FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	BR 2023(420)		1
STATE	STATE DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	072	US 87

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT
PROJECT NO.: BR 2023(420)
CSJ: 0143-04-072

WILSON COUNTY
US 87

LIMITS: AT CLIFTON BRANCH

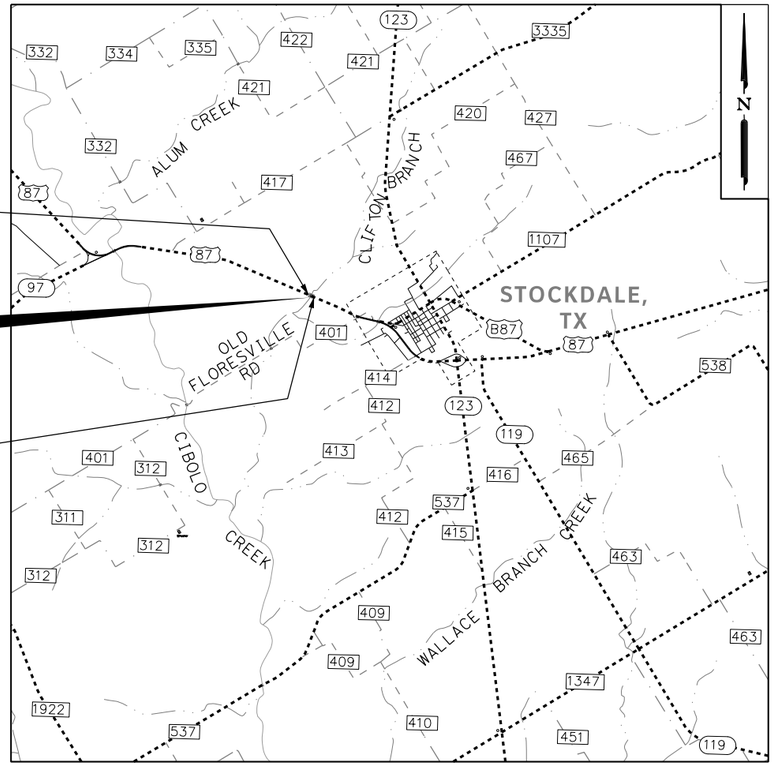
NET LENGTH OF ROADWAY = 290.00 FT = 0.055 MI
NET LENGTH OF BRIDGE = 120.00 FT = 0.023 MI
NET LENGTH OF PROJECT = 410.00 FT = 0.078 MI

TYPE OF WORK: FOR THE CONSTRUCTION OF BRIDGE REPLACEMENT
CONSISTING OF: REPLACE BRIDGE AND APPROACHES

INDEX OF SHEETS

SEE SHEET 2 FOR INDEX OF SHEETS

FUNCTIONAL CLASSIFICATION = PRINCIPAL ARTERIAL
DESIGN SPEED = 70 MPH
AREA OF DISTURBED SOIL = 1.63 AC
ADT: (2024) = 10,400
ADT: (2044) = 15,300
ACCESSIBILITY STANDARDS = N/A



NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
R.R. CROSSINGS: NONE

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)

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS ACCEPTED: _____

FINAL CONTRACT COST: $ _____

CONTRACTOR: _____

FINAL PLANS STATEMENT:

THE CONSTRUCTION WORK WAS PERFORMED IN ACCORDANCE WITH THE PLANS.

_____ P.E. _____
AREA ENGINEER DATE

TEXAS DEPARTMENT OF TRANSPORTATION

RECOMMENDED FOR LETTING 11/3/2022
DocuSigned by: Roger J. Collard, P.E.
TRANSPORTATION ENGINEER SUPERVISOR

RECOMMENDED FOR LETTING 11/3/2022
DocuSigned by: J.E. Rogers, P.E.
TRANSPORTATION ENGINEER SUPERVISOR

RECOMMENDED FOR LETTING 11/2/2022
DocuSigned by: Clayton Kipps, P.E.
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

APPROVED FOR LETTING 11/2/2022
DocuSigned by: Gina Gallegos
DISTRICT ENGINEER

FILE LOCATION
http://www.txdot.gov/inside-txdot/district/san-antonio/specinfo.html

LEVELS DISPLAYED
1

COUNTY WILSON PROJ. NO. _____
HWY. NO. US 87 LETTING DATE _____
DATE ACCEPTED _____

SHEET			DESCRIPTION
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2			INDEX OF SHEETS
3			PROJECT LAYOUT
4			TYPICAL SECTIONS
5			GENERAL NOTES
6			QUANTITY SHEET
7	-	9	SUMMARY OF QUANTITIES
10			EARTHWORK SUMMARY - MAINLANES & DETOUR
TRAFFIC CONTROL PLANS			
11			TCP SEQUENCE OF WORK
12			TCP SCHEDULE OF BARRICADES
13			DETOUR HORIZONTAL ALIGNMENT DATA
14	-	15	TCP PHASE 1 TYPICAL SECTIONS
16	-	17	TCP PHASE 1 PLAN LAYOUT
18	-	20	TCP PHASE 1 DETOUR PLAN AND PROFILE
21	-	22	TEMPORARY SHORING LAYOUT - TSS01 AND TSS02
23			TCP CULVERT LAYOUT
24			TCP PHASE 1 TEMPORARY DRIVEWAY P&P
25	-	26	TCP PHASE 2 TYPICAL SECTIONS
27	-	28	TCP PHASE 2 PLAN LAYOUT
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35	-	36	TCP PHASE 4 PLAN LAYOUT
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38			TMA
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51		*	TCP (1-2)-18
52		*	TCP (2-1)-18
53		*	TCP (2-2)-18
54		*	TCP (2-3)-18
55		*	TCP (2-7)-18
56		*	TCP (3-1)-13
57		*	TCP (3-3)-14
58		*	TCP (SC-1)-22
59		*	TCP (SC-4)-22
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128		*	SMD (GEN)-08
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130		*	SMD (SLIP-2)-08
131		*	D & OM (1)-20
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CHRIS S MUNDIE, P.E. 11/29/2022 DATE

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED BY * OR ** ON THIS SHEET HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

* STATE STANDARD

** SAN ANTONIO DISTRICT (SAT) STANDARD

STATE OF TEXAS
CHRIS S. MUNDIE
102280
LICENSED
PROFESSIONAL ENGINEER
11/29/2022

NOT TO SCALE

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

Texas Department of Transportation
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US 87 AT CLIFTON BRANCH

INDEX OF SHEETS

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	2

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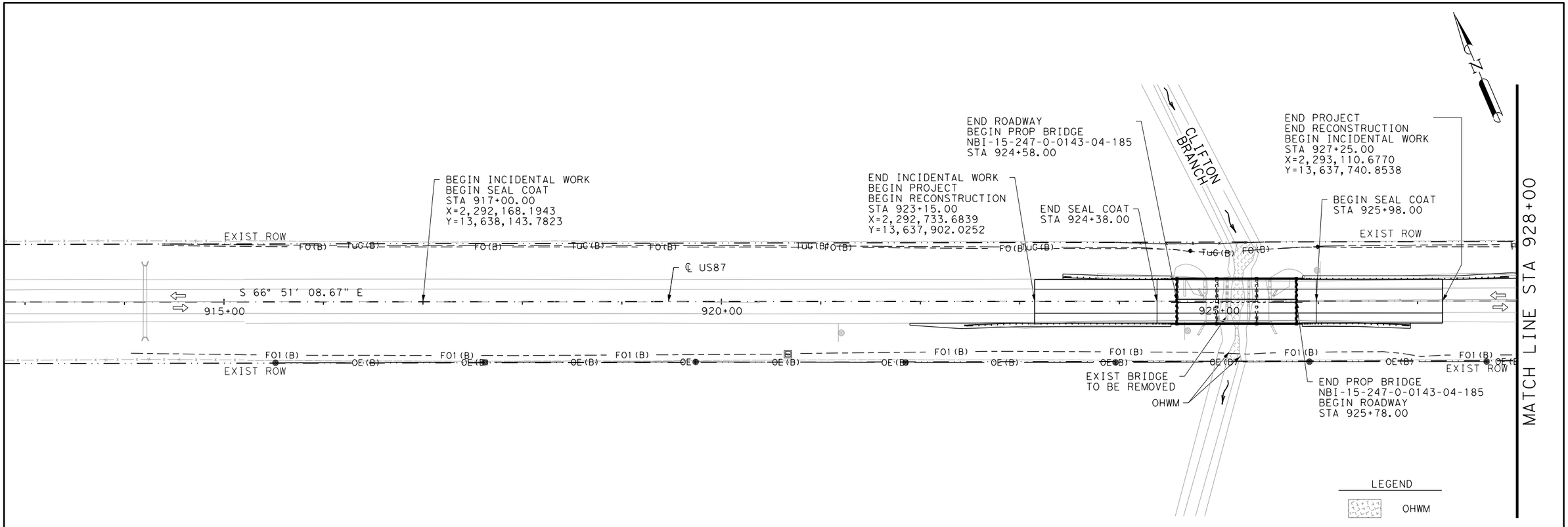

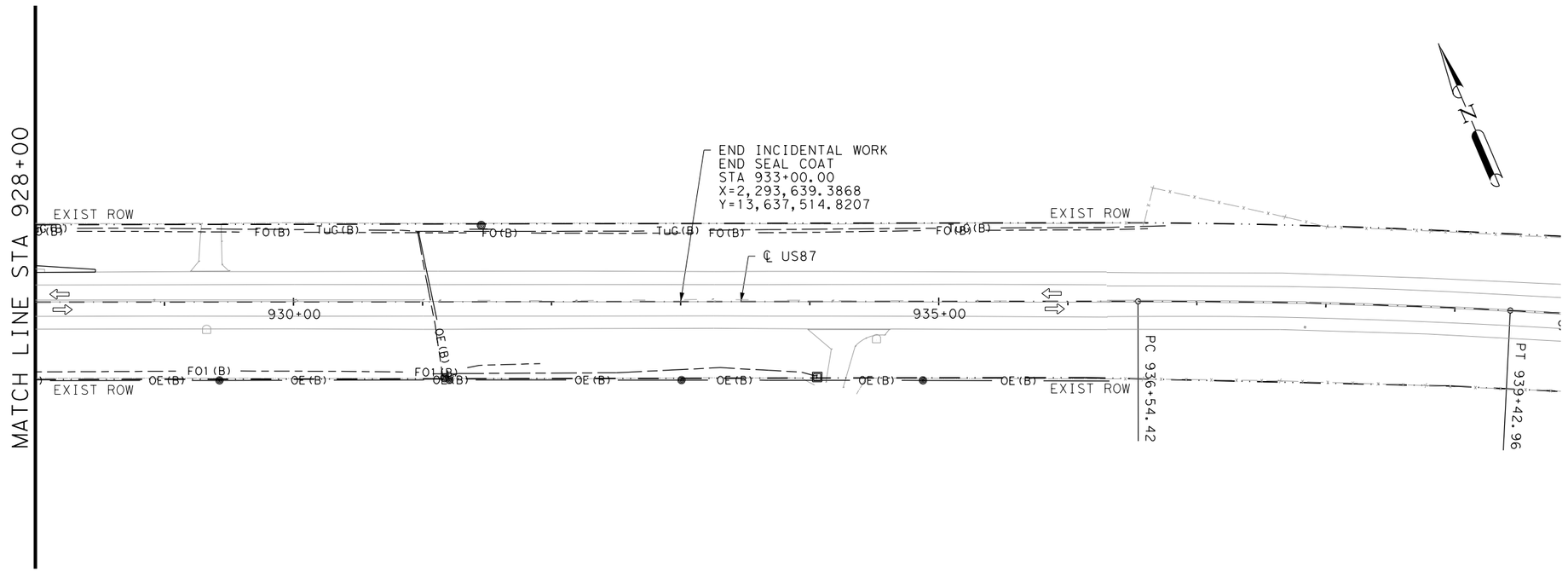

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

0' 25' 50' 100'
SCALE: 1"=100'

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

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US 87 AT CLIFTON BRANCH
PROJECT LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	3

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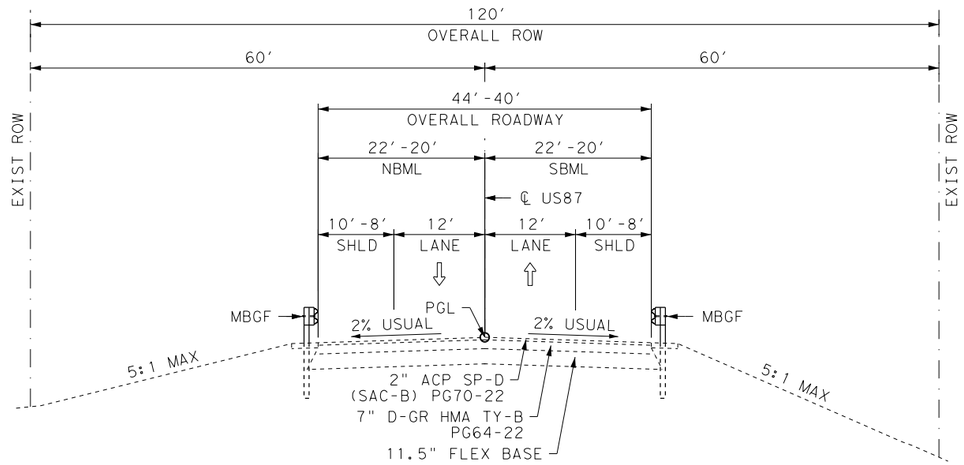
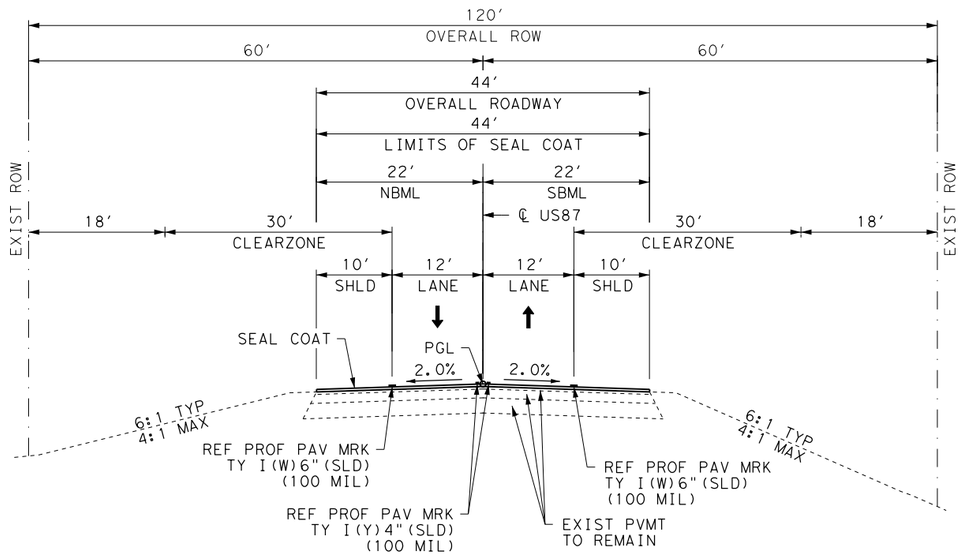


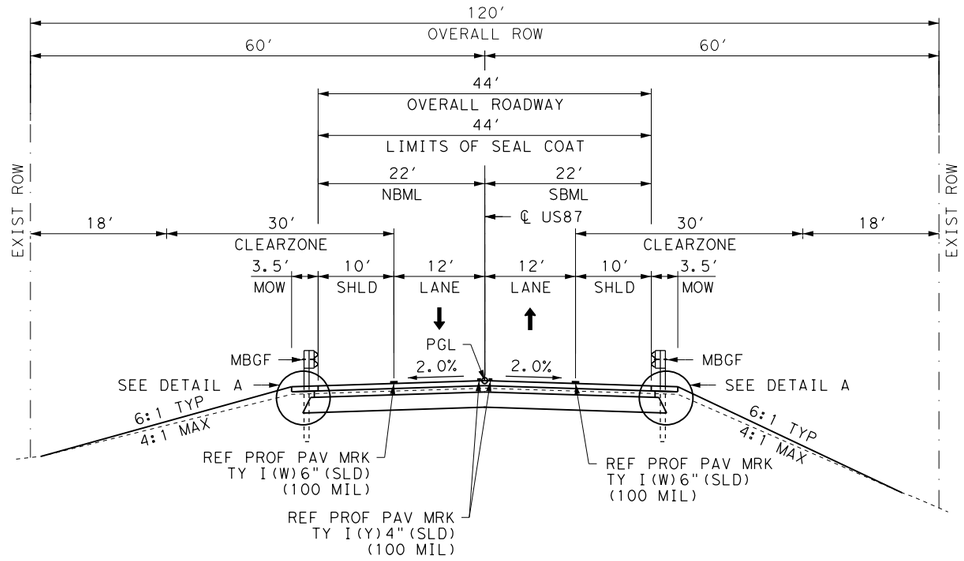
US 87 EXISTING ROADWAY SECTION

STA 923+15.00 TO STA 924+64.86
STA 924+64.86 TO STA 925+71.94 (EXIST BRIDGE)
STA 925+71.94 TO STA 927+25.00



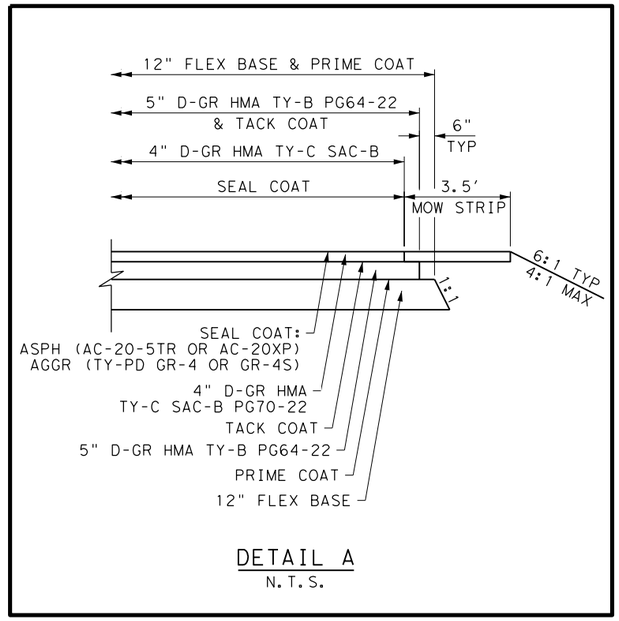
US 87 PROPOSED ROADWAY SECTION

STA 917+00.00 TO STA 923+15.00
STA 927+25.00 TO STA 933+00.00



US 87 PROPOSED ROADWAY SECTION

STA 923+15.00 TO STA 924+58.00
STA 924+58.00 TO STA 925+78.00 (PROP BRIDGE)
STA 925+78.00 TO STA 927+25.00



DETAIL A

N.T.S.

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

NOT TO SCALE

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

Texas Department of Transportation
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US 87 AT CLIFTON BRANCH

TYPICAL SECTIONS

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	4

**********GENERAL NOTES**********
2014 Specification Book (Revised August 4, 2022)

========== **Basis of Estimate** ==========

Item	Description	Rate	Area	Quantity
168	Vegetative Watering	15.6 GAL/SY	6,286 SY	98 MG
310	Asph (Prime Coat)	0.2 GAL/SY	1,278 SY	256 GAL
3076	Asph (Tack Coat)	0.2 GAL/SY	1,250 SY	250 GAL

Item	Description	Depth	Area	Quantity
247	Flex Base	12”	1,306 SY	435 CY

========== **Asphalt Concrete Pavement** ==========

Type	Location	Depth	Rate	Area	Quantity
HMA TY-B	ML	5”	115 LB/SY-IN	1,250 SY	359 Tons
HMA TY-C	ML	4”	115 LB/SY-IN	1,223 SY	281 Tons

========== **Surface Treatment Data** ==========

Description	Seal Coat
Area	7033 SY

-----See Bid Item-----

Asphalt—type	AC-20-5TR or AC-20XP
Asphalt—rate (gal/sy)	.30 GAL/SY = 2110 GAL
Asphalt—rate (lb/gal)	8.53 LB/GAL = 9 TON
Aggregate--type/gr	TY PD/GR-4 OR GR-4S
Aggregate—rate (sy/cy)	120 SY/CY = 59 CY

--General--
The following State, District, Local and/or Utility Standards have been modified: CSAB(MOD).

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

City of San Antonio: (210) 207-8642
City of New Braunfels: (830) 221-4049

Any materials removed and not reused and determined to be salvageable shall be stored within the project limits at an approved location or delivered undamaged to the storage yard as directed. Deface traffic signs so that they will not reappear in public as signs.

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

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

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

The Contractor has the option to adjust or construct all manholes and valves to final pavement elevations prior to the final mat of HMA or after final mat of HMA. If between the final elevation adjustment and the final mat of HMA, the manholes and valves are going to be exposed to traffic, place temporary asphalt around the manhole and valve to provide a +/- 50:1 taper. The cost of elevation adjustment and the concrete apron around the manhole and valve will be part of the manhole and valve work. The asphalt tapers are part of the HMA work.

Hurricane Evacuation

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

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

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

damages, loss of efficiency that may be attributed to the restriction or suspension of road or lane closures, or to changes in the Traffic Control Plan.

In accordance with the Underground Facility Damage Prevention Act (One Call Bill) the phone number for a utility locator is 811. It is the Contractor's responsibility to plan for utility locators as needed.

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

For signal and ITS locates call TransGuide at 210-731-5136 or email sat_its_locates@txdot.gov for ITS locates and signal.request@txdot.gov for signal locates.

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

Will Lockett, Will.Locket@TxDOT.gov, 830-609-0707
Ismael Solalinde, Ismael.Solalinde@TxDOT.gov, 830-609-0707

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/
All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

The Contractor must measure the vertical clearance at each structure after the final surface of the roadway is completed and provide the vertical clearance measurement to the Engineer.

--Item 5--
Taper ACP placed at curb inlets, traffic inlets and slotted drains.

A horizontal boom or equivalent equipment is required for construction in the vicinity of the CPS Energy electric lines to provide vertical clearance of equipment during construction. Contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of pole bracing. The estimated duration for pole bracing is 6 to 10 weeks (or longer if temporary construction easements are required) after invoice is paid. For de-energizing or sleeving of the

overhead electrical lines depicted on the plans, please contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of needed de-energization. The estimated duration for de-energizing is approximately 4 to 6 weeks (after invoice is paid) but could vary on system scenario and back feed requirements. De-energizing may not be possible in all instances or may be restricted during specific periods of time due to load demand. Contractor will be reimbursed for the invoice cost for pole bracing and/or de-energizing or sleeving through force account.

Prevention of Migratory Bird Nesting

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

Structures

Bridge and culvert construction operations cannot begin until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting deterrent on the bridges and culverts, maintain the existing nesting deterrent to prevent swallow nesting until October 1 or completion of the bridge and culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:

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

2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts. This work is subsidiary to the various bid items.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows.

When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate

Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/forms-publications/consultants-contractors/publications/bridge.html#design. Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Excavation within 5 feet of an existing CPS Energy pole will require pole bracing. Contact CPS Energy utility coordination to request pole bracing (Customer Engineering 210-353-4050). The estimated duration for the pole bracing process is approximately 10 to 15 weeks.

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

Steel Wrapped or Asbestos Utility Lines:

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

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

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 materials classified as a manufactured product.

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

The Buy America Material Classification Sheet is located at the below link.

https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html for clarification on material categorization.

--Item 7--
The project's total disturbed area is 1.63 AC. The disturbed area in all project locations and Contractor project specific locations (PSL's), within 1/4 mile of the project limits, will further establish the authorization requirements for storm water discharges. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality

(TCEQ) for the construction activities shown on the plans. Obtain any required authorization from the TCEQ for any PSL's on or off the ROW. When the total area disturbed on the project and PSL's within 1/4 mile of the project exceeds 5 acres, provide a copy of the Contractor NOI for PSL's to the Engineer (to the appropriate MS4 operator when the project is on an off-state system route).

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

Roadway closures during the following key dates and/or special event are prohibited.
See the general notes under Item 502 for these dates.

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

A Special Provision to Item 8 for a delayed authorized date to begin work has been included in the contract. The reason for including the Special Provision is for material processing or contractor mobilization.

Create and maintain a Critical Path Method (CPM) schedule.

The CPM schedule shall be created and maintained using software fully compatible with Primavera Project Planner version P6 Professional R15.2 .

Incentive using road-user cost or contract administration liquidated damage values and disincentive using road-user cost will be paid in accordance with special provision 008---006.

The road-user cost liquidated damages shall be $6,250 per day.

Notes for Substantial Completion of Work for the Project

Substantial Completion of Work is defined in Special Provision to Item 8.

The daily road-user cost for incentive and disincentive for Substantial Completion of Work for the project will be $6,250 per day.

The contractor will have a maximum of 177 working days for Substantial Completion of Work for the project.

Working day time charges for Substantial Completion of Work for the project will be computed and charged in accordance with Article 8.3.1.4: Standard work week.

The time charges for the purpose of computing incentive and disincentive for Substantial Completion of Work for the project will begin when time charges begin for the project.

The time charges for the purpose of computing incentive and disincentive for Substantial Completion of Work for the project will end when all project work is completed according to the definition of Substantial Completion of Work in Special Provision to Item 8.

The maximum number of working days for computing the incentive credit for Substantial Completion of Work for the project will be 40 days. The maximum credit allowable for early completion is $250,000.

Failure of Substantial Completion of Work for the project within the established number of working days shown above will result in the assessment of disincentives using the daily road-user costs shown above for each working day more than those allowed for Substantial Completion of Work for the project.

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

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

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

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

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

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

--Item 100--
100-1 Trim and remove brush and trees within the stations noted in the plans and as needed for construction operations. Unless shown otherwise in the plans or a designated non-mow area, perform trimming or removal for areas to the ROW limits. Trim or remove to provide minimum of 5 ft. of horizontal clearance and 7 ft. of vertical clearance for the following: sidewalks, paths, guard fence, rails, signs, object markers, and structures. Trim to provide a minimum of 12 ft. vertical clearance under all trees.

Obtain approval for proposed method of tree and brush trimming and removal. Vertical flailing equipment is not allowed. Treat damaged or cut branches, roots and/or stumps of all oak trees with a commercial tree wound dressing. Disinfect all pruning tools with a solution of 70% alcohol before moving from one tree to another. Unless otherwise approved remove all resulting vegetative debris from the ROW within 24 hours. The Engineer can stop all construction operations if the dressing, cut and removal requirements are not followed.

Removal and disposal of existing abandoned utilities that were unable to be identified before letting required to support this project’s construction shall be performed under the overall Preparing Right of Way. If you are uncertain whether the utility is active, contact the District Utility Section.

--Item 132--
Embankment (TY C) shall meet the following specifications:

	Percent Passing					LL	PI	PI
Description	1 3/4"	7/8"	3/8"	#4	#40	MAX	MAX	MIN
Embankment (TY C)	100	-	-	-	-	45	25	6

--Item 160--
Approximately 528 CY of existing topsoil may be windrowed or stockpiled (as approved) for later use under this Item. Place erosion control measures for the stockpile and/or windrow.

--Item 164--
Drill seeding of permanent grasses requires the use of approved grass seeding equipment capable of properly storing and metering the release of small seeds (such as Bermuda grass) separately from fluffy type seeds (such as bluestems). Equipment manufactured for planting grain crops is acceptable for planting temporary cool season seeds, but not for planting the permanent seed mix.

If performing a permanent seeding in an area with established temporary grass cover and mowing is performed instead of tilling, seed and fertilizer may be distributed simultaneously during “Broadcast Seeding” operations, provided each component is applied at the specified rate.

--Item 166--
Use a fertilizer with an analysis of 13-13-13 (50% of the total N must be sulfur coated urea) to apply 60 lbs of actual N per acre. This requires 460 lbs of 13-13-13 per acre or .095 lbs per SY of area.

--Item 168--
Apply vegetative watering as needed to supplement natural rainfall during the vegetation establishment period. Plan quantity of irrigation water is based on the application of a total of 1.3 gal of water each week for each sq. yd. of area that is sodded or seeded. Establishment time is estimated to be 12 weeks for both sod and permanent seed mixes. Temporary seeding will require less time for establishment. Provide a schedule and coordinate watering cycles and rates per cycle with the Engineer. Obtain approval if the quantity of water to be applied is expected to exceed the plan quantity. Adjust the amount of water applied with each cycle and the number of cycles each wk. according to actual site conditions. Drought or other conditions, as determined by the Engineer, may require the application of supplemental irrigation during hours other than normal working hours.

--Item 247--
There is no minimum PI requirement for this project.

--Item 275--
The Engineer will designate a target cement content and optimum moisture content necessary to produce a stabilized mixture that meets the strength requirements and moisture susceptibility requirements shown in Table 1. The Contractor shall furnish the Engineer with representative samples of the materials to be used in production of the cement treated base.

Table 1
Requirements for Cement Treatment

Description	Minimum	Maximum
Cement Content (by dry weight of base)	2%	5%
	Procedure	Minimum
7-Day Unconfined Compressive Strength	Tex-120-E, Part I	150 psi
Retained Strength after Moisture Conditioning	Tex-120-E, Part I (Submerged in water for 24 hrs. after seven days of curing)	80% of 7—Day Unconfined Compressive Strength

Microcracking will be required in accordance with Item 275.4.7.

Control: 0143-04-072

--Item 302--
Previously tested aggregates found to contain excessive quantities of dust (more than 0.5 percent passing the No. 40 sieve) during precoating, stockpiling or hauling operations, may be rejected. Use Test Method Tex-200-F, Part I for testing.

Precoated Aggregate Type PE shall consist of crushed slag, crushed stone or natural limestone rock asphalt.

--Item 305--
All reclaimable asphalt pavement (RAP) material will be retained by the Contractor.

--Item 316--
Asphalt season will be year-round but meet temperature limitations specified in the standard specifications for Item 316.

Ensure that the asphalt for precoating the aggregate and the asphalt used for the surface treatment will not result in a reaction that may adversely affect the bonding of the aggregate and asphalt during the surface treatment operation.

Do not add bag house fines in the production of precoated material.

Clean all concrete curbs, islands, medians, etc. that get coated with asphalt.

--Item 320--
Construct all longitudinal ACP joints adjacent to a travel lane with a joint maker device that will create a 3:1 to 6:1 taper. For placement of 2 inches or more, the device shall provide a maximum ½ inch vertical edge. Taper outside edges (next to the grass) or backfill (shoulder-up) the same day.

Provide a material transfer device capable of providing a continuous flow of material to the paver. The material transfer device will consist of a windrow elevator or better.

When placing Item 346 mixtures, use a self-propelled wheel mounted MTV capable of receiving mix from the haul trucks, separate from the paver. It shall have a minimum storage capacity of approximately 25 tons. It shall be equipped with a pivoting discharge conveyor and shall completely and thoroughly remix the material prior to placement. The effectiveness of the MTV's remixing ability is subject to the approval of the Engineer. In addition, the paver shall have a surge storage insert with a minimum capacity of 20 tons.

--Item 401--
A shrinkage compensator is not required for when used for backfilling pipes.

--Item 420--
Mass concrete will be measured in place.

Pier and Bent Concrete will be paid for as “Plans Quantity”.

--Item 421--
Use an automated ticket that contains the same information as shown in the standard specification. Submit the ticket for approval prior to use. The concrete producer will contact the District Laboratory or the Engineer’s Office (outside the San Antonio area) to inform TxDOT of scheduled structural concrete batching. The Engineer may suspend concrete operations if ticket information is incomplete/incorrect.

Entrained air is allowed for Class P and Class HES concrete only. Air content testing is waived for all classes of concrete.

The curing facilities and strength testing equipment is not required for this project.

Poly-fiber reinforced concrete may be used as an option, with the approval by the Engineer, for riprap, sidewalk, curb/gutter, and mow strip. Use a TxDOT approved manufacturer or producer for the poly-fiber. The poly-fibers shall be combined with the concrete in proportions as recommended by the manufacturer. A concrete mix design must be approved by the Engineer.

--Item 422--
For construction of approach slabs, longitudinal joints shall be placed on lane lines. Joints may be either a saw-cut crack control joint or a construction joint. Saw cut joints shall terminate 1’-0” before reaching the edge of the slab, must be saw cut as soon as possible after placement of concrete, and will be cut within 12 hours of concrete placement. Once sawing begins, it should be a continuous operation and should only be stopped if raveling occurs. Saw cut will be to a depth of 1.5” and filled with approved joint sealant.

--Item 496--
The Contractor will submit a demolition plan for all structures to be replaced and/or removed in accordance with Item 496.

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

--Item 502--
General

In addition to providing a Contractor's Responsible Person and a phone number for emergency contact, have an employee available to respond on the project for emergencies and for taking

corrective measures within 2 hours or within a reasonable time frame as specified by the Engineer.

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

Avoid placing stockpiles, equipment, and other construction materials within the roadway’s horizontal clear zone or at any location that will constitute a hazard and will endanger traffic. If a stockpile is placed within the clear zone, address in accordance with the TMUTCD.

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

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

Mounting and moving the mailbox as needed for the various construction phases is subsidiary to Item 502.

Access to adjoining property must be maintained at all times.

Barricades, Signs, and Traffic Control Devices

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

After written notification, the time frame is provided on the Form 599 to provide properly maintained signs and barricades before considered in non-compliance with this item.

Temporary Rumble Strips are to be used according to WZ (RS)-16.

Use two number of rumble strip arrays.

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

Cover permanent signs if not used. This is subsidiary to Item 502.

Lane and Ramp Closures and Detours

Notify the Engineer in writing 10 business days in advance of any temporary or permanent lane, ramp, connector, etc. closures/detours, restrictions to lane widths, alterations to vertical clearances, or modifications to radii. Any other modifications to the roadway that may adversely affect the mobility of oversized/overweight trucks also require 10 business days advance written notice to the Engineer. At least one lane must always remain open.

At no time shall two consecutive intersecting roadways be closed at one time during construction.

Unless otherwise noted in the plans and/or as directed by the Engineer, daily lane closures shall be limited according to the following restrictions:

Nighttime: *9:00 PM to 5:00 AM Monday through Friday.*
(With uniformed off duty law enforcement officers)

Weekend closures when approved by the Engineer: *9:00 PM Friday to 5:00 AM Monday*

No lane closures will be permitted for the following dates and/or special events:
Between December 15 and January 1
Fiesta Week and Sales Tax Holidays (Bexar County Only)
Wednesday before Thanksgiving thru the Sunday after Thanksgiving
Saturday and Sunday before Memorial Day and Labor Day
Saturday or Sunday when July 4 falls on a Friday or Monday

Hauling

The use of rubber-tired equipment will be required for moving dirt or other materials along or across pavement surfaces. Where the contractor desires to move any equipment not licensed for operation on public highways, on or across pavement, they shall protect the pavement from damage as directed/approved by the Engineer.

Throughout construction operations, the Contractor will be required to conduct their hauling operations in a manner such that vehicles will not haul over previously recompacted subgrade or compacted base material, except in short sections for dumping manipulations.

The Contractor shall keep the roadway clean and free of dirt or other materials during hauling operations. If the Contractor does not maintain a clean roadway, they shall cease all construction operations, when directed by the Engineer, to clean the roadway to the satisfaction of the Engineer.

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

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

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

--Item 512--
Portable traffic barrier manufactured after December 31, 2019, must have been successfully tested to the 2016 edition of MASH and will be manufactured in accordance with the Standard Sheets in the plans. Portable traffic barrier manufactured on or before this date, and successfully tested to NCHRP Report 350 or the 2009 edition of MASH may continue to be used throughout their normal service lives but must be the same shape type as shown in the plans.

Only Single Slope shape CTB may be furnished on the inside shoulder/inside median of the Interstate or Freeway Main Lanes.

More than one shape type of CTB may be furnished on a project, although no mixing of CTB shape types will be permitted along a continuous segment of CTB.

CTB reflectors will not be paid for directly but will be considered subsidiary to the barrier.

--Item 540--
Guard fence posts placed in proposed and/or existing areas of riprap, sidewalks or other concrete shall have an 18 inch +/- (square or round) leave-out in the concrete as shown in the state standard for MBGF Mow Strip. After the posts are installed, fill the leave-outs with a Grout mixture as shown in the state standard for MBGF Mow Strip.

When connecting a Thrie-Beam to a concrete wingwall, bridge rail, CTB, etc., drill the holes for bolt placement using rotary or core type equipment. Use a core type drill when reinforcing steel is encountered. Do not use percussion or impact drilling. Repair damage to the concrete and spalls exceeding ½" from the edge of the hole.

--Item 545--
See the Crash Cushion Summary Sheet.

--Item 585--
Use Surface Test Type B, pay adjustment schedule 2 to evaluate ride quality of travel lanes.

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

Triangular Slip base Systems with set screws are not allowed.

--Item 666--
Use TY II markings (vs. an acrylic or epoxy) on asphalt surfaces as the sealer for the TY I markings, unless otherwise approved by the Engineer.

--Item 672--
Place all adhesive material directly from the heated dispenser to the pavement. Do not use portable or non-heated containers. Use adhesive of sufficient thickness so that when the marker is pressed into the adhesive, 1/8" or more adhesive will remain under 100% of the marker. The adhesive should extend not less than 1/2" but not more than 1 1/2" beyond the perimeter of the marker.

--Item 677--
Obtain approval before using the mechanical method for the elimination of existing thermoplastic pavement markings.

--Item 730--
Mow full-width and hand trim the right of way, including newly seeded or sodded areas, when vegetation reaches a height of 16” or when directed. Removal of brush sprouts growing within guardrail, concrete barriers or at other locations where mowing or hand trimming is done within the limits of construction is required and subsidiary to this item. Mowing may be required more often in newly sodded or seeded areas than in other parts of the project because of the supplemental irrigation these areas receive and the resulting weed growth. Coordinate mowing to avoid rutting or compaction of the soil when mowing where supplemental irrigation is being used. Use mowing equipment that will not adversely affect soil retention blankets or mulches that have been applied. Work performed under this item does not replace the mowing required when placing permanent seeding in an area that has established temporary seeding as described in Article 164.3, Construction.

--Item 734--
Perform Litter Removal once a month or as directed by the Engineer.

During hurricane season (June-October), special attention should be given to remove and dispose of litter and debris from the right of way.

--Item 735--
Perform Debris Removal as directed by the Engineer.

During hurricane season (June-October), special attention should be given to keep center medians, main lanes, HOV lanes, shoulders, frontage roads, entrance and exit ramps, and direct connector ramps clear of debris.

--Item 738--
Perform Cleaning and Sweeping Highways once a month or as directed by the Engineer.

During hurricane season (June-October), special attention should be given to keep center medians, main lanes, HOV lanes, shoulders, frontage roads, entrance and exit ramps, and/or direct connector ramps clear of debris.

--Item 3076, 3077, 3079, 3080, 3081, & 3082 --
Table 10 in Item 3076 and Table 11in Item 3077, Hamburg Wheel Test Requirements tested in accordance with Tex-242-F are changed for PG 64-22 or lower and PG 70-22. Minimum number of passes at 12.55 mm Rut Depth, Tested at 50 degrees C will be 5,000 and 10,000 respectively.

Submit a copy of the Tex 233-F production charts on a weekly basis. At the end of the ACP work, provide all originals.

Crushing of aggregate for hot mix and immediate use for production of the mix is not allowed. Stockpile the aggregate until enough material is available for five days of production unless prior approval is provided

Hold a pre-paving meeting one month prior to the placement of the hot mix. The date and time of pre-paving meeting should be coordinated with the Engineer prior to scheduling.

Do not use diesel or solvents as asphalt release agents in production, transportation, or construction. A list of approved asphalt release agents is available from the District Laboratory.

No more than one hot mix lot will be open for any specific type of hot mix, unless authorized. After a lot is open and the Contractor gets approval to change plants, the previous lot will be closed, and a new lot will be opened. The numbering for the lots produced at the new plant will start with No. 1. If allowed to switch back to the original or previous plant, the next lot from that plant will resume numbering sequentially from the last lot produced by that plant.

The minimum application rates are listed in Table UC. The Engineer may adjust the application rates taking into consideration the existing pavement surface conditions

Table UC

Material	Minimum Application Rate (gal. per square yard)
TRAIL – Hot Asphalt	0.15
Spray Applied Underseal Membrane	0.20
Seal Coat – Emulsion (CHFRS-2P, CRS-2P)	0.25
Seal Coat – Asphalt (AC-15P, AC-20-5TR, AC-20XP, AC10-2TR)	0.23
Aggregate for Seal Coat Options TY PB GR 4(AC) or TY B GR 4(Emulsion)	1 CY:120 SY

--Item 4171--
Install bridge identification numbers shown below for each of the following listed bridges in accordance with the special specification and San Antonio District Standard. Install the bridge identification number on two locations as shown on the plans, or as directed. For bridges in a two-way condition, install the bridge identification number on each outside beam on the upstream side of traffic. For bridges in a one-way condition, install the bridge identification number on each side, opposite corners on each outside beam. For culverts less than 5 ft. in height, install the bridge identification number on the headwall on upstream and downstream location. For culverts greater than 5 ft. in height, install the bridge identification number inside the first barrel on the upstream side of traffic and inside the last barrel on the opposite corner in the direction of traffic.

NBI: 15-247-0-0143-04-185

--Item 6185--
2 shadow vehicles with TMA will be required for this project. The TMA's will be measured and paid for by the DAY for each TMA/TA set up and operational on the worksite. 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. See TMA and TA Summary sheet in the plans.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0143-04-072 **DISTRICT** San Antonio **COUNTY** Wilson
HIGHWAY US 87

			CONTROL SECTION JOB		**0143-04-072**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00135152**		
			COUNTY		**Wilson**		
			HIGHWAY		**US 87**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW	STA	16.000		16.000	
	104-6009	REMOVING CONC (RIPRAP)	SY	442.000		442.000	
	104-6054	REMOVING CONCRETE(MOW STRIP)	LF	666.000		666.000	
	105-6020	REMOVING STAB BASE & ASPH PAV (12")	SY	60.000		60.000	
	105-6164	REMOVE STAB BASE & ASPH PAV (12"-22")	SY	1,515.000		1,515.000	
	110-6001	EXCAVATION (ROADWAY)	CY	700.000		700.000	
	132-6006	EMBANKMENT (FINAL)(DENS CONT)(TY C)	CY	70.000		70.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")	SY	4,748.000		4,748.000	
	164-6021	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)	SY	6,286.000		6,286.000	
	164-6041	DRILL SEEDING (TEMP) (WARM)	SY	6,286.000		6,286.000	
	168-6001	VEGETATIVE WATERING	MG	98.000		98.000	
	247-6466	FL BS (CIP)(TY A GR 1-2 OR 5) FINAL POS	CY	435.000		435.000	
	310-6027	PRIME COAT(MC-30 OR AE-P)	GAL	256.000		256.000	
	316-6447	AGGR (TY-PD GR-4 OR GR-4S SAC-B)	CY	59.000		59.000	
	316-6521	ASPH (AC-20-5TR OR AC-20XP)	TON	9.000		9.000	
	354-6106	PLANE ASPH CONC PAV (1" TO 4")	SY	486.000		486.000	
	400-6005	CEM STABIL BKFL	CY	131.000		131.000	
	403-6001	TEMPORARY SPL SHORING	SF	1,857.000		1,857.000	
	416-6002	DRILL SHAFT (24 IN)	LF	264.000		264.000	
	416-6003	DRILL SHAFT (30 IN)	LF	260.000		260.000	
	420-6013	CL C CONC (ABUT)	CY	27.400		27.400	
	420-6029	CL C CONC (CAP)	CY	22.600		22.600	
	420-6037	CL C CONC (COLUMN)	CY	7.600		7.600	
	422-6007	REINF CONC SLAB (SLAB BEAM)	SF	5,520.000		5,520.000	
	422-6015	APPROACH SLAB	CY	70.620		70.620	
	425-6009	PRESTR CONC SLAB BEAM (4SB12)	LF	711.000		711.000	
	425-6010	PRESTR CONC SLAB BEAM (5SB12)	LF	474.000		474.000	
	432-6002	RIPRAP (CONC)(5 IN)	CY	49.000		49.000	
	432-6031	RIPRAP (STONE PROTECTION)(12 IN)	CY	314.000		314.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)	CY	38.000		38.000	
	450-6006	RAIL (TY T223)	LF	264.000		264.000	
	454-6018	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	LF	92.000		92.000	
	464-6026	RC PIPE (CL V)(24 IN)	LF	23.000		23.000	
	467-6389	SET (TY II) (24 IN) (RCP) (3: 1) (P)	EA	2.000		2.000	
	496-6010	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	EA	1.000		1.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	12.000		12.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0143-04-072 **DISTRICT** San Antonio **COUNTY** Wilson
HIGHWAY US 87

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0143-04-072**			
		PROJECT ID		**A00135152**			
		COUNTY		**Wilson**			
		HIGHWAY		**US 87**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	506-6001	ROCK FILTER DAMS (INSTALL) (TY 1)	LF	148.000		148.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	148.000		148.000	
	506-6021	CONSTRUCTION EXITS (INSTALL) (TY 2)	SY	80.000		80.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	80.000		80.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1,608.000		1,608.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1,608.000		1,608.000	
	508-6001	CONSTRUCTING DETOURS	SY	1,984.000		1,984.000	
	510-6002	ONE-WAY TRAF CONT (PILOT CAR)	HR	12.000		12.000	
	512-6001	PORT CTB (FUR & INST)(SGL SLOPE)(TY 1)	LF	2,940.000		2,940.000	
	512-6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	900.000		900.000	
	512-6049	PORT CTB (REMOVE)(SGL SLP)(TY 1)	LF	2,940.000		2,940.000	
	530-6005	DRIVEWAYS (ACP)	SY	182.000		182.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	350.000		350.000	
	540-6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4.000		4.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	520.000		520.000	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4.000		4.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4.000		4.000	
	545-6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	2.000		2.000	
	545-6005	CRASH CUSH ATTEN (REMOVE)	EA	4.000		4.000	
	545-6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	4.000		4.000	
	550-6006	GATE (REMOVE)	EA	1.000		1.000	
	552-6001	WIRE FENCE (TY A)	LF	162.000		162.000	
	552-6005	GATE (TY 1)	EA	1.000		1.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	2.000		2.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	3.000		3.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	6.000		6.000	
	658-6071	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BI)	EA	4.000		4.000	
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	5,637.000		5,637.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	5,637.000		5,637.000	
	666-6224	PAVEMENT SEALER 4"	LF	2,745.000		2,745.000	
	666-6225	PAVEMENT SEALER 6"	LF	3,200.000		3,200.000	
	666-6343	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	LF	3,200.000		3,200.000	
	666-6344	REF PROF PAV MRK TY I(Y)4"(BRK)(100MIL)	LF	160.000		160.000	
	666-6345	REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)	LF	2,585.000		2,585.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	41.000		41.000	
	730-6107	FULL - WIDTH MOWING	CYC	4.000		4.000	
	734-6002	LITTER REMOVAL	CYC	12.000		12.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0143-04-072 **DISTRICT** San Antonio **COUNTY** Wilson
HIGHWAY US 87

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0143-04-072**			
		PROJECT ID		**A00135152**			
		COUNTY		**Wilson**			
		HIGHWAY		**US 87**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	735-6002	DEBRIS REMOVAL (CNTR MEDIANS/MAINLANES)	MI	12.000		12.000	
	738-6003	CLEANING / SWEEPING (OUTSIDE MAIN LANE)	CYC	12.000		12.000	
	772-6001	POST AND CABLE FENCE (REMOVAL)	LF	162.000		162.000	
	3076-6003	D-GR HMA TY-B PG64-22 (EXEMPT)	TON	359.000		359.000	
	3076-6066	TACK COAT	GAL	250.000		250.000	
	3076-6074	D-GR HMA TY-C SAC-B PG70-22 (EXEMPT)	TON	281.000		281.000	
	4171-6001	INSTALL BRIDGE IDENTIFICATION NUMBERS	EA	1.000		1.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	1.000		1.000	
	6185-6002	TMA (STATIONARY)	DAY	44.000		44.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	10.000		10.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		LAW ENFORCEMENT: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		ENVIRONMENTAL: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

TRAFFIC CONTROL PLAN

LOCATION	104 6009	105 6020	403 6001	432 6002	464 6026	467 6389	502 6001	508 6001	510 6002	512 6001	512 6025	512 6049
	REMOVING CONC (RIPRAP)	REMOVING STAB BASE & ASPH PAV (12")	TEMPORARY SPL SHORING	RIPRAP (CONC) (5 IN)	RC PIPE (CL V) (24 IN)	SET (TY II) (24 IN) (RCP) (3:1) (P)	BARRICADES, SIGNS AND TRAFFIC HANDLING	CONSTRUCTING DETOURS	ONE-WAY TRAF CONT (PILOT CAR)	PORT CTB (FUR & INST) (SGL SLOPE) (TY 1)	PORT CTB (MOVE) (SGL SLP) (TY 1)	PORT CTB (REMOVE) (SGL SLP) (TY 1)
	SY	SY	SF	CY	LF	EA	MO	SY	HR	LF	LF	LF
PHASE 1												
SHEET 1 OF 2										1470		
SHEET 2 OF 2										900		
DETOUR												
SHEET 1 OF 3				8				549				
SHEET 2 OF 3				41				990				
SHEET 3 OF 3								445				
TEMP SHORING LAYOUT												
SHEET 1 OF 1			1429									
TEMP DRIVEWAY												
SHEET 1 OF 1		60			23	2						
PHASE 2												
SHEET 1 OF 2											300	450
SHEET 2 OF 2											150	420
PHASE 3												
SHEET 1 OF 2										330	300	
SHEET 2 OF 2										240	150	
PHASE 4												
SHEET 1 OF 2	260											1350
SHEET 2 OF 2	94											720
PROJECT TOTALS	354	60	1429	49	23	2	12	1984	12	2940	900	2940

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LJA Engineering, Inc.
FRN - F-1386

Texas Department of Transportation

US 87 AT CLIFTON BRANCH

SUMMARY OF QUANTITIES

SHEET 1 OF 3

FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	7

TRAFFIC CONTROL PLAN (CONTINUED)

LOCATION	530 6005	545 6003	545 6005	545 6013	550 6006	662 6063	662 6095	730 6107	734 6002	735 6002	738 6003	772 6001	6001 6002	6185 6002	6185 6005
	DRIVEWAYS (ACP)	CRASH CUSH ATTEN (MOVE & RESET)	CRASH CUSH ATTEN (REMOVE)	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	GATE (REMOVE)	WK ZN PAV MRK REMOV (W)4"(SLD)	WK ZN PAV MRK REMOV (Y)4"(SLD)	FULL - WIDTH MOWING	LITTER REMOVAL	DEBRIS REMOVAL (CNTR MEDIANS/MAINLANES)	CLEANING / SWEEPING (OUTSIDE MAIN LANE)	POST AND CABLE FENCE (REMOVAL)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	SY	EA	EA	EA	EA	LF	LF	CYC	CYC	MI	CYC	LF	EA	DAY	DAY
PHASE 1															
SHEET 1 OF 2															
SHEET 2 OF 2				3									1		
DETOUR															
SHEET 1 OF 3															
SHEET 2 OF 3															
SHEET 3 OF 3															
TEMP SHORING LAYOUT															
SHEET 1 OF 1															
TEMP DRIVEWAY															
SHEET 1 OF 1	110				1							12			
PHASE 2															
SHEET 1 OF 2		1				1839	1839								
SHEET 2 OF 2						1409	1409								
PHASE 3															
SHEET 1 OF 2		1		1		1266	1266								
SHEET 2 OF 2						1123	1123								
PHASE 4															
SHEET 1 OF 2			2												
SHEET 2 OF 2			2												
PROJECT TOTALS	110	2	4	4	1	5637	5637	4	12	12	12	12	1	44	10

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US 87 AT CLIFTON BRANCH

SUMMARY OF QUANTITIES

SHEET 2 OF 3

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	8

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REMOVAL

LOCATION	100 6002	104 6009	104 6054	105 6164	354 6106	496 6010	542 6001	544 6003	772 6001
	PREPARING ROW	REMOVING CONC (RIPRAP)	REMOVING CONCRETE (MOW STRIP)	REMOVING STAB BASE & ASPH PAV (12"-22")	PLANE ASPH CONC PAV (1" TO 4")	REMOV STR (BRIDGE 100 - 499 FT LENGTH)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (REMOVE)	POST AND CABLE FENCE (REMOVAL)
	STA	SY	LF	SY	SY	EA	LF	EA	LF
SHEET 1 OF 1	16	88	666	1515	486	1	520	4	150
PROJECT TOTALS	16	88	666	1515	486	1	520	4	150

ROADWAY

LOCATION	110 6001	132 6006	247 6466	310 6027	316 6521	316 6447	432 6045	540 6001	540 6006	544 6001	552 6001	3076 6003	3076 6066	3076 6074
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY C)	⁎ FL BS (CIP) (TY A GR 1-2 OR 5) FINAL POS	⁎ PRIME COAT (MC-30 OR AE-P)	⁎ ASPH (AC-20-5TR OR AC-20XP)	⁎ AGGR (TY-PD GR-4 OR GR-4S SAC-B)	RIPRAP (MOW STRIP) (4 IN)	MTL W-BEAM GD FEN (TIM POST)	MTL BEAM GD FEN TRANS (THRIE-BEAM)	GUARDRAIL END TREATMENT (INSTALL)	WIRE FENCE (TY A)	⁎ D-GR HMA TY-B PG64-22 (EXEMPT)	⁎ TACK COAT	⁎ D-GR HMA TY-C SAC-B PG70-22 (EXEMPT)
	CY	CY	SY	SY	SY	SY	CY	LF	EA	EA	LF	SY	SY	SY
SHEET 1 OF 1	700	70	1306	1278	7033	7033	38	350	4	4	150	1250	1250	1223
PROJECT TOTALS	700	70	1306	1278	7033	7033	38	350	4	4	150	1250	1250	1223

⁎ BID ITEMS FOR CONTRACTOR'S INFORMATION ONLY. SEE BASIS OF ESTIMATE FOR BID ITEM QUANTITIES.

SIGNING & PAVEMENT MARKINGS

LOCATION	644 6004	644 6068	658 6062	658 6071	666 6224	666 6225	666 6343	666 6344	666 6345	672 6009
	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	RELOCATE SM RD SN SUP&AM TY 10BWG	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	INSTL DEL ASSM (D-SY)SZ (BRF)CTB (BI)	PAVEMENT SEALER 4"	PAVEMENT SEALER 6"	REF PROF PAV MRK TY I(W)6"(SLD)(100MIL)	REF PROF PAV MRK TY I(Y)4"(BRK)(100MIL)	REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)	REFL PAV MRKR TY II-A-A
	EA	EA	EA	EA	LF	LF	LF	LF	LF	EA
SHEET 1 OF 1	2	3	6	4	2745	3200	3200	160	2585	41
PROJECT TOTALS	2	3	6	4	2745	3200	3200	160	2585	41

EROSION CONTROL

LOCATION	160 6003	164 6021	164 6041	168 6001	506 6001	506 6011	506 6021	506 6024	506 6038	506 6039
	FURNISHING AND PLACING TOPSOIL (4")	CELL FBR MLCH SEED(PERM)(RURAL)(SANDY)	DRILL SEEDING (TEMP) (WARM)	VEGETATIVE WATERING	ROCK FILTER DAMS (INSTALL) (TY 1)	ROCK FILTER DAMS (REMOVE)	CONSTRUCTION EXITS (INSTALL) (TY 2)	CONSTRUCTION EXITS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)
	SY	SY	SY	MG	LF	LF	SY	SY	LF	LF
SHEET 1 OF 1	4748	6286	6286	98	148	148	80	80	1608	1608
PROJECT TOTALS	4748	6286	6286	98	148	148	80	80	1608	1608

DRIVEWAY

SUMMARY OF DRIVEWAY ITEMS			
LOCATION	530 6005	552 6001	552 6005
	DRIVEWAYS (ACP)	WIRE FENCE (TY A)	GATE (TY 1)
	SY	LF	EA
SHEET 1 OF 1	72	12	1
PROJECT TOTALS	72	12	1

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US 87 AT CLIFTON BRANCH

SUMMARY OF QUANTITIES

SHEET 3 OF 3

FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	9

US 87 EARTHWORK

STATION	VOLUMES	
	0110-6001 EXCAVATION (ROADWAY)	0132-6006 EMBANKMENT (FINAL)(DENS CONT)(TY C)
915+50.00	0	0
916+00.00	0	0
916+50.00	0	0
917+00.00	0	0
917+50.00	0	0
918+00.00	0	0
918+50.00	0	0
919+00.00	0	0
919+50.00	0	0
920+00.00	0	0
920+50.00	0	0
921+00.00	0	0
921+50.00	0	0
922+00.00	4	2
922+50.00	4	2
923+00.00	4	2
923+50.00	4	2
924+00.00	13	2
924+50.00	13	2
925+00.00	300	26
925+50.00	0	0
926+00.00	300	28
926+50.00	20	2
927+00.00	21	2
927+50.00	12	0
928+00.00	3	0
928+50.00	2	0
929+00.00	0	0
929+50.00	0	0
930+00.00	0	0
930+50.00	0	0
931+00.00	0	0
931+50.00	0	0
932+00.00	0	0
932+50.00	0	0
933+00.00	0	0
933+50.00	0	0
934+00.00	0	0
934+50.00	0	0
935+00.00	0	0
935+50.00	0	0
936+00.00	0	0
PROJECT	700	70

DETOUR EARTHWORK

STATION	VOLUMES	
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(DENS CONT)(TY B)
10+00.00	0	0
10+50.00	0	0
11+00.00	0	0
11+50.00	0	0
12+00.00	5	0
12+50.00	11	0
13+00.00	11	1
13+50.00	9	7
14+00.00	8	18
14+50.00	7	37
15+00.00	10	42
15+50.00	34	18
16+00.00	86	2
16+50.00	155	0
17+00.00	221	0
17+50.00	246	0
18+00.00	132	0
18+50.00	10	50
19+00.00	84	50
19+50.00	193	0
20+00.00	197	0
20+50.00	140	0
21+00.00	68	7
21+50.00	22	22
22+00.00	12	20
22+50.00	14	4
23+00.00	13	0
23+50.00	11	0
24+00.00	12	0
24+50.00	6	0
25+00.00	0	0
25+50.00	0	0
26+00.00	0	0
26+24.79	0	0
PROJECT	* 1717	* 278

* FOR CONTRACTOR INFORMATION ONLY. NOT A SEPERATE PAY ITEM BUT INCIDENTAL TO ITEM 508 6003 CONSTRUCTING DETOURS (TY 1).

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US 87 AT CLIFTON BRANCH

EARTHWORK SUMMARY
MAINLANES & DETOUR

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	10

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TRAFFIC CONTROL PLAN SEQUENCE OF WORK

(1) THIS PROJECT WILL BE CONSTRUCTED IN 4 PHASES. BEFORE THE COMMENCEMENT OF EACH PHASE, INSTALL ADVANCE WARNING SIGNS, TEMPORARY SIGNS AND BARRICADES AS SHOWN ON THE PLANS AND/OR AS DIRECTED/APPROVED BY THE ENGINEER. DAILY LANE CLOSURES WILL BE USED IN ACCORDANCE WITH STATE TCP STANDARDS. DROP OFF CONDITIONS OF GREATER THAN 2" MUST HAVE A 3:1 SLOPE AT THE END OF EACH DAY, AS WELL AS THROUGHOUT THE PROJECT WHERE ACCESS TO ADJACENT PROPERTIES IS ALLOWED TO DRIVEWAYS AND SIDE STREETS.

(2) PREPARING ROW / REMOVAL OF EXISTING ITEMS TO BE DONE ONLY IN AREAS WHERE WORK IS OCCURING, AS PER THE PHASES NOTED BELOW.

(3) PLANING, SURFACE TREATMENTS AND OVERLAYS SHALL BE PERFORMED IN THE DIRECTION OF TRAFFIC. BEGIN SURFACE CONSTRUCTION ON HIGH SIDE OF ROAD TO AVOID WATER PONDING ISSUES.

(4) THE CONTRACTOR'S ATTENTION IS DIRECTED TO THE REQUIREMENTS OF ITEM 7, "LEGAL RELATIONS AND RESPONSIBILITIES TO THE PUBLIC" AND ITEM 502, "BARRICADES, SIGNS, AND TRAFFIC HANDLING", OF THE STANADARD SPECIFICATIONS, AND TO THE GENERAL NOTES

(5) A BRIEF DESCRIPTION OF THESE PHASES ARE AS FOLLOWS:

PHASE 1: Construct Detour

THE INTENT OF THIS PHASE IS TO CONSTRUCT A TEMPORARY DETOUR FOR THE NORTHBOUND (NB) TRAFFIC TO ACCOMMODATE CONSTRUCTION IN PHASE 2 AND 3. THE SB AND NB TRAFFIC WILL REMAIN IN THE EXISTING CONDITION DURING THIS PHASE.

1. INSTALL ADVANCED WARNING SIGNS PER ADVANCE WARNING LAYOUT.
2. INSTALL TRAFFIC CONTROL DEVICES ALONG THE PROJECT LIMITS AS SHOWN.
3. INSTALL SW3P AS SHOWN ON SW3P LAYOUTS AND/OR AS DIRECTED BY THE ENGINEER USING TCP (2-1)-18.
4. INSTALL TEMPORARY CULVERT.
5. CONSTRUCT TEMPORARY SPECIAL SHORING AND DETOUR EARTHWORK.
6. CONSTRUCT DETOUR PAVEMENT.
7. PLACE TEMPORARY RIPRAP.
8. INSTALL TEMP PAVEMENT MARKINGS AND SIGNS PER TCP LAYOUTS.

PHASE 2: Construct Northbound (NB) Side of Proposed Bridge

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE NORTHBOUND (LEFT) SIDE OF THE PROPOSED BRIDGE. THE NB TRAFFIC WILL UTILIZE TEMPORARY DETOUR WHILE THE SB TRAFFIC WILL UTILIZE THE EXISTING SOUTHBOUND (RIGHT) SIDE OF BRIDGE.

1. INSTALL TRAFFIC CONTROL DEVICES ALONG THE PROJECT LIMITS AS SHOWN.
2. SWITCH NB TRAFFIC TO DETOUR ROAD. SB TRAFFIC WILL UTILIZE SOUTHBOUND (RIGHT) SIDE OF EXIST BRIDGE.
3. REMOVE EXIST METAL BEAM GUARD FENCE AND MOW STRIP ON NB DIRECTION.
4. REMOVE NB SIDE OF EXIST BRIDGE. DEMOLITION PLAN TO INCLUDE CONCRETE SLAB SPAN SUPERSTRUCTURE, RAILING, ABUTMENTS, AND BENTS.
5. REMOVE NB SIDE OF EXIST PAVEMENT
6. CONSTRUCT TEMPORARY SPECIAL SHORING.
7. CONSTRUCT NB SIDE OF PROPOSED BRIDGE AND APPROACH SLAB.
    a. DRILLED SHAFTS
    b. BRIDGE BENTS
    c. BRIDGE ABUTMENTS
    d. SLAB BEAM / BRIDGE DECK
    e. APPROACH EARTHWORK
    f. BRIDGE APPROACH SLABS
8. INSTALL NB APPROACH PAVEMENT
    a. 12" FLEX BASE
    b. PRIME COAT
    c. 5" HMA TY-B PG64-22
    d. TACK COAT
    e. 4" HMA TY-C SAC-B PG70-22
9. INSTALL TEMP PAVEMENT MARKINGS AND SIGNS PER TCP LAYOUTS.

PHASE 3: Construct Southbound (SB) Side of Proposed Bridge

THE INTENT OF THIS PHASE IS TO CONSTRUCT THE SOUTHBOUND (RIGHT) SIDE OF THE PROPOSED BRIDGE. THE NB TRAFFIC WILL UTILIZE TEMPORARY DETOUR WHILE THE SB TRAFFIC WILL UTILIZE THE NEWLY CONSTRUCTED (LEFT) SIDE OF BRIDGE.

1. INSTALL TRAFFIC CONTROL DEVICES ALONG THE PROJECT LIMITS AS SHOWN.
2. SWITCH SB TRAFFIC TO NEWLY CONSTRUCTED LEFT SIDE OF BRIDGE PER TCP LAYOUTS. NB TRAFFIC TO REMAIN ON TEMPORARY DETOUR.
3. REMOVE EXISTING METAL BEAM GUARD FENCE AND MOW STRIP ON SB DIRECTION.
4. REMOVE SB SIDE OF EXIST BRIDGE. DEMOLITION PLAN TO INCLUDE CONCRETE SLAB SPAN SUPERSTRUCTURE, RAILING, ABUTMENTS, AND BENTS.
5. REMOVE SB SIDE OF EXIST PAVEMENT
6. CONSTRUCT SB SIDE OF PROPOSED BRIDGE AND APPROACH SLAB.
    a. DRILLED SHAFTS
    b. BRIDGE BENTS
    c. BRIDGE ABUTMENTS
    d. SLAB BEAM / BRIDGE DECK
    e. APPROACH EARTHWORK
    f. BRIDGE APPROACH SLABS
7. INSTALL SB APPROACH PAVEMENT
    a. 12" FLEX BASE
    b. PRIME COAT
    c. 5" HMA TY-B PG64-22
    d. TACK COAT
    e. 4" HMA TY-C SAC-B PG70-22

PHASE 4: Remove Detour and Construct MBGF

THE INTENT OF THIS PHASE IS TO REMOVE THE DETOUR PAVEMENT, INSTALL SEAL COAT FOR BOTH NB AND SB SIDES, AND INSTALL THE FINAL PAVEMENT MARKINGS AND SIGNS.

1. INSTALL SEAL COAT UTILIZING TCP (SC-1)-21
2. INSTALL FINAL PAVEMENT MARKINGS AND SIGNING
3. SWITCH SB AND NB TRAFFIC ONTO NEWLY CONSTRUCTED BRIDGE.
4. REMOVE DETOUR PAVEMENT AND TEMPORARY CULVERT UTILIZING TCP (2-1)-18.
5. CONSTRUCT FINAL EARTHWORK AND GRADING TO MATCH PRE-CONSTRUCTION GRADING.
6. INSTALL METAL BEAM GUARD FENCE AND MOW STRIP UTILIZING TCP (2-1)-18.
7. PLACE SEEDING AS PER PLANS.
8. INSTALL FINAL SEEDING
9. REMOVE SW3P MEASURES.

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
Julio A. Rangel
10/28/2022

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FRN - F-1386

US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
SEQUENCE OF WORK

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	11

TRAFFIC CONTROL PLAN ITEMS
PROJECT LIMIT SIGNING

LOCATION	G20-5T 48" X 24" BEGIN ROAD WORK NEXT X MILES NAME ADDRESS CITY STATE CONTRACTOR G20-6T 48" X 30"	ROAD WORK AHEAD CW20-1D 48" X 48"	ROAD WORK XXX FT CW20-1A 48" X 48"	G20-5aP 36" X 24" WORK ZONE SPEED LIMIT 55 R2-1 36" X 48"	SPEED LIMIT 55 CW3-5 48" X 48"	BEGIN WORK ZONE G20-9T 36" X 30"	TRAFFIC FINES DOUBLE R20-5T 36" X 36"	WHEN WORKERS ARE PRESENT R20-5a-TP 36" X 18"	STAY ALERT TALK OR TEXT LATER C20-10T 24" X 18"	OBSERVE WARNING SIGNS STATE LAW R20-3T 48" X 32"	END ROAD WORK G20-2 48" X 24"	END DETOUR M4-8a 30" X 15"	CW1-4L 48" X 48"	CW1-4R 48" X 48"	XX MPH CW13-1P 24" X 24"
1	X	X	X	X	X	X	X	X	X	X					
2											X	X			
3		X											X	X	X
4		X											X	X	X

TRAFFIC CONTROL PLAN ITEMS
PROJECT LIMIT SIGNING

LOCATION	ROAD CLOSED R11-2 48" X 30"	CW1-6L 48" X 24"	CW1-6R 48" X 24"	DO NOT PASS R4-1 24" X 30"	CW6-3 48" X 48"	ROAD MAY FLOOD CW8-18 36" X 36"	DETOUR XXX FT CW20-2 48" X 48"
1							
2							
3	X		X	X			
4	X	X	X	X	X	X	X

TRAFFIC CONTROL PLAN ITEMS
PHASE DEVICES

LOCATION	BARRELS	BARRELS	T.M.A.	TY III BARRICADES	P.C.M.S.
1					
2					
3	X	X	X	X	
4	X	X	X	X	X

GENERAL NOTES - BARRICADES:

LOCATION NO.1 TO BE USED AT BEGINNING OF PROJECT.
LOCATION NO.2 TO BE USED AT THE END OF THE PROJECT.
LOCATION NO.3 TO BE USED SOUTHBOUND DIRECTION THROUGHOUT THE COURSE OF THE PROJECT AS DIRECTED BY THE ENGINEER.
LOCATION NO.4 TO BE USED NORTHBOUND DIRECTION THROUGHOUT THE COURSE OF THE PROJECT AS DIRECTED BY THE ENGINEER.

NOTE:

1. LOCATIONS SHOWN FOR SIGNING ARE APPROXIMATE AND FOR VISUAL AID. EXACT LOCATIONS AND SIGN SPACING TO BE ACCORDING TO TxMUTCD, BARRICADE & TCP STANDARDS, OR AS DIRECTED. TYPE 3 BARRICADES TO BE PLACED IN A LOCATION THAT IS SATISFACTORY TO THE ENGINEER.

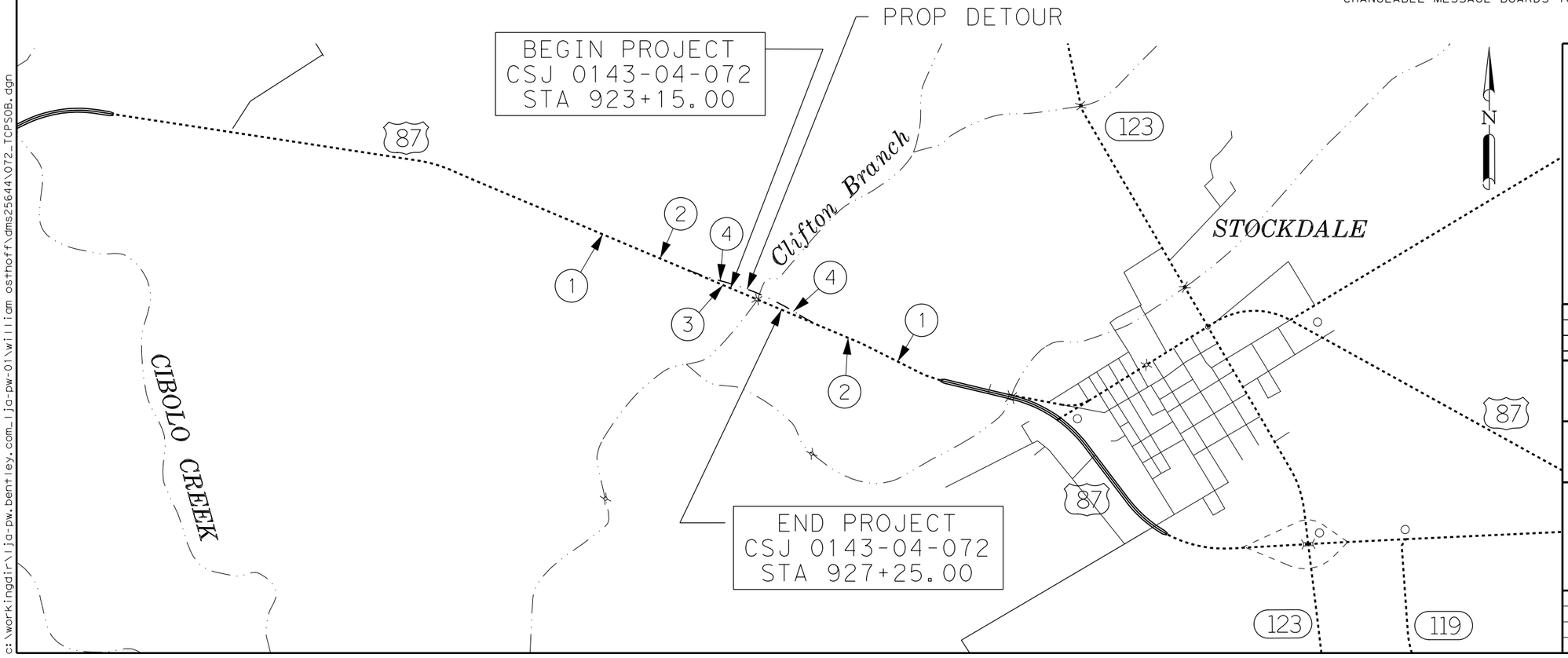
2. BARRICADES AND WARNING SIGNS ON THIS SHEET ARE MINIMAL. CONSTRUCTION ZONE SIGNING, ADDITIONAL BARRICADES, WARNING SIGNS, ARROW PANELS, CONES, ETC, IN ACCORDANCE WITH CURRENT BC STANDARDS AND THE TEXAS MUTCD MAY BE REQUIRED IN AREAS OF ACTUAL CONSTRUCTION.

3. ANY SIGN LISTED ON THIS SHEET AND ANY ADDITIONAL SIGNS REQUIRED ARE TO BE SUPPLIED BY THE CONTRACTOR AND CONSIDERED SUBSIDIARY TO ITEM 502. ANY ADDITIONAL SIGNS REQUESTED BY THE ENGINEER WILL BE IN ACCORDANCE WITH THE "BC" STANDARD SHEETS, THE "TCP" STANDARD SHEETS AND/OR THE TEXAS MUTCD.

4. BARRICADES SHALL NOT BE USED AS SIGN SUPPORT. SUPPORTS FOR SIGNS SHALL BE TEMPORARY, OR PORTABLE SIGN SUPPORTS AS DIRECTED BY THE ENGINEER OR IN ACCORDANCE WITH CURRENT BC STANDARDS AND THE TEXAS MUTCD.

5. ALL CONSTRUCTION TRAFFIC SHALL BE REGULATED SO AS TO CAUSE MINIMUM OF INCONVENIENCE TO THE TRAVELING PUBLIC. AT TIMES WHEN IT IS NECESSARY FOR CONSTRUCTION EQUIPMENT OR TRUCKS TO STOP, UNLOAD, OR CROSS ROADWAYS UNDER TRAFFIC, WARNING SIGNS AND FLAGGER SHALL BE PROVIDED AS NECESSARY TO ADEQUATELY PROTECT THE TRAVELING PUBLIC.

6. IMPLEMENT DETOUR IN ACCORDANCE WITH THE TEXAS MUTCD. USE CHANGEABLE MESSAGE BOARDS TO GUIDE MOTORISTS THROUGH THE DETOUR.



STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

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FRN-F-1386

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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
SCHEDULE OF BARRICADES

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	12

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DETOUR

Beginning chain DETOUR description

```
                                        Curve Data
                                       *----------*
Curve DETOUR1
P.I.  Station              11+42.88  N      13,638,095.0570  E       2,292,282.1668
Delta          =       5° 32′ 45.19" (LT)
Degree         =       1° 56′ 32.03"
Tangent        =            142.8827
Length         =            285.5422
Radius         =          2,950.0000
External       =              3.4582
Long Chord     =            285.4307
Mid. Ord.      =              3.4542
P.C.  Station              10+00.00  N      13,638,151.2243  E       2,292,150.7869
P.T.  Station              12+85.54  N      13,638,051.8495  E       2,292,418.3599
C.C.                                 N      13,640,863.7354  E       2,293,310.4348
Back         = S  66° 51′ 08.67" E
Ahead        = S  72° 23′ 53.86" E
Chord Bear   = S  69° 37′ 31.27" E

                                        Curve Data
                                       *----------*
Curve DETOUR2
P.I.  Station              14+84.13  N      13,637,991.7965  E       2,292,607.6516
Delta          =       5° 32′ 45.84" (RT)
Degree         =       1° 23′ 50.85"
Tangent        =            198.5892
Length         =            396.8683
Radius         =          4,100.0000
External       =              4.8067
Long Chord     =            396.7134
Mid. Ord.      =              4.8010
P.C.  Station              12+85.54  N      13,638,051.8495  E       2,292,418.3599
P.T.  Station              16+82.41  N      13,637,913.7303  E       2,292,790.2532
C.C.                                 N      13,634,143.8047  E       2,291,178.5271
Back         = S  72° 23′ 53.86" E
Ahead        = S  66° 51′ 08.02" E
Chord Bear   = S  69° 37′ 30.94" E

Course from PT DETOUR2 to PC DETOUR3 S 66° 51′ 08.02" E Dist 260.0000

                                        Curve Data
                                       *----------*
Curve DETOUR3
P.I.  Station              21+40.98  N      13,637,733.4632  E       2,293,211.9089
Delta          =       5° 32′ 44.28" (RT)
Degree         =       1° 23′ 50.85"
Tangent        =            198.5736
Length         =            396.8371
Radius         =          4,100.0000
External       =              4.8059
Long Chord     =            396.6822
Mid. Ord.      =              4.8003
P.C.  Station              19+42.41  N      13,637,811.5232  E       2,293,029.3216
P.T.  Station              23+39.25  N      13,637,638.1235  E       2,293,386.0979
C.C.                                 N      13,634,041.5976  E       2,291,417.5955
Back         = S  66° 51′ 08.02" E
Ahead        = S  61° 18′ 23.74" E
Chord Bear   = S  64° 04′ 45.88" E

                                        Curve Data
                                       *----------*
Curve DETOUR4
P.I.  Station              24+82.13  N      13,637,569.5232  E       2,293,511.4332
Delta          =       5° 32′ 44.93" (LT)
Degree         =       1° 56′ 32.03"
Tangent        =            142.8809
Length         =            285.5386
Radius         =          2,950.0000
External       =              3.4581
Long Chord     =            285.4271
Mid. Ord.      =              3.4541
P.C.  Station              23+39.25  N      13,637,638.1235  E       2,293,386.0979
P.T.  Station              26+24.79  N      13,637,513.3566  E       2,293,642.8115
C.C.                                 N      13,640,225.8677  E       2,294,802.4594
Back         = S  61° 18′ 23.74" E
Ahead        = S  66° 51′ 08.67" E
Chord Bear   = S  64° 04′ 46.21" E

================================================================================
Ending chain DETOUR description
```

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

NOT TO SCALE

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

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US 87 AT CLIFTON BRANCH
DETOUR
HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	13

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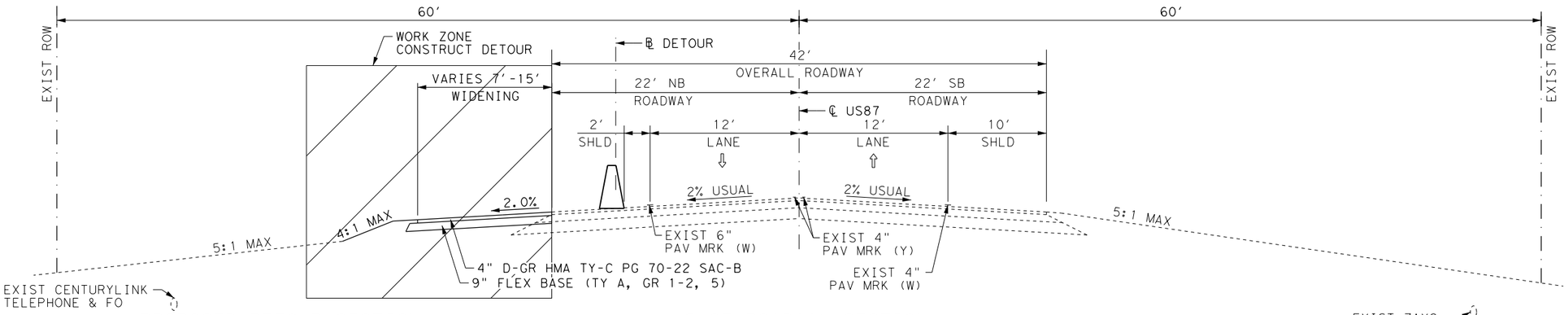
SUMMARY OF TEMPORARY DETOUR (FOR CONTRACTOR INFORMATION ONLY)							
LOCATION	*	*	*	*	*	*	*
	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL) (DENS CONT) (TY B)	PROOF ROLLING	FL BS (CIP) (TY A GR 1-2 OR 5) FINAL POS	HMA TY-C (4")	TACK COAT	CONC BOX CULV (8 FT X 3 FT)
	CY	CY	HR	SY	SY	SY	LF
DETOUR TOTALS	1717	278	1	2182	1984	1984	80

* CONTRACTOR INFO ONLY, SUBSIDIARY TO ITEM 508 (CONSTRUCTING DETOURS)



PROPOSED DETOUR SECTION

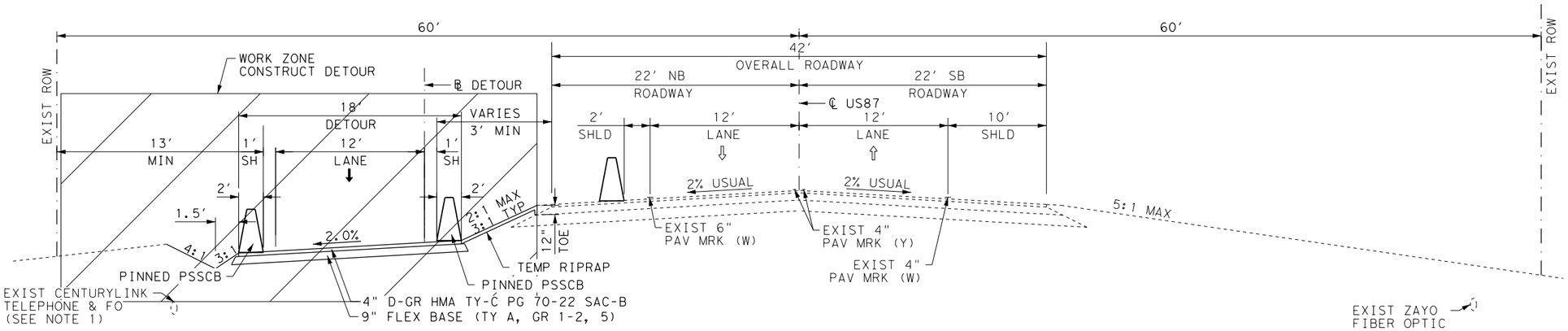
STA 11+80.81 TO STA 14+46.99
STA 21+61.77 TO STA 24+38.10

US 87 ROADWAY SECTION

STA 918+60.31 TO STA 921+27.18
STA 928+41.46 TO STA 931+18.73

NOTES:

1. CONTRACTOR SHALL NOTE EXISTING UTILITY CONDUIT UNDERNEATH TEMPORARY DETOUR PAVEMENT. USE EXTREME CAUTION TO AVOID IMPACTS TO UTILITY.



PROPOSED DETOUR SECTION

STA 14+46.99 TO STA 16+15.00
STA 19+85.00 TO STA 21+61.77

US 87 EXISTING ROADWAY SECTION

STA 921+27.18 TO STA 922+95.12
STA 926+65.01 TO STA 928+41.46

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

NOT TO SCALE

LJA Engineering, Inc.
FRN-F-1386

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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 1
TYPICAL SECTIONS

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	14

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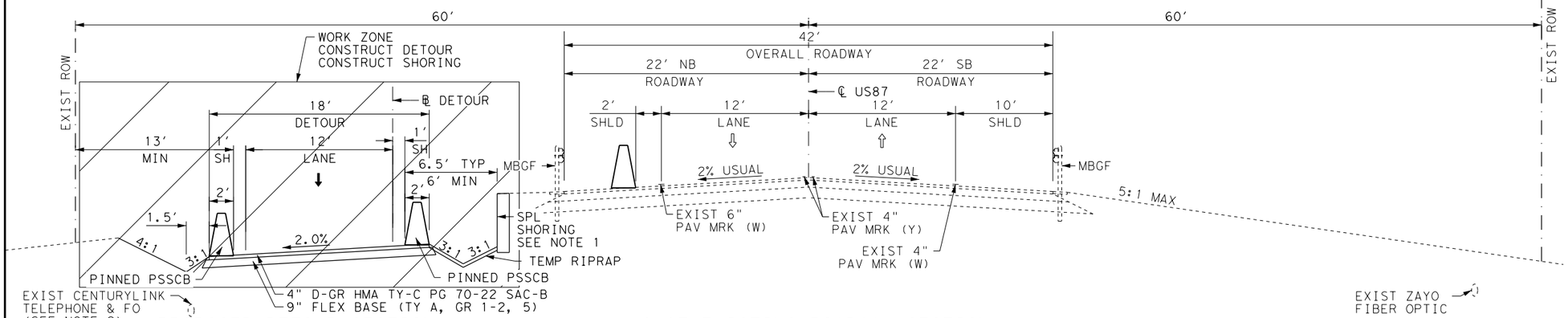


PROPOSED DETOUR SECTION

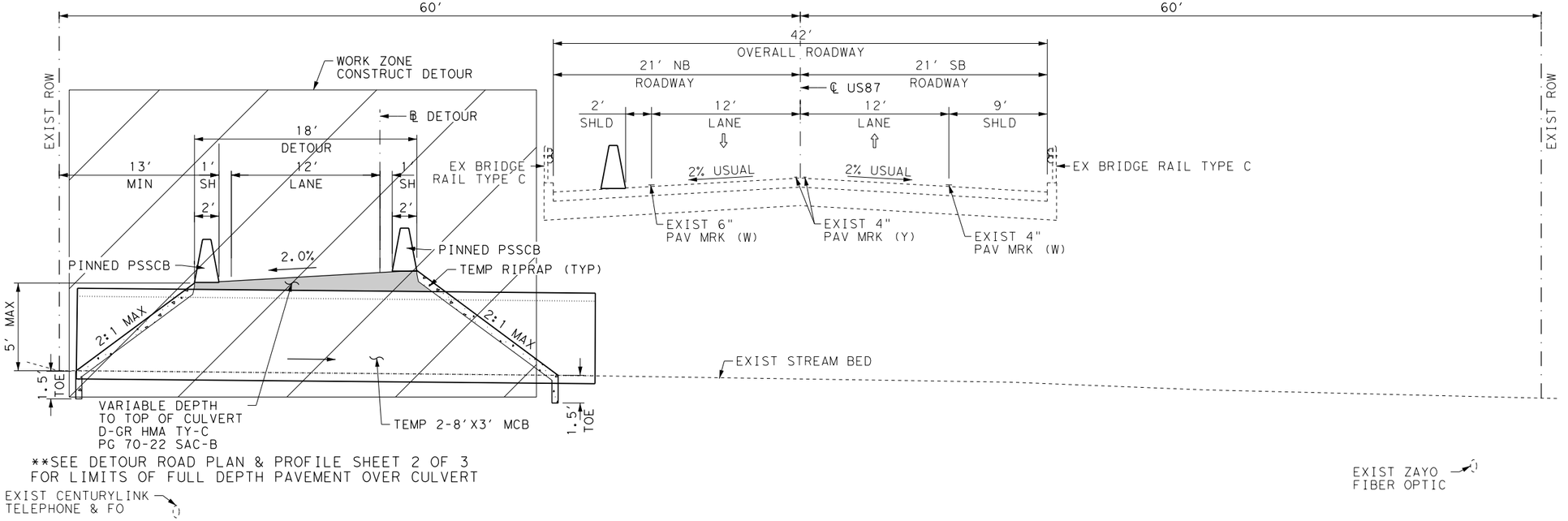
STA 16+15.00 TO STA 17+99.87
STA 18+79.77 TO STA 19+85.00

US 87 EXISTING ROADWAY SECTION

STA 922+95.12 TO STA 924+79.88
STA 925+59.78 TO STA 926+65.01

NOTES:

1. CONTRACTOR SHOULD UTILIZE TEMPORARY SPL SHORING METHODS THAT ACCOMODATE THE MINIMUM OFFSETS TO THE TEMPORARY DETOUR AS SHOWN IN THE PLANS.
2. CONTRACTOR SHALL NOTE EXISTING UTILITY CONDUIT UNDERNEATH TEMPORARY DETOUR PAVEMENT. USE EXTREME CAUTION TO AVOID IMPACTS TO UTILITY.



**SEE DETOUR ROAD PLAN & PROFILE SHEET 2 OF 3
FOR LIMITS OF FULL DEPTH PAVEMENT OVER CULVERT

PROPOSED DETOUR SECTION

STA 17+99.87 TO STA 18+79.77

US 87 EXISTING BRIDGE SECTION

STA 924+79.88 TO STA 925+59.78

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
Julio A. Rangel
10/28/2022

NOT TO SCALE

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FRN-F-1386

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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 1
TYPICAL SECTIONS

SHEET 2 OF 2

FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	15

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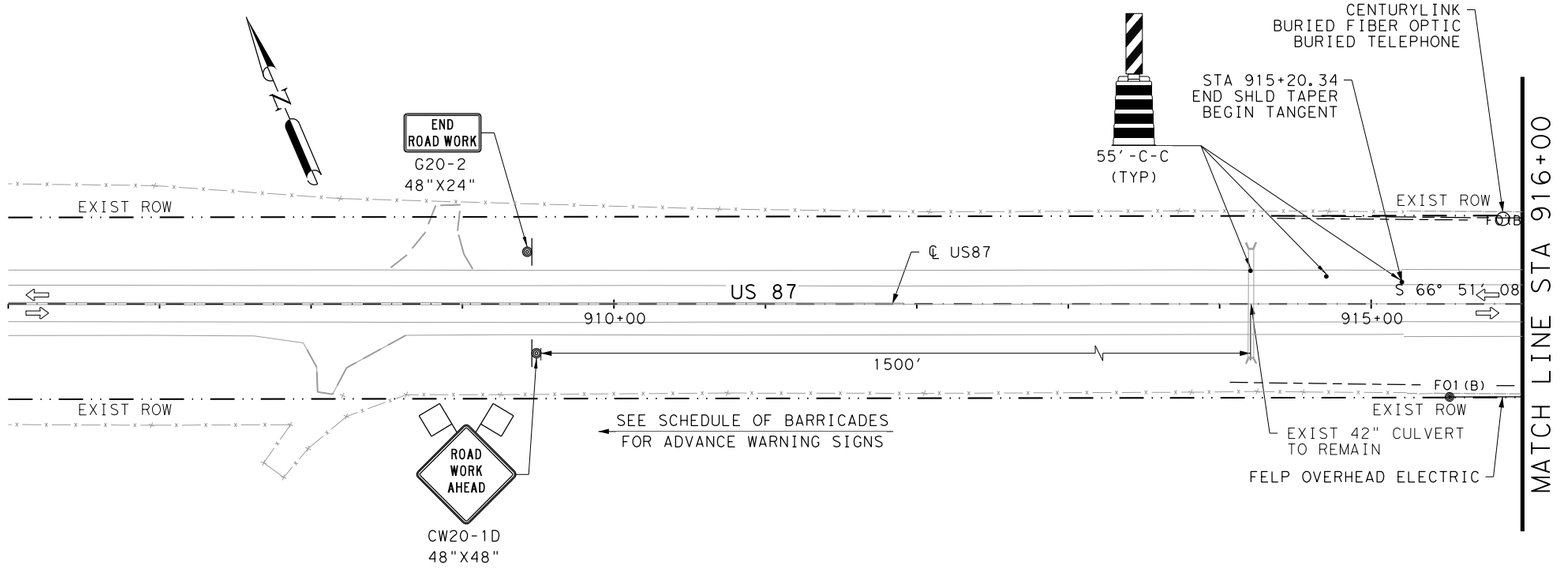
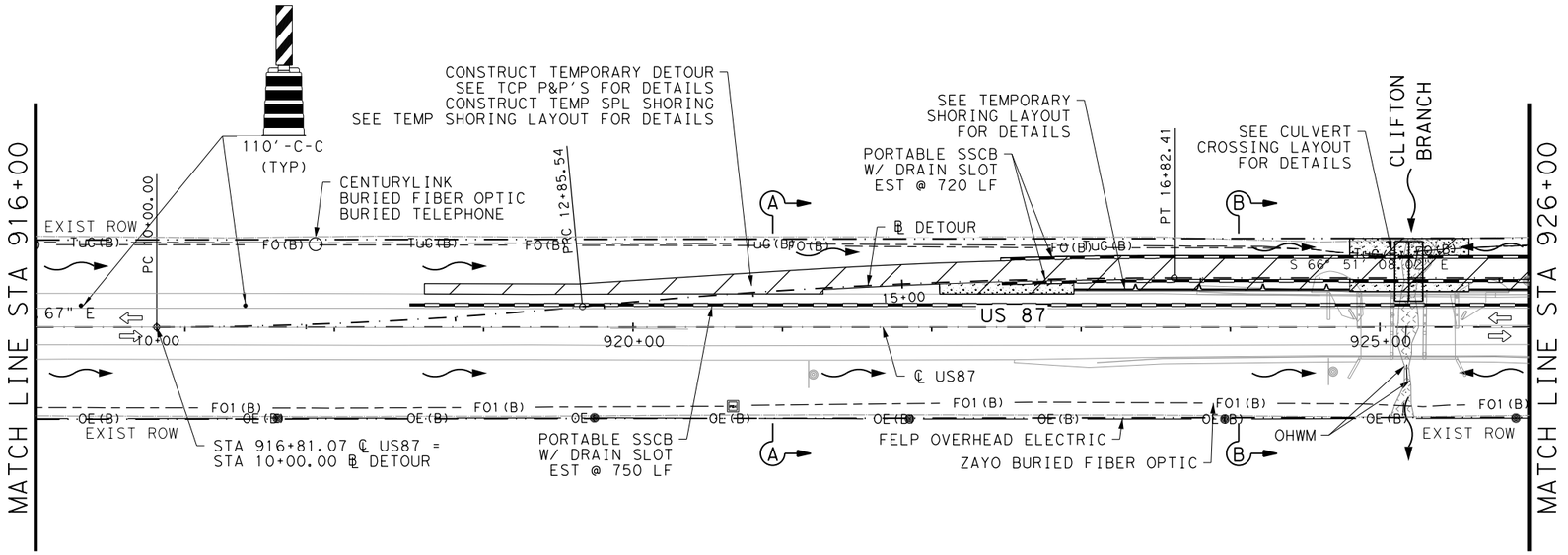
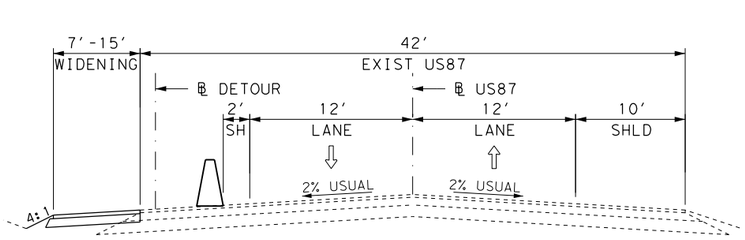
ITEM	CODE	DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	
403	6001	TEMPORARY SPL SHORING	SF	
432	6002	RIPRAP (CONC)(5 IN)	CY	
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	1470
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	
512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	
545	6005	CRASH CUSH ATTEN (REMOVE)	EA	
545	6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	
662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	
662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	

NOTES:

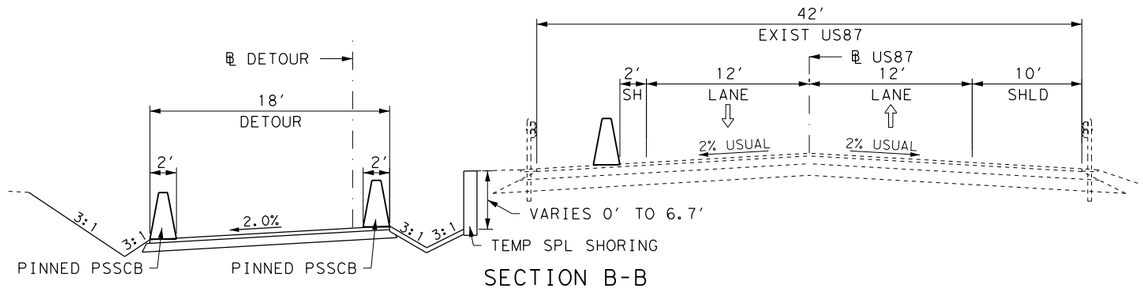
1. SEE TCP (2-1)-18 FOR SIGN AND DEVICES SPACING.







SECTION A-A



SECTION B-B

LEGEND

- WARNING SIGN
- BARRICADE (TYPE 3)
- CHANGEABLE MESSAGE SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM
- FLOW ARROW

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

0' 25' 50' 100'
SCALE: 1"=100'

LJA Engineering, Inc.
FRN-F-1386

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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 1
PLAN LAYOUT

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	16

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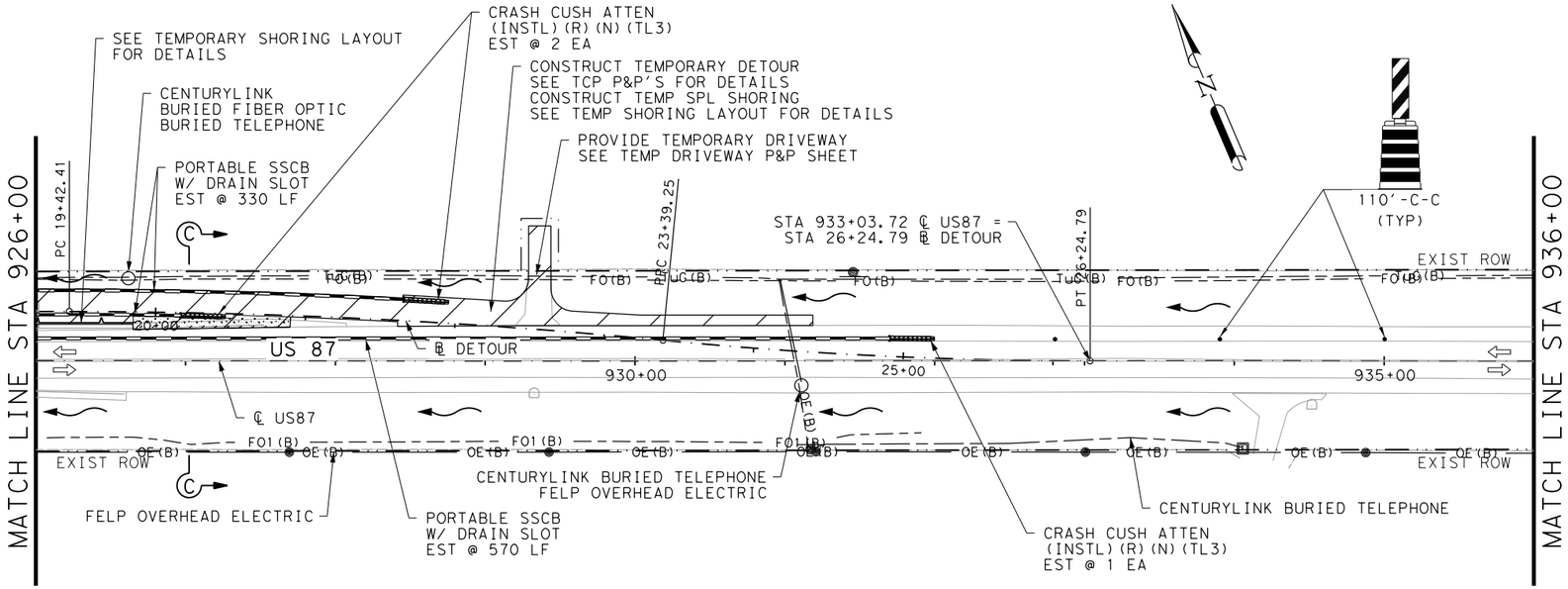

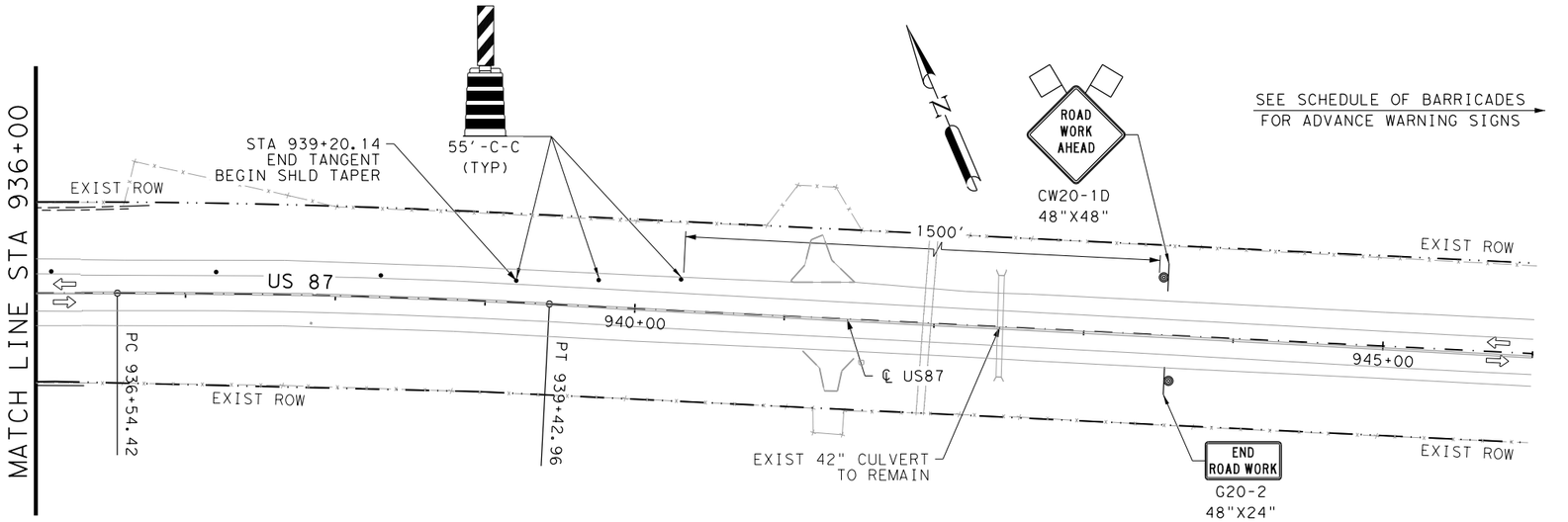

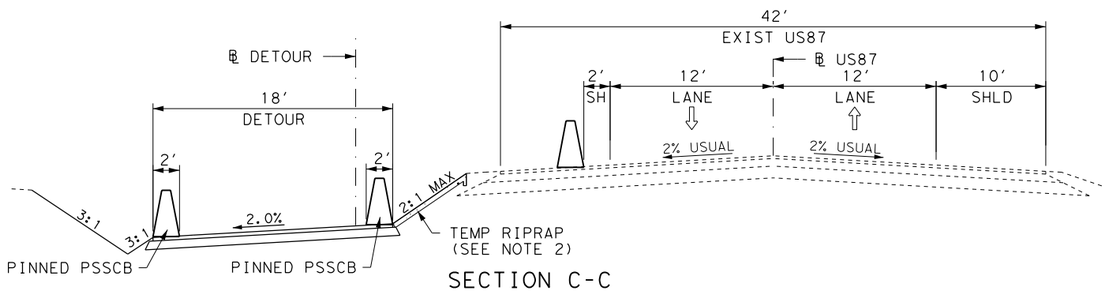

ITEM	CODE	DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	
403	6001	TEMPORARY SPL SHORING	SF	
432	6002	RIPRAP (CONC)(5 IN)	CY	
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	900
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	
512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	
545	6005	CRASH CUSH ATTEN (REMOVE)	EA	
545	6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	3
662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	
662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	

NOTES:

1. SEE TCP (2-1)-18 FOR SIGN AND DEVICES SPACING.
2. SEE SHEETS 18-19 DETOUR RD P&P FOR PAYMENT OF RIPRAP (CONC)(5 IN).

LEGEND

- WARNING SIGN
- BARRICADE (TYPE 3)
- CHANGEABLE MESSAGE SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM
- FLOW ARROW

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED PROFESSIONAL ENGINEER
10/28/2022

0' 25' 50' 100'
SCALE: 1"=100'

LJA Engineering, Inc.
FRN-F-1386

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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 1
PLAN LAYOUT

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	17

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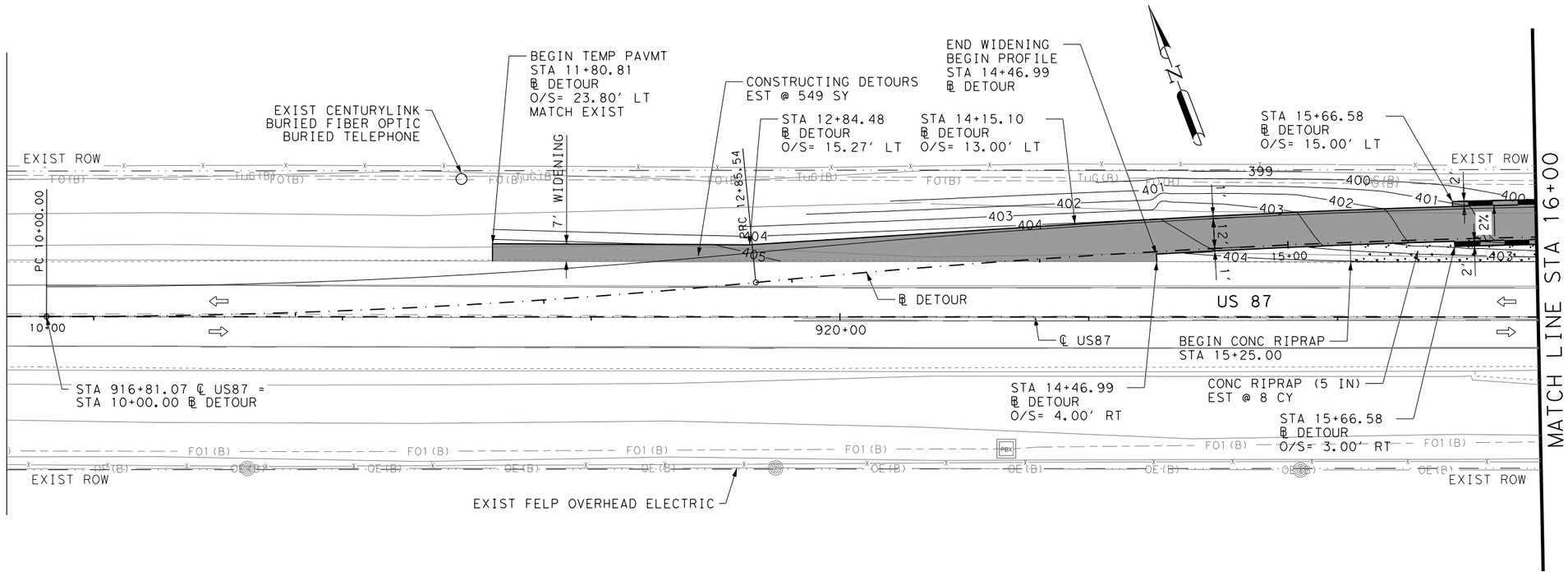

ITEM	CODE	DESCRIPTION	UNIT	QTY
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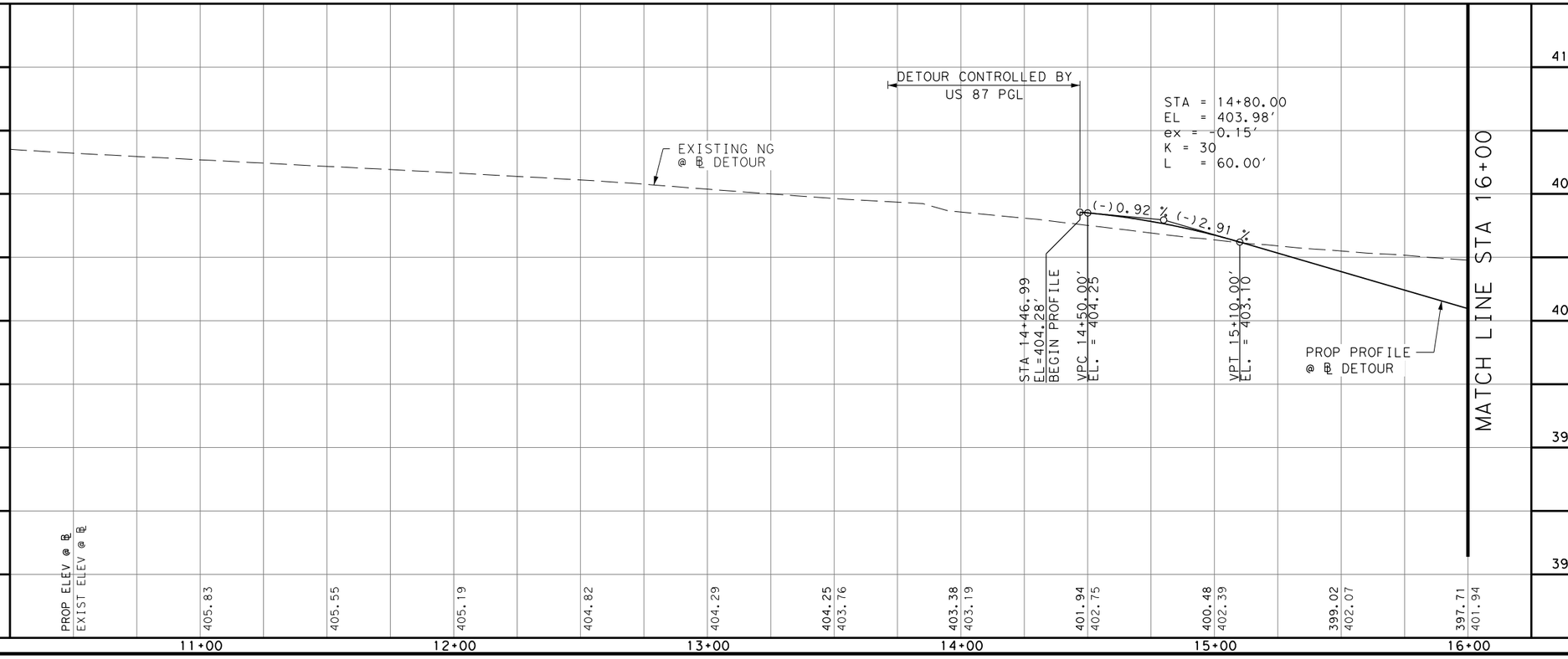
403	6001	TEMPORARY SPL SHORING	SF	
432	6002	RIPRAP (CONC)(5 IN)	CY	8
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	549
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	
512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	
545	6005	CRASH CUSH ATTEN (REMOVE)	EA	
545	6013	CRASH CUSH ATTEN ([INSTL)(R)(N)(TL3)	EA	
662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	
662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	

LEGEND

- WARNING SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM
- TEMP SPL SHORING

NOTES:

1. SEE ALIGNMENT DATA SHEET FOR PROP & EXIST TEMP ALIGNMENT DATA.
2. SEE SURVEY DATA SHEET FOR BM STATIONS, OFFSET, ELEV, ECT.
3. SEE TCP PLAN LAYOUT FOR SIGNS, AND STRIPING ITEMS.
4. SEE REMOVAL LAYOUT FOR REMOVAL ITEMS.



JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
10/28/2022

0' 25' 50'

SCALE: 1"=50' - HORZ
1"=5' - VERT

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
DETOUR ROAD (PHASE 1)
PLAN AND PROFILE
BEGIN TO STA 17+00

SHEET 1 OF 3

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	18

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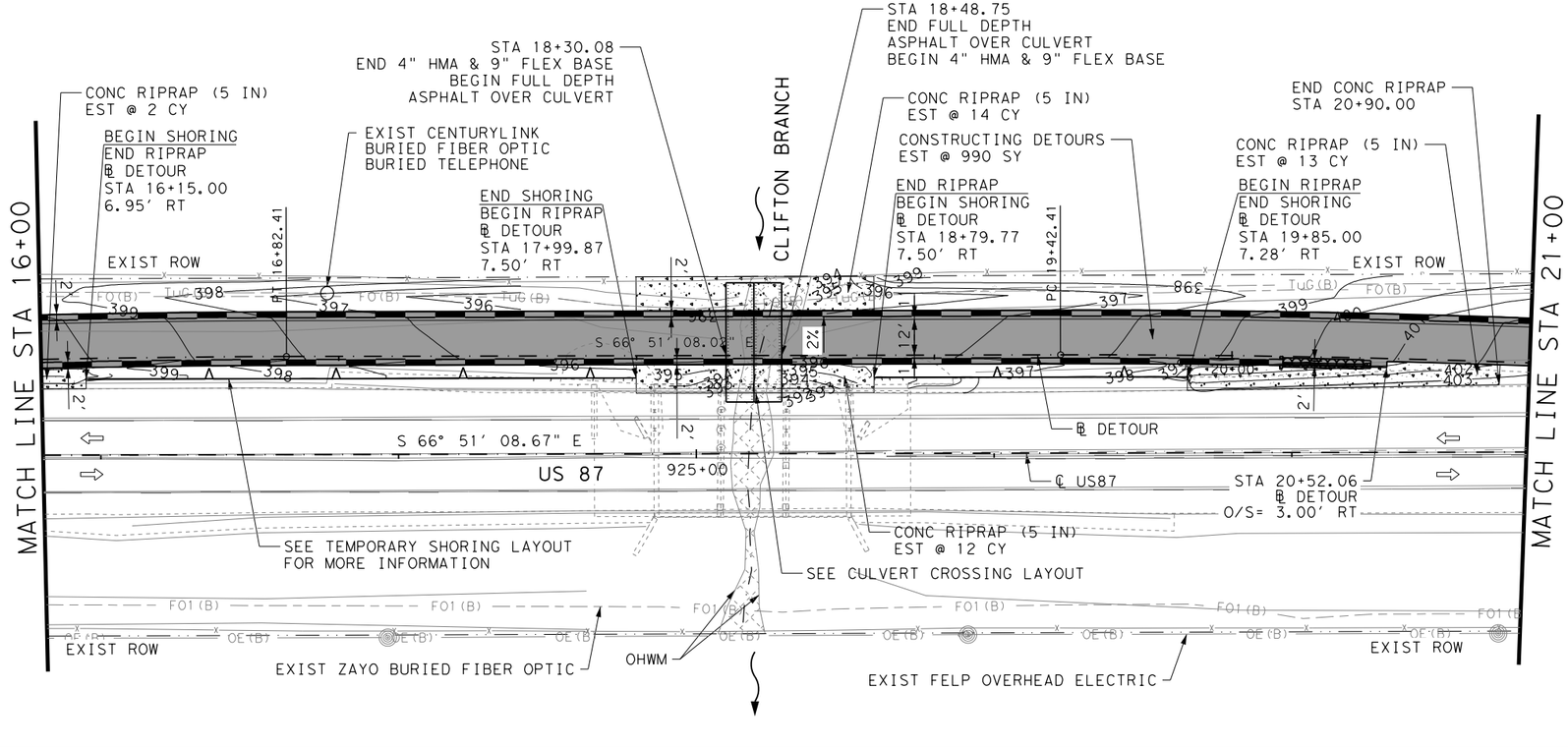


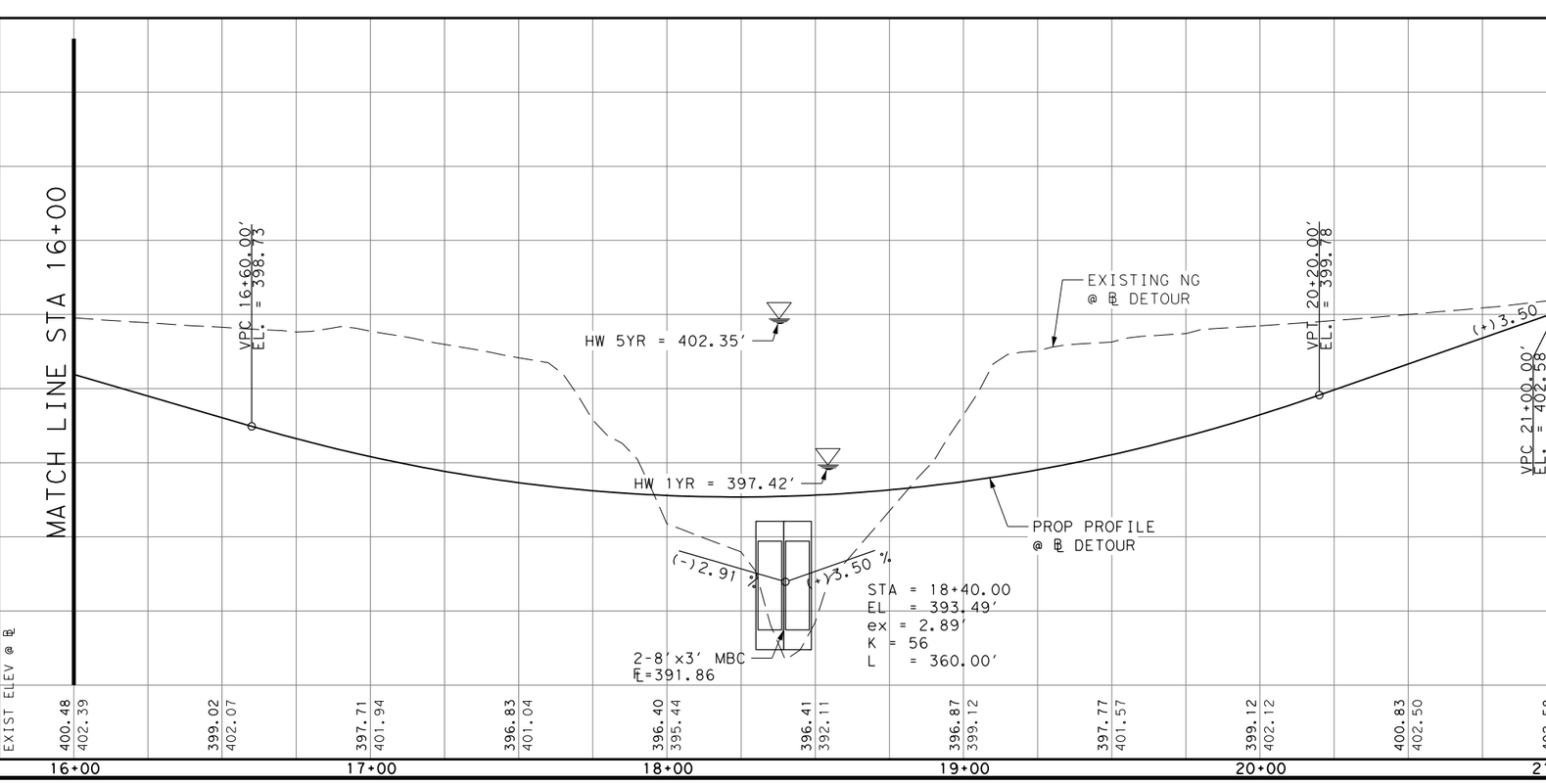
ITEM	CODE	DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	
403	6001	TEMPORARY SPL SHORING	SF	
432	6002	RIPRAP (CONC)(5 IN)	CY	41
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	990
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	
512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	
545	6005	CRASH CUSH ATTEN (REMOVE)	EA	
545	6013	CRASH CUSH ATTEN ([INSTL)(R)(N)(TL3)	EA	
662	6063	WK ZN PAV MRK REMOV (W)4" (SLD)	LF	
662	6095	WK ZN PAV MRK REMOV (Y)4" (SLD)	LF	

LEGEND

- WARNING SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM
- TEMP SPL SHORING

NOTES:

1. SEE ALIGNMENT DATA SHEET FOR PROP & EXIST TEMP ALIGNMENT DATA.
2. SEE SURVEY DATA SHEET FOR BM STATIONS, OFFSET, ELEV, ECT.
3. SEE TCP PLAN LAYOUT FOR SIGNS, AND STRIPING ITEMS.
4. SEE REMOVAL LAYOUT FOR REMOVAL ITEMS.



STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

0' 25' 50'

SCALE: 1"=50' - HORZ
1"=5' - VERT

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
DETOUR ROAD (PHASE 1)
PLAN AND PROFILE
STA 17+00 TO STA 23+00

SHEET 2 OF 3

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	19

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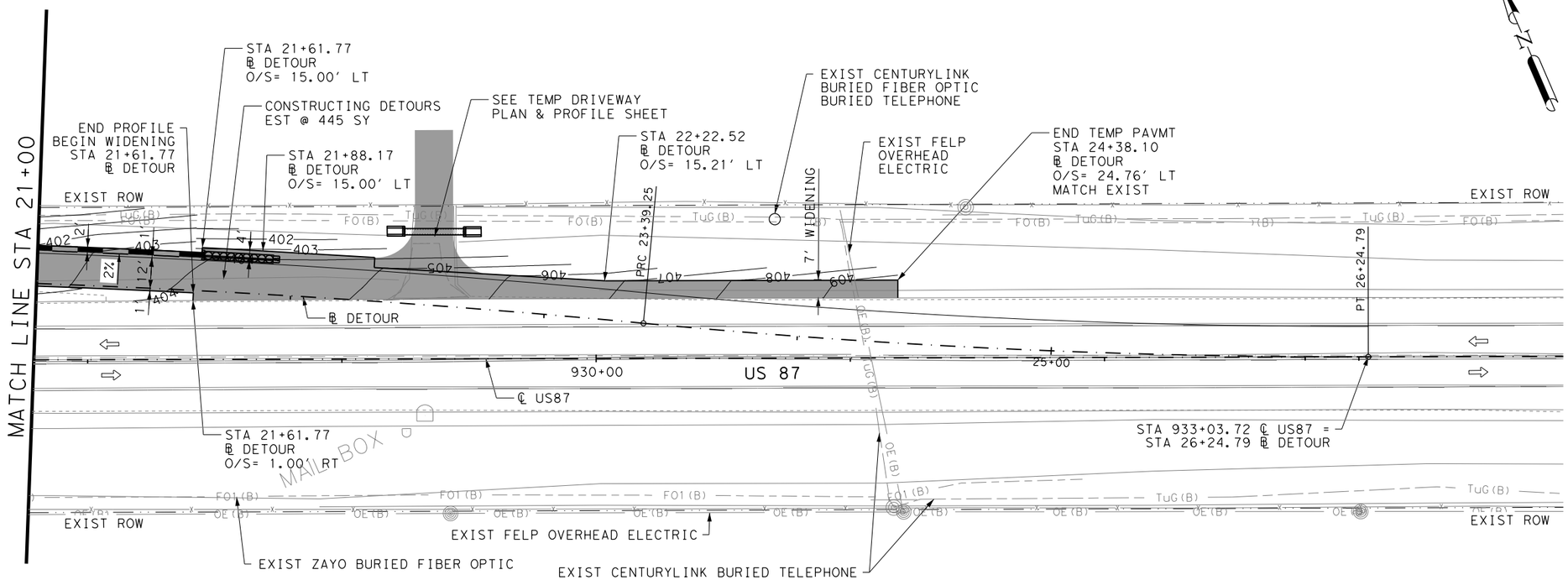
ITEM	CODE	DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	
403	6001	TEMPORARY SPL SHORING	SF	
432	6002	RIPRAP (CONC)(5 IN)	CY	
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	445
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	
512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	
545	6005	CRASH CUSH ATTEN (REMOVE)	EA	
545	6013	CRASH CUSH ATTEN ([INSTL)(R)(N)(TL3)	EA	
662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	
662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	

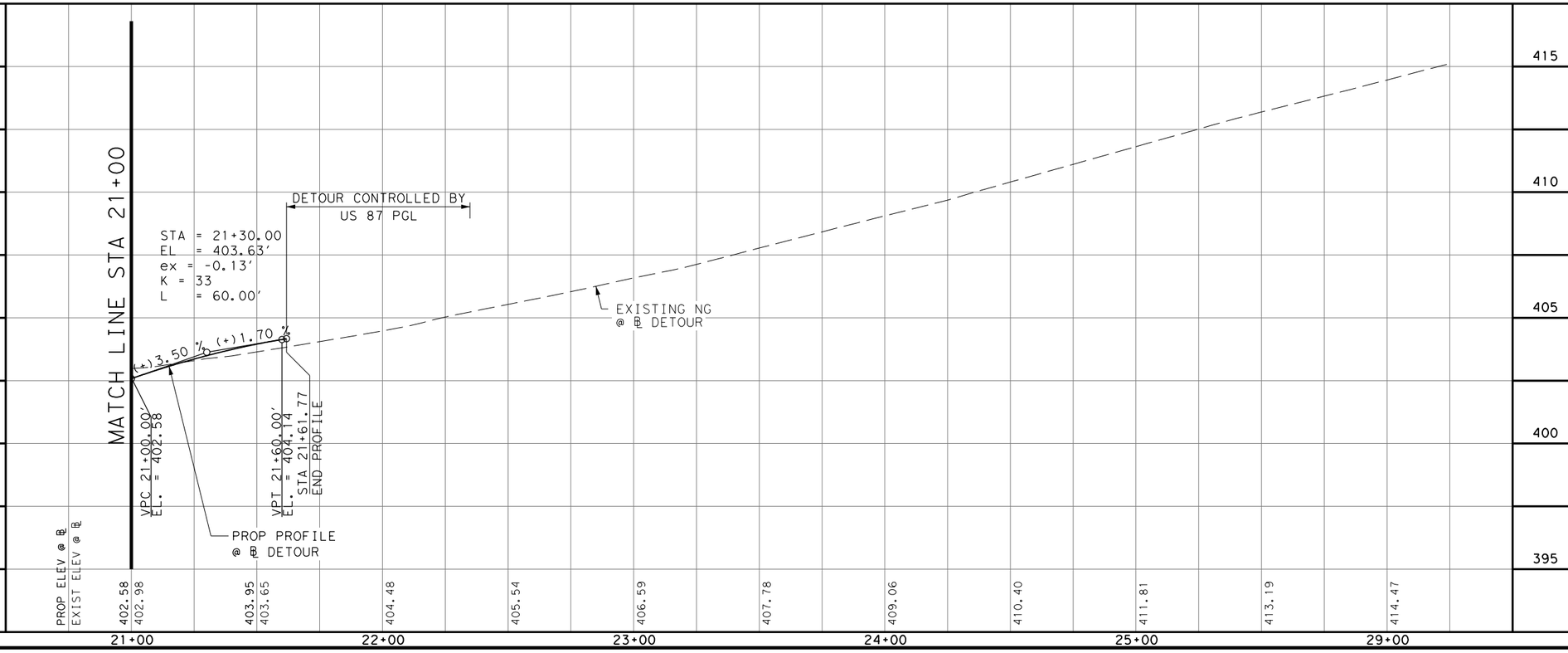


LEGEND

- WARNING SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM
- TEMP SPL SHORING

NOTES:

1. SEE ALIGNMENT DATA SHEET FOR PROP & EXIST TEMP ALIGNMENT DATA.
2. SEE SURVEY DATA SHEET FOR BM STATIONS, OFFSET, ELEV, ECT.
3. SEE TCP PLAN LAYOUT FOR SIGNS, AND STRIPING ITEMS.
4. SEE REMOVAL LAYOUT FOR REMOVAL ITEMS.



STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

SCALE: 1"=50' - HORZ
1"=5' - VERT

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
DETOUR ROAD (PHASE 1)
PLAN AND PROFILE
STA 23+00 TO STA 29+00

SHEET 3 OF 3

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	20

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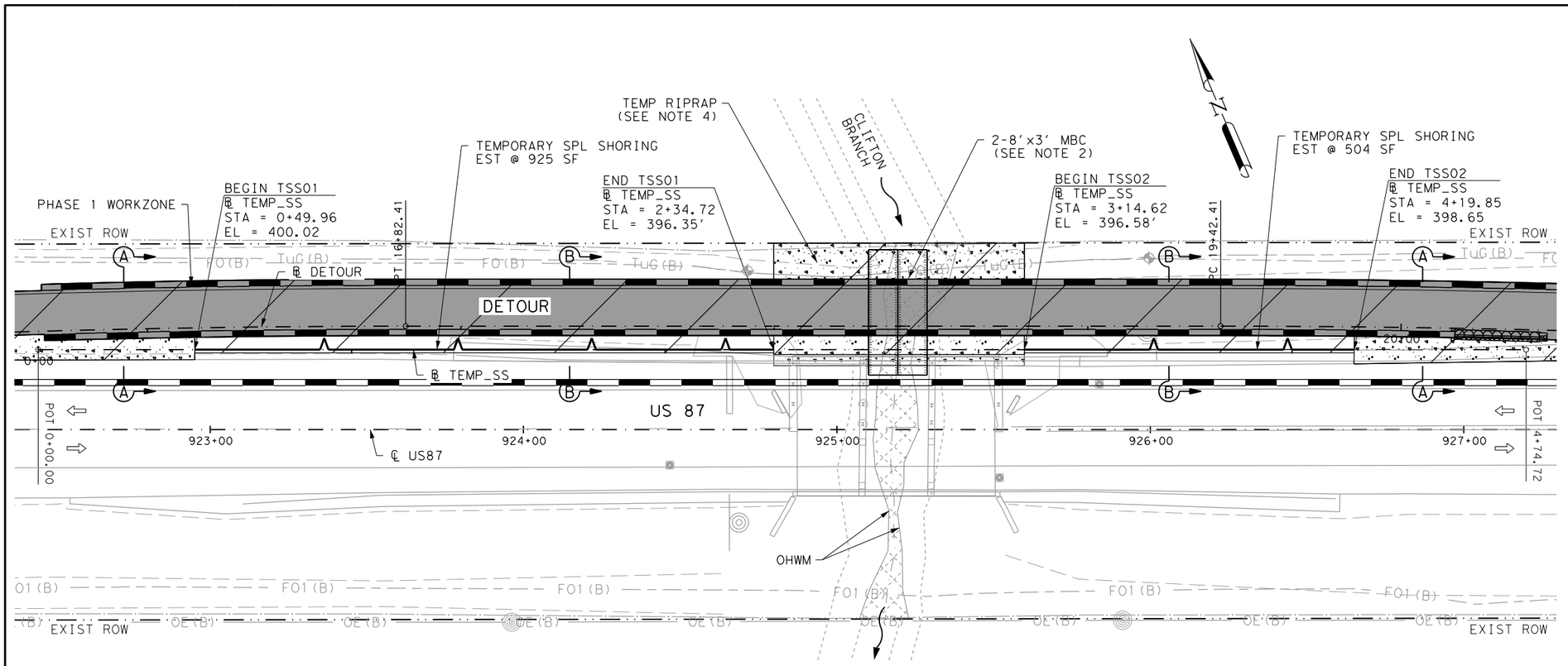
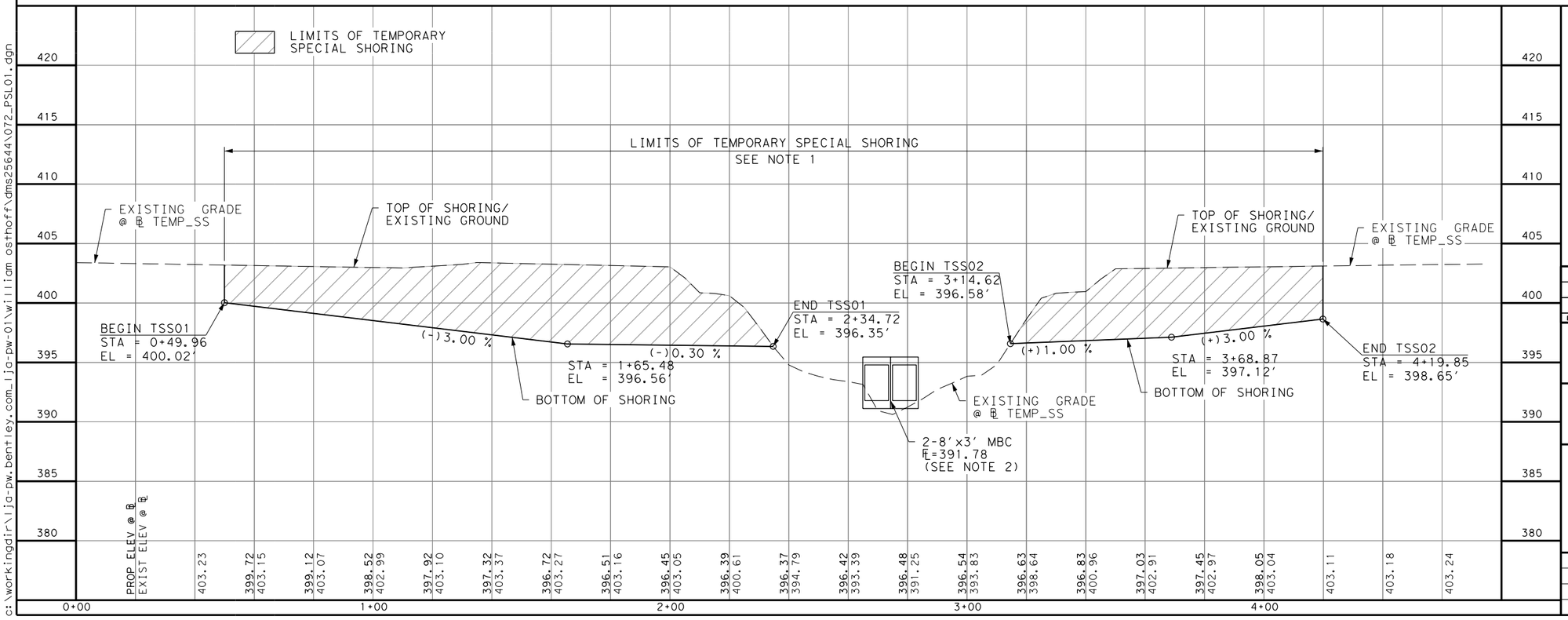


ITEM	CODE	DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	
403	6001	TEMPORARY SPL SHORING	SF	1429
432	6002	RIPRAP (CONC)(5 IN)	CY	
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	
512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	
545	6005	CRASH CUSH ATTEN (REMOVE)	EA	
545	6013	CRASH CUSH ATTEN ([INSTL)(R)(N)(TL3)	EA	
662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	
662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	

LEGEND

- WARNING SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM
- TEMP SPL SHORING

NOTES:
1. CONTRACTOR SHOULD UTILIZE TEMPORARY SPL SHORING METHODS THAT ACCOMODATE THE MINIMUM OFFSETS TO THE TEMPORARY DETOUR AS SHOWN IN THE PLANS.
2. SEE TCP CULVERT LAYOUT FOR MORE INFORMATION
3. SEE SHEET 2 OF 2 FOR SECTION A-A, SECTION B-B, AND HORIZONTAL ALIGNMENT DATA FOR ℄ TEMP_SS
4. SEE SHEETS 18-19 DETOUR RD P&P FOR PAYMENT OF RIPRAP (CONC)(5 IN).



STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

0' 10' 20' 40'

SCALE: 1"=40'- HORZ
1"=10'- VERT

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

US 87 AT CLIFTON BRANCH TEMPORARY SHORING LAYOUT TSS01 AND TSS02

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	21

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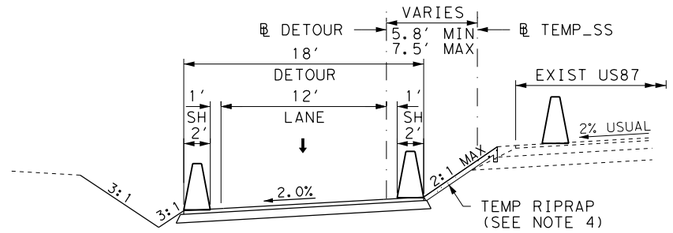
Beginning chain TEMP SS description

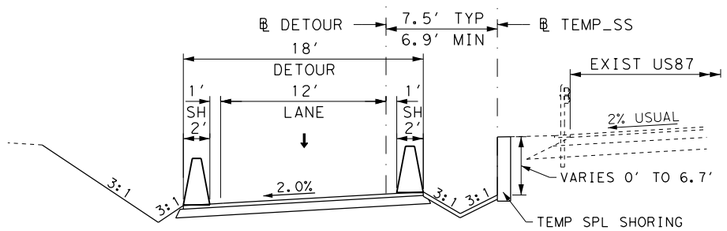
Point TSS0100	N 13,637,952.9277	E 2,292,679.4875	Sta	0+00.00
Course from TSS0100 to TSS0101 S 66° 51′ 08.67" E Dist 474.7214				
Point TSS0101	N 13,637,766.3143	E 2,293,115.9916	Sta	4+74.72

Ending chain TEMP SS description



SECTION A-A

STA 0+00.00 TO STA 0+49.96
STA 4+19.85 TO STA 4+74.72



SECTION B-B

STA 0+49.96 TO STA 2+34.72
STA 3+14.62 TO STA 4+19.85

LEGEND

- WARNING SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM
- TEMP SPL SHORING

NOTES:
1. CONTRACTOR SHOULD UTILIZE TEMPORARY SPL SHORING METHODS THAT ACCOMODATE THE MINIMUM OFFSETS TO THE TEMPORARY DETOUR AS SHOWN IN THE PLANS.
2. SEE TCP CULVERT LAYOUT FOR MORE INFORMATION
3. SEE SHEET 2 OF 2 FOR SECTION A-A, SECTION B-B, AND HORIZONTAL ALIGNMENT DATA FOR ℄ TEMP_SS
4. SEE SHEETS 18-19 DETOUR RD P&P FOR PAYMENT OF RIPRAP (CONC)(5 IN).

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

NOT TO SCALE

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

US 87 AT CLIFTON BRANCH
TEMPORARY SHORING
LAYOUT
TSS01 AND TSS02

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	22

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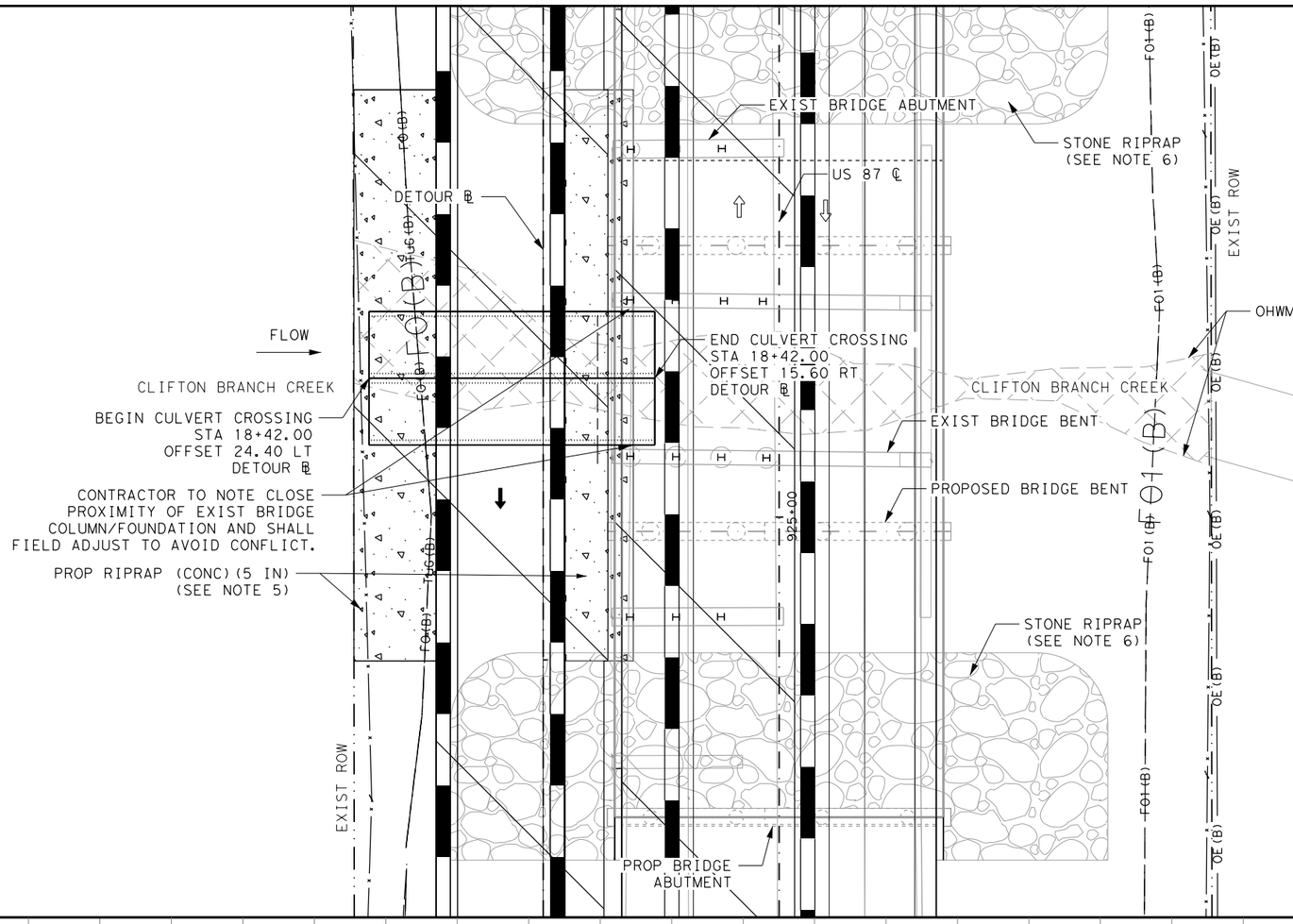
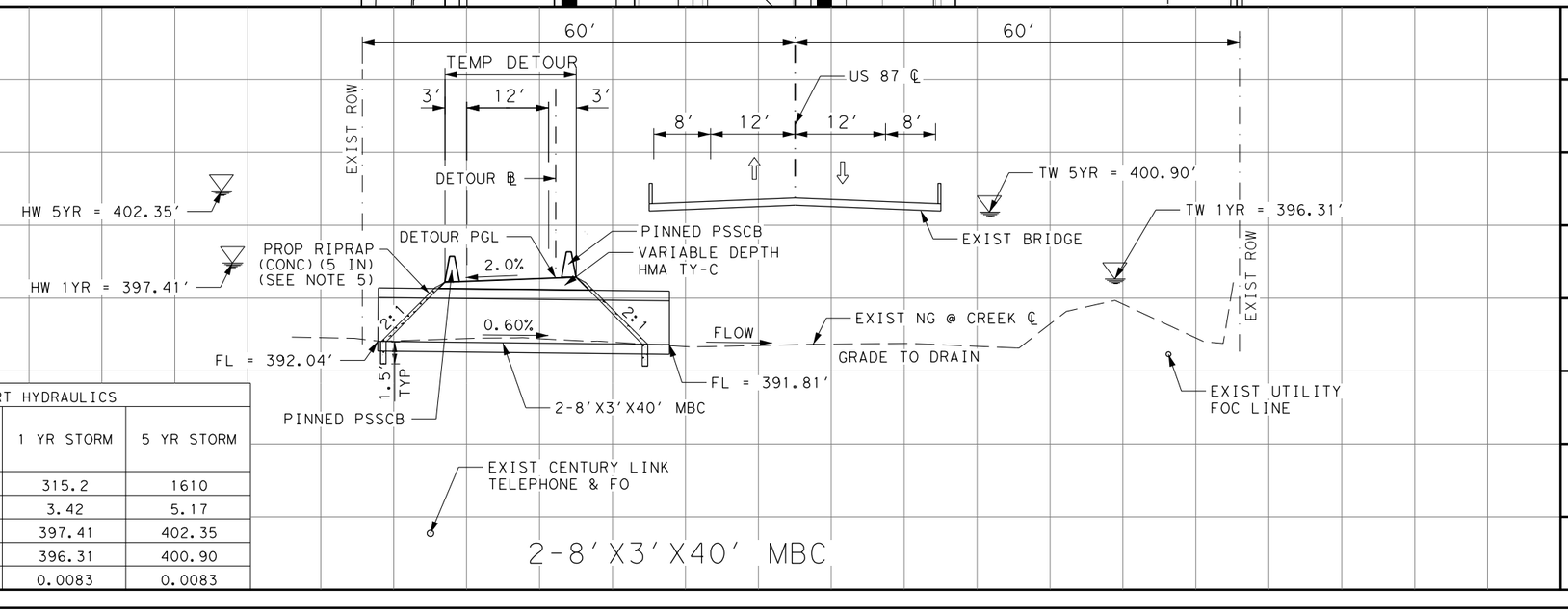


LEGEND

- WARNING SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM

NOTES:

1. SEE ALIGNMENT DATA SHEET FOR PROP & EXIST TEMP. ALIGNMENT DATA.
2. SEE SURVEY DATA SHEET FOR BM STATIONS, OFFSET, ELEV. ETC.
3. SEE TCP PLAN LAYOUT FOR SIGNS AND STRIPING ITEMS.
4. SEE REMOVAL LAYOUT FOR REMOVAL ITEMS.
5. SEE SHEETS 18-19 TCP DETOUR RD P&P FOR PAYMENT OF RIPRAP (CONC)(5 IN).
6. SEE SHEET 96 BRIDGE LAYOUT FOR PAYMENT OF STONE RIPRAP.



2-8'X3'X40' MBC

CULVERT HYDRAULICS		
	1 YR STORM	5 YR STORM
FLOW (CFS)	315.2	1610
VELOCITY (FPS)	3.42	5.17
HW(FT)	397.41	402.35
TW (FT)	396.31	400.90
AVG. CHANEL SLP (%)	0.0083	0.0083

JULIO A. RANGEL
117165
LICENSED PROFESSIONAL ENGINEER
STATE OF TEXAS
10/28/2022

0' 5' 10' 20'
SCALE: 1"=20'- HORZ
1"=10'- VERT

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

Texas Department of Transportation
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US 87
TCP CULVERT LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	23

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ITEM	CODE	DESCRIPTION	UNIT	QTY
105	6020	REMOVING STAB BASE & ASPH PAV (12")	SY	60
464	6026	RC PIPE (CL V) (24 IN)	LF	23
467	6389	SET (TY II) (24 IN) (RCP) (3:1) (P)	EA	2
530	6005	DRIVEWAYS (ACP)	SY	110
550	6006	GATE (REMOVE)	EA	1
772	6001	POST AND CABLE FENCE (REMOVAL)	LF	12

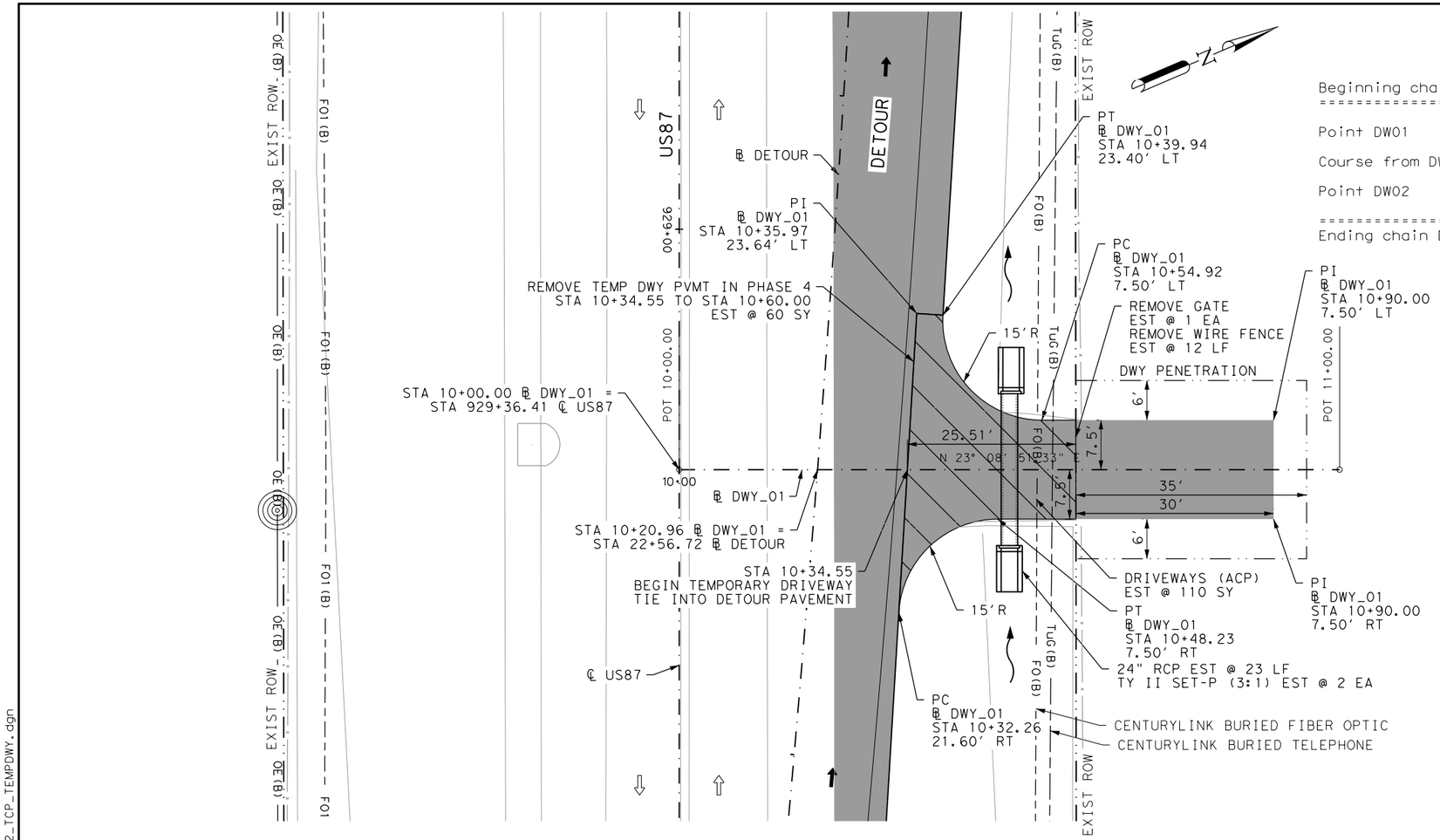
Beginning chain DWY_01 description

Point DW01 N 13,637,657.7480 E 2,293,305.0681 Sta 10+00.00

Course from DW01 to DW02 N 23° 08' 51.33" E Dist 100.0000

Point DW02 N 13,637,749.6976 E 2,293,344.3782 Sta 11+00.00

Ending chain DWY_01 description



LEGEND

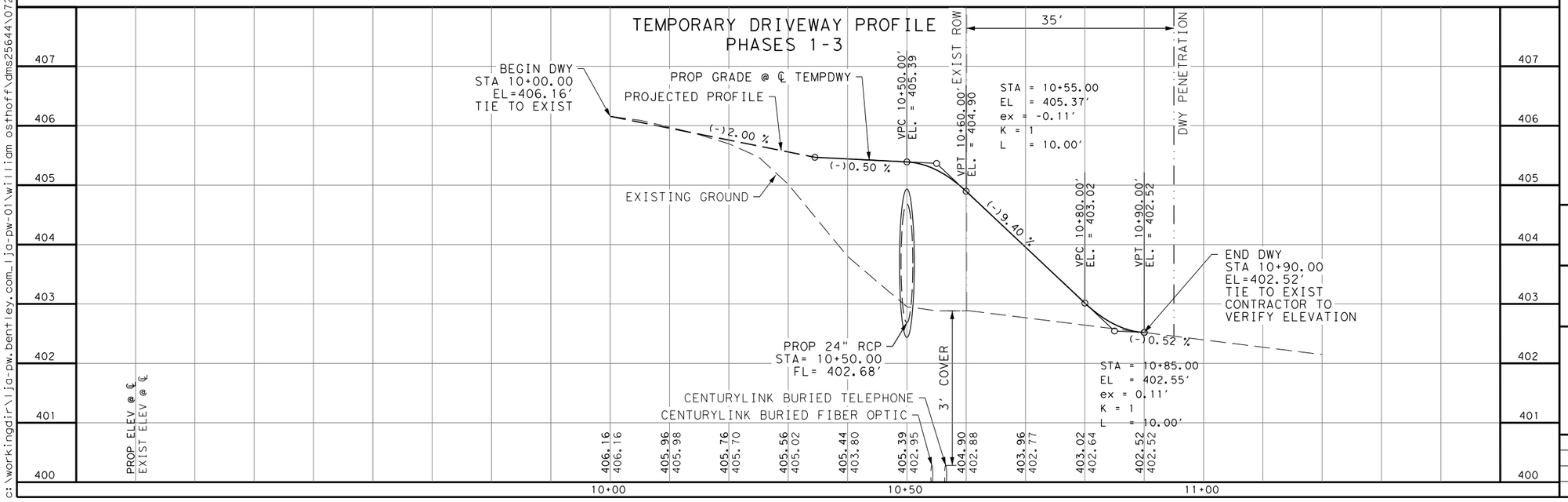
⇨ TRAFFIC DIRECTION (EXIST)

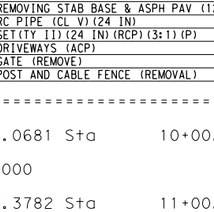
➡ TRAFFIC DIRECTION (PROPOSED)

OHWM

NOTES:

1. SEE ALIGNMENT DATA SHEET FOR PROP & EXIST BASELINE (BL) DATA.
2. SEE SURVEY DATA SHEET FOR BM STATIONS, OFFSET, ELEV ECT.





0' 5' 10' 20'

SCALE: 1"=20'

LJA Engineering, Inc.
FRN-F-1386

Texas Department of Transportation
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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
TEMPORARY DRIVEWAY
PLAN AND PROFILE

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	24

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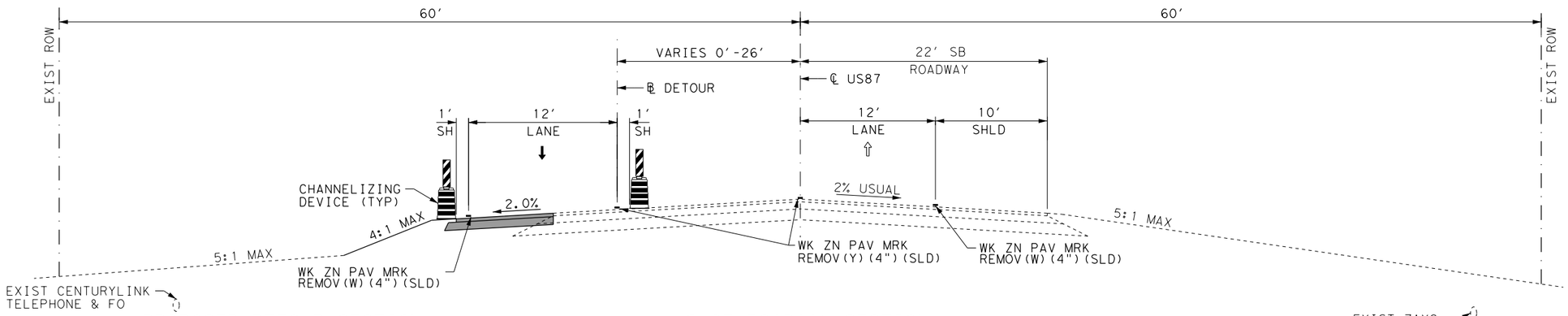
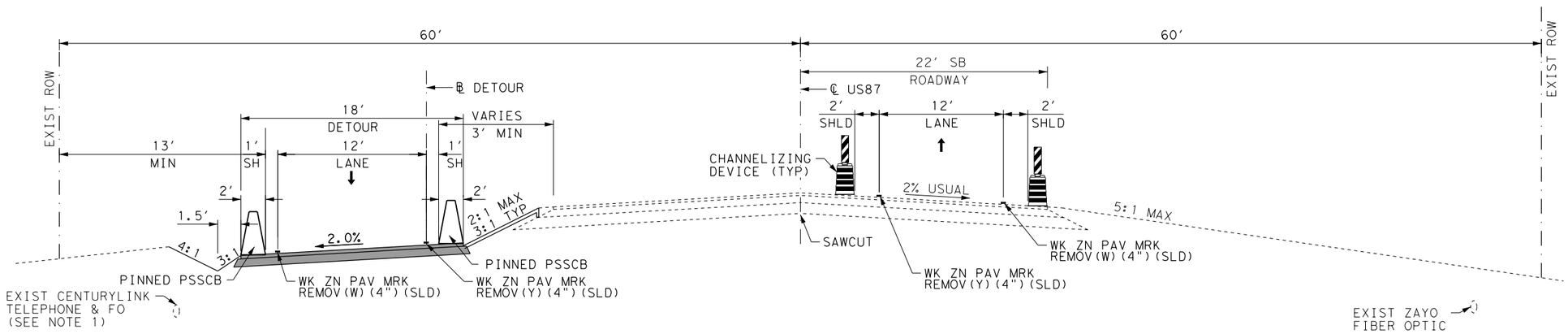


PROPOSED DETOUR SECTION

STA 11+80.81 TO STA 14+46.99
STA 21+61.77 TO STA 24+38.10

US 87 ROADWAY SECTION

STA 918+60.31 TO STA 921+27.18
STA 928+41.46 TO STA 931+18.73



PROPOSED DETOUR SECTION

STA 14+46.99 TO STA 16+15.00
STA 19+85.00 TO STA 21+61.77

US 87 ROADWAY SECTION

STA 921+27.18 TO STA 922+95.12
STA 926+65.01 TO STA 928+41.46

NOTES:

1. CONTRACTOR SHALL NOTE EXISTING UTILITY CONDUIT UNDERNEATH TEMPORARY DETOUR PAVEMENT. USE EXTREME CAUTION TO AVOID IMPACTS TO UTILITY.

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

NOT TO SCALE

LJA Engineering, Inc.
FRN - F-1386

 Texas Department of Transportation

US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 2
TYPICAL SECTIONS

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	25

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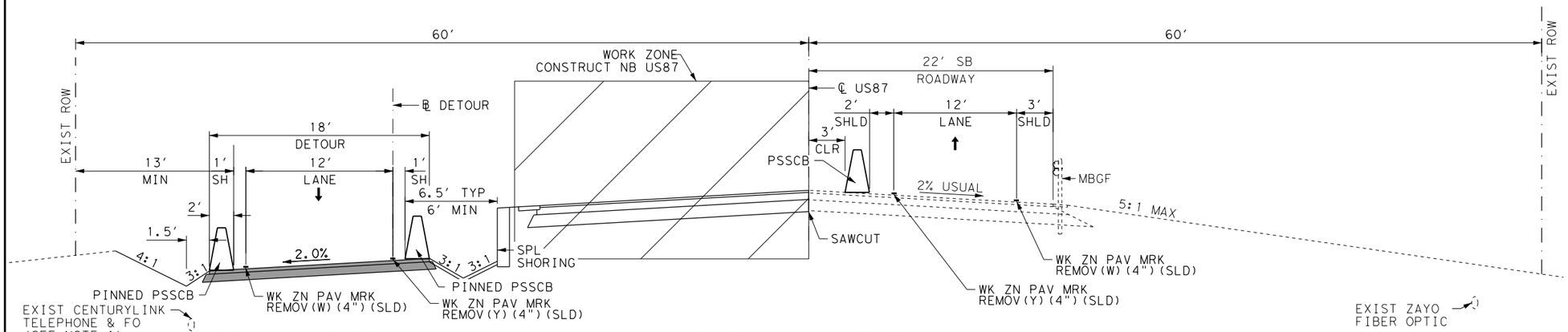
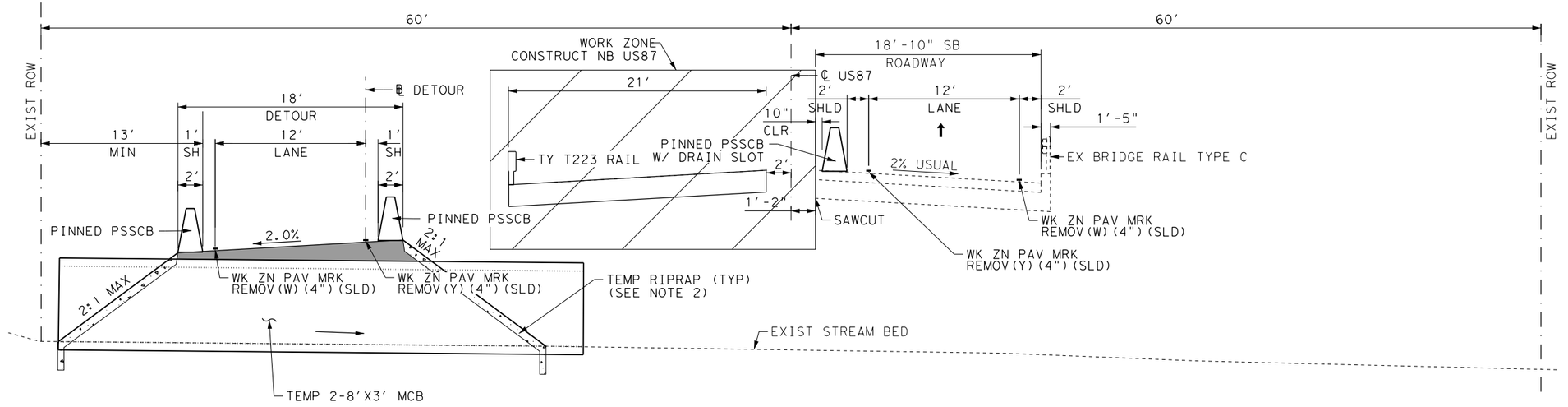


PROPOSED DETOUR SECTION

STA 16+15.00 TO STA 17+99.87
STA 18+79.77 TO STA 19+85.00

US 87 ROADWAY SECTION

STA 922+95.12 TO STA 924+79.88
STA 925+59.78 TO STA 926+65.01



**SEE DETOUR ROAD PLAN & PROFILE SHEET 2 OF 3
FOR LIMITS OF FULL DEPTH PAVEMENT OVER CULVERT

PROPOSED DETOUR SECTION

STA 17+99.87 TO STA 18+79.77

US 87 BRIDGE SECTION

STA 924+79.88 TO STA 925+59.78

NOTES:

1. CONTRACTOR SHALL NOTE EXISTING UTILITY CONDUIT UNDERNEATH TEMPORARY DETOUR PAVEMENT. USE EXTREME CAUTION TO AVOID IMPACTS TO UTILITY.
2. SEE SHEETS 18-19 DETOUR RD P&P FOR PAYMENT OF RIPRAP (CONC)(5 IN).

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

NOT TO SCALE

LJA Engineering, Inc.
FRN-F-1386

Texas Department of Transportation
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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 2
TYPICAL SECTIONS

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	26

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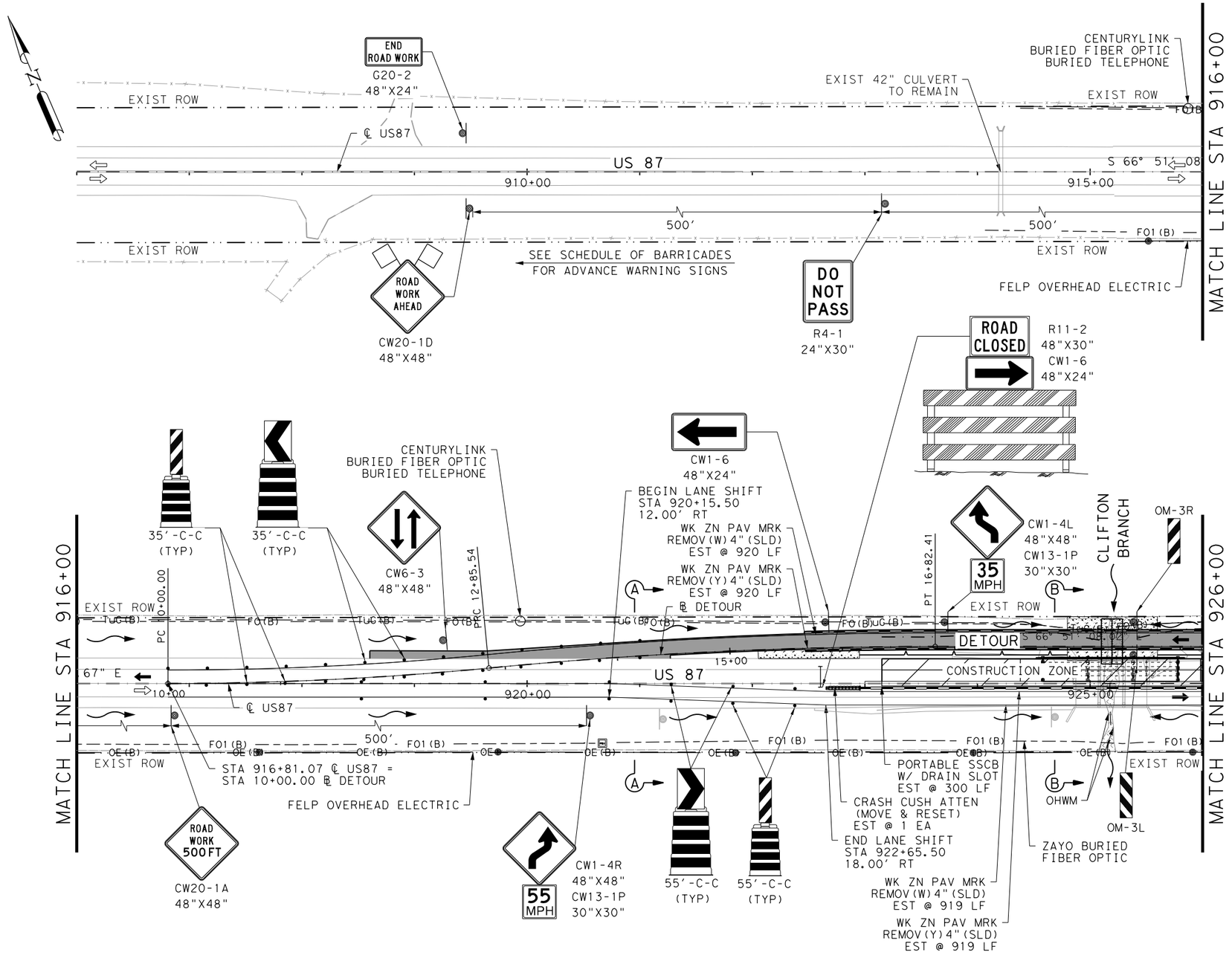
ITEM	CODE	DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	
403	6001	TEMPORARY SPL SHORING	SF	
432	6002	RIPRAP (CONC)(5 IN)	CY	
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	300
512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	450
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	1
545	6005	CRASH CUSH ATTEN (REMOVE)	EA	
545	6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	
662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	1839
662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	1839

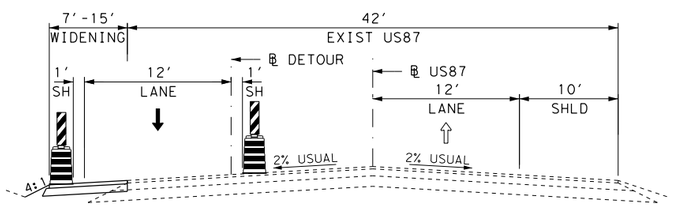
NOTES:

1. SEE TCP (2-7)-18 FOR SIGN AND DEVICES SPACING.

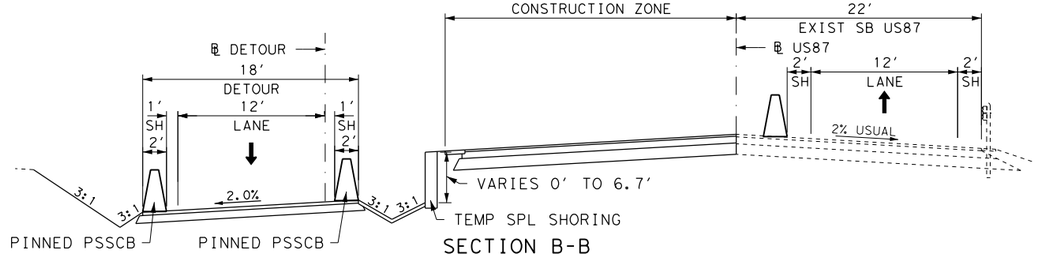


LEGEND

- WARNING SIGN
- BARRICADE (TYPE 3)
- CHANGEABLE MESSAGE SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM
- FLOW ARROW



SECTION A-A



SECTION B-B

JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
10/28/2022

0' 25' 50' 100'
SCALE: 1"=100'

LJA Engineering, Inc.
FRN-F-1386

Texas Department of Transportation
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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 2
PLAN LAYOUT

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	27

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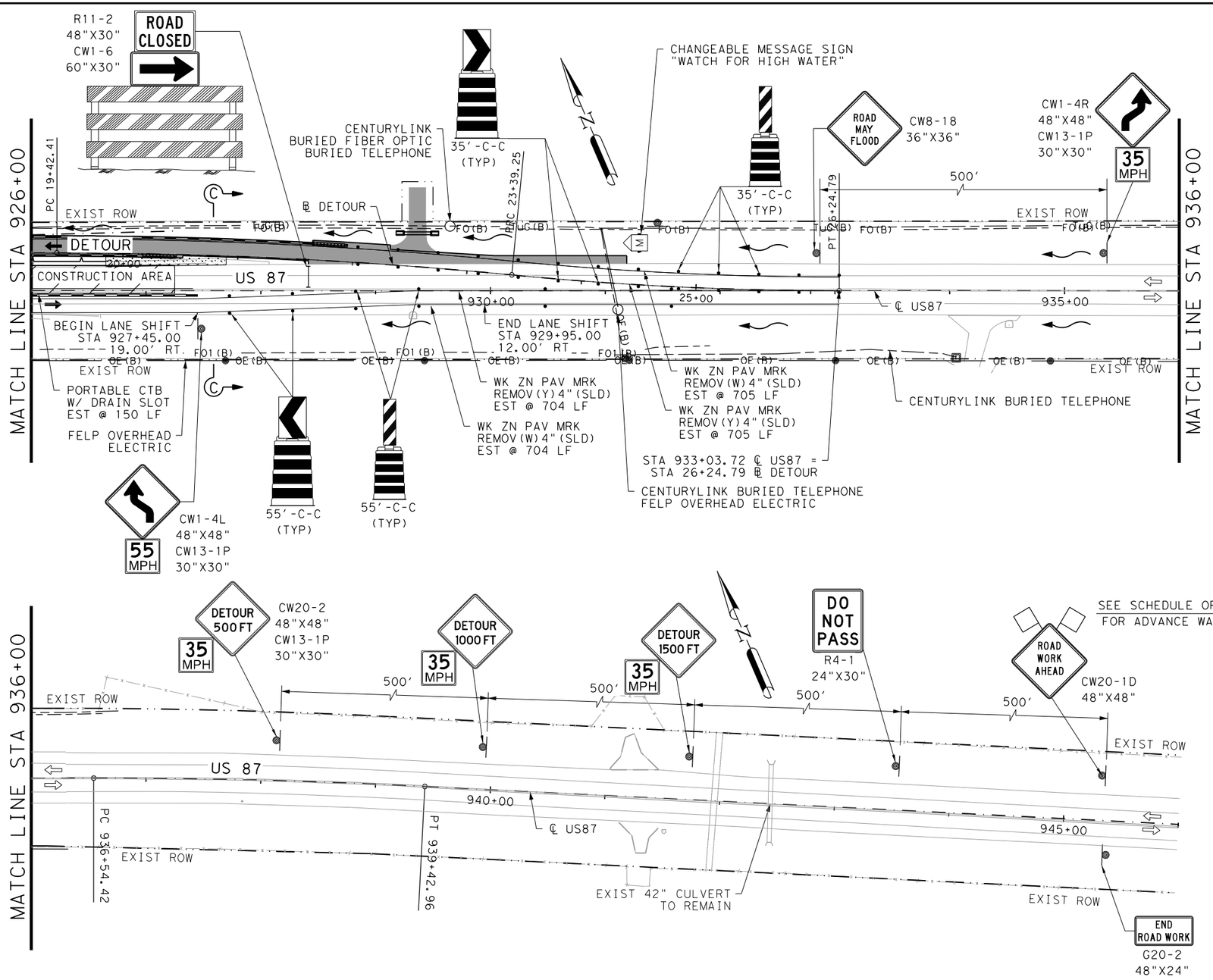

ITEM	CODE	DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	
403	6001	TEMPORARY SPL SHORING	SF	
432	6002	RIPRAP (CONC)(5 IN)	CY	
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	150
512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	420
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	
545	6005	CRASH CUSH ATTEN (REMOVE)	EA	
545	6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	
662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	1409
662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	1409

NOTES:

1. SEE TCP (2-7)-18 FOR SIGN AND DEVICES SPACING.
2. SEE SHEETS 18-19 DETOUR RD P&P FOR PAYMENT OF RIPRAP (CONC)(5 IN).

LEGEND

- WARNING SIGN
- BARRICADE (TYPE 3)
- CHANGEABLE MESSAGE SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM
- FLOW ARROW

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED PROFESSIONAL ENGINEER
10/28/2022

0' 25' 50' 100'
SCALE: 1"=100'

LJA Engineering, Inc.
FRN-F-1386

Texas Department of Transportation
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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 2
PLAN LAYOUT

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	28

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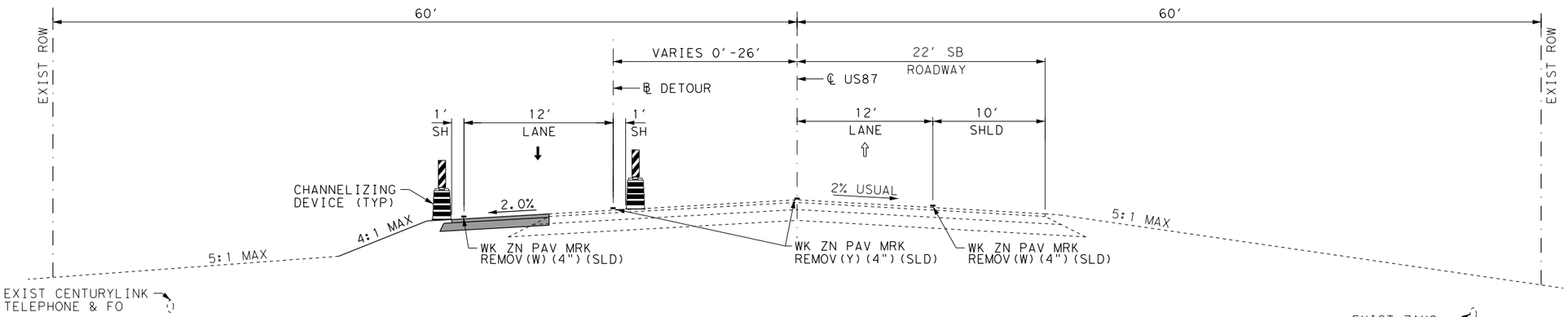


PROPOSED DETOUR SECTION

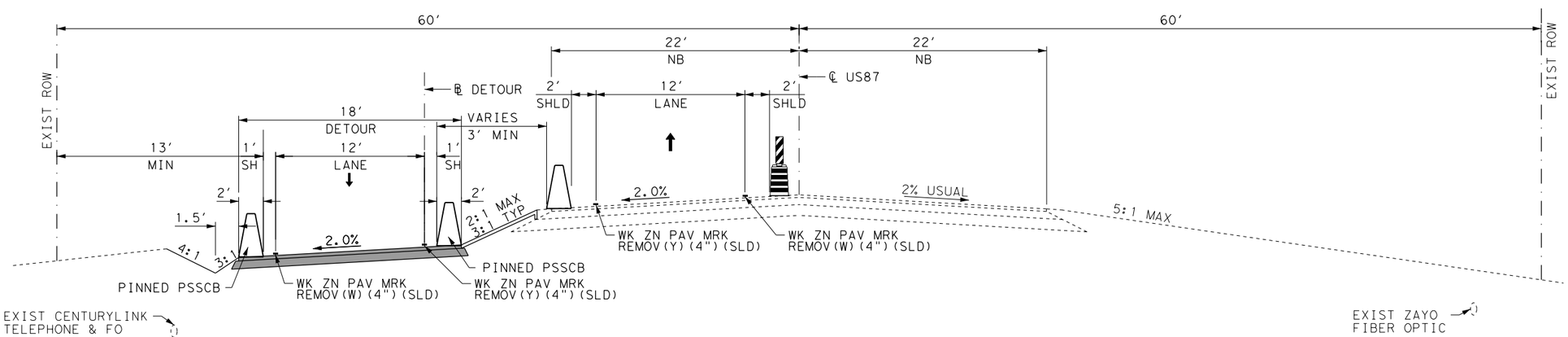
STA 11+80.81 TO STA 14+46.99
STA 21+61.77 TO STA 24+38.10

US 87 ROADWAY SECTION

STA 918+60.31 TO STA 921+27.18
STA 928+41.46 TO STA 931+18.73

NOTES:

1. CONTRACTOR SHALL NOTE EXISTING UTILITY CONDUIT UNDERNEATH TEMPORARY DETOUR PAVEMENT. USE EXTREME CAUTION TO AVOID IMPACTS TO UTILITY.



PROPOSED DETOUR SECTION

STA 14+46.99 TO STA 16+15.00
STA 19+85.00 TO STA 21+61.77

US 87 PROPOSED ROADWAY SECTION

STA 921+27.18 TO STA 922+95.12
STA 926+65.01 TO STA 928+41.46

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NOT TO SCALE

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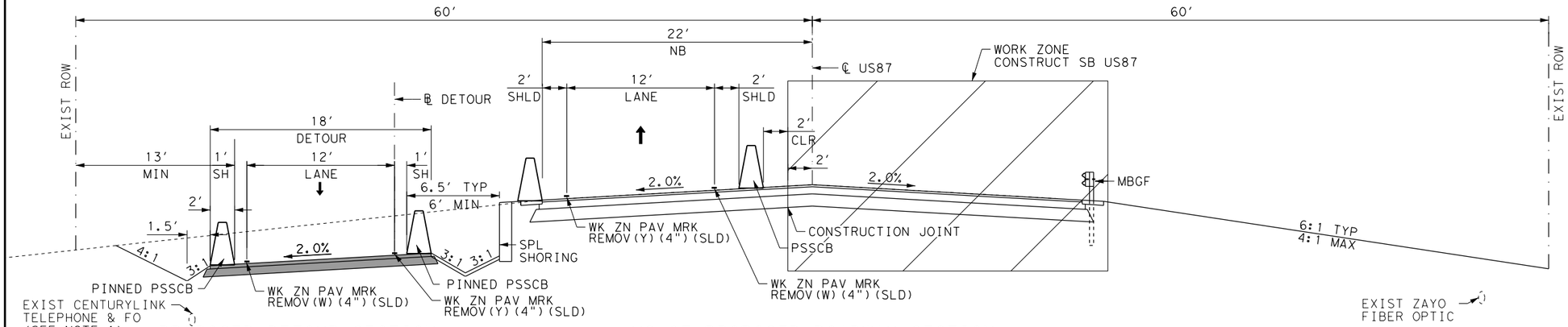
 Texas Department of Transportation

US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 3
TYPICAL SECTIONS

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	29



PROPOSED DETOUR SECTION

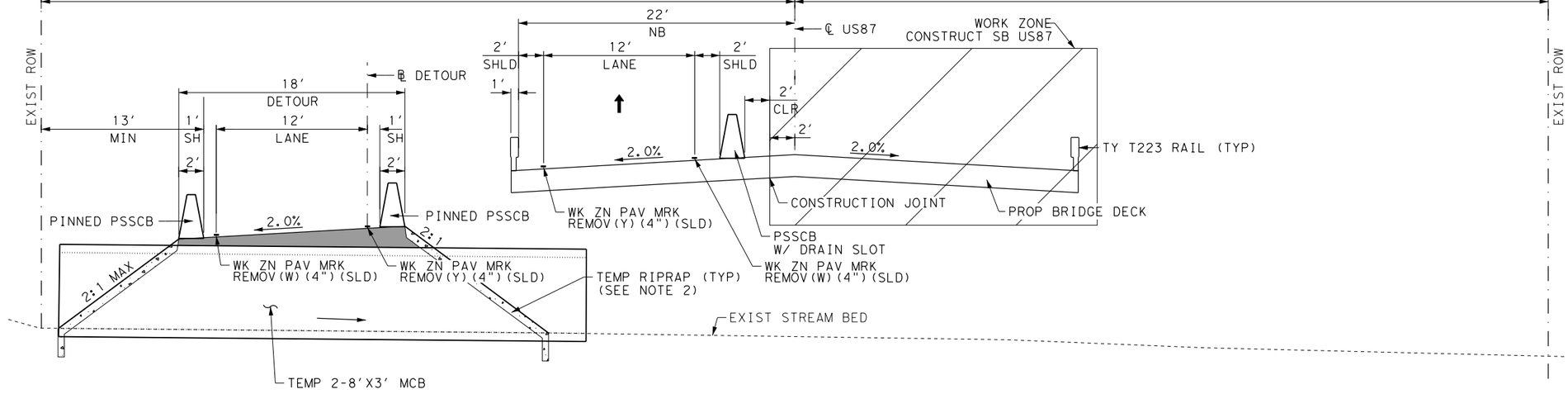
STA 16+15.00 TO STA 17+99.87
STA 18+79.77 TO STA 19+85.00

US 87 PROPOSED ROADWAY SECTION

STA 922+95.12 TO STA 924+79.88
STA 925+59.78 TO STA 926+65.01

NOTES:

1. CONTRACTOR SHALL NOTE EXISTING UTILITY CONDUIT UNDERNEATH TEMPORARY DETOUR PAVEMENT. USE EXTREME CAUTION TO AVOID IMPACTS TO UTILITY.
2. SEE SHEETS 18-19 DETOUR RD P&P FOR PAYMENT OF RIPRAP (CONC)(5 IN).



**SEE DETOUR ROAD PLAN & PROFILE SHEET 2 OF 3
FOR LIMITS OF FULL DEPTH PAVEMENT OVER CULVERT

PROPOSED DETOUR SECTION

STA 17+99.87 TO STA 18+79.77

US 87 PROPOSED BRIDGE SECTION

STA 924+79.88 TO STA 925+59.78

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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 3
TYPICAL SECTIONS

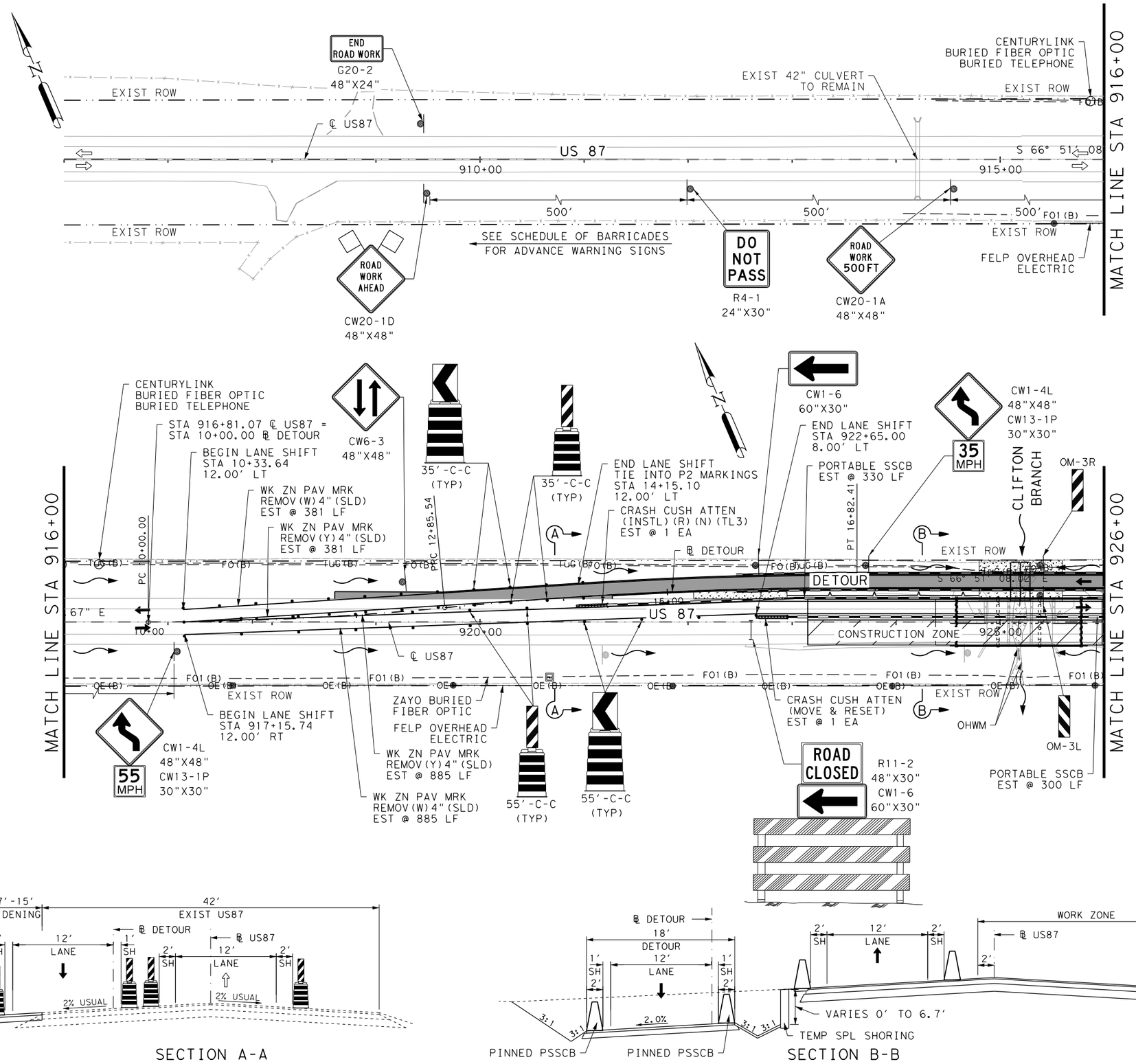
SHEET 2 OF 2

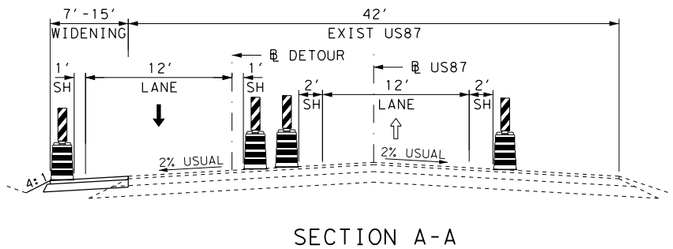
FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	30

ITEM	CODE	DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	
403	6001	TEMPORARY SPL SHORING	SF	
432	6002	RIPRAP (CONC)(5 IN)	CY	
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	330
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	300
512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	1
545	6005	CRASH CUSH ATTEN (REMOVE)	EA	
545	6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	1
662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	1266
662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	1266

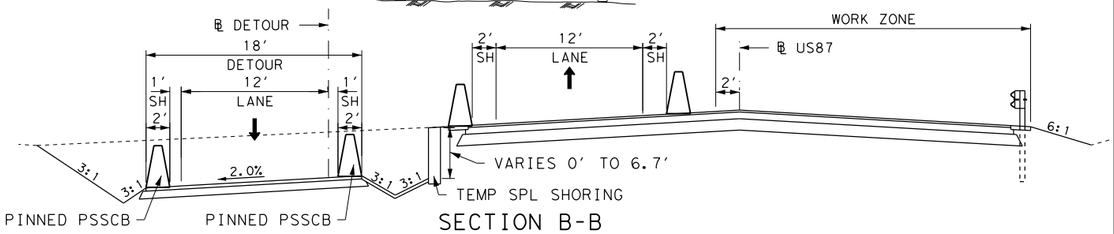
NOTES:

1. SEE TCP (2-7)-18 FOR SIGN AND DEVICES SPACING.





SECTION A-A



SECTION B-B

LEGEND

- WARNING SIGN
- BARRICADE (TYPE 3)
- CHANGEABLE MESSAGE SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM
- FLOW ARROW

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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 3
PLAN LAYOUT

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	31

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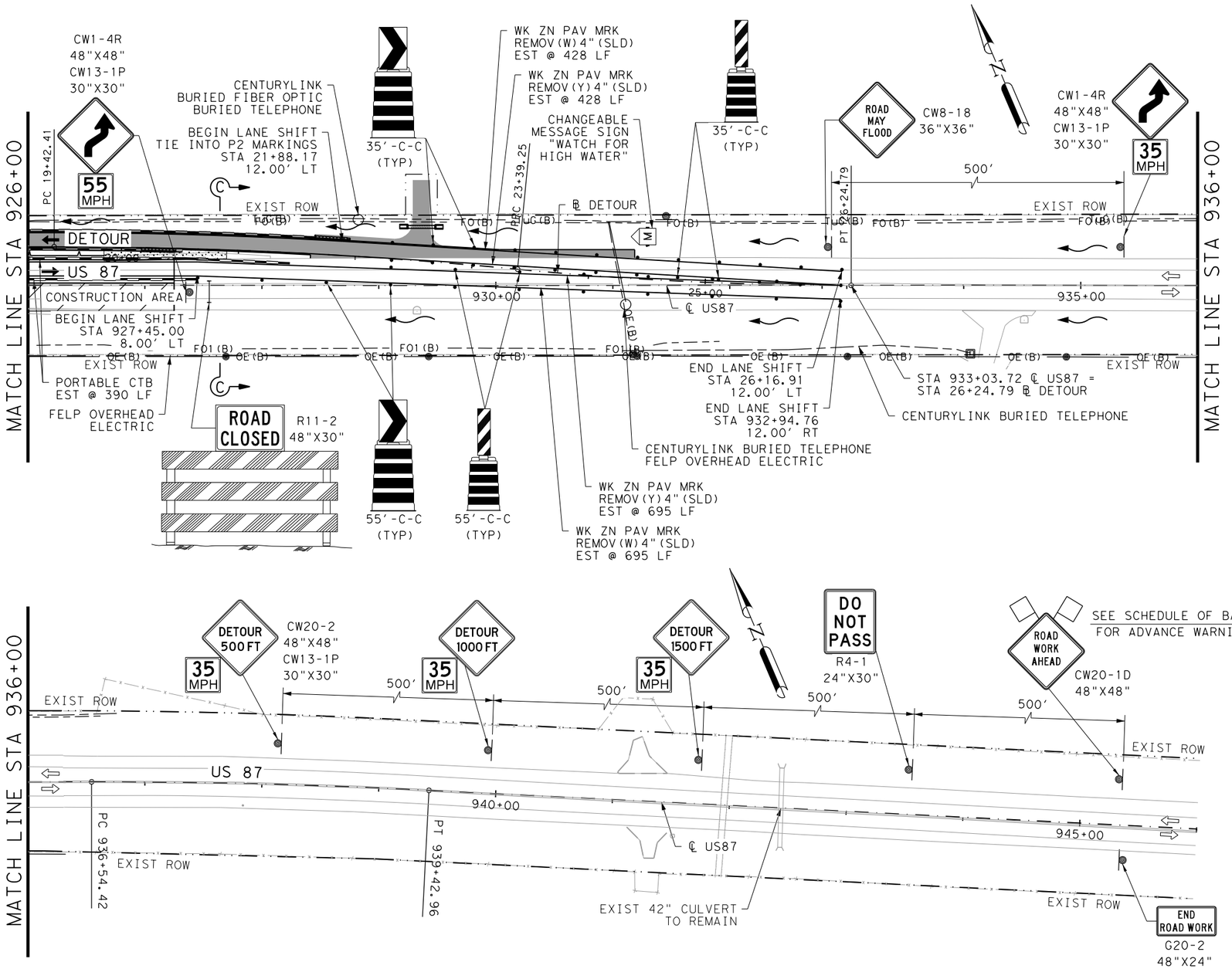

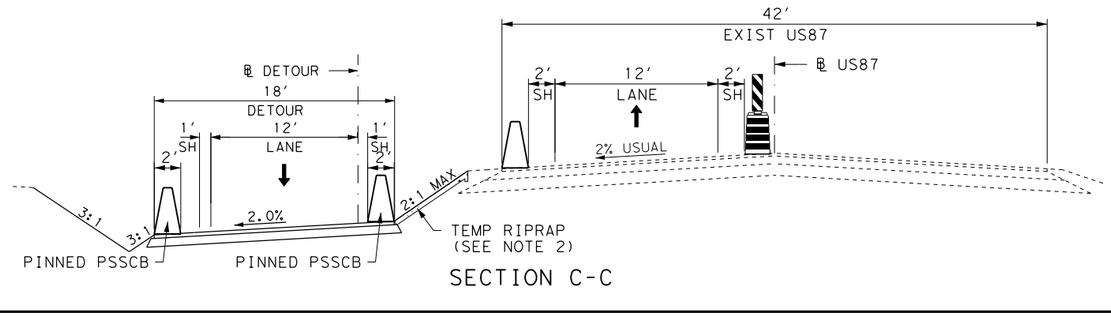

SECTION C-C

ITEM	CODE	DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	
403	6001	TEMPORARY SPL SHORING	SF	
432	6002	RIPRAP (CONC)(5 IN)	CY	
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	240
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	150
512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	
545	6005	CRASH CUSH ATTEN (REMOVE)	EA	
545	6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	
662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	1123
662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	1123

NOTES:

1. SEE TCP (2-7)-18 FOR SIGN AND DEVICES SPACING.
2. SEE SHEETS 18-19 DETOUR RD P&P FOR PAYMENT OF RIPRAP (CONC)(5 IN).

LEGEND

- WARNING SIGN
- BARRICADE (TYPE 3)
- CHANGEABLE MESSAGE SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- TEMPORARY PAVEMENT
- WORKZONE
- OHWM
- FLOW ARROW

STATE OF TEXAS
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10/28/2022

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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 3
PLAN LAYOUT

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	32

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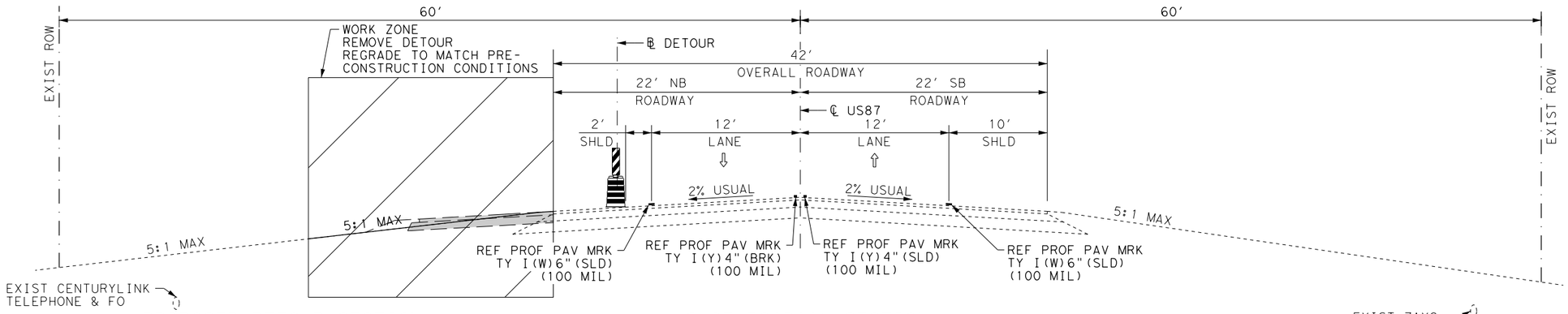


PROPOSED DETOUR SECTION

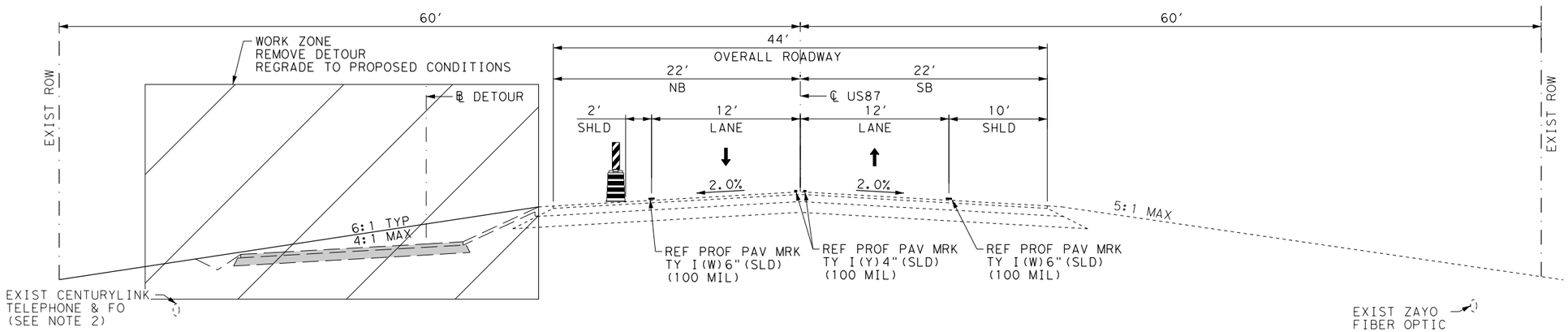
STA 11+80.81 TO STA 14+46.99
STA 21+61.77 TO STA 24+38.10

US 87 ROADWAY SECTION

STA 918+60.31 TO STA 921+27.18
STA 928+41.46 TO STA 931+18.73

NOTES:

1. CONTRACTOR SHALL REMOVE DETOUR AND TEMPORARY CULVERT AND GRADE BACK TO MATCH PRE-CONSTRUCTION GRADING. NOT A SEPARATE PAY ITEM BUT INCIDENTAL TO ITEM 508 6003 CONSTRUCTING DETOURS (TY 1).
2. CONTRACTOR SHALL NOTE EXISTING UTILITY CONDUIT UNDERNEATH TEMPORARY DETOUR PAVEMENT. USE EXTREME CAUTION TO AVOID IMPACTS TO UTILITY.



PROPOSED DETOUR SECTION

STA 14+46.99 TO STA 16+15.00
STA 19+85.00 TO STA 21+61.77

US 87 PROPOSED ROADWAY SECTION

STA 921+27.18 TO STA 922+95.12
STA 926+65.01 TO STA 928+41.46

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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 4
TYPICAL SECTIONS

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	33

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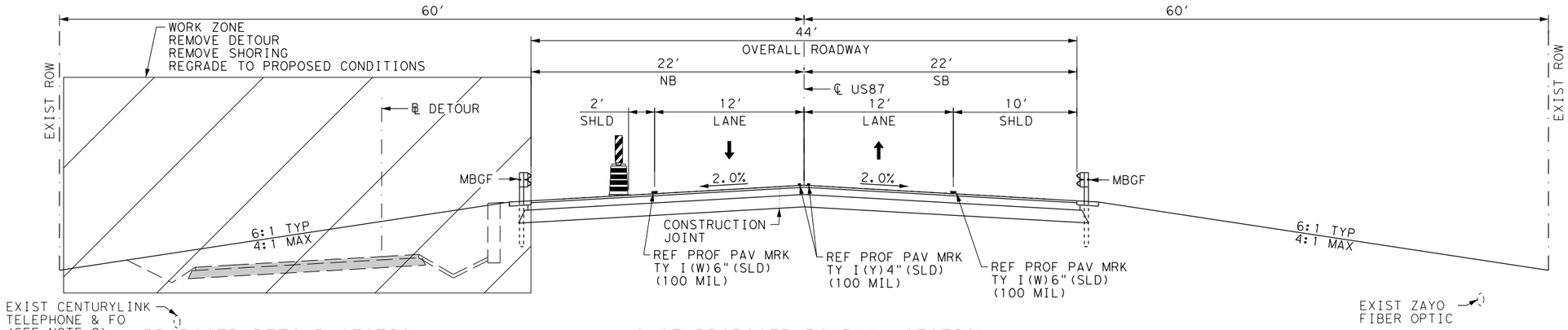
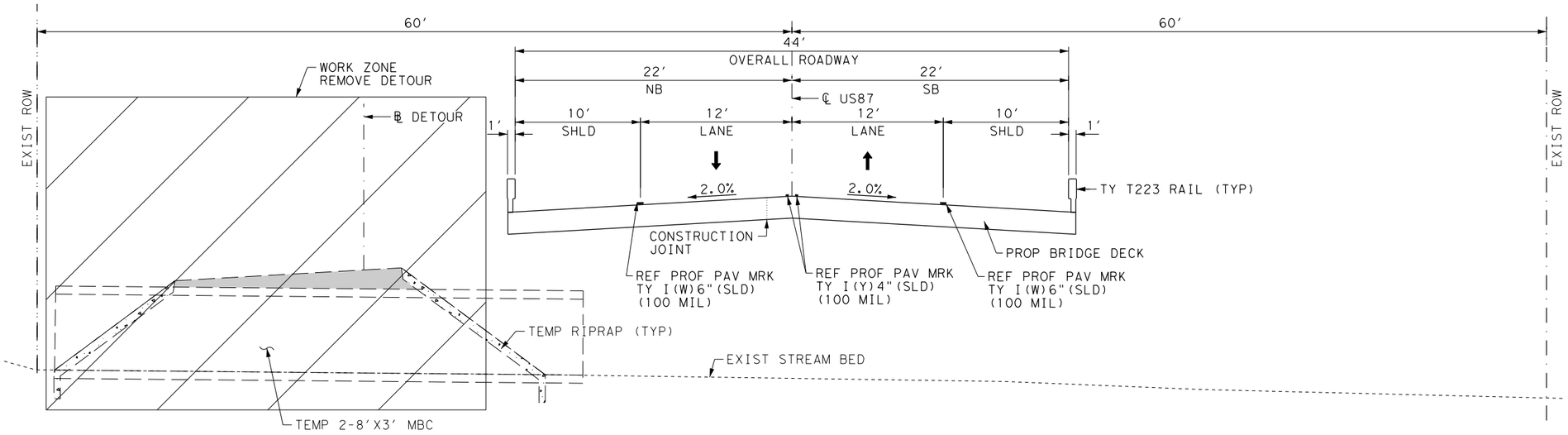


PROPOSED DETOUR SECTION

STA 16+15.00 TO STA 17+99.87
STA 18+79.77 TO STA 19+85.00

US 87 PROPOSED ROADWAY SECTION

STA 922+95.12 TO STA 924+79.88
STA 925+59.78 TO STA 926+65.01



**SEE DETOUR ROAD PLAN & PROFILE SHEET 2 OF 3
FOR LIMITS OF FULL DEPTH PAVEMENT OVER CULVERT

EXIST CENTURYLINK
TELEPHONE & FO

EXIST ZAYO
FIBER OPTIC

PROPOSED DETOUR SECTION

STA 17+99.87 TO STA 18+79.77

US 87 PROPOSED BRIDGE SECTION

STA 924+79.88 TO STA 925+59.78

NOTES:

1. CONTRACTOR SHALL REMOVE DETOUR AND TEMPORARY CULVERT AND GRADE BACK TO MATCH PRE-CONSTRUCTION GRADING. NOT A SEPARATE PAY ITEM BUT INCIDENTAL TO ITEM 508 6003 CONSTRUCTING DETOURS (TY 1).
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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 4
TYPICAL SECTIONS

SHEET 2 OF 2

FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	34

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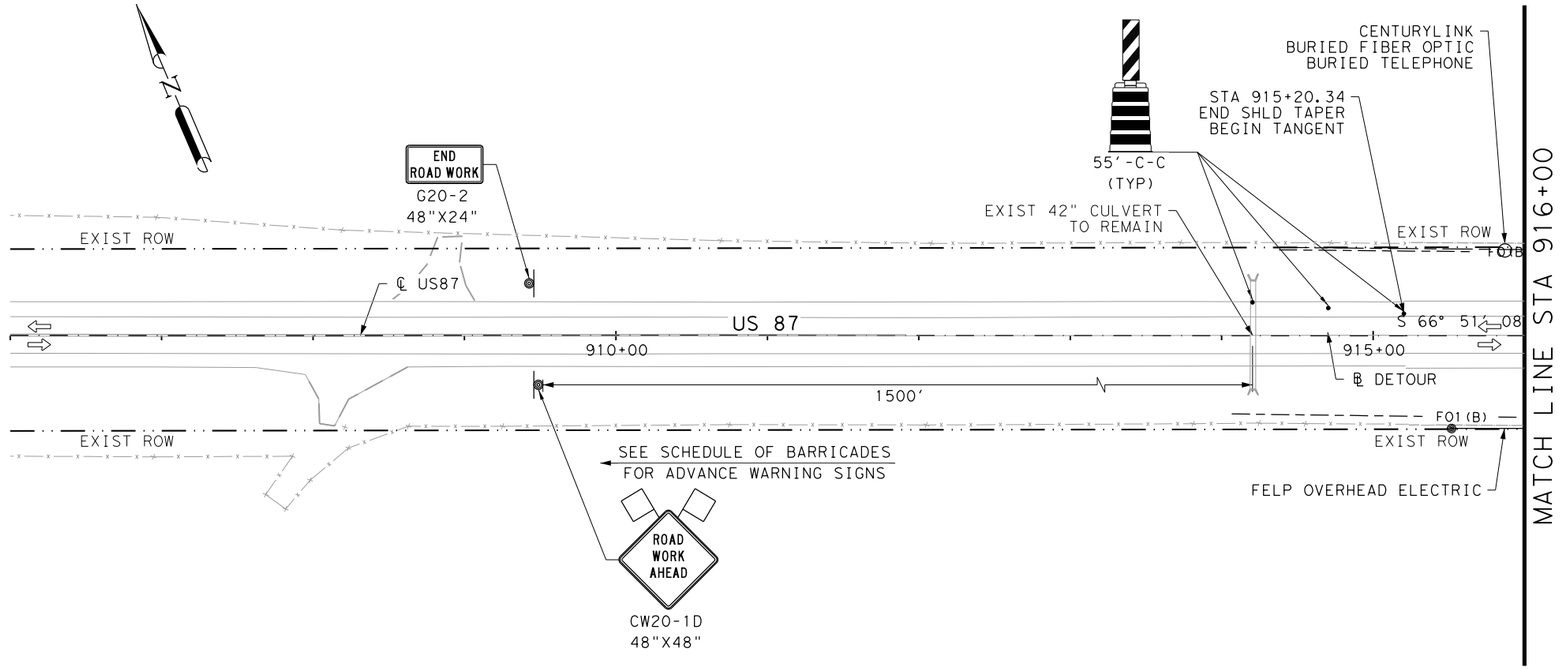

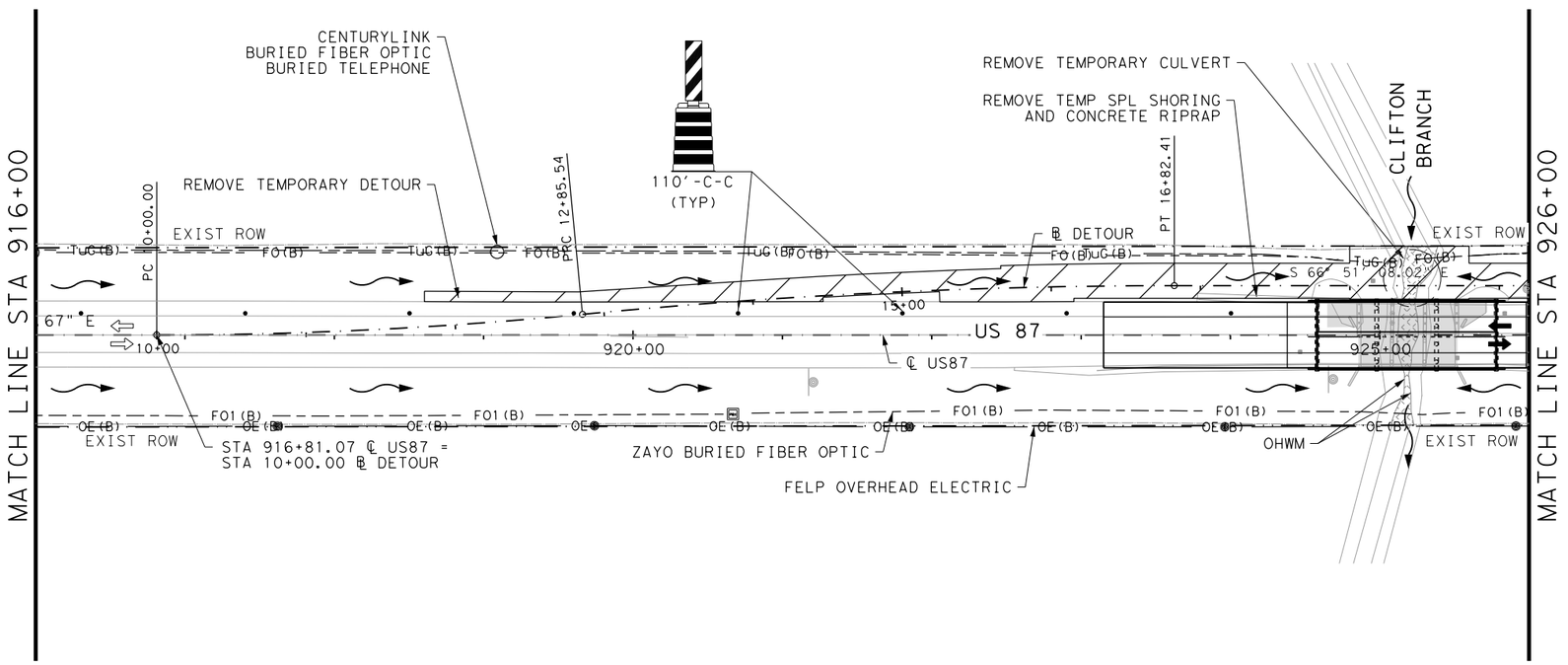

ITEM	CODE	DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	260
403	6001	TEMPORARY SPL SHORING	SF	
432	6002	RIPRAP (CONC)(5 IN)	CY	
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	
* 512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	1350
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	
* 545	6005	CRASH CUSH ATTEN (REMOVE)	EA	2
545	6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	
662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	
662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	

NOTES:
1. SEE TCP (2-1)-18 FOR SIGN AND DEVICES SPACING.
2. CONTRACTOR SHALL REMOVE DETOUR AND TEMPORARY CULVERT AND GRADE BACK TO MATCH PRE-CONSTRUCTION GRADING. NOT A SEPERATE PAY ITEM BUT INCIDENTAL TO ITEM 508 6003 CONSTRUCTING DETOURS (TY 1).

* QUANTITY INCLUDES REMOVAL OF ALL CTB AND CCA FROM PHASE 3

LEGEND

- WARNING SIGN
- BARRICADE (TYPE 3)
- CHANGEABLE MESSAGE SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
- TEMPORARY PAVEMENT
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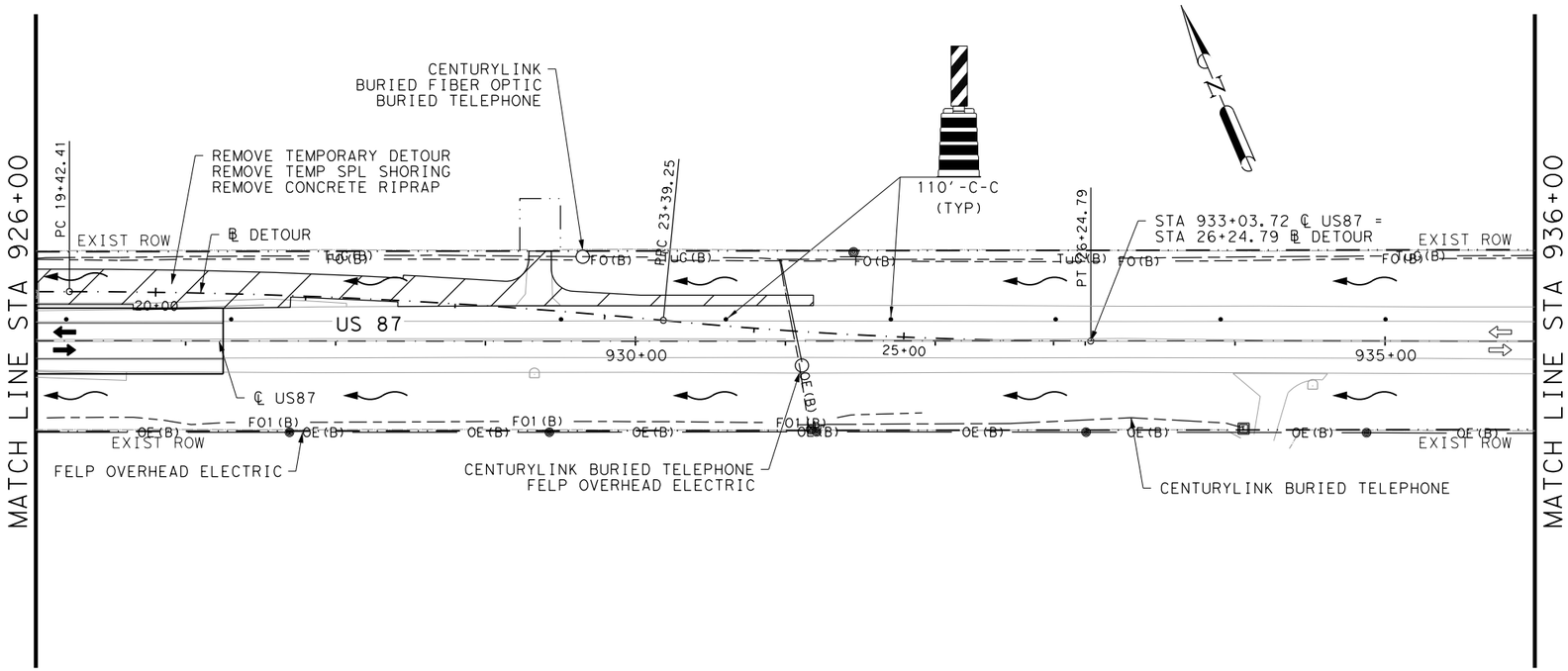
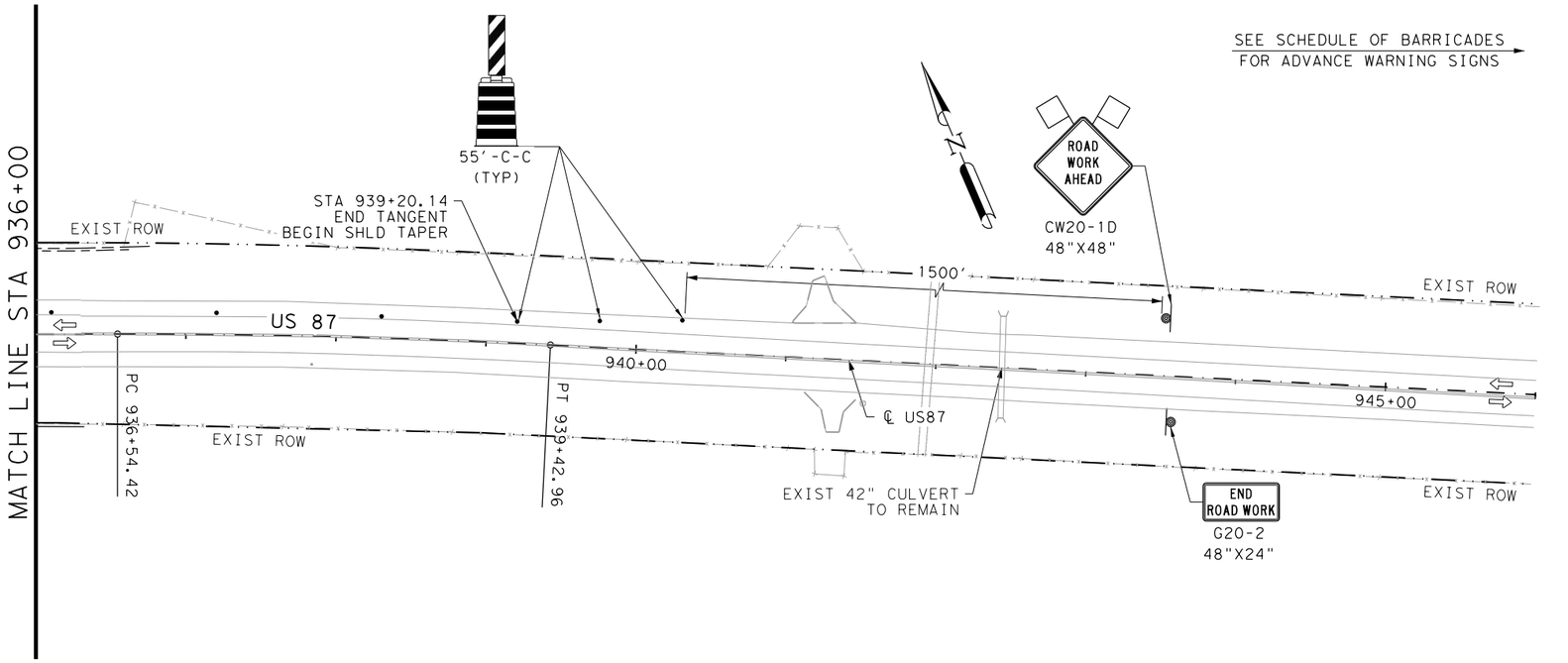
TRAFFIC CONTROL PLAN
PHASE 4
PLAN LAYOUT

SHEET 1 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	35





ITEM	CODE	DESCRIPTION	UNIT	QTY
104	6009	REMOVING CONC (RIPRAP)	SY	94
403	6001	TEMPORARY SPL SHORING	SF	
432	6002	RIPRAP (CONC)(5 IN)	CY	
502	6001	BARRICADES, SIGNS, TRAFFIC HANDLING	MO	
508	6001	CONSTRUCTING DETOURS	SY	
512	6001	PORT CTB(FUR&INST)(SGL SLOPE)(TY 1)	LF	
512	6025	PORT CTB (MOVE)(SGL SLP)(TY 1)	LF	
* 512	6049	PORT CTB(REMOVE)(SGL SLP)(TY 1)	LF	720
545	6003	CRASH CUSH ATTEN (MOVE & RESET)	EA	
* 545	6005	CRASH CUSH ATTEN (REMOVE)	EA	2
545	6013	CRASH CUSH ATTEN (INSTL)(R)(N)(TL3)	EA	
662	6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	
662	6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	

NOTES:
1. SEE TCP (2-1)-18 FOR SIGN AND DEVICES SPACING.
2. CONTRACTOR SHALL REMOVE DETOUR AND TEMPORARY CULVERT AND GRADE BACK TO MATCH PRE-CONSTRUCTION GRADING. NOT A SEPERATE PAY ITEM BUT INCIDENTAL TO ITEM 508 6003 CONSTRUCTING DETOURS (TY 1).

* QUANTITY INCLUDES REMOVAL OF ALL CTB AND CCA FROM PHASE 3

LEGEND

- WARNING SIGN
- BARRICADE (TYPE 3)
- CHANGEABLE MESSAGE SIGN
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- CHANNELIZING DEVICE
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US 87 AT CLIFTON BRANCH
TRAFFIC CONTROL PLAN
PHASE 4
PLAN LAYOUT

SHEET 2 OF 2

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	36

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LOC NO.	TCP PHASE	PLAN SHEET NUMBER	LOCATION	STA	TEST LEVEL	DIRECTION OF TRAFFIC (UNI/BI)	FOUNDATION PAD		BACKUP SUPPORT			AVAILABLE SITE LENGTH	CRASH CUSHION									
															MOVE / RESET		L	L	R	R	S	S
							PROPOSED MATERIAL	PROPOSED THICKNESS	DESCRIPTION	WIDTH	HEIGHT		INSTALL	REMOVE	MOVE/ RESET	FROM LOC.*	N	W	N	W	N	W
1	1	17	WB US87 IN PLACE THROUGH PHASE 3	CL US87 STA 928+46.00	TL-3	UNI	ACP	5"	SSCB	24"	3'-6"	>20'	X	X					X			
2	1	17	WB US87 IN PLACE THROUGH PHASE 3	CL US87 STA 927+00.00	TL-3	UNI	ACP	5"	SSCB	24"	3'-6"	>20'	X	X					X			
3	1	17	WB US87 IN PLACE THROUGH PHASE 1	CL US87 STA 931+70.00	TL-3	UNI	ACP	5"	SSCB	24"	3'-6"	>20'	X						X			
4	2	27	EB US87 IN PLACE THROUGH PHASE 2	CL US87 STA 922+95.00	TL-3	UNI	ACP	5"	SSCB	24"	3'-6"	>20'			X	3			X			
5	3	31	WB US87 IN PLACE THROUGH PHASE 3	CL US87 STA 921+20.00	TL-3	UNI	ACP	5"	SSCB	24"	3'-6"	>20'		X	X	4			X			
6	3	31	WB US87 IN PLACE THROUGH PHASE 3	CL US87 STA 923+02.00	TL-3	UNI	ACP	5"	SSCB	24"	3'-6"	>20'	X	X					X			
												TOTALS	4	4	1							

LEGEND:
L=LOW MAINTENANCE
R=REUSABLE
S=SACRIFICIAL
N=NARROW
W=WIDE

FOR DEFINITIONS SEE THE "CRASH CUSHION CATEGORIZATION CHART.PDF" AT THE DESIGN DIVISION (ROADWAY STANDARDS) WEBSITE. USE QUICK LINKS TO ACCESS ATTENUATORS / CRASH CUSHIONS SECTION.
http://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/rdwylse.htm

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

CRASH CUSHION SUMMARY SHEET

FILE: ccss.dgn	DN: TxDOT	CK:		CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		
	SAT	WILSON		
	FEDERAL AID PROJECT			SHEET NO.
	SEE TITLE SHEET			37

LOC NO.	TCP PHASE	SPECIFIC TCP PLAN SHEET OR TCP STANDARD SHEET	FURNISH TMA/TA	RELOCATE/REUSE TMA/TA	TOTAL TMA/TA PER SET UP	DURATION OF TMA/TA SET UP	6185 6002 TMA (STATIONARY)	6185 6005 TMA (MOBILE OPERATION)
		SHEET NUMBER	EA	EA	EA	DAYS PER TMA/TA USE	DAY	DAY
1	PHASE 1	TCP(2-1)-18	1		1	23	23	
2	PHASE 2	TCP(3-1)-13	1	1	2	1		2
3	PHASE 2	TCP(2-2)-18		1	1	2	2	
4	PHASE 3	TCP(3-1)-13		2	2	4		8
5	PHASE 3	TCP(2-2)-18		1	1	2	2	
6	PHASE 4	TCP(2-1)-18		1	1	17	17	
		TOTALS	2	6	8		44	10

NOTE.
FURNISH TMA/TA - THE NUMBER OF ATTENUATORS BEING FURNISHED FOR THE SPECIFIC TCP.
RELOCATE/REUSE TMA/TA - THE NUMBER OF ATTENUATORS BEING REUSED FROM A PREVIOUS TCP FOR THE SPECIFIC TCP.
TOTAL TMA/TA PER SET UP = (FURNISH TMA/TA) + (RELOCATE/REUSE TMA/TA)
DURATION OF TMA/TA SET UP - THE NUMBER OF DAYS THE ATTENTUATORS WILL BE USED FOR THE SPECIFIC TCP.
TMA/TA (STATIONARY) = (TOTAL TMA/TA PER SET UP) X (THE DURATION OF TMA/TA SET UP)
TMA/TA (MOBILE OPERATION) = (TOTAL TMA/TA PER SET UP) X (THE DURATION OF TMA/TA SET UP)

TRUCK MOUNTED ATTENUATOR (TMA) AND TRAILER ATTENUATOR (TA) SUMMARY SHEET

FILE: tma.dgn	DN: TxDOT	CK:	CK:
© TxDOT	CONT	SECT	JOB	HIGHWAY
REVISIONS 3/2018	0143	04	072	US 87
	DIST	COUNTY	
	SAT	WILSON	
	FEDERAL AID PROJECT	SHEET NO.
	SEE TITLE SHEET	38

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\ljg-pw.bentley.com_ljg-pw-01\william.osthoff\dms25645\bc-21.dgn

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

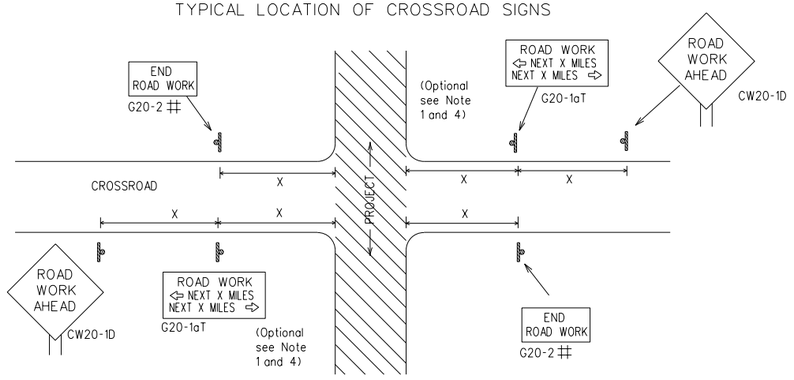
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	014.3	04	072	US 87
4-03 7-13	DIST	COUNTY		SHEET NO.
9-07 8-14	SAT	WILSON		39
5-10 5-21				

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\william osthoff\dms25645\bc-21.dgn

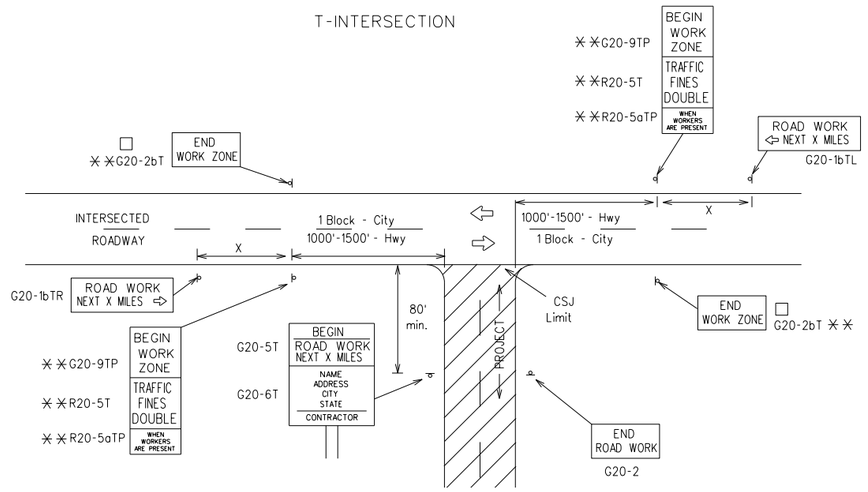
TYPICAL LOCATION OF CROSSROAD SIGNS



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]

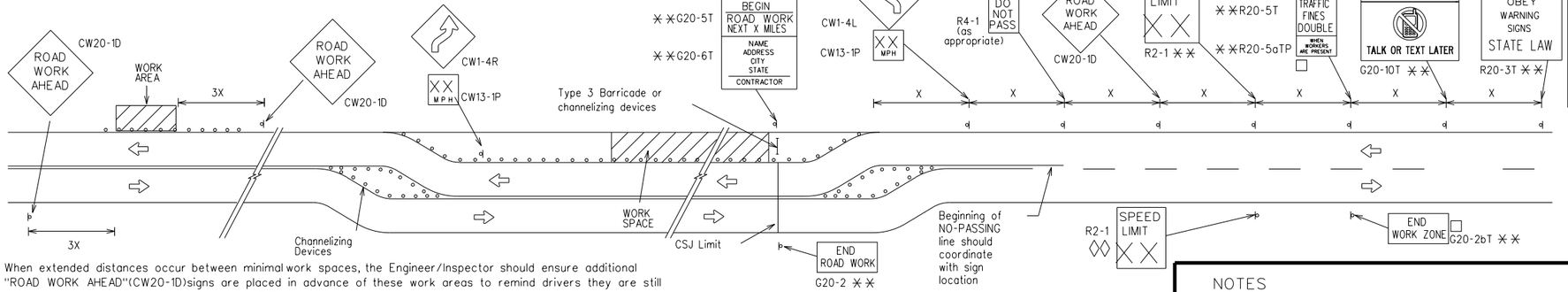
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

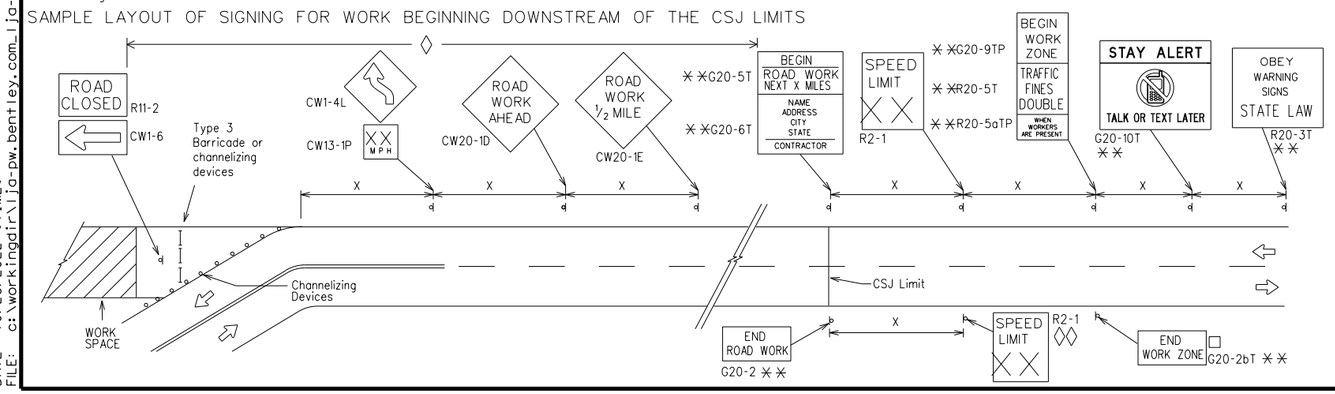
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may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

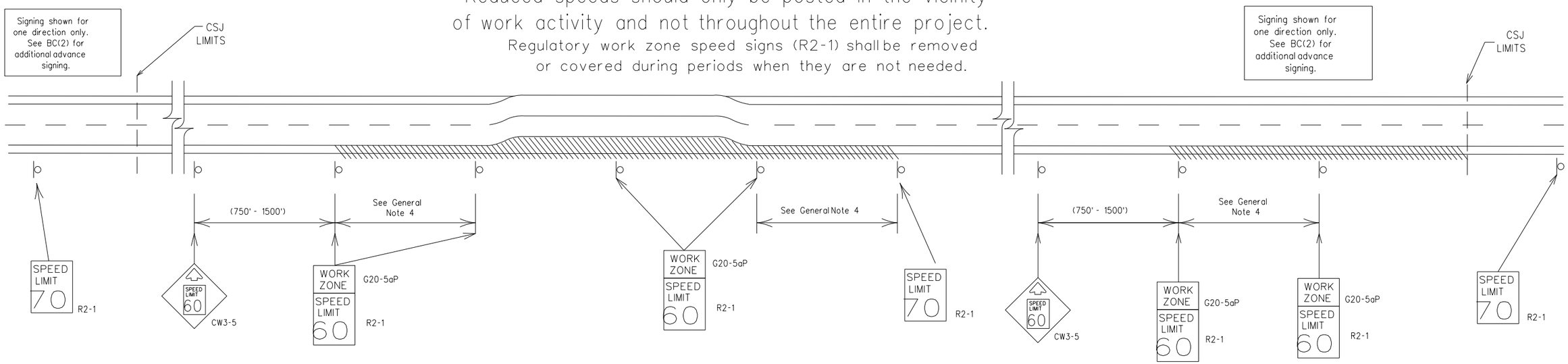
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	WILSON		40

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\william osthoff\dms25645\bc-21.dgn

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation | Traffic Safety Division Standard

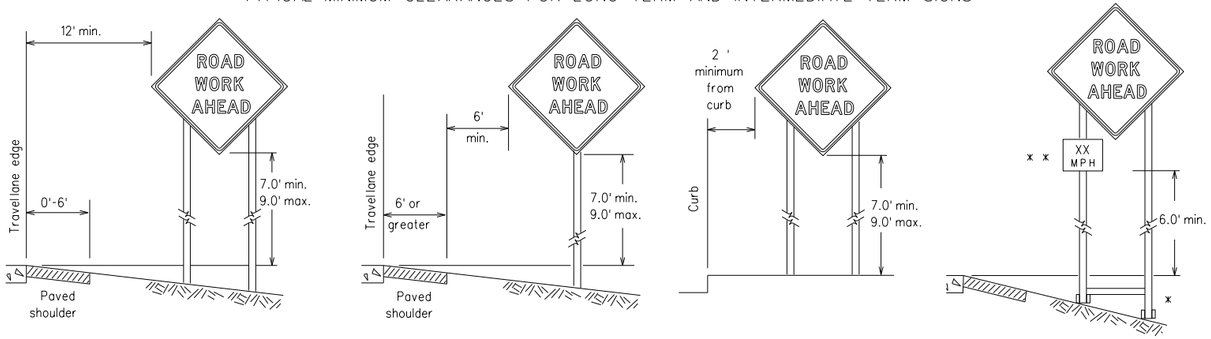
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	WILSON		41

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\ljo-pw.bentley.com_ljo-pw-01\william osthoff\dms25645\bc-21.dgn

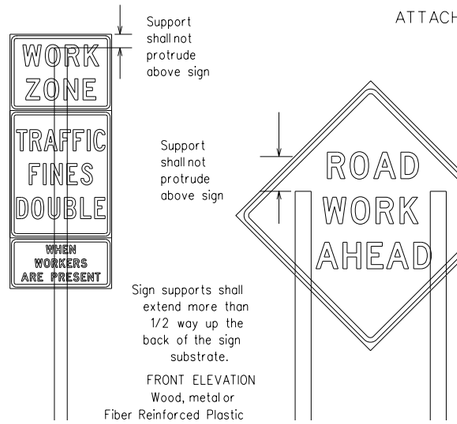
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

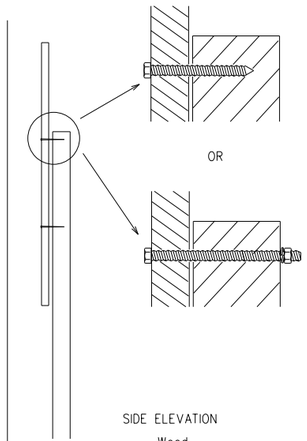


x When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





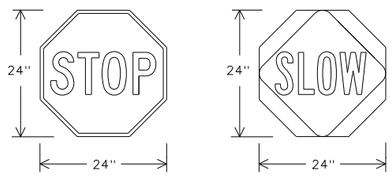
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



SHEETING REQUIREMENTS (WHEN USED AT NIGHT)		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	ORANGE	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDER	WHITE	TYPE B OR C SHEETING
LEGEND & BORDER	BLACK	ACRYLIC NON-REFLECTIVE FILM

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	WILSON		42

DATE: 10/28/2022 $TIME$
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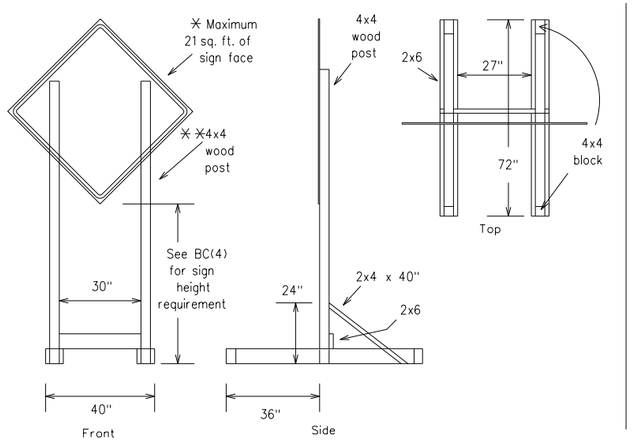
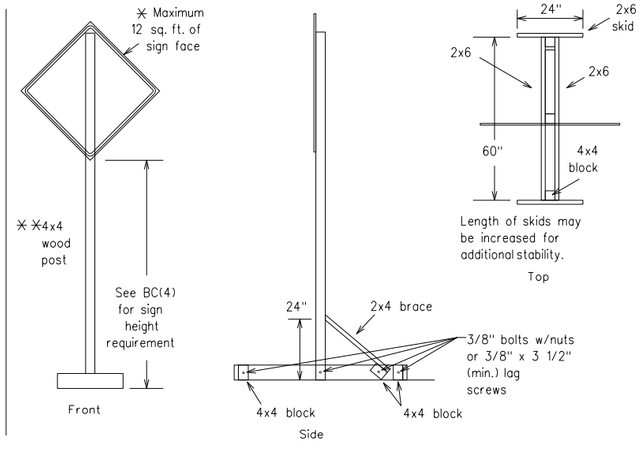
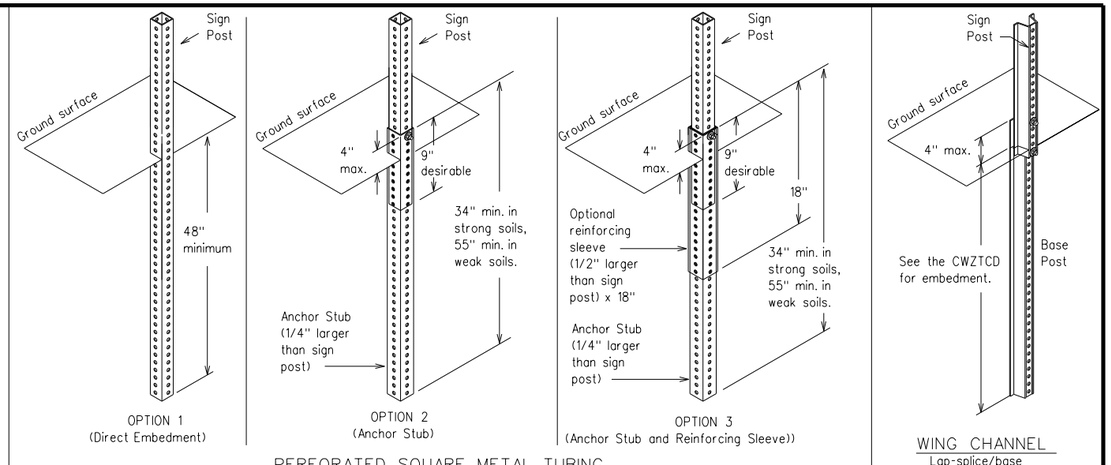




SKID MOUNTED WOOD SIGN SUPPORTS

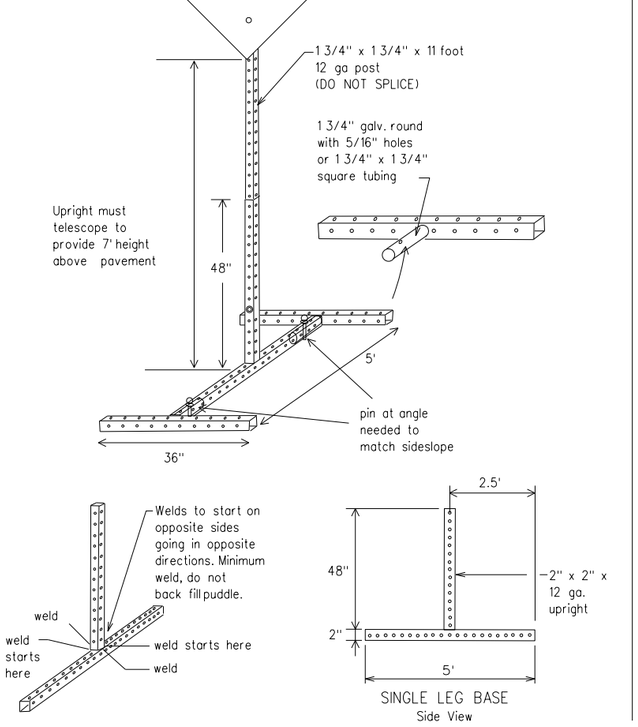
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

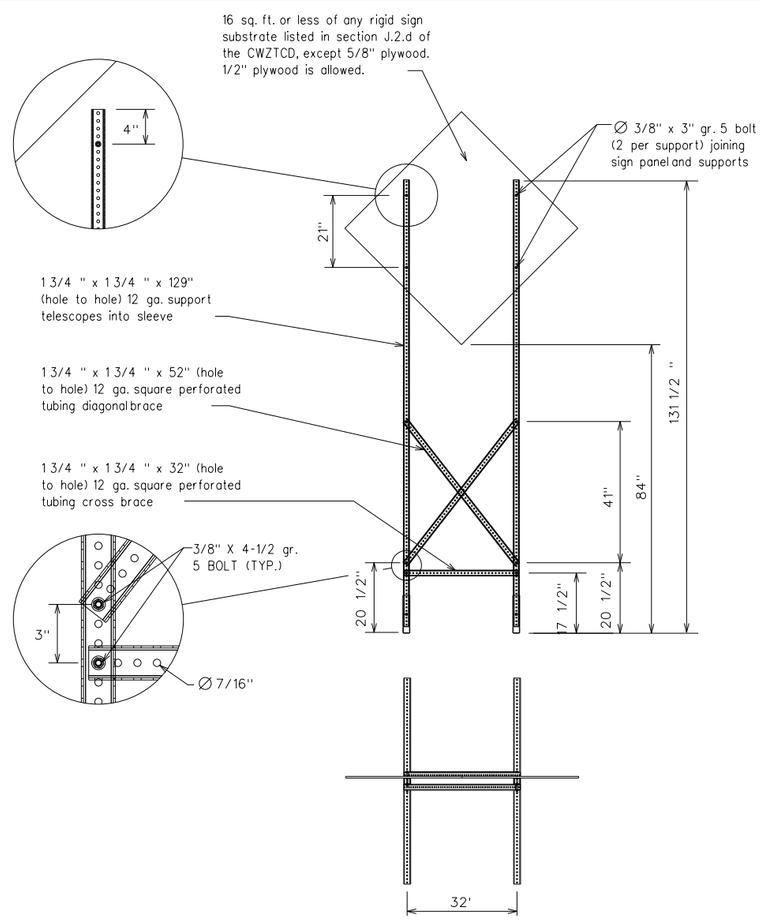


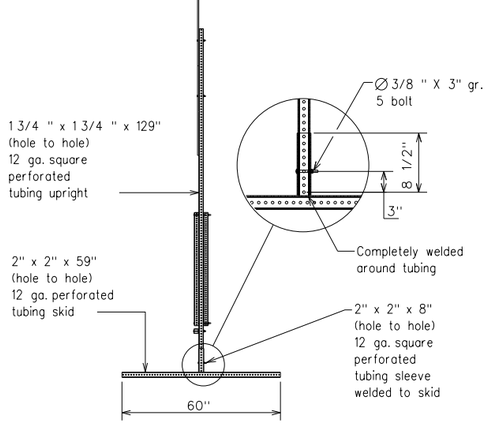
PERFORATED SQUARE METAL TUBING

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

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	WILSON		43

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\william osthoff\dms25645\bc-21.dgn

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
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 *	

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

Location List

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

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

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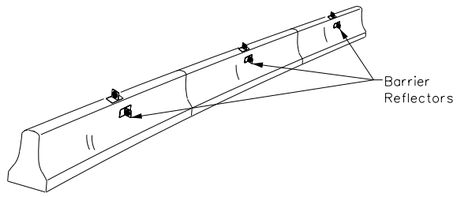
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	WILSON		44

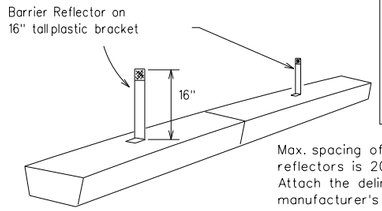
DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\william osthoff\dms25645\bc-21.dgn

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



CONCRETE TRAFFIC BARRIER (CTB)

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

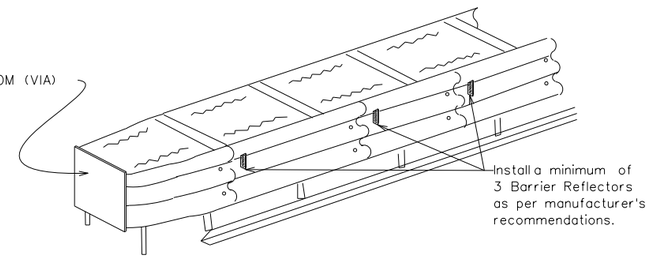


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

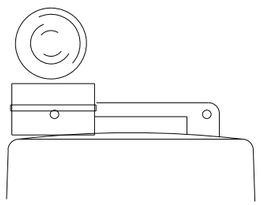


DELINEATION OF END TREATMENTS

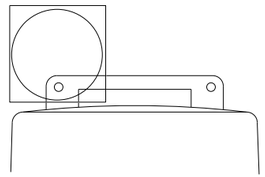
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

1. Warning lights shall meet the requirements of the TMUTCD.
2. Warning lights shall NOT be installed on barricades.
3. Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet and/or other sheets of the plans by the designation "FL". The Type A Warning Lights shall not be used with signs manufactured with Type B 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

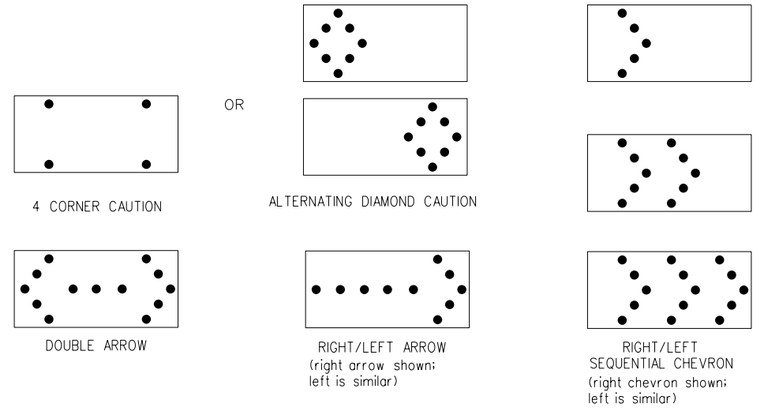
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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



4 CORNER CAUTION

ALTERNATING DIAMOND CAUTION

DOUBLE ARROW

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

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

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

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

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

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	WILSON		45

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DATE: 10/28/2022 $TIME$
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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:

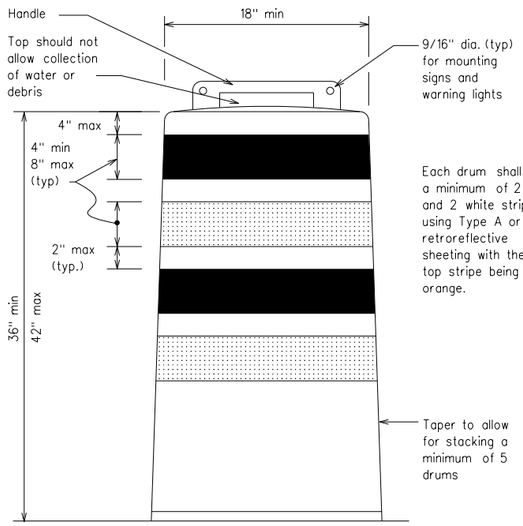
1. Plastic drums shall be a two-piece design: the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

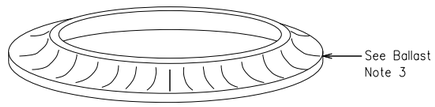
RETROREFLECTIVE SHEETING

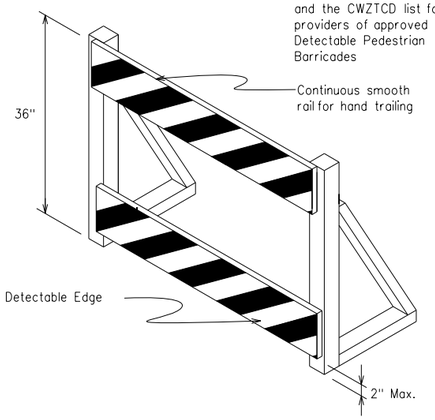
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

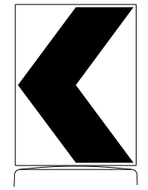




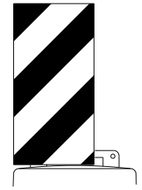


DETECTABLE PEDESTRIAN BARRICADES

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.

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	SAT	WILSON		46
7-13				

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DATE: 10/28/2022 $TIME$
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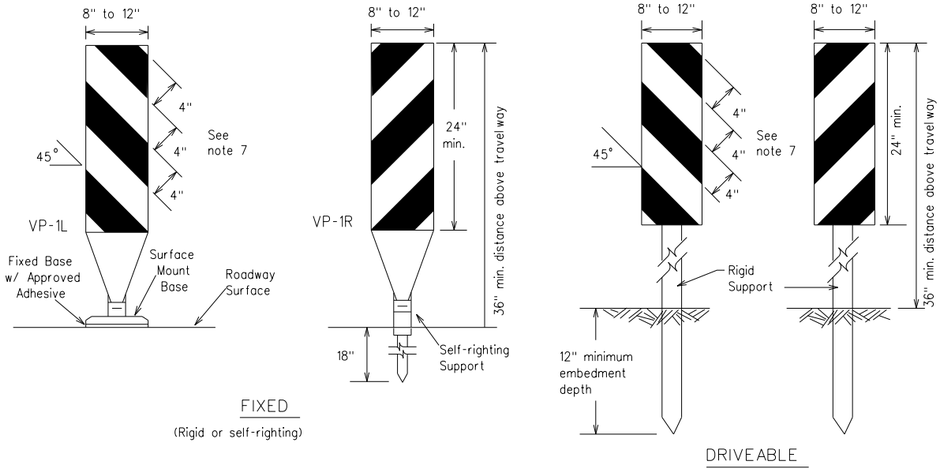
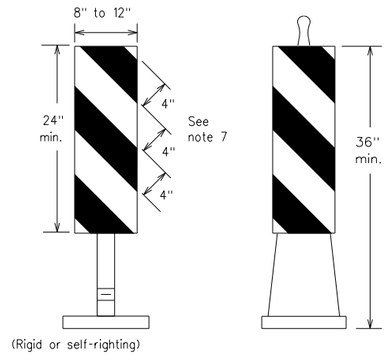


FIXED

(Rigid or self-righting)

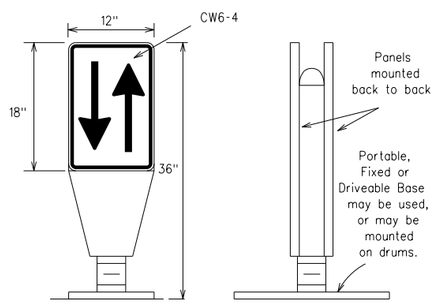
DRIVEABLE



PORTABLE

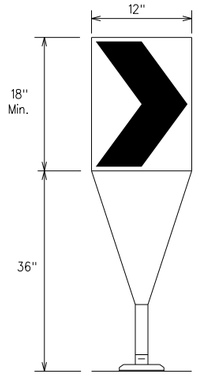
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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



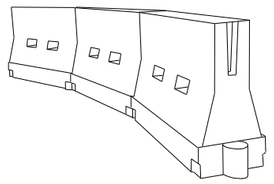
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

1. The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
2. Chevrons are intended to give notice of a sharp change of alignment with the direction of travel and provide additional emphasis and guidance for vehicle operators with regard to changes in horizontal alignment of the roadway.
3. Chevrons, when used, shall be erected on the outside of a sharp curve or turn, or on the far side of an intersection. They shall be in line with and at right angles to approaching traffic. Spacing should be such that the motorist always has three in view, until the change in alignment eliminates its need.
4. To be effective, the chevron should be visible for at least 500 feet.
5. Chevrons shall be orange with a black nonreflective legend. Sheeting for the chevron shall be retroreflective Type B 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 ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: 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

SHEET 9 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	WILSON		47

DATE: 10/28/2022 $TIME$
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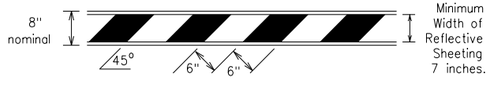
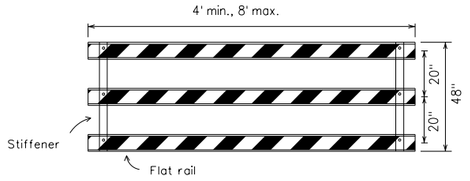
TYPE 3 BARRICADES

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.



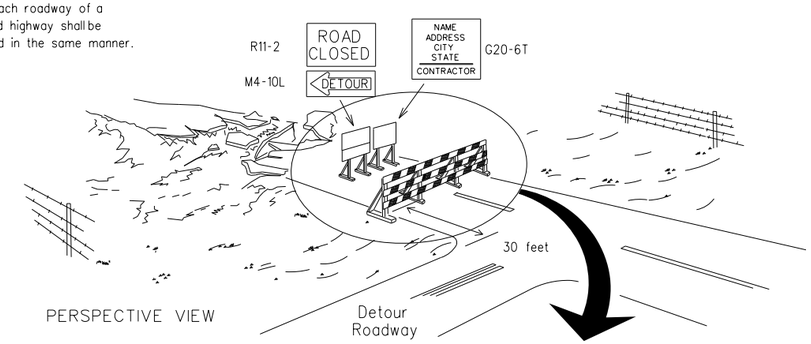
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

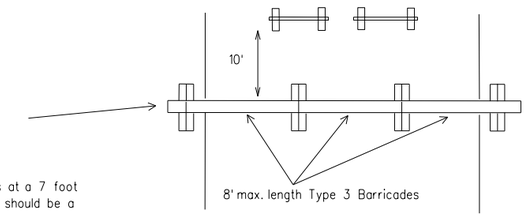
Each roadway of a divided highway shall be barricaded in the same manner.



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.

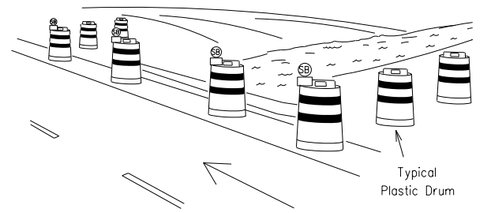
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

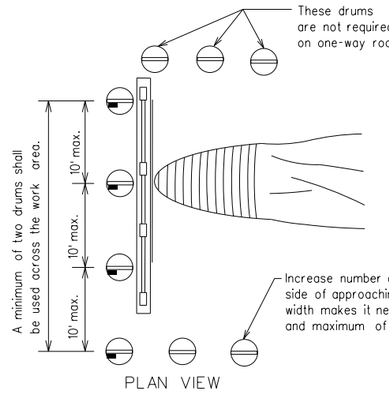
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

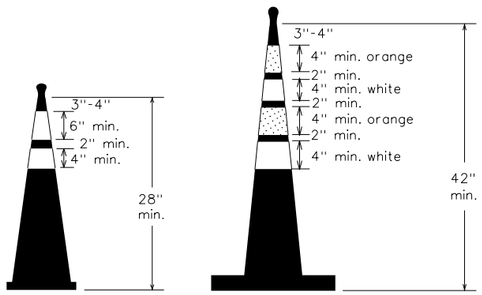
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



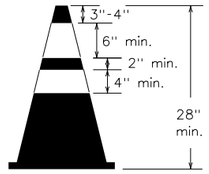
PLAN VIEW

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

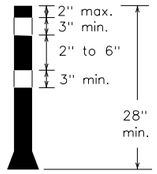
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

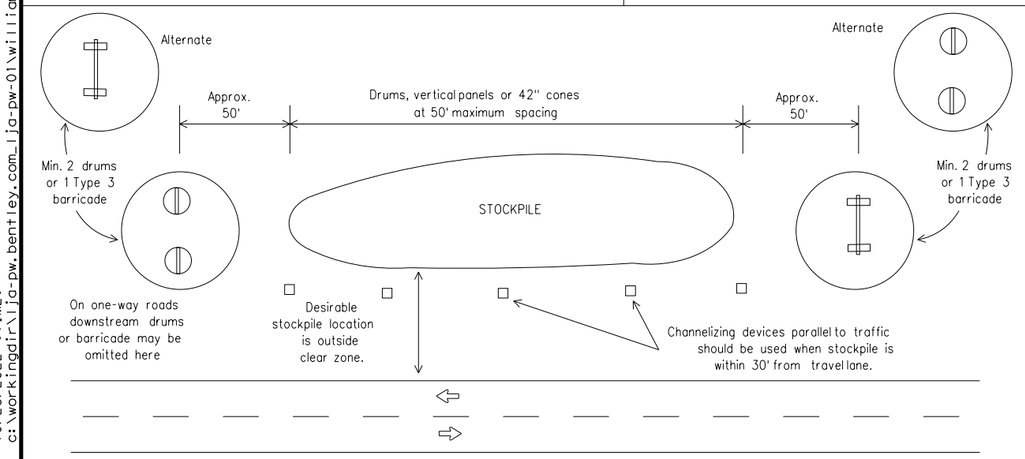


Tubular Marker

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

SHEET 10 OF 12

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	WILSON		48

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\william osthoff\dms25645\bc-21.dgn

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

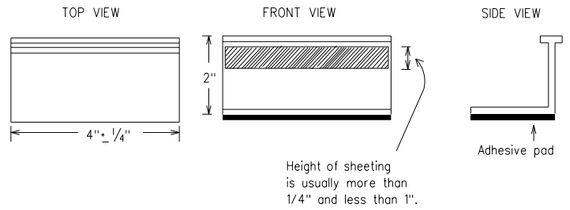
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation | Traffic Safety Division Standard

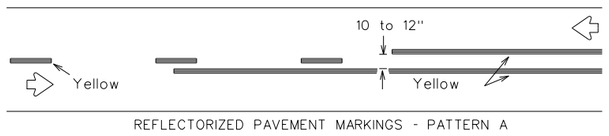
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

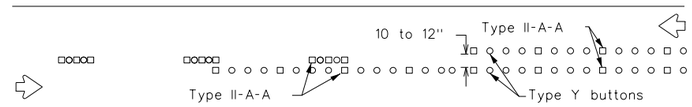
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	SAT	WILSON		49
11-02 8-14				

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\william osthoff\dms25645\bc-21.dgn

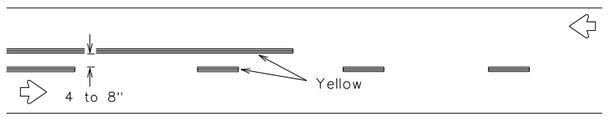
PAVEMENT MARKING PATTERNS



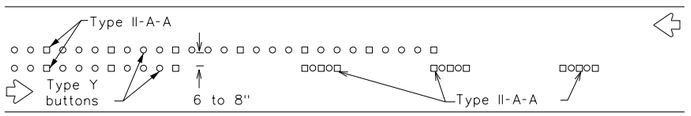
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



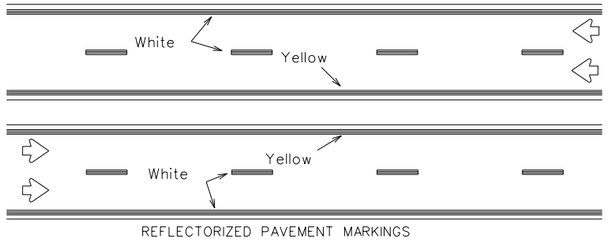
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



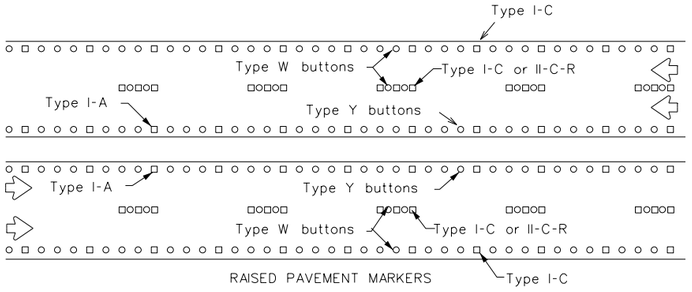
RAISED PAVEMENT MARKERS - PATTERN B

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



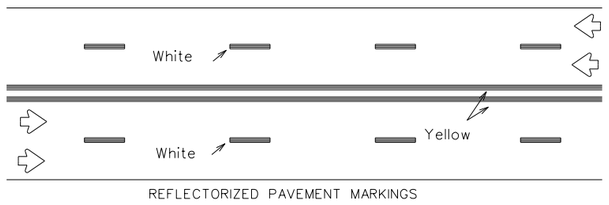
REFLECTORIZED PAVEMENT MARKINGS



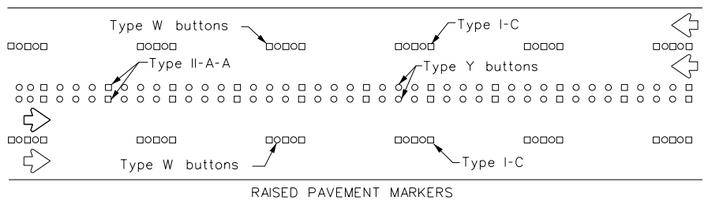
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



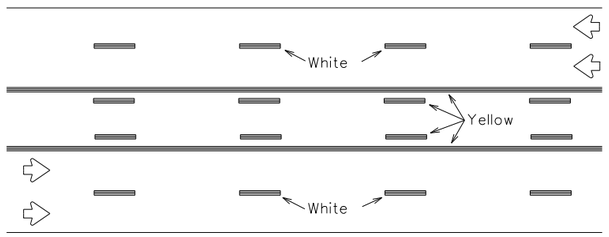
REFLECTORIZED PAVEMENT MARKINGS



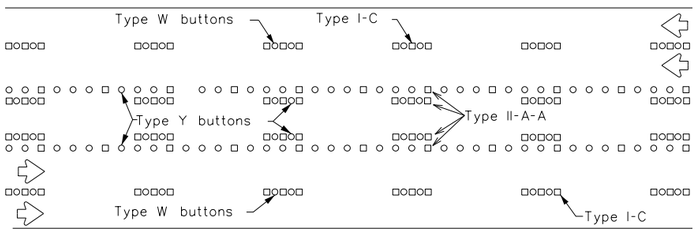
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

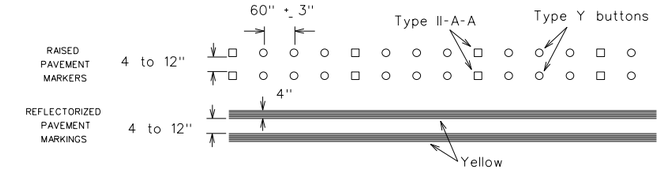
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

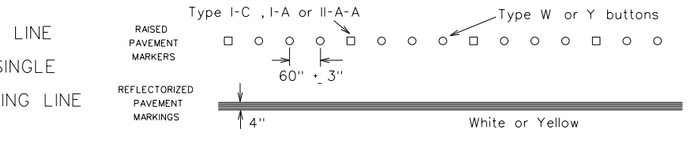
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

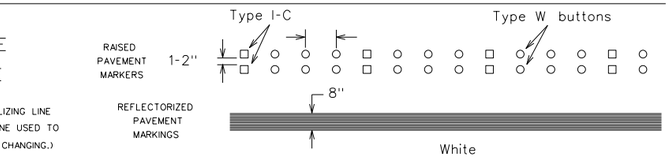


EDGE LINE OR SINGLE NO-PASSING LINE



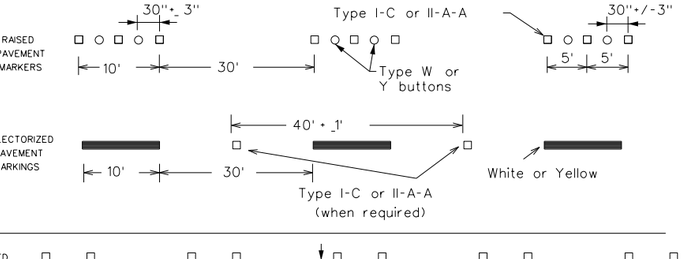
WIDE LINE

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



BROKEN LINES

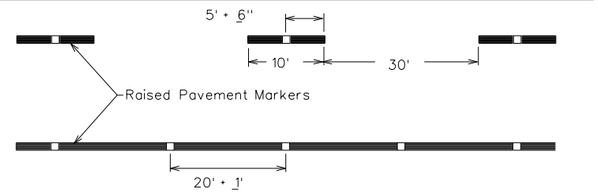
CENTER LINE OR LANE LINE



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."

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
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REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	0143	04	072	US 87
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106

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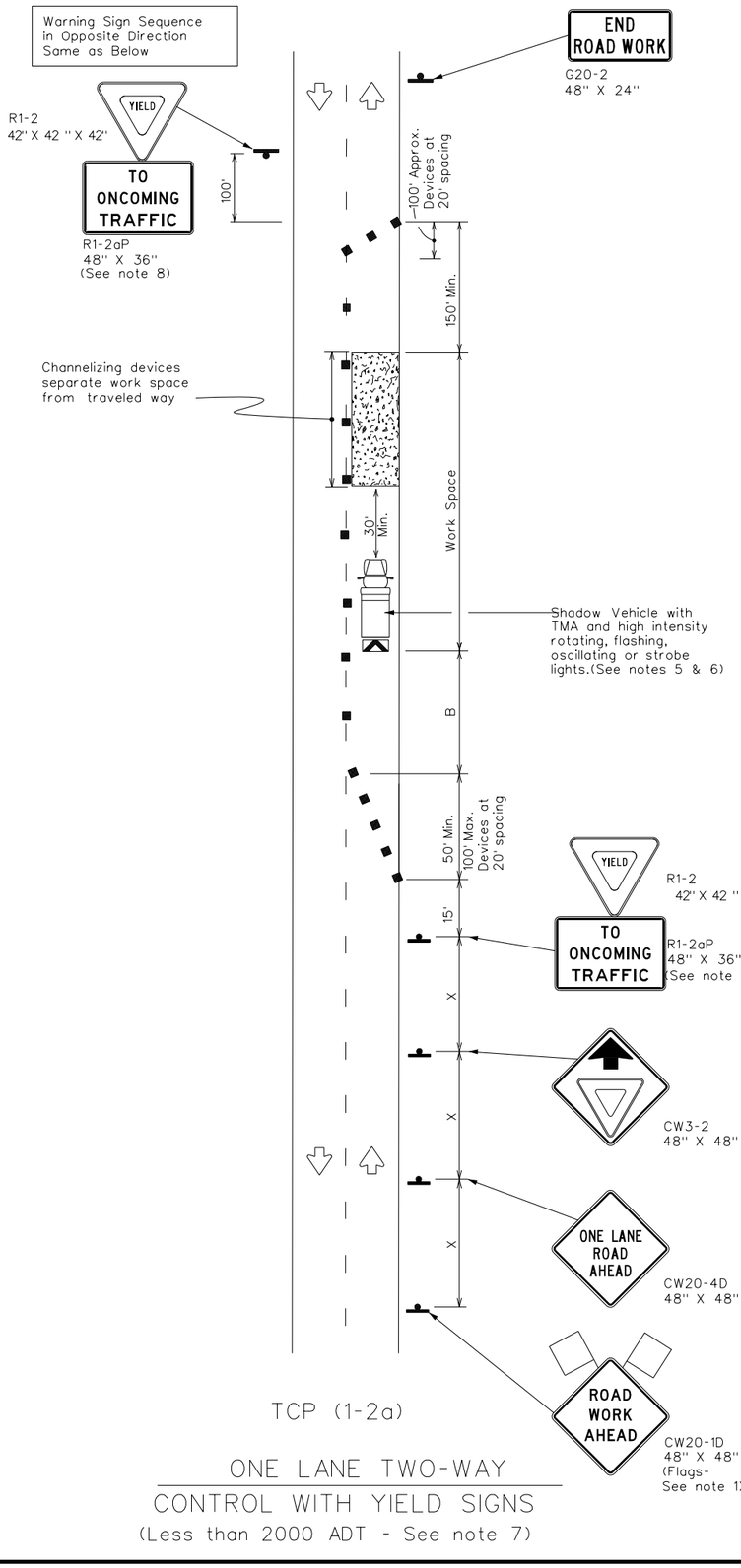
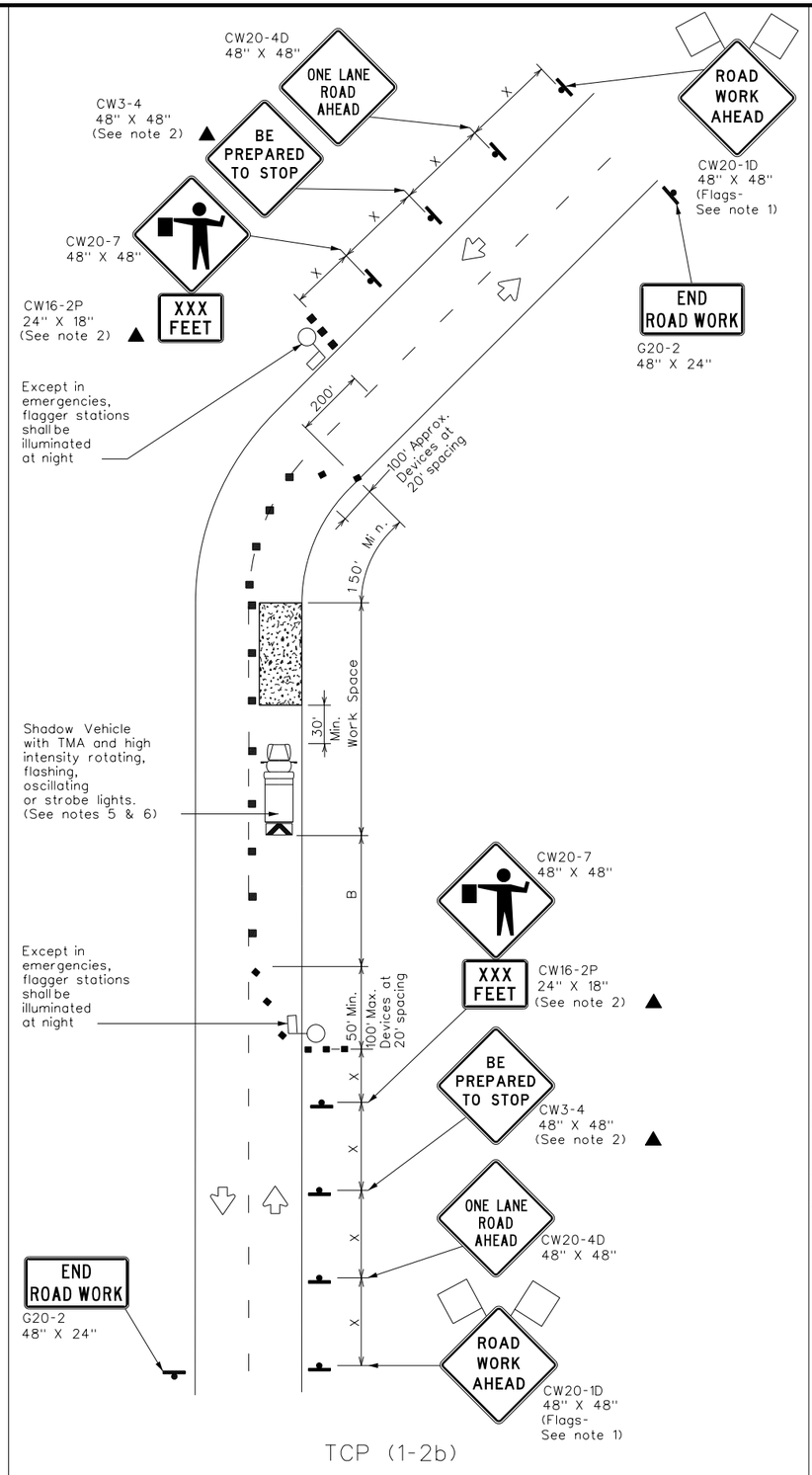


TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board	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 CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

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

TCP (1-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98 2-94 2-12 1-97 2-18	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		51

DATE: 10/28/2022 $TIME$
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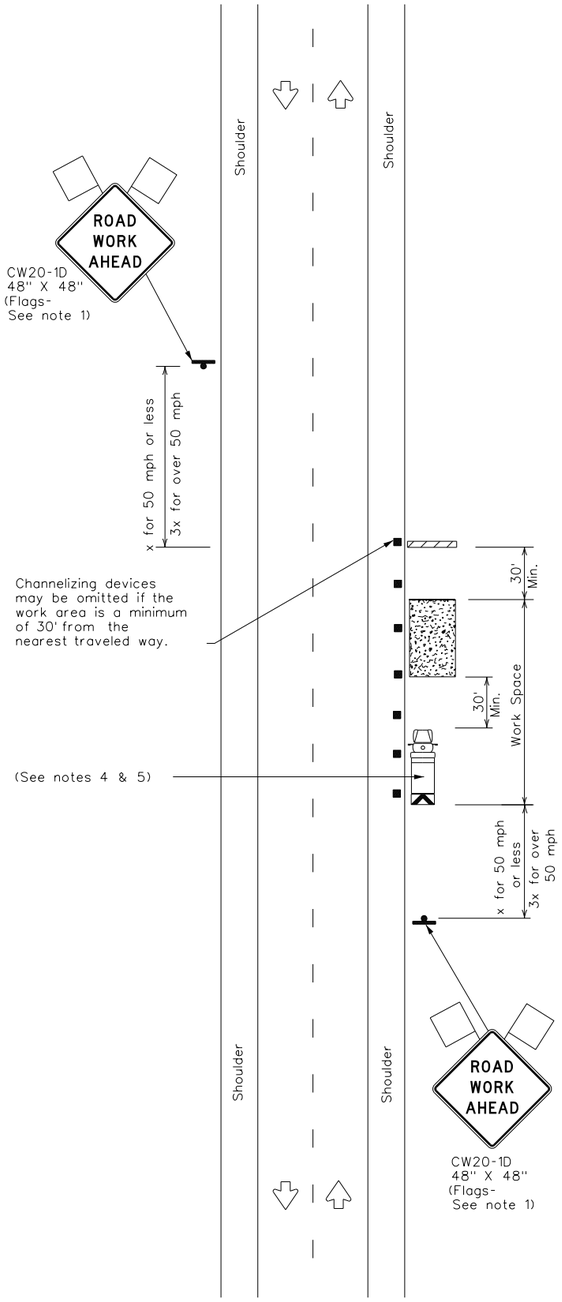
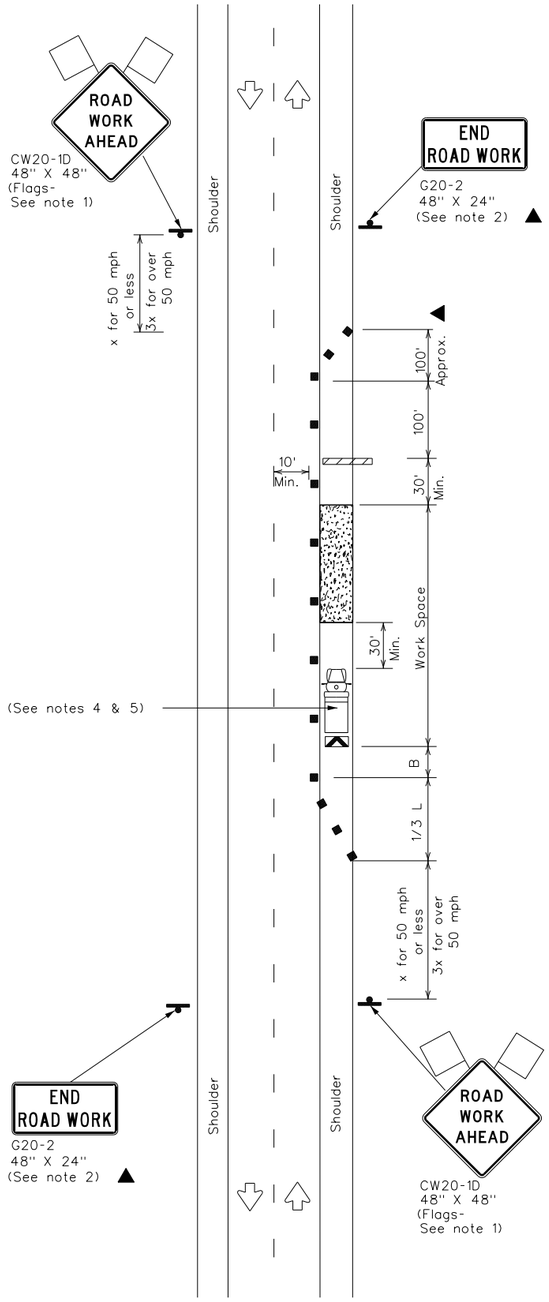


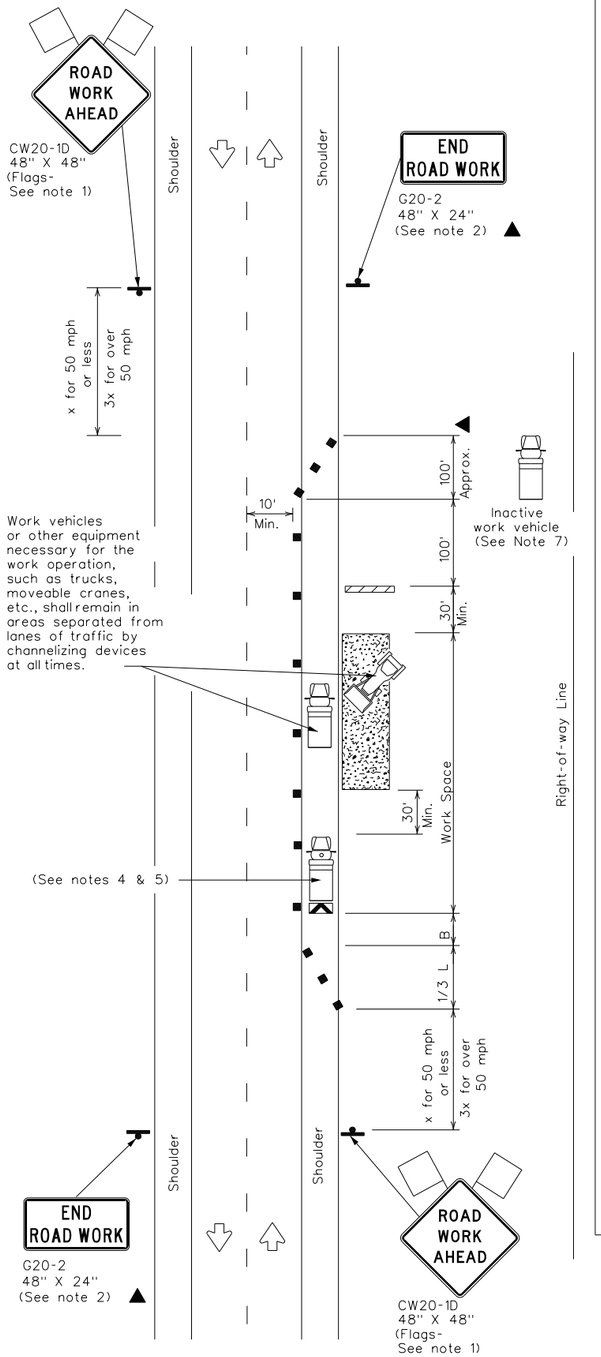
TCP (2-1a)

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	0143	04	072	US 87
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	SAT	WILSON		52
1-97 2-18				

161

DATE: 10/28/2022 $TIME$
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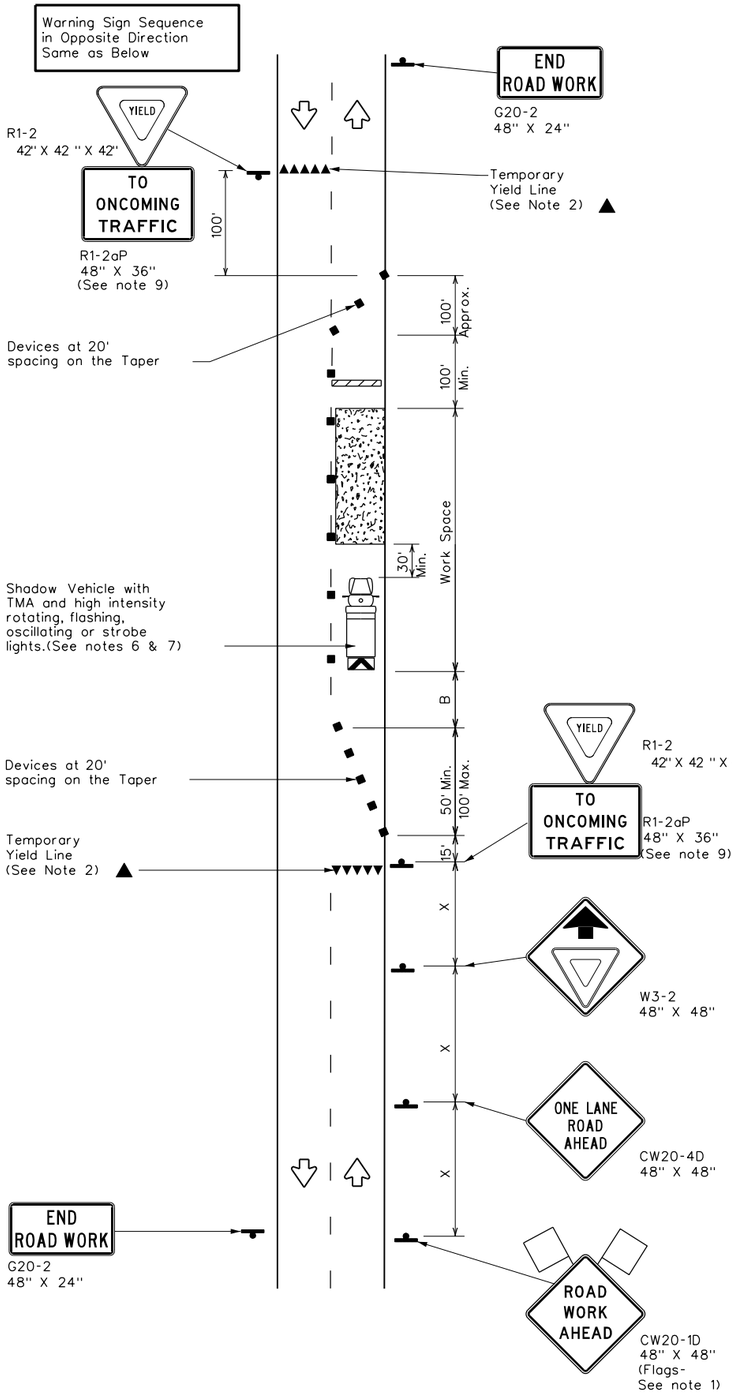
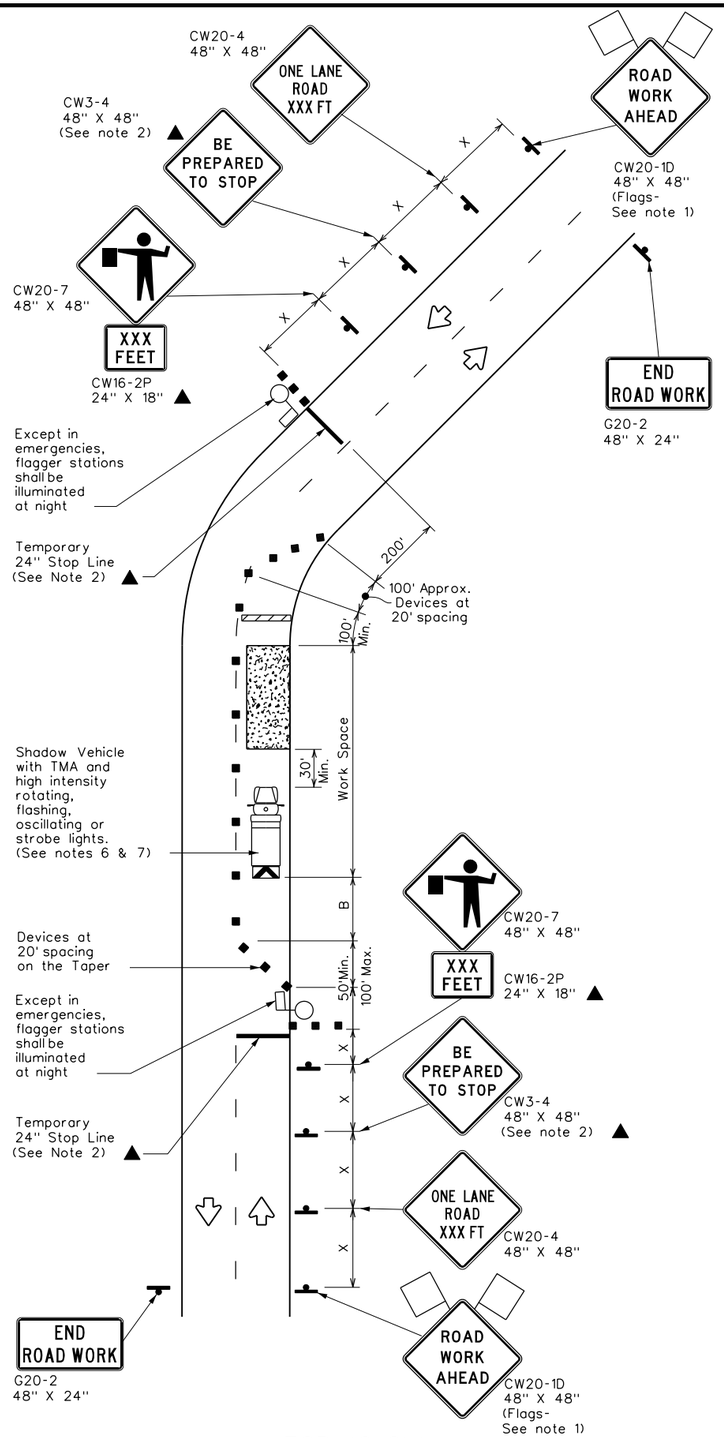


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS

ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

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

TCP (2-2b)

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0143	04	072	US 87
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	SAT	WILSON		53

DATE: 10/28/2022 $TIME$
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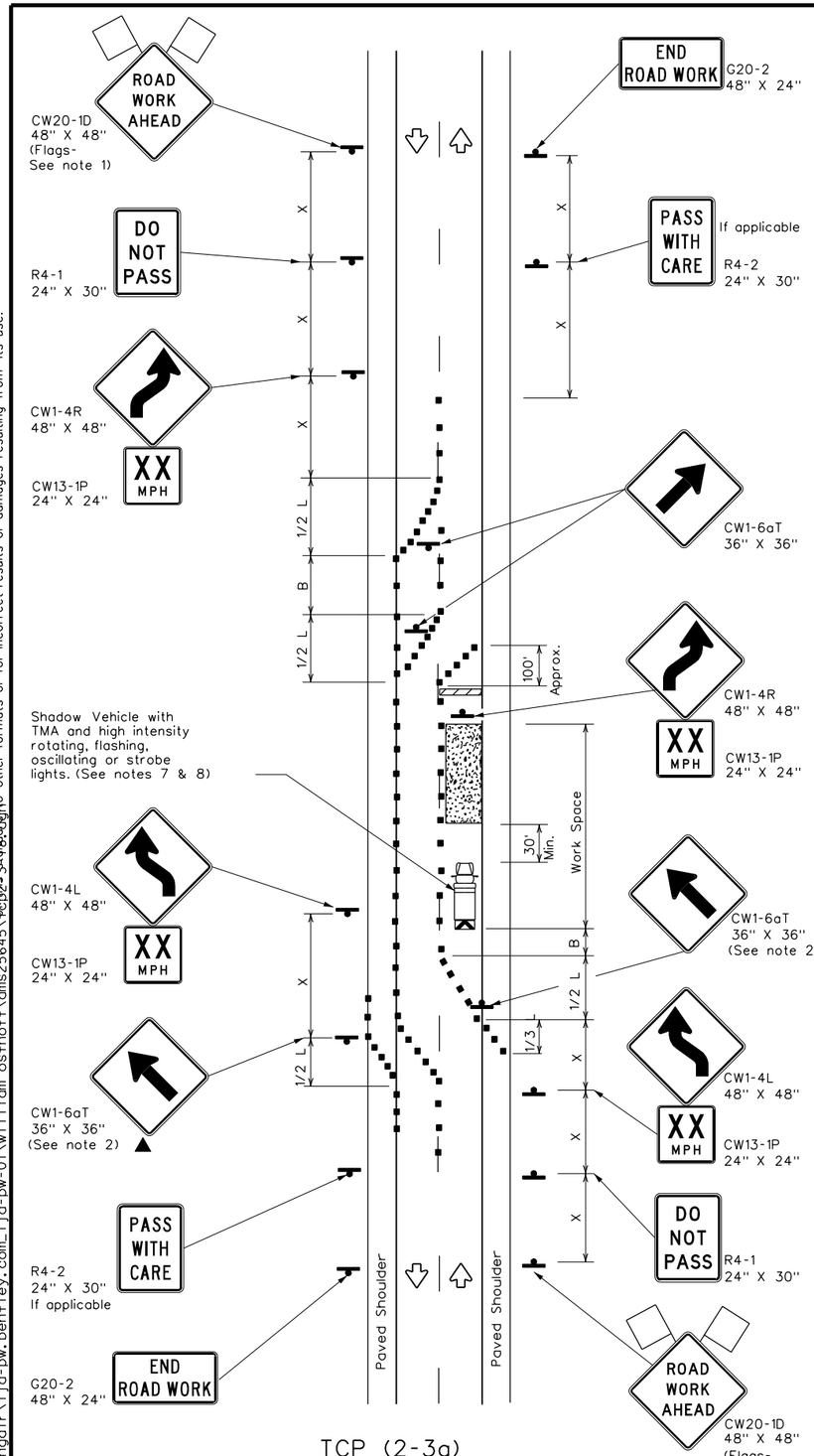
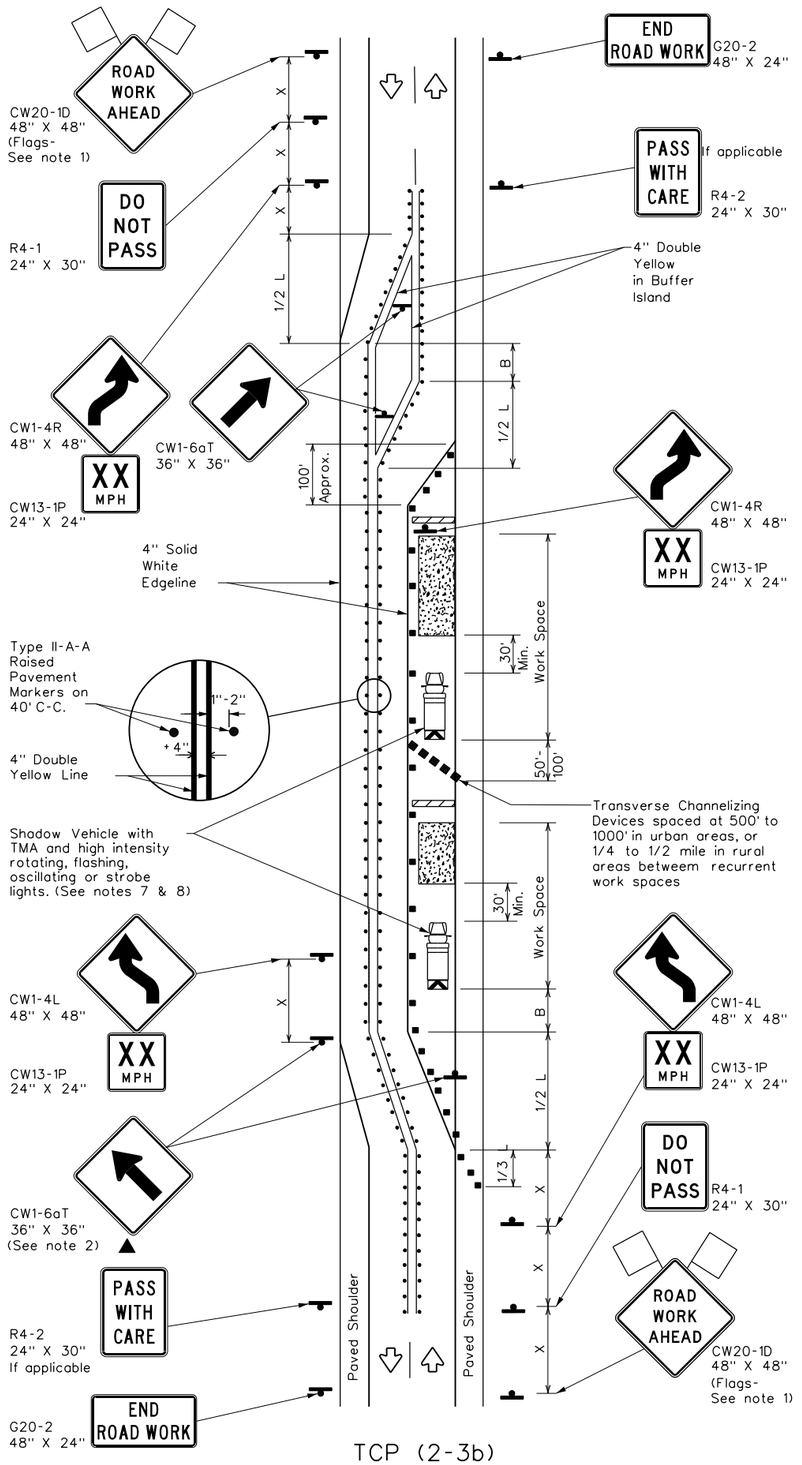


TCP (2-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



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

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	SAT	WILSON		54
4-98 2-18				

16.3

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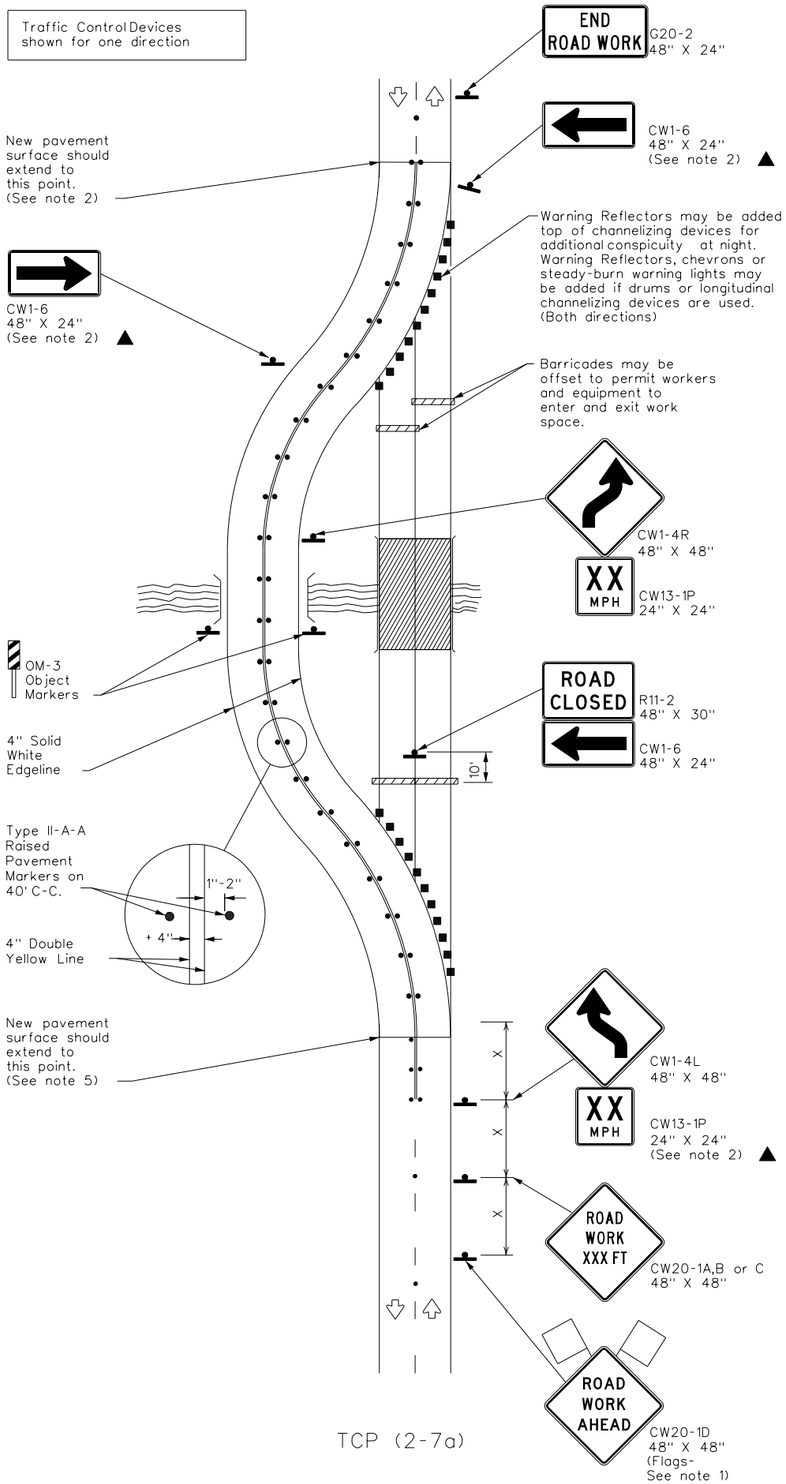
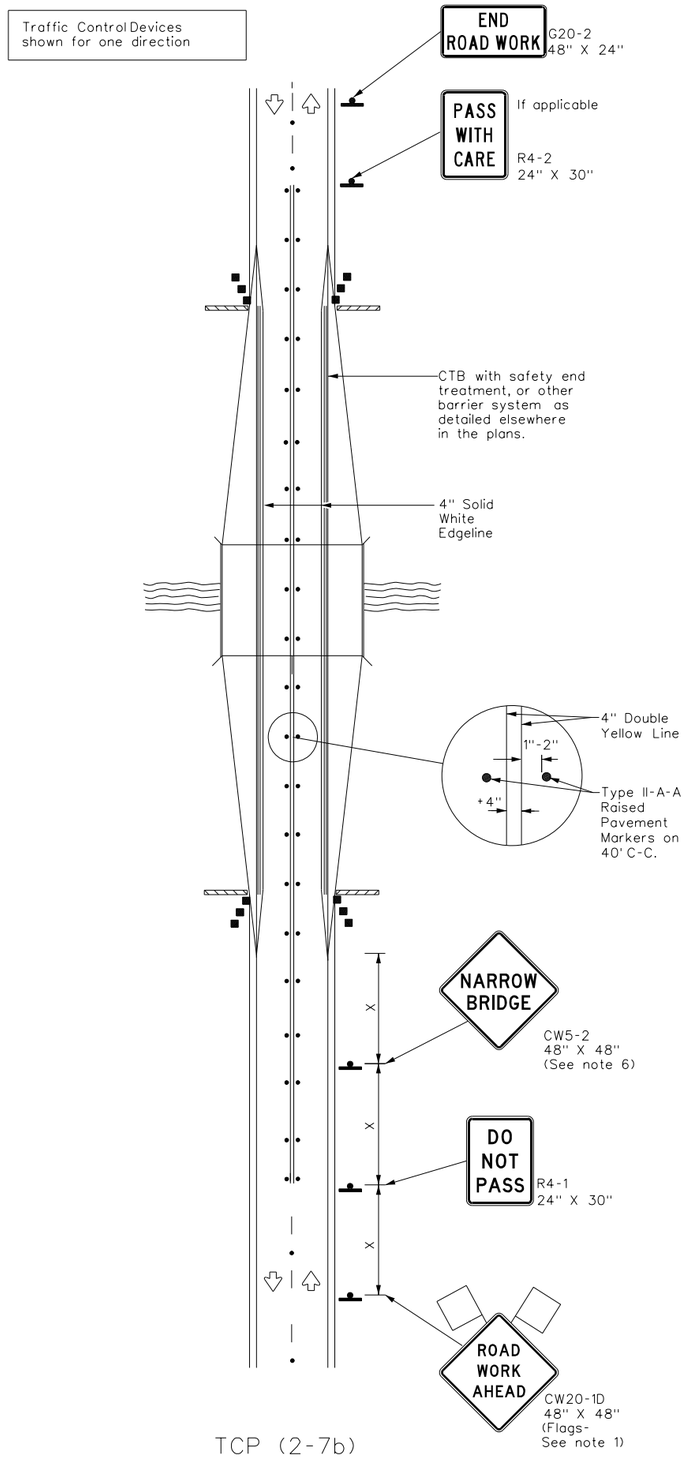


TCP (2-7a)

ROADWAY DIVERSION



TCP (2-7b)

BRIDGE WIDENING

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

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

* Conventional Roads Only

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

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

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.

TCP (2-7a)

3. Raised pavement markers shall be placed 40 feet c-c on centerline throughout project.
4. Roadway diversion design requirements should be based on posted speed limit or prevailing speed.
5. New pavement surface should be extended across existing roadway edge to a point where existing pavement markings left in place during project do not conflict with construction area pavement marking.

TCP (2-7b)

6. The CW5-2 "Narrow Bridge" sign may be omitted if lane and shoulder widths are maintained.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN DIVERSIONS AND NARROW BRIDGES

TCP(2-7)-18

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03 1-97 2-12 4-98 2-18	0143	04	072	US 87
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	SAT	WILSON		55

167

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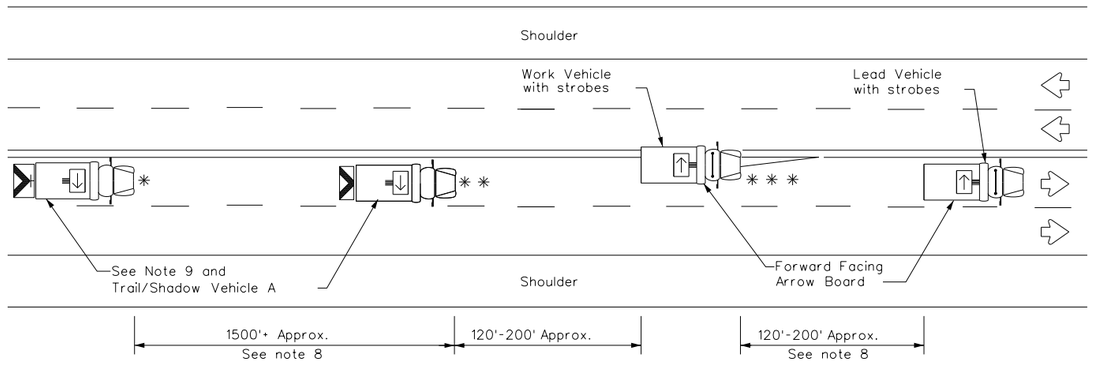
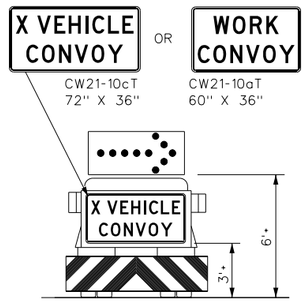


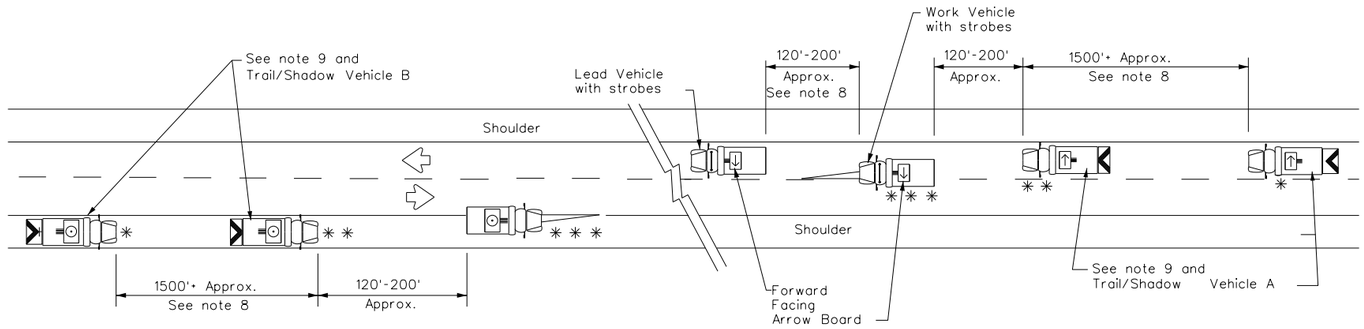
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

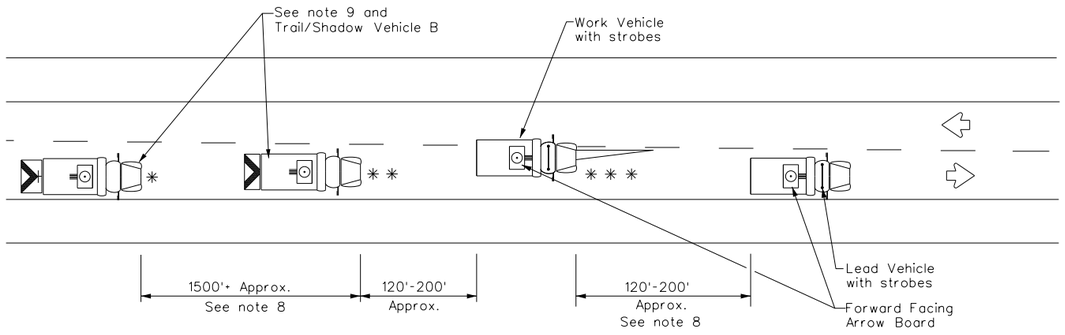


WORK ON SHOULDER

WORK ON TRAVEL LANE

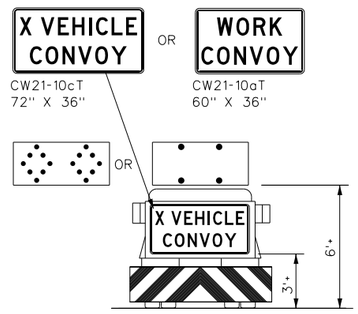
TCP (3-1b)

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

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.

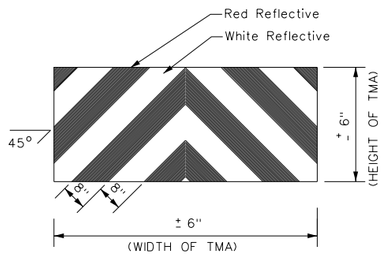
6. Each vehicle shall have two-way radio communication capability.

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.



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

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©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	SAT	WILSON		56
1-97				

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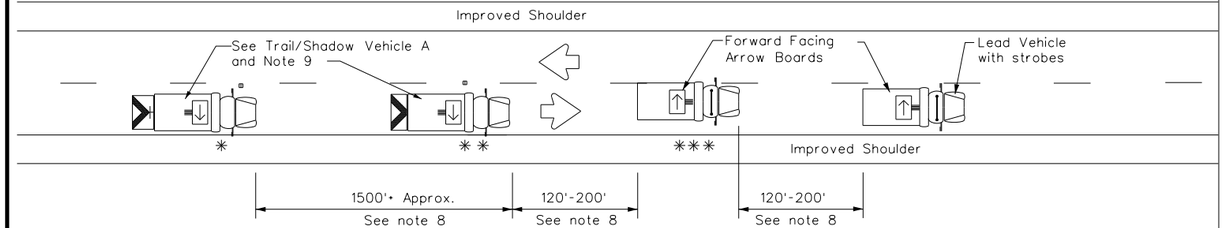
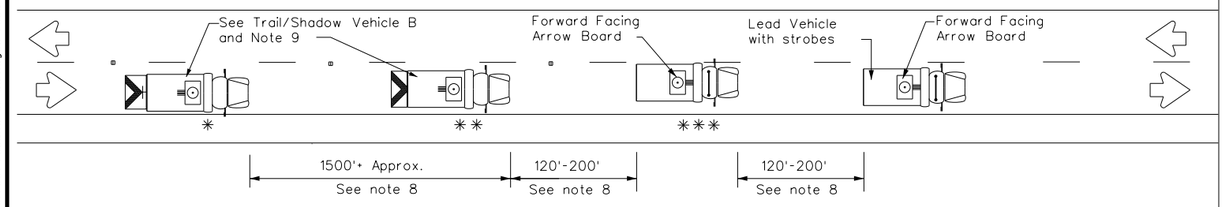


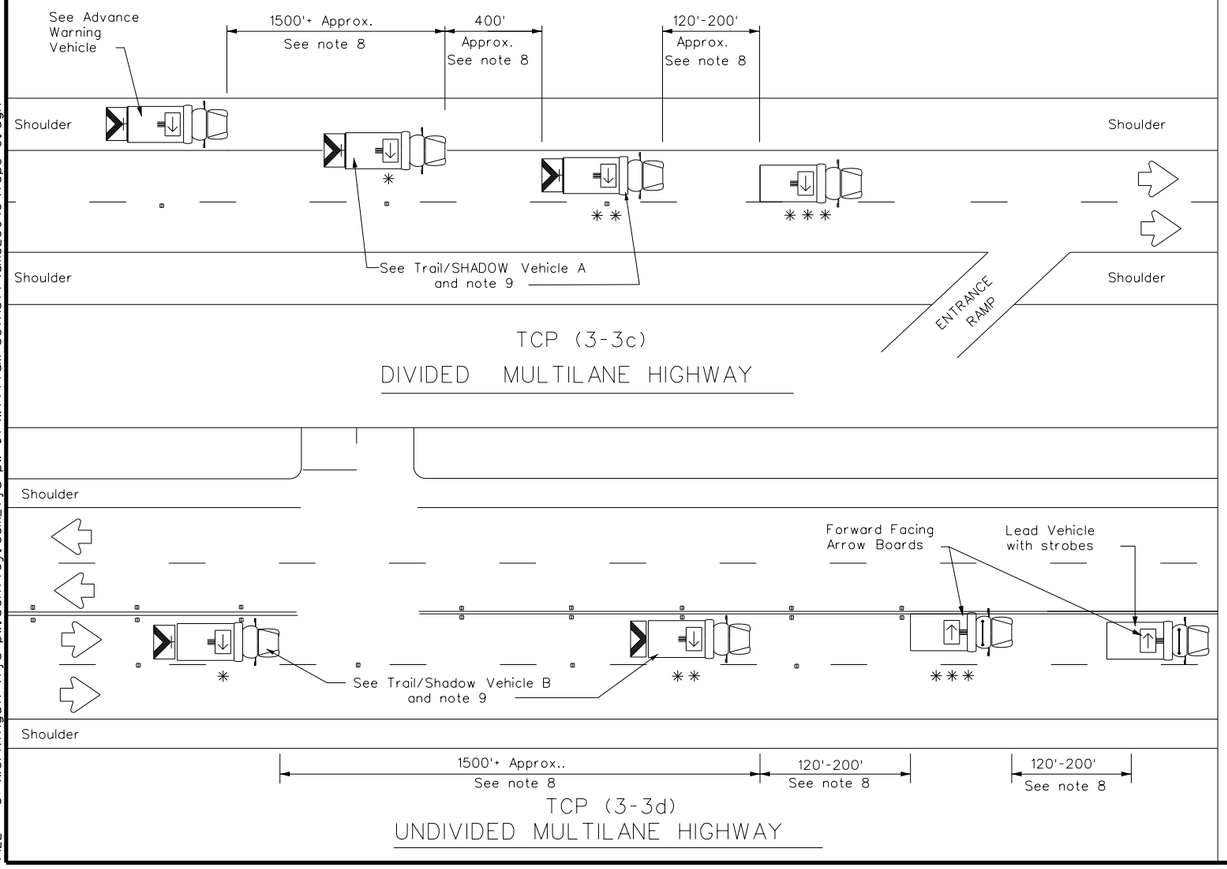
TCP (3-3a)

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



TCP (3-3b)

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

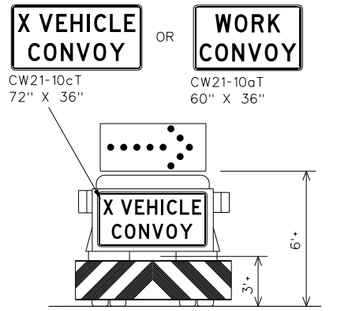


TCP (3-3c)

DIVIDED MULTILANE HIGHWAY

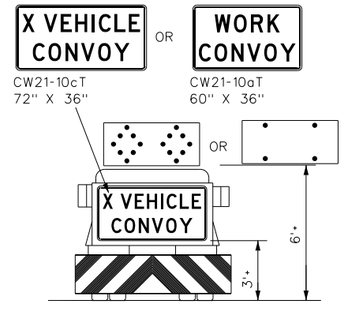
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



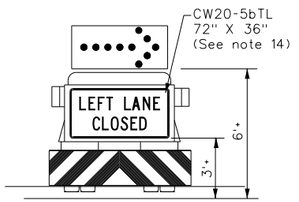
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

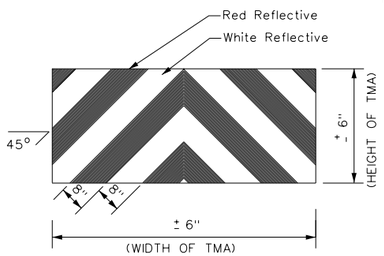


TRAIL/SHADOW VEHICLE B

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
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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	SAT	WILSON		57
1-97 7-14				

DATE: 11/29/2022 $TIME$
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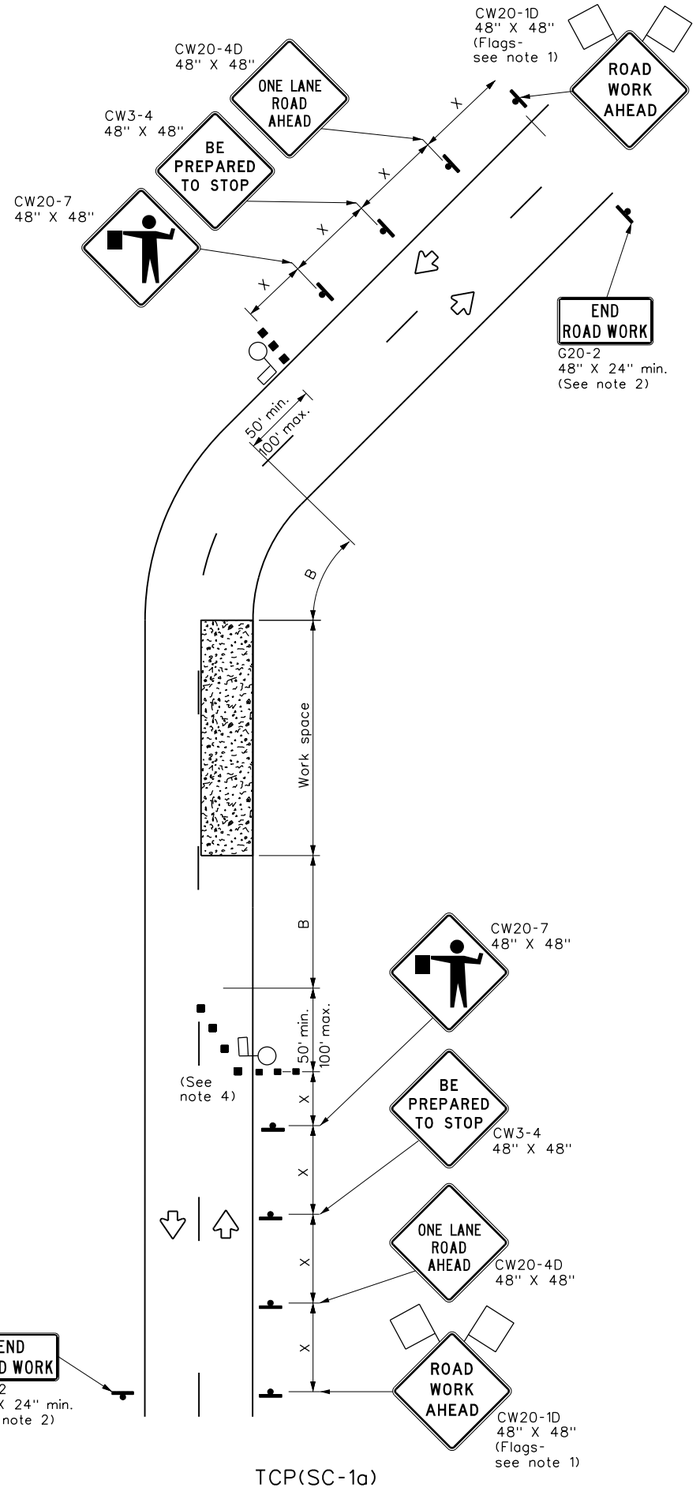
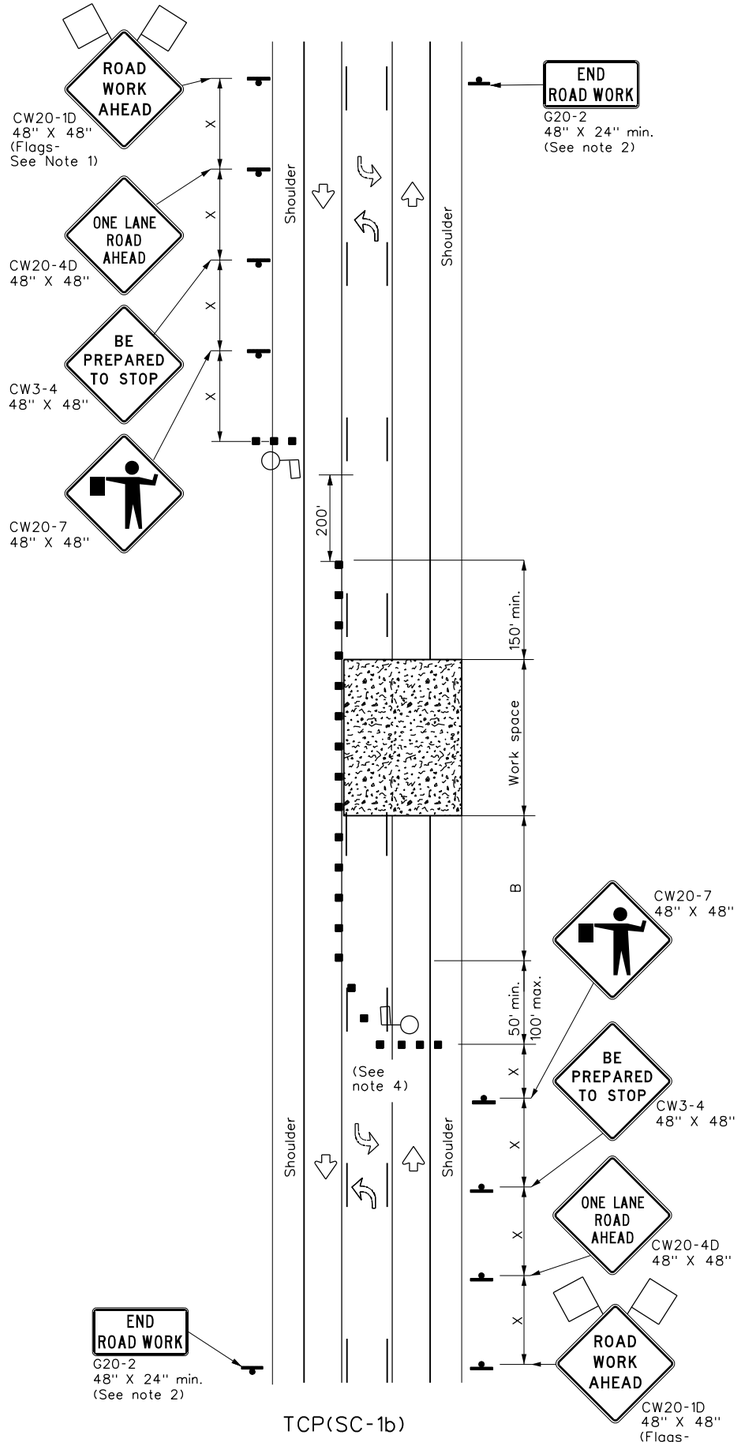


TCP(SC-1a)

ONE LANE TWO-WAY (TWO LANES) CONTROL WITH PILOT VEHICLE



TCP(SC-1b)

ONE LANE TWO-WAY (THREE LANES) CONTROL WITH PILOT VEHICLE AND CHANNELIZING DEVICES

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 Distance "X"	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: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. Sign spacing may be increased or an additional ROAD WORK AHEAD (CW20-1D) sign may be used if advance warning ahead of the flagger sign is less than 1500 feet.
4. Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
5. Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
6. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
7. If the seal coat operation crosses intersections, traffic in these areas must be controlled. Care must be taken to prevent vehicles from crossing the asphalt before the aggregate is placed. This may require positioning additional traffic control personnel (flaggers) at the intersection.
8. Temporary rumble strips are not required on seal coat operations.
9. The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

TCP (SC-1a)

1. Channelizing devices on the centerline are not required when a pilot car is leading traffic, unless directed by the Engineer.

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS ONE-LANE TWO-WAY

TCP(SC-1)-22

FILE: tcpsc-1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
4-21	DIST	COUNTY		SHEET NO.
10-22	SAT	WILSON		58

217

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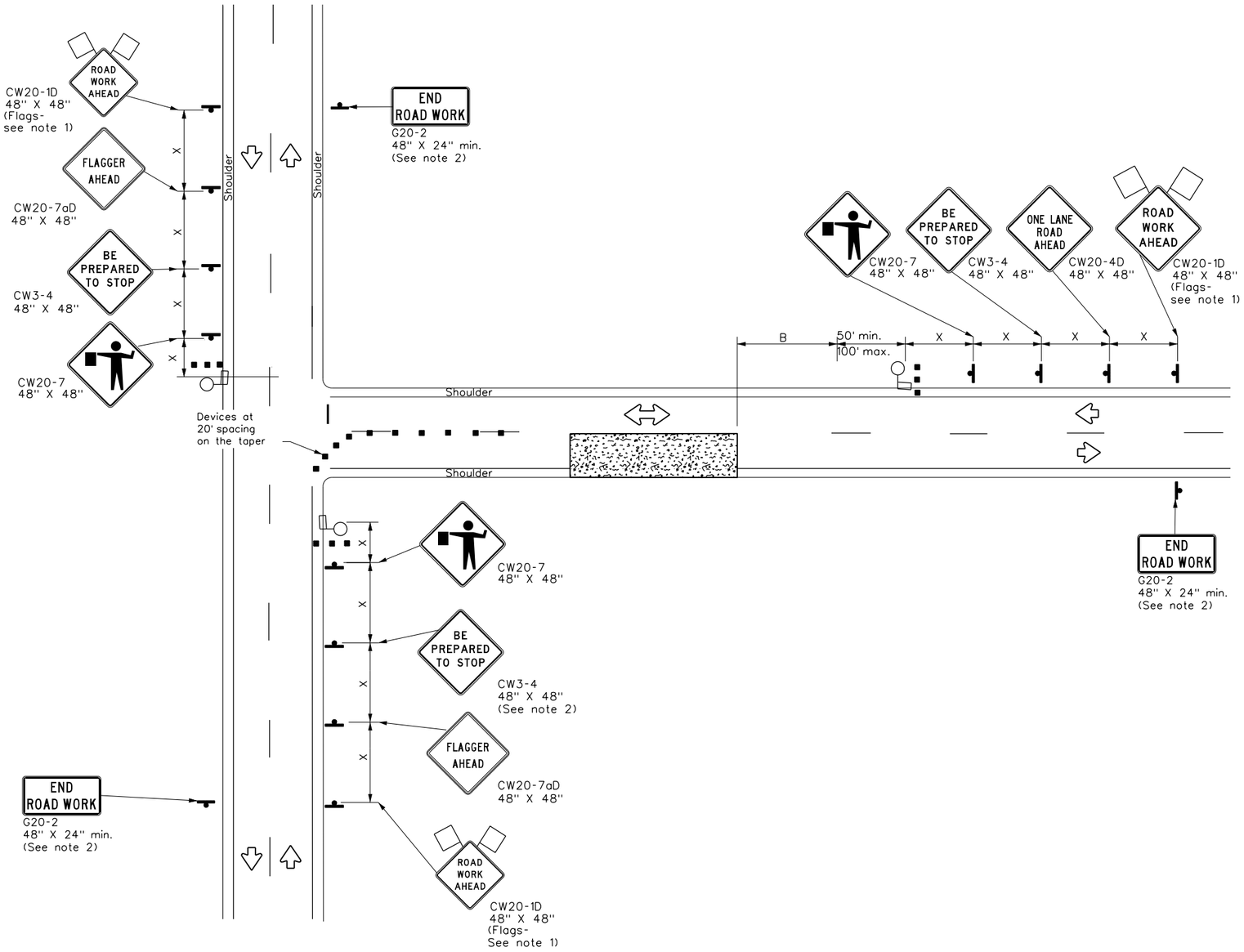

ONE LANE TWO-WAY (T-INTERSECTION) CONTROL WITH PILOT VEHICLE

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 Distance "X"	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: if project signing is present, END ROAD WORK (G20-2) sign is optional with approval by the Engineer.
3. Flaggers should use two-way radios or other methods of communication at all times for traffic control coordination.
4. Flaggers should use 24" STOP (CW20-8) / SLOW (CW20-8aT) paddles to control traffic. Flags should be limited to emergency situations.
5. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
6. Temporary rumble strips are not required on seal coat operations.
7. The pilot car is used to guide vehicles through traffic control zone. The pilot car shall have an identification name displayed and PILOT CAR, FOLLOW ME (G20-4) sign or message board mounted in a conspicuous position on rear.

Texas Department of Transportation | Traffic Safety Division Standard

TRAFFIC CONTROL PLAN SEAL COAT OPERATIONS NEAR INTERSECTION

TCP(SC-4)-22

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© TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
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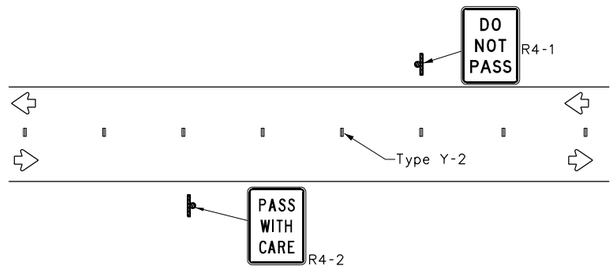
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		59

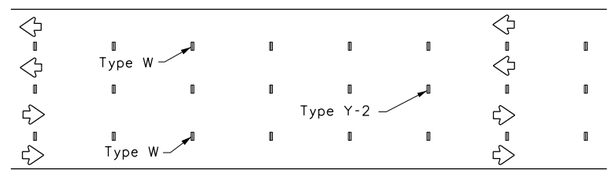
220

DATE: 11/29/2022
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\julio range\dms25645\tcpsc-7-22.dgn

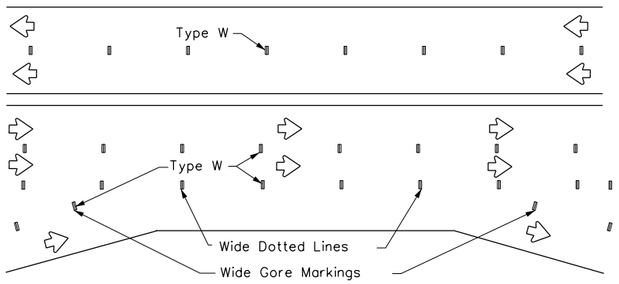
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS (TABS)



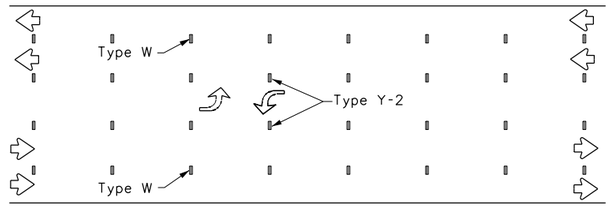
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS

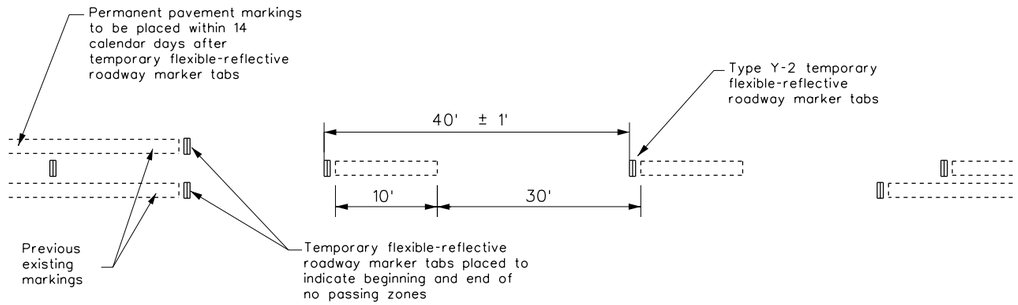


LANE LINES FOR DIVIDED HIGHWAY



TWO-WAY LEFT TURN LANE

TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS



TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS

1. Temporary markings for surfacing projects shall be Temporary Flexible-Reflective Roadway Marker Tabs with protective cover 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 days before the surfacing is applied. After the surfacing is rolled and swept, the protective cover over the reflective strip shall be removed.
2. Temporary Flexible-Reflective Roadway Marker Tabs detailed on this sheet will be designated Type Y-2 (two amber reflective surfaces with a 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).
3. Temporary Flexible-Reflective Roadway Marker Tabs will require normal maintenance replacement when used on roadways with an Average Daily Traffic (ADT) per lane of up to 7500 vehicles with no more than 10% truck mix. When roadway volumes exceed these values, additional maintenance replacement of these devices should be planned for.
4. 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.
5. 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 4.
6. Tabs shall meet requirements of Departmental Material Specification DMS-8242.
7. Tabs shall NOT be used to simulate edge lines.

NOTES:

1. 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.
2. 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 acceptable.
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.

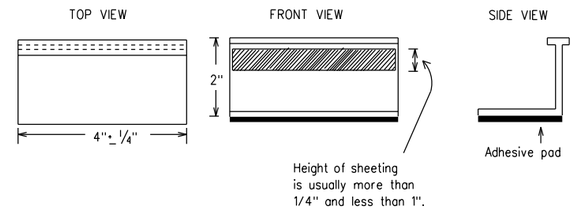
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS) & MATERIAL PRODUCER LISTS (MPL)

1. DMSs referenced above may be found along with embedded links to their respective MPLs at the following website: http://www.txdot.gov

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS (TABS)

SOLID LINES	DOUBLE NO-PASSING LINE	40' ± 1' — Type Y-2
	SINGLE NO-PASSING LINE or CHANNELIZATION LINE	40' ± 1' — Type Y-2 or W
	8" WIDE SOLID LINE	20' ± 1' — Type Y-2 or W
BROKEN LINES (FOR CENTER LINE OR LANE LINE)		40' ± 1' — Type Y-2 or W
WIDE DOTTED LINES (FOR LANE DROP LINES)		12' ± 1' — Type W
WIDE GORE MARKINGS		20' ± 1' — Type W

TEMPORARY FLEXIBLE-REFLECTIVE ROADWAY MARKER TABS



Texas Department of Transportation — Traffic Safety Division Standard

TEMPORARY PAVEMENT MARKINGS FOR SEAL COAT OPERATIONS

TCP(SC-7)-22

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10-22	SAT	WILSON		60

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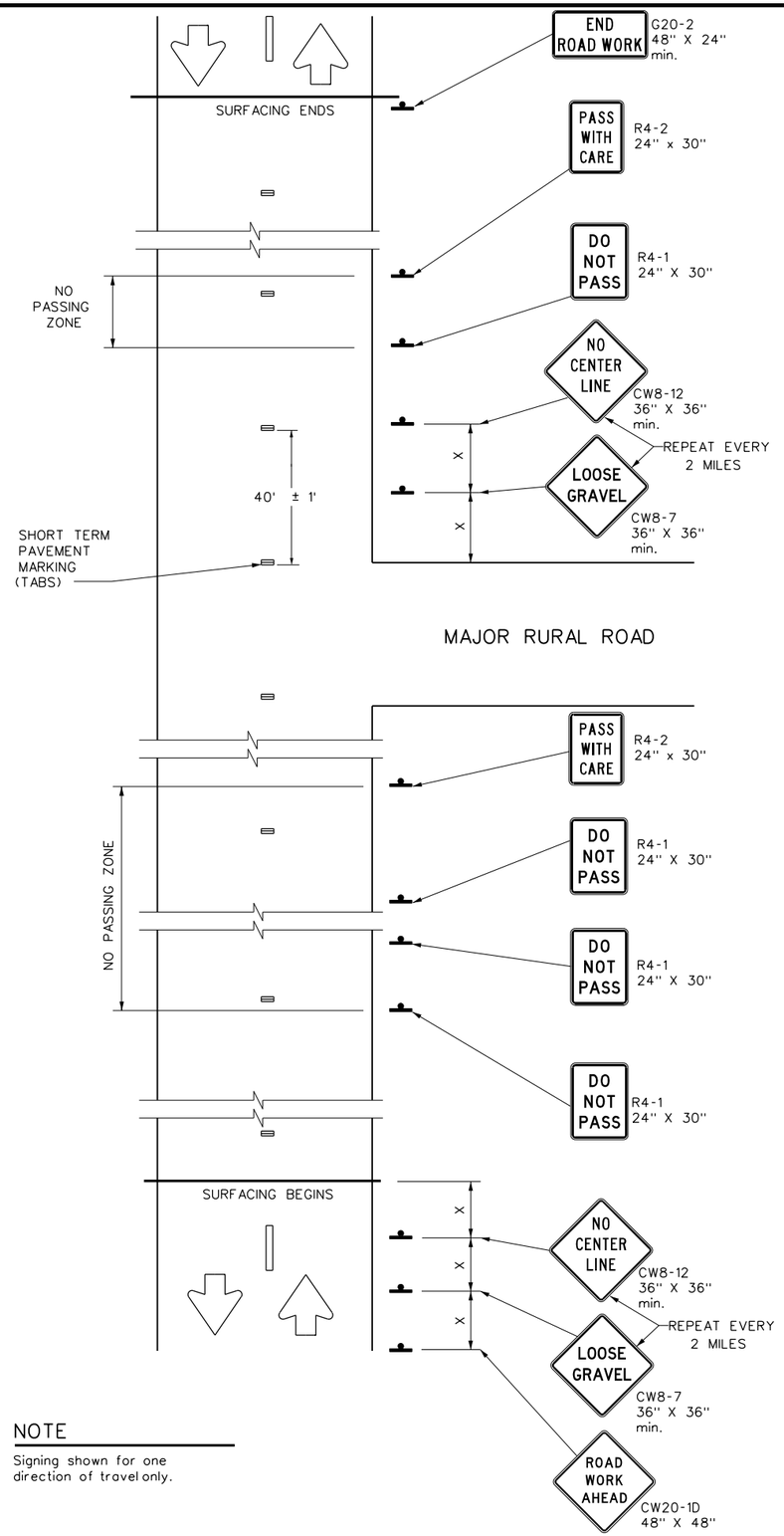


MAJOR RURAL ROAD

NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS

DO NOT PASS (R4-1) SIGN 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 prohibitd 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 a 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 windshields 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 day of 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. DO NOT PASS and PASS WITH CARE signs are to remain in place until permanent pavement markings are installed.

NO CENTER LINE (CW8-12) SIGN

A. Center line markings are yellow pavement markings that delineate the separation between 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 center line), a NO CENTER LINE (CW8-12) sign should be erected at the beginning of the work area, at approximately two 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 permanent pavement markings are installed.

LOOSE GRAVEL (CW8-7) SIGN

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 two 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.

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:
   a.) In the sequence shown following the OBEY WARNING SIGNS STATE LAW (R20-3T) sign and the TRAFFIC FINES DOUBLE (R20-5T) sign; and
   b.) 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 sign placements will then be repeated as described above.

Posted Speed *	Minimum Sign Spacing Distance "X"
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. Surfacing operations that cover or obliterate existing pavement markings must first have the passing zones clearly marked with tabs as well as having any of the traffic control devices detailed on this sheet furnished and erected as directed by the Engineer.

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 Short Duration / Short Term Stationary 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 should 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 Safety Division Standard

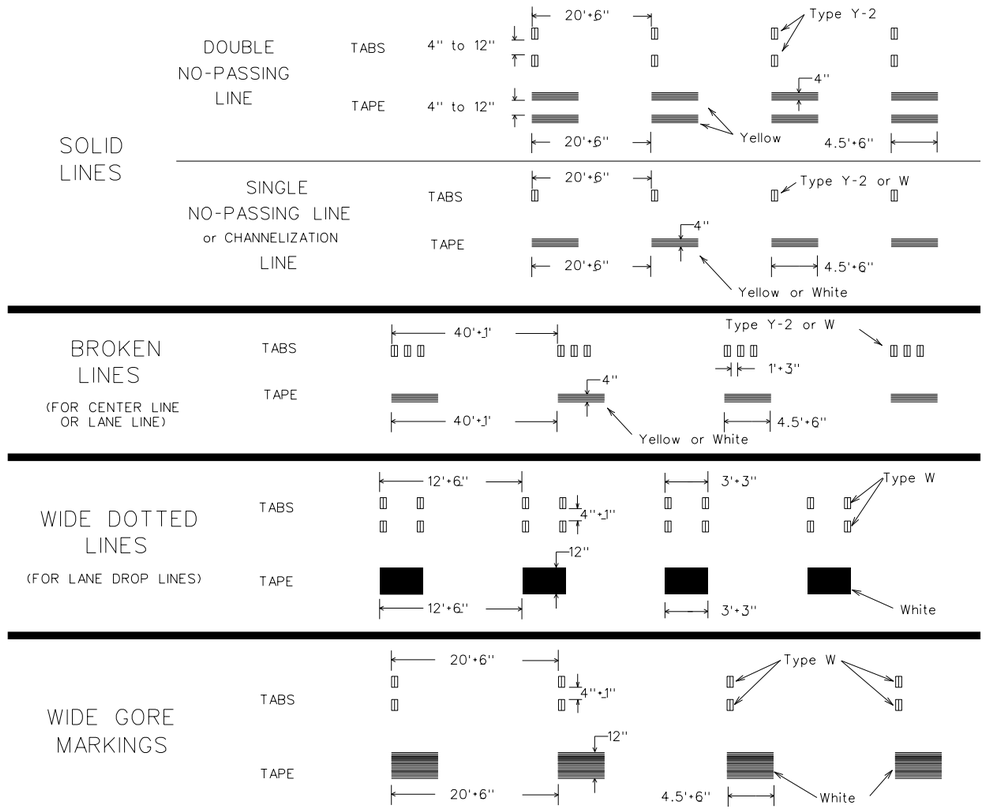
TRAFFIC CONTROL DETAILS FOR SEAL COAT OPERATIONS

TCP(SC-8)-22

FILE: tcpsc-8-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
4-21	DIST	COUNTY		SHEET NO.
10-22	SAT	WILSON		61

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\william.osthoff\dms25645\wzstpm-13.dgn

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



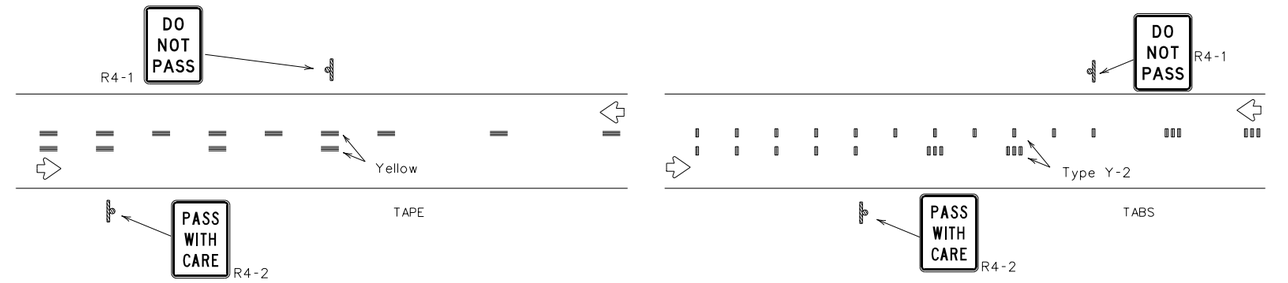
NOTES:

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.

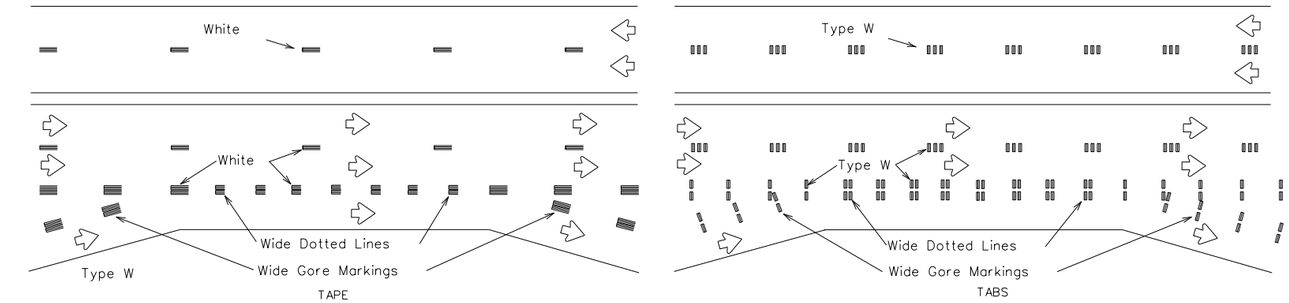
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

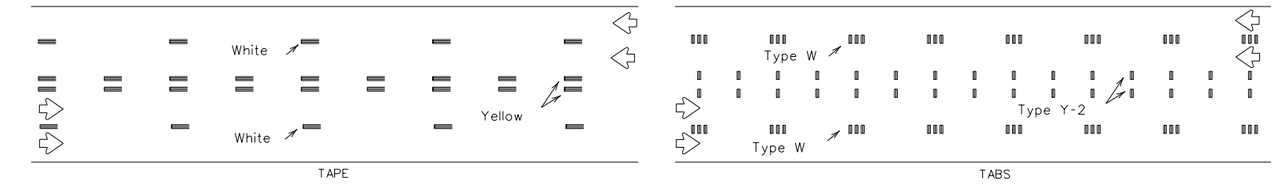
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



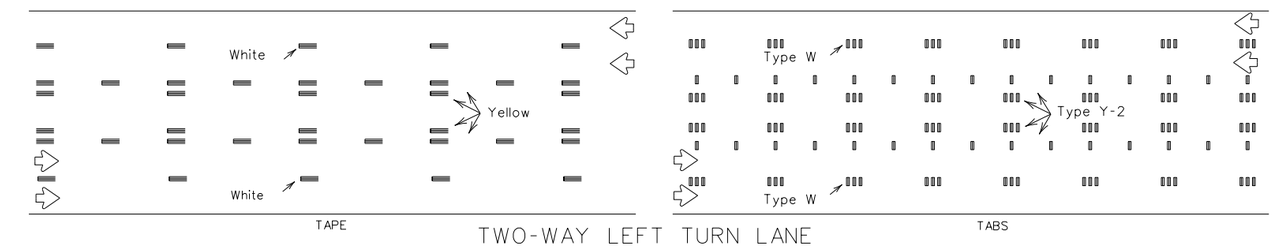
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



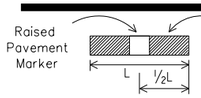
LANE LINES FOR DIVIDED HIGHWAY



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 Operations Division Standard

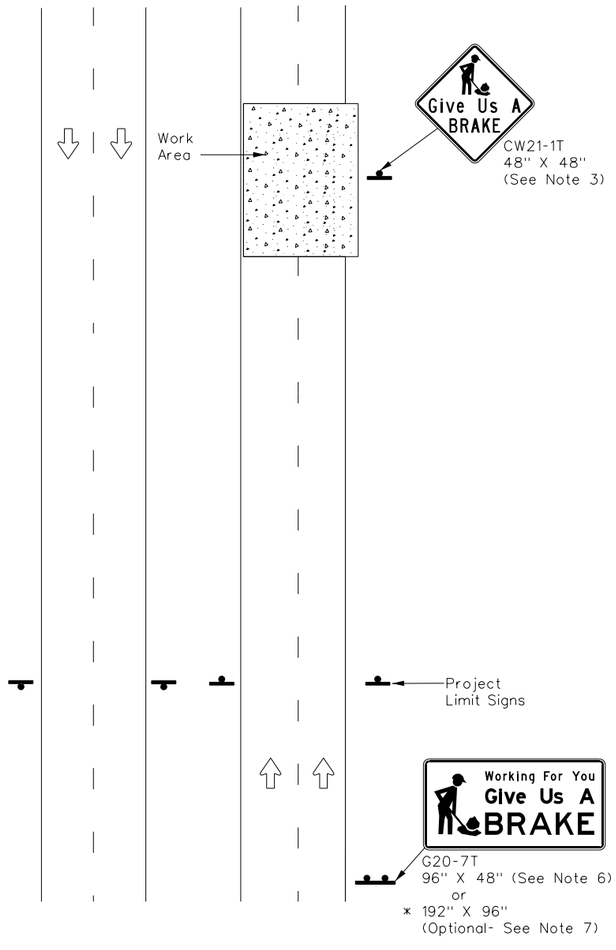
WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

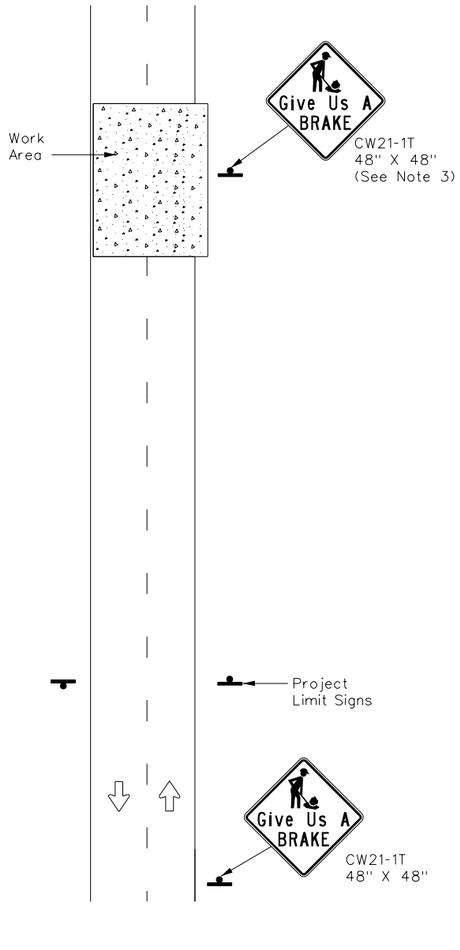
FILE: wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
1-97	DIST	COUNTY		SHEET NO.
3-03	SAT	WILSON		62
7-13				

111

DATE:
FILE:



DIVIDED HIGHWAY



UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

* When the optional larger WORKING FOR YOU GIVE US A BRAKE (G20-7T) 192" x 96" sign is required, the locations shall be noted elsewhere in the plans.

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL			DRILLED SHAFT 24" DIA. (LF)
						Size	(LF) ①	(LF) ②	
Orange	G20-7T	Working For You Give Us A BRAKE	96" X 48"	Type B_{FL} or C_{FL}	32	▲	▲	▲	▲
Orange	G20-7T	Working For You Give Us A BRAKE	192" X 96"	Type B_{FL} or C_{FL}	128	W8x18	16	17	12

▲ See Note 6 Below

LEGEND	
	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS	
PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

1. See BC and SMD sheets for additional sign support details.

2. Sign locations shall be approved by the Engineer.

3. For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.

4. Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.

5. Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."

6. The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.

7. The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
   Item 636 - Aluminum Signs
   Item 647 - Large Roadside Sign Supports and Assemblies.
   Item 416 - Drilled Shaft Foundations

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.

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE "GIVE US A BRAKE" SIGNS

WZ(BRK)-13

FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
6-96 5-98 7-13	DIST	COUNTY		SHEET NO.
8-96 3-03	SAT	WILSON		63

116

DATE: 10/28/2022 $TIME$
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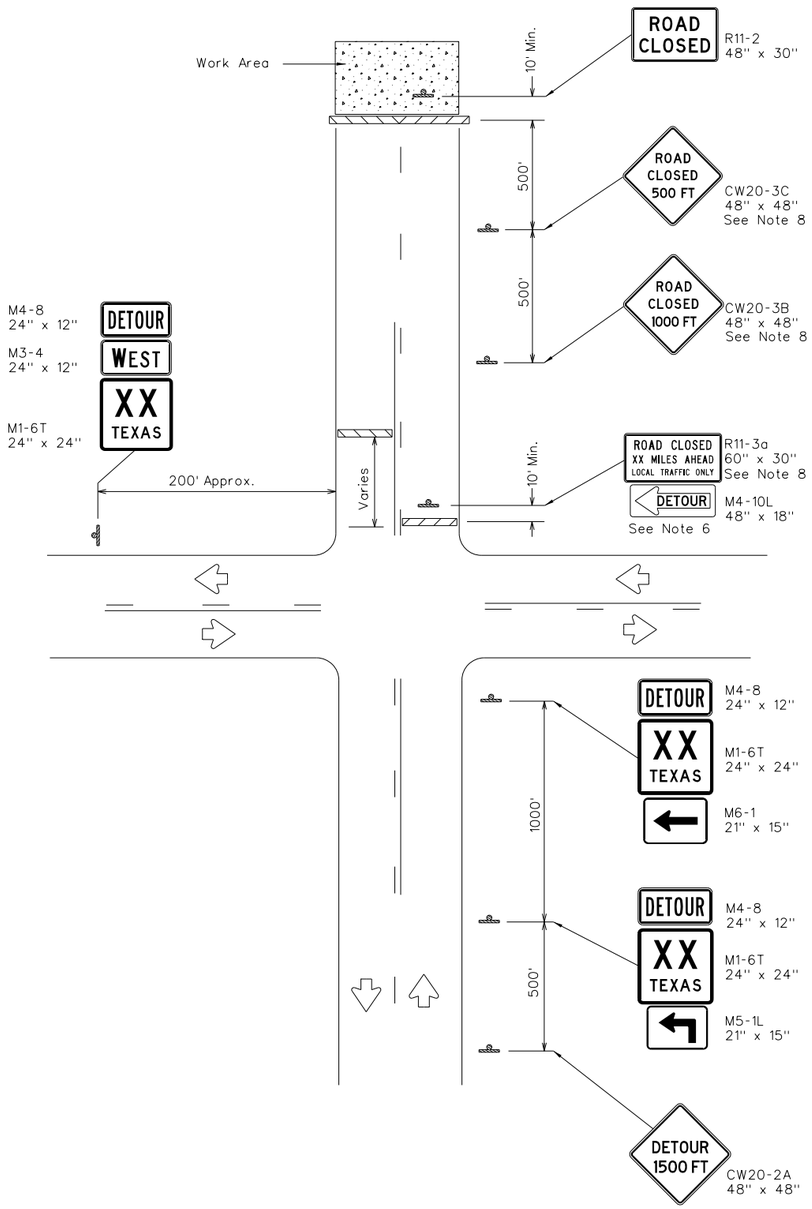
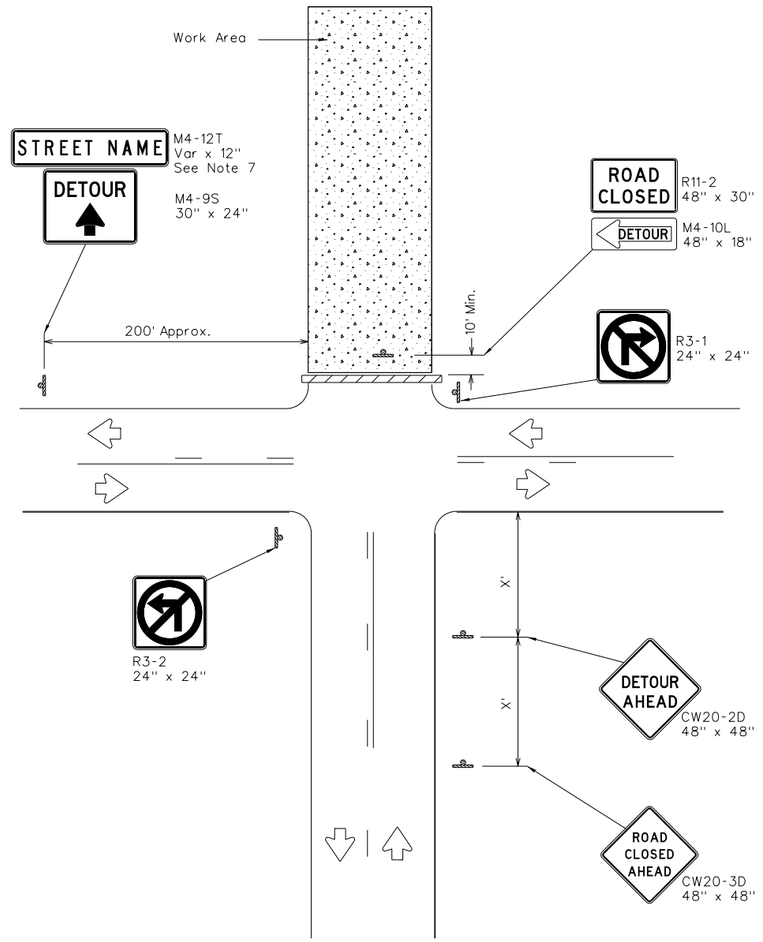


ROAD CLOSURE BEYOND THE INTERSECTION

Signing for a Numbered Route with an Off-Site Detour



ROAD CLOSURE AT THE INTERSECTION

Signing for an Un-numbered Route with an Off-Site Detour

LEGEND	
	Type 3 Barricade
	Sign

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

GENERAL NOTES

1. This sheet is intended to provide details for temporary work zone road closures. For permanent road closure details see the D&OM standards.
2. Barricades used shall meet the requirements shown on Barricade and Construction Standard BC(10) and listed on the Compliant Work Zone Traffic Control Devices list (CWZTCD).
3. Stockpiled materials shall not be placed on the traffic side of barricades.
4. Barricades at the road closure should extend from pavement edge to pavement edge.
5. Detour signing shown is intended to illustrate the type of signing that is appropriate for numbered routes or un-numbered routes as labeled. It does not indicate the full extent of detour signing required. Detour routes should be signed as shown elsewhere in the plans.
6. If the road is open for a significant distance beyond the intersection or there are significant origin/destination points beyond the intersection, the signs and barricades at this location should be located at the edge of the traveled way.
7. The Street Name (M4-12T) sign is to be placed above the DETOUR (M4-9S) sign.
8. For urban areas where there is a shorter distance between the intersection and the actual closure location, the ROAD CLOSED XX MILES AHEAD (R11-3a) sign may be replaced with a ROAD CLOSED TO THRU TRAFFIC (R11-4) sign. If adequate space does not exist between the intersection and the closure a single ROAD CLOSED AHEAD (CW20-3D) sign spaced as per the table above may replace the ROAD CLOSED 1000 FT (CW20-3B) and ROAD CLOSED 500 FT (CW20-3C) signs.
9. Signs and barricades shown shall be subsidiary to Item 502. Locations where these details will be required shall be as shown elsewhere in the plans.

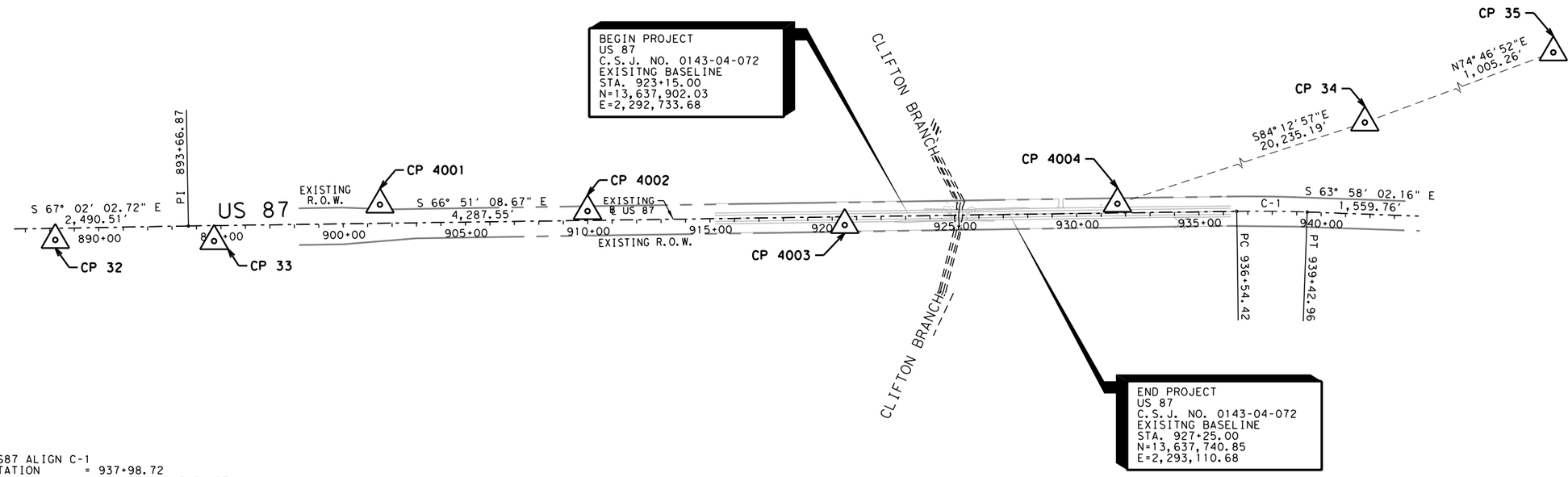
Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE ROAD CLOSURE DETAILS

WZ(RCD)-13

FILE: wzrcd-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
1-97 4-98 7-13	DIST	COUNTY		SHEET NO.
2-98 3-03	SAT	WILSON		64



SCALE: 1" = 250' (22" X 34")
SCALE: 1" = 500' (11" X 17")

0' 250' 500'

GRAPHIC SCALE IN FEET

EX US87 ALIGN C-1
PI STATION = 937+98.72
DELTA = 02° 53' 06.51" (RT)
DEGREE OF CURVE = 00° 59' 59.73"
TANGENT = 144.2983
LENGTH = 288.5355
RADIUS = 5,730.0000
PC STATION = 936+54.42
PT STATION = 939+42.96

FROM	TO	DIRECTION	DISTANCE
CP 32	CP 33	S 65° 37' 50" E	649.29'
CP 33	CP 4001	S 78° 27' 20" E	694.38'
CP 4001	CP 4002	S 64° 14' 48" E	849.60'
CP 4002	CP 4003	S 62° 57' 41" E	1,053.31'
CP 4003	CP 4004	S 70° 31' 10" E	1,118.71'
CP 4004	CP 34	S 84° 12' 57" E	20,235.19'
CP 34	CP 35	N 74° 46' 52" E	1,005.26'

STATION / OFFSET BASED ON EXISITNG ALIGNMENT

POINT	NORTH	EAST	ELEVATION	STATION	OFFSET	DESCRIPTION
CP 32	13,639,229.78	2,289,502.48	424.72'	888+21.83	47.60'	FOUND 1/2" IRON ROD STAMPED "MAVERICK"
CP 33	13,638,961.87	2,290,093.92	433.56'	894+71.12	63.17'	FOUND 1/2" IRON ROD STAMPED "MAVERICK"
CP 34	13,635,562.56	2,313,664.48	505.48'	1148+37.85	65.28'	FOUND 1/2" IRON ROD STAMPED "MAVERICK"
CP 35	13,635,826.45	2,314,634.49	490.04'	1158+43.12	65.01'	FOUND 1/2" IRON ROD STAMPED "MAVERICK"
CP 4001	13,638,822.90	2,290,774.25	431.28'	901+51.32	-76.49'	SET 5/8" IRON ROD WITH CAP "CIVILCORP"
CP 4002	13,638,453.76	2,291,539.46	410.68'	910+00.03	-37.86'	SET 5/8" IRON ROD WITH CAP "CIVILCORP"
CP 4003	13,637,974.93	2,292,477.64	402.30'	920+50.91	33.61'	SET 5/8" IRON ROD WITH CAP "CIVILCORP"
CP 4004	13,637,601.86	2,293,532.32	409.44'	931+67.34	-37.94'	SET 5/8" IRON ROD WITH CAP "CIVILCORP"

NOTES:
1. ALL BEARINGS AND DISTANCES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE (4204), NORTH AMERICAN DATUM OF 1983 (NAD 83), CORS2011 (EPOCH 2010.00). ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00016.

2. ALL ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), 1991 ADJUSTMENT.

3. ALL HORIZONTAL AND VERTICAL SOLUTIONS ARE BASED ON GPS OBSERVATION MEANS UTILIZING THE TXDOT VRS NETWORK AT THE TIME OF THE SURVEY AND LOCALIZED TO CP32, CP33, CP34 AND CP35 FROM DANNENBAUM CONTROL SURVEY FOR US87 REHABILITATION DATED 02/21/19 PROVIDED BY LJA. HELD MONUMENT SURFACE CONTROL VALUES:

CP32 N=13,639,229.78 E=2,289,502.48 ELEV=424.72'	CP34 N=13,635,562.56 E=2,313,664.48 ELEV=505.48'
CP33 N=13,638,961.87 E=2,290,093.92 ELEV=433.56'	CP35 N=13,635,826.45 E=2,314,634.49 ELEV=490.04'

4. ALL MEASUREMENTS ARE U.S. SURVEY FEET.

STATE OF TEXAS
REGISTERED
JAMES A. WOODS
5333
PROFESSIONAL
LAND SURVEYOR

SIGNED: James A Woods
JAMES A. WOODS
REGISTERED PROFESSIONAL
LAND SURVEYOR TEXAS No. 5333

THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

CivilCorp
ENGINEERS • SURVEYORS
4611 E. AIRLINE ROAD, SUITE 300, VICTORIA, TEXAS 77904
TXSURV FIRM #100576-00 TXENG FIRM #10283

LJA Engineering, Inc.
FRN - F-1386

US 87

INDEX CONTROL

SHEET 1 OF 1

FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	65

$TIME$
DATE: $DATE$
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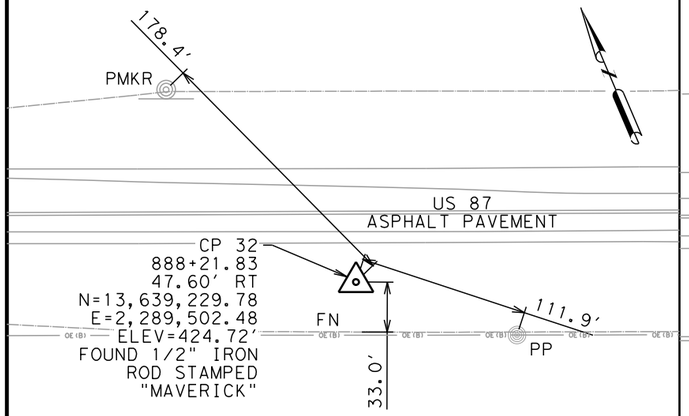

STATION/OFFSET BASED ON EXISTING US 87 ALIGNMENT

SITUATED ON THE SOUTH SIDE OF US 87
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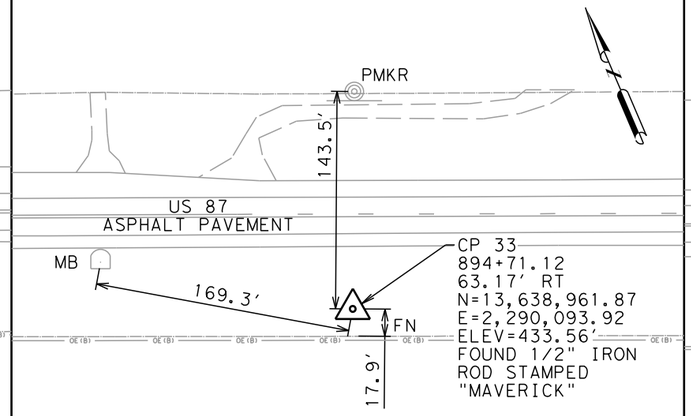

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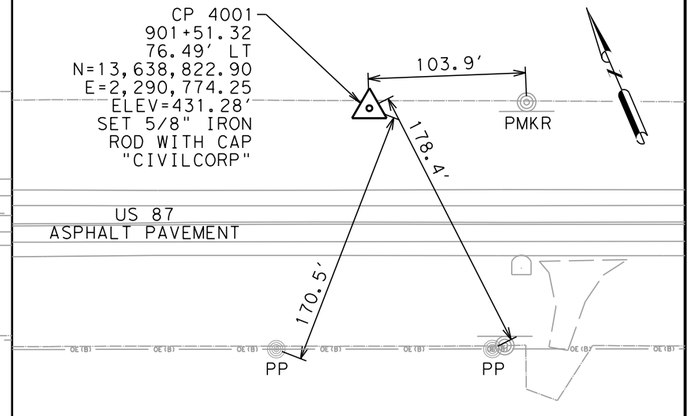

STATION/OFFSET BASED ON EXISTING US 87 ALIGNMENT

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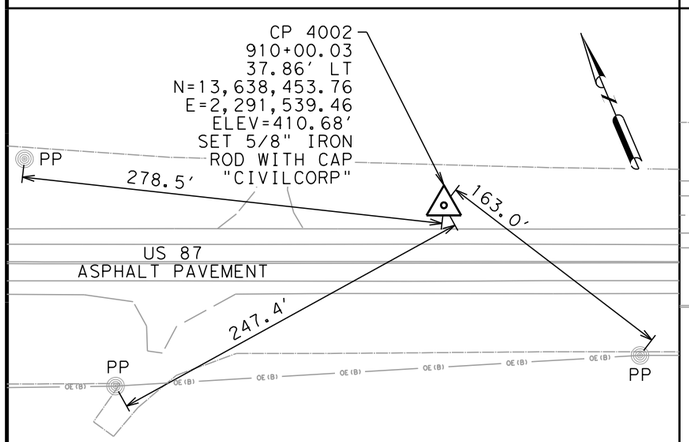

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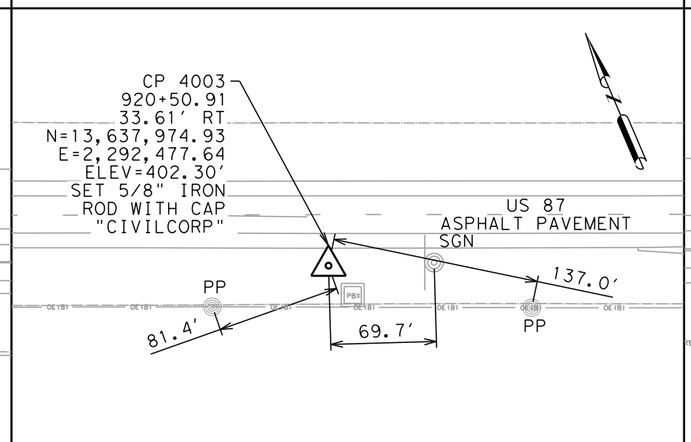
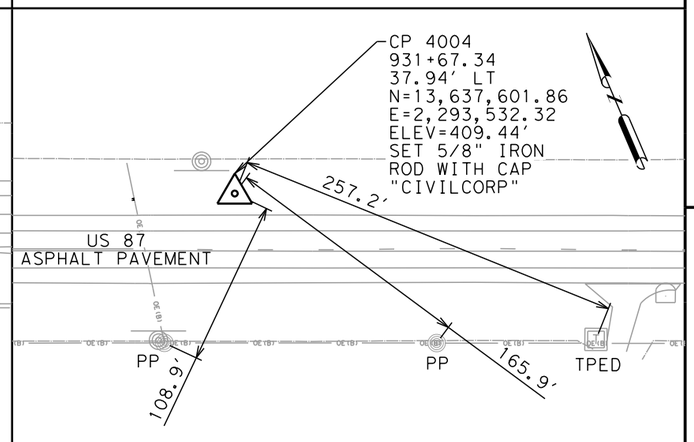


STATION/OFFSET BASED ON PROPOSED US 87 ALIGNMENT

SITUATED ON THE SOUTH SIDE OF US 87
APPROXIMATELY 3,720 FEET WEST OF OLD FLORESVILLE RD



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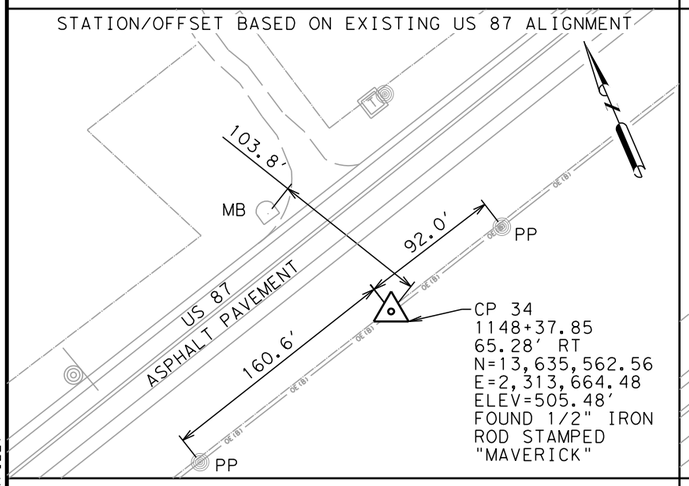
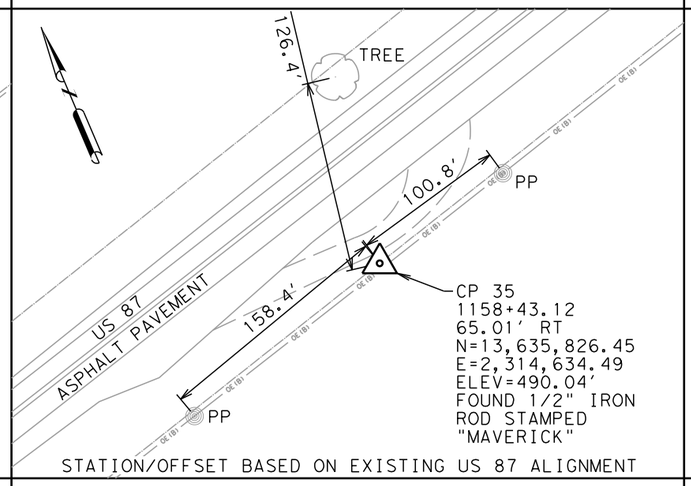


STATION/OFFSET BASED ON EXISTING US 87 ALIGNMENT

SITUATED ON THE SOUTH SIDE OF US 87
APPROXIMATELY 1,880 FEET EAST OF CR 538



STATION/OFFSET BASED ON EXISTING US 87 ALIGNMENT

SITUATED ON THE SOUTH SIDE OF US 87
APPROXIMATELY 2,880 FEET EAST OF CR 538

NOTES:
1. ALL BEARINGS AND DISTANCES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE (4204), NORTH AMERICAN DATUM OF 1983 (NAD 83), CORS2011 (EPOCH 2010.00). ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00016.

2. ALL ELEVATIONS ARE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), 1991 ADJUSTMENT.

3. ALL HORIZONTAL AND VERTICAL SOLUTIONS ARE BASED ON GPS OBSERVATION MEANS UTILIZING THE TXDOT VRS NETWORK AT THE TIME OF THE SURVEY AND LOCALIZED TO CP32, CP33, CP34 AND CP35 FROM DANNENBAUM CONTROL SURVEY FOR US87 REHABILITATION DATED 02/21/19 PROVIDED BY LJA. HELD MONUMENT SURFACE CONTROL VALUES:

CP32	CP34
N=13,639,229.78	N=13,635,562.56
E=2,289,502.48	E=2,313,664.48
ELEV=424.72'	ELEV=505.48'
CP33	**CP35**
N=13,638,961.87	N=13,635,826.45
E=2,290,093.92	E=2,314,634.49
ELEV=433.56'	ELEV=490.04'

4. ALL MEASUREMENTS ARE U.S. SURVEY FEET.

STATE OF TEXAS
REGISTERED
JAMES A. WOODS
5333
PROFESSIONAL
LAND SURVEYOR

SIGNED: James A Woods
JAMES A. WOODS
REGISTERED PROFESSIONAL
LAND SURVEYOR TEXAS No. 5333

THE SURVEY CONTROL INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THIS PS&E.

CivilCorp
ENGINEERS - SURVEYORS
4611 E. AIRLINE ROAD, SUITE 300, VICTORIA, TEXAS 77904
TXSURV FIRM #100576-00 TXENG FIRM #10283

LJA Engineering, Inc.
FRN - F-1386

Texas Department of Transportation
© 2022

SCALE: 1" = 50' (22" X 34")
SCALE: 1" = 100' (11" X 17")
0' 25' 50' 100'
GRAPHIC SCALE IN FEET
(ALL SKETCHES)

US 87

HORIZONTAL AND VERTICAL CONTROL

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	66

DATE: $DATE$
FILE: $FILE$
$TIME$

US 87

Beginning chain US87 description

Point US8701 N 13,639,008.6045 E 2,290,145.3046 Sta 895+00.00

Course from US8701 to PC US871 S 66° 51′ 08.67" E Dist 4,154.4242

	Curve Data				
Curve US871					
P.I. Station	937+98.72	N	13,637,318.7724	E	2,294,097.9597
Delta =	2° 53′ 06.51" (RT)				
Degree =	0° 59′ 59.73"				
Tangent =	144.2983				
Length =	288.5355				
Radius =	5,730.0000				
External =	1.8166				
Long Chord =	288.5050				
Mid. Ord. =	1.8161				
P.C. Station	936+54.42	N	13,637,375.4962	E	2,293,965.2781
P.T. Station	939+42.96	N	13,637,255.4422	E	2,294,227.6180
C.C.		N	13,632,106.7881	E	2,291,712.8095

Back = S 66° 51′ 08.67" E
Ahead = S 63° 58′ 02.16" E
Chord Bear = S 65° 24′ 35.42" E

Course from PT US871 to US8702 S 63° 58′ 02.16" E Dist 1,559.7609

Point US8702 N 13,636,570.8872 E 2,295,629.1309 Sta 955+02.72

Ending chain US87 description

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED PROFESSIONAL ENGINEER
10/28/2022

NOT TO SCALE

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

US 87 AT CLIFTON BRANCH

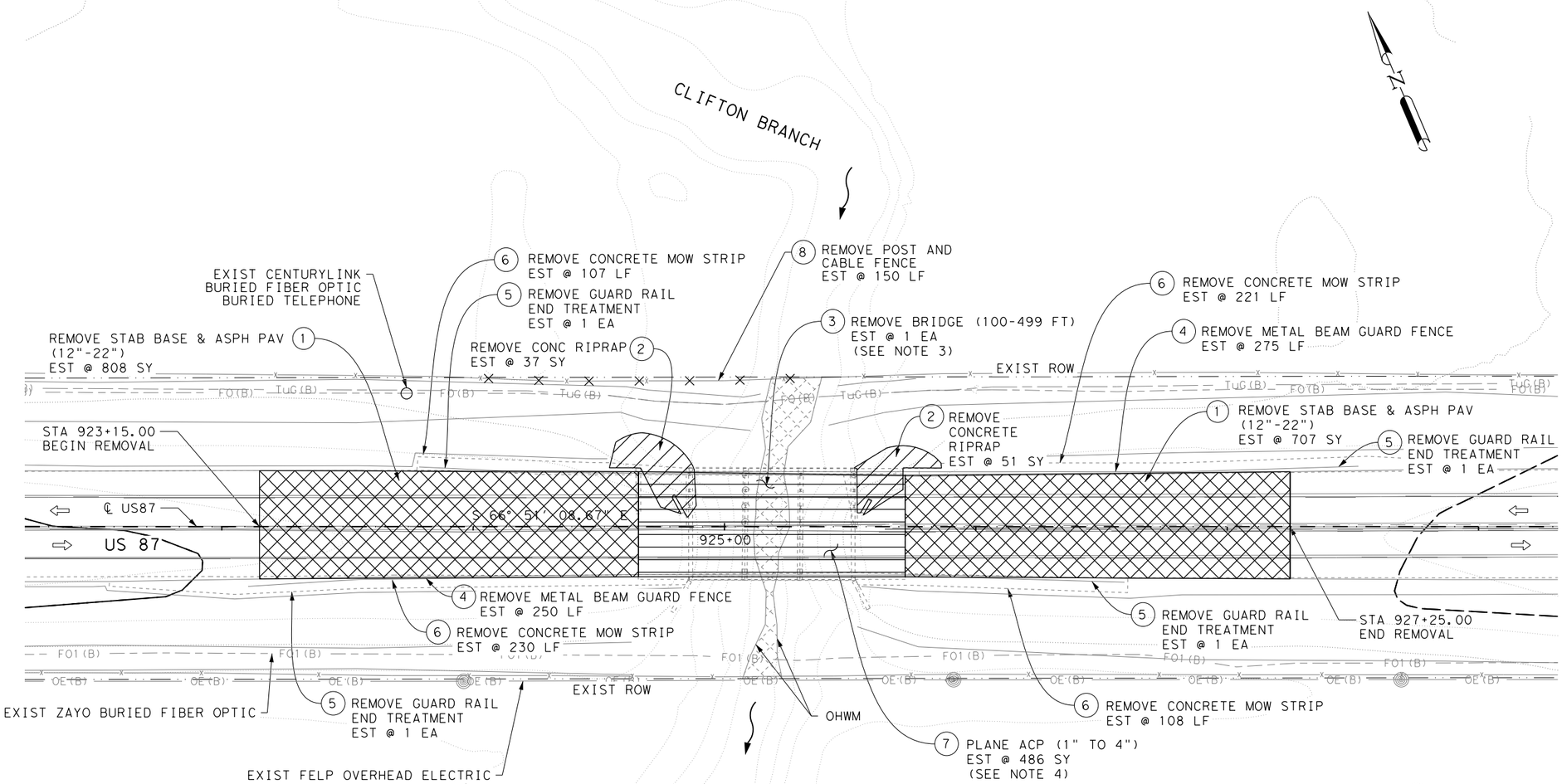
HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	67

ITEM	CODE	DESCRIPTION	UNIT	QTY
* 100	6002	PREPARING ROW	STA	16
104	6009	REMOVING CONC (RIPRAP)	SY	88
104	6054	REMOVING CONC (MOW STRIP)	LF	666
105	6164	REMOVE STAB BASE & ASPH PAV (12"-22")	SY	1515
354	6106	PLANE ASPH CONC PAV (1" TO 4")	SY	486
496	6010	REMOV STR (BRIDGE 100-499FT LENGTH)	EA	1
542	6001	REMOVE METAL BEAM GUARD FENCE	LF	520
544	6003	GUARDRAIL END TREATMENT (REMOVE)	EA	4
772	6001	POST AND CABLE FENCE (REMOVAL)	LF	150

* PREPARING ROW LIMITS INCLUDE INCIDENTAL LIMITS TO COVER TREE AND SHRUB PRUNING. SEE NOTE 5 & 6 FOR MORE INFORMATION.



LEGEND

1. REMOVE STAB BASE & ASPH PAV
2. REMOVE CONCRETE RIPRAP
3. REMOVE BRIDGE (DECK, ABUTMENTS, BENTS COLUMNS)
4. REMOVE METAL BEAM GUARD FENCE
5. REMOVE GUARD RAIL END TREATMENT
6. REMOVE CONCRETE MOW STRIP
7. PLANE ACP (1" TO 4") ON BRIDGE
8. REMOVE POST AND CABLE FENCE

OHWM

NOTES:

1. SEE ROADWAY DETAILS FOR SAWCUT DETAILS.
2. REMOVAL OF BRUSH AND TREES REQUIRED FOR DETOUR SHALL BE SUBSIDIARY TO PREP ROW.
3. REMOVAL OF BRIDGE INCLUDES REMOVAL OF BRIDGE RAILING/CURB, CONCRETE DECK, ABUTMENTS, BENTS, FOUNDATIONS, AND WINGWALLS.
4. EXIST HMA SURFACE SHALL BE REMOVED IN HALVES TO COINCIDE WITH TRAFFIC CONTROL PHASING.
5. SEE "PLAN LAYOUT" FOR COMPLETE LIMITS OF PRUNING TREES AND SHRUBS. PRUNE TREES AND SHRUBS UP TO ROW LINE OR AS DIRECTED BY THE ENGINEER. THIS WORK IS SUBSIDIARY TO ITEM 100 PREPARING ROW.
6. SEE SHEET "PREP ROW TREE PRUNING & REMOVAL" FOR MORE INFORMATION.

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED PROFESSIONAL ENGINEER
10/28/2022

0′ 25′ 50′
SCALE: 1"=50′

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

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US 87 AT CLIFTON BRANCH

REMOVAL LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	68

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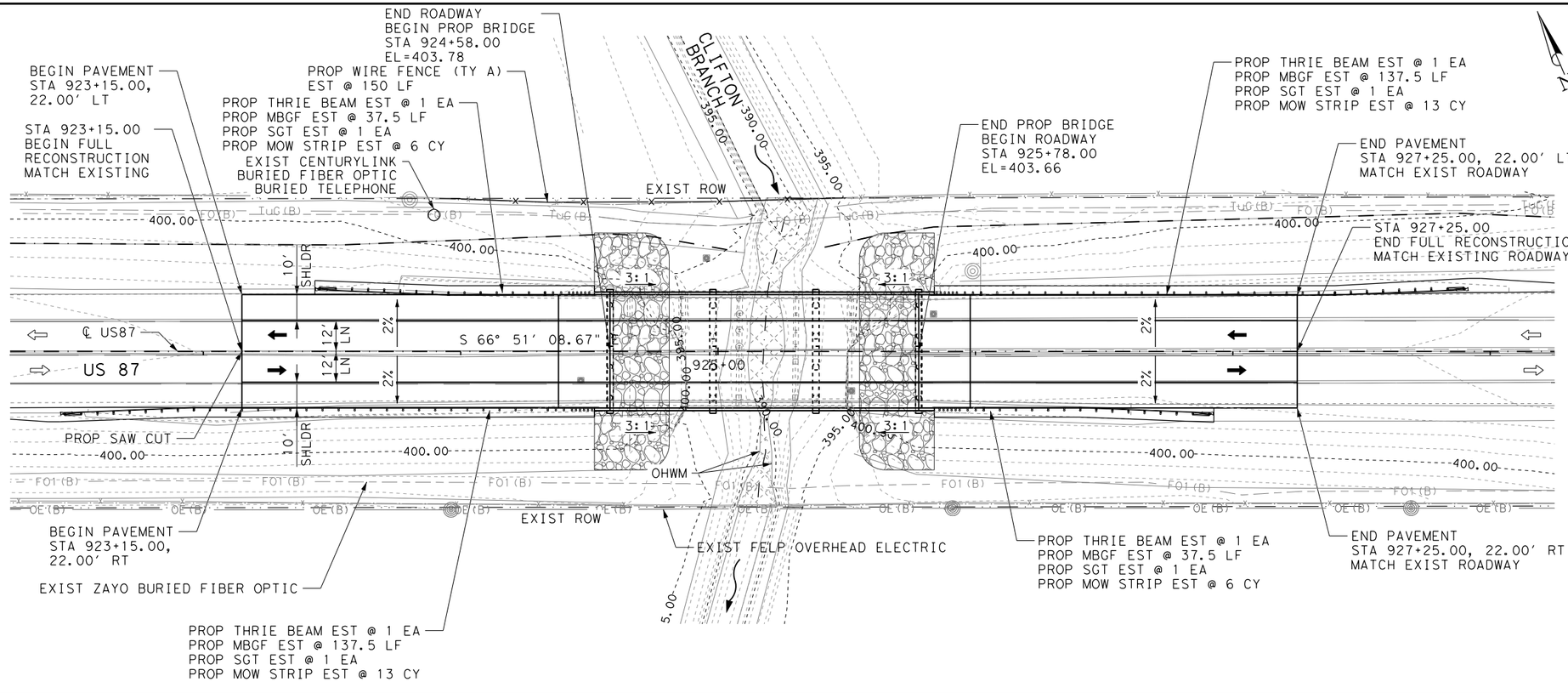


ITEM	CODE	DESCRIPTION	UNIT	QTY
110	6001	EXCAVATION (ROADWAY)	CY	700
132	6006	EMBANKMENT(FINAL)(DENS CONT)(TY C)	CY	70
* 247	6475	FL BS (CIP)(TY D GR 1-2,OR 5)FNL POS	SY	1306
* 310	6027	PRIME COAT(MC-30 OR AE-P)	SY	1278
432	6045	RIPRAP (MOW STRIP)(4 IN)	CY	38
540	6001	MTL W-BEAM GD FEN (TIM POST)	LF	350
540	6006	MTL BEAM GD FEN TRANS (THRIE-BEAM)	EA	4
544	6001	GUARDRAIL END TREATMENT (INSTALL)	EA	4
552	6001	WIRE FENCE (TY A)	LF	150
* 3076	6003	D-GR HMA TY-B PG64-22 (EXEMPT)	SY	1250
* 3076	6066	TACK COAT	SY	1250
* 3076	6074	D-GR HMA TY-C SAC-B PG70-22 (EXEMPT)	SY	1223

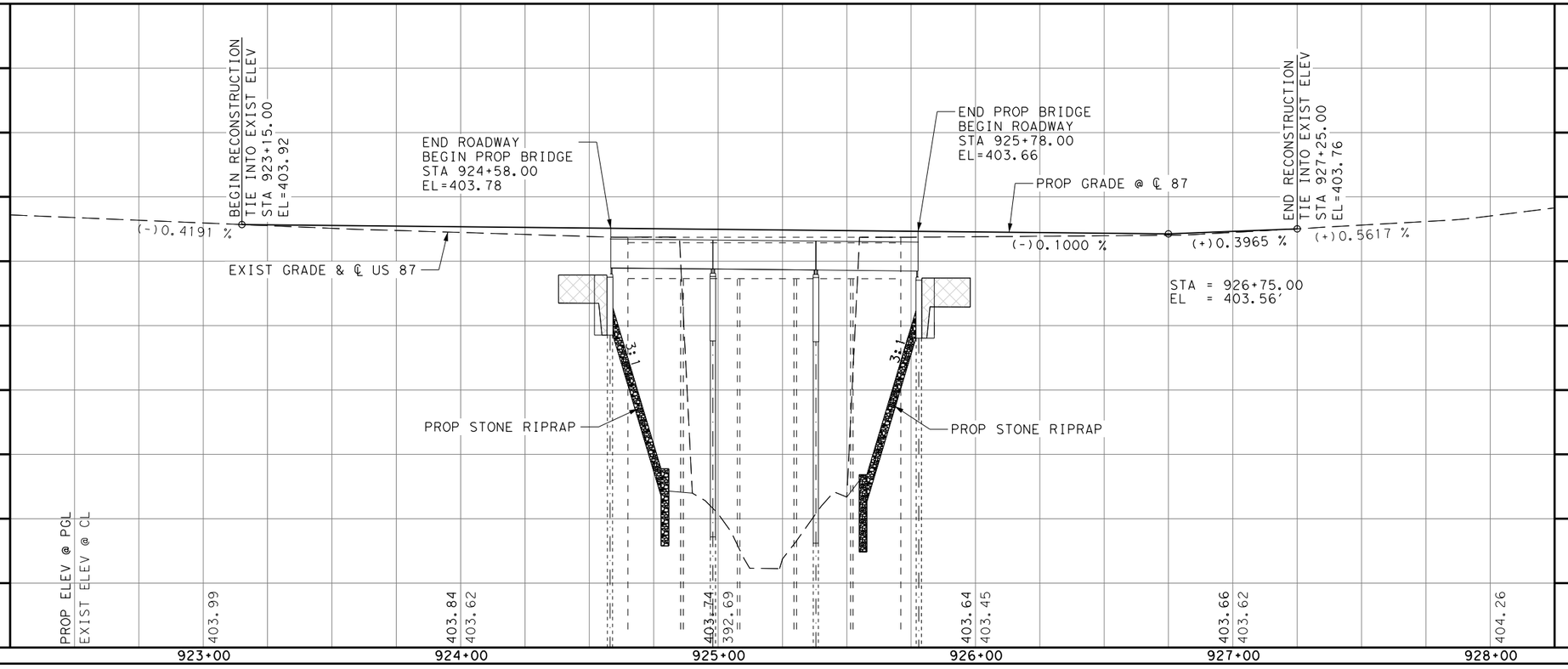
* BID ITEMS FOR CONTRACTOR'S INFORMATION ONLY. SEE BASIS OF ESTIMATE FOR BID ITEM QUANTITIES.

LEGEND

- ⇨ TRAFFIC DIRECTION (EXIST)
- ➡ TRAFFIC DIRECTION (PROPOSED)
- OHWM

NOTES:

1. SEE ALIGNMENT DATA SHEET FOR PROP & EXIST BASELINE (BL) DATA.
2. SEE SURVEY DATA SHEET FOR BM STATIONS, OFFSET, ELEV, ECT.



0′ 25′ 50′

SCALE: 1"=50′ - HORZ
1"=5′ - VERT

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

 Texas Department of Transportation

US 87 AT CLIFTON BRANCH

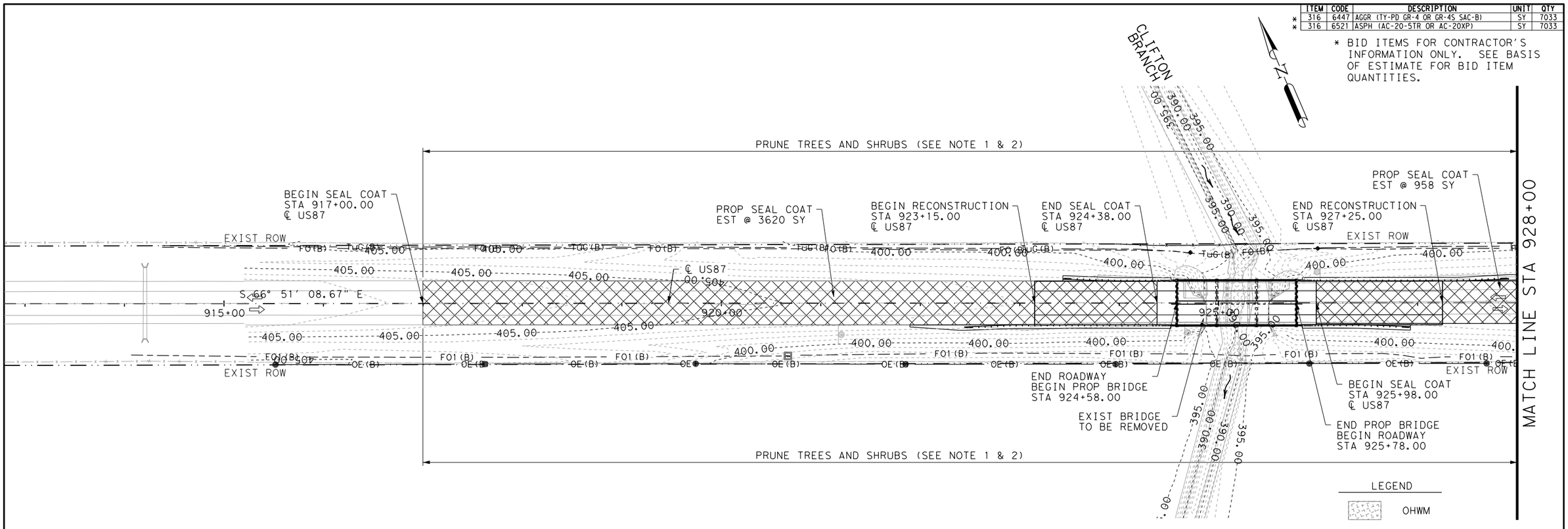
PLAN & PROFILE

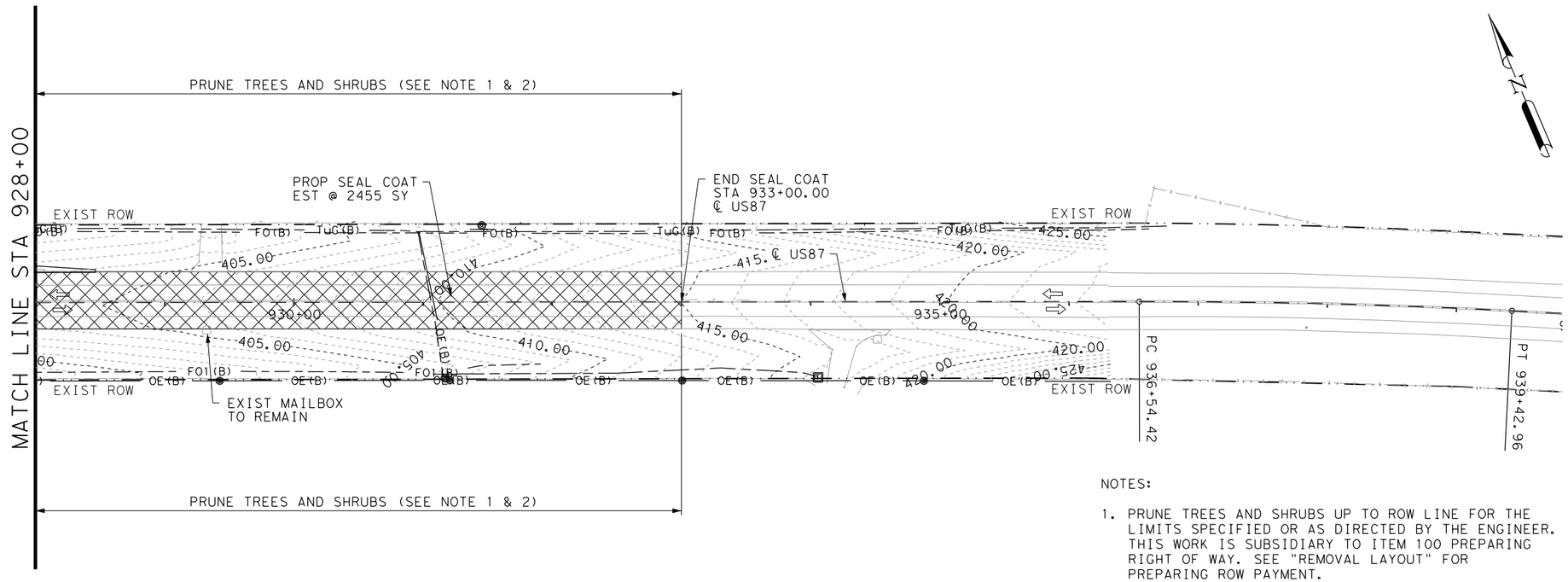
SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	69

ITEM	CODE	DESCRIPTION	UNIT	QTY
* 316	6447	AGGR (TY-PD GR-4 OR GR-4S SAC-B)	SY	7033
* 316	6521	ASPH (AC-20-5TR OR AC-20XP)	SY	7033

* BID ITEMS FOR CONTRACTOR'S INFORMATION ONLY. SEE BASIS OF ESTIMATE FOR BID ITEM QUANTITIES.





NOTES:

1. PRUNE TREES AND SHRUBS UP TO ROW LINE FOR THE LIMITS SPECIFIED OR AS DIRECTED BY THE ENGINEER. THIS WORK IS SUBSIDIARY TO ITEM 100 PREPARING RIGHT OF WAY. SEE "REMOVAL LAYOUT" FOR PREPARING ROW PAYMENT.

2. SEE SHEET "PREP ROW TREE PRUNING & REMOVAL" FOR MORE INFORMATION.

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

0' 25' 50' 100'
SCALE: 1"=100'

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

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US 87 AT CLIFTON BRANCH
PLAN LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	70

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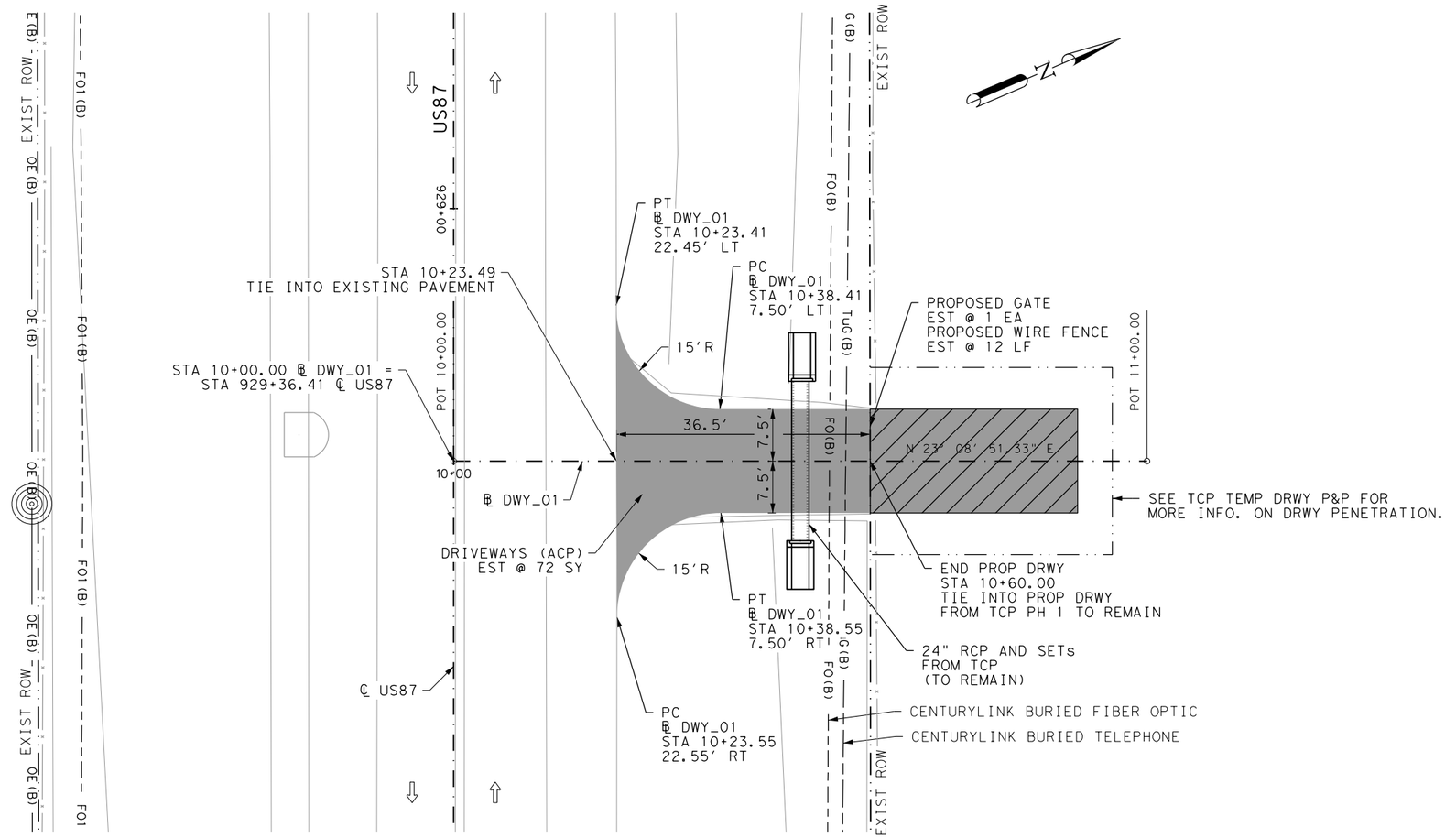
ITEM	CODE	DESCRIPTION	UNIT	QTY
530	6005	DRIVEWAYS (ACP)	SY	72
552	6001	WIRE FENCE (TY A)	LF	12
552	6005	GATE (TY 1)	EA	1



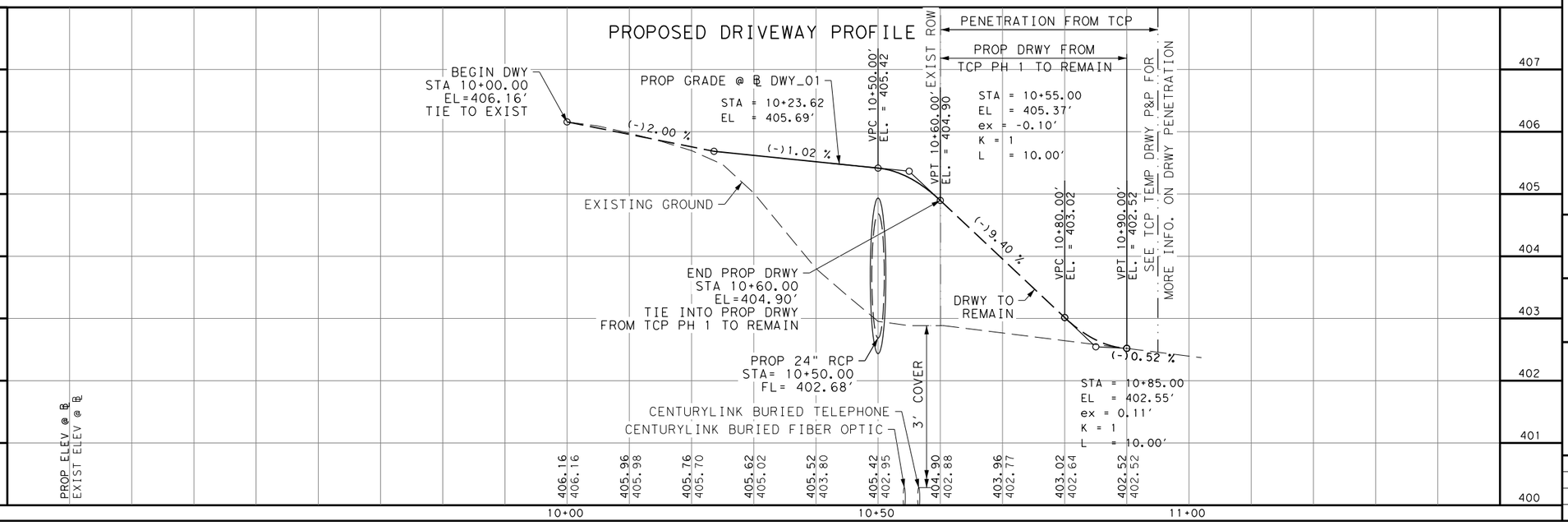
LEGEND

- ⇨ TRAFFIC DIRECTION (EXIST)
- ➡ TRAFFIC DIRECTION (PROPOSED)
- LIMITS OF PROPOSED DRIVEWAY FROM TCP PHASE 1 TO REMAIN

NOTES:

1. SEE ALIGNMENT DATA SHEET FOR PROP & EXIST BASELINE (BL) DATA.
2. SEE SURVEY DATA SHEET FOR BM STATIONS, OFFSET, ELEV ECT.

PROPOSED DRIVEWAY PROFILE



0' 5' 10' 20'

SCALE: 1"=20'

LJA Engineering, Inc.
FRN - F-1386

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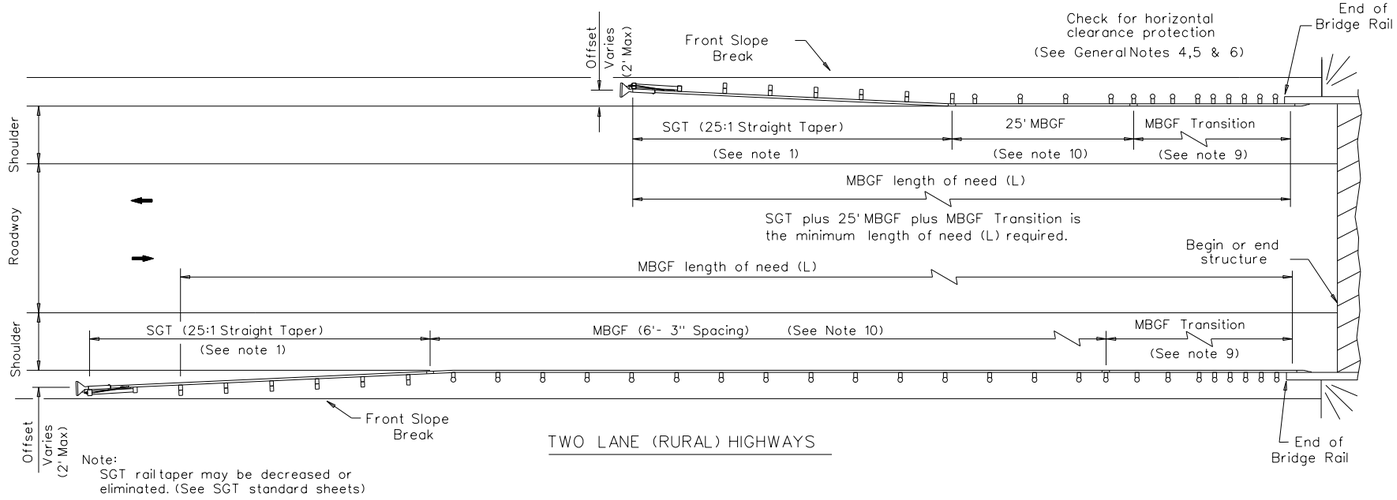
US 87 AT CLIFTON BRANCH
PROPOSED DRIVEWAY
PLAN AND PROFILE

SHEET 1 OF 1

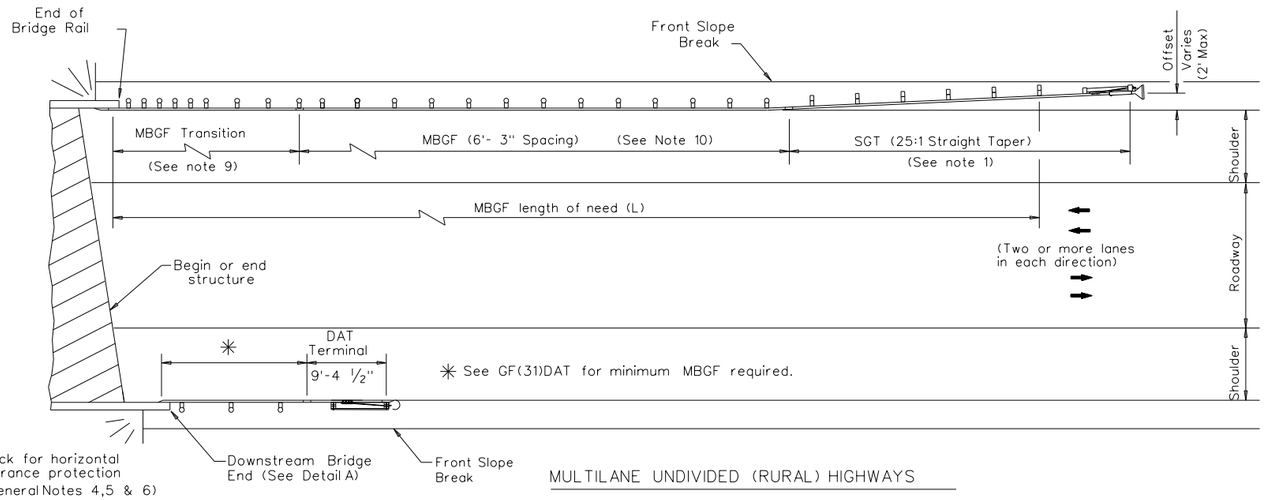
FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	71

DATE:
FILE:

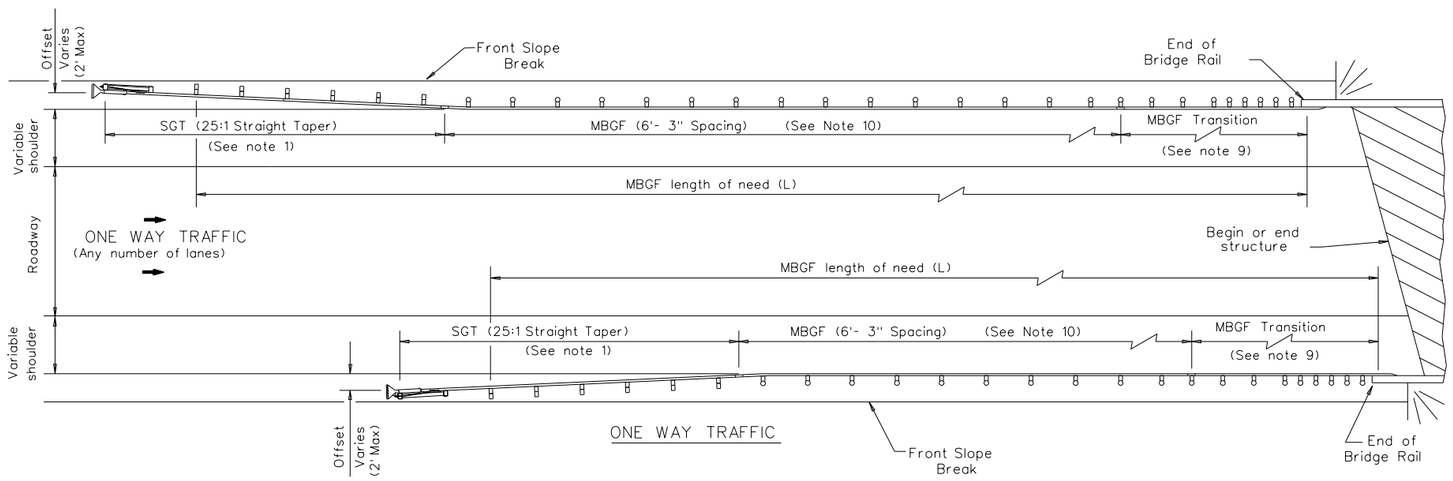


TWO LANE (RURAL) HIGHWAYS

Note:
SGT rail taper may be decreased or eliminated. (See SGT standard sheets)



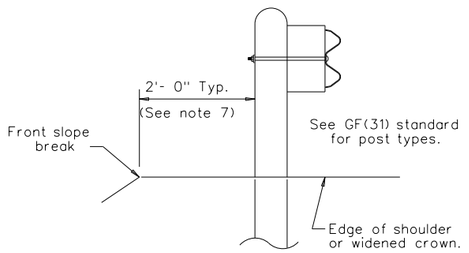
MULTILANE UNDIVIDED (RURAL) HIGHWAYS



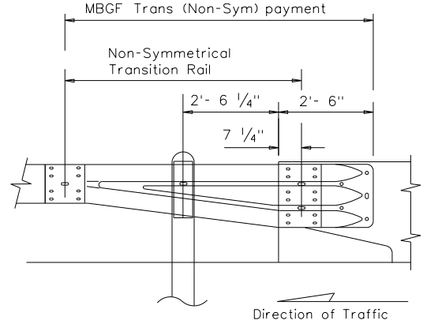
ONE WAY TRAFFIC

GENERAL NOTES

1. For more detail: See GF(31), SGT( )31, GF(31)TR, and GF(31)TL2 standard sheets.
2. Quantities of metal beam guard fence (MBGF) at individual bridge ends are as shown in the plans.
3. Use average daily traffic (ADT) for the current year to determine MBGF length of need in accordance with the Roadway Design Manual unless otherwise specified. Where significant traffic volume growth is anticipated on low volume (0-750 ADT) highways, use length determinations for the higher volume category.
4. MBGF may not be required to shield departure end of bridge unless other obstacles within the horizontal clearance limits or opposing traffic indicate a MBGF consideration.
5. Downstream anchor terminals (DAT) are only for downstream end anchorage use, outside the horizontal clearance area of opposing traffic.
6. Direct connection of MBGF to concrete rails are only for downstream rail connections outside the horizontal clearance area of opposing traffic. (This requires a minimum of three standard line posts plus the DAT terminal, See Detail A)
7. The crown shall be widened to accommodate MBGF. Typically the "front slope" break should be 2'- 0" from the back of the MBGF post. This applies to new construction on new alignment or where existing roadway cross section is to be widened to increase roadway width. This does not apply to rehabilitation work where existing roadway crown width is to be retained (See Typical Cross Section at MBGF).
8. For restrictive bridge widths: The MBGF should be properly transitioned from the existing bridge rail to the adjoining MBGF (See MBGF Transition Standards). Metal beam guard fence at these bridge location(s) shall be flared at the rate of 25:1 or flatter, and be of the length necessary to locate the terminal end at the 2 ft."maximum" offset from the shoulder edge in the approach direction.
9. Transition length and post spacing will vary depending on the transition type. Transition type will be shown elsewhere in the plans.
10. A minimum 25' length of MBGF will be required.



TYPICAL CROSS SECTION AT MBGF



Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DETAIL A
Showing Downstream Rail Attachment

Texas Department of Transportation

Design Division Standard

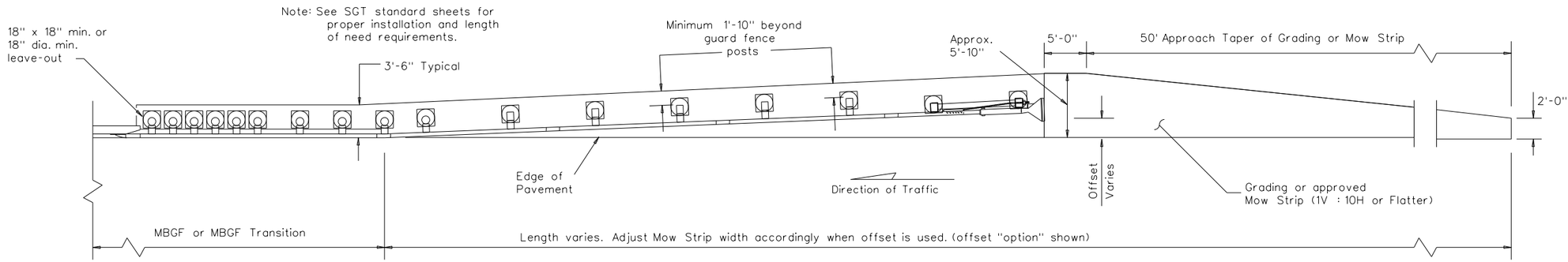
BRIDGE END DETAILS

(METAL BEAM GUARD FENCE APPLICATIONS TO RIGID RAILS)

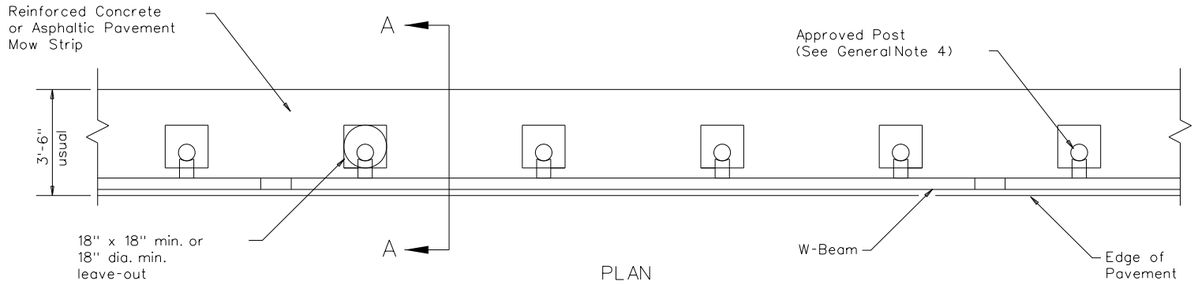
BED-14

FILE: bed14.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: CGL
© TxDOT: December 2011	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
REVISED APRIL 2014 SEE (MEMO 0414)	DIST	COUNTY		SHEET NO.
	SAT	WILSON		72

DATE:
FILE:

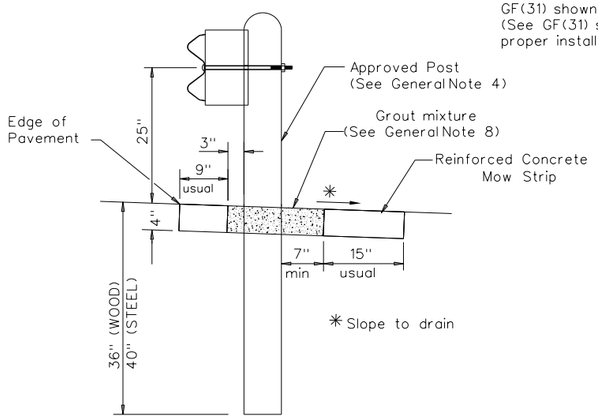


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



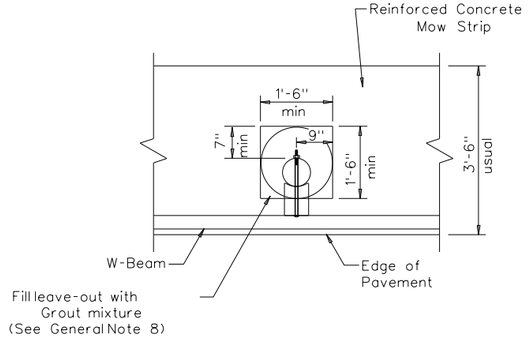
PLAN

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



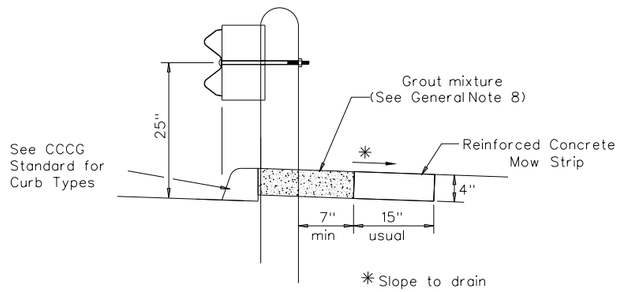
SECTION A-A

Typical



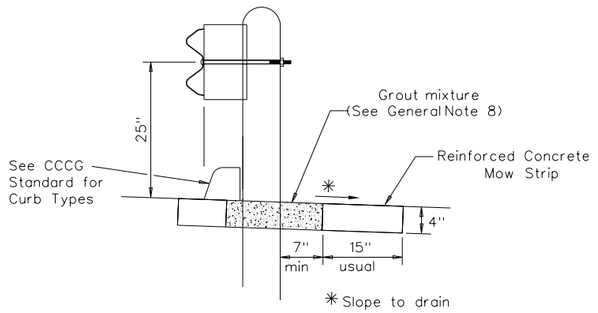
MOW STRIP DETAIL

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



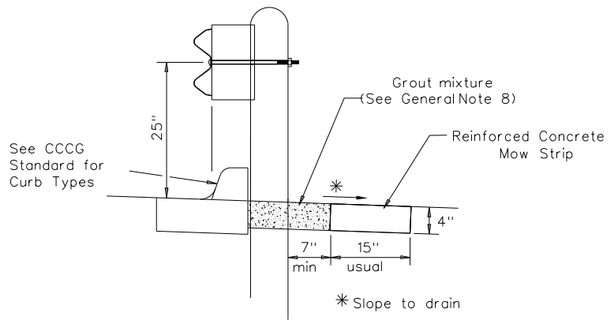
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

Note: Site Condition(s)

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

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

GENERAL NOTES

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

Texas Department of Transportation

Design Division Standard

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

GF(31)MS-19

FILE: gf31ms19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		73

DATE: 10/28/2022
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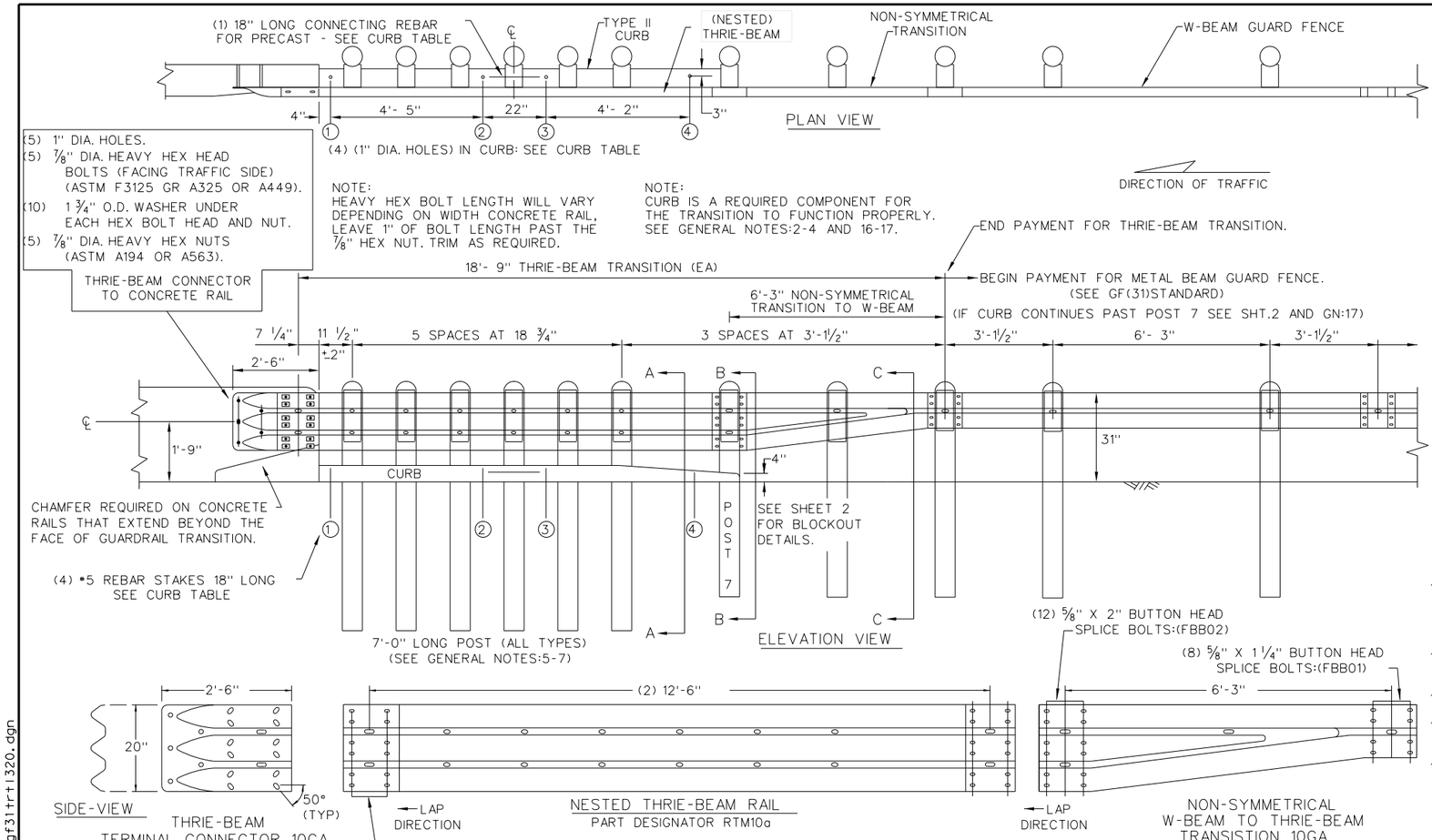
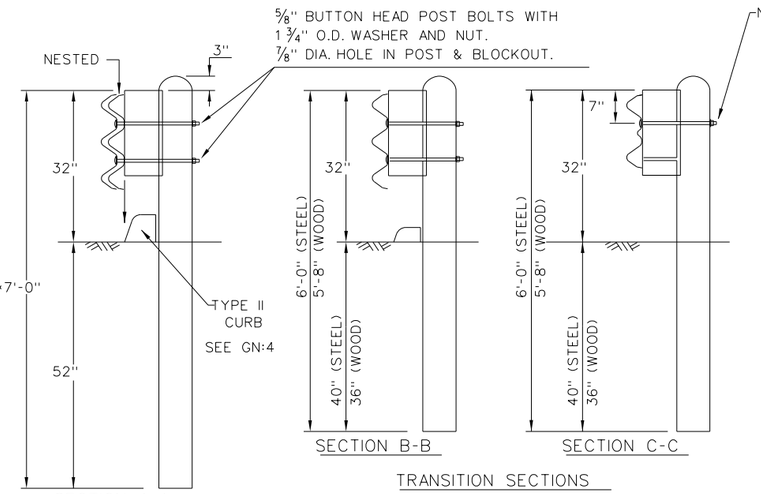
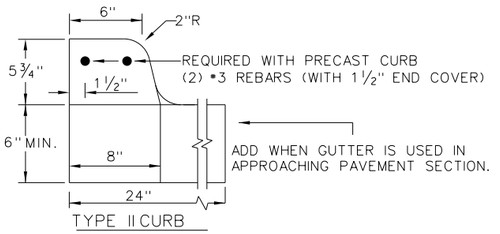


GENERAL NOTES

1. CONTACT THE DESIGN DIVISION FOR DRAINAGE CUT OUT OPTIONS NEEDED WITHIN THE CURB SECTION OF THE THRIE-BEAM TRANSITION. (512) 416-2678
2. CONCRETE CURB MAY BE CAST-IN-PLACE OR PRECAST AS SHOWN ON THIS SHEET. WHEN USED IN CONJUNCTION WITH THE THRIE-BEAM TRANSITIONS, CURB SHALL BE TYPE II (5- 3/4" HEIGHT); SEE CURRENT CCCG STANDARD SHEET FOR FURTHER DETAILS. IF OTHER CURB HEIGHTS ARE SHOWN IN THE PLANS IN CONJUNCTION WITH THE TRANSITION, THE CURB HEIGHT MAY BE FROM 4" TO 8" WITH A RELATIVELY VERTICAL FACE. CONCRETE CURB SHALL BE CONTINUOUS TO THE SEVENTH POST UNLESS OTHERWISE SHOWN IN THE PLANS. SEE GENERAL NOTE:17 FOR CIRCUMSTANCES WHERE CURB CONTINUES PAST POST 7.
3. CONCRETE CURB TYPE II SUBSIDIARY TO "METAL BEAM GUARD FENCE TRANSITION". IF NO ADDITIONAL CURB IS INDICATED BEYOND THE TRANSITION, THEN ANY CURB HEIGHT GREATER THAN 4" WILL BE TAPERED DOWN BEGINNING AT THE LAST 7 FT. POST TO A MAXIMUM HEIGHT OF 4" AT POST 7. IF SHOWN ELSEWHERE IN THE PLANS, ADDITIONAL CURB UNDERNEATH GUARDRAIL WILL BE PAID FOR BY THE LINEAR FOOT.
4. UNLESS OTHERWISE SHOWN IN THE PLANS, TRANSITIONS SHALL BE PLACED WITH THE BLOCKOUT FACE IN FRONT OF OR DIRECTLY ABOVE THE CURB FACE. SEE SECTION A-A.
5. FOR ROUND WOOD POST SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE THRIE-BEAM TRANSITION.
6. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. REFER TO GF(31) STANDARD SHEET.
7. THE POST LENGTH SHALL BE MARKED ON ALL 7'- 0" LONG POSTS BY THE MANUFACTURER. THE MARK SHALL BE LOCATED WITHIN THE TOP 1 FT. REGION OF THE POST, AT LEAST 5/8" IN HEIGHT, AND VISIBLE AFTER INSTALLATION. WOODEN POSTS SHALL BE MARKED WITH A BRAND, AND STEEL POSTS WITH A STENCIL BEFORE GALVANIZING.
8. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
9. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540,"METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED ON THE PLANS. THE THRIE-BEAM TERMINAL CONNECTOR AND THE THRIE-BEAM TRANSITION TO W-BEAM SHALL BE OF THE SAME MATERIAL, BUT SHALL NOT BE LESS THAN 10 GAUGE. CONTRACTOR SHALL VERIFY THAT THE LOCATIONS OF BOLT HOLES MATCH THOSE IN THE THRIE-BEAM TERMINAL CONNECTOR PRIOR TO ORDERING MATERIALS.
10. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC16a) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
11. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
12. CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
13. WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
14. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. TXDOT'S MATERIALS AND TESTS DIVISION MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
15. REFER TO GF(31)STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
16. THE INSTALLATION OF THE TYPE II CURB IS CRITICAL FOR THE PERFORMANCE OF THE THRIE-BEAM TRANSITION SYSTEM. THE CURB PREVENTS (VEHICLE WHEEL SNAGGING) AT THE CONCRETE RAIL AND IS REQUIRED TO MEET MASH CRASH TEST CRITERIA.
17. IF CURB EXTENDS BEYOND POST 7, 25' OF NESTED W-BEAM GUARDRAIL SHALL BE INSTALLED BEYOND THE PAY LIMITS OF THRIE-BEAM TRANSITION SECTION, (SEE SHT.2). PAYMENT FOR THIS 25' SECTION WILL BE BY LINEAR FOOT, PAY ITEM "0540 6XXX MTL W-BEAM GD FEN (NESTED)(TIM POST)" OR "540 6XXX MTL W-BEAM GD FEN (NESTED)(STEEL POST)" AS APPLICABLE FOR POST TYPE. SEE SHT.2 FOR ADDITIONAL INFORMATION.



THRIE-BEAM TERMINAL - CURB TABLE
PRECAST CURB FULL LENGTH EQUALS 12'- 2" THE PRECAST CURB MAY BE FORMED INTO TWO SECTIONS.
CURB (1) LENGTH 5'- 8"
CURB (2) LENGTH 6'- 6"
TAPER CURB (2) TO A HEIGHT OF 4" AT POST 7
CONNECTING PRECAST CURB SECTIONS (1) & (2):
FORM OR CORE 1" DIA. HOLE 9" LONG INTO EACH CURB END. USE (1) #5 GR.60 REBAR 18" LONG TO CONNECT BOTH CURBS.
SECURING PRECAST OR CAST-IN-PLACE TO FINISHED GRADE : *
FORM OR CORE (4) 1" DIA. HOLES, SEE PLAN AND ELEVATION VIEWS FOR HOLE LOCATIONS. DRIVE (4) #5 GR.60 REBAR STAKES 18" LONG INTO THE GROUND AND 1/2" BELOW TOP OF CURB. FILL HOLES WITH APPROVED GROUT MIXTURE.



NOTE: OPTIONS FOR TYPE II CURB:
1. PRECAST
2. CAST-IN-PLACE

* NOTES: NOT NEEDED FOR CAST-IN-PLACE. SEE TYPE II CURB DETAIL FOR REBAR AND COVER REQUIREMENTS. PERCUSSION DRILLING IS NOT PERMITTED WITH: TYPE II CURB, BRIDGE RAIL OR CONCRETE TRAFFIC RAIL.

TYPE II CURB DETAILS

HIGH-SPEED TRANSITION

SHEET 1 OF 2

Texas Department of Transportation

Design Division Standard

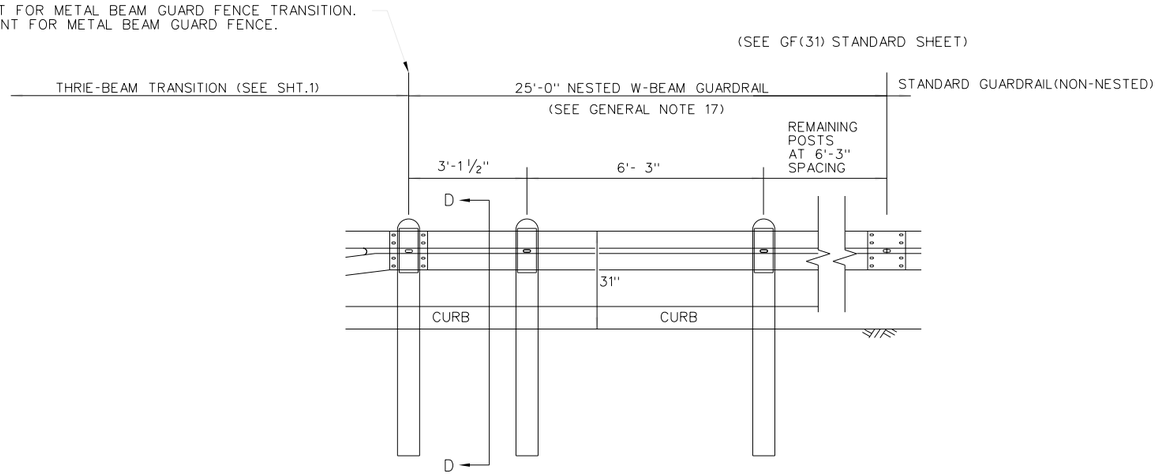
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

GF(31)TR TL3-20

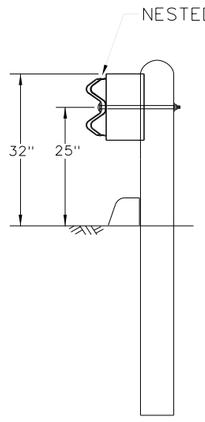
FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		74

DATE: 10/28/2022
FILE: c:\workingdir\lja-pw.bentley.com_lja-pw-01\william osthoff\dms25647\gf31trtl320.dgn

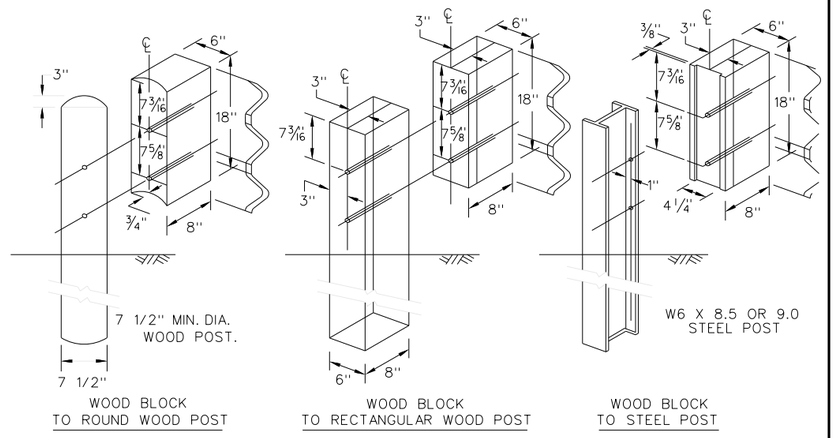
REQUIRED ALTERNATIVE FOR CONTINUOUS CURB EXTENDING PAST POST 7 (SEE SHT. 1 GENERAL NOTE 17)



ELEVATION VIEW



SECTION D-D



THRIE BEAM TRANSITION BLOCKOUT DETAILS

HIGH-SPEED TRANSITION

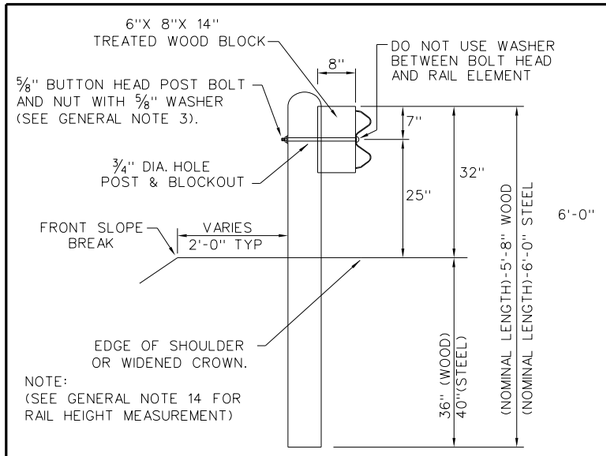
Texas Department of Transportation — Design Division Standard

METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-3 MASH COMPLIANT

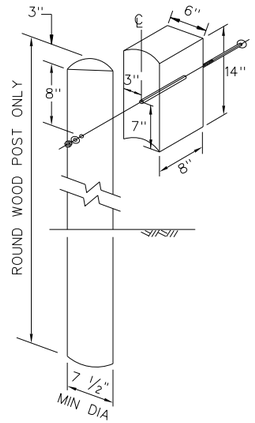
GF(31)TR TL3-20

FILE: gf31trtl320.dgn	DN: TxDOT	CK: KM	DW: KM	CK: CGL/AG		
©TxDOT: NOVEMBER 2020	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0143	04	072	US 87		
	DIST	COUNTY		SHEET NO.		
	SAT	WILSON		75		

DATE:
FILE:

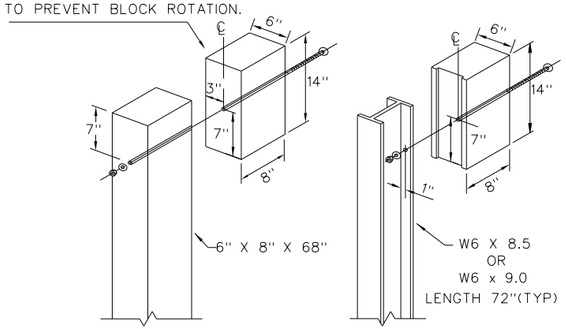


TYPICAL POST PLACEMENT



WOOD BLOCK TO ROUND WOOD POST

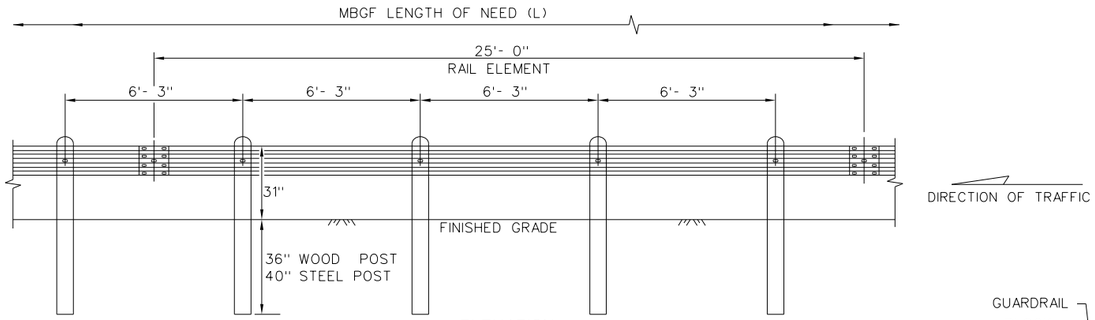
NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.



WOOD BLOCK TO RECTANGULAR WOOD POST

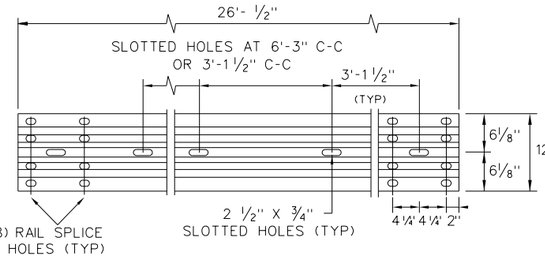
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



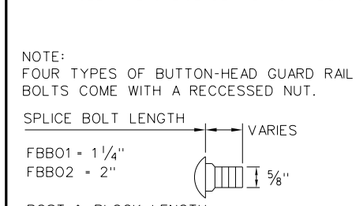
ELEVATION
MID-SPAN RAIL SPLICE

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



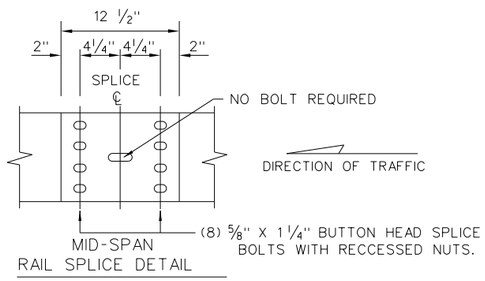
ELEVATION 25'- 0"(NOM.) W-BEAM SECTION

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



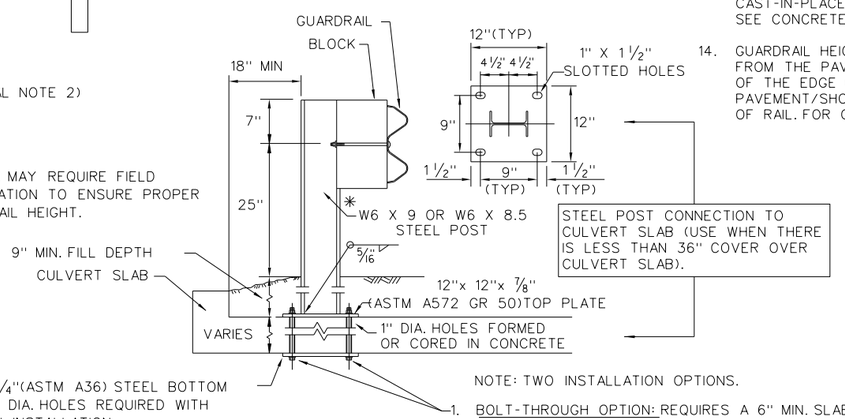
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS.
NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.

2. EPOXY ANCHOR OPTION: THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTIHIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTIHIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

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

GENERAL NOTES

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

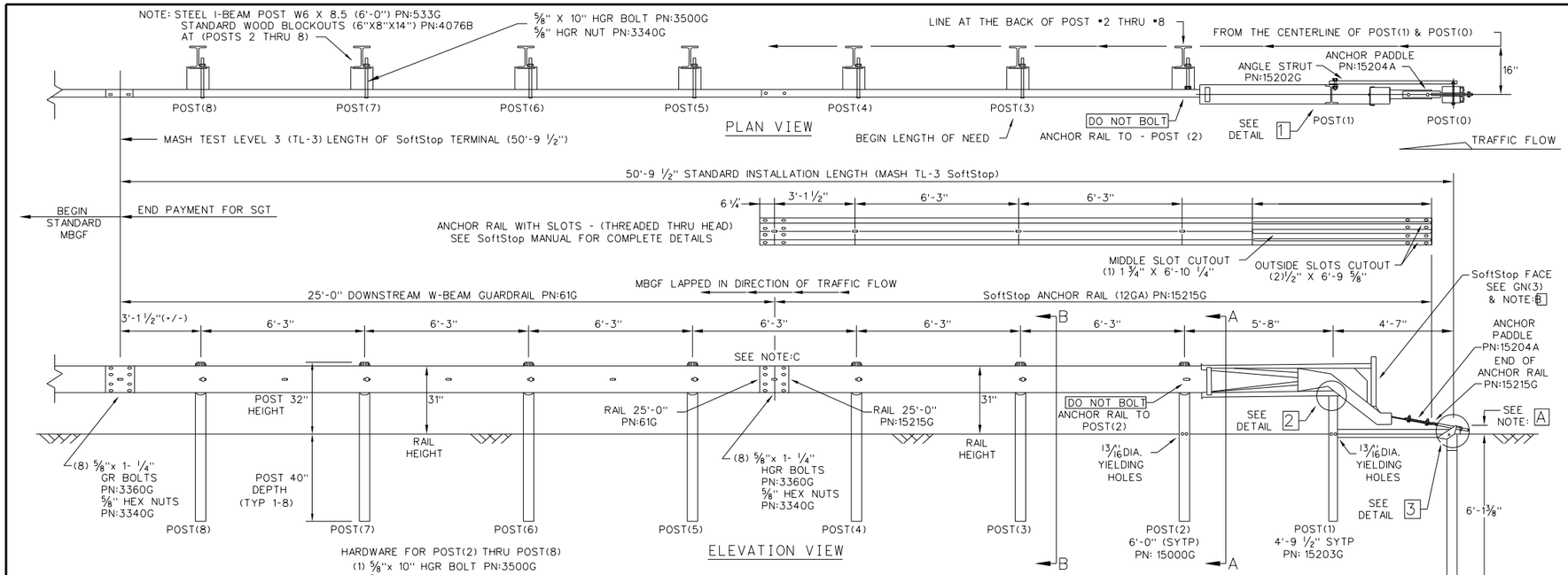
NOTE: TRANSISTIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS.
SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS.
SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

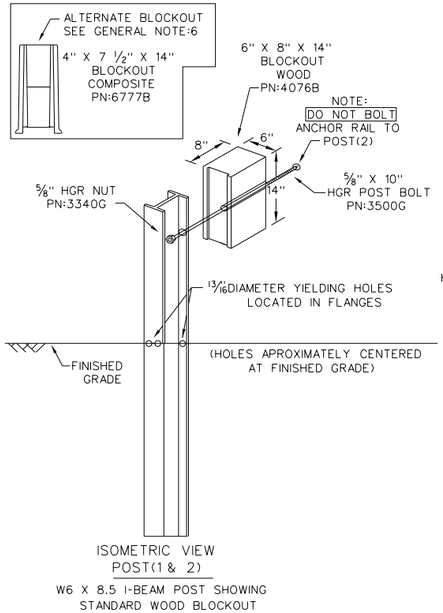
Texas Department of Transportation — Design Division Standard

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

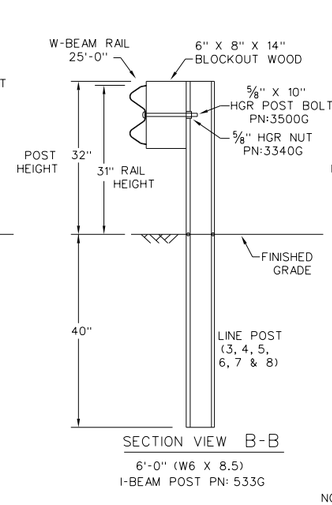
FILE: gf3119.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		76

DATE:
FILE:

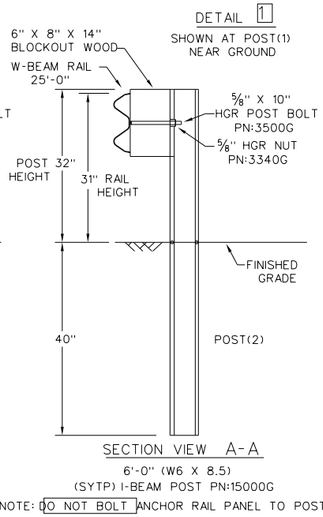




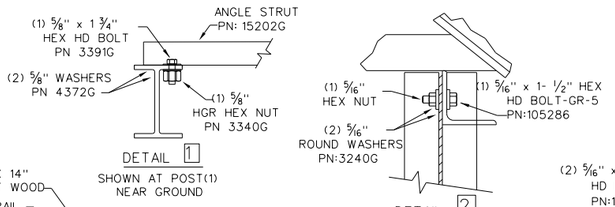
ISOMETRIC VIEW
POST(1 & 2)
W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT
NOTE: NO BLOCKOUT INSTALLED AT POST(1)



SECTION VIEW B-B
6'-0" (W6 X 8.5)
I-BEAM POST PN: 533G

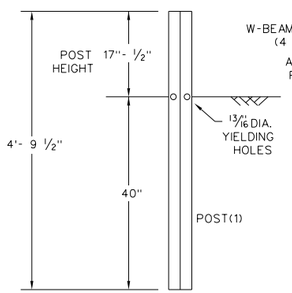


SECTION VIEW A-A
6'-0" (W6 X 8.5)
(SYTP) I-BEAM POST PN:15000G
NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

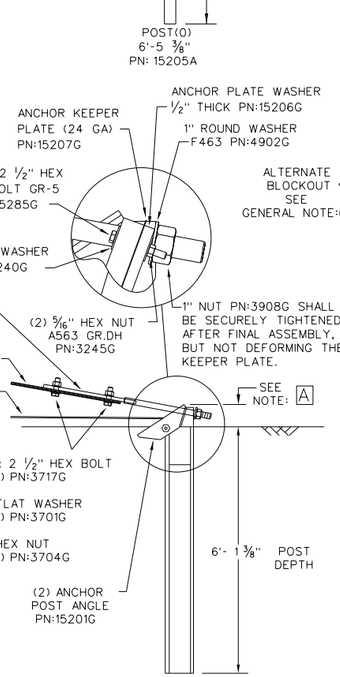


DETAIL 1
SHOWN AT POST(1) NEAR GROUND

DETAIL 2
SHOWN AT POST(1)

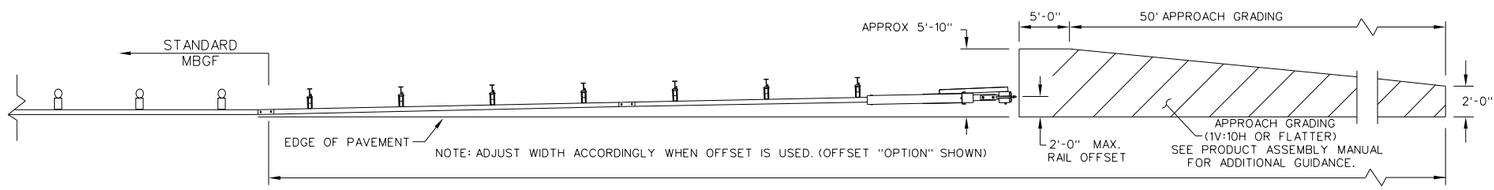


FRONT VIEW POST(1)
4'-9 1/2" (W6 X 8.5)
(SYTP) I-BEAM POST PN:15203G
NOTE: NO BLOCKOUT INSTALLED AT POST(1)



DETAIL 3
AT POST(0)
6'-5 3/8" (W6 X 15)
I-BEAM POST PN:15205A

TRAFFIC FLOW



APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: TRINITY HIGHWAY AT 1(888)323-6374. 2525 N. STEMMONS FREEWAY, DALLAS, TX 75207
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE: SoftStop END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL. PN:620237B
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445,"GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
6. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS OF SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
7. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL AND REFER TO THE LATEST ROADWAY MBGF STANDARD FOR INSTALLATION GUIDANCE.
8. POSTS SHALL NOT BE SET IN CONCRETE.
9. IT IS ACCEPTABLE TO INSTALL THE SoftStop IMPACT HEAD PARALLEL TO THE GRADE LINE OR WITH AN UPWARD TILT.
10. DO NOT ATTACH THE SoftStop SYSTEM DIRECTLY TO A RIGID BARRIER.
11. UNDER NO CIRCUMSTANCES SHALL THE GUARDRAIL WITHIN THE SoftStop SYSTEM BE CURVED.
12. A FLARE RATE OF UP TO 25:1 MAY BE USED TO PREVENT THE TERMINAL HEAD FROM ENCROACHING ON THE SHOULDER. THE FLARE MAY BE DECREASED OR ELIMINATED FOR SPECIFIC INSTALLATIONS, IF DIRECTED BY THE ENGINEER.

NOTE:A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-3/4" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE:B	PART PN:5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN:5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE:C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4)AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN:61G ANCHOR RAIL 25'-0" PN:15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST •0 - ANCHOR POST (6'- 5 5/8")
15203G	1	POST •1 - (SYTP) (4'- 9 1/2")
15000G	1	POST •2 - (SYTP) (6'- 0")
533G	6	POST •3 THRU •8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 1/2" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	3/4" x 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR.DH
3360G	16	5/8" x 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" x 10" HGR POST BOLT A307
3391G	1	5/8" x 1 3/4" HEX HD BOLT A325
4489G	1	5/8" x 9" HEX HD BOLT A325
4372G	4	5/8" WASHER F436
105285G	2	5/16" x 2 1/2" HEX HD BOLT GR-5
105286G	1	5/16" x 1 1/2" HEX HD BOLT GR-5
3240G	6	5/16" ROUND WASHER (WIDE)
3245G	3	5/16" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

Texas Department of Transportation

Design Division Standard

TRINITY HIGHWAY
SOFTSTOP END TERMINAL
MASH - TL-3
SGT(10S)31-16

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
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	SAT	WILSON		77

DATE:
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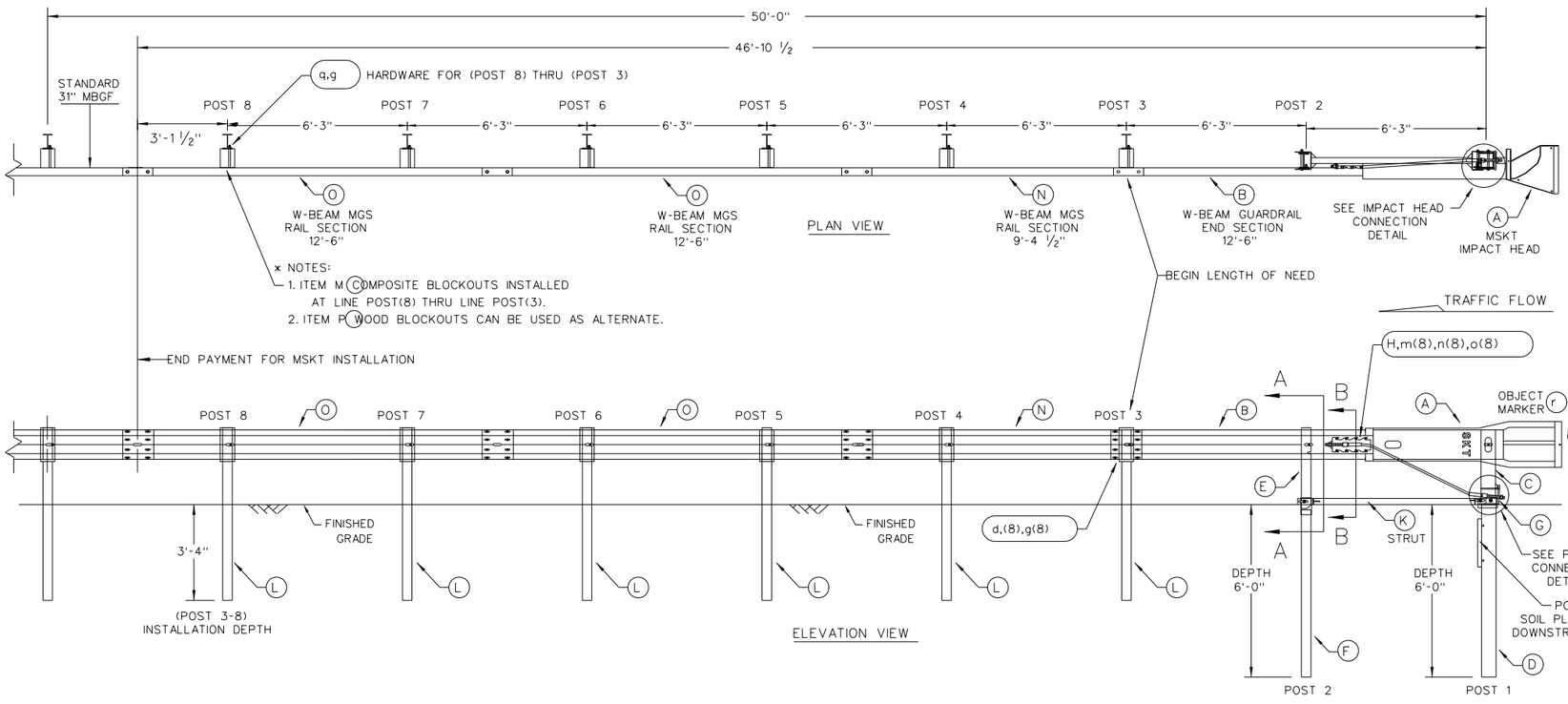


NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.

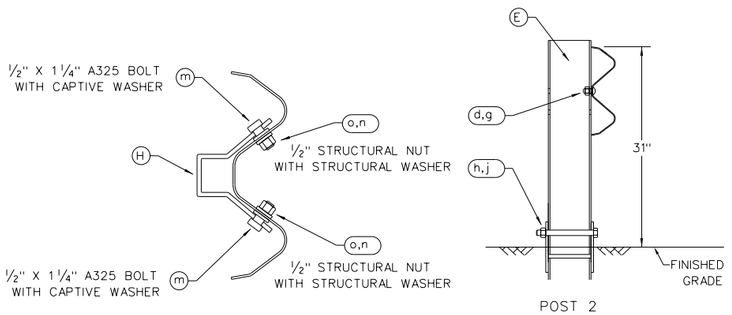
GENERAL NOTES

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

SEE NOTES: *

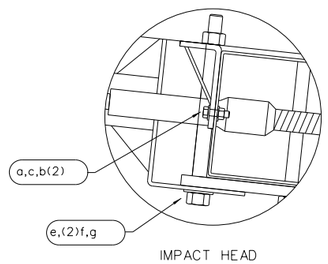
ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE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

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

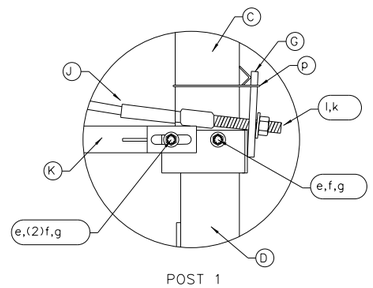


SECTION B-B
ANCHOR BRACKET

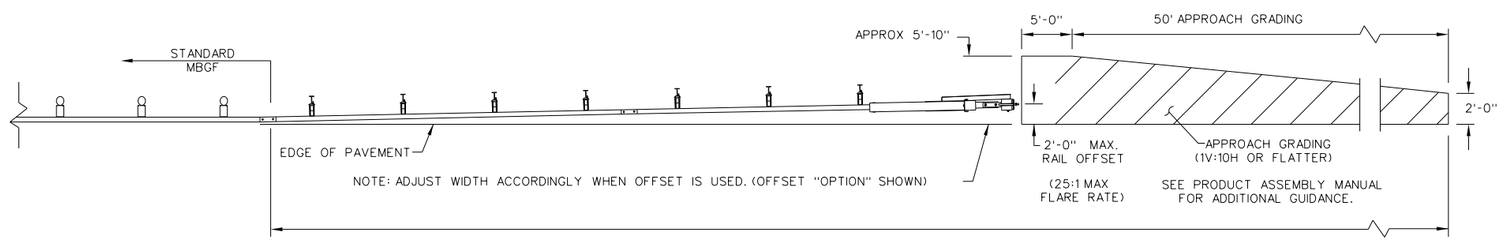
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL

MSKT-MASH-TL-3

SGT(12S)31-18

FILE: sgt12s3118.dgn	DN: TxDOT	CK: KM	DW: VP		CK: CL
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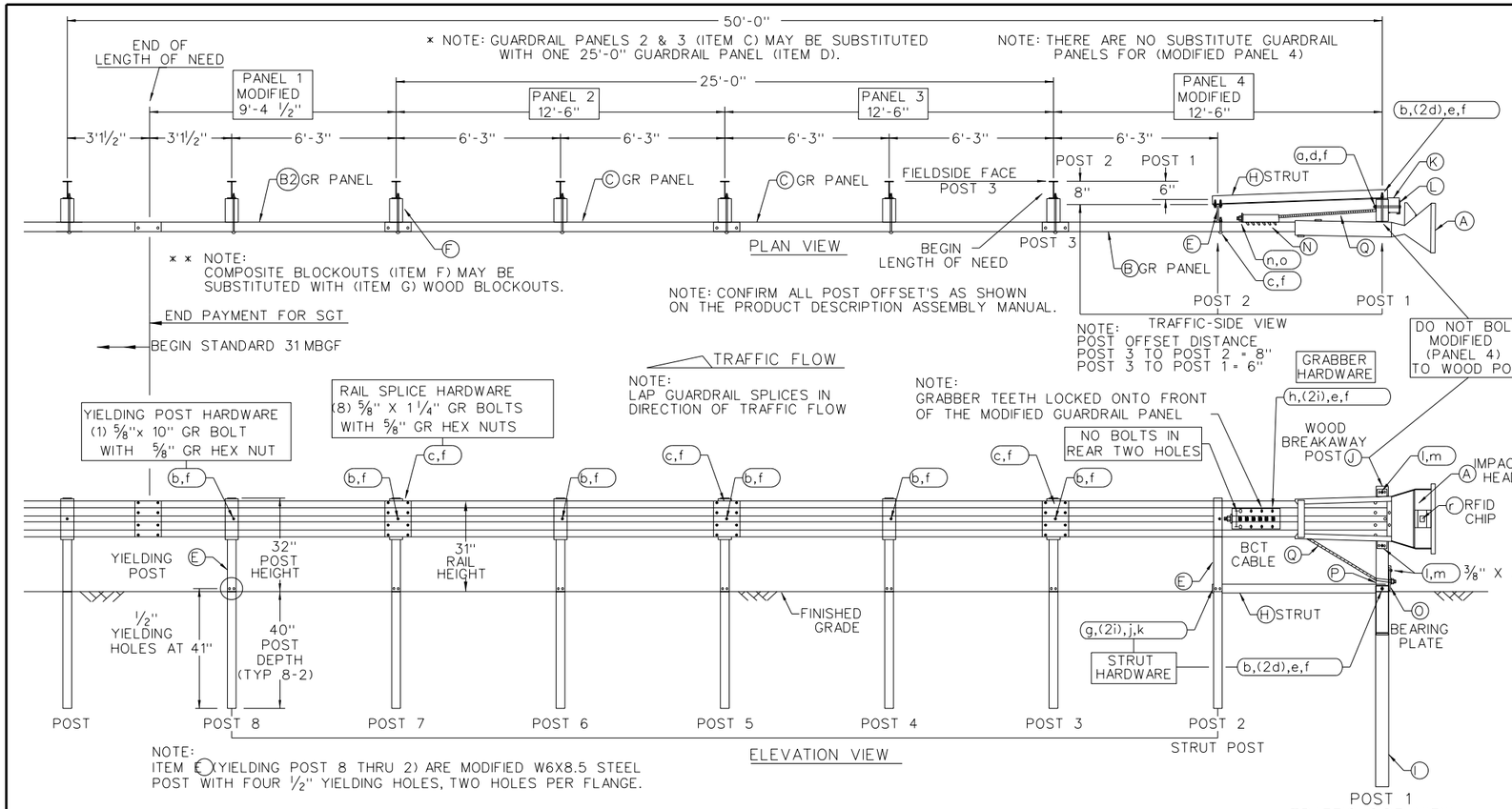
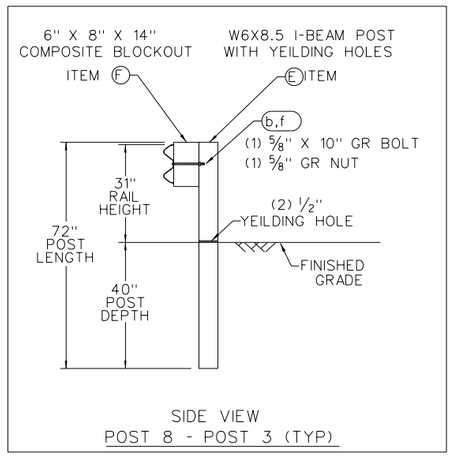


GENERAL NOTES

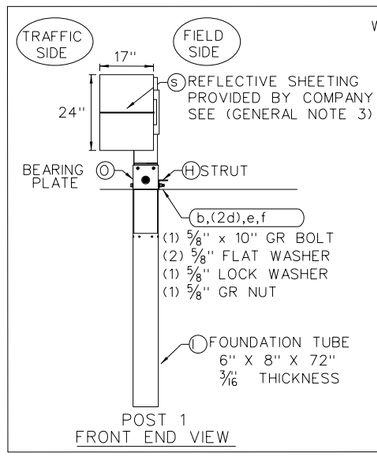
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY MANUAL.
3. MANUFACTURER WILL APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" TO THE FACE PLATE OF THE DEVICE PER MANUFACTURER'S RECOMMENDATIONS. THE OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. THE NOMINAL HEIGHT OF THE GUARDRAIL BEAM IS 31 INCHES WITH A TOLERANCE OF +/- ONE INCH.
5. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
6. (POST 2 THROUGH POST 8) ARE MODIFIED STEEL-YIELDING POSTS WITH YIELDING HOLES AT GROUND LEVEL. THERE ARE NO SUBSTITUTE POSTS.
7. POSTS SHALL NOT BE SET IN CONCRETE.
8. IF SOLID ROCK IS ENCOUNTERED FOR ANY OF THE POSTS IN THE SYSTEM, CONTACT THE MANUFACTURER FOR SPECIFIC INSTALLATION GUIDANCE.
9. HARDWARE (BOLTS, NUTS, & WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING". FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
10. A COMPOSITE MATERIAL BLOCKOUT THAT MEETS DMS-7210 REQUIREMENTS MAY BE SUBSTITUTED FOR AN APPROVED WOOD BLOCKOUT. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST (MPL) FOR CERTIFIED PRODUCERS.
11. THE ENTIRE SYSTEM MUST BE INSTALLED IN A STRAIGHT LINE WITHOUT ANY CURVE. HOWEVER, THE SYSTEM CAN BE OFFSET BY TWO FEET AS SHOWN ON THE APPROACH GRADING DETAIL TO HELP OFF-SET THE IMPACT HEAD FROM SHOULDER OF THE ROAD.

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM #
A	1	SGET IMPACT HEAD	SIH1A
B	1	MODIFIED GUARDRAIL PANEL 12'-6" 12GA	126SPZGP
B2	1	MODIFIED GUARDRAIL PANEL 9'-4 1/2" 12GA	GP94
C	2	STANDARD GUARDRAIL PANEL 12'-6" 12GA	GP126
D	1	STANDARD GUARDRAIL PANEL 25'-0" 12GA	GP25
E	7	MODIFIED YIELDING I-BEAM POST W6x8.5	YP6MOD
F	6	COMPOSITE BLOCKOUT 6" X 8" X 14"	CBO8
G	6	WOOD BLOCKOUT 6" X 8" X 14"	WBO8
H	1	STRUT 3" X 3" X 80" x 1/4" A36 ANGLE	STR80
I	1	FOUNDATION TUBE 6" X 8" X 72" x 3/16"	FNDT6
J	1	WOOD BREAKAWAY POST 5 1/2" x 7 1/2" x 50"	WBRK50
K	1	WOOD STRIKE BLOCK	WSBLK14
L	1	STRIKE PLATE 1/4" A36 BENT PLATE	SPLT8
M	1	REINFORCEMENT PLATE 12 GA. GR55	REPLT17
N	1	GUARDRAIL GRABBER 2 1/2" X 2 1/2" X 16 1/2"	GGR17
O	1	BEARING PLATE 8" X 8 5/8" X 5/8" A36	BPLT8
P	1	PIPE SLEEVE 4 1/4" X 2 3/8" O.D. (2 1/8" I.D.)	PSLV4
Q	1	BCT CABLE 3/4" X 81" LENGTH	CBL81
		SMALL HARDWARE	
a	1	5/8" X 12" GUARDRAIL BOLT 307A HDG	12GRBLT
b	7	5/8" X 10" GUARDRAIL BOLT 307A HDG	10GRBLT
c	33	5/8" X 1 1/4" GR SPLICE BOLTS 307A HDG	1GRBLT
d	3	5/8" FLAT WASHER F436 A325 HDG	58FW436
e	1	5/8" LOCK WASHER HDG	58LW
f	39	5/8" GUARDRAIL HEX NUT HDG	58HN563
g	2	1/2" X 2" STRUT BOLT A325 HDG	2BLT
h	6	1/2" X 1 1/4" PLATE BOLT A325 HDG	125BLT
i	16	1/2" FLAT WASHER F436 A325 HDG	12FWF436
j	8	1/2" LOCK WASHER HDG	12LW
k	8	1/2" HEX NUT A563 HDG	12HN563
l	4	3/8" X 3" HEX LAG SCREW GR5 HDG	38LS
m	4	3/8" FLAT WASHER F436 A325 HDG	38FW844
n	2	1" FLAT WASHER F436 A325 HDG	1FWF436
o	2	1" HEX NUT A563DH HDG	1HN563
p	1	18" TO 24" LONG ZIP TIE RATED 175-200LB	ZPT18
q	1	1 1/2" X 4" SCH-40 PVC PIPE	PSPCR4
r	1	RFID CHIP RATED MIL-STD-810F	RFID810F
s	1	IMPACT HEAD REFLECTIVE SHEETING	RS30M

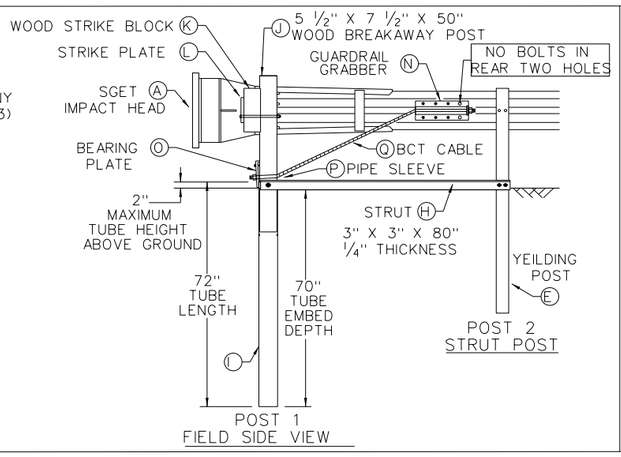
ALTERNATIVE ITEMS
NOTE: SEE PLAN VIEW



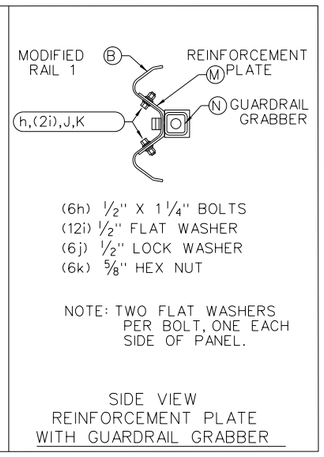
SIDE VIEW
POST 8 - POST 3 (TYP)



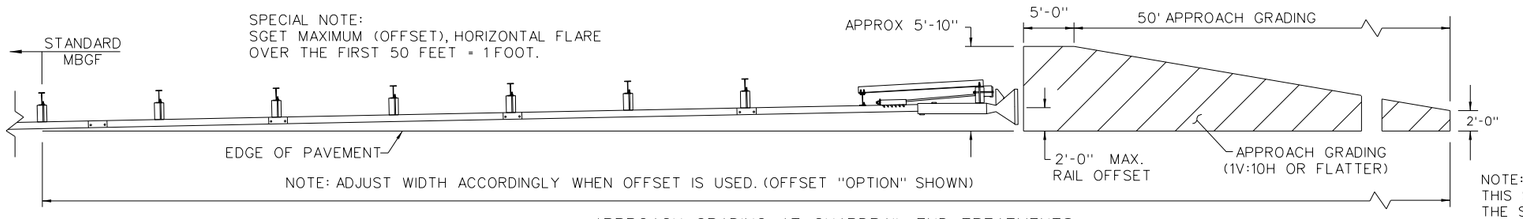
POST 1
FRONT END VIEW



POST 1
FIELD SIDE VIEW



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation

Design Division Standard

SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP	
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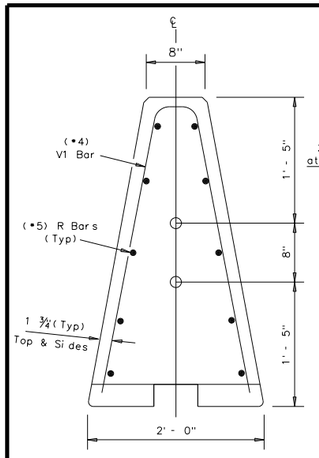
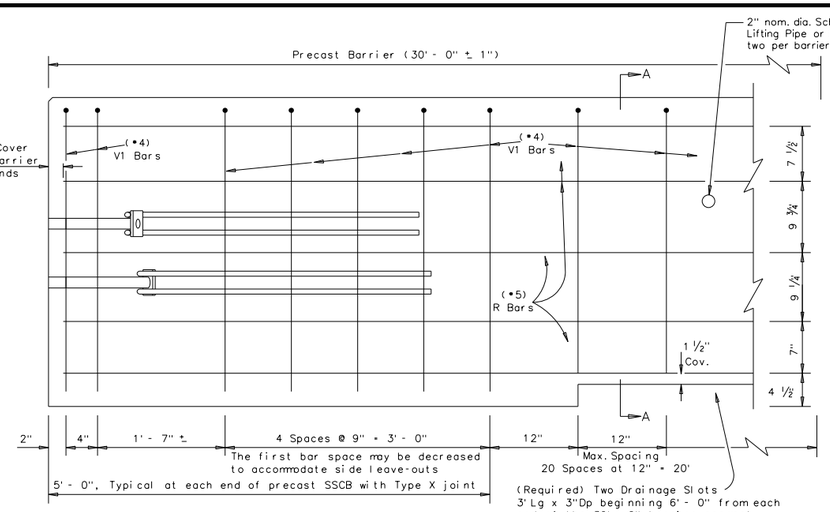


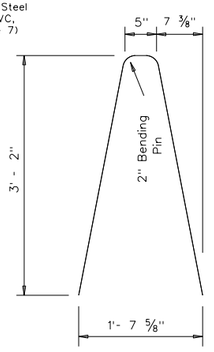
End View
Precast Barrier

Pipe locations for Joint Type X connection



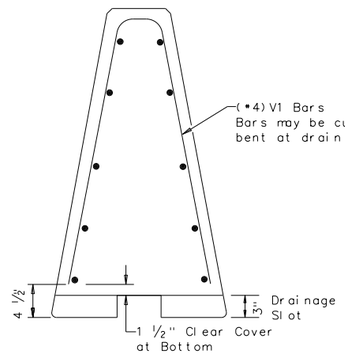
Reinforcement for Precast (SSCB)
Single Slope Concrete Barrier (Type 1)

Showing reinforcement for Joint Connection (Type X)



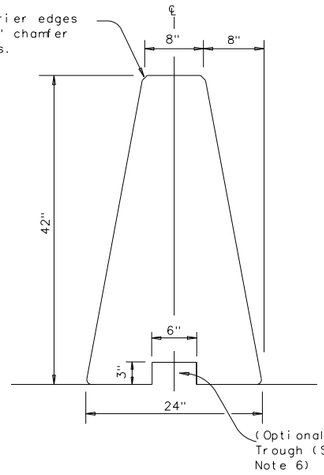
V1 Bar
•4 Rebar

Note:
V1 Bars above the drainage slots may bent to accomodate 1 ½" clear cover as directed by the Engineer.



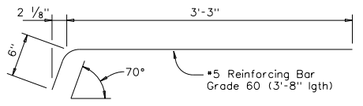
Section A-A

Steel Placement at (Required) Drainage Slots



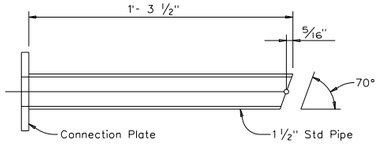
Single Slope Concrete Traffic Barrier

Precast SSCB barrier may be connected to cast-in-place SSBC. The joint connection "Types" may be used in the cast-in-place barrier, to match the precast barrier connection.



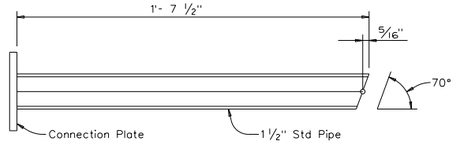
DEFORMED BAR ANCHOR DETAILS

Two (2) Bars required per assembly.
Eight (8) required per Joint.



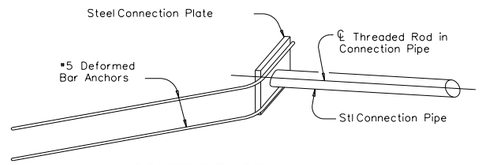
UPPER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Upper Assembly.
Two (2) required per Joint.



LOWER CONNECTION PIPE DETAILS

One (1) Steel Pipe required per Lower Assembly.
Two (2) required per Joint.

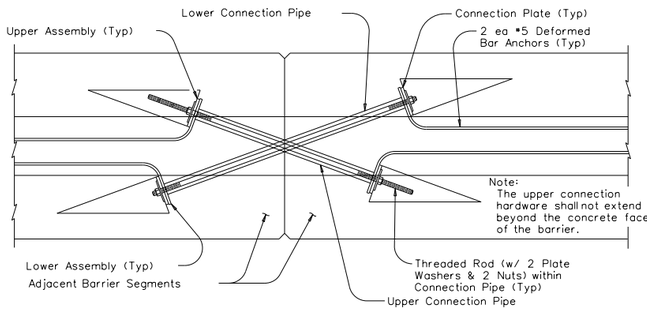


ISOMETRIC OF
TYPICAL WELDED ASSEMBLY

Four (4) [2 Upper & 2 Lower] Assemblies required per Joint.

General Notes

1. Concrete shall be Class H with a minimum compressive strength of 3,600 psi.
2. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
3. Precast barrier length shall be 30 ft. unless otherwise specified on the plans.
4. All precast barrier edges shall have a ¾" chamfer or a tooled radius.
5. All concrete, reinforcement, joint connection systems, grout etc. as shown, are considered as part of the barrier payment.
6. Conduit trough when required shall be shown elsewhere on the plans, or as directed by the Engineer.
7. Regardless of the method of handling, barrier lifting points shall be approx. 7.5 feet from the ends of the barrier. Lifting devices and attachments to barrier sections shall be approved by the Engineer.
8. Surface finishing and grouting (where required) shall be two parts sand one part cement with enough water to make the mixture plastic. Grouting shall be done in a manner that will assure a smooth surface. Surface finishing shall be considered subsidiary to the various bid items.
9. All steel assemblies shall be galvanized after fabrication in accordance with Item 445,"Galvanizing."



TYPE X JOINT INSTALLATION DETAIL

Barrier reinforcing and Type X Joint Leave-Out dimensions not shown for clarity.

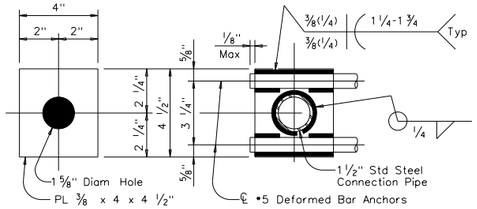
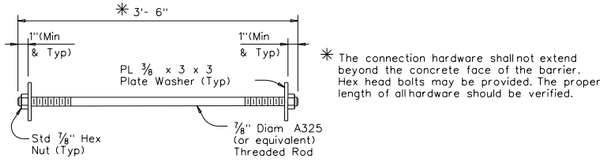


PLATE DIMENSIONS WELDING DETAILS

CONNECTION PLATE DETAILS

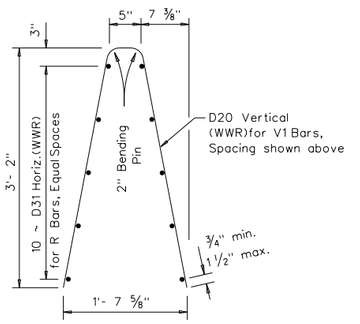
One (1) Plate required per assembly.
Four (4) required per Joint. All steel fittings for joint Type X shall be galvanized after fabrication in accordance with Item 445.



CONNECTION BOLT OR
THREADED ROD DETAIL

Two (2) Threaded Rods (Or Equivalent Hex Hd. Bolts) (w/ Two (2) PL ⅜ x 3 x 3 Plate Washers & Two (2) Std Hex Nuts) required per Joint.

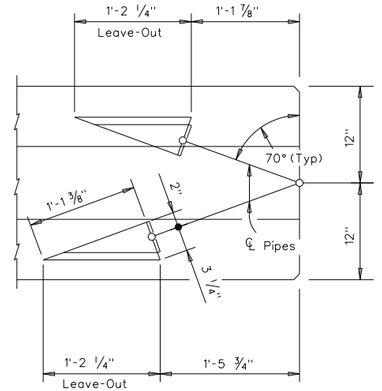
Weight of one precast 30 ft. (SSCB) segment = Approx. 10.5 Tons or 717 lbs per ft.



Welded Wire Reinforcement
(WWR) Option for Bars R and V1

(WWR) General Notes

1. Deformed Welded Wire Reinforcement (WWR) shall conform to ASTM A497.
2. Welded wire cage may be cut or bent to accommodate the Type X joint connection and drainage slots, as directed by the Engineer.
3. All reinforcement shall comply with Item 440, "Reinforcing Steel."
4. Combinations of reinforcing steel and WWR will be permitted, as directed by the Engineer. The dimension from the end of the barrier section to the first wire shall not exceed 3".



BARRIER PLAN AT JOINT

SHEET 1 OF 2

Texas Department of Transportation | Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER (TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: BD	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		80

DATE: 10/28/2022
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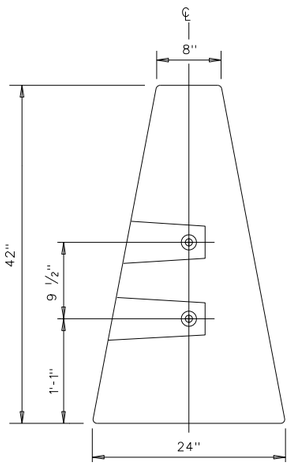
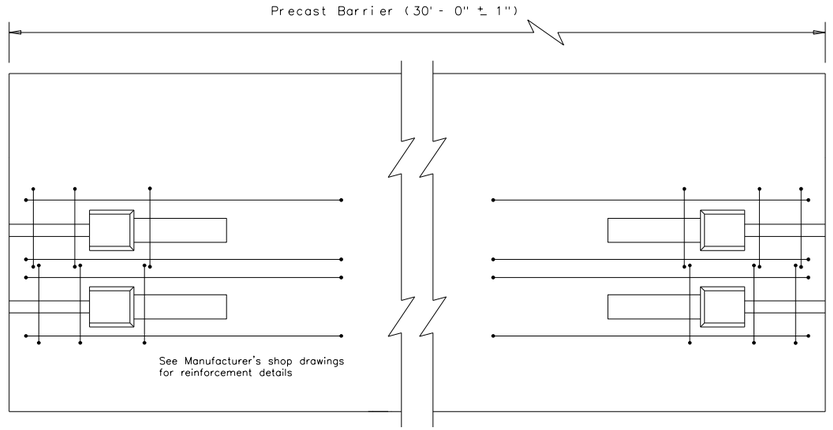
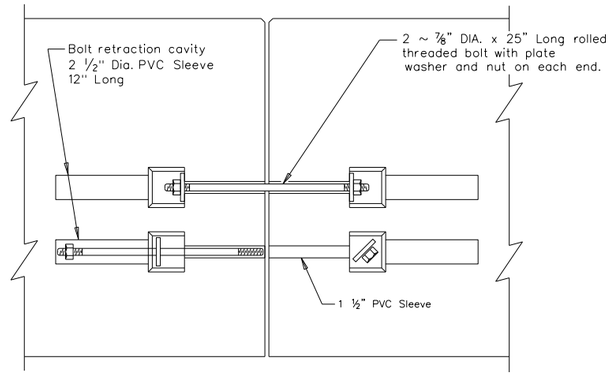


END VIEW
"QUICK-BOLT" POCKET LOCATIONS

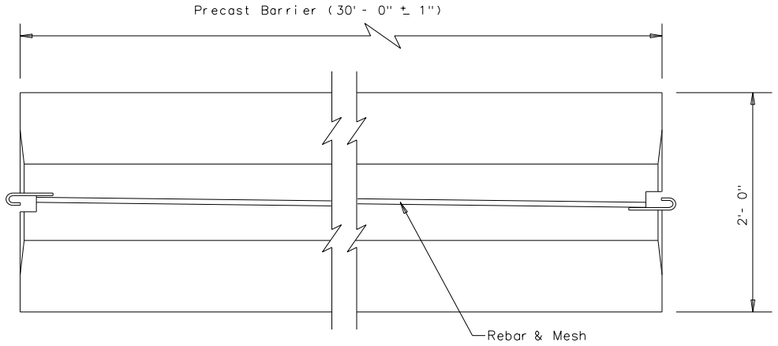


ELEVATION VIEW
"QUICK-BOLT" (SSCB)
See Manufacturer's shop drawing for additional details

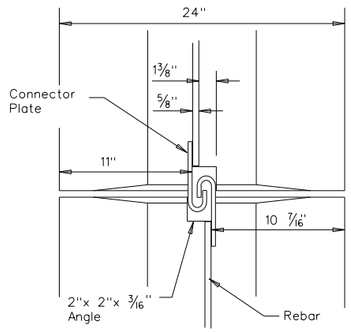


ELEVATION VIEW SHOWING JOINT CONNECTION
"QUICK-BOLT"

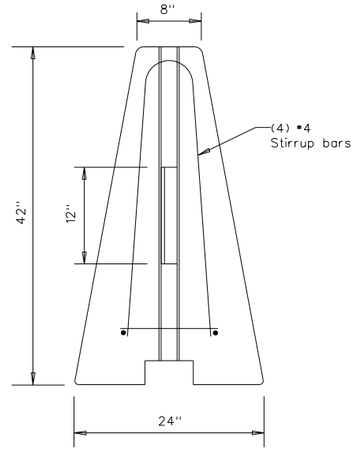
Joint Connection (Type Q)



TOP VIEW
PRECAST (SSCB) WITH J-J HOOKS
See Manufacturer's shop drawing for additional details



VIEW FROM ABOVE
J-J HOOK CONNECTION



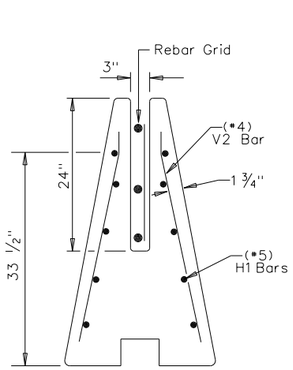
END VIEW

Proprietary Joint Connections (SSCB)

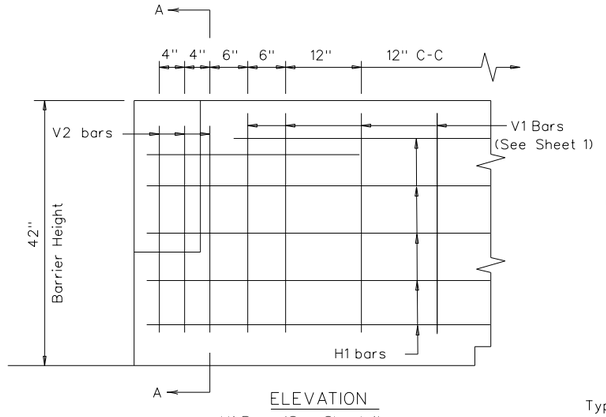
Two proprietary joint connections are acceptable as alternates to the (Type X) connection shown, here on. These joint connections types are:

J-J Hooks by Easi-Set Industries, (800)547-4045
Quik-Bolt by Bexar Concrete, (210)497-3773

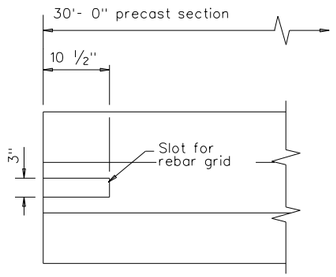
If one of these connection systems are exclusively specified in the plans, prior approval for sole source use must be obtained. Details of the connection components and barrier reinforcement for these systems, will be shown on the manufacturer's shop drawing(s) furnished to the Engineer.



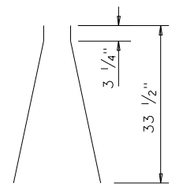
SECTION A-A
Showing (Type R) Rebar Grid



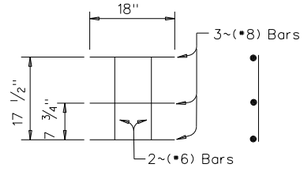
ELEVATION
V1 Bars (See Sheet 1)



TOP VIEW
JOINT CONNECTION
Typical at both ends of barrier segment



(#4) V2 BARS
6 ~ two piece bars per barrier segment



WELDED REBAR GRID

Joint Connection (Type R)

SHEET 2 OF 2

Texas Department of Transportation — Design Division Standard

SINGLE SLOPE CONCRETE BARRIER

PRECAST BARRIER
(TYPE 1)

SSCB(2)-10

FILE: sscb210.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		81

DATE: 10/28/2022
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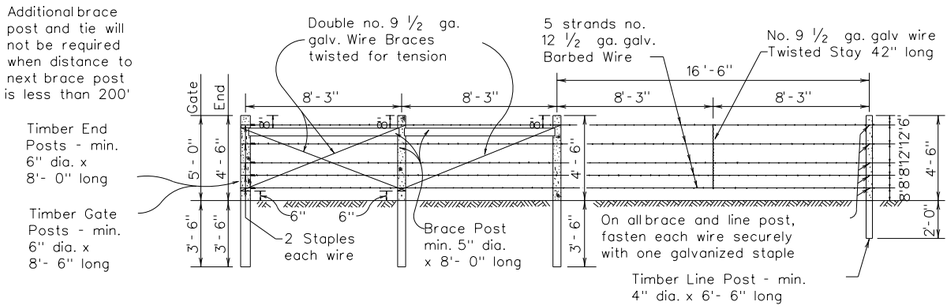
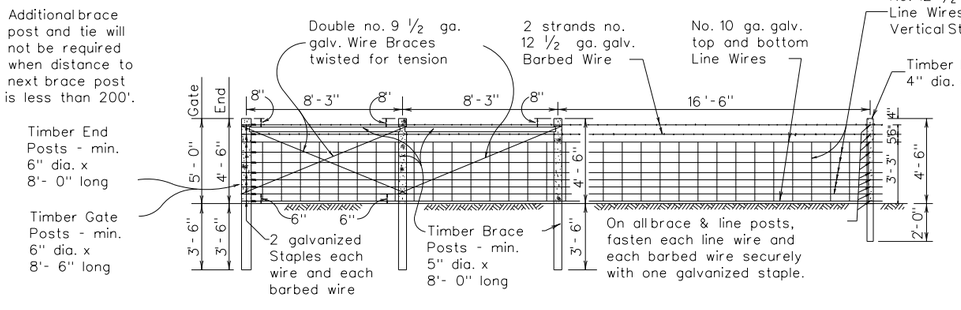


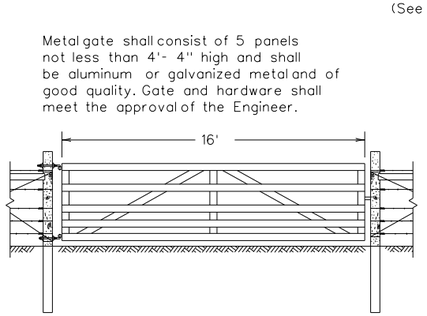
SECTION GALVANIZED BARBED WIRE FENCE WITH WOOD POSTS
Bracing Detail Used at Ends and Gates
TYPE "A" FENCE
(See General Note 6)



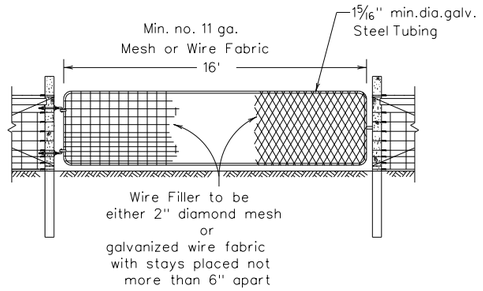
SECTION GALVANIZED WOVEN WIRE FENCE WITH WOOD POSTS
Bracing Detail Used at Ends and Gates
TYPE "B" FENCE
(See General Note 6)

TABLE OF EQUIVALENT SIZES FOR OPTIONAL SHAPE

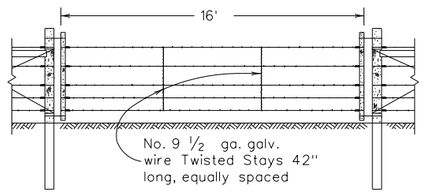
Minimum Diameter of Round Post (Inches)	Minimum Equivalent Dimension for Each Side of Square Post (Inches)
4	3 ½
5	4 ½
6	5 ¼



DETAIL TYPE 1 GATE



DETAIL TYPE 2 GATE

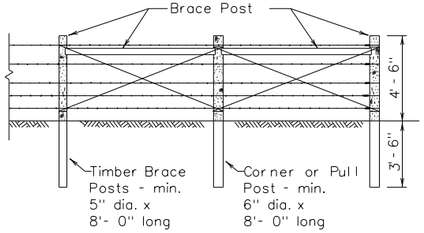


DETAIL TYPE 3 GATE

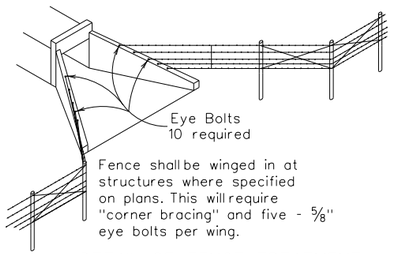
GENERAL NOTES

1. Any high point which interferes with the placing of wire mesh shall be excavated to provide 2" clearance.
2. Latches for Type 1 and Type 2 gates shall be good commercial quality and design latches of the spring, fork or chain type. All latches shall be suitable for the gate and shall be approved by the Engineer.
3. Hinges for Type 2 gates shall be commercial design approved by the Engineer suitable for post and gate.
4. Concrete shall be of the design and consistency approved by the Engineer and shall contain not less than 4 sacks of cement per cubic yard. Concrete footings are to be crowned at the top to shed water.
5. If rock is encountered at a depth less than the embedded depth required, a 15" or larger diameter hole shall be drilled for the post and the post shall be set in concrete. If rock is encountered at a depth of 1'- 6" or more below the ground surface, the hole shall be drilled to the required depth. If rock is encountered at a depth less than 1'- 6" below the ground surface, the holes shall be drilled a minimum of 2'- 0" into the rock or to the depth whichever is the lesser depth.
6. Barbed Wire shall be in accordance with ASTM A 121 (Class 1) Design designation 12-2-4-1 4R or 12-2-5-1 4R, or as approved by the Engineer.

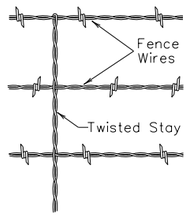
   Woven Wire Fence (Type B) shall be in accordance with ASTM A 116 (Class 1) No. 12-1/2 Grade 60 (See Table 1 ASTM A 116) to the height and design shown on the plans, or as approved by the Engineer.
7. The location of gates and corner posts will be as indicated elsewhere on these plans.
8. Square wood posts may be used in lieu of round posts provided minimum equivalent size requirements, as shown are met. All wood posts shall be in accordance with Item 552, "Wire Fence."



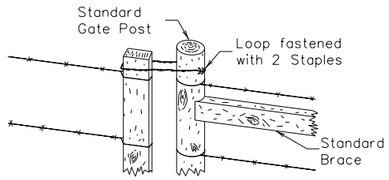
CORNER OR PULL POST ASSEMBLY



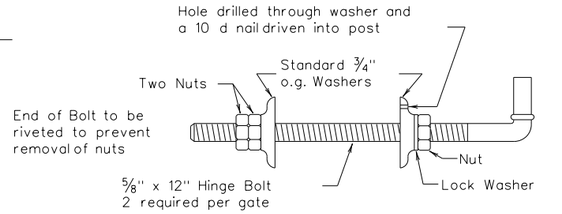
DETAIL OF FENCE TREATMENT AT STRUCTURES



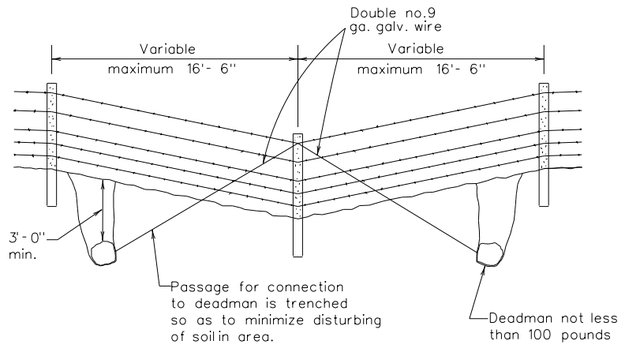
DETAIL OF STAY
(Barbed wire fence)



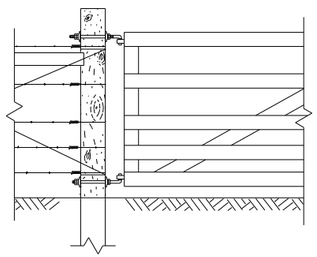
DETAIL FASTENER TYPE 3 GATE



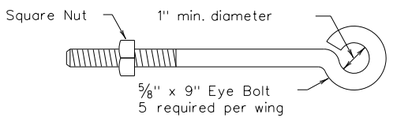
DETAIL OF GATE HINGE BOLT ASSEMBLY



DETAIL OF FENCE SAG
(Single Line Connection)



DETAIL SHOWING INSTALLATION OF HINGES OF TYPE 1 & 2 GATE



DETAIL OF EYE BOLT

Texas Department of Transportation
Design Division Standard

BARBED WIRE AND WOVEN WIRE FENCE (WOOD POSTS)

WF(1)-10

FILE: wf110.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
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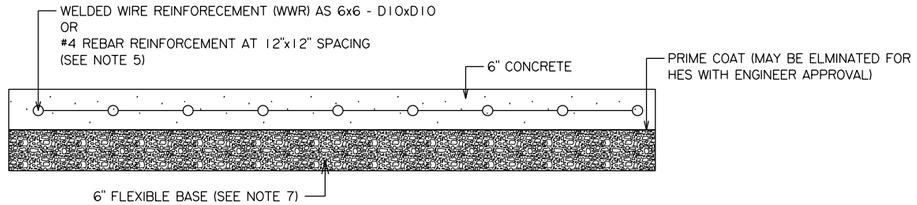
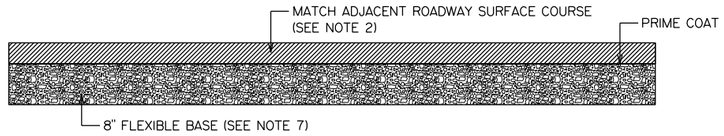
	SAT	WILSON		82



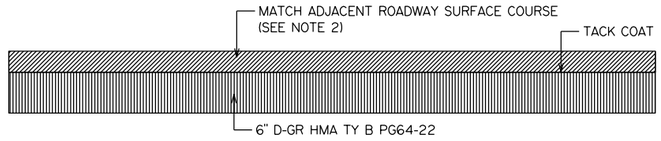
TYPICAL CONCRETE DRIVEWAY

* NOTE: STEEL SHALL BE CENTERED VERTICALLY IN CONCRETE.
PAID AS 'DRIVEWAYS CONC (HES)' OR 'DRIVEWAYS (CONC)'



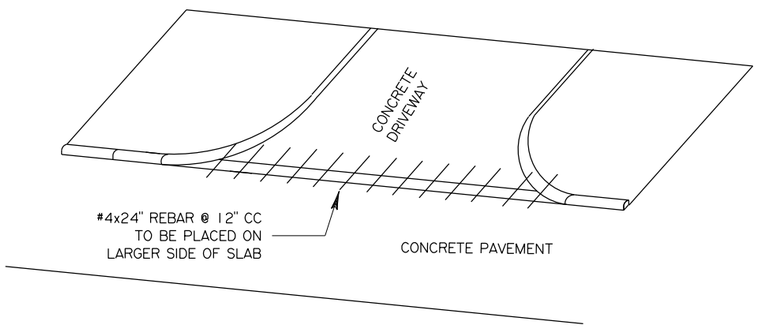
TYPICAL ROADWAY DRIVEWAY (TYPE 1)

PAID AS DRIVEWAYS ACP (TYPE 1)

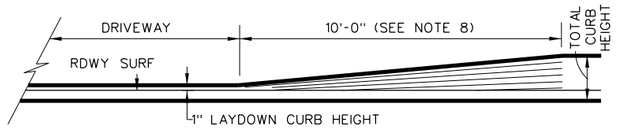


TYPICAL ROADWAY DRIVEWAY (TYPE 2)

PAID AS DRIVEWAYS ACP (TYPE 2)



TIE BAR PLACEMENT WITH CRCP



LAYDOWN CURB AT DRIVEWAYS DETAIL

NOTES:

1. USE CLASS A CONCRETE UNLESS OTHERWISE NOTED.
2. DENSE GRADED HMA MAY BE USED WHEN APPROVED BY THE ENGINEER IF THE ROADWAY SURFACE COURSE IS A PERFORMANCE MIX.
3. REFER TO PLAN SHEETS FOR GEOMETRIC DESIGN DETAILS.
4. FOR CONCRETE DRIVEWAYS, PROVIDE EXPANSION JOINT 20 FT C-C FOR WIDTH OR LENGTH OVER 25 FT.
5. FIBER REINFORCEMNT IS NOT ALLOWED.
6. MACHINE LAID HMA IS REQUIRED UNLESS OTHERWISE APPROVED BY THE ENGINEER.
7. FURNISH BASE MEETING THE REQUIREMENTS FOR ANY TYPE OF GRADE IN ACCORDANCE WITH ITEM 247. FLEXIBLE BASE COMPRESSIVE STRENGTHS ARE WAIVED. BASE IS SUBSIDIARY TO THE ITEM.
8. WHERE SIDEWALK IS PRESENT, SLOPE AND LENGTH OF CURB TRANSITION SHOULD MATCH THE SIDEWALK AND MEET ADA REQUIREMENTS.
9. IF ROOTS ARE ENCOUNTERED VERIFY WITH THE ENGINEER PRIOR TO ACCOMODATING OR REMOVING 2 IN. DIAMETER OR LARGER ROOTS. ROOT REMOVAL MUST BE IN ACCORDANCE WITH ITEM 752.4.2. ROOTS MAY REMAIN IN THE BASE. FOR IMPROVEMENTS WITHIN 6 IN. OF A ROOT, THE CONCRETE THICKNESS MAY BE REDUCED BY 1 IN. AND THE BASE INCREASED BY 1 IN. TO MINIMIZE THE IMPACT TO THE ROOTS. ADJUST BASE AND SURFACE PROFILE TO PROVIDE A 1 IN. BASE CUSHION AROUND THE ROOTS. THE SURFACE PROFILE MAY BE ADJUSTED TO THE EXTENT ALLOWED BY ADA. THIS WORK IS SUBSIDIARY.

Texas Department of Transportation
San Antonio District

DRIVEWAY DETAILS

San Antonio District Standard
Sheet (1 of 1)

T:Engdata/Standards/Drivewaydetails.dgn	PREPARED BY AND FOR USE OF TxDoT.					
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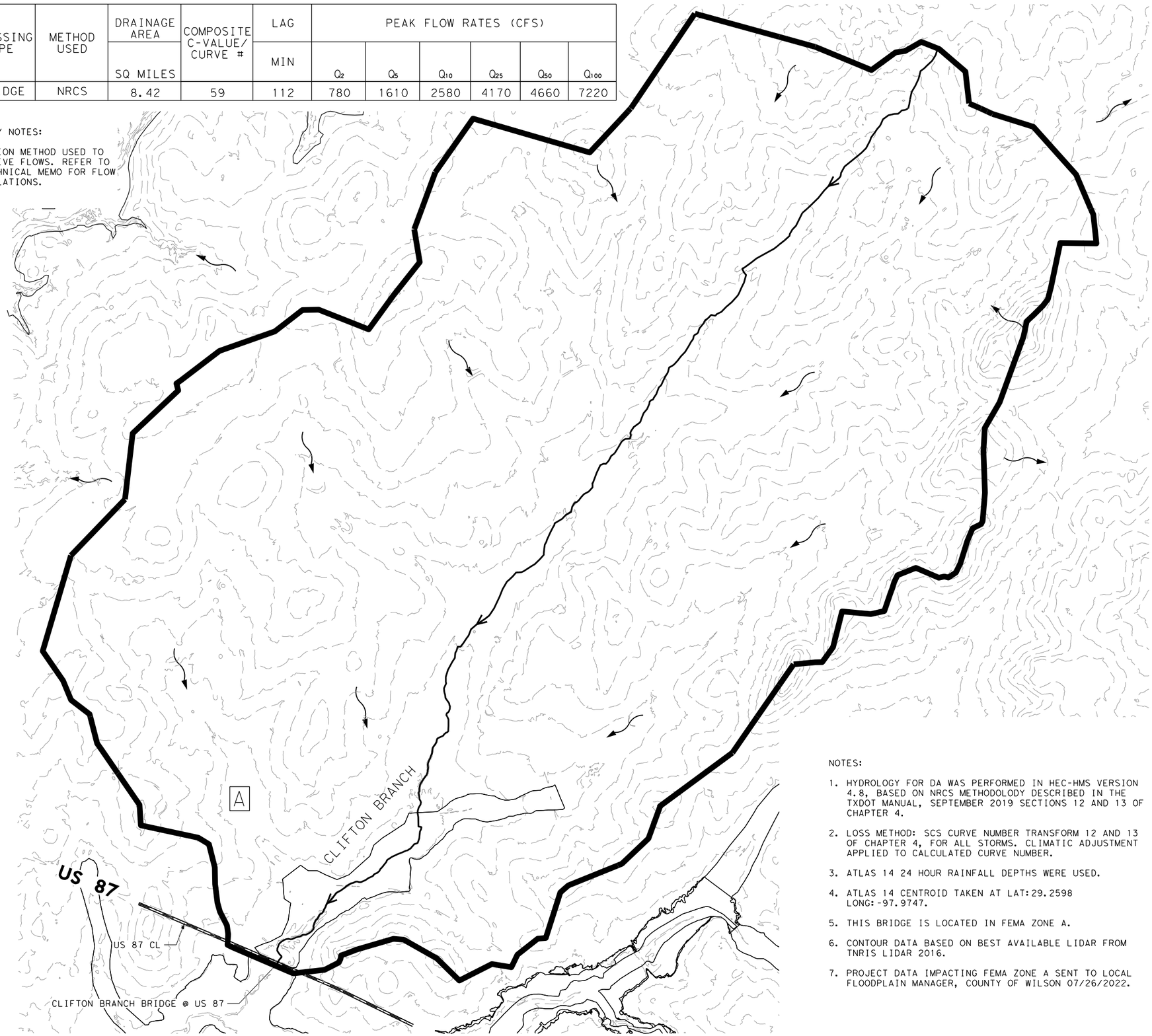
REVISIONS	SAT	6	SEE TITLE SHEET			83
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	WILSON		0143	04	072	US 87

$TIME$
10/28/2022
c:\workingdir\ljarpw.bentley.com_ljarpw-01\william osthoff\dms25647\drivewaydetails.dgn

DRAINAGE AREA	CROSSING TYPE	METHOD USED	DRAINAGE AREA	COMPOSITE C-VALUE/ CURVE #	LAG	PEAK FLOW RATES (CFS)					
			SQ MILES		MIN	Q_2	Q_5	Q_{10}	Q_{25}	Q_{50}	Q_{100}
A	BRIDGE	NRCS	8.42	59	112	780	1610	2580	4170	4660	7220

SPECIAL HYDROLOGY NOTES:

REGRESSION EQUATION METHOD USED TO DEVELOP COMPARATIVE FLOWS. REFER TO THE DRAINAGE TECHNICAL MEMO FOR FLOW VALUES AND CALCULATIONS.



N

LEGEND

- FLOW ARROW
- X — DRAINAGE AREA ID
- DRAINAGE AREA BOUNDARY
- DRAINAGE AREA CONTOUR
- STREAM FLOW PATH
- FEMA 100-YR FLOODPLAIN

NOTES:

1. HYDROLOGY FOR DA WAS PERFORMED IN HEC-HMS VERSION 4.8, BASED ON NRCS METHODOLODY DESCRIBED IN THE TXDOT MANUAL, SEPTEMBER 2019 SECTIONS 12 AND 13 OF CHAPTER 4.
2. LOSS METHOD: SCS CURVE NUMBER TRANSFORM 12 AND 13 OF CHAPTER 4, FOR ALL STORMS. CLIMATIC ADJUSTMENT APPLIED TO CALCULATED CURVE NUMBER.
3. ATLAS 14 24 HOUR RAINFALL DEPTHS WERE USED.
4. ATLAS 14 CENTROID TAKEN AT LAT:29.2598 LONG:-97.9747.
5. THIS BRIDGE IS LOCATED IN FEMA ZONE A.
6. CONTOUR DATA BASED ON BEST AVAILABLE LIDAR FROM TNRIS LIDAR 2016.
7. PROJECT DATA IMPACTING FEMA ZONE A SENT TO LOCAL FLOODPLAIN MANAGER, COUNTY OF WILSON 07/26/2022.

STATE OF TEXAS
BRADLEY J. RATCLIFF
133286
LICENSED
PROFESSIONAL ENGINEER
9/7/2022

0' 500' 1000' 2000'
SCALE: 1"=2000'

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

Texas Department of Transportation
©2022

US 87 AT CLIFTON BRANCH
DRAINAGE AREA MAP
CLIFTON BRANCH

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	84

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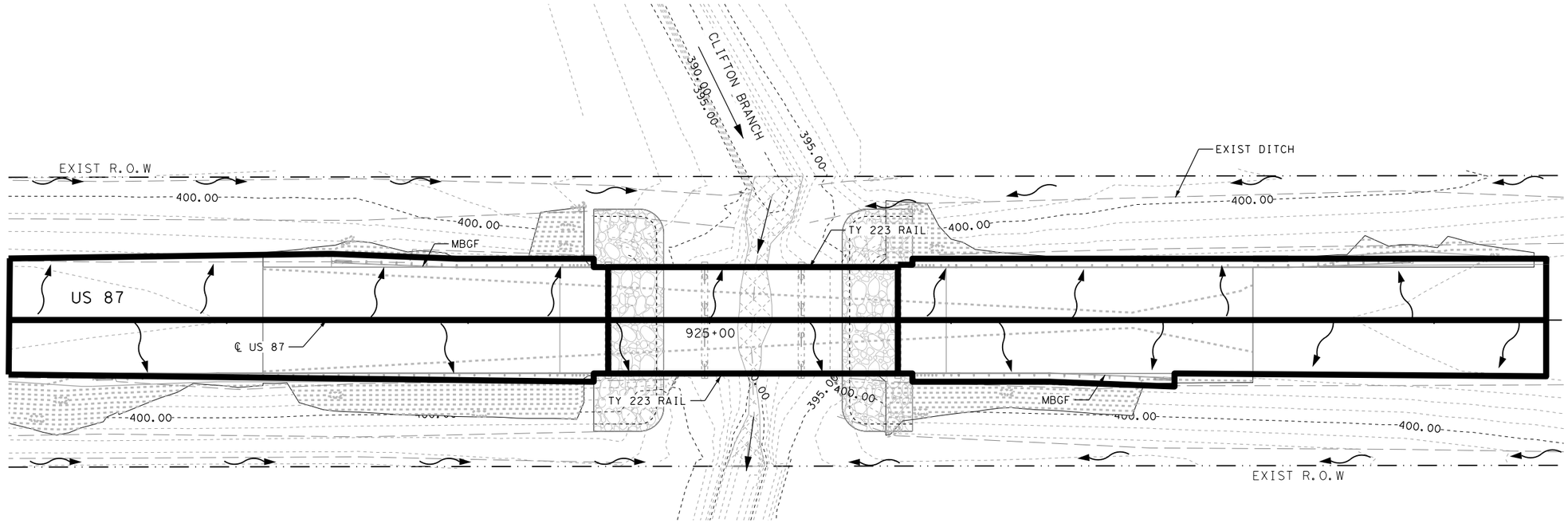

N

LEGEND

- FLOW ARROW
- EXIST R.O.W
- DRAINAGE AREA BOUNDARY
- OHWM

NOTES:

1. US87 BRIDGE AT CLIFTON BRANCH IS ON GRADE.
2. STORMWATER RUNOFF DISCHARGES DIRECTLY INTO CLIFTON BRANCH THROUGH OPENINGS IN TY 223 RAIL, EXISTING DITCHES, AND THROUGH PROPOSED GUARD FENCE.

STATE OF TEXAS
BRADLEY J. RATCLIFF
133286
LICENSED
PROFESSIONAL ENGINEER

9/7/2022

0′ 25′ 50′
SCALE: 1"=50′

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

 Texas Department of Transportation

US 87 AT CLIFTON BRANCH INTERNAL DRAINAGE AREA MAP

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	85

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****

Straight Culvert

Inlet Elevation (invert): 392.04 ft

Break Elevation (invert): 391.81 ft

Culvert Length: 40.00 ft

Culvert Slope: 0.0058

****

Site Data - 2-8x3 MBC at 396.50

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 392.04 ft

Outlet Station: 40.00 ft

Outlet Elevation: 391.81 ft

Number of Barrels: 2

Culvert Data Summary - 2-8x3 MBC at 396.50

Barrel Shape: Concrete Box

Barrel Span: 8.00 ft

Barrel Rise: 3.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: Square Edge (90 53/64) Headwall

Inlet Depression: None

Tailwater Channel Data - Clifton Branch TCP - Low Water Crossing #2

Tailwater Channel Option: Trapezoidal Channel

Bottom Width: 7.00 ft

Side Slope (H:V): 3.00 (_:1)

Channel Slope: 0.0030

Channel Manning's n: 0.0450

Channel Invert Elevation: 391.81 ft

Roadway Data for Crossing: Clifton Branch TCP - Low Water Crossing #2

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	1450	404.25
1	1510	403.1
2	1660	402.23
3	1660	402.23
4	1840	400
5	2020	403.28
6	2020	403.29
7	2100	406.08

Roadway Surface: Paved

Roadway Top Width: 18.00 ft

Table 1 - Summary of Culvert Flows at Crossing

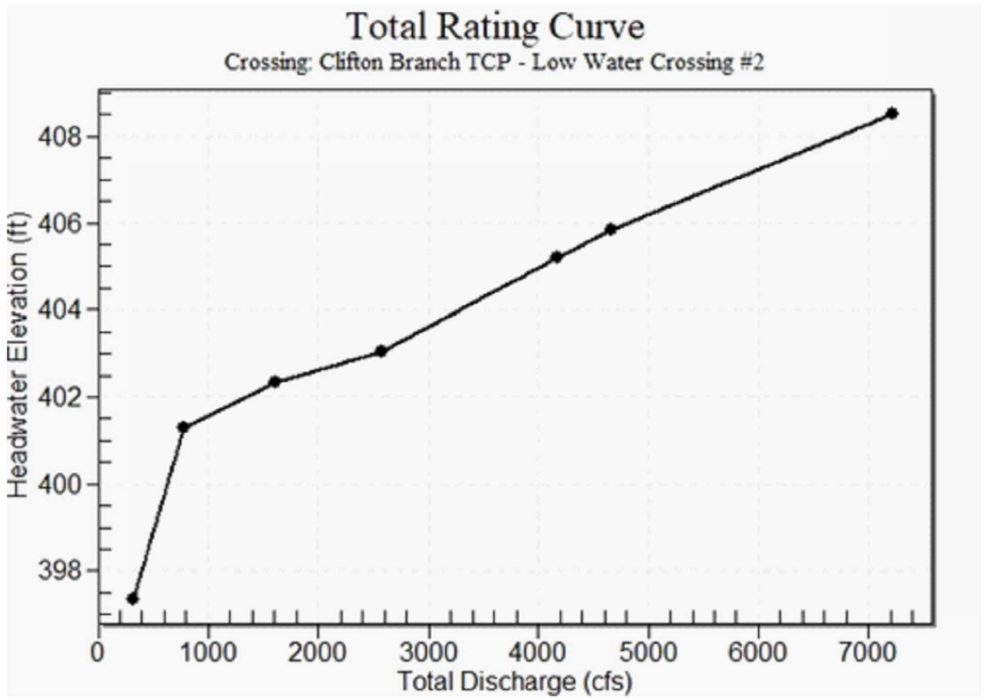
Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Prop Culvert Discharge (cfs)	Roadway Discharge (cfs)	Iterations
397.41	1 year	315.2	315.2	0	1
402.35	5 year	1610	360.9	1247.33	5
400.00	Overtopping	493.3	493.3	0	Overtopping

Table 2 - Culvert Summary Table

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
1 year	315.2	315.2	397.41	4.056	5.371	4-FFf	1.809	2.293	3	4.50	6.567	3.42
5 year	1610	361.31	402.35	4.611	10.311	4-FFf	1.987	2.51	3	9.09	7.527	5.168

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
315.2	396.31	4.50	3.42	0.84	0.37
1610	400.9	9.09	5.17	1.7	0.4



NOTES:

1. CULVERT ANALYSIS PERFORMED USING HY-8 HYDRAULIC ANALYSIS PROGRAM VERSION 7.6.

STATE OF TEXAS
BRADLEY J. RATCLIFF
133286
LICENSED
PROFESSIONAL ENGINEER

10/27/22

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

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US 87 AT CLIFTON BRANCH
TCP CULVERT
HYDRAULIC DATA

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	86

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HEC-RAS Table 1: US 87 Clifton Branch

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	23026	10% ATLAS 14	Corrected Existing	2580	399.45	408.15		408.25	0.001838	3.6	1579.52	831.45	0.31
2	23026	10% ATLAS 14	Proposed	2580	399.45	408.15		408.25	0.001838	3.6	1579.49	831.45	0.31
2	23026	4% ATLAS 14	Corrected Existing	4170	399.45	408.93		409.05	0.001857	4.05	2271.15	941.69	0.32
2	23026	4% ATLAS 14	Proposed	4170	399.45	408.93		409.05	0.001856	4.05	2271.79	941.76	0.32
2	23026	1% ATLAS 14	Corrected Existing	7220	399.45	409.93		410.08	0.002059	4.82	3305.92	1091.52	0.35
2	23026	1% ATLAS 14	Proposed	7220	399.45	409.95		410.09	0.002022	4.78	3327.61	1092.44	0.34
2	22649	10% ATLAS 14	Corrected Existing	2580	398.24	406.59	405.88	407.14	0.005375	6.48	704.88	630.82	0.54
2	22649	10% ATLAS 14	Proposed	2580	398.24	406.59	405.88	407.14	0.005374	6.48	704.96	630.83	0.54
2	22649	4% ATLAS 14	Corrected Existing	4170	398.24	407.11	407.07	407.82	0.00697	7.94	1051.18	696.6	0.63
2	22649	4% ATLAS 14	Proposed	4170	398.24	407.11	407.07	407.82	0.006994	7.95	1049.1	695.32	0.63
2	22649	1% ATLAS 14	Corrected Existing	7220	398.24	408.01	407.88	408.76	0.007342	9.09	1788.31	956.76	0.66
2	22649	1% ATLAS 14	Proposed	7220	398.24	407.95	407.88	408.76	0.007848	9.34	1735.52	946.86	0.68
2	22383	10% ATLAS 14	Corrected Existing	2580	397.62	406.16	405.46	406.23	0.001783	3.39	1921.92	1587.79	0.3
2	22383	10% ATLAS 14	Proposed	2580	397.62	406.15	405.46	406.23	0.001791	3.4	1918.24	1582.26	0.3
2	22383	4% ATLAS 14	Corrected Existing	4170	397.62	406.93	405.62	406.98	0.001198	3.13	3549.94	2307.61	0.25
2	22383	4% ATLAS 14	Proposed	4170	397.62	406.92	405.62	406.97	0.001236	3.17	3509.59	2307.06	0.26
2	22383	1% ATLAS 14	Corrected Existing	7220	397.62	408.07	405.86	408.1	0.000704	2.77	6191.15	2353.6	0.2
2	22383	1% ATLAS 14	Proposed	7220	397.62	408.03	405.86	408.07	0.000733	2.82	6108.02	2350.66	0.21
2	21904	10% ATLAS 14	Corrected Existing	2580	395.94	404.93	404.66	405.16	0.002827	5.31	977.81	421.73	0.39
2	21904	10% ATLAS 14	Proposed	2580	395.94	404.91	404.66	405.14	0.002891	5.36	969.16	419.68	0.4
2	21904	4% ATLAS 14	Corrected Existing	4170	395.94	405.79	404.67	406.08	0.003213	6.22	1362.76	463.46	0.43
2	21904	4% ATLAS 14	Proposed	4170	395.94	405.72	404.67	406.02	0.00342	6.37	1329.43	459.68	0.44
2	21904	1% ATLAS 14	Corrected Existing	7220	395.94	407.07	405.49	407.43	0.003491	7.3	1980.65	502.47	0.46
2	21904	1% ATLAS 14	Proposed	7220	395.94	406.99	405.49	407.36	0.003709	7.47	1938.57	500.48	0.47
2	21500	10% ATLAS 14	Corrected Existing	2580	397.33	404.38	403.1	404.44	0.001081	2.83	2143.07	1246.33	0.24
2	21500	10% ATLAS 14	Proposed	2580	397.33	404.3	403.1	404.36	0.001237	2.99	2036.97	1241.77	0.26
2	21500	4% ATLAS 14	Corrected Existing	4170	397.33	405.41	403.6	405.45	0.000753	2.73	3417.55	1297.19	0.21
2	21500	4% ATLAS 14	Proposed	4170	397.33	405.27	403.6	405.32	0.000875	2.89	3246.78	1291.08	0.22
2	21500	1% ATLAS 14	Corrected Existing	7220	397.33	406.77	404.15	406.82	0.000657	2.97	5238.62	1473.63	0.2
2	21500	1% ATLAS 14	Proposed	7220	397.33	406.65	404.15	406.7	0.000724	3.08	5070.85	1462.9	0.21
2	21082	10% ATLAS 14	Corrected Existing	2580	395.49	403.92		403.98	0.001263	2.97	1761.11	706.58	0.26
2	21082	10% ATLAS 14	Proposed	2580	395.49	403.75		403.81	0.001542	3.19	1639.91	694.49	0.28
2	21082	4% ATLAS 14	Corrected Existing	4170	395.49	405.05		405.11	0.001052	3.18	2610.74	862.72	0.24
2	21082	4% ATLAS 14	Proposed	4170	395.49	404.84		404.91	0.00127	3.4	2440.95	794.62	0.26
2	21082	1% ATLAS 14	Corrected Existing	7220	395.49	406.43		406.5	0.001023	3.65	3957.01	1136.36	0.25
2	21082	1% ATLAS 14	Proposed	7220	395.49	406.27		406.36	0.001141	3.8	3781.23	1102.39	0.26
2	20515	10% ATLAS 14	Corrected Existing	2580	393.27	403.12		403.21	0.001783	3.42	1416.2	519.7	0.26
2	20515	10% ATLAS 14	Proposed	2580	393.27	402.53		402.68	0.003348	4.34	1116.43	491.33	0.35
2	20515	4% ATLAS 14	Corrected Existing	4170	393.27	404.35		404.45	0.00162	3.73	2094.81	582.81	0.25
2	20515	4% ATLAS 14	Proposed	4170	393.27	403.94		404.06	0.00224	4.21	1858.88	562.76	0.3
2	20515	1% ATLAS 14	Corrected Existing	7220	393.27	405.65		405.8	0.00196	4.62	2891.32	639.5	0.29
2	20515	1% ATLAS 14	Proposed	7220	393.27	405.38		405.54	0.002341	4.93	2714.82	629.14	0.31

NOTES:

1. HEC-RAS 5.0.7 WAS USED FOR THE HYDRAULIC ANALYSIS OF THE BRIDGE.
2. DRAINAGE AREA DELINEATIONS BASED ON BEST AVAILABLE LIDAR DATA FROM TNRIS 2017.
3. THIS IS AN EXISTING BRIDGE LOCATION THAT WILL BE REPLACED.
4. DISCHARGES DETERMINED USING THE NRCS HYDROGRAPH METHOD APPLYING THE SCS STORM RUNOFF, CURVE NUMBER LOSS METHOD, AND ATLAS 14 RAINFALL DATA.
5. BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH WITH A SLOPE OF 0.0037 FT/FT.
6. THIS BRIDGE IS LOCATED IN FEMA ZONE A.
7. DATUM USED: NAD83 NATIONAL SPATIAL REFERENCE SYSTEM 2011
8. PROJECT DATA IMPACTING FEMA ZONE AE OR A SENT TO LOCAL FLOODPLAIN MANAGER, 07/26/2022.

STATE OF TEXAS
BRADLEY J. RATCLIFF
133286
LICENSED
PROFESSIONAL ENGINEER
9/7/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

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US 87 AT CLIFTON BRANCH
HYDRAULIC DATA
CLIFTON BRANCH

SHEET 1 OF 5

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US 87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	87

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HEC-RAS Table 1: US 87 Clifton Branch													
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2	20073	10% ATLAS 14	Corrected Existing	2580	392.08	402.66		402.8	0.000673	3.31	1519.35	765.01	0.21
2	20073	10% ATLAS 14	Proposed	2580	392.08	401.15		401.55	0.00217	5.16	646.02	353.28	0.36
2	20073	4% ATLAS 14	Corrected Existing	4170	392.08	403.96		404.08	0.000639	3.57	2634.49	918.1	0.21
2	20073	4% ATLAS 14	Proposed	4170	392.08	403.25		403.47	0.001101	4.45	2002.78	875.05	0.27
2	20073	1% ATLAS 14	Corrected Existing	7220	392.08	405.19		405.35	0.000833	4.44	3825.89	1009.53	0.24
2	20073	1% ATLAS 14	Proposed	7220	392.08	404.74		404.96	0.001115	4.99	3381.31	986.68	0.28
2	19782	10% ATLAS 14	Corrected Existing	2580	391.72	402.73	398.61	402.74	0.000028	0.7	9166.49	2616.15	0.04
2	19782	10% ATLAS 14	Proposed	2580	391.72	401.33	398.91	401.34	0.000127	1.42	5578.52	2499.12	0.09
2	19782	4% ATLAS 14	Corrected Existing	4170	391.72	404.02	400.01	404.02	0.000028	0.76	12625.97	2739.22	0.04
2	19782	4% ATLAS 14	Proposed	4170	391.72	403.37	400.03	403.37	0.000045	0.98	10851.96	2689.26	0.05
2	19782	1% ATLAS 14	Corrected Existing	7220	391.72	405.26	400.8	405.27	0.00004	0.99	16117.62	2872.26	0.05
2	19782	1% ATLAS 14	Proposed	7220	391.72	404.85	400.56	404.85	0.00005	1.14	14935.14	2826.79	0.06
2	19721	10% ATLAS 14	Corrected Existing	2580	391.6	402.21	398.67	402.61	0.001747	5.41	567.37	2750.44	0.33
2	19721	10% ATLAS 14	Proposed	2580	391.6	400.83	398.85	401.21	0.00226	5.82	713.13	2636.09	0.37
2	19721	4% ATLAS 14	Corrected Existing	4170	391.6	404.02	400.05	404.02	0.000026	0.75	13360.13	2936.69	0.04
2	19721	4% ATLAS 14	Proposed	4170	391.6	403.36	400.15	403.37	0.000042	0.96	11454.17	2898.93	0.05
2	19721	1% ATLAS 14	Corrected Existing	7220	391.6	405.26	402.1	405.27	0.000036	0.96	17064.34	3005.51	0.05
2	19721	1% ATLAS 14	Proposed	7220	391.6	404.85	401.54	404.85	0.000046	1.1	15820.88	2985.62	0.06
2	19690	10% ATLAS 14	Corrected Existing	2580	391.92	402.17	398.31	402.56	0.001605	5.44	576.94	921.1	0.33
2	19690	10% ATLAS 14	Proposed	2580	391.92	400.6	398.38	401.09	0.002815	6.29	552.88	249.17	0.42
2	19690	4% ATLAS 14	Corrected Existing	4170	391.92	403.93	399.85	404	0.000449	3.26	3475	1194.14	0.18
2	19690	4% ATLAS 14	Proposed	4170	391.92	402.57	399.79	403.18	0.002639	7.19	789.39	974.75	0.42
2	19690	1% ATLAS 14	Corrected Existing	7220	391.92	405.15	402.52	405.24	0.000595	4.04	5343.45	1712.26	0.21
2	19690	1% ATLAS 14	Proposed	7220	391.92	404.67	401.56	404.8	0.000906	4.85	4532.04	1664.02	0.26
2	19650			Bridge									
2	19578	10% ATLAS 14	Corrected Existing	2580	389.52	400.15	397.27	400.64	0.00255	5.71	473.66	2509.31	0.39
2	19578	10% ATLAS 14	Proposed	2580	389.52	400.09	397.63	400.5	0.002179	5.69	605.62	2505.59	0.37
2	19578	4% ATLAS 14	Corrected Existing	4170	389.52	401.2	398.58	402.13	0.004004	7.9	554.29	2563.78	0.51
2	19578	4% ATLAS 14	Proposed	4170	389.52	401.14	398.87	401.85	0.003296	7.65	731.37	2562.99	0.46
2	19578	1% ATLAS 14	Corrected Existing	7220	389.52	402.59	400.63	404.56	0.00674	11.46	661.74	2630.58	0.67
2	19578	1% ATLAS 14	Proposed	7220	389.52	402.57	400.6	403.93	0.00526	10.72	902.64	2628.54	0.6
2	18981	10% ATLAS 14	Corrected Existing	2580	387.91	398.89	395.85	399.16	0.002087	4.85	1096.47	1126.79	0.35
2	18981	10% ATLAS 14	Proposed	2580	387.91	398.89	395.85	399.16	0.002087	4.85	1096.47	1126.79	0.35
2	18981	4% ATLAS 14	Corrected Existing	4170	387.91	399.55	398.52	399.9	0.002692	5.9	1634.92	1350.93	0.4
2	18981	4% ATLAS 14	Proposed	4170	387.91	399.55	398.52	399.9	0.002692	5.9	1634.92	1350.93	0.4
2	18981	1% ATLAS 14	Corrected Existing	7220	387.91	400.24	399.66	400.76	0.004069	7.74	2229.78	1437.65	0.5
2	18981	1% ATLAS 14	Proposed	7220	387.91	400.24	399.66	400.76	0.004069	7.74	2229.78	1437.65	0.5

NOTES:

1. HEC-RAS 5.0.7 WAS USED FOR THE HYDRAULIC ANALYSIS OF THE BRIDGE.
2. DRAINAGE AREA DELINEATIONS BASED ON BEST AVAILABLE LIDAR DATA FROM TNRIS 2017.
3. THIS IS AN EXISTING BRIDGE LOCATION THAT WILL BE REPLACED.
4. DISCHARGES DETERMINED USING THE NRCS HYDROGRAPH METHOD APPLYING THE SCS STORM RUNOFF, CURVE NUMBER LOSS METHOD, AND ATLAS 14 RAINFALL DATA.
5. BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH WITH A SLOPE OF 0.0037 FT/FT.
6. THIS BRIDGE IS LOCATED IN FEMA ZONE A.
7. DATUM USED: NAD83 NATIONAL SPATIAL REFERENCE SYSTEM 2011
8. PROJECT DATA IMPACTING FEMA ZONE AE OR A SENT TO LOCAL FLOODPLAIN MANAGER, 07/26/2022.

STATE OF TEXAS
BRADLEY J. RATCLIFF
133286
LICENSED
PROFESSIONAL ENGINEER
9/7/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

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US 87 AT CLIFTON BRANCH
HYDRAULIC DATA
CLIFTON BRANCH

SHEET 2 OF 5

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US 87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	88

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HEC-RAS Table 2: US 87 Clifton Branch 10 YR				
Plan: Proposed Clifton Branch, RS: 19650, Profile: 10% ATLAS 14				
E.G. US. (ft)	401.09	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	400.6	E.G. Elev (ft)	400.97	400.67
Q Total (cfs)	2580	W.S. Elev (ft)	400.29	400.19
Q Bridge (cfs)	2580	Crit W.S. (ft)	398.45	397.61
Q Weir (cfs)		Max Chl Dpth (ft)	8.37	10.19
Weir Sta Lft (ft)		Vel Total (ft/s)	5.56	4.82
Weir Sta Rgt (ft)		Flow Area (sq ft)	464.28	535.39
Weir Submerg		Froude # Chl	0.49	0.39
Weir Max Depth (ft)		Specif Force (cu ft)	1799.25	2155.18
Min El Weir Flow (ft)	403.57	Hydr Depth (ft)	4.32	5.02
Min El Prs (ft)	401.79	W.P. Total (ft)	130.28	131.09
Delta EG (ft)	0.59	Conv. Total (cfs)	35182.7	42648.7
Delta WS (ft)	0.5	Top Width (ft)	107.38	106.74
BR Open Area (sq ft)	624.46	Frctn Loss (ft)	0.2	0.13
BR Open Vel (ft/s)	5.56	C & E Loss (ft)	0.1	0.04
BR Sluice Coef		Shear Total (lb/sq ft)	1.2	0.93
BR Sel Method	Energy only	Power Total (lb/ft s)	6.65	4.5

HEC-RAS Table 3: US 87 Clifton Branch 25 YR				
Plan: Proposed Clifton Branch, RS: 19650, Profile: 4% ATLAS 14				
E.G. US. (ft)	403.18	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	402.57	E.G. Elev (ft)	403.18	401.85
Q Total (cfs)	4170	W.S. Elev (ft)	401.79	401.14
Q Bridge (cfs)	4170	Crit W.S. (ft)	399.95	399.01
Q Weir (cfs)		Max Chl Dpth (ft)	9.87	11.14
Weir Sta Lft (ft)		Vel Total (ft/s)	6.68	6.52
Weir Sta Rgt (ft)		Flow Area (sq ft)	624.46	639.93
Weir Submerg		Froude # Chl	0.45	0.5
Weir Max Depth (ft)		Specif Force (cu ft)	3106.9	3224.13
Min El Weir Flow (ft)	403.57	Hydr Depth (ft)		5.69
Min El Prs (ft)	401.79	W.P. Total (ft)	261.08	140.94
Delta EG (ft)	1.33	Conv. Total (cfs)	34799.6	52990.9
Delta WS (ft)	1.43	Top Width (ft)		112.46
BR Open Area (sq ft)	624.46	Frctn Loss (ft)		
BR Open Vel (ft/s)	6.68	C & E Loss (ft)		
BR Sluice Coef	0.41	Shear Total (lb/sq ft)	2.14	1.76
BR Sel Method	Press Only	Power Total (lb/ft s)	14.32	11.44

HEC-RAS Table 4: US 87 Clifton Branch 100 YR				
Plan: Proposed Clifton Branch, RS: 19650, Profile: 1% ATLAS 14				
E.G. US. (ft)	404.8	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	404.67	E.G. Elev (ft)	404.81	404.65
Q Total (cfs)	7220	W.S. Elev (ft)	404.67	404.38
Q Bridge (cfs)	5993.71	Crit W.S. (ft)	405.39	401.03
Q Weir (cfs)	1226.29	Max Chl Dpth (ft)	12.75	14.38
Weir Sta Lft (ft)	-325.59	Vel Total (ft/s)	7.03	6.99
Weir Sta Rgt (ft)	422.1	Flow Area (sq ft)	1027.5	1033.02
Weir Submerg	0	Froude # Chl	0.53	0.44
Weir Max Depth (ft)	1.24	Specif Force (cu ft)	6257.25	6889.55
Min El Weir Flow (ft)	403.57	Hydr Depth (ft)	1.76	2.05
Min El Prs (ft)	401.79	W.P. Total (ft)	847.99	780.37
Delta EG (ft)	0.87	Conv. Total (cfs)		
Delta WS (ft)	2.1	Top Width (ft)	585.02	502.88
BR Open Area (sq ft)	624.46	Frctn Loss (ft)		
BR Open Vel (ft/s)	9.6	C & E Loss (ft)		
BR Sluice Coef		Shear Total (lb/sq ft)		
BR Sel Method	Press/Weir	Power Total (lb/ft s)		

HEC RAS TABLE 5: HYDRAULIC SUMMARY TABLE
PROPOSED BRIDGE
NBI: 15-247-01430-04-185
Q_{10YR} = 2,580 CFS
HW_{10YR} = 400.60 FT
V_{10YR} = 5.56 FT/S
Q_{25YR} = 4,170 CFS
HW_{25YR} = 402.57 FT
V_{25YR} = 6.68 FT/S
Q_{100YR} = 7,220 CFS
HW_{100YR} = 404.67 FT
V_{100YR} = 7.03 FT/S

NOTES:

1. HEC-RAS 5.0.7 WAS USED FOR THE HYDRAULIC ANALYSIS OF THE BRIDGE.
2. DRAINAGE AREA DELINEATIONS BASED ON BEST AVAILABLE LIDAR DATA FROM TNRIS 2017.
3. THIS IS AN EXISTING BRIDGE LOCATION THAT WILL BE REPLACED.
4. DISCHARGES DETERMINED USING THE NRCS HYDROGRAPH METHOD APPLYING THE SCS STORM RUNOFF, CURVE NUMBER LOSS METHOD, AND ATLAS 14 RAINFALL DATA.
5. BOUNDARY CONDITION WAS BASED ON NORMAL DEPTH WITH A SLOPE OF 0.0037 FT/FT.
6. THIS BRIDGE IS LOCATED IN FEMA ZONE A.
7. DATUM USED: NAD83 NATIONAL SPATIAL REFERENCE SYSTEM 2011.
8. PROJECT DATA IMPACTING FEMA ZONE AE OR A SENT TO LOCAL FLOODPLAIN MANAGER, 07/26/2022.

STATE OF TEXAS
BRADLEY J. RATCLIFF
133286
LICENSED
PROFESSIONAL ENGINEER
9/7/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN-F-1386

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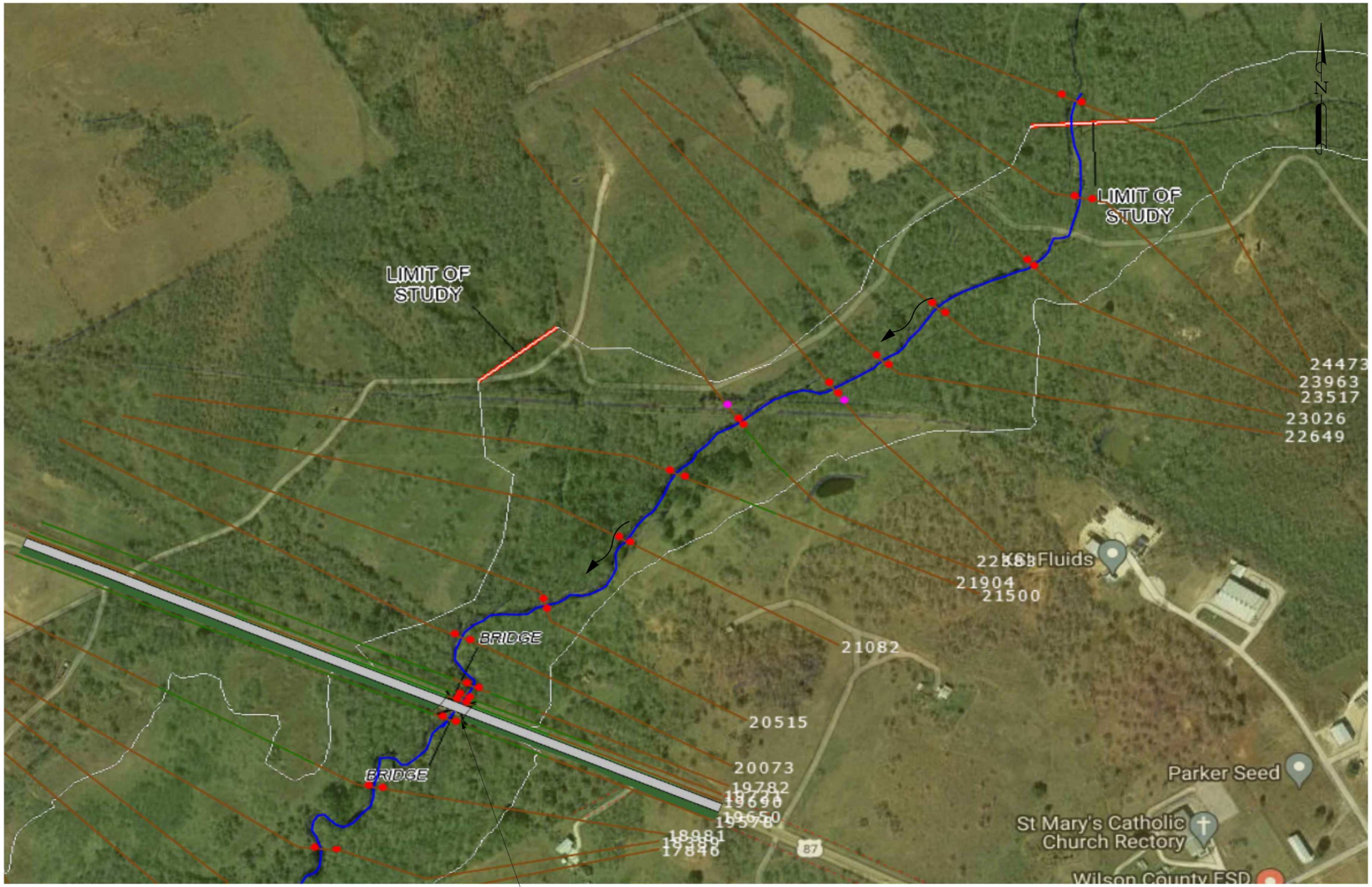
US 87 AT CLIFTON BRANCH
HYDRAULIC DATA
CLIFTON BRANCH

SHEET 3 OF 5

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	89



CLIFTON BRANCH BRIDGE @ US 87

NOTES:

1. HEC-RAS 5.0.7 WAS USED FOR THE HYDRAULIC ANALYSIS OF THE BRIDGE.
2. DRAINAGE AREA DELINEATIONS BASED ON BEST AVAILABLE LIDAR DATA FROM TNRIS 2017.
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8. PROJECT DATA IMPACTING FEMA ZONE AE OR A SENT TO LOCAL FLOODPLAIN MANAGER, 07/26/2022.

STATE OF TEXAS
BRADLEY J. RATCLIFF
133286
LICENSED
PROFESSIONAL ENGINEER
9/7/2022

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REV. NO.	DATE	DESCRIPTION	BY

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FRN - F-1386

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US 87 AT CLIFTON BRANCH
HYDRAULIC DATA
CLIFTON BRANCH

SHEET 4 OF 5

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	90

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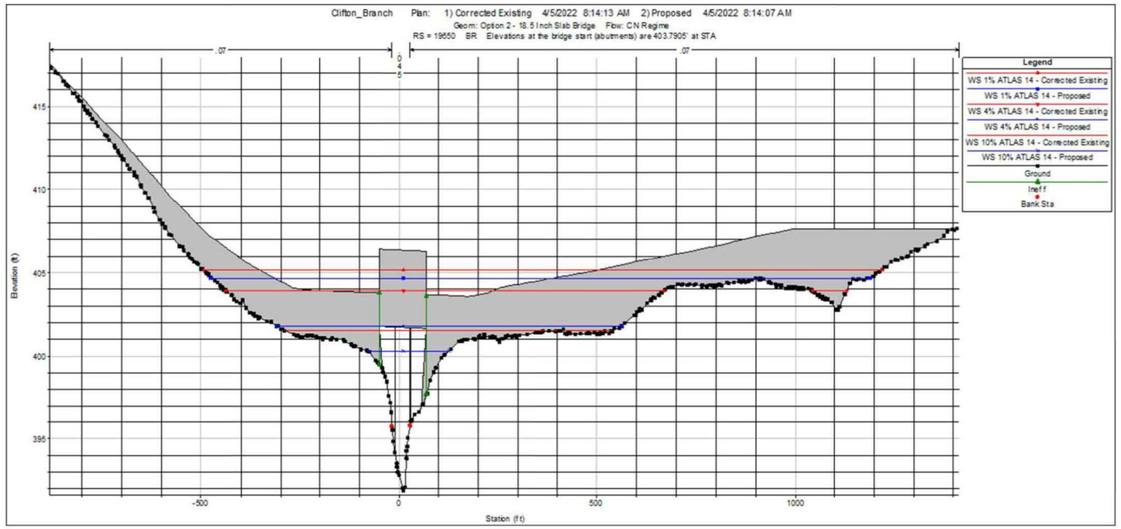

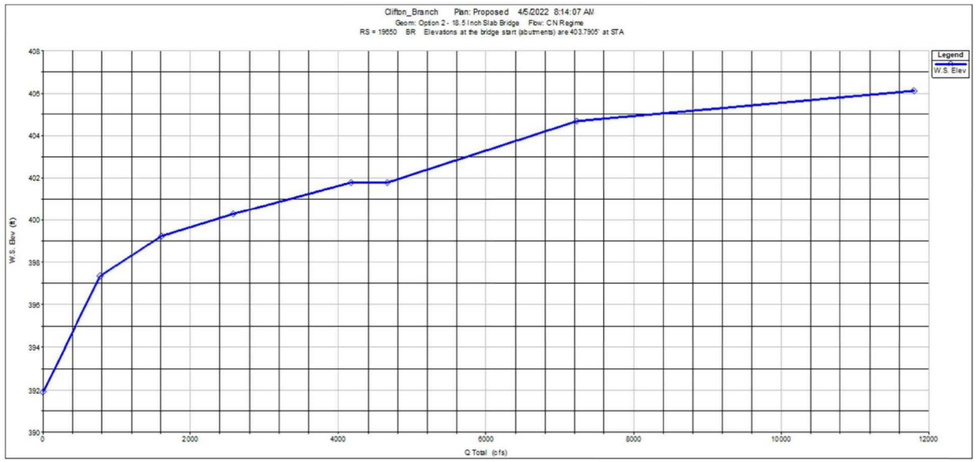

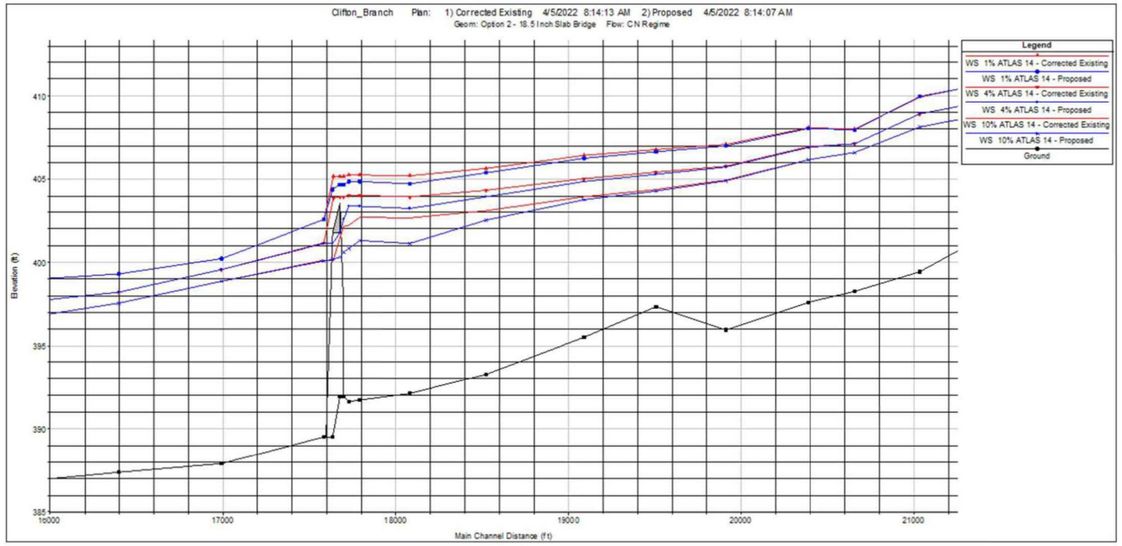

NOTES:

1. HEC-RAS 5.0.7 WAS USED FOR THE HYDRAULIC ANALYSIS OF THE BRIDGE.
2. DRAINAGE AREA DELINEATIONS BASED ON BEST AVAILABLE LIDAR DATA FROM TNRIS 2017.
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6. THIS BRIDGE IS LOCATED IN FEMA ZONE A.
7. DATUM USED: NAD83 NATIONAL SPATIAL REFERENCE SYSTEM 2011.
8. PROJECT DATA IMPACTING FEMA ZONE AE OR A SENT TO LOCAL FLOODPLAIN MANAGER, 07/26/2022.

STATE OF TEXAS
BRADLEY J. RATCLIFF
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9/7/2022

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US 87 AT CLIFTON BRANCH
HYDRAULIC DATA
CLIFTON BRANCH

SHEET 5 OF 5

FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	91

DRILLING LOG

WinCore Version 3.3

County	Wilson	Hole	B-1	District	San Antonio
Highway	US 87	Structure	Bridge	Date	02/08/22 and 02/11/22
CSJ	0143-04-072	Station	924+46.68	Grnd. Elev.	403.27 ft
		Offset	11.38 ft RT	GW Elev.	388.47 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
401.6			ASPHALT (8.5"), BASE (12")			10	23	8		SSS@1', N=20 (16, 13, 7, 6) -#200=27.4%
			FILL: SAND, Clayey, moist, dark brown, fine grained (SC)			11	23	8		SSS@3', N=5 (4, 2, 3, 2), -#200=29.0%
398.3	5	3 (6) 4 (6)	SAND, Clayey, very loose, moist, dark brown, fine grained (SC)			16	29	14		SSS@6.5', N=6, -#200=36.8%
						22				SSS@8', N=14 (3, 6, 8, 8)
394.8						18				-#200=34.8%
	10	8 (6) 12 (6)	SAND, Clayey, loose, moist, light brown and gray, fine grained (SC)			19				SSS@11.5', N=13
						19	29	14		SSS@13', N=18 (5, 6, 12, 15), -#200=24.1% Sulfate Content=526 ppm
388.3	15	17 (6) 24 (6)	SAND, Clayey, compact, moist, light brown and gray, fine grained (SC)			20				SSS@16.5', N=30
383.3	20	40 (6) 50 (5.25)	SAND, Clayey, dense, wet, dark gray, fine grained (SC)			25	27	12		SSS@21.2', N=62, -#200=24.1%
	25	50 (3.75) 50 (3)				35				SSS@25.7', N=25
377.1			CLAY, Fat, very stiff, moist, gray (CH)			31				
	30	24 (6) 24 (6)				28	62	41		SSS@31.4', N=25, -#200=95.2%
						27				
368.3	35	50 (5) 50 (1.5)	SAND, Clayey, dense, wet, dark gray, fine grained; CH layer from 35.7' to 36.2' (SC)			28				SSS@35.7', N=20, 50/5.5
						19				
363.8	40	50 (2.25) 50 (0.5)								

Remarks: Drill Rig: CME 75 with 170-pound TxDOT Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: Mud Rotary; Backfilled with Flowable Backfill and Asphalt; Northing: 13637839.80, Easting: 2292850.29; Groundwater measurement obtained from companion boring.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Micah Klempel **Logger:** Ali Murad **Organization:** Corsair Consulting LLC

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DRILLING LOG

WinCore Version 3.3

County	Wilson	Hole	B-1	District	San Antonio
Highway	US 87	Structure	Bridge	Date	02/08/22 and 02/11/22
CSJ	0143-04-072	Station	924+46.68	Grnd. Elev.	403.27 ft
		Offset	11.38 ft RT	GW Elev.	388.47 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, Silty, very dense, wet, gray, fine grained (SM)			23				SSS@40.4', N=50/5.5
45		50 (4.25) 50 (0.75)				27				SSS@45.7', N=30, 42, 28/1.75, -#200=26.3%
50		50 (2.5) 50 (1.75)				25				SSS@50.5', N=30, 50/5
55		50 (1) 50 (0.25)								SSS@55.2', N=50/5.5
60		50 (1.25) 50 (0.5)								SSS@60.3', N=50/2.5
										SSS@62', N=50/5
65		50 (1) 50 (0.75)								SSS@65.2', N=50/2
70		50 (1.25) 50 (0.5)								SSS@70.3', N=50/3
75		50 (0.5) 50 (0.25)								SSS@75.1', N=50/2
323.3	80	50 (0.75) 50 (0.5)								Boring Terminated at 80.2'

Remarks: Drill Rig: CME 75 with 170-pound TxDOT Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: Mud Rotary; Backfilled with Flowable Backfill and Asphalt; Northing: 13637839.80, Easting: 2292850.29; Groundwater measurement obtained from companion boring.

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Micah Klempel **Logger:** Ali Murad **Organization:** Corsair Consulting LLC

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STATE OF TEXAS
MIN HO RHEE
128342
LICENSED
PROFESSIONAL ENGINEER
9/6/2022

REV. NO.	DATE	DESCRIPTION	BY

CORSAIR CONSULTING LLC
TBPE Registration No. F-14217

US 87 AT CLIFTON BRANCH

BORING LOG

CLIFTON BRANCH BRIDGE AT US 87

SHEET 1 OF 4

DSN	TB	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
CHK	LNH	6	SEE TITLE SHEET		92
		STATE	DIST.	COUNTY	
DRN	AM	TEXAS	SAT	WILSON	
		CONT.	SECT.	JOB	HIGHWAY NO.
CHK	TB	0143	04	072	US 87

DRILLING LOG

WinCore Version 3.3

County	Wilson	Hole	B-2	District	San Antonio
Highway	US 87	Structure	Bridge	Date	02/11/22
CSJ	0143-04-072	Station	924+95.48	Grnd. Elev.	394.61 ft
		Offset	36.20 ft LT	GW Elev.	387.31 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, Clayey, moist, brown to dark brown, fine to coarse grained, few Gravel (SC)			13				SSS@0', N=7
						13				SSS@1.5', N=10
						16	41	23		SSS@3', N=11 (3, 4, 7, 7), -#200=26.7%
389.6		8 (6) 7 (6)								
5			SAND, Clayey, loose, moist, brown and gray, fine grained (SC)			20				SSS@6.5', N=16
						20	31	15		SSS@8', N=23, -#200=23.3% Sulfate Content<100 ppm
384.6		50 (3.5) 50 (2.75)								
10			SAND, Clayey, dense, wet, gray, brown and reddish brown, fine grained (SC)			22				SSS@10.7', N=54
381.6			SAND, Silty, dense, wet, brown, fine grained (SM)			26				SSS@13', N=30, -#200=15.7%
15		41 (6) 50 (4.25)								
						26				SSS@16.1', N=57
376.6			CLAY, Fat, very stiff, moist, gray (CH)							
20		36 (6) 31 (6)								
						26				SSS@21.4', N=23
25		26 (6) 30 (6)								
						25	54	34		SSS@26.3', N=68, -#200=95.9%
364.6		50 (1.75) 50 (0.75)								
30			SAND, Silty, very dense, wet, gray, fine grained (SM)			25				SSS@30.4', N=39, 50/3.75
35		50 (1.25) 50 (0.75)								
						28				SSS@35.3', N=42, 50/5.75
40		50 (1.75) 50 (0.75)								

Remarks: Drill Rig: CME 75 with 170-pound TxDOT Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 10', then Mud Rotary; Backfilled with Bentonite; Northing: 13637864.36, Easting: 2292913.87

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Nolan Hilbig **Logger: Roshan Chaulagain** **Organization: Corsair Consulting LLC**

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DRILLING LOG

WinCore Version 3.3

County	Wilson	Hole	B-2	District	San Antonio
Highway	US 87	Structure	Bridge	Date	02/11/22
CSJ	0143-04-072	Station	924+95.48	Grnd. Elev.	394.61 ft
		Offset	36.20 ft LT	GW Elev.	387.31 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test Lateral Press. (psi)	Triaxial Test Deviator Stress (psi)	Properties MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, Silty, very dense, wet, gray, fine grained (SM)			28				SSS@40.4', N=36, 50/5.25
45		50 (2.5) 50 (0.75)								
						28				SSS@45.5', N=31, 50/5.5, -#200=24.9%
50		50 (1.25) 50 (0.5)								
						22				SSS@50.2', N=50/1.5
55		50 (0.75) 50 (0.25)								
						26				SSS@55.2', N=48, 50/4.25
60		50 (0.75) 50 (0.25)								
						28				SSS@60.2', N=43, 50/4.25
65		50 (1.25) 50 (0.25)								
						28				SSS@65.2', N=50/5.75
70		50 (0.5) 50 (0.25)								
						27				SSS@70.1', N=50/4.25
75		50 (0.25) 50 (0.25)								
						23				SSS@75.1', N=50/5.5
314.6		50 (0.75) 50 (0.75)								Boring Terminated at 80.3'
80										

Remarks: Drill Rig: CME 75 with 170-pound TxDOT Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 10', then Mud Rotary; Backfilled with Bentonite; Northing: 13637864.36, Easting: 2292913.87

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Nolan Hilbig **Logger: Roshan Chaulagain** **Organization: Corsair Consulting LLC**

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STATE OF TEXAS
MIN HO RHEE
128342
LICENSED
PROFESSIONAL ENGINEER
9/6/2022

REV. NO.	DATE	DESCRIPTION	BY

CORSAIR CONSULTING LLC
TBPE Registration No. F-14217

US 87 AT CLIFTON BRANCH

BORING LOG

CLIFTON BRANCH BRIDGE AT US 87

SHEET 2 OF 4

		FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DSN	TB	6	SEE TITLE SHEET	93
CHK	LNH	STATE	DIST.	COUNTY
DRN	AM	TEXAS	SAT	WILSON
CHK	TB	CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87

DRILLING LOG

WinCore
Version 3.3

County	Wilson	Hole	B-3	District	San Antonio
Highway	US 87	Structure	Bridge	Date	02/10/22
CSJ	0143-04-072	Station	925+51.83	Grnd. Elev.	403.15 ft
		Offset	15.35 ft RT	GW Elev.	388.15 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
402.2			ASPHALT (5"), BASE (7.5")							
			FILL: SAND, Clayey, moist, brown, dark brown and gray, fine grained (SC)			12	25	10		SSS@1.7', N=13, -#200=34.3%
						12				SSS@3.5', N=7
398.2	5	6 (6) 5 (6)	SAND, Clayey, very loose to loose, moist to wet, dark brown to 13', brown thereafter, fine grained (SC)			14				SSS@6.5', N=4
						15	26	11		PTS@8', PP=1.75, -#200=31.2% Sulfate Content<100 ppm
	10	5 (6) 2 (6)				21				SSS@11.5', N=6
						21	43	25		PTS@13', PP=0.5, -#200=22.9%
388.2	15	9 (6) 20 (6)	SAND, Clayey, slightly compact, wet, light gray, fine grained, trace ferrous staining (SC)			21				SSS@16.5', N=18
383.2	20	50 (1.5) 50 (0.5)	SAND, Silty, very dense, wet, brown to dark gray, fine grained, few CH lenses to 21.6' (SM)			25				SSS@20.3', N=34, 35, 31/4
	25	50 (2.25) 50 (0.5)				24				SSS@25.4', N=43, 50/5, -#200=16.2%
376.2			CLAY, Fat, very stiff, moist, gray (CH)							
	30	28 (6) 19 (6)				28				SSS@31.4', N=17
368.2	35	50 (3.5) 50 (2.25)	CLAY, Fat, hard, moist, gray (CH)			24				SSS@35.7', N=56
363.2	40	50 (0.5) 50 (0.25)								

Remarks: Drill Rig: CME 75 with 170-pound TxDOT Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 15', then Mud Rotary; Backfilled with Flowable Backfill and Asphalt; Northing: 13637794.81, Easting: 2292945.41

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Nolan Hilbig **Logger:** Ahmed Tanveer / Roshan Chaulagain **Organization:** Corsair Consulting LLC

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DRILLING LOG

WinCore
Version 3.3

County	Wilson	Hole	B-3	District	San Antonio
Highway	US 87	Structure	Bridge	Date	02/10/22
CSJ	0143-04-072	Station	925+51.83	Grnd. Elev.	403.15 ft
		Offset	15.35 ft RT	GW Elev.	388.15 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, Silty, very dense, wet, gray, fine grained (SM)			24				SSS@40.2', N=50/5.5
45		50 (0.75) 50 (0.25)								SSS@45.2', N=50/4.25
50		50 (2.5) 50 (0.75)				26				SSS@50.4', N=31, 50/6, -#200=29.7%
55		50 (2.25) 50 (0.25)								SSS@55.4', N=40, 50/3.75
60		50 (0.75) 50 (0.25)				27				SSS@60.2', N=50/3.25
65		50 (0.75) 50 (0.25)								SSS@65.1', N=50/4.25
70		50 (0.5) 50 (0.25)								SSS@70.1', N=50/3.5
75		50 (1.25) 50 (0.5)								SSS@75.2', N=50/4.25
323.2	80	50 (1.25) 50 (0.25)								Boring Terminated at 80.2'

Remarks: Drill Rig: CME 75 with 170-pound TxDOT Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 15', then Mud Rotary; Backfilled with Flowable Backfill and Asphalt; Northing: 13637794.81, Easting: 2292945.41

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Nolan Hilbig **Logger:** Ahmed Tanveer / Roshan Chaulagain **Organization:** Corsair Consulting LLC

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STATE OF TEXAS
MIN HO RHEE
128342
LICENSED
PROFESSIONAL ENGINEER
9/6/2022

REV. NO.	DATE	DESCRIPTION	BY

CORSAIR CONSULTING LLC
TBPE Registration No. F-14217

US 87 AT CLIFTON BRANCH

BORING LOG

CLIFTON BRANCH BRIDGE AT US 87

SHEET 3 OF 4

		FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DSN	TB	6	SEE TITLE SHEET		94
CHK	LNH	STATE	DIST.	COUNTY	
DRN	AM	TEXAS	SAT	WILSON	
CHK	TB	CONT.	SECT.	JOB	HIGHWAY NO.
		0143	04	072	US 87

DRILLING LOG

WinCore Version 3.3

County	Wilson	Hole	B-4	District	San Antonio
Highway	US 87	Structure	Bridge	Date	02/09/22
CSJ	0143-04-072	Station	925+83.69	Grnd. Elev.	403.21 ft
		Offset	14.47 ft LT	GW Elev.	388.71 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
401.5			ASPHALT (8.75"), BASE (11.75")			18	35	18		SSS@1', N=26 (14, 16, 10, 9) -#200=41.0%
			FILL: SAND, Clayey, moist, reddish brown and light brown, fine grained, trace ferrous staining (SC)			15	35	19		SSS@3', N=16 (5, 6, 10, 9), -#200=40.3%
398.2 5		16 (6) 15 (6)								
			SAND, Clayey, slightly compact, moist, dark brown from 6.8'to 8', light gray from 11.5' to 13', reddish brown and light gray thereafter, fine grained, trace ferrous staining below 8' (SC)			13	41	23		SSS@6.5', N=13, -#200=41.3%
				0	34.4	18	42	24	131	PTS@8', PP=4.5+, -#200=49.8% Sulfate Content=7,760 ppm
10		12 (6) 12 (6)								
						18				SSS@11.5', N=20
						16				SSS@13', N=21
388.2 15		30 (6) 42 (6)								
			SAND, Silty, compact, wet, brown, fine grained (SM)			21				SSS@16.4', N=68, -#200=18.4%
383.2 20		50 (2.25) 50 (0.75)				22				SSS@20.4', N=28, 42, 30/4.25
			SAND, Silty, very dense, wet, brown and dark gray, fine grained (SM)							
25		50 (3.25) 50 (1.75)				23				SSS@25.6', N=38, 50/5.5
375.2			CLAY, Fat, very stiff, moist, gray (CH)							
30		35 (6) 22 (6)				30				SSS@31.2', N=19
368.2 35		50 (4.75) 50 (4.75)								
			CLAY, Fat, hard, moist, gray (CH)			24	66	45		SSS@36', N=47, -#200=96.4%
363.2 40		50 (1) 50 (0.25)								

Remarks: Drill Rig: CME 75 with 170-pound TxDOT Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 15', then Mud Rotary; Backfilled with Flowable Backfill and Asphalt; Northing: 13637809.71, Easting: 2292986.43

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Nolan Hilbig **Logger:** Ahmed Tanveer / Roshan Chaulagain **Organization:** Corsair Consulting LLC

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DRILLING LOG

WinCore Version 3.3

County	Wilson	Hole	B-4	District	San Antonio
Highway	US 87	Structure	Bridge	Date	02/09/22
CSJ	0143-04-072	Station	925+83.69	Grnd. Elev.	403.21 ft
		Offset	14.47 ft LT	GW Elev.	388.71 ft

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test: Lateral Press. (psi)	Triaxial Test: Deviator Stress (psi)	Properties: MC	LL	PI	Wet Den. (pcf)	Additional Remarks
			SAND, Silty, very dense, wet, gray, fine grained (SM)							SSS@40.2', N=50/5.75
45		50 (1) 50 (0.25)				27				SSS@45.2', N=50/5.75
50		50 (2.25) 50 (0.75)								SSS@50.4', N=36, 50/6
55		50 (2.25) 50 (1.25)				26				SSS@55.4', N=33, 50/5.5, -#200=29.7%
60		50 (0.75) 50 (0.25)								SSS@60.2', N=50/5.75
65		50 (0.5) 50 (0.25)				28				SSS@65.2', N=50/5.75
70		50 (0.75) 50 (0.25)								SSS@70.2', N=50/5.5
75		50 (0.75) 50 (0.25)				24				SSS@75.1', N=50/3.75
323.2 80		50 (0.75) 50 (0.25)								Boring Terminated at 80.2'

Remarks: Drill Rig: CME 75 with 170-pound TxDOT Automatic Hammer; SSS: Split Spoon Sample; PTS: Push Tube Sample; PP: Pocket Penetrometer Reading (tsf); Drilling Method: CFA to 15', then Mud Rotary; Backfilled with Flowable Backfill and Asphalt; Northing: 13637809.71, Easting: 2292986.43

Any ground water elevation information provided on this boring log is representative of conditions existing on the day and for the specific location where this information was collected. The actual groundwater elevation may fluctuate due to time, climatic conditions, and/or construction activity.

Driller: Nolan Hilbig **Logger:** Ahmed Tanveer / Roshan Chaulagain **Organization:** Corsair Consulting LLC

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STATE OF TEXAS
MIN HO RHEE
128342
LICENSED
PROFESSIONAL ENGINEER
9/6/2022

REV. NO.	DATE	DESCRIPTION	BY

CORSAIR CONSULTING LLC
TBPE Registration No. F-14217

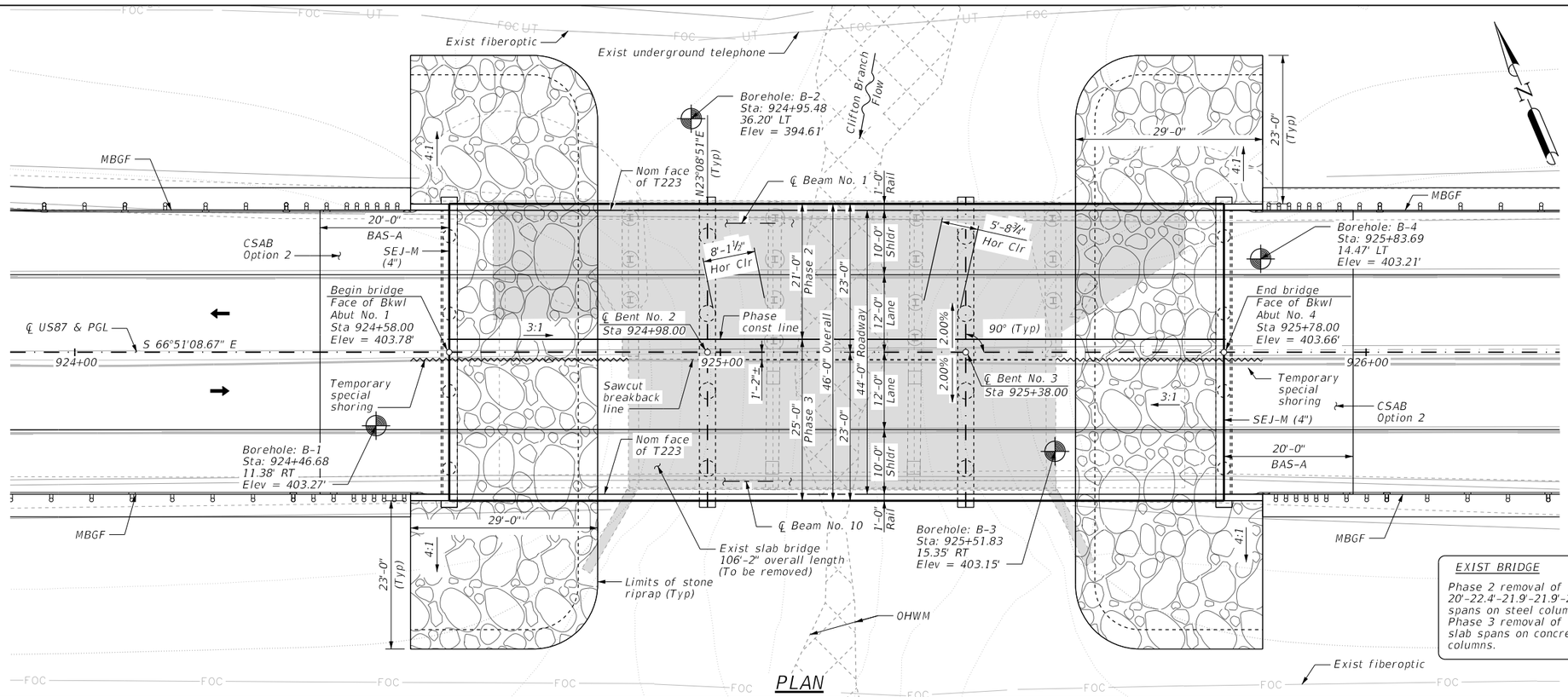
US 87 AT CLIFTON BRANCH

BORING LOG

CLIFTON BRANCH BRIDGE AT US 87

SHEET 4 OF 4

		FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DSN	TB	6	SEE TITLE SHEET	95
CHK	LNH	STATE	DIST.	COUNTY
DRN	AM	TEXAS	SAT	WILSON
CHK	TB	CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87



PLAN

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

⊕ – Denotes approximate soil boring location See boring logs for test hole information.

▭ – Exist bridge to be removed. Remove existing foundation at least 2' below finished grade elevation. Bridge will be removed in phases. See "BRIDGE PHASED CONSTRUCTION" for phases of existing bridge removal. Remove bridge in accordance with Item 496 "REMOVING STRUCTURES".

▨ – OHWM

The "H" values shown are estimated column heights. Contractor is responsible for calculating the actual column heights based on field conditions.

Contractor will verify the location and depth of all utilities prior to construction or fabrication.

For bridge typical sections see "BRIDGE PHASED CONSTRUCTION" sheets.

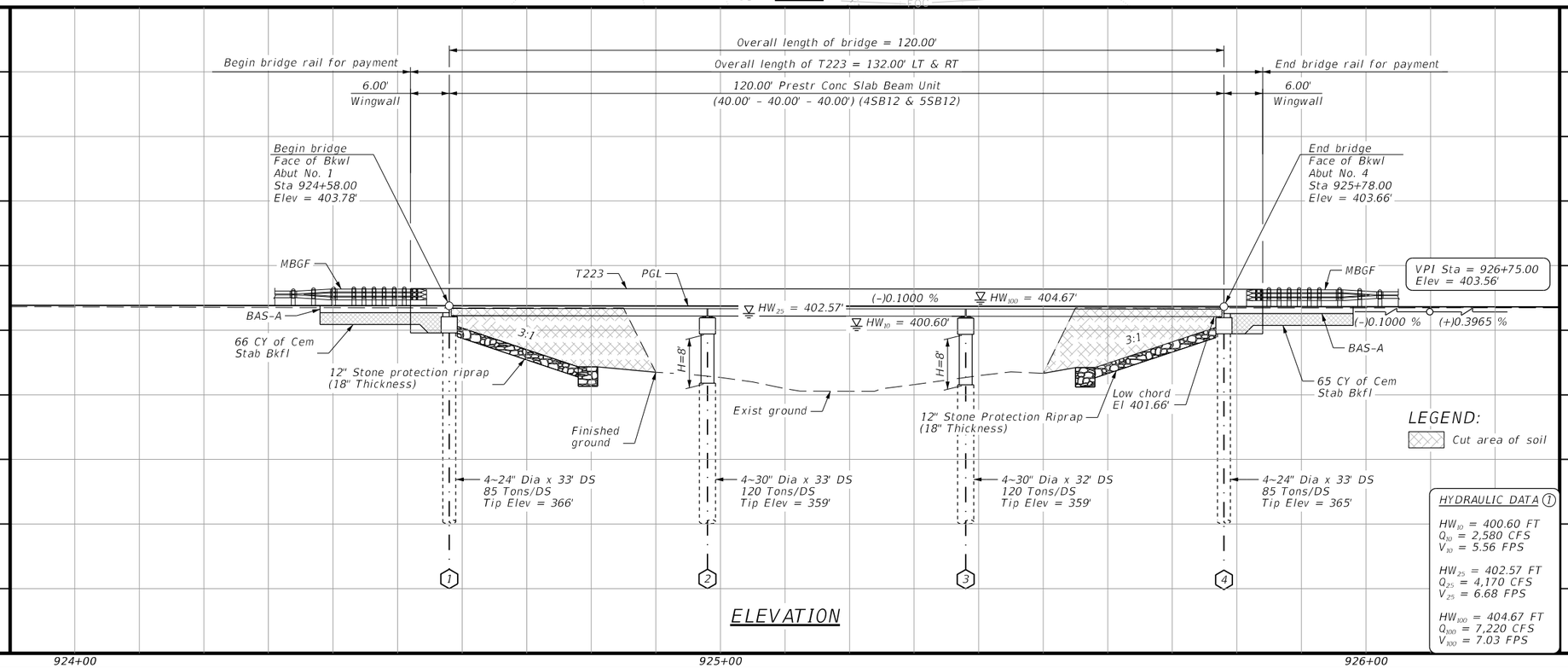
① The passing design storm is the 10 yr. 25 yr and 100 yr are provided for reference only.

EXIST BRIDGE

Phase 2 removal of 20'-22.4'-21.9'-21.9'-20' slab spans on steel columns.
Phase 3 removal of 3 ~ 22' slab spans on concrete columns.

Exist NBI: 15-247-0-0143-04-010
Prop NBI: 15-247-0-0143-04-185
Functional Class: Principal Arterial
Design Speed: 70 MPH
ADT (2024): 10,400
ADT (2044): 15,300

0' 10' 20' 40'
SCALE: 1"=20'
HL93 LOADING



ELEVATION

LEGEND:

▨ Cut area of soil

HYDRAULIC DATA ①

HW_{10} = 400.60 FT
Q_{10} = 2,580 CFS
V_{10} = 5.56 FPS

HW_{25} = 402.57 FT
Q_{25} = 4,170 CFS
V_{25} = 6.68 FPS

HW_{100} = 404.67 FT
Q_{100} = 7,220 CFS
V_{100} = 7.03 FPS

STATE OF TEXAS
LORI NEUWIRTH-HIRSCH
115919
LICENSED
PROFESSIONAL ENGINEER

Lori Neuwirth-Hirsch
10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

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FRN - F-1386

US 87 AT CLIFTON BRANCH

BRIDGE LAYOUT

CLIFTON BRANCH BRIDGE AT US 87

		FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DSN	BZ	6	SEE TITLE SHEET	96
CHK	LNH	STATE	DIST.	COUNTY
DRN	GZ	TEXAS	SAT	WILSON
CHK	BZ	CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87

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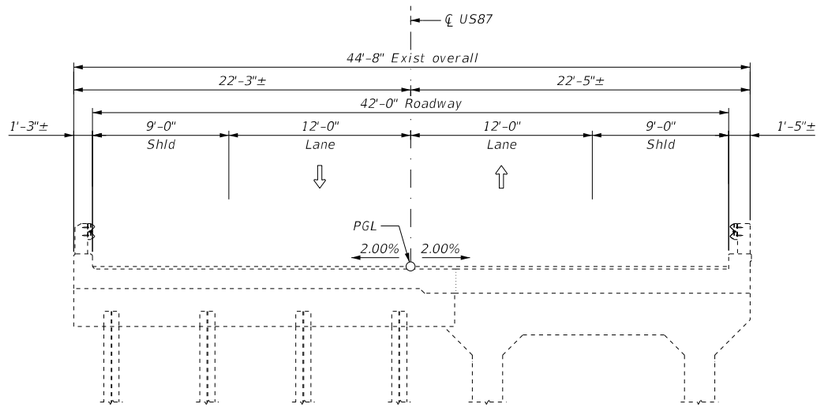
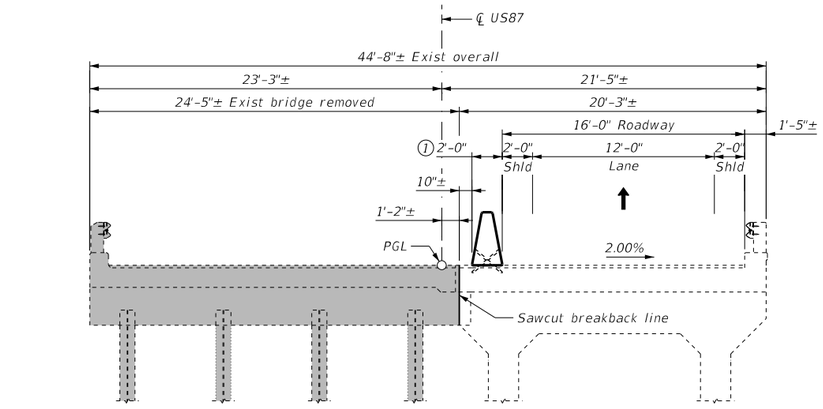
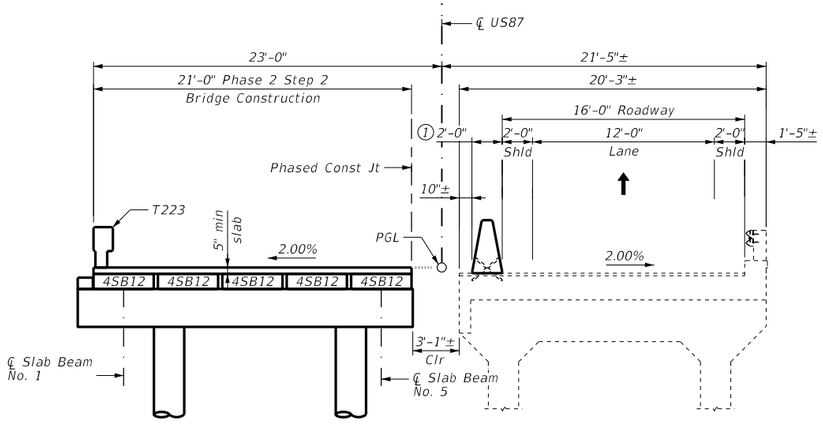


EXIST TYPICAL SECTION



PHASE 2 TYPICAL SECTION

(Bridge Removal)



PHASE 2 TYPICAL SECTION

(Bridge Construction)

LEGEND:

- Existing bridge structure
- Existing structure to be removed this phase
- Constructed previous phase
- New construction phase

ⓘ PSSCB w/ cross pin & drain slot

0' 5' 10' 20'

SCALE: 1"=10'

HL93 LOADING

STATE OF TEXAS
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PROFESSIONAL ENGINEER

Lori Neuwirth-Hirsch

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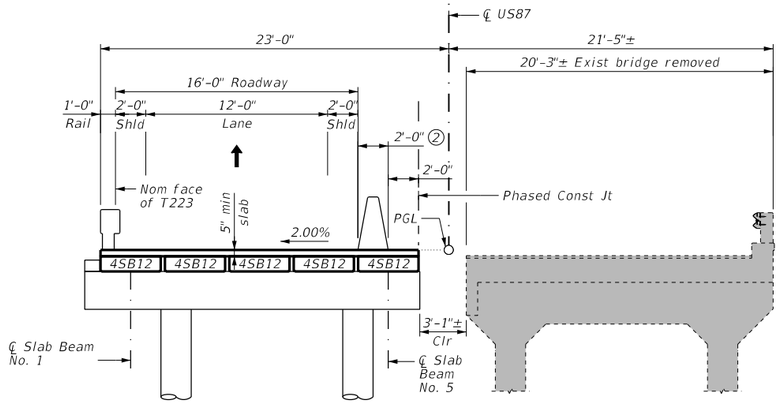
US 87 AT CLIFTON BRANCH

BRIDGE PHASED CONSTRUCTION

CLIFTON BRANCH BRIDGE
AT US 87

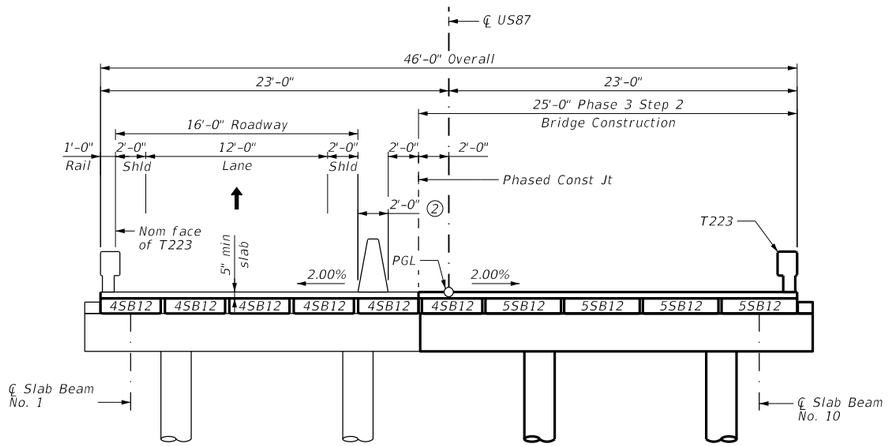
SHEET 1 OF 2

		FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DSN	BZ	6	SEE TITLE SHEET	97
CHK	LNH	STATE	DIST.	COUNTY
DRN	GZ	TEXAS	SAT	WILSON
CHK	BZ	CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87



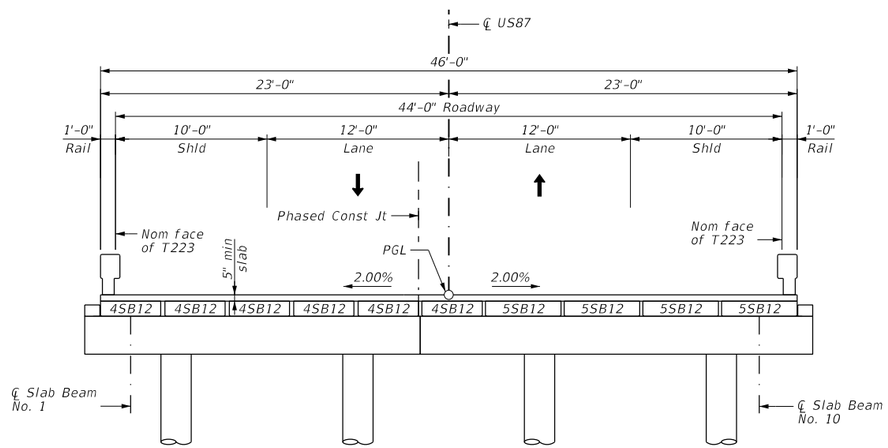
PHASE 3 TYPICAL SECTION

(Bridge Removal)



PHASE 3 TYPICAL SECTION

(Bridge Construction)



COMPLETE BRIDGE TYPICAL SECTION

LEGEND:

- Existing bridge structure
- Existing structure to be removed this phase
- Constructed previous phase
- New construction phase

② PSSCB w/ drain slot

0′ 5′ 10′ 20′

SCALE: 1"=10′

HL93 LOADING

STATE OF TEXAS
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115919
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PROFESSIONAL ENGINEER

Lori Neuwirth-Hirsch

10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

US 87 AT CLIFTON BRANCH

BRIDGE PHASED CONSTRUCTION

CLIFTON BRANCH BRIDGE AT US 87

SHEET 2 OF 2

		FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DSN	BZ	6	SEE TITLE SHEET		98
CHK	LNH	STATE	DIST.	COUNTY	
DRN	GZ	TEXAS	SAT	WILSON	
CHK	BZ	CONT.	SECT.	JOB	HIGHWAY NO.
		0143	04	072	US 87

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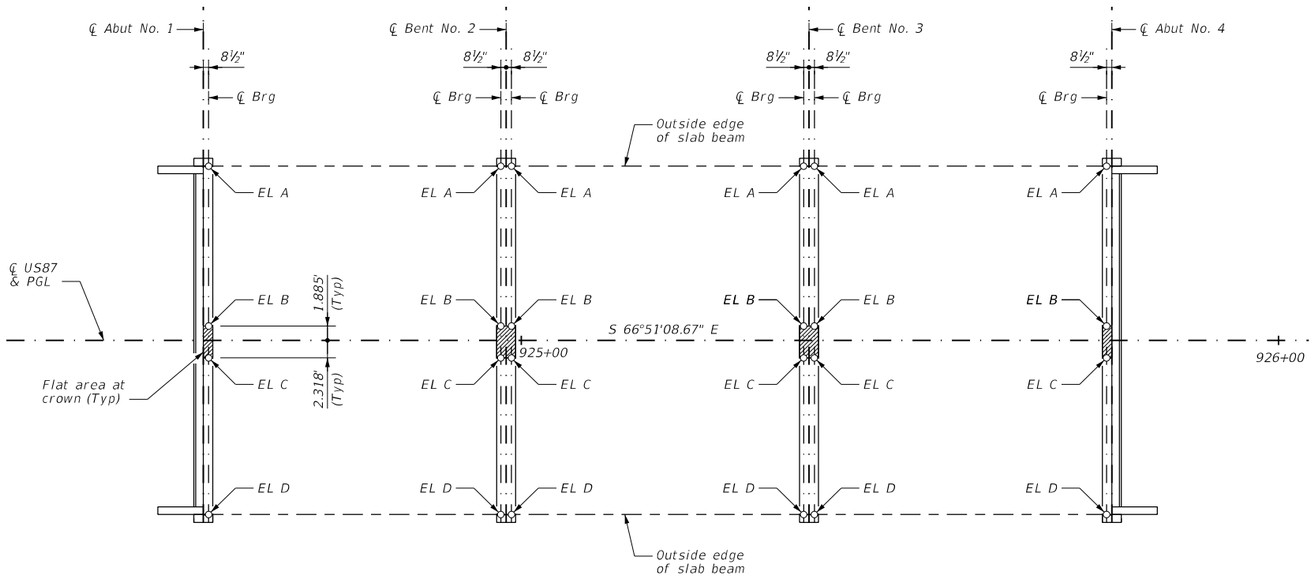
SUMMARY OF BRIDGE QUANTITIES

	ITEM	400	403	416	416	420	420	420	422	422	425	425	432	450	454	4171
	DESCRIPTION CODE	6005	6001	6002	6003	6013	6029	6037	6007	6015	6009	6010	6031	6006	6018	6001
	ITEM DESCRIPTION	CEM STABIL BKFL	TEMPORARY SPL SHORING	DRILL SHAFT (24 IN)	DRILL SHAFT (30 IN)	CL C CONC (ABUT)	CL C CONC (CAP)	CL C CONC (COLUMN)	REINF CONC SLAB (SLAB BEAM)	APPROACH SLAB	PRESTR CONC SLAB BEAM (4SB12)	PRESTR CONC SLAB BEAM (5SB12)	RIPRAP (STONE PROTECTION) (12 IN)	RAIL (TY T223)	SEALED EXPANSION JOINT (4 IN) (SEJ - M)	INSTALL BRIDGE IDENTIFICATION NUMBERS
		CY	SF	LF	LF	CY	CY	CY	SF	CY	LF	LF	CY	LF	LF	EA
PHASE 2	2 ~ ABUTMENTS	60	428	132		12.8										
	2 ~ BENTS				130		10.4	3.8								
	120' PRESTR CONC SLAB BEAM UNIT								2,520	32.1	592.50		143	132.0	42	1
	PHASE 2 SUBTOTAL	60	428	132	130	12.8	10.4	3.8	2,520	32.1	592.50	0.00	143	132.0	42	1
PHASE 3	2 ~ ABUTMENTS	71		132		14.6										
	2 ~ BENTS				130		12.2	3.8								
	120' PRESTR CONC SLAB BEAM UNIT								3,000	38.5	118.50	474.00	171	132.0	50	
	PHASE 3 SUBTOTAL	71	0	132	130	14.6	12.2	3.8	3,000	38.5	118.50	474.00	171	132.0	50	0
	TOTAL	131	428	264	260	27.4	22.6	7.6	5,520	70.6	711.00	474.00	314	264.0	92	1



PLAN OF CAP ELEVATIONS

See ABUTMENT NO. 1, ABUTMENT NO. 4, & INTERIOR BENT NO. 2 & 3 sheets for exact location of cap elevations.

Top of Cap Elevations (ft)					
		EL A	EL B	EL C	EL D
Abut No. 1	(FWD)	401.603	402.025	402.025	401.611
Bent No. 2	(BK)	401.563	401.985	401.985	401.571
	(FWD)	401.563	401.985	401.985	401.571
Bent No. 3	(BK)	401.523	401.945	401.945	401.531
	(FWD)	401.523	401.945	401.945	401.531
Abut No. 4	(BK)	401.484	401.906	401.906	401.493

GENERAL NOTES:

For bridge removal pay item, see "SUMMARY OF QUANTITIES" sheets.

STATE OF TEXAS
BASIL M. ZIBDAWI
138455
LICENSED
PROFESSIONAL ENGINEER

10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

US 87 AT CLIFTON BRANCH

ESTIMATED QUANTITIES & CAP ELEVATIONS

CLIFTON BRANCH BRIDGE AT US 87

		FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DSN	BZ	6	SEE TITLE SHEET	99
CHK	LNH	STATE	DIST.	COUNTY
DRN	AM	TEXAS	SAT	WILSON
CHK	BZ	CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87

GENERAL NOTES:

Utilities shown are in approximate locations. Contractor must verify location prior to construction and ordering of material.

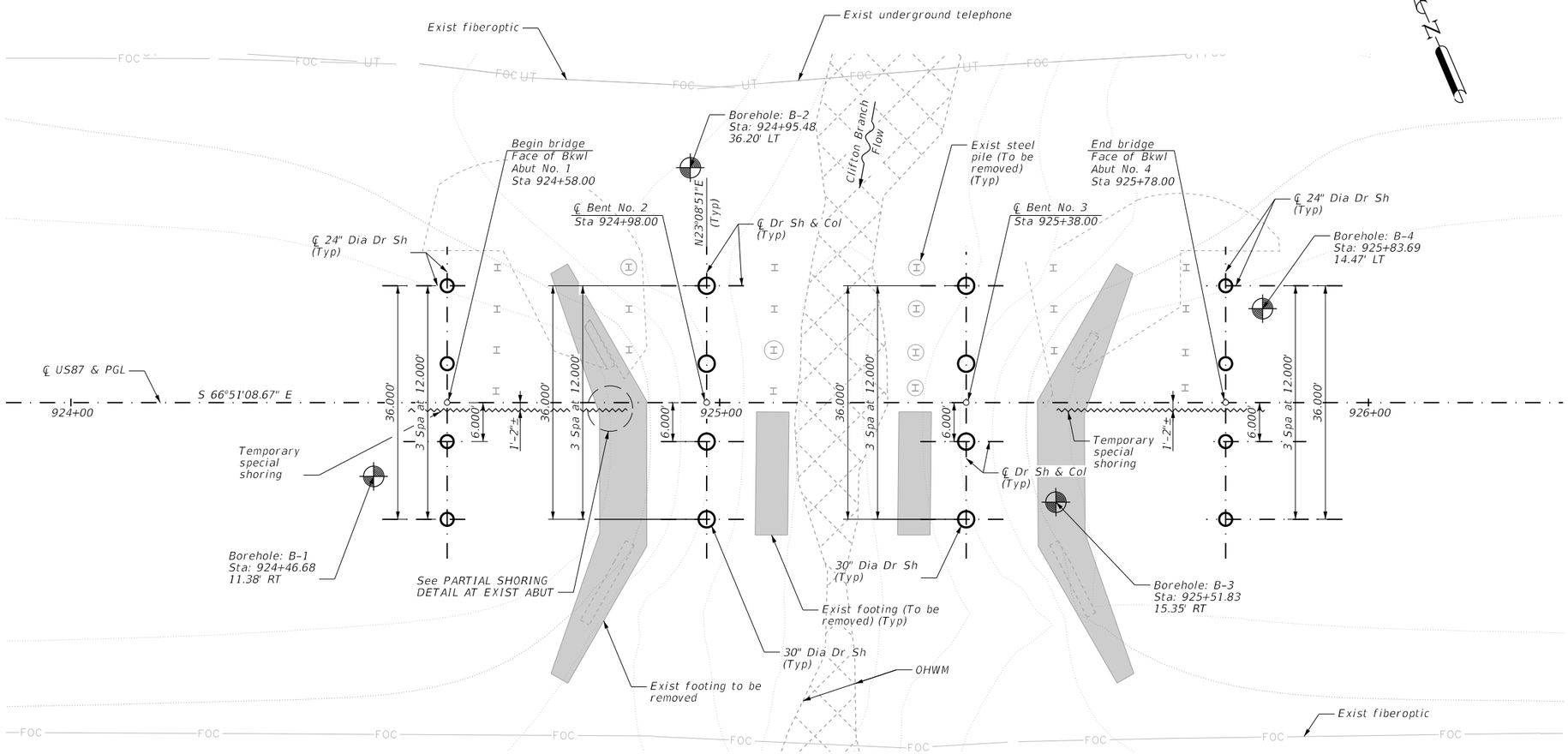
See Common Foundation Details (FD) standard sheet for all structural details and notes not shown.

See BRIDGE LAYOUT sheets for foundation loads and lengths.

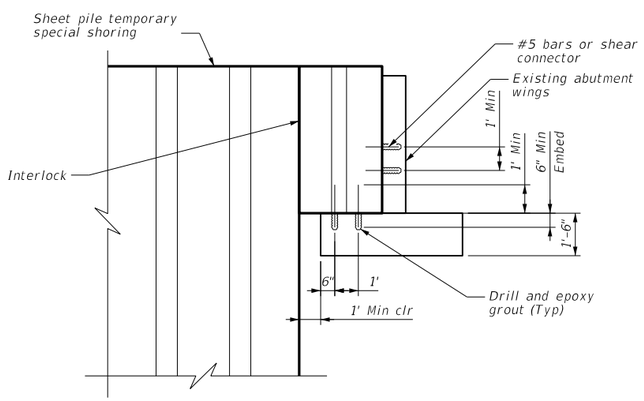
– Denotes approximate soil boring location. See BORING LOG sheets for test hole information.

– Remove existing foundation at least 2' below finished grade elevation. Bridge will be removed in phases. Remove bridge in accodance with Item 496 "REMOVING STRUCTURES".

– OHWM



PLAN



PARTIAL ELEVATION SHORING DETAIL AT EXIST ABUT ⓘ

ⓘ Contractor may propose alternate temporary shoring for engineer's approval. Payment for installation of shoring and shear connectors will be subsidiary to Item 403 6001, "Temporary Special Shoring".

0' 10' 20' 40'

SCALE: 1"=20'

HL93 LOADING

STATE OF TEXAS
LORI NEUWIRTH-HIRSCH
115919
LICENSED
PROFESSIONAL ENGINEER

Lori Neuwirth-Hirsch

10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

US 87 AT CLIFTON BRANCH

FOUNDATION LAYOUT

CLIFTON BRANCH BRIDGE AT US 87

		FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DSN	BZ	6	SEE TITLE SHEET	100
CHK	LNH	STATE	DIST.	COUNTY
DRN	AM	TEXAS	SAT	WILSON
CHK	BZ	CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87

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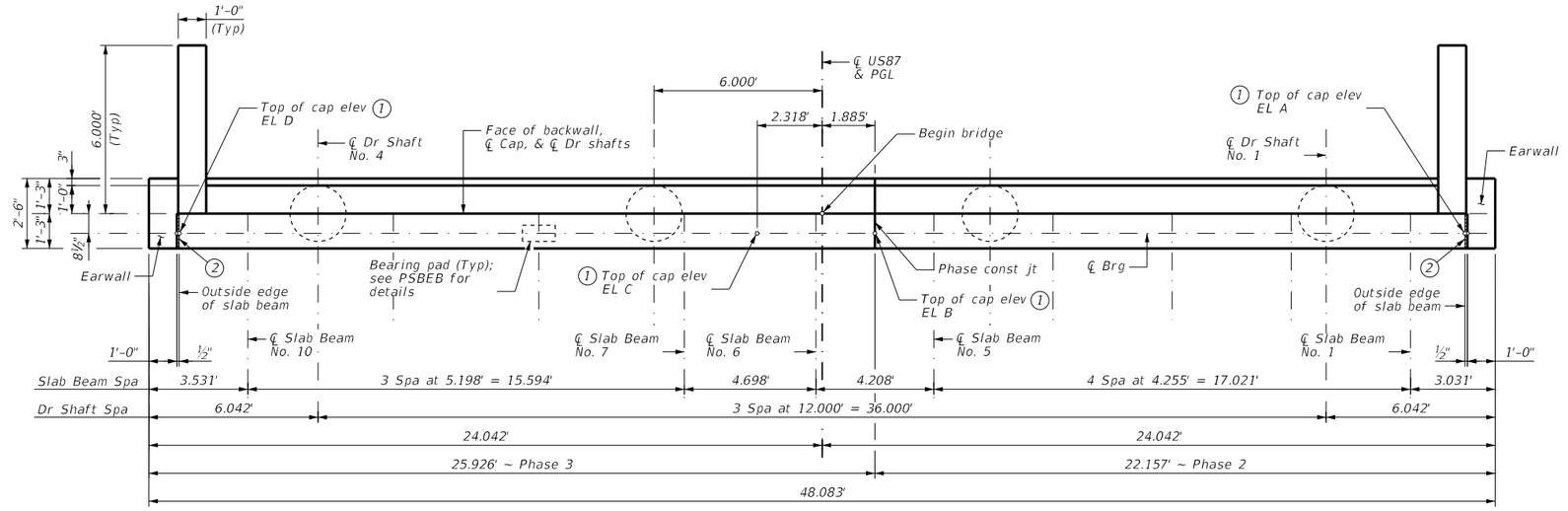
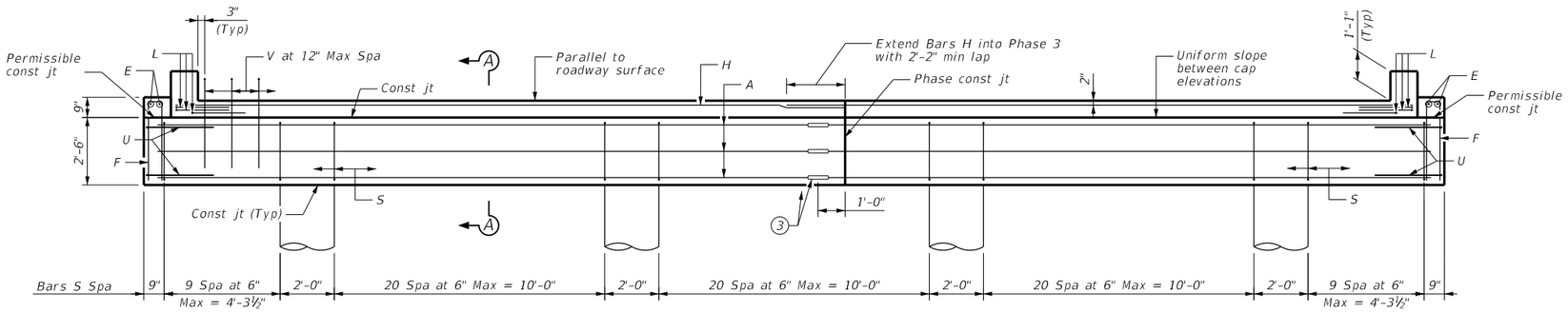
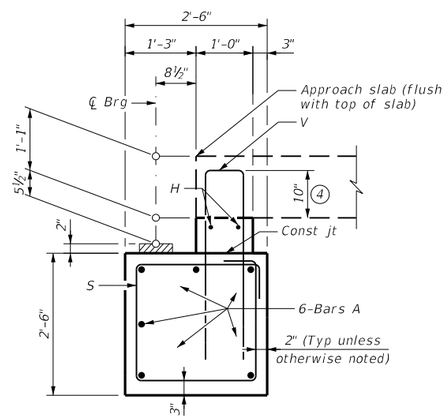


PLAN



ELEVATION



SECTION A-A

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Type T223 standard sheets for rail anchorage in wingwalls.

Calculated foundation load = 85 tons / dr shaft.

Cover dimensions are clear dimensions, unless shown otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi.)

Provide Grade 60 reinforcing steel.

(1) See ESTIMATED QUANTITIES & CAP ELEVATIONS sheet for top of cap elevations.

(2) Provide ½" preformed bituminous fiber material between slab beam and earwall. Bond to beam with an approved adhesive. Cast inside face of earwall with vertical side of beam. Do not cast earwalls until beams are erected in their final position.

(3) Contractor must splice Bars A using mechanical couplers in accordance with Standard Spec Item 440.2.8.

(4) Increase as required to maintain 3" from finished grade.

HL93 LOADING

STATE OF TEXAS
BASIL M. ZIBDAWI
138455
LICENSED
PROFESSIONAL ENGINEER

10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

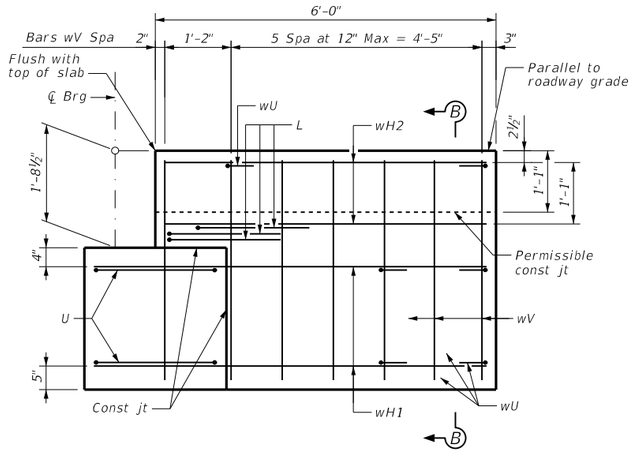
US 87 AT CLIFTON BRANCH

ABUTMENT NO. 1

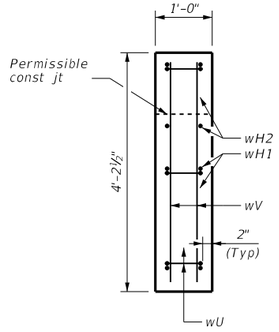
CLIFTON BRANCH BRIDGE AT US 87

SHEET 1 OF 2

		FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DSN	BZ	6	SEE TITLE SHEET	101
CHK	LNH	STATE	DIST.	COUNTY
DRN	AM	TEXAS	SAT	WILSON
CHK	BZ	CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87



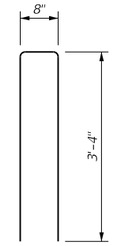
ELEVATION



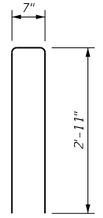
SECTION B-B

WINGWALL DETAILS

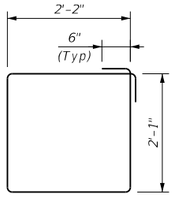
(Earwall not shown for clarity)



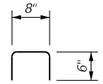
BARS V



BARS F



BARS S



BARS wU

TABLE OF ESTIMATED QUANTITIES

(Phase 2)					(Phase 3)				
Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight
A	6	#11	22'-10" (3)	728	A	6	#11	24'-3" (3)	774
E	2	#5	2'-2"	5	E	2	#5	2'-2"	5
F	5	#5	6'-5"	34	F	5	#5	6'-5"	34
H	2	#6	23'-3" (5)	70	H	2	#6	24'-7"	74
L	3	#6	4'-0"	19	L	3	#6	4'-0"	19
S	38	#5	9'-6"	377	S	45	#5	9'-6"	446
U	2	#6	7'-1"	22	U	2	#6	7'-1"	22
V	21	#5	7'-3"	159	V	24	#5	7'-4"	184
wH1	4	#6	6'-11"	42	wH1	4	#6	6'-11"	42
wH2	4	#6	5'-8"	35	wH2	4	#6	5'-8"	35
wU	6	#4	1'-8"	7	wU	6	#4	1'-8"	7
wV	14	#5	3'-11"	58	wV	14	#5	3'-11"	58
Reinforcing Steel (lb) (6)				1,556	Reinforcing Steel (lb) (6)				1,700
Class "C" Conc (Abut) (CY)				6.4	Class "C" Conc (Abut) (CY)				7.3

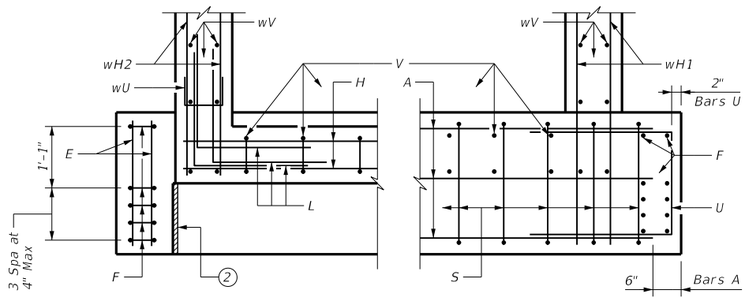
TOTAL ESTIMATED QUANTITIES	
Reinforcing Steel (lb) (6)	3,256
Class "C" Conc (Abut) (CY)	13.7

(2) Provide ½" preformed bituminous fiber material between slab beam and earwall. Bond to beam with an approved adhesive. Cast inside face of earwall with vertical side of beam. Do not cast earwalls until beams are erected in their final position.

(3) Contractor must splice Bars A using mechanical couplers in accordance with Standard Spec Item 440.2.8.

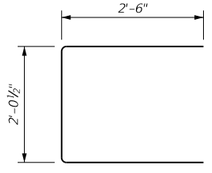
(5) Includes 2'-2" lap splice.

(6) Reinforcing steel quantities are for contractor's information only.

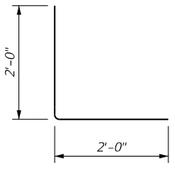


BACKWALL CAP

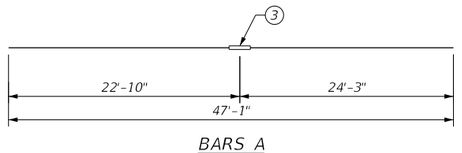
CORNER DETAILS



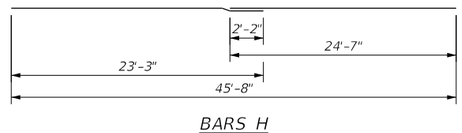
BARS U



BARS L



BARS A



BARS H

HL93 LOADING

STATE OF TEXAS
BASIL M. ZIBDAWI
138455
LICENSED
PROFESSIONAL ENGINEER

10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

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US 87 AT CLIFTON BRANCH

ABUTMENT NO. 1

CLIFTON BRANCH BRIDGE AT US 87

SHEET 2 OF 2

		FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DSN	BZ	6	SEE TITLE SHEET	102
CHK	LNH	STATE	DIST.	COUNTY
DRN	AM	TEXAS	SAT	WILSON
CHK	BZ	CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87

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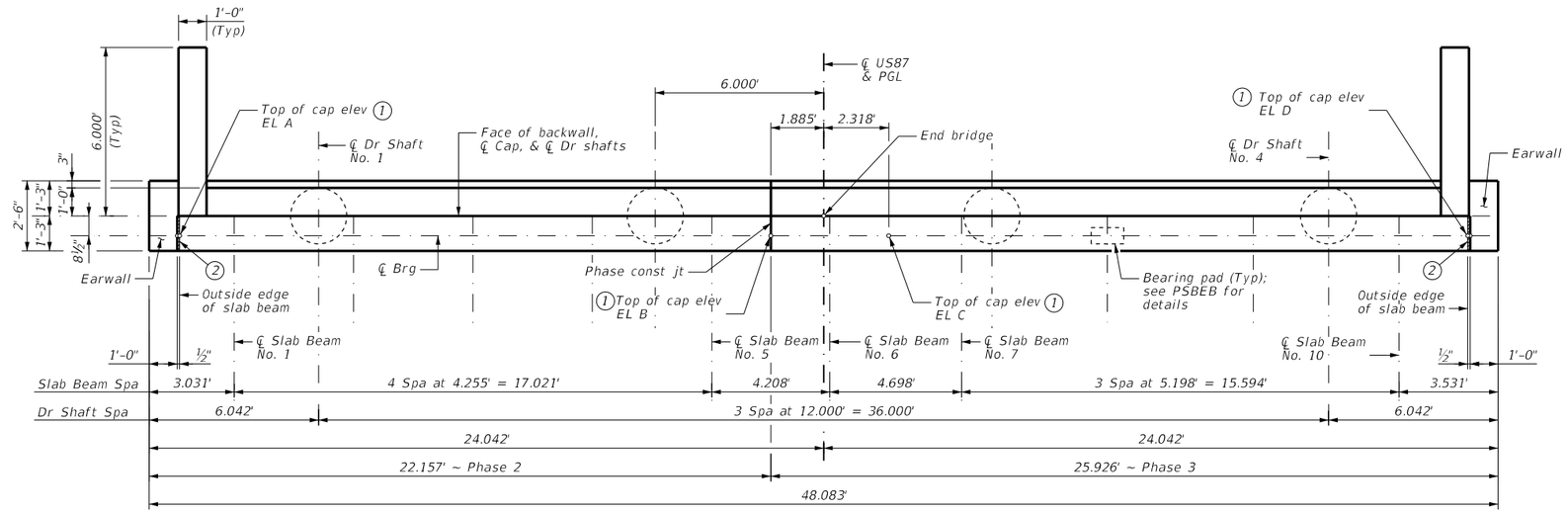
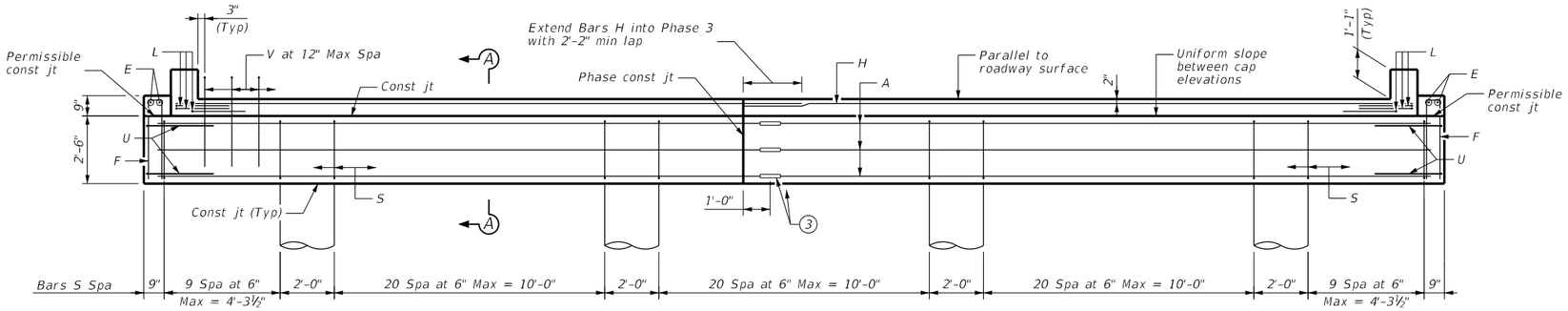
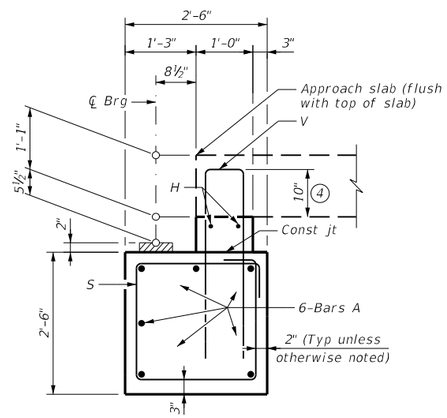


PLAN



ELEVATION



SECTION A-A

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

See Type T223 standard sheets for rail anchorage in wingwalls.

Calculated foundation load = 85 tons / dr shaft.

Cover dimensions are clear dimensions, unless shown otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

MATERIAL NOTES:

Provide Class C concrete (f'c = 3,600 psi.)

Provide Grade 60 reinforcing steel.

(1) See ESTIMATED QUANTITIES & CAP ELEVATIONS sheet for top of cap elevations.

(2) Provide ½" preformed bituminous fiber material between slab beam and earwall. Bond to beam with an approved adhesive. Cast inside face of earwall with vertical side of beam. Do not cast earwalls until beams are erected in their final position.

(3) Contractor must splice Bars A using mechanical couplers in accordance with Standard Spec Item 440.2.8.

(4) Increase as required to maintain 3" from finished grade.

HL93 LOADING

STATE OF TEXAS
BASIL M. ZIBDAWI
138455
LICENSED
PROFESSIONAL ENGINEER

10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

US 87 AT CLIFTON BRANCH

ABUTMENT NO. 4

CLIFTON BRANCH BRIDGE AT US 87

SHEET 1 OF 2

		FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DSN	BZ	6	SEE TITLE SHEET		103
CHK	LNH	STATE	DIST.	COUNTY	
DRN	AM	TEXAS	SAT	WILSON	
CHK	BZ	CONT.	SECT.	JOB	HIGHWAY NO.
		0143	04	072	US 87

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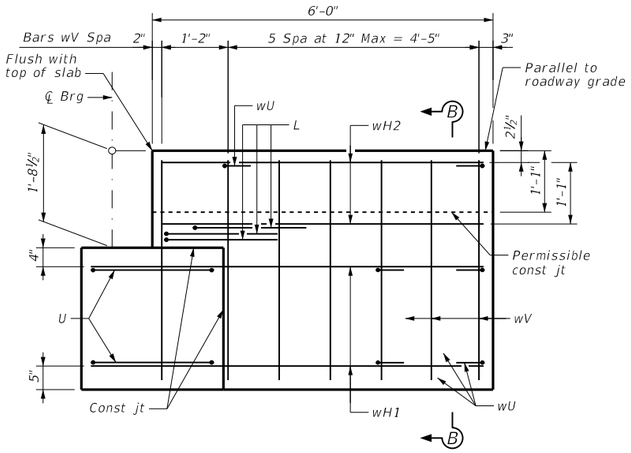
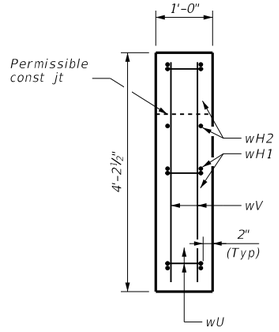


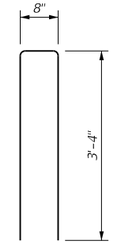
ELEVATION



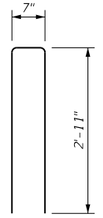
SECTION B-B

WINGWALL DETAILS

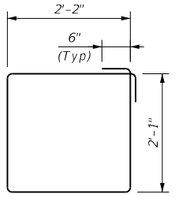
(Earwall not shown for clarity)



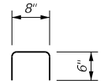
BARS V



BARS F



BARS S



BARS wU

TABLE OF ESTIMATED QUANTITIES

(Phase 2)					(Phase 3)				
Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight
A	6	#11	22'-10" (3)	728	A	6	#11	24'-3" (3)	774
E	2	#5	2'-2"	5	E	2	#5	2'-2"	5
F	5	#5	6'-5"	34	F	5	#5	6'-5"	34
H	2	#6	23'-3" (5)	70	H	2	#6	24'-7"	74
L	3	#6	4'-0"	19	L	3	#6	4'-0"	19
S	38	#5	9'-6"	377	S	45	#5	9'-6"	446
U	2	#6	7'-1"	22	U	2	#6	7'-1"	22
V	21	#5	7'-3"	159	V	24	#5	7'-4"	184
wH1	4	#6	6'-11"	42	wH1	4	#6	6'-11"	42
wH2	4	#6	5'-8"	35	wH2	4	#6	5'-8"	35
wU	6	#4	1'-8"	7	wU	6	#4	1'-8"	7
wV	14	#5	3'-11"	58	wV	14	#5	3'-11"	58
Reinforcing Steel (lb) (6)				1,556	Reinforcing Steel (lb) (6)				1,700
Class "C" Conc (Abut) (CY)				6.4	Class "C" Conc (Abut) (CY)				7.3

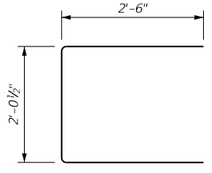
TOTAL ESTIMATED QUANTITIES	
Reinforcing Steel (lb) (6)	3,256
Class "C" Conc (Abut) (CY)	13.7

(2) Provide ½" preformed bituminous fiber material between slab beam and earwall. Bond to beam with an approved adhesive. Cast inside face of earwall with vertical side of beam. Do not cast earwalls until beams are erected in their final position.

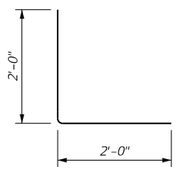
(3) Contractor must splice Bars A using mechanical couplers in accordance with Standard Spec Item 440.2.8.

(5) Includes 2'-2" lap splice.

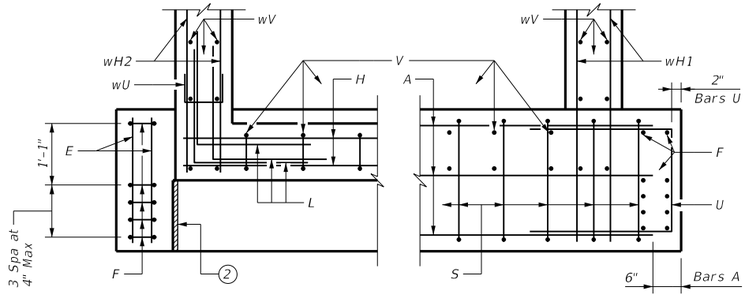
(6) Reinforcing steel quantities are for contractor's information only.



BARS U



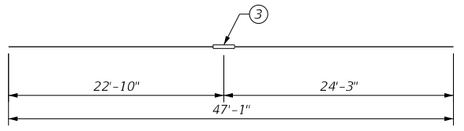
BARS L



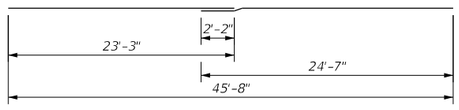
BACKWALL

CAP

CORNER DETAILS



BARS A



BARS H

HL93 LOADING

STATE OF TEXAS
BASIL M. ZIBDAWI
138455
LICENSED
PROFESSIONAL ENGINEER

10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

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US 87 AT CLIFTON BRANCH

ABUTMENT NO. 4

CLIFTON BRANCH BRIDGE AT US 87

SHEET 2 OF 2

		FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DSN	BZ	6	SEE TITLE SHEET	104
CHK	LNH	STATE	DIST.	COUNTY
DRN	AM	TEXAS	SAT	WILSON
CHK	BZ	CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87

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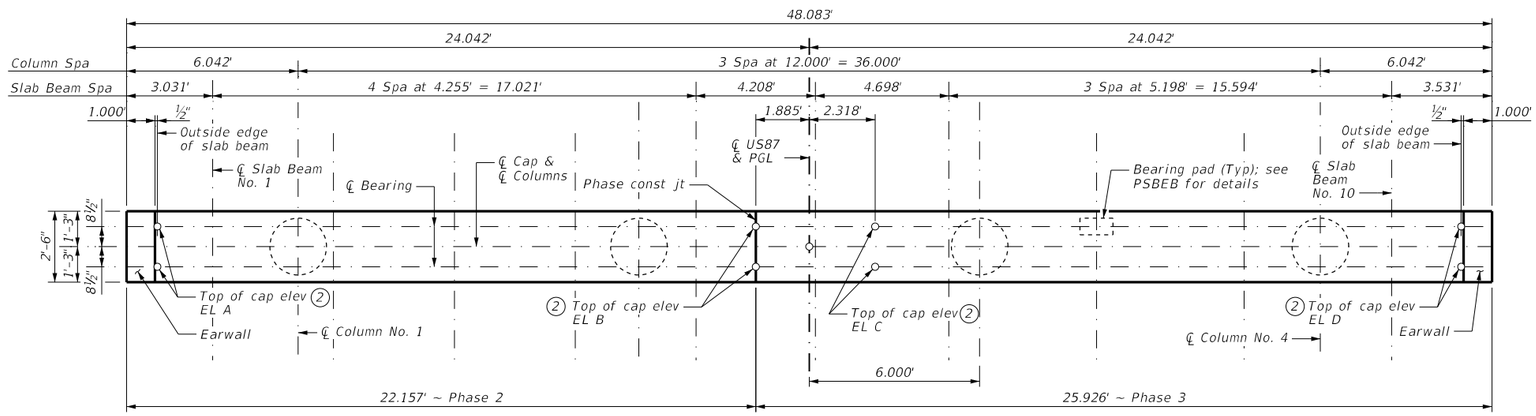
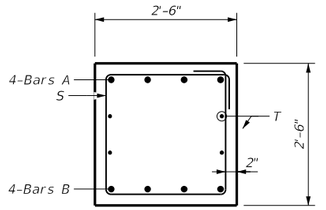
TOTAL ESTIMATED QUANTITIES (4)	
Reinforcing Steel (LB) (1)	3,166
Class "C" Conc (Cap) (CY)	11.3
Reinforcing Steel (Column) (LB) (1)	748
Class "C" Conc (Column) (CY)	3.8

TABLE OF ESTIMATED QUANTITIES (4)(5)

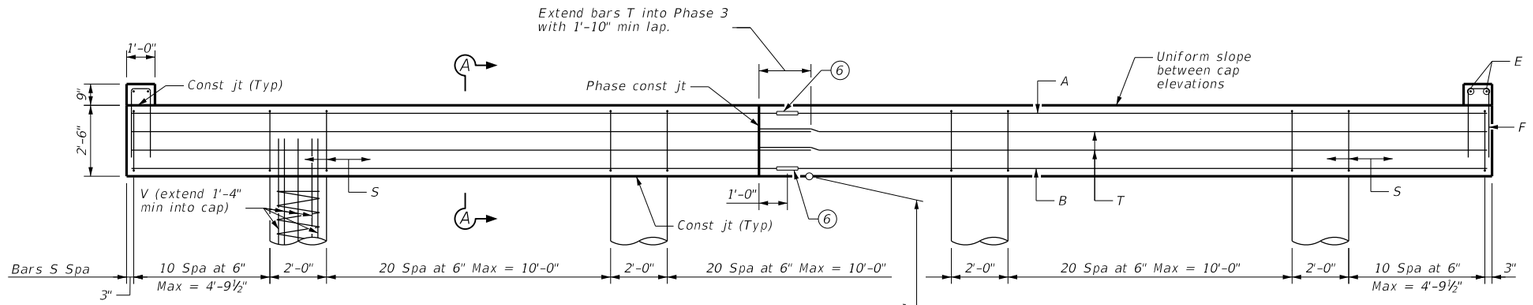
(Phase 2)					(Phase 3)				
Bar	No.	Size	Length	Weight	Bar	No.	Size	Length	Weight
A	4	#11	23'-2"	493	A	4	#11	24'-7"	523
B	4	#11	23'-2"	493	B	4	#11	24'-7"	523
E	2	#5	2'-2"	5	E	2	#5	2'-2"	5
F	5	#5	5'-6"	29	F	5	#5	5'-6"	29
S	39	#5	9'-8"	394	S	46	#5	9'-8"	464
T	4	#5	24'-0" (7)	101	T	4	#5	25'-7"	107
V	16	#7	9'-4"	306	V	16	#7	9'-4"	306
Z	2	#3	90'-2"	68	Z	2	#3	90'-2"	68
Reinforcing Steel (Cap) (LB) (1)				1,515	Reinforcing Steel (Cap) (LB) (1)				1,651
Class "C" Conc (Cap) (CY)				5.2	Class "C" Conc (Cap) (CY)				6.1
Reinforcing Steel (Column) (LB) (1)				374	Reinforcing Steel (Column) (LB) (1)				374
Class "C" Conc (Column) (CY)				1.9	Class "C" Conc (Column) (CY)				1.9



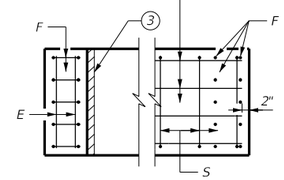
PLAN



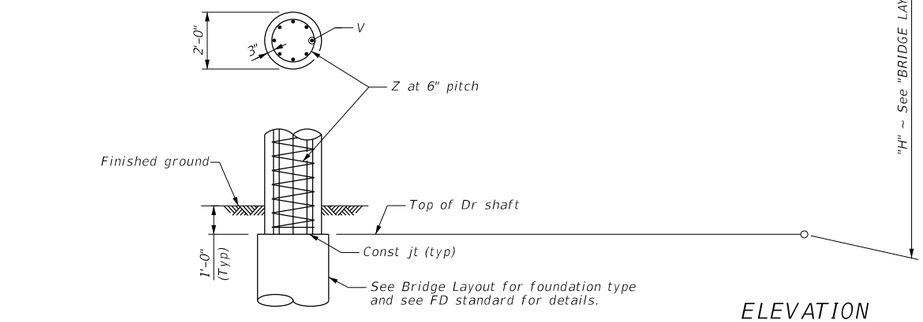
SECTION A-A



ELEVATION



CAP END DETAILS



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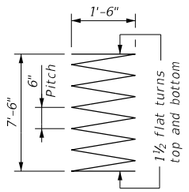
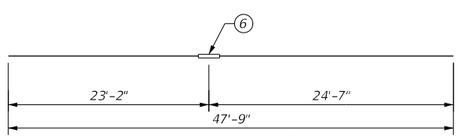
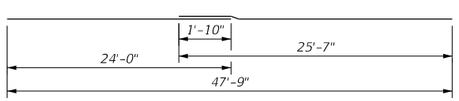


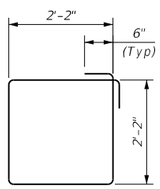
BARS Z



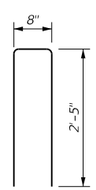
BARS A & B



BARS T



BARS S



BARS F

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

See Common Foundation Details (FD) standard sheet for all foundation details and notes.

Calculated foundation load = 120 tons / dr shaft.

Cover dimensions are clear dimensions, unless shown otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

MATERIAL NOTES:

Provide Class C Concrete (f'c = 3,600 psi.)

Provide Grade 60 reinforcing steel.

(1) Reinforcing steel quantities are for Contractor's information only.

(2) See ESTIMATED QUANTITIES & CAP ELEVATIONS sheet for top of cap elevations.

(3) Provide ½" preformed bituminous fiber material between slab beam and earwall. Bond to beam with an approved adhesive. Cast inside face of earwall with vertical side of beam. Do not cast earwalls until beams are erected in their final position.

(4) Quantities shown are for one bent only.

(5) For each linear foot of variation in "H" value, make the following adjustments per column:
Bars V length: 1'-0"
Bars Z length: 9'-6"
Reinforcing steel: 80 lbs
Class C Conc (Column): 0.47 CY

(6) Contractor must splice bars A & B using mechanical couplers in accordance with Standard Spec Item 440.2.8.

(7) Includes 1'-10" lap splice.

HL93 LOADING

STATE OF TEXAS
BASIL M. ZIBDAWI
138455
LICENSED
PROFESSIONAL ENGINEER

10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

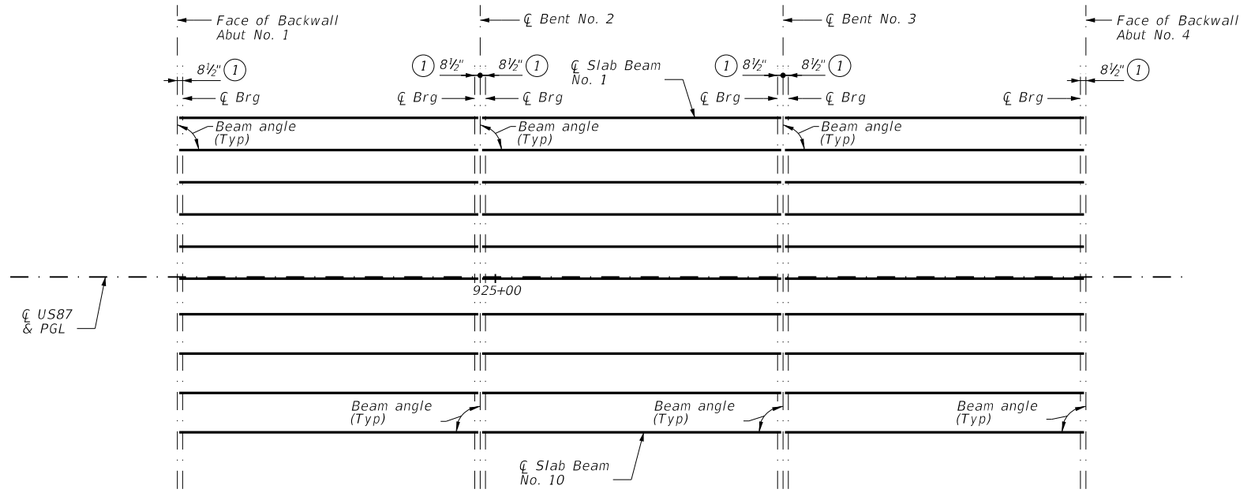
LJA Engineering, Inc.
FRN-F-1386

US 87 AT CLIFTON BRANCH

INTERIOR BENT
NO. 2 & 3

CLIFTON BRANCH BRIDGE
AT US 87

DSN	BZ	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
CHK	LNH	6	SEE TITLE SHEET	105
DRN	AM	STATE	DIST.	COUNTY
CHK	BZ	TEXAS	SAT	WILSON
		CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87



Span 1
(4SB12 and 5SB12)

Span 2
(4SB12 and 5SB12)

Span 3
(4SB12 and 5SB12)

1. See Slab Beam Elastomeric Bearing Details (PSBEB) standard sheet for orientation of dimension.
2. Beam lengths shown are bottom beam lengths with adjustments made for beam slope.

BENT REPORT

ABUT NO. 1 (S 23 8 51.33 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.010 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.000	90	0	0
	BEAM	2	4.255	90	0	0
	BEAM	3	4.255	90	0	0
	BEAM	4	4.255	90	0	0
	BEAM	5	4.255	90	0	0
	BEAM	6	4.208	90	0	0
	BEAM	7	4.698	90	0	0
	BEAM	8	5.198	90	0	0
	BEAM	9	5.198	90	0	0
	BEAM	10	5.198	90	0	0
	TOTAL		41.521			

BENT NO. 2 (S 23 8 51.33 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.010 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 1	BEAM	1	0.000	90	0	0
	BEAM	2	4.255	90	0	0
	BEAM	3	4.255	90	0	0
	BEAM	4	4.255	90	0	0
	BEAM	5	4.255	90	0	0
	BEAM	6	4.208	90	0	0
	BEAM	7	4.698	90	0	0
	BEAM	8	5.198	90	0	0
	BEAM	9	5.198	90	0	0
	BEAM	10	5.198	90	0	0
	TOTAL		41.521			
SPAN 2	BEAM	1	0.000	90	0	0
	BEAM	2	4.255	90	0	0
	BEAM	3	4.255	90	0	0
	BEAM	4	4.255	90	0	0
	BEAM	5	4.255	90	0	0
	BEAM	6	4.208	90	0	0
	BEAM	7	4.698	90	0	0
	BEAM	8	5.198	90	0	0
	BEAM	9	5.198	90	0	0
	BEAM	10	5.198	90	0	0
	TOTAL		41.521			

BENT NO. 3 (S 23 8 51.33 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.010 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 2	BEAM	1	0.000	90	0	0
	BEAM	2	4.255	90	0	0
	BEAM	3	4.255	90	0	0
	BEAM	4	4.255	90	0	0
	BEAM	5	4.255	90	0	0
	BEAM	6	4.208	90	0	0
	BEAM	7	4.698	90	0	0
	BEAM	8	5.198	90	0	0
	BEAM	9	5.198	90	0	0
	BEAM	10	5.198	90	0	0
	TOTAL		41.521			
SPAN 3	BEAM	1	0.000	90	0	0
	BEAM	2	4.255	90	0	0
	BEAM	3	4.255	90	0	0
	BEAM	4	4.255	90	0	0
	BEAM	5	4.255	90	0	0
	BEAM	6	4.208	90	0	0
	BEAM	7	4.698	90	0	0
	BEAM	8	5.198	90	0	0
	BEAM	9	5.198	90	0	0
	BEAM	10	5.198	90	0	0
	TOTAL		41.521			

ABUT NO. 4 (S 23 8 51.33 W)
DISTANCE BETWEEN STATION LINE AND BEAM 1, 21.010 L

			BEAM SPAC. (C.L. BENT)	BEAM ANGLE D	M	S
SPAN 3	BEAM	1	0.000	90	0	0
	BEAM	2	4.255	90	0	0
	BEAM	3	4.255	90	0	0
	BEAM	4	4.255	90	0	0
	BEAM	5	4.255	90	0	0
	BEAM	6	4.208	90	0	0
	BEAM	7	4.698	90	0	0
	BEAM	8	5.198	90	0	0
	BEAM	9	5.198	90	0	0
	BEAM	10	5.198	90	0	0
	TOTAL		41.521			

BEAM REPORT

BEAM REPORT, SPAN 1

	C-C BENT	HORIZONTAL DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM 1	40.000	38.583	39.50	-0.0010
BEAM 2	40.000	38.583	39.50	-0.0010
BEAM 3	40.000	38.583	39.50	-0.0010
BEAM 4	40.000	38.583	39.50	-0.0010
BEAM 5	40.000	38.583	39.50	-0.0010
BEAM 6	40.000	38.583	39.50	-0.0010
BEAM 7	40.000	38.583	39.50	-0.0010
BEAM 8	40.000	38.583	39.50	-0.0010
BEAM 9	40.000	38.583	39.50	-0.0010
BEAM 10	40.000	38.583	39.50	-0.0010

BEAM REPORT, SPAN 2

	C-C BENT	HORIZONTAL DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM 1	40.000	38.583	39.50	-0.0010
BEAM 2	40.000	38.583	39.50	-0.0010
BEAM 3	40.000	38.583	39.50	-0.0010
BEAM 4	40.000	38.583	39.50	-0.0010
BEAM 5	40.000	38.583	39.50	-0.0010
BEAM 6	40.000	38.583	39.50	-0.0010
BEAM 7	40.000	38.583	39.50	-0.0010
BEAM 8	40.000	38.583	39.50	-0.0010
BEAM 9	40.000	38.583	39.50	-0.0010
BEAM 10	40.000	38.583	39.50	-0.0010

BEAM REPORT, SPAN 3

	C-C BENT	HORIZONTAL DISTANCE C-C BRG.	TRUE DISTANCE BOT. BM. FLG. (2)	BEAM SLOPE
BEAM 1	40.000	38.583	39.50	-0.0010
BEAM 2	40.000	38.583	39.50	-0.0010
BEAM 3	40.000	38.583	39.50	-0.0010
BEAM 4	40.000	38.583	39.50	-0.0010
BEAM 5	40.000	38.583	39.50	-0.0010
BEAM 6	40.000	38.583	39.50	-0.0010
BEAM 7	40.000	38.583	39.50	-0.0010
BEAM 8	40.000	38.583	39.50	-0.0010
BEAM 9	40.000	38.583	39.50	-0.0010
BEAM 10	40.000	38.583	39.50	-0.0010

HL93 LOADING

STATE OF TEXAS
BASIL M. ZIBDAWI
138455
LICENSED
PROFESSIONAL ENGINEER

10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

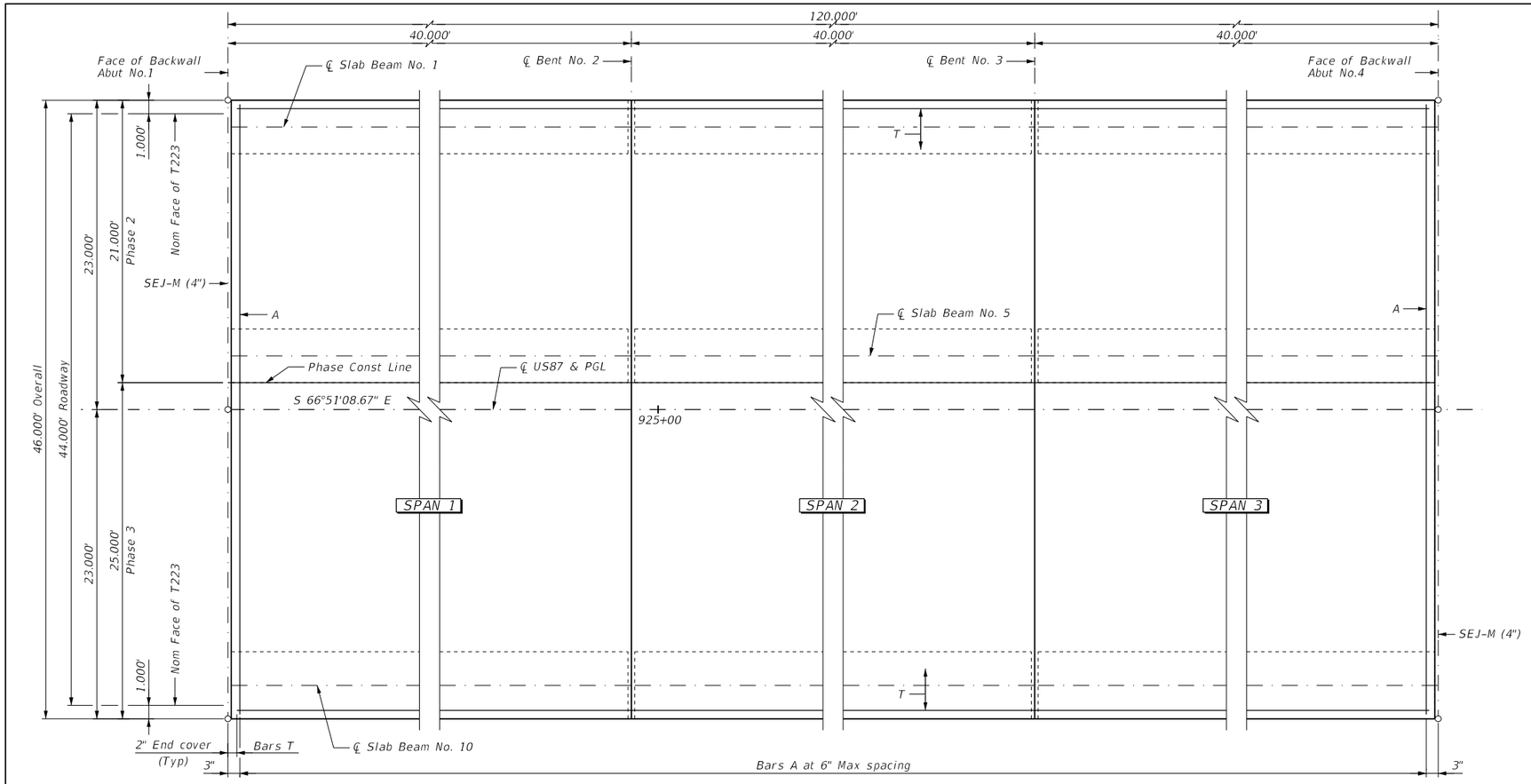
LJA Engineering, Inc.
FRN - F-1386

US 87 AT CLIFTON BRANCH

FRAMING PLAN

CLIFTON BRANCH BRIDGE
AT US 87

		FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
DSN	BZ	6	SEE TITLE SHEET	106
CHK	LNH	STATE	DIST.	COUNTY
DRN	CJ	TEXAS	SAT	WILSON
CHK	BZ	CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87



PLAN

TOTAL ESTIMATED QUANTITIES

Span No.	Reinf Concrete Slab	Prestressed Concrete Slab Beam ①		Total Reinforcing Steel ②
		(4SB12)	(5SB12)	
	SF	LF	LF	LB
1	1,840	237.00	158.00	5,152
2	1,840	237.00	158.00	5,152
3	1,840	237.00	158.00	5,152
TOTAL	5,520	711.00	474.00	15,456

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications, 9th Edition (2020) and TxDOT Bridge Design Manual (Nov 2021).

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

MATERIAL NOTES:

Provide Class S concrete (f'c = 4,000 psi).

Provide Grade 60 reinforcing steel.

Provide bar laps, where required, as follows:
Uncoated ~ #4 = 1'-7"
#5 = 2'-0"

Deformed welded wire reinforcement (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars A or T. Provide the same laps as required for reinforcing bars.

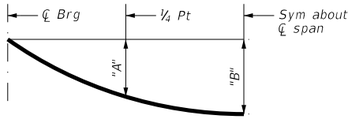
① Lengths shown are bottom beam lengths with adjustments made for beam slope. See FRAMING PLAN sheet for beam lengths.

② For contractor's information only. Reinforcing steel weight is calculated using an approximate factor of 2.8 psf.

HL93 LOADING

TABLE OF DEAD LOAD DEFLECTIONS

Span No.	Girder No.	"A"	"B"
		FT	FT
1-3	1-10	0.023	0.032



DEAD LOAD DEFLECTION DIAGRAM

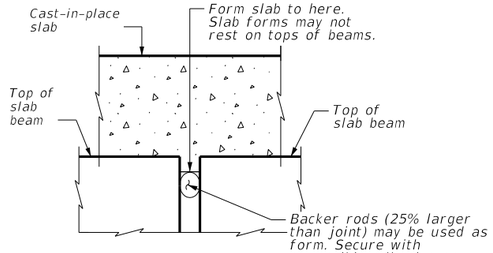
NOTE: Deflections shown are due to prestressed concrete panels and cast-in place slab only (E_c = 5,000 ksi). Adjust deflections based on field observations as needed.

TABLE OF SECTION DEPTHS

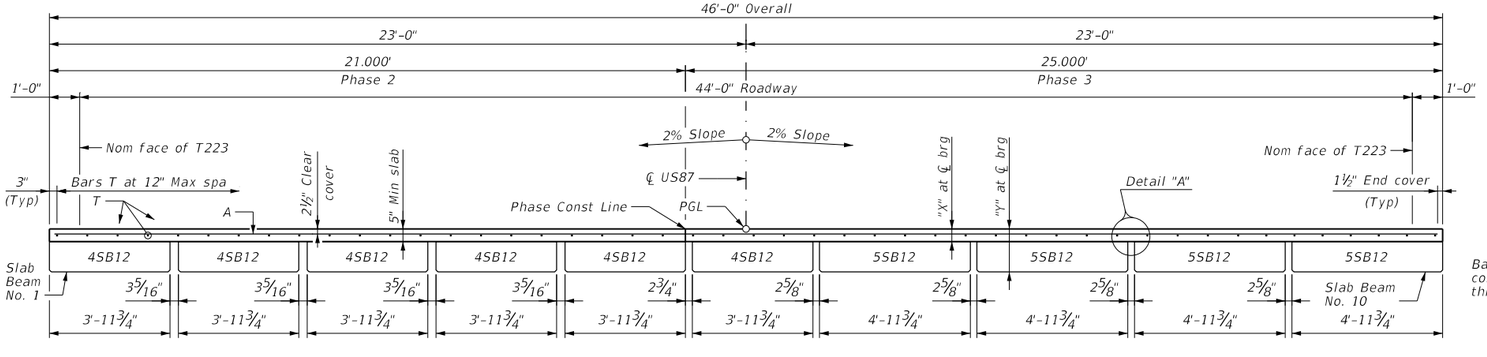
Span No.	Girder No.	"X" At ℄ Brg	"Y" At ℄ Brg
1 - 3	1-5 & 7-10	6 1/2"	1'-6 1/2"
	6	7"	1'-7"

BAR TABLE

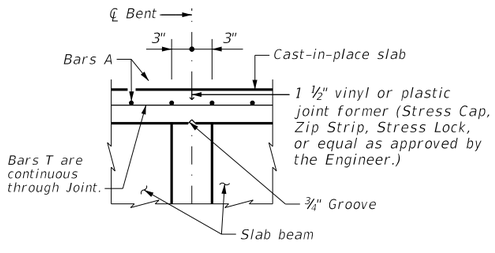
Bar	Size
A	#5
T	#4



DETAIL "A"



TYPICAL TRANSVERSE SECTION



CONTINUOUS SLAB DETAIL

STATE OF TEXAS
BASIL M. ZIBDAWI
138455
LICENSED PROFESSIONAL ENGINEER

10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

US 87 AT CLIFTON BRANCH

120.00' PRESTRESSED CONCRETE SLAB BEAM UNIT (SPANS 1-3)
CLIFTON BRANCH BRIDGE AT US 87

DSN	BZ	FED.RD. DIV.NO.	PROJECT NO.	SHEET NO.
CHK	LNH	6	SEE TITLE SHEET	107
DRN	CJ	STATE	DIST.	COUNTY
		TEXAS	SAT	WILSON
CHK	BZ	CONT.	SECT.	JOB / HIGHWAY NO.
		0143	04	072 / US 87

DESIGNED BEAMS (STRAIGHT STRANDS)

STRUCTURE	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS: NON-STD STRAND PATTERN	PRESTRESSING STRANDS: TOTAL NO.	PRESTRESSING STRANDS: SIZE (in)	PRESTRESSING STRANDS: STRGTH fpu (ksi)	PRESTRESSING STRANDS: "e" ℄ (in)	PRESTRESSING STRANDS: "e" END (in)	PRESTRESSING STRANDS: TOT NO. DEB	DEBONDED STRANDS PER ROW: DIST FROM BOTTOM (in)	DEBONDED STRANDS PER ROW: NO. OF STRANDS: TOTAL	DEBONDED STRANDS PER ROW: NO. OF STRANDS: DE-BONDED	DEBONDED STRANDS PER ROW: NUMBER OF STRANDS DEBONDED TO (ft from end): 3	6	9	12	15	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	CONCRETE: MINIMUM 28 DAY COMP STRGTH f'c (ksi)
Clifton Branch Bridge at US 87	1-3	1-6	4SB12		16	0.6	270	3.50	3.50	4	2.50	16	4	4	0	0	0	0	4.700	6.300
	1-3	7-10	5SB12		18	0.6	270	3.50	3.50	0	0.00	0	0	0	0	0	0	0	4.000	5.000

OPTIONAL DESIGN

DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct (ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb (ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2): Moment	LIVE LOAD DISTRIBUTION FACTOR (2): Shear
2.372	-3.106	730	0.381	0.381
2.262	-2.823	821	0.442	0.442

LOAD RATING FACTORS

STRENGTH I: Inv	STRENGTH I: Opr	SERVICE III: Inv
1.38	1.78	1.32
1.33	1.73	1.09

NON-STANDARD STRAND PATTERNS

PATTERN	STRAND ARRANGEMENT AT ℄ OF BEAM

(1) Based on the following allowable stresses (ksi):

Compression = 0.65 f'ci

Tension = $0.24\sqrt{f'ci}$

Optional designs must likewise conform.

(2) Portion of full HL93.

DESIGN NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications and TxDOT Bridge Design Manual (Nov 2021).

Load rated using Load and Resistance Factor Rating according to AASHTO Manual for Bridge Evaluation.

Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:

Provide Class H concrete.

Provide Grade 60 reinforcing steel.

Use low relaxation strands, each pretensioned to 75 percent of fpu.

Full-length debonded strands are not permitted in positions "A" and "B".

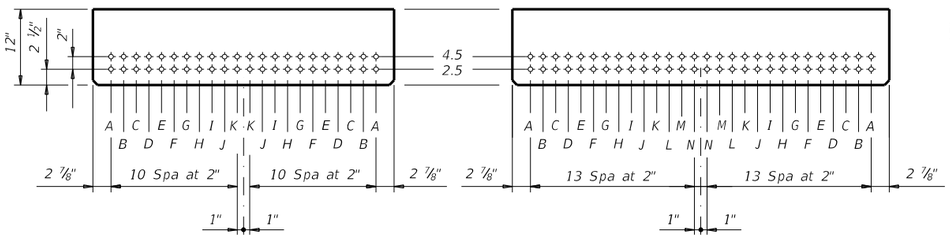
Strand debonding must comply with Item 424.4.2.2.2.4.

When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.

Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard strand pattern is indicated. Fill row "2.5", then row "4.5". Place strands within a row as follows:

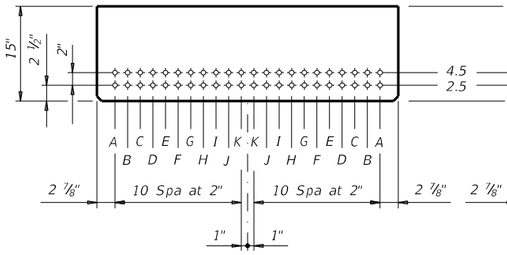
1) Locate a strand in each "A" position.
2) Place strand symmetrically about vertical centerline of beam.
3) Space strands as equally as possible across the entire width.

Do not debond strands in position "A". Distribute debonded strands symmetrically about the vertical centerline. Increase debonded lengths working outward, with debonding staggered in each row.

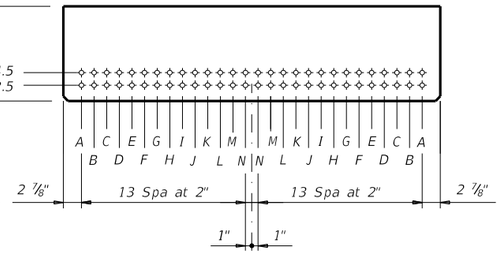


TxDOT 4SB12 SLAB BEAM

TxDOT 5SB12 SLAB BEAM



TxDOT 4SB15 SLAB BEAM



TxDOT 5SB15 SLAB BEAM

HL93 LOADING

LJA Engineering, Inc.
FRN - F-1386

STATE OF TEXAS
BASIL M. ZIBDAWI
138455
LICENSED
PROFESSIONAL ENGINEER

10/27/2022

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DESIGNS (NON-STANDARD SPANS)

PSBND

FILE: psbsts05-22.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS 3-22: Added Load Rating.	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		108

DATE: 10/27/2022 $TIME$
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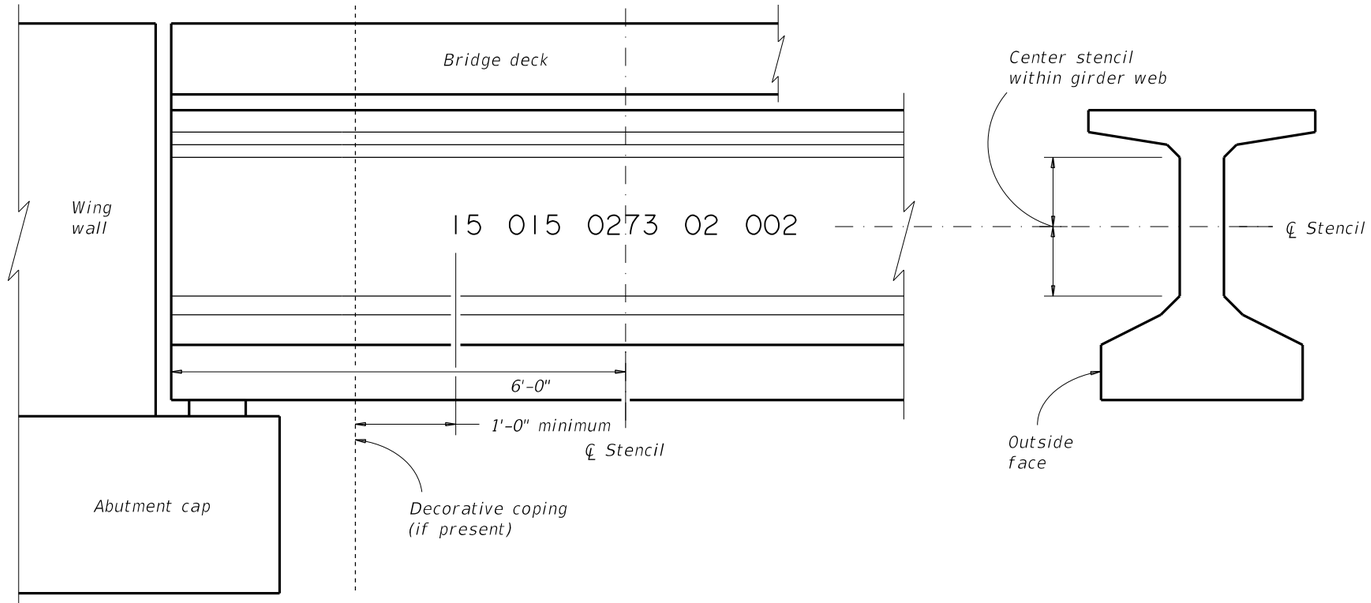
15 015 0273 02 002

San Antonio District designation	County designation	Control number	Section nunber	Structure number

PAINTED STRUCTURE NUMBER DETAIL



TYPICAL BRIDGE CORNER (ELEVATION)

SAN ANTONIO DISTRICT COUNTY DESIGNATIONS

Atascosa 007
Bandera 010
Bexar 015
Comal 046
Frio 083
Guadalupe 095
Kendall 131
Kerr 133
McMullen 162
Medina 163
Uvalde 232
Wilson 247

GENERAL NOTES:
Apply stucture number in accordance with Special Specification for Stenciling Permanent Structure Numbers.

SAN ANTONIO DISTRICT STANDARD

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

BRIDGE NBI NUMBER STENCIL

DN: BCL	CK: XXX	FILENAME: 000000000 SA District Stencil.dgn		
DW: SRF	CK: XXX	ORIGINAL DRAWING DATE: August 2019		
DIST	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		COUNTY
SAT	6	SEE TITLE SHEET		WILSON
CONTROL	SECTION	JOB	SHEET NO.	ROUTE
0143	04	072	109	US 87

REVISIONS:

10/27/2022 $TIME$
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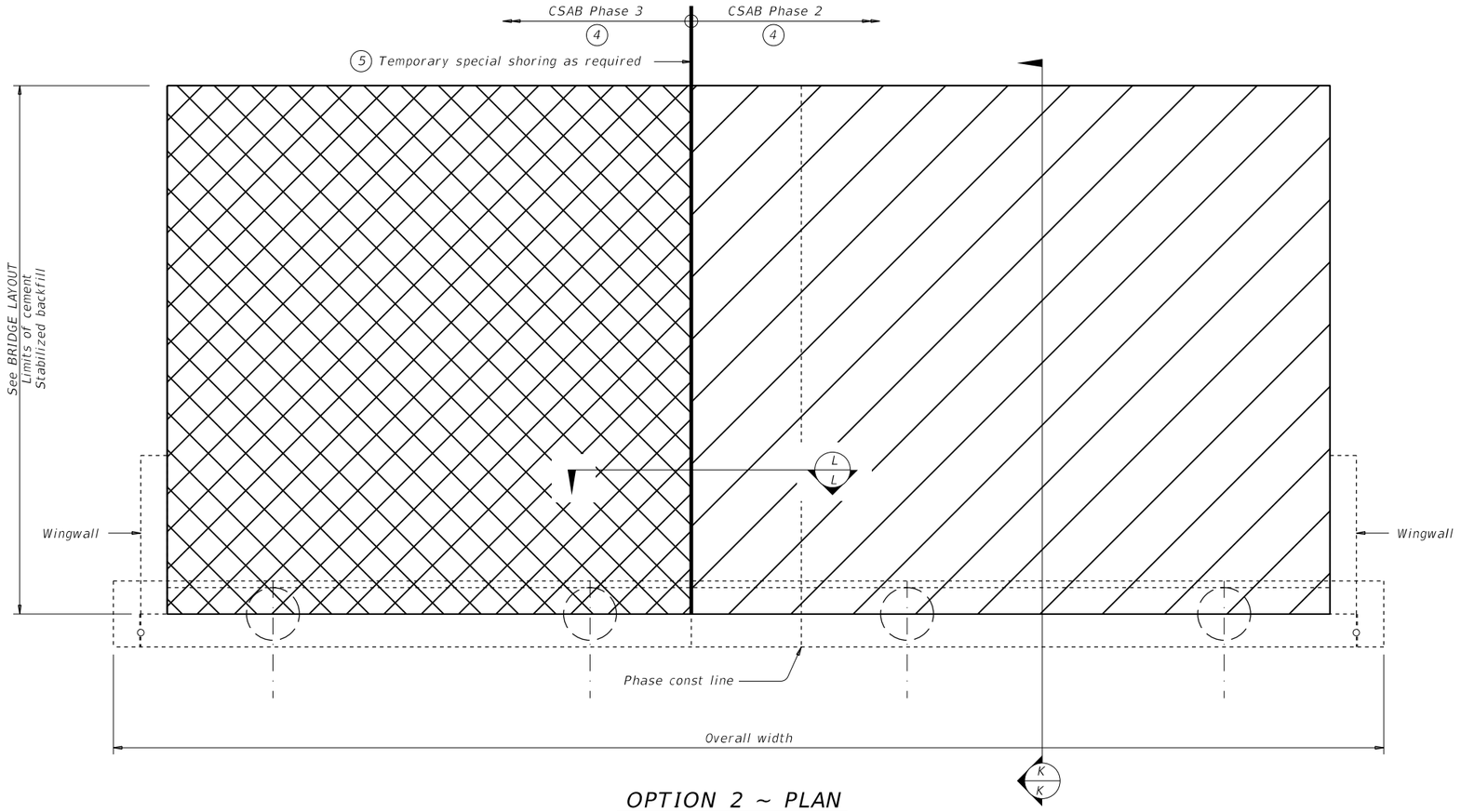
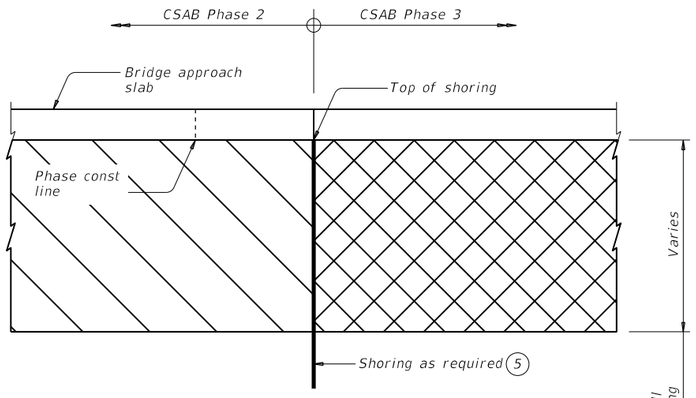
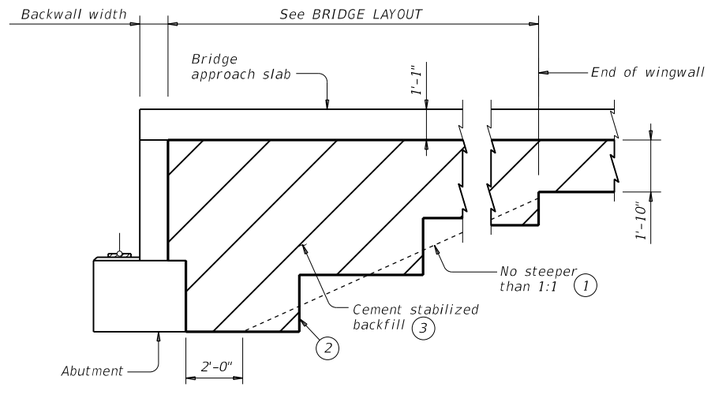


OPTION 2 ~ PLAN



SECTION L-L



SECTION K-K

(Showing BAS-A)

1. Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of backfill.
2. Bench backfill as shown with 12" (approximate) bench depths.
3. If shown in the plans flowable backfill can be used as a substitute for cement stabilized backfill with the following constraints:
   Place flowable fill in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).
4. Refer to BRIDGE LAYOUT and TCP sheets for specific phase.
5. Temporary shoring shall be paid under item 403 6001 TEMPORARY SPL SHORING.

HL93 LOADING

STATE OF TEXAS
BASIL M. ZIBDAWI
138455
LICENSED
PROFESSIONAL ENGINEER

10/27/2022

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

US 87 AT CLIFTON BRANCH

CSAB (MOD)

CLIFTON BRANCH BRIDGE
AT US 87

		FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DSN	BZ	6			110
CHK	LNH	STATE	DIST.	COUNTY	
DRN	AM	TEXAS	SAT	WILSON	
CHK	BZ	CONT.	SECT.	JOB	HIGHWAY NO.
		0143	04	072	US 87

DATE:
11/7/2022 11:09:59 AM
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10/27/2022
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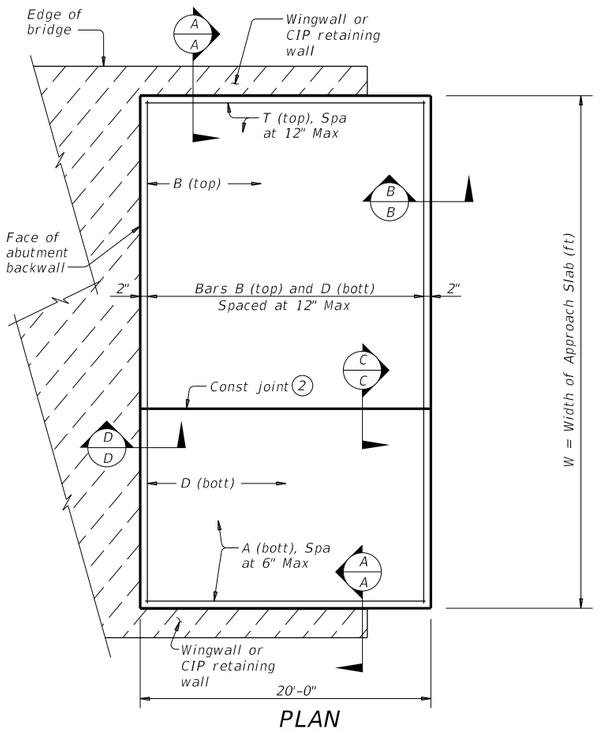
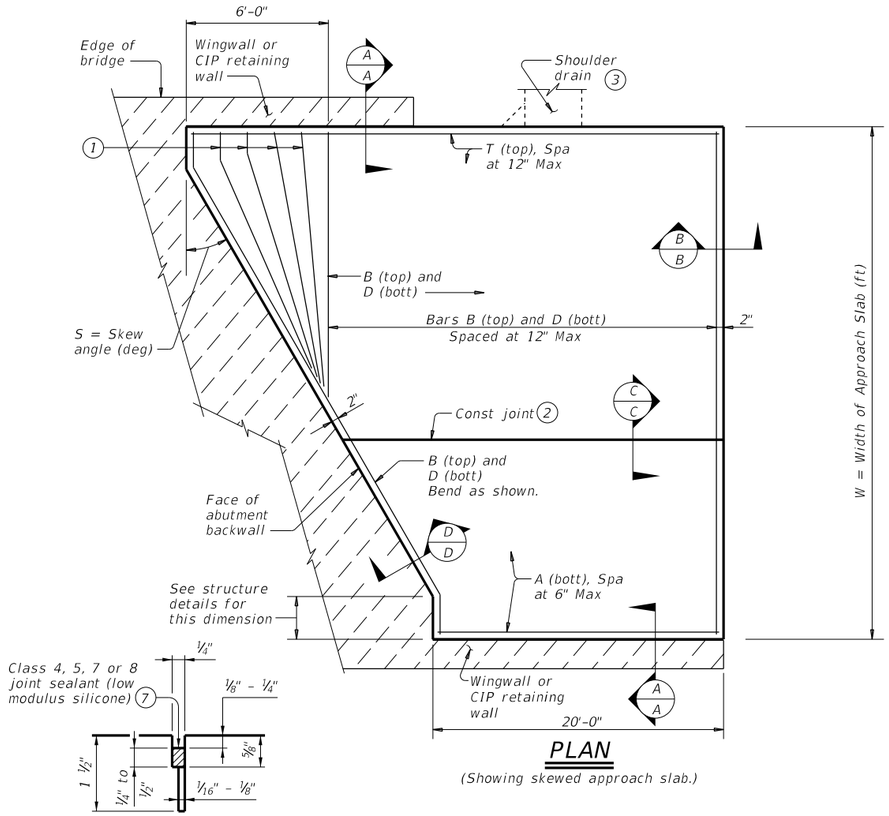


PLAN

(Showing non-skewed approach slab.)



PLAN

(Showing skewed approach slab.)

BAR TABLE

BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared bar length = 2'-6". Bend bars as necessary.

(2) Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.

(3) See details elsewhere in plans for shoulder drain location and details.

(4) For Contractor's information only. Quantities shown are for one approach slab.

(5) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(6) See details elsewhere in plans for required cross-slope.

(7) Place in accordance with Item 438.

(8) Provide backer rod that is 25% larger than joint opening and compatible with the sealant.

(9) If bridge rail is present at the wingwall or CIP retaining wall, place ½" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 ½" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 ½" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

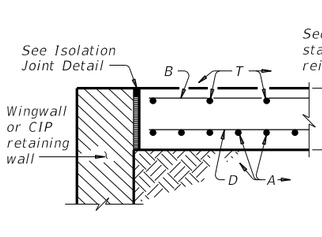
Compact and finish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

Cure for 4 days using water or membrane curing per Item 422.

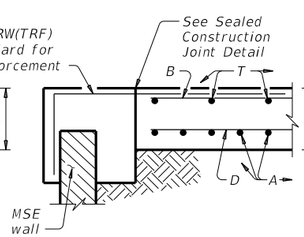
All details shown herein are subsidiary to bridge approach slab.

Cover dimensions are clear dimensions, unless noted otherwise.

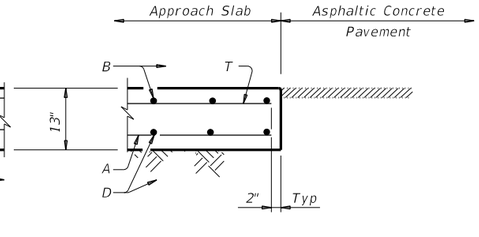
LONGITUDINAL SAW CUT JOINT DETAIL

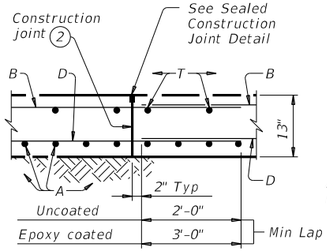


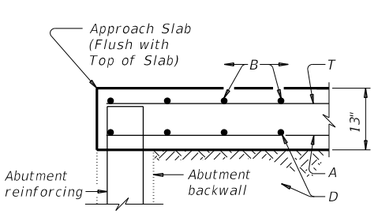
SHOWING WINGWALL OR CIP RETAINING WALL



SHOWING MSE WALL





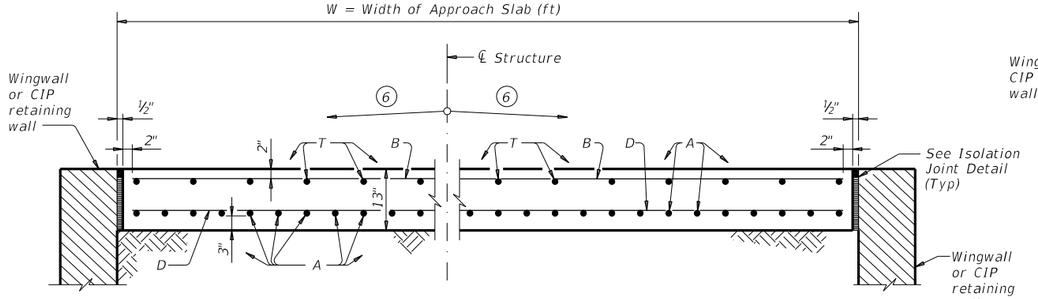


SECTION A-A

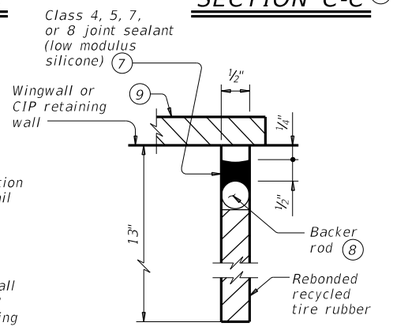
SECTION B-B

SECTION C-C (5)

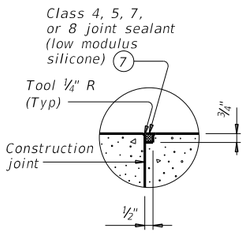
SECTION D-D



TYPICAL TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION JOINT DETAIL

Texas Department of Transportation

Bridge Division Standard

BRIDGE APPROACH SLAB

ASPHALTIC CONCRETE PAVEMENT

BAS-A

FILE: basaste1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
02-20: Removed stress relieving pad.	DIST	COUNTY		SHEET NO.
	SAT	WILSON		111

DATE: 10/27/2022 $TIME$
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DATE: 10/27/2022
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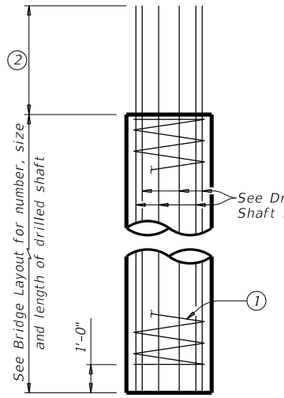
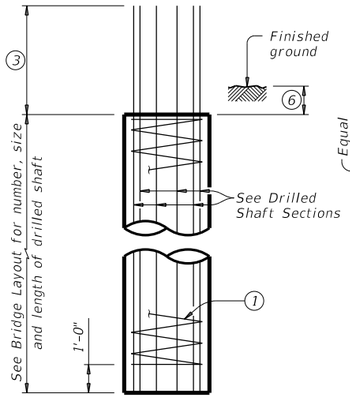
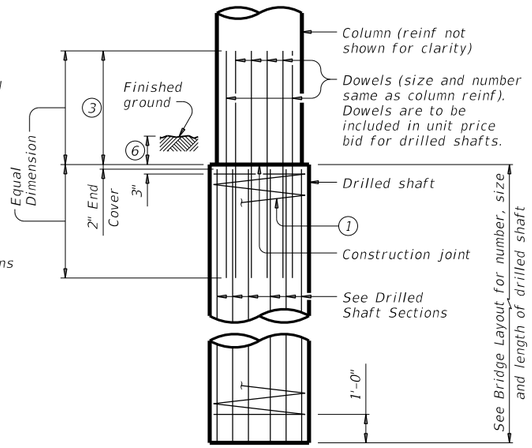
$TIMES



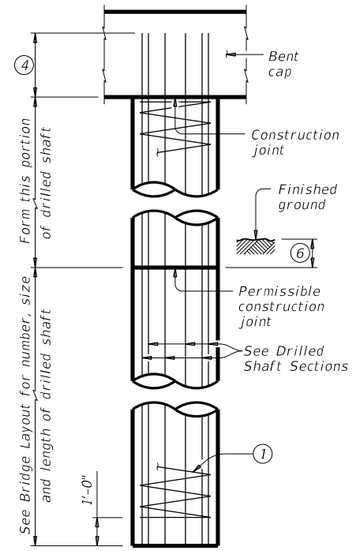
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



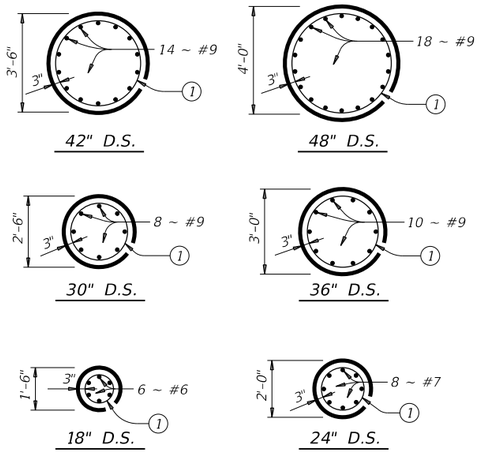
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

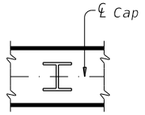


DRILLED SHAFT SECTIONS

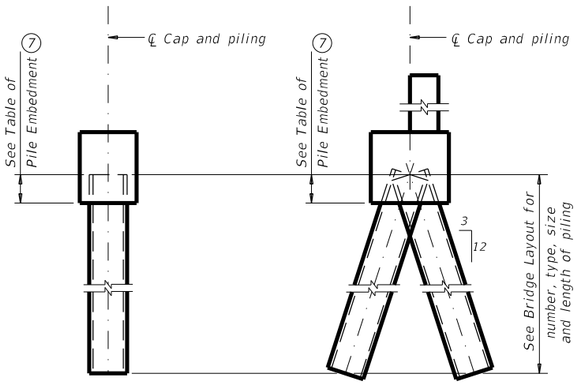
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

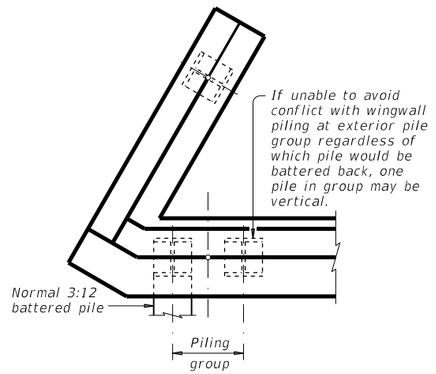
See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.



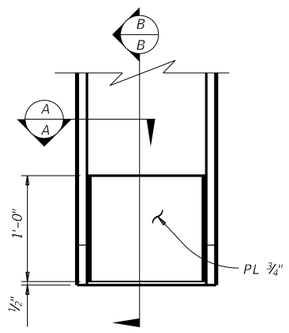
ORIENTATION OF STEEL H-PILING



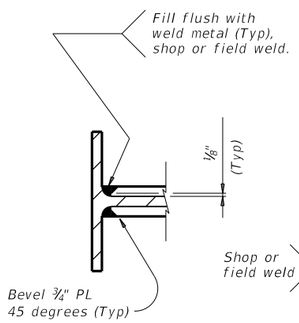
PILING DETAILS
(Concrete or steel H)



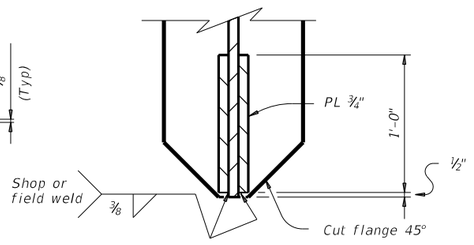
DETAIL "A"
(Showing plan view of a 30° skewed abutment)



ELEVATION



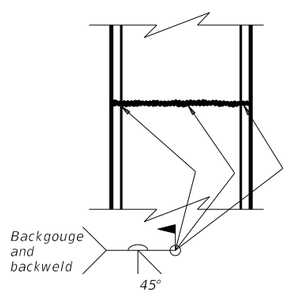
SECTION A-A

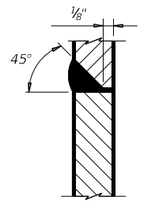


SECTION B-B

STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.





SECTION THRU FLANGE OR WEB

STEEL H-PILE SPLICE DETAIL

Use when required.

(1) #3 spiral at 6" pitch (one and a half flat turns top and bottom).

(2) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"

(3) Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(4) Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"

(5) Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	SAT	WILSON		112

DATE: 10/27/2022 $TIME$
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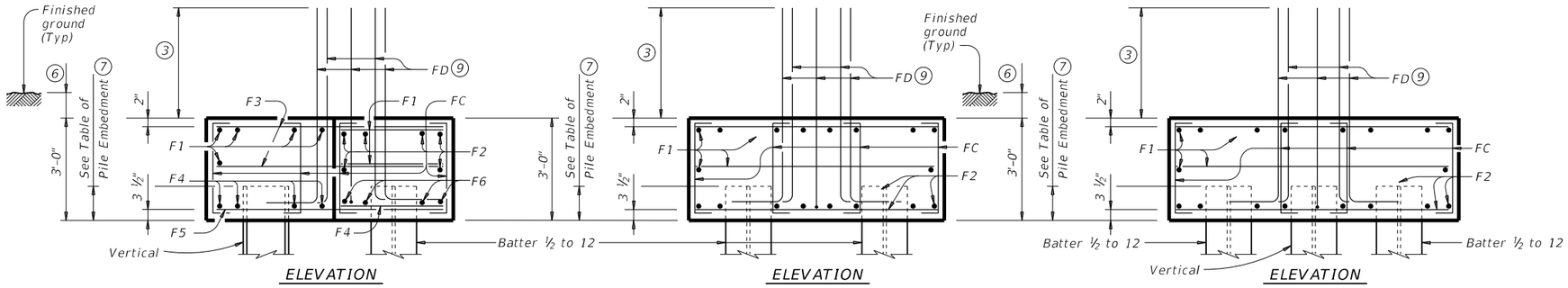
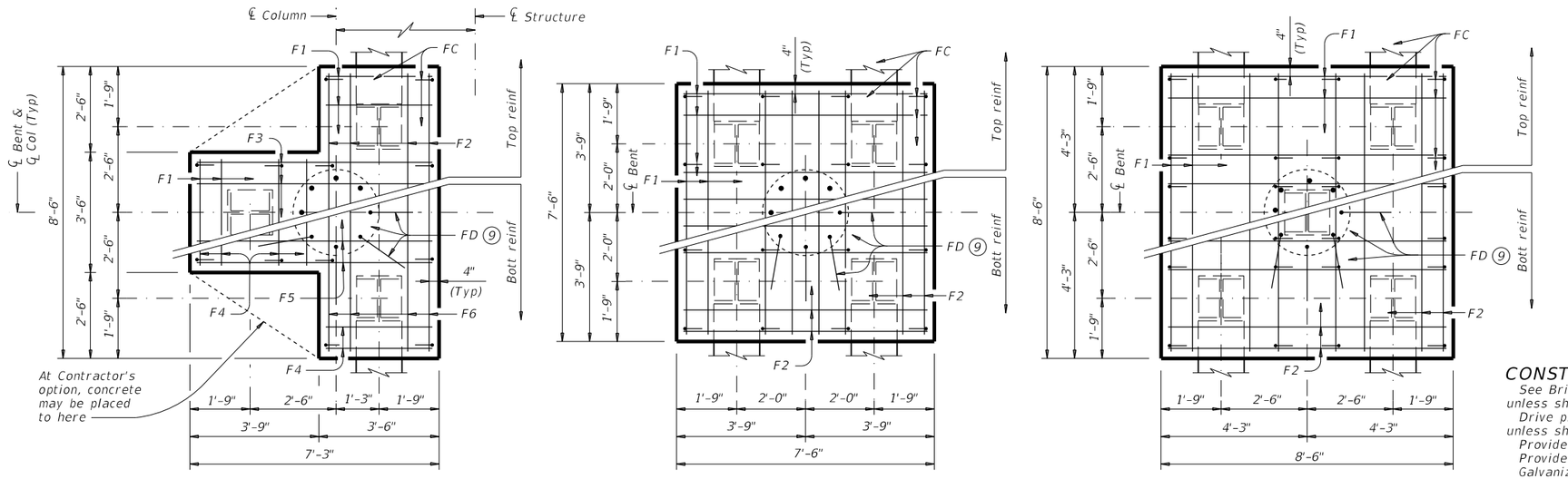




THREE PILE FOOTING (8)

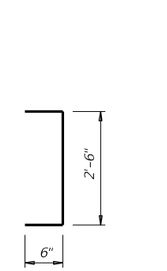
For 36" Dia and smaller columns.

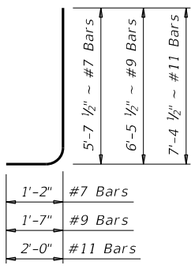
FOUR PILE FOOTING (8)

For 42" Dia and smaller columns.

FIVE PILE FOOTING (8)

For 42" Dia and smaller columns.





(3) Min lap with column reinforcing:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
#11 Bars = 4'-8"

(6) 1'-0" Min, unless shown otherwise on plans.

(7) Or as shown on plans.

(8) See Bridge Layout for type, size and length of piling.

(9) Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.

(10) Adjust FD quantity, size and weight as needed to match column reinforcing.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	11	#4	3'- 2"	23
F2	6	#4	8'- 2"	33
F3	6	#4	6'- 11"	28
F4	8	#9	3'- 2"	86
F5	4	#9	6'- 11"	94
F6	4	#9	8'- 2"	111
FC	12	#4	3'- 6"	28
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	623
Class "C" Concrete			CY	4.8

ONE 4 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	659
Class "C" Concrete			CY	6.3

ONE 5 PILE FOOTING

Bar	No.	Size	Length	Weight
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD (10)	8	#9	8'- 1"	220
Reinforcing Steel			Lb	829
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.

Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

Provide Class C Concrete (f'c = 3,600 psi), unless shown otherwise.

Provide Grade 60 reinforcing steel.

Galvanize reinforcing if shown elsewhere in the plans.

Provide bar laps for drilled shaft reinforcing, where required, as follows:

Uncoated or galvanized (#6) ~ 2'-6"
Uncoated or galvanized (#7) ~ 2'-11"
Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

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

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.

Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.

Maximum allowable pile loads for the footings shown are:

72 Tons/Pile with 24" Dia Columns
80 Tons/Pile with 30" Dia Columns
100 Tons/Pile with 36" Dia Columns
120 Tons/Pile with 42" Dia Columns

Texas Department of Transportation

Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

FILE: fdstde01-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
01-20: Added #11 bars to the FD bars.	DIST	COUNTY		SHEET NO.
	SAT	WILSON		113

DATE: 10/27/2022 STIMES
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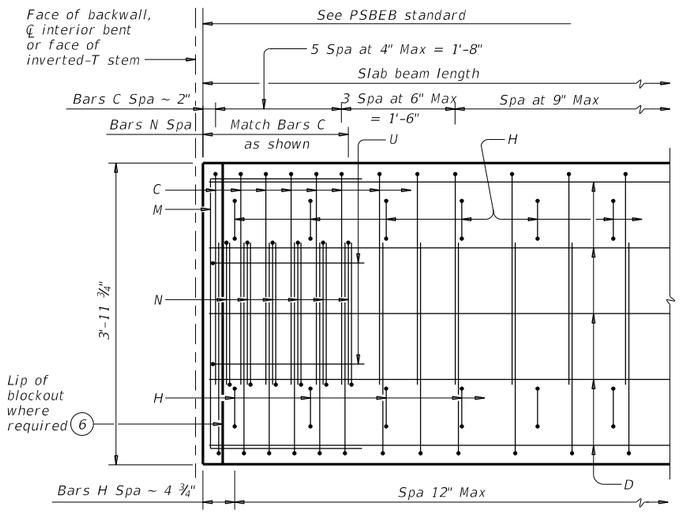
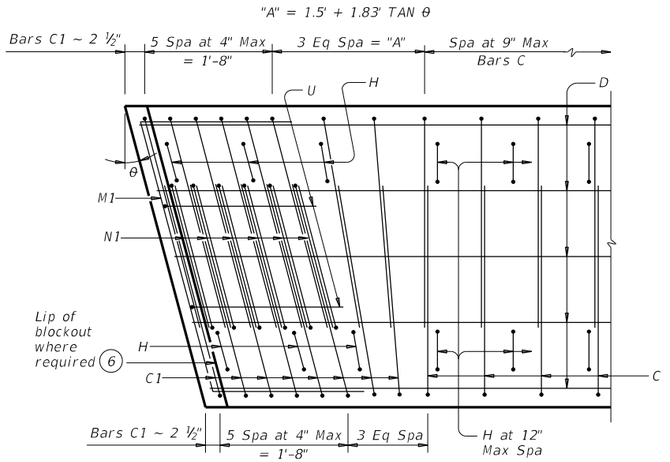
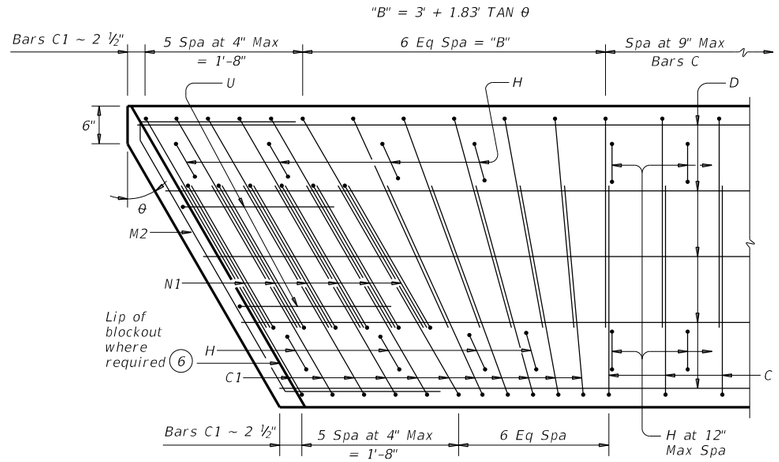


PART PLAN



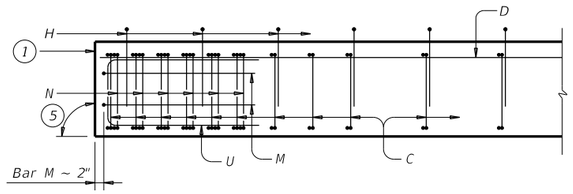
PART SKEW PLAN

(Showing θ over 0° to 15° Skew)



PART SKEW PLAN

(Showing θ over 15° to 30° Skew)



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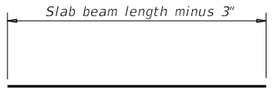
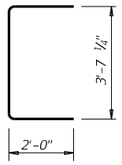


BARS D(#6)



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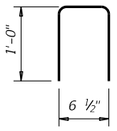

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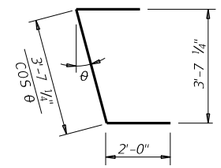

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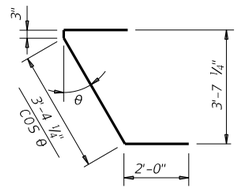

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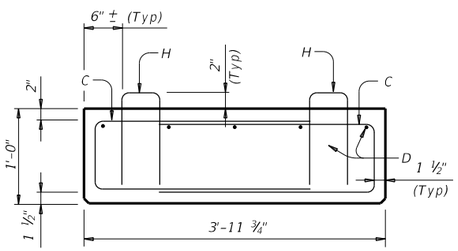
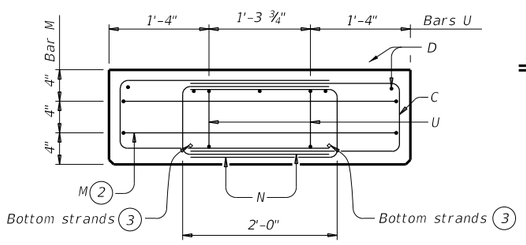
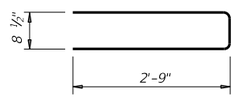


SECTION

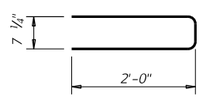


END MAT REINFORCING

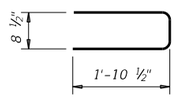
Bars H not shown for clarity.



BARS C(#4)



BARS U(#5)



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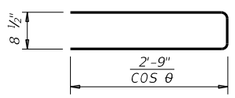

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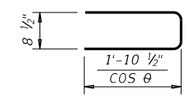

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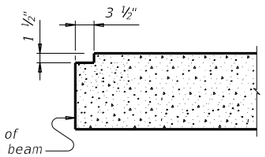


ELEVATION OF BLOCKOUT 6

BEAM PROPERTIES		
Area	in^2	573.0
Y top	in	6.00
Y bott	in	6.00
I	in^4	6,876
Weight (4)	lb/ft	597

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.

These details can be used for any skew angle up to a maximum of 30 degrees.

Chamfer all exposed corners ¾" or round to a ¾" radius.

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

(3) See sheet PSBND or PSBSD for strand locations.

(4) Assumes 150 pcf weight density of concrete.

(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.

(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

HL93 LOADING

Texas Department of Transportation

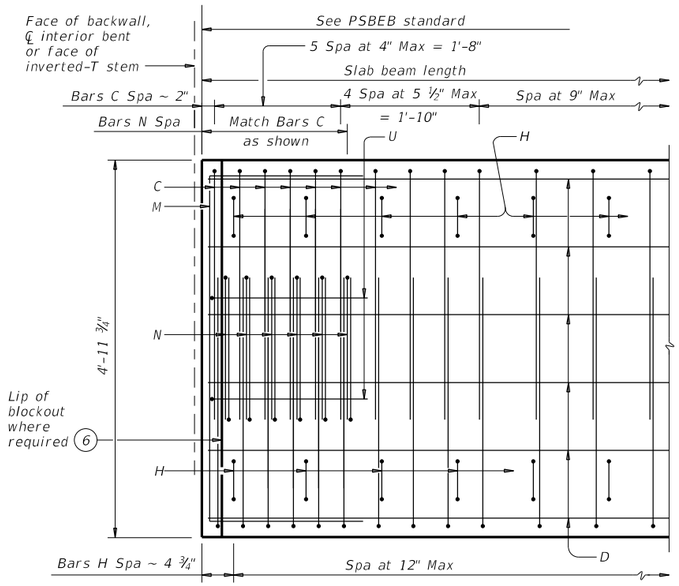
Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

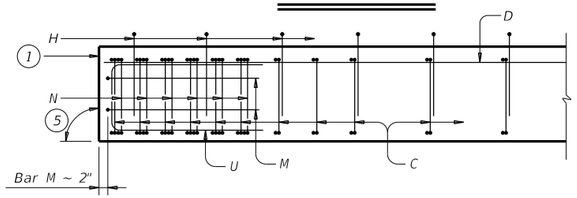
(TYPE 4SB12)

PSB-4SB12

FILE: psbsts01-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		114



PART PLAN



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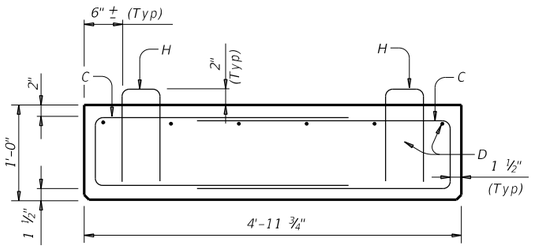

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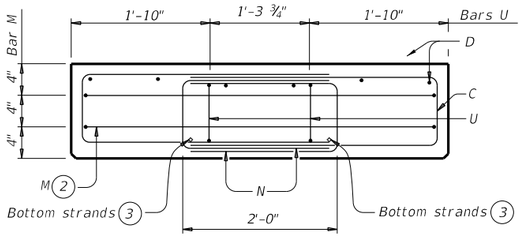
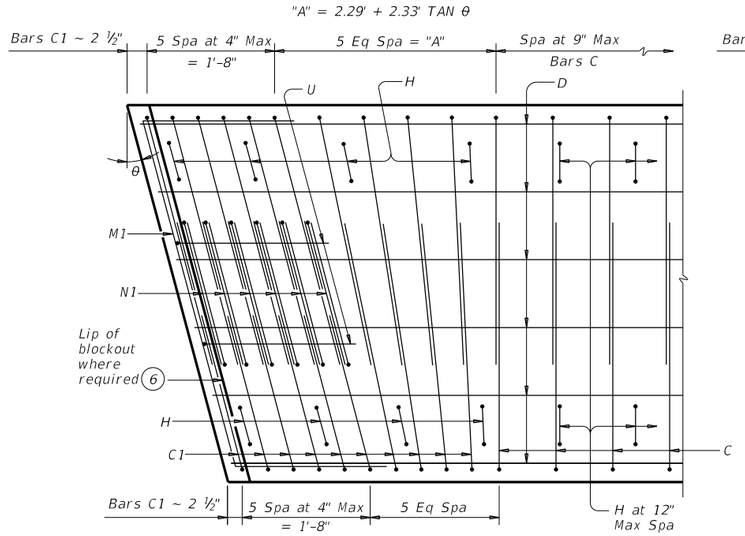


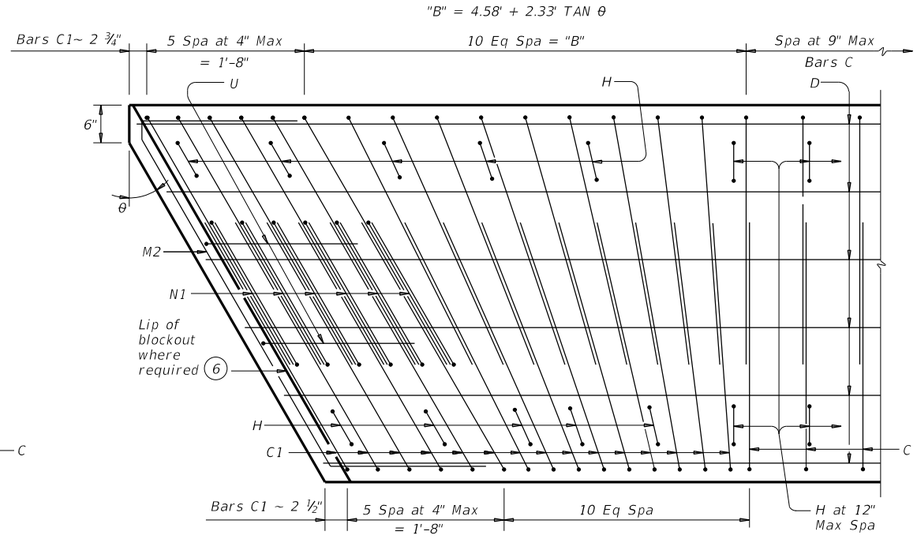
END MAT REINFORCING

Bars H not shown for clarity.



PART SKEW PLAN

(Showing θ over 0° to 15° Skew)



PART SKEW PLAN

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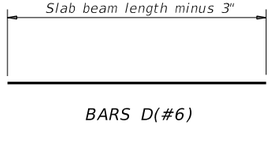

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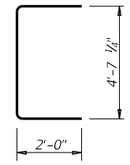
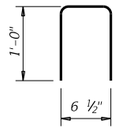


BARS M(#4)



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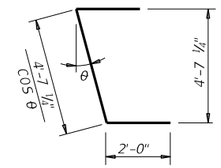

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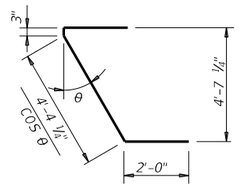

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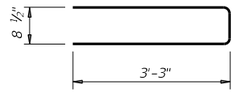

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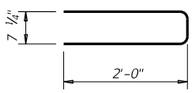

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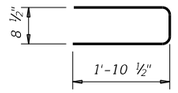

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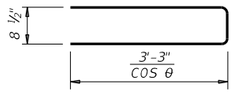

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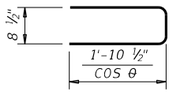

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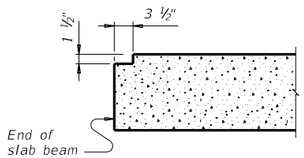

ELEVATION OF BLOCKOUT 6

BEAM PROPERTIES		
Area	in^2	717.0
Y top	in	6.00
Y bott	in	6.00
I	in^4	8,604
Weight (4)	lb/ft	747

(1) See End Mat Reinforcing detail.

(2) Adjust bars M vertically to avoid strands.

(3) See sheet PSBND or PSBSD for strand locations.

(4) Assumes 150 pcf weight density of concrete.

(5) 90° at conventional interior bents. End of beam must be vertical at abutment backwall and inverted-T stem.

(6) Blockout required at armor joint (AJ) and sealed expansion joint (SEJ) locations to accommodate joint anchorage.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Provide Class H concrete. Provide Class H (HPC) if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

An equal area of welded wire reinforcement (WWR) (ASTM 1064) may be substituted for bars C and D if approved by the Engineer.

These details can be used for any skew angle up to a maximum of 30 degrees.

Chamfer all exposed corners ¾" or round to a ¾" radius.

Details are drawn showing right forward skew. See Bridge Layout for actual direction.

Cover dimensions are clear dimensions, unless noted otherwise.

Reinforcing bar dimensions shown are out-to-out of bar.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE SLAB BEAM DETAILS

(TYPE 5SB12)

PSB-5SB12

FILE: psbsts03-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		115

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

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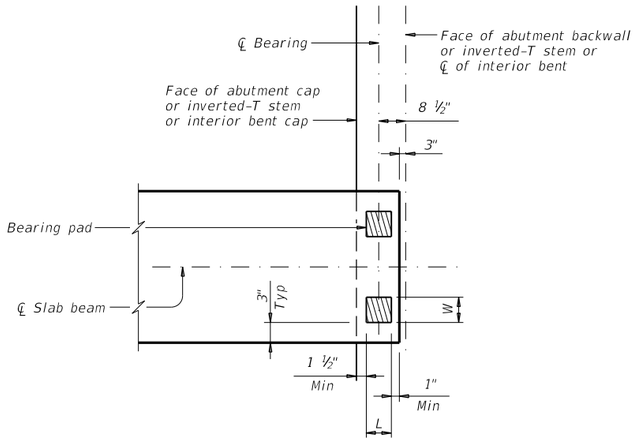
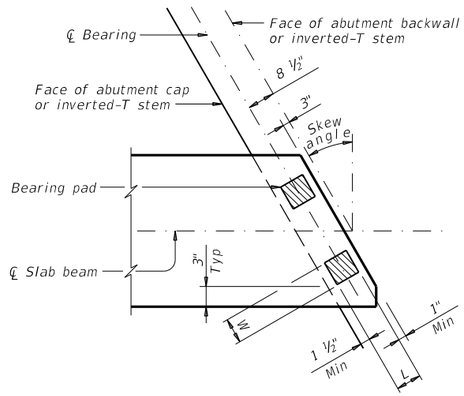


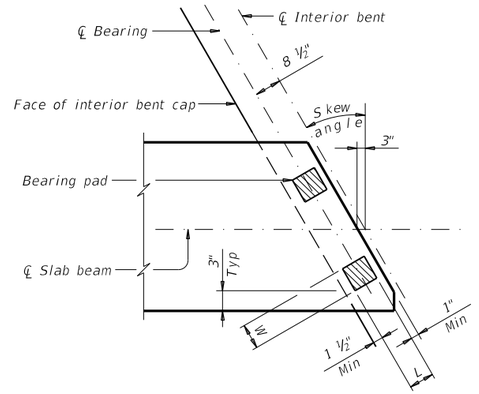
TWO-PAD DETAIL PLAN

(At abutment or inverted-T cap or at interior bent)



TWO-PAD DETAIL SKEW PLAN

(At abutment or inverted-T cap)



TWO-PAD DETAIL SKEW PLAN

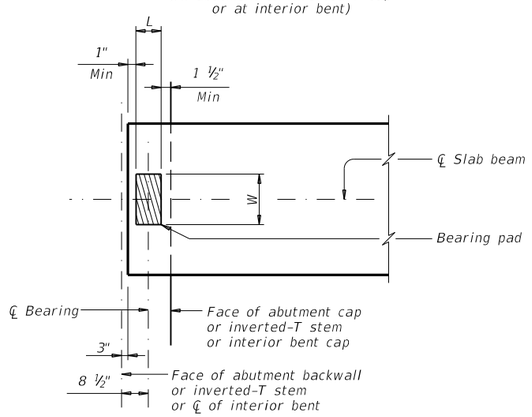
(At interior bent)

TABLE OF BEARING PAD DIMENSIONS (ALL PRESTR CONC SLAB BM TYPES)

One-Pad (Ty SB1-"N") (2)			Two-Pad (Ty SB2-"N") (2)		
W	L	T	W	L	T
14"	7"	2"	7"	7"	2"

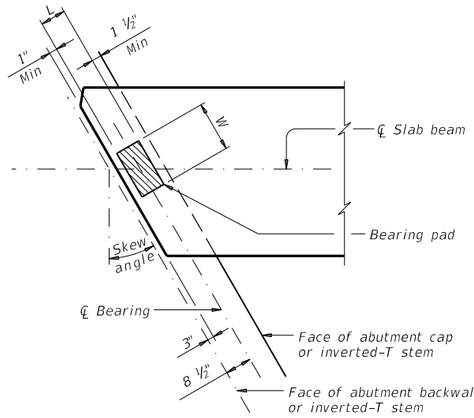
Pad sizes shown are applicable for the following conditions:

(1) All one, two and three span units where the minimum span length is not less than 25' and the maximum span is not more than 50'.
(2) Skews less than or equal to 30°.



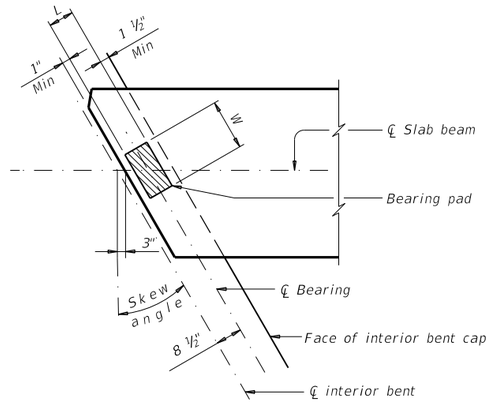
ONE-PAD DETAIL PLAN

(At abutment or inverted-T cap or at interior bent)



ONE-PAD DETAIL SKEW PLAN

(At abutment or inverted-T cap)

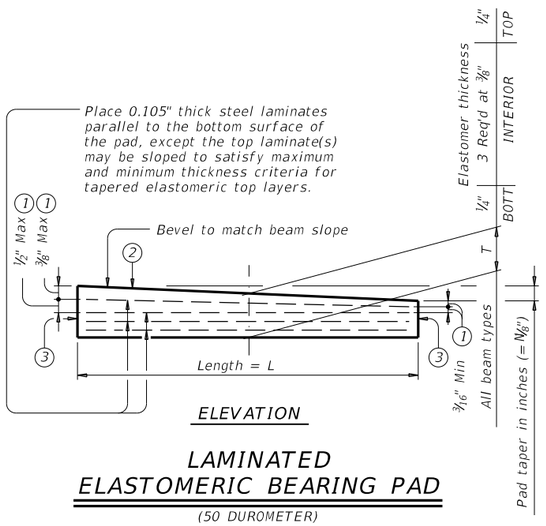


ONE-PAD DETAIL SKEW PLAN

(At interior bent)

ELASTOMERIC BEARING PAD PLACEMENT AND BEAM END DIAGRAMS

Place one bearing pad at forward station beam end.
Place two bearing pads at back station beam end.



ELEVATION

LAMINATED ELASTOMERIC BEARING PAD

(50 DUROMETER)

(1) Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.

(2) Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper in ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625"}{Length}\right)$ IN/IN.

(3) Locate permanent mark here.

GENERAL NOTES:

These details accommodate skew angles up to 30°.

Shop drawings for approval are required.

A bearing layout which identifies location and orientation of all bearings must be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.

Cost of furnishing and installing elastomeric bearings must be included in unit price bid for "Prestressed Concrete Slab Beams".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

ELASTOMERIC BEARING AND BEAM END DETAILS

PRESTR CONCRETE SLAB BEAM

PSBEB

FILE: psbste06-17.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		116

DATE: 10/27/2022 $TIME$
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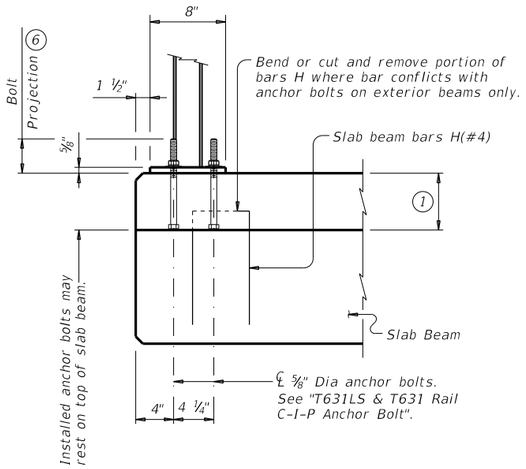
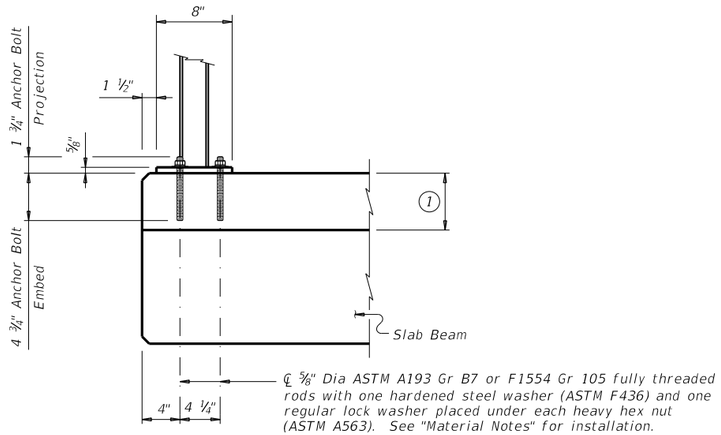
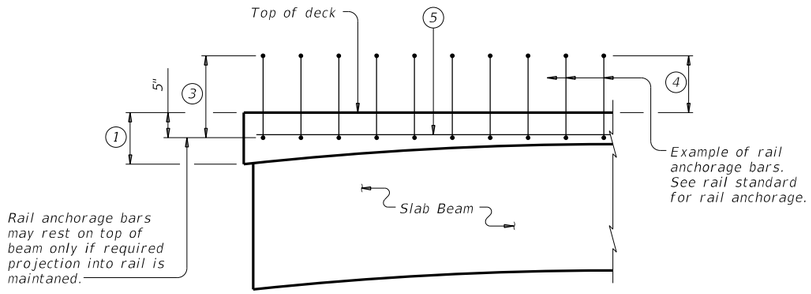


CAST-IN-PLACE ANCHORAGE OPTION

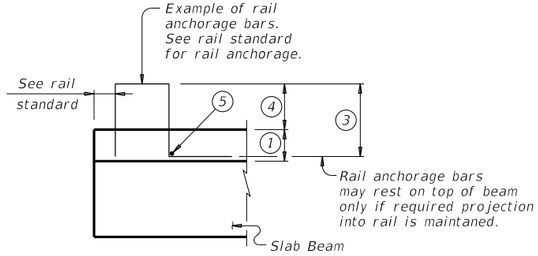


ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT (2)(7)



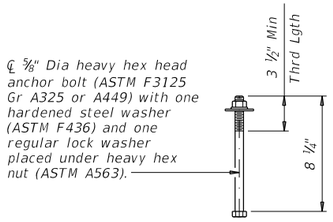
PART SPAN ELEVATION



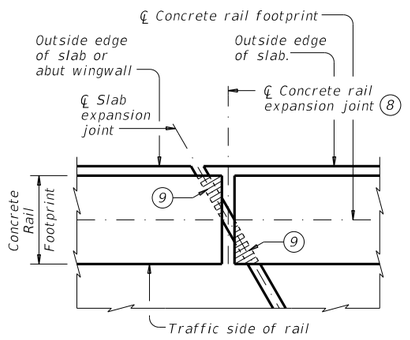
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

(1) Cast-in-place slab thickness varies due to beam camber (5" minimum).

(2) Replace cast-in-place anchor bolts shown on T631LS and T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.

(3) Bar length shown on rail standard, minus 1 ¼". Adjust bar length for a raised sidewalk.

(4) See rail standard for projection from finished grade or top of sidewalk.

(5) Place additional (#5) longitudinal bar.

(6) Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 7", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than ½" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".

(7) Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only)
30° Skew: 1'-3" (acute corner only)

(8) Location of rail expansion joint must be at the intersection of ℄ slab expansion joint, ℄ rail footprint and perpendicular to slab outside edge.

(9) Cross-hatched area must have ½" preformed bitumuminous fiber material under concrete rail, as shown.

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

MATERIAL NOTES:

Galvanize all steel components of steel rail system.

Provide Grade 60 reinforcing steel.

Cast-in-place anchorage system for T631LS and T631 Rail must be ⅝" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 ½" minimum.

Adhesive anchors for T631LS and T631 Rail must be ⅝" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 ¾". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing."

Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications.

This standard is for use with structures with a 5" minimum cast-in-place concrete slab.

This standard may require modification for interior rails. This standard does not apply to median barriers.

This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on slab beam bridges.

See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation

Bridge Division Standard

RAIL ANCHORAGE DETAILS

PRESTR CONCRETE SLAB BEAMS

PSBRA

FILE: psbste07-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT January 2017	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
03-18: Updated adhesive anchor notes.	DIST	COUNTY		SHEET NO.
	SAT	WILSON		117

DATE: 10/27/2022 sTIMEs
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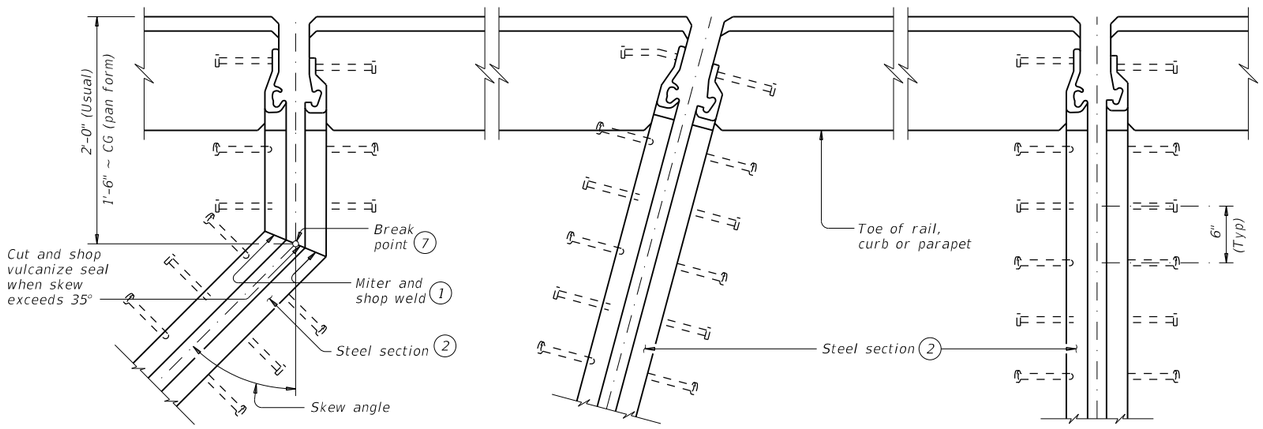
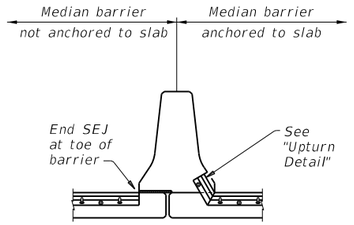
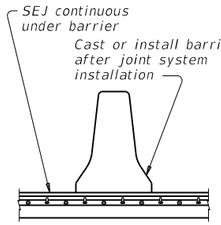


SHOWING SKEWS WITH SLAB BREAKBACKS | SHOWING SKEWS WITHOUT SLAB BREAKBACKS | SHOWING WITHOUT SKEWS AND SLAB BREAKBACKS

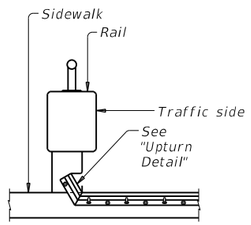
PLANS OF END CONDITIONS



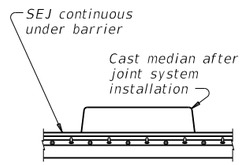
WITH OPEN DECK JOINT BELOW MEDIAN BARRIER



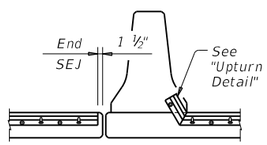
AT MEDIAN BARRIER



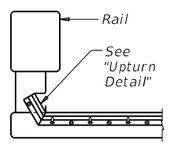
AT SIDEWALK BEHIND BRIDGE RAIL



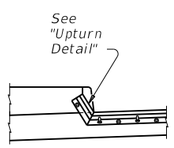
AT RAISED MEDIAN



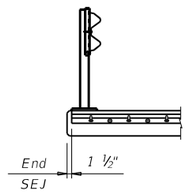
WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER



AT CONCRETE BRIDGE RAIL

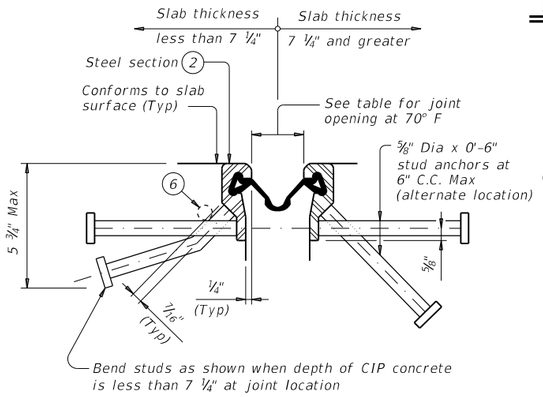


AT SIDEWALK

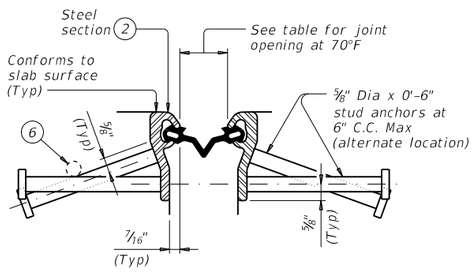


AT STEEL POST BRIDGE RAIL

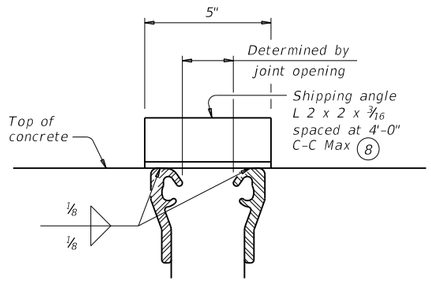
TYPICAL SECTIONS (5)



SECTION THRU WATSON BOWMAN ACME (SE-400 OR SE-500) JOINTS



SECTION THRU D.S. BROWN (A2R-400 OR A2R-XTRA) JOINTS



SHOWING D.S. BROWN (Ty SSCM2)
(All joints are similar.) (Studs are not shown for clarity.)

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

TABLE OF SEALED EXPANSION JOINT INFORMATION

MANUFACTURER	STEEL SECTION (2)	STRIP SEAL			
		4" JOINT		5" JOINT	
		Seal Type	Joint Opening (3)	Seal Type	Joint Opening (3)
D.S. Brown	Type SSCM2	A2R-400	1 ¾"	A2R-XTRA	2"
Watson Bowman Acme	Type R	SE-400	1 ¾"	SE-500	2"

REDUCED LONGITUDINAL MOVEMENT RANGE

SKEW (deg)	JOINT SIZE	
	4"	5"
0	4.0"	5.0"
15	4.0"	5.0"
30	3.5"	4.3"
45	2.8"	3.5"

DESIGN NOTES:

Joints installed on a skew have reduced ability to accommodate longitudinal movement. Use table values to determine the correct joint size for skewed installations.

For other skews over 25 degrees, calculate reduced movement range by multiplying joint size by cosine (skew).

(1) Remove all burrs which will be in contact with seal prior to making splice.

(2) Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.

(3) These openings are also the recommended minimum installation openings.

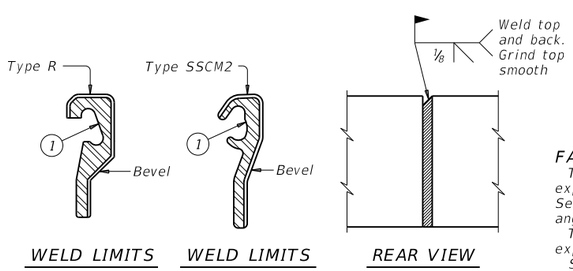
(4) Reduce for sidewalk or parapet heights less than 6".

(5) Other conditions affecting the joint profile should be noted elsewhere.

(6) Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.

(7) See Span details for location of break point.

(8) Align shipping angle perpendicular to joint.



WELD LIMITS | WELD LIMITS | REAR VIEW

FIELD SPLICE DETAIL

FABRICATION NOTES:

Temporarily shop assemble corresponding sections of sealed expansion joints (SEJ), check for fit, and match mark for shipment. Secure corresponding sections together for shipment with shipping angle. Do not use erection bolts.

The seal must be continuous and included in the price bid for sealed expansion joint.

Ship steel sections in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for staged construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.

Weld studs in accordance with AWS D1.1.

Butt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.

Paint the entire steel section with System II or IV primer in accordance with Item 446, "Feild Cleaning and Painting Steel", unless required to galvanize when shown in the plans. Provide galvanizing in accordance with Item 445, "Galvanizing". Provide paints in accordance with Item 446.2. Prepare steel and apply paint in accordance with Item 446.4.7.3 and 446.4.7.4.

Shop drawings for the fabrication of sealed expansion joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

CONSTRUCTION NOTES:

Secure the sealed expansion joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for sealed expansion joint.

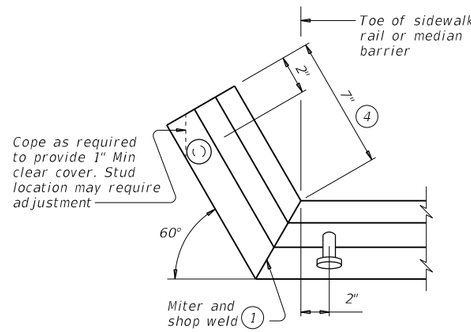
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

Clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.

GENERAL NOTES:

Provide sealed expansion joints in the size and at locations shown on the plans.

Minimum slab and overhang thickness required for the use of SEJ-M is 6 ½".



UPTURN DETAIL

Texas Department of Transportation

Bridge Division Standard

SEALED EXPANSION JOINT TYPE M
WITHOUT OVERLAY

SEJ-M

FILE: sejmjste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH
©TxDOT April 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
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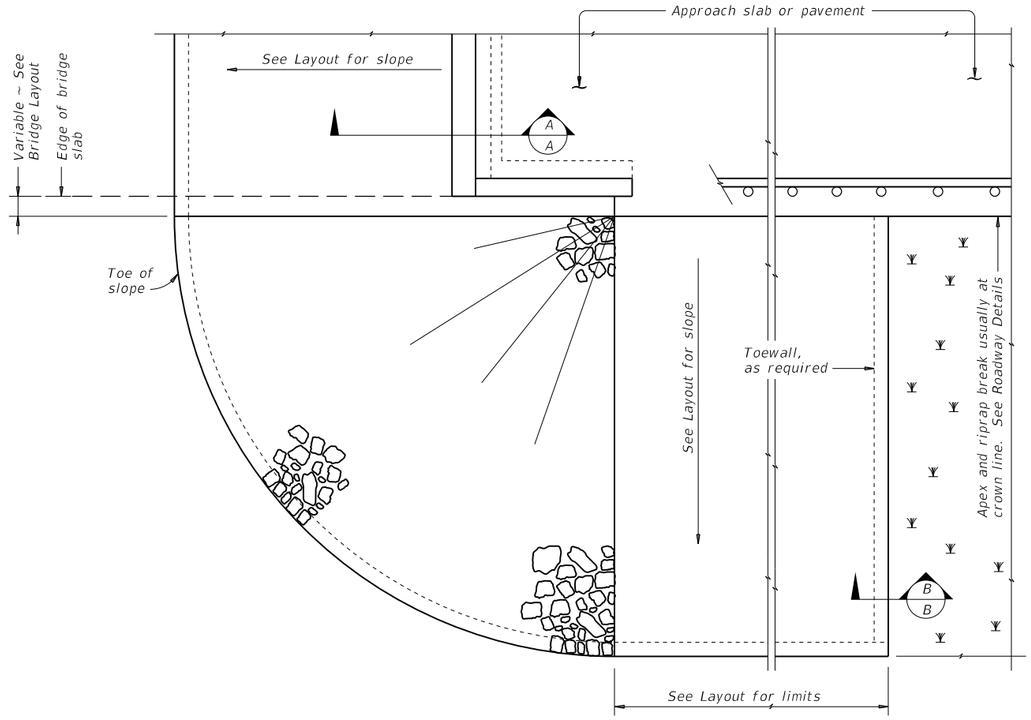
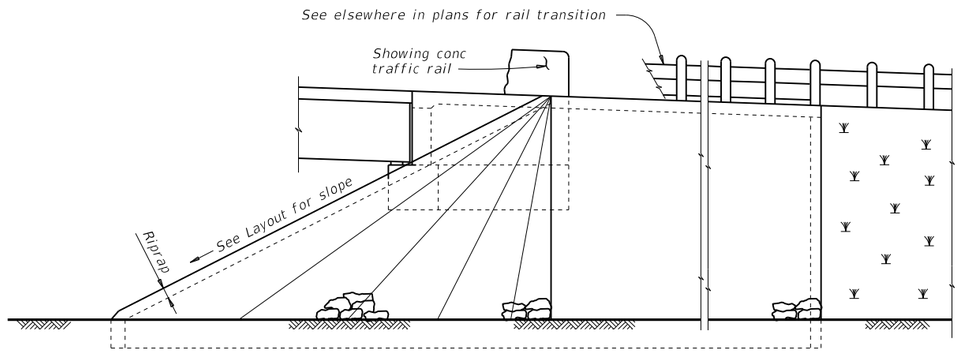
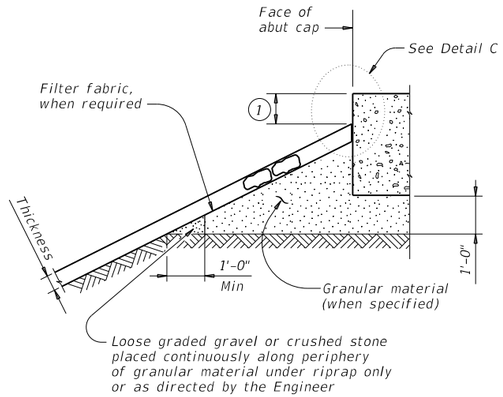
	SAT	WILSON		118



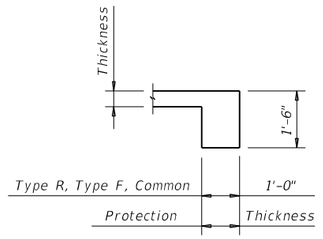
PLAN



ELEVATION

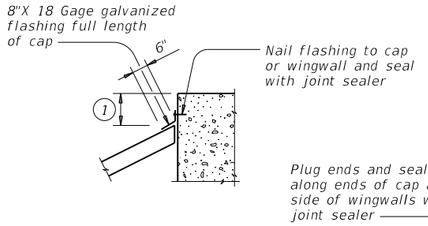


SECTION A-A AT CAP

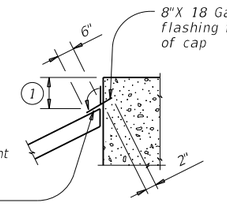


SECTION B-B

Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A



CAP OPTION B

DETAIL C

(1) Top of cap to top of riprap dimension varies as directed by the Engineer. Provide 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

GENERAL NOTES:
Refer to Item 432, "Riprap" for stone size and gradation, and construction details. See Layout for limits and thickness of riprap specified.
See elsewhere in plans for locations and details of shoulder drains.

SHEET 1 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES		CK: JGD	DW: BWH		CK: AES	
©TxDOT April 2019	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0143	04	072		US 87		
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	SAT	WILSON				119	

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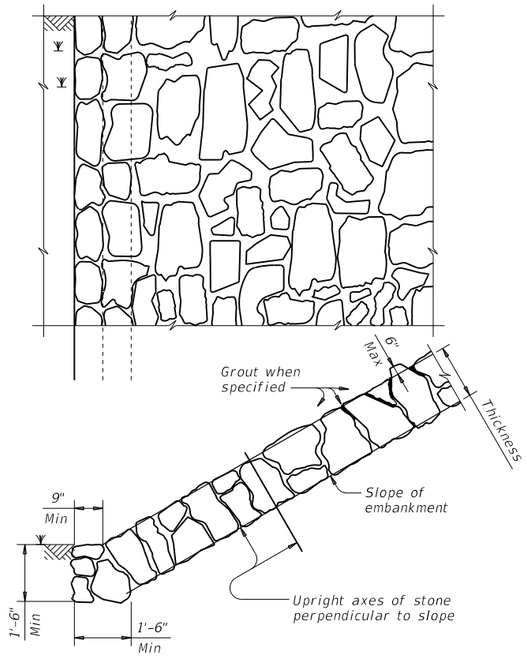


FIGURE 1 ~ TYPE R STONE RIPRAP

dry or grouted

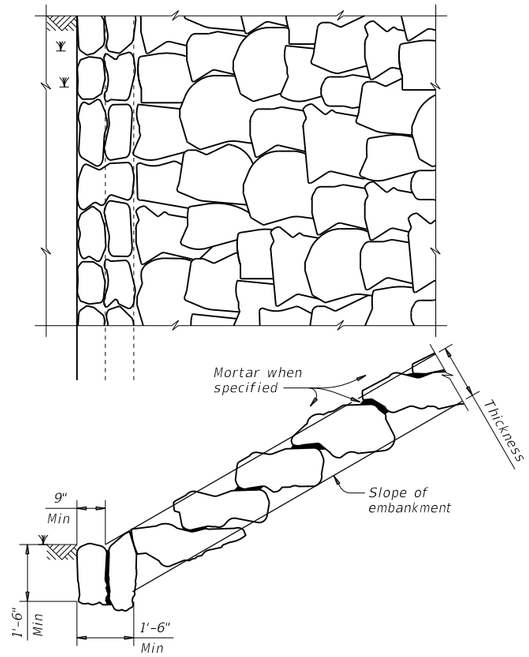


FIGURE 2 ~ TYPE F STONE RIPRAP

dry or mortared

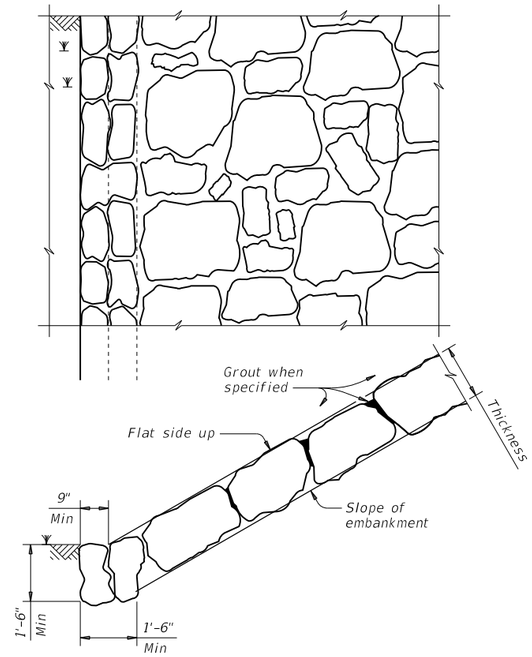


FIGURE 3 ~ TYPE F STONE RIPRAP

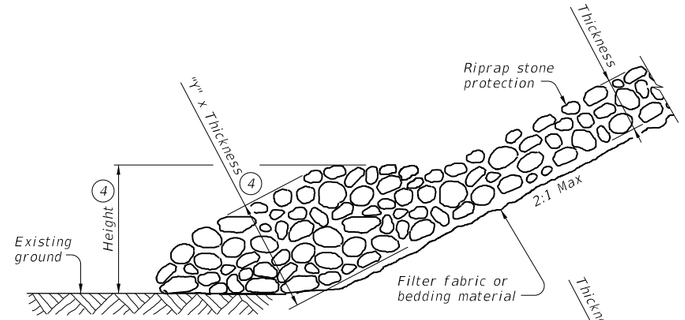
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

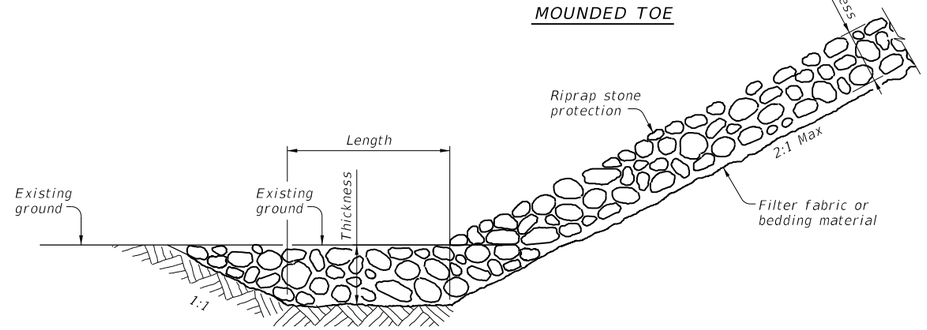
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(4) "Y" and Height need to be defined. See layout or detail sheet for values if this option is used.

(5) List Stone Protection as size (XX inch) and thickness (YY inch) on the layout.
Example: Riprap (Stone Protection) XX inch, Thickness = YY inch.

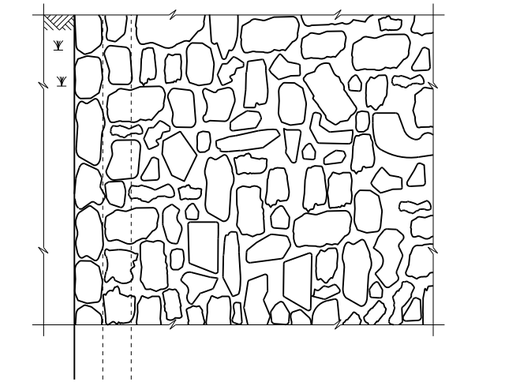


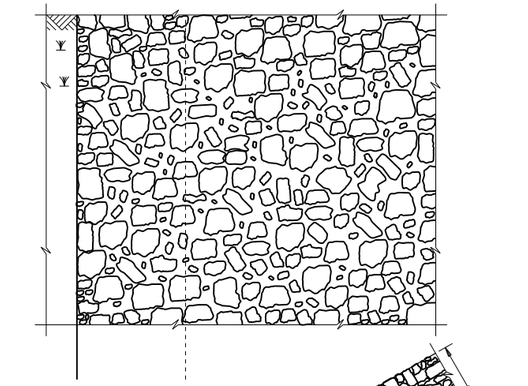
MOUNDED TOE



EXTENDED ROCK FILLED TRENCH

PROTECTION STONE RIPRAP TOE OPTIONS (5)





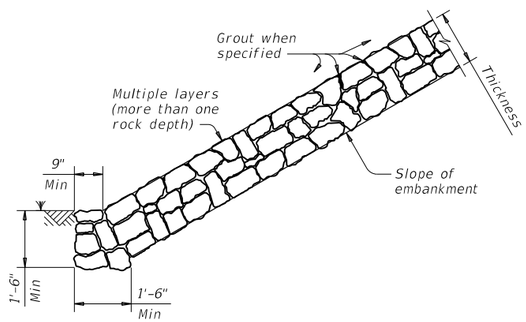


FIGURE 4 ~ COMMON STONE RIPRAP

dry or grouted

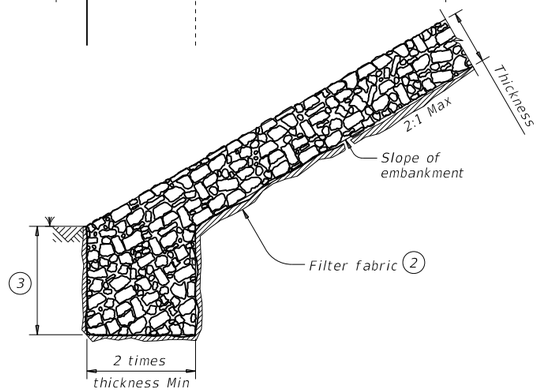


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

Texas Department of Transportation

Bridge Division Standard

STONE RIPRAP

SRR

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©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		120

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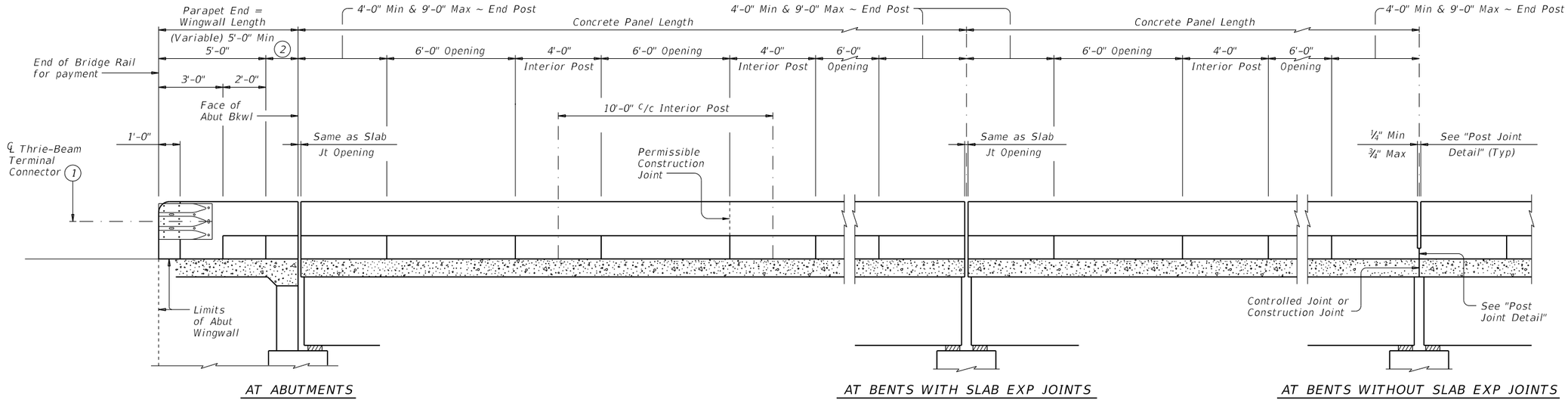
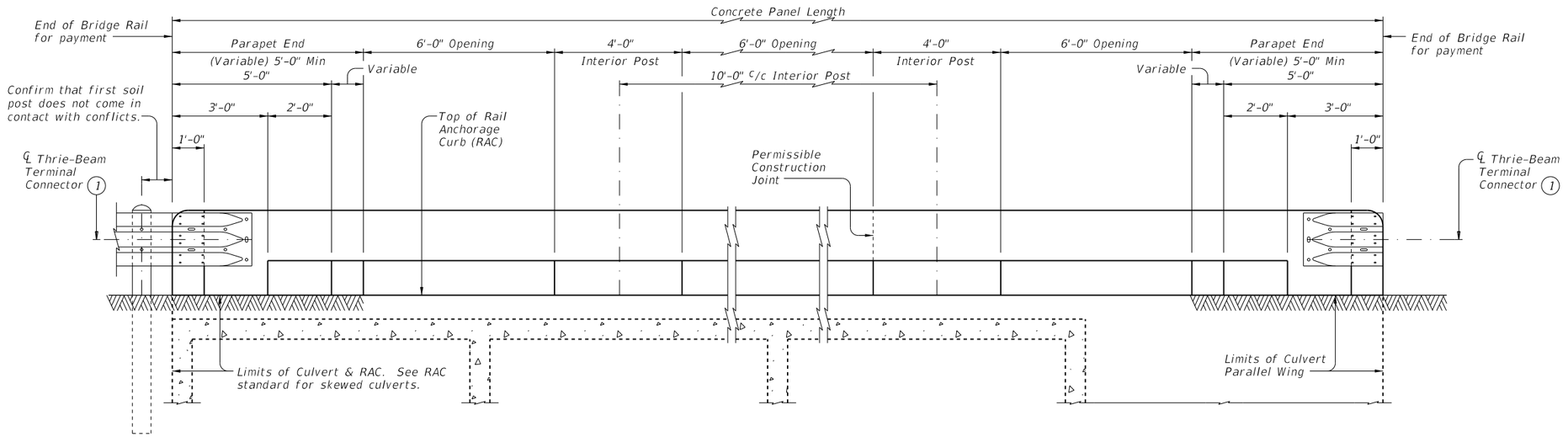


AT ABUTMENTS

AT BENTS WITH SLAB EXP JOINTS

AT BENTS WITHOUT SLAB EXP JOINTS

ROADWAY ELEVATION OF RAIL ON BRIDGE



AT STRAIGHT OR FLARED WINGS

AT PARALLEL WINGS

ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown.
Vertical joints in concrete rail are not required, unless shown elsewhere.

(1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.

(2) Wingwall Length minus 5'-0" (Varies)

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SHEET 1 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
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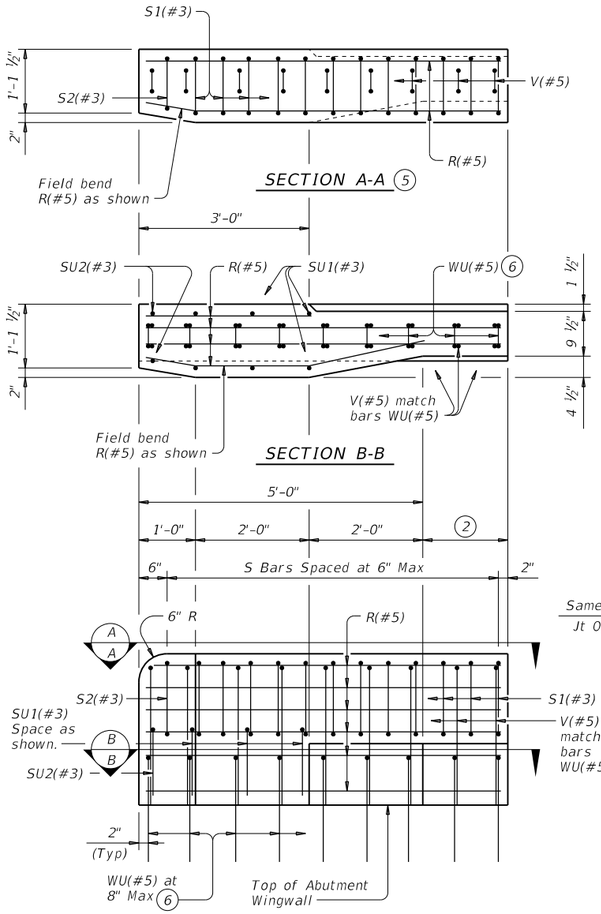
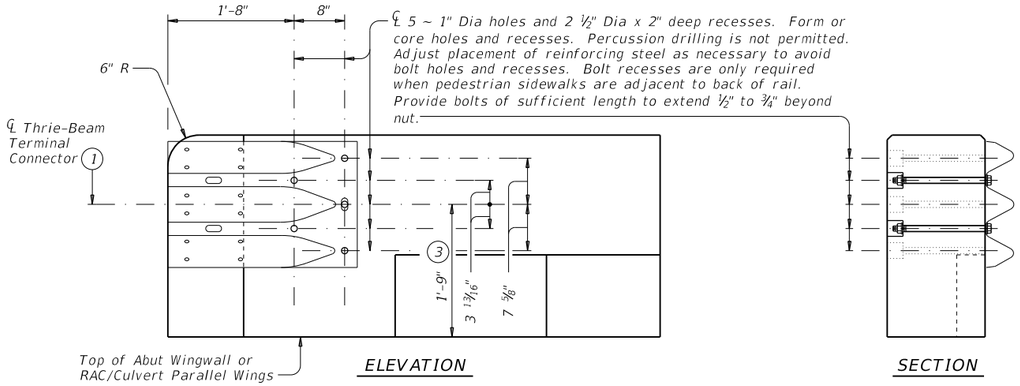
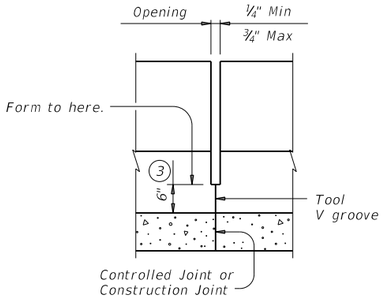
	SAT	WILSON		121



PARAPET END AT ABUT WINGWALL (6)

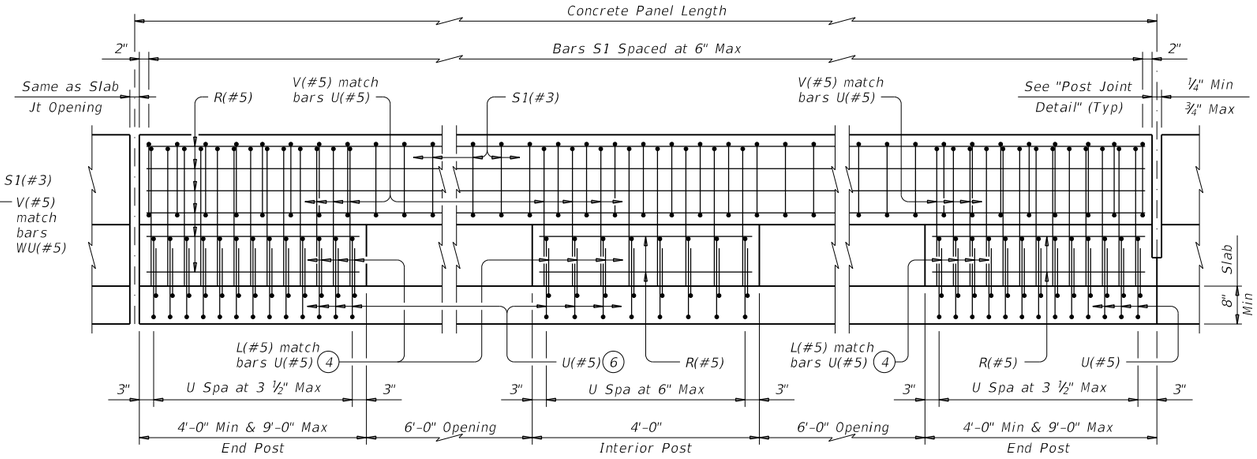


TERMINAL CONNECTION DETAILS



POST JOINT DETAIL

Provide at all interior bents without slab expansion joints.



AT SLAB EXPANSION JOINTS

AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXPANSION JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab. Rail on box culvert similar.

(1) *Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.*

(2) *Wingwall Length minus 5'-0" (Varies)*

(3) *Increase 2" for structures with overlay.*

(4) *Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.*

(5) *Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.*

(6) *Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on achorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.*

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SHEET 2 OF 3

Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

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	SAT	WILSON		122

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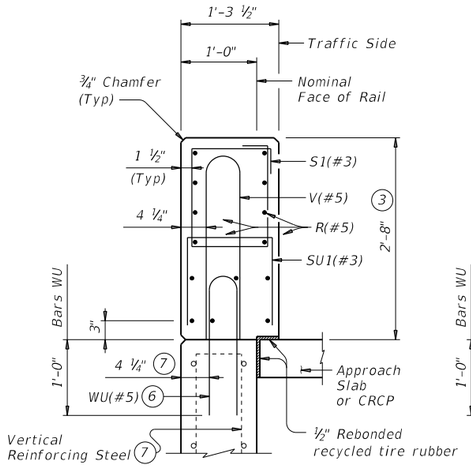
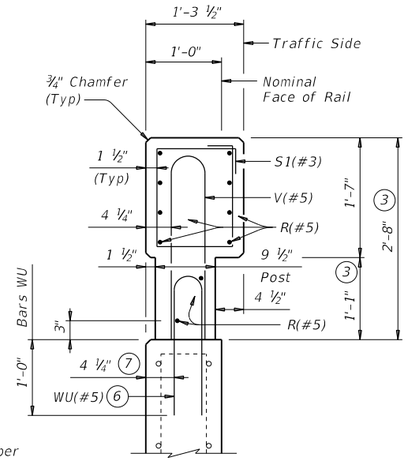
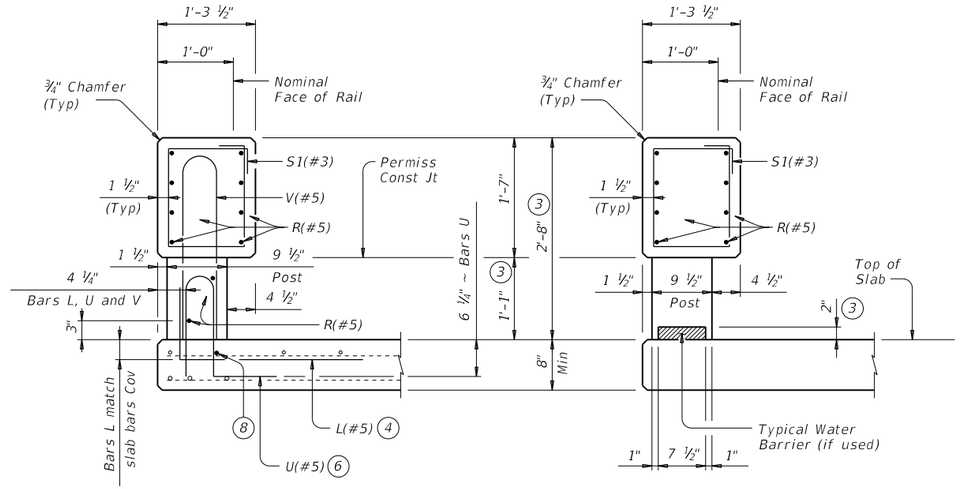


SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

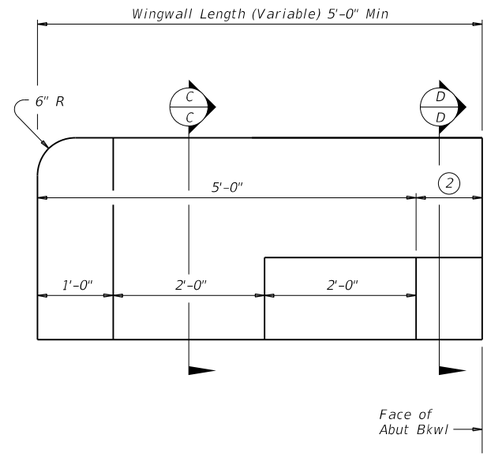


AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB

SECTIONS THRU RAIL

Sections on box culverts similar.



ELEVATION AT ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.

Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.

Provide bar laps, where required, as follows:

Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

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

Shop drawings are not required for this rail.

Average weight of railing with no overlay is 358 plf.

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

(2) Wingwall Length minus 5'-0" (Varies)

(3) Increase 2" for structures with overlay.

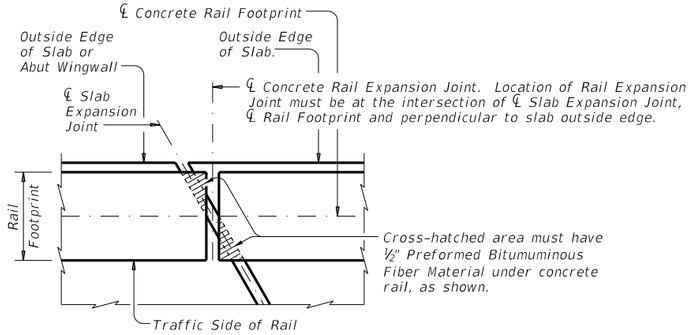
(4) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.

(6) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

(7) When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on traffic side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars conflict.

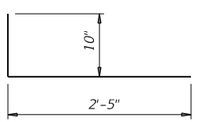
(8) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(9) At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 ¼" above the roadway surface without overlay.

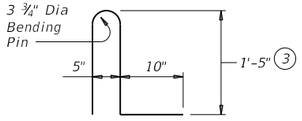


PLAN OF RAIL AT EXPANSION JOINTS

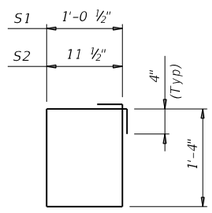
Example showing Slab Expansion Joints without breakbacks.



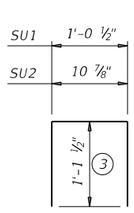
BARS L (#5)



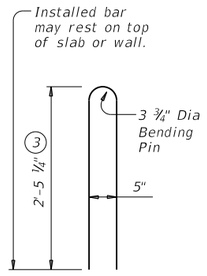
BARS U (#5) (9)



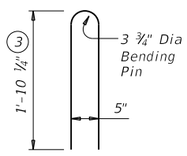
BARS S (#3)



BARS SU (#3)



BARS V (#5) (9)



BARS WU (#5)

SHEET 3 OF 3

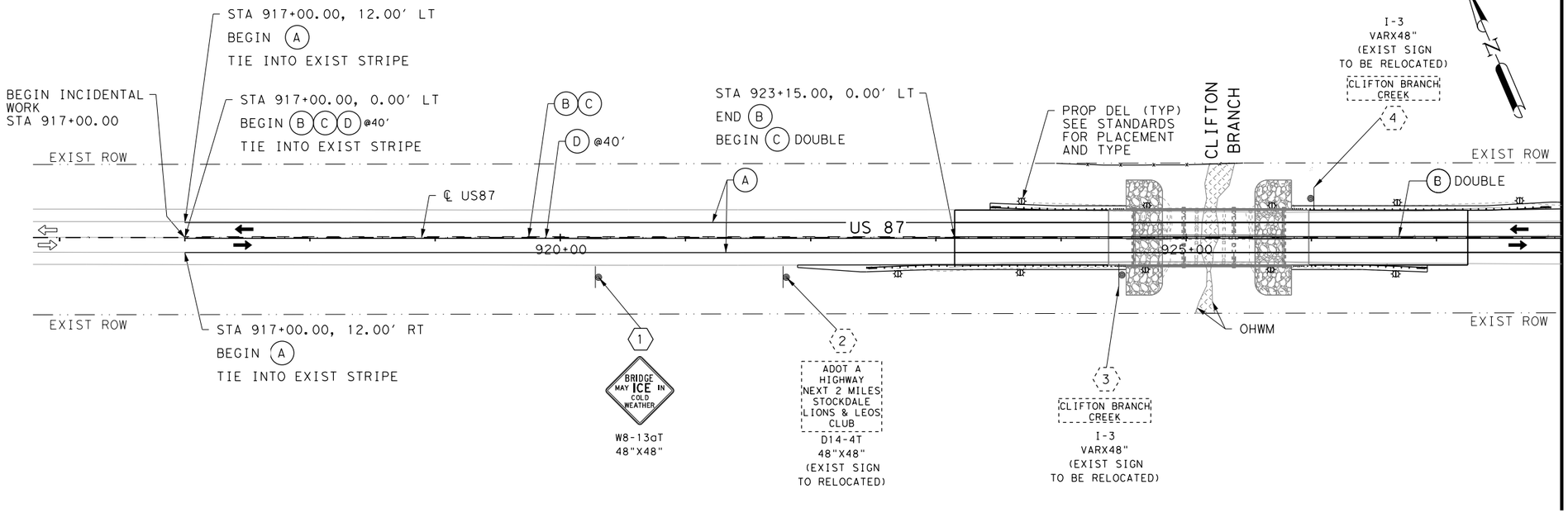
Texas Department of Transportation

Bridge Division Standard

TRAFFIC RAIL

TYPE T223

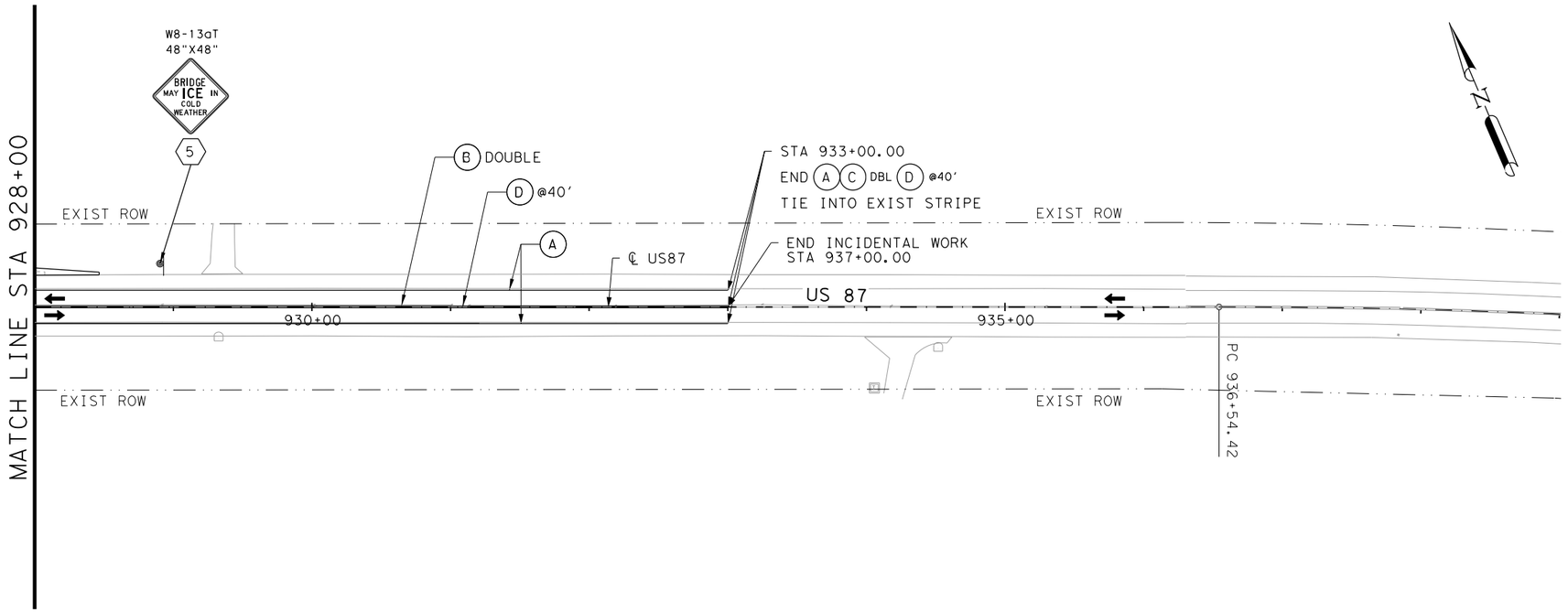
FILE: rlstd005-19.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT September 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		123



ITEM	CODE	DESCRIPTION	UNIT	QTY
644	6004	IN SUM RD SN SUP&AM TY10BWG(1)SAT(T)	EA	2
644	6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	3
658	6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	6
658	6071	INSTL DEL ASSM (D-SW)SZ (BRF)CTB (BI)	EA	4
666	6224	PAVEMENT SEALER 4"	LF	2745
666	6225	PAVEMENT SEALER 6"	LF	3200
666	6343	REF PROF PAV MRK TY I (W)6"(SLD)(100 MIL)	LF	3200
666	6344	REF PROF PAV MRK TY I(Y)4"(BRK)(100MIL)	LF	160
666	6345	REF PROF PAV MRK TY I(Y)4"(SLD)(100MIL)	LF	2585
672	6009	REFL PAV MRKR TY II-A-A	EA	41

LEGEND

- (A) REF PROF PAV MRK TY I(W)6"(SLD)(100 MIL)
- (B) REF PROF PAV MRK TY I(Y)4"(BRK)(100 MIL)
- (C) REF PROF PAV MRK TY I(Y)4"(SLD)(100 MIL)
- (D) REF PAV MRKR TY II-A-A
- (X) PROPOSED SIGN
- EXIST SIGN TO BE RELOCATED
- TRAFFIC DIRECTION (EXIST)
- TRAFFIC DIRECTION (PROPOSED)
- BIDIRECTIONAL DELINEATOR



STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

0' 25' 50' 100'
SCALE: 1"=100'

LJA Engineering, Inc.
FRN - F-1386

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US 87 AT CLIFTON BRANCH
SIGNING & PAVEMENT MARKINGS
LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	124

10:43:42 AM 10/28/2022
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DATE: 10/28/2022 $TIME$
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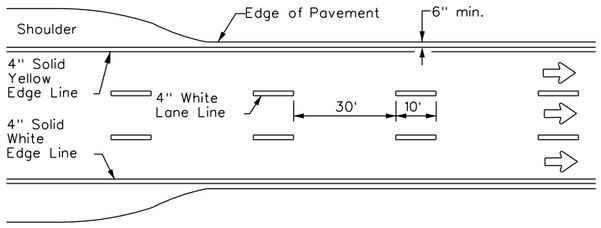
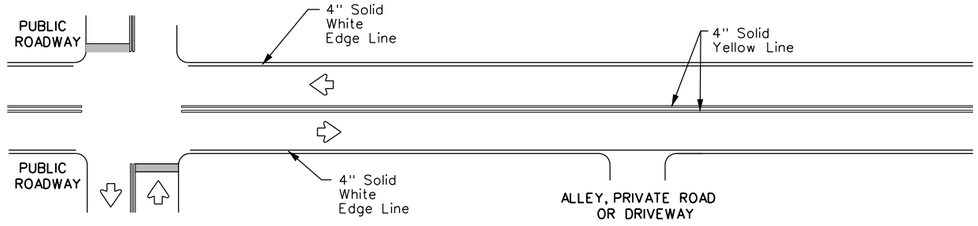
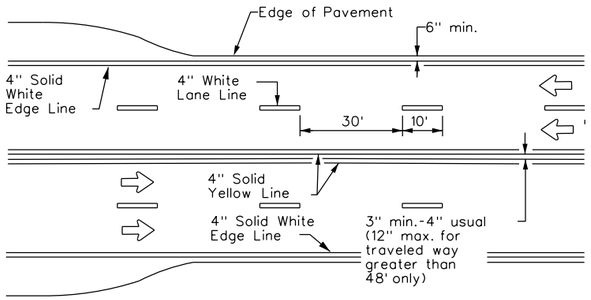


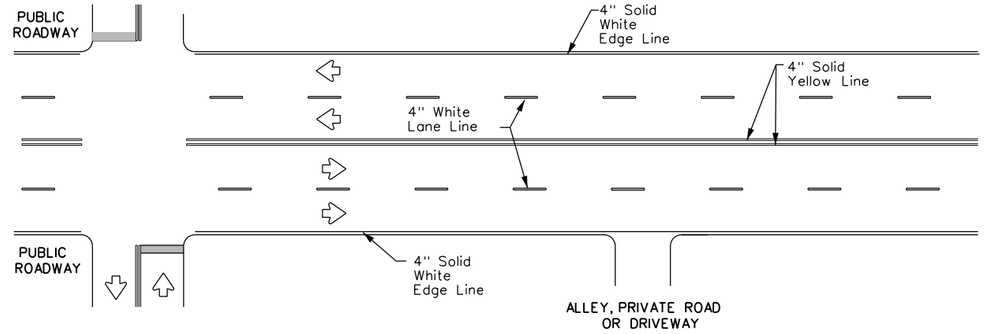
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



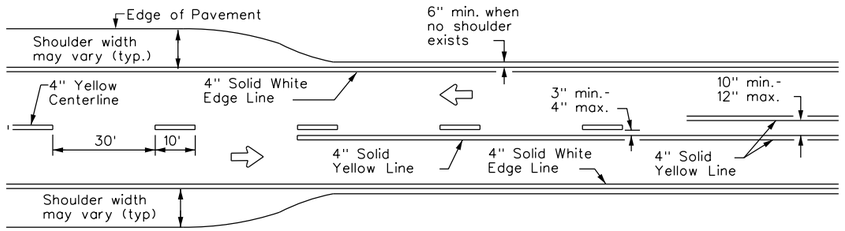
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



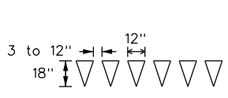
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



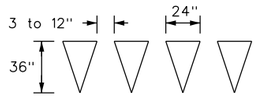
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

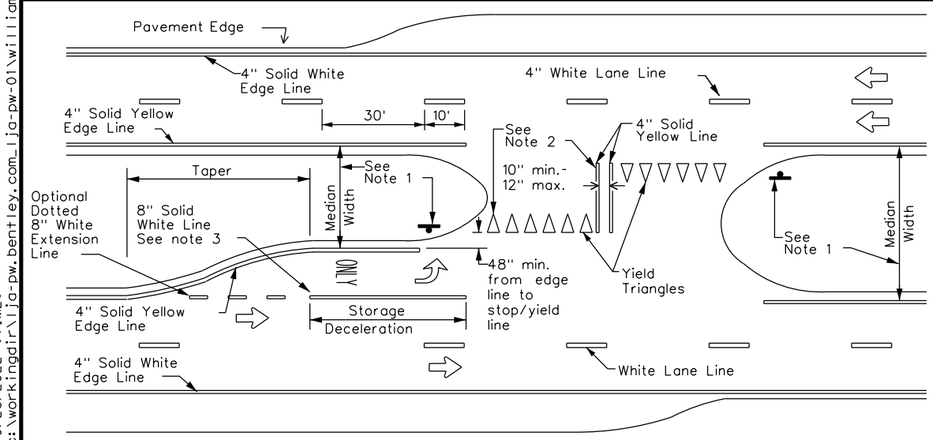


For posted speed on road being marked equal to or less than 40 MPH.



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

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles 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.

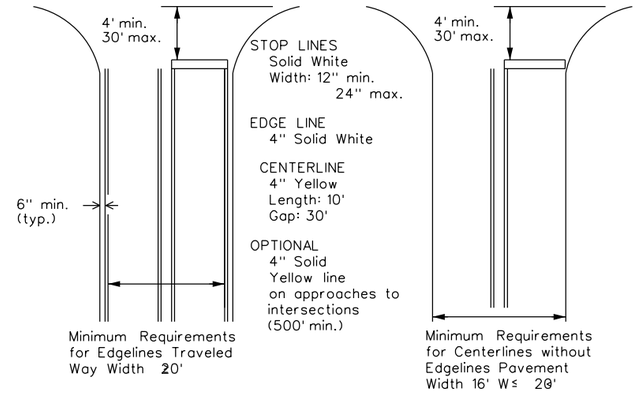
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines 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 inside of edgeline to the inside of edgeline 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.



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

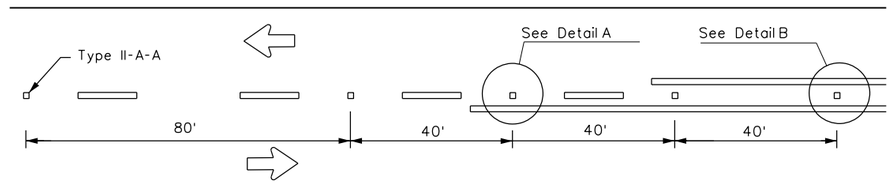
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

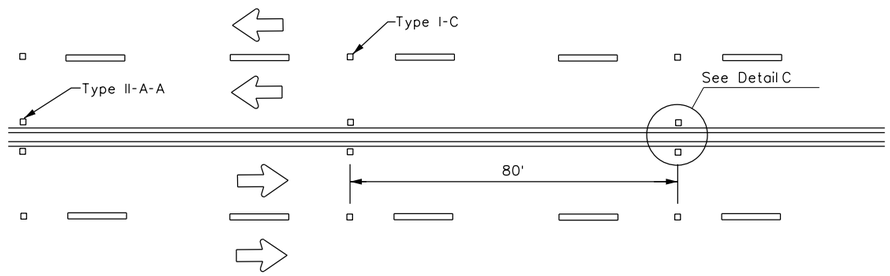
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0143	04	072	US 87
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	SAT	WILSON		125

22A

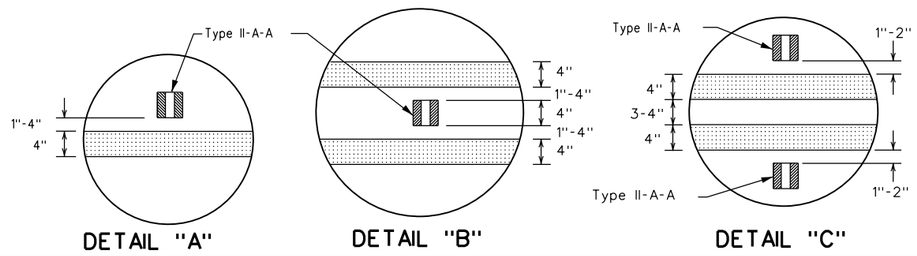
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

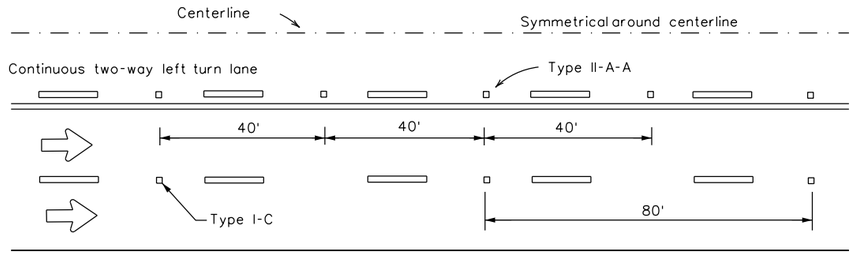


CENTERLINE FOR ALL TWO LANE ROADWAYS

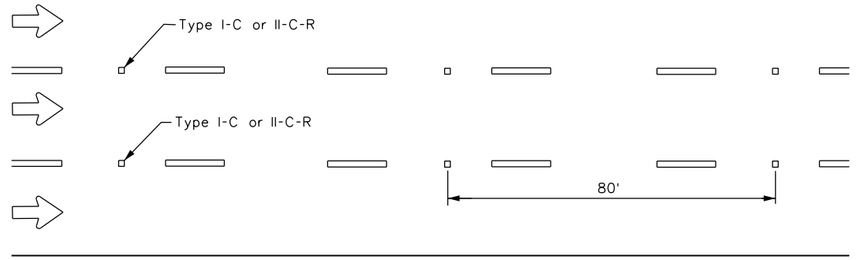


CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



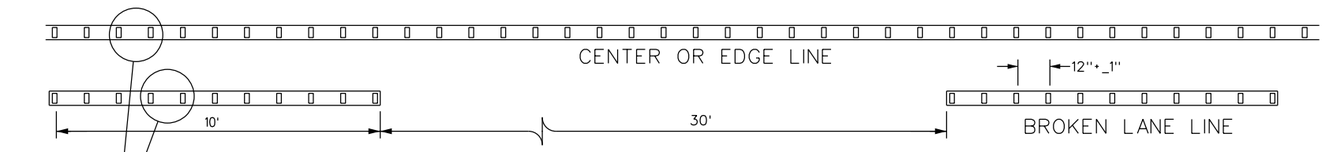


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



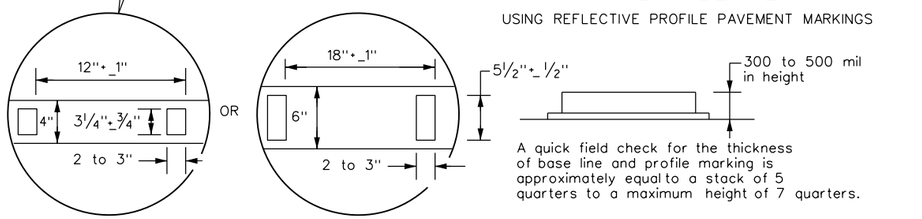
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

NOTE

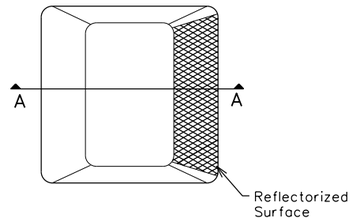
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

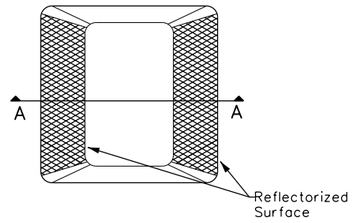
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

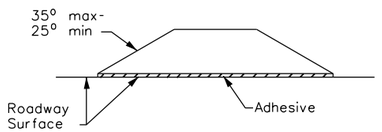
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



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)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	0143	04	072	US 87
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	SAT	WILSON		126

22B

DATE: 10/28/2022 $TIME$
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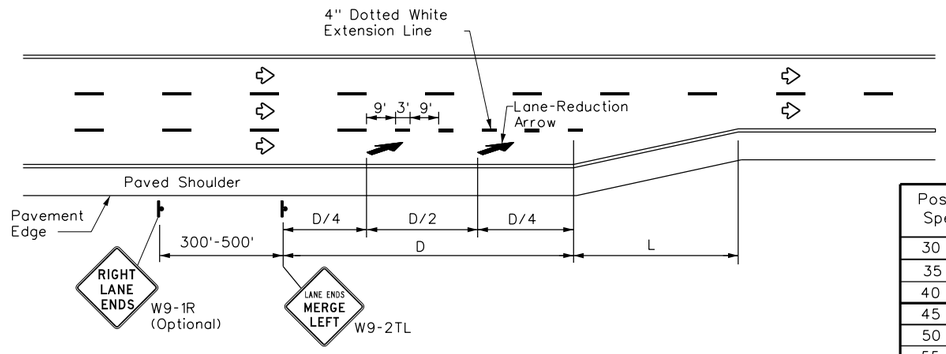
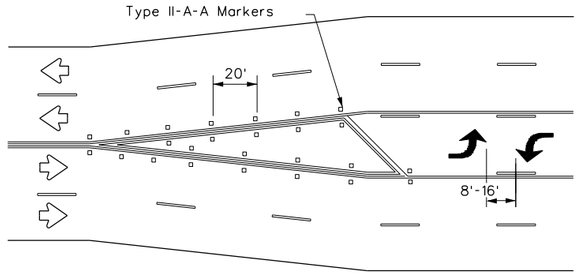


LANE REDUCTION

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

NOTES

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



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

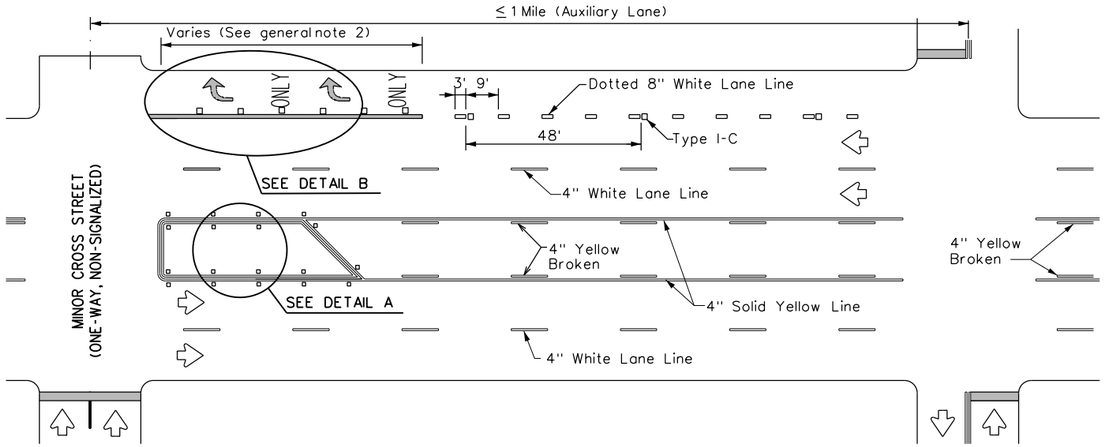
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

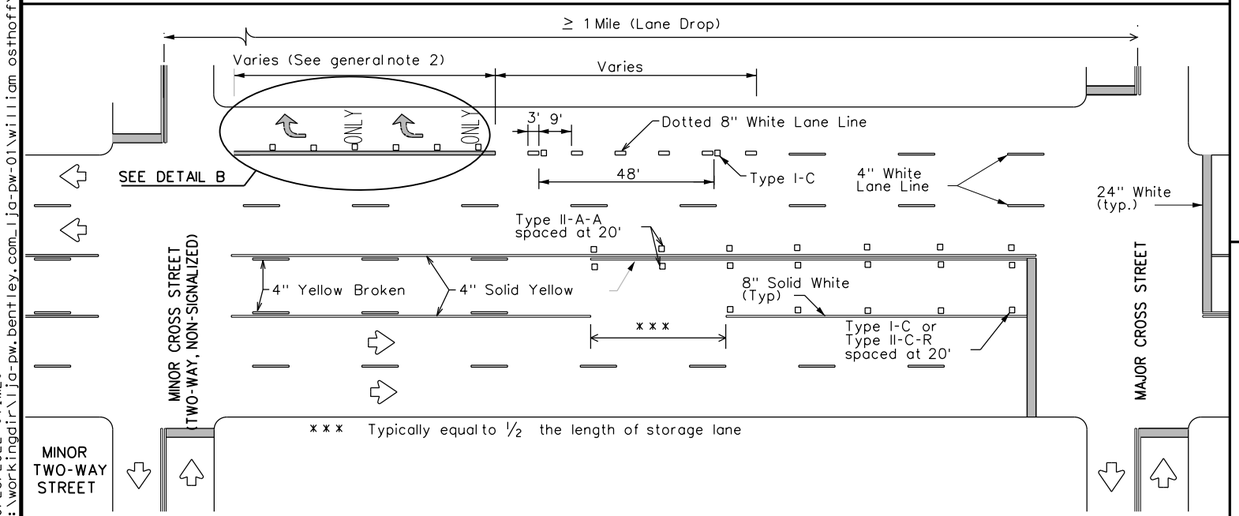
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn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

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

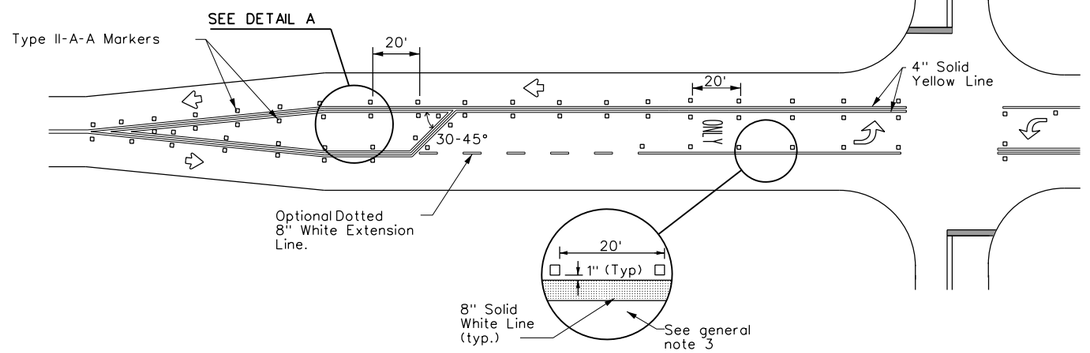
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



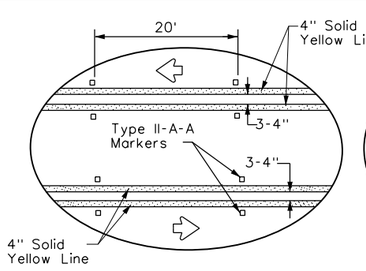
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



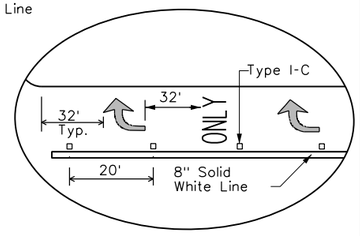
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	SAT	WILSON		127
3-03 6-20				

22C

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\william osthoff\dms25664\pm3-20.dgn

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\tja-pw.bentley.com_tja-pw-01\william osthoff\dms25664\smdgen.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

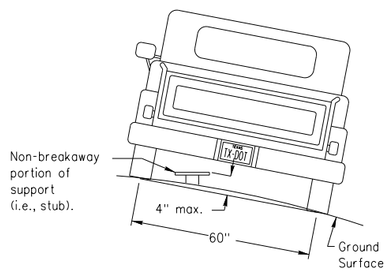
Anchor Type

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

Sign Mounting Designation

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

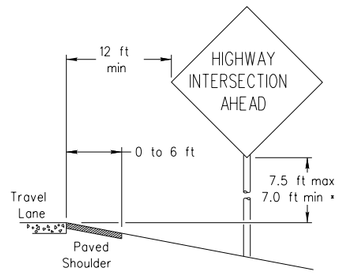
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

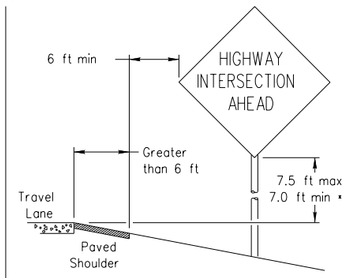
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

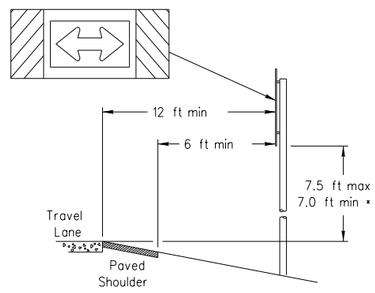
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



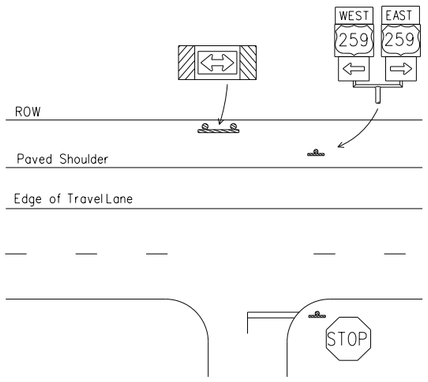
GREATER THAN 6 FT. WIDE

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

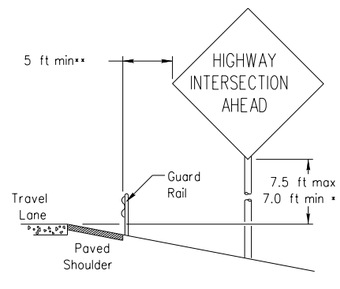
T-INTERSECTION



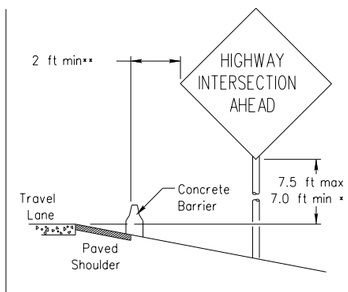
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

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

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

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

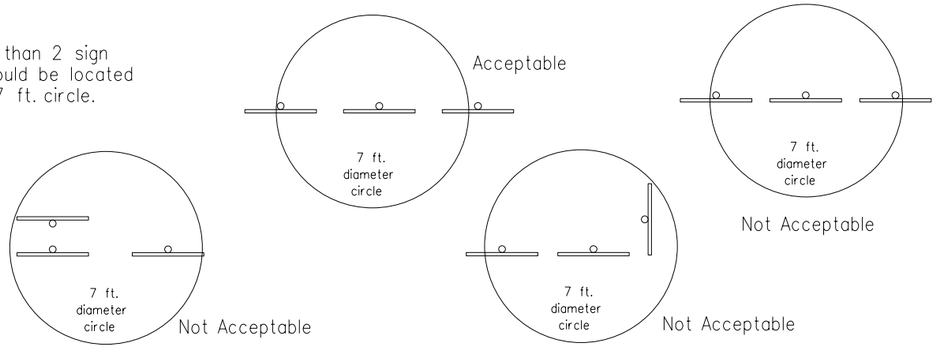
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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

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

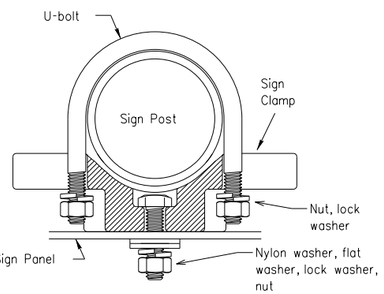
The website address is:
http://www.txdot.gov/publications/traffic.htm

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

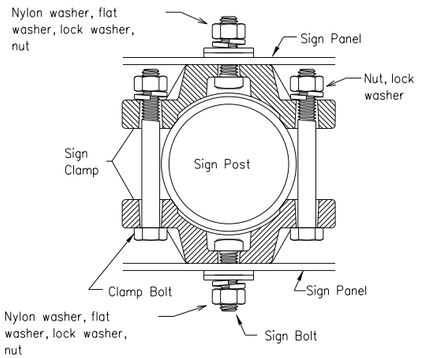


TYPICAL SIGN ATTACHMENT DETAIL

Single Signs



Back-to-Back Signs



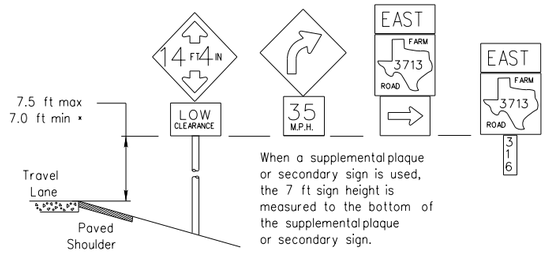
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

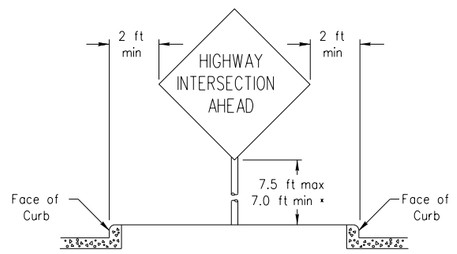
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



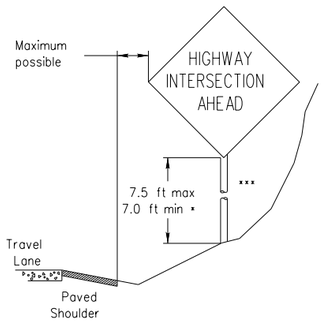
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

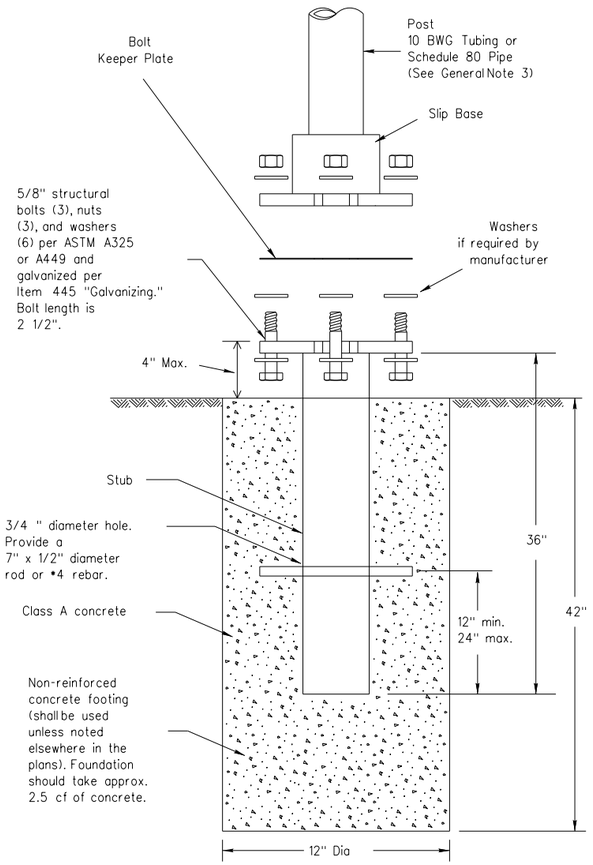
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0143	04	072	US 87
DIST	COUNTY		SHEET NO.
SAT	WILSON		128

26A

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

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

ASSEMBLY PROCEDURE

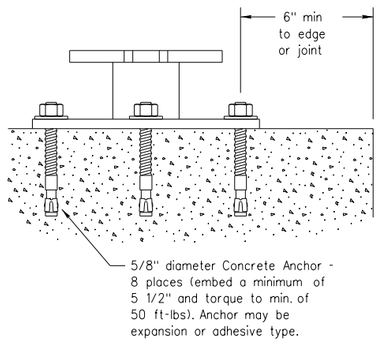
Foundation

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

Support

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

CONCRETE ANCHOR



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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\jfo-pw.bentley.com_jfo-pw-01\william osthoff\dms25664\smds1.dgn

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		129

26B

DATE: 10/28/2022 $TIME$
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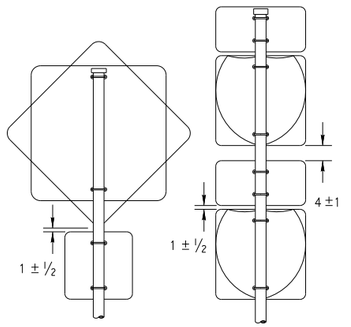
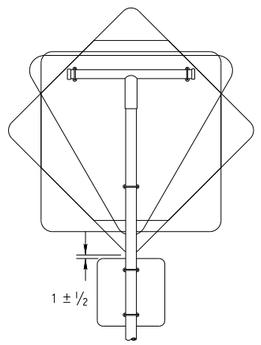
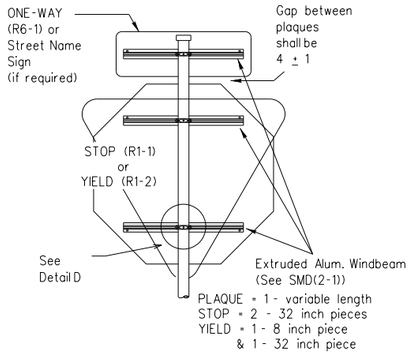


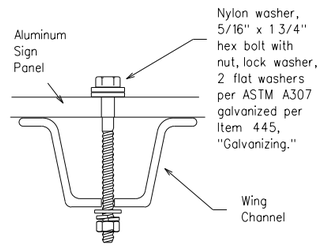
SM RD SGN ASSM TY XXXXX(1)XX(P)



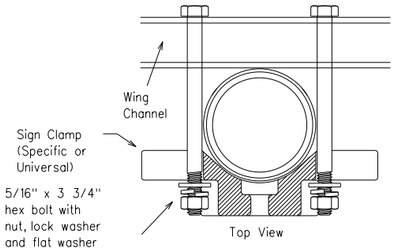
SM RD SGN ASSM TY XXXXX(1)XX(T)



SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



Detail A

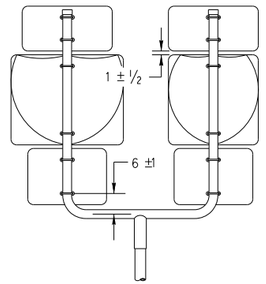


Detail B

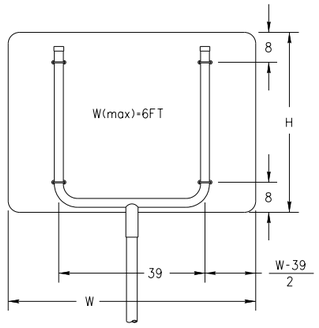
GENERAL NOTES:

1. | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|---|---|---|
| 10 BWG | 1 | 16 SF |
| 10 BWG | 2 | 32 SF |
| Sch 80 | 1 | 32 SF |
| Sch 80 | 2 | 64 SF |

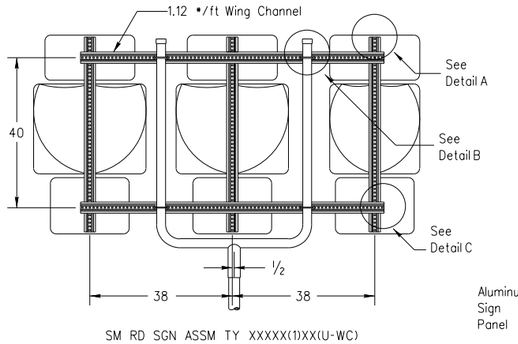
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material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



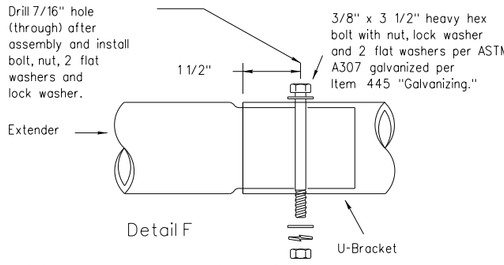
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

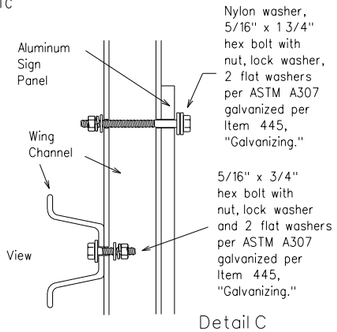


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

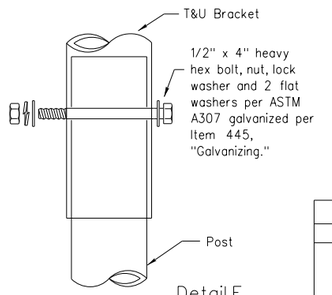


Detail F

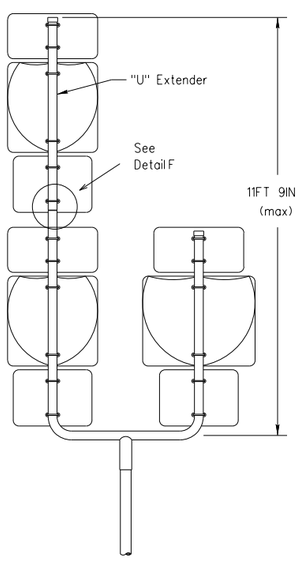
Splices shall only be allowed behind the sign substrate.



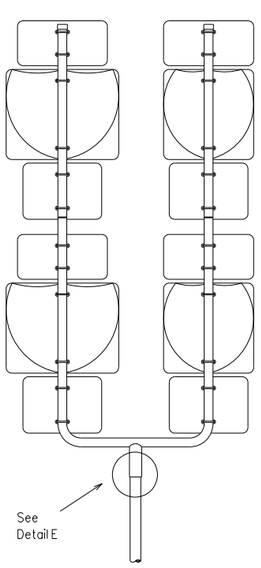
Detail C



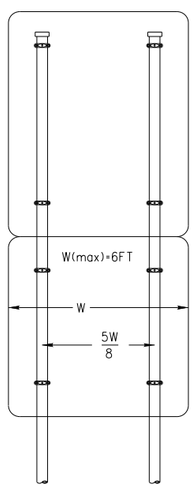
Detail E



SM RD SGN ASSM TY S80(1)XX(U-1EXT)

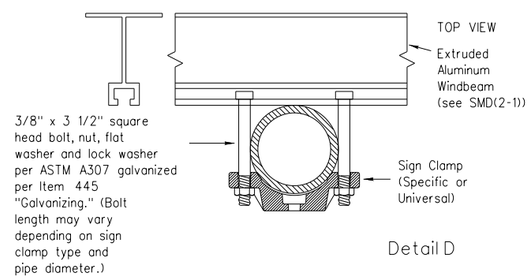


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

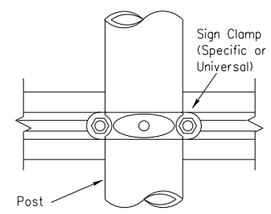


SM RD SGN ASSYM TY XXXXX(2)XX(P)

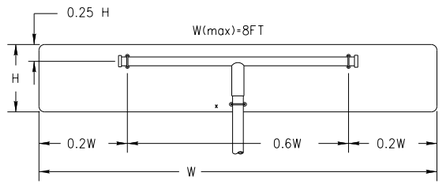
SIDE VIEW



Detail D



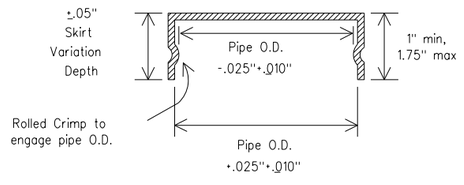
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)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



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

All dimensions are in english unless detailed otherwise.

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-2)-08

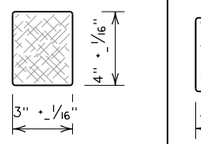
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		130

26C

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\ljg-pw.bentley.com_ljg-pw-01\william.osthoff\dms25664\dom1-20.dgn

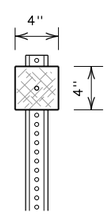
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
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

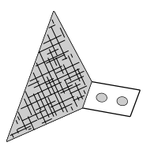
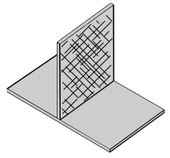
TYPE OF MOUNT
- GND = Embedded (drivable)
- SRF = Surface Mount
- WAS = Wedge Anchor Steel
- WAP = Wedge Anchor Plastic

DIRECTION
- If Required
- BI = Bi-Directional

OBJECT MARKERS

	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)
	OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4
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 Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B or C Sheeting			Red -Type B or C Sheeting
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP

BARRIER REFLECTORS (BRF)

	GF1	GF2	CTB
DEVICE			

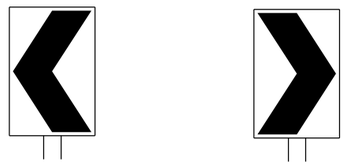
1. Barrier reflectors shall meet the requirements of DMS 8600.
2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.

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



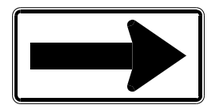
W1-8

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"	

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

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

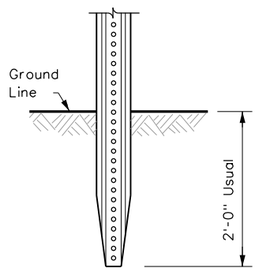
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SAT	WILSON		131

DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

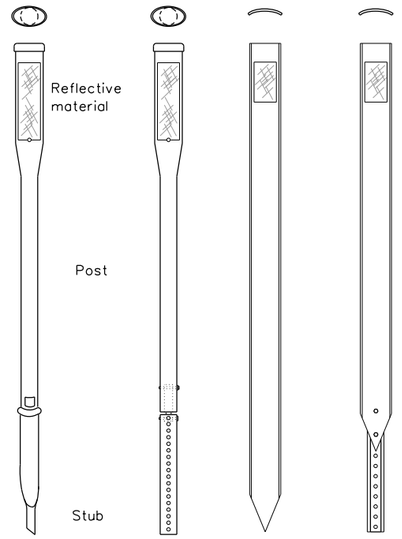


NOTES

1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.
2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.

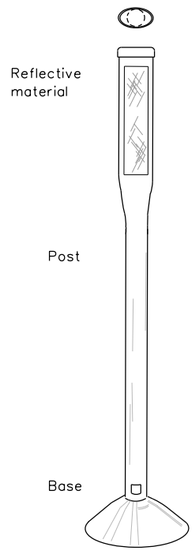
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



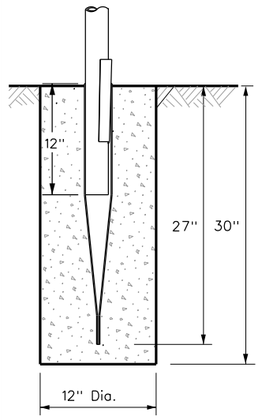
SURFACE MOUNT

NOTES

1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.
2. Install per manufacturer's recommendations.
3. Post length may vary to meet field conditions.
4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow.

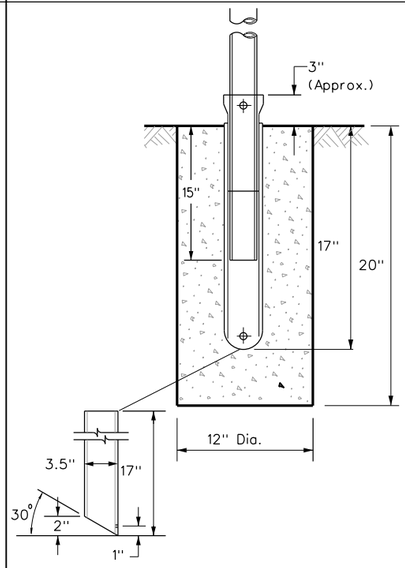
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

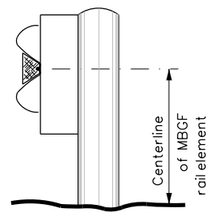
NOTE

1. Install per manufacturer's recommendations.

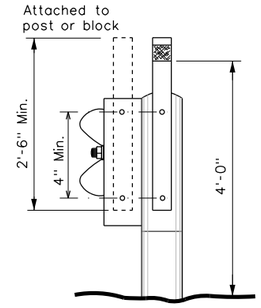
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

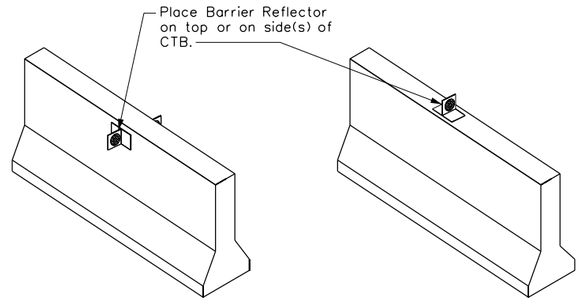
GF1



GF2



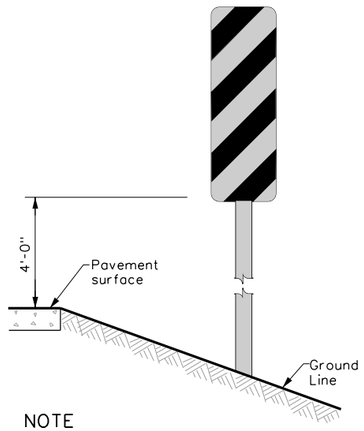
CONCRETE TRAFFIC BARRIER (CTB)



GENERAL NOTES

1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.
2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction.
3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible.
4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.
5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.
6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.

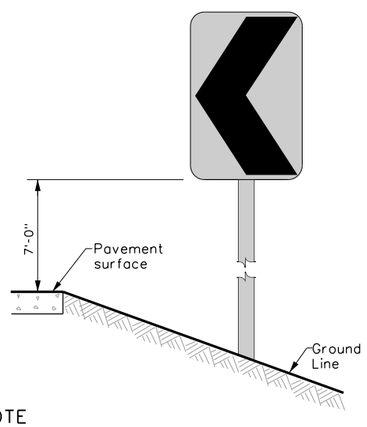
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



NOTE

Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)

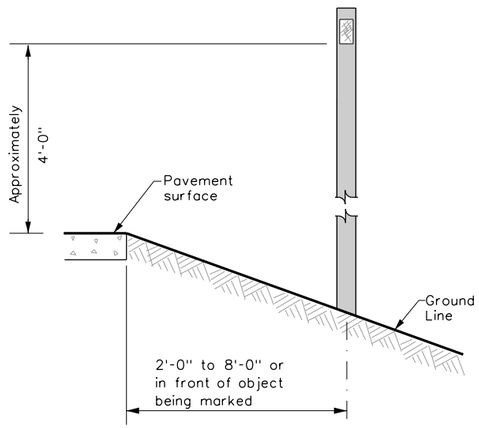
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



NOTE

Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.

DELINEATORS AND TYPE 2 OBJECT MARKERS



See general notes 1, 2 and 3.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

D & OM(2)-20

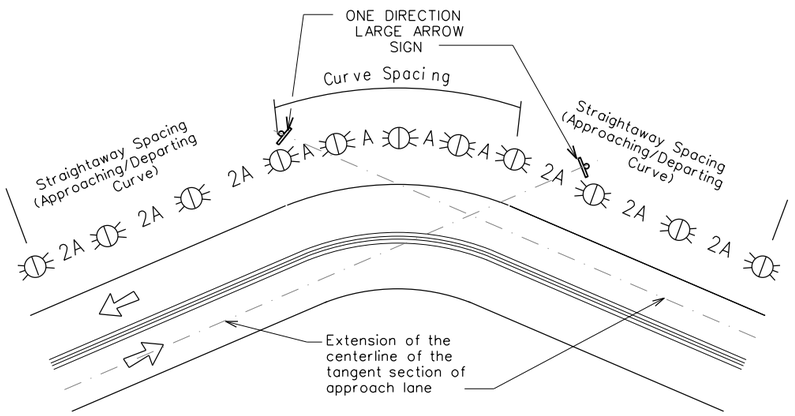
FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	SAT	WILSON		132

DATE:
FILE:

MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

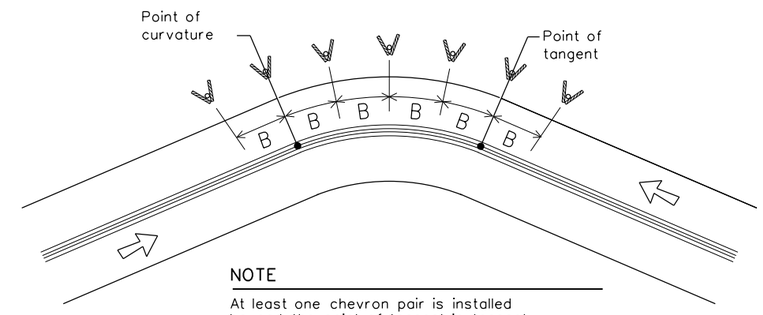
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
		A	2A	B
1	5730	225	450	——
2	2865	160	320	——
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINEATOR AND CHEVRON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
	A	2xA	B
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINEATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy/Exp.Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete)and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100'max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100'max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications

LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

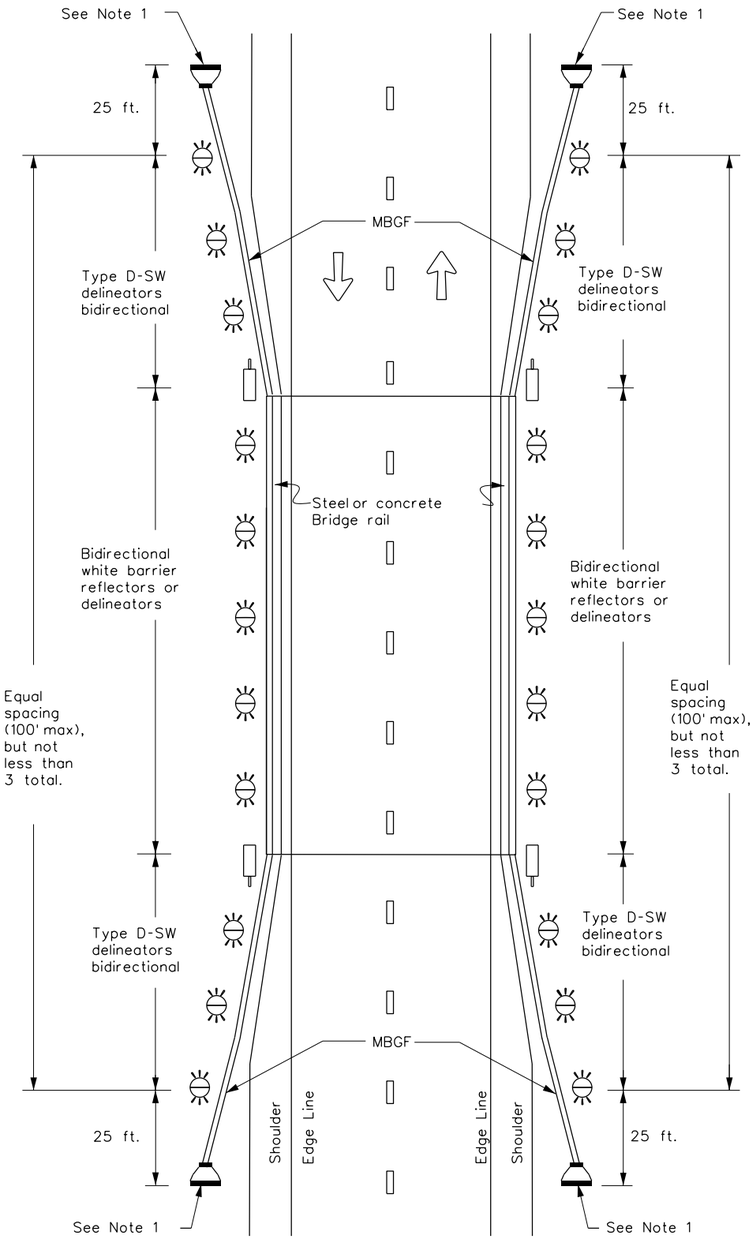
FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	SAT	WILSON		133

DATE:
FILE:

20C

DATE: 10/28/2022 $TIME$
FILE: c:\workingdir\ija-pw.bentley.com_ija-pw-01\william osthoff\dms25664\dom5-20.dgn

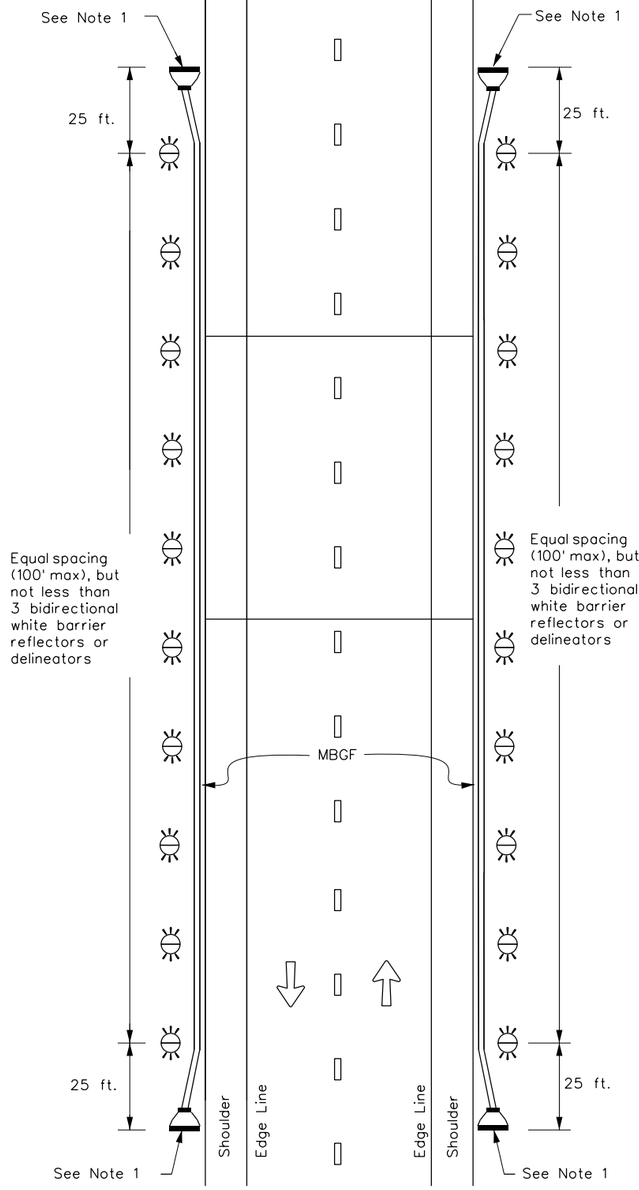
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

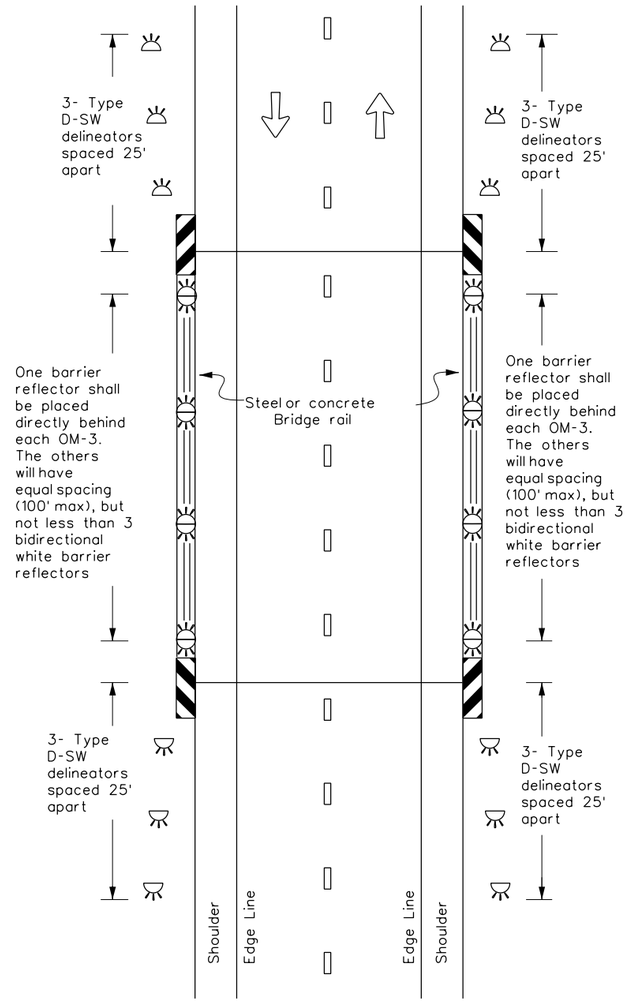
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

TWO-WAY, TWO LANE ROADWAY BRIDGE WITH NO APPROACH RAIL



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
7-20	DIST	COUNTY		SHEET NO.
	SAT	WILSON		134

20E

DATE: 10/28/2022 $TIME$
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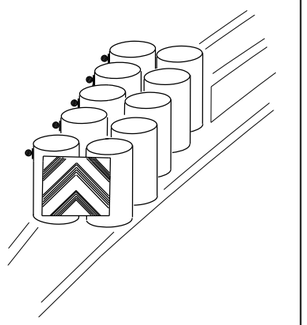
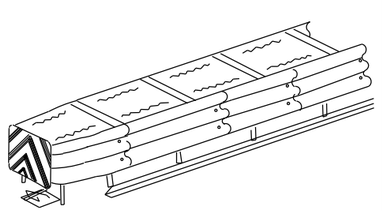
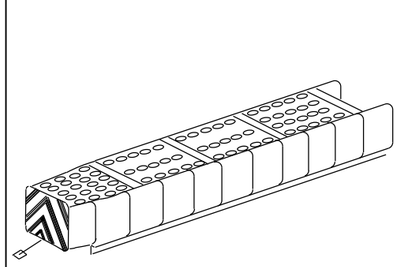
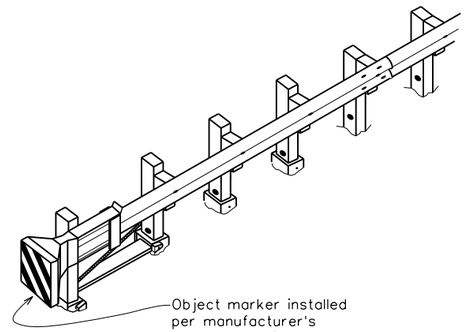
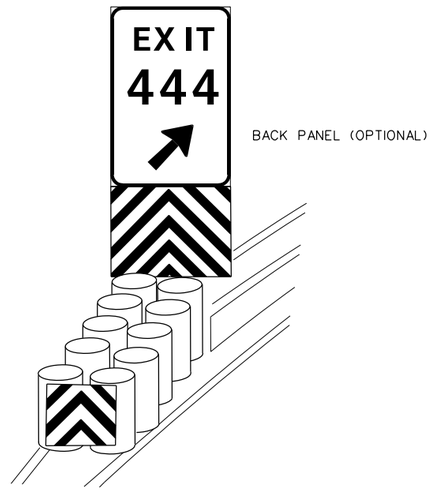
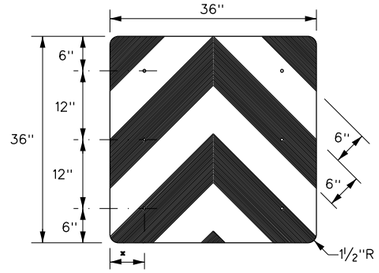


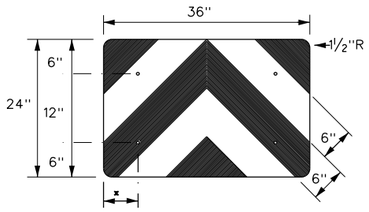




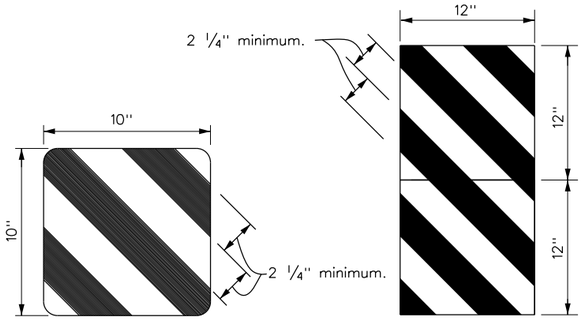




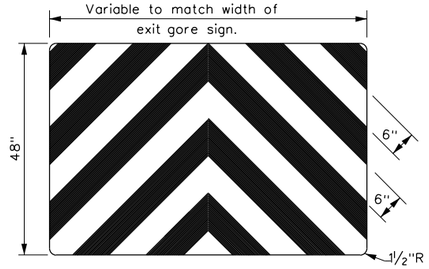


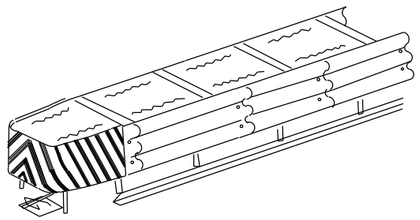


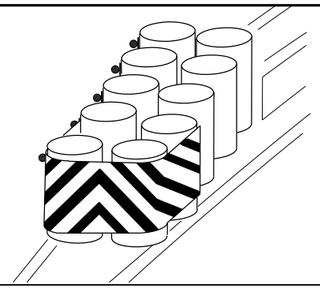
x Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

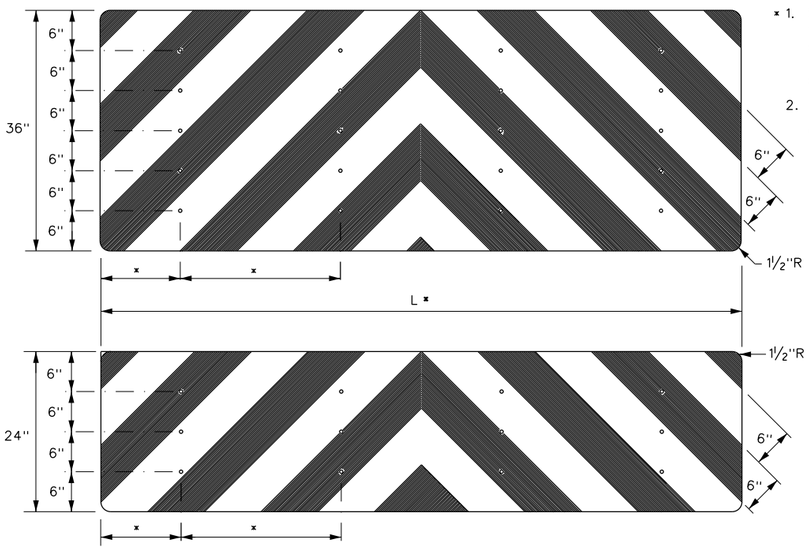


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

x 1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.

2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.

2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.

3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 ¼".

4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.

5. Object Marker at nose of attenuator is subsidiary to the attenuator.

6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	SAT	WILSON		135
4-98 7-20				
20G				

DATE: 10/28/2022 $TIME$
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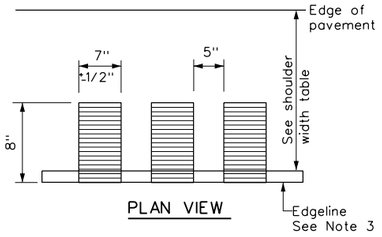
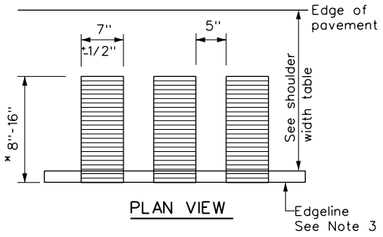


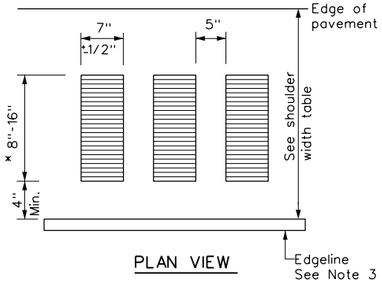
PROFILE VIEW
OPTION 1

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



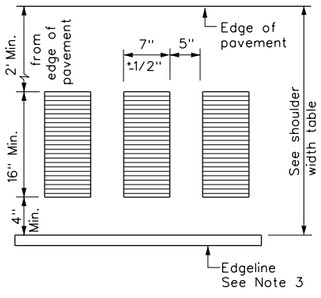
PROFILE VIEW
OPTION 2

CONTINUOUS MILLED DEPRESSIONS
(Rumble Stripes)



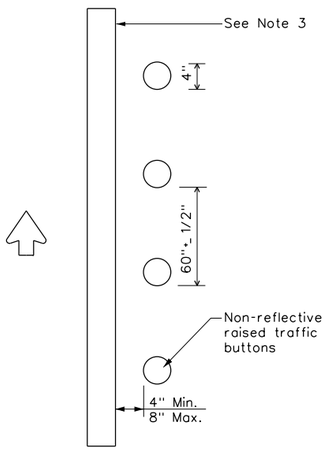
PROFILE VIEW
OPTION 3

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



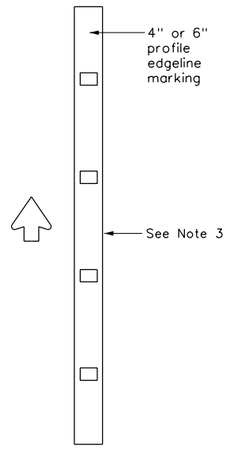
PROFILE VIEW
OPTION 4

CONTINUOUS MILLED DEPRESSIONS
(Rumble Strips)



PLAN VIEW
OPTION 5

RAISED EDGELINE RUMBLE STRIPS



PLAN VIEW
OPTION 6

PROFILE EDGELINE MARKINGS

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 OR 6	Option 1, 2, 3 5 OR 6	Option 2, 4, 5 OR 6

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) for positioning, dimensioning, and spacing of all reflective raised pavement markers, pavement markings, and profile markings.
4. See the table below for determining what options may be used for edgeline rumble strips.

WHEN INSTALLING MILLED DEPRESSION EDGELINE RUMBLE STRIPS:

5. See dimensions for milled rumble strips. Other shapes and dimensions may be used if approved by the Traffic Operations Division.
6. Pavement markings can be applied over milled shoulder rumble strips to create an edgeline rumble stripe.
7. Breaks in edgeline rumble strips shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossings, intersections and driveways with high usage of large trucks when installed on conventional highways.
8. Rumble strips shall not be placed across exit or entrance ramps, acceleration and deceleration lanes, crossovers, gore areas or intersections with other roadways.
9. Consideration should be given to noise levels when edgeline rumble strips are installed near residential areas, schools, churches, etc. A minimum of 3/8 inches depth of milled rumble strip may be considered in these areas.
10. On roadways with high bicycle activity, consideration should be given before the installation of edgeline rumble strips. Things to consider include size of rumble strips, rumble strip material and location of rumble strips on the shoulder. If the designer determines that gaps are needed in the rumble strips due to bicycle use of the road, then follow the requirement shown in FHWA Technical Advisory T5040.39, or latest version. A detail of the spacing shall be included in the plans.

WHEN INSTALLING RAISED OR PROFILE EDGELINE 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 edgeline when used as a rumble strip. The color of the button should match the color of the adjacent edgeline 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. Breaks in edgeline rumble strips using raised traffic buttons shall occur at least 50 feet and no more than 150 feet in advance of bridges, railroad crossing, intersections and driveways with high usage of large trucks when installed on conventional highways.
15. The minimum distance between the edgeline and the buttons should be used if the shoulder is less than 8 feet in width.
16. Raised profile thermoplastic markings used as edgelines may substitute for buttons.

Texas Department of Transportation

Traffic Operations Division Standard

EDGELINE RUMBLE STRIPS ON UNDIVIDED OR TWO LANE HIGHWAYS
RS(4)-13

FILE: rs(4)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		136

10/28/2022 $TIME$
c:\workingdir\ija-pw.bentley.com_ija-pw-01\william.osthoff\dms25666\epic standard 2015.dgn

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit (CGP) required for projects with 1 or more acres distrubed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

☐ 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 Storm Water Pollution Prevention Plan (SW3P) and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and Texas Commission on Environmental Quality (TCEQ), Environmental Protection Agency (EPA) or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, Contractor shall submit Notice of Intent (NOI) to TCEQ and the Engineer.

5. NOI required: Yes ☐ No ☒

Note: If amount of soil disturbance changes, permit requirements may change.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

US Army Corps of Engineers (USACE) Permit required for filling, dredging, excavating or other work in any potential USACE jurisdictional water, such as, rivers, creeks, streams, or wetlands.

The Contractor shall adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required
☒ Nationwide Permit (NWP) 14 - Pre-construction Notice (PCN) not Required
☐ Nationwide Permit 14 - PCN Required
☐ Individual 404 Permit Required
☐ Other Nationwide Permit Required: NWP• _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices (BMPs) planned to control erosion, sedimentation and post-project total suspended solids (TSS).

1. CLIFTON BRANCH

2.

3.

4.

401 Best Management Practices: (Not applicable if no USACE permit)

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	☐ Sedimentation Chambers
		☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162,164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

☐ No Action Required ☒ Required Action

Action No.

1. MIGRATORY BIRD NESTS: Schedule construction activities as needed to meet the following requirements:

   A. Do not remove or destroy any active migratory bird nests (nests containing eggs and/or flightless birds) at any time of year. If there are any active nests, they shall not be removed until the nests become inactive.

   B. On/in structures, if there are any active nests, they shall not be removed until all nests become inactive. After inactive nests are removed and/or before nest activity begins, deterrent materials may be applied to the structures to prevent future nest building.

2. See Item 5 in General Notes.
3. Skunk BMP: Contractors will be advised of potential occurence in the project area, and avoid harming the species if encountered, and to avoid unecessary impacts to dens.
4. Bat BMPs: If bats are present or recent signs of occupation (i.e., piles of guano, distinct musky ador, or staining and rub marks at potential entry points) are observed, contact District Biologist and take appropriate measures to ensure that bats are not harmed, such as implementing non-lethal exclusion activities or timing or phasing of construction.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediated area, and contact the Engineer immediately.

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropiate 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 follwing 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

Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Does the project involve the demolition of a span bridge?

☒ Yes ☐ No (No further action required)

If "Yes", a pre- demolition notification must be submitted to the Texas Department of State Health Services. The contractor shall contact TxDOT's Project Engineer 25 calendar days prior to the demolition of the bridges(s) on the project to assist with the notification.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

Texas Department of Transportation
San Antonio District Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic 2015-10-09 SAT.dgn		DN: TxDOT		CK: TxDOT	DW: BW		CK: GAG
		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0143	04	072		US 87	
		DIST		COUNTY			SHEET NO.
		SAT		WILSON			137

Note To Designer:
1. Do not alter Sheet Design or Font style, size or weight - match text attributes.
2. If additional space is needed for a numbered section, fence and adjust sections up or down as needed for proportioning and readability but do not relocate from it's relative position.

A. GENERAL SITE DATA

1. PROJECT LIMITS: *Same as stated on the Title Sheet*

2. PROJECT SITE MAPS:
   - *Project Latitude 29°14'18.39" N Project Longitude 97°59'01.82" W*
   - *Project Location Map: Shown on Title Sheet*
   - *Drainage Patterns: Shown on Drainage Area Maps Sheets 83-84*
   - *Approx. Slopes Anticipated After Major Gradings and Areas of Soil Disturbance: Shown on Typical Sections Sheet 4*
   - *Major Controls and Locations of Stabilization Practices: Shown on SW3P Sheets Sheets 137-147*
   - *Project Specific Locations: Off-site waste, borrow, or storage areas are not part of this SW3P.*
   - *Surface Waters and Discharge Locations: Shown on Drainage and Culvert Layout Sheets Sheets 23, 84-91*

3. PROJECT DESCRIPTION: *US 87 AT CLIFTON BRANCH*

Non-Joint Bid Utilities are not part of this SW3P.

4. FOR MAJOR SOIL DISTURBING ACTIVITIES SEQUENCE OF EVENTS:

1. Install controls down-slope of work area and initiate inspection and maintenance activities.

2. Begin phased construction with interim stabilization practices. Adjust erosion and sedimentation controls during construction to meet requirements and changing conditions and as directed/approved by the Engineer.

3. Major soil disturbing activities may include but are not limited to: right-of-way preparation, cut and/or fill to improve roadway profile, final grading and placement of topsoil and the following (if marked):

- ____ *Placement of road base*
- ____ *Exstensive ditch grading*
- _X_ *Upgrading or replacing culverts or bridges*
- _X_ *Temporary detour road(s)*
- ____ *Other:* _____

5. EXISTING AND PROPOSED CONDITIONS:

Description of existing vegetative cover: Native grass and weeds
Percentage of existing vegetative cover: 90%
Existing vegetative cover: (mark one)
- ____ *Thick or uniformly established*
- _X_ *Thin and Patchy*
- ____ *None or minimal cover*

Description of soils: (Provide classification and description of soils)
Site Acreage: 4.38 AC Acreage disturbed: 1.63 AC
Site runoff coefficient (pre-construction): 0.55 Site runoff coefficient (post-construction): 0.56

6. RECEIVING WATERS: *(Mark all that apply)*

_X_ *A classified stream does not pass through project.*

____ *A classified stream passes through project. Name* _____ *Segment Number* _____

Name of receiving waters that will receive discharges from disturbed areas of the project: CLIFTON BRANCH

Site is in a Municipal Separate Storm Sewer System (MS4).
MS4 Operator (name): Texas Department of Transportation

B. BEST MANAGEMENT PRACTICES

General timing or sequence for implementation of BMPs shall be as required and/or as directed/approved by the Engineer to provide adequate controls. BMPs shown on plan sheets are to be considered "proposed" unless/until install date is shown. BMPs are to reduce sediments from road construction activities.

1. SOIL STABILIZATION PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

- T&P SEEDING
- ____ MULCHING (Hay or Straw)
- ____ BUFFER ZONES
- ____ PLANTING
- ____ COMPOST/MULCH FILTER BERM
- ____ SODDING
- ____ PRESERVATION OF NATURAL RESOURCES
- ____ FLEXIBLE CHANNEL LINER
- ____ RIGID CHANNEL LINER
- ____ SOIL RETENTION BLANKET
- ____ COMPOST MANUFACTURED TOPSOIL
- ____ OTHER: (Specify Practice)

2. STRUCTURAL PRACTICES: (Select T = Temporary or P = Permanent, as applicable)

- T SILT FENCES
- ____ HAY BALES
- T ROCK FILTER DAMS
- ____ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
- ____ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
- ____ DIVERSION DIKE AND SWALE COMBINATIONS
- ____ PIPE SLOPE DRAINS
- ____ PAVED FLUMES
- ____ ROCK BEDDING AT CONSTRUCTION EXIT
- T TIMBER MATTING AT CONSTRUCTION EXIT
- ____ CHANNEL LINERS
- ____ SEDIMENT TRAPS
- ____ SEDIMENT BASINS
- ____ STORM INLET SEDIMENT TRAP
- ____ STONE OUTLET STRUCTURES
- ____ CURBS AND GUTTERS
- ____ STORM SEWERS
- ____ VELOCITY CONTROL DEVICES
- ____ OTHER: *(Specify Practice)*

3. STORM WATER MANAGEMENT:

The proposed facility was designed in consideration of hydraulic design standards to convey stormwater in a manner that is protective of public safety and property. The control of erosion from the facility is inherent to the design. Additional factors affecting post-construction stormwater at the project location include: (mark all that apply)

- _X_ *Existing or new vegetation provides natural filtration.*
- ____ *The design includes provisions for permanent erosion controls provided by strategically placed pervious and impervious surfaces.*
- ____ *Project includes permanent sedimentation controls (other than grass).*
- ____ *Velocities do not require dissipation devices.*
- ____ *Velocity-dissipation devices included in the design.*
- ____ *Other :* _____

4. NON-STORM WATER DISCHARGES:

Off-site discharges are prohibited except as follows:

1. Discharges from fire fighting activities and/or fire hydrant flushings.
2. Vehicle, external building, and pavement wash water where detergents and soaps are not used and where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed).
3. Plain water used to control dust.
4. Plain water originating from potable water sources.
5. Uncontaminated groundwater, spring water or accumulated stormwater.
6. Foundation or footing drains where flows are not contaminated with process materials such as solvents.
7. Other: _____

Concrete truck wash water discharges on the site should be prohibited or minimized. If allowed by the Engineer, they must be managed in a manner so as not to contaminate surface water. They must not be located in areas of concentrated flow. Concrete truck wash-out locations must be shown on the SW3P Layout and included in the inspections.

Hazardous material spill/leak shall be prevented or minimized. At a minimum, this includes asphalt products, fuels, oils, lubricants, solvents, paints, acids, concrete curing compounds and chemical additives for soil stabilization. BMPs shall be implemented to the storage areas of these products. All spills must be cleaned and disposed properly and reported to the Engineer. Report any release at or above the reportable quantity during a 24 hour period to the National Response Center at 1-800-424-8802.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

All erosion and sediment controls shall be maintained in good working order. If a repair is necessary, it shall be performed before the next anticipated storm event but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from equipment. If maintenance prior to the next anticipated storm event is impracticable, maintenance must be scheduled and accomplished as soon as practicable. Disturbed areas on which construction activities have ceased, temporarily or permanently, shall be stabilized within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways shall have priority followed by protecting storm sewer inlets.

2. INSPECTION:

For areas of the construction site that have not been finally stabilized, areas used for storage of materials, structural control measures, and locations where vehicles enter or exit the site, personnel provided by the permittee and familiar with the SW3P must inspect disturbed areas at least once every seven (7) calendar days. An Inspection and Maintenance Report shall be prepared for each inspection and the controls shall be revised on the SW3P within seven (7) calendar days following the inspection.

3. WASTE MATERIALS:

All non-hazardous municipal waste materials such as litter, rubbish, trash and garbage located on or originating from the project shall be collected and stored in a securely lidded metal dumpster, provided by the Contractor. The dumpster shall be emptied as necessary or as required by local regulation and the trash shall be hauled to a permitted disposal facility. The burying of non-hazardous municipal waste on the project shall not be permitted. Construction material waste sites, stockpiles and haul roads shall be constructed to minimize and control the amount of sediment that may enter receiving waters. Construction material waste sites shall not be located in any wetland, water body or stream bed. Construction staging areas and vehicle maintenance areas shall be constructed in a manner to minimize the runoff of pollutants.

4. OFFSITE VEHICLE TRACKING:

Off-site vehicle tracking of sediments and the generation of dust must be minimized. Excess sediments on road shall be removed on a regular basis as directed/approved by the Engineer.

5. OTHER:

See the EPIC sheet for additional environmental information.

Design Consultant Logo here - delete block if not applicable

STATE OF TEXAS
CHRIS S. MUNDIE
102280
LICENSED
PROFESSIONAL ENGINEER

10/28/2022

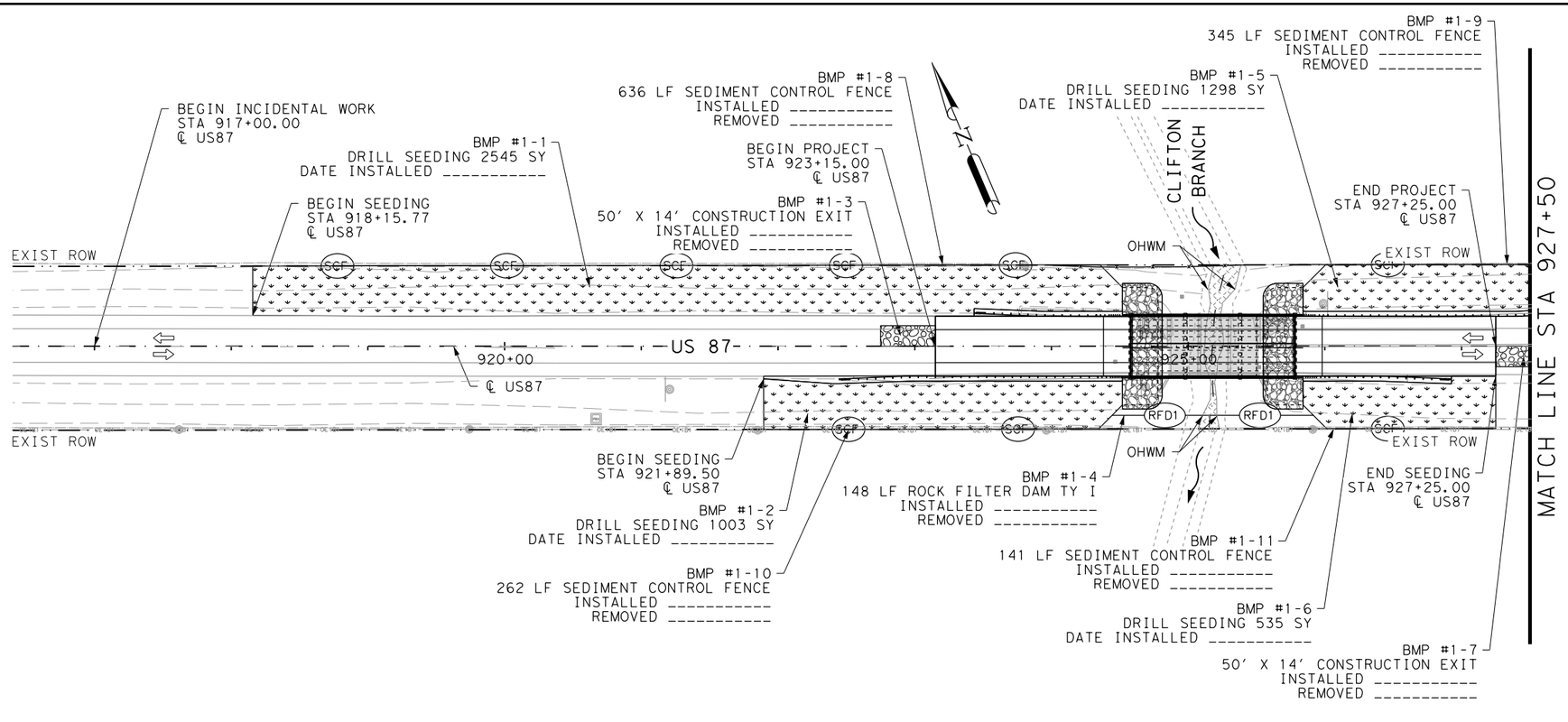
_____, P.E.
Signature of Registrant & Date

REVISION DATE: 10/12

 Texas Department of Transportation

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

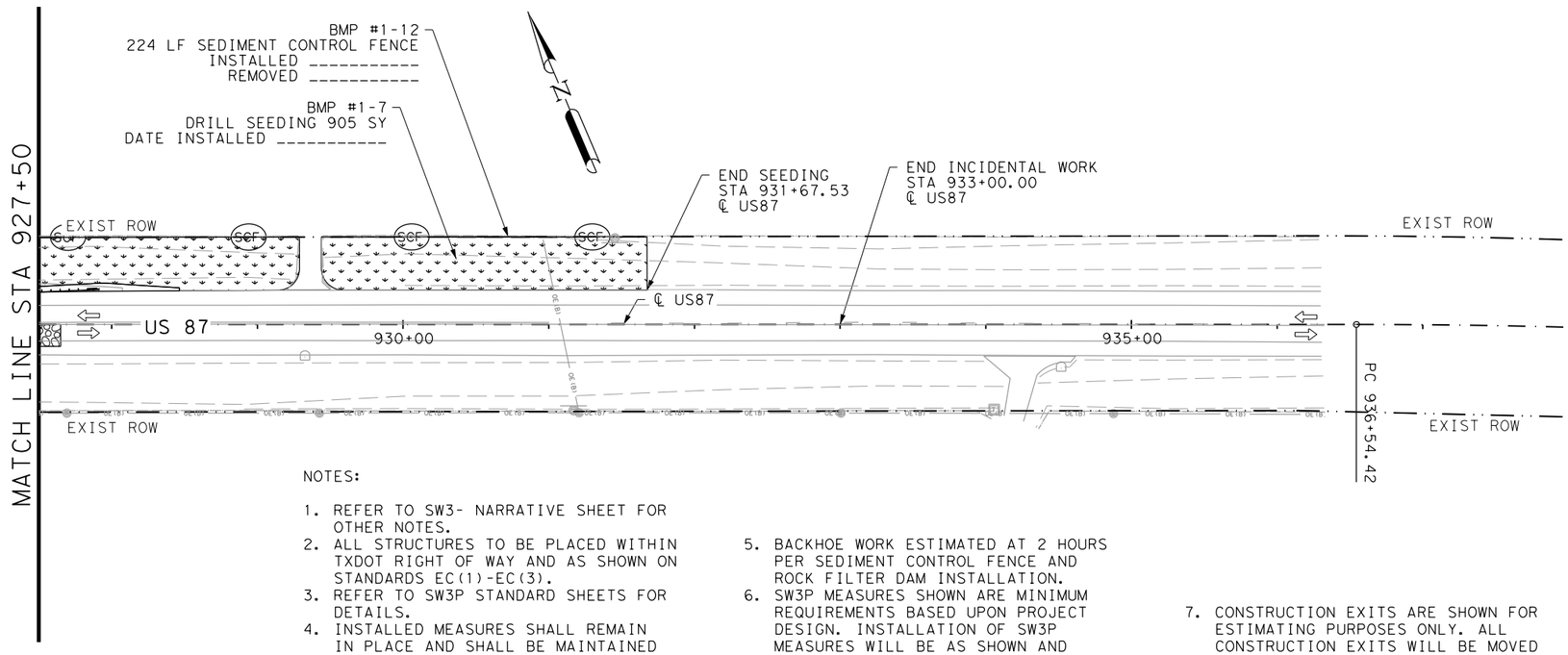
FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		HIGHWAY NO.
6	SEE TITLE SHEET		US87
STATE	DISTRICT	COUNTY	
TEXAS	SAT	WILSON	
CONTROL	SECTION	JOB	SHEET NO.
0143	04	072	138



ITEM	CODE	DESCRIPTION	UNIT	QTY
160	6003	FURNISHING AND PLACING TOPSOIL (4")	SY	4748
164	6035	DRILL SEEDING(PERM)(RURAL)(CLAY)	SY	6286
164	6041	DRILL SEEDING(TEMP)(WARM)	SY	6286
168	6001	VEGETATIVE WATERING	MG	98
506	6001	ROCK FILTER DAMS (INSTALL)(TY 1)	LF	148
506	6011	ROCK FILTER DAMS (REMOVE)	LF	148
506	6021	CONSTRUCTION EXITS (INSTALL)(TY 2)	SY	80
506	6024	CONSTRUCTION EXITS (REMOVE)	SY	80
506	6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	1608
506	6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	1608

LEGEND:

- RFD1 — ROCK FILTER DAM
- SCF — TEMPORARY SEDIMENT CONTROL FENCE
- DRILL SEEDING
- CONSTRUCTION EXIT
- OHWM



NOTES:

1. REFER TO SW3- NARRATIVE SHEET FOR OTHER NOTES.
2. ALL STRUCTURES TO BE PLACED WITHIN TXDOT RIGHT OF WAY AND AS SHOWN ON STANDARDS EC(1)-EC(3).
3. REFER TO SW3P STANDARD SHEETS FOR DETAILS.
4. INSTALLED MEASURES SHALL REMAIN IN PLACE AND SHALL BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY THE ENGINEER.
5. BACKHOE WORK ESTIMATED AT 2 HOURS PER SEDIMENT CONTROL FENCE AND ROCK FILTER DAM INSTALLATION.
6. SW3P MEASURES SHOWN ARE MINIMUM REQUIREMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE AS SHOWN AND MODIFIED TO ACCOMMODATE ACTUAL FIELD CONDITIONS.
7. CONSTRUCTION EXITS ARE SHOWN FOR ESTIMATING PURPOSES ONLY. ALL CONSTRUCTION EXITS WILL BE MOVED AND RESET DURING EACH CONSTRUCTION PHASE.

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

0' 25' 50' 100'
SCALE: 1"=100'

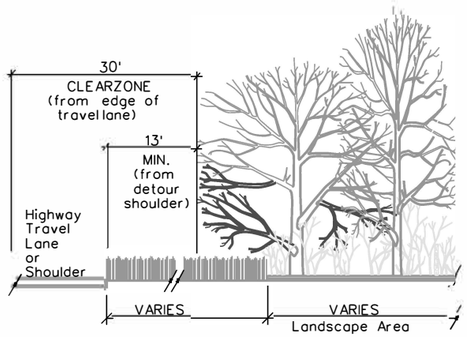
LJA Engineering, Inc.
FRN-F-1386

US 87 AT CLIFTON BRANCH
SW3P LAYOUT

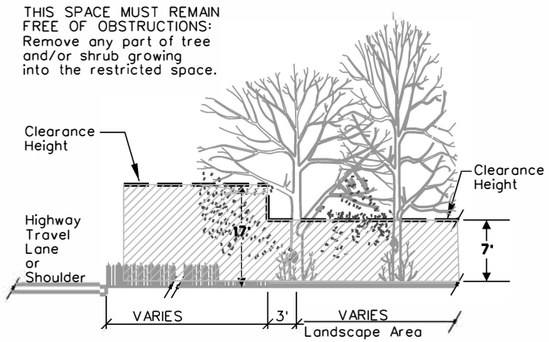
SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	139

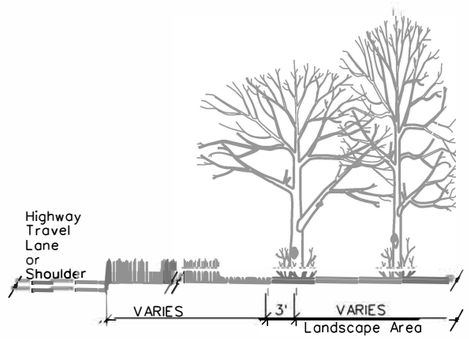
EXISTING CONDITION



PRUNE/REMOVAL REQUIREMENTS



FINAL CONDITION



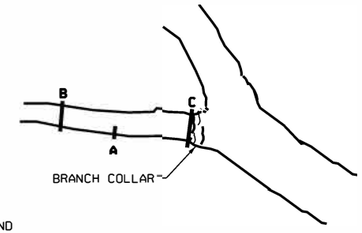
PLANT MAINTENANCE

EDGE PRUNING, TRIMMING AND REMOVAL

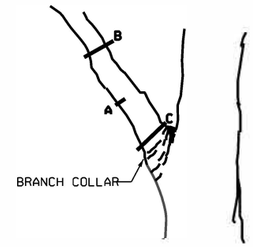
A - STEP 1
CUT 1/3 WAY THROUGH BOTTOM OF LIMB 8-12" ABOVE MAIN STEM OR TRUNK

B - STEP 2
REMOVE LIMB 4-6" BEYOND THE FIRST CUT

C - STEP 3
REMOVE STUB WITH A SMOOTH CUT JUST BEYOND THE BRANCH COLLAR OF THE REMOVED LIMB.



TREE LIMB



MAIN BRANCH

PRUNING CUTS

LIMBS 2" IN DIAMETER AND GREATER

PAYMENT FOR THIS WORK IS SUBSIDIARY TO ITEM 100- PREPARING RIGHT OF WAY

TREE REMOVAL:

REMOVE ALL DEAD WOODY VEGETATION WITHIN THE ROW. CUT STUMPS FLUSH WITH THE GROUND.

TREE PRUNING:

THE OBJECTIVE OF TREE PRUNING IS FOR CROWN RAISING TO ALLOW CLEARANCE FOR MAINTENANCE VEHICLES.

WITH THE EXCEPTION OF WORK WITHIN OR ALONG A CHANNEL OR UNLESS OTHERWISE SHOWN ON THE PLANS, LIMIT WIDTH OF WORK TO 35' FROM THE EDGE OF THE TRAVEL LANE, OR TO ROW LINE, CLIFF, STEEP HILL, OR NON-MOW AREA, WHICHEVER IS LESS. THE ENGINEER WILL DEFINE CLIFFS, STEEP HILLS AND NON-MOW AREAS BASED ON FIELD CONDITIONS. THE ENGINEER MAY DEFINE AREAS TO RESTRICT OR INCREASE TREE PRUNING.

IF ANY TREES IN THE ROW ARE MARKED IN ANY WAY, VERIFY THE MEANING OF THE MARKINGS BEFORE BEGINNING PRUNING OPERATIONS.

WHEN PRUNING OAK TREES, DISINFECT TOOLS BEFORE MOVING FROM ONE TREE TO ANOTHER. USE 70% METHYL ALCOHOL, CHLORINE SOLUTION, OR OTHER APPROVED MATERIAL AS A DISINFECTANT.

TREAT ALL WOUNDS AND CUTS ON ALL OAK SPECIES WITH A COMMERCIAL TREE WOUND DRESSING WITHIN 20 MINUTES OF CREATING THE WOUND.

FLAILING EQUIPMENT IS NOT ALLOWED FOR THIS WORK.

REPAIR DAMAGE TO A PRIVATE FENCE OR OTHER PRIVATE PROPERTY AT CONTRACTOR EXPENSE.

PERFORM TREE PRUNING WITHIN ROW LIMITS. IF POSSIBLE, OBTAIN LANDOWNER PERMISSION AND MAKE PROPER PRUNING CUTS NECESSARY TO MAINTAIN THE HEALTH OF THE TREE.

CUT LIMBS AT A MAJOR FORK IN THE BRANCH OR, IF THE ENTIRE BRANCH IS ENCROACHING INTO THE AREA TO BE CLEARED, REMOVE THE BRANCH AT THE TRUNK.

DO NOT LEAVE A STUB BEYOND THE BRANCH COLLAR OR CUT THROUGH THE BRANCH COLLAR WHEN MAKING PRUNING CUTS. THE BRANCH COLLAR IS GENERALLY VISIBLE, BUT IF IT IS NOT, MAKE THE FINAL CUT APPROXIMATELY 1/2" FROM THE PARENT BRANCH OR TRUNK, PERPENDICULAR TO THE BRANCH OR LIMB BEING REMOVED.

NTS

REGISTERED LANDSCAPE ARCHITECT
HARRY N. DAWSON
1932
STATE OF TEXAS

9/7/2022

PREP ROW
TREE PRUNING & REMOVAL

SHEET 1 OF 1

Texas Department of Transportation

FED RD. DIV.NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		140
STATE	DIST.	COUNTY	
TEXAS	SAT	WILSON	
CONT.	SECT.	JOB	HIGHWAY NO.
0143	04	072	US87

GENERAL NOTES FOR TREE PROTECTION

1. PROTECT AND INSURE THE CONTINUED GOOD HEALTH OF EXISTING TREES IDENTIFIED ON THE PLANS OR DIRECTED BY THE ENGINEER. PRESERVE ALL EXISTING VEGETATION WITHIN THE PREFERRED ROOT PROTECTION ZONE.

2. SECURE THE SERVICES OF A TREE CARE SPECIALIST TO PERFORM OR OVERSEE ANY OPERATION INVOLVING LIMB PRUNING, ROOT PRUNING, CHEMICAL APPLICATION, OR ASSESSMENT OF THE CONDITION OF TREES OR EFFECTS OF CONSTRUCTION ON TREES DESIGNATED FOR PROTECTION.

3. WITHIN THE PREFERRED ROOT PROTECTION ZONE, NONE OF THE FOLLOWING ACTIVITIES ARE ALLOWED:

PARKING OF ANY VEHICLES; ERECTION OF ANY SHED OR STRUCTURE; STORAGE OF ANY EQUIPMENT OR MATERIALS; USE BY PEOPLE FOR ANY REASON; DUMPING OF ANY LITTER, WASTE MATERIALS, OR LIQUIDS; IMPOUNDMENT OF WATER; ADDITION OF FILL-SOIL; EXCAVATION, BORING, OR TRENCHING OF ANY TYPE

DEFINITIONS

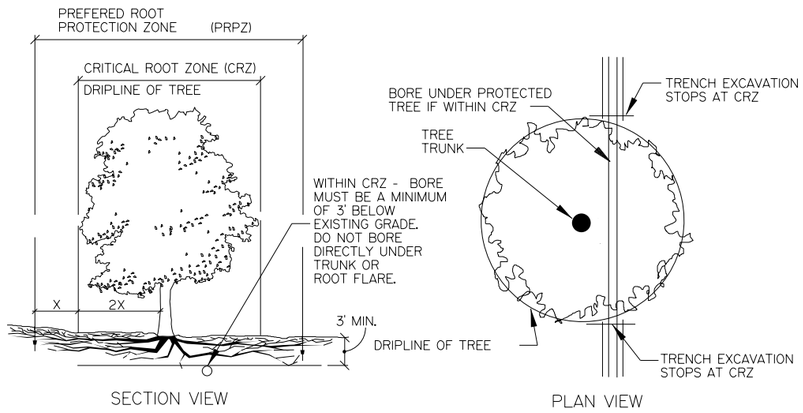
1. DRIPLINE - THE LINE ON THE GROUND DIRECTLY BELOW THE OUTER TIPS OR ENDS OF THE TREE LIMBS.

2. CRITICAL ROOT ZONE (CRZ) - THE GROUND AREA EXTENDING OUT FROM THE TREE TRUNK TO THE DRIPLINE.

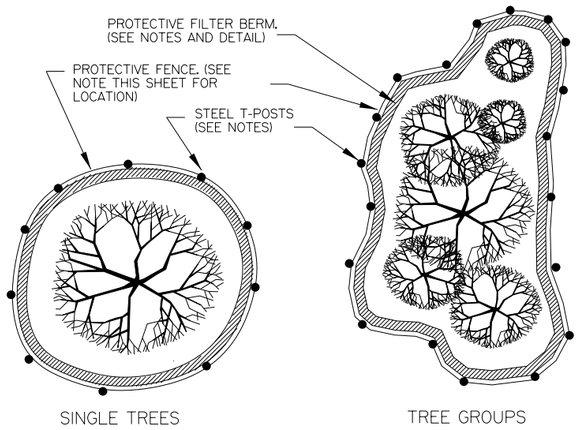
3. PREFERRED ROOT PROTECTION ZONE (PRPZ) - THE GROUND AREA EXTENDING OUT FROM THE TREE TRUNK A DISTANCE EQUAL TO ONE AND ONE HALF OF THE DISTANCE FROM THE TRUNK TO THE DRIPLINE.

4. TREE CARE SPECIALIST - CERTIFIED ARBORIST OR PROFESSIONAL URBAN FORESTER.

5. O.C. - ON CENTER



TRENCHING PAST TREES



PLAN VIEW OF FENCING LAYOUT

CONSTRUCTION METHODS

1. PRIOR TO THE START OF CONSTRUCTION, MARK ALL TREES OR OTHER FEATURES INDICATED ON THE PLANS TO BE PROTECTED WITH YELLOW FLAGGING FOR APPROVAL BY THE ENGINEER.

2. PRIOR TO CONSTRUCTION, PRUNE PROTECTED TREES AS FOLLOWS:
   A. REMOVE ANY DISEASED OR DEAD LIMBS AND CORRECT ANY PREVIOUS IMPROPER PRUNING
   B. REMOVE LIMBS FOR NECESSARY EQUIPMENT ACCESS (AS APPROVED BY THE ENGINEER).
   C. REMOVE LIMBS THAT WILL BE WITHIN TWENTY FEET (20) VERTICAL CLEARANCE OF VEHICLE TRAVEL LANES.
   D. REMOVE LIMBS THAT WILL BE WITHIN TEN FEET (10) VERTICAL CLEARANCE OF PEDESTRIAN AREAS.

3. PERFORM PRUNING USING ONLY TOOLS SPECIFICALLY DESIGNED FOR THE JOB AND IN ACCORDANCE WITH ANSI A300 PRUNING STANDARD. PRUNED MATERIAL BECOMES THE PROPERTY OF THE CONTRACTOR AND WILL BE DISPOSED OF OFF-SITE.

4. ERECT PROTECTIVE FENCING AT ALL TREES, GROUPS OF TREES, OR OTHER FEATURES AS SHOWN ON THE PLANS, OR DESIGNATED BY THE ENGINEER, OR OTHERWISE INDICATED FOR PROTECTION.

5. ERECT PROTECTIVE FENCING FOR TREES AT THE EDGE OF THE PRPZ. PLACE FENCING IN OTHER LOCATIONS ONLY WITH THE APPROVAL OF THE ENGINEER. THE FENCE MATERIAL SHALL BE CHAIN-LINK FENCE.
   A. CHAIN-LINK FENCING SHALL BE SIX-FOOT (6) IN HEIGHT AND SUPPORTED BY EIGHT-FOOT (8) STEEL T-POSTS SPACED SIX FEET (6) O.C., DRIVEN A MINIMUM OF 20" INTO EXISTING GRADE.
   B. THE FENCING SHALL BE CONTINUOUS BETWEEN POSTS AND SHALL BE FIRMLY ATTACHED TO THE POSTS WITH A MINIMUM OF 4 WIRE TIES.

6. PREPARE SIGNS WITH THE FOLLOWNG WORDING, AND INSTALL AT A MINIMUM OF 50' ON CENTER ALONG THE PROTECTIVE FENCING:
   PROTECTED AREA
   DO NOT ENTER
   THIS FENCE MAY NOT BE REMOVED OR MODIFIED WITHOUT THE PERMISSION OF THE ENGINEER
   CONTACT (PHONE NUMBER)

7. IF IT BECOMES NECESSARY TO LOCATE THE PROTECTIVE FENCING WITHIN SIX FEET (6) OF THE TRUNK OF A TREE, SECURE WOOD PLANKING TO THE TRUNK. THE PLANKING SHALL BE NOMINAL 2X4 DIMENSION LUMBER SECURED WITH A ROPE, BAND, OR STRAP OF SUFFICIENT DURABILITY TO REMAIIN IN PLACE FOR THE DURATION OF THE PROJECT. INSTALL PLANKS TO A HEIGHT OF TEN FEET (10) OR TO THE LOWEST MAJOR BRANCHES WHICHEVER IS LOWEST. DO NOT USE NAILS, SCREWS, OR ANY OTHER DAMAGING ATTACHMENTS UNDER ANY CIRCUMSTANCES.

8. ERECT A FILTER BERM COMPOSED OF WOOD CHIPS TO THE DIMENSIONS AND LOCATION SHOWN IN THE DETAILS. USE WOOD CHIPS LESS THAN OR EQUAL TO 5 IN. IN LENGTH WITH 95% PSSING A 2-IN. SCREEN AND LESS THAN 30% PASSING A 1-IN. SCREEN.

9. IMMEDIATELY REMOVE ANY CONCRETE, LIME OR OTHER CHEMICALS ACCIDENTALLY SPILLED WITHIN THE PROTECTED ROOT ZONE. IMMEDIATELY TREAT FOR ACCIDENTAL DAMAGE TO ANY TREE AS DIRECTED BY THE ENGINEER. SECURE THE SERVICES OF A TREE CARE SPECIALIST TO ASSESS AND/OR TREAT FOR THE DAMAGE.

10. MAINTAIN ALL TREE PROTECTION MATERIALS THROUGHOUT ENTIRE LENGTH OF PROJECT. REPAIR ANY DAMAGED TREE PROTECTION MATERIALS IMMEDIATELY AT THE CONTRACTOR'S EXPENSE. ADDITIONAL COMPOST OR MULCH MATERIALS MAY BE REQUIRED.

11. NO TRENCHING, EXCAVATING, FILLING, OR COMPACTION IS ALLOWED WITHIN THE CRITICAL ROOT ZONE EXCEPT AS SPECIFICALLY IDENTIFIED IN THE PLANS OR APPROVED BY THE ENGINEER.

12. IF ROOT REMOVAL OR EXCAVATION IS UNAVOIDABLE WITHIN THE PREFERRED ROOT PROTECTION ZONE, HAND-DIG TO EXPOSE MAJOR TREE ROOTS OF ONE-INCH (1") DIAMETER OR GREATER. ONCE EXPOSED, PRUNE ROOTS WITH SHARP, CLEAN TOOLS DESIGNED FOR THAT PURPOSE. BACKFILL EXPOSED ROOT ENDS AS SOON AS POSSIBLE OR COVERED WITH SIX INCHES (6") SHREDDED HARDWOOD MULCH WITHIN THE SAME DAY OF EXCAVATION.

13. PRUNE ANY ROOTS EXPOSED BY CONSTRUCTION FLUSH WITH THE SOIL. BACKFILL ROOT AREAS WITH GOOD QUALITY TOPSOIL AS SOON AS POSSIBLE. IF EXPOSED ROOTS ARE NOT TO BE BACKFILLED WITHIN TWO DAYS, COVER THEM WITH A MINIMUM OF SIX INCHES (6") OF SHREDDED HARDWOOD MULCH.

14. SHOULD ACCESS ACROSS THE CRITICAL ROOT ZONE BE NECESSARY, OPEN ONLY THAT PORTION NEEDED FOR ACCESS AND THE COMPLETION OF THE TASK. INSTALL SIX INCHES (6") OF SHREDDED HARDWOOD BARK IN ACCESS AREAS BEFORE ANY WHEELED OR TRACKED VEHICES ENTER THE CRITICAL ROOT ZONE. REPLACE PROTECTIVE FENCING TO ITS ORIGINAL POSITIONS AS SOON AS POSSIBLE AFTER THE CONSTRUCTION TASK IS COMPLETED AND REMOVE THE BARK MULCH LAYER AND STOCKPILE OUTSIDE THE CRITICAL ROOT ZONE.

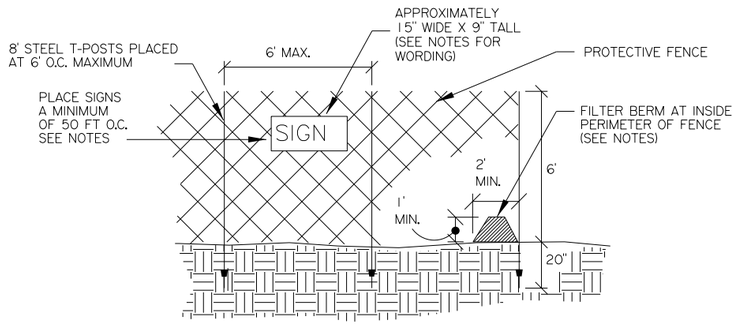
15. FOR PROPOSED UNDERGROUND UTILITIES SHOWN ELSEWHERE IN THE PLANS THAT CROSS THE CRITICAL ROOT ZONE, BORE AT A MINIMUM OF THREE FEET (3') BELOW EXISTING GRADE. TRENCH FOR BORE SHALL NOT INTRUDE INTO CRITICAL ROOT ZONE.

POST CONSTRUCTION

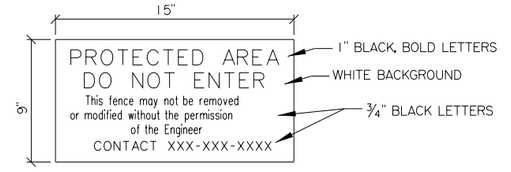
1. UPON THE COMPLETION OF CONSTRUCTION ACTIVITIES, CONDUCT A FINAL ASSESSMENT BY A TREE CARE SPECIALIST TO DETERMINE THE HEALTH AND CONDITION OF THE TREES. THE SPECIALIST SHOULD PROVIDE RECOMMENDATIONS FOR THE FOLLOWING INSPECTION ITEMS FOR NEEDED POST-CONSTRUCTION MEASURES:
   A. DAMAGE TO ANY PART OF THE TREE
   B. CHANGES IN SOILS STRUCTURE SUCH AS COMPACTION, FILLS, EROSION, OR LOSS OF ORGANIC MATTER

IMPLEMENT THE RECOMMENDATIONS MADE BY THE TREE CARE SPECIALIST AS DIRECTED. AT A MINIMUM, PERFORM THE FOLLOWING:
   A. REMOVE TREES THAT MAY HAVE DIED DURING CONSTRUCTION
   B. REMOVE ANY FILL SOIL FROM ROOT ZONES
   C. REPAIR AREAS DAMAGED DURING CONSTRUCTION

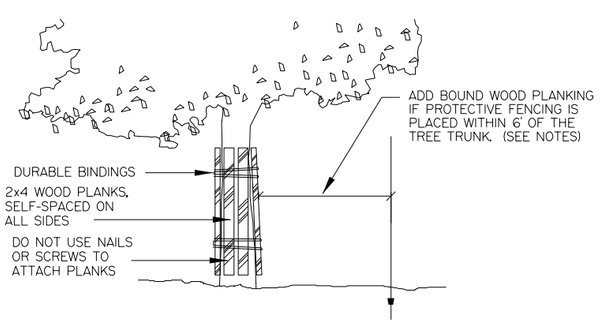
2. AFTER ALL CONSTRUCTION ACTIVITIES HAVE CEASED, REMOVE ALL TREE PROTECTION MATERIALS FROM THE PROJECT SITE. MULCH MAY BE SPREAD OVER THE SITE IN A TWO-INCH THICK MAXIMUM LAYER.



PROTECTIVE FENCE AND SIGN PLACEMENT



SIGNAGE FOR PROTECTED AREAS



WOOD PLANKING INSTALLATION

THIS WORK AND ALL ASSOCIATED MATERIALS WILL NOT BE PAID FOR DIRECTLY, BUT WILL BE SUBSIDIARY TO ITEM 100 - PREPARING RIGHT OF WAY.

NOT TO SCALE

Texas Department of Transportation
San Antonio District

TREE PROTECTION

San Antonio District Standard

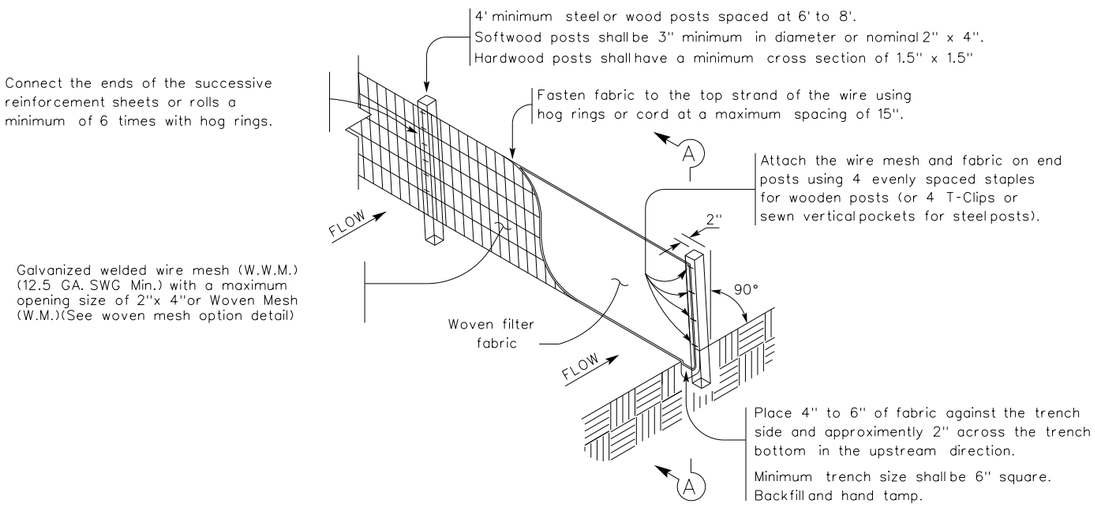
T:Engdata/Standards/SATreeProtection.dgn
ORIGINAL DRAWING DATE: 12-18-18
REVISIONS
- -
- -
- -
- -

PREPARED BY AND FOR USE OF TxDoT.

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
SAT	6	SEE TITLE SHEET	141

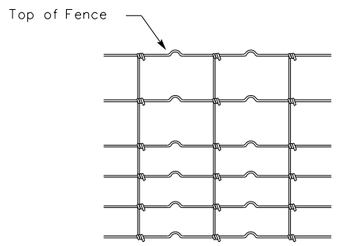
COUNTY	CONTROL	SECTION	JOB	HIGHWAY
WILSON	0143	04	072	US 87

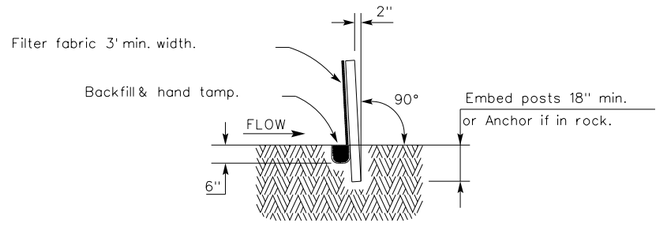
DATE
FILE



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

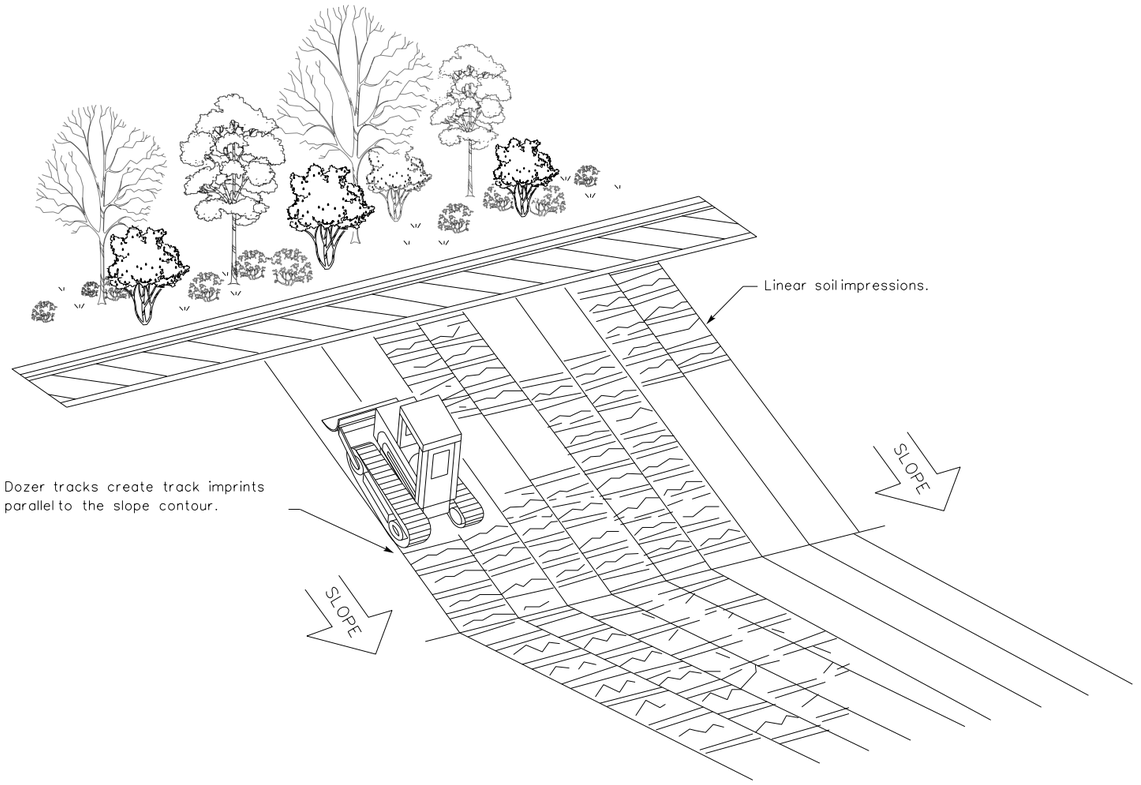
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT		CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0143	04	072		US 87	
	DIST	COUNTY			SHEET NO.	
	SAT	WILSON			142	

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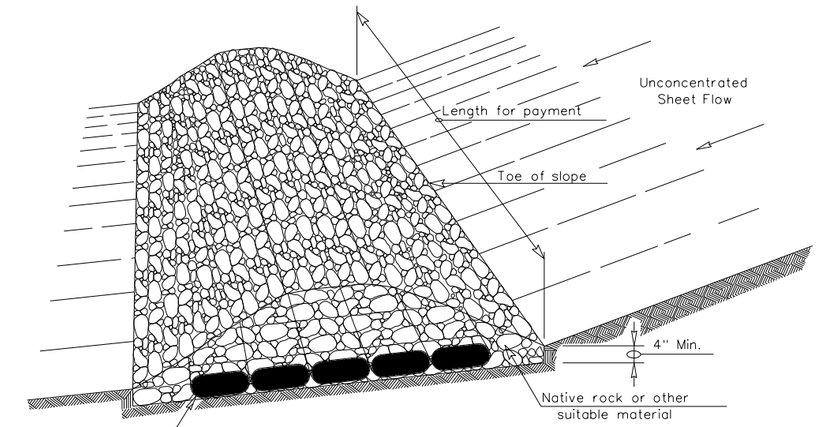
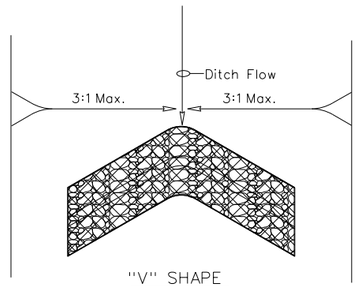
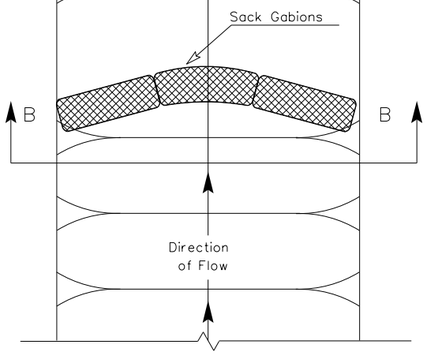


FILTER DAM AT TOE OF SLOPE

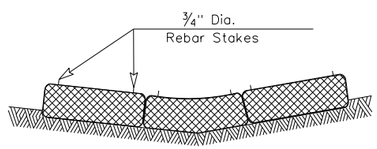
RFD1



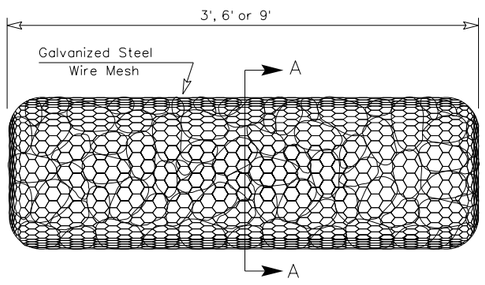
"V" SHAPE
PLAN VIEW



PLAN VIEW

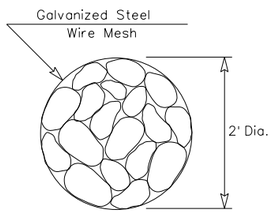


SECTION B-B

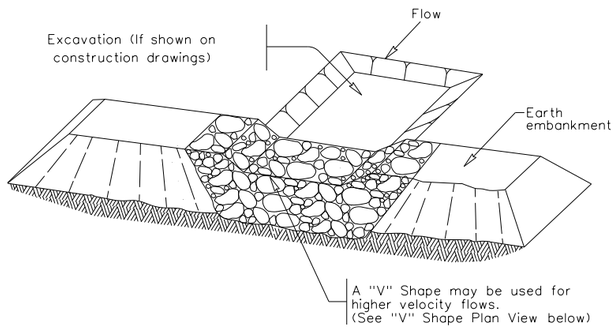


TYPE 4 (SACK GABIONS)

RFD4

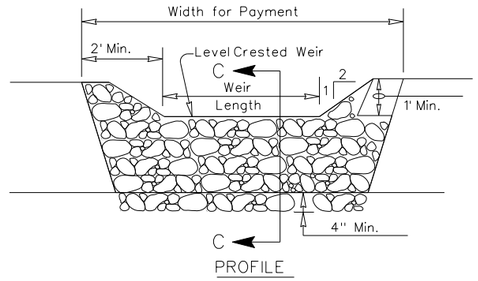


SECTION A-A

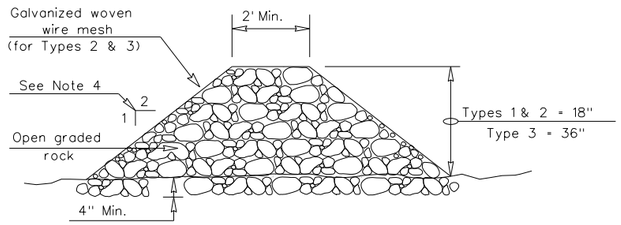


FILTER DAM AT SEDIMENT TRAP

RFD1 OR RFD2



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT^2 of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

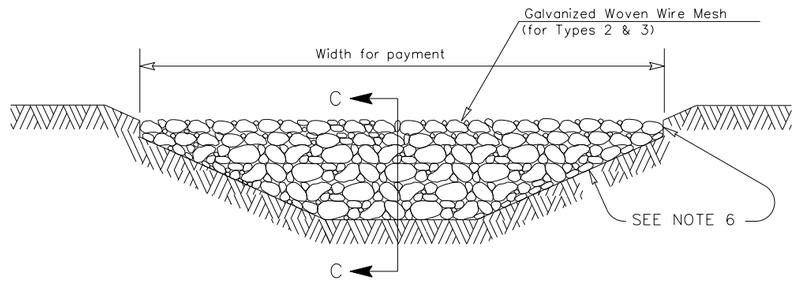
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximently 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

RFD1 OR RFD2 OR RFD3

GENERAL NOTES

1. If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
2. Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
3. The rock filter dam dimensions shall be as indicated on the SW3P plans.
4. Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
5. Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
6. Filter dams should be embedded a minimum of 4" into existing ground.
7. The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
8. Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
9. Sack Gabions should be staked down with 3/4" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 1/2" x 3 1/4"
10. Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
11. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	RFD1
Type 2 Rock Filter Dam	RFD2
Type 3 Rock Filter Dam	RFD3
Type 4 Rock Filter Dam	RFD4

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

ROCK FILTER DAMS

EC(2)-16

FILE: ec216	DN: TxDOT		CK: KM		DW: VP		DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0143	04	072		US 87		
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	SAT	WILSON			143		

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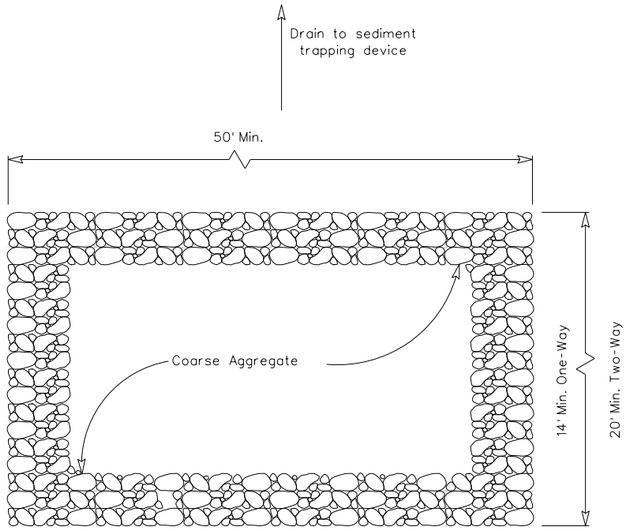
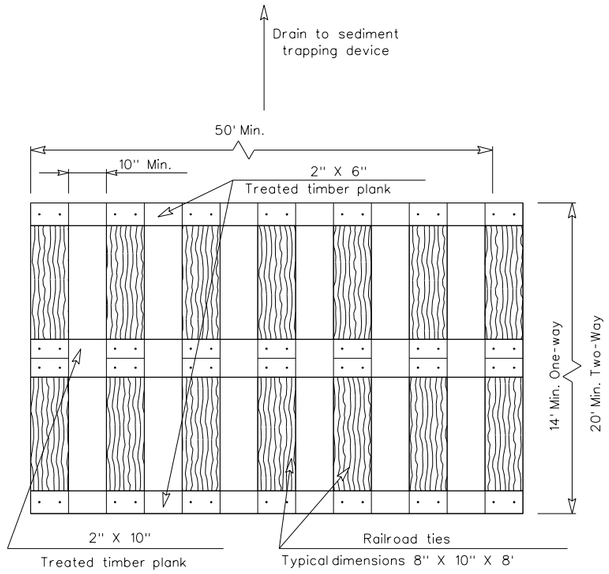


PLAN VIEW



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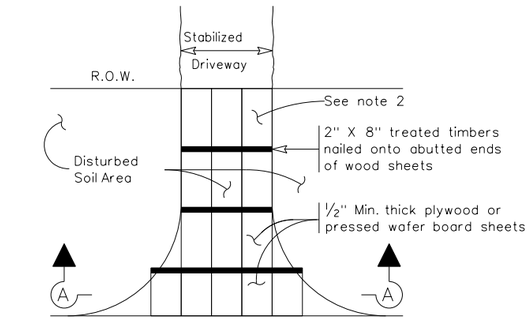

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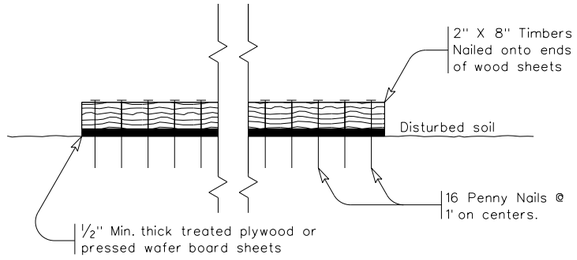
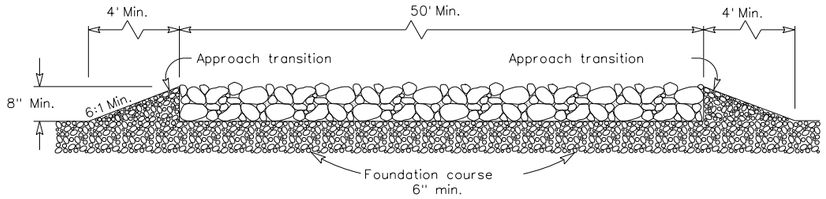


SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

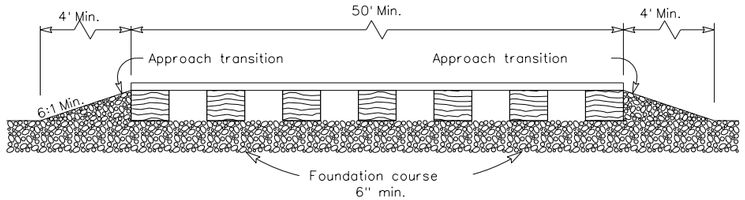
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT.	SECT	JOB	HIGHWAY
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	DIST	COUNTY		SHEET NO.
	SAT	WILSON		144

DATE:
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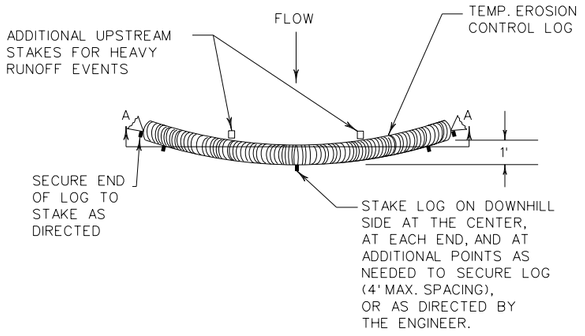

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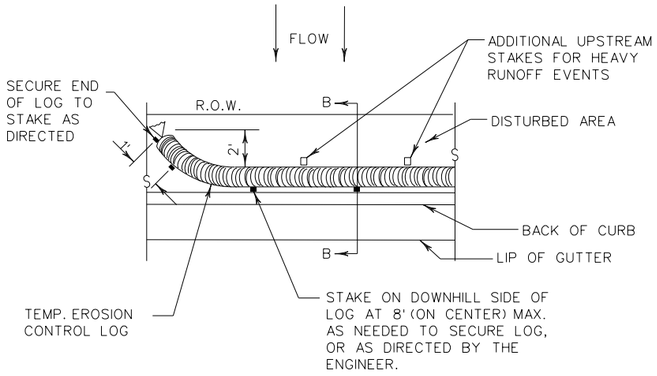

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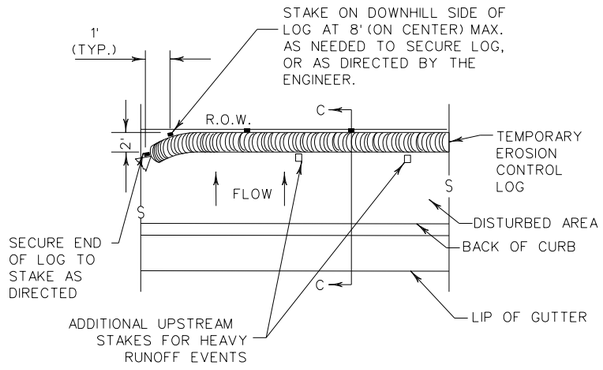

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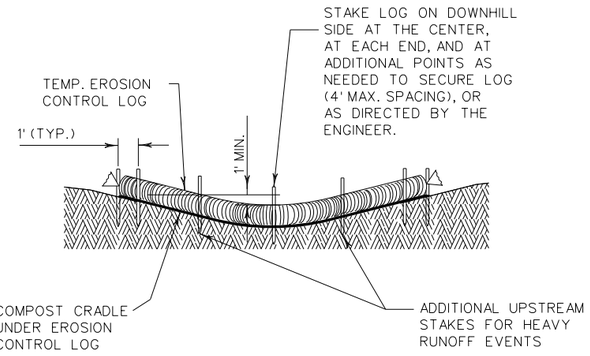
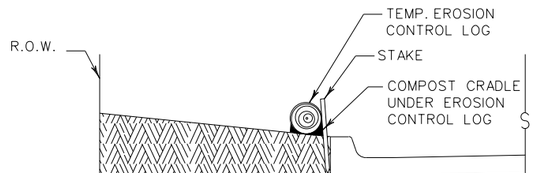


SECTION A-A

EROSION CONTROL LOG DAM

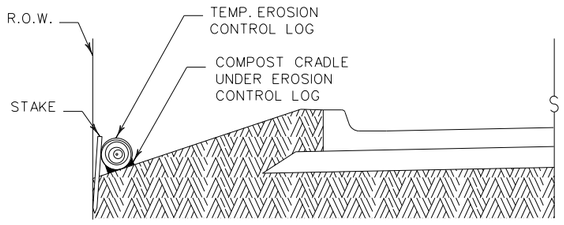
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



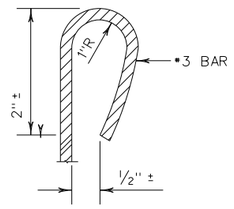
SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

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.

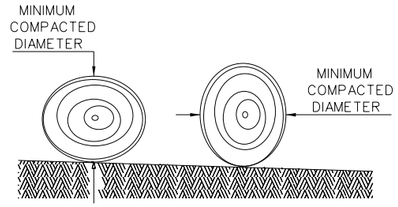
Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

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

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
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	DIST	COUNTY		SHEET NO.
	SAT	WILSON		145

DATE:
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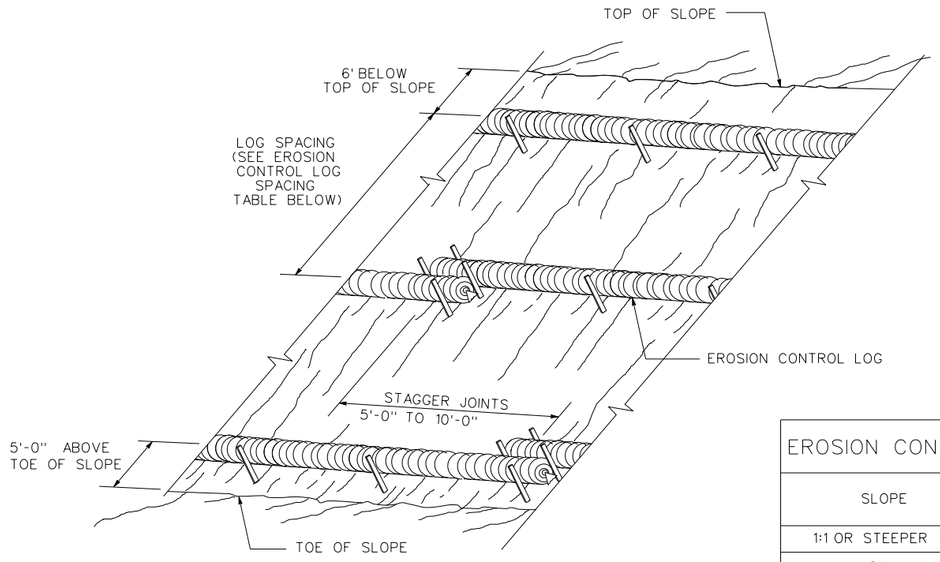
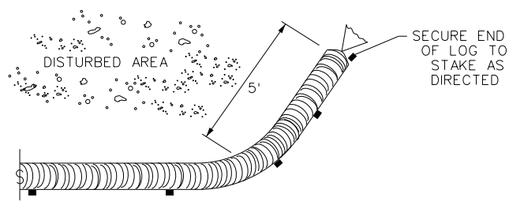


EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

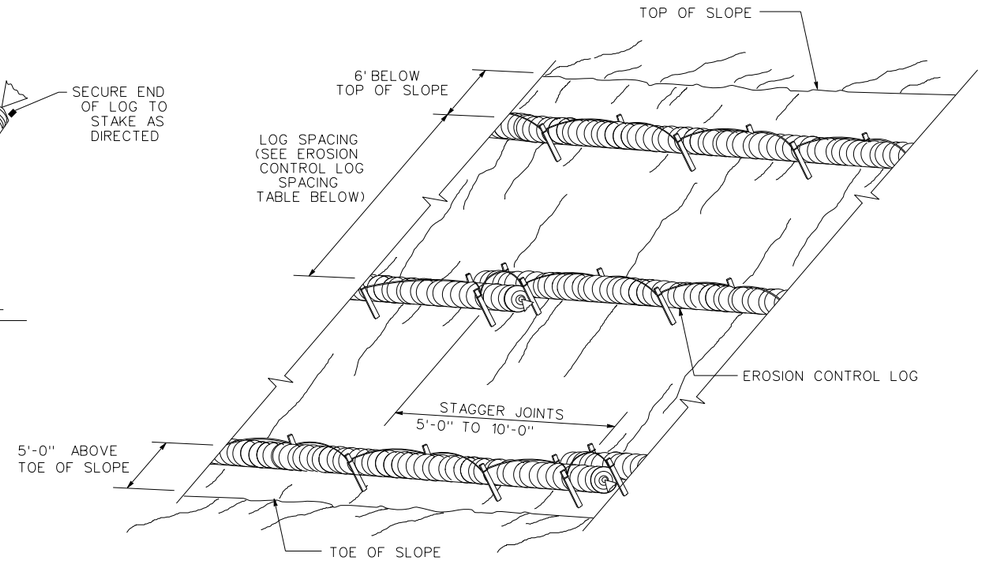
CL-SST



END SECTION RAP DETAIL

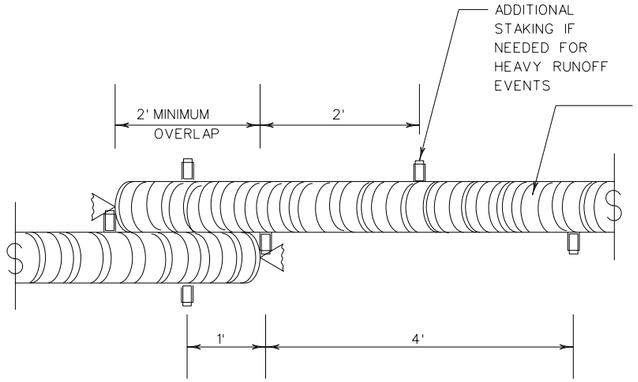
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

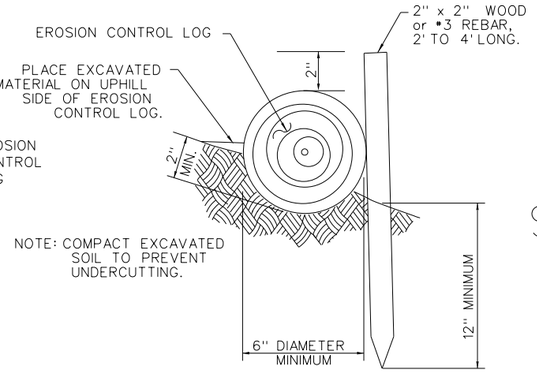
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

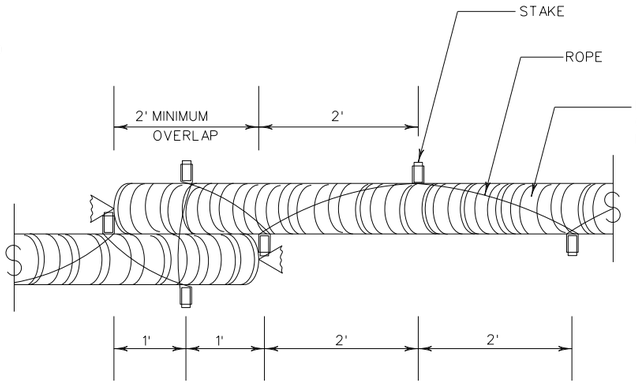


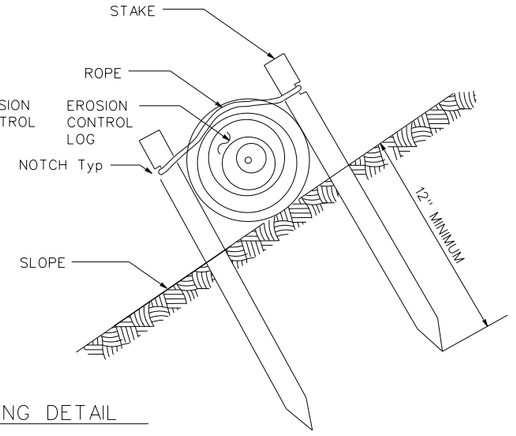


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

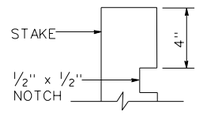
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

SHEET 2 OF 3

Texas Department of Transportation

Design Division Standard

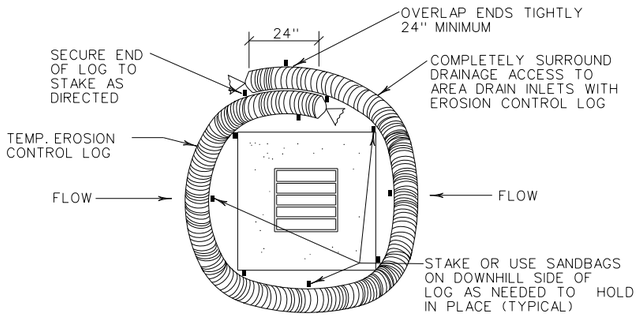
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

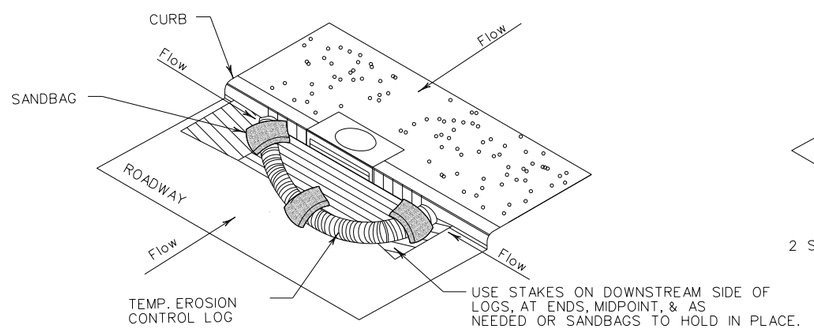
FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0143	04	072		US 87	
	DIST	COUNTY			SHEET NO.	
	SAT	WILSON			146	

DATE:
FILE:



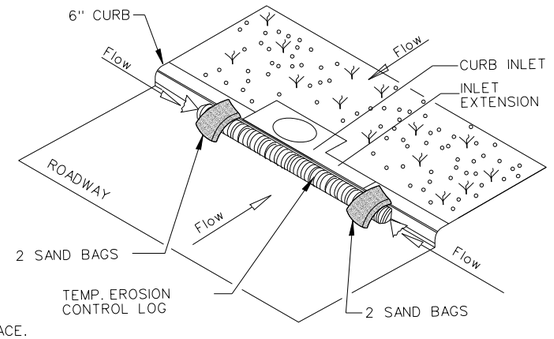
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

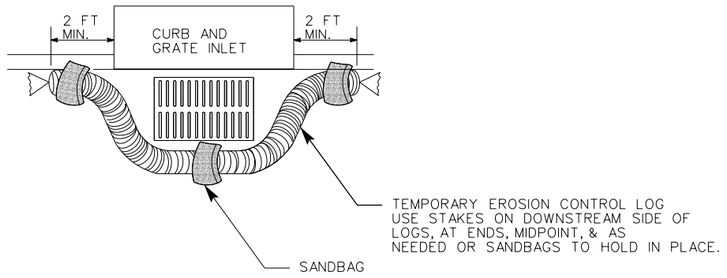
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

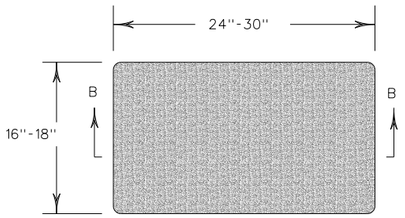
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

Texas Department of Transportation

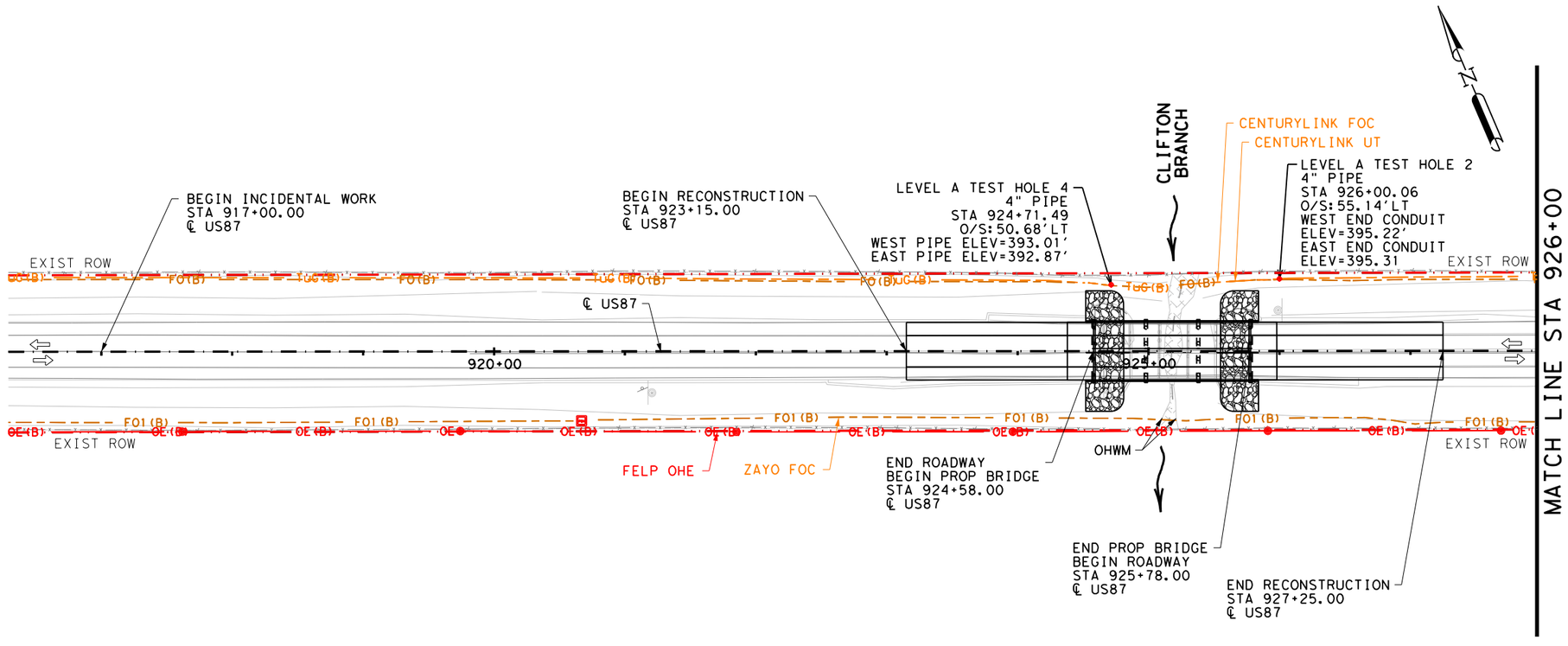
Design Division Standard

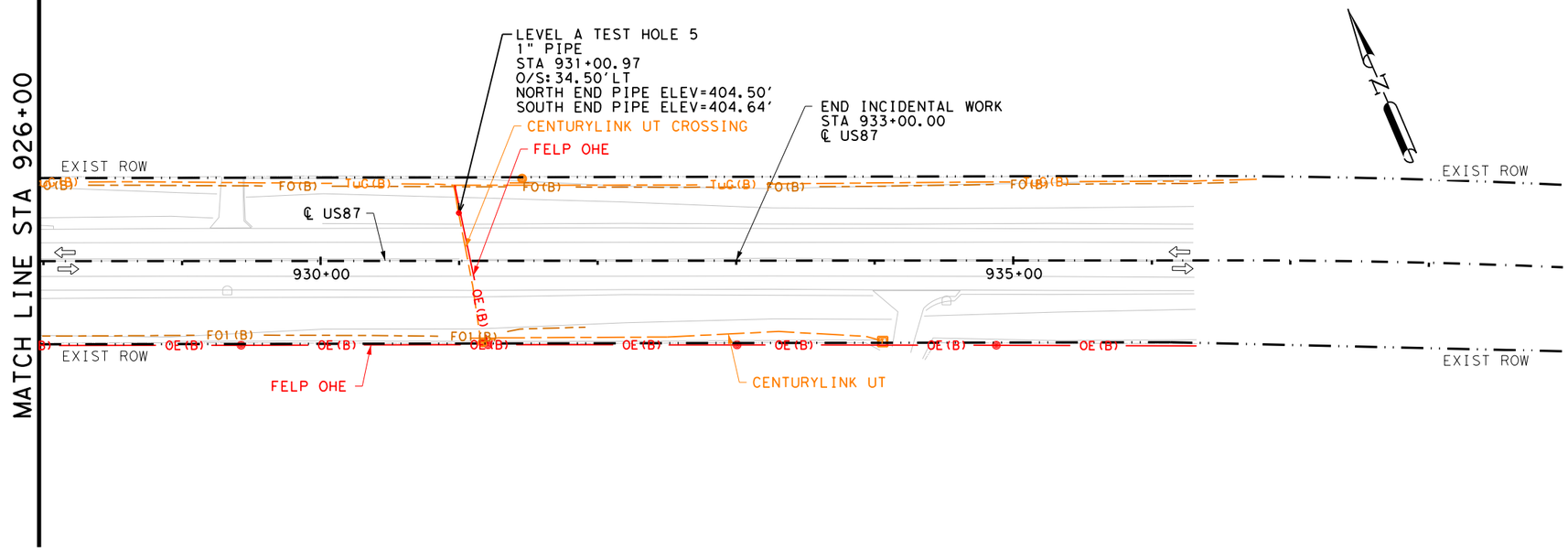
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

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	0143	04	072	US 87
	DIST	COUNTY		SHEET NO.
	SAT	WILSON		147





LEGEND

- OE(B) — OHE - FLORESVILLE ELECTRIC LIGHT & POWER (FELP)
- FO(B) — FIBER OPTIC CABLE - CENTURY LINK
- FO1(B) — FIBER OPTIC CABLE - ZAYO GROUP
- TuG(B) — UNDERGROUND TELEPHONE - CENTURY LINK
- TPED TELEPHONE PEDESTAL
- PMKR PHONE MARKER SIGN
- PP POWER POLE
- PBX PULL BOX
- OHWM

STATE OF TEXAS
JULIO A. RANGEL
117165
LICENSED
PROFESSIONAL ENGINEER
10/28/2022

0' 25' 50' 100'
SCALE: 1"=100'

LJA Engineering, Inc.
FRN-F-1386

Texas Department of Transportation

US 87 AT CLIFTON BRANCH
UTILITY LAYOUT

SHEET 1 OF 1

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	148

10:55:01 AM 10/28/2022
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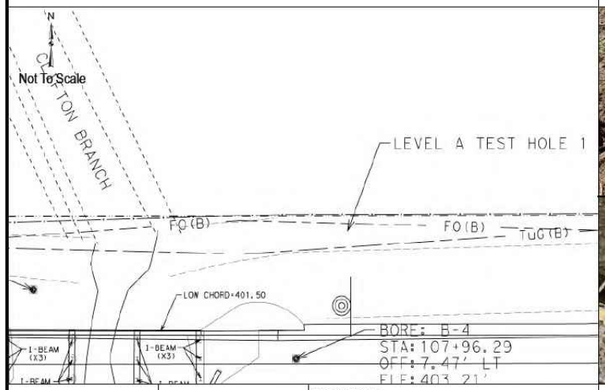
TEST HOLE DATA SHEET

Test Hole Number:	1	CivilCorp ENGINEERS • SURVEYORS 29255 FM 1093, SUITE 7A, FULSHEAR, TX 77441 T: 832-252-8100 TXENG FIRM #10283 TXSURV FIRM #10193783	**Date Excavated:**	3/11/2022
SUE Crew:	N. CONSTANCIO		**City:**	STOCKDALE
CSJ:	0143-04-072		**County:**	WILSON
CivilCorp Project No.	1907902	US 87	**Survey Pts:**	12344
Location Plan			**Photo ID:**	12344



Utility Found?	NO	Exist. Grade Elev. 399.17 FT Trench Depth 387.17 FT SURVEYED ELEV. BOTTOM TRENCH	**Field Condition:** (EX: HEAVY RDWY TRAFFIC, LIGHT RAIN, FOG, ETC.)	GOOD
Utility Condition: (EX: GOOD, BAD, FAIR, POOR)	NA		**Surface Type:** PAVEMENT THICKNESS IF AVAILABLE (EX. NAT. GROUND, CONC. PVMT., ETC.)	NATURAL GROUND
Soil Type/Conditions: (EX: SOFT CLAY, FIRM CLAY, ETC.)	CLAY		**Surface Elev:**	399.17 FT
Utility Type: (EX: WATER LINE, GAS PIPELINE, ETC.)	NA		**Bottom Trench Elev:**	387.17 FT
Utility Size: (EX: 24", 8", ETC.)	NA		**Trench Depth:**	12.0 FT
Utility Material: (EX: PVC, POLY, STEEL, ETC.)	NA	**Utility Owner/Operator:**	NA	

Prepared by: M. PARKINSON
Checked by: J. WOODS
Test Hole Located by: N. CONSTANCIO

Sta/Off: 108+11.39, 47.86 LT
Coordinates: N = 13,637,840.91
E = 2,293,016.19

Benchmark Location:
BM: CP-4001
Description: 5/8 IR W/ CIVILCORP CAP
N= 13,638,822.90
E= 2,290,774.25
Elev.= 431.28 FT

FIELD NOTES OR COMMENTS:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203) NAD83 (2001 ADJ.; EPOCH 2010) AS DETERMINED BY GPS OBSERVATIONS USING TXDOT VRS SYSTEM. ALL COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A SURFACE ADJUSTMENT FACTOR OF 1.00003.
2. ALL PROJECT ELEVATIONS ARE BASED OFF DIGITAL LEVLES HOLDING AN ELEVATION OF 175.036' ON CP104 DERIVED FROM GPS OBSERVATION MEANS, REFERENCING NAVD88, GEOID18 USING THE TXDOT VRS SYSTEM AT THE TIME OF SURVEY.
3. ALL MEASURMENTS ARE U.S. SURVEY FEET.

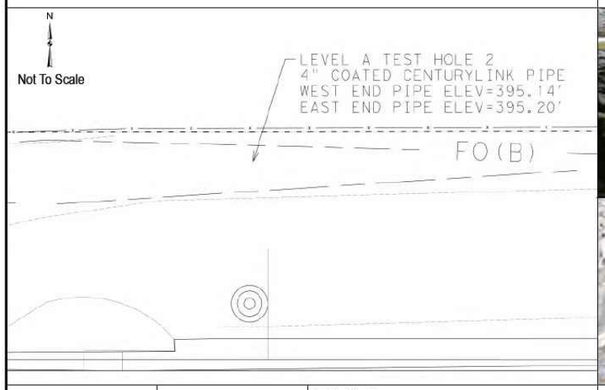
STATE OF TEXAS BENNIE L. GALVAN 69918 REGISTERED PROFESSIONAL ENGINEER
3/21/22

SUBSURFACE UTILITY ENGINEERING (SUE) CERTIFCATION:

THIS ENGINEER'S SEAL HEREON IS TO CERTIFY THAT THE UTILITIES SHOWN HAVE BEEN INVESTIGATED IN GENERAL ACCORDANCE WITH ASCE STANDARD 38-02. ALL OTHER INFORMATION HEREON HAS BEEN APPROVED BY OTHERS AND IS NOT PART OF THIS CERTIFICATION.

TEST HOLE DATA SHEET

Test Hole Number:	2	CivilCorp ENGINEERS • SURVEYORS 29255 FM 1093, SUITE 7A, FULSHEAR, TX 77441 T: 832-252-8100 TXENG FIRM #10283 TXSURV FIRM #10193783	**Date Excavated:**	3/11/2022
SUE Crew:	N. CONSTANCIO		**City:**	STOCKDALE
CSJ:	0143-04-072		**County:**	WILSON
CivilCorp Project No.	1907902	US 87	**Survey Pts:**	12343
Location Plan			**Photo ID:**	12343, 12343_1



Utility Found?	YES	Exist. Grade Elev. 399.17 FT Utility Depth 395.20 FT SURVEYED ELEV. TOP UTILITY 4 IN UTIL. DIA. IF AVAILABLE	**Field Condition:** (EX: HEAVY RDWY TRAFFIC, LIGHT RAIN, FOG, ETC.)	GOOD
Utility Condition: (EX: GOOD, BAD, FAIR, POOR)	GOOD		**Surface Type:** PAVEMENT THICKNESS IF AVAILABLE (EX. NAT. GROUND, CONC. PVMT., ETC.)	NATURAL GROUND
Soil Type/Conditions: (EX: SOFT CLAY, FIRM CLAY, ETC.)	CLAY		**Surface Elev:**	399.17 FT
Utility Type: (EX: WATER LINE, GAS PIPELINE, ETC.)	FIBER OPTIC		**Top of Util. Elev:**	395.20 FT
Utility Size: (EX: 24", 8", ETC.)	4 IN		**Utl. Depth to Top:**	3.97 FT
Utility Material: (EX: PVC, POLY, STEEL, ETC.)	PLASTIC CONDUIT	**Utility Owner/Operator:**	CENTURYLINK	

Prepared by: M. PARKINSON
Checked by: J. WOODS
Test Hole Located by: N. CONSTANCIO

Sta/Off: 108+12.14, 47.73' LT
Coordinates: N = 13,637,840.20
E = 2,293,017.28

Benchmark Location:
BM: CP-4001
Description: 5/8 IR W/ CIVILCORP CAP
N= 13,638,822.90
E= 2,290,774.25
Elev.= 431.28 FT

FIELD NOTES OR COMMENTS:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203) NAD83 (2001 ADJ.; EPOCH 2010) AS DETERMINED BY GPS OBSERVATIONS USING TXDOT VRS SYSTEM. ALL COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A SURFACE ADJUSTMENT FACTOR OF 1.00003.
2. ALL PROJECT ELEVATIONS ARE BASED OFF DIGITAL LEVLES HOLDING AN ELEVATION OF 175.036' ON CP104 DERIVED FROM GPS OBSERVATION MEANS, REFERENCING NAVD88, GEOID18 USING THE TXDOT VRS SYSTEM AT THE TIME OF SURVEY.
3. ALL MEASURMENTS ARE U.S. SURVEY FEET.

STATE OF TEXAS BENNIE L. GALVAN 69918 REGISTERED PROFESSIONAL ENGINEER
3/21/22

SUBSURFACE UTILITY ENGINEERING (SUE) CERTIFCATION:

THIS ENGINEER'S SEAL HEREON IS TO CERTIFY THAT THE UTILITIES SHOWN HAVE BEEN INVESTIGATED IN GENERAL ACCORDANCE WITH ASCE STANDARD 38-02. ALL OTHER INFORMATION HEREON HAS BEEN APPROVED BY OTHERS AND IS NOT PART OF THIS CERTIFICATION.

NOTES:

1. THIS TEST HOLE INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THE PS&E.

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

Texas Department of Transportation ©2022

US 87 AT CLIFTON BRANCH

SUBSURFACE UTILITY ENGINEERING TEST HOLE DATA

SHEET 1 OF 3

FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	149

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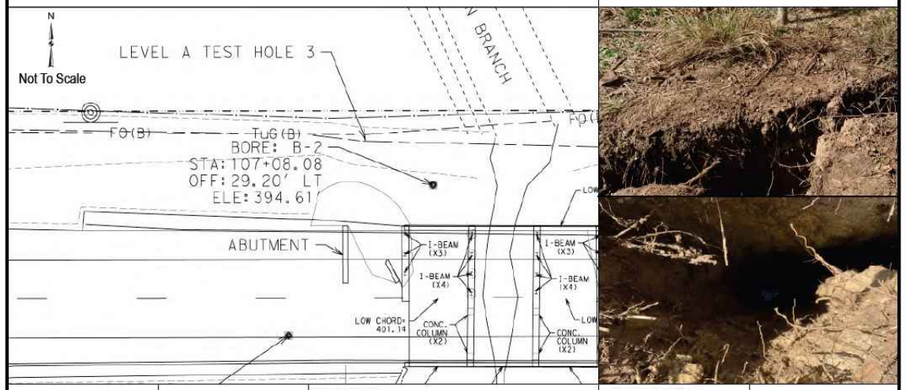
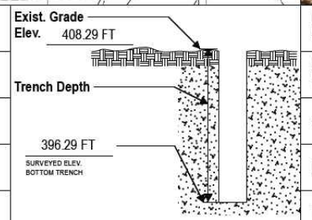
TEST HOLE DATA SHEET

Test Hole Number:	3	CivilCorp ENGINEERS • SURVEYORS 29255 FM 1093, SUITE 7A, FULSHEAR, TX 77441 T: 832-253-8100 TXENG FIRM #10283 TXSURV FIRM #10193783	**Date Excavated:**	3/11/2022
SUE Crew:	N. CONSTANCIO		**City:**	STOCKDALE
CSJ:	0143-04-072		**County:**	WILSON
CivilCorp Project No.	1907902	US 87	**Survey Pts:**	12335
Location Plan			**Photo ID:**	12335



Utility Found?	NO	**Field Condition:** (EX: HEAVY RDWY TRAFFIC, LIGHT RAIN, FOG, ETC.)	GOOD
Utility Condition: (EX: GOOD, BAD, FAIR, POOR)	NA	**Surface Type:** PAVEMENT THICKNESS IF AVAILABLE (EX. NAT. GROUND, CONC. PVMT., ETC.)	NATURAL GROUND
Soil Type/Conditions: (EX: SOFT CLAY, FIRM CLAY, ETC.)	CLAY	**Surface Elev:**	408.29 FT
Utility Type: (EX: WATER LINE, GAS PIPELINE, ETC.)	NA	**Bottom Trench Elev:**	396.29 FT
Utility Size: (EX: 24", 8", ETC.)	NA	**Trench Depth:**	12.0 FT
Utility Material: (EX: PVC, POLY, STEEL, ETC.)	NA	**Utility Owner/Operator:**	NA



Prepared by: M. PARKINSON
Checked by: J. WOODS
Test Hole Located by: N. CONSTANCIO
Sta/Off: 106+56.18, 43.25 LT
Coordinates: N = 13,637,886.29
E = 2,292,898.31

Benchmark Location:
BM: CP-4001
Description: 5/8 IR W/ CIVILCORP CAP
N= 13,638,822.90
E= 2,290,774.25
Elev.= 431.28 FT

FIELD NOTES OR COMMENTS:

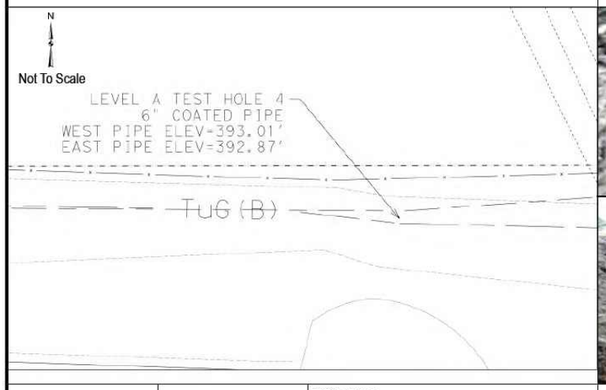
1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203) NAD83 (2001 ADJ.; EPOCH 2010) AS DETERMINED BY GPS OBSERVATIONS USING TXDOT VRS SYSTEM. ALL COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A SURFACE ADJUSTMENT FACTOR OF 1.00003.
2. ALL PROJECT ELEVATIONS ARE BASED OFF DIGITAL LEVLES HOLDING AN ELEVATION OF 175.036' ON CP104 DERIVED FROM GPS OBSERVATION MEANS, REFERENCING NAVD88, GEOID18 USING THE TXDOT VRS SYSTEM AT THE TIME OF SURVEY.
3. ALL MEASURMENTS ARE U.S. SURVEY FEET.

SUBSURFACE UTILITY ENGINEERING (SUE) CERTIFCATION:

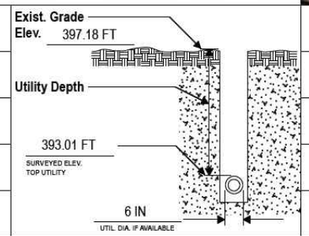
THIS ENGINEER'S SEAL HEREON IS TO CERTIFY THAT THE UTILITIES SHOWN HAVE BEEN INVESTIGATED IN GENERAL ACCORDANCE WITH ASCE STANDARD 38-02. ALL OTHER INFORMATION HEREON HAS BEEN APPROVED BY OTHERS AND IS NOT PART OF THIS CERTIFICATION.

TEST HOLE DATA SHEET

Test Hole Number:	4	CivilCorp ENGINEERS • SURVEYORS 29255 FM 1093, SUITE 7A, FULSHEAR, TX 77441 T: 832-253-8100 TXENG FIRM #10283 TXSURV FIRM #10193783	**Date Excavated:**	3/11/2022
SUE Crew:	N. CONSTANCIO		**City:**	STOCKDALE
CSJ:	0143-04-072		**County:**	WILSON
CivilCorp Project No.	1907902	US 87	**Survey Pts:**	12333
Location Plan			**Photo ID:**	12333, 12333_1



Utility Found?	YES	**Field Condition:** (EX: HEAVY RDWY TRAFFIC, LIGHT RAIN, FOG, ETC.)	GOOD
Utility Condition: (EX: GOOD, BAD, FAIR, POOR)	GOOD	**Surface Type:** PAVEMENT THICKNESS IF AVAILABLE (EX. NAT. GROUND, CONC. PVMT., ETC.)	NATURAL GROUND
Soil Type/Conditions: (EX: SOFT CLAY, FIRM CLAY, ETC.)	CLAY	**Surface Elev:**	397.18 FT
Utility Type: (EX: WATER LINE, GAS PIPELINE, ETC.)	TELEPHONE	**Top of Util. Elev:**	393.01 FT
Utility Size: (EX: 24", 8", ETC.)	6 IN	**Utl. Depth to Top:**	4.17 FT
Utility Material: (EX: PVC, POLY, STEEL, ETC.)	PLASTIC CONDUIT	**Utility Owner/Operator:**	CENTURYLINK



Prepared by: M. PARKINSON
Checked by: J. WOODS
Test Hole Located by: N. CONSTANCIO
Sta/Off: 106+84.09, 43.68' LT
Coordinates: N = 13,637,887.11
E = 2,292,897.50

Benchmark Location:
BM: CP-4001
Description: 5/8 IR W/ CIVILCORP CAP
N= 13,638,822.90
E= 2,290,774.25
Elev.= 431.28 FT

FIELD NOTES OR COMMENTS:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203) NAD83 (2001 ADJ.; EPOCH 2010) AS DETERMINED BY GPS OBSERVATIONS USING TXDOT VRS SYSTEM. ALL COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A SURFACE ADJUSTMENT FACTOR OF 1.00003.
2. ALL PROJECT ELEVATIONS ARE BASED OFF DIGITAL LEVLES HOLDING AN ELEVATION OF 175.036' ON CP104 DERIVED FROM GPS OBSERVATION MEANS, REFERENCING NAVD88, GEOID18 USING THE TXDOT VRS SYSTEM AT THE TIME OF SURVEY.
3. ALL MEASURMENTS ARE U.S. SURVEY FEET.

SUBSURFACE UTILITY ENGINEERING (SUE) CERTIFCATION:

THIS ENGINEER'S SEAL HEREON IS TO CERTIFY THAT THE UTILITIES SHOWN HAVE BEEN INVESTIGATED IN GENERAL ACCORDANCE WITH ASCE STANDARD 38-02. ALL OTHER INFORMATION HEREON HAS BEEN APPROVED BY OTHERS AND IS NOT PART OF THIS CERTIFICATION.

NOTES:

1. THIS TEST HOLE INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THE PS&E.

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

Texas Department of Transportation ©2022

US 87 AT CLIFTON BRANCH

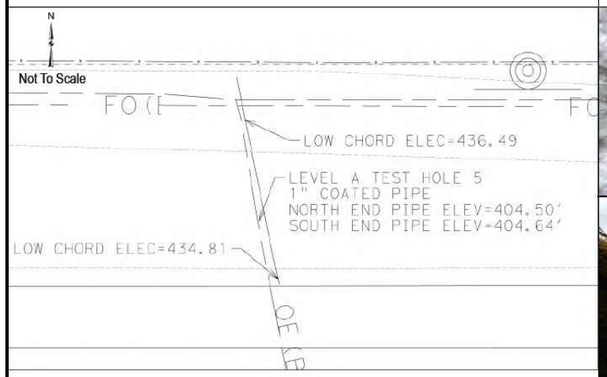
SUBSURFACE UTILITY ENGINEERING TEST HOLE DATA

SHEET 2 OF 3

FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	150

TEST HOLE DATA SHEET

Test Hole Number:	5	CivilCorp ENGINEERS • SURVEYORS 29255 FM 1093, SUITE 7A, FULSHEAR, TX 77441 T: 832-252-8100 TXENG FIRM #10283 TXSURV FIRM #10193783	**Date Excavated:**	3/11/2022
SUE Crew:	N. CONSTANCIO		**City:**	STOCKDALE
CSJ:	0143-04-072		**County:**	WILSON
CivilCorp Project No.	1907902	US 87	**Survey Pts:**	12349
Location Plan			**Photo ID:**	12349, 12349_1



Utility Found?	YES	Exist. Grade Elev. 408.29 FT Utility Depth 404.64 FT SURVEYED ELEV. TOP UTILITY 1 IN UTIL. DIA. IF AVAILABLE	**Field Condition:** (EX: HEAVY RDWY TRAFFIC, LIGHT RAIN, FOG, ETC.)	GOOD
Utility Condition: (EX: GOOD, BAD, FAIR, POOR)	GOOD		**Surface Type:** PAVEMENT THICKNESS IF AVAILABLE (EX. NAT. GROUND/ CONC. PVMT., ETC.)	NATURAL GROUND
Soil Type/Conditions: (EX: SOFT CLAY, FIRM CLAY, ETC.)	CLAY		**Surface Elev:**	408.29 FT
Utility Type: (EX: WATER LINE, GAS PIPELINE, ETC.)	TELEPHONE		**Top of Util. Elev:**	404.64 FT
Utility Size: (EX: 24", 8", ETC.)	1 IN		**Utl. Depth to Top:**	3.65 FT
Utility Material: (EX: PVC, POLY, STEEL, ETC.)	PLASTIC CONDUIT	**Utility Owner/Operator:**	CENTURYLINK	

Prepared by: M. PARKINSON
Checked by: J. WOODS
Test Hole Located by: N. CONSTANCIO

Sta/Off: 11+312.14, 33.69' LT
Coordinates: N = 13,637,624.18
E = 2,293,468.57

Benchmark Location:
BM: CP-4001
Description: 5/8 IR W/ CIVILCORP CAP
N= 13,638,822.90
E= 2,290,774.25
Elev.= 431.28 FT

FIELD NOTES OR COMMENTS:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE (4203) NAD83 (2001 ADJ.; EPOCH 2010) AS DETERMINED BY GPS OBSERVATIONS USING TXDOT VRS SYSTEM. ALL COORDINATES SHOWN ARE SURFACE AND MAY BE CONVERTED TO GRID BY DIVIDING BY A SURFACE ADJUSTMENT FACTOR OF 1.00003.
2. ALL PROJECT ELEVATIONS ARE BASED OFF DIGITAL LEVLES HOLDING AN ELEVATION OF 175.036' ON CP104 DERIVED FROM GPS OBSERVATION MEANS, REFERENCING NAVD88, GEOID18 USING THE TXDOT VRS SYSTEM AT THE TIME OF SURVEY.
3. ALL MEASURMENTS ARE U.S. SURVEY FEET.

STATE OF TEXAS
BENNIE L. GALVAN
69918
REGISTERED
PROFESSIONAL ENGINEER
3/21/22

SUBSURFACE UTILITY ENGINEERING (SUE) CERTIFCATION:

THIS ENGINEER'S SEAL HEREON IS TO CERTIFY THAT THE UTILITIES SHOWN HAVE BEEN INVESTIGATED IN GENERAL ACCORDANCE WITH ASCE STANDARD 38-02. ALL OTHER INFORMATION HEREON HAS BEEN APPROVED BY OTHERS AND IS NOT PART OF THIS CERTIFICATION.

NOTES:

1. THIS TEST HOLE INFORMATION HAS BEEN ACCEPTED AND INCORPORATED INTO THE PS&E.

REV. NO.	DATE	DESCRIPTION	BY

LJA Engineering, Inc.
FRN - F-1386

Texas Department of Transportation
2022

US 87 AT CLIFTON BRANCH
SUBSURFACE UTILITY ENGINEERING TEST HOLE DATA
SHEET 3 OF 3

FED.RD. DIV.NO.	STATE	PROJECT NO.			HIGHWAY NO.
6	TEXAS	SEE TITLE SHEET			US87
STATE DISTRICT	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
SAT	WILSON	0143	04	072	151