STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

FHWA TEXAS DIVISION	PROJECT NO.		SHEET NO.
	C 2782-1-13		1
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632

DESIGN SPEED: N/A
CURRENT ADT: 286(2021)
PROJECTED ADT: 400(2041)

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO.: C 2782-1-13

CSJ: 2782- 01 - 013

FM 1632

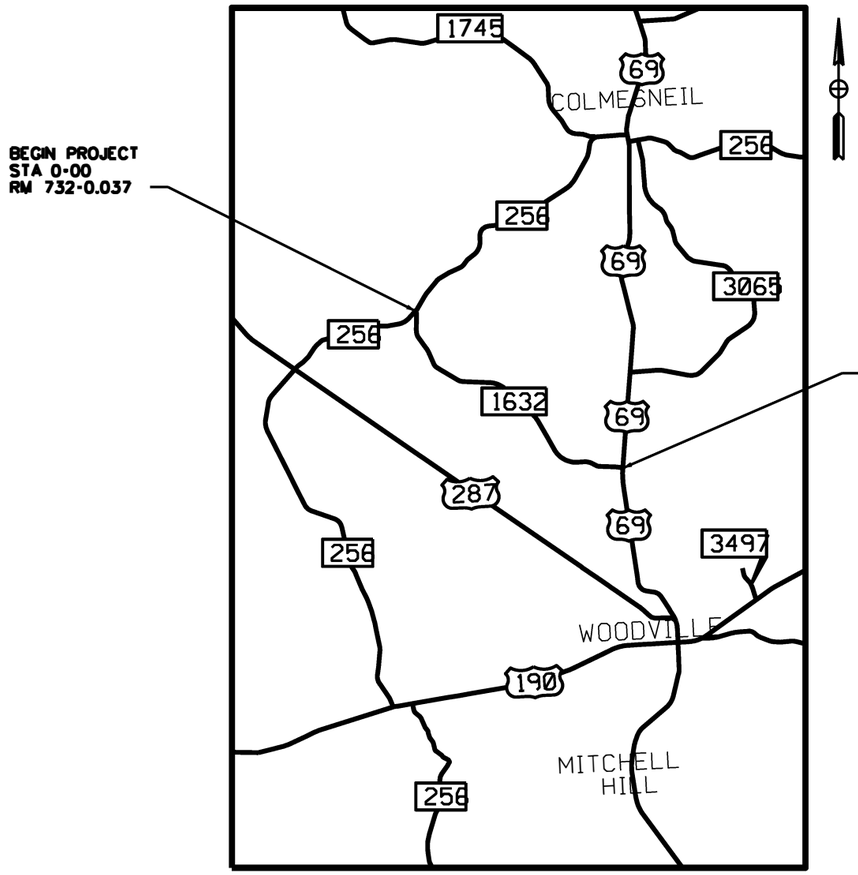
TYLER COUNTY

LENGTH OF PROJECT = 27292 FT = 5.169 MI
LIMITS: FROM FM 256, SOUTH TO US 69

FOR THE CONSTRUCTION OF A ROADWAY RESTORATION PROJECT CONSISTING OF WIDEN & OVERLAY

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
SEE SHEET 2	



LOCATION MAP

SCALE
0 1 2 3 4 MILE

EQUATIONS: NONE
EXCEPTIONS: NONE
RAILROAD CROSSINGS: NONE

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED & ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR: _____

REQUIRED SIGNS SHALL BE IN ACCORDANCE WITH BC(1)-21 THRU BC(12)-21 AND THE "TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES."

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, JULY 2022)

SUBMITTED FOR LETTING: 3/31/2023
DocuSigned by:
[signature]
DISTRICT DESIGN ENGINEER

APPROVED FOR LETTING: 3/31/2023
DocuSigned by:
Martin N. Hoyle, P.E.
DISTRICT ENGINEER

3/28/2023 2:26:44 PM
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	SHEET NO.	DESCRIPTION
		GENERAL
	1	TITLE SHEET
	2	INDEX OF SHEETS
	3	TYPICAL SECTIONS
	4-9	GENERAL NOTES
	10-10A	ESTIMATE & QUANTITY
	11-15	SUMMARIES
		TRAFFIC CONTROL PLAN
	16	SEQUENCE OF WORK
#	17-28	BC (1)-21 THRU BC (12)-21
#	29	TCP (2-1)-18
#	30	TCP (2-2)-18
#	31	TCP (3-1)-13
#	32	TCP (3-3)-14
	33	TRAFFIC CONTROL DETAIL FOR BASE OPERATIONS
#	34	TCP (7-1)-13
#	35	WZ (STPM)-23
#	36	WZ (UL)-13
#	37	WZ (RS)-22
		ROADWAY DETAILS
	38-49	FM 1632 LAYOUT
	49A-49B	HORIZONTAL ALIGNMENT DATA SHEETS
	49C-49D	VERTICAL ALIGNMENT DATA SHEETS
	50	SIDE ROAD/DRIVEWAY DETAILS
	51	TYPICAL PROFILE TRANSITION DETAIL
#	52	TE (HMAC)-11

	SHEET NO.	DESCRIPTION
		TRAFFIC ITEMS
#	53	PM (1)-22
#	54	PM (2)-22
#	55	D&OM (1)-20
#	56	RS (2)-23
#	57	RS (4)-23
		MISC
	58	EROSION CONTROL MEASURES
	59-60	SW3P INDEX
#	61	SW3P-B
#	62-64	EC (9)-16
	65	EPIC

STATE OF TEXAS
JASON D. WALDREP
107826
LICENSED
PROFESSIONAL ENGINEER

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

Jason D. Waldrep, P.E. P.E.

04/06/2023
DATE

INDEX OF SHEETS

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			2
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632

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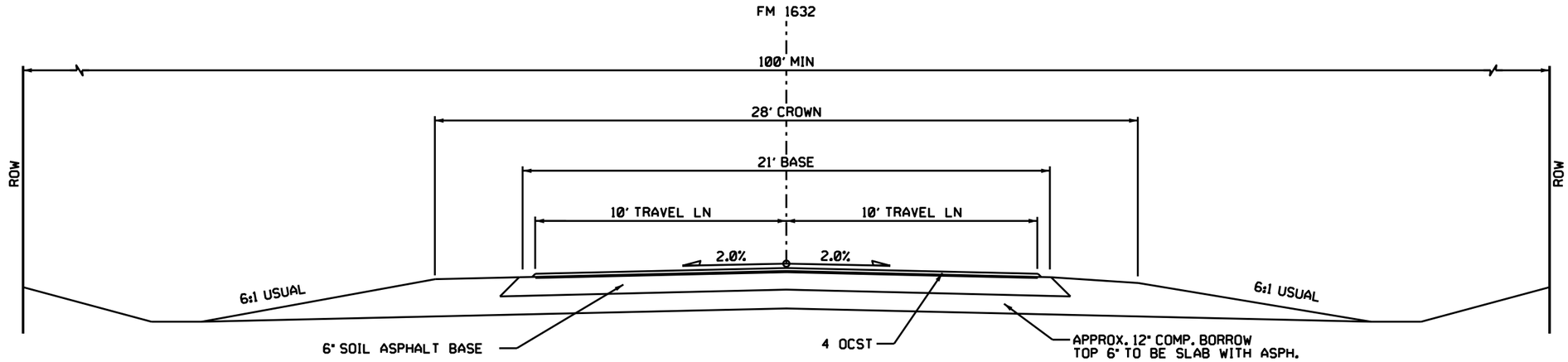
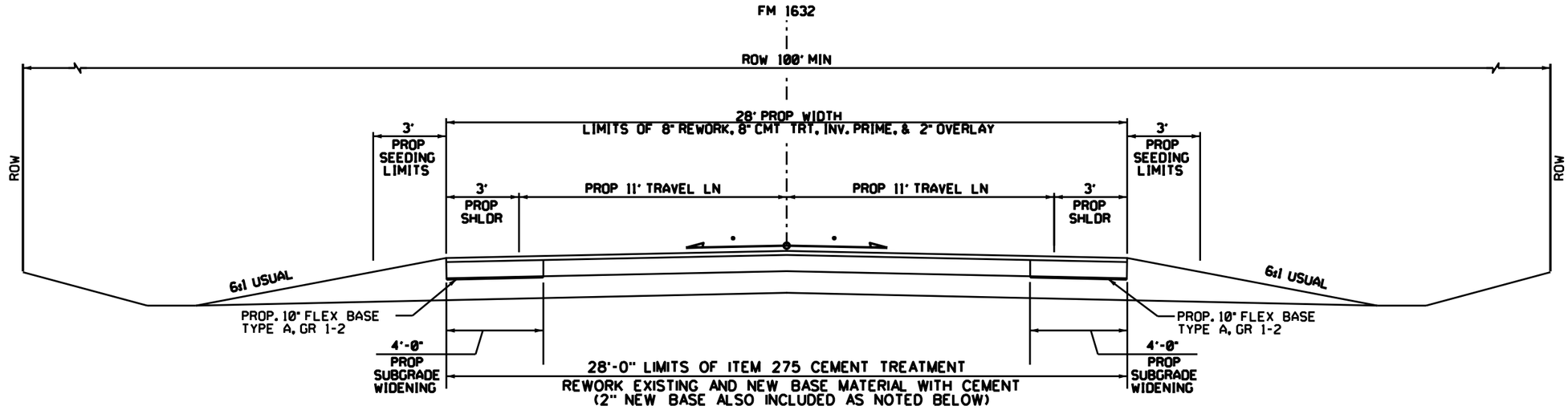


EXISTING TYPICAL SECTION

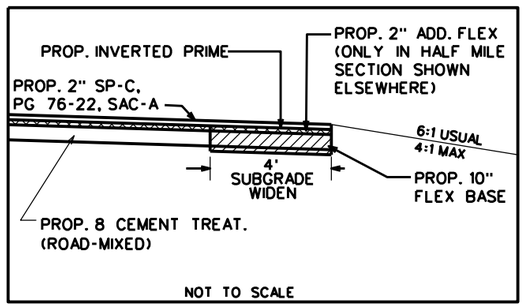
STA 0+00 TO STA 273+10



PROPOSED TYPICAL SECTION

STA 0+00 TO STA 83+00
STA 83+00 TO STA 106+00 ADDITIONAL 2" OF FLEX BASE
STA 106+00 TO STA 273+00

PAVEMENT EDGE DETAIL



NOTE:
* - MATCH EXISTING SLOPES

STATE OF TEXAS
JASON D. WALDREP
107826
LICENSED
PROFESSIONAL ENGINEER

Jason D. Waldrep, P.E.

04/06/2023

TYPICAL SECTIONS

N.T.S

 Texas Department of Transportation

SHEET 1 OF 1

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6			3
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632

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GENERAL NOTES:

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

Name Dave Collins, P.E., Beaumont Area Engineer

Email dave.collins@txdot.gov

Name Taylor Kane, P.E., Beaumont Asst. Area Engineer

Email Taylor.Kane@txdot.gov

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.

Assume full responsibility for the preservation of all sod, shrubbery, and trees at the site during construction. Carefully preserve and replace, in their original position, all sod and shrubbery removed. Replace all Contractor damaged sod or shrubbery at the Contractor's own expense.

Maintain adequate drainage throughout the limits of the project during all construction phases. Provide a weekly a list of equipment, including idle equipment, used on the project each week.

Item 000 Utilities

Consider the locations of underground utilities depicted on the plans as approximate and employ responsible care to avoid damaging, or accommodate utility facilities. Depending upon scope and magnitude of planned construction activities, advanced field confirmation by the utility owner or operator may be prudent. Where possible, protect and preserve permanent signs, markers, and designations of underground facilities. If utility damage (breaks, leaks, nicks, dents, gouges, etc.) occurs, contact the utility facility owner or operator immediately. In the event utility lines needing

unforeseen adjustments are encountered during construction operations, alter operations and continue to prosecute the contract in such a manner that will allow utility adjustments to be made by others.

Item 5 Control of the Work

Station the project before commencing work. Mark the stations every 100 feet. Maintain stationing throughout the duration of the project. Remove the station markings at the completion of the project. Consider this work to be subsidiary to the various bid items of the contract.

Furnish, to the Engineer, a list of the final centerline elevations based on the alignment stationing shown on the plans.

Item 6 Control of Materials

Flammable/Conbustable materials must be stored at a designated location as approved.

Do not Store flammable/combustible materials under or adjacent to Bridge class structures. Daily removal of these materials will be considered incidental work. To Comply with the latest provisions of Build America, Buy America Act (BABA Act) of the Bipartisan Infrastructure Law, the contractor must submit a notarized original of the TxDOT Construction Material Buy America Certification Form for all items classified as construction materials. This form is not required for the 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-classification-sjeet.html for clarification on material categorization.

Item 7 Legal Relations and Responsibilities

Furnish all materials, labor and incidentals required to provide for traffic across the highway and for temporary ingress and egress to private property in accordance with article 7.2.4 of the standard specifications at no additional cost to the state. Maintain ingress and egress to the adjacent property at all times. Consider this work to be subsidiary to the various bid items of the contract.

The Contractor will be completely responsible for the immediate removal of any material that gets upon any vehicle as a result of their operation.

No significant traffic generator events have been identified in the

project limits.

Item 8 Prosecution and Progress

Working days will be charged during all observed curing times, even if no other work is being performed

Compute and charge working days in accordance with Section 8.3.1.4 Standard Workweek.

Adjoining projects may be in progress during the construction of a portion of this project. Plan and prosecute the sequence of construction and the traffic control plan with adjacent construction projects, if applicable. Manage construction of all phases to minimize disruption to traffic.

Night work will not be allowed.

Maintain one lane open to traffic during construction, unless otherwise approved.

Schedule work so that all travel lanes are open during non-working hours, nights and weekends, unless otherwise approved.

Limit lane closures to 1mile unless otherwise approved.

The Contractor will be expected to schedule this work so that the base placement operations will follow the subgrade work as closely as practical in order to reduce the hazard to the traveling public and prevent undue delay from wet weather.

All edges must be backfilled by the end of the day with a 3:1 or flatter slope. No drop offs will be left overnight.

The Engineer will suspend time charges after completion of all work and removal of the barricades. The Department will grant final acceptance when all performance periods are complete.

Accrue Contract time charges through the Contractor's completion of the final punch list. Time will not be suspended until all work is completed.

Submit a work schedule to the Engineer at the preconstruction meeting indicating completion dates for each location, and the number of crews required for the completion of the contract within the contract time period. If at any time during the contract the work progress is behind the initial schedule, submit documentation

indicating how the project will be accelerated to ensure project completion in the remaining contract time.

Work will not be permitted when impending bad weather or low temperatures may impair the quality of work.

Rework no more than 1 mile section of roadway per day, unless approved otherwise. Rework existing base, cement treat, and add base to both travel lanes in a section by the end of the day such that no vertical elevation difference exists between travel lanes.

HURRICANE

In the event of the declaration of a hurricane watch, warning, other severe weather warning or national or state emergency that requires the roadways in the vicinity be used as evacuation routes, cease all work that requires the Contractor's, sub-contractors' or material suppliers' vehicles to enter the stream of traffic on these primary or secondary evacuation routes. This work includes material hauling and delivery, and mobilization or demobilization of equipment.

Item 112 Subgrade Widening

Remove excess material daily unless otherwise directed. Fill all excavated areas by the end of the workday.

Provide a clean vertical edge by milling or saw cutting full depth. Consider this work to be subsidiary to the various bid items of the contract.

Subgrade widening will be used to excavate material from earth shoulders and to correct minor deficiencies, such as adding embankment on high sides of horizontal curves. It is not expected that additional embankment will be required.

No buildup of material that impedes drainage from the roadway will be allowed.

Item 134 Backfilling Pavement Edges

Backfill Pavement Edges quantity by station includes both sides of the roadway. No deduction in payment will be made when in the opinion of the Engineer only one side of a roadbed section requires backfilling.

Type A or B material will meet one of the following requirements:

1. Item 132, Type C

Embankment Type C will conform to the following specification requirements:

Liquid Limit – 40 maximum, Plasticity Index – 25 maximum, 8 minimum, A cohesionless sand will not be permitted

2. Use material from subgrade widening for backfilling pavement edges.

Item 150 Blading

Use blading to consolidate soft spots or reshape ditches. Quantity by the hour includes both sides of the roadway.

Item 164 Seeding for Erosion Control

Final grading and stabilization (seeding) will be achieved as soon as possible and not scheduled only for the end of the project. Final grading and stabilization should be initiated as the overall work progresses.

Multiple mobilizations of the seeding crews will be expected to comply with the Construction General Permit of the Texas Pollution Elimination Discharge System requirements for re- vegetating disturbed soils.

Eliminate seeding in areas of natural growth determined to have enough cover.

Item 166 Fertilizer

Fertilize all the seeded or sodded areas of project.

Furnish and apply fertilizer with analysis of 13-13-13 at a rate of 600 bulk pounds per acre.

Item 168 Vegetative Watering

Equip water trucks with sprinkler systems capable of covering the entire area to be seeded or sodded from the roadway.

Water all newly placed sod or seeded areas the same day of installation. Thereafter, maintain the sod or seeded areas in a well-watered condition and at no time allow the areas to dry to the condition that water stress is evident.

Mechanical watering may not be required during periods of adequate moisture as determined.

Furnish and apply water at a rate of 6.788 Mega gallons per acre per cycle or as directed on the plans.

Comply with stabilization requirements for 70% grass coverage; uniform vegetative coverage is required. During this period, meter and operate water equipment under pumping pressure capable of delivering the required quantities of water necessary. For Permanent seeding each cycle will be executed weekly for 12 weeks, unless directed otherwise. For Temporary seeding each cycle will be executed weekly for 6 weeks, unless directed otherwise.

Provide a logbook showing daily water usage and receipts of water applied, in addition to metering the water equipment.

Item 247 Flexible Base

The minimum plasticity index for this material will be 4.

Do not damage existing or proposed structures during base operations.

Item 275 Cement Treatment (Road-Mixed)

Maintain moisture content of the finished cement treated base for a period of 24 to 48 hours. During this time, but not sooner than 24 hours, induce the microcracking in the finished cement treated base as shown in Article 275.4.7 Microcracking.

In order to provide a uniform mixture as specified under item 275.4.3, a truck mounted metered spreader, trailer mounted metered spreader, or custom designed spreader is required in the application of cement at the required rate or percentage shown in the plans. Consider this necessary equipment and method of placement subsidiary to Item 275.

The cement content will be 24.9 LBS/SY.

Item 310 Prime Coat

For this project, provide an Inverted Prime Coat as shown elsewhere on the plans. An Inverted Prime Coat will be defined as a dual-purpose Prime Coat consisting of bituminous material with the addition of an aggregate layer as a temporary surface for traffic. Allow a minimum of 7 days for the RC-250 to cure before placing subsequent pavement elements.

Item 316 Seal Coat

Furnish medium pneumatic-tire rollers in accordance with Item 210, “Rolling.”

All trucks hauling materials to be paid for by truck measurement will be “struck off” before delivery to the project.

The open season for the application of asphalt is **May 1st through September 15th** unless otherwise directed in writing.

Seal intersections and driveways before sealing the main lanes. Seal all existing roadway surfaces, including extra widths, crossovers, roadside parks, picnic areas, mailbox turnouts, public road intersections, and public drives, within the limits of each project. Do not seal intersections or driveways surfaced with ACP or constructed of concrete.

Sweep all roadways with a powered rotary broom before placement of the surface treatment to remove all loose or excess material or debris. After rolling, sweep as soon as aggregate has sufficiently bonded to remove excess. Use a vacuum broom on all roadway sections with curb and gutter and all roadway sections within the city limits of any city.

Station limits may be adjusted as directed to meet varying field conditions

Asphalt storage tanks may be used.

Vehicles used to haul aggregate from the stockpile to the chip spreader will not be overloaded. Any damage to the roadway caused by the vehicles will be repaired by the Contractor at his expense and subsequent loads will be reduced so as not to cause further damage.

Item 502 Barricades, Signs, and Traffic Handling

Construct all work zone signs, sign supports, and barricades from material other than wood unless approved otherwise. Metal posts, if used, are to be galvanized. Aluminum signs, if used, will meet the following minimum thickness requirements:

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

The Contractor Force Account "Safety Contingency" that has been established for this project is intended to be used 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.

Arrange asphalt laydown schedule to meet plan striping requirements.

Restrict work to one side of the roadway at a time.

Use 42" cones or Vertical Panels as channelizing devices.

Remove all traffic control devices from the right of way when they are not in use. Devices scheduled to be used within 3 days may be placed along the shoulder of the roadway or along the right of way when not in use, or stored in other approved areas on the project. Cover any construction signs that are not in effect and are installed in a fashion that will not allow them to be removed from the right of way easily.

Arrange construction operations to prevent the hauling of materials through the completed pavement sections unless otherwise approved.

Provide all flaggers and pilot vehicle drivers with two-way radio communication capability. Provide flaggers at each side road intersection.

Item 506 Temporary Erosion, Sedimentation, and Environmental Controls

The Contractor is prohibited from removing grass vegetation throughout the entire project limits and then ceasing construction for long periods, typically over three weeks. The Contractor schedule will be developed based on staged vegetation removal, limiting disturbed soil to no more than 25 percent at one time, unless otherwise approved. Should the Contractor not be able to adequately control sediment and erosion for areas disturbed, the Department will substantially reduce the size of areas that the Contractor may disturb soil.

Should the project be evaluated to have sediment control problems as a result of the Contractor disturbing excessive amounts of soil, the Contractor will be required to immediately re-vegetate (seed and water) those disturbed areas at no cost to the Department.

Item 585 Ride Quality for Pavement Surfaces

Use Surface Test Type B pay adjustment schedule 3 to evaluate ride quality of the travel lanes in accordance with Item 585, "Ride Quality for Pavement Surfaces."

Item 666 Retroreflectorized Pavement Markings

Furnish Type II drop-on glass beads.

Item 3077 Dens Graded Hot Mix Asphalt

Prepare Mix Designs and QC testing using the Superpave Gyratory compactor.

Provide a separate Laboratory space, building or testing area, large enough to accommodate TxDOT equipment and testing on site at the Hot Mix Plant near or

within the area of Contractor's testing equipment. The contractor will provide the SGC" Superpave Gyratory Compactor" and

TGC "Texas Gyratory Compactor". All other equipment must be provided by TxDOT. TxDOT will be responsible for maintaining state provided equipment. The Contractor will provide TxDOT with the Calibration paperwork on the shared equipment that they provide.

Provide an all-weather parking area for the sole use of at least 2 State-owned vehicles. Situate the parking area near the Laboratory area at an acceptable location. Maintain the parking area until the project is completed and restore the area to a condition acceptable to the Engineer upon project completion.

Laboratory area shall have a roof, floor, doors, and screened windows. Ensure the floor is strong enough to support testing equipment and has an impervious floor covering. Ensure that the Laboratory area is tied down, weatherproof, piped for water and fuel, and electrically wired by personnel meeting the requirements of Article 7.18., "Electrical Requirements."

Provide secured and controlled access to the Laboratory area through security measures such as bars, locks, alarms, or security fencing for the Laboratory area.

Furnish and install adequate equipment, outlets, lighting, air-conditioning, heating, and ventilation for the Laboratory area. Heating and Air Conditioning shall maintain the Laboratory working area temperature within a range of (68^{O}F through 72^{O}F).

Provide partitioned restroom furnished with restroom supplies, a lavatory, and a flush toilet connected to a sewer or septic tank within the Laboratory area.

Laboratory area will have the use of an internet service provider (ISP) that can provide more than one computer access to ISP account at one time. ISP provider must be able to supply a minimum 100 gigabyte download speed per account.

Required appurtenances within the Laboratory Area:

1. A 10lb ABC fire extinguisher with up-to-date inspection tag and a working smoke detector.
2. Additional workbench and tables at least 3 ft. wide, 6 ft. long, and 3 ft. high.
3. Minimum two chairs and one desk, filing cabinets, solar screen blinds or shades.
4. An operational telephone system.
5. Water fountain or bottled water fountain able to provide cold water and have cup dispenser and cups.
6. Water (for testing purposes) from an approved source

7. Adequately power ventilate the room for the ignition oven. Provide a NEMA 6-50R (208/240 volt, 50 amp) outlet within 2.25 ft. of the ignition oven location and an independent exhaust outlet to the outside located a maximum of 8 ft. from the oven. Provide a level, sturdy and
8. fireproof surface for the ignition oven with a minimum of 6 in. clearance between the furnace and other vertical surfaces. Vent the ignition oven to the outside.
9. A minimum of 20 ft. of total work counter length at least 3 ft. wide and 3 ft. above the floor and strong enough to support required testing equipment
10. A laboratory sink measuring 24 × 30 in. and 12 in. deep
11. Door openings for the Laboratory area must be 48-inches minimum width. If steps are required to gain access to the facility's then a landing dock will be provided with minimum dimensions of 60 inches wide by 60 inches deep. The strong floor and landing of the facility shall support the weight of all equipment and personnel providing a stable, essentially zero deflection during testing operations acceptable to the Engineer.

- Provide multifunction color printer/fax/scanner/copier capable of reproducing 11 X 17

For the Laboratory area the work performed, materials furnished, utilities, and utility services (including phone and internet), appurtenances including office equipment testing equipment, labor, tools, and incidentals will not be paid measured or paid for directly but will be subsidiary to pertinent items.

Use aggregate that meets the SAC requirement of class A for all surface mixes. RAP aggregate must meet the requirements of Table 1.

Aggregates used on shoulders and ramps are required to meet SAC requirements. Provide mix designs. Mix designs must be verified and approved.

Remove all vegetation from pavement edges, intersections, curbs and gutters and driveways before planning or ACP operations. This work will not be paid for directly but will be subsidiary to the various bid items.

Operate the spreading and finishing machine at a uniform forward speed consistent with the plant production rate, hauling capability, and roller train capacity to result

in a continuous operation. The speed will be slow enough, so that stopping between trucks is not ordinarily required. If the Engineer determines sporadic delivery of material is adversely affecting the HMA placement, the Engineer may require paving operations to cease until acceptable methods are employed to minimize starting and stopping of the paver.

A material transfer device (MTD) will be required for all surface courses of HMA on this project. An MTD is defined as a self-propelled, wheel-mounted vehicle capable of receiving HMA from the haul trucks separate from the paver. The MTD will have a minimum storage capacity of approximately 25 tons and will be equipped with a pivoting discharge conveyor and a means of completely remixing the HMA before placement. The Engineer may approve an alternative device on a trial basis for the surface course. This device will be capable of receiving HMA separate from the paver and must have remixing capabilities. For all other courses of HMA, other than the surface, an alternative device may be used as long as it is capable of receiving HMA separate from the paver.

Item 6185

Shadow vehicles with TMA and high intensity rotating, flashing, oscillating or strobe lights are required. Use one TMA preceding every stationary work zone and two TMA's for mobile operations.

In addition to the shadow vehicles with truck mounted attenuator (TMA) that are specified as being required for this project, provide one additional shadow vehicle with TMA for TCP as detailed in the general notes of the standards elsewhere in the plans.

Therefore, two total shadow vehicles with TMA will be required for this type of work. The contractor will be responsible for determining if one or more of these operations will be ongoing at the same time to determine the total number of TMA's needed for the project.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 2782-01-013 **DISTRICT** Beaumont **COUNTY** Tyler
HIGHWAY FM 1632

ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL
	112-6001	SUBGRADE WIDENING (ORD COMP)	STA	273.100	
	134-6004	BACKFILL (TY A OR B)	STA	273.100	
	150-6002	BLADING	HR	85.000	
	164-6025	CELL FBR MLCH SEED(PERM)(URBAN)(SANDY)	SY	18,206.000	
	168-6001	VEGETATIVE WATERING	MG	153.140	
	247-6041	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)	CY	7,140.000	
	251-6014	REWORK BS MTL (TY C) (8") (ORD COMP)	STA	273.100	
	275-6001	CEMENT	TON	1,058.000	
	275-6014	CEMENT TREAT (MX EXST MTL & NW BS)(8")	SY	84,964.000	
	310-6012	PRIME COAT (RC-250)	GAL	16,993.000	
	316-6403	AGGR (TY-B GR-5 OR TY-L GR-5)	CY	680.000	
	354-6021	PLANE ASPH CONC PAV(0" TO 2")	SY	624.000	
	467-6580	SET (REMOV & REINSTALL)	EA	2.000	
	500-6001	MOBILIZATION	LS	1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	9.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	1,700.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	1,700.000	
	530-6011	INTRSCT, DRVWAYS, & TURNOUT (ACP)	SY	156.000	
	530-6016	DRIVEWAYS (BASE)	SY	923.000	
	533-6001	RUMBLE STRIPS (SHOULDER)	LF	54,620.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	27,310.000	
	662-6008	WK ZN PAV MRK NON-REMOV (W)6"(SLD)	LF	53,420.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	22.000	
	662-6035	WK ZN PAV MRK NON-REMOV (Y)6"(BRK)	LF	3,400.000	
	662-6037	WK ZN PAV MRK NON-REMOV (Y)6"(SLD)	LF	38,515.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	3,984.000	
	666-6308	RE PM W/RET REQ TY I (W)6"(SLD)(090MIL)	LF	53,420.000	
	666-6317	RE PM W/RET REQ TY I (Y)6"(BRK)(090MIL)	LF	3,400.000	
	666-6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF	38,515.000	
	668-6076	PREFAB PAV MRK TY C (W) (24") (SLD)	LF	22.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	660.000	
	3077-6033	SP MIXESSP-CSAC-A PG76-22	TON	9,601.000	
	3077-6075	TACK COAT	GAL	5,098.000	
	6185-6002	TMA (STATIONARY)	DAY	80.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	20.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000	

Estimate Quantity Sheet

CONTROLLING PROJECT ID 2782-01-0 3

DISTRICT Beaumont

HIGHWAY FM 1632

COUNTY Tyler

		CONTROL SECTION JOB		**2782-01-013**		TOTAL EST.	TOTAL FINAL
		PROJECT ID		**A00187857**			
		COUNTY		**Tyler**			
		HIGHWAY		**FM 1632**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

BASIS OF ESTIMATE

ITEM	CODE	DESCRIPTION	QUANTITY	RATE	DEPTH	QUANTITY
150	6002	BLADING	84964 SY	0.001 HR/SY	-	85 HR
* 166	6002	FERTILIZER	3.76 AC	625 LBS/AC	-	1 TON
168	6001	VEGETATIVE WATERING	3.76 AC	6.788 MG/AC/CYCLE, 6 CYCLES	-	153.14 MG
275	6001	CEMENT	84,964 SY	24.9 LBS/SY	-	1,058 TON
310	6012	PRIME COAT (RC-250)	84,964 SY	0.2 GAL/SY	-	16,993 GAL
316	6403	AGGR (TY-B GR-5 OR TY-L GR-5)	84,964 SY	0.008 CY/SY	-	680 CY
3077	6033	SP MIXESSP-CSAC-A PG76-22	84,964 SY	113 LB/SY/IN	2 IN	9,601 TON
3077	6075	TACK COAT	84,964 SY	0.06 GAL/SY	-	5,098 GAL

* - For the Contractor information only. Not a pay item.

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SUMMARIES

FED.RD. DIV.NO.	FEDERAL PROJECT NUMBER		SHEET NO.
6			11
STATE	DIST.	COUNTY	
TEXAS	BMT	TYLER	
CONT.	SECT.	JOB	HIGHWAY NO.
2782	01	013	FM 1632

ROADWAY ITEMS

STA	TO	STA	LENGTH (FT)	WIDTH (FT)	SURFACE AREA (SY)	112	134	247	251	275		354	533	
						6001	6004	6041	6014	* 6001	6014	6021	6001	6002
						SUBGRADE WIDENING (ORD COMP)	BACKFILL (TY A OR B)	FL BS (CMP IN PLC) (TY A GR 1-2) (FNAL POS)	REWORK BS MTL (TY C)(8")(ORD COMP)	CEMENT	CEMENT TREAT (MX EXST MTL & NW BS) (8")	PLANE ASPH CONC PAV (0" TO 2")	RUMBLE STRIPS (SHOULDER)	RUMBLE STRIPS (CENTERLINE)
						STA	STA	CY	STA	SY	SY	SY	LF	LF
0+00	TO	136+55	13,655	28	42,482	136.55	136.55	3371	136.55	42482	42482	312	27310	13655
83+00	TO	106+00	2,300	28	7,156	---	---	398	---	---	---	---	---	---
136+55	TO	273+10	13,655	28	42,482	136.55	136.55	3371	136.55	42482	42482	312	27310	13655
PROJECT TOTAL:						273.1	273.1	7,140	273.1	84,964	84,964	624	54,620	27,310

* FOR THE CONTRACTORS INFORMATION ONLY

PAVEMENT MARKINGS ITEMS

STA	TO	STA	LENGTH (FT)	662					666			668	672
				6016	6035	6037	6008	6111	6308	6317	6320	6076	6009
				WK ZN PAV MRK NON-REM OV (W)24" (SLD)	WK ZN PAV MRK NON-REM OV (Y)6"(BRK)	WK ZN PAV MRK NON-REM OV (Y)6"(SLD)	WK ZN PAV MRK NON-REM OV (W)6" (SLD)	WK ZN PAV MRK SHT TERM (TAB) TY Y-2	RE PM W/RET REQ TY I (W) 6"(SLD) (090MIL)	RE PM W/RET REQ TY I (Y) 6" (BRK) (090MIL)	RE PM W/RET REQ TY I (Y) 6" (SLD) (090MIL)	PREFAB PAV MRK TY C (W) (24") (SLD)	REFL PAV MRKR TY II-A-A
				LF	LF	LF	EA	EA	LF	LF	LF	LF	EA
0+00	TO	136+55	13,655	11	1,940	19,443	26,752	2,134	26,752	1,940	19,443	11	342
136+55	TO	273+10	13,655	11	1,460	19,072	26,668	1,850	26,668	1,460	19,072	11	318
PROJECT TOTAL:				22	3,400	38,515	53,420	3,984	53,420	3,400	38,515	22	660

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SUMMARIES

Texas Department of Transportation

FED.RD. DIV.NO.	FEDERAL PROJECT NUMBER		SHEET NO.
6			12
STATE	DIST.	COUNTY	
TEXAS	BMT	TYLER	
CONT.	SECT.	JOB	HIGHWAY NO.
2782	01	013	FM 1632

DRIVEWAY & INTERSECTION ITEMS

STA	DESCRIPTION	OFFSET	MATERIAL	R1	R2	W2	W1	L	AREA (SY)	530 6011 INTRSCT, DRVWAYS, & TURNOUT (ACP) SY	530 6016 DRIVEWAYS (BASE) SY	247 6001 * FL BS (CMP IN PLACE)(TYA GR1-2) (IN VEH) CY
7+81	1	L	GRAVEL	10	10	40	16	5	14	-	14	1
8+72	2	R	GRAVEL	10	10	40	17	5	15	-	15	1
8+72	3 - CR 2790	L	GRAVEL	10	10	40	17	5	15	-	15	1
14+25	4	R	GRAVEL	10	10	40	17	5	15	-	15	1
17+42	5	R	DIRT	10	10	40	15	5	14	-	14	1
24+21	6	R	GRAVEL	10	10	40	15	5	14	-	14	1
30+09	7	R	GRAVEL	10	10	40	12	5	12	-	12	1
31+13	8	R	GRAVEL	10	10	40	16	5	14	-	14	1
40+96	9	L	GRAVEL	10	10	40	16	5	14	-	14	1
43+08	10	R	GRAVEL	10	10	40	11	5	12	-	12	1
43+11	11	L	DIRT	10	10	40	18	5	16	-	16	1
47+17	12	R	ASPH	10	10	40	15	5	14	14	-	-
49+02	13	R	DIRT	10	10	40	13	5	13	-	13	1
58+02	14	L	GRAVEL	10	10	40	16	5	14	-	14	1
59+78	15 - CR 2525	R	GRAVEL	10	10	40	12	5	12	-	12	1
63+28	16	L	DIRT	10	10	40	29	5	22	-	22	1
73+19	17	R	GRAVEL	10	10	40	16	5	14	-	14	1
76+23	18	L	GRAVEL	10	10	40	12	5	12	-	12	1
78+01	19	L	DIRT	10	10	40	15	5	14	-	14	1
88+36	20	L	DIRT	10	10	40	14	5	13	-	13	1
88+49	21	R	GRAVEL	10	10	40	11	5	12	-	12	1
92+81	22	L	GRAVEL	10	10	40	14	5	13	-	13	1
92+81	23	R	GRAVEL	10	10	40	14	5	13	-	13	1
103+67	24	L	DIRT	10	10	40	21	5	17	-	17	1
106+98	24 - CR 2778	L	DIRT	10	10	40	21	5	17	-	17	1
110+58	25	R	GRAVEL	10	10	40	26	5	20	-	20	1
114+00	26	R	GRAVEL	10	10	40	24	5	19	-	19	1
118+19	27	L	DIRT	10	10	40	13	5	13	-	13	1
122+22	28	L	DIRT	10	10	40	15	5	14	-	14	1
127+32	29	L	ASPH	10	10	40	20	5	17	17	-	-
129+40	30	R	GRAVEL	10	10	40	14	5	13	-	13	1
129+99	31	L	GRAVEL	10	10	40	20	5	17	-	17	1
132+36	32	R	DIRT	10	10	40	23	5	18	-	18	1
132+41	33	L	GRAVEL	10	10	40	20	5	17	-	17	1
141+95	34 - CR 2773	R	GRAVEL	10	10	40	20	5	17	-	17	1
SUBTOTAL										31	489	33

* FOR THE CONTRACTORS INFORMATION ONLY.

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SUMMARIES

Texas Department of Transportation

SHEET 3 OF 5

FED.RO.	FEDERAL PROJECT NUMBER		SHEET NO.
6			13
STATE	DIST.	COUNTY	
TEXAS	BMT	TYLER	
CONT.	SECT.	JOB	HIGHWAY NO.
2782	01	013	FM 1632

DRIVEWAY & INTERSECTION ITEMS (CONT)

STA	DESCRIPTION	OFFSET	MATERIAL	R1	R2	W2	W1	L	AREA (SY)	530 6011 INTRSCT, DRVWAYS, & TURNOUT (ACP) SY	530 6016 DRIVEWAYS (BASE) SY	247 6001 * FL BS (CMP IN PLACE)(TYA GR1-2) (IN VEH) CY
142+79	35	R	GRAVEL	10	10	40	20	5	17	-	17	1
144+10	36	L	GRAVEL	10	10	40	20	5	17	-	17	1
148+31	37	L	GRAVEL	10	10	40	13	5	13	-	13	1
148+44	38	R	GRAVEL	10	10	40	21	5	17	-	17	1
159+43	39	R	DIRT	10	10	40	21	5	17	-	17	1
188+48	40	L	ASPH	10	10	40	28	5	21	21	-	-
198+23	41	R	GRAVEL	10	10	40	26	5	20	-	20	1
220+67	42	L	GRAVEL	10	10	40	26	5	20	-	20	1
221+81	43	R	GRAVEL	10	10	40	12	5	12	-	12	1
226+40	44	L	GRAVEL	10	10	40	16	5	14	-	14	1
228+45	45	L	GRAVEL	10	10	40	18	5	16	-	16	1
229+84	46	L	GRAVEL	10	10	40	20	5	17	-	17	1
233+41	47	R	GRAVEL	10	10	40	17	5	15	-	15	1
234+62	48	L	GRAVEL	10	10	40	14	5	13	-	13	1
237+20	49	R	GRAVEL	10	10	40	18	5	16	-	16	1
245+40	50	R	GRAVEL	10	10	40	14	5	13	-	13	1
249+11	51	L	GRAVEL	10	10	40	23	5	18	-	18	1
252+07	52	L	DIRT	10	10	40	18	5	16	-	16	1
252+07	53	R	ASPH	10	10	40	18	5	16	16	-	-
252+90	54	L	GRAVEL	10	10	40	14	5	13	-	13	1
254+61	55	L	ASPH	10	10	40	12	5	12	12	-	-
254+88	56	R	DIRT	10	10	40	20	5	17	-	17	1
256+60	57	L	ASPH	10	10	40	32	5	23	23	-	-
256+83	58	R	ASPH	10	10	40	21	5	17	17	-	-
257+69	59	L	GRAVEL	10	10	40	31	5	23	-	23	1
257+88	60	R	ASPH	10	10	40	25	5	19	19	-	-
259+02	61	L	GRAVEL	10	10	40	19	5	16	-	16	1
260+85	62	R	GRAVEL	10	10	40	19	5	16	-	16	1
261+41	63	L	GRAVEL	10	10	40	19	5	16	-	16	1
261+88	64	L	GRAVEL	10	10	40	19	5	16	-	16	1
263+29	65	R	GRAVEL	10	10	40	19	5	16	-	16	1
264+31	66 - CR 2776	L	GRAVEL	10	10	40	17	5	15	-	15	1
267+80	67 - CR 2776	L	GRAVEL	10	10	40	17	5	15	-	15	1
272+15	68 - CR 2775	L	ASPH	10	10	40	21	5	17	17	-	-
SUBTOTAL										125	434	27
PROJECT TOTAL										**156**	**923**	**60**

* FOR THE CONTRACTORS INFORMATION ONLY.

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SUMMARIES

FED.RD. DIV.NO.	FEDERAL PROJECT NUMBER		SHEET NO.
6			14
STATE	DIST.	COUNTY	
TEXAS	BMT	TYLER	
CONT.	SECT.	JOB	HIGHWAY NO.
2782	01	013	FM 1632

EROSION CONTROL ITEMS

STA	TO	STA	164	168	506	
			6025	6001*	6041	6043
			CELL FBR MLCH SEED (PERM) (URBAN)	VEGETATIVE WATERING	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
			SY	AC	LF	LF
0+00	TO	136+55	9103	1.88	900	900
136+55	TO	273+10	9103	1.88	700	700
DISCRETIONARY					100	100
PROJECT TOTAL:			18206	3.76	1700	1700

* FOR THE CONTRACTORS INFORMATION ONLY - SEE BASIS OF ESTIMATE

MISCELLANOUS ITEMS

STA	TO	STA	467	6185	
			6580	6002	6005
			SET (REMOV & REINSTALL)	TMA (STATIONARY)	TMA (MOBILE OPERATION)
			EA	DAY	DAY
0+00	TO	273+10	2	80	20
PROJECT TOTAL:			2	80	20

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SUMMARIES

FED.RD. DIV.NO.	FEDERAL PROJECT NUMBER		SHEET NO.
6			15
STATE	DIST.	COUNTY	
TEXAS	BMT	TYLER	
CONT.	SECT.	JOB	HIGHWAY NO.
2782	01	013	FM 1632

* CONSTRUCTION SEQUENCE:

1. INSTALL CONSTRUCTION BARRICADES AS PER BC STANDARDS.
2. INSTALL SW3P ITEMS.

2a. PRIOR TO REWORKING BASE, PLACE CHANNELIZING DEVICES ALONG EDGE LINES FOR ONE MILE. THE CD WILL BE MAINTAINED AND LEFT IN PLACE TO ORIENT THE TRAVELING PUBLIC.

** 3. PERFORM SUBGRADE WIDENING AS SHOWN ON PLANS WITH ADDITION OF FLEXIBLE BASE AS SHOWN ON THE TYPICAL SECTIONS. NOTE: ALL SUBGRADE WIDENING WITH THE ADDITION OF FLEXIBLE BASE MAY BE COMPLETED FOR THE ENTIRE LIMITS PRIOR TO REWORKING THE BASE, IF APPROVED BY THE ENGINEER.

*** 4. REWORK AND ADD BASE AS SHOWN ON PLANS. (IN THE SECTION WITH 2" OF ADDITIONAL BASE - REWORK, ADD 2" FLEXIBLE BASE, COMPACT TO ENSURE 2" COMPACTED DEPTH IS OBTAINED, AND THEN CEMENT TREAT EXISTIN AND NEW BASE BY MIXING TO ACHIEVE A HOMOGENOUS MATERIAL.")

*** 5. CEMENT TREAT REWORKED BASE.

6. REPEAT STEPS 3 THROUGH 5 ON THE OPPOSITE SIDE.

6a. ONCE CEMENT TREATMENT IS COMPLETED APPLY INVERTED PRIME SURFACE AND AGGREGATE FOR ONE MILE LENGTH (BOTH SIDES OF THE ROADWAY).

6b. PLACE WORK ZONE PAVEMENT MARKINGS AT CENTERLINE ONCE INVERTED PRIME IS PLACED. SEVERAL MOBILIZATIONS OF THE MARKING CONTRACTOR WILL BE REQUIRED.

7. PLACE SP-C AND TABS.

8. PLACE FINAL PAVEMENT MARKINGS.

* PERFORM WORK ON ONE SIDE OF ROADWAY WHILE MAINTAINING ONE LANE TRAFFIC ON OPPOSITE SIDE. PROVIDE WORK ZONE PAVEMENT MARKINGS WITHIN 7 CALENDAR DAYS AFTER ELIMINATION OF THE EXISTING STRIPING AND PLACEMENT OF SHORT TERM STRIPING (TABS). REFER TO GENERAL NOTES AND PLAN SHEETS FOR ADDITIONAL REQUIREMENTS.

** REFER TO TYPICAL SECTIONS FOR LIMITS OF SUBGRADE WIDENING.

*** REWORK OF BASE, ADDITIONAL BASE, CEMENT TREATMENT AND PRIME WILL BE LIMITED TO NO MORE THAN ONE MILE IN LENGTH, MAINTAIN TWO WAY/ONE LANE USING FLAGGERS AND ESCORT VEHICLE DURING THE DAY.

STATE OF TEXAS
JASON D. WALDREP
107826
LICENSED
PROFESSIONAL ENGINEER

Jason D. Waldrep, P.E.

04/06/2023

SEQUENCE OF WORK

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			16
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632

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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

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	2782	01	013	FM 1632
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	BMT	TYLER		17
5-10 5-21				

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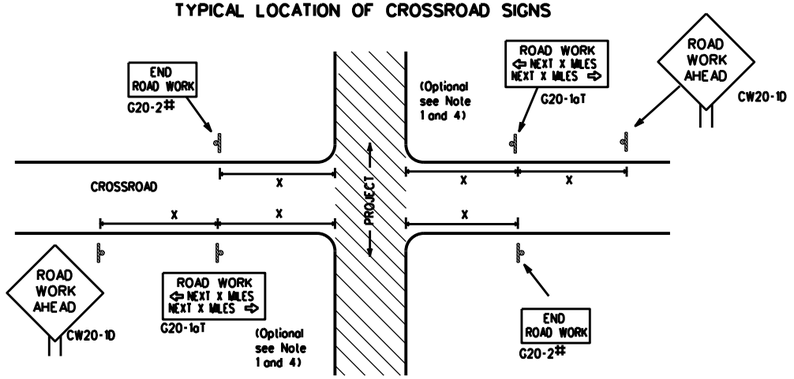
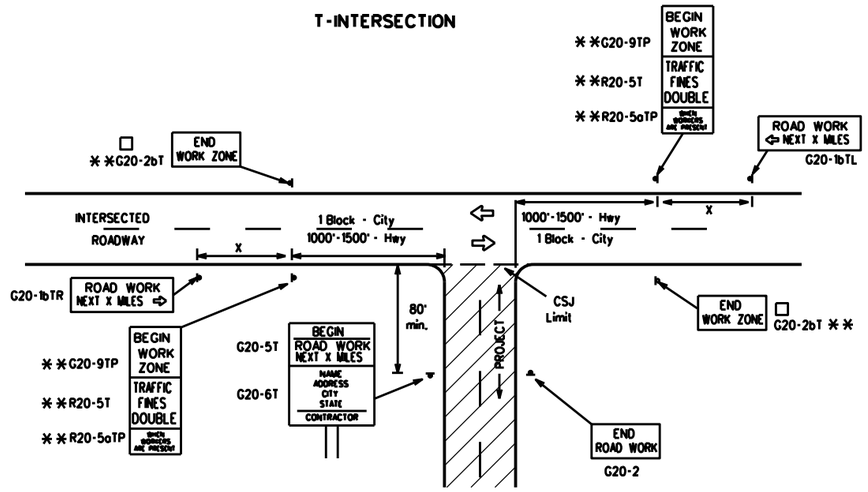
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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]

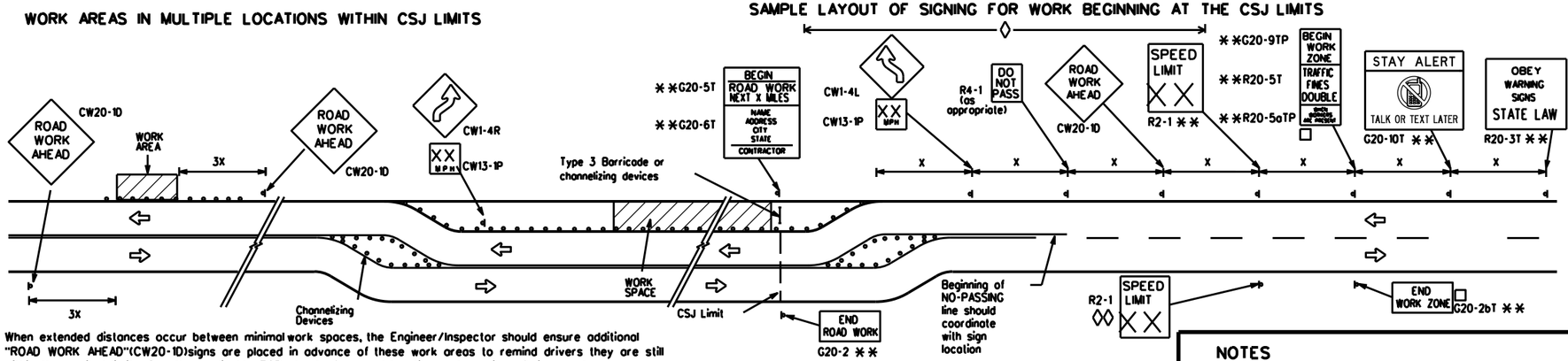
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

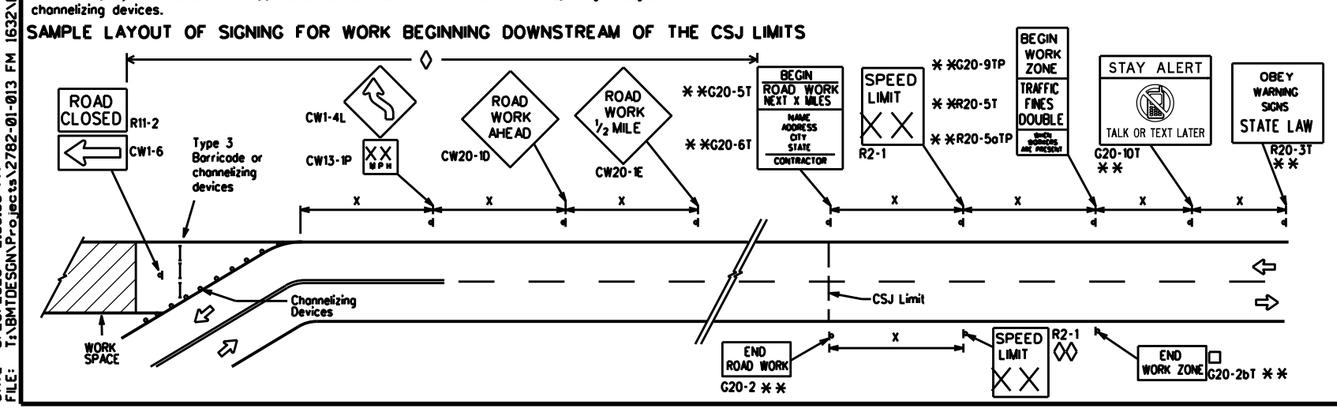
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may 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 DOWNSTREAM OF THE CSJ LIMITS



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

NOTES

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

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

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

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

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

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

SHEET 2 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

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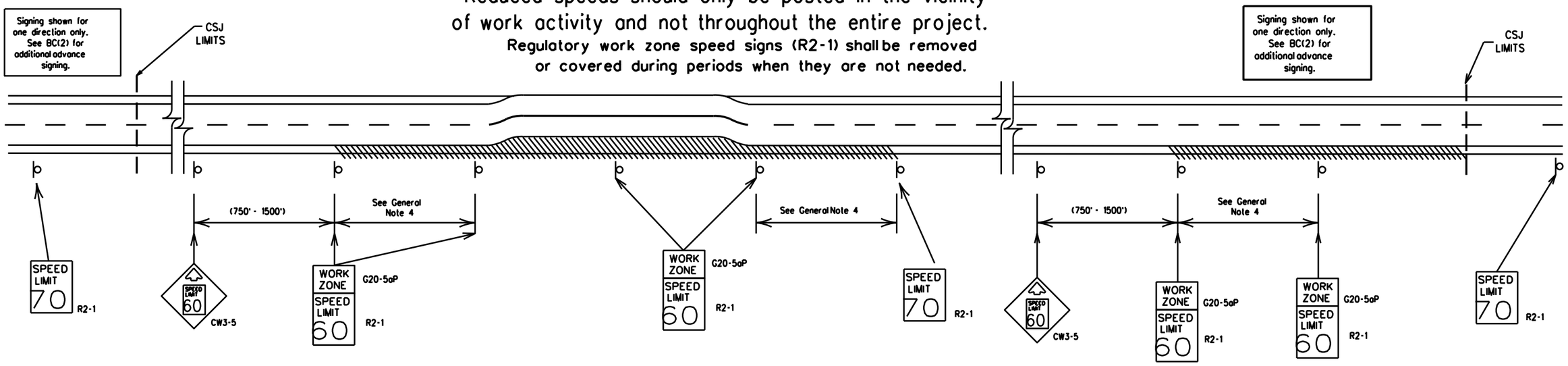
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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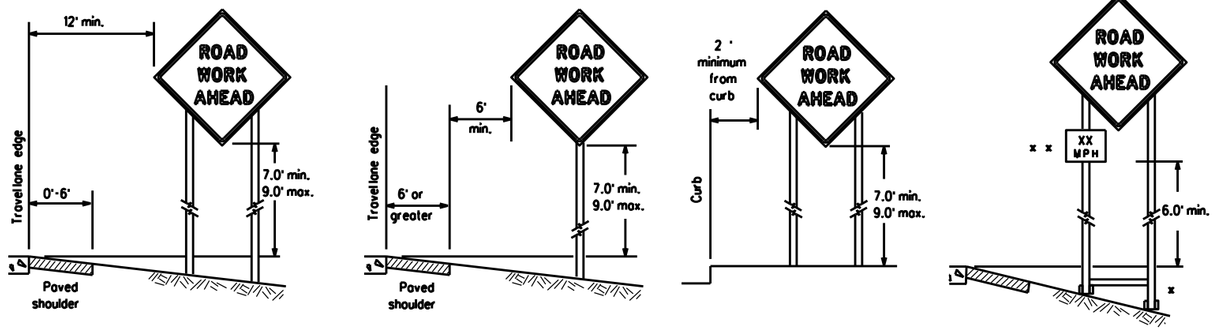
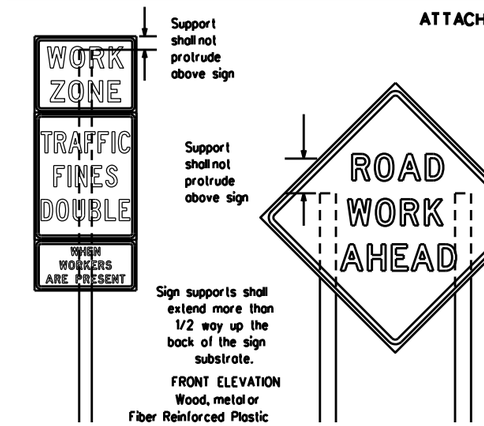
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



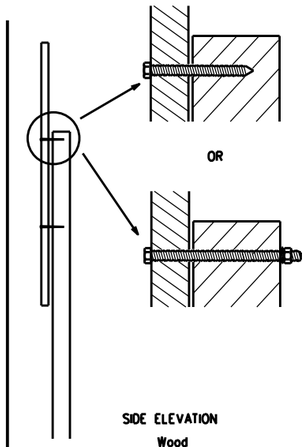
x When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



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.

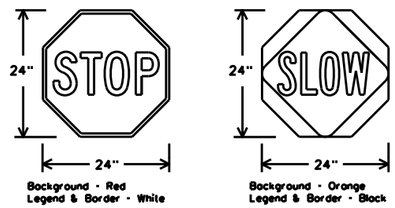


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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.

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 lightness 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 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.

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BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

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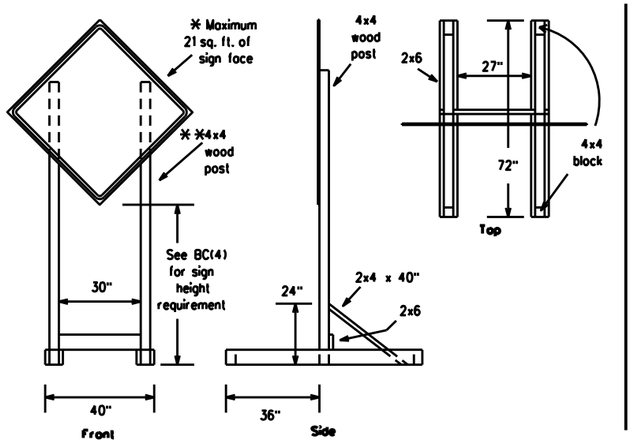
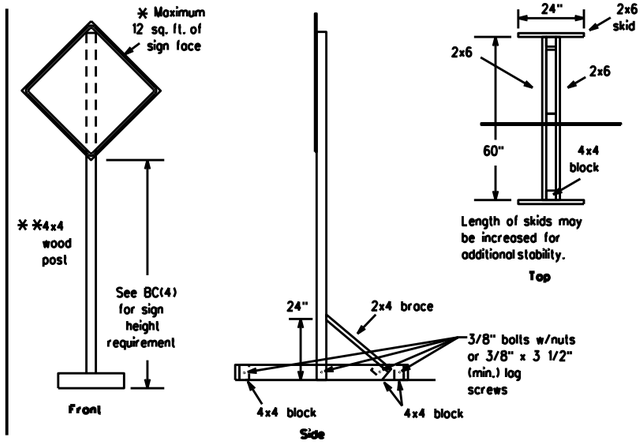
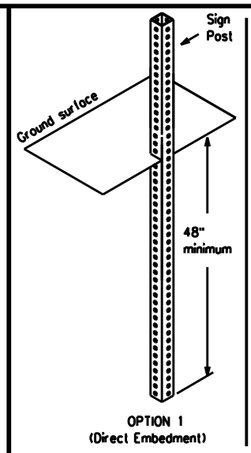
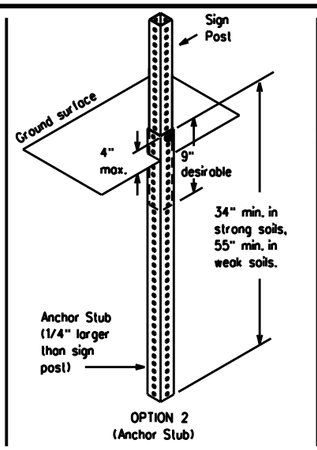


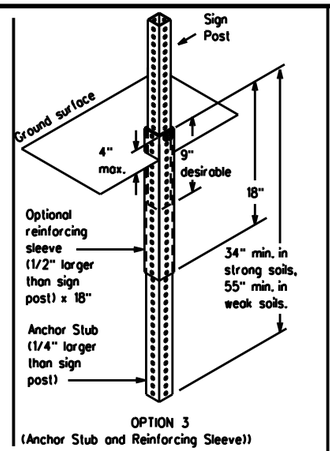


SKID MOUNTED WOOD SIGN SUPPORTS

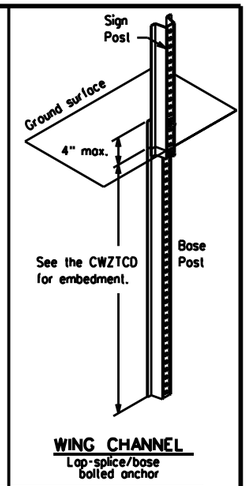
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS







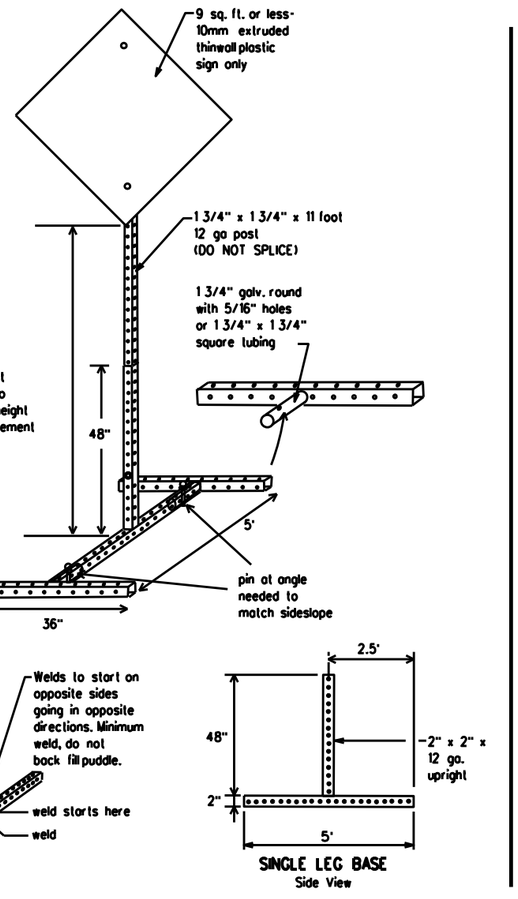
PERFORATED SQUARE METAL TUBING

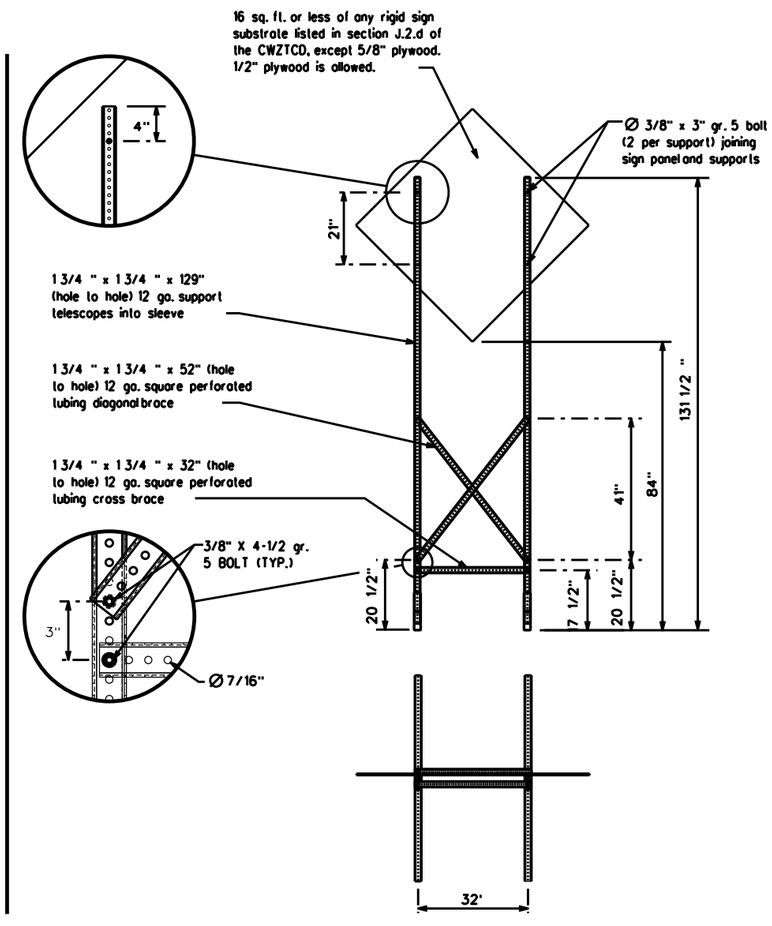


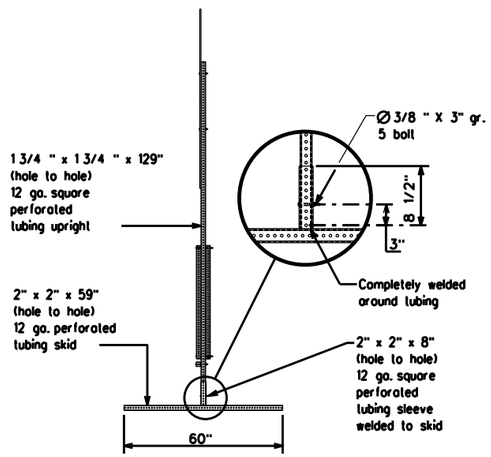
WING CHANNEL
Lap-splice/base bolted anchor

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.

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

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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

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

** 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.

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	2782	01	013	FM 1632
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	BMT	TYLER		22

DATE: 3/28/2023 2:58:55 PM
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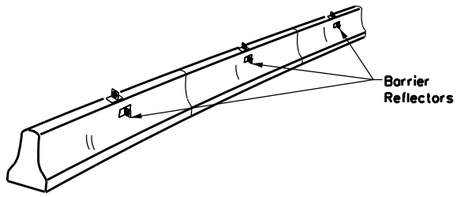
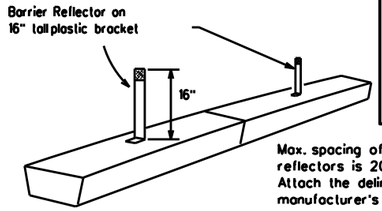
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost 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.

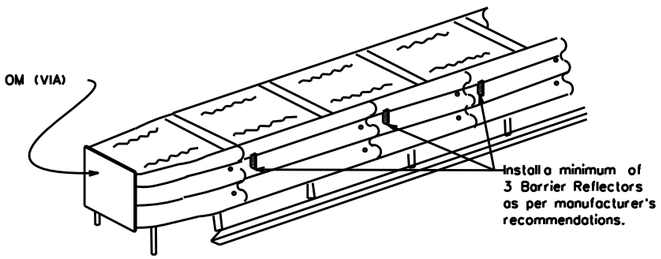


Max. spacing of barrier reflectors is 20 feet.
Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

LPCB is approved for use in work zone locations, where the posted speed is 45mph, or less. See Roadway Standard Sheet LPCB.

LOW PROFILE CONCRETE BARRIER (LPCB)

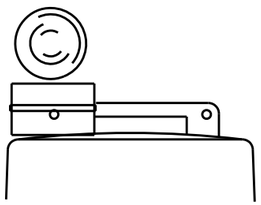


DELINEATION OF END TREATMENTS

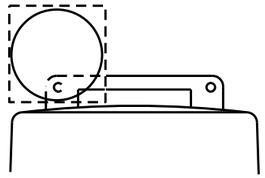
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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 or C 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

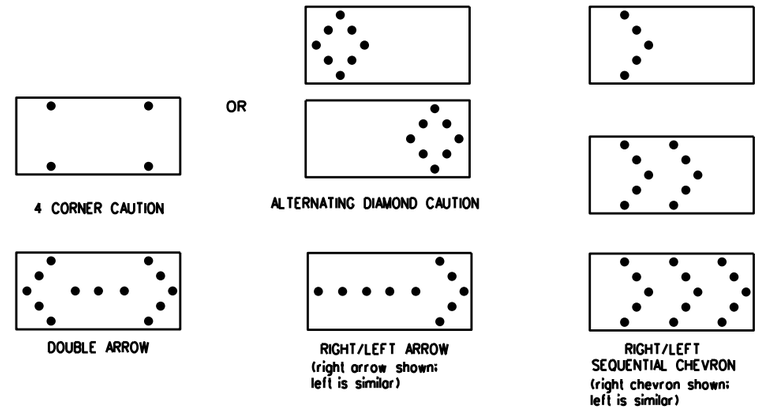
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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



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 on 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	2782	01	013	FM 1632
9-07 8-14	DIST	COUNTY		SHEET NO.
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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:

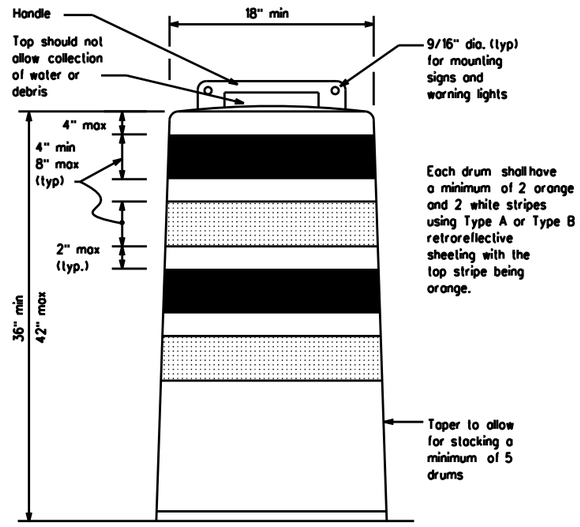
1. Plastic drums shall be a two-piece design: the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

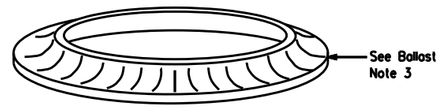
RETROREFLECTIVE SHEETING

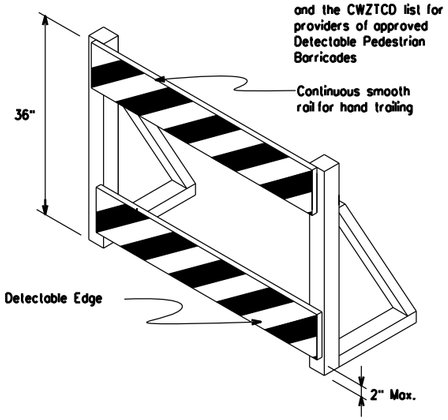
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

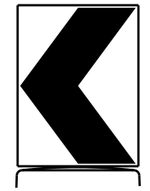




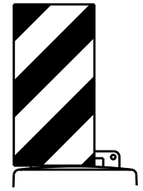


DETECTABLE PEDESTRIAN BARRICADES

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 or Type C Orange_{FL} 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.

SHEET 8 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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REVISIONS	2782	01	013	FM 1632
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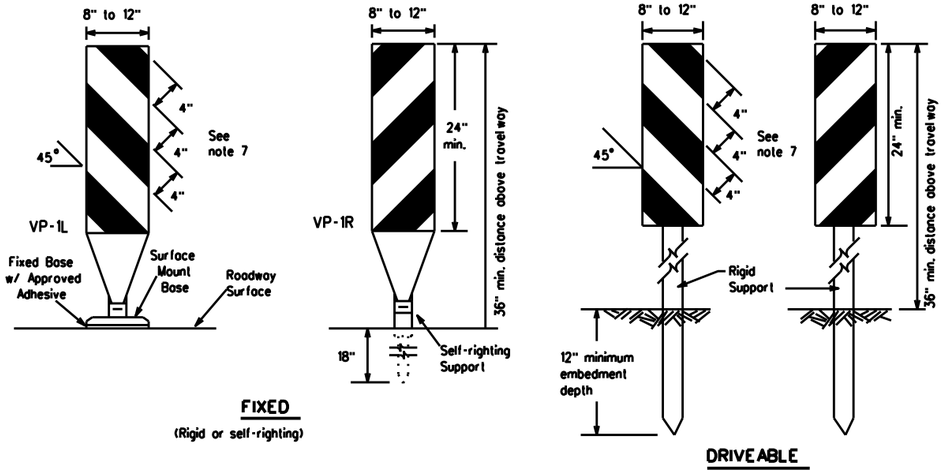
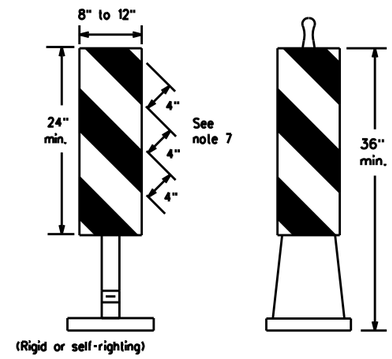
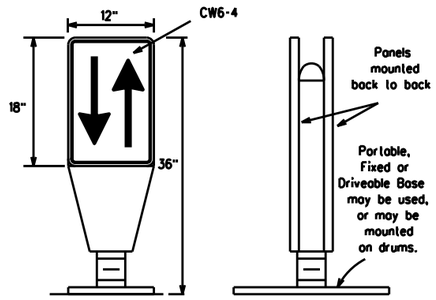




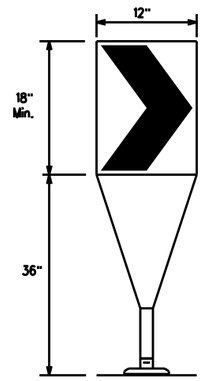
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is 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 or Type C conforming to Departmental Material Specification DMS-8300, unless noted otherwise. The legend shall meet the requirements of DMS-8300.

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

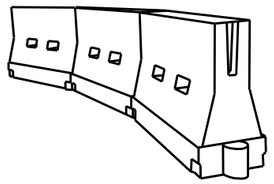


1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of 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 or Type C 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

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

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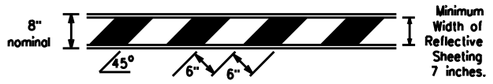
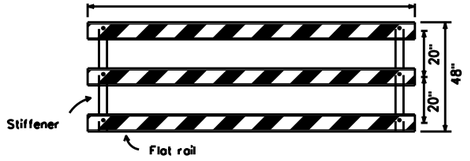
TYPE 3 BARRICADES

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.



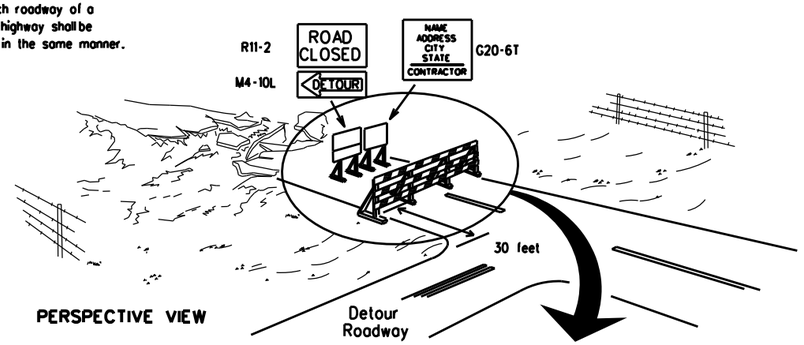
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

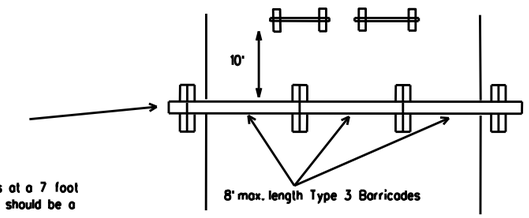
Each roadway of a divided highway shall be barricaded in the same manner.



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.

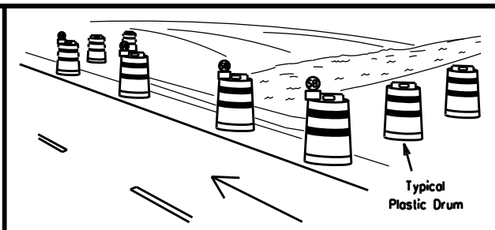
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

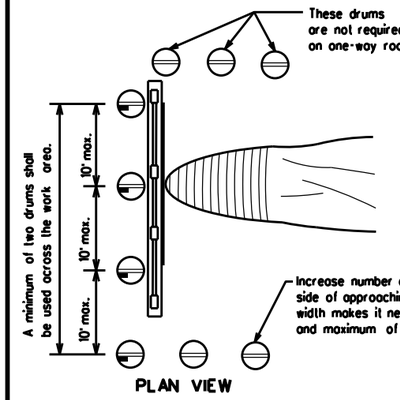
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

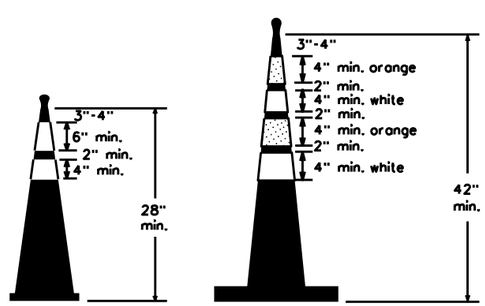
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



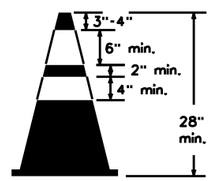
PLAN VIEW

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

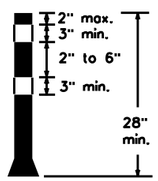
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

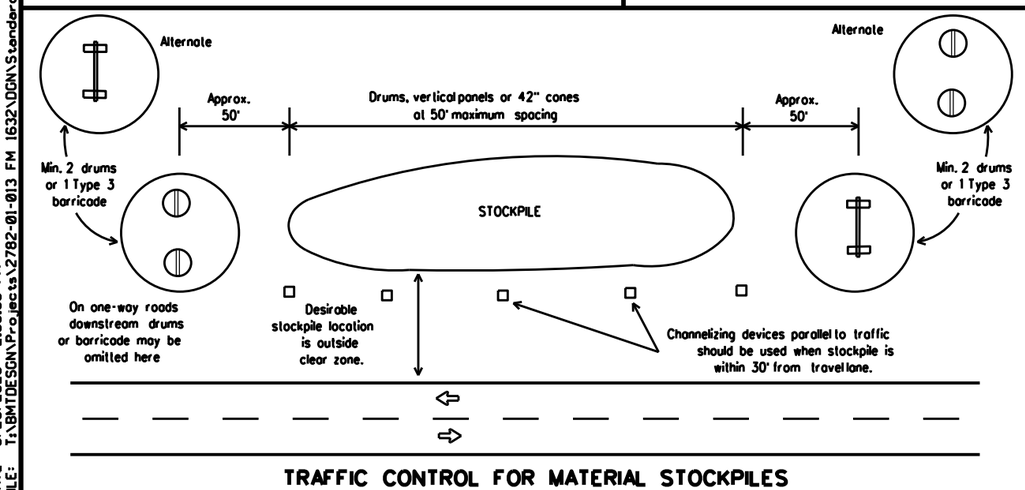


Tubular Marker

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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

Texas Department of Transportation — Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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REVISIONS	2782	01	013	FM 1632
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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.

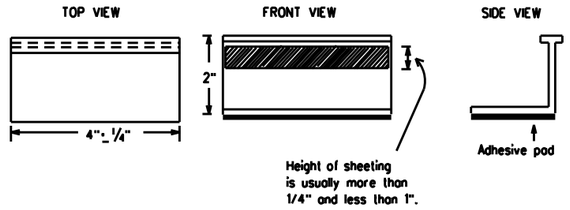
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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).

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SHEET 11 OF 12

Texas Department of Transportation | Traffic Safety Division Standard

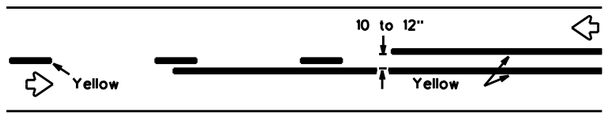
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

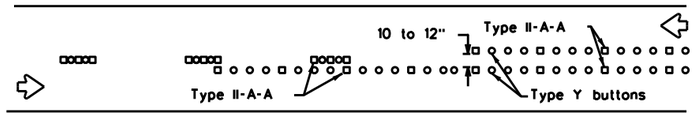
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	2782	01	013	FM 1632
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	BMT	TYLER		27
11-02 8-14				

DATE: 3/28/2023 2:58:56 PM
FILE: T:\BMTDESIGN\Projects\2782-01-013 FM 1632\DGN\Standards\bc-21.dgn

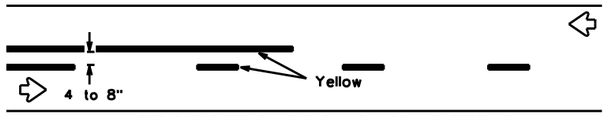
PAVEMENT MARKING PATTERNS



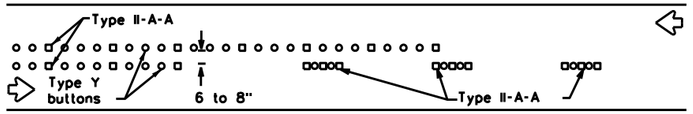
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



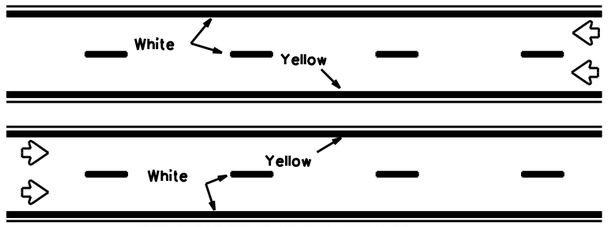
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



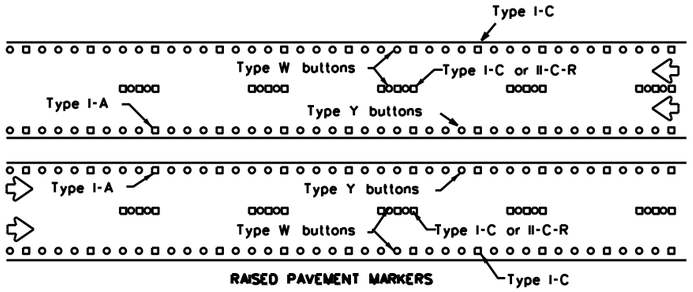
RAISED PAVEMENT MARKERS - PATTERN B

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



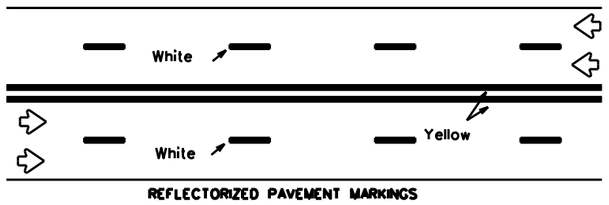
REFLECTORIZED PAVEMENT MARKINGS



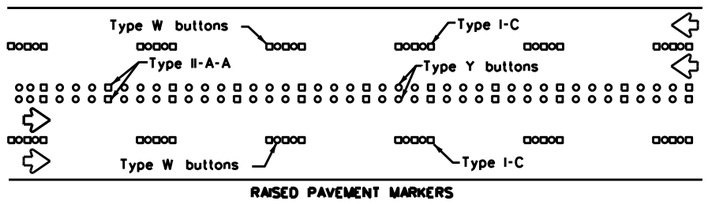
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



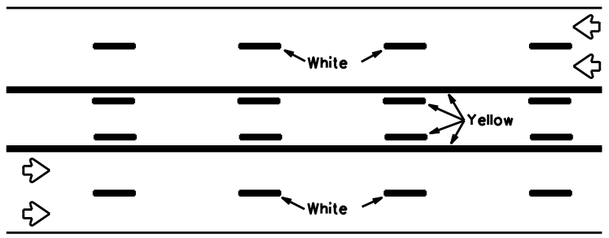
REFLECTORIZED PAVEMENT MARKINGS



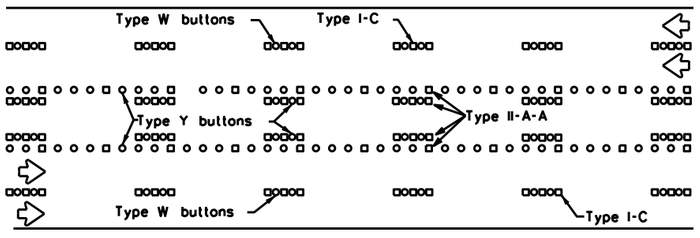
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

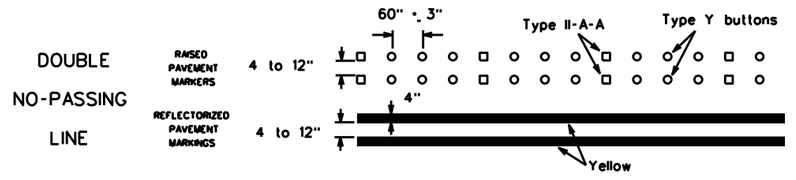
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

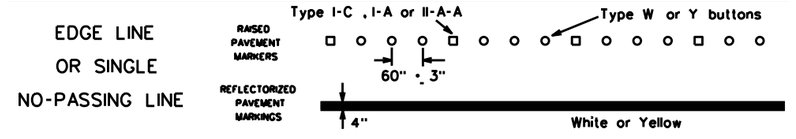
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

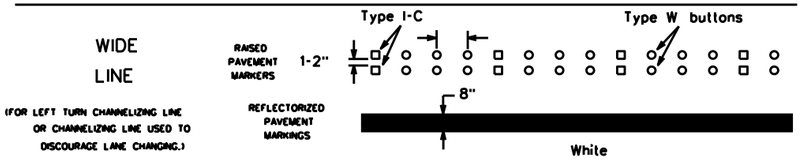


EDGE LINE OR SINGLE NO-PASSING LINE



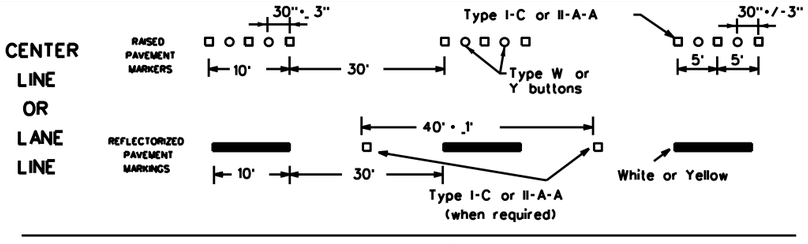
WIDE LINE

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

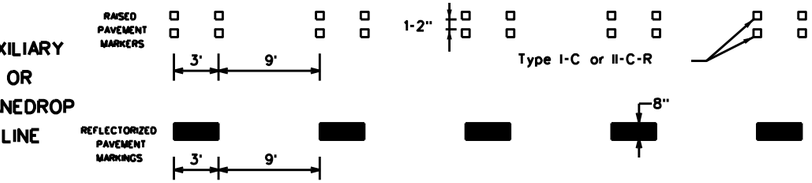


BROKEN LINES

CENTER LINE OR LANE LINE

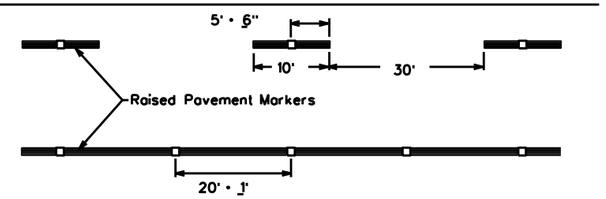


AUXILIARY OR LANEDROP LINE



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."

SHEET 12 OF 12

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	2782	01	013	FM 1632
	DIST	COUNTY		SHEET NO.
	BMT	TYLER		28

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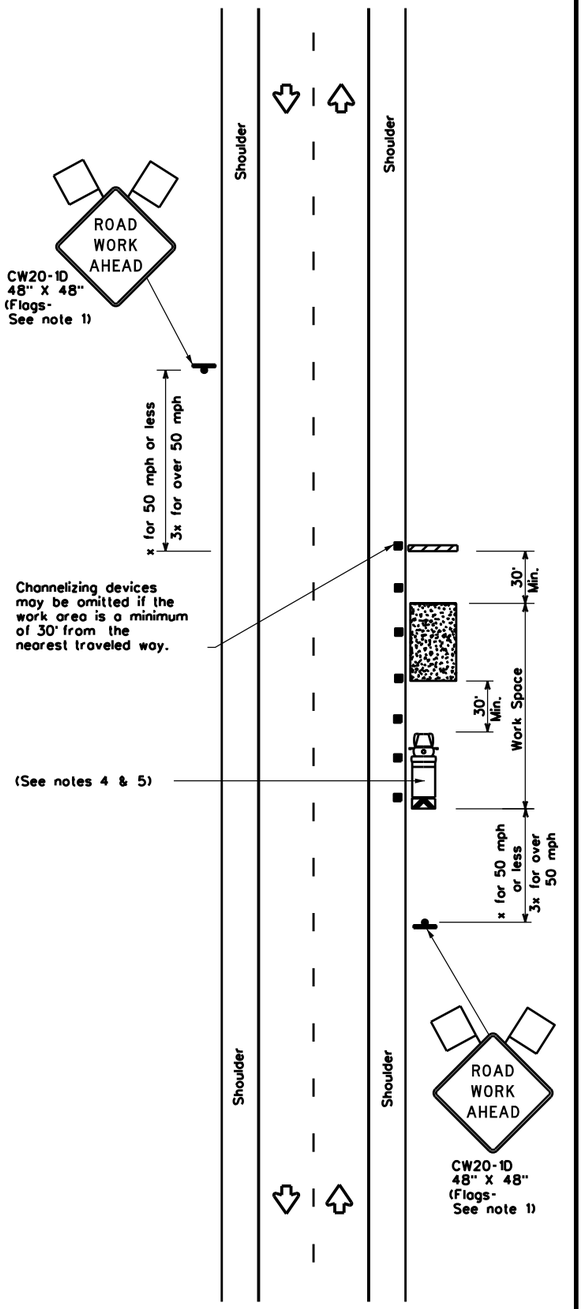
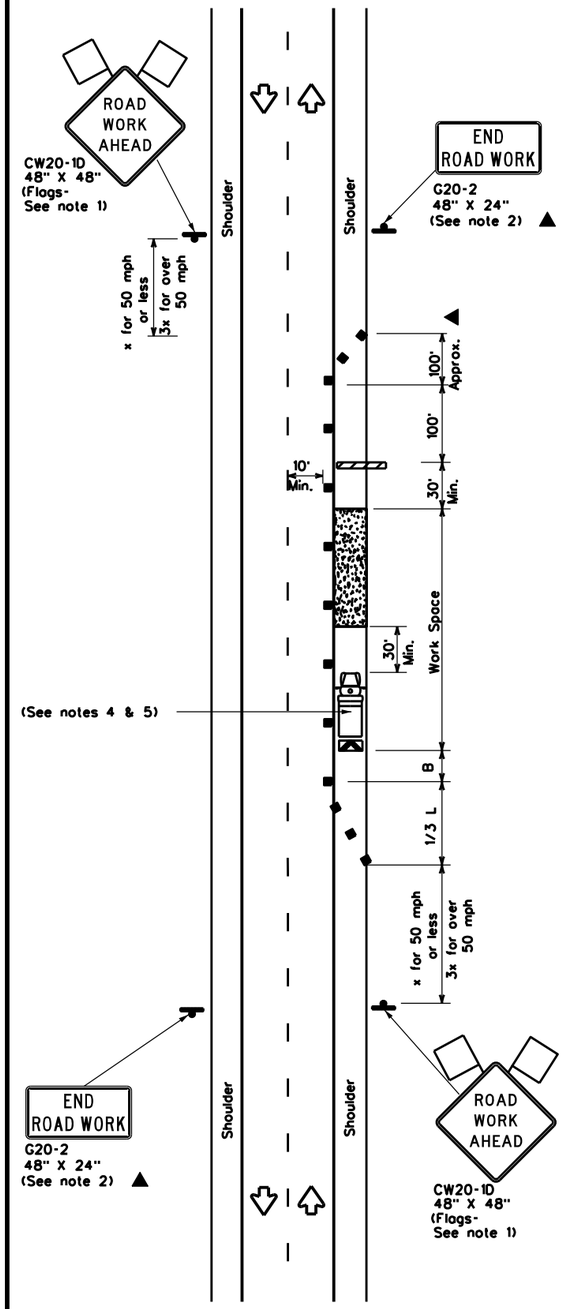


TCP (2-1a)

WORK SPACE NEAR SHOULDER

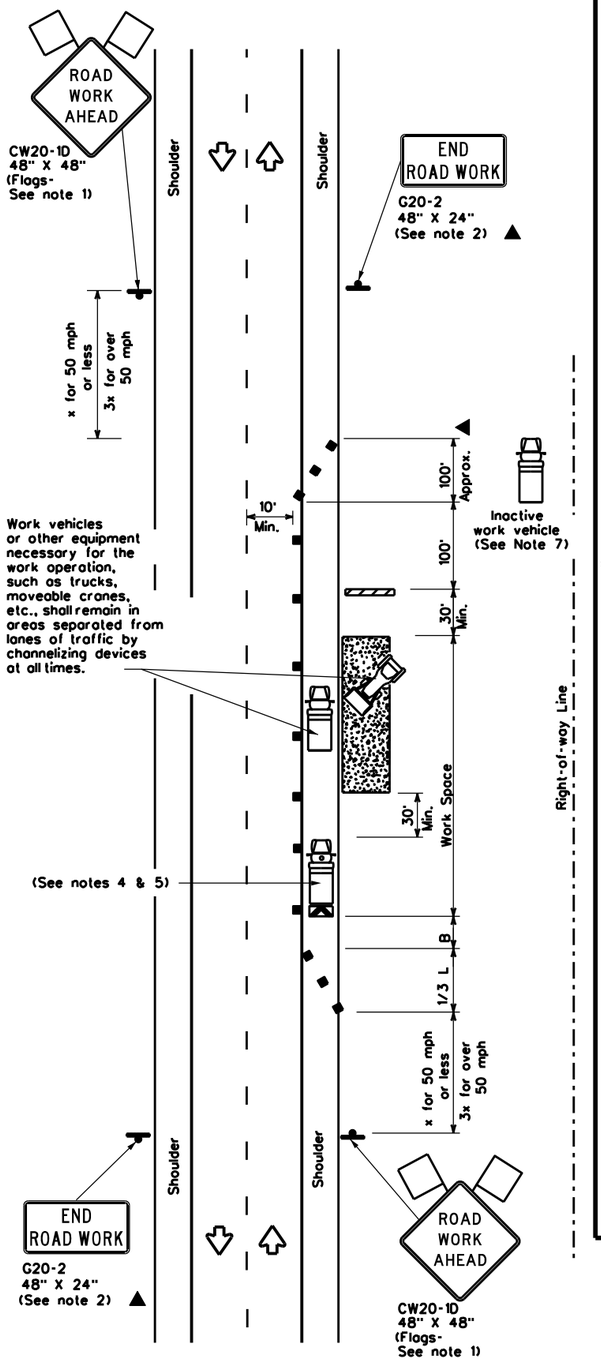
Conventional Roads



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	2782	01	013	FM 1632
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	BMT	TYLER		29
1-97 2-18				

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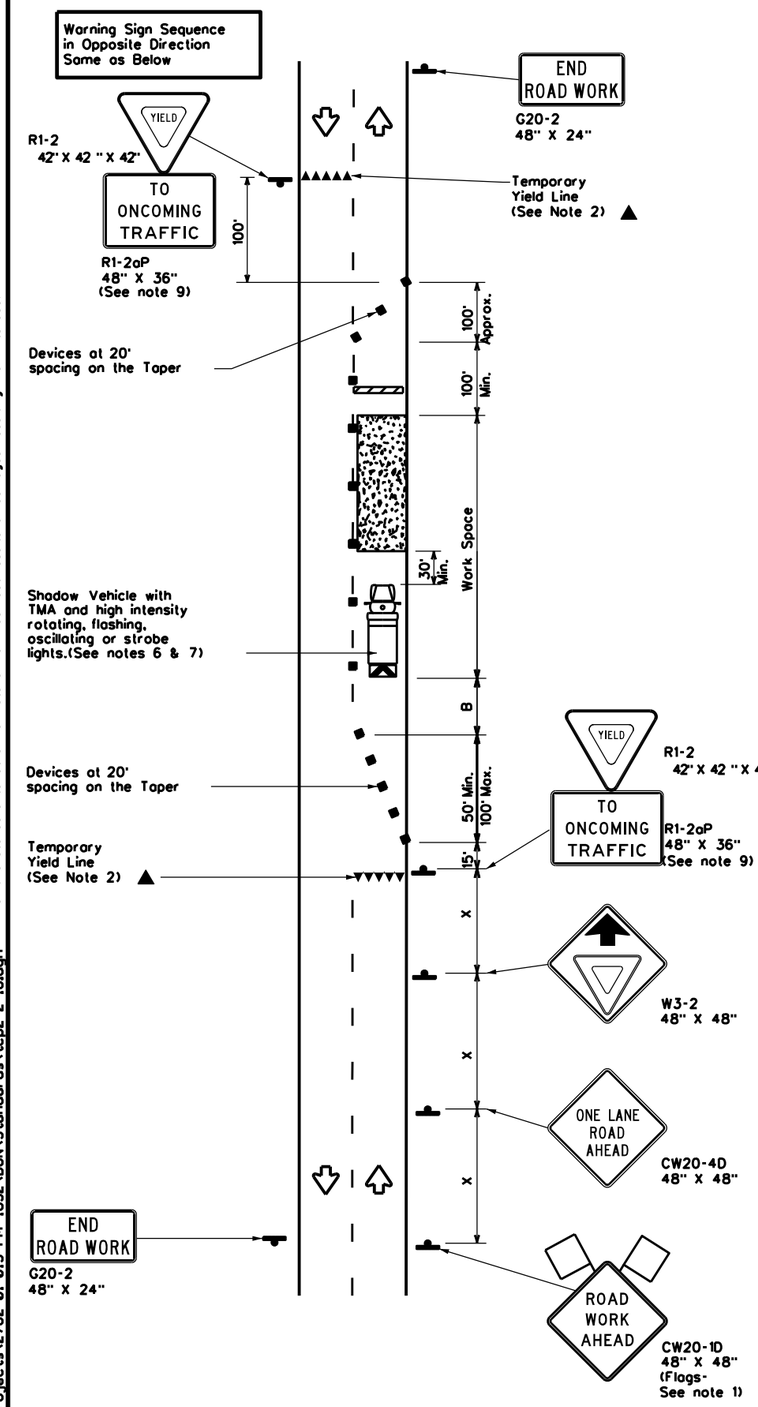
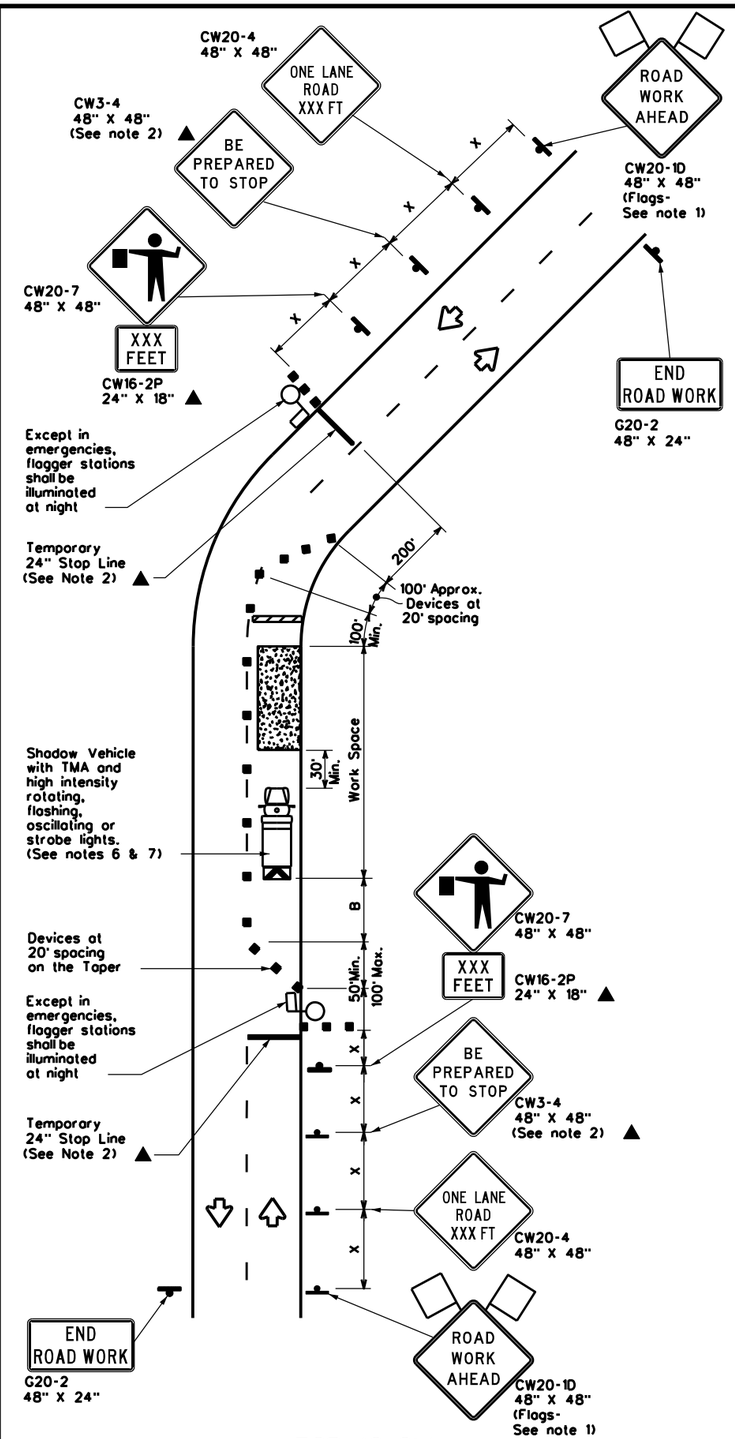


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



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 situations.

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	2782	01	013	FM 1632
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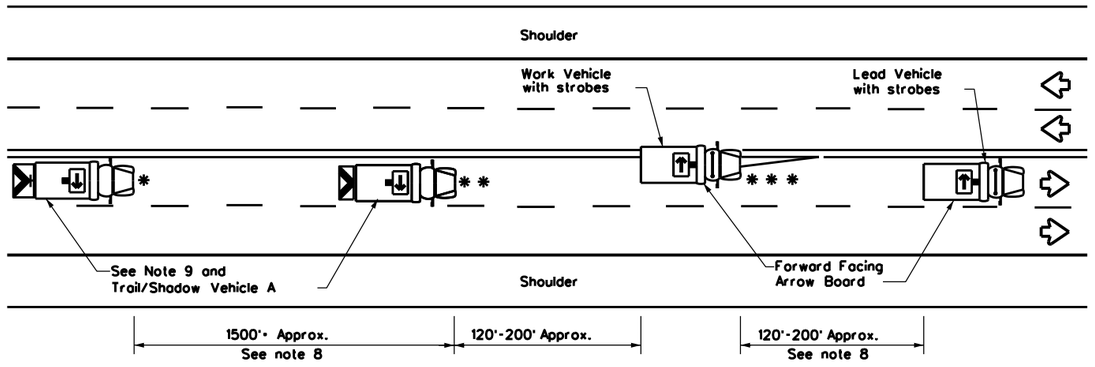
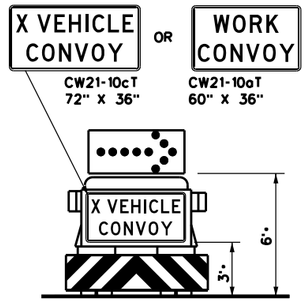


TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

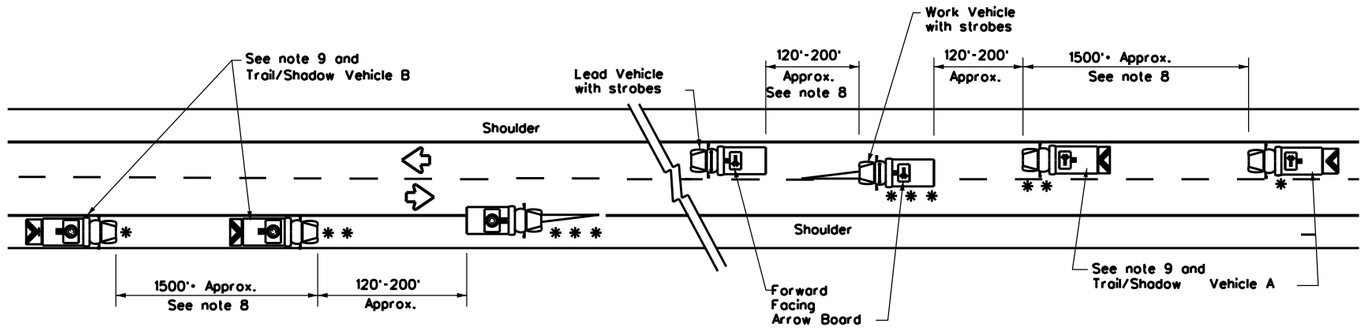
with RIGHT Directional display Flashing Arrow Board

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

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

GENERAL NOTES

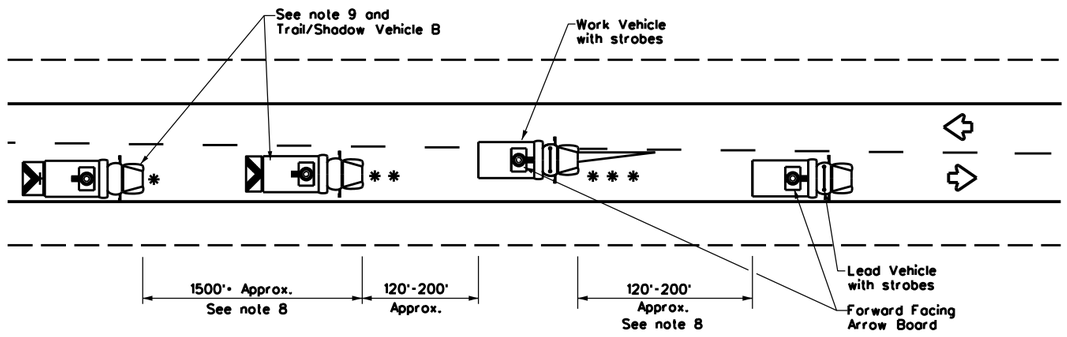
1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic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



WORK ON SHOULDER — WORK ON TRAVEL LANE

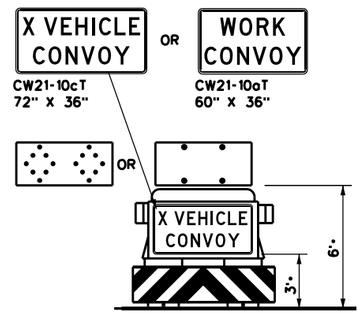
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



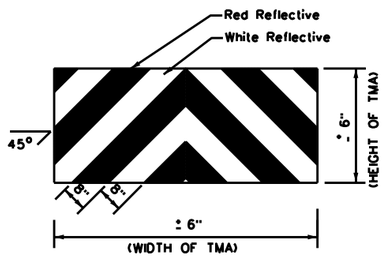
TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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2-94 4-98 8-95 7-13 1-97	DIST	COUNTY		SHEET NO.
	BMT	TYLER		31

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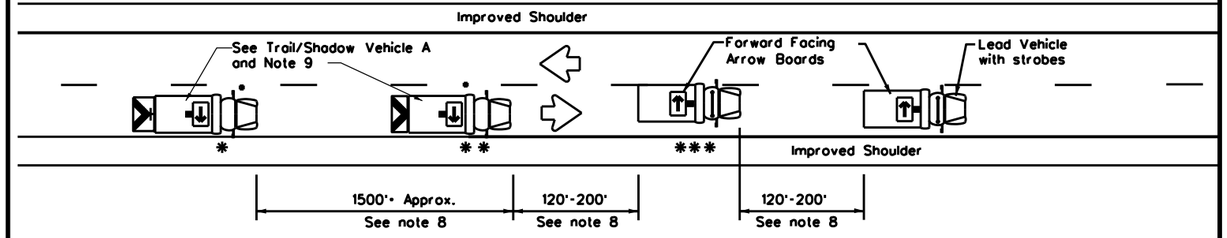
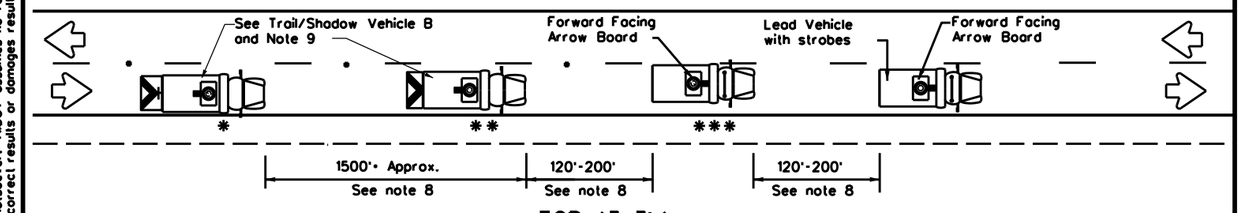


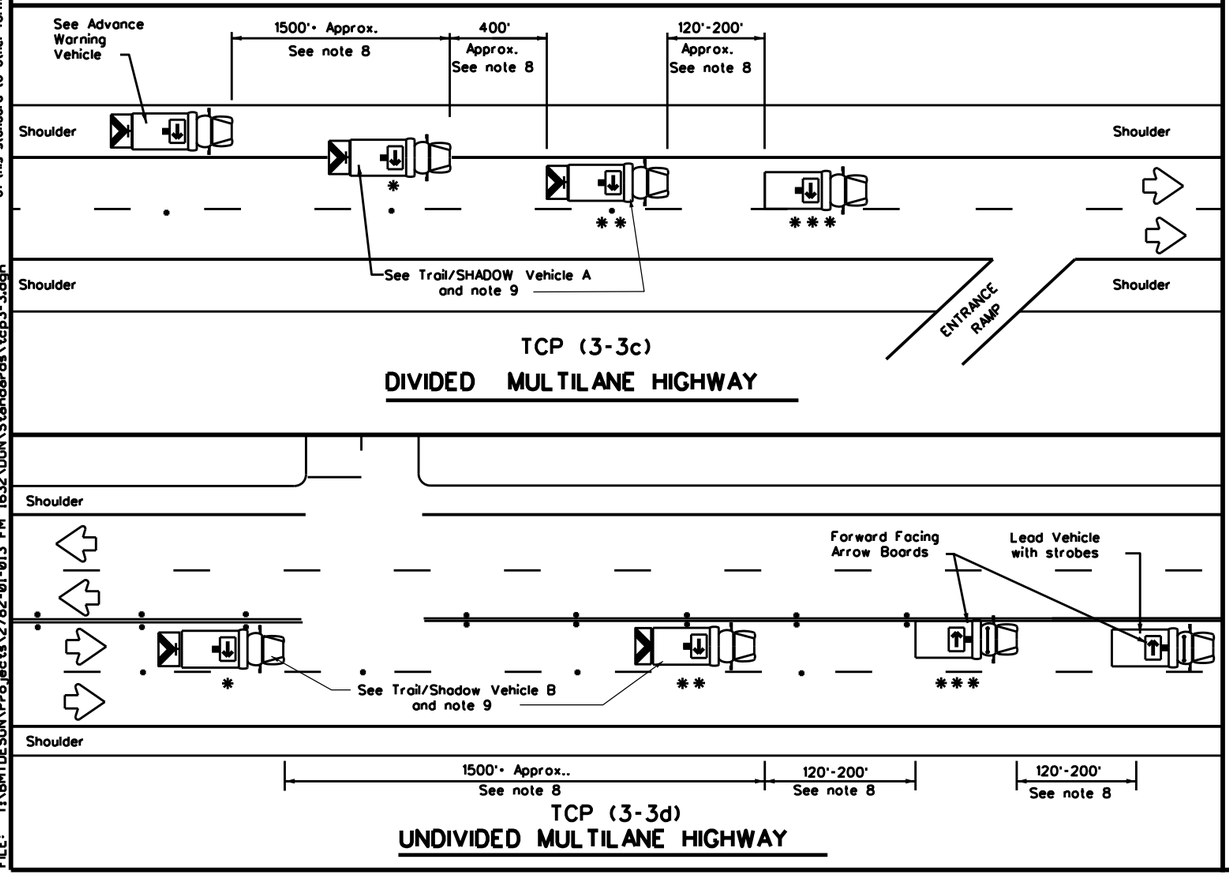
TCP (3-3a)

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



TCP (3-3b)

TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS (WORK ON TRAVEL LANE)

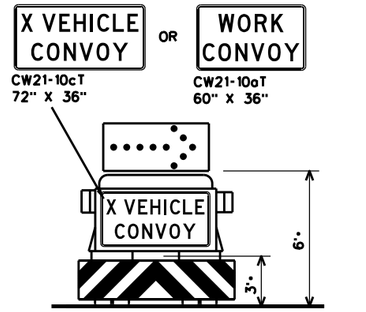


TCP (3-3c)

DIVIDED MULTILANE HIGHWAY

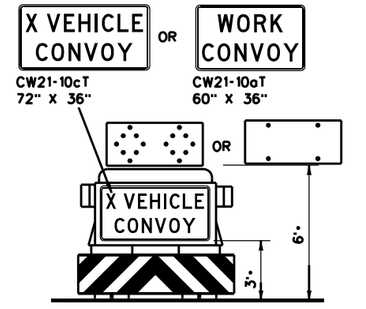
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



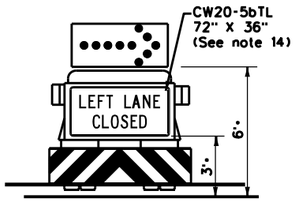
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

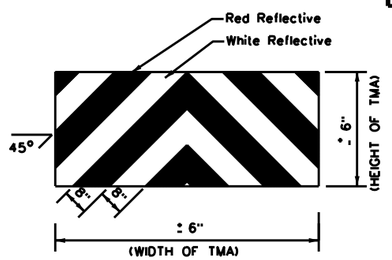


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

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

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	2782	01	013	FM 1632
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	BMT	TYLER		32
1-97 7-14				

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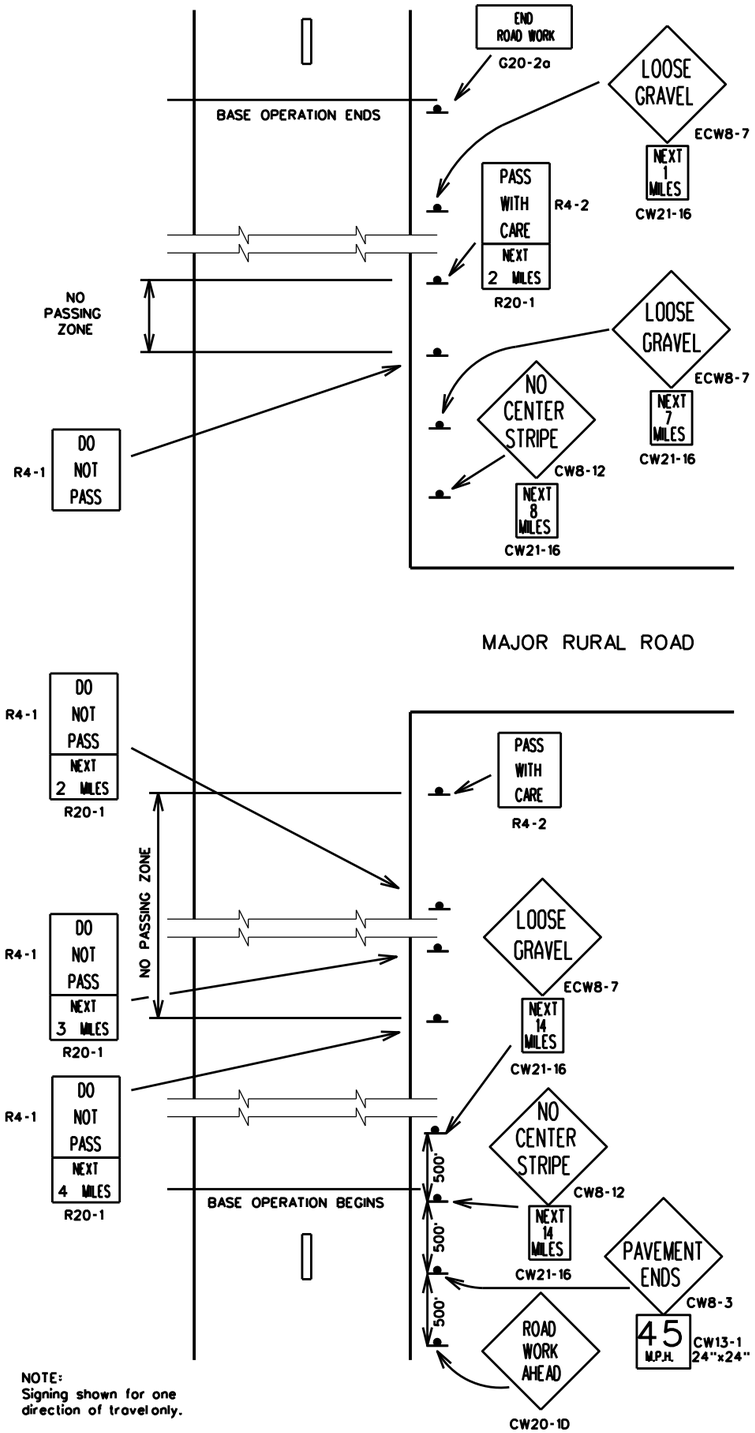
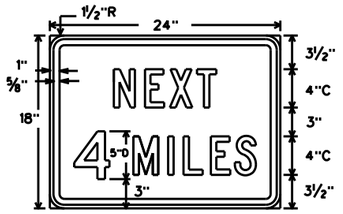
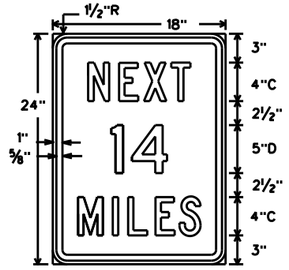




R20-1
24"x18"

Legend - Black
Border - Black
Background - White Refl.

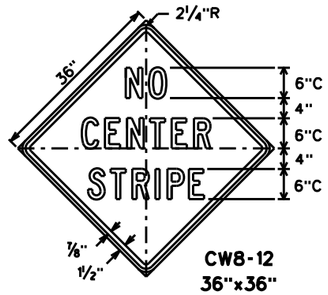
FOR USE WITH REGULATORY SIGNS ONLY



CW21-16
18"x24"

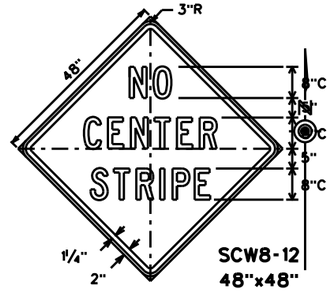
Legend - Black
Border - Black
Background - Orange Refl.

FOR USE WITH CONSTRUCTION WARNING SIGNS ONLY



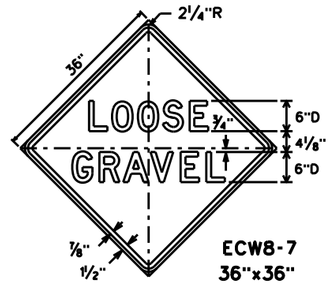
CW8-12
36"x36"

Legend - Black
Border - Black
Background - Orange Refl.



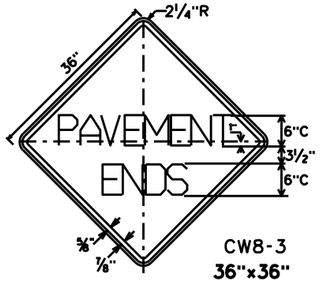
SCW8-12
48"x48"

Legend - Black
Border - Black
Background - Orange Refl.



ECW8-7
36"x36"

Legend - Black
Border - Black
Background - Orange Refl.



CW8-3
36"x36"

Legend - Black
Border - Black
Background - Orange Refl.

GENERAL NOTES

The traffic control devices detailed on this sheet will be furnished and erected as directed by the Engineer on sections of roadway where the surfacing operation has covered or obliterated existing pavement markings. These traffic control devices are to be used to supplement those required by BC Standards.

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

Prior to the beginning of construction, all currently striped no-passing zones should be signed with the DO NOT PASS sign (R4-1) and PASS WITH CARE sign (R4-2) placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined and signed as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES sign (R20-1) may be used at the beginning of such zones. The DO NOT PASS and NEXT XX MILES signs should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of a no-passing zone may be signed with a PASS WITH CARE and NEXT XX MILES sign.

Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshields and lights. The DO NOT PASS and NEXT XX MILES sign should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, care must be taken to place DO NOT PASS and PASS WITH CARE signs in order to sign the beginning and end of the no-passing zones in the area where the surfacing operation has stopped for the day.

R4-1 and R4-2 signs should be mounted on fixed supports as detailed on BC Standards. These signs are to remain in place until standard pavement markings are placed.

"NO CENTER STRIPE" SIGN (CW21-15)

At the time construction activity obliterates the existing centerline (low volume roads may not have an existing centerline), a NO CENTER STRIPE sign (CW8-12) should be erected at each end of the work area and just beyond major rural intersections and other location deemed necessary by the Engineer. Where possible, the signs erected at each end of the work area should be located in such a manner that drivers can read the sign and immediately see the change to no centerline. The NO CENTER STRIPE sign should be supplemented with the NEXT XX MILES sign (CW21-16) mounted below it.

The NO CENTER STRIPE sign should be erected as detailed on BC Standards. These signs are to remain in place until standard pavement markings are placed.

"LOOSE GRAVEL" SIGN (ECW8-7)

When construction begins, a LOOSE GRAVEL sign (ECW8-7) should be erected at each end of the work area and repeated at intervals of approximately two (2) miles in rural areas and closer in urban areas. The LOOSE GRAVEL sign should be supplemented with the NEXT XX MILES sign (CW21-16) mounted below it.

The LOOSE GRAVEL sign should be erected as detailed on BC Standards. They should remain in place until the loose gravel condition no longer exists.

"PAVEMENT ENDS" SIGN (CW8-3)

When the existing roadway surface course is removed, a PAVEMENT ENDS sign (CW8-3) should be erected at each end of the work area.

The PAVEMENT ENDS sign should be erected as detailed on BC Standards. They should remain in place until the surface course is applied to the roadway.

STATE OF TEXAS
JASON D. WALDREP
107826
LICENSED
PROFESSIONAL ENGINEER

Jason D. Waldrep, P.E.

03/29/2023

TRAFFIC CONTROL DETAILS FOR BASE OPERATIONS

 Texas Department of Transportation

FED. RD. DIV. NO.			SHEET NO.
6			33
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632

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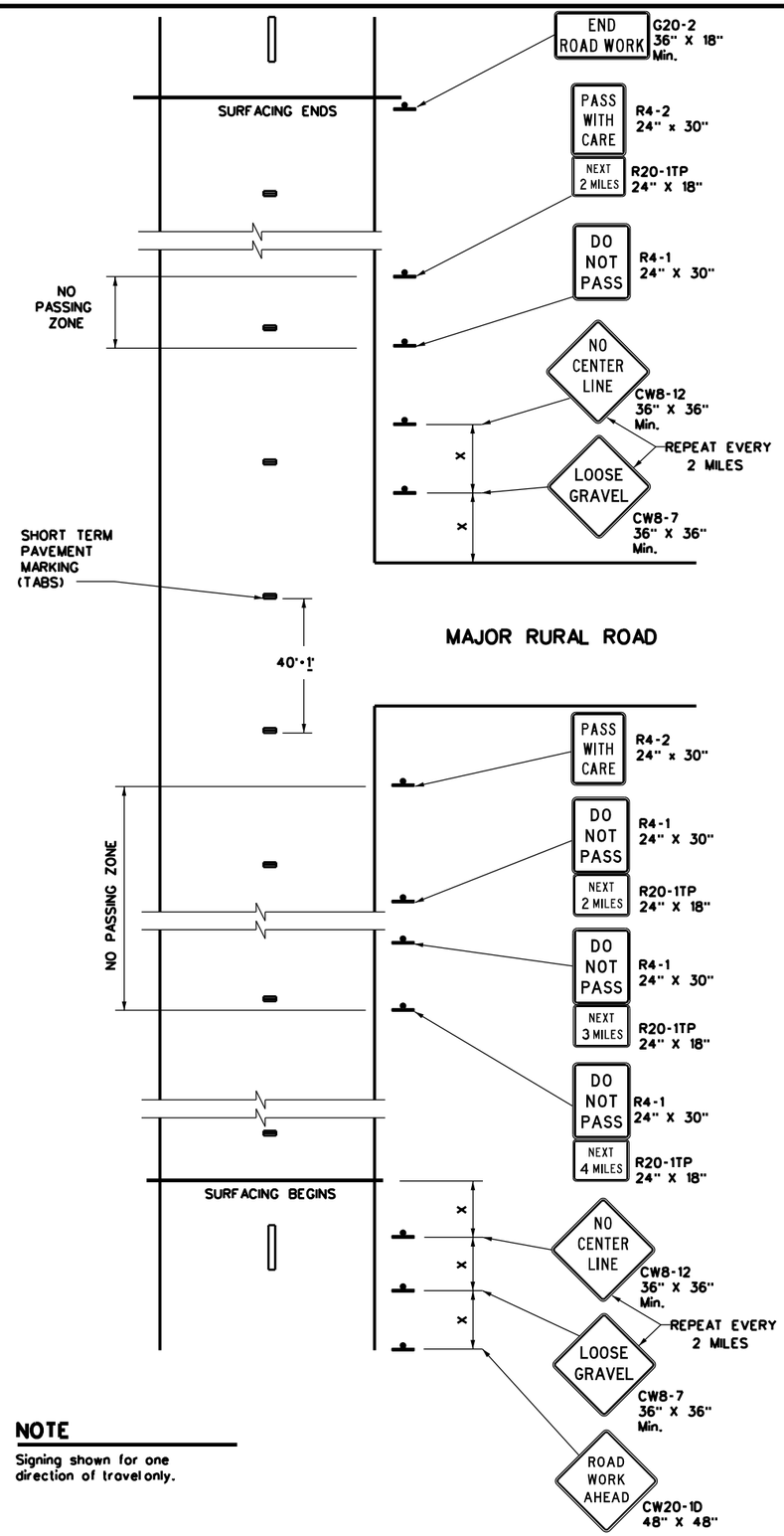
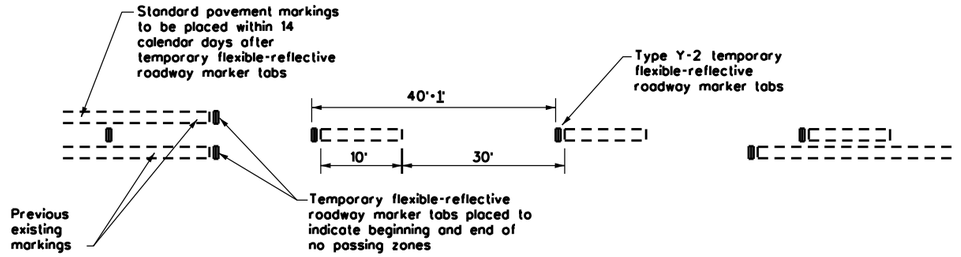


NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

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

A. Prior to the beginning of construction, all currently striped no-passing zones shall be signed with the DO NOT PASS (R4-1) signs and PASS WITH CARE (R4-2) signs placed at the beginning and end of each zone for each direction of travel except as otherwise provided herein. Signs marking these individual no-passing zones need not be covered prior to construction if the signs supplement the existing pavement markings.

B. At the discretion of the Engineer, in areas of numerous no-passing zones, several zones may be combined as a single zone. If passing is to be prohibited over one or more lengthy sections, a DO NOT PASS sign and a NEXT XX MILES (R20-1TP) plaque may be used at the beginning of such zones. The DO NOT PASS sign and the NEXT XX MILES plaque should be repeated every mile to the end of the no-passing zone. In areas where there is considerable distance between no-passing zones, the end of the no-passing zone may be signed with a PASS WITH CARE sign and a NEXT XX MILES plaque.

C. Depending on traffic volumes and length of sections, it may be desirable to prohibit passing throughout the project to prevent damage to windshield and lights. The DO NOT PASS sign and NEXT XX MILES plaque should be used and repeated as often as necessary for this purpose. Where several existing zones are to be combined into one individual no-passing zone, the sign at the beginning of the zone should be covered until the surfacing operation has passed this location so as not to have the DO NOT PASS sign conflict with the existing pavement markings. Also, unless one days operation completes the entire length of such combined zones, appropriate DO NOT PASS and PASS WITH CARE signs should be placed at the beginning and end of the no-passing zones where the surfacing operation has stopped for the day.

D. R4-1 and R4-2 are to remain in place until standard pavement markings are installed.

"NO CENTER LINE" SIGN (CW8-12)

A. Center line markings are yellow pavement markings that delineate the separation of travel lanes that have opposite directions of travel on a roadway. Divided highways do not typically have center line markings.

B. At the time construction activity obliterates the existing center line markings (low volume roads may not have an existing centerline), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately 2 mile intervals within the work area, beyond major intersections and other locations deemed necessary by the Engineer.

C. The NO CENTER LINE signs are to remain in place until standard pavement markings are installed.

"LOOSE GRAVEL" SIGN (CW8-7)

A. When construction begins, a LOOSE GRAVEL (CW8-7) sign should be erected at each end of the work area and repeated at intervals of approximately 2 miles in rural areas and closer in urban areas.

B. The LOOSE GRAVEL signs are to remain in place until the condition no longer exists.

PAVEMENT MARKINGS

A. Temporary markings for surfacing projects shall be Temporary Flexible-reflective Roadway Marker Tabs unless otherwise approved by the Engineer. Tabs are to be installed to provide true alignment for striping crews or as directed by the Engineer. Tabs will be placed at the spacing indicated. Tabs should be applied to the pavement no more than two (2) days before the surfacing is applied. After the surfacing is rolled and swept, the cover over the reflective strip shall be removed.

B. Tabs shall not be used to simulate edge lines.

C. Tab placement for overlay/inlay operations shall be as shown on the WZ(STPM) standard sheet.

COORDINATION OF SIGN LOCATIONS

A. The location of warning signs at the beginning and end of a work area are to be coordinated with other signing typically shown on the Barricade and Construction Standards for project limits to ensure adequate sign spacing.

B. Where possible the ROAD WORK AHEAD (CW20-1D), LOOSE GRAVEL (CW8-7), and NO CENTER LINE (CW8-12) signs should be placed in the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) and the TRAFFIC FINES DOUBLE (R20-5T) sign, and one "X" sign spacing prior to the CONTRACTOR (G20-6T) sign typically located at or near the limits of surfacing. LOOSE GRAVEL and NO CENTER LINE signs will then be repeated as described above.

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

* Conventional Roads Only

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

GENERAL NOTES

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

Texas Department of Transportation

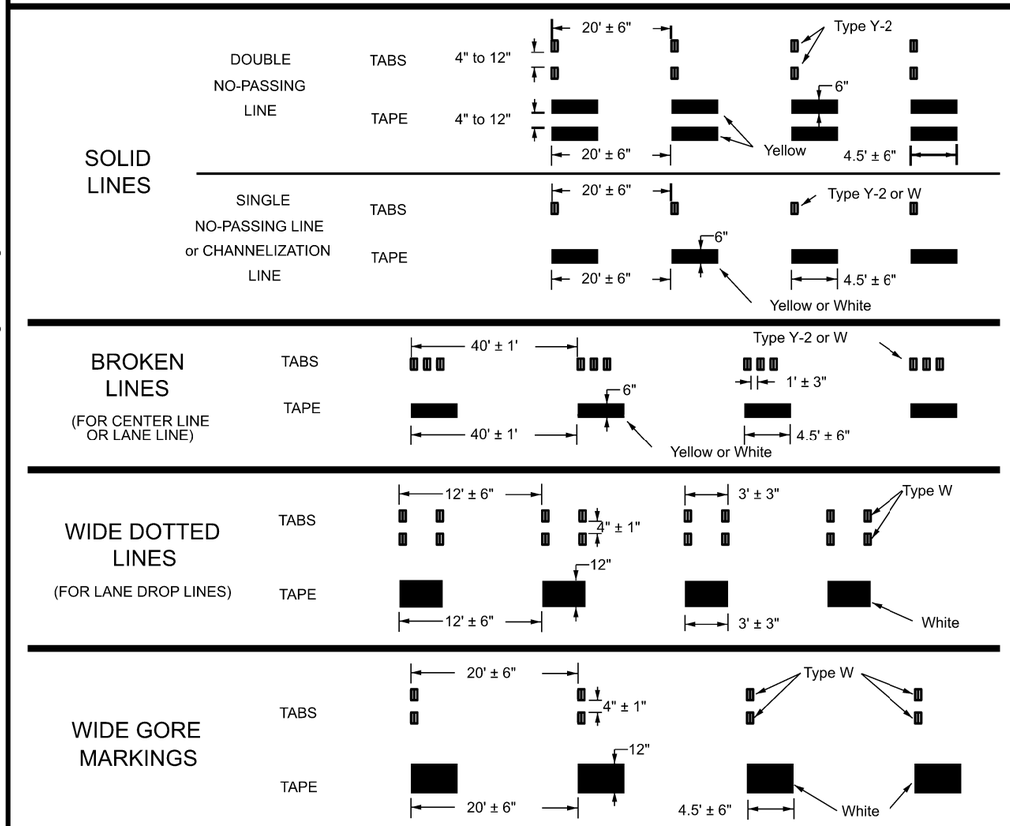
Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	2782	01	013	FM 1632
4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	BMT	TYLER		34

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



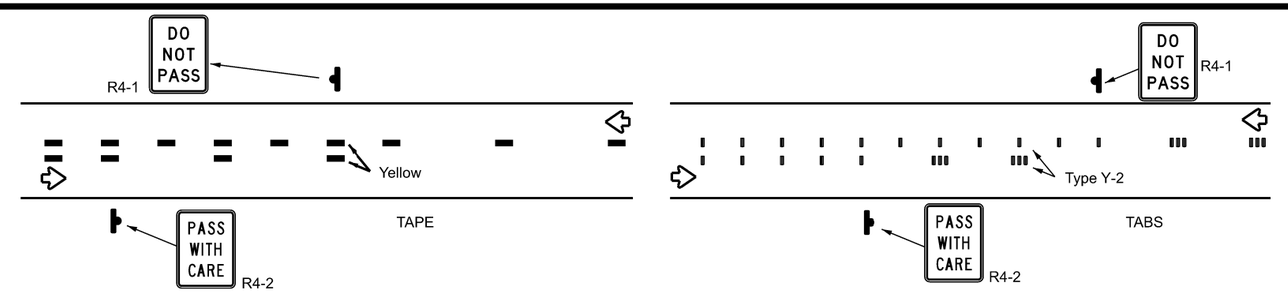
NOTES:

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

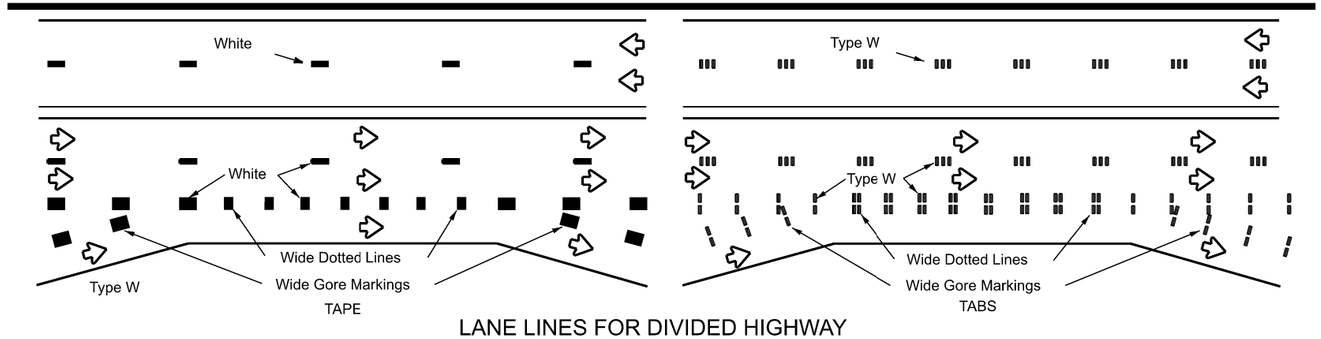
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

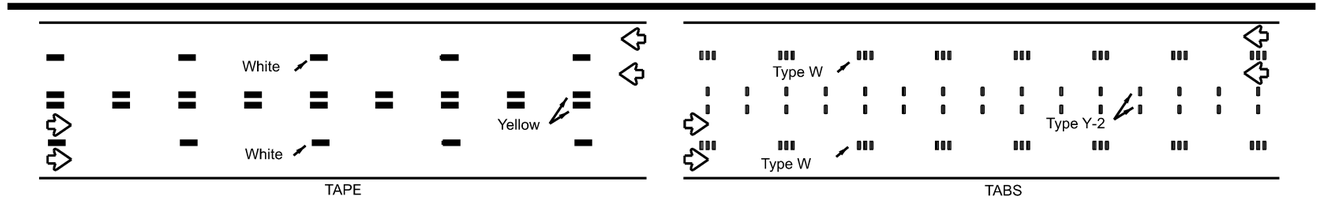
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



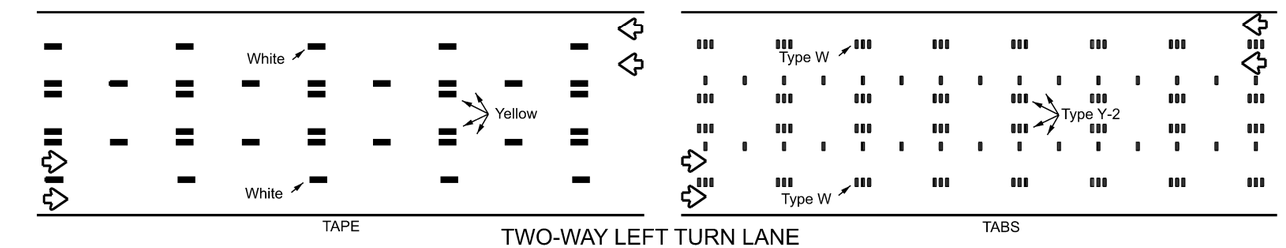
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



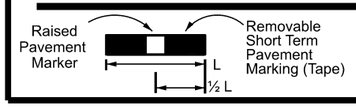
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



If raised pavement markers are used to supplement REMOVABLE short term markings, the markers shall be applied to the top of the tape at the approximate mid length of the tape. This allows an easier removal of raised markers and tape.

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

1. All raised pavement markers used for work zone markings shall meet the requirements of Item 672, "RAISED PAVEMENT MARKERS" and DMS-4200.

DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above can be found along with embedded links to their respective MPLs at the following website:

http://www.txdot.gov/business/contractors_consultants/material_specifications/default.htm

Texas Department of Transportation

Traffic Safety Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

FILE: wzstpm-23.dgn	DN:	CK:	DW:	CK:
© TxDOT February 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 7-13 1-97 2-23 3-03	2782	01	013	FM 1632
	DIST	COUNTY		SHEET NO.
	BMT	TYLER		35

111

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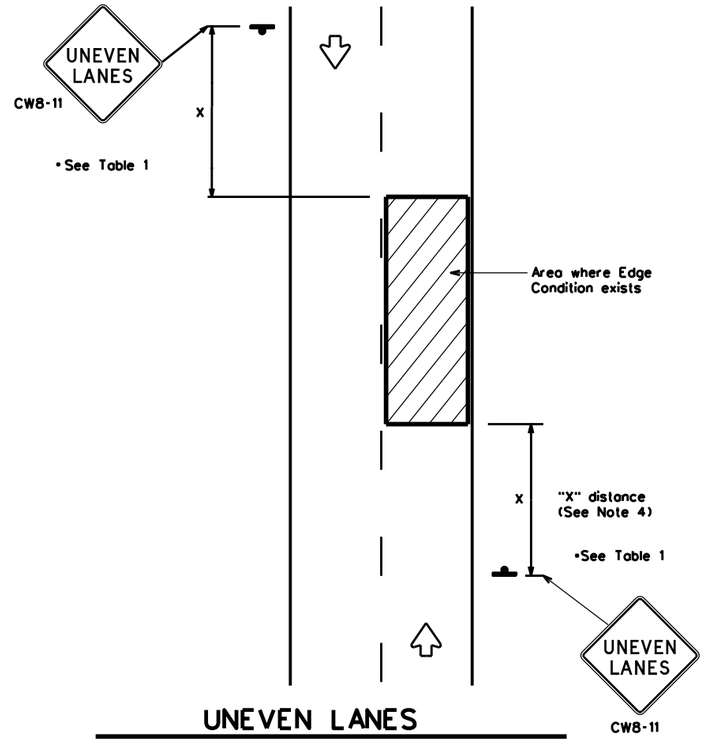
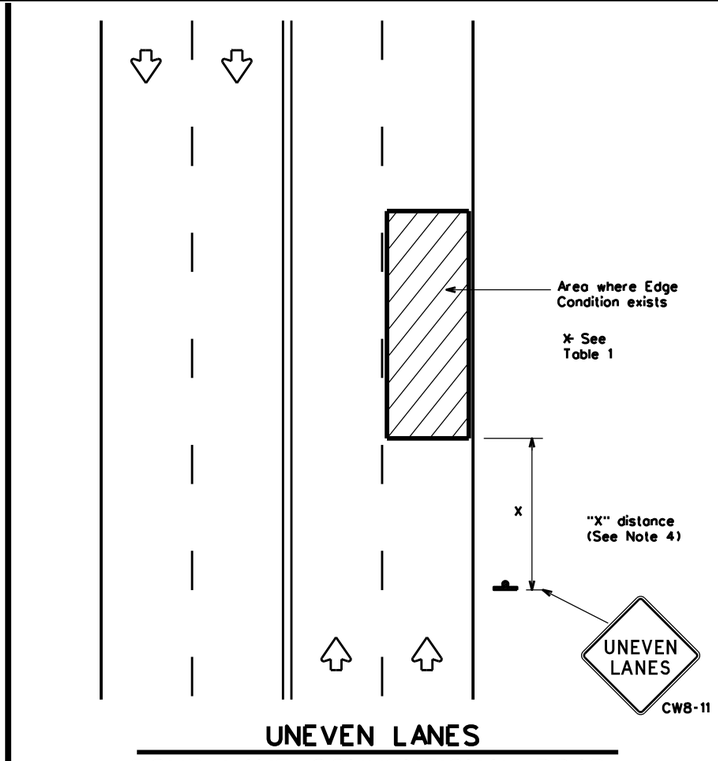
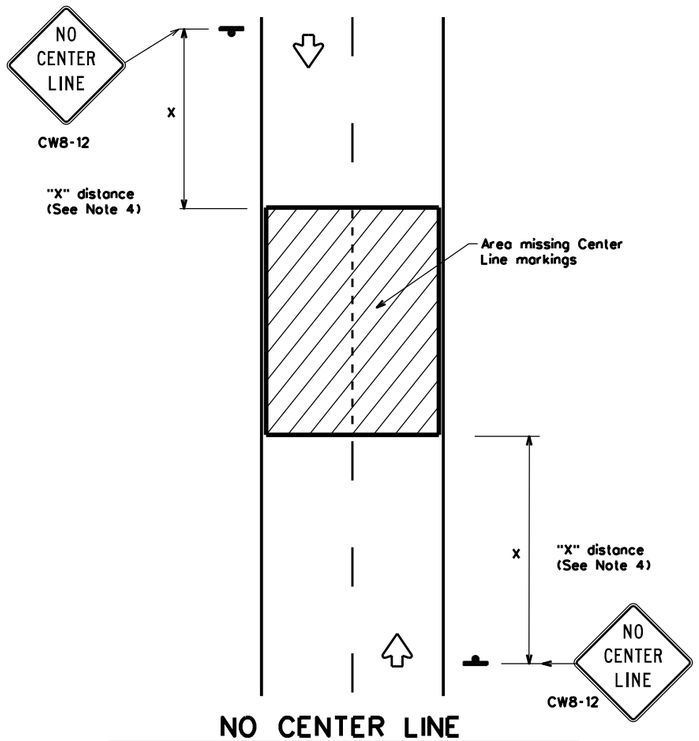


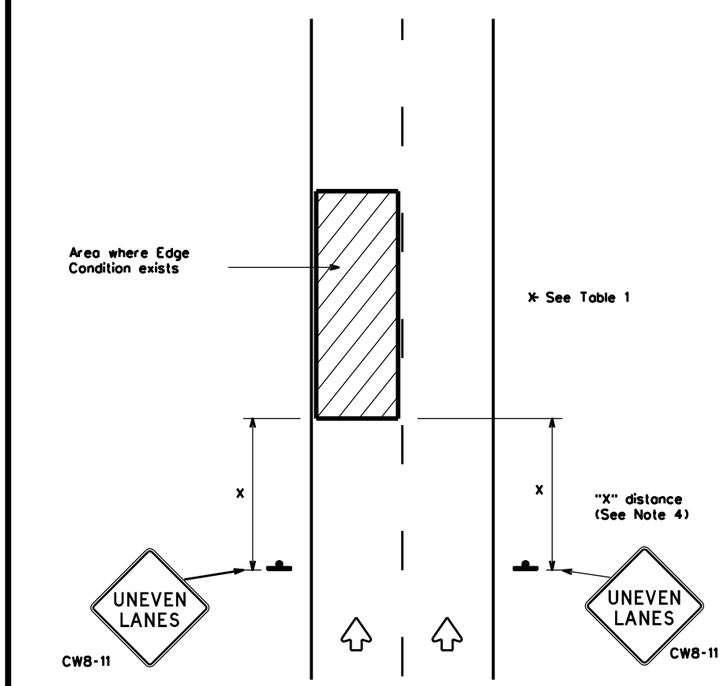
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

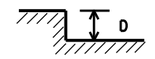
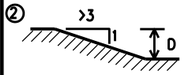
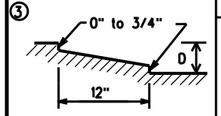
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B_{FL} OR TYPE C_{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

1. If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
2. UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane condition may be supplemented with the NEXT XX MILES (CW7-3aP) plaque or Advisory Speed (CW13-1P) plaque.
3. NO CENTER LINE (CW8-12) signs and temporary pavement markings as per the WZ(STPM) standard shall be installed if yellow centerlines separating two way traffic are obscured or obliterated. Repeat NO CENTER LINE signs every two miles where the center line markings are not in place. The signs and markings shall remain in place until permanent pavement markings are installed.
4. Signs shall be spaced at the distances recommended as per BC standards.
5. Additional signs may be required as directed by the Engineer. Signs shall remain in place until final surface is applied. Signs shall be considered subsidiary to Item 502 "BARRICADES, SIGNS AND TRAFFIC HANDLING."
6. Signs shall be fabricated and mounted on supports as shown on the BC standards and/or listed on the "Compliant Work Zone Traffic Control Devices" list.
7. Short term markings shall not be used to simulate edge lines.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition.

TABLE 1

Edge Condition	Edge Height (D)	* Warning Devices
① 	Less than or equal to: 1¼" (maximum-planing) 1½" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4 " for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
② 	Less than or equal to 3"	Sign: CW8-11
③  Notched Wedge Joint	Distance "D" may be a maximum of 3" if uneven lanes with edge condition 2 or 3 are open to traffic after work operations cease. Uneven lanes should not be open to traffic when "D" is greater than 3".	

TRAFFIC CONTROL DURING PLANING, OVERLAY AND LEVELING OPERATIONS ARE SHOWN ELSEWHERE IN THE PLANS.

MINIMUM WARNING SIGN SIZE	
Conventional roads	36" x 36"
Freeways/expressways, divided roadways	48" x 48"

Texas Department of Transportation

Traffic Operations Division Standard

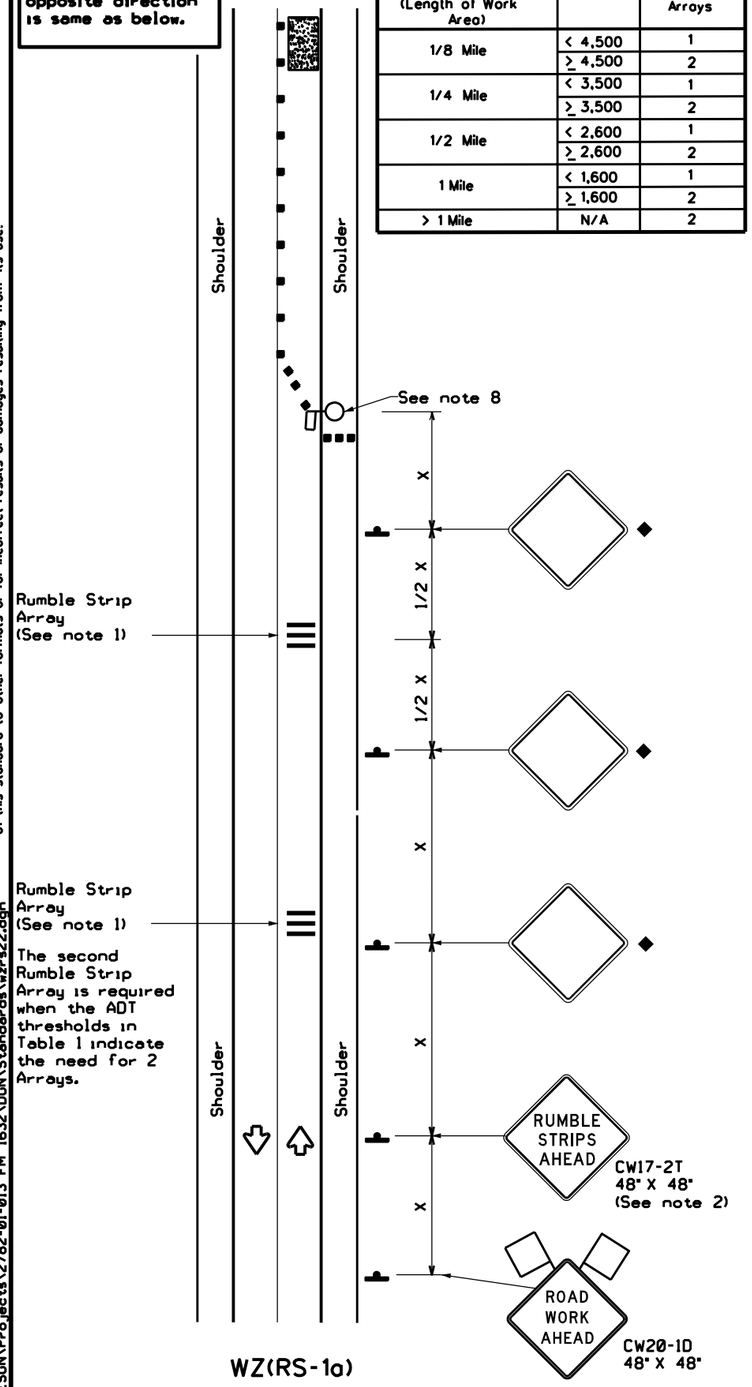
SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	2782	01	013	FM 1632
8-95 2-98 7-13 1-97 3-03	DIST	COUNTY		SHEET NO.
	BMT	TYLER		36

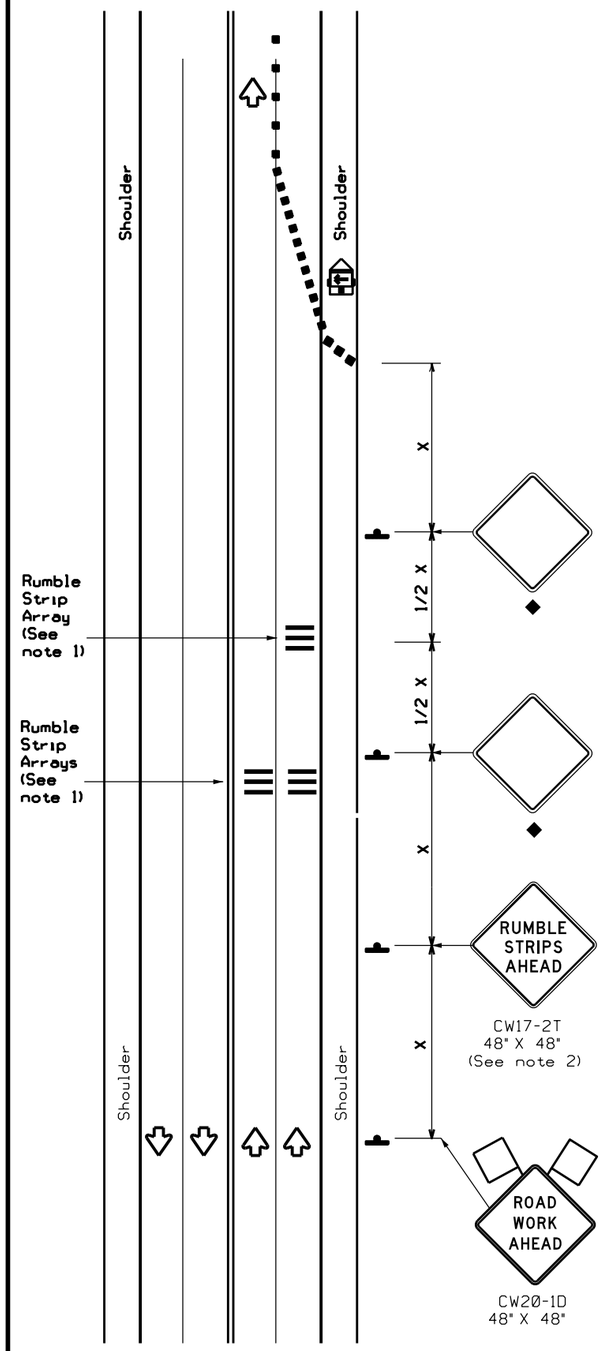
Warning sign and rumble strip sequence in opposite direction is same as below.

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



WZ(RS-1a)

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Panel	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
	✓	✓		

◆ Signs are for illustrative purposes only. Signs required may vary depending on the TCP, TMUTCD Typical Application, or project specific details for the project.

* For posted speeds in excess of 65 MPH, it is recommended that spacing is increased as speed limits increase. Increasing space between rumble strips will improve effectiveness.

TABLE 2	
Speed	Approximate distance between strips in an array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
= 60 MPH	20'
≥ 65 MPH	* 35'+

Texas Department of Transportation

Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-22

FILE: wzrs22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-14 1-22 4-16	2782	01	013	FM 1632
	DIST	COUNTY		SHEET NO.
	BMT	TYLER		37

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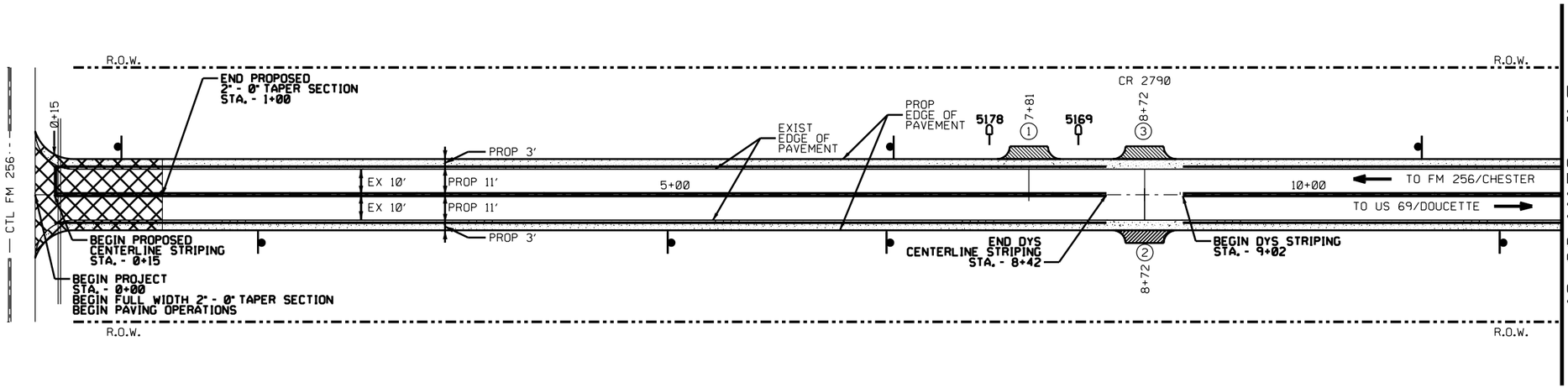

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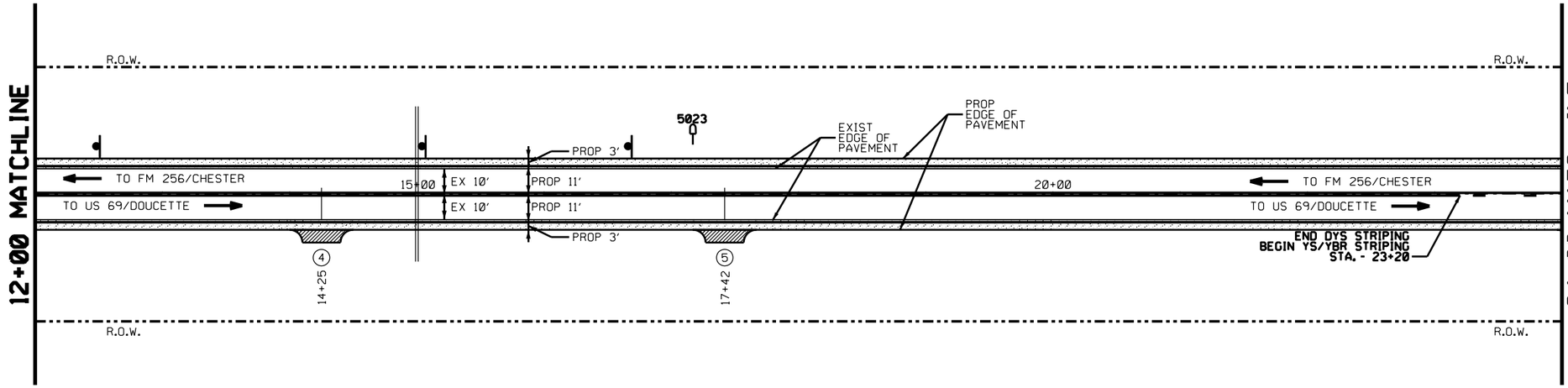

STATE OF TEXAS
JASON D. WALDREP
107826
LICENSED
PROFESSIONAL ENGINEER

Jason D. Waldrep, P.E.

04/06/2023

FM 1632
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SHEET 1 OF 12

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
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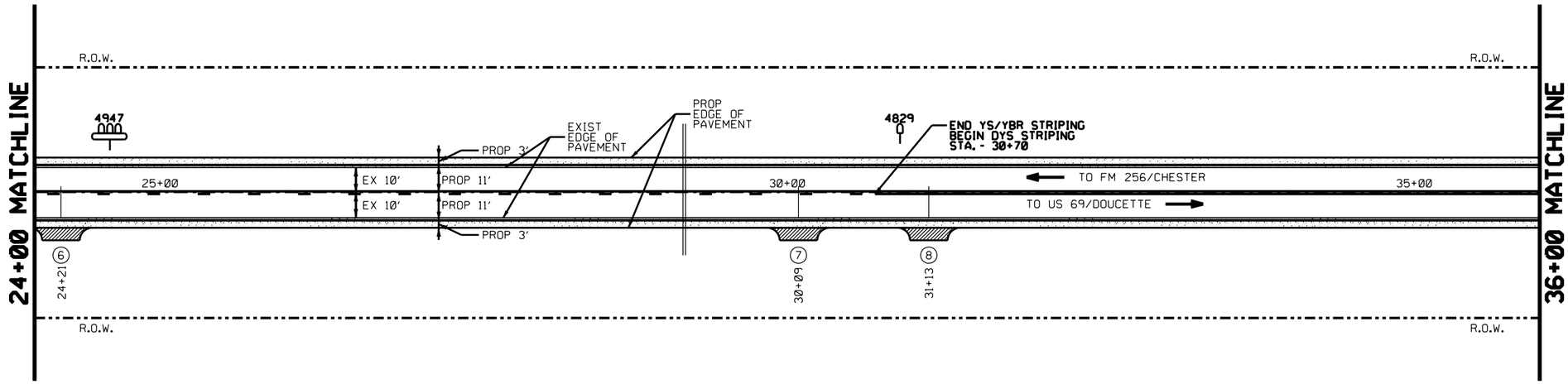
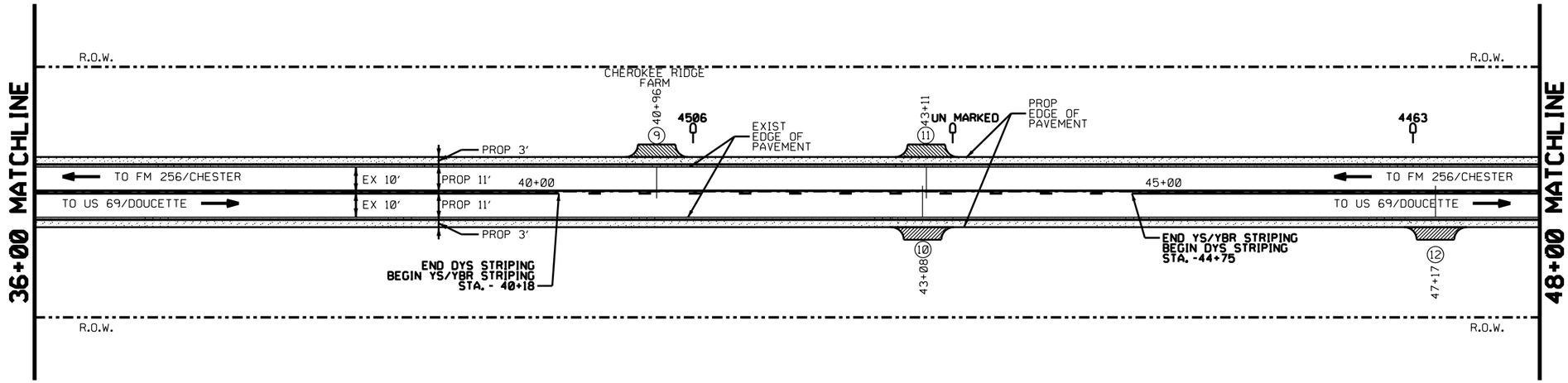
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632





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SHEET 2 OF 12

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
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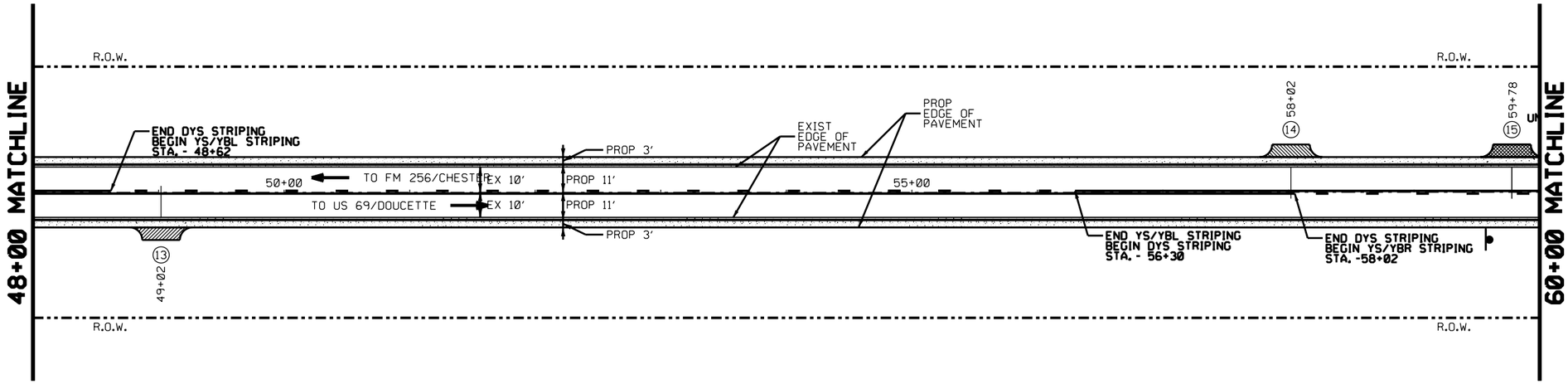
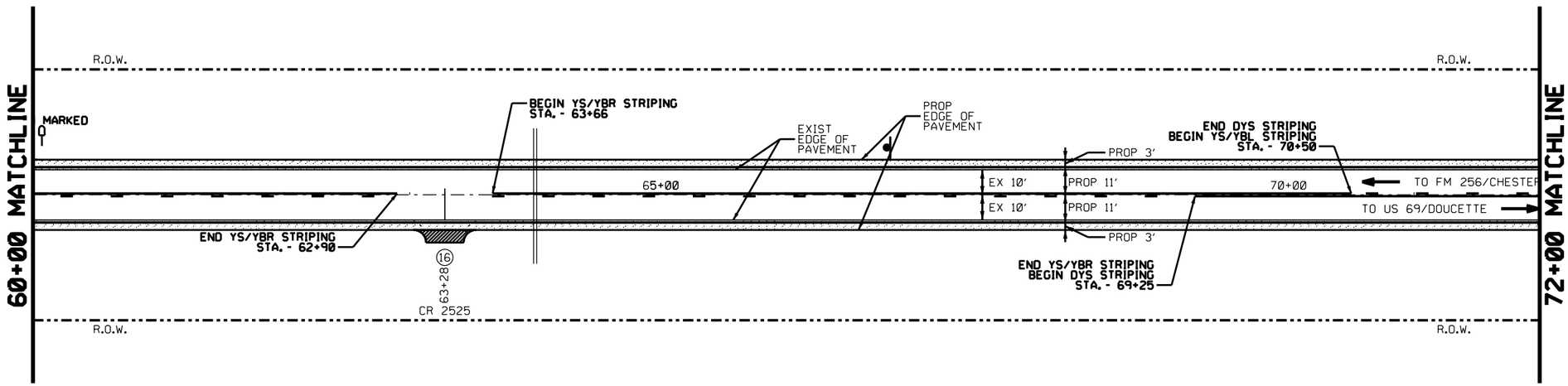
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632





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SHEET 3 OF 12

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
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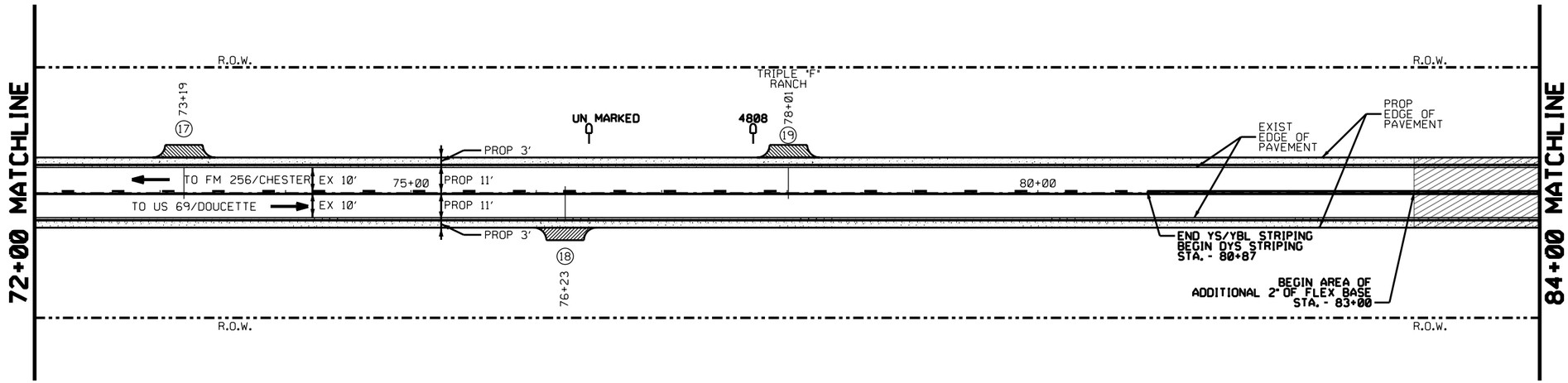
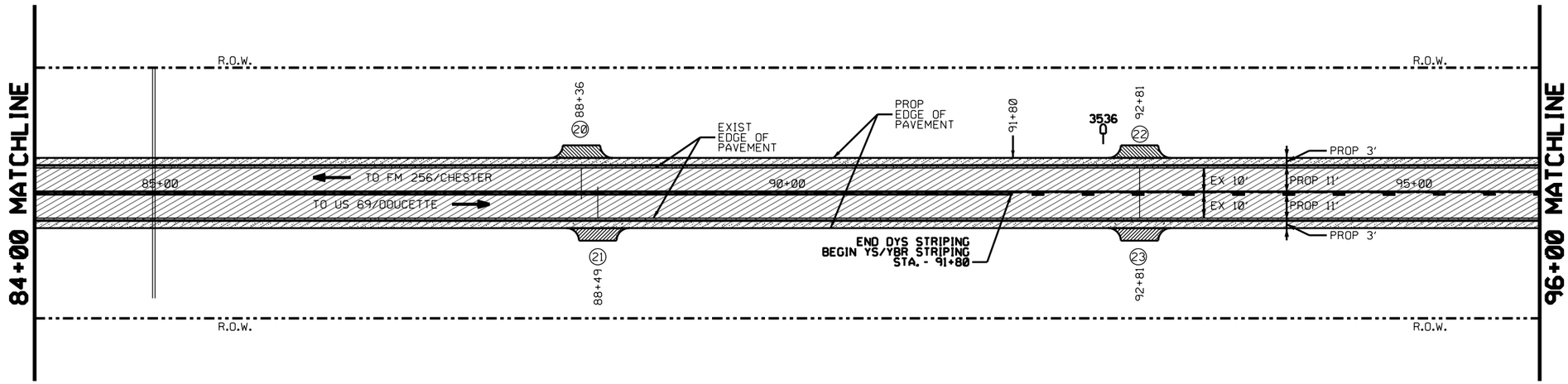
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632





ADD. 2" FLEX BASE SECTION

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FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
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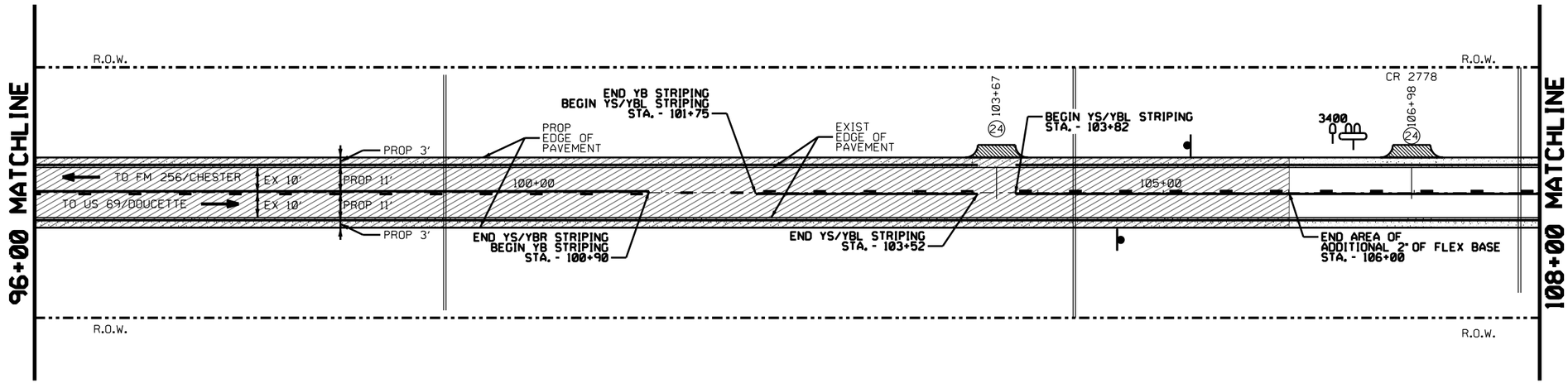

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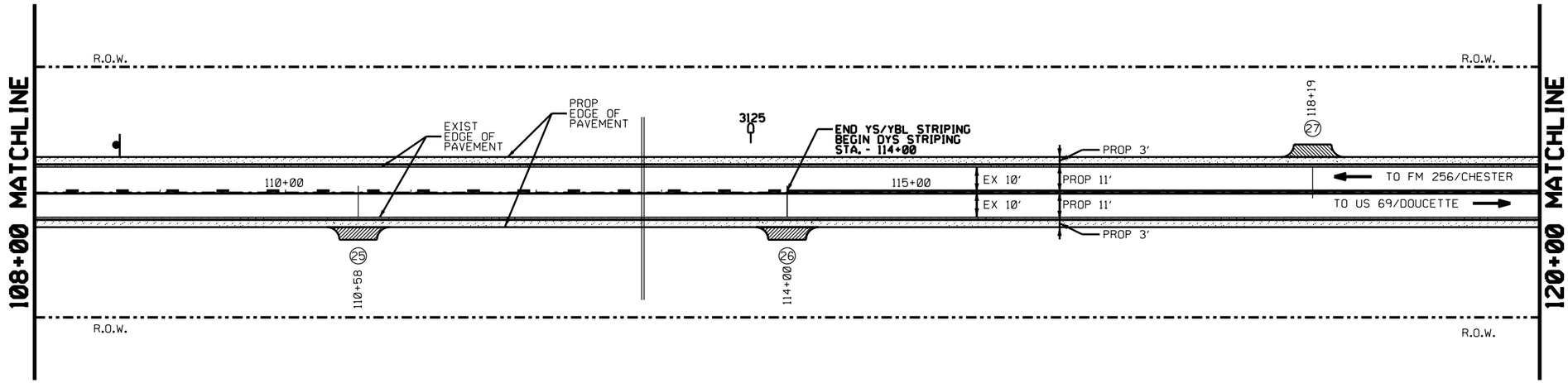

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SHEET 5 OF 12

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
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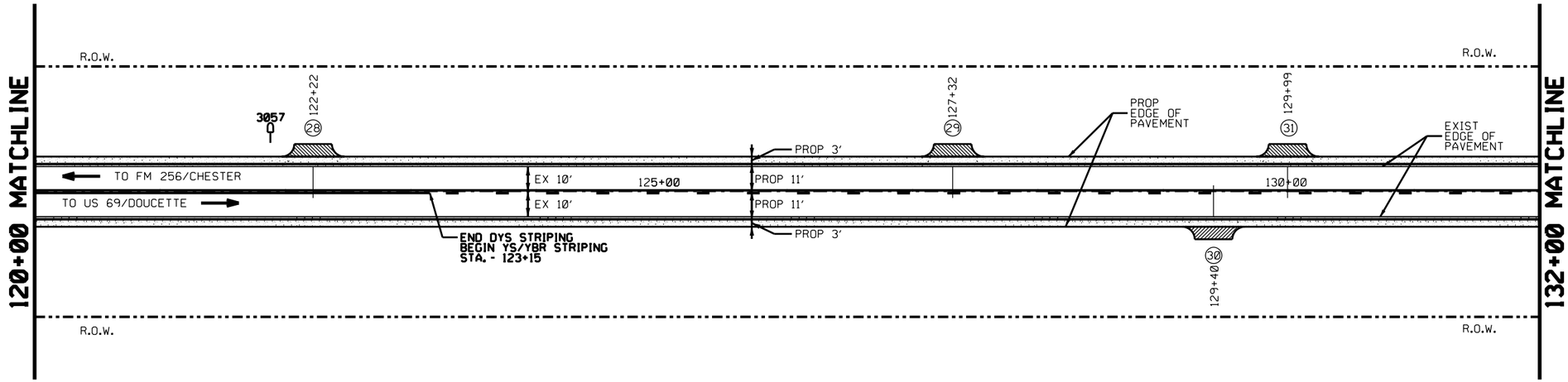
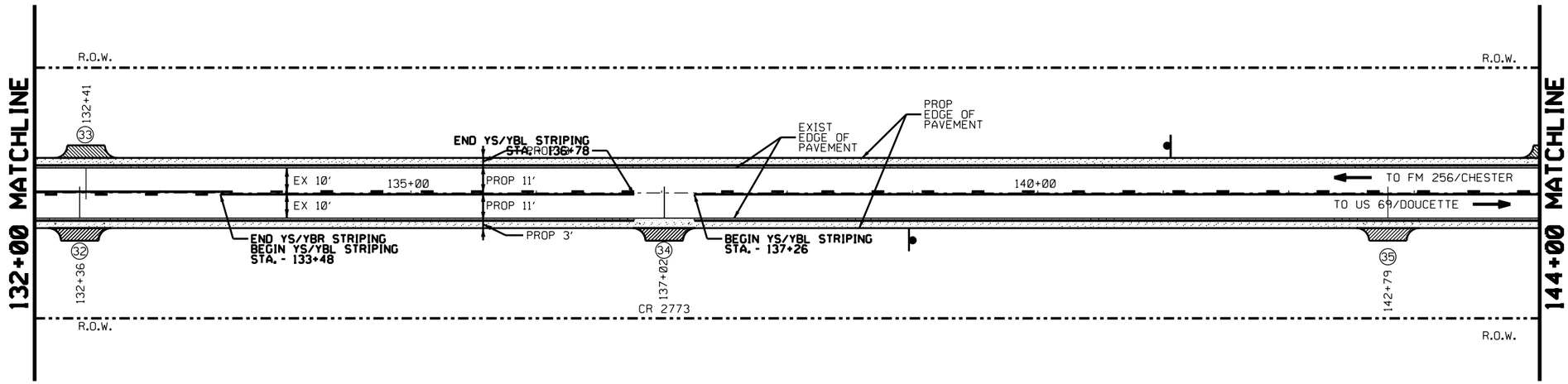
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632





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 Texas Department of Transportation

SHEET 6 OF 12

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
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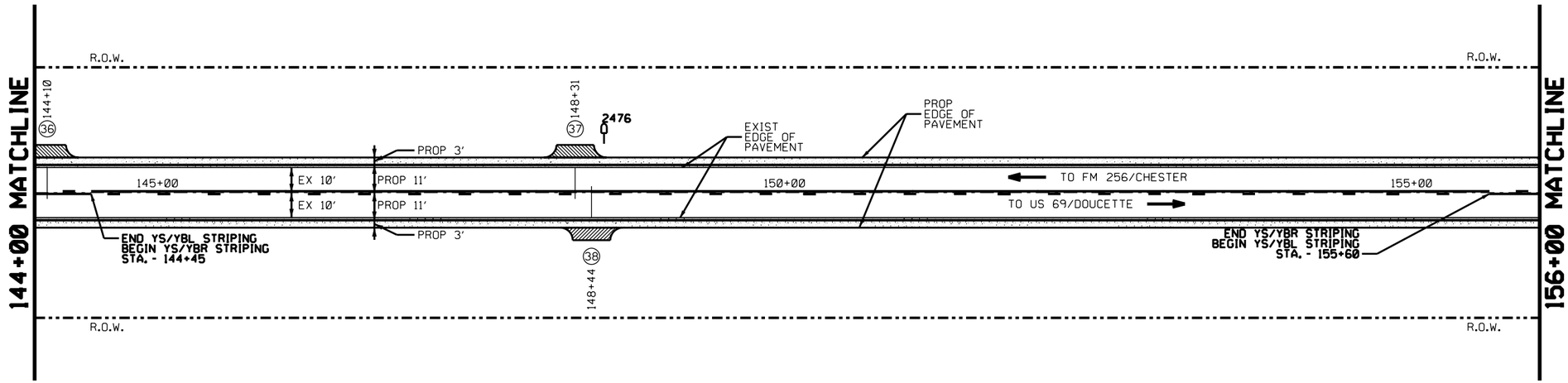
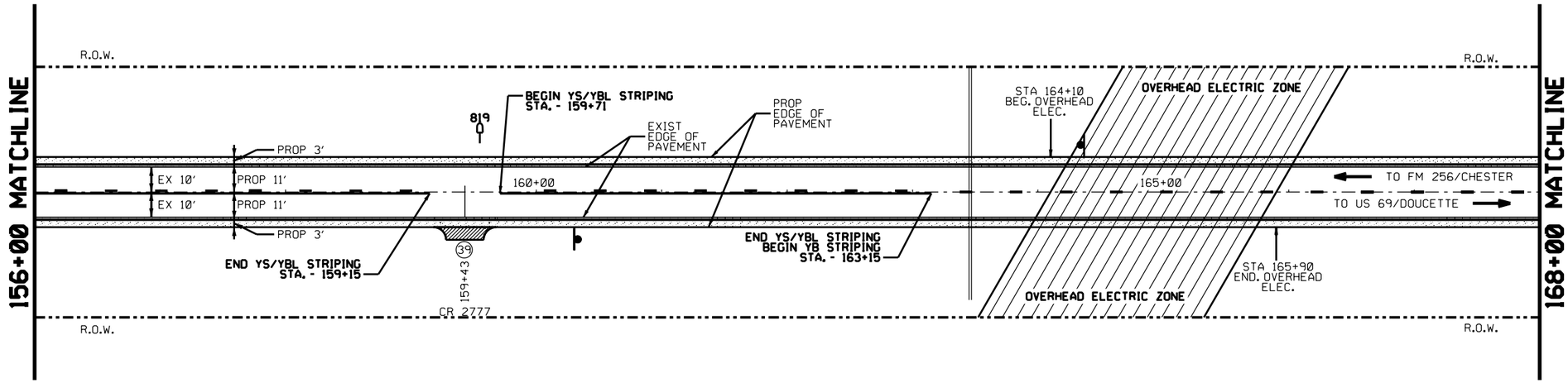
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632





STATE OF TEXAS
JASON D. WALDREP
107826
LICENSED
PROFESSIONAL ENGINEER

Jason D. Waldrep, P.E.

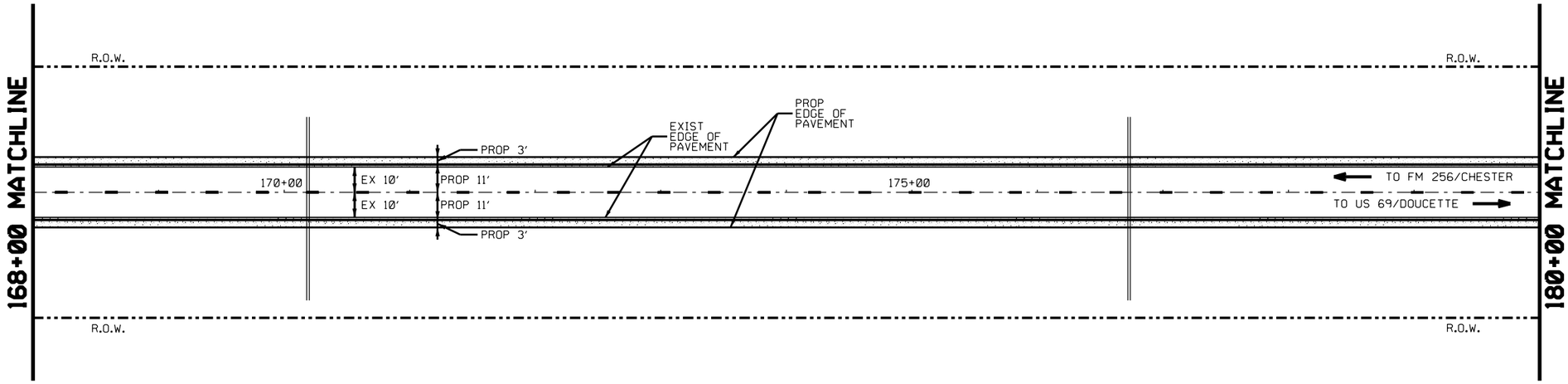
04/06/2023

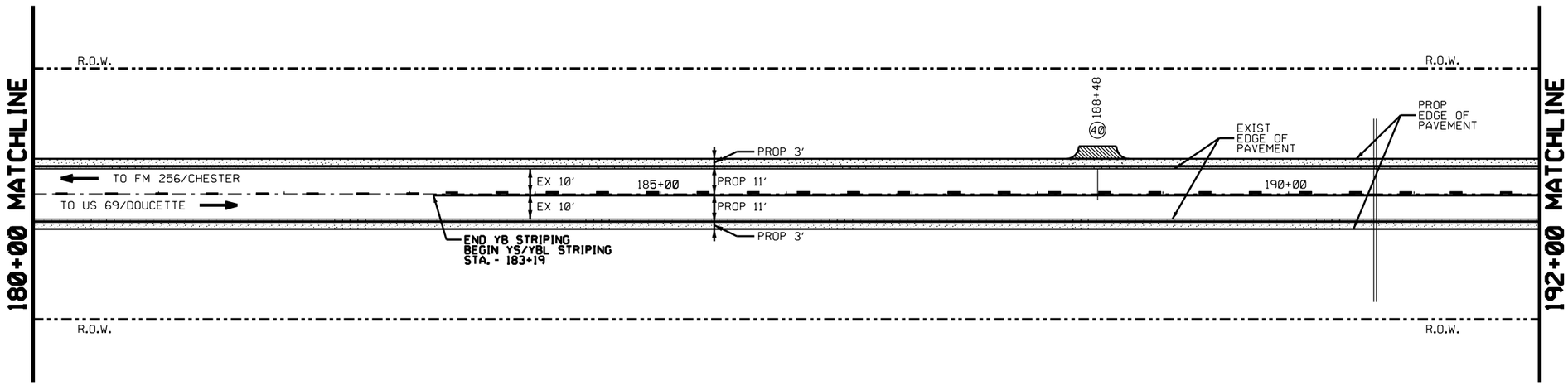
FM 1632
LAYOUT

N.T.S.

SHEET 7 OF 12

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			44
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632





STATE OF TEXAS
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PROFESSIONAL ENGINEER

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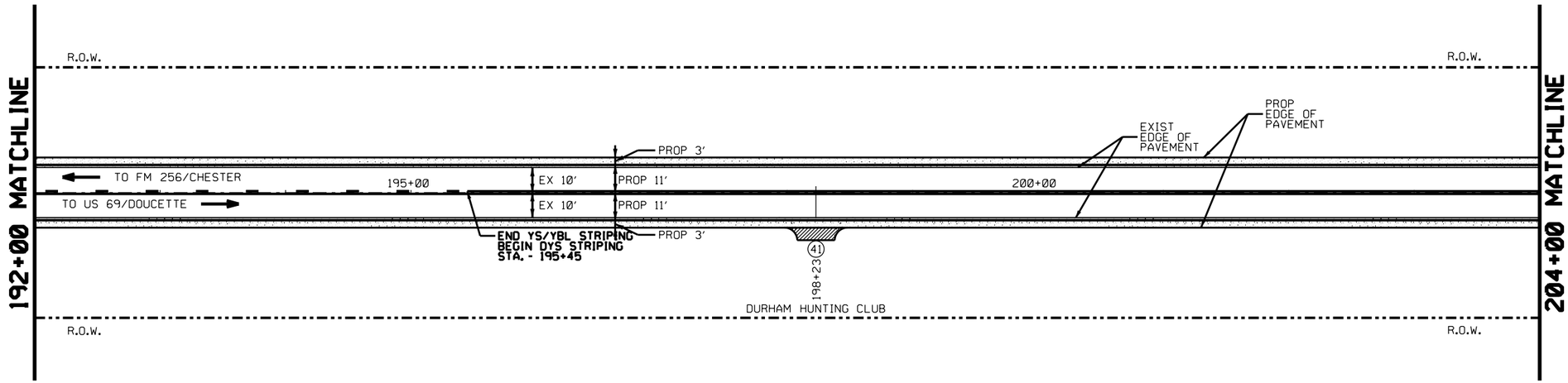
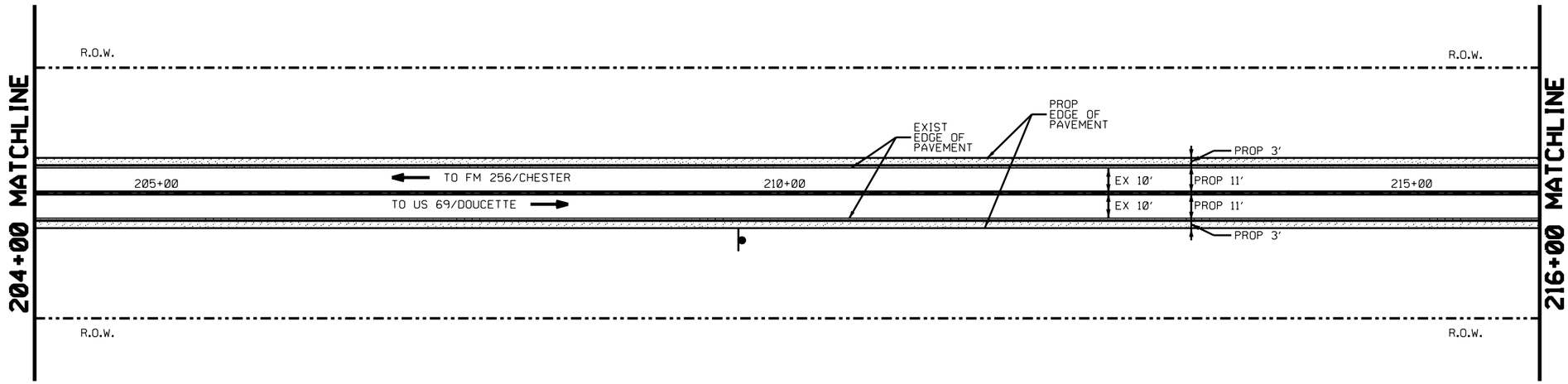
FM 1632
LAYOUT

N.T.S.

SHEET 8 OF 12

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			45
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632





STATE OF TEXAS
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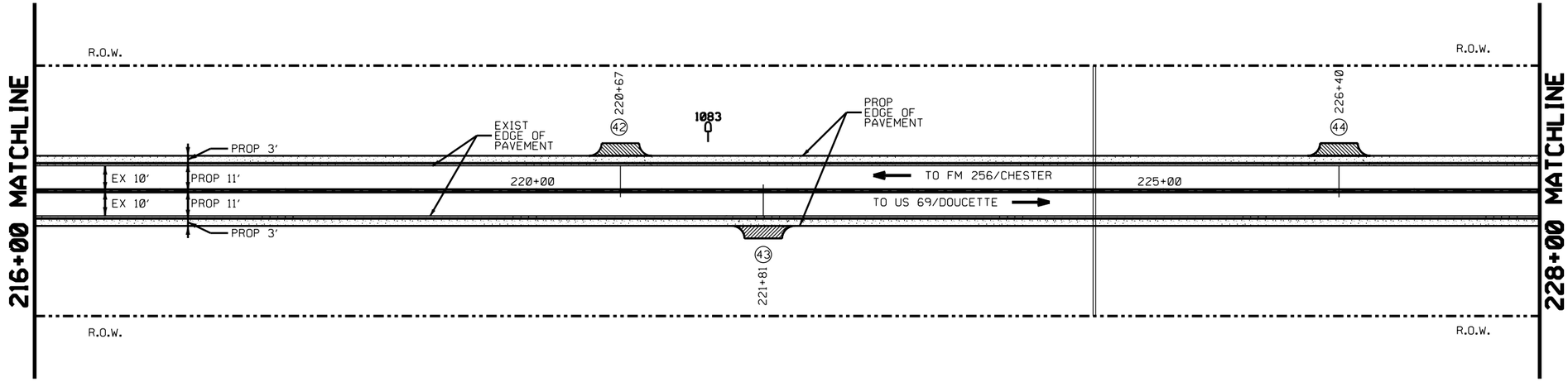
04/06/2023

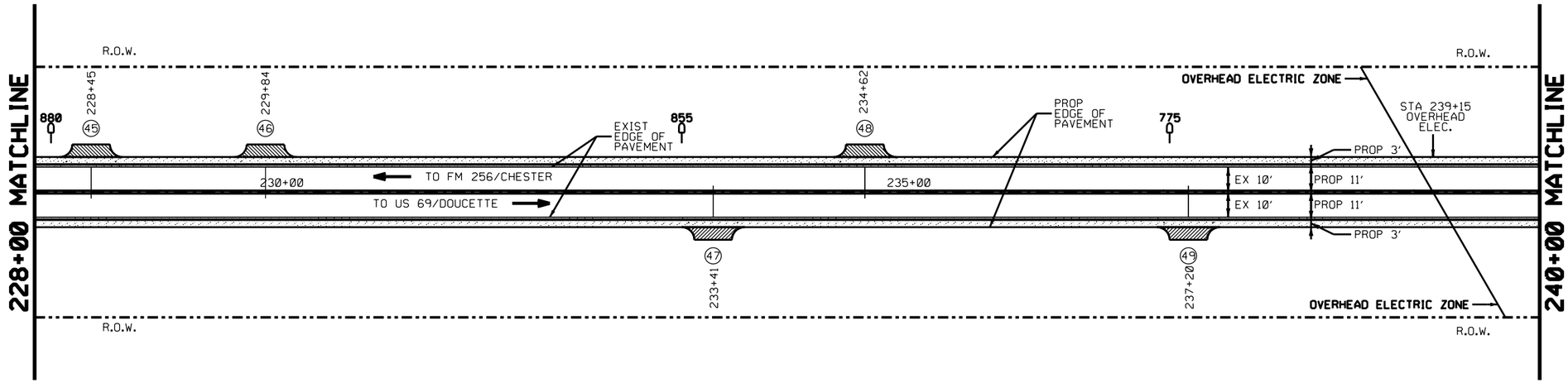
FM 1632
LAYOUT

N.T.S.

SHEET 9 OF 12

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			46
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632





STATE OF TEXAS
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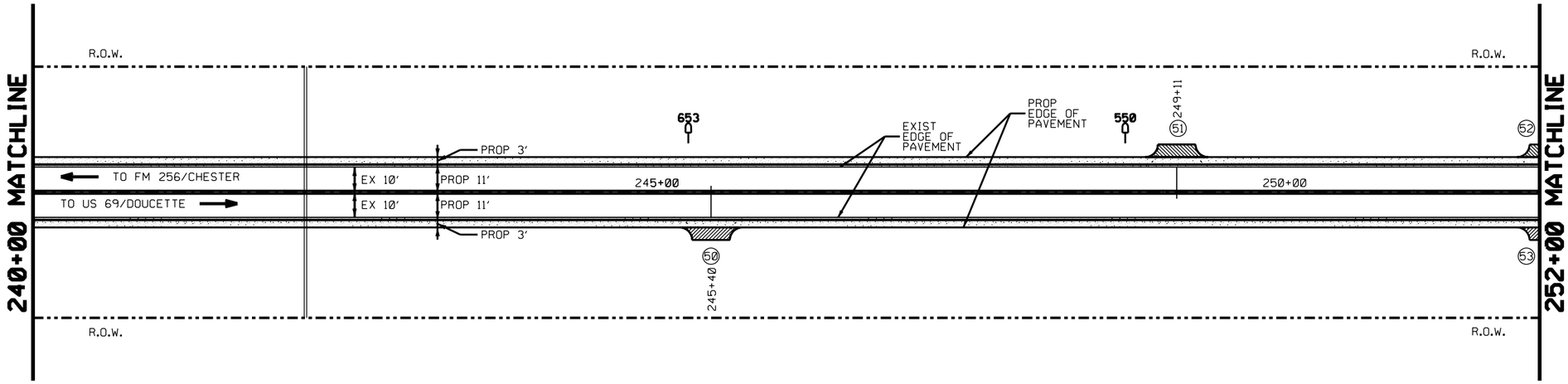
04/06/2023

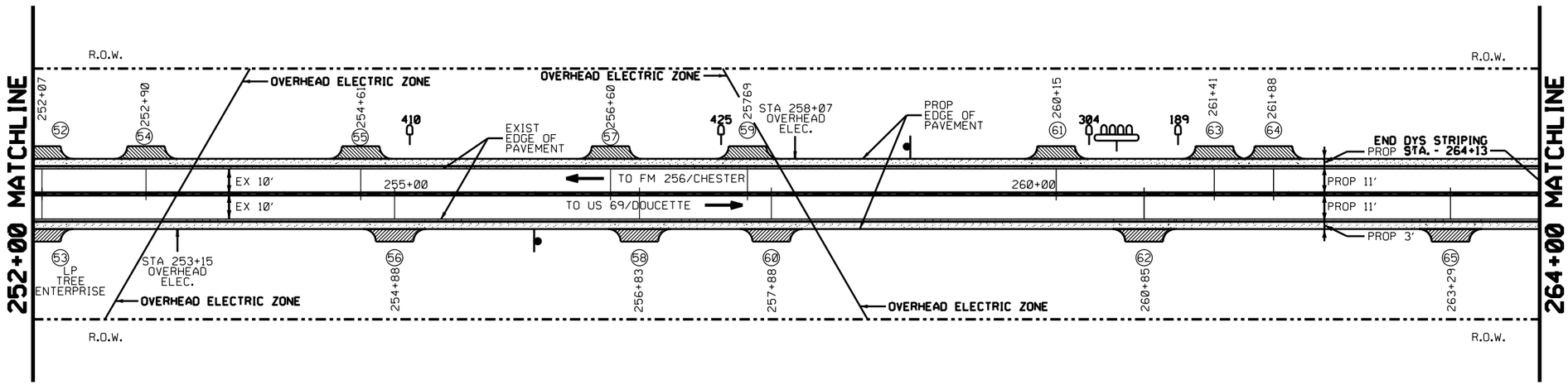
FM 1632
LAYOUT

N.T.S.

SHEET 10 OF 12

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			47
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632





STATE OF TEXAS
JASON D. WALDREP
107826
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Jason D. Waldrep, P.E.

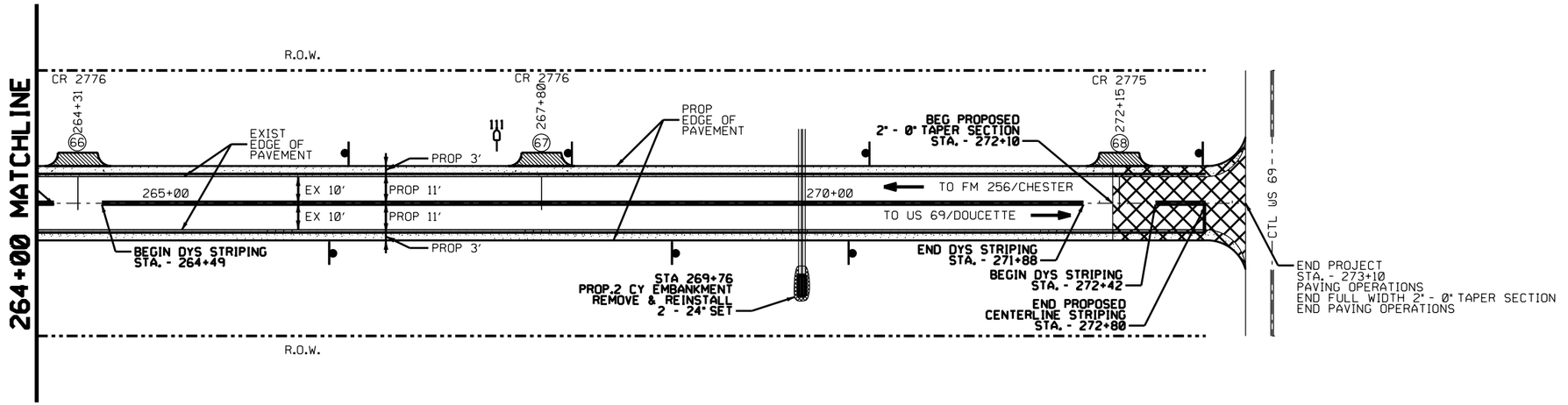
04/06/2023

FM 1632
LAYOUT

N.T.S.

SHEET 11 OF 12

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			48
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632



TAPER SECTION

STATE OF TEXAS
JASON D. WALDREP
107826
LICENSED
PROFESSIONAL ENGINEER

Jason D. Waldrep, P.E.

04/06/2023

FM 1632

LAYOUT

N.T.S.

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			49
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632

Horizontal Alignment Review Report
Report Created: Thursday, April 6, 2023
Time: 9:21:47 AM
Project: Default
Description:
File Name: T:\BMTDESGN\Projects\2782-01-013 FM 1632\DGN\AlignmentDataSheet.dgn
Last Revised: 4/6/2023 09:21:10
Note: All units in this report are in feet unless specified otherwise.

Alignment Name: CL_FM1632
Alignment Description:
Alignment Style: Alignment\Baseline

Station	Northing	Easting

Element: Linear
POT ( ) -0+11.72 R1 10326450.90 4129329.72
PC ( ) 0+35.19 R1 10326417.98 4129363.14
Tangential Direction: S45°26'19.422"E
Tangential Length: 46.91

Element: Circular
PC ( ) 0+35.19 R1 10326417.98 4129363.14
PI ( ) 0+66.68 R1 10326395.89 4129385.58
CC ( ) 10326315.92 4129262.64
PCC ( ) 0+97.18 R1 10326366.42 4129396.68
Radius: 143.24
Delta: 24°47'45.144" Right
Degree of Curvature (Arc): 39°59'57.332"
Length: 61.99

Tangent: 31.49
Chord: 61.51
Middle Ordinate: 3.34
External: 3.42
Back Tangent Direction: S45°26'19.422"E
Back Radial Direction: S44°33'40.578"W
Chord Direction: S33°02'26.849"E
Ahead Radial Direction: S69°21'25.723"W
Ahead Tangent Direction: S20°38'34.277"E

Element: Circular
PCC ( ) 0+97.18 R1 10326366.42 4129396.68
PI ( ) 1+43.36 R1 10326323.20 4129412.96
CC ( ) 10326276.86 4129158.95
PT ( ) 1+88.54 R1 10326277.02 4129412.99
Radius: 254.04
Delta: 20°36'21.937" Right
Degree of Curvature (Arc): 22°33'12.810"
Length: 91.37

Tangent: 46.18
Chord: 90.87
Middle Ordinate: 4.10
External: 4.16
Back Tangent Direction: S20°38'34.277"E
Back Radial Direction: S69°21'25.723"W
Chord Direction: S10°20'23.309"E
Ahead Radial Direction: S89°57'47.660"W
Ahead Tangent Direction: S00°02'12.340"E

Element: Linear
PT ( ) 1+88.54 R1 10326277.02 4129412.99
PC ( ) 17+89.09 R1 10324676.48 4129414.02
Tangential Direction: S00°02'12.340"E
Tangential Length: 1600.54

Element: Circular
PC ( ) 17+89.09 R1 10324676.48 4129414.02
PI ( ) 22+47.13 R1 10324218.44 4129414.31
CC ( ) 10324677.42 4130872.06
PT ( ) 26+76.70 R1 10323842.86 4129676.49
Radius: 1458.04
Delta: 34°52'47.796" Left
Degree of Curvature (Arc): 03°55'46.724"
Length: 887.61

Tangent: 458.04
Chord: 873.97
Middle Ordinate: 67.02
External: 70.25
Back Tangent Direction: S00°02'12.340"E
Back Radial Direction: S89°57'47.660"W
Chord Direction: S17°28'36.238"E
Ahead Radial Direction: S55°04'59.864"W
Ahead Tangent Direction: S34°55'00.136"E

Element: Linear
PT ( ) 26+76.70 R1 10323842.86 4129676.49
PC ( ) 30+68.18 R1 10323521.85 4129900.57
Tangential Direction: S34°55'00.136"E
Tangential Length: 391.48

Element: Circular
PC ( ) 30+68.18 R1 10323521.85 4129900.57
PI ( ) 32+37.47 R1 10323383.03 4129997.46
CC ( ) 10328033.05 4136363.22
PT ( ) 34+06.71 R1 10323248.51 4130100.23
Radius: 7881.42
Delta: 02°27'39.564" Left
Degree of Curvature (Arc): 00°43'37.101"
Length: 338.53

Tangent: 169.29
Chord: 338.50
Middle Ordinate: 1.82
External: 1.82
Back Tangent Direction: S34°55'00.136"E
Back Radial Direction: S55°04'59.864"W
Chord Direction: S36°08'49.918"E
Ahead Radial Direction: S52°37'20.300"W
Ahead Tangent Direction: S37°22'39.700"E

Element: Linear
PT ( ) 34+06.71 R1 10323248.51 4130100.23
PC ( ) 38+22.02 R1 10322918.48 4130352.36
Tangential Direction: S37°22'39.700"E
Tangential Length: 415.31

Element: Circular
PC ( ) 38+22.02 R1 10322918.48 4130352.36
PI ( ) 40+82.56 R1 10322711.44 4130510.52
CC ( ) 10321636.57 4128674.34
PT ( ) 43+40.48 R1 10322472.16 4130613.62
Radius: 2111.64
Delta: 14°04'03.221" Right
Degree of Curvature (Arc): 02°42'47.995"
Length: 518.46

Tangent: 260.54
Chord: 517.16
Middle Ordinate: 15.89
External: 16.01
Back Tangent Direction: S37°22'39.700"E
Back Radial Direction: S52°37'20.300"W
Chord Direction: S30°20'38.089"E
Ahead Radial Direction: S66°41'23.521"W
Ahead Tangent Direction: S23°18'36.479"E

Element: Linear
PT ( ) 43+40.48 R1 10322472.16 4130613.62
PC ( ) 52+85.94 R1 10321603.88 4130987.75
Tangential Direction: S23°18'36.479"E
Tangential Length: 945.46

Element: Circular
PC ( ) 52+85.94 R1 10321603.88 4130987.75
PI ( ) 57+57.37 R1 10321170.93 4131174.29
CC ( ) 10322160.83 4132280.34
PT ( ) 61+95.74 R1 10320937.68 4131583.99
Radius: 1407.48
Delta: 37°02'11.122" Left
Degree of Curvature (Arc): 04°04'14.945"
Length: 909.80

Tangent: 471.43
Chord: 894.05
Middle Ordinate: 72.88
External: 76.85
Back Tangent Direction: S23°18'36.479"E
Back Radial Direction: S66°41'23.521"W
Chord Direction: S41°49'42.039"E
Ahead Radial Direction: S29°39'12.400"W
Ahead Tangent Direction: S60°20'47.600"E

Element: Linear
PT ( ) 61+95.74 R1 10320937.68 4131583.99
PC ( ) 81+55.58 R1 10319968.05 4133287.15
Tangential Direction: S60°20'47.600"E
Tangential Length: 1959.84

Element: Circular
PC ( ) 81+55.58 R1 10319968.05 4133287.15
PI ( ) 85+11.27 R1 10319792.07 4133596.26
CC ( ) 10321233.80 4134007.77
PT ( ) 88+53.30 R1 10319778.37 4133951.68
Radius: 1456.51
Delta: 27°26'47.252" Left
Degree of Curvature (Arc): 03°56'01.555"
Length: 697.71

Tangent: 355.69
Chord: 691.06
Middle Ordinate: 41.58
External: 42.80
Back Tangent Direction: S60°20'47.600"E
Back Radial Direction: S29°39'12.400"W
Chord Direction: S74°04'11.226"E
Ahead Radial Direction: S02°12'25.148"W
Ahead Tangent Direction: S87°47'34.852"E

Element: Linear
PT ( ) 88+53.30 R1 10319778.37 4133951.68
PC ( ) 112+77.87 R1 10319685.00 4136374.46
Tangential Direction: S87°47'34.852"E
Tangential Length: 2424.58

Element: Circular
PC ( ) 112+77.87 R1 10319685.00 4136374.46
PI ( ) 123+27.04 R1 10319644.60 4137422.84
CC ( ) 10317367.53 4136285.14
PT ( ) 132+48.42 R1 10318830.52 4138084.68
Radius: 2319.20
Delta: 48°40'56.540" Right
Degree of Curvature (Arc): 02°28'13.800"
Length: 1970.55

Tangent: 1049.17
Chord: 1911.80
Middle Ordinate: 206.16
External: 226.27
Back Tangent Direction: S87°47'34.852"E
Back Radial Direction: S02°12'25.148"W
Chord Direction: S63°27'06.582"E
Ahead Radial Direction: S50°53'21.688"W
Ahead Tangent Direction: S39°06'38.312"E

NOTE: THIS ALIGNMENT DATA IS APPROXIMATED FROM THE SURVEY.

STATE OF TEXAS
SAMANTHA JO HARRIS
134616
LICENSED
PROFESSIONAL ENGINEER
P.E.
04/06/2023

Texas Department of Transportation

FM 1632

HORIZONTAL ALIGNMENT DATA SHEET

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
2782	01	013	FM 1632
DIST	COUNTY		SHEET NO.
BMT	TYLER		49A

DATE: 4/6/2023 3:37:06 PM
FILE: T:\BMTDESGN\Projects\2782-01-013 FM 1632\DGN\AlignmentDataSheet.dgn

Element: Linear
PT ( ) 132+48.42 R1 10318830.52 4138084.68
PC ( ) 139+88.86 R1 10318256.00 4138551.76
Tangential Direction: S39°06'38.312"E
Tangential Length: 740.44

Element: Circular
PC ( ) 139+88.86 R1 10318256.00 4138551.76
PI ( ) 146+96.53 R1 10317706.89 4138998.17
CC ( ) 10321723.82 4142817.30
PT ( ) 153+96.47 R1 10317288.75 4139569.10
Radius: 5497.34
Delta: 14°40'14.663" Left
Degree of Curvature (Arc): 01°02'32.087"
Length: 1407.61

Tangent: 707.67
Chord: 1403.77
Middle Ordinate: 44.99
External: 45.36
Back Tangent Direction: S39°06'38.312"E
Back Radial Direction: S50°53'21.688"W
Chord Direction: S46°26'45.643"E
Ahead Radial Direction: S36°13'07.025"W
Ahead Tangent Direction: S53°46'52.975"E

Element: Linear
PT ( ) 153+96.47 R1 10317288.75 4139569.10
PC ( ) 162+32.04 R1 10316795.03 4140243.22
Tangential Direction: S53°46'52.975"E
Tangential Length: 835.58

Element: Circular
PC ( ) 162+32.04 R1 10316795.03 4140243.22
PI ( ) 168+31.56 R1 10316440.79 4140726.90
CC ( ) 10314497.80 4138560.76
PT ( ) 174+13.82 R1 10315921.60 4141026.67
Radius: 2847.45
Delta: 23°46'46.363" Right
Degree of Curvature (Arc): 02°00'43.853"
Length: 1181.78

Tangent: 599.52
Chord: 1173.32
Middle Ordinate: 61.09
External: 62.43
Back Tangent Direction: S53°46'52.975"E
Back Radial Direction: S36°13'07.025"W
Chord Direction: S41°53'29.793"E
Ahead Radial Direction: S59°59'53.388"W
Ahead Tangent Direction: S30°00'06.612"E

Element: Linear
PT ( ) 174+13.82 R1 10315921.60 4141026.67
PC ( ) 202+32.61 R1 10313480.50 4142436.15
Tangential Direction: S30°00'06.612"E
Tangential Length: 2818.79

Element: Circular
PC ( ) 202+32.61 R1 10313480.50 4142436.15
PI ( ) 218+29.18 R1 10312097.86 4143234.48
CC ( ) 10314751.63 4144637.64
PT ( ) 230+83.79 R1 10312216.55 4144826.63
Radius: 2542.12
Delta: 64°15'41.673" Left
Degree of Curvature (Arc): 02°15'13.905"
Length: 2851.18

Tangent: 1596.57
Chord: 2704.07
Middle Ordinate: 389.36
External: 459.78
Back Tangent Direction: S30°00'06.612"E
Back Radial Direction: S59°59'53.388"W
Chord Direction: S62°07'57.448"E
Ahead Radial Direction: S04°15'48.285"E
Ahead Tangent Direction: N85°44'11.715"E

Element: Linear
PT ( ) 230+83.79 R1 10312216.55 4144826.63
PC ( ) 234+62.79 R1 10312244.73 4145204.58
Tangential Direction: N85°44'11.715"E
Tangential Length: 379.00

Element: Circular
PC ( ) 234+62.79 R1 10312244.73 4145204.58
PI ( ) 238+82.69 R1 10312275.94 4145623.32
CC ( ) 10310642.70 4145324.01
PT ( ) 242+84.22 R1 10312098.27 4146003.78
Radius: 1606.48
Delta: 29°17'47.548" Right
Degree of Curvature (Arc): 03°33'59.568"
Length: 821.43

Tangent: 419.90
Chord: 812.51
Middle Ordinate: 52.22
External: 53.97
Back Tangent Direction: N85°44'11.715"E
Back Radial Direction: S04°15'48.285"E
Chord Direction: S79°36'54.510"E
Ahead Radial Direction: S25°01'59.264"W
Ahead Tangent Direction: S64°58'00.736"E

Element: Linear
PT ( ) 242+84.22 R1 10312098.27 4146003.78
PC ( ) 246+17.73 R1 10311957.14 4146305.96
Tangential Direction: S64°58'00.736"E
Tangential Length: 333.51

Element: Circular
PC ( ) 246+17.73 R1 10311957.14 4146305.96
PI ( ) 249+61.29 R1 10311811.77 4146617.25
CC ( ) 10313400.44 4146980.00
PT ( ) 252+94.48 R1 10311807.62 4146960.78
Radius: 1592.93
Delta: 24°20'31.637" Left
Degree of Curvature (Arc): 03°35'48.792"
Length: 676.76

Tangent: 343.56
Chord: 671.68
Middle Ordinate: 35.81
External: 36.63
Back Tangent Direction: S64°58'00.736"E
Back Radial Direction: S25°01'59.264"W
Chord Direction: S77°08'16.555"E
Ahead Radial Direction: S00°41'27.627"W
Ahead Tangent Direction: S89°18'32.373"E

Element: Linear
PT ( ) 252+94.48 R1 10311807.62 4146960.78
PC ( ) 262+79.30 R1 10311795.75 4147945.53
Tangential Direction: S89°18'32.373"E
Tangential Length: 984.82

Element: Circular
PC ( ) 262+79.30 R1 10311795.75 4147945.53
PI ( ) 265+18.96 R1 10311792.86 4148185.17
CC ( ) 10308374.10 4147904.26
PT ( ) 267+57.84 R1 10311756.59 4148422.08
Radius: 3421.90
Delta: 08°00'45.532" Right
Degree of Curvature (Arc): 01°40'27.790"
Length: 478.54

Tangent: 239.66
Chord: 478.15
Middle Ordinate: 8.36
External: 8.38
Back Tangent Direction: S89°18'32.373"E
Back Radial Direction: S00°41'27.627"W
Chord Direction: S85°18'09.607"E
Ahead Radial Direction: S08°42'13.159"W
Ahead Tangent Direction: S81°17'46.841"E

Element: Linear
PT ( ) 267+57.84 R1 10311756.59 4148422.08
PC ( ) 272+43.22 R1 10311683.14 4148901.86
Tangential Direction: S81°17'46.841"E
Tangential Length: 485.38

Element: Circular
PC ( ) 272+43.22 R1 10311683.14 4148901.86
PI ( ) 272+96.46 R1 10311675.09 4148954.49
CC ( ) 10307910.84 4148324.37
PT ( ) 273+49.68 R1 10311665.56 4149006.86
Radius: 3816.25
Delta: 01°35'54.340" Right
Degree of Curvature (Arc): 01°30'04.909"
Length: 106.47

Tangent: 53.24
Chord: 106.46
Middle Ordinate: 0.37
External: 0.37
Back Tangent Direction: S81°17'46.841"E
Back Radial Direction: S08°42'13.159"W
Chord Direction: S80°29'49.671"E
Ahead Radial Direction: S10°18'07.499"W
Ahead Tangent Direction: S79°41'52.501"E

STATE OF TEXAS
SAMANTHA JO HARRIS
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P.E.
04/06/2023

NOTE: THIS ALIGNMENT DATA IS APPROXIMATED FROM THE SURVEY.

Texas Department of Transportation

FM 1632

HORIZONTAL ALIGNMENT DATA SHEET

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
2782	01	013	FM 1632
DIST		COUNTY	SHEET NO.
			49B

DATE: 4/6/2023 3:37:07 PM
FILE: ...\2782-01-013 FM 1632\DGN\AlignmentDataSheet.dgn

Vertical Alignment Review Report
Report Created: Thursday, April 6, 2023
Time: 9:23:43 AM
Project: Default
Description:
File Name: T:\BMTDESGN\Projects\2782-01-013 FM 1632\DGN\AlignmentDataSheet.dgn
Last Revised: 4/6/2023 09:21:51
Note: All units in this report are in feet unless specified otherwise.

Horizontal Alignment: CL_FM1632
Horizontal Description:
Horizontal Style: Alignment\Baseline

Vertical Alignment: FM1632_P
Vertical Description:
Vertical Style: Alignment\Baseline
Station Elevation

Element: Linear
POT -0+11.72 R1 304.69
VPC 0+90.71 R1 307.32
Tangent Grade: 2.57%
Tangent Length: 102.44

Element: Symmetrical Parabola
VPC 0+90.71 R1 307.32
VPI 1+71.58 R1 309.40
VPT 2+52.46 R1 312.90
Length: 161.74
Entrance Grade: 2.57%
Exit Grade: 4.33%
r = 100 * (g2 - g1) / L: 1.09
K = l / (g2 - g1): 91.82
Middle Ordinate: 0.36

Element: Linear
VPT 2+52.46 R1 312.90
VPC 2+89.17 R1 314.49
Tangent Grade: 4.33%
Tangent Length: 36.71

Element: Symmetrical Parabola
VPC 2+89.17 R1 314.49
VPI 4+13.30 R1 319.87
VPT 5+37.42 R1 321.52
Length: 248.25
Entrance Grade: 4.33%
Exit Grade: 1.34%
r = 100 * (g2 - g1) / L: -1.21
K = l / (g2 - g1): 82.87
Middle Ordinate: -0.93

Element: Linear
VPT 5+37.42 R1 321.52
VPC 6+20.16 R1 322.63
Tangent Grade: 1.34%
Tangent Length: 82.74

Element: Symmetrical Parabola
VPC 6+20.16 R1 322.63
VPI 6+27.75 R1 322.73
VPT 6+35.33 R1 322.81
Length: 15.17
Entrance Grade: 1.34%
Exit Grade: 1.03%
r = 100 * (g2 - g1) / L: -2.00
K = l / (g2 - g1): 49.94
Middle Ordinate: -0.01

Element: Linear
VPT 6+35.33 R1 322.81
VPC 6+80.31 R1 323.27
Tangent Grade: 1.03%
Tangent Length: 44.97

Element: Symmetrical Parabola
VPC 6+80.31 R1 323.27
VPI 7+35.85 R1 323.85
VPT 7+91.39 R1 325.59
Length: 111.09
Entrance Grade: 1.03%
Exit Grade: 3.14%
r = 100 * (g2 - g1) / L: 1.90
K = l / (g2 - g1): 52.60
Middle Ordinate: 0.29

Element: Linear
VPT 7+91.39 R1 325.59
VPC 8+84.29 R1 328.51
Tangent Grade: 3.14%
Tangent Length: 92.89

Element: Symmetrical Parabola
VPC 8+84.29 R1 328.51
VPI 11+26.54 R1 336.13
VPT 13+68.80 R1 333.55
VHP 12+46.12 R1 334.20
Length: 484.51
Entrance Grade: 3.14%
Exit Grade: -1.07%
r = 100 * (g2 - g1) / L: -0.87
K = l / (g2 - g1): 115.10
Middle Ordinate: -2.55

Element: Linear
VPT 13+68.80 R1 333.55
VPC 15+58.59 R1 331.52
Tangent Grade: -1.07%
Tangent Length: 189.80

Element: Symmetrical Parabola
VPC 15+58.59 R1 331.52
VPI 16+32.86 R1 330.73
VPT 17+07.12 R1 330.33
Length: 148.53
Entrance Grade: -1.07%
Exit Grade: -0.55%
r = 100 * (g2 - g1) / L: 0.35
K = l / (g2 - g1): 285.26
Middle Ordinate: 0.10

Element: Linear
VPT 17+07.12 R1 330.33
VPC 17+42.20 R1 330.13
Tangent Grade: -0.55%
Tangent Length: 35.08

Element: Symmetrical Parabola
VPC 17+42.20 R1 330.13
VPI 18+96.61 R1 329.29
VPT 20+51.03 R1 325.44
Length: 308.83
Entrance Grade: -0.55%
Exit Grade: -2.50%
r = 100 * (g2 - g1) / L: -0.63
K = l / (g2 - g1): 158.12
Middle Ordinate: -0.75

Element: Linear
VPT 20+51.03 R1 325.44
VPC 22+72.51 R1 319.90
Tangent Grade: -2.50%
Tangent Length: 221.48

Element: Symmetrical Parabola
VPC 22+72.51 R1 319.90
VPI 24+86.58 R1 314.55
VPT 27+00.65 R1 314.61
VLP 26+96.08 R1 314.61
Length: 428.14
Entrance Grade: -2.50%
Exit Grade: 0.03%
r = 100 * (g2 - g1) / L: 0.59
K = l / (g2 - g1): 169.54
Middle Ordinate: 1.35

Element: Linear
VPT 27+00.65 R1 314.61
VPC 32+92.35 R1 314.77
Tangent Grade: 0.03%
Tangent Length: 591.70

Element: Symmetrical Parabola
VPC 32+92.35 R1 314.77
VPI 33+63.18 R1 314.79
PVRC 34+34.01 R1 315.61
Length: 141.66
Entrance Grade: 0.03%
Exit Grade: 1.16%
r = 100 * (g2 - g1) / L: 0.80
K = l / (g2 - g1): 125.40
Middle Ordinate: 0.20

Element: Symmetrical Parabola
PVRC 34+34.01 R1 315.61
VPI 35+04.57 R1 316.43
VPT 35+75.12 R1 317.02
Length: 141.12
Entrance Grade: 1.16%
Exit Grade: 0.85%
r = 100 * (g2 - g1) / L: -0.22
K = l / (g2 - g1): 458.48
Middle Ordinate: -0.05

Element: Linear
VPT 35+75.12 R1 317.02
VPC 36+65.51 R1 317.79
Tangent Grade: 0.85%
Tangent Length: 90.38

Element: Symmetrical Parabola
VPC 36+65.51 R1 317.79
VPI 37+00.40 R1 318.09
VPT 37+35.30 R1 318.30
Length: 69.79
Entrance Grade: 0.85%
Exit Grade: 0.62%
r = 100 * (g2 - g1) / L: -0.33
K = l / (g2 - g1): 305.15
Middle Ordinate: -0.02

Element: Linear
VPT 37+35.30 R1 318.30
VPC 37+52.65 R1 318.41
Tangent Grade: 0.62%
Tangent Length: 17.35

Element: Symmetrical Parabola
VPC 37+52.65 R1 318.41
VPI 37+61.31 R1 318.47
VPT 37+69.98 R1 318.56
Length: 17.33
Entrance Grade: 0.62%
Exit Grade: 1.12%
r = 100 * (g2 - g1) / L: 2.87
K = l / (g2 - g1): 34.90
Middle Ordinate: 0.01

Element: Linear
VPT 37+69.98 R1 318.56
VPC 38+35.95 R1 319.30
Tangent Grade: 1.12%
Tangent Length: 65.98

Element: Symmetrical Parabola
VPC 38+35.95 R1 319.30
VPI 38+79.22 R1 319.78
VPT 39+22.48 R1 319.48
VHP 38+88.92 R1 319.59
Length: 86.53
Entrance Grade: 1.12%
Exit Grade: -0.71%
r = 100 * (g2 - g1) / L: -2.11
K = l / (g2 - g1): 47.43
Middle Ordinate: -0.20

Element: Linear
VPT 39+22.48 R1 319.48
VPC 40+55.99 R1 318.53
Tangent Grade: -0.71%
Tangent Length: 133.50

Element: Symmetrical Parabola
VPC 40+55.99 R1 318.53
VPI 40+89.77 R1 318.29
VPT 41+23.56 R1 318.22
Length: 67.58
Entrance Grade: -0.71%
Exit Grade: -0.20%
r = 100 * (g2 - g1) / L: 0.75
K = l / (g2 - g1): 134.08
Middle Ordinate: 0.04

Element: Linear
VPT 41+23.56 R1 318.22
VPC 41+67.52 R1 318.13
Tangent Grade: -0.20%
Tangent Length: 43.96

Element: Symmetrical Parabola
VPC 41+67.52 R1 318.13
VPI 42+19.72 R1 318.03
PVRC 42+71.93 R1 317.44
Length: 104.40
Entrance Grade: -0.20%
Exit Grade: -1.12%
r = 100 * (g2 - g1) / L: -0.88
K = l / (g2 - g1): 114.25
Middle Ordinate: -0.12

Element: Symmetrical Parabola
PVRC 42+71.93 R1 317.44
VPI 44+05.77 R1 315.95
PVRC 45+39.61 R1 314.72
Length: 267.68
Entrance Grade: -1.12%
Exit Grade: -0.92%
r = 100 * (g2 - g1) / L: 0.07
K = l / (g2 - g1): 1360.90
Middle Ordinate: 0.07

NOTE: THIS ALIGNMENT DATA IS APPROXIMATED FROM THE SURVEY.

STATE OF TEXAS
SAMANTHA JO HARRIS
134616
LICENSED
PROFESSIONAL ENGINEER
P.E.
04/06/2023

Texas Department of Transportation

FM 1632

VERTICAL ALIGNMENT DATA SHEET

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
2782	01	013	FM 1632
DIST	COUNTY		SHEET NO.
BMT	TYLER		49C

DATE: 4/6/2023 3:37:09 PM
FILE: T:\BMTDESGN\Projects\2782-01-013 FM 1632\DGN\AlignmentDataSheet.dgn

Element: Symmetrical Parabola
PVRC 45+39.61 R1 314.72
VPI 46+57.08 R1 313.63
VPT 47+74.56 R1 312.01
Length: 234.95
Entrance Grade: -0.92%
Exit Grade: -1.38%
r = 100 * (g2 - g1) / L: -0.19
K = l / (g2 - g1): 513.64
Middle Ordinate: -0.13

Element: Linear
VPT 47+74.56 R1 312.01
VPC 50+46.22 R1 308.27
Tangent Grade: -1.38%
Tangent Length: 271.66

Element: Symmetrical Parabola
VPC 50+46.22 R1 308.27
VPI 53+65.30 R1 303.87
VPT 56+84.38 R1 304.81
VLP 55+72.03 R1 304.65
Length: 638.16
Entrance Grade: -1.38%
Exit Grade: 0.29%
r = 100 * (g2 - g1) / L: 0.26
K = l / (g2 - g1): 381.51
Middle Ordinate: 1.33

Element: Linear
VPT 56+84.38 R1 304.81
VPC 61+17.82 R1 306.09
Tangent Grade: 0.29%
Tangent Length: 433.44

Element: Symmetrical Parabola
VPC 61+17.82 R1 306.09
VPI 62+49.50 R1 306.48
VPT 63+81.18 R1 309.12
Length: 263.36
Entrance Grade: 0.29%
Exit Grade: 2.01%
r = 100 * (g2 - g1) / L: 0.65
K = l / (g2 - g1): 153.58
Middle Ordinate: 0.56

Element: Linear
VPT 63+81.18 R1 309.12
VPC 64+82.76 R1 311.16
Tangent Grade: 2.01%
Tangent Length: 101.58

Element: Symmetrical Parabola
VPC 64+82.76 R1 311.16
VPI 67+86.05 R1 317.26
PVRC 70+89.35 R1 318.29
Length: 606.59
Entrance Grade: 2.01%
Exit Grade: 0.34%
r = 100 * (g2 - g1) / L: -0.28
K = l / (g2 - g1): 363.45
Middle Ordinate: -1.27

Element: Symmetrical Parabola
PVRC 70+89.35 R1 318.29
VPI 74+01.78 R1 319.35
VPT 77+14.22 R1 324.20
Length: 624.87
Entrance Grade: 0.34%
Exit Grade: 1.55%
r = 100 * (g2 - g1) / L: 0.19
K = l / (g2 - g1): 515.83
Middle Ordinate: 0.95

Element: Linear
VPT 77+14.22 R1 324.20
VPC 78+76.72 R1 326.72
Tangent Grade: 1.55%
Tangent Length: 162.50

Element: Symmetrical Parabola
VPC 78+76.72 R1 326.72
VPI 80+58.33 R1 329.54
VPT 82+39.95 R1 325.32
VHP 80+22.10 R1 327.85
Length: 363.23
Entrance Grade: 1.55%
Exit Grade: -2.33%
r = 100 * (g2 - g1) / L: -1.07
K = l / (g2 - g1): 93.69
Middle Ordinate: -1.76

Element: Linear
VPT 82+39.95 R1 325.32
VPC 82+88.06 R1 324.20
Tangent Grade: -2.33%
Tangent Length: 48.11

Element: Symmetrical Parabola
VPC 82+88.06 R1 324.20
VPI 85+10.33 R1 319.03
VPT 87+32.60 R1 326.34
VLP 84+72.22 R1 322.06
Length: 444.54
Entrance Grade: -2.33%
Exit Grade: 3.29%
r = 100 * (g2 - g1) / L: 1.26
K = l / (g2 - g1): 79.21
Middle Ordinate: 3.12

Element: Linear
VPT 87+32.60 R1 326.34
VPC 89+18.32 R1 332.44
Tangent Grade: 3.29%
Tangent Length: 185.73

Element: Symmetrical Parabola
VPC 89+18.32 R1 332.44
VPI 91+92.13 R1 341.44
VPT 94+65.93 R1 333.90
VHP 92+16.20 R1 337.34
Length: 547.61
Entrance Grade: 3.29%
Exit Grade: -2.76%
r = 100 * (g2 - g1) / L: -1.10
K = l / (g2 - g1): 90.61
Middle Ordinate: -4.14

Element: Linear
VPT 94+65.93 R1 333.90
VPC 102+93.39 R1 311.09
Tangent Grade: -2.76%
Tangent Length: 827.45

Element: Symmetrical Parabola
VPC 102+93.39 R1 311.09
VPI 106+12.23 R1 302.30
VPT 109+31.07 R1 313.07
VLP 105+79.92 R1 307.14
Length: 637.68
Entrance Grade: -2.76%
Exit Grade: 3.38%
r = 100 * (g2 - g1) / L: 0.96
K = l / (g2 - g1): 103.96
Middle Ordinate: 4.89

Element: Linear
VPT 109+31.07 R1 313.07
VPC 115+20.79 R1 332.99
Tangent Grade: 3.38%
Tangent Length: 589.72

Element: Symmetrical Parabola
VPC 115+20.79 R1 332.99
VPI 122+25.08 R1 356.78
VPT 129+29.38 R1 342.10
VHP 123+91.94 R1 347.70
Length: 1408.60
Entrance Grade: 3.38%
Exit Grade: -2.08%
r = 100 * (g2 - g1) / L: -0.39
K = l / (g2 - g1): 257.92
Middle Ordinate: -9.62

Element: Linear
VPT 129+29.38 R1 342.10
VPC 137+60.50 R1 324.79
Tangent Grade: -2.08%
Tangent Length: 831.11

Element: Symmetrical Parabola
VPC 137+60.50 R1 324.79
VPI 139+20.13 R1 321.46
VPT 140+79.76 R1 320.59
Length: 319.26
Entrance Grade: -2.08%
Exit Grade: -0.54%
r = 100 * (g2 - g1) / L: 0.48
K = l / (g2 - g1): 207.31
Middle Ordinate: 0.61

Element: Linear
VPT 140+79.76 R1 320.59
VPC 148+40.84 R1 316.45
Tangent Grade: -0.54%
Tangent Length: 761.08

Element: Symmetrical Parabola
VPC 148+40.84 R1 316.45
VPI 150+16.88 R1 315.50
VPT 151+92.93 R1 310.19
Length: 352.08
Entrance Grade: -0.54%
Exit Grade: -3.02%
r = 100 * (g2 - g1) / L: -0.70
K = l / (g2 - g1): 142.45
Middle Ordinate: -1.09

Element: Linear
VPT 151+92.93 R1 310.19
VPC 160+83.20 R1 283.34
Tangent Grade: -3.02%
Tangent Length: 890.28

Element: Symmetrical Parabola
VPC 160+83.20 R1 283.34
VPI 163+44.51 R1 275.46
VPT 166+05.82 R1 278.14
VLP 164+73.37 R1 277.46
Length: 522.62
Entrance Grade: -3.02%
Exit Grade: 1.02%
r = 100 * (g2 - g1) / L: 0.77
K = l / (g2 - g1): 129.40
Middle Ordinate: 2.64

Element: Linear
VPT 166+05.82 R1 278.14
VPC 194+54.82 R1 307.30
Tangent Grade: 1.02%
Tangent Length: 2849.00

Element: Symmetrical Parabola
VPC 194+54.82 R1 307.30
VPI 200+10.58 R1 312.99
VPT 205+66.33 R1 296.64
VHP 197+41.74 R1 308.77
Length: 1111.51
Entrance Grade: 1.02%
Exit Grade: -2.94%
r = 100 * (g2 - g1) / L: -0.36
K = l / (g2 - g1): 280.32
Middle Ordinate: -5.51

Element: Linear
VPT 205+66.33 R1 296.64
VPC 218+50.84 R1 258.86
Tangent Grade: -2.94%
Tangent Length: 1284.51

Element: Symmetrical Parabola
VPC 218+50.84 R1 258.86
VPI 222+50.09 R1 247.11
VPT 226+49.34 R1 254.55
VLP 223+39.70 R1 251.67
Length: 798.51
Entrance Grade: -2.94%
Exit Grade: 1.86%
r = 100 * (g2 - g1) / L: 0.60
K = l / (g2 - g1): 166.19
Middle Ordinate: 4.80

Element: Linear
VPT 226+49.34 R1 254.55
VPC 228+17.47 R1 257.68
Tangent Grade: 1.86%
Tangent Length: 168.12

Element: Symmetrical Parabola
VPC 228+17.47 R1 257.68
VPI 232+40.84 R1 265.57
VPT 236+64.22 R1 258.23
VHP 232+56.00 R1 261.77
Length: 846.75
Entrance Grade: 1.86%
Exit Grade: -1.73%
r = 100 * (g2 - g1) / L: -0.42
K = l / (g2 - g1): 235.37
Middle Ordinate: -3.81

Element: Linear
VPT 236+64.22 R1 258.23
VPC 238+47.72 R1 255.05
Tangent Grade: -1.73%
Tangent Length: 183.51

Element: Symmetrical Parabola
VPC 238+47.72 R1 255.05
VPI 242+89.33 R1 247.39
VPT 247+30.93 R1 267.13
VLP 240+94.60 R1 252.90
Length: 883.21
Entrance Grade: -1.73%
Exit Grade: 4.47%
r = 100 * (g2 - g1) / L: 0.70
K = l / (g2 - g1): 142.35
Middle Ordinate: 6.85

Element: Linear
VPT 247+30.93 R1 267.13
VPC 255+15.12 R1 302.18
Tangent Grade: 4.47%
Tangent Length: 784.18

Element: Symmetrical Parabola
VPC 255+15.12 R1 302.18
VPI 260+93.71 R1 328.05
VPT 266+72.30 R1 312.84
VHP 262+43.83 R1 318.47
Length: 1157.18
Entrance Grade: 4.47%
Exit Grade: -2.63%
r = 100 * (g2 - g1) / L: -0.61
K = l / (g2 - g1): 163.01
Middle Ordinate: -10.27

Element: Linear
VPT 266+72.30 R1 312.84
VPC 267+15.02 R1 311.72
Tangent Grade: -2.63%
Tangent Length: 42.72

Element: Symmetrical Parabola
VPC 267+15.02 R1 311.72
VPI 270+29.60 R1 303.45
VPT 273+44.19 R1 304.12
VLP 272+96.91 R1 304.07
Length: 629.17
Entrance Grade: -2.63%
Exit Grade: 0.21%
r = 100 * (g2 - g1) / L: 0.45
K = l / (g2 - g1): 221.38
Middle Ordinate: 2.24

Element: Linear
VPT 273+44.19 R1 304.12
POT 273+48.88 R1 304.13
Tangent Grade: 0.21%
Tangent Length: 4.69

NOTE: THIS ALIGNMENT DATA IS APPROXIMATED FROM THE SURVEY.

STATE OF TEXAS
SAMANTHA JO HARRIS
134616
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PROFESSIONAL ENGINEER
P.E.
04/06/2023

Texas Department of Transportation

FM 1632

VERTICAL ALIGNMENT DATA SHEET

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
2782	01	013	FM 1632
DIST	COUNTY		SHEET NO.
ATL	TYLER		49D

DATE: 4/6/2023 3:37:10 PM
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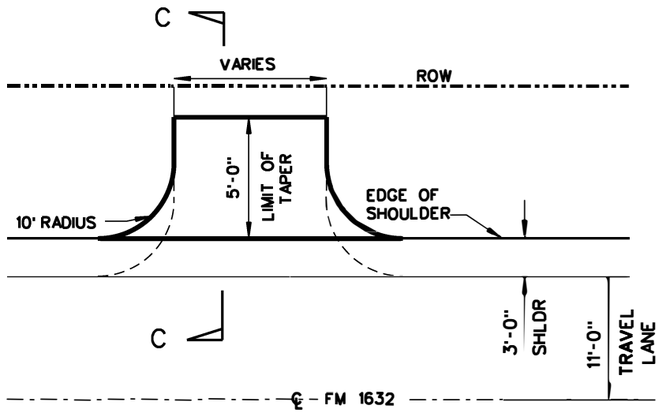
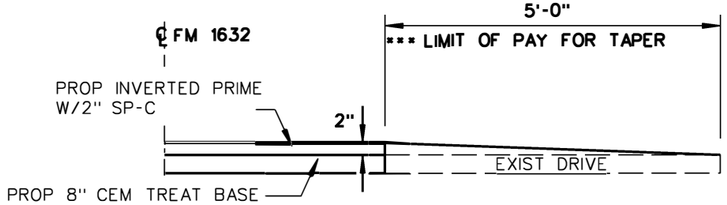


TYPICAL FOR DIRT, GRASS, ROCK, ASPH DRIVEWAYS

NTS



SECTION "C-C"

NTS

*** FINAL TAPER TO CONSIST OF FLEX BASE FOR DIRT, GRASS & ROCK DRIVES.

STATE OF TEXAS
JASON D. WALDREP
107826
LICENSED
PROFESSIONAL ENGINEER

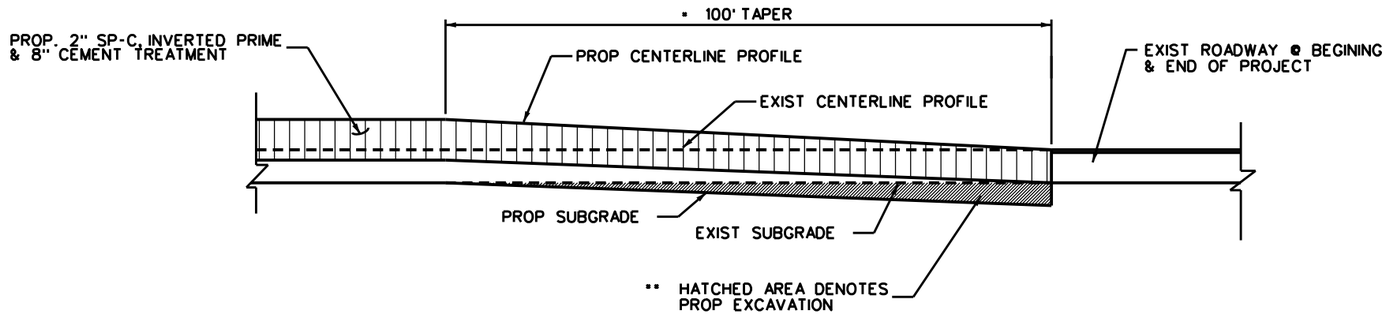
Jason D. Waldrep, P.E.

04/06/2023

SIDE ROAD/DRIVEWAY DETAILS

NOT TO SCALE

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			50
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632



TYPICAL TRANSITION PROFILE

TO BE USED AT BEGINNING AND END OF PROJECTS.

* TAPER LENGTH MAY BE MODIFIED WHEN APPROVED BY THE ENGINEER.

** PROPOSED EXCAVATION FOR TAPERS WILL NOT BE PAID FOR DIRECTLY, BUT CONSIDERED SUBSIDIARY TO VARIOUS OTHER ITEMS.

STATE OF TEXAS
JASON D. WALDREP
107826
LICENSED
PROFESSIONAL ENGINEER

Jason D. Waldrep, P.E.

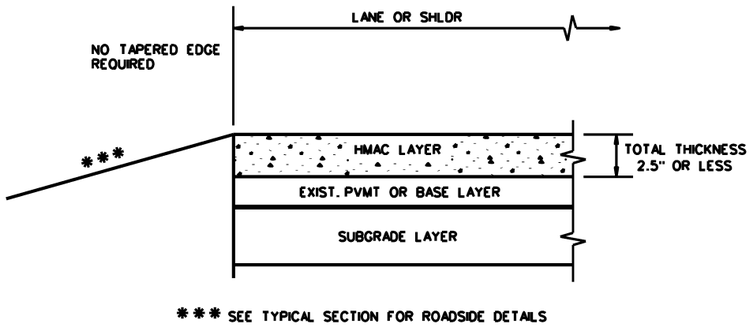
03/29/2023

Texas Department of Transportation

TYPICAL PROFILE TRANSITION DETAIL

DR. BY	FED. RD. DIV. NO.		SHEET NO.
•	6		51
CK. BY	STATE	STATE DIST. NO.	COUNTY
•	TEXAS	BMT	TYLER
DW. BY	CONT.	SECT.	JOB	HIGHWAY NO.
•	2782	01	013	FM 1632
CK. BY				
•				

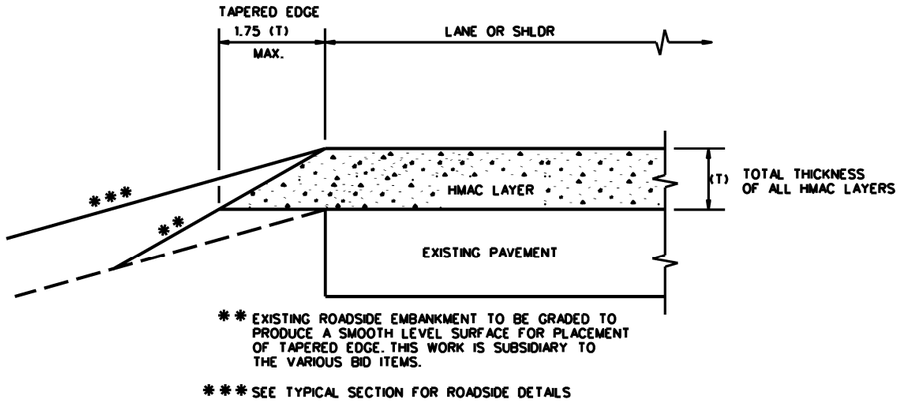
DATE: 3/28/2023
FILE: T:\BMTDESGN\Projects\2782-01-013 FM 1632\DGN\Standards\tehmac11.dgn



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 1

THIN HMAC SURFACES OR HMAC OVERLAY WITH THICKNESS OF 2.5" OR LESS

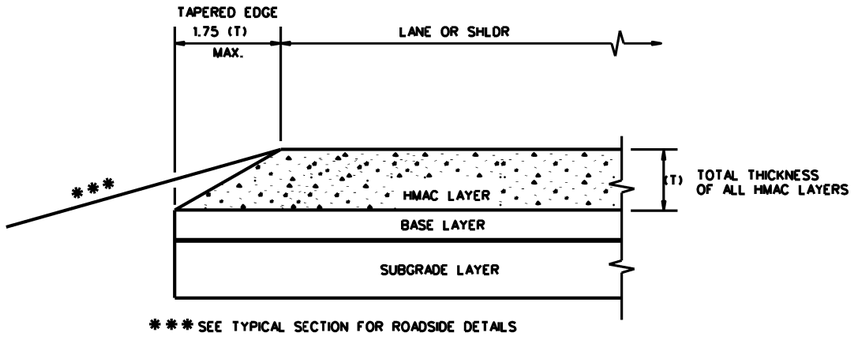


** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2

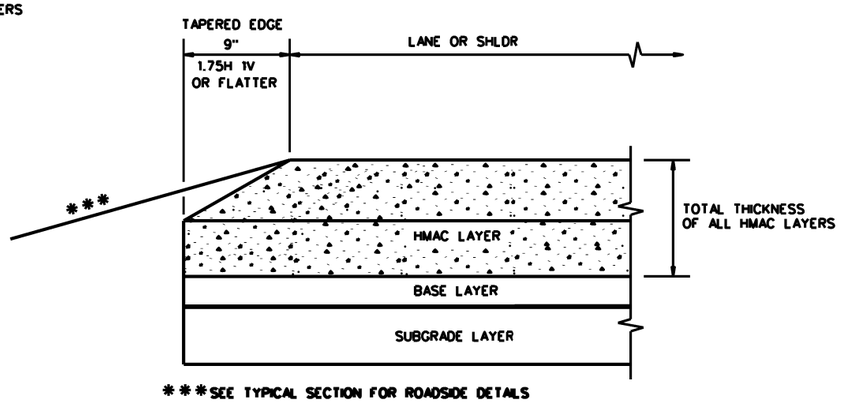
OVERLAY OF EXISTING PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3

NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4

NEW OR RECONSTRUCTED PAVEMENT HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

GENERAL NOTES

1. UNLESS OTHERWISE SHOWN IN THE PLANS, A VERTICAL EDGE IS PERMISSIBLE FOR HMAC PLACED GREATER THAN 5" BELOW THE EDGE OF PAVEMENT AND FOR THICKNESS OF HMAC LESS THAN 2.5".
2. FOR FURTHER INFORMATION REGARDING THE ROADSIDE AND PAVEMENT DETAILS, SEE TYPICAL SECTIONS.
3. PAYMENT FOR TAPERED EDGE WILL BE IN ACCORDANCE WITH APPLICABLE ITEMS IN THE CONTRACT.
4. THE SLOPE OF THE TAPERED EDGE SHALL BE 1.75H 1V: OR FLATTER.
5. THE TAPERED EDGE SHALL BE PRODUCED BY USE OF A SCREED ATTACHMENT CAPABLE OF PRODUCING A SMOOTH COMPACTED SURFACE. ADDITIONAL COMPACTING EFFORT BEHIND THE SCREED IS NOT REQUIRED.

Texas Department of Transportation

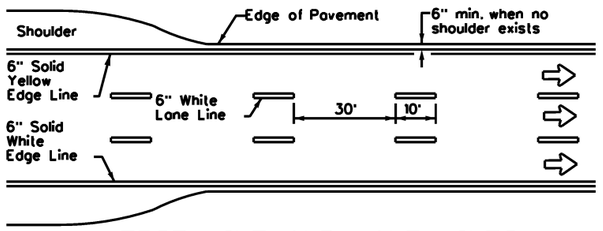
Design Division Standard

TAPERED EDGE DETAILS HMAC PAVEMENT

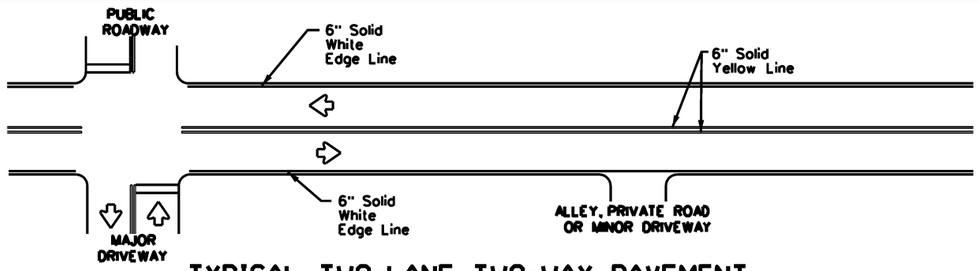
TE(HMAC)-11

FILE: tehmac11.dgn	DN: TxDOT	CK: RL	DW: KB	CK:
© TxDOT January 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	2782	01	013	FM 1632
	DIST	COUNTY		SHEET NO.
	BMT	TYLER		52

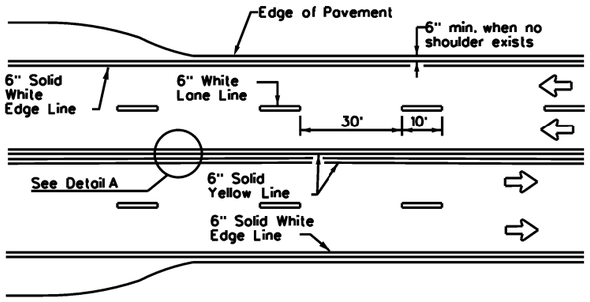
DATE: 3/28/2023 3:22:05 PM
FILE: T:\BMTDESIGN\Projects\2782-01-013 FM 1632\DGN\Standards\pm1-22.dgn

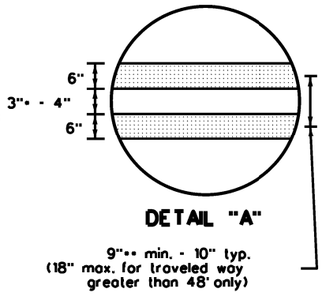


EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



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





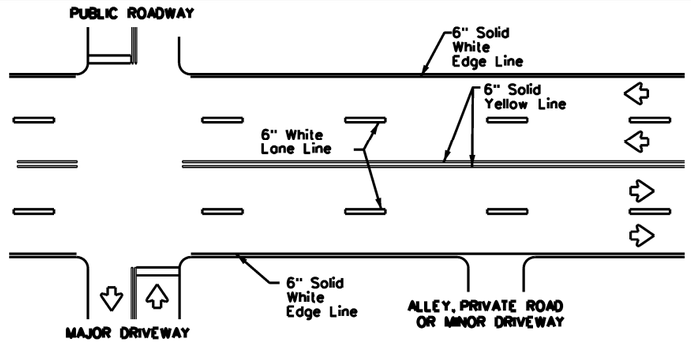
DETAIL "A"

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

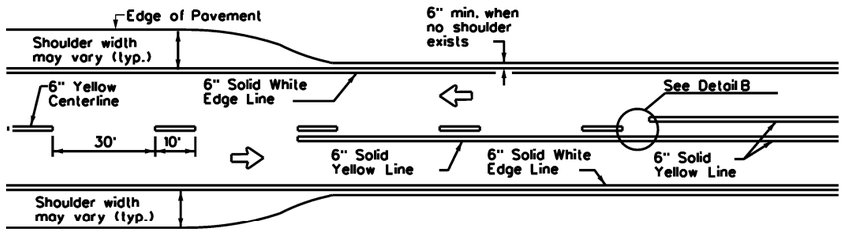
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

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

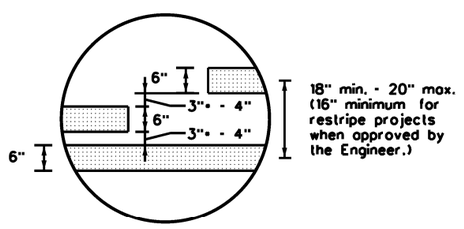
•• 8" minimum for restripe projects when approved by the Engineer.



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

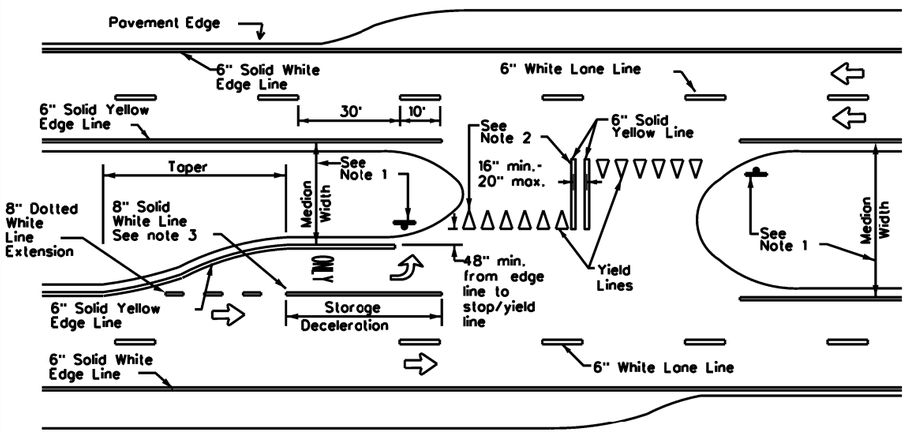


TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

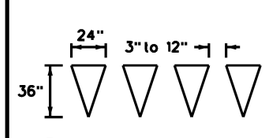


DETAIL "B"

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

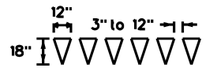


FOUR LANE DIVIDED ROADWAY CROSSOVERS



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.

NOTES

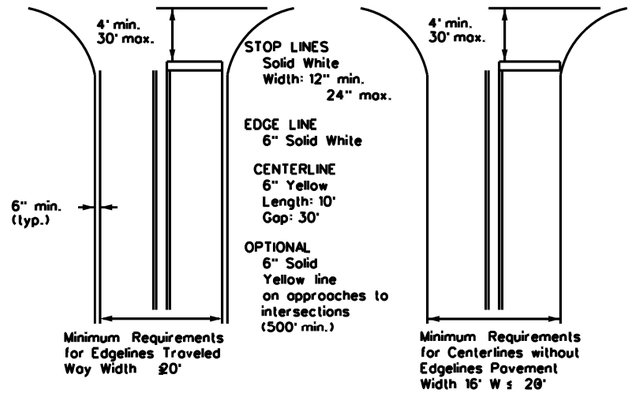
1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections.
   Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling 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

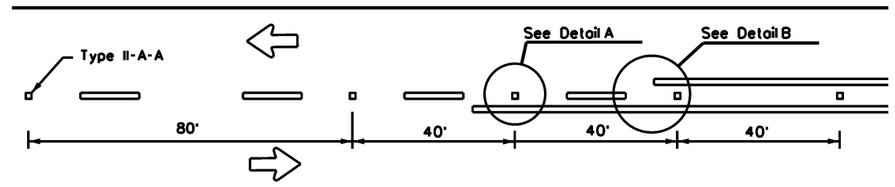
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

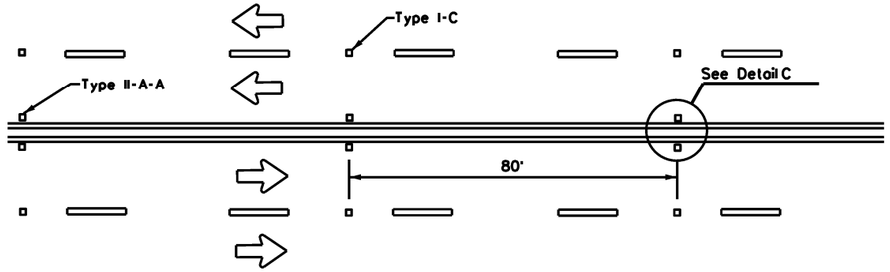
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	2782	01	013	FM 1632
11-78 8-00 6-20	DIST	COUNTY		SHEET NO.
8-95 3-03 12-22	BMT	TYLER		53
5-00 2-12				

22A

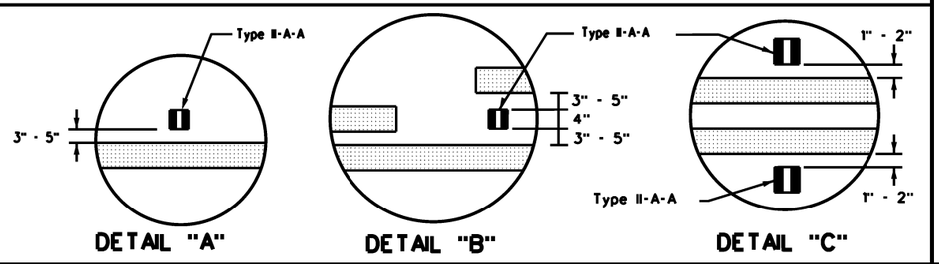
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

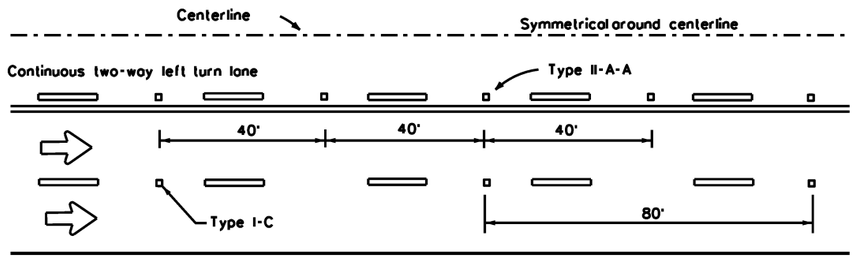


CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS

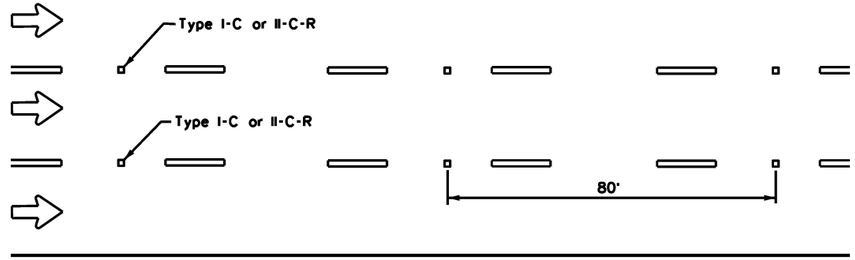


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY ROADWAYS





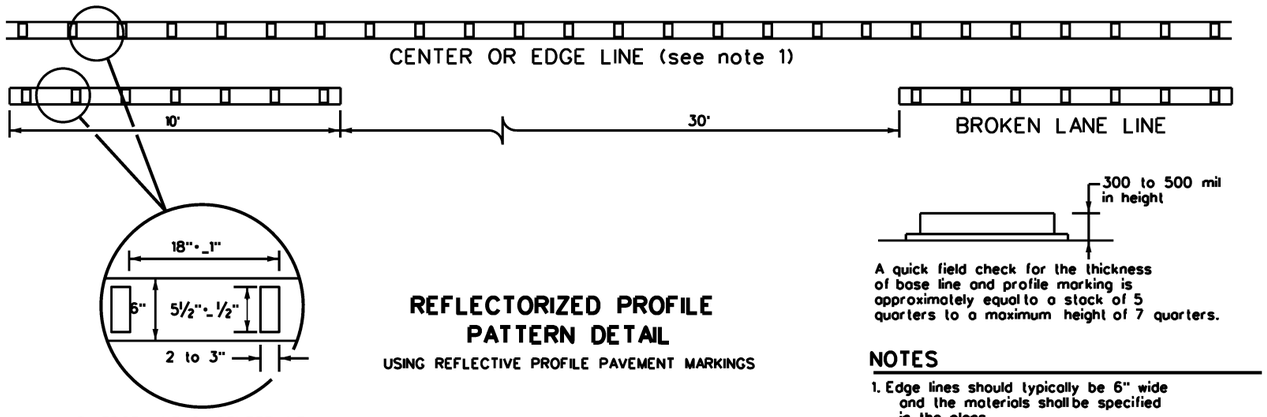
CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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

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

See Note 3.



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

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

NOTES

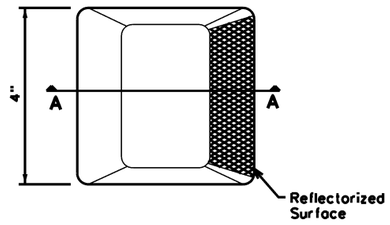
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

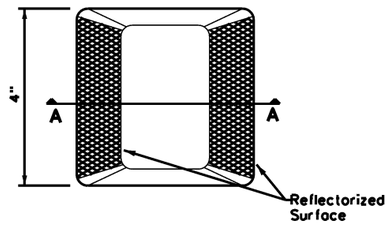
1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

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

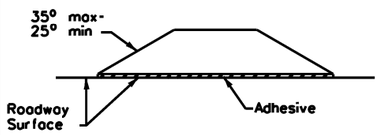
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

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	2782	01	013	FM 1632
	DIST	COUNTY		SHEET NO.
	BMT	TYLER		54

228

DATE: 3/28/2023 3:23:14 PM
FILE: TxDMTDESIGN\Projects\2782-01-013 FM 1632\DGN\Standards\pm2-22.dgn

REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

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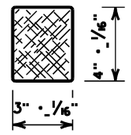
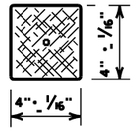
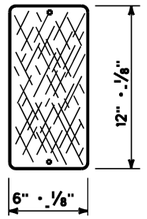
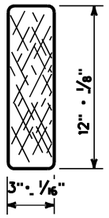
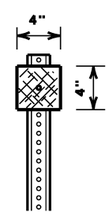
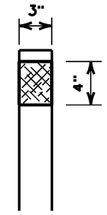
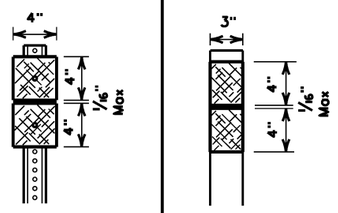
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

NOTE

1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (flx).
2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.

DELINEATORS

	SINGLE		DOUBLE	
DEVICE				
	1-Size 2 reflector unit	1-Size 1 reflector unit	2-Size 2 reflector units	2-Size 1 reflector units
SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

D & OM DESCRIPTIVE CODES

INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)

NUMBER OF REFLECTORS
- S = Single
- D = Double

COLOR OF REFLECTORS
- W = White
- Y = Yellow
- R = Red

REFLECTOR UNIT SIZE
- 1 or 2

TYPE OF POST OR DELINEATOR
- WC = Wing Channel Post
- YFLX = Yellow Flexible Post
- WFLX = White Flexible Post
- BRF = Barrier Reflector

TYPE OF MOUNT
- GND = Embedded (drivable or set in concrete)
- CTB = Concrete Barrier Mount
- GF1 or GF2 = Guard Fence Attachment
- SRF = Surface Mount

DIRECTION
- If Required
- BI = Bi-Directional
- BR = Bi-Directional with red on back

INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)

TYPE OF OBJECT MARKER
- 1, 2, 3, or 4

NUMBER OF REFLECTORS OR DIRECTION
- X = 3-Size 2 reflector units (Type 2 only)
- Y = 1-Size 3 reflector unit (Type 2 only)
- Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only)
- L = Left Side (Type 3 Object Marker only)
- R = Right Side (Type 3 Object Marker only)
- C = Center (Type 3 Object Marker only)

TYPE OF POST
- WC = Wing Channel Post
- WFLX = White Flexible Post
- TWT = Thin Walled Tubing

TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

DIRECTION
- If Required
- BI = Bi-Directional

OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
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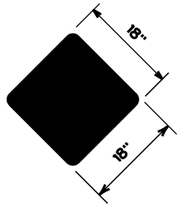
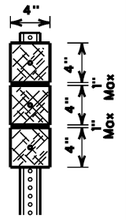
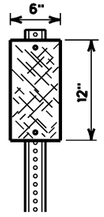
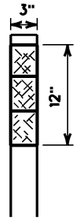
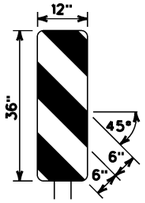
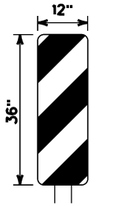
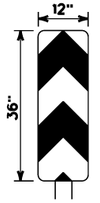
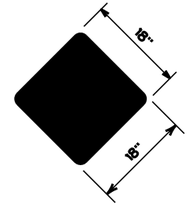
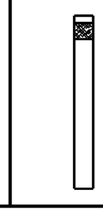
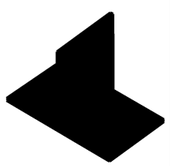
DEVICE								
		3-Size 2 reflector units	1-Size 3 reflector unit	3-Size 1 reflector units or 1-Size 4 reflector unit				
SHEETING	Yellow - Type B or C FL Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B or C FL Sheeting			Red - Type B or C FL Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

DEPARTMENTAL MATERIAL SPECIFICATIONS

FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES)	DMS-4400
SIGN FACE MATERIALS	DMS-8300
DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS	DMS-8600

BARRIER REFLECTORS (BRF)

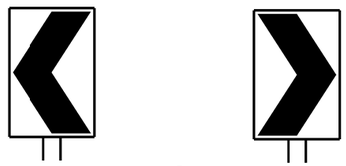
	GF1	GF2	CTB
DEVICE			

1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

SHEETING: Yellow, White, Red

NOTE
1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.

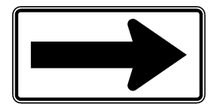
CHEVRONS

DEVICE:  W1-8

SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

NOTE
1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies).
2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).

ONE DIRECTION LARGE ARROW

DEVICE:  W1-6

SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
MOUNTING HEIGHT	7'-0"	

NOTE:

Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	2782	01	013	FM 1632
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	BMT	TYLER		55

20A

DATE: 3/28/2023 3:24:24 PM
FILE: TxDMTDESGN\Projects\2782-01-013 FM 1632\DGN\Standards\dom1-20.dgn

DATE: 3/28/2023 3:25:28 PM
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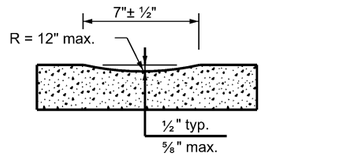
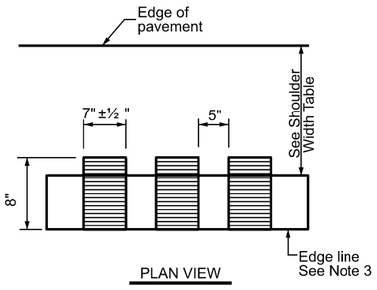
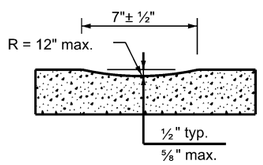


PROFILE VIEW
OPTION 1

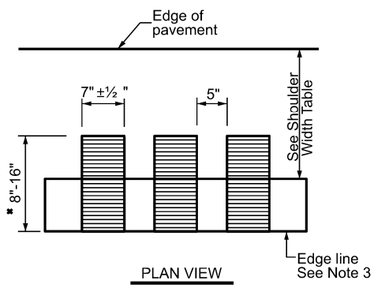


PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



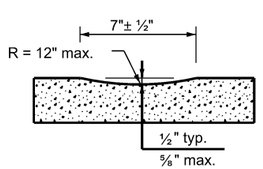
PROFILE VIEW
OPTION 2



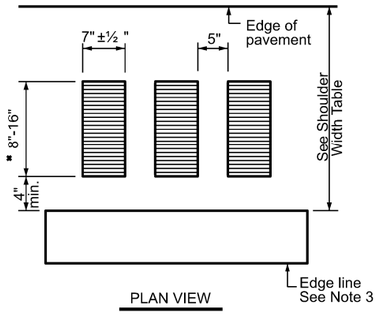
PLAN VIEW

✖ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



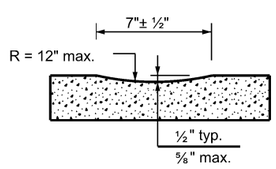
PROFILE VIEW
OPTION 3



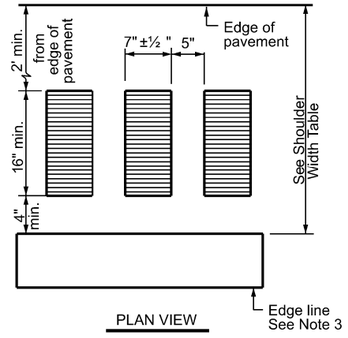
PLAN VIEW

✖ This distance may vary based on width of shoulder

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)

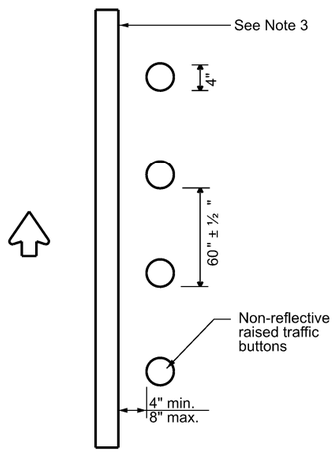


PROFILE VIEW
OPTION 4



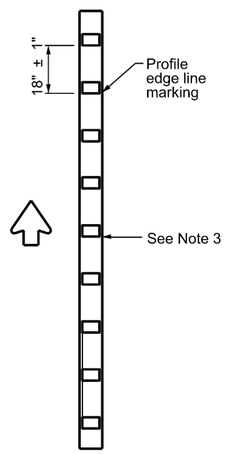
PLAN VIEW

CONTINUOUS MILLED DEPRESSIONS (Rumble Strips)



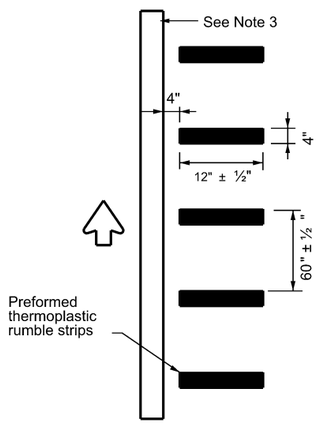
PLAN VIEW
OPTION 5

RAISED EDGE LINE (Rumble Strips)



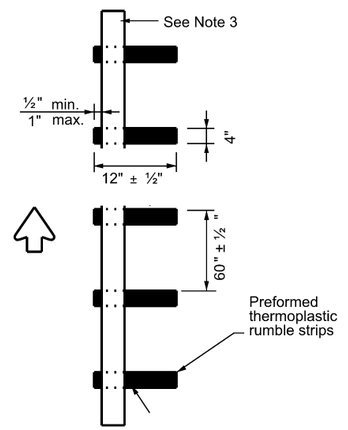
PLAN VIEW
OPTION 6

PROFILE EDGE LINE MARKINGS (Rumble Strips)



PLAN VIEW
OPTION 7

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)



PLAN VIEW
OPTION 8

PREFORMED THERMOPLASTIC EDGE LINE (Rumble Strips)

SHOULDER WIDTH TABLE		
EQUAL TO OR LESS THAN 2 FEET	GREATER THAN 2 FEET LESS THAN 4 FEET	EQUAL TO OR GREATER THAN 4 FEET
Option 1, 5, 6 or 8	Option 1, 2, 3 5, 6 or 7	Option 2, 4, 5 6 or 7

GENERAL NOTES

1. Rumble strips and profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
2. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
3. Use Standard Sheet PM(2) and FPM(1) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the Shoulder Width Table below for determining what options may be used for edge line rumble strips.
5. Breaks in edge line rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections, or driveways with high usage of large trucks when installed on conventional highways.
6. Rumble strips shall not be placed across exit or entrance ramps, acceleration or deceleration lanes, crossovers, gore areas, or intersections with other roadways.
7. Consideration should be given to noise levels when edgeline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING MILLED DEPRESSION EDGE LINE RUMBLE STRIPS:

9. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
10. Pavement markings can be applied over milled shoulder rumble strips to create an edge line rumble strip.

WHEN INSTALLING RAISED OR PROFILE EDGE LINE RUMBLE STRIPS:

11. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per the manufacturer's recommendations.
12. Non-reflective traffic buttons shall be placed adjacent to the pavement marking delineating the edge line when used as a rumble strip. The color of the button should match the color of the adjacent edge line marking (white or yellow). The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
13. Non-reflective traffic buttons shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
14. The minimum distance between the edge line and the buttons should be used if the shoulder is less than 8 feet in width.
15. Raised profile thermoplastic markings used as edge lines may substitute for buttons.

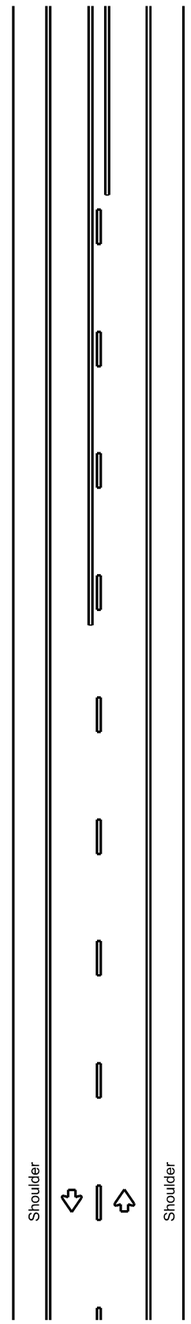
Texas Department of Transportation

Traffic Safety Division Standard

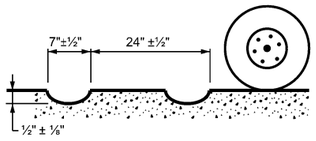
EDGE LINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS RS(2)-23

FILE: rs(2)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2782	01	013	FM 1632
10-13 1-23	DIST	COUNTY		SHEET NO.
	BMT	TYLER		56

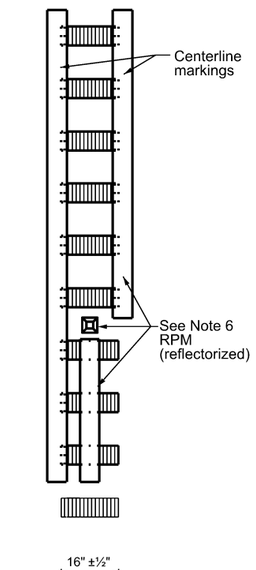
CENTERLINE RUMBLE STRIPS



TWO LANE TWO-WAY HIGHWAYS

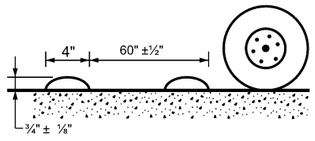


PROFILE VIEW

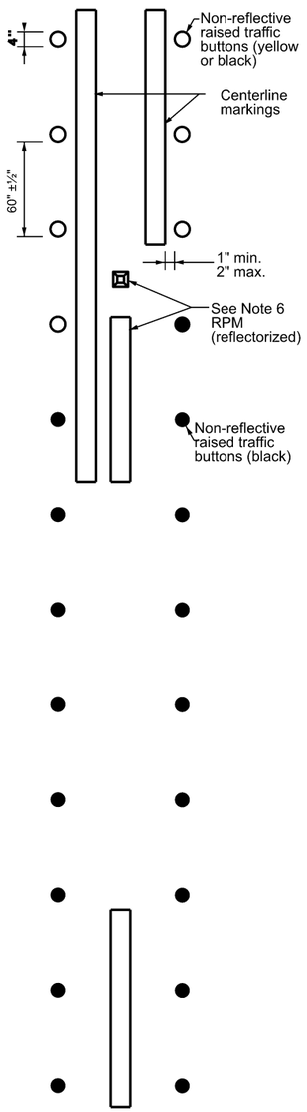


PLAN VIEW
OPTION 1

MILLED CENTERLINE RUMBLE STRIPS

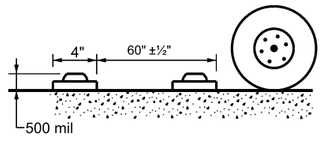


PROFILE VIEW

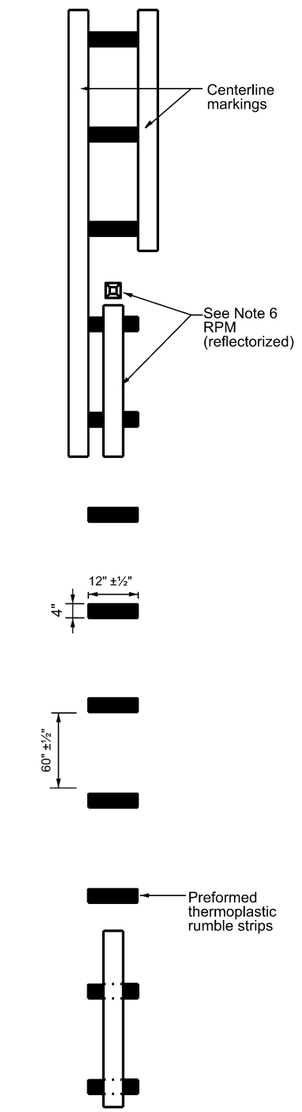


PLAN VIEW
OPTION 2

RAISED CENTERLINE RUMBLE STRIPS

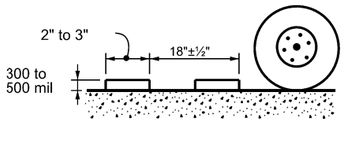


PROFILE VIEW

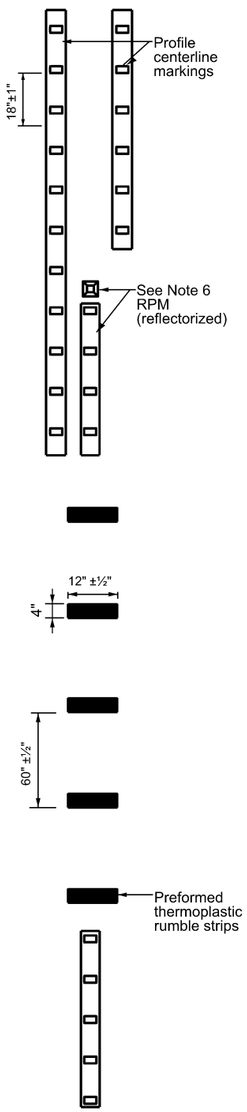


PLAN VIEW
OPTION 3

PREFORMED THERMOPLASTIC RUMBLE STRIPS



PROFILE VIEW



PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC RUMBLE STRIPS

GENERAL NOTES

1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edge line rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred when adequate pavement depth is available. If pavement thickness is less than 2 inches, milled rumble strips shall not be used. Rumble strips shall not be milled or depressed into bridge decks.
4. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Safety Division.
5. Breaks in milled centerline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections or driveways with high usage of large trucks.
6. Use standard sheet PM(2) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings and profile markings.
7. Consideration should be given to noise levels when centerline rumble strips are to be installed near residential areas, schools, churches, etc. A 3/8 inch deep (minimum) milled rumble strip may be considered in these areas.
8. Pavement markings must be applied over milled centerline rumble strips.

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

9. Raised rumble strips consisting of non-reflective raised traffic buttons may be used. Non-reflective raised traffic buttons can be affixed to asphalt or concrete with bitumen or adhesives, as per manufacturer's recommendations.
10. When using non-reflective raised traffic buttons as a centerline rumble strip, the button shall be placed adjacent to the pavement marking delineating the centerline. The buttons will be paid for under Item 672, "Raised Pavement Markers." Non-reflective traffic buttons must meet the requirements of DMS-4300.
11. The color of the button should be yellow for a continuous no passing roadway. Black buttons should be used in areas where passing is allowed.
12. Consideration shall be given to bicyclists. See RS(6).

WHEN INSTALLING EDGE LINE RUMBLE STRIPS WITH OR WITHOUT CENTERLINE RUMBLE STRIPS ON UNDIVIDED HIGHWAYS:

13. See standard sheet RS(2).

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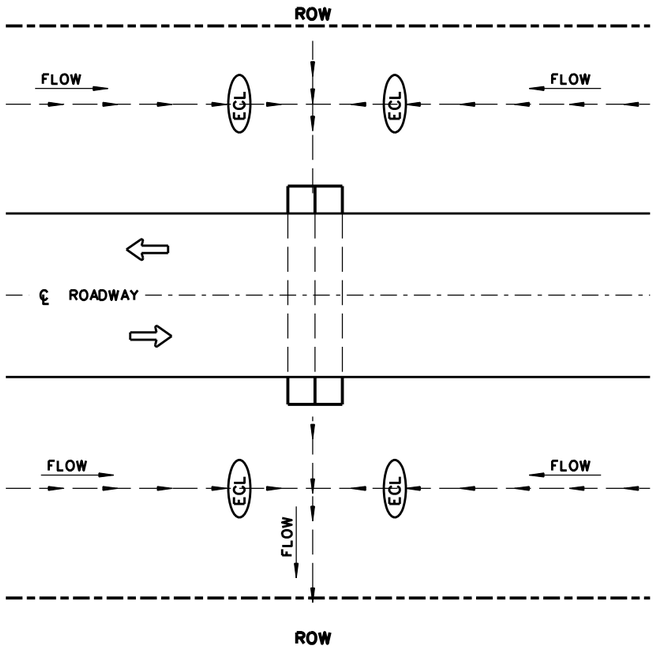
Texas Department of Transportation

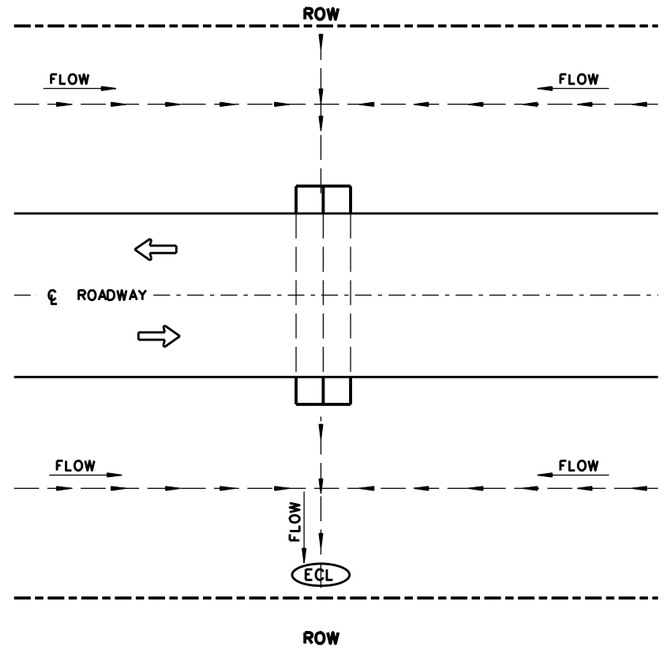
Traffic Safety Division Standard

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS RS(4)-23

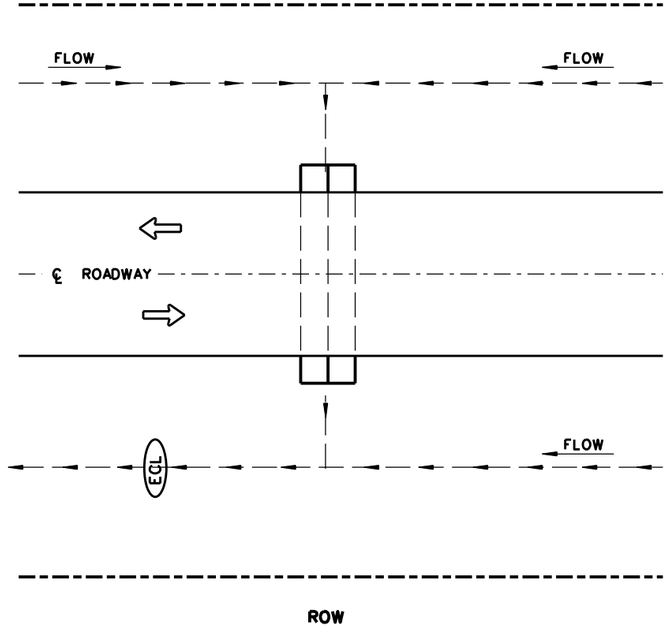
FILE: rs(4)-23.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT January 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS	2782	01	013	FM 1632
10-13 1-23	DIST	COUNTY		SHEET NO.
	BMT	TYLER		57



Ⓐ TYPICAL DEEP OUTFALL
NTS



Ⓑ TYPICAL SHALLOW OUTFALL
NTS



Ⓒ TYPICAL EQUALIZER
NTS

LEGEND:

Ⓧ EROSION CONTROL SETUP

EDGE OF PAVEMENT

℄ OF DITCH

ECL EROSION CONTROL LOG

STATE OF TEXAS
JASON D. WALDREP
107826
LICENSED
PROFESSIONAL ENGINEER

Jason D. Waldrep, P.E.

03/29/2023

EROSION CONTROL MEASURES

NOT TO SCALE

FHWA TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
			58
STATE	DISTRICT	COUNTY	
TEXAS	BMT	TYLER	
CONTROL	SECTION	JOB	HIGHWAY NO.
2782	01	013	FM 1632

FILE: T:\BMTDESGN\Projects\2782-01-013 FM 1632\DGN\Standards\Erosion Control Measures.dgn
DATE: 3/29/2023 10:33:16 AM

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):
2782-01-013

1.2 PROJECT LIMITS:
From: FM 256, SOUTH

To: US 69

1.3 PROJECT COORDINATES:
BEGIN: (Lat) 30.8649002 ,(Long) -94.4889865

END: (Lat) 30.8214536 ,(Long) -94.4288823

1.4 TOTAL PROJECT AREA (Acres): 21.32

1.5 TOTAL AREA TO BE DISTURBED (Acres): 3.76

1.6 NATURE OF CONSTRUCTION ACTIVITY:
MIXING THE EXISTING BASE WITH NEW BASE AND CEMENT TO WIDEN THEN OVERLAY.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
NhB	Newco fine sandy loam, 1 to 5 percent slopes
UrB	Urland fine sandy loam, 1 to 5 percent slopes
WnB	Woodville very fine sandy loam, 1 to 5 percent slopes

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.)

- ☐ Mobilization
- ☒ Install sediment and erosion controls
- ☐ Blade existing topsoil into windrows, prep ROW, clear and grub
- ☐ Remove existing pavement
- ☒ Grading operations, excavation, and embankment
- ☒ Excavate and prepare subgrade for proposed pavement widening
- ☐ Remove existing culverts, safety end treatments (SETs)
- ☐ Remove existing metal beam guard fence (MBGF), bridge rail
- ☒ Install proposed pavement per plans
- ☒ Install culverts, culvert extensions, SETs
- ☐ Install mow strip, MBGF, bridge rail
- ☐ Place flex base
- ☐ Rework slopes, grade ditches
- ☐ Blade windrowed material back across slopes
- ☐ Revegetation of unpaved areas
- ☐ Achieve site stabilization and remove sediment and erosion control measures
- ☐ Other: _____
- ☐ 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
Turkey Creek Segment ID: 0608F	Village Creek Segment ID: 0608

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- ☒ Development of plans and specifications
- ☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- ☒ Post Construction Site Notice
- ☒ Submit NOI/CSN to local MS4
- ☒ Perform SWP3 inspections
- ☒ Maintain SWP3 records and update to reflect daily operations
- ☒ Complete and submit Notice of Termination to TCEQ
- ☒ Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- ☒ Day To Day Operational Control
- ☒ Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- ☒ Post Construction Site Notice
- ☒ Submit NOI/CSN to local MS4
- ☒ Maintain schedule of major construction activities
- ☒ Install, maintain and modify BMPs
- ☒ Complete and submit Notice of Termination to TCEQ
- ☒ Maintain SWP3 records for 3 years
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
			59
STATE	STATE DIST.	COUNTY	
TEXAS	BMT	TYLER	
CONT.	SECT.	JOB	HIGHWAY NO.
2782	01	013	FM 1632

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

- [x] ☐ Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ [x] Permanent Planting, Sodding or Seeding
- [x] ☐ 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

- [x] ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Dewatering Controls
- ☐ ☐ Inlet Protection
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Sandbag Berms
- ☐ ☐ Sediment Control Fence
- ☐ ☐ Stabilized Construction Exit
- ☐ ☐ Floating Turbidity Barrier
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Vegetated Filter Strips
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

Refer to the Environmental Layout Sheets/ SWP3 Layout Sheets located in Attachment 1.2 of this SWP3

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- ☐ ☐ Sediment Trap
  - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
  - ☐ 3,600 cubic feet of storage per acre drained
- ☐ ☐ Sedimentation Basin
  - ☐ Not required (<10 acres disturbed)
  - ☐ Required (>10 acres) and implemented.
    - ☐ Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
    - ☐ 3,600 cubic feet of storage per acre drained
  - ☐ Required (>10 acres), but not feasible due to:
    - ☐ Available area/Site geometry
    - ☐ Site slope/Drainage patterns
    - ☐ Site soils/Geotechnical factors
    - ☐ Public safety
    - ☐ Other: _____

2.3 PERMANENT CONTROLS:

(Coordinate post-construction BMPs with appropriate TxDOT maintenance sections.)

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To
Seeding	0+00	273+10

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
- ☐ 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 .

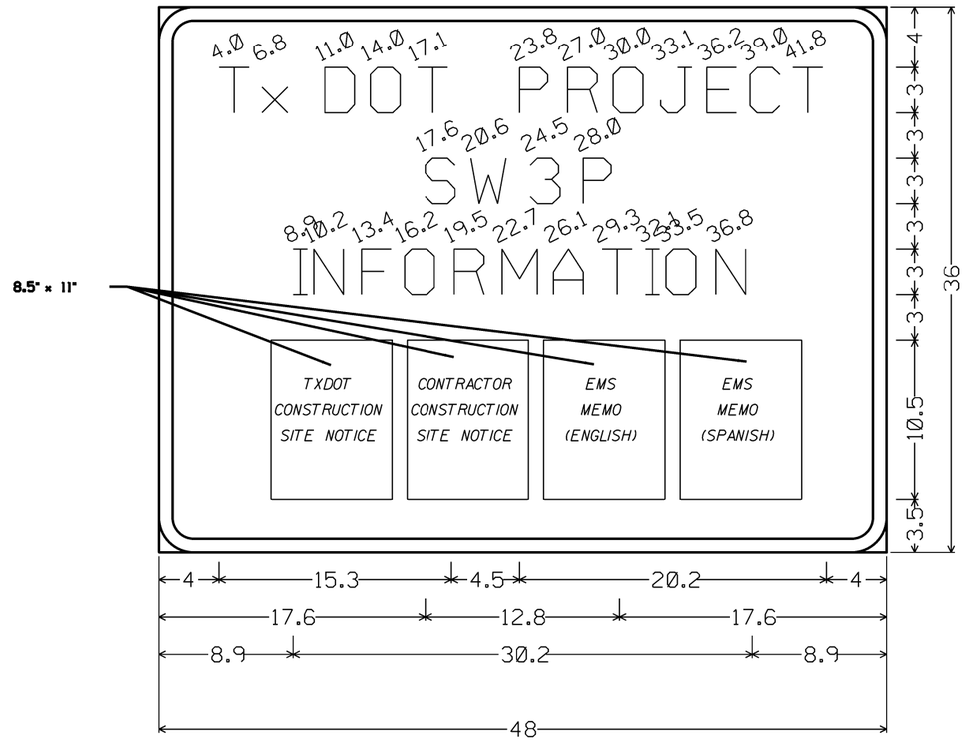
2.9 MAINTENANCE:

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.
			60
STATE	STATE DIST.	COUNTY	
TEXAS	BMT	TYLER	
CONT.	SECT.	JOB	HIGHWAY NO.
2782	01	013	FM 1632



2.3" Radius, 0.9" Border, White on Blue;
[TxDOT PROJECT] E Mod; [SW3P] E Mod; [INFORMATION] E Mod;

NOTES:

For projects disturbing 5 or more acres, place laminated copies of the TxDOT and Contractor Construction Site Notices and the TxDOT and Contractor Notices of Intent on the SW3P Notification Board.

For projects disturbing between 1 and 5 acres, place laminated copies of the TxDOT and Contractor Construction Site Notices on the SW3P Notification Board.

For projects with an Individual Permit with the US Army Corp of Engineer, place a laminated copy of the Permit Certificate on the Notification Board.

Center all postings.

Notification Boards are to be constructed from chloroplast and placed at a location within the right-of-way but outside the clear zone as directed by the Engineer. This work will not be paid for directly, but will be considered subsidiary to other items.

CSN - Construction Site Notice, Large for projects greater than 5 acres, Small for projects greater than 1 and less than 5 acres.

Texas Department of Transportation

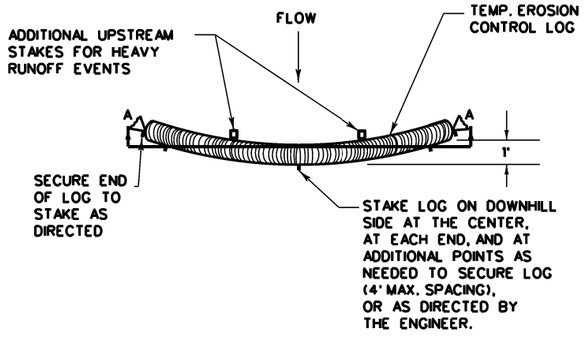
BEAUMONT DISTRICT

SW3P NOTIFICATION BOARD DETAIL

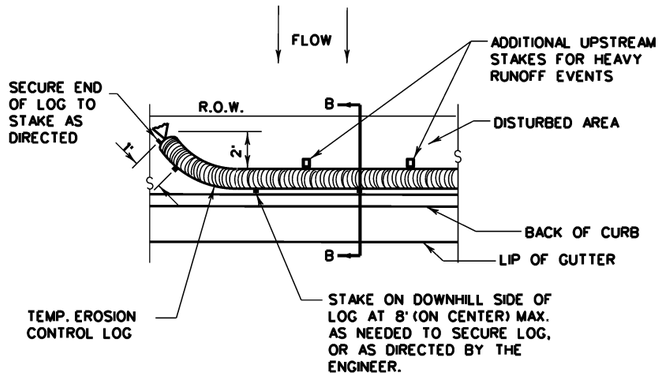
(SW3P-B)

REVISIONS	FROM TEXAS DIVISION	FEDERAL AID PROJECT NO.		SHEET NO.
©2022				61
	STATE	DISTRICT	COUNTY	
	TEXAS	BMT	TYLER	
	CONTROL	SECTION	JOB	HIGHWAY NO.
	2782	01	013	FM 1632

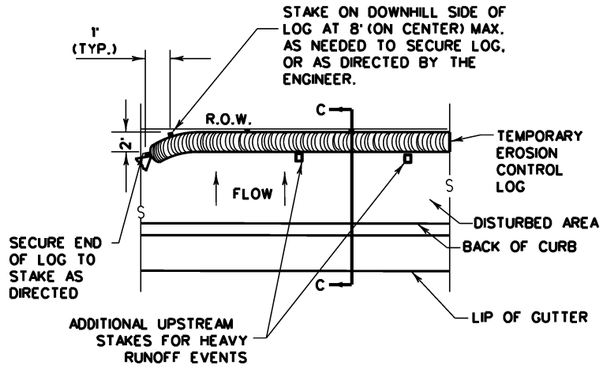
DATE: 3/28/2023
FILE: T:\BMTDESGN\Projects\2782-01-013 FM 1632\DGN\Standards\ec916.dgn



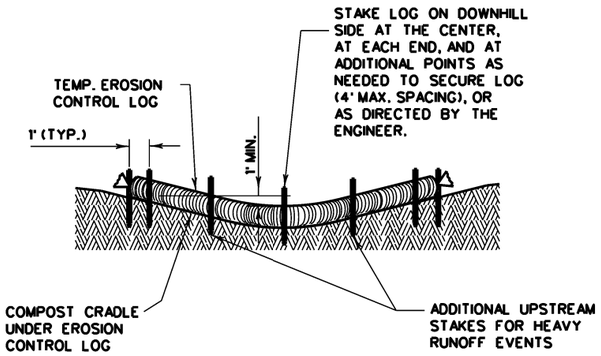
PLAN VIEW



PLAN VIEW



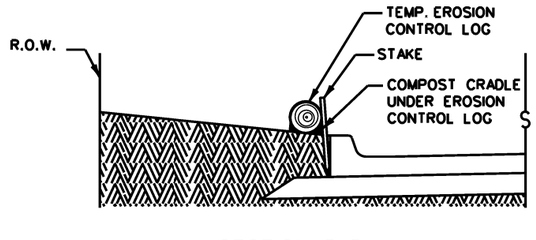
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

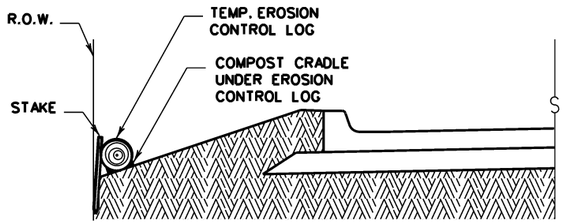
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

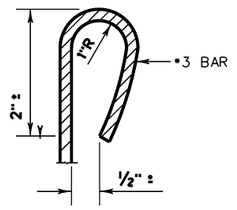
CL-BOC



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.

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.

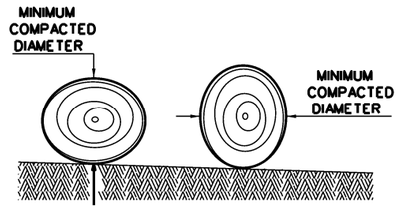
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SHEET 1 OF 3

Texas Department of Transportation

Design Division Standard

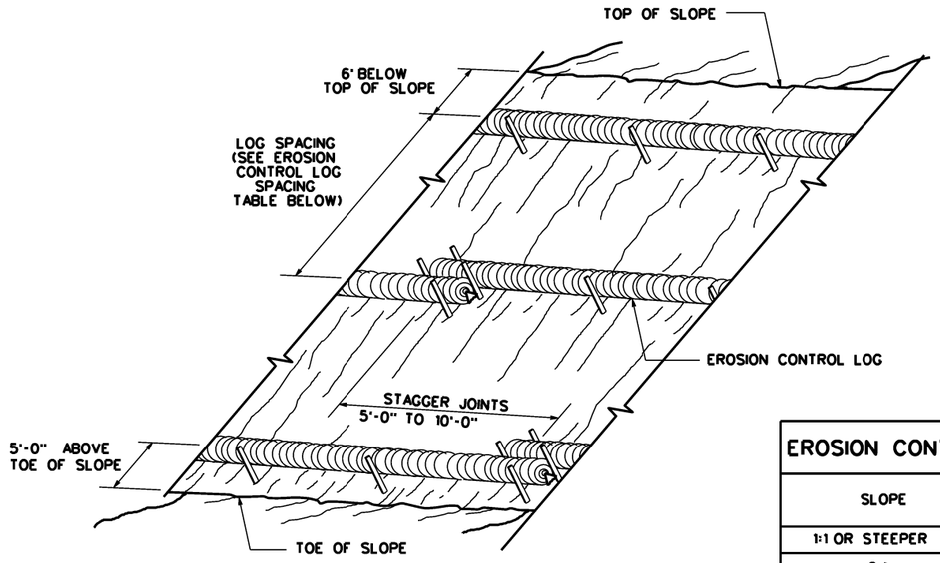
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

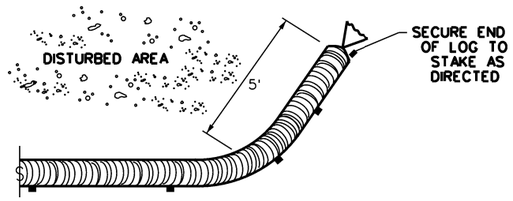
FILE: ec916	DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	2782	01	013		FM 1632	
	DIST	COUNTY				SHEET NO.
	BMT	TYLER				62

DATE: 3/28/2023
FILE: T:\BMTDESGN\Projects\2782-01-013 FM 1632\DGN\Standards\ec916.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

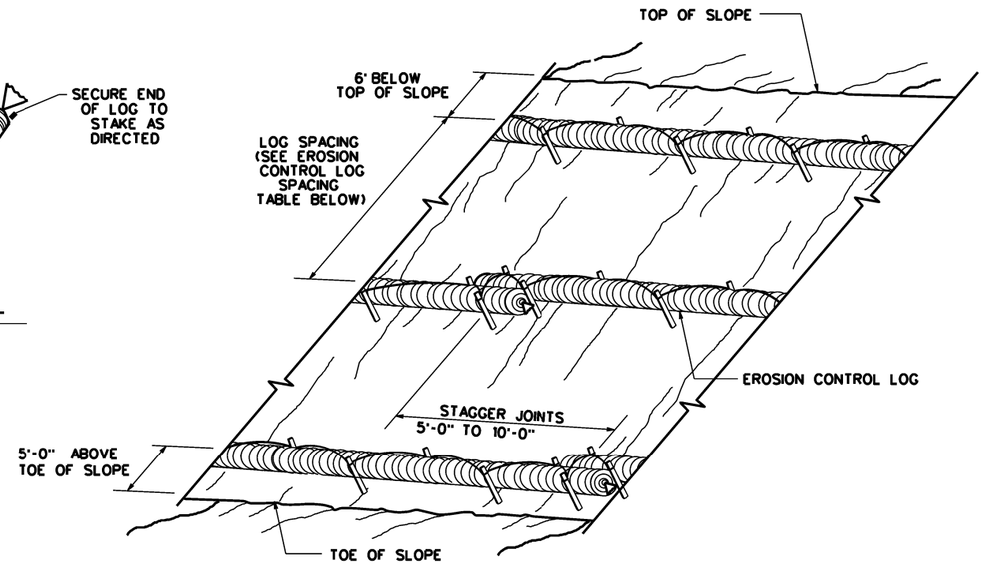
CL-SST



END SECTION RAP DETAIL

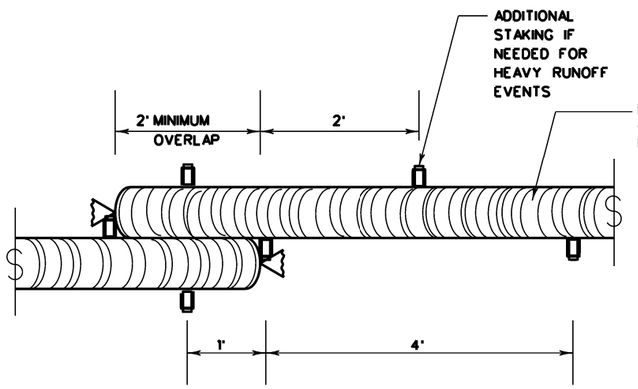
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

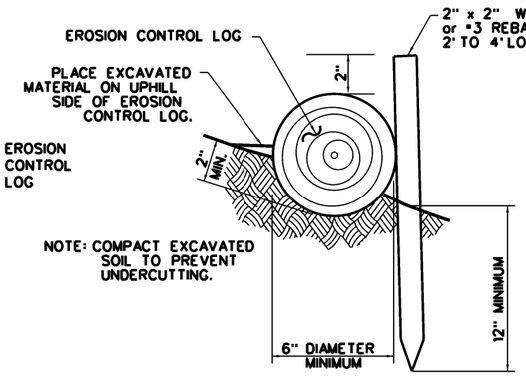
• ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER:
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

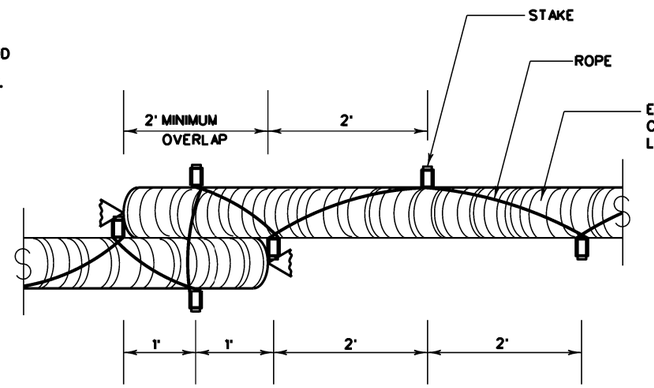


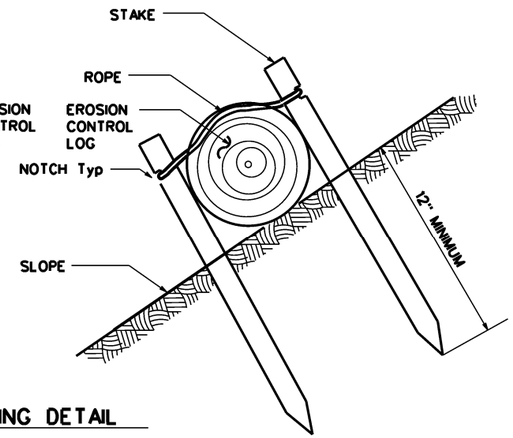


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

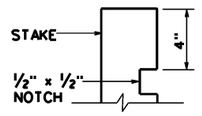
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





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	2782	01	013	FM 1632
	DIST	COUNTY		SHEET NO.
	BMT	TYLER		63

DATE: 3/28/2023
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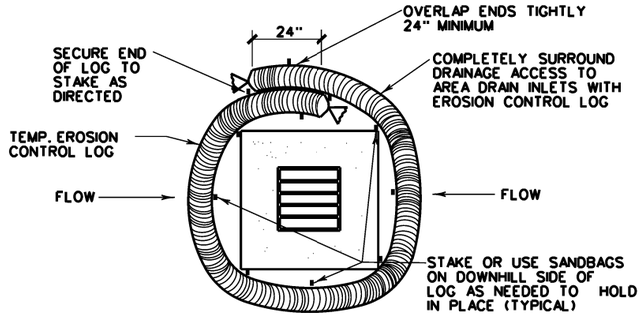
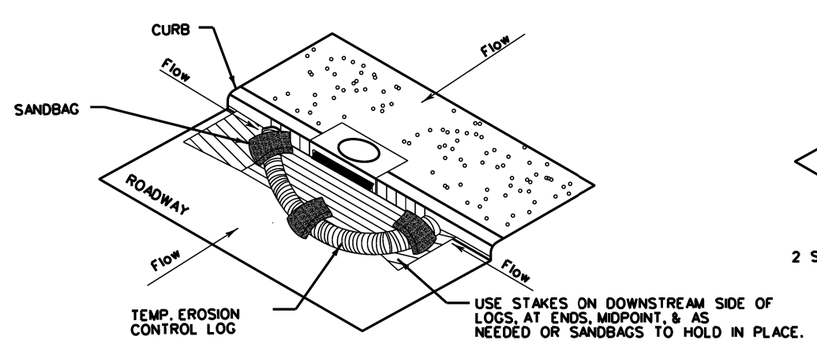


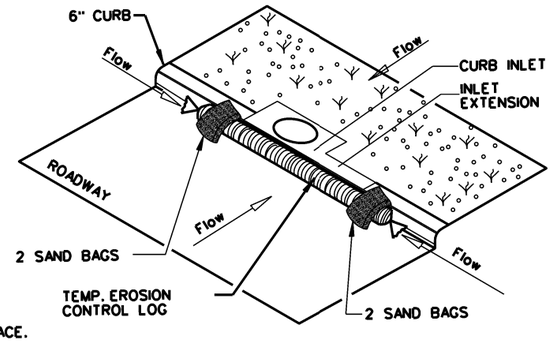
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

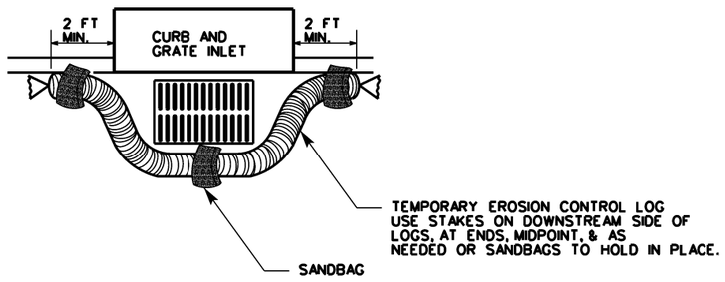
CL-CI



EROSION CONTROL LOG AT CURB INLET

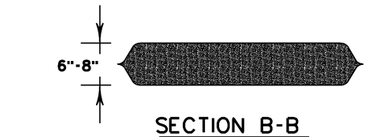
CL-CI

NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.

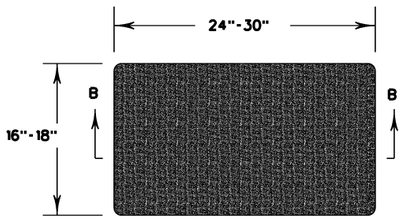


EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



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	2782	01	013		FM 1632		
	DIST	COUNTY				SHEET NO.	
	BMT	TYLER				64	

DATE:
FILE:

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. TxDOT - Beaumont District

☐ 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 as required by the Engineer.
3. This project disturbs more than one but less than five acres. The Contractor is required to post a Construction Site Notice in a manner which meets TCEQ Permit 150000 requirements and conforms to TxDOT standards. Contractor shall provide a copy of the Construction Site Notice to any adjacent non-TxDOT MS4 Operator. Contractor is responsible for acquiring permits from any adjacent non-TxDOT MS4 Operatopr. Contact the Beaumont District Construction Office with questions regarding TCEQ Permit 150000.
4. Take measures to prevent construction materials and debris including, but not limited to wastewater (i.e., cooling liquid, etc.) associated with concrete removal from entering any inlets, ditches, or waterways.

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, including Regional conditions for the State of Texas, 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: Permit # _____

☐ 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. Maintain a neat and clean worksite next to the water and do not allow any debris to fall into the water.
2. Comply with "Work In or Near Waters/Wetlands Regulatory Requirements and Best Management Practices" section found in the Beaumont District Environmental Field Guide.

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	

III. CULTURAL RESOURCES

☐ No Action Required ☒ Required Action

Action No.

1. 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.

IV. VEGETATION RESOURCES

☐ No Action Required ☒ Required Action

Action No.

1. 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.

2. Comply with "Vegetation and Habitat Impacts: Regulatory Requirements and Best Management Practices" section found in the Beaumont District Environmental Field Guide.

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. If any animal enters the work area, do not harm, harass, or attempt to handle; let the animal leave on its own. Do not impact dens of animals if found.
2. If caves or sinkholes are discovered on site, cease work in the area and contact the TxDOT Inspector or DEQC for guidance.
3. Comply with "Wildlife: Regulatory Requirements and Best Management Practices" section found in the Beaumont District Environmental Field Guide.
4. Contractor shall maintain compliance with the Migratory Bird Treaty Act (MBTA) and (TPW) Code Section 64.002. For compliance with MBTA and TPW Code, bridge demolition, clearing of vegetation, and tree trimming activities are to be scheduled from October 1 to February 14 (outside of migratory bird nesting season). Contractor is responsible for securing a qualified biologist to conduct a nest survey for any bridge demolition, tree trimming, or vegetation clearing that occurs during migratory bird nesting season. The qualified biologist must submit a survey protocol for approval by District environmental staff prior to construction. A nesting survey will remain valid up to five days. Any activity not completed within 5 days of nesting survey will require another survey. Migratory bird nesting season is from February 15 to September 30. No removal of active nests is allowed during migratory bird nesting season; therefore, any structure or vegetation containing an active nest may not be disturbed, cleared, or trimmed. No removal of inactive nests is allowed during migratory bird nesting season except by an approved, qualified biologist. Contractor is responsible for ensuring all nests on bridge structures are removed prior to the start of nesting season. The full TxDOT MBTA guidance may be found here: https://ftp.txdot.gov/pub/txdot-info/env/toolkit/350-01-gui.pdf
5. Resource specific BMPs (Section I) and Pavement BMPs (Section II,F) from the 'Updated Best Management Practices (BMPs) for TxDOT Maintenance Activities' guidance under the TxDOT Maintenance Program EA shall be reviewed and implemented where appropriate. The maintenanc EA BMPs may be found here: https://ftp.txdot.gov/pub/txdot-info/env/080-01-bmp.pdf

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

☐ No Action Required ☒ Required Action

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
* Any other evidence indicating possible hazardous materials or contamination discovered on site.

List below any bridge class structure(s), not including box culverts, being replaced, rehabilitated, removed, extended or modified as part of this project, or state "None", if applicable.
If "None", then no further action is required. Otherwise TxDOT is responsible for completing asbestos assessment/inspection and evaluation for presence of lead.

Provide results below:

Structure Location	PSN	Element	Lead	Asbestos
None				

If Asbestos is present, then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary.

If Asbestos is not present, then TxDOT is still required to notify DSHS 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.

Hazardous Materials or Contamination Issues Specific to this Project:

Action No.

1. Comply with TxDOT Standard Specification 7.12 and Special Provision 006-012 if evidence of hazardous materials or contamination is noted during construction.
2. Notify TxDOT Inspector or DEQC of any hazardous materials spills including fuel, hydraulic fluid, etc.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

1. Comply with "General Construction" section found in the Beaumont District Environmental Field Guide.

Johnny J Darcey Jr
APPROVED BY

03/09/2023
DATE

DISTRICT ENVIRONMENTAL DEPARTMENT

Texas Department of Transportation

Beaumont District Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: AM	DW: VP	CK: AR
©TxDOT February 2019	CONT	SECT	JOB	HIGHWAY
	2782	01	013	FM 1632
	DIST	COUNTY		SHEET NO.
	BMT	TYLER		65