION TOLERANCES TABLE

DIMENSION	TOLERANCE
Shaft length	+1"
I.D. of outside piece of slip fitting pieces	+1/8", -1/16"
O.D. of inside piece of slip fitting pieces	+1/32", -1/8"
Shaft diameter: other	+3/16"
Out of "round"	1/4"
Straightness of shaft	±1/4" in 10 ft
Twist in multi-sided shaft	4° in 50 ft
Perpendicular to baseplate	1/8" in 24"
Pole centered on baseplate	±1/4"
Location of Attachments	±1/4"
Bolt hole spacing	±1/16"

SHEET 2 OF 4

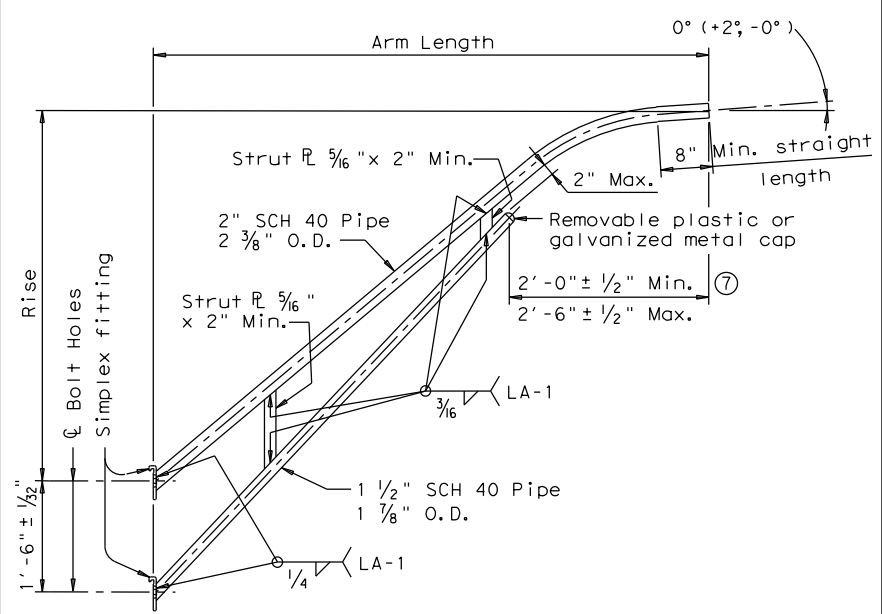


**ROADWAY ILLUMINATION POLES
 RIP(2) - 19**

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©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
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7-17	DIST	COUNTY	SHEET NO.	
12-19	WAC	MCLENNAN	85	

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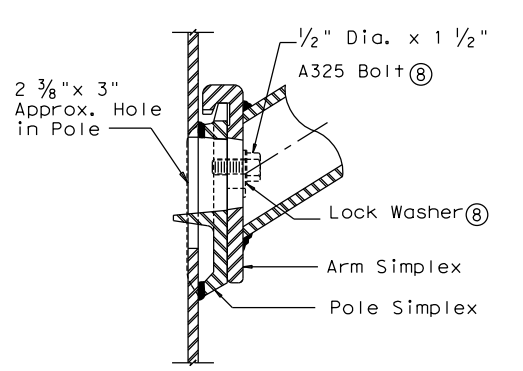
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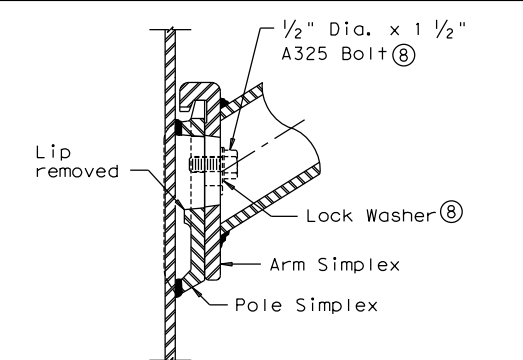
LUMINAIRE ARM

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"

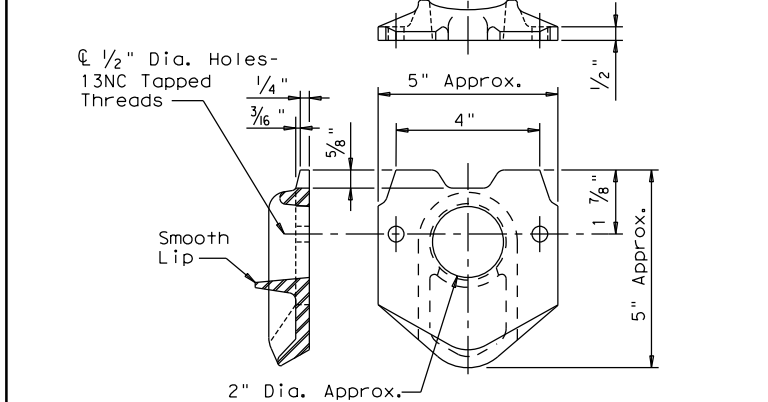


UPPER SIMPLEX FITTING
 (Gusset not shown for clarity)

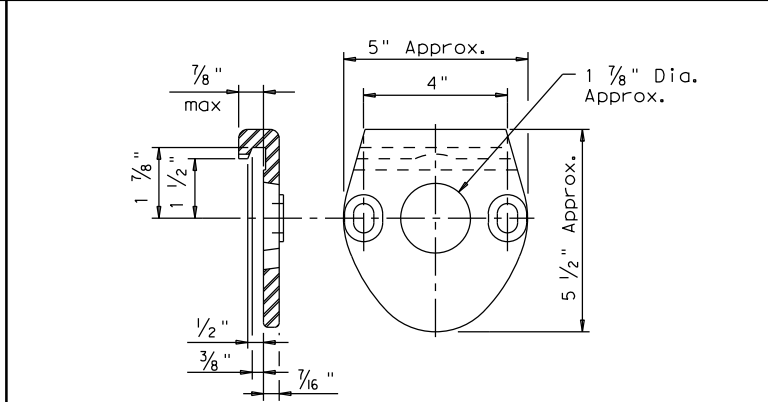


LOWER SIMPLEX FITTING
 (Gusset not shown for clarity)

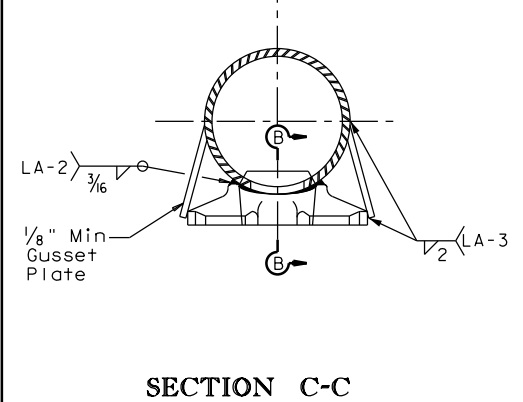
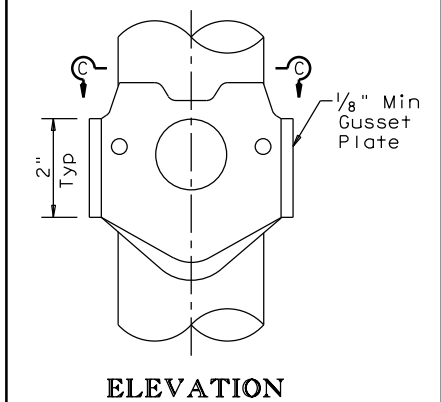
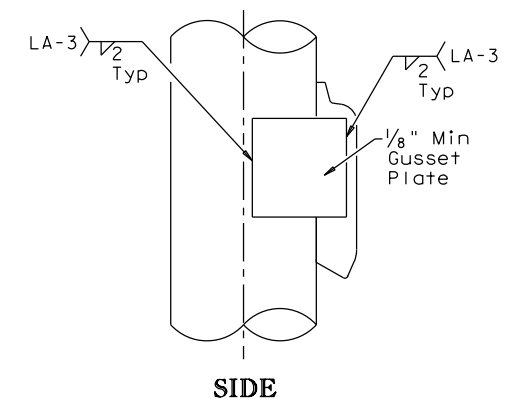
SECTION B-B



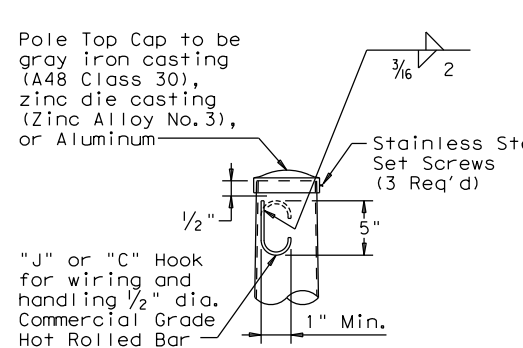
POLE SIMPLEX DETAIL



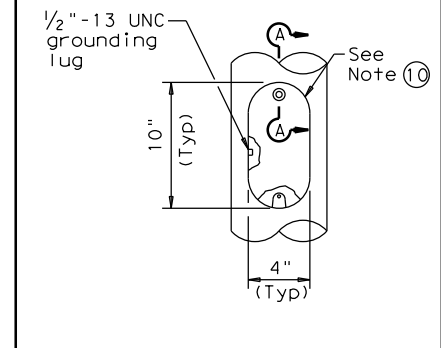
ARM SIMPLEX DETAIL



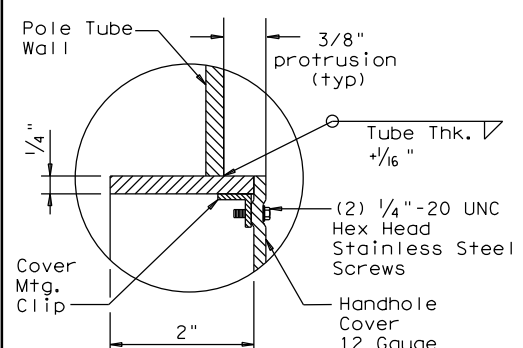
SIMPLEX ATTACHMENT DETAIL



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

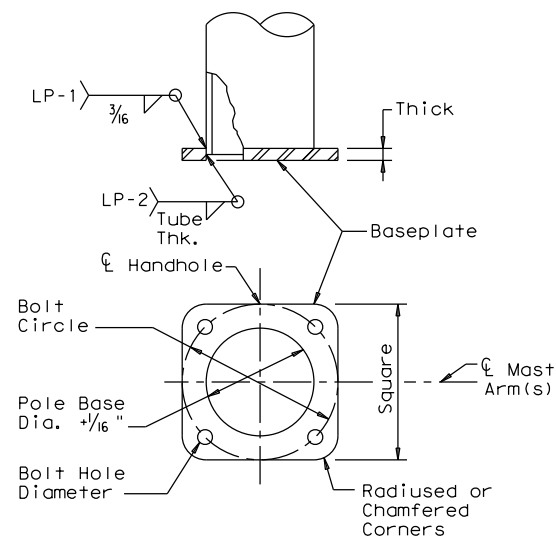
SHEET 3 OF 4



ROADWAY ILLUMINATION POLES
RIP(3) - 19

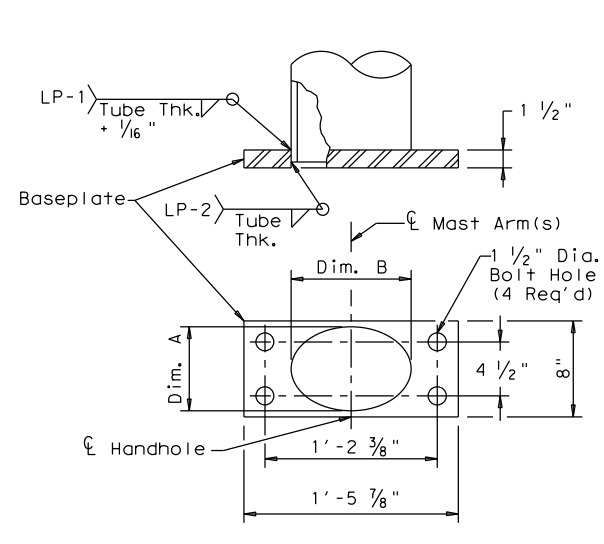
FILE: rip-19.dgn	DN:	CK:	DW:	CK:
©TxDOT January 2007	CONT	SECT	JOB	HIGHWAY
REVISIONS	0909	22	197	CS
7-17	DIST	COUNTY	SHEET NO.	
12-19	WAC	MCLENNAN	86	

DATE: 10/23/2023 \$TIME\$
 FILE: S:\4.0.0.0. Engineering Operations\4.2.0.0.0. Project Files\2024\91151\91151.dwg
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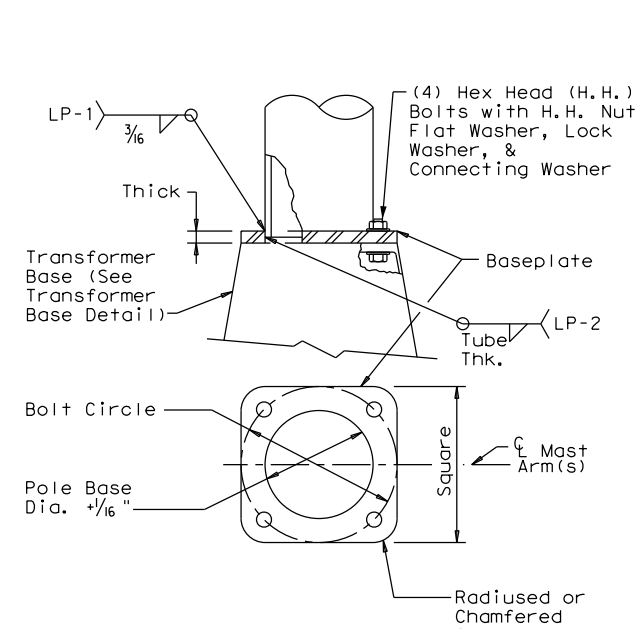
**SHOE BASE
BASEPLATE**

SHOE BASE BASEPLATE TABLE				
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	BOLT HOLE DIAMETER
20' - 39'	13"	13"	1 1/4"	1 1/4"
40'	15"	15"	1 1/4"	1 1/2"
50'	15"	15"	1 1/2"	1 1/2"



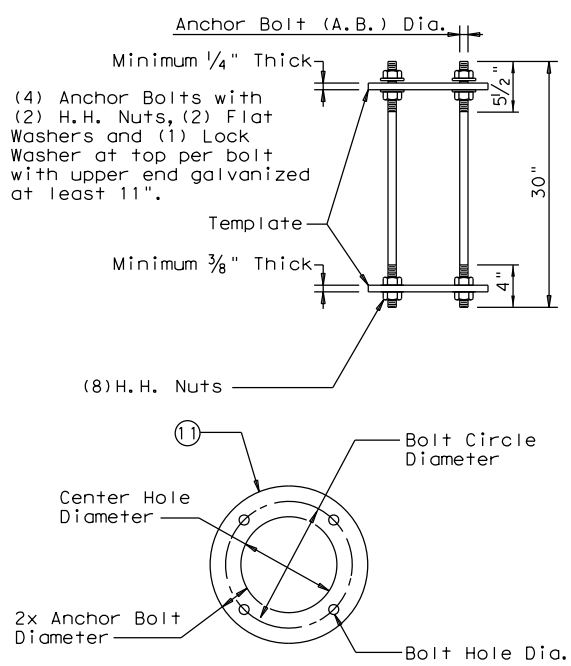
**CONCRETE TRAFFIC
BARRIER BASE BASEPLATE**

CONCRETE TRAFFIC BARRIER BASE BASEPLATE TABLE			
MOUNTING HEIGHTS (nominal)	POLE DIA. (12)	DIM. A	DIM. B
28' - 38'	9"	7" ± 1/4"	10" ± 1/4"
48'	10 1/2"	7" ± 1/4"	13" ± 1/4"



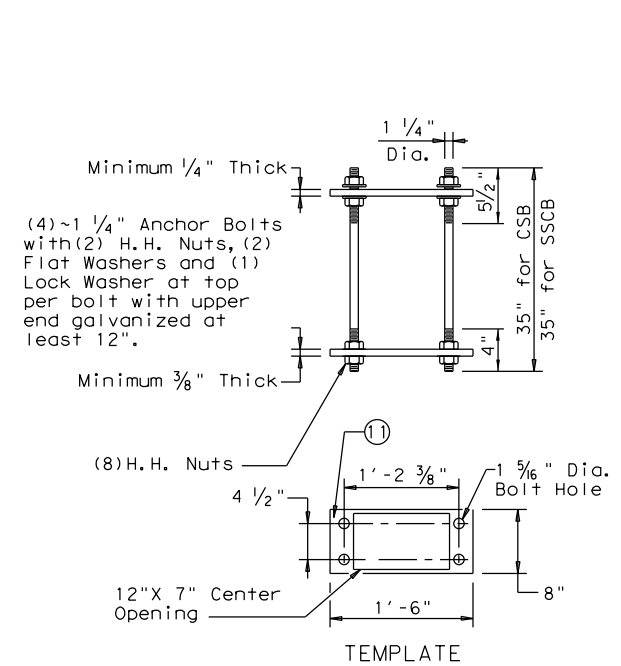
**TRANSFORMER
BASE BASEPLATE**

TRANSFORMER BASE BASEPLATE TABLE						
MOUNTING HEIGHTS (nominal)	BOLT CIRCLE	SQUARE	THICK	CONNECTING BOLT DIA.	BOLT HOLE DIAMETER	TRANSFORMER BASE TYPE
20' - 39'	13"	13"	1 1/4"	1"	1 1/4"	A
40'	15"	15"	1 1/4"	1 1/4"	1 1/2"	B
50'	15"	15"	1 1/2"	1 1/4"	1 1/2"	B



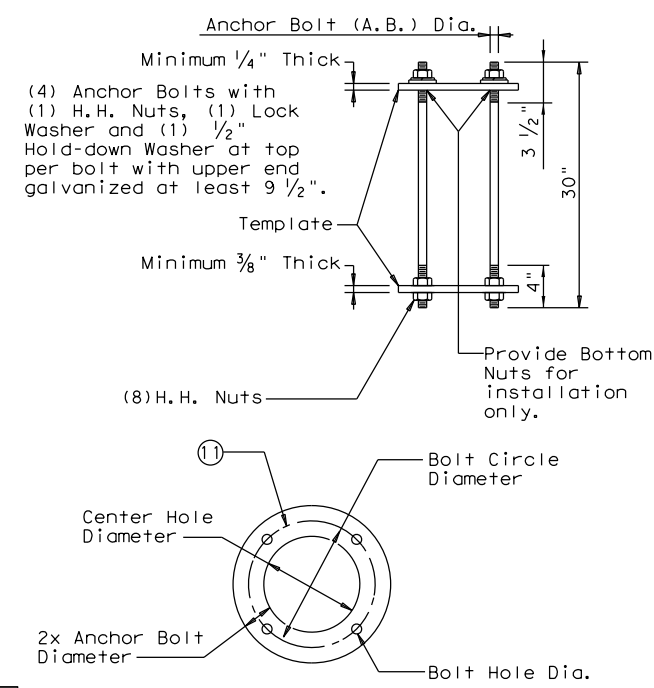
**SHOE BASE
ANCHOR BOLT ASSEMBLY**

SHOE BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20' - 39'	1"	13"	11"	1 1/16"
40' - 50'	1 1/4"	15"	12 1/2"	1 5/16"



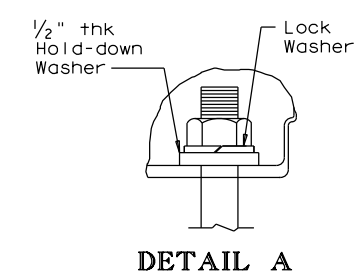
**CONCRETE TRAFFIC BARRIER
BASE ANCHOR BOLT ASSEMBLY**

CONCRETE TRAFFIC BARRIER BASE ANCHOR BOLT ASSEMBLY TABLE				
MOUNTING HEIGHTS (nominal)	A.B. Dia.	BOLT CIRCLE DIAMETER	CTR. HOLE DIAMETER	BOLT HOLE DIAMETER
20' - 39'	1"	14"	12"	1 1/16"
40' - 50'	1 1/4"	17 1/4"	14 3/4"	1 5/16"

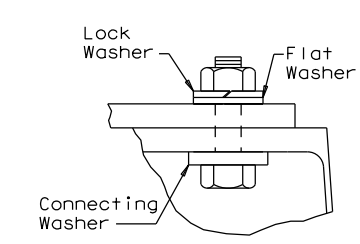


**TRANSFORMER BASE
ANCHOR BOLT ASSEMBLY**

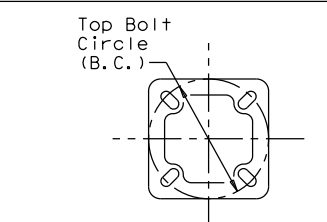
TRANSFORMER BASE TABLE		
TYPE	TOP B.C.	BTM. B.C.
A	13"	14"
B	15"	17 1/4"



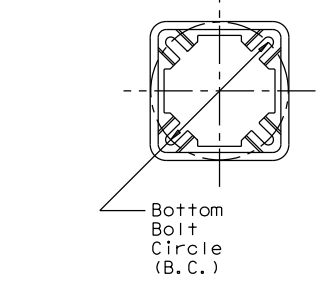
DETAIL A



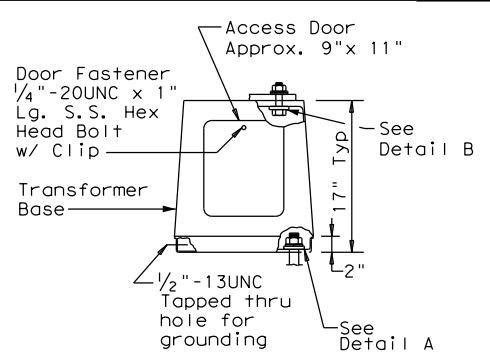
DETAIL B



TOP PLAN



BOTTOM PLAN



ELEVATION

**TRANSFORMER BASE
DETAILS**

GENERAL NOTES:

- For mounting heights between those shown in the table, use the values in the table for the larger mounting height.
- All breakaway bases shall meet the breakaway requirements of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, 6th Edition (2013) and Interim Revisions thereto, and shall have been tested by FHWA-approved methods. All bases shall have been structurally tested to resist 150% of the design moment.
- Transformer bases shall be cast from aluminum, ASTM B108 or B26 Alloy 356.0-T6, or other material approved by the Engineer. Four Hex Head (H.H.) bolts with four H.H. nuts, four lock washers, four flat washers, and connecting and hold-down washers as recommended by the manufacturer, galvanized to ASTM A153 Class C or D, or B695 Class 50, shall be provided with each transformer base for connecting the pole. Bolts shall be ASTM A325 or approved equal. Nuts shall be ASTM A563 grade DH galvanized.
- Bases shall be stamped, incised or by other approved permanent means, marked to show fabricator's name or logo, and model number. Such information shall be placed in a readily seen location, inside or outside the base, but shall not be placed on the door.
- Doors for transformer bases shall be made of plastic, fiberglass or other non-metallic material approved by the Engineer and shall be attached with stainless steel screws or bolts. Transformer bases shall be cleaned by grit blast cleaning after heat treatment. Certification by the manufacturer of heat treatment shall be furnished with transformer bases. The certification shall show the metal alloy and temper and that the base meets those requirements, chemical and physical. The certification shall also show the material ASTM specification. Transformer bases shall be cast with a removable tab bar for material testing. Some bars may have been removed by the manufacturer for testing.

NOTES:

- Anchor Bolt Templates do not need to be galvanized.
- Pole diameter before ovalized.

ANCHOR BOLT FABRICATION TOLERANCES TABLE	
DIMENSION	TOLERANCE
Length	± 1/2"
Threaded length	± 1/2"
Galvanized length (if required)	- 1/4"

SHEET 4 OF 4

Texas Department of Transportation

Traffic Safety Division Standard

**ROADWAY
ILLUMINATION
POLES**

RIP(4) - 19

FILE: rip-19.dgn	DW: 12-19	CK: 197	HW: 197
©TxDOT January 2007		CONT: 0909	SECT: 22
REVISIONS		JOB: 197	HIGHWAY: CS
7-17	DIST: WAC	COUNTY: MCLENNAN	SHEET NO.: 87

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DATE: 10/23/2023
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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.

- 1.
2. No Action Required Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. 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.

- 1.
- 2.
- 3.
- 4.

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 checked="" 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.

- 1.
- 2.
- 3.
- 4.

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.

- 1.
- 2.
- 3.
- 4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

- No Action Required Required Action

Action No.

- 1.
- 2.
- 3.
- 4.

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.

- 1.
- 2.
- 3.


VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

- No Action Required Required Action

Action No.

- 1.
- 2.
- 3.

				Design Division Standard	
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC					
FILE: epic.dgn	DN: TxDOT	CK: RG	DN: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
12-12-2011 IDS REVISIONS	0909	22	197	CS	
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.	WAC	MCLENNAN	88		

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION

TRAFFIC SIGNAL INSTALLATION OR UPGRADES

1.1 PROJECT CONTROL SECTION JOB (CSJ):

0909-22-197

1.2 PROJECT LIMITS: FRANKLIN AVENUE

From: 17 TH STREET

To: 18 TH STREET

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 31°32'43.30"N, (Long) 97°8'34.34"W

END: (Lat) 31°32'46.46"N, (Long) 97°8'30.75"W

1.4 TOTAL PROJECT AREA (Acres): 0.6

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.2

1.6 NATURE OF CONSTRUCTION ACTIVITY:

SAFETY CONSISTING OF IMPROVE TRAFFIC SIGNALS, INSTALL PED SIGNALS, SAFETY LIGHTING AND INSTALL PED CROSSWALKS

1.7 MAJOR SOIL TYPES:

Soil Type	Description
Ur	Urban Land

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

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 2.3.)

- 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: REMOVE AND/OR INSTALL TRAFFIC SIGNAL POLES AND CABINETS
- Other: INSTALL NECESSARY CONDUITS

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

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- Development of plans and specifications
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Other: _____
- Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- Day To Day Operational Control
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Other: _____
- Other: _____



STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
				89
STATE	STATE DIST.	COUNTY		
TEXAS	WAC	MCLENNAN		
CONT.	SECT.	JOB	HIGHWAY NO.	
0909	22	197	CS	

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: _____
- 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

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

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
- Other: _____
- 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

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 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 2.3 of this SWP3 .

2.9 MAINTENANCE:

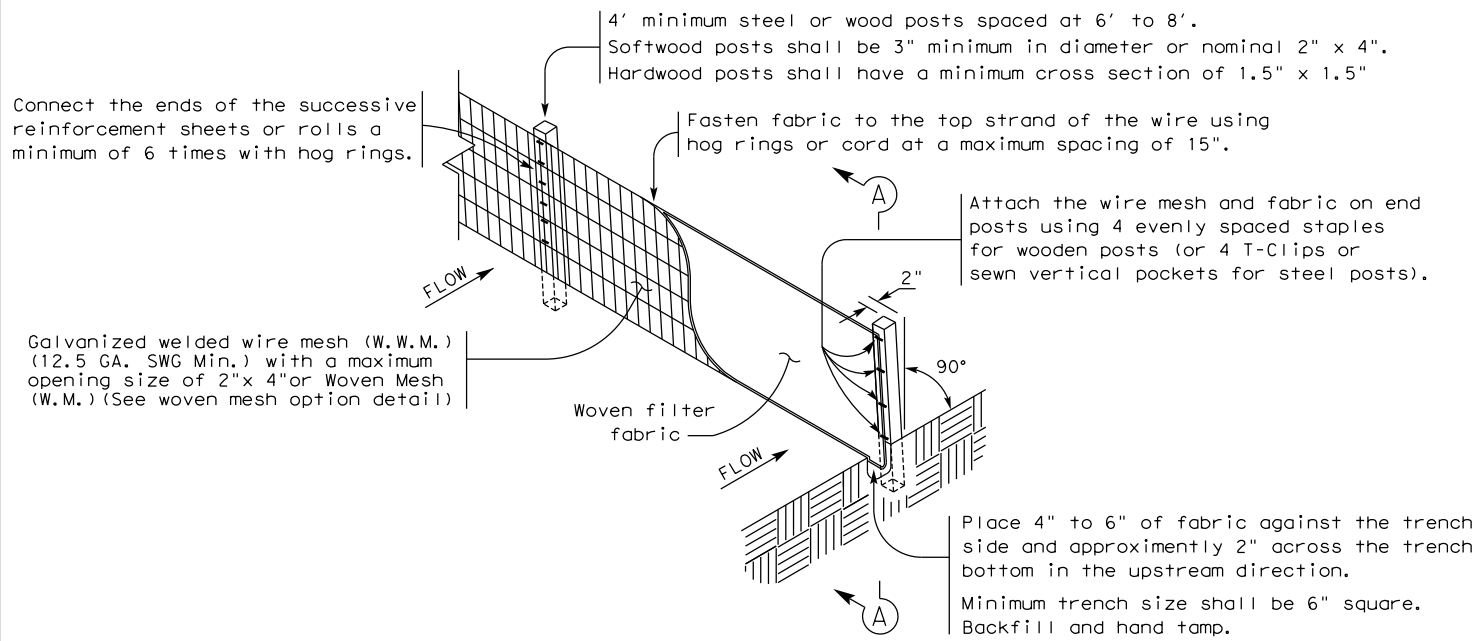
Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being 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 2.3 of this SWP3.



STORMWATER POLLUTION PREVENTION PLAN (SWP3) (Less Than 1 Acre)

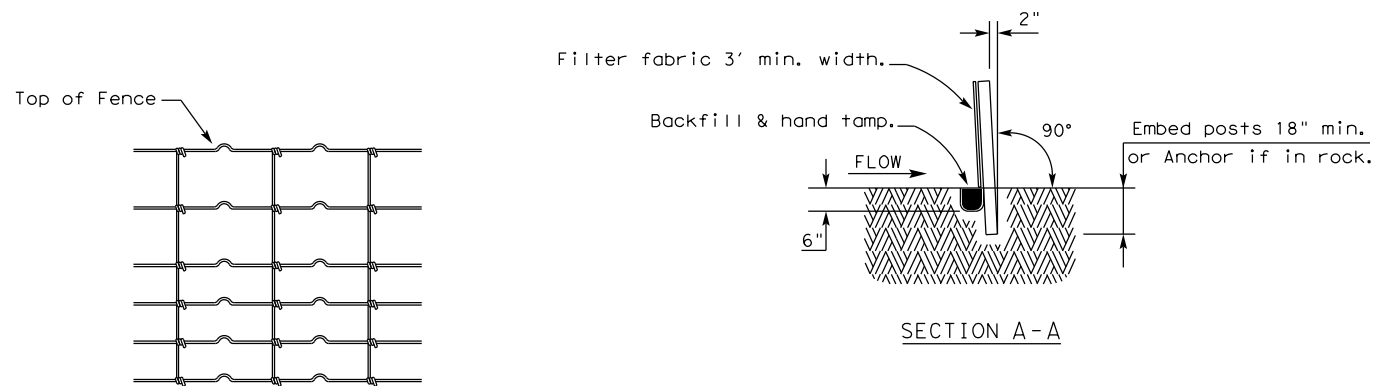
FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
				90
STATE	STATE DIST.	COUNTY		
TEXAS	WAC	MCLENNAN		
CONT.	SECT.	JOB	HIGHWAY NO.	
0909	22	197	CS	

10/25/2023
 SF 14E0.0.0.0. Engineering Operations\4.2.0.0.0.0. Project Files\2022\22049 - COW HSIP Projects\cadd\sheets\standards\ec116.dgn
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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/FT². Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

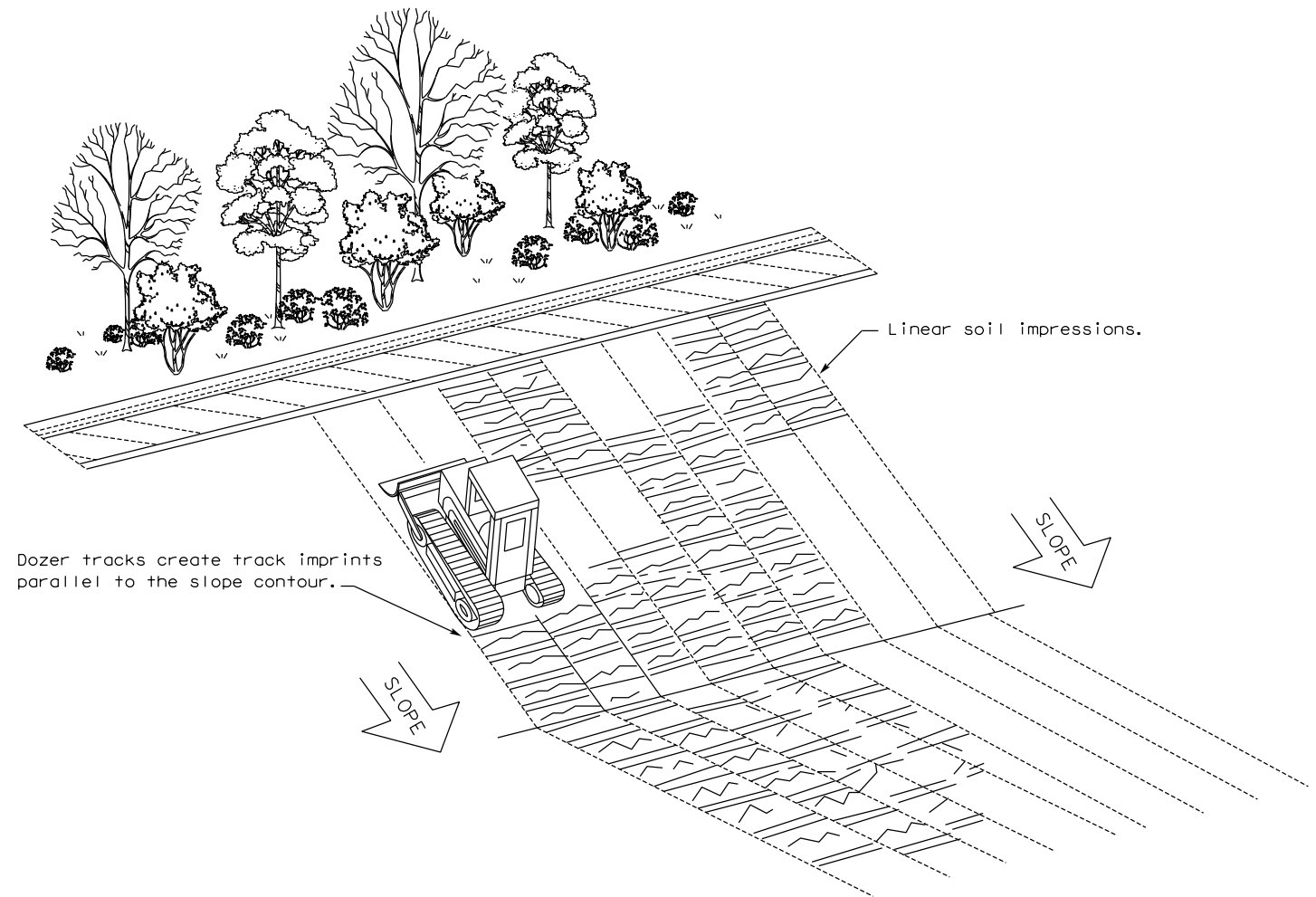
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

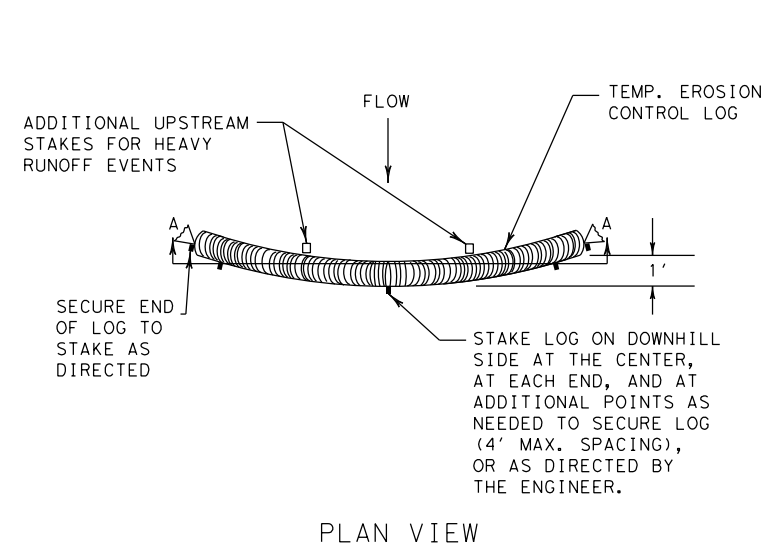
1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum 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.



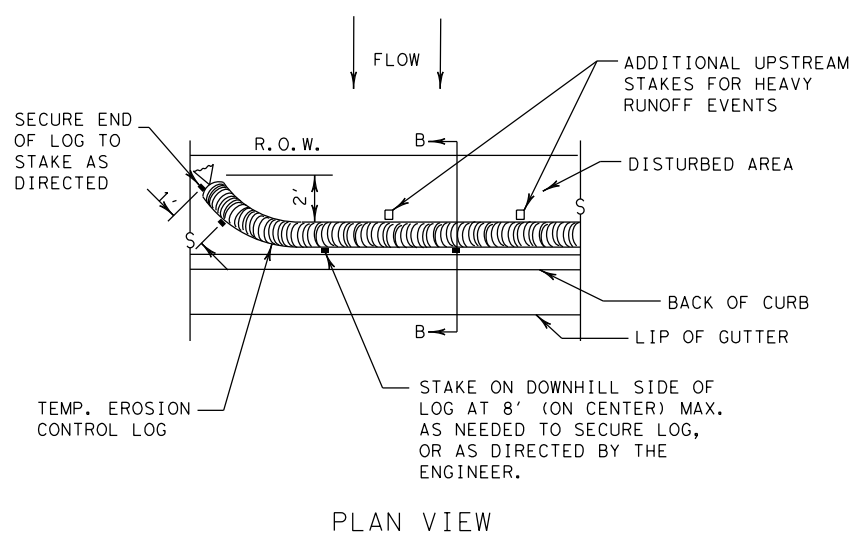
VERTICAL TRACKING

				Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE & VERTICAL TRACKING					
EC(1)-16					
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0909	22	197	CS	
	DIST	COUNTY		SHEET NO.	
	WAC	MCLENNAN		91	

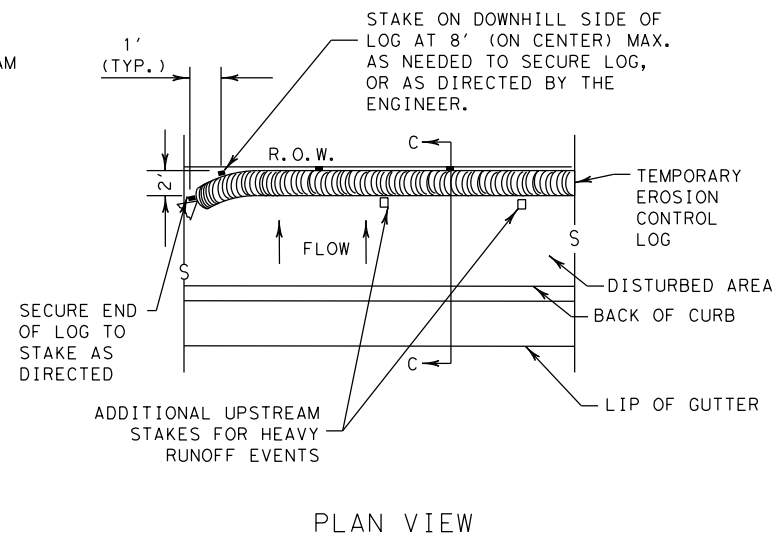
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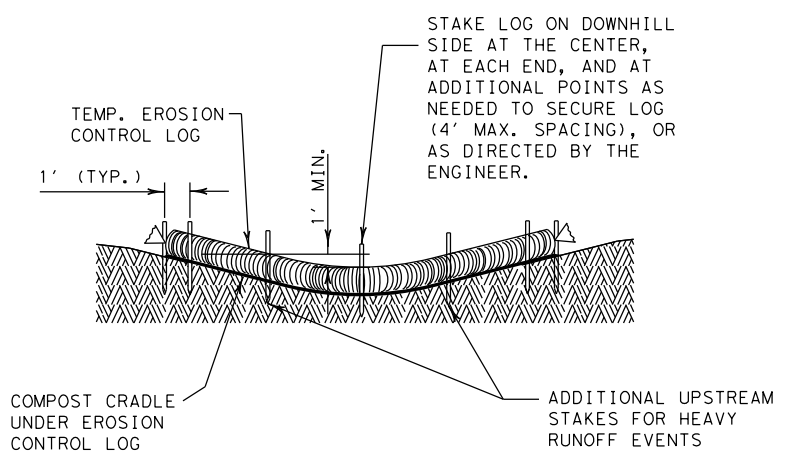
PLAN VIEW



PLAN VIEW



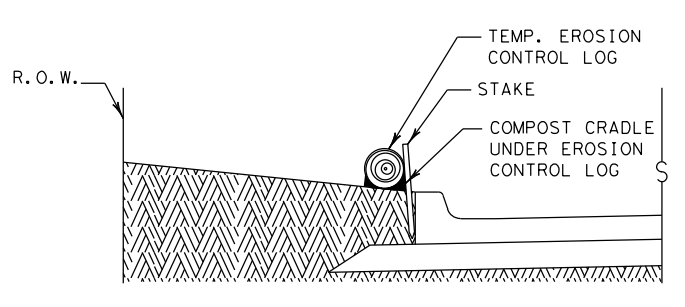
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

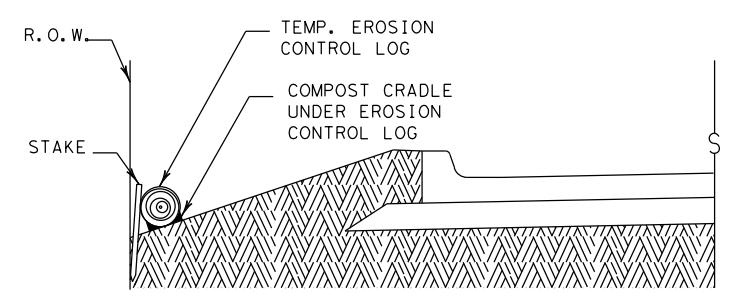
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

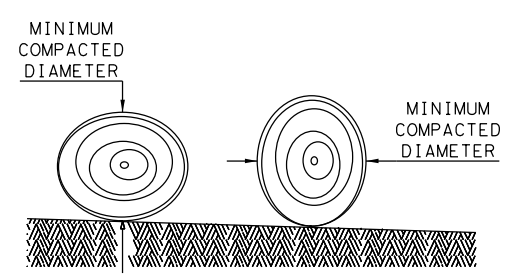
CL-BOC



SECTION C-C

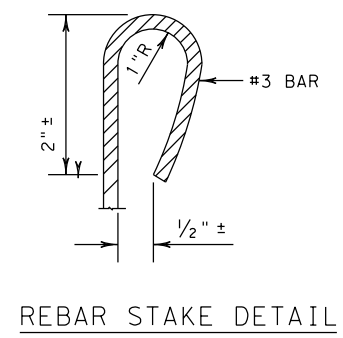
EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

- 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



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.

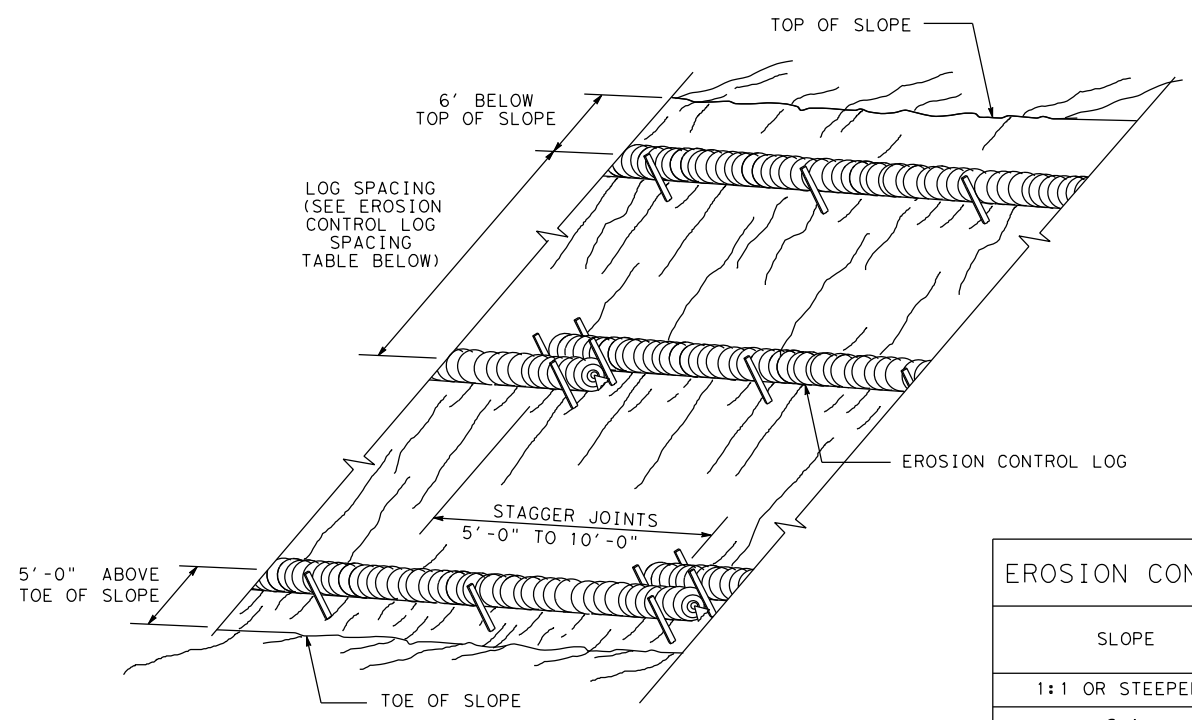
Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

- 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.

SHEET 1 OF 3

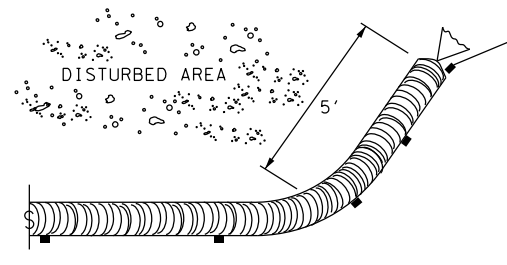
		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT: 0909	SECT: 22	JOB: 197
REVISIONS		HIGHWAY: CS	
DIST: WAC	COUNTY: MCLENNAN	SHEET NO.: 92	

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EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

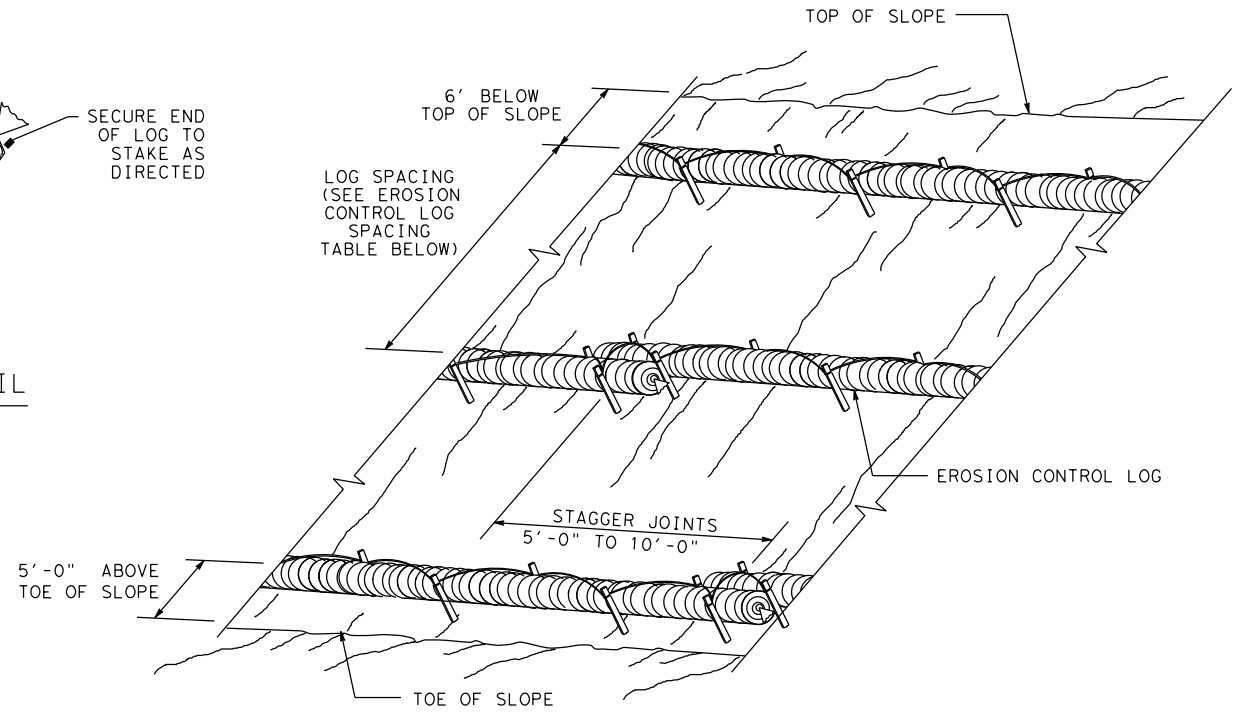
CL-SST



END SECTION RAP DETAIL

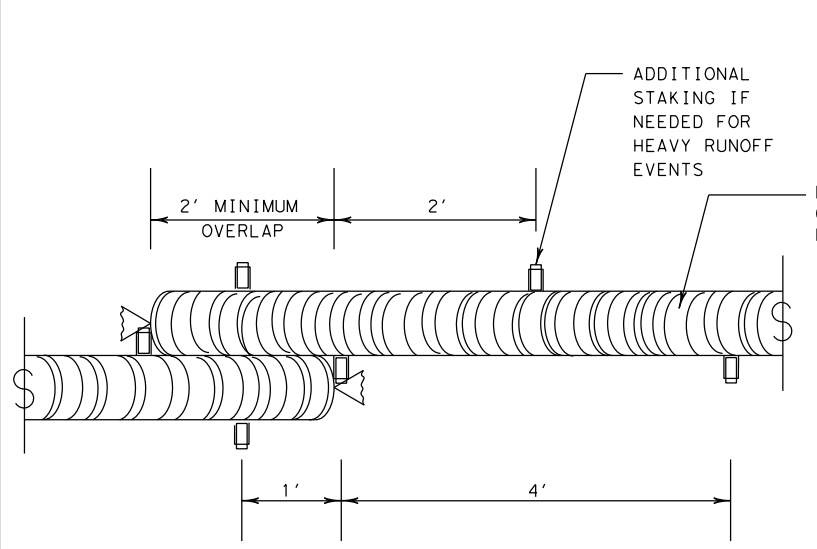
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
 SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
 HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



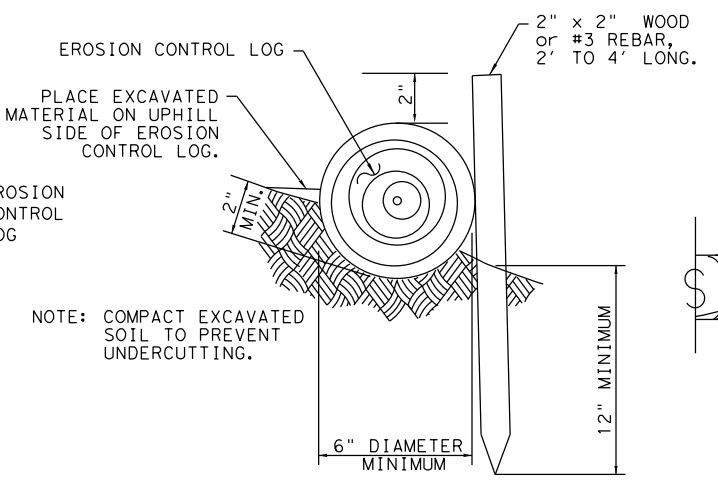
EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL



STAKE AND TRENCHING ANCHORING DETAIL

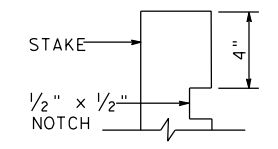
CL-SST



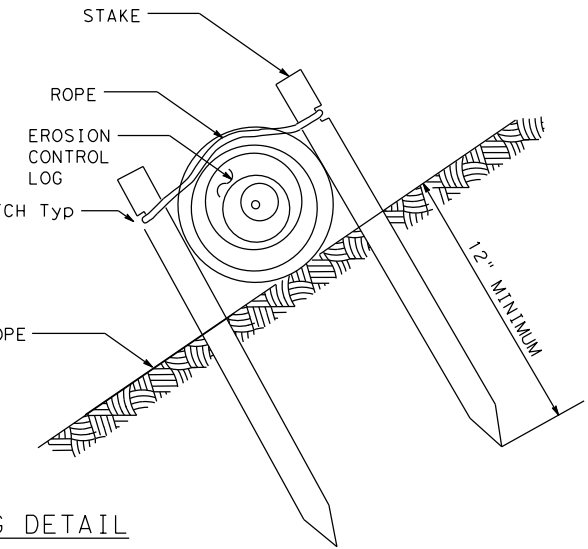
STAKE AND LASHING ANCHORING DETAIL

CL-SSL

TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"



STAKE NOTCH DETAIL

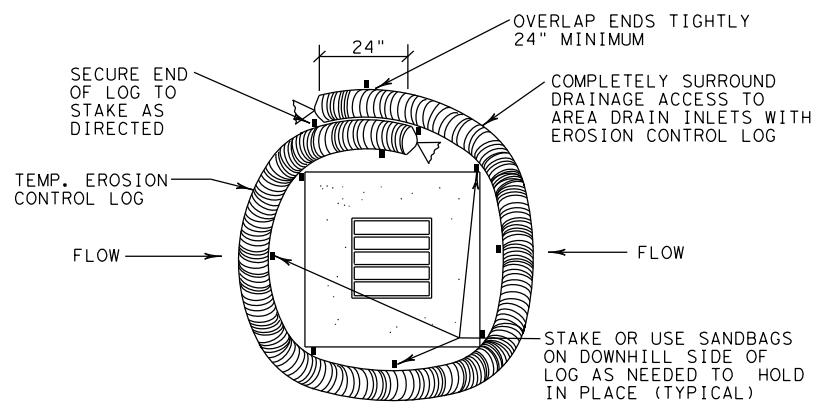


SHEET 2 OF 3

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
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REVISIONS	DIST: WAC		COUNTY: MCLENNAN
			SHEET NO.: 93

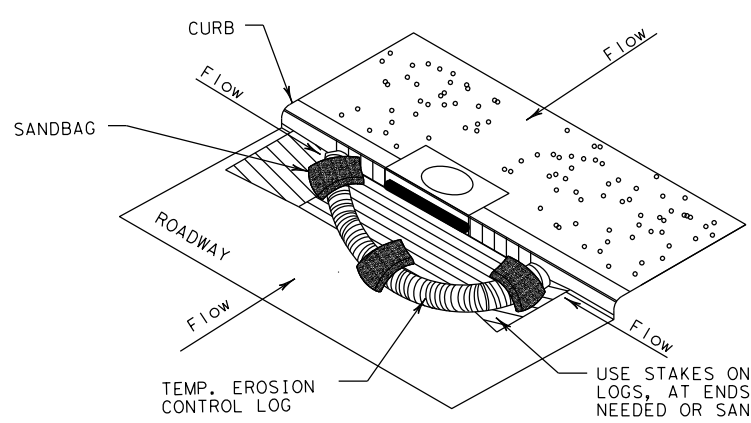
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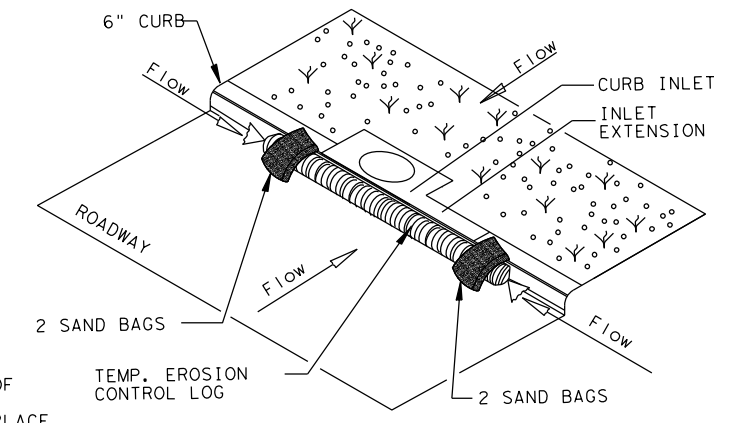
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

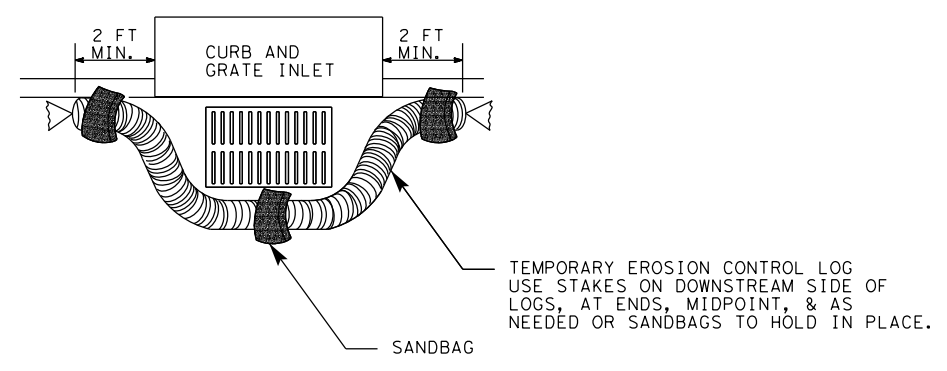
CL-CI



EROSION CONTROL LOG AT CURB INLET

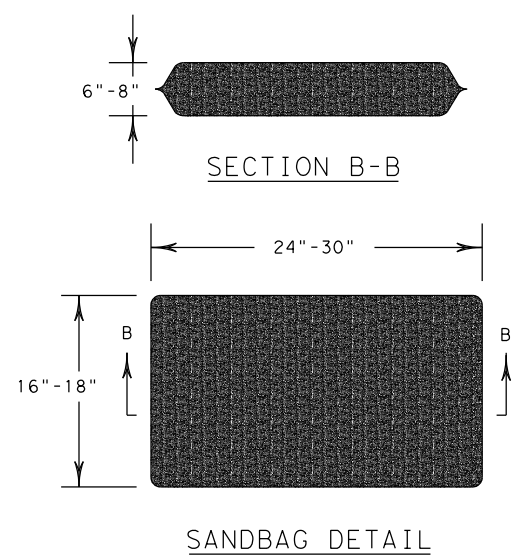
CL-CI

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



		Design Division Standard		
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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REVISIONS	0909	22	197	CS
	DIST	COUNTY	SHEET NO.	
	WAC	MCLENNAN	94	

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

1. Prior to TxDOT allowing the Contractor to start construction, the Contractor will provide the required storm water and 404 permit documentation and support activities, including but not limited to the following:
 - Provide a list of all chemicals, construction and waste products that will be generated, stored or brought upon TxDOT ROW. The list includes expected construction debris, sanitary wastes, construction chemicals and petroleum products used or generated by the Contractor and sub-contractors. Along with the list, the Contractor will supply a spill prevention plan and clean up procedures that will include each of these chemical products or generated waste.
 - Provide in the construction schedule the necessary line items that will comply with the schedule and planning requirements of the storm water permit.
 - Post the TxDOT storm water permit and any Contractor permits, per permit requirements.
 - Provide copies of storm water permits for Contractor PSL(s). As new PSL(s) may be obtained for the project, provide copies of new or amended permits to TxDOT. The Contractor will not disturb soil without the proper permits.
 - Provide scale drawings of off ROW PSL's within one mile of the project, for field offices, borrow sources, plant sites or other uses.
 - Provide permit information on any Contractor batch plants or concrete crushing plants to be located at a Contractor PSL(s) within one mile of the project limits or boundaries. Copies of the air and water permits are to be provided to TxDOT before materials will be used on the project. No asphalt or concrete batch plants or concrete crushing plants will be located on TxDOT ROW.
 - Provide a letter indicating a Contractor Responsible Person for environmental compliance (CRP) for the project, and maintain a CRP throughout the project duration.
 - Provide all environmental documentation including certification of compliance and EMS training documents/certificates prior to starting work. The Contractor is to provide daily BMP inspection reports that document all field BMPs needing repair or replacement. The Contractor is to clearly document specific BMPs needing repair and location each work day. The Contractor is encouraged to be proactive in fixing BMPs without TxDOT direction.
 - Provide documentation required for Waters of the US, Note #3 and submittals for Item 496 bridge removal. Bridge removal methods submitted will follow all Waters of the US note requirements. The Contractor is not to start construction within the Ordinary High Water Marks of any stream until receiving approval for stream channel construction methods from TxDOT.
 - Provide a written procedure for managing all chemicals and construction items placed in vertical containment structures. Also, provide methods to be used for the treatment, disposal, collection or release of storm water.
 - Provide an estimated date by letter, for the submittal of marked up bridge drawings, indicating cut locations for any structural steel requiring cutting or torching of steel, coated with lead containing paints.
2. Place and maintain trash cans and portable sanitary facilities at locations where there is active construction. Worker generated trash and construction debris will be kept from being transported by storm water and will be collected daily from the ground and routinely hauled from the work area.
3. Contractor will provide TxDOT copies of all correspondence with MS4s, TCEQ, EPA, DSHS and Corps of Engineers regarding activities on this project.
4. Contractor to conduct storm water inspections and develop SWPPP documents to support Contractor permits obtained for the project including PSL(s).
5. Contractor will maintain written documentation of locations of all portable sanitary facilities. The Contractor is required to document the location and disposition of all spills and cleanups from portable sanitary facilities.
6. Contractor will not store chemicals on TxDOT ROW, unless chemicals are stored following all environmental and safety regulations. Fuels for construction equipment will not be stored on TxDOT ROW.
7. The Contractor will store fuels and bulk chemicals on Contractor PSL(s) using a secondary containment method, such as double lined tanks and/or free standing containment reservoirs made of plastic or steel designed to hold bulk chemicals or drums.
8. The Contractor will not remove sediment controls without the prior approval of TxDOT, except for a sediment control that may back up water and cause safety or traffic problems.

SCALE = NTS SHEET 1 OF 10



TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

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DEC 2013	DIST	COUNTY		SHEET NO.
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BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

9. Any sediment controls removed by the Contractor must be re-installed before the next rainfall event or by the end of day, as approved in advance.
10. Vegetative buffer strips may be used in place of temporary sediment controls such as silt fences and rock filter dams. The amount of disturbed soil area will be limited to 1/3 of an acre or less for a minimum of 50 feet of grassed ditch and 2/3 of an acre of disturbed soil for a minimum of 100 feet of grassed ditch.
11. Construction equipment found to be leaking oil, fuel or coolant will be immediately stopped, the leaking fluid collected and the equipment fixed. Equipment continuing to leak will be removed from the project at no cost to TxDOT. Leaking fluids from equipment will be collected and removed from the project or PSL.
12. Earth berms or mounds typically used to stockpile topsoil and used in place of boundary silt fence will be seeded upon being constructed. Long term use of earth berms or mounds will not be continued without establishing grass on the control.
13. The Contractor will inform TxDOT of new areas where soil will be disturbed to facilitate planning for new sediment controls. Areas of vegetated soil will not be disturbed by the Contractor, unless adequate sediment controls can be installed before the next rainfall event. The Contractor will assist TxDOT in keeping an accurate set of working SWPPP drawings that show the locations of all temporary sediment and erosion controls.
14. The Contractor will maintain an adequate amount of temporary sediment controls on hand at the field office or project staging area for critical SWPPP maintenance, including silt fence (minimum of 200 feet) and rock / fabric for rock filter dams (minimum for 100 feet of Type III dams).

The requirement for BMP rock quantities on hand is waived for small projects for on and off system bridge installations. The Contractor having a BMP Subcontractor does not eliminate the requirement for the Contractor to have the required silt fence and rock on hand, typically stored at the Contractor PSL.
15. Failure of a sub-contractor to complete storm water work on time will require the Contractor to start storm water sediment control work immediately and complete the work with high priority, or be subject to stop work on the entire project.
16. Earth materials on roads as a result of soil tracking will not be allowed to be transported off ROW in storm water. Soil or rock material found on roadways deposited from Contractor equipment will be removed daily.
17. Unless approved, completed concrete curb inlets will not be blocked by sediment controls. The contractor will frequently sweep the completed or partially completed roadway to keep sediment out of drainage pipes.
18. The Contractor will be responsible for proper dust control and will route construction traffic in a manner that minimizes dust generation.
19. Water for dust control will contain no pollutants, but may be non-potable from upland stock ponds. No quantity of water to be used for construction purposes may be taken from a 404 stream, prior to the proper authorizations or permits being obtained by the Contractor.
20. Contractor is to direct workers and sub-contractors to use portable sanitary facilities provided by the Contractor and not to trespass off ROW.
21. Contractor will provide written verification to TxDOT that earth borrow pits and disposal sources meet environmental and regulatory requirements, prior to use. Excavations will meet all OSHA requirements and the current safety guidelines established for TxDOT Quarries and Pits.
22. Boundary silt fences that are terminated down slope, with one end being at the lowest elevation, will be installed with an L - hook to contain sediment. Boundary silt fences that are installed on flat ground will have L-hooks on both ends.
23. Rock filter dams across ditches will be constructed where the rock filter dam ends are embedded within the ditch side slopes and ditch bottom. The top center elevation of the rock filter dam will be at least 6 inches lower than the elevations on the rock filter dam ends.
24. Silt fence will be constructed in a U or V pattern across ditch lines and up the ditch side slope to keep storm water from flowing around the ends of the silt fence. Small silt fences that do not adequately span the ditch and allows storm water around the end(s) will not be used. Where there is adequate space, large U pattern silt fences are preferred to facilitate sediment collection and sediment removal with equipment.
25. Sediment controls (RFDs or silt fences) will be located along road ditches as marked on the SWPPP drawings. Modifications to the sediment control spacing will be adjusted during the project based on sediment control effectiveness. The installation and maintenance of sediment controls at or near outfalls, where storm water leaves TxDOT ROW, takes persistent over ditch line sediment controls.

SCALE = NTS SHEET 2 OF 10

 *Texas Department of Transportation*
Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

TA-BMP

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REVISIONS	0909	22	197	CS
DEC 2013	DIST	COUNTY		SHEET NO.
FEB 2015	WAC	MCLENNAN		96

BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

26. Storm water draining sheet flow over disturbed soil sloped towards the ROW property line, will be intercepted by a boundary silt fence typically installed with L-shaped ends.
27. For ditch grading and shoulder up work, the Contractor is limited during good weather to remove up to one mile (limited to five acres of disturbed soil) of ditch line sediment controls; on one side of the roadway. Outfall controls cannot be removed during this activity. Ditch line controls must be replaced upon completion of work and before the next rain event.
28. Sediment controls damaged by the Contractor, as defined by permit, must be fixed or replaced immediately upon discovery.
29. Notches in silt fences are not typically allowed. Specific silt fences that back up water onto lanes of traffic may be notched if approved.
30. For silt fence maintenance, the Contractor will leave approximately 4 inches of deposited sediment up stream of silt fences and not over excavate around silt fences or rock filter dams.
31. The Contractor will inform TxDOT of new construction areas and where soil is planned to be disturbed. Sediment controls will be installed at outfalls prior to the Contractor beginning soil disturbing activities up slope from the outfall.
32. Water from concrete saw cutting, concrete grinding and concrete coring activities; or fine materials from concrete chipping and salvage will not be allowed to enter storm drains or enter streams.
33. Storm water containing suspended sediment and turbidity needing to be removed from excavations or low areas will be pumped or gravity drained through vegetated buffer strips (50 foot minimum) or placed in ditches with temporary sediment controls, prior to the water being discharged into a stream.
34. Uncontaminated water from natural groundwater seepage, springs, foundations and drains that does not contain suspended sediment or any pollutants may be discharged without storm water controls.
35. Lime or cement if spilled in ditches or outside the defined limits of application is considered a pollutant and will be excavated and removed the same day, to avoid contaminating streams.
36. If located along the project ROW, RAP stockpiles will be located where there is a minimum 100 feet of vegetative buffer strip before storm water will reach a stream. RAP will not be used as a construction material within the Ordinary High Water Marks of a stream channel of a 404 designated stream.
37. If allowed on the project, concrete truck wash out areas will have adequate volume to allow 12 inch freeboard for rain and will be lined with 6 mils of plastic. No concrete will be stored higher than the 12 inch freeboard. Cleaning of truck chutes and equipment does not constitute concrete truck wash out and this activity may be completed at the concrete placement location. Wash out areas will not be located closer than 50 ft from down slope inlets or stream channels.
38. For outfalls near stock ponds closer than 50 foot from disturbed soil at the ROW line, redundant sediment controls will be provided, typically a combination of rock filter dam and a silt fence constructed in line of the flow.
39. Earth stockpiles will utilize silt fence sediment controls, positioned on the low end of the stockpile drainage area with L-hooks or silt fence installed around the entire stockpile.
40. Sediment controls including rock filter dams and silt fences will not be installed across any 404 streams. Sediment controls at 404 streams will be positioned to limit sediment entering the stream from the banks and around structures/culverts, and will allow free flow of storm water to pass through the ROW without being dammed by any sediment controls. Remove loose materials from stream channels prior to each rain event.
41. Sediment controls for non-404 streams may be constructed across the drainage channel in unlimited locations. It is appropriate to use sediment control details typically used for 404 streams for non-404 streams when flow velocities are high. Remove loose material from stream channels prior to each rain event.
42. Incomplete drainage pipe installation across the roadway does not remove the requirement for having sediment controls around the ends of the pipe. To stay within permit requirements, sediment controls should be installed over and around the terminated end and along each side of the banks as soon as construction on the pipe has been completed. Remove loose material from stream channels prior to each rain event.
43. Safety end / headwall construction temporarily will require the removal of part of the sediment control placed over and around the pipe end. Retain in place as much functioning sediment control as possible. Replace the silt fence over and around the top of the pipe, immediately upon concrete placement and form removal. Do not remove culvert sediment controls that cannot be replaced before the next rain event. Sediment control at the ends of culverts must be in place and available for any rain event until the disturbed soil areas are re-vegetated.

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TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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BEST MANAGEMENT PRACTICE (BMP) GENERAL NOTES

44. Between the Ordinary High Water Marks of a 404 stream channel, the Contractor will disturb only the minimum amount of stream channel that is necessary to complete the work.
45. Rock riprap for erosion control does not replace the requirements to maintain sediment control until vegetation is re-established. Replace sediment controls immediately after installing erosion rock.
46. At the direction of TxDOT, sediment deposited into existing and new culverts will be removed subsidiary to Item 506. Sediment to be removed is either pre-existing material before construction starts or sediment generated as a part of this project.
47. Provide treated 2X4 cross bracing for rectangular inlet silt fence, subsidiary to Item 506.
48. Loose or granular earth materials will not be used to repair silt fence undercuts. Silt fence undercut repairs will be conducted with well compacted soils or the silt fence will be reset in a nearby location.
49. Silt fence steel T posts of approximately 1.25 pounds per foot are allowed at a spacing of 8 feet or less. Silt fence steel T posts between approximately 1.25 pounds per foot and 0.85 pounds per foot are allowed for T post spacing of 5 feet or less.
50. Silt fence to be used to slow the flow of storm water down slopes will be positioned approximately horizontal (on the contour) with L hooks on the ends and limited to approximately 200 feet in length. Multiple sections and levels of silt fence may be required in addition to temporary / permanent erosion control flumes.
51. Soil retention blankets will be installed rolled down the slope with the small dimension side embedded at the top of slope, unless recommended otherwise by the manufacturer. Excess grass, rocks, trash, debris or clods will be removed before seeding and installing soil retention blankets. All installations will be by the manufacturer recommendations. Contractor equipment, including tractor mowers will be kept off areas with soil retention blankets until the grass is established.

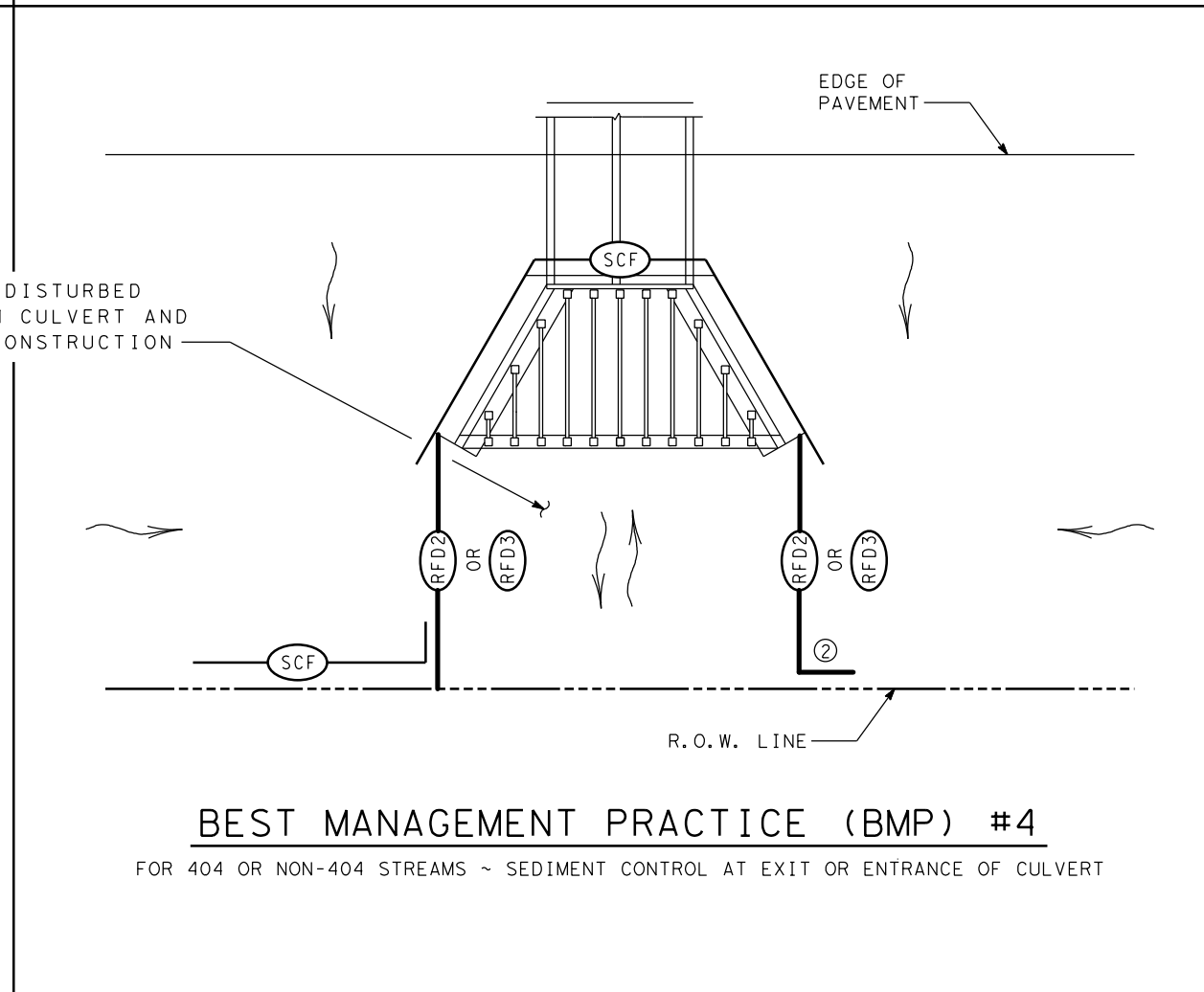
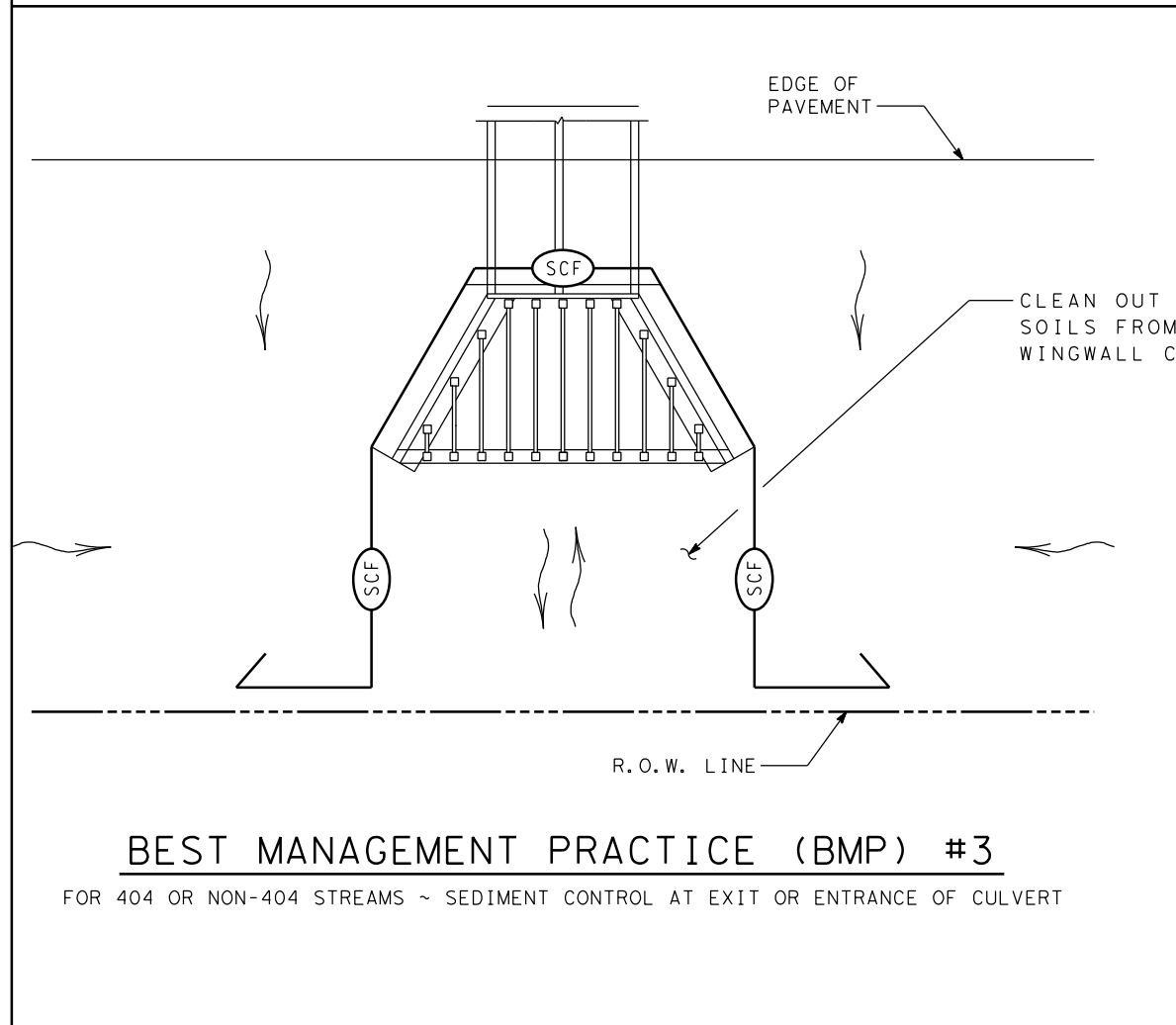
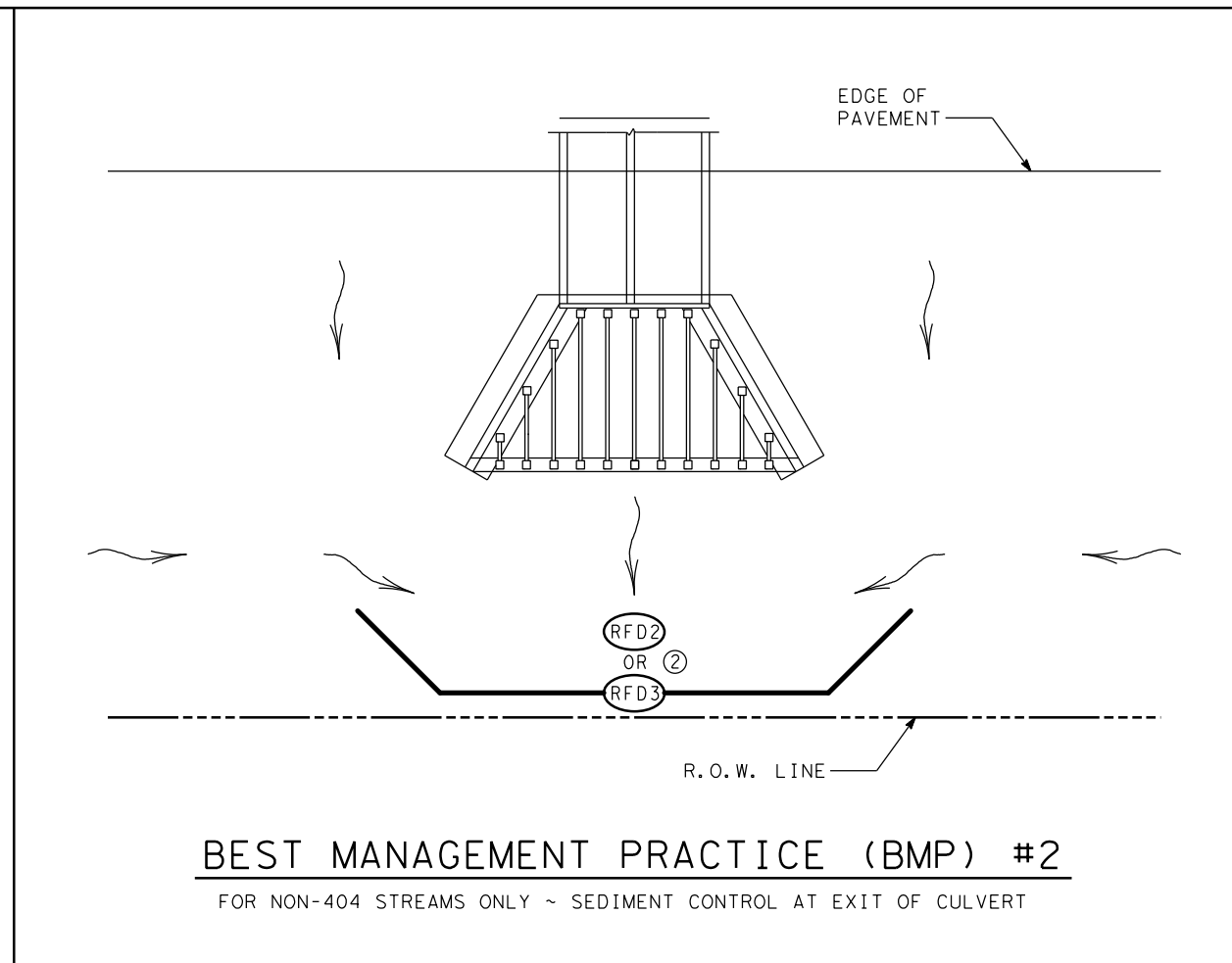
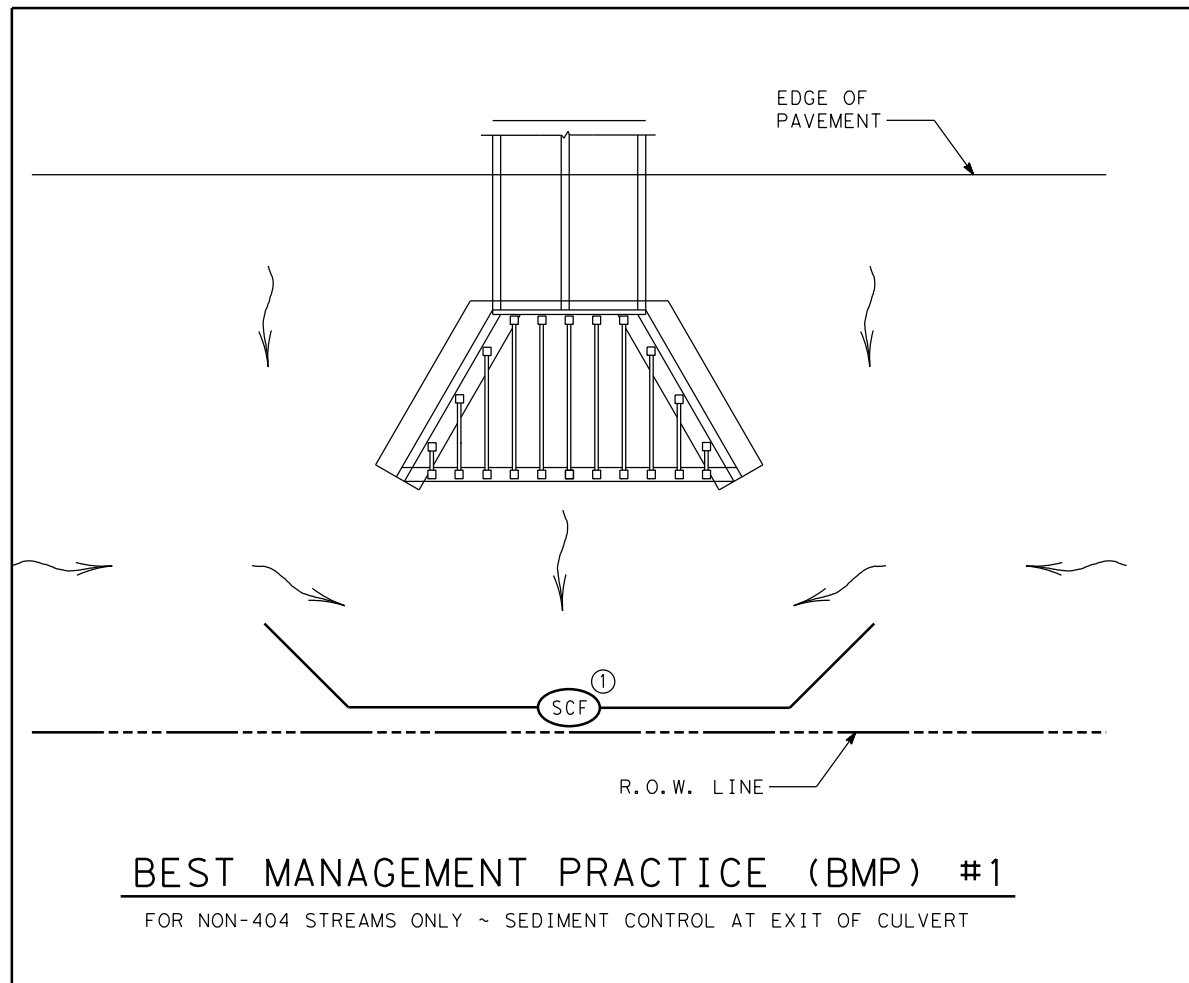
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Waco District Standard

TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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	SEDIMENT CONTROL FENCE
	ROCK FILTER DAM (TY 2)
	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

- NOTES:
- ① EXTEND SILT FENCE SO STORM WATER DOES NOT GO AROUND THE ENDS. USE L-HOOKS ON ENDS AS REQUIRED.
 - ② EXTEND ROCK FILTER DAM SO STORM WATER DOES NOT GO AROUND THE ENDS.

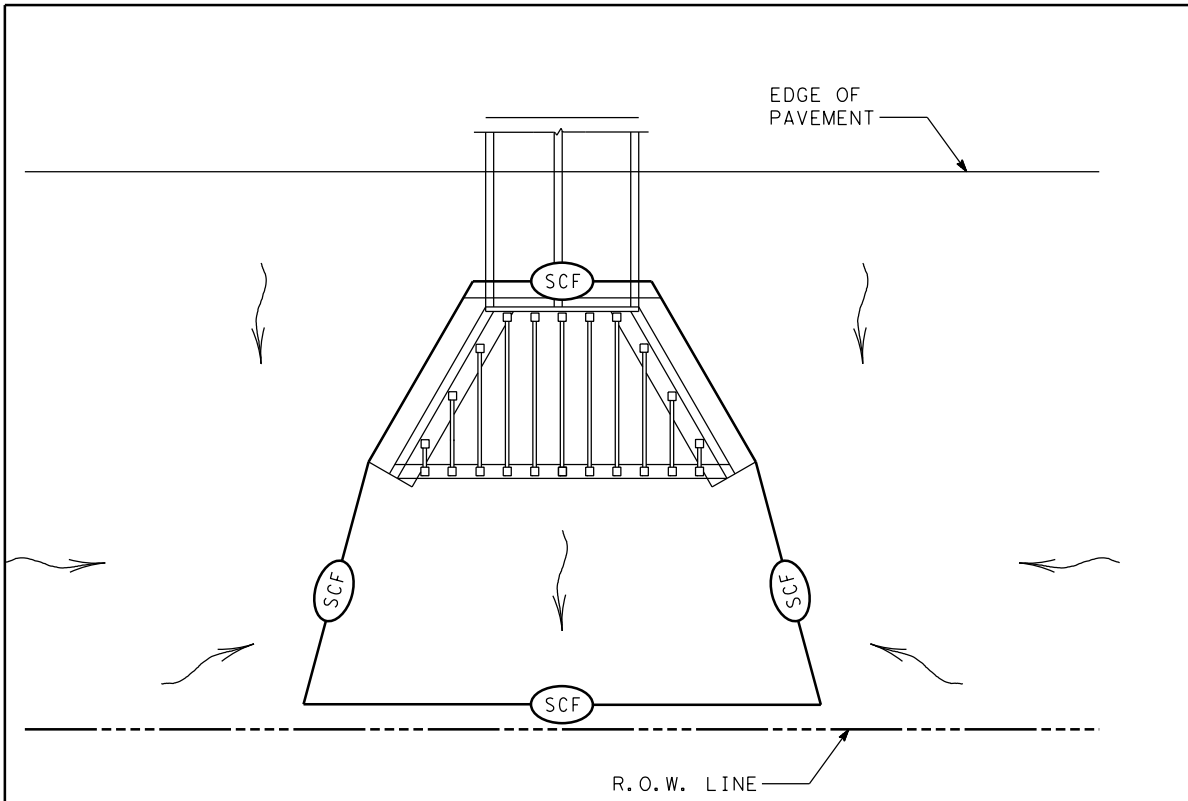
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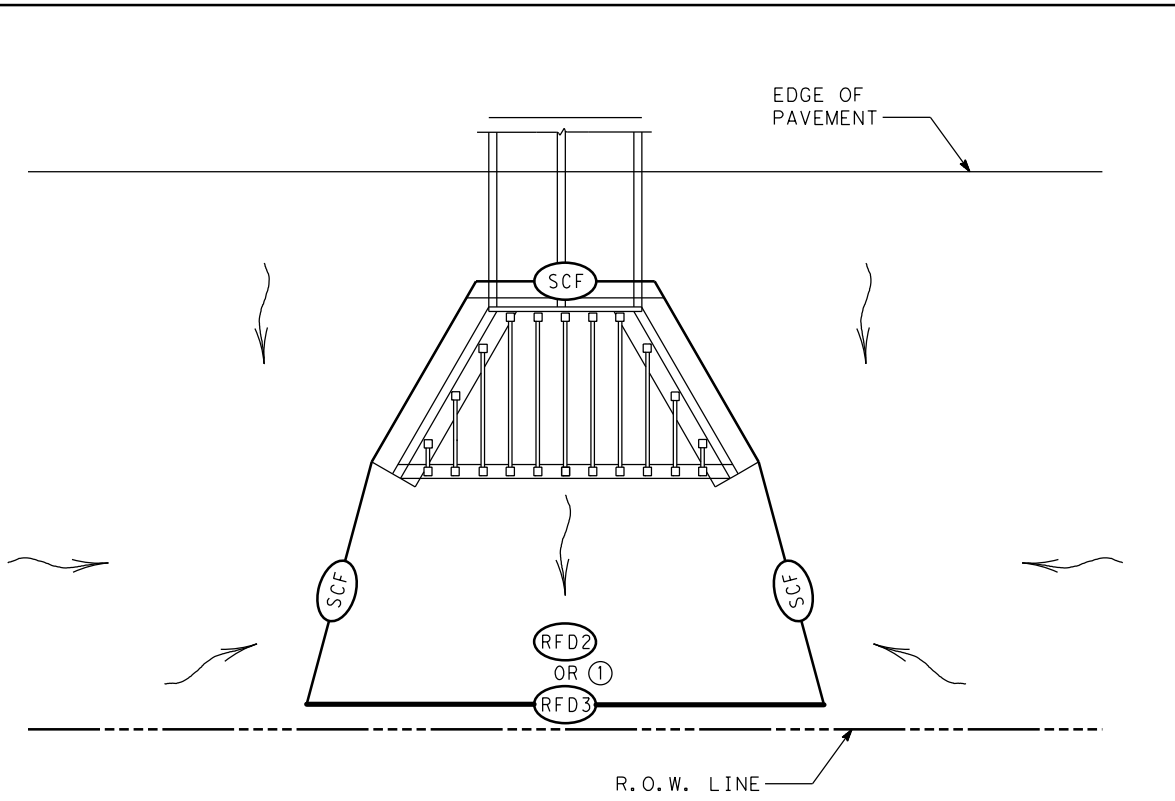
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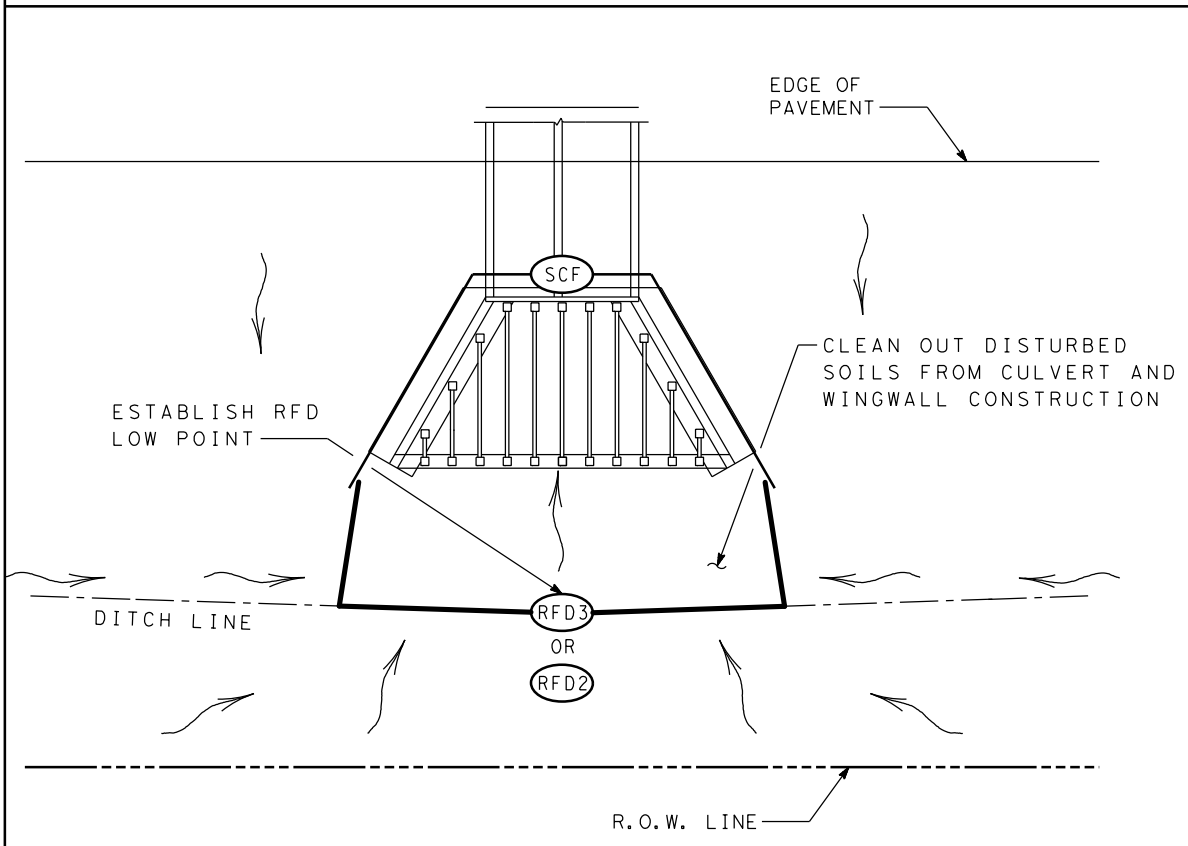
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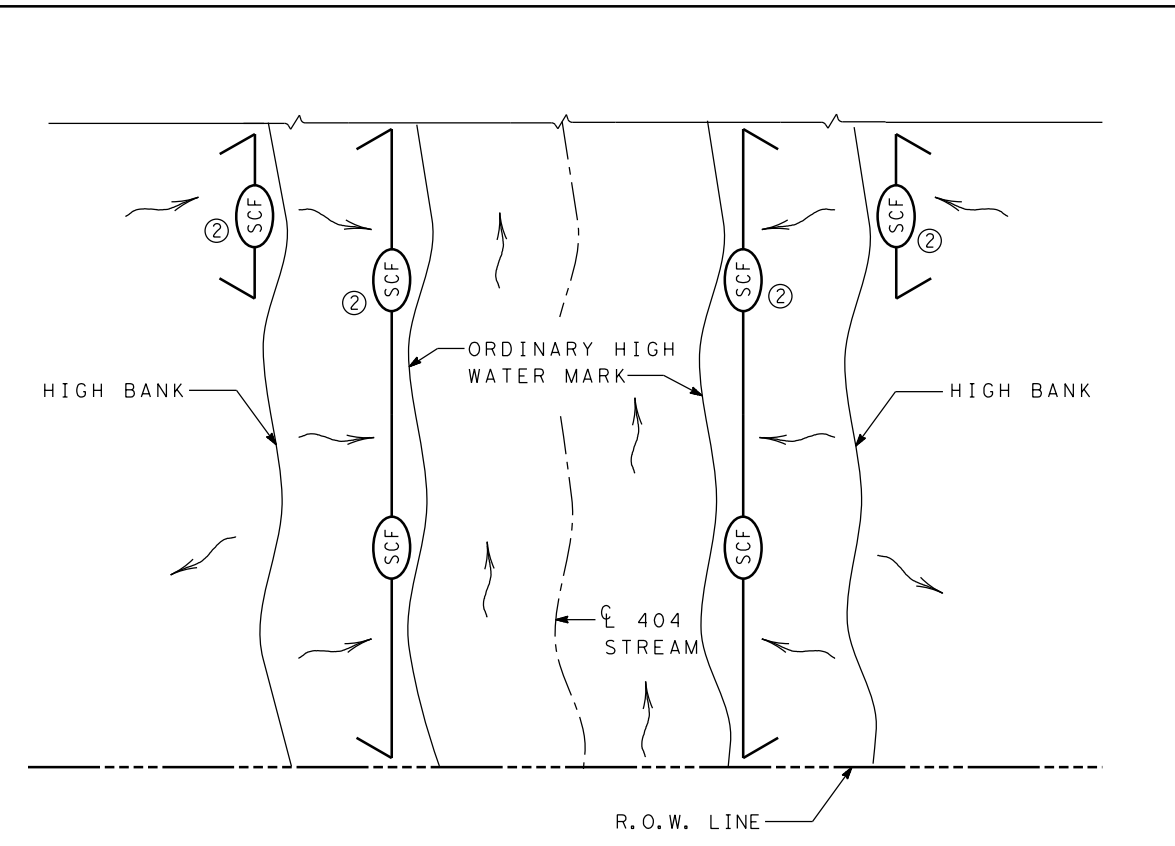
BEST MANAGEMENT PRACTICE (BMP) #5
FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #6
FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT EXIT OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #7
FOR NON-404 STREAMS ONLY ~ SEDIMENT CONTROL AT ENTRANCE OF CULVERT



BEST MANAGEMENT PRACTICE (BMP) #8
FOR 404 STREAMS ~ SEDIMENT CONTROL DURING PROJECT CLEARING AND GRUBBING

	SEDIMENT CONTROL FENCE
	ROCK FILTER DAM (TY 2)
	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

- NOTES:
- ① PROVIDE OVERLAP OF SILT FENCE WITH ROCK FILTER DAM.
 - ② USE SILT FENCE L-HOOKS ON ENDS TO BLOCK STORM WATER SEDIMENT

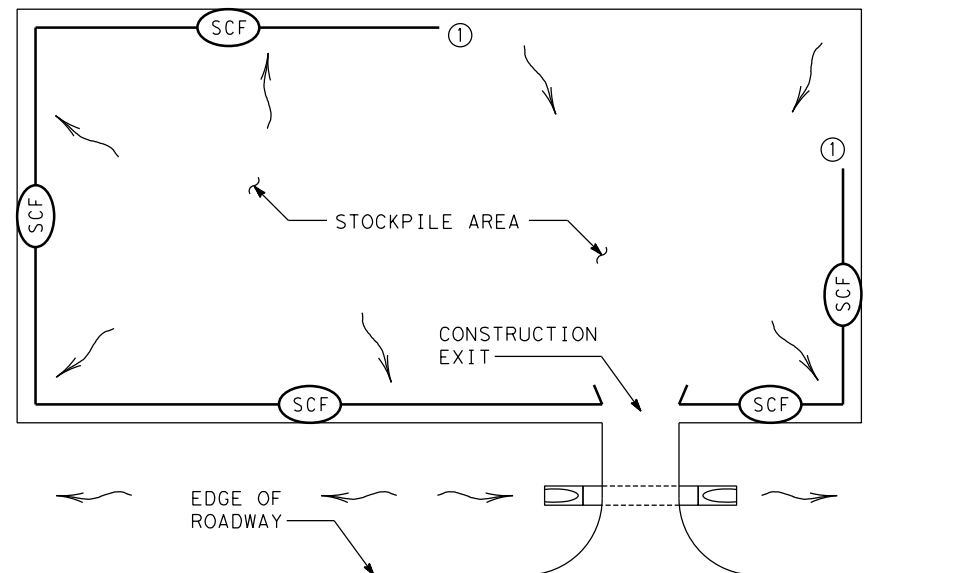
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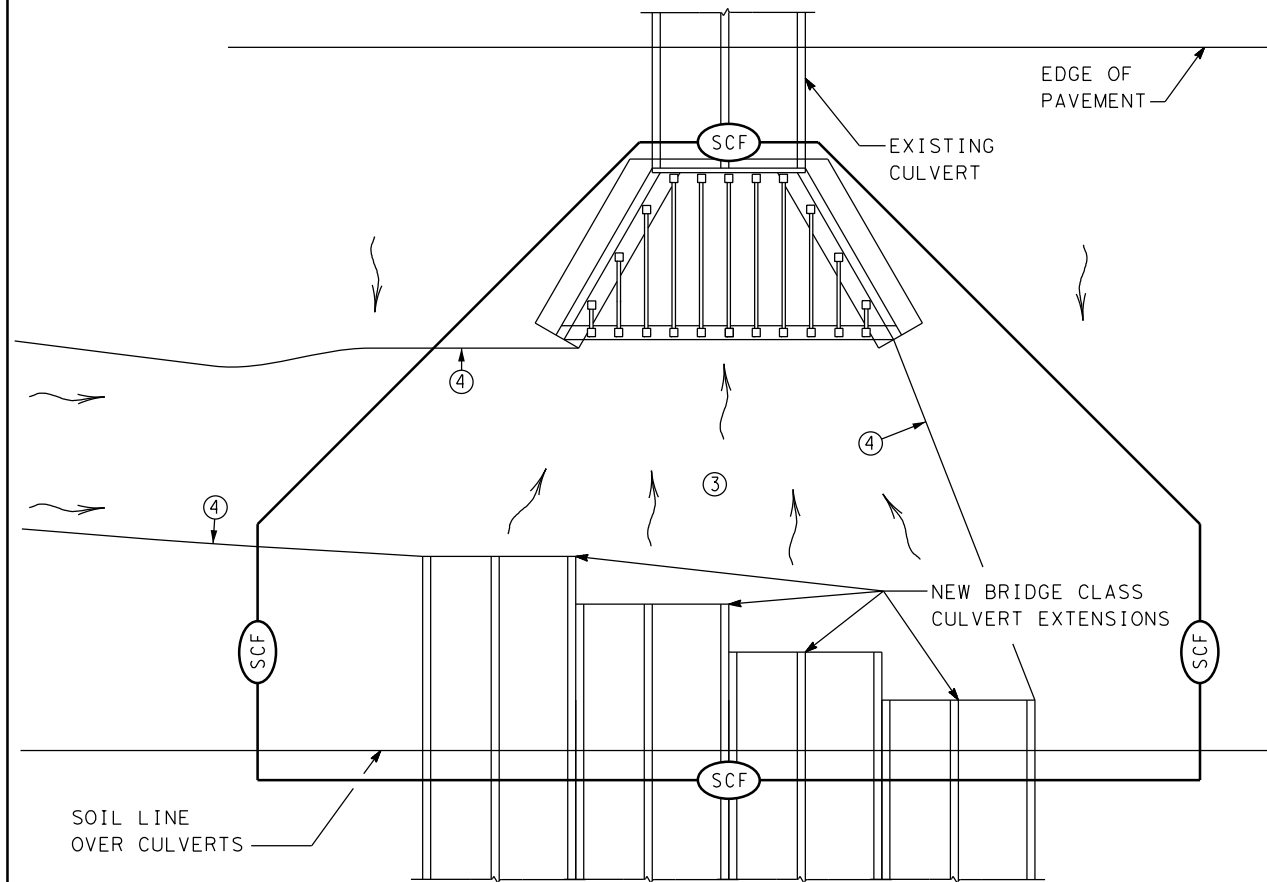
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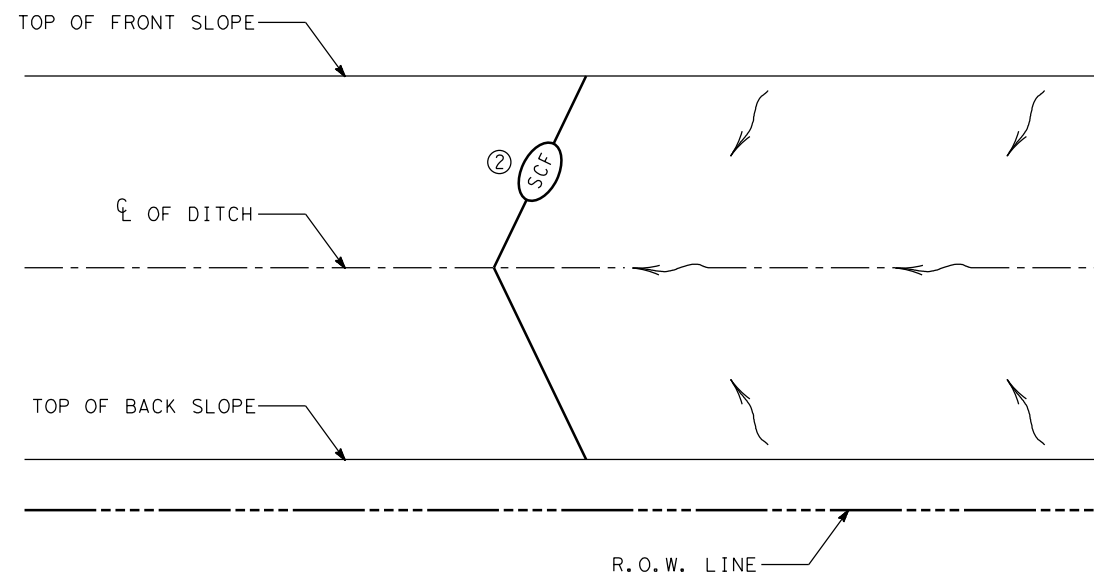
BEST MANAGEMENT PRACTICE (BMP) #9
STOCKPILE SEDIMENT CONTROL



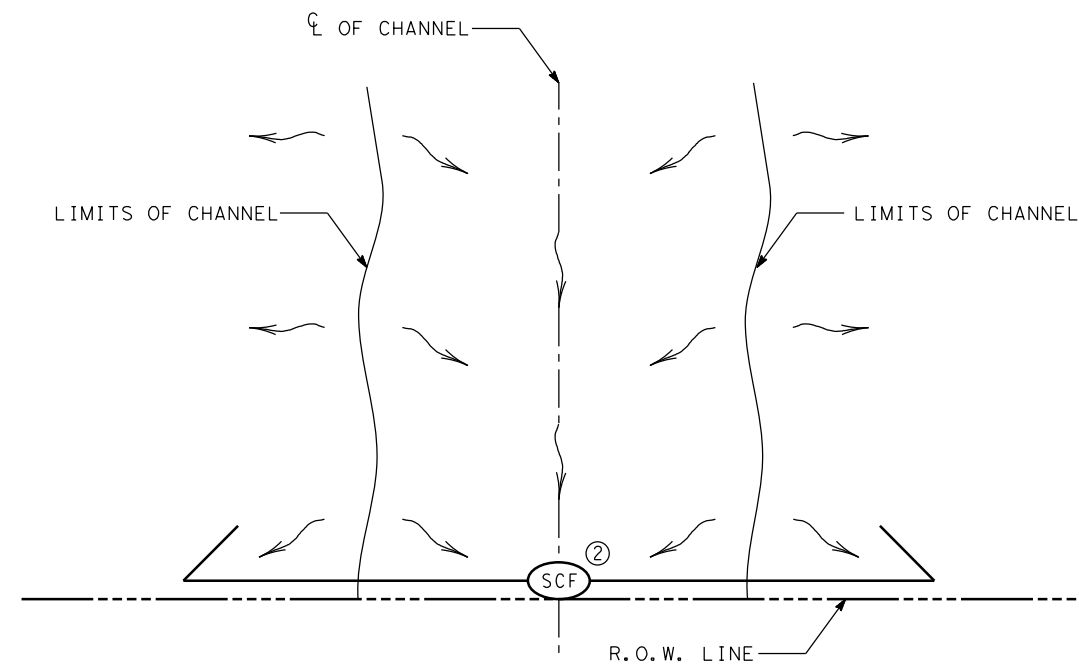
BEST MANAGEMENT PRACTICE (BMP) #10
FOR 404 OR NON-404 STREAMS ONLY ~
SEDIMENT CONTROL AT PHASED CONSTRUCTION OF BRIDGE CLASS CULVERTS

	SEDIMENT CONTROL FENCE
	ROCK FILTER DAM (TY 2)
	ROCK FILTER DAM (TY 3)
	DIRECTION OF FLOW

- NOTES:
- START SEDIMENT CONTROL AT LOCATION SO ALL STORM WATER WITH SEDIMENT IS COLLECTED
 - ROCK FILTER DAMS OR EARTH/GRASSED EMBANKMENTS CAN BE SUBSTITUTED AS DIRECTED.
 - PROVIDE A SMOOTH TRANSITION FROM THE INVERT ELEVATIONS BETWEEN CULVERTS. REMOVE LOOSE SOIL FROM EXCAVATED AREA BETWEEN CULVERTS.
 - PROVIDE AND INSTALL PNEUMATICALLY PLACED CONCRETE ON THE DITCH BOTTOM AND SIDE SLOPES BETWEEN TEMPORARY TERMINATIONS BETWEEN OLD AND NEW CULVERTS. PNEUMATICALLY PLACED CONCRETE WILL BE PLACED TO THE HEIGHT OF THE LARGEST CULVERT ON THE DITCH SIDE SLOPES; AND TO A LIMIT 10 FEET OUTSIDE THE LOCATION OF BMPs ALONG THE DITCH BOTTOM. CEMENT STABILIZED SAND MAY BE SUBSTITUTED FOR PNEUMATICALLY PLACED CONCRETE, IN AREAS WHERE INSTALLATION WORKS AND AT THE OPTION OF TXDOT.



BEST MANAGEMENT PRACTICE (BMP) #11
BOUNDARY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED UP SLOPE



BEST MANAGEMENT PRACTICE (BMP) #12
BOUNDARY SEDIMENT CONTROL ~ BOTH ENDS OF CONTROL TERMINATED DOWN SLOPE

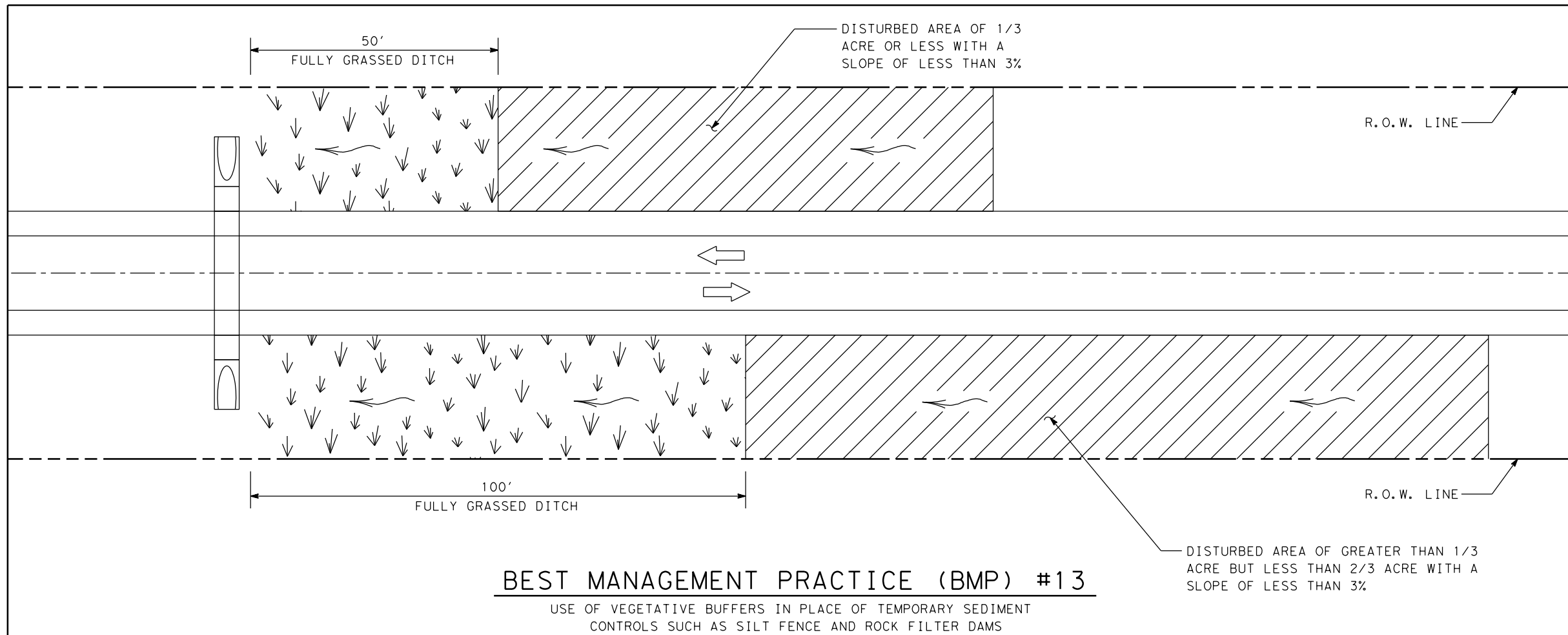
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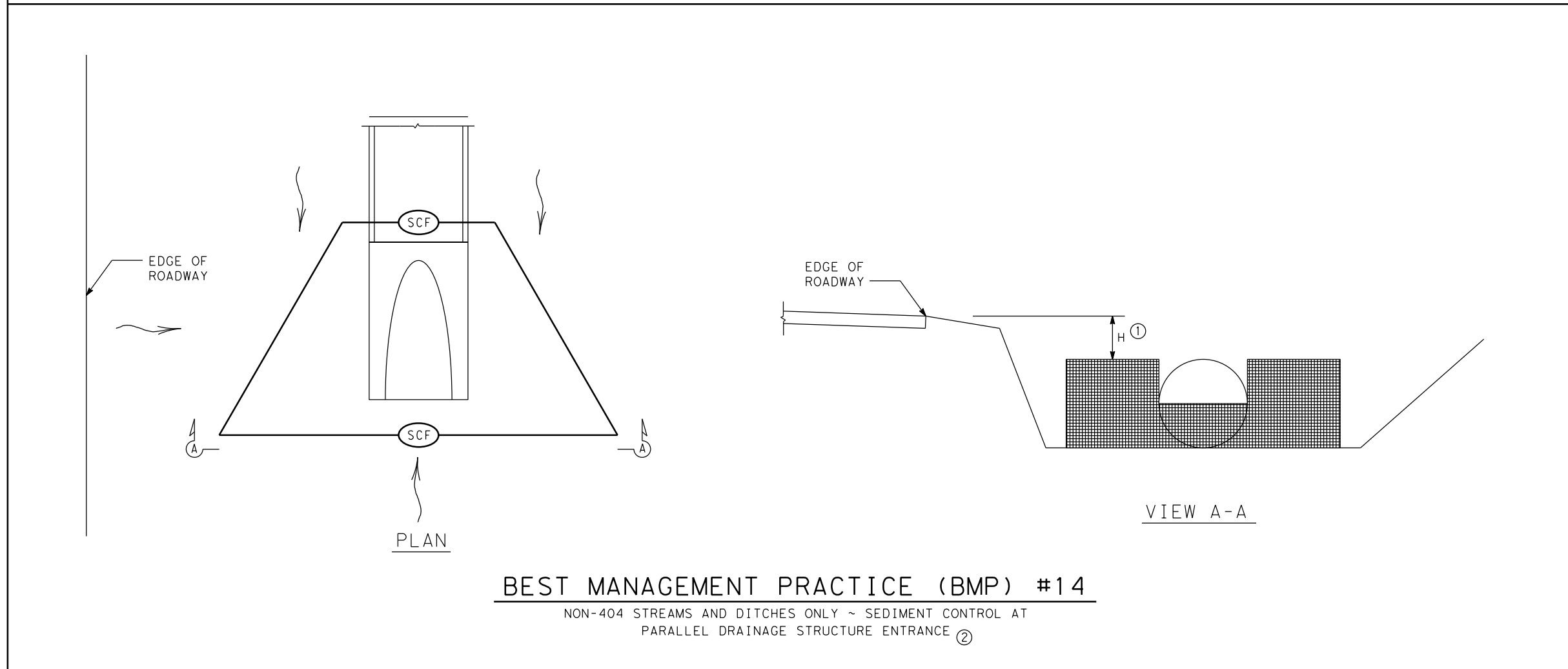
BEST MANAGEMENT PRACTICE (BMP) #13

USE OF VEGETATIVE BUFFERS IN PLACE OF TEMPORARY SEDIMENT CONTROLS SUCH AS SILT FENCE AND ROCK FILTER DAMS

DISTURBED AREA OF GREATER THAN 1/3 ACRE BUT LESS THAN 2/3 ACRE WITH A SLOPE OF LESS THAN 3%

	FULLY GRASSED DITCH
	DISTURBED AREA
	DIRECTION OF FLOW
	SEDIMENT CONTROL FENCE

- ① FOR H DIMENSIONS LESS THAN 1.5' SILT FENCE MAY NEED TO BE NOTCHED AS SHOWN IN VIEW A-A. ADD EXTRA POSTS AT NOTCH.
- ② BMP #14 MAY BE USED AT CROSS DRAINAGE STRUCTURES AS DIRECTED.



BEST MANAGEMENT PRACTICE (BMP) #14

NON-404 STREAMS AND DITCHES ONLY ~ SEDIMENT CONTROL AT PARALLEL DRAINAGE STRUCTURE ENTRANCE ②

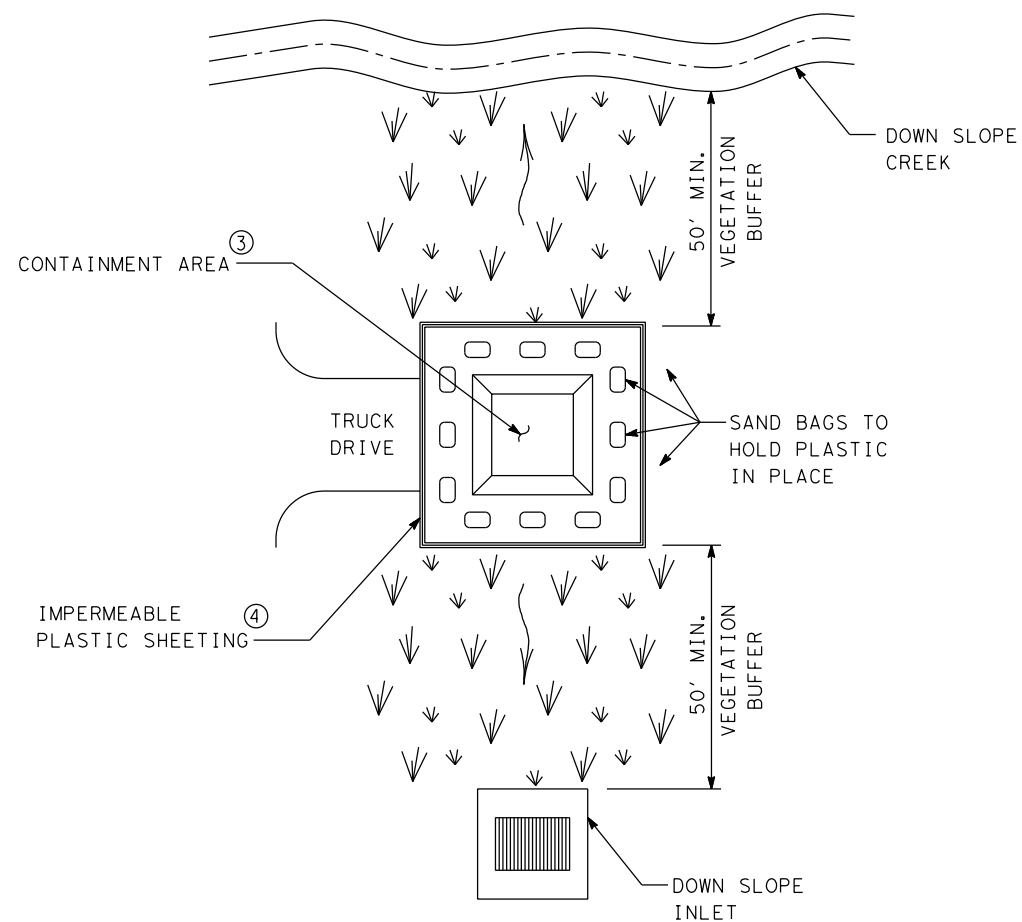
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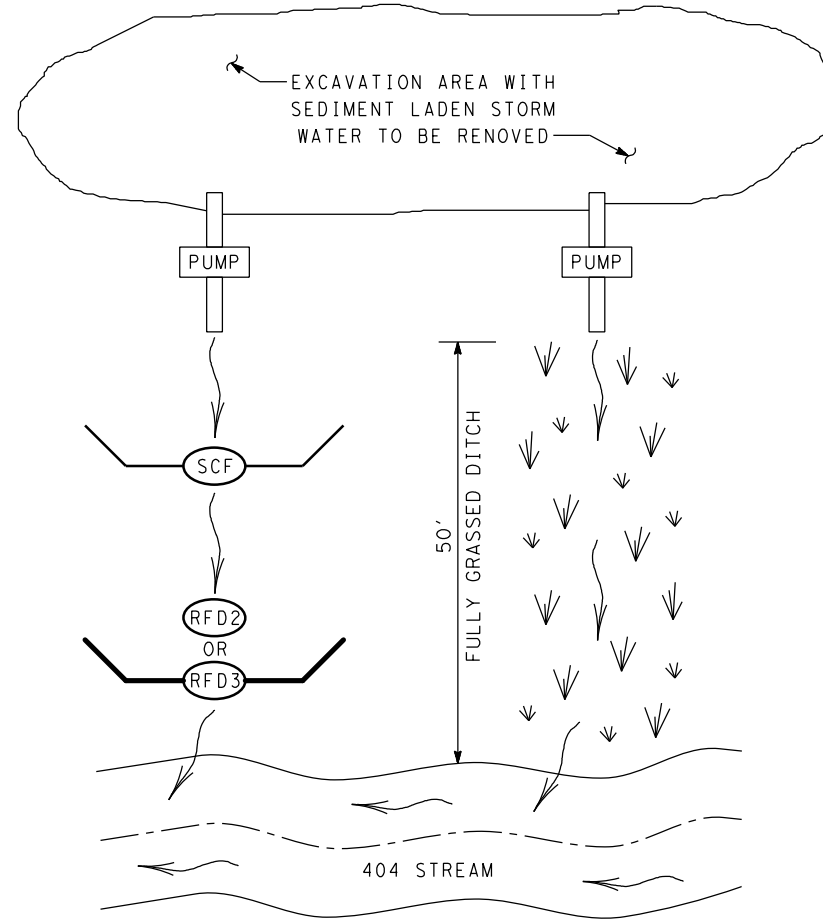
TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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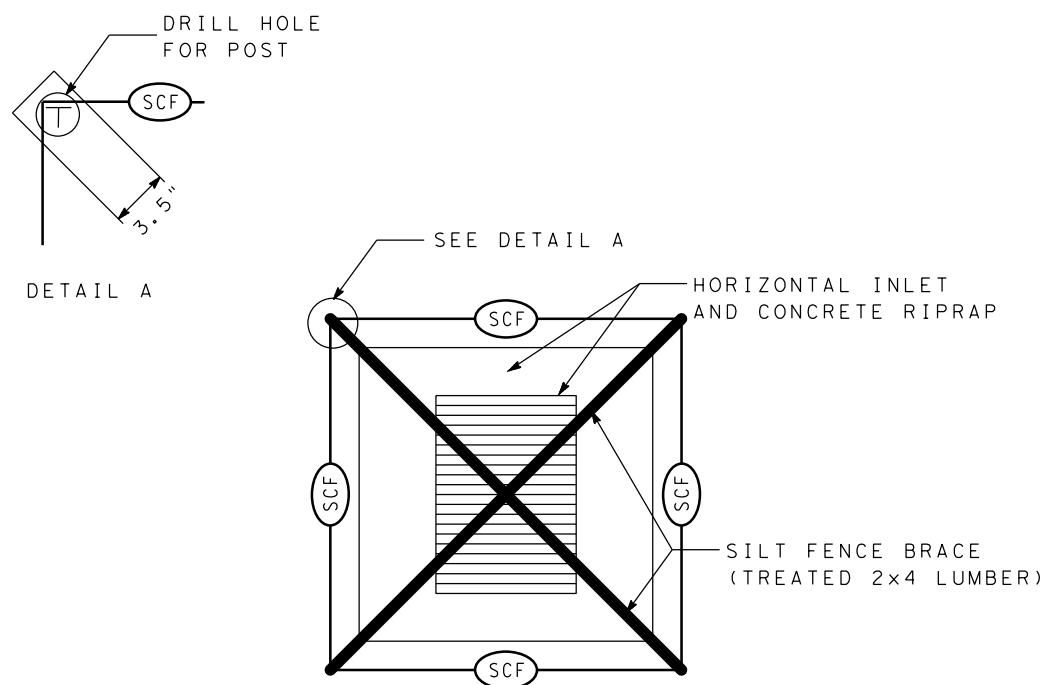
BEST MANAGEMENT PRACTICE (BMP) #15
CONCRETE TRUCK WASHOUT AREA



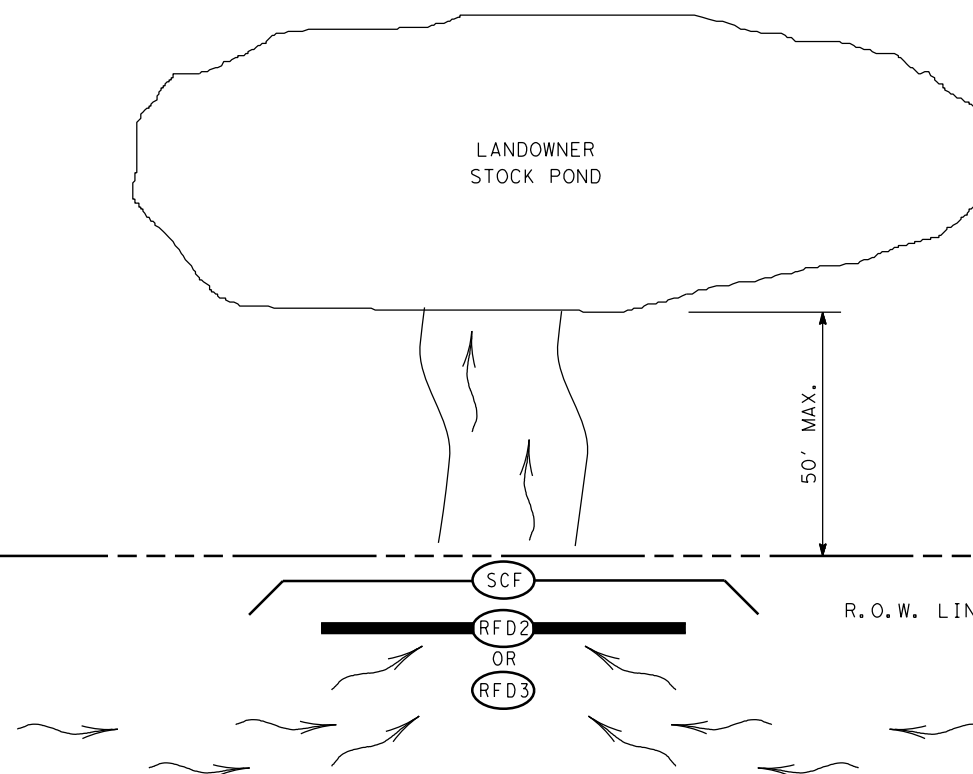
BEST MANAGEMENT PRACTICE (BMP) #16
PUMPED STORM WATER SEDIMENT CONTROLS ①

	FULLY GRASSED DITCH
	DIRECTION OF FLOW
	SEDIMENT CONTROL FENCE
	ROCK FILTER DAM (TY 2)
	ROCK FILTER DAM (TY 3)

- ① PUMPED STORM WATER FROM AN EXCAVATION AREA SHOULD BE DISCHARGED IN A 50' VEGETATIVE BARRIER OR THROUGH TWO TEMPORARY SEDIMENT CONTROLS BEFORE ENTERING A 404 STREAM.
- ② FOR LANDOWNER STOCKPONDS WITHIN 50' OF THE RIGHT OF WAY LINE, PROVIDE REDUNDANT SEDIMENT CONTROLS AT THE CONVEYANCE OF THE POND. MINIMUM OF TWO SEDIMENT CONTROLS.
- ③ WHEN CONTAINMENT AREA REACHES 1' FREEBOARD, DISCONTINUE WASHOUT PLACEMENT AND REMOVE MATERIAL UPON SOLIDIFICATION.
- ④ EACH TIME SOLIDIFIED MATERIAL IS REMOVED REPLACE PLASTIC SHEETING.



BEST MANAGEMENT PRACTICE (BMP) #17
HORIZONTAL INLET SEDIMENT CONTROL



BEST MANAGEMENT PRACTICE (BMP) #18
LANDOWNER STOCKPOND SEDIMENT CONTROL ②

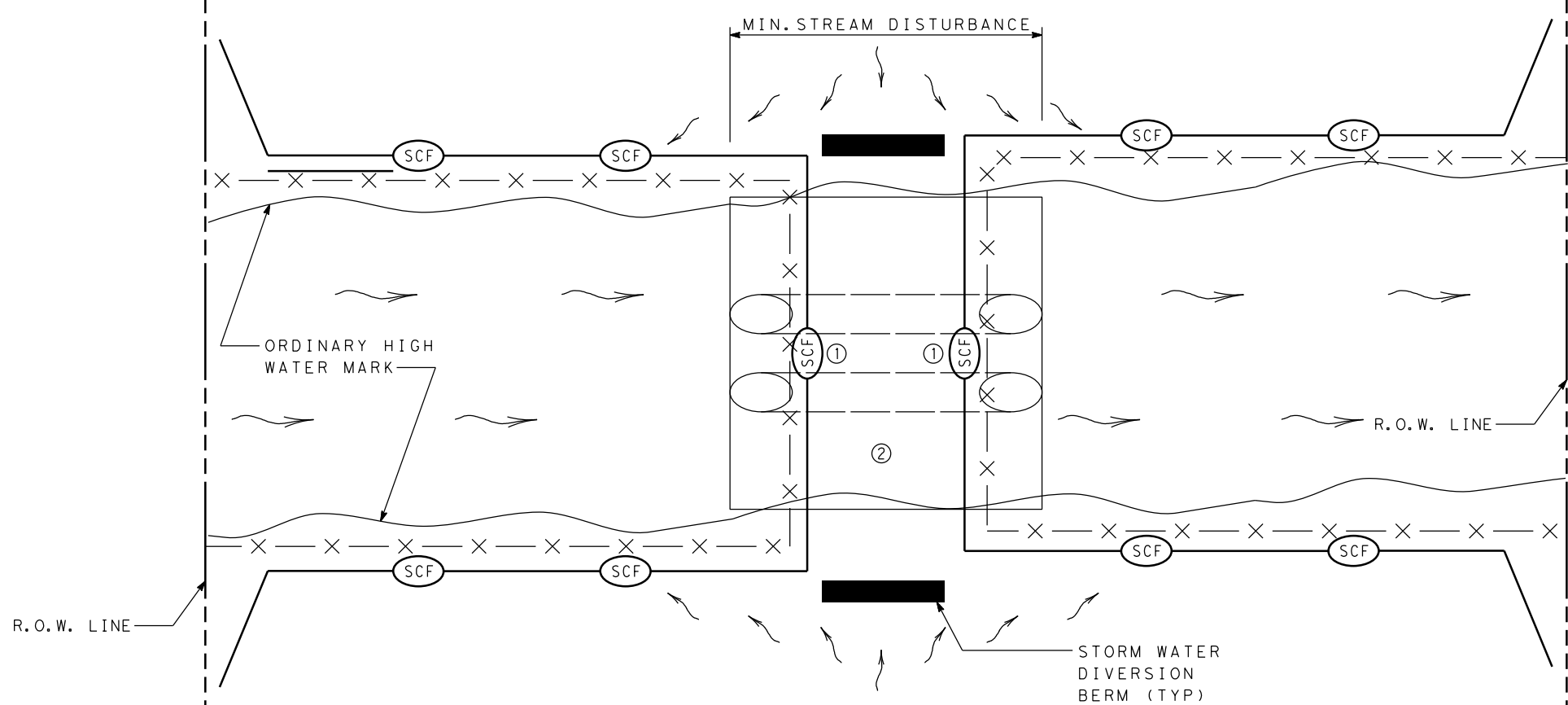
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TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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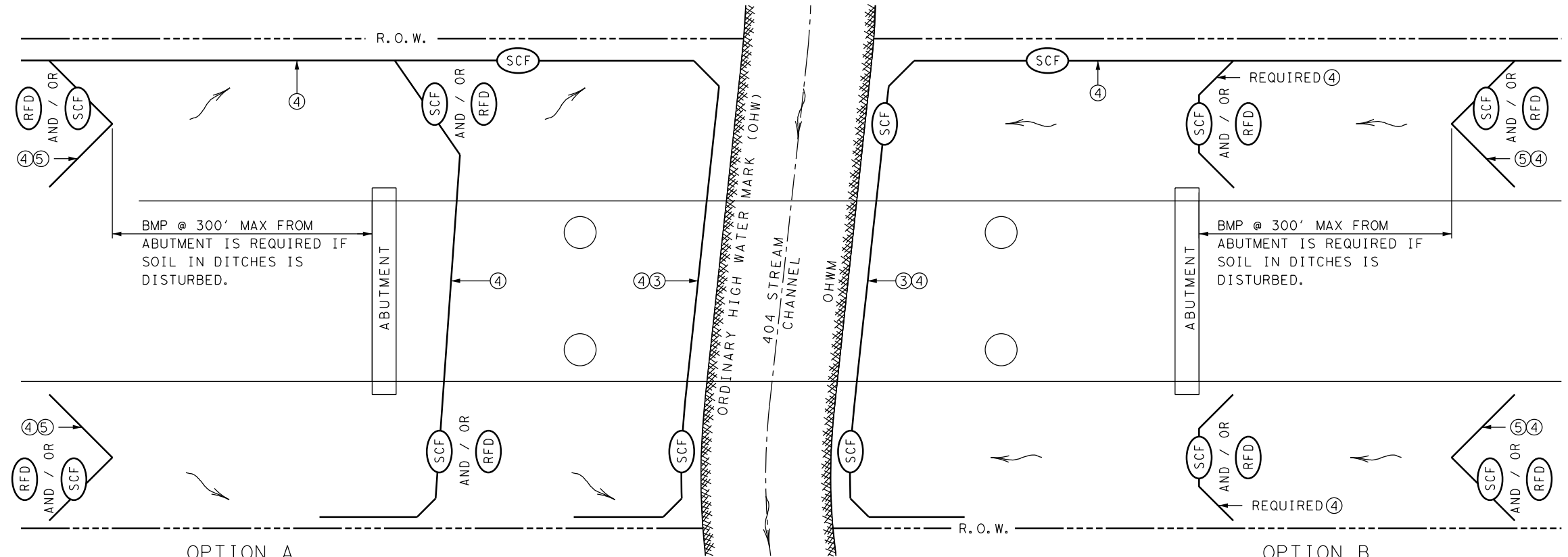
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BEST MANAGEMENT PRACTICE (BMP) #19
TYPICAL 404 STREAM CROSSING (SEDIMENT CONTROL AT CROSSING)

	DIRECTION OF FLOW
	SEDIMENT CONTROL FENCE
	ROCK FILTER DAM
	SECURITY FENCING

- ① HAY BALES MAY BE SUBSTITUTED FOR SILT FENCE OVER THE STREAM CROSSING.
- ② CROSSING WILL BE AS PER REQUIREMENTS OF THE WATERS OF THE US GENERAL NOTES.
- ③ INSTALL SILT FENCE SLIGHTLY UP FROM OHW MARK FROM R.O.W. TO R.O.W.
- ④ USE SILT FENCE L-HOOKS ON LEVEL OR DOWN SLOPING ENDS TO BLOCK STORM WATER SEDIMENT
- ⑤ INSTALL LARGE V OR U SHAPED BMP'S FROM ABUTMENT AS SHOWN. IF THERE IS STEEP DITCH CONDITIONS DECREASE SPACING AND CONSIDER RFD'S. ADD ADDITIONAL BMP'S IF GRADE IS STEEP OR IF FLOW IS HIGH.



BEST MANAGEMENT PRACTICE (BMP) #20
FOR 404 STREAMS ~ BMP'S AT BRIDGES

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TYPICAL APPLICATIONS FOR BEST MANAGEMENT PRACTICES

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