INDEX OF SHEETS

SEE SHEET NO. 2

FUNCTIONAL CLASS = N/A
TERRAIN = N/A
DESIGN SPEED = N/A

FEDERAL-AID PROJECT NUMBER			
F 2B24(130)			
CONT	SECT	JOB	HIGHWAY
0907	00	229, ETC	RM 584
DIST	COUNTY		SHEET NO.
SJT	TOM GREEN		1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT F 2B24(130)

RM 584, SH 158, AND US 277
TOM GREEN AND COKE

NET LENGTH OF PROJECT
ROADWAY = 7600 FT = 1.44 MI
BRIDGE = 120 FT = 0.02MI
TOTAL = 7720 FT = 1.46 MI

LIMITS: VARIOUS LOCATIONS IN SAN ANGELO DISTRICT

FOR THE CONSTRUCTION OF CURB RAMPS, SIDEWALKS,
PEDESTRIAN BRIDGE, AND MISCELLANEOUS PEDESTRIAN ELEMENTS

FINAL PLANS

Letting Date: _____

Name of Contractor: _____

Date Work Began: _____

Date Work Completed: _____

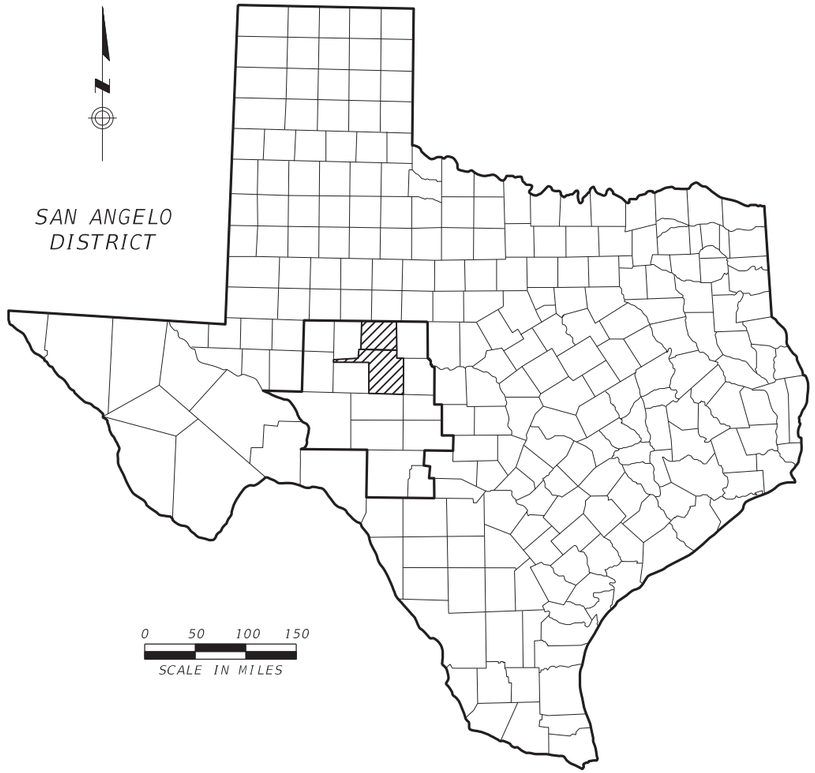
Date Work Accepted: _____

Final Contract Cost: _____

Project was built according to the Plans & Specifications.
These final plans reflect the work done and the quantities shown thereon and on the Final Estimate are Final Quantities.

Area Engineer Date

Summary of Change Orders:



Registered Accessibility Specialist (RAS) inspection required

TDLR PROJECT NO. TABS2024011240

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, OCTOBER 23, 2023).

EXCEPTIONS
NONE

EQUATIONS
NONE

RAILROAD CROSSINGS
NONE

2023 Texas Department of Transportation

SUBMITTED FOR LETTING: 4/5/2024
DocuSigned by:
Nicholas Greenly
DDF89C6522AF49E...
District Design Engineer

RECOMMENDED FOR LETTING: 4/5/2024
DocuSigned by:
826185212F51427...
District Director of TP&D

APPROVED FOR LETTING: 4/5/2024
DocuSigned by:
BC10B17FA709437...
District Engineer

Kimley»Horn F-928

SUBMITTED FOR LETTING:

Consultant Engineer

DATE: 4/3/2024 5:04:15 PM
FILE: $FILE1$

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4/4/2024

STATE OF TEXAS
HIRON M. FERNANDO
123288
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE WITH AN *** HAVE BEEN ISSUED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

4/4/2024

STATE OF TEXAS
YAN G. LINWOOD
131665
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE WITH AN ** HAVE BEEN ISSUED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

4/4/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE WITH AN * HAVE BEEN ISSUED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Kimley»Horn F-928

Texas Department of Transportation

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6		RM 584

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CONT.	SECT.	JOB	2
0907	00	229,ETC	

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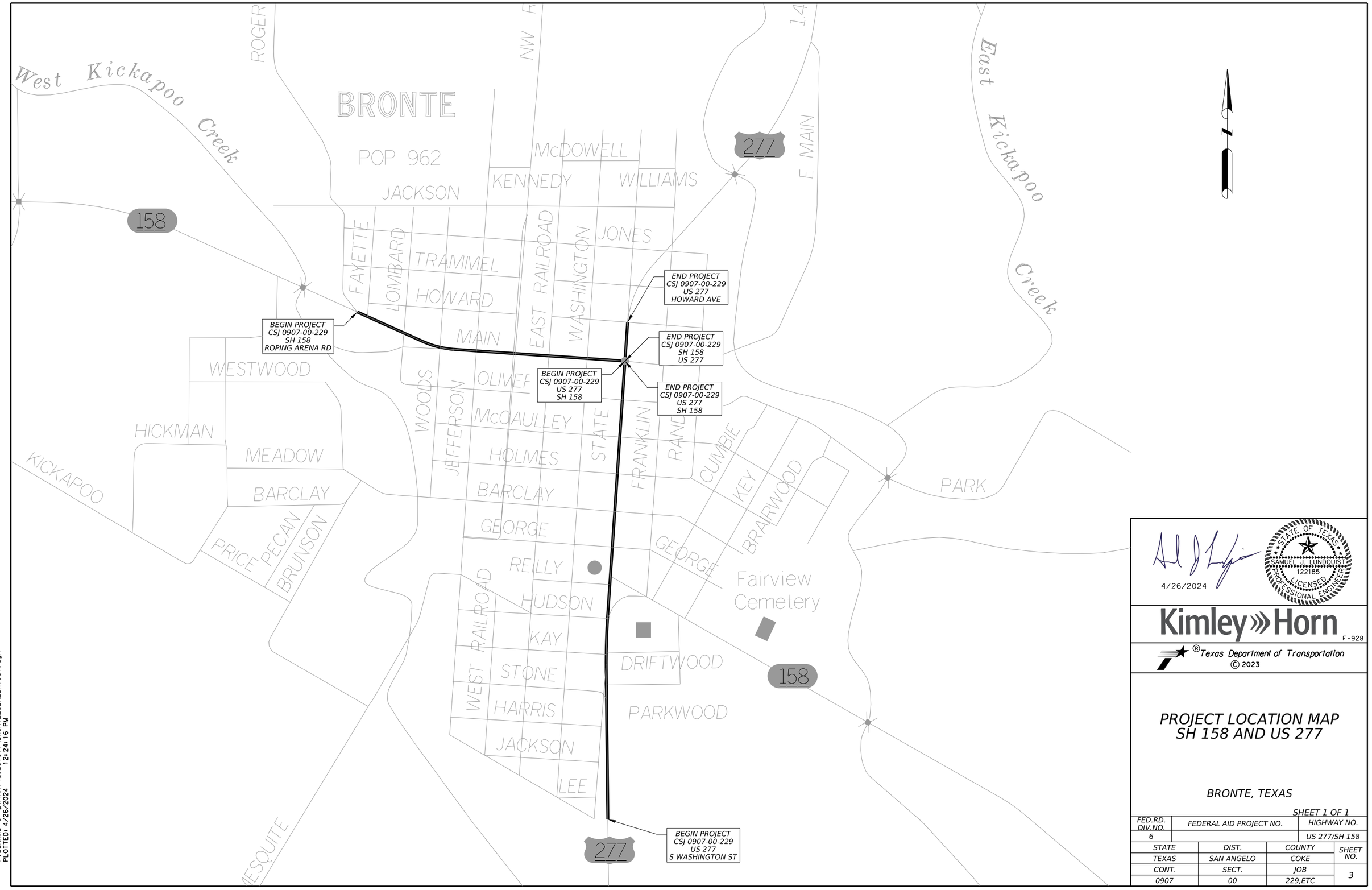

4/26/2024

SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

Kimley»Horn F-928

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PROJECT LOCATION MAP
SH 158 AND US 277

BRONTE, TEXAS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277/SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	3
0907	00	229,ETC	

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4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
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PROJECT LOCATION MAP
RM 584

SAN ANGELO, TEXAS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	4
0907	00	229,ETC	

GENERAL NOTES

The following Standard Sheets have been modified: RW(MSE)

Locate the project bulletin board at an approved location within the project limits such as at a field office, staging area, or stockpile, and make accessible to the public at all times. Do not remove the bulletin board from the project until approved. If a construction site notice is required for the project, post a copy at each geographically separated work location.

In those instances where fixed features require, vary the governing slopes indicated in these plans from within the limits to the extent determined.

If Contractor elects to establish a pit within 200 ft. of a public road, construct a barrier or other device in accordance with Natural Resources Code, Chapter 133, and Section 133.041.

Do not use salt water with solids in excess of 10,000 parts per million, as determined by evaporation.

Contractor questions on this project are to be addressed by the following individual:

Jordan Sefcik, P.E.; email Jordan.Sefcik@txdot.gov and Alfredo Luera, P.E.; email Alfredo.Luera@txdot.gov

Contractor questions will be accepted through email, phone, and in person by the above individuals.

Questions may 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.

A copy of the 3D model or cross-sections and earthwork data may be obtained by qualified bidders by sending a request to the following set of email addresses:

San Angelo Area Office:

Jordan Sefcik, P.E. and Alfredo Luera, P.E.; emails Jordan.Sefcik@txdot.gov and Alfredo.Luera@txdot.gov

County: Tom Green **Sheet:** 5

Highway: RM 584/US 277/SH 158 **Control:** 0907-00-229,ETC.

Data as provided is for non-construction purposes only and it is the responsibility of the prospective bidder to validate this information with the appropriate plans and Specifications.

Item 5, "Control of the Work"

State Highway right of way markers destroyed by the Contractor shall be replaced by a Texas Registered Professional Land Surveyor (RPLS) at no cost to the State. Provide written documentation from the RPLS attesting to the replacement of the right of way markers.

Make suitable advance notification to affected non-participating municipalities regarding Class B underground facilities, call the Department's San Angelo District Traffic Office at telephone number (325) 947-9208 to have the Department's existing traffic signal and illumination utilities located, and call the Department's San Angelo District Maintenance Office at telephone number (325) 947-9322 to have the Department's existing irrigation utilities located.

Responsibility for construction surveying shall conform to Section 5.9.3., "Method C."

Submit shop drawings electronically for the fabrication of structural items and other items specifically listed in the plans to SJT_ShopPlanReview@txdot.gov. For instructions on submitting shop drawings electronically see "Guide to Electronic Shop Drawing Submittal" at http://www.txdot.gov/business/resources/specifications/shop-drawings.html.

Item 6, "Control of Materials"

When allowed, store materials and equipment in approved areas within the right of way.

Access the work area from the right of way.

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.

Item 7, "Legal Relations and Responsibilities"

No significant traffic generator events have been identified.

Item 8, "Prosecution and Progress"

Submit the sequence of work and estimated progress schedule on paper or as a Portable Document Format (PDF) electronic file compatible with Adobe Systems Incorporated "Acrobat Reader XI".

A delayed start provision is included in the contract to allow time to procure construction materials including precast bridge beams and precast drainage components.

Item 9, "Measurement and Payment"

The progress payment period shall end two working days before the last working day of the month. Deliver invoices to be paid as material on hand on or before the end of the progress payment period.

For projects that include a disadvantaged business enterprises (DBE) goal, provide a conversion rate for units of payment for work subcontracted to DBE if units of payments differ from those shown on the plans.

Item 132, "Embankment"

Furnish Type C material that meets the requirements of the following table:

Grading Requirements Cumulative % Retained On Square Sieves						Soil Constants		Bar Linear Shrinkage
3"	2"	7/8"	3/8"	No. 4	No. 40	L.L. Max	P.I. Max	

Item 134, "Backfilling Pavement Edges"

Apply emulsified asphalt mixture in accordance with Item 314, "Emulsified Asphalt Treatment". Provide MS-2, MC-30 or AE-P asphalt.

For Type B backfill, blade the existing vegetation from the pavement edges prior to placement of final asphalt concrete pavement. Windrow and incorporate this material into the backfill after placing asphalt concrete pavement. Reclaimed asphalt pavement (RAP) salvaged from this project may be used to backfill pavement edges.

Item 204, "Sprinkling"

Apply water for dust control to un-surfaced bases during the work day, at the end of each work day, and on non-work days as directed.

County: Tom Green **Sheet:** 5A

Highway: RM 584/US 277/SH 158 **Control:** 0907-00-229,ETC.

Item 247, "Flexible Base"

Stockpile flexible base produced for this project separately from any other stockpiled material and label stockpile with project number, material type, and grade.

Place flexible base in lifts of 8 in. maximum.

Provide 24 hours written notice of intent to begin crushing operations. Materials produced prior to this notice will not be accepted.

Furnish Grade 4 material that meets the requirements of the following table:

Master gradation sieve size (% retained)					Soil Constants		Wet Ball Mill Max
1 3/4"	7/8"	3/8"	No. 4	No. 40	L.L. Max	P.I. Max	

Notes: Triaxial requirement is Classification __ as tested in accordance with Tex-117-E.

Minimum compressive strength required is __ psi at __ psi lateral pressure as tested in accordance with Tex-117-E.

The maximum increase in material passing the number 40 sieve resulting from the wet ball mill test is __ as tested in accordance with Tex-116-E.

Compact using ordinary compaction.

Item 310, "Prime Coat"

If planing operations expose base material:

1. Refinish exposed base material in accordance with Item 251, Type D. This work will not be measured or paid for separately, but will be considered as included in payment for Item 310.
2. Place prime coat on refinished base material in accordance with Item 310.
3. Place one-course seal coat on primed base material in accordance with Item 316.

Refinish material that does not receive prime coat within one working day following acceptance of flexible base.

Item 314, "Emulsified Asphalt Treatment"

Apply a 2.5 ft. wide strip of emulsified asphalt at a total rate of 0.80 gallons per square yard as an edge seal along each pavement edge. Lap the pavement edge seal onto the pavement a maximum of 6 in. Dilute the emulsion 3 parts water (0.60 gallons per square yard) to 1 part asphalt (0.20 gallons per square yard). Residual asphalt rate is 11.11 gallons per station of roadbed.

Item 316, "Seal Coat"

Cure the first surface treatment course a minimum of 5 days before placing the second course.

If cutback asphalt is used for the first surface treatment course, a minimum of 7days curing time shall be required before placing the second course. The Department will assume interim maintenance of the first course during the curing period provided that other items of work including clean-up have been completed as directed.

Cover or protect the following, as applicable: railings, bridge joints, utility covers, railroad crossings, and exposed concrete such as curbs, bridge approach slabs, bridge decks, sidewalks, mow strips, and concrete pavement.

Do not place wet aggregate.

Use medium pneumatic rollers that meet the requirements of Item 210, "Rolling." If traprock aggregate is used, the Engineer may require steel wheel rollers.

Item 320, "Equipment for Asphalt Concrete Pavement"

Provide production equipment that ensures a uniform continuous production rate of at least 150 tons per hour.

A Type D Structure is not required.

Item 340, "Dense-Graded Hot-Mix Asphalt (Small Quantity)", Item 3076, "Dense-Graded Hot-Mix Asphalt", Item 3077, "Superpave Mixtures"

Liquid antistripping agents are not allowed.

Do not dump and reload hot mix asphalt into a material transfer device, truck, or asphalt paver using a front-end loader.

Should the paving operation stop three times in one day due to equipment malfunction or mixture flow interruption, the Engineer may require the Contractor to immediately suspend operations until the next working day.

Hauling equipment is subject to weight verification.

Substitute PG binder is not allowed.

Unless otherwise approved, do not pave during the months of December, January, and February.

Apply tack coat at a total rate of 0.09 gallons per square yard. Dilute the emulsion 1 part water (0.03 gallons per square yard) to 2 parts asphalt (0.06 gallons per square yard). Residual asphalt rate is 0.06 gallons per square yard.

County: Tom Green **Sheet:** 5B

Highway: RM 584/US 277/SH 158 **Control:** 0907-00-229,ETC.

Item 400, "Excavation and Backfill for Structures"

If excavating beyond the dimensions shown on the plans, furnish and install cement stabilized backfill in such areas at no cost.

Use Class C bedding.

Item 421, "Hydraulic Cement Concrete"

Provide sulfate-resistant concrete (containing Type II cement) for all concrete identified as structural concrete in Table 8, except for the following: bridge railing, approach slabs, concrete traffic barrier, prestressed concrete panels, Class H concrete, and Class S concrete.

Entrained air is required in all slip formed concrete, but is not required for other structural concrete. Adjust the dosage of air entraining agent for low air content as directed by the Engineer. If entrained air is provided where not required, only the upper limits of the applicable Special Provision will be enforced.

Provide only the following items listed in 421.3.3, "Testing Equipment": test molds and wheelbarrow.

Item 422, "Concrete Superstructures"

Item 427, "Surface Finishes for Concrete"

Provide rub finish to Surface Area III. Provide low-pressure water blast finish to Surface Area I, except for top and roadway faces of concrete railing and bridge wingwalls.

Item 429, "Concrete Structure Repair"

Maintain a complete paper copy of the TxDOT Concrete Repair Manual at each active location which requires work performed under this Item. This document is available as a free download from: http://onlinemanuals.txdot.gov/txdotmanuals/crm/crm.pdf.

Obtain approval of both damaged concrete removal and concrete surface preparation before placing repair materials.

Item 432, "Riprap"

Furnish and install 1/2-in. thick joint filler board conforming to DMS-6310, "Joint Sealants and Fillers" between concrete riprap and adjacent existing concrete, and where directed.

Item 440, "Reinforcement for Concrete"

Reinforcing steel shall be epoxy-coated in bridge slabs, in top slabs of culverts that require Class S concrete, in bridge approach slabs, in concrete railings and in permanent concrete barriers.

Item 450, "Railing", Item 451, "Retrofit Railing", Item 512, "Permanent Concrete Traffic Barrier"

Furnish and install barrier reflectors on the top of concrete railing.

Obtain approval of drilled holes in existing concrete before placing anchor bars with epoxy.

Construct traffic and combination railings to increased heights to accommodate future overlay.

Existing slab bars are not epoxy coated.

Construct side slot drains at spacing as shown in the plans or as directed.

Item 451, "Retrofit Railing", Item 496, "Removing Structures", Item 542, "Removing Metal Beam Guard Fence"

Rail elements to be removed have metal components coated with lead-containing paint (hazardous materials). Remove these metal components by mechanical dismantling and/or by hydraulic cutting. Do not use a flame cutting torch or any other means that will produce fumes or will strip paint. Segregate these metal components from other construction waste and dispose of properly. Follow applicable safety standards. Only the following rail elements to be removed have metal components coated with lead-containing paint (hazardous materials): __

Item 458, "Waterproofing Membranes for Structures"

Where lengthening concrete box culverts, apply Type 10 waterproofing along the widening joint.

Item 496, "Removing Structures"

This item shall include the complete removal and proper disposal of existing structures, including but not limited to the following: culvert barrels, railing, wingwalls, headwalls, retaining walls, safety end treatments, pipe runners, riprap, deck, overlay, approach slabs, joints, beams, bracing, drains, conduits, pipes, bents, abutments, columns, pilings, footings, web-walls, drilled shafts, reinforcing steel, bridge protective assemblies, clearance signs, etc. Portions of the structure at least 2 ft. below the permanent ground line may be left in place as directed.

County: Tom Green **Sheet:** 5C

Highway: RM 584/US 277/SH 158 **Control:** 0907-00-229,ETC.

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.

Furnish regulatory speed limit signs. The Engineer will determine placement locations and will provide supervision to the Contractor in placing, removing and replacing these signs. The construction speed zones are as follows:

highway	begin reference marker	end reference marker	existing speed limit (mph)	work zone speed limit (mph)
SH 158			40	30
US 277			50	30
RM 584			40	30

Furnish and install regulatory speed limit signs at the ends of the construction speed zones, if such signs do not exist.

Item 533, "Milled Rumble Strips"

Place milled rumble strips prior to placement of final pavement markings.

Item 618, "Conduit"

Where PVC, duct cable, and HDPE conduit 1 in. diameter and larger is allowed and installed as per Department standards, optionally provide PVC elbows in place of the galvanized rigid metal elbows required by the Electrical Details standard sheets. Provide PVC elbows of the same schedule rating as the conduits to which they connect. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system that uses PVC elbows.

Secure permission from the proper authority before cutting into or removing any walks or curbs.

Install conduit under existing pavement by an approved boring method unless otherwise directed. Do not construct boring pits within 2 ft. of the edge of the pavement unless otherwise directed. When conduits are bored, the vertical and horizontal tolerances shall not exceed 18 in. as measured from the intended target point.

Do not use a pneumatically driven device for punching holes beneath the pavement, commonly known as a "missile."

Install a pull rope in conduit runs in excess of 60 ft.

Furnish and install duct seal at ends of conduits.

Furnish and install access fittings in bridges for conduit.

Optionally substitute HDPE conduit meeting the requirements of Item 622, “Duct Cable” for bores requiring PVC Schedule 40 and Schedule 80 conduit when approved. HDPE shall be the same size as the PVC conduit shown on the plans. No additional compensation will be paid when HDPE is substituted for this purpose.

Install a continuous bare or green insulated copper wire number 8 AWG or larger in every conduit throughout the electrical system in accordance with the electrical detail sheets and the NEC.

Item 620, “Electrical Conductors”

Grounding conductors that share the same conduit, junction box, ground box or structure shall be bonded together at every accessible point in accordance with the NEC.

For both transformer and shoe-base type illumination poles, provide double-pole breakaway fuse-holders as noted on the Department’s Material/Producer List for Roadway Illumination and Electrical Supplies.

Item 636, “Signs”

Install the prismatic sheeting for overhead signs material to within 30 degrees of the manufacturer-specified orientation.

Before removal from the project site, spray-paint (with an oil-based paint), an “X” across the face of non-salvageable signs as directed.

Item 644, “Small Roadside Sign Assemblies”

Furnish and install omni-directional sign post wrap (12 in. by 12 in. Type C retroreflective sheeting with pressure sensitive backing) on sign posts that have sign faces that do not face the predominant direction of traffic, as directed. Sign post wrap shall be yellow for signs R6-1 “ONE WAY” and shall be red for signs R1-2 “YIELD”, R5-1 “DO NOT ENTER”, R5-1a “WRONG WAY”, and R1-1 “STOP”. Place the bottom of sign post wrap a height of 4 ft. above the edge of travel lane.

Where foundations protrude through riprap or other concrete areas, wrap the foundation with 1/4-in. thick bituminous fiber sheets before placing concrete or repairing the concrete area. Bituminous fiber sheet tubes may be used for forming sign foundations instead of removable forms and shall be left in place below the finished concrete or riprap surface. Neatly trim the bituminous fiber sheets flush with the finished surface after the concrete has cured.

Drill and pour small roadside sign foundations on the same day or suitably cover the drilled hole.

County: Tom Green **Sheet:** 5D

Highway: RM 584/US 277/SH 158 **Control:** 0907-00-229,ETC.

Signs indicated to be mounted on the back of another sign or on a traffic signal pole or mast arm may require punch spacing different from that shown on the Standard Sheets. Adjust punch spacing on affected signs.

Cover each unfinished sign base with a reflectorized traffic cone.

After paving operations are complete, the Engineer will determine and provide vertical clearances to be placed on signs W12-2 and W12-2a.

Item 656, “Foundations for Traffic Control Devices”

Form a 3/4-in. chamfer on the top edge of each roadside flashing beacon foundation.

Probe before drilling foundations to determine the location of buried utilities and structures.

Protect open foundation holes left unattended with traffic control devices and cover suitably, as directed.

Item 658, “Delineator and Object Marker Assemblies”

Remove existing object markers and delineators. Removal is not a pay item.

Item 662, “Work Zone Pavement Markings”

Do not use temporary flexible-reflective roadway marker tabs to delineate words, symbols, shapes, or diagonal or transverse lines.

Paint and beads are allowed for nonremovable markings.

Item 666, “Retroreflectorized Pavement Markings”

Place glass beads for pavement markings in accordance with the following table:

Marking Types	Glass Bead (Double Drop) Types	Glass Bead Rates	
		Surface Treatment	Asphalt Concrete Pavement, Microsurfacing, Concrete Pavement
TY I markings	Type II	12 LB per 100 SF	6 LB per 100 SF
	Type III	12 LB per 100 SF	6 LB per 100 SF
TY II markings	Type II	12 LB per GAL	6 LB per GAL
	Type III	12 LB per GAL	6 LB per GAL

Apply TY II marking material at a rate of 25 gallons per mile.

The striper speed shall not exceed 5 MPH during application. Convert to gravity-flow beaders (if not in use) to obtain optimum bead application, when directed.

Clean striper tanks before use if there is a build-up of dry paint, as directed. Flush lines and guns before use.

Reference existing markings before performing work that disturbs the markings, so that the markings can be re-established.

Provide a double-drop of Type II and Type III glass beads.

Item 668, "Prefabricated Pavement Markings"

When applying Type C specialty markings (symbols, words, etc.) over existing thermoplastic markings, first apply heat to the surface of the existing markings and roughen the surface with a shovel. Remove existing Type A, B, or C prefabricated markings prior to placing the new Type C markings.

Item 682, "Vehicle and Pedestrian Signal Heads"

Signal heads, lenses and visors shall be manufactured of polycarbonate. Signal heads shall be black or other color as approved. Mounting brackets and pipes shall not be manufactured of polycarbonate.

Signal heads mounted on poles and mast arm shall be level and plumb.

Enclose electrical wiring and traffic signal cable in an approved traffic signal devices and mounting hardware.

Item 684, "Traffic Signal Cables"

Leave a minimum of 1 foot of each signal cable in each signal pole base and controller enclosure.

Terminate the multiconductor signal cable shown on the plans on the terminal strip in the hand hole. Do not splice the conductors at the hand hole.

Identify each cable as shown on the plans with permanent marking labels using a double-tie strap label at each ground box, pole base and controller.

Item 687, "Pedestal Pole Assemblies"

Inside each breakaway base, provide breakaway fuse-holders conforming to Material/Producer List, "Item 620 – Electrical Conductors" for ungrounded cables, neutral breakaway connectors for neutral cable, and pedestrian button cables.

County: Tom Green **Sheet:** 5E

Highway: RM 584/US 277/SH158 **Control:** 0907-00-229, ETC.

Item 688, "Pedestrian Detectors"

Identify each detector cable as shown on the plans with permanent marking labels using a double-tie strap label at each ground box and pole base.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0907-00-229 **DISTRICT** San Angelo **COUNTY** Tom Green
HIGHWAY RM 584, US 87, Various

			CONTROL SECTION JOB	0070-02-098		0907-00-229		2574-01-051		TOTAL EST.	TOTAL FINAL
			PROJECT ID	A00184104		A00183304		A00187252			
			COUNTY	Tom Green		Tom Green		Tom Green			
			HIGHWAY	US 87		Various		RM 584			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	100-6006	PREP ROW (TREE)(LESS THAN 24" DIA)	EA			1.000				1.000	
	100-6007	PREP ROW (TREE)(GREATER THAN 24" DIA)	EA					2.000		2.000	
	104-6009	REMOVING CONC (RIPRAP)	SY					130.000		130.000	
	104-6011	REMOVING CONC (MEDIANS)	SY					88.000		88.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY			1,309.000		187.000		1,496.000	
	104-6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF			1,489.000		132.000		1,621.000	
	104-6036	REMOVING CONC (SIDEWALK OR RAMP)	SY			105.000		14.000		119.000	
	105-6037	REMOVING STAB BASE AND ASPH PAV(0"-16")	SY			1,227.000				1,227.000	
	110-6003	EXCAVATION (SPECIAL)	CY			7.500		7.500		15.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY			7.500		7.500		15.000	
	132-6056	EMBANKMENT (FINAL)(ORD COMP)(TY C2)(DS)	CY					125.000		125.000	
	134-6005	BACKFILL TY A	CY					20.000		20.000	
	162-6002	BLOCK SODDING	SY			3,277.000				3,277.000	
	340-6272	TACK COAT	GAL			20.000		20.000		40.000	
	354-6002	PLAN & TEXT ASPH CONC PAV(0" TO 2")	SY			250.000		250.000		500.000	
	400-6008	CUT & RESTORE ASPH PAVING	SY			427.000		61.000		488.000	
	401-6001	FLOWABLE BACKFILL	CY			10.000		10.000		20.000	
	416-6004	DRILL SHAFT (36 IN)	LF					120.000		120.000	
	416-6030	DRILL SHAFT (TRF SIG POLE) (24 IN)	LF	33.000						33.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	26.000						26.000	
	416-6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	44.000						44.000	
	420-6002	CL A CONC (MISC)	CY			5.000		5.000		10.000	
	420-6013	CL C CONC (ABUT)	CY					13.400		13.400	
	420-6054	CL C CONC (HEADWALL)	CY					2.000		2.000	
	420-6057	CL C CONC (WINGWALLS)	CY					7.000		7.000	
	422-6001	REINF CONC SLAB	SF					102.000		102.000	
	423-6001	RETAINING WALL (MSE)	SF					1,235.000		1,235.000	
	432-6001	RIPRAP (CONC)(4 IN)	CY			12.000		25.000		37.000	
	432-6035	RIPRAP (STONE PROTECTION)(24 IN)	CY					52.000		52.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY					16.500		16.500	
	450-6052	RAIL (HANDRAIL)(TY F)	LF					201.000		201.000	
	450-6103	RAIL (TY PR11)	LF					92.000		92.000	
	462-6047	CONC BOX CULV (4 FT X 2 FT)(EXTEND)	LF					47.000		47.000	
	465-6233	INLET (COMP) (TY SIDEWALK BRIDGE)	EA					1.000		1.000	
	496-6005	REMOV STR (WINGWALL)	EA					1.000		1.000	
	496-6007	REMOV STR (PIPE)	LF					20.000		20.000	
	500-6001	MOBILIZATION	LS	0.110		0.480		0.410		1.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0907-00-229 **DISTRICT** San Angelo **COUNTY** Tom Green
HIGHWAY RM 584, US 87, Various

			CONTROL SECTION JOB	0070-02-098		0907-00-229		2574-01-051		TOTAL EST.	TOTAL FINAL
			PROJECT ID	A00184104		A00183304		A00187252			
			COUNTY	Tom Green		Tom Green		Tom Green			
			HIGHWAY	US 87		Various		RM 584			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	2.000		6.000		5.000		13.000	
	506-6035	SANDBAGS FOR EROSION CONTROL	EA			31.000		31.000		62.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF			750.000		750.000		1,500.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF			750.000		750.000		1,500.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF			850.000		850.000		1,700.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF			850.000		850.000		1,700.000	
	528-6001	COLORED TEXTURED CONC (4")	SY			47.000				47.000	
	529-6002	CONC CURB (TY II)	LF			1,286.000		168.000		1,454.000	
	529-6008	CONC CURB & GUTTER (TY II)	LF			442.000		23.000		465.000	
	529-6012	CONC CURB (SLOTTED)	LF			46.000				46.000	
	530-6004	DRIVEWAYS (CONC)	SY			3,052.000		220.000		3,272.000	
	531-6001	CONC SIDEWALKS (4")	SY			4,448.000		472.000		4,920.000	
	531-6002	CONC SIDEWALKS (5")	SY			250.000		250.000		500.000	
	531-6018	CURB RAMPS (TY 1)	SY			30.000		10.000		40.000	
	531-6019	CURB RAMPS (TY 2)	SY			13.000		42.000		55.000	
	531-6024	CURB RAMPS (TY 7)	SY			661.000		25.000		686.000	
	531-6027	CURB RAMPS (TY 10)	SY			93.000		9.000		102.000	
	531-6029	CURB RAMPS (TY 20)	SY					36.000		36.000	
	531-6030	CURB RAMPS (TY 21)	SY			9.000				9.000	
	531-6050	CONCRETE SIDEWALK (STEPS)	SY			92.000				92.000	
	536-6002	CONC MEDIAN	SY					91.000		91.000	
	540-6002	MTL W-BEAM GD FEN (STEEL POST)	LF					812.500		812.500	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA					1.000		1.000	
	540-6017	MTL BM GD FEN (LONG SPAN SYSTEM)	LF					200.000		200.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF					800.000		800.000	
	542-6002	REMOVE TERMINAL ANCHOR SECTION	EA					1.000		1.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA					1.000		1.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA					1.000		1.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	230.000		50.000				280.000	
	618-6053	CONDT (PVC) (SCH 80) (3")	LF	260.000						260.000	
	618-6058	CONDT (PVC) (SCH 80) (4")	LF	20.000						20.000	
	618-6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	425.000						425.000	
	620-6004	ELEC CONDR (NO.12) INSULATED	LF	80.000						80.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	850.000		50.000				900.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	1,020.000						1,020.000	
	624-6008	GROUND BOX TY C (162911)W/APRON	EA	6.000						6.000	
	624-6028	REMOVE GROUND BOX	EA	13.000						13.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0907-00-229 **DISTRICT** San Angelo **COUNTY** Tom Green
HIGHWAY RM 584, US 87, Various

			CONTROL SECTION JOB	**0070-02-098**		**0907-00-229**		**2574-01-051**		TOTAL EST.	TOTAL FINAL
			PROJECT ID	**A00184104**		**A00183304**		**A00187252**			
			COUNTY	**Tom Green**		**Tom Green**		**Tom Green**			
			HIGHWAY	**US 87**		**Various**		**RM 584**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	628-6188	ELC SRV TY D 120/240 070(NS)SS(E)SP(O)	EA	1.000						1.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA					1.000		1.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA			33.000		3.000		36.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF					804.000		804.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF			794.000		652.000		1,446.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA					9.000		9.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA					9.000		9.000	
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF					500.000		500.000	
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF					648.000		648.000	
	672-6007	REFL PAV MRKR TY I-C	EA					79.000		79.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA					38.000		38.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF					911.000		911.000	
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF					391.000		391.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF			1,219.000		184.000		1,403.000	
	677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA					5.000		5.000	
	677-6012	ELIM EXT PAV MRK & MRKS (WORD)	EA					5.000		5.000	
	678-6002	PAV SURF PREP FOR MRK (6")	LF					1,148.000		1,148.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF					804.000		804.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF			794.000		652.000		1,446.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA					9.000		9.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA					9.000		9.000	
	680-6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1.000						1.000	
	680-6004	REMOVING TRAFFIC SIGNALS	EA	1.000						1.000	
	680-6011	INSTALL HWY TRF SIG (UPGRADE)	EA			1.000				1.000	
	682-6001	VEH SIG SEC (12")LED(GRN)	EA	13.000						13.000	
	682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	5.000						5.000	
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	15.000						15.000	
	682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	4.000						4.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	15.000						15.000	
	682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	4.000						4.000	
	682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	6.000						6.000	
	682-6051	BACKPLATE W/REFL BRDR(3 SEC)ALUM	EA	17.000						17.000	
	682-6052	BACKPLATE W/REFL BRDR(4 SEC)ALUM	EA	1.000						1.000	
	684-6028	TRF SIG CBL (TY A)(14 AWG)(2 CONDR)	LF			200.000				200.000	
	684-6031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	855.000						855.000	
	684-6033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	80.000						80.000	
	684-6036	TRF SIG CBL (TY A)(14 AWG)(10 CONDR)	LF	1,130.000						1,130.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0907-00-229 **DISTRICT** San Angelo **COUNTY** Tom Green
HIGHWAY RM 584, US 87, Various

			CONTROL SECTION JOB		**0070-02-098**		**0907-00-229**		**2574-01-051**		TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00184104**		**A00183304**		**A00187252**			
			COUNTY		**Tom Green**		**Tom Green**		**Tom Green**			
			HIGHWAY		**US 87**		**Various**		**RM 584**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL	EST.	FINAL	EST.	FINAL		
	684-6046	TRF SIG CBL (TY A)(14 AWG)(20 CONDR)		LF	520.000						520.000	
	684-6079	TRF SIG CBL (TY C)(12 AWG)(2 CONDR)		LF	1,160.000						1,160.000	
	686-6037	INS TRF SIG PL AM(S)1 ARM(36')		EA	1.000						1.000	
	686-6045	INS TRF SIG PL AM(S)1 ARM(44')		EA	1.000						1.000	
	686-6065	INS TRF SIG PL AM(S)1 ARM(65')		EA	2.000						2.000	
	687-6001	PED POLE ASSEMBLY		EA	6.000		2.000				8.000	
	688-6001	PED DETECT PUSH BUTTON (APS)		EA	6.000		4.000				10.000	
	688-6003	PED DETECTOR CONTROLLER UNIT		EA	1.000						1.000	
	690-6007	REPLACE OF GROUND BOXES		EA			4.000				4.000	
	690-6030	REMOVAL OF PEDESTRIAN PUSH BUTTONS		EA			4.000				4.000	
	3076-6077	D-GR HMA TY-D SAC-B PG70-22 (EXEMPT)		TON			10.000		10.000		20.000	
	4196-6001	PREFAB PED STL TRUSS BRG SPAN (120 FT)		EA					1.000		1.000	
	5129-6001	INSTALL FTB		LF					175.000		175.000	
	5129-6002	REMOVE FTB		LF					175.000		175.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN		EA			1.000		1.000		2.000	
	6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)		EA	1.000						1.000	
	6062-6042	RELOCATE ITS RADIO		EA	1.000						1.000	
	6089-6002	CAT 5 ETHERNET CABLE		LF	60.000						60.000	
	6185-6002	TMA (STATIONARY)		DAY	6.000						6.000	
	6185-6005	TMA (MOBILE OPERATION)		DAY	8.000						8.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)		LS			1.000				1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)		LS			1.000				1.000	

SPEC ITEM #	0100 6006	0100 6007	0104 6009	0104 6011	0104 6017	0104 6029	0104 6036	0105 6037	0132 6056	0134 6005	0162 6002	0400 6008	0416 6004	0416 6030
LOCATION	PREPARING ROW (TREE) (LESS THAN 24" DIA)	PREPARING ROW (TREE) (GREATER THAN 24" DIA)	REMOVING CONC (RIPRAP)	REMOVING CONC (MEDIANS)	REMOVING CONC (DRIVEWAYS)	REMOVING CONC (CURB OR CURB & GUTTER)	REMOVING CONC (SIDEWALK OR RAMP)	REMOVING STAB BASE & ASPH PAV (0"-16")	EMB (FINAL) (ORD COMP) (TY C2) (DS)	BACKFILL (TY A)	BLOCK SODDING	CUT & RESTORE ASPH PAVING	DRILL SHAFT (36 IN)	DRILL SHAFT (TRF SIG POLE) (24 IN)
UNITS	EA	EA	SY	SY	SY	LF	SY	SY	CY	CY	SY	SY	LF	LF
CSJ: 0907-00-229	1				1309	1489	105	1227			3277	427		
CSJ: 2574-01-051		2	130	88	187	132	5		125	20		61	120	33
PROJECT TOTAL	1	2	130	88	1496	1621	110	1227	125	20	3277	488	120	33

SPEC ITEM #	0416 6032	0416 6034	0420 6013	0420 6054	0420 6057	0422 6001	0423 6001	0432 6001	0432 6035	0432 6045	0450 6052	0450 6103	0462 6047	0465 6233	0496 6005
LOCATION	DRILL SHAFT (TRF SIG POLE) (36 IN)	DRILL SHAFT (TRF SIG POLE) (48 IN)	CL C CONC (ABUT)	CL C CONC (HEADWALL)	CL C CONC (WINGWALLS)	REINF CONC SLAB	RETAINING WALL (MSE)	RIPRAP (CONC)(4IN)	RIPRAP (STONE PROTECTION) (24 IN)	RIPRAP (MOW STRIP) (4 IN)	RAIL (HANDRAIL) (TY F)	RAIL (TY PR 11)	CONC BOX CULV (4FT X 2 FT) (EXTEND)	INLET (COMP) (TY SIDEWALK BRIDGE)	REMOV STR (WINGWALL)
UNITS	LF	LF	CY	CY	CY	SF	SF	CY	CY	CY	LF	LF	LF	EA	EA
CSJ: 0907-00-229								12							
CSJ: 2574-01-051	26	44	13.4	2	7	102	1235	25	52	16.5	201	92	47	1	1
PROJECT TOTAL	26	44	13.4	2	7	102	1235	37	52	16.5	201	92	47	1	1

SPEC ITEM #	0496 6007	0528 6001	0529 6002	0529 6008	0529 6012	0530 6004	0531 6001	0531 6018	0531 6019	0531 6024	0531 6027	0531 6029	0531 6030
LOCATION	REMOV STR (PIPE)	COLORED TEXTURED CONC (4")	CONC CURB (TY II)	CONC CURB & GUTTER (TY II)	CONC CURB (SLOTTED)	DRIVEWAYS (CONC)	CONC SIDEWALKS (4")	CURB RAMPS (TY 1)	CURB RAMPS (TY 2)	CURB RAMPS (TY 7)	CURB RAMPS (TY 10)	CURB RAMPS (TY 20)	CURB RAMPS (TY 21)
UNITS	LF	SY	LF	LF	LF	SY	SY	SY	SY	SY	SY	SY	SY
CSJ: 0907-00-229		47	1286	442	46	3052	4448	30	13	661	93		9
CSJ: 2574-01-051	20		168	23		220	472	10	42	25	9	36	
PROJECT TOTAL	20	47	1454	465	46	3272	4920	40	55	686	102	36	9

SPEC ITEM #	0531 6050	0536 6002	0540 6002	0540 6016	0540 6017	0542 6001	0542 6002	0544 6001	0544 6003	0618 6046	0618 6053	0618 6058	0618 6059
LOCATION	CONCRETE SIDEWALK (STEPS)	CONC MEDIAN	MTL W-BEAM GD FEN (STEEL POST)	DOWNSTREAM ANCHOR TERMINAL SECTION	MTL BEAM GD FEN (LONG SPAN SYSM)	REMOVE METAL BEAM GUARD FENCE	REMOVE TERMINAL ANCHOR SECTION	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	CONDT (PVC) (SCH 80) (2")	CONDT (PVC) (SCH 80) (3")	CONDT (PVC) (SCH 80) (4")	CONDT (PVC) (SCH 80) (4") (BORE)
UNITS	SY	SY	LF	EA	LF	LF	EA	EA	EA	LF	LF	LF	LF
CSJ: 0907-00-229	92									50			
CSJ: 2574-01-051		91	812.5	1	200	800	1	1	1	230	260	20	425
PROJECT TOTAL	92	91	812.5	1	200	800	1	1	1	280	260	20	425

4/30/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

Texas Department of Transportation

PROJECT SUMMARY

SAN ANGELO, TEXAS

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	7
0907	00	229,ETC	

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SPEC ITEM #	0620 6004	0620 6007	0620 6008	0624 6008	0624 6028	0628 6188	0644 6001	0644 6068	0666 6036	0666 6048	0666 6054	0666 6078	0666 6306	0666 6321	0672 6007
LOCATION	ELEC CONDR (NO.12) INSULATED	ELEC CONDR (NO.8) BARE	ELEC CONDR (NO.8) INSULATED	GROUND BOX TY C (162911) W/APRON	REMOVE GROUND BOX	ELEV SRV TY D 120/240 070 (NS)SS(E)SP(O)	IN SM RD SN SUP&AM TY10BWG(1) SA(P)	RELOCATE SM RD SN SUP&AM TY 10BWG	REFL PAV MRK TY I (W) 8" (SLD) (100MIL)	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	REFL PAV MRK TY I (W) (ARROW) (100MIL)	REFL PAV MRK TY I (W) (WORD) (100MIL)	REFL PAV W/RET REQ TY 1(W)6" (BRK)(100MIL)	REFL PAV W/RET REQ TY I (Y) 6" (SLD)(100MIL)	REFL PAV MRKR TY I-C
UNITS	LF	LF	LF	EA	EA	EA	EA	EA	LF	LF	EA	EA	LF	LF	EA
CSJ: 0907-00-229		50						33		794					
CSJ: 2574-01-051	80	850	1020	6	13	1	1	3	804	652	9	9	500	648	79
PROJECT TOTAL	80	900	1020	6	13	1	1	36	804	1446	9	9	500	648	79

SPEC ITEM #	0672 6009	0677 6001	0677 6003	0677 6007	0677 6008	0677 6012	0678 6002	0678 6004	0678 6008	0678 6009	0678 6016	0680 6002	0680 6004	0680 6011	0682 6001
LOCATION	REFL PAV MRKR TY II-A-A	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (8")	ELIM EXT PAV MRK & MRKS (24")	ELIM EXT PAV MRK & MRKS (ARROW)	ELIM EXT PAV MRK & MRKS (WORD)	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)	INSTALL HWY TRF SIG (ISOLATED)	REMOVING TRAFFIC SIGNALS	INSTALL HWY TRF SIG (UPDGRADE)	VEH SIG SEC (12") LED (GRN)
UNITS	EA	LF	LF	LF	EA	EA	LF	LF	LF	EA	EA	EA	EA	EA	EA
CSJ: 0907-00-229				1219					794					1	
CSJ: 2574-01-051	38	911	391	184	5	5	1148	804	652	9	9	1	1		13
PROJECT TOTAL	38	911	391	1403	5	5	1148	804	1446	9	9	1	1	1	13

SPEC ITEM #	0682 6002	0682 6003	0682 6004	0682 6005	0682 6006	0682 6018	0682 6051	0682 6052	0684 6028	0684 6031	0684 6033	0684 6036	0684 6046
LOCATION	VEH SIG SEC (12") LED (GRN ARW)	VEH SIG SEC (12") LED (YEL)	VEH SIG SEC (12") LED (YEL ARW)	VEH SIG SEC (12") LED (RED)	VEH SIG SEC (12") LED (RED ARW)	PED SIG SEC (LED) (COUNTDOWN)	BACKPLATE W/REFL BRDR (3 SEC) ALUM	BACKPLATE W/REFL BRDR (4 SEC) ALUM	TRF SIG CBL (TY A) (14 AWG) (2 CONDR)	TRF SIG CBL (TY A) (14 AWG) (5 CONDR)	TRF SIG CBL (TY A) (14 AWG) (7 CONDR)	TRF SIG CBL (TY A) (14 AWG) (10 CONDR)	TRF SIG CBL (TY A) (14 AWG) (20 CONDR)
UNITS	EA	EA	EA	EA	EA	EA	EA	EA	LF	LF	LF	LF	LF
CSJ: 0907-00-229									200				
CSJ: 2574-01-051	5	15	4	15	4	6	17	1		855	80	1130	520
PROJECT TOTAL	5	15	4	15	4	6	17	1	200	855	80	1130	520

SPEC ITEM #	0684 6079	0686 6037	0686 6045	0686 6065	0687 6001	0688 6001	0688 6003	0690 6007	0690 6030	6058 6001	6062 6042	6089 6002	6185 6002
LOCATION	TRF SIG CBL (TY C) (12 AWG) (2 CONDR)	INS TRF SIG PL AM(S) 1 ARM (36')	INS TRF SIG PL AM(S) 1 ARM (44')	INS TRF SIG PL AM(S) 1 ARM (65')	PED POLE ASSEMBLY	PED DETECT PUSH BUTTON (APS)	PED DETECTOR CONTROLLER UNIT	REPLACE OF GROUND BOXES	REMOVAL OF PEDESTRIAN PUSH BUTTONS	BBU SYSTEM (EXTERNAL BATT CABINET)	RELOCATE ITS RADIO	CAT 5 ETHERNET CABLE	TMA (STATIONARY)
UNITS	LF	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	LF	DAY
CSJ: 0907-00-229					2	4		4	4				
CSJ: 2574-01-051	1160	1	1	2	6	6	1			1	1	60	6
PROJECT TOTAL	1160	1	1	2	8	10	1	4	4	1	1	60	6

4/30/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
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Texas Department of Transportation

PROJECT SUMMARY

SAN ANGELO, TEXAS

SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	8
0907	00	229,ETC	

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SPEC ITEM #	6185 6005	9999 6003
LOCATION	TMA (MOBILE OPERATION)	PREFAB STL TRUSS BRIDGE (120 FT)
UNITS	DAY	LS
CSJ: 0907-00-229		
CSJ: 2574-01-051	8	1
PROJECT TOTAL	8	1

SUMMARY OF INDEFINITE QUANTITIES *

SPEC ITEM #	0110 6003	0132 6003	0340 6272	0354 6002	0401 6001	0420 6002	0506 6035	0506 6038	0506 6039	0506 6041	0506 6043
LOCATION	EXCAVATION (SPECIAL)	EMBANKMENT (FINAL) (ORD COMP) (TY B)	TACK COAT	PLAN & TEXT ASPH CONC PAV (0" TO 2")	FLOWABLE BACKFILL	CL A CONC (MISC)	SANDBAGS FOR EROSION CONTROL	TEMP SDMT CONT FENCE (INSTALL)	TEMP SDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
UNITS	CY	CY	GAL	SY	CY	CY	EA	LF	LF	LF	LF
PROJECT TOTAL	15	15	40	500	20	10	62	1500	1500	1700	1700

SPEC ITEM #	0531 6002	3076 6077	5129 6001	5129 6002
LOCATION	CONC SIDEWALKS (5")	D-GR HMA SAC-B TY-D PG70-22 (EXEMPT)	INSTALL FTB	REMOVE FTB
UNITS	SY	TON	LF	LF
PROJECT TOTAL	500	20	175	175

* AS APPROVED BY THE ENGINEER

4/30/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

Texas Department of Transportation

PROJECT SUMMARY

SAN ANGELO, TEXAS

SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	9
0907	00	229,ETC	

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RM 584, US 277, AND SH 158 SIDEWALK

1. ESTABLISH AND MAINTAIN TRAFFIC CONTROL AND SW3P FEATURES PER THE VARIOUS STANDARDS INCLUDED IN THIS PLAN SET OR AS DIRECTED.

2. BUSINESS ACCESS SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION

3. REMOVE EXISTING CONCRETE, ASPHALT, FOUNDATIONS, OR OTHER FEATURES WHERE INDICATED IN THE PLANS WITHIN THE AREA OF PROPOSED WORK

4. EXCAVATE OR BACKFILL AS NECESSARY TO ACHIEVE PROPOSED GRADES. PLACE BEDDING MATERIALS

5. FORM PROPOSED CONCRETE FEATURES

6. PLACE CONCRETE OR ASPHALT, REMOVE AND INSTALL PAVEMENT MARKINGS, AND RELOCATE SIGNS WHERE INDICATED

7. REMOVE FORMWORK AND BACKFILL DISTURBED AREAS FOR SMOOTH FINISHED GRADE. GRADE TO DRAIN AS NECESSARY.

8. PLACE AND IRRIGATE BLOCK SODDING WHERE INDICATED AND AS SPECIFIED.

9. REMOVE ANY DEBRIS, TRAFFIC CONTROL, AND SW3P FEATURES AT THE COMPLETION OF CONSTRUCTION

RM 584 PEDESTRIAN BRIDGE

1. ESTABLISH AND MAINTAIN TRAFFIC CONTROL AND SW3P FEATURES PER THE VARIOUS STANDARDS INCLUDED IN THIS PLAN SET OR AS DIRECTED. THE USE OF TEMPORARY PAVEMENT MARKINGS IS TO BE CONSIDERED SUBSIDIARY TO ITEM 0502 6001.

2. COORDINATE WITH AEP TWO WEEKS PRIOR TO CONSTRUCTION FOR ANY CONFLICTS WITH LIGHTPOLE AS SHOWN ON BRIDGE LAYOUT.

3. REMOVE EXISTING CONCRETE, ASPHALT, FOUNDATIONS, OR OTHER FEATURES WHERE INDICATED IN THE PLANS WITHIN THE AREA OF PROPOSED WORK

4. INSTALL SHORING AND DEWATERING MEASURES

5. EXCAVATE OR BACKFILL AS NECESSARY TO ACHIEVE PROPOSED GRADES. PLACE BEDDING MATERIALS

6. CONSTRUCT SIDEWALK, WINGWALLS, ABUTMENTS, AND BRIDGE AS SHOWN IN THE PLANS. HANDRAIL INSTALLATION TO FOLLOW SIDEWALK COMPLETION WITHIN TWO WEEKS.

7. REMOVE FORMWORK AND BACKFILL DISTURBED AREAS FOR SMOOTH FINISHED GRADE. GRADE TO DRAIN AS NECESSARY.

8. PLACE AND IRRIGATE BLOCK SODDING WHERE INDICATED AND AS SPECIFIED.

9. REMOVE ANY DEBRIS, TRAFFIC CONTROL, AND SW3P FEATURES AT THE COMPLETION OF CONSTRUCTION

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

SIDEWALK PLAN

SEQUENCE OF WORK NARRATIVE

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	10
0907	00	229,ETC	

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).

2. The development and design of the Traffic Control Plan (TCP)is the responsibility of the Engineer.

3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.

4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.

5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.

6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.

7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.

8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.

10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.

11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.

12. The Engineer has the final decision on the location of all traffic control devices.

13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

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

2. Except in emergency situations, flagger stations shall be illuminated when flagging is used at night.

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.

2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

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

Texas Department of Transportation

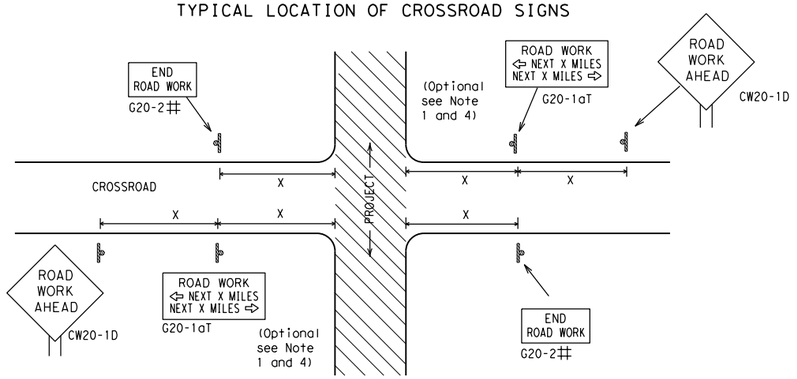
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13 9-07 8-14 5-10 5-21	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		11

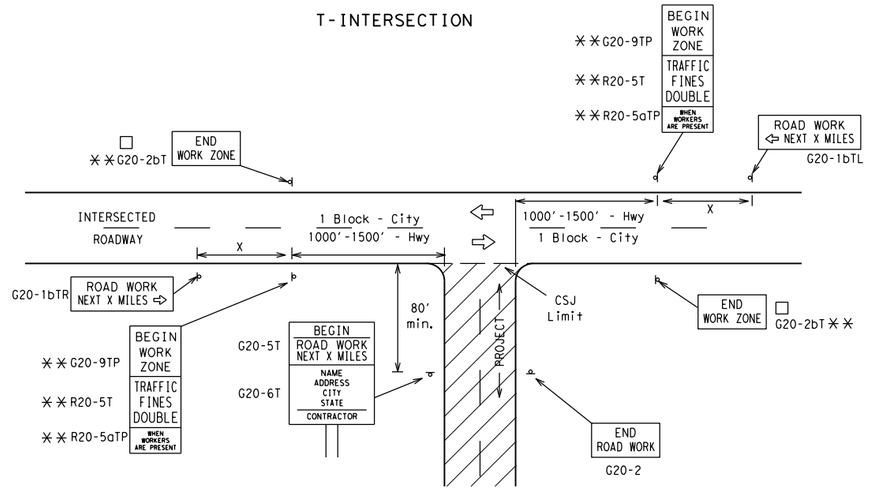
TYPICAL LOCATION OF CROSSROAD SIGNS



May be mounted on back of "ROAD WORK AHEAD"(CW20-1D) sign with approval of Engineer. (See note 2 below)

1. 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.
2. 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.
3. 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.
4. 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.
5. Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
6. 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

1. 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.
2. 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]

SIZE

Sign Number or Series	Conventional Road	Expressway/ Freeway
CW20[4] CW21 CW22 CW23 CW25	48" x 48"	48" x 48"
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"

SPACING

Posted Speed	Sign △ Spacing "X"
MPH	Feet (Apprx.)
30	120
35	160
40	240
45	320
50	400
55	500[2]
60	600[2]
65	700[2]
70	800[2]
75	900[2]
80	1000[2]
*	*[3]

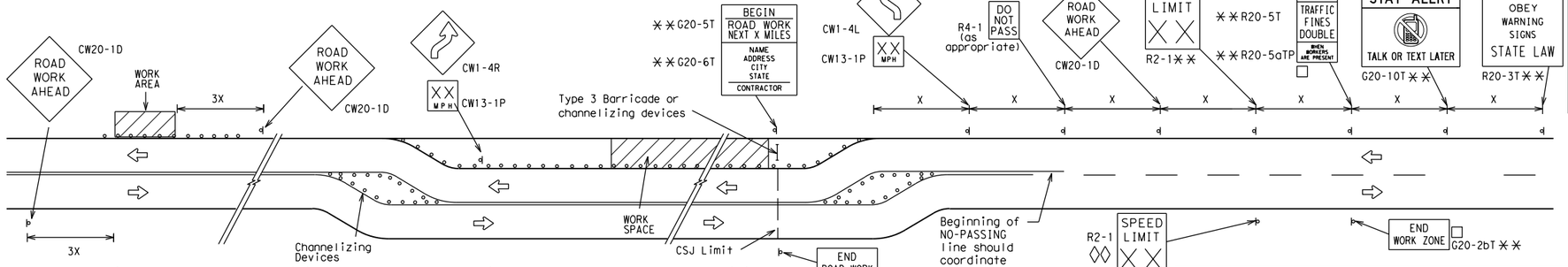
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 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".
5. Only diamond shaped warning sign sizes are indicated.
6. 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.

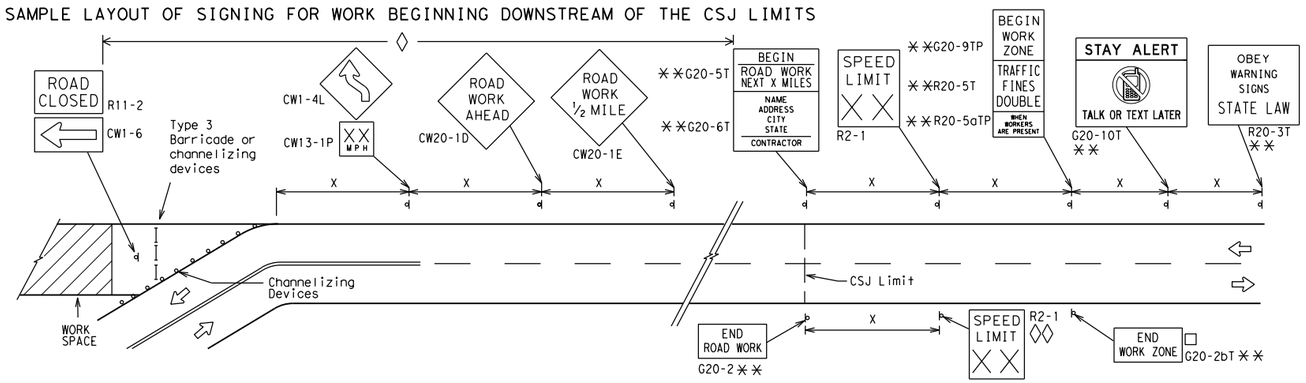
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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 AT THE CSJ LIMITS

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



NOTES

The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES"(G20-5T)sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.

□ The "BEGIN WORK ZONE"(G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.

** CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.

◊ Area for placement of "ROAD WORK AHEAD" (CW20-1D)sign and other signs or devices as called for on the Traffic Control Plan.

◊◊ Contractor will install a regulatory speed limit sign at the end of the work zone.

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	TOM GREEN		12

DATE: 4/26/2024 12:26:39 PM
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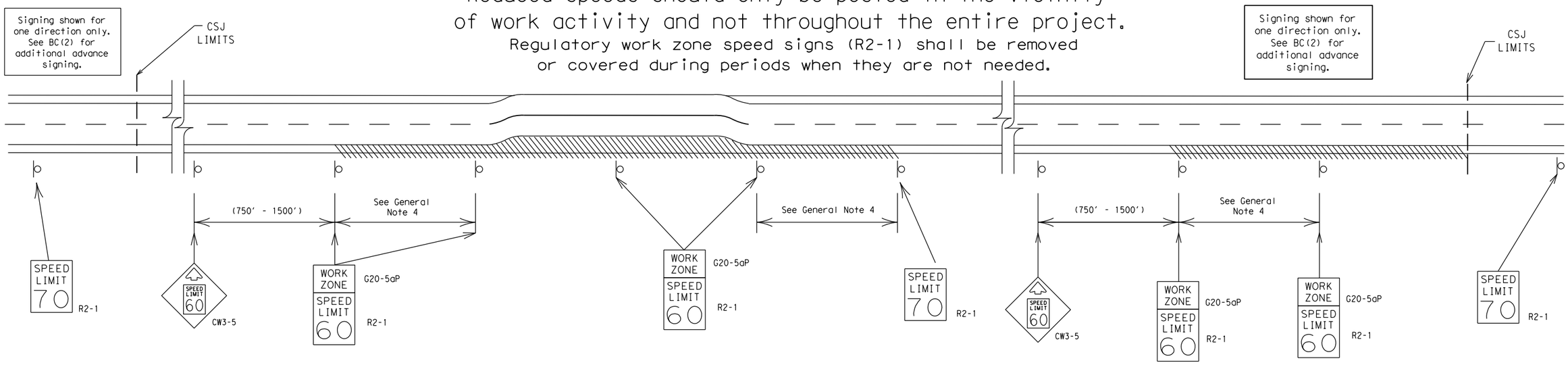
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project.

Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

a) rough road or damaged pavement surface
b) substantial alteration of roadway geometrics (diversions)
c) construction detours
d) grade
e) width
f) other conditions readily apparent to the driver

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:
   40 mph and greater 0.2 to 2 miles
   35 mph and less 0.2 to 1 mile
5. Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
6. Fabrication, erection and maintenance of the"ADVANCE SPEED LIMIT"(CW3-5)sign, "WORK ZONE"(G20-5aP) plaque and the "SPEED LIMIT"(R2-1)signs shall not be paid for directly, but shall be considered subsidiary to Item 502.
7. Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
8. Techniques that may help reduce traffic speeds include but are not limited to:
   A. Law enforcement.
   B. Flagger stationed next to sign.
   C. Portable changeable message sign (PCMS).
   D. Low-power (drone) radar transmitter.
   E. Speed monitor trailers or signs.
9. Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
10. For more specific guidance concerning the type of work, work zone conditions and factors impacting allowable regulatory construction speed zone reduction see TxDOT form #1204 in the TxDOT e-form system.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS 9-07 8-14 7-13 5-21	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		13

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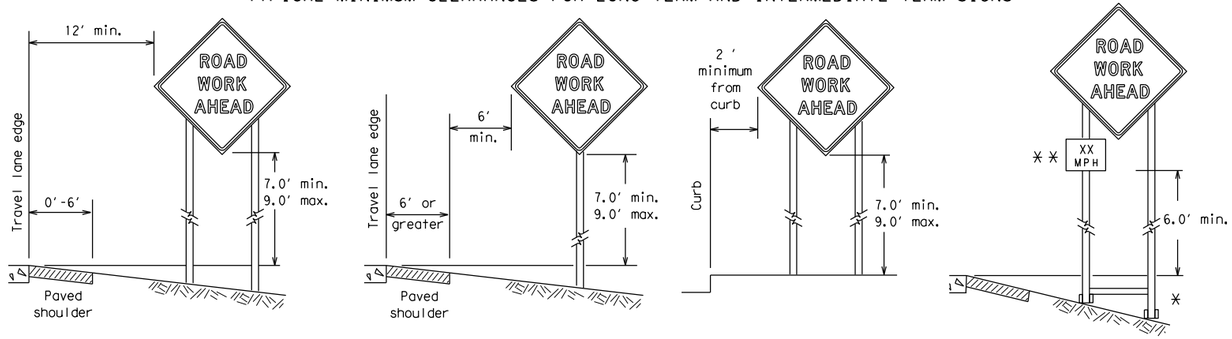
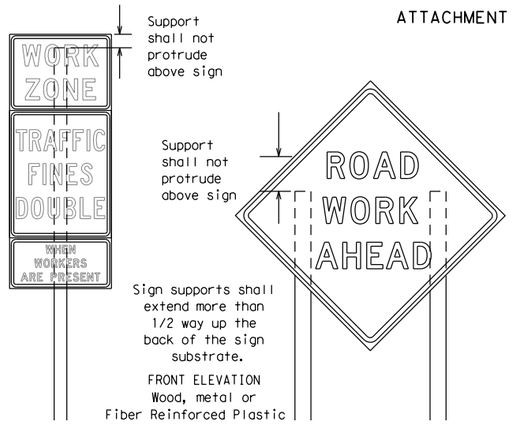
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

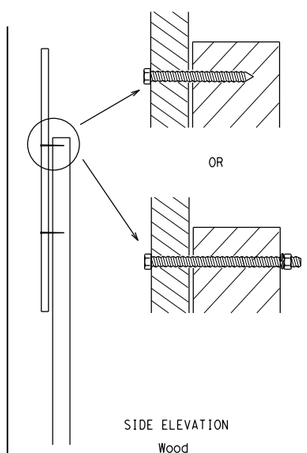


⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





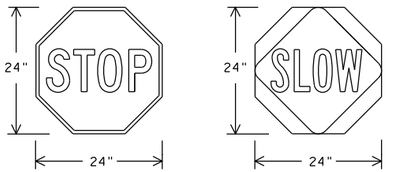
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{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

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

GENERAL NOTES FOR WORK ZONE SIGNS

1. Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. All signs shall be installed in accordance with the plans or as directed by the Engineer. Signs shall be used to regulate, warn, and guide the traveling public safely through the work zone.
5. The Contractor may furnish either the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD). The Engineer/Inspector may require the Contractor to furnish other work zone signs that are shown in the TMUTCD but may have been omitted from the plans. Any variation in the plans shall be documented by written agreement between the Engineer and the Contractor's Responsible Person. All changes must be documented in writing before being implemented. This can include documenting the changes in the Inspector's TxDOT diary and having both the Inspector and Contractor initial and date the agreed upon changes.
6. The Contractor shall furnish sign supports listed in the "Compliant Work Zone Traffic Control Device List" (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.
7. The Contractor is responsible for installing signs on approved supports and replacing signs with damaged or cracked substrates and/or damaged or marred reflective sheeting as directed by the Engineer/Inspector.
8. Identification markings may be shown only on the back of the sign substrate. The maximum height of letters and/or company logos used for identification shall be 1 inch.
9. The Contractor shall replace damaged wood posts. New or damaged wood sign posts shall not be spliced.

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
2. Long-term stationary or intermediate stationary signs installed on square metal tubing may be turned away from traffic 90 degrees when the sign message is not applicable. This technique may not be used for signs installed in the median of divided highways or near any intersections where the sign may be seen from approaching traffic.
3. Signs installed on wooden skids shall not be turned at 90 degree angles to the roadway. These signs should be removed or completely covered when not required.
4. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night, without damaging the sign sheeting.
5. Burlap shall NOT be used to cover signs.
6. Duct tape or other adhesive material shall NOT be affixed to a sign face.
7. Signs and anchor stubs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

1. Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall NOT be used.
6. Rubber ballasts designed for channelizing devices should not be used for ballast on portable sign supports. Sign supports designed and manufactured with rubber bases may be used when shown on the 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.

FLAGS ON SIGNS

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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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REVISIONS	0907	00	229,ETC	RM 584
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	TOM GREEN		14

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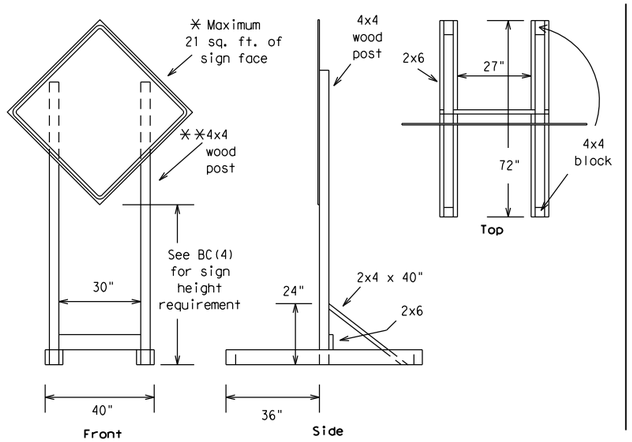
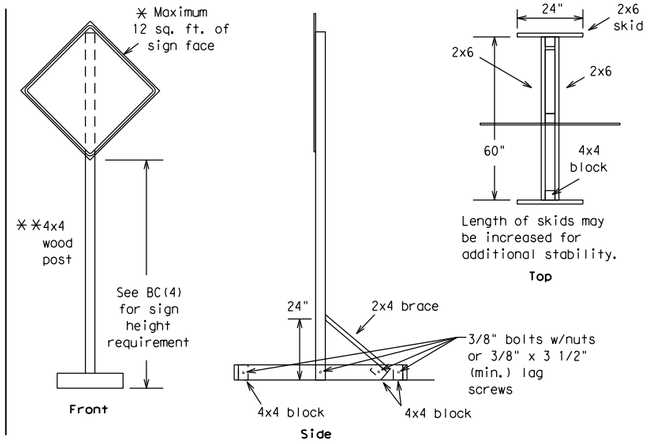
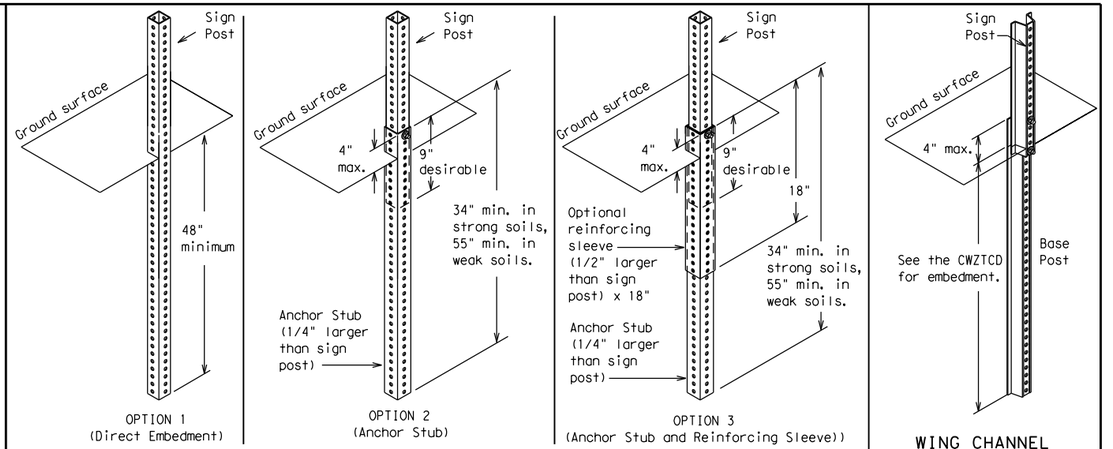




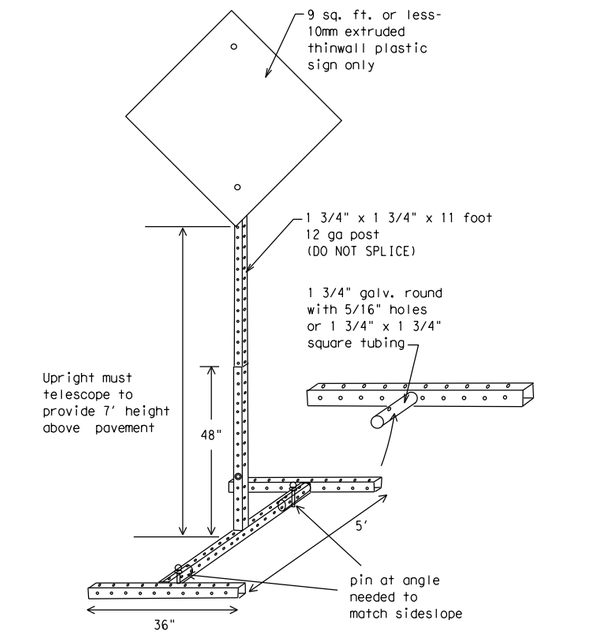
SKID MOUNTED WOOD SIGN SUPPORTS

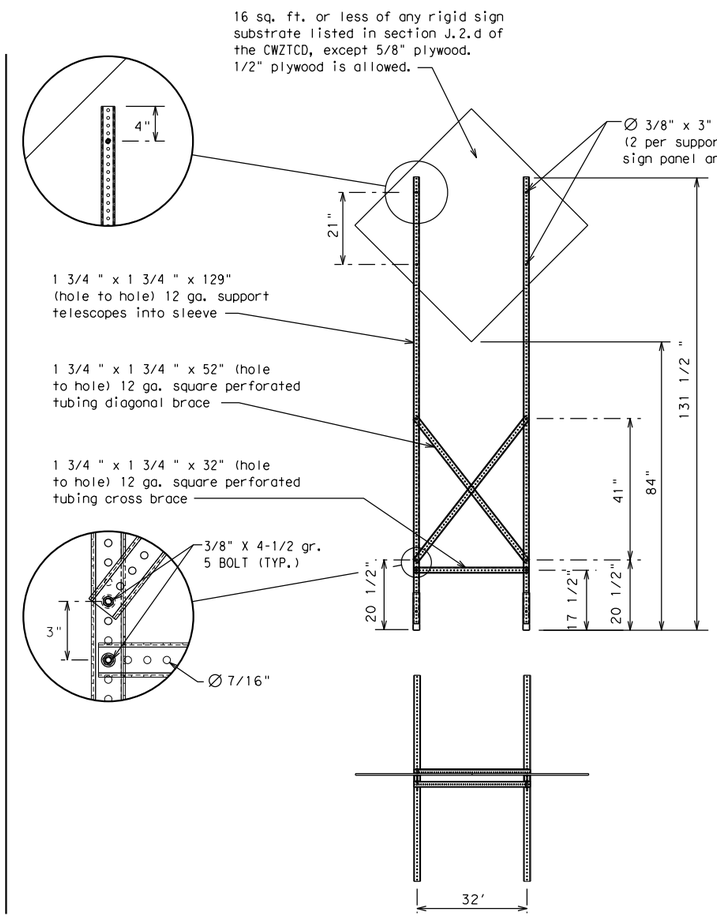
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

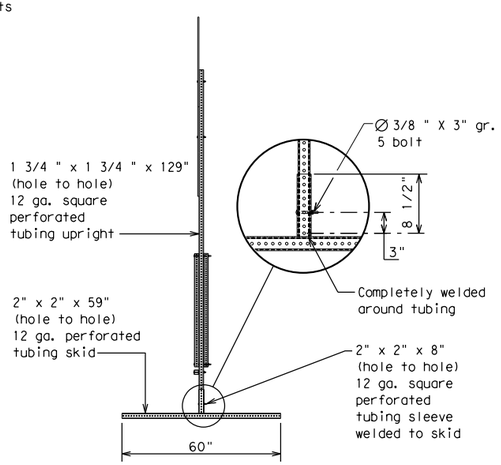


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

1. 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.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. 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.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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7-13 5-21	SJT	TOM GREEN		15

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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

PORTABLE CHANGEABLE MESSAGE SIGNS

1. The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
2. 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.
3. 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.
4. Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
5. Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
6. When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
7. 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.
8. 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.
9. Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
10. 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.
11. Do not use the word "Danger" in message.
12. Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
13. Do not display messages that scroll horizontally or vertically across the face of the sign.
14. 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.
15. 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.
16. Each line of text should be centered on the message board rather than left or right justified.
17. 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.

WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD
Alternate	ALT
Avenue	AVE
Best Route	BEST RTE
Boulevard	BLVD
Bridge	BRDG
Cannot	CANT
Center	CTR
Construction Ahead	CONST AHD
CROSSING	XING
Detour Route	DETOUR RTE
Do Not	DONT
East	E
Eastbound	(route) E
Emergency	EMER
Emergency Vehicle	EMER VEH
Entrance, Enter	ENT
Express Lane	EXP LN
Expressway	EXPWY
XXXX Feet	XXXX FT
Fog Ahead	FOG AHD
Freeway	FRWY, FWY
Freeway Blocked	FWY BLKD
Friday	FRI
Hazardous Driving	HAZ DRIVING
Hazardous Material	HAZMAT
High-Occupancy	HOV
Vehicle Highway	HWY
Hour(s)	HR, HRS
Information	INFO
It Is	ITS
Junction	JCT
Left	LFT
Left Lane	LFT LN
Lane Closed	LN CLOSED
Lower Level	LWR LEVEL
Maintenance	MAINT

WORD OR PHRASE	ABBREVIATION
Major	MAJ
Miles	MI
Miles Per Hour	MPH
Minor	MNR
Monday	MON
Normal	NORM
North	N
Northbound	(route) N
Parking	PKING
Road	RD
Right Lane	RT LN
Saturday	SAT
Service Road	SERV RD
Shoulder	SHLDR
Slippery	SLIP
South	S
Southbound	(route) S
Speed	SPD
Street	ST
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Thursday	THURS
To Downtown	TO DWNTN
Traffic	TRAF
Travelers	TRVLRS
Tuesday	TUES
Time Minutes	TIME MIN
Upper Level	UPR LEVEL
Vehicles (s)	VEH, VEHS
Warning	WARN
Wednesday	WED
Weight Limit	WT LIMIT
West	W
Westbound	(route) W
Wet Pavement	WET PVMT
Will Not	WONT

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT
RIGHT X LANES CLOSED	RIGHT X LANES OPEN
CENTER LANE CLOSED	DAYTIME LANE CLOSURES
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED
VARIOUS LANES CLOSED	EXIT XXX CLOSED X MILE
EXIT CLOSED	RIGHT LN TO BE CLOSED
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI
XXXXXXXX BLVD CLOSED	

Other Condition List

ROADWORK XXX FT	ROAD REPAIRS XXXX FT
FLAGGER XXXX FT	LANE NARROWS XXXX FT
RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
DETOUR X MILE	ROUGH ROAD XXXX FT
ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
BUMP XXXX FT	US XXX EXIT X MILES
TRAFFIC SIGNAL XXXX FT	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	FORM X LINES RIGHT
DETOUR NEXT X EXITS	USE XXXXX RD EXIT
USE EXIT XXX	USE EXIT I-XX NORTH
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N
TRUCKS USE US XXX N	WATCH FOR TRUCKS
WATCH FOR TRUCKS	EXPECT DELAYS
EXPECT DELAYS	PREPARE TO STOP
REDUCE SPEED XXX FT	END SHOULDER USE
USE OTHER ROUTES	WATCH FOR WORKERS
STAY IN LANE *	

Location List

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

1. Only 1 or 2 phases are to be used on a PCMS.
2. The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
3. A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
4. A Location Phase is necessary only if a distance or location is not included in the first phase selected.
5. 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.
6. 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

1. The words RIGHT, LEFT and ALL can be interchanged as appropriate.
2. Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
3. EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
4. Highway names and numbers replaced as appropriate.
5. ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
6. AHEAD may be used instead of distances if necessary.
7. FT and MI, MILE and MILES interchanged as appropriate.
8. AT, BEFORE and PAST interchanged as needed.
9. 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

1. 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.
2. 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.
3. 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.
4. A full matrix PCMS may be used to simulate a flashing arrow board provided it meets the visibility, flash rate and dimming requirements on BC(7), for the same size arrow.

SHEET 6 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002		CONT	SECT	JOB	HIGHWAY
REVISIONS		0907	00	229,ETC	RM 584
9-07	8-14	DIST		COUNTY	SHEET NO.
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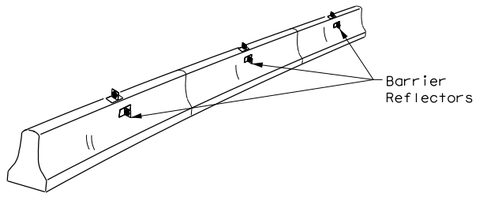
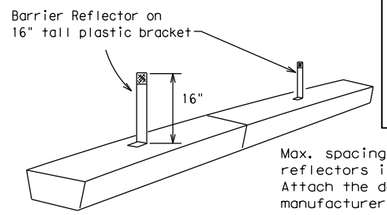
100

1. 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).
2. 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)

3. 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.
4. 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.
5. When CTB separates traffic traveling in the same direction, no barrier reflectors will be required on top of the CTB.
6. Barrier Reflector units shall be yellow or white in color to match the edgeline being supplemented.
7. Maximum spacing of Barrier Reflectors is forty (40) feet.
8. Pavement markers or temporary flexible-reflective roadway marker tabs shall NOT be used as CTB delineation.
9. Attachment of Barrier Reflectors to CTB shall be per manufacturer's recommendations.
10. Missing or damaged Barrier Reflectors shall be replaced as directed by the Engineer.
11. Single slope barriers shall be delineated as shown on the above detail.

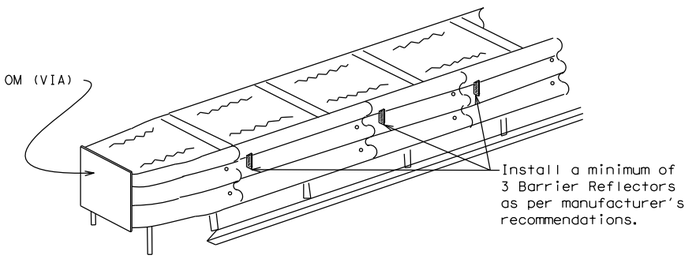


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

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.

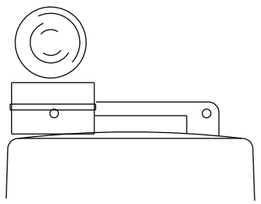


DELINEATION OF END TREATMENTS

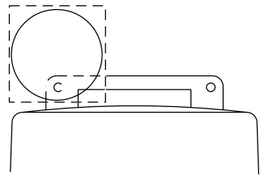
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the apppropriate 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



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

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. 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_{FL} or C_{FL} Sheeting meeting the requirements of Departmental Material Specification DMS-8300.
4. 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".
5. The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
6. 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.
7. 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.
8. The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

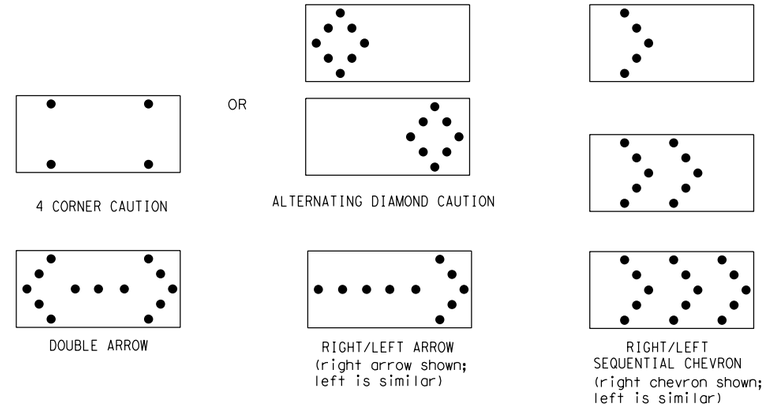
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing 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.
4. 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.
5. Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
6. Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
7. 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

1. 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.
2. 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.
3. The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
4. Round reflectors shall be fully reflectorized, including the area where attached to the drum.
5. 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.
6. 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.
7. When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
8. The warning reflector should be mounted on the side of the handle nearest approaching traffic.
9. The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.

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.

1. 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.
2. 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.
3. 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.
4. The Flashing Arrow Board should be able to display the following symbols:



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

RIGHT/LEFT ARROW
(right arrow shown;
left is similar)

RIGHT/LEFT
SEQUENTIAL CHEVRON
(right chevron shown;
left is similar)

5. The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
6. The straight line caution display is NOT ALLOWED.
7. 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.
8. 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.
9. The sequential arrow display is NOT ALLOWED.
10. The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
11. The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
12. A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
13. 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.
14. 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

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. 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.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SJT	TOM GREEN		17

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GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. 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.
3. 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.
4. 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).
5. 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.
6. 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:

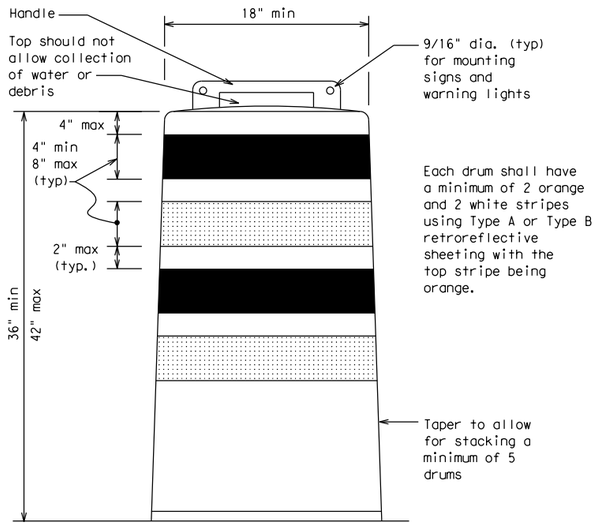
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
9. Drum body shall have a maximum unballasted weight of 11 lbs.
10. Drum and base shall be marked with manufacturer's name and model number.

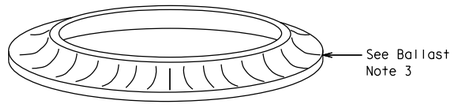
RETROREFLECTIVE SHEETING

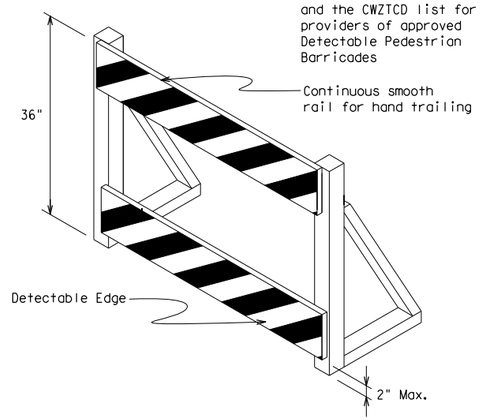
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall 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

1. 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.
2. 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.
3. Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
4. 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.
5. 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.
6. Ballast shall not be placed on top of drums.
7. Adhesives may be used to secure base of drums to pavement.

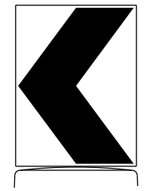




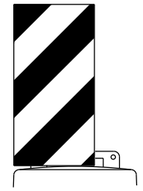


DETECTABLE PEDESTRIAN BARRICADES

1. 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.
2. 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.
3. 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.
4. 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.
5. Warning lights shall not be attached to detectable pedestrian barricades.
6. 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

1. Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
2. 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.
3. 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.
4. 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.
5. Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
6. Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
7. 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.
8. 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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	SJT	TOM GREEN		18
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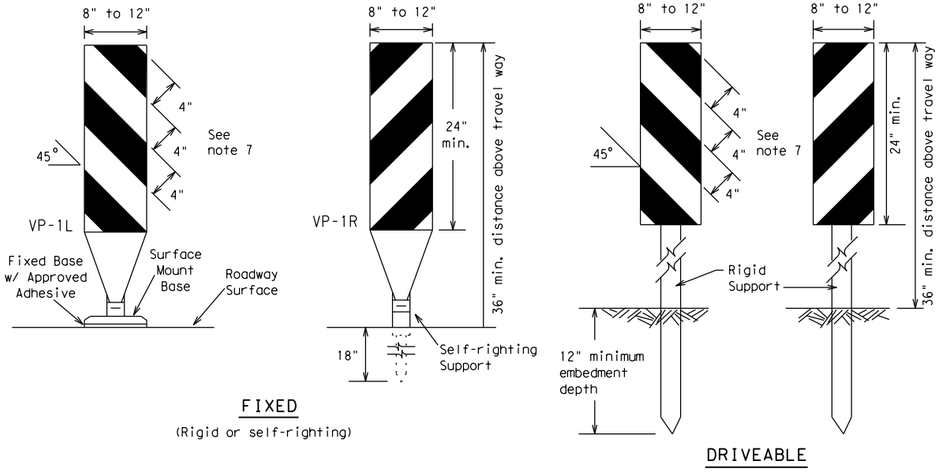
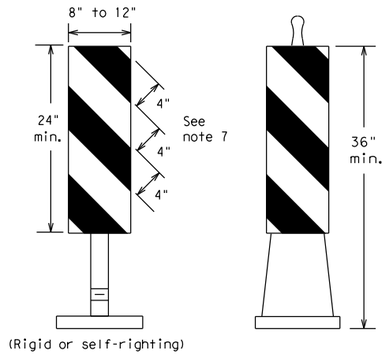


FIXED

(Rigid or self-righting)

DRIVEABLE

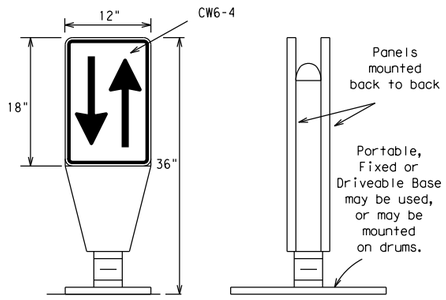


(Rigid or self-righting)

PORTABLE

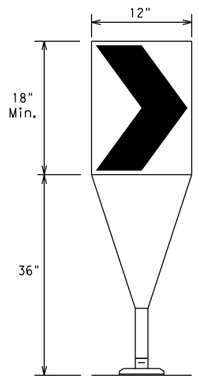
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual for additional requirements on the use VP's for drop-offs.
3. 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.
4. VP's used on expressways and freeways or other high speed roadways, may have more than 270 square inches of retroreflective area facing traffic.
5. Self-righting supports are available with portable base. See "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
6. Sheeting for the VP's shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



1. 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.
2. The OTLD may be used in combination with 42" cones or VPs.
3. Spacing between the OTLD shall not exceed 500 feet. 42" cones or VPs placed between the OTLD's should not exceed 100 foot spacing.
4. 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.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



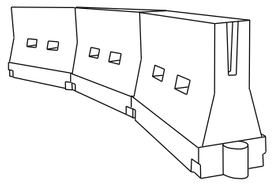
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. 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.
3. 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.
4. To be effective, the chevron should be visible for at least 500 feet.
5. 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.
6. For Long Term Stationary use on tapers or transitions on freeways and divided highways, self-righting chevrons may be used to supplement plastic drums but not to replace plastic drums.

CHEVRONS

GENERAL NOTES

1. 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).
2. 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.
3. 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).
4. 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.
5. Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
6. 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.
7. 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.



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. 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.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. 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

1. 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.
2. 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.
3. 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.
4. 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.
5. 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

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	$L = \frac{WS^2}{60}$	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

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Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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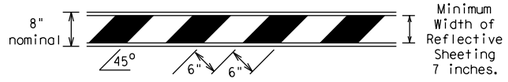
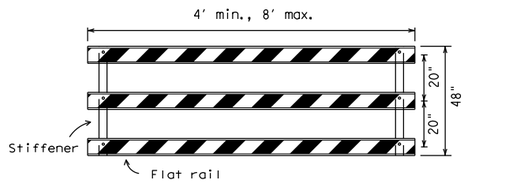
TYPE 3 BARRICADES

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.



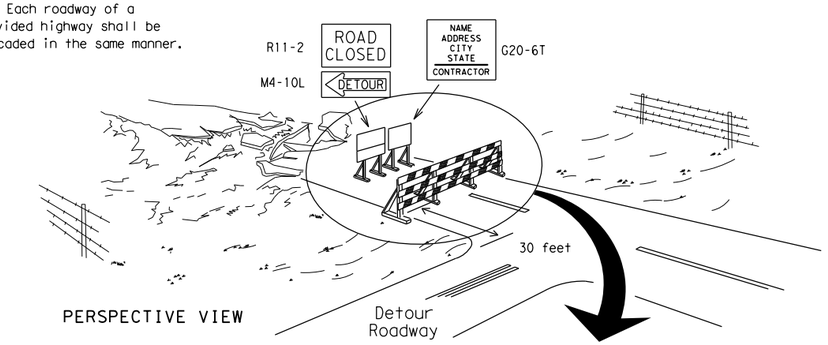
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



Stiffener may be inside or outside of support, but no more than 2 stiffeners shall be allowed on one barricade.

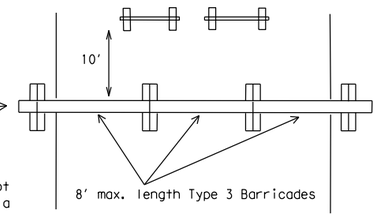
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

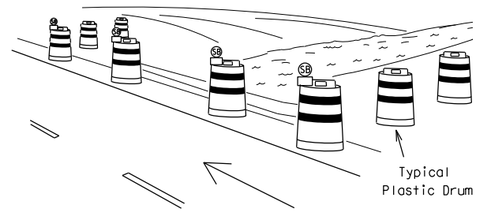
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

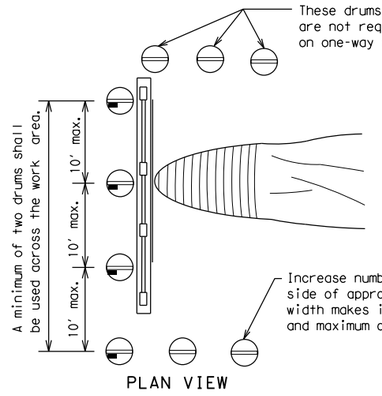
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

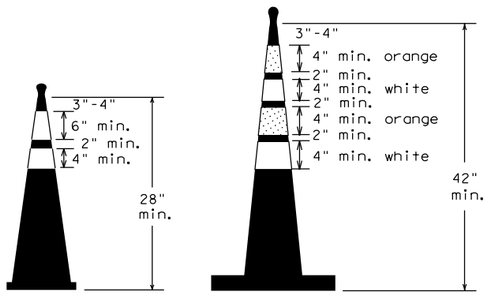
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder 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.



PLAN VIEW

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

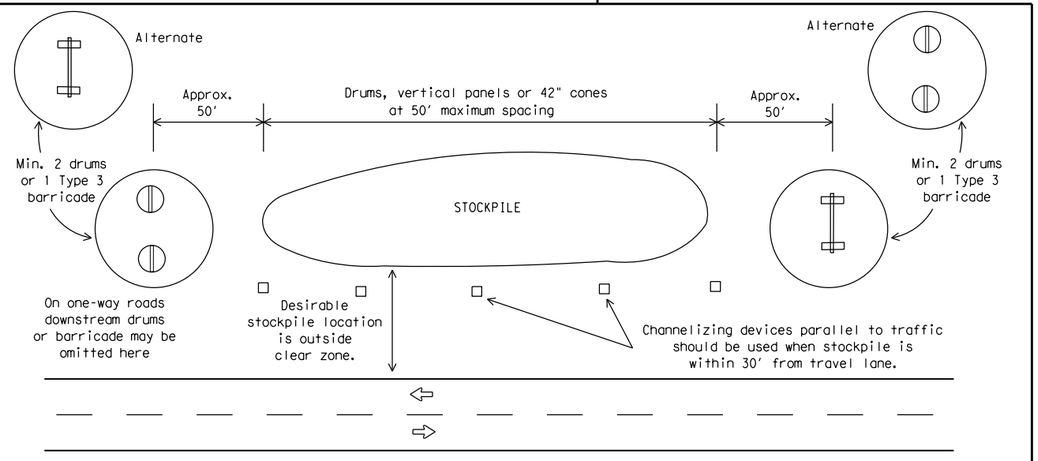
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



28" Cones shall have a minimum weight of 9 1/2 lbs.

42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

1. 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.
2. Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
3. Additional supplemental pavement marking details may be found in the plans or specifications.
4. Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
5. 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).
6. 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.
7. All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

1. Raised pavement markers are to be placed according to the patterns on BC(12).
2. 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

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

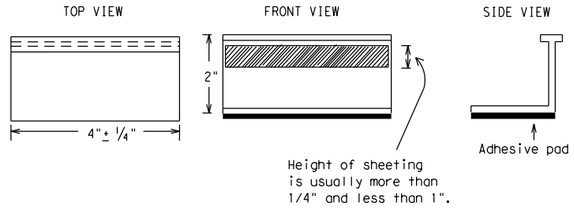
MAINTAINING WORK ZONE PAVEMENT MARKINGS

1. The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
2. 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.
3. 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.
4. 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

1. 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.
2. 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.
3. 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".
4. The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
5. Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
6. Blast cleaning may be used but will not be required unless specifically shown in the plans.
7. Over-painting of the markings SHALL NOT BE permitted.
8. Removal of raised pavement markers shall be as directed by the Engineer.
9. 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.
10. 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

1. Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
2. 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.
   A. 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.
   B. 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.
3. Small design variances may be noted between tab manufacturers.
4. 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

1. Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
2. All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
3. 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).

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

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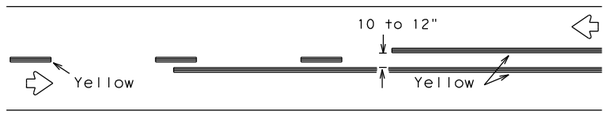
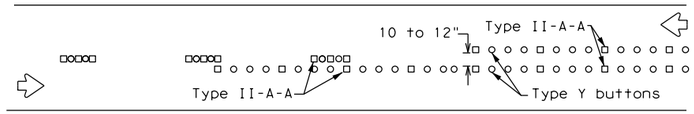
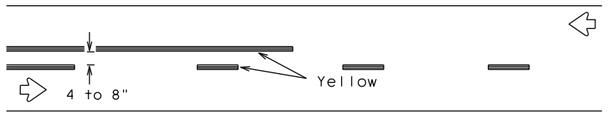
PAVEMENT MARKING PATTERNS



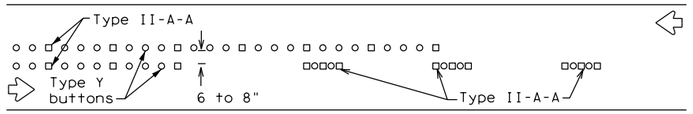
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



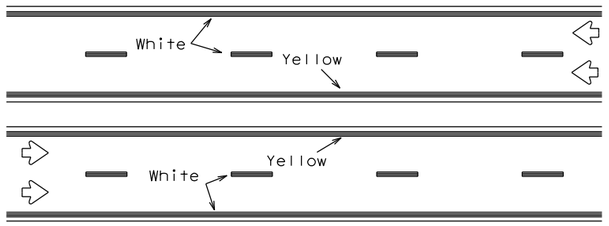
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



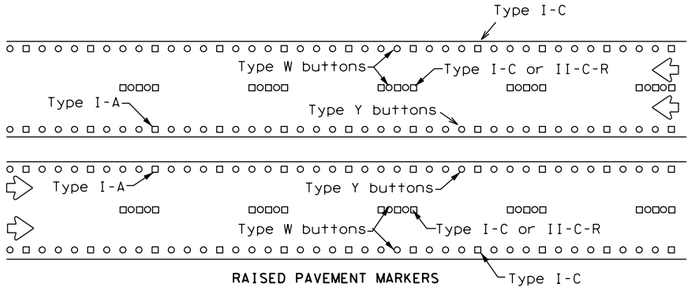
RAISED PAVEMENT MARKERS - PATTERN B

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.

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



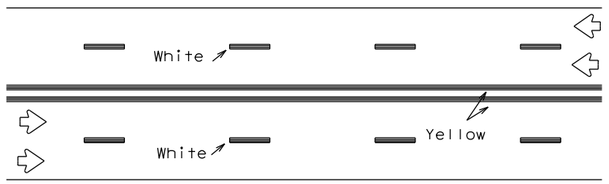
REFLECTORIZED PAVEMENT MARKINGS



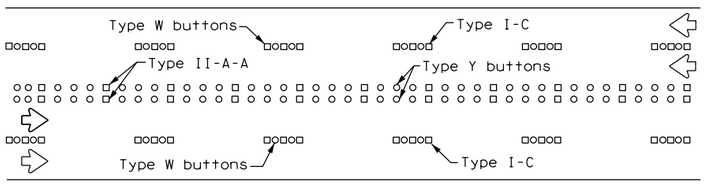
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



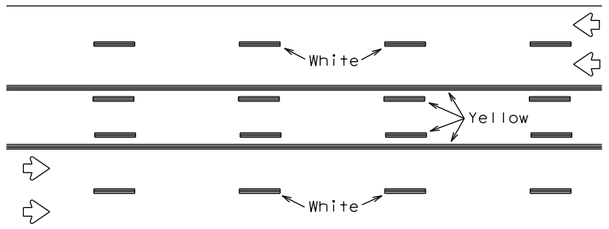
REFLECTORIZED PAVEMENT MARKINGS



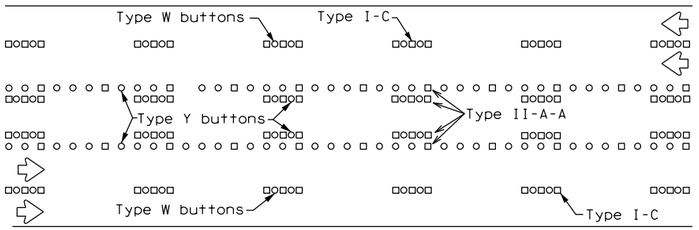
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

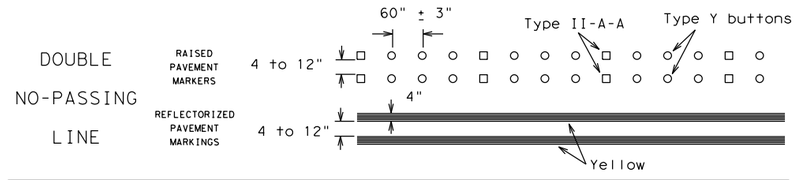
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

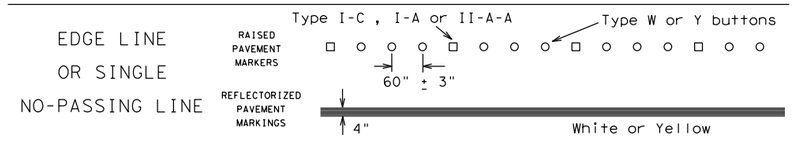
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

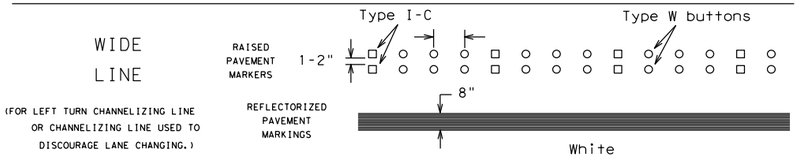


EDGE LINE OR SINGLE NO-PASSING LINE



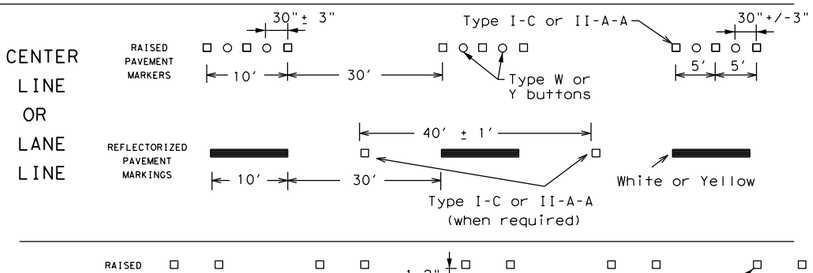
WIDE LINE

(FOR LEFT TURN CHANNELIZING LINE OR CHANNELIZING LINE USED TO DISCOURAGE LANE CHANGING.)

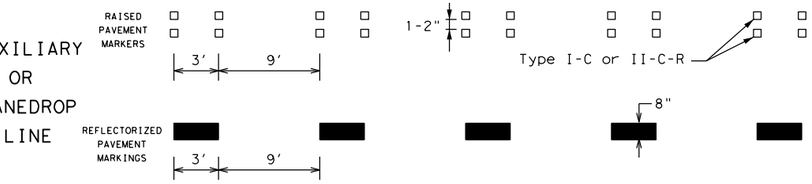


BROKEN LINES

CENTER LINE OR LANE LINE

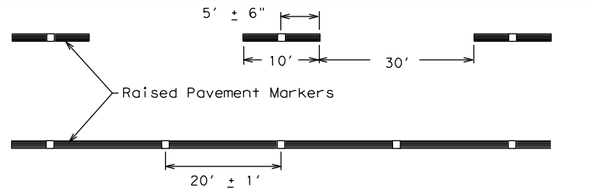


AUXILIARY OR LANEDROP LINE



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.



Centerline only - not to be used on edge lines

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."

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		22

DATE: 4/26/2024 12:26:42 PM
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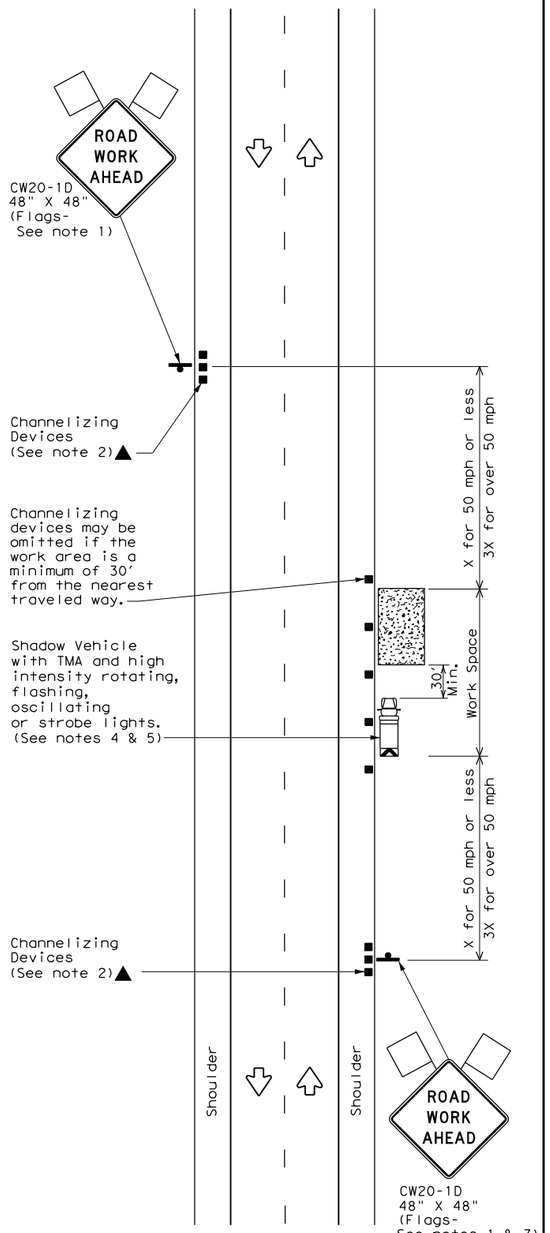
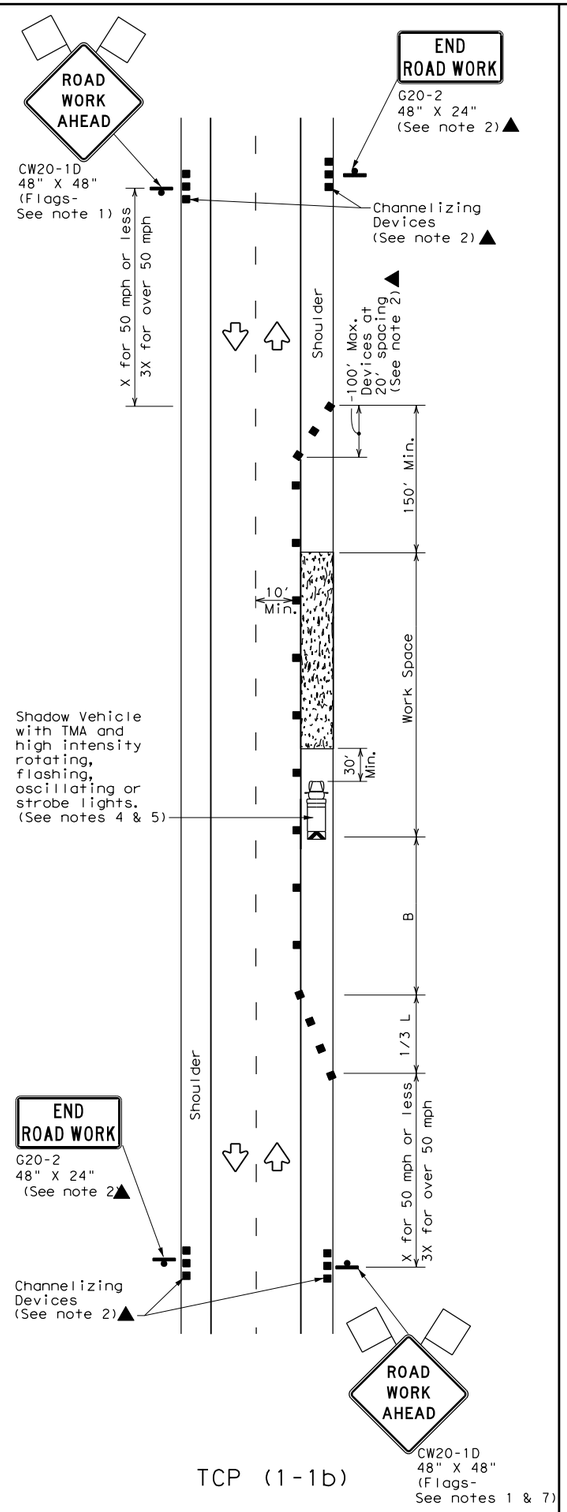


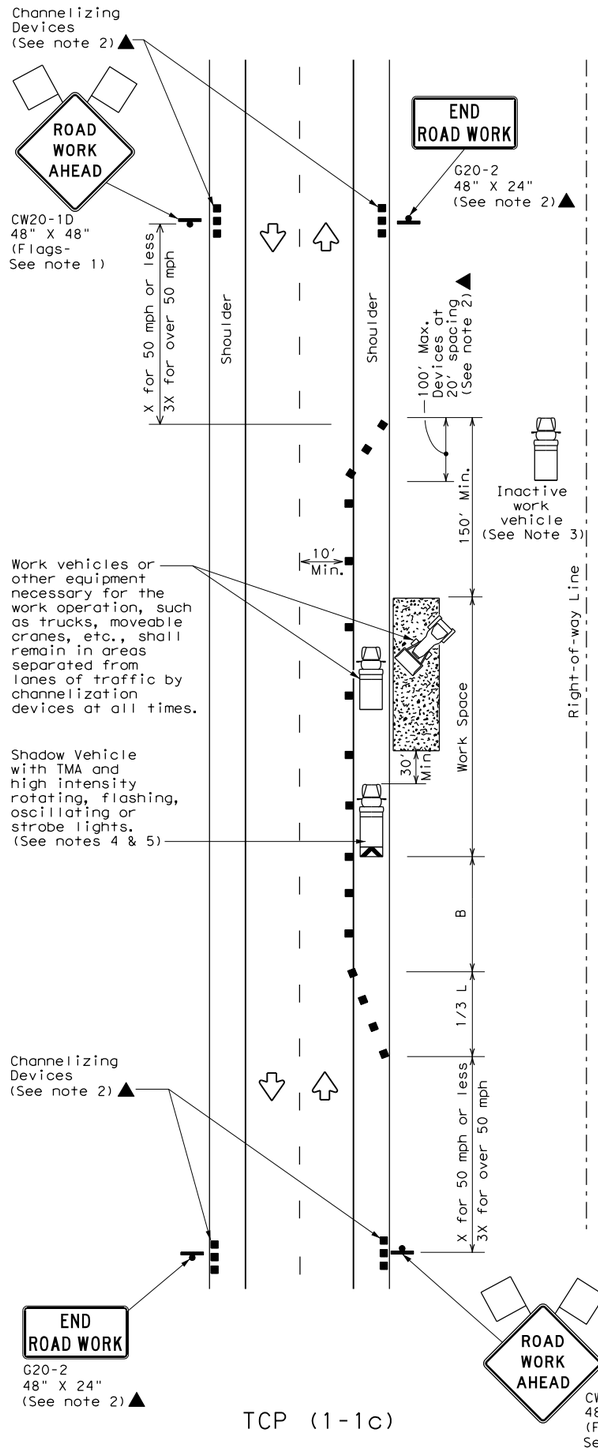
TCP (1-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (1-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (1-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. 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.
3. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
4. 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.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(1-1)-18

FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 2-12 1-97 2-18	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		23

151

DATE: 4/26/2024 12:27:07 PM
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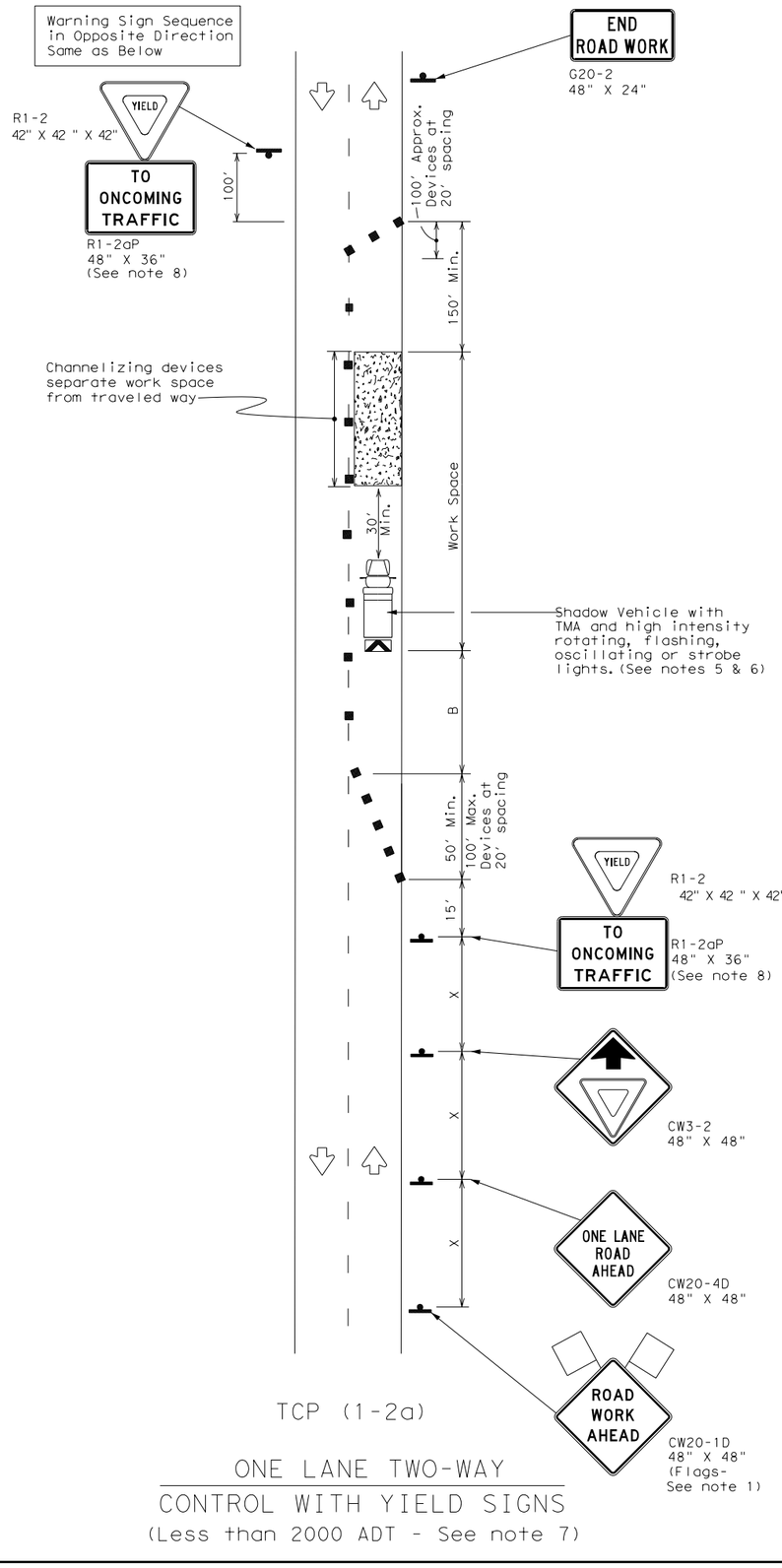
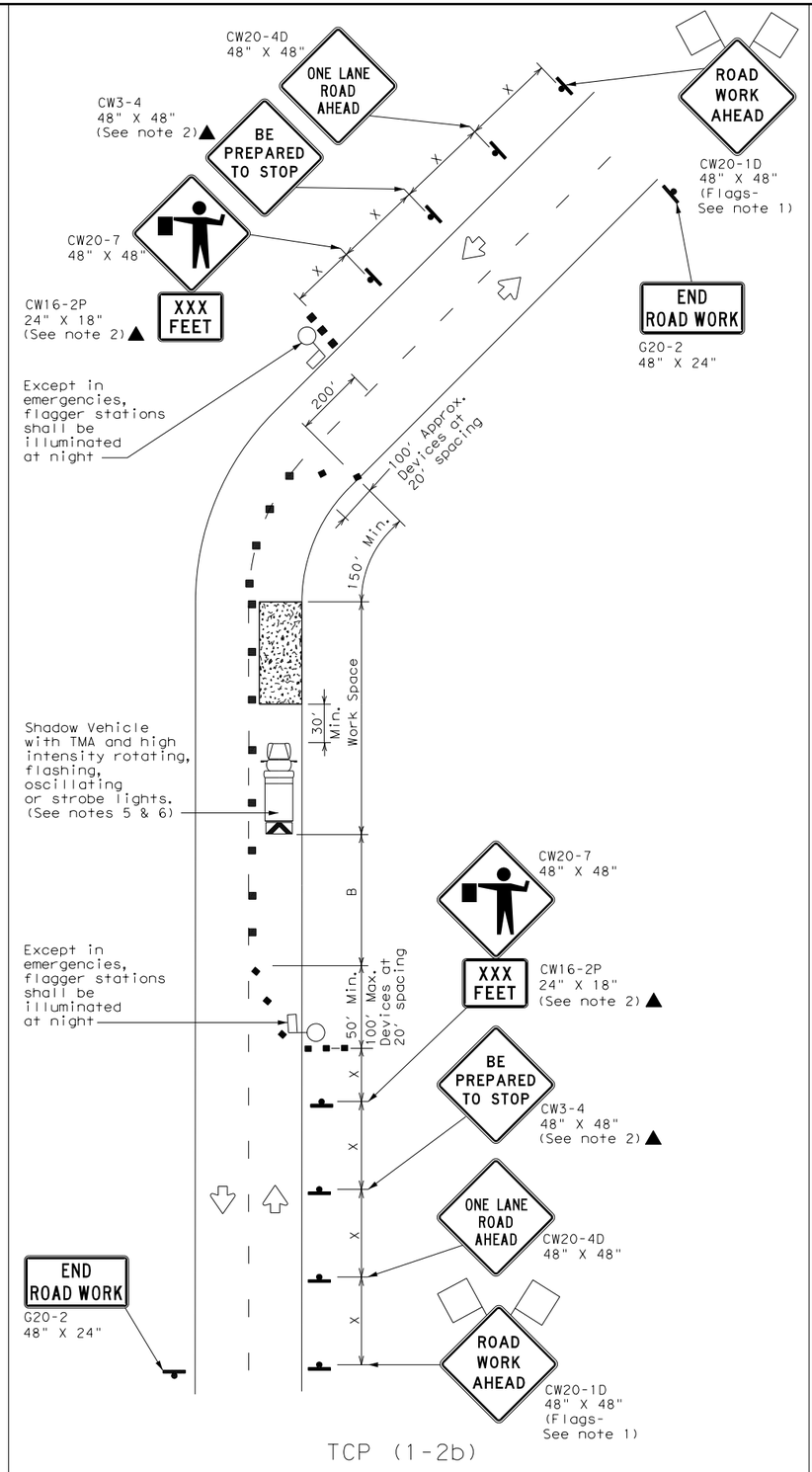


TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

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 ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* 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. Flags attached to signs where shown are REQUIRED.
2. 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.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. 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.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

7. R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work spaces should be no longer than one half city block. In rural areas on roadways with less than 2000 ADT, work spaces should be no longer than 400 feet.
8. R1-2 "YIELD" sign with R1-2aP "TO ONCOMING TRAFFIC" plaque shall be placed on a support at a 7 foot minimum mounting height.

TCP (1-2b)

9. Flaggers should use two-way radios or other methods of communication to control traffic.
10. Length of work space should be based on the ability of flaggers to communicate.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
12. Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
13. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	0907	00	229, ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		24

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DATE: 4/26/2024 12:27:52 PM
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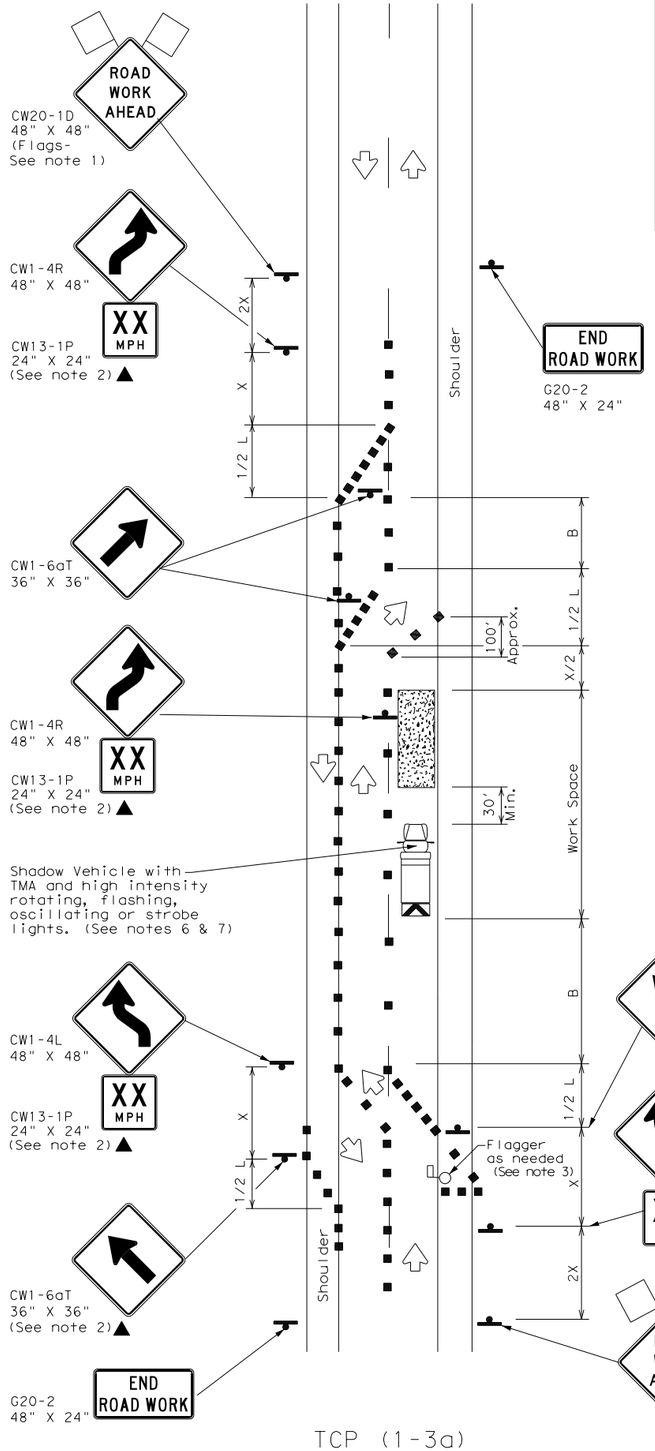
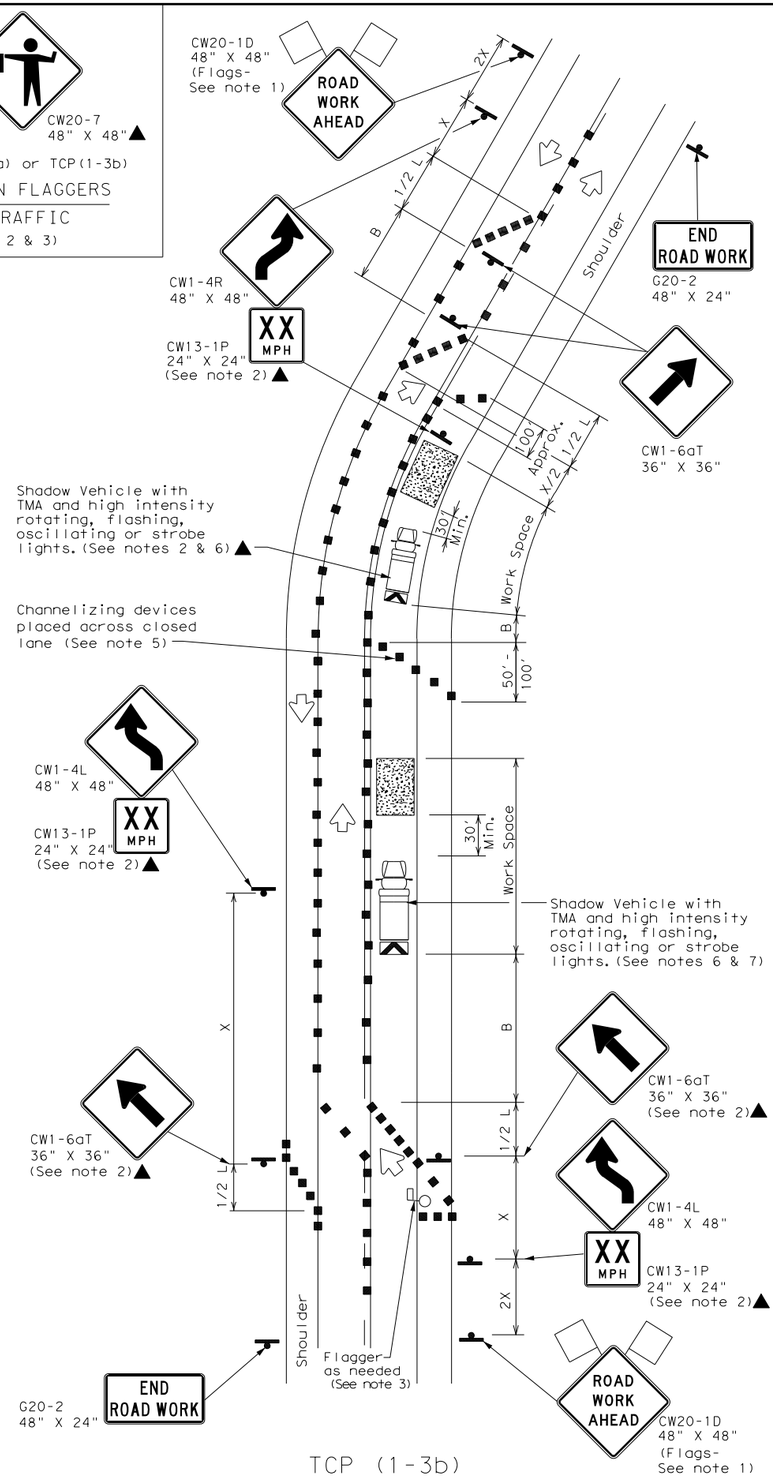


TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW

BE PREPARED TO STOP
CW3-4 48" X 48"
CW20-7 48" X 48"
For either TCP(1-3a) or TCP(1-3b)

USE ONLY WHEN FLAGGERS
CONTROL TRAFFIC
(See Notes 2 & 3)



TCP (1-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. 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.
3. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
6. 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.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
8. 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 speed are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-18

FILE: tcp1-3-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	SJT	TOM GREEN		25
1-97 2-18				

153

DATE: 4/26/2024 12:28:14 PM
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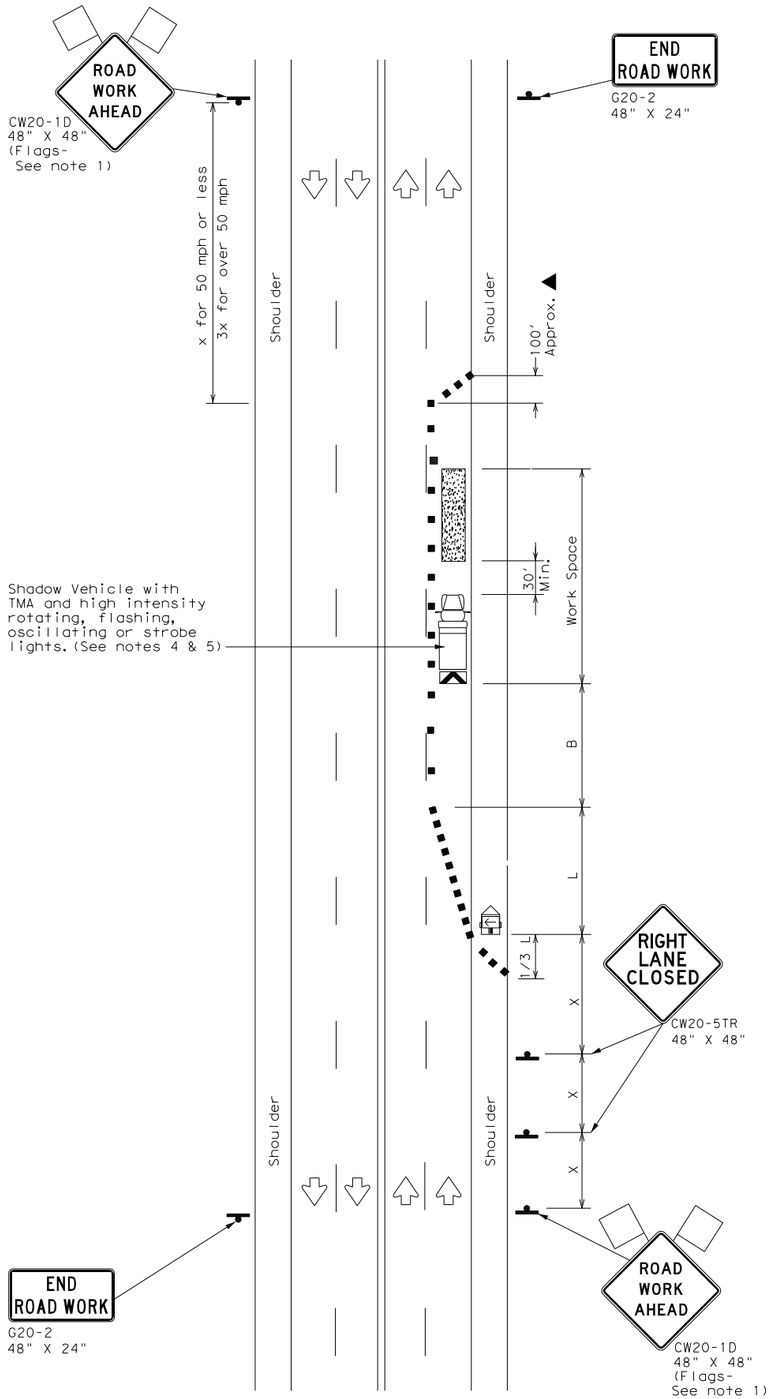
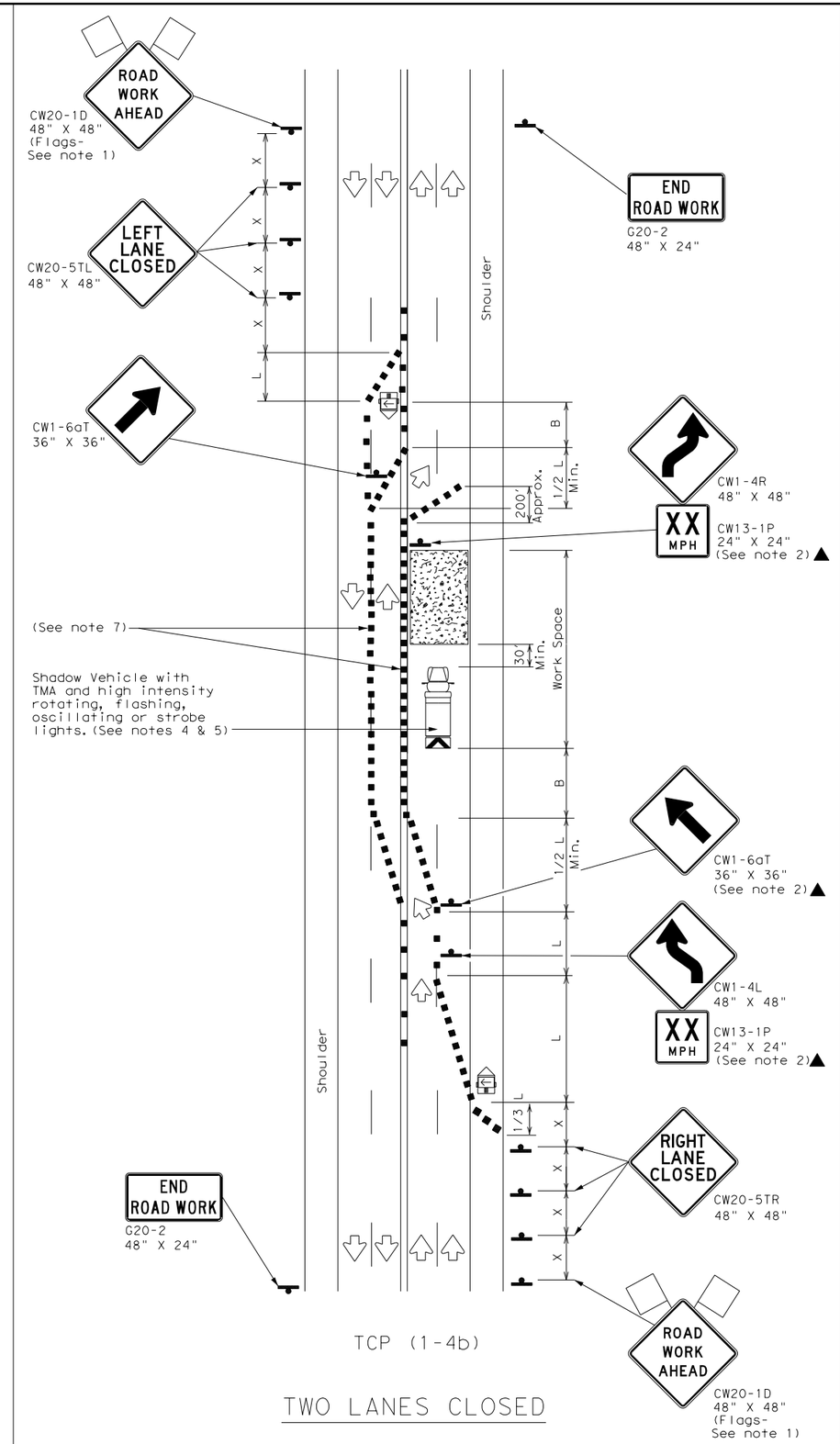


TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. 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.
3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. 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.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-4a)

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

TCP (1-4b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(1-4)-18

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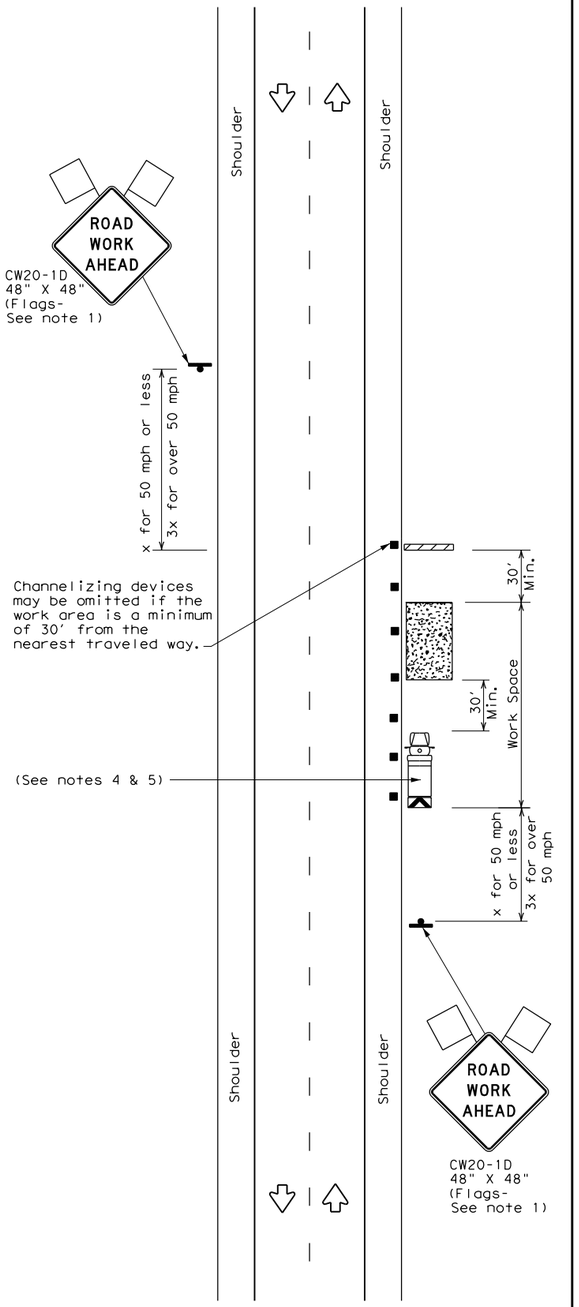
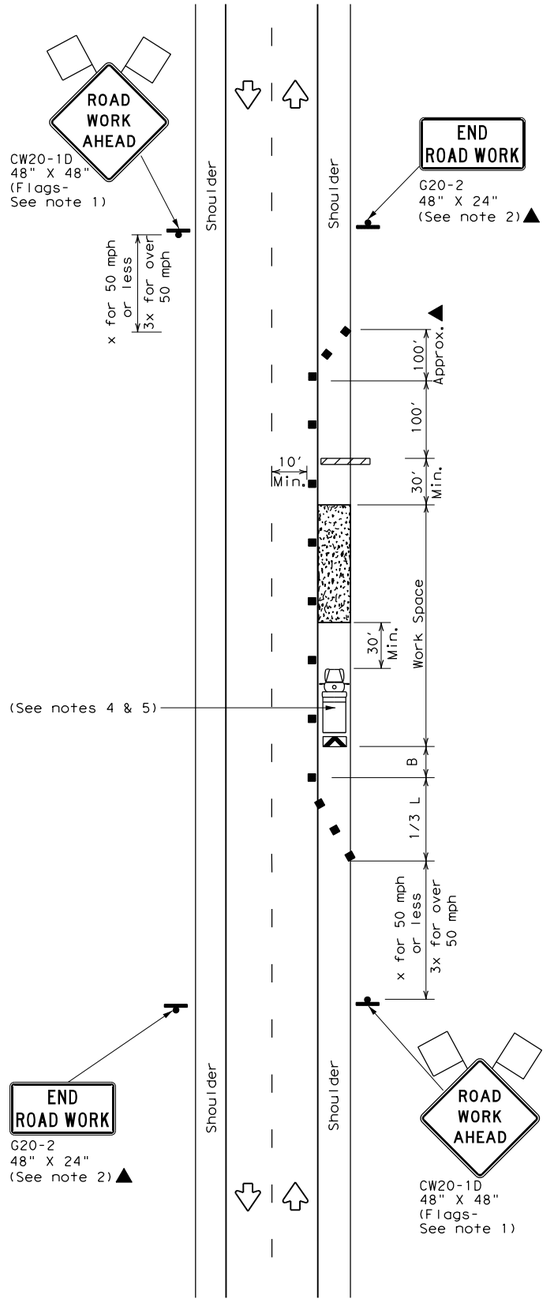
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	SJT	TOM GREEN		26
1-97 2-18				



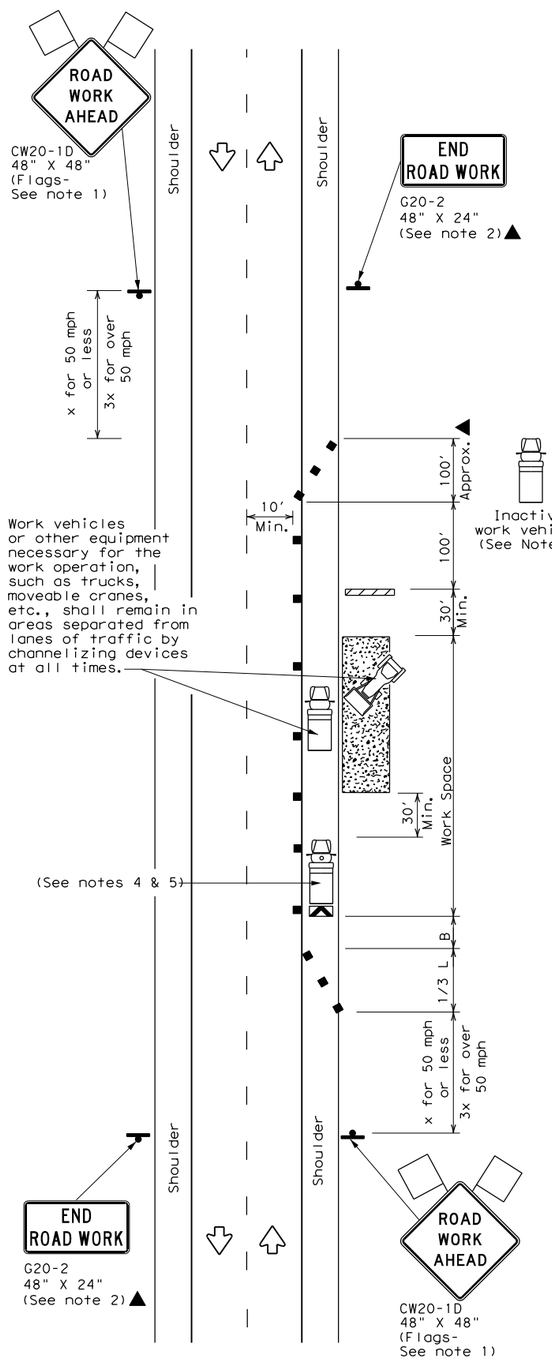
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. 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.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
2-94 4-98	DIST	COUNTY		SHEET NO.
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161

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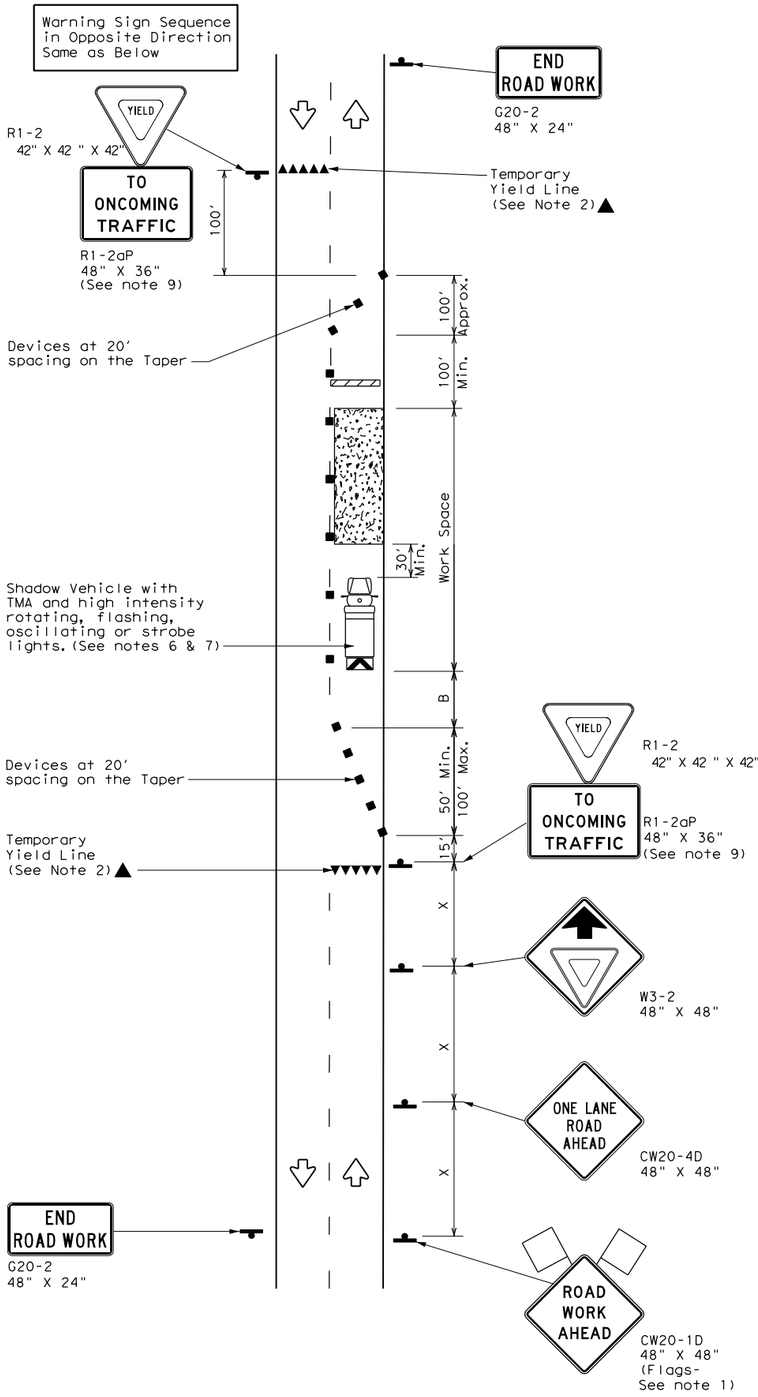
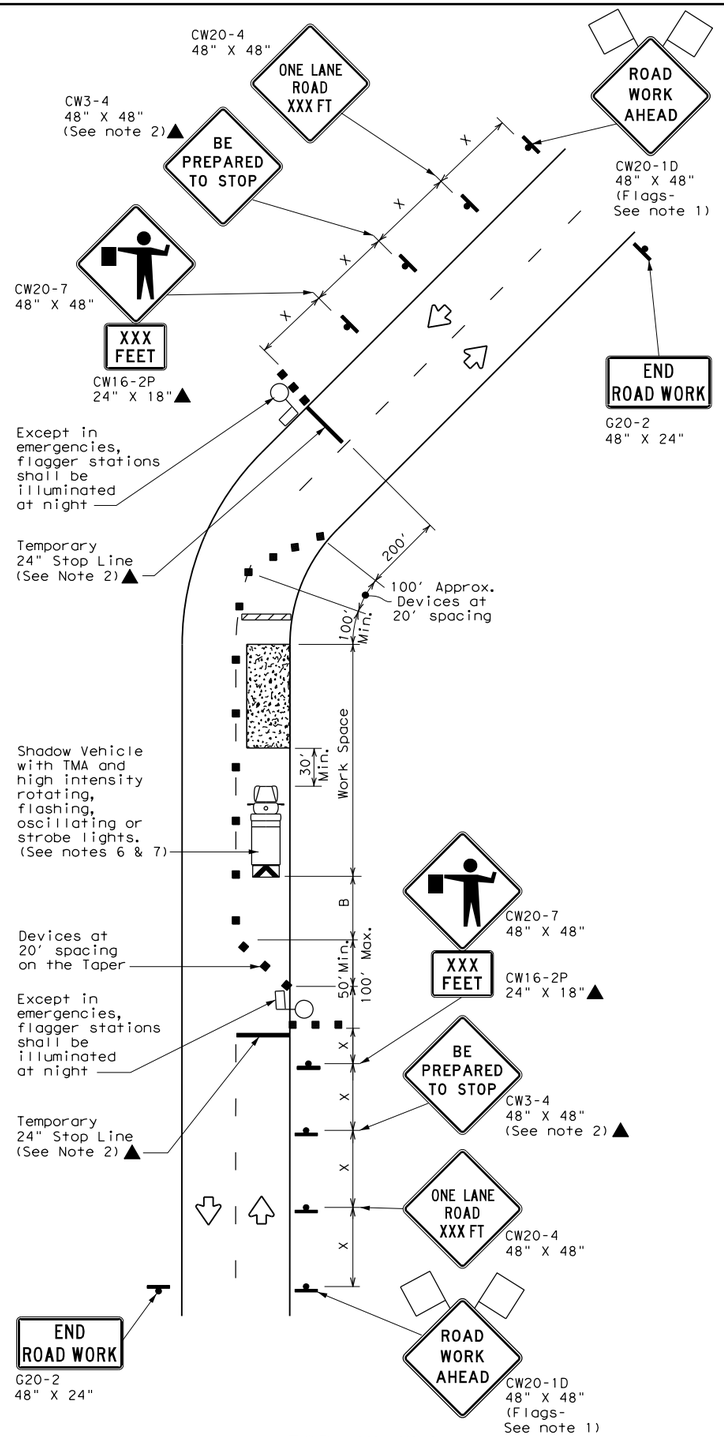


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"	Stopping Sight Distance
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45	L = WS	450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

* 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. Flags attached to signs where shown, are REQUIRED.
2. 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.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. 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.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

8. The R1-2 "YIELD" sign traffic control may be used on projects with approaches that have adequate sight distance. For projects in urban areas, work space should be no longer than one half city block. In rural areas, roadways with less than 2000 ADT, work space should be no longer than 400 feet.
9. The R1-2aP "YIELD TO ONCOMING TRAFFIC" sign shall be placed on a support at a 7 foot minimum mounting height.

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		28

162

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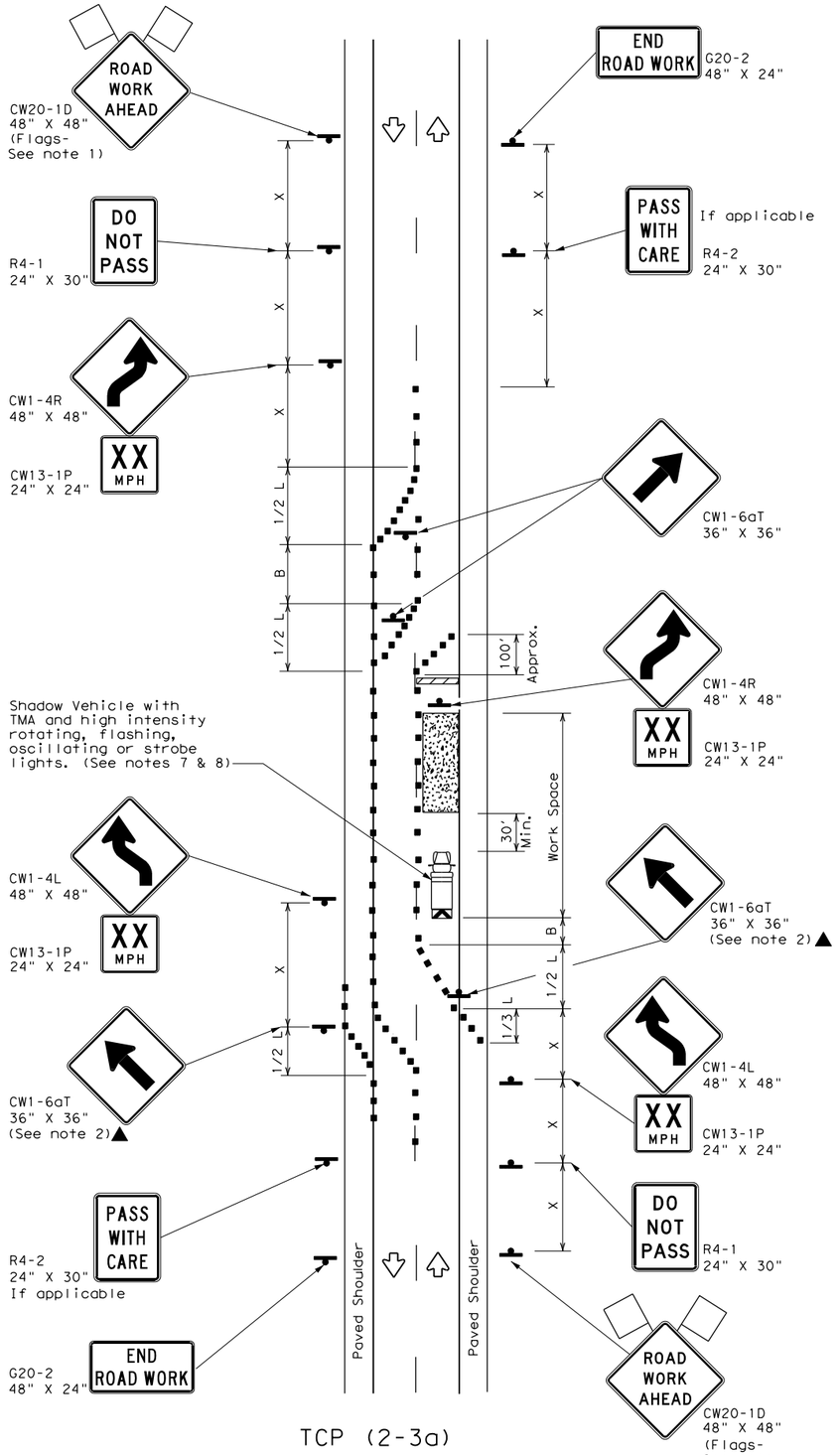
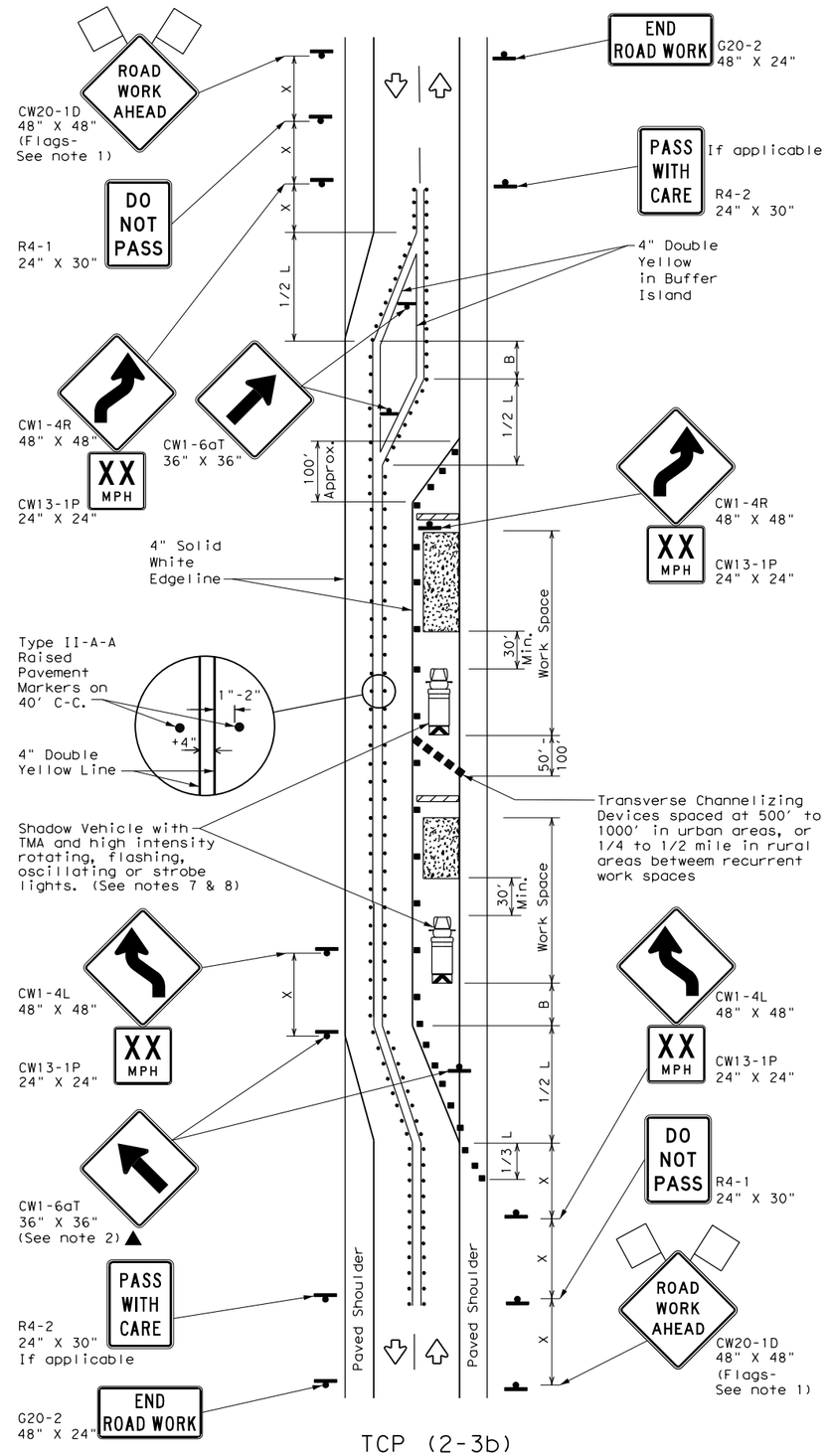


TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS
ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



TCP (2-3b)
2-LANE ROADWAY WITH PAVED SHOULDERS
ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers Ty II-AA
	Sign		Traffic Flow
	Flag		Flagger

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

* Conventional Roads Only

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
				TCP(2-3b)ONLY
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. 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.
3. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. 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.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

9. Conflicting pavement markings shall be removed for long-term projects. 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 device spacing is intended for the area of the conflicting markings, not the entire work zone.

Texas Department of Transportation | Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	SJT	TOM GREEN		29
4-98 2-18				

163

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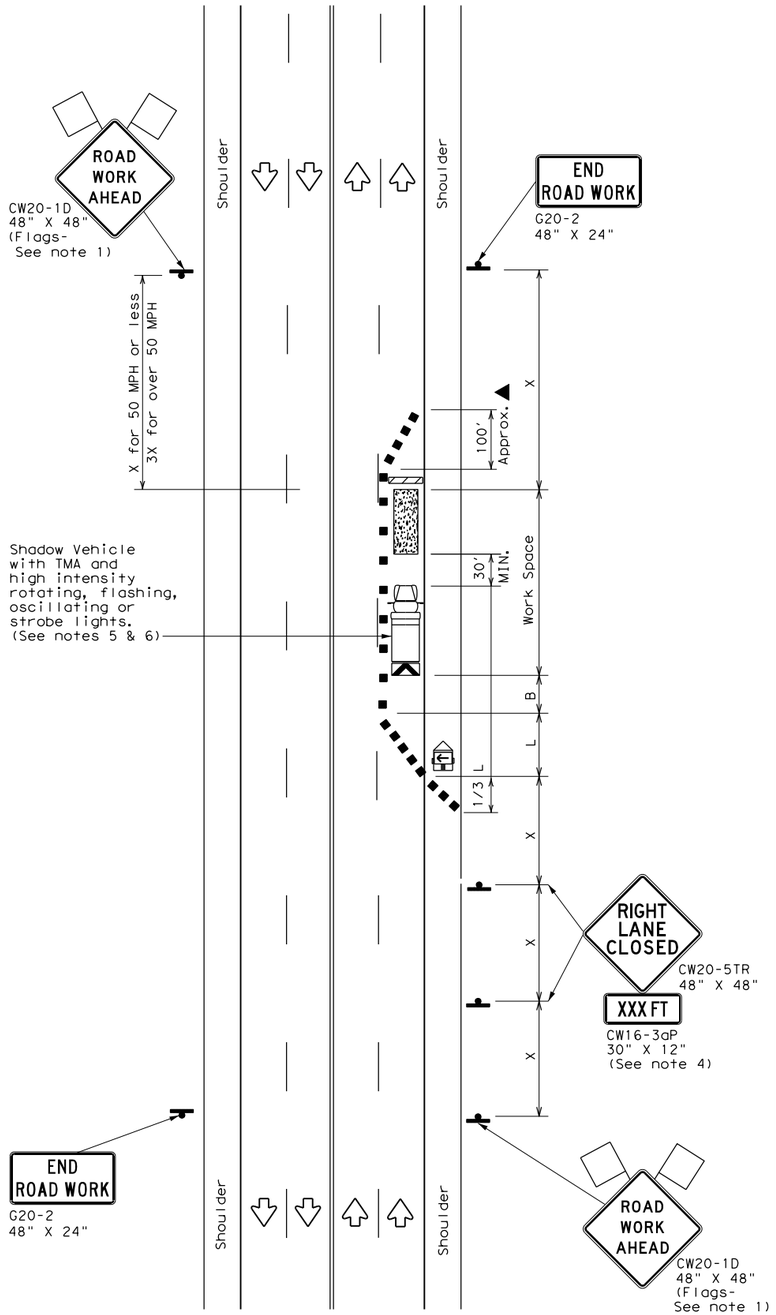
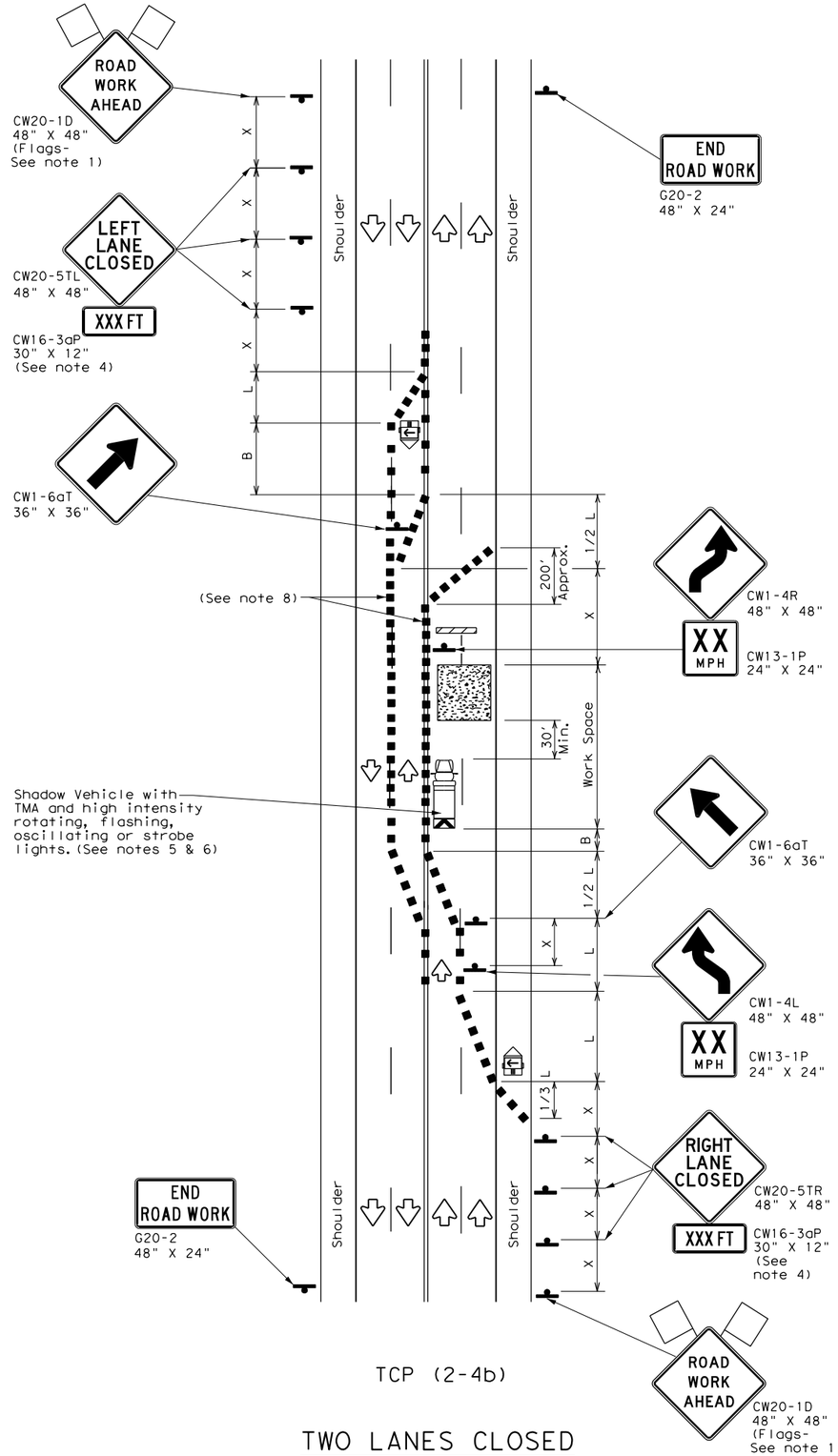


TCP (2-4a)

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. 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.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. 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.
5. 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.
6. 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)

7. 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)

8. 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.

Texas Department of Transportation — Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

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1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	SJT	TOM GREEN		30

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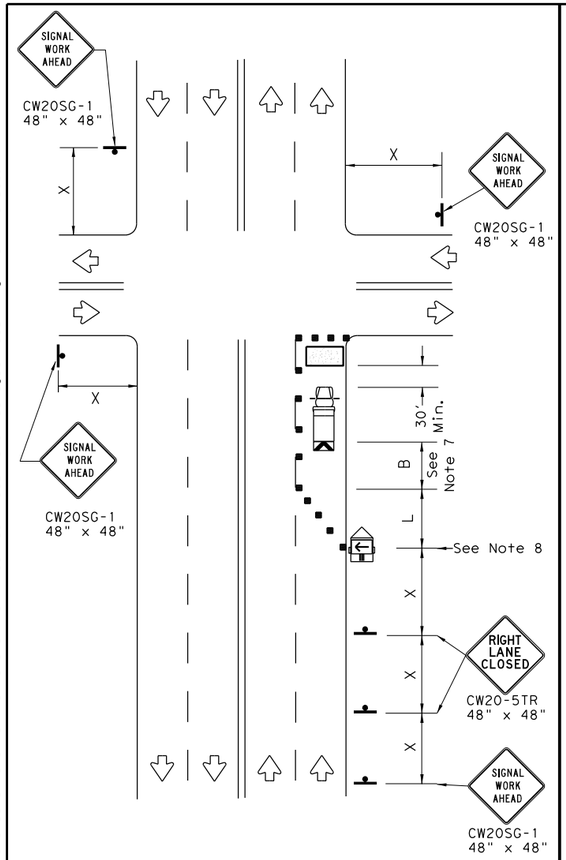
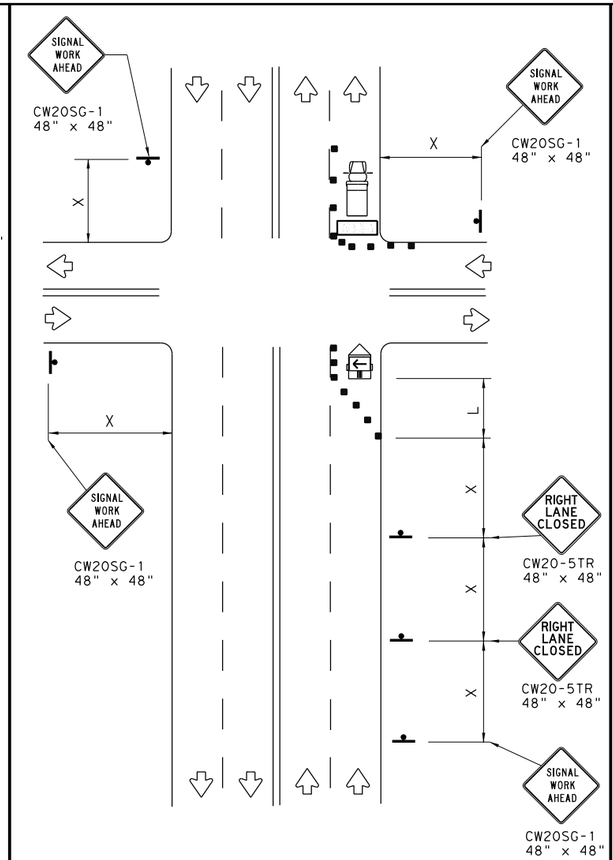


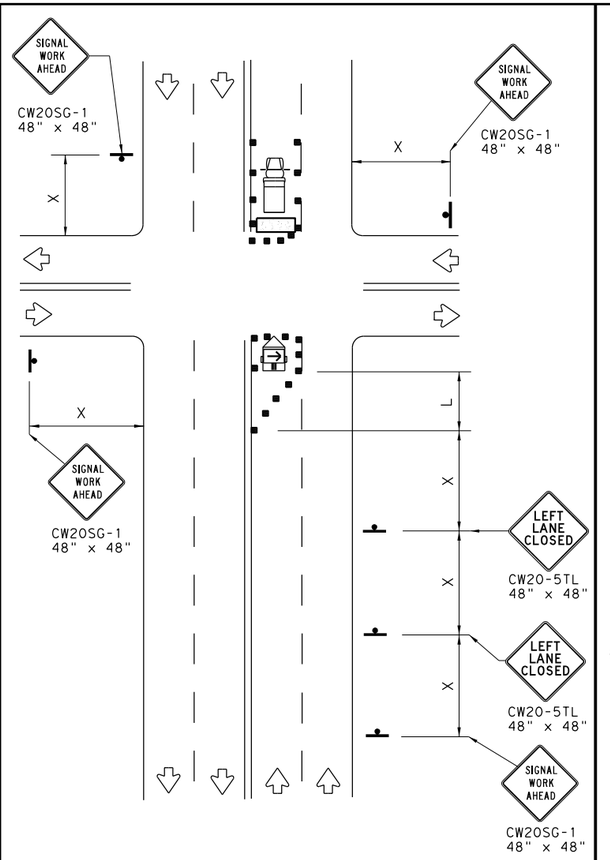
NEAR SIDE LANE CLOSURE

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

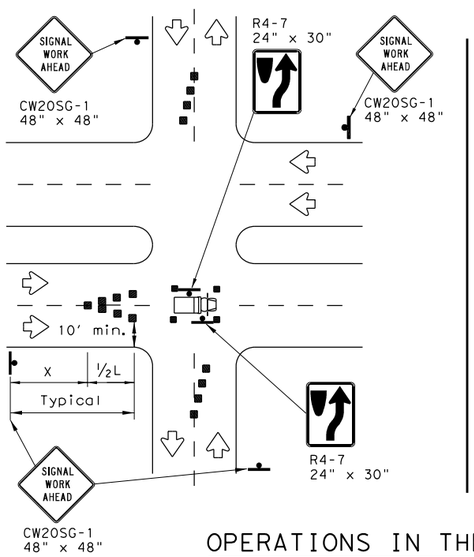
LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	M	Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

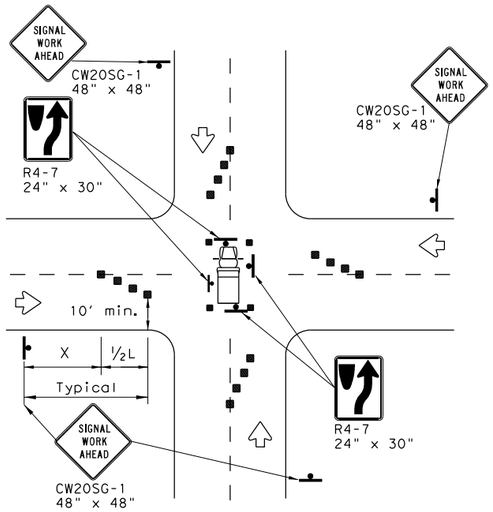
Posted Speed *	Formula	Minimum Desirable Taper Lengths ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
35	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

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

SHEET 1 OF 2

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ(BTS-1)-13

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©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
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4-98 3-03	SJT	TOM GREEN		31

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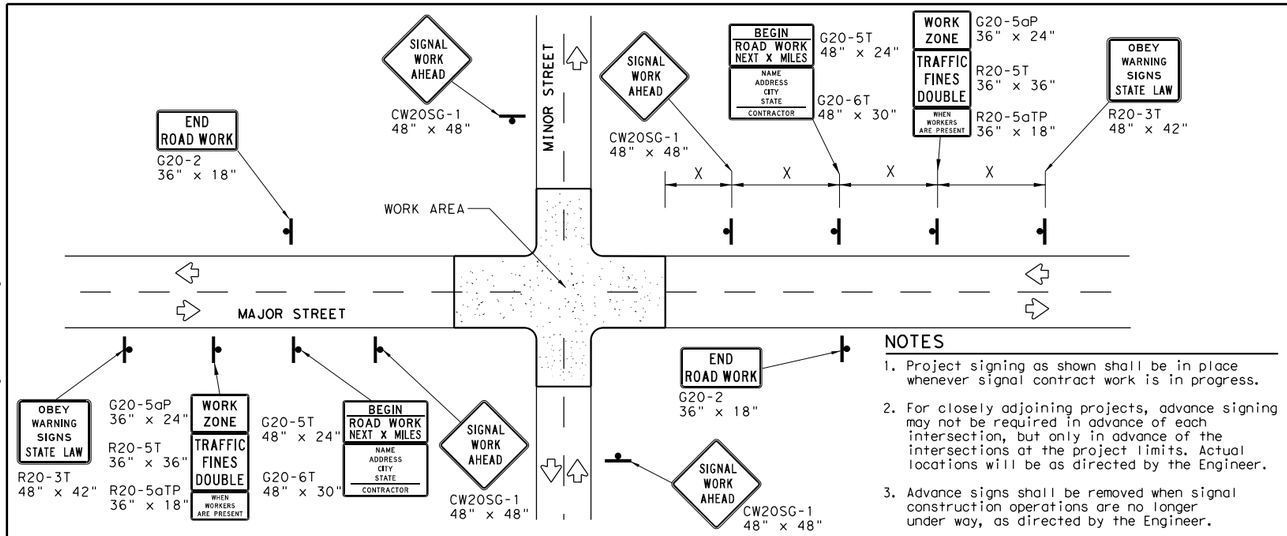


TYPICAL ADVANCE SIGNAL PROJECT SIGNING

FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

NOTES

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 6G.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

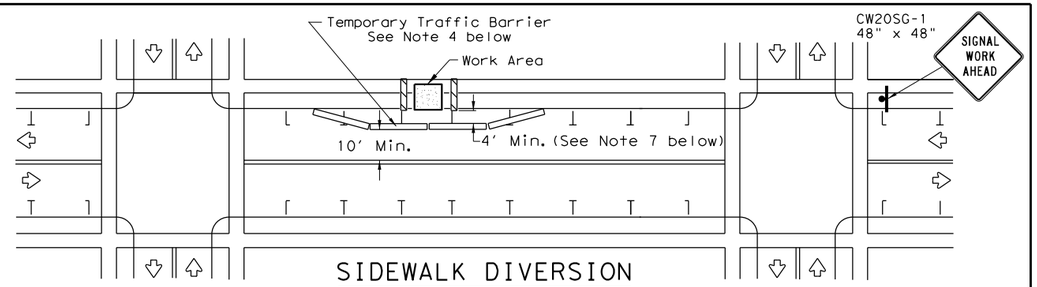
1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support 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 fastners. 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

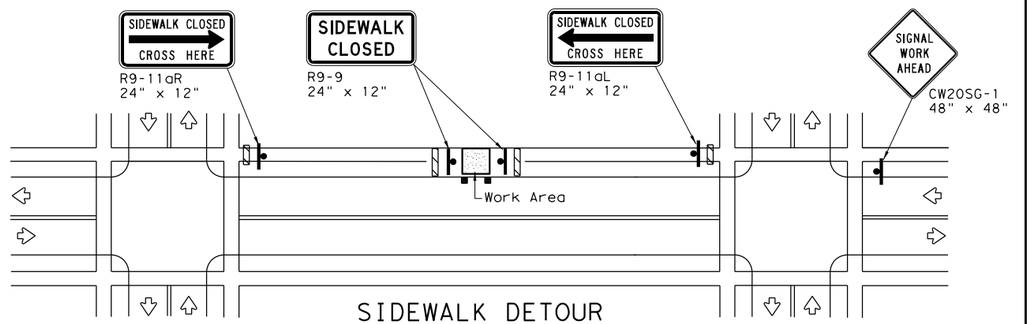
DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

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

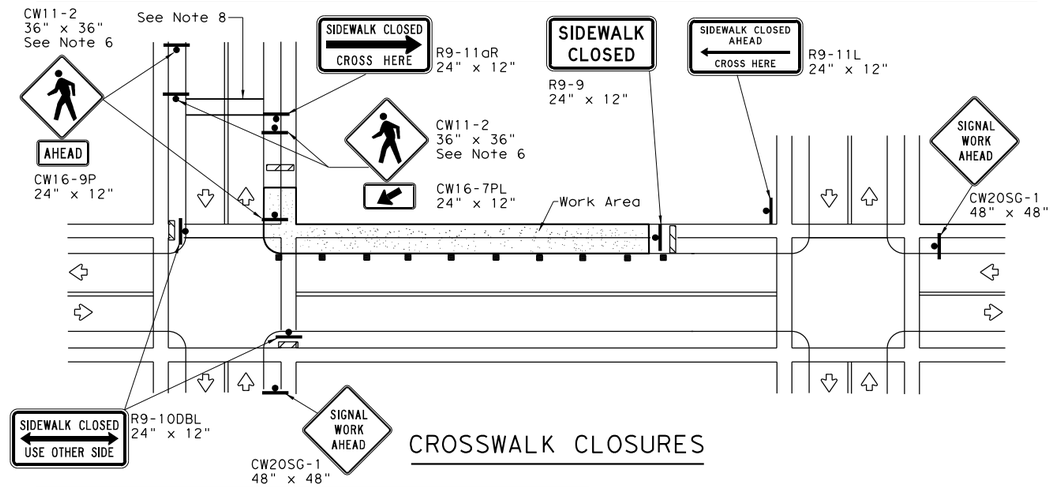
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

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

Texas Department of Transportation

Traffic Operations Division Standard

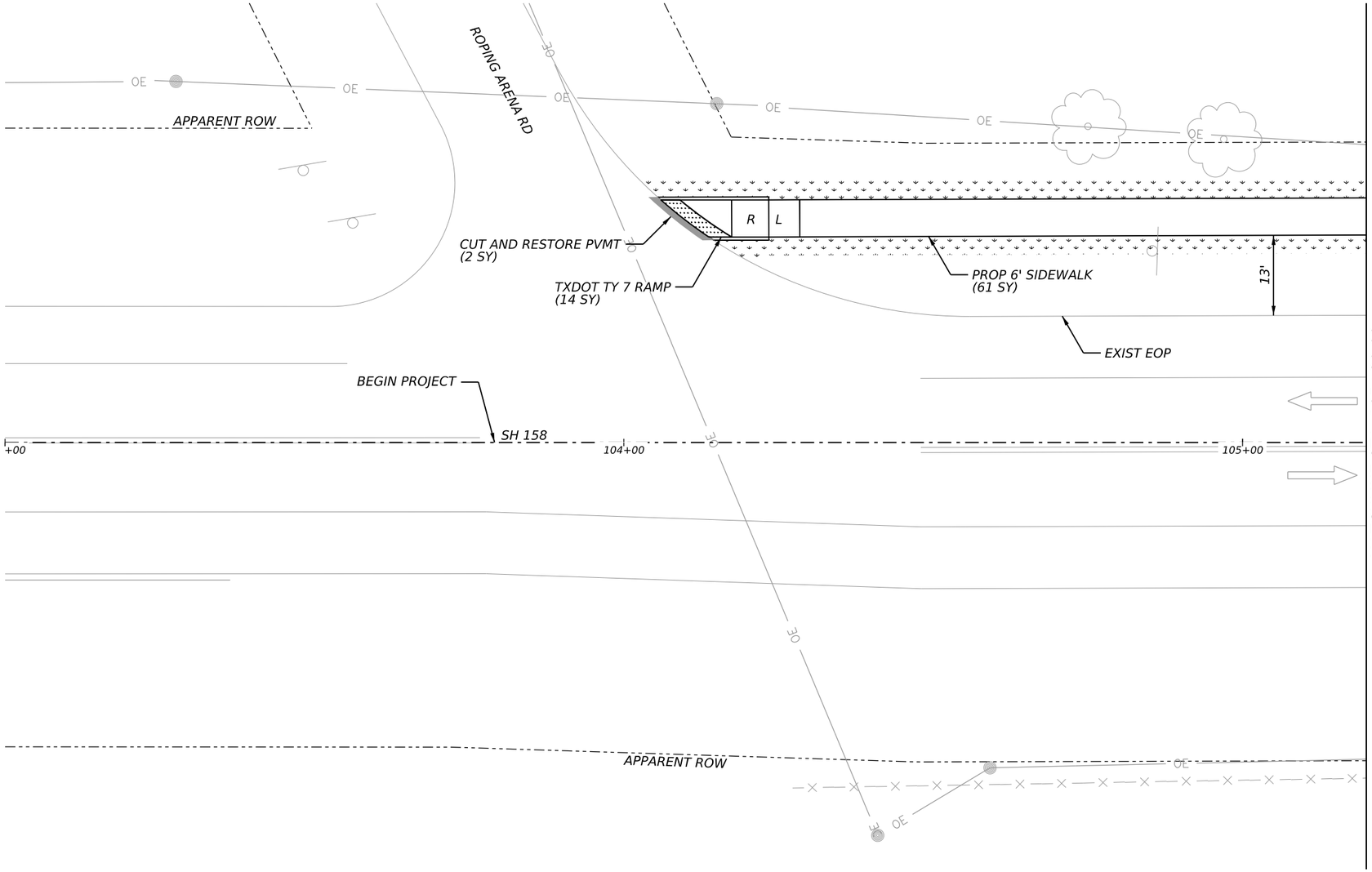
TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ(BTS-2)-13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229, ETC	RM 584
2-98 10-99 7-13	DIST	COUNTY		SHEET NO.
4-98 3-03	SJT	TOM GREEN		32

DATE: 4/26/2024 12:30:05 PM
FILE: c:\pw\khl\d0251616\wzbts-13.dgn

SHEET #			1
ITEM	DESCRIPTION	UNIT	QTY
0162 6002	BLOCK SODDING	SY	74
0400 6008	CUT & RESTORE ASPH PAVING	SY	2
0531 6001	CONC SIDEWALKS (4")	SY	61
0531 6024	CURB RAMPS (TY 7)	SY	14



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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
- POWER/UTILITY POLE
- R RAMP
- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
- MISCELLANEOUS STRUC
- IRRIGATION CONTROLS
- UTILITY WITNESS
- SL LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
- TRAFFIC FLOW
- SB TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL POLE
- TREE/BUSHES
- W WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation
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SIDEWALK PLAN

SH 158
AT ROPING ARENA RD

BRONTE, TEXAS

SHEET 1 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	33
0907	00	229,ETC	

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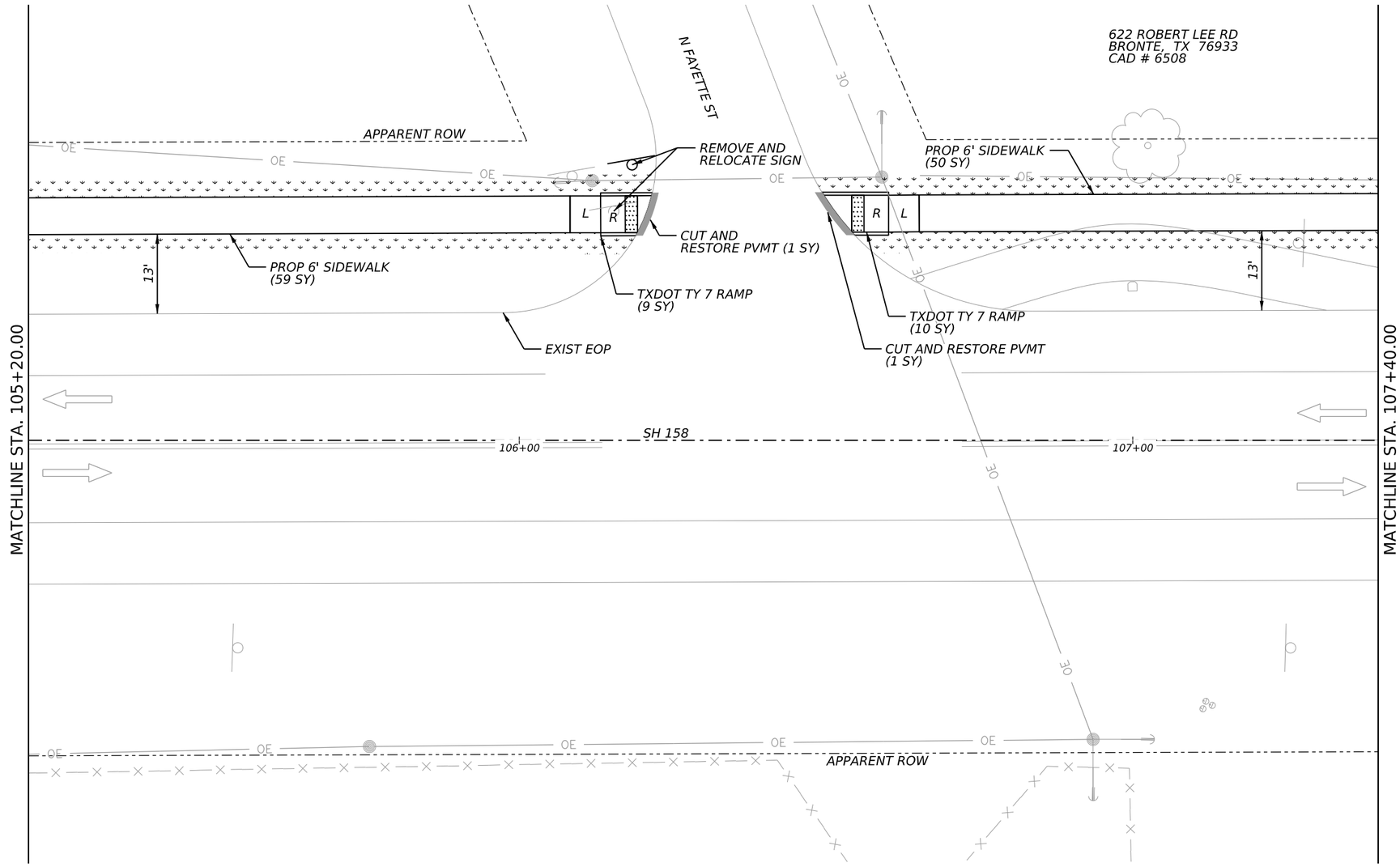
SHEET #			2
ITEM	DESCRIPTION	UNIT	QTY
0162 6002	BLOCK SODDING	SY	128
0400 6008	CUT & RESTORE ASPH PAVING	SY	2
0531 6001	CONC SIDEWALKS (4")	SY	109
0531 6024	CURB RAMPS (TY 7)	SY	19
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1



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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
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- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
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SIDEWALK PLAN

SH 158
AT N FAYETTE ST

BRONTE, TEXAS

SHEET 2 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	34
0907	00	229,ETC	

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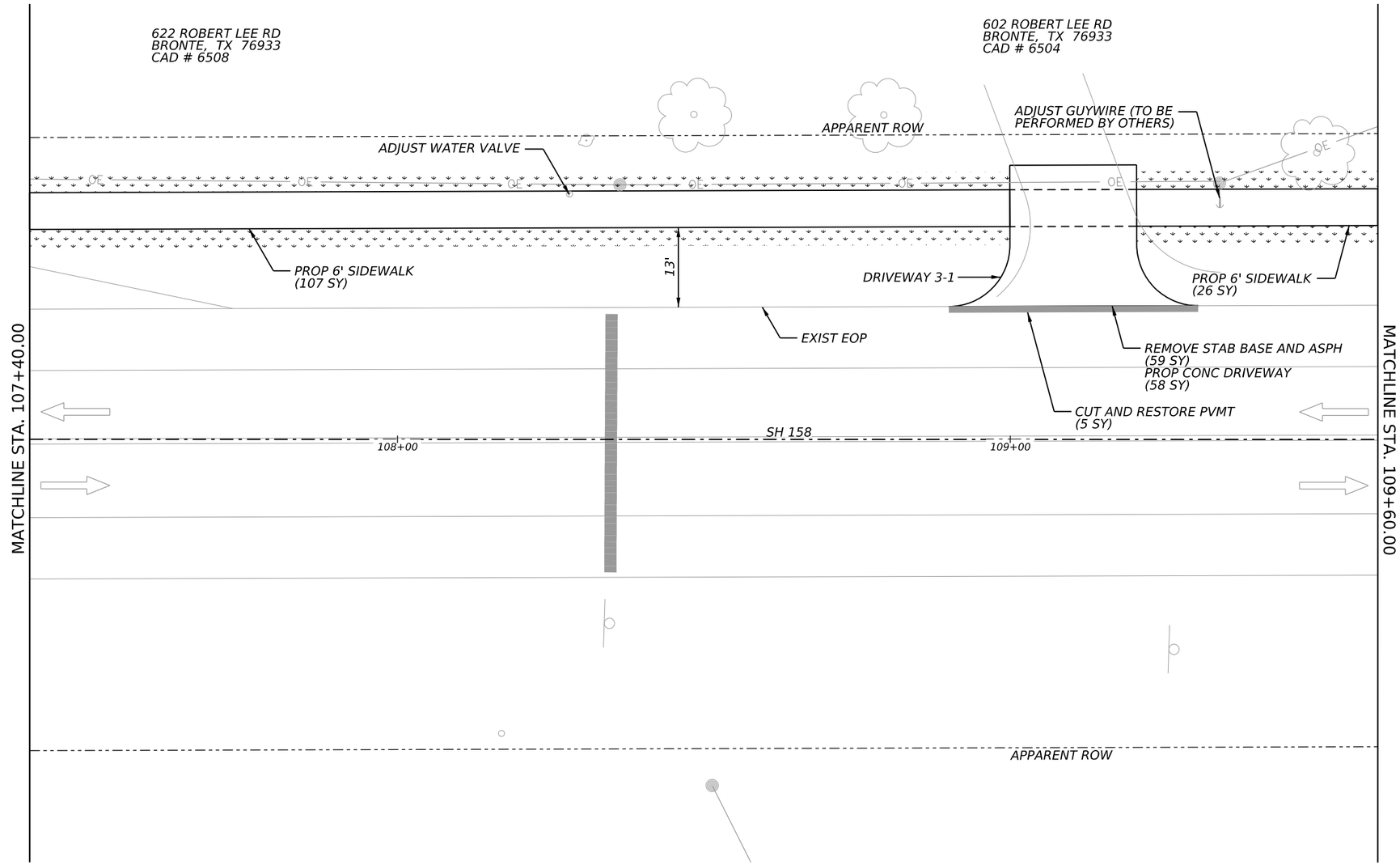
SHEET #			3
ITEM	DESCRIPTION	UNIT	QTY
0105 6037	REMOVING STAB BASE & ASPH PAV(0"-16")	SY	59
0162 6002	BLOCK SODDING	SY	147
0400 6008	CUT & RESTORE ASPH PAVING	SY	5
0530 6004	DRIVEWAYS (CONC)	SY	58
0531 6001	CONC SIDEWALKS (4")	SY	133



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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
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- TRAFFIC SIGNAL CONTROLLER
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- W WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
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PROFESSIONAL ENGINEER

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SIDEWALK PLAN

SH 158 BETWEEN N FAYETTE ST AND N LOMBARD ST

BRONTE, TEXAS

SHEET 3 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	35
0907	00	229,ETC	

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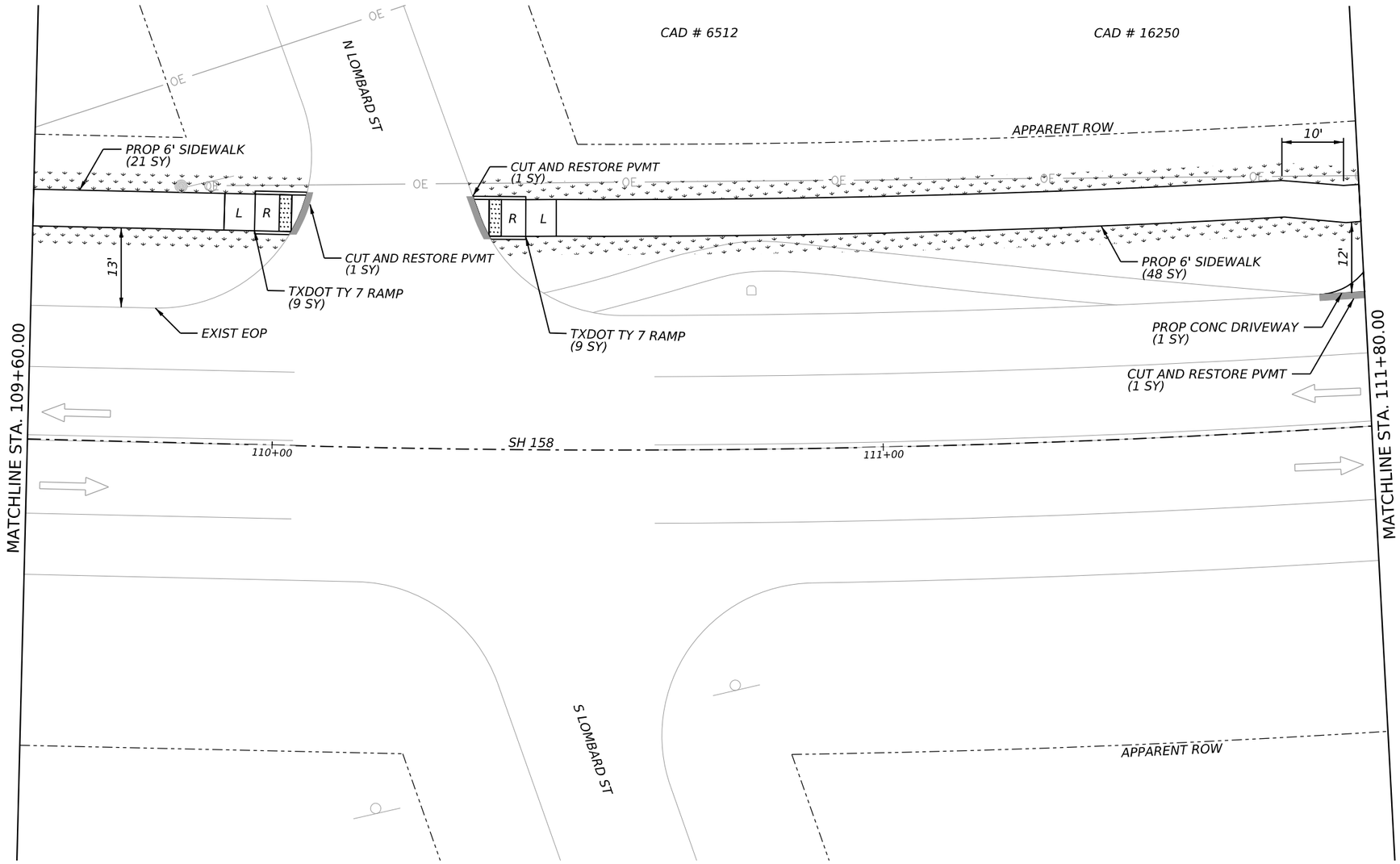
SHEET #			4
ITEM	DESCRIPTION	UNIT	QTY
0162 6002	BLOCK SODDING	SY	126
0400 6008	CUT & RESTORE ASPH PAVING	SY	3
0530 6004	DRIVEWAYS (CONC)	SY	1
0531 6001	CONC SIDEWALKS (4")	SY	69
0531 6024	CURB RAMPS (TY 7)	SY	18



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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
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- MANHOLE
- PEDESTAL SIGNAL POLE
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- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
- MISCELLANEOUS STRUC
- IRRIGATION CONTROLS
- UTILITY WITNESS
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- TRAFFIC SIGNAL POLE
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- W WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
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SIDEWALK PLAN

SH 158 AT LOMBARD ST

BRONTE, TEXAS

SHEET 4 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	36
CONT.	SECT.	JOB	
0907	00	229,ETC	

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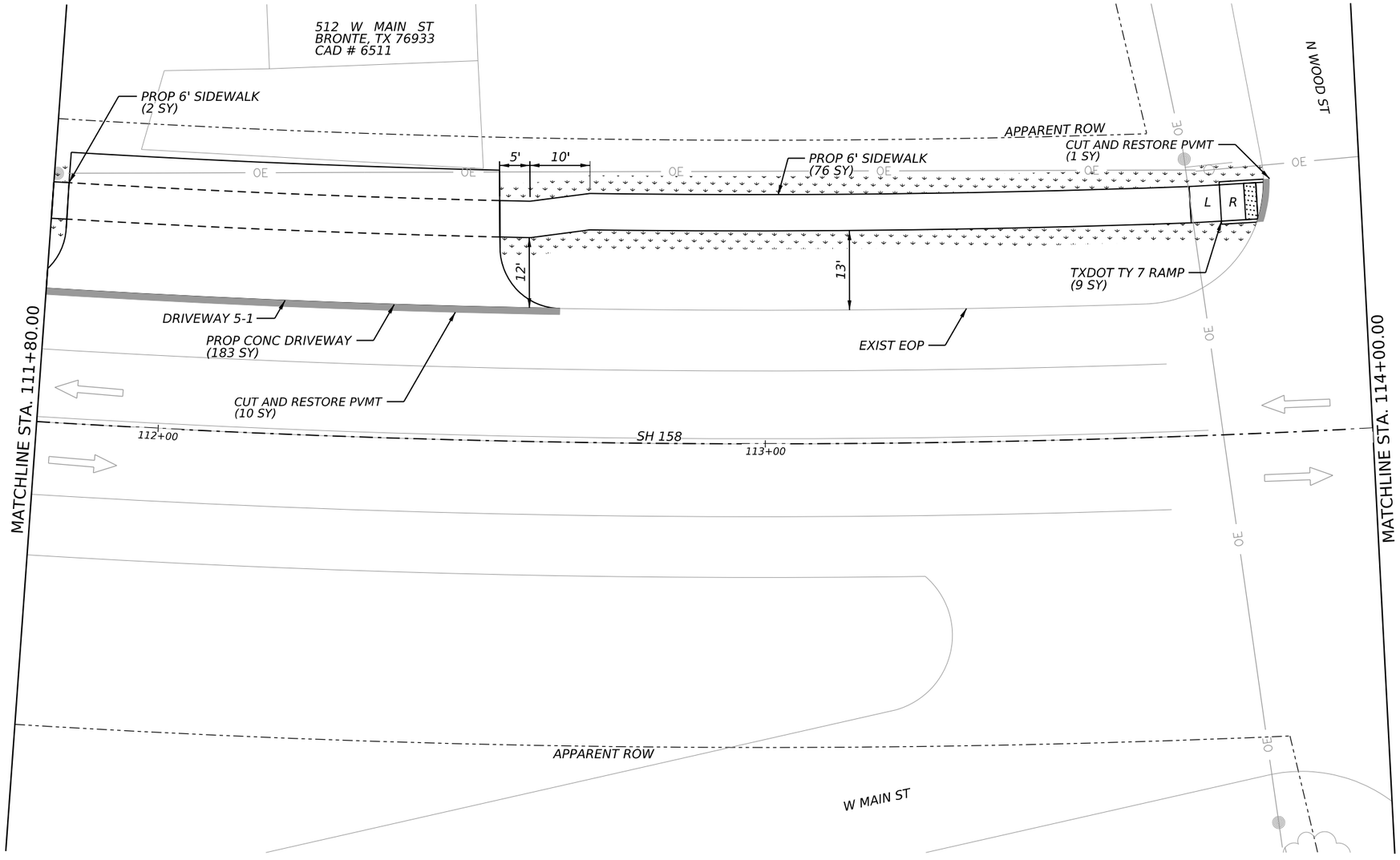
SHEET #			5
ITEM	DESCRIPTION	UNIT	QTY
0162 6002	BLOCK SODDING	SY	87
0400 6008	CUT & RESTORE ASPH PAVING	SY	11
0530 6004	DRIVEWAYS (CONC)	SY	183
0531 6001	CONC SIDEWALKS (4")	SY	78
0531 6024	CURB RAMPS (TY 7)	SY	9



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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
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- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
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- W WATER METER/VALVE
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4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
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SIDEWALK PLAN

SH 158 BETWEEN LOMBARD ST AND WOODS ST

BRONTE, TEXAS

SHEET 5 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	37
0907	00	229,ETC	

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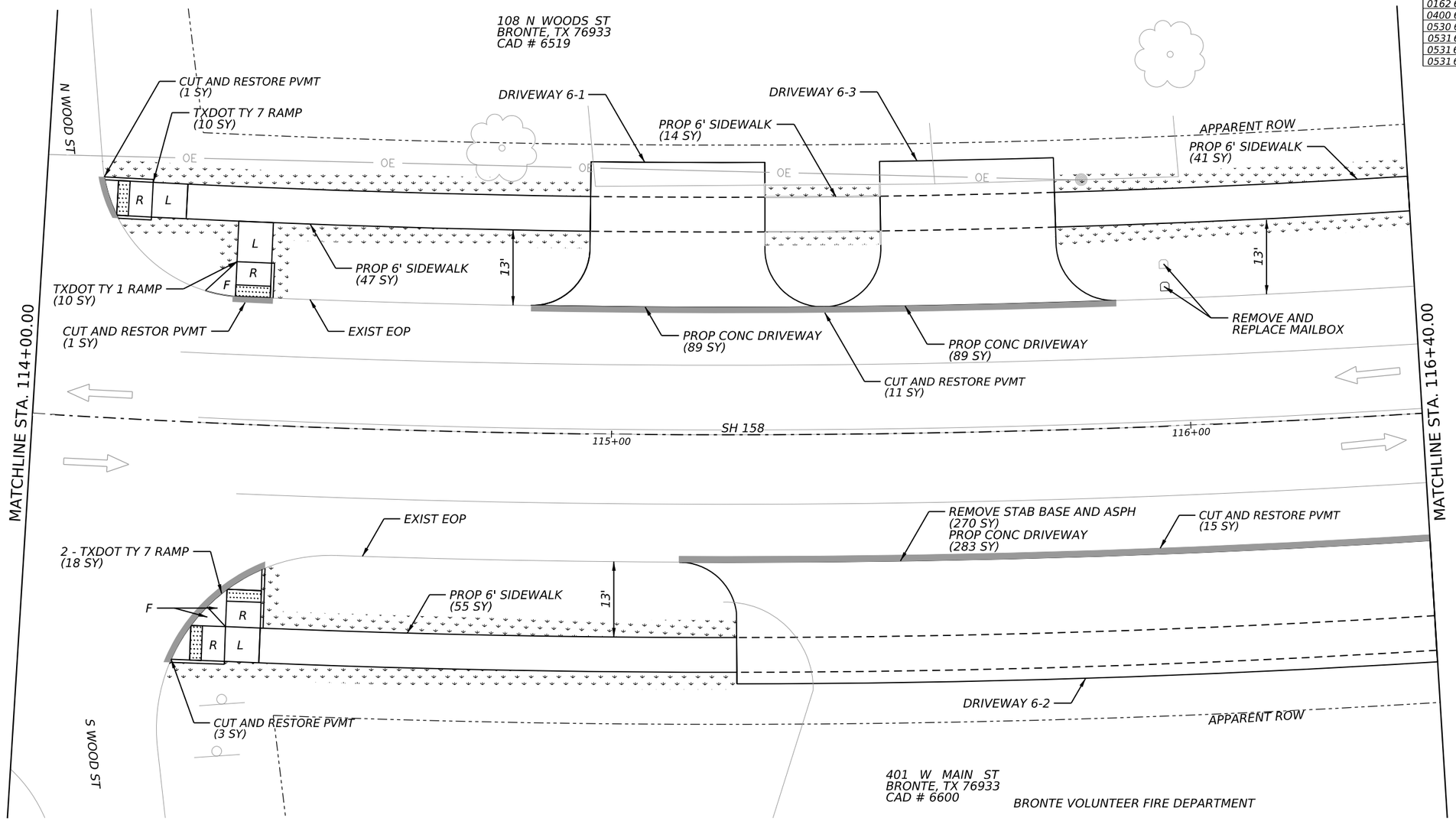
SHEET #			6
ITEM	DESCRIPTION	UNIT	QTY
0105 6037	REMOVING STAB BASE & ASPH PAV(0"-16")	SY	270
0162 6002	BLOCK SODDING	SY	150
0400 6008	CUT & RESTORE ASPH PAVING	SY	31
0530 6004	DRIVEWAYS (CONC)	SY	461
0531 6001	CONC SIDEWALKS (4")	SY	157
0531 6018	CURB RAMPS (TY 1)	SY	10
0531 6024	CURB RAMPS (TY 7)	SY	28



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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

	DRAINAGE FLOW ARROW		LIGHT POLE	SL	LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
— × —	FENCE		MAIL BOX		TRAFFIC FLOW
F	FLARE		MANHOLE	SB	TRAFFIC SIGNAL BOX
	FIRE HYDRANT		PEDESTAL SIGNAL POLE		TRAFFIC SIGNAL CONTROLLER
	GAS METER/VALVE		POWER/UTILITY POLE		TRAFFIC SIGNAL POLE
	GROUND BOX	R	RAMP		TREE/BUSHES
L	LANDING		RIPRAP (CONC)	W	WATER METER/VALVE
L1	LANDING (COMMON)		SIGN		GUTTER LINE PROJECTION
LS	LEVEL SIDEWALK (2% MAX)		SODDING		GRATE INLET
	GUY WIRE	T	TRANSITION		PROPOSED PEDESTAL POLE
	GUARD FENCE/RAIL		MISCELLANEOUS STRUC		PROPOSED CONDUIT
	PROPOSED CONDUIT (BORE)		IRRIGATION CONTROLS		EXISTING CONDUIT
			UTILITY WITNESS		STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
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Texas Department of Transportation

SIDEWALK PLAN

SH 158 BETWEEN WOODS ST AND JEFFERSON ST

BRONTE, TEXAS

SHEET 6 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	38
0907	00	229,ETC	

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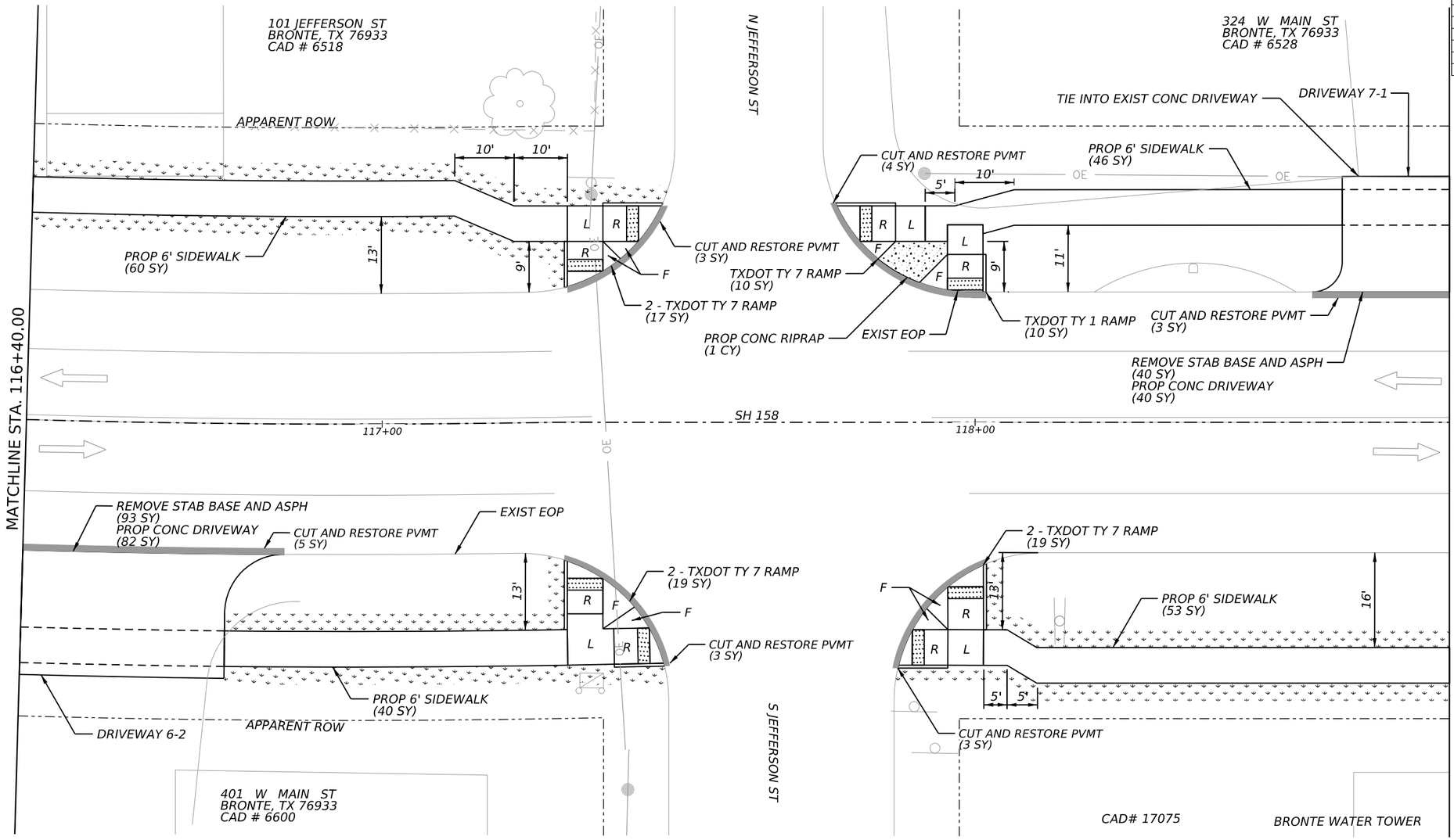
SHEET #			7
ITEM	DESCRIPTION	UNIT	QTY
0105 6037	REMOVING STAB BASE & ASPH PAV(0"-16")	SY	133
0162 6002	BLOCK SODDING	SY	176
0400 6008	CUT & RESTORE ASPH PAVING	SY	21
0432 6001	RIPRAP (CONC)(4 IN)	CY	1
0530 6004	DRIVEWAYS (CONC)	SY	122
0531 6001	CONC SIDEWALKS (4")	SY	199
0531 6018	CURB RAMPS (TY 1)	SY	10
0531 6024	CURB RAMPS (TY 7)	SY	65



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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
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4/26/2024

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PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation
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SIDEWALK PLAN

SH 158 AT JEFFERSON ST

BRONTE, TEXAS

SHEET 7 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	39
CONT.	SECT.	JOB	
0907	00	229,ETC	

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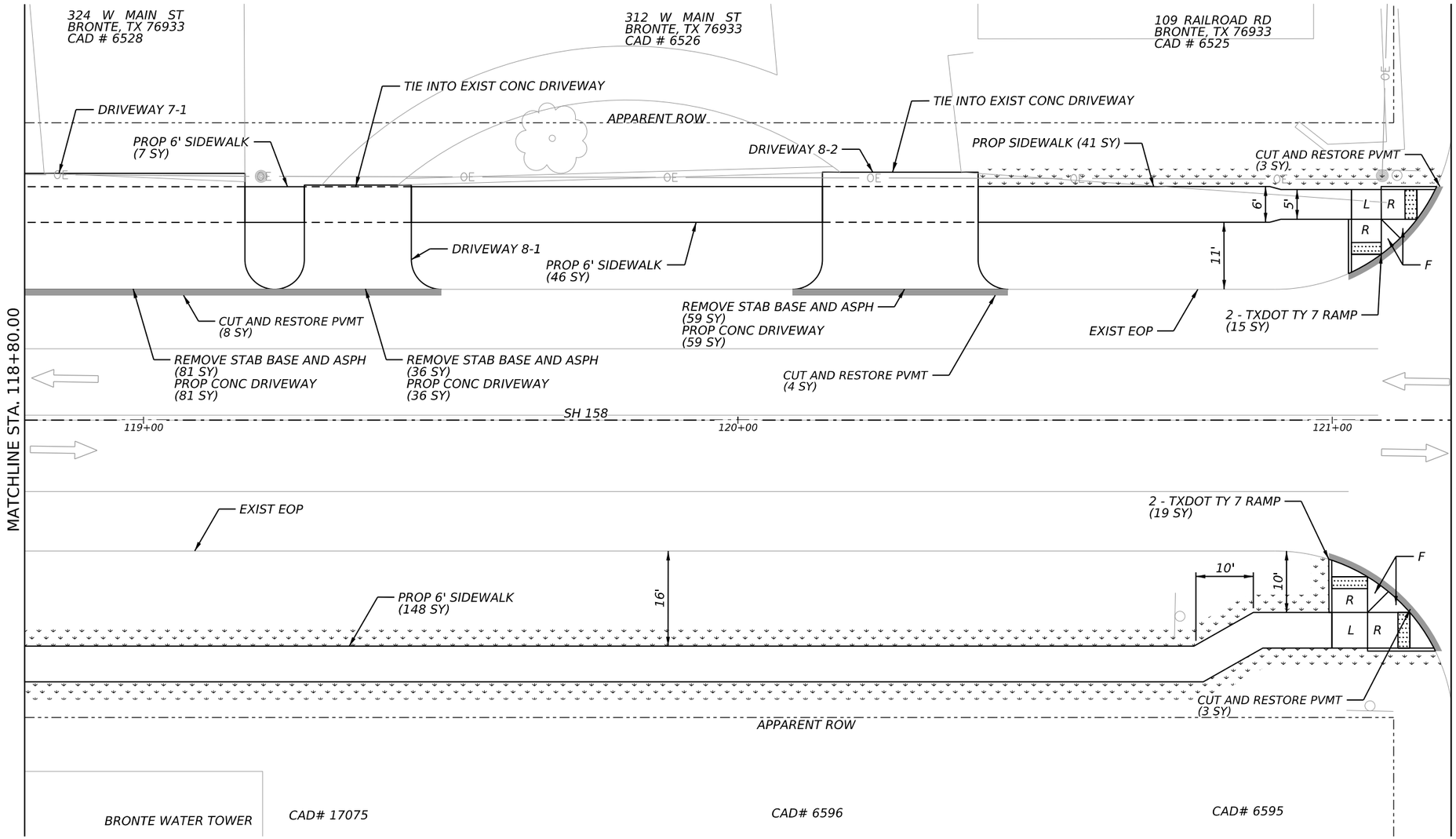
SHEET #			8
ITEM	DESCRIPTION	UNIT	QTY
0105 6037	REMOVING STAB BASE & ASPH PAV(0"-16")	SY	176
0162 6002	BLOCK SODDING	SY	158
0400 6008	CUT & RESTORE ASPH PAVING	SY	18
0530 6004	DRIVEWAYS (CONC)	SY	176
0531 6001	CONC SIDEWALKS (4")	SY	242
0531 6024	CURB RAMPS (TY 7)	SY	34



NOTES:

* FOR CONTRACTOR INFORMATION ONLY

1. THE EXISTENCE AND LOCATION OF ALL UTILITIES AND DRAINAGE STRUCTURES INDICATED IN THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO BEGINNING CONSTRUCTION.
2. LONGITUDINAL SLOPE SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.

0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

	DRAINAGE FLOW ARROW		LIGHT POLE	SL	LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
— × —	FENCE		MAIL BOX		TRAFFIC FLOW
F	FLARE		MANHOLE	SB	TRAFFIC SIGNAL BOX
	FIRE HYDRANT		PEDESTAL SIGNAL POLE		TRAFFIC SIGNAL CONTROLLER
	GAS METER/VALVE		POWER/UTILITY POLE		TRAFFIC SIGNAL POLE
	GROUND BOX	R	RAMP		TREE/BUSHES
L	LANDING		RIPRAP (CONC)	W	WATER METER/VALVE
L1	LANDING (COMMON)		SIGN		GUTTER LINE PROJECTION
LS	LEVEL SIDEWALK (2% MAX)		SODDING		GRATE INLET
	GUY WIRE	T	TRANSITION		PROPOSED PEDESTAL POLE
	GUARD FENCE/RAIL		MISCELLANEOUS STRUC		PROPOSED CONDUIT
	PROPOSED CONDUIT (BORE)		IRRIGATION CONTROLS		EXISTING CONDUIT
			UTILITY WITNESS		STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

SIDEWALK PLAN

SH 158 BETWEEN JEFFERSON ST AND W RAILROAD RD

BRONTE, TEXAS

SHEET 8 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	40
CONT.	SECT.	JOB	
0907	00	229,ETC	

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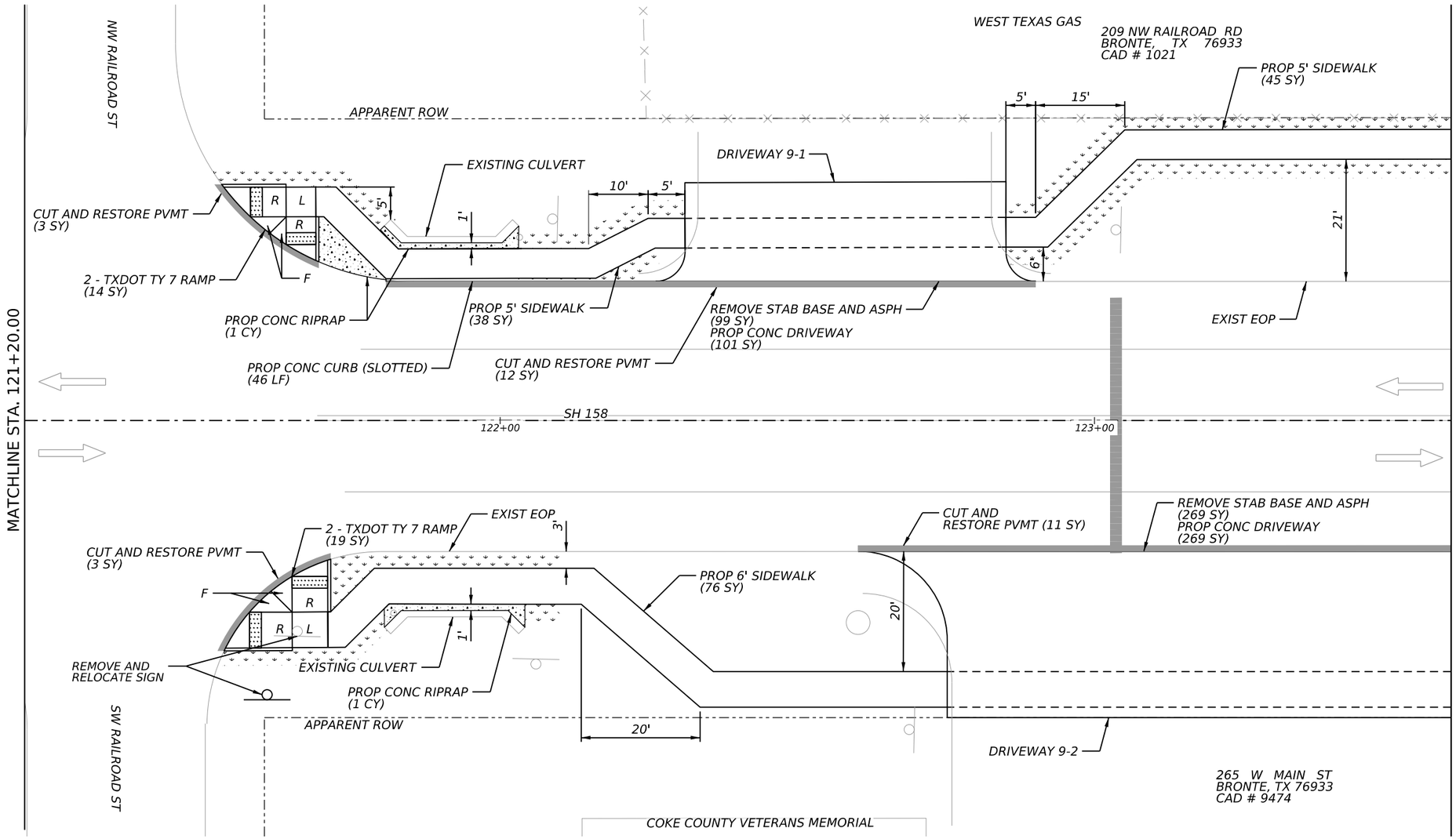
SHEET #			9
ITEM	DESCRIPTION	UNIT	QTY
0105 6037	REMOVING STAB BASE & ASPH PAV(0"-16")	SY	368
0162 6002	BLOCK SODDING	SY	98
0400 6008	CUT & RESTORE ASPH PAVING	SY	29
0432 6001	RIPRAP (CONC)(4 IN)	CY	2
0529 6012	CONC CURB (SLOTTED)	LF	46
0530 6004	DRIVEWAYS (CONC)	SY	370
0531 6001	CONC SIDEWALKS (4")	SY	159
0531 6024	CURB RAMPS (TY 7)	SY	33
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1



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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
- POWER/UTILITY POLE
- R RAMP
- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
- MISCELLANEOUS STRUC
- IRRIGATION CONTROLS
- UTILITY WITNESS
- SL LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
- TRAFFIC FLOW
- SB TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL POLE
- TREE/BUSHES
- W WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
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SIDEWALK PLAN

SH 158 BETWEEN W AND E RAILROAD RD

BRONTE, TEXAS

SHEET 9 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	41
0907	00	229,ETC	

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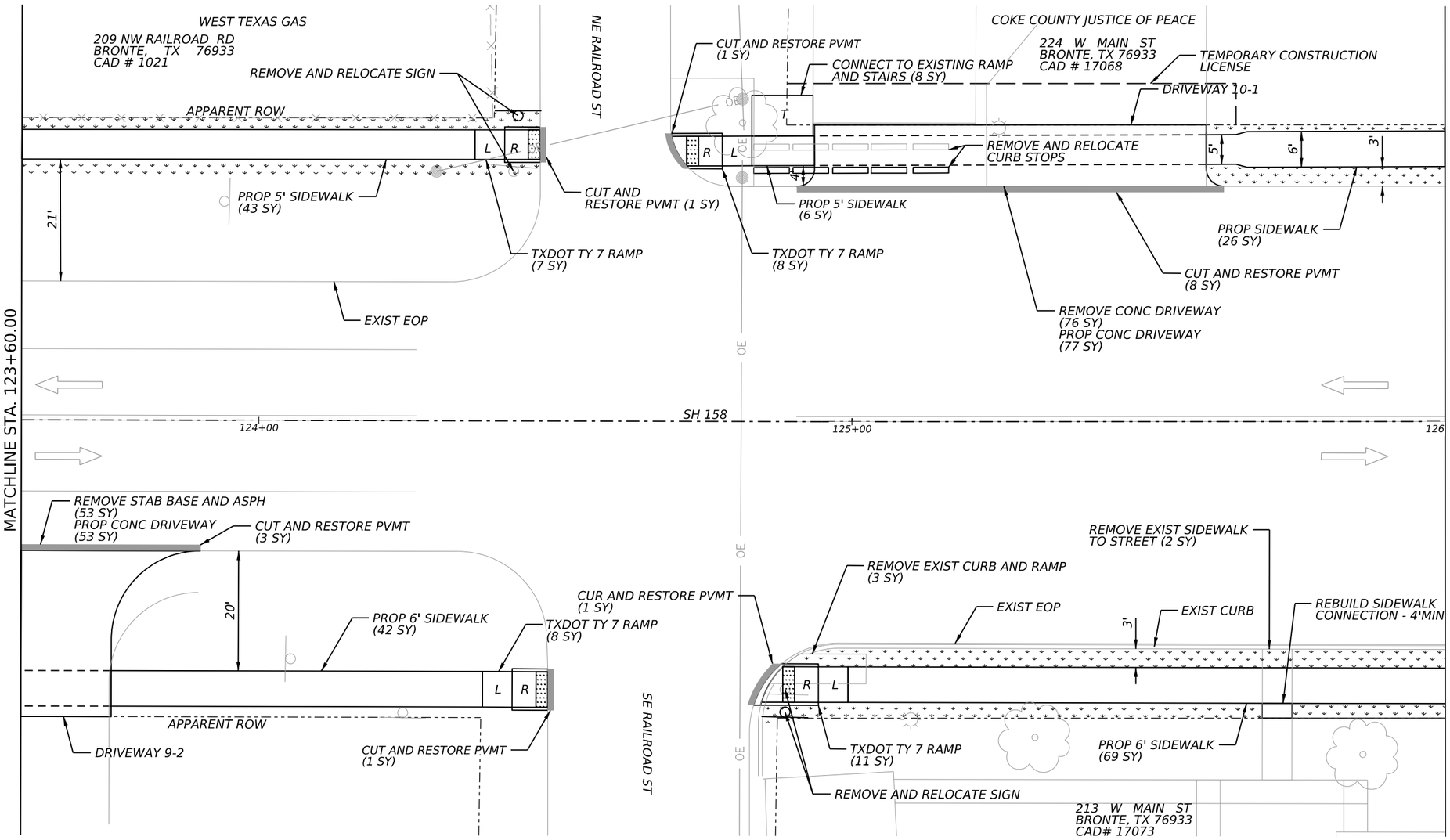

SHEET #			10
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	76
0104 6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	5
0105 6037	REMOVING STAB BASE & ASPH PAV(0"-16")	SY	53
0162 6002	BLOCK SODDING	SY	134
0400 6008	CUT & RESTORE ASPH PAVING	SY	15
0530 6004	DRIVEWAYS (CONC)	SY	130
0531 6001	CONC SIDEWALKS (4")	SY	194
0531 6024	CURB RAMPS (TY 7)	SY	34
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	2

NOTES:

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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

	DRAINAGE FLOW ARROW		LIGHT POLE	SL	LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
— × —	FENCE		MAIL BOX		TRAFFIC FLOW
F	FLARE		MANHOLE	SB	TRAFFIC SIGNAL BOX
	FIRE HYDRANT		PEDESTAL SIGNAL POLE		TRAFFIC SIGNAL CONTROLLER
	GAS METER/VALVE		POWER/UTILITY POLE		TRAFFIC SIGNAL POLE
	GROUND BOX	R	RAMP		TREE/BUSHES
L	LANDING		RIPRAP (CONC)	W	WATER METER/VALVE
L1	LANDING (COMMON)		SIGN		GUTTER LINE PROJECTION
LS	LEVEL SIDEWALK (2% MAX)		SODDING		GRATE INLET
	GUY WIRE	T	TRANSITION		PROPOSED PEDESTAL POLE
	GUARD FENCE/RAIL		MISCELLANEOUS STRUC		PROPOSED CONDUIT
	PROPOSED CONDUIT (BORE)		IRRIGATION CONTROLS		EXISTING CONDUIT
			UTILITY WITNESS		STAMPED CONCRETE

4/26/2024

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Texas Department of Transportation

SIDEWALK PLAN

SH 158
AT E RAILROAD RD

BRONTE, TEXAS

SHEET 10 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			SH 158
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	42
0907	00	229,ETC	

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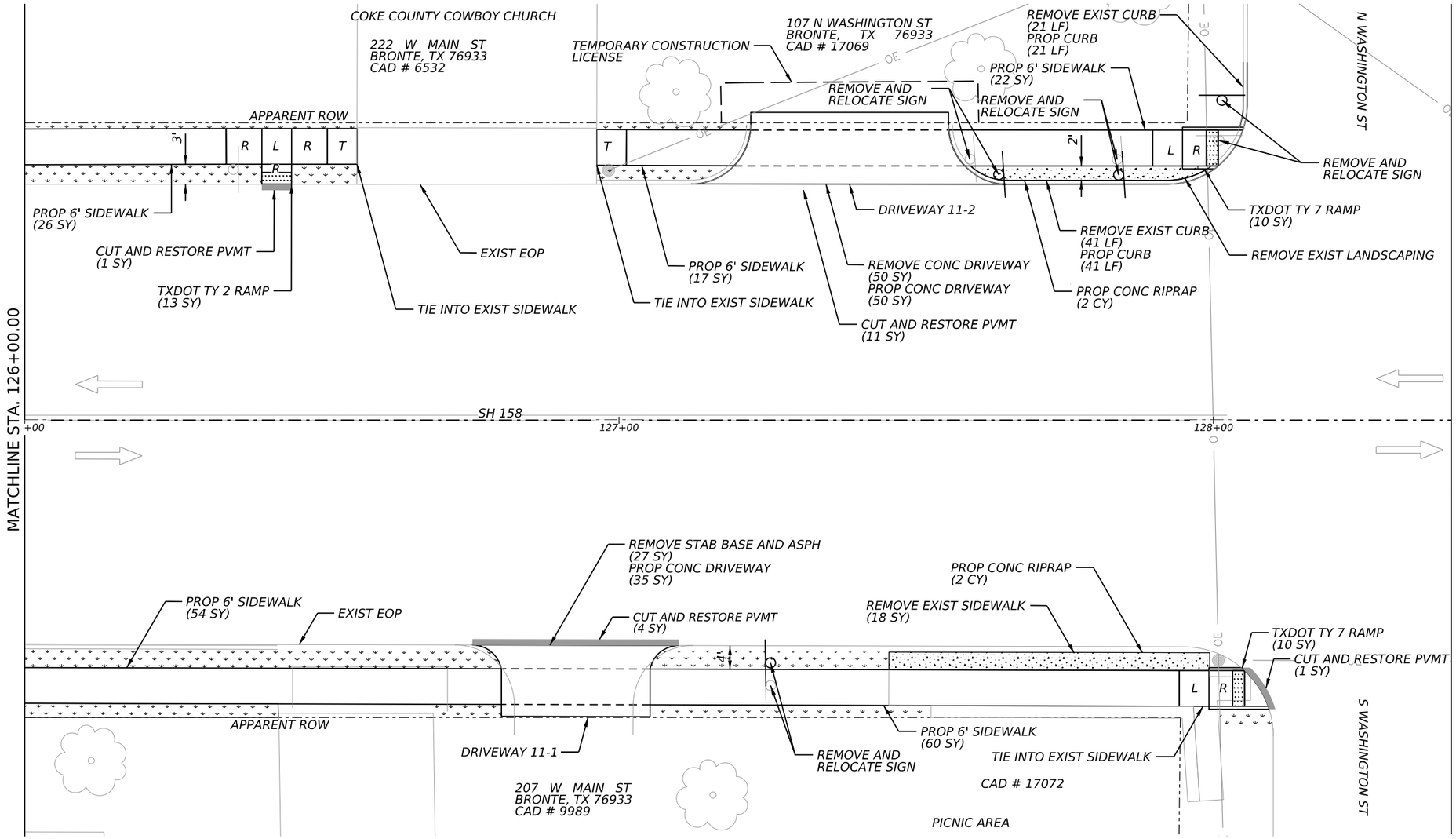

SHEET #			11
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	50
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	62
0104 6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	18
0105 6037	REMOVING STAB BASE & ASPH PAV(0"-16")	SY	27
0162 6002	BLOCK SODDING	SY	126
0400 6008	CUT & RESTORE ASPH PAVING	SY	17
0432 6001	RIPRAP (CONC)(4 IN)	CY	4
0529 6002	CONC CURB (TY II)	LF	62
0530 6004	DRIVEWAYS (CONC)	SY	85
0531 6001	CONC SIDEWALKS (4")	SY	179
0531 6019	CURB RAMPS (TY 2)	SY	13
0531 6024	CURB RAMPS (TY 7)	SY	20
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	4

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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

	DRAINAGE FLOW ARROW		LIGHT POLE	SL	LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
— × —	FENCE		MAIL BOX		TRAFFIC FLOW
F	FLARE		MANHOLE	SB	TRAFFIC SIGNAL BOX
	FIRE HYDRANT		PEDESTAL SIGNAL POLE		TRAFFIC SIGNAL CONTROLLER
	GAS METER/VALVE		POWER/UTILITY POLE		TRAFFIC SIGNAL POLE
	GROUND BOX	R	RAMP		TREE/BUSHES
L	LANDING		RIPRAP (CONC)		WATER METER/VALVE
L1	LANDING (COMMON)		SIGN		GUTTER LINE PROJECTION
LS	LEVEL SIDEWALK (2% MAX)		SODDING		GRATE INLET
	GUY WIRE	T	TRANSITION		PROPOSED PEDESTAL POLE
	GUARD FENCE/RAIL		MISCELLANEOUS STRUC		PROPOSED CONDUIT
	PROPOSED CONDUIT (BORE)		IRRIGATION CONTROLS		EXISTING CONDUIT
			UTILITY WITNESS		STAMPED CONCRETE

4/26/2024

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SIDEWALK PLAN

SH 158 BETWEEN E RAILROAD RD AND WASHINGTON ST

BRONTE, TEXAS

SHEET 11 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	43
CONT.	SECT.	JOB	
0907	00	229,ETC	

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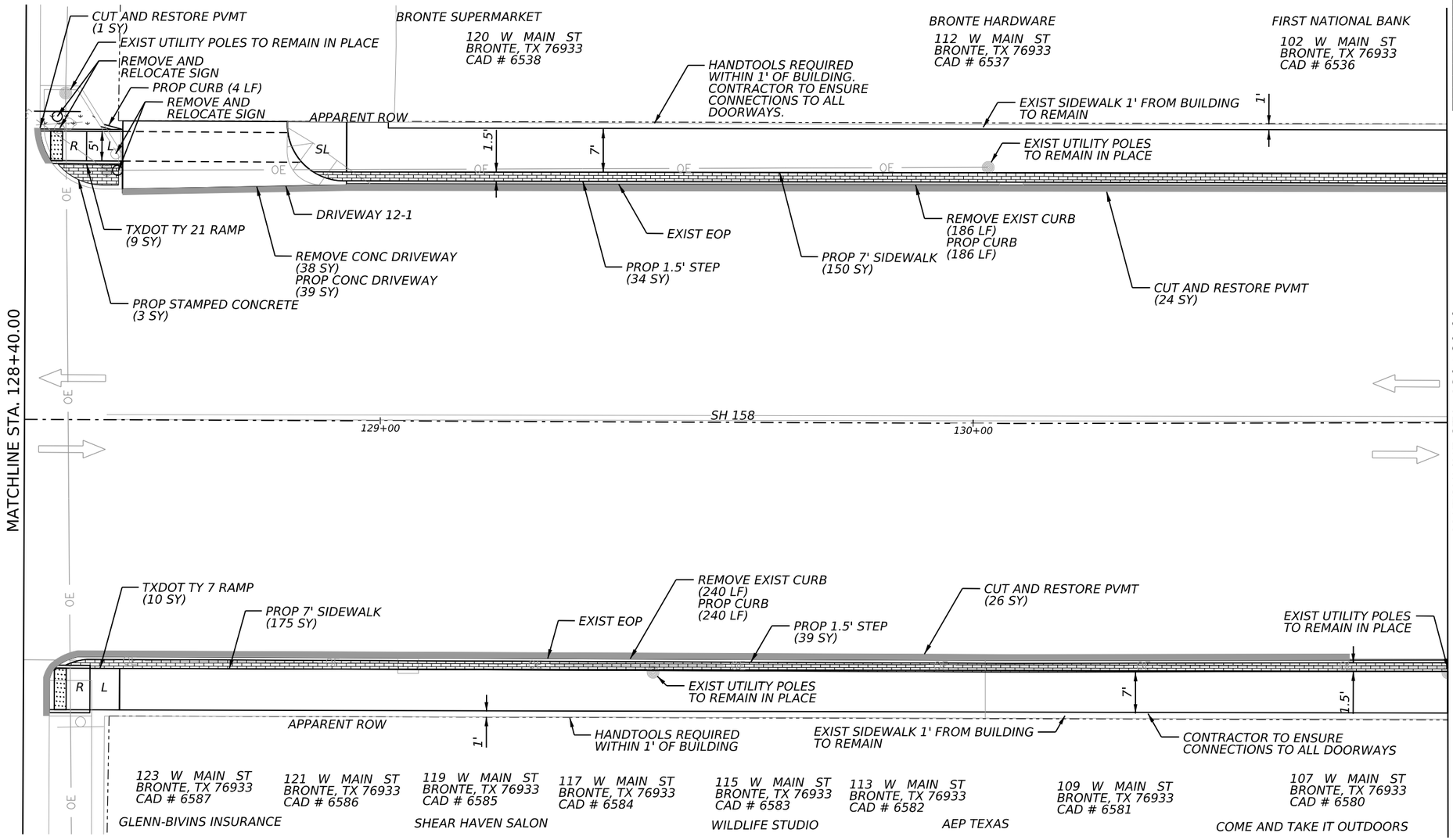
SHEET #			12
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	38
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	426
0400 6008	CUT & RESTORE ASPH PAVING	SY	51
0528 6001	COLORED TEXTURED CONC (4")	SY	3
0529 6002	CONC CURB (TY II)	LF	430
0530 6004	DRIVEWAYS (CONC)	SY	39
0531 6001	CONC SIDEWALKS (4")	SY	325
0531 6024	CURB RAMPS (TY 7)	SY	10
0531 6030	CURB RAMPS (TY 21)	SY	9
0531 6050	CONCRETE SIDEWALK (STEPS)	SY	73
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	2



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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
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- TRAFFIC SIGNAL POLE
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- W WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
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Texas Department of Transportation
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SIDEWALK PLAN

SH 158 BETWEEN WASHINGTON ST AND US 277

BRONTE, TEXAS

SHEET 12 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		SH 158

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	44
0907	00	229,ETC	

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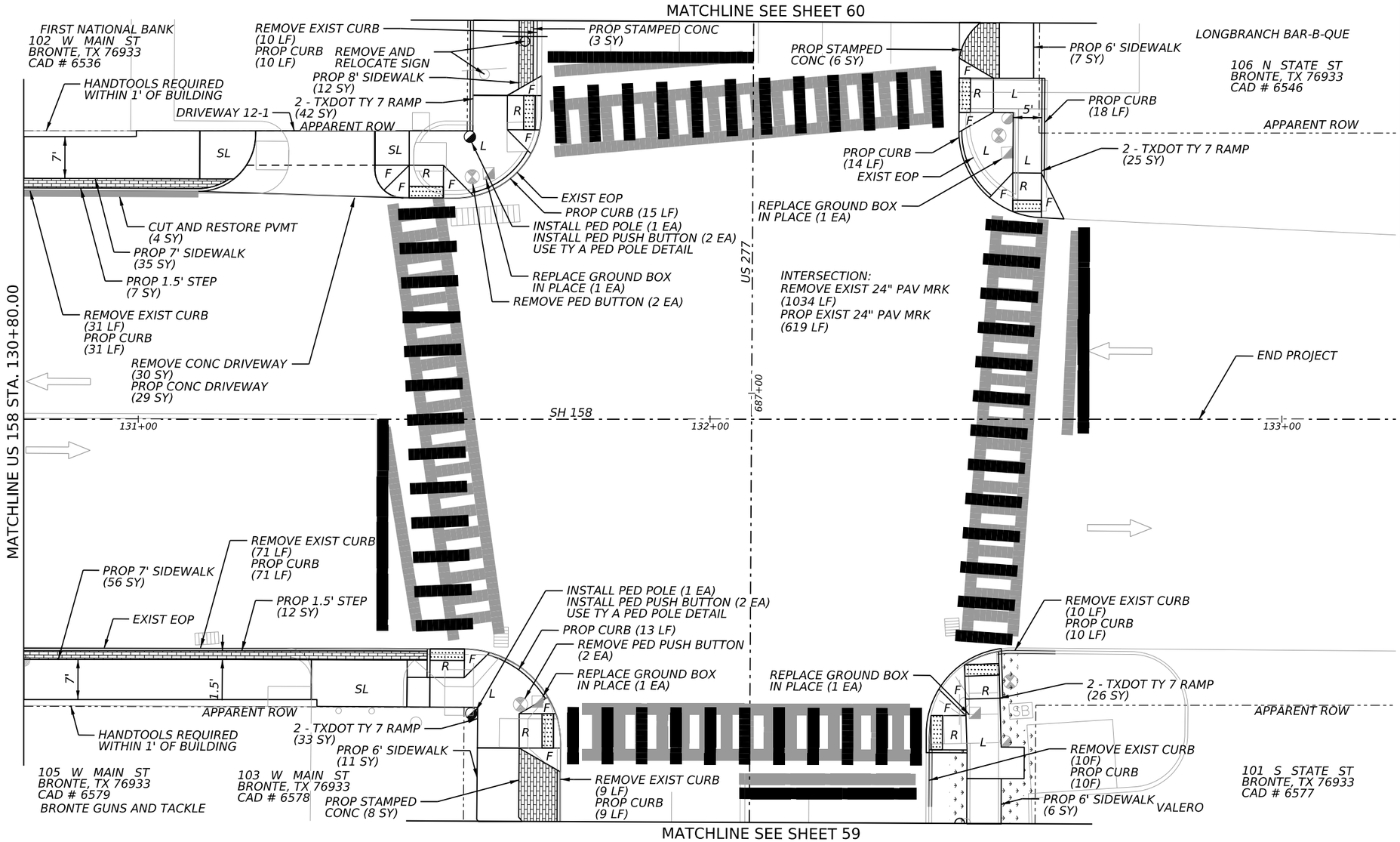

SHEET #			13
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	30
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	141
0162 6002	BLOCK SODDING	SY	15
0400 6008	CUT & RESTORE ASPH PAVING	SY	4
0528 6001	COLORED TEXTURED CONC (4")	SY	17
0529 6002	CONC CURB (TY II)	LF	201
0530 6004	DRIVEWAYS (CONC)	SY	29
0531 6001	CONC SIDEWALKS (4")	SY	127
0531 6024	CURB RAMPS (TY 7)	SY	126
0531 6050	CONCRETE SIDEWALK (STEPS)	SY	19
0618 6046	CONDT (PVC) (SCH 80) (2")	LF	50
0620 6007	ELEC CONDR (NO.8) BARE	LF	50
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1
0666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	619
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	1034
0678 6008	PAV SURF PREP FOR MRK (24")	LF	619
0680 6011	INSTALL HWY TRF SIG (UPGRADE)	EA	1
0684 6028	TRF SIG CBL (TY A)(14 AWG)(2 CONDR)	LF	200
0687 6001	PED POLE ASSEMBLY	EA	2
0688 6001	PED DETECT PUSH BUTTON (APS)	EA	4
0690 6007	REPLACE OF GROUND BOXES	EA	4
0690 6030	REMOVAL OF PEDESTRIAN PUSH BUTTONS	EA	4

NOTES:

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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

APS MESSAGE INFORMATION			
APS UNIT NO.	ACKNOWLEDGEMENT DEFAULT WAIT	EXTENDED PRESS MESSAGE	WALK PRESS MESSAGE
		"WAIT TO CROSS (STREET NAME) AT (CROSS STREET NAME)"	"WALK SIGN IS ON TO CROSS (STREET NAME)"
NW-1	YES	MAIN ST AT STATE	MAIN ST
NW-2	YES	STATE ST AT MAIN	STATE ST
SW-1	YES	MAIN ST AT STATE	MAIN ST
SW-2	YES	STATE ST AT MAIN	STATE ST

NOTES:

1. CONTRACTOR SHALL MAINTAIN EXISTING TRAFFIC SIGNAL OPERATION THROUGHOUT DURATION OF CONSTRUCTION.
2. CONTRACTOR SHALL CONNECT FIELD WIRING TO CONTROLLER.
3. CONTRACTOR SHALL POTHOLE ALL PROPOSED PED POLE FOUNDATION LOCATIONS NEAR UNDERGROUND UTILITIES PRIOR TO INSTALLING POLE FOUNDATIONS.
4. LOCATION OF ALL PROPOSED PED POLE FOUNDATIONS SHALL BE VERIFIED AND APPROVED BY TXDOT PRIOR TO CONSTRUCTION.
5. CONTRACTOR SHALL CONTACT TXDOT TRAFFIC ENGINEER A MINIMUM OF SEVEN (7) DAYS PRIOR TO BEGINNING OF CONSTRUCTION.
6. CONTRACTOR SHALL CONTACT TXDOT TRAFFIC ENGINEER A MINIMUM OF FOURTEEN (14) DAYS PRIOR TO THE TRAFFIC SIGNAL TURN-ON.

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
- POWER/UTILITY POLE
- R RAMP
- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
- MISCELLANEOUS STRUC
- IRRIGATION CONTROLS
- UTILITY WITNESS
- SL LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
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- SB TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL POLE
- TREE/BUSHES
- WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL LUNDQUIST
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SIDEWALK PLAN

SH 158 AND US 277 INTERSECTION

BRONTE, TEXAS

SHEET 13 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			SH 158
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	45
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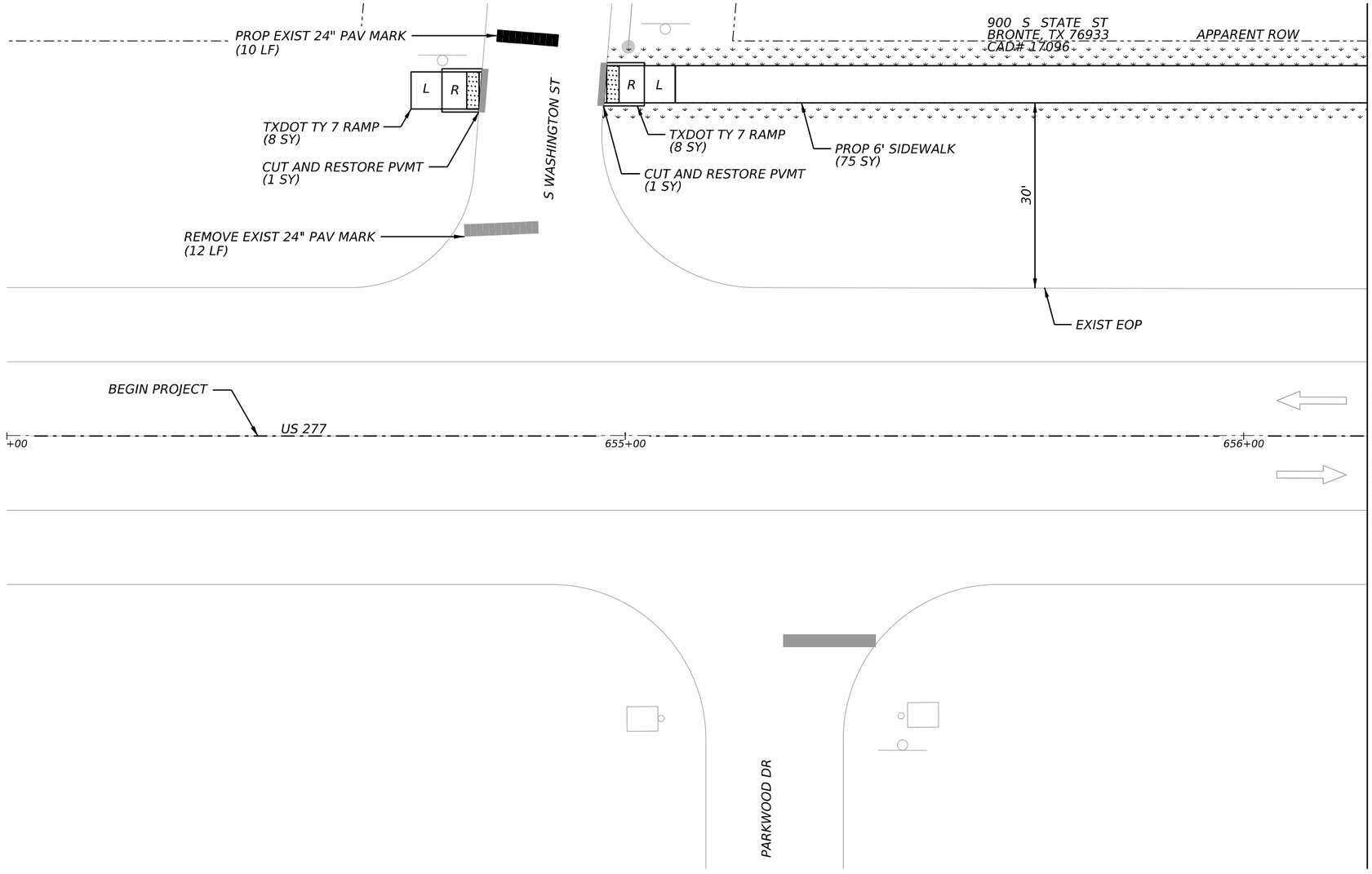

SHEET #			14
ITEM	DESCRIPTION	UNIT	QTY
0162 6002	BLOCK SODDING	SY	83
0400 6008	CUT & RESTORE ASPH PAVING	SY	2
0531 6001	CONC SIDEWALKS (4")	SY	75
0531 6024	CURB RAMPS (TY 7)	SY	16
0666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	10
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	12
0678 6008	PAV SURF PREP FOR MRK (24")	LF	10

NOTES:

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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
- POWER/UTILITY POLE
- R RAMP
- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
- MISCELLANEOUS STRUC
- IRRIGATION CONTROLS
- UTILITY WITNESS
- SL LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
- TRAFFIC FLOW
- SB TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL POLE
- TREE/BUSHES
- WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

Kimley»Horn
F-928

Texas Department of Transportation

SIDEWALK PLAN

US 277
AT S WASHINGTON ST

BRONTE, TEXAS

SHEET 14 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	46
0907	00	229,ETC	

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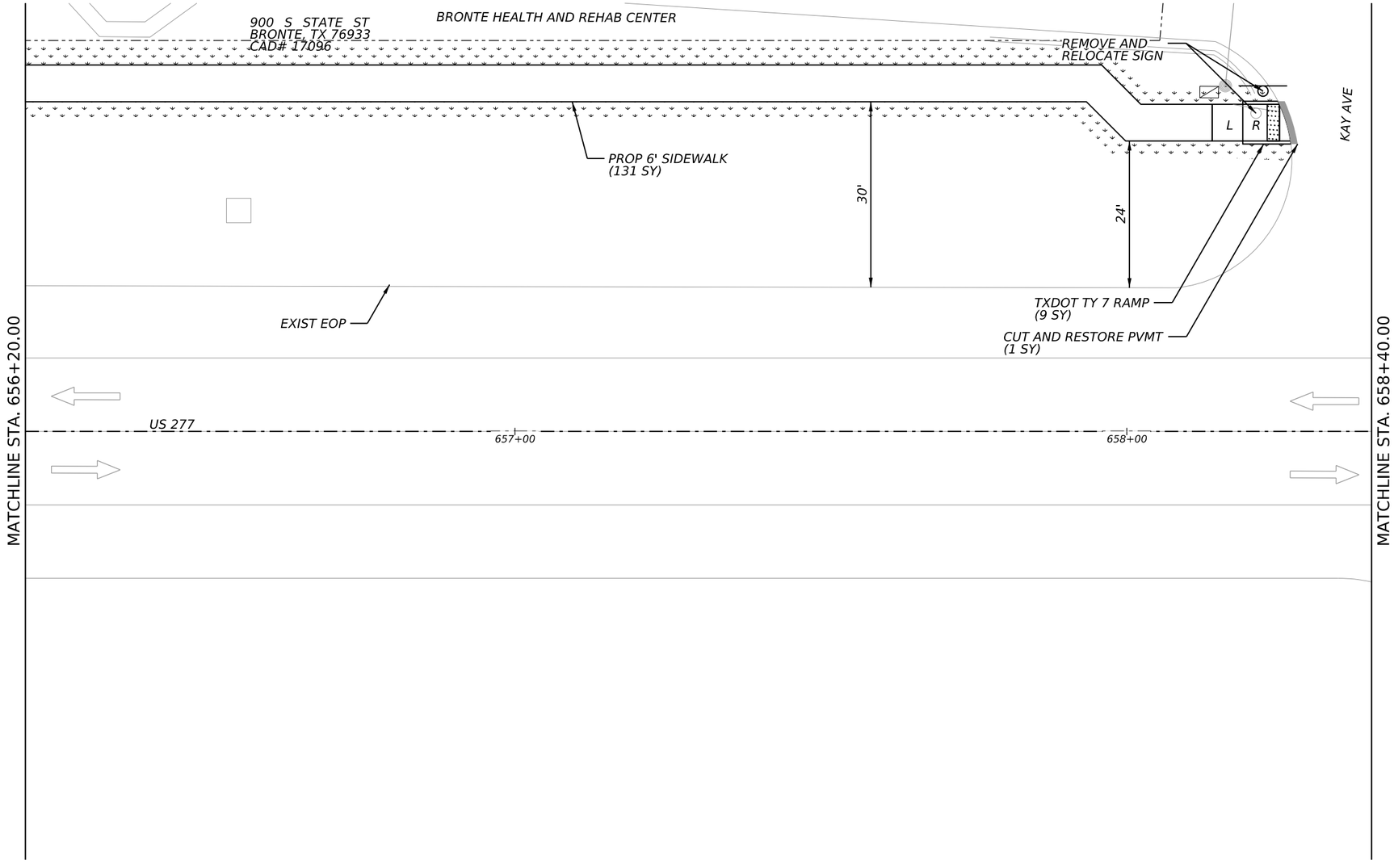

SHEET #			15
ITEM	DESCRIPTION	UNIT	QTY
0162 6002	BLOCK SODDING	SY	140
0400 6008	CUT & RESTORE ASPH PAVING	SY	1
0531 6001	CONC SIDEWALKS (4")	SY	131
0531 6024	CURB RAMPS (TY 7)	SY	9
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1

NOTES:

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0 10 20

SCALE: 1" = 20'

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- PROPOSED CONDUIT
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4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
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Kimley»Horn

F-928

Texas Department of Transportation

SIDEWALK PLAN

US 277
BETWEEN S WASHINGTON ST AND KAY AVE

BRONTE, TEXAS

SHEET 15 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			US 277
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	47
0907	00	229,ETC	

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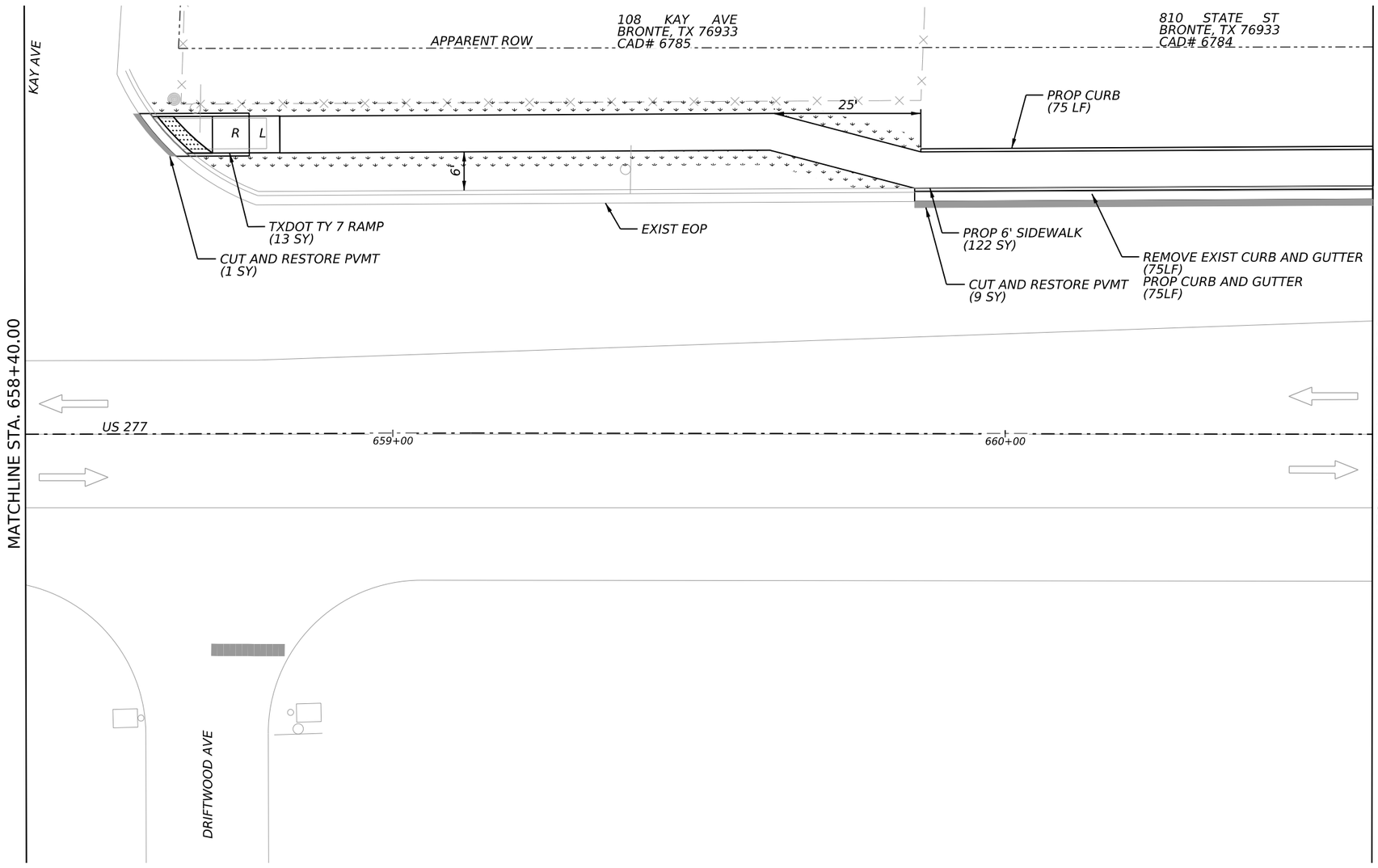

SHEET #			16
ITEM	DESCRIPTION	UNIT	QTY
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	75
0162 6002	BLOCK SODDING	SY	79
0400 6008	CUT & RESTORE ASPH PAVING	SY	10
0529 6002	CONC CURB (TY II)	LF	75
0529 6008	CONC CURB & GUTTER (TY II)	LF	75
0531 6001	CONC SIDEWALKS (4")	SY	122
0531 6024	CURB RAMPS (TY 7)	SY	13

N

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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

	DRAINAGE FLOW ARROW		LIGHT POLE	SL	LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
— × —	FENCE		MAIL BOX		TRAFFIC FLOW
F	FLARE		MANHOLE	SB	TRAFFIC SIGNAL BOX
	FIRE HYDRANT		PEDESTAL SIGNAL POLE		TRAFFIC SIGNAL CONTROLLER
	GAS METER/VALVE		POWER/UTILITY POLE		TRAFFIC SIGNAL POLE
	GROUND BOX	R	RAMP		TREE/BUSHES
L	LANDING		RIPRAP (CONC)	W	WATER METER/VALVE
L1	LANDING (COMMON)		SIGN		GUTTER LINE PROJECTION
LS	LEVEL SIDEWALK (2% MAX)		SODDING		GRATE INLET
	GUY WIRE	T	TRANSITION		PROPOSED PEDESTAL POLE
	GUARD FENCE/RAIL		MISCELLANEOUS STRUC		PROPOSED CONDUIT
	PROPOSED CONDUIT (BORE)		IRRIGATION CONTROLS		EXISTING CONDUIT
			UTILITY WITNESS		STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
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PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation
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SIDEWALK PLAN

US 277
AT KAY AVE

BRONTE, TEXAS

SHEET 16 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			US 277
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	48
0907	00	229,ETC	

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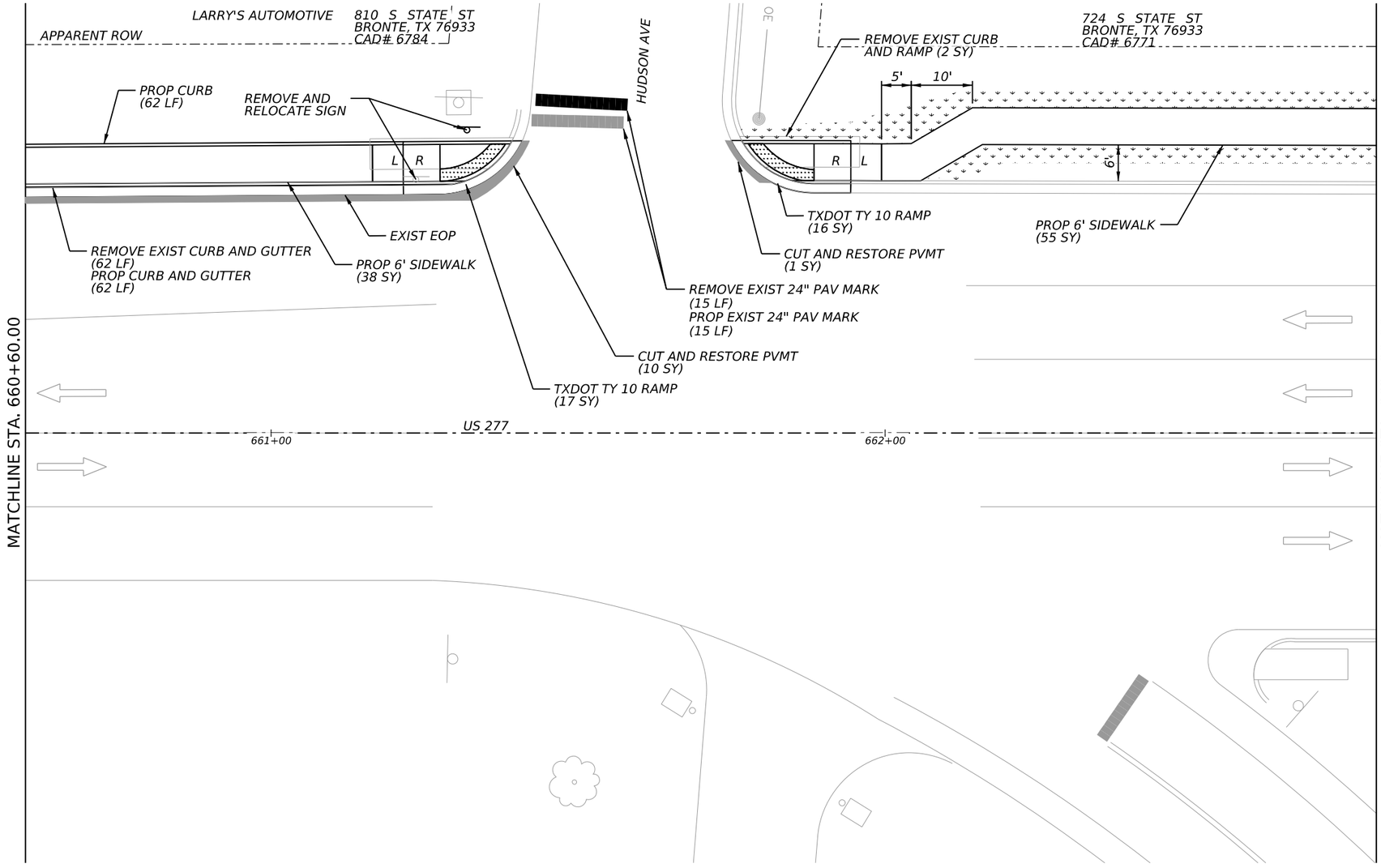

SHEET #			17
ITEM	DESCRIPTION	UNIT	QTY
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	62
0104 6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	2
0162 6002	BLOCK SODDING	SY	59
0400 6008	CUT & RESTORE ASPH PAVING	SY	11
0529 6002	CONC CURB (TY II)	LF	62
0529 6008	CONC CURB & GUTTER (TY II)	LF	62
0531 6001	CONC SIDEWALKS (4")	SY	93
0531 6027	CURB RAMPS (TY 10)	SY	33
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1
0666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	15
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	15
0678 6008	PAV SURF PREP FOR MRK (24")	LF	15

NOTES:

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4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
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Kimley»Horn
F-928

Texas Department of Transportation

SIDEWALK PLAN

US 277
AT HUDSON AVE

BRONTE, TEXAS

SHEET 17 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			US 277
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	49
0907	00	229,ETC	

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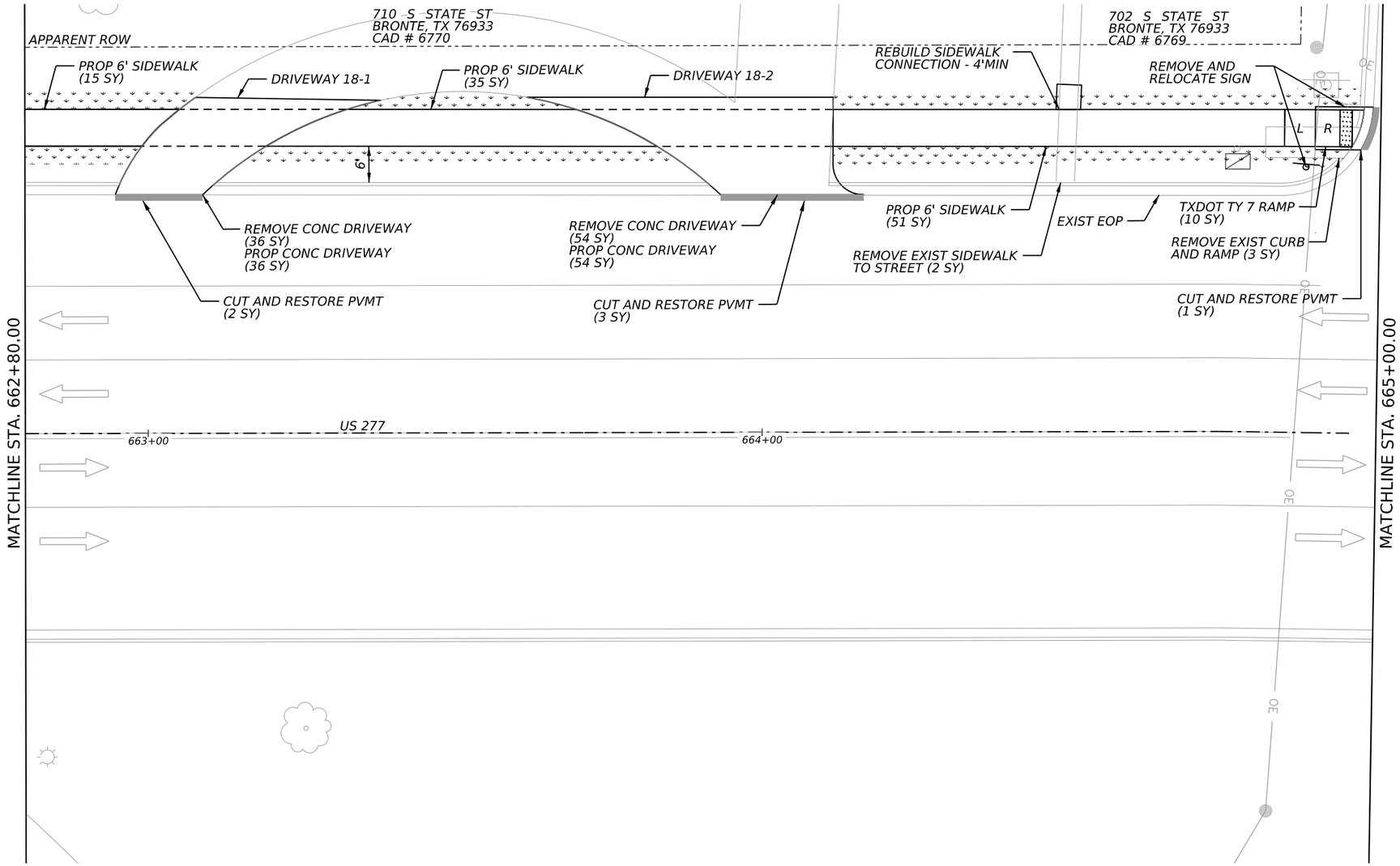

SHEET #			18
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	90
0104 6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	5
0162 6002	BLOCK SODDING	SY	97
0400 6008	CUT & RESTORE ASPH PAVING	SY	6
0530 6004	DRIVEWAYS (CONC)	SY	90
0531 6001	CONC SIDEWALKS (4")	SY	101
0531 6024	CURB RAMPS (TY 7)	SY	10
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1

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0 10 20

SCALE: 1" = 20'

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- FENCE
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- EXISTING CONDUIT
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4/26/2024

SAMUEL J. LUNDQUIST 122185 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Kimley»Horn F-928

Texas Department of Transportation

SIDEWALK PLAN

US 277 BETWEEN HUDSON AVE AND REILLY AVE

BRONTE, TEXAS

SHEET 18 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	50
0907	00	229,ETC	

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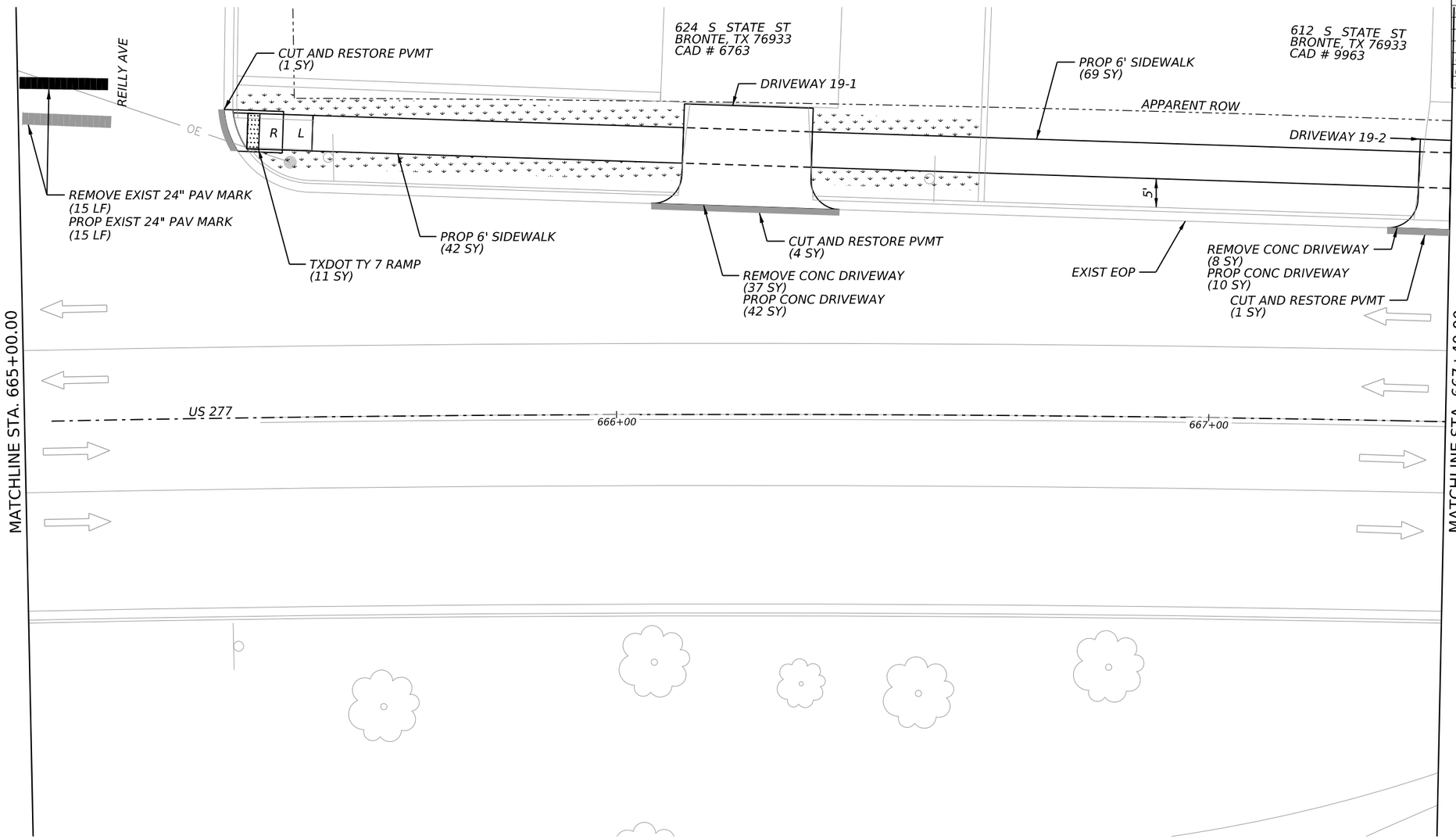

SHEET #			19
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	45
0162 6002	BLOCK SODDING	SY	69
0400 6008	CUT & RESTORE ASPH PAVING	SY	6
0530 6004	DRIVEWAYS (CONC)	SY	52
0531 6001	CONC SIDEWALKS (4")	SY	111
0531 6024	CURB RAMPS (TY 7)	SY	11
0666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	15
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	15
0678 6008	PAV SURF PREP FOR MRK (24")	LF	15

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0 10 20

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4/26/2024

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STATE OF TEXAS

Kimley»Horn
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Texas Department of Transportation

SIDEWALK PLAN

US 277
BETWEEN REILLY AVE AND W GEORGE AVE

BRONTE, TEXAS

SHEET 19 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	51
0907	00	229,ETC	

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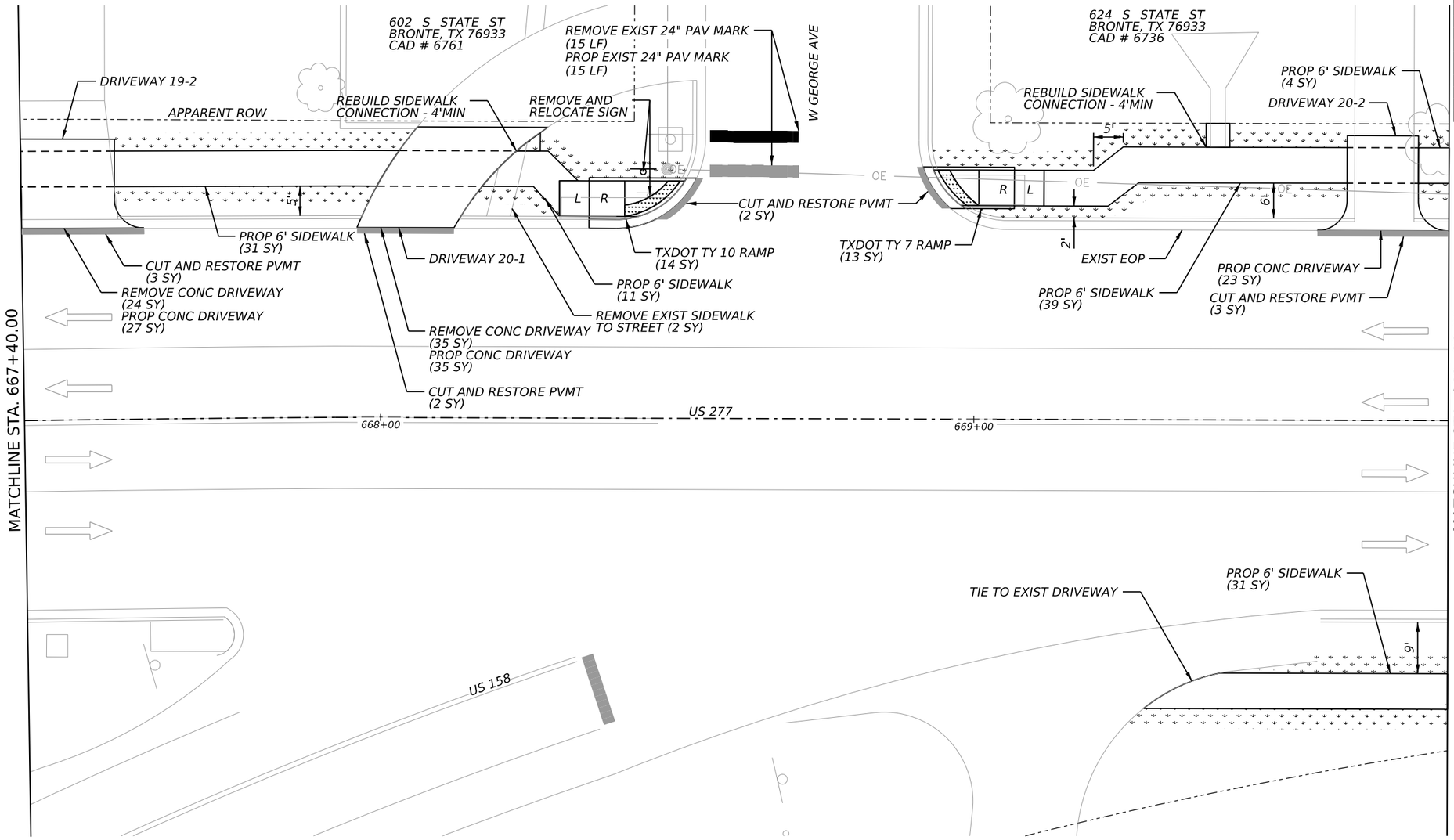

SHEET #			20
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	59
0104 6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	2
0162 6002	BLOCK SODDING	SY	118
0400 6008	CUT & RESTORE ASPH PAVING	SY	10
0530 6004	DRIVEWAYS (CONC)	SY	85
0531 6001	CONC SIDEWALKS (4")	SY	116
0531 6024	CURB RAMPS (TY 7)	SY	13
0531 6027	CURB RAMPS (TY 10)	SY	14
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1
0666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	15
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	15
0678 6008	PAV SURF PREP FOR MRK (24")	LF	15

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4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
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LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation
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SIDEWALK PLAN

US 277
AT W GEORGE AVE

BRONTE, TEXAS

SHEET 20 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	52
0907	00	229,ETC	

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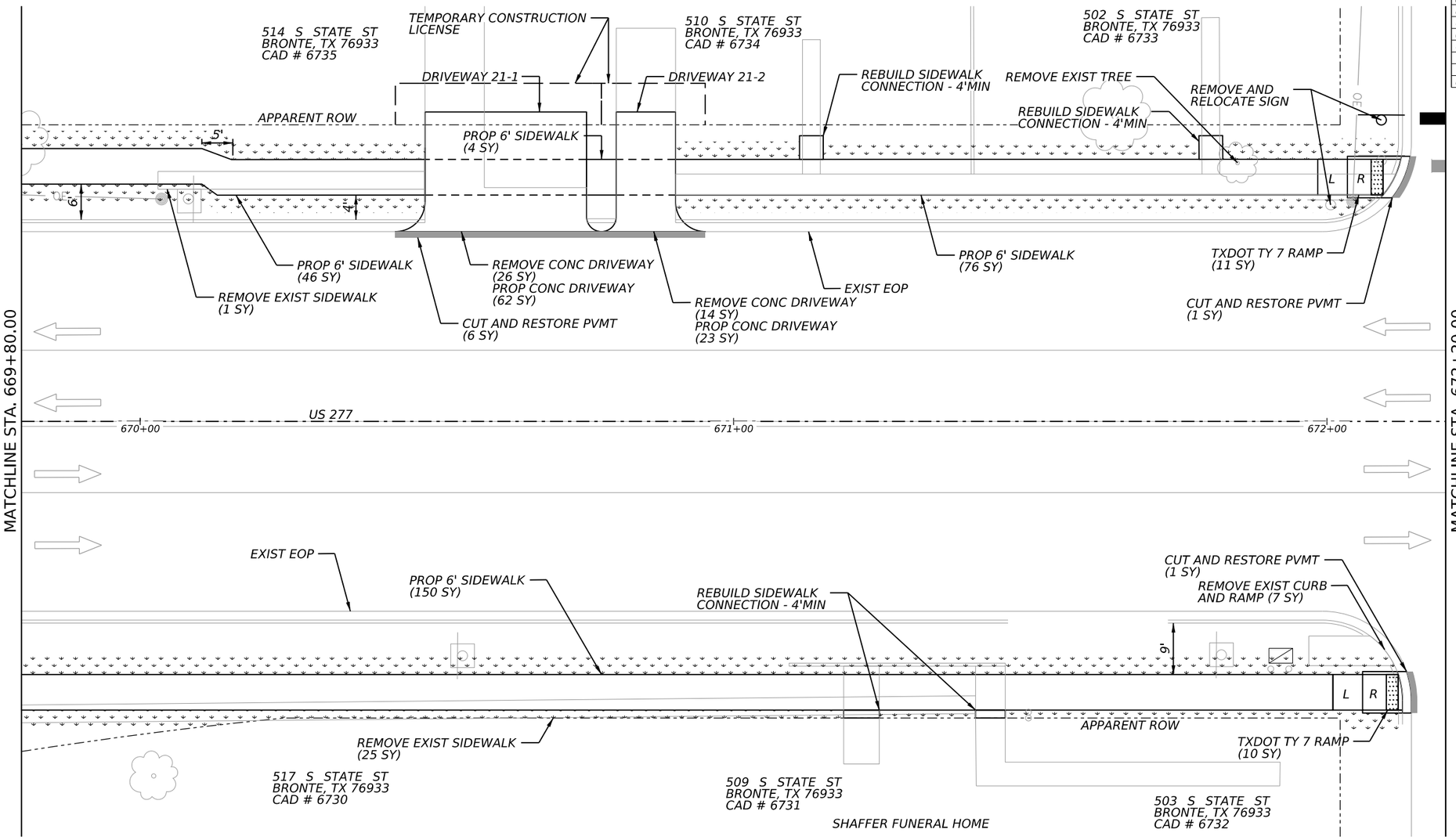

SHEET #			21
ITEM	DESCRIPTION	UNIT	QTY
0100 6006	PREP ROW (TREE)(LESS THAN 24" DIA)	EA	1
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	40
0104 6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	33
0162 6002	BLOCK SODDING	SY	241
0400 6008	CUT & RESTORE ASPH PAVING	SY	8
0530 6004	DRIVEWAYS (CONC)	SY	85
0531 6001	CONC SIDEWALKS (4")	SY	276
0531 6024	CURB RAMPS (TY 7)	SY	21
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1

NOTES:

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2. LONGITUDINAL SLOPE SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.

0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
- POWER/UTILITY POLE
- R RAMP
- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
- MISCELLANEOUS STRUC
- IRRIGATION CONTROLS
- UTILITY WITNESS
- SL LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
- TRAFFIC FLOW
- SB TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL POLE
- TREE/BUSHES
- WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation
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SIDEWALK PLAN

US 277
BETWEEN W GEORGE AVE AND BARCLAY AVE

BRONTE, TEXAS

SHEET 21 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	53
0907	00	229,ETC	

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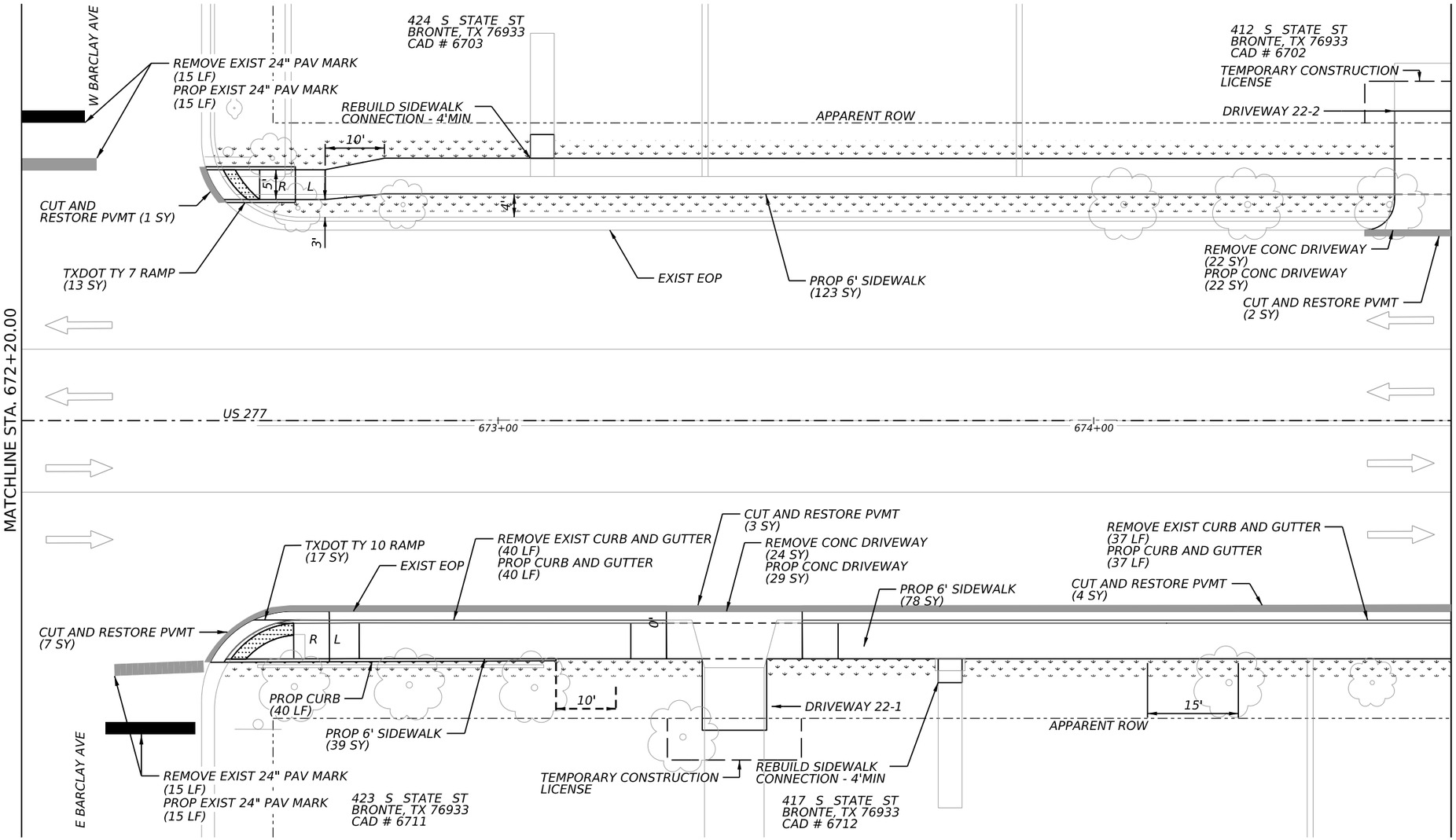

SHEET #			22
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	46
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	77
0162 6002	BLOCK SODDING	SY	228
0400 6008	CUT & RESTORE ASPH PAVING	SY	17
0529 6002	CONC CURB (TY II)	LF	40
0529 6008	CONC CURB & GUTTER (TY II)	LF	77
0530 6004	DRIVEWAYS (CONC)	SY	51
0531 6001	CONC SIDEWALKS (4")	SY	240
0531 6024	CURB RAMPS (TY 7)	SY	13
0531 6027	CURB RAMPS (TY 10)	SY	17
0666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	30
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	30
0678 6008	PAV SURF PREP FOR MRK (24")	LF	30

NOTES:

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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

	DRAINAGE FLOW ARROW		LIGHT POLE	SL	LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
— X —	FENCE		MAIL BOX		TRAFFIC FLOW
F	FLARE		MANHOLE	SB	TRAFFIC SIGNAL BOX
	FIRE HYDRANT		PEDESTAL SIGNAL POLE		TRAFFIC SIGNAL CONTROLLER
	GAS METER/VALVE		POWER/UTILITY POLE		TRAFFIC SIGNAL POLE
	GROUND BOX	R	RAMP		TREE/BUSHES
L	LANDING		RIPRAP (CONC)	W	WATER METER/VALVE
L1	LANDING (COMMON)		SIGN		GUTTER LINE PROJECTION
LS	LEVEL SIDEWALK (2% MAX)		SODDING		GRATE INLET
	GUY WIRE	T	TRANSITION		PROPOSED PEDESTAL POLE
	GUARD FENCE/RAIL		MISCELLANEOUS STRUC		PROPOSED CONDUIT
	PROPOSED CONDUIT (BORE)		IRRIGATION CONTROLS		EXISTING CONDUIT
			UTILITY WITNESS		STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

SIDEWALK PLAN

US 277
BETWEEN BARCLAY AVE AND HOLMES AVE

BRONTE, TEXAS

SHEET 22 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	54
0907	00	229,ETC	

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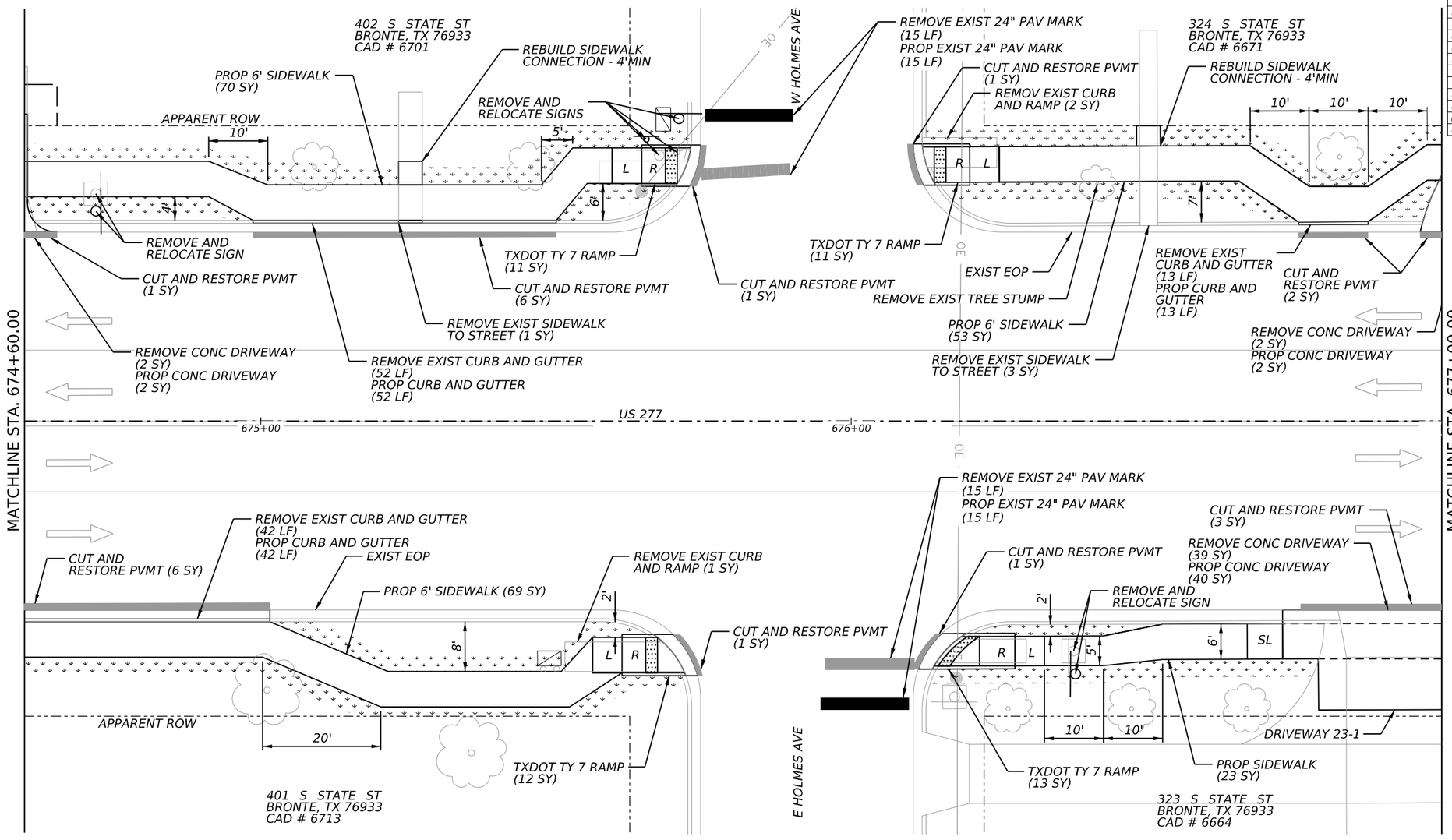
SHEET #			23
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	43
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	107
0104 6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	7
0162 6002	BLOCK SODDING	SY	176
0400 6008	CUT & RESTORE ASPH PAVING	SY	22
0529 6008	CONC CURB & GUTTER (TY II)	LF	107
0530 6004	DRIVEWAYS (CONC)	SY	44
0531 6001	CONC SIDEWALKS (4")	SY	215
0531 6024	CURB RAMPS (TY 7)	SY	47
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	4
0666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	30
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	30
0678 6008	PAV SURF PREP FOR MRK (24")	LF	30



NOTES:

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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
- POWER/UTILITY POLE
- R RAMP
- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
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- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL POLE
- TREE/BUSHES
- W WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
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SIDEWALK PLAN

US 277
AT HOLMES AVE

BRONTE, TEXAS

SHEET 23 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	55
0907	00	229,ETC	

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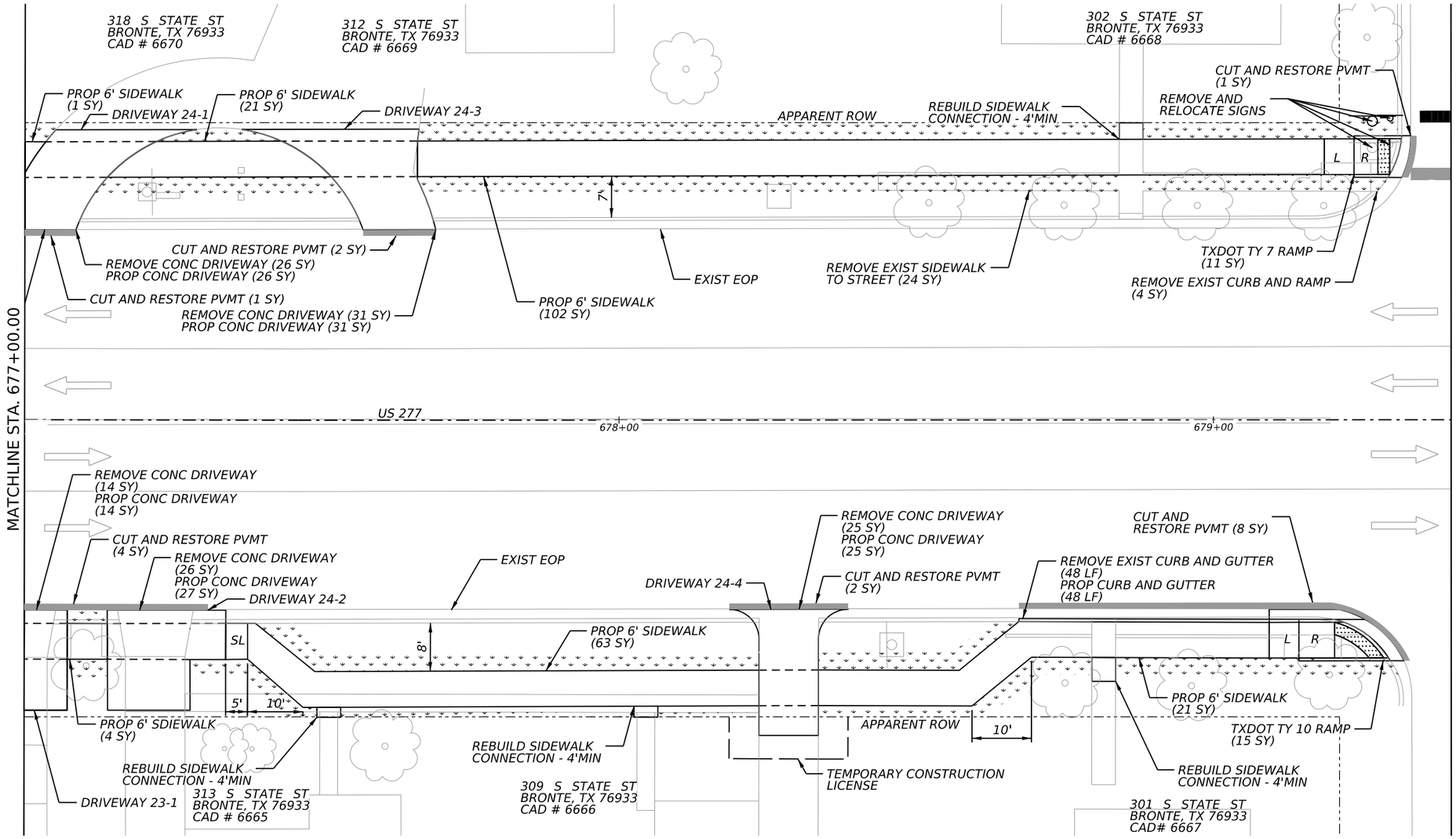

SHEET #			24
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	122
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	48
0104 6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	28
0162 6002	BLOCK SODDING	SY	183
0400 6008	CUT & RESTORE ASPH PAVING	SY	18
0529 6008	CONC CURB & GUTTER (TY II)	LF	48
0530 6004	DRIVEWAYS (CONC)	SY	123
0531 6001	CONC SIDEWALKS (4")	SY	212
0531 6024	CURB RAMPS (TY 7)	SY	11
0531 6027	CURB RAMPS (TY 10)	SY	15
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	2

NOTES:

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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
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- GROUND BOX
- L LANDING
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- PROPOSED PEDESTAL POLE
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- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
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SIDEWALK PLAN

US 277
BETWEEN HOLMES AVE AND MC CAULLEY AVE

BRONTE, TEXAS

SHEET 24 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	56
0907	00	229,ETC	

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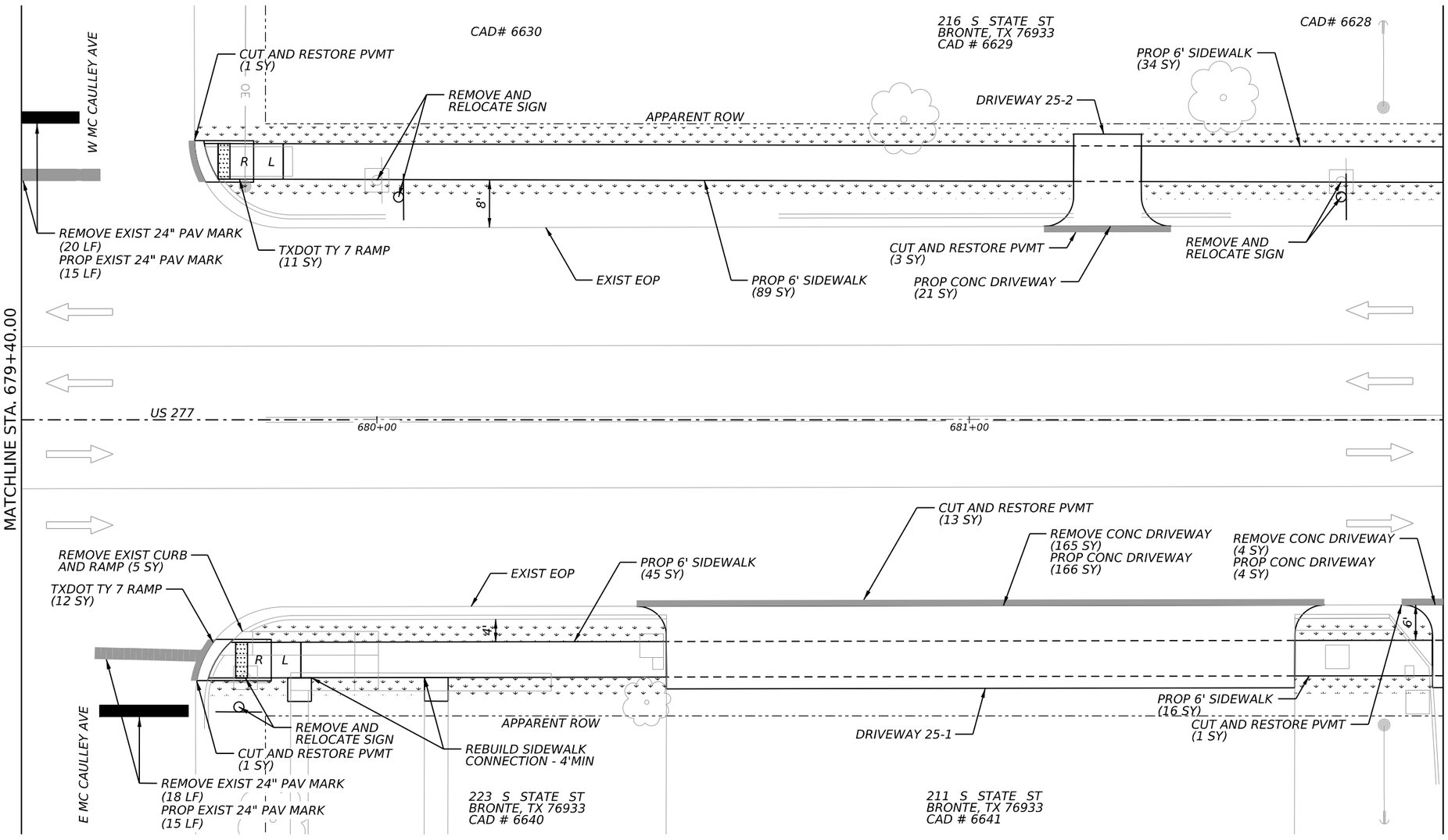
SHEET #			25
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	169
0104 6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	5
0162 6002	BLOCK SODDING	SY	195
0400 6008	CUT & RESTORE ASPH PAVING	SY	19
0530 6004	DRIVEWAYS (CONC)	SY	191
0531 6001	CONC SIDEWALKS (4")	SY	184
0531 6024	CURB RAMPS (TY 7)	SY	23
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	3
0666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	30
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	38
0678 6008	PAV SURF PREP FOR MRK (24")	LF	30



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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

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- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
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Texas Department of Transportation

SIDEWALK PLAN

US 277
BETWEEN MC CAULLEY AVE AND OLIVER AVE

BRONTE, TEXAS

SHEET 25 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	57
0907	00	229,ETC	

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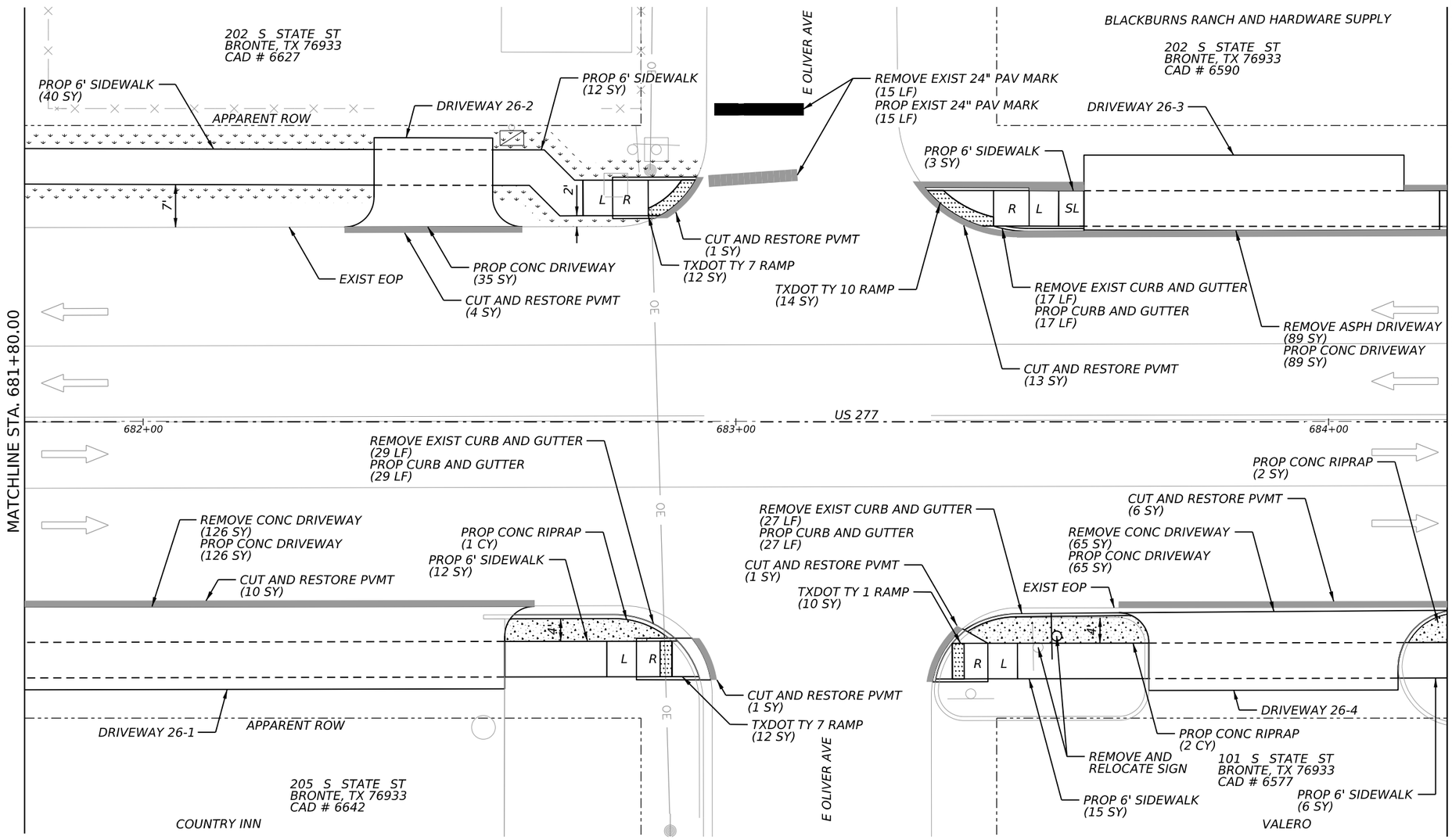

SHEET #			26
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	191
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	73
0105 6037	REMOVING STAB BASE & ASPH PAV(0"-16")	SY	89
0162 6002	BLOCK SODDING	SY	58
0400 6008	CUT & RESTORE ASPH PAVING	SY	36
0432 6001	RIPRAP (CONC)(4 IN)	CY	3
0529 6008	CONC CURB & GUTTER (TY II)	LF	73
0530 6004	DRIVEWAYS (CONC)	SY	315
0531 6001	CONC SIDEWALKS (4")	SY	88
0531 6018	CURB RAMPS (TY 1)	SY	10
0531 6024	CURB RAMPS (TY 7)	SY	24
0531 6027	CURB RAMPS (TY 10)	SY	14
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1
0666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	15
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	15
0678 6008	PAV SURF PREP FOR MRK (24")	LF	15

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0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

	DRAINAGE FLOW ARROW		LIGHT POLE	SL	LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
— × —	FENCE		MAIL BOX		TRAFFIC FLOW
F	FLARE		MANHOLE	SB	TRAFFIC SIGNAL BOX
	FIRE HYDRANT		PEDESTAL SIGNAL POLE		TRAFFIC SIGNAL CONTROLLER
	GAS METER/VALVE		POWER/UTILITY POLE		TRAFFIC SIGNAL POLE
	GROUND BOX	R	RAMP		TREE/BUSHES
L	LANDING		RIPRAP (CONC)	W	WATER METER/VALVE
L1	LANDING (COMMON)		SIGN		GUTTER LINE PROJECTION
LS	LEVEL SIDEWALK (2% MAX)		SODDING		GRATE INLET
	GUY WIRE	T	TRANSITION		PROPOSED PEDESTAL POLE
	GUARD FENCE/RAIL		MISCELLANEOUS STRUC		PROPOSED CONDUIT
	PROPOSED CONDUIT (BORE)		IRRIGATION CONTROLS		EXISTING CONDUIT
			UTILITY WITNESS		STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

SIDEWALK PLAN

US 277
AT OLIVER AVE

BRONTE, TEXAS

SHEET 26 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	58
CONT.	SECT.	JOB	
0907	00	229,ETC	

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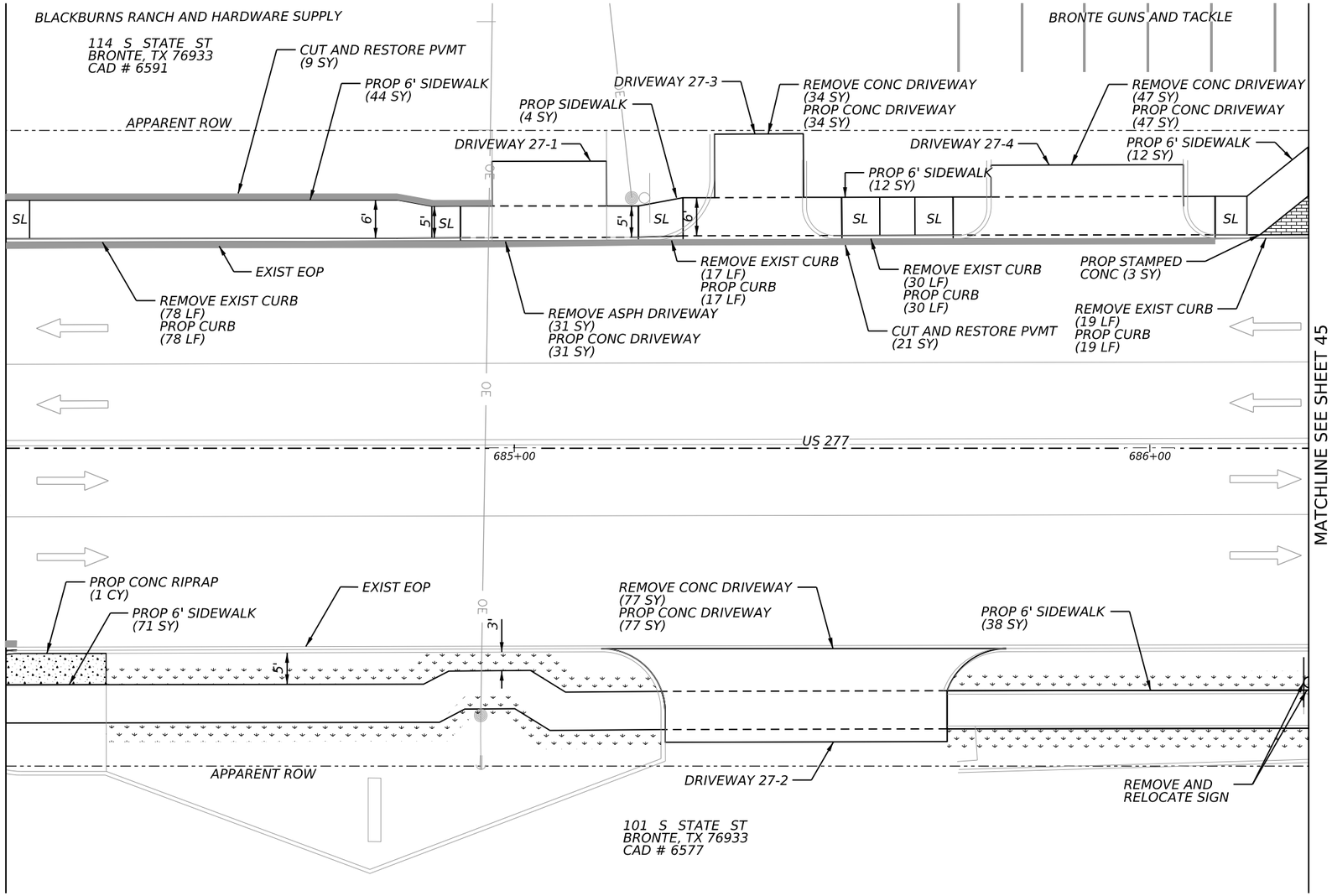

SHEET #			27
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	158
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	144
0105 6037	REMOVING STAB BASE & ASPH PAV(0"-16")	SY	31
0162 6002	BLOCK SODDING	SY	97
0400 6008	CUT & RESTORE ASPH PAVING	SY	30
0432 6001	RIPRAP (CONC)(4 IN)	CY	1
0528 6001	COLORED TEXTURED CONC (4")	SY	3
0529 6002	CONC CURB (TY II)	LF	144
0530 6004	DRIVEWAYS (CONC)	SY	189
0531 6001	CONC SIDEWALKS (4")	SY	181
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1

NOTES:

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0 10 20

SCALE: 1" = 20'

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
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LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

SIDEWALK PLAN

US 277 BETWEEN OLIVER AVE AND US 158

BRONTE, TEXAS

SHEET 27 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	59
0907	00	229,ETC	

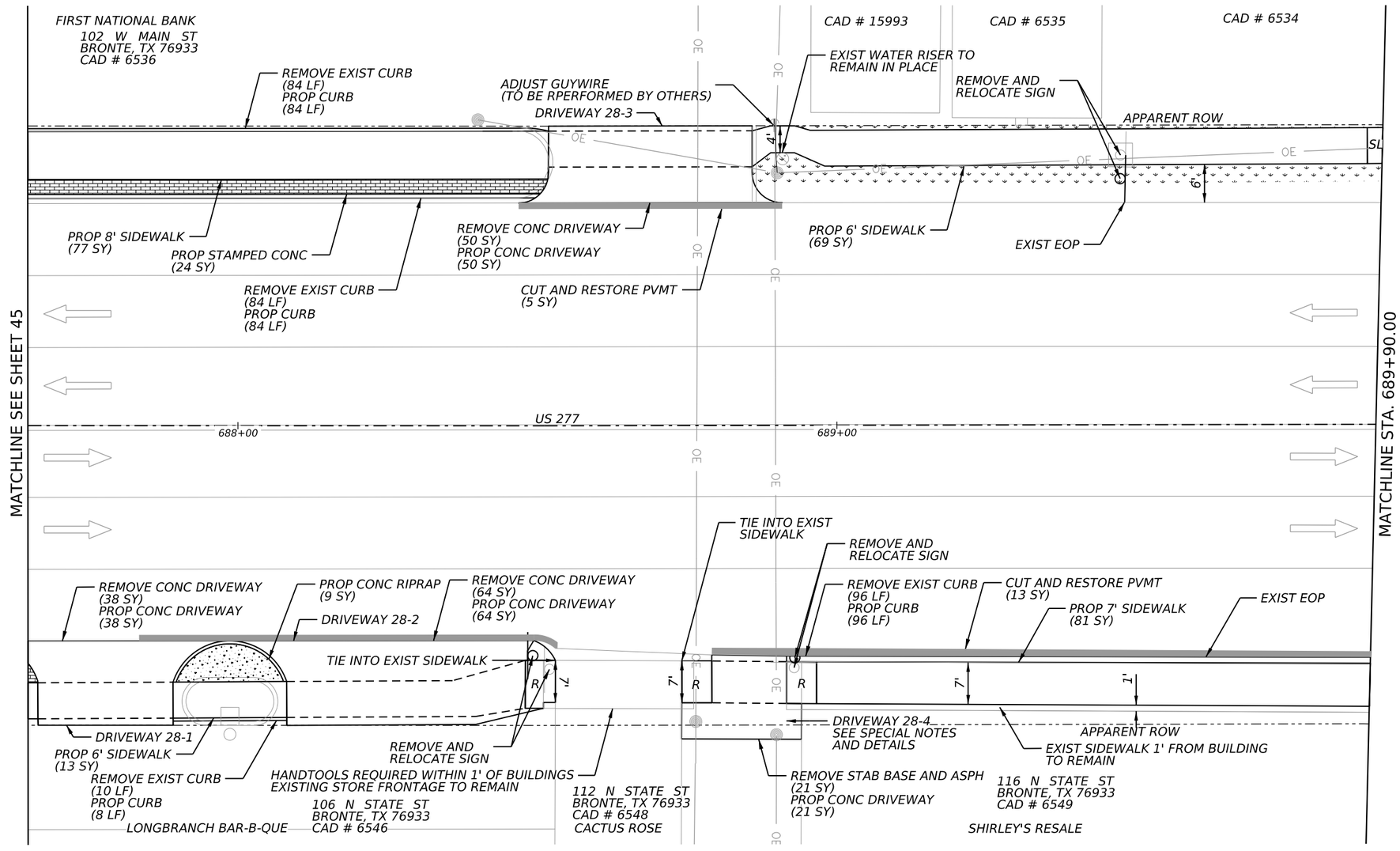
SPECIAL NOTES & DETAILS

LEGEND

	DRAINAGE FLOW ARROW		LIGHT POLE	SL	LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
— X —	FENCE		MAIL BOX		TRAFFIC FLOW
F	FLARE		MANHOLE	SB	TRAFFIC SIGNAL BOX
	FIRE HYDRANT		PEDESTAL SIGNAL POLE		TRAFFIC SIGNAL CONTROLLER
	GAS METER/VALVE		POWER/UTILITY POLE		TRAFFIC SIGNAL POLE
	GROUND BOX	R	RAMP		TREE/BUSHES
L	LANDING		RIPRAP (CONC)	W	WATER METER/VALVE
L1	LANDING (COMMON)		SIGN		GUTTER LINE PROJECTION
LS	LEVEL SIDEWALK (2% MAX)		SODDING		GRATE INLET
	GUY WIRE	T	TRANSITION		PROPOSED PEDESTAL POLE
	GUARD FENCE/RAIL		MISCELLANEOUS STRUC		PROPOSED CONDUIT
	PROPOSED CONDUIT (BORE)		IRRIGATION CONTROLS		EXISTING CONDUIT
			UTILITY WITNESS		STAMPED CONCRETE

FILENAME: c:\pw\xn1\d0251617\sJT_US277_ROW_14.dgn
PLOTTED: 4/26/2024 12:40:55 PM

SHEET #			28
ITEM	DESCRIPTION	UNIT	QTY
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	152
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	274
0105 6037	REMOVING STAB BASE & ASPH PAV(0"-16")	SY	21
0162 6002	BLOCK SODDING	SY	35
0400 6008	CUT & RESTORE ASPH PAVING	SY	18
0432 6001	RIPRAP (CONC)(4 IN)	CY	1
0528 6001	COLORED TEXTURED CONC (4")	SY	24
0529 6002	CONC CURB (TY II)	LF	272
0530 6004	DRIVEWAYS (CONC)	SY	173
0531 6001	CONC SIDEWALKS (4")	SY	240
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	3



NOTES:

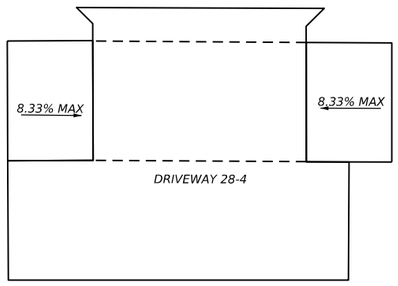
* FOR CONTRACTOR INFORMATION ONLY

1. THE EXISTENCE AND LOCATION OF ALL UTILITIES AND DRAINAGE STRUCTURES INDICATED IN THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO BEGINNING CONSTRUCTION.
2. LONGITUDINAL SLOPE SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.

0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS



NOTES:

1. RAISE ALLEY DRIVEWAY GRADE TO ACHIEVE LESS THAN 8.33% GRADE AND LESS THAN 6" VERTICAL ELEVATION CHANGE TO SIDEWALKS.
2. ENSURE THAT ALLEY DRIVEWAY HAS POSITIVE DRAINAGE TO ROADWAY

LEGEND

	DRAINAGE FLOW ARROW		LIGHT POLE	SL	LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
— X —	FENCE		MAIL BOX		TRAFFIC FLOW
F	FLARE		MANHOLE	SB	TRAFFIC SIGNAL BOX
	FIRE HYDRANT		PEDESTAL SIGNAL POLE		TRAFFIC SIGNAL CONTROLLER
	GAS METER/VALVE		POWER/UTILITY POLE		TRAFFIC SIGNAL POLE
	GROUND BOX	R	RAMP		TREE/BUSHES
L	LANDING		RIPRAP (CONC)	W	WATER METER/VALVE
L1	LANDING (COMMON)		SIGN		GUTTER LINE PROJECTION
LS	LEVEL SIDEWALK (2% MAX)		SODDING		GRATE INLET
	GUY WIRE	T	TRANSITION		PROPOSED PEDESTAL POLE
	GUARD FENCE/RAIL		MISCELLANEOUS STRUC		PROPOSED CONDUIT
	PROPOSED CONDUIT (BORE)		IRRIGATION CONTROLS		EXISTING CONDUIT
			UTILITY WITNESS		STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

SIDEWALK PLAN

US 277 BETWEEN SH 158 AND HOWARD AVE

BRONTE, TEXAS

SHEET 28 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		US 277

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	60
0907	00	229,ETC	

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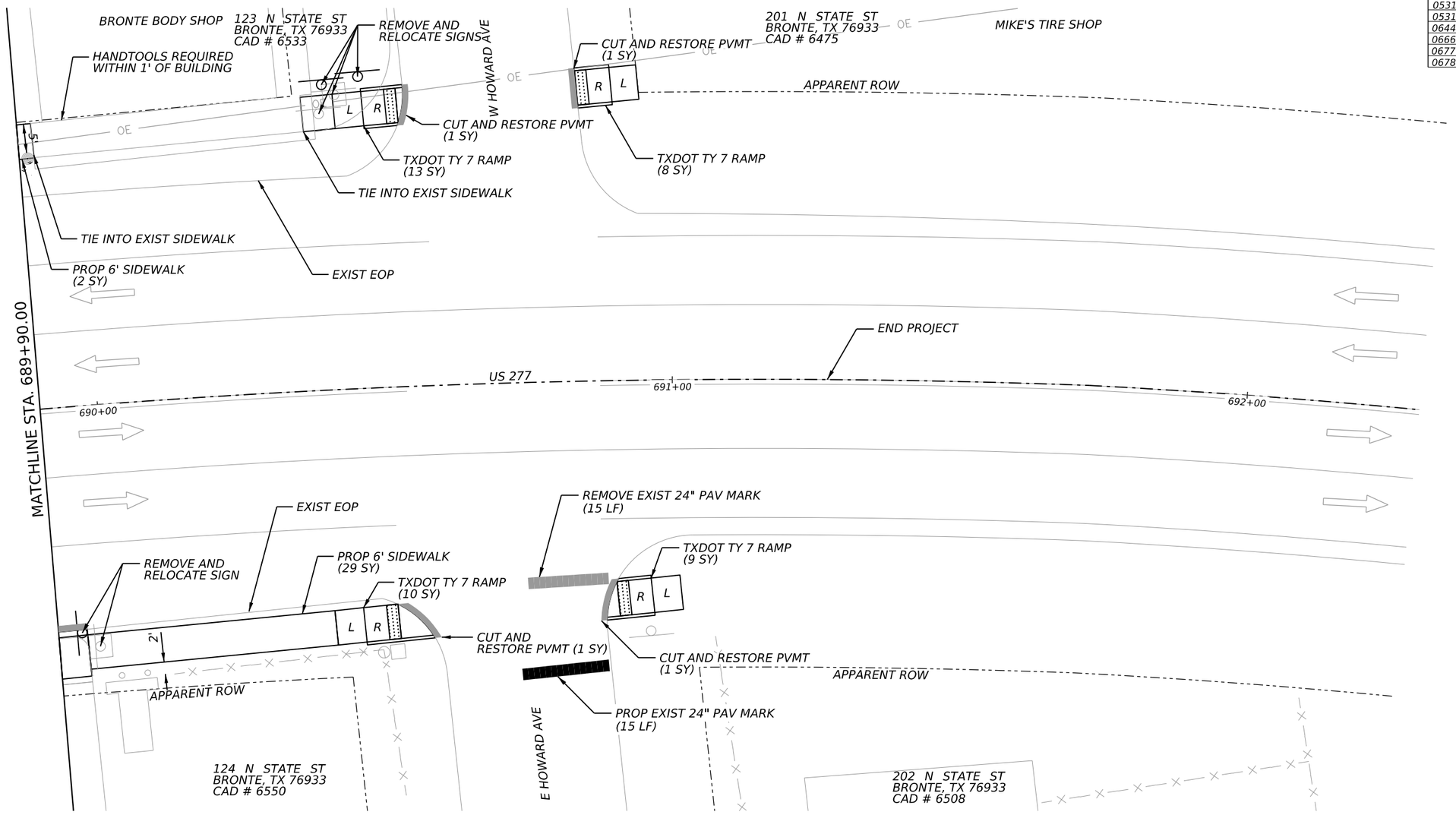
SHEET #			29
ITEM	DESCRIPTION	UNIT	QTY
0400 6008	CUT & RESTORE ASPH PAVING	SY	4
0531 6001	CONC SIDEWALKS (4")	SY	31
0531 6024	CURB RAMPS (TY 7)	SY	40
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	3
0666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	15
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	15
0678 6008	PAV SURF PREP FOR MRK (24")	LF	15



NOTES:

* FOR CONTRACTOR INFORMATION ONLY

1. THE EXISTENCE AND LOCATION OF ALL UTILITIES AND DRAINAGE STRUCTURES INDICATED IN THE PLANS ARE TAKEN FROM THE BEST RECORDS AVAILABLE AND ARE NOT GUARANTEED TO BE ACCURATE. CONTRACTOR SHALL COORDINATE WITH ALL UTILITY COMPANIES TO FIELD VERIFY UTILITIES PRIOR TO BEGINNING CONSTRUCTION.
2. LONGITUDINAL SLOPE SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.

0 10 20

SCALE: 1" = 20'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
- POWER/UTILITY POLE
- R RAMP
- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
- MISCELLANEOUS STRUC
- IRRIGATION CONTROLS
- UTILITY WITNESS
- SL LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
- TRAFFIC FLOW
- SB TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL POLE
- TREE/BUSHES
- WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

Texas Department of Transportation

SIDEWALK PLAN

US 277
AT HOWARD AVE

BRONTE, TEXAS

SHEET 29 OF 29

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			US 277
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	COKE	
CONT.	SECT.	JOB	61
0907	00	229,ETC	

FILENAME: c:\pw\kh1\d0251617\SJT_US277_ROW_16.dgn
PLOTTED: 4/26/2024 12:41:44 PM

HORIZONTAL ALIGNMENT REPORT

Alignment name: CL KNK
Alignment description:
Report Created: Wednesday, May 10, 2023
Time: 11:26:18 PM

	STATION	X	Y
POT	10+00.000 R1	2249032.256	10474010.773
PC	28+09.048 R1	2250408.748	10475184.623

Tangential Direction: N49°32'34.722"E
Tangential Length: 1809.048

PC	28+09.048 R1	2250408.748	10475184.623
PI	32+44.536 R1	2250740.107	10475467.202
CC		2249126.409	10476688.331
PT	36+66.323 R1	2250922.005	10475862.882

Radius: 1976.241
Delta: 24°51'15.790" Left
Degree of Curvature(Arc): 02°53'57.229"
Length: 857.275
Tangent: 435.488
Chord: 850.570
Middle Ordinate: 46.303
External: 47.414
Tangent Back Direction: N49°32'34.722"E
Radial Direction: S40°27'25.278"E
Chord Direction: N37°06'56.827"E
Radial Direction: S65°18'41.068"E
Tangent Ahead Direction: N24°41'18.932"E

PT	36+66.323 R1	2250922.005	10475862.882
PC	95+38.548 R1	2253374.752	10481198.335

Tangential Direction: N24°41'18.932"E
Tangential Length: 5872.225

PC	95+38.548 R1	2253374.752	10481198.335
PI	100+56.961 R1	2253591.286	10481669.361
CC		2255576.464	10480186.192
PT	105+59.977 R1	2253981.585	10482010.564

Radius: 2423.214
Delta: 24°09'04.411" Right
Degree of Curvature(Arc): 02°21'52.034"
Length: 1021.429
Tangent: 518.413
Chord: 1013.884
Middle Ordinate: 53.620
External: 54.833
Tangent Back Direction: N24°41'18.932"E
Radial Direction: S65°18'41.068"E
Chord Direction: N36°45'51.137"E
Radial Direction: S41°09'36.657"E
Tangent Ahead Direction: N48°50'23.343"E

PT	105+59.977 R1	2253981.585	10482010.564
PC	138+34.497 R1	2256446.881	10484165.742

Tangential Direction: N48°50'23.343"E
Tangential Length: 3274.519

PC	138+34.497 R1	2256446.881	10484165.742
PI	139+16.303 R1	2256508.471	10484219.585
CC		2252675.864	10488479.385
PT	139+98.099 R1	2256568.498	10484275.163

Radius: 5729.580
Delta: 01°38'09.673" Left
Degree of Curvature(Arc): 00°59'59.999"
Length: 163.602
Tangent: 81.807
Chord: 163.597
Middle Ordinate: 0.584
External: 0.584
Tangent Back Direction: N48°50'23.343"E
Radial Direction: S41°09'36.657"E
Chord Direction: N48°01'18.507"E
Radial Direction: S42°47'46.330"E
Tangent Ahead Direction: N47°12'13.670"E

PT	139+98.099 R1	2256568.498	10484275.163
PC	144+07.493 R1	2256868.901	10484553.303

Tangential Direction: N47°12'13.670"E
Tangential Length: 409.394

PC	144+07.493 R1	2256868.901	10484553.303
PI	144+82.593 R1	2256924.008	10484604.325
CC		2260761.536	10480349.081
PT	145+57.684 R1	2256980.433	10484653.886

Radius: 5729.580
Delta: 01°30'06.898" Right
Degree of Curvature(Arc): 00°59'59.999"
Length: 150.192
Tangent: 75.100
Chord: 150.187
Middle Ordinate: 0.492
External: 0.492
Tangent Back Direction: N47°12'13.670"E
Radial Direction: S42°47'46.330"E
Chord Direction: N47°57'17.119"E
Radial Direction: S41°17'39.432"E
Tangent Ahead Direction: N48°42'20.568"E

PT	145+57.684 R1	2256980.433	10484653.886
PC	165+23.982 R1	2258457.771	10485951.498

Tangential Direction: N48°42'20.568"E
Tangential Length: 1966.297

Kimley»Horn F-928

Texas Department of Transportation

HORIZONTAL ALIGNMENT DATA & CONTROL POINTS

SHEET 1 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	62
0907	00	229,ETC	

FILENAME: c:\pw\kn1\d0251617\SJT_ROW_HAD_01.dgn
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PC	165+23.982 R1	2258457.771	10485951.498
PI	165+57.998 R1	2258483.328	10485973.946
CC		2254676.668	10490256.303
PT	165+92.013 R1	2258508.617	10485996.696

Radius: 5729.580
Delta: 00°40'49.131" Left
Degree of Curvature(Arc): 00°59'59.999"
Length: 68.031
Tangent: 34.016
Chord: 68.031
Middle Ordinate: 0.101
External: 0.101
Tangent Back Direction: N48°42'20.568"E
Radial Direction: S41°17'39.432"E
Chord Direction: N48°21'56.002"E
Radial Direction: S41°58'28.563"E
Tangent Ahead Direction: N48°01'31.437"E

PT	165+92.013 R1	2258508.617	10485996.696
PC	192+39.116 R1	2260476.583	10487767.081

Tangential Direction: N48°01'31.437"E
Tangential Length: 2647.103

PC	192+39.116 R1	2260476.583	10487767.081
PI	193+53.688 R1	2260561.761	10487843.707
CC		2264308.533	10483507.475
PT	194+68.229 R1	2260649.933	10487916.867

Radius: 5729.580
Delta: 02°17'28.067" Right
Degree of Curvature(Arc): 00°59'59.999"
Length: 229.113
Tangent: 114.572
Chord: 229.098
Middle Ordinate: 1.145
External: 1.145
Tangent Back Direction: N48°01'31.437"E
Radial Direction: S41°58'28.563"E
Chord Direction: N49°10'15.470"E
Radial Direction: S39°41'00.496"E
Tangent Ahead Direction: N50°18'59.504"E

PT	194+68.229 R1	2260649.933	10487916.867
PC	203+40.653 R1	2261321.336	10488473.949

Tangential Direction: N50°18'59.504"E
Tangential Length: 872.423

PC	203+40.653 R1	2261321.336	10488473.949
PI	204+38.740 R1	2261396.823	10488536.582
CC		2257662.737	10492883.341
PT	205+36.809 R1	2261470.121	10488601.763

Radius: 5729.580
Delta: 01°57'41.619" Left
Degree of Curvature(Arc): 00°59'59.999"
Length: 196.156
Tangent: 98.088
Chord: 196.147
Middle Ordinate: 0.839
External: 0.840
Tangent Back Direction: N50°18'59.504"E
Radial Direction: S39°41'00.496"E
Chord Direction: N49°20'08.694"E
Radial Direction: S41°38'42.115"E
Tangent Ahead Direction: N48°21'17.885"E

PT	205+36.809 R1	2261470.121	10488601.763
PC	212+86.064 R1	2262030.022	10489099.653

Tangential Direction: N48°21'17.885"E
Tangential Length: 749.255

PC	212+86.064 R1	2262030.022	10489099.653
PI	218+05.827 R1	2262418.429	10489445.043
CC		2262929.074	10488088.628
PT	222+78.551 R1	2262938.180	10489441.545

Radius: 1352.947
Delta: 42°01'50.474" Right
Degree of Curvature(Arc): 04°14'05.592"
Length: 992.487
Tangent: 519.764
Chord: 970.382
Middle Ordinate: 89.992
External: 96.404
Tangent Back Direction: N48°21'17.885"E
Radial Direction: S41°38'42.115"E
Chord Direction: N69°22'13.122"E
Radial Direction: S00°23'08.359"W
Tangent Ahead Direction: S89°36'51.641"E

PT	222+78.551 R1	2262938.180	10489441.545
POT	228+18.209 R1	2263477.826	10489437.912

Tangential Direction: S89°36'51.641"E
Tangential Length: 539.658

Kimley»Horn F-928

HORIZONTAL ALIGNMENT DATA & CONTROL POINTS

SHEET 2 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	63
0907	00	229,ETC	

FILENAME: c:\pw\km1\d0251617\SJT_ROW_HAD_02.dgn
PLOTTED: 4/26/2024 12:42:35 PM

HORIZONTAL ALIGNMENT REPORT

Alignment name: BL SDWK
Alignment description:
Report Created: Wednesday, May 10, 2023
Time: 11:30:23 PM

	STATION	X	Y
POT	10+00.000 R1	2249763.288	10474677.422
PI	10+05.000 R1	2249767.092	10474680.667
Tangential Direction:	N49°32'34.722"E		
Tangential Length:	5.000		
PI	10+05.000 R1	2249767.092	10474680.667
PI	10+25.211 R1	2249777.193	10474698.173
Tangential Direction:	N29°59'05.153"E		
Tangential Length:	20.211		
PI	10+25.211 R1	2249777.193	10474698.173
PI	11+65.259 R1	2249883.755	10474789.047
Tangential Direction:	N49°32'34.722"E		
Tangential Length:	140.048		
PI	11+65.259 R1	2249883.754	10474789.046
PI	12+10.156 R1	2249920.836	10474814.358
Tangential Direction:	N55°40'59.280"E		
Tangential Length:	44.897		
PIBL CL-4	12+10.156 R1	2249920.836	10474814.358
POT	12+15.156 R1	2249924.640	10474817.602
Tangential Direction:	N49°32'34.722"E		
Tangential Length:	5.000		

DATUM NOTE FOR SAN ANGELO PROJECT:

THIS PROJECT IS REFERENCED, FOR ALL BEARING AND COORDINATE BASIS, TO THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE (4204), NORTH AMERICA DATUM OF 1983 (2011) EPOCH 2010.00.

COORDINATES SHOWN HEREON ARE SURFACE COORDINATES.

ALL ELEVATIONS SHOWN HEREON ARE NORTH AMERICAN VERTICAL DATUM (NAVD) 88 AND WERE DERIVED FROM GPS OBSERVATIONS.

UNITS: U.S. SURVEY FEET

Kimley»Horn F-928

HORIZONTAL ALIGNMENT DATA & CONTROL POINTS

SHEET 3 OF 3

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	64
0907	00	229,ETC	

FILENAME: c:\pw\kh1\d0251617\SJT_ROW_HAD_03.dgn
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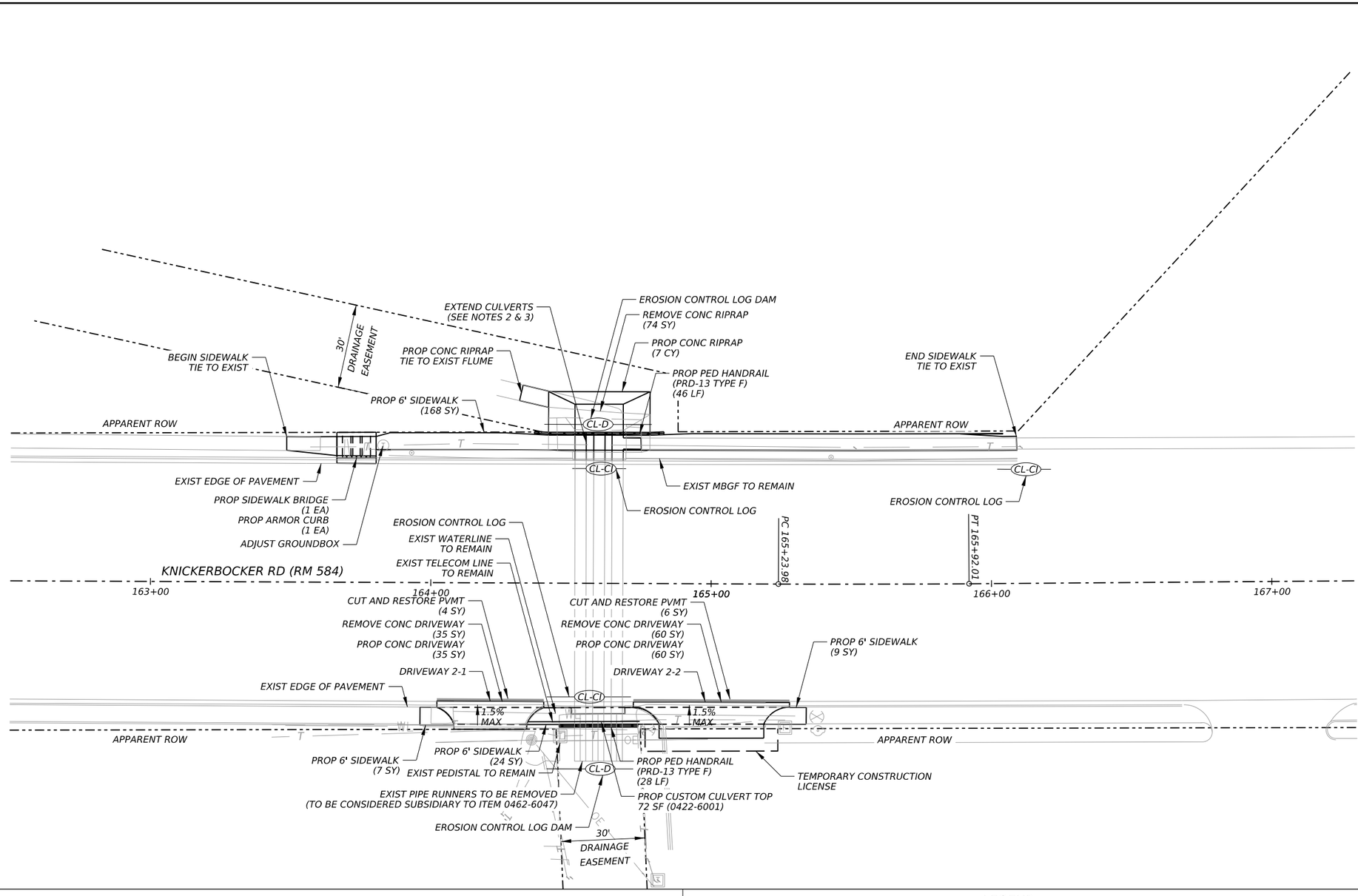
SHEET #			MRKT 1
ITEM	DESCRIPTION	UNIT	QTY
0104 6009	REMOVING CONC (RIPRAP)	SY	74
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	95
0400 6008	CUT & RESTORE ASPH PAVING	SY	10
0422 6001	REINF CONC SLAB	SF	72
0432 6001	RIPRAP (CONC)(4 IN)	CY	7
0450 6052	RAIL (HANDRAIL)(TY F)	LF	74
0465 6233	INLET (COMP) (TY SIDEWALK BRIDGE)	EA	1
0530 6004	DRIVEWAYS (CONC)	SY	95
0531 6001	CONC SIDEWALKS (4")	SY	208



NOTES:

1. LONGITUDINAL SLOPE SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.
2. SEE DRAINAGE SHEETS FOR MORE INFORMATION.
3. SEE STRUCTURAL DETAILS SHEET FOR MORE INFORMATION.

0 20 40

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
- POWER/UTILITY POLE
- R RAMP
- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
- MISCELLANEOUS STRUC
- IRRIGATION CONTROLS
- UTILITY WITNESS
- SL LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
- TRAFFIC FLOW
- SB TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL POLE
- TREE/BUSHES
- WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

SAMUEL J. LUNDQUIST 122185 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Kimley»Horn F-928

Texas Department of Transportation ® © 2023

SIDEWALK PLAN

RM 584 BETWEEN JACKSON AND MARKET

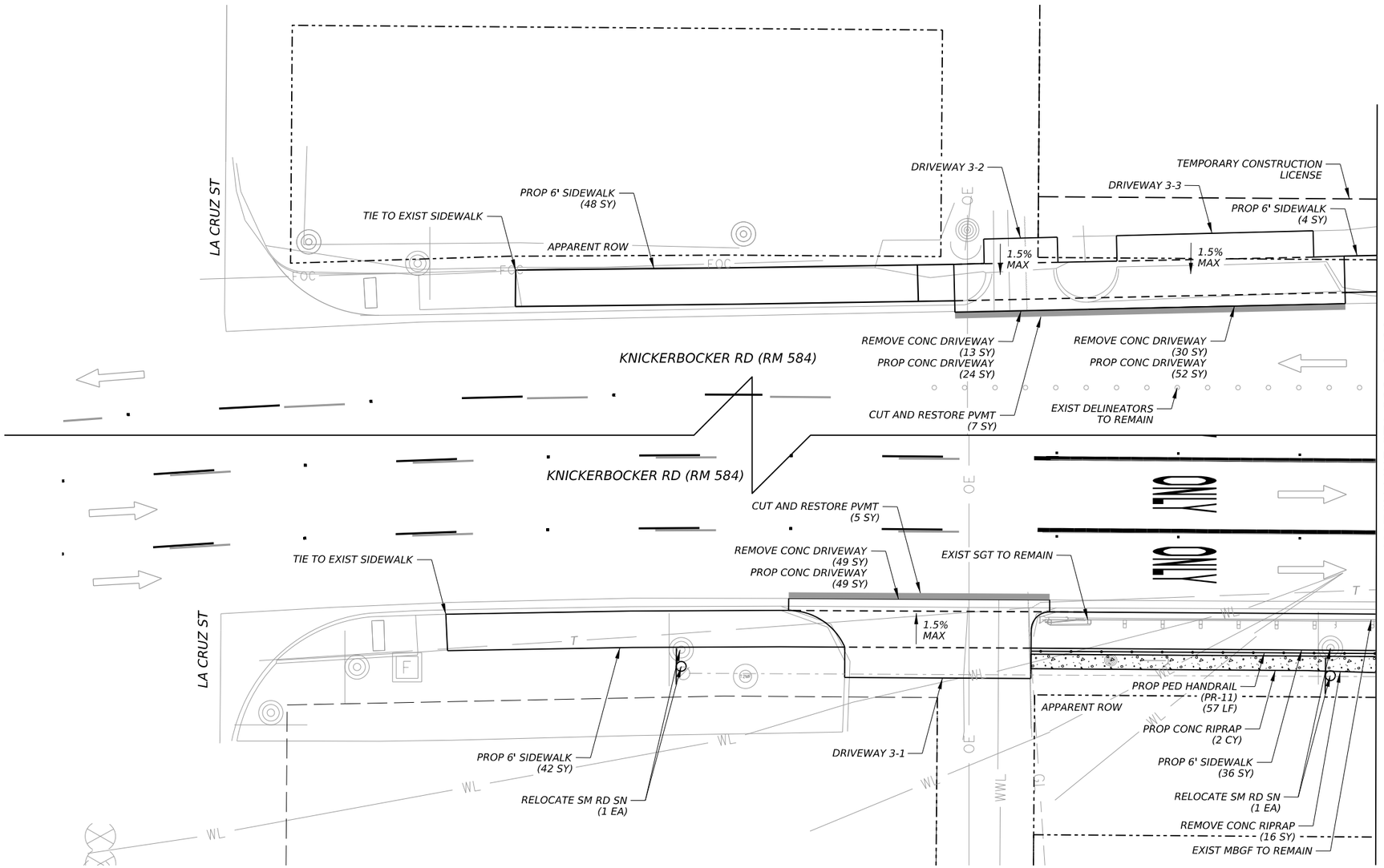
SAN ANGELO, TEXAS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	65
0907	00	229,ETC	

FILENAME: c:\pw\kn1\d0251617\SJT_SAN_RDW_JACKSON.dgn
PLOTTED: 4/26/2024 12:43:32 PM

SHEET #			US 87-1
ITEM	DESCRIPTION	UNIT	QTY
0104 6009	REMOVING CONC (RIPRAP)	SY	16
0104 6017	REMOVING CONC (DRIVEWAYS)	SY	92
0400 6008	CUT & RESTORE ASPH PAVING	SY	12
0432 6001	RIPRAP (CONC)(4 IN)	CY	2
0450 6103	RAIL (TY PR 11)	LF	57
0530 6004	DRIVEWAYS (CONC)	SY	125
0531 6001	CONC SIDEWALKS (4")	SY	130
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	2



NOTES:

1. LONGITUDINAL SLOPE SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.
2. SEE DRAINAGE SHEETS FOR MORE INFORMATION.
3. SEE STRUCTURAL DETAILS SHEET FOR MORE INFORMATION.

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
- POWER/UTILITY POLE
- R RAMP
- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
- MISCELLANEOUS STRUC
- IRRIGATION CONTROLS
- UTILITY WITNESS
- SL LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
- TRAFFIC FLOW
- SB TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL POLE
- TREE/BUSHES
- WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

0 10 20

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

Texas Department of Transportation

SIDEWALK PLAN

RM 584
AT US 87

SAN ANGELO, TEXAS

SHEET 1 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	66
0907	00	229,ETC	

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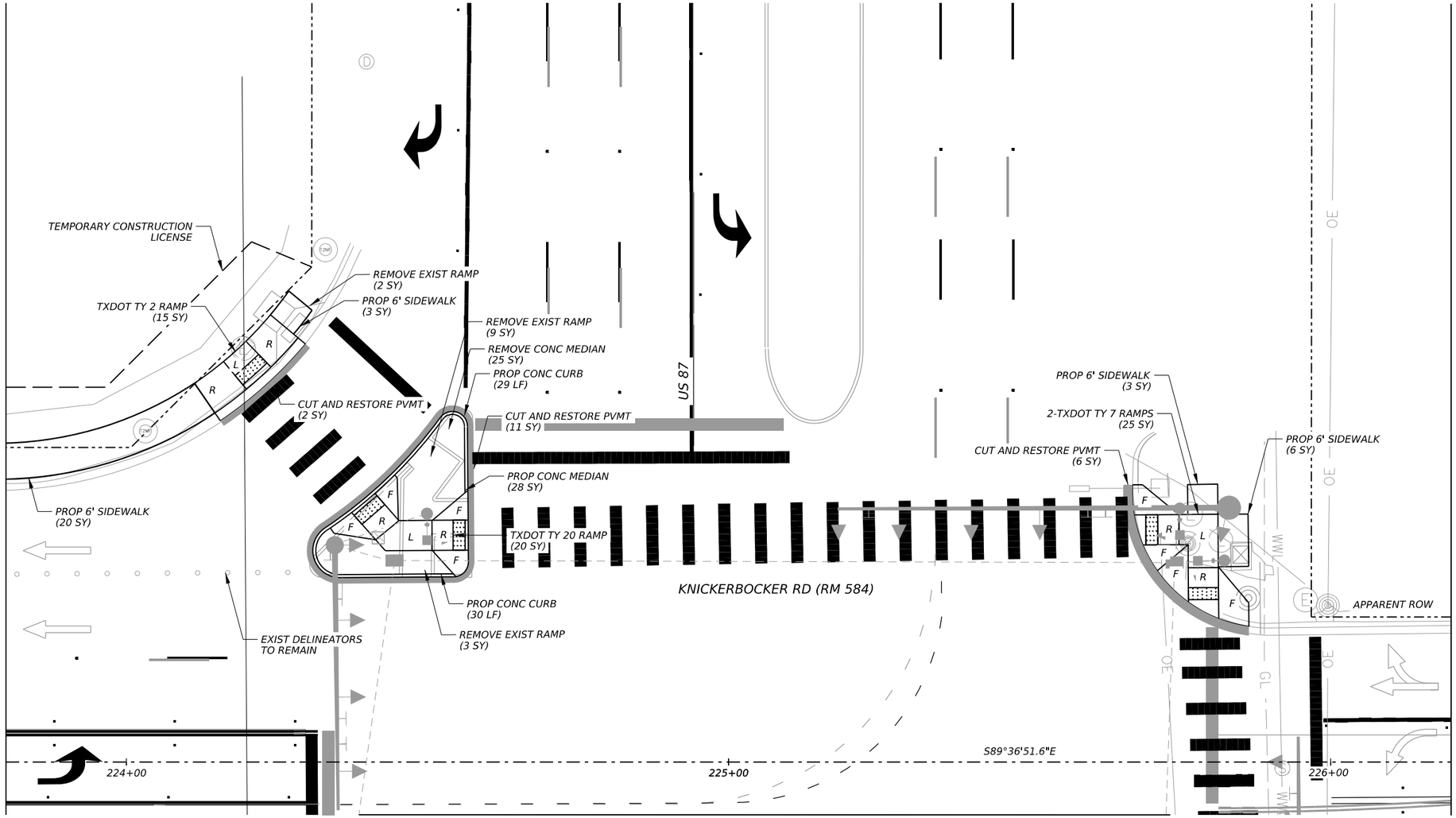
SHEET #			US 87-2
ITEM	DESCRIPTION	UNIT	QTY
0104 6011	REMOVING CONC (MEDIANS)	SY	25
0104 6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	14
0400 6008	CUT & RESTORE ASPH PAVING	SY	19
0529 6002	CONC CURB (TY II)	LF	59
0531 6001	CONC SIDEWALKS (4")	SY	32
0531 6019	CURB RAMPS (TY 2)	SY	15
0531 6024	CURB RAMPS (TY 7)	SY	25
0531 6029	CURB RAMPS (TY 20)	SY	20
0536 6002	CONC MEDIAN	SY	28



SEE SHEET 68

NOTES:

1. LONGITUDINAL SLOPE SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.
2. SEE DRAINAGE SHEETS FOR MORE INFORMATION.
3. SEE STRUCTURAL DETAILS SHEET FOR MORE INFORMATION.

0 10 20

4/26/2024

SAMUEL J. LUNDQUIST 122185 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Kimley»Horn F-928

SIDEWALK PLAN

RM 584
AT US 87

SAN ANGELO, TEXAS

SHEET 2 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	67
0907	00	229,ETC	

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
- POWER/UTILITY POLE
- R RAMP
- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
- MISCELLANEOUS STRUC
- IRRIGATION CONTROLS
- UTILITY WITNESS
- SL LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
- TRAFFIC FLOW
- SB TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL POLE
- TREE/BUSHES
- W WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

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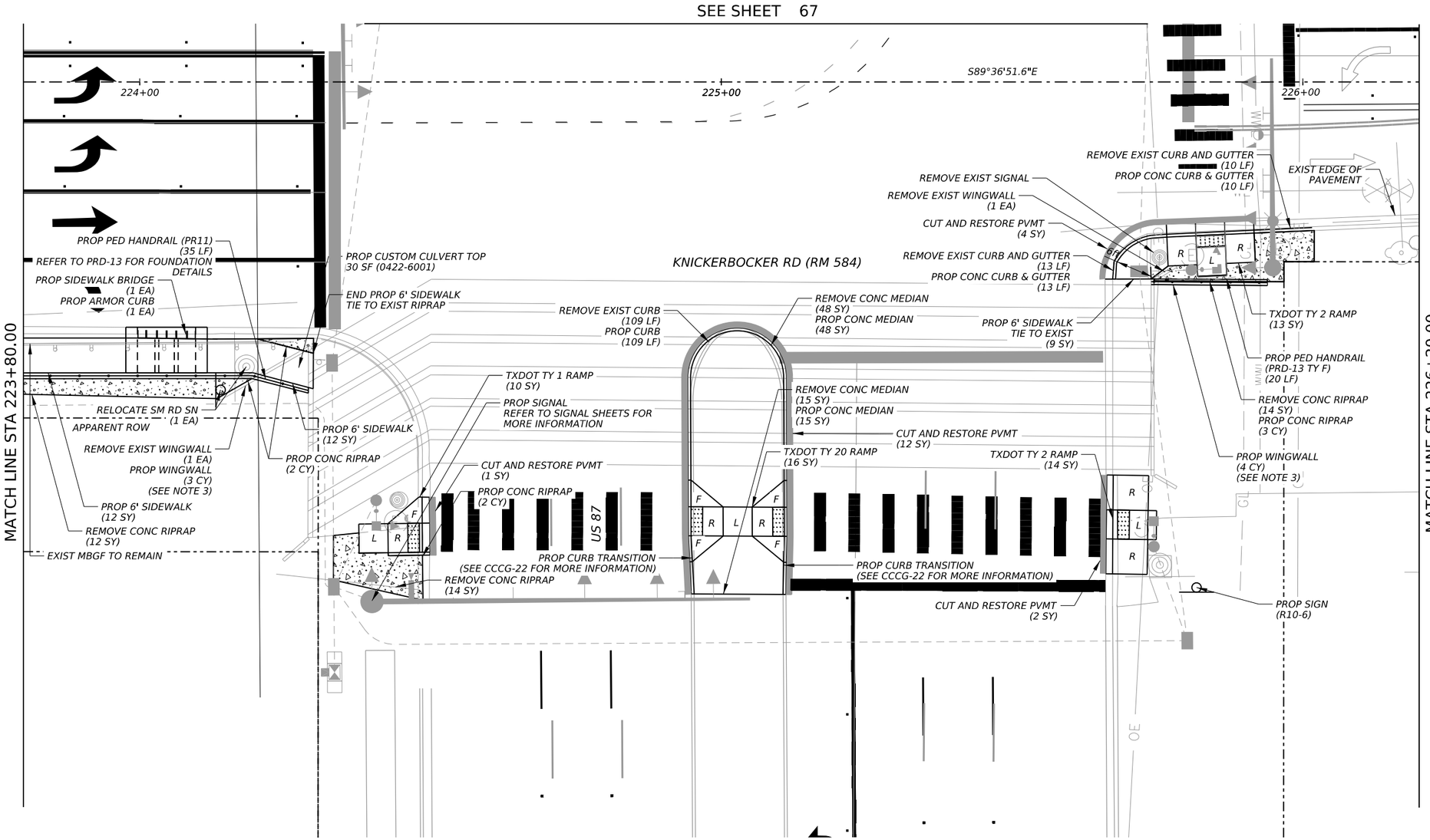

SHEET #			US 87-3
ITEM	DESCRIPTION	UNIT	QTY
0104 6009	REMOVING CONC (RIPRAP)	SY	40
0104 6011	REMOVING CONC (MEDIANS)	SY	63
0104 6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	132
0400 6008	CUT & RESTORE ASPH PAVING	SY	19
0420 6057	CL C CONC (WINGWALLS)	CY	7
0422 6001	REINF CONC SLAB	SF	30
0432 6001	RIPRAP (CONC)(4 IN)	CY	7
0450 6052	RAIL (HANDRAIL)(TY F)	LF	20
0450 6103	RAIL (TY PR 11)	LF	35
0496 6005	REMOV STR (WINGWALL)	EA	1
0529 6002	CONC CURB (TY II)	LF	109
0529 6008	CONC CURB & GUTTER (TY II)	LF	23
0531 6001	CONC SIDEWALKS (4")	SY	33
0531 6018	CURB RAMPS (TY 1)	SY	10
0531 6019	CURB RAMPS (TY 2)	SY	27
0531 6029	CURB RAMPS (TY 20)	SY	16
0536 6002	CONC MEDIAN	SY	63
0644 6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	1

NOTES:

1. LONGITUDINAL SLOPE SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.
2. SEE DRAINAGE SHEETS FOR MORE INFORMATION.
3. SEE STRUCTURAL DETAILS SHEET FOR MORE INFORMATION.

0 10 20

4/30/2024

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SPECIAL NOTES & DETAILS

R10-6
24"x30"

LEGEND

DRAINAGE FLOW ARROW	LIGHT POLE	SL	LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
FENCE	MAIL BOX		TRAFFIC FLOW
F FLARE	MANHOLE	SB	TRAFFIC SIGNAL BOX
FIRE HYDRANT	PEDESTAL SIGNAL POLE		TRAFFIC SIGNAL CONTROLLER
GAS METER/VALVE	POWER/UTILITY POLE		TRAFFIC SIGNAL POLE
GROUND BOX	R RAMP		TREE/BUSHES
L LANDING	RIPRAP (CONC)	W	WATER METER/VALVE
L1 LANDING (COMMON)	SIGN		GUTTER LINE PROJECTION
LS LEVEL SIDEWALK (2% MAX)	SODDING		GRATE INLET
GUY WIRE	T TRANSITION		PROPOSED PEDESTAL POLE
GUARD FENCE/RAIL	MISCELLANEOUS STRUC		PROPOSED CONDUIT
PROPOSED CONDUIT (BORE)	IRRIGATION CONTROLS		EXISTING CONDUIT
	UTILITY WITNESS		STAMPED CONCRETE

SIDEWALK PLAN

RM 584
AT US 87

SAN ANGELO, TEXAS

SHEET 3 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	68
CONT.	SECT.	JOB	
0907	00	229,ETC	

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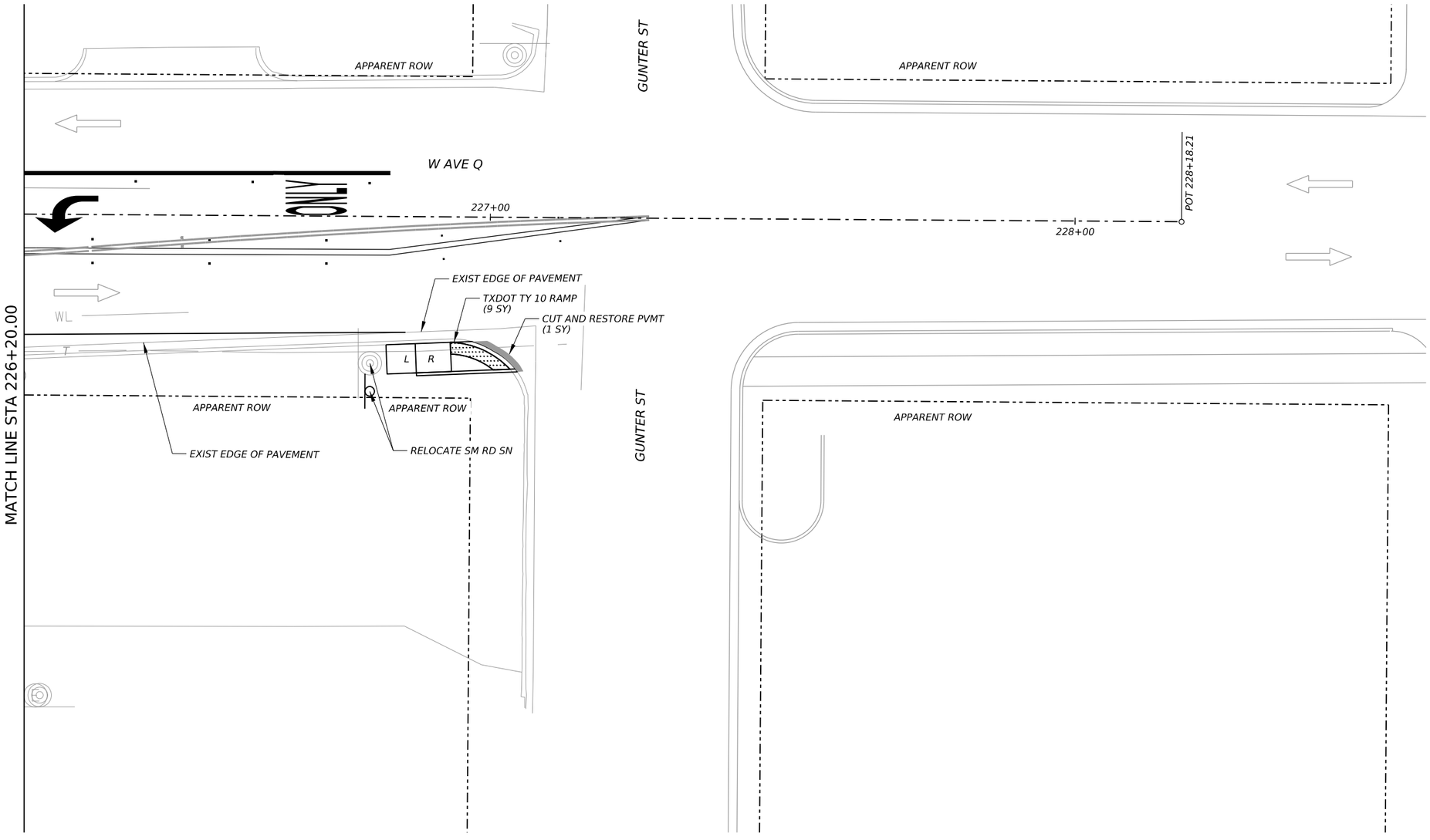
SHEET #			US87-4
ITEM	DESCRIPTION	UNIT	QTY
0400 6008	CUT & RESTORE ASPH PAVING	SY	1
0531 6027	CURB RAMPS (TY 10)	SY	9
0644 6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	1



NOTES:

1. LONGITUDINAL SLOPE SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF THE SIDEWALK MAY MATCH THAT OF THE ROADWAY.
2. SEE DRAINAGE SHEETS FOR MORE INFORMATION.
3. SEE STRUCTURAL DETAILS SHEET FOR MORE INFORMATION.

0 10 20

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
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- PROPOSED CONDUIT (BORE)
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- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

STATE OF TEXAS
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SIDEWALK PLAN

RM 584
AT US 87

SAN ANGELO, TEXAS

SHEET 4 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	69
0907	00	229,ETC	

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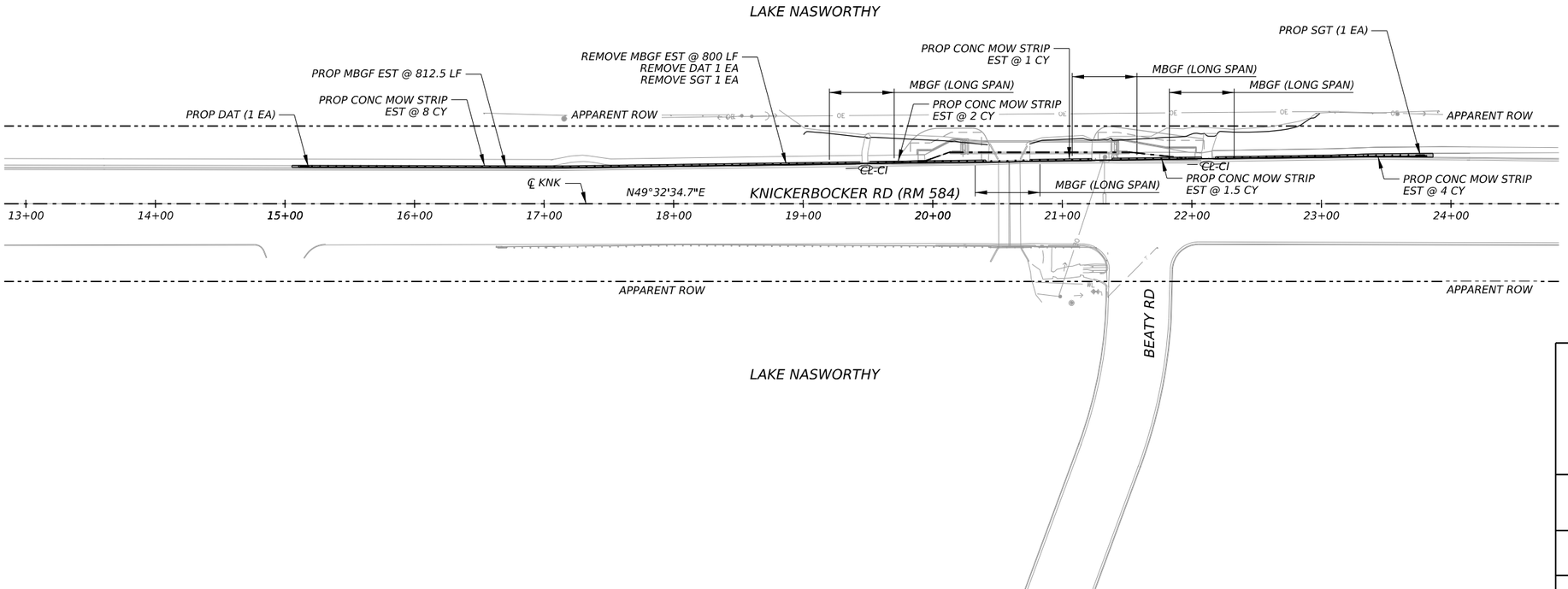
SHEET # ITEM	DESCRIPTION	UNIT	MBG QTY
0432 6045	RIPRAP (MOW STRIP)(4 IN)	CY	16.5
0540 6002	MTL W-BEAM GD FEN (STEEL POST)	LF	812.5
0540 6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	1
0540 6017	MTL BM GD FEN (LONG SPAN SYSTEM)	LF	200
0542 6001	REMOVE METAL BEAM GUARD FENCE	LF	800
0542 6002	REMOVE TERMINAL ANCHOR SECTION	EA	1
0544 6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1
0544 6003	GUARDRAIL END TREATMENT (REMOVE)	EA	1



0 50 100

SCALE: 1"=100'

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
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- W WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

4/26/2024

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RM 584
BARRIER LAYOUT

SAN ANGELO, TEXAS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	70
CONT.	SECT.	JOB	
0907	00	229,ETC	

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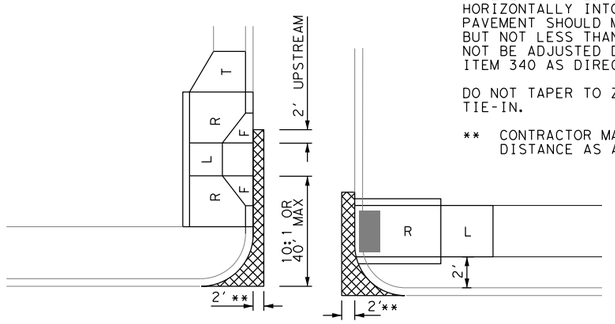
ASPHALT/SEALCOAT ROADWAY

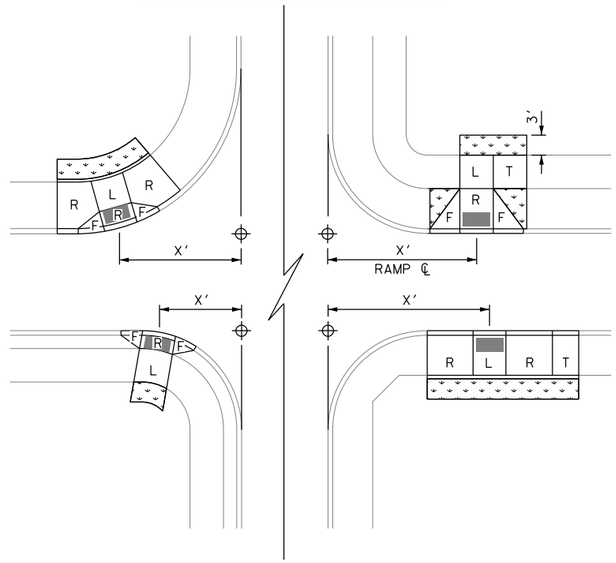
IN AREAS OF ROADWAY CROSS SLOPES EXCEEDING 48:1 LONGITUDINAL SLOPE, EXCAVATE 2' OF PAVEMENT IN FRONT OF RAMP AND TRANSITION THE RAMP LANDING INTO THE EXISTING PAVEMENT. THE PAVEMENT SHOULD THEN BE TRANSITIONED HORIZONTALLY INTO THE EXISTING PAVEMENT AT 10:1. PAVEMENT SHOULD MATCH EXISTING PAVEMENT DEPTH BUT NOT LESS THAN 2" MINIMUM. GUTTERLINES SHOULD NOT BE ADJUSTED DOWNWARD. ASPHALT TO CONFORM TO ITEM 340 AS DIRECTED BY THE ENGINEER.

DO NOT TAPER TO ZERO. MINIMUM 1-1/2" DEPTH @ TIE-IN.

** CONTRACTOR MAY EXCEED CROSS SLOPE TRANSITION DISTANCE AS APPROVED BY THE ENGINEER.



HORIZONTAL RAMP CONTROL



NOTES

1. FLARE (F), RAMP (R), AND LANDING (L), DIRECTLY IN CONTACT WITH THE CURB RAMP ARE PAID FOR UNDER ITEM 531 "CURB RAMPS".
2. LEVEL SIDEWALK (LS) AND RIPRAP (RR) PAID FOR UNDER ITEM 531 "SIDEWALK"
3. ALL CURB RAMPS ARE TO BE 6" IN THICKNESS UNLESS OTHERWISE SHOWN.

X = LENGTH MEASURED FROM PI POINT
F = FLARE (10:1 OR LESS)
R = RAMP (CROSS SLOPE NOT TO EXCEED 50:1, LONGITUDINAL NOT TO EXCEED 12:1)
L = LANDING (SHALL NOT EXCEED 50:1 SLOPE IN ANY DIRECTION)
L1 = SHARED LANDING (SHALL NOT EXCEED 50:1 SLOPE IN ANY DIRECTION)
LS = LEVEL SIDEWALK (SHALL NOT EXCEED 50:1 SLOPE IN ANY DIRECTION) (PAID AS SIDEWALK)
SL = SLOPED SIDEWALK (LONGITUDINAL SLOPES MAY NOT EXCEED 20:1, CROSS SLOPES MAY NOT EXCEED 48:1)
T = TRANSITION (PAID FOR UNDER CONC SIDEWALKS)
TOC = TOP OF CURB
BOC = BACK OF CURB
EOP = EDGE OF PAVEMENT
⊕ = PI POINT MEASURED FROM TANGENTIAL BACK OF CURB OR EDGE OF PAVEMENT INTERSECTION

4/26/2024

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SIDEWALK PLAN

MISCELLANEOUS DETAILS

SHEET 1 OF 11

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	71
0907	00	229,ETC	

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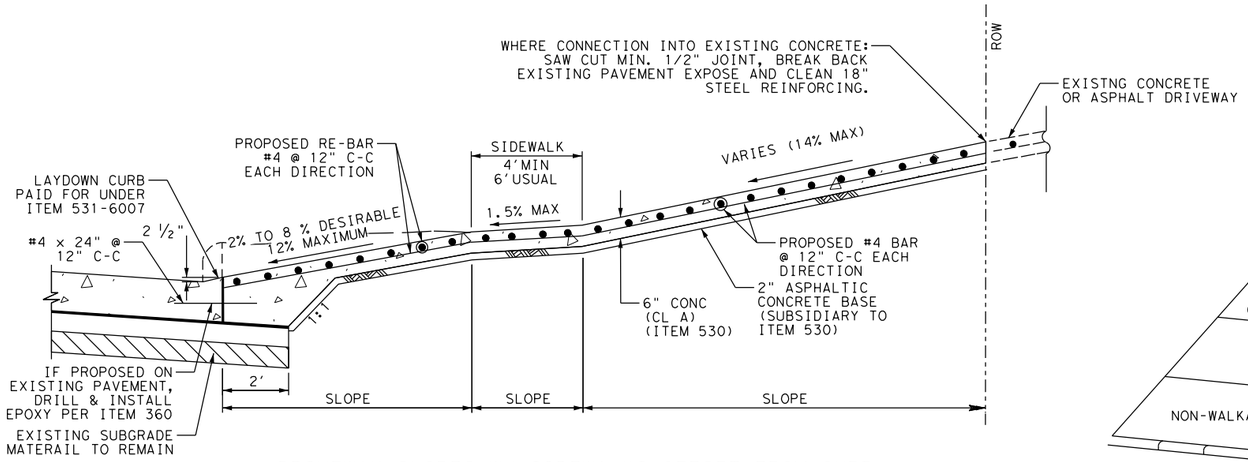
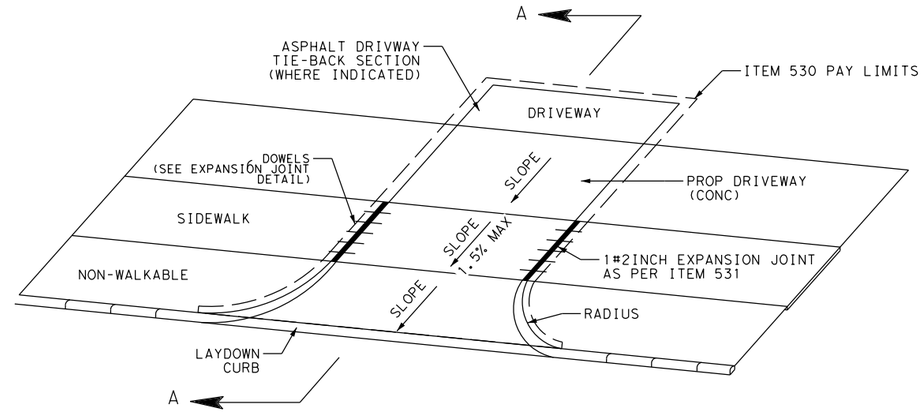
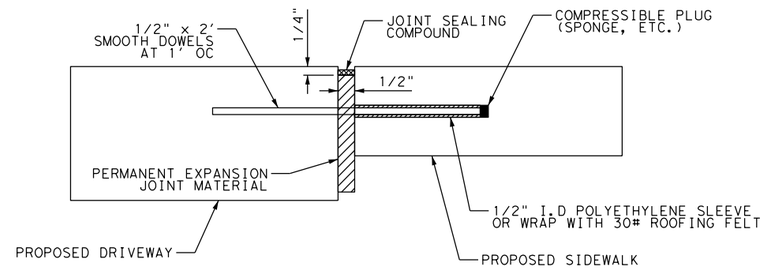


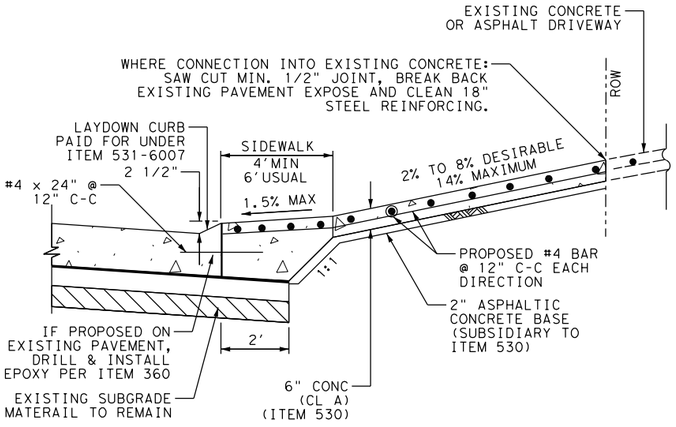
DRIVEWAY SLOPES W/ SIDEWALKS OFFSET FROM CURB
(SECTION A-A)



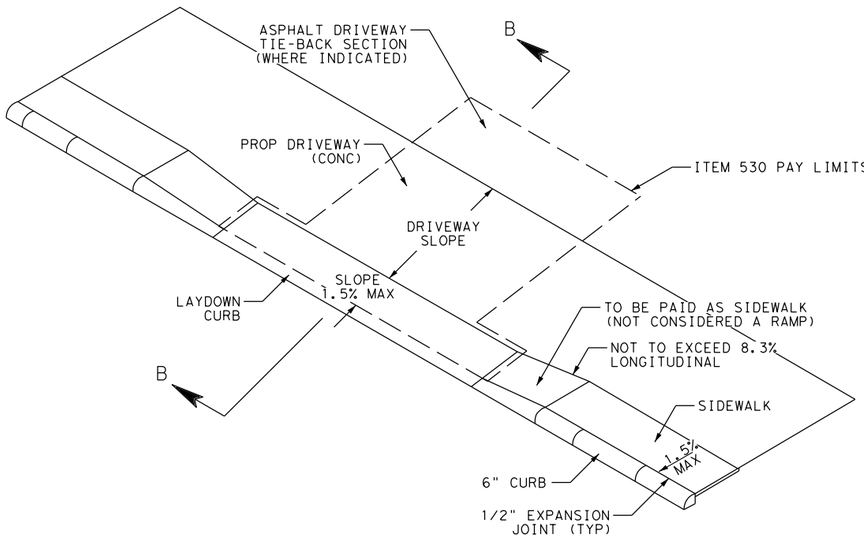
SIDEWALK OFFSET FROM CURB DETAILS



EXPANSION JOINT DETAIL



DRIVEWAY SLOPES W/ SIDEWALKS ADJACENT TO CURB
(SECTION B-B)



SIDEWALK ADJACENT TO CURB DETAILS

NOTES:

1. ACP DRIVEWAYS WILL CONSIST OF 6" OF ACP HOTMIX ON 6" HMA TY D PAID FOR UNDER ITEM 530.
2. BASE DRIVEWAYS WILL CONSIST OF 6" OF ASPHALTIC CONCRETE BASE OR 6" CEMENT TREATED BASE PAID FOR UNDER ITEM 530.

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SIDEWALK PLAN

MISCELLANEOUS DETAILS

SHEET 2 OF 11

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	72
0907	00	229,ETC	

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BRONTE - DRIVEWAY TABLE

DRIVEWAY	MATERIAL	L OR R	DRIVEWAY LENGTH (FT)	THROAT WIDTH (FT)	RADIUS 1 (FT)	RADIUS 2 (FT)	G1 (%)	L1 LENGTH (FT)	G2 (%)	L2 LENGTH (FT)	G3 (%)	L3 LENGTH (FT)
3-1	CONCRETE	L	23.0	20.0	10.0	10.0	-5.0	13.0	-1.5	6.0	-5.5	4.0
5-1	CONCRETE	L	23.0	70.0	10.0	10.0	-5.5	12.0	-1.5	6.0	-5.5	5.0
6-1	CONCRETE	L	25.0	30.0	10.0	10.0	-5.5	13.0	-1.5	6.0	-10.0	6.0
6-2	CONCRETE	R	21.0	155.0	10.0	10.0	-3.5	13.0	-1.5	6.0	-0.5	2.0
6-3	CONCRETE	L	25.0	30.0	10.0	10.0	-5.5	13.0	-1.5	6.0	-10.0	6.0
7-1	CONCRETE	L	19.0	55.0	5.0	5.0	-2.5	11.0	-1.5	6.0	-2.5	2.0
8-1	CONCRETE	L	18.0	18.0	5.0	5.0	0.5	11.0	-1.5	6.0	-5.5	1.0
8-2	CONCRETE	L	19.5	26.0	5.0	5.0	-2.0	11.0	-1.5	6.0	-3.2	2.5
9-1	CONCRETE	L	17.0	54.0	5.0	5.0	-7.0	6.0	-1.5	5.0	-7.5	6.0
9-2	CONCRETE	R	28.0	100.0	15.0	15.0	-2.3	20.0	-1.5	6.0	-2.5	2.0
10-1	CONCRETE	L	10.0	66.0	3.0	3.0	3.0	3.5	1.5	5.0	2.0	1.5
11-1	CONCRETE	R	12.0	25.0	5.0	5.0	0.0	4.0	1.5	6.0	1.5	2.0
11-2	CONCRETE	L	14.0	33.0	10.0	10.0	10.0	3.0	1.5	6.0	11.0	5.0
12-1	CONCRETE	L	11.5	28.0	-	10.0	12.0	4.5	1.5	5.0	10.0	2.0
13-1	CONCRETE	L	11.5	21.0	10.0	5.0	4.2	5.5	1.5	6.0	-	0.0
18-1	CONCRETE	L	14.0	30.0	30.0	60.0	9.5	6.0	1.5	6.0	10.0	2.0
18-2	CONCRETE	L	14.0	50.0	60.0	5.0	9.5	6.0	1.5	6.0	5.0	2.0
19-1	CONCRETE	L	15.0	22.0	5.0	5.0	10.0	5.0	1.5	6.0	11.5	4.0
19-2	CONCRETE	L	13.0	21.0	5.0	5.0	9.0	5.0	1.5	6.0	4.5	2.0
20-1	CONCRETE	L	15.0	22.0	60.0	50.0	12.0	5.0	1.5	6.0	10.0	4.0
20-2	CONCRETE	L	14.0	12.0	5.0	5.0	3.5	6.0	1.5	6.0	2.5	2.0
21-1	CONCRETE	L	18.0	27.0	5.0	2.5	10.0	4.0	1.5	6.0	12.0	8.0
21-2	CONCRETE	L	18.0	10.0	2.5	5.0	10.0	4.0	1.5	6.0	11.0	8.0
22-1	CONCRETE	R	18.0	12.0	5.0	5.0	10.0	4.0	1.5	6.0	11.5	8.0
22-2	CONCRETE	L	18.0	10.0	5.0	5.0	10.0	4.0	1.5	6.0	13.0	8.0
23-1	CONCRETE	R	14.5	28.0	-	-	-	0.0	1.5	6.0	4.00	8.5
24-1	CONCRETE	L	15.0	24.0	40.0	25.0	11.0	7.0	1.5	6.0	6.0	2.0
24-2	CONCRETE	R	14.5	14.0	3.0	3.0	8.0	0.0	1.5	6.0	6.0	8.5
24-3	CONCRETE	L	15.0	30.0	25.0	40.0	8.0	7.0	1.5	6.0	5.0	2.0
24-4	CONCRETE	R	19.0	10.0	5.0	5.0	12.0	8.0	1.5	6.0	9.5	5.0
25-1	CONCRETE	R	12.0	106.0	5.0	5.0	4.0	4.0	1.5	6.0	3.5	2.0
25-2	CONCRETE	L	13.0	11.0	5.0	5.0	3.0	5.0	1.5	6.0	4.0	2.0
26-1	CONCRETE	R	12.0	83.0	5.0	5.0	3.0	4.0	1.5	6.0	1.5	2.0
26-2	CONCRETE	L	15.0	20.0	5.0	5.0	3.0	7.0	1.5	6.0	4.0	2.0
26-3	CONCRETE	L	14.0	60.0	-	-	-	0.0	1.5	6.0	10.5	8.0
26-4	CONCRETE	R	12.0	42.0	5.0	10.0	7.0	4.0	1.5	6.0	5.0	2.0
27-1	CONCRETE	L	13.0	18.0	-	-	-	0.0	1.5	5.0	9.0	8.0
27-2	CONCRETE	R	13.0	44.0	10.0	10.0	6.0	5.0	1.5	6.0	2.5	2.0
27-3	CONCRETE	L	16.0	14.0	-	-	-	0.0	1.5	6.0	13.0	10.0
27-4	CONCRETE	L	11.0	30.0	-	-	-	0.0	1.5	6.0	9.0	5.0
28-1	CONCRETE	R	14.0	23.0	10.0	10.0	2.0	7.0	1.5	6.0	-2.0	1.0
28-2	CONCRETE	R	14.0	40.0	10.0	-	10.0	7.0	1.5	6.0	1.0	1.0
28-3	CONCRETE	L	12.0	34.0	5.0	5.0	4.0	4.0	1.5	7.0	3.5	1.0
28-4	CONCRETE	R	15.0	12.5	-	-	8.0	2.0	1.5	7.0	4.5	6.0

NOTES:

1. REFER TO DRIVEWAY DETAILS FOR MORE INFORMATION

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

MISCELLANEOUS DETAILS

SHEET 3 OF 11

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	73
0907	00	229,ETC	

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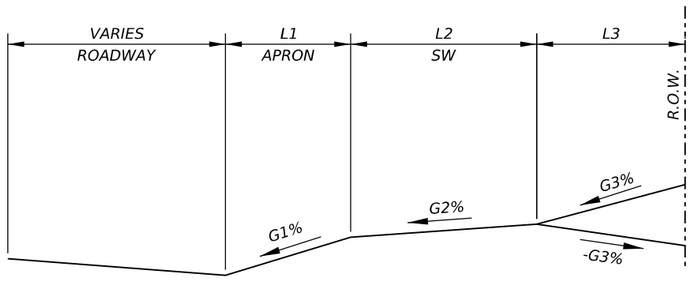
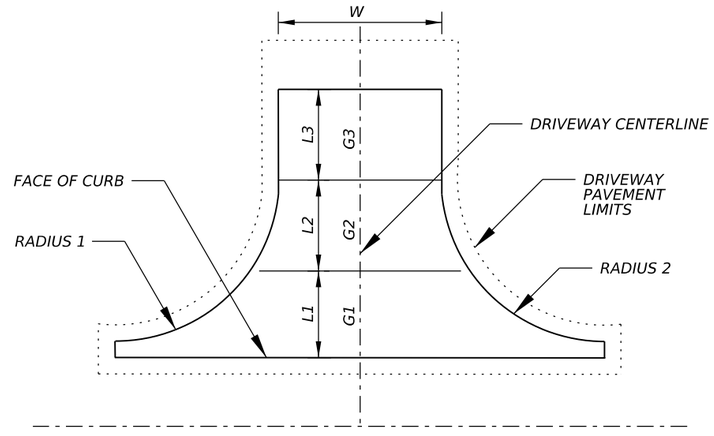
SAN ANGELO - DRIVEWAY TABLE

DRIVEWAY	MATERIAL	L OR R	DRIVEWAY LENGTH (FT)	THROAT WIDTH (FT)	RADIUS 1 (FT)	RADIUS 2 (FT)	G1 (%)	L1 LENGTH (FT)	G2 (%)	L2 LENGTH (FT)	G3 (%)	L3 LENGTH (FT)
2-1	CONCRETE	R	8.0	38.0	10.0	10.0	-	0.0	1.5	6.0	9	2.0
2-2	CONCRETE	R	11.0	55.0	10.0	10.0	-	0.0	1.5	6.0	12.5	5.0
3-1	CONCRETE	R	14.0	49.0	10.0	10.0	-	0.0	1.5	6.0	-13.0	8.0
3-2	CONCRETE	L	12.0	22.0	-	-	5.0	2.0	1.5	6.0	7	4.0
3-3	CONCRETE	L	15.0	42.0	-	-	12.0	2.0	1.5	6.0	9.0	7.0



DRIVEWAY PROFILE



TYPICAL PLAN VIEW

NOTES:

1. REFER TO DRIVEWAY DETAILS FOR MORE INFORMATION

4/26/2024

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STATE OF TEXAS

Kimley»Horn
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Texas Department of Transportation

MISCELLANEOUS DETAILS

SHEET 4 OF 11

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	74
0907	00	229,ETC	

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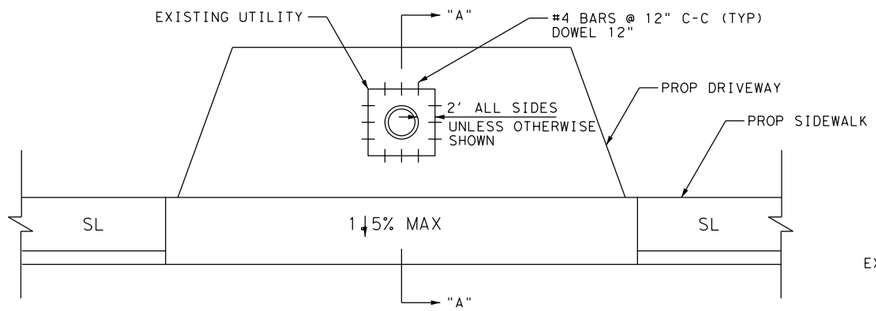
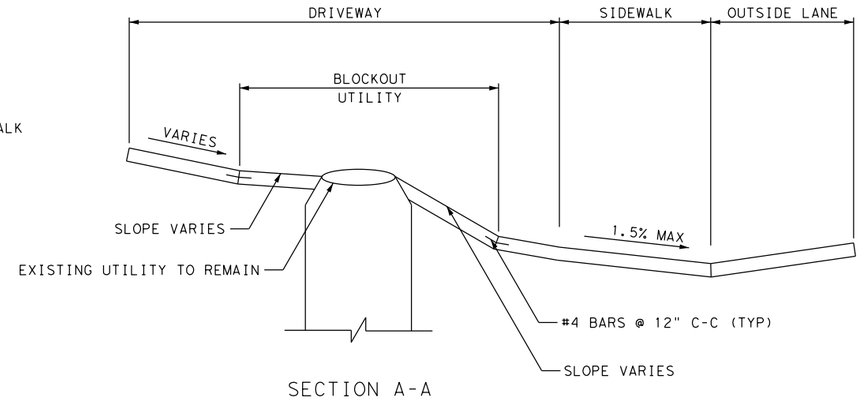
UTILITY BLOCKOUT



SEQUENCE OF WORK:
1. REMOVE EXISTING CONCRETE OR ASPHALT WITHIN LIMITS OF PROPOSED WORK. CONSTRUCT THE FORMWORK FOR PROPOSED IMPROVEMENTS, INCLUDING UTILITY BLOCKOUT AS SHOWN. EXISTING UTILITY RIM TO REMAIN UNDISTURBED.

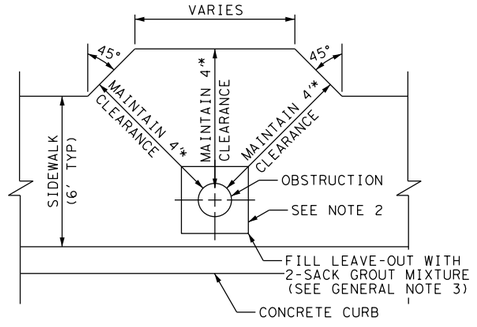
2. CONSTRUCT PROPOSED IMPROVEMENTS EXCEPT WITHIN UTILITY BLOCKOUT AREA. ALLOW TIME TO CURE, REMOVE FORMWORK.

3. DOWEL REINFORCEMENT AS SHOWN. CONSTRUCT IMPROVEMENTS WITHIN UTILITY BLOCKOUT AREA FLUSH WITH RIM OF UTILITY AND SURROUNDING (COMPLETED) IMPROVEMENTS.

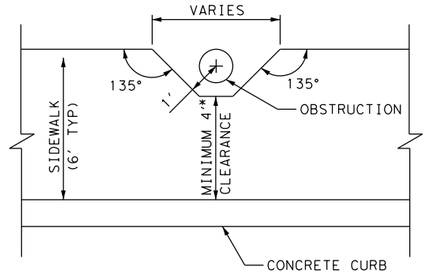


SECTION A-A

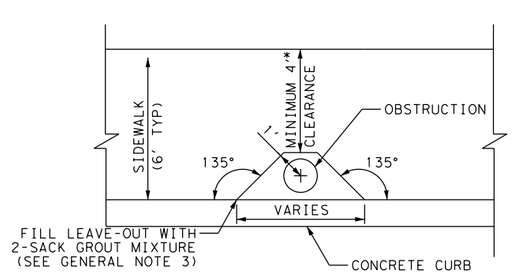
OBSTRUCTION CONFLICT



OBSTRUCTION IN SIDEWALK
* UNLESS OTHERWISE SPECIFIED



OBSTRUCTION IN SIDEWALK
* UNLESS OTHERWISE SPECIFIED



OBSTRUCTION IN SIDEWALK
* UNLESS OTHERWISE SPECIFIED

NOTES:

1. UTILIZE DETAIL AT OBSTRUCTION ENCROACHMENTS INTO THE PEDESTRIAN ACCESS ROUTE. A MINIMUM UNOBSTRUCTED CLEARANCE OF 4', UNLESS OTHERWISE SPECIFIED, SHOULD BE MAINTAINED AROUND THE OBSTRUCTION MEASURED FROM THE MOST RESTRICTIVE LOCATION OR AS APPROVED BY THE ENGINEER.

2. IF OBSTRUCTION IS LOCATED WITHIN THE SIDEWALK, CONSTRUCT 2' SQUARE CONSTRUCTION JOINT CENTERED ON OBSTRUCTION TO FACILITATE FUTURE MAINTENANCE WITHOUT FULL SIDEWALK PANEL REMOVAL/REPLACEMENT.

3. THE LEAVE-OUTS SHALL BE FILLED WITH NO MORE THAN A 2-SACK GROUT MIXTURE AND PLACED IN ACCORDANCE WITH SECTION 421.2.F, "MORTAR AND GROUT." PAYMENT FOR FURNISHING AND PLACING THE GROUT MIXTURE WILL BE SUBSIDIARY TO THE PAY ITEM OF CONCRETE SIDEWALKS.

4/26/2024

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Kimley»Horn F-928

SIDEWALK PLAN

MISCELLANEOUS DETAILS

SHEET 5 OF 11

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	75
0907	00	229,ETC	

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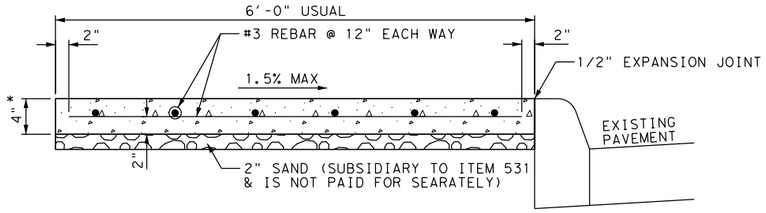
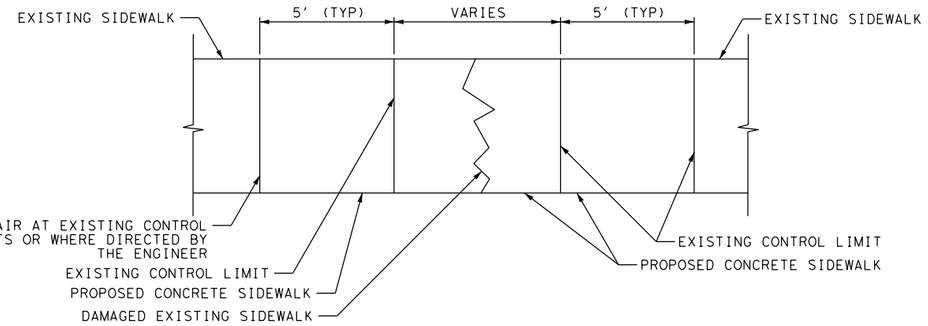


PLACE GROOVED JOINTS IN THE SIDEWALK AT A MAX SPACING OF 10 FT
PLACE 3/4" EXPANSION JOINTS AT A MAX SPACING OF 40 FT TO COINCIDE WITH THE CURB EXPANSION JOINTS.

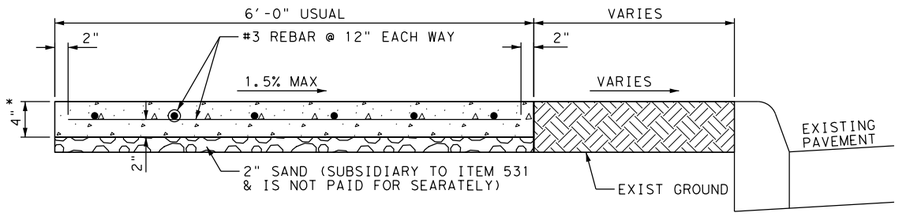
* UNLESS OTHERWISE SHOWN

SIDEWALK DETAIL WITHOUT BUFFER



NOTE:
PAYMENT FOR SPOT REPAIR QUANTITIES ARE INCLUDED UNDER ITEM 0531 6001.
SEE LOCATIONS ON PLAN SHEETS.

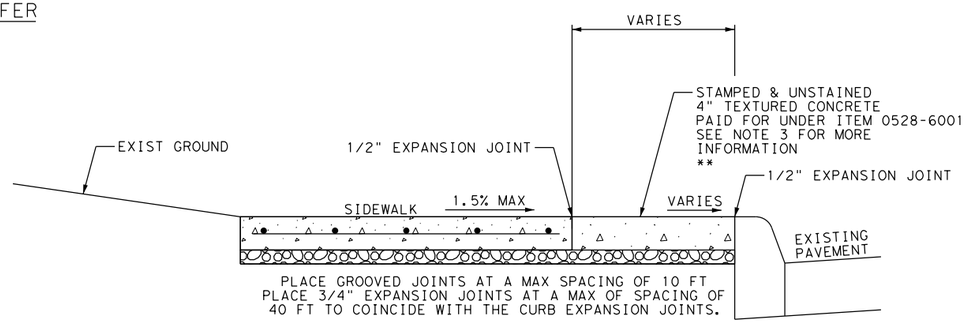
SPOT REPAIR DETAIL



PLACE GROOVED JOINTS IN THE SIDEWALK AT A MAX SPACING OF 10 FT
PLACE 3/4" EXPANSION JOINTS AT A MAX SPACING OF 40 FT TO COINCIDE WITH THE CURB EXPANSION JOINTS.

* UNLESS OTHERWISE SHOWN

SIDEWALK DETAIL WITH BUFFER



PLACE GROOVED JOINTS AT A MAX SPACING OF 10 FT
PLACE 3/4" EXPANSION JOINTS AT A MAX OF SPACING OF 40 FT TO COINCIDE WITH THE CURB EXPANSION JOINTS.

** CONTRACTOR TO USE NO. 4 REINFORCING BARS AS SPECIRFIED IN ITEM 432. CONTRACTOR MAY USE HIGHER STRENGTH CLASS A CONCRETE IN LIEU OF CLASS B.

RIPRAP DETAIL

NOTES:

1. 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 SIDEWALK MAY MATCH THAT OF ROADWAY.

2. IF SIDEWALK WIDTH IS LESS THAN 5', PROVIDE 5' x 5' PASSING AREAS AT INTERVALS NOT TO EXCEED 200' SPACING.

3. THE STAMP PATTERN SHALL BE BRICK FOR CONCRETE RIPRAP BUFFERS. THE CONCRETE SHALL NOT BE COLORED, UNLESS OTHERWISE DIRECTED BY THE ENGINEER. CONTRACTOR TO PROVIDE SAMPLE TO BE APPROVED BY ENGINEER.

4/26/2024

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SIDEWALK PLAN

MISCELLANEOUS DETAILS

SHEET 6 OF 11

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	76
0907	00	229,ETC	

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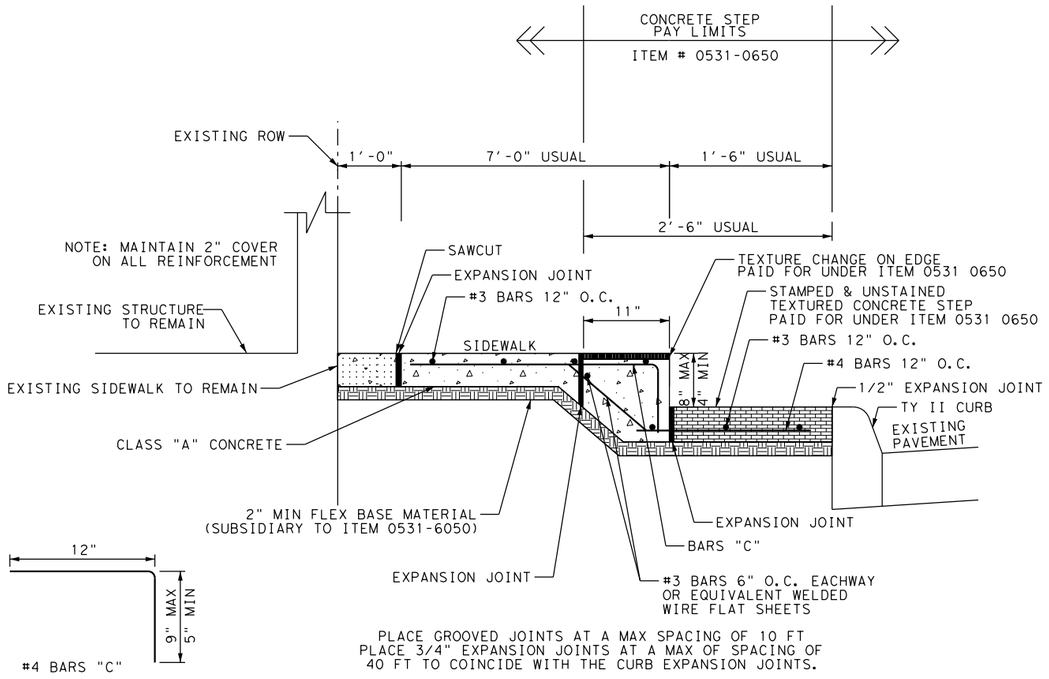

PLACE GROOVED JOINTS AT A MAX SPACING OF 10 FT
PLACE 3/4" EXPANSION JOINTS AT A MAX OF SPACING OF
40 FT TO COINCIDE WITH THE CURB EXPANSION JOINTS.

SIDEWALK ADJACENT TO EXISTING STRUCTURES DETAIL

NOTES:

1. 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 SIDEWALK MAY MATCH THAT OF ROADWAY.

2. SEE PLAN SHEETS FOR AREAS WITH SIDEWALK NEXT TO EXISTING STRUCTURES

3. THE STAMP PATTERN SHALL BE PROVIDED BY THE DISTRICT. CONTRACTOR TO PROVIDE SAMPLE TO BE APPROVED BY ENGINEER.

4/26/2024

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SIDEWALK PLAN

MISCELLANEOUS DETAILS

SHEET 7 OF 11

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	77
0907	00	229,ETC	

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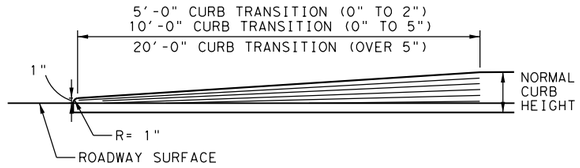
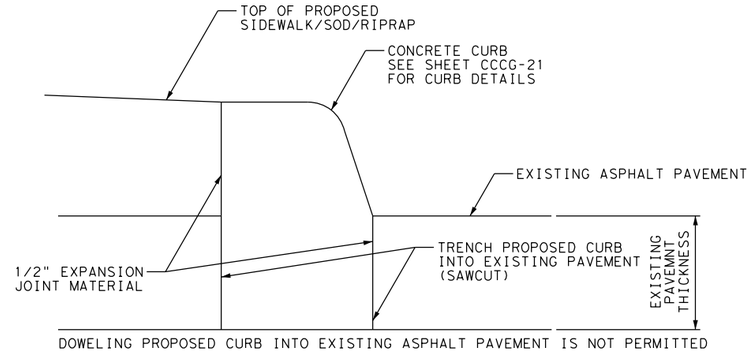
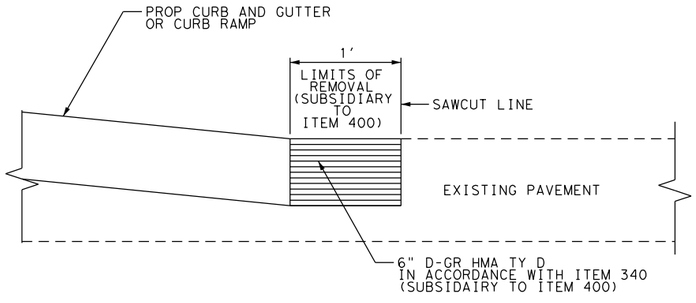


NOTE:
TRANSITIONS FOR CONCRETE CURB ENDS WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM 529.

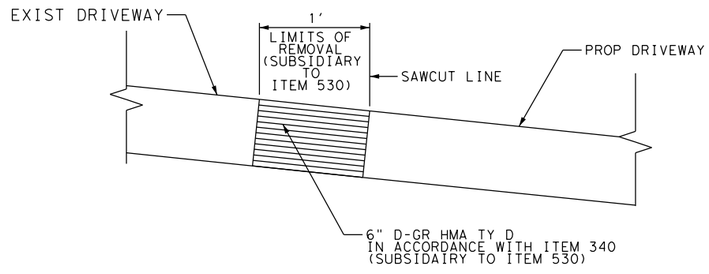
TYPICAL TRANSITION
FOR CONCRETE CURB ENDS



CURB TRENCH DETAIL



PAVEMENT CUT & RESTORE DETAIL



PROPOSED DRIVEWAY ASPHALT DRIVEWAY TIE IN DETAIL

4/26/2024

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Texas Department of Transportation

SIDEWALK PLAN

MISCELLANEOUS DETAILS

SHEET 8 OF 11

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	78
0907	00	229,ETC	

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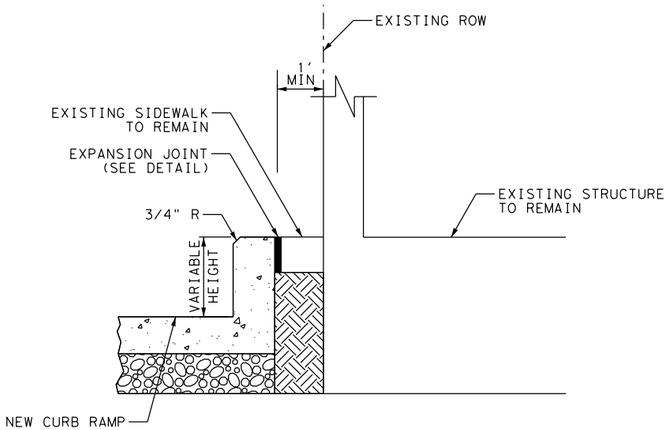
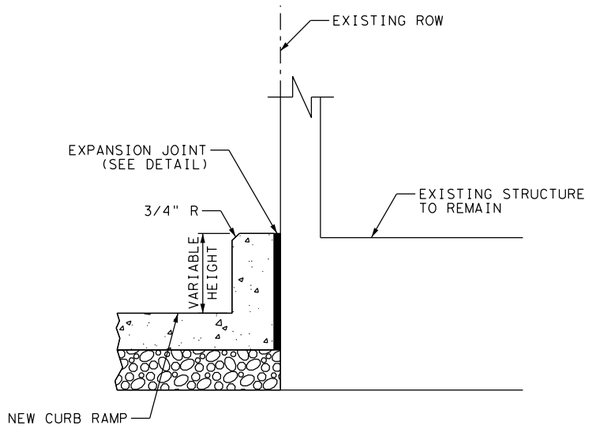
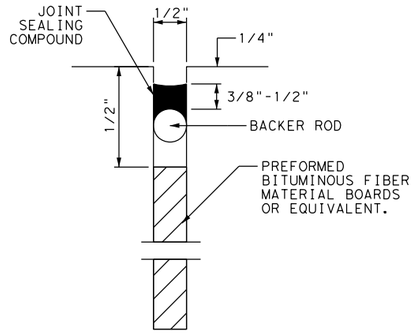


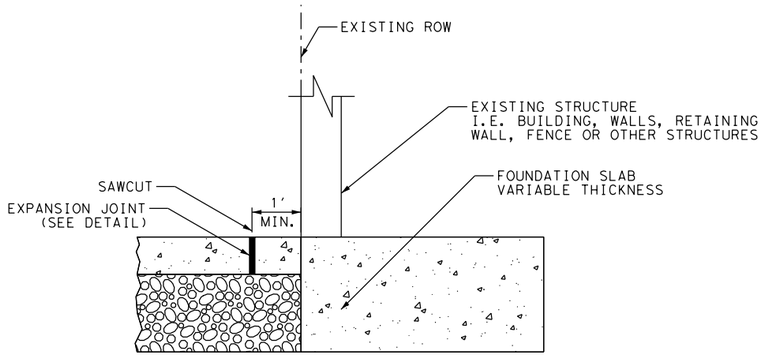
ADJACENT SIDEWALK
TO REMAIN DETAIL



ADJACENT SIDEWALK
REMOVED DETAIL



EXPANSION
JOINT DETAIL



SAWCUT DETAIL

PAVING OPTION @ BUILDING FACE
N.T.S.

GENERAL PROTECTION NOTES FOR BUILDINGS AND HISTORIC STRUCTURES:

1. SAW CUT EXISTING SIDEWALK 1 FOOT AWAY FROM PROTECTED BUILDING/STRUCTURE TO MINIMIZE POTENTIAL DAMAGE, PRIOR TO DEMOLITION OF WALK.

2. CONTRACTOR IS RESPONSIBLE FOR PREVENTING DAMAGE TO ALL BUILDINGS AND STRUCTURES DURING THE ENTIRE CONSTRUTION PROJECT. IF DIRECTED BY ENGINEER TO HAND REMOVE EXISTING PAVING ADJACENT TO HISTORIC STRUCTURES. PROTECT FOUNDATION, MATERIALS, ELEVATION AND ENTRYWAYS. DO NOT REMOVE EXISTING MATERIALS IF FACADE (BRICK/STONE, ETC.) UTILIZES THE MATERIALS TO BE REMOVED AS A FOOTING, FOUNDATION OR SUPPORT. IF THIS CONDITION IS OBSERVED, IMEDIATELY CONTACT ENGINEER AND DO NOT EXCAVATE FURTHER. SEPARATE PAYMENT WILL NOT BE MADE FOR HAND REMOVAL.

3. REPAIR OR REPLACE IN KIND, AT NO EXPENSE TO THE DEPARTMENT, ANY DAMAGE TO HISTORIC OR NON-HISTORIC MATERIAL THAT RESULTS FROM AN ACT OF OMISSION ON THE PART OF OR ON BEHALF OF THE CONTRACTOR. CONTRACTOR IS RESPONSIBLE FOR LOCATING A REPLACEMENT SOURCE FOR HISTORIC AND NON-HISTORIC MATERIALS DAMAGED IN THE PROCESS OF CONSTRUCTION. INFORM TXDOT ENVIRONMENTAL AFFAIRS DIVISION (ENV) OF PROPOSED REPAIRS AND/OR DAMAGED AREAS IN ORDER TO FACILITATE CONSULTATION WITH TEXAS HISTORICAL COMMISSION. MATERIAL AND SOURCE SHALL BE APPROVED BY TXDOT ENV PRIOR TO REPLACEMENT.

4. PROTECT BUILDINGS AND STRUCTURE FROM CONCRETE SPLASH UTILIZING A MATERIAL APPROVED BY THE ENGINEER. ANY CONCRETE SPLASH AS A RESULT OF CONSTRUCTION ACTIVITIES MUST BE REMOVED FROM THE BUILDING OR STRUCTURE AT CONTRACTORS EXPENSE. NO PAYMENT WILL BE MADE FOR BUILDING PROTECTION.

4/26/2024

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SIDEWALK PLAN

MISCELLANEOUS DETAILS

SHEET 9 OF 11

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	79
0907	00	229,ETC	

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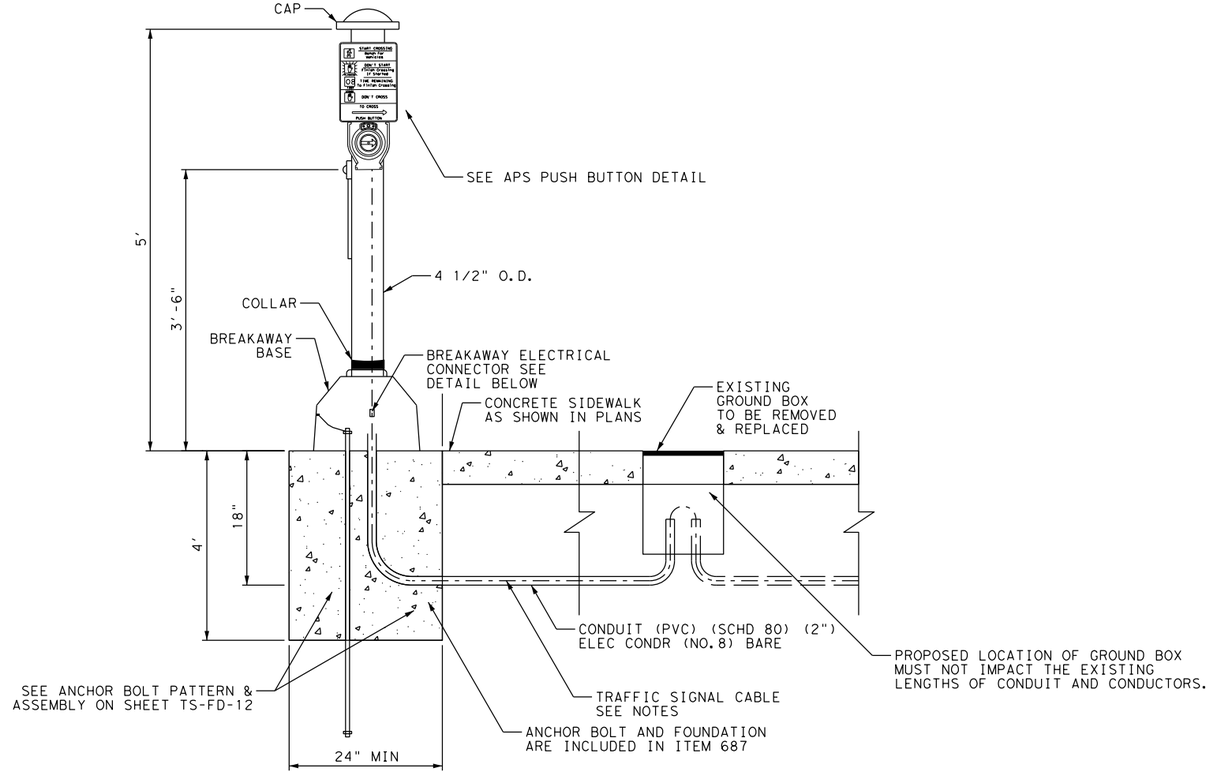


PEDESTRIAN POLE DETAIL
TY A

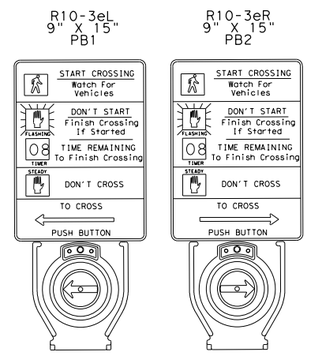
USE DETAIL TY A FOR INSTALLATION OF NEW POLE.

NOTE:
1. GROUND ROD, FOUNDATION, BREAKAWAY BASE ARE INCLUSIVE TO PEDESTRIAN POLE ITEM 0687-6001.
2. PUSH BUTTONS TO BE PAID FOR AS ITEM 0688-6002. ITEM 0688-6002 INCLUDES INSTALLATION OF NEW PUSH BUTTON STATION ASSEMBLY (PELCO SE-2023 OR SE-2019 WITH PUSH BUTTON MEETING REQUIREMENTS OF TMUTCD 4E.08 THROUGH 4E.13 AND R403 OF THE U.S. ACCESS BOARD PROWAG. PUSH BUTTON SHOULD BE NO LESS THAN 2" OF UNOBSTRUCTED SURFACE AREA) AND ALL INCIDENTAL CONSTRUCTION INCLUDING BUT NOT LIMITED TO PLUGGING EXISTING HOLES.
3. SPLICES AT GROUND BOXES ARE NOT ALLOWED.
4. FOUNDATION TO BE FLUSH WITH SIDEWALK.
5. BREAKAWAY ELECTRIC CONNECTORS ARE REQUIRED.
6. PUSH BUTTON AND PEDESTRIAN SIGNAL HEAD ADJUSTMENTS ARE TO UTILIZE EXISTING CONDUCTORS.

TRAFFIC SIGNAL CABLE NOTES:

FOR PUSH BUTTONS USE: TY A (14 AWG) (2 CONDR)
(ITEM 0684-6028)

LENGTH OF PAY: FROM PED POLE TO EXISTING SIGNAL CABINET.



APS PUSH BUTTON DETAIL

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation
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SIDEWALK PLAN

MISCELLANEOUS DETAILS

SHEET 10 OF 11

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	80
0907	00	229,ETC	

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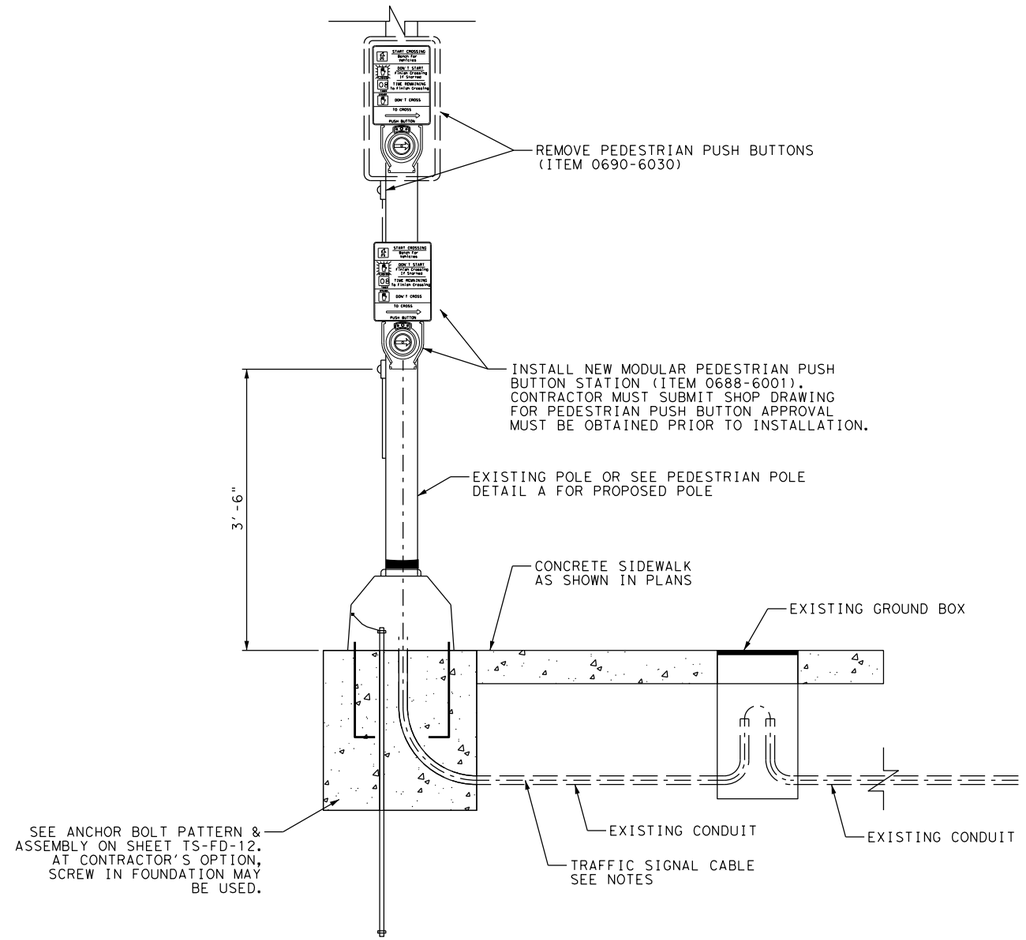

PEDESTRIAN POLE DETAIL
TY B

USE DETAIL TY B WHEN ADJUSTING PEDESTRIAN PUSH BUTTONS ON SAME POLE.

NOTE:
1. GROUND ROD, FOUNDATION, BREAKAWAY BASE ARE INCLUSIVE TO PEDESTRIAN POLE ITEM 0687-6001.
2. PUSH BUTTONS TO BE PAID FOR AS ITEM 0688-6002. ITEM 0688-6002 INCLUDES INSTALLATION OF NEW PUSH BUTTON STATION ASSEMBLY (PELCO SE-2023 OR SE-2019 WITH PUSH BUTTON MEETING REQUIREMENTS OF TMUTCD 4E.08 THROUGH 4E.13 AND R403 OF THE U.S. ACCESS BOARD PROWAG. PUSH BUTTON SHOULD BE NO LESS THAN 2" OF UNOBSTRUCTED SURFACE AREA) AND ALL INCIDENTAL CONSTRUCTION INCLUDING BUT NOT LIMITED TO PLUGGING EXISTING HOLES.
3. SPLICES AT GROUND BOXES ARE NOT ALLOWED.
4. FOUNDATION TO BE FLUSH WITH SIDEWALK.
5. BREAKAWAY ELECTRIC CONNECTORS ARE REQUIRED.
6. PUSH BUTTON AND PEDESTRIAN SIGNAL HEAD ADJUSTMENTS ARE TO UTILIZE EXISTING CONDUCTORS.

TRAFFIC SIGNAL CABLE NOTES:

FOR PUSH BUTTONS USE: TY A (14 AWG) (2 CONDR)
(ITEM 0684-6028)

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

SIDEWALK PLAN

MISCELLANEOUS DETAILS

SHEET 11 OF 11

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	81
0907	00	229,ETC	

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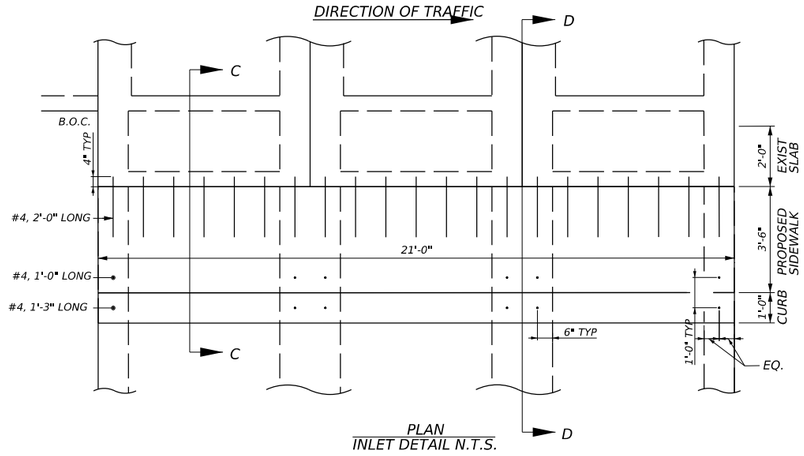
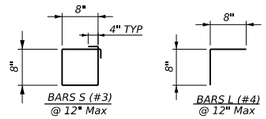


PLAN
INLET DETAIL N.T.S.



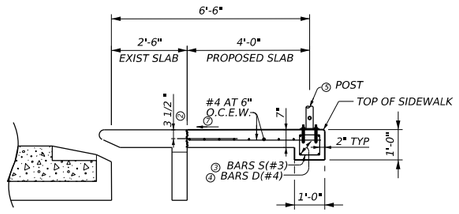
MATERIAL NOTES:

- PROVIDE CLASS C CONCRETE (F'C=3,600 PSI).
- PROVIDE GRADE 60 REINFORCING STEEL.
- PROVIDE GALVANIZED REINFORCING STEEL IF REQUIRED ELSEWHERE IN THE PLANS.

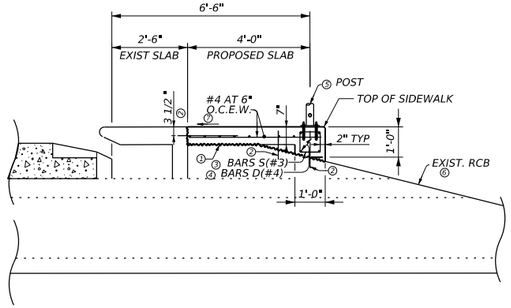
GENERAL NOTES:

- DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
- WHEN STRUCTURE IS FOUNDED ON SOLID ROCK, DEPTH OF TOE WALLS FOR CULVERTS AND WINGWALLS MAY BE REDUCED OR ELIMINATED AS DIRECTED BY THE ENGINEER.
- SEE BOX CULVERT AS-BUILT SHEET FOR ADDITIONAL DIMENSIONS AND INFORMATION.
- COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
- MINIMUM COVER TO REINFORCEMENT IS 2" UNLESS OTHERWISE NOTED ON PLAN.
- REINFORCING DIMENSIONS ARE OUT-TO-OUT OF BARS.

1. REMOVE TOP PORTION OF EXISTING WALL, WHERE APPLICABLE, AND ROUGHEN SURFACE TO AMPLITUDE OF 1/4".
2. EMBED (#4) ANCHOR BARS 2'-0" IN LENGTH (HORIZONTAL, LENGTH OF VERTICAL DOWELS TO OBTAIN 1 ½" COVER AT TOP, OR BARS L SHOWN), WITH A TYPE III, CLASS C, D, E, OR F ANCHOR ADHESIVE. MINIMUM ADHESIVE ANCHOR EMBEDMENT DEPTH IS 4". ANCHOR ADHESIVE CHOSEN MUST BE ABLE TO ACHIEVE A BASIC BOND STRENGTH IN TENSION, NBA, OF 10 KIPS. SUBMIT SIGNED AND SEALED CALCULATIONS OR THE MANUFACTURER'S PUBLISHED LITERATURE SHOWING THE PROPOSED ANCHOR ADHESIVE'S ABILITY TO DEVELOP THIS LOAD TO THE ENGINEER FOR APPROVAL PRIOR TO USE. ANCHOR INSTALLATION, INCLUDING HOLE SIZE, DRILLING, AND CLEAN OUT, MUST BE IN ACCORDANCE WITH ITEM 450, "RAILING".
3. BARS S(#3) SPACED AT 12" MAX (SPACED 3" FROM END OF OVERALL LENGTH OF THE CURB.
4. PROVIDE 1 ½" END COVER TO BARS D(#4) FROM END OF OVERALL LENGTH OF THE CURB.
5. REFER TO TXDOT STANDARD PRD-13 FOR HANDRAIL INSTALLATION DETAILS.
6. SALVAGE THE END TREATMENT STEEL PIPES MODIFY THE LENGTH AS NECESSARY TO FIT UPDATED RCB END.
7. FIELD VERIFY AND MATCH EXISTING CROSS SLOPE. IF EXISTING SLAB HAS CROSS SLOPE LESS THAN 0.5%, CREATE 1% CROSS SLOPE AT PROPOSED SECTION DOWN TO EXTERIOR EDGE.
8. REFER TO CIVIL PLAN FOR REQUIRED BREAKBACK/BUILDUP HEIGHT AS NECESSARY ACHIEVE PROPOSED SIDEWALK ELEVATION.



SECTION C-C
N.T.S



SECTION D-D
N.T.S

4/26/2024

STATE OF TEXAS
JIANYING GUO
104055
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

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STRUCTURAL DETAILS

RM 584 BETWEEN JACKSON AND MARKET ST SOUTH SIDE MISCELLANEOUS STRUCTURAL DETAILS

SHEET 1 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	82
0907	00	229,ETC	

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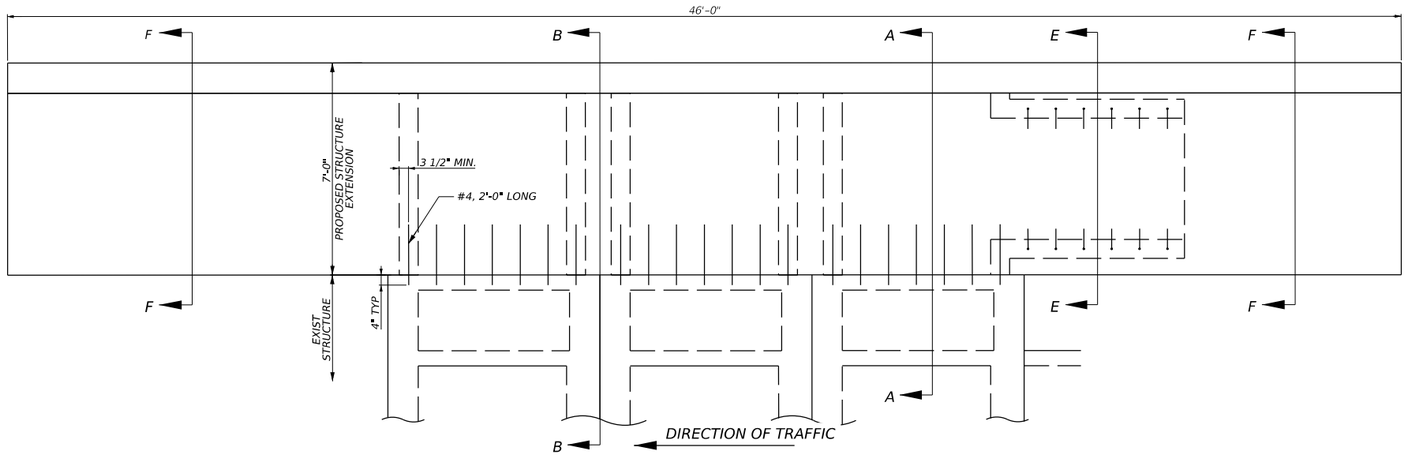
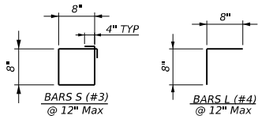
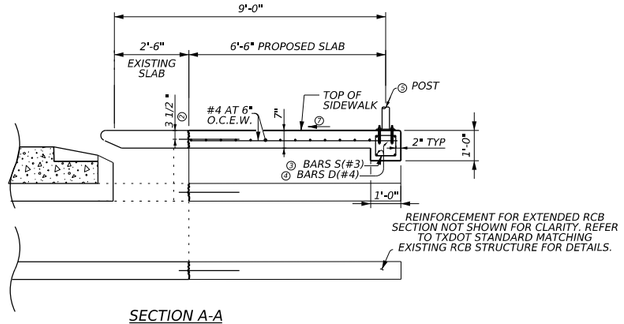


MATERIAL NOTES:
- PROVIDE CLASS C CONCRETE (F'C=3,600 PSI).
- PROVIDE GRADE 60 REINFORCING STEEL.
- PROVIDE GALVANIZED REINFORCING STEEL IF REQUIRED ELSEWHERE IN THE PLANS.

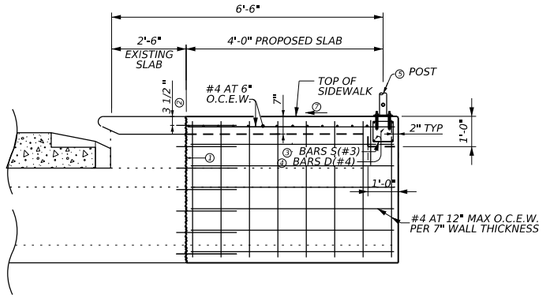
GENERAL NOTES:
- DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
- WHEN STRUCTURE IS FOUNDED ON SOLID ROCK, DEPTH OF TOE WALLS FOR CULVERTS AND WINGWALLS MAY BE REDUCED OR ELIMINATED AS DIRECTED BY THE ENGINEER.
- SEE BOX CULVERT AS-BUILT SHEET FOR ADDITIONAL DIMENSIONS AND INFORMATION.
- COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
- MINIMUM COVER TO REINFORCEMENT IS 2" UNLESS OTHERWISE NOTED ON PLAN.
- REINFORCING DIMENSIONS ARE OUT-TO-OUT OF BARS.

1. REMOVE TOP PORTION OF EXISTING WALL, WHERE APPLICABLE, AND ROUGHEN SURFACE TO AMPLITUDE OF 1/4".
2. EMBED (#4) ANCHOR BARS 2'-0" IN LENGTH (HORIZONTAL, LENGTH OF VERTICAL DOWELS TO OBTAIN 1 ½" COVER AT TOP, OR BARS L SHOWN), WITH A TYPE III, CLASS C, D, E, OR F ANCHOR ADHESIVE. MINIMUM ADHESIVE ANCHOR EMBEDMENT DEPTH IS 4". ANCHOR ADHESIVE CHOSEN MUST BE ABLE TO ACHIEVE A BASIC BOND STRENGTH IN TENSION, NBA, OF 10 KIPS. SUBMIT SIGNED AND SEALED CALCULATIONS OR THE MANUFACTURER'S PUBLISHED LITERATURE SHOWING THE PROPOSED ANCHOR ADHESIVE'S ABILITY TO DEVELOP THIS LOAD TO THE ENGINEER FOR APPROVAL PRIOR TO USE. ANCHOR INSTALLATION, INCLUDING HOLE SIZE, DRILLING, AND CLEAN OUT, MUST BE IN ACCORDANCE WITH ITEM 450, "RAILING".
3. BARS S(#3) SPACED AT 12" MAX (SPACED 3" FROM END OF OVERALL LENGTH OF THE CURB.
4. PROVIDE 1 ½" END COVER TO BARS D(#4) FROM END OF OVERALL LENGTH OF THE CURB.
5. REFER TO TXDOT STANDARD PRD-13 FOR HANDRAIL INSTALLATION DETAILS.
6. SALVAGE THE END TREATMENT STEEL PIPES MODIFY THE LENGTH AS NECESSARY TO FIT UPDATED RCB END.
7. FIELD VERIFY AND MATCH EXISTING CROSS SLOPE. IF EXISTING SLAB HAS CROSS SLOPE LESS THAN 0.5%, CREATE 1% CROSS SLOPE AT PROPOSED SECTION DOWN TO EXTERIOR EDGE.
8. REFER TO CIVIL PLAN FOR REQUIRED BREAKBACK/BUILDUP HEIGHT AS NECESSARY ACHIEVE PROPOSED SIDEWALK ELEVATION.





SECTION A-A
N.T.S



SECTION B-B
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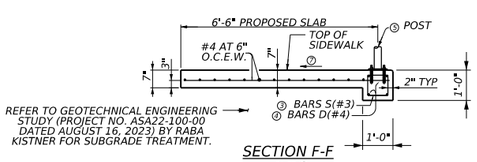

SECTION F-F
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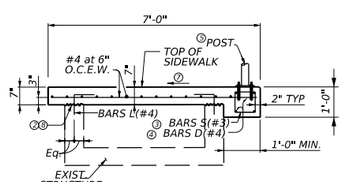

SECTION E-E
N.T.S

4/26/2024

STATE OF TEXAS
JIANYING GUO
104055
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

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STRUCTURAL DETAILS

RM 584 BETWEEN JACKSON AND MARKET ST NORTH SIDE MISCELLANEOUS STRUCTURAL DETAILS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	83
0907	00	229,ETC	

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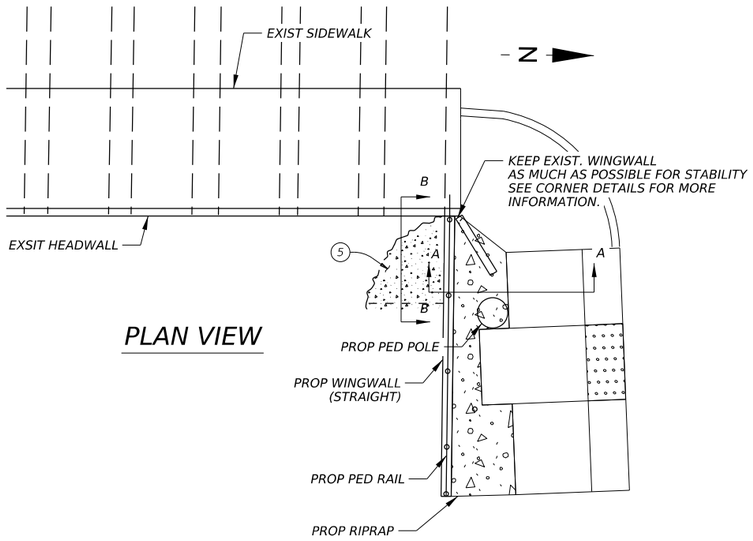
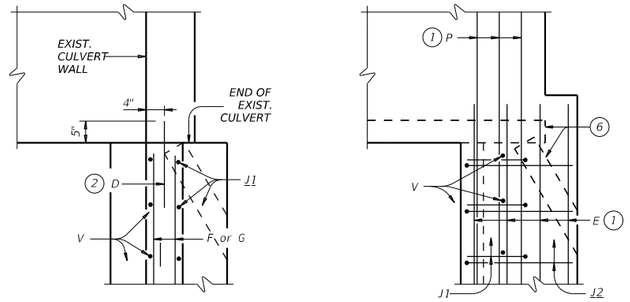


PLAN VIEW



WINGWALL

FOOTING AND TOEWALL

CORNER DETAILS

PLAN

1. IF DEMOLISION/EXCAVATION SHOWS EXISTING REINFORCEMENT AT/OR CLOSE TO PROPOSED BARS P AND E LOCATIONS AND EXTENDED FROM BOTTOM SLAB OF BOX CULVERT, PROTECT THOSE REINFORCEMENT, WHICH ARE TO BE LAP SPLICED WITH P AND E. MINIMUM LAP SPLICE SHALL BE 1'-0".
2. ADJUST AS NECESSARY TO MAINTAIN 1 1#2" CLEAR COVER AND 4" MINIMUM BETWEEN BARS.
3. EXISTING CHANNEL SLAB BREAKBACK 2'-0" OR MORE AS NECESSARY TO CONSTRUCT WINGWALL FOOTING.
4. EMBED (#5) ANCHOR BARS, GALVANIZED AND 2'-5" LONG, WITH A TYPE III, CLASS C, D, E, OR F ANCHOR ADHESIVE. MINIMUM ADHESIVE ANCHOR EMBEDMENT DEPTH IS 5". ANCHOR ADHESIVE CHOSEN MUST BE ABLE TO ACHIEVE A BASIC BOND STRENGTH IN TENSION, NBA, OF 15 KIPS. ANCHOR INSTALLATION, INCLUDING HOLE SIZE, DRILLING, AND CLEAN OUT, MUST BE IN ACCORDANCE WITH TXDOT SPEC ITEM 450, "RAILING".
5. DEMO EXISTING CONCRETE CHANNEL PARTIALLY AS NECESSARY TO CONSTRUCT THE STRAIGHT WING FOOTING. INSTALL #5 GALVANIZED DOWEL, 1'-0" INTO EACH SIDE AND SPACED AT 1'-0", BEFORE CONSTRUCTING THE CHANNEL TO THE LIMIT OF NEWLY CONSTRUCTED FOOTING PER AS-BUILT PLAN OF THE CHANNEL. PAYMENT FOR RIPRAP IS AS REQUIRED BY ITEM 432, "RIPRAP."
6. FIELD VERIFY EXISTING CULVERT TOEWALL AND EXISTING WINGWALL, WHERE WINGWALL TOEWALL WILL TO BE CONSTRUCTED AGAINST.

MATERIAL NOTES:

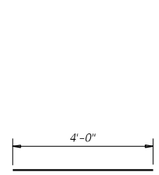
PROVIDE CLASS C CONCRETE (F'C=3,600 PSI).
PROVIDE GRADE 60 REINFORCING STEEL.
PROVIDE GALVANIZED REINFORCING STEEL IF REQUIRED ELSEWHERE IN THE PLANS.

GENERAL NOTES:

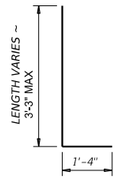
DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
WHEN STRUCTURE IS FOUNDED ON SOLID ROCK, DEPTH OF TOEWALLS FOR CULVERTS AND WINGWALLS MAY BE REDUCED OR ELIMINATED AS DIRECTED BY THE ENGINEER.
SEE BOX CULVERT AS-BUILT SHEET FOR ADDITIONAL DIMENSIONS AND INFORMATION.
COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE.
REINFORCING DIMENSIONS ARE OUT-TO-OUT OF BARS.

TABLE OF WINGWALL REINFORCING

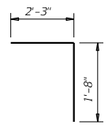
Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
M	#4	2	~
P	#4	~	1'-0"
V	#4	~	1'-0"



BARS D

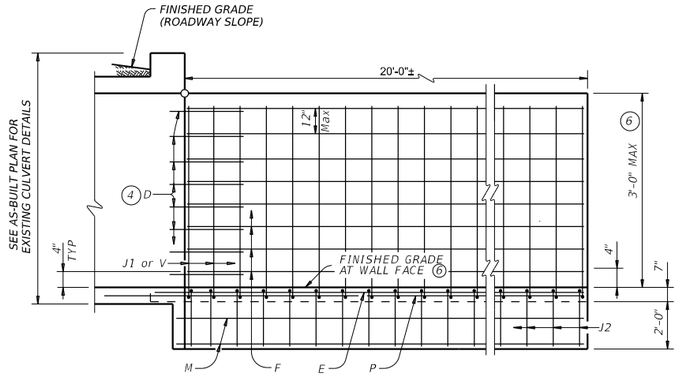


BARS J1
(#4 at 12")



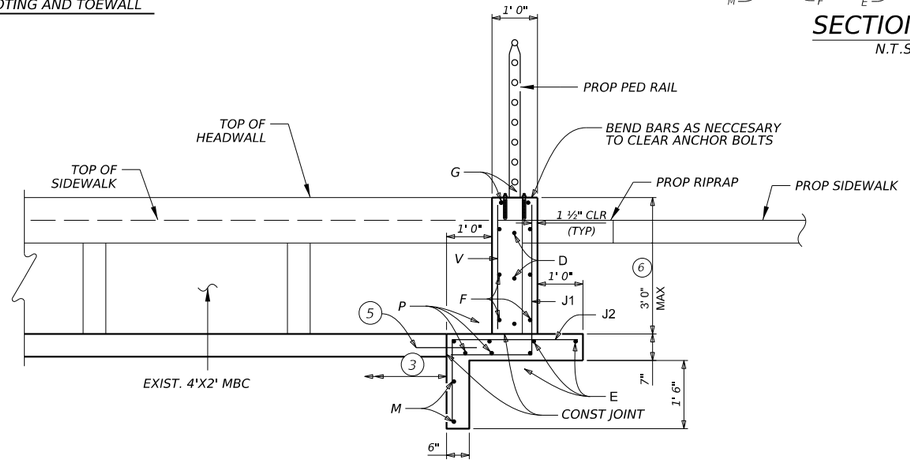
BARS J2
(#4 at 12")

BARS V



SECTION B-B

N.T.S



SECTION A-A

N.T.S

5/1/2024

STATE OF TEXAS
JIANYING GUO
104055
LICENSED PROFESSIONAL ENGINEER

Kimley»Horn
F-928

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STRUCTURAL DETAILS

RM 584 AT US 87
SE CORNER MISCELLANEOUS STRUCTURAL DETAILS

SHEET 3 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	84
0907	00	229,ETC	

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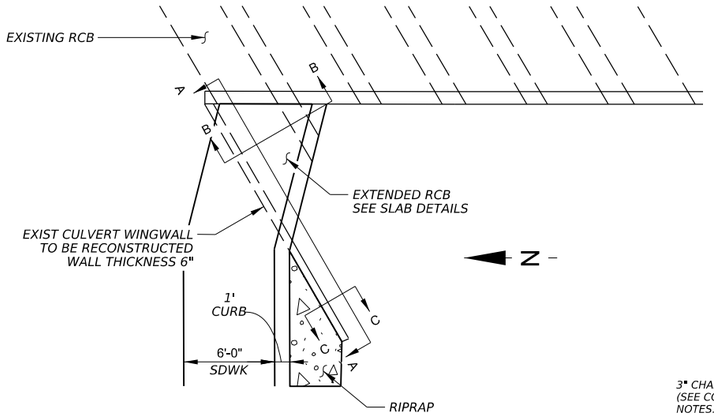
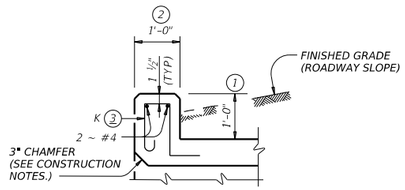
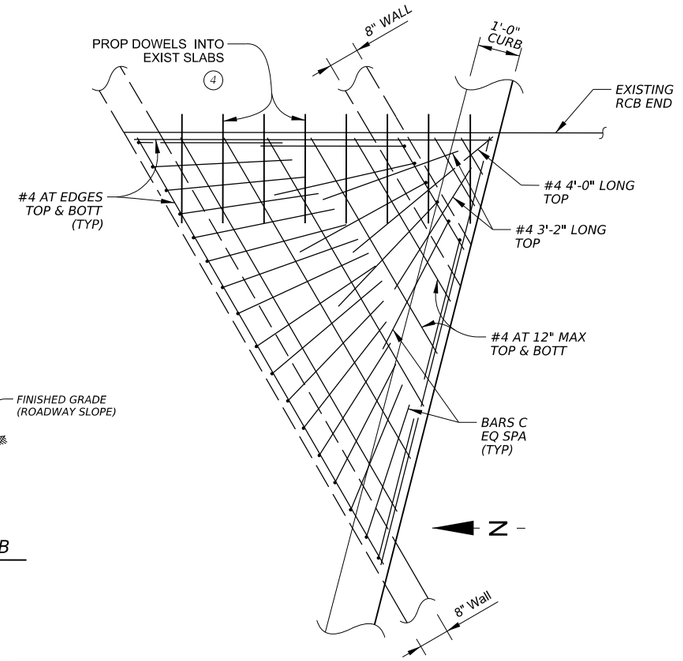


PLAN VIEW

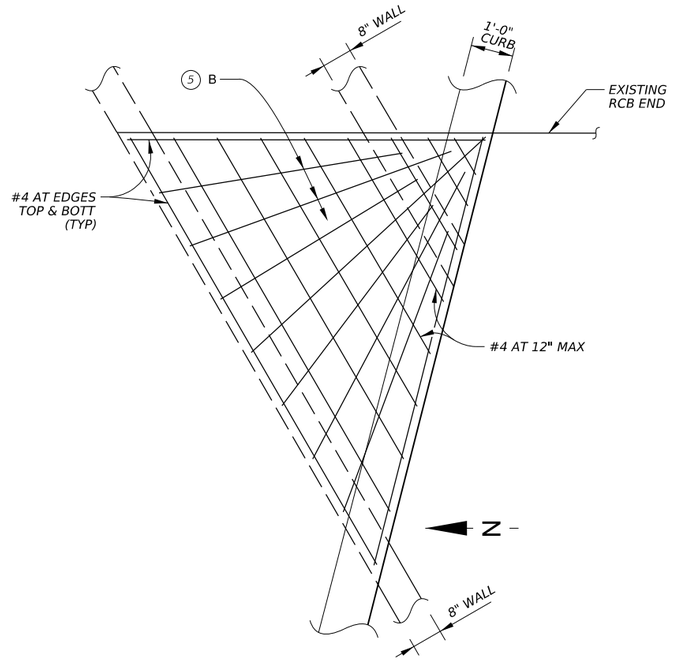


SECTION THRU CURB



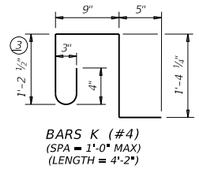
TOP SLAB DETAILS

(BARS B NOT SHOWN FOR CLARITY. SEE BARS B LAYOUT AND SECTION B-B FOR MORE INFORMATION)

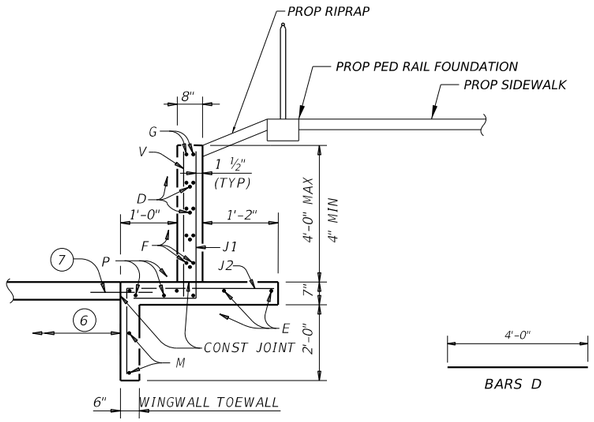


BARS B LAYOUT

(BOTTOM MAT OF TOP SLAB, INCLUDING BARS B SHOWN) (5)

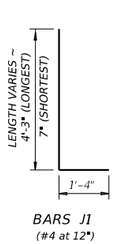


BARS K (#4)
(SPA = 1'-0" MAX)
(LENGTH = 4'-2")

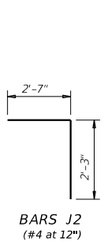


SECTION C-C

BARS D

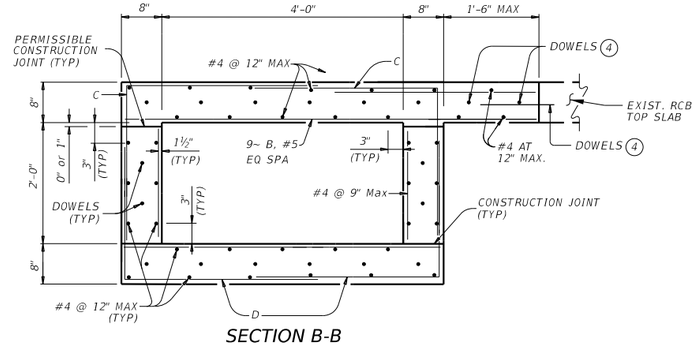


BARS J1
(#4 at 12")

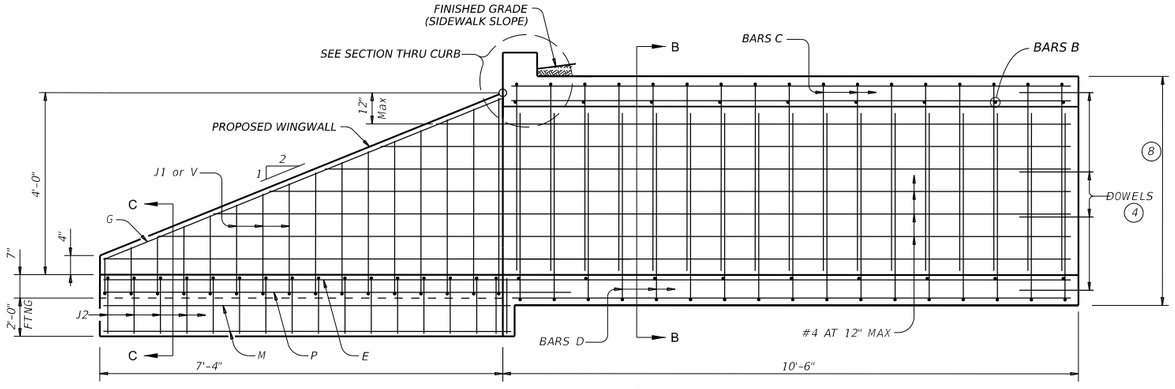


BARS J2
(#4 at 12")

BARS V



SECTION B-B



ELEVATION A-A

1. ESTIMATED CURB HEIGHTS ARE SHOWN ELSEWHERE IN THE PLANS.
2. PEDESTRIAN RAIL NOT SHOWN FOR CLARITY. SEE RAIL MANUFACTURER'S MANUAL FOR INSTALLATION DETAILS.
3. FOR CURBS LESS THAN 1'-0" HIGH, TILT BARS K OR REDUCE BAR HEIGHT AS NECESSARY TO MAINTAIN COVER. FOR CURBS LESS THAN 3" HIGH, BARS K MAY BE OMITTED.
4. EMBED (#5) ANCHOR BARS, GALVANIZED AND 2'-5" LONG, WITH A TYPE III, CLASS C, D, E, OR F ANCHOR ADHESIVE. MINIMUM ADHESIVE ANCHOR EMBEDMENT DEPTH IS 5". ANCHOR ADHESIVE CHOSEN MUST BE ABLE TO ACHIEVE A BASIC BOND STRENGTH IN TENSION, NBA, OF 15 KIPS. ANCHORS ARE ESTIMATED TO SPACE AT 11". ANCHOR INSTALLATION, INCLUDING HOLE SIZE, DRILLING, AND CLEAN OUT, MUST BE IN ACCORDANCE WITH TXDOT SPEC ITEM 450, "RAILING".
5. EVENLY DISTRIBUT BARS B (#5) IN A MANNER THAT, AT EACH END, THEY ARE NOT SPACED LESS THAN 3", NOR DO THEY SPACE AT MORE THAN 1'-3".
6. EXISTING CHANNEL SLAB BREAKBACK 2'-0" OR MORE AS NECESSARY TO CONSTRUCT WINGWALL FOOTING.
7. DEMO EXISTING CONCRETE CHANNEL PARTIALLY AS NECESSARY TO CONSTRUCT THE STRAIGHT WING FOOTING. INSTALL #5 GALVANIZED DOWEL, 1'-0" INTO EACH SIDE, BEFORE CONSTRUCTING THE CHANNEL TO THE LIMIT OF NEWLY CONSTRUCTED FOOTING PER AS-BUILT PLAN OF THE CHANNEL. PAYMENT FOR RIPRAP IS AS REQUIRED BY ITEM 432, "RIPRAP."
8. SEE AS-BUILT PLAN FOR EXISTING CULVERT DIMENSIONS, WHICH ARE TO BE MATCHED.

4/26/2024

STATE OF TEXAS
JIANYING GUO
104055
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn

F-928

Texas Department of Transportation
© 2023

STRUCTURAL DETAILS

RM 584 AT US 87
SW CORNER MISCELLANEOUS STRUCTURAL DETAILS

SHEET 4 OF 4

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	85
CONT.	SECT.	JOB	
0907	00	229,ETC	

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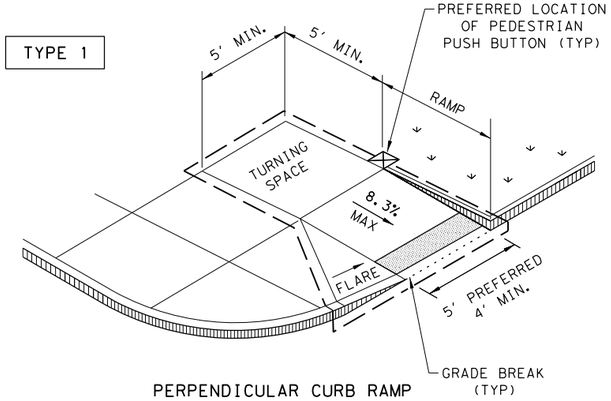
PLOTTED: 4/26/2024 12:49:38 PM

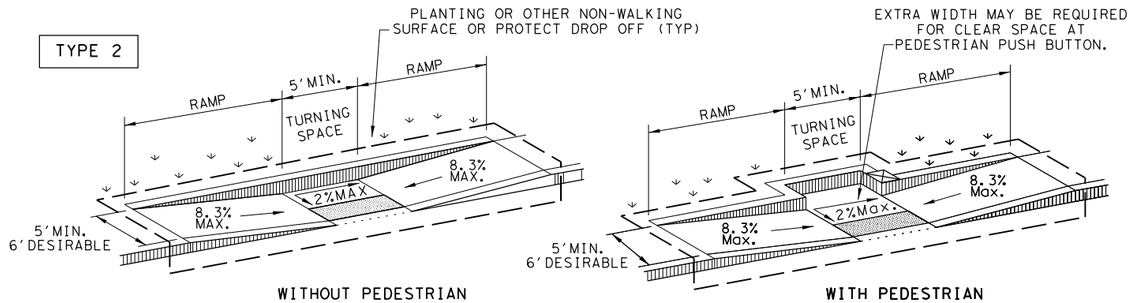
DATE: 4/26/2024
FILE: c:\pw\km1\d0273596\ped18.dgn

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

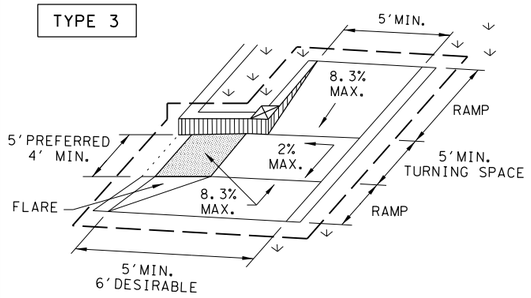


WITHOUT PEDESTRIAN PUSH BUTTON

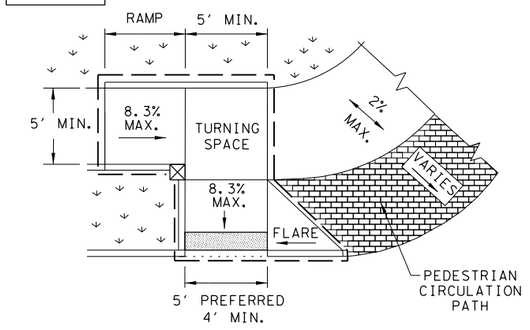
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

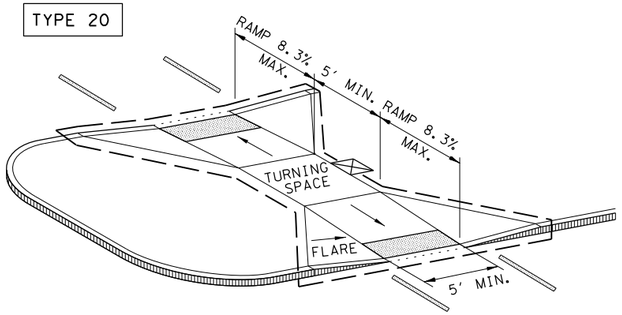


TYPE 6



COMBINATION CURB RAMPS

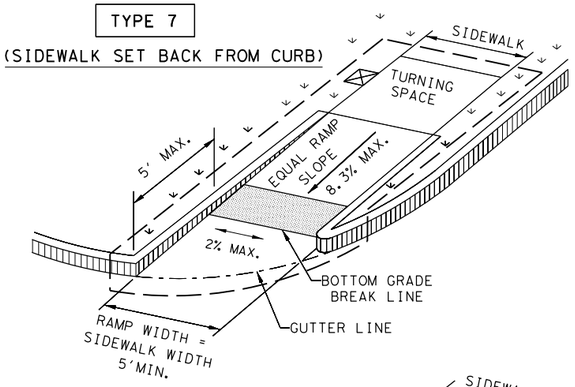
TYPE 20



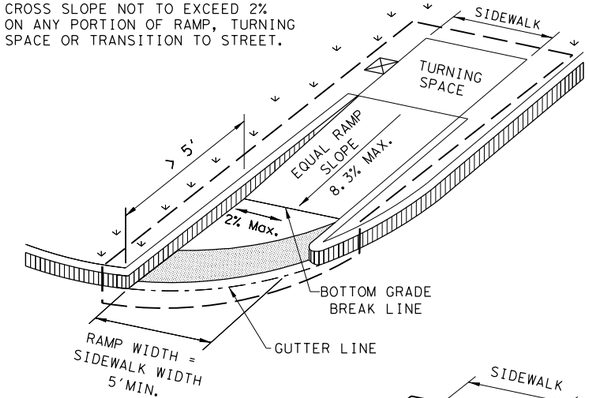
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

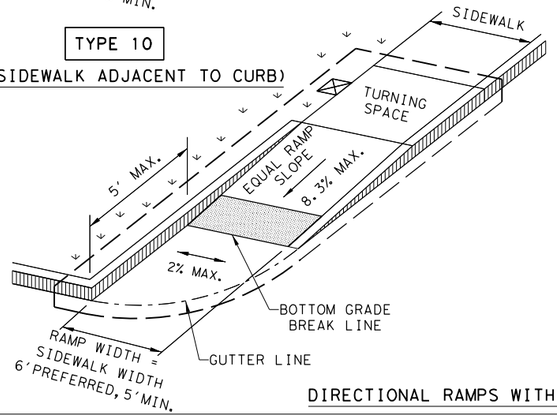


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

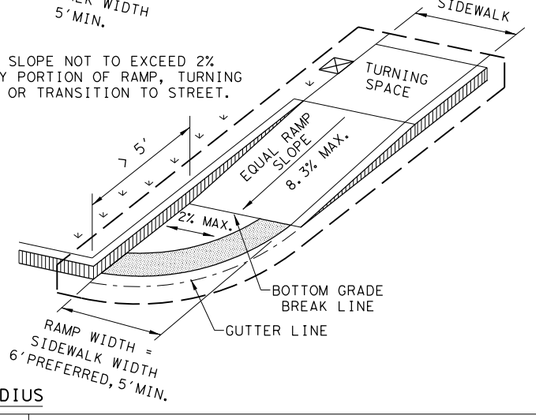


TYPE 10

(SIDEWALK ADJACENT TO CURB)

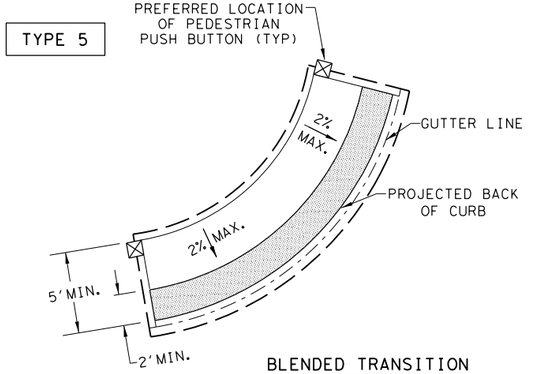


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

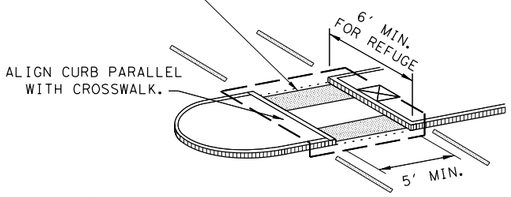
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

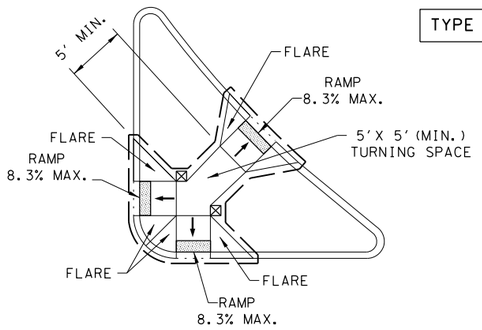
TYPE 21

INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.



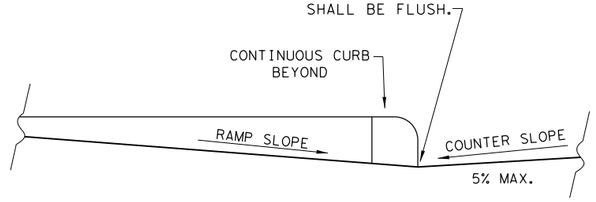
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

BOTTOM GRADE BREAK OF CURB RAMP WILL NORMALLY BE AT GUTTER LINE. SURFACE SLOPES AT GRADE BREAKS SHALL BE FLUSH.



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

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.

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229, ETC	RM 584
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		86

DATE: 4/26/2024
FILE: c:\pw\khl\d0273596\ped18.dgn

GENERAL NOTES

CURB RAMPS

1. Install a curb ramp or blended transition at each pedestrian street crossing.
2. All slopes shown are maximum allowable. Cross slopes of 1.5% and lesser running should be used. Adjust curb ramp length or grade of approach sidewalks as directed.
3. Maximum allowable cross slope on sidewalk and curb ramp surfaces is 2%.
4. The minimum sidewalk width is 5′. Where the sidewalk is adjacent to the back of curb, a 6′ sidewalk width is desirable. Where a 5′ sidewalk cannot be provided due to site constraints, sidewalk width may be reduced to 4′ for short distances. 5′x 5′ passing areas at intervals not to exceed 200′ are required.
5. Turning Spaces shall be 5′x 5′ minimum. Cross slope shall be maximum 2%.
6. Clear space at the bottom of curb ramps shall be a minimum of 4′x 4′ wholly contained within the crosswalk and wholly outside the parallel vehicular travel path.
7. Provide flared sides where the pedestrian circulation path crosses the curb ramp. Flared sides shall be sloped at 10% maximum, measured parallel to the curb. Returned curbs may be used only where pedestrians would not normally walk across the ramp, either because the adjacent surface is planted, substantially obstructed, or otherwise protected.
8. Additional information on curb ramp location, design, light reflective value and texture may be found in the latest draft of the Proposed Guidelines for Pedestrian Facilities in the Public Right of Way (PROWAG) as published by the U.S. Architectural and Transportation Barriers Compliance Board (Access Board).
9. To serve as a pedestrian refuge area, the median should be a minimum of 6′ wide, measured from back of curbs. Medians should be designed to provide accessible passage over or through them.
10. Small channelization islands, which do not provide a minimum 5′x 5′ landing at the top of curb ramps, shall be cut through level with the surface of the street.
11. Crosswalk dimensions, crosswalk markings and stop bar locations shall be as shown elsewhere in the plans. At intersections where crosswalk markings are not required, curb ramps shall align with theoretical crosswalks unless otherwise directed.
12. Provide curb ramps to connect the pedestrian access route at each pedestrian street crossing. Handrails are not required on curb ramps.
13. Curb ramps and landings shall be constructed and paid for in accordance with Item 531 "Sidewalks".
14. Place concrete at a minimum depth of 5" for ramps, flares and landings, unless otherwise directed.
15. Furnish and install No. 3 reinforcing steel bars at 18" o.c. both ways, unless otherwise directed.
16. Provide a smooth transition where the curb ramps connect to the street.
17. Curbs shown on sheet 1 within the limits of payment are considered part of the curb ramp for payment, whether it is concrete curb, gutter, or combined curb and gutter.
18. Existing features that comply with applicalble standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

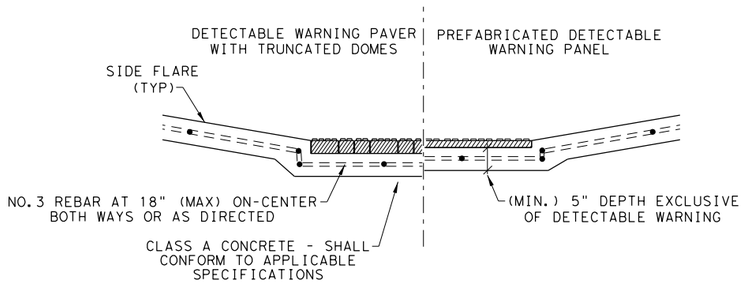
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material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

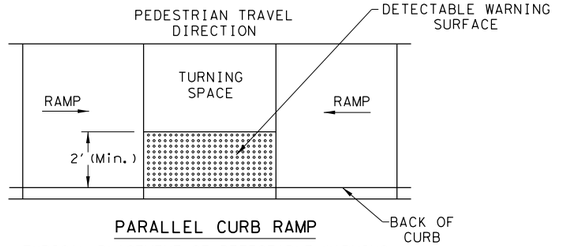
SIDEWALKS

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.

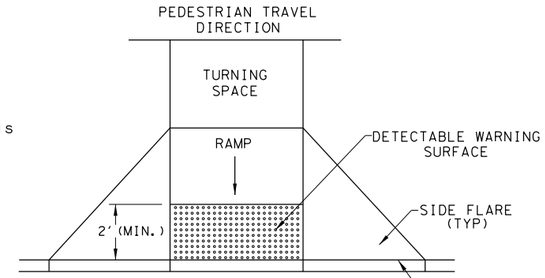


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

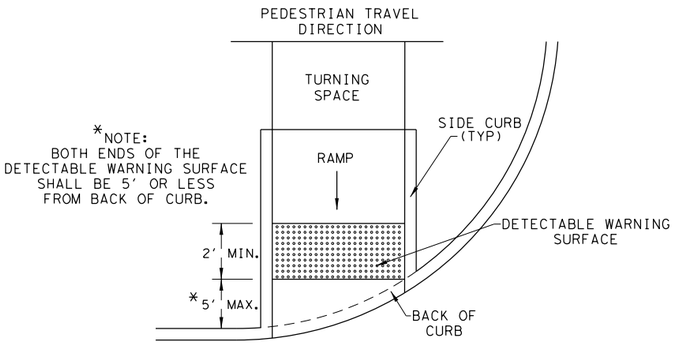
DETECTABLE WARNING SURFACE DETAILS



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.

Texas Department of Transportation | Design Division Standard

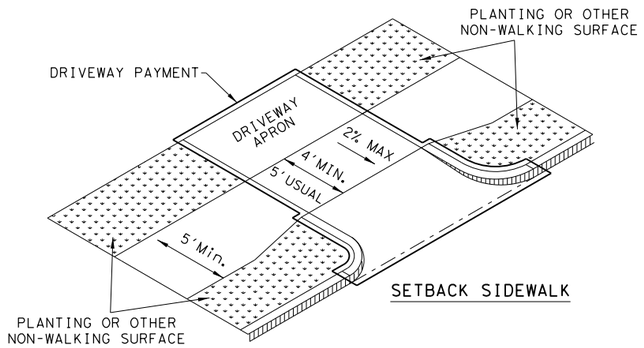
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

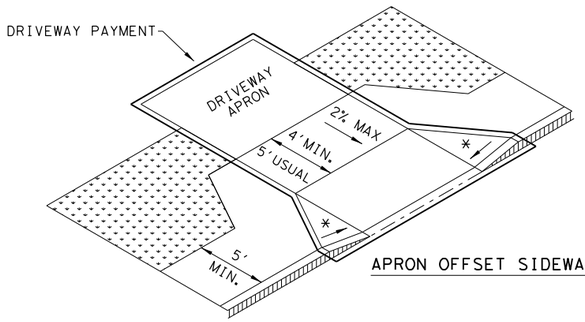
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0907	00	229, ETC		RM 584
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST		COUNTY		SHEET NO.
	SJT		TOM GREEN		87

DATE: 4/26/2024
FILE: c:\pw\khl\d0273596\ped18.dgn

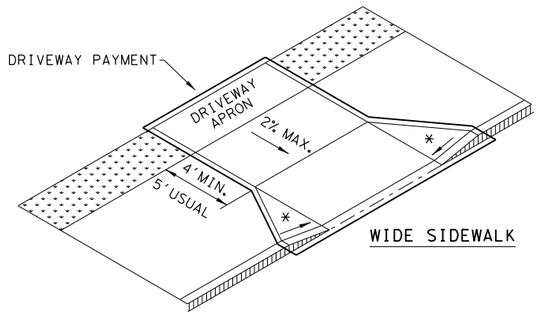
SIDEWALK TREATMENT AT DRIVEWAYS



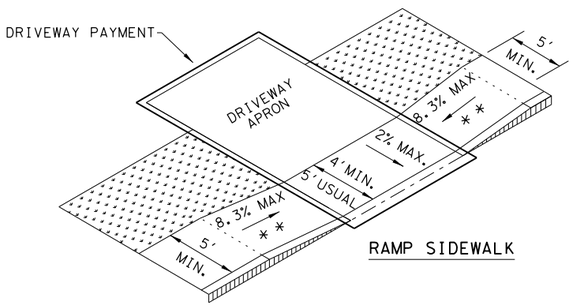
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

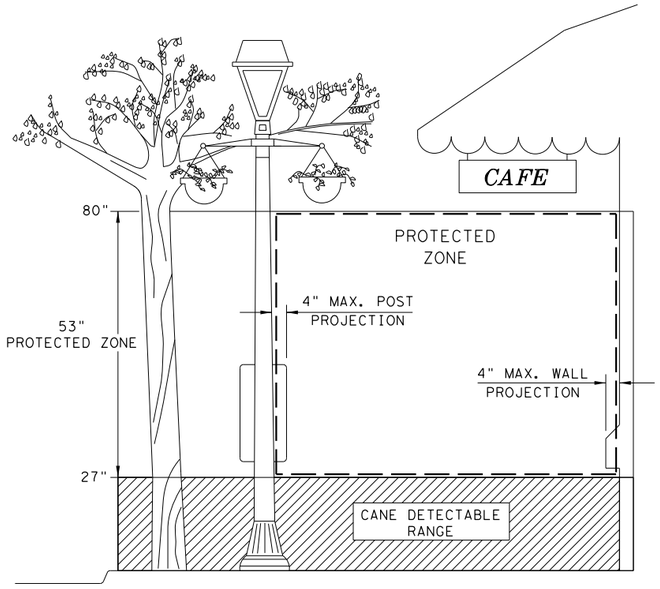


RAMP SIDEWALK

NOTES:

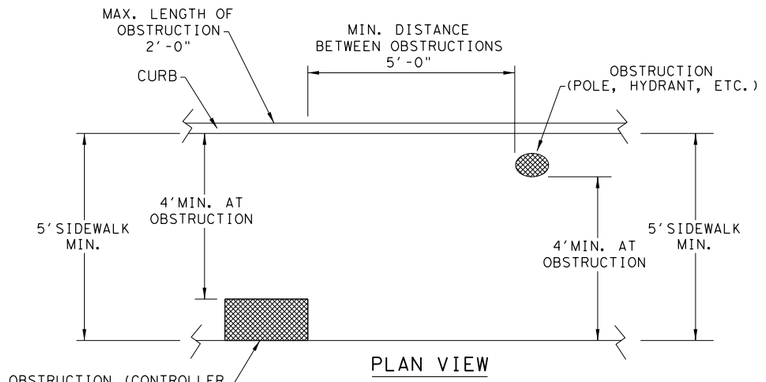
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * 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

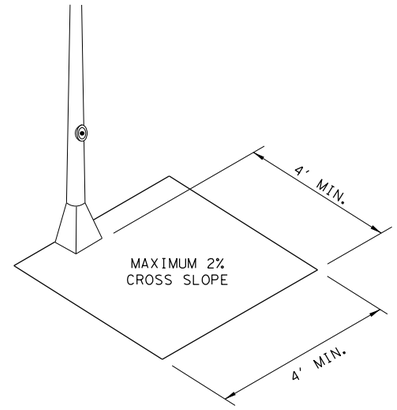
NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



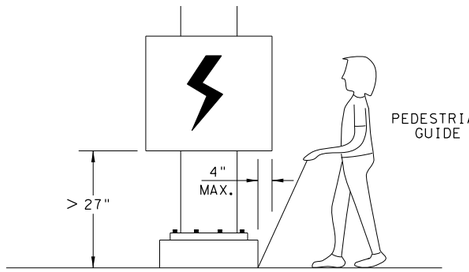
PLAN VIEW

PLACEMENT OF STREET FIXTURES

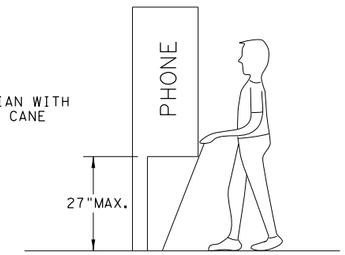
NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.



PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

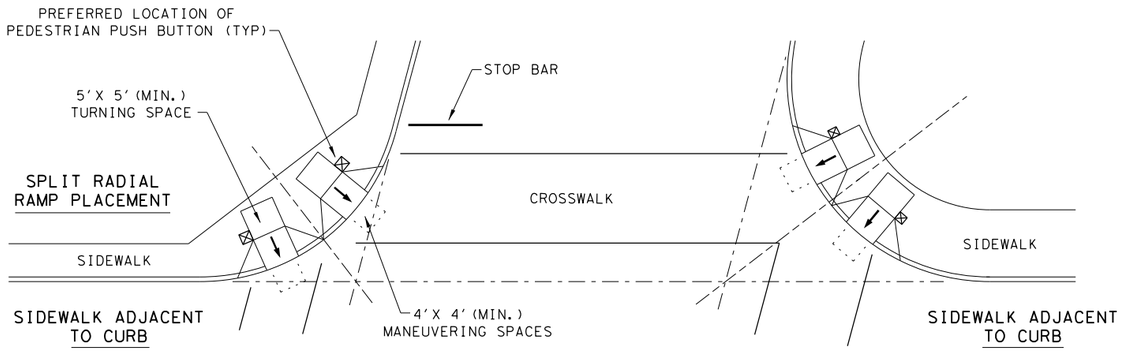
PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0907	00	229, ETC		RM 584	
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.	
	SJT	TOM GREEN			88	

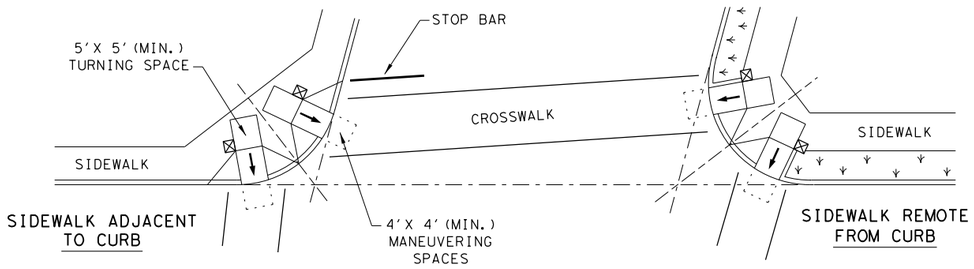
DATE: 4/26/2024
FILE: c:\pw\kh1\d0273596\ped18.dgn

TYPICAL CROSSING LAYOUTS

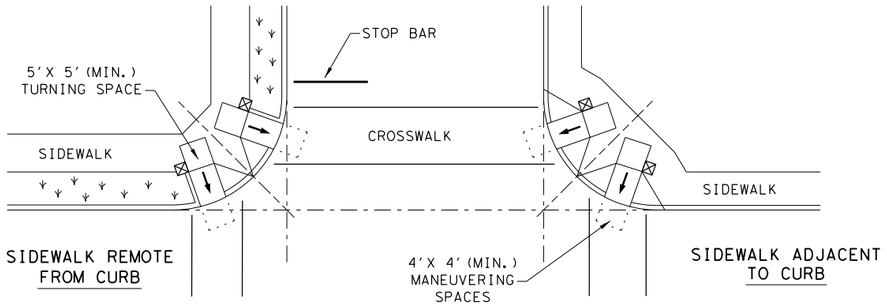
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



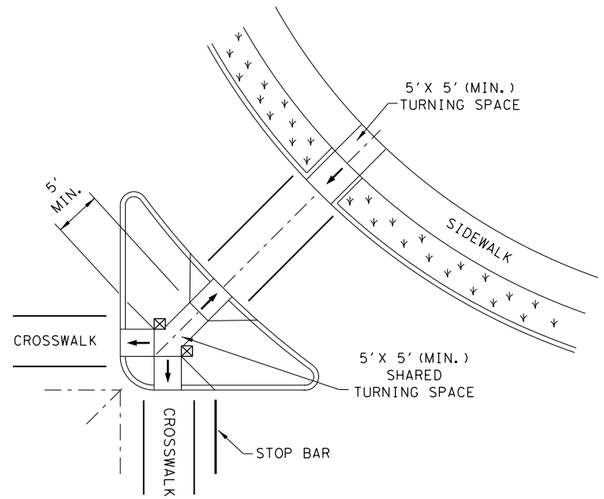
SKEWED INTERSECTION WITH "LARGE" RADIUS



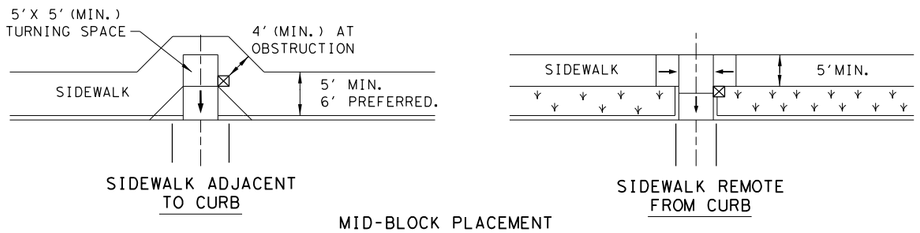
SKEWED INTERSECTION WITH "SMALL" RADIUS



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON (IF APPLICABLE). ☒

DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

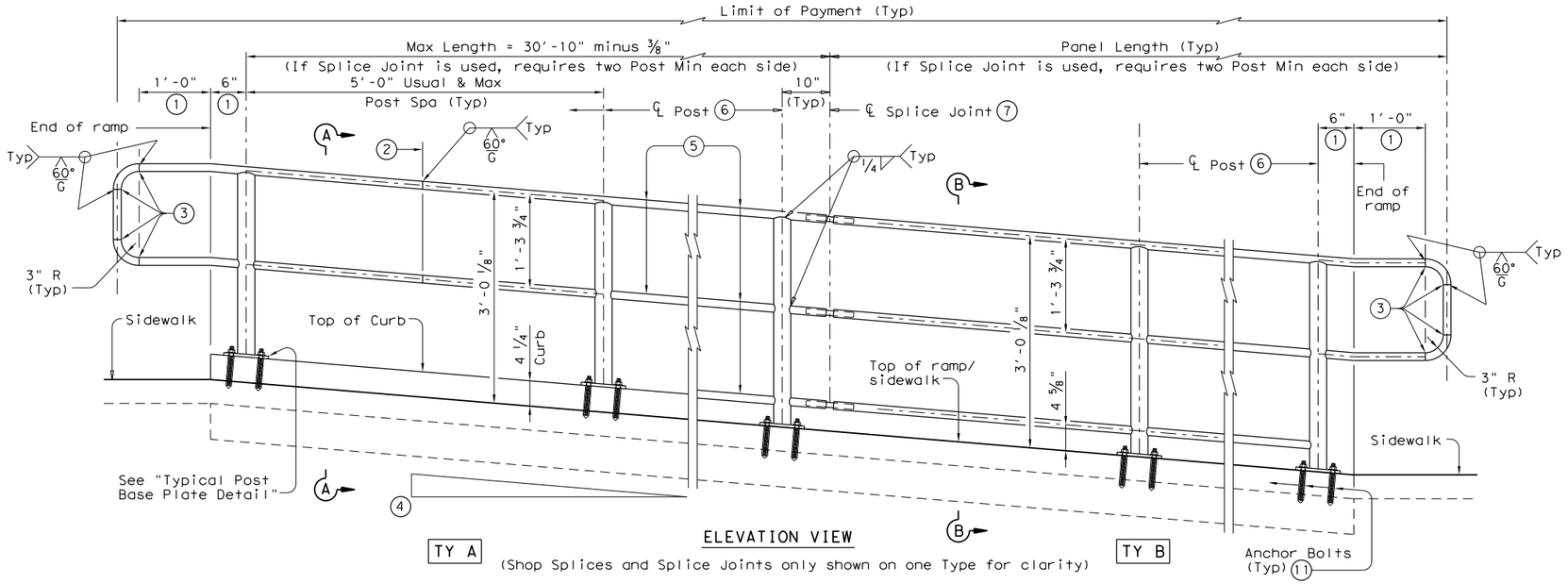
SHEET 4 OF 4

Texas Department of Transportation — Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

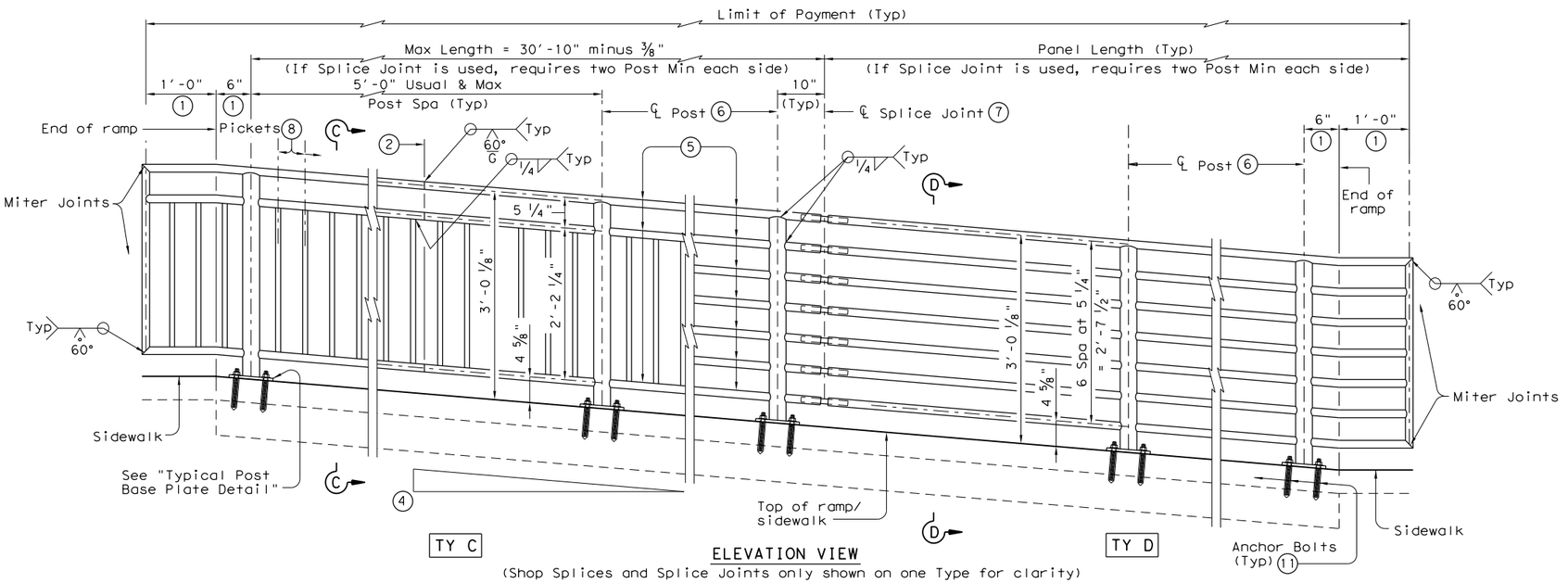
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229, ETC	RM 584
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		89



ELEVATION VIEW

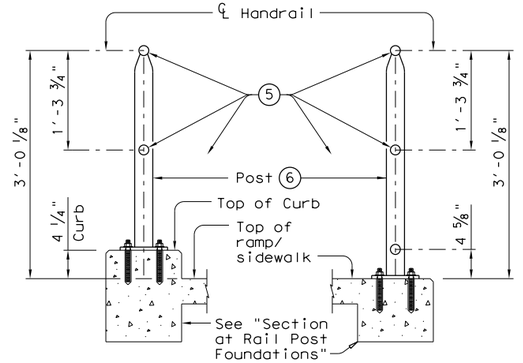
(Shop Splices and Splice Joints only shown on one Type for clarity)



ELEVATION VIEW

(Shop Splices and Splice Joints only shown on one Type for clarity)

RECOMMENDED USAGE (9)(10)	
Dropoff Height/ Condition	Recommended Rail Options
< 30" dropoff	TY A, TY B, TY C, or TY D
≥ 30" dropoff, or along Bike Path	TY E or TY F

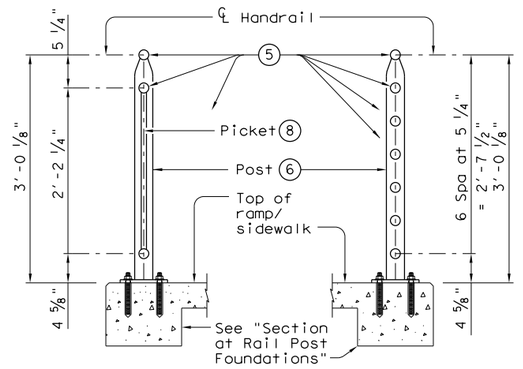


SECTION A-A

(Showing Handrail TY A)

SECTION B-B

(Showing Handrail TY B)



SECTION C-C

(Showing Handrail TY C)

SECTION D-D

(Showing Handrail TY D)

1. Parallel to ground.
2. One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
3. Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
4. See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
5. 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.
6. 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
7. See "Handrail Fabrication Details" for Splice Joints.
8. ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
9. When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.
10. Not to be used on bridges.
11. See "General Notes" for anchor bolt information.

SHEET 1 OF 3

Texas Department of Transportation

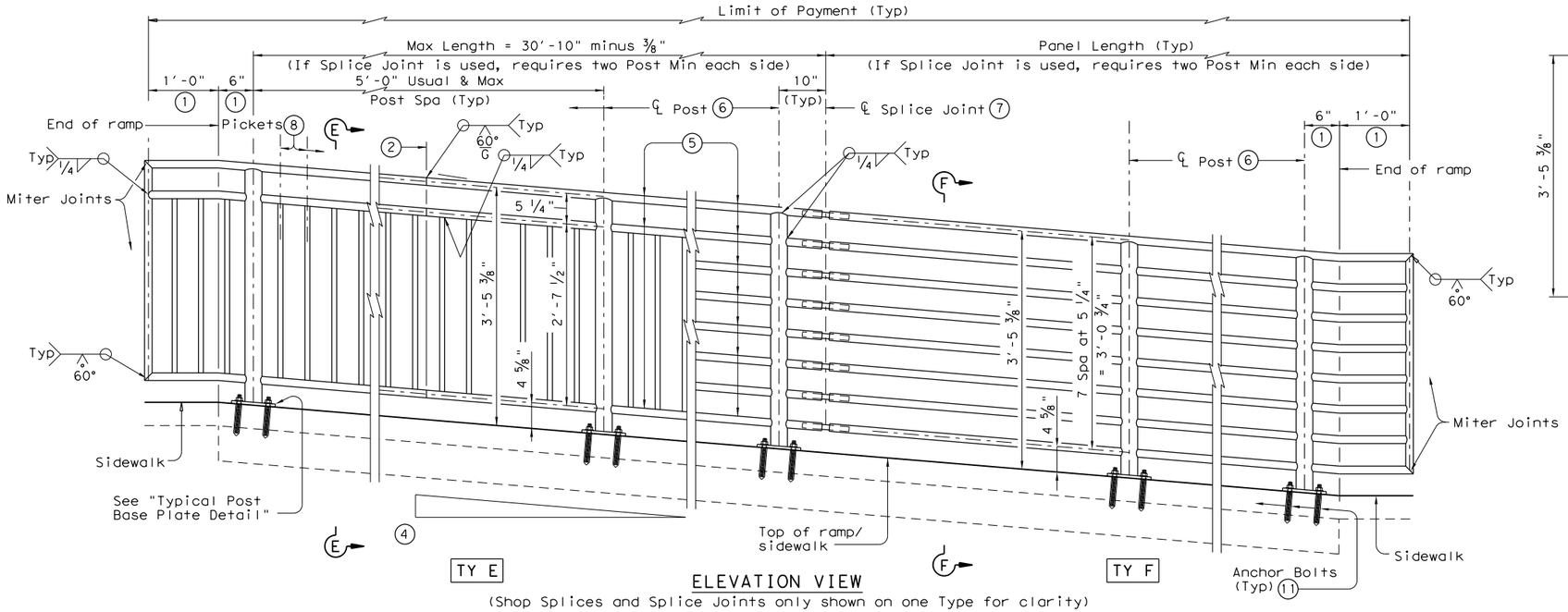
Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

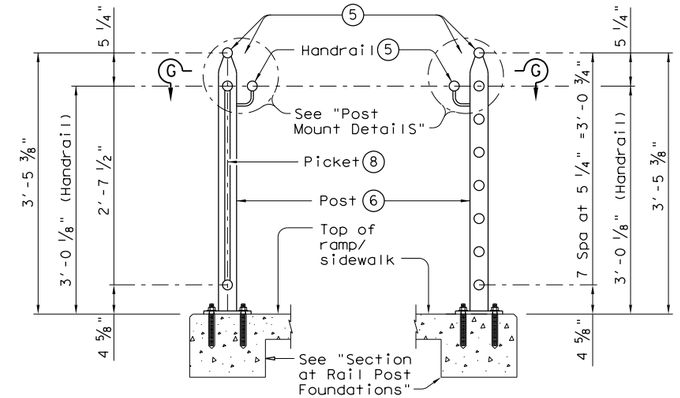
FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT Decmeber 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		90

DATE: 4/26/2024
FILE: c:\pw\kmi\d0273596\prd13.dgn



ELEVATION VIEW

(Shop Splices and Splice Joints only shown on one Type for clarity)

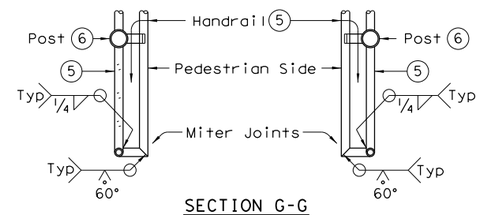


SECTION E-E

(Showing Handrail TY E)

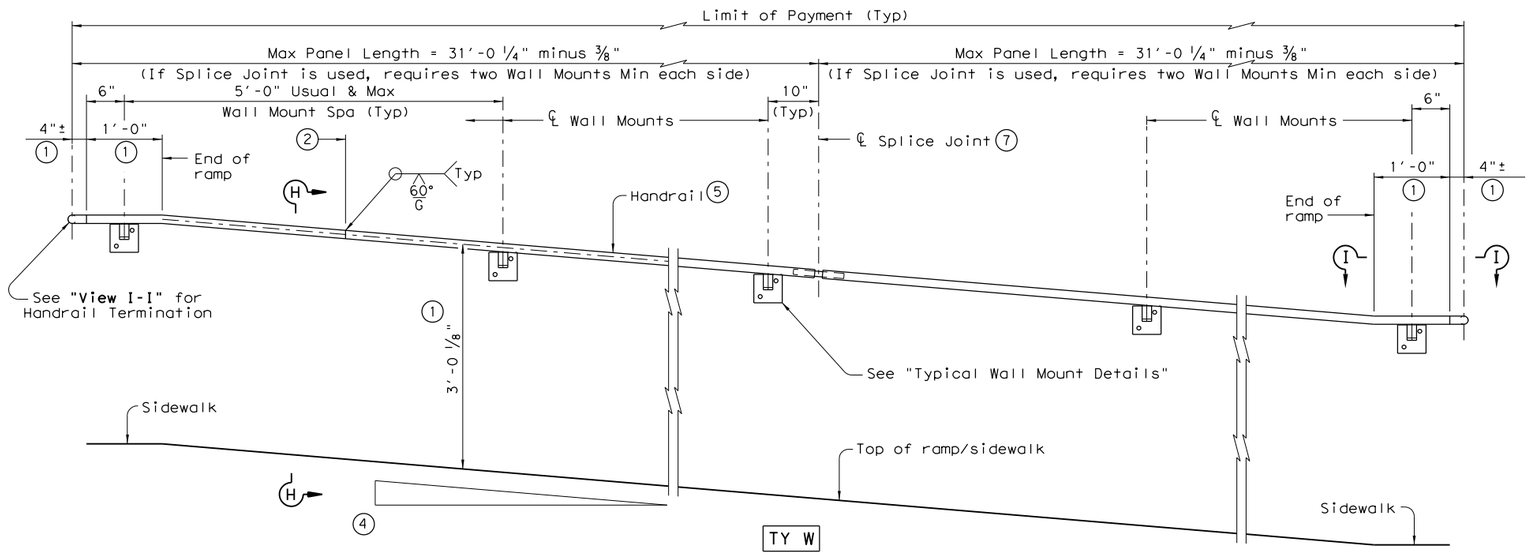
SECTION F-F

(Showing Handrail TY F)

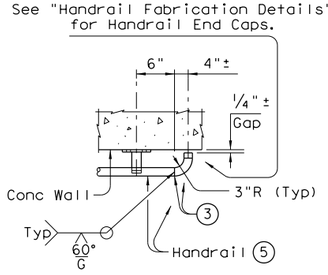


SECTION G-G

(Showing Handrail Termination)

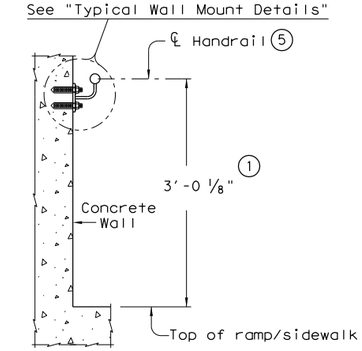


ELEVATION VIEW



VIEW I-I

(Showing Handrail Termination)



SECTION H-H

(Showing Handrail TY W)

1. Parallel to ground.
2. One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
3. Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.
4. See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.
5. 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp / sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.
6. 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). See "Post Mount Detail" for crimping and trimming post to fit Dia. of top rail. Provide holes as needed in post for galvanizing drainage and venting. Plumb all posts.
7. See "Handrail Fabrication Details" for Splice Joints.
8. ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.
11. See "General Notes" for anchor bolt information.

Texas Department of Transportation — Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		91

DATE: 4/26/2024
FILE: c:\pw\khi\d0273596\prd13.dgn

DATE: 4/26/2024
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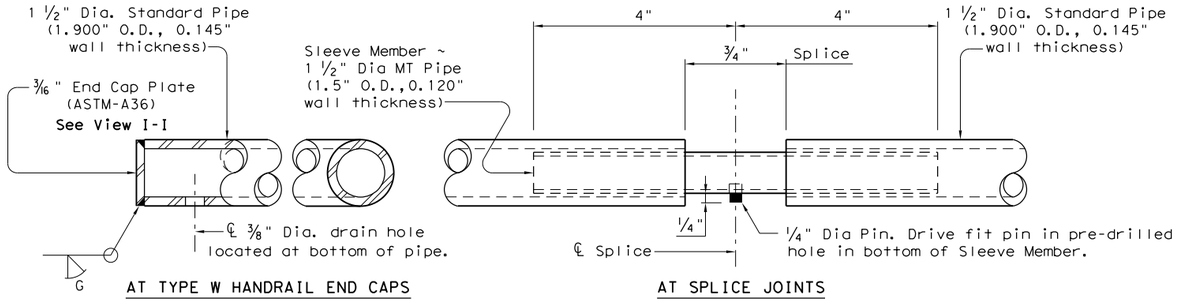
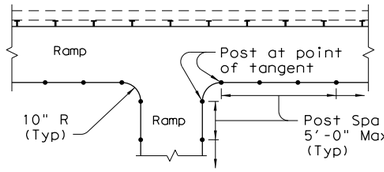


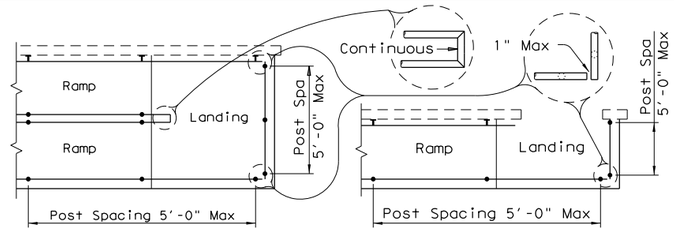
AT TYPE W HANDRAIL END CAPS

AT SPLICE JOINTS

HANDRAIL FABRICATION DETAILS



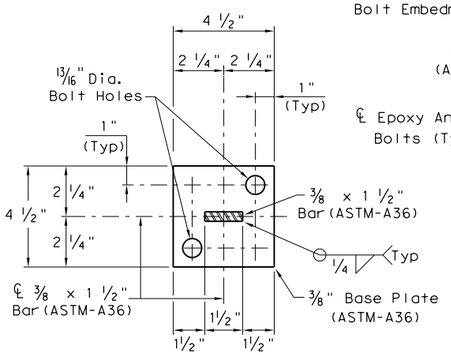
RAMP INTERSECTION



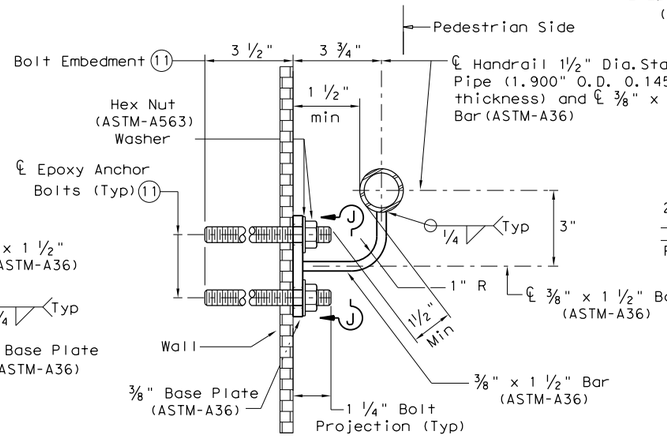
MULTI-LEVEL RAMP

SINGLE-LEVEL RAMP

PLAN SHOWING RAIL AT RAMP CONDITIONS

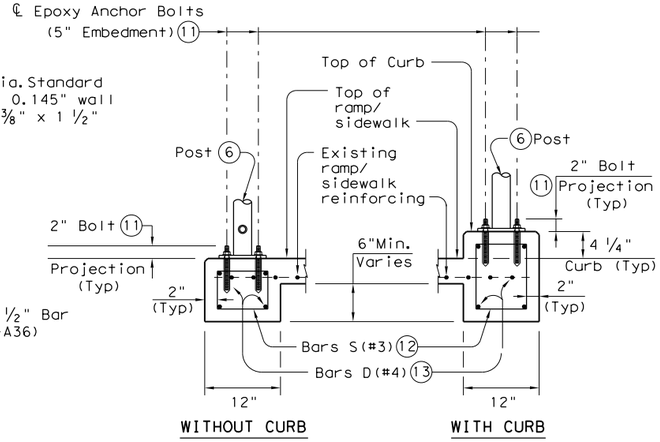


SECTION J-J
(Anchor Bolts not shown for clarity)



SECTION AT WALL MOUNT

TYPICAL WALL MOUNT DETAILS



SECTION AT RAIL POST FOUNDATIONS

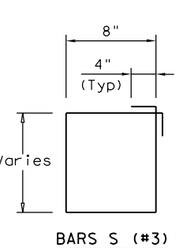
(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp/sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

(6) 2 ½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). Plumb all posts. See "Post Mount Detail" for crimping and trimming post to fit the diamenter of top rail. Provide holes as needed in post for galvanizing drainage and venting.

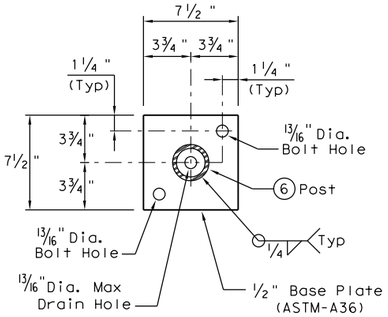
(11) See "General Notes" for anchor bolt information.

(12) Bars S(#3) spaced at 12" Max (Spaced 3" from outside edge of overall length of Ramp/Sidewalk).

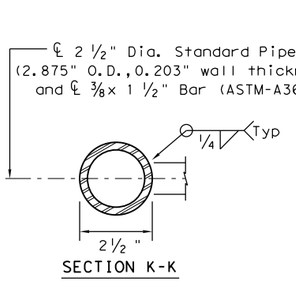
(13) Provide 1 ½" end cover to Bars D(#4) from outside edge of overall length of Ramp/Sidewalk.



BARS S (#3)

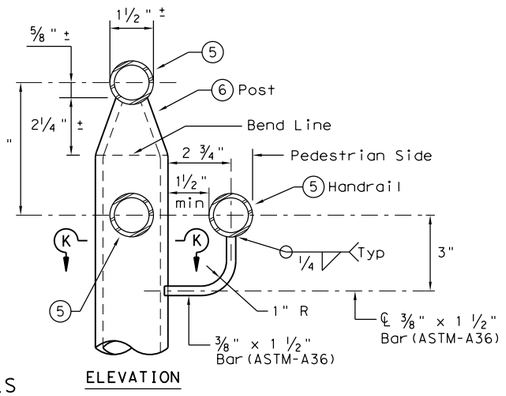


TYPICAL POST BASE PLATE DETAIL

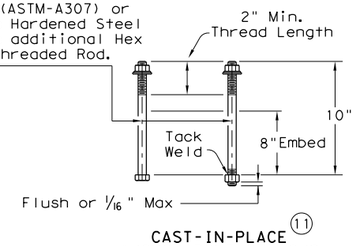


SECTION K-K

POST MOUNT DETAILS



ELEVATION



CAST-IN-PLACE ANCHOR BOLT OPTIONS
(Used for Post Base Plate only)

GENERAL NOTES

Designed according to ADAAG, Texas Accessibility Standards, Uniform Building Code, and AASHTO LRFD Specifications.

Handrail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Pipe will conform to ASTM-A53 Grade B or A500 Grade B. Steel plates and steel bars will conform to ASTM-A36. Mechanical tubing (MT) will conform to ASTM A513 Grade 1015 or higher. Galvanize all steel components except reinforcing steel unless noted otherwise.

Concrete for foundations will be in accordance with Item 531 "Sidewalks". All reinforcing steel must be Grade 60. Bar laps, where required, will be as follows: Uncoated ~ #4 = 1'-5" Epoxy coated ~ #4 = 2'-1"

When the plans require painted steel, follow the requirements for painting galvanized steel in Item 446, "Cleaning and Painting Steel". Sleeve Members will receive galvanization and only get field painted after installation unless directed otherwise by Engineer.

Epoxy Anchor bolts for wall mount and post base plate will be ⅝" Dia. ASTM A36 threaded rods with one hex nut and one hardened steel washer at each bolt. ⅝" Dia. threaded rod embedment depth for wall mounts is 3 ½" and embedment depth for post base plate is 5".

Embed threaded rods into concrete with a Type III (Class C) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Mix and dispense adhesive with the manufacturer's static mixing nozzle/dual cartridge system. Core drill holes (percussion drilling not permitted).

At the contractor's option the post base plate anchor bolts may be cast with the Ramp/Sidewalk (See Cast-in-Place Anchor Bolt Options).

Optional cast-in-place anchor bolts will be ⅝" Dia ASTM A307 Grade A bolts (or A36 threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Embedment depth of cast-in-place bolt will be 8" for post base plate.

Handrails and any wall or other surface adjacent to them will be free of any sharp or abrasive elements.

Submit shop drawings to the Engineer unless otherwise noted. For curved handrail applications, fabricate the handrail to the curve if radius is less than 600 ft. Shop drawings are required when rail is fabricated to the curve.

For all handrails, erection drawings will be submitted to the Engineer for approval to ensure proper installation.

Drawings will show handrail mount locations with bolts setting, spacing, ramp slope, and/or splice joint locations, and handrail lengths with identification showing where each handrail goes on the layout.

Payment for concrete sidewalks or curb ramps will be paid for in accordance with Item 531 "Sidewalks".

Payment for all items shown is to be included in unit price bid in accordance with Item 450 "Railing" of the type specified.

All exposed edges will be rounded or chamfered to approximately ⅛" by grinding.

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
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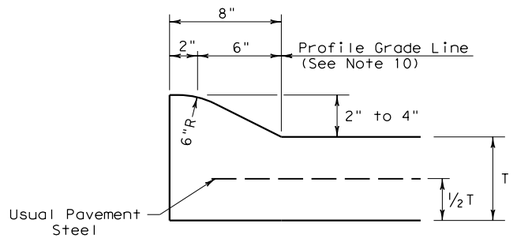
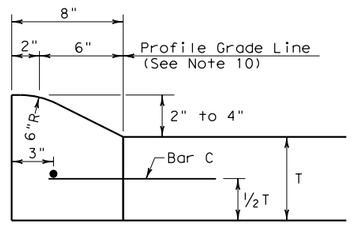
REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		92



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



TYPE I CURB
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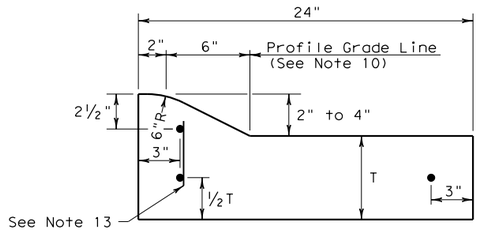
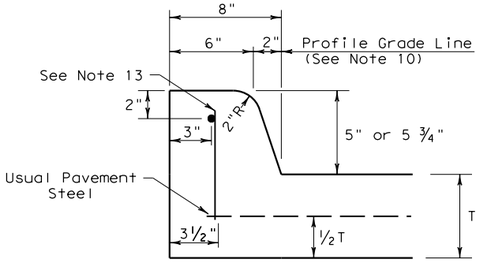
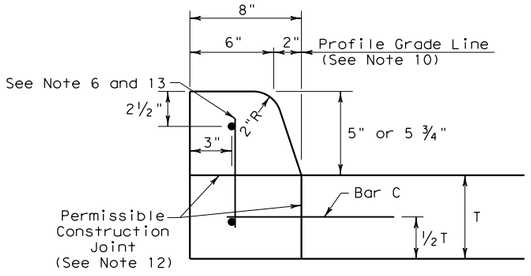


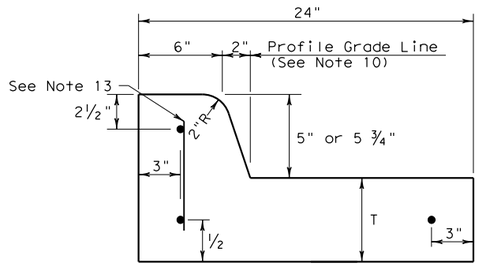
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



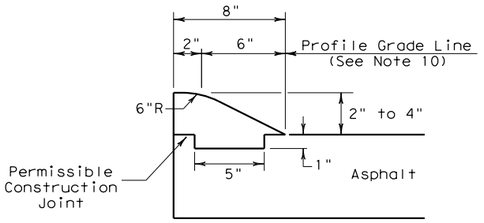
TYPE II CURB (MONOLITHIC)
5" - 5 ¾" HEIGHT



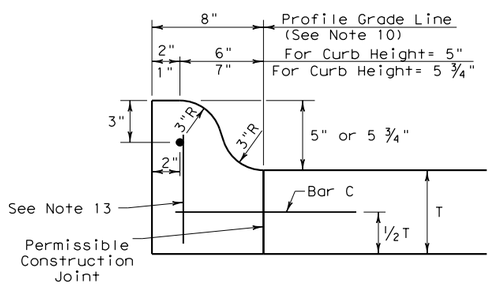
TYPE II CURB
5" - 5 ¾" HEIGHT



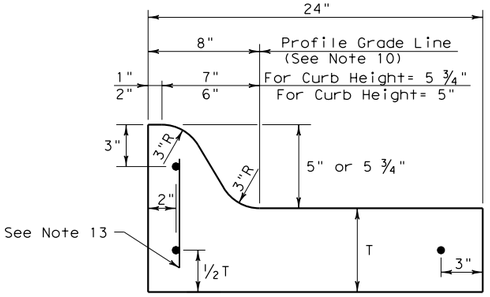
TYPE II CURB AND GUTTER
5" - 5 ¾" HEIGHT



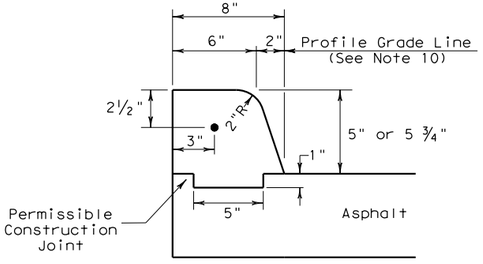
TYPE III CURB (KEYED)
2" - 4" HEIGHT



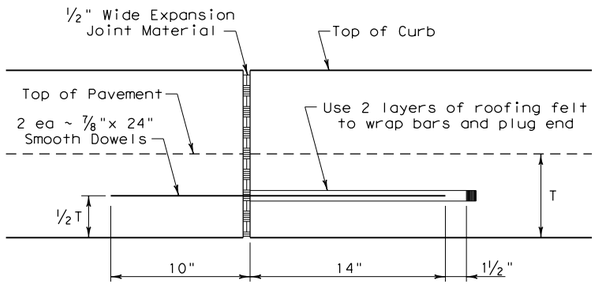
TYPE IIa CURB
5" - 5 ¾" HEIGHT



TYPE IIa CURB AND GUTTER
5" - 5 ¾" HEIGHT

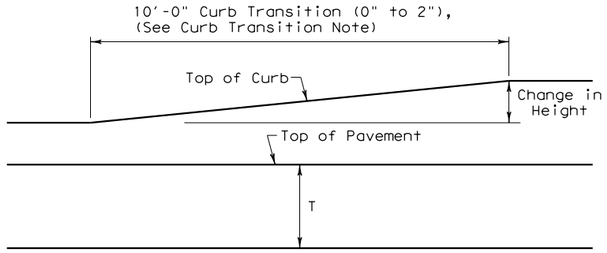


TYPE IV CURB (KEYED)
5" - 5 ¾" HEIGHT



EXPANSION JOINT DETAIL

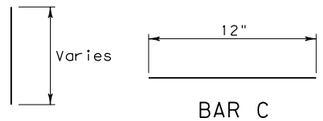
CURB TRANSITION NOTE:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

1. All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
2. Concrete shall be Class A.
3. 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."
4. Round exposed sharp edges with a rounding tool, to a minimum radius of ¼ inch.
5. All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
6. 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.
7. 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.
8. Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C~C.
9. Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
10. Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
11. One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
12. 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.
13. Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



BAR B

BAR C

Texas Department of Transportation

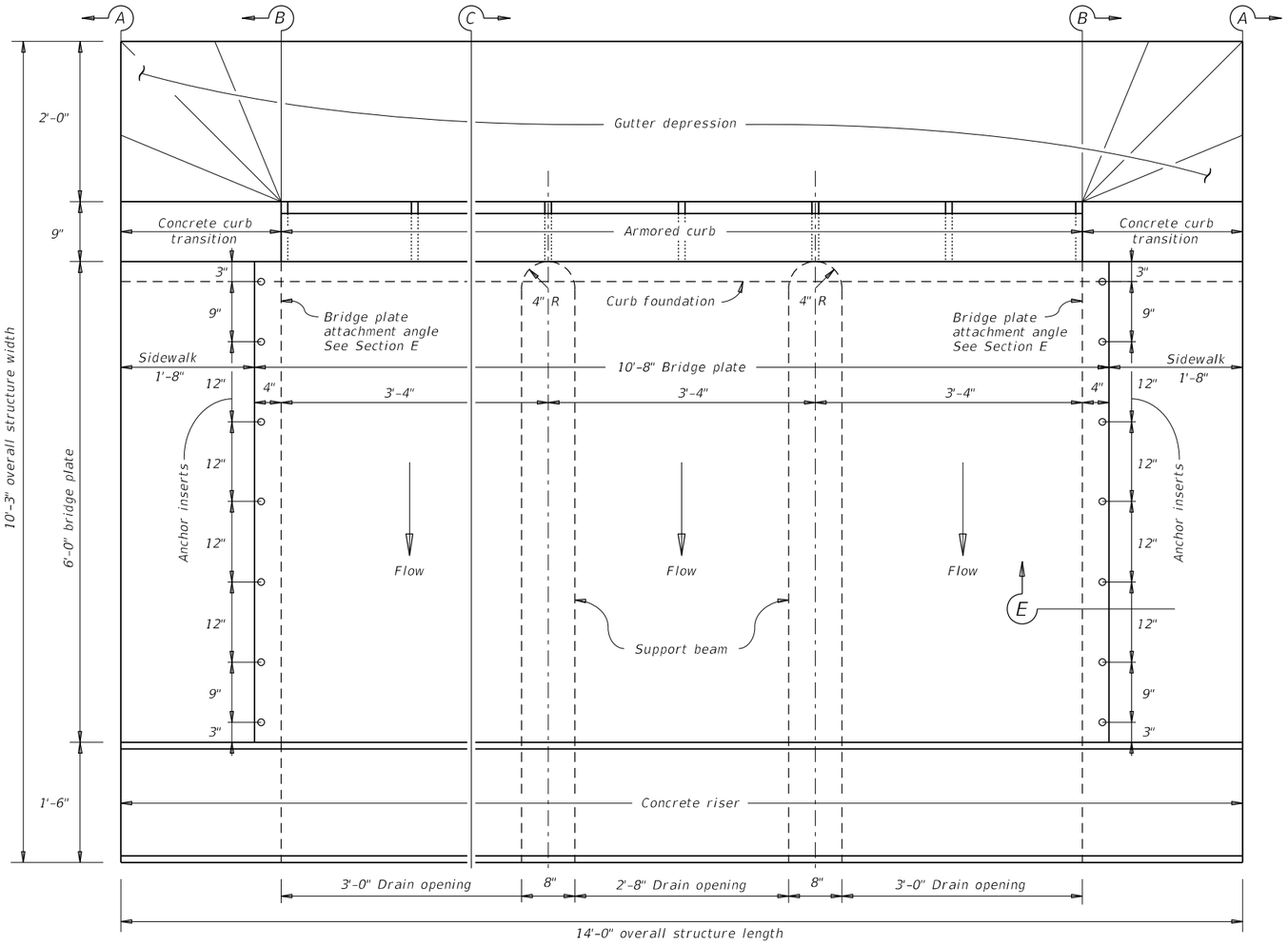
Design Division Standard

CONCRETE CURB AND CURB AND GUTTER

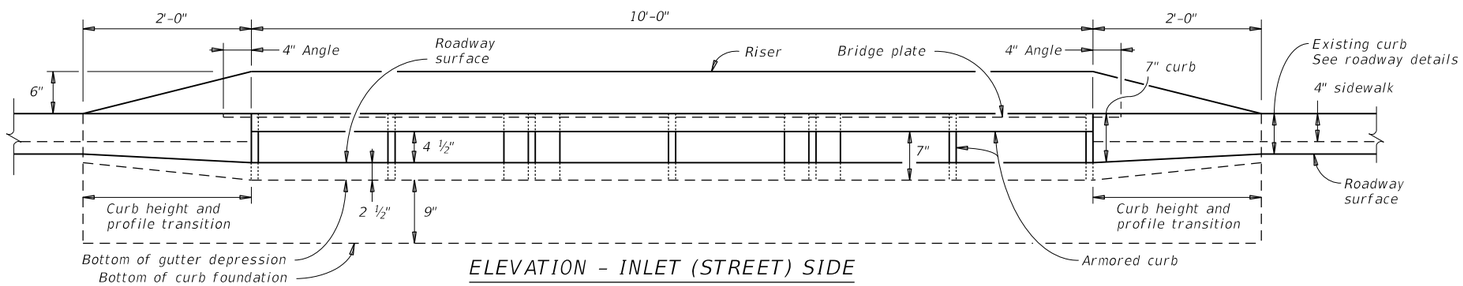
CCCG-22

FILE: cccg21.dgn	DN: TXDOT	CK: AN	DW: CS	CK: KM
© TxDOT: JUNE 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229, ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		93

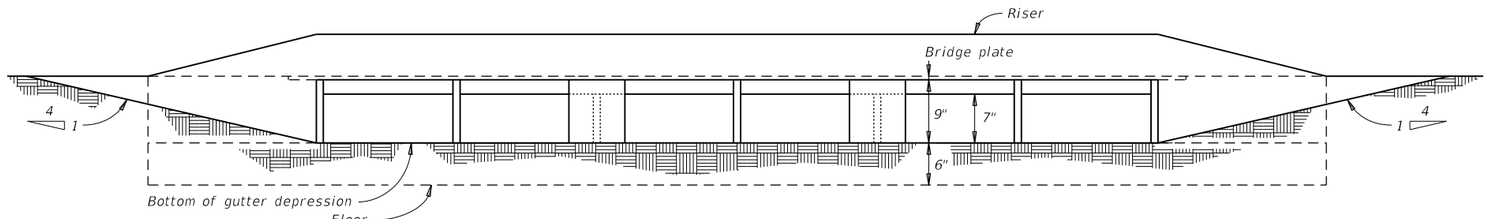
DATE: 4/26/2024
FILE: c:\pw\khl\d0273596\cccg22.dgn



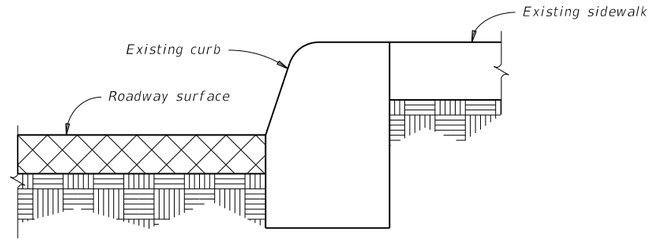
PLAN



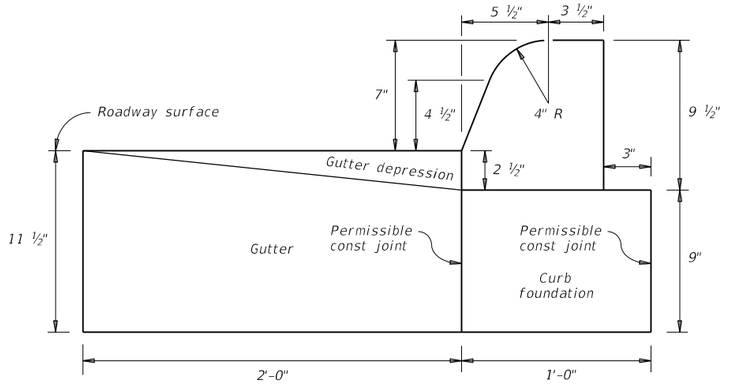
ELEVATION – INLET (STREET) SIDE



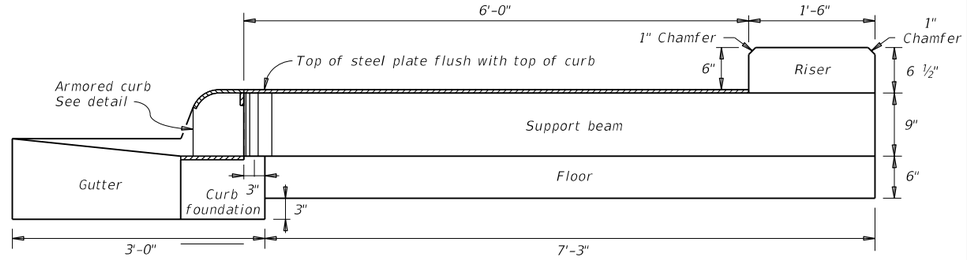
ELEVATION – OUTLET (BACK) SIDE



SECTION A



SECTION B DIMENSIONS



SECTION C DIMENSIONS

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions are out-to-out of bar.

Contractor is responsible for verifying all dimensions and quantities in the field before beginning work.

SHEET 1 OF 3

Texas Department of Transportation
San Antonio District (Structural Design)

SIDEWALK BRIDGE

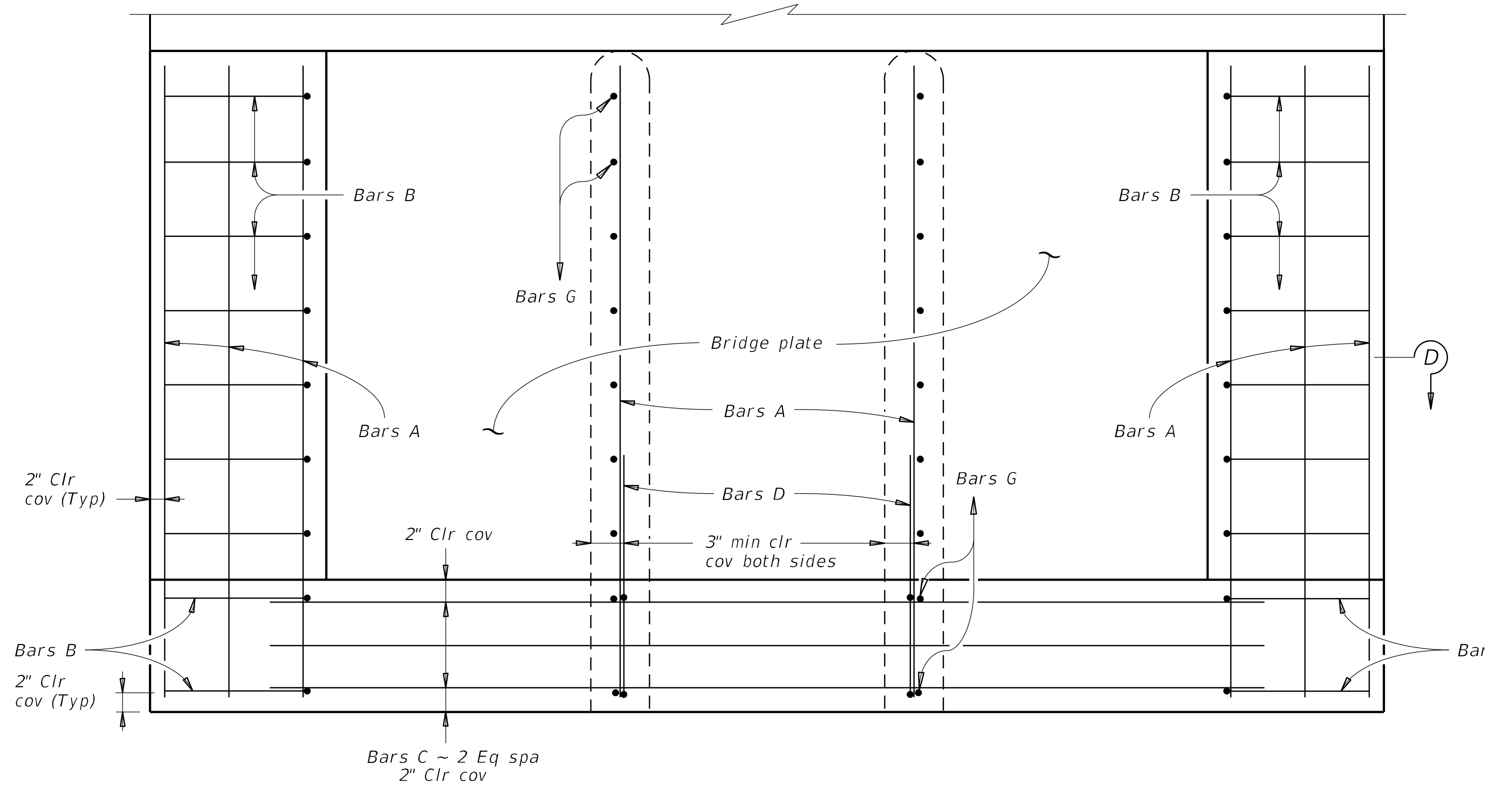
SAN ANTONIO DISTRICT STANDARD

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

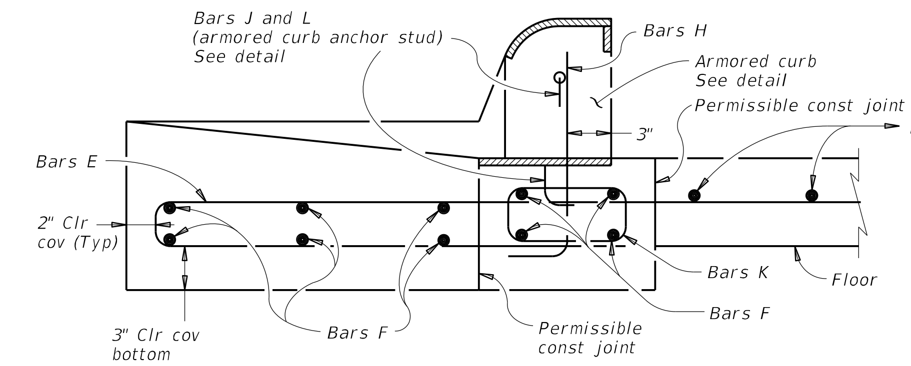
DN: BCL	CK:	FILENAME: SA District Sidewalk Bridge.dgn		
DW: SRF	CK:	ORIGINAL DRAWING DATE: January 2020		
DIST	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		COUNTY
SJT		F 2B24(130)		TOM GREEN, COKE
CONTROL	SECTION	JOB	SHEET NO.	ROUTE
0907	00	229	94	RM 584, ETC

REVISIONS:



PLAN - TOP REINFORCEMENT

TABLE OF ESTIMATED QUANTITIES For Contractor information only.				
Bar	No.	Size	Length	Weight
A	10	#4	7'-2"	48
B	18	#4	4'-3"	52
C	3	#4	11'-4"	23
D	2	#4	5'-6"	8
E	19	#4	12'-10"	163
F	14	#4	13'-8"	128
G	18	#4	1'-6"	18
H	6	#4	1'-10"	8
I	6	#4	0'-8"	3
J	2	#4	0'-9"	1
K	19	#3	2'-6"	18
L	6	#4	0'-5"	2
Struct. steel (Misc. non bridge)			Lb	2100
Reinforcing Steel			Lb	472
Class "C" Concrete			CY	4.9



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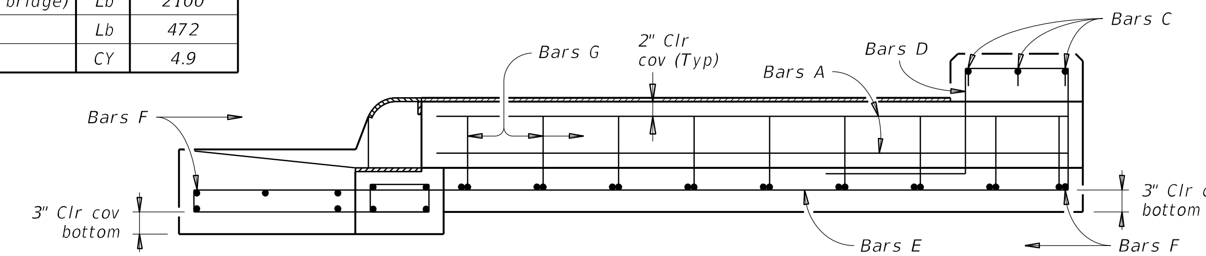
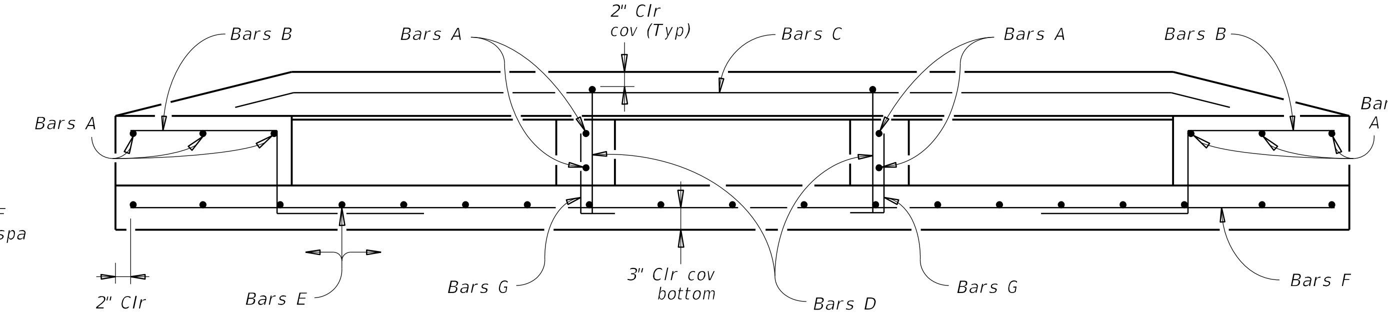


SECTION C REINFORCEMENT



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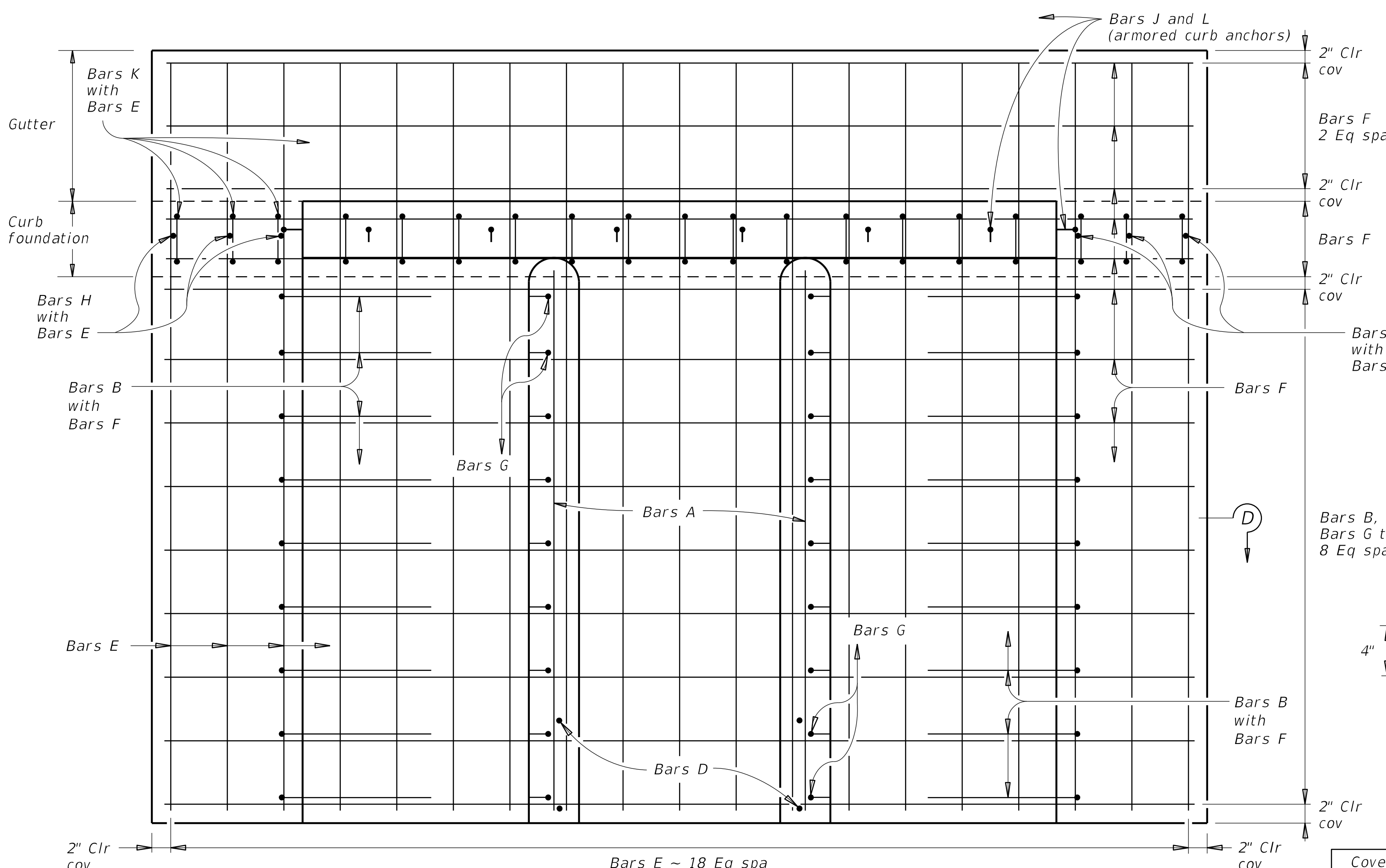
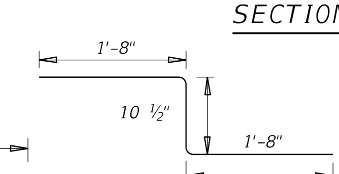
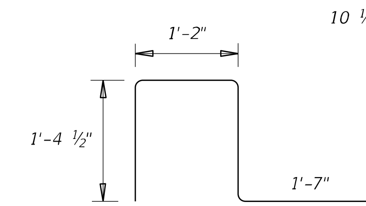


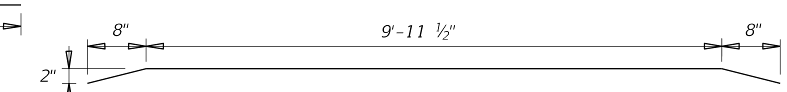
PLAN - BOTTOM REINFORCEMENT



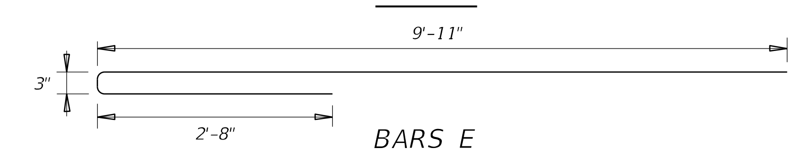
BARS B



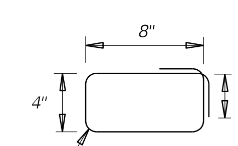
BARS D



BARS C

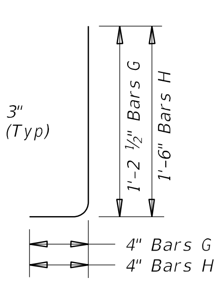


BARS E



BARS K

1" Dia. bending pin typ all bars



BARS G AND H

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions are out-to-out of bar.

Contractor is responsible for verifying all dimensions and quantities in the field before beginning work.

[illegible]
4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

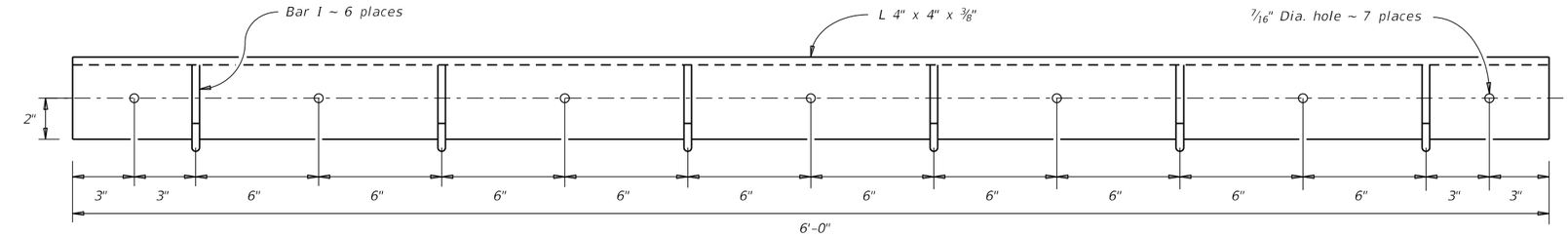
SHEET 2 OF 3

Texas Department of Transportation
San Antonio District (Structural Design)
Prepared by and for the use of TxDOT

SIDEWALK BRIDGE

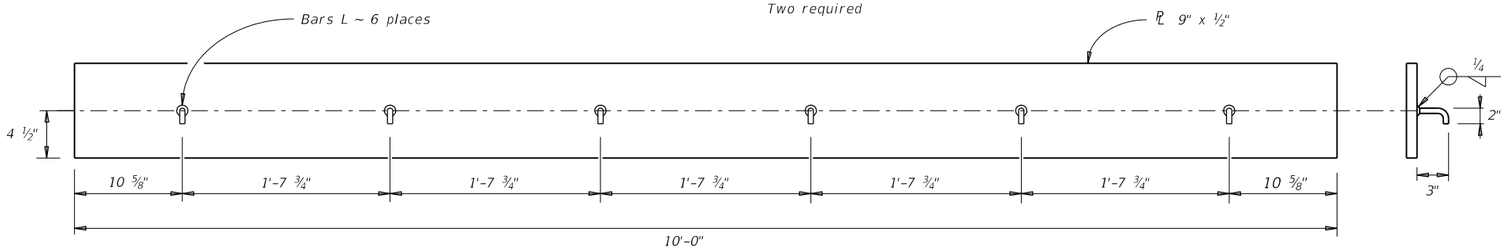
SAN ANTONIO DISTRICT STANDARD

DN: BCL	CK:	FILENAME: SA District Sidewalk Bridge.dgn		
DW: SRF	CK:	ORIGINAL DRAWING DATE: January 2020		
DIST	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		COUNTY
SJT		F 2B24(130)		TOM GREEN, COKE
CONTROL	SECTION	JOB	SHEET NO.	ROUTE
0907	00	229	95	RM 584, ETC
REVISIONS:				

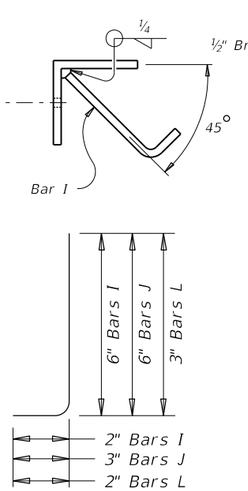


BRIDGE PLATE ATTACHMENT ANGLE

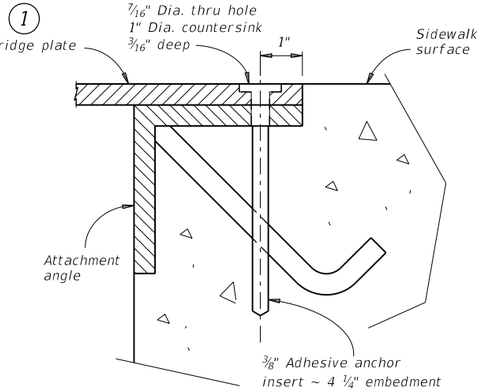
Two required



FLOOR PLATE



BARS I, J, AND L



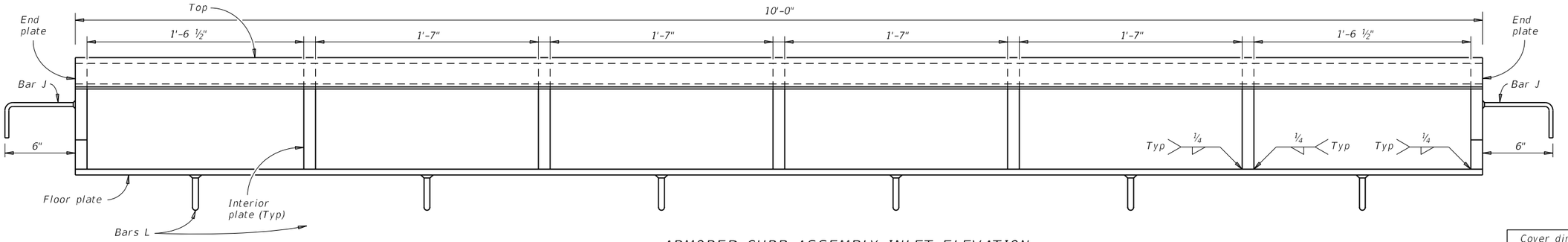
SECTION E

APPROVED SLIP RESISTANT PLATE	
Product	Manufacturer Website
Algrip™, Steel	www.algrip.com
Mebac® #3, Steel	www.harscoikg.com
SlipNOT® Grade 2, Steel	www.slipnot.com

(1) Provide cover plates fabricated with a product from this list. No exceptions are permitted.

GENERAL NOTES:

Provide Class A concrete (f'c = 3000 psi).
Provide Grade 60 reinforcing steel.
Structural steel components must be Grade A36.
All exposed edges of the armored curb must receive a ⅛" bevel.
All structural steel components must be galvanized after fabrication in accordance with Item 445, "Galvanizing".
Galvanizing damaged during transport or construction must be repaired in accordance with the Specification.
The bridge plate must be hot-dip galvanized slip resistant steel (see table). Checker or diamond plate is not allowed, nor are slip resistant tapes, films, or non-metallic coatings.
Adhesive anchor system must be HIT HY 150 H.I.S. internally threaded inserts as furnished by Hilti, Inc., Tulsa, OK, or approved equivalent.
Sidewalk bridge, including all labor, armored curb, bridge plate, and other material complete and in place must be paid for under Item 465, "Inlet (Comp) (Ty Sidewalk Bridge)" by location.
Shop drawings will not require the Engineer's approval if fabrication is in accordance with the details shown.



ARMORED CURB ASSEMBLY INLET ELEVATION

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions are out-to-out of bar.

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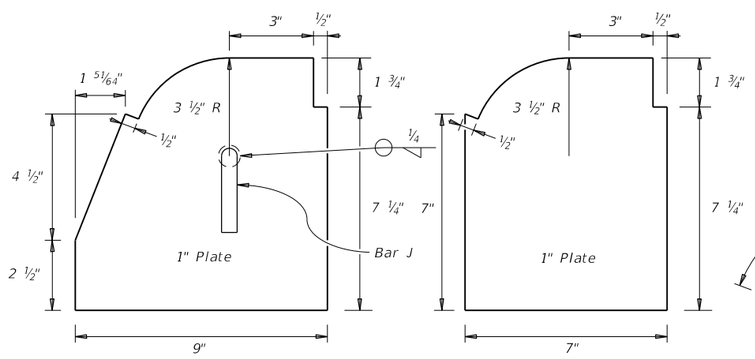
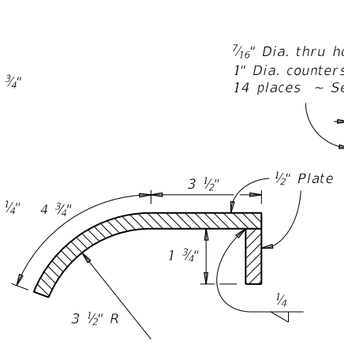


END PLATE

Two required

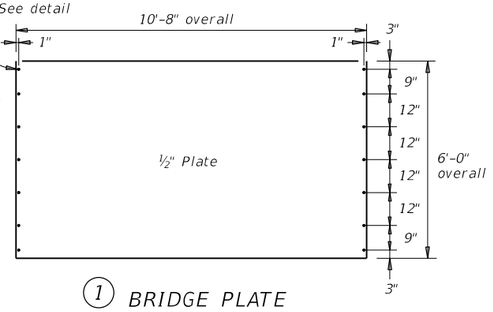
INTERIOR PLATE

Five required



TOP (SECTION)

10'-0" length



(1) BRIDGE PLATE

Hole location dimensions to center of hole

4/26/2024

SHEET 3 OF 3

Texas Department of Transportation
San Antonio District (Structural Design)
Prepared by and for the use of TxDOT

SIDEWALK BRIDGE

SAN ANTONIO DISTRICT STANDARD

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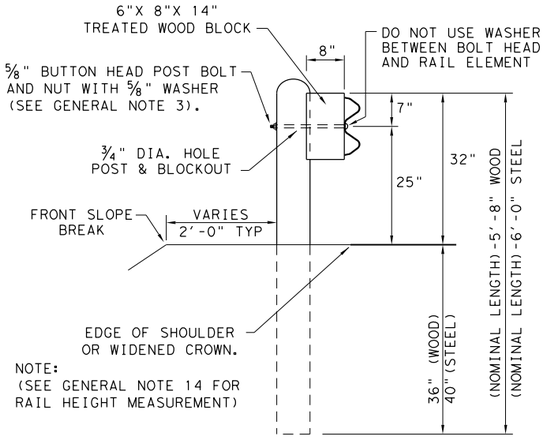
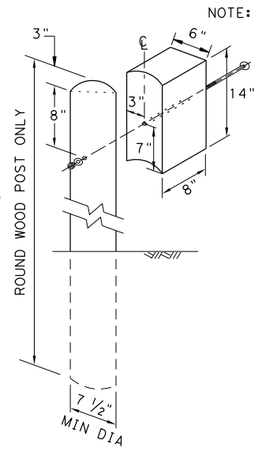
REVISIONS:



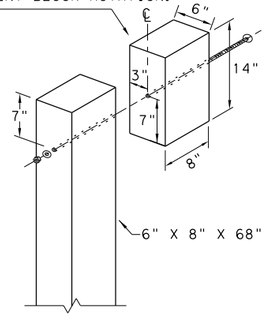
NOTE:
(SEE GENERAL NOTE 14 FOR
RAIL HEIGHT MEASUREMENT)

TYPICAL POST PLACEMENT

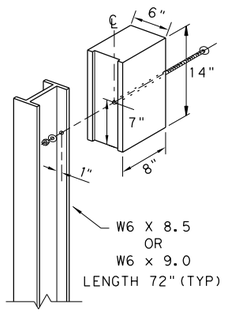


WOOD BLOCK TO
ROUND WOOD POST

NOTE: TOENAIL WITH ONE 16D GALV. NAIL
TO PREVENT BLOCK ROTATION.

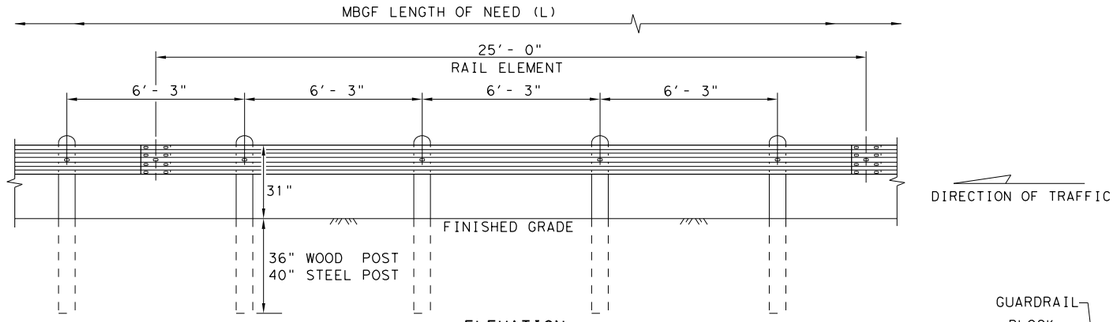


WOOD BLOCK TO
RECTANGULAR WOOD POST



ROUTED WOOD BLOCK
TO I-BEAM STEEL POST

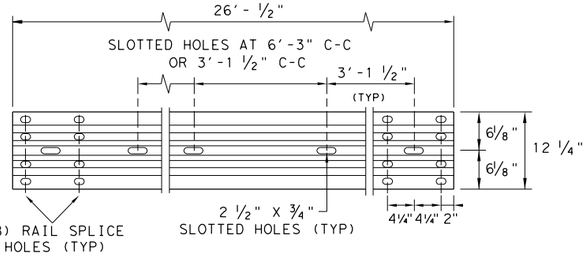
NOTE: ✳✳ "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



DIRECTION OF TRAFFIC

ELEVATION
MID-SPAN RAIL SPLICE

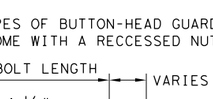
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

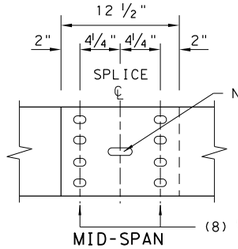
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

NOTE:
FOUR TYPES OF BUTTON-HEAD GUARD RAIL
BOLTS COME WITH A RECCESSED NUT.



BUTTON HEAD BOLT

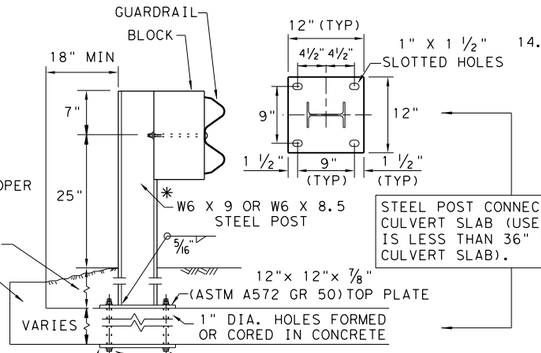
NOTE: SEE GENERAL NOTE 3 FOR
SPLICE & POST BOLT DETAILS.



DIRECTION OF TRAFFIC

MID-SPAN
RAIL SPLICE DETAIL

NOTE: GF(31), MID-SPAN RAIL SPLICES ARE
REQUIRED WITH 6'-3" POST SPACINGS.



✳ POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.

STEEL POST CONNECTION TO CULVERT SLAB (USE WHEN THERE IS LESS THAN 36" COVER OVER CULVERT SLAB).

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. ⅞" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
   NOTE: BOLT LENGTH = SLAB PLUS 2 ¼" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE ⅞" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS ¼" MIN. BEYOND NUT.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.

NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

GENERAL NOTES

1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'- 0", OR 12'- 6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 ½" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210,"COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
13. FOR THE LOW FILL CULVERT OPTION, POSTS LOCATED PARTIALLY OR WHOLLY BETWEEN PRECAST BOX CULVERT UNITS, THE USE OF A CAST-IN-PLACE CONCRETE CLOSURE BETWEEN BOXES IS REQUIRED. THE LENGTH OF THE CAST-IN-PLACE CONCRETE CLOSURE SHALL ACCOMMODATE THE PLACEMENT OF THE LOW FILL CULVERT OPTION. SEE CONCRETE CLOSURE DETAILS ON BRIDGE STANDARD SCP-MD.
14. GUARDRAIL HEIGHT MEASUREMENT: WHEN THE GUARDRAIL IS LOCATED ABOVE PAVEMENT, MEASURE THE HEIGHT FROM THE PAVEMENT TO THE TOP OF THE W-BEAM RAIL. WHEN THE GUARDRAIL IS LOCATED UP TO 2 FT. OFF OF THE EDGE OF PAVEMENT OR FOR A PAVEMENT OVERLAY, USE A 10-FOOT STRAIGHTEDGE TO EXTEND THE PAVEMENT/SHOULDER SLOPE TO THE BACK OF RAIL, MEASURE FROM THE BOTTOM OF STRAIGHTEDGE TO THE TOP OF RAIL. FOR GUARDRAIL LOCATED DOWN A 10:1 SLOPE, MEASURE FROM THE NOMINAL TERRAIN.

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
TL-3 MASH COMPLIANT
GF(31)-19

FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
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	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		97

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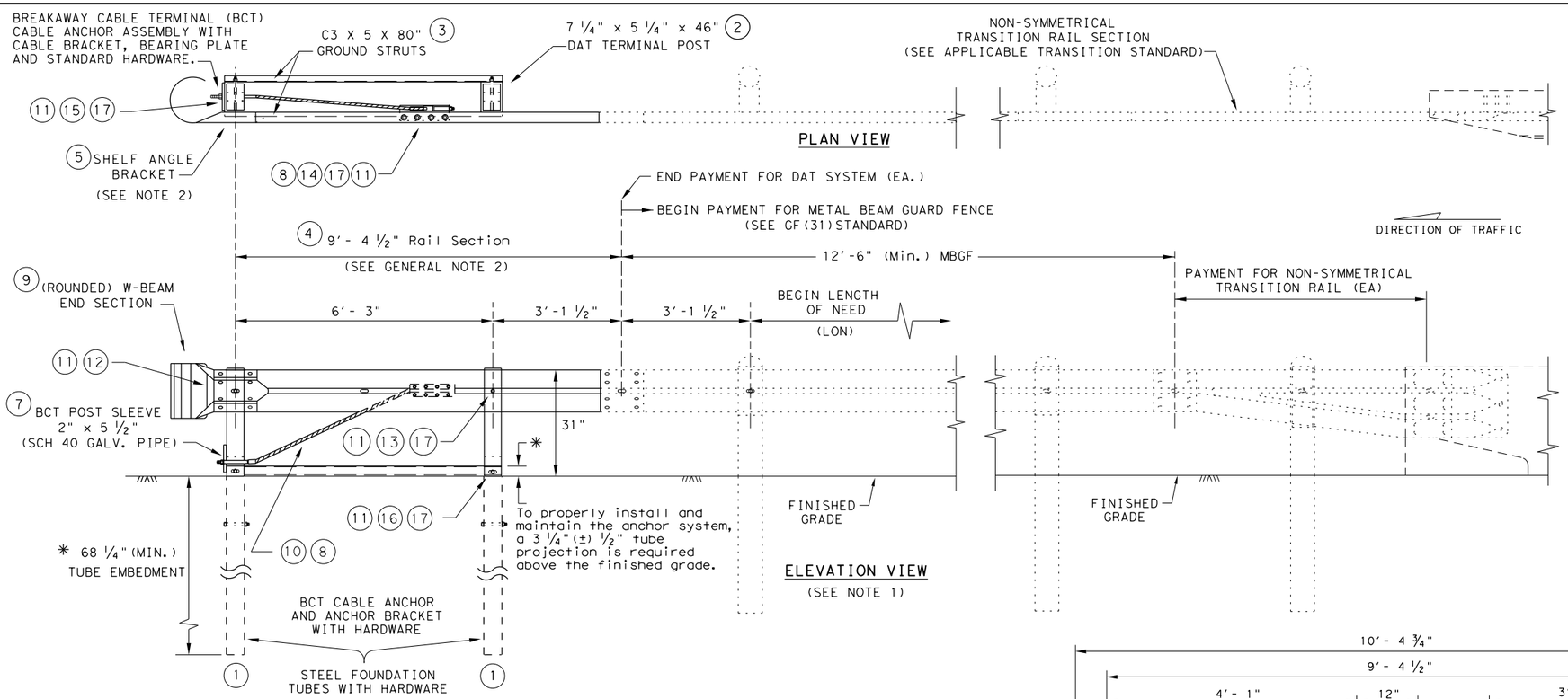


DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

GENERAL NOTES

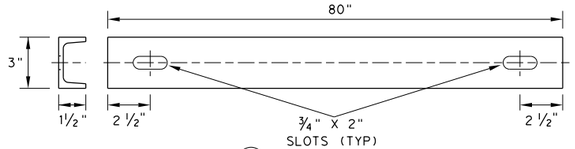
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
5. REFER TO GF(31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION

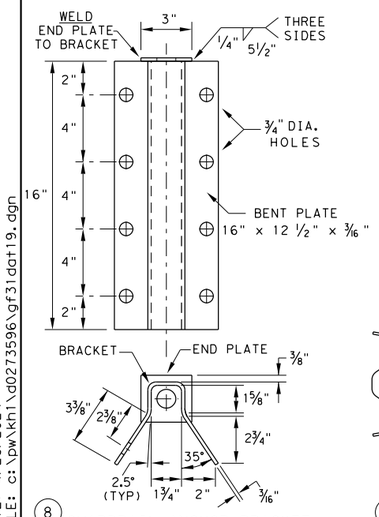
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

#	(DAT) PARTS LIST	QTY
(1)	STEEL FOUNDATION TUBE	2
(2)	DAT TERMINAL POST	2
(3)	CHANNEL STRUT	2
(4)	TERMINAL RAIL ELEMENT	1
(5)	SHELF ANGLE BRACKET	1
(6)	BCT BEARING PLATE	1
(7)	BCT POST SLEEVE	1
(8)	GUARDRAIL ANCHOR BRACKET	1
(9)	(ROUNDED) W-BEAM END SECTION	1
(10)	BCT CABLE ANCHOR	1
(11)	RECESSED NUT, GUARDRAIL	20
(12)	1 1/4" BUTTON HEAD BOLT	4
(13)	10" BUTTON HEAD BOLT	2
(14)	5/8" X 2" HEX HEAD BOLT	8
(15)	5/8" X 8" HEX HEAD BOLT	4
(16)	5/8" X 10" HEX HEAD BOLT	2
(17)	5/8" FLAT WASHER	18

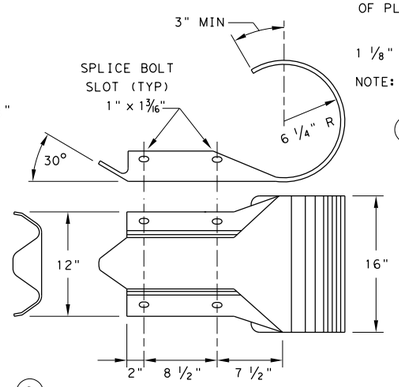
(4) TERMINAL RAIL ELEMENT FOR DAT



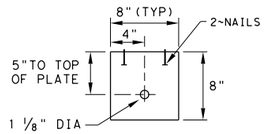
(3) CHANNEL STRUT
C3 X 5 X 80", GRADE A36



(8) GUARDRAIL ANCHOR BRACKET

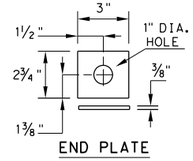


(9) W-BEAM END SECTION (ROUNDED) (12 GA.)

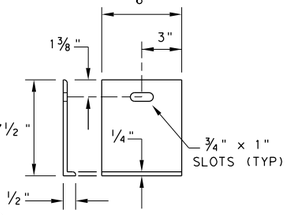


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

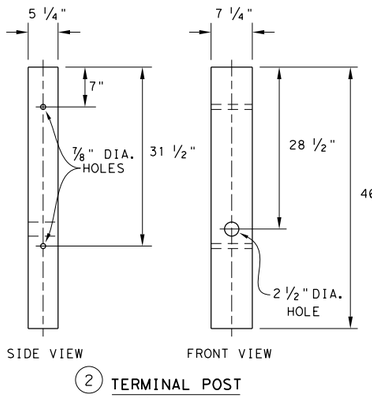
(6) BEARING PLATE
8"x 8"x 5/8" ℞



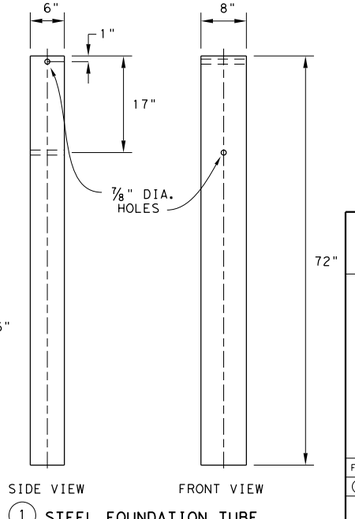
END PLATE



(5) SHELF ANGLE BRACKET



(2) TERMINAL POST
7 1/4"x 5 1/4"x 46" WOOD POST



(1) STEEL FOUNDATION TUBE
6"x 8"x 1/8" x 72" STEEL TUBE

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

GF(31)DAT-19

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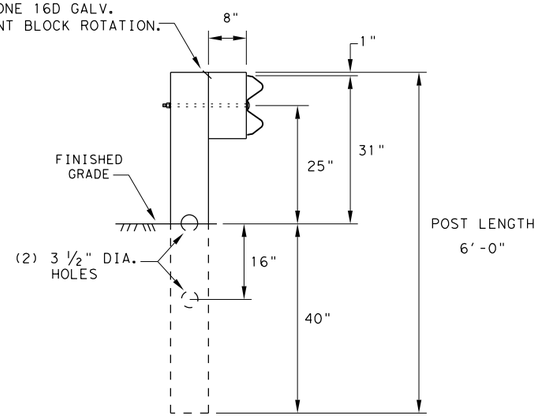
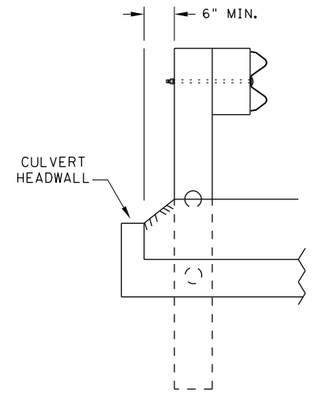
	SJT	TOM GREEN		98



RECTANGULAR CRT POST
(6"X 8" X 6' LONG)

(6) CRT REQUIRED
SEE ELEVATION DETAIL FOR LOCATIONS



LATERAL OFFSET BETWEEN THE GUARDRAIL AND THE CULVERT HEADWALL

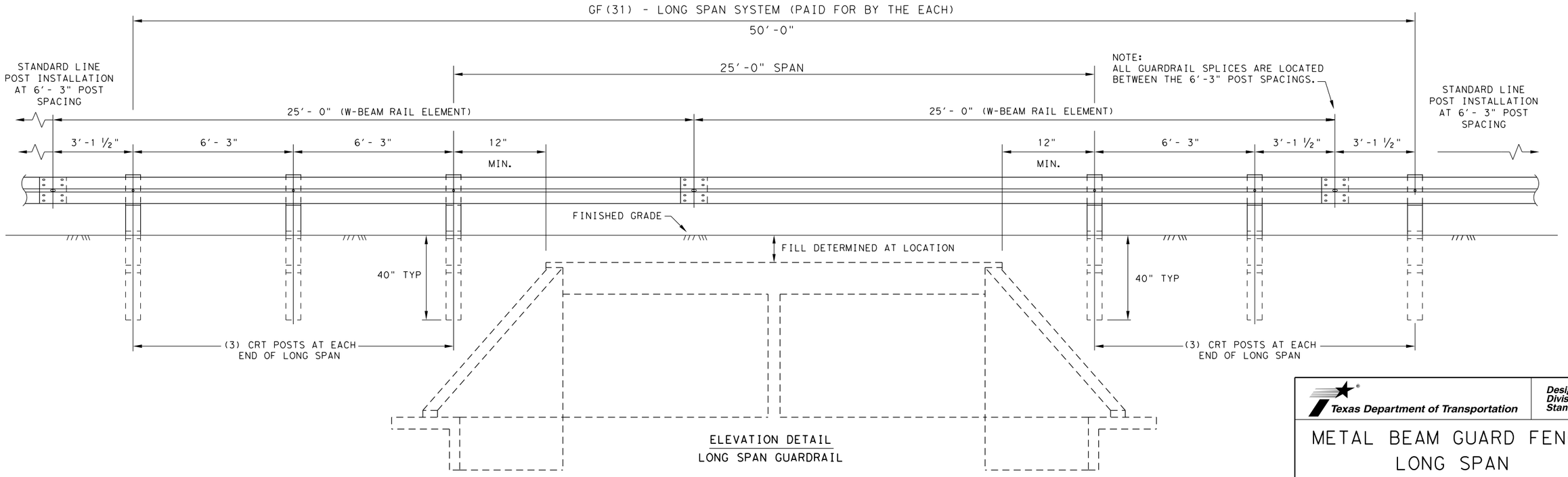
GENERAL NOTES

1. THE TYPE OF LINE POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF THE TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENT SHALL MEET ALL REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 12'- 6" OR 25'- 0" NOMINAL LENGTHS.
3. RAIL POST HOLES ARE OFFSET 3'- 1 ½" FROM STANDARD GUARDRAIL TO ACCOMMODATE THE MIDSPAN SPLICING.
4. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND ⅝" WASHER (FWC16a) AND NO MORE THAN 1" BEYOND IT.
5. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
7. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
8. REFER TO GF(31) STANDARD SHEET FOR ADDITIONAL DETAILS.
9. FLAME CUTTING OF HOLES IN GUARDRAIL SHALL NOT BE PERMITTED. IF YOU ENCOUNTER MIS-ALIGNED BOLT HOLES IN GUARDRAIL CONTACT THE DESIGN DIVISION FOR ADDITIONAL INFORMATION & OPTIONS.

DIRECTION OF TRAFFIC

NOTE: SEE GF(31) STANDARD FOR STANDARD LINE POSTS.

GF(31) - LONG SPAN SYSTEM (PAID FOR BY THE EACH)



ELEVATION DETAIL
LONG SPAN GUARDRAIL

Texas Department of Transportation

Design Division Standard

METAL BEAM GUARD FENCE
LONG SPAN
TL-3 MASH COMPLIANT

GF(31)LS-19

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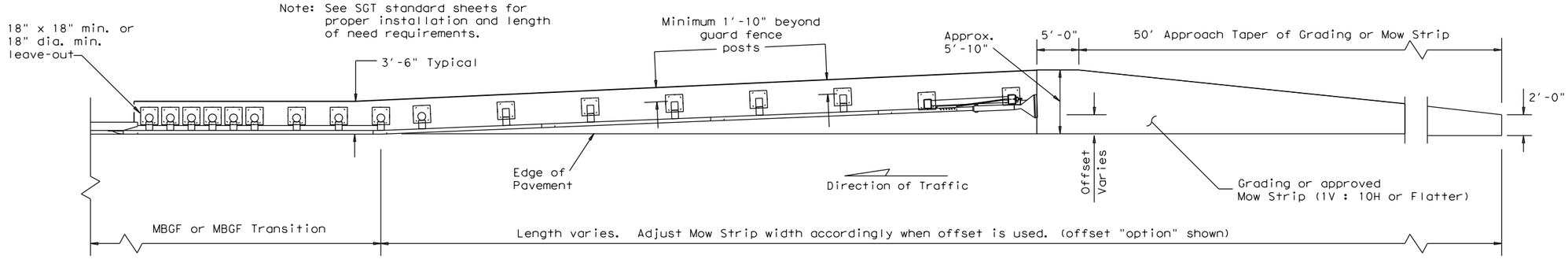
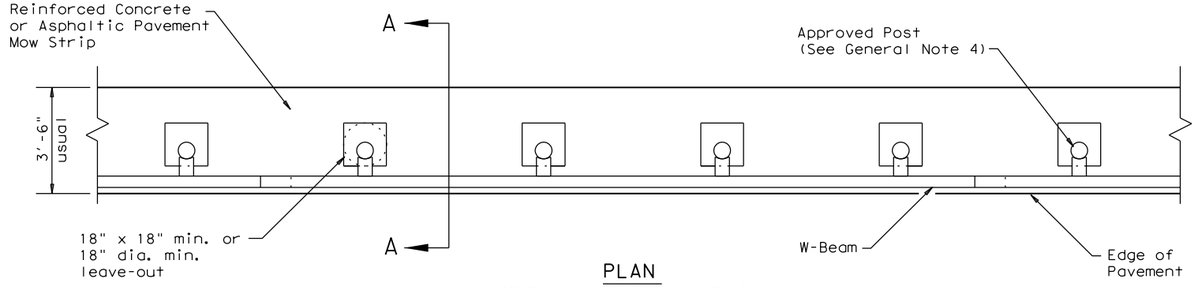
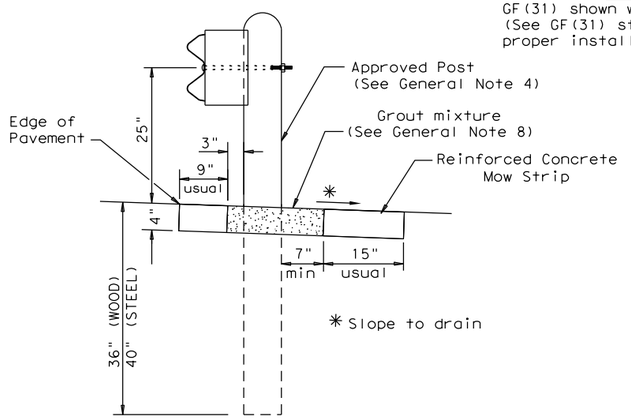


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



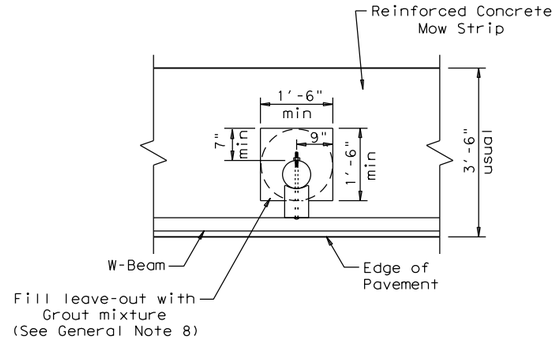
PLAN

GF(31) shown with Mow Strip
(See GF(31) standard sheet for proper installation)



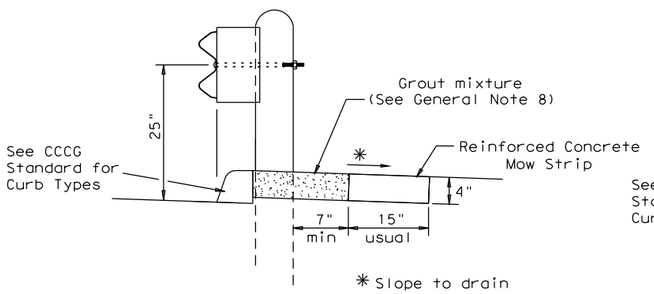
SECTION A-A

Typical



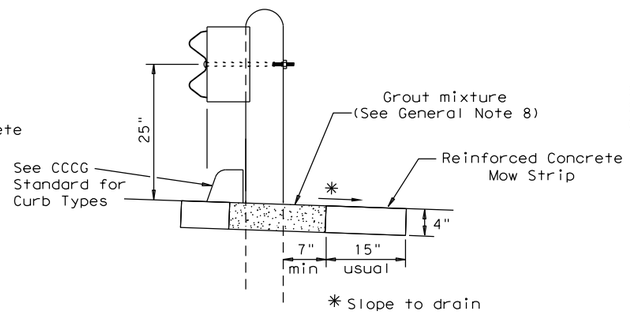
MOW STRIP DETAIL

Reinforced Concrete Mow Strip
with 18" x 18" Square or
18" Dia. minimum leave-out.



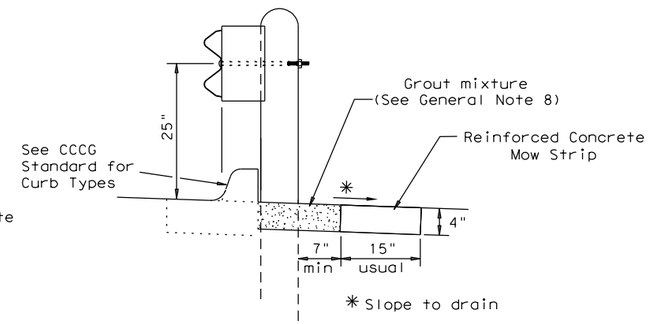
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.

Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.

GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
3. The leave-out behind the post shall be a minimum of 7".
4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 ½" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
6. Thickness of the mow strip will be 4".
7. The limits of payment for reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.

Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE (MOW STRIP) TL-3 MASH COMPLIANT

GF(31)MS-19

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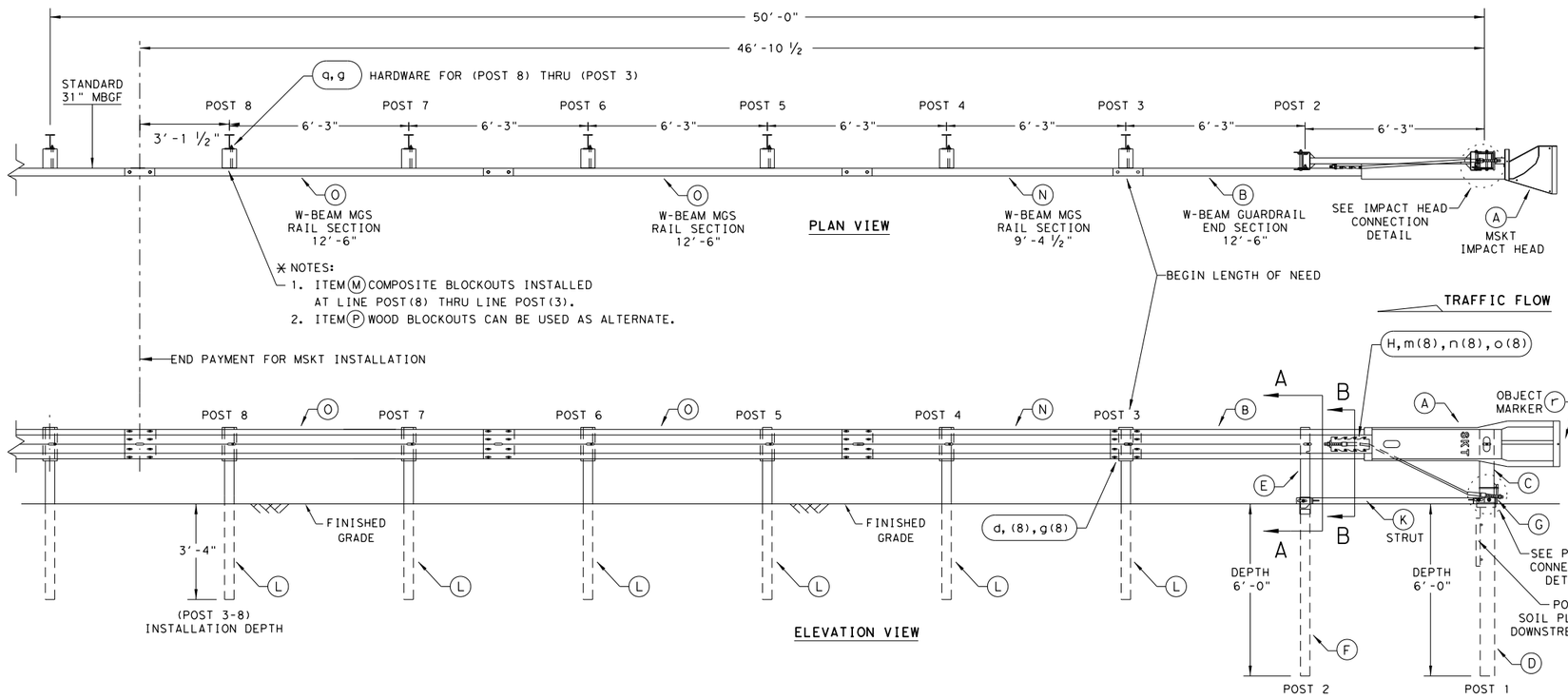


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

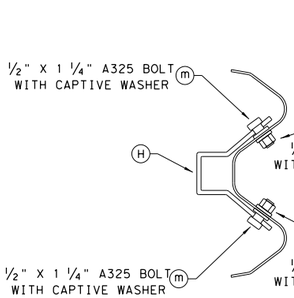
GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: ROAD SYSTEMS, INC. (432)263-2435. 3616 OLD HOWARD COUNTY AIRPORT, BIG SPRING, TX 79720
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE; MSKT END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL (PUBLICATION~062717).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POSTS WITH COMPOSITE BLOCKOUTS.
7. A COMPOSITE MATERIAL BLOCKOUTS THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
8. IF SOLID ROCK IS ENCOUNTERED IN THE AREA OF (POST 1) AND / OR (POST 2) CONTACT THE MANUFACTURER, & REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
9. POSTS SHALL NOT BE SET IN CONCRETE.
10. SYSTEM MUST BE ATTACHED TO STANDARD 31" MBGF.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE MSKT SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.
13. THE SYSTEM IS SHOWN WITH TWO 12'-6" MBGF PANELS, ONE 25'-0" MBGF PANEL IS ALSO ALLOWED IN THEIR PLACE.
14. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POSTS 3-8 TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST. SPECIAL DRIVING CAP TO BE USED ON LOWER POSTS 1 & 2 TO PREVENT DAMAGE TO THE WELDED PLATES.

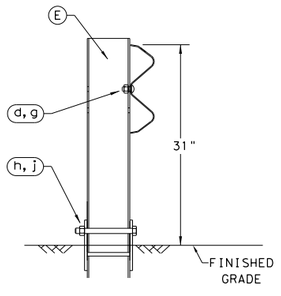
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	5/8" x 1" HEX BOLT (GRD 5)	B5160104A
b	4	5/8" WASHER	W0516
c	2	5/8" HEX NUT	N0516
d	25	5/8" Dia. x 1 1/4" SPLICE BOLT (POST 2)	B580122
e	2	5/8" Dia. x 9" HEX BOLT (GRD A449)	B580904A
f	3	5/8" WASHER	W050
g	33	5/8" Dia. H.G.R NUT	N050
h	1	3/4" Dia. x 8 1/2" HEX BOLT (GRD A449)	B340854A
j	1	3/4" Dia. HEX NUT	N030
k	2	1 ANCHOR CABLE HEX NUT	N100
l	2	1 ANCHOR CABLE WASHER	W100
m	8	1/2" x 1 1/4" A325 BOLT WITH CAPTIVE WASHER	SB12A
n	8	1/2" STRUCTURAL NUTS	N012A
o	8	1 1/16" O.D. x 3/16" I.D. STRUCTURAL WASHERS	W012A
p	1	BEARING PLATE RETAINER TIE	CT-100ST
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: ✳

ALTERNATIVE ITEMS NOT SHOWN. ✳✳
✳ ITEM(P) 8" WOOD-BLOCKOUT
✳✳ ITEM(Q) 25'GUARD FENCE PANEL



SECTION B-B
ANCHOR BRACKET



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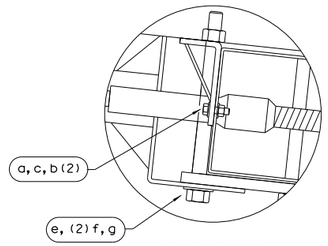
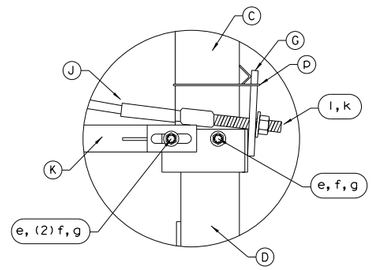
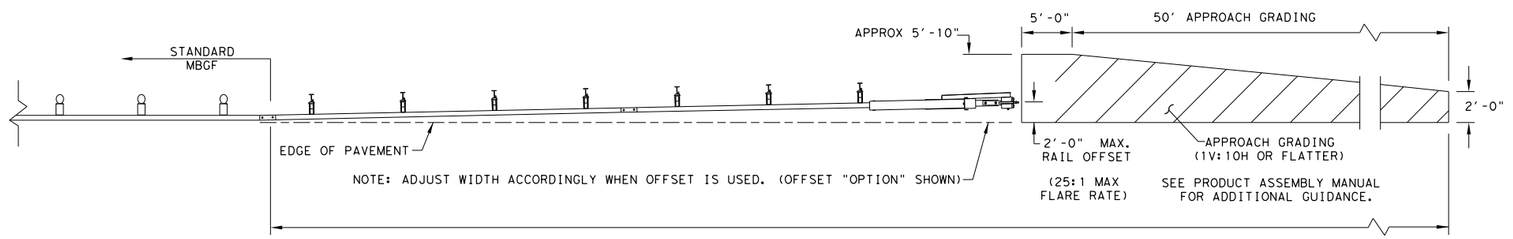
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

NOTE: TXDOT GENERIC APPROACH GRADING LAYOUT USED FOR ALL TANGENT TYPE END TREATMENTS.

NOTE: THIS STANDARD IS A BASIC REPRESENTATION OF THE MSKT END TERMINAL, IT IS NOT INTENDED TO REPLACE THE PRODUCT DESCRIPTION ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP		CK:CL
© TxDOT: APRIL 2018	CONT	SECT	JOB		HIGHWAY
REVISIONS	0907	00	229,ETC		RM 584
	DIST	COUNTY			SHEET NO.
	SJT	TOM GREEN			101

HORIZONTAL ALIGNMENT REPORT

Alignment name: BL WALL 1
Alignment description:
Report Created: Wednesday, May 24, 2023
Time: 8:05:04 AM

	STATION		X	Y
POT	5+00.000	R1	2249922.222	10474821.979
PI	5+04.101	R1	2249919.561	10474825.099

Tangential Direction: N40?27'25.277"W
Tangential Length: 4.101

PI	5+04.101	R1	2249919.561	10474825.099
PI	5+27.527	R1	2249901.736	10474809.898

Tangential Direction: S49?32'34.722"W
Tangential Length: 23.426

PI	5+27.527	R1	2249901.736	10474809.898
PI	5+63.677	R1	2249870.562	10474791.596

Tangential Direction: S59?34'58.431"W
Tangential Length: 36.150

PI	5+63.677	R1	2249870.562	10474791.596
PI	5+70.551	R1	2249865.332	10474787.136

Tangential Direction: S49°32'34.722"W
Tangential Length: 6.874

PI	5+70.551	R1	2249865.332	10474787.136
POT	5+82.051	R1	2249872.794	10474778.385

Tangential Direction: S40°27'25.278"E
Tangential Length: 11.500

HORIZONTAL ALIGNMENT REPORT

Alignment name: BL WALL 2
Alignment description:
Report Created: Wednesday, May 24, 2023
Time: 8:10:30 AM

	STATION		X	Y
POT	6+00.000	R1	2249789.095	10474707.009
PI	6+11.500	R1	2249781.633	10474715.759

Tangential Direction: N40°27'25.278"W
Tangential Length: 11.500

PI	6+11.500	R1	2249781.633	10474715.759
PI	6+23.629	R1	2249772.405	10474707.889

Tangential Direction: S49°32'34.722"W
Tangential Length: 12.129

PI	6+23.629	R1	2249772.405	10474707.889
PI	6+41.642	R1	2249765.590	10474691.214

Tangential Direction: S22°13'42.773"W
Tangential Length: 18.014

PI	6+41.642	R1	2249765.590	10474691.214
PI	6+53.343	R1	2249756.687	10474683.621

Tangential Direction: S49°32'34.722"W
Tangential Length: 11.701

PI	6+53.343	R1	2249756.687	10474683.621
POT	6+57.462	R1	2249759.359	10474680.488

Tangential Direction: S40°27'25.278"E
Tangential Length: 4.118

FILENAME: c:\pw\kn1\d0251618\SJT_RET_HAD.dgn
PLOTTED: 4/26/2024 12:53:38 PM

Kimley»Horn F-928

Texas Department of Transportation

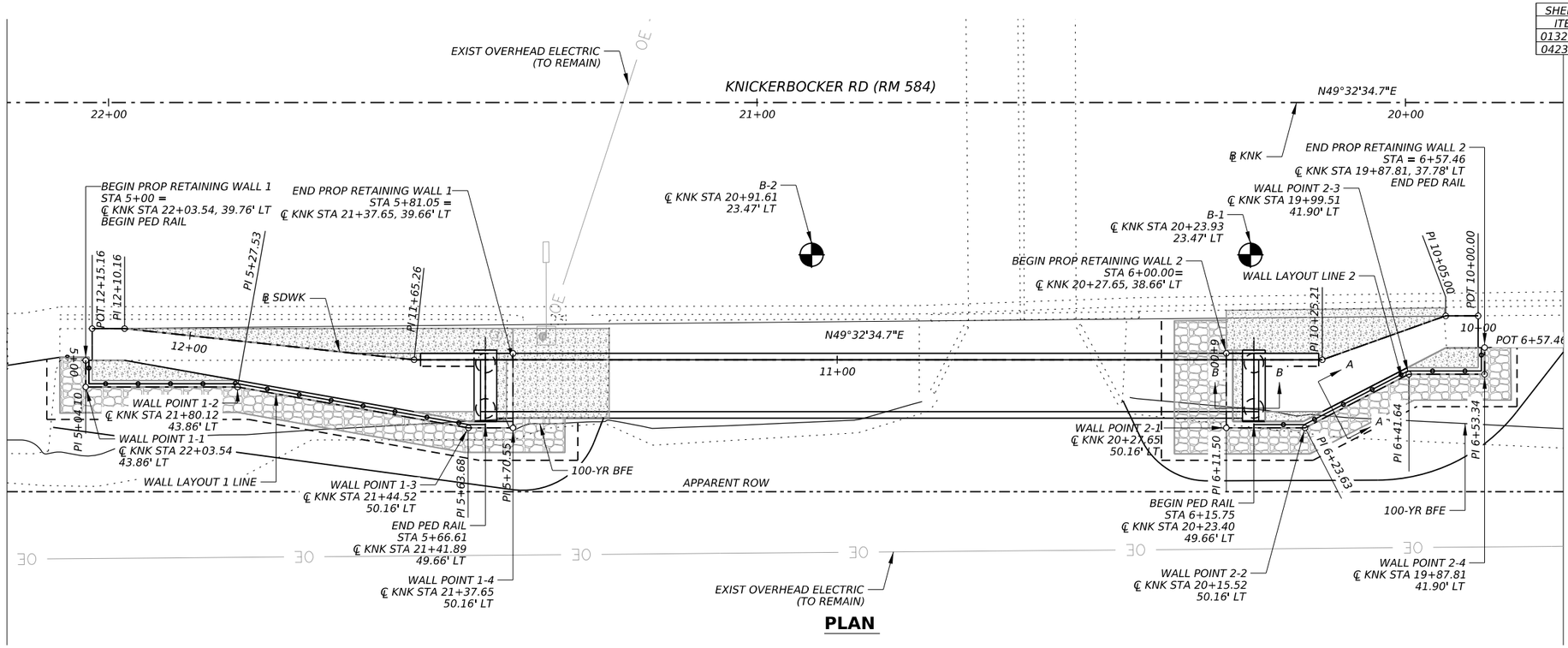
RETAINING WALL HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	102
0907	00	229,ETC	

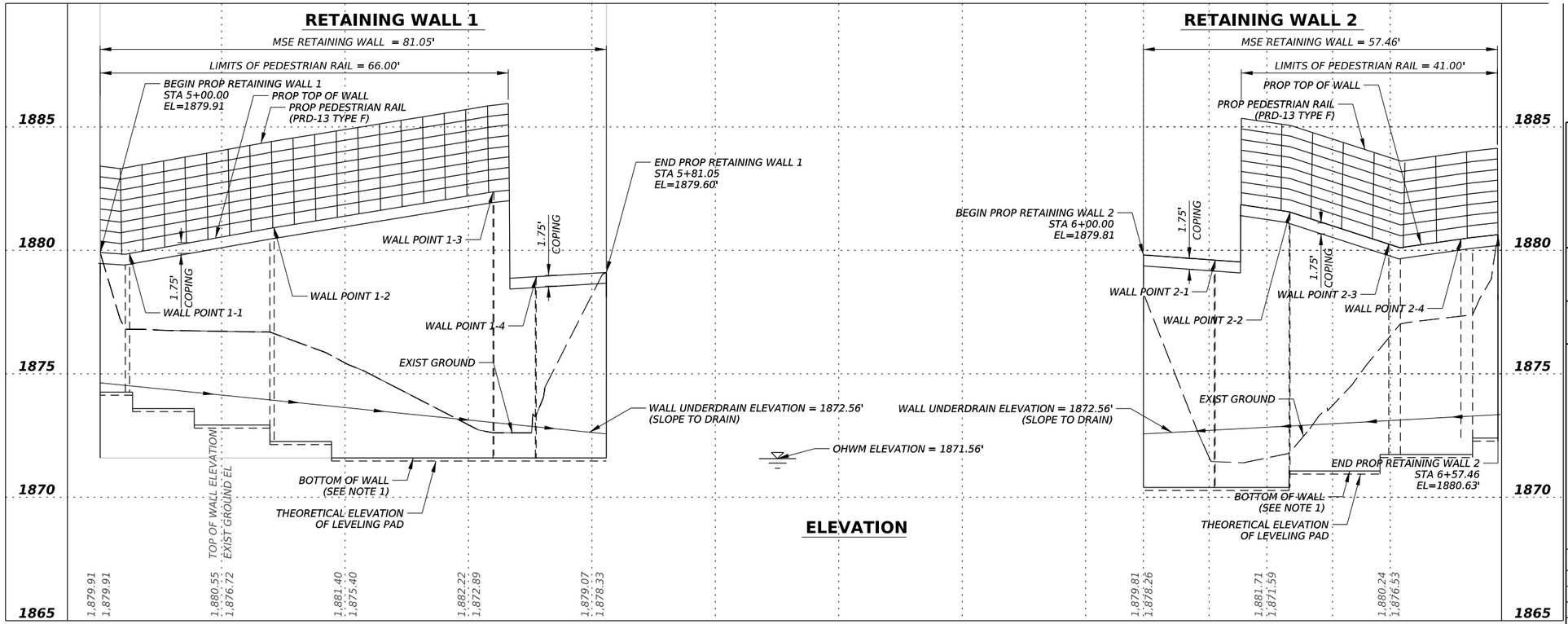
SHEET #			RW
ITEM	DESCRIPTION	UNIT	QTY
0132 6056	EMB (FINAL) (ORD COMP) (TY C2) (DS)	CY	125
0423 6001	RETAINING WALL (MSE)	SF	1235



PLAN

NOTES:

1. BOTTOM OF WALL TO BE MIN 1' BELOW EXIST GROUND
2. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR ROADWAY AND SIDEWALK ALIGNMENT INFORMATION.
3. WALL UNDERDRAINS REQUIRED. REFER TO DRAINAGE PLANS FOR ADDITIONAL INFORMATION.
4. REFER TO RW(MSE), RW(MSE)DD FOR ADDITIONAL RETAINING WALL DETAILS NOT SHOWN.
5. REFER TO PRD-13 FOR PEDESTRIAN RAIL ANCHORAGE AND ADDITIONAL DETAILS NOT SHOWN.



ELEVATION

0 10 20

4/26/2024

YAN G. LINWOOD 131665 LICENSED PROFESSIONAL ENGINEER STATE OF TEXAS

Kimley»Horn F-928

Texas Department of Transportation

RM 584
RETAINING WALL LAYOUT

SAN ANGELO, TEXAS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	103
CONT.	SECT.	JOB	
0907	00	229,ETC	

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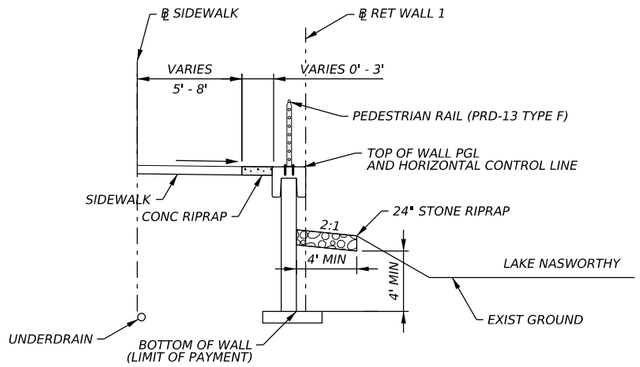
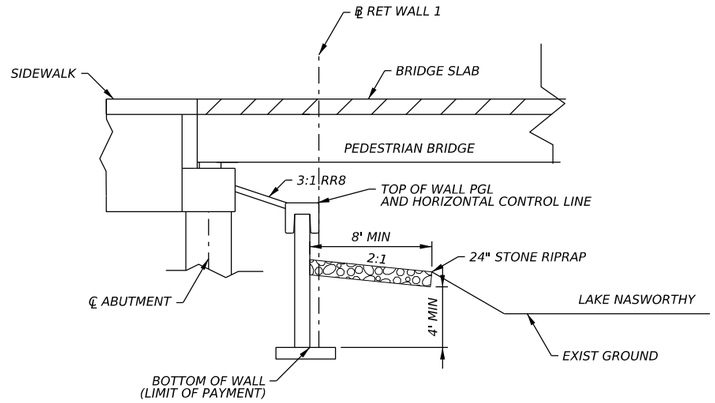


SECTION A-A

N.T.S.

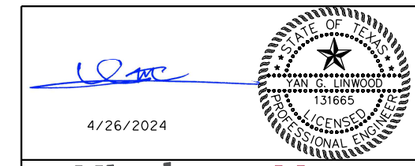


SECTION B-B

N.T.S.

NOTES:

1. SEE RETAINING WALL LAYOUT SHEET FOR MORE INFORMATION.
2. SEE BRIDGE LAYOUT SHEET FOR MORE INFORMATION.
3. SEE CONCRETE RIPRAP (CRR) STANDARD SHEET OR STONE RIPRAP (SRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS, IF APPLICABLE.
4. SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE.



4/26/2024

Kimley»Horn F-928

Texas Department of Transportation

RM 584

MSE RETAINING WALL TYPICAL SECTIONS

SAN ANGELO, TEXAS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	104
0907	00	229,ETC	

DATE: 4/26/2024 12:54:30 PM
FILE: c:\pwikh1\d0251621\SJT_RW_TYP.dgn

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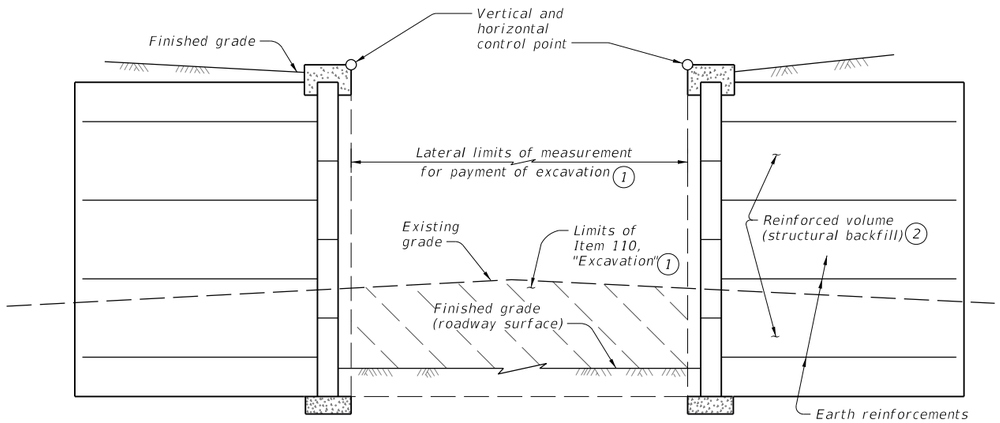
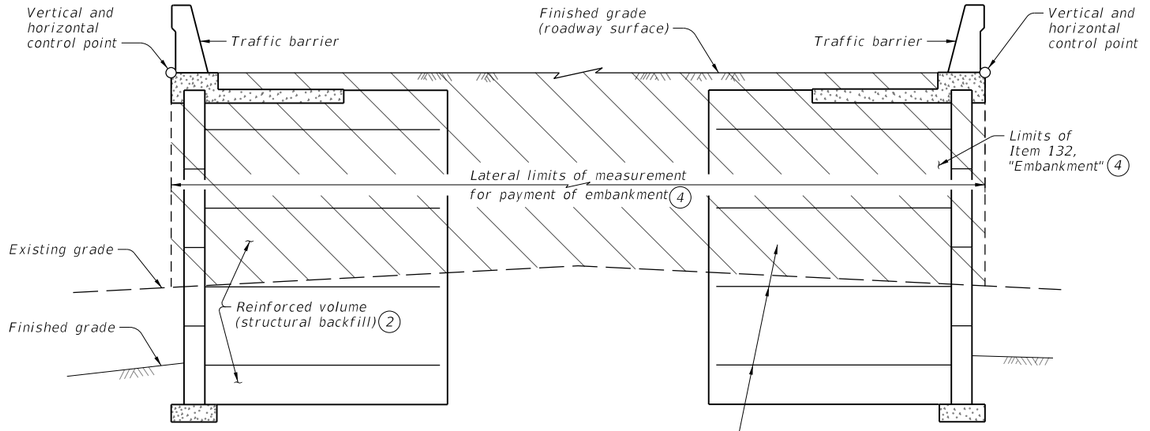
DW:
CK:
DW:



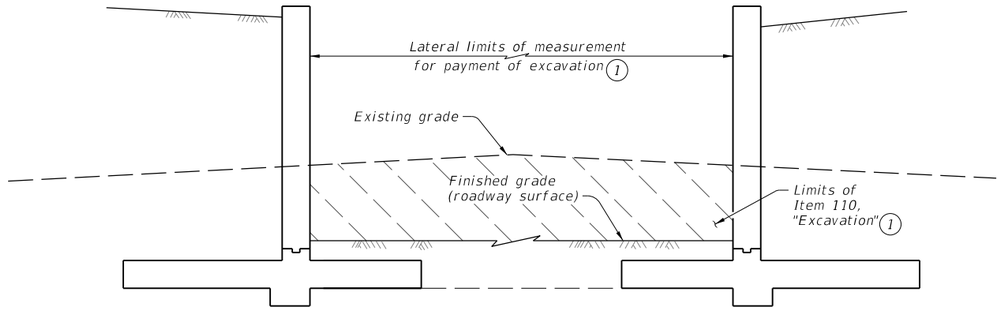
TYPICAL SECTION

(Excavation between MSE retaining walls.) (3)



TYPICAL SECTION

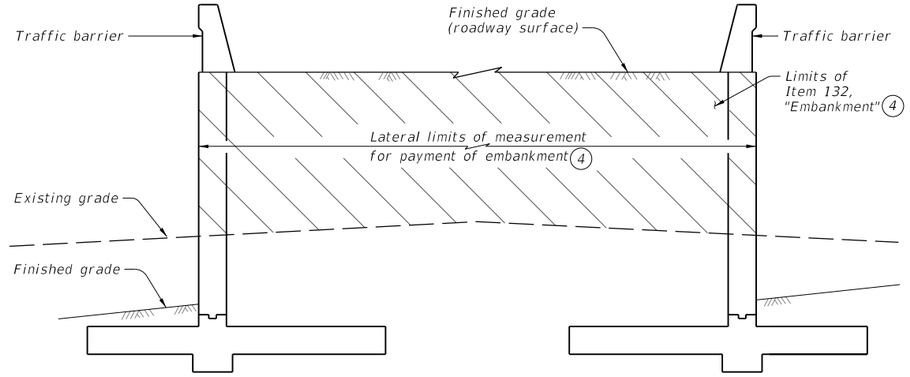
(Embankment between MSE retaining walls.) (3)



TYPICAL SECTION

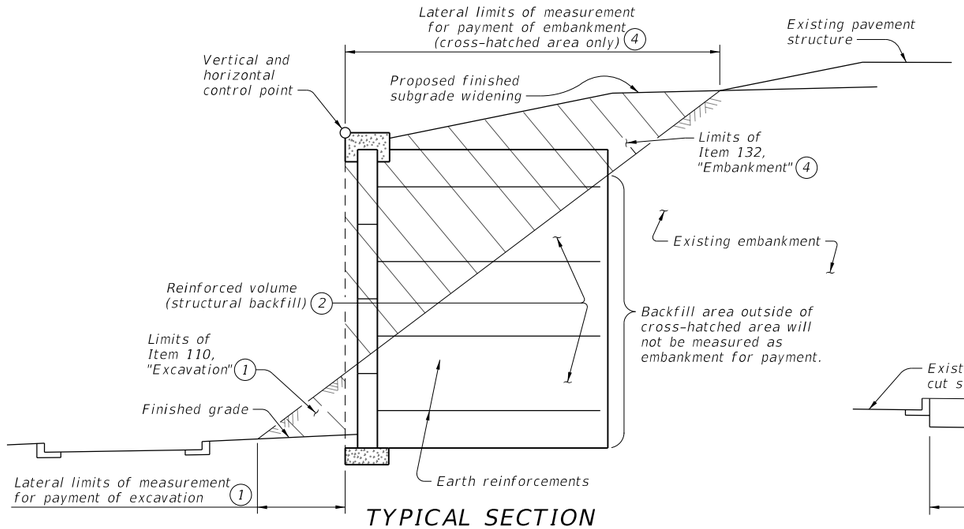
(Excavation between conventional retaining walls.)

1. Only the excavation above the proposed subgrade elevation will be measured for payment.
2. Meeting requirements for Item 423, "Retaining Walls."
3. Earthwork measurement with other retaining wall types will be made to the outside finished face in the same manner.
4. Only the embankment above the existing ground line will be measured for payment.



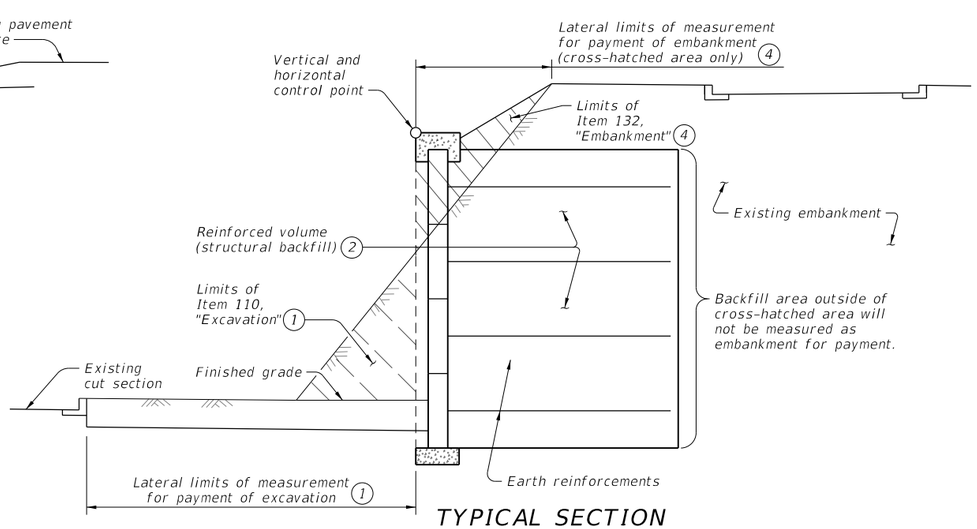
TYPICAL SECTION

(Embankment between conventional retaining walls.)



TYPICAL SECTION

(Widening embankment with MSE retaining walls.) (3)



TYPICAL SECTION

(Widening cut section with MSE retaining walls.) (3)

Texas Department of Transportation

Bridge Division Standard

EARTHWORK MEASUREMENT AT RETAINING WALL

RW(EM)

FILE: RW-EM-22.dgn	DN: TxDOT	CK: TxDOT	DW: JER	CK: RLE
©TxDOT June 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		105

DATE: 4/26/2024 12:54:55 PM
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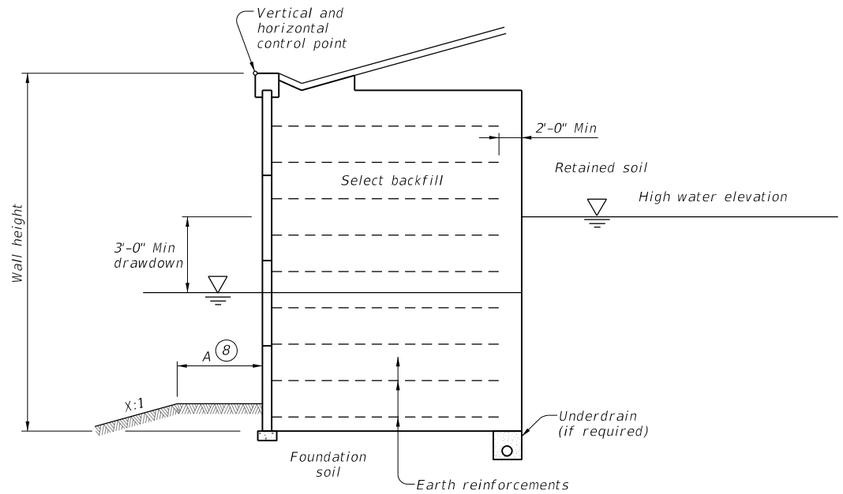
DATE: 4/3/2024 11:07:42 AM
FILE: c:\pw\kh1\d0251618\RW-MSEDD-22.dgn

WALL SUMMARY

MSE Retaining Wall	Begin Station (1)	End Station (1)	Retained Soil Friction Angle (2)	Foundation Soil Friction Angle (2)	Ground Improvement (3)	Min Earth Reinf. Length (4)	Min Wall Embedment (5)	Underdrain Required (6)	Drawdown Analysis (7)	Bench Width (8)
RETAINING WALL 1	5+00.00	5+81.05	30°	27°	NO	9 FT	2 FT	YES	NO	4 FT
RETAINING WALL 1	5+00.00	5+81.05	30°	27°	NO	8 FT	2 FT	YES	NO	4 FT
RETAINING WALL 2	6+00.00	6+57.46	30°	27°	NO	10 FT	2 FT	YES	NO	4 FT
RETAINING WALL 2	6+00.00	6+57.46	30°	27°	NO	8 FT	2 FT	YES	NO	4 FT



TYPICAL SECTION
(Rapid drawdown condition.)

(1) Indicate limits for which the stated soil design requirements and assumptions are applicable.

(2) Base the listed retained and foundation friction angle on local experience or measured/correlated long term strength values.

(3) Indicate if ground improvement is required or not required. If shown as required, refer to ground improvement detail(s) shown elsewhere in the plans for additional information.

(4) Indicate on table both the minimum length and length ratio required. The minimum default length of earth reinforcements is either 8 feet or 70% of the wall height, whichever is greater. Wall height and design wall height may differ depending on project geometry and loading conditions. Note: Wall height at bridge abutments is equal to the distance between the top of leveling pad and finished grade at the bridge abutment backwall.

(5) Guidance to wall designer of record for determination of minimum wall embedment. Unless noted elsewhere in the plans, provide a minimum embedment from the top of leveling pad to finish grade of
- 1 foot for level ground where there is no potential for erosion or future excavation, or
- 2 feet for sloping ground (4.0H:1.0V or steeper) or where there is potential for removal of soil in front of the wall.

(6) Indicate if underdrain is required or not required.

(7) Indicate if rapid drawdown analysis is required.

(8) Horizontal bench width at base of wall varies. Use the following criteria to establish base width:
A = 2-foot Min for X > 4 or
A = 4-foot Min for X ≤ 4
Applicable to both drawdown and dry condition.

1. WALL SUMMARY TABLE DATA TAKEN FROM GEOTECHNICAL REPORT. FOR MORE INFORMATION SEE GEOTECHNICAL REPORT BY RABA KISTNER DATED SEPTEMBER 26, 2023.

STATE OF TEXAS
MUHANNAD HUSSEIN
126892
LICENSED
PROFESSIONAL ENGINEER

4/5/2024

SPECIAL NOTES:
This sheet is to be filled out by the wall designer of record at time of plan preparation to provide soil strength parameters for the design of the specified walls.
The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

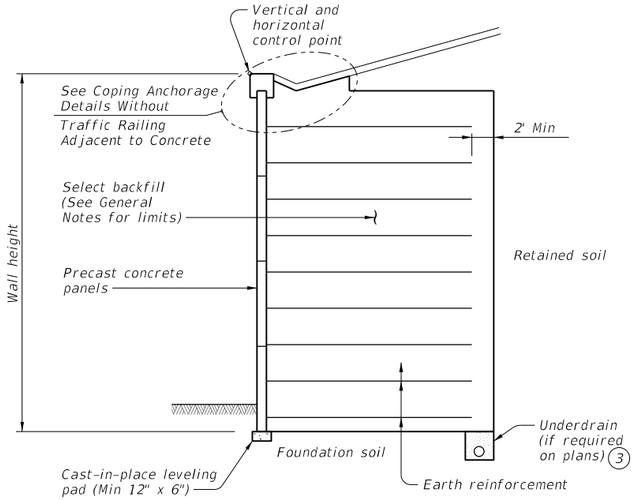
Texas Department of Transportation

Bridge Division Standard

MECHANICALLY STABILIZED EARTH RETAINING WALL DESIGN DATA

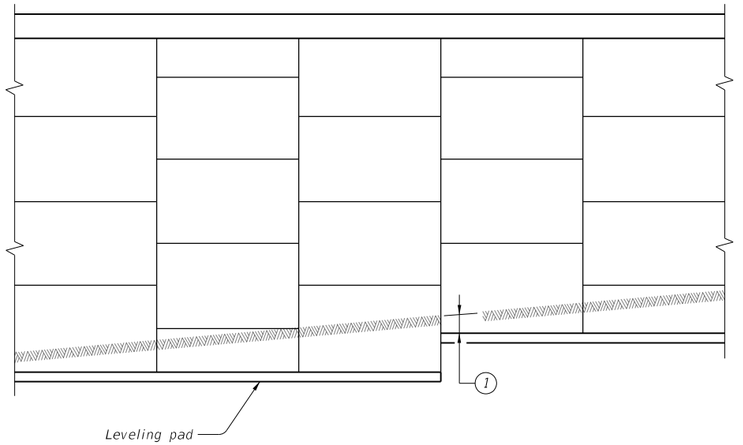
RW(MSE)DD

FILE: RW-MSEDD-22.dgn	DN: TxDOT	CK: RLE	DW: JER	CK: RLE
©TxDOT June 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		106



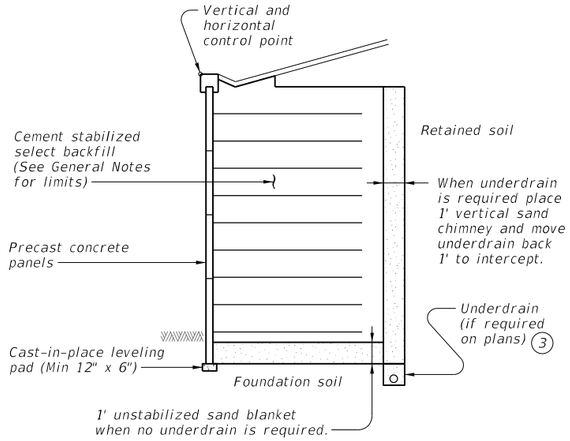
TYPICAL SECTION

(Wall at bottom of slope.)



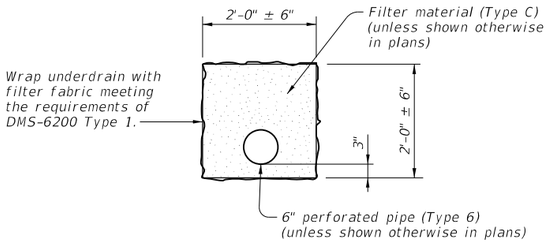
ELEVATION

1. Minimum embedment conforming to values given on the RW(MSE)DD standard.
2. Form map of Texas emblem into a wall panel next to each bridge abutment. Submit the exact location of each emblem to the Engineer for approval. The cost of forming the emblems will not be paid for directly, but is subsidiary to Item 423, "Retaining Walls." Inset the map of Texas a minimum of ¾" into the face of the panel with a smooth finish. Finish the inset area in a contrasting color as approved by the Engineer.
3. Provide underdrain pipe and filter material in accordance with Item 556, "Pipe Underdrains."
4. Anchor precast coping to prevent rotation or displacement. Use these details to develop custom anchorage for precast copings. Provide details that include coping reinforcement. Concrete flume (if required) is paid for separately from Item 423, "Retaining Walls."
5. 2½" Dia. Standard Pipe (2.875" O.D., 0.203" wall thickness). Plumb all posts. See "Post Mount Detail" for crimping and trimming post to fit the diamenter of top rail. Provide holes as needed in post for galvanizing drainage and venting.
6. See "General Notes" in PRD-13 Standard Sheets for anchor bolt information.
7. Provide 1½" end cover to Bars D(#4) from outside edge of overall length of Ramp/Sidewalk.

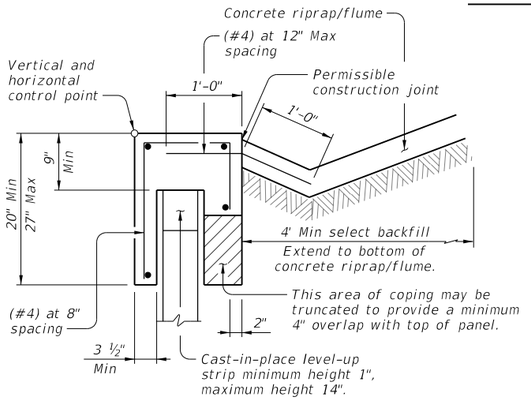


SPECIAL DRAINAGE PROVISIONS

(When cement stabilized backfill is used.)

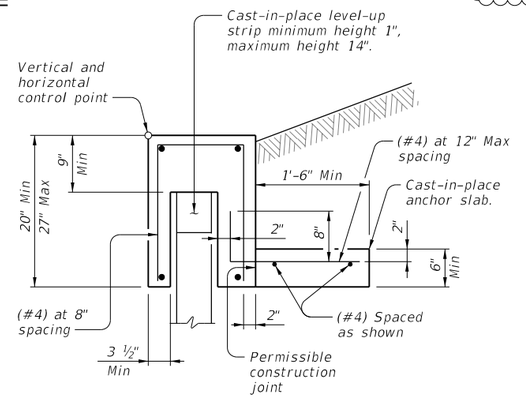


UNDERDRAIN DETAIL 3



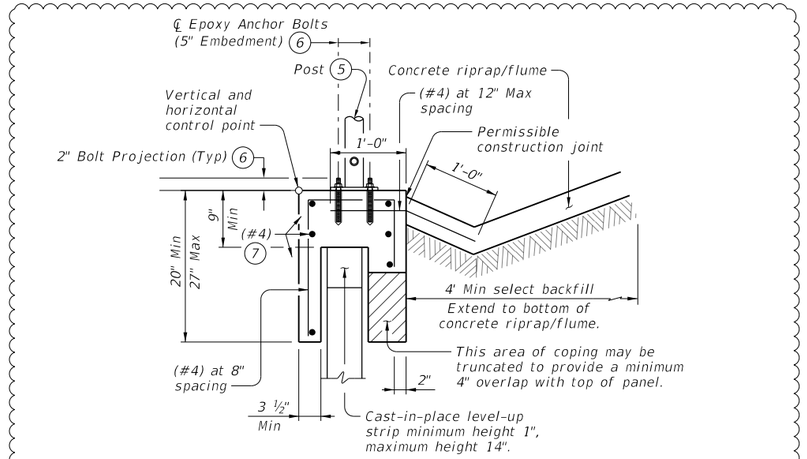
ADJACENT TO CONCRETE

(Excluding concrete pavement)

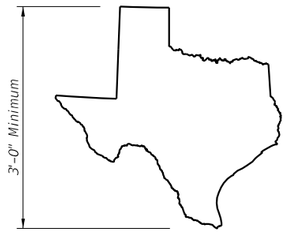


ADJACENT TO SOIL

COPING ANCHORAGE DETAILS WITHOUT TRAFFIC RAILING 4



COPING ANCHORAGE DETAILS WITH PRD-13 HANDRAIL 4



MAP OF TEXAS EMBLEM 2

4/26/2024

STATE OF TEXAS
YAN G. LINWOOD
131665
LICENSED PROFESSIONAL ENGINEER

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

MECHANICALLY STABILIZED EARTH RETAINING WALL

RW(MSE)(MOD)

FILE: RW-MSE-22.dgn	DN: TxDOT	CK: TxDOT	DW: JER	CK: RLE
©TxDOT June 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
Added Coping Detail for PRD-13 Handrail Anchorage	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		107

DATE: 4/26/2024 12:55:43 PM
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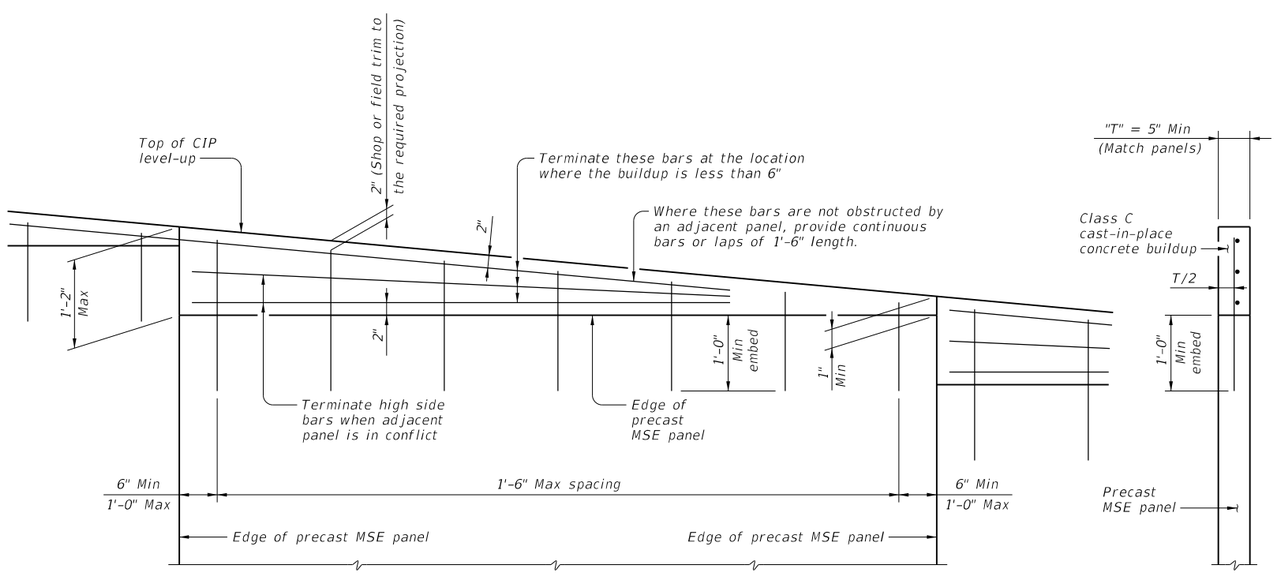


ELEVATION SECTION

LEVEL UP DETAIL (5)

DESIGN CRITERIA NOTES:

Design Parameters:

Base design of retaining walls on the following design parameters unless stated elsewhere in the plans:

Retained Soil	Unit Weight = 125 pcf ϕ = (6) C = 0 psf
Foundation Soil	ϕ = (6) C = 0 psf
Select Backfill	Unit Weight = See Table (7) ϕ = 34° C = 0 psf
Cement Stabilized Select Backfill	Unit Weight = 125 pcf ϕ = 45° C = 0 psf

Limit stress in steel and concrete in accordance with current AASHTO Standard Specifications for Highway Bridges and Interim Specifications.

The minimum length of earth reinforcement are as shown on the Mechanically Stabilized Earth Retaining Wall Design Data (RW[MSE]DD) standard.

Stability Criteria:

Stability criteria applies to both dry and drawdown analysis. Base design on the following factors of safety.

Sliding along the base of the structure	Factor of Safety ≥ 1.5
Overturning	Factor of Safety ≥ 2.0
Pullout of Earth Reinforcement at each level	Factor of Safety ≥ 1.5

Design the wall such that the base pressure resultant falls within the middle third of the retaining wall.

Determine pullout resistance from test data evaluated at ¾ inch strain.

Corrosion Criteria:

Design the earth reinforcement elements to have a minimum design life of 75 years, using current AASHTO corrosion rates.

Perform stress calculations (rupture) on the calculated earth reinforcement section remaining after 75 years. Pullout calculations may be based on non-corroded section.

(5) Cast vertical bars into the top of panels. At Contractor's option vertical bars may be embedded 4 inches with a Type III Class C epoxy anchorage system. Follow manufacturer's directions for installing the epoxy vertical bars.

(6) Soil design parameters must be based on long term soil strength. Design parameters must be listed on the RW(MSE)DD standard.

(7)

SELECT BACKFILL UNIT WEIGHT			
Type AS, BS & DS	Unit Weight	Internal Stability	External Stability
	105 PCF	Pullout	Sliding, Overturning, Eccentricity
	125 PCF	Rupture	Bearing

PRECAST COPINGS:

Wall supplier is to maximize lengths of precast coping. Provide precast coping in 10-foot minimum lengths (typical.) To optimize coping lengths at radiuses, ends of runs, or other wall geometric conditions favorable to shorter coping sections, shorter lengths may be used pending approval by the Engineer. This applies only to coping without railing.

JOINT SEALANT:

Seal joints between coping segments in accordance with Item 438, "Cleaning and Sealing Joints." Provide Class 4 joint seal. Place sealant flush with coping surface. The purpose of the joint sealing is to reduce surface drainage infiltration into the retaining wall backfill. Sealing coping joint is considered subsidiary to other items.

EARTH REINFORCEMENT:

Place the uppermost earth reinforcement no more than 3 feet below the top of wall.

Place the lowest level of earth reinforcement no more than 2 feet above the top of the leveling pad.

Provide earth reinforcement with a minimum wire size of W7.0. If different longitudinal and cross wires are used in an earth reinforcement mesh, the smaller wire must be at least 50% of the cross sectional area of the larger wire.

A maximum of four wire mesh configurations (wire sizes) will be allowed on a project. Provide unique transverse bar spacing for each mesh configuration, differing from other configurations by a minimum of 3 inches. Step earth reinforcement lengths in increments no finer than 12 inches.

PANELS:

Fabricate standard precast concrete panels to a maximum height of 6 feet and a maximum surface area of 50 sq ft. Top and bottom panels may exceed these limitations as necessary to achieve required wall grades. Maximum height of any panel must not exceed 7 ft.-6 in. Provide a minimum panel thickness of 5 inches. Arrange panels to provide offset horizontal joints.

Provide an open joint around the perimeter of the concrete panels. Configure joints such that 1) the filter fabric and/or pad materials are not exposed at the wall face and 2) the design opening is between ⅜" and ¾".

Provide a one-piece corner panel for wall angle changes of greater than 30 degrees. Butting of chamfered panels will be allowed for angle changes of 30 degrees or less.

MATERIAL NOTES:

Provide Class C concrete for reinforced concrete and precast coping.
Provide Class H concrete for precast concrete panels.
Provide Class A concrete for unreinforced concrete.
Provide Grade 60 reinforcing steel.

GENERAL NOTES:

Section and elevation shown is for informational purposes only. Determine specific geometry based on wall layouts and other plan information.

Extend select backfill specified for use within the mechanically stabilized earth volume horizontally from the back of the panels a minimum 2 feet beyond the end of the earth reinforcement. Extend select backfill vertically to the top of the panels from either the top of the leveling pad, or from 4 inches below the lowest earth reinforcement, whichever is lower.

Provide concrete coping along the top of wall, at the vertical steps at bridge backwalls, and at other vertical steps along the top of wall.

Provide details and calculations that establish support for panels that are affected when obstructions (inlets, drilled shafts, piling, etc.) prevent placement of soil reinforcement in their normal locations. Furnish the same earth reinforcement coverage as that required in the absence of the obstruction. For skewed (rotated) earth reinforcement, no adjustment in length is needed for skew angles less than or equal to 10 degrees. Adjust the length of earth reinforcement to provide a cosine length of the reinforcement equivalent to the stated design length for the section of wall when skew angles are greater than 10 degrees. Provide calculations that justify any alterations made to the soil reinforcement or modifications to their normal placement. Do not use panels without any soil reinforcement connected to them unless they are connected with galvanized hardware to adjacent panels which do have supporting soil reinforcement attached to them and as approved by the Engineer.

Coping and anchor slabs are considered subsidiary to the Item 423, "Retaining Walls."

Use these details in conjunction with the retaining wall layout, the Mechanically Stabilized Earth Retaining Wall Design Data (RW[MSE]DD) standard and other applicable standards.

Cover dimensions are clear dimensions, unless noted otherwise.

4/26/2024

STATE OF TEXAS
YAN G. LINWOOD
131665
LICENSED PROFESSIONAL ENGINEER

SHEET 2 OF 2

Texas Department of Transportation

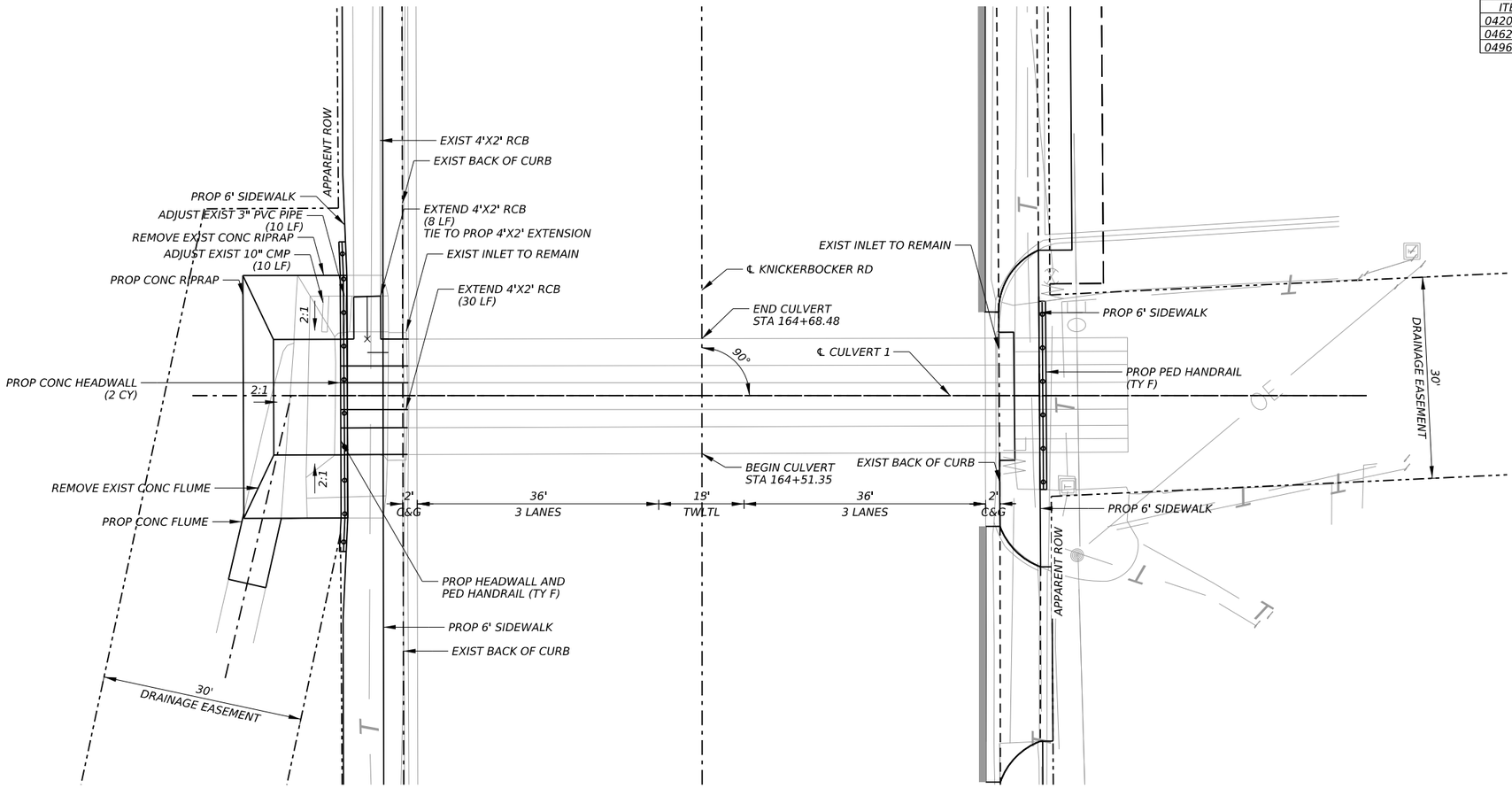
Bridge Division Standard

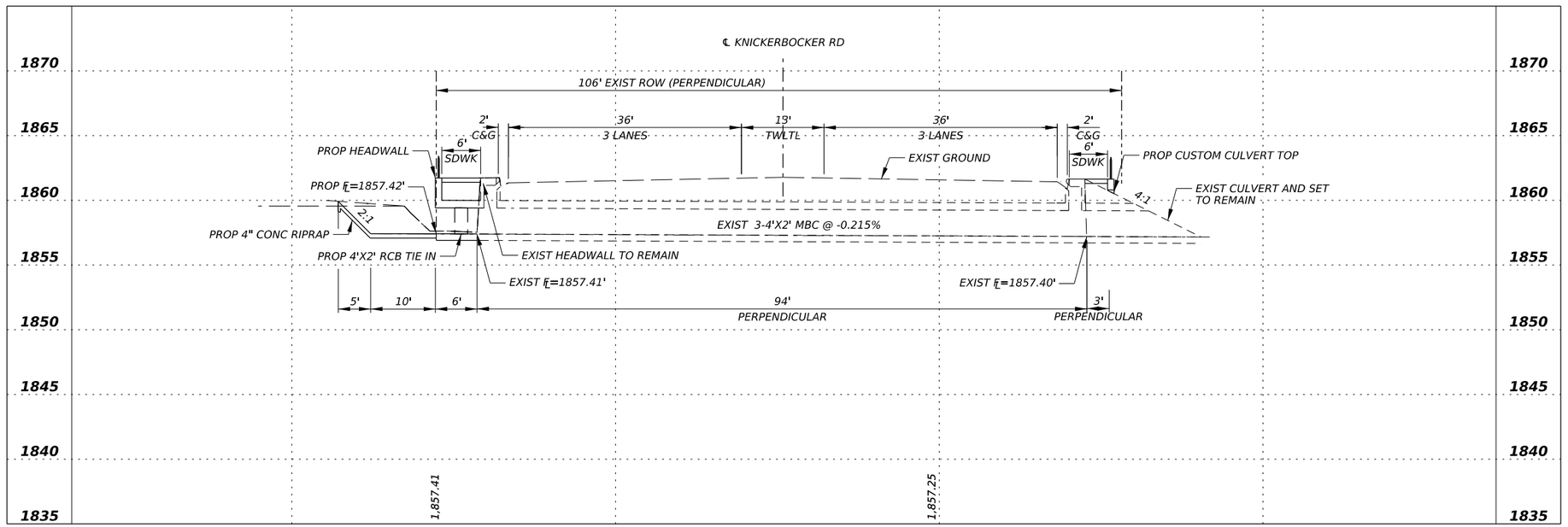
MECHANICALLY STABILIZED EARTH RETAINING WALL

RW(MSE)(MOD)

FILE: RW-MSE-22.dgn	DN: TxDOT	CK: TxDOT	DW: JER	CK: RLE			
©TxDOT June 2022	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0907	00	229,ETC		RM 584		
	DIST	COUNTY			SHEET NO.		
	SJT	TOM GREEN			108		

SHEET #			DRG
ITEM	DESCRIPTION	UNIT	QTY
0420 6054	CL C CONC (HEADWALL)	CY	2
0462 6047	CONC BOX CULV (4 FT X 2 FT) (EXTEND)	LF	47
0496 6007	REMOV STR (PIPE)	LF	20





NOTES:

1. SEE STRUCTURAL DETAILS SHEET FOR MORE INFORMATION.

0 10 20 HORZ
0 5 10 VERT

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation
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CULVERT LAYOUT

SAN ANGELO, TEXAS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	109
0907	00	229,ETC	

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CULVERT CROSSING AT KNICKERBOCKER AND US 87

5-yr

Hydrology Data

Existing Conditions						
D.A.	Area	Run Off Coef.	Time con.	Intensity	Design Freq.	Run Off
	Acres	"C"	Min.	in/hr	Yrs.	cfs
C-1	60.43	0.61	17.9	3.96	5	145.29

Proposed Conditions						
D.A.	Area	Run Off Coef.	Time con.	Intensity	Design Freq.	Run Off
	Acres	"C"	Min.	in/hr	Yrs.	cfs
C-1	60.43	0.61	17.9	3.96	5	145.32

Culvert Data

Existing Conditions															
Culvert	Barrels	Width	Height	Length	Material	Inlet	Profile	Q (5)	HW	HW	TW	TW	Outlet Velocity	Tailwater Velocity
ID	No.	ft	ft	ft				cfs	Ft.	Elev.	Ft.	Elev.	ft/s	ft/s
C-1	6	4	2	149	Conc	Flare	Straight	145.29	2.03	1840.63	1.31	1839.98	5.03	2.85

Proposed Conditions															
Culvert	Barrels	Width	Height	Length	Material	Inlet	Profile	Q (5)	HW	HW	TW	TW	Outlet Velocity	Tailwater Velocity
ID	No.	ft	ft	ft				cfs	Ft.	Elev.	Ft.	Elev.	ft/s	ft/s
C-1	6	4	2	149	Conc	Flare	Straight	145.32	2.03	1840.63	1.31	1839.98	5.03	2.85

100-yr

Hydrology Data

Existing Conditions						
D.A.	Area	Run Off Coef.	Time con.	Intensity	Design Freq.	Run Off
	Acres	"C"	Min.	in/hr	Yrs.	cfs
C-1	60.43	0.61	17.9	7.04	5	258.29

Proposed Conditions						
D.A.	Area	Run Off Coef.	Time con.	Intensity	Design Freq.	Run Off
	Acres	"C"	Min.	in/hr	Yrs.	cfs
C-1	60.43	0.61	17.9	7.04	5	258.34

Culvert Data

Existing Conditions															
Culvert	Barrels	Width	Height	Length	Material	Inlet	Profile	Q (100)	HW	HW	TW	TW	Outlet Velocity	Tailwater Velocity
ID	No.	ft	ft	ft				cfs	Ft.	Elev.	Ft.	Elev.	ft/s	ft/s
C-1	6	4	2	149	Conc	Flare	Straight	258.29	2.78	1841.38	1.83	1840.5	6.75	3.48

Proposed Conditions															
Culvert	Barrels	Width	Height	Length	Material	Inlet	Profile	Q (100)	HW	HW	TW	TW	Outlet Velocity	Tailwater Velocity
ID	No.	ft	ft	ft				cfs	Ft.	Elev.	Ft.	Elev.	ft/s	ft/s
C-1	6	4	2	149	Conc	Flare	Straight	258.34	2.78	1841.38	1.83	1840.5	6.76	3.48

CULVERT EXTENSION AT KNICKERBOCKER RD BETWEEN JACKSON AND MARKET

100-yr

Hydrology Data

Existing Conditions						
D.A.	Area	Run Off Coef.	Time con.	Intensity		Run Off
	Acres	"C"	Min.	in/hr		cfs
C-3	103.4	0.58	32	5.10		306.06

Proposed Conditions						
D.A.	Area	Run Off Coef.	Time con.	Intensity		Run Off
	Acres	"C"	Min.	in/hr		cfs
C-3	103.4	0.58	32	5.10		306.12

Culvert Data

Existing Conditions															
Culvert	Barrels	Width	Height	Length	Material	Inlet	Profile	Slope	Q (100)	HW	HW	TW	TW	Outlet Velocit	Tailwater Velocity
ID	No.	ft	ft	ft				%	cfs	Ft.	Elev.	Ft.	Elev.	ft/s	ft/s
C-3	3	4	2	93	Conc	Parallel	Straight	0.0323	306.06	3.73	1862.29	3.01	1860.42	7.34	4.23

Proposed Conditions															
Culvert	Barrels	Width	Height	Length	Material	Inlet	Profile	Slope	Q (100)	HW	HW	TW	TW	Outlet Velocit	Tailwater Velocity
ID	No.	ft	ft	ft				%	cfs	Ft.	Elev.	Ft.	Elev.	ft/s	ft/s
C-3	3	4	2	99	Conc	Parallel	Straight	0.05	306.12	3.68	1862.29	3.01	1860.42	7.27	4.23

5-yr

Hydrology Data

Existing Conditions							
D.A.	Area	Run Off Coef.	Time con.	Intensit	Design Freq	Run Off
	Acres	"C"	Min.	in/hr	Yrs.	cfs
C-3	103.4	0.58	32	2.92	5	175.16

Proposed Conditions							
D.A.	Area	Run Off Coef.	Time con.	Intensit	Design Freq	Run Off
	Acres	"C"	Min.	in/hr	Yrs.	cfs
C-3	103.4	0.58	32	2.92	5	175.19

Culvert Data

Existing Conditions															
Culvert	Barrels	Width	Height	Length	Material	Inlet	Profile	Slope	Q (5)	HW	HW	TW	TW	Outlet Velocit	Tailwater Velocity
ID	No.	ft	ft	ft				%	cfs	Ft.	Elev.	Ft.	Elev.	ft/s	ft/s
C-3	3	4	2	93	Conc	Parallel	Straight	0.0323	175.16	3.70	1861.50	2.24	1859.65	7.29	3.60

Proposed Conditions															
Culvert	Barrels	Width	Height	Length	Material	Inlet	Profile	Slope	Q (5)	HW	HW	TW	TW	Outlet Velocit	Tailwater Velocity
ID	No.	ft	ft	ft				%	cfs	Ft.	Elev.	Ft.	Elev.	ft/s	ft/s
C-3	3	4	2	99	Conc	Parallel	Straight	0.05	175.19	3.70	1861.54	2.24	1859.65	7.30	3.60

4/3/2024

STATE OF TEXAS
MADISON M. RICE
145812
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn

F-928

HYDROLOGIC CALCULATIONS

CULVERTS ON RM 584

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	110
0907	00	229,ETC	

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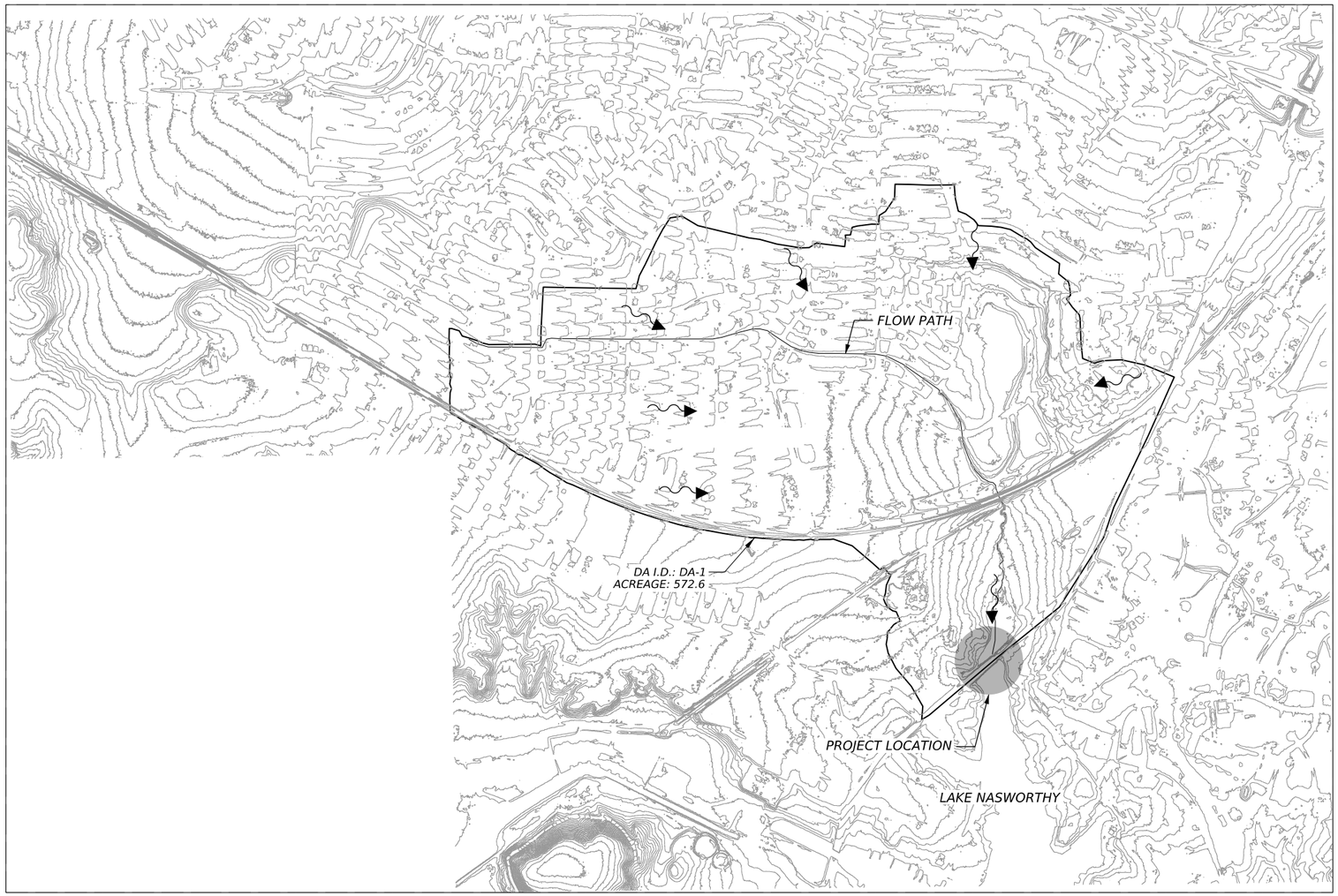

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LEGEND

FLOW ARROW

PROJECT LOCATION

DRAINAGE AREA LIMITS

NOTES:

1. REFER TO HYDROLOGIC DATA SHEET FOR DETAILED CALCULATIONS.
2. LAKE NASWORTHY CROSSING AT BEATY RD IS LOCATED IN A FEMA ZONE AE FLOODPLAIN PER FIRM PANEL 48451C0490E DATED JUNE 19, 2012. COORDINATION WITH LOCAL FLOODPLAIN ADMINISTRATOR KEVIN PATE PROVIDED ON APRIL 5. 2023.
3. DRAINAGE AREA DELINIATED BASED ON 3' TNRIS 2018 LIDAR

4/3/2024

STATE OF TEXAS
MADISON M. RICE
145812
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PROFESSIONAL ENGINEER

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DRAINAGE AREA MAP

RM 584
PEDESTRIAN BRIDGE

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	111
0907	00	229,ETC	

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PEDESTRIAN BRIDGE

Design Annual Exceedance Probability (Design Annual Recurrence Interval)				
	10-year	50-year	100-year	500-year
e	0.8047	0.7835	0.7727	0.7448
b	68.3593	85.1471	90.7014	100.3101
d (min)	10.0487	9.6059	9.4364	9.2163
Intensity (in/hour)	2.23	3.06	3.42	4.26

Depth Duration Frequency Data				
Duration	10-year (in)	50-year (in)	100-year (in)	500-year (in)
5 Minutes	0.656	0.88	0.974	1.18
15 Minutes	1.3	1.73	1.92	2.32
1 Hour	2.23	2.99	3.32	4.06
2 Hours	2.72	3.7	4.14	5.2
3 Hours	3.01	4.15	4.66	5.98
6 Hours	3.53	4.97	5.65	7.44
12 Hours	4.06	5.91	6.83	9.26
1 Day	4.65	6.90	8.06	11.1

TIME OF CONCENTRATION & LAG TIME
PRE-PROJECT WATERSHED CONDITIONS
TR-55 Methodology

Basin	SHEET FLOW Tc = (0.42(nL)^0.8)/(P2^0.5)(s^0.4) 2-year/24-hr Rainfall Depth (in.) = 2.98						SHALLOW CONCENTRATED FLOW Tc = L / 60*V						
	Length (ft)	Elev1	Elev2	Slope (ft/ft)	Manning's "n"	Tc1 (min)	Length (ft)	Elev2	Elev3	Slope (ft/ft)	Condition TR-55 Fig. 3-1	Vavg (ft/s)	Tc2 (min)
DA-1	100	1963.6	1962.1	0.0147	0.011	1.4	5451.75	1962.120	1900.720	0.0113	Paved	2.16	42.1

Basin	OPEN CHANNEL FLOW Tc = L / 60*V V = (1.49/n)*R^(2/3)*s^(1/2)													TOTAL	
	Length (ft)	Manning's "n"	Width (ft)	Side Slope (ft/ft)	Depth (ft)	Area (ft^2)	Perimeter (ft)	Radius (ft)	Elev3	Elev4	Slope (ft/ft)	Vavg (ft/s)	Tc3 (min)	TcTOTAL* (min)	Tlag 0.6*Tc (min)
DA-1	3382	0.065	25		3	102	43.97	2.32	1895.6	1871.56	0.0071	3.38	16.66	60.2	36.1

Hydrologic Calculated Flows (cfs)				
DA	10-year	50-year	100-year	500-year
DA - 1	818	1312.3	1541.5	2360.9

NOTES:

1. TIME OF CONCENTRATION WAS CALCULATED USING THE NATURAL RESOURCES CONSERVATION SERVICES (NRCS) METHOD AS OUTLINED BY TXDOT.

2. ATLAS 14 VALUES WERE CALCULATED FOR TOM GREEN COUNTY UTILIZING THE TXDOT RAINFALL INTENSITY-DURATION COEFFICIENTS FOR TEXAS SPREADSHEET. THE ANNUAL MAXIMUM SERIES (AMS) METHODOLOGY WAS USED ALONG WITH A TIME OF CONCENTRATION OF 61 MINUTES.

3. DEPTH-DURATION-FREQUENCY DATA WAS OBTAINED FROM THE NOAA PRECIPITATION FREQUENCY DATA SERVER. THE NOAA SPATIAL COORDINATES USED ARE 31.3989, -100.4849.

4. PEAK FLOWS WERE DETERMINED USING THE U.S. ARMY CORE OF ENGINEERS HEC-HMS SOFTWARE. THE SCS CURVE NUMBER METHOD WAS UTILIZED TO ACCOUNT FOR LOSSES AND THE SCS UNIT HYDROGRAPH METHOD WASUSED TO DEVELOP THE UNIT HYDROGRAPH.

4/3/2024

STATE OF TEXAS
MADISON M. RICE
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PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

HYDROLOGIC CALCULATIONS

PEDESTRIAN BRIDGE

SHEET: 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	112
0907	00	229,ETC	

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HEC-RAS Hydraulic Parameters and Calculations

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach 1	1045	10yr	Exst_Bridge	818	1872.57	1876.27		1876.28	0.000585	0.98	837.59	320.68	0.1
Reach 1	1045	10yr	Prop_Bridge	818	1872.57	1876.27		1876.28	0.000585	0.98	837.59	320.68	0.1
Reach 1	1045	100yr	Exst_Bridge	1541.5	1872.57	1880.31		1880.32	0.00009	0.66	2715.82	582.73	0.04
Reach 1	1045	100yr	Prop_Bridge	1541.5	1872.57	1880.31		1880.32	0.00009	0.66	2715.82	582.73	0.04
Reach 1	981	10yr	Exst_Bridge	818	1872.28	1876.25		1876.26	0.000267	0.73	1124.99	362.64	0.07
Reach 1	981	10yr	Prop_Bridge	818	1872.28	1876.25		1876.26	0.000267	0.73	1124.99	362.64	0.07
Reach 1	981	100yr	Exst_Bridge	1541.5	1872.28	1880.31		1880.31	0.000059	0.56	2996.88	555.24	0.04
Reach 1	981	100yr	Prop_Bridge	1541.5	1872.28	1880.31		1880.31	0.000059	0.56	2996.88	555.24	0.04
Reach 1	755	10yr	Exst_Bridge	818	1871.53	1876.21		1876.22	0.000119	0.6	1366.6	354.6	0.05
Reach 1	755	10yr	Prop_Bridge	818	1871.53	1876.21		1876.22	0.000119	0.6	1366.6	354.6	0.05
Reach 1	755	100yr	Exst_Bridge	1541.5	1871.53	1880.3		1880.3	0.000038	0.54	2912.3	403.24	0.03
Reach 1	755	100yr	Prop_Bridge	1541.5	1871.53	1880.3		1880.3	0.000038	0.54	2912.3	403.24	0.03
Reach 1	595	10yr	Exst_Bridge	818	1871.54	1876.2		1876.2	0.000061	0.41	2008.54	587.34	0.04
Reach 1	595	10yr	Prop_Bridge	818	1871.54	1876.2		1876.2	0.000061	0.41	2008.54	587.34	0.04
Reach 1	595	100yr	Exst_Bridge	1541.5	1871.54	1880.29		1880.3	0.000017	0.36	4680.19	731.62	0.02
Reach 1	595	100yr	Prop_Bridge	1541.5	1871.54	1880.29		1880.3	0.000017	0.36	4680.19	731.62	0.02
Reach 1	550	10yr	Exst_Bridge	818	1871.44	1876.2		1876.2	0.000037	0.39	2138.87	633.23	0.04
Reach 1	550	10yr	Prop_Bridge	818	1871.44	1876.2		1876.2	0.000037	0.39	2138.87	633.23	0.04
Reach 1	550	100yr	Exst_Bridge	1541.5	1871.44	1880.29		1880.29	0.000012	0.34	4992.98	771.25	0.02
Reach 1	550	100yr	Prop_Bridge	1541.5	1871.44	1880.29		1880.29	0.000012	0.34	4992.98	771.25	0.02
Reach 1	514	10yr	Exst_Bridge	818	1871.44	1876.1	1873.07	1876.17	0.000627	2.26	361.18	729.91	0.19
Reach 1	514	10yr	Prop_Bridge	818	1871.44	1876.1	1873.07	1876.17	0.000627	2.26	361.18	729.91	0.19
Reach 1	514	100yr	Exst_Bridge	1541.5	1871.44	1880.19	1873.85	1880.27	0.000259	2.24	688.99	986.94	0.13
Reach 1	514	100yr	Prop_Bridge	1541.5	1871.44	1880.19	1873.85	1880.27	0.000259	2.24	688.99	986.94	0.13
Reach 1	499	10yr	Exst_Bridge	818	1868.38	1875.99	1872.69	1876.14	0.001161	3.11	262.79	472.5	0.24
Reach 1	499	10yr	Prop_Bridge	818	1868.38	1875.99	1872.68	1876.14	0.001161	3.11	262.79	472.49	0.24
Reach 1	499	100yr	Exst_Bridge	1541.5	1868.38	1880.06	1873.77	1880.24	0.000688	3.33	462.35	957.61	0.19
Reach 1	499	100yr	Prop_Bridge	1541.5	1868.38	1880.06	1873.75	1880.24	0.000688	3.33	462.35	957.61	0.19
Reach 1	484			Culvert									
Reach 1	387	10yr	Exst_Bridge	818	1868.83	1872.39	1872.39	1873.52	0.015507	8.51	96.1	354.9	1
Reach 1	387	10yr	Prop_Bridge	818	1868.83	1872.39	1872.39	1873.52	0.015507	8.51	96.1	354.9	1
Reach 1	387	100yr	Exst_Bridge	1541.5	1868.83	1873.61	1873.61	1875.21	0.01352	10.16	151.75	393.79	1
Reach 1	387	100yr	Prop_Bridge	1541.5	1868.83	1873.61	1873.61	1875.21	0.01352	10.16	151.75	393.79	1
Reach 1	345	10yr	Exst_Bridge	818	1870.81	1872.53		1872.56	0.000459	1.29	635.81	375.44	0.17
Reach 1	345	10yr	Prop_Bridge	818	1870.81	1872.53		1872.56	0.000459	1.29	635.81	375.44	0.17
Reach 1	345	100yr	Exst_Bridge	1541.5	1870.81	1873.22		1873.27	0.000528	1.72	895.42	379.58	0.2
Reach 1	345	100yr	Prop_Bridge	1541.5	1870.81	1873.22		1873.27	0.000528	1.72	895.42	379.58	0.2
Reach 1	146	10yr	Exst_Bridge	818	1870.81	1872.37		1872.42	0.001081	1.86	440.92	287.81	0.26
Reach 1	146	10yr	Prop_Bridge	818	1870.81	1872.37		1872.42	0.001081	1.86	440.92	287.81	0.26
Reach 1	146	100yr	Exst_Bridge	1541.5	1870.81	1873.02		1873.11	0.001197	2.45	628.53	291.5	0.29
Reach 1	146	100yr	Prop_Bridge	1541.5	1870.81	1873.02		1873.11	0.001197	2.45	628.53	291.5	0.29
Reach 1	23	10yr	Exst_Bridge	818	1870.81	1872.18	1871.46	1872.25	0.001721	2.14	381.87	283.78	0.33
Reach 1	23	10yr	Prop_Bridge	818	1870.81	1872.18	1871.46	1872.25	0.001721	2.14	381.87	283.78	0.33
Reach 1	23	100yr	Exst_Bridge	1541.5	1870.81	1872.81	1871.8	1872.93	0.00172	2.74	562.24	289.97	0.35
Reach 1	23	100yr	Prop_Bridge	1541.5	1870.81	1872.81	1871.8	1872.93	0.00172	2.74	562.24	289.97	0.35

NOTES:

1. HEC-RAS VERSION 5.0.7 WAS USED FOR STEADY FLOW HYDRAULIC ANALYSIS AND DESIGN

2. ELEVATIONS BASED ON NAVD 88 VERTICAL DATUM.

3. SEE BRIDGE LAYOUT FOR MORE INFORMATION

4. DESIGN FLOW BASED ON 100-YR FREQUENCY

5. COORDINATION WITH LOCAL FLOODPLAIN ADMINISTRATOR KEVIN PATE PROVIDED ON APRIL 5, 2023.

6. LAKE NASWORTHY CROSSING AT BEATY RD IS LOCATED IN A FEMA ZONE AE FLOODPLAIN PER FIRM PANEL 48451C0490E DATE JUNE 19, 2012.

7. SEE HYDROLOGIC DATA SHEET FOR HYDROLOGIC INFORMATION

4/3/2024

STATE OF TEXAS
MADISON M. RICE
145812
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation
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HYDRAULIC DATA

PEDESTRIAN BRIDGE

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	113
0907	00	229,ETC	

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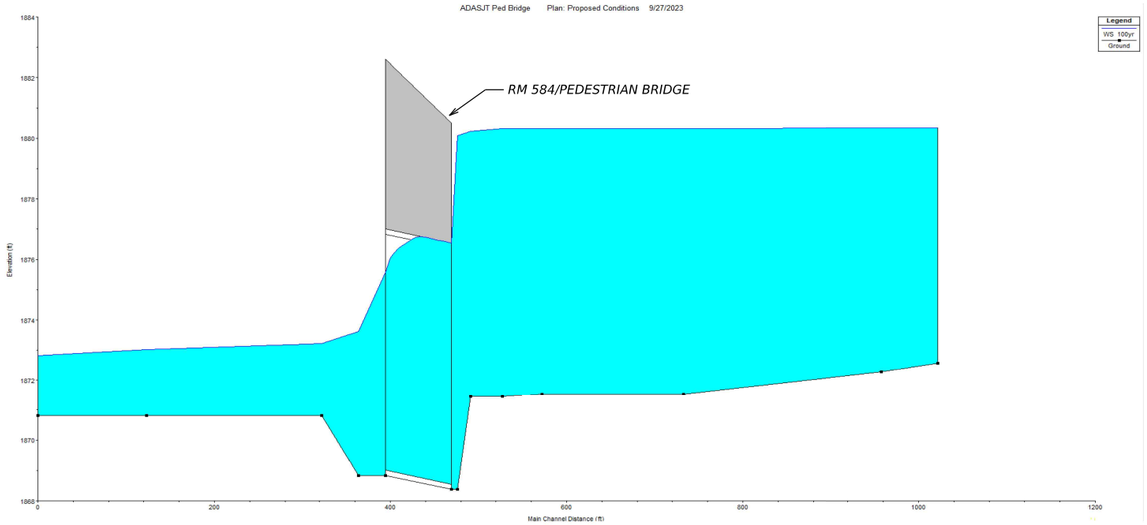
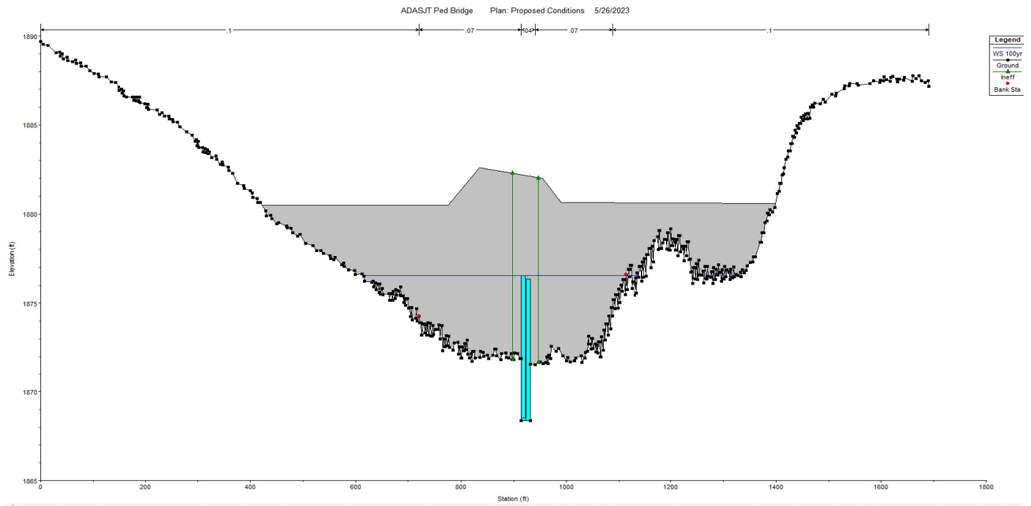
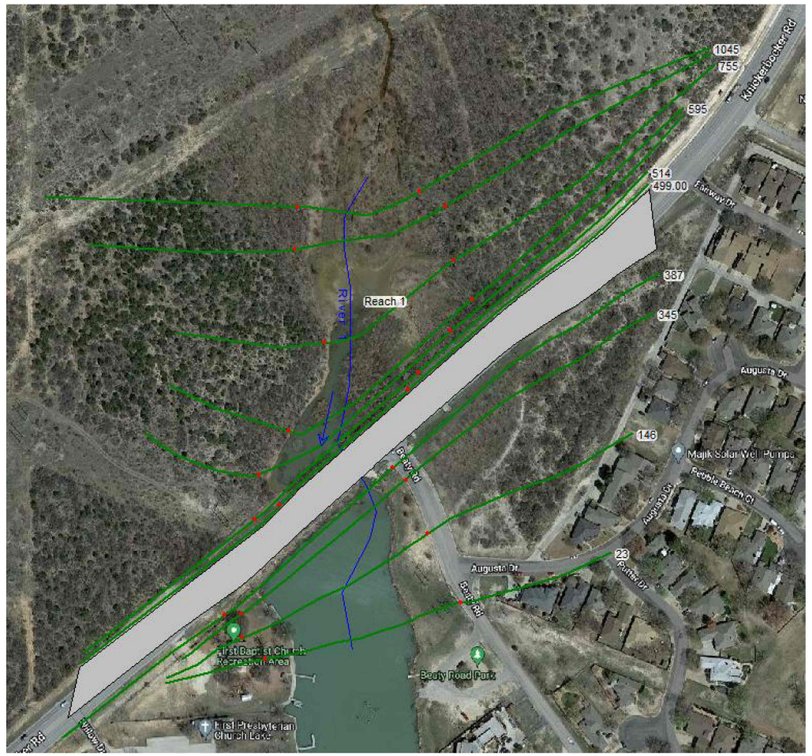


PROPOSED WATER SURFACE PROFILE



PROPOSED US BRIDGE FACE



HEC-RAS CROSS SECTION LOCATIONS

Plan: Prop_Bridge River 1 Reach 1 RS: 484 Culv Group: Culvert #1 Profile: 10yr

Q Culv Group (cfs)	402.53	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	8.47
Q Barrel (cfs)	402.53	Culv Vel DS (ft/s)	11.74
E.G. US. (ft)	1876.14	Culv Inv El Up (ft)	1868.54
W.S. US. (ft)	1875.99	Culv Inv El Dn (ft)	1869.01
E.G. DS (ft)	1873.52	Culv Frctn Ls (ft)	0.16
W.S. DS (ft)	1872.39	Culv Exit Loss (ft)	1.92
Delta EG (ft)	2.63	Culv Entr Loss (ft)	0.56
Delta WS (ft)	3.60	Q Weir (cfs)	
E.G. IC (ft)	1875.46	Weir Sta Lft (ft)	
E.G. OC (ft)	1876.15	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1874.48	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1873.30	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	4.29	Min El Weir Flow (ft)	1882.61

Plan: Prop_Bridge River 1 Reach 1 RS: 484 Culv Group: Culvert #1 Profile: 100yr

Q Culv Group (cfs)	763.18	Culv Full Len (ft)	33.66
# Barrels	1	Culv Vel US (ft/s)	11.92
Q Barrel (cfs)	763.18	Culv Vel DS (ft/s)	14.53
E.G. US. (ft)	1880.24	Culv Inv El Up (ft)	1868.54
W.S. US. (ft)	1880.06	Culv Inv El Dn (ft)	1869.01
E.G. DS (ft)	1875.21	Culv Frctn Ls (ft)	0.28
W.S. DS (ft)	1873.61	Culv Exit Loss (ft)	3.64
Delta EG (ft)	5.03	Culv Entr Loss (ft)	1.10
Delta WS (ft)	6.45	Q Weir (cfs)	
E.G. IC (ft)	1879.98	Weir Sta Lft (ft)	
E.G. OC (ft)	1880.23	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1876.54	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1875.57	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	6.56	Min El Weir Flow (ft)	1882.61

Plan: Prop_Bridge River 1 Reach 1 RS: 484 Culv Group: Culvert #2 Profile: 10yr

Q Culv Group (cfs)	415.47	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	8.63
Q Barrel (cfs)	415.47	Culv Vel DS (ft/s)	11.87
E.G. US. (ft)	1876.14	Culv Inv El Up (ft)	1868.38
W.S. US. (ft)	1875.99	Culv Inv El Dn (ft)	1868.83
E.G. DS (ft)	1873.52	Culv Frctn Ls (ft)	0.16
W.S. DS (ft)	1872.39	Culv Exit Loss (ft)	1.88
Delta EG (ft)	2.63	Culv Entr Loss (ft)	0.58
Delta WS (ft)	3.60	Q Weir (cfs)	
E.G. IC (ft)	1875.45	Weir Sta Lft (ft)	
E.G. OC (ft)	1876.13	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1874.40	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1873.21	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	4.38	Min El Weir Flow (ft)	1882.61

Plan: Prop_Bridge River 1 Reach 1 RS: 484 Culv Group: Culvert #2 Profile: 100yr

Q Culv Group (cfs)	778.32	Culv Full Len (ft)	37.05
# Barrels	1	Culv Vel US (ft/s)	12.16
Q Barrel (cfs)	778.32	Culv Vel DS (ft/s)	14.63
E.G. US. (ft)	1880.24	Culv Inv El Up (ft)	1868.38
W.S. US. (ft)	1880.06	Culv Inv El Dn (ft)	1868.83
E.G. DS (ft)	1875.21	Culv Frctn Ls (ft)	0.28
W.S. DS (ft)	1873.61	Culv Exit Loss (ft)	3.59
Delta EG (ft)	5.03	Culv Entr Loss (ft)	1.15
Delta WS (ft)	6.45	Q Weir (cfs)	
E.G. IC (ft)	1880.02	Weir Sta Lft (ft)	
E.G. OC (ft)	1880.24	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	1876.38	Weir Max Depth (ft)	
Culv WS Outlet (ft)	1875.48	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	6.65	Min El Weir Flow (ft)	1882.61

HEC-RAS BRIDGE OUTPUT DATA

NOTES:

1. SEE NOTES ON HYDRAULIC DATA SHEET 1 OF 2
2. CULVERT FLOWLINES SHOWN ON THE PROPOSED WATER SURFACE PROFILE WERE VERIFIED WITH FIELD SURVEY INFORMATION.

4/3/2024

STATE OF TEXAS
MADISON M. RICE
145812
LICENSED PROFESSIONAL ENGINEER

Kimley»Horn F-928

Texas Department of Transportation

HYDRAULIC DATA

PEDESTRIAN BRIDGE

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	114
0907	00	229,ETC	

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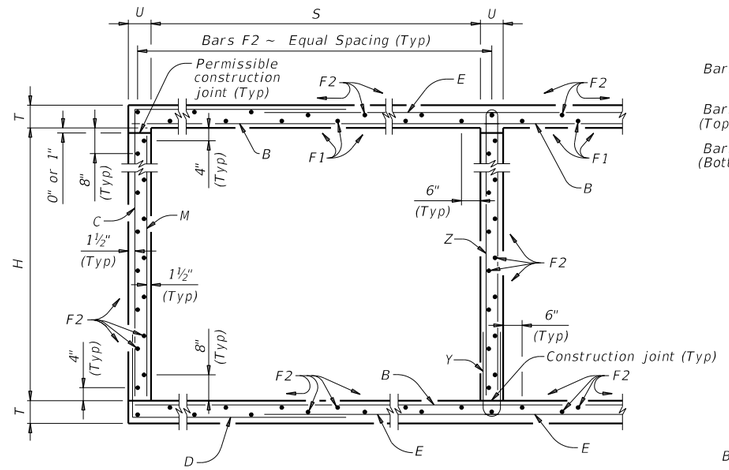
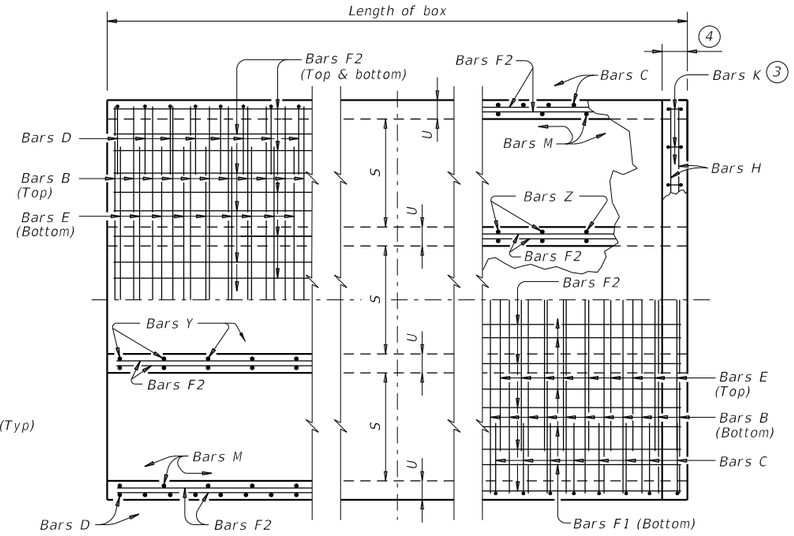
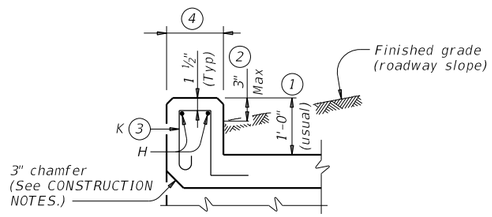


TYPICAL SECTION



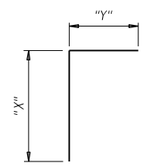
BOTTOM SLAB TOP SLAB

PART PLANS

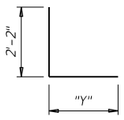


SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-6 ½"	3'-0"
3'-0"	3'-6 ½"	3'-0"
4'-0"	4'-0 ½"	3'-0"



BARS C



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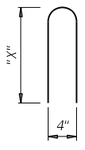
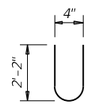
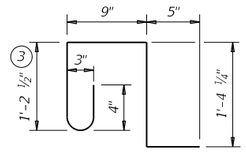


BARS Z



BARS Y



BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

1 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2 For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3 For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86"
Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Multiple Box Culverts Cast-In-Place Miscellaneous Detail (MC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

Use this standard only when lengthening existing multiple box culverts.

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE 4'-0" SPAN 0' TO 23' FILL FOR LENGTHENING ONLY

MC-4-23

FILE: mc423ste-20.dgn	DN: TBE	CK: TAR	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		115

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BILLS OF REINFORCING STEEL (For Box Length = 40 feet)

NUMBER OF SPANS	SECTION DIMENSIONS				Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4								Bars H 4 ~ #4		Bars K		QUANTITIES: Per Foot of Barrel		QUANTITIES: Curb		QUANTITIES: Total	
													Bars C		Bars D																						Bars Y		Bars Z													
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Length	Wt	Length	Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	Length	Wt	Length	Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	4'-0"	2'-0"	8"	7"	108	#5	9"	9'-6"	1,070	162	#4	6"	5'-8"	613	5'-4"	577	108	#5	9"	7'-4"	826	6	18"	39'-9"	159	36	18"	39'-9"	956	108	9"	2'-0"	144	54	9"	4'-7"	165	5'-3"	189	9'-6"	25	22	61	0.611	117.5	0.7	86	25.2	4,785
3	4'-0"	2'-0"	8"	7"	108	#5	9"	14'-1"	1,586	162	#4	6"	5'-8"	613	5'-4"	577	108	#5	9"	11'-11"	1,342	9	18"	39'-9"	239	51	18"	39'-9"	1,354	108	9"	2'-0"	144	108	9"	4'-7"	331	5'-3"	379	14'-1"	38	32	89	0.881	164.1	1.1	127	36.3	6,692
4	4'-0"	2'-0"	8"	7"	108	#5	9"	18'-8"	2,103	162	#4	6"	5'-8"	613	5'-4"	577	108	#5	9"	16'-6"	1,859	12	18"	39'-9"	319	66	18"	39'-9"	1,752	108	9"	2'-0"	144	162	9"	4'-7"	496	5'-3"	568	18'-8"	50	40	111	1.150	210.8	1.4	161	47.4	8,592
5	4'-0"	2'-0"	8"	7"	108	#5	9"	23'-3"	2,619	162	#4	6"	5'-8"	613	5'-4"	577	108	#5	9"	21'-1"	2,375	15	18"	39'-9"	398	81	18"	39'-9"	2,151	108	9"	2'-0"	144	216	9"	4'-7"	661	5'-3"	758	23'-3"	62	50	139	1.420	257.4	1.7	201	58.5	10,497
6	4'-0"	2'-0"	8"	7"	108	#5	9"	27'-10"	3,135	162	#4	6"	5'-8"	613	5'-4"	577	108	#5	9"	25'-8"	2,891	18	18"	39'-9"	478	96	18"	39'-9"	2,549	108	9"	2'-0"	144	270	9"	4'-7"	827	5'-3"	947	27'-10"	74	58	161	1.689	304.0	2.1	235	69.6	12,396
2	4'-0"	3'-0"	8"	7"	108	#5	9"	9'-6"	1,070	162	#4	6"	6'-8"	721	5'-4"	577	108	#5	9"	7'-4"	826	6	18"	39'-9"	159	42	18"	39'-9"	1,115	108	9"	3'-0"	216	54	9"	4'-7"	165	7'-3"	262	9'-6"	25	22	61	0.676	127.8	0.7	86	27.8	5,197
3	4'-0"	3'-0"	8"	7"	108	#5	9"	14'-1"	1,586	162	#4	6"	6'-8"	721	5'-4"	577	108	#5	9"	11'-11"	1,342	9	18"	39'-9"	239	59	18"	39'-9"	1,567	108	9"	3'-0"	216	108	9"	4'-7"	331	7'-3"	523	14'-1"	38	32	89	0.967	177.6	1.1	127	39.7	7,229
4	4'-0"	3'-0"	8"	7"	108	#5	9"	18'-8"	2,103	162	#4	6"	6'-8"	721	5'-4"	577	108	#5	9"	16'-6"	1,859	12	18"	39'-9"	319	76	18"	39'-9"	2,018	108	9"	3'-0"	216	162	9"	4'-7"	496	7'-3"	785	18'-8"	50	40	111	1.258	227.4	1.4	161	51.7	9,255
5	4'-0"	3'-0"	8"	7"	108	#5	9"	23'-3"	2,619	162	#4	6"	6'-8"	721	5'-4"	577	108	#5	9"	21'-1"	2,375	15	18"	39'-9"	398	93	18"	39'-9"	2,469	108	9"	3'-0"	216	216	9"	4'-7"	661	7'-3"	1,046	23'-3"	62	50	139	1.549	277.1	1.7	201	63.7	11,283
6	4'-0"	3'-0"	8"	7"	108	#5	9"	27'-10"	3,135	162	#4	6"	6'-8"	721	5'-4"	577	108	#5	9"	25'-8"	2,891	18	18"	39'-9"	478	110	18"	39'-9"	2,921	108	9"	3'-0"	216	270	9"	4'-7"	827	7'-3"	1,308	27'-10"	74	58	161	1.841	326.9	2.1	235	75.7	13,309
2	4'-0"	4'-0"	8"	7"	108	#5	9"	9'-6"	1,070	162	#4	6"	7'-8"	830	5'-4"	577	108	#5	9"	7'-4"	826	6	18"	39'-9"	159	42	18"	39'-9"	1,115	108	9"	4'-0"	289	54	9"	4'-7"	165	9'-3"	334	9'-6"	25	22	61	0.741	134.1	0.7	86	30.4	5,451
3	4'-0"	4'-0"	8"	7"	108	#5	9"	14'-1"	1,586	162	#4	6"	7'-8"	830	5'-4"	577	108	#5	9"	11'-11"	1,342	9	18"	39'-9"	239	59	18"	39'-9"	1,567	108	9"	4'-0"	289	108	9"	4'-7"	331	9'-3"	667	14'-1"	38	32	89	1.053	185.7	1.1	127	43.2	7,555
4	4'-0"	4'-0"	8"	7"	108	#5	9"	18'-8"	2,103	162	#4	6"	7'-8"	830	5'-4"	577	108	#5	9"	16'-6"	1,859	12	18"	39'-9"	319	76	18"	39'-9"	2,018	108	9"	4'-0"	289	162	9"	4'-7"	496	9'-3"	1,001	18'-8"	50	40	111	1.366	237.3	1.4	161	56.0	9,653
5	4'-0"	4'-0"	8"	7"	108	#5	9"	23'-3"	2,619	162	#4	6"	7'-8"	830	5'-4"	577	108	#5	9"	21'-1"	2,375	15	18"	39'-9"	398	93	18"	39'-9"	2,469	108	9"	4'-0"	289	216	9"	4'-7"	661	9'-3"	1,335	23'-3"	62	50	139	1.679	288.8	1.7	201	68.9	11,754
6	4'-0"	4'-0"	8"	7"	108	#5	9"	27'-10"	3,135	162	#4	6"	7'-8"	830	5'-4"	577	108	#5	9"	25'-8"	2,891	18	18"	39'-9"	478	110	18"	39'-9"	2,921	108	9"	4'-0"	289	270	9"	4'-7"	827	9'-3"	1,668	27'-10"	74	58	161	1.992	340.4	2.1	235	81.8	13,851

Use this standard only when lengthening existing multiple box culverts.

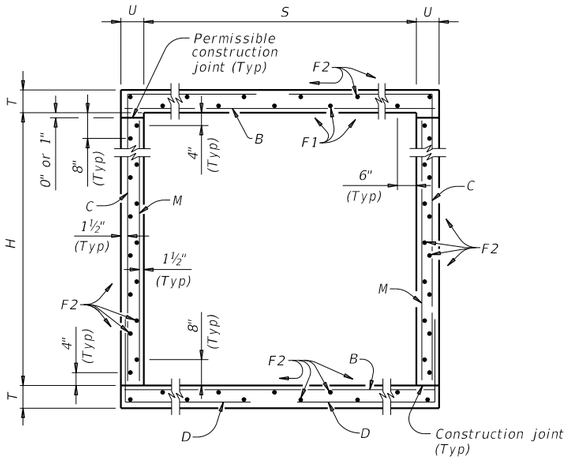
HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

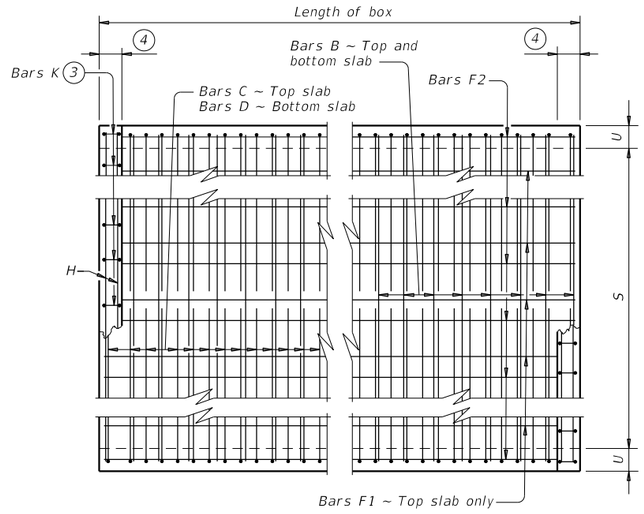
Bridge Division Standard

MULTIPLE BOX CULVERTS
CAST-IN-PLACE
4'-0" SPAN
0' TO 23' FILL
FOR LENGTHENING ONLY
MC-4-23

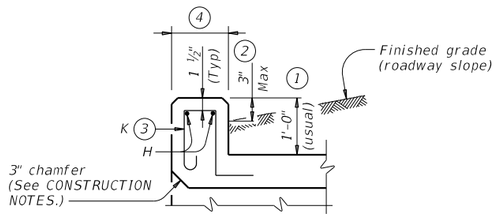
FILE: mc423ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		116



TYPICAL SECTION



PLAN OF REINF STEEL



SECTION THRU CURB

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR.
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.

Chamfer the bottom edge of the top slab 3" at the entrance.

Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.

Provide galvanized reinforcing steel if required elsewhere in the plans.

Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

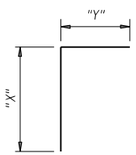
Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min

GENERAL NOTES:

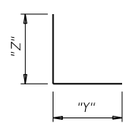
Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.

See the Single Box Culverts Cast-In-Place Miscellaneous Detail (SCC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

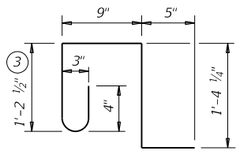
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



BARS C



BARS D



BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

SCC-3 & 4

FILE: scc34ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		117

DATE: 4/26/2024 12:59:08 PM
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SECTION DIMENSIONS				FILL HEIGHT (5)	BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																												QUANTITIES					
					Bars B					Bars C							Bars D							Bars M ~ #4				Bars F1 ~ #4 at 18" Spa			Bars F2 ~ #4 at 18" Spa			Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
S	H	T	U		No.	Size	Spa	Length	Weight	No.	Size	Spa	Length	Weight	" X "	" Y "	No.	Size	Spa	Length	Weight	" Y "	" Z "	No.	Spa	Length	Weight	No.	Length	Wt	No.	Length	Weight	Length	Wt	No.	Wt	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)	Conc (CY)	Reinf (Lb)
3' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	5' – 4"	385	2' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	19	39' – 9"	505	3' – 11"	10	10	28	0.292	48.1	0.3	38	12.0	1,960
3' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	3' – 11"	441	108	#4	9"	6' – 4"	457	3' – 6"	2' – 10"	108	#4	9"	5' – 1"	367	2' – 10"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	23	39' – 9"	611	3' – 11"	10	10	28	0.335	54.3	0.3	38	13.7	2,210
4' – 0"	2' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	5' – 8"	613	2' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	2' – 0"	144	3	39' – 9"	80	21	39' – 9"	558	4' – 11"	13	12	33	0.342	63.4	0.4	46	14.1	2,581
4' – 0"	3' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	6' – 8"	721	3' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	3' – 0"	216	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.385	70.5	0.4	46	15.8	2,867
4' – 0"	4' – 0"	8"	7"	30'	108	#5	9"	4' – 11"	554	162	#4	6"	7' – 8"	830	4' – 6"	3' – 2"	162	#4	6"	5' – 5"	586	3' – 2"	2' – 3"	108	9"	4' – 0"	289	3	39' – 9"	80	25	39' – 9"	664	4' – 11"	13	12	33	0.428	75.1	0.4	46	17.5	3,049

(5) For direct traffic culverts (fill height ≤ 2 ft.), identify the required box size and select the option with the minimum fill height.

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HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS CAST-IN-PLACE
0' TO 30' FILL

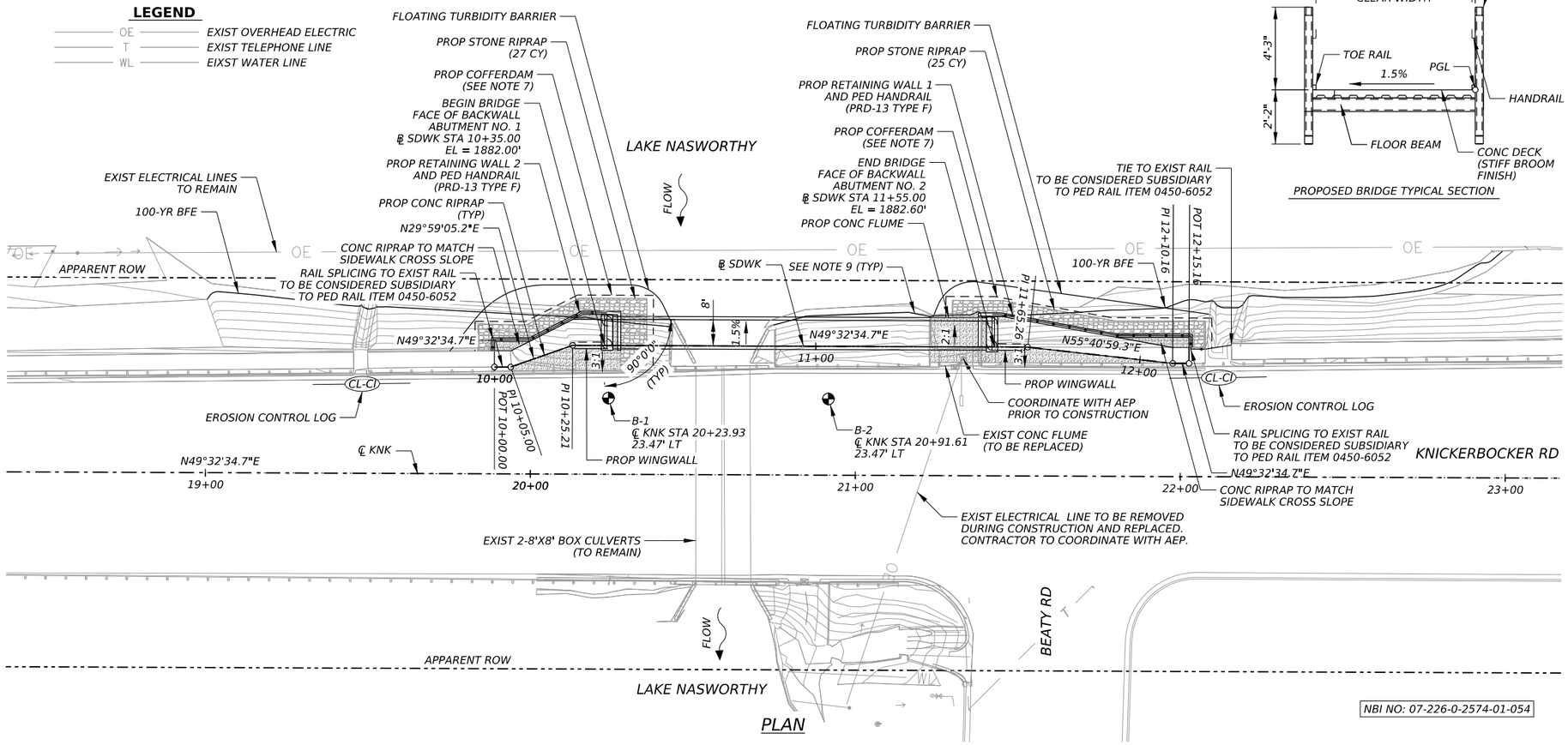
SCC-3 & 4

FILE: scc34ste-21.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
04/2021 Updated X values.	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		118

CK
DW
CK
DW

LEGEND

OE — EXIST OVERHEAD ELECTRIC
T — EXIST TELEPHONE LINE
WL — EIXST WATER LINE



PROPOSED BRIDGE TYPICAL SECTION

NOTES:

1. ALL DIMENSIONS ARE HORIZONTAL AND MUST BE CORRECTED FOR GRADE AND CROSS SLOPE.
2. EXTEND DRILLED SHAFTS TO THE LENGTHS SHOWN. FOR COMPLETE DRILLED SHAFT INFORMATION SEE GEOTECHNICAL REPORT BY RABA KISTNER DATED SEPTEMBER 26, 2023.
3. DESIGN STRESSES ARE IN ACCORDANCE WITH "STANDARD SPECIFICATION FOR HIGHWAY BRIDGES" & "GUIDE SPECIFICATIONS FOR DESIGN OF PEDESTRIAN BRIDGES" BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO), 2009.
4. CONCRETE DECK SURFACE TO BE STIFF BROOM FINISH ACROSS THE WIDTH OF THE BRIDGE.
5. CONTRACTOR TO COORDINATE WITH CITY TO ENSURE POWER LINES ARE DE-ENERGIZED DURING CONSTRUCTION AS NEEDED TO AVOID CONFLICT.
6. LENGTH OF PREFABRICATED SUPERSTRUCTURE IS TO BE 120.00' TO ALLOW FOR 2" EXPANSION GAP ON BOTH ENDS OF STRUCTURE. COVER PLATE TO BE INSTALLED AT EACH GAP.
7. CONTRACTOR TO INSTALL COFFERDAM AND DEWATER AREA INSIDE COFFERDAM FOR THE CONSTRUCTION OF THE RETAINING WALLS AND BRIDGE ABUTMENTS. PAID FOR AS SUBSIDIARY TO ITEM 0420 6013 CL C CONC (ABUT). REFERENCE ITEM 400 SPECIFICATION FOR DEWATERING AND COFFERDAM.
8. SEE SOIL BORE LOG SHEETS FOR GEOTECHNICAL INFORMATION.
9. TREE REMOVAL AND TREE TRIMMING FOR TREES UNDER 12" IN DIAMETER TO BE CONSIDERED SUBSIDIARY TO ITEM 100-6007.
10. FILL EXISTING VOIDS UNDER SIDEWALK WALL WITH FLOWABLE BACKFILL FROM STA 19+50 TO 22+25 AS APPROVED BY ENGINEER.

NBI NO: 07-226-0-2574-01-054

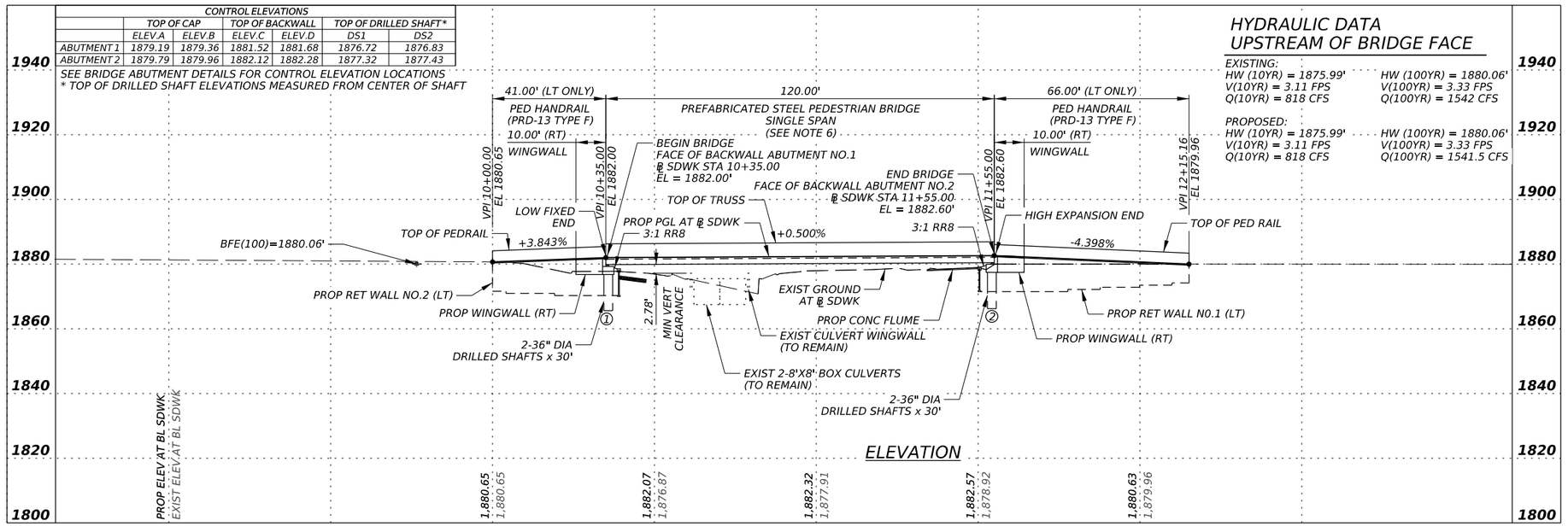
0 20 40

0 20 40

PLAN

CONTROL ELEVATIONS						
	TOP OF CAP		TOP OF BACKWALL		TOP OF DRILLED SHAFT*	
	ELEV.A	ELEV.B	ELEV.C	ELEV.D	DS1	DS2
ABUTMENT 1	1879.19	1879.36	1881.52	1881.68	1876.72	1876.83
ABUTMENT 2	1879.79	1879.96	1882.12	1882.28	1877.32	1877.43

SEE BRIDGE ABUTMENT DETAILS FOR CONTROL ELEVATION LOCATIONS
* TOP OF DRILLED SHAFT ELEVATIONS MEASURED FROM CENTER OF SHAFT



ELEVATION

HYDRAULIC DATA
UPSTREAM OF BRIDGE FACE

EXISTING:
HW (10YR) = 1875.99' HW (100YR) = 1880.06'
V(10YR) = 3.11 FPS V(100YR) = 3.33 FPS
Q(10YR) = 818 CFS Q(100YR) = 1542 CFS

PROPOSED:
HW (10YR) = 1875.99' HW (100YR) = 1880.06'
V(10YR) = 3.11 FPS V(100YR) = 3.33 FPS
Q(10YR) = 818 CFS Q(100YR) = 1541.5 CFS

4/26/2024

YAN G. LINWOOD
131665
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS

Kimley»Horn F-928

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BRIDGE LAYOUT

RM 584 PEDESTRIAN BRIDGE

SAN ANGELO, TEXAS

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	119
0907	00	229,ETC	

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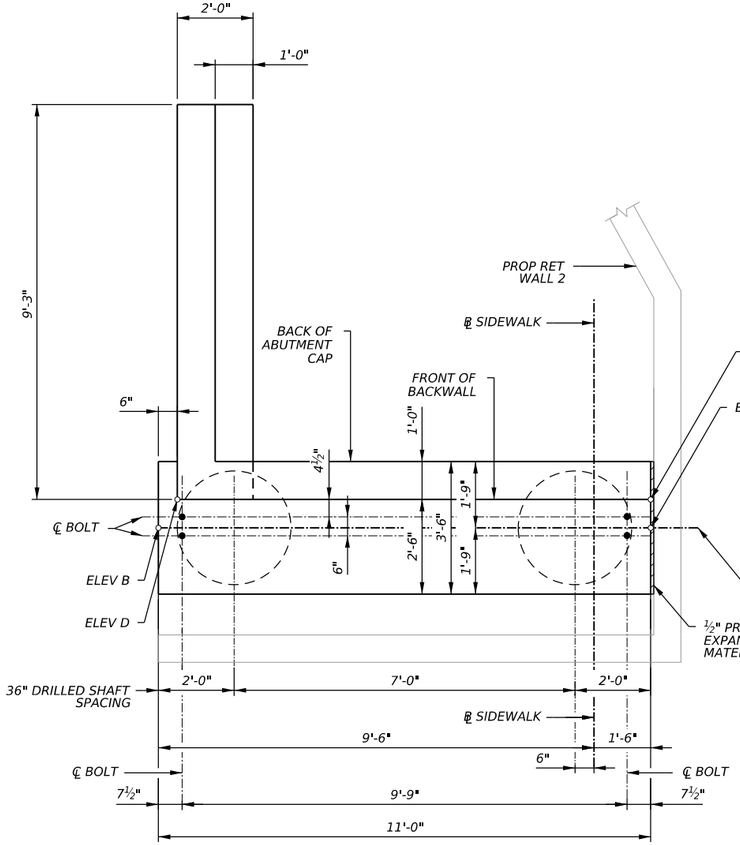
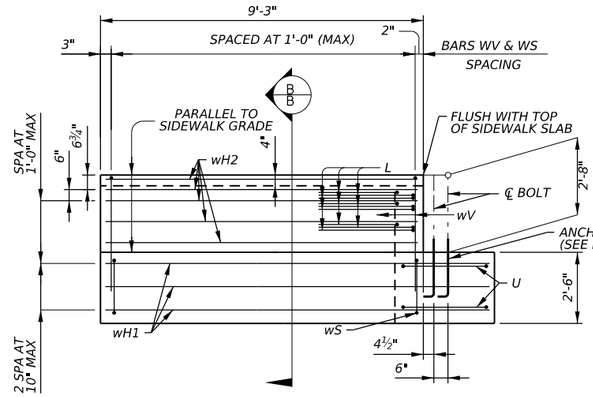
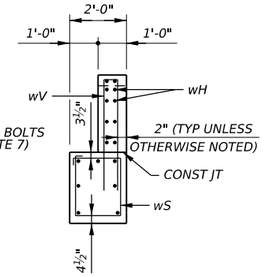


PLAN VIEW



WINGWALL ELEVATION

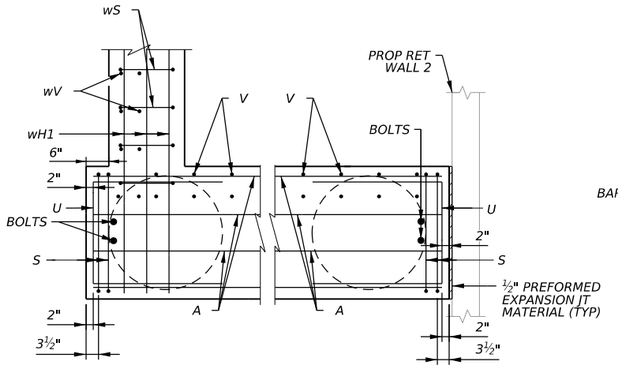


SECTION B-B

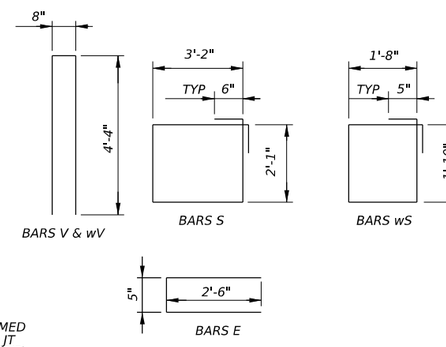
NOTES:

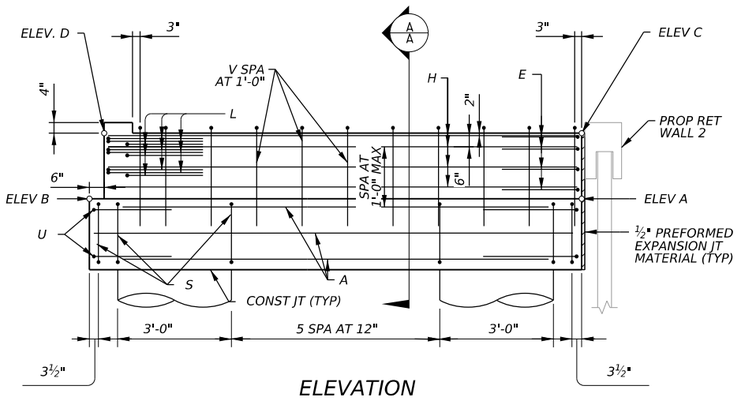
1. SUBSTRUCTURE DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN, 9TH EDITION (2020) AND TXDOT BRIDGE DESIGN MANUAL (JAN. 2023).
2. SEE BRIDGE LAYOUT FOR HEADER SLOPE AND FOUNDATION TYPE, SIZE AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE CONCRETE RIPRAP (CRR) STANDARD SHEET OR STONE RIPRAP (SRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS, IF APPLICABLE.
5. SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALLS.
6. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
7. ABUTMENT DESIGN ASSUMES ASTM F1554 GRADE 36 1" Ø J BOLT WITH 1'-6" EMBEDMENT AND 6" PROJECTION.

CALCULATED SERVICE FOUNDATION LOADS:
ABUTMENT 1 = 54 TONS/ DRILLED SHAFT

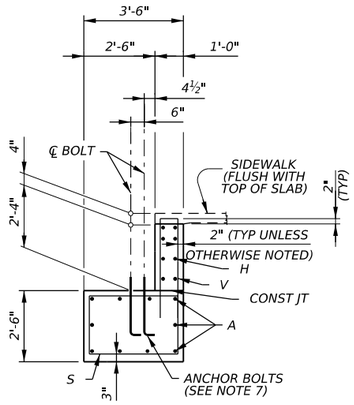


CAP CORNER DETAILS

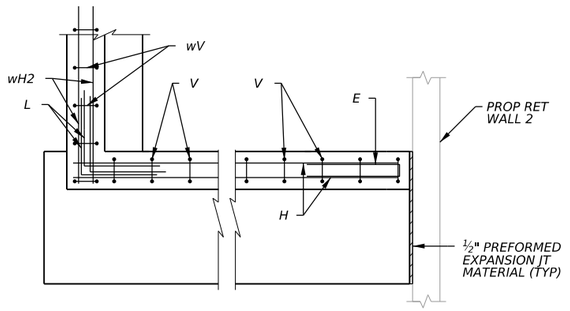




ELEVATION



SECTION A-A



BACKWALL CORNER DETAILS

4/26/2024

Kimley»Horn F-928

RM 584 PEDESTRIAN BRIDGE

ABUTMENT 1 DETAILS

SAN ANGELO, TEXAS

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	120
CONT.	SECT.	JOB	
0907	00	229,ETC	

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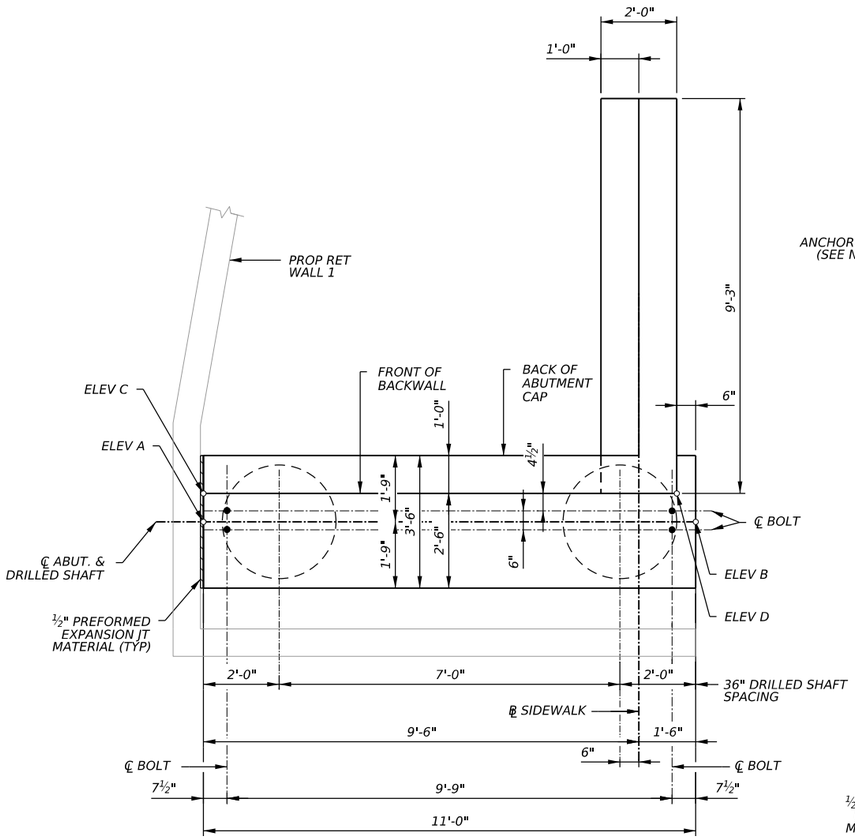
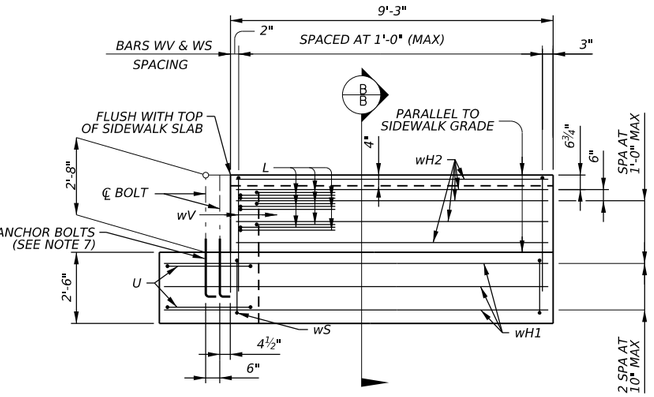
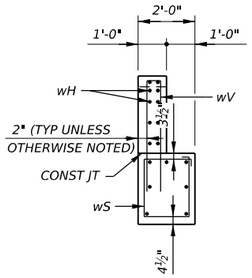


PLAN VIEW



WINGWALL ELEVATION

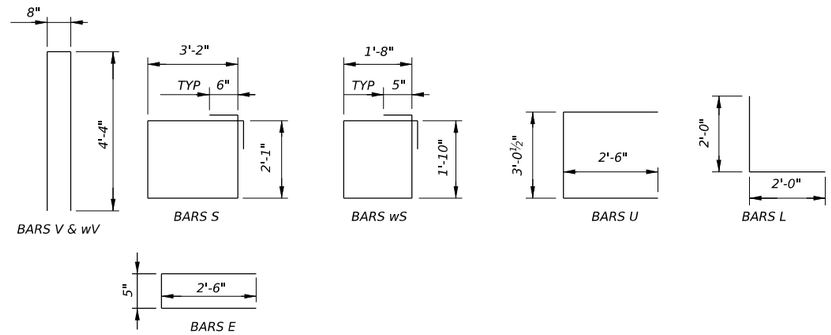


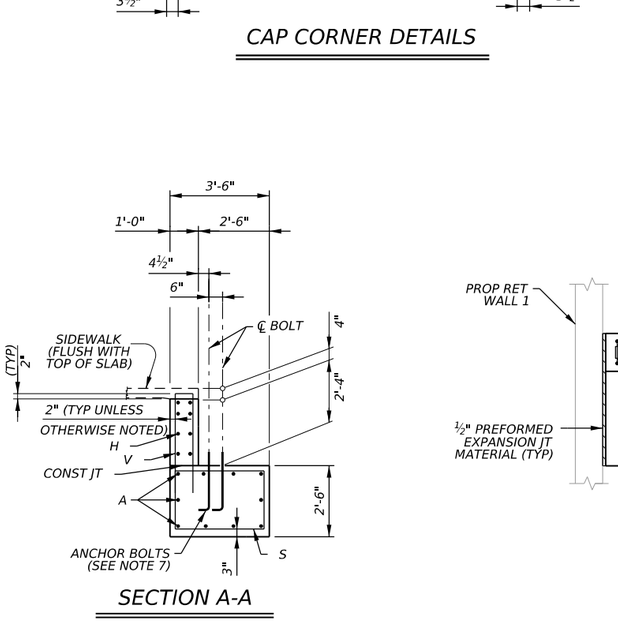
SECTION B-B

NOTES:

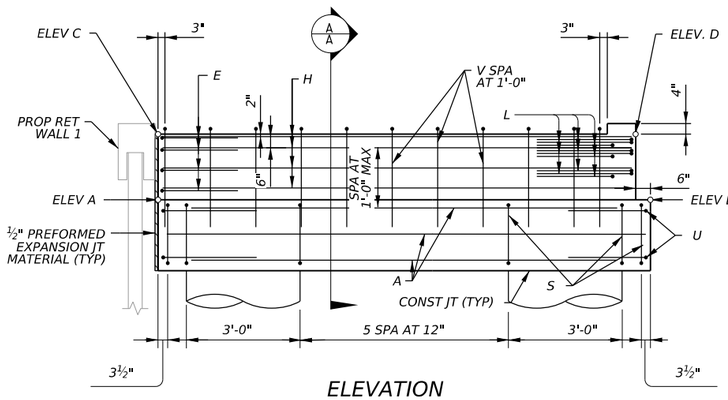
1. SUBSTRUCTURE DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN, 9TH EDITION (2020) AND TXDOT BRIDGE DESIGN MANUAL (JAN. 2023).
2. SEE BRIDGE LAYOUT FOR HEADER SLOPE AND FOUNDATION TYPE, SIZE AND LENGTH.
3. SEE COMMON FOUNDATION DETAILS (FD) STANDARD SHEET FOR ALL FOUNDATION DETAILS AND NOTES.
4. SEE CONCRETE RIPRAP (CRR) STANDARD SHEET OR STONE RIPRAP (SRR) STANDARD SHEET FOR RIPRAP ATTACHMENT DETAILS, IF APPLICABLE.
5. SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE IN WINGWALLS.
6. COVER DIMENSIONS ARE CLEAR DIMENSIONS, UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BAR.
7. ABUTMENT DESIGN ASSUMES ASTM F1554 GRADE 36 1" Ø J BOLT WITH 1'-6" EMBEDMENT AND 6" PROJECTION.

CALCULATED SERVICE FOUNDATION LOADS:
ABUTMENT 2 = 54 TONS/ DRILLED SHAFT



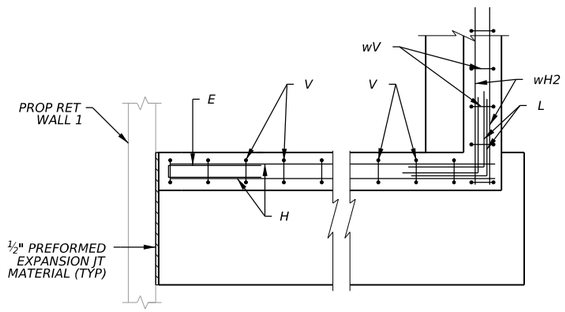


CAP CORNER DETAILS



ELEVATION

SECTION A-A



BACKWALL CORNER DETAILS

4/26/2024

STATE OF TEXAS
YAN G. LINWOOD
131665
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

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RM 584 PEDESTRIAN BRIDGE

ABUTMENT 2 DETAILS

SAN ANGELO, TEXAS

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	121
0907	00	229,ETC	

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CK
DW
CK
DW

CK:
DW:
CK:
DW:

TABLE OF ESTIMATED QUANTITIES				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	10'-8"	567
H	8	#6	10'-8"	129
L	9	#6	4'-0"	55
E	4	#4	5'-5"	15
S	9	#5	11'-6"	108
U	4	#6	8'-1"	49
V	10	#5	9'-4"	98
wH1	7	#6	11'-5"	121
wH2	10	#6	8'-11"	134
wS	10	#4	7'-10"	53
wV	10	#5	9'-4"	98
REINFORCING STEEL			LB	1,427
CLASS "C" CONC (ABUT)			CY	6.7

NOTE: QUANTITIES SHOWN ARE PER ABUTMENT.

SPEC ITEM #	0100 6007	0134 6005	0416 6004	0420 6013	0432 6001	0432 6035	0450 6052	0531 6001	PREFAB
ITEM DESCRIPTION	PREP ROW (TREE)(GREATER THAN 24"	BACKFILL TY A	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	RIPRAP (CONC) (4 IN)	RIPRAP (STONE PROTECTION) (24 IN)	RAIL (HANDRAIL) (TY F)	CONC SIDEWALKS (4")	PED STL TRUSS BRG SPAN (120 FT) LS
UNITS	EA	CY	LF	CY	SY	CY	LF	SY	
ABUTMENT 1 & ABUTMENT 2	2	20	120	13.4	75	52	107	69	1
TOTAL	2	20	120	13.4	75	52	107	69	1

STRUCTURAL NOTES:

1. CONSTRUCTION FOR STRUCTURES, INCLUDING EXCAVATION, COMPACTION, AND BACKFILL SHALL BE IN ACCORDANCE WITH GEOTECHNICAL REPORT BY RABA KISTNER DATED SEPTEMBER 26, 2023.
2. LOCATION OF ALL JOINTS SHALL BE AS SHOWN.
3. ALL EXPANSION JOINTS SHALL BE DOUBLE- CHAMFERED AND SEALED WITH POLYURETHANE JOINT MATERIAL. JOINT SEALERS AND FILLERS SHALL BE IN ACCORDANCE WITH TXDOT ITEM 438, CLEANING AND SEALING JOINTS. SUBMIT PRODUCT DATA FOR ALL JOINTS AND SEALANTS.
4. ALL CONCRETE ABUTMENTS AND DRILLED SHAFTS SHALL BE CLASS C, $f'c$=3600 PSI. ALL MIX DESIGNS SHALL BE SUBMITTED FOR APPROVAL.
5. CHAMFER ALL EXPOSED EDGES OF CONCRETE STRUCTURES 3/4" UNLESS OTHERWISE NOTED.
6. ALL REINFORCING STEEL SHALL BE ASTM A615 GRADE 60 IN ACCORDANCE WITH TXDOT ITEM 440, REINFORCEMENT FOR CONCRETE. SUBMIT CERTIFICATION FOR ALL REINFORCING STEEL.
7. REINFORCED CONCRETE PIERS (DRILLED SHAFTS) SHALL CONFORM TO THE GEOTECHNICAL REPORT AND TXDOT ITEM 416, DRILLED SHAFT FOUNDATIONS.
8. CONTRACTOR SHALL BE RESPONSIBLE FOR SHORING AND BRACING ALL WORK INCLUDING THE PROTECTION OF ALL EXISTING UTILITIES DURING CONSTRUCTION. CONTRACTOR SHALL FIELD VERIFY ALL EXISTING STRUCTURES AND UTILITIES PRIOR TO THE START OF CONSTRUCTION.
9. ALL BACKFILL MATERIAL SHALL BE SELECT FILL IN ACCORDANCE WITH THE GEOTECHNICAL ENGINEERING REPORT AND TXDOT SPECIFICATIONS. WHERE DISCREPANCIES OCCUR, THE PROJECT GEOTECHNICAL REPORT SHALL GOVERN.
10. PRE- MANUFACTURED BRIDGE STRUCTURE SHALL BE AS MANUFACTURED BY "CONTECH ENGINEERED SOLUTIONS" OR APPROVED EQUAL.
11. BRIDGE STRUCTURE SHALL BE DESIGNED FOR THE FOLLOWING CRITERIA:
    - A. VEHICLE LOAD = 5,000 LB
    - B. DEAD LOAD = 24,575 LB
    - C. UNIFORM LIVE LOAD = 21,600 LB
    - D. THERMAL LOAD = 3,690 LB
    - E. WIND UPLIFT (WINDWARD) = -8,400 LBS
    - F. WIND UPLIFT (LEEWARD) = -2,800 LBS
    - G. WIND (VERTICAL) = +/-6,970 LBS
    - H. WIND (LATERAL) = 13,820 LBS
    - I. CLEAR TRAVEL WIDTH = 8 FEET
12. RAILING SHALL BE INSTALLED PER TXDOT STANDARDS AND MANUFACTURER RECOMMENDATIONS. RAILING SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL. SUBMIT SHOP DRAWINGS FOR RAIL CONNECTION TO CONCRETE STRUCTURES.
13. BRIDGE RUB RAIL SHALL BE PROVIDED IN ACCORDANCE WITH MANUFACTURER INSTALLATION.
14. CONTRACTOR SHALL SUBMIT SHOP DRAWINGS CONFORMING TO THE GEOMETRY AND ABUTMENT CONFIGURATION AS SHOWN ON THE PLANS. IF CONTRACTOR SUBMITS A DIFFERENT CONFIGURATION FOR APPROVAL, IT SHALL BE SIGNED AND SEALED BY A REGISTERED PROFESSIONAL ENGINEER IN THE STATE OF TEXAS. CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COSTS INCURRED FOR THE ALTERNATE DESIGN INCLUDING SHOP DRAWING REVIEW AND APPROVAL BY THE COUNTY AND THE COUNTY'S CONSULTING ENGINEER.
15. ALL DIMENSIONS SHALL BE VERIFIED BY CONTRACTOR AND SUBMITTED AS PART OF SHOP DRAWINGS.
16. REINFORCING CLEAR COVER SHALL BE 2" WHERE FORMED AND 3" WHERE CAST AGAINST SOIL UNLESS OTHERWISE NOTED.

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4/26/2024

STATE OF TEXAS
YAN G. LINWOOD
131665
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

Texas Department of Transportation
© 2023

RM 584 PEDESTRIAN BRIDGE

SUMMARY OF ESTIMATED BRIDGE QUANTITIES

SAN ANGELO, TEXAS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	122
0907	00	229,ETC	

DRILLING LOG

WinCore Version 3.3

County	Tom Green	Hole	B-1	District	San Angelo
Highway	RM 584	Structure	Bridge	Date	12/13/22
CSJ	0907-00-229	Station	℄ KNK STA 20+23.93	Grnd. Elev.	0.00 ft
		Offset	23.47' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
-.7			ASPHALT, (3-inches) over BASE, (6-inches)							
			SAND, clayey, compact to dense, moist, brown and light gray (SC)			6	27	13		-%200 = 45
		43 (6) 45 (6)								
5		19 (6) 22 (6)								
-8.						19	39	20		-%200 = 75
			CLAY, w/ sand, soft to medium stiff, moist to wet, brown (CL)							
10		4 (6) 6 (6)								
				15	8	13			142	
15		8 (6) 11 (6)								
-18.						25	32	17		-%200 = 60
			CLAY, sandy, very hard, wet, light gray, w/ some gravel (CL)							
20		50 (0.75) 50 (0.25)								
-23.						17				-%200 = 21
			GRAVEL, poorly graded, sandy, water-bearing, light gray, w/ some clay (GP)							
-25. 25		50 (0.75) 50 (0.25)	SANDSTONE, very hard, light gray, moderately weathered, poor to good							RUN 25'-30': REC: 93%; RQD: 68%
30		50 (1) 50 (0.5)								
				0	1143	2			144	RUN 30'-35': REC: 70%; RQD: 31%
35		50 (0.5) 50 (0)								
-38.										RUN 35'-40': REC: 91%; RQD: 83%
			SHALE, soft to hard, gray, fair							
40		50 (4) 50 (4)								

Remarks: 1. Groundwater was encountered at a depth of 16 ft and rose to a depth of 8.5 ft after 15 minutes.
2. Straight Flight Auger used above 25 ft, and NX Rock Core used below 25 ft.
3. Boring backfilled with bentonite chips. (Latitude, Longitude): (31.399049,-100.484753)

The ground water elevation was not determined during the course of this boring.

Driller: Universal **Logger: Mohammad Dehqan** **Organization: Raba-Kistner, Inc.**

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DRILLING LOG

WinCore Version 3.3

County	Tom Green	Hole	B-1	District	San Angelo
Highway	RM 584	Structure	Bridge	Date	12/13/22
CSJ	0907-00-229	Station	℄ KNK STA 20+23.93	Grnd. Elev.	0.00 ft
		Offset	23.47' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			SHALE, soft to hard, gray, fair							RUN 40'-45': REC: 92%; RQD: 68%
45		50 (2.5) 50 (0.25)								
-48.										RUN 45'-50': REC: 95%; RQD: 70%
			SANDSTONE, hard to very hard, gray, fair to excellent							
50		50 (0.75) 50 (0.75)								
										RUN 50'-55': REC: 80%; RQD: 63%
55		50 (0.5) 50 (0)								
-58.										RUN 55'-60': REC: 100%; RQD: 94%
			CLAYSTONE, hard to very hard, gray, good							
60		50 (2) 50 (2)								
										RUN 60'-65': REC: 92%; RQD: 83%
65		50 (0.25) 50 (0)								
										RUN 65'-70': REC: 100%; RQD: 88%
70		50 (0.5) 50 (0)								
										RUN 70'-75': REC: 93%; RQD: 76%
-75. 75		50 (0.25) 50 (0)								
80										

Remarks: 1. Groundwater was encountered at a depth of 16 ft and rose to a depth of 8.5 ft after 15 minutes.
2. Straight Flight Auger used above 25 ft, and NX Rock Core used below 25 ft.
3. Boring backfilled with bentonite chips. (Latitude, Longitude): (31.399049,-100.484753)

The ground water elevation was not determined during the course of this boring.

Driller: Universal **Logger: Mohammad Dehqan** **Organization: Raba-Kistner, Inc.**

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STATE OF TEXAS
MUHANNAD HUSSEIN
126892
LICENSED
PROFESSIONAL ENGINEER

4/5/2024

Kimley»Horn F-928

Texas Department of Transportation

RM 584 PEDESTRIAN BRIDGE

SOIL BORING LOGS

SHEET 1 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	123
0907	00	229,ETC	

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DRILLING LOG

WinCore Version 3.3

County	Tom Green	Hole	B-2	District	San Angelo
Highway	RM 584	Structure	Bridge	Date	12/13/22
CSJ	0907-00-229	Station	℄ KNK STA 20+91.61	Grnd. Elev.	0.00 ft
		Offset	23.47' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
-.7			ASPHALT, (3-inches) over BASE, (6-inches)							
		22 (6) 23 (6)	CLAY, sandy, stiff to very stiff, moist, light tan and brown, w/ some gravel (CL)			14	35	20		-%200 = 62
5		18 (6) 17 (6)								
-8.						29	49	25		-%200 = 90
10		4 (6) 6 (6)	CLAY, very soft to stiff, moist to wet, brown (CL)							
				13	17	25			124	
15		3 (6) 3 (6)								
-18.						13	21	8		-%200 = 46
20		12 (6) 45 (6)	SAND, clayey, compact, water-bearing, brown and yellowish, w/ some silt (SC)							
-23.						19				-%200 = 11
-25.		50 (3) 50 (1)	GRAVEL, poorly graded, w/ sand, water-bearing, brown and tan (GP)							
25			SANDSTONE, very hard, yellowish brown, moderately weathered, fair, w/ some clay							RUN 25'-30': REC: 60%; RQD: 70%
30		50 (0.75) 50 (0.75)								RUN 30'-35': REC: 95%; RQD: 70%
35		50 (0.75) 50 (0.25)								RUN 35'-40': REC: 85%; RQD: 71%
-38.			SHALE, soft to very hard, gray, fair to excellent							
40		47 (6) 50 (2.25)								

Remarks: 1. Groundwater was encountered at a depth of 16 ft and rose to a depth of 8.5 ft after 15 minutes.
2. Straight Flight Auger used above 25 ft, and NX Rock Core used below 25 ft.
3. Boring backfilled with bentonite chips. (Latitude, Longitude): (31.399164,-100.484588)

The ground water elevation was not determined durirg the course of this boring.

Driller: Universal **Logger: Mohammad Dehqan** **Organization: Raba-Kistner, Inc.**

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DRILLING LOG

WinCore Version 3.3

County	Tom Green	Hole	B-2	District	San Angelo
Highway	RM 584	Structure	Bridge	Date	12/13/22
CSJ	0907-00-229	Station	℄ KNK STA 20+91.61	Grnd. Elev.	0.00 ft
		Offset	23.47' LT	GW Elev.	N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	Properties LL	Properties PI	Properties Wet Den. (pcf)	Additional Remarks
			SHALE, soft to very hard, gray, fair to excellent							
				0	379	7			146	RUN 40'-45': REC: 80%; RQD: 80%
45		5 (2) 50 (0)								
										RUN 45'-50': REC: 95%; RQD: 80%
50		50 (0.25) 50 (0.25)								
										RUN 50'-55': REC: 100%; RQD: 99%
55		50 (2) 50 (2)								
										RUN 55'-60': REC: 87%; RQD: 79%
60		50 (0.25) 50 (0.75)								
										RUN 60'-65': REC: 68%; RQD: 67%
-68.			SANDSTONE, very hard, gray, good to excellent							
65		50 (0.75) 50 (0)								
										RUN 65'-70': REC: 94%; RQD: 70%
70		50 (0.5) 50 (0.5)								
										RUN 70'-75': REC: 95%; RQD: 90%
-75.		50 (0.25) 50 (0)								
75										
80										

Remarks: 1. Groundwater was encountered at a depth of 16 ft and rose to a depth of 8.5 ft after 15 minutes.
2. Straight Flight Auger used above 25 ft, and NX Rock Core used below 25 ft.
3. Boring backfilled with bentonite chips. (Latitude, Longitude): (31.399164,-100.484588)

The ground water elevation was not determined during the course of this boring.

Driller: Universal **Logger: Mohammad Dehqan** **Organization: Raba-Kistner, Inc.**

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STATE OF TEXAS
MUHANNAD HUSSEIN
126892
LICENSED
PROFESSIONAL ENGINEER

4/5/2024

Kimley»Horn F-928

RM 584 PEDESTRIAN BRIDGE

SOIL BORING LOGS

SHEET 2 OF 2

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	124
CONT.	SECT.	JOB	
0907	00	229,ETC	

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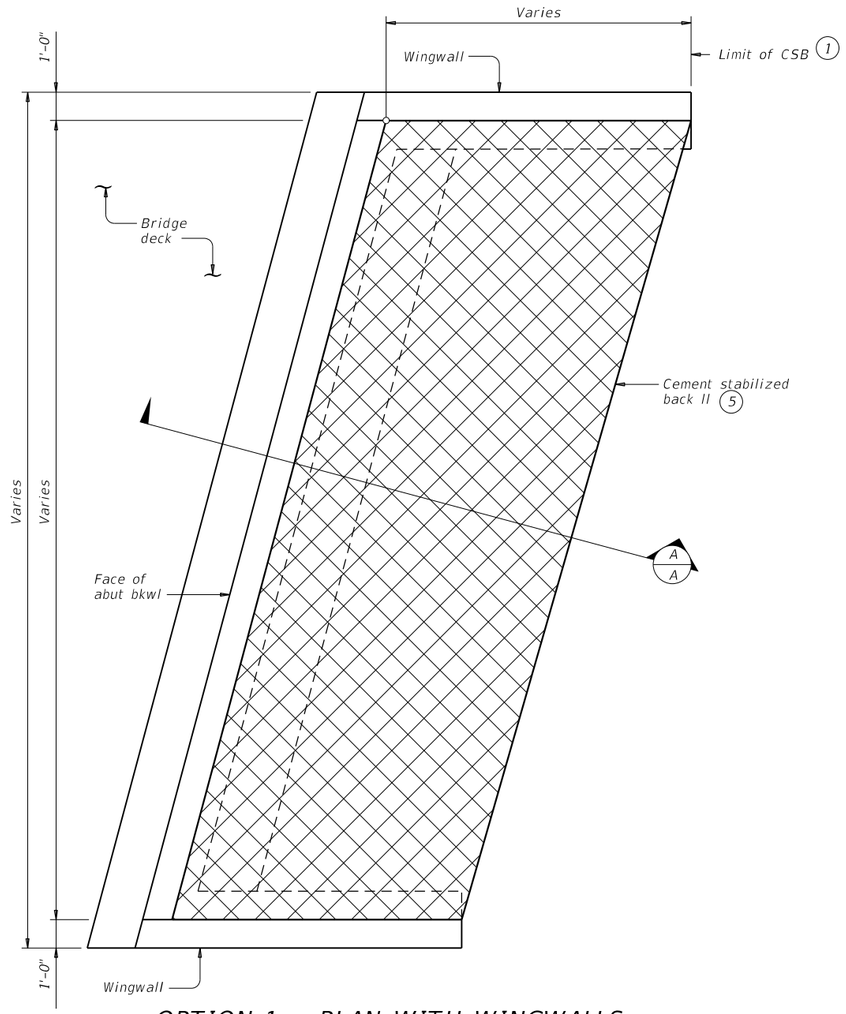
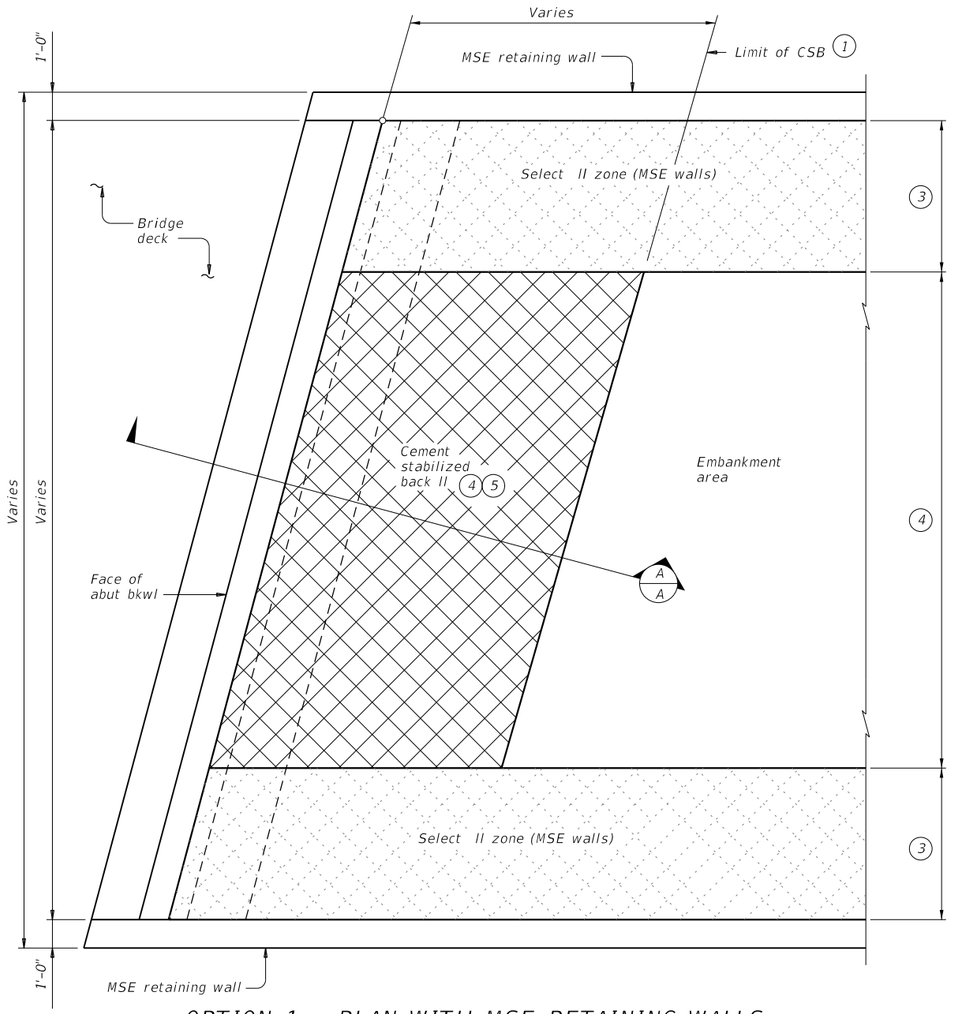
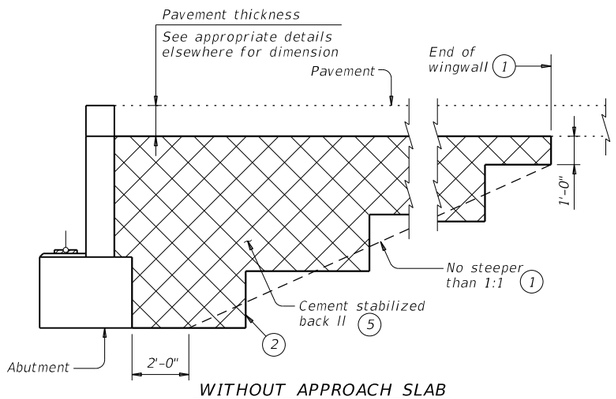


OPTION 1 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 1 ~ PLAN WITH MSE RETAINING WALLS



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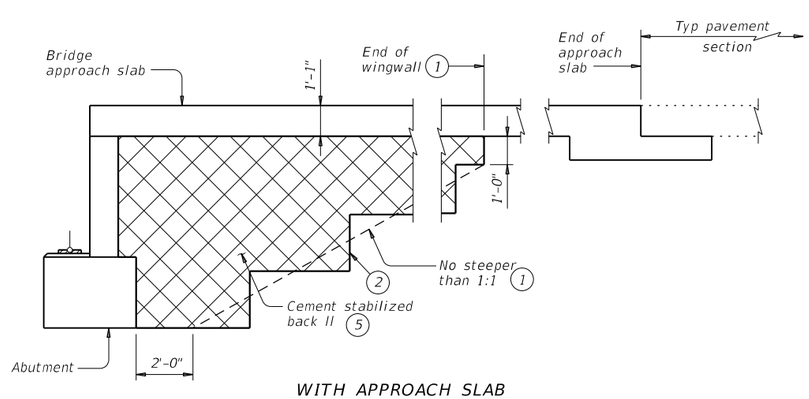

WITH APPROACH SLAB

(Showing BAS-C, BAS-A similar.)

SECTION A-A

(1) Usual limit of Cement Stabilized Back II is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of back II.

(2) Bench back II as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select II zone. See retaining wall details for additional information.

(4) When distance between select II zones is less than 5'-0", MSE select II may be substituted for cement stabilized back II with approval from the Engineer.

(5) If shown in the plans, owable back II can be used as a substitute for cement stabilized back II with the following constraints:
a). If owable back II is to be placed over MSE back II, then a lter fabric will be placed over the MSE back II prior to placement of the owable II; and
b). Place owable II in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has sti ened/hardened (i.e. has lost its owability).

GENERAL NOTES:

See the Bridge Layout for selected Option. Option 1 is intended for construction only requiring plasticity index (PI) controlled embankment II or excavation in competent soils/rocks in order to construct the abutment. Option 2 is intended for new construction requiring high plasticity embankment II with a PI greater than 30 or pavement built in poor native soil. Poor soils are de ned as high plasticity clays or expansive clays.

Construct abutment back II in accordance with Item 400, "Excavation and Back II for Structures".

Provide Cement Stabilized Back II (CSB) meeting the requirements of Item 400, "Excavation and Back II for Structures", to the limits shown at bridge abutments.

If required elsewhere in the plans, provide Flowable Back II meeting the requirements of Item 401, "Flowable Back II", to the limits shown at bridge abutments.

Details are drawn showing left forward skew. See Bridge Layout for actual skew direction.

These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		125

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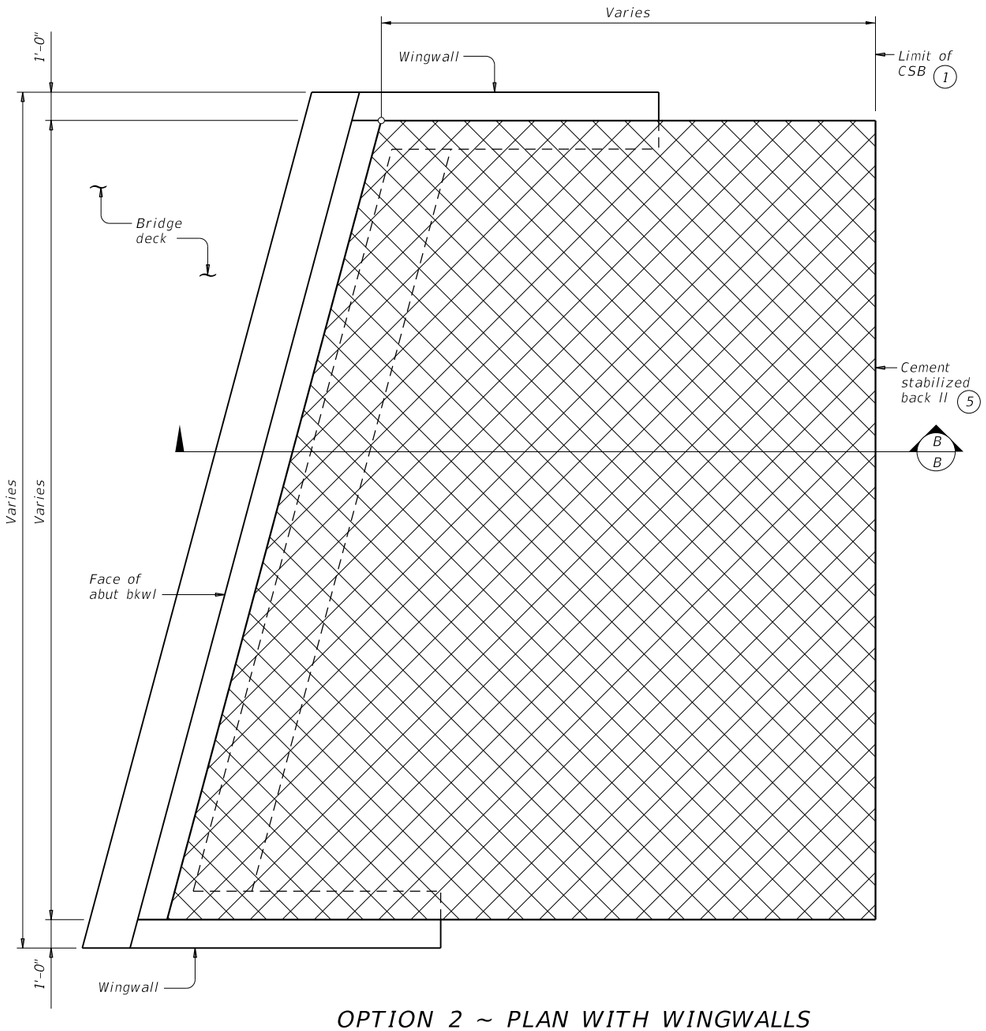
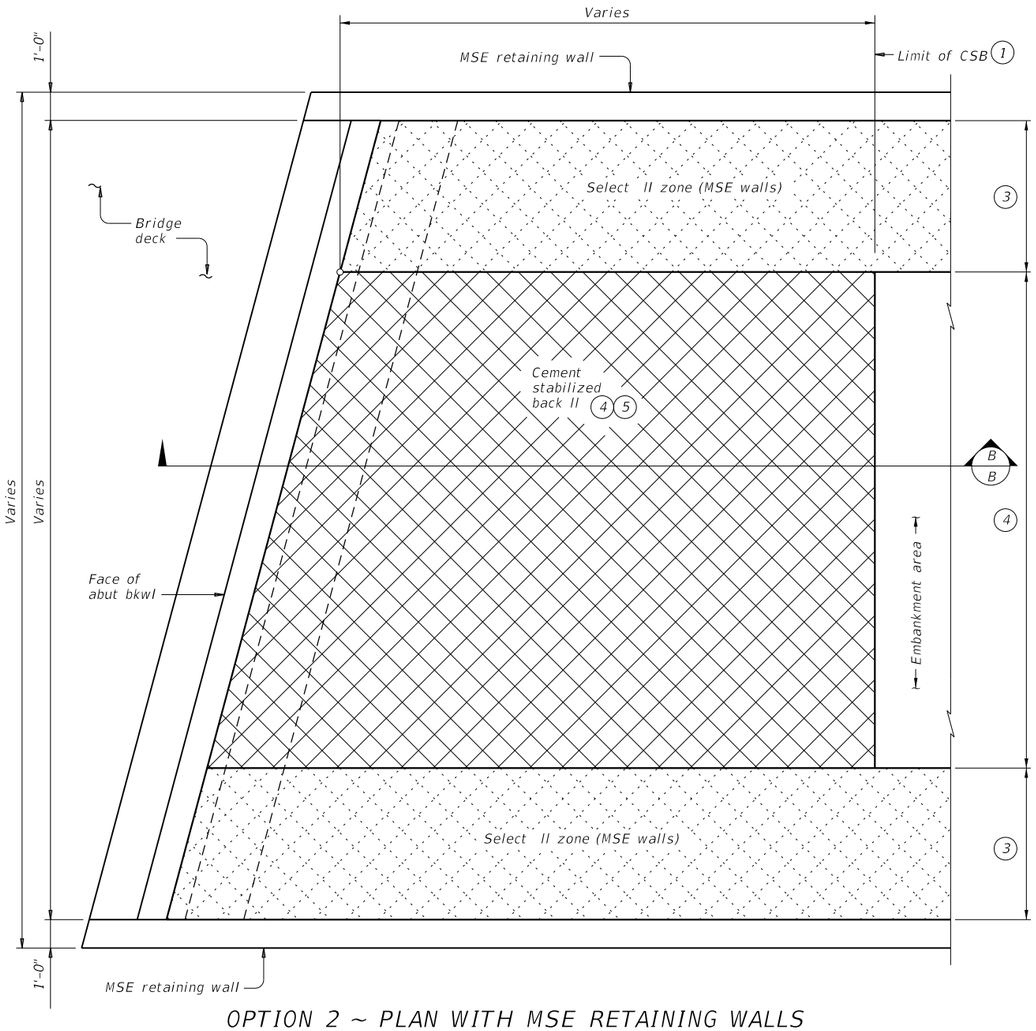


OPTION 2 ~ PLAN WITH WINGWALLS

Cast-in-place retaining walls similar.



OPTION 2 ~ PLAN WITH MSE RETAINING WALLS

(1) Usual limit of Cement Stabilized Back II is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of back II.

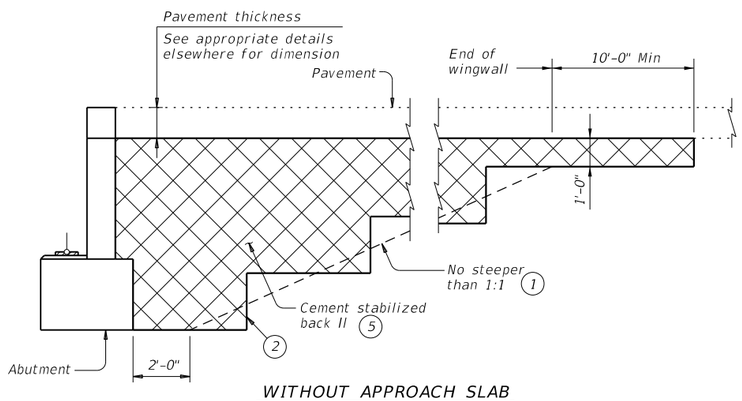
(2) Bench back II as shown with 12" (approximate) bench depths.

(3) Where MSE retaining walls are present, adjust CSB limits to accommodate the select II zone. See retaining wall details for additional information.

(4) When distance between select II zones is less than 5'-0", MSE select II may be substituted for cement stabilized back II with approval from the Engineer.

(5) If shown in the plans, owable back II can be used as a substitute for cement stabilized back II with the following constraints:
a). If owable back II is to be placed over MSE back II, then a lter fabric will be placed over the MSE back II prior to placement of the owable II; and
b). Place owable II in lifts not exceeding 2 feet in height. Place each successive lift when the previous lift has sti ened/hardened (i.e. has lost its owability).

(6) 1'-0" for BAS-A
1'-10" for BAS-C



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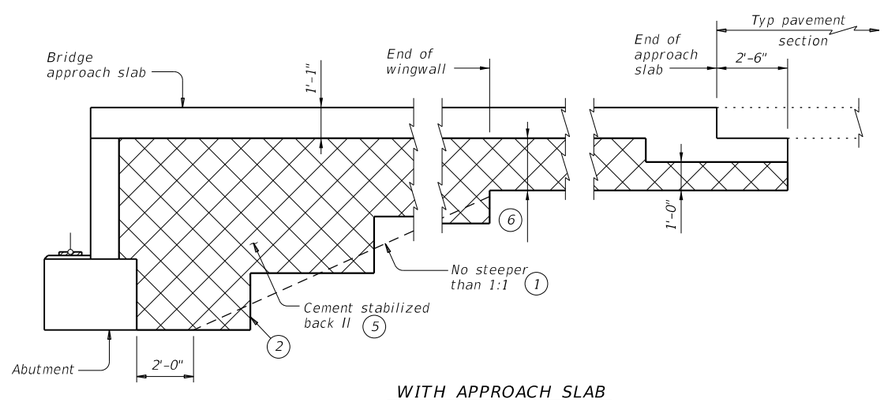

WITH APPROACH SLAB
(Showing BAS-C, BAS-A similar.)

SECTION B-B

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

CEMENT STABILIZED ABUTMENT BACKFILL

BRIDGE ABUTMENT

CSAB

FILE: MS-CSAB-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
02-20: Added Option 2. 03-23: Updated General Notes.	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		126

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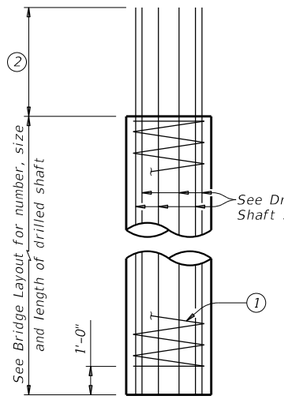
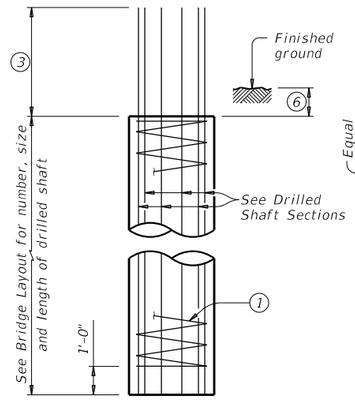
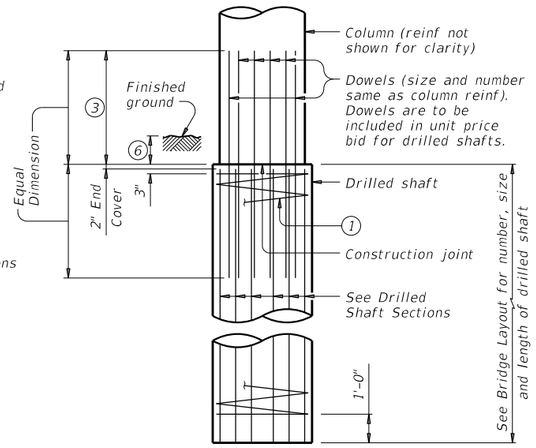


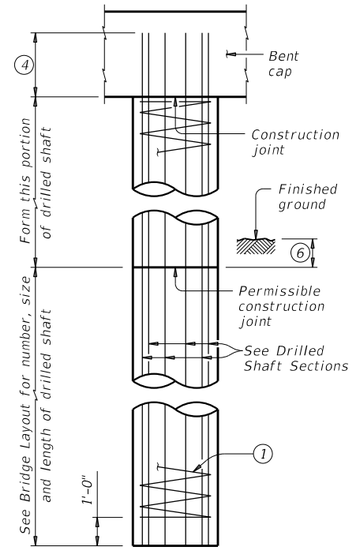
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



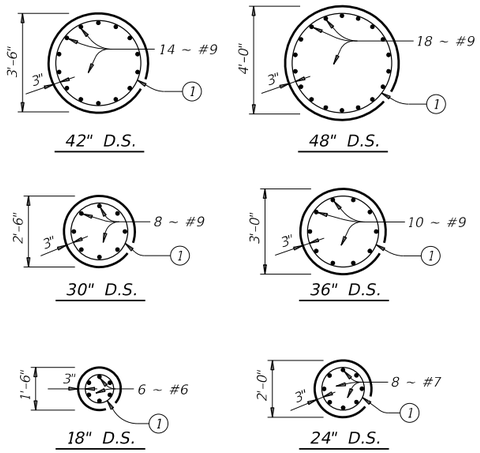
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

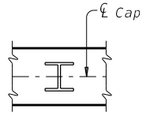


DRILLED SHAFT SECTIONS

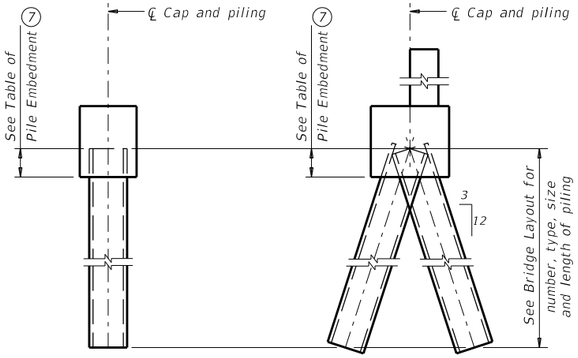
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.

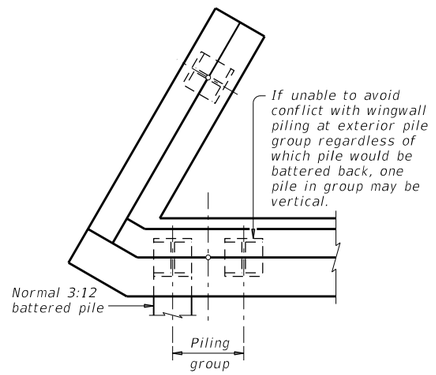


ORIENTATION OF STEEL H-PILING

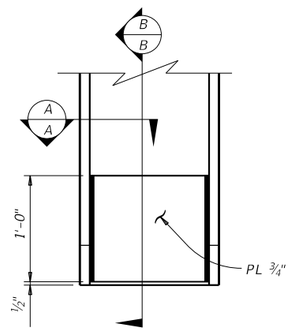


VERTICAL PILE BATTERED PILE

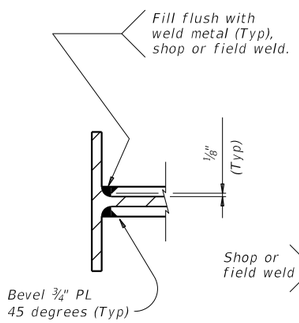
PILING DETAILS
(Concrete or steel H)



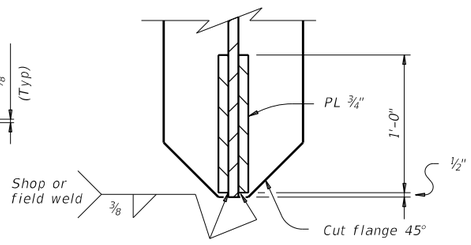
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



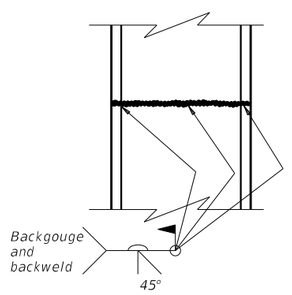
SECTION A-A

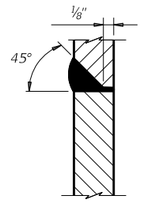


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

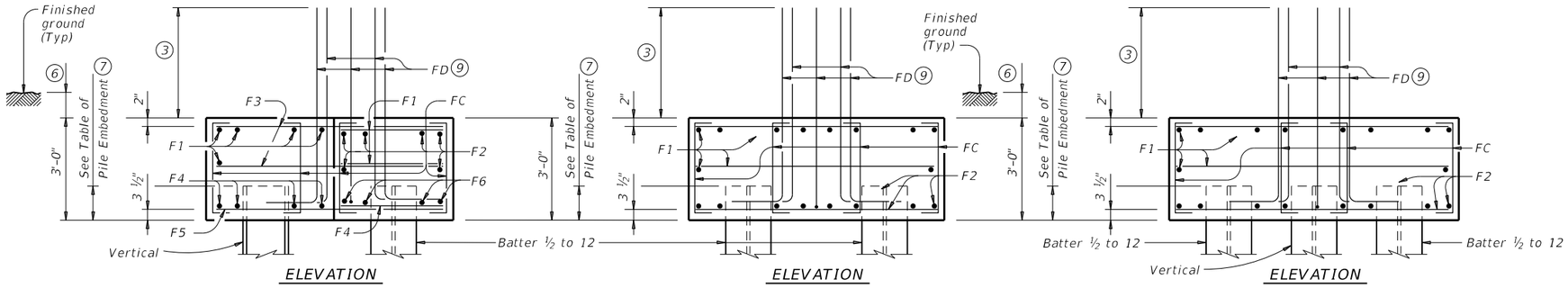
Texas Department of Transportation

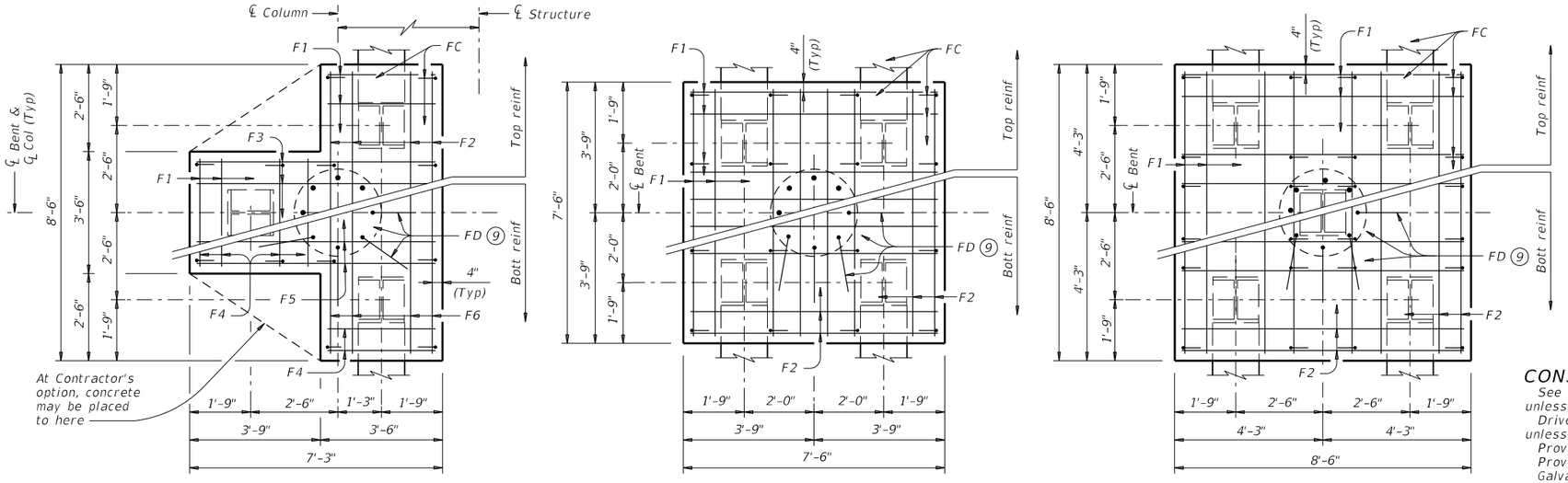
Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		127





THREE PILE FOOTING (8)

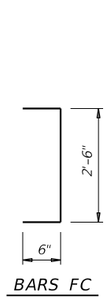
For 36" Dia and smaller columns.

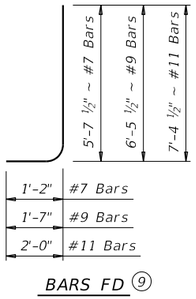
FOUR PILE FOOTING (8)

For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.





(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		128

DATE: 4/26/2024 1:02:42 PM
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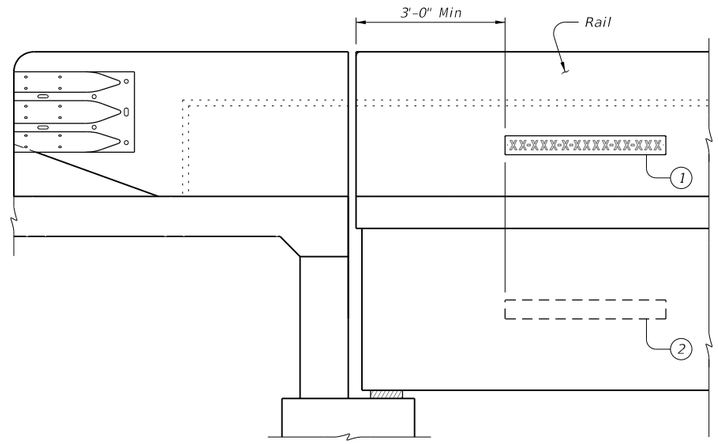
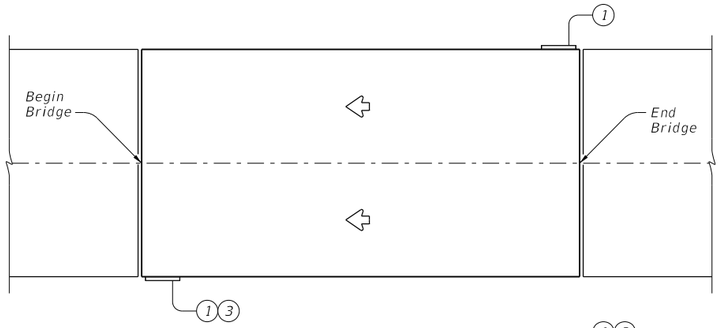
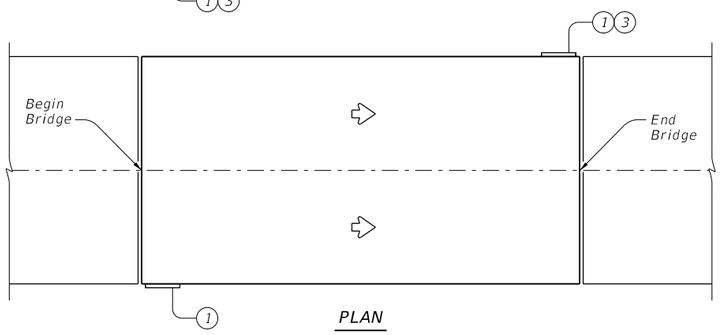


ELEVATION

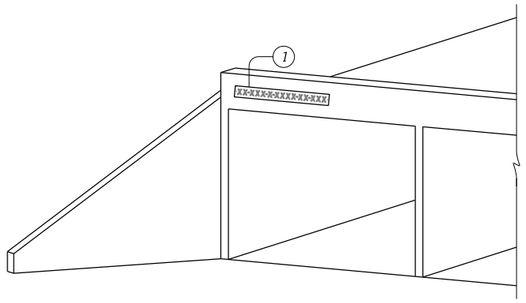


PLAN

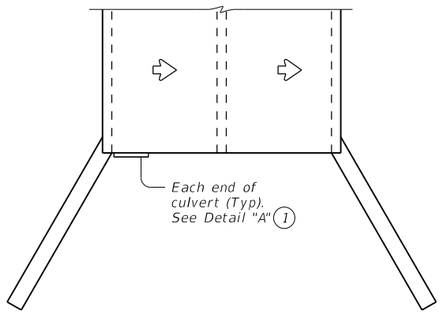


PLAN

BRIDGE SIGN LOCATIONS

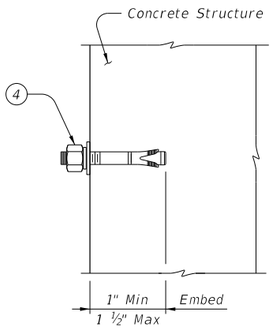


DETAIL "A"

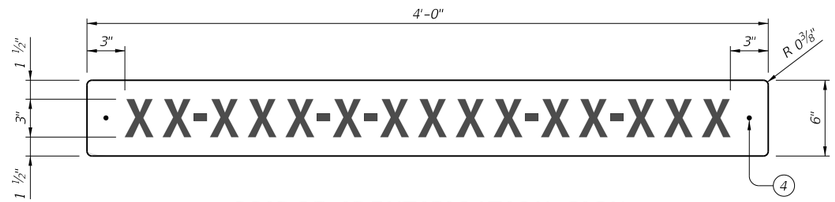


PLAN

BRIDGE CLASS CULVERT SIGN PLACEMENT



ANCHOR DETAIL



BRIDGE IDENTIFICATION SIGN

SHEETING REQUIREMENTS		
Usage	Color	Sign Face Material
Background	White	Type B or C Sheeting
Letters and Symbols	Black	Type B or C Sheeting

(1) Bridge identification sign location

(2) Alternate sign placement location for exterior concrete beams.

(3) If adjacent bridges are less than 2 feet apart, these signs may be omitted.

(4) ¼" Diameter stainless steel expansion anchor with hex nut, washer, and spring-lock washer.

SIGN NOTES:

Standard sign designs can be found in the Standard Highway Sign Designs for Texas (SHSD).

Use the Clearview Alphabet CV-2W for the letters and symbols.

MATERIAL NOTES:

Provide lateral spacing between letters and numerals conforming with the SHSD, and any approved changes thereto. Provide a balanced appearance when spacing is not shown.

Provide aluminum sign blanks with a minimum thickness of 0.080" that meet the requirements of DMS-7110.

Provide sign face materials that meet the requirements of DMS-8300 and the sheeting requirements shown in the table.

Provide ¼" diameter stainless steel expansion anchors with one hex head nut, one flat washer, and one helical spring-lock washer each.

Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). Provide anchor products that have a designated ICC-ES Evaluation Report number. The approval status must be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.

Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.

Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environments, provide both stainless steel anchor bodies and expansion wedges.

GENERAL NOTES:

Prior to hole drilling, locate rebar to ensure clearing of existing reinforcement and/or strands.

Prior to installation, obtain approval of sign locations from the Engineer. Avoid placement of sign over travel lanes and pedestrian walkways. Submit proposed installation method to Engineer prior to beginning work. Install anchors as shown on plans and in accordance with the anchor manufacturer's published installation instructions.

Do not install anchors sections of members under tension.

For new construction, the signs and anchors are subsidiary to the bridge. For installations on existing structures, the signs and anchors are paid under Item 442, "Metal for Structures." Each sign weighs 28 lbs.

Texas Department of Transportation

Bridge Division Standard

NBI BRIDGE IDENTIFICATION SIGN STANDARD

NBIS

FILE: MS-NBIS-23.dgn	DN: TAR	CK: TxDOT	DW: JER	CK: TAR
©TxDOT March 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		129

DATE: 4/26/2024 1:03:04 PM
FILE: c:\pw\kh1\d0251621\MS-NBIS-23 (1).dgn

EXISTING SIGNALS TO BE REMOVED

H4S — SH 13

H3 — SH 2, 3, 7, 10, 11, 14

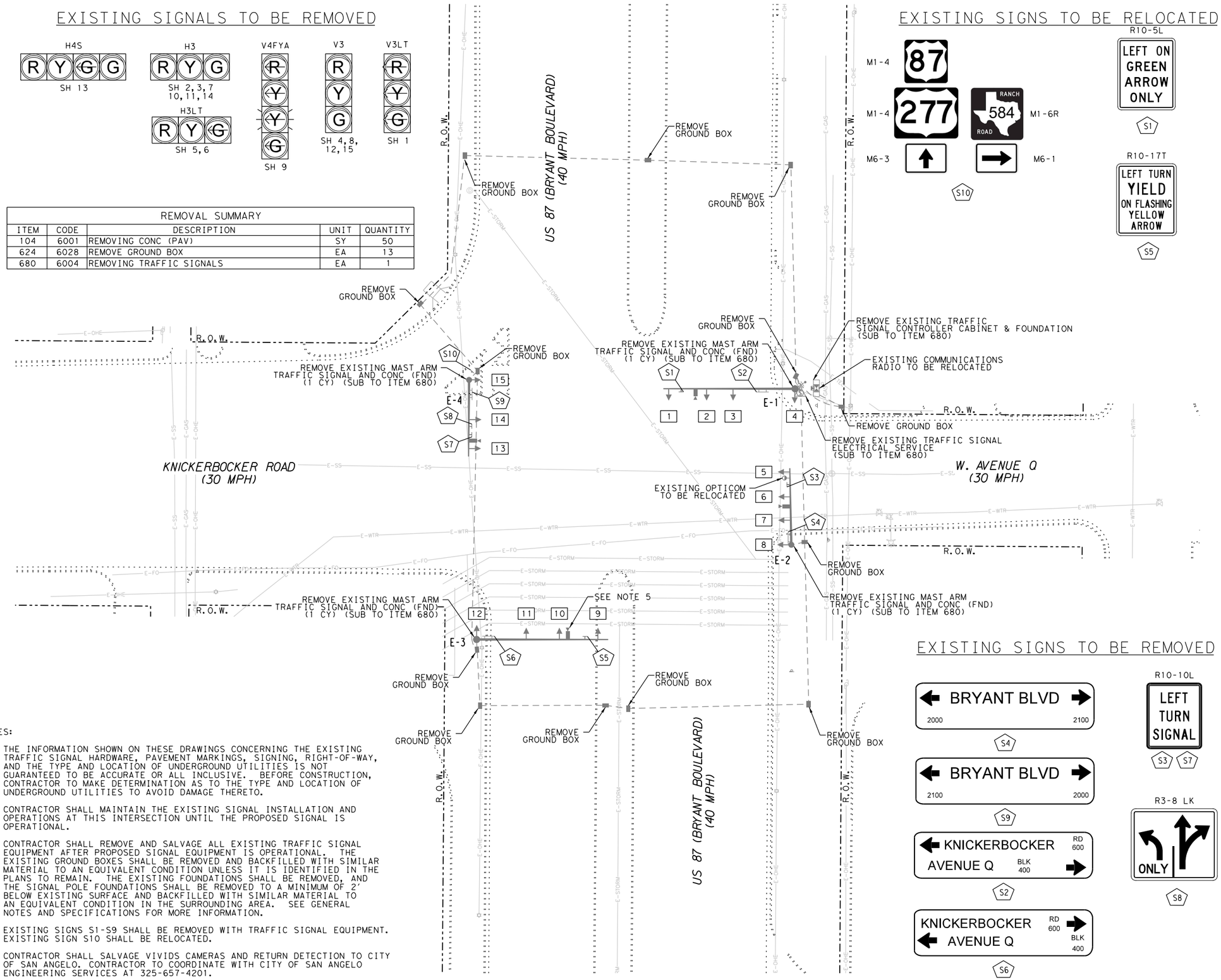
H3LT — SH 5, 6

V4FYA — SH 9

V3 — SH 4, 8, 12, 15

V3LT — SH 1

REMOVAL SUMMARY				
ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
104	6001	REMOVING CONC (PAV)	SY	50
624	6028	REMOVE GROUND BOX	EA	13
680	6004	REMOVING TRAFFIC SIGNALS	EA	1



EXISTING SIGNS TO BE RELOCATED

M1-4 / 87 / M1-4 / 277 / RANCH 584 ROAD / M1-6R / M6-3 / M6-1 — S10

R10-5L "LEFT ON GREEN ARROW ONLY" — S1

R10-17T "LEFT TURN YIELD ON FLASHING YELLOW ARROW" — S5

NOTES:

1. THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING THE EXISTING TRAFFIC SIGNAL HARDWARE, PAVEMENT MARKINGS, SIGNING, RIGHT-OF-WAY, AND THE TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. BEFORE CONSTRUCTION, CONTRACTOR TO MAKE DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES TO AVOID DAMAGE THERETO.
2. CONTRACTOR SHALL MAINTAIN THE EXISTING SIGNAL INSTALLATION AND OPERATIONS AT THIS INTERSECTION UNTIL THE PROPOSED SIGNAL IS OPERATIONAL.
3. CONTRACTOR SHALL REMOVE AND SALVAGE ALL EXISTING TRAFFIC SIGNAL EQUIPMENT AFTER PROPOSED SIGNAL EQUIPMENT IS OPERATIONAL. THE EXISTING GROUND BOXES SHALL BE REMOVED AND BACKFILLED WITH SIMILAR MATERIAL TO AN EQUIVALENT CONDITION UNLESS IT IS IDENTIFIED IN THE PLANS TO REMAIN. THE EXISTING FOUNDATIONS SHALL BE REMOVED, AND THE SIGNAL POLE FOUNDATIONS SHALL BE REMOVED TO A MINIMUM OF 2' BELOW EXISTING SURFACE AND BACKFILLED WITH SIMILAR MATERIAL TO AN EQUIVALENT CONDITION IN THE SURROUNDING AREA. SEE GENERAL NOTES AND SPECIFICATIONS FOR MORE INFORMATION.
4. EXISTING SIGNS S1-S9 SHALL BE REMOVED WITH TRAFFIC SIGNAL EQUIPMENT. EXISTING SIGN S10 SHALL BE RELOCATED.
5. CONTRACTOR SHALL SALVAGE VIVIDS CAMERAS AND RETURN DETECTION TO CITY OF SAN ANGELO. CONTRACTOR TO COORDINATE WITH CITY OF SAN ANGELO ENGINEERING SERVICES AT 325-657-4201.

EXISTING SIGNS TO BE REMOVED

BRYANT BLVD 2000 2100 — S4

BRYANT BLVD 2100 2000 — S9

KNICKERBOCKER AVENUE Q RD 600 BLK 400 — S2

KNICKERBOCKER AVENUE Q RD 600 BLK 400 — S6

R10-10L "LEFT TURN SIGNAL" — S3 S7

R3-8 LK "ONLY" — S8

0 10 20 40
ORIGINALLY PLOTTED SCALE: SCALE: 1" = 40'

LEGEND

- EXISTING TYPICAL MAST ARM COMBINATION SIGNAL \ WITH PEDESTRIAN SIGNAL, PUSH BUTTON, LED LUMINAIRE, AND SIGNAGE
- EXISTING TRAFFIC SIGNAL CONTROLLER CABINET
- EXISTING GROUND BOX
- EXISTING CONDUIT
- EXISTING ELECTRICAL SERVICE
- EXISTING OPTICOM
- EXISTING VIVDS DETECTORS
- SIGNAL HEAD NUMBER
- SIGN LABEL
- E-# EXISTING TRAFFIC SIGNAL POLE NUMBER
- REMOVAL
- E-STORM EXISTING STORM LINE
- E-SS EXISTING SEWER LINE
- E-OHE EXISTING OVERHEAD CABLE
- E-WTR EXISTING WATER LINE
- E-GAS EXISTING GAS LINE
- E-FO EXISTING FIBER OPTIC LINE

4/23/2024

STATE OF TEXAS — HIRON M. FERNANDO — 123288 — LICENSED PROFESSIONAL ENGINEER

Kimley»Horn
F-928
2600 N. Central Expressway
Suite 400
Richardson, Texas 75080
Tel. No. (214) 617-0535

THE CITY OF SAN ANGELO TEXAS

TRAFFIC SAFETY IMPROVEMENTS

EXISTING CONDITIONS AND REMOVALS

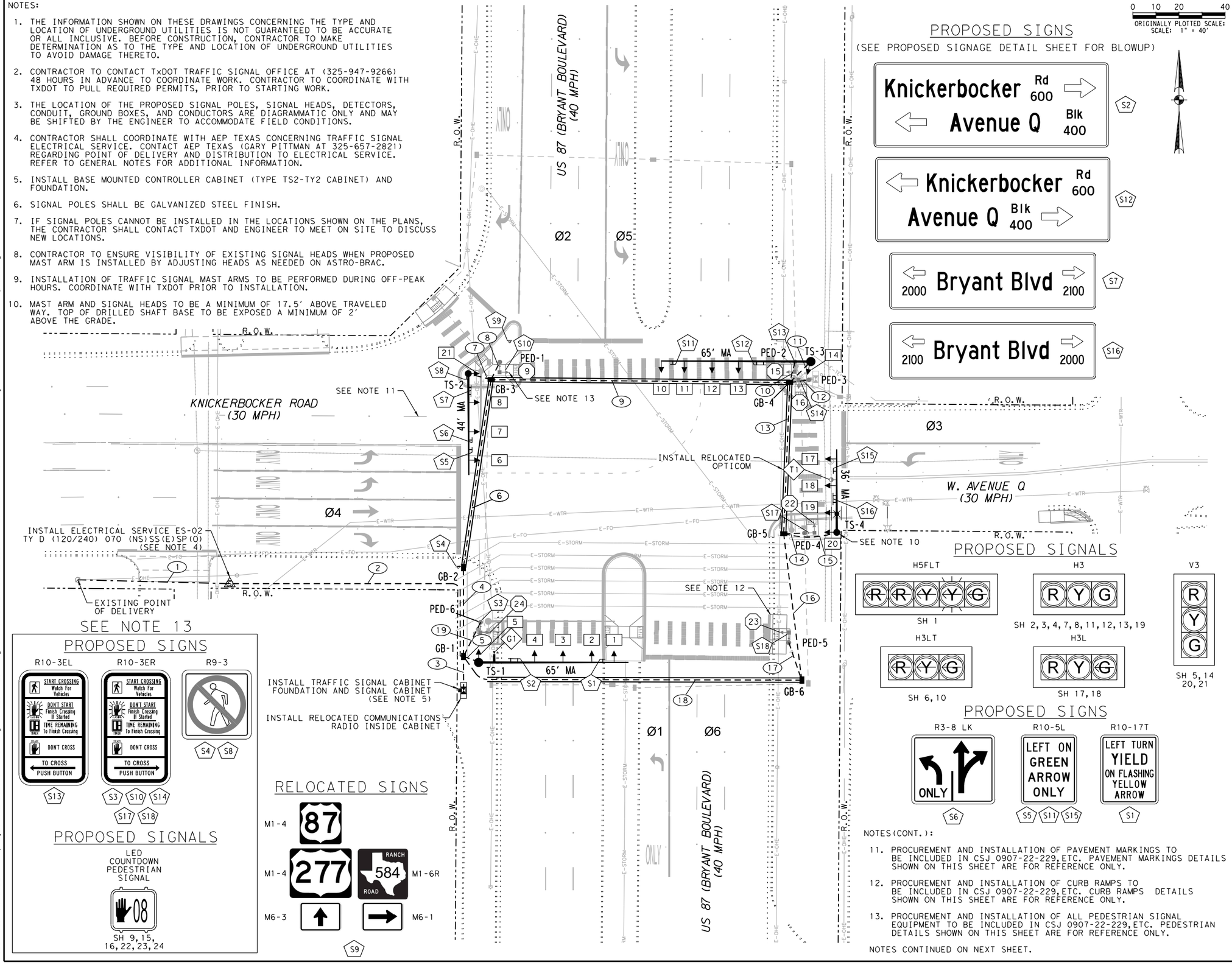
US 87 (BRYANT BOULEVARD) AT KNICKERBOCKER ROAD/W AVENUE Q

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
HMF	6	(SEE TITLE SHEET)		FM 388
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
MB	TEXAS	SJT	TOM GREEN	130
CHECK	CONTROL	SECTION	JOB	
ASA	0069	07	111, ETC.	
CHECK				
HMF				

PLOTTED: 4/23/2024
FILENAME: K:\DAL_TPTO\1project\064586906 - San Angelo 2021 HSIP Signals\CADD\1_Archive\2023-11-01\COSA - HSIP - SHT 500 - Bryant at Avenue Q - Existing.dgn
40.0000 ft / in.
BY: Marianna.Borrego

NOTES:

1. THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. BEFORE CONSTRUCTION, CONTRACTOR TO MAKE DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES TO AVOID DAMAGE THERETO.
2. CONTRACTOR TO CONTACT TxDOT TRAFFIC SIGNAL OFFICE AT (325-947-9266) 48 HOURS IN ADVANCE TO COORDINATE WORK. CONTRACTOR TO COORDINATE WITH TXDOT TO PULL REQUIRED PERMITS, PRIOR TO STARTING WORK.
3. THE LOCATION OF THE PROPOSED SIGNAL POLES, SIGNAL HEADS, DETECTORS, CONDUIT, GROUND BOXES, AND CONDUCTORS ARE DIAGRAMMATIC ONLY AND MAY BE SHIFTED BY THE ENGINEER TO ACCOMMODATE FIELD CONDITIONS.
4. CONTRACTOR SHALL COORDINATE WITH AEP TEXAS CONCERNING TRAFFIC SIGNAL ELECTRICAL SERVICE. CONTACT AEP TEXAS (GARY PITTMAN AT 325-657-2821) REGARDING POINT OF DELIVERY AND DISTRIBUTION TO ELECTRICAL SERVICE. REFER TO GENERAL NOTES FOR ADDITIONAL INFORMATION.
5. INSTALL BASE MOUNTED CONTROLLER CABINET (TYPE TS2-TY2 CABINET) AND FOUNDATION.
6. SIGNAL POLES SHALL BE GALVANIZED STEEL FINISH.
7. IF SIGNAL POLES CANNOT BE INSTALLED IN THE LOCATIONS SHOWN ON THE PLANS, THE CONTRACTOR SHALL CONTACT TXDOT AND ENGINEER TO MEET ON SITE TO DISCUSS NEW LOCATIONS.
8. CONTRACTOR TO ENSURE VISIBILITY OF EXISTING SIGNAL HEADS WHEN PROPOSED MAST ARM IS INSTALLED BY ADJUSTING HEADS AS NEEDED ON ASTRO-BRAC.
9. INSTALLATION OF TRAFFIC SIGNAL MAST ARMS TO BE PERFORMED DURING OFF-PEAK HOURS. COORDINATE WITH TXDOT PRIOR TO INSTALLATION.
10. MAST ARM AND SIGNAL HEADS TO BE A MINIMUM OF 17.5' ABOVE TRAVELED WAY. TOP OF DRILLED SHAFT BASE TO BE EXPOSED A MINIMUM OF 2' ABOVE THE GRADE.



PROPOSED SIGNS

(SEE PROPOSED SIGNAGE DETAIL SHEET FOR BLOWUP)

0 10 20 40
ORIGINALLY PLOTTED SCALE:
SCALE: 1" = 40'

LEGEND

	TYPICAL PROPOSED MAST ARM COMBINATION SIGNAL\ WITH PEDESTRIAN SIGNAL, PUSH BUTTON, LED LUMINAIRE (250W E.Q.), AND SIGNAGE
	PEDESTRIAN POLE AND PUSH BUTTON
	TRAFFIC SIGNAL CONTROLLER CABINET AND CONCRETE PAD
	PROPOSED TYPE C GROUND BOX W/ APRON
	PROPOSED BORED CONDUIT
	PROPOSED TRENCHED CONDUIT
(1)	CONDUIT RUN NUMBER
1	SIGNAL HEAD NUMBER
S1	SIGN LABEL
1	PEDESTRIAN HEAD
G1	PROPOSED GRIDSMART DETECTOR
T1	RELOCATED OPTICOM
S	PROPOSED ELECTRICAL SERVICE
TS-#	PROPOSED TRAFFIC SIGNAL POLE NUMBER
PED-#	PEDESTRIAN SIGNAL POLE NUMBER
E-STORM	EXISTING STORM LINE
E-SS	EXISTING SEWER LINE
E-OHE	EXISTING OVERHEAD CABLE
E-WTR	EXISTING WATER LINE
E-GAS	EXISTING GAS LINE
E-FO	EXISTING FIBER OPTIC LINE

SEE NOTE 13

PROPOSED SIGNS

R10-3EL

S13

R10-3ER

S3 S10 S14 S17 S18

R9-3

S4 S8

PROPOSED SIGNALS

LED COUNTDOWN PEDESTRIAN SIGNAL

SH 9, 15, 16, 22, 23, 24

RELOCATED SIGNS

S9

PROPOSED SIGNALS

H5FLT

SH 1

H3

SH 2, 3, 4, 7, 8, 11, 12, 13, 19

V3

SH 5, 14 20, 21

H3LT

SH 6, 10

H3L

SH 17, 18

PROPOSED SIGNS

R3-8 LK

S6

R10-5L

S5 S11 S15

R10-17T

S1

NOTES(CONT.):

11. PROCUREMENT AND INSTALLATION OF PAVEMENT MARKINGS TO BE INCLUDED IN CSJ 0907-22-229,ETC. PAVEMENT MARKINGS DETAILS SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY.
12. PROCUREMENT AND INSTALLATION OF CURB RAMPS TO BE INCLUDED IN CSJ 0907-22-229,ETC. CURB RAMPS DETAILS SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY.
13. PROCUREMENT AND INSTALLATION OF ALL PEDESTRIAN SIGNAL EQUIPMENT TO BE INCLUDED IN CSJ 0907-22-229,ETC. PEDESTRIAN DETAILS SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY.

NOTES CONTINUED ON NEXT SHEET.

4/23/2024

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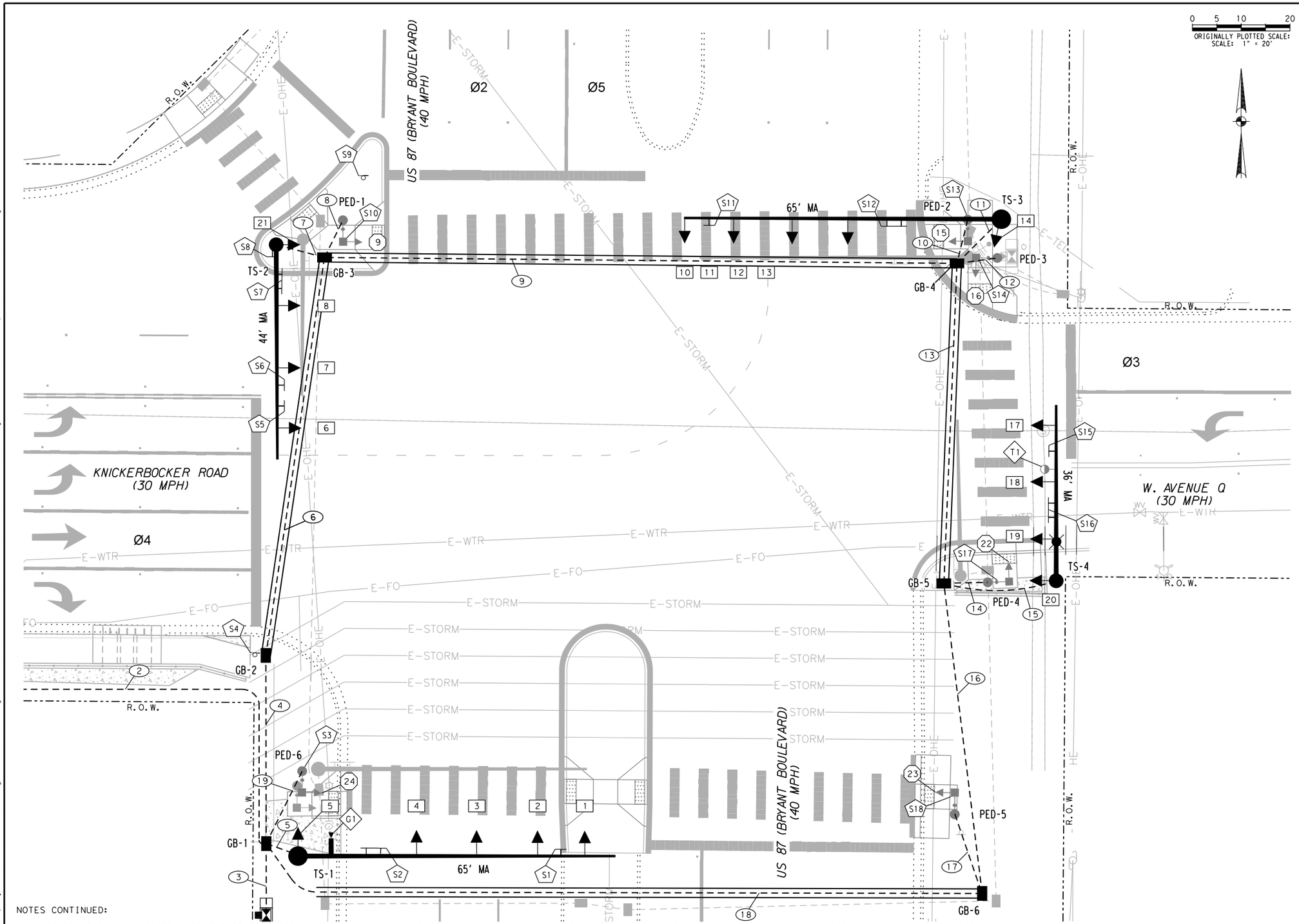
THE CITY OF SAN ANGELO TEXAS

TRAFFIC SAFETY IMPROVEMENTS
PROPOSED CONDITIONS

US 87 (BRYANT BOULEVARD)
AT KNICKERBOCKER ROAD/W AVENUE Q

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
HMF	6	(SEE TITLE SHEET)		FM 388
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
MB	TEXAS	SJT	TOM GREEN	131
CHECK ASA	CONTROL	SECTION	JOB	
CHECK HMF	0069	07	111, ETC.	

PLOTTED: 4/23/2024
FILENAME: K:\DAL_TPTO\Project\06458906 - San Angelo 2021 HSIP Signals\CADD\1_Archive\2023-11-01\COSA - HSIP - SHT 501 - Bryant at Avenue Q - Proposed.dgn
40.0000 ft / in.
BY: Marianna.Borrego



NOTES CONTINUED:

14. CONTRACTOR SHALL COORDINATE THE TRAFFIC SIGNAL POLE FOUNDATION WORK WITH THE CURB RAMP AND SIDEWALK INSTALLATION. IF CURB RAMPS ARE CONSTRUCTED FIRST, CONTRACTOR SHALL NOTIFY THE CITY AND ENGINEER SO A FIELD MEETING CAN BE SCHEDULED TO DETERMINE IF FOUNDATIONS NEED TO BE SHIFTED TO BE ADJACENT TO THE LANDING AREAS. IF SIGNAL POLE FOUNDATIONS ARE INSTALLED FIRST, THE CURB RAMPS AND SIDEWALKS SHALL BE MODIFIED SO THAT THE CURB RAMP LANDING AREAS ARE ADJACENT TO THE PUSH BUTTONS AND THE SIDE REACH TO THE PUSH BUTTONS ARE 10" OR LESS.

15. PROPOSED APS UNITS SHALL BE PLACED ADJACENT TO A LEVEL LANDING AREA (2% MAX IN ANY DIRECTION). IF THE DISTANCE FROM THE PUSH BUTTON TO THE EDGE OF ACCESSIBLE PATH EXCEEDS 10", THE CONTRACTOR SHALL FURNISH AND INSTALL A PUSH BUTTON EXTENDER TO MAKE THE REACH 10" OR LESS. MEASUREMENT AND PAYMENT SHALL BE CONSIDERED SUBSIDIARY TO THE INSTALLATION OF THE TRAFFIC SIGNAL EQUIPMENT.

16. PROPOSED CURB RAMP LANDING SHALL BE POURED UP TO THE SIGNAL FOUNDATION, LEAVING NO GAPS.

17. CONTRACTOR TO MAINTAIN FULL ACCESS TO A MINIMUM OF TWO PEDESTRIAN CROSSINGS AT ALL TIMES DURING CONSTRUCTION.

LEGEND

- TYPICAL PROPOSED MAST ARM COMBINATION SIGNAL\ WITH PEDESTRIAN SIGNAL, PUSH BUTTON, LED LUMINAIRE (250W E.Q.), AND SIGNAGE
- PEDESTRIAN POLE AND PUSH BUTTON
- TRAFFIC SIGNAL CONTROLLER CABINET AND CONCRETE PAD
- PROPOSED TYPE C GROUND BOX W/ APRON
- PROPOSED BORED CONDUIT
- PROPOSED TRENCHED CONDUIT
- (1) CONDUIT RUN NUMBER
- [1] SIGNAL HEAD NUMBER
- (S1) SIGN LABEL
- (1) PEDESTRIAN HEAD
- (G1) PROPOSED GRIDSMART DETECTOR
- (T1) RELOCATED OPTICOM
- (E) PROPOSED ELECTRICAL SERVICE
- TS-# PROPOSED TRAFFIC SIGNAL POLE NUMBER
- PED-# PEDESTRIAN SIGNAL POLE NUMBER
- E-STORM EXISTING STORM LINE
- E-SS EXISTING SEWER LINE
- E-OHE EXISTING OVERHEAD CABLE
- E-WTR EXISTING WATER LINE
- E-GAS EXISTING GAS LINE
- E-FO EXISTING FIBER OPTIC LINE

4/23/2024

STATE OF TEXAS
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THE CITY OF SAN ANGELO TEXAS

TRAFFIC SAFETY IMPROVEMENTS

PROPOSED CONDITIONS (CORNER DETAILS)

US 87 (BRYANT BOULEVARD) AT KNICKERBOCKER ROAD/W AVENUE Q

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
HMF	6	(SEE TITLE SHEET)		FM 388
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
MB	TEXAS	SJT	TOM GREEN	132
CHECK	CONTROL	SECTION	JOB	
ASA	0069	07	111, ETC.	
CHECK				
HMF				

PLOTTED: 4/23/2024
FILENAME: K:\DAL_TPTO\project\064586906 - San Angelo 2021 HSIP Signals\CADD\1_Archive\2023-11-01\COSA - HSIP - SHT 502 - Bryant at Avenue Q - Proposed Corner Details.dgn
20.0000 ft / in.
BY: Marianna.Borrego

CONDUIT AND CABLE CHART
WIRE SIZE AND TYPE

RUN NO	CONDUIT STATUS	ITEM 618 CONDUIT (SCH 80) 618-6046 2" PVC SCH 80 (RISER) Qty	618-6046 2" PVC SCH 80 (RISER) Len	618-6046 2" PVC (TRENCHED) Qty	618-6046 2" PVC (TRENCHED) Len	618-6053 3" PVC (TRENCHED) Qty	618-6053 3" PVC (TRENCHED) Len	618-6058 4" PVC (TRENCHED) Qty	618-6058 4" PVC (TRENCHED) Len	618-6059 4" PVC (BORED) Qty	618-6059 4" PVC (BORED) Len	CABLE STATUS	ITEM 620 ELECTRICAL CONDUCTORS 620-6008 ** NO.8 XHHW WIRE (SIGNAL) Qty	620-6008 ** NO.8 XHHW WIRE (SIGNAL) Len	620-6007 ** NO.8 BARE WIRE (GROUND) Qty	620-6007 ** NO.8 BARE WIRE (GROUND) Len	620-6008 *** NO.8 XHHW WIRE (LIGHTING) Qty	620-6008 *** NO.8 XHHW WIRE (LIGHTING) Len	620-6004 *** NO.12 XHHW WIRE (LIGHTING) Qty	620-6004 *** NO.12 XHHW WIRE (LIGHTING) Len	ITEM 684 TRAFFIC SIGNAL CABLES 684-6079 TY C 2 CNDR NO. 12 Qty	684-6079 TY C 2 CNDR NO. 12 Len	684-6031 TY A 5 CNDR NO. 14 Qty	684-6031 TY A 5 CNDR NO. 14 Len	684-6033 TY A 7 CNDR NO. 14 Qty	684-6033 TY A 7 CNDR NO. 14 Len	684-6036 TY A 10 CNDR NO. 14 Qty	684-6036 TY A 10 CNDR NO. 14 Len	684-6046 TY A 20 CNDR NO. 14 Qty	684-6046 TY A 20 CNDR NO. 14 Len	CAT5E CABLE 6089-6002 GRIDSMART CABLE Qty	CAT5E CABLE 6089-6002 GRIDSMART CABLE Len	OPTICOM CABLE (SUB TO ITEM 680) Qty	OPTICOM CABLE (SUB TO ITEM 680) Len	TOTAL LENGTH OF RUN	RUN NO
1	I	1	10	1	75							I	TO BE INSTALLED BY OTHERS																								70	1
2	I			1	135							I	2	270	1	135	2	270																			135	2
3	I			1	10							I	2	20	1	10																						
	I							1	10			I			1	10															4	40	1	10	1	10	10	3
	I							1	10			I			1	10					6	60					6	60										
4	I					1	40					I			1	40					3	120					3	120	2	80							40	4
5	I					1	10					I			1	10													1	10	1	10					10	5
6	I									1	85	I			1	85					3	255					3	255	2								85	6
7	I					1	15					I			1	15													1	15							15	7
8	I					1	20					I			1	20					1	20					1	20									20	8
9	I									1	130	I			1	130					2	260					2	260	1	130							130	9
10	I					1	10					I			1	10					1	10					1	10									10	10
11	I					1	15					I			1	15													1	15							15	11
12	I					1	10					I			1	10					1	10					1	10									10	12
13	I									1	70	I			1	70																					70	13
14	I					1	10					I			1	10					1	10					1	10									10	14
15	I					1	25					I			1	25	2	50											1	25			1	25			25	15
16	I					1	65					I			1	65	2	130			1	65					1	65	1	65			1	65			65	16
17	I					1	20					I			1	20					1	20					1	20									20	17
18	I									1	140	I			1	140	2	280			2	280					2	280	1	140			1	140			140	18
19	I					1	20					I			1	20					1	20					1	20									20	19
SUBTOTAL			10		220		260		20		425			290		850		730		0		1130		0		0		1130		520		20		240			
TS-1	P											I												195		80						40			VARIES	TS-1
TS-2	P											I												160											VARIES	TS-2
TS-3	P											I												295											VARIES	TS-3
TS-4	P											I								80				145										55	VARIES	TS-4
PED-1	P											I										5		10											VARIES	PED-1
PED-2	P											I										5		10											VARIES	PED-2
PED-3	P											I										5		10											VARIES	PED-3
PED-4	P											I										5		10											VARIES	PED-4
PED-5	P											I										5		10											VARIES	PED-5
PED-6	P											I										5		10											VARIES	PED-6
SUBTOTAL			0		0		0		0		0			0		0		0		80		30		855		80		0		0		40		55		
TOTAL			10		220		260		20		425			290		850		750		80		1190		855		80		1160		530		60		305		

CONDUIT STATUS: I=INSTALL; E=EXISTING; P=WIRE TO BE INSTALLED INSIDE STEEL POLE; A=ABANDON; REM=REMOVE AND SALVAGE

P-# - REFERS TO WIRING WITHIN THE SIGNAL POLE AND MAST ARM.

* - AEP TEXAS WILL INSTALL THE ELECTRICAL CONDUCTORS AND THE UNDERGROUND RUN FROM THE POINT OF DELIVERY TO THE ELECTRICAL SERVICE POLE.
AEP TEXAS WILL INSTALL THE ELECTRICAL CONDUCTORS FROM THE POINT OF DELIVERY TO THE PEDESTAL METER.

** - CONDUCTOR TO BE USED FOR POWER/GROUND TO CABINET. ALL GROUND WIRE SHALL BE INSULATED WITH A GREEN JACKET.

*** - CONDUCTOR TO BE USED FOR POWER TO LUMINAIRE FIXTURES.

TRAFFIC SIGNAL HEAD AND POLE PLACEMENT (FT)

POLE NUMBER	STATUS	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)	F (FT)	G (FT)	H (FT)	I (FT)	NO. OF HEADS (EA)*	SUB TO 680 GRIDMSART DET. (EA)	LUM	DRILLED SHAFT LENGTH (FT) 36" DIA TYPE A ITEM 416	DRILLED SHAFT LENGTH (FT) 48" DIA TYPE A ITEM 416	FDN. TYPE WIND ZONE 80 MPH
TS-1	I	9	24	12	13	10	65**	19	-	13	4	1	N	-	22	48-A
TS-2	I	6	13	13	12	-	44	19	-	13	3	-	N	13	-	36-A
TS-3	I	16	32	11	12	10	65**	19	-	13	4	-	N	-	22	48-A
TS-4	I	7	9	12	12	-	36	19	30	13	3	-	Y	13	-	36-A
											TOTAL:	1		26	44	

SIGNAL POLE STATUS: I=INSTALL; E=EXISTING; REM=REMOVE; F=INSTALL IN FUTURE PHASE; O=COMPLETED BY OTHERS

* - DOES NOT INCLUDE VERTICAL SIDEMOUNT SIGNAL HEADS

** - INSTALL MAST ARM MITIGATOR ON TS-1 AND TS-3

GROUND BOX SUMMARY

ITEM NO.	DESCRIPTION	UNIT	QTY.
0624	GROUND BOX TY C (162911)W/APRON	EA	6

PEDESTRIAN SIGNAL HEAD AND POLE PLACEMENT (FT)

POLE NUMBER +	STATUS	A (FT)	B (FT)	C (FT)	D (FT)	E (FT)	F (FT)	G (FT)	DRILLED SHAFT LENGTH (FT) 24" DIA SUB TO ITEM 687	FDN. TYPE WIND ZONE 80 MPH
PED-1	O	9	PEDESTRIAN SIGNAL POLE					10	6	24-A
PED-2	O	9	PEDESTRIAN SIGNAL POLE					10	6	24-A
PED-3	O	10	PEDESTRIAN SIGNAL POLE					10	6	24-A
PED-4	O	6	PEDESTRIAN SIGNAL POLE					10	3***	24-A
PED-5	O	7	PEDESTRIAN SIGNAL POLE					10	6	24-A
PED-6	O	8	PEDESTRIAN SIGNAL POLE					10	6	24-A
								TOTAL:	33	

SIGNAL POLE STATUS: I=INSTALL; E=EXISTING; REM=REMOVE; O=COMPLETED BY OTHERS

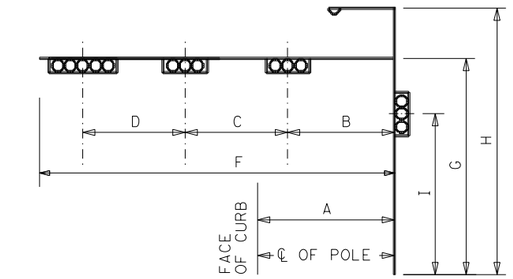
*** - PEDESTRIAN POLE PED-4 TO BE CUSTOM FOUNDATION DEPTH. REFER TO CSJ 0907-22-229, ETC PLANS FOR CUSTOM PEDESTRIAN FOUNDATION DETAILS.

\+ - PROCUREMENT AND INSTALLATION OF PEDESTRIAN SIGNAL POLES AND FOUNDATIONS TO BE INCLUDED IN CSJ 0907-22-229, ETC. PEDESTRIAN POLES DETAILS SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY.

PEDESTRIAN ITEMS

ITEM NO.	CODE	DESCRIPTION	UNIT	QTY.
416	6030	DRILL SHAFT (TRF SIG POLE) (24 IN)	LF	33
618	6053	CONDT (PVC) (SCH 80) (3")	LF	90
620	6007	ELEC CONDR (NO.8) BARE	LF	90
684	6031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	60
684	6036	TRF SIG CBL (TY A)(14 AWG)(10 CONDR)	LF	1130
684	6079	TRF SIG CBL (TY C)(12 AWG)(2 CONDR)	LF	1160
687	6001	PED POLE ASSEMBLY	EA	6
688	6001	PED DETECT PUSH BUTTON (APS)	EA	6
688	6003	PED DETECTOR CONTROLLER UNIT	EA	1

NOTE:
1. PROCUREMENT AND INSTALLATION OF PEDESTRIAN ITEMS TO BE INCLUDED IN CSJ 0907-22-229, ETC. PEDESTRIAN POLES DETAILS SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY.



4/23/2024

STATE OF TEXAS
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THE CITY OF SAN ANGELO TEXAS

TRAFFIC SAFETY IMPROVEMENTS
PROPOSED QUANTITIES

US 87 (BRYANT BOULEVARD)
AT KNICKERBOCKER ROAD/W AVENUE Q

SHEET 1 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
HMF	6	(SEE TITLE SHEET)		FM 388
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
MB	TEXAS	SJT	TOM GREEN	133
CHECK	CONTROL	SECTION	JOB	
ASA	0069	07	111, ETC.	
CHECK				
HMF				

PLOTTED: 4/23/2024
FILENAME: K:\DAL_TPTO\Project\06486906 - San Angelo 2021 HSIP Signals\CADD\1_Archive\2023-11-01\COSA - HSIP - SHT 503 - Bryant at Avenue Q - Quantity 1 of 3.dgn
40.0000 ft / in.
BY: Marianna.Borrego

CABLE TERMINATION CHART

CNDR. NO.	CONDUCTOR COLOR	CABLE 1 20 CNDR. FROM TS-1 TO CNTRL.	CABLE 2 10 CNDR. FROM PED-1 TO CNTRL.	CABLE 3 20 CNDR. FROM TS-2 TO CNTRL.	CABLE 4 10 CNDR. FROM PED-2 TO CNTRL.	CABLE 5 10 CNDR. FROM PED-3 TO CNTRL.	CABLE 6 20 CNDR. FROM TS-3 TO CNTRL.	CABLE 7 20 CNDR. FROM TS-4 TO CNTRL.	CABLE 8 10 CNDR. FROM PED-4 TO CNTRL.	CABLE 9 10 CNDR. FROM PED-5 TO CNTRL.	CABLE 10 10 CNDR. FROM PED-6 TO CNTRL.
1	BLACK	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
2	WHITE	SH COM	SH COM	SH COM	SH COM	SH COM	SH COM	SH COM	SH COM	SH COM	SH COM
3	RED	SH 2,3,4,5 - Ø2 R	SPARE	SH 6,7,8,21 - Ø3 R (BALL / LT ARW)	SPARE	SPARE	SH 10,11,12,13,14 - Ø6 R (BALL / LT ARW)	SH 17,18,19,20 - Ø4 R	SPARE	SPARE	SPARE
4	GREEN	SH 2,3,4,5 - Ø2 G	SPARE	SH 6,7,8,21 - Ø3 G (BALL / LT ARW)	SPARE	SPARE	SH 10,11,12,13,14 - Ø6 G (BALL / LT ARW)	SH 17,18,19,20 - Ø4 G (BALL / LT ARW)	SPARE	SPARE	SPARE
5	ORANGE	SH 2,3,4,5 - Ø2 Y	SPARE	SH 6,7,8,21 - Ø3 Y (BALL / LT ARW)	SPARE	SPARE	SH 10,11,12,13,14 - Ø6 Y (BALL / LT ARW)	SH 17,18,19,20 - Ø4 Y	SPARE	SPARE	SPARE
6	BLUE	SPARE	SH 9 - Ø3 DW	SPARE	SH 15 - Ø3 DW	SPARE	SPARE	SPARE	SH 22 - Ø6 DW	SH 23 - Ø4 DW	SH 24 - Ø4 DW
7	WHITE/BLACK	SPARE	SH 9 - Ø3 W	SPARE	SH 15 - Ø3 W	SPARE	SPARE	SPARE	SH 22 - Ø6 W	SH 23 - Ø4 W	SH 24 - Ø4 W
8	RED/BLACK	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
9	GREEN/BLACK	SPARE	SPARE	SPARE	SPARE	SH 16 - Ø6 DW	SPARE	SPARE	SPARE	SPARE	SPARE
10	ORANGE/BLACK	SPARE	SPARE	SPARE	SPARE	SH 16 - Ø6 W	SPARE	SPARE	SPARE	SPARE	SPARE
11	BLUE/BLACK	SPARE		SPARE			SPARE	SPARE			
12	BLACK/WHITE	SPARE		SPARE			SPARE	SPARE			
13	RED/WHITE	SH 1 - OLC R (LT ARW)		SPARE			SPARE	SPARE			
14	GREEN/WHITE	SH 1 - Ø5 G (LT ARW)		SPARE			SPARE	SPARE			
15	BLUE/WHITE	SH 1 - OLC Y (LT ARW)		SPARE			SPARE	SPARE			
16	BLACK/RED	SPARE		SPARE			SPARE	SPARE			
17	WHITE/RED	SPARE		SPARE			SPARE	SPARE			
18	ORANGE/RED	SPARE		SPARE			SPARE	SPARE			
19	BLUE/RED	SH 1 - OLC FY (LT ARW)		SPARE			SPARE	SPARE			
20	RED/GREEN	SPARE		SPARE			SPARE	SPARE			

*NOTE: HOME RUN 2 CONDR. TO ALL POLES WITH PED HEADS FOR PED CALL

TRAFFIC SIGNS SUMMARY

SIGN *	SIGN TYPE	SIGN LEGEND	STATUS	SUPPORT	SIGN DIMENSION (in x in)
S1	R10-17T	LEFT TURN YIELD ON FLASHING YELLOW ARROW	I	TS-1	36"x42"
S2	STREET NAME	KNICKERBOCKER / AVENUE Q	I	TS-1	36"X100"
S5	R10-5L	LEFT ON GREEN ARROW	I	TS-2	30"x36"
S6	R3-8 LK	LANE ASSIGNMENT	I	TS-2	36"x30"
S7	STREET NAME	BRYANT BOULEVARD	I	TS-2	24"x88"
S9	ROUTE SIGNS	US HIGHWAY ROUTE SIGNS	REL	GROUND MOUNTED	EXISTING
S11	R10-5L	LEFT ON GREEN ARROW	I	TS-3	30"x36"
S12	STREET NAME	KNICKERBOCKER / AVENUE Q	I	TS-3	36"X100"
S15	R10-5L	LEFT ON GREEN ARROW	I	TS-4	30"x36"
S16	STREET NAME	BRYANT BOULEVARD	I	TS-4	24"x88"

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

*- SIGNS TO BE FURNISHED AND INSTALLED BY THE CONTRACTOR (SUB TO ITEM 680).

PEDESTRIAN SIGNS SUMMARY

SIGN **	SIGN TYPE	SIGN LEGEND	STATUS	SUPPORT	SIGN DIMENSION (in x in)
S3	R10-3ER	PED PUSH BUTTON	O	PED-6	9"x15"
S4	R9-3	NO PEDESTRIAN CROSSING	O	GROUND MOUNTED	24"x24"
S8	R9-3	NO PEDESTRIAN CROSSING	O	TS-2	24"x24"
S10	R10-3ER	PED PUSH BUTTON	O	PED-1	9"x15"
S13	R10-3EL	PED PUSH BUTTON	O	PED-2	9"x15"
S14	R10-3ER	PED PUSH BUTTON	O	PED-3	9"x15"
S17	R10-3ER	PED PUSH BUTTON	O	PED-4	9"x15"
S18	R10-3ER	PED PUSH BUTTON	O	PED-5	9"x15"

STATUS: I=INSTALL; E=EXISTING; REM=EXISTING TO BE REMOVED; REL=EXISTING TO BE RELOCATED; O=COMPLETED BY OTHERS

**- PROCUREMENT AND INSTALLATION OF ALL PEDESTRIAN SIGNS TO BE INCLUDED IN CSJ 0907-22-229,ETC. PEDESTRIAN SIGNS DETAILS SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY.

SUMMARY OF TRAFFIC SIGNAL EQUIPMENT

ITEM	TxDOT ITEM NUMBER	DESCRIPTION
CABINET	SUB TO 680	TS2-TY2 BASE MOUNTED CONTROLLER CABINET AND FOUNDATION
CONTROLLER	SUB TO 680	ECONOLITE COBALT CONTROLLER
MMU	SUB TO 680	EDI MMU-16 LEip SMART MONITOR
DETECTION	SUB TO 680	GRIDSMART DETECTION W/ PERFORMANCE MODULE
DETECTION CABLE	6089	CAT 5E CABLE FOR GRIDSMART DETECTOR
SIGNAGE	SUB TO 680	ALL SIGNAL-MOUNTED SIGNS AND MOUNTING HARDWARE
BATTERY BACK-UP UNIT (BBU)	6058	ALPHA FXMHP 2000 BATTERY BACK-UP UNIT (BBU)
MAST ARM DAMPENER	SUB TO 680	VALMONT MITIGATOR (DST-1)

NOTES:

1. CONTRACTOR TO PROCURE EQUIPMENT AS STATED ABOVE OR APPROVED EQUAL. ANY ADDITIONAL ITEMS NOT EXPLICITLY STATED SHALL BE PROCURED AND INSTALLED BY THE CONTRACTOR.
2. CONTRACTOR TO SUBMIT SHOP DRAWINGS TO CITY OF SAN ANGELO TRAFFIC OPERATIONS DEPARTMENT TO REVIEW AND APPROVE PRIOR TO EQUIPMENT PROCUREMENT.

SUMMARY OF PEDESTRIAN SIGNAL EQUIPMENT

ITEM	TxDOT ITEM NUMBER	DESCRIPTION
APS PUSH BUTTONS	688	POLARA iNS iNAVIGATOR PUSH BUTTONS

NOTE:

1. PROCUREMENT AND INSTALLATION OF ALL PEDESTRIAN SIGNAL EQUIPMENT TO BE INCLUDED IN CSJ 0907-22-229,ETC. PEDESTRIAN DETAILS SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY.

4/23/2024

STATE OF TEXAS
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THE CITY OF SAN ANGELO TEXAS

TRAFFIC SAFETY IMPROVEMENTS
PROPOSED QUANTITIES

US 87 (BRYANT BOULEVARD)
AT KNICKERBOCKER ROAD/W AVENUE Q

SHEET 2 OF 3

DESIGN	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
HMF	6	(SEE TITLE SHEET)		FM 388
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
MB	TEXAS	SJT	TOM GREEN	134
CHECK	CONTROL	SECTION	JOB	
ASA	0069	07	111, ETC.	
CHECK				
HMF				

PLOTTED: 4/23/2024
FILENAME: K:\DAL_TPTO\1project\064586906 - San Angelo 2021 HSIP Signals\CADD\1_Archive\2023-11-01\COSA - HSIP - SHT 504 - Bryant at Avenue Q - Quantity 2 of 3.dgn
40.0000 ft / in.
BY: Marianna.Borrego

SIGNAL HEADS (ITEM 682)											
SIGNAL HEAD NUMBER	12" LED SIGNAL INDICATION										PED SIG SEC (LED) (COUNTDOWN)
	SIGNAL HEAD TYPE	STATUS	BACK PLATE		LED SIGNAL LAMPS						
			3 SEC	5 SEC	<-G-	G	<-Y-	Y	<-R-	R	
			EA	EA	EA	EA	EA	EA	EA	EA	EA
1	H5FLT	I		1	1		2		2		
2	H3	I	1			1		1		1	
3	H3	I	1			1		1		1	
4	H3	I	1			1		1		1	
5	V3	I	1			1		1		1	
6	H3LT	I	1		1		1		1		
7	H3	I	1			1		1		1	
8	H3	I	1			1		1		1	
**9	PED	O									1
10	H3LT	I	1		1		1		1		
11	H3	I	1			1		1		1	
12	H3	I	1			1		1		1	
13	H3	I	1			1		1		1	
14	V3	I	1			1		1		1	
**15	PED	O									1
**16	PED	O									1
17	H3L	I	1		1			1		1	
18	H3L	I	1		1			1		1	
19	H3	I	1			1		1		1	
20	V3	I	1			1		1		1	
21	V3	I	1			1		1		1	
**22	PED	O									1
**23	PED	O									1
**24	PED	O									1
TOTAL (NEW)			17	1	5	13	4	15	4	15	6

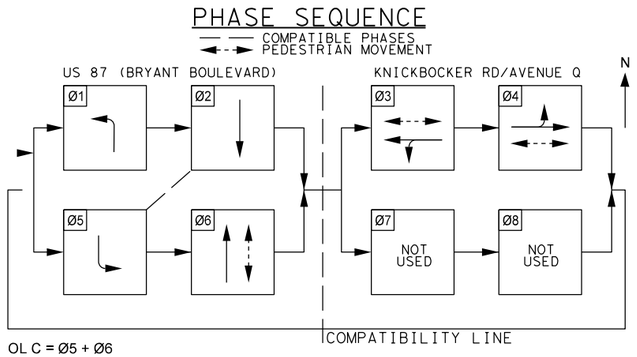
STATUS: I=INSTALL; E=EXISTING; REM=EXISTING TO BE REMOVED; REL=RELOCATE; O=COMPLETED BY OTHERS

** - PROCUREMENT AND INSTALLATION OF PEDESTRIAN SIGNAL HEADS TO BE INCLUDED IN CSJ 0907-22-229,ETC.
PEDESTRIAN SIGNAL HEADS DETAILS SHOWN ON THIS SHEET ARE FOR REFERENCE ONLY.

APS MESSAGE CHART			
POLE LOCATION	PEDESTRIAN MOVEMENT	FUNCTIONS	SPEECH MESSAGE/SOUND DETAILS
PED-1	Phase 3	BUTTON PUSH ON DW	WAIT TO CROSS BRYANT BOULEVARD AT KNICKERBOCKER ROAD
		EXTENDED BUTTON PUSH	WAIT TO CROSS BRYANT BOULEVARD AT KNICKERBOCKER ROAD
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BRYANT BOULEVARD, WALK SIGN IS ON TO CROSS BRYANT BOULEVARD
PED-2	Phase 3	BUTTON PUSH ON DW	WAIT TO CROSS BRYANT BOULEVARD AT KNICKERBOCKER ROAD
		EXTENDED BUTTON PUSH	WAIT TO CROSS BRYANT BOULEVARD AT KNICKERBOCKER ROAD
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BRYANT BOULEVARD, WALK SIGN IS ON TO CROSS BRYANT BOULEVARD
PED-3	Phase 6	BUTTON PUSH ON DW	WAIT TO CROSS KNICKERBOCKER ROAD AT BRYANT BOULEVARD
		EXTENDED BUTTON PUSH	WAIT TO CROSS KNICKERBOCKER ROAD AT BRYANT BOULEVARD
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	KNICKERBOCKER ROAD, WALK SIGN IS ON TO CROSS KNICKERBOCKER ROAD
PED-4	Phase 6	BUTTON PUSH ON DW	WAIT TO CROSS KNICKERBOCKER ROAD AT BRYANT BOULEVARD
		EXTENDED BUTTON PUSH	WAIT TO CROSS KNICKERBOCKER ROAD AT BRYANT BOULEVARD
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	KNICKERBOCKER ROAD, WALK SIGN IS ON TO CROSS KNICKERBOCKER ROAD
PED-5	Phase 4	BUTTON PUSH ON DW	WAIT TO CROSS BRYANT BOULEVARD AT KNICKERBOCKER ROAD
		EXTENDED BUTTON PUSH	WAIT TO CROSS BRYANT BOULEVARD AT KNICKERBOCKER ROAD
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BRYANT BOULEVARD, WALK SIGN IS ON TO CROSS BRYANT BOULEVARD
PED-6	Phase 4	BUTTON PUSH ON DW	WAIT TO CROSS BRYANT BOULEVARD AT KNICKERBOCKER ROAD
		EXTENDED BUTTON PUSH	WAIT TO CROSS BRYANT BOULEVARD AT KNICKERBOCKER ROAD
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BRYANT BOULEVARD, WALK SIGN IS ON TO CROSS BRYANT BOULEVARD

* COUNTDOWN SPEECH MESSAGE = "OFF" FOR ALL UNITS

PHASE SEQUENCE



OL C = Ø5 + Ø6

ELECTRICAL SERVICE DATA											
ELEC. SERVICE ID	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5)-14)	SERVICE CONDUIT SIZE	SERVICE CONDUCTORS NO. / SIZE	SAFETY SWITCH AMPS	MAIN CKT. BRK. POLE / AMPS	TWO-POLE CONTACTOR AMPS	PANELBD / LOADCENTER AMP RATING (MIN)	BRANCH CIRCUIT ID	BRANCH CKT. BRK. POLE / AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
ES-02 (US 87 (BRYANT BLVD) AT AVENUE Q/KNICKERBOCKER RD)	TY D (120/240) 070 (NS) SS (E) SP (O)	2"	3 / #4	N/A	2P / 70	30	100	T.S. LIGHTING	1P / 50 1P / 20	23 1	<7.1

** - VERIFY SERVICE CONDUIT SIZE WITH UTILITY. SIZE MAY CHANGE DUE TO THE UTILITY METER REQUIREMENTS. ENSURE CONDUIT SIZE MEETS THE NATIONAL ELECTRICAL CODE.

4/23/2024

STATE OF TEXAS
HIRON M. FERNANDO
123288
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn F-928
2600 N. Central Expressway
Suite 400
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Tel. No. (214) 617-0535

THE CITY OF SAN ANGELO TEXAS

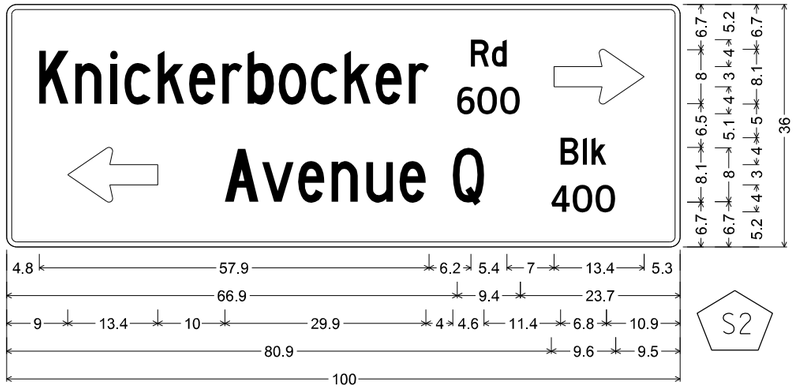
TRAFFIC SAFETY IMPROVEMENTS
PROPOSED QUANTITIES

US 87 (BRYANT BOULEVARD)
AT KNICKERBOCKER ROAD/W AVENUE Q

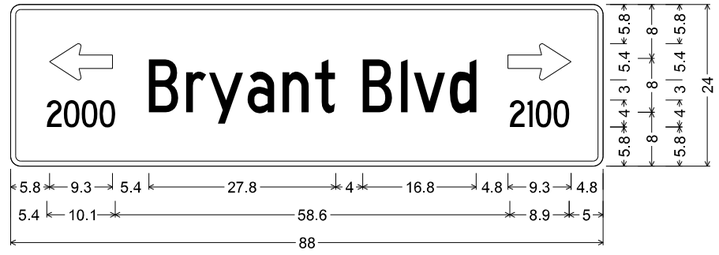
SHEET 3 OF 3

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
HMF	6	(SEE TITLE SHEET)		FM 388
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
MB	TEXAS	SJT	TOM GREEN	135
CHECK	CONTROL	SECTION	JOB	
ASA	0069	07	111, ETC.	
CHECK				
HMF				

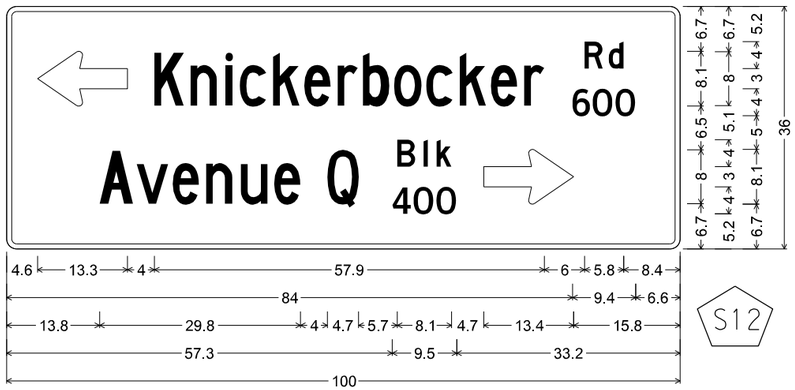
PLOTTED: 4/23/2024
FILENAME: K:\DAL_TPTO\Project\064586906 - San Angelo 2021 HSIP Signals\CADD\1_Archive\2023-11-01\COSA - HSIP - SHT 505 - Bryant at Avenue Q - Quantity 3 of 3.dgn
40.0000 ft / in.
BY: Marianna.Borrego



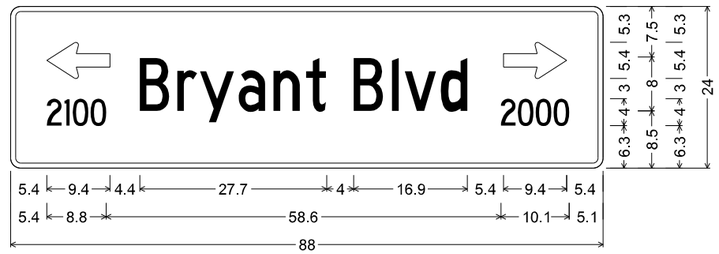
D-3;
1.5" Radius, 0.8" Border, White on Green;
"Knickerbocker", C 50% spacing; "Rd", D 50% spacing;
"600", ClearviewHwy-3-W 50% spacing; Standard Arrow Custom 13.4" X 8.1" 0°;
Standard Arrow Custom 13.4" X 8.1" 180°; "Avenue Q", C 50% spacing;
"Blk", D 50% spacing; "400", ClearviewHwy-3-W 50% spacing;



D-3;
1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.4" X 5.4" 180°; "2000", C 50% spacing;
"Bryant Blvd", C 50% spacing; Standard Arrow Custom 9.4" X 5.4" 0°;
"2100", C 50% spacing;



D-3;
1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 13.4" X 8.1" 180°; "Knickerbocker", C 50% spacing; "Rd", D;
"600", ClearviewHwy-3-W 50% spacing; "Avenue Q", C 50% spacing; "Blk", D;
"400", ClearviewHwy-3-W 50% spacing; Standard Arrow Custom 13.4" X 8.1" 0°;



D-3;
1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.4" X 5.4" 180°; "2100", C 50% spacing;
"Bryant Blvd", C 50% spacing; Standard Arrow Custom 9.4" X 5.4" 0°;
"2000", C 50% spacing;

NOTES: REFER TO PROPOSED CONDITIONS SHEET FOR SIGN PLACEMENT INFORMATION.

4/23/2024

STATE OF TEXAS
HIRON M. FERNANDO
123288
LICENSED
PROFESSIONAL ENGINEER

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2600 N. Central Expressway
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Tel. No. (214) 617-0535

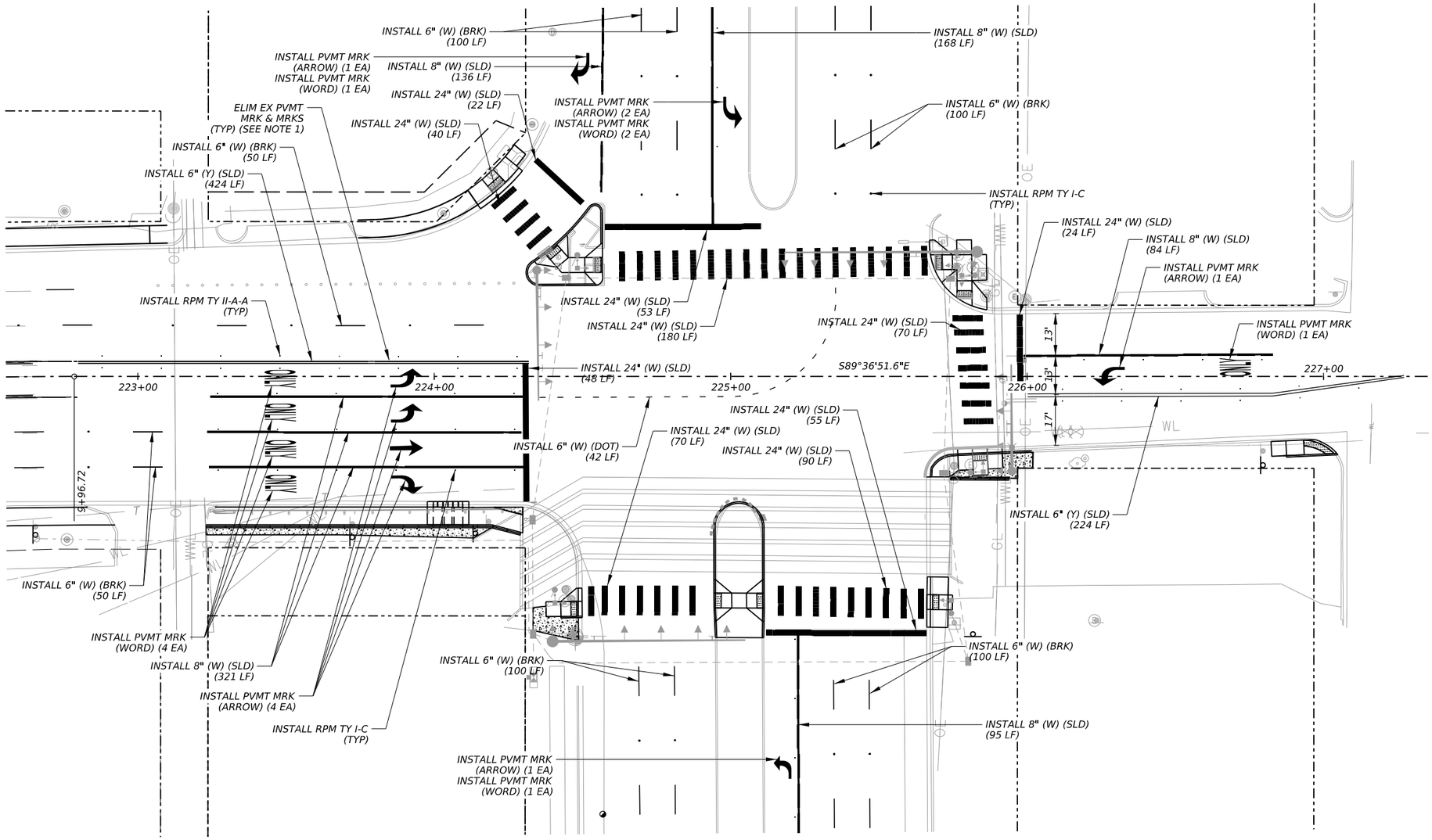
THE CITY OF SAN ANGELO TEXAS

TRAFFIC SAFETY IMPROVEMENTS
PROPOSED SIGNAGE DETAILS

US 87 (BRYANT BOULEVARD)
AT KNICKERBOCKER ROAD/W AVENUE Q

DESIGN	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
HMF	6	(SEE TITLE SHEET)		FM 388
GRAPHICS	STATE	DISTRICT	COUNTY	SHEET NO.
MB	TEXAS	SJT	TOM GREEN	136
CHECK	CONTROL	SECTION	JOB	
ASA	0069	07	111, ETC.	
CHECK				
HMF				

PLOTTED: 4/23/2024
FILENAME: K:\DAL_TPTO\1project+\06458906 - San Angelo 2021 HSIP Signals\CADD\1_Archive\2023-11-01\COSA - HSIP - SHT 508 - Bryant at Avenue Q - Proposed Signage Details.dgn
40.0000 ft / in.
BY: Marianna.Borrego



SHEET # / ITEM	DESCRIPTION	UNIT	SPMD QTY
0666 6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	804
0666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	652
0666 6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	9
0666 6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	9
0666 6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	500
0666 6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	648
0672 6007	REFL PAV MRKR TY I-C	EA	79
0672 6009	REFL PAV MRKR TY II-A-A	EA	38
0677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	911
0677 6003	ELIM EXT PAV MRK & MRKS (8")	LF	391
0677 6007	ELIM EXT PAV MRK & MRKS (24")	LF	184
0677 6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	5
0677 6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	5
0678 6002	PAV SURF PREP FOR MRK (6")	LF	1148
0678 6004	PAV SURF PREP FOR MRK (8")	LF	804
0678 6008	PAV SURF PREP FOR MRK (24")	LF	652
0678 6009	PAV SURF PREP FOR MRK (ARROW)	EA	9
0678 6016	PAV SURF PREP FOR MRK (WORD)	EA	9

NOTES:

1. ELIMINATE ALL EXISTING PAVEMENT MARKINGS WITHIN THE INTERSECTION AND ALONG 200' IN EACH DIRECTION FROM STOP BAR.
2. UNLESS OTHERWISE NOTED LANE WIDTHS SHALL MATCH EXISTING LANES. ALL PROPOSED PAVEMENT MARKINGS SHALL BE TIED TO EXISTING MARKINGS WHERE APPLICABLE TO REFRESH THE INTERSECTION PAVEMENT MARKINGS.
3. CONTRACTOR SHALL APPLY PAVEMENT SEALER IN AREAS WHERE NEW PAVEMENT MARKINGS ARE BEING INSTALLED.
4. ALL EXISTING SIGNS AND PAVEMENT MARKINGS TO REMAIN UNLESS OTHERWISE NOTED.
5. STRIPING CONTRACTOR SHALL CONTACT TxDOT TRAFFIC SIGNAL OFFICE AT LEAST 24 HOURS IN ADVANCE OF MOBILIZATION.
6. CONTRACTOR IS RESPONSIBLE FOR REPAIRS AND SUBSTITUTION OF ANY DAMAGED IRRIGATION EQUIPMENT.
7. INSTALL PAVEMENT MARKINGS 200' IN EACH DIRECTION FROM STOP BAR.

0 20 40

4/30/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

Texas Department of Transportation

SPECIAL NOTES & DETAILS

LEGEND

- DRAINAGE FLOW ARROW
- FENCE
- F FLARE
- FIRE HYDRANT
- GAS METER/VALVE
- GROUND BOX
- L LANDING
- L1 LANDING (COMMON)
- LS LEVEL SIDEWALK (2% MAX)
- GUY WIRE
- GUARD FENCE/RAIL
- PROPOSED CONDUIT (BORE)
- LIGHT POLE
- MAIL BOX
- MANHOLE
- PEDESTAL SIGNAL POLE
- POWER/UTILITY POLE
- R RAMP
- RIPRAP (CONC)
- SIGN
- SODDING
- T TRANSITION
- MISCELLANEOUS STRUC
- IRRIGATION CONTROLS
- UTILITY WITNESS
- SL LONGITUDINAL SLOPES MAY NOT EXCEED 5%, CROSS SLOPES MAY NOT EXCEED 2%
- TRAFFIC FLOW
- SB TRAFFIC SIGNAL BOX
- TRAFFIC SIGNAL CONTROLLER
- TRAFFIC SIGNAL POLE
- TREE/BUSHES
- WATER METER/VALVE
- GUTTER LINE PROJECTION
- GRATE INLET
- PROPOSED PEDESTAL POLE
- PROPOSED CONDUIT
- EXISTING CONDUIT
- STAMPED CONCRETE

SIGNING & STRIPING

RM 584
AT US 87

SAN ANGELO, TEXAS

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	HIGHWAY NO.
6		RM 584

STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	137
0907	00	229,ETC	

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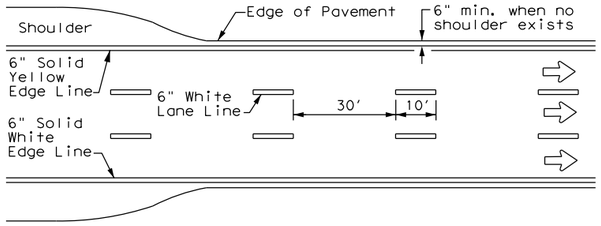
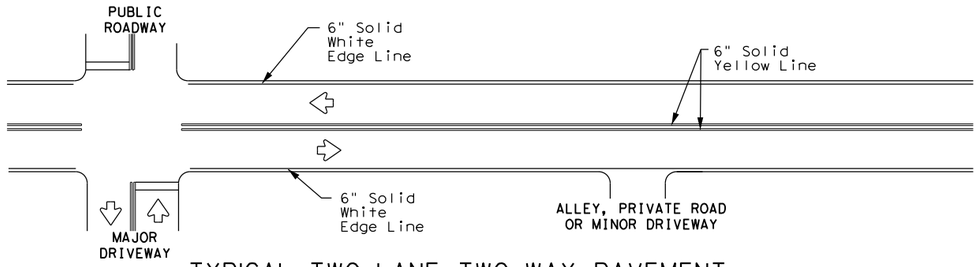
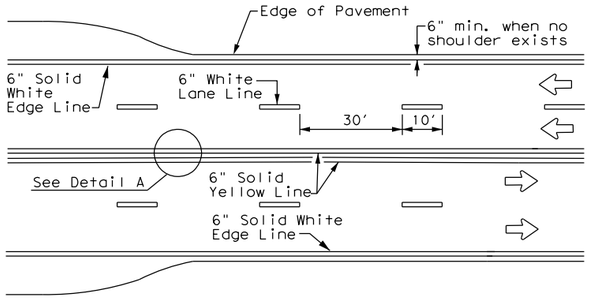
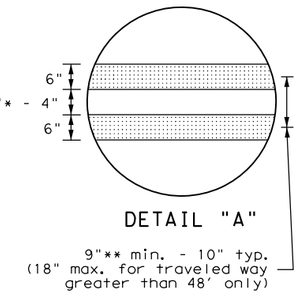


EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



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

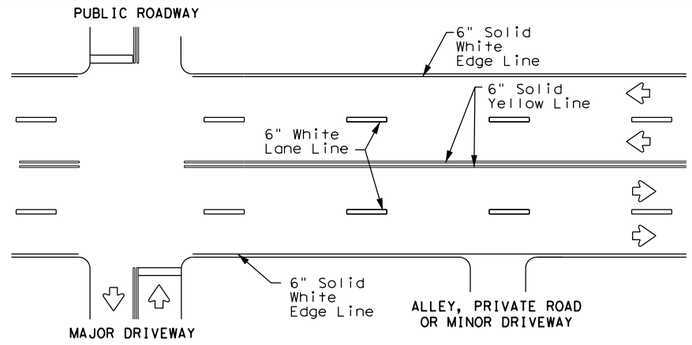




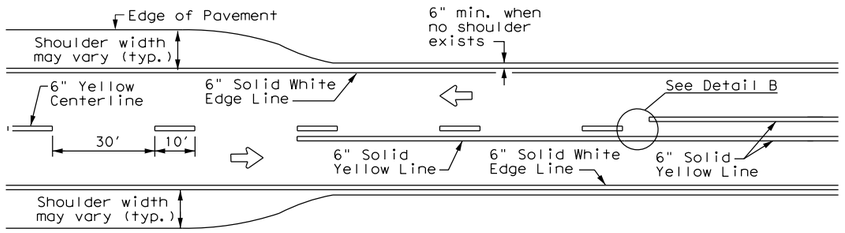
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

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

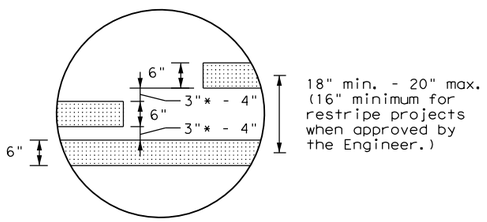
** 8" minimum for restripe projects when approved by the Engineer.



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

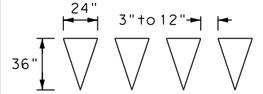


TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



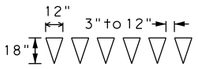
DETAIL "B"

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

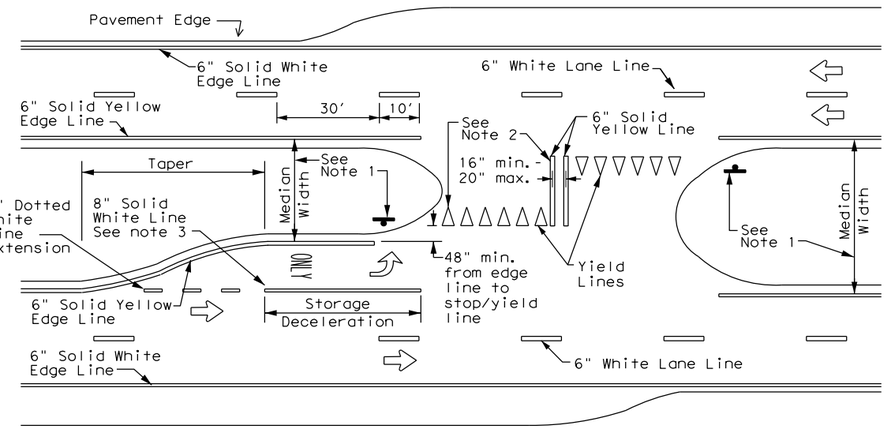


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



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



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

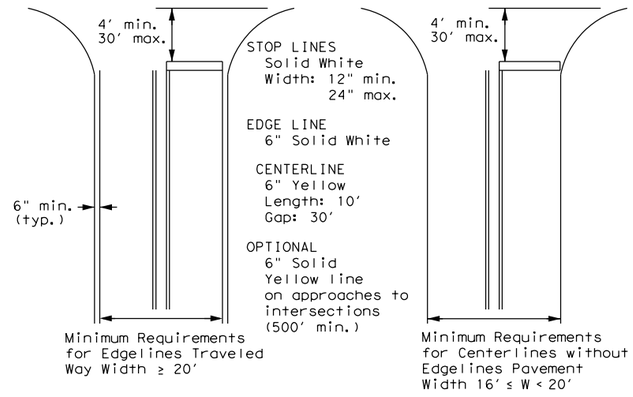
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
   Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling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

GENERAL NOTES

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

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

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



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

GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths
for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

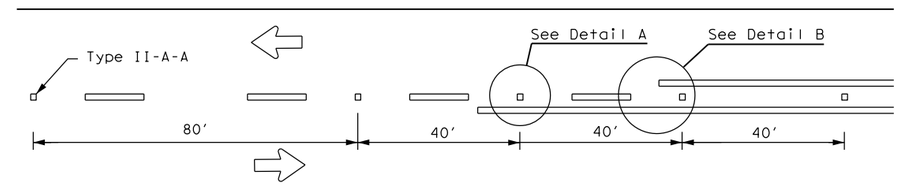
PM(1)-22

FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20	0907	00	229,ETC	RM 584
8-95 3-03 12-22	DIST	COUNTY		SHEET NO.
5-00 2-12	SJT	TOM GREEN		138

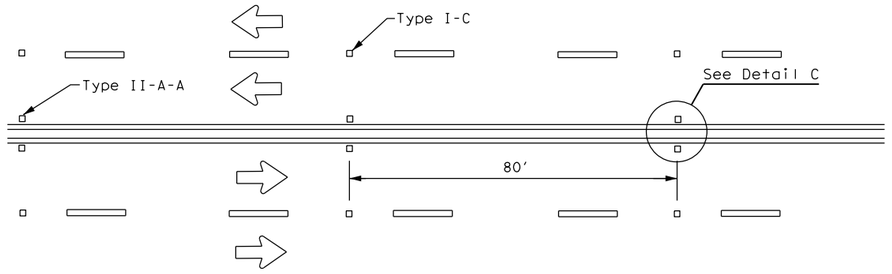
22A

DATE: 4/26/2024 1:03:54 PM
FILE: c:\pw\khl\d0273596.pm1-22.dgn

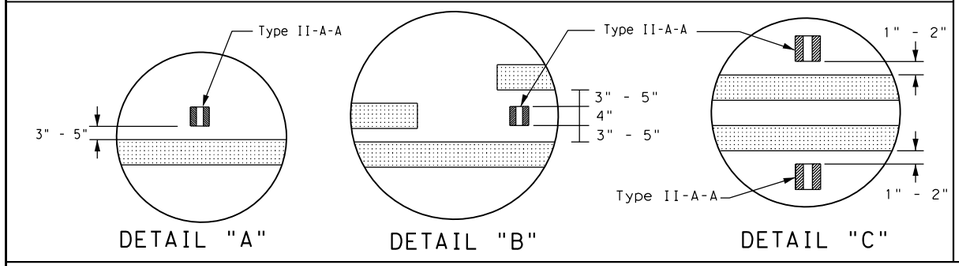
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



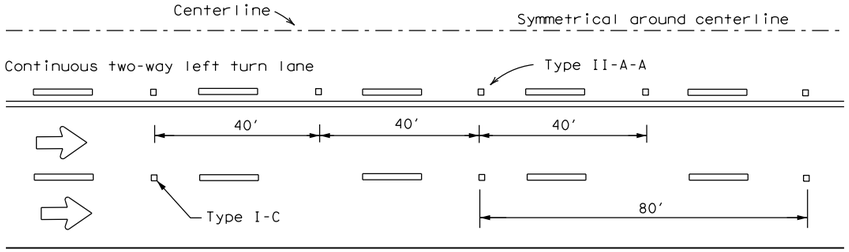
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



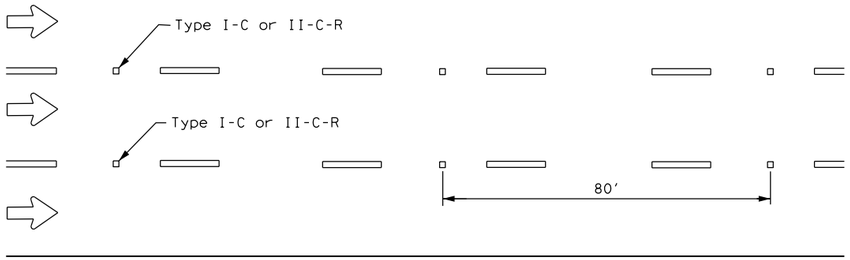
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS



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



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



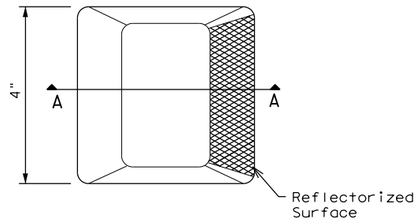
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

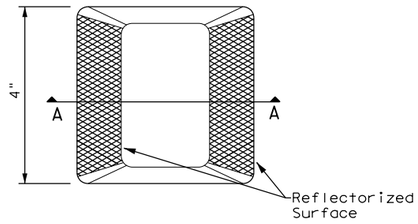
See Note 3.

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

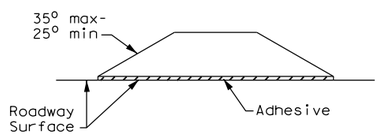
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

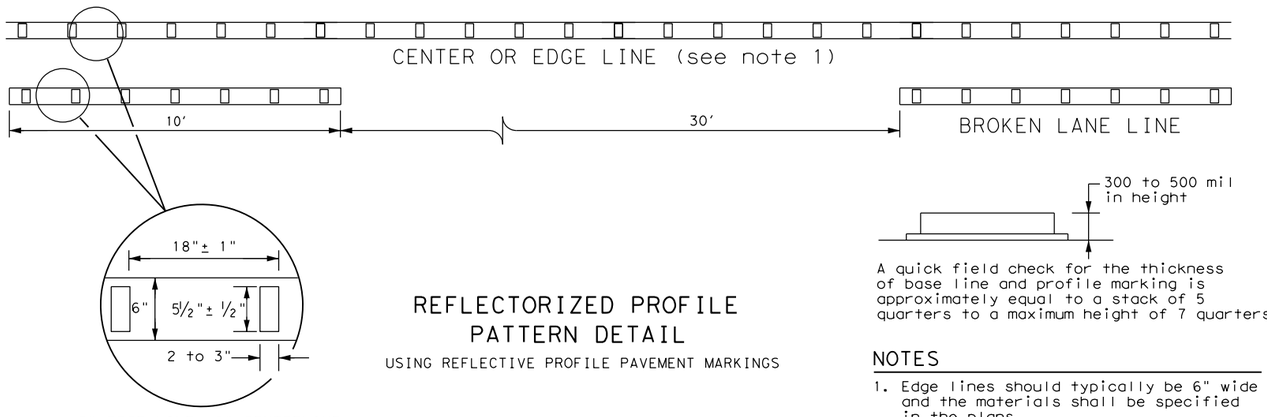


Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



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

REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

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

NOTES

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

GENERAL NOTES

1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

Texas Department of Transportation

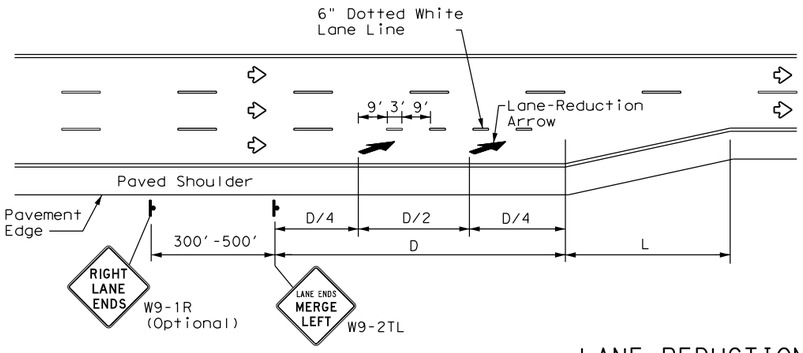
Traffic Safety Division Standard

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

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-77 8-00 6-20 4-92 2-10 12-22 5-00 2-12	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		139

22B

DATE: 4/26/2024 1:04:19 PM
FILE: c:\pw\kn1\d0273596\pm2-22.dgn

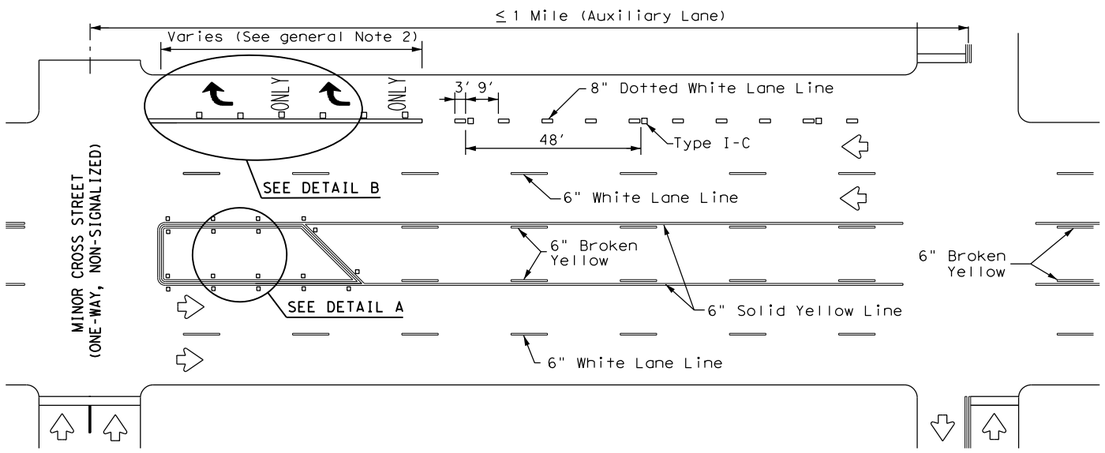


LANE REDUCTION

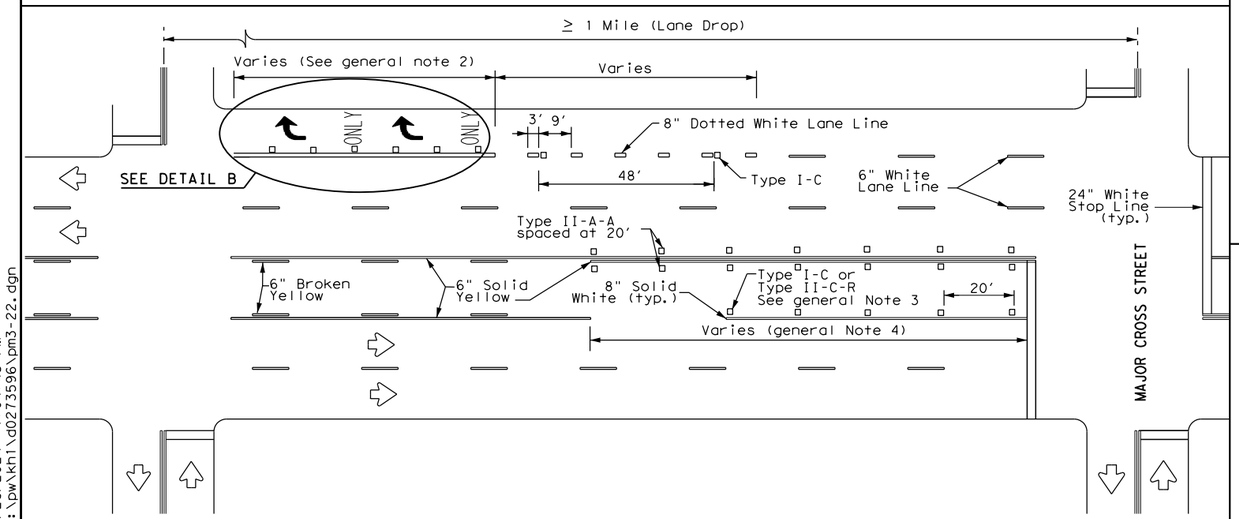
NOTES

1. 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.
2. 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.
3. 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.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

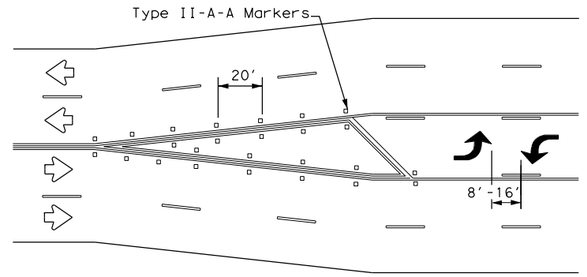
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



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



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



A two-way left-turn (TWLT) 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.

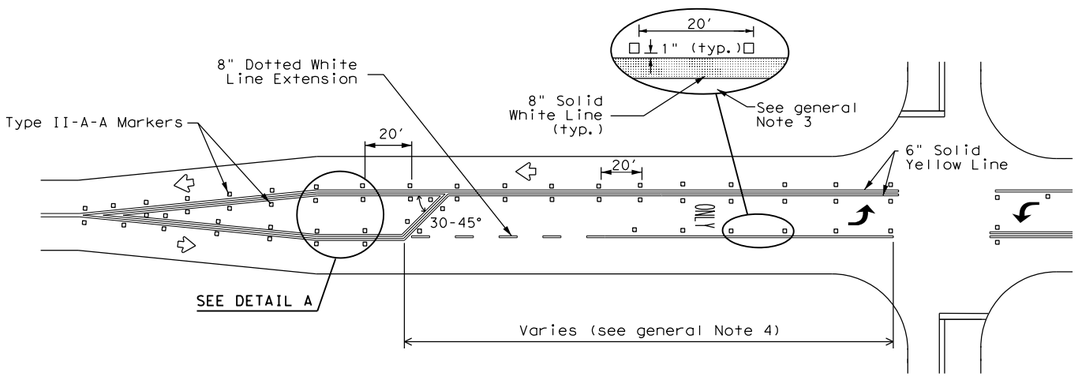
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

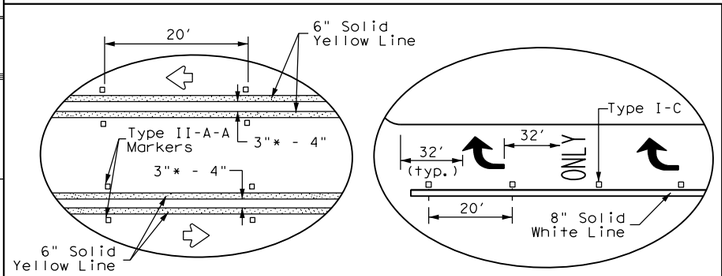
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. 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.
3. 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.
4. 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 TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



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

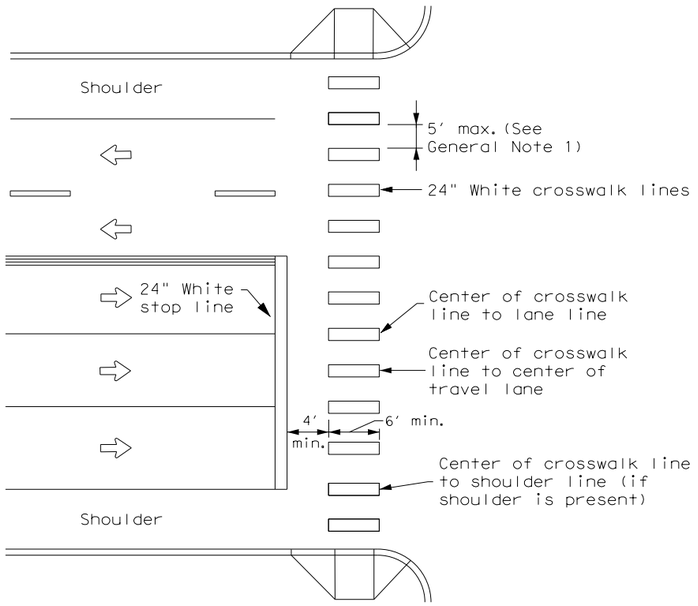
Texas Department of Transportation

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
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		140

22C



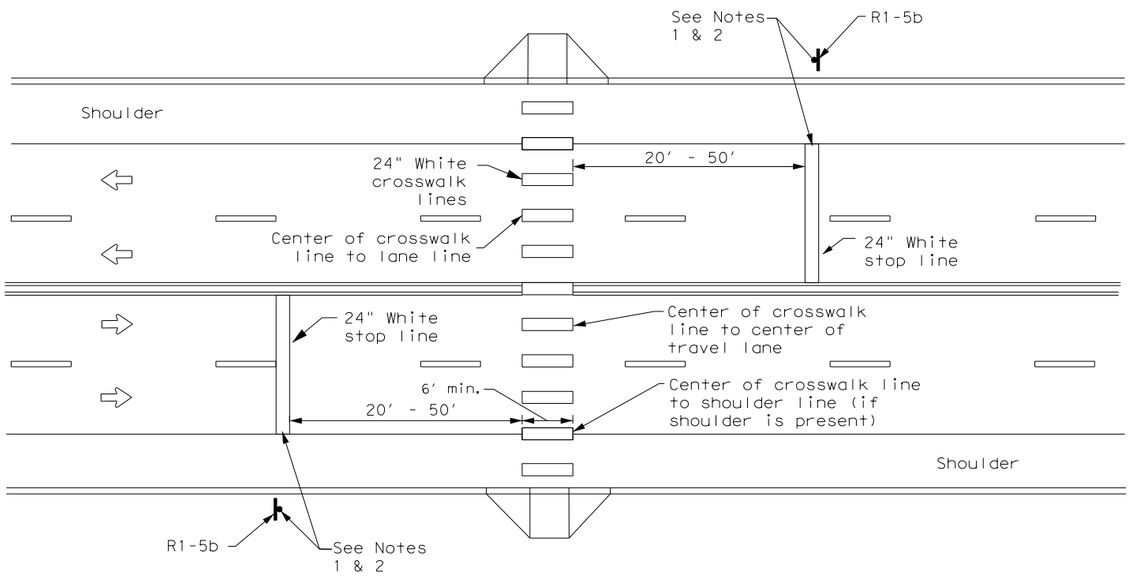
HIGH-VISIBILITY LONGITUDINAL CROSSWALK
AT CONTROLLED APPROACH

GENERAL NOTES

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

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

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



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY
LONGITUDINAL CROSSWALK

NOTES:

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

Texas Department of Transportation | Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229, ETC	RM 584
6-20	DIST	COUNTY		SHEET NO.
6-22	SJT	TOM GREEN		141
12-22				
22D				

DATE: 4/26/2024 1:05:06 PM
FILE: c:\pw\khl\d0217596\pm4-22a.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

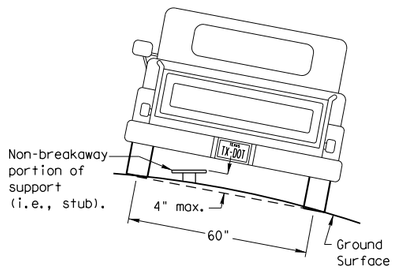
Anchor Type

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

Sign Mounting Designation

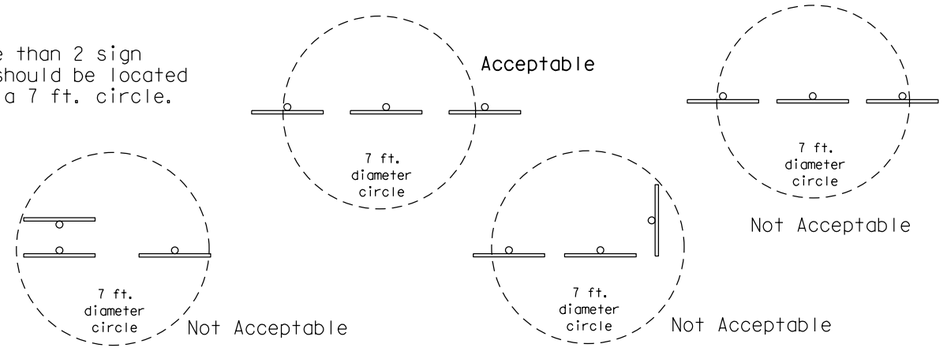
P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))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

REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



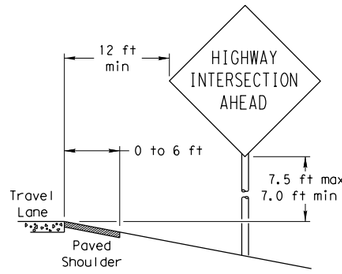
To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

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



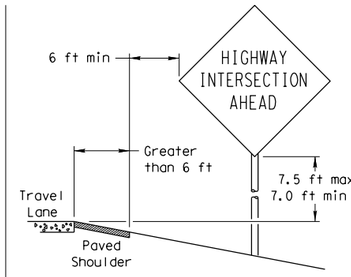
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

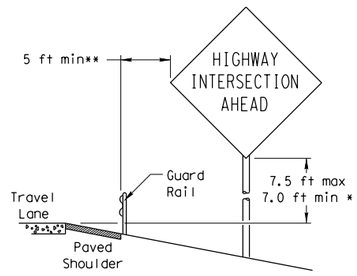
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



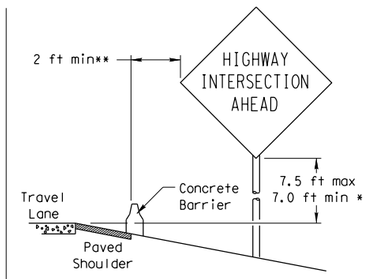
GREATER THAN 6 FT. WIDE

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

BEHIND BARRIER



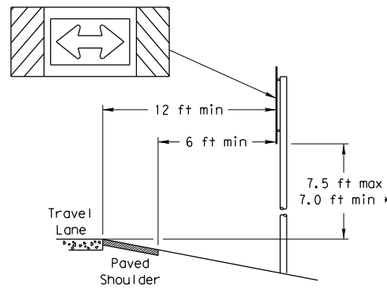
BEHIND GUARDRAIL



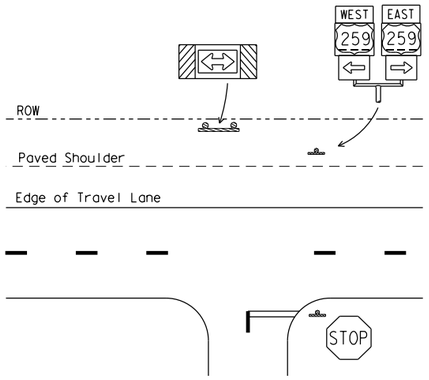
BEHIND CONCRETE BARRIER

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

T-INTERSECTION



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



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

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

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

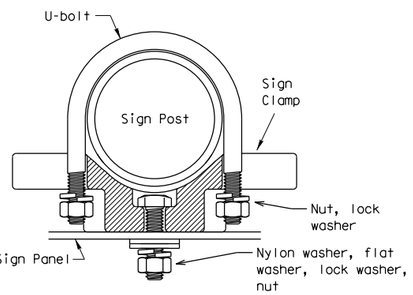
The maximum values may be increased when directed by the Engineer.

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

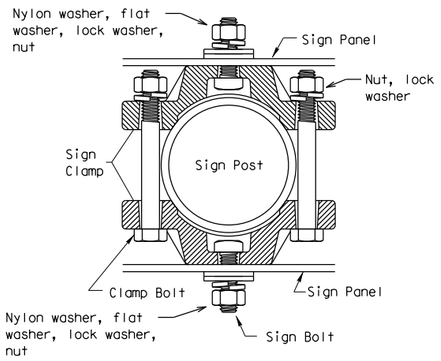
The website address is:
http://www.txdot.gov/publications/traffic.htm

TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



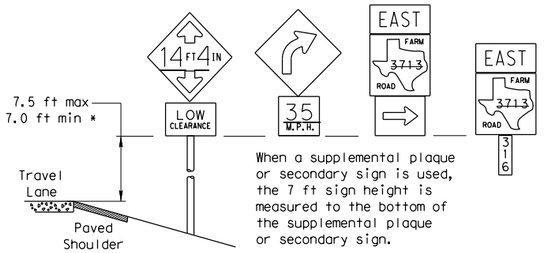
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

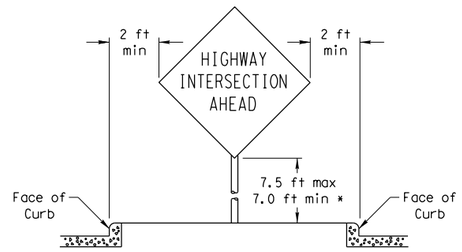
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



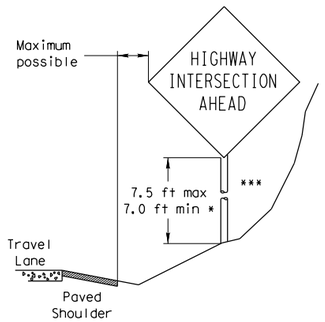
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0907	00	229,ETC	RM 584
DIST	COUNTY		SHEET NO.
SJT	TOM GREEN		142

9-08 REVISIONS

26A

DATE: 4/26/2024 1:05:29 PM
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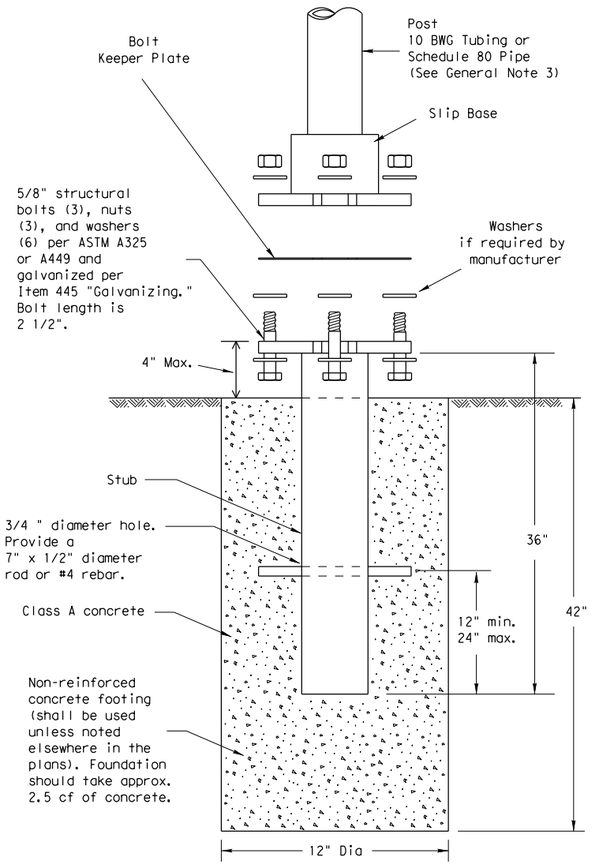
TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

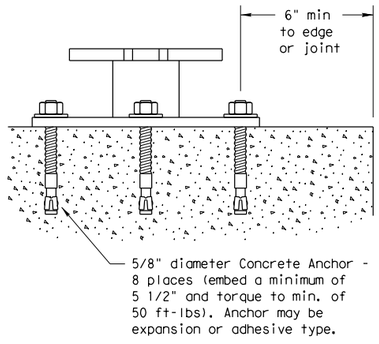
1. Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
2. Material used as post with this system shall conform to the following specifications:
   10 BWG Tubing (2.875" outside diameter)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

ASSEMBLY PROCEDURE

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

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

CONCRETE ANCHOR



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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

© TxDOT July 2002	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		143

DATE: 4/26/2024 1:05:53 PM
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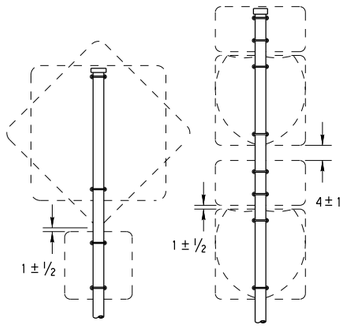
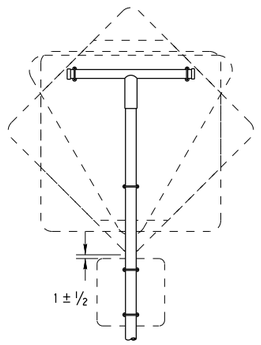
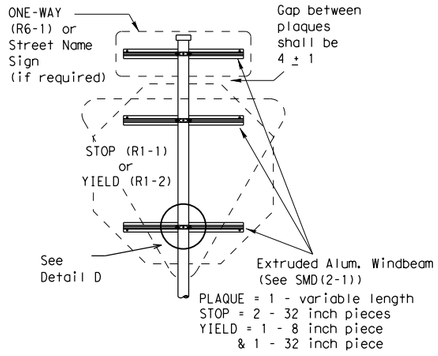


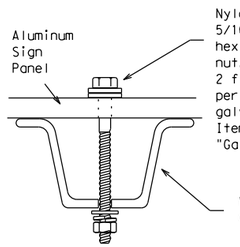
SM RD SGN ASSM TY XXXXX(1)XX(P)



SM RD SGN ASSM TY XXXXX(1)XX(T)

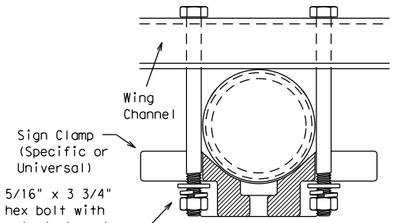


SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Top View

Detail A



Top View

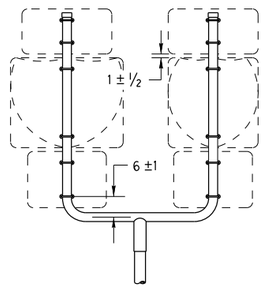
Detail B

GENERAL NOTES:

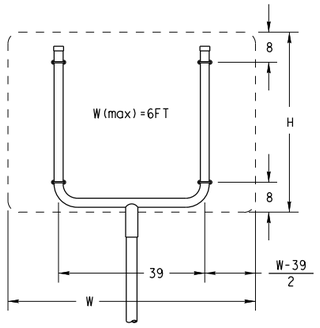
1.

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

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



SM RD SGN ASSM TY XXXXX(1)XX(U)



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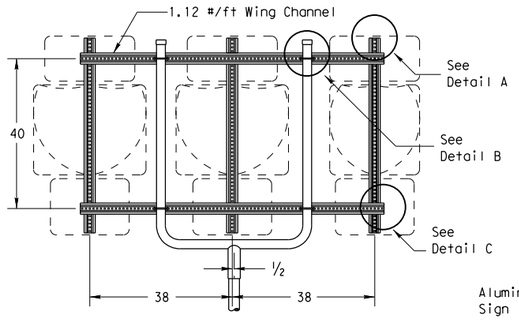
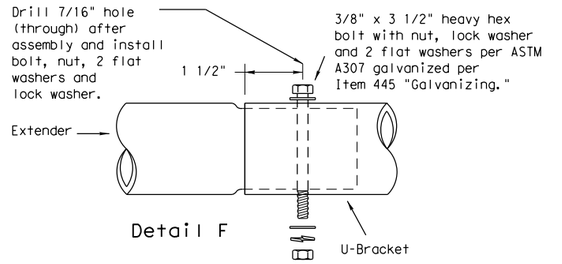
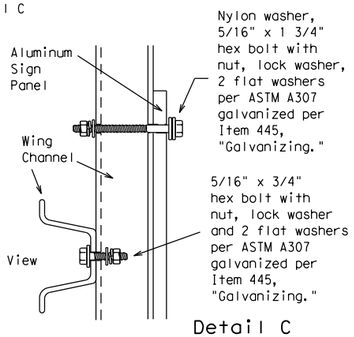


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

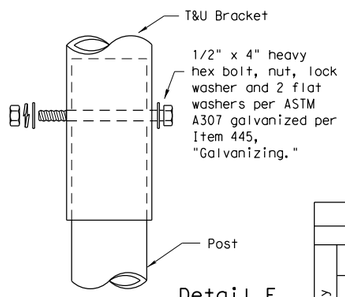


Detail F

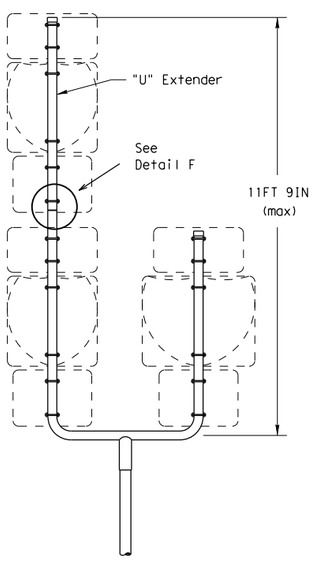
Splices shall only be allowed behind the sign substrate.



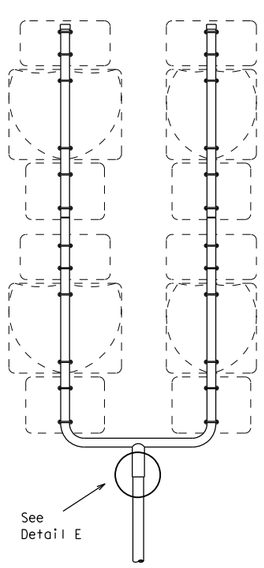
Detail C



Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)



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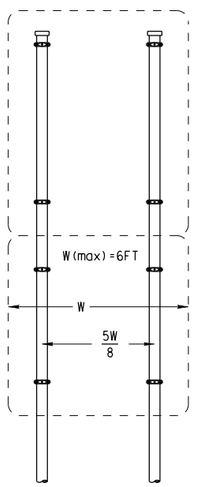
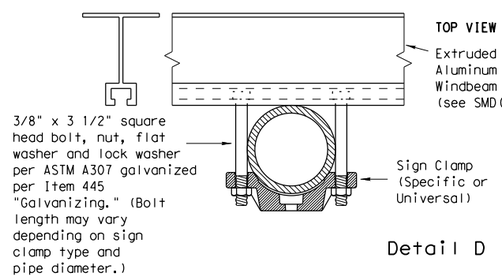
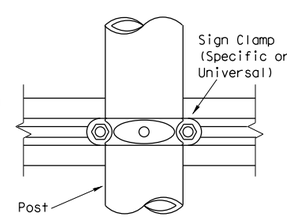


SM RD SGN ASSYM TY XXXXX(2)XX(P)

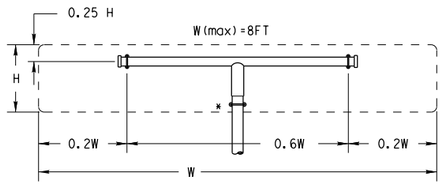
SIDE VIEW



Detail D



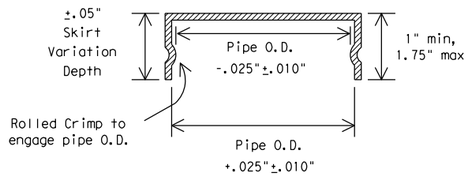
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)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



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

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		144

26C

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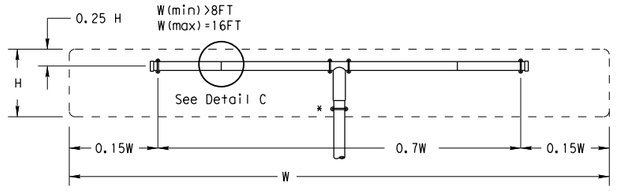
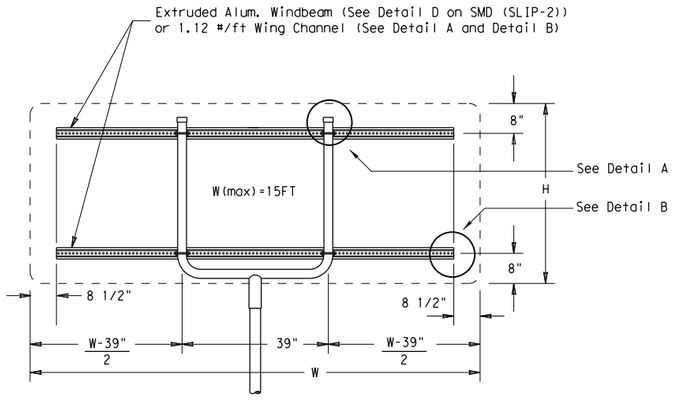
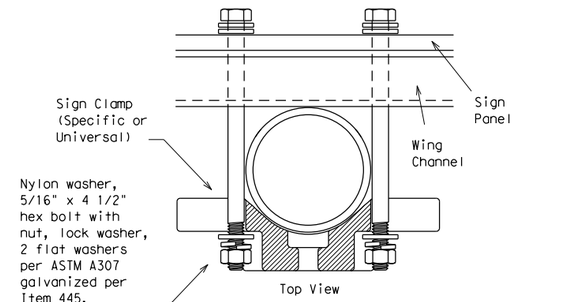


SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

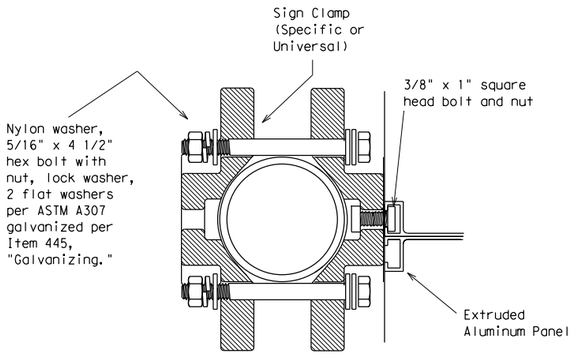
(* - See Note 12)



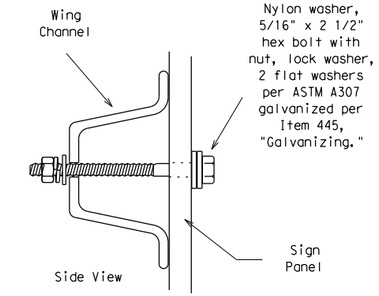
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



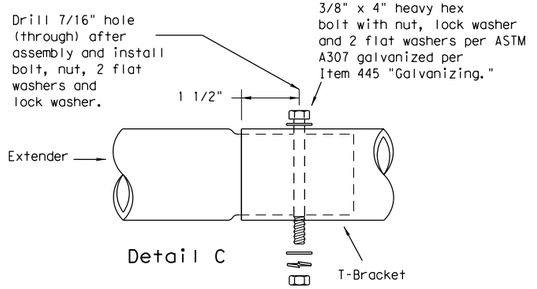
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET

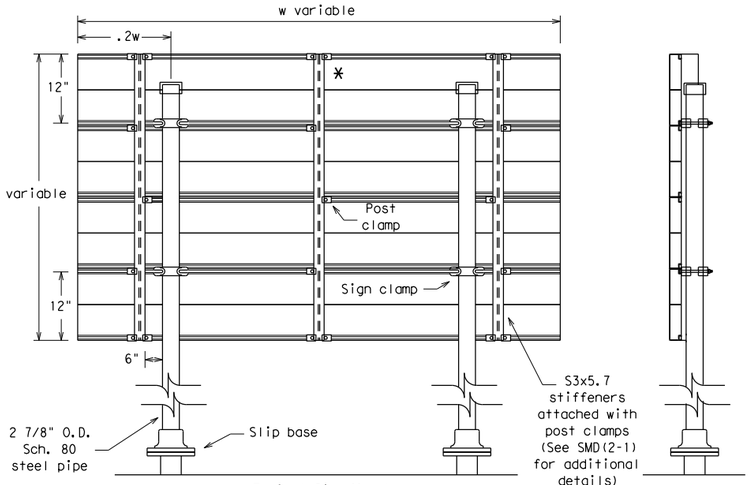


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

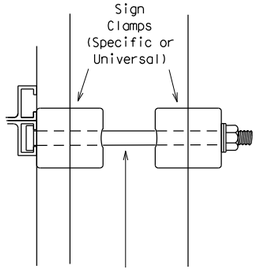


Typical Sign Mount

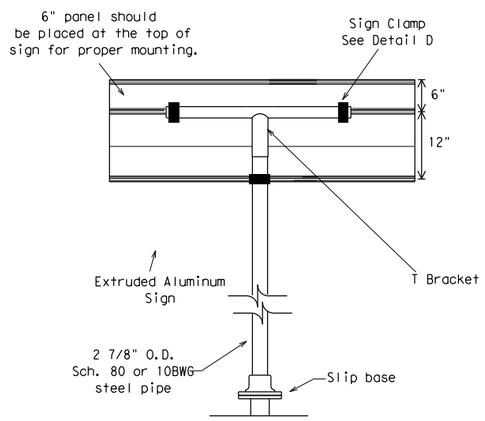
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

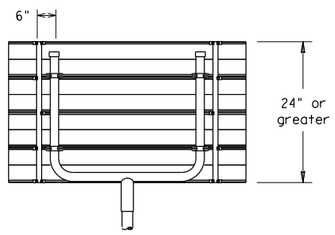
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

REVISIONS
9-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0907	00	229,ETC	RM 584

DIST	COUNTY	SHEET NO.
SJT	TOM GREEN	145

26D

DATE: 4/26/2024 1:06:37 PM
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GENERAL NOTES:

1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.

2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.

3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.

4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.

5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".

6. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.

7. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."

8. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.

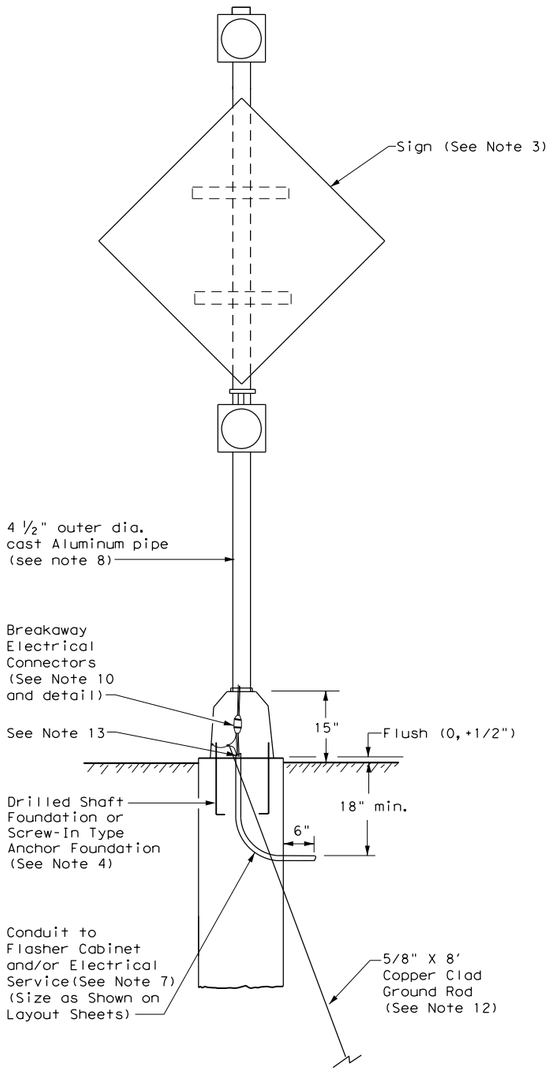
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening of connection.

10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).

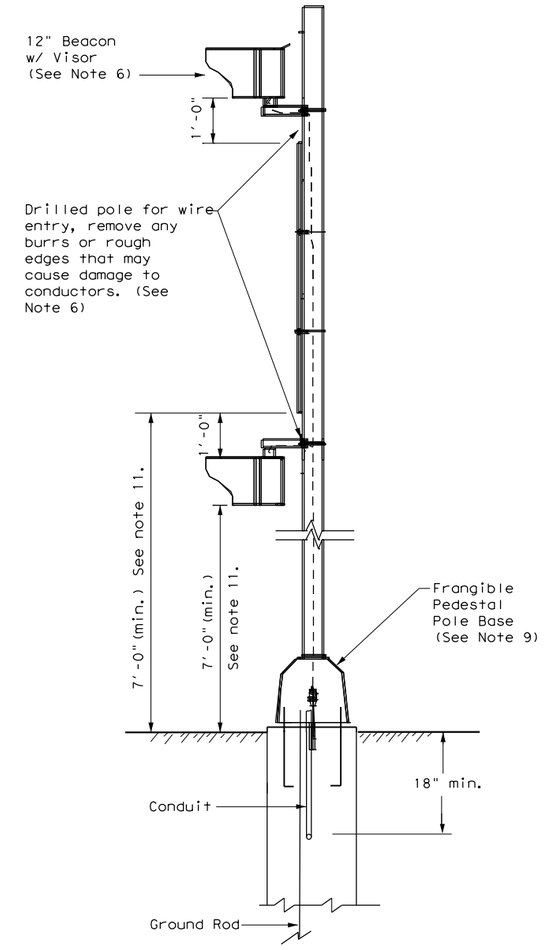
11. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.

12. Make connections to ground rods according to NEC. Ground rod clamps shall be listed for their intended purpose.

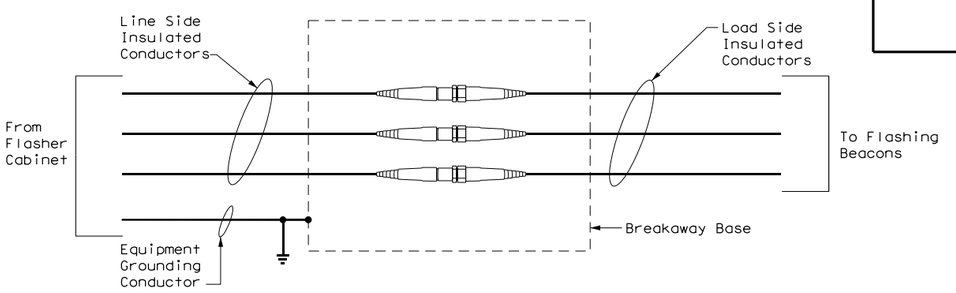
13. Ensure height of conduit and ground rod is below top of anchor bolts.



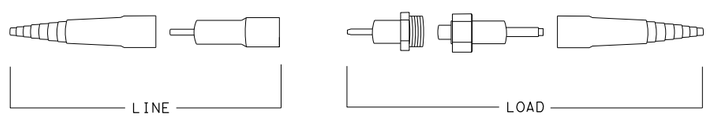
FRONT



SIDE



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

ROADSIDE FLASHING BEACON ASSEMBLY

RFBA-13

FILE: rfba-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS 5-93 12-04 10-93 3-13 4-98	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		146

74

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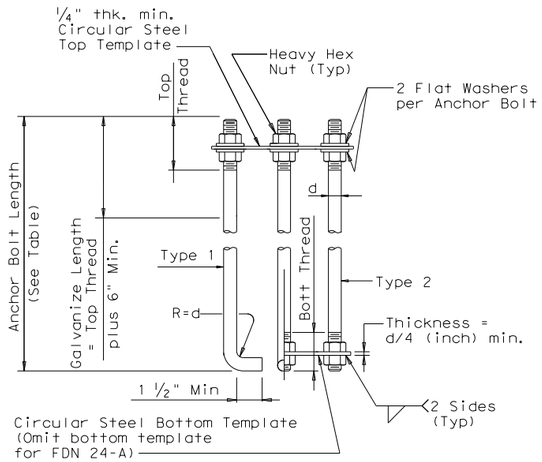
FOUNDATION DESIGN TABLE

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	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 ½"	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 ¾"	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 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'

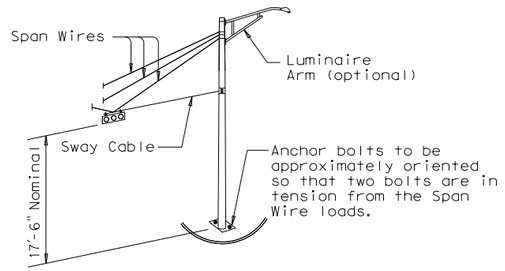
EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



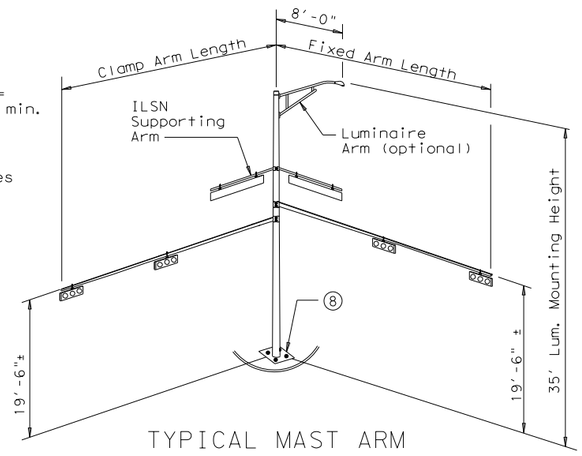
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

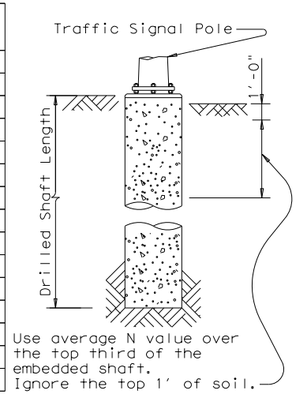
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL STRAIN POLE ASSEMBLY



TYPICAL MAST ARM ASSEMBLY



NOTES:

① Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

② Foundation Design Loads are the allowable moments and shears at the base of the structure.

③ Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

④ Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

⑤ If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

ANCHOR BOLT & TEMPLATE SIZES

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

⑦ Min dimensions given, longer bolts are acceptable.

FOUNDATION DETAILS

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
US 87 AT KNICKERBICKER RD	10	24-A	6	33				
	10	36-A	2			26		
SH 158 & US 277	10	24-A	2	12				
TOTAL DRILLED SHAFT LENGTHS				45		26		

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".

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEB

REVISIONS: 5-96, 11-99, 1-12

CONT	SECT	JOB	HIGHWAY
0907	00	229, ETC.	RM 584
DIST	COUNTY		SHEET NO.
SJT	TOM GREEN		147

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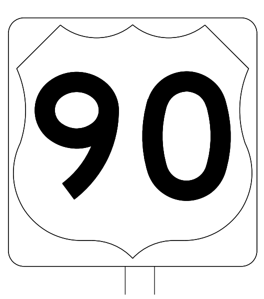
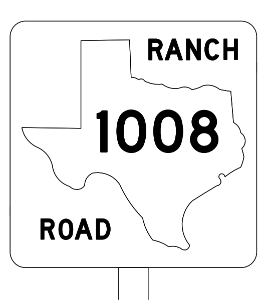
REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

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

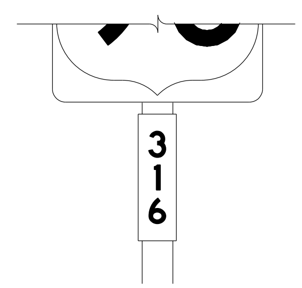


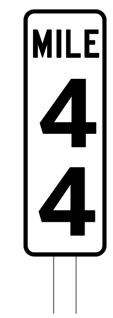


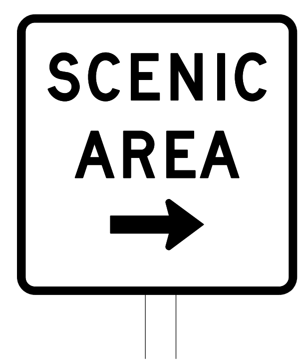
TYPICAL EXAMPLES

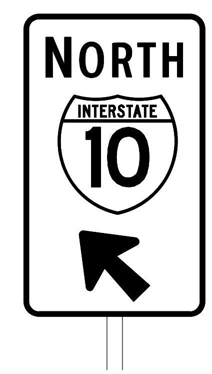
REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

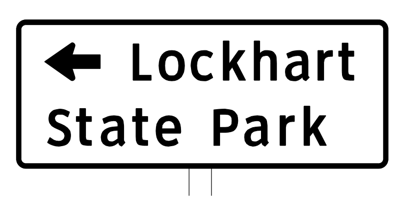
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING

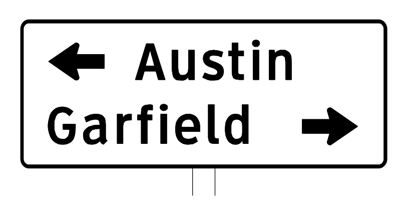












TYPICAL EXAMPLES

GENERAL NOTES

1. 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).

2. 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

3. 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).

4. 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.

5. 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.

6. 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.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. 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/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(3)-13

FILE: tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-03 7-13 9-08	0907	00	229,ETC	RM 584
	SJT	TOM GREEN		SHEET NO. 148

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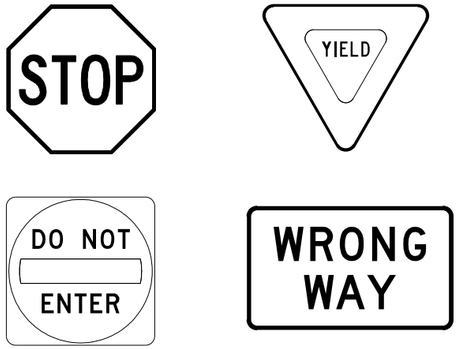
REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(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

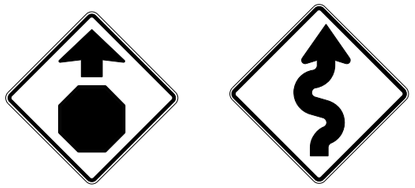
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(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

1. 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).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. 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.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. 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.
6. 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.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. 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/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

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REVISIONS 12-03 7-13 9-08	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		149

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GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

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

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

1. Provide Type XHHW insulated conductors in accordance with Departmental Material Specification (DMS)11040 "Conductors" and Item 620 "Electrical Conductors." Provide conductors as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 620. Color code insulated conductors in conformance with the NEC. Identify grounded (neutral) conductors with white insulation. Identify grounding conductors (ground wires) with green insulation or bare conductors. Identify ungrounded (hot) conductors with any color insulation except green, white, or gray. Keep color scheme consistent throughout the wiring system. Identify conductors 6 American Wire Gauge (AWG) and smaller by continuous color jacket. Identify electrical conductors 4 AWG and larger by continuous color jacket or by colored tape. When identifying conductors with colored tape, mark at least 6 in. of the conductor's insulation with half laps of tape.

2. Provide a solid copper 6 AWG grounding electrode conductor to bond the electrical service equipment to the concrete encased grounding electrode or the ground rod at the service location. Connect the grounding electrode conductor to the ground rod with a UL listed connector in accordance with DMS 11040. Connect the grounding electrode conductor to the concrete encased grounding electrode as shown in the plans.

3. Where two or more circuits are present in one conduit or enclosure, permanently identify the conductors of each branch circuit by attaching a non-metallic tag around both circuit conductors at each accessible location. Provide tags with two straps, large enough to indicate circuit number, letter, or other identification as shown in the plans. Print circuit identification on the tag with a permanent marker.

4. Use listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors for splicing as specified in DMS 11040. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Provide UL listed gel-filled insulating splice covers. Splicing materials, insulating materials, breakaway disconnects, splice covers, and fuse holders are subsidiary to various bid items.

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.

2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.

3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.

4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.

5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.

6. Support conductors in illumination poles with a J-hook at the top of the pole.

7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.

8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.

9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.

10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.

11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.

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

C. TEMPORARY WIRING

1. Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.

2. Provide a ground fault circuit interrupter (GFCI) for power outlets for portable electrical equipment, power tools, ice machines, ice storage bins and refrigerators located outdoors at grade. GFCI may be any one of the following: molded cord and plug set, receptacle, or circuit breaker type.

3. Use listed wire nuts with factory applied sealant for temporary wiring where approved.

4. Enclose conductor splices within a listed enclosure or ground box, or ensure the splices are more than 10 ft. above grade vertically and more than 5 ft. horizontally from any metal structure. Where installing temporary conductors in areas subject to vehicle traffic or mobile construction equipment, ensure the vertical clearance to ground is at least 18 ft. when measured at the lowest point. Ground messenger wires that support power conductors in conformance with the NEC.

5. Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.

2. Do not place ground rods in the same drilled hole as a timber pole.

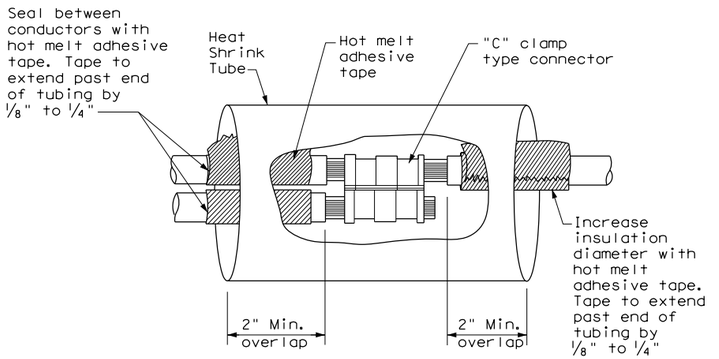
3. Install ground rods so the imprinted part number is at the upper end of the rod.

4. Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.

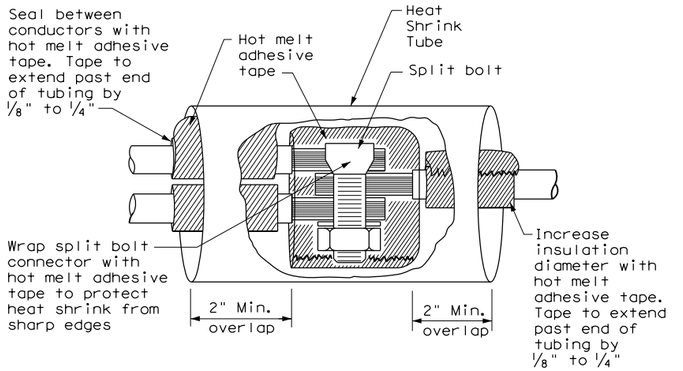
5. Route all conductors as short and straight as possible for connection to lightning protection ground rods. When a bend is required, ensure a minimum radius bend of four inches for these conductors.

6. Unless otherwise called for in the plans, protect grounding electrode conductors with non-metallic conduit. When protecting grounding electrode conductors with metal conduit, provide and install a grounding type bushing and properly sized bonding jumper on each end of the metal conduit.

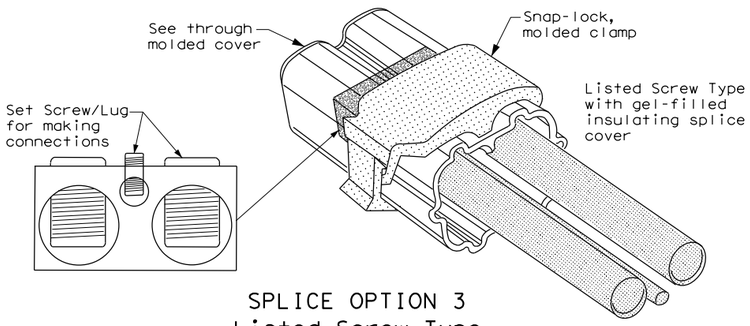
7. Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

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ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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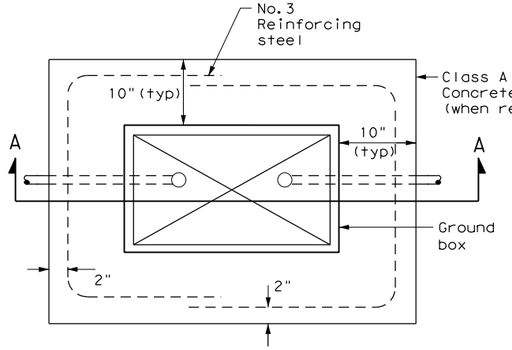
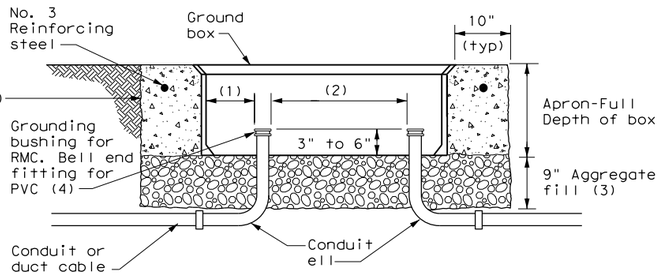


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

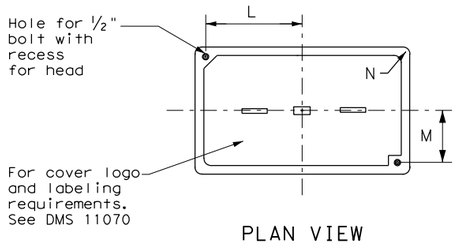
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

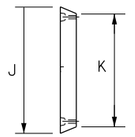
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

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

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



PLAN VIEW



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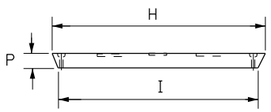

SIDE

GROUND BOX COVER

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

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

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

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

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Traffic Operations Division Standard

ELECTRICAL DETAILS
GROUND BOXES

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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

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

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

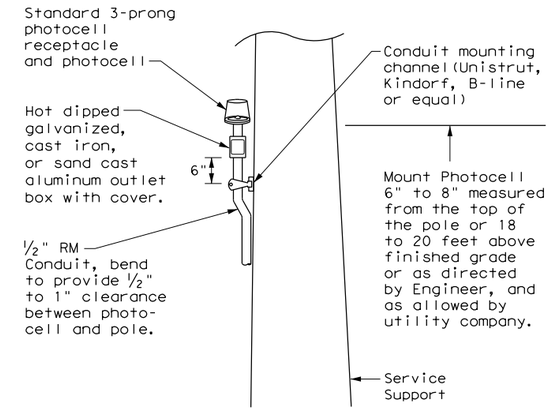
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

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

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

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

- Schematic Type
- Service Voltage V / V
- Disconnect Amp Rating
  000 indicates main lug only/
  Typically Type T
- (SS)= Safety Switch Ahead of Meter-Check with Utility
  (NS)= No safety Switch Ahead of Meter-Check with Utility
- Enclosure Type
  GS= Galvanized steel("off the shelf")
  SS= Stainless steel(Custom Enclosure)See MPL
  AL= Aluminum (Custom Enclosure)See MPL
- Photocell Mounting Location
  (E)= Inside Service/Enclosure Mounted
  (T)= Top of pole
  (L)= Luminaire mounted
  (N)= None/No Photocell or Lighting Contactor Required
- Service Support Type
  GC= Granite concrete
  OC= Other concrete
  TP= Timber pole
  SP= Steel pole
  SF= Steel frame
  OT= Pole by others or paid for separately
  EX= Existing pole
  TS= Service on traffic signal pole
  PS= Pedestal Service
- O= Overhead Service Feed from Utility
  U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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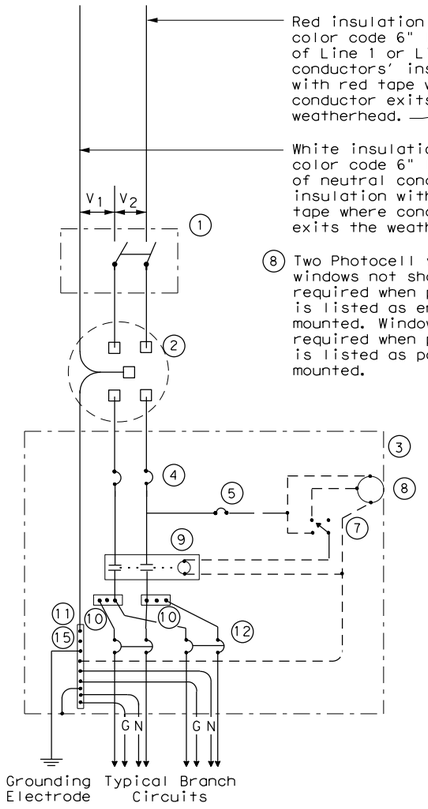
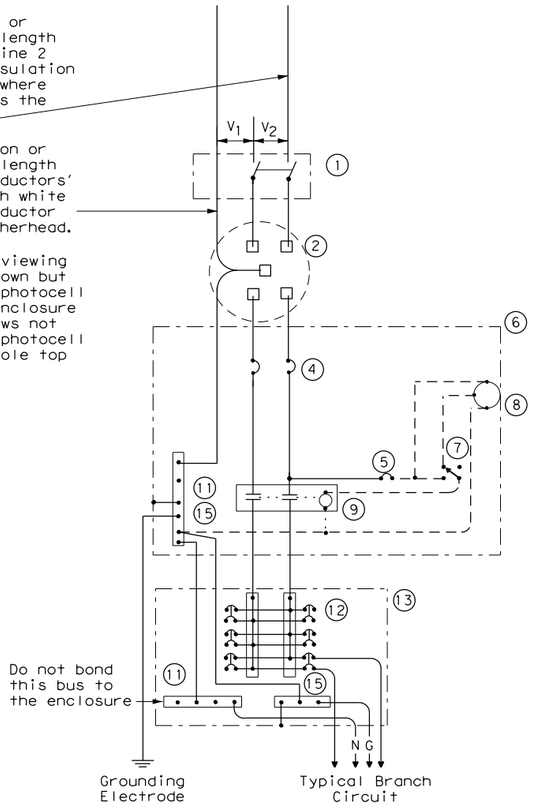
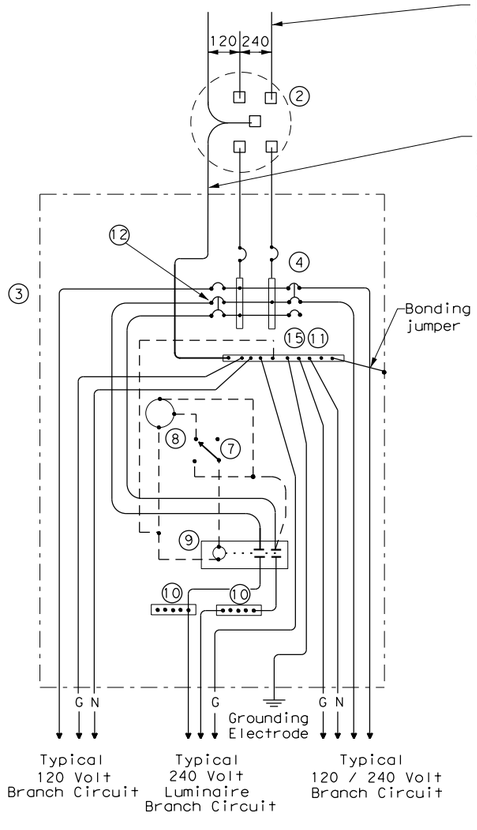


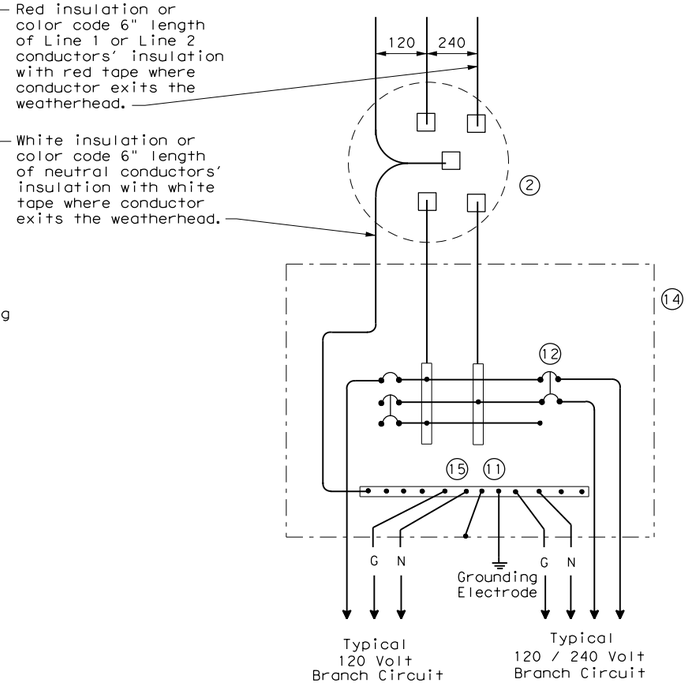
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



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



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

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

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

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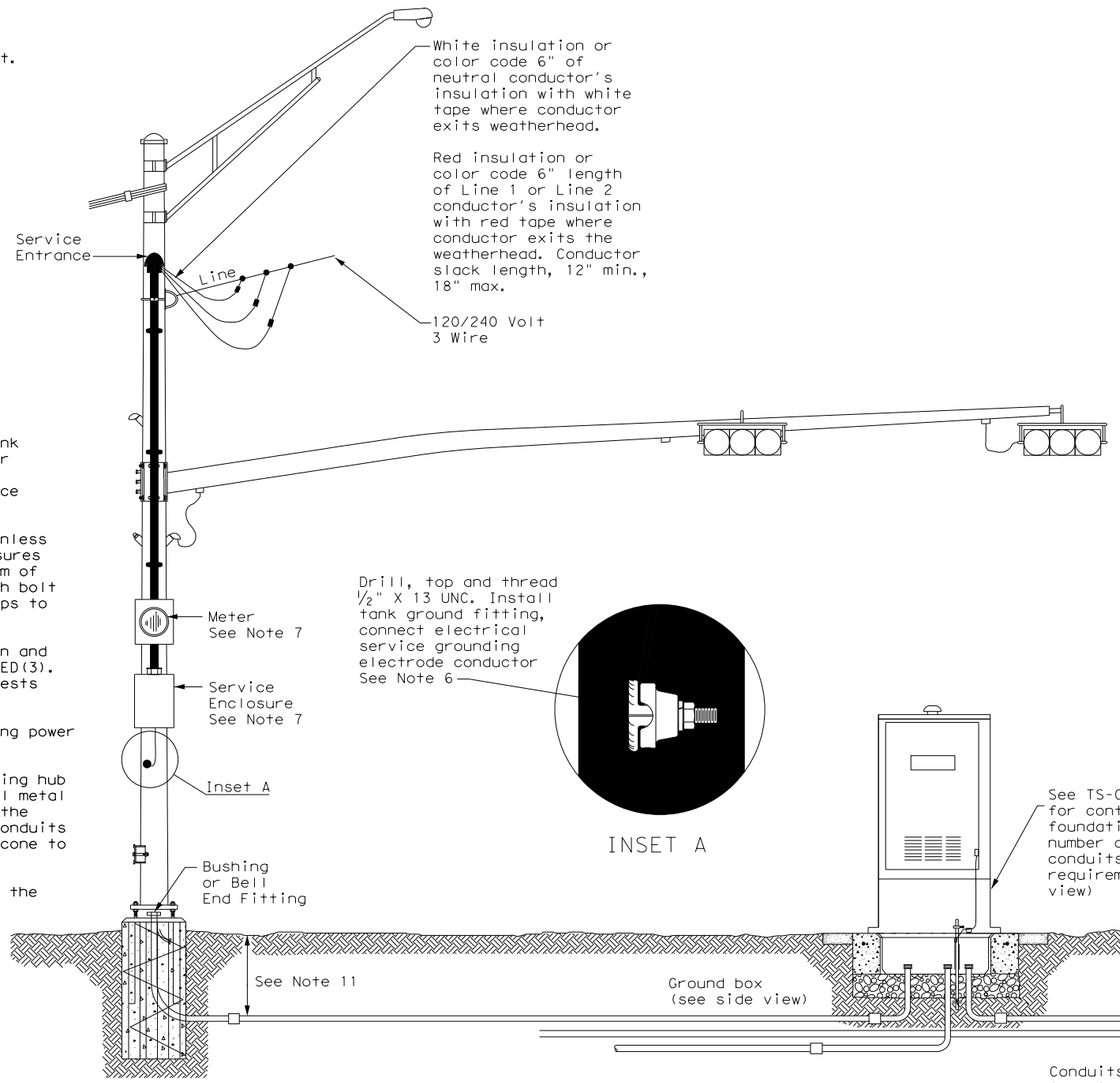
TRAFFIC SIGNAL NOTES

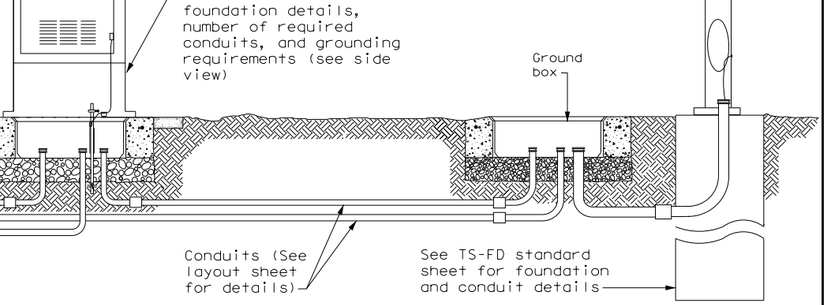
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material 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 ½ 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 ¾ in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".



SIGNAL POLE WITH SERVICE

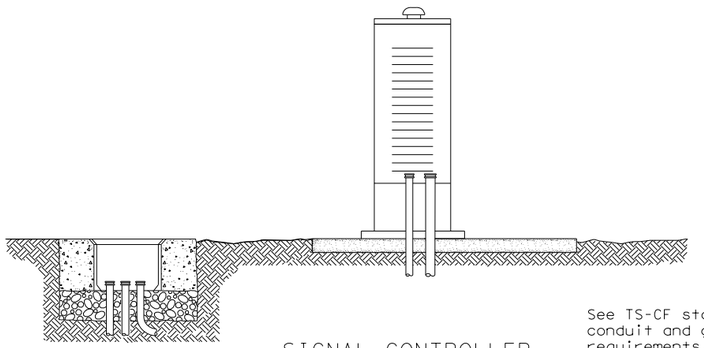
Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

INSET A



SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

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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.

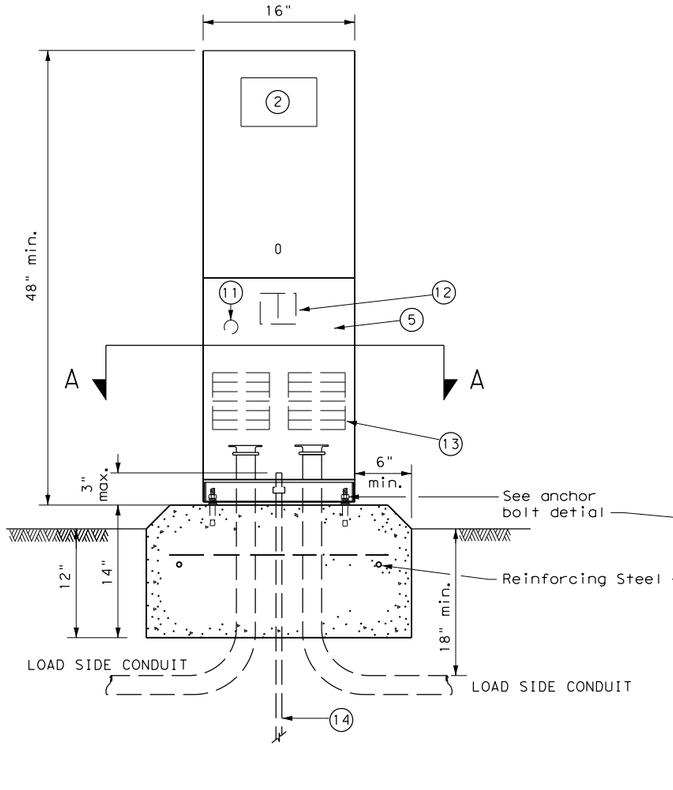
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."

5. Install ½ in. X 2 ⅛ 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 ½ in. galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.

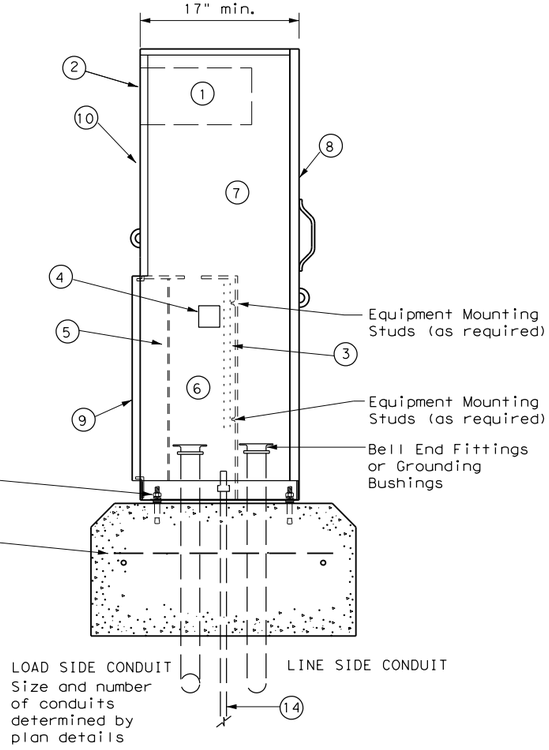
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than ⅛ in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of ⅛ in. per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within ¼ 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.

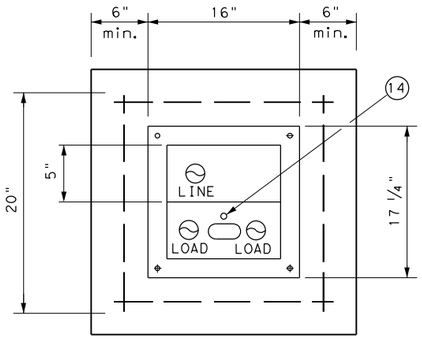


FRONT VIEW

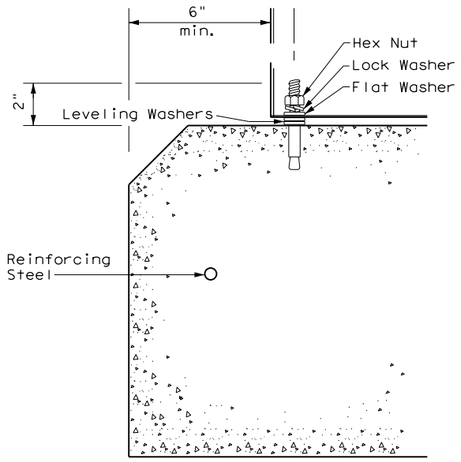


SIDE VIEW

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'

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS
ED(9)-14

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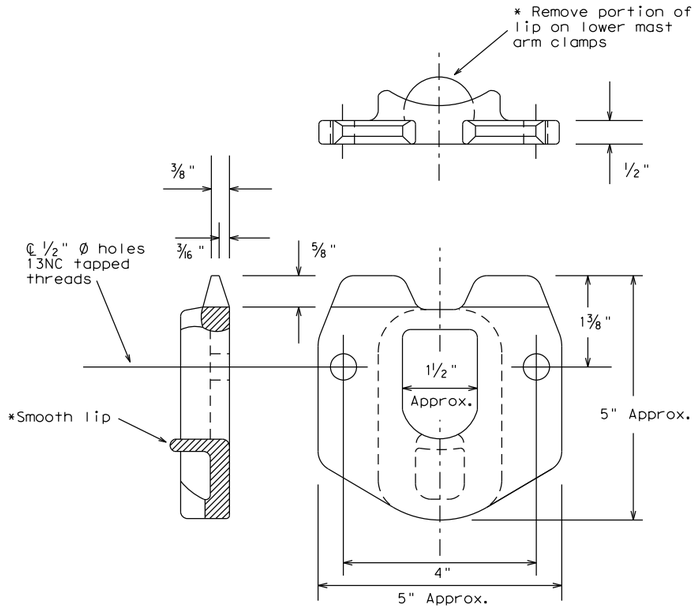
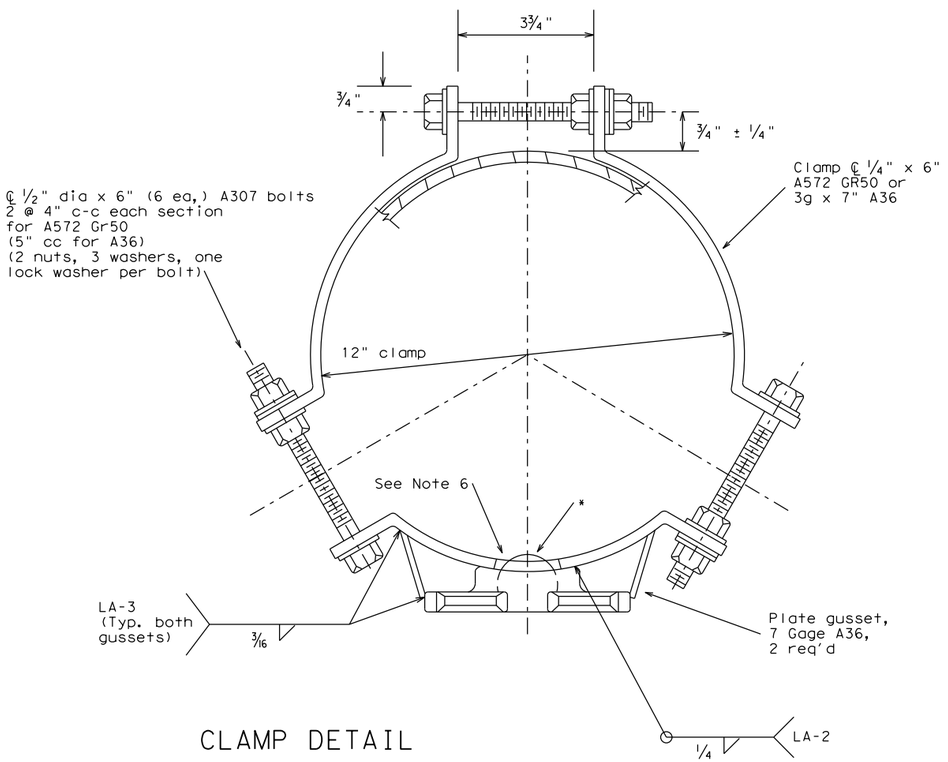


POLE SIMPLEX DETAILS



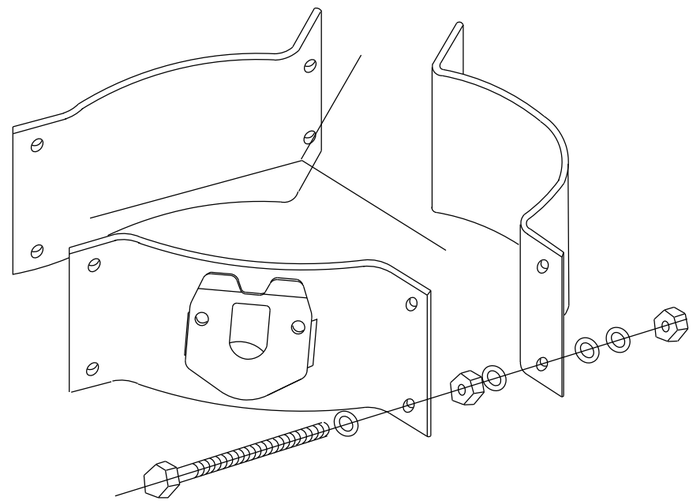
CLAMP DETAIL

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, 1/2in. X 1 1/2in. 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.



PROJECTION

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

Texas Department of Transportation
Traffic Operations Division

CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

CFA-12

DN: KAB	CK: RES	DW: FDN	CK: CAL

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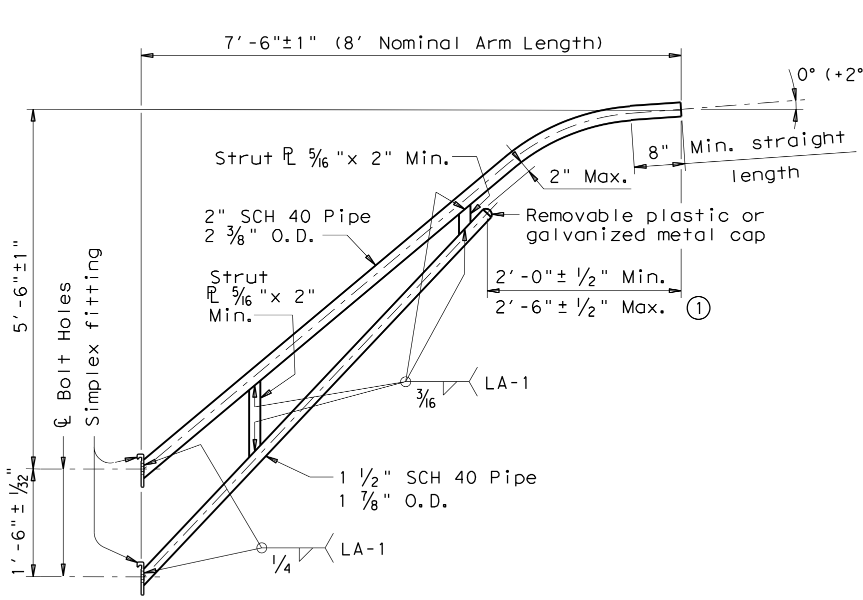
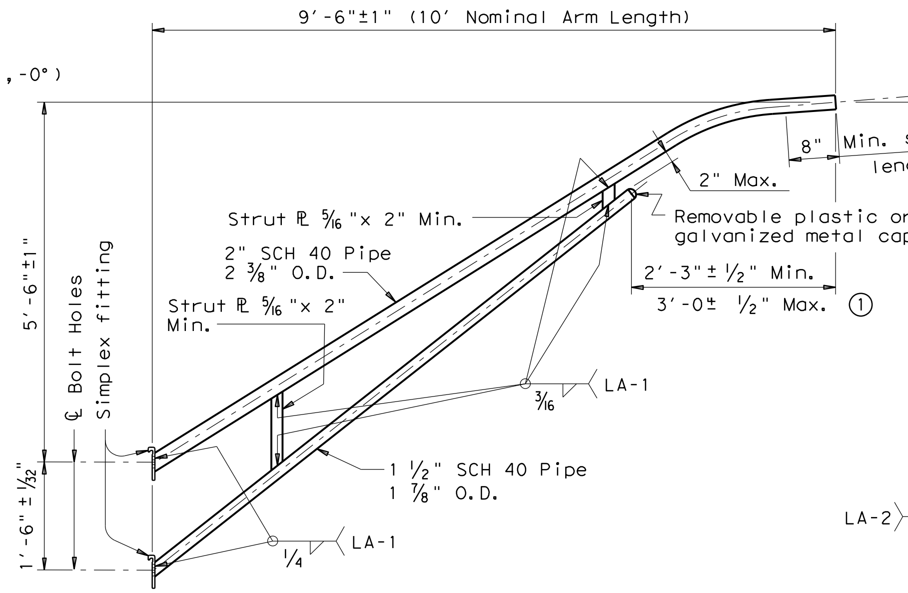


8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM

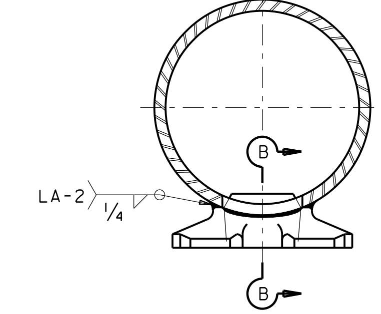
MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr.65-35 or A148 Gr.80-50, A576 Gr.1021 ③, or A36 (Arm only)
Arm Pipes	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50 ④, or A1011 HSLAS-F Gr.50 ④
Arm Strut Plates ②	ASTM A36, A572 Gr.50 ④, or A588
Misc.	ASTM designations as noted

① Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

② Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

③ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

④ ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.



DIRECT ATTACHMENT DETAIL

GENERAL NOTES:

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

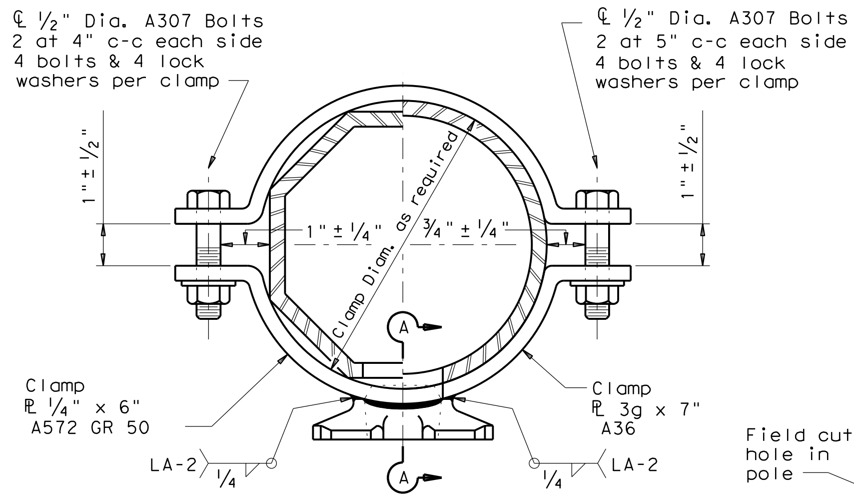
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absense of specified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

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

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

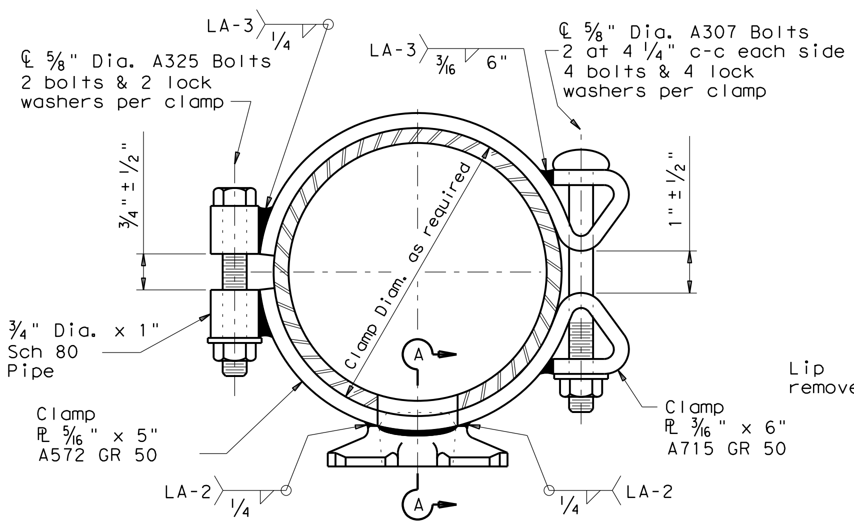
Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly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

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



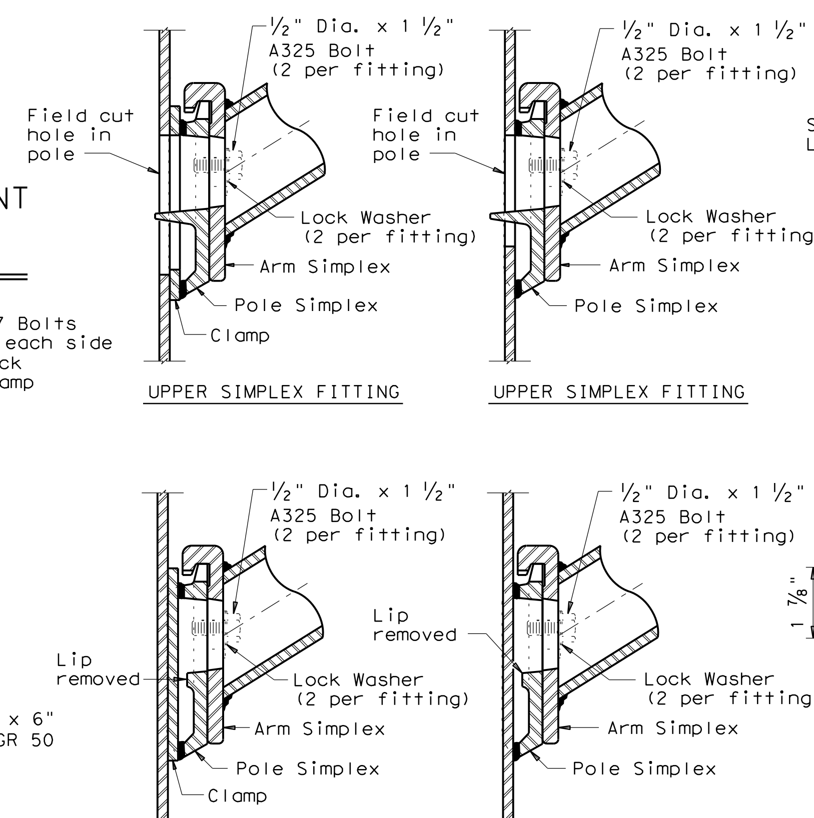
CLAMP ATTACHMENT DETAIL NO.1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO.2 (HALF SECTION)



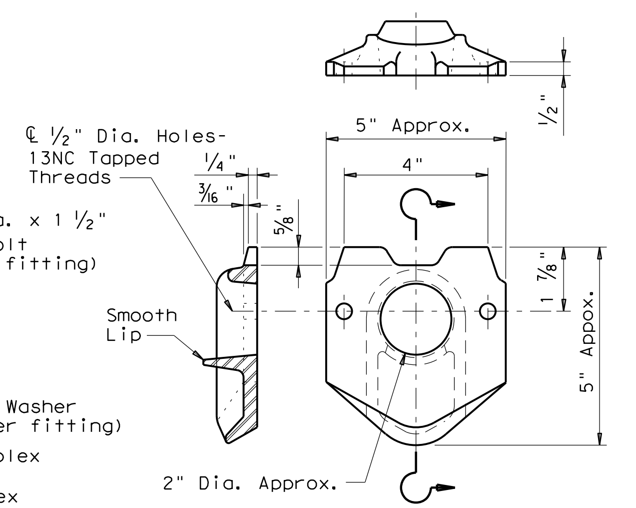
CLAMP ATTACHMENT DETAIL NO.3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO.4 (HALF SECTION)

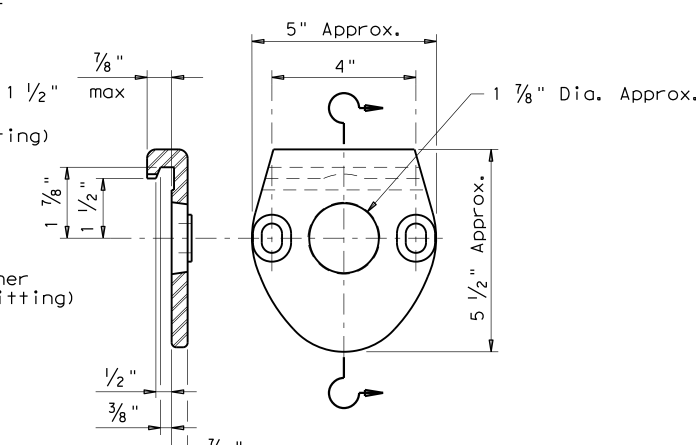


SECTON A-A

SECTON B-B



POLE SIMPLEX DETAIL



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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DATE:
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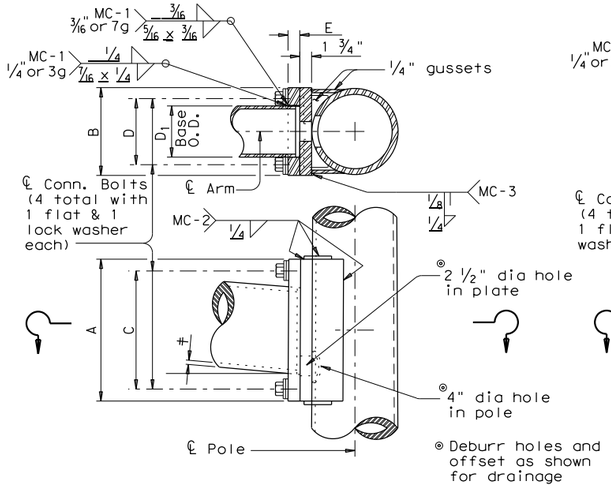
ARM SIZE D_1	ARM SIZE ϕ	A	B	C	D	E	CONN BOLT DIA
in.	in.	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2



FIXED MOUNT DETAIL 1

ARM SIZE D_1	ARM SIZE ϕ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	4	1 1/4	3	5/8
9.5	.239	18	12	4	1 1/4	3	5/8
10.0	.239	18	12	4	1 1/4	3	5/8

ARM SIZE D_1	ARM SIZE ϕ	A	B	C	D	E	CONN BOLT DIA
in.	in.	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
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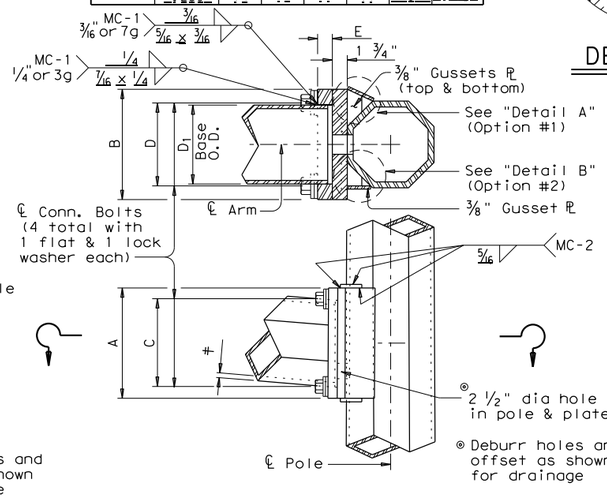
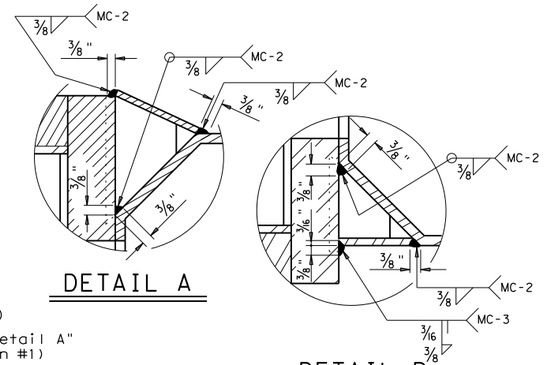
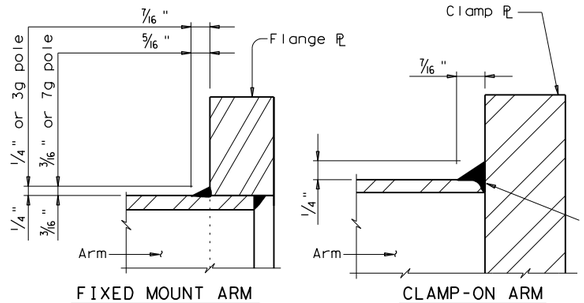


FIXED MOUNT DETAIL 2

ARM SIZE D_1	ARM SIZE ϕ	A	F	T	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	in.	ea.	in.	ea.	in.
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





ARM BASE WELD DETAILS

ARM SIZE D_1	ARM SIZE ϕ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8

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

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 1/2" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

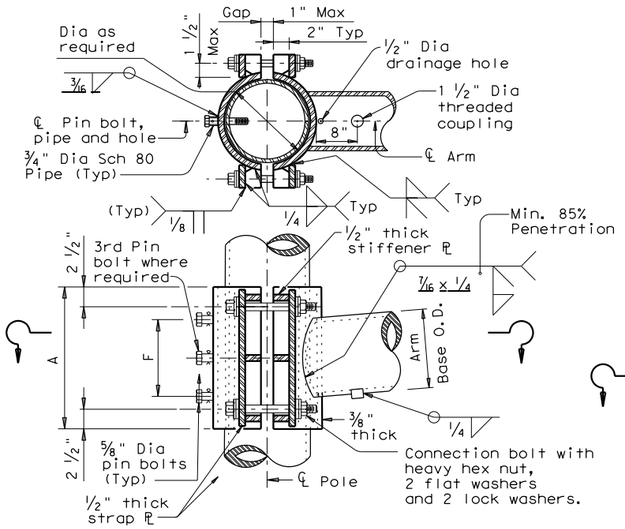
Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

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

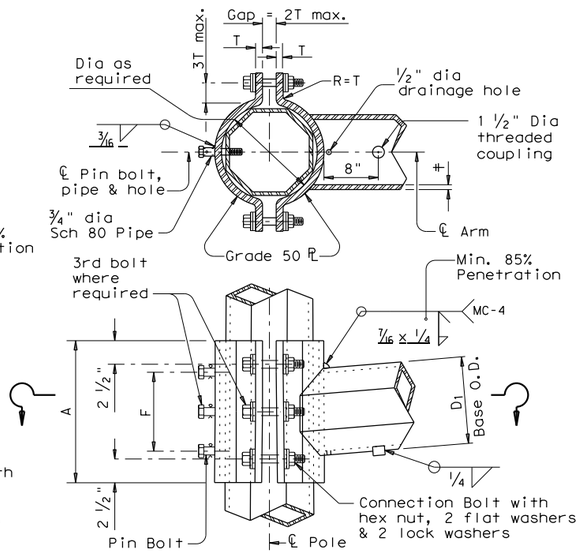
Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

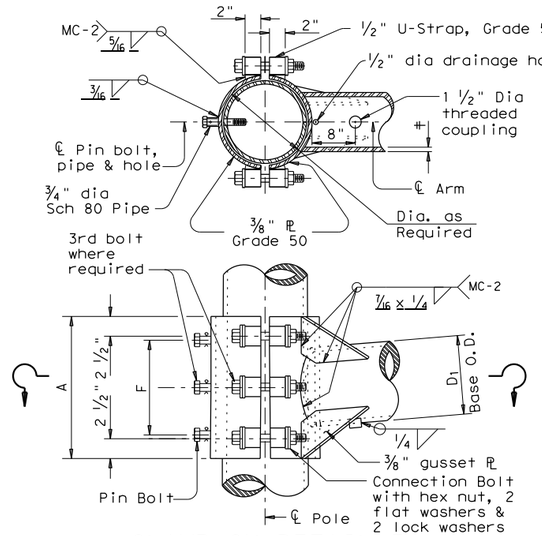
Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 3/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



CLAMP-ON DETAIL 1



CLAMP-ON DETAIL 2



CLAMP-ON DETAIL 3

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

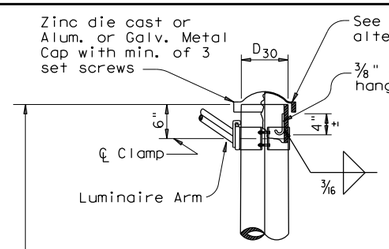
MAST ARM CONNECTIONS

MA-C-12

REVISIONS	DN: MS	CK: JSY	DW: MMF	CK: JSY
5-96	CONT	SECT	JOB	HIGHWAY
5-09	0907	00	229,ETC	RM 584
1-12	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		159

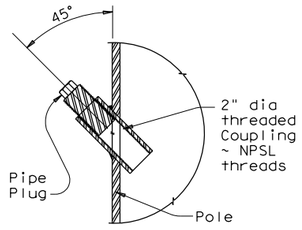
126A

DATE:
FILE:

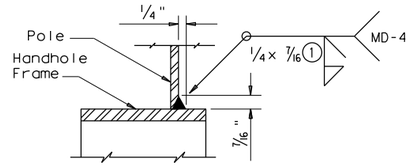


DETAIL A

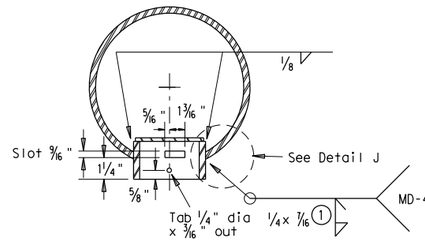
(for pole with luminaire)



POLE COUPLING DETAIL

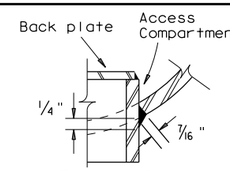


DETAIL G

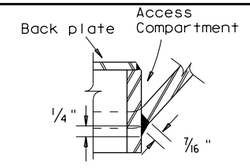


SECTION X-X

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

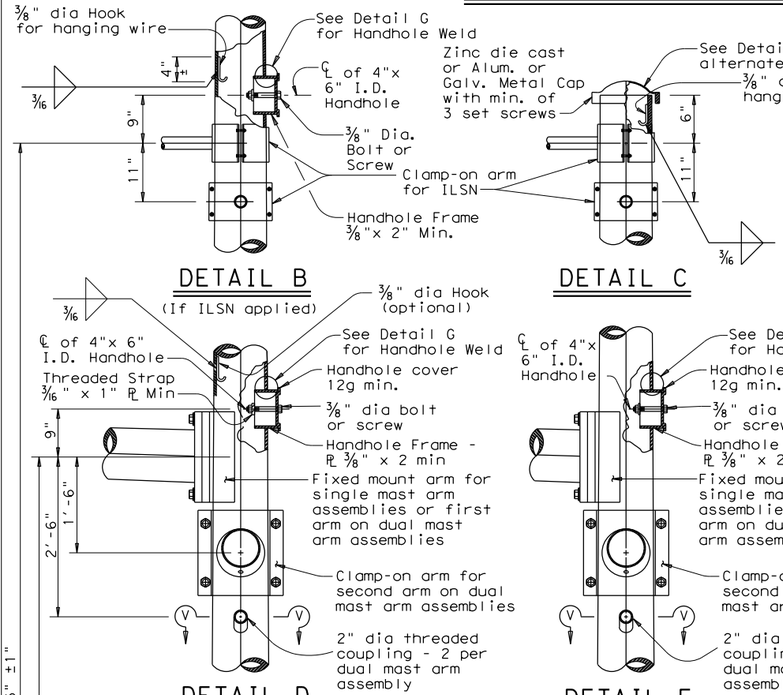


Round Pole



Polygonal Pole

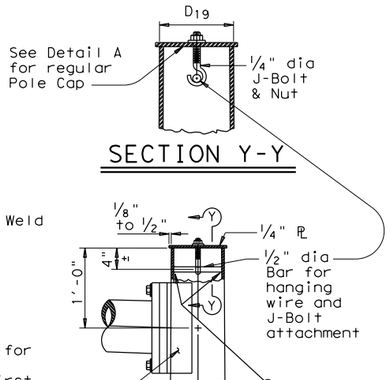
DETAIL J



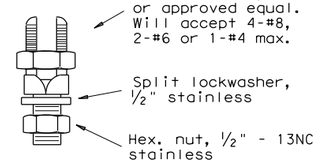
DETAIL B

(If ILSN applied)

DETAIL C



SECTION Y-Y



COPPER GROUND CONNECTOR

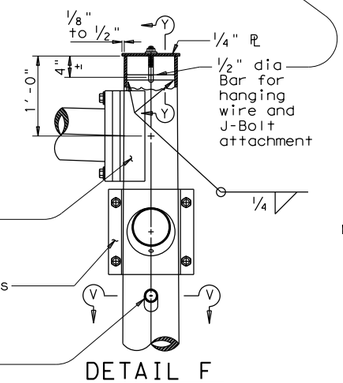
ACCESS COMPARTMENT

DETAIL D

(for 30' pole with luminaire and ILSN sign)

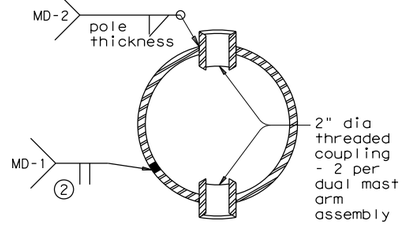
DETAIL E

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



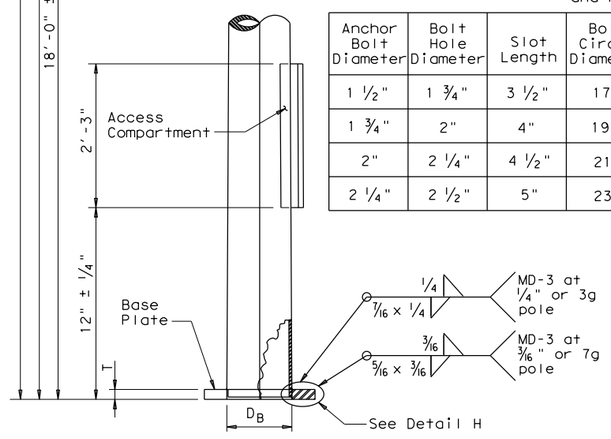
DETAIL F

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

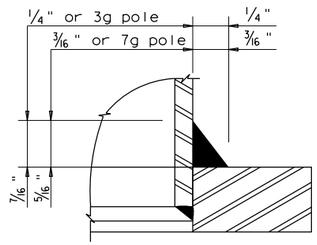


SECTION V-V

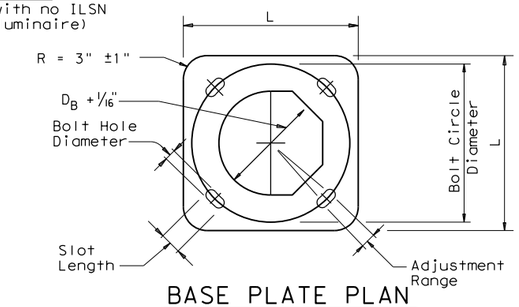
Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base ℞ Dim. L x T	Adjust. Range
1 1/2"	1 3/4"	3 1/2"	17"	18" x 1 1/2"	13.4°
1 3/4"	2"	4"	19"	20" x 1 3/4"	13.5°
2"	2 1/4"	4 1/2"	21"	22" x 2"	13.6°
2 1/4"	2 1/2"	5"	23"	24" x 2 1/4"	13.7°



POLE ELEVATION



DETAIL H



BASE PLATE PLAN

(1) 85% Min. penetration

(2) 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

NOTES:

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

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

DN: MS	CK: JSY	DW: FDN	CK: CAL

REVISIONS
8-99
1-12

CONT	SECT	JOB	HIGHWAY
0907	00	229,ETC	RM 584
DIST	COUNTY		SHEET NO.
SJT	TOM GREEN		160

DATE: 4/26/2024 1:12:36 PM
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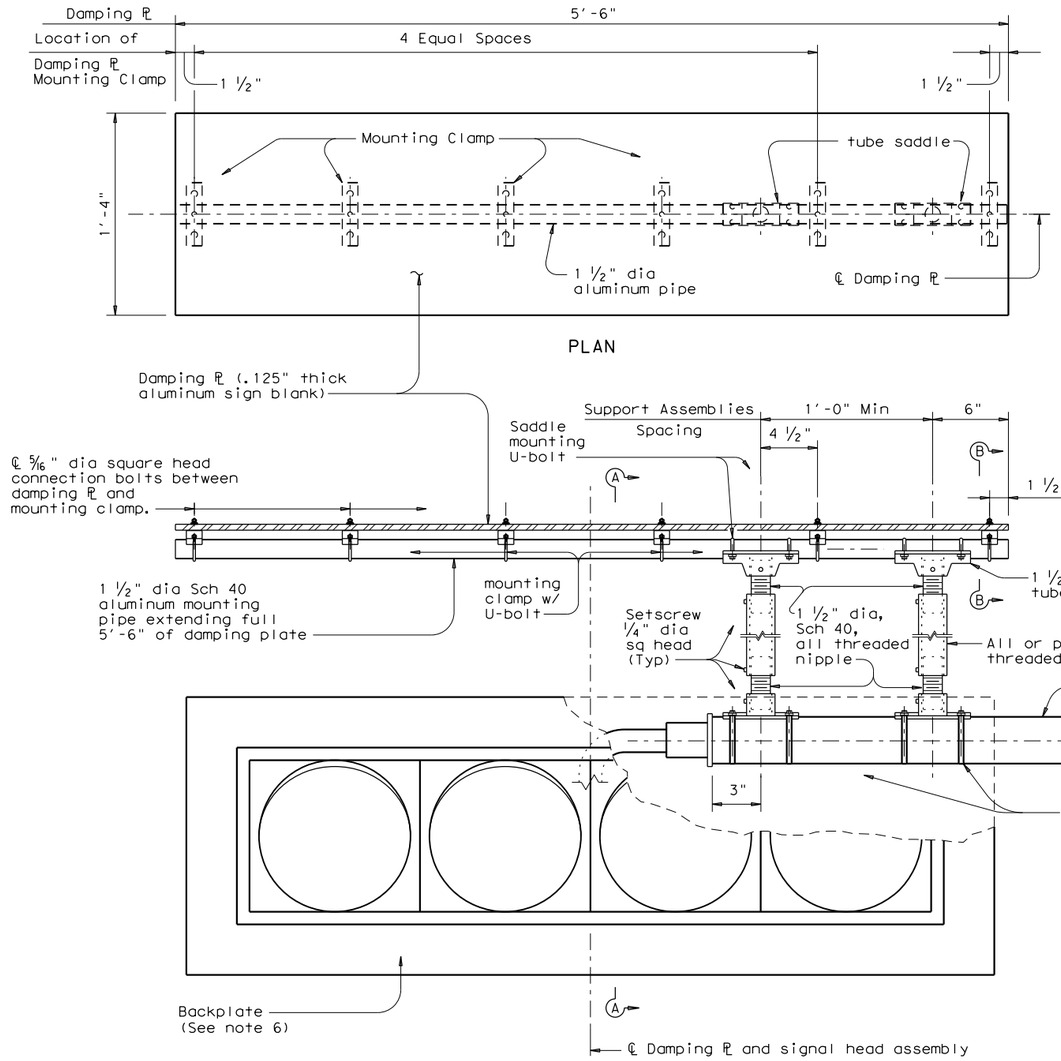
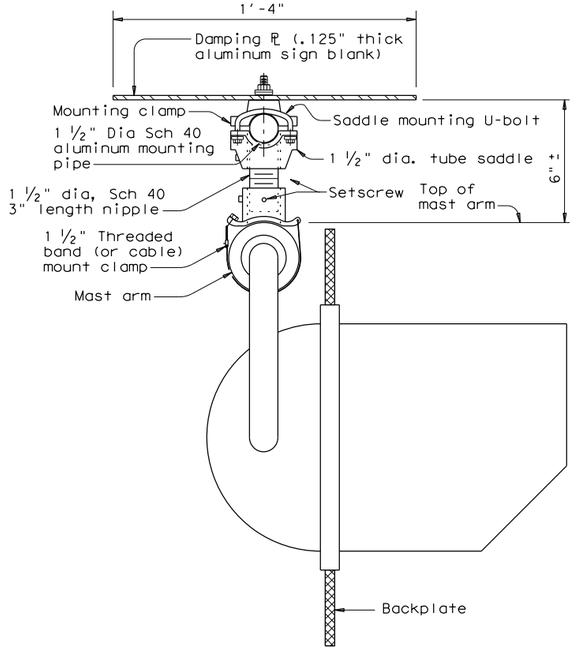


DAMPING PLATE MOUNTING DETAILS

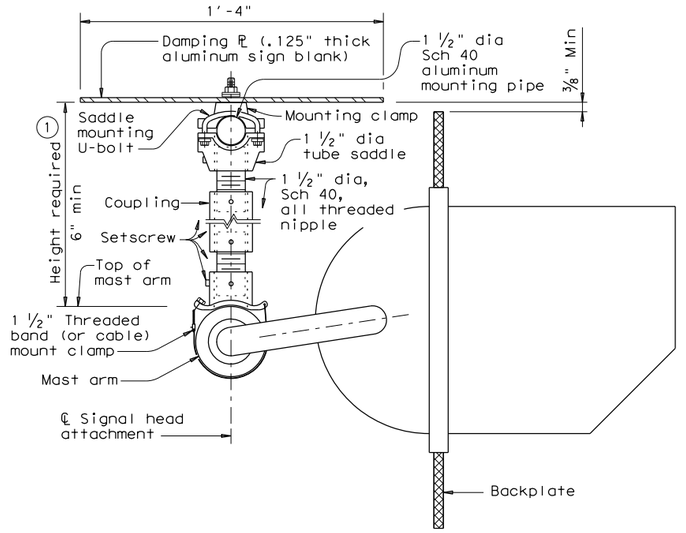
(Showing alternate placement of signal head)



SECTION A-A

(Showing standard placement of signal head)

(Mounting clamp U-bolt is not shown for clarity)

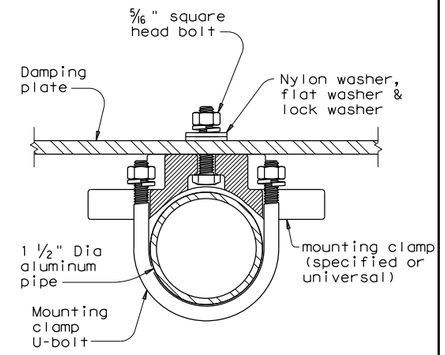


SECTION A-A

(Showing alternate placement of signal head)

(Mounting clamp U-bolt is not shown for clarity)

① Recommended supporting assemblies to achieve required height for horizontal section heads			
Height required	One nipple each length	Two nipples each length plus	One coupling each length
6"-6 ¾"	3"	-	-
7"-8 ½"	4"	-	-
9"-10 ½"	6"	-	-
11"-15 ½"	-	4"	5"
16"-24"	-	6"	10"



SECTION B-B

(Showing damping plate attachment)

GENERAL NOTES:

1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.

2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.

3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate) and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.

4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".

5. Contractor will verify applicable field dimensions before the installation.

6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.

Texas Department of Transportation

Traffic Safety Division Standard

MAST ARM DAMPING PLATE DETAILS

MA-DPD-20

FILE: ma-dpd-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229, ETC	RM 584
6-20	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		161

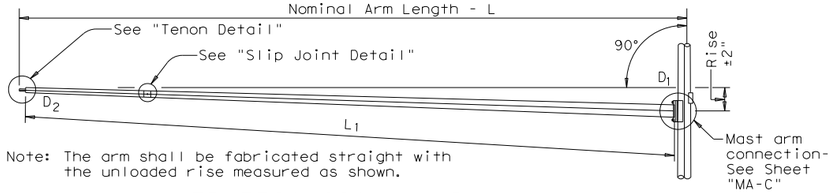
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179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

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1′-9"	19.1	7.0	3.5	.179	1′-8"
24	23.1	7.5	4.3	.179	1′-10"	23.1	7.5	3.5	.179	1′-9"
28	27.1	8.0	4.2	.179	1′-11"	27.1	8.0	3.5	.179	1′-10"
32	31.0	9.0	4.7	.179	2′-1"	31.0	9.0	3.5	.179	2′-0"
36	35.0	9.5	4.6	.179	2′-4"	35.0	10.0	3.5	.179	2′-1"
40	39.0	9.5	4.1	.239	2′-8"	39.0	9.5	3.5	.239	2′-3"
44	43.0	10.0	4.1	.239	2′-11"	43.0	10.0	3.5	.239	2′-6"
48	47.0	10.5	4.1	.239	3′-4"	47.0	11.0	3.5	.239	2′-9"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② D_2 may be increased by up to 1" for polygonal arms.



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

TRAFFIC SIGNAL ARM

(Fixed Mount)

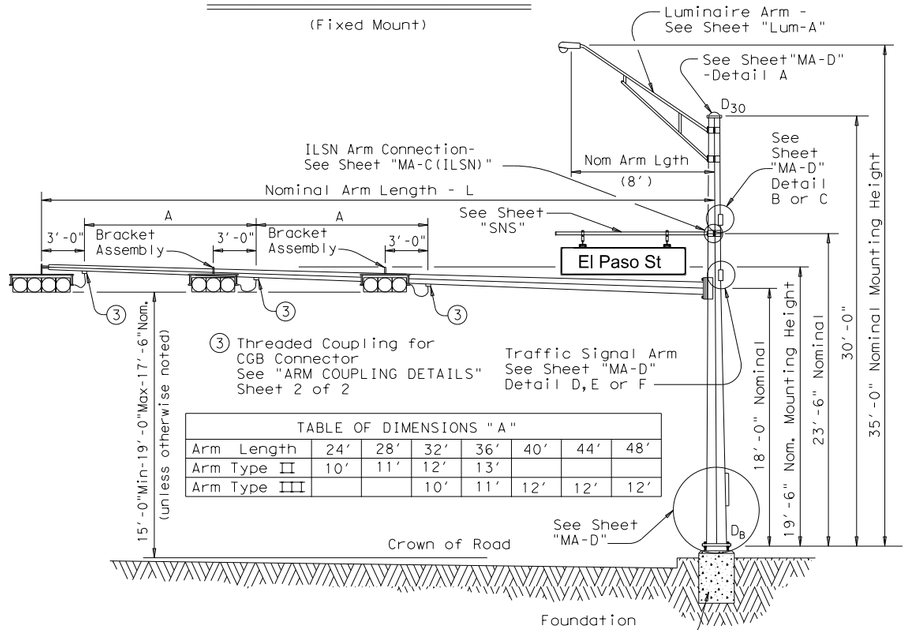


TABLE OF DIMENSIONS "A"							
Arm Length	24′	28′	32′	36′	40′	44′	48′
Arm Type II	10′	11′	12′	13′			
Arm Type III			10′	11′	12′	12′	12′

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

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

Nominal Arm Length	30′ Poles With Luminaire		24′ Poles With ILSN		19′ Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80		24S-80		24-80	
28	28L-80		28S-80		28-80	
32	32L-80		32S-80		32-80	
36	36L-80	1	36S-80		36-80	
40	40L-80		40S-80		40-80	
44	44L-80		44S-80		44-80	1
48	48L-80		48S-80		48-80	

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

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

Luminaire Arms (1 per 30′ pole)

Nominal Arm Length	Quantity
8′ Arm	1

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 ½"	3′-4"	
1 ¾"	3′-10"	2

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.

SHEET 1 OF 2

DOCUMENT IS FOR INTERIM REVIEW AND NOT INTENDED FOR CONSTRUCTION BIDDING, OR PERMIT PURPOSES.

HIRON M. FERNANDO, P. E.
123288
TEXAS SERIAL NO.
4/26/2024
DATE

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(1)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY
0907	00	229, ETC.	RM 584
DIST	COUNTY		SHEET NO.
SJT	TOM GREEN		162

122A

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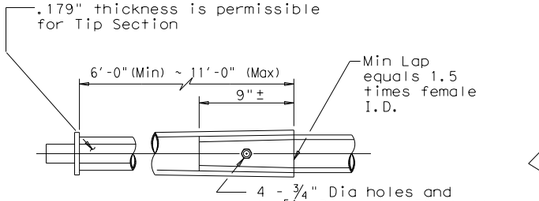
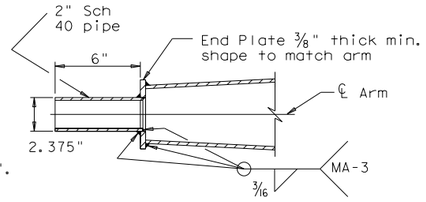
DATE:
FILE:



Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL



TENON DETAIL

VIBRATION WARNING

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

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

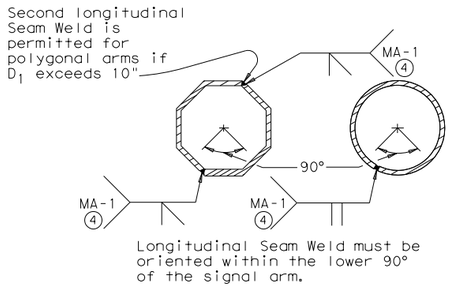
If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. 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.

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

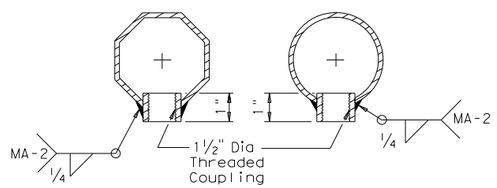
BRACKET ASSEMBLY



Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.

ARM WELD DETAIL

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



ARM COUPLING DETAILS

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.

DOCUMENT IS FOR INTERIM REVIEW AND NOT INTENDED FOR CONSTRUCTION BIDDING, OR PERMIT PURPOSES.

HIRON M. FERNANDO, P. E.

123288
TEXAS SERIAL NO.

4/26/2024
DATE

THE AFFIXED SEAL ABOVE APPLIES ONLY TO INFORMATION FILLED BY ABOVE STATED ENGINEER.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

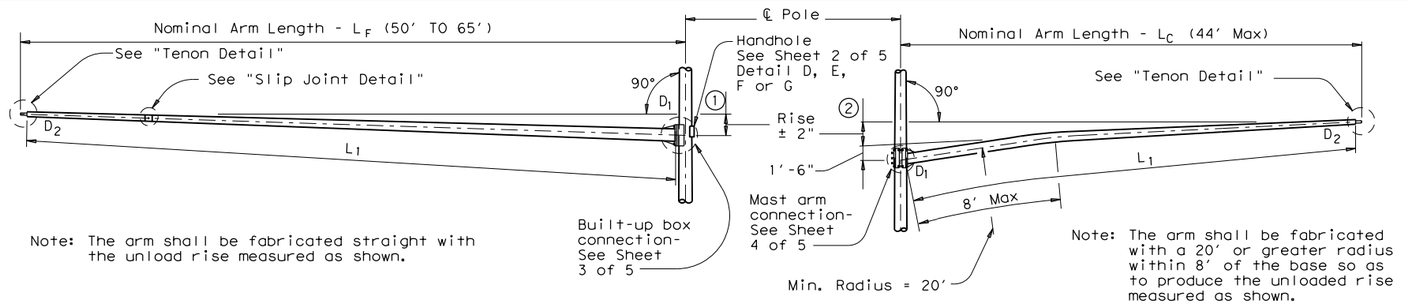
(80 MPH WIND ZONE)

SMA-80(2)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS	CONT	SECT	JOB	HIGHWAY
5-96	0907	00	229, ETC.	RM 584
1-12	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		163

122B



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

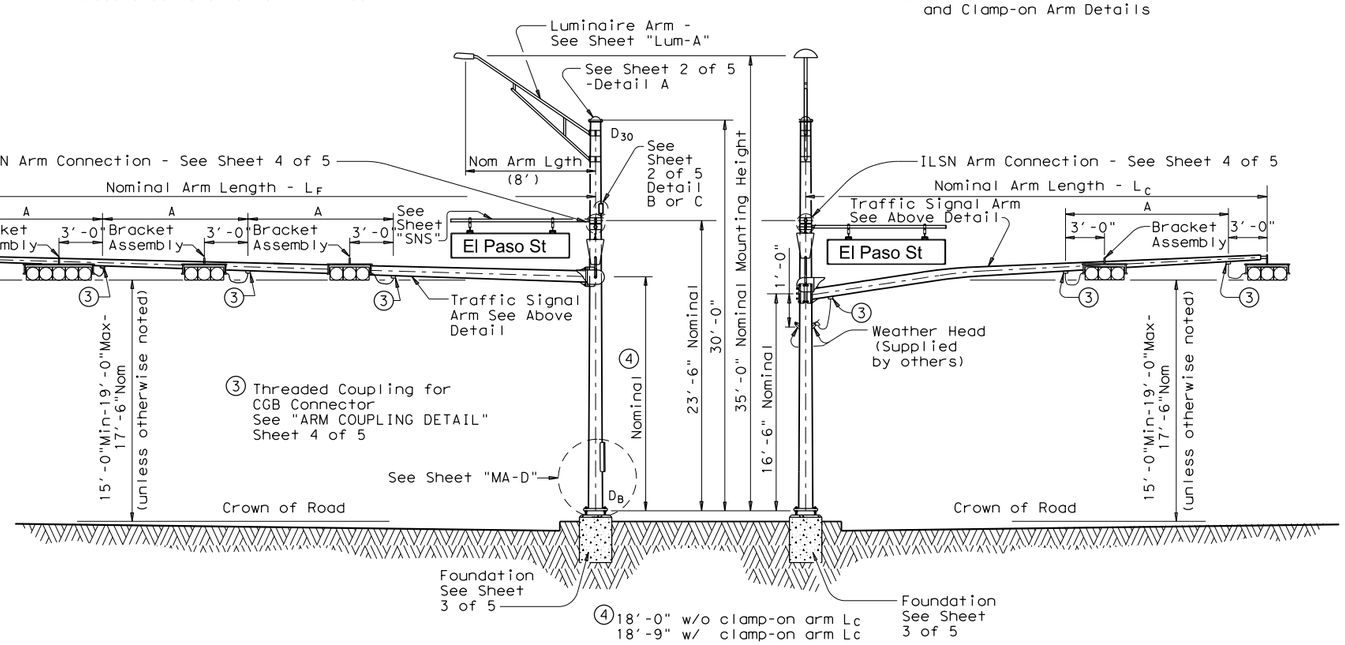
Note: The arm shall be fabricated with a 20' or greater radius within 8' of the base so as to produce the unloaded rise measured as shown.

FIXED MOUNT TRAFFIC SIGNAL ARM

① See Sheet 3 of 5 for Arm Rise

CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details

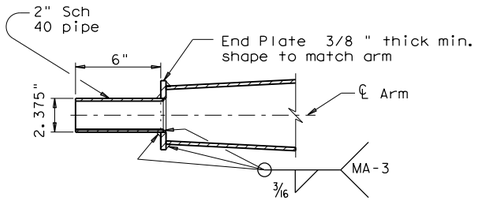


ELEVATION
(Showing fixed mount arm)

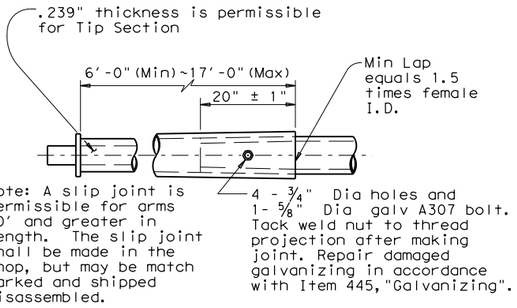
STRUCTURE ASSEMBLY

ELEVATION
(Showing clamp-on arm)

TABLE OF DIMENSIONS "A"										
Arm Length	24'	28'	32'	36'	40'	44'	50'	55'	60'	65'
Arm Type II	10'	11'	12'	13'						
Arm Type III			10'	11'	12'	12'				
Arm Type IV							12'	12'	12'	12'



TENON DETAIL



Note: A slip joint is permissible for arms 50' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (FIXED MOUNT ARM)

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

Arm	Equivalent DL ⑤	WL EPA ⑤⑥
8' Luminaire Arm	Luminaire 60 lbs	1.6 sq ft
9' ILSN Arm	Sign 85 lbs	11.5 sq ft
50' to 65' Fixed Mount Arm	Signal Loads 310 lbs	52 sq ft
Up to 44' Clamp-on Arm	Signal Loads 180 lbs	32.4 sq ft

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

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

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

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

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)
LMA(1)-12

Sheet 1 of 5

DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT

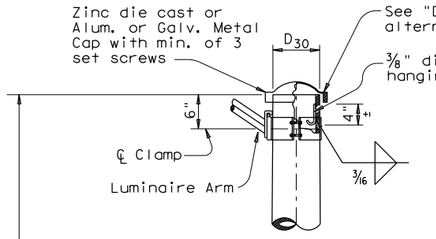
REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0907	00	229, ETC.	RM 584
DIST	COUNTY		SHEET NO.
SJT	TOM GREEN		164

DATE:
FILE:

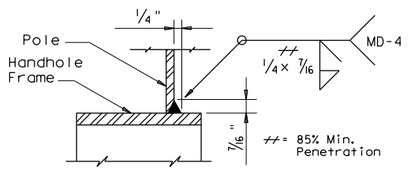
131A

DATE:
FILE:

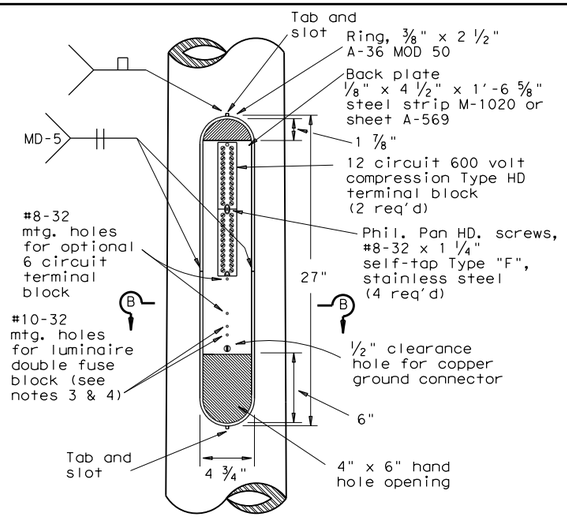


DETAIL A

(for pole with luminaire)



DETAIL H

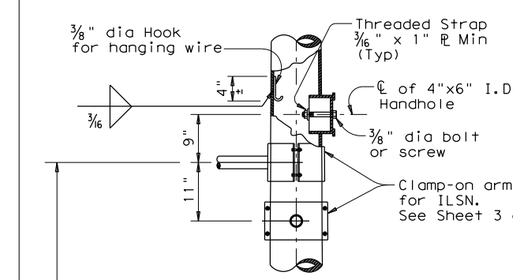


ACCESS COMPARTMENT

MATERIALS	
Round Shafts or Polygonal Shafts (7)	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 (8)
Plates (7)	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325, or A449 except where noted
Pin Bolts	ASTM A325
Pipe (7)	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

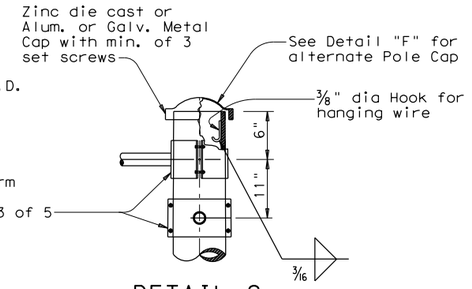
(7) ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

(8) ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

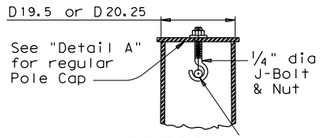


DETAIL B

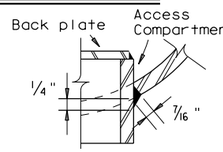
(If ILSN applied)



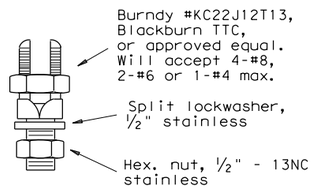
DETAIL C



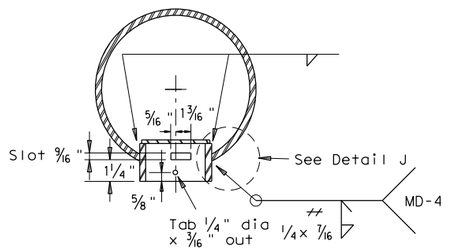
SECTION Y-Y



DETAIL J



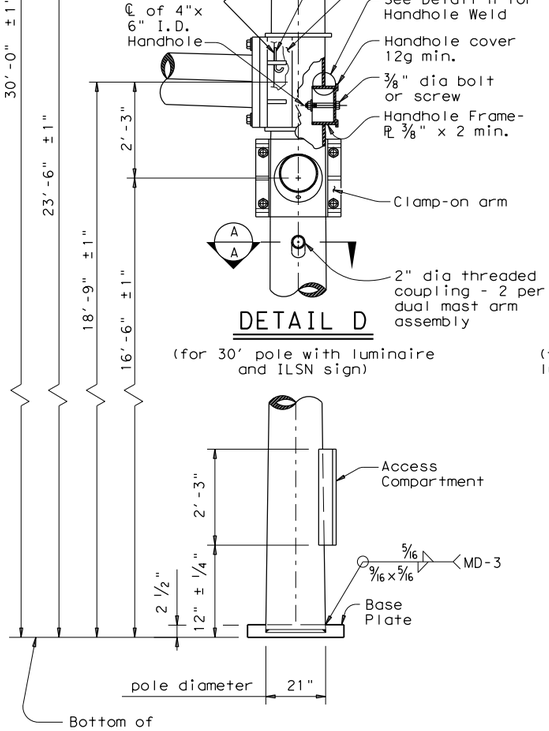
COPPER GROUND CONNECTOR



SECTION B-B

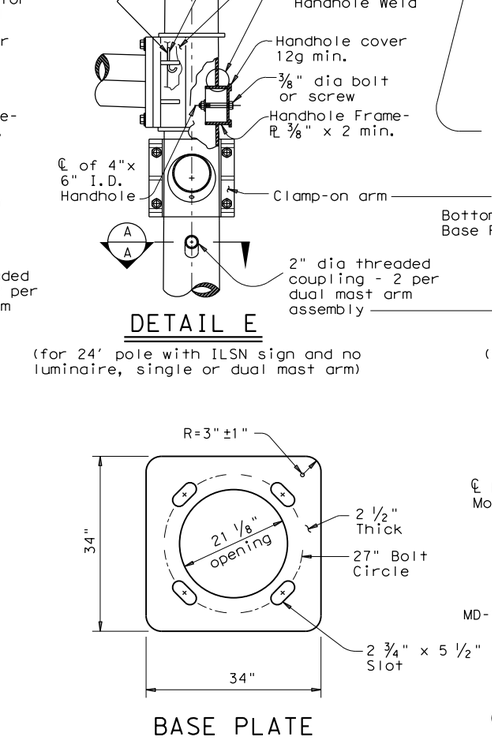
// = 85% Min. Penetration

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



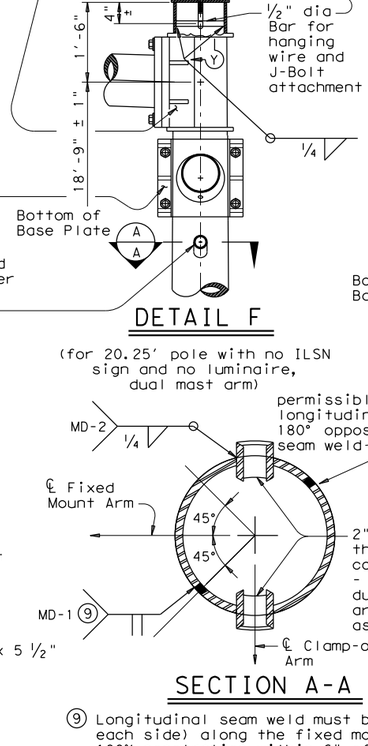
DETAIL D

(for 30' pole with luminaire and ILSN sign)



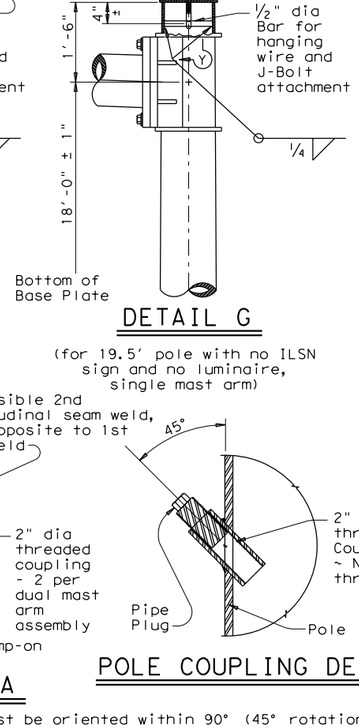
DETAIL E

(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)



DETAIL F

(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)



DETAIL G

(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)

POLE ELEVATION

BASE PLATE

SECTION A-A

POLE COUPLING DETAIL

(9) Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

ACCESS COMPARTMENT NOTES:

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

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 2 of 5

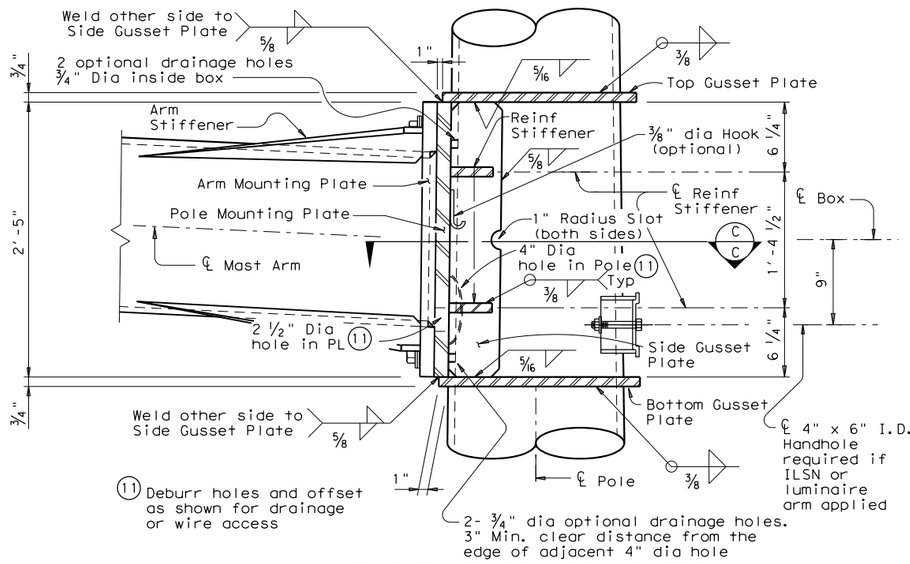
LMA(2)-12

DN: JSY	CK: ARC	DW: TGG	CK: JSY

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
0907	00	229, ETC.	RM 584
DIST	COUNTY		SHEET NO.
SJT	TOM GREEN		165

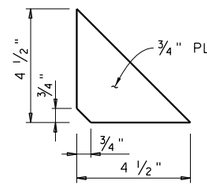
131B



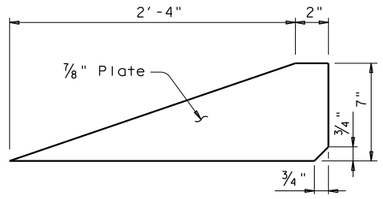
(11) Deburr holes and offset as shown for drainage or wire access

2- 3/4" dia optional drainage holes. 3" Min. clear distance from the edge of adjacent 4" dia hole

BUILT-UP BOX CONNECTION

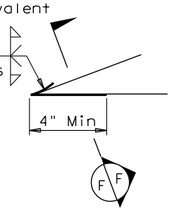


REINFORCING STIFFENER



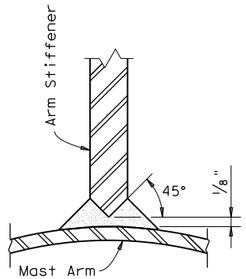
ARM STIFFENER
(Cut to match arm inclination and taper)

Provide Detail shown in SECTION F-F or equivalent 100% complete joint penetration weld from both sides.



Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

DETAIL "K"



SECTION F-F

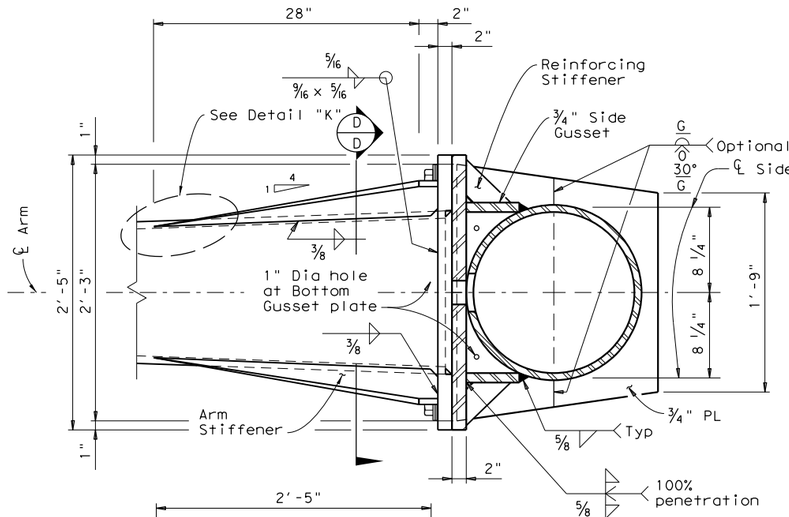
Fixed Mount Arm L_F	ROUND POLES (13)					Foundation Type
	D_B	$D_{19.5}$ or $D_{20.25}$	D_{24}	D_{30}	(12) thk	
ft.	in.	in.	in.	in.	in.	
50', 55' 60', 65'	21.0	18.2	17.6	16.8	.3125	48-A

Fixed Mount Arm L_F	ROUND ARMS (13)				
	L_1	D_1	D_2	(12) thk	Rise
ft.	ft.	in.	in.	in.	
50	49	18.5	11.7	.3125	3'- 3"
55	54	18.5	11.0	.3125	3'- 7"
60	59	18.5	10.3	.3125	3'-11"
65	64	18.5	9.6	.3125	4'- 4"

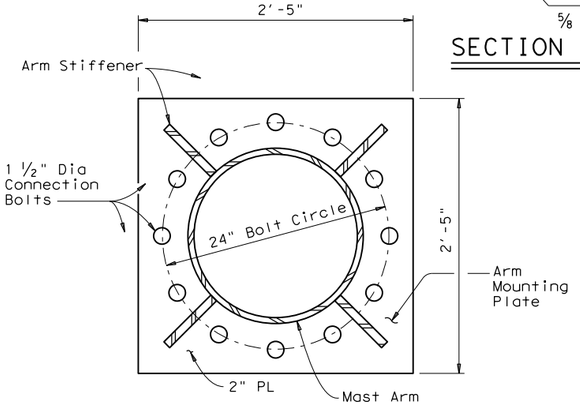
D_B = Pole Base O.D.
$D_{19.5}$ = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
$D_{20.25}$ = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L_F = Fixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

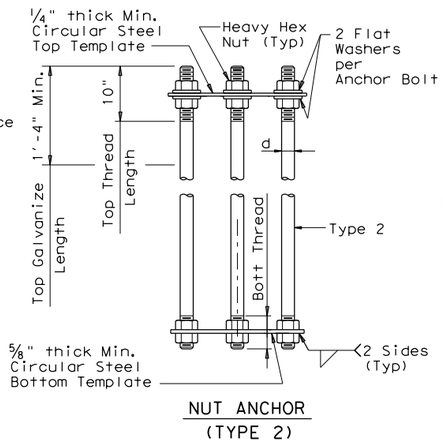
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.



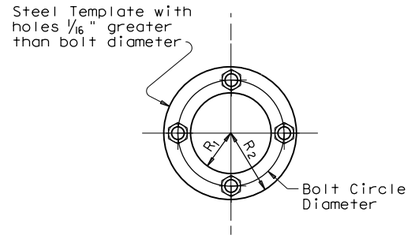
SECTION C-C



SECTION D-D



NUT ANCHOR
(TYPE 2)



TEMPLATE DETAIL

ANCHOR BOLT ASSEMBLY

ANCHOR BOLT & TEMPLATE SIZE						
Bolt Dia in.	Length ‡	Top Thread	Bottom Thread	Bolt Circle	R_2	R_1
2 1/2"	5'-2"	10"	6 1/2"	27"	16"	11"

‡ Min dimension given, longer bolts are acceptable.

FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		DRILLED SHAFT LENGTH-ft (16), (17), (18)			ANCHOR BOLT DESIGN (14)				FOUNDATION DESIGN LOAD (15)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
48-A	48"	20 #9	#4 at 6"	21.9	19.5	14.7	2 1/2"	55	27"	2	490	10	50' to 65' Mast arm assembly.

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

(14) Anchor bolt design develops the foundation capacity given under Foundation Design Loods.

(15) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(16) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

(17) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

(18) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

GENERAL NOTES:

Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

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TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT)
(80 AND 100 MPH WIND ZONE)

Sheet 3 of 5 LMA(3)-12

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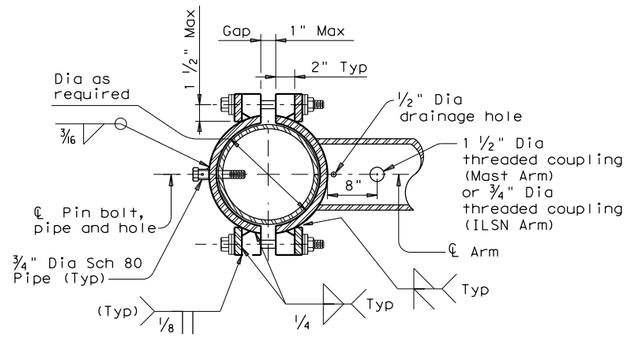

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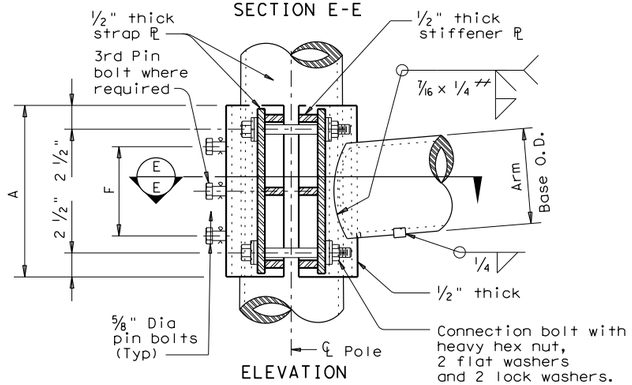


ELEVATION
(Mast Arm or ILSN Arm to pole)

= 85% Min. Penetration

CLAMP-ON CONNECTION

80 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L1	D1	D2	thk (12)	Rise	L1	D1	D2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"

100 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L1	D1	D2	thk (12)	Rise	L1	D1	D2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

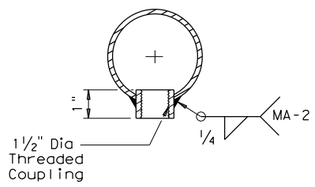
D1 = Arm Base O.D.
D2 = Arm End O.D.
L1 = Shaft Length
Lc = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

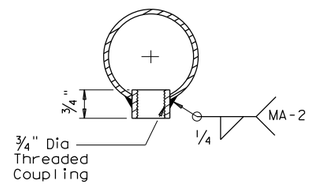
CLAMP-ON ARM CONNECTION

ILSN Arm Size		A	F	4 Conn. Bolts	⅝" Dia. Pin Bolts
Sch 40 pipe Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
3	.216	10	4	¾	2

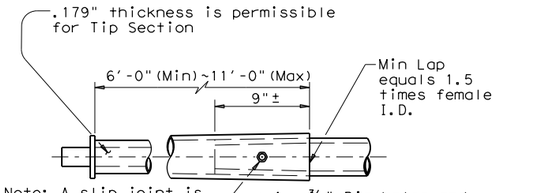
Mast Arm Size		A	F	4 Conn. Bolts	⅝" Dia. Pin Bolts
Base Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 ¼	3
9.5	.239	18	12	1 ¼	3
10.0	.239	18	12	1 ¼	3
10.5	.239	18	12	1 ¼	3
11.0	.239	18	12	1 ¼	3
11.5	.239	18	12	1 ¼	3



ARM COUPLING DETAIL



ILSN ARM COUPLING DETAIL

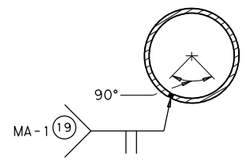


Note: A slip joint is permissible for arms 40' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (CLAMP-ON ARM)

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.
60% Min penetration
100% penetration within 6" of circumferential base welds.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 ½" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 ½" diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

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

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and ¾" diameter pipe shall have 3/16" diameter holes for a ⅛" diameter galvanized cotter pin. Back clamp plate shall be furnished with a ¾" diameter hole for each pin bolt. An 11/16" diameter 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

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 4 of 5 LMA(4)-12

DN: JK	CK: GRB	DW: FDN	CK: CAL

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Shipping Parts List

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

Nominal Arm Length	30' Poles with Luminaire: See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex		24' Poles with ILSN: See note above plus one small hand hole		19.50' (Single Mast Arm) 20.25' (Dual Mast Arm) Poles with no Luminaire and no ILSN: See note above	
Single Mast Arm						
Lf ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50	50L		50S		50	
55	55L		55S		55	
60	60L		60S		60	
65	65L		65S		65	2
Dual Mast Arm						
Lf ft. / Lc ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50 / 20	5020L		5020S		5020	
50 / 24	5024L		5024S		5024	
50 / 28	5028L		5028S		5028	
50 / 32	5032L		5032S		5032	
50 / 36	5036L		5036S		5036	
50 / 40	5040L		5040S		5040	
50 / 44	5044L		5044S		5044	
55 / 20	5520L		5520S		5520	
55 / 24	5524L		5524S		5524	
55 / 28	5528L		5528S		5528	
55 / 32	5532L		5532S		5532	
55 / 36	5536L		5536S		5536	
55 / 40	5540L		5540S		5540	
55 / 44	5544L		5544S		5544	
60 / 20	6020L		6020S		6020	
60 / 24	6024L		6024S		6024	
60 / 28	6028L		6028S		6028	
60 / 32	6032L		6032S		6032	
60 / 36	6036L		6036S		6036	
60 / 40	6040L		6040S		6040	
60 / 44	6044L		6044S		6044	
65 / 20	6520L		6520S		6520	
65 / 24	6524L		6524S		6524	
65 / 28	6528L		6528S		6528	
65 / 32	6532L		6532S		6532	
65 / 36	6536L		6536S		6536	
65 / 40	6540L		6540S		6540	
65 / 44	6544L		6544S		6544	

Foundation Summary Table **

Location Ident.	Avg. N Blow/ft.	No. Each	Drill Shaft *** Length (feet) 48-A
US 87 (BRYANT BLVD) AT W AVE Q	10	2	44
Total Drill Shaft Length			44

Notes

** Foundations may be listed separately and type. Quantities are for the Contractor's information only.

*** Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Shipping Parts List

Traffic Signal Arms (Fixed Mount) (1 per pole)
Ship each arm with listed equipment attached

Nominal Arm Length	Type IV Arm (4 Signals) 3 Bracket Assembly and 4 CGB Connectors	
ft.	Designation	Quantity
50	50IV	
55	55IV	
60	60IV	
65	65IV	2

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	

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

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	

Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	
44					44III-100	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
2 1/2 "	5' - 3"	2

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.

Abbreviations
Lf= Fixed Arm Length
Lc= Clamp-on Arm Length (44' Max.)

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HIRON M. FERNANDO, P. E.
123288
TEXAS SERIAL NO.
4/26/2024
DATE

THE AFFIXED SEAL ABOVE APPLIES ONLY TO INFORMATION FILLED BY ABOVE STATED ENGINEER.

Texas Department of Transportation
Traffic Operations Division

LONG MAST ARM ASSEMBLY PARTS LIST

LMA(5)-12

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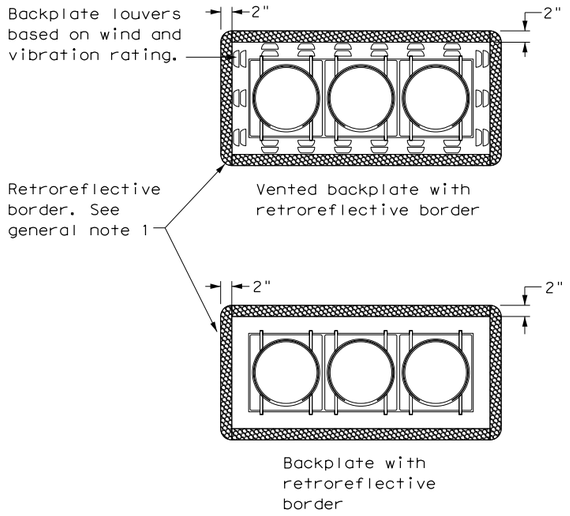
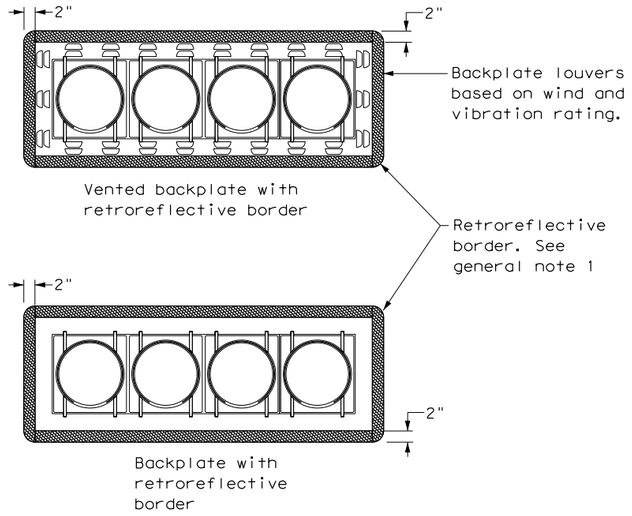
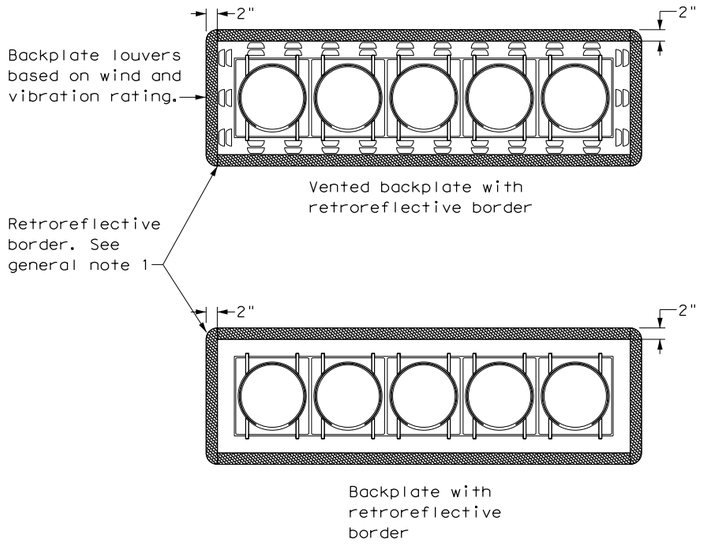


THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
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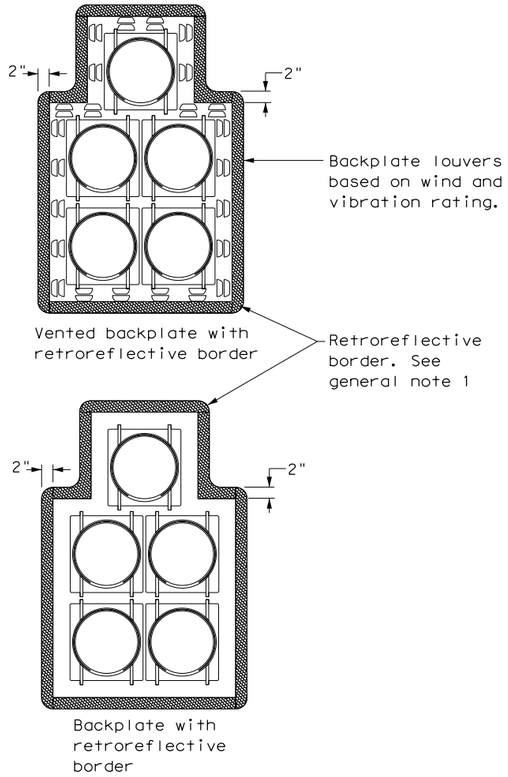
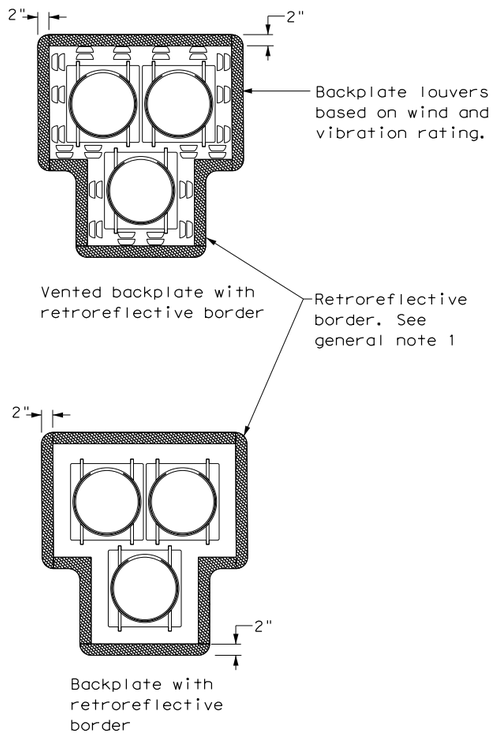


FIVE-SECTION HEAD
CLUSTER



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 compatability 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

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC SIGNAL HEAD WITH BACKPLATE

TS-BP-20

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	SJT	TOM GREEN		169

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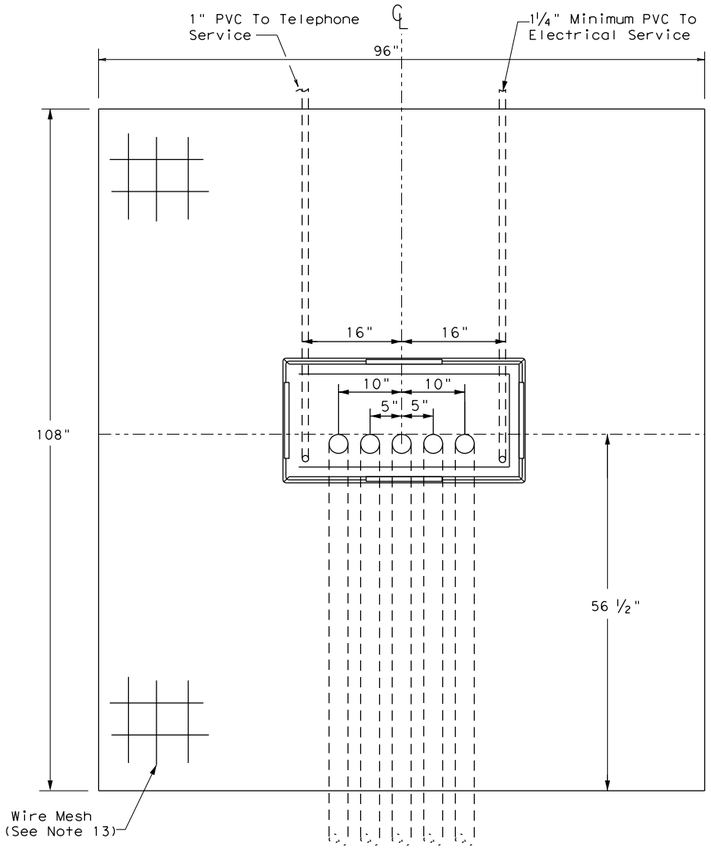
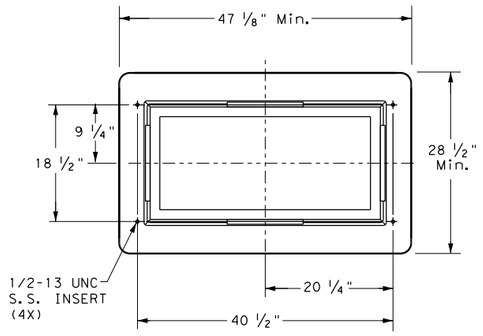
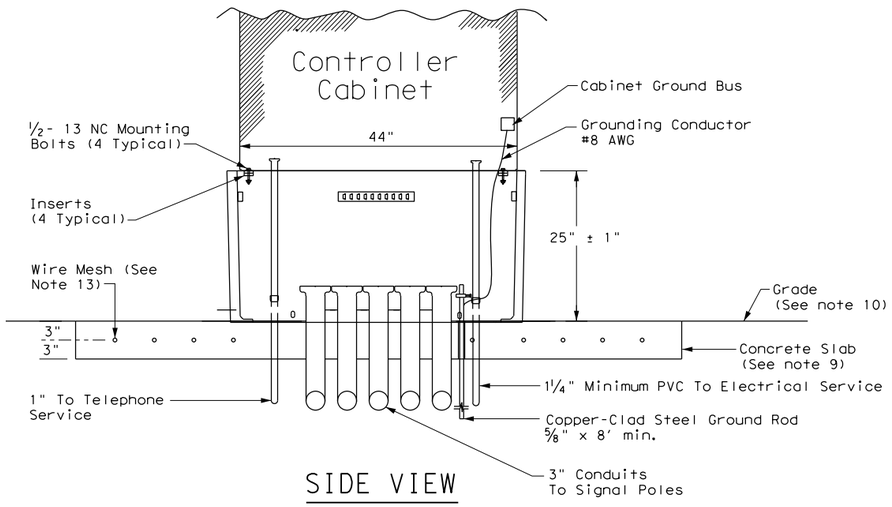


TOP VIEW



CABINET BASE



SIDE VIEW

TRAFFIC SIGNAL CONTROLLER BASE:

1. Provide a traffic signal controller base (cabinet base) manufactured of polymer concrete material consisting of calcareous and siliceous stone; glass fibers and thermoset polyester resin. The polymer concrete cabinet base must be reinforced on the inside of the cabinet base with fiberglass matting. Provide one of the following bases: Armorcast Part # A6001848X24, Quazite Model # PG3048Z709, or other as approved by TxDOT Traffic Safety Division.
2. The polymer concrete material must have a minimum compressive strength of 10,300 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard TxDOT basemount cabinet.
4. Supply the cabinet base with four 1#2"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-lb and a minimum straight pull out strength of 750 lbs.
5. Provide the cabinet base with 4 cable racks mounted one on each side of the base 2" to 7 " from the top edge of the base. Unless approved otherwise, cable racks must be 1-1/2 x 9#16x 3#16inch steel channel with eight T-slots spaced at 1-1/2 inches. The cable racks must easily accommodate the insertion of tie wraps to attach field wiring to the racks to serve as strain relief. Secure cable racks to the base using 1#2"-13 UNC stainless steel screws and inserts.
6. The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 850 lb force applied at 49" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must supply certification by an independent testing laboratory or sealed by a Texas Licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
7. The traffic signal base must be permanently marked either by impress or by permanent ink with the manufacturer's model number and name or logo.
8. Seal the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's instructions.

CONCRETE SLAB:

9. Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to the dimensions shown, and must be level.
10. Grade earthwork such that it is flush with the concrete pad on all four sides, unless otherwise shown on the plans. Subsidiary to ITEM 680, four inch rip rap may be used in lieu of earthwork. Slopes shall gradually contour to match plans.
11. Bond a #8 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL Listed clamp and terminated to the cabinet grounding bus for the purpose of providing a local ground for the electrical grounding conductor. The electrical grounding conductor specified in Item 680-3.A.4 is required and must be terminated to the cabinet ground bus.
12. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
13. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
14. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

15. Stub up and run 3-inch conduits through the slab to the various traffic signal poles and ground boxes as shown on the layouts. Install the number of conduits as shown on layouts plus two additional 3 inch conduits for future use. Terminate the conduits with a bushing between 2 and 4-inches above the slab.
16. Extend conduits for future use at least 18-inches from the edge of the slab, terminate underground with a coupling, and cap and seal so that the seal can be removed without damaging the coupling. This must also apply to unused telephone conduit.
17. Stub up two separate conduits through the slab from the electrical and telephone services. Run the conduit for the electrical feed directly to the electrical service enclosure. Run the conduit for the telephone line directly to the telephone service, usually located on the same pole as the electrical service. Telephone must not under any circumstance share a conduit with any other function.
18. Terminate electric and telephone conduits above the slab with a coupling. After the base is installed, extend the conduits above the top of the base and secure to the base using a steel one-hole strap or similar suitable substitute.

CONTROLLER CABINET:

19. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
20. The silicone caulk bead specified in Item 680.3.B must be RTV 133.

PAYMENT:

21. Bid TS-CF as subsidiary to Item 680.

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Traffic Safety Division Standard

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD

TS-CF-21

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REVISIONS	0907	00	229,ETC	RM 584
12-04 2-21	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		170

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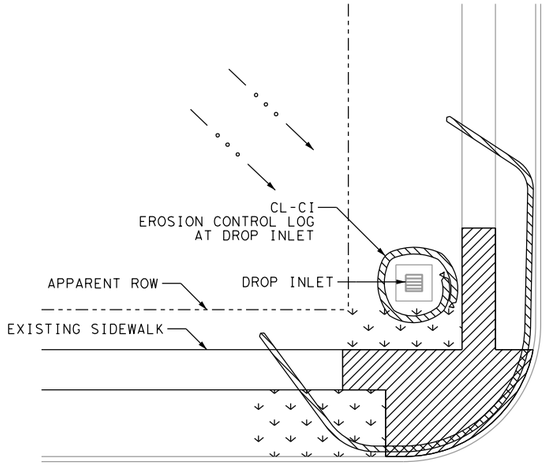
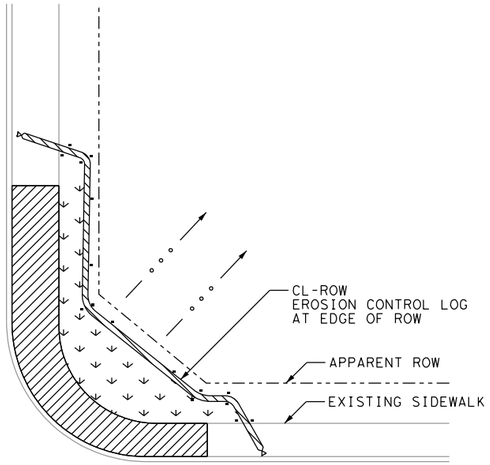




NOTES:

REFERENCE ENVIRONMENTAL PERMITS, ISSUES, AND COMMITMENTS (EPIC) AND STORM WATER POLLUTION PREVENTION PLAN (SW3P) SHEETS FOR SPECIFIC CONSTRUCTION CONSIDERATIONS OR REQUIREMENTS.

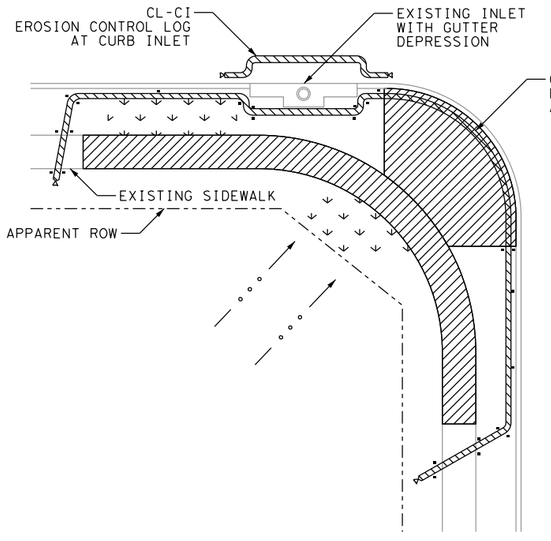
EXAMPLES SHOWN ON THE SHEET ARE FOR GENERAL GUIDANCE AND MAY BE MODIFIED AS DIRECTED BY THE ENGINEER.

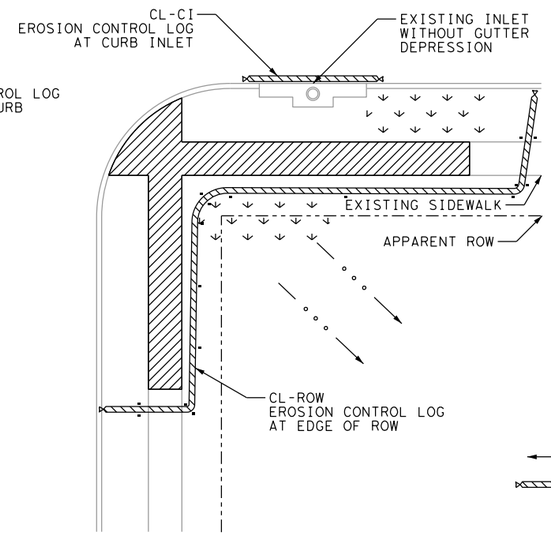
TEMPORARY SEDIMENT CONTROL FENCE MAY BE USED IN LIEU OF EROSION CONTROL LOGS WHERE APPROVED BY THE ENGINEER.

SITE CONDITIONS MAY DICTATE ADDITIONAL COUNTERMEASURES AS DIRECTED BY THE ENGINEER.

USE ADDITIONAL STAKES AS NEEDED TO HOLD IN PLACE (NSPI).

INSTALLATION OF COUNTERMEASURES MUST BE APPROVED BY THE ENGINEER PRIOR TO PLACEMENT.





LEGEND

- SODDING
- FLOW DIRECTION
- EROSION CONTROL LOG
- WOOD OR METAL STAKES (AS APPROVED BY THE ENGINEER)
- EXISTING FEATURES
- PROPOSED WORK AREA

4/26/2024

STATE OF TEXAS
SAMUEL J. LUNDQUIST
122185
LICENSED
PROFESSIONAL ENGINEER

Kimley»Horn
F-928

Texas Department of Transportation
© 2023

SIDEWALK PLAN

SW3P SIDEWALK GENERAL LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6			RM 584
STATE	DIST.	COUNTY	SHEET NO.
TEXAS	SAN ANGELO	TOM GREEN	
CONT.	SECT.	JOB	171
0907	00	229,ETC	

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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. City of San Angelo

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. Lake Nasworthy

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
☐ Temporary Vegetation	☒ Silt Fence	☒ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☒ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☒ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ 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. Only remove woody vegetation beween Oct. 1st and Feb. 14th.

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. Migratory Bird Act

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. The paint on the bridge rail/railing is assumed to contain lead-based paint. The torching, grinding or mechanical cutting of the rail or its components is not recommended without the use of proper personal protective equipment (i.e., respirators). The contractor must remove the rail by unbolting the rail supports from the bridge. Only licensed professionals trained in lead abatement should remove by means other than mechanical.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation — Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-12-2011 (DS) 05-07-14 ADDED NOTE SECTION IV. 01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		172

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with 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 in the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0907-00-229

1.2 PROJECT LIMITS:
From: SAN ANGELO AND BRONTE

To: _____

1.3 PROJECT COORDINATES:
BEGIN: (Lat)_____,(Long)_____

END: (Lat)_____,(Long)_____

1.4 TOTAL PROJECT AREA (Acres): 5.8

1.5 TOTAL AREA TO BE DISTURBED (Acres): 3.1

1.6 NATURE OF CONSTRUCTION ACTIVITY:
CONSTRUCTION OF CURB RAMPS, SIDEWALKS, PEDESTRIAN BRIDGE, AND MISCELLANEOUS PEDESTRIAN ELEMENTS

1.7 MAJOR SOIL TYPES:

Soil Type	Description

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 2.5.)

X Mobilization
X Install sediment and erosion controls
X Blade existing topsoil into windrows, prep ROW, clear and grub
☐ Remove existing pavement
X Grading operations, excavation, and embankment
☐ Excavate and prepare subgrade for proposed pavement widening
X Remove existing culverts, safety end treatments (SETs)
X Remove existing metal beam guard fence (MBGF), bridge rail
X Install proposed pavement per plans
X Install culverts, culvert extensions, SETs
☐ Install mow strip, MBGF, bridge rail
☐ Place flex base
☐ Rework slopes, grade ditches
☐ Blade windrowed material back across slopes
X Revegetation of unpaved areas
X Achieve site stabilization and remove sediment and erosion control measures
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☐ Sediment laden stormwater from stormwater conveyance over disturbed area
☐ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☐ Solvents, paints, adhesives, etc. from various construction activities
☐ Transported soils from offsite vehicle tracking
☐ Construction debris and waste from various construction activities
☐ Contaminated water from excavation or dewatering pump-out water
☐ Sanitary waste from onsite restroom facilities
☐ Trash from various construction activities/receptacles
☐ Long-term stockpiles of material and waste
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:
Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

X Development of plans and specifications
X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
X Post Construction Site Notice
X Submit NOI/CSN to local MS4
X Perform SWP3 inspections
X Maintain SWP3 records and update to reflect daily operations
X Complete and submit Notice of Termination to TCEQ
X Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

X Day To Day Operational Control
X Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
X Post Construction Site Notice
X Submit NOI/CSN to local MS4
X Maintain schedule of major construction activities
X Install, maintain and modify BMPs
X Complete and submit Notice of Termination to TCEQ
X Maintain SWP3 records for 3 years
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			173
STATE	STATE DIST.	COUNTY	
TEXAS	SJT	TOM GREEN	
CONT.	SECT.	JOB	HIGHWAY NO.
0907	00	229, ETC	RM 584

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
- ☐ X 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
- X ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☐ ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - X Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
SODDING	BRONTE AND	SAN ANGELO

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: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- X Concrete and Materials Waste Management
- ☐ Debris and Trash Management
- ☐ Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ 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:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X 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 2.5 of this SWP3 .

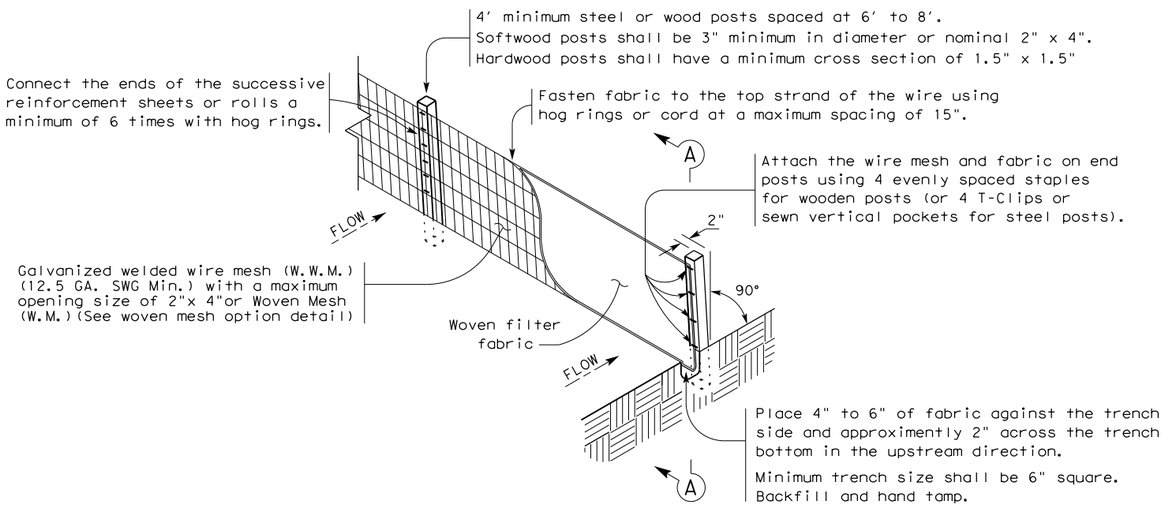
2.9 MAINTENANCE:

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 2.5 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

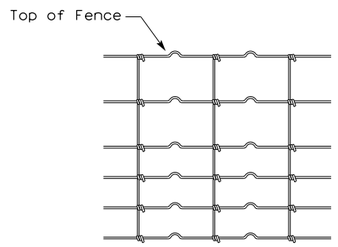
Texas Department of Transportation

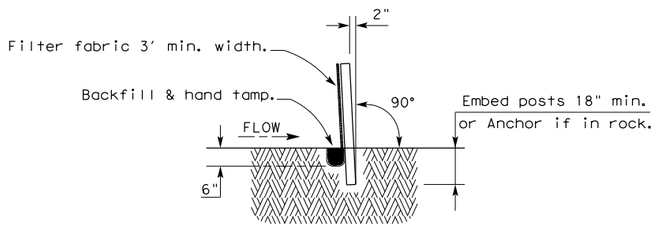
FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			174
STATE	STATE DIST.	COUNTY	
TEXAS	SJT	TOM GREEN	
CONT.	SECT.	JOB	HIGHWAY NO.
0907	00	229, ETC	RM 584



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

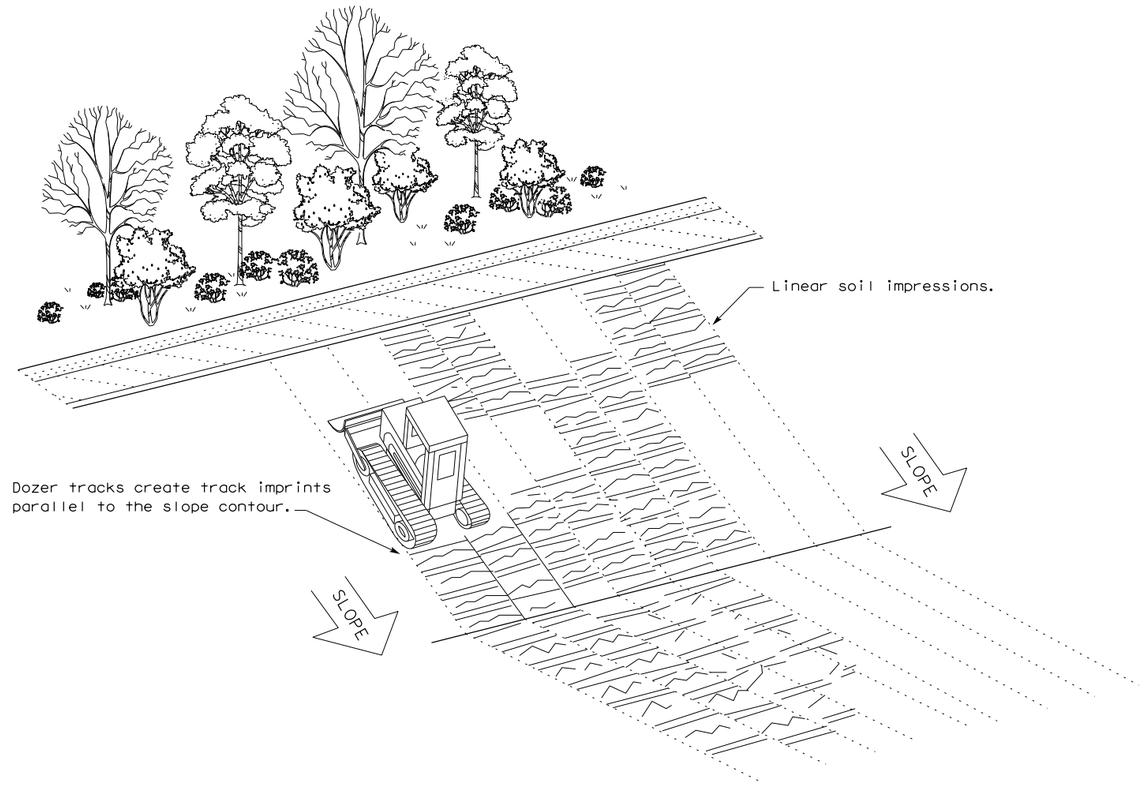
LEGEND

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 continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

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	0907	00	229,ETC		RM 584	
	DIST	COUNTY			SHEET NO.	
	SJT	TOM GREEN			175	

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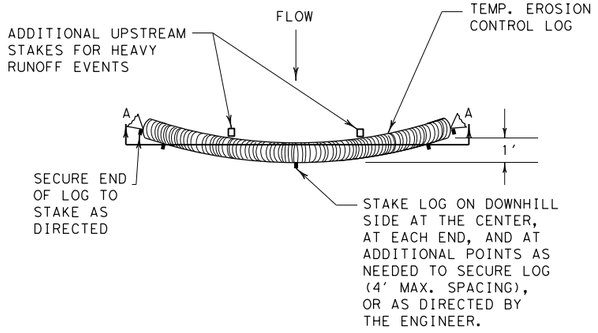
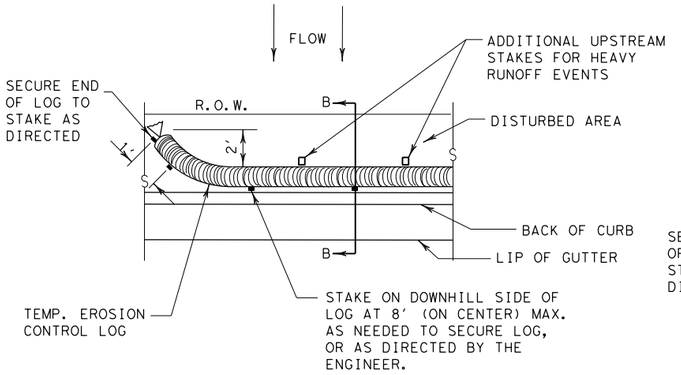
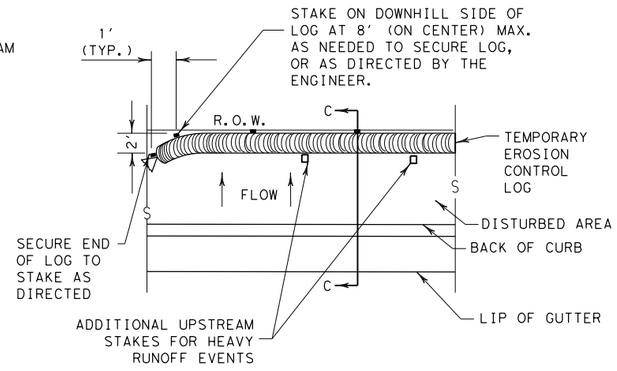


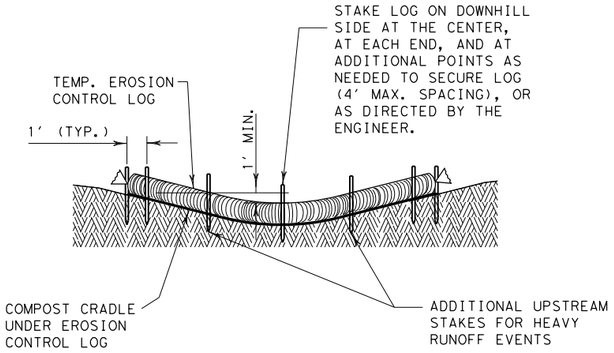
PLAN VIEW



PLAN VIEW



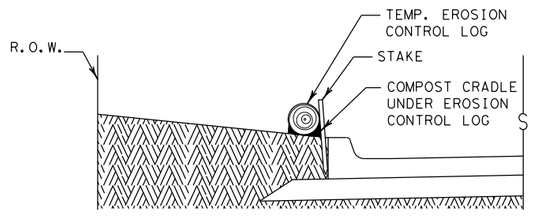
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

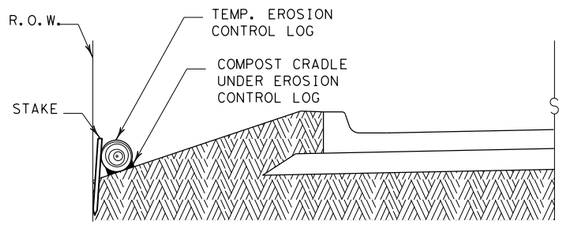
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

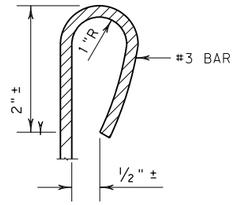
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



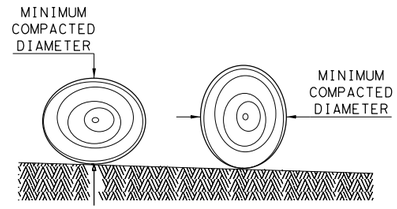
REBAR STAKE DETAIL

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

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'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.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

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.

Texas Department of Transportation

Design Division Standard

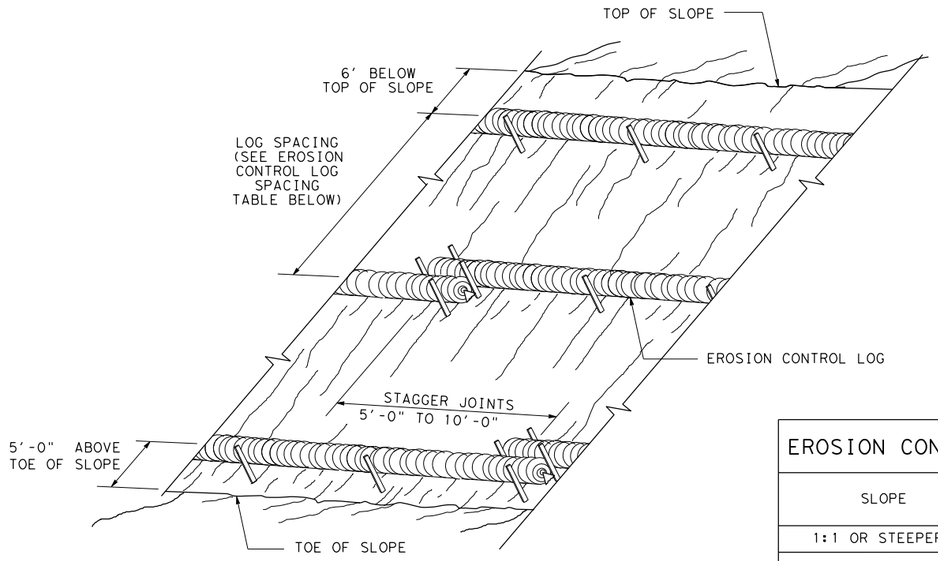
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

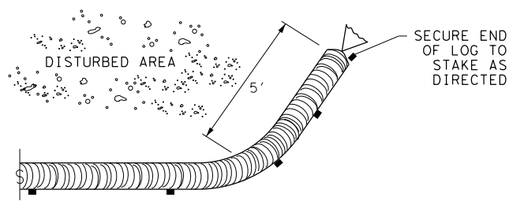
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		176

DATE:
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

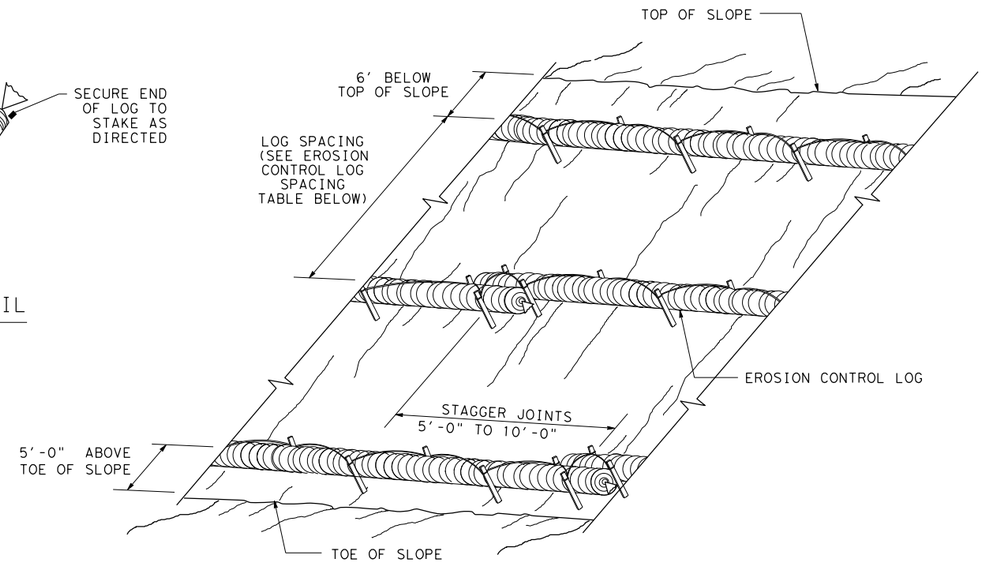
CL-SST



END SECTION RAP DETAIL

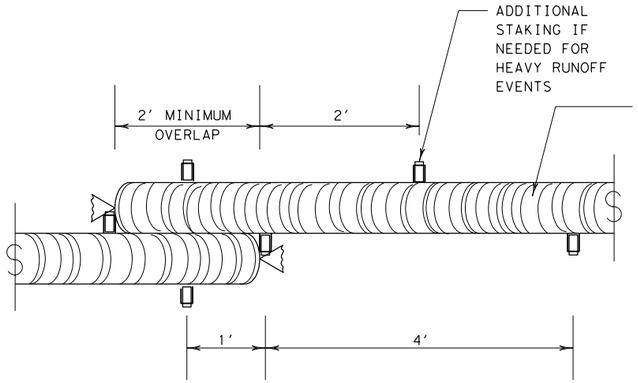
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

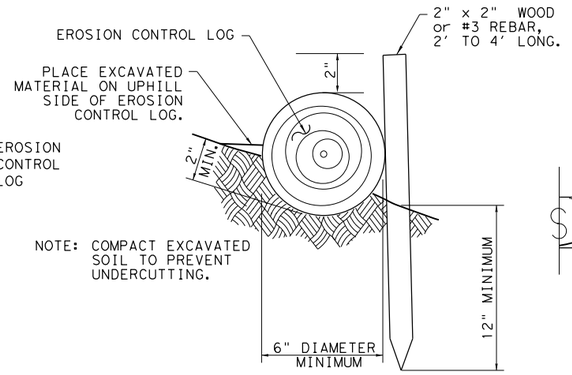
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

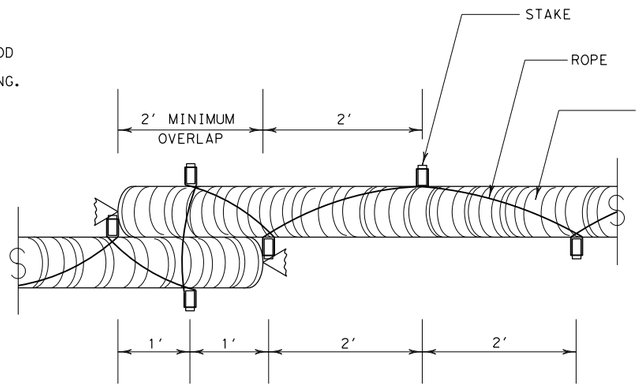


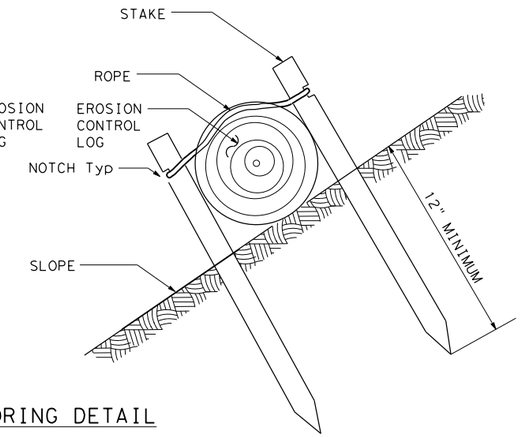


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

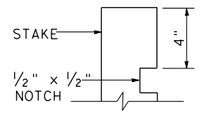
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation

Design Division Standard

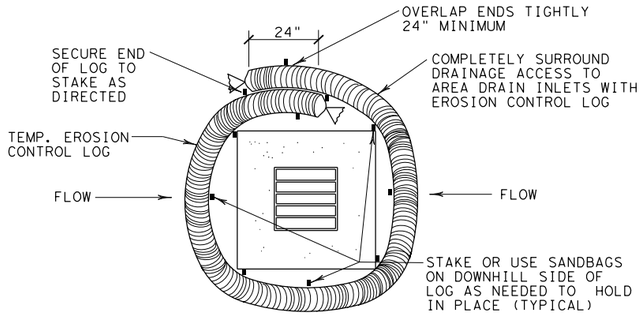
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

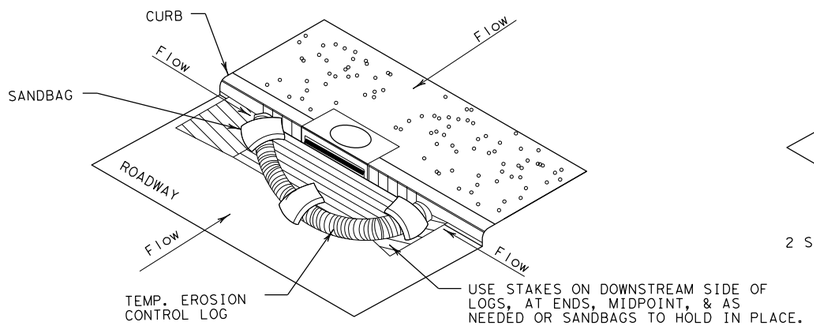
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0907	00	229,ETC	RM 584
	DIST	COUNTY		SHEET NO.
	SJT	TOM GREEN		177

DATE:
FILE:



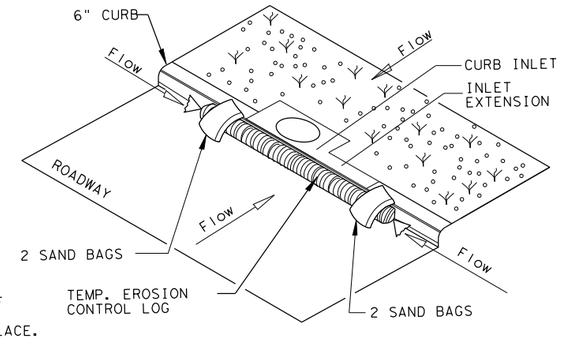
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

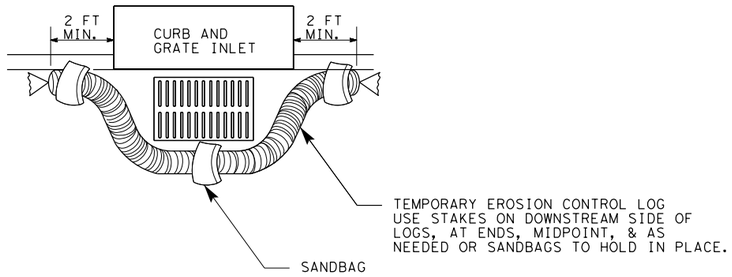
CL-CI



EROSION CONTROL LOG AT CURB INLET

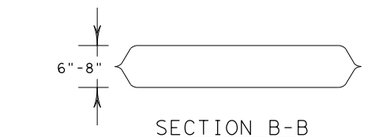
CL-CI

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.

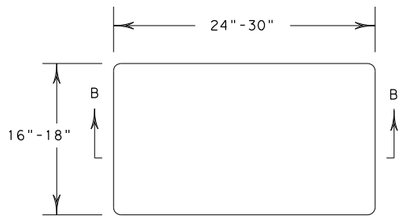


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation | 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
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0907	00	229, ETC		RM 584		
	DIST	COUNTY					SHEET NO.
	SJT	TOM GREEN					178