CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		1

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

STATE PROJECT NUMBER

C 573-1-34

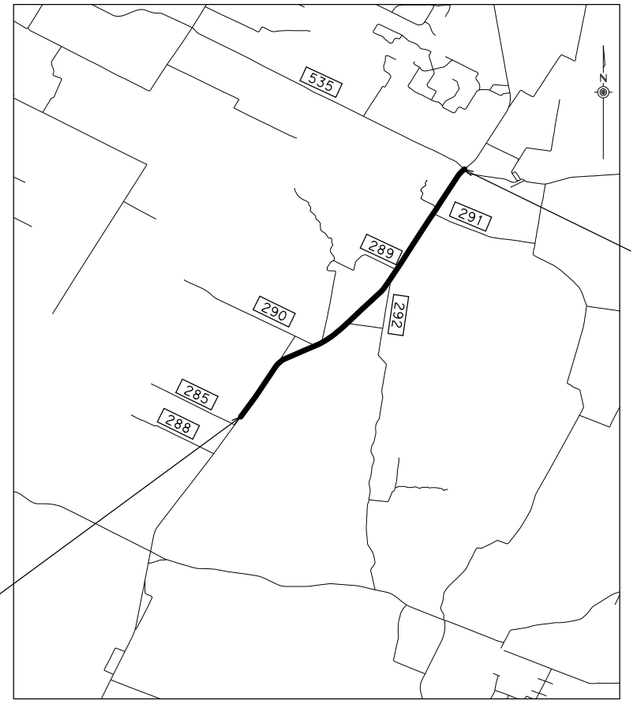
CSJ: 0573-01-034

NET LENGTH OF PROJECT = 32,368.400 FEET = 6.130 MILES
- ROADWAY = 32,368.400 FEET = 6.130 MILES
- BRIDGE = 0.000 FEET = 0.000 MILES

BASTROP COUNTY
SH 304

FROM: FM 535
TO: 6.13 MILES SOUTH OF FM 535

FOR CONSTRUCTION OF WIDEN ROAD - ADD SHOULDERS
CONSISTING OF ADDITIONAL PAVED SURFACE WIDTH.



BEGIN PROJECT
CSJ: 0573-01-034
STA 759+31.60
LATITUDE: 29.932080
LONGITUDE: -97.309690

END PROJECT
CSJ: 0573-01-034
STA 1083+00.00
LATITUDE: 29.863410
LONGITUDE: -97.37152

LOCATION MAP NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: UPRR: STA 774+00.00
DOT# 415746U
RRMP 11.73

DESIGN SPEED

40 MPH

A.D.T.

2020: 1869 VPD
2040: 2617 VPD

FINAL PLANS

DATE OF LETTING: _____

DATE WORK BEGAN: _____

DATE WORK COMPLETED AND ACCEPTED: _____

FINAL CONTRACT COST: $_____

CONTRACTOR: _____

LIST OF APPROVED CHANGE ORDERS:

I CERTIFY THAT THIS PROJECT
WAS CONSTRUCTED IN SUBSTANTIAL
COMPLIANCE WITH THE FINAL AS-BUILT
PLANS AND SPECIFICATIONS.

_____ P.E. _____
AREA ENGINEER DATE

PGAL

CORRECT: 10/27/2021

Megan E. Houtchens
CONSULTING ENG. (TBPE FIRM REG. F-2742)

RECOMMENDED FOR LETTING: 10/29/2021

DocuSigned by: Dwayne Hellums, P.E.
198012497A804A0...
DISTRICT DESIGN ENGINEER

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens P.E. 10/27/2021
MEGAN E. HOUTCHENS, P.E. DATE
PGAL, INC.
TBPE FIRM REG. F-2742

TDLR INSPECTION NOT REQUIRED

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION ON NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: SPECIAL LABOR PROVISIONS FOR STATE PROJECTS (000---008).

SUBMITTED FOR LETTING: 10/29/2021

DocuSigned by: Diana K. Schulze, P.E.
6775445255A3482...
AREA ENGINEER

APPROVED FOR LETTING: 11/1/2021

DocuSigned by: Heather Ashley-Nguyen
8912AF18F45A416...
DIRECTOR OF TRANSPORTATION PLANNING & DEVELOPMENT

Texas Department of Transportation

FILE: R:\1002700-1003299\1003179.00\WA3*SH304\04*DOCUMENTS\PLAN*SET\PLAN*SET*034\1. GENERAL\SH304*GEN*TITLE*01.dgn
DATE: 10/27/2021 10:14:29 AM

GENERAL

	1	TITLE SHEET
	2	INDEX OF SHEETS
	3	EXISTING TYPICAL SECTIONS
	4-5	PROPOSED TYPICAL SECTIONS
	5A	PROPOSED TYPICAL SECTIONS
	6, 6A - 6G	GENERAL NOTES
	7, 7A - 7C	ESTIMATE & QUANTITIES
	8-10	ROADWAY SUMMARY
	11	TCP & SW3P SUMMARY
	12	DRAINAGE SUMMARY (DRIVEWAY SUMMARY)
	13	DRAINAGE SUMMARY
	14	SIGNING & PAVEMENT MARKING SUMMARY
	15-17	SUMMARY OF SMALL SIGNS

TRAFFIC CONTROL PLAN

	18	SEQUENCE OF WORK
	19-22	TCP TYPICAL SECTIONS
	22a	TCP DETOUR RAILROAD

TRAFFIC CONTROL PLAN STANDARDS

>>	23	BC (1)-21
>>	24	BC (2)-21
>>	25	BC (3)-21
>>	26	BC (4)-21
>>	27	BC (5)-21
>>	28	BC (6)-21
>>	29	BC (7)-21
>>	30	BC (8)-21
>>	31	BC (9)-21
>>	32	BC (10)-21
>>	33	BC (11)-21
>>	34	BC (12)-21
>>	35	TCP(2-1)-18
>>	36	TCP(2-2)-18
>>	37	TCP(2-3)-18
>>	38	TCP(3-1)-13
>>	39	TCP(3-3)-14
>>	40	TCP(7-1)-13
>>	41	WZ(STPM)-13
>>	42	WZ(UL)-13
>>	43	WZ(RS)-16

ROADWAY DETAILS

	44-50	SURVEY CONTROL DATA SHEETS
	51-53	HORIZONTAL AND VERTICAL CONTROL SHEETS
	54-56	HORIZONTAL ALIGNMENT DATA
	57-84	PLAN AND PROFILE
	85-89	INTERSECTION PLAN AND PROFILE
	90-91	DRIVEWAY SUMMARY SHEET
	92	DRIVEWAY DETAILS
>>	93	PRWPD-20 (AUS)

ROADWAY DETAILS STANDARDS

>>	94	PAVEMENT TRANSITION DETAIL
>>	95	MB(1)-21
>>	96	MB(2)-21
>>	97	MB(3)-21
>>	98	MB(4)-21
>>	99	MB-14(2)
>>	100	MB-14(2A)
>>	101	MB-14(2B)
>>	102	GF(31)-19
>>	103	GF(31)DAT-19
>>	104	SGT(10S)31-16
>>	105	SGT(11S)31-18
>>	106	SGT(12S)31-18
>>	106a	SGT(15)31-20
>>	107	MBGF(MS)-19

DRAINAGE DETAILS

	108-109	DRAINAGE AREA MAPS
	110-111	HYDROLOGIC DATA SHEET
	112-121	CULVERT HYDRAULIC DATA SHEETS
	122-132	CULVERT LAYOUTS
	133	MISCELLANEOUS DRAINAGE DETAILS

DRAINAGE DETAIL STANDARDS

##	134	BCS
##	135	SCP-MD
##	136	SCP-5
##	137	SCP-6
##	138	SCP-7
##	139	SCP-8
##	140	MC-MD
##	141-142	MC-6-16
##	143-144	MC-10-7
##	145	FW-O
##	146	FW-S
##	147	PW
##	148	CH-FW-O
##	149	CH-PW-O
##	150-151	SETP-CD
##	152	PSET-SC
##	153	PSET-RC
##	154	PSET-RR
##	155-156	SRR
>>	157	SETP-PD
>>	158	PSET-SP
>>	159	PSET-RP
>>	160	PSN-19(AUS)

PAVEMENT MARKINGS & DELINEATION

	161-174	SIGNING AND PAVEMENT MARKING LAYOUT
	174A	PAVEMENT MARKING DETAIL SHEET
	175-177	SMALL SIGN DETAILS

PAVEMENT MARKINGS & DELINEATION STANDARDS

##	178	D&OM(1)-20
##	179	D&OM(2)-20
##	180	D&OM(3)-20
##	181	D&OM(4)-20
##	182	D&OM(5)-20
##	183	D&OM(6)-20
##	184	D&OM(VIA)-20
##	185	PM(1)-20
##	186	PM(2)-20
##	187	PM(3)-20
##	188	TSR(3)-13
##	189	TSR(4)-13
##	190	TSR(5)-13
##	191	SMD(2-1)-08
##	192	SMD(GEN)-08
##	193	SMD(SLIP-1)-08
##	194	SMD(SLIP-2)-08
##	195	SMD(SLIP-3)-08
##	196	SMD(TWT)-08
##	197	RS(3)-13
##	198	RCD(1)-16
##	199	RCD(2)-16

ENVIRONMENTAL ISSUES

	200	STORMWATER POLLUTION PREVENTION PLAN (SW3P)
	201	ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS
	202-215	EROSION CONTROL LAYOUTS

ENVIRONMENTAL ISSUES STANDARDS

>>	216	EC(1)-16
>>	217	EC(2)-16

RAILROAD

	218	RAILROAD SCOPE OF WORK
	219-220	RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECT
	221	RAILROAD EXHIBIT A PROJECT LAYOUT
	222	RAILROAD EXHIBIT A CULVERT LAYOUT

>> THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY SUPERVISION AND ARE APPLICABLE TO THIS PROJECT.

Megan E. Houtchens — P.E. — 10/18/2021

MEGAN E. HOUTCHENS — DATE

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL, INC.
TBPE FIRM REG. F-2742

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE HAVE BEEN SELECTED BY ME OR UNDER MY SUPERVISION AND ARE APPLICABLE TO THIS PROJECT.

Ross DeBord — P.E. — 10/18/2021

ROSS C. DEBORD — DATE

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

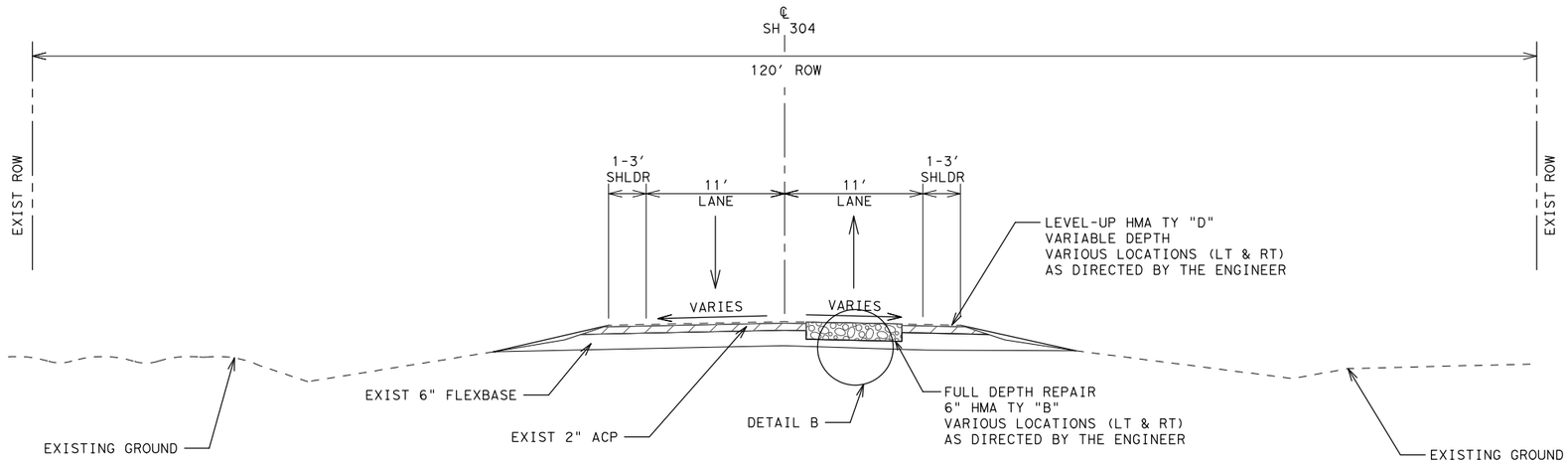
PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304
INDEX OF SHEETS

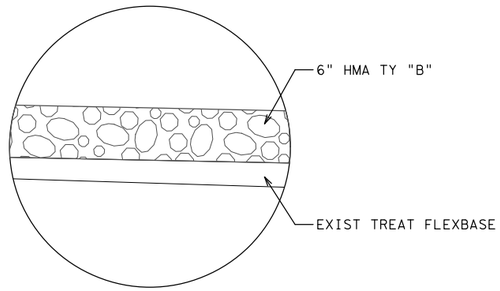
© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	BASTROP		2

DATE: 10/18/2021 11:41:34 AM
FILE: R:\1002700-100299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\1. GENERAL\SH304_GEN_INDEX_01.dgn



EXISTING ROADWAY SECTION

STA 759+31.60 TO STA 1083+00.00



DETAIL B

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

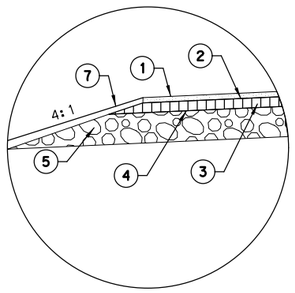
Texas Department of Transportation

SH 304
EXISTING TYPICAL SECTIONS

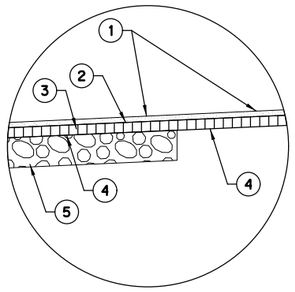
NOT TO SCALE SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		3

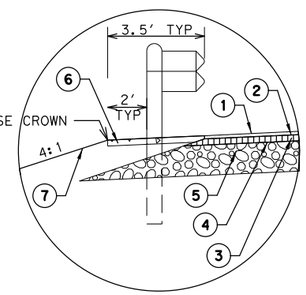
DATE: 10/14/2021 1:12:42 PM
FILE: R:\1002700-100329\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\1. GENERAL\SH304_GEN_TYP_EX_01.dgn



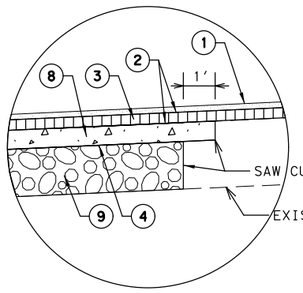
DETAIL A



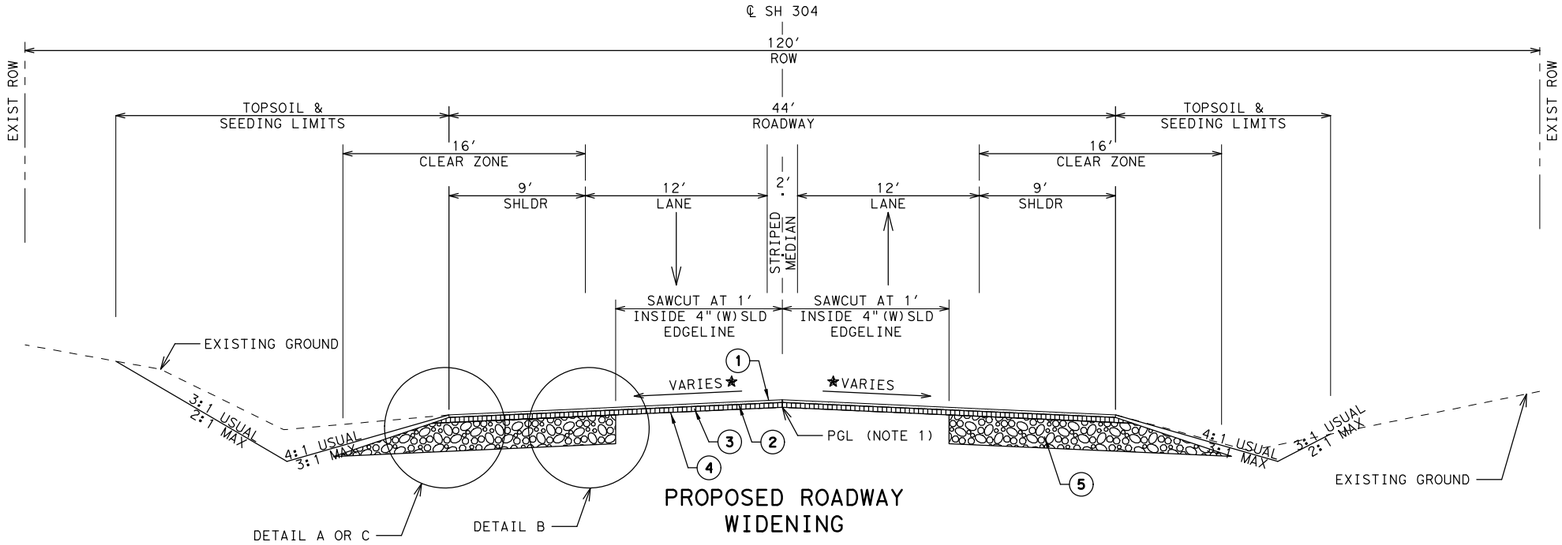
DETAIL B



DETAIL C

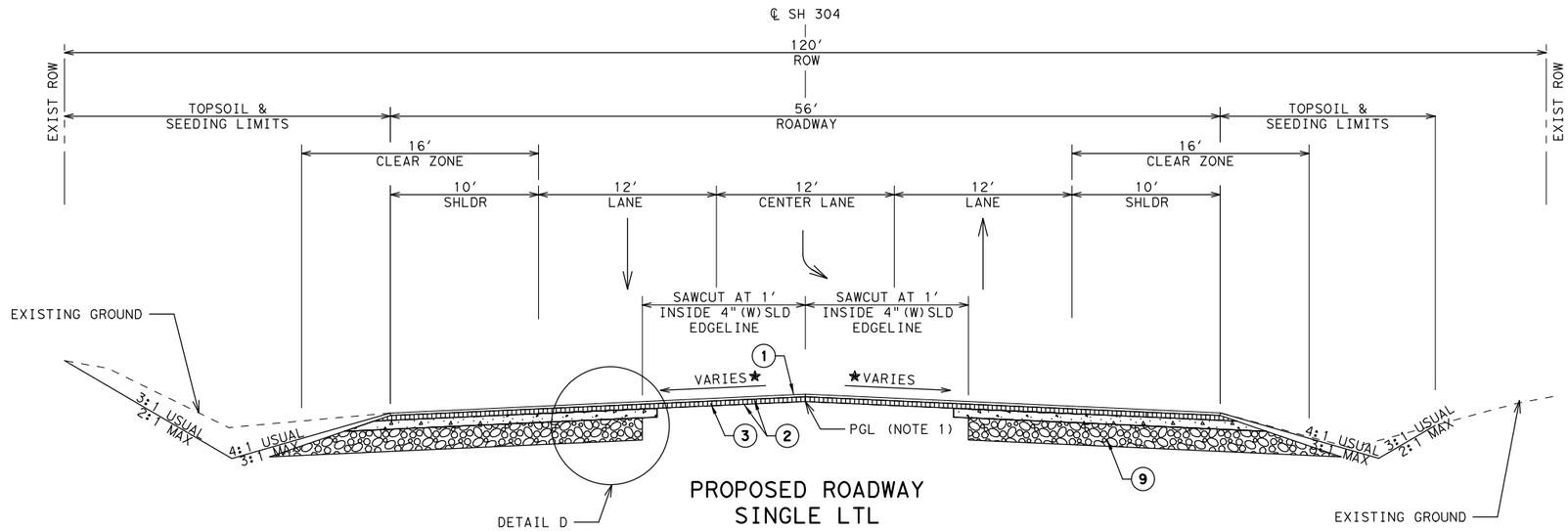


DETAIL D



PROPOSED ROADWAY
WIDENING

STA 768+70.35 TO STA 772+60.35
STA 774+87.65 TO STA 968+50.00
STA 978+50.00 TO 1083+00.00



PROPOSED ROADWAY
SINGLE LTL

STA 759+31.60 TO STA 768+70.35

★ MATCH EXISTING ROADWAY CROSS SLOPES FOR SHOULDER WIDENING

NOTES

1. PROPOSED PGL IS LOCATED AT TOP OF EXIST PAVEMENT AT CENTERLINE.
2. CONTRACTOR TO AVOID SAW CUTS ALONG WHEELPATHS.
3. THE PROFILE DATA IS A GUIDE AND FOR DESIGN VERIFICATION PURPOSES ONLY. CONSTRUCT THE PAVEMENT IN ACCORDANCE WITH THE TYPICAL SECTION.
4. THE HORIZONTAL DATA IS A GUIDE AND FOR DESIGN VERIFICATION PURPOSES ONLY. CONSTRUCT THE PAVEMENT IN ACCORDANCE WITH THE TYPICAL SECTION.

LEGEND

1. 1" TOM SAC B PG 76-22
2. BONDING COURSE (3084 6001)
3. 1.5" D-GR HMA TYPE D PG 76-22
4. INVERTED PRIME (316 6029 & 316 6467)
5. 12" FLEX BASE TYPE A GR-5
6. CONCRETE RIPRAP MOWSTRIP
7. TOPSOIL AND SEEDING AREA
8. 3" D-GR HMA TYPE B PG 64-22
9. 8" FLEX BASE TYPE A GR-5

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

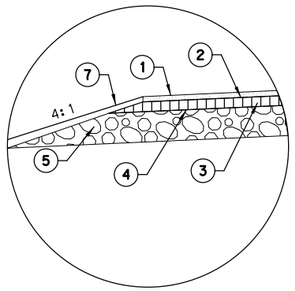
SH 304
PROPOSED TYPICAL SECTIONS

NOT TO SCALE — SHEET 1 OF 3

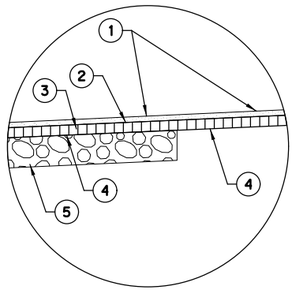
CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		4

DS: CK: DW: CK:

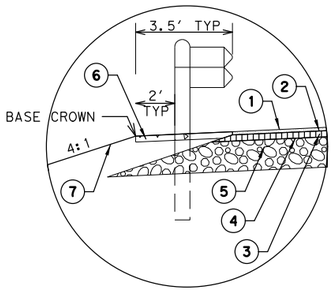
DATE: 10/14/2021 1:12:43 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\1. GENERAL\SH304_GEN_TYP_PR_01.dgn



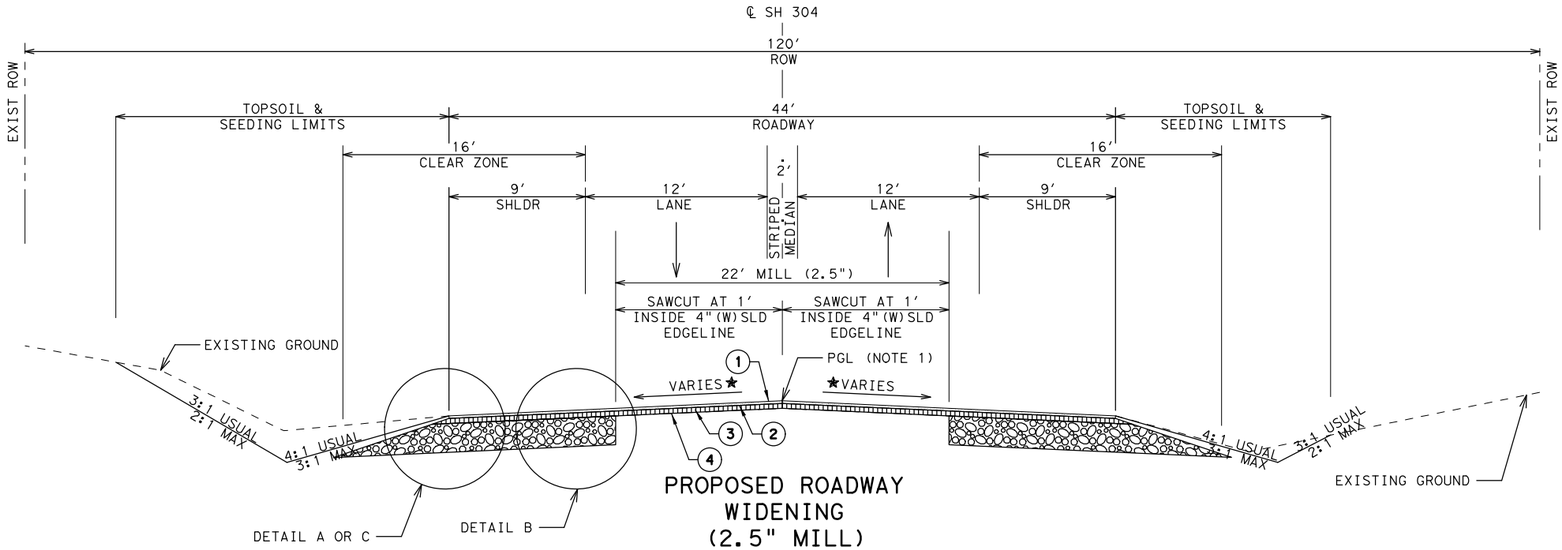
DETAIL A



DETAIL B

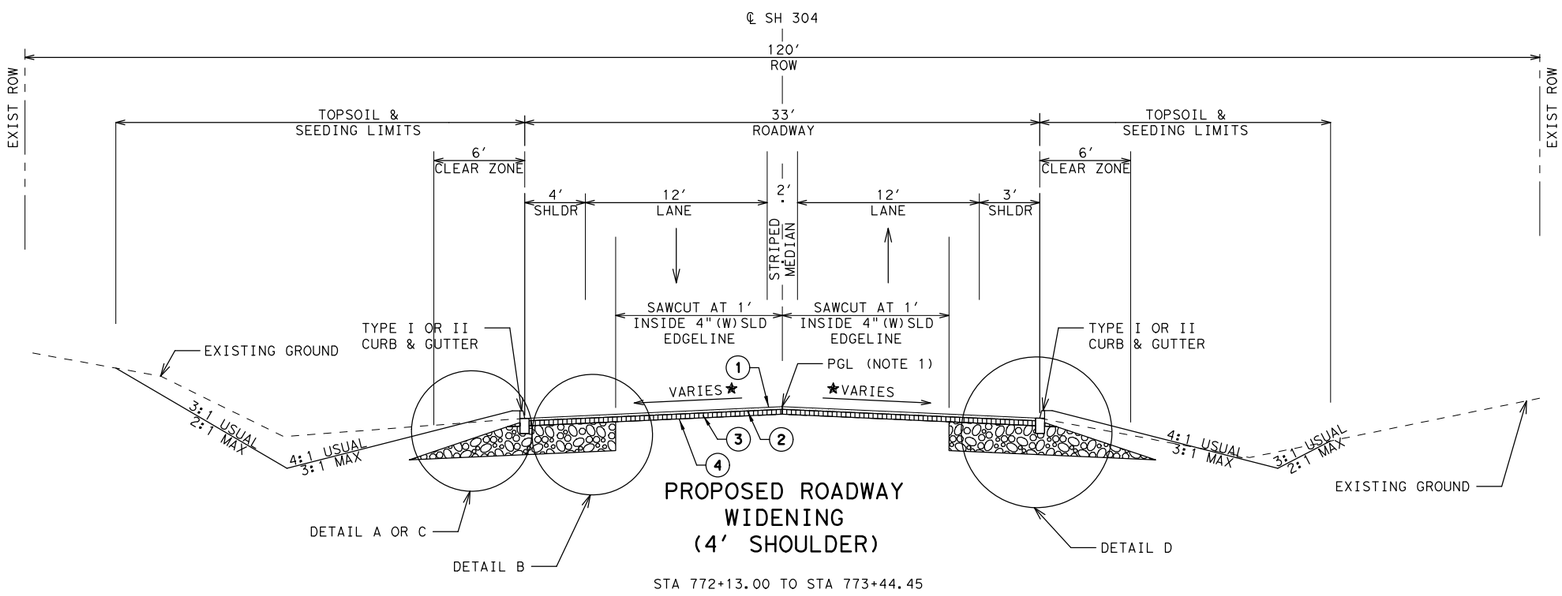


DETAIL C



PROPOSED ROADWAY WIDENING (2.5" MILL)

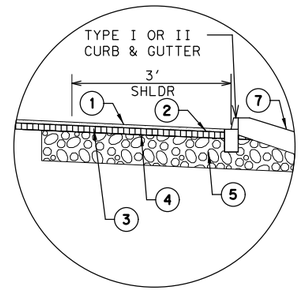
STA 763+50.00 TO STA 764+50.00
STA 968+50.00 TO STA 978+50.00
STA 1082+00.00 TO STA 1083+00.00



PROPOSED ROADWAY WIDENING (4' SHOULDER)

STA 772+13.00 TO STA 773+44.45

★ MATCH EXISTING ROADWAY CROSS SLOPES FOR SHOULDER WIDENING



DETAIL D

NOTES

1. PROPOSED PGL IS LOCATED AT TOP OF EXIST PAVEMENT AT CENTERLINE.
2. CONTRACTOR TO AVOID SAW CUTS ALONG WHEELPATHS.
3. THE PROFILE DATA IS A GUIDE AND FOR DESIGN VERIFICATION PURPOSES ONLY. CONSTRUCT THE PAVEMENT IN ACCORDANCE WITH THE TYPICAL SECTION.
4. THE HORIZONTAL DATA IS A GUIDE AND FOR DESIGN VERIFICATION PURPOSES ONLY. CONSTRUCT THE PAVEMENT IN ACCORDANCE WITH THE TYPICAL SECTION.

LEGEND

1. 1" TOM SAC B PG 76-22
2. BONDING COURSE (3084 6001)
3. 1.5" D-GR HMA TYPE D PG 76-22
4. INVERTED PRIME (316 6029 & 316 6467)
5. 12" FLEX BASE TYPE A GR-5
6. CONCRETE RIPRAP MOWSTRIP
7. TOPSOIL AND SEEDING AREA

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

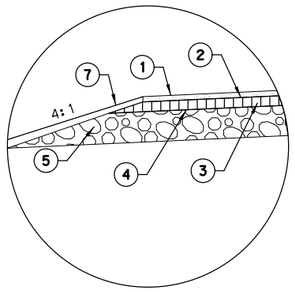
Texas Department of Transportation

SH 304
PROPOSED TYPICAL SECTIONS

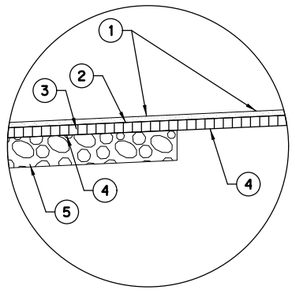
NOT TO SCALE SHEET 2 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		5

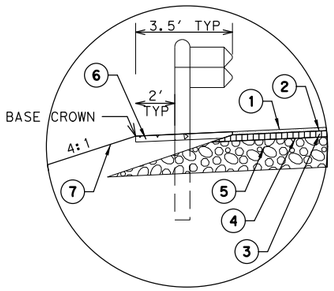
DATE: 10/14/2021 1:12:45 PM
FILE: R:\1002700-100329\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\1. GENERAL\SH304_GEN_TYP_PR_02.dgn



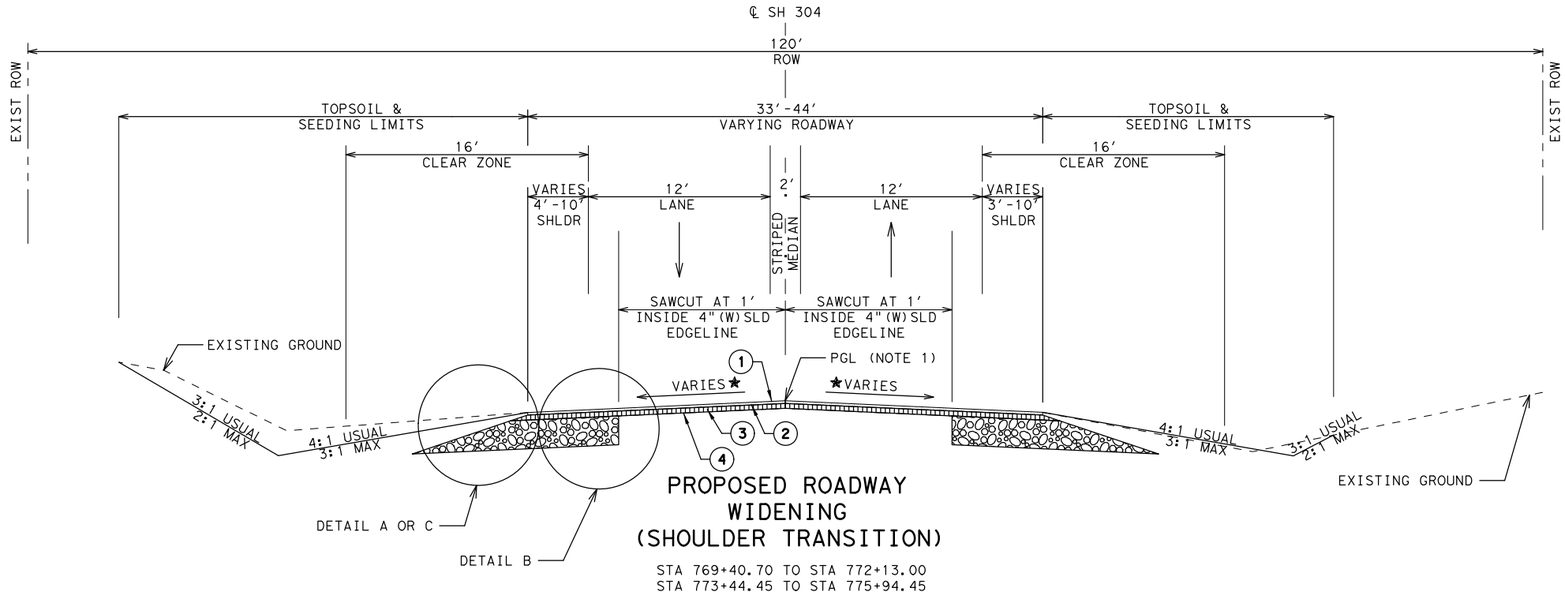
DETAIL A



DETAIL B



DETAIL C



PROPOSED ROADWAY WIDENING (SHOULDER TRANSITION)

STA 769+40.70 TO STA 772+13.00
STA 773+44.45 TO STA 775+94.45

NOTES

1. PROPOSED PGL IS LOCATED AT TOP OF EXIST PAVEMENT AT CENTERLINE.
2. CONTRACTOR TO AVOID SAW CUTS ALONG WHEELPATHS.
3. THE PROFILE DATA IS A GUIDE AND FOR DESIGN VERIFICATION PURPOSES ONLY. CONSTRUCT THE PAVEMENT IN ACCORDANCE WITH THE TYPICAL SECTION.
4. THE HORIZONTAL DATA IS A GUIDE AND FOR DESIGN VERIFICATION PURPOSES ONLY. CONSTRUCT THE PAVEMENT IN ACCORDANCE WITH THE TYPICAL SECTION.

LEGEND

(1) 1" TOM SAC B PG 76-22
(2) BONDING COURSE (3084 6001)
(3) 1.5" D-GR HMA TYPE D PG 76-22
(4) INVERTED PRIME (316 6029 & 316 6467)
(5) 12" FLEX BASE TYPE A GR-5
(6) CONCRETE RIPRAP MOWSTRIP
(7) TOPSOIL AND SEEDING AREA

★ MATCH EXISTING ROADWAY CROSS SLOPES FOR SHOULDER WIDENING

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304 PROPOSED TYPICAL SECTIONS

NOT TO SCALE — SHEET 3 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		5A

DATE: 10/14/2021 1:12:46 PM
FILE: R:\1002700-100329\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\1. GENERAL\SH304_GEN_TYP_PR_03.dgn

GENERAL NOTES: Version: September 22, 2021

Item	Description	**Rate
247	**Flexible Base (CMP IN PLC)**	132 LB/CF
316	**Underseals Asphalts (Multi Option)**	0.20 GAL/SY
	Surface Treatments	
	Seal Coat	
	Grade 4	
	Asphalt	0.38 GAL/SY
	Aggregate	1 CY/120 SY
	Grade 5	
	Asphalt	0.32 GAL/SY
	Aggregate	1 CY/150 SY
	Two Course Surface Treatment	
	Asphalt 1st Application	0.28 GAL/SY
	Asphalt 2nd Application	0.24 GAL/SY
	Aggregate 1st Application Grade 4	1 CY/110 SY
	Aggregate 2nd Application Grade 4	1 CY/130 SY
340/3078,341/3076, 344/3077	**Dense-Graded Hot-Mix Asphalt and Superpave**	110 LB/SY/IN
3084	**Bonding Course**	0.09 GAL/SY

** For Informational Purposes Only

GENERAL
Contractor questions on this project are to be addressed to the following individual(s):
Bastrop Area Diana.Schulze@txdot.gov
Bastrop Area Tanli.Sun@txdot.gov

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%20Responses/

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.

References to manufacturer's trade name or catalog numbers are for the purpose of identification only. Similar materials from other manufacturers are permitted if they are of equal quality, comply with the specifications for this project, and are approved.

County: Bastrop
Highway: SH 304

Sheet: 6
Control: 0573-01-034

If work is performed at Contractor's option, when inclement weather is impending, and the work is damaged by subsequent precipitation, the Contractor is responsible for all costs associated with replacing the work, if required.

The roadbed will be free of organic material prior to placing any section of the pavement structure.
Contact the supervisor for the passenger facility at Capital Metro and request the relocation of Capital Metro signs. Contact the supervisor at (512) 385-0190.

Equip all construction equipment used in roadway work with highly visible omnidirectional flashing warning lights.

Provide a smooth, clean sawcut along the existing asphalt or concrete pavement structure, as directed. Consider subsidiary to the pertinent Items.

Construct all manholes/valves to final pavement elevations prior to the placement of final surface. If the manholes/valves are going to be exposed to traffic, place temporary asphalt around the manhole/valve to provide a 50:1 taper. The asphalt taper is subsidiary to the ACP work.

Supply litter barrels in enough numbers at locations as directed to control litter within the project. Consider subsidiary to pertinent Items.

Use a self-contained vacuum broom to sweep the roadway and keep it free of sediment as directed. The contractor will be responsible for any sweeping above and beyond the normal maintenance required to keep fugitive sediment off the roadway as directed by the Engineer.

Damage to existing pipes and SET's due to Contractor operations will be repaired at Contractor's expense.

All locations used for storing construction equipment, materials, and stockpiles of any type, within the right of way, will be as directed. Use of right of way for these purposes will be restricted to those locations where driver sight distance to businesses and side street intersections is not obstructed and at other locations where an unsightly appearance will not exist. The Contractor will not have exclusive use of right of way but will cooperate in the use of the right of way with the city/county and various public utility companies as required.

Coordinate and obtain approval for all bridgework over existing roadways.

ITEM 5 – CONTROL OF THE WORK
Place construction stakes at intervals of no more than 100 ft. This work is subsidiary.

Precast Alternate Proposals.

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.

Electronic Shop Drawing Submittals.
Submit electronic shop drawing submittals according to the current Guide to Electronic Shop Drawing Submittal https://www.txdot.gov/business/resources/specifications/shop-drawings.html (TxDOT.gov Business > Resources - General > Shop Drawings). Pre-approved producers can be found online at TxDOT.gov > Business > Resources - Material Producer List. Use the following contact list for all submittals that are not required to be sent to Bridge Division and to copy the Engineer for all submittals to the Bridge Division.
Submittal Contact List
Bastrop Area Diana.Schulze@txdot.gov AUS_BA-ShopReview@txdot.gov

Alignment and Profile.
Unless shown in the plans, profile and alignment data for roadways being overlaid or widened are for design verification only. Provide survey and construct the roadway in accordance with the typical section. Bid items and data may be provided to adjust cross slope and super elevations.

ITEM 6 - CONTROL OF MATERIALS
Give a minimum of 1 business day notice for materials, which require inspection at the Plant.

For removal, tie, or tap of asbestos concrete (AC) pipe, contact TxDOT and the local utility company 60 days prior to performing the work. Expose the AC pipe to provide a minimum of 1 ft. of clearance around the top and sides. A minimal amount of soil may remain around the AC pipe to avoid disturbance. The local utility company will be responsible for the demo notice to DSHS and removal of the AC pipe. Tie or tap into existing AC pipe may require removing an entire section of pipe from collar to collar and replacement of pipe with new pipe using existing bid items.

ITEM 7 – LEGAL RELATIONS AND RESPONSIBILITIES
Roadway closures during key dates and/or special events are prohibited. See notes for Item 502 for the key dates and/or special events.

Refer to the Environmental Permits, Issues and Commitments (EPIC) plan sheets for additional requirements and permits.

When any abandoned well is encountered, cease construction operations in this area and notify the Engineer who will coordinate the proper plugging procedures. A water well driller licensed in the State of Texas must be used to plug a well.

Perform maintenance of vehicles or equipment at designated maintenance sites. Keep a spill kit on-site during fueling and maintenance. This work is subsidiary.

Maintain positive drainage for permanent and temporary work for the duration of the project. Be responsible for any items associated with the temporary or interim drainage and all related maintenance. This work is subsidiary.

Suspend all activities near any significant recharge features, such as sinkholes, caves, or any other subterranean openings that are discovered during construction or core sampling. Do not proceed until the designated Geologist or TCEQ representative is present to evaluate and approve remedial action.
Locate aboveground storage tanks kept on-site for construction purposes in a contained area as to not allow any exposure to soils. The containment will be sized to capture 150% of the total capacity of the storage tanks.

Work within a USACE Jurisdictional Area.
Do not initiate activities within a U.S. Army Corps of Engineers (USACE) jurisdictional area that have not been previously evaluated by the USACE as part of the permit review of this project. Such activities include, but are not limited to, haul roads, equipment staging areas, borrow and disposal sites. Obtain written approval from the Engineer for activities not specifically addressed in the plans. Provide a signed sketch and description of the location 60 business days prior to begin work at the location. Complete and return any forms provided by TxDOT. Approval of the work is not guaranteed. Un approved work is not a compensable impact.

Work over or near Bodies of Water (lakes, rivers, ponds, creeks, dry waterways, etc.).
Keep on site a universal spill kit adequate for the body of water and the work being performed. Debris is not allowed to fall into the ordinary high-water level (OHWL). Debris that falls into the OHWL must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event. Install and maintain traffic control devices to maintain a navigable corridor for water traffic, except during bridge demo and beam placement. This work is subsidiary.

Obtain written approval from the Engineer for temporary fill or crossings not specifically addressed in the plans. Provide a signed sketch of the location 60 business days prior to begin work at the location. Complete and return any forms provided by TxDOT. Approval of the work is not guaranteed. Unapproved work is not a compensable impact.

DSHS Asbestos and Demolition Notification.
Complete and provide the Texas Department of State Health Services (DSHS) notification form to the Engineer and email to AUS_BRG_Notify@txdot.gov at least 30 calendar days prior to bridge removal or renovation for each phase or step of work. Notify the Engineer via email of any changes to the work start and end dates.

Migratory Birds and Bats.

Migratory birds and bats may be nesting within the project limits and concentrated on roadway structures such as bridges and culverts. Remove all old and unoccupied migratory bird nests from any structures, trees, etc. between September 16 and February 28. Prevent migratory birds from re-nesting between March 1 and September 15. Prevention shall include all areas within 25 ft. of proposed work. All methods used for the removal of old nesting areas and the prevention of re-nesting must be submitted to TxDOT 30 business days prior to begin work. This work is subsidiary.

If active nests are encountered on-site during construction, all construction activity within 25 ft. of the nest must stop. Contact the Engineer to determine how to proceed.

Tree and Brush Trimming and Removal.
Work will be conducted September 16 thru February 28. Work conducted outside this timeframe will require a bird survey. Submit a survey request to TxDOT 30 business days prior to begin work.

No extension of time or compensation will be granted for a delay or suspension due to the above bird, bat and tree/brush requirements.

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

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

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

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

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

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

ITEM 8 – PROSECUTION AND PROGRESS
Electronic versions of schedules will be saved in Primavera P6 format.

Working days will be charged in accordance with 8.3.1.4, "Standard Workweek."

A CPM schedule in Primavera format and a PSSR is required. Use software fully compatible with Primavera P6

ITEM 100 - PREPARING RIGHT OF WAY
Prep ROW must not begin until accessible trees designated for preservation have been protected, items listed in the EPIC have been addressed, and SW3P controls installed in accessible areas.

Backfill material will be Type B Embankment using ordinary compaction.

Unless shown otherwise in the plans or a designated non-mow area, perform trimming or removal for areas within 30 ft. of edge of pavement under construction. 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 14 ft. vertical clearance under all trees. This work is subsidiary.

ITEM 105 – REMOVING TREATED AND UNTREATED BASE AND ASPHALT PAVEMENT
Existing typical is based on information available. This typical may not account for all maintenance work such as overlays or pavement repairs. A change in material type or thickness does not warrant additional payment. Payment is full compensation for removing all material to the depth specified.

ITEM 110 – EXCAVATION
The Engineer will define unsuitable material.

ITEM 132 – ALL EMBANKMENT
The Engineer will define unsuitable material. Material which the Contractor might deem to be unsuitable due to moisture content will not be considered unsuitable material.

Prior to begin embankment of existing area, correct or replace unstable material to a depth of 6 in. below existing grade. Embankment areas will be inspected prior to beginning work.

Rock or broken concrete produced by the project is allowed in earth embankments. The size of the rock or broken concrete will not exceed the layer thickness requirements in Section 132.3.4., "Compaction Methods." The material will not be placed vertically within 5 ft. of the finished subgrade elevation.

Embankment placed vertically within 5 ft. of the finished subgrade elevation or within the edges of the subgrade and treated with lime, cement, or other calcium based additives must have a sulfate content less than 3000 ppm. Allow 5 business days for testing. Treatment of sulfate material 3000 ppm to 7000 ppm requires 7 days of mellowing and continuous water curing, in accordance TxDOT guidelines for Treatment of Sulfate-Rich Soils and Bases in Pavement Structures (9/2005). Material over 7000 ppm is not allowed.

ITEM 160 - TOPSOIL
Off-site topsoil will have a minimum PI of 25.

No Sandy Loam allowed.

Obtain approval of the actual depth of the topsoil sources for both on-site and off-site sources.
Construct topsoil stockpiles of no more than five (5) feet in height.

It is permissible to use topsoil dikes for erosion control berms within the right of way, as directed.
Seed or track slopes within 14 days of placement.

Salvage topsoil from sites of excavation and embankment. Maximum salvage depth is 6 inches.

Windrowing of topsoil obtained from the Right of Way (ROW) is not allowed.

ITEM 168 – VEGETATIVE WATERING
Water all areas of project to be seeded or sodded.

Maintain the seedbed in a condition favorable for the growth of grass. Watering can be postponed immediately after a rainfall on the site of ½ inch or greater, but will be resumed before the soil dries out. Continue watering until final acceptance.

Vegetative watering rates and quantities are based on ¼ inch of watering per week over a 3-month watering cycle. The actual rates used and paid for will be as directed and will be based on prevailing weather conditions to maintain the seedbed.

Obtain water at a source that is metered (furnish a current certification of the meter being used) or furnish the manufacturer's specifications showing the tank capacity for each truck used. Notify the Engineer, each day that watering takes place, before watering, so that meter readings or truck counts can be verified.

ITEM 169 – SOIL RETENTION BLANKETS
Type A blankets containing straw fibers are not allowed. Type B and D blankets shall be a spray type blanket.

ITEM 247 - FLEXIBLE BASE
The layer thickness will be 4 in. to 6 in. unless shown on the plans. Placing in a single layer is allowed when total thickness of base is 8 in. or less. When placed in multiple layers, compact the bottom and middle layers to at least 95% and 98% of the maximum dry density, respectively. When placed in a single layer or the final layer, compact to at least 100%.

Correction of subgrade soft spots is subsidiary.

Complete per plans the subgrade, ditches, slopes, and drainage structures prior to the placement of base.

Do not use a vibratory roller to compact base placed directly on top of a drainage structure.

ITEM 300s – SURFACE COURSES AND PAVEMENTS
Asphalt season is May 1 thru September 15. Emulsified Asphalt season is April 1 thru October 15. The latest work start date for asphalt season is August 1.

If an under seal is not provided, furnish a tack coat. Apply tack coat at 0.08 GAL/SY (residual). Apply non-tracking tack coat using manufacturer recommend rates.

ITEM 316 – SEAL COAT
Ensure that all underseals are covered by HMACP before exposing to traffic for roadways listed in Table 1 of Item 502 or ADT greater than 5,000.

Aggregates (Multi Option) for seal coats not exposed to traffic and underseals shall be Type E, PA, PB, A or B. The Grade shall range between 4 and 5.

Use a medium pneumatic roller in accordance with Item 210.

Surface all transitions, tapers, climbing lanes and intersections to the limits as directed.

Remove and dispose of off the ROW the audible/profile markings, reflectorized markings, and raised markers. Blade pavement edges to remove vegetation. Any areas with excessive asphalt or aggregate will be removed. Continue sweeping excess aggregate off the roadway, riprap, and shoulder up to two weeks after completing the work. This work is subsidiary.

ITEM 340/3078 & 341/3076 - DENSE-GRADED HOT-MIX ASPHALT
Use the SGC for design and production testing of all mixtures. Design all Dense-Graded Type D mixtures as a surface mix, maximum 15% RAP and no RAS.
When using substitute binders, mold specimens for mix design and production at the temperature required for the substitute binder used to produce the HMA.
The Hamburg Wheel minimum number of passes for PG 64 or lower is reduced to 7,000. The Engineer may accept Hamburg Wheel test results for production and placement if no more than 1 of the 5 most recent tests is below the specified number of passes and the failing test is no more than 2,000 passes below the specified number of passes.

ITEMS 347/3081- THIN OVERLAY MIXTURES (TOM)
For SAC A, blending SAC B aggregate with an RSSM greater than the SAC A rating or 10, whichever is greater, is prohibited.

When using a Thermal Imaging System follow the Weather Condition requirements for When Not Using a Thermal Imaging System.

Produce mixture with a Department approved WMA additive or process to facilitate compaction when the haul distance is greater than 40 miles or when the air temperature is 70°F and falling. WMA processes such as water or foaming processes are not allowed under these circumstances.

ITEM 351 – FLEXIBLE PAVEMENT STRUCTURE REPAIR
Use materials and lift thickness per SS3076. Place Type C and D mixes with a paver. Type B mixes may use a blade to place the mix. Type C and D mixes will receive an underseal per SS 3085 if the repair surface is the final surface. This work is subsidiary.

Unless otherwise shown on the plans, use the following for repairs:
For up to 2 in. deep repairs use Type D PG 76-22 SAC B.
For up to 6 in. deep repairs use Type C PG 76-22 SAC B.
For greater than 6 in. deep repairs use 2 in. Type C or D PG76-22 surface and Type B 64-22 for the bottom lifts. The final 2 lifts must be machine laid regardless of mix type.
For greater than 6 in. deep repairs that will be milled then overlaid use Type C or D PG 76-22 to a depth 1.5 in. below the bottom of the milling.

ITEM 400 - EXCAVATION AND BACKFILL FOR STRUCTURES
Unless shown on the plans, the following backfill will apply to cutting and restoring flexible pavement. Backfill with cement-stabilized backfill. The cement-stabilized backfill is subsidiary. Cap the backfill with Type B hot-mix to a depth equal to the adjacent hot-mix. At locations where the backfill surface is final, place 1-1/2 in. Type D for the surface. The minimum hot-mix depth will be 4 in.

Saw-cut the pavement at the edge of the excavation. This work is subsidiary.

Backfill the bridge ends in accordance with the limits shown on TxDOT "CSAB" Standard. Use material in accordance with "CSAB" or Item 423, Type BS. The "CSAB" optional bond breaker materials are allowed. This work is subsidiary.

ITEM 432 - RIPRAP
Mow strip riprap will be 4 in. and all other riprap will be 5 in. unless otherwise shown on the plans or in the pay items. Mow strip for cable barrier may be placed monolithically with the barrier foundations if using concrete in accordance with Item 543. Fiber reinforcement is not allowed except in mow strip for cable barrier if foundation and mow strip are placed monolithically.

Saw-cut existing riprap then epoxy 12 in. long No. 3 or No. 4 bars 6 in. deep at a maximum spacing of 18 in. in each direction to tie new riprap to existing riprap. This work is subsidiary.
For cement-stabilized riprap, provide Type A Grade 5 flexible base. Compressive strengths for Item 247 are waived.

SGT approach taper, paid using mow strip item, shall be installed using concrete, flexible base coated with SS-1 at a rate of 0.12 GAL/SY, or HMA Type B/C/D. Placement shall be ordinary compaction and does not require placement using an asphalt paver.

ITEM 462 - CONCRETE BOX CULVERTS AND DRAINS

ITEM 466 - HEADWALLS AND WINGWALLS
Remove all loose formwork and materials from the waterway at the end of each work week or prior to a rain event. Debris that falls into the waterway must be removed at the end of each work day. Upon completion of the structure, stencil the National Bridge Inventory (NBI) number (structure number) using black paint and 4 in. tall numbers at 4 locations designated by TxDOT. This work is subsidiary.

ITEM 467 - SAFETY END TREATMENT
Field adjust pipe end to maintain the necessary slope. Field cutting of pipe end is allowed. Coat all metal field cuts or exposed reinforcement with asphalt paint.

ITEM 496 - REMOVING STRUCTURES
Submit a demolition plan to the Engineer. Have the plan signed and sealed by a licensed professional engineer when the structure will continue to accommodate traffic after removal has begun and the removal impacts any part of the structure below the deck or riding surface. If applicable, the plan must detail requirements for meeting the U.S. Army Corps of Engineers' Section 404 Permit. The demolition plan must detail handling of roadway and waterway traffic. Waterway traffic must be maintained at all times unless a closure is approved by the Engineer.

No debris is allowed to fall into a body of water. Debris that falls into the water must be removed at the end of each work day. Debris that falls into the floodway must be removed at the end of each work week or prior to a rain event.

ITEM 502 - BARRICADES, SIGNS, AND TRAFFIC HANDLING

Table 1
Table 2

Roadway	Limits	Allowable Closure Time
SH 304	From FM 535 to 6.03 Miles South of FM 535	30 min after dawn to 30 min before dusk

For roadways without defined allowable closure times, nighttime lane closures will be allowed from 7 P to 6 A. Unless stated, daytime or Friday night lane closures will not be allowed and one lane in each direction will remain open at all times for all roadways.

To account for directional traffic volumes, begin and end times of closures may be shifted equally by the Engineer. The closure duration will remain. Added compensation is not allowed.

Submit an emailed request for a lane closure (LCN) to TxDOT. The email will be submitted in the format provided. Receive concurrence prior to implementation. Submit a cancellation of

lane closures a minimum of 18 hours prior to implementation. Blanket requests for extended periods are not allowed. Max duration of a request is 2 weeks prior to requiring resubmittal.

Provide 2 hour notice prior to implementation and immediately upon removal of the closure.

For roadways listed in Table 1: Submit the request 96 hours prior to implementation.

For roadways not listed in Table 1: Submit the request a minimum of 48 hours prior to the closure and by the following deadline immediately prior to the closure: 11A on Tuesday or 11A on Friday. For all roadways: Submit request for traffic detours and full roadway closures 168 hours prior to implementation. Submit request for nighttime work 96 hours to implementation date.

Cancellations of accepted closures (not applicable to full closures or detours) due to weather will not require resubmission in accordance with the above restrictions if the work is completed during the next allowable closure time.

Closures that conflict with adjacent contractor will be prioritized according to critical path work per latest schedule. Conflicting critical path or non-critical work will be approved for first LCN submitted. Denial of a closure due to prioritization or other reasons will not be reason for time suspension, delay, overhead, etc.

Cover, relocate or remove existing signs that conflict with traffic control. Install all permanent signs, delineation, and object markers required for the operation of the roadway before opening to traffic. Use of temporary mounts is allowed or may be required until the permanent mounts are installed or not impacted by construction. Maintain the temporary mounts. This work is subsidiary.

Meet with the Engineer prior to lane closures to ensure that sufficient equipment, materials, devices, and workers will be used. Take immediate action to modify traffic control, if at any time the queue becomes greater than 20 minutes. Have a contingency plan of how modification will occur. Consider inclement weather prior to implementing the lane closures. Do not set up traffic control when the pavement is wet.

Place a 28-inch cone, meeting requirements of BC (10), on top of foundations that have protruding studs. This work is subsidiary.
Edge condition treatment types must be in accordance with the TxDOT standard. Installation and removal of a safety slope is subsidiary.

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.

ITEM 506 - TEMPORARY EROSION, SEDIMENTATION, AND ENV CONTROLS
If SW3P plan sheets are not provided, place the control measures as directed.

Install, maintain, remove control measures in areas of the right of way utilized by the Contractor that are outside the limits of disturbance required for construction. Permanently stabilize the area. This work is subsidiary.

Erosion control measures must be initiated immediately in areas where construction activities have ceased and will not resume for a period exceeding 14 calendar days. Vertical track all exposed soil, stockpiles, and slopes. Re-track after each rain event or every 14 days, whichever occurs first. Sheep foot roller is allowed for vertical tracking. This work is subsidiary.

Unless a specific pay item is provided in the plans, the installation of the 6:1 or flatter for RFD side slopes in the safety zone will be subsidiary to pertinent bid items.

ITEM 530 – INTERSECTIONS, DRIVEWAYS, AND TURNOUTS
Notify property owners a minimum of 48 hr. in advance of beginning work on their driveway. Provide a list of each notification and contact prior to each closure. Only close driveways for reconstruction if duration and alternate access are approved. Install and maintain material across a work zone as temporary access. Temporary access must not have grade breaks that exceed 8%. This work is subsidiary.

Grade breaks must not exceed 8%. Sidewalk crossing slope will be 1.5% and 5 ft. wide with width reduction in approved locations.

For ACP or SURF TREAT, the pavement structure will match the adjacent roadway unless detailed on the plans. HMA, including surface, may use a maximum allowable amount of 40% RAP and 5% RAS for private driveways, public driveways for 2-lane roadways or smaller, and turnouts. Blending of 2 or more sources is allowed. Furnish base meeting the requirement for any type or grade in accordance with Item 247. Compressive strengths for flexible base are waived. Base must be placed using ordinary compaction.

For CONC, the pavement structure will be 6 in. thick and have 3 in. base bedding unless detailed on the plans. Furnish base meeting ACP or SURF TREAT requirements. Class A concrete is required and may use Coarse Aggregate Grades 1-8. Expansion joints will be placed every 20 ft.

Expansion joints will be constructed as detailed in the latest TxDOT Concrete Curb and Curb and Gutter Standard. Reinforcement will be in accordance with concrete riprap for Item 432.3.1., unless specified on the plans.

ITEM 533 – MILLED RUMBLE STRIPS
If surface is a seal coat, rumble strips shall be installed prior to placing the seal coat.

ITEM 540, 542, & 544 - METAL BEAM GUARD FENCE AND GUARDRAIL END TREATMENTS

Furnish round timber posts for guard fence. Steel posts for low fill culverts are subsidiary. Stake the locations for approval prior to installation. Adjust the limits of the fence to meet field conditions. Install delineators before opening the road to traffic.

Retain all materials. Contractor may reuse all existing materials that are structurally sound and dent free. All reused material shall be from this project and in compliance with current standards. Structurally sound rust spots with the largest dimension of 4 in. may be cleaned and repaired in accordance with 540.3.5. Contractor may punch or field drill holes in the metal rail element to accommodate post spacing. Additional holes for splice or connections are not allowed. The holes shall be spaced in accordance with the latest standard and shall not be closer than the minimum spacing shown on the current standard.

Remove, replace, and install mow strip block out material. Construct new block outs and backfill unused block outs with class B concrete. This work is subsidiary.

Repair of mow strip damage, not caused by contractor negligence, and installation of new mow strip will be paid with appropriate bid items. Backfill and shoulder up of area around fence and mow strip will be paid using embankment item.

ITEM 644 – SMALL ROADSIDE SIGN ASSEMBLIES
Triangular slip base that use set screws to secure the post will require 1 of the set screws to penetrate the post by drilling a hole in the post at the location of the screw. All set screws shall be treated with anti-seize compound.

ITEM 658 – DELINEATOR AND OBJECT MARKER ASSEMBLIES
Installation and maintenance of portable CTB reflectors will be subsidiary to the barrier.

ITEM 662 - WORK ZONE PAVEMENT MARKINGS
Notify the Engineer at least 24 hours in advance of work for this item.

Maintain removable and short-term markings daily. Remove within 48 hours after permanent striping has been completed.

Item 668 is not allowed for use as Item 662.

ITEM 666 - RETROREFLECTORIZED PAVEMENT MARKINGS
Notify the Engineer at least 24 hr. before beginning work.

Place longitudinal markings nightly for IH 35 main lanes or roadways with AADT greater than 100,000. Use of temporary flexible reflective roadway marker tabs is subsidiary and at the Contractor's option. Replace missing or damaged tabs nightly. If using tabs, place longitudinal markings weekly by 5 AM Friday for all weekday work and by 5 AM Monday for all weekend work. Failure to maintain tabs or place longitudinal markings by deadline will require nightly placement of longitudinal markings.
Place longitudinal markings no later than 7 calendar days after placement of the surface for roadways with AADT greater than 20,000.

When the raised portion of a profile marking is placed as a separate operation from the pavement marking, the raised portion must be placed first then covered with TY I.

When using black shadow to cover existing stripe apply a non-retroreflective angular abrasive bead drop. The marking color shall be adjusted to resemble the pavement color. If Item 677 is not used prior to placement of black shadow, scrape the top of the marking with a blade or large piece of equipment unless surface is a seal coat. The scraping of the marking is subsidiary.

ITEM 3084 – BONDING COURSE
The minimum application rates are listed in Table BC. Miscellaneous Tack is allowed for use with dense-graded Type B HMA. If a tack bid item is not provided, use bonding course item.

The target shear bond strengths are listed in Table BCS. The informational test cores shall be taken once a shift for first 5 lots of placement or a change to placement method of bonding course, bonding material, or hot mix material. The remaining informational test cores shall be taken once every 3 lots for surface mix. Informational tests are not required for non-surface mix beyond the first 5 lots unless there is a change to placement method of bonding course, bonding material, or hot mix material. Results from these informational tests will not be used for specification compliance.

Table BC

Material	Minimum Application Rate (gal. per square yard)
TRAIL – Emulsified Asphalt	0.06
TRAIL – Hot Asphalt	0.12
Spray Applied Underseal Membrane	0.10

Table BCS (For Informational Tests)

Material	Target Shear Bond Strength (Tex-249-F psi)
SMA – Stone-Matrix Asphalt	60.0
PFC – Permeable Friction Course	N/A
All Other Materials	40.0

ITEM 6001 – PORTABLE CHANGEABLE MESSAGE SIGN
Provide 1 PCMS. Provide a replacement within 12 hours. PCMS will be available for traffic control, event notices, roadway conditions, service announcements, etc.

Place PCMS 10 calendar days prior to begin work stating "Road Work Begin Soon, Contact 832-7000 For Info".

Place PCMS at time of LCN request. Place the PCMS at the expected end of queue caused by the closure. When the closure is active, revise the message to reflect the actual condition during the closure, such as “RIGHT LN CLOSED XXX FT”.

ITEM 6185 – TRUCK MOUNTED ATTENUATOR AND TRAILER ATTENUATOR
The TMA/TA used for installation/removal of traffic control for a work area will be subsidiary to the TMA/TA used to perform the work.

The contractor will be responsible for determining if one or more operations will be ongoing at the same time to determine the total number of TMA/TA required for the work. TMA/TAs paid by the day is full compensation for all worksite locations during an entire day.

TMA/TAs used to protect damaged attenuators will be paid by the day using the force account item for the repair.

In addition to the TMA/TA required per the TCP plans and standards, provide 1 additional TMA/TA for the other end of the one-lane closure required to widen pavement.

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0573-01-034 **DISTRICT** Austin **COUNTY** Bastrop
HIGHWAY SH 304

							TOTAL EST.	TOTAL FINAL
			CONTROL SECTION JOB		**0573-01-034**			
			PROJECT ID		**A00061183**			
			COUNTY		**Bastrop**			
			HIGHWAY		**SH 304**			
ALT	**BID CODE**	**DESCRIPTION**		**UNIT**	EST.	FINAL		
	100-6002	PREPARING ROW		STA	325.000		325.000	
	104-6017	REMOVING CONC (DRIVEWAYS)		SY	179.000		179.000	
	105-6045	REMOVING STAB BASE AND ASPH PAV (2"-8")		SY	19,186.000		19,186.000	
	110-6001	EXCAVATION (ROADWAY)		CY	29,620.000		29,620.000	
	132-6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)		CY	18,856.000		18,856.000	
	160-6003	FURNISHING AND PLACING TOPSOIL (4")		SY	137,173.000		137,173.000	
	164-6001	BROADCAST SEED (PERM) (RURAL) (SANDY)		SY	137,173.000		137,173.000	
	164-6009	BROADCAST SEED (TEMP) (WARM)		SY	137,173.000		137,173.000	
	164-6011	BROADCAST SEED (TEMP) (COOL)		SY	137,173.000		137,173.000	
	168-6001	VEGETATIVE WATERING		MG	3,401.000		3,401.000	
	169-6001	SOIL RETENTION BLANKETS (CL 1) (TY A)		SY	137,173.000		137,173.000	
	247-6366	FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS)		CY	32,230.000		32,230.000	
	316-6029	ASPH (RC-250)		GAL	55,955.000		55,955.000	
	316-6467	AGGR (TY-D GR-5)		CY	1,166.000		1,166.000	
	347-6001	TOM (ASPHALT) PG 76-22		TON	571.000		571.000	
	347-6006	TOM - C (AGGREGATE) SAC - B		TON	8,551.000		8,551.000	
	351-6002	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")		SY	7,912.000		7,912.000	
	354-6024	PLANE ASPH CONC PAV(2" TO 4")		SY	1,956.000		1,956.000	
	400-6005	CEM STABIL BKFL		CY	348.000		348.000	
	402-6001	TRENCH EXCAVATION PROTECTION		LF	30.000		30.000	
	403-6001	TEMPORARY SPL SHORING		SF	3,284.000		3,284.000	
	432-6001	RIPRAP (CONC)(4 IN)		CY	43.000		43.000	
	432-6002	RIPRAP (CONC)(5 IN)		CY	54.000		54.000	
	432-6045	RIPRAP (MOW STRIP)(4 IN)		CY	219.000		219.000	
	432-6051	RIPRAP (STONE COMMON)(GROUT)(18 IN)		CY	739.000		739.000	
	462-6053	CONC BOX CULV (5 FT X 5 FT)(EXTEND)		LF	34.000		34.000	
	462-6055	CONC BOX CULV (6 FT X 4 FT)(EXTEND)		LF	95.000		95.000	
	462-6059	CONC BOX CULV (7 FT X 4 FT)(EXTEND)		LF	28.000		28.000	
	462-6063	CONC BOX CULV (8 FT X 4 FT)(EXTEND)		LF	24.000		24.000	
	462-6078	CONC BOX CULV (10 FT X 10 FT)(EXTEND)		LF	90.000		90.000	
	464-6003	RC PIPE (CL III)(18 IN)		LF	738.000		738.000	
	464-6005	RC PIPE (CL III)(24 IN)		LF	130.000		130.000	
	464-6008	RC PIPE (CL III)(36 IN)		LF	42.000		42.000	
	464-6009	RC PIPE (CL III)(42 IN)		LF	49.000		49.000	
	464-6030	RC PIPE (ARCH)(CL III)(DES 1)		LF	888.000		888.000	
	464-6032	RC PIPE (ARCH)(CL III)(DES 3)		LF	46.000		46.000	
	464-6034	RC PIPE (ARCH)(CL III)(DES 5)		LF	34.000		34.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0573-01-034 **DISTRICT** Austin **COUNTY** Bastrop
HIGHWAY SH 304

			CONTROL SECTION JOB		**0573-01-034**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00061183**		
			COUNTY		**Bastrop**		
			HIGHWAY		**SH 304**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	466-6010	HEADWALL (CH - FW - 0) (DIA= 42 IN)	EA	1.000		1.000	
	466-6102	HEADWALL (CH - PW - 0) (DIA= 42 IN)	EA	2.000		2.000	
	466-6151	WINGWALL (FW - 0) (HW=4 FT)	EA	5.000		5.000	
	466-6167	WINGWALL (FW - S) (HW=6 FT)	EA	1.000		1.000	
	466-6171	WINGWALL (PW - 1) (HW=10 FT)	EA	2.000		2.000	
	466-6179	WINGWALL (PW - 1) (HW=4 FT)	EA	4.000		4.000	
	466-6181	WINGWALL (PW - 1) (HW=6 FT)	EA	1.000		1.000	
	467-6363	SET (TY II) (18 IN) (RCP) (6: 1) (P)	EA	50.000		50.000	
	467-6395	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	10.000		10.000	
	467-6448	SET (TY II) (36 IN) (RCP) (3: 1) (C)	EA	2.000		2.000	
	467-6454	SET (TY II) (36 IN) (RCP) (6: 1) (P)	EA	2.000		2.000	
	467-6461	SET (TY II) (42 IN) (RCP) (3: 1) (C)	EA	2.000		2.000	
	467-6463	SET (TY II) (42 IN) (RCP) (4: 1) (C)	EA	1.000		1.000	
	467-6519	SET (TY II) (DES 1) (RCP) (6: 1) (P)	EA	60.000		60.000	
	467-6545	SET (TY II) (DES 3) (RCP) (6: 1) (P)	EA	4.000		4.000	
	467-6562	SET (TY II) (DES 5) (RCP) (6: 1) (P)	EA	2.000		2.000	
	496-6004	REMOV STR (SET)	EA	32.000		32.000	
	496-6006	REMOV STR (HEADWALL)	EA	14.000		14.000	
	496-6050	REMOV STR (DRIVEWAY CULVERT)	EA	58.000		58.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	12.000		12.000	
	506-6004	ROCK FILTER DAMS (INSTALL) (TY 4)	LF	630.000		630.000	
	506-6011	ROCK FILTER DAMS (REMOVE)	LF	630.000		630.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	6,338.000		6,338.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	6,338.000		6,338.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	6,338.000		6,338.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	6,338.000		6,338.000	
	529-6007	CONC CURB & GUTTER (TY I)	LF	52.000		52.000	
	529-6008	CONC CURB & GUTTER (TY II)	LF	148.000		148.000	
	530-6004	DRIVEWAYS (CONC)	SY	203.000		203.000	
	530-6005	DRIVEWAYS (ACP)	SY	5,868.000		5,868.000	
	533-6002	RUMBLE STRIPS (CENTERLINE)	LF	30,438.000		30,438.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	4,100.000		4,100.000	
	540-6015	DRIVEWAY TERMINAL ANCHOR SECTION	EA	2.000		2.000	
	540-6016	DOWNSTREAM ANCHOR TERMINAL SECTION	EA	16.000		16.000	
	540-6020	MTL W - BEAM GD FEN (LOW FILL CULVERT)	LF	100.000		100.000	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	3,560.000		3,560.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0573-01-034 **DISTRICT** Austin **COUNTY** Bastrop
HIGHWAY SH 304

			CONTROL SECTION JOB		**0573-01-034**	TOTAL EST.	TOTAL FINAL
			PROJECT ID		**A00061183**		
			COUNTY		**Bastrop**		
			HIGHWAY		**SH 304**		
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	15.000		15.000	
	544-6003	GUARDRAIL END TREATMENT (REMOVE)	EA	26.000		26.000	
	560-6001	MAILBOX INSTALL-S (TWG-POST) TY 1	EA	21.000		21.000	
	560-6002	MAILBOX INSTALL-D (TWG-POST) TY 1	EA	4.000		4.000	
	560-6003	MAILBOX INSTALL-M (TWG-POST) TY 1	EA	4.000		4.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	12.000		12.000	
	644-6002	IN SM RD SN SUP&AM TY10BWG(1)SA(P-BM)	EA	9.000		9.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	19.000		19.000	
	644-6007	IN SM RD SN SUP&AM TY10BWG(1)SA(U)	EA	2.000		2.000	
	644-6028	IN SM RD SN SUP&AM TYS80(1)SA(P-BM)	EA	1.000		1.000	
	644-6036	IN SM RD SN SUP&AM TYS80(1)SA(U-BM)	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	44.000		44.000	
	658-6062	INSTL DEL ASSM (D-SW)SZ 1(BRF)GF2(BI)	EA	70.000		70.000	
	658-6100	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)	EA	1.000		1.000	
	662-6016	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	LF	72.000		72.000	
	662-6075	WK ZN PAV MRK REMOV (W)24"(SLD)	LF	144.000		144.000	
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	64,736.000		64,736.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	809.000		809.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	715.000		715.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	93.000		93.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	2.000		2.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	2.000		2.000	
	666-6093	REFL PAV MRK TY I (W)(RR XING)(100MIL)	EA	2.000		2.000	
	666-6161	RE PV MRK TY I(BLACK)6"(SHADOW)(090MIL)	LF	32,368.000		32,368.000	
	666-6170	REFL PAV MRK TY II (W) 4" (SLD)	LF	64,182.000		64,182.000	
	666-6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	715.000		715.000	
	666-6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	93.000		93.000	
	666-6184	REFL PAV MRK TY II (W) (ARROW)	EA	2.000		2.000	
	666-6192	REFL PAV MRK TY II (W) (WORD)	EA	2.000		2.000	
	666-6196	REFL PAV MRK TY II (W) (RR XING)	EA	2.000		2.000	
	666-6205	REFL PAV MRK TY II (Y) 4" (BRK)	LF	7,880.000		7,880.000	
	666-6207	REFL PAV MRK TY II (Y) 4" (SLD)	LF	64,182.000		64,182.000	
	666-6283	REF PROF PAV MRK TY I(W)4"(SLD)(090MIL)	LF	64,182.000		64,182.000	
	666-6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	LF	7,880.000		7,880.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	32,974.000		32,974.000	
	672-6007	REFL PAV MRKR TY I-C	EA	36.000		36.000	
	672-6009	REFL PAV MRKR TY II-A-A	EA	1,482.000		1,482.000	

Estimate & Quantity Sheet

CONTROLLING PROJECT ID 0573-01-034 **DISTRICT** Austin **COUNTY** Bastrop
HIGHWAY SH 304

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0573-01-034**			
		PROJECT ID		**A00061183**			
		COUNTY		**Bastrop**			
		HIGHWAY		**SH 304**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	3076-6003	D-GR HMA TY-B PG64-22 (EXEMPT)	TON	694.000		694.000	
	3076-6048	D-GR HMA TY-D PG76-22	TON	14,056.000		14,056.000	
	3076-6051	D-GR HMA TY-D PG76-22 (LEVEL-UP)	TON	2,611.000		2,611.000	
	3084-6001	BONDING COURSE	GAL	15,065.000		15,065.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2.000		2.000	
	6185-6002	TMA (STATIONARY)	DAY	72.000		72.000	
	6185-6003	TMA (MOBILE OPERATION)	HR	64.000		64.000	
	7251-6001	Subsurface Util Locate (Outside Rdbed)	EA	5.000		5.000	
	02	PLANKING WORK, LABOR, AND MATERIAL: RAILROAD FORCE ACCOUNT WORK	LS	1.000		1.000	
	08	SAFETY CONTINGENCY (NON-PART)	LS	1.000		1.000	
		LAW ENFORCEMENT	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE (NON-PART)	LS	1.000		1.000	

ROADWAY SUMMARY

ITEM	100	104	105	110	132	247	316	316	347	347	351	354	432	432
	6002	6017	6045	6001	6003	6366	6029	6467	6001	6006	6002	6024	6002	6045
DESCRIPTION	PREPARING ROW	REMOVING CONC (DRIVEWAYS)	REMOVING STAB BASE AND ASPH PAV (2"-8")	EXCAVATION (ROADWAY)	EMBANKMENT (FINAL)(ORD COMP)(TY B)	FL BS (CMP IN PLC)(TY A GR 5)(FNAL POS)	ASPH (RC-250)	AGGR (TY-D GR5)	TOM (ASPHALT) PG 76-22	TOM - C (AGGREGATE) SAC - B	FLEXIBLE PAVEMENT STRUCTURE REPAIR(6")	PLANE ASPH CONC PAV(2" TO 4")	RIPRAP (CONC)(5 IN)	RIPRAP (MOW STRIP)(4 IN)
	STA	SY	SY	CY	CY	CY	GAL	CY	TON	TON	SY	SY	CY	CY
ROADWAY PLAN AND PROFILE SHT 1 OF 28	11	179	349	786	1,309	1,073	1,558	32	23	352				
ROADWAY PLAN AND PROFILE SHT 2 OF 28	12		827	895	833	1,238	2,127	44	21	322				
ROADWAY PLAN AND PROFILE SHT 3 OF 28	12		844	1,097	811	1,171	2,063	43	21	311				24
ROADWAY PLAN AND PROFILE SHT 4 OF 28	12		818	920	592	1,208	2,098	44	21	316				7
ROADWAY PLAN AND PROFILE SHT 5 OF 28	12		933	864	779	1,213	2,103	44	21	317				
ROADWAY PLAN AND PROFILE SHT 6 OF 28	12		700	870	524	1,171	2,063	43	21	311				
ROADWAY PLAN AND PROFILE SHT 7 OF 28	12		716	1,210	303	1,171	2,063	43	21	311				
ROADWAY PLAN AND PROFILE SHT 8 OF 28	12		733	1,249	826	1,171	2,063	43	21	311				19
ROADWAY PLAN AND PROFILE SHT 9 OF 28	12		785	1,217	357	1,171	2,063	43	21	311				
ROADWAY PLAN AND PROFILE SHT 10 OF 28	12		954	758	1,259	1,217	2,107	44	21	317				
ROADWAY PLAN AND PROFILE SHT 11 OF 28	12		883	678	1,505	1,261	2,149	45	21	324				29
ROADWAY PLAN AND PROFILE SHT 12 OF 28	12		718	1,056	348	1,171	2,063	43	21	311				
ROADWAY PLAN AND PROFILE SHT 13 OF 28	12		680	1,781	496	1,171	2,063	43	21	311				
ROADWAY PLAN AND PROFILE SHT 14 OF 28	12		530	1,021	1,094	1,171	2,063	43	21	311			14	13
ROADWAY PLAN AND PROFILE SHT 15 OF 28	12		574	1,002	606	1,171	2,063	43	21	311				3
ROADWAY PLAN AND PROFILE SHT 16 OF 28	12		590	991	490	1,212	2,102	44	21	316				
ROADWAY PLAN AND PROFILE SHT 17 OF 28	12		573	1,492	344	1,171	2,063	43	21	311				
ROADWAY PLAN AND PROFILE SHT 18 OF 28	12		975	1,157	896	1,179	2,031	42	20	306		978		26
ROADWAY PLAN AND PROFILE SHT 19 OF 28	12		760	897	1,146	1,178	2,031	42	20	306		978		32
ROADWAY PLAN AND PROFILE SHT 20 OF 28	12		548	1,307	700	1,171	2,063	43	21	311				16
ROADWAY PLAN AND PROFILE SHT 21 OF 28	12		578	1,291	566	1,171	2,063	43	21	311				
ROADWAY PLAN AND PROFILE SHT 22 OF 28	12		698	1,283	640	1,349	2,234	47	22	336				22
ROADWAY PLAN AND PROFILE SHT 23 OF 28	12		653	1,155	477	1,171	2,063	43	21	311				17
ROADWAY PLAN AND PROFILE SHT 24 OF 28	12		586	1,678	599	1,171	2,063	43	21	311				11
ROADWAY PLAN AND PROFILE SHT 25 OF 28	12		695	1,161	294	1,171	2,063	43	21	311				
ROADWAY PLAN AND PROFILE SHT 26 OF 28	12		629	797	470	1,171	2,063	43	21	311				
ROADWAY PLAN AND PROFILE SHT 27 OF 28	12		736	734	503	1,171	2,063	43	21	311				
ROADWAY PLAN AND PROFILE SHT 28 OF 28	2		121	273	89	195	344	7	3	52				
TOTALS	325	179	19,186	29,620	18,856	32,230	55,955	1,166	571	8,551	7,912	1,956	14	219

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304
ROADWAY
SUMMARY

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		8

DATE: 10/14/2021 1:12:47 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\1. GENERAL\SH304_GEN_SUM_RDWY_01.dgn

ROADWAY SUMMARY

ITEM	529	529	530	530	540	540	540	540	542	544	544	560	560
DESCRIPTION	6007	6008	6004	6005	6001	6015	6016	6020	6001	6001	6003	6001	6002
	CONC CURB & GUTTER (TY I)	CONC CURB & GUTTER (TY II)	DRIVEWAYS (CONC)	DRIVEWAYS (ACP)	MTL W-BEAM GD FEN (TIM POST)	DRIVEWAY TERMINAL ANCHOR SECTION	DOWNSTREAM ANCHOR TERMINAL SECTION	MTL W - BEAM GD FEN (LOW FILL CULVERT)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (INSTALL)	GUARDRAIL END TREATMENT (REMOVE)	MAILBOX INSTALL-S (TWG-POST) TY 1	MAILBOX INSTALL-D (TWG-POST) TY 1
	LF	LF	SY	SY	LF	EA	EA	LF	LF	EA	EA	EA	EA
ROADWAY PLAN AND PROFILE SHT 1 OF 28			203	389								1	
ROADWAY PLAN AND PROFILE SHT 2 OF 28	52	148		275									
ROADWAY PLAN AND PROFILE SHT 3 OF 28				171	393		1	100	517	1	2		1
ROADWAY PLAN AND PROFILE SHT 4 OF 28				140	107		1		133	1	2		2
ROADWAY PLAN AND PROFILE SHT 5 OF 28				140									
ROADWAY PLAN AND PROFILE SHT 6 OF 28				146								1	
ROADWAY PLAN AND PROFILE SHT 7 OF 28				71								1	
ROADWAY PLAN AND PROFILE SHT 8 OF 28				141	325		2			2			
ROADWAY PLAN AND PROFILE SHT 9 OF 28				216								1	
ROADWAY PLAN AND PROFILE SHT 10 OF 28				140								1	
ROADWAY PLAN AND PROFILE SHT 11 OF 28				128	550		2		550	2	4		
ROADWAY PLAN AND PROFILE SHT 12 OF 28				82									
ROADWAY PLAN AND PROFILE SHT 13 OF 28				211								1	
ROADWAY PLAN AND PROFILE SHT 14 OF 28				361	280		1		262.5		1	3	
ROADWAY PLAN AND PROFILE SHT 15 OF 28				215	20				37.5	1	1	2	
ROADWAY PLAN AND PROFILE SHT 16 OF 28												1	
ROADWAY PLAN AND PROFILE SHT 17 OF 28				506								2	
ROADWAY PLAN AND PROFILE SHT 18 OF 28				229	537.5	1	2		485	1	4	1	
ROADWAY PLAN AND PROFILE SHT 19 OF 28				339	563.5		2		575	3	4		
ROADWAY PLAN AND PROFILE SHT 20 OF 28				494	299		1			1		2	
ROADWAY PLAN AND PROFILE SHT 21 OF 28				398									
ROADWAY PLAN AND PROFILE SHT 22 OF 28				288	487.5	1	2		450	1	4	2	
ROADWAY PLAN AND PROFILE SHT 23 OF 28				290	336		1		332	1	2	1	1
ROADWAY PLAN AND PROFILE SHT 24 OF 28				140	201.5		1		218	1	2	1	
ROADWAY PLAN AND PROFILE SHT 25 OF 28				139									
ROADWAY PLAN AND PROFILE SHT 26 OF 28													
ROADWAY PLAN AND PROFILE SHT 27 OF 28				219									
ROADWAY PLAN AND PROFILE SHT 28 OF 28													
TOTALS	52	148	203	5,868	4,100	2	16	100	3,560	15	26	21	4

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304
ROADWAY
SUMMARY

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		9

DS: CK:
DW: CK:

DATE: 10/14/2021 1:12:48 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\1. GENERAL\SH304_GEN_SUM_RDWY_02.dgn

ROADWAY SUMMARY

ITEM	560	3076	3076	3076	3084	7251
DESCRIPTION	6003	6003	6048	6051	6001	6001
	MAILBOX INSTALL-M (TWG-POST) TY 1	D-GR HMA TY-B PG64-22 (EXEMPT)	D-GR HMA TY-D PG76-22	D-GR HMA TY-D PG76-22 (LEVEL UP)	BONDING COURSE	SUBSURFACE UTIL LOCATE (OUTSIDE RDBED)
	EA	TON	TON	TON	GAL	EA
ROADWAY PLAN AND PROFILE SHT 1 OF 28		694	573		1,147	
ROADWAY PLAN AND PROFILE SHT 2 OF 28			528		546	
ROADWAY PLAN AND PROFILE SHT 3 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 4 OF 28			519		536	
ROADWAY PLAN AND PROFILE SHT 5 OF 28			520		538	
ROADWAY PLAN AND PROFILE SHT 6 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 7 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 8 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 9 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 10 OF 28			521		538	
ROADWAY PLAN AND PROFILE SHT 11 OF 28			531		550	
ROADWAY PLAN AND PROFILE SHT 12 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 13 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 14 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 15 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 16 OF 28			520		537	
ROADWAY PLAN AND PROFILE SHT 17 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 18 OF 28	2		502		519	
ROADWAY PLAN AND PROFILE SHT 19 OF 28	1		502		519	
ROADWAY PLAN AND PROFILE SHT 20 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 21 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 22 OF 28			551		571	
ROADWAY PLAN AND PROFILE SHT 23 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 24 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 25 OF 28	1		512		528	
ROADWAY PLAN AND PROFILE SHT 26 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 27 OF 28			512		528	
ROADWAY PLAN AND PROFILE SHT 28 OF 28			85		88	
TOTALS	4	694	14,056	2,611	15,065	5

DATE: 10/14/2021 1:12:49 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\1. GENERAL\SH304_GEN_SUM_RDWY_03.dgn

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304
ROADWAY
SUMMARY

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		10

DS: CK: DW: CK:

TRAFFIC CONTROL SUMMARY

ITEM	502	662	662	662	662	666	6001	6185	6185
DESCRIPTION	6001	6016	6075	6095	6111	6161	6002	6002	6003
	BARRICADES, SIGNS AND TRAFFIC HANDLING	WK ZN PAV MRK NON-REMOV (W)24"(SLD)	WK ZN PAV MRK REMOV (W)24"(SLD)	WK ZN PAV MRK REMOV (Y)4"(SLD)	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	RE PV MRK TY I(BLACK)6"(SHADOW)(090MIL)	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)	TMA (MOBILE OPERATION)
	MO	LF	LF	LF	EA	LF	EA	DAY	HR
PHASE 1	4.5		72	32,368		32,368			
PHASE 2	4.5	72		32,368					
PHASE 3	3		72		809				
TOTALS:	12	72	144	64,736	809	32,368	2	72	64

EROSION CONTROL SUMMARY

ITEM	160	164	164	164	168	169	506	506	506	506	506	506
DESCRIPTION	6003	6001	6009	6011	6001	6001	6004	6011	6038	6039	6041	6043
	FURNISHING AND PLACING TOPSOIL (4")	BROADCAST SEED (PERM) (RURAL) (SANDY)	BROADCAST SEED (TEMP) (WARM)	BROADCAST SEED (TEMP) (COOL)	VEGETATIVE WATERING	SOIL RETENTION BLANKETS (CL 1) (TY A)	ROCK FILTER DAMS (INSTALL) (TY 4)	ROCK FILTER DAMS (REMOVE)	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	BIODEG EROSN CONT LOGS (INSTL) (12")	BIODEG EROSN CONT LOGS (REMOVE)
	SY	SY	SY	SY	MG	SY	LF	LF	LF	LF	LF	LF
EROSION CONTROL LAYOUT 1 OF 14	9,166	9,166	9,166	9,166	227	9,166	30	30	212	212	212	212
EROSION CONTROL LAYOUT 2 OF 14	11,738	11,738	11,738	11,738	291	11,738	60	60	244	244	244	244
EROSION CONTROL LAYOUT 3 OF 14	10,704	10,704	10,704	10,704	265	10,704			150	150	150	150
EROSION CONTROL LAYOUT 4 OF 14	11,567	11,567	11,567	11,567	287	11,567	30	30	184	184	184	184
EROSION CONTROL LAYOUT 5 OF 14	10,138	10,138	10,138	10,138	251	10,138	30	30	713	713	713	713
EROSION CONTROL LAYOUT 6 OF 14	9,494	9,494	9,494	9,494	235	9,494	60	60	714	714	714	714
EROSION CONTROL LAYOUT 7 OF 14	11,623	11,623	11,623	11,623	288	11,623	60	60	419	419	419	419
EROSION CONTROL LAYOUT 8 OF 14	9,953	9,953	9,953	9,953	247	9,953	30	30	575	575	575	575
EROSION CONTROL LAYOUT 9 OF 14	9,418	9,418	9,418	9,418	234	9,418	60	60	586	586	586	586
EROSION CONTROL LAYOUT 10 OF 14	11,003	11,003	11,003	11,003	273	11,003	90	90	649	649	649	649
EROSION CONTROL LAYOUT 11 OF 14	8,291	8,291	8,291	8,291	206	8,291	60	60	526	526	526	526
EROSION CONTROL LAYOUT 12 OF 14	9,553	9,553	9,553	9,553	237	9,553	30	30	244	244	244	244
EROSION CONTROL LAYOUT 13 OF 14	10,141	10,141	10,141	10,141	251	10,141	60	60	696	696	696	696
EROSION CONTROL LAYOUT 14 OF 14	4,384	4,384	4,384	4,384	109	4,384	30	30	426	426	426	426
TOTALS	137,173	137,173	137,173	137,173	3,401	137,173	630	630	6,338	6,338	6,338	6,338

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304
TCP & SW3P
SUMMARY

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		11

DATE: 10/14/2021 1:12:50 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\1. GENERAL\SH304_GEN_SUM_TCP_01.dgn

DRAINAGE SUMMARY - DRIVEWAY CULVERTS

ITEM	464	464	464	464	464	464	467	467	467	467	467	467	496	496
	6003	6005	6008	6030	6032	6034	6363	6395	6454	6519	6545	6562	6004	6050
DESCRIPTION	RC PIPE (CL III)(18 IN)	RC PIPE (CL III)(24 IN)	RC PIPE (CL III)(36 IN)	RC PIPE (ARCH)(CL III)(DES 1)	RC PIPE (ARCH)(CL III)(DES 3)	RC PIPE (ARCH)(CL III)(DES 5)	SET (TY II) (18 IN) (RCP) (6: 1) (P)	SET (TY II) (24 IN) (RCP) (6: 1) (P)	SET (TY II) (36 IN) (RCP) (6: 1) (P)	SET (TY II) (DES 1) (RCP) (6: 1) (P)	SET (TY II) (DES 3) (RCP) (6: 1) (P)	SET (TY II) (DES 5) (RCP) (6: 1) (P)	REMOV STR (SET)	REMOV STR (DRIVEWAY CULVERT)
	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA	EA	EA	EA	EA
ROADWAY PLAN AND PROFILE SHT 1 OF 28	166					34	8					2	2	5
ROADWAY PLAN AND PROFILE SHT 2 OF 28	28		36				2		2					2
ROADWAY PLAN AND PROFILE SHT 3 OF 28	22			32			2			2			2	2
ROADWAY PLAN AND PROFILE SHT 4 OF 28	44			26	22		2			2	2		2	2
ROADWAY PLAN AND PROFILE SHT 5 OF 28	22	36		24			2	2		2				3
ROADWAY PLAN AND PROFILE SHT 6 OF 28	54						4							2
ROADWAY PLAN AND PROFILE SHT 7 OF 28				26						2				1
ROADWAY PLAN AND PROFILE SHT 8 OF 28		22			24			2			2			2
ROADWAY PLAN AND PROFILE SHT 9 OF 28	24			26			2			2				2
ROADWAY PLAN AND PROFILE SHT 10 OF 28														
ROADWAY PLAN AND PROFILE SHT 11 OF 28				46						4			2	2
ROADWAY PLAN AND PROFILE SHT 12 OF 28				54						4			4	2
ROADWAY PLAN AND PROFILE SHT 13 OF 28	48			26			4			2			2	3
ROADWAY PLAN AND PROFILE SHT 14 OF 28				134						10			2	2
ROADWAY PLAN AND PROFILE SHT 15 OF 28	24			26			2			2			2	2
ROADWAY PLAN AND PROFILE SHT 16 OF 28	38						2							1
ROADWAY PLAN AND PROFILE SHT 17 OF 28	128			48			10			2			2	6
ROADWAY PLAN AND PROFILE SHT 18 OF 28	58	24					4	2						3
ROADWAY PLAN AND PROFILE SHT 19 OF 28	34						2							1
ROADWAY PLAN AND PROFILE SHT 20 OF 28				174						8			2	4
ROADWAY PLAN AND PROFILE SHT 21 OF 28	24			70			2			4				3
ROADWAY PLAN AND PROFILE SHT 22 OF 28				74						6				2
ROADWAY PLAN AND PROFILE SHT 23 OF 28		26		78				2		6			2	3
ROADWAY PLAN AND PROFILE SHT 24 OF 28	24	22					2	2					2	2
ROADWAY PLAN AND PROFILE SHT 25 OF 28														
ROADWAY PLAN AND PROFILE SHT 26 OF 28														
ROADWAY PLAN AND PROFILE SHT 27 OF 28				24						2				1
ROADWAY PLAN AND PROFILE SHT 28 OF 28														
TOTALS	738	130	36	888	46	34	50	10	2	60	4	2	26	58

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304
DRAINAGE SUMMARY

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		12

DS: CK:
DW: CK:

DATE: 10/14/2021 1:12:51 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\1. GENERAL\SH304_GEN_SUM_DRN_01.dgn

DRAINAGE SUMMARY - CROSS CULVERTS

ITEM	400	402	403	432	432	432	462	462	462	462	462	464	464
CODE	6005	6001	6001	6001	6002	6051	6053	6055	6059	6063	6078	6008	6009
DESCRIPTION	CEM STABIL BKFL	TRENCH EXCAVATION PROTECTION	TEMPORARY SPL SHORING	RIPRAP (CONC)(4 IN)	RIPRAP (CONC)(5 IN)	RIPRAP (STONE COMMON) (GROUT) (18 IN)	CONC BOX CULV (5 FT X 5 FT) (EXTEND)	CONC BOX CULV (6 FT X 4 FT) (EXTEND)	CONC BOX CULV (7 FT X 4 FT) (EXTEND)	CONC BOX CULV (8 FT X 4 FT) (EXTEND)	**** CONC BOX CULV (10FT X 10FT) (EXTEND)	RC PIPE (CL III) (36 IN)	RC PIPE (CL III) (42 IN)
	CY	LF	SF	CY	CY	CY	LF	LF	LF	LF	LF	LF	LF
CULVERT 1 - STA 772+45.32	11 **		240	4		20							12
CULVERT 2 - STA 793+03.55	94 **	30	840	13		432					90		
CULVERT 3 - STA 844+52.36	9 *		260	2		10							11
CULVERT 5 - STA 880+35.34	30 **		280	2	12	36			28				
CULVERT 7 - STA 924+38.21	57 **		280	3		77				24			
CULVERT 9 - STA 970+35.89	48 **		384	4	14	35		60					
CULVERT 10 - STA 976+58.75	38 **		320	5	5	40		35					
CULVERT 11 - STA 985+56.62	5 *			2		10						6	
CULVERT 12 - STA 1010+31.05	33 **		340	5	2	35	34						
CULVERT 13 - STA 1032+83.91	23 **		340	3	7	44							26
PROJECT TOTAL	348	30	3,284	43	40	739	34	95	28	24	90	6	49

DRAINAGE SUMMARY - CROSS CULVERTS

ITEM	466	466	466	466	466	466	466	467	467	467	496	496
CODE	6010	6102	6151	6167	6171	6179	6181	6448	6461	6463	6004	6006
DESCRIPTION	HEADWALL (CH-FW-0) (DIA= 42 IN)	HEADWALL (CH-PW-0) (DIA= 42 IN)	*** WINGWALL (FW-0) (HW=4 FT)	*** WINGWALL (FW-S) (HW=6 FT)	*** WINGWALL (PW-1) (HW=10 FT)	*** WINGWALL (PW-1) (HW=4 FT)	*** WINGWALL (PW-1) (HW=6 FT)	SET (TY II) (36 IN) (RCP) (3: 1) (C)	SET (TY II) (42 IN) (RCP) (3: 1) (C)	SET (TY II) (42 IN) (RCP) (4:1) (C)	REMOV STR (SET)	REMOV STR (HEADWALL)
	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA	EA
CULVERT 1 - STA 772+45.32		1								1	2	
CULVERT 2 - STA 793+03.55					2							2
CULVERT 3 - STA 844+52.36									2		2	
CULVERT 5 - STA 880+35.34			2									2
CULVERT 7 - STA 924+38.21						2						2
CULVERT 9 - STA 970+35.89			2									2
CULVERT 10 - STA 976+58.75			1			1						2
CULVERT 11 - STA 985+56.62								2			2	
CULVERT 12 - STA 1010+31.05				1			1					2
CULVERT 13 - STA 1032+83.91	1	1										2
PROJECT TOTAL	1	2	5	1	2	3	1	2	2	1	6	14

* CEM STABIL BKFL CALCULATED FOR PIPE BEDDING ONLY

** CEM STABIL BKFL CALCULATED FOR PIPE BEDDING & LOW FILL CULVERT

*** SEE NOTE 1 ON BCS SHEET

**** PAINT PSN ON APPLICABLE STRUCTURES. THIS WORK IS SUBSIDIARY TO ITEM 462 "CONCRETE BOX CULVERTS AND DRAINS".

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

SH 304

DRAINAGE SUMMARY

SHEET 1 OF 1

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		13

PAVEMENT MARKING SUMMARY

ITEM	533	666	666	666	666	666	666	666	666	666	666	666	666	666	666	666	666	672	672
CODE	6002	6036	6048	6054	6078	6093	6170	6178	6182	6184	6192	6196	6205	6207	6283	6312	6315	6007	6009
DESCRIPTION	RUMBLE STRIPS (CENTERLINE)	REFL PAV MRK TY I (W)8"(SLD) (100MIL)	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	REFL PAV MRK TY I (W)(ARROW) (100MIL)	REFL PAV MRK TY I (W)(WORD) (100MIL)	REFL PAV MRK TY I (W) (RR XING) (100MIL)	REFL PAV MRK TY II (W) 4" (SLD)	REFL PAV MRK TY II (W) 8" (SLD)	REFL PAV MRK TY II (W) 24" (SLD)	REFL PAV MRK TY II (W) (ARROW)	REFL PAV MRK TY II (W) (WORD)	REFL PAV MRK TY II (W) (RR XING)	REFL PAV MRK TY II (Y) 4" (BRK)	REFL PAV MRK TY II (Y) 4" (SLD)	REF PROF PAV MRK TY I (W)4"(SLD) (090MIL)	RE PM W/RET REQ TY I (Y)4"(BRK) (100MIL)	RE PM W/RET REQ TY I (Y)4"(SLD) (100MIL)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-A-A
	LF	LF	LF	EA	EA	EA	LF	LF	LF	EA	EA	EA	LF	LF	LF	LF	LF	EA	EA
BEGIN PROJ TO STA 782+00 (SHEET 1 OF 14)	895	715	36	2	2	2	4,511	715	36	2	2	2		4,511	4,511		5,380	36	226
STA 782+00 TO STA 806+00 (SHEET 2 OF 14)	2,400						4,800						820	4,800	4,800	820	1,600		96
STA 806+00 TO STA 830+00 (SHEET 3 OF 14)	2,400						4,735						990	4,735	4,735	990	900		84
STA 830+00 TO STA 854+00 (SHEET 4 OF 14)	2,400						4,800							4,800	4,800		4,813		122
STA 854+00 TO STA 878+00 (SHEET 5 OF 14)	2,400		12				4,707		12				670	4,707	4,707	670	2,004		98
STA 878+00 TO STA 902+00 (SHEET 6 OF 14)	2,279		12				4,679		12				580	4,679	4,679	580	2,229		104
STA 902+00 TO STA 926+00 (SHEET 7 OF 14)	2,400						4,800						1,020	4,800	4,800	1,020	704		78
STA 926+00 TO STA 950+00 (SHEET 8 OF 14)	2,400						4,800						840	4,800	4,800	840	1,441		94
STA 950+00 TO STA 973+50 (SHEET 9 OF 14)	2,293						4,693						10	4,693	4,693	10	4,536		114
STA 973+50 TO STA 997+00 (SHEET 10 OF 14)	2,284		12				4,570		12				620	4,570	4,570	620	2,086		108
STA 997+00 TO STA 1021+00 (SHEET 11 OF 14)	2,087		21				4,687		21				90	4,687	4,687	90	3,831		116
STA 1021+00 TO STA 1045+00 (SHEET 12 OF 14)	2,400						4,800						870	4,800	4,800	870	1,326		94
STA 1045+00 TO STA 1069+00 (SHEET 13 OF 14)	2,400						4,800						670	4,800	4,800	670	2,124		112
STA 1069+00 TO STA END PROJ (SHEET 14 OF 14)	1,400						2,800						700	2,800	2,800	700			36
PROJECT TOTAL	30,438	715	93	2	2	2	64,182	715	93	2	2	2	7,880	64,182	64,182	7,880	32,974	36	1,482

SIGNING SUMMARY

ITEM	644	644	644	644	644	644	644	658	658
CODE	6001	6002	6004	6007	6028	6036	6076	6062	6100
DESCRIPTION	IN SM RD SN SUP&AM TY10BWG(1)SA (P)	IN SM RD SN SUP&AM TY10BWG(1)SA (P-BM)	IN SM RD SN SUP&AM TY10BWG(1)SA (T)	IN SM RD SN SUP&AM TY10BWG(1)SA (U)	IN SM RD SN SUP&AM TYS80(1)SA (P-BM)	IN SM RD SN SUP&AM TYS80(1)SA (U-BM)	REMOVE SM RD SN SUP&AM	INSTL DEL ASSM (D-SW) SZ 1 (BRF) GF2 (BI)	INSTL OM ASSM (OM-2Z) (WFLX) GND (BI)
	EA	EA	EA	EA	EA	EA	EA	EA	EA
BEGIN PROJ TO STA 782+00 (SHEET 1 OF 14)	5		2	2	1	1	10		1
STA 782+00 TO STA 806+00 (SHEET 2 OF 14)		1	1				3	10	
STA 806+00 TO STA 830+00 (SHEET 3 OF 14)		1	1				2		
STA 830+00 TO STA 854+00 (SHEET 4 OF 14)	1						1	7	
STA 854+00 TO STA 878+00 (SHEET 5 OF 14)		1	1				2		
STA 878+00 TO STA 902+00 (SHEET 6 OF 14)		1	3				4	8	
STA 902+00 TO STA 926+00 (SHEET 7 OF 14)								4	
STA 926+00 TO STA 950+00 (SHEET 8 OF 14)		1	3				4	1	
STA 950+00 TO STA 973+50 (SHEET 9 OF 14)	4	1	1				6	8	
STA 973+50 TO STA 997+00 (SHEET 10 OF 14)	1	1	4				6	15	
STA 997+00 TO STA 1021+00 (SHEET 11 OF 14)		2	1				3	8	
STA 1021+00 TO STA 1045+00 (SHEET 12 OF 14)			1				1	9	
STA 1045+00 TO STA 1069+00 (SHEET 13 OF 14)	1						1		
STA 1069+00 TO STA END PROJ (SHEET 14 OF 14)			1				1		
PROJECT TOTAL	12	9	19	2	1	1	44	70	1

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

SH 304
SIGNING & PAVEMENT MARKING SUMMARY

SHEET 1 OF 1

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		14

DATE: 10/18/2021 12:45:48 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155417\PH3_SH304_GEN_SUM_SPMD_SUMM.dgn

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
1of14	1	R1-1	STOP	48x48	✓		S80	1	SA	P	BM	
		W4-4P	CROSS TRAFFIC DOES NOT STOP	36x18	✓							
	2	M3-1	NORTH	24x12	✓		10 BWG	1	SA	U		
		M1-6T	304 TEXAS	24x24	✓							
		M6-1L	←	21x15	✓							
		M3-3	SOUTH	24x12	✓							
		M1-6T	304 TEXAS	24x24	✓							
		M6-1R	→	21x15	✓							
	3	M3-4	WEST	24x12	✓		10 BWG	1	SA	U		
		M1-6F	FARM ROAD 535	24x24	✓							
		M6-1L	←	21x15	✓							
		M3-2	EAST	24x12	✓							
		M1-6F	FARM ROAD 535	24x24	✓							
		M6-1R	→	21x15	✓							
	4	M3-3	SOUTH	24x12	✓		10 BWG	1	SA	P		
		M1-6T	304 TEXAS	24x24	✓							
	5	R2-1	SPEED LIMIT 65	30x36	✓		10 BWG	1	SA	P		
	6	D1-2	← Rockne 10	84x30	✓		S80	1	SA	U	BM	
			Rosanky 1 →									
	7	W10-1	RR XING	36 DIA	✓		10 BWG	1	SA	P		
	8	D2-1	GONZALES 34	78x18	✓		10 BWG	1	SA	T		
	9	M2-1	JCT	21x15	✓		10 BWG	1	SA	P		
		M1-6F	FARM ROAD 535	24x24	✓							
		M6-3	↑	21x15	✓							
	10	W2-1aT	HIGHWAY INTERSECTION AHEAD	48x48	✓		10 BWG	1	SA	T		
	11	W10-1	RR XING	36 DIA	✓		10 BWG	1	SA	P		
2of14	1	D21-1TL	← Hofferek Rd	72x12	✓		10 BWG	1	SA	T		
	2	D3-1G	HWY 304	30x8	✓		10 BWG	1	SA	P	BM	
		D3-1G	Waneck Rd	36x8	✓							
		R1-1	STOP	36x36	✓							
3of14	1	D3-1G	HWY 304	30x8	✓		10 BWG	1	SA	P	BM	
		D3-1G	Hofferek Rd	42x8	✓							
		R1-1	STOP	36x36	✓							
	2	D21-1TR	Hofferek Rd →	72x12	✓		10 BWG	1	SA	T		
4of14	1	M1-6T	304 TEXAS	24x24	✓		10 BWG	1	SA	P		
		D10-7aT	MILE 466	3x10	✓							
		D10-7aT	MILE 466	3x10	✓							
5of14	1	D21-1TR	St Marys Rd →	72x12	✓		10 BWG	1	SA	T		
	2	D3-1G	HWY 304	30x8	✓		10 BWG	1	SA	P	BM	
		D3-1G	St Marys Rd	42x8	✓							
		R1-1	STOP	36x36	✓							

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 1 OF 3

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
4-16	DIST	COUNTY		SHEET NO.
8-16	AUS	BASTROP		15

18

DATE: 9/23/2021 3:12:34 PM
FILE: c:\pw-af\pw-af-prod\ross.deborde\aguirre-fields.com\d0155417\PH3_SH304FGEN_LUM_SMSGA_01.dgn

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
6of14	1	D21-1TL	← Peach Creek Rd	84x12	✓		10 BWG	1	SA	T		
	2	D21-1TL	← St Marys Rd	72x12	✓		10 BWG	1	SA	T		
	3	D3-1G	HWY 304	30x8	✓		10 BWG	1	SA	P	BM	
		D3-1G	Peach Creek Rd	54x8	✓							
		R1-1	STOP	36x36	✓							
	4	D21-1TR	Peach Creek Rd →	84x12	✓		10 BWG	1	SA	T		
8of14	1	D21-1TL	← Seidel Rd	60x12	✓		10 BWG	1	SA	T		
	2	D3-1G	HWY 304	30x8	✓		10 BWG	1	SA	P	BM	
		D3-1G	Seidel Rd	36x8	✓							
		R1-1	STOP	36x36	✓							
	3	I-2cT	String Prairie	96x18	✓		10 BWG	1	SA	T		
	4	D21-1TR	Seidel Rd →	60x12	✓		10 BWG	1	SA	T		
9of14	1	M1-6T	304 TEXAS	24x24	✓		10 BWG	1	SA	P		
		D10-7aT	MILE 468	3x10	✓							
		D10-7aT	MILE 468	3x10	✓							
	2	W11-8L	EMERGENCY VEHICLE	36x36	✓		10 BWG	1	SA	P		
		W16-9P	AHEAD	24x12	✓							
	3	R2-1	SPEED LIMIT 65	30x36	✓		10 BWG	1	SA	P		
	4	D21-1TR	St Marys Rd →	72x12	✓		10 BWG	1	SA	T		
	5	R2-1	SPEED LIMIT 65	30x36	✓		10 BWG	1	SA	P		
	6	D3-1G	HWY 304	30x8	✓		10 BWG	1	SA	P	BM	
		D3-1G	St Marys Rd	42x8	✓							
		R1-1	STOP	36x36	✓							
10of14	1	D21-1aTR	Community Center Rd →	66x24	✓		10 BWG	1	SA	T		
	2	W11-8R	EMERGENCY VEHICLE	36x36	✓		10 BWG	1	SA	P		
		W16-9P	AHEAD	24x12	✓							
	3	D21-1TL	← St Marys Rd	72x12	✓		10 BWG	1	SA	T		
	4	D3-1G	HWY 304	30x8	✓		10 BWG	1	SA	P	BM	
		D3-1G	Community Center Rd	60x8	✓							
		R1-1	STOP	36x36	✓							
	5	I-2cT	String Prairie	96x18	✓		10 BWG	1	SA	T		
	6	D21-1aTL	← Community Center Rd	72x24	✓		10 BWG	1	SA	T		
11of14	1	D21-1TR	Fiebrich Rd →	72x12	✓		10 BWG	1	SA	T		

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0573	01	034	SH 304
4-16		DIST	COUNTY		SHEET NO.
8-16		AUS	BASTROP		16

18

DATE: 9/23/2021 3:12:44 PM
FILE: c:\pw-af\pw-af-prodvross.debord@aguirre-fields.com\d0155417\PH3_SH304GEN_SUMSGN_02.dgn SMSGN_02.dgn

SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
11of14	2	D3-1G	HWY 304	30x8	✓		10 BWG	1	SA	P	BM	
		D3-1G	Fiebrich Rd	42x8	✓							
		R1-1	STOP	36x36	✓							
	3	D3-1G	HWY 304	30x8	✓		10 BWG	1	SA	P	BM	
		D3-1G	Fiebrich Rd	42x8	✓							
		R1-1	STOP	36x36	✓							
12of14	1	D21-1TL	← Fiebrich Rd	72x12	✓		10 BWG	1	SA	T		
13of14	1	M1-6T	304 TEXAS	24x24	✓		10 BWG	1	SA	P		
		D10-7aT	MILE 470	3x10	✓							
		D10-7aT	MILE 470	3x10	✓							
14of14	1	D21-1TR	Cedar Rock Rd →	84x12	✓		10 BWG	1	SA	T		

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 3 OF 3

FILE:	sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS		0573	01	034	SH 304
4-16		DIST	COUNTY		SHEET NO.
8-16		AUS	BASTROP		17

18

DATE: 9/23/2021 3:12:55 PM
FILE: c:\pw-cf\pw-cf-prod\ross.deborde@aguirre-fields.com\d0155417\PH3_SH304\GEN\SUMSGN_03.dgn

GENERAL NOTES

1. CONSTRUCT THE ROADWAY USING ONE-WAY TRAFFIC CONTROL DURING DAYTIME WORKING HOURS. THIS WORK WILL BE CONSIDERED SUBSIDIARY TO ITEM 502. RESTORE TWO-WAY TRAFFIC FOR NIGHTTIME OPERATIONS UNLESS OTHERWISE APPROVED BY THE ENGINEER.

2. LIMIT THE LENGTH OF THE WORK ZONE TO 2 MI IN ANY ONE DIRECTION. WORK ZONES WILL BE SEPARATED BY A 2 MI BUFFER BEFORE BEGINNING THE NEXT 2 MI WORK ZONE. MULTIPLE WORK ZONE PHASES MAY BE OPERATED CONCURRENTLY. THERE SHALL BE NO EDGE DROP-OFF BETWEEN THE TRAFFIC LANES BEFORE OPENING TO TWO-WAY TRAFFIC. IN THE EVENT THAT CONSTRUCTION IS NOT ABLE TO BE COMPLETED BEFORE NIGHTTIME OPERATIONS, THE CONTRACTOR SHALL PROVIDE A TRANSITION BETWEEN THE TRAFFIC LANES AS APPROVED BY THE ENGINEER BEFORE OPENING TO TWO-WAY TRAFFIC.

3. SPRINKLE FOR DUST CONTROL AS DIRECTED. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE CONSIDERED SUBSIDIARY.

4. UTILIZE TCP(2-1)-18 FOR WORK IN THE RIGHT-OF-WAY THAT DOES NOT REQUIRE LANE CLOSURES. THIS WORK INCLUDES PREPARING ROW, GRADING, DRIVEWAY CONSTRUCTION, SEEDING, ETC.

5. INCORPORATE 3:1 SAFETY WEDGES FOR ALL DROP OFFS GREATER THAN TWO (2) INCHES LEFT OVERNIGHT. CONSIDER THIS SUBSIDIARY TO THE VARIOUS ITEMS.

6. MAINTAIN POSITIVE DRAINAGE THROUGHOUT THE PROJECT SITE TO REDUCE PONDING WHERE EVER POSSIBLE.

7. NO PLAN VIEW TCP PROVIDED. USE TCP(2-2b)-18 FOR ONE-WAY TRAFFIC CONTROL SETUP/LANE CLOSURE DETAILS.

SEQUENCE OF WORK

TRAFFIC CONTROL: FROM STA 759+31.60 TO STA 1083+00.00, PLACE NEW PAVEMENT FOR PROPOSED WIDENED PAVEMENT SECTIONS.

SPECIAL NOTE TO CONTRACTOR: BEGIN WORK THROUGH STA.777+00.00 TO STA.1083+00.00.
WORK THROUGH STA.759+31.60 TO STA.777+00.00
CANNOT BEGIN UNTIL CONSTRUCTION THROUGH STATIONS
777+00.00 THROUGH 1083+00.00 IS COMPLETED.

A. SETUP ADVANCED WARNING SIGNS ACCORDING TO BC STANDARDS.
B. INSTALL EROSION CONTROLS.
C. PREPARE RIGHT-OF-WAY.
D. FOLLOW TCP(2-2b)-18 SETUP FOR ONE-WAY TRAFFIC CONTROL.
E. EXTEND EXISTING CULVERTS AND INSTALL S.E.T.s PRIOR TO SUBGRADE WIDENING, UTILIZE BC(10)-14.
F. INSTALL 1.5" TYPE D OVERLAY OVER THE FULL WIDTH OF THE EXISTING PAVEMENT.
G. SAWCUT AND CONSTRUCT WIDENED PAVEMENT SECTIONS ON THIS SIDE.
H. CONSTRUCT PHASE 2.
I. COMPLETE PHASE 3, TOM.
J. INSTALL PERMANENT PAVEMENT MARKINGS AND ANY REMAINING SIGNAGE.
K. PERFORM FINAL CLEAN UP.

PHASE 1

PHASE 1A & 1B: CONSISTS OF PREPARING RIGHT-OF-WAY, OVERLAY THE FULL WIDTH OF THE EXISTING PAVEMENT WITH 1.5" TY D, TEMPORARY PAVEMENT WIDENING, SAW CUTTING, EXCAVATING, PREPARING SUBGRADE, EXTENDING CROSS DRAINAGE STRUCTURES, AND CONSTRUCTING WIDENED PAVEMENT SECTIONS. SEE PHASE 1 TCP TYPICAL SECTIONS FOR MORE DETAILS.

1. CLOSE ONE LANE IN EITHER DIRECTION FOR THE LIMITS OF THE WORK ZONE. USING TCP(2-2b)-18. LIMIT THE LENGTH OF THE WORK TO 2 MILES, OR LENGTH AS DIRECTED BY THE ENGINEER. USE ONE-WAY TRAFFIC CONTROL WHILE THE LANE CLOSURE IS IN PLACE.
2. PREPARE RIGHT-OF-WAY.
3. EXTEND CULVERTS UTILIZING TCP(2-2b)-18.
4. OVERLAY 1.5" TY-D, SAW CUT, EXCAVATE, AND PREPARE SUBGRADE.
5. INSTALL FLEX BASE AS CONSTRUCTION PROGRESSES. PLACE 1.5" TY D HMA CONTINUOUSLY FROM BEGINNING TO END OF WORK ZONE LIMITS.
6. CONSTRUCT PAVEMENT TRANSITIONS.
7. UTILIZING TCP(2-2b)-18, INSTALL SIGNS, TOPSOIL, AND SEEDING.
8. UTILIZE TCP(3-1)-13 AND TCP(3-3)-14 TO INSTALL WORK ZONE PAVEMENT MARKINGS.
9. OPEN SECTION TO TRAFFIC.

PHASE 1A: LIMITS ARE FROM STA.926+00.00 TO STA. 1083+00.00 SOUTHBOUND
PHASE 1B: LIMITS ARE FROM STA.1083+00.00 TO STA. 926+00.00 NORTHBOUND

PHASE 2

PHASE 2A & 2B REPEATS PHASE 1A & B FOR THE STATION LIMITS LISTED BELOW.

PHASE 2A: LIMITS ARE FROM STA.777+00.00 TO STA. 926+00.00 SOUTHBOUND
PHASE 2B: LIMITS ARE FROM STA.926+00.00 TO STA. 777+00.00 NORTHBOUND

PHASE 3

PHASE 3 REPEATS PHASE 1 AND 2 FOR THE REMAINING STATIONS OF THE PROJECT. STA.759+61.00 TO STA.777+00.00.

PHASE 3 ALSO INCLUDES COMPLETING THE TOM PAVEMENT LAYER.

1. BEGIN INSTALLING THE TOM LAYER WIDTH WHILE USING TCP(2-2b)-18. LIMIT THE LENGTH OF THE WORK ZONE TO 2 MILES. USE ONE-WAY TRAFFIC CONTROL WHILE THE LANE CLOSURE IS IN PLACE.
2. AFTER THE TOM LAYER IS COMPLETE, UTILIZE TCP(3-1)-13 AND TCP(3-3)-14 TO PLACE PAVEMENT MARKINGS AND MARKERS.
3. INSTALL ANY REMAINING SIGNS AND COMPLETE ALL MISCELLANEOUS WORK TO FINISH THE PROJECT AS DIRECTED.
4. REMOVE EROSION CONTROL DEVICES ONCE VEGETATION IS ESTABLISHED TO THE SATISFACTION OF THE ENGINEER.
5. REMOVE PROJECT BARRICADES WHEN DIRECTED.

10/20/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

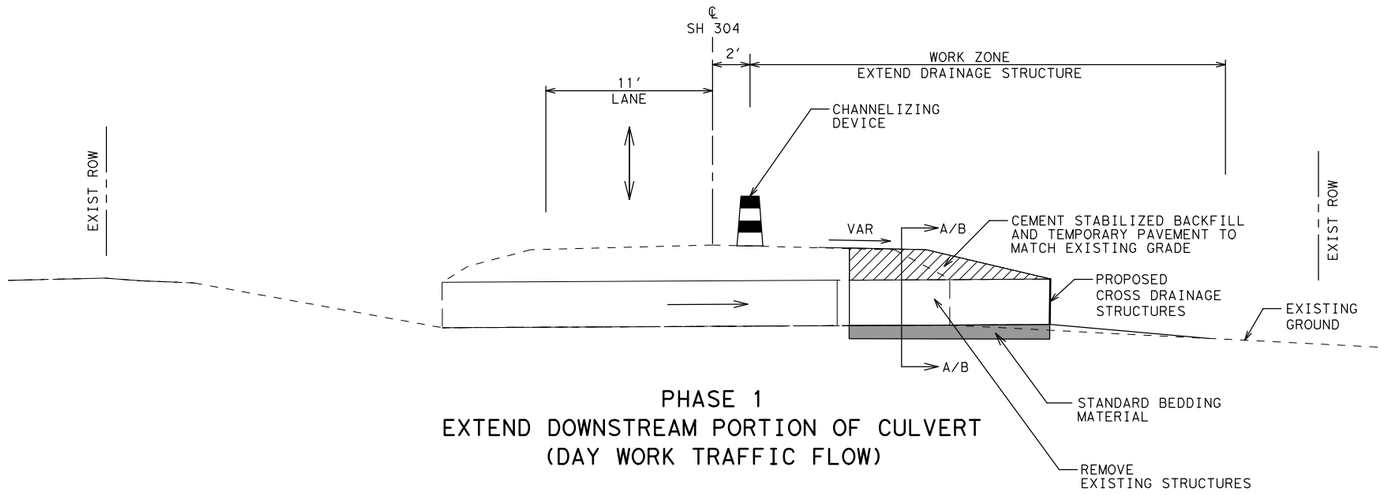
PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

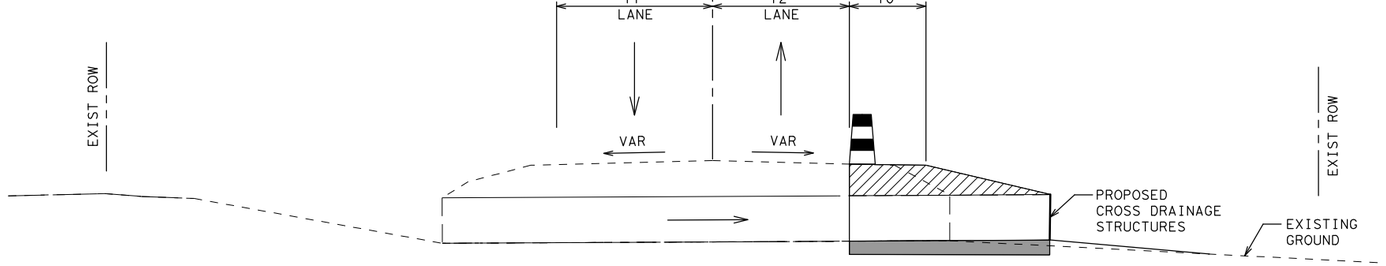
SH 304
SEQUENCE OF WORK

SHEET 1 OF 1

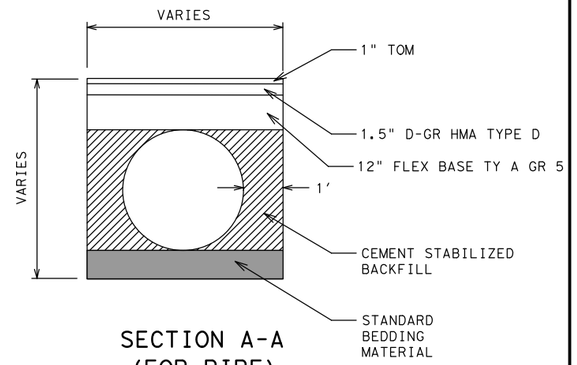
DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		18



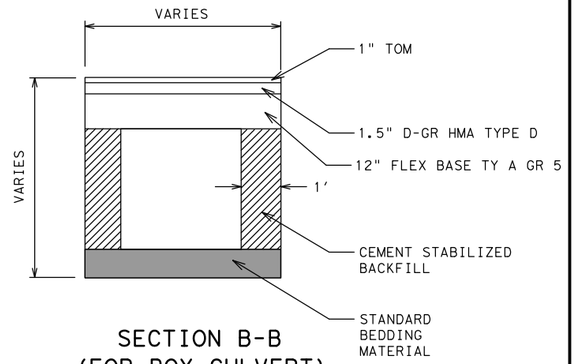
PHASE 1
EXTEND DOWNSTREAM PORTION OF CULVERT
(DAY WORK TRAFFIC FLOW)



PHASE 1
(NON-WORK TRAFFIC FLOW)



SECTION A-A
(FOR PIPE)



SECTION B-B
(FOR BOX CULVERT)

NOTES

1. **RESTORE TWO-WAY TRAFFIC TO ITS ORIGINAL LOCATION AT THE END OF THE WORK DAY.**
2. **UTILIZE BC(10)-21 AND TCP(2-2b)-18 FOR CULVERT EXTENSIONS.**

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

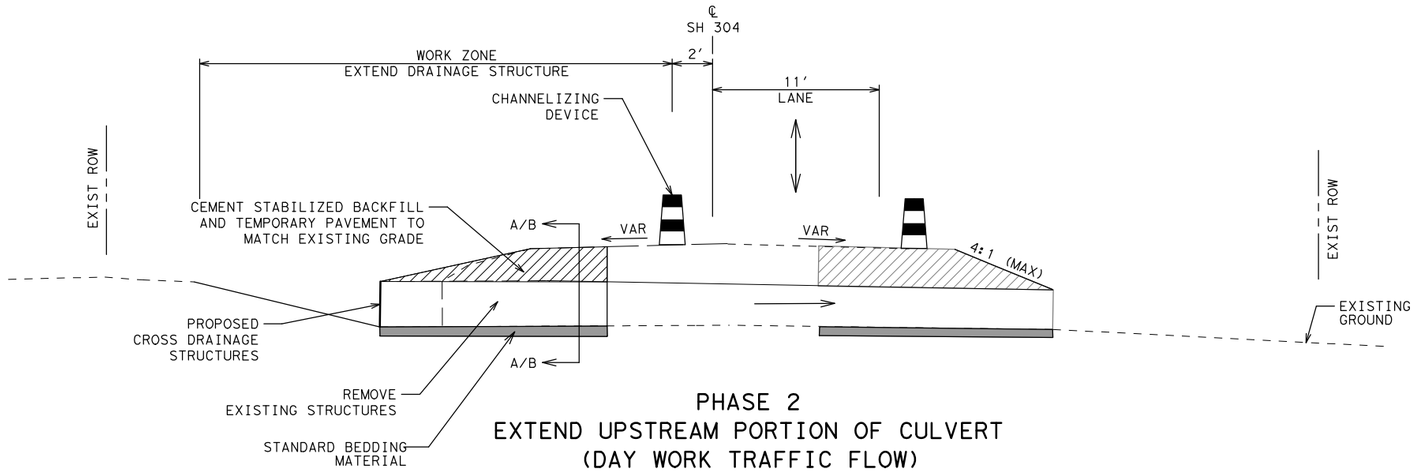
SH 304
TCP TYPICAL SECTIONS

NOT TO SCALE — SHEET 1 OF 4

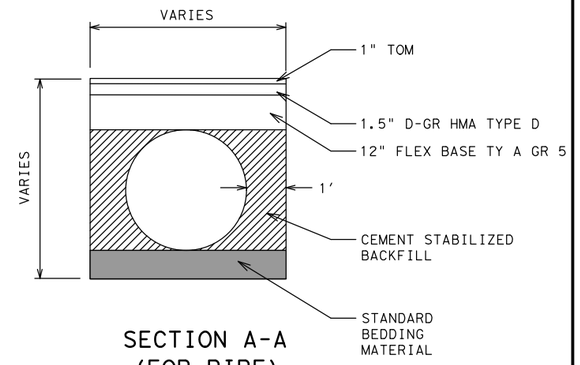
CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		19

DS: CK:
DW: CK:

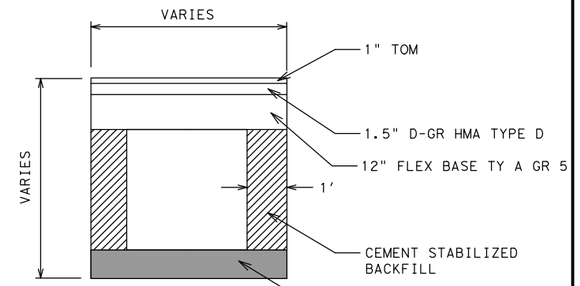
DATE: 10/14/2021 1:21:14 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\2. TCP\SH304_TCP_TYP_01.dgn



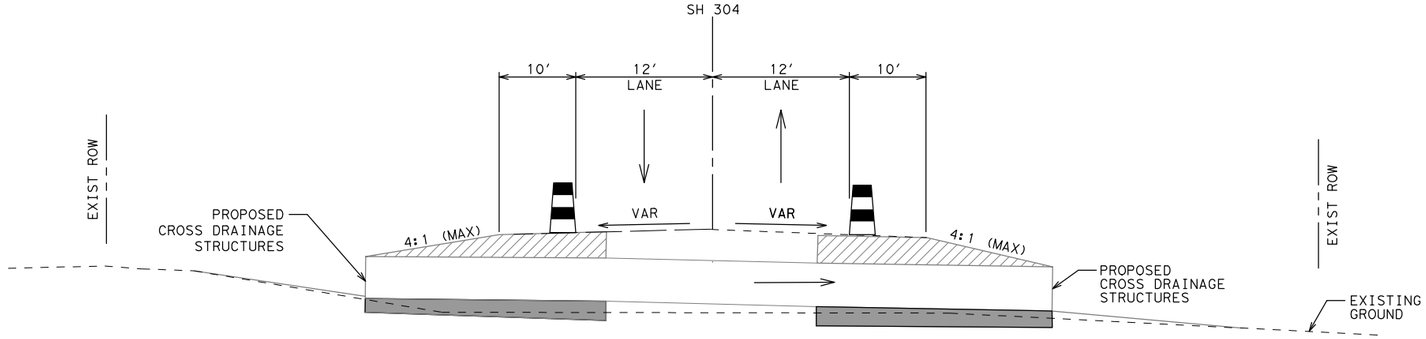
PHASE 2
EXTEND UPSTREAM PORTION OF CULVERT
(DAY WORK TRAFFIC FLOW)



SECTION A-A
(FOR PIPE)



SECTION B-B
(FOR BOX CULVERT)



PHASE 2
(NON-WORK TRAFFIC FLOW)

NOTES

1. **UTILIZE BC(10)-21 AND TCP(2-2b)-18 FOR DAY WORK TRAFFIC FLOW.**

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

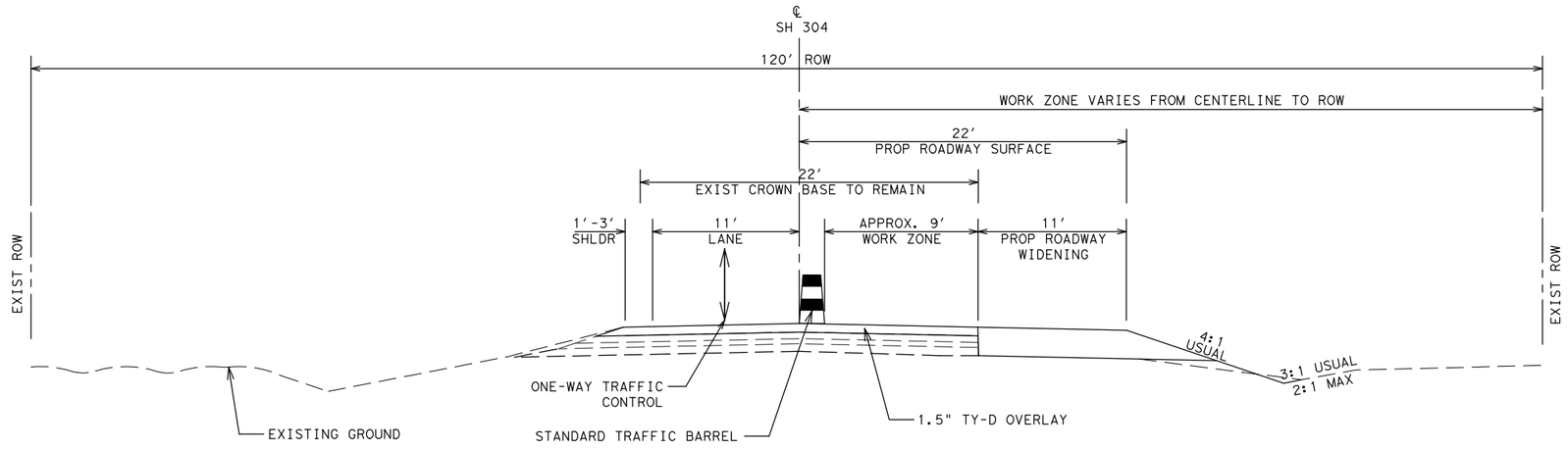
Texas Department of Transportation

SH 304
TCP TYPICAL SECTIONS

NOT TO SCALE SHEET 2 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		20

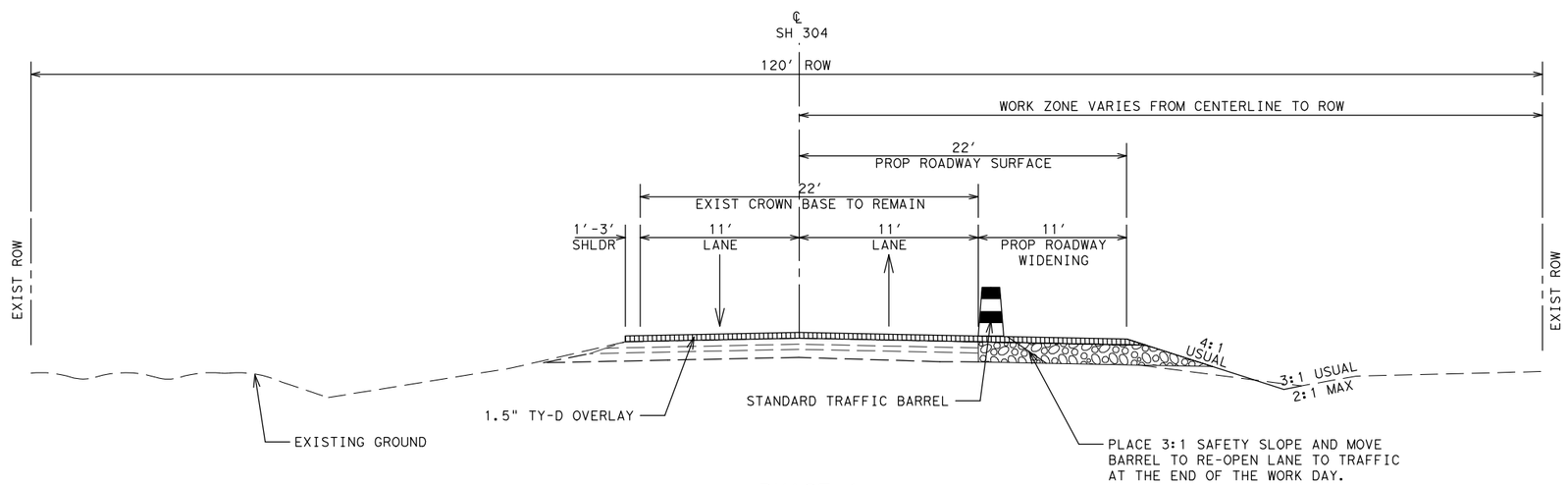
DATE: 10/14/2021 1:22:10 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034v2. TCP\SH304_TCP_TYP_03.dgn



PHASE 1
PAVEMENT WIDENING
(DAY WORK TRAFFIC FLOW)

NOTES

1. UTILIZE TCP (2-2b)-18 FOR DAY WORK TRAFFIC FLOW.
2. AFTER THE 1.5" TY-D OVERLAY OVER THE FULL WIDTH OF EXISTING PAVEMENT IS COMPLETE, SAW CUT & BEGIN PAVEMENT WIDENING.



PHASE 1
PAVEMENT WIDENING
(NON-WORK TRAFFIC FLOW)

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

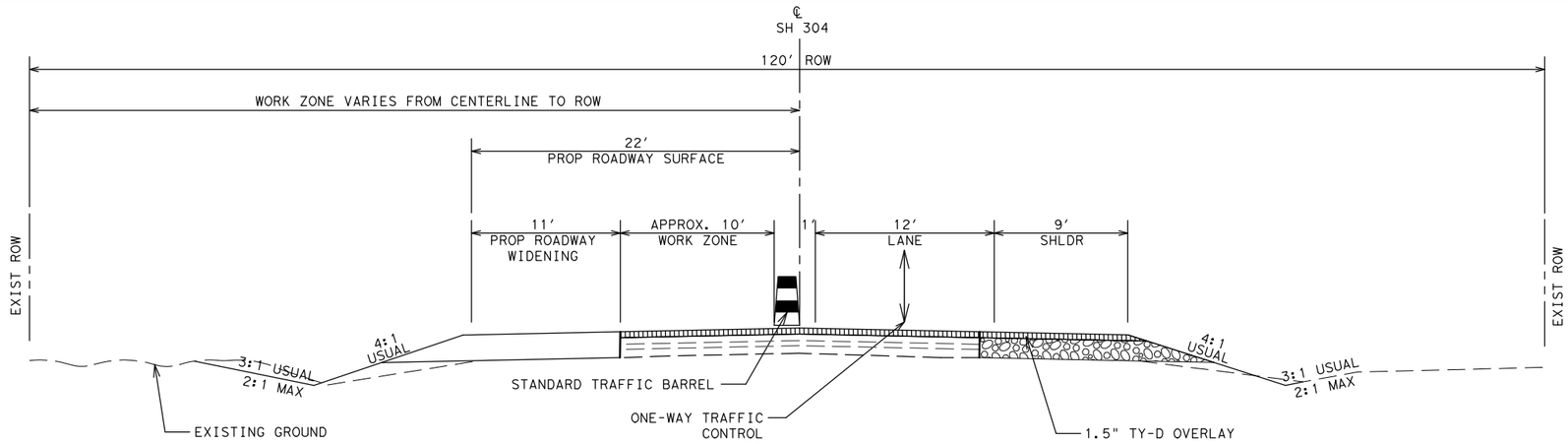
Texas Department of Transportation

SH 304
TCP TYPICAL SECTIONS

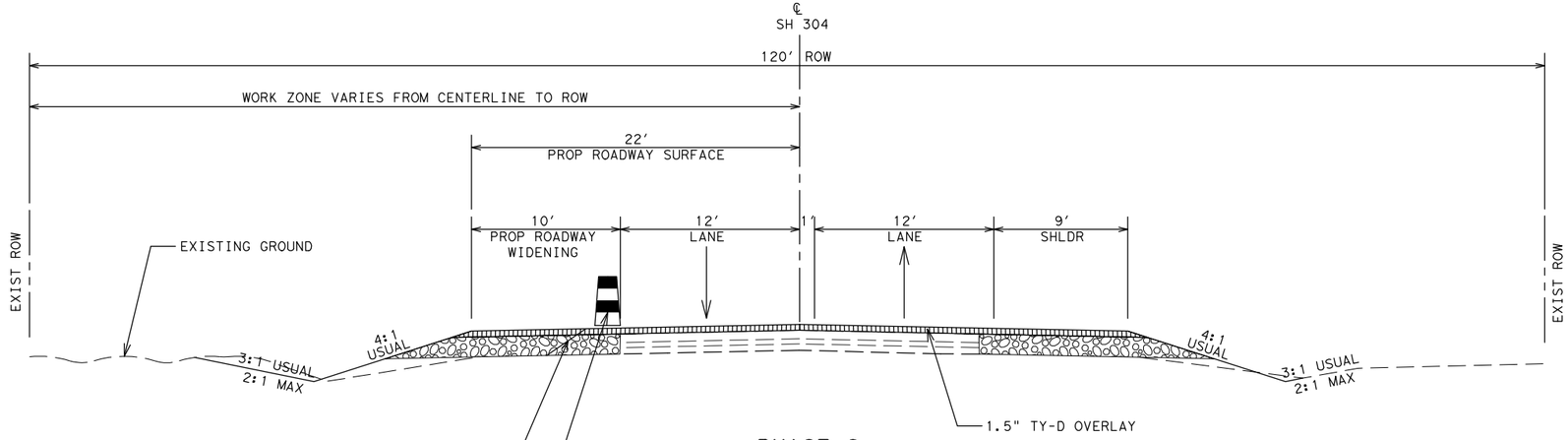
NOT TO SCALE SHEET 3 OF 4

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		21

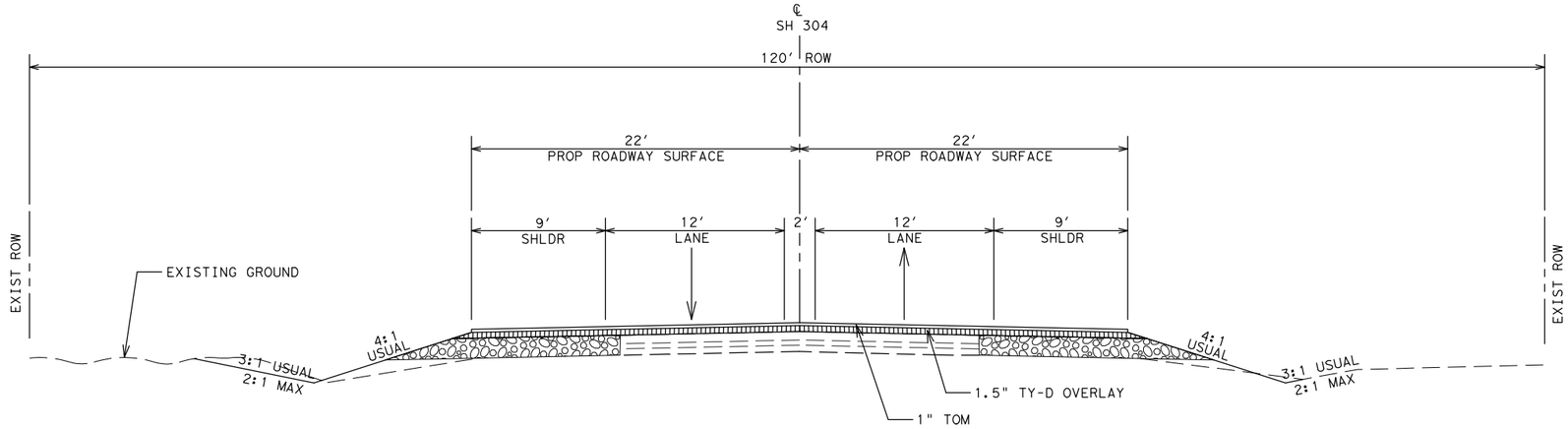
DATE: 10/14/2021 1:13:26 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\2. TCP\SH304_TCP_TYP_02.dgn



PHASE 2
PAVEMENT WIDENING
(DAY WORK TRAFFIC FLOW)



PHASE 2
PAVEMENT WIDENING
(NON-WORK TRAFFIC FLOW)



PHASE 3
PAVEMENT WIDENING

NOTES

1. UTILIZE TCP(2-2b)-18 FOR DAY WORK TRAFFIC FLOW.

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304
TCP TYPICAL SECTIONS

NOT TO SCALE SHEET 4 OF 4

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		22

DS: CK:
DW: CK:

DATE: 10/14/2021 1:13:27 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\2. TCP\SH304_TCP_TYP_04.dgn

M4-9N
SH 304
DETOUR
M4-9S

M4-9N
SH 304
DETOUR
M4-9L

M4-9N
SH 304
DETOUR
M4-9R

M4-9N
SH 304
DETOUR
M4-9S

M4-9N
SH 304
DETOUR
M4-9L

M4-9N
SH 304
DETOUR
M4-9R

M4-9N
SH 304
DETOUR
M4-9S

M4-9N
SH 304
DETOUR
M4-9L

M4-9N
SH 304
DETOUR
M4-9R

M4-9N
SH 304
DETOUR
M4-9S

M4-9N
SH 304
DETOUR
M4-9L

M4-9N
SH 304
DETOUR
M4-9R

M4-9N
SH 304
DETOUR
M4-9S

END DETOUR
M4-8A

END DETOUR
M4-8A

ROAD CLOSED AHEAD
CW20-3D

ROAD CLOSED AHEAD
CW20-3D

ROAD CLOSED
R11-2
48"X30"

MESSAGE BOARD
MSG #1 "SH 304" "CLOSED" "AHEAD"
MSG #2 "USE FM 535"

MESSAGE BOARD
MSG #1 "SH 304" "CLOSED" "AHEAD"
MSG #2 "USE FM 713"

PROJECT AREA

TYPE III BARRICADE

TYPE III BARRICADE

20
86
304
535
713
M

NOTES

1. ADDITIONAL GUIDE SIGNS WILL BE REQUIRED AT INTERSECTING PUBLIC ROADWAYS OR AS DIRECTED.
2. RAILROAD WORKING DAYS ARE MONDAY THROUGH THURSDAY ONLY.

SEQUENCE OF WORK

1. PLACE SIGNING WITHIN PROJECT LIMITS IN ACCORDANCE WITH BC(2)-21.
2. REROUTE TRAFFIC TO DETOUR AS NOTED ON THE DETOUR PLAN.
3. ONCE RAILROAD WORK IS COMPLETE, REMOVE ALL DETOUR SIGNAGE AND OPEN SH 304 TO TRAFFIC.

N

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

N. T. S.

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304
TCP DETOUR
RAILROAD

© 2022	CONT	SECT	JOB	HIGHWAY
DS: CK:	0573	01	034	SH 304
DW: CK:	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		22a

DATE: 10/14/2021 1:13:28 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\2. TCP\SH304_TCP_DETOUR_01.dgn

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

WORKER SAFETY NOTES:

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

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

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

Texas Department of Transportation

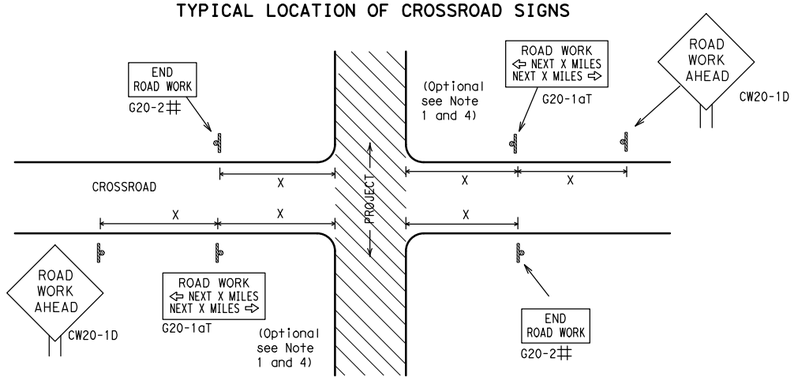
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-03 7-13	057301		034	SH 304
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	AUS	BASTROP		23

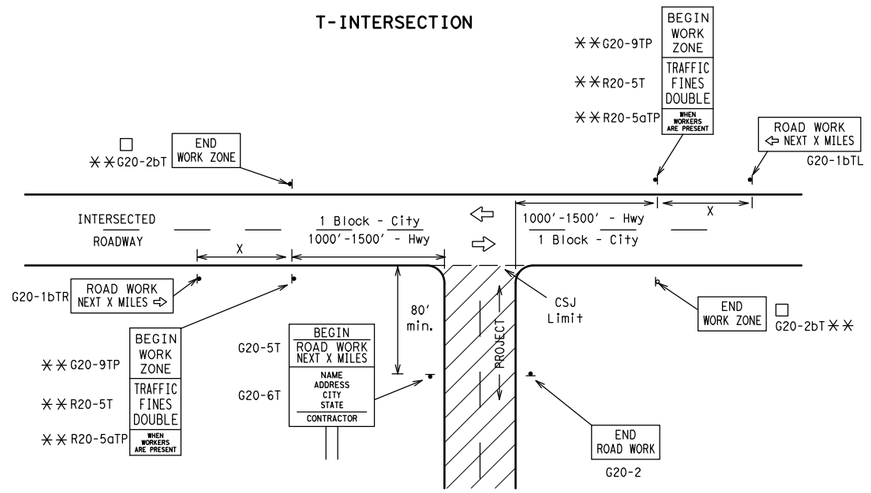
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING[1,5,6]

SIZE

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

SPACING

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

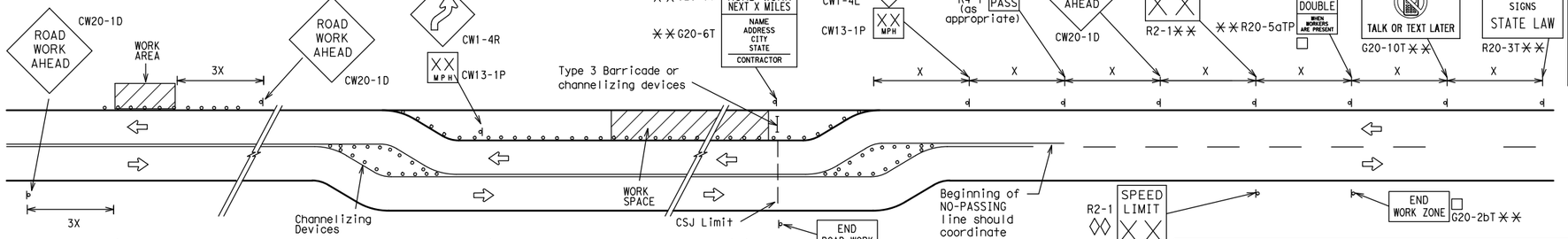
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

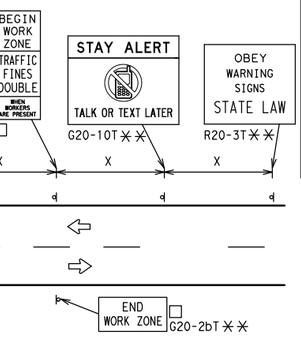
1. Special or larger size signs may be used as necessary.
2. Distance between signs should be increased as required to have 1500 feet advance warning.
3. Distance between signs should be increased as required to have 1/2 mile or more advance warning.
4. 36" x 36" "ROAD WORK AHEAD" (CW20-1D)signs may be used on low volume crossroads at the discretion of the Engineer as per TMUTCD Part 5. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

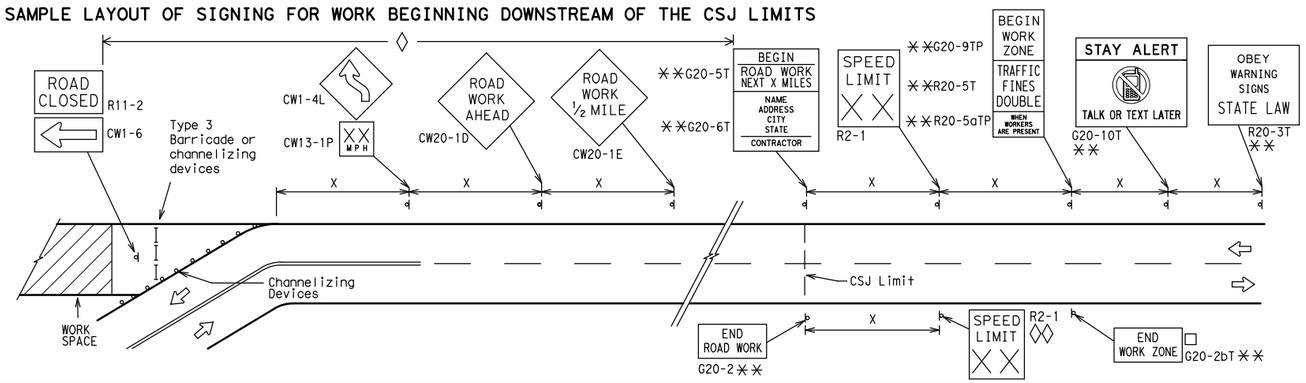


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD"(CW20-1D)signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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



NOTES

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

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

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

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

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

LEGEND

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

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	057301		034	SH 304
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	BASTROP		24

DATE:
FILE:

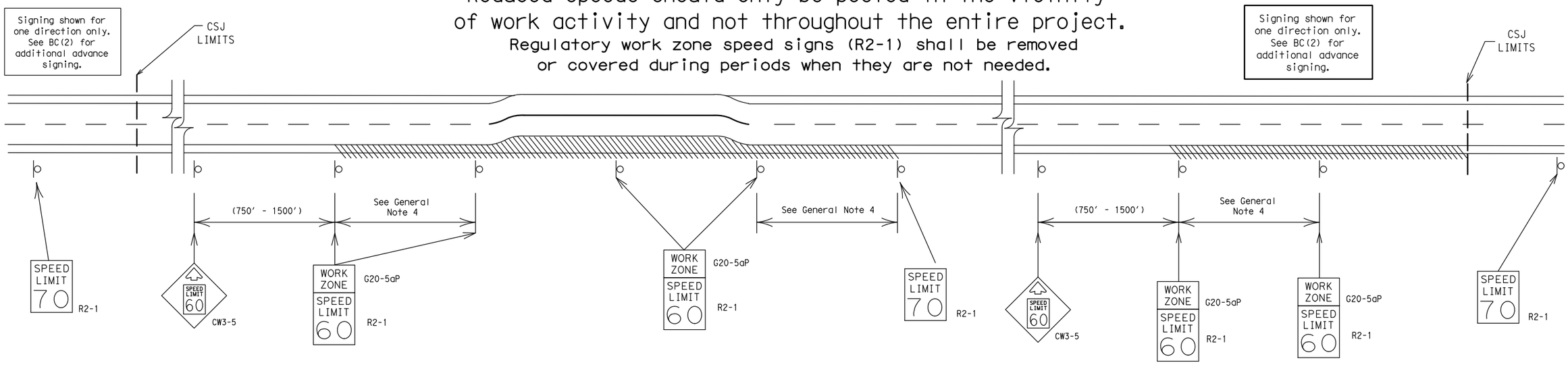
DATE:
FILE:

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

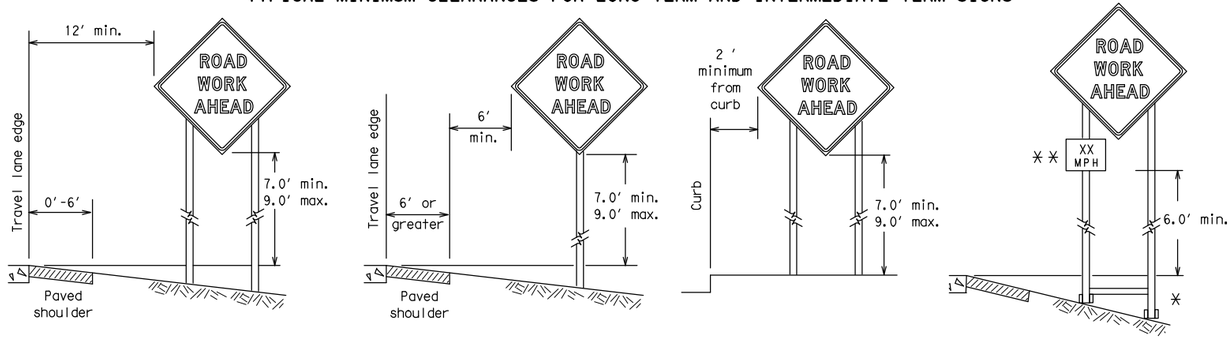
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	BASTROP		25

DATE:
FILE:

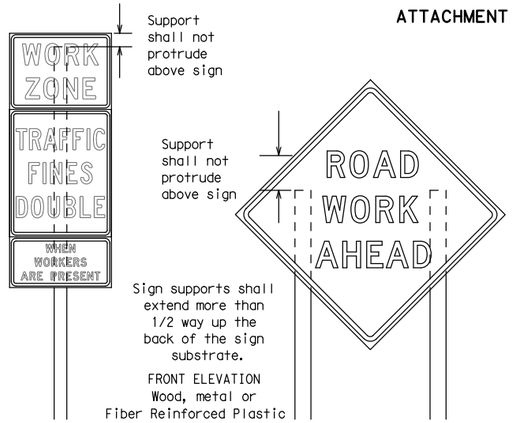
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS

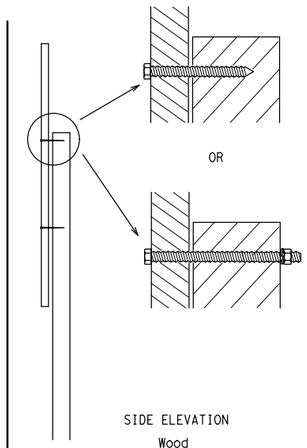


⚹ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS





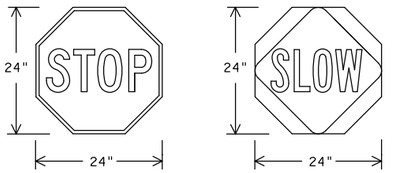
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



Background - Red
Legend & Border - White

Background - Orange
Legend & Border - Black

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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

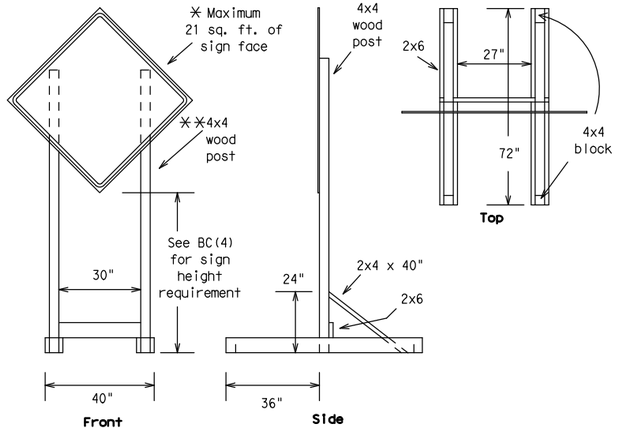
Texas Department of Transportation

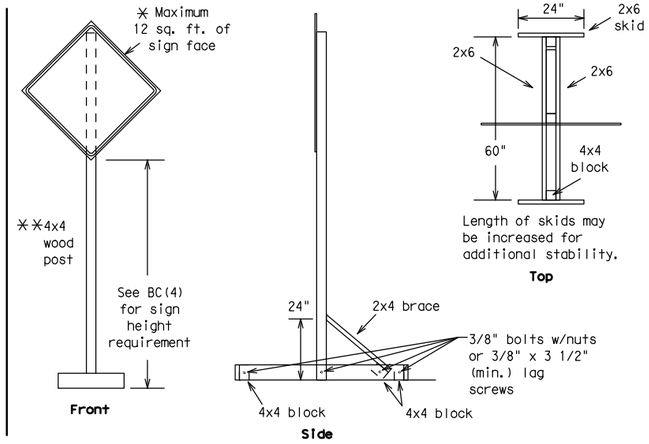
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-21

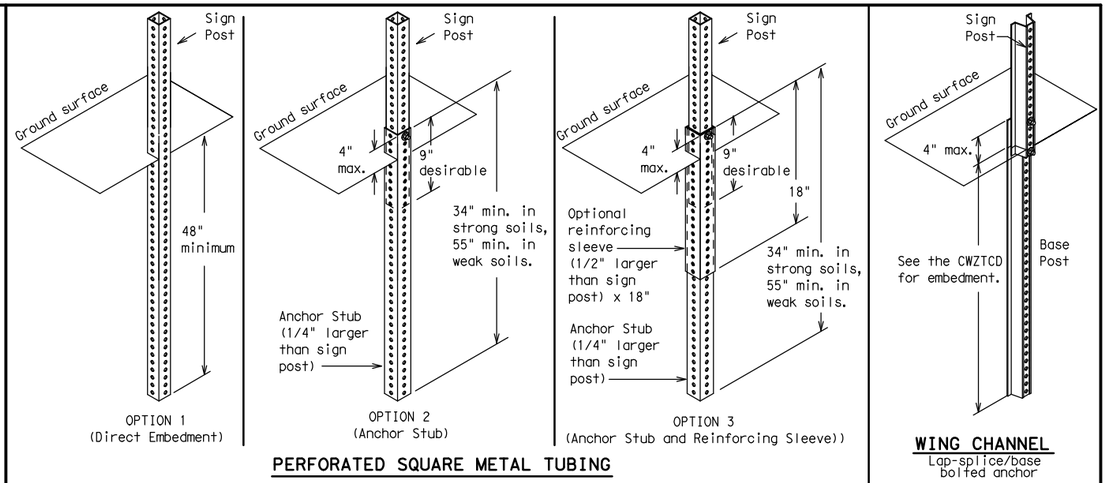
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	BASTROP		26





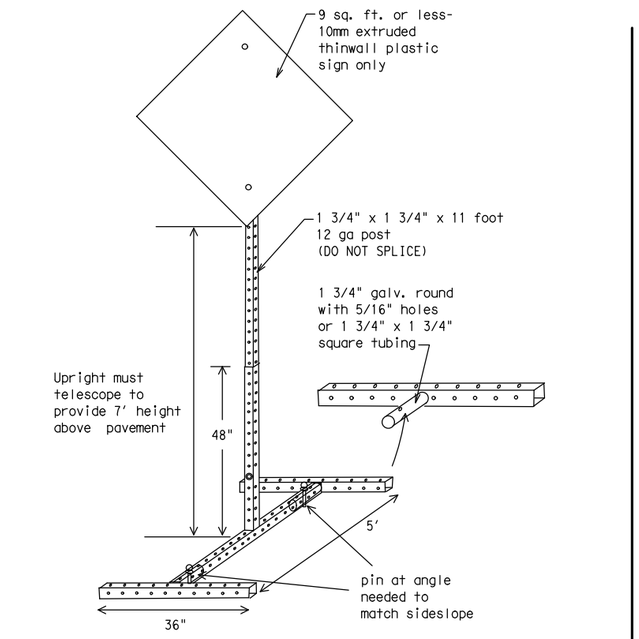
SKID MOUNTED WOOD SIGN SUPPORTS

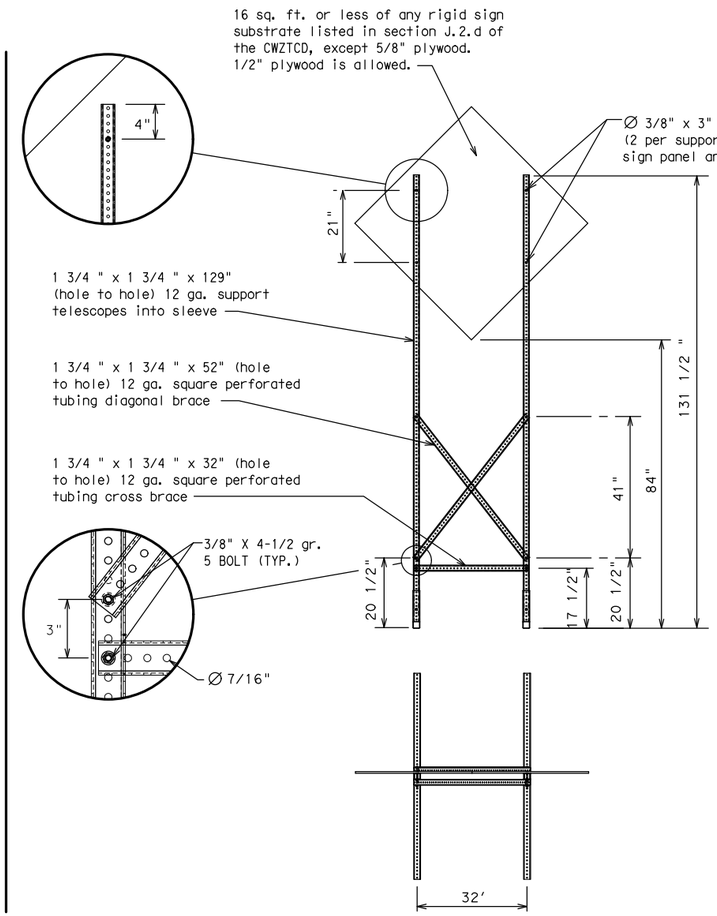
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

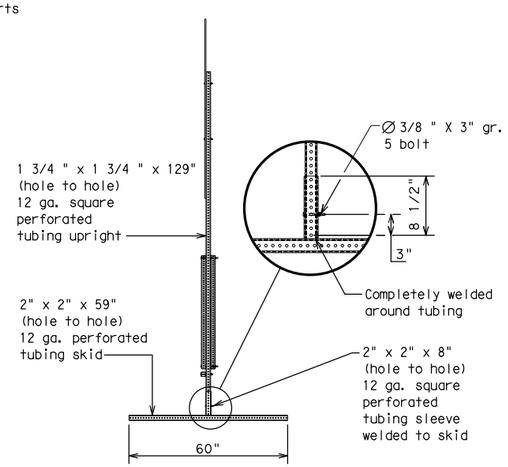


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

1. Nails may be used in the assembly of wooden sign supports, but 3/8" bolts with nuts or 3/8" x 3 1/2" lag screws must be used on every joint for final connection.
2. No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
3. When project is completed, all sign supports and foundations shall be removed from the project site. This will be considered subsidiary to Item 502.

* See BC(4) for definition of "Work Duration."

** Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.

□ See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

Texas Department of Transportation | Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	BASTROP		27

DATE:
FILE:

DATE:
FILE:

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

- ROADWORK XXX FT
- ROAD REPAIRS XXXX FT
- FLAGGER XXXX FT
- LANE NARROWS XXXX FT
- RIGHT LN NARROWS XXXX FT
- TWO-WAY TRAFFIC XX MILE
- MERGING TRAFFIC XXXX FT
- CONST TRAFFIC XXX FT
- LOOSE GRAVEL XXXX FT
- UNEVEN LANES XXXX FT
- DETOUR X MILE
- ROUGH ROAD XXXX FT
- ROADWORK PAST SH XXXX
- ROADWORK NEXT FRI-SUN
- BUMP XXXX FT
- US XXX EXIT X MILES
- TRAFFIC SIGNAL XXXX FT
- LANES SHIFT ✳

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

- MERGE RIGHT
- FORM X LINES RIGHT
- DETOUR NEXT X EXITS
- USE XXXXX RD EXIT
- USE EXIT XXX
- USE EXIT I-XX NORTH
- STAY ON US XXX SOUTH
- USE I-XX E TO I-XX N
- TRUCKS USE US XXX N
- WATCH FOR TRUCKS
- WATCH FOR TRUCKS
- EXPECT DELAYS
- EXPECT DELAYS
- PREPARE TO STOP
- REDUCE SPEED XXX FT
- END SHOULDER USE
- USE OTHER ROUTES
- WATCH FOR WORKERS
- STAY IN LANE ✳

Location List

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

Warning List

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

✳✳ Advance Notice List

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

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

✳✳ See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Safety Division Standard

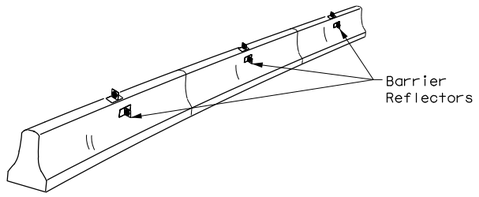
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	BASTROP		28

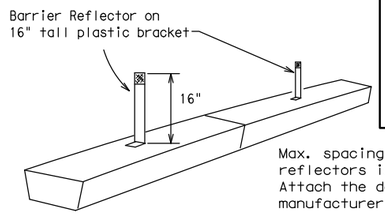
DATE:
FILE:

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



CONCRETE TRAFFIC BARRIER (CTB)

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

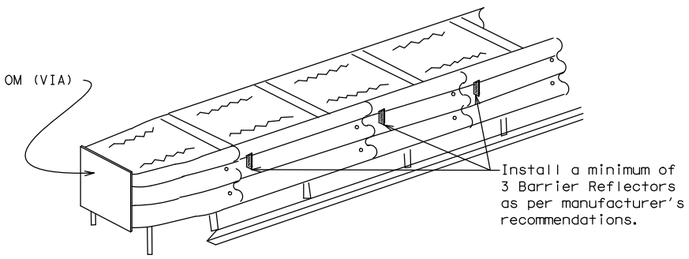


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

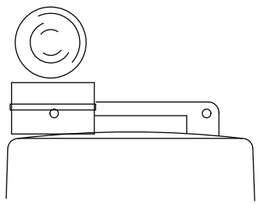


DELINEATION OF END TREATMENTS

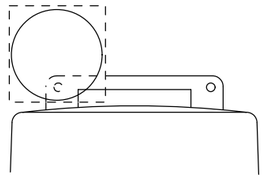
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

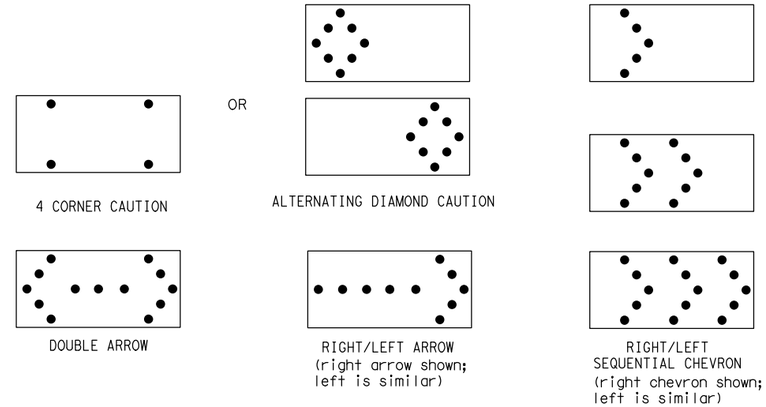
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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	057301		034	SH 304
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	BASTROP		29

101

DATE:
FILE:

GENERAL NOTES

1. For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
2. For intermediate term stationary work zones on freeways, drums should be used as the primary channelizing device but may be replaced in tangent sections by vertical panels, or 42" two-piece cones. In tangent sections, one-piece cones may be used with the approval of the Engineer but only if personnel are present on the project at all times to maintain the cones in proper position and location.
3. For short term stationary work zones on freeways, drums are the preferred channelizing device but may be replaced in tapers, transitions and tangent sections by vertical panels, two-piece cones or one-piece cones as approved by the Engineer.
4. Drums and all related items shall comply with the requirements of the current version of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) and the "Compliant Work Zone Traffic Control Devices List" (CWZTCD).
5. Drums, bases, and related materials shall exhibit good workmanship and shall be free from objectionable marks or defects that would adversely affect their appearance or serviceability.
6. The Contractor shall have a maximum of 24 hours to replace any plastic drums identified for replacement by the Engineer/Inspector. The replacement device must be an approved device.

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

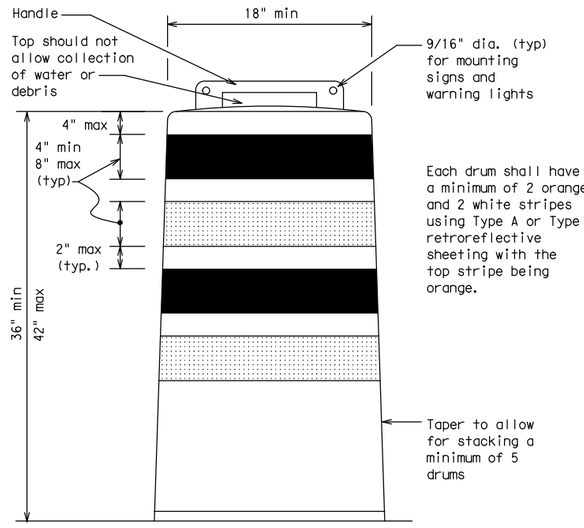
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

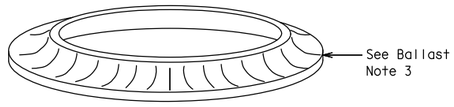
RETROREFLECTIVE SHEETING

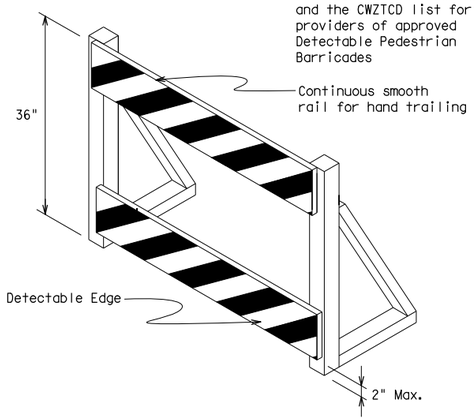
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

BALLAST

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

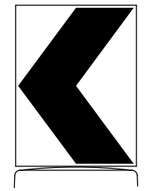




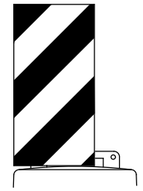


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

.

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

Texas Department of Transportation | Traffic Safety Division Standard

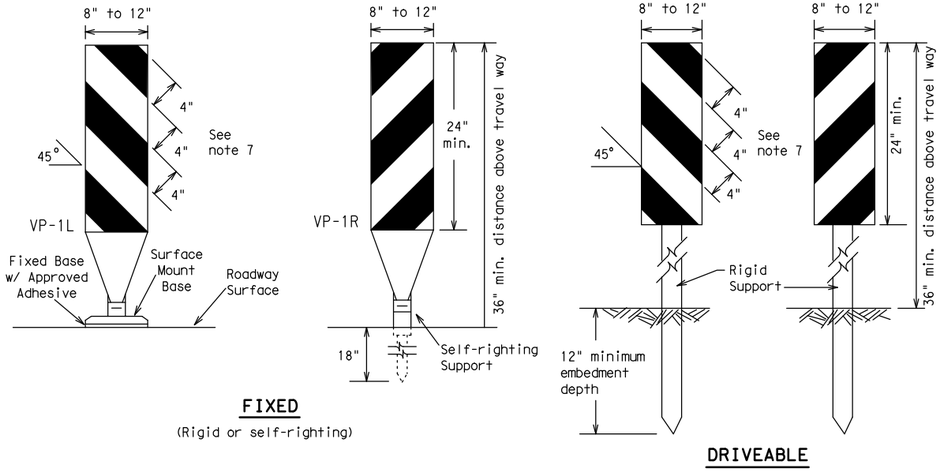
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
4-03 8-14	DIST	COUNTY		SHEET NO.
9-07 5-21	AUS	BASTROP		30
7-13				

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.

DATE:
FILE:



FIXED
(Rigid or self-righting)

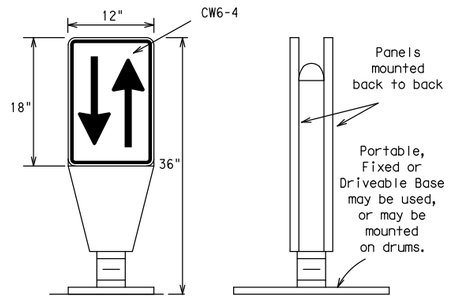
DRIVEABLE

(Rigid or self-righting)

PORTABLE

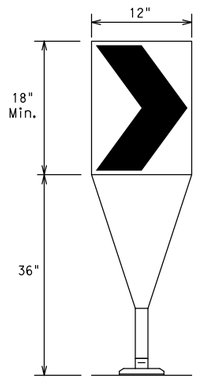
VERTICAL PANELS (VPs)

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.



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



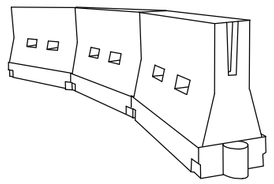
Fixed Base w/ Approved Adhesive
(Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

Posted Speed	Formula	Minimum Desirable Taper Lengths ✻✻ 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

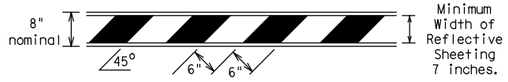
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	BASTROP		31

103

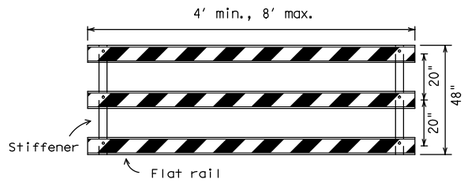
TYPE 3 BARRICADES

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.



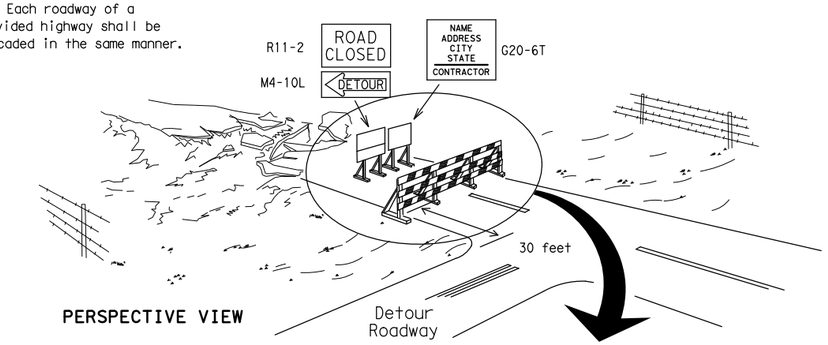
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

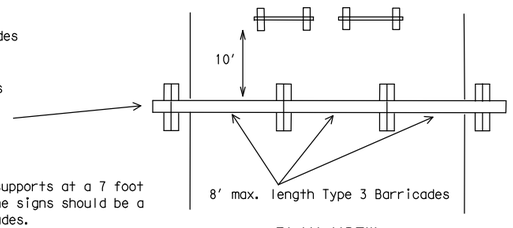
Each roadway of a divided highway shall be barricaded in the same manner.



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.

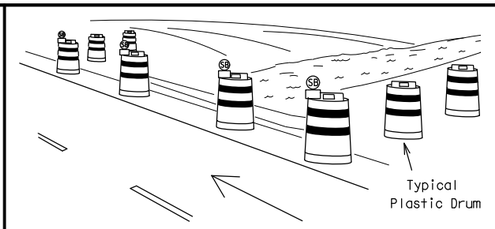
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

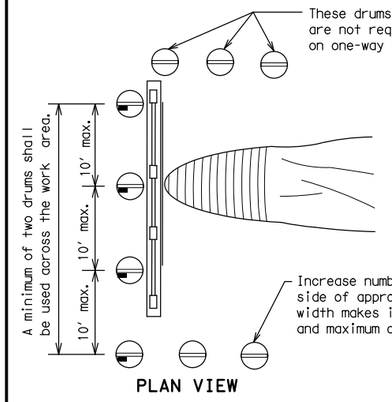
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

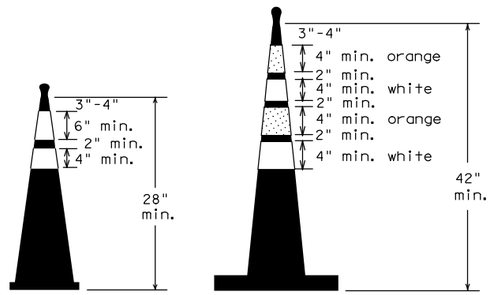
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



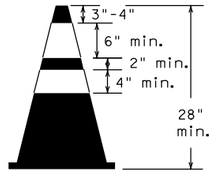
LEGEND	
	Plastic drum
	Plastic drum with steady burn light or yellow warning reflector
SB	Steady burn warning light or yellow warning reflector

PLAN VIEW

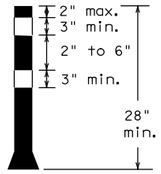
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



Two-Piece cones



One-Piece cones

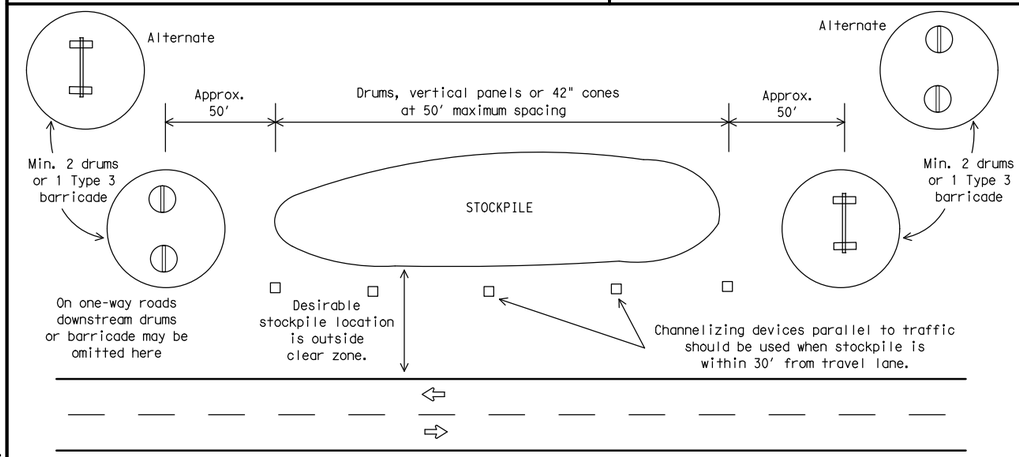


Tubular Marker

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

DATE:
FILE:

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	057301		034	SH 304
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	AUS	BASTROP		32

104

DATE:
FILE:

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.

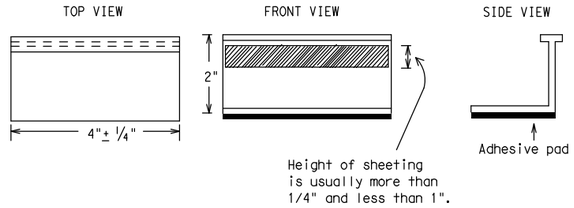
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

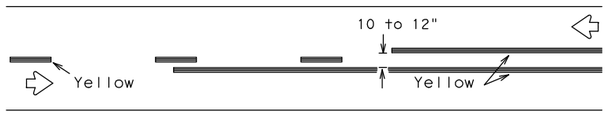
BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

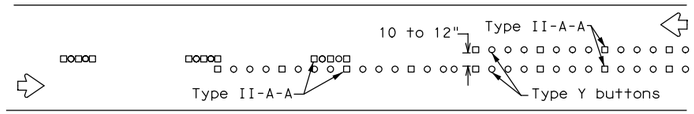
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	AUS	BASTROP		33
11-02 8-14				

DATE:
FILE:

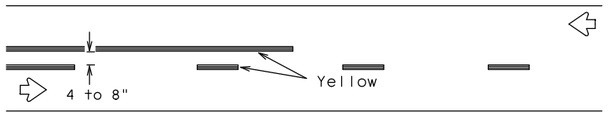
PAVEMENT MARKING PATTERNS



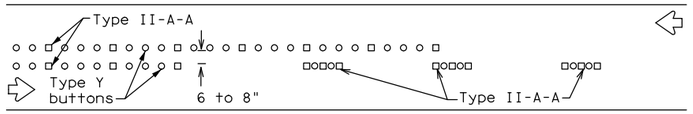
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



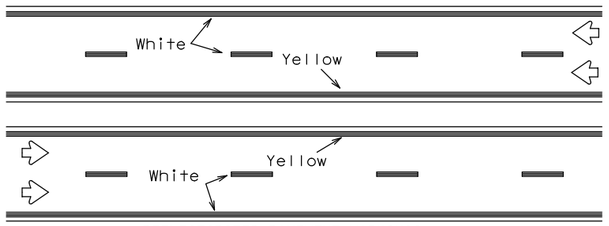
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



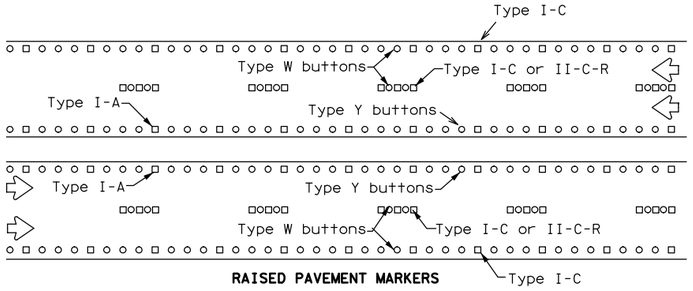
RAISED PAVEMENT MARKERS - PATTERN B

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

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



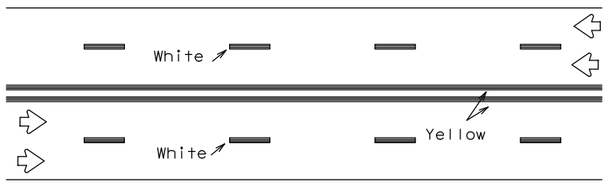
REFLECTORIZED PAVEMENT MARKINGS



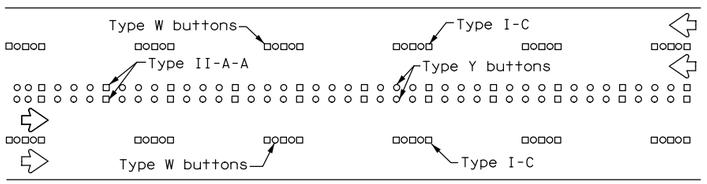
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



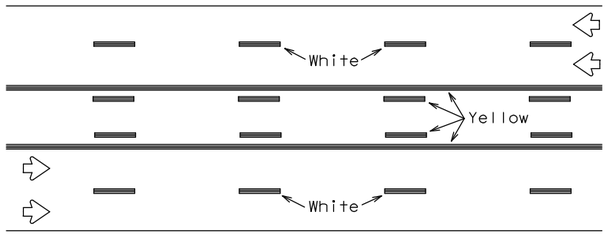
REFLECTORIZED PAVEMENT MARKINGS



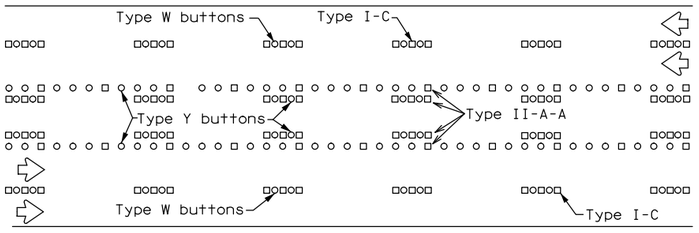
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

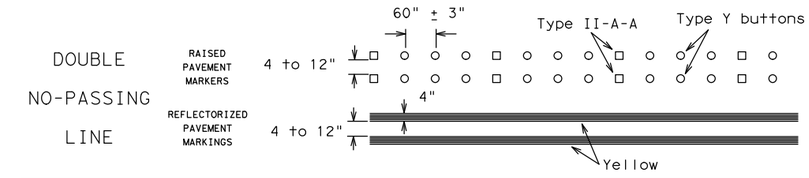
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

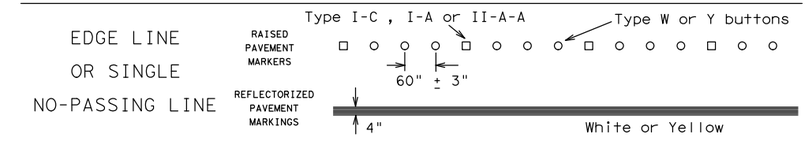
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

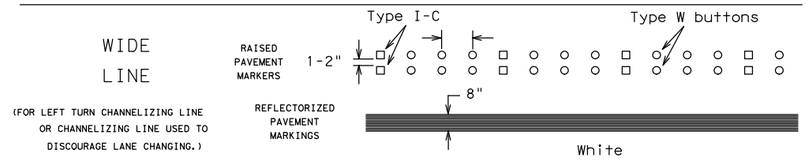


EDGE LINE OR SINGLE NO-PASSING LINE



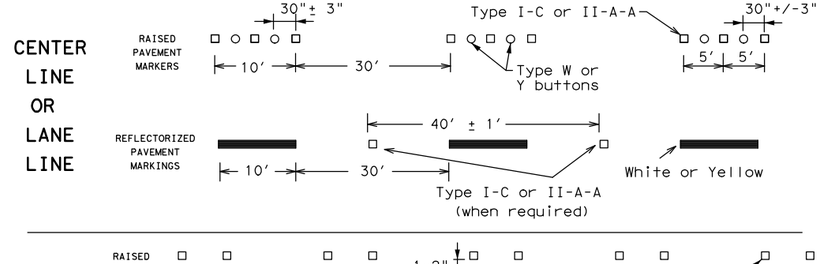
WIDE LINE

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

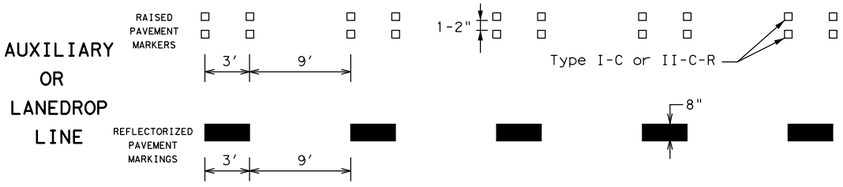


BROKEN LINES

CENTER LINE OR LANE LINE

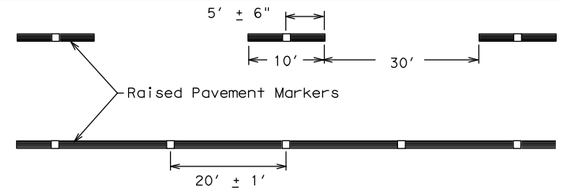


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Safety Division Standard

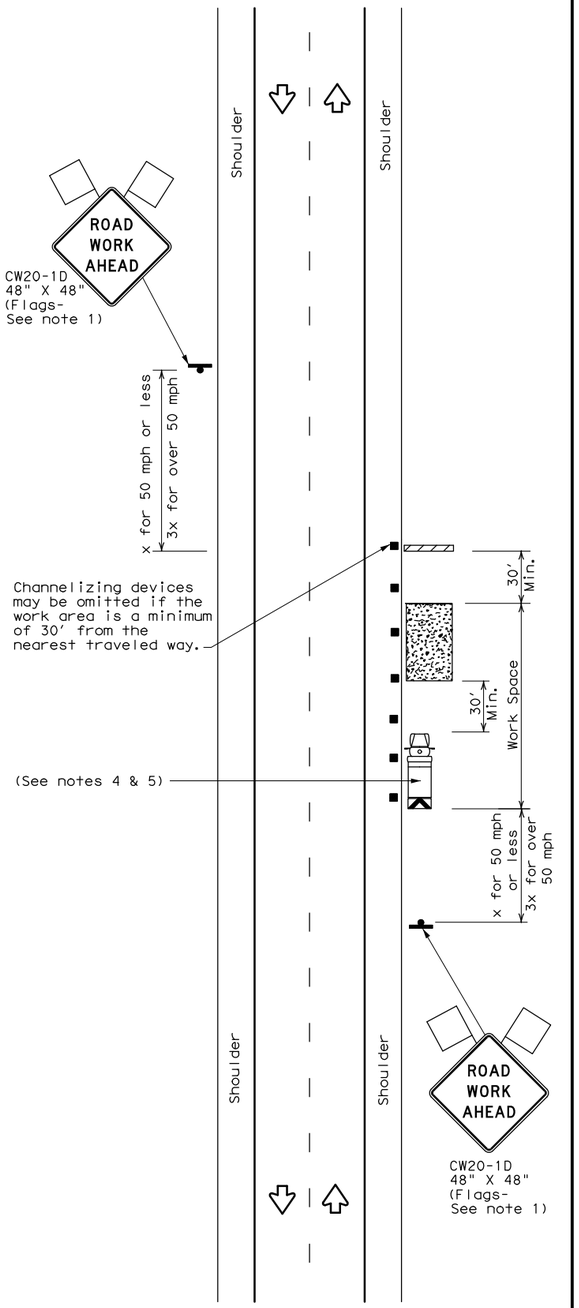
BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS 1-97 9-07 5-21 2-98 7-13 11-02 8-14	057301		034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		34

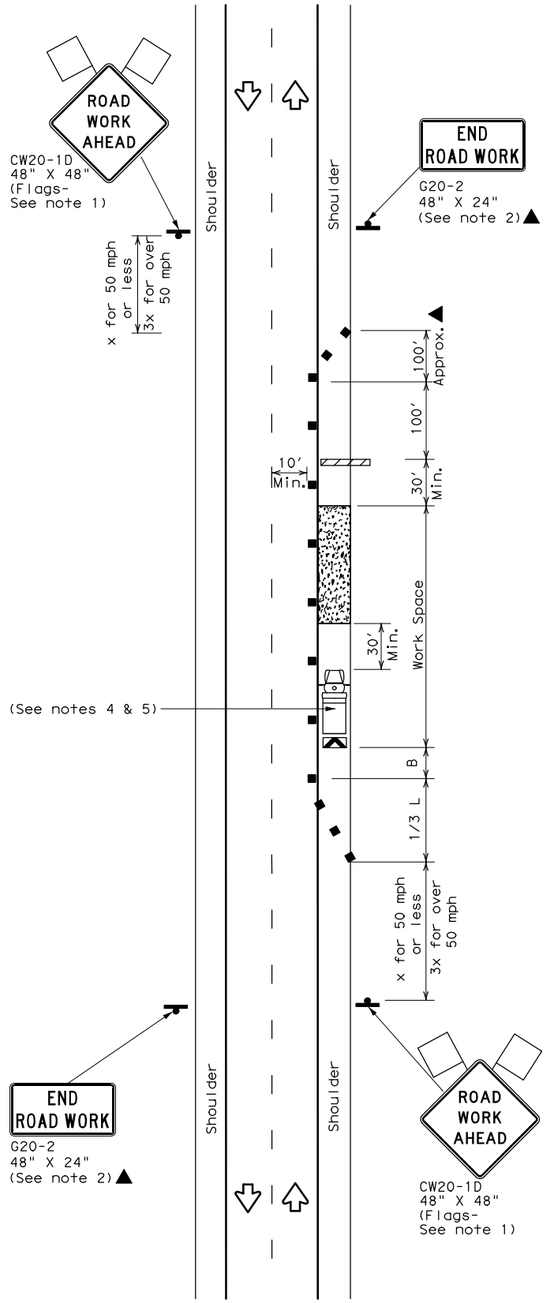
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



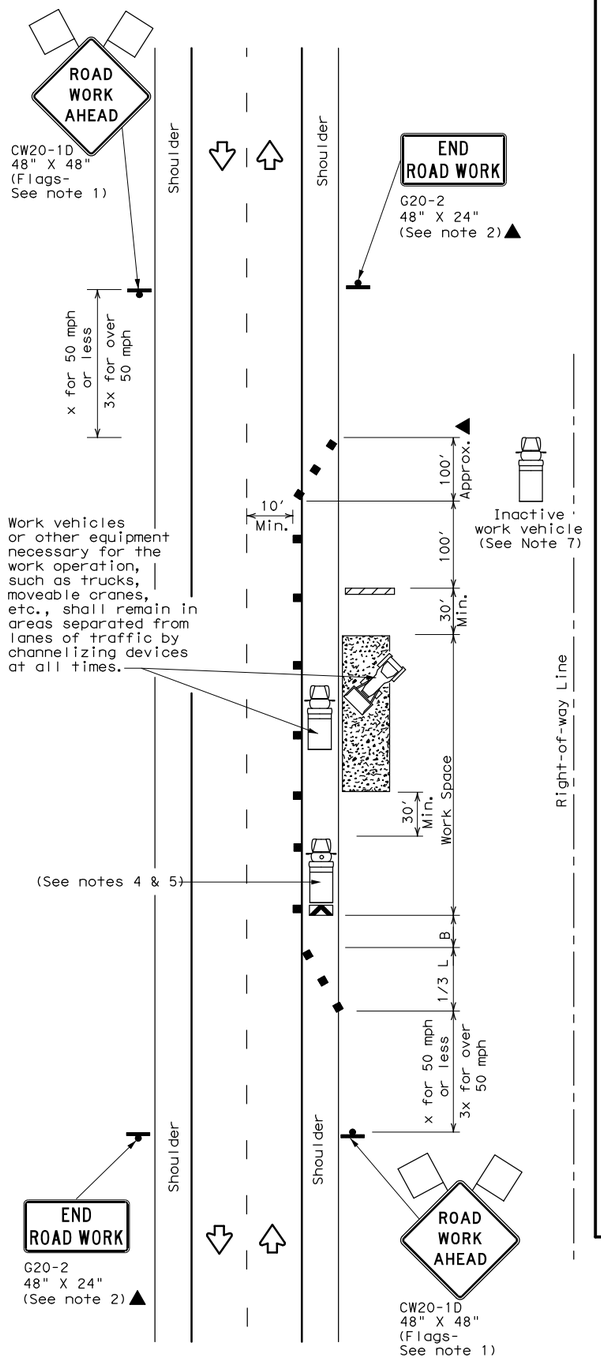
TCP (2-1a)

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 CW21-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

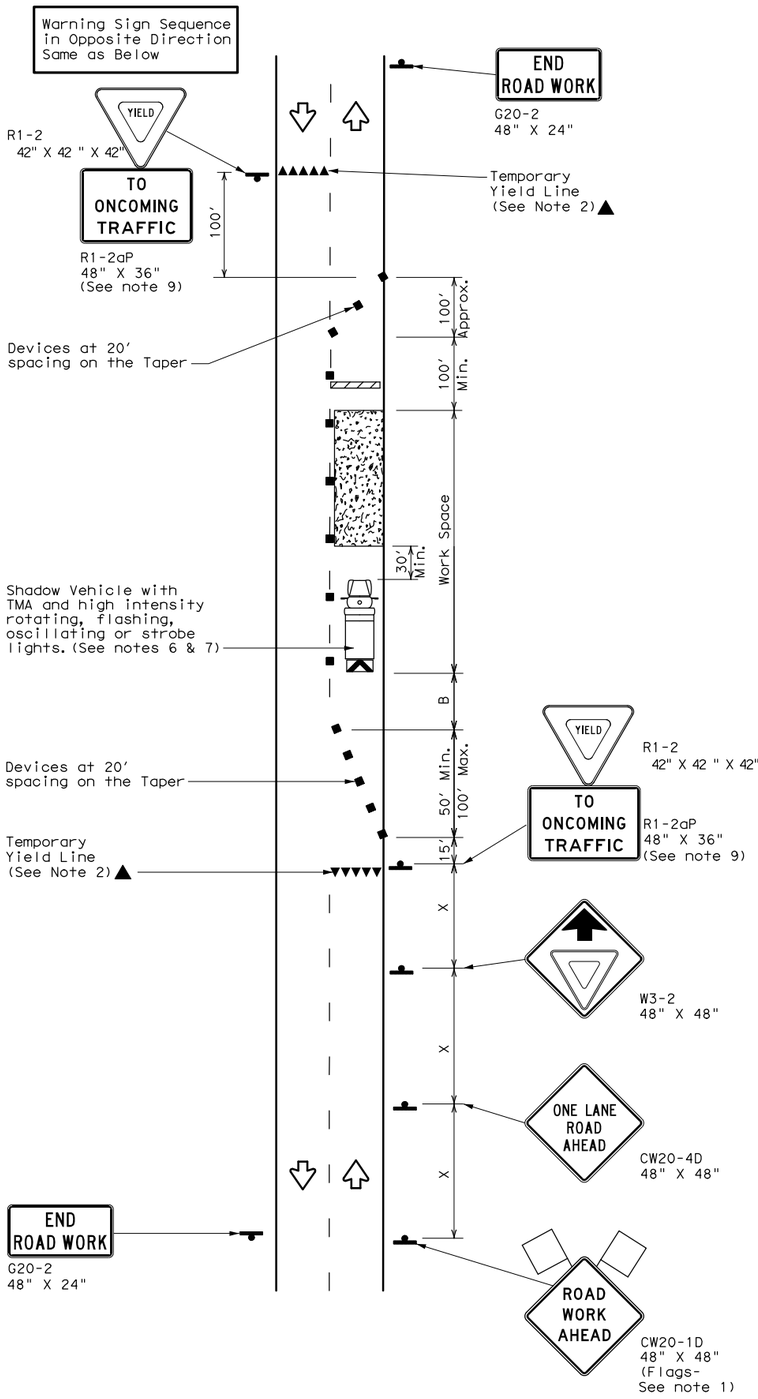
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

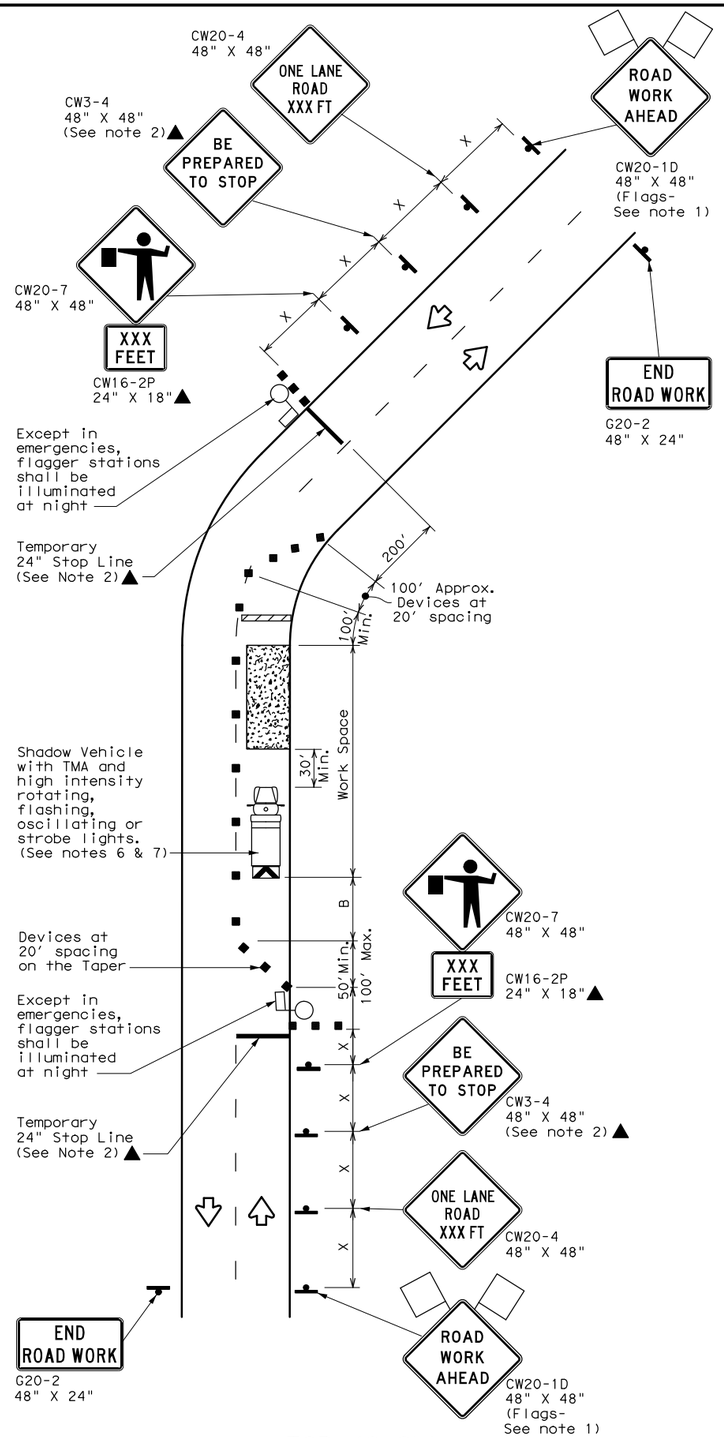
TCP(2-1)-18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	AUS	BASTROP		35
1-97 2-18				

DATE:
FILE:



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

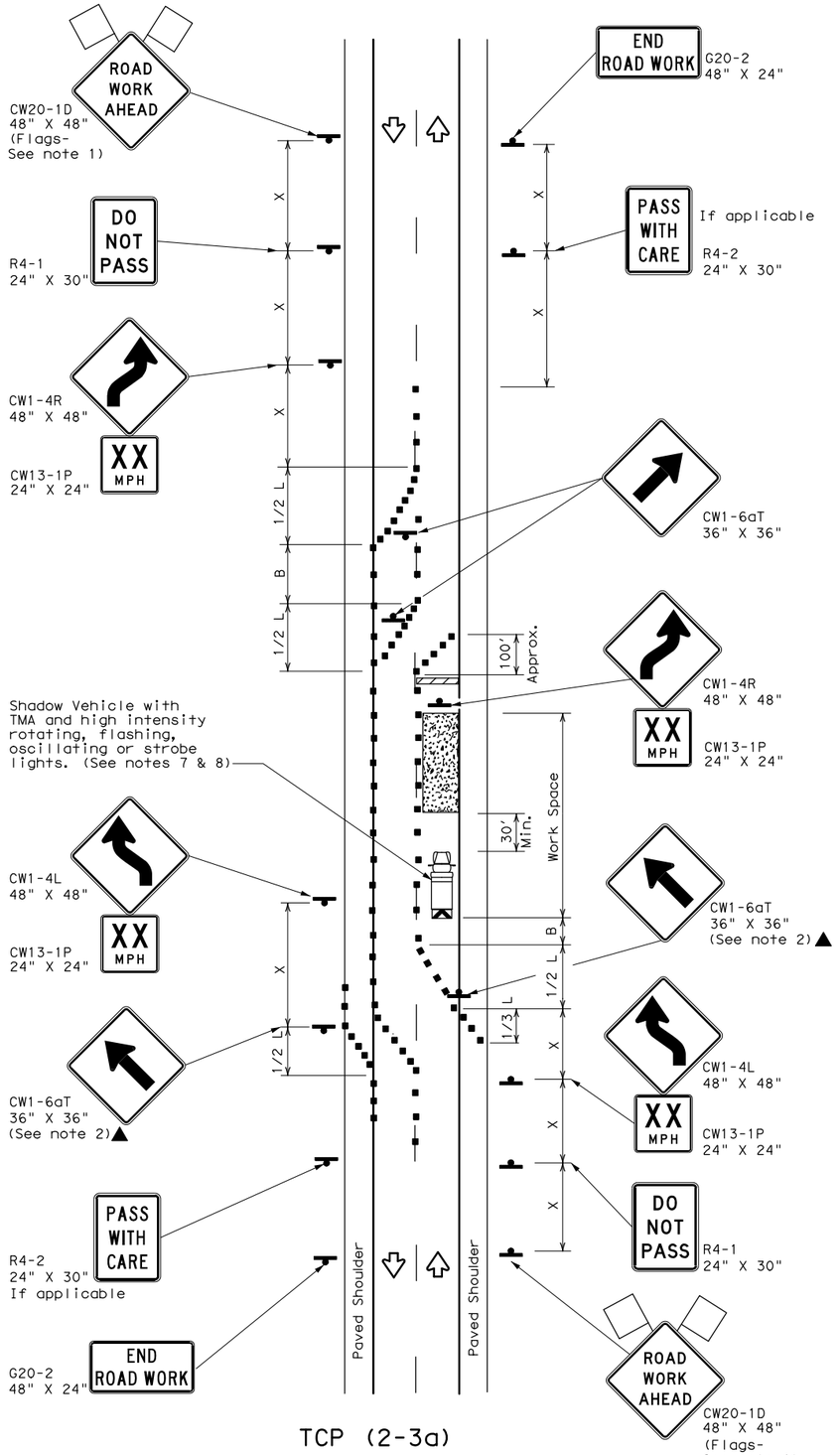
TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL

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	057301		034	SH 304
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	AUS	BASTROP		36

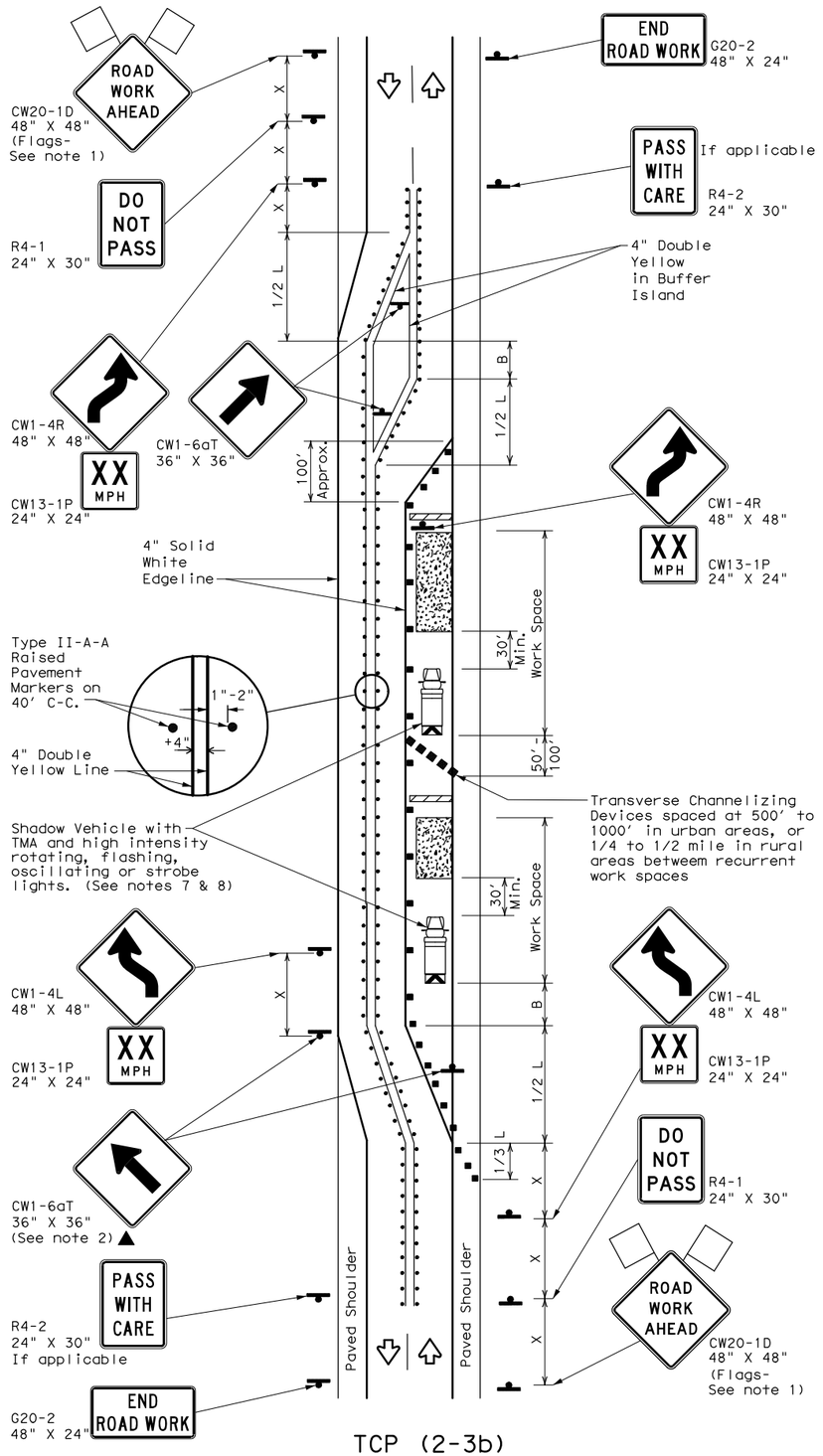
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:



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

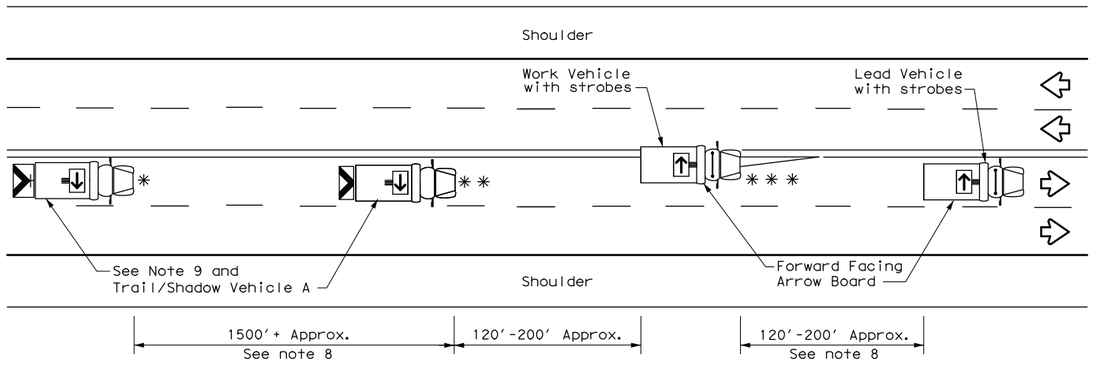
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

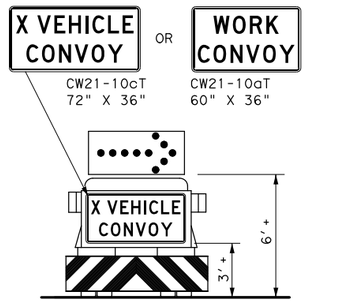
FILE: tcp(2-3)-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	AUS	BASTROP		37
4-98 2-18				

DATE:
FILE:



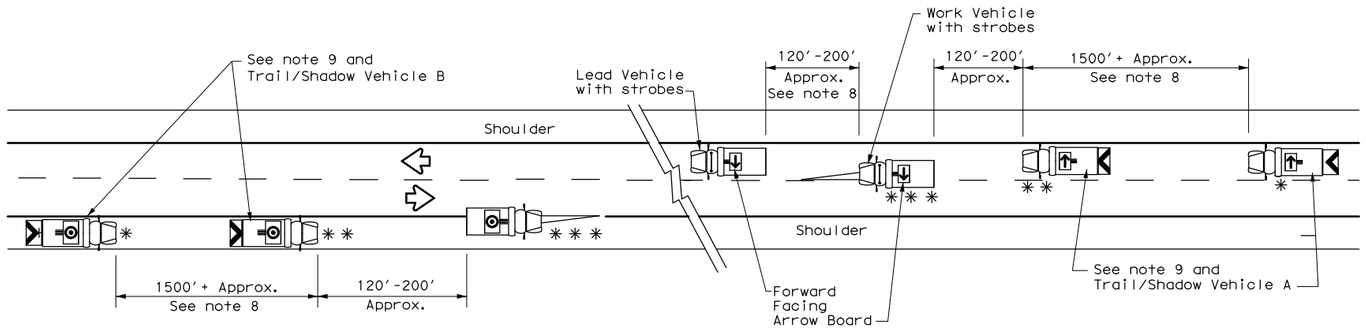
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

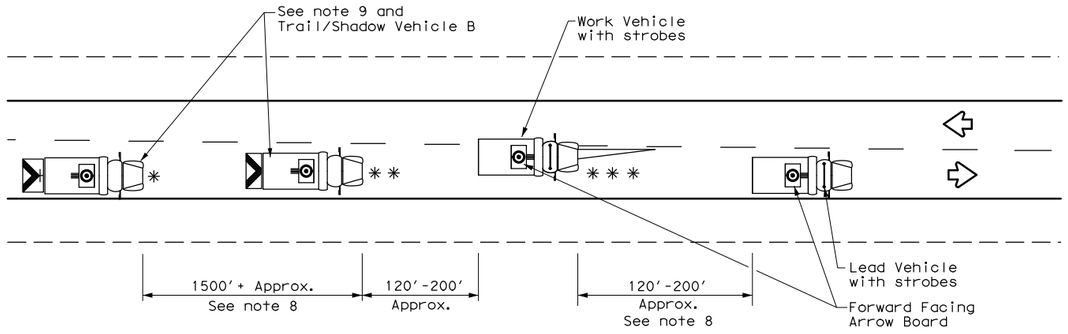


WORK ON SHOULDER

WORK ON TRAVEL LANE

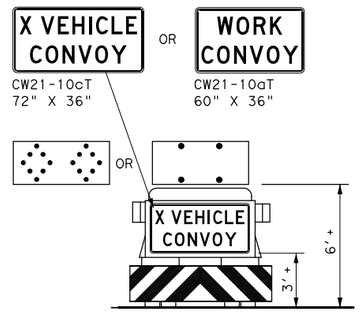
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

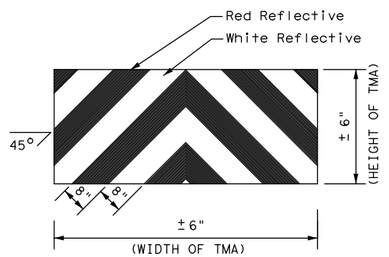
with Flashing Arrow Board in CAUTION display

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

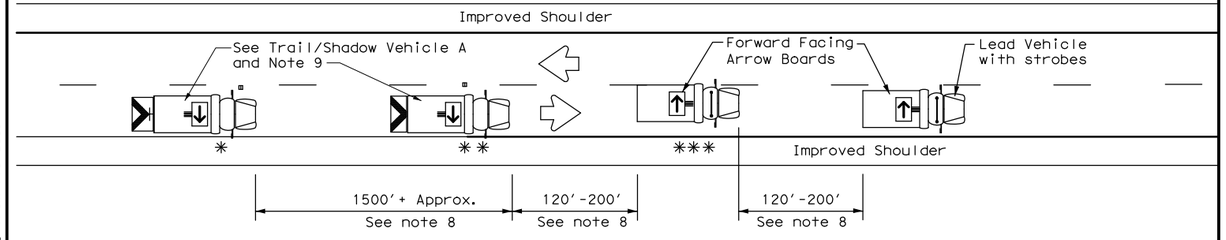
Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

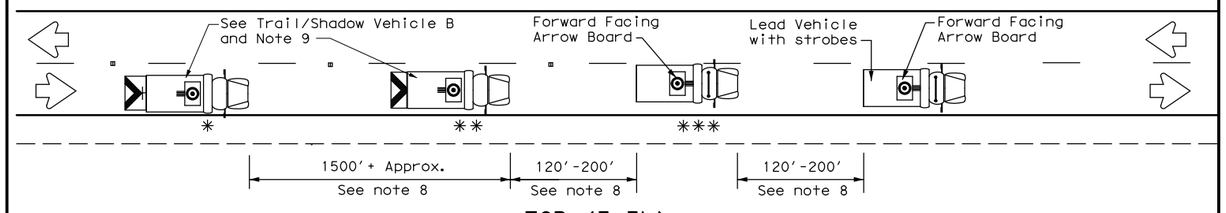
TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 2-94 4-98 8-95 7-13 1-97	057301		034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		38



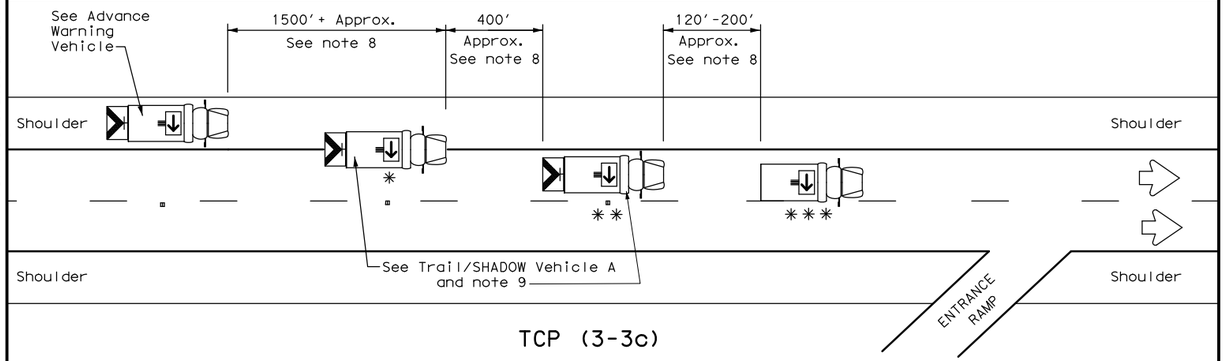
TCP (3-3a)

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



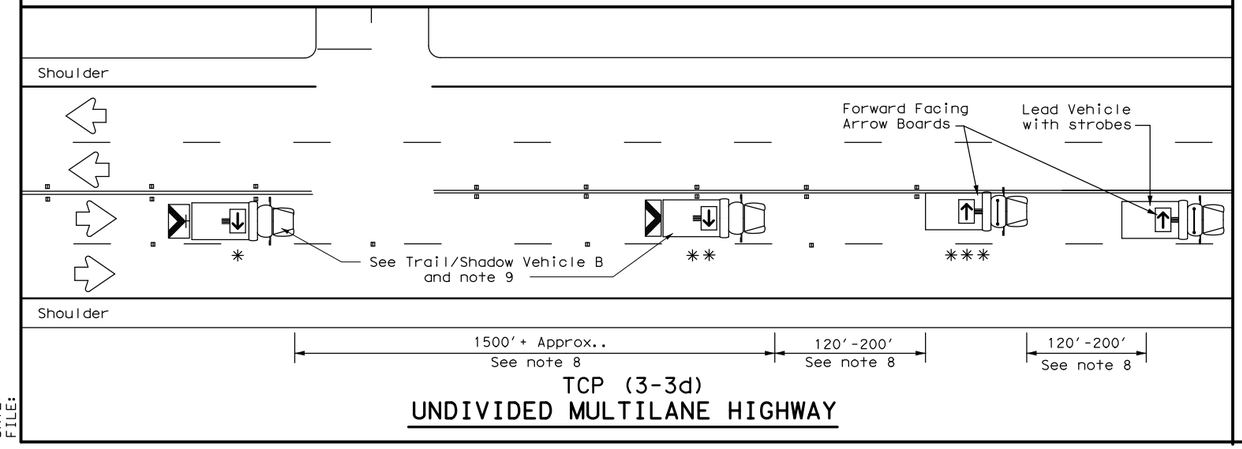
TCP (3-3b)

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



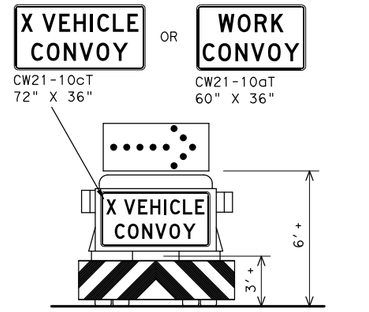
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



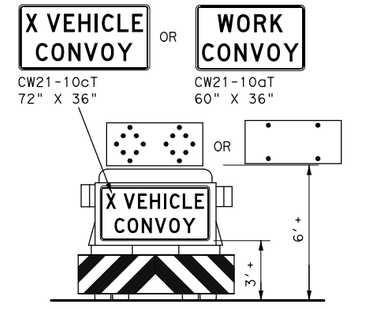
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



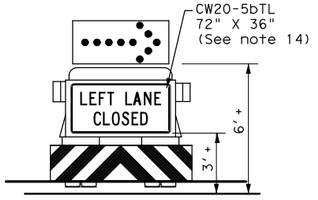
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

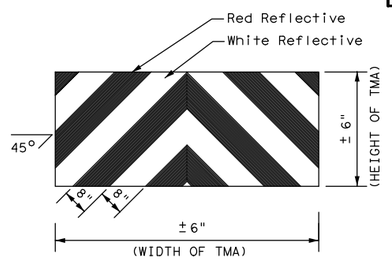


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

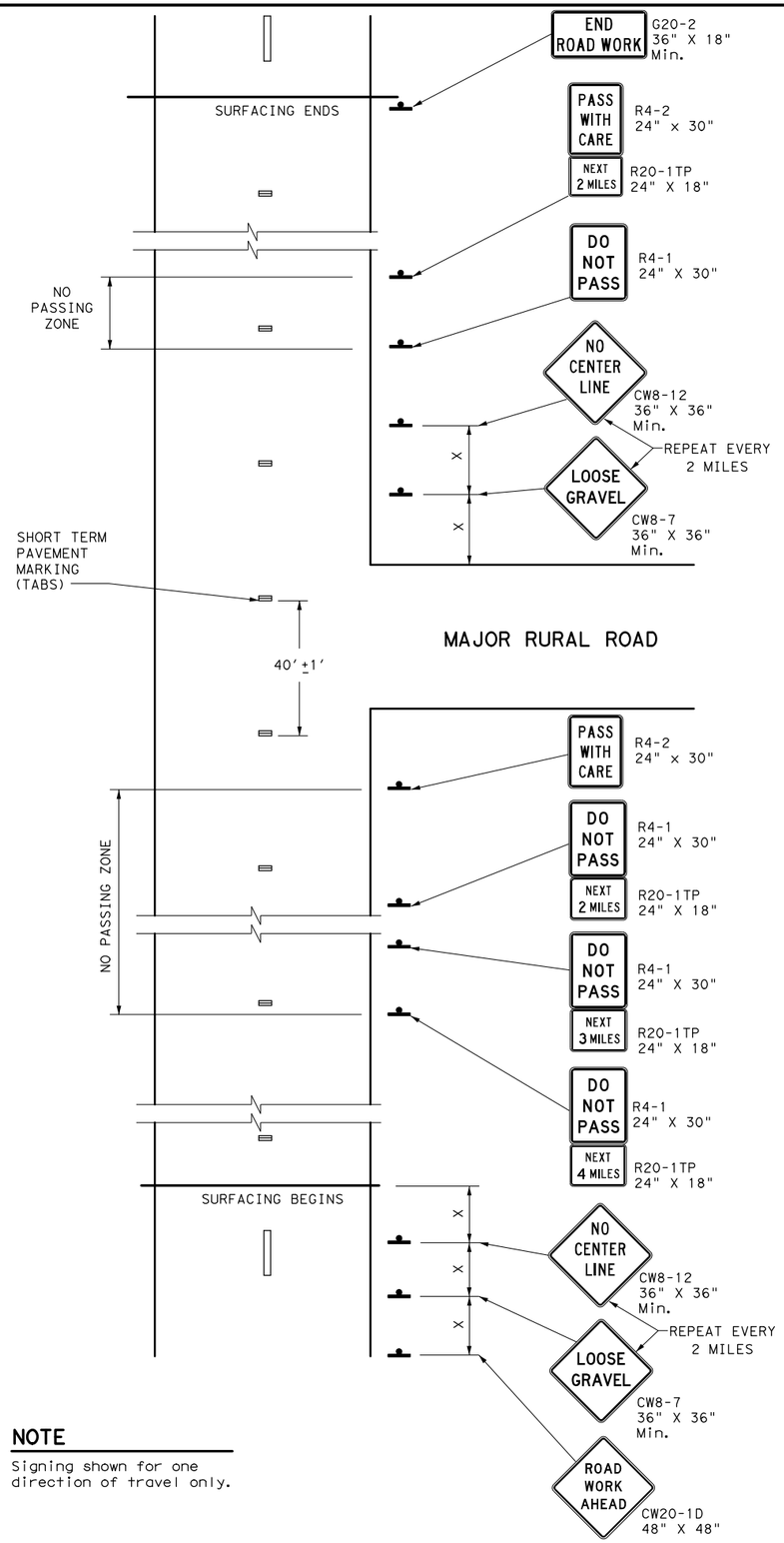
TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL

TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	AUS	BASTROP		39
1-97 7-14				

DATE:
FILE:

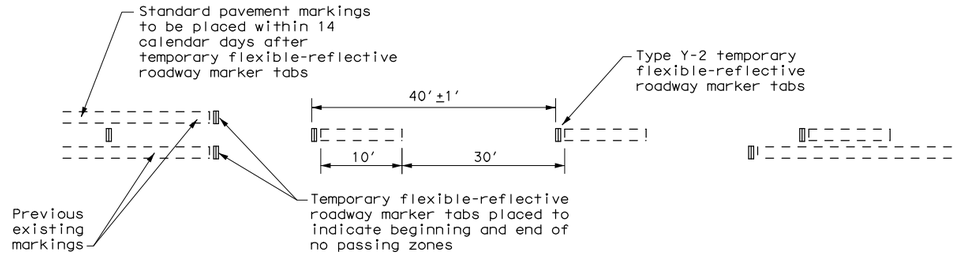
DATE:
FILE:



NOTE

Signing shown for one direction of travel only.

NO PASSING ZONES ON TWO-LANE TWO-WAY ROADS



TABS ON CENTERLINES OF TWO-LANE TWO-WAY ROADS

For seal coat, micro-surface or similar operations

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

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

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

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

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

"NO CENTER LINE" SIGN (CW8-12)

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

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

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

"LOOSE GRAVEL" SIGN (CW8-7)

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

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

PAVEMENT MARKINGS

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

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

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

COORDINATION OF SIGN LOCATIONS

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

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

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

* Conventional Roads Only

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL DETAILS FOR SURFACING OPERATIONS

TCP(7-1)-13

FILE: tcp7-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 1991	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
4-92 4-98	DIST	COUNTY		SHEET NO.
1-97 7-13	AUS	BASTROP		40

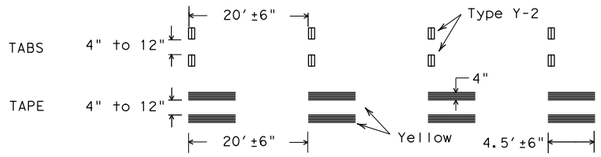
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

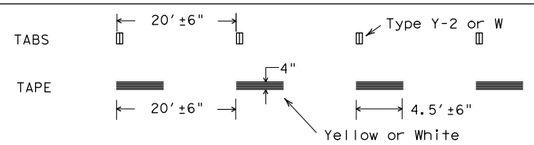
WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

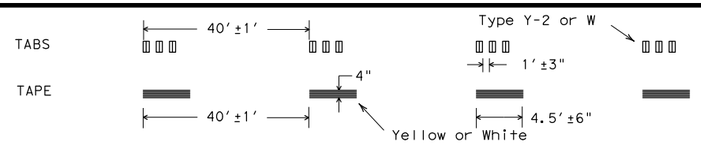


SINGLE NO-PASSING LINE or CHANNELIZATION LINE



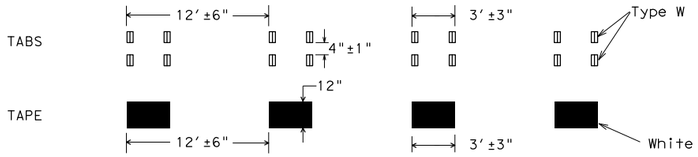
BROKEN LINES

(FOR CENTER LINE OR LANE LINE)

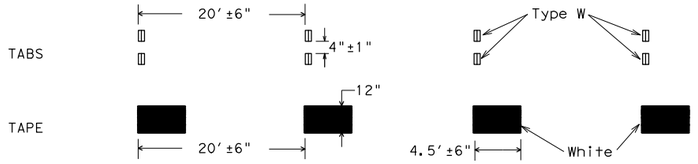


WIDE DOTTED LINES

(FOR LANE DROP LINES)



WIDE GORE MARKINGS



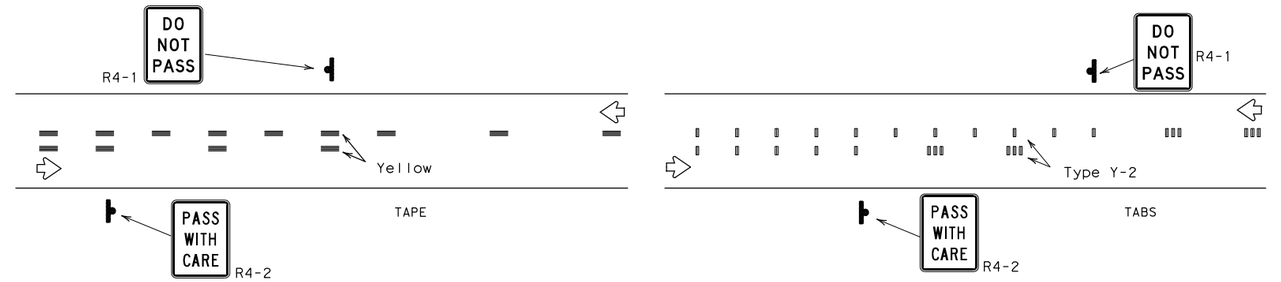
NOTES:

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.

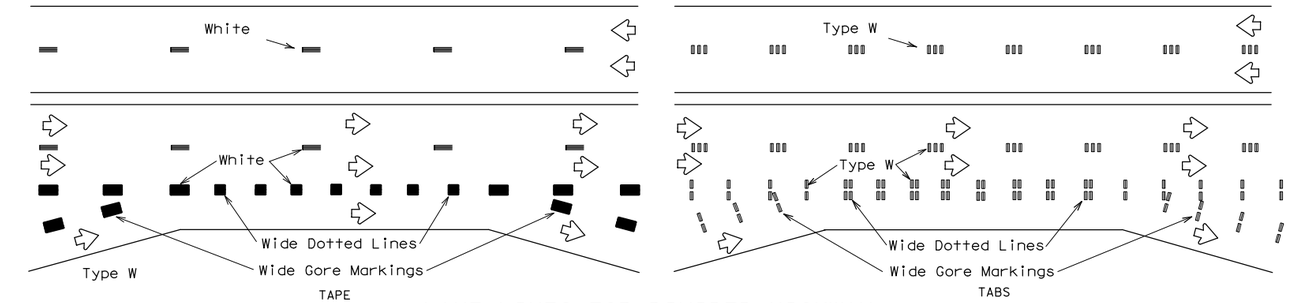
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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.

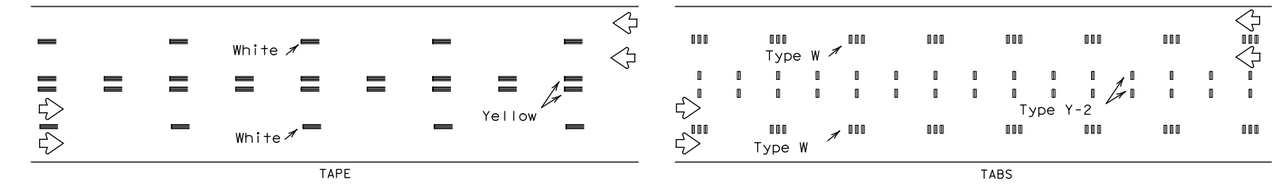
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



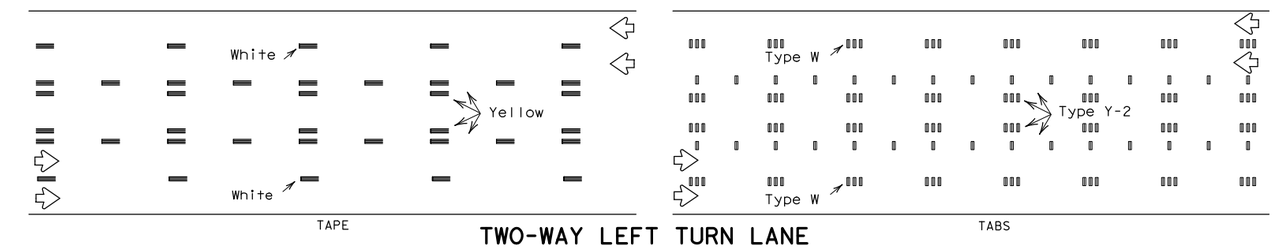
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



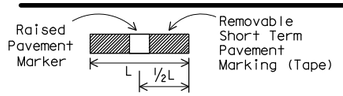
LANE LINES FOR DIVIDED HIGHWAY



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

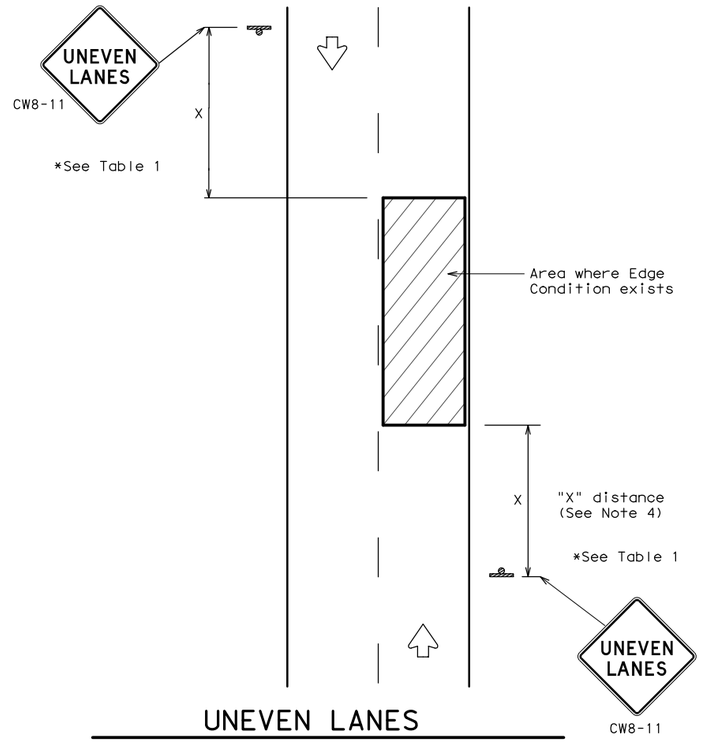
WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

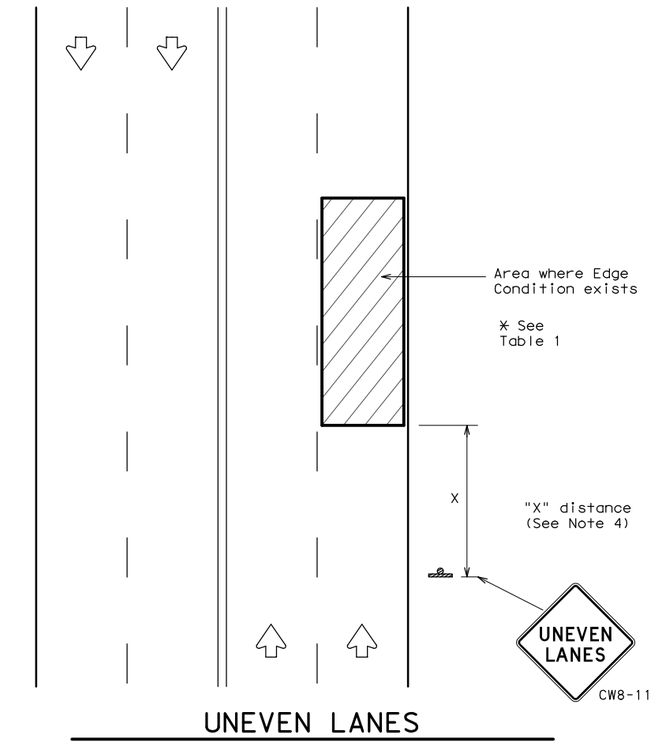
FILE:	wzstpm-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS		057301		034	SH 304
1-97		DIST	COUNTY		SHEET NO.
3-03		AUS	BASTROP		41
7-13					

111

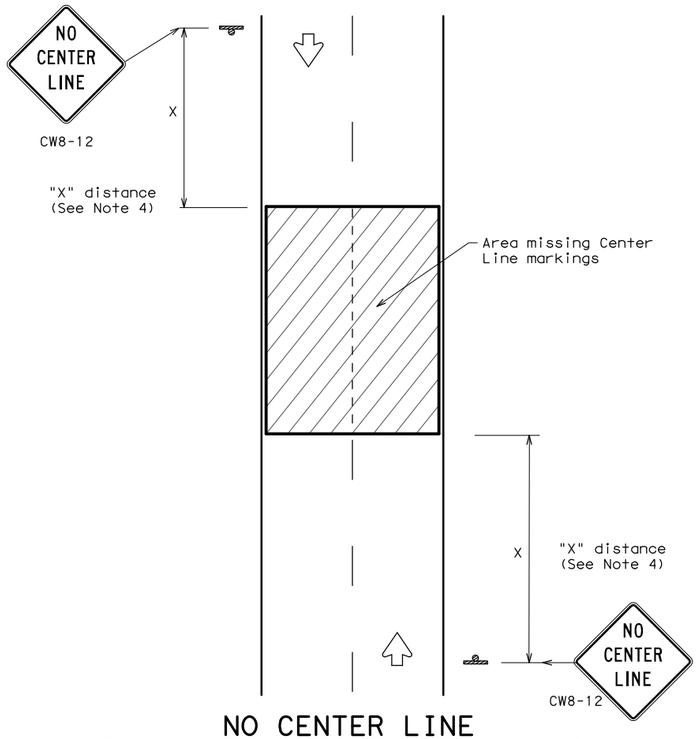
DATE:
FILE:



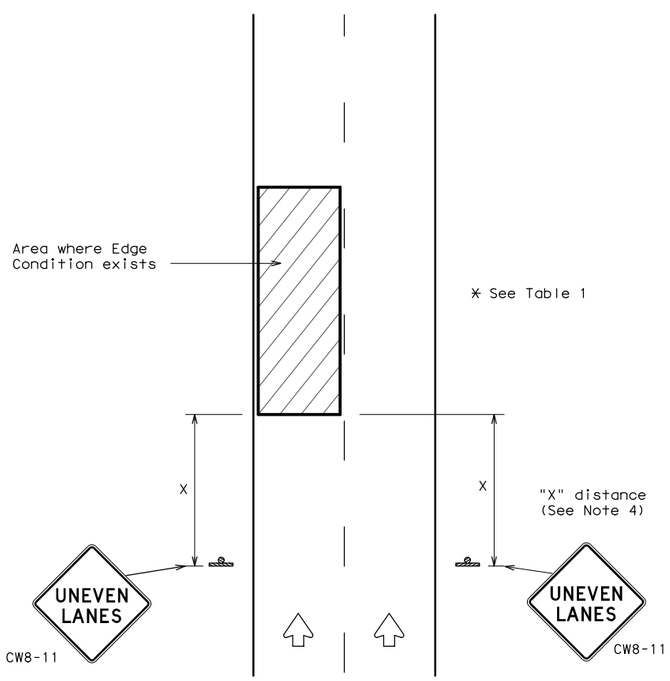
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

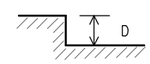
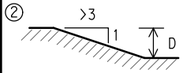
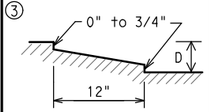
DEPARTMENTAL MATERIAL SPECIFICATIONS	
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

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

TABLE 1

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

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

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

Texas Department of Transportation

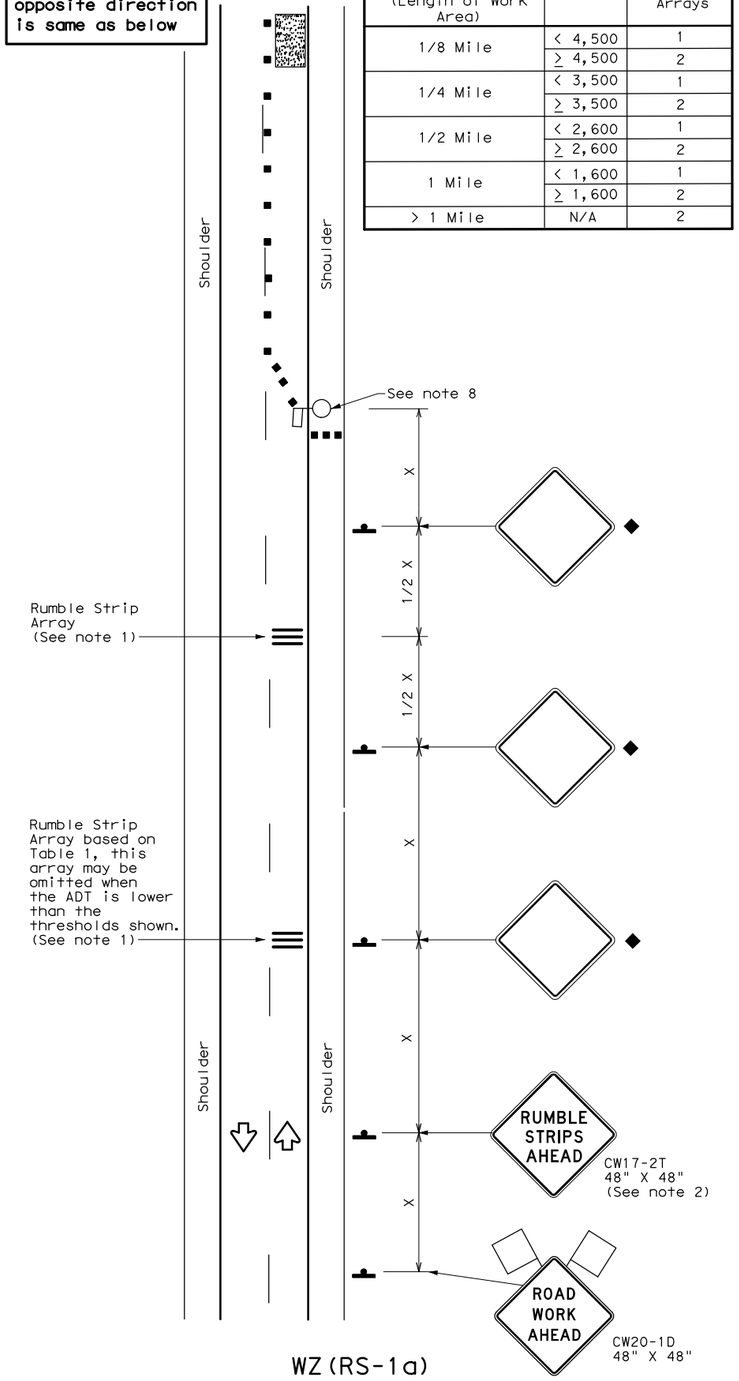
Traffic Operations Division Standard

SIGNING FOR UNEVEN LANES

WZ(UL)-13

FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
8-95 2-98 7-13	DIST	COUNTY		SHEET NO.
1-97 3-03	AUS	BASTROP		42

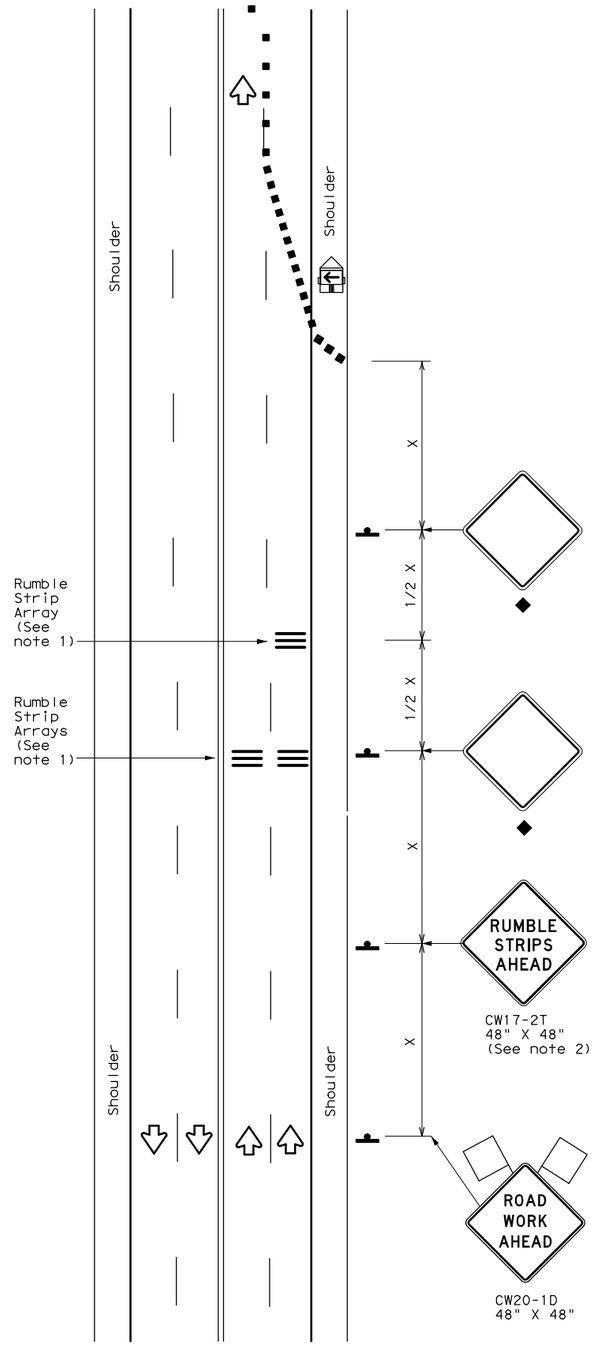
Warning sign and rumble strip sequence in opposite direction is same as below



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION

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



WZ(RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

* Conventional Roads Only

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

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

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

TABLE 2	
Speed	Approximate distance between strips in an Array
≤ 40 MPH	10'
> 40 MPH & ≤ 55 MPH	15'
> 55 MPH	20'

Texas Department of Transportation

Traffic Operations Division Standard

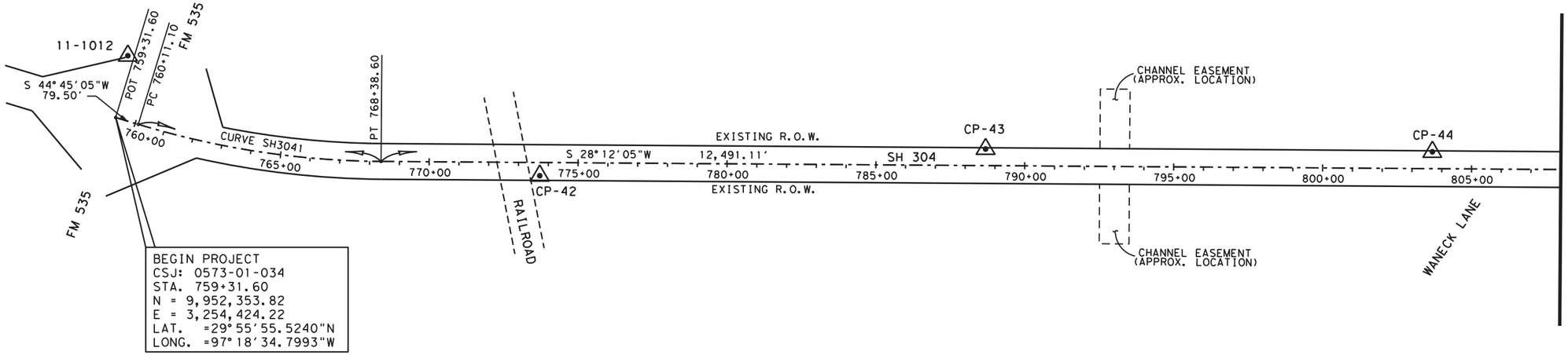
TEMPORARY RUMBLE STRIPS

WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	057301		034	SH 304
2-14	DIST	COUNTY		SHEET NO.
4-16	AUS	BASTROP		43

DATE:
FILE:

CURVE SH3041
PI STATION = 764+27.75
DELTA = 16°33'00" (LT)
DEGREE OF CURVE = 02°00'00"
TANGENT = 416.65'
LENGTH = 827.50'
RADIUS = 2,864.79'
PC STATION = 760+11.10
PT STATION = 768+38.60



BEGIN PROJECT
CSJ: 0573-01-034
STA. 759+31.60
N = 9,952,353.82
E = 3,254,424.22
LAT. =29°55'55.5240"N
LONG. =97°18'34.7993"W

0 200 400
SCALE: 1"=200' (22" x 34" SHEET)
SCALE: 1"=400' (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83), BASED ON TXDOT VRS GPS OBSERVATIONS. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000030 FOR BASTROP COUNTY. UNIT OF MEASURE IS U.S. SURVEY FOOT.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON DIFFERENTIAL LEVELING.
3. FIELD SURVEYS WERE PERFORMED BETWEEN JUNE, 2018 TO MARCH, 2019.

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/27/2021

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

CONTROL MONUMENTATION

POINT NO.	NORTHING (Y)	EASTING (X)	ELEVATION	STATION	OFFSET	DESCRIPTION
11-1012	9,952,220.58	3,254,589.21	467.34'	N/A	N/A	SET TXDOT ALUM. CAP IN CONC. STAMPED "11-1012"
CP-42	9,951,185.32	3,253,587.27	457.75'	773+71.66	44.06'RT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-43	9,949,819.15	3,252,968.39	448.77'	788+68.12	56.13'LT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-44	9,948,496.41	3,252,260.15	452.88'	803+68.53	57.05'LT	SET 5/8" IR w/TXDOT ALUM. CAP

CONTROL MONUMENT INVERSE

FROM	BEARING	DIST	TO
11-1012	S 44°03'46"W	1,440.71'	CP-42
CP-42	S 24°22'15"W	1,499.82'	CP-43
CP-43	S 28°09'58"W	1,500.41'	CP-44
CP-44	S 32°18'18"W	1,499.87'	CP-45

Texas Department of Transportation

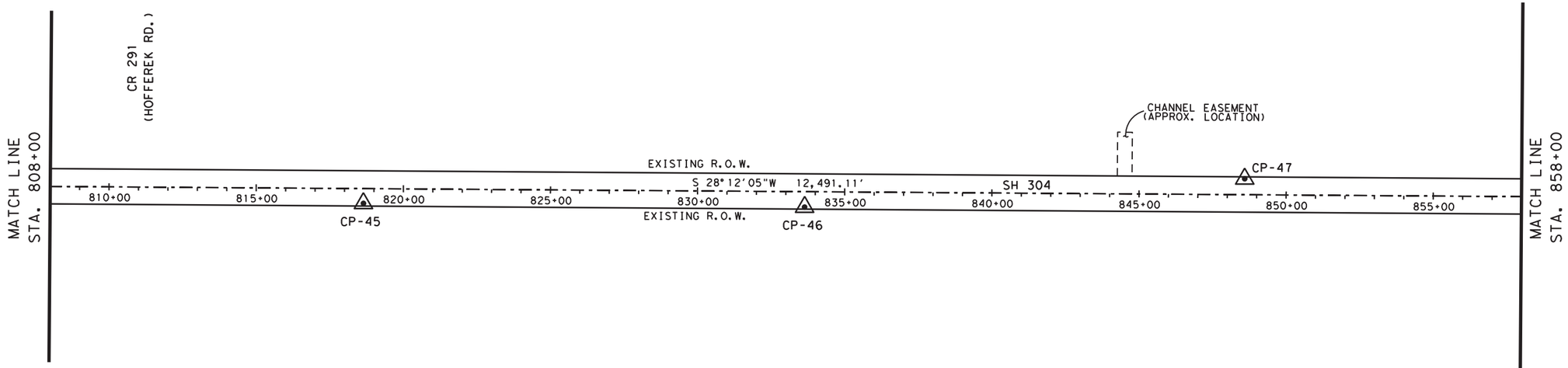
LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

SH 304
SURVEY CONTROL INDEX

SHEET 1 OF 7

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TX					SH 304
STATE DIST.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
AUS	BASTROP		0573	01	034	44

S:\2018\1820106\CADD\SH 304 Survey control map\057301034*Survey Control Index*01.dgn



0 200 400

SCALE: 1"=200' (22" x 34" SHEET)
SCALE: 1"=400' (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83), BASED ON TXDOT VRS GPS OBSERVATIONS. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000030 FOR BASTROP COUNTY. UNIT OF MEASURE IS U.S. SURVEY FOOT.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON DIFFERENTIAL LEVELING.
3. FIELD SURVEYS WERE PERFORMED BETWEEN JUNE, 2018 TO MARCH, 2019.

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/27/2021

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

CONTROL MONUMENTATION

POINT NO.	NORTHING (Y)	EASTING (X)	ELEVATION		OFFSET	DESCRIPTION
CP-45	9,947,228.70	3,251,458.58	475.85'	818+64.56	50.28'RT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-46	9,945,908.39	3,250,748.18	488.22'	833+63.85	52.41'RT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-47	9,944,540.62	3,250,135.60	487.06'	848+58.74	54.10'LT	SET 5/8" IR w/TXDOT ALUM. CAP

CONTROL MONUMENT INVERSE

FROM	BEARING	DIST	TO
CP-44	S 32°18'18"W	1,499.87'	CP-45
CP-45	S 28°16'58"W	1,499.30'	CP-46
CP-46	S 24°07'34"W	1,498.68'	CP-47
CP-47	S 32°19'23"W	1,498.79'	CP-48

Texas Department of Transportation

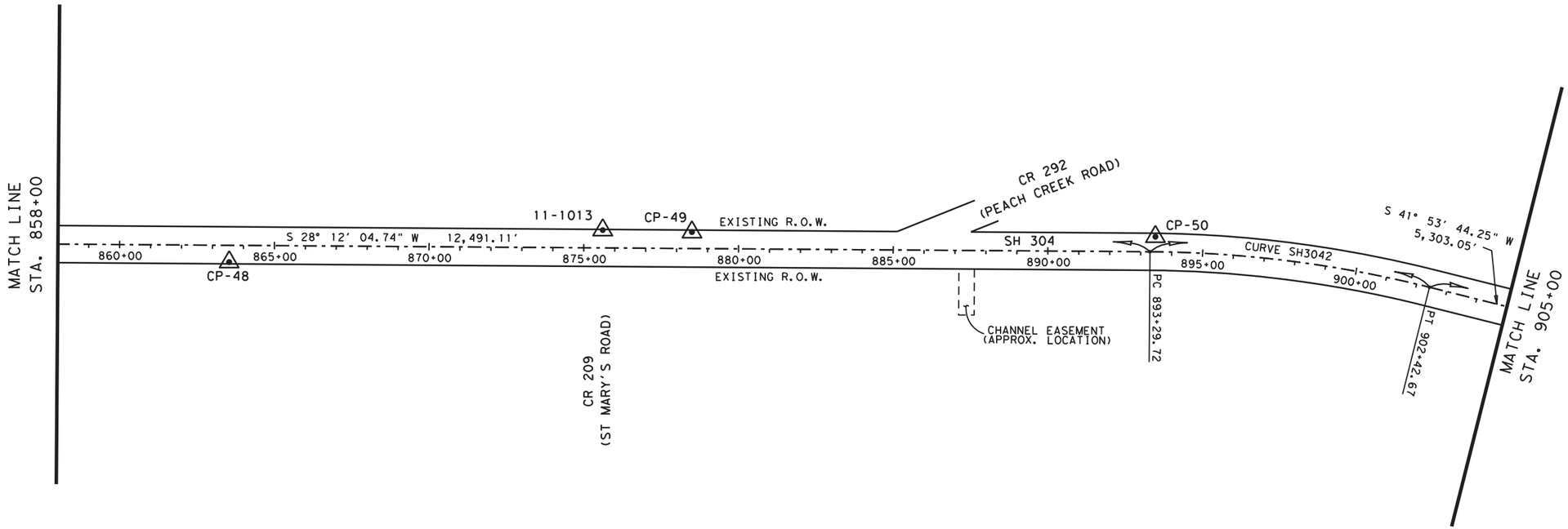
LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

SH 304
SURVEY CONTROL INDEX

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TX					SH 304
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
AUS	BASTROP	0573	01	034		45

S:\2018\1820106\CADD\SH 304 Survey control map\057301034-Survey Control Index-02.dgn

CURVE SH3042
PI STATION = 897+88.38
DELTA = 13° 41' 40" (RT)
DEGREE OF CURVE = 01° 30' 00"
TANGENT = 458.66'
LENGTH = 912.95'
RADIUS = 3,819.72'
PC STATION = 893+29.72
PT STATION = 902+42.67



0 200 400
SCALE: 1"=200' (22" x 34" SHEET)
SCALE: 1"=400' (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83), BASED ON TXDOT VRS GPS OBSERVATIONS. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000030 FOR BASTROP COUNTY. UNIT OF MEASURE IS U.S. SURVEY FOOT.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON DIFFERENTIAL LEVELING.
3. FIELD SURVEYS WERE PERFORMED BETWEEN JUNE, 2018 TO MARCH, 2019.

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/27/2021

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

CONTROL MONUMENTATION

POINT NO.	NORTHING (Y)	EASTING (X)	ELEVATION	STATION	OFFSET	DESCRIPTION
CP-48	9,943,274.07	3,249,334.21	492.54'	863+53.66	53.63'RT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-49	9,941,905.88	3,248,722.24	491.73'	878+48.63	53.61'LT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-50	9,940,587.95	3,248,010.49	494.87'	893+46.25	49.20'LT	SET 5/8" IR w/TXDOT ALUM. CAP
11-1013	9,942,157.81	3,248,862.50	494.12'	875+60.33	58.17'LT	SET TXDOT ALUM. CAP IN CONC. STAMPED "11-1013"

CONTROL MONUMENT INVERSE

FROM	BEARING	DIST	TO
CP-47	S 32°19'23"W	1,498.79'	CP-48
CP-48	S 22°54'29"W	1,211.84'	11-1013
11-1013	S 29°06'23"W	288.34'	CP-49
CP-49	S 28°22'17"W	1,497.84'	CP-50
CP-50	S 41°42'55"W	1,496.83'	CP-51

Texas Department of Transportation

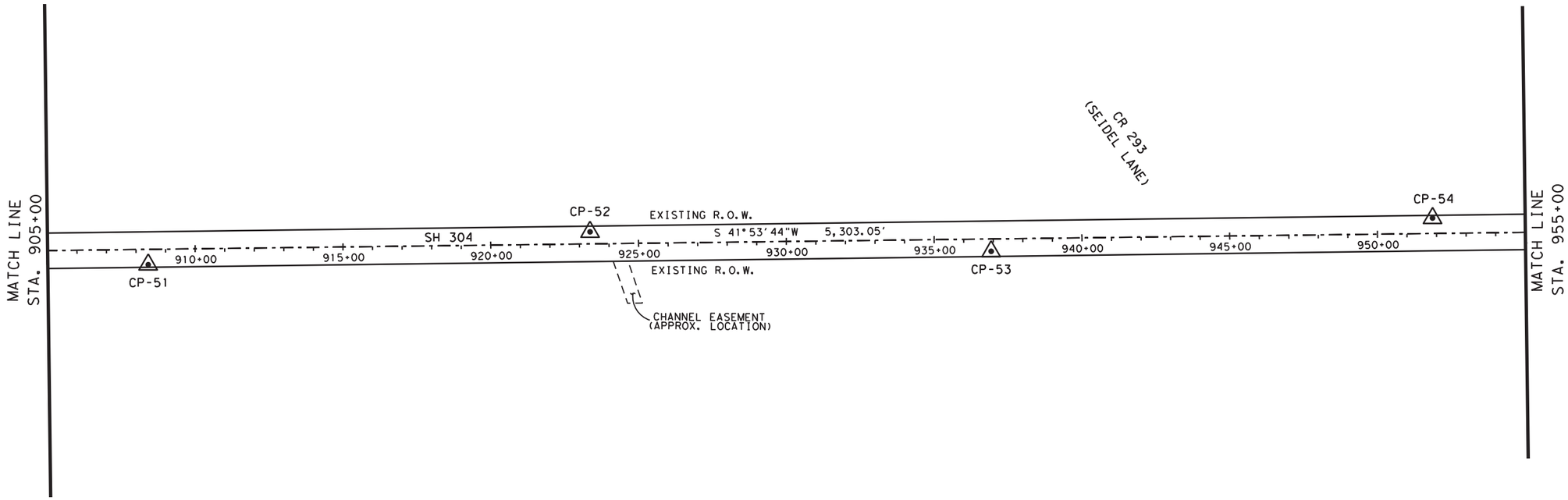
LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

SH 304
SURVEY CONTROL INDEX

SHEET 3 OF 7

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TX					SH 304
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
AUS	BASTROP	0573	01	034		46

S:\2018\1820106\CADD\SH 304 Survey control map\057301034*Survey Control Index*03.dgn



0 200 400

SCALE: 1"=200' (22" x 34" SHEET)
SCALE: 1"=400' (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83), BASED ON TXDOT VRS GPS OBSERVATIONS. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000030 FOR BASTROP COUNTY. UNIT OF MEASURE IS U.S. SURVEY FOOT.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON DIFFERENTIAL LEVELING.
3. FIELD SURVEYS WERE PERFORMED BETWEEN JUNE, 2018 TO MARCH, 2019.

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/27/2021

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

CONTROL MONUMENTATION

POINT NO.	NORTHING (Y)	EASTING (X)	ELEVATION	STATION	OFFSET	DESCRIPTION
CP-51	9,939,470.63	3,247,014.46	501.38'	908+39.84	52.14'RT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-52	9,938,295.13	3,246,084.36	500.86'	923+35.93	40.50'LT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-53	9,937,340.82	3,245,117.23	512.62'	936+92.10	42.13'RT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-54	9,936,165.33	3,244,189.41	520.02'	951+86.68	52.21'LT	SET 5/8" IR w/TXDOT ALUM. CAP

CONTROL MONUMENT INVERSE

FROM	BEARING	DIST	TO
CP-50	S 41°42'55"W	1,496.83'	CP-51
CP-51	S 38°21'08"W	1,498.96'	CP-52
CP-52	S 45°22'56"W	1,358.69'	CP-53
CP-53	S 38°17'03"W	1,497.55'	CP-54
CP-54	S 47°04'35"W	1,498.34'	CP-55

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

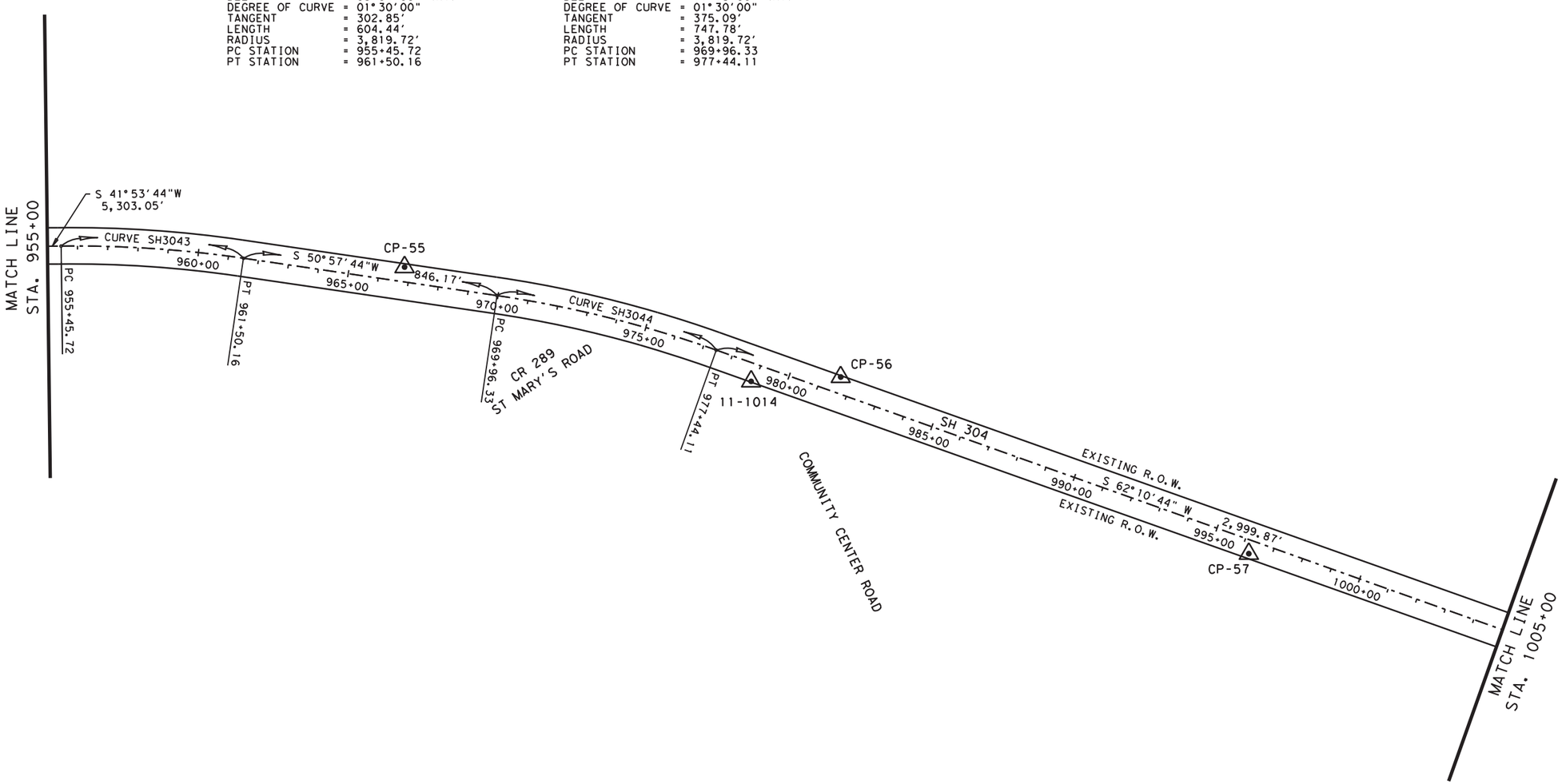
SH 304
SURVEY CONTROL INDEX

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				SH 304
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
AUS	BASTROP	0573	01	034	47

S:\2018\1820106\CADD\SH 304 Survey control map\057301034-Survey Control Index-04.dgn

CURVE SH3043
PI STATION = 958+48.57
DELTA = 09°04'00" (RT)
DEGREE OF CURVE = 01°30'00"
TANGENT = 302.85'
LENGTH = 604.44'
RADIUS = 3,819.72'
PC STATION = 955+45.72
PT STATION = 961+50.16

CURVE SH3044
PI STATION = 973+71.42
DELTA = 11°13'00" (RT)
DEGREE OF CURVE = 01°30'00"
TANGENT = 375.09'
LENGTH = 747.78'
RADIUS = 3,819.72'
PC STATION = 969+96.33
PT STATION = 977+44.11



0 200 400
SCALE: 1"=200' (22" x 34" SHEET)
SCALE: 1"=400' (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83), BASED ON TXDOT VRS GPS OBSERVATIONS. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000030 FOR BASTROP COUNTY. UNIT OF MEASURE IS U.S. SURVEY FOOT.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON DIFFERENTIAL LEVELING.
3. FIELD SURVEYS WERE PERFORMED BETWEEN JUNE, 2018 TO MARCH, 2019.

STATE OF TEXAS REGISTERED
HONG YANG
6557
PROFESSIONAL LAND SURVEYOR

5/27/2021

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

CONTROL MONUMENTATION

POINT NO.	NORTHING (Y)	EASTING (X)	ELEVATION	STATION	OFFSET	DESCRIPTION
CP-55	9,935,144.92	3,243,092.23	502.67'	966+80.35	48.79'LT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-56	9,934,330.18	3,241,849.91	504.76'	981+60.64	54.20'LT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-57	9,933,732.95	3,240,507.69	530.41'	996+26.44	44.04'RT	SET 5/8" IR w/TXDOT ALUM. CAP
11-1014	9,934,557.74	3,242,039.48	500.57'	978+86.78	58.59'RT	SET TXDOT ALUM. CAP IN CONC. STAMPED "11-1014"

CONTROL MONUMENT INVERSE

FROM	BEARING	DIST	TO
CP-54	S 47°04'35"W	1,498.34'	CP-55
CP-55	S 60°50'57"W	1,205.44'	11-1014
11-1014	S 39°47'42"W	296.18'	CP-56
CP-56	S 66°00'48"W	1,469.09'	CP-57
CP-57	S 60°44'53"W	1,498.33'	CP-58

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

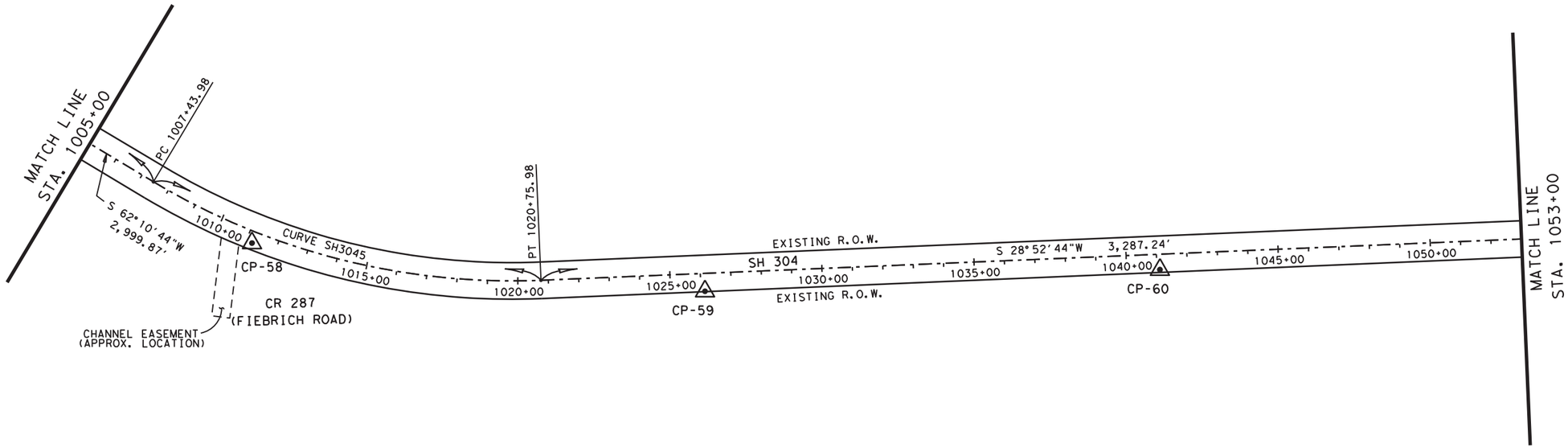
SH 304
SURVEY CONTROL INDEX

SHEET 5 OF 7

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TX					SH 304
STATE DIST.	COUNTY		CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
AUS	BASTROP		0573	01	034	48

S:\2018\1820106\CADD\SH 304 Survey control map\057301034*Survey Control Index*05.dgn

CURVE SH3045
PI STATION = 1014+29.38
DELTA = 33°18'00" (LT)
DEGREE OF CURVE = 02°30'00"
TANGENT = 685.40'
LENGTH = 1,332.00'
RADIUS = 2,291.83'
PC STATION = 1007+43.98
PT STATION = 1020+75.98



0 200 400
SCALE: 1"=200' (22" x 34" SHEET)
SCALE: 1"=400' (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83), BASED ON TXDOT VRS GPS OBSERVATIONS. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000030 FOR BASTROP COUNTY. UNIT OF MEASURE IS U.S. SURVEY FOOT.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON DIFFERENTIAL LEVELING.
3. FIELD SURVEYS WERE PERFORMED BETWEEN JUNE, 2018 TO MARCH, 2019.

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/27/2021

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

CONTROL MONUMENTATION

POINT NO.	NORTHING (Y)	EASTING (X)	ELEVATION	STATION	OFFSET	DESCRIPTION
CP-58	9,933,000.79	3,239,200.43	508.60'	1011+19.80	37.88'RT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-59	9,931,811.12	3,238,292.24	501.78'	1026+12.29	58.73'RT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-60	9,930,496.95	3,237,576.41	510.57'	1041+08.76	50.84'RT	SET 5/8" IR w/TXDOT ALUM. CAP

CONTROL MONUMENT INVERSE

FROM	BEARING	DIST	TO
CP-57	S 60°44'53"W	1,498.33'	CP-58
CP-58	S 37°21'28"W	1,496.70'	CP-59
CP-59	S 28°34'38"W	1,496.49'	CP-60
CP-60	S 28°50'13"W	1,498.84'	CP-61

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

SH 304
SURVEY CONTROL INDEX

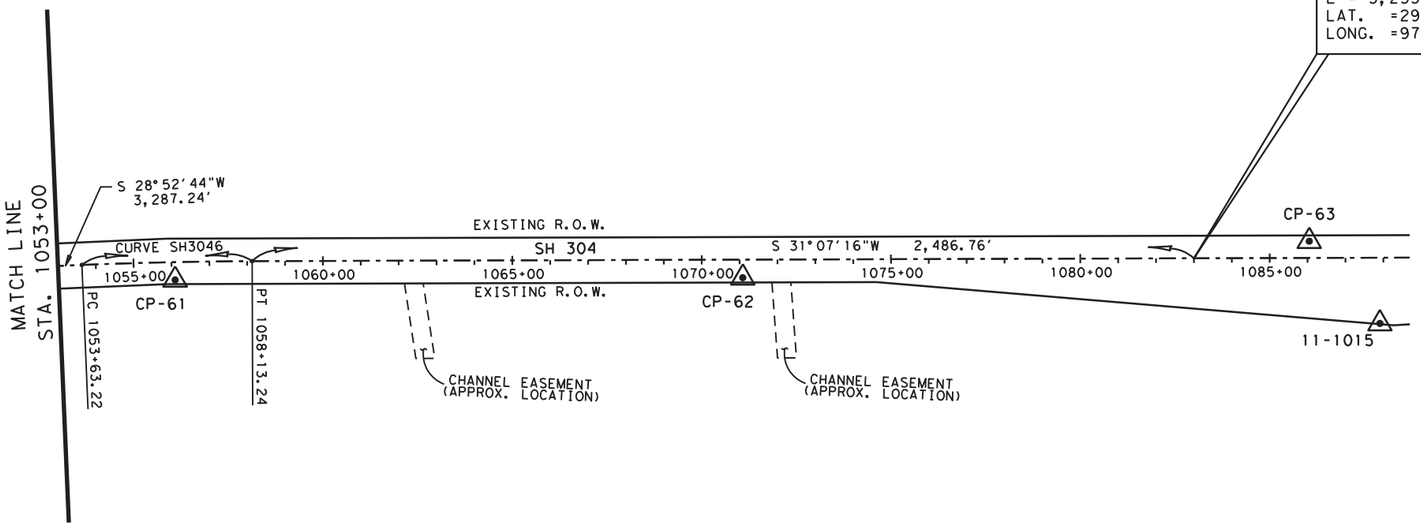
SHEET 6 OF 7

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				SH 304
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
AUS	BASTROP	0573	01	034	49

S:\2018\1820106\CADD\SH 304 Survey control map\057301034-Survey Control Index-06.dgn

CURVE SH3046
PI STATION = 1055+88.26
DELTA = 02°14'32" (RT)
DEGREE OF CURVE = 00°29'54"
TANGENT = 225.04'
LENGTH = 450.02'
RADIUS = 11,500.00'
PC STATION = 1053+63.22
PT STATION = 1058+13.24

END PROJECT
CSJ: 0573-01-034
BEGIN PROJECT
CSJ: 0573-01-041
STA. 1083+00.00
N = 9,926,855.37
E = 3,235,504.80
LAT. =29°51'48.2743"N
LONG. =97°22'17.4322"W



0 200 400
SCALE: 1"=200' (22" x 34" SHEET)
SCALE: 1"=400' (11" x 17" SHEET)

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83), BASED ON TXDOT VRS GPS OBSERVATIONS. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000030 FOR BASTROP COUNTY. UNIT OF MEASURE IS U.S. SURVEY FOOT.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON DIFFERENTIAL LEVELING.
3. FIELD SURVEYS WERE PERFORMED BETWEEN JUNE, 2018 TO MARCH, 2019.

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/27/2021

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

CONTROL MONUMENTATION						
POINT NO.	NORTHING (Y)	EASTING (X)	ELEVATION	STATION	OFFSET	DESCRIPTION
CP-61	9,929,183.97	3,236,853.50	518.66'	1056+08.62	47.13'RT	SET 5/8" IR w/TXDOT ALUM. CAP
CP-62	9,927,899.98	3,236,080.01	518.09'	1071+08.43	47.48'RT	SET 5/8" IR w/TXDOT ALUM. CAP

CONTROL MONUMENT INVERSE			
FROM	BEARING	DIST	TO
CP-60	S 28°50'13"W	1,498.84'	CP-61
CP-61	S 31°03'54"W	1,498.97'	CP-62
CP-62	S 27°36'01"W	1,498.84'	CP-63

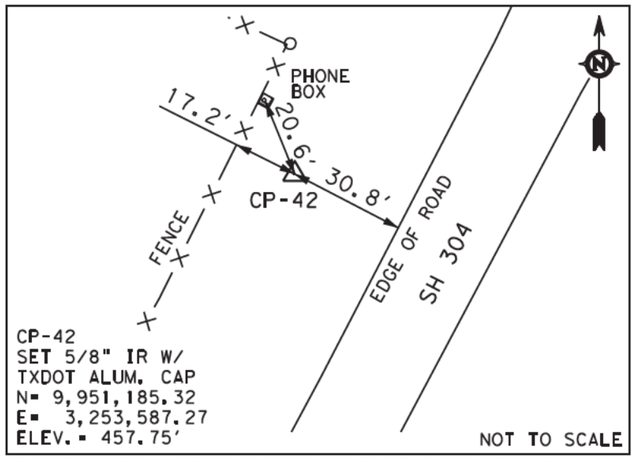
LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

SH 304
SURVEY CONTROL INDEX

SHEET 7 OF 7

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.				HIGHWAY NO.
6	TX					SH 304
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
AUS	BASTROP	0573	01	034	50	

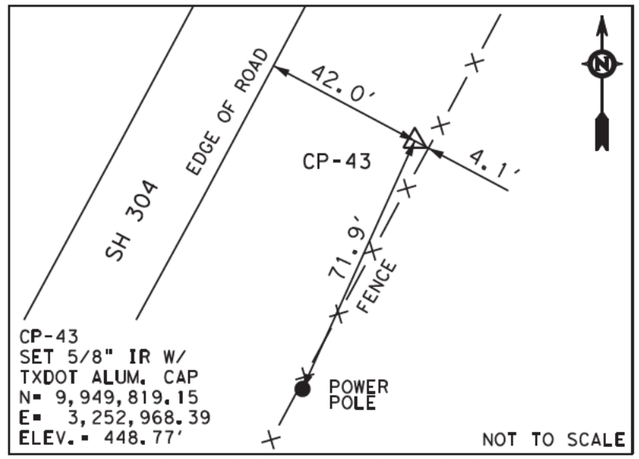
S:\2018\1820106\CADD\SH 304 Survey control map\057301034-Survey Control Index-07.dgn



CP-42
SET 5/8" IR W/
TXDOT ALUM. CAP
N= 9,951,185.32
E= 3,253,587.27
ELEV.= 457.75'

NOT TO SCALE

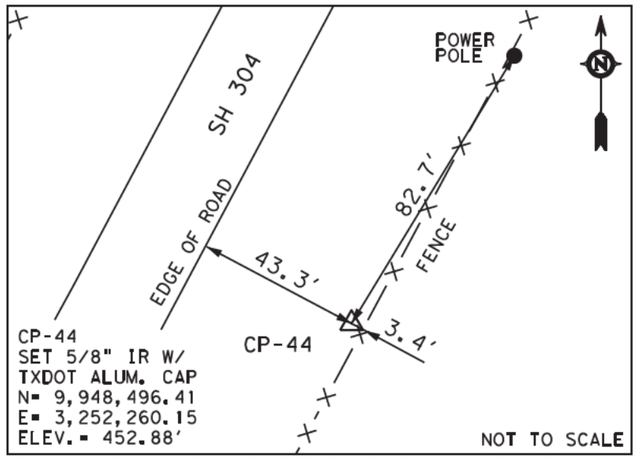
CP-42: LOCATED ON THE NORTHWEST SIDE OF SH 304, APPROX. 1,440 FEET SOUTHWEST FROM THE INTERSECTION OF SH 304 AND FM 535.



CP-43
SET 5/8" IR W/
TXDOT ALUM. CAP
N= 9,949,819.15
E= 3,252,968.39
ELEV.= 448.77'

NOT TO SCALE

CP-43: LOCATED ON THE SOUTHEAST SIDE OF SH 304, APPROX. 2,930 FEET SOUTHWEST FROM THE INTERSECTION OF SH 304 AND FM 535.



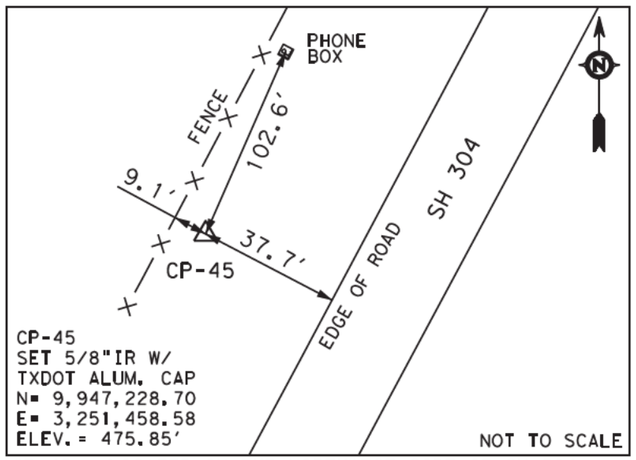
CP-44
SET 5/8" IR W/
TXDOT ALUM. CAP
N= 9,948,496.41
E= 3,252,260.15
ELEV.= 452.88'

NOT TO SCALE

CP-44: LOCATED ON THE SOUTHEAST SIDE OF SH 304, APPROX. 0.84 MILE SOUTHWEST FROM THE INTERSECTION OF SH 304 AND FM 535.

NOTES:

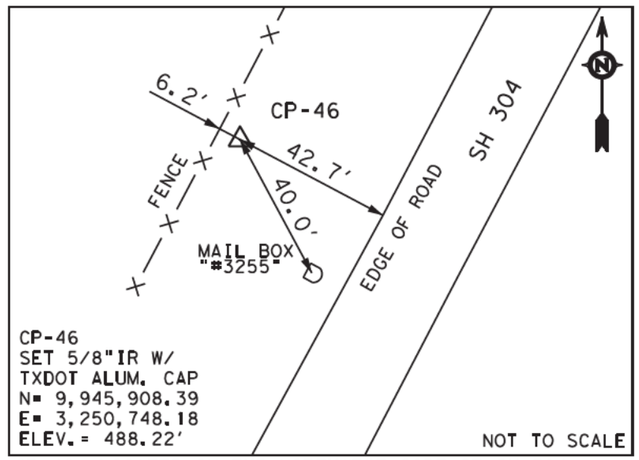
1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83), BASED ON TXDOT VRS GPS OBSERVATIONS. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000030 FOR BASTROP COUNTY, UNIT OF MEASURE IS U.S. SURVEY FOOT.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON DIFFERENTIAL LEVELING.
3. FIELD SURVEYS WERE PERFORMED BETWEEN JUNE, 2018 TO MARCH, 2019.



CP-45
SET 5/8"IR W/
TXDOT ALUM. CAP
N= 9,947,228.70
E= 3,251,458.58
ELEV.= 475.85'

NOT TO SCALE

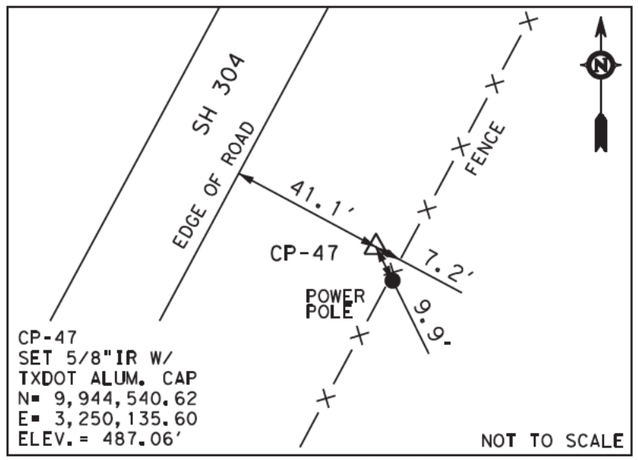
CP-45: LOCATED ON THE NORTHWEST SIDE OF SH 304, APPROX. 840 FEET SOUTHWEST FROM THE INTERSECTION OF SH 304 AND CR 291(HOFFEREK ROAD).



CP-46
SET 5/8"IR W/
TXDOT ALUM. CAP
N= 9,945,908.39
E= 3,250,748.18
ELEV.= 488.22'

NOT TO SCALE

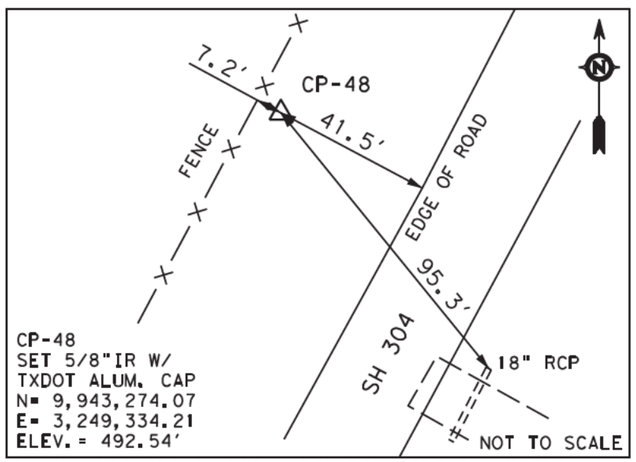
CP-46: LOCATED ON THE NORTHWEST SIDE OF SH 304, APPROX. 2,330 FEET SOUTHWEST FROM THE INTERSECTION OF SH 304 AND CR 291(HOFFEREK ROAD).



CP-47
SET 5/8"IR W/
TXDOT ALUM. CAP
N= 9,944,540.62
E= 3,250,135.60
ELEV.= 487.06'

NOT TO SCALE

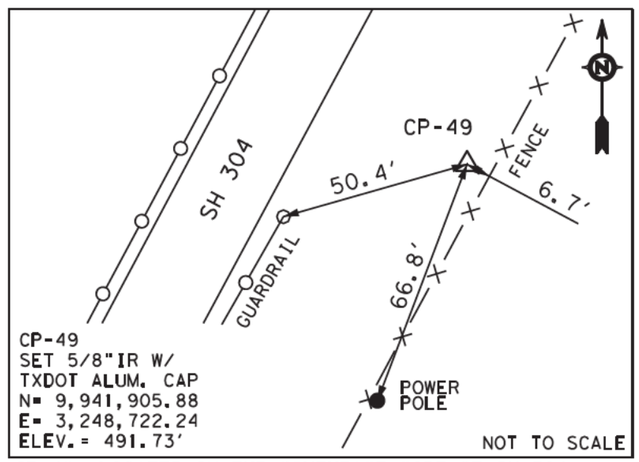
CP-47: LOCATED ON THE SOUTHEAST SIDE OF SH 304, APPROX. 0.72 MILE SOUTHWEST FROM THE INTERSECTION OF SH 304 AND CR 291(HOFFEREK ROAD).



CP-48
SET 5/8"IR W/
TXDOT ALUM. CAP
N= 9,943,274.07
E= 3,249,334.21
ELEV.= 492.54'

NOT TO SCALE

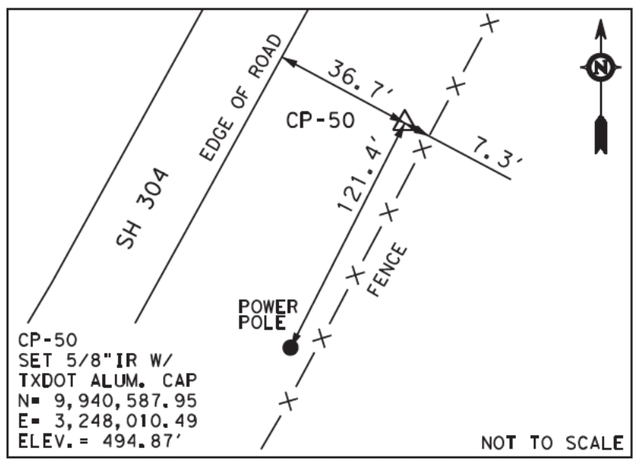
CP-48: LOCATED ON THE NORTHWEST SIDE OF SH 304, APPROX. 1.01 MILES SOUTHWEST FROM THE INTERSECTION OF SH 304 AND CR 291(HOFFEREK ROAD).



CP-49
SET 5/8"IR W/
TXDOT ALUM. CAP
N= 9,941,905.88
E= 3,248,722.24
ELEV.= 491.73'

NOT TO SCALE

CP-49: LOCATED ON THE SOUTHEAST SIDE OF SH 304, APPROX. 330 FEET SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 209 (ST MARY'S ROAD).



CP-50
SET 5/8"IR W/
TXDOT ALUM. CAP
N= 9,940,587.95
E= 3,248,010.49
ELEV.= 494.87'

NOT TO SCALE

CP-50: LOCATED ON THE SOUTHEAST SIDE OF SH 304, APPROX. 1,840 FEET SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 209 (ST MARY'S ROAD).

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/27/2021

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

Texas Department of Transportation

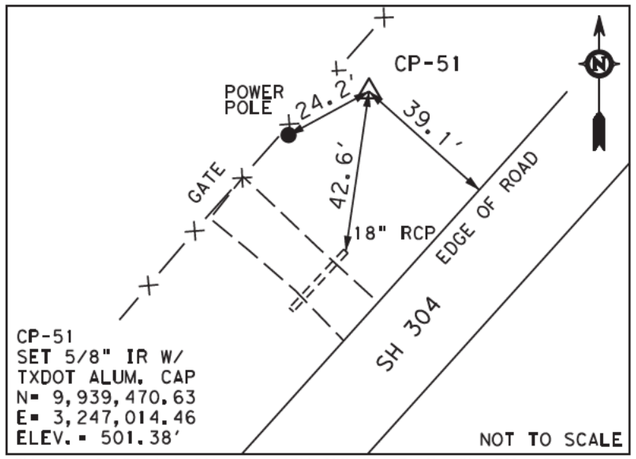
LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

SH 304 HORIZONTAL & VERTICAL CONTROL

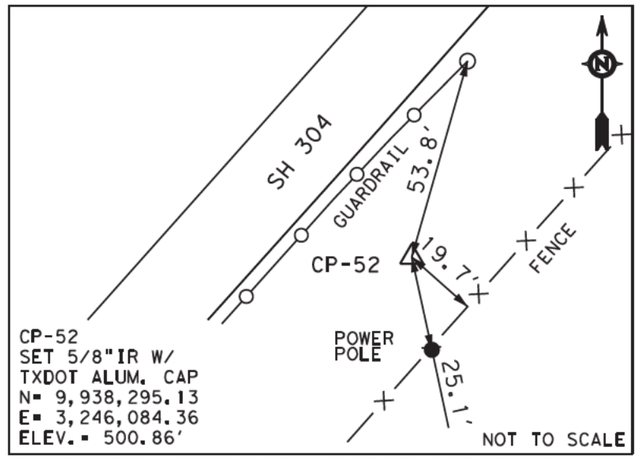
SHEET 1 OF 3

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				SH 304
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
AUS	BASTROP	0573	01	034	51

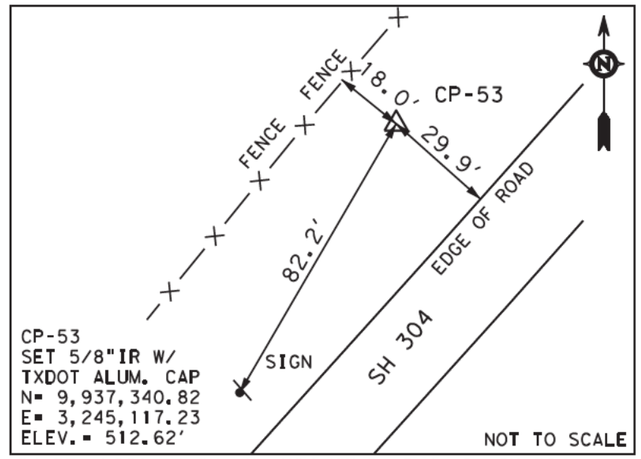
S:\2018\1820106\CADD\SH 304 Survey control map\057301034-Horiz&Vert Cntrl-01.dgn



CP-51: LOCATED ON THE NORTHWEST SIDE OF SH 304, APPROX. 0.63 MILE SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 209 (ST MARY'S ROAD).



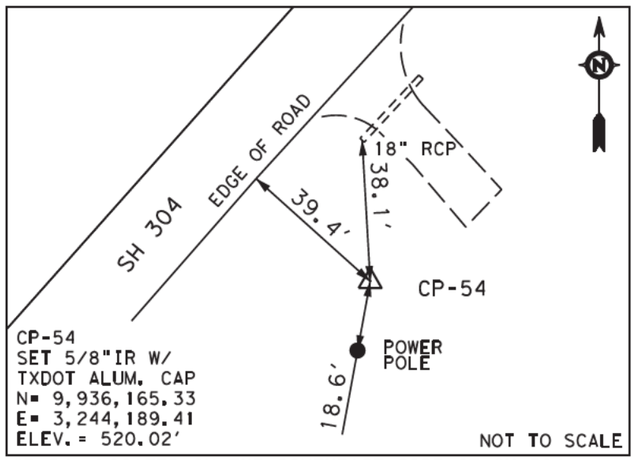
CP-52: LOCATED ON THE SOUTHEAST SIDE OF SH 304, APPROX. 0.91 MILE SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 209 (ST MARY'S ROAD).



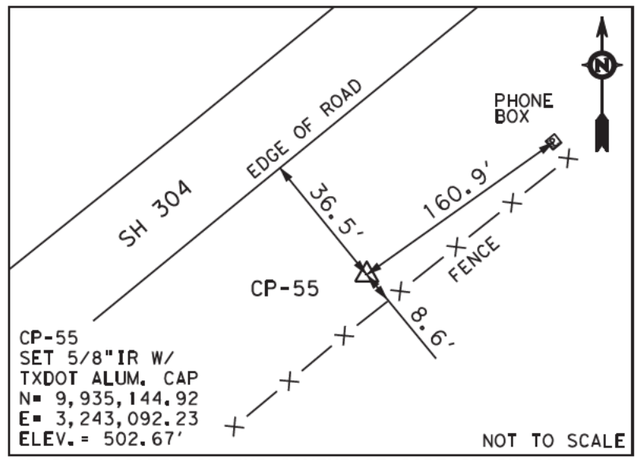
CP-53: LOCATED ON THE NORTHWEST SIDE OF SH 304, APPROX. 1.17 MILE SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 209 (ST MARY'S ROAD).

NOTES:

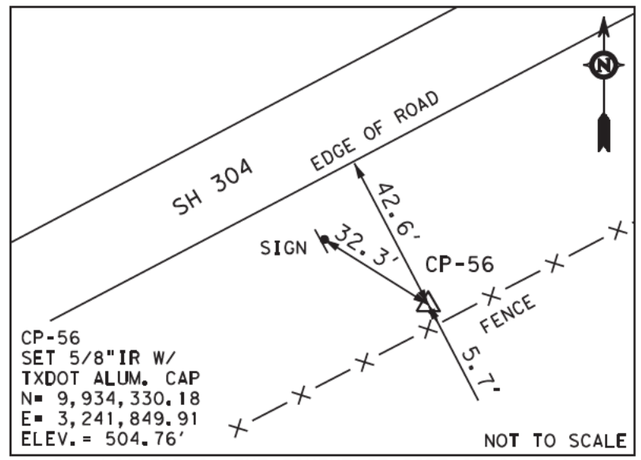
1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83), BASED ON TXDOT VRS GPS OBSERVATIONS. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000030 FOR BASTROP COUNTY, UNIT OF MEASURE IS U.S. SURVEY FOOT.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON DIFFERENTIAL LEVELING.
3. FIELD SURVEYS WERE PERFORMED BETWEEN JUNE, 2018 TO MARCH, 2019.



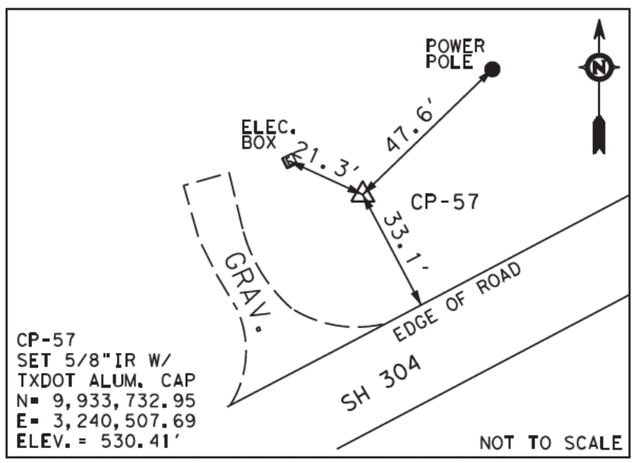
CP-54: LOCATED ON THE SOUTHEAST SIDE OF SH 304, APPROX. 810 FEET SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 293(SEIDEL LANE)



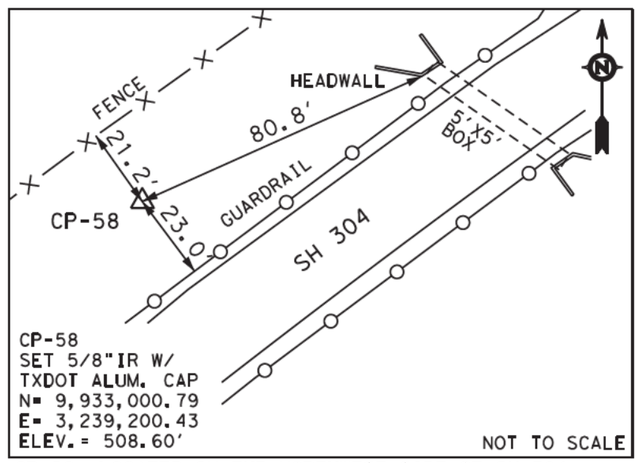
CP-55: LOCATED ON THE SOUTHEAST SIDE OF SH 304, APPROX. 2,300 FEET SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 293(SEIDAL LANE).



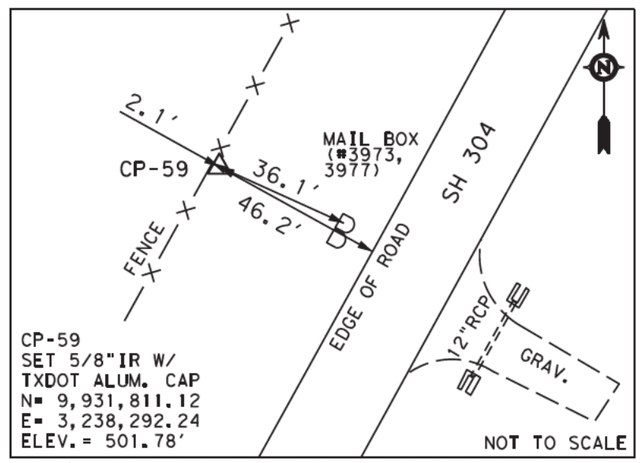
CP-56: LOCATED ON THE SOUTHEAST SIDE OF SH 304, APPROX. 230 FEET SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 287(COMMUNITY CENTER ROAD).



CP-57: LOCATED ON THE SOUTHEAST SIDE OF SH 304, APPROX. 1,690 FEET SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 287(COMMUNITY CENTER ROAD).



CP-58: LOCATED ON THE NORTHWEST SIDE OF SH 304, APPROX. 0.60 MILE SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 287(COMMUNITY CENTER ROAD)



CP-59: LOCATED ON THE NORTHWEST SIDE OF SH 304, APPROX. 800 FEET SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 287(FIEBRICH ROAD).

STATE OF TEXAS
REGISTERED
HONG YANG
6557
PROFESSIONAL
LAND SURVEYOR

5/27/2021

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

Texas Department of Transportation

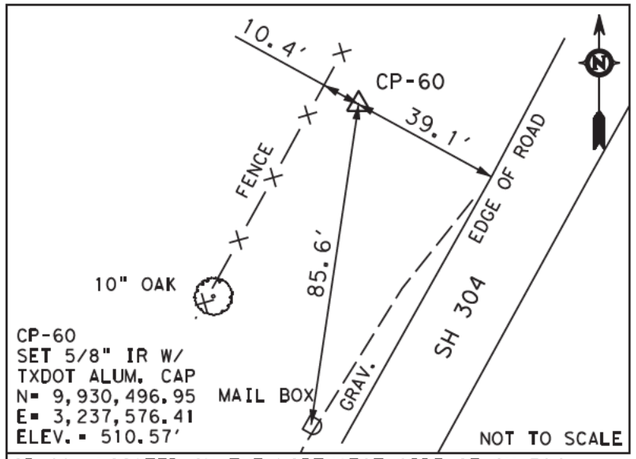
LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

SH 304 HORIZONTAL & VERTICAL CONTROL

SHEET 2 OF 3

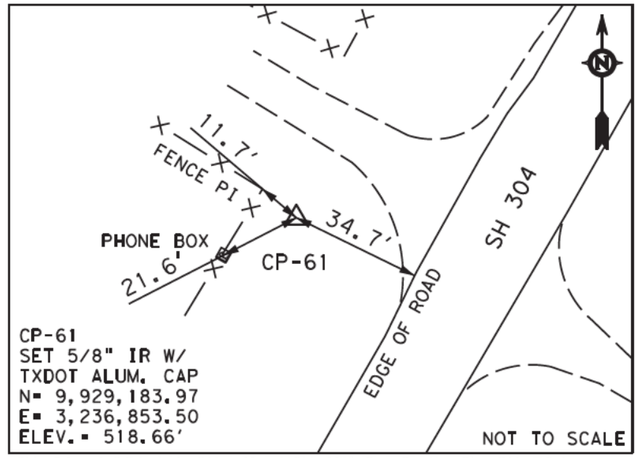
FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				SH 304
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
AUS	BASTROP	0573	01	034	52

S:\2018\1820106\CADD\SH 304 Survey control map\057301034-Horiz&Vert Cntrl-02.dgn



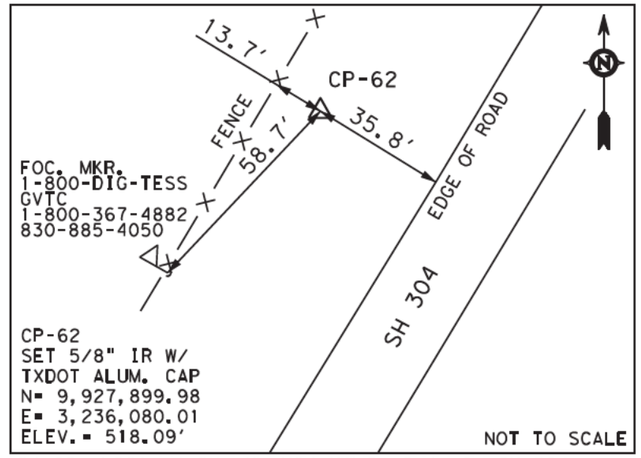
CP-60
SET 5/8" IR W/
TXDOT ALUM. CAP
N= 9,930,496.95
E= 3,237,576.41
ELEV.= 510.57'

CP-60: LOCATED ON THE NORTHWEST SIDE OF SH 304, APPROX. 2,310 FEET SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 287(FIEBRICH ROAD).



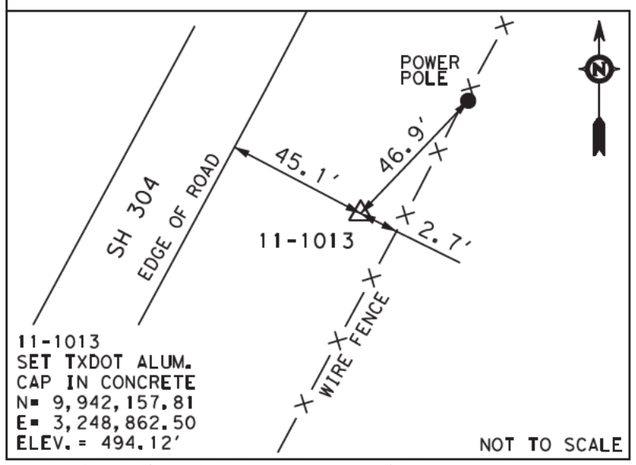
CP-61
SET 5/8" IR W/
TXDOT ALUM. CAP
N= 9,929,183.97
E= 3,236,853.50
ELEV.= 518.66'

CP-61: LOCATED ON THE NORTHWEST SIDE OF SH 304, APPROX. 0.72 MILE SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 287(FIEBRICH ROAD).



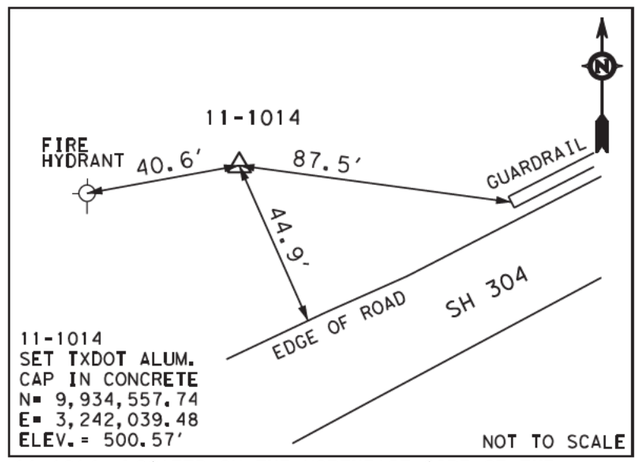
CP-62
SET 5/8" IR W/
TXDOT ALUM. CAP
N= 9,927,899.98
E= 3,236,080.01
ELEV.= 518.09'

CP-62: LOCATED ON THE NORTHWEST SIDE OF SH 304, APPROX. 1.01 MILES SOUTHWEST OF THE INTERSECTION OF SH 304 AND CR 287(FIEBRICH ROAD).



11-1013
SET TXDOT ALUM.
CAP IN CONCRETE
N= 9,942,157.81
E= 3,248,862.50
ELEV.= 494.12'

11-1013: LOCATED ON THE SOUTHEAST SIDE OF THE INTERSECTION OF SH 304 AND CR 209 (ST MARY'S ROAD)



11-1014
SET TXDOT ALUM.
CAP IN CONCRETE
N= 9,934,557.74
E= 3,242,039.48
ELEV.= 500.57'

11-1014: LOCATED ON THE NORTHEAST SIDE OF THE INTERSECTION OF SH 304 AND CR 287(COMMUNITY CENTER ROAD).

NOTES:

1. ALL BEARINGS AND COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM, CENTRAL ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83), BASED ON TXDOT VRS GPS OBSERVATIONS. ALL DISTANCES AND COORDINATES SHOWN ARE SURFACE VALUES AND MAY BE CONVERTED TO GRID BY DIVIDING BY THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.000030 FOR BASTROP COUNTY. UNIT OF MEASURE IS U.S. SURVEY FOOT.
2. ALL ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), BASED ON DIFFERENTIAL LEVELING.
3. FIELD SURVEYS WERE PERFORMED BETWEEN JUNE, 2018 TO MARCH, 2019.

5/27/2021

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

Texas Department of Transportation

LANDTECH
2525 North Loop West, Suite 300,
Houston, Texas 77008
T: 713-861-7068 F: 713-861-4131
TBPE Registration No. F-1364; TBPLS Registration No. 10019100

SH 304 HORIZONTAL & VERTICAL CONTROL

SHEET 3 OF 3

FED. RD. DIV. NO.	STATE	FEDERAL AID PROJECT NO.			HIGHWAY NO.
6	TX				SH 304
STATE DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
AUS	BASTROP	0573	01	034	53

S:\2018\1820106\CADD\SH 304 Survey control map\057301034-Horiz&Vert Cntrl-03.dgn

SH 304 CENTERLINE

Chain SH304 contains:
SH30405 CUR SH3041 CUR SH3042 CUR SH3043 CUR SH3044 CUR SH3045 CUR SH3046 CUR S-H3047 5 SH30406

Beginning chain SH304 description

Point SH30405 X 3,254,424.22 Y 9,952,353.82 Sta 759+31.60

Course from SH30405 to PC SH3041 S 44° 45′ 04.74" W Dist 79.50

Curve Data

Curve SH3041						
P.I. Station	764+27.75	X	3,254,074.91	Y	9,952,001.47	
Delta =	16° 33′ 00.00"	(LT)				
Degree =	2° 00′ 00.00"					
Tangent =	416.65					
Length =	827.50					
Radius =	2,864.79					
External =	30.14					
Long Chord =	824.63					
Mid. Ord. =	29.83					
P.C. Station	760+11.10	X	3,254,368.25	Y	9,952,297.36	
P.T. Station	768+38.60	X	3,253,878.01	Y	9,951,634.27	
C.C.		X	3,256,402.73	Y	9,950,280.46	
Back = S 44° 45′ 04.74" W						
Ahead = S 28° 12′ 04.74" W						
Chord Bear = S 36° 28′ 34.74" W						

Course from PT SH3041 to PC SH3042 S 28° 12′ 04.74" W Dist 12,491.11

Curve Data

Curve SH3042						
P.I. Station	897+88.38	X	3,247,758.32	Y	9,940,221.73	
Delta =	13° 41′ 39.51"	(RT)				
Degree =	1° 30′ 00.00"					
Tangent =	458.66					
Length =	912.95					
Radius =	3,819.72					
External =	27.44					
Long Chord =	910.78					
Mid. Ord. =	27.24					
P.C. Station	893+29.72	X	3,247,975.07	Y	9,940,625.95	
P.T. Station	902+42.67	X	3,247,452.04	Y	9,939,880.32	
C.C.		X	3,244,608.79	Y	9,942,431.04	
Back = S 28° 12′ 04.74" W						
Ahead = S 41° 53′ 44.25" W						
Chord Bear = S 35° 02′ 54.50" W						

Course from PT SH3042 to PC SH3043 S 41° 53′ 44.25" W Dist 5,303.05

Curve Data

Curve SH3043						
P.I. Station	958+48.57	X	3,243,708.56	Y	9,935,707.50	
Delta =	9° 04′ 00.00"	(RT)				
Degree =	1° 30′ 00.00"					
Tangent =	302.85					
Length =	604.44					
Radius =	3,819.72					
External =	11.99					
Long Chord =	603.81					
Mid. Ord. =	11.95					
P.C. Station	955+45.72	X	3,243,910.79	Y	9,935,932.93	
P.T. Station	961+50.16	X	3,243,473.32	Y	9,935,516.75	
C.C.		X	3,241,067.54	Y	9,938,483.65	
Back = S 41° 53′ 44.25" W						
Ahead = S 50° 57′ 44.25" W						
Chord Bear = S 46° 25′ 44.25" W						

Course from PT SH3043 to PC SH3044 S 50° 57′ 44.25" W Dist 846.17

Curve Data

Curve SH3044						
P.I. Station	973+71.42	X	3,242,524.73	Y	9,934,747.56	
Delta =	11° 13′ 00.00"	(RT)				
Degree =	1° 30′ 00.00"					
Tangent =	375.09					
Length =	747.78					
Radius =	3,819.72					
External =	18.37					
Long Chord =	746.58					
Mid. Ord. =	18.28					
P.C. Station	969+96.33	X	3,242,816.07	Y	9,934,983.81	
P.T. Station	977+44.11	X	3,242,193.00	Y	9,934,572.51	
C.C.		X	3,240,410.29	Y	9,937,950.70	
Back = S 50° 57′ 44.25" W						
Ahead = S 62° 10′ 44.25" W						
Chord Bear = S 56° 34′ 14.25" W						

Course from PT SH3044 to PC SH3045 S 62° 10′ 44.25" W Dist 2,999.87

Curve Data

Curve SH3045						
P.I. Station	1014+29.38	X	3,238,933.71	Y	9,932,852.55	
Delta =	33° 18′ 00.00"	(LT)				
Degree =	2° 30′ 00.00"					
Tangent =	685.40					
Length =	1,332.00					
Radius =	2,291.83					
External =	100.29					
Long Chord =	1,313.33					
Mid. Ord. =	96.09					
P.C. Station	1007+43.98	X	3,239,539.89	Y	9,933,172.43	
P.T. Station	1020+75.98	X	3,238,602.69	Y	9,932,252.38	
C.C.		X	3,240,609.51	Y	9,931,145.52	
Back = S 62° 10′ 44.25" W						
Ahead = S 28° 52′ 44.25" W						
Chord Bear = S 45° 31′ 44.25" W						

Course from PT SH3045 to PC SH3046 S 28° 52′ 44.25" W Dist 3,287.24

Curve Data

Curve SH3046						
P.I. Station	1055+88.26	X	3,236,906.39	Y	9,929,176.88	
Delta =	2° 14′ 31.56"	(RT)				
Degree =	0° 29′ 53.61"					
Tangent =	225.04					
Length =	450.02					
Radius =	11,500.00					
External =	2.20					
Long Chord =	449.99					
Mid. Ord. =	2.20					
P.C. Station	1053+63.22	X	3,237,015.08	Y	9,929,373.93	
P.T. Station	1058+13.24	X	3,236,790.08	Y	9,928,984.23	
C.C.		X	3,226,945.20	Y	9,934,927.98	
Back = S 28° 52′ 44.25" W						
Ahead = S 31° 07′ 15.81" W						
Chord Bear = S 30° 00′ 00.03" W						

Course from PT SH3046 to PC SH3047 S 31° 07′ 15.81" W Dist 7,005.54

Curve Data

Curve SH3047						
P.I. Station	1129+58.37	X	3,233,097.13	Y	9,922,867.45	
Delta =	1° 23′ 27.17"	(RT)				
Degree =	0° 29′ 53.61"					
Tangent =	139.59					
Length =	279.17					
Radius =	11,500.00					
External =	0.85					
Long Chord =	279.16					
Mid. Ord. =	0.85					
P.C. Station	1128+18.78	X	3,233,169.28	Y	9,922,986.95	
P.T. Station	1130+97.95	X	3,233,022.11	Y	9,922,749.73	
C.C.		X	3,223,324.39	Y	9,928,930.70	
Back = S 31° 07′ 15.81" W						
Ahead = S 32° 30′ 42.98" W						
Chord Bear = S 31° 48′ 59.40" W						

Course from PT SH3047 to 5 S 32° 30′ 42.98" W Dist 2,468.58

Point SH30402 X 3,231,695.31 Y 9,920,668.03 Sta 1155+66.53

Course from SH30402 to SH30403 S 32° 30′ 42.98" W Dist 5,203.92

Point SH30403 X 3,228,898.33 Y 9,916,279.67 Sta 1207+70.45

Ending chain SH304 description

WANECK RD CENTERLINE

WANECK01 CUR WANECK1 WANECK02

Beginning chain WANECK description

Point WANECK01 X 3,252,154.23 Y 9,948,373.06 Sta 10+00.00

Course from WANECK01 to PC WANECK1 N 61° 47′ 55.26" W Dist 69.55

Curve Data

Curve WANECK1						
P.I. Station	11+18.88	X	3,252,049.47	Y	9,948,429.24	
Delta =	31° 29′ 07.98"	(RT)				
Degree =	32° 44′ 25.60"					
Tangent =	49.33					
Length =	96.17					
Radius =	175.00					
External =	6.82					
Long Chord =	94.96					
Mid. Ord. =	6.56					
P.C. Station	10+69.55	X	3,252,092.94	Y	9,948,405.93	
P.T. Station	11+65.72	X	3,252,024.57	Y	9,948,471.83	
C.C.		X	3,252,175.64	Y	9,948,560.16	
Back = N 61° 47′ 55.26" W						
Ahead = N 30° 18′ 47.28" W						
Chord Bear = N 46° 03′ 21.27" W						

Course from PT WANECK1 to WANECK02 N 30° 18′ 47.28" W Dist 11.58

Point WANECK02 X 3,252,018.72 Y 9,948,481.82 Sta 11+77.29

Ending chain WANECK description

HOFFEREK RD CENTERLINE

HOFFEREK04 HOFFEREK05 HOFFEREK06

Beginning chain HOFFEREK description

Point HOFFEREK04 X 3,252,111.07 Y 9,947,778.49 Sta 10+00.00

Course from HOFFEREK04 to HOFFEREK05 N 63° 12′ 08.70" W Dist 204.50

Point HOFFEREK05 X 3,251,928.53 Y 9,947,870.68 Sta 12+04.50

Course from HOFFEREK05 to HOFFEREK06 N 61° 47′ 55.26" W Dist 82.50

Point HOFFEREK06 X 3,251,855.82 Y 9,947,909.67 Sta 12+87.00

Ending chain HOFFEREK description

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304 HORIZONTAL ALIGNMENT DATA

SHEET 1 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		54

DATE: 10/14/2021 10:34:57 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_ROW_HAD_01.dgn

ST MARY'S RD (NORTH) CENTERLINE

STMARYS01 STMARYS02

Beginning chain NSTMARYS description

Point STMARYS01 X 3,248,852.96 Y 9,942,216.54 Sta 10+00.00

Course from STMARYS01 to STMARYS02 N 61° 47′ 55.26" W Dist 278.20

Point STMARYS02 X 3,248,607.78 Y 9,942,348.01 Sta 12+78.20

Ending chain NSTMARYS description

PEACH CREEK CENTERLINE

PEACHCR05 CUR PEACHCR1 CUR PEACHCR2 PEACHCR06

Beginning chain PEACHCR description

Point PEACHCR05 X 3,248,366.26 Y 9,941,070.07 Sta 10+00.00

Course from PEACHCR05 to PC PEACHCR1 N 6° 29′ 56.11" E Dist 62.90

Curve Data

Curve PEACHCR1						
P.I. Station		11+28.62	X	3,248,380.82	Y	9,941,197.86
Delta	=	9° 23′ 33.36" (LT)				
Degree	=	7° 09′ 43.10"				
Tangent	=	65.72				
Length	=	131.15				
Radius	=	800.00				
External	=	2.69				
Long Chord	=	131.00				
Mid. Ord.	=	2.69				
P.C. Station		10+62.90	X	3,248,373.38	Y	9,941,132.57
P.T. Station		11+94.05	X	3,248,377.50	Y	9,941,263.50
C.C.			X	3,247,578.52	Y	9,941,223.11
Back	= N	6° 29′ 56.11" E				
Ahead	= N	2° 53′ 37.25" W				
Chord Bear	= N	1° 48′ 09.43" E				

Curve Data

Curve PEACHCR2						
P.I. Station		12+22.28	X	3,248,376.07	Y	9,941,291.70
Delta	=	58° 54′ 18.01" (LT)				
Degree	=	114° 35′ 29.61"				
Tangent	=	28.23				
Length	=	51.40				
Radius	=	50.00				
External	=	7.42				
Long Chord	=	49.17				
Mid. Ord.	=	6.46				
P.C. Station		11+94.05	X	3,248,377.50	Y	9,941,263.50
P.T. Station		12+45.45	X	3,248,351.19	Y	9,941,305.04
C.C.			X	3,248,327.56	Y	9,941,260.98
Back	= N	2° 53′ 37.25" W				
Ahead	= N	61° 47′ 55.26" W				
Chord Bear	= N	32° 20′ 46.25" W				

Course from PT PEACHCR2 to PEACHCR06 N 61° 47′ 55.26" W Dist 32.55

Point PEACHCR06 X 3,248,322.51 Y 9,941,320.42 Sta 12+78.00

Ending chain PEACHCR description

SEIDEL LN CENTERLINE

SEIDEL04 SEIDEL05 CUR SEIDEL1 SEIDEL06

Beginning chain SEIDEL description

Point SEIDEL04 X 3,244,954.52 Y 9,936,736.31 Sta 10+00.00

Course from SEIDEL04 to SEIDEL05 N 83° 01′ 27.26" W Dist 101.49

Point SEIDEL05 X 3,244,853.78 Y 9,936,748.63 Sta 11+01.49

Course from SEIDEL05 to PC SEIDEL1 N 81° 24′ 39.66" W Dist 73.90

Curve Data

Curve SEIDEL1						
P.I. Station		12+23.25	X	3,244,733.39	Y	9,936,766.82
Delta	=	33° 18′ 23.92" (RT)				
Degree	=	35° 48′ 35.50"				
Tangent	=	47.86				
Length	=	93.01				
Radius	=	160.00				
External	=	7.00				
Long Chord	=	91.71				
Mid. Ord.	=	6.71				
P.C. Station		11+75.39	X	3,244,780.71	Y	9,936,759.67
P.T. Station		12+68.40	X	3,244,697.76	Y	9,936,798.78
C.C.			X	3,244,804.61	Y	9,936,917.88
Back	= N	81° 24′ 39.66" W				
Ahead	= N	48° 06′ 15.75" W				
Chord Bear	= N	64° 45′ 27.71" W				

Course from PT SEIDEL1 to SEIDEL06 N 48° 06′ 15.75" W Dist 29.60

Point SEIDEL06 X 3,244,675.73 Y 9,936,818.54 Sta 12+98.00

Ending chain SEIDEL description

ST MARY'S RD (SOUTH) CENTERLINE

SSSTMARYS01 CUR SSTMARYS1 SSSTMARYS02 SSSTMARYS03

Beginning chain SSTMARYS description

Point SSSTMARYS01 X 3,242,605.17 Y 9,934,797.72 Sta 10+00.00

Course from SSSTMARYS01 to PC SSTMARYS1 N 34° 52′ 52.71" W Dist 11.15

Curve Data

Curve SSTMARYS1						
P.I. Station		10+79.77	X	3,242,559.55	Y	9,934,863.16
Delta	=	41° 44′ 17.96" (RT)				
Degree	=	31° 49′ 51.56"				
Tangent	=	68.62				
Length	=	131.12				
Radius	=	180.00				
External	=	12.64				
Long Chord	=	128.24				
Mid. Ord.	=	11.81				
P.C. Station		10+11.15	X	3,242,598.80	Y	9,934,806.86
P.T. Station		11+42.27	X	3,242,567.74	Y	9,934,931.29
C.C.			X	3,242,746.46	Y	9,934,909.80
Back	= N	34° 52′ 52.72" W				
Ahead	= N	6° 51′ 25.25" E				
Chord Bear	= N	14° 00′ 43.73" W				

Course from PT SSTMARYS1 to SSSTMARYS02 N 6° 51′ 25.25" E Dist 46.65

Point SSSTMARYS02 X 3,242,573.31 Y 9,934,977.61 Sta 11+88.92

Course from SSSTMARYS02 to SSSTMARYS03 N 9° 04′ 57.21" E Dist 92.98

Point SSSTMARYS03 X 3,242,587.99 Y 9,935,069.43 Sta 12+81.91

Ending chain SSTMARYS description

COMMUNITY CENTER RD CENTERLINE

COMCENT01 CUR COMCENT1 COMCENT02

Beginning chain COMCENT description

Point COMCENT01 X 3,242,017.30 Y 9,934,454.92 Sta 10+00.00

Course from COMCENT01 to PC COMCENT1 N 27° 49′ 15.75" W Dist 38.72

Curve Data

Curve COMCENT1						
P.I. Station		10+71.28	X	3,241,984.04	Y	9,934,517.95
Delta	=	44° 17′ 15.76" (LT)				
Degree	=	71° 37′ 11.01"				
Tangent	=	32.56				
Length	=	61.84				
Radius	=	80.00				
External	=	6.37				
Long Chord	=	60.31				
Mid. Ord.	=	5.90				
P.C. Station		10+38.72	X	3,241,999.23	Y	9,934,489.16
P.T. Station		11+00.56	X	3,241,953.06	Y	9,934,527.95
C.C.			X	3,241,928.48	Y	9,934,451.82
Back	= N	27° 49′ 15.75" W				
Ahead	= N	72° 06′ 31.51" W				
Chord Bear	= N	49° 57′ 53.63" W				

Course from PT COMCENT1 to COMCENT02 N 72° 06′ 31.51" W Dist 190.36

Point COMCENT02 X 3,241,771.91 Y 9,934,586.43 Sta 12+90.91

Ending chain COMCENT description

FIEBRICH RD CENTERLINE

CUR FIEBRICH1 FIEBRICH02

Beginning chain FIEBRICH description

Curve Data

Curve FIEBRICH1						
P.I. Station		11+30.97	X	3,238,751.67	Y	9,932,576.33
Delta	=	26° 47′ 21.93" (RT)				
Degree	=	10° 25′ 02.69"				
Tangent	=	130.97				
Length	=	257.16				
Radius	=	550.00				
External	=	15.38				
Long Chord	=	254.82				
Mid. Ord.	=	14.96				
P.C. Station		10+00.00	X	3,238,748.74	Y	9,932,445.39
P.T. Station		12+57.16	X	3,238,813.31	Y	9,932,691.89
C.C.			X	3,239,298.60	Y	9,932,433.07
Back	= N	1° 16′ 59.57" E				
Ahead	= N	28° 04′ 21.50" E				
Chord Bear	= N	14° 40′ 40.53" E				

Course from PT FIEBRICH1 to FIEBRICH02 N 28° 04′ 21.50" E Dist 259.39

Point FIEBRICH02 X 3,238,935.37 Y 9,932,920.76 Sta 15+16.55

Ending chain FIEBRICH description

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

SH 304
HORIZONTAL ALIGNMENT DATA

SHEET 2 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		55

DATE: 10/14/2021 10:34:58 AM
FILE: R:\1002700-100329\100317900\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_RDW_HAD_02.dgn

FIEBRICH RD (2) CENTERLINE

FIEBRICH10 CUR FIEBRICH21 FIEBRICH11

Beginning chain FIEBRICH2 description

==========

Point FIEBRICH10 X 3,238,909.57 Y 9,932,649.62 Sta 10+00.00

Course from FIEBRICH10 to PC FIEBRICH21 N 48° 29′ 51.54" W Dist 55.67

		Curve Data				

Curve FIEBRICH21						
P.I. Station		10+67.79	X	3,238,858.80	Y	9,932,694.54
Delta	=	13° 49′ 25.06" (LT)				
Degree	=	57° 17′ 44.81"				
Tangent	=	12.12				
Length	=	24.13				
Radius	=	100.00				
External	=	0.73				
Long Chord	=	24.07				
Mid. Ord.	=	0.73				
P.C. Station		10+55.67	X	3,238,867.88	Y	9,932,686.51
P.T. Station		10+79.80	X	3,238,848.06	Y	9,932,700.17
C.C.			X	3,238,801.61	Y	9,932,611.62
Back	= N 48° 29′ 51.54" W					
Ahead	= N 62° 19′ 16.60" W					
Chord Bear	= N 55° 24′ 34.07" W					

Course from PT FIEBRICH21 to FIEBRICH11 N 62° 19′ 16.60" W Dist 35.73

Point FIEBRICH11 X 3,238,816.42 Y 9,932,716.77 Sta 11+15.53

==========

Ending chain FIEBRICH2 description

DATE: 10/14/2021 10:35:00 AM
FILE: R:\1002700-100299\100317900\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_RDW_HAD_03.dgn

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

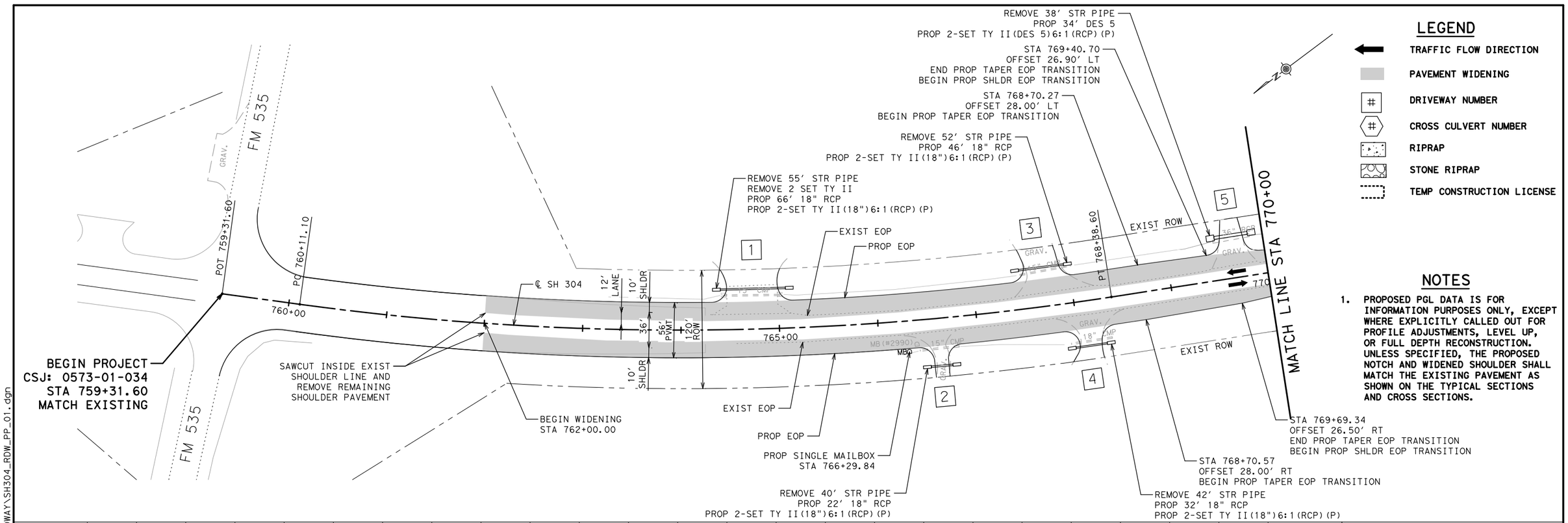
PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

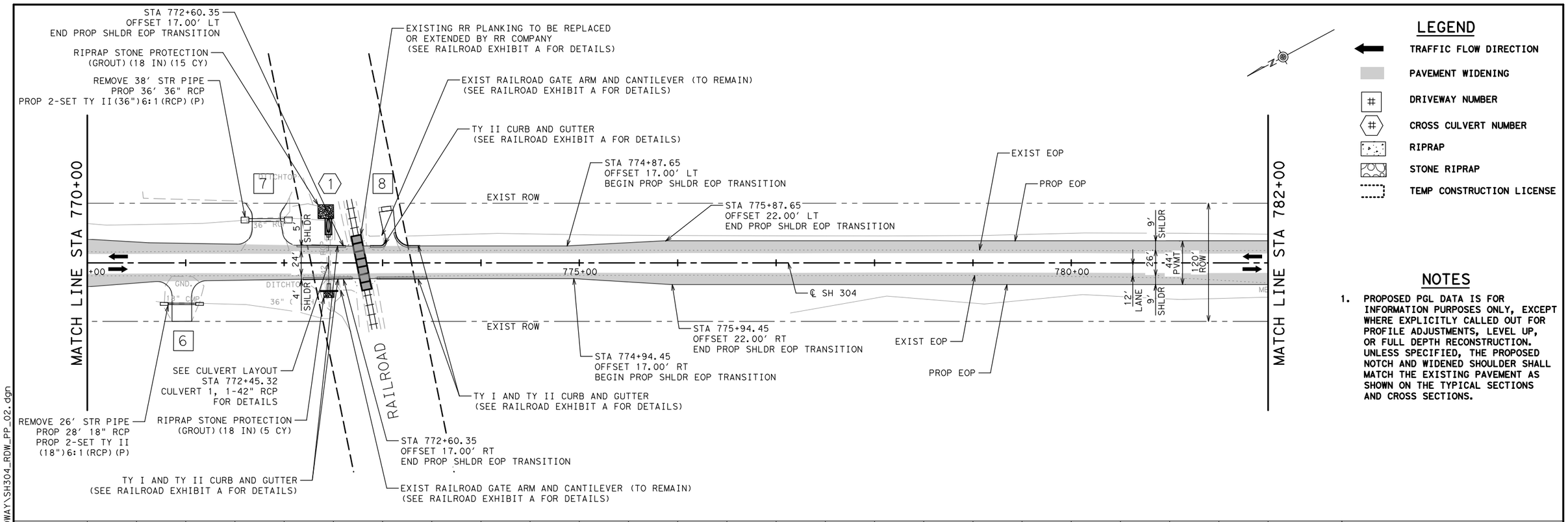
Texas Department of Transportation

SH 304
HORIZONTAL ALIGNMENT DATA

SHEET 3 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		56


REMOVE 38' STR PIPE
PROP 34' DES 5
PROP 2-SET TY II(DES 5)6:1(RCP)(P)
STA 769+40.70
OFFSET 26.90' LT
END PROP TAPER EOP TRANSITION
BEGIN PROP SHLDR EOP TRANSITION
STA 768+70.27
OFFSET 28.00' LT
BEGIN PROP TAPER EOP TRANSITION
REMOVE 52' STR PIPE
PROP 46' 18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)
REMOVE 55' STR PIPE
REMOVE 2 SET TY II
PROP 66' 18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)
EXIST EOP
PROP EOP
FM 535
GRAV.
POT 759+31.60
PC 760+11.10
760+00
℄ SH 304
12' LANE
10' SHLDR
36'
56' PVMT
120' ROW
765+00
10' SHLDR
BEGIN PROJECT
CSJ: 0573-01-034
STA 759+31.60
MATCH EXISTING
SAWCUT INSIDE EXIST
SHOULDER LINE AND
REMOVE REMAINING
SHOULDER PAVEMENT
BEGIN WIDENING
STA 762+00.00
EXIST EOP
PROP EOP
PROP SINGLE MAILBOX
STA 766+29.84
REMOVE 40' STR PIPE
PROP 22' 18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)
MB(#2990)
15" CMP
MBO
1
2
3
4
5
PT 768+38.60
EXIST ROW
GRAV.
18" CMP
36" RCP
MATCH LINE STA 770+00
STA 769+69.34
OFFSET 26.50' RT
END PROP TAPER EOP TRANSITION
BEGIN PROP SHLDR EOP TRANSITION
STA 768+70.57
OFFSET 28.00' RT
BEGIN PROP TAPER EOP TRANSITION
REMOVE 42' STR PIPE
PROP 32' 18" RCP
PROP 2-SET TY II(18")6:1(RCP)(P)
LEGEND
TRAFFIC FLOW DIRECTION
PAVEMENT WIDENING
DRIVEWAY NUMBER
CROSS CULVERT NUMBER
RIPRAP
STONE RIPRAP
TEMP CONSTRUCTION LICENSE
NOTES
1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.
480
470
460
450
440
STA = 761+00.00
EL = 466.70'
L = 250.00'
K = 990
VPC 759+75.00
EL. = 467.07'
(-)0.2956 %
(-)0.5481 %
VPT 762+25.00
EL. = 466.01'
100'
PAVEMENT
TRANS
TYPE "A"
SEE PAVEMENT
TRANSITION DETAIL
EXISTING PGL
PROPOSED PGL
VPC 767+20.00
EL. = 463.30'
(-)0.5481 %
(-)0.0920 %
STA = 768+70.00
EL = 462.48'
L = 300.00'
K = 658
466.99 PROPOSED
467.00 EXISTING
466.82 466.82
466.62 466.62
466.40 466.40
466.15 466.15
465.88 465.89
465.60 465.61
465.33 465.32
465.06 465.02
464.78 464.70
464.51 464.42
464.23 464.15
463.96 463.91
463.69 463.70
463.41 463.46
463.14 463.22
462.91 462.97
462.72 462.74
462.56 462.52
462.44 462.40
462.36 462.32
760+00
765+00
770+00
SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10
10/14/2021
STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER
PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444
Texas Department of Transportation
SH 304
PLAN
AND PROFILE
BEGIN TO STA 770+00
SHEET 1 OF 28
© 2022
CONT 0573 SECT 01 JOB 034 HIGHWAY SH 304
DIST AUS COUNTY BASTROP SHEET NO. 57
DATE: 10/14/2021 10:35:04 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_RDW_PP_01.dgn

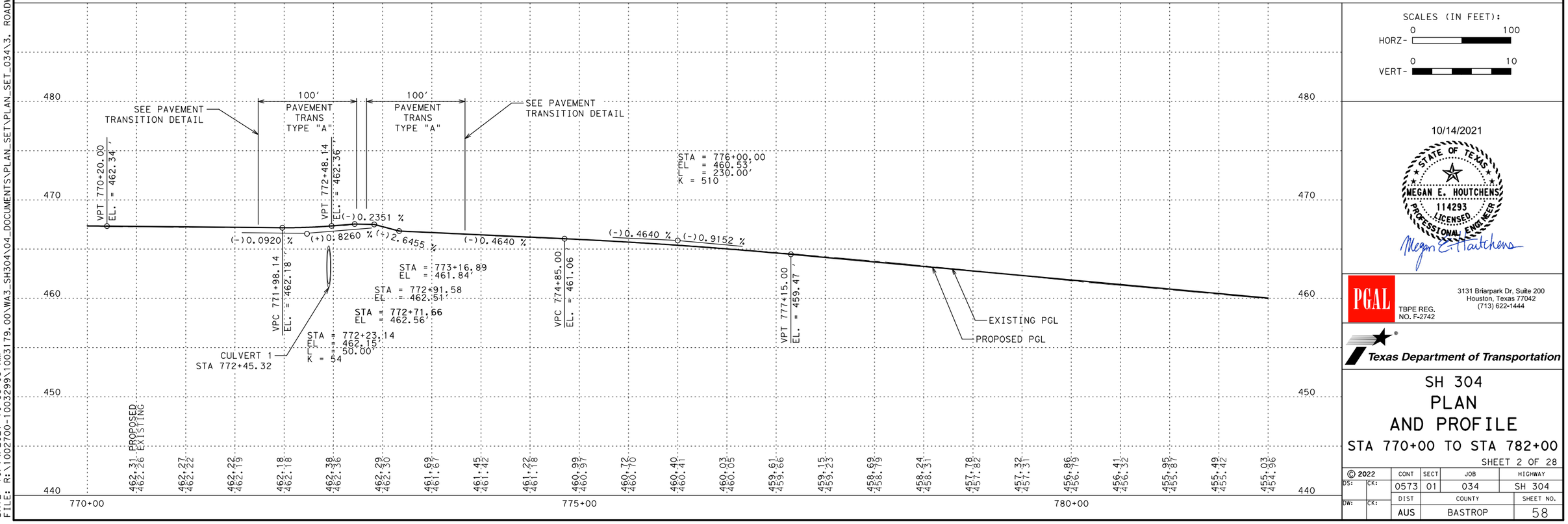


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

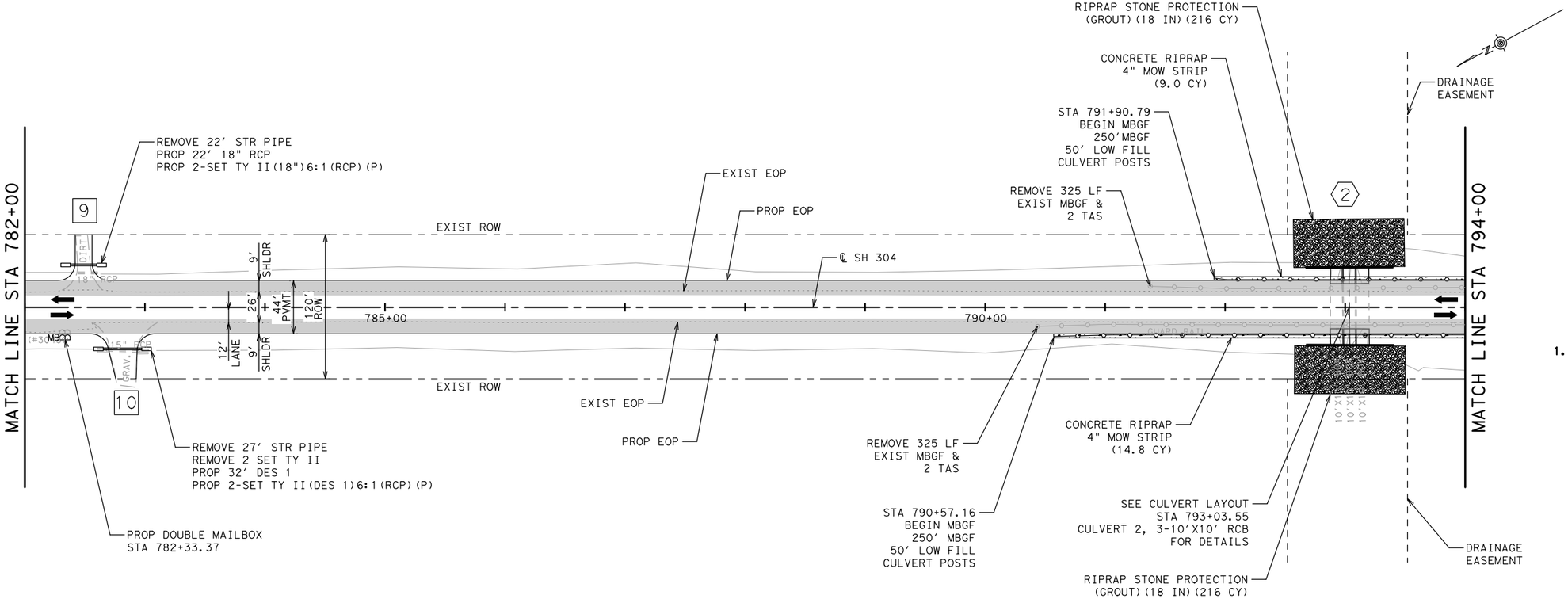
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 770+00 TO STA 782+00

SHEET 2 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		58

DATE: 10/14/2021 10:35:05 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_RDW_PP_02.dgn

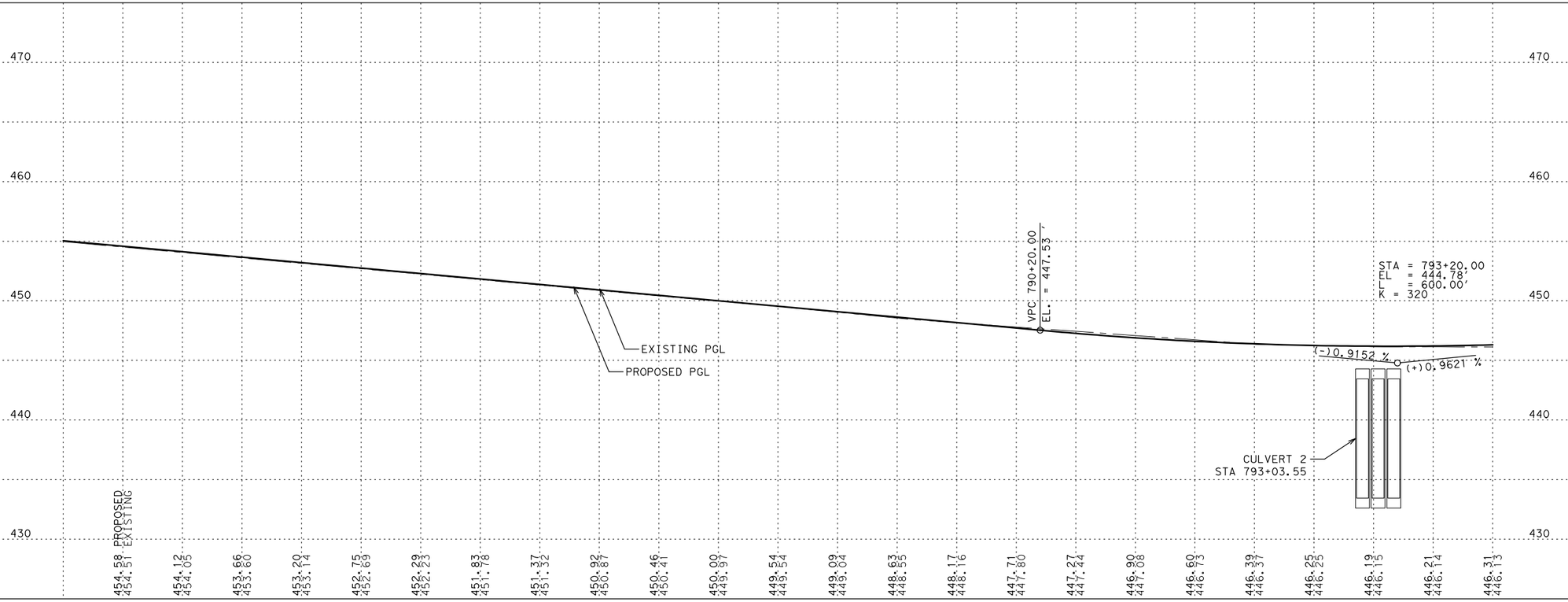


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

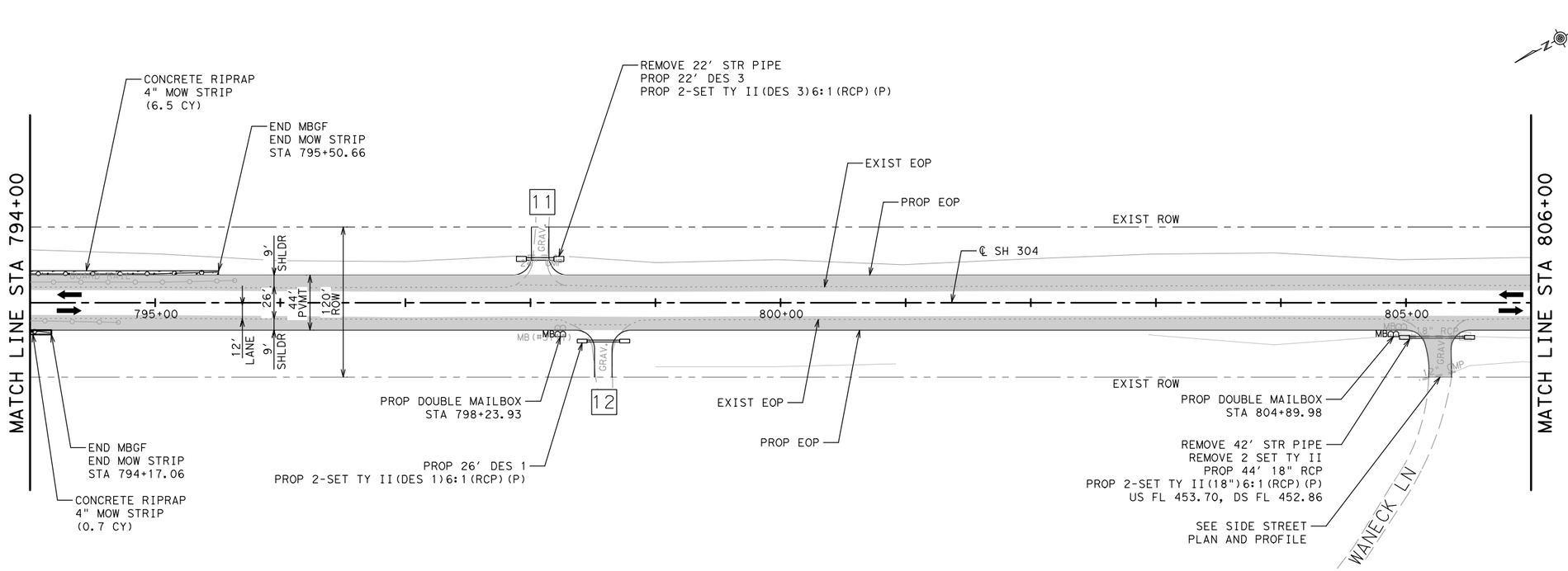
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 782+00 TO STA 794+00

SHEET 3 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		59

DATE: 10/14/2021 10:35:06 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_RDW_PP_03.dgn

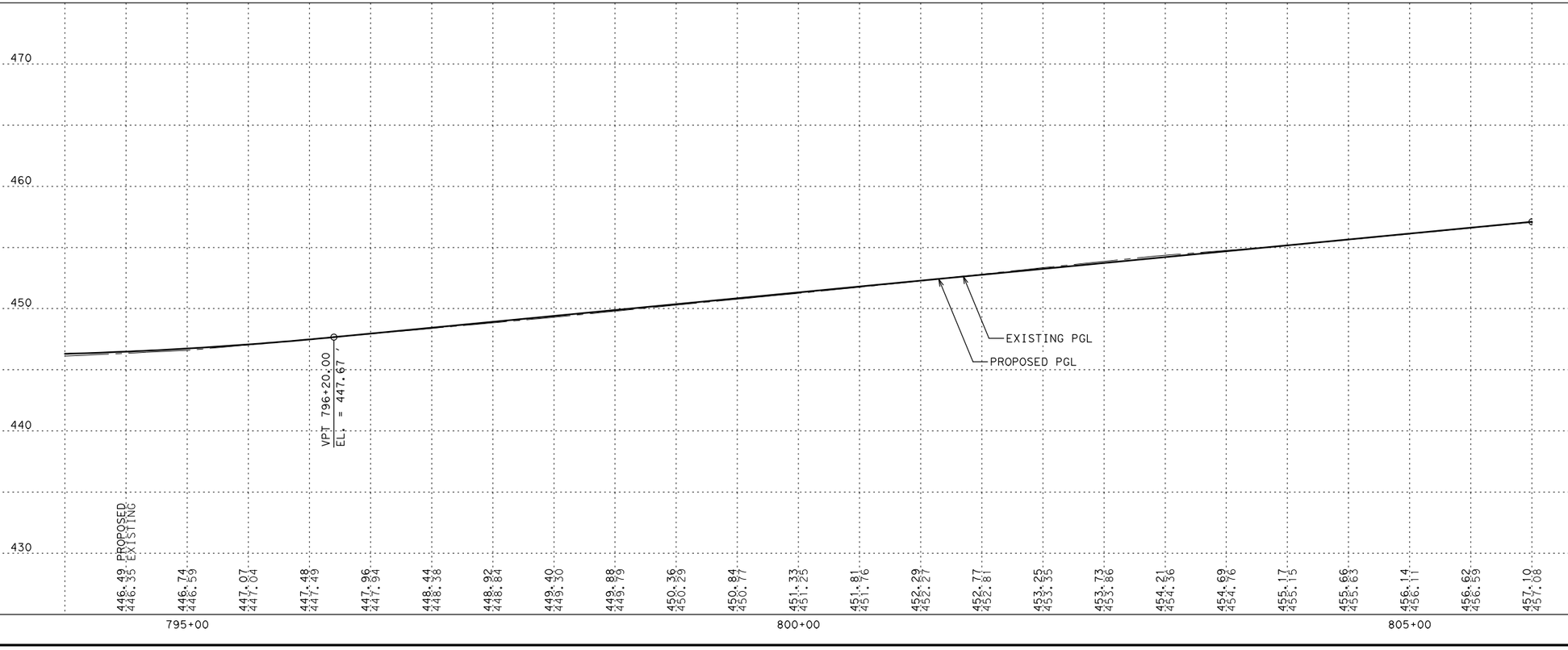


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

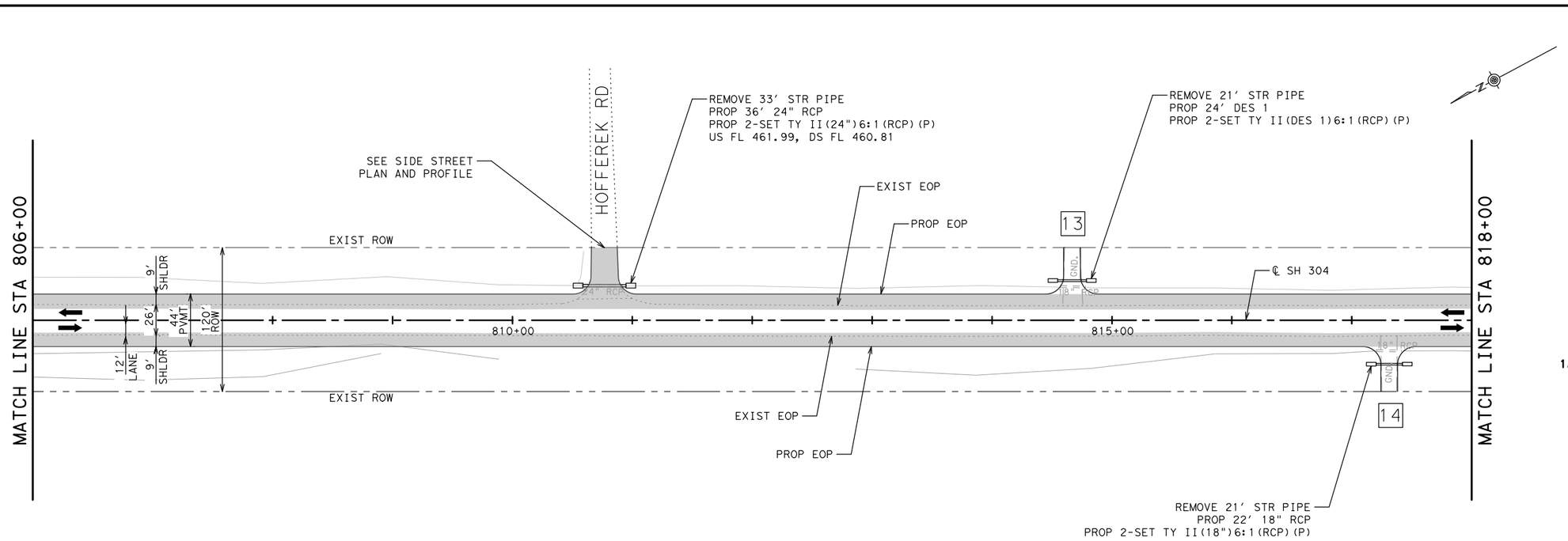
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 794+00 TO STA 806+00

SHEET 4 OF 28

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	BASTROP		60

DATE: 10/14/2021 10:35:07 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_RDW_PP_04.dgn

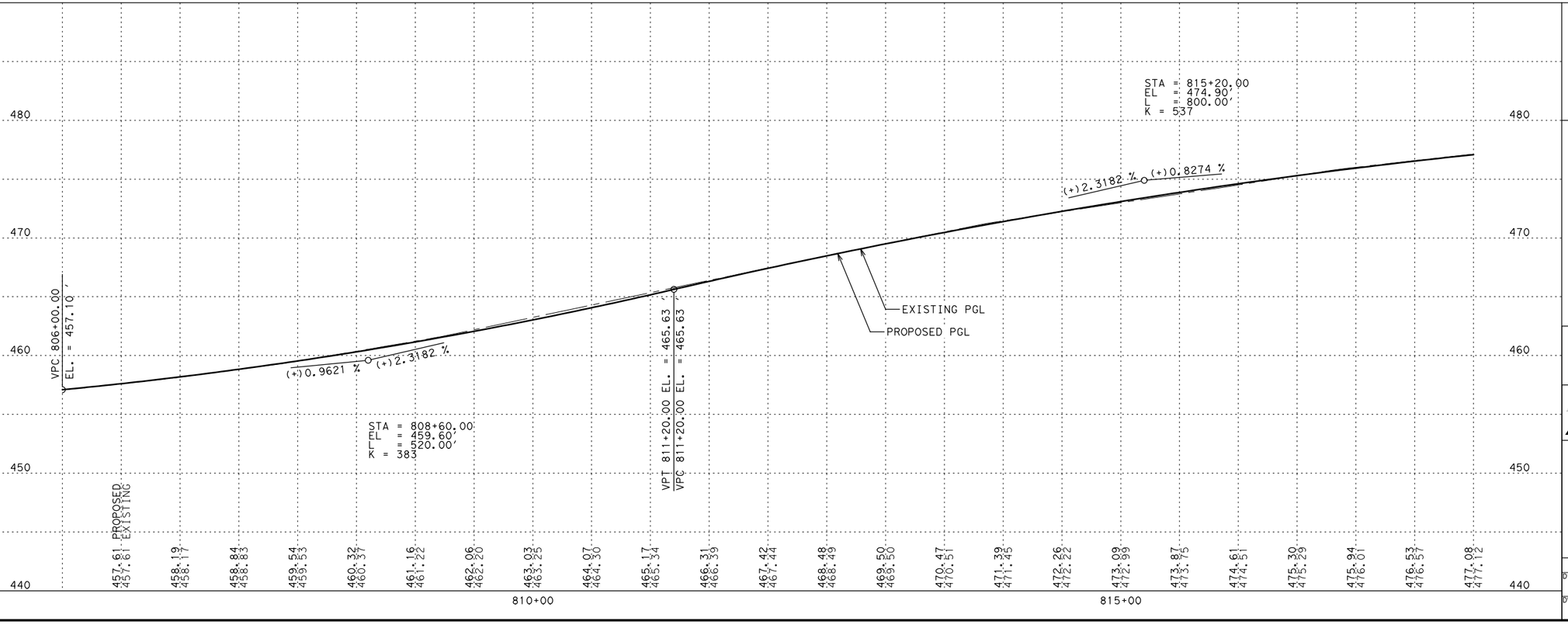


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

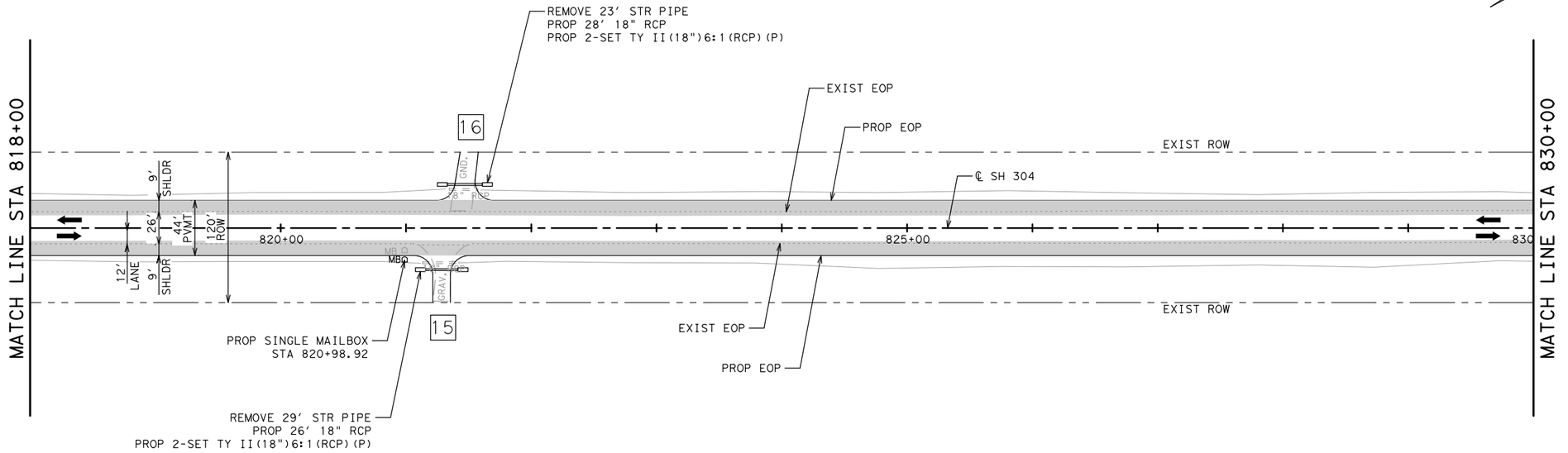
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 806+00 TO STA 818+00

SHEET 5 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		61

DATE: 10/14/2021 10:35:08 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_RDW_PP_05.dgn

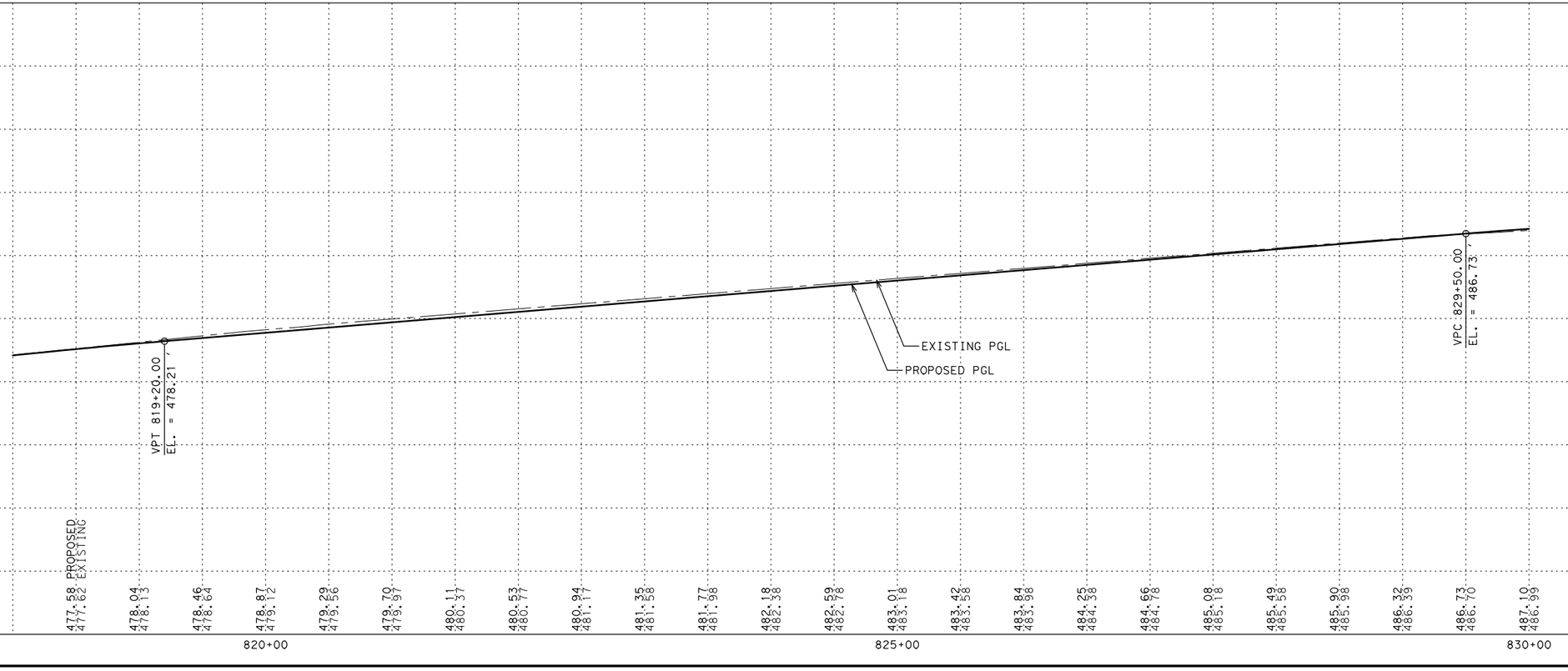


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

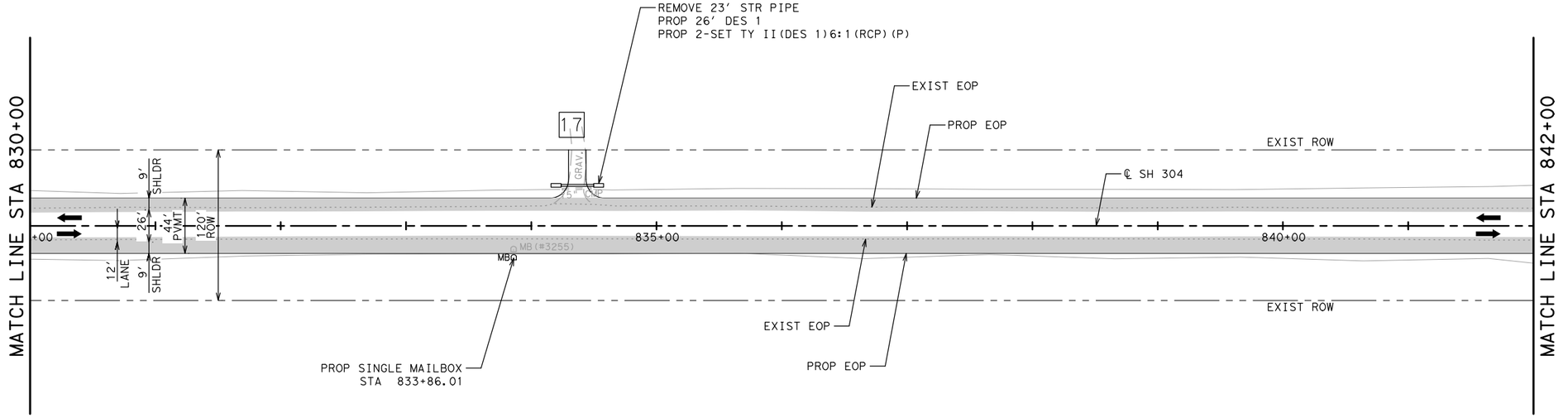
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 818+00 TO STA 830+00

SHEET 6 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		62

DATE: 10/14/2021 10:35:10 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_RDW_PP_06.dgn

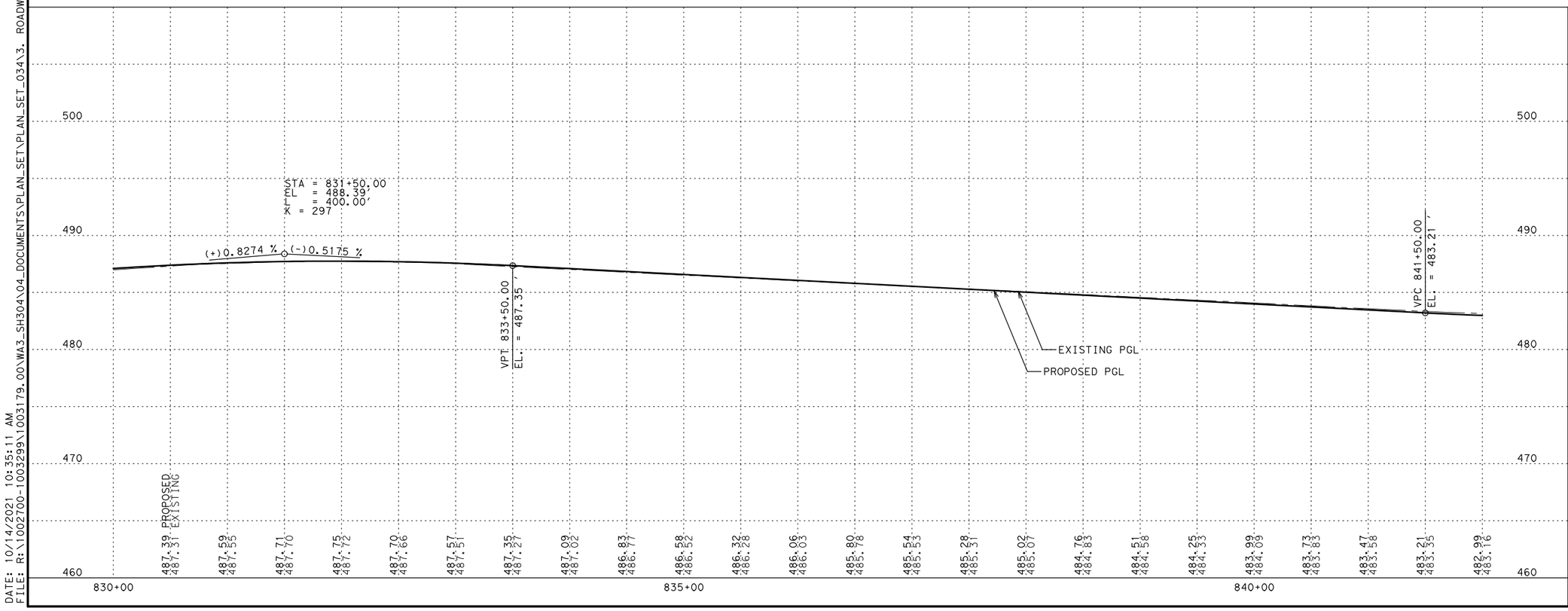


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

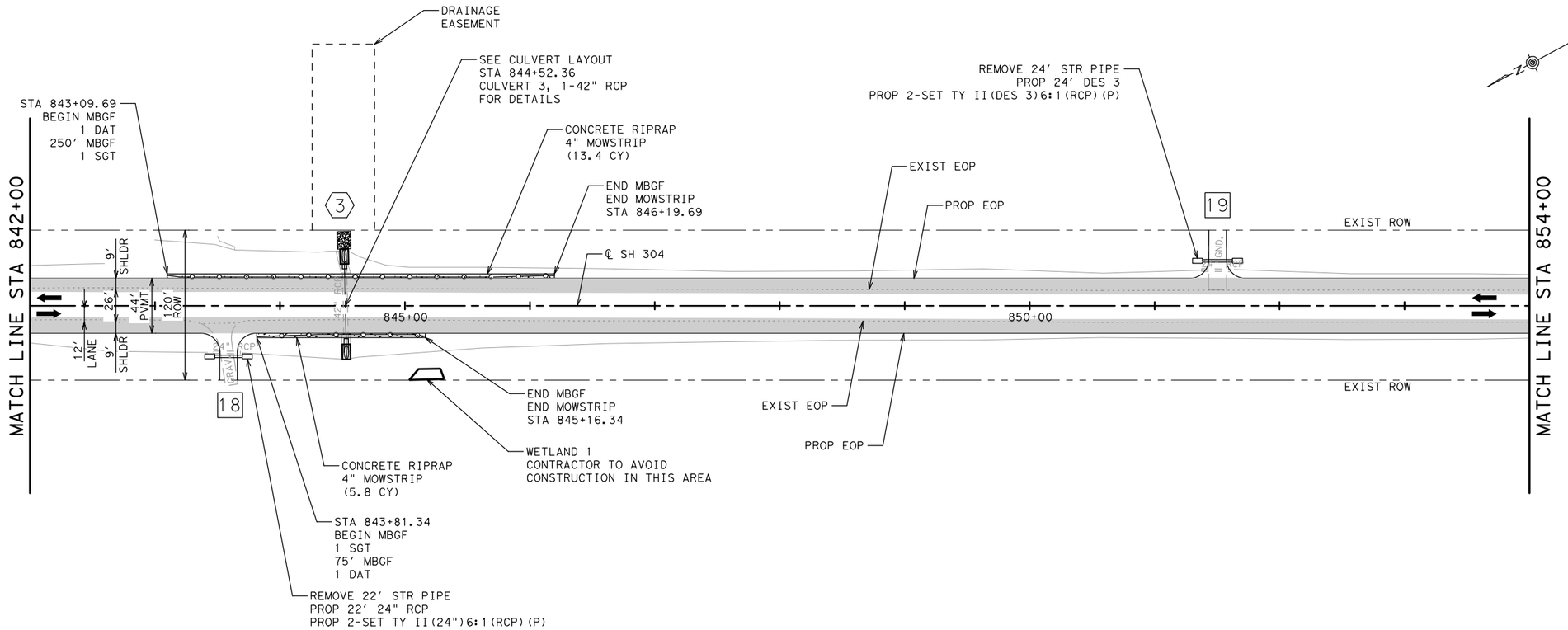
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 830+00 TO STA 842+00

SHEET 7 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
DW:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
		AUS	BASTROP		63

DATE: 10/14/2021 10:35:11 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_ROW_PP_07.dgn

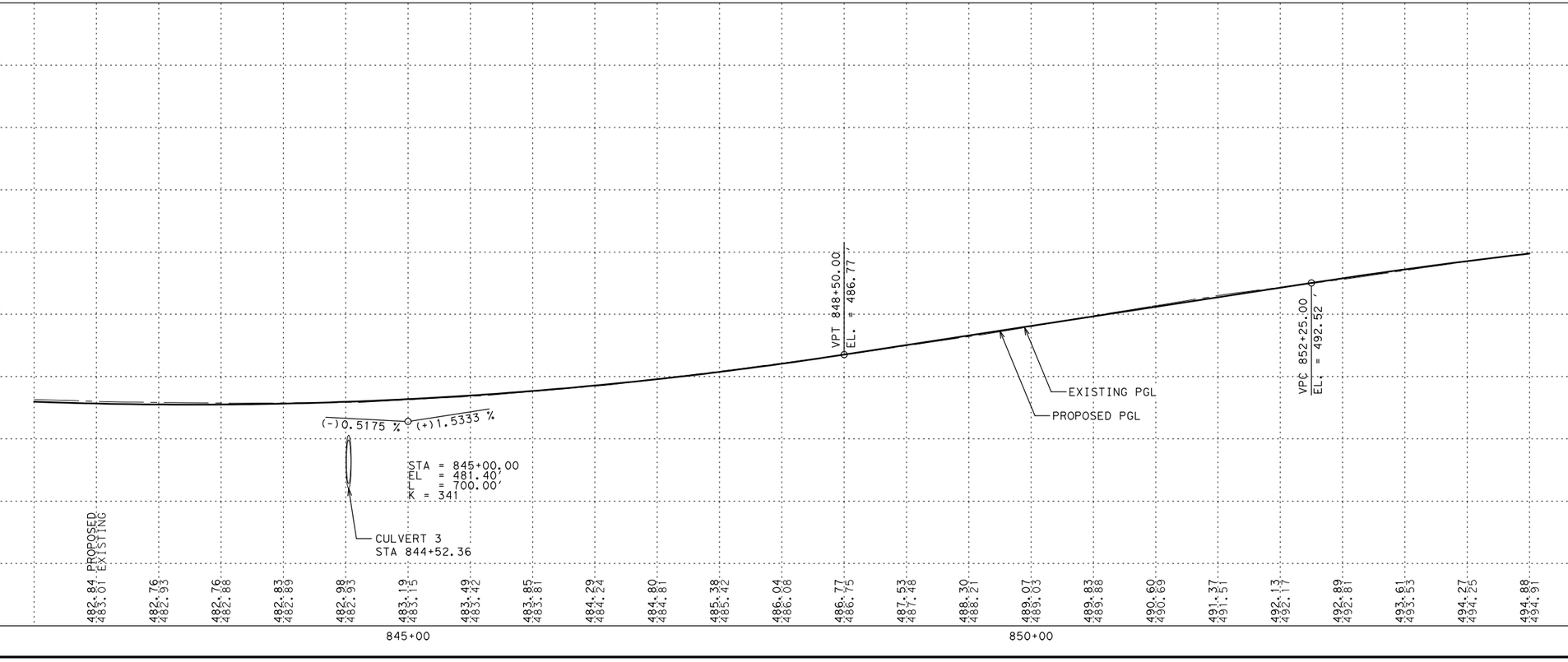


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

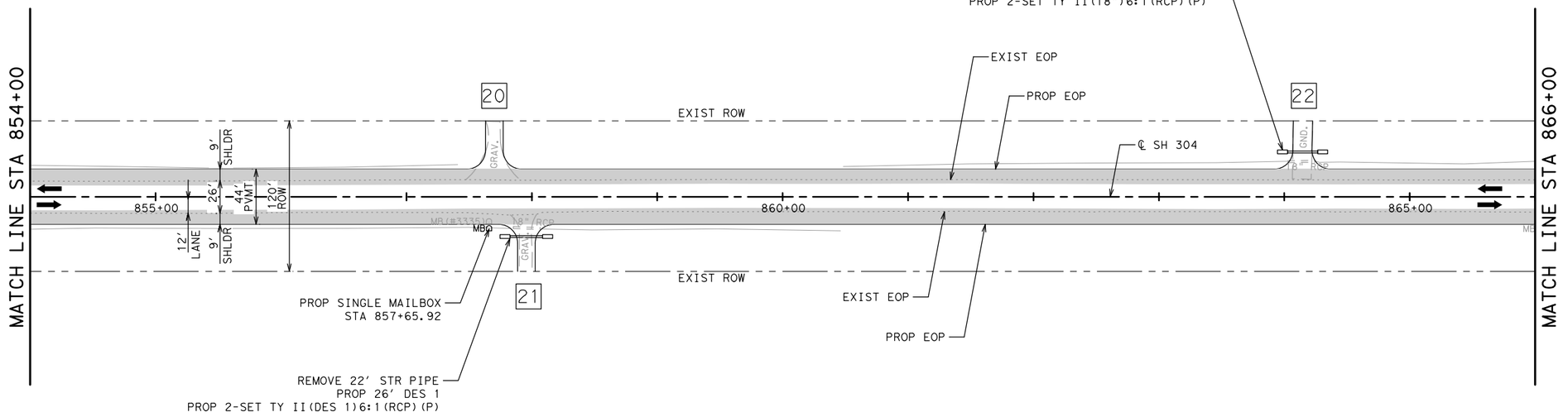
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 842+00 TO STA 854+00

SHEET 8 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		64

DATE: 10/14/2021 10:35:12 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_RDW_PP_08.dgn

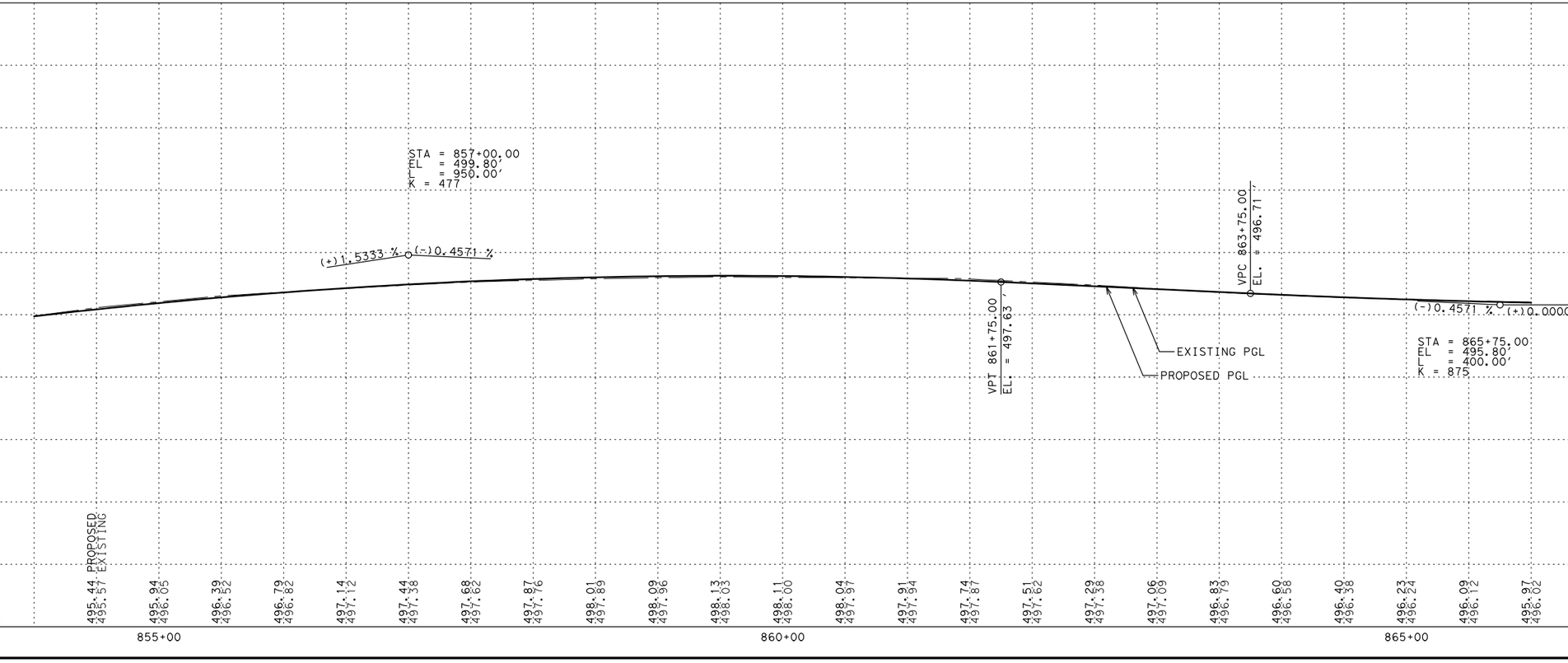


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

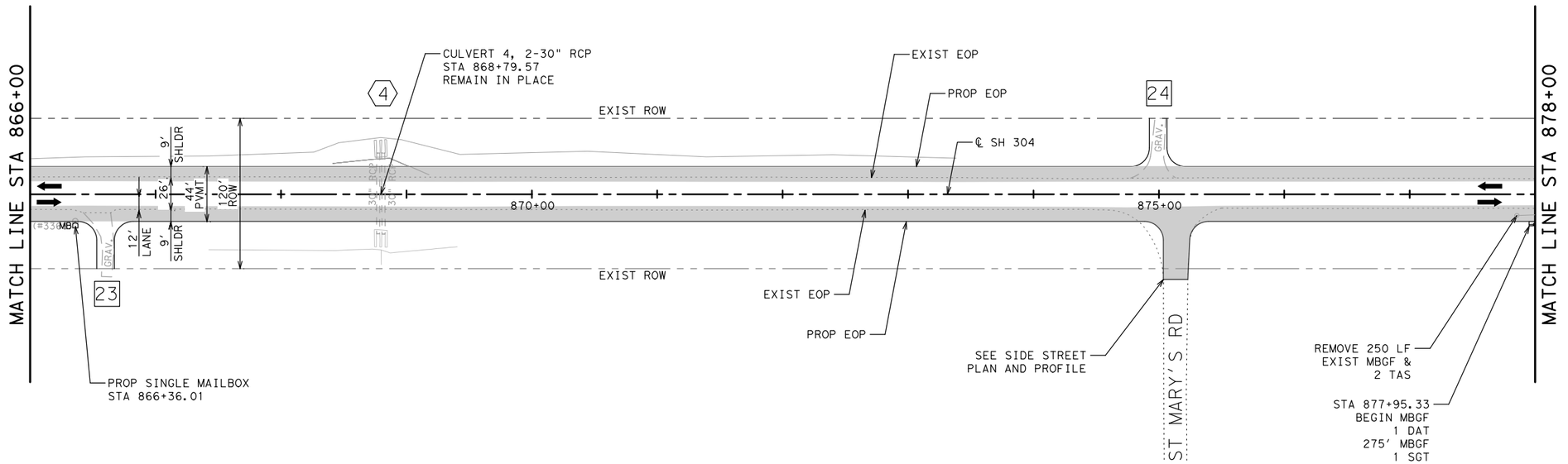
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 854+00 TO STA 866+00

SHEET 9 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		65

DATE: 10/14/2021 10:35:13 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_09.dgn

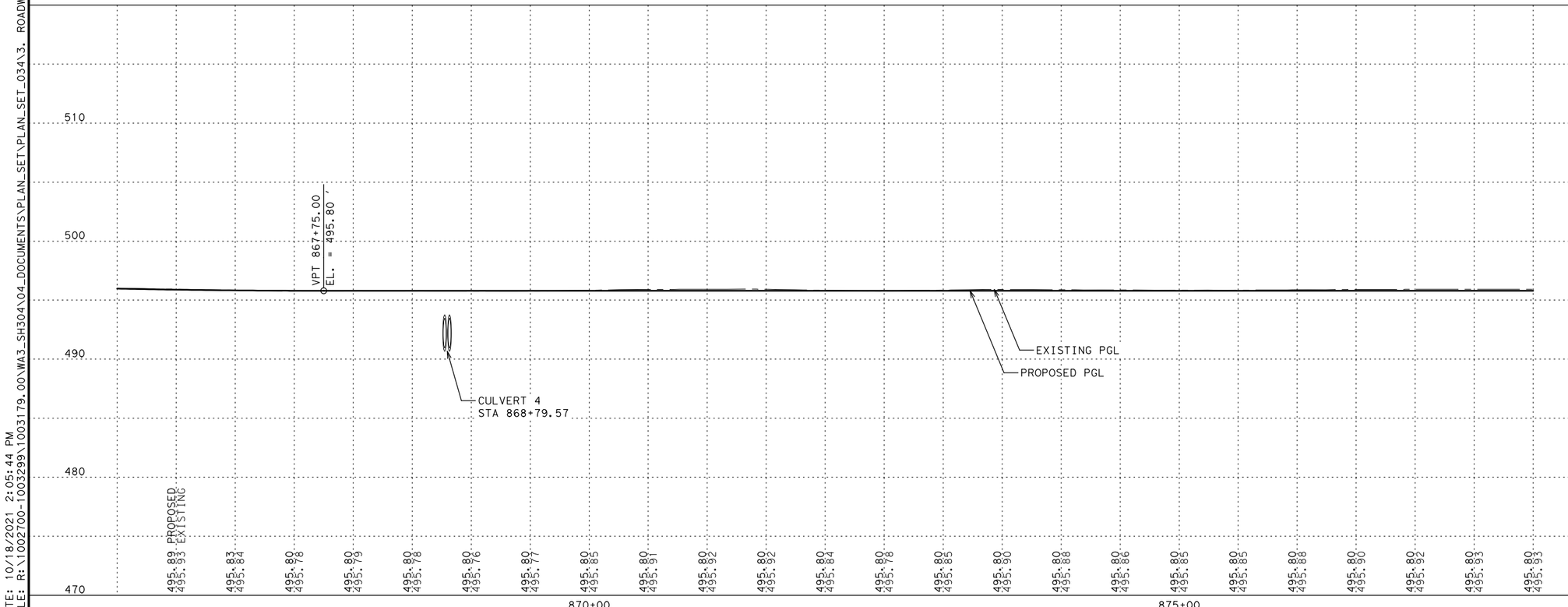


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/18/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

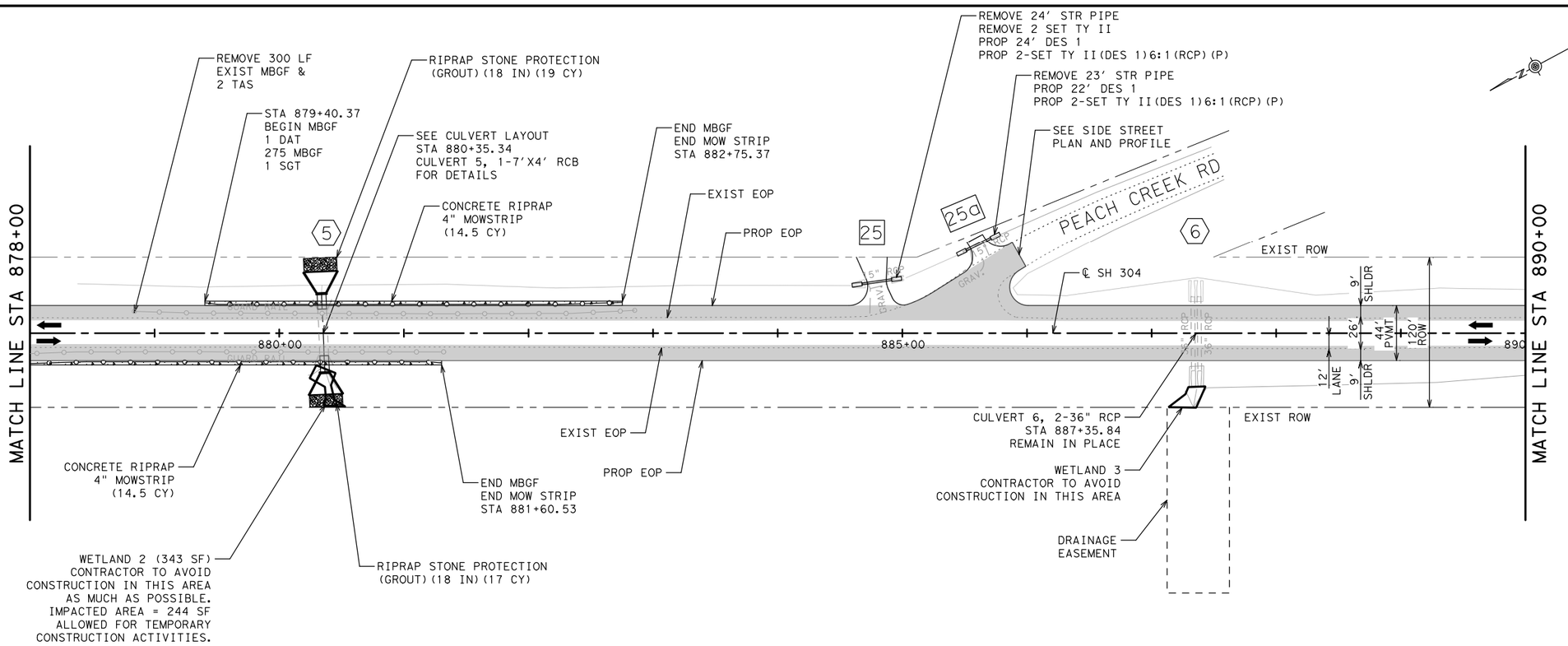
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 866+00 TO STA 878+00

SHEET 10 OF 28

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		66

DATE: 10/18/2021 2:05:44 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_RDW_PP_10.dgn

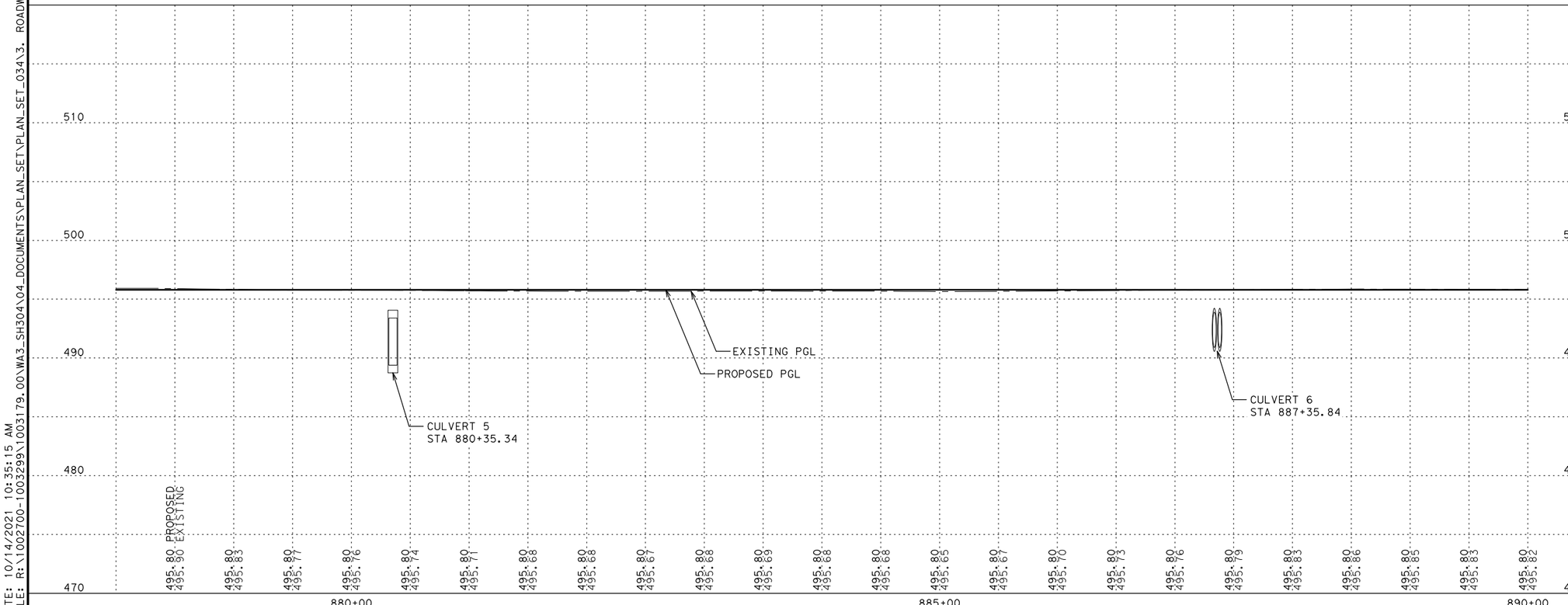


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

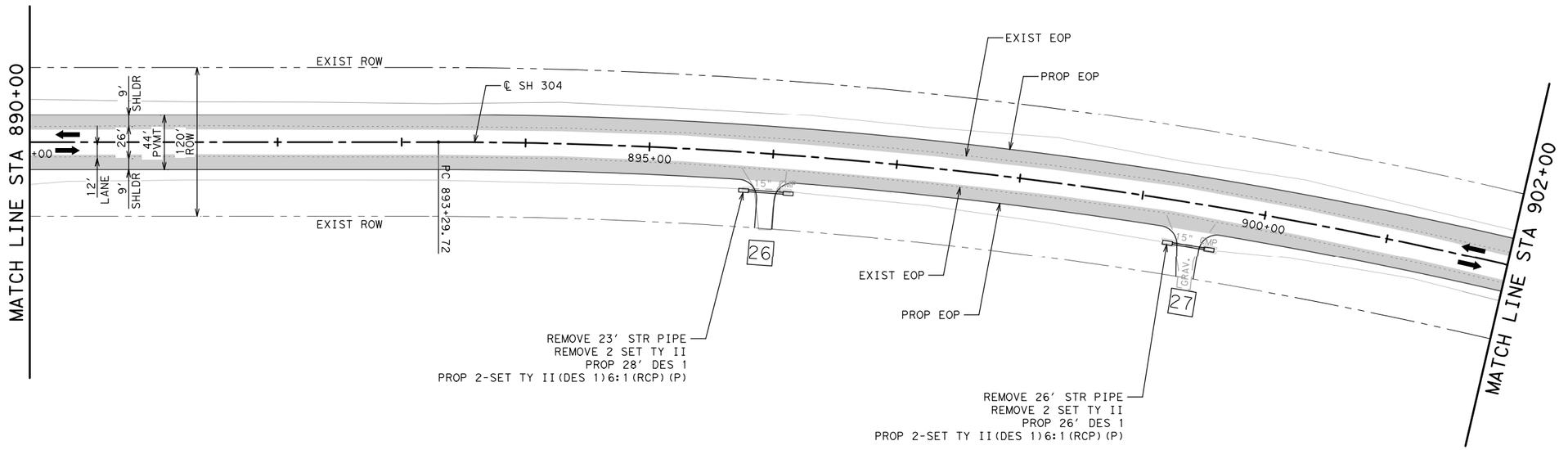
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 878+00 TO STA 890+00

SHEET 11 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		67

DATE: 10/14/2021 10:35:15 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_ROW_PP_11.dgn

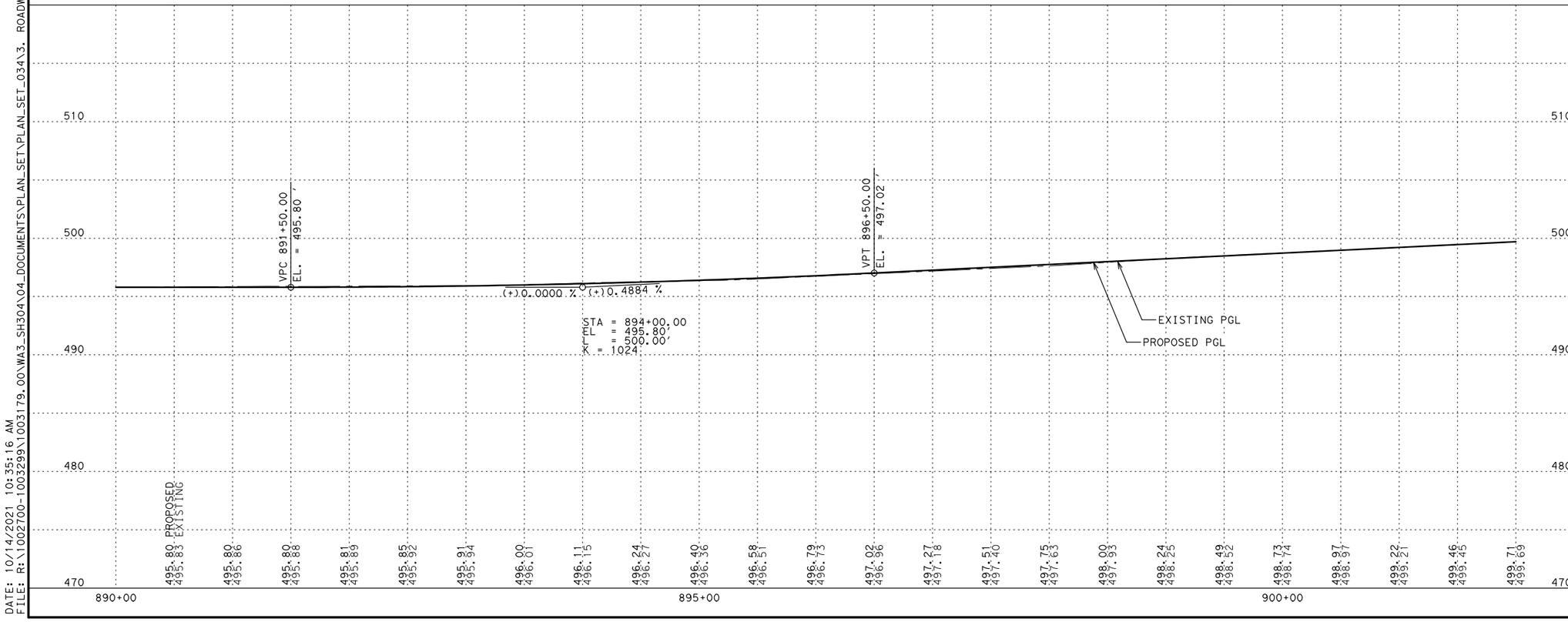


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

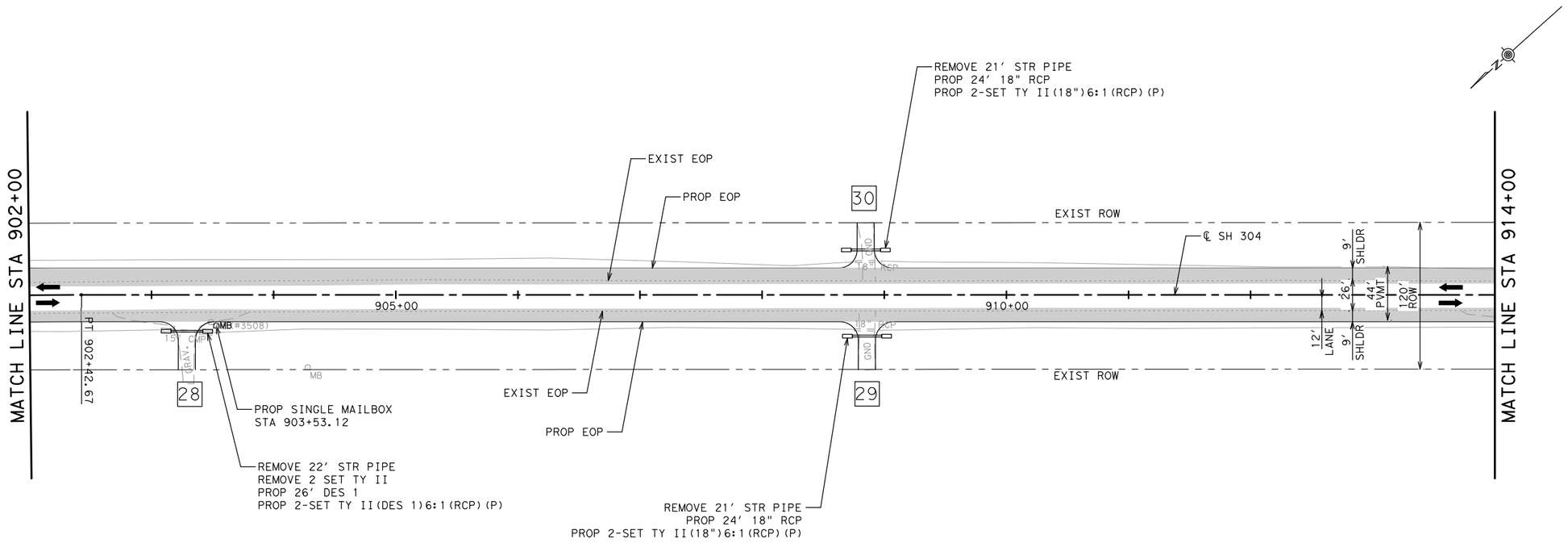
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 890+00 TO STA 902+00

SHEET 12 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		68

DATE: 10/14/2021 10:35:16 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_12.dgn

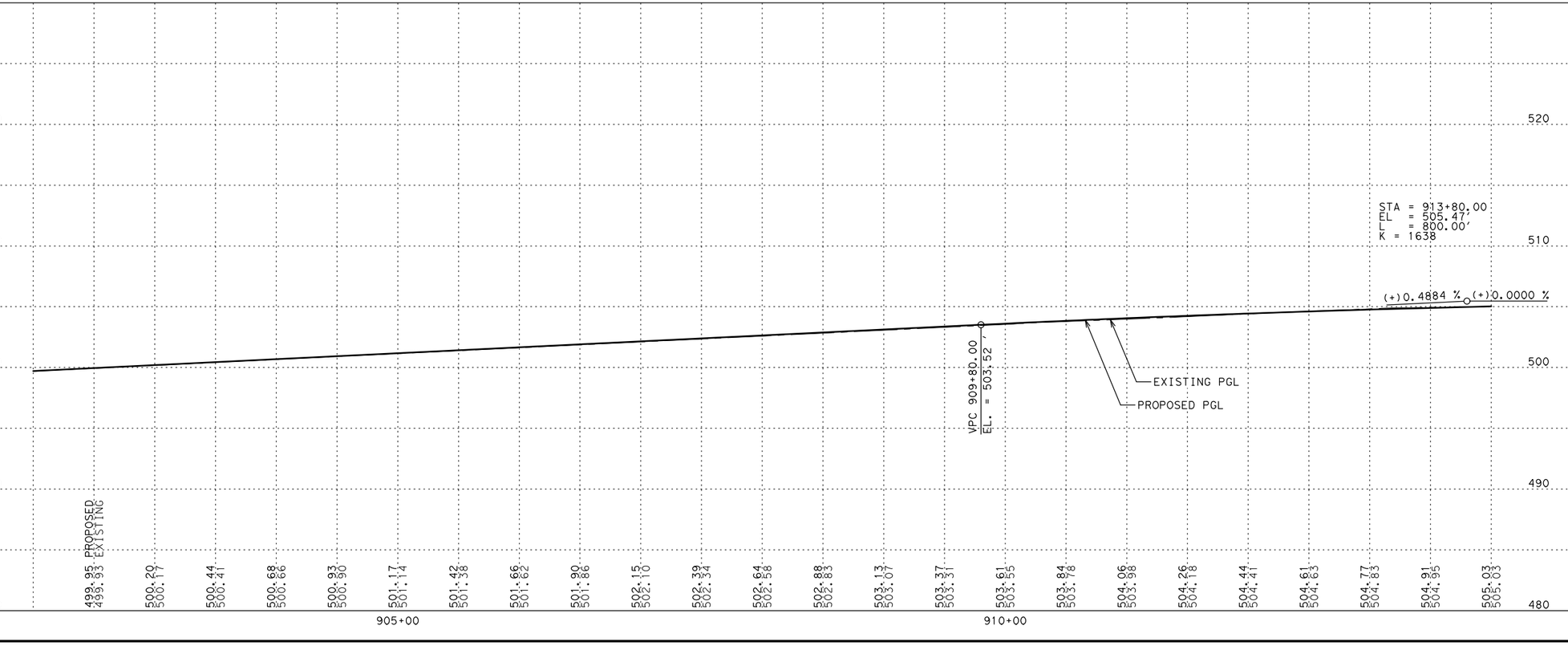


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):

HORZ- 0 100

VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

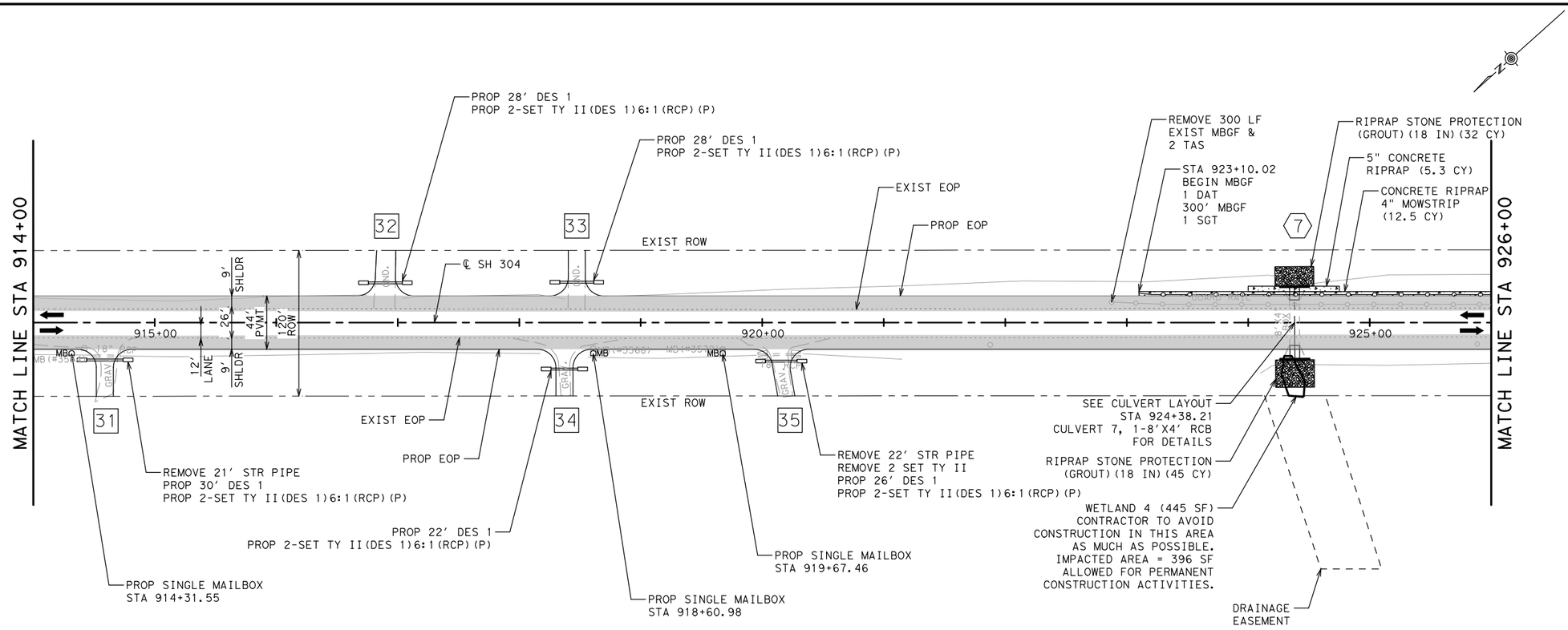
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 902+00 TO STA 914+00

SHEET 13 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		69

DATE: 10/14/2021 10:35:17 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_13.dgn

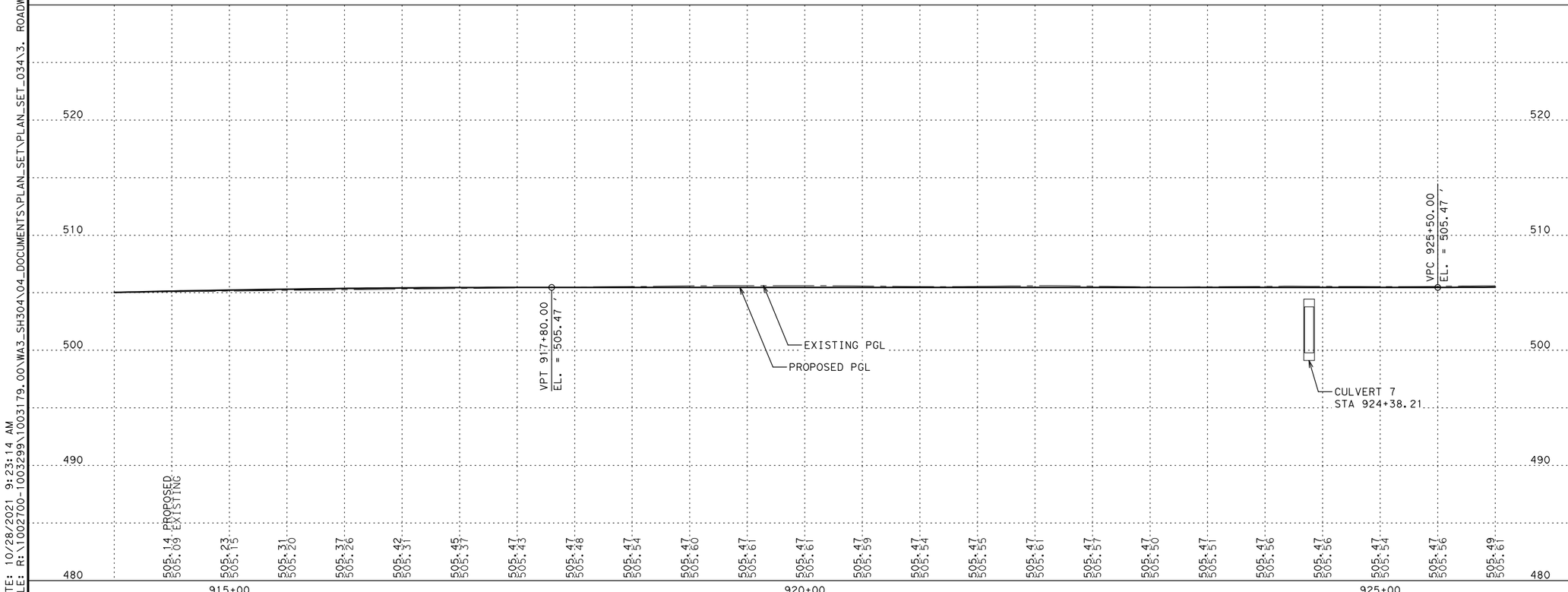


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/28/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

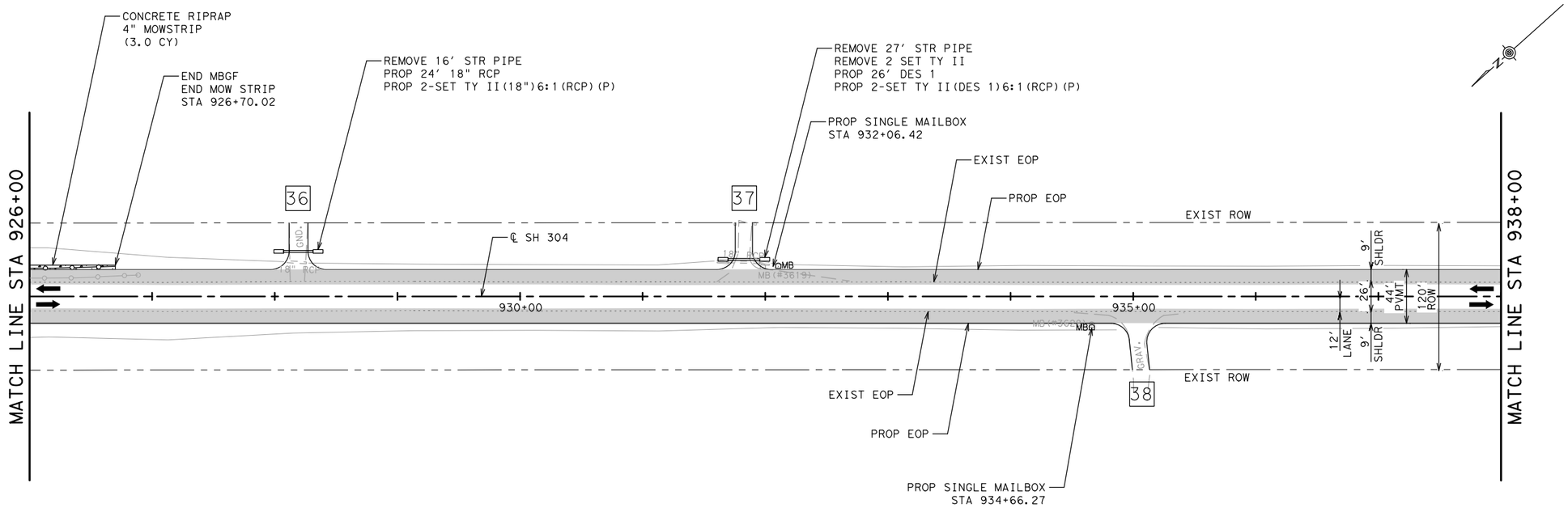
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 914+00 TO STA 926+00

SHEET 14 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		70

DATE: 10/28/2021 9:23:14 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_14.dgn

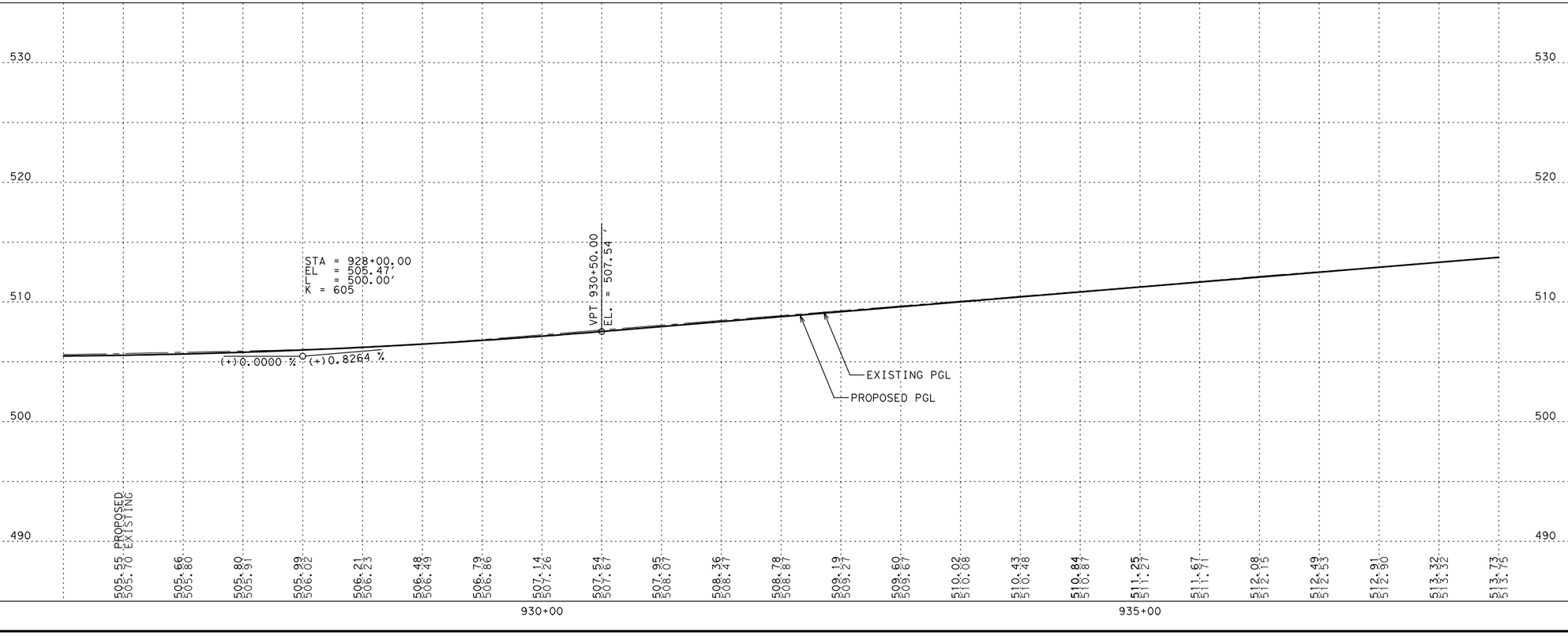


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

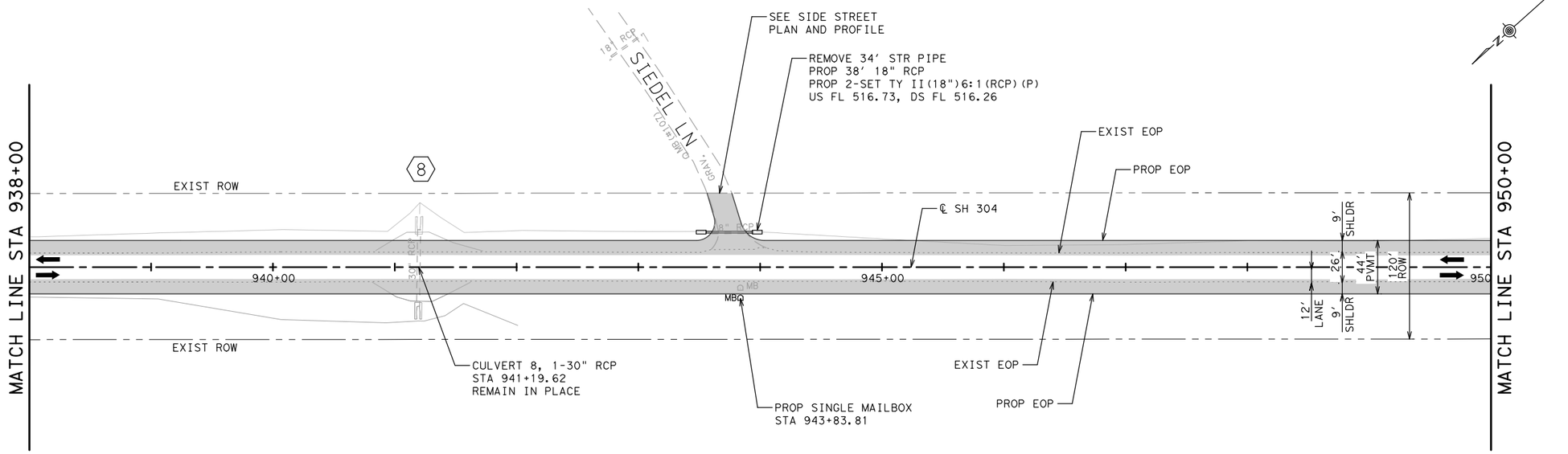
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 926+00 TO STA 938+00

SHEET 15 OF 28

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		71

DATE: 10/14/2021 10:35:19 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_15.dgn

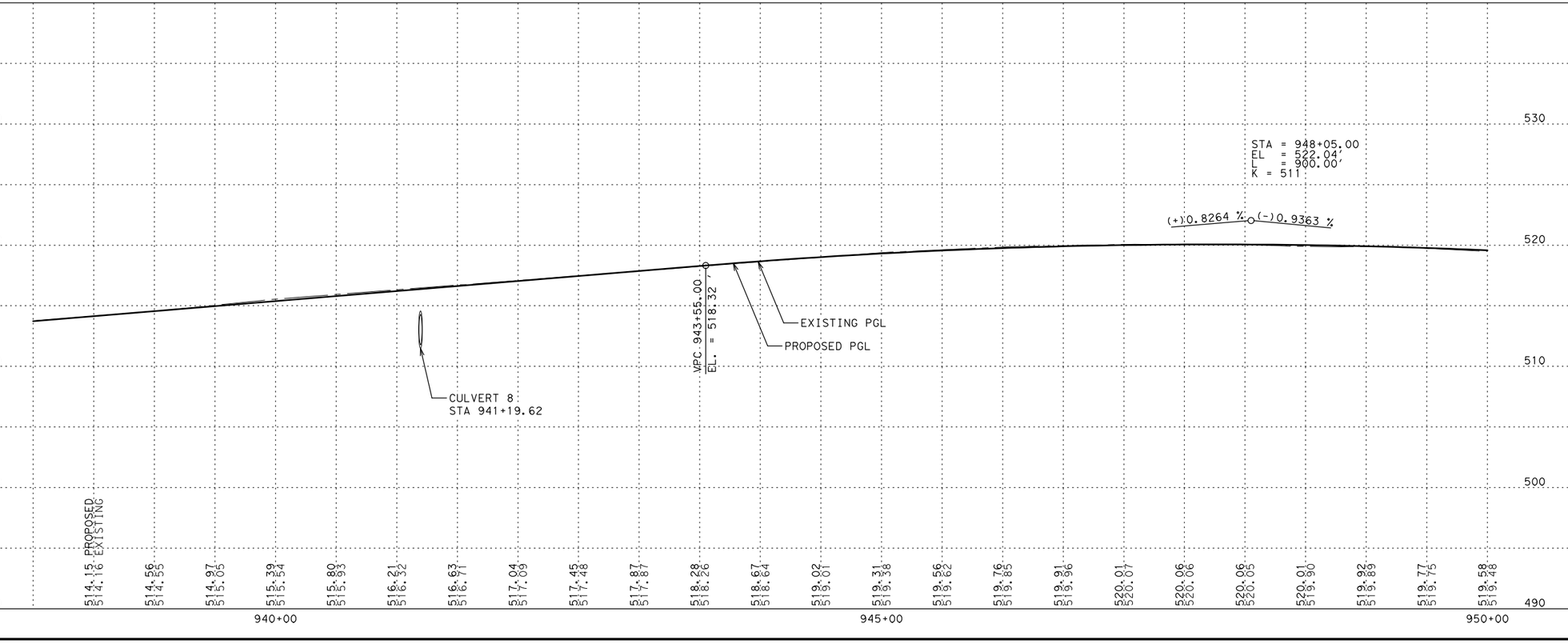


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

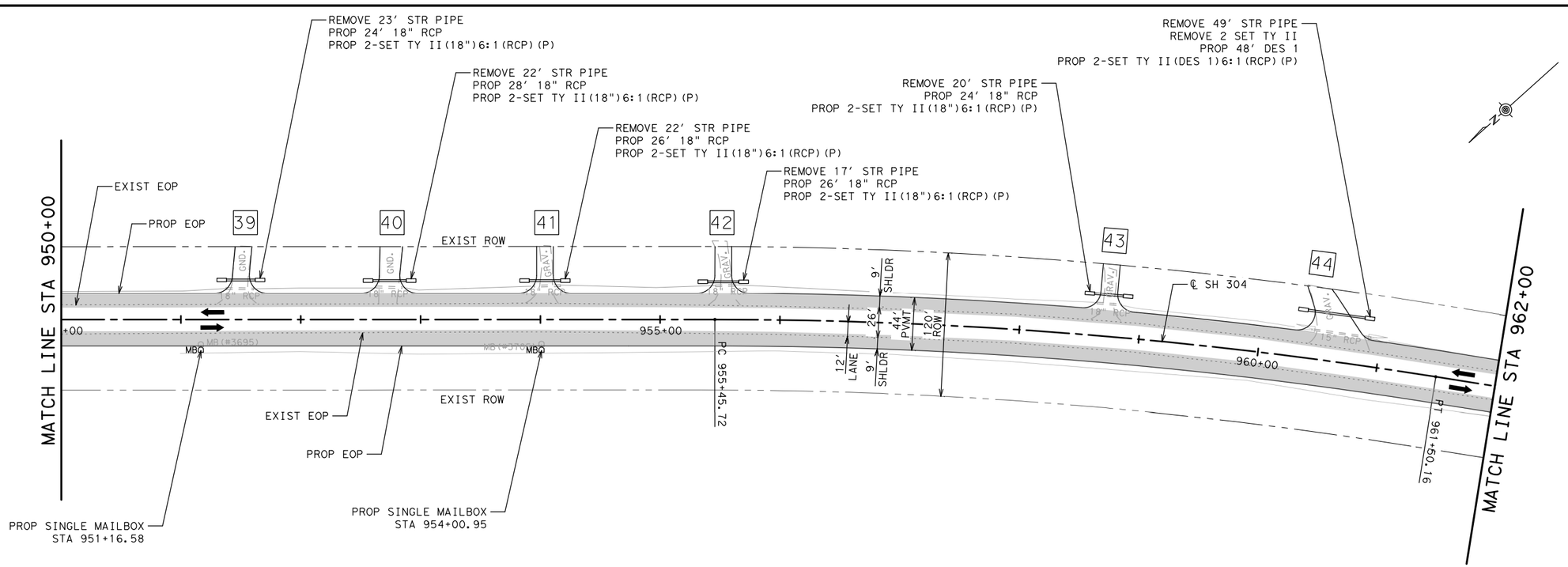
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 938+00 TO STA 950+00

SHEET 16 OF 28

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	BASTROP		72

DATE: 10/14/2021 10:35:20 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_16.dgn

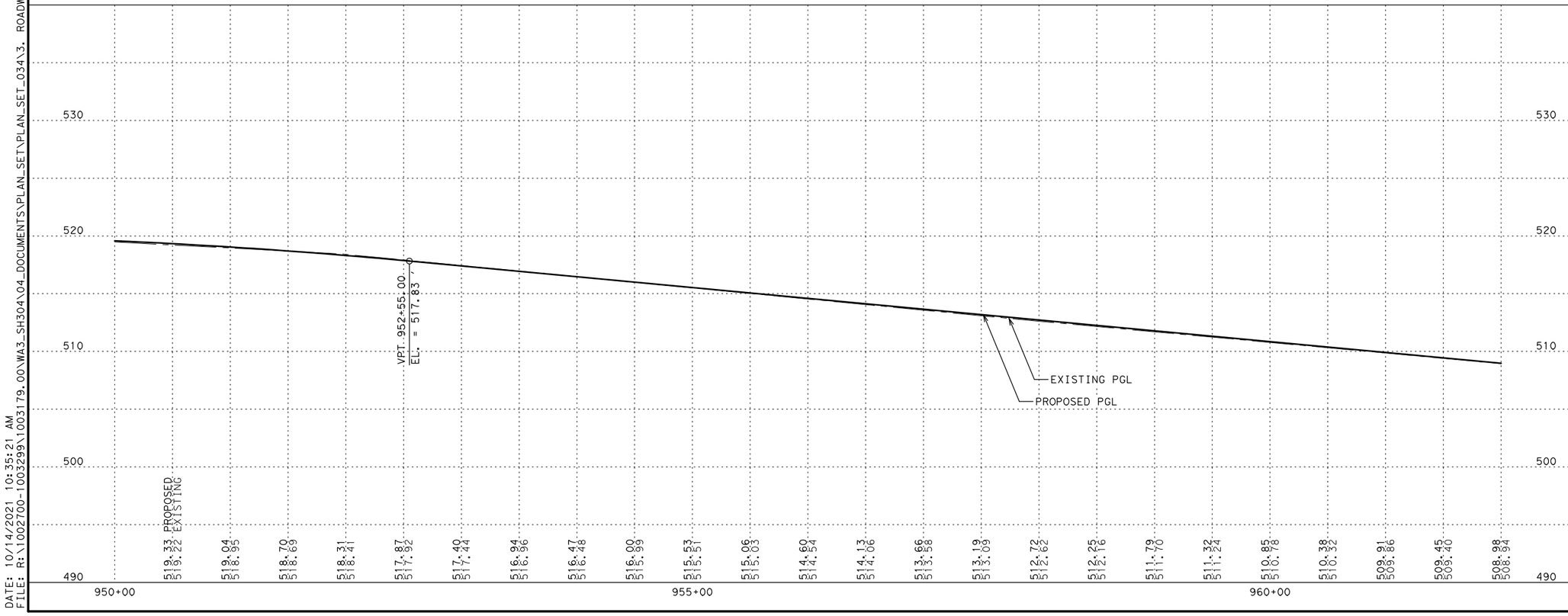


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

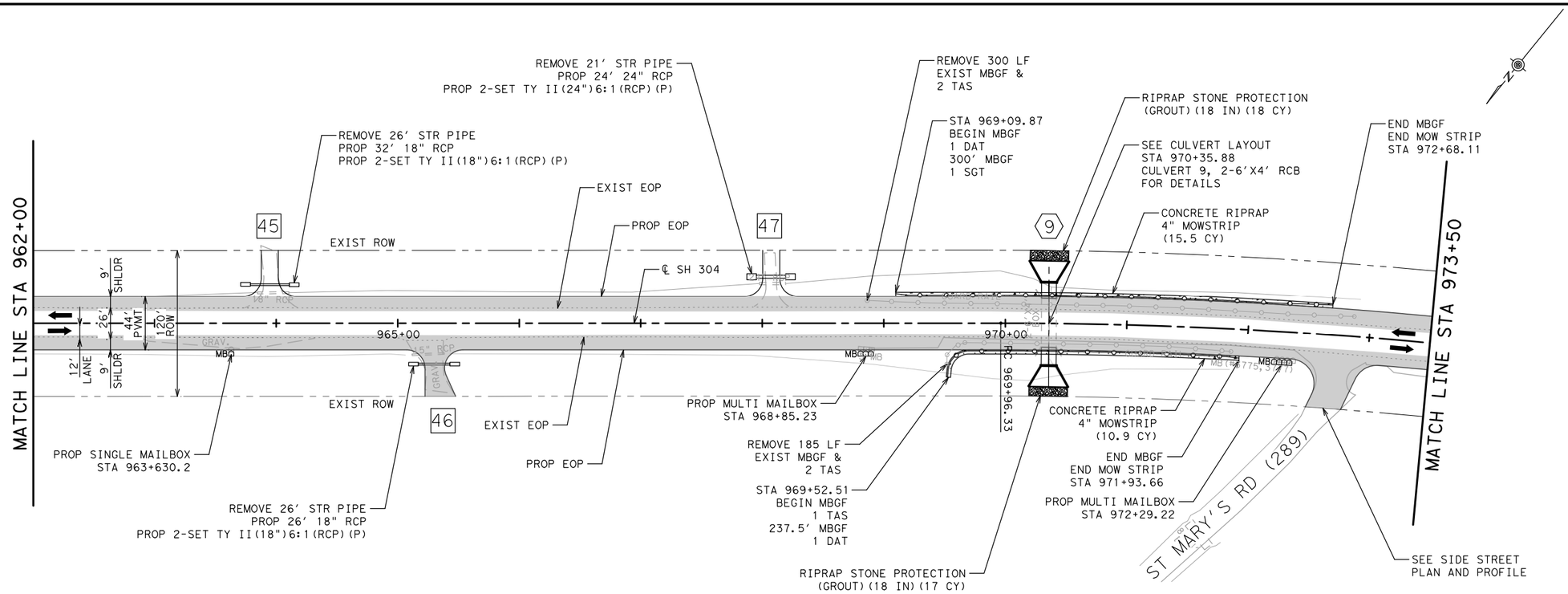
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 950+00 TO STA 962+00

SHEET 17 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		73

DATE: 10/14/2021 10:35:21 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_RDW_PP_17.dgn

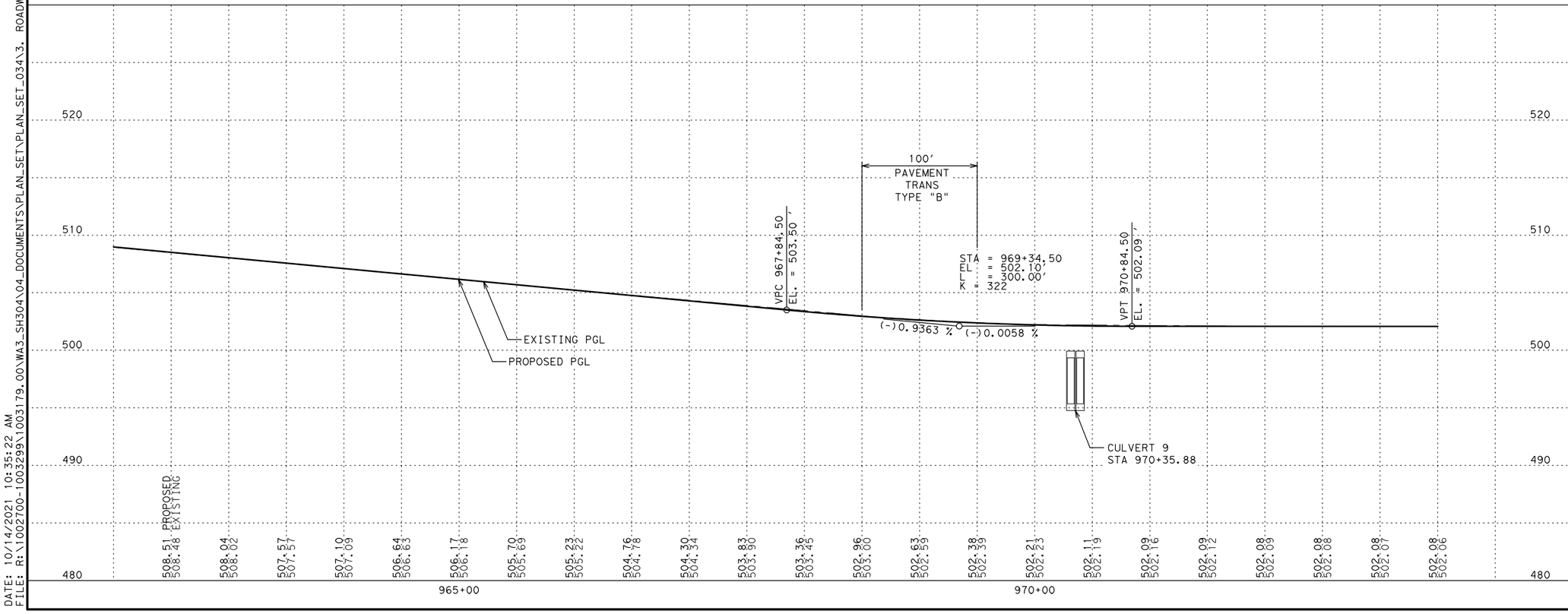


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

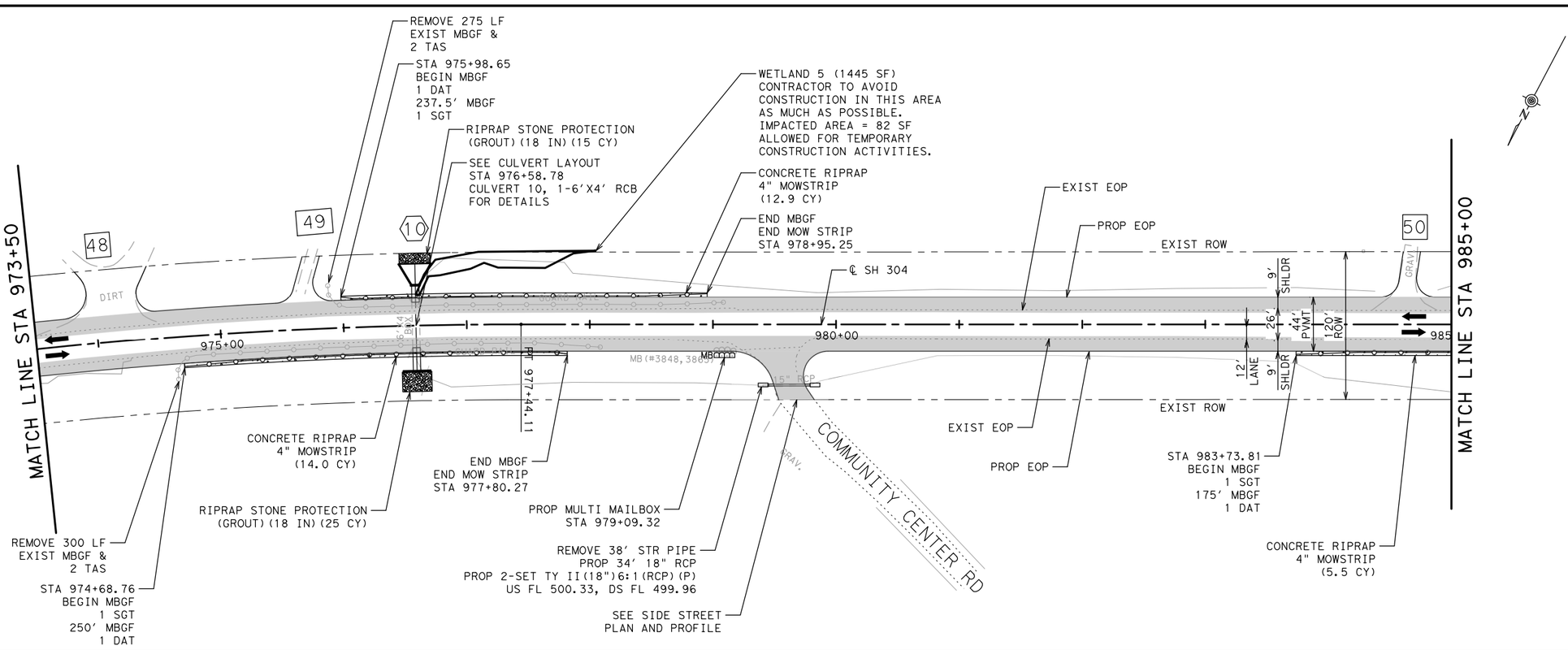
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 962+00 TO STA 973+50

SHEET 18 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		74

DATE: 10/14/2021 10:35:22 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_RDW_PP_18.dgn

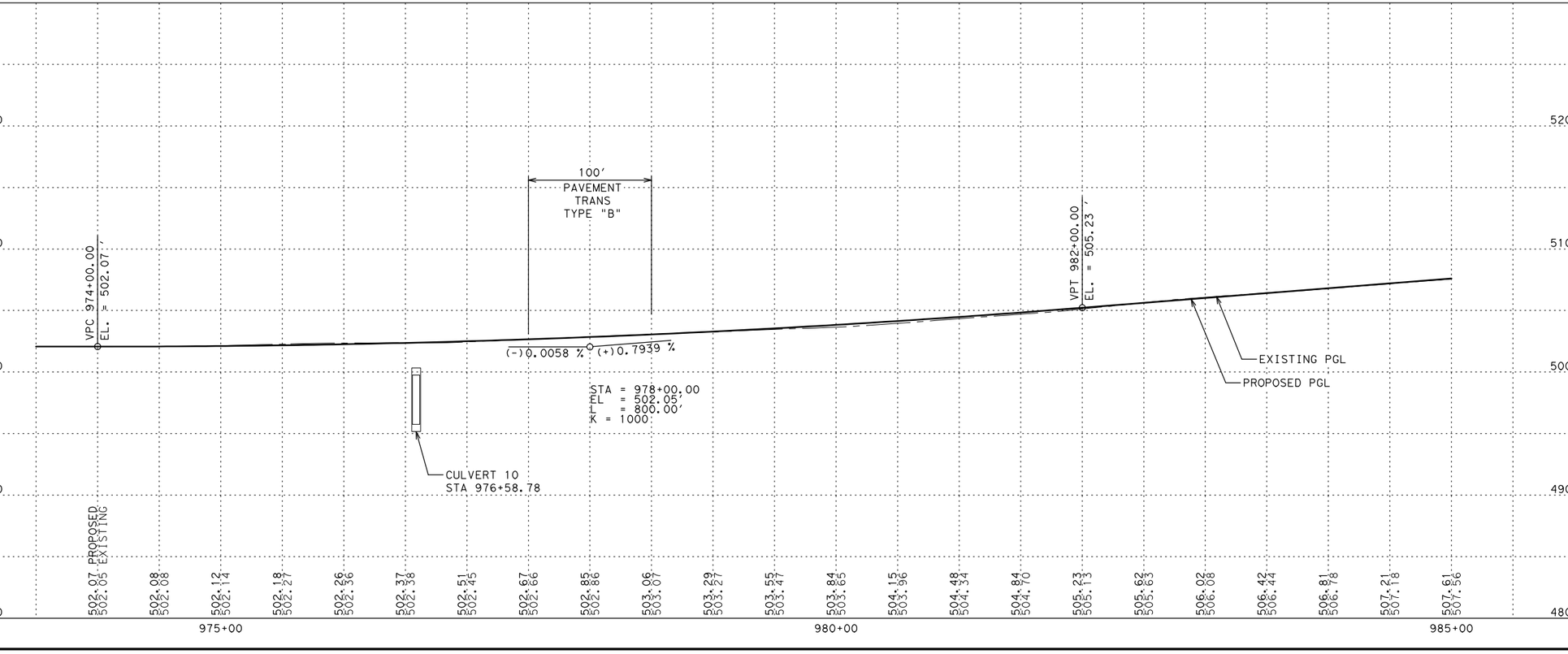


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- # DRIVEWAY NUMBER
- # CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

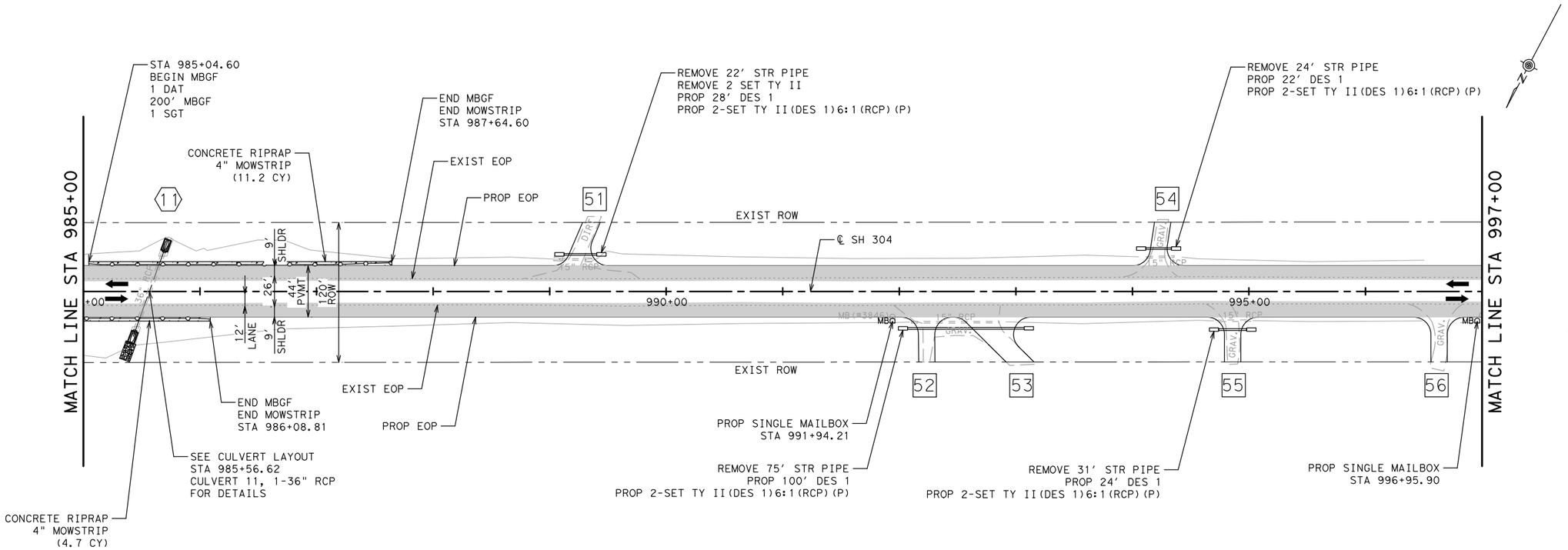
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 973+50 TO STA 985+00

SHEET 19 OF 28

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	BASTROP		75

DATE: 10/14/2021 10:35:23 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_ROW_PP_19.dgn

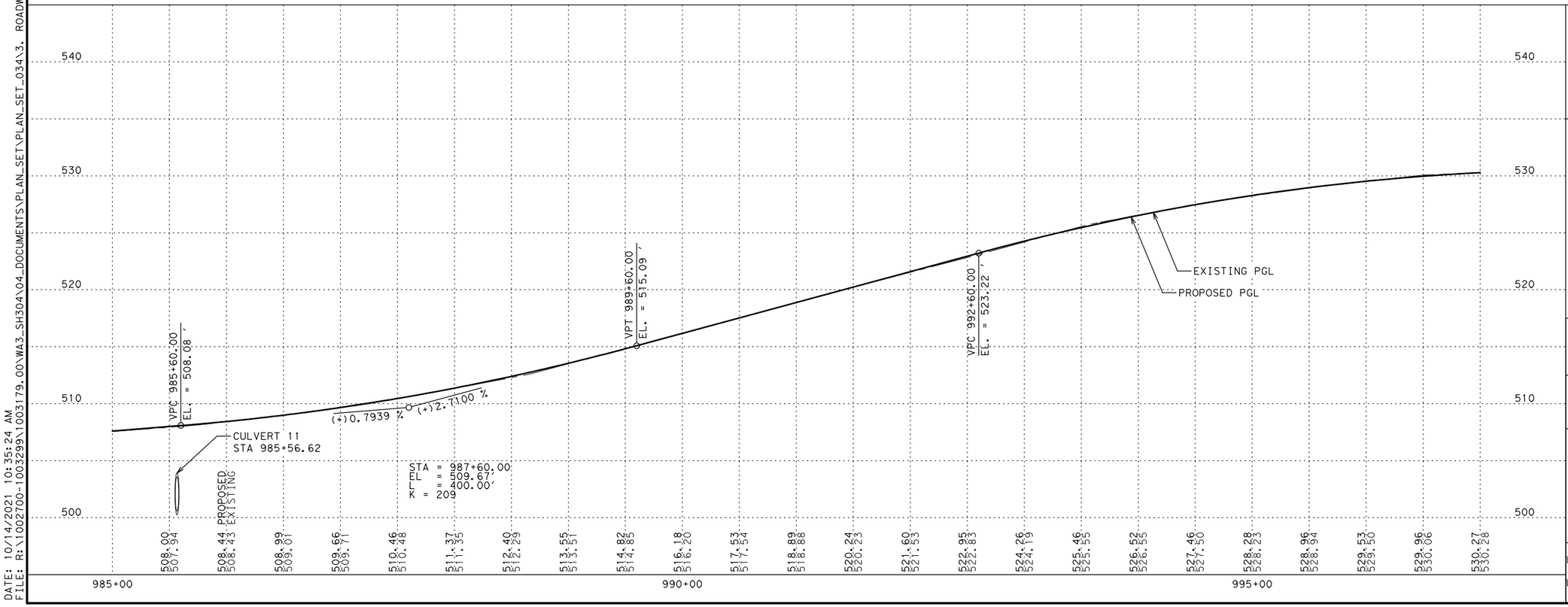


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

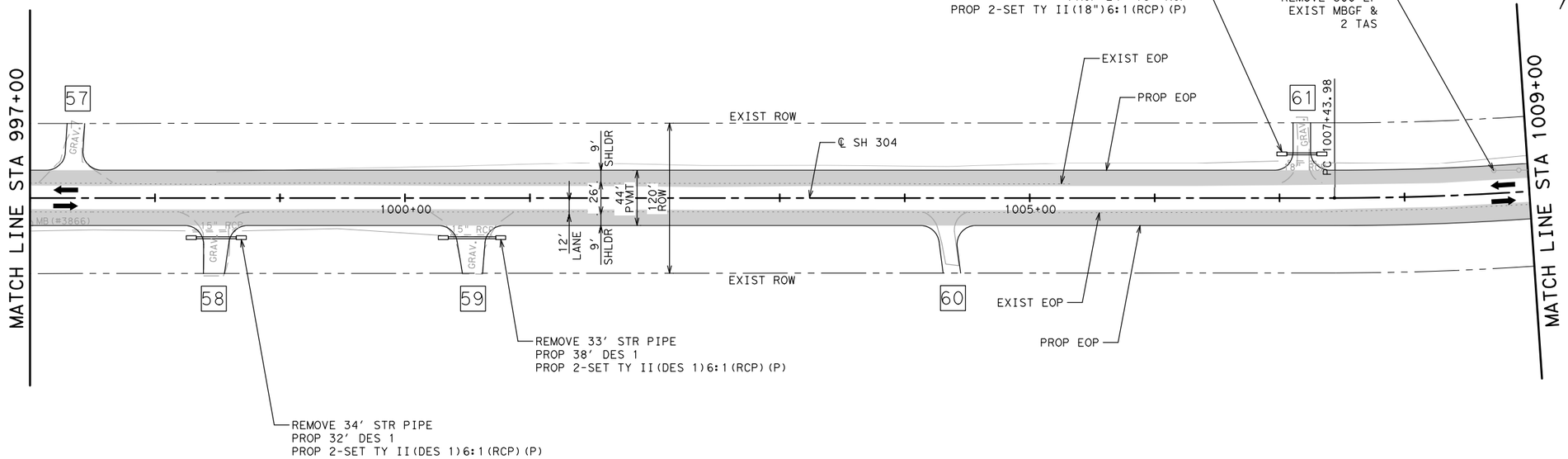
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 985+00 TO STA 997+00

SHEET 20 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		76

DATE: 10/14/2021 10:35:24 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_RDW_PP_20.dgn

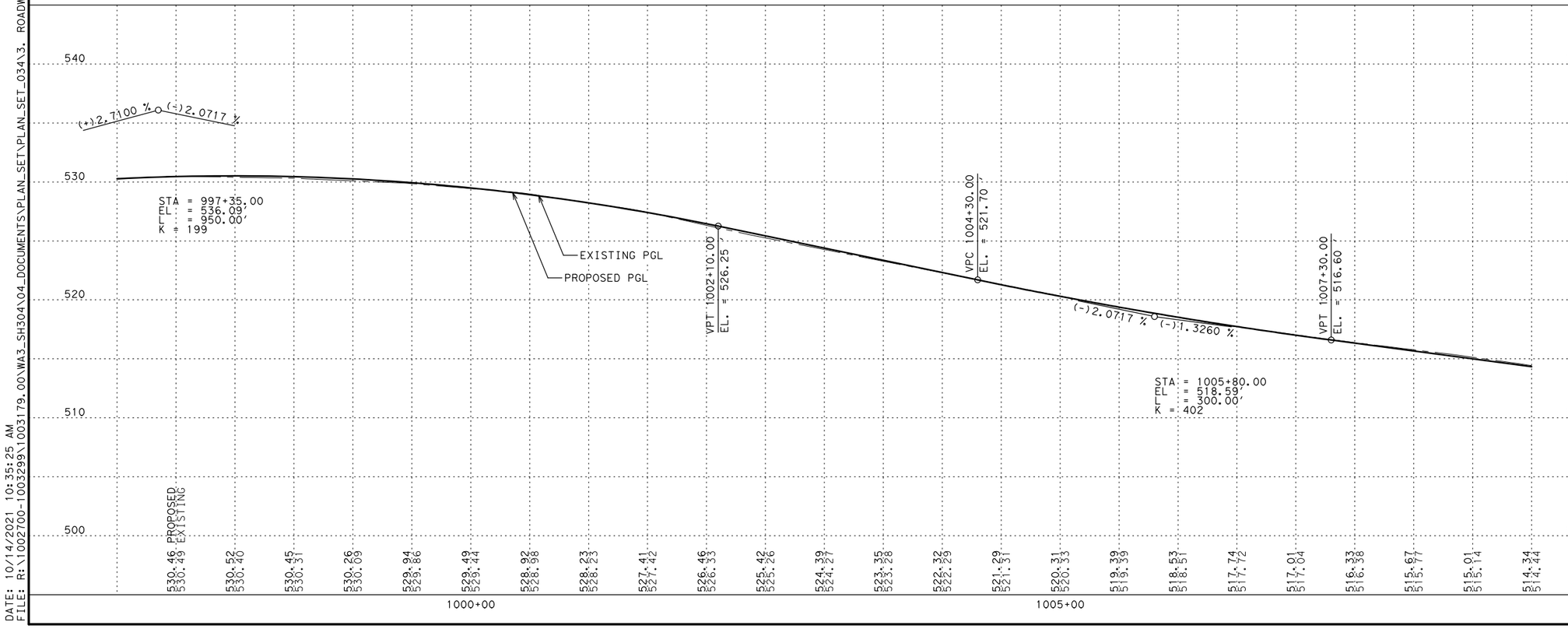


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

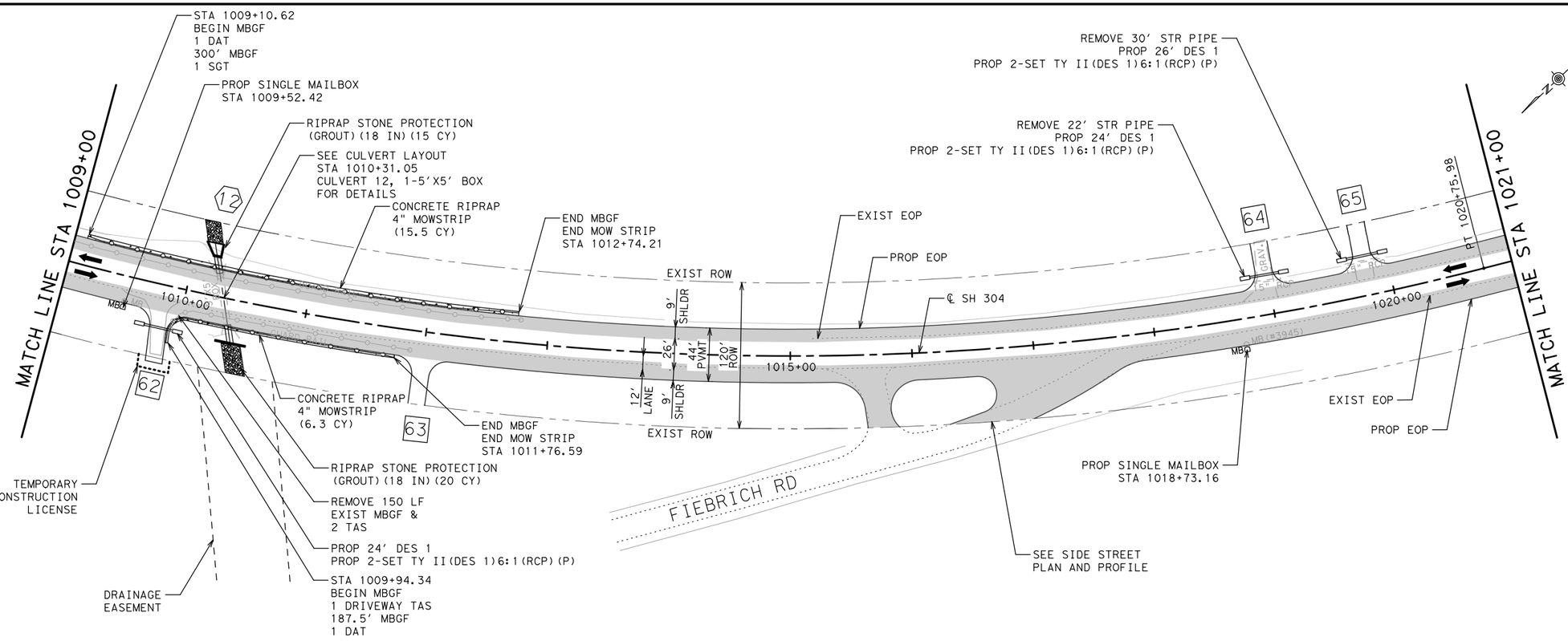
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 997+00 TO STA 1009+00

SHEET 21 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		77

DATE: 10/14/2021 10:35:25 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_21.dgn

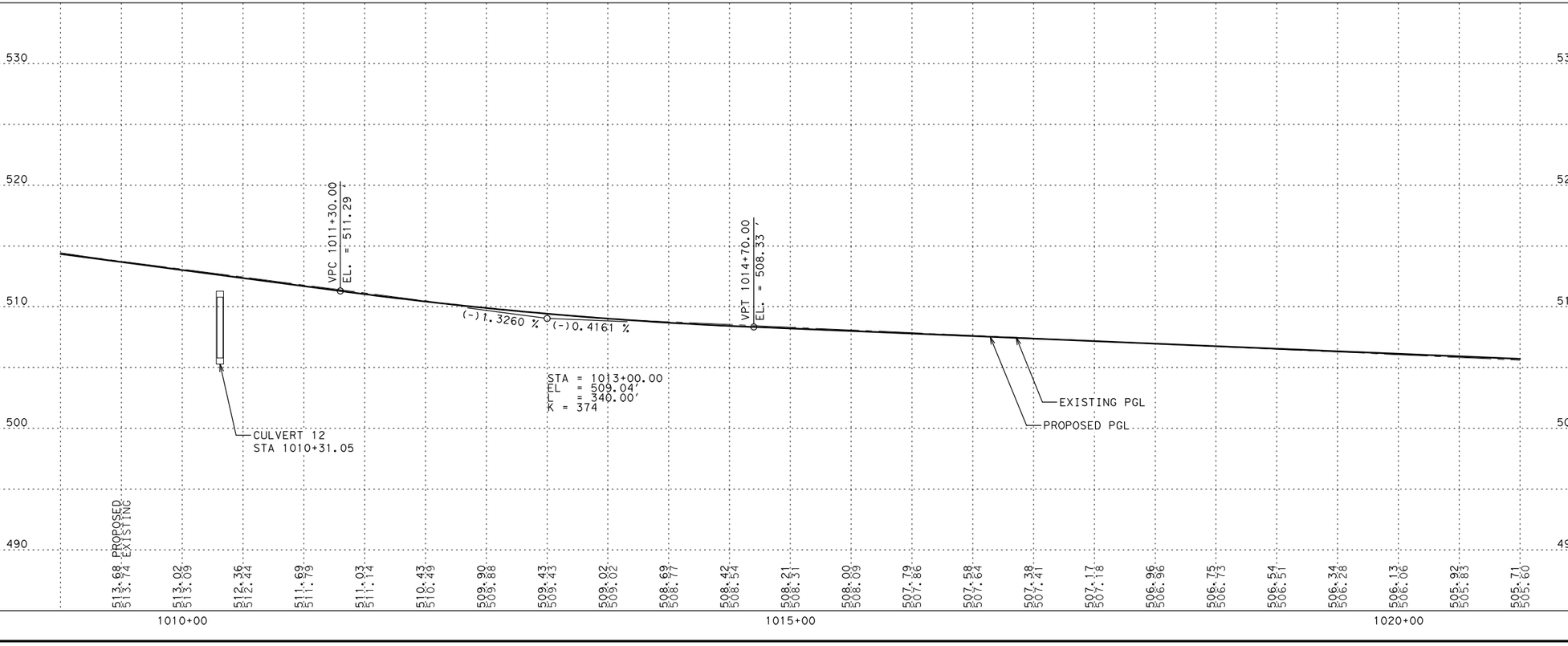


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

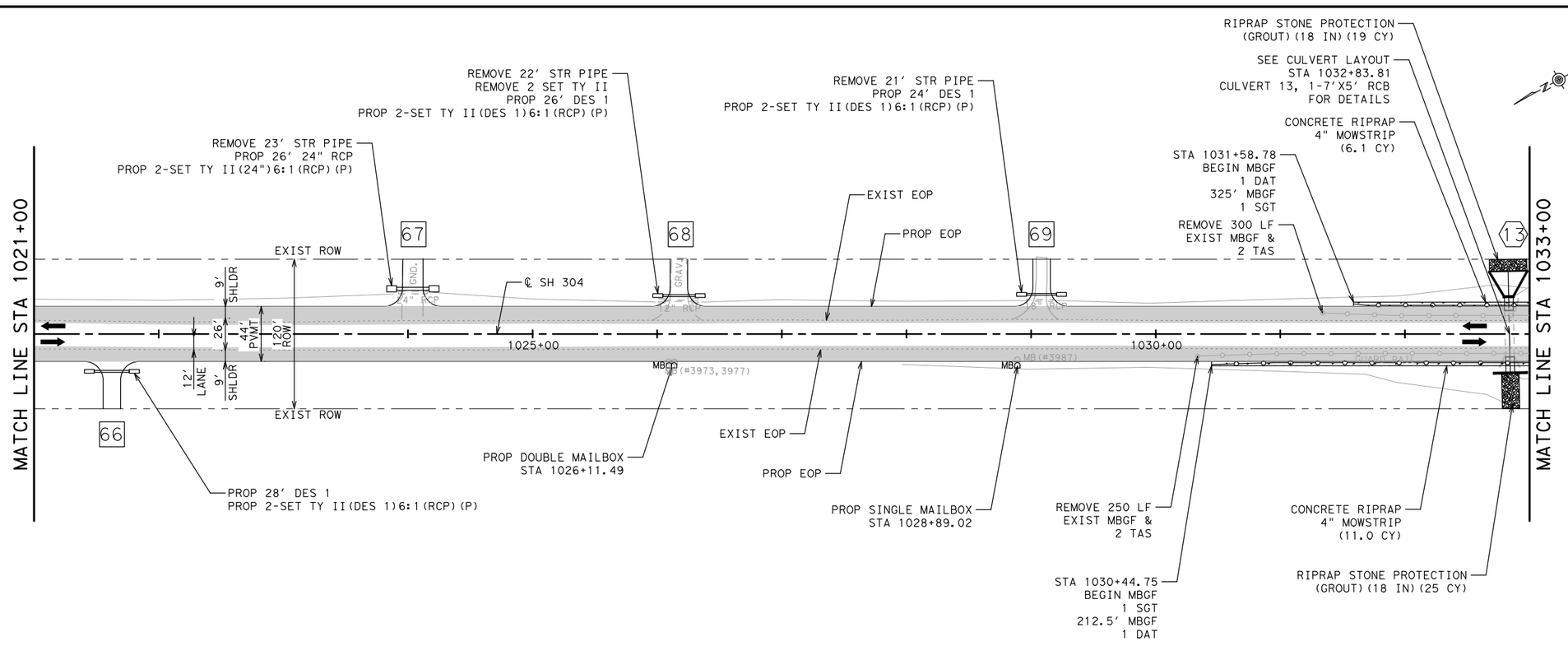
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 1009+00 TO STA 1021+00

SHEET 22 OF 28

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		78

DATE: 10/14/2021 10:35:26 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_ROW_PP_22.dgn

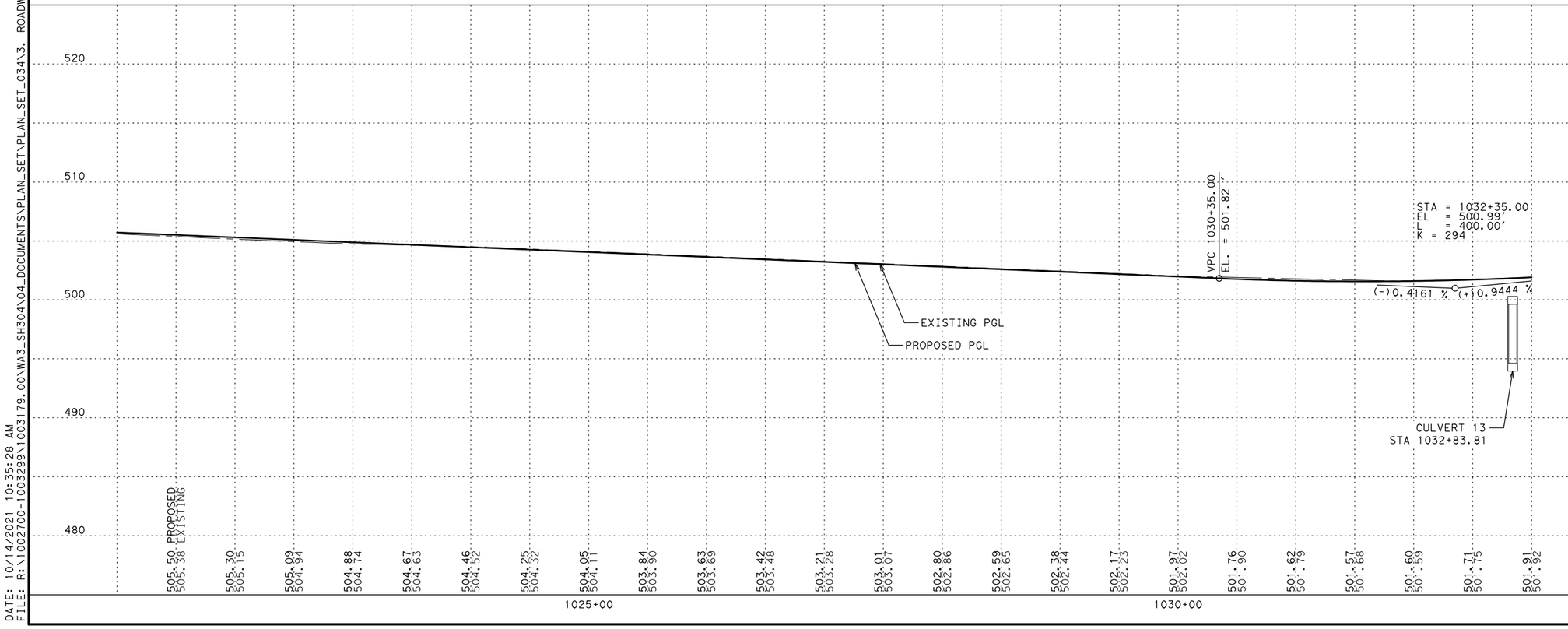


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- # DRIVEWAY NUMBER
- # CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

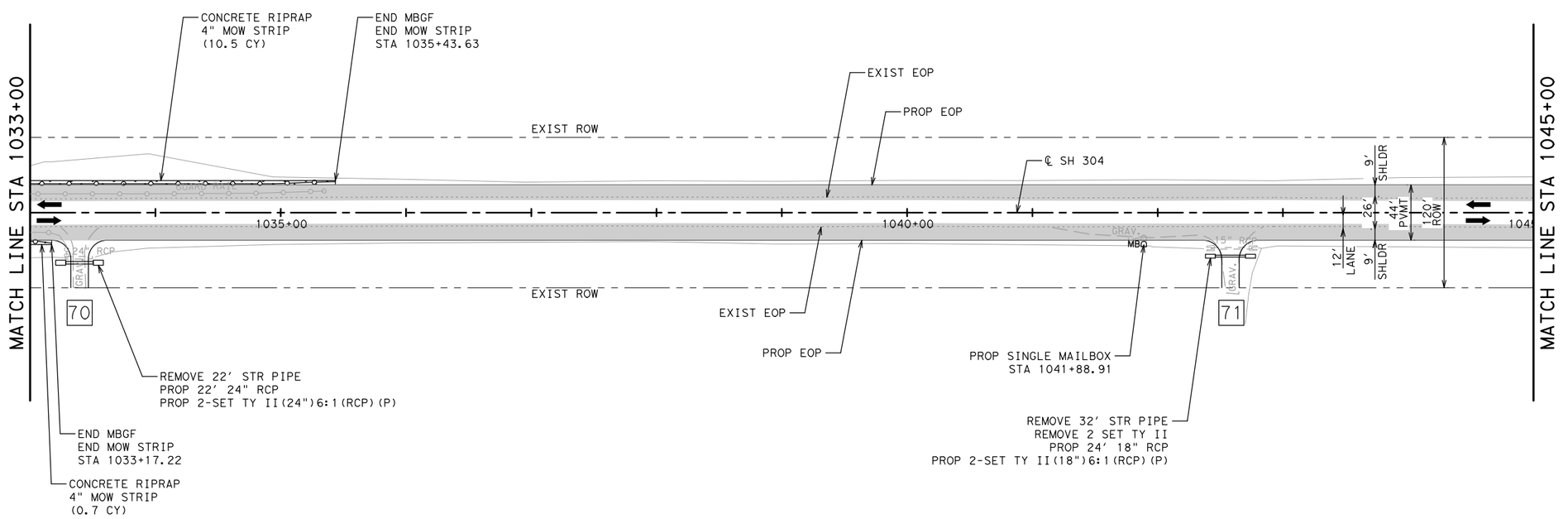
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 1021+00 TO STA 1033+00

SHEET 23 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		79

DATE: 10/14/2021 10:35:28 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_RDW_PP_23.dgn

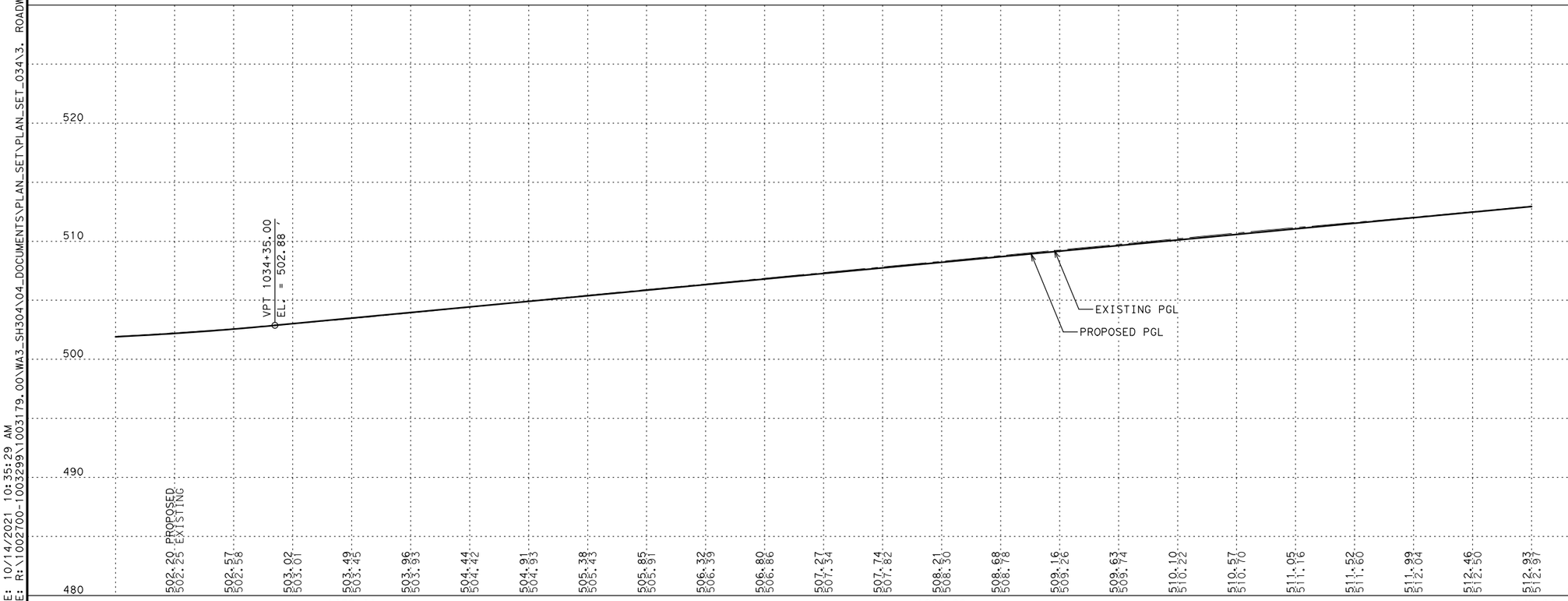


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

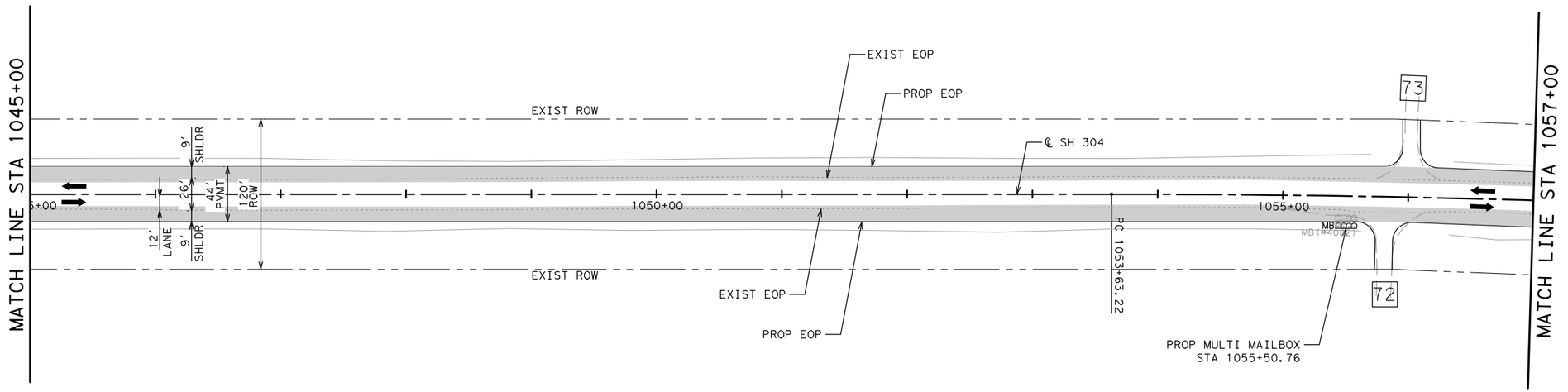
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 1033+00 TO STA 1045+00

SHEET 24 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		80

DATE: 10/14/2021 10:35:29 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_RDW_PP_24.dgn

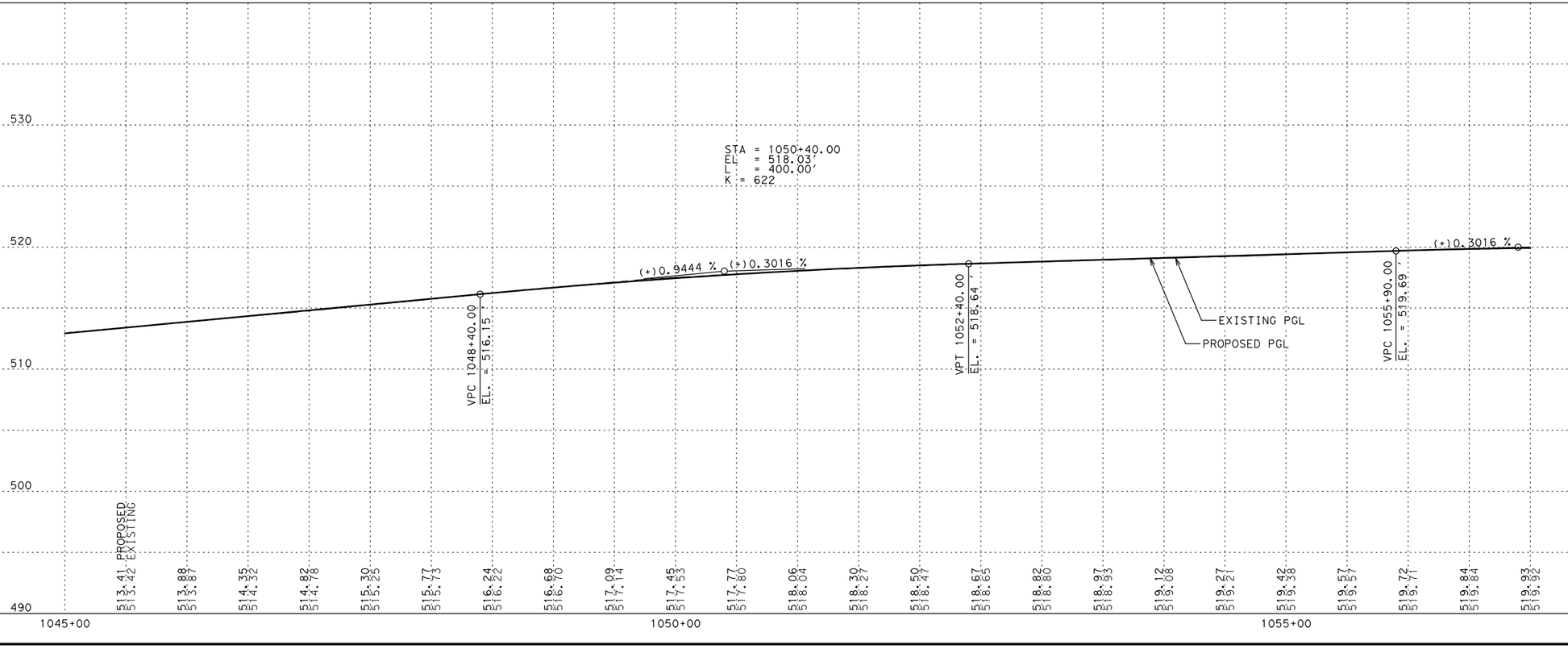


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

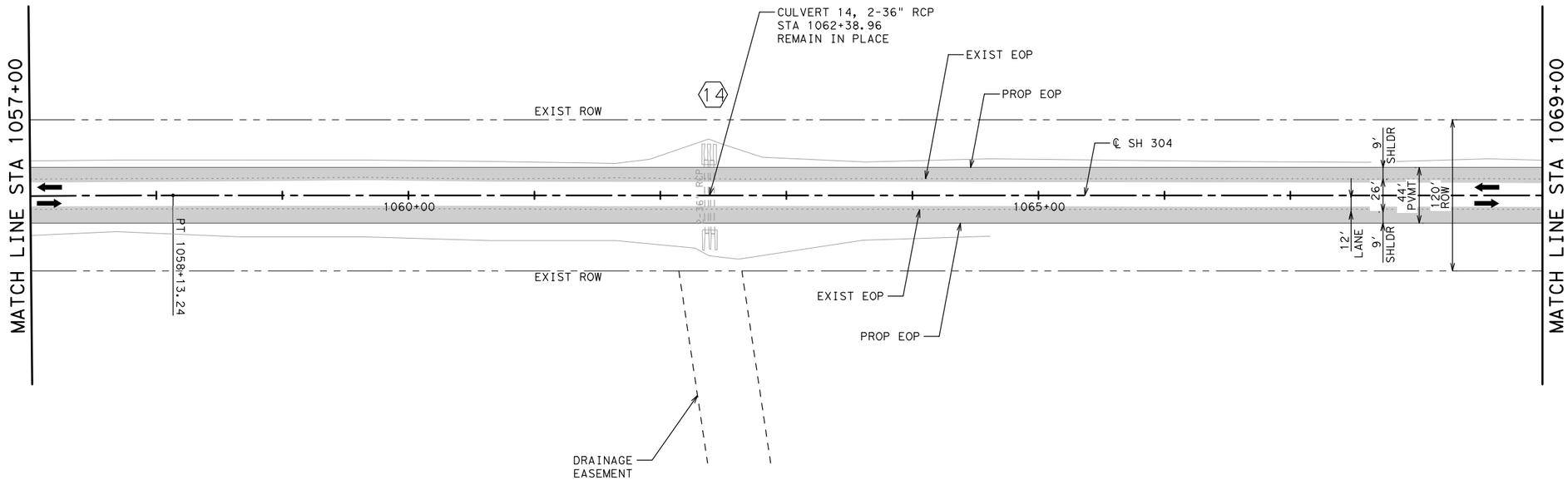
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 1045+00 TO STA 1057+00

SHEET 25 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		81

DATE: 10/14/2021 10:35:30 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_25.dgn

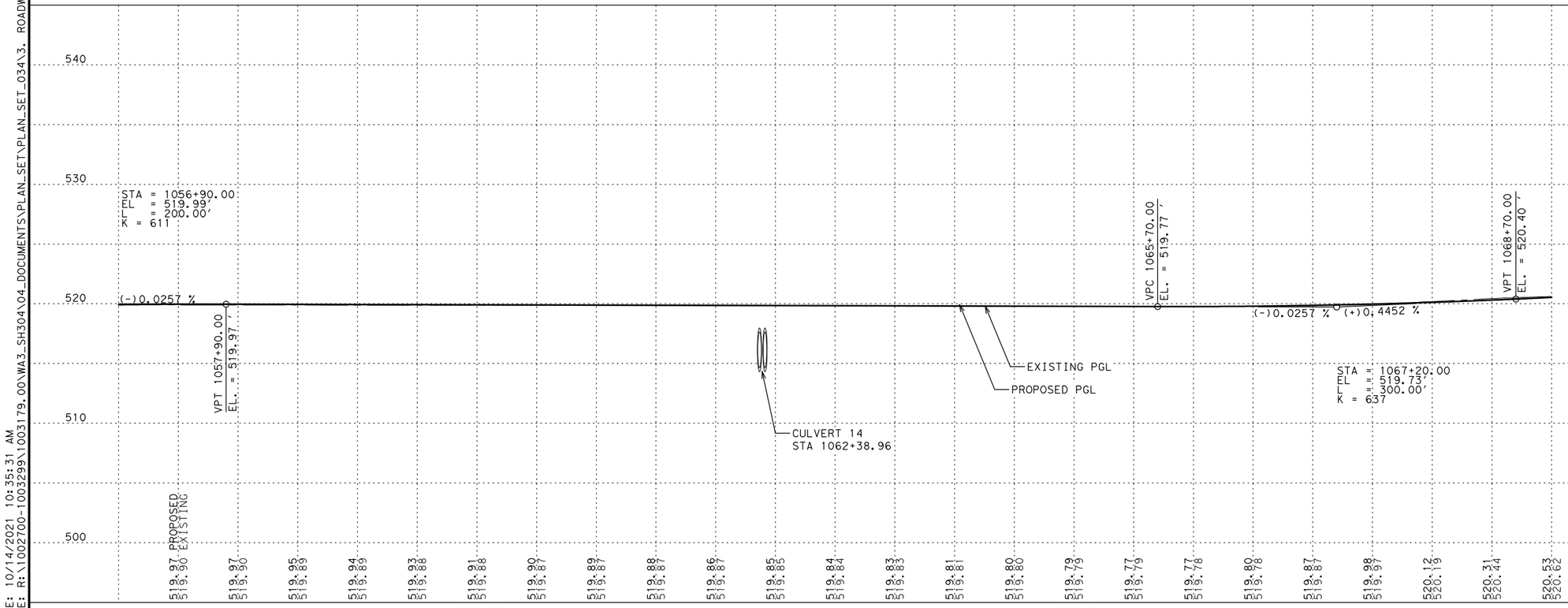


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

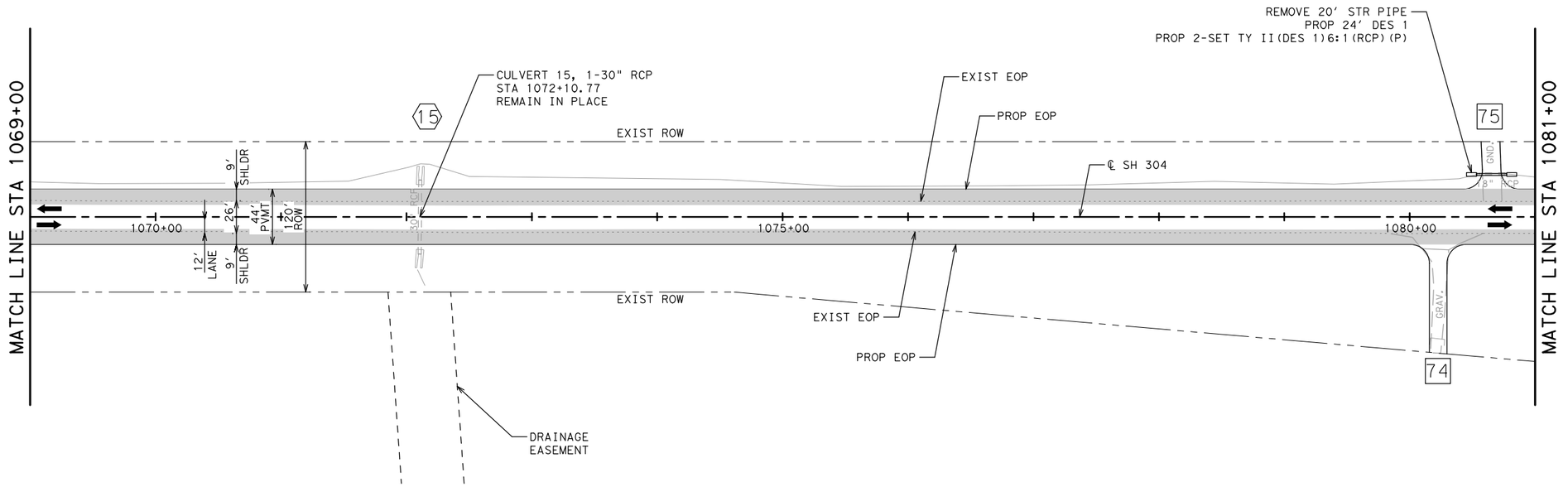
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 1057+00 TO STA 1069+00

SHEET 26 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		82

DATE: 10/14/2021 10:35:31 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_26.dgn

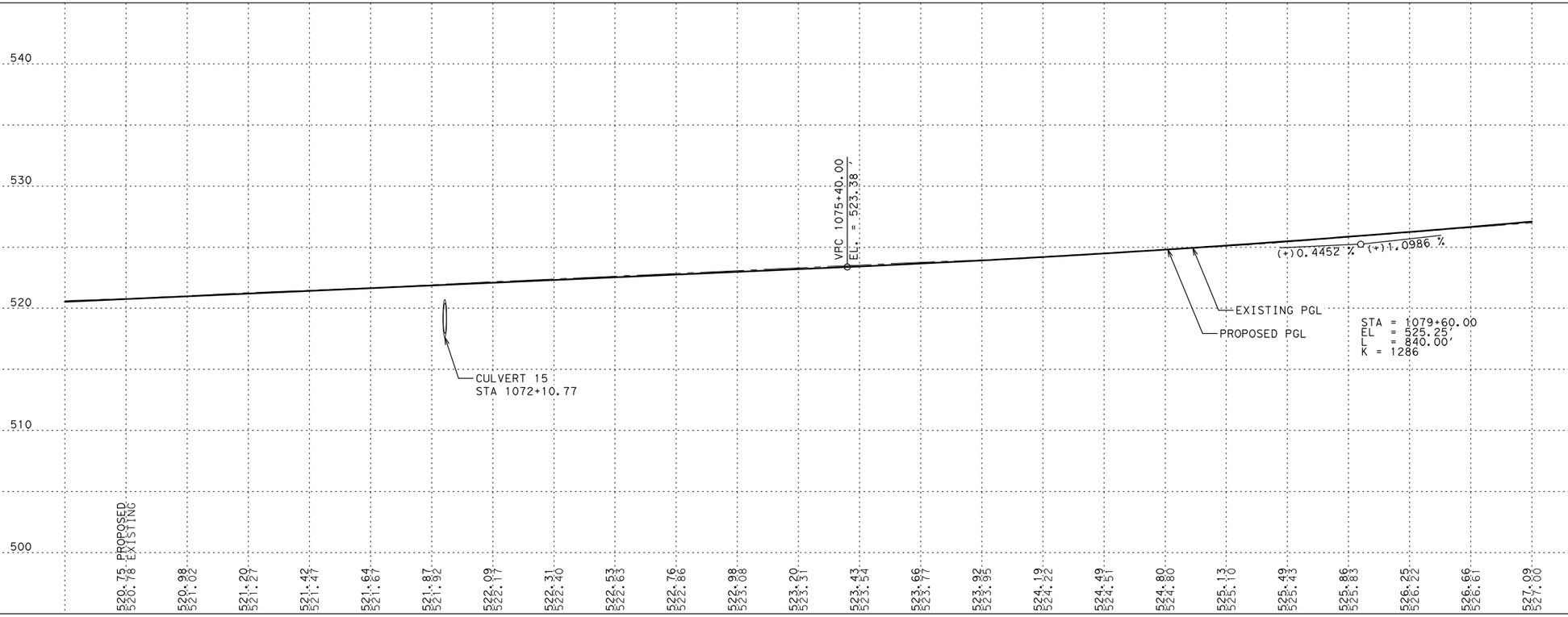


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

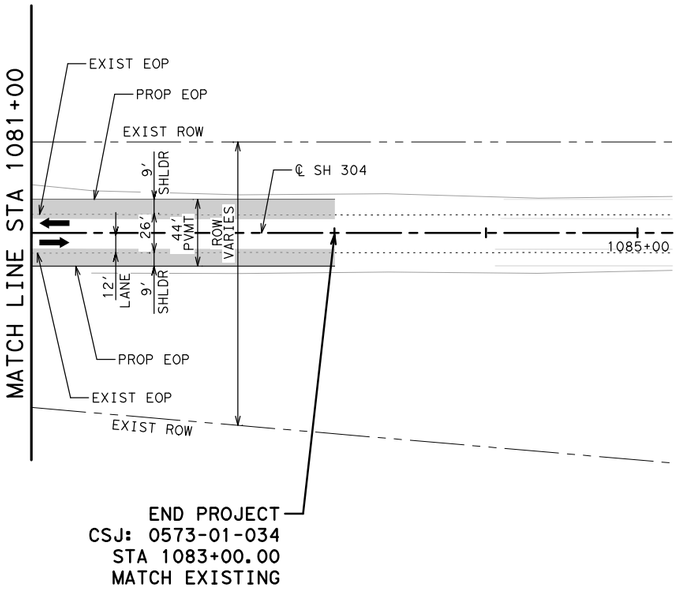
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 1069+00 TO STA 1081+00

SHEET 27 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		83

DATE: 10/14/2021 10:35:32 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_RDW_PP_27.dgn

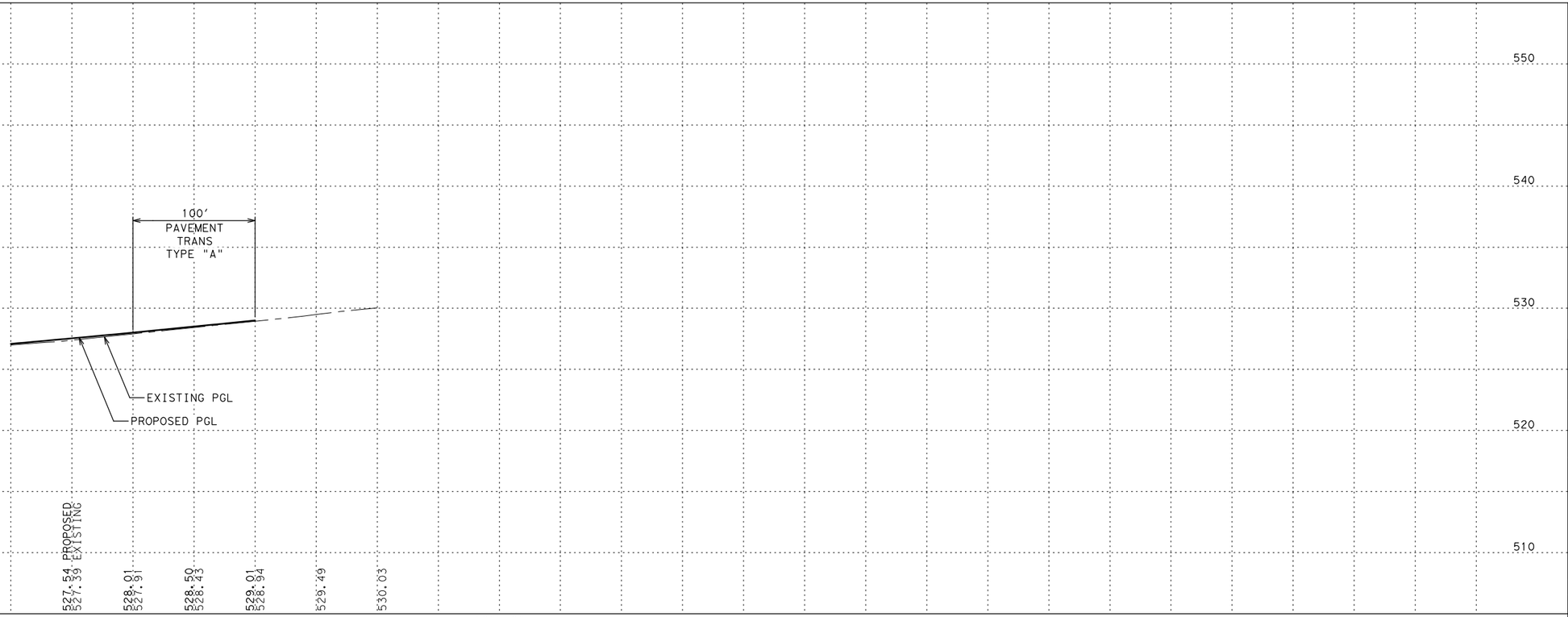


LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. PROPOSED PGL DATA IS FOR INFORMATION PURPOSES ONLY, EXCEPT WHERE EXPLICITLY CALLED OUT FOR PROFILE ADJUSTMENTS, LEVEL UP, OR FULL DEPTH RECONSTRUCTION. UNLESS SPECIFIED, THE PROPOSED NOTCH AND WIDENED SHOULDER SHALL MATCH THE EXISTING PAVEMENT AS SHOWN ON THE TYPICAL SECTIONS AND CROSS SECTIONS.



SCALES (IN FEET):
HORZ- 0 100
VERT- 0 10

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

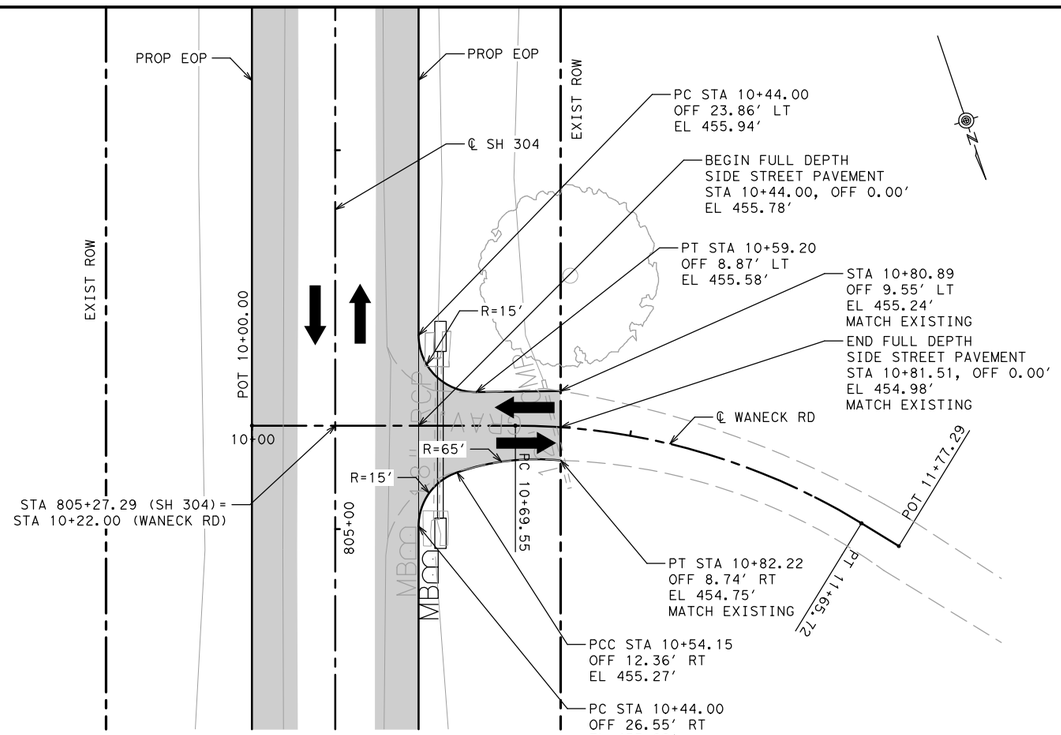
Texas Department of Transportation

SH 304
PLAN AND PROFILE
STA 1081+00 TO END

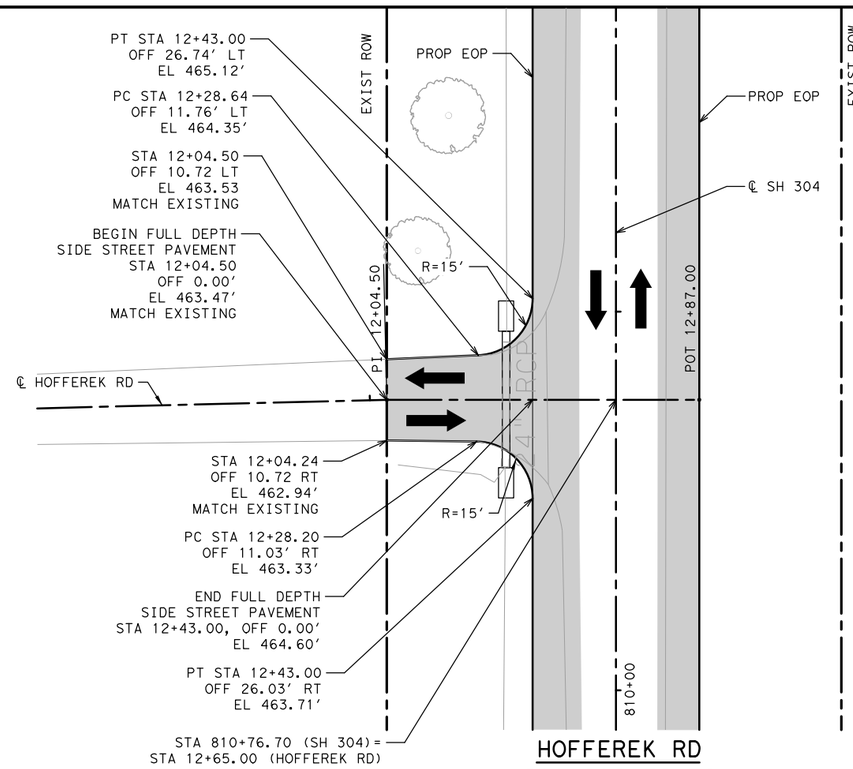
SHEET 28 OF 28

DS:	CK:	CONT	SECT	JOB	HIGHWAY
DW:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
		AUS	BASTROP		84

DATE: 10/14/2021 10:35:33 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_28.dgn



WANECK RD
STA 805+27.29



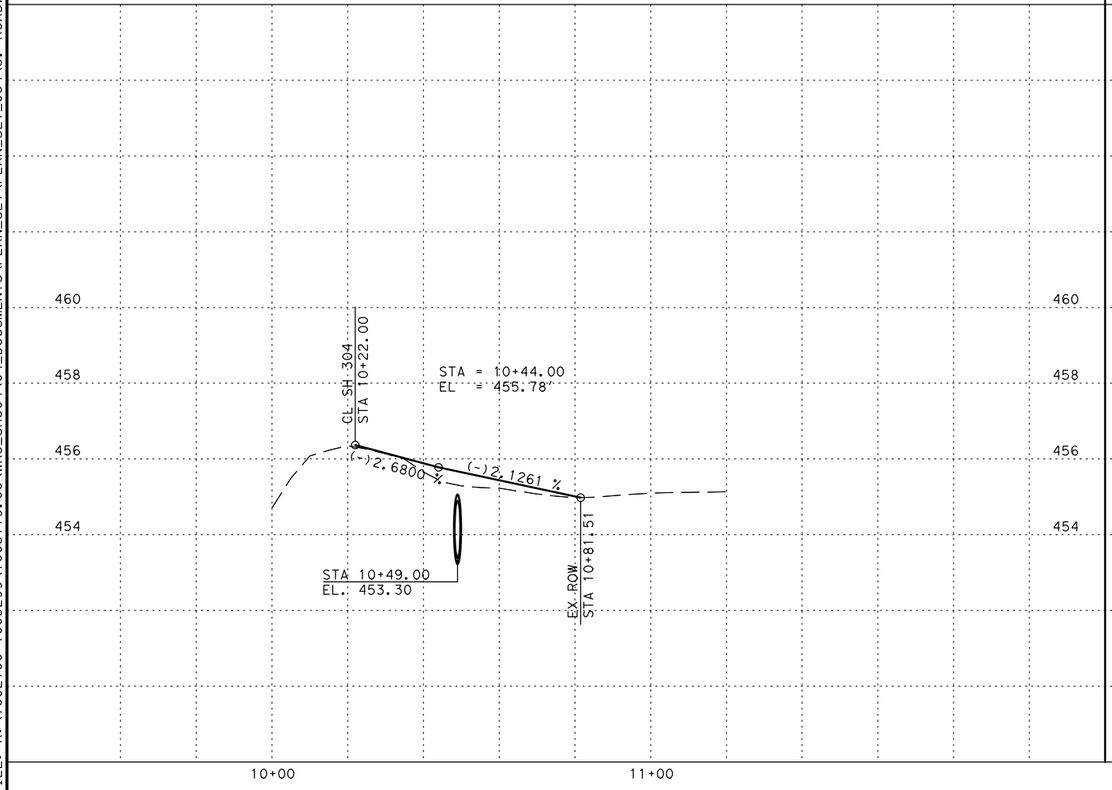
HOFFEREK RD
STA 810+76.70

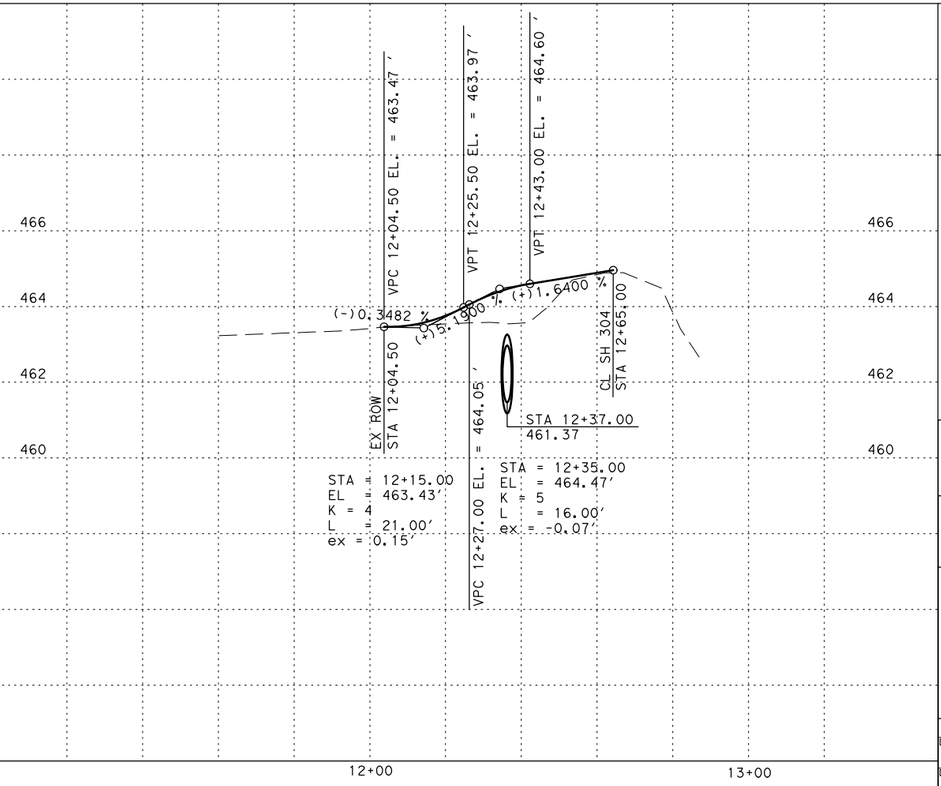
LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. REFER TO SH 304 P&P SHEETS FOR ADDITIONAL INFORMATION ON SH 304 ALIGNMENT AND PROFILE.





SCALES (IN FEET):
HORZ- 0 40
VERT- 0 4

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

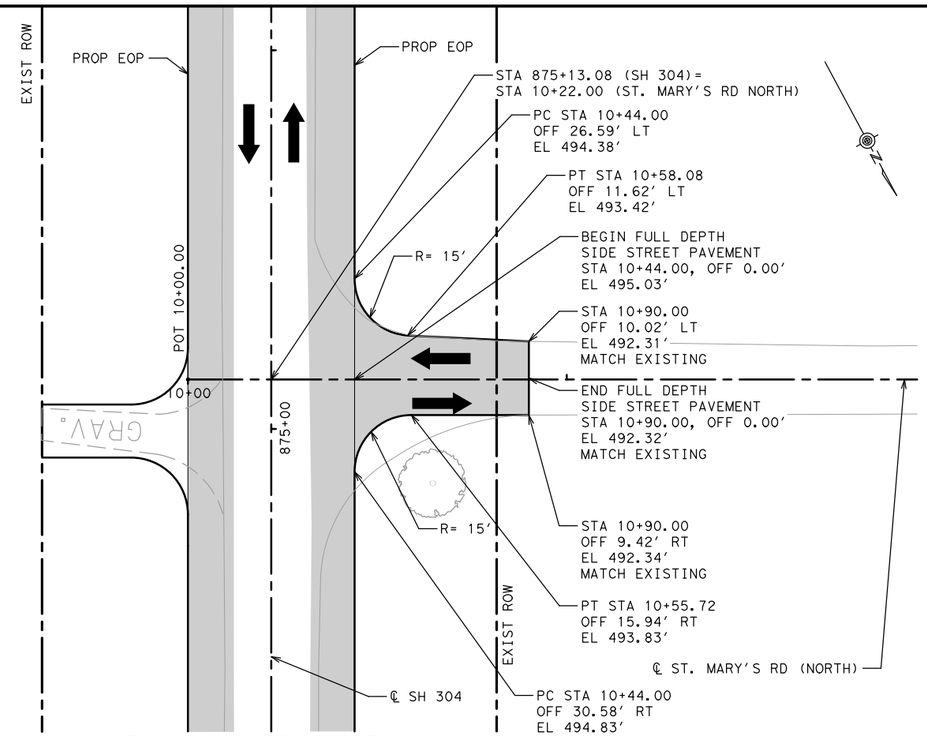
SH 304
SIDE STREET PLAN AND PROFILE

SHEET 1 OF 5

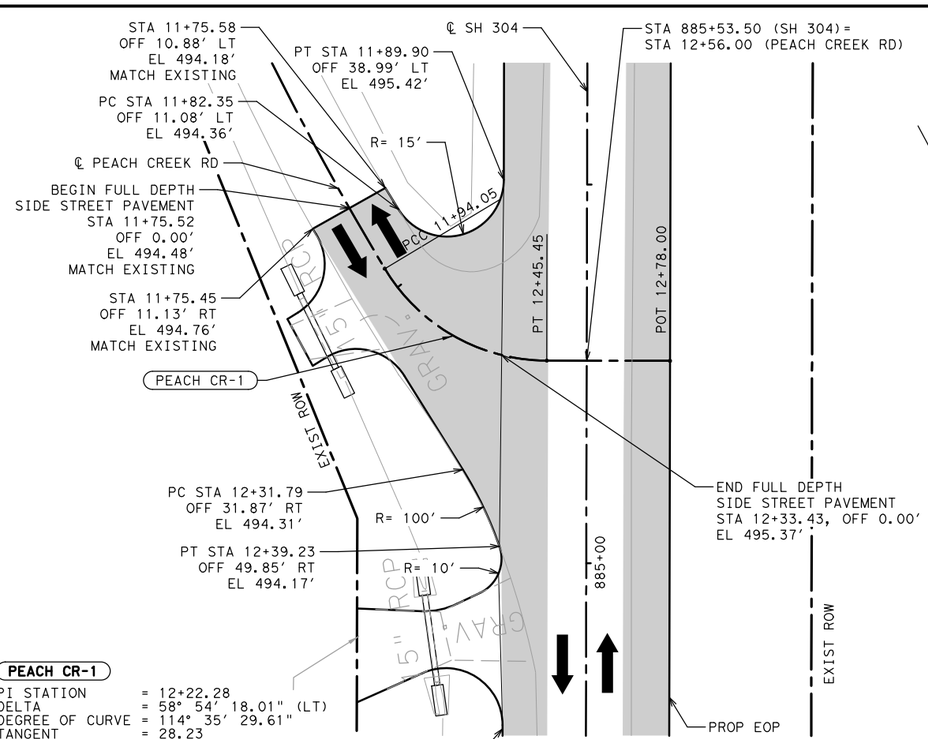
CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		85

DS: CK:
DW: CK:

DATE: 10/14/2021 10:35:34 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_INTERSECT_01.dgn



ST MARY'S RD (NORTH)
STA 875+13.08



PEACH CR-1

PI STATION	= 12+22.28
DELTA	= 58° 54' 18.01" (LT)
DEGREE OF CURVE	= 114° 35' 29.61"
TANGENT	= 28.23
LENGTH	= 51.40
RADIUS	= 50.00
PC STATION	= 11+94.05
PT STATION	= 12+45.45

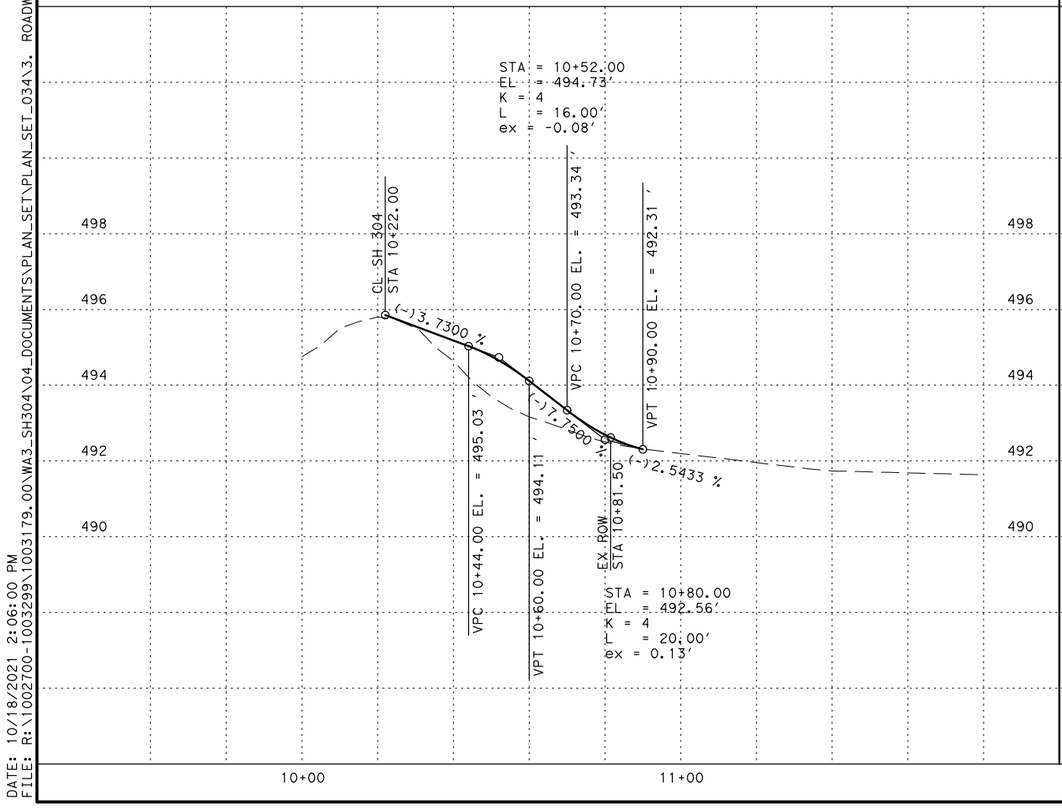
PEACH CREEK
STA 885+53.50

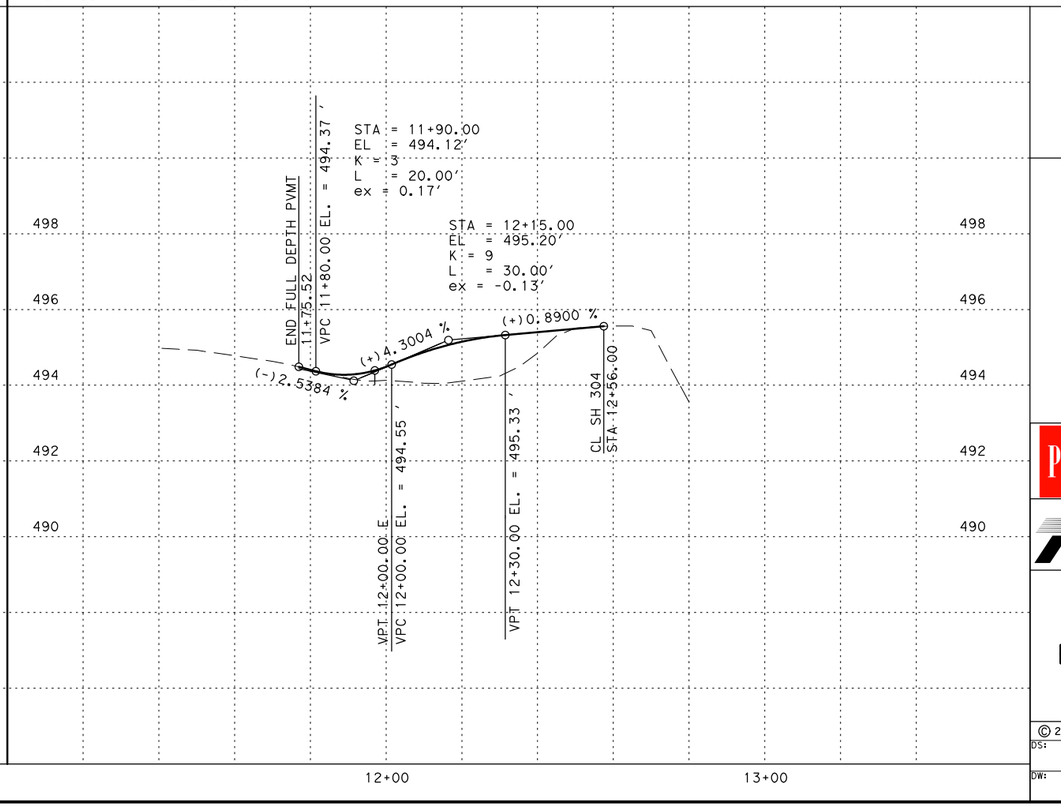
LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. REFER TO SH 304 P&P SHEETS FOR ADDITIONAL INFORMATION ON SH 304 ALIGNMENT AND PROFILE.





SCALES (IN FEET):
HORZ- 0 40
VERT- 0 4

10/18/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

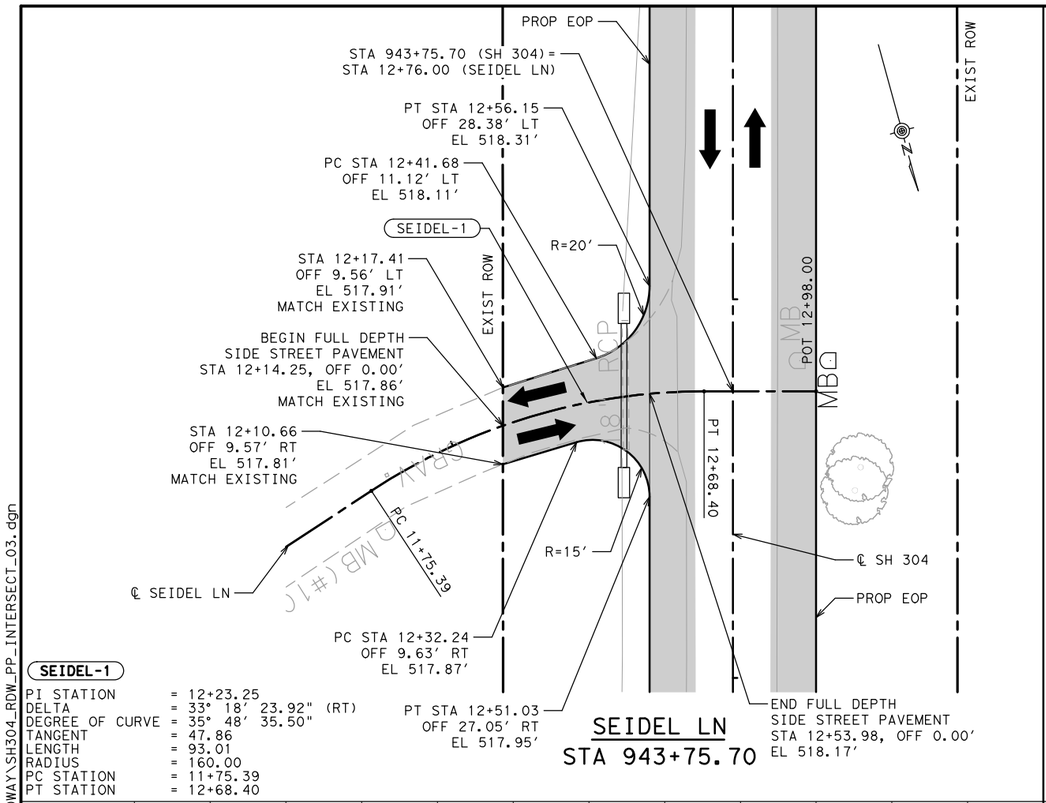
Texas Department of Transportation

SH 304
SIDE STREET PLAN AND PROFILE

SHEET 2 OF 5

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	BASTROP		86

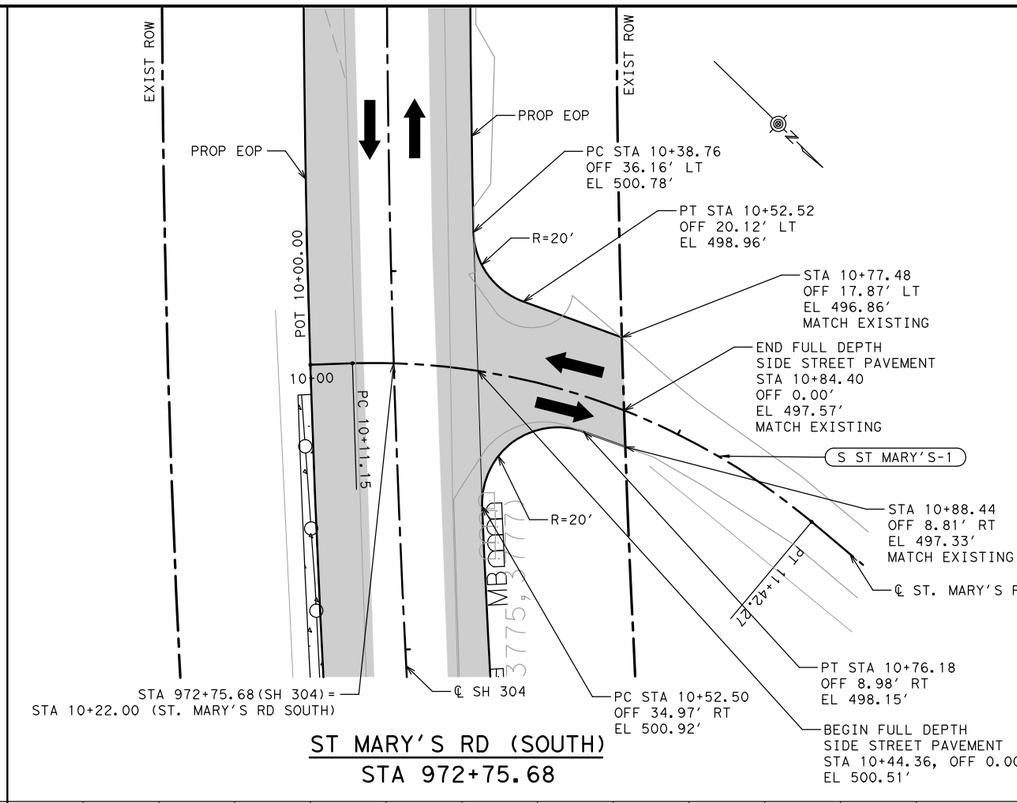
DATE: 10/18/2021 2:06:00 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_INTERSECT_02.dgn



SEIDEL LN
STA 943+75.70

SEIDEL-1

PI STATION	= 12+23.25
DELTA	= 33° 18' 23.92" (RT)
DEGREE OF CURVE	= 35° 48' 35.50"
TANGENT	= 47.86
LENGTH	= 93.01
RADIUS	= 160.00
PC STATION	= 11+75.39
PT STATION	= 12+68.40



ST MARY'S RD (SOUTH)
STA 972+75.68

S ST MARY'S-1

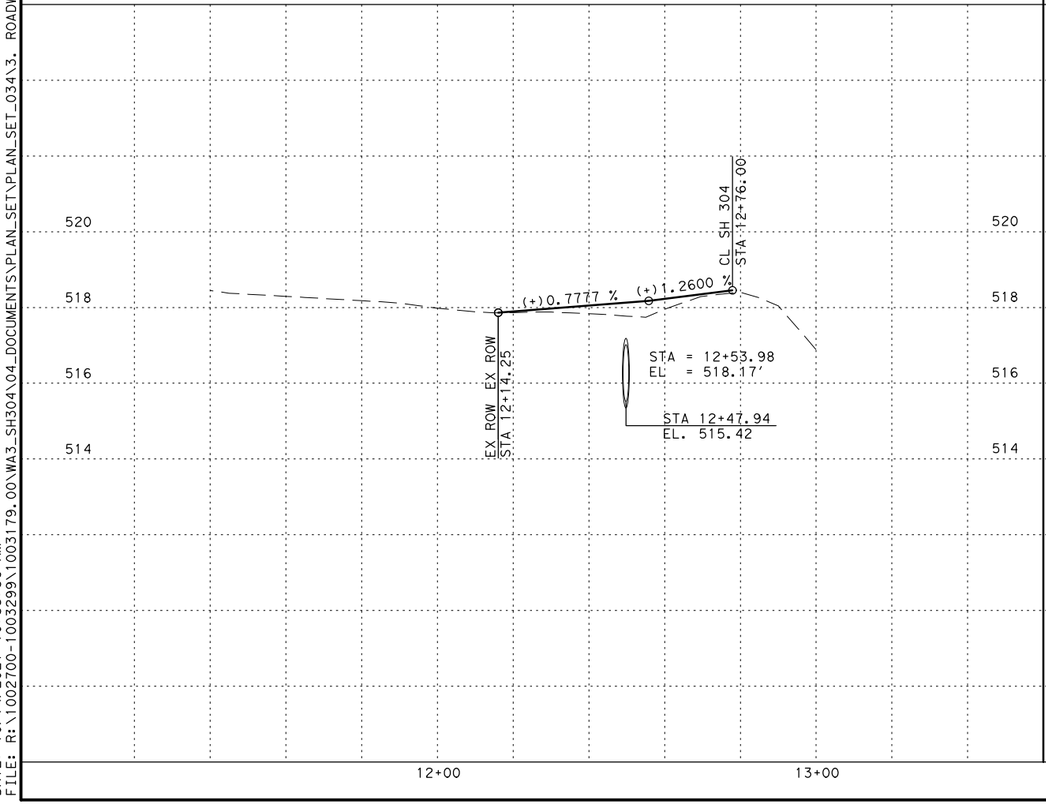
PI STATION	= 10+79.77
DELTA	= 41° 44' 17.96" (RT)
DEGREE OF CURVE	= 31° 49' 51.56"
TANGENT	= 68.62
LENGTH	= 131.12
RADIUS	= 180.00
PC STATION	= 10+11.15
PT STATION	= 11+42.27

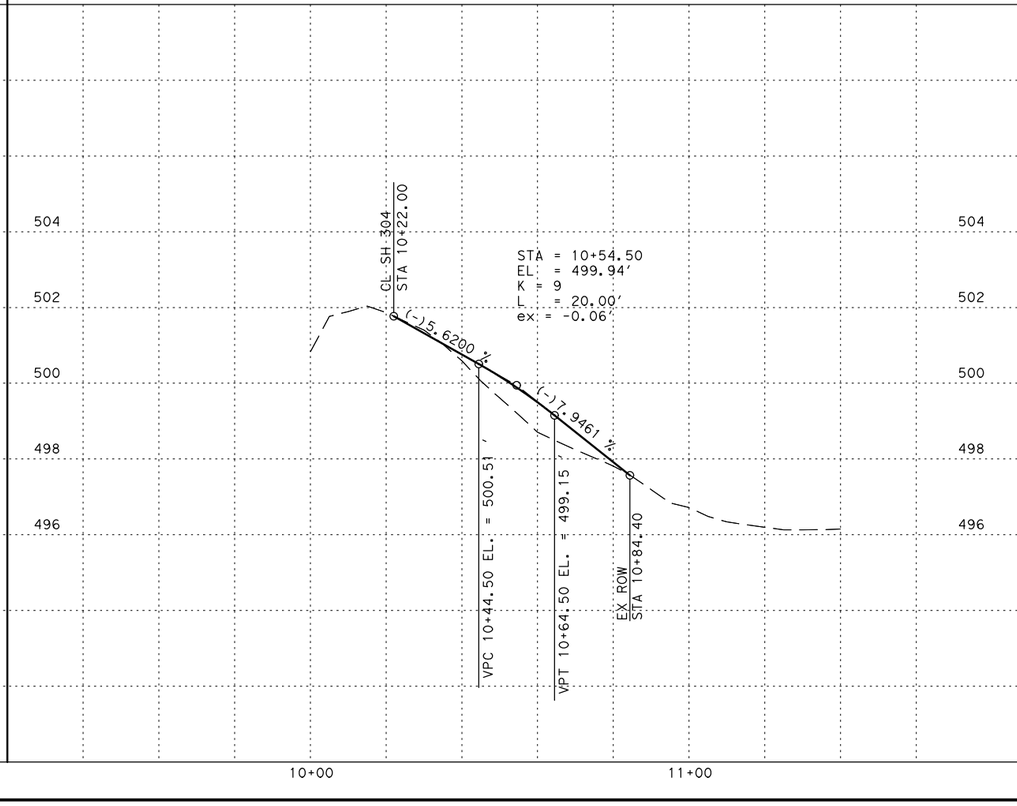
LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. REFER TO SH 304 P&P SHEETS FOR ADDITIONAL INFORMATION ON SH 304 ALIGNMENT AND PROFILE.





SCALES (IN FEET):
HORZ- 0 40
VERT- 0 4

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

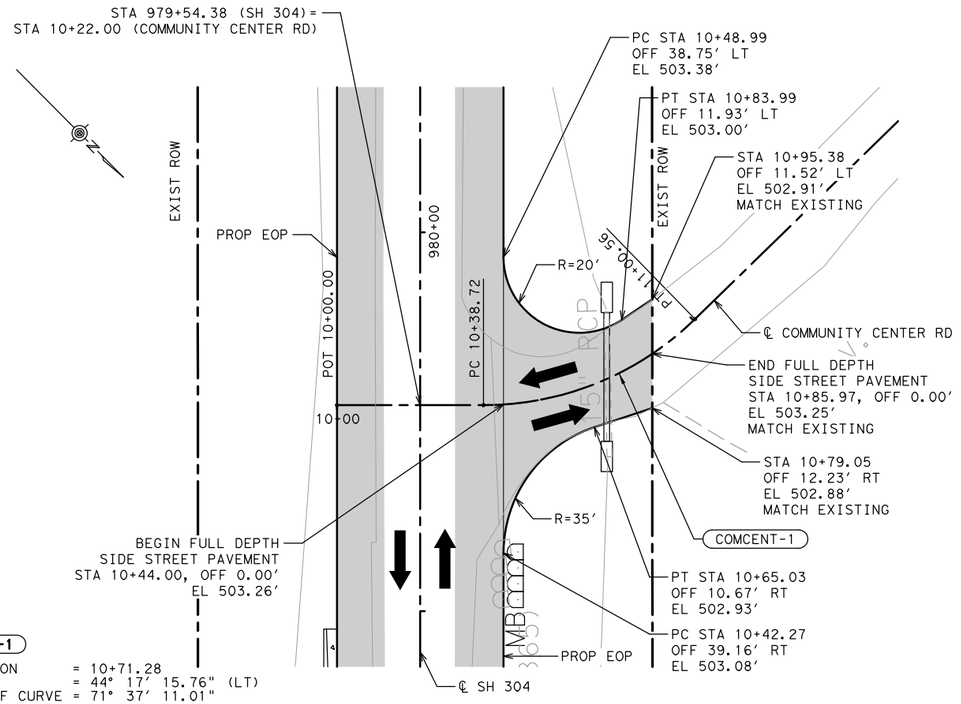
Texas Department of Transportation

SH 304
SIDE STREET PLAN AND PROFILE

SHEET 3 OF 5

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		87

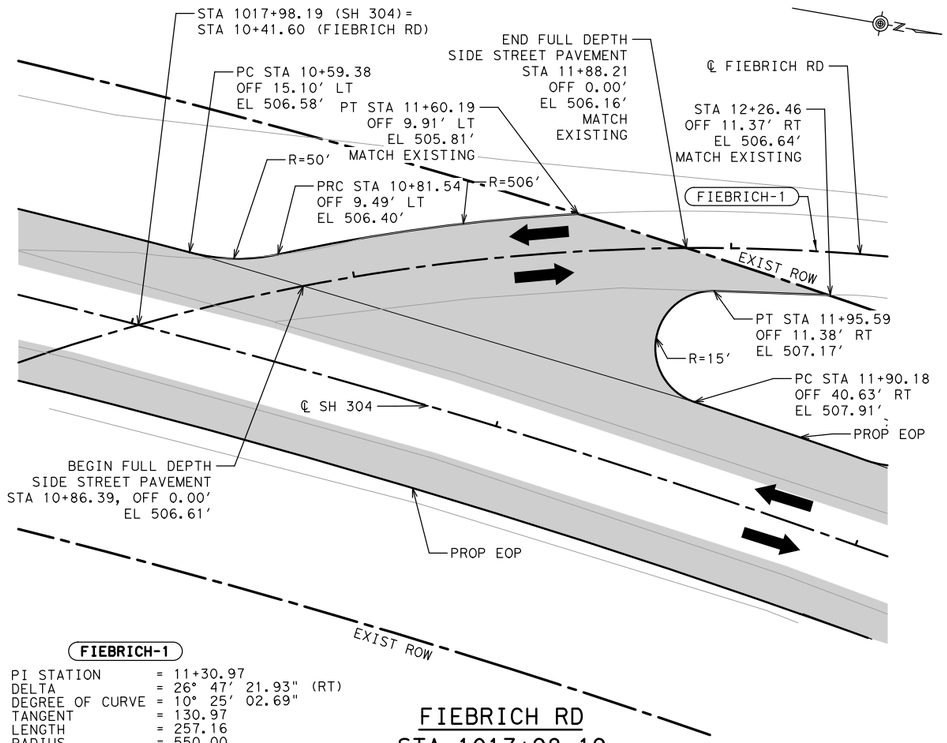
DATE: 10/14/2021 10:35:36 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_INTERSECT_03.dgn



COMCENT-1

PI STATION	= 10+71.28
DELTA	= 44° 17' 15.76" (LT)
DEGREE OF CURVE	= 71° 37' 11.01"
TANGENT	= 32.56
LENGTH	= 61.84
RADIUS	= 80.00
PC STATION	= 10+38.72
PT STATION	= 11+00.56

COMMUNITY CENTER RD
STA 979+54.38



FIEBRICH-1

PI STATION	= 11+30.97
DELTA	= 26° 47' 21.93" (RT)
DEGREE OF CURVE	= 10° 25' 02.69"
TANGENT	= 130.97
LENGTH	= 257.16
RADIUS	= 550.00
PC STATION	= 10+00.00
PT STATION	= 12+57.16

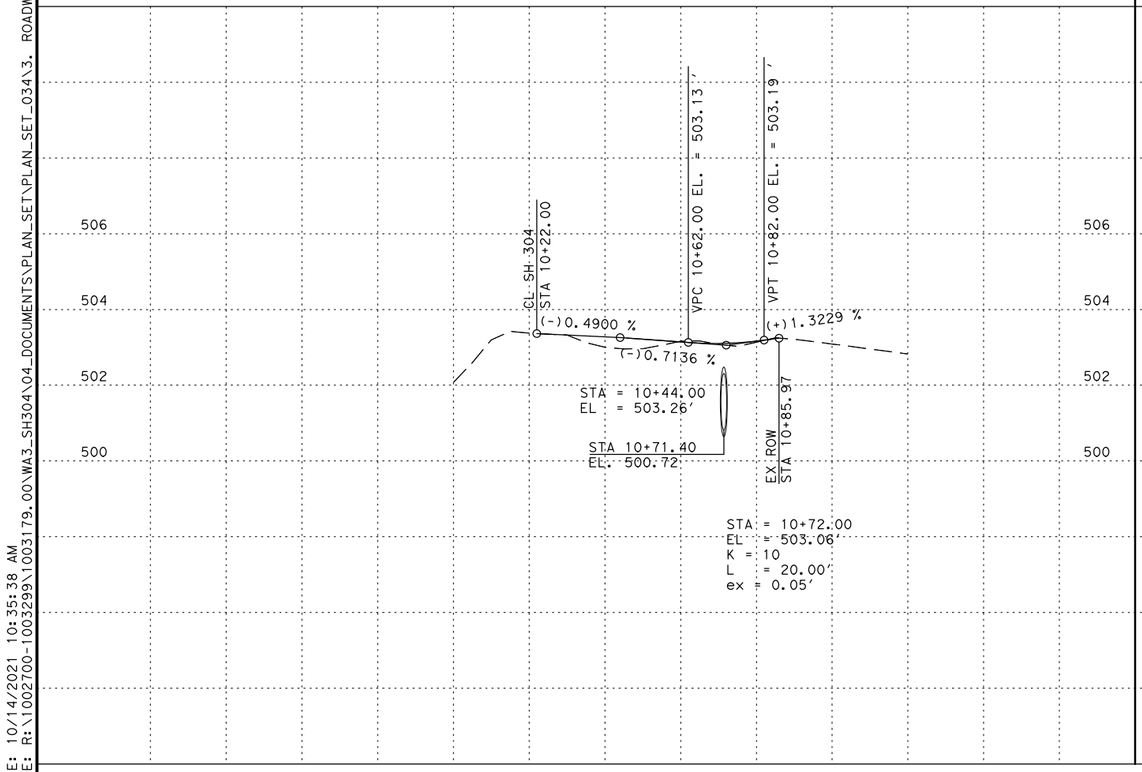
FIEBRICH RD
STA 1017+98.19

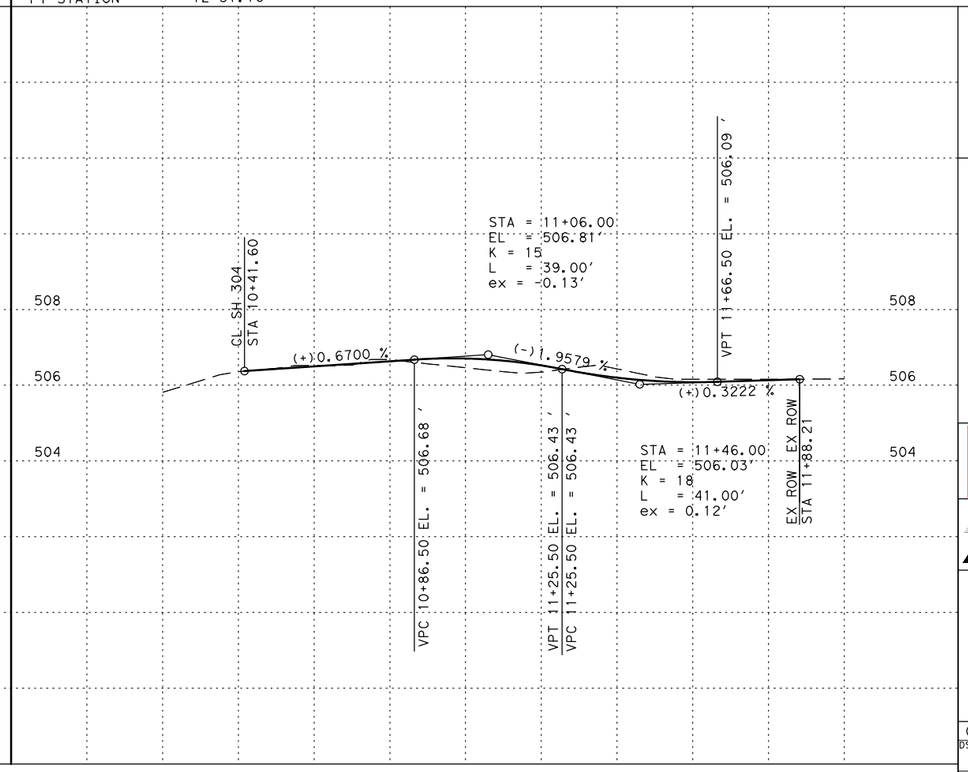
LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. REFER TO SH 304 P&P SHEETS FOR ADDITIONAL INFORMATION ON SH 304 ALIGNMENT AND PROFILE.





SCALES (IN FEET):
HORZ- 0 40
VERT- 0 4

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

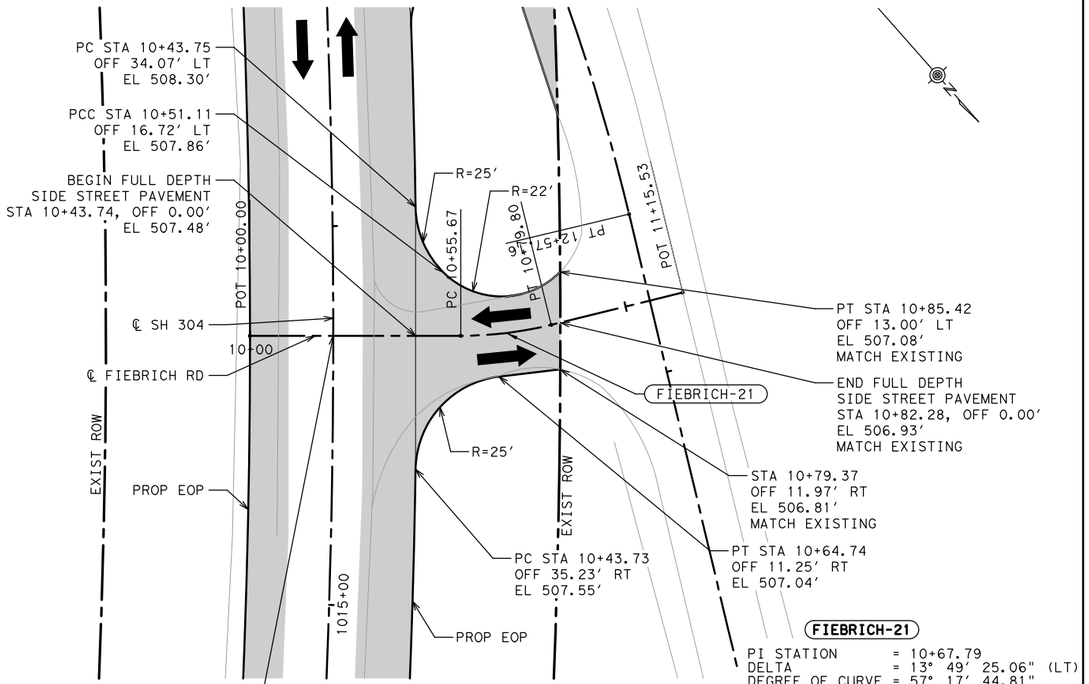
SH 304
SIDE STREET PLAN AND PROFILE

SHEET 4 OF 5

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		88

DS: CK: DW: CK:

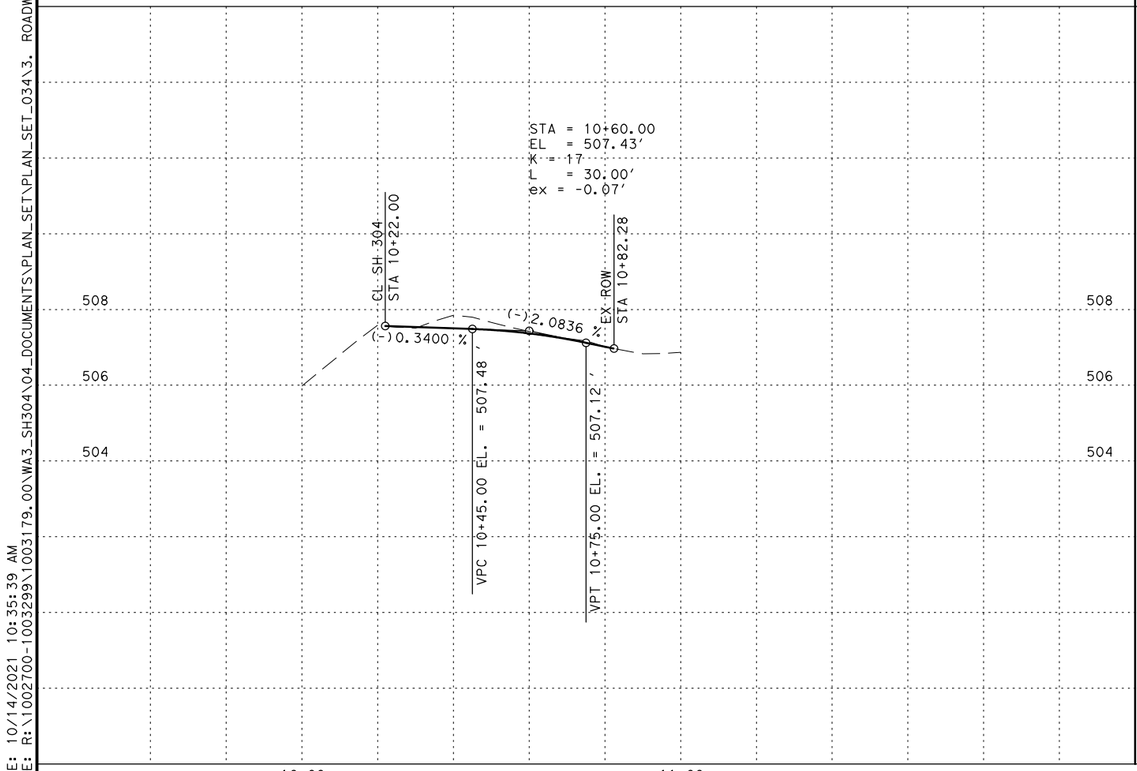
DATE: 10/14/2021 10:35:38 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0343_ROADWAY\SH304_ROW_PP_INTERSECT_04.dgn



FIEBRICH RD
STA 1015+71.04

FIEBRICH-21

PI STATION	= 10+67.79
DELTA	= 13° 49' 25.06" (LT)
DEGREE OF CURVE	= 57° 17' 44.81"
TANGENT	= 12.12
LENGTH	= 24.13
RADIUS	= 100.00
PC STATION	= 10+55.67
PT STATION	= 10+79.80



LEGEND

- TRAFFIC FLOW DIRECTION
- PAVEMENT WIDENING
- DRIVEWAY NUMBER
- CROSS CULVERT NUMBER
- RIPRAP
- STONE RIPRAP
- TEMP CONSTRUCTION LICENSE

NOTES

1. REFER TO SH 304 P&P SHEETS FOR ADDITIONAL INFORMATION ON SH 304 ALIGNMENT AND PROFILE.

SCALES (IN FEET):
HORZ- 0 40
VERT- 0 4

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304
SIDE STREET PLAN AND PROFILE

SHEET 5 OF 5

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		89

DS: CK: DW: CK:

DATE: 10/14/2021 10:35:39 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034N3. ROADWAY\SH304_ROW_PP_INTERSECT_05.dgn

DRIVEWAY NO.	P&P SHEET NO.	EXISTING DRIVEWAY TYPE	PROPOSED DRIVEWAY TYPE	STATION	SIDE (LT/RT)	DWY LENGTH L (FT)	DWY WIDTH @ MOUTH (FT)	DWY WIDTH @ THROAT (FT)	SURFACE AREA (SY)	RADIUS R_L (FT)	RADIUS R_R (FT)	PIPE LENGTH (FT)	NO. OF BARRELS	PIPE SIZE (IN)	S.E.T. SIDE SLOPE	CULVERT (UPSTREAM)		CULVERT (DOWNSTREAM)		CULVERT
																STATION	ELEV. (FT)	STATION	ELEV. (FT)	GRADE (%)
1	1	CONCRETE	CONCRETE	764+72.94	LT	32.0	82.3	60.4	203.3	15.0	15.0	66	1	18" RCP	6:1	764+40.38	461.15	765+07.29	460.56	0.89
2	1	GRAVEL	ASPHALT	766+60.99	RT	32.0	43.9	14.0	60.2	15.0	15.0	22	1	18" RCP	6:1	766+50.30	459.29	766+71.94	459.16	0.59
3	1	GRAVEL	ASPHALT	767+67.54	LT	32.0	65.5	37.4	138.3	15.0	15.0	46	1	18" RCP	6:1	767+48.25	459.59	767+94.87	459.3	0.63
4	1	GRAVEL	ASPHALT	768+12.94	RT	32.0	52.6	31.8	96.0	15.0	15.0	32	1	18" RCP	6:1	767+96.37	459.05	768+27.88	458.92	0.41
5	1	GRAVEL	ASPHALT	769+66.73	LT	34.0	54.1	17.7	94.7	15.0	15.0	34	1	DES 5	6:1	769+51.07	458.14	769+85.07	457.61	1.56
6	2	GRASS	ASPHALT	771+00.00	RT	35.0	50.0	20.0	99.6	15.0	15.0	28	1	18" RCP	6:01	770+82.09	458.08	771+10.09	457.94	0.50
7	2	GRAVEL	ASPHALT	771+82.86	LT	37.3	59.9	34.3	157.2	15.0	15.0	36	1	36" RCP	6:1	771+64.20	457.47	772+00.21	457.29	0.50
8	2	ASPHALT	ASPHALT	773+00.00	LT	31.7	30.0	14.5	54.1	5.0	15.0	-	-	-	-	-	-	-	-	-
9	3	DIRT	ASPHALT	782+48.93	LT	38.5	44.0	14.0	70.6	15.0	15.0	22	1	18" RCP	6:1	782+37.90	451.23	782+59.90	450.81	1.91
10	3	GRAVEL	ASPHALT	782+80.39	RT	37.5	54.3	17.0	100.5	15.0	15.0	32	1	DES 1	6:1	782+97.27	450.92	782+65.27	450.87	0.16
11	4	GRAVEL	ASPHALT	798+07.79	LT	38.5	44.0	14.0	70.6	15.0	15.0	22	1	DES 3	6:1	798+18.79	446.52	797+96.79	445.91	2.77
12	4	GRAVEL	ASPHALT	798+58.38	RT	37.5	44.0	14.0	69.1	15.0	15.0	26	1	DES 1	6:1	798+71.38	448.21	798+45.38	447.38	3.19
13	5	GRAVEL	ASPHALT	814+66.78	LT	38.5	44.0	14.0	70.6	15.0	15.0	24	1	DES 1	6:1	814+78.82	469.79	814+54.82	469.45	1.42
14	5	GRAVEL	ASPHALT	817+31.26	RT	37.5	44.0	14.0	69.1	15.0	15.0	22	1	18" RCP	6:1	817+42.23	472.29	817+20.23	472.28	0.05
15	6	GRAVEL	ASPHALT	821+28.39	RT	37.5	44.0	14.0	69.1	15.0	15.0	26	1	18" RCP	6:1	821+41.49	476.67	821+15.49	476.37	1.15
16	6	GRAVEL	ASPHALT	821+46.47	LT	38.5	46.0	14.4	76.6	15.0	15.0	28	1	18" RCP	6:1	821+60.98	477.26	821+32.98	477.21	0.18
17	7	GRAVEL	ASPHALT	834+36.73	LT	38.5	44.0	14.0	70.6	15.0	15.0	26	1	DES 1	6:1	834+23.76	484.35	834+49.76	483.95	1.54
18	8	GRAVEL	ASPHALT	843+58.77	RT	37.5	44.0	14.0	69.1	15.0	15.0	22	1	24" RCP	6:1	843+47.80	478.3	843+69.80	478.11	0.86
19	8	GRAVEL	ASPHALT	851+50.44	LT	38.5	44.3	14.1	71.5	15.0	15.0	24	1	DES 3	6:1	851+62.31	488.59	851+38.31	487.88	2.96
20	9	GRAVEL	ASPHALT	857+70.08	LT	38.5	44.0	14.0	70.6	15.0	15.0	-	-	-	-	-	-	-	-	-
21	9	GRAVEL	ASPHALT	858+00.00	RT	37.5	44.0	14.0	69.1	15.0	15.0	26	1	DES 1	6:1	858+08.56	495.32	857+82.56	495.26	0.23
22	9	GRAVEL	ASPHALT	864+14.37	LT	38.5	45.3	15.5	76.3	15.0	15.0	24	1	18" RCP	6:1	864+02.59	493.52	864+26.59	493.32	0.83
23	10	GRAVEL	ASPHALT	866+60.19	RT	37.5	44.0	14.0	69.1	15.0	15.0	-	-	-	-	-	-	-	-	-
24	10	GRAVEL	ASPHALT	875+00.00	LT	38.5	44.0	14.0	70.6	15.0	15.0	-	-	-	-	-	-	-	-	-
25	11	GRAVEL	ASPHALT	884+82.81	LT	38.5	40.1	24.8	85.1	15.0	15.0	24	1	DES 1	6:1	884+91.70	492.55	884+67.93	492.39	0.67
25a	11	GRAVEL	ASPHALT	886+11.71	LT	18.7	44.0	14.0	39.8	15.0	15.0	22	1	DES 1	6:1	885+50.62	492.50	885+70.35	492.19	1.41
26	12	ASPHALT	ASPHALT	896+00.00	RT	38.0	44.3	14.0	70.0	15.0	15.0	28	1	DES 1	6:1	896+10.27	493.87	895+82.03	493.72	0.54
27	12	GRAVEL	ASPHALT	899+42.44	RT	38.8	48.4	14.0	82.9	15.0	15.0	26	1	DES 1	6:1	899+55.86	496.11	899+29.60	496.02	0.35
28	13	GRAVEL	ASPHALT	903+29.95	RT	39.2	44.0	14.0	71.8	15.0	15.0	26	1	DES 1	6:1	903+41.94	497.99	903+15.94	497.76	0.88
29	13	GRAVEL	ASPHALT	908+84.85	RT	39.0	44.0	14.0	71.3	15.0	15.0	24	1	18" RCP	6:1	908+73.87	499.76	908+97.87	499.64	0.50
30	13	GRAVEL	ASPHALT	908+84.85	LT	37.0	44.0	14.0	68.3	15.0	15.0	24	1	18" RCP	6:1	908+72.93	499.49	908+96.93	499.43	0.25
31	14	GRAVEL	ASPHALT	914+58.93	RT	38.7	44.0	14.0	70.9	15.0	15.0	30	1	DES 1	6:1	914+74.00	502.78	914+44.00	502.2	1.93
32	14	GRAVEL	ASPHALT	916+89.63	LT	37.4	46.6	15.8	78.7	15.0	15.0	28	1	DES 1	6:1	917+03.78	504.27	916+75.78	503.99	1.00
33	14	GRAVEL	ASPHALT	918+47.35	LT	37.5	44.0	14.0	69.1	15.0	15.0	28	1	DES 1	6:1	918+61.35	504.25	918+33.35	503.96	1.04
34	14	GRAVEL	ASPHALT	918+37.17	RT	38.5	44.0	14.0	70.6	15.0	15.0	22	1	DES 1	6:1	918+48.17	504.17	918+26.17	504.05	0.55
35	14	GRAVEL	ASPHALT	920+14.82	RT	38.4	44.5	14.0	71.2	15.0	15.0	26	1	DES 1	6:1	920+02.66	503.18	920+28.66	503.15	0.12
36	15	GRAVEL	ASPHALT	928+19.35	LT	38.0	45.4	15.5	75.5	15.0	15.0	24	1	18" RCP	6:1	928+31.29	502.82	928+07.29	502.48	1.42
37	15	GRAVEL	ASPHALT	931+82.55	LT	38.1	44.0	14.0	70.1	15.0	15.0	26	1	DES 1	6:1	931+95.52	506.96	931+69.52	506.87	0.35
38	15	GRAVEL	ASPHALT	935+06.42	RT	37.7	44.2	14.0	69.7	15.0	15.0	-	-	-	-	-	-	-	-	-
39	17	GRAVEL	ASPHALT	951+49.51	LT	39.1	44.2	14.0	72.0	15.0	15.0	24	1	18" RCP	6:1	951+61.96	516.54	951+37.96	516.53	0.04
40	17	GRAVEL	ASPHALT	952+73.79	LT	39.1	47.0	18.8	87.2	15.0	15.0	28	1	18" RCP	6:1	952+60.12	514.81	952+88.12	514.51	1.07
41	17	GRAVEL	ASPHALT	954+00.00	LT	38.7	44.0	14.0	71.7	15.0	15.0	26	1	18" RCP	6:1	954+16.80	513.75	953+90.80	513.57	0.69
42	17	GRAVEL	ASPHALT	955+52.59	LT	39.3	43.9	14.0	71.9	15.0	15.0	26	1	18" RCP	6:1	955+65.51	512.72	955+39.66	512.69	0.12
43	17	GRAVEL	ASPHALT	958+72.25	LT	38.5	43.8	14.0	70.6	15.0	15.0	24	1	18" RCP	6:1	958+60.18	509.32	958+83.98	509.22	0.42
44	17	GRAVEL	ASPHALT	960+74.55	LT	38.0	65.8	20.5	133.0	15.0	15.0	48	1	DES 1	6:1	960+37.22	509.01	960+84.75	508.53	1.00
45	18	GRAVEL	ASPHALT	964+00.00	LT	37.9	44.0	14.0	69.7	15.0	15.0	32	1	18" RCP	6:1	964+10.75	504.59	963+78.75	504.52	0.22
46	18	GRAVEL	ASPHALT	965+29.85	RT	38.0	45.2	25.1	84.2	15.0	15.0	26	1	18" RCP	6:1	965+17.01	503.03	965+43.01	502.76	1.04
47	18	GRAVEL	ASPHALT	968+07.39	LT	38.1	44.0	14.0	70.0	15.0	15.0	24	1	24" RCP	6:1	967+95.27	499.84	968+19.27	498.98	3.58
48	19	GRAVEL	ASPHALT	974+00.00	LT	37.5	70.9	58.5	195.7	15.0	15.0	-	-	-	-	-	-	-	-	-
49	19	GRAVEL	ASPHALT	975+68.56	LT	37.1	45.4	14.0	71.0	15.0	15.0	-	-	-	-	-	-	-	-	-
50	19	GRAVEL	ASPHALT	984+61.35	LT	37.1	44.3	14.0	68.8	15.0	15.0	-	-	-	-	-	-	-	-	-

**If the existing driveway type is concrete then the proposed driveway type is concrete. If the existing driveway type is anything other than concrete then the proposed driveway type will be 2" TY C HMAC.

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304 DRIVEWAY SUMMARY SHEET

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		90

DS: CK: DW: CK:

DATE: 10/14/2021 10:35:40 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0343. ROADWAY\SH304_RDW_DRVWY_DETAILS_02.dgn

DRIVEWAY NO.	P&P SHEET NO.	EXISTING DRIVEWAY TYPE	PROPOSED DRIVEWAY TYPE	STATION	LT	DWY LENGTH L (FT)	DWY WIDTH @ MOUTH (FT)	DWY WIDTH @ THROAT (FT)	SURFACE AREA (SY)	RADIUS R_L (FT)	RADIUS R_R (FT)	PIPE LENGTH (FT)	NO. OF BARRELS	PIPE SIZE (IN)	S.E.T. SIDE SLOPE	CULVERT (UPSTREAM)		CULVERT (DOWNSTREAM)		CULVERT
																STATION	ELEV. (FT)	STATION	ELEV. (FT)	GRADE (%)
51	20	GRAVEL	ASPHALT	989+18.72	LT	37.2	47.8	15.2	77.8	15.0	15.0	28	1	DES 1	6:1	989+40.41	511.96	989+12.41	511.25	2.54
52	20	GRAVEL	ASPHALT	992+23.64	RT	38.7	44.0	14.2	70.9	15.0	15.0	100	1	DES 1	6:1	993+07.12	521.43	992+07.12	520.04	1.39
53	20	GRAVEL	ASPHALT	992+42.36	RT	38.7	66.5	23.8	134.1	15.0	15.0	-	-	-	-	-	-	-	-	-
54	20	GRAVEL	ASPHALT	994+21.78	LT	37.4	44.4	14.0	69.5	15.0	15.0	22	1	DES 1	6:1	994+34.49	525.71	994+11.49	525.17	-
55	20	GRAVEL	ASPHALT	994+86.01	RT	38.6	44.0	14.0	70.7	15.0	15.0	24	1	DES 1	6:1	994+98.01	526.30	994+66.01	525.76	2.25
56	20	GRAVEL	ASPHALT	996+63.14	RT	38.5	44.0	14.0	70.5	15.0	15.0	-	-	-	-	-	-	-	-	-
57	21	GRAVEL	ASPHALT	997+34.90	LT	37.6	44.1	14.0	69.4	15.0	15.0	-	-	-	-	-	-	-	-	-
58	21	GRAVEL	ASPHALT	998+48.90	RT	38.4	50.3	16.9	91.8	15.0	15.0	32	1	DES 1	6:1	998+32.99	528.25	998+64.99	528.18	0.22
59	21	GRAVEL	ASPHALT	1000+53.56	RT	38.3	56.4	16.0	104.0	15.0	15.0	38	1	DES 1	6:1	1000+34.67	526.55	1000+72.67	526.00	1.45
60	21	ASPHALT	ASPHALT	1004+34.07	RT	38.0	44.3	14.0	70.4	15.0	15.0	-	-	-	-	-	-	-	-	-
61	21	GRAVEL	ASPHALT	1007+17.87	LT	38.0	44.0	14.0	69.9	15.0	15.0	24	1	18" RCP	6:1	1007+05.88	513.38	1007+29.88	512.99	1.62
62	22	ASPHALT	ASPHALT	1009+83.63	RT	38.0	44.0	14.0	70.4	15.0	15.0	24	1	DES 1	6:01	1009+72.53	511.29	1009+96.17	511.2	0.38
63	22	GRAVEL	ASPHALT	1012+00	RT	38.0	44.0	14.0	69.9	15.0	15.0	-	-	-	-	-	-	-	-	-
64	22	GRAVEL	ASPHALT	1019+00.00	LT	38.0	44.3	14.0	69.7	15.0	15.0	24	1	DES 1	6:1	1018+84.93	503.36	1019+09.26	503.2	0.67
65	22	GRAVEL	ASPHALT	1019+79.85	LT	38.0	44.9	14.7	72.3	15.0	15.0	26	1	DES 1	6:1	1019+93.25	503.02	1019+66.87	502.93	0.35
66	23	GRASS	ASPHALT	1021+62.34	RT	38.0	44.0	14.0	69.8	15.0	15.0	28	1	DES 1	6:1	1021+48.34	503.38	1021+76.34	503.21	0.61
67	23	GRAVEL	ASPHALT	1024+00.00	LT	38.0	46.6	16.3	80.4	15.0	15.0	26	1	24" RCP	6:1	1023+90.89	501.18	1024+16.89	501.06	0.46
68	23	GRAVEL	ASPHALT	1026+17.41	LT	38.0	44.0	14.0	69.8	15.0	15.0	26	1	DES 1	6:1	1026+04.47	501.28	1026+30.47	501.09	0.73
69	23	ASPHALT	ASPHALT	1029+08.42	LT	38.0	44.0	14.0	69.8	15.0	15.0	24	1	DES 1	6:1	1028+96.42	499.94	1029+20.42	499.58	1.50
70	24	GRAVEL	ASPHALT	1033+39.41	RT	38.0	44.0	14.0	69.8	15.0	15.0	22	1	24" RCP	6:1	1033+28.37	497.30	1033+50.37	497.08	1.00
71	24	GRAVEL	ASPHALT	1042+58.14	RT	38.0	44.0	14.0	69.8	15.0	15.0	24	1	18" RCP	6:1	1042+70.12	508.01	1042+46.12	507.61	1.67
72	25	GRAVEL	ASPHALT	1055+81.77	LT	38.0	44.6	14.0	69.4	15.0	15.0	-	-	-	-	-	-	-	-	-
73	25	GRAVEL	ASPHALT	1056+00.00	LT	38.0	44.7	14.0	72.3	15.0	15.0	-	-	-	-	-	-	-	-	-
74	27	GRAVEL	ASPHALT	1080+22.72	RT	86.6	44.0	14.0	145.5	15.0	15.0	-	-	-	-	-	-	-	-	-
75	27	GRAVEL	ASPHALT	1080+65.52	LT	38.0	44.9	15.0	73.8	15.0	15.0	24	1	DES 1	6:1	1080+77.33	524.32	1080+53.33	523.91	1.71

**If the existing driveway type is concrete then the proposed driveway type is concrete. If the existing driveway type is anything other than concrete then the proposed driveway type will be 2" TY C HMAC.

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

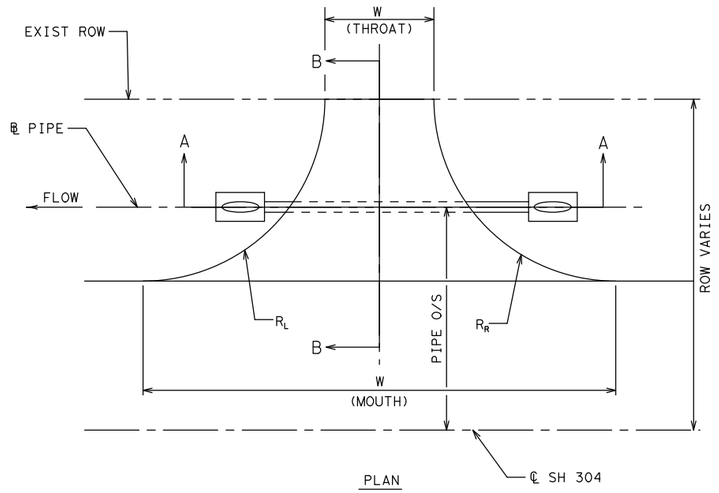
SH 304
DRIVEWAY SUMMARY SHEET

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		91

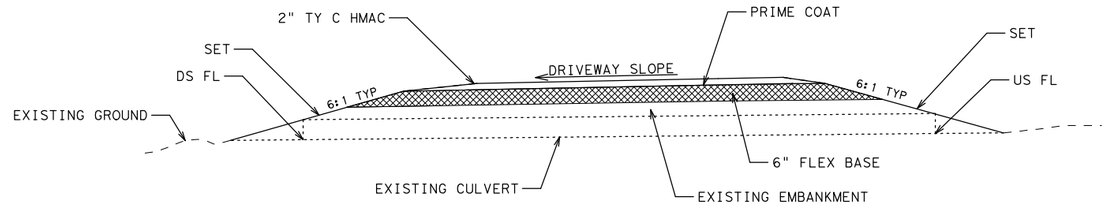
DS: CK:
DW: CK:

DATE: 10/14/2021 10:35:42 AM
FILE: R:\1002700-100329\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034%3. ROADWAY'S\SH304_ROW_DRVWY_DETAILS_03.dgn

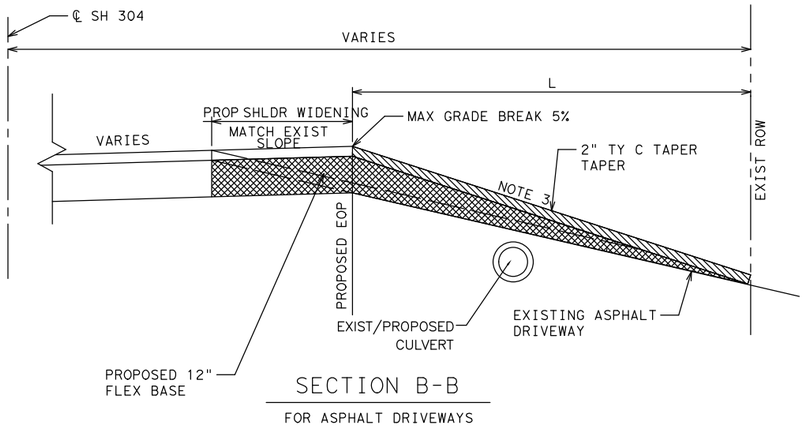


PLAN

DRIVEWAY WITH CULVERT

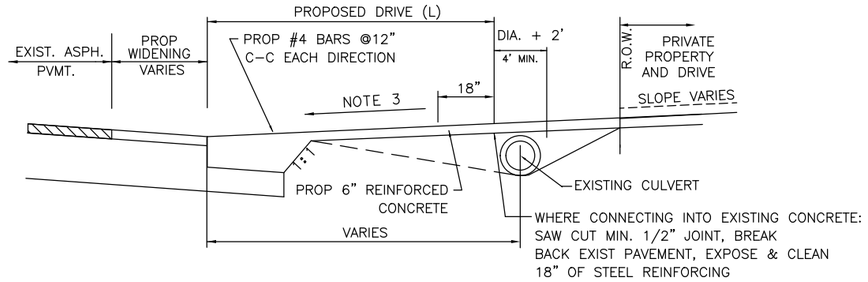


SECTION A-A



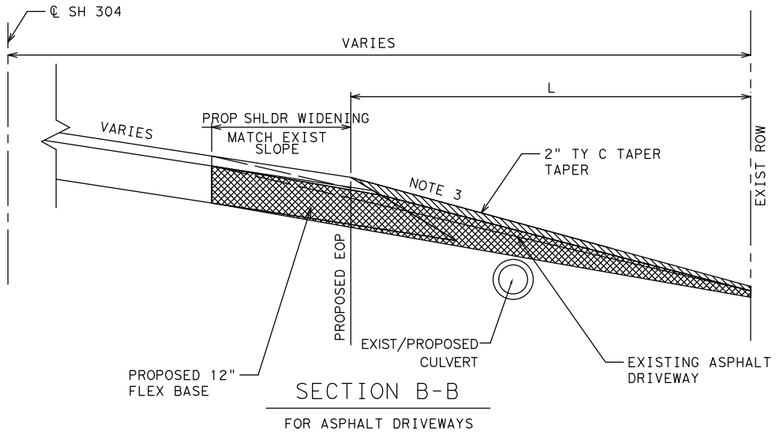
SECTION B-B

FOR ASPHALT DRIVEWAYS



SECTION B-B

FOR CONCRETE DRIVEWAYS



SECTION B-B

FOR ASPHALT DRIVEWAYS

NOTES:

1. DRIVEWAY EARTHWORK QUANTITIES CALCULATED BEYOND TYPICAL ROADWAY SLOPE.
2. GRADE ALL DRIVEWAYS TO DRAIN.
3. MAXIMUM SLOPE IS: 12% RESIDENTIAL
   8% OTHERS.

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

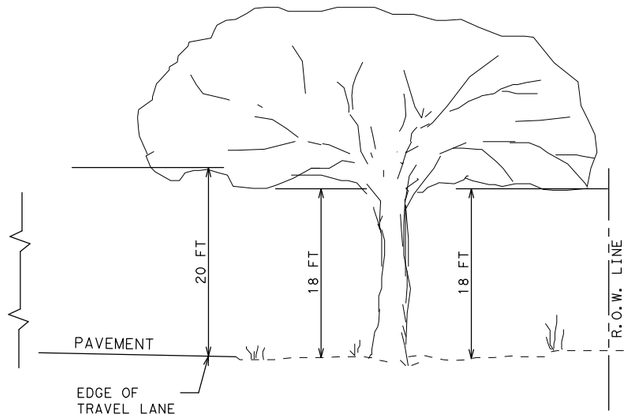
SH 304

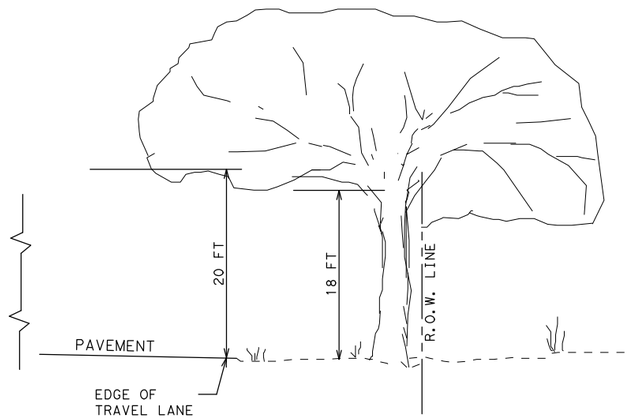
DRIVEWAY DETAILS

SHEET 1 OF 1

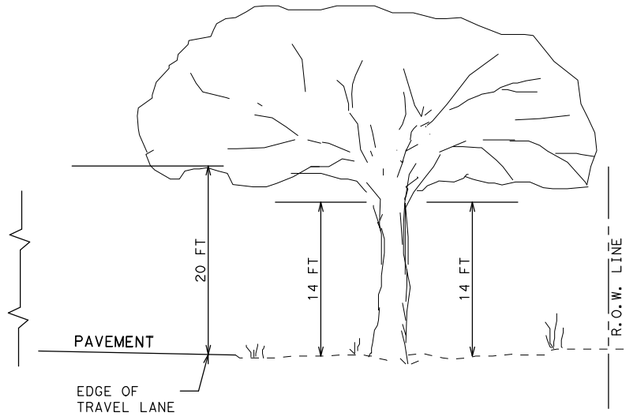
DS:	CK:	CONT	SECT	JOB	HIGHWAY
DW:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
		AUS	BASTROP		92

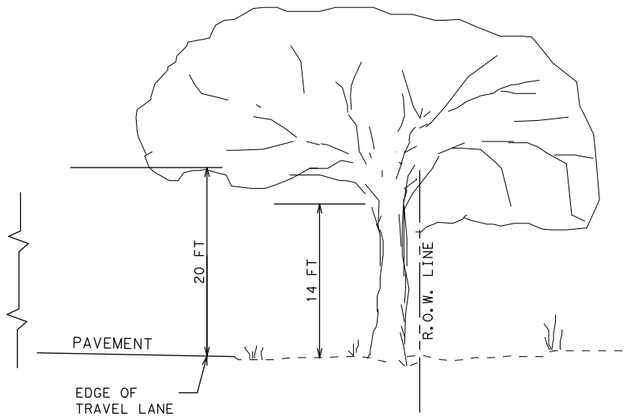
DATE: 10/14/2021 10:35:43 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\034\3. ROADWAY\SH304_ROW_DRVWY_DETAILS_01.dgn





NON-OAK SPECIES
TREE PRUNING LIMITS



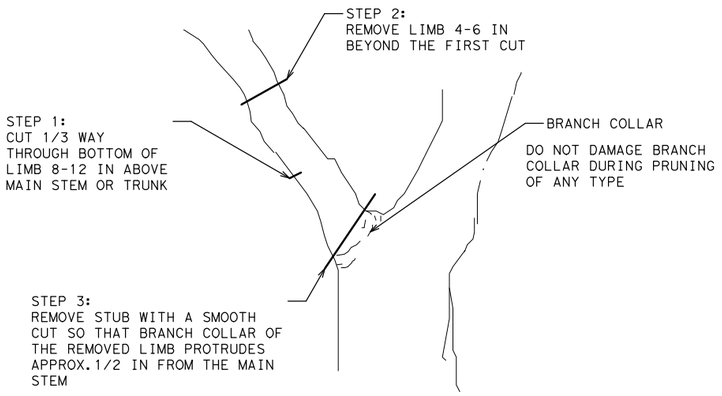


OAK SPECIES
TREE PRUNING LIMITS

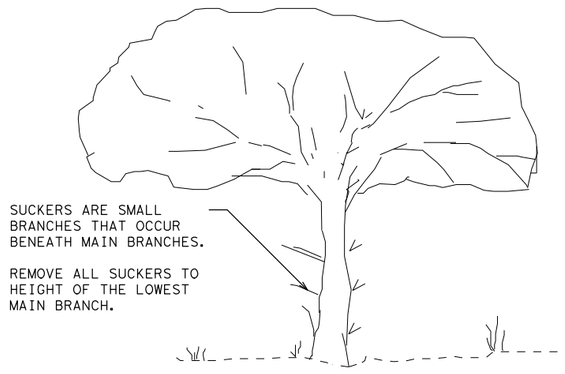
GENERAL NOTES

PAYMENT FOR THIS WORK IS SUBSIDIARY TO PREP R.O.W.

1. REMOVE ALL DEAD TREES, DEAD BRUSH, AND DEAD MULTI-TRUNKED TREES WITHIN THE R.O.W.. TREES, SHRUBS, OR MULTI-TRUNKED TREES THAT DIE DURING CONSTRUCTION SHALL BE REMOVED PRIOR TO COMPLETION OF THE PROJECT.
2. USE WORK METHODS IN ACCORDANCE WITH ANSI A300 STANDARDS AND ITEM 752.
3. FLAILING EQUIPMENT IS NOT ALLOWED ON OAK TREES.
4. REPAIR DAMAGE TO PRIVATE FENCES AND/OR PRIVATE PROPERTY.
5. PERFORM TREE PRUNING ONLY WITHIN THE R.O.W.. NO CUTS SHALL BE MADE OUTSIDE THE R.O.W..
6. PERFORM TREE PRUNING PER DETAIL FOR ENTIRE R.O.W. AREA WITHIN PROJECT LIMITS. THE ENGINEER MAY DEFINE AREAS TO RESTRICT TREE PRUNING.
7. REVIEW EPIC SHEETS FOR AREAS TO BE AVOIDED DUE TO ENVIRONMENTAL REASONS OR ADDITIONAL NOTES THAT PERTAIN TO TREE PRUNING.
8. MIGRATORY BIRDS AND BATS MAY BE NESTING WITHIN THE PROJECT LIMITS. PERFORM TREE TRIMMING OUTSIDE THE NESTING SEASON DATES LISTED IN THE GENERAL NOTES.
9. NO TRIMMING OF THE VEGETATION THAT CONTAINS AN ACTIVE NEST FOR MIGRATORY BIRDS IS ALLOWED.
10. THE TRIMMING OR CUTTING OF RED OAK AND LIVE OAK SPECIES FOR PURPOSES OTHER THAN PROTECTING PUBLIC SAFETY IS ONLY PERMITTED BETWEEN JULY 1ST AND JANUARY 31ST AND PROHIBITED BETWEEN FEBRUARY 1ST AND JUNE 30TH
11. ALL PRUNING CUTS MUST BE TREATED IMMEDIATELY WITH COMMERCIAL PRUNING PAINT TO SEAL THE EXPOSED SURFACE FROM CONTAMINATION. USE OF AEROSOL CAN IS THE PREFERRED METHOD OF APPLICATION FOR SEALING CUTS. ANY WOUNDS, WHETHER MADE BY TRIMMING, CONSTRUCTION OR ACCIDENT, SHALL BE TREATED IMMEDIATELY WITH COMMERCIAL PRUNING PAINT TO SEAL THE SURFACE FROM CONTAMINATION. THE TXDOT INSPECTOR MAY CONDUCT UNANNOUNCED INSPECTIONS TO ENSURE COMPLIANCE.
12. IF MORE THAN 25% OF THE TREE CANOPY WILL BE REMOVED CONTACT THE TXDOT ABORIST OR INSPECTOR FOR APPROVAL PRIOR TO PROCEEDING.



PROPER TREE PRUNING
FOR LIMBS 2" IN DIA. AND GREATER



SUCKER REMOVAL DETAIL

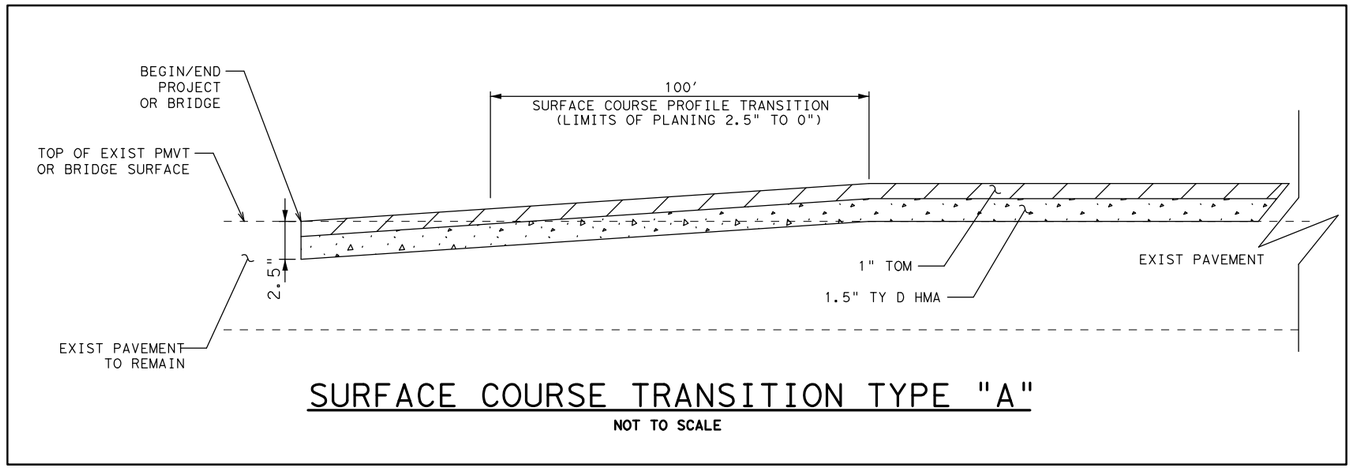
Texas Department of Transportation | Austin District Standard

PREP R.O.W. PRUNING DETAIL

PRWPD-20 (AUS)

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		93

DATE: 10/14/2021 10:35:44 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_ROW_DRVWY_DETAILS_04.dgn

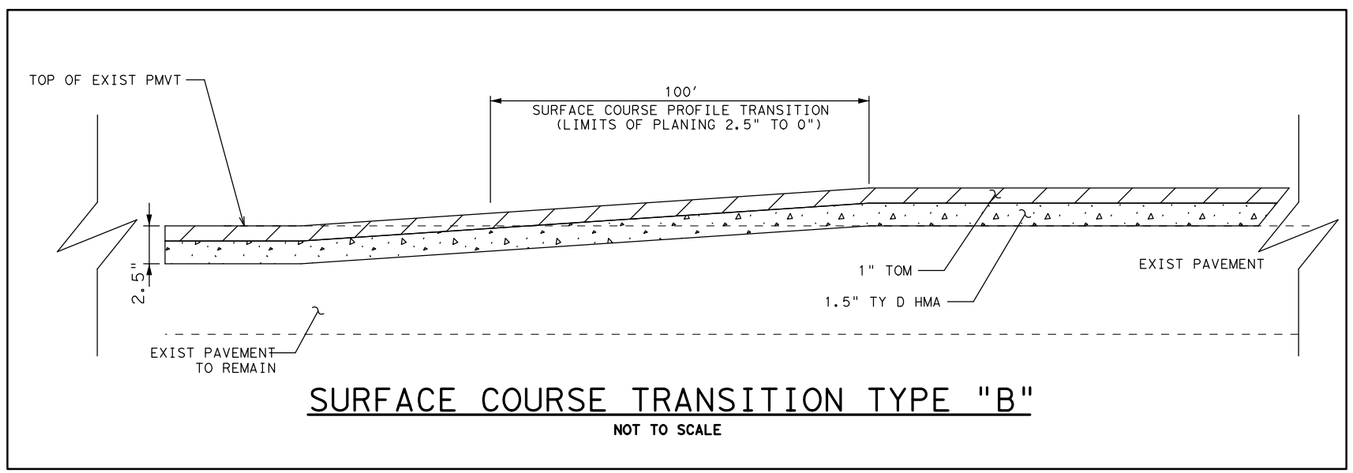


SURFACE COURSE TRANSITION TYPE "A"

NOT TO SCALE

ROADWAY CONSTRUCTION TRANSITION AREAS (HORIZONTAL AND VERTICAL)				
LOCATION LIMITS		LENGTH	WIDTH	DESCRIPTION
FROM (STA)	TO (STA)	FT	FT	
763+50.00	764+50.00	100	56	BEGIN CSJ 0573-01-034
771+73.60	772+73.60	100	46-44	NORTH RR APPROACH
772+83.80	773+83.80	100	44	SOUTH RR APPROACH
1082+00.00	1083+00.00	100	44	END CSJ 0573-01-034

PLANING LOCATIONS TYPE "A"



SURFACE COURSE TRANSITION TYPE "B"

NOT TO SCALE

ROADWAY CONSTRUCTION TRANSITION AREAS (HORIZONTAL AND VERTICAL)				
LOCATION LIMITS		LENGTH	WIDTH	DESCRIPTION
FROM (STA)	TO (STA)	FT	FT	
968+50.00	969+50.00	100	44	MILL APPROACH
977+50.00	978+50.00	100	44	MILL APPROACH

PLANING LOCATIONS TYPE "B"

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304

PAVEMENT TRANSITION DETAIL

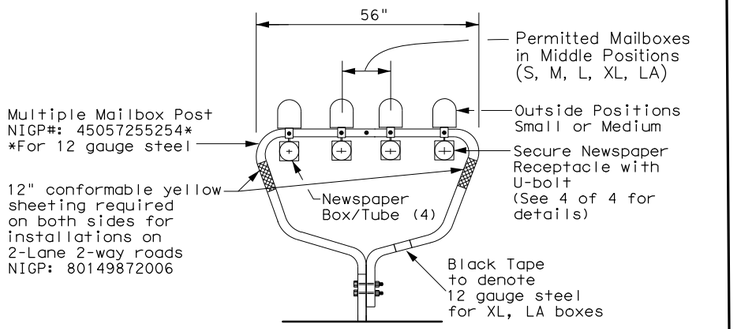
CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		94

DS: CK:
DW: CK:

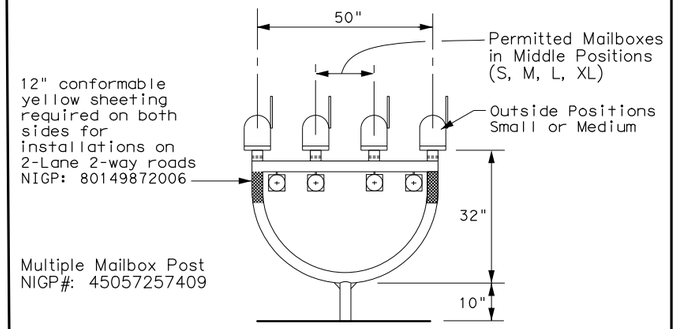
DATE: 10/14/2021 10:35:45 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_RDW_DETAILS_09.dgn

DATE:
FILE:

TYPE 1 - MULTIPLE



TYPE 4 - MULTIPLE



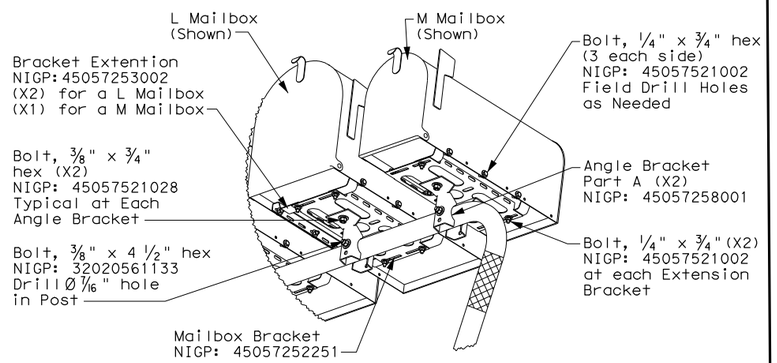
MAILBOX SIZES

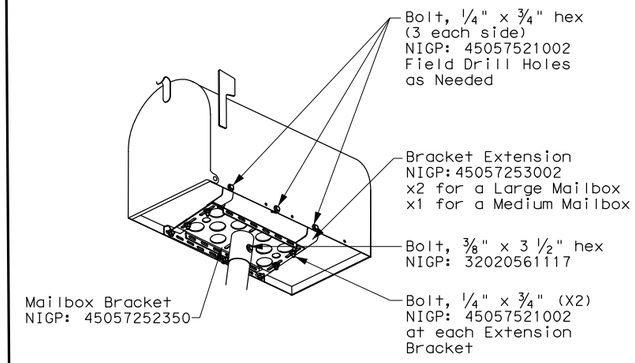
MAILBOX SIZE	TYPICAL DIMENSIONS			MAX **
	LENGTH	WIDTH	HEIGHT	WEIGHT
SMALL	19 ½"	6"	7"	6 LBS
MEDIUM	22 ½" *	8" *	11 ½" *	8 LBS
LARGE	23 ½"	11 ½"	13 ½"	11 LBS
EXTRA LARGE	18"	14"	12"	13 LBS
LOCKABLE	18"	11 ½"	15"	23 LBS

* See Note 1.
** Excluding Molded Plastic on 4 X 4 Post

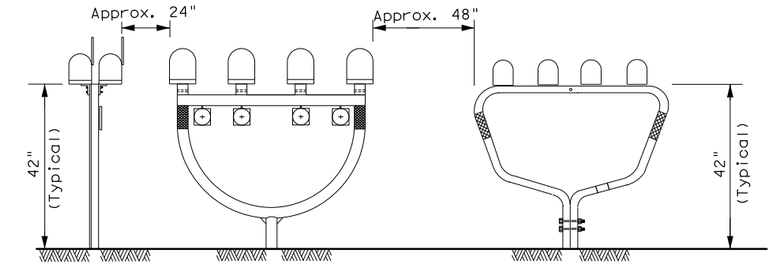
GENERAL NOTES:

1. Dimensions shown (length, width, and height) are typical, not maximums. However, anytime a medium size mailbox is mounted on a single/double mount or on the outside position on a multi mount, the dimensions shown are maximums.
2. Mailboxes shall be made of light weight sheet metal or light weight plastic. Heavy steel, cast iron or decorative mailboxes shall not be used on the state highway system.





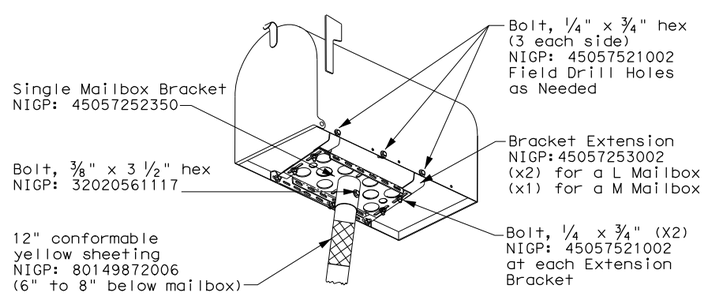
TYPICAL INSTALLATION MEASUREMENTS

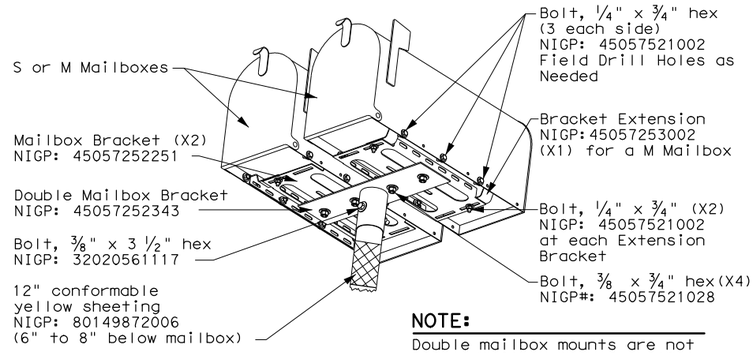


NOTE:

Mailbox installations in sidewalk areas shall be in accordance with the latest TxDOT Design Standard sheets PED-Pedestrian Facilities Curb Ramps.

TYPE 2 and 4 - SINGLE/DOUBLE

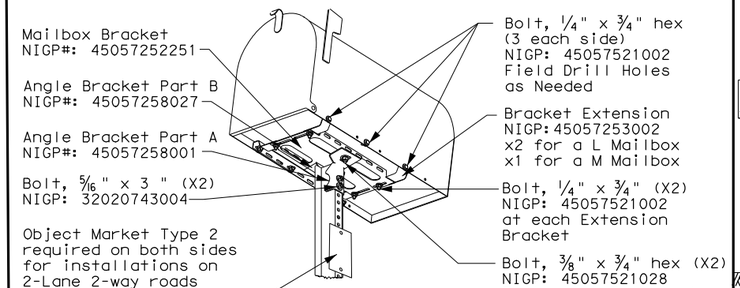


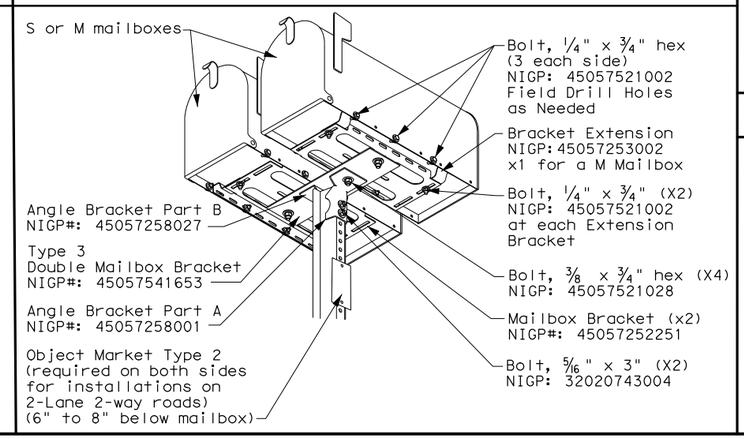


NOTE:

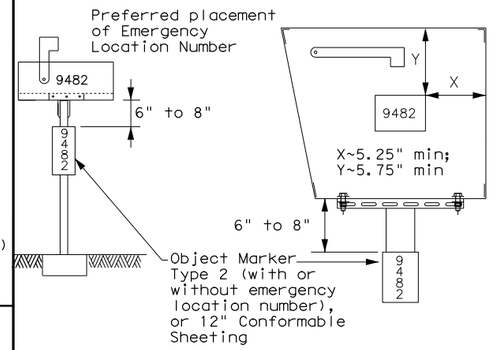
Double mailbox mounts are not allowed with a type 4 multiple mailbox installation

TYPE 3 - SINGLE/DOUBLE





PLACEMENT OF EMERGENCY LOCATION NUMBER

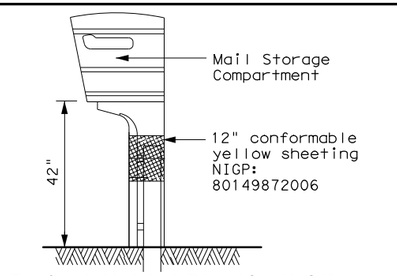


NOTES:

1. Location numbers are provided by homeowner. Minimum size 1" height.
2. Location number is typically placed on the mailbox in a contrasting color.
3. Black numbers may be placed on the Type 2 object marker if the numbers cannot be placed on the mailbox.
4. Alternatively, a green or blue plate with white numbers attached may be mounted below the object marker. Other contrasting color configuration, as approved, may be used.
5. See 3 of 4 for Foundation details.
6. See 4 of 4 for Hardware details.

SHEET 1 OF 4

TYPE 5



Typical Molded Plastic Mailbox

Texas Department of Transportation

Maintenance Division Standard

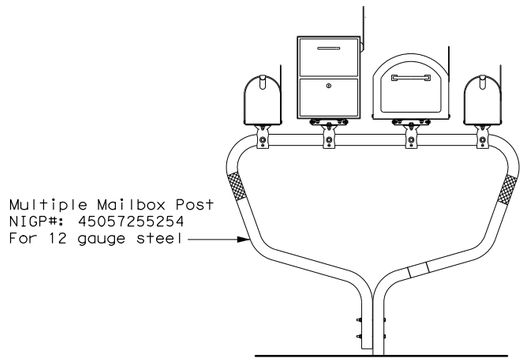
MAILBOX MOUNTING AND ASSEMBLY

MB(1)-21

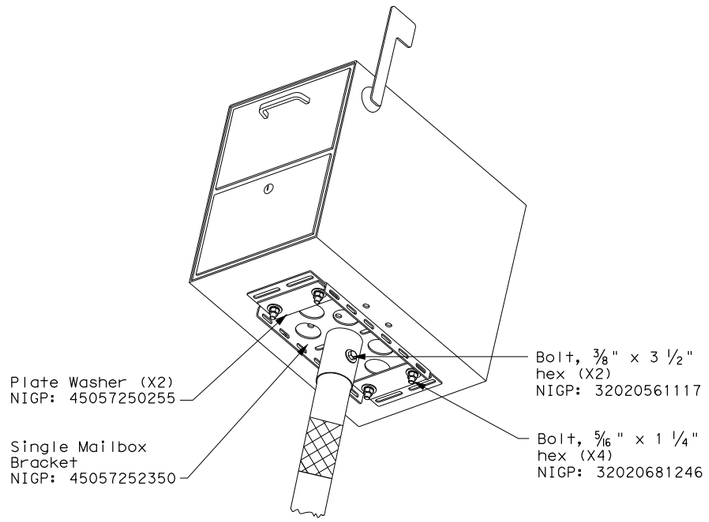
FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		95

DATE:
FILE:

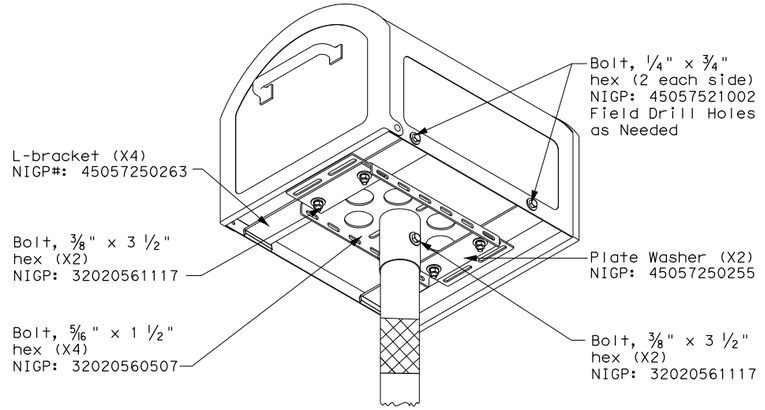
TYPE 1- MULTI LOCKABLE AND XL MAILBOX



TYPE 2/4 - SINGLE LOCKABLE MAILBOX

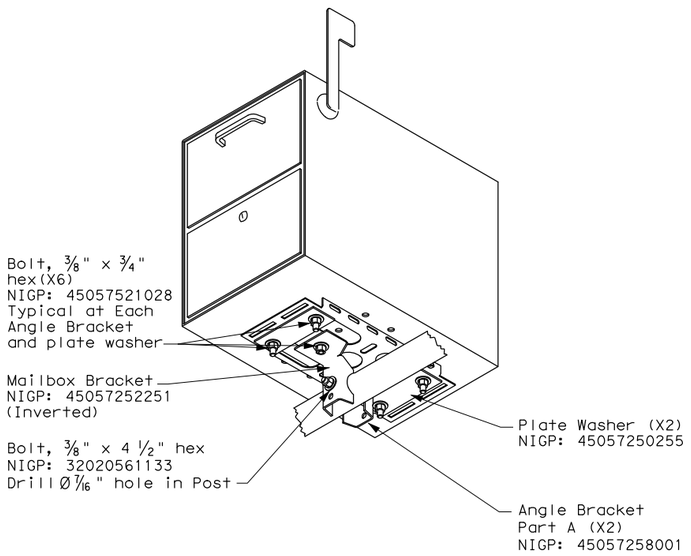


TYPE 2/4 - SINGLE XL MAILBOX

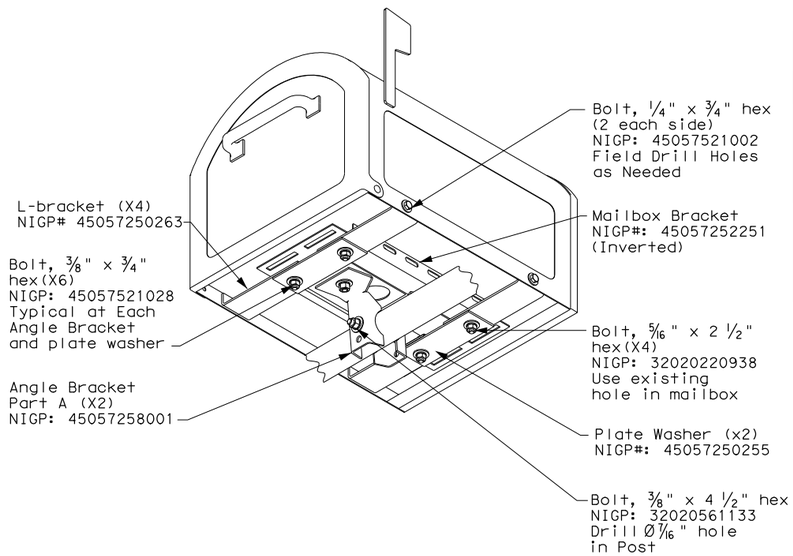


NOTE:
Follow same configuration when mounting an XL mailbox on a Type 4 multi post.

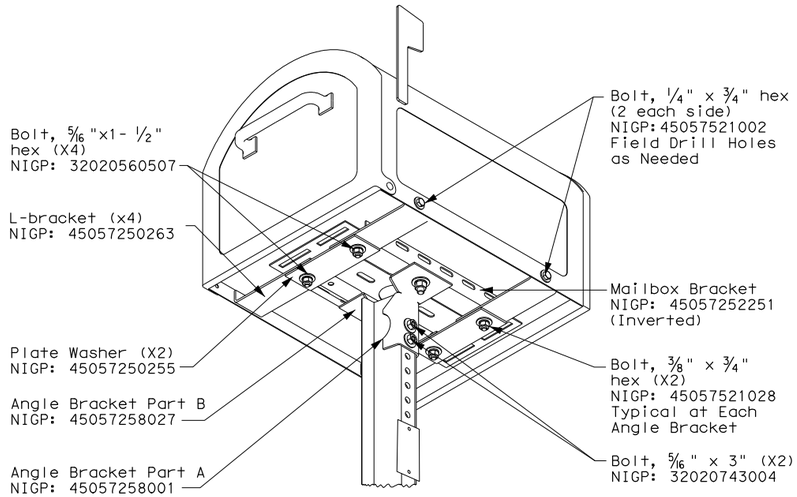
TYPE 1 MULTI – LOCKABLE ARCHITECTURAL (LA)



TYPE 1 MULTI – XL MAILBOX



TYPE 3 - XL MAILBOX MOUNTING



Texas Department of Transportation

Maintenance Division Standard

XL AND LOCKABLE ARCHITECTURAL MAILBOX ASSEMBLY

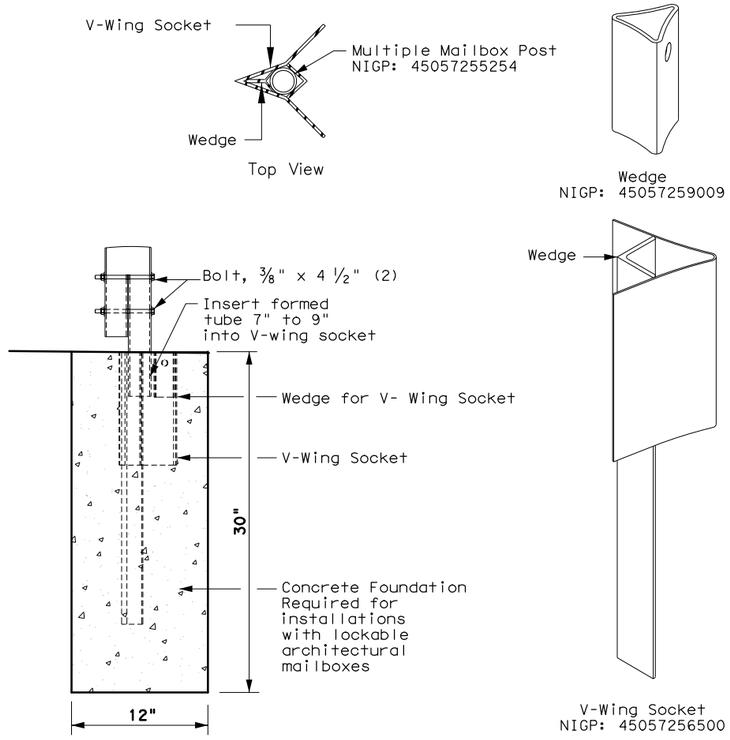
MB(2)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		96

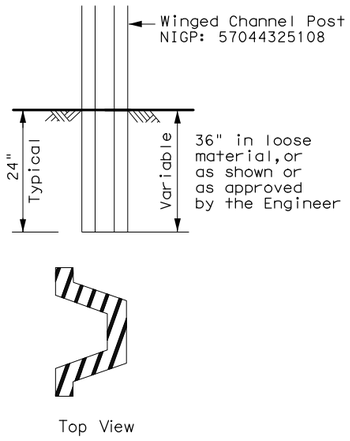
DATE:
FILE:

TYPE 1 - SUPPORT/FOUNDATION

Thin Wall Tube w/ V-LOC Anchorage



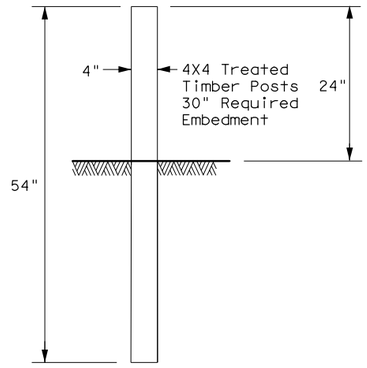
TYPE 3 - SUPPORT/FOUNDATION



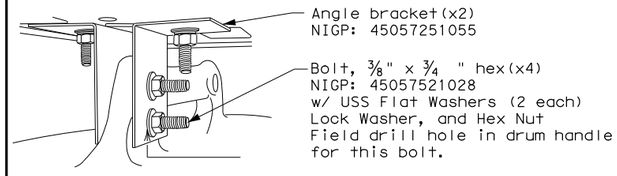
NOTES:

1. Attach Object Marker(OM) facing direction of traffic.
2. OM will also be required on opposite side if installed on a 2-Lane, 2-Way roadway.

TYPE 5 - SUPPORT/FOUNDATION



TYPE 6 - TEMPORARY MAILBOX SUPPORT



Plastic Drum NIGP: 55093383655
Rubber Collar NIGP: 55093387102

NOTES:

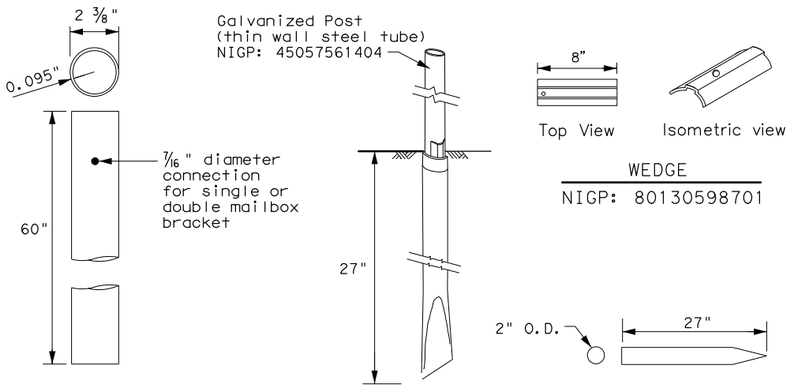
1. Place on approved plastic drum as shown in the Compliant Work Zone Traffic Control Devices (CWZTCD).
2. Existing attachment hardware shall be used unless damaged. Damaged hardware shall be replaced.

GENERAL NOTES:

1. Erect post plumb or vertical.
2. When galvanized part is required galvanize in accordance with Item 445.
3. Use a concrete footing as shown or when directed. Concrete footing will be required when soils do not hold the support/foundations in a stable condition, only on Type 1, Type 2, and Type 4

TYPE 2 - SUPPORT/FOUNDATION

Thin Wall Steel Tube w/Wedge Anchor System

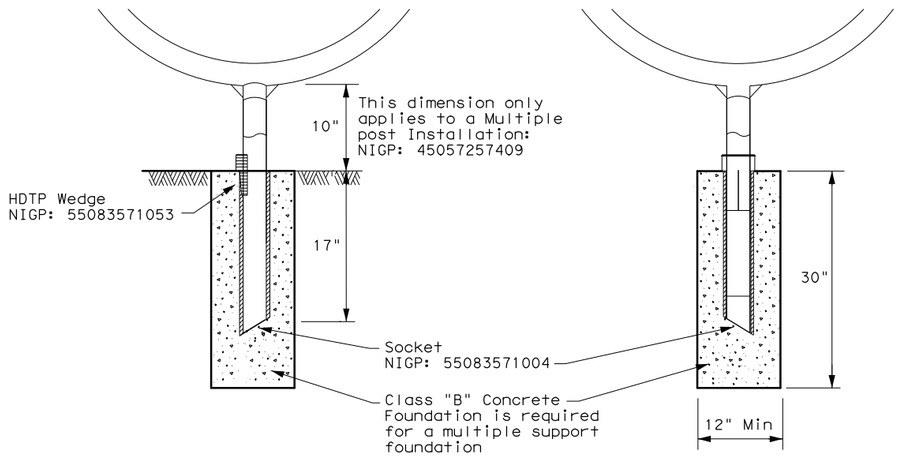


MAILBOX POST

WEDGE ANCHOR
NIGP: 80130238407

TYPE 4 - SUPPORT/FOUNDATION

Whitecoated steel post NIGP: 45057561107
Multiple post NIGP: 45057257409
Recycled Rubber post (RR) NIGP: 45057561057



SHEET 3 OF 4

Texas Department of Transportation

Maintenance Division Standard

MAILBOX SUPPORT AND FOUNDATION

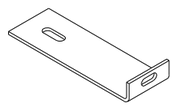
MB(3)-21

FILE: MB-21.dgn	DN:	CK:	DW:	CK:
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		97

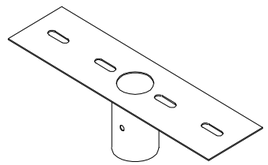
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE:
FILE:

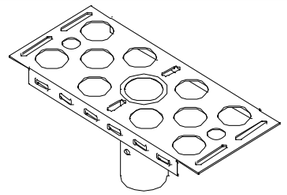
TYPE	TYPE 1	TYPE 2	TYPE 3	TYPE 4			TYPE 5	TYPE 6
Configuration	Multiple	Single or Double	Single or Double	Single	Double	Multiple	Single	Single
Mailbox Size NIGP #	Outside Position: S or M Inside Position: S, M, L, XL, or LA	Single: S, M, L, XL, or LA Double: SS, SM, MM	Single: S, M, L, or XL Double: SS, SM, MM	S, M, L, XL, or LA	SS, SM, or MM	Outside Position: S or M Inside Position: S, M, L, or XL	Molded Plastic	S, or M
Mailbox Post NIGP #	45057255254 (Galvanized Multiple)	45057561404 (Thin Walled Gavanize)	57044325108 (Wing Channel Post)	45057561107 (Thin walled white powder coated) 45057561057 (Recycled Rubber Post: S or M only)	45057561107 (Thin Walled White Powder Coated)	45057257409 (White Powder Coated Multiple)	4x4 Timber	Construction Barrel
Post and Mailbox Hardware NIGP #	45057259009 (Wedge) 45057256500 (V-Wing Socket) 45057253002 (Bracket Extension) 45057252251 (Mailbox Bracket) 45057258001 (Part A Angle Bracket x2) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	80130598701 (Wedge) 80130238407 (Wedge Anchor) 45057253002 (Bracket Extension) 45057252343 (Double MB Bracket) 45057252350 (S. Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket forXL x4)	45057541653 (Type 3 Double Mailbox Bracket) 45057252251 (Mailbox Bracket) 45057253002 (Bracket Extension) 45057258001 (Part A Angle Bracket) 45057258027 (Part B Angle Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057252350 (Single Mailbox Bracket) 45057253002 (Bracket Extension) 45057250255 (Plate Washer for XL/LA x2) 45057250263 (L-Bracket for XL x4)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252343 (Double Mount Bracket) 45057252251 (Mailbox Bracket x2)	55083571053 (Wedge) 55083571004 (Socket) 45057253002 (Bracket Extension) 45057252350 (Single Mount Bracket) 45057250255 (Plate Washer for XL x2) 45057250263 (L-Bracket for XL x4)	None	45057251055 Angle Bracket (x2)
Foundation Used	Class B Concrete (Required for LA Mailboxes)	Class B Concrete (Required for LA Mailboxes)	None	Class B Concrete (not used with recycled rubber post, required for LA Mailboxes)	Class B Concrete (not required)	Class B Concrete	None	None



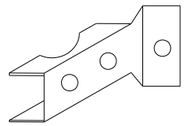
NIGP: 45057250263
L-Bracket x4 for
XL sized mailboxes



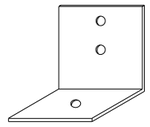
NIGP: 45057252343
Double Mailbox Bracket
For Type 2 and Type 4
double mount



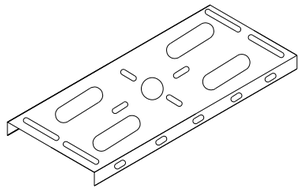
NIGP: 45057252350
Single Mailbox Bracket
For Type 2 single and for
Type 4 single and multi mount



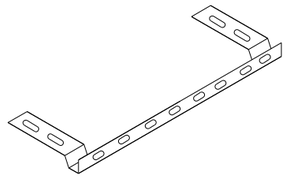
NIGP: 45057258001
Part "A" Angle Bracket
For Type 1 multi (2 per mailbox)
and Type 3 single and double



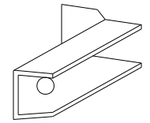
NIGP: 45057251055
Type 6 Angle Bracket
(2 per mailbox)



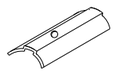
NIGP: 45057252251
Mailbox Bracket
For Type 1 multi and
any double mount (use 2)



NIGP: 45057253002
Bracket Extension
Use 1 for a medium Mailbox
Use 2 for a Large Mailbox



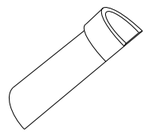
NIGP: 45057258027
Part "B" Angle Bracket
For Type 3 single
and double



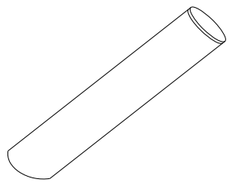
NIGP: 80130598701
Wedge for Type 2

NIGP: 45057250255
Plate Washer for Architecural
and XL Mailboxes

NIGP: 45057541653
Type 3 double mailbox bracket

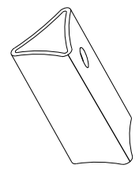


NIGP: 55083571053
Type 4 Mailbox Wedge

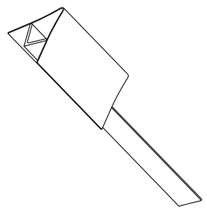


NIGP: 55083571004
Type 4 Mailbox Socket

NIGP: 80130238407
Type 2 Wedge Anchor



NIGP: 45057259009
Wedge for Type 1 V-wing Socket



NIGP: 45057256500
V-wing Socket for
Type 1 Foundation

NIGP #	OBJECT MARKERS AND CONFORMABLE SHEETING
55008311759	Type 2 OM 4"x4" (3 Needed) for Type 3 Wing Channel Post
55008312906	Type 2 OM 6"x12" (1 needed) for Type 3 Wing Channel Post
80149872006	12" Conformable Reflective Yellow Sheeting for Flexible Posts

NOTES:

1. Type 2 object marker in accordance with Traffic Engineering Standard Delineators & Object Markers.
2. A light weight receptacle for newspaper delivery can be attached to mailbox posts if the receptacle does not touch the mailbox, present a hazard to traffic or delivery of the mail, extend beyond the front of the mailbox, or display advertising, except the publication title.

BID CODES FOR CONTRACTS

MB-(X) ASSM TY (XXX) (X)

Type of Mailbox
- S = Single
- D = Double
- M = Multiple
- MP = Molded Plastic

Type of Post
- WC = Winged Channel Post
- RR = Recycled Rubber
- TWW = Thin Walled White Tubing
- TWG = Thin Walled Galvanized Tubing
- TIM = Timber

Type of Foundation
- Ty 1 = V-Loc
- Ty 2 = Wedge Anchor Steel System
- Ty 3 = Winged Channel post
- Ty 4 = Wedge Anchor Plastic System
- Ty 5 = 4 X 4 Post

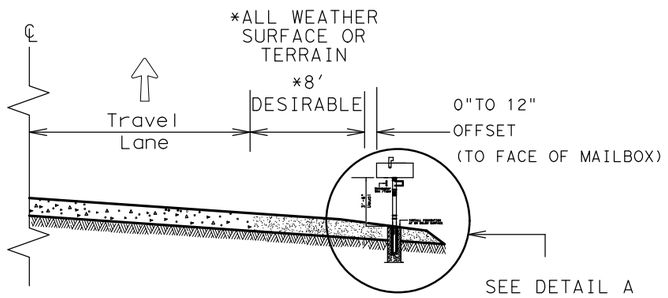
Texas Department of Transportation — Maintenance Division Standard

NIGP PARTS LIST AND COMPATIBILITY

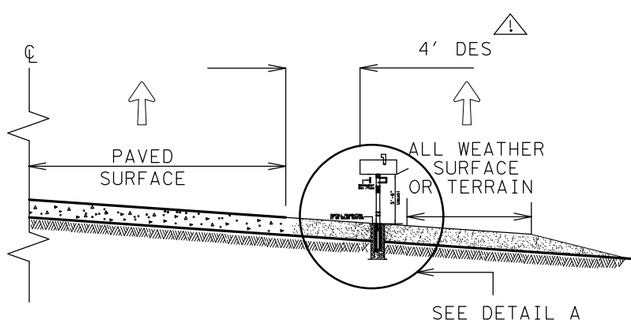
MB(4)-21

FILE: MB-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT March 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS 2/2005 11/2009 4/2015 6/2005 1/2011 11/2006 7/2014	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		98

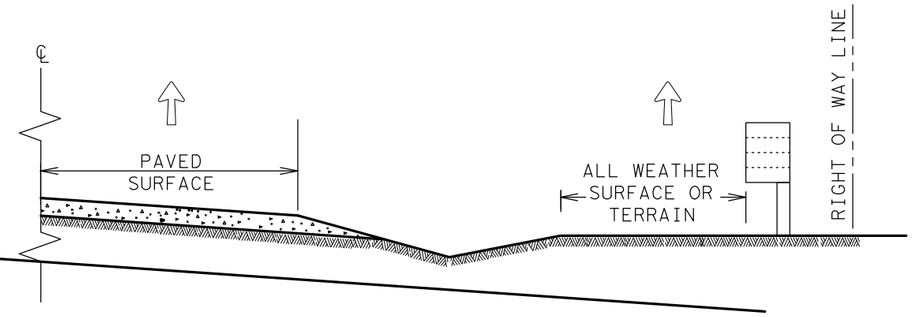
DATE: 10/14/2021 10:35:48 AM
FILE: R:\1002700-1003299\1003179_00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0304_SH304_ROW.DGN



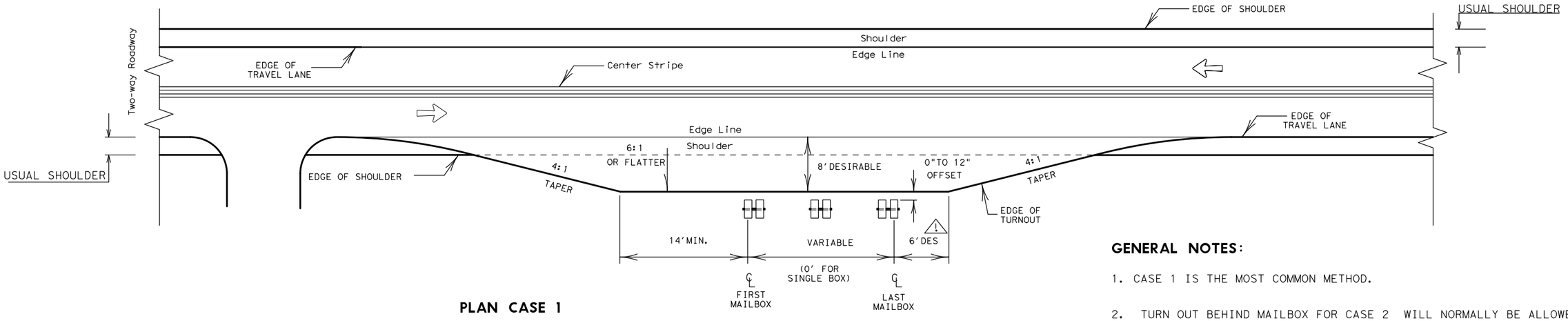
CASE 1. OFF TRAVEL WAY DELIVERY



CASE 2. BACK SIDE DELIVERY



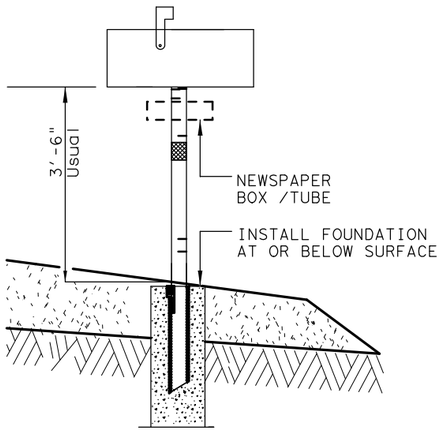
CASE 3. DELIVERY NEAR RIGHT OF WAY LINE



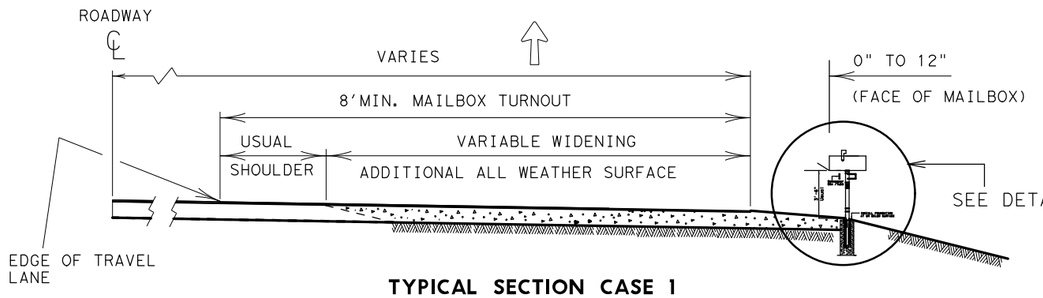
PLAN CASE 1

GENERAL NOTES:

1. CASE 1 IS THE MOST COMMON METHOD.
2. TURN OUT BEHIND MAILBOX FOR CASE 2 WILL NORMALLY BE ALLOWED FOR NATURAL TERRAIN THAT WILL SERVE AS AN ALL WEATHER SURFACE.
3. ALL WEATHER DRIVEWAYS FOR CASE 3 MAILBOXES LOCATED AT THE RIGHT OF WAY LINE SHOULD NORMALLY BE PLACED IN CONJUNCTION WITH COUNTY ROADS OR OTHER CONNECTING COMMUNITY ROADS OR STREETS. IF THE NUMBER OF MAILBOXES EXCEEDS FOUR, A COMMUNITY MAIL BOX SHOULD BE ENCOURAGED AT THESE LOCATIONS.



DETAIL A



TYPICAL SECTION CASE 1

MAIL DELIVERY VEHICLE TRAVEL DIRECTION

SHEET 1 OF 3

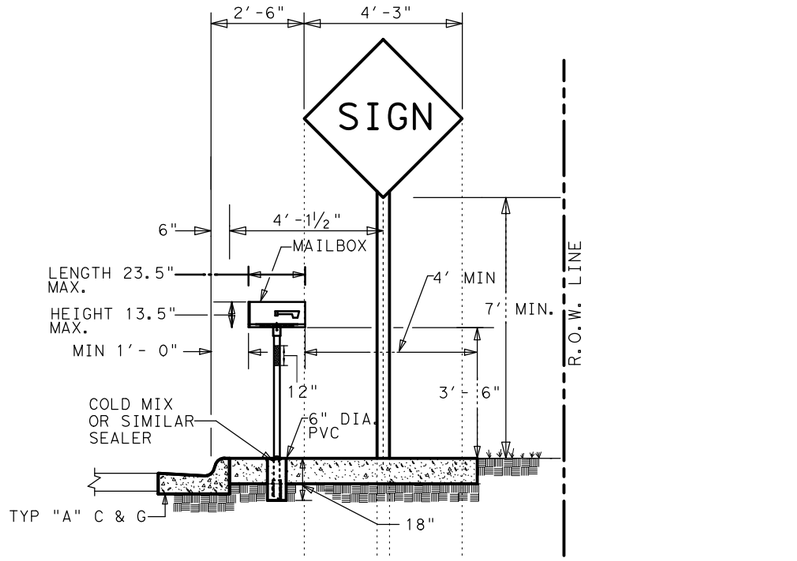
Texas Department of Transportation | Maintenance Division Standard

Guideline

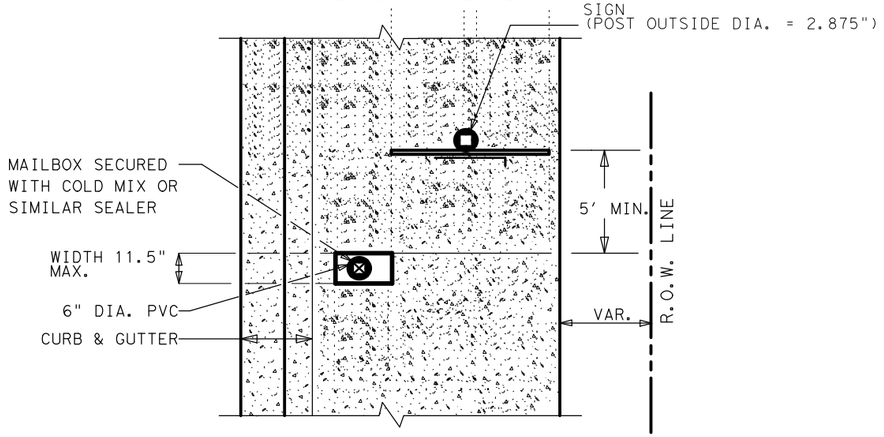
MAILBOX SIDE ROAD PLACEMENT AND TURNOUTS
MB-14(2)

FILE: MB14(2).DGN	DN: JEO	CK:	DW: JEO	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS DECEMBER 2012-NEW TXDOT TITLE BLOCK	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		99

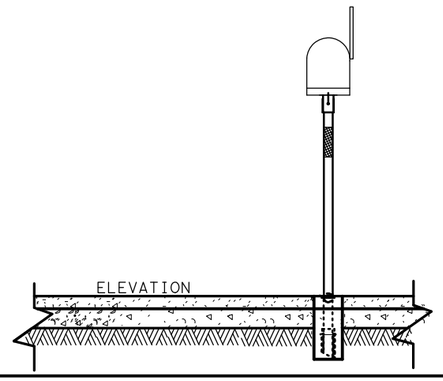
DATE: 10/14/2021 10:35:49 AM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_MB-14(2A).DGN

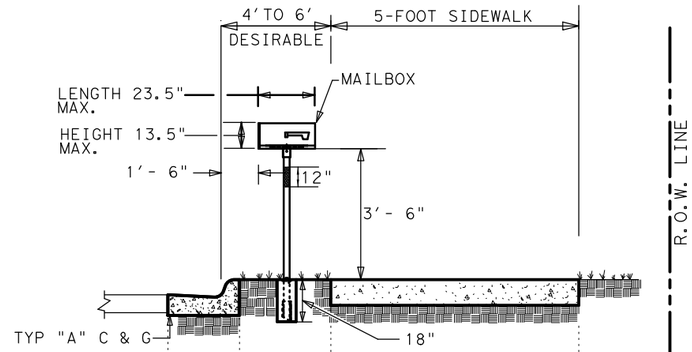


MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)

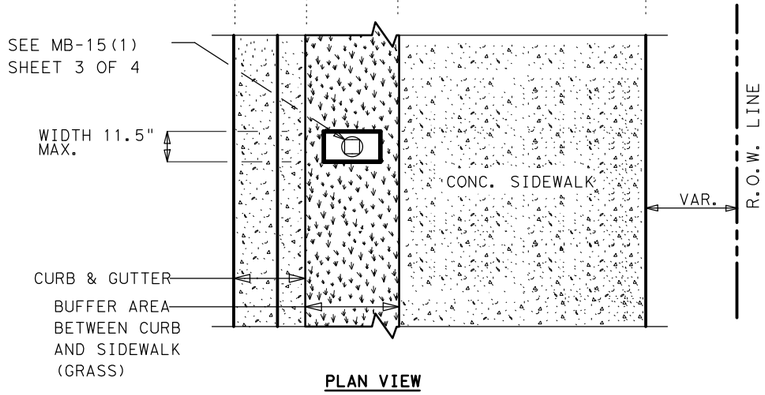


PLAN VIEW





MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW

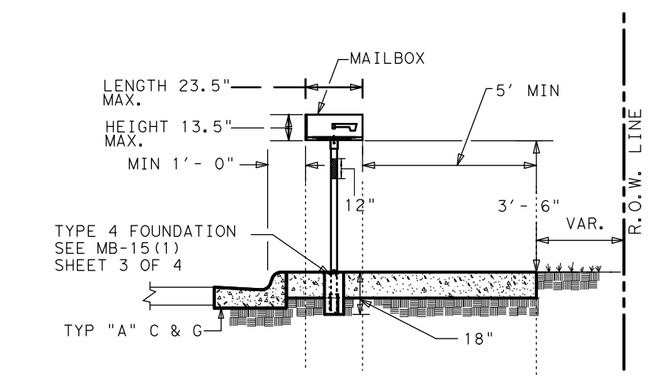
Texas Department of Transportation
Maintenance Division Standard

SINGLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

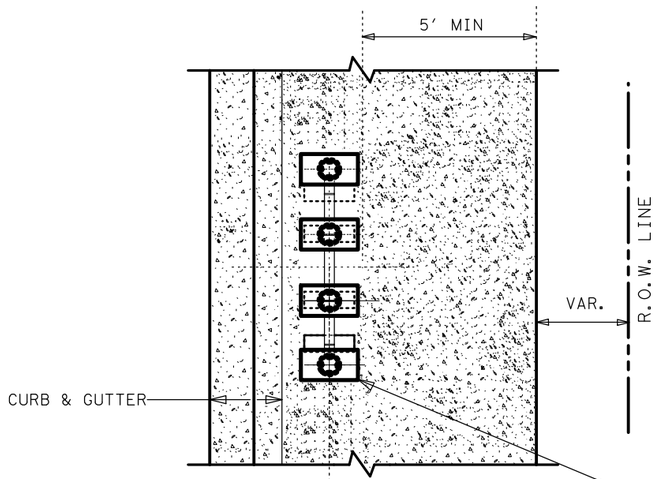
MB-14(2A)

FILE: MB-14(2A)	DN:	CK:	DW:	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		100

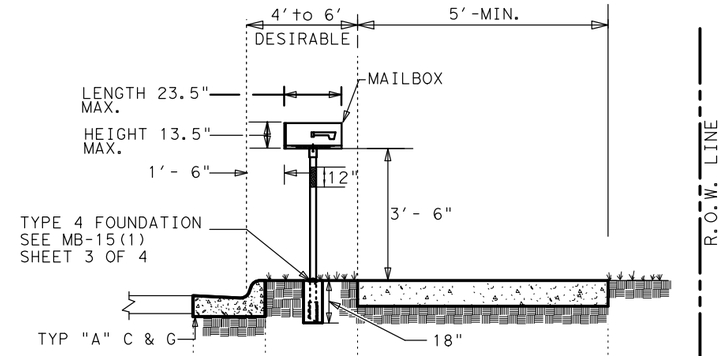
DATE: 10/14/2021 10:35:49 AM
FILE: R:\1002700-1003200\1003179_001\W3_SH304\04_DOCUMENTS\PLAN SET\PLAN SET\PLAN SET SHEETS\MB-14(2A) SHEET 1 OF 3.dgn



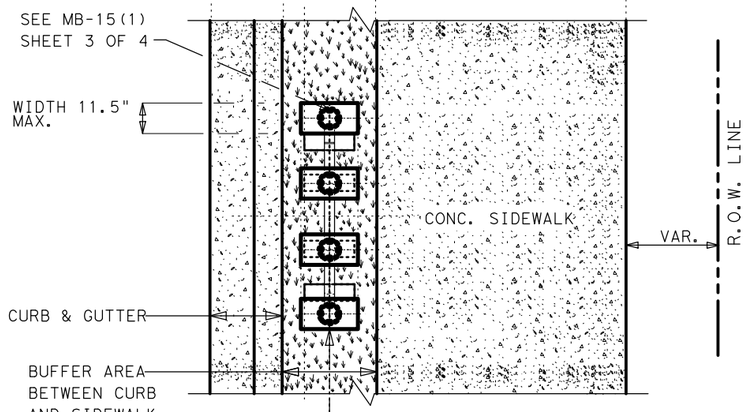
MAILBOX SIDEWALK INSTALLATION RELATIVE TO ANY OTHER OBSTRUCTION SUCH AS A SIGN
(MINIMUM BORDER DISTANCE)



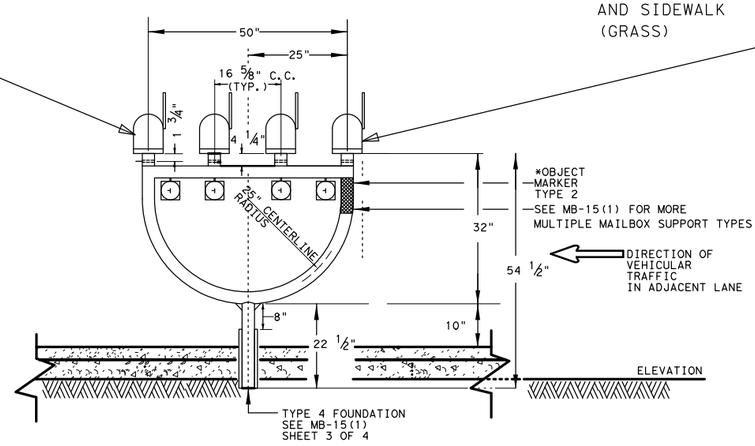
PLAN VIEW



MAILBOX SIDEWALK INSTALLATION
(DESIRABLE BORDER DISTANCE)



PLAN VIEW



SHEET 3 OF 3

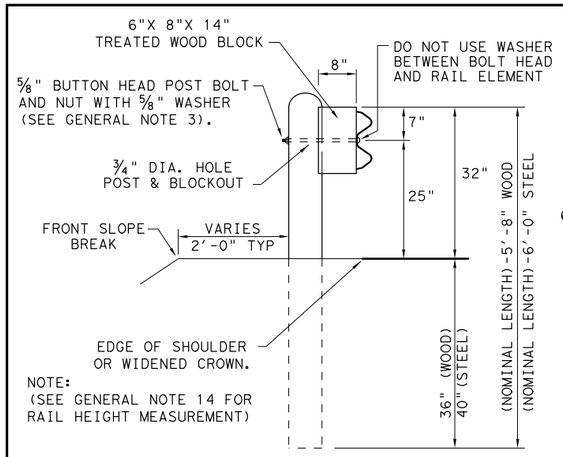
Texas Department of Transportation | Maintenance Division Standard

MULTIPLE MAILBOX PLACEMENT BEHIND CURBS WITH OR WITHOUT SIDEWALKS

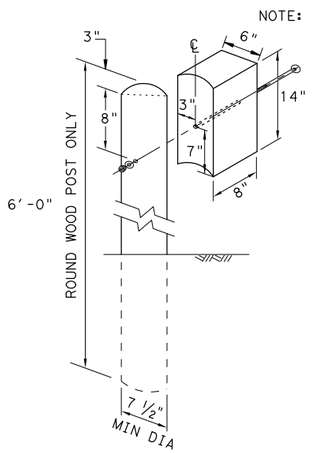
MB-14(2B)

FILE: MB-14(2A)	DN:	CK:	DW:	CK:
© TxDOT MAY 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		101

DATE:
FILE:

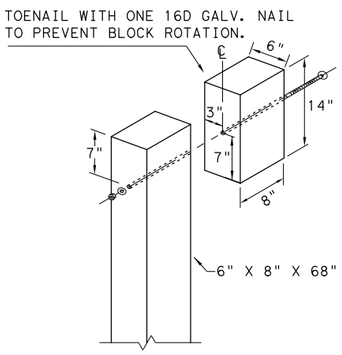


TYPICAL POST PLACEMENT

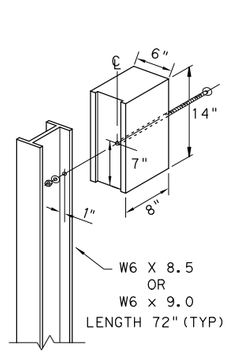


WOOD BLOCK TO ROUND WOOD POST

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

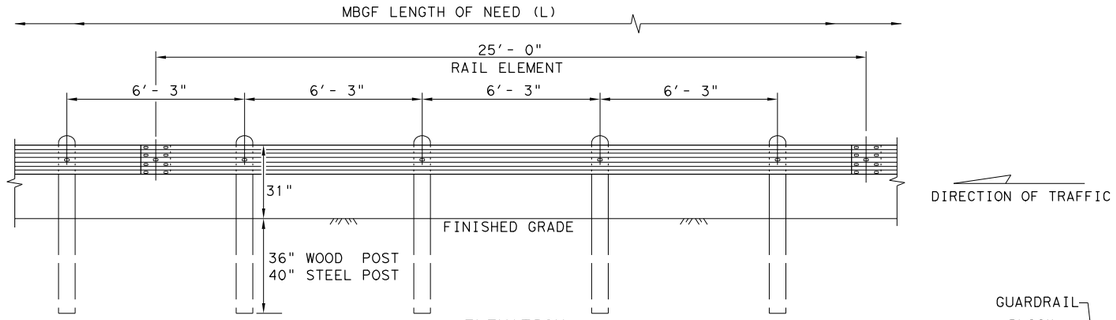


WOOD BLOCK TO RECTANGULAR WOOD POST



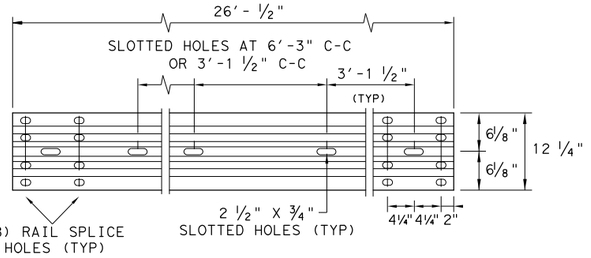
ROUTED WOOD BLOCK TO I-BEAM STEEL POST

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



ELEVATION MID-SPAN RAIL SPLICE

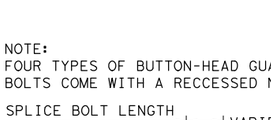
SHOWING A 25'- 0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



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

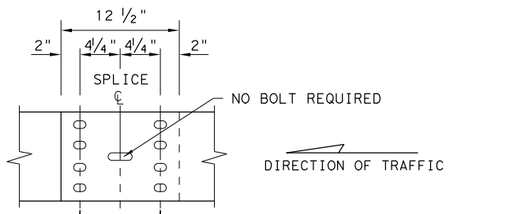
NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES.
SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

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



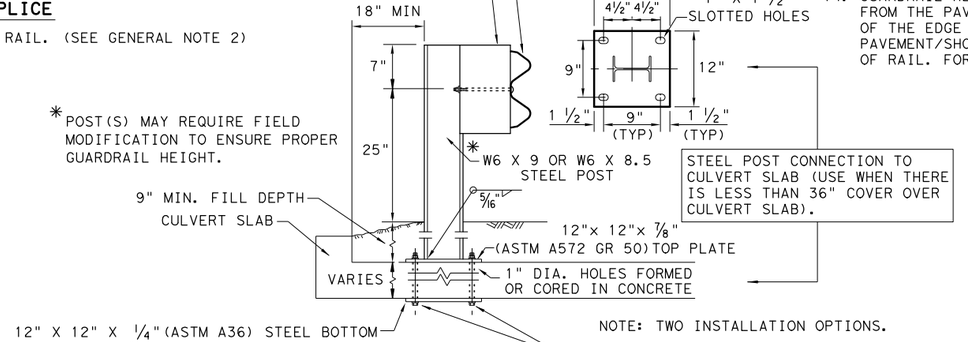
BUTTON HEAD BOLT

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



MID-SPAN RAIL SPLICE DETAIL

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



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

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

LOW FILL CULVERT POST

NOTE: TWO INSTALLATION OPTIONS.

1. BOLT-THROUGH OPTION: REQUIRES A 6" MIN. SLAB THICKNESS. 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 HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 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

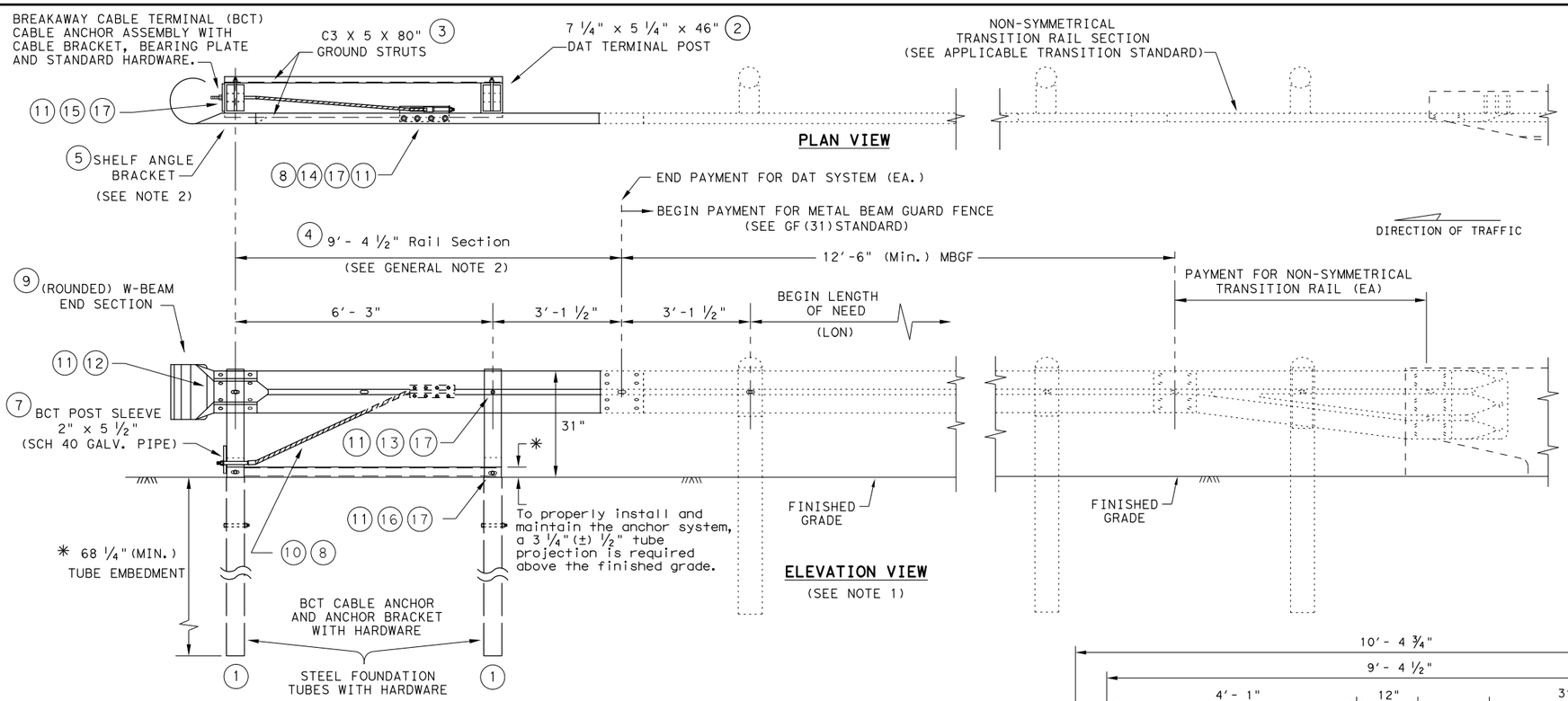
Design Division Standard

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	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		102

DATE:
FILE:



DOWNSTREAM ANCHOR TERMINAL (DAT)

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

GENERAL NOTES

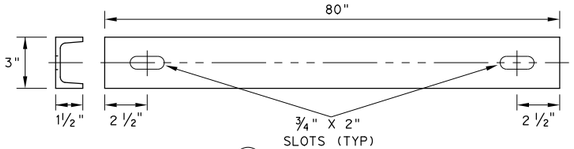
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN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

MOW STRIP INSTALLATION

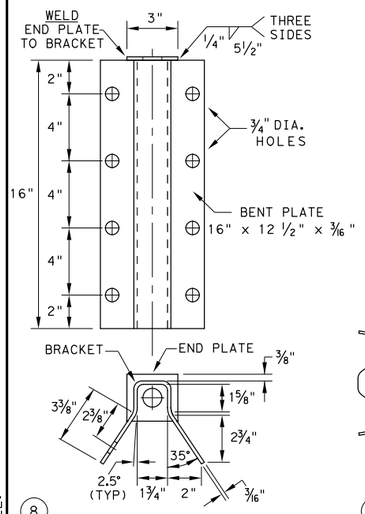
IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

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

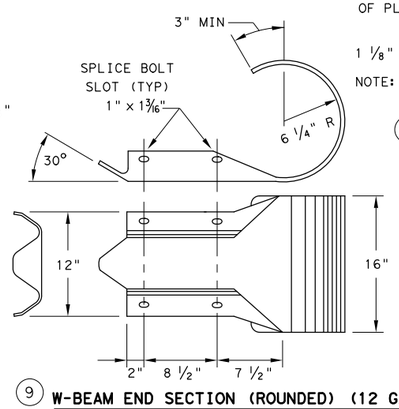
(4) **TERMINAL RAIL ELEMENT FOR DAT**



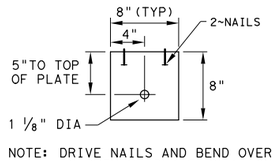
(3) **CHANNEL STRUT**
C3 X 5 X 80", GRADE A36



(8) **GUARDRAIL ANCHOR BRACKET**

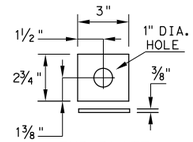


(9) **W-BEAM END SECTION (ROUNDED) (12 GA.)**

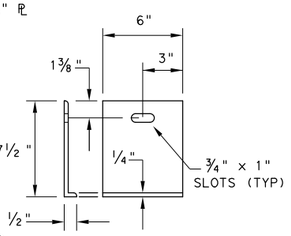


NOTE: DRIVE NAILS AND BEND OVER TO PREVENT PLATE ROTATION

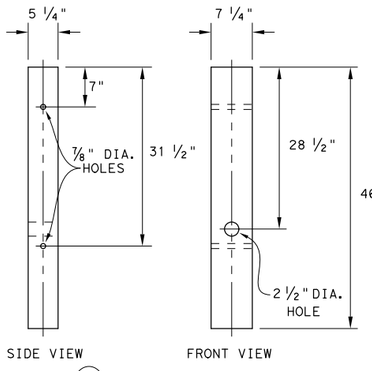
(6) **BEARING PLATE**
8"x 8"x 5/8" PL



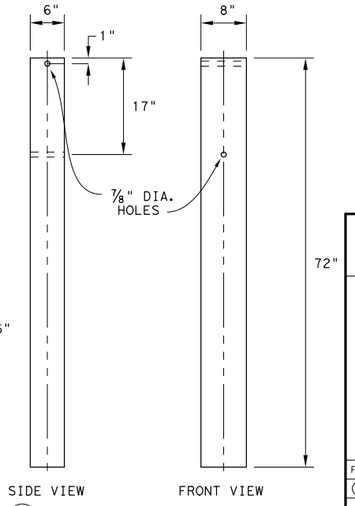
END PLATE



(5) **SHELF ANGLE BRACKET**



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



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

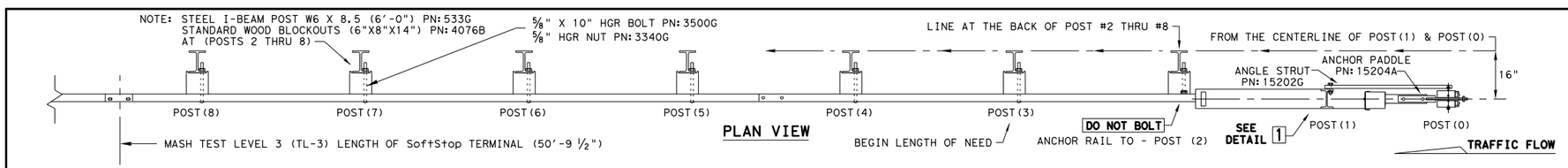
Texas Department of Transportation — Design Division Standard

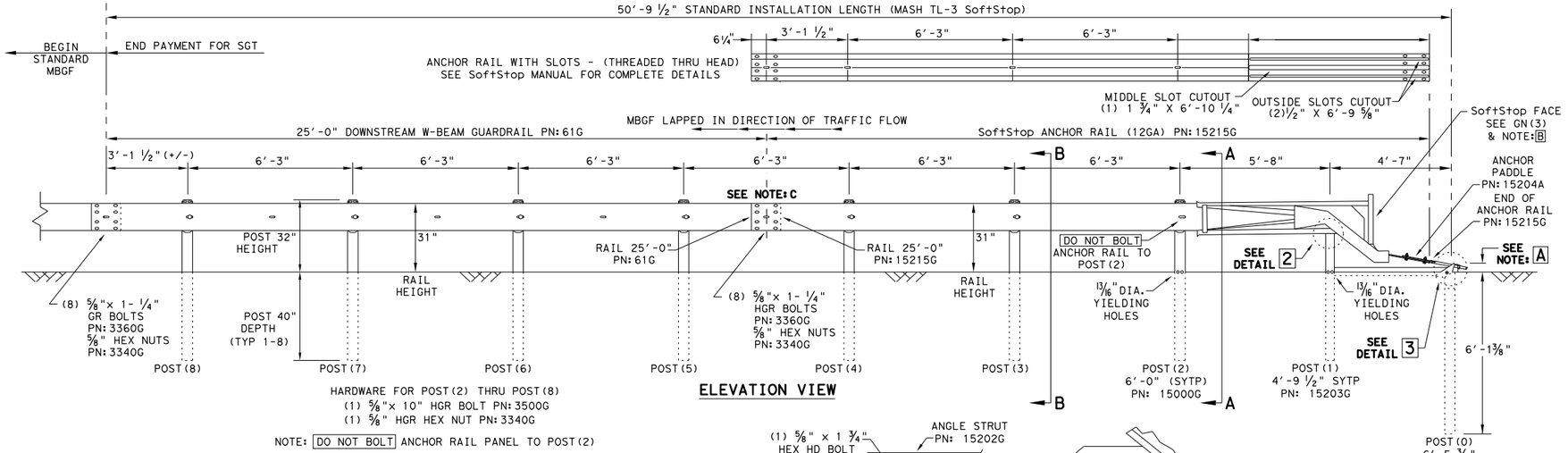
METAL BEAM GUARD FENCE
(DOWNSTREAM ANCHOR TERMINAL)
TL-3 MASH COMPLIANT

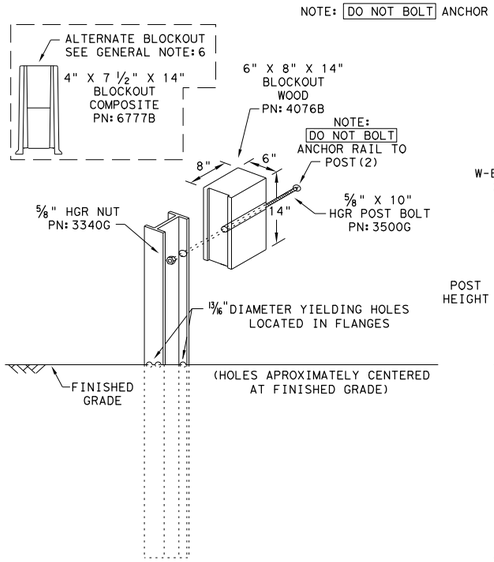
GF(31)DAT-19

FILE: gf31dat19.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
©TxDOT: NOVEMBER 2019 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		103

DATE: 10/14/2021
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_ROW_DETAILS_05.dgn



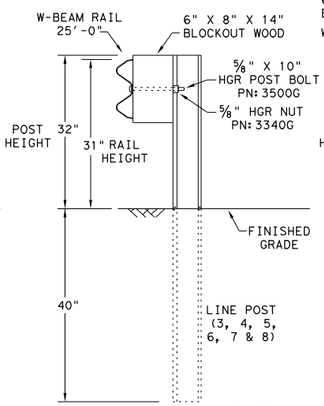




ISOMETRIC VIEW POST(1 & 2)

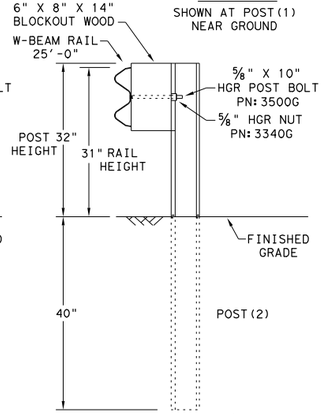
W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)



SECTION VIEW B-B

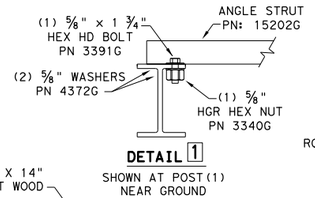
6'-0" (W6 X 8.5)
I-BEAM POST PN: 533G



SECTION VIEW A-A

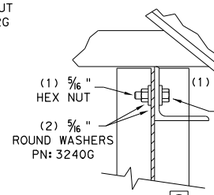
6'-0" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)



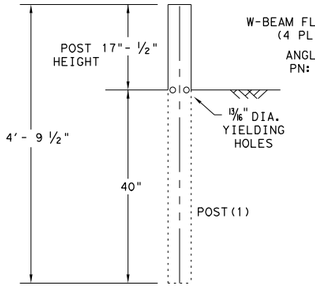
DETAIL 1

SHOWN AT POST(1) NEAR GROUND



DETAIL 2

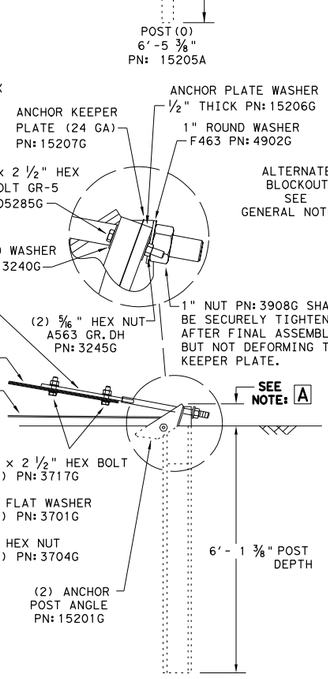
SHOWN AT POST(1)



FRONT VIEW POST(1)

4'-9 1/2" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15203G

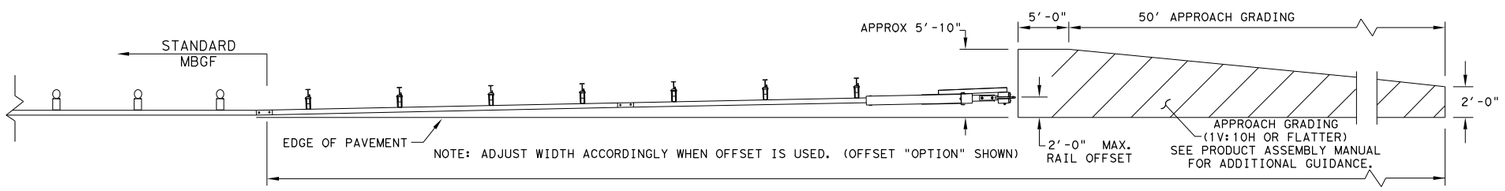
NOTE: NO BLOCKOUT INSTALLED AT POST(1)



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

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 7/8")
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	5/8" x 2 1/2" HEX HD BOLT GR-5
105286G	1	7/8" x 1 1/2" HEX HD BOLT GR-5
3240G	6	5/8" ROUND WASHER (WIDE)
3245G	3	5/8" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE:B

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

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		
REVISIONS	0573	01	034	SH 304		
	DIST	COUNTY		SHEET NO.		
	AUS	BASTROP		104		

DATE: 10/14/2021
FILE: R:\1002700-1003299\1003179_00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0314_SGT11S3118.DGN

(SEE GN NOTE 15)
STANDARD 31" MBGF

ITEM (6)
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3

FIELD-SIDE
(RAIL 3)

NOTE:
RECESSED HEX NUTS FACING
TRAFFIC-SIDE **SEE DETAIL (C)**

REFERENCE LINE USED TO INSTALL
LINE POST(9) THRU POST(2)

POST 1 OFFSET DISTANCE MEASURED
7-⅝" FROM REFERENCE LINE

POST 9 POST 8 POST 7 POST 6 POST 5 POST 4 POST 3 POST 2

RAIL 4 RAIL 3 RAIL 2 RAIL 1

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

NO BLOCKOUT
AT (POST 1)

CABLES

NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

ITEM (5)
TRAFFIC SIDE SLIDER
(TSS) PANEL FOR RAIL 2

NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.

PLAN VIEW

MBGF RAIL 2
INSTALL GUARD FENCE RECESSED HEX NUTS ON TRAFFIC-SIDE
MBGF RAIL 1

DETAIL (C)

TRAFFIC FLOW

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

ITEM (25)
MAX-TENSION HEAD
SEE DETAIL (A)

INSTALLATION LENGTH 55'- ½"

49'-8 9/16"

6'-3" 6'-3" 6'-3" 6'- ¾" 6'-3" 6'-3" 6'-3" 37 ½" 5'-3 11/16"

RAIL HEIGHT 31"

ARROWS

RAIL HEIGHT 31"

HEAD HEIGHT

ITEM (13) RAIL 4 ITEM (13) RAIL 3 ITEM (13) RAIL 2 ITEM (13) RAIL 1

DETAIL (D)

DETAIL (B)

32-¼"

FINISHED GRADE

CABLES

FINISHED GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

68-⅛"

POST 9 POST 8 POST 7 POST 6 POST 5 POST 4 POST 3 POST 2 POST 1

ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

(8) X-LITE LINE POST - ITEM (11)

ELEVATION VIEW

**SOIL
ANCHOR POST**
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

INSTALL THE TSS AND RSS
WITH THE ARROWS POINTING
TOWARDS THE MAX-HEAD

TSS PANEL AND RSS PLATE

DETAIL (D)

HEAD HEIGHT 32-¼"

TOP OF POST

31-⅞"

FINISHED GRADE

40-⅛"

68-⅛" ANCHOR POST DEPTH

ITEM (1) ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9
(NOTE: ITEM (4) POST 1 (NOT SHOWN), TO BE INSTALLED AT SAME DEPTH AS LINE POSTS.)

**SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9**

SECTION VIEW A-A

NOTE:
USE THE MASH APPROVED
X-TENSION CABLE ASSEMBLY.

7 5/16"

2 1/8"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL ⅝" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)
ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

✳ ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

✳ TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

✳✳ ALTERNATIVE ITEMS NOT SHOWN.
ITEM(26) 8" WOOD-BLOCKOUTS
ITEM(27) 25'GUARD FENCE PANELS

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX.
RAIL OFFSET

APPROACH GRADING
(1V:10H OR FLATTER)
SEE PRODUCT ASSEMBLY MANUAL
FOR ADDITIONAL GUIDANCE.

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE MAX-TENSION 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: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
2. FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE; MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURE'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. ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
7. COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST(MPL)FOR CERTIFIED PRODUCERS.
8. REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
9. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
10. POSTS SHALL NOT BE SET IN CONCRETE.
11. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
12. MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
13. IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
14. THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
15. A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
✳ 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
✳✳ 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
✳✳ 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

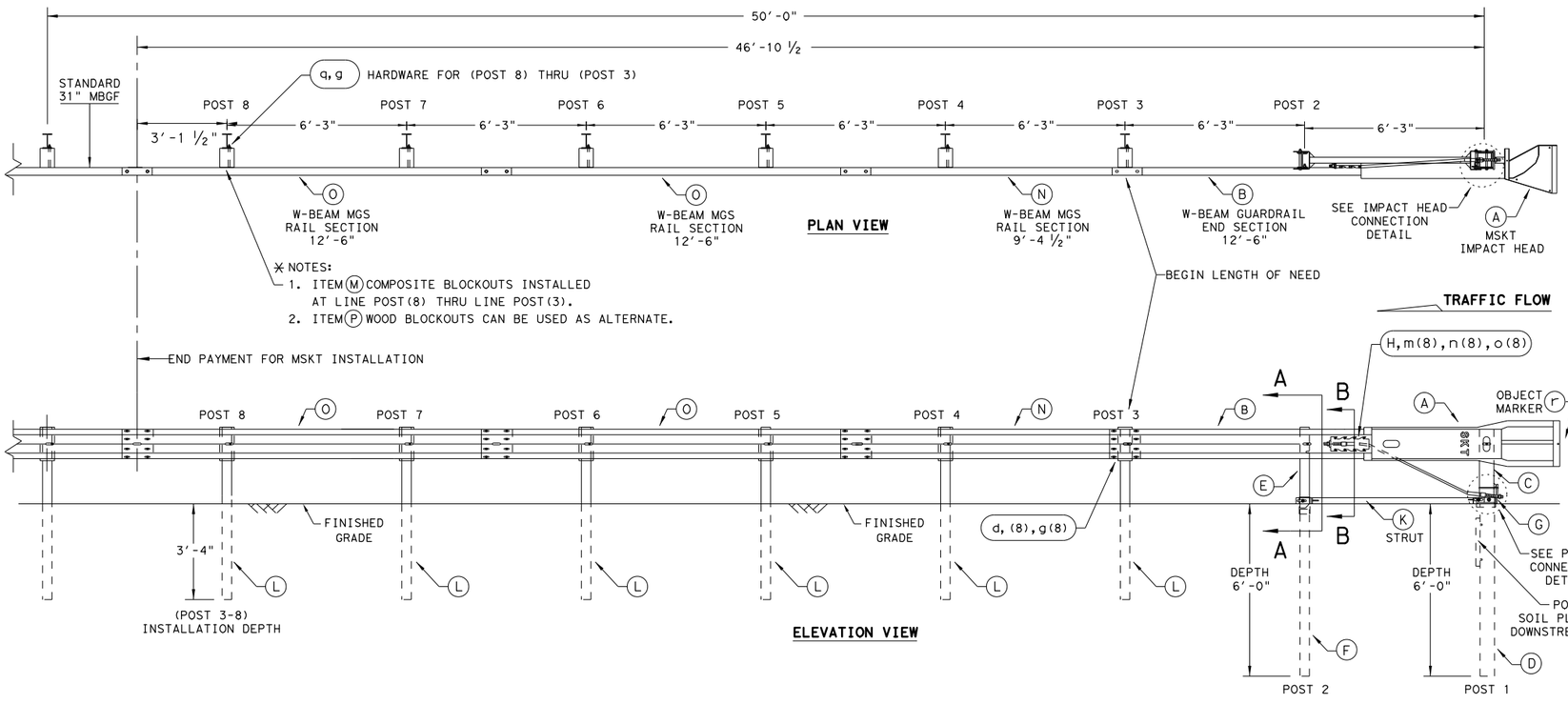
Texas Department of Transportation

Design Division Standard

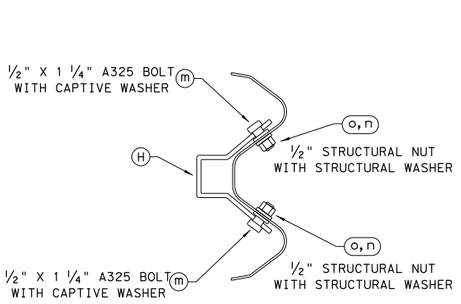
MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS		01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		105

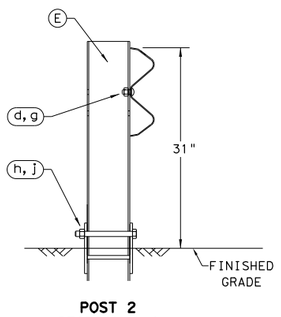
DATE: 10/14/2021
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\3. ROADWAY\SH304_ROW_DETAILS_07.dgn



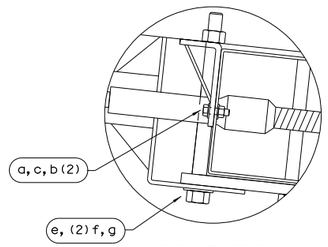
NOTE: SEE (GENERAL NOTE 14) FOR DRIVING CAP INFORMATION.



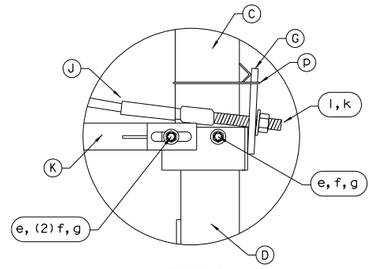
SECTION B-B
ANCHOR BRACKET



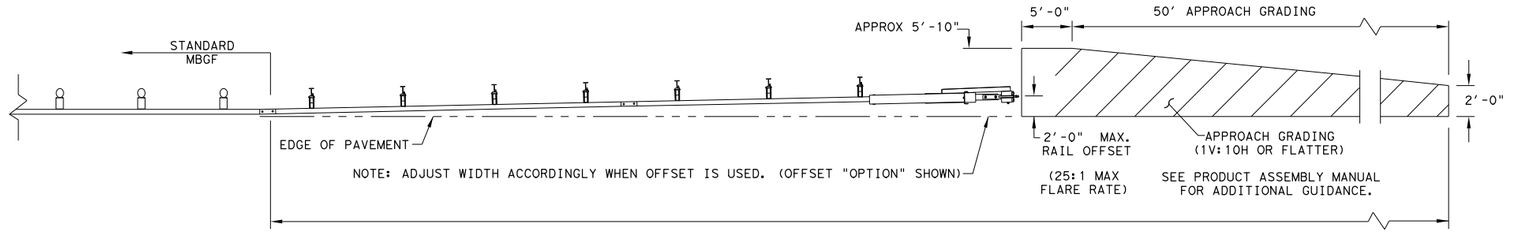
POST 2
SECTION A-A



IMPACT HEAD
CONNECTION DETAIL



POST 1
CONNECTION DETAIL



NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

APPROACH GRADING AT GUARDRAIL END TREATMENTS

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

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

GENERAL NOTES

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

ITEM	QTY	MAIN SYSTEM COMPONENTS	ITEM NUMBERS
A	1	MSKT IMPACT HEAD	MS3000
B	1	W-BEAM GUARDRAIL END SECTION, 12 Ga.	SF1303
C	1	POST 1 - TOP (6" X 6" X 1/8" TUBE)	MTPHP1A
D	1	POST 1 - BOTTOM (6' W6X15)	MTPHP1B
E	1	POST 2 - ASSEMBLY TOP	UHP2A
F	1	POST 2 - ASSEMBLY BOTTOM (6' W6X9)	HP2B
G	1	BEARING PLATE	E750
H	1	CABLE ANCHOR BOX	S760
J	1	BCT CABLE ANCHOR ASSEMBLY	E770
K	1	GROUND STRUT	MS785
L	6	W6x9 OR W6x8.5 STEEL POST	P621
M	6	COMPOSITE BLOCKOUTS	CBSP-14
N	1	W-BEAM MGS RAIL SECTION (9'-4 1/2")	G12025
O	2	W-BEAM MGS RAIL SECTION (12'-6")	G1203A
P	6	WOOD BLOCKOUT 6" X 8" X 14"	P675
Q	1	W-BEAM MGS RAIL SECTION (25'-0")	G1209
		SMALL HARDWARE	
a	2	5/16" 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
q	6	5/8" x 10" H.G.R. BOLT	B581002
r	1	OBJECT MARKER 18" X 18"	E3151

SEE NOTES: ✳

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

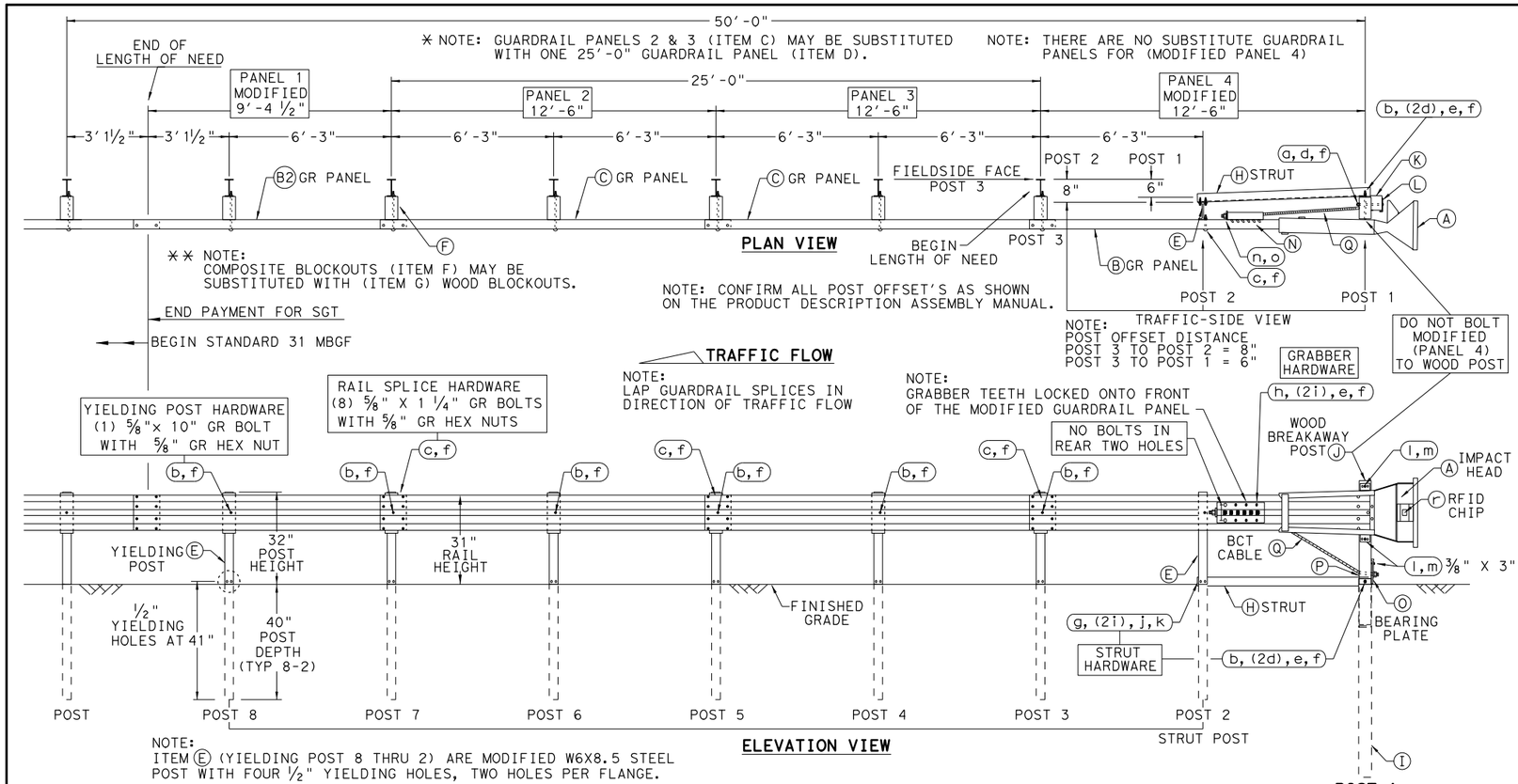
Texas Department of Transportation

Design Division Standard

SINGLE GUARDRAIL TERMINAL
MSKT-MASH-TL-3
SGT(12S)31-18

FILE: sgt12s3118.dgn	DN:TxDOT	CK:KM	DW:VP	CK:CL	
© TxDOT: APRIL 2018	CONT	SECT	JOB	HIGHWAY	
REVISIONS		01	034	SH 304	
	DIST	COUNTY		SHEET NO.	
	AUS	BASTROP		106	

DATE:
FILE:

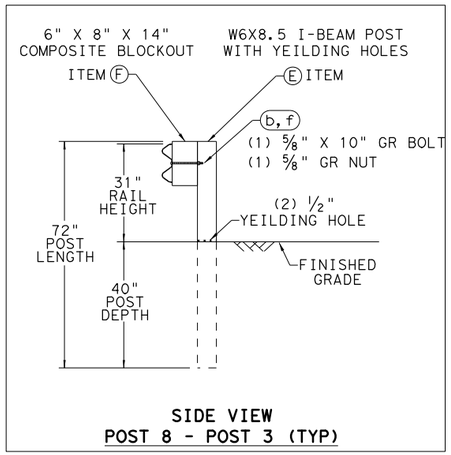


GENERAL NOTES

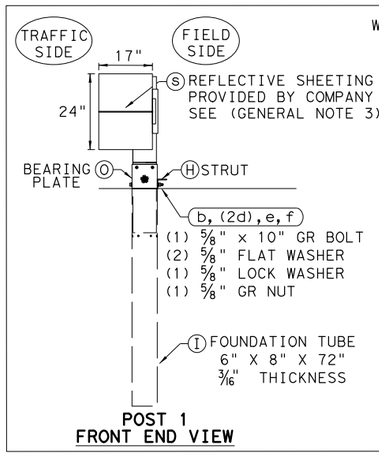
1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: SPIG INDUSTRY, INC. AT 1(267) 644-9510. 14675 INDUSTRIAL PARK RD; BRISTOL, VA 24202
2. FOR INSTALLATION, REPAIR AND MAINTENANCE REFER TO THE MANUFACTURER'S; SGET END TERMINAL, PRODUCT DESCRIPTION ASSEMBLY 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

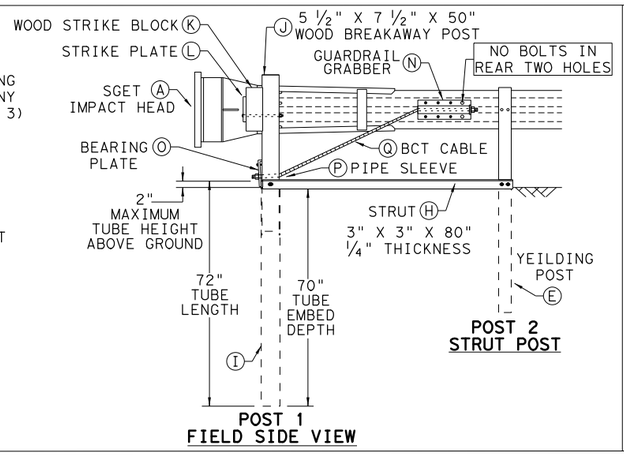
ALTERNATIVE ITEMS NOTE: * D, ** G — SEE PLAN VIEW



SIDE VIEW
POST 8 - POST 3 (TYP)

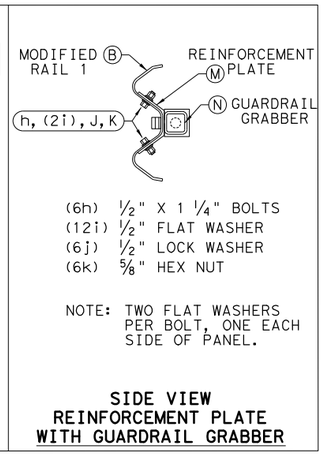


POST 1
FRONT END VIEW

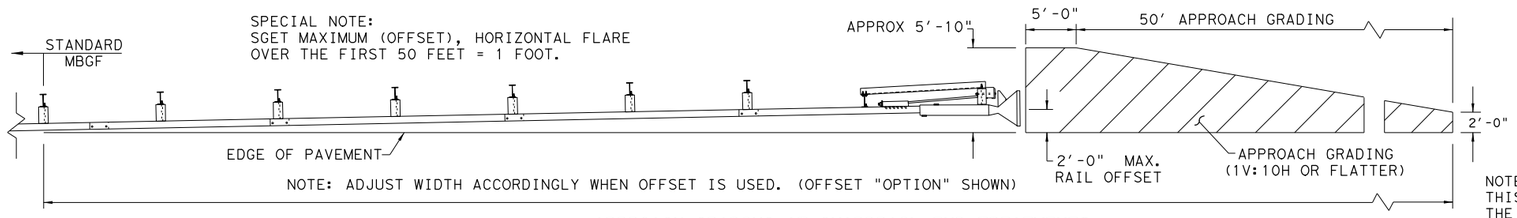


POST 1
FIELD SIDE VIEW

POST 2
STRUT POST



SIDE VIEW
REINFORCEMENT PLATE
WITH GUARDRAIL GRABBER



APPROACH GRADING AT GUARDRAIL END TREATMENTS

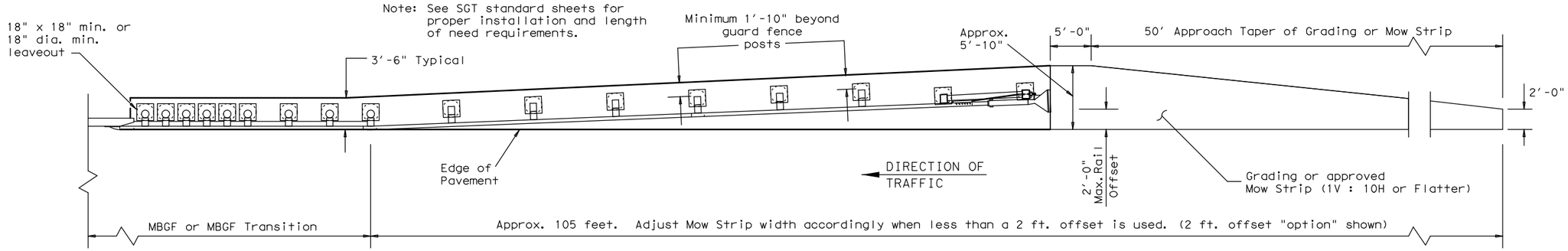
NOTE:
THIS STANDARD IS A BASIC REPRESENTATION OF THE SGET TERMINAL SYSTEM AND IS NOT INTENDED TO REPLACE THE MANUFACTURER'S ASSEMBLY MANUAL.

Texas Department of Transportation — Design Division Standard

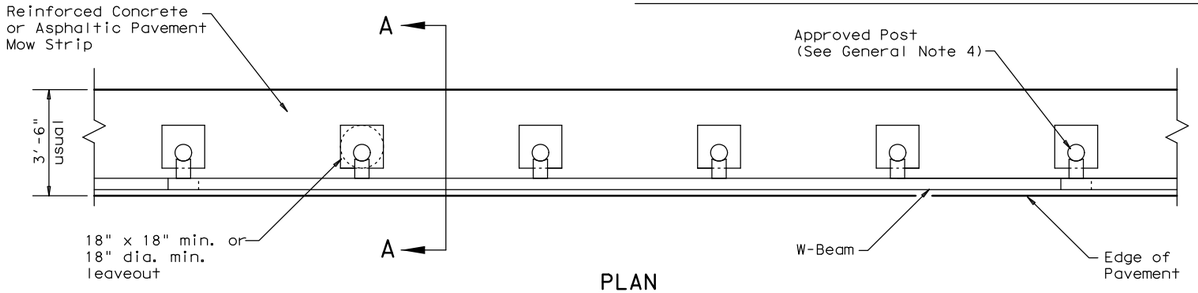
SPIG INDUSTRY, LLC
SINGLE GUARDRAIL TERMINAL
SGET - TL-3 - MASH
SGT(15)31-20

FILE: sgt153120.dgn	DN: TxDOT	CK: KM	DW: VP	CK: VP		
© TxDOT: APRIL 2020	CONT	SECT	JOB	HIGHWAY		
REVISIONS	0573	01	034	SH 304		
	DIST	COUNTY		SHEET NO.		
	AUS	BASTROP		106a		

DATE:
FILE:

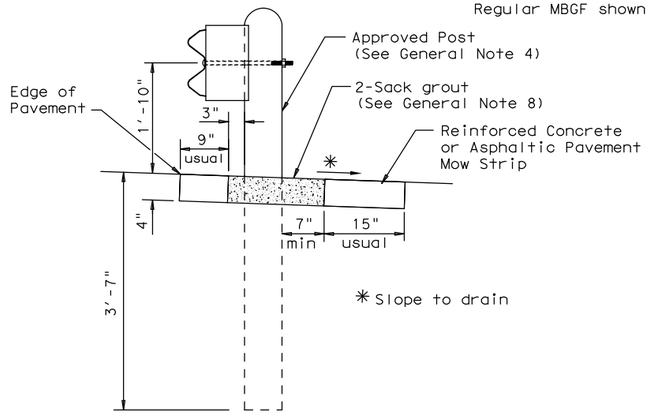


GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



PLAN

Regular MBGF shown with Mow Strip

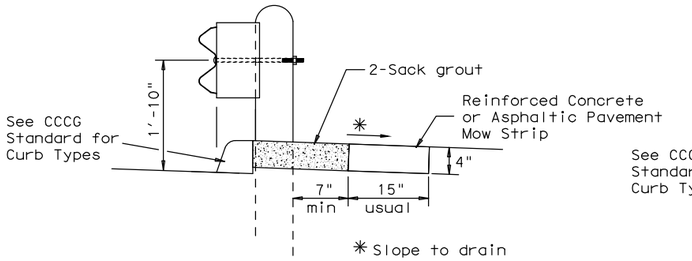


SECTION A-A

Typical

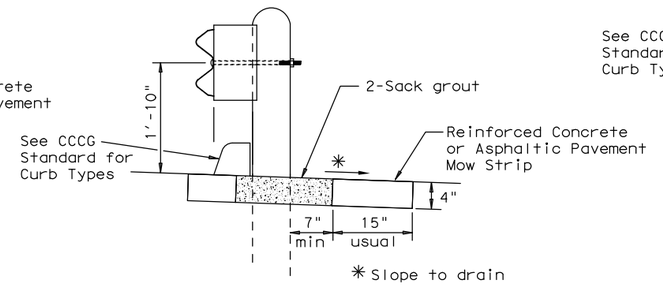
MOW STRIP DETAIL

Reinforced Concrete or Asphaltic Pavement Mow Strip with 18" x 18" or 18" dia. minimum leaveout.



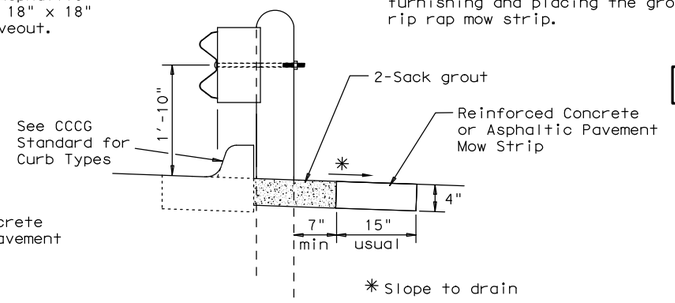
CURB OPTION (1)

This option will increase the post embedment through out 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 SGT standards for proper SGT installation).
2. Mow strips shall be asphaltic pavement or reinforced concrete (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item of work. Asphaltic pavement shall meet the requirements of the item, and be placed in accordance with the pertinent bid item as shown on the plans. 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 leaveout behind the post shall be a minimum of 7".
4. The type of approved post will be shown elsewhere in the plans. See the applicable standard sheets for additional details and information.
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. Depth of mow strip will be 4".
7. The limits of payment for asphaltic pavement or reinforced concrete will include leaveouts for posts.
8. The leave-outs shall be filled with no more than a 2-sack grout mixture (1 part cement, 5 parts water, and 14 parts sand by volume) with a 28-day compressive strength of approximately 120 psi or less. Provide grout of a consistency that will flow into and completly 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 rip rap mow strip.

ONLY FOR USE IN MAINTENANCE REPAIRS.

Texas Department of Transportation

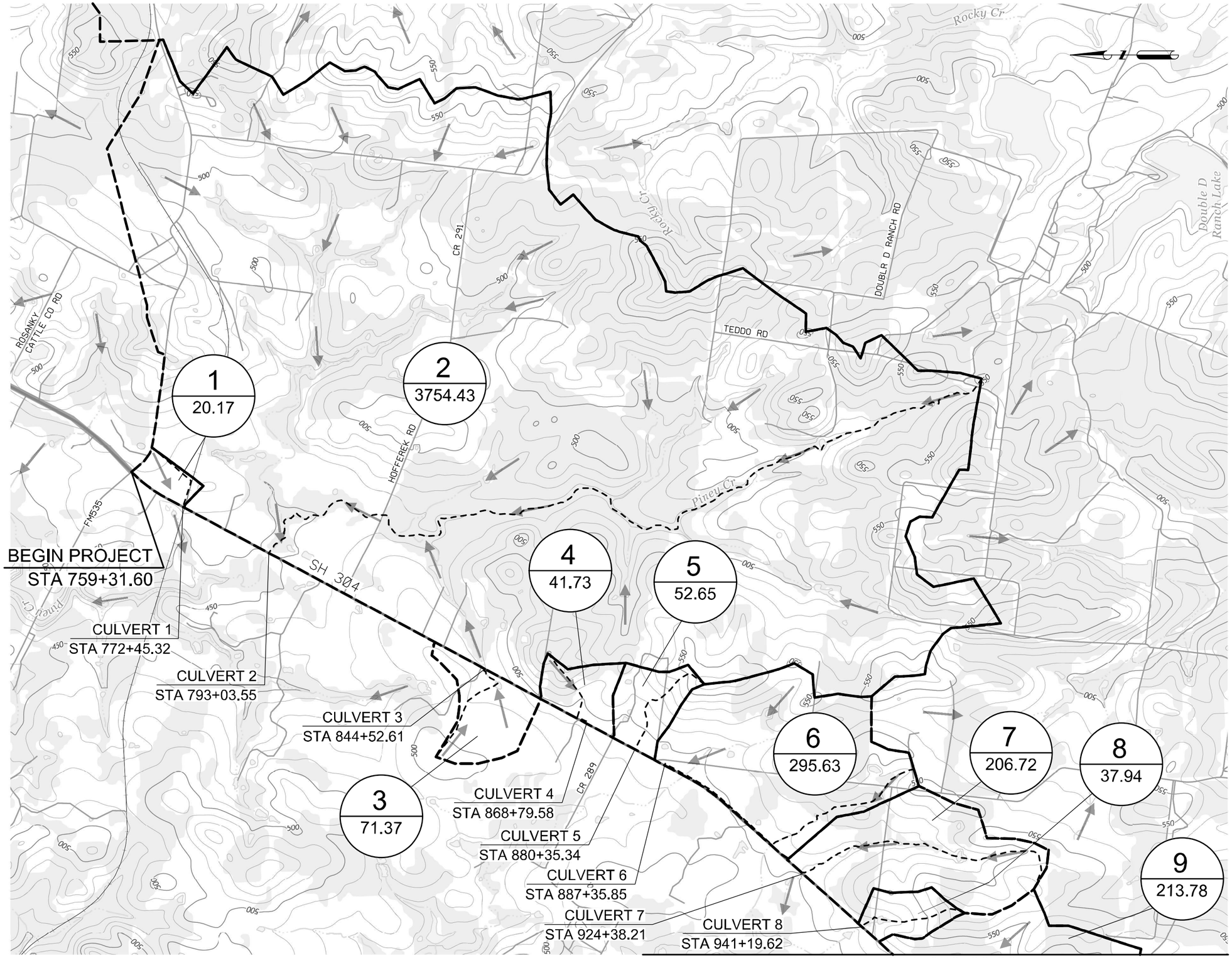
Design Division Standard

METAL BEAM GUARD FENCE

(MOW STRIP)

MBGF(MS)-19

FILE: mbgfms19.dgn	DN: TxDOT	CK: KM	DW: TXDOT	CK: CL
© TxDOT NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		107



LEGEND	
### / ###	DRAINAGE AREA ID / AREA (AC)
	DRAINAGE FLOW DIRECTION
	DRAINAGE DIVIDE
	LONGEST FLOW PATH

NOTES:

1. TOPOGRAPHIC CONTOUR FROM USGS QUADRANGLE MAPS:
   - BASTROP
   - BASTROP SW
   - BUDA
   - CREEDMOOR
   - DALE
   - DELHI
   - JEDDO
   - LAKE BASTROP
   - LOCKHART NORTH
   - LOCKHART SOUTH
   - LYTTON
   - MARTINDALE
   - McMAHAN
   - MONTOPOLIS
   - OAK HILL
   - RED ROCK
   - ROSANKY
   - UHLAND
   - UTLEY
   - WEBBERVILLE
2. NOTIFICATION OF THE LOCAL FLOODPLAIN ADMINISTRATOR WAS DONE ON MARCH 6, 2020.

0 1000 2000

SCALE: 1" = 2000'

STATE OF TEXAS
RICHARD KRAUS
57390
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Richard A. Kraus, PE, CFM
DN: cn=Richard A. Kraus, PE, CFM, o=P&D Professional Services, Inc., ou, email=rkraus@pdproservices.com, c=US
Date: 2021.05.31 20:40:09 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

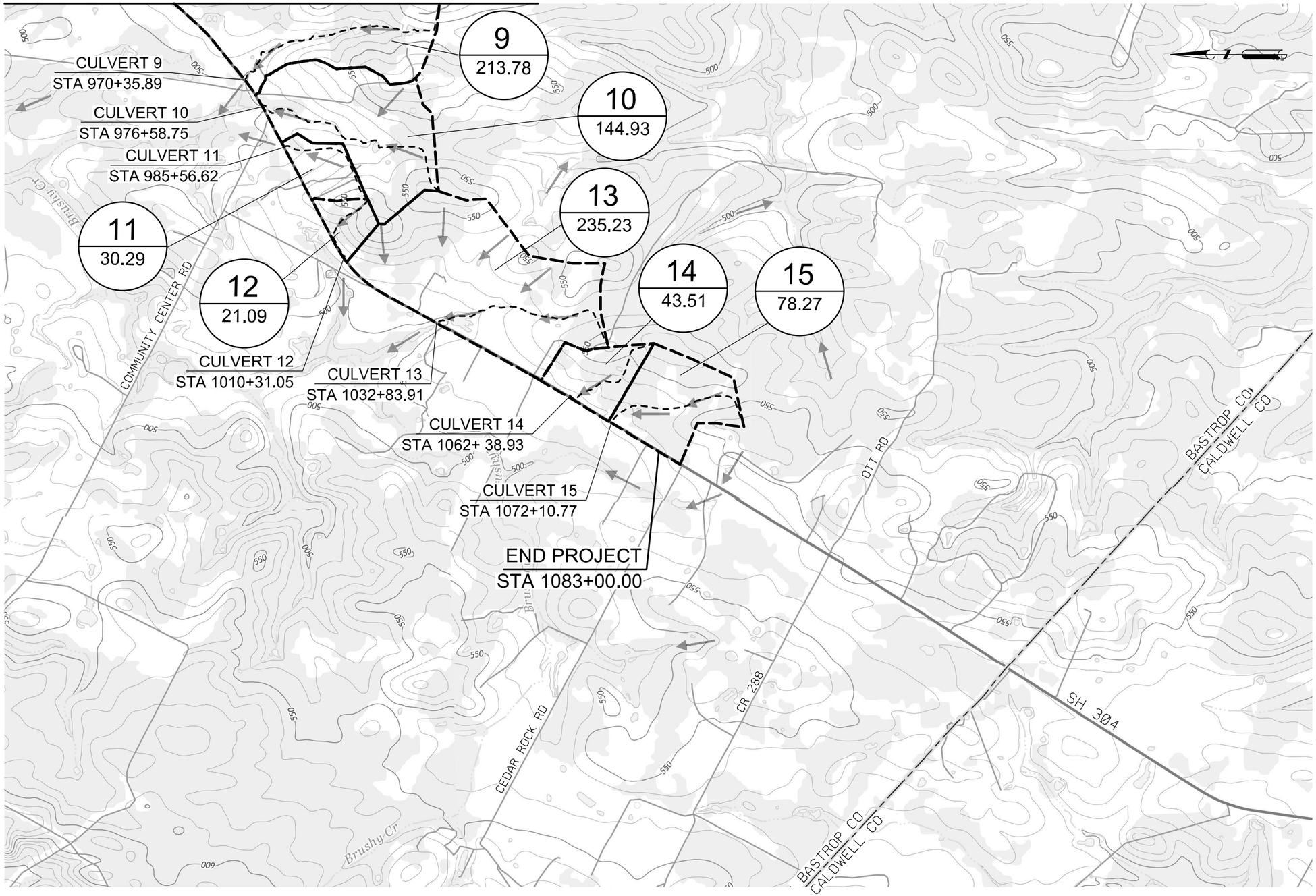
SH 304

DRAINAGE AREA MAP

1 OF 2

DS:	CK:	CONT	SECT	JOB	HIGHWAY
PNP	RAK	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
PNP	RAK	AUS	BASTROP		108

DATE: 5/31/2021 7:10:10 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034_Drainage Area Map 1 of 2.dgn



LEGEND

### / ###	DRAINAGE AREA ID / AREA (AC)
	DRAINAGE FLOW DIRECTION
	DRAINAGE DIVIDE
	LONGEST FLOW PATH

NOTES:

1. TOPOGRAPHIC CONTOUR FROM USGS QUADRANGLE MAPS:
   - BASTROP
   - BASTROP SW
   - BUDA
   - CREEDMOOR
   - DALE
   - DELHI
   - JEDDO
   - LAKE BASTROP
   - LOCKHART NORTH
   - LOCKHART SOUTH
   - LYTTON
   - MARTINDALE
   - McMAHAN
   - MONTOPOLIS
   - OAK HILL
   - RED ROCK
   - ROSANKY
   - UHLAND
   - UTLEY
   - WEBBERVILLE
2. NOTIFICATION OF THE LOCAL FLOODPLAIN ADMINISTRATOR WAS DONE ON MARCH 6, 2020.

0 1000 2000

SCALE: 1" = 2000'

STATE OF TEXAS
RICHARD KRAUS
57390
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Richard A. Kraus, PE, CFM
DN: cn=Richard A. Kraus, PE, CFM, o=P&D Professional Services, Inc., ou, email=rkraus@pdproservices.com, c=US
Date: 2021.05.31 20:40:50 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

SH 304

DRAINAGE AREA MAP

2 OF 2

DS:	CK:	CONT	SECT	JOB	HIGHWAY
PNP	RAK	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
PNP	RAK	AUS	BASTROP		109

DATE: 5/31/2021 8:30:11 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034_Drainage Area Map 2 of 2.dgn

RUNOFF COMPUTATIONS

DRAINAGE AREA ID	CUVLERT STATION	Culvert Description	METHOD USED	DRAINAGE AREA (ACRES)	C	CURVE NUMBER	Tc (MIN)	INTENSITY I (In/Hr)						PEAK FLOW Q (cfs)					
								2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
1	772+45.32	1-42" RCP	RATIONAL	20.17	0.28		58.48	2.04	2.54	2.97	3.56	3.99	4.48	11.55	14.37	16.79	20.08	22.54	25.29
2	793+03.35	3-10'x10' BCC	HEC-HMS	3,754.43		42	134.70	N/A	N/A	N/A	N/A	N/A	N/A	89.47	395.32	863.90	1820.29	2772.46	3984.12
3	844+52.61	42" RCP	RATIONAL	71.37	0.28		63.37	1.94	2.42	2.83	3.39	3.81	4.27	38.77	48.30	56.48	67.67	76.04	85.41
4	868+79.58	2-30" RCP	RATIONAL	41.73	0.28		25.91	3.34	4.13	4.78	5.67	6.33	7.04	38.98	48.20	55.88	66.25	73.93	82.25
5	880+35.34	7' x4' RCB	RATIONAL	52.65	0.28		33.21	2.90	3.59	4.17	4.95	5.53	6.16	42.75	52.92	61.45	72.99	81.52	90.88
6	887+35.85	2-36" RCP	HEC-HMS	295.63		50	58.20	N/A	N/A	N/A	N/A	N/A	N/A	40.63	115.29	209.47	372.24	516.43	684.36
7	924+38.21	8'X4' RCB	HEC-HMS	206.72		44.5	57.78	N/A	N/A	N/A	N/A	N/A	N/A	10.17	42.50	91.37	187.29	276.54	386.11
8	941+19.62	30" RCP	RATIONAL	37.94	0.28		61.76	1.97	2.46	2.87	3.44	3.86	4.34	20.96	26.11	30.52	36.55	41.05	46.09
9	970+35.88	2-6'X4' RCB	HEC-HMS	213.78		40.8	61.62	N/A	N/A	N/A	N/A	N/A	N/A	3.79	23.52	59.43	138.81	218.90	320.57
10	976+58.75	6' X4' RCB	HEC-HMS	144.93		64.2	65.96	N/A	N/A	N/A	N/A	N/A	N/A	77.85	140.67	203.81	298.93	375.28	458.65
9+10			HEC-HMS	358.71			65.96	N/A	N/A	N/A	N/A	N/A	N/A	81.64	164.19	263.24	437.73	594.17	779.22
11	985+56.62	36" RCP	RATIONAL	30.29	0.28		30.22	3.06	3.79	4.40	5.22	5.82	6.49	25.97	32.13	37.28	44.25	49.40	55.02
12	1010+31.05	5' X5' RCB	RATIONAL	21.09	0.28		29.72	3.09	3.82	4.44	5.26	5.88	6.55	18.25	22.58	26.20	31.09	34.71	38.65
13	1032+83.91	7'X5' RCB	HEC-HMS	235.23		49.9	52.05	N/A	N/A	N/A	N/A	N/A	N/A	33.92	97.65	178.19	317.89	438.83	582.19
14	1062+38.93	2-36" RCP	RATIONAL	43.51	0.28		38.60	2.65	3.29	3.82	4.55	5.08	5.67	32.32	40.04	46.55	55.38	61.92	69.12
15	1072+10.77	30" RCP	RATIONAL	78.27	0.28		57.88	2.06	2.56	2.99	3.58	4.02	4.51	45.11	56.13	65.55	78.42	88.02	98.74

TIME OF CONCENTRATIOIN - KERBY-KIRPICH METHOD

DRAINAGE AREA ID	CUVLERT STATION	Tc (HR)	Tc (MIN)	OVERLAND FLOW							CHANNEL FLOW					
				T_{ov} (MIN)	K_{OV}	L_{OV} (FT)	N	S	ELEV START	ELEV END	T_{CH} (MIN)	K_{CH}	L_{CH} (FT)	S	ELEV START	ELEV END
1	772+45.32	0.97	58.48	48.20	0.828	441.0	0.2	0.0002	469.9	469.8	10.28	0.0078	1192.3	0.0112	469.8	456.5
2	793+03.35	2.25	134.70	30.29	0.828	138.2	0.6	0.0014	550.2	550.0	104.41	0.0078	18266.0	0.0064	550.0	433.5
3	844+52.61	1.06	63.37	47.51	0.828	433.4	0.4	0.0009	500.4	500.0	15.85	0.0078	2097.1	0.0112	500.0	476.4
4	868+79.58	0.43	25.91	16.54	0.828	46.3	0.6	0.0022	550.1	550.0	9.37	0.0078	1807.4	0.0328	550.0	490.8
5	880+35.34	0.55	33.21	21.30	0.828	187.8	0.4	0.0053	561.0	560.0	11.91	0.0078	2354.9	0.0298	560.0	489.8
6	887+35.85	0.97	58.20	15.48	0.828	94.5	0.4	0.0053	540.5	540.0	42.72	0.0078	6319.5	0.0078	540.0	490.9
7	924+38.21	0.96	57.78	22.68	0.828	95.0	0.4	0.0011	570.1	570.0	35.10	0.0078	6004.6	0.0117	570.0	499.8
8	941+19.62	1.03	61.76	51.53	0.828	337.4	0.6	0.0009	570.3	570.0	10.23	0.0078	1939.0	0.0300	570.0	511.8
9	970+35.88	1.03	61.62	35.31	0.828	284.0	0.4	0.0014	560.4	560.0	26.31	0.0078	4550.3	0.0142	560.0	495.4
10	976+58.75	1.10	65.96	41.16	0.828	245.0	0.6	0.0012	560.3	560.0	24.79	0.0078	4313.8	0.0149	560.0	495.8
9+10		1.10	65.96	41.16	0.828	245.0	0.6	0.0012	560.3	560.0	24.79	0.0078	4313.8	0.0149	560.0	495.8
11	985+56.62	0.50	30.22	18.74	0.828	55.3	0.6	0.0018	560.1	560.0	11.48	0.0078	2157.0	0.0275	560.0	500.6
12	1010+31.05	0.50	29.72	22.27	0.828	70.7	0.6	0.0014	560.1	560.0	7.45	0.0078	1445.9	0.0380	560.0	505.1
13	1032+83.91	0.87	52.05	29.36	0.828	104.8	0.6	0.0010	560.1	560.0	22.70	0.0078	3873.9	0.0151	560.0	501.5
14	1062+38.93	0.64	38.60	26.54	0.828	196.2	0.6	0.0051	561.0	560.0	12.06	0.0078	2058.6	0.0221	560.0	514.6
15	1072+10.77	0.96	57.88	39.10	0.828	198.8	0.6	0.0010	560.2	560.0	18.78	0.0078	2945.6	0.0143	560.0	517.9

NOTES:

1. TIME OF CONCENTRATION CALCULATED USING KERBY-KIRPICH METHOD.
2. RATIONAL METHOD USED FOR DRAINAGE AREAS LESS THAN 200 AC.
3. RAINFALL INTENSITY "e,b,d" COEFFICIENTS CALCULATED FROM NOAA ATLAS 14, VOL 11 RAINFALL INTENSITY DATA CENTERED AT LAT. 29.8435 AND LONG. -97.3836.
4. RATIONAL C VALUE CALCULATED USING TXDOT HDM TABLE 4-11. "RUNOFF COEFFICIENTS FOR RURAL WATERSHEDS".
5. HEC-HMS USED FOR DRAINAGE AREAS GREATER THAN 200 AC.
6. SCS CURVE NUMBER COMPUTED FOR LAND USES. TYPICAL LAND USES INCLUDE PASTURE IN FAIR CONDITION, WOODS IN FAIR CONDITION, AND FARMSTEADS.
7. RAINFALL DEPTH-DURATION-FREQUENCY VALUES FROM ATLAS 14, VOL 11 CENTERED AT LAT. 29.8435 AND LONG. -97.3836.
8. DRAINAGE AREAS FOR CULVERTS 9 AND 10 COMBINED JUST DOWNSTREAM OF SH 304. PEAK FLOWS FROM EACH DRAINAGE AREA ADDED TOGETHER FOR DOWNSTREAM FLOW RATES.

STATE OF TEXAS
RICHARD KRAUS
57390
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Richard A. Kraus, PE, CFM
DN: cn=Richard A. Kraus, PE, CFM, o=P&D Professional Services, Inc., ou, email=kraus@pdproservices.com, c=US
Date: 2021.05.31 20:44:22 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

SH 304

HYDROLOGIC DATA SHEET

1 OF 2

DS:	CK:	CONT	SECT	JOB	HIGHWAY
PNP	RAK	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
PNP	RAK	AUS	BASTROP		110

DATE: 5/31/2021 7:24:40 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034_Hydrologic Data 1 of 2.dgn

DRAINAGE AREA	2	TOTAL AREA (AC)	3,754.43						
COMPOSITE CURVE NUMBER									
LAND COVER			% TOTAL	CURVE NUMBER / % DRAINAGE AREA				WATER	COMPOSITE
GROUP	DESCRIPTION	CONDITION	AREA	A	B	C	D		CN
Other Agricultural Lands	Pasture, grassland, or range-continuouse forage for grazing	Fair	55%	49	69	79	84	98	
				23.0%	64.0%	0.0%	12.0%	1.0%	36.6
Other Agricultural Lands	Woods	Fair	45%	36	60	73	79	98	
				69.0%	15.0%	0.0%	15.0%	1.0%	21.0
TOTAL COMPOSITE CN									57.6
PROJECT LOCATED IN SOUTHERN BASTROP COUNTY. TxDOT HDM FIG 4-22 SHOWS CLIMATIC ADJ OF -15								CLIMATIC A	-15.0
ADJUSTED COMPOSITE CN									42.6
INITIAL ABSTRACTION									2.7

DRAINAGE AREA	6	TOTAL AREA (AC)	295.63						
COMPOSITE CURVE NUMBER									
LAND COVER			% TOTAL	CURVE NUMBER / % DRAINAGE AREA				WATER	COMPOSITE
GROUP	DESCRIPTION	CONDITION	AREA	A	B	C	D		CN
Other Agricultural Lands	Pasture, grassland, or range-continuouse forage for grazing	Fair	90%	49	69	79	84	98	
				15.0%	74.0%	0.0%	10.0%	1.0%	61.0
Other Agricultural Lands	Woods	Fair	10%	36	60	73	79	98	
				85.0%	15.0%	0.0%	0.0%	0.0%	4.0
TOTAL COMPOSITE CN									65.0
PROJECT LOCATED IN SOUTHERN BASTROP COUNTY. TxDOT HDM FIG 4-22 SHOWS CLIMATIC ADJ OF -15								CLIMATIC A	-15.0
ADJUSTED COMPOSITE CN									50.0
INITIAL ABSTRACTION									2.0

DRAINAGE AREA	7	TOTAL AREA (AC)	206.72						
COMPOSITE CURVE NUMBER									
LAND COVER			% TOTAL	CURVE NUMBER / % DRAINAGE AREA				WATER	COMPOSITE
GROUP	DESCRIPTION	CONDITION	AREA	A	B	C	D		CN
Other Agricultural Lands	Pasture, grassland, or range-continuouse forage for grazing	Fair	68%	49	69	79	84	98	
				25.0%	71.0%	0.0%	3.0%	1.0%	44.0
Other Agricultural Lands	Woods	Fair	32%	36	60	73	79	98	
				48.0%	52.0%	0.0%	0.0%	0.0%	15.5
TOTAL COMPOSITE CN									59.5
PROJECT LOCATED IN SOUTHERN BASTROP COUNTY. TxDOT HDM FIG 4-22 SHOWS CLIMATIC ADJ OF -15								CLIMATIC A	-15.0
ADJUSTED COMPOSITE CN									44.5
INITIAL ABSTRACTION									2.5

DRAINAGE AREA	9	TOTAL AREA (AC)	213.78						
COMPOSITE CURVE NUMBER									
LAND COVER			% TOTAL	CURVE NUMBER / % DRAINAGE AREA				WATER	COMPOSITE
GROUP	DESCRIPTION	CONDITION	AREA	A	B	C	D		CN
Other Agricultural Lands	Pasture, grassland, or range-continuouse forage for grazing	Fair	10%	49	69	79	84	98	
				65.0%	32.0%	0.0%	0.0%	3.0%	5.7
Other Agricultural Lands	Woods	Fair	40%	36	60	73	79	98	
				71.0%	26.0%	0.0%	0.0%	3.0%	17.6
Other Agricultural Lands	Farmsteads - buildings, lanes, driveways, and surrounding lots	Good	50%	59	74	82	86	98	
				73.0%	17.0%	0.0%	5.0%	5.0%	32.4
TOTAL COMPOSITE CN									55.8
PROJECT LOCATED IN SOUTHERN BASTROP COUNTY. TxDOT HDM FIG 4-22 SHOWS CLIMATIC ADJ OF -15								CLIMATIC A	-15.0
ADJUSTED COMPOSITE CN									40.8
INITIAL ABSTRACTION									2.9

DRAINAGE AREA	10	TOTAL AREA (AC)	144.93						
COMPOSITE CURVE NUMBER									
LAND COVER			% TOTAL	CURVE NUMBER / % DRAINAGE AREA				WATER	COMPOSITE
GROUP	DESCRIPTION	CONDITION	AREA	A	B	C	D		CN
Other Agricultural Lands	Pasture, grassland, or range-continuouse forage for grazing	Fair	30%	49	69	79	84	98	
				0.0%	0.0%	0.0%	85.0%	15.0%	25.8
Other Agricultural Lands	Woods	Fair	20%	36	60	73	79	98	
				70.0%	0.0%	0.0%	30.0%	0.0%	9.8
Other Agricultural Lands	Farmsteads - buildings, lanes, driveways, and surrounding lots	Good	50%	59	74	82	86	98	
				0.0%	0.0%	0.0%	90.0%	10.0%	43.6
TOTAL COMPOSITE CN									79.2
PROJECT LOCATED IN SOUTHERN BASTROP COUNTY. TxDOT HDM FIG 4-22 SHOWS CLIMATIC ADJ OF -15								CLIMATIC A	-15.0
ADJUSTED COMPOSITE CN									64.2
INITIAL ABSTRACTION									1.1

DRAINAGE AREA	13	TOTAL AREA (AC)	235.23						
COMPOSITE CURVE NUMBER									
LAND COVER			% TOTAL	CURVE NUMBER / % DRAINAGE AREA				WATER	COMPOSITE
GROUP	DESCRIPTION	CONDITION	AREA	A	B	C	D		CN
Other Agricultural Lands	Pasture, grassland, or range-continuouse forage for grazing	Fair	58%	49	69	79	84	98	
				0.0%	0.0%	0.0%	96.0%	4.0%	49.0
Other Agricultural Lands	Woods	Fair	42%	36	60	73	79	98	
				96.0%	0.0%	0.0%	4.0%	0.0%	15.8
TOTAL COMPOSITE CN									64.9
PROJECT LOCATED IN SOUTHERN BASTROP COUNTY. TxDOT HDM FIG 4-22 SHOWS CLIMATIC ADJ OF -15								CLIMATIC A	-15.0
ADJUSTED COMPOSITE CN									49.9
INITIAL ABSTRACTION									2.0

RAINFALL DEPTHS (inches) (from NOAA Atlas 14, Vol 11 - Lat: 29.8435, Long: -97.3836)						
DURATION	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
5 min	0.542	0.674	0.783	0.934	1.05	1.16
10 min	0.861	1.07	1.25	1.49	1.68	1.86
15 min	1.09	1.35	1.57	1.86	2.09	2.32
30 min	1.54	1.91	2.21	2.62	2.92	3.23
1 hr	2.03	2.52	2.93	3.49	3.91	4.35
2 hr	2.49	3.16	3.74	4.55	5.18	5.87
3 hr	2.77	3.55	4.24	5.24	6.04	6.92
6 hr	3.24	4.22	5.12	6.46	7.56	8.81
12 hr	3.71	4.88	5.99	7.67	9.1	10.8
1 day	4.21	5.57	6.9	8.95	10.7	12.8

RAINFALL INTENSITY COEFFICIENTS						
NOAA Atlas 14 Vol 11 - Lat: 29.8435, Long: -97.3836						
COEFFICIENT	2-YR	5-YR	10-YR	25-YR	50-YR	100-yr
e	0.761	0.734	0.709	0.679	0.655	0.635
b (in)	51.073	56.032	58.351	60.861	61.143	62.772
d (min)	10.15	9.05	8.15	7.05	6.00	5.45

RATIONAL C VALUE FOR RURAL WATERSHEDS			
RELIEF (Cr)	LOW - RELEATIVELY FLAT LAND (SLOPE 0-5%)	0.08-0.14	0.1
SOIL INFILTRATION (Ci)	NORMAL - WELL DRAINED SANDY LOAMS	0.06 - 0.08	0.06
VEGETAL COVER (Cv)	LOW - GOOD TO EXCELLENT GRASSLAND OR WOODLAND (COVERAGE 90%)	0.04 - 0.06	0.05
SURFACE STORAGE (Cs)	NORMAL - CONSIDERABLE SURFACE DEPRESSION	0.06 - 0.08	0.07
COMPOSITE C			0.28

NOTES:

1. TIME OF CONCENTRATION CALCULATED USING KERBY-KIRPICH METHOD.
2. RATIONAL METHOD USED FOR DRAINAGE AREAS LESS THAN 200 AC.
3. RAINFALL INTENSITY "e,b,d" COEFFICIENTS CALCULATED FROM NOAA ATLAS 14, VOL 11 RAINFALL INTENSITY DATA CENTERED AT LAT. 29.8435 AND LONG. -97.3836.
4. RATIONAL C VALUE CALCULATED USING TXDOT HDM TABLE 4-11. "RUNOFF COEFFICIENTS FOR RURAL WATERSHEDS".
5. HEC-HMS USED FOR DRAINAGE AREAS GREATER THAN 200 AC.
6. SCS CURVE NUMBER COMPUTED FOR LAND USES. TYPICAL LAND USES INCLUDE PASTURE IN FAIR CONDITION, WOODS IN FAIR CONDITION, AND FARMSTEADS.
7. RAINFALL DEPTH-DURATION-FREQUENCY VALUES FROM ATLAS 14, VOL 11 CENTERED AT LAT. 29.8435 AND LONG. -97.3836.
8. DRAINAGE AREAS FOR CULVERTS 9 AND 10 COMBINED JUST DOWNSTREAM OF SH 304. PEAK FLOWS FROM EACH DRAINAGE AREA ADDED TOGETHER FOR DOWNSTREAM FLOW RATES.

STATE OF TEXAS
RICHARD KRAUS
57390
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Richard A. Kraus, PE, CFM
DN: cn=Richard A. Kraus, PE, CFM, o=P&D Professional Services, Inc., ou, email=rkraus@pdpsrservices.com, c=US
Date: 2021.05.31 20:44:57 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

SH 304

HYDROLOGIC DATA SHEET

2 OF 2

DS:	CK:	CONT	SECT	JOB	HIGHWAY
PNP	RAK				SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
PNP	RAK	AUS	BASTROP		111

DATE: 5/31/2021 7:33:49 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034_Hydrologic Data 2 of 2.dgn

HY-8 Analysis Report - Existing

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straight Culvert

Inlet Elevation (invert): 456.46 ft, Outlet Elevation (invert): 456.13 ft

Culvert Length: 47.42 ft, Culvert Slope: 0.0070

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
458.08	2 year	11.55	11.55	0	1
458.29	5 year	14.37	14.37	0	1
458.47	10 year	16.79	16.79	0	1
458.72	25 year	20.08	20.08	0	1
458.9	50 year	22.54	22.54	0	1
459.1	100 year	25.29	25.29	0	1
462.18	Overtopping	80.81	80.81	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)
2 year	11.55	11.55	458.08	1.479	1.616	1-S1t	0.841	1.03	1.63	1.63	2.63	0
5 year	14.37	14.37	458.29	1.662	1.834	1-S1t	0.939	1.153	1.84	1.84	2.804	0
10 year	16.79	16.79	458.47	1.81	2.015	1-S1t	1.017	1.25	2.01	2.01	2.937	0
25 year	20.08	20.08	458.72	2.003	2.258	1-S1t	1.116	1.372	2.24	2.24	3.088	0
50 year	22.54	22.54	458.9	2.138	2.439	1-S1t	1.186	1.457	2.41	2.41	3.191	0
100 year	25.29	25.29	459.1	2.28	2.641	1-S1t	1.261	1.547	2.6	2.6	3.3	0

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 456.46 ft
Outlet Station: 47.41 ft
Outlet Elevation: 456.13 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Enter Rating Curve
Channel Invert Elevation: 456.13 ft
Tailwater set equal to Headwater elevation from 36" CMP located immediately downstream

Culvert Data Summary

Barrel Shape: Circular
Barrel Diameter: 3.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)
11.55	457.76	457.76	0
14.37	457.97	457.97	0
16.79	458.14	458.14	0
20.08	458.37	458.37	0
22.54	458.54	458.54	0
25.29	458.73	458.73	0

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	77000.00	462.32
1	77100.00	462.22
2	77200.00	462.18
3	77300.00	462.30

Roadway Surface: Paved
Roadway Top Width: 26.00 ft

HY-8 Analysis Report - Proposed

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straight Culvert

Inlet Elevation (invert): 456.50 ft, Outlet Elevation (invert): 456.07 ft

Culvert Length: 61 ft, Culvert Slope: 0.0070

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
458.12	2 year	11.55	11.55	0	1
458.32	5 year	14.37	14.37	0	1
458.49	10 year	16.79	16.79	0	1
458.73	25 year	20.08	20.08	0	1
458.91	50 year	22.54	22.54	0	1
459.11 *	100 year	25.29	25.29	0	1
462.39	Overtopping	82.68	82.68	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)
2 year	11.55	11.55	458.12	1.479	1.617	1-S1t	0.838	1.03	1.69	1.69	2.511	0
5 year	14.37	14.37	458.32	1.662	1.819	1-S1t	0.936	1.153	1.9	1.9	2.694	0
** 10 year	16.79	16.79	458.49	1.811	1.994	1-S1t	1.014	1.25	2.07	2.07	2.834	0
25 year	20.08	20.08	458.73	2.004	2.233	1-S1t	1.112	1.372	2.3	2.3	2.996	0
50 year	22.54	22.54	458.91	2.138	2.412	1-S1t	1.182	1.457	2.47	2.47	3.106	0
** 100 year	25.29	25.29	459.11	2.28	2.613	1-S1t	1.257	1.547	2.66	2.66	3.224	0

** THE INCREASE IN HEADWATER ELEVATION DOES NOT CREATE A DRAINAGE PROBLEM WITIN THE TxDOT AND RAILROAD ROW OR AFFECT THE SURROUNDING PRIVATE PROPERTIES.

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 456.50 ft
Outlet Station: 61.0 ft
Outlet Elevation: 456.07 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Enter Rating Curve
Channel Invert Elevation: 456.13 ft
Tailwater set equal to Headwater elevation from 36" CMP located immediately downstream

Culvert Data Summary

Barrel Shape: Circular
Barrel Diameter: 3.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)
11.55	457.76	457.76	0
14.37	457.97	457.97	0
16.79	458.14	458.14	0
20.08	458.37	458.37	0
22.54	458.54	458.54	0
25.29	458.73	458.73	0

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	77000.00	462.53
1	77100.00	462.43
2	77200.00	462.39
3	77300.00	462.51

Roadway Surface: Paved
Roadway Top Width: 44.00 ft

STATE OF TEXAS
PAULA PRICE
90265
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Paula N. Price, P.E, CFM
DN: cn=Paula N. Price, P.E, CFM, o=P&D Professional Services, Inc., ou, email=pprice@pdproservices.com, c=US
Date: 2021.10.18 11:05:40 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

SH 304

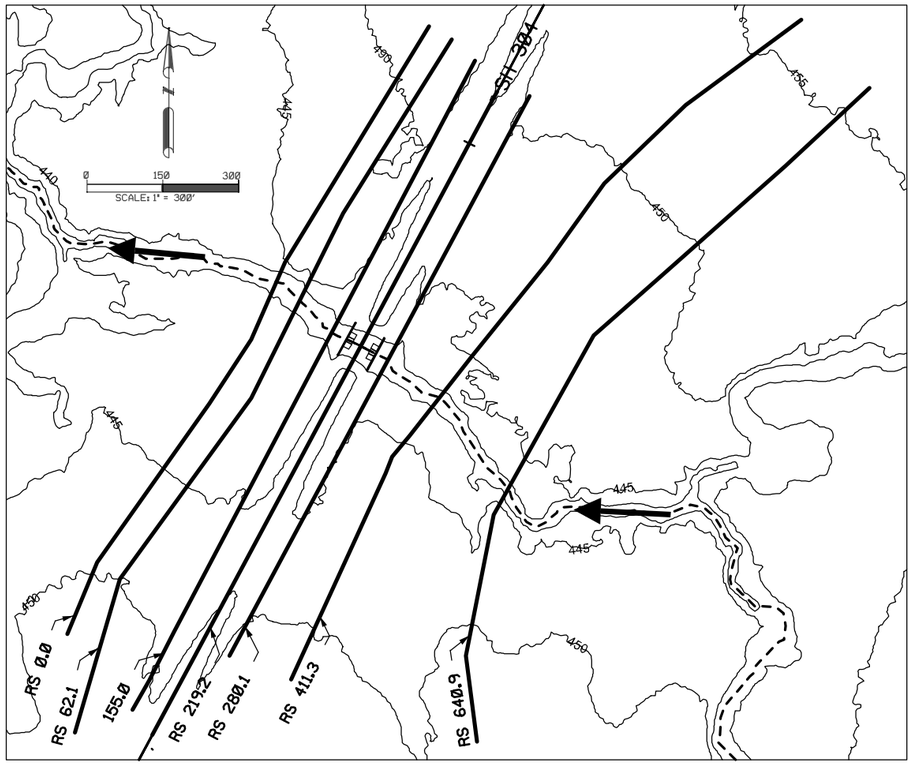
HYDRAULIC DATA

CULVERT No. 1

STA 772+45.32

DS:	CK:	CONT	SECT	JOB	HIGHWAY
PNP	RAK	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
PNP	RAK	AUS	BASTROP		112

DATE: 10/18/2021 11:04:10 AM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034 HYD_1_3_5_11_12_13.dgn



Plan: Prop SH 304 Culvert 2 RS: 219.2 Culv Group: Culvert #1 Profile: 25-YR			
Q Culv Group (cfs)	1820.29	Culv Full Len (ft)	68
# Barrels	3	Culv Vel US (ft/s)	6.07
Q Barrel (cfs)	606.76	Culv Vel DS (ft/s)	6.07
E.G. US. (ft)	445.03	Culv Inv El Up (ft)	433.55
W.S. US. (ft)	444.91	Culv Inv El Dn (ft)	433.28
E.G. DS (ft)	444.36	Culv Frctn Ls (ft)	0.06
W.S. DS (ft)	444.12	Culv Exit Loss (ft)	0.33
Delta EG (ft)	0.67	Culv Entr Loss (ft)	0.29
Delta WS (ft)	0.79	Q Weir (cfs)	
E.G. IC (ft)	441.5	Weir Sta Lft (ft)	
E.G. OC (ft)	445.03	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	443.55	Weir Max Depth (ft)	
Culv WS Outlet (ft)	443.28	Weir Avg Depth (ft)	
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	4.85	Min El Weir Flow (ft)	446.36

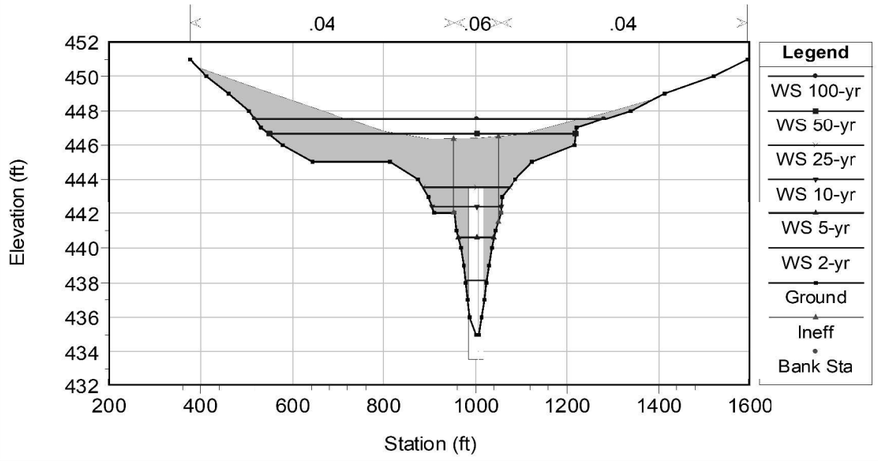
Plan: Prop SH 304 Culvert 2 RS: 219.2 Culv Group: Culvert #1 Profile: 100-YR			
Q Culv Group (cfs)	2896.14	Culv Full Len (ft)	68
# Barrels	3	Culv Vel US (ft/s)	9.65
Q Barrel (cfs)	965.38	Culv Vel DS (ft/s)	9.65
E.G. US. (ft)	447.56	Culv Inv El Up (ft)	433.55
W.S. US. (ft)	447.52	Culv Inv El Dn (ft)	433.28
E.G. DS (ft)	445.41	Culv Frctn Ls (ft)	0.14
W.S. DS (ft)	445.25	Culv Exit Loss (ft)	1.28
Delta EG (ft)	2.15	Culv Entr Loss (ft)	0.72
Delta WS (ft)	2.27	Q Weir (cfs)	1087.98
E.G. IC (ft)	446.97	Weir Sta Lft (ft)	715.23
E.G. OC (ft)	447.56	Weir Sta Rgt (ft)	1237.91
Culvert Control	Outlet	Weir Submerg	0
Culv WS Inlet (ft)	443.55	Weir Max Depth (ft)	1.22
Culv WS Outlet (ft)	443.28	Weir Avg Depth (ft)	0.82
Culv Nml Depth (ft)		Weir Flow Area (sq ft)	430.2
Culv Crt Depth (ft)	6.62	Min El Weir Flow (ft)	446.36

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Culvert 2	640.9	25-YR	Exist	1820.29	438	445.73	443.65	446.08	0.005387	4.99	438.05	297.07	0.41
Culvert 2	640.9	25-YR	Prop	1820.29	438	445.69	443.65	446.06	0.005667	5.08	425.51	285.73	0.42
Culvert 2	640.9	100-YR	Exist	3984.12	438	447.73	446.36	447.88	0.001985	3.85	1393.11	613.22	0.26
Culvert 2	640.9	100-YR	Prop	3984.12	438	447.81	446.36	447.95	0.001819	3.71	1440.61	622.14	0.25
Culvert 2	411.3	25-YR	Exist	1820.29	435.5	445.14	442.10	445.31	0.002041	3.54	591.03	253.79	0.26
Culvert 2	411.3	25-YR	Prop	1820.29	435.5	445.05	442.10	445.23	0.002199	3.63	569.85	232.19	0.27
Culvert 2	411.3	100-YR	Exist	3984.12	435.5	447.45	444.22	447.55	0.001012	3.12	1708.21	639.95	0.19
Culvert 2	411.3	100-YR	Prop	3984.12	435.5	447.55	444.23	447.65	0.000921	3.00	1774.51	650.61	0.18
Culvert 2	280.1	25-YR	Exist	1820.29	435	445.03	439.83	445.13	0.000852	2.55	719.49	484.5	0.17
Culvert 2	280.1	25-YR	Prop	1820.29	435	444.91	439.82	445.03	0.001005	2.79	652.84	301.22	0.19
Culvert 2	280.1	100-YR	Exist	3984.12	435	447.41	441.97	447.46	0.000379	2.09	2489.69	748.54	0.12
Culvert 2	280.1	100-YR	Prop	3984.12	435	447.52	441.91	447.56	0.00035	2.02	2569.31	763.84	0.12
Culvert 2	219.2			Culvert									
Culvert 2	155	25-YR	Exist	1820.29	433	444.12	440.33	444.33	0.002223	3.79	508.76	436.43	0.27
Culvert 2	155	25-YR	Prop	1820.29	433	444.12	440.33	444.36	0.002499	4.02	465.26	435.37	0.29
Culvert 2	155	100-YR	Exist	3984.12	433	445.25	443.19	445.41	0.001986	4.01	1360.88	596.74	0.26
Culvert 2	155	100-YR	Prop	3984.12	433	445.25	442.95	445.41	0.001986	4.01	1360.88	596.74	0.26
Culvert 2	62.1	25-YR	Exist	1820.29	433.5	443.93	439.44	444.14	0.001935	3.74	550.27	327.38	0.26
Culvert 2	62.1	25-YR	Prop	1820.29	433.5	443.93	439.44	444.13	0.001916	3.72	549.62	327.75	0.26
Culvert 2	62.1	100-YR	Exist	3984.12	433.5	444.72	442.11	445.1	0.003805	5.65	959.14	467.56	0.37
Culvert 2	62.1	100-YR	Prop	3984.12	433.5	444.72	442.11	445.1	0.003804	5.65	959.16	467.56	0.37
Culvert 2	0	25-YR	Exist	1820.29	435.3	443.71	441.17	443.96	0.004007	4.25	491.81	426.84	0.35
Culvert 2	0	25-YR	Prop	1820.29	435.3	443.71	441.17	443.96	0.004007	4.25	491.81	426.84	0.35
Culvert 2	0	100-YR	Exist	3984.12	435.3	444.56	443.8	444.82	0.004001	4.77	1034.33	463.57	0.36
Culvert 2	0	100-YR	Prop	3984.12	435.3	444.56	443.8	444.82	0.004001	4.77	1034.33	463.57	0.36

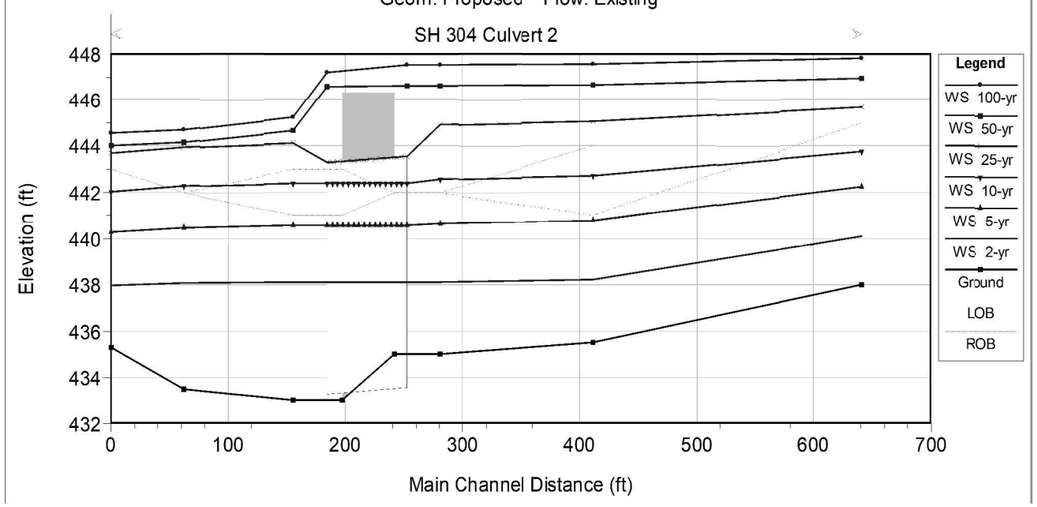
NOTES

1. HEC-RAS 5.0.5 USED FOR HYDRAULIC ANALYSIS.
2. N-VALUES: CHANNEL = 0.06, OVERBANKS = 0.04
3. CROSS SECTION GEOMETRY SURVEYED ELEVATIONS FOR TOP OF ROAD AND CHANNEL.
4. DOWNSTREAM BOUNDARY CONDITION BASED ON NORMAL DEPTH USING AVERAGE CHANNEL SLOPE OF 0.0040 FT/FT.
5. PEAK FLOW COMPUTED USING HEC-HMS VERSION 4.3. REFER TO HYDROLOGIC DATA SHEET FOR PEAK FLOW COMPUTATIONS.
6. CULVERT 2 HAS FIS DELINEATED ZONE A FLOODPLAIN. NO DETAILED ANALYSIS AVAILABLE.
7. PROPOSED PROJECT CONSISTS OF LENGTHENING 3 - 10' x 10' RCB BY 30.0 FT WITH PARALLEL HEADWALLS.
8. NO STRUCTURES LOCATED IN THE UPSTREAM VICINITY OF THE CULVERT.
9. COORDINATION WITH LOCAL FLOODPLAIN ADMINISTRATOR WAS DONE ON MARCH 6, 2020.

SH 304 Phase 3 Culvert 2 Plan: Proposed 1/15/2020 12:29:33 PM
Geom: Proposed Flow: Existing
River = SH 304 Reach = Culvert 2 RS = 219.2 Culv



SH 304 Phase 3 Culvert 2 Plan: Proposed 1/15/2020 12:29:33 PM
Geom: Proposed Flow: Existing



HYDROLOGIC SUMMARY

DRAINAGE AREA ID	CUVLERT STATION	DRAINAGE AREA (ACRES)	PEAK FLOW - Q (cfs)					
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
2	793+03.55	3,754.43	89.47	395.32	863.90	1820.29	2772.46	3984.12

STATE OF TEXAS
RICHARD KRAUS
57390
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Richard A. Kraus, PE, CFM
DN: cn=Richard A. Kraus, PE, CFM, o=P&D Professional Services, Inc., ou, email=rkraus@pdproservices.com, c=US
Date: 2021.05.31 20:41:50 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

SH 304
HYDRAUIC DATA
CULVERT No. 2

STA 793+03.55

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		113

DATE: 5/31/2021 7:39:05 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034_HYD_2.dgn

HY-8 Analysis Report - Existing

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straight Culvert

Inlet Elevation (invert): 476.42 ft, Outlet Elevation (invert): 475.73 ft

Culvert Length: 56.00 ft, Culvert Slope: 0.0123

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
479.36	2 year	38.77	38.77	0	1
479.84	5 year	48.3	48.3	0	1
480.31	10 year	56.48	56.48	0	1
481.07	25 year	67.67	67.67	0	1
481.74	50 year	76.04	76.04	0	1
482.58	100 year	85.41	85.41	0	1
482.89	Overtopping	88.65	88.65	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)
2 year	38.77	38.77	479.36	2.939	1.744	1-S2n	1.36	1.935	1.495	0.742	9.882	2.33
5 year	48.3	48.3	479.84	3.421	2.255	1-S2n	1.536	2.17	1.702	0.833	10.407	2.484
10 year	56.48	56.48	480.31	3.892	2.722	5-S2n	1.679	2.353	1.866	0.904	10.825	2.599
25 year	67.67	67.67	481.07	4.654	3.409	5-S2n	1.869	2.578	2.08	0.992	11.36	2.736
50 year	76.04	76.04	481.74	5.319	4.344	5-S2n	2.009	2.728	2.234	1.053	11.732	2.828
100 year	85.41	85.41	482.58	6.158	4.921	5-S2n	2.167	2.878	2.401	1.117	12.14	2.921

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 476.42 ft
Outlet Station: 56.00 ft
Outlet Elevation: 475.73 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 15.00 ft
Side Slope (H:V): 10.00 (_:1)
Channel Slope: 0.0086
Channel Manning's n: 0.0400
Channel Invert Elevation: 475.73 ft

Culvert Data Summary

Barrel Shape: Circular
Barrel Diameter: 3.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
38.77	476.47	0.74	2.33	0.4	0.55
48.3	476.56	0.83	2.48	0.45	0.56
56.48	476.63	0.9	2.6	0.49	0.57
67.67	476.72	0.99	2.74	0.53	0.57
76.04	476.78	1.05	2.83	0.57	0.58
85.41	476.85	1.12	2.92	0.6	0.58

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	84000.00	484.09
1	84100.00	483.58
2	84200.00	483.16
3	84300.00	482.93
4	84400.00	482.89
5	84500.00	483.15
6	84600.00	483.81

Roadway Surface: Paved
Roadway Top Width: 26.00 ft

HY-8 Analysis Report - Proposed

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straight Culvert

Inlet Elevation (invert): 476.49 ft, Outlet Elevation (invert): 475.67 ft

Culvert Length: 67 ft, Culvert Slope: 0.0122

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
479.43	2 year	38.77	38.77	0	1
479.91	5 year	48.3	48.3	0	1
480.38	10 year	56.48	56.48	0	1
481.14	25 year	67.67	67.67	0	1
481.81	50 year	76.04	76.04	0	1
482.65	100 year	85.41	85.41	0	1
483.1	Overtopping	90.08	90.08	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)
2 year	38.77	38.77	479.43	2.939	1.628	1-S2n	1.363	1.935	1.477	0.742	10.043	2.33
5 year	48.3	48.3	479.91	3.421	2.146	1-S2n	1.539	2.17	1.679	0.833	10.583	2.484
** 10 year	56.48	56.48	480.38	3.892	2.622	5-S2n	1.682	2.353	1.844	0.904	10.991	2.599
25 year	67.67	67.67	481.14	4.653	3.321	5-S2n	1.873	2.578	2.058	0.992	11.505	2.736
50 year	76.04	76.04	481.81	5.319	4.267	5-S2n	2.014	2.728	2.211	1.053	11.875	2.828
**100 year	85.41	85.41	482.65	6.158	4.858	5-S2n	2.172	2.878	2.376	1.117	12.286	2.921

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 476.49 ft
Outlet Station: 67.0 ft
Outlet Elevation: 475.67 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 15.00 ft
Side Slope (H:V): 10.00 (_:1)
Channel Slope: 0.0086
Channel Manning's n: 0.0400
Channel Invert Elevation: 475.67 ft

Culvert Data Summary

Barrel Shape: Circular
Barrel Diameter: 3.50 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
38.77	476.41	0.74	2.33	0.4	0.55
48.3	476.5	0.83	2.48	0.45	0.56
56.48	476.57	0.9	2.6	0.49	0.57
67.67	476.66	0.99	2.74	0.53	0.57
76.04	476.72	1.05	2.83	0.57	0.58
85.41	476.79	1.12	2.92	0.6	0.58

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Rcadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	84000.00	484.30
1	84100.00	483.79
2	84200.00	483.37
3	84300.00	483.14
4	84400.00	483.10
5	84500.00	483.36
6	84600.00	484.02

Roadway Surface: Paved
Roadway Top Width: 44.00 ft

** THE INCREASE IN HEADWATER ELEVATION DOES NOT AFFECT THE SURROUNDING PRIVATE PROPERTIES.

*** STREAM BED AND BANK PROTECTION SHOULD BE PROVIDED WHEN OUTLET VELOCITIES ARE GREATER THAN 8 FT/S.

STATE OF TEXAS
PAULA PRICE
90265
LICENSED
PROFESSIONAL ENGINEER

Paula N. Price

Digitally signed by Paula N. Price, P.E, CFM
DN: cn=Paula N. Price, P.E, CFM, o=P&D Professional Services, Inc., ou, email=pprice@pdproservices.com, c=US
Date: 2021.05.31 20:36:30 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST. SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

SH 304

HYDRAULIC DATA

CULVERT No. 3

STA 844+52.36

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		114

DS: PNP CK: RAK
DW: PNP CK: RAK

DATE: 5/31/2021 7:51:58 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034 HYD_1_3_5_11_12_13.dgn

HY-8 Analysis Report - Existing

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straight Culvert

Inlet Elevation (invert): 489.82 ft, Outlet Elevation (invert): 489.40 ft

Culvert Length: 37.42 ft, Culvert Slope: 0.0112

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
491.42	2 year	42.75	42.75	0.00	1
491.66	5 year	52.92	52.92	0.00	1
491.86	10 year	61.45	61.45	0.00	1
492.11	25 year	72.99	72.99	0.00	1
492.29	50 year	81.52	81.52	0.00	1
492.48	100 year	90.88	90.88	0.00	1
495.71	Overtopping	255.88	255.88	0.00	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)
2 year	42.75	42.75	491.42	1.597	0.685	1-S2n	0.677	1.050	0.760	0.713	8.039	2.209
5 year	52.92	52.92	491.66	1.841	0.875	1-S2n	0.777	1.211	0.887	0.801	8.520	2.359
10 year	61.45	61.45	491.86	2.036	1.031	1-S2n	0.856	1.338	0.990	0.868	8.868	2.467
25 year	72.99	72.99	492.11	2.293	1.240	1-S2n	0.958	1.500	1.123	0.952	9.285	2.597
50 year	81.52	81.52	492.29	2.472	1.394	1-S2n	1.031	1.615	1.218	1.010	9.560	2.683
100 year	90.88	90.88	492.48	2.661	1.564	1-S2n	1.108	1.736	1.321	1.069	9.827	2.770

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 489.82 ft
Outlet Station: 37.42 ft
Outlet Elevation: 489.40 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 20.00 ft
Side Slope (H:V): 10.00 (_:1)
Channel Slope: 0.0076
Channel Manning's n: 0.0400
Channel Invert Elevation: 489.40 ft

Culvert Data Summary

Barrel Shape: Concrete Box
Barrel Span: 7.00 ft
Barrel Rise: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (30-75° flare) Wingwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
42.75	490.11	0.71	2.21	0.34	0.52
52.92	490.20	0.80	2.36	0.38	0.53
61.45	490.27	0.87	2.47	0.41	0.53
72.99	490.35	0.95	2.60	0.45	0.54
81.52	490.41	1.01	2.68	0.48	0.54
90.88	490.47	1.07	2.77	0.51	0.55

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	87900.00	495.83
1	88000.00	495.76
2	88100.00	495.71

Roadway Surface: Paved
Roadway Top Width: 24.00 ft

HY-8 Analysis Report - Proposed

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straight Culvert

Inlet Elevation (invert): 489.97 ft, Outlet Elevation (invert): 489.23 ft

Culvert Length: 66.00 ft, Culvert Slope: 0.0112

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
491.57	2 year	42.75	42.75	0.00	1
491.81	5 year	52.92	52.92	0.00	1
492.01	10 year	61.45	61.45	0.00	1
492.26	25 year	72.99	72.99	0.00	1
492.44	50 year	81.52	81.52	0.00	1
492.63	100 year	90.88	90.88	0.00	1
495.92	Overtopping	258.36	258.36	0.00	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)
2 year	42.75	42.75	491.57	1.597	0.368	1-S2n	0.677	1.05	0.721	0.713	8.473	2.209
5 year	52.92	52.92	491.81	1.841	0.56	1-S2n	0.777	1.211	0.84	0.801	9.002	2.359
** 10 year	61.45	61.45	492.01	2.036	0.717	1-S2n	0.856	1.338	0.936	0.868	9.382	2.467
25 year	72.99	72.99	492.26	2.293	0.929	1-S2n	0.958	1.5	1.062	0.952	9.819	2.597
50 year	81.52	81.52	492.44	2.472	1.086	1-S2n	1.031	1.615	1.152	1.01	10.108	2.683
**100 year	90.88	90.88	492.63	2.661	1.258	1-S2n	1.108	1.736	1.247	1.069	10.414	2.77

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 489.97 ft
Outlet Station: 66.00 ft
Outlet Elevation: 489.23 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 20.00 ft
Side Slope (H:V): 10.00 (_:1)
Channel Slope: 0.0076
Channel Manning's n: 0.0400
Channel Invert Elevation: 489.23 ft

Culvert Data Summary

Barrel Shape: Concrete Box
Barrel Span: 7.00 ft
Barrel Rise: 4.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (30-75° flare) Wingwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
42.75	489.94	0.71	2.21	0.34	0.52
52.92	490.03	0.80	2.36	0.38	0.53
61.45	490.10	0.87	2.47	0.41	0.53
72.99	490.18	0.95	2.60	0.45	0.54
81.52	490.24	1.01	2.68	0.48	0.54
90.88	490.30	1.07	2.77	0.51	0.55

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	87900.00	496.04
1	88000.00	495.97
2	88100.00	495.92

Roadway Surface: Paved
Roadway Top Width: 44.00 ft

** THE INCREASE IN HEADWATER ELEVATION DOES NOT AFFECT THE SURROUNDING PRIVATE PROPERTIES.

*** STREAM BED AND BANK PROTECTION SHOULD BE PROVIDED WHEN OUTLET VELOCITIES ARE GREATER THAN 8 FT/S.

STATE OF TEXAS
PAULA PRICE
90265
LICENSED
PROFESSIONAL ENGINEER

Paula N. Price

Digitally signed by Paula N. Price, P.E, CFM
DN: cn=Paula N. Price, P.E, CFM, o=P&D Professional Services, Inc., ou, email=pprice@pdproservices.com, c=US
Date: 2021.05.31 20:37:13 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

SH 304

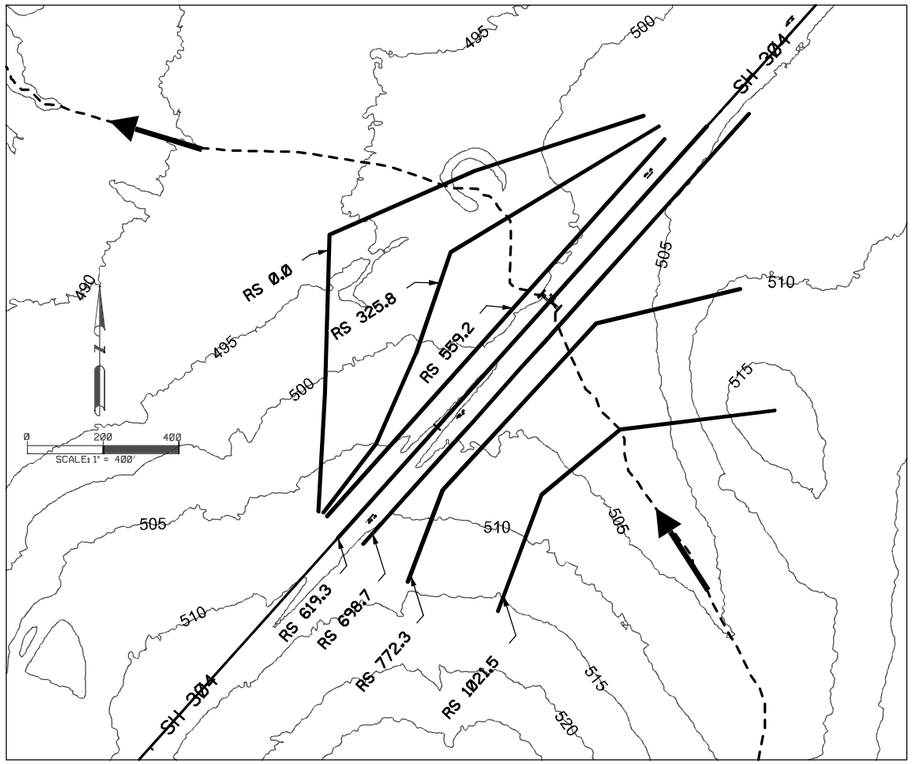
HYDRAULIC DATA

CULVERT No. 5

STA 880+35.34

© 2022		CONT	SECT	JOB	HIGHWAY
DS: PNP	CK: RAK	0573	01	034	SH 304
DW: PNP	CK: RAK	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		115

DATE: 5/31/2021 7:57:21 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034 HYD_1_3_5_11_12_13.dgn



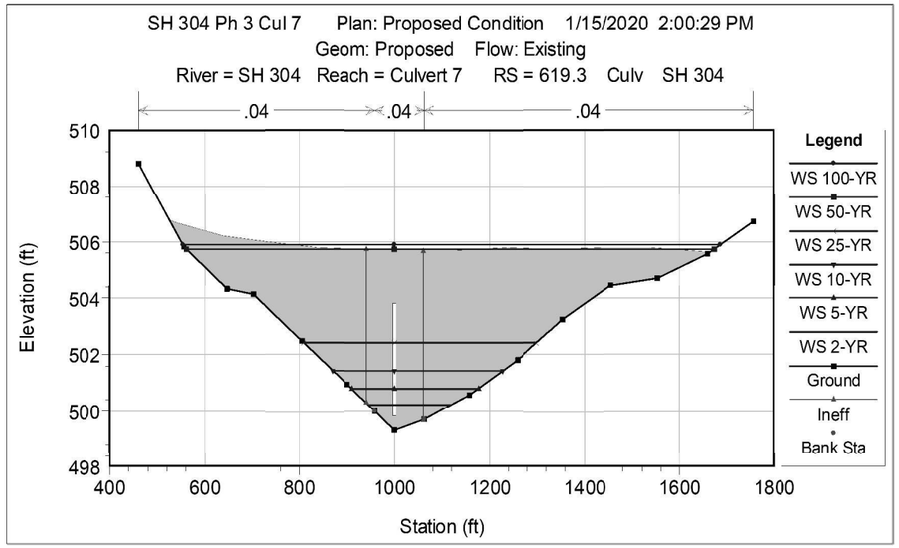
Plan: Prop SH 304 Culvert 7 RS: 619.3 Culv Group: Culvert #1 Profile: 25-YR			
Q Culv Group (cfs)	187.29	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	9.1
Q Barrel (cfs)	187.29	Culv Vel DS (ft/s)	10.14
E.G. US. (ft)	504.34	Culv Inv El Up (ft)	499.84
W.S. US. (ft)	504.34	Culv Inv El Dn (ft)	499.52
E.G. DS (ft)	500.17	Culv Frctn Ls (ft)	0.27
W.S. DS (ft)	499.94	Culv Exit Loss (ft)	3.25
Delta EG (ft)	4.17	Culv Entr Loss (ft)	0.64
Delta WS (ft)	4.4	Q Weir (cfs)	
E.G. IC (ft)	504.06	Weir Sta Lft (ft)	
E.G. OC (ft)	504.34	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	502.41	Weir Max Depth (ft)	
Culv WS Outlet (ft)	501.83	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.24	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.57	Min El Weir Flow (ft)	505.72

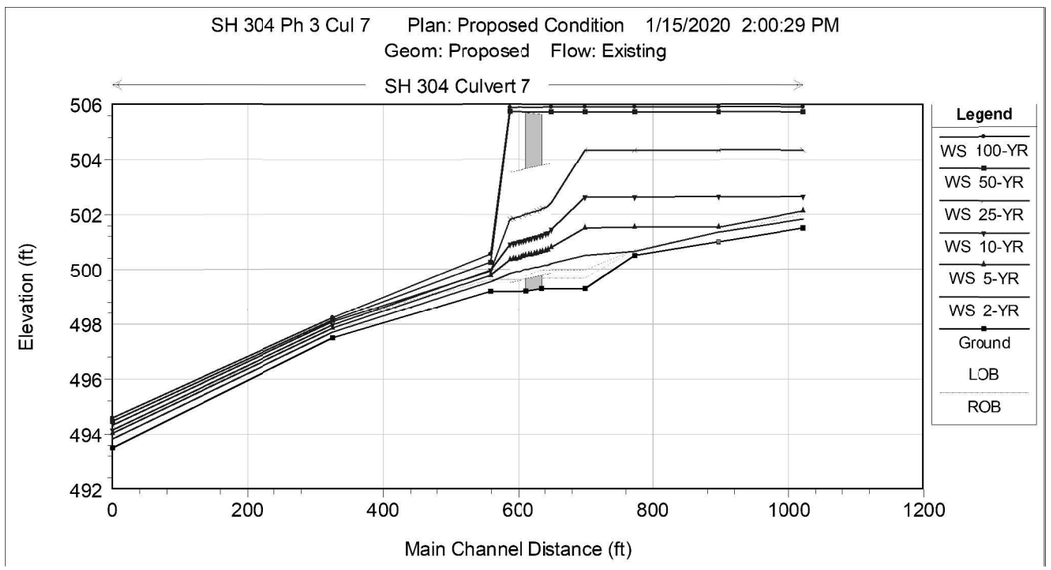
Plan: Prop SH 304 Culvert 7 RS: 619.3 Culv Group: Culvert #1 Profile: 100-YR			
Q Culv Group (cfs)	281.52	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	8.8
Q Barrel (cfs)	281.52	Culv Vel DS (ft/s)	13.04
E.G. US. (ft)	505.9	Culv Inv El Up (ft)	499.84
W.S. US. (ft)	505.9	Culv Inv El Dn (ft)	499.52
E.G. DS (ft)	500.58	Culv Frctn Ls (ft)	0.44
W.S. DS (ft)	500.55	Culv Exit Loss (ft)	4.28
Delta EG (ft)	5.33	Culv Entr Loss (ft)	0.6
Delta WS (ft)	5.35	Q Weir (cfs)	108.17
E.G. IC (ft)	505.9	Weir Sta Lft (ft)	794.62
E.G. OC (ft)	505.75	Weir Sta Rgt (ft)	1685.97
Culvert Control	Inlet	Weir Submerg	0
Culv WS Inlet (ft)	503.84	Weir Max Depth (ft)	0.24
Culv WS Outlet (ft)	502.22	Weir Avg Depth (ft)	0.13
Culv Nml Depth (ft)	3	Weir Flow Area (sq ft)	113.54
Culv Crt Depth (ft)	3.38	Min El Weir Flow (ft)	505.72

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Culvert 7	1021.5	25-YR	Exist	187.29	501.5	504.16		504.16	0.000083	0.61	381.71	244.7	0.07
Culvert 7	1021.5	25-YR	Prop	187.29	501.5	504.34		504.35	0.000061	0.55	429.07	258.58	0.06
Culvert 7	1021.5	100-YR	Exist	386.11	501.5	505.71		505.71	0.00004	0.59	841.23	334.7	0.05
Culvert 7	1021.5	100-YR	Prop	386.11	501.5	505.9		505.91	0.000032	0.55	907.58	342.39	0.05
Culvert 7	896.90*	25-YR	Exist	187.29	501	504.16		504.16	0.000015	0.3	772.87	367.55	0.03
Culvert 7	896.90*	25-YR	Prop	187.29	501	504.34		504.34	0.000011	0.27	842.96	376.09	0.03
Culvert 7	896.90*	100-YR	Exist	386.11	501	505.71		505.71	0.000012	0.35	1437.85	496.03	0.03
Culvert 7	896.90*	100-YR	Prop	386.11	501	505.9		505.9	0.00001	0.32	1536.29	507.78	0.03
Culvert 7	772.3	25-YR	Exist	187.29	500.5	504.15	501.00	504.15	0.000006	0.21	914.37	548.25	0.02
Culvert 7	772.3	25-YR	Prop	187.29	500.5	504.34	501.00	504.34	0.000005	0.20	964.77	559.77	0.02
Culvert 7	772.3	100-YR	Exist	386.11	500.5	505.71	501.15	505.71	0.000004	0.22	2251.74	659.8	0.02
Culvert 7	772.3	100-YR	Prop	386.11	500.5	505.9	501.15	505.9	0.000003	0.21	2382.81	676.44	0.02
Culvert 7	698.7	25-YR	Exist	187.29	499.3	504.15	500.03	504.15	0.000012	0.35	541.18	730.06	0.03
Culvert 7	698.7	25-YR	Prop	187.29	499.3	504.34	500.03	504.34	0.00001	0.34	563.83	798.64	0.03
Culvert 7	698.7	100-YR	Exist	386.11	499.3	505.71	500.33	505.71	0.000002	0.17	3359.49	1105.48	0.01
Culvert 7	698.7	100-YR	Prop	386.11	499.3	505.9	500.33	505.9	0.000002	0.16	3579.07	1131.72	0.01
Culvert 7	619.3			Culvert									
Culvert 7	559.2	25-YR	Exist	187.29	499.2	499.94	499.94	500.17	0.027493	3.96	48.51	278.26	0.97
Culvert 7	559.2	25-YR	Prop	187.29	499.2	499.94	499.94	500.17	0.027493	3.96	48.51	278.26	0.97
Culvert 7	559.2	100-YR	Exist	386.11	499.2	500.32	500.2	500.38	0.005072	2.39	212.74	421.81	0.45
Culvert 7	559.2	100-YR	Prop	386.11	499.2	500.55	500.2	500.58	0.001585	1.57	314.71	447.79	0.26
Culvert 7	325.8	25-YR	Exist	187.29	497.5	498.08	498.04	498.17	0.018727	2.42	82.95	344.94	0.74
Culvert 7	325.8	25-YR	Prop	187.29	497.5	498.08	498.04	498.17	0.018727	2.42	82.95	344.94	0.74
Culvert 7	325.8	100-YR	Exist	386.11	497.5	498.24	498.19	498.37	0.017429	3.04	140.00	371.95	0.77
Culvert 7	325.8	100-YR	Prop	386.11	497.5	498.24	498.19	498.37	0.017429	3.04	140.00	371.95	0.77
Culvert 7	0	25-YR	Exist	187.29	493.5	494.33	494.19	494.41	0.007802	2.29	91.49	202.47	0.53
Culvert 7	0	25-YR	Prop	187.29	493.5	494.33	494.19	494.41	0.007802	2.29	91.49	202.47	0.53
Culvert 7	0	100-YR	Exist	386.11	493.5	494.6	494.38	494.71	0.007807	2.93	146.17	216.36	0.56
Culvert 7	0	100-YR	Prop	386.11	493.5	494.6	494.38	494.71	0.007807	2.93	146.17	216.36	0.56

NOTES

1. HEC-RAS 5.0.5 USED FOR HYDRAULIC ANALYSIS.
2. N-VALUES: CHANNEL = 0.04, OVERBANKS = 0.04
3. CROSS SECTION GEOMETRY SURVEYED ELEVATIONS FOR TOP OF ROAD AND CHANNEL.
4. DOWNSTREAM BOUNDARY CONDITION BASED ON NORMAL DEPTH USING AVERAGE CHANNEL SLOPE OF 0.0078 FT/FT.
5. PEAK FLOW COMPUTED USING HEC-HMS VERSION 4.3. REFER TO HYDROLOGIC DATA SHEET FOR PEAK FLOW COMPUTATIONS.
6. CULVERT 7 HAS FIS DELINEATED ZONE A FLOODPLAIN. NO DETAILED ANALYSIS AVAILABLE.
7. PROPOSED PROJECT CONSISTS OF LENGTHENING 8' X 4' RCB BY 24.0 FT WITH PARALLEL HEADWALLS.
8. NO STRUCTURES LOCATED IN THE UPSTREAM VICINITY OF CULVERT 7.
9. COORDINATION WITH LOCAL FLOODPLAIN ADMINISTRATOR WAS DONE ON MARCH 6, 2020.





HYDROLOGIC SUMMARY

DRAINAGE AREA ID	CUVLERT STATION	DRAINAGE AREA (ACRES)	PEAK FLOW - Q (cfs)					
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
7	924+38.21	206.72	10.17	42.50	91.37	187.29	276.54	386.11

STATE OF TEXAS
RICHARD KRAUS
57390
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Richard A. Kraus, PE, CFM
DN: cn=Richard A. Kraus, PE, CFM, o=P&D Professional Services, Inc., ou, email=rkraus@pdproservices.com, c=US
Date: 2021.05.31 20:42:29 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST. SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

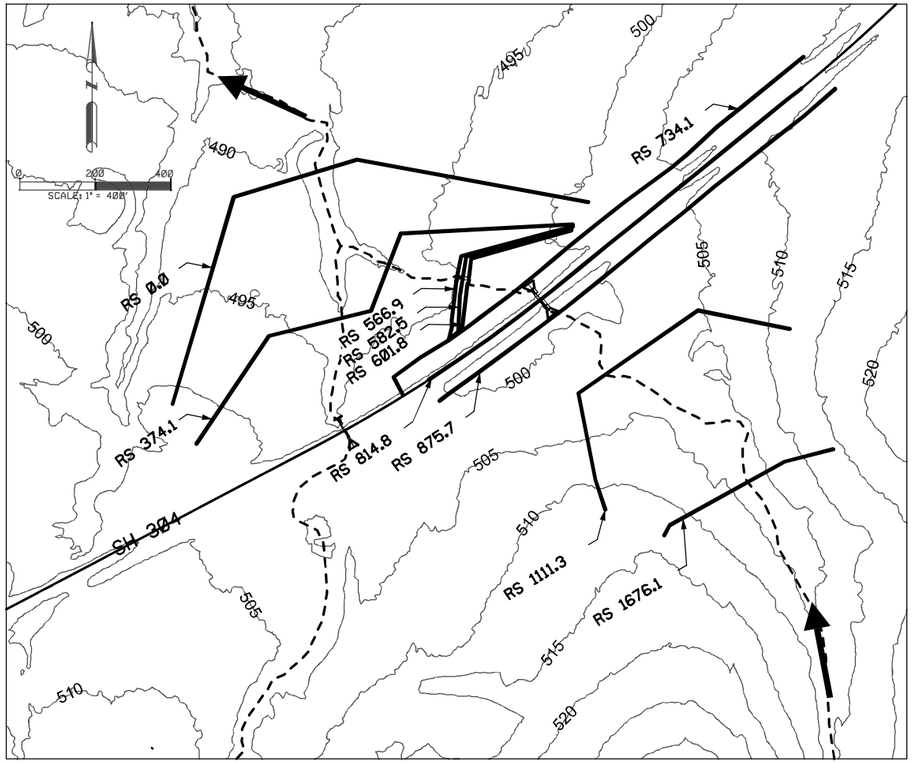
SH 304
HYDRAUIC DATA
CULVERT No. 7

STA 924+38.21

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		116

DS: CK: DW: CK:

DATE: 5/31/2021 8:04:59 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034_HYD_7.dgn



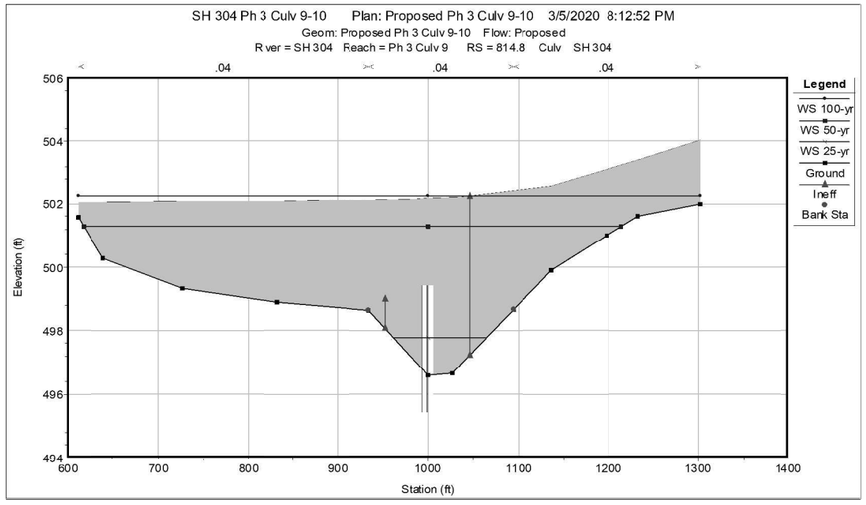
Plan: Prop SH 304 Ph 3 Culv 9 RS: 814.8 Culv Group: Culvert #1 Profile: 25-YR			
Q Culv Group (cfs)	246.81	Culv Full Len (ft)	
# Barrels	2	Culv Vel US (ft/s)	8.71
Q Barrel (cfs)	123.41	Culv Vel DS (ft/s)	11.14
E.G. US. (ft)	499.43	Culv Inv El Up (ft)	495.42
W.S. US. (ft)	499.42	Culv Inv El Dn (ft)	494.71
E.G. DS (ft)	497.34	Culv Frctn Ls (ft)	0.48
W.S. DS (ft)	497.08	Culv Exit Loss (ft)	1.15
Delta EG (ft)	2.1	Culv Entr Loss (ft)	0.47
Delta WS (ft)	2.34	Q Weir (cfs)	
E.G. IC (ft)	499.21	Weir Sta Lft (ft)	
E.G. OC (ft)	499.43	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	497.78	Weir Max Depth (ft)	
Culv WS Outlet (ft)	496.56	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.7	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	2.36	Min El Weir Flow (ft)	502.06

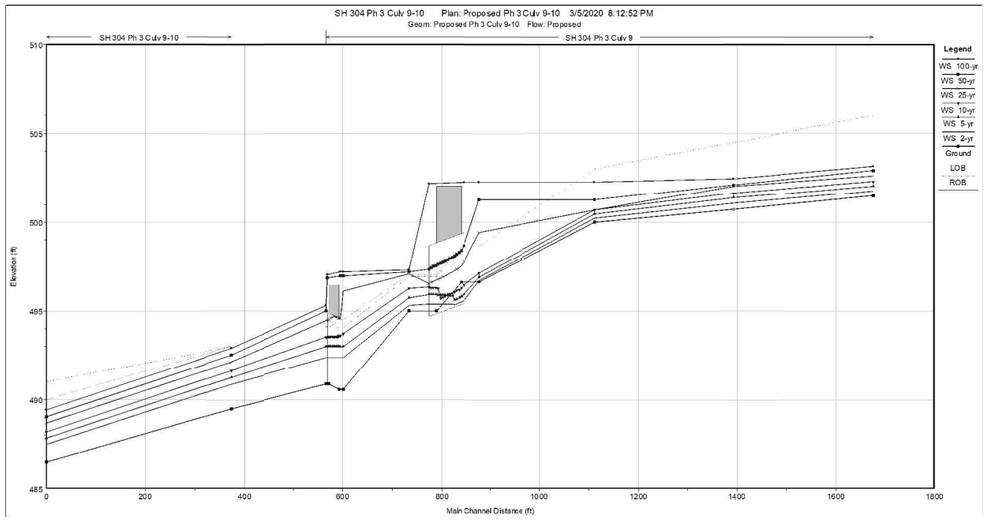
Plan: Prop SH 304 Ph 3 Culv 9 RS: 814.8 Culv Group: Culvert #1 Profile: 100-YR			
Q Culv Group (cfs)	477.24	Culv Full Len (ft)	
# Barrels	2	Culv Vel US (ft/s)	9.94
Q Barrel (cfs)	238.62	Culv Vel DS (ft/s)	15.06
E.G. US. (ft)	502.27	Culv Inv El Up (ft)	495.42
W.S. US. (ft)	502.27	Culv Inv El Dn (ft)	494.71
E.G. DS (ft)	497.46	Culv Frctn Ls (ft)	0.78
W.S. DS (ft)	497.32	Culv Exit Loss (ft)	3.42
Delta EG (ft)	4.81	Culv Entr Loss (ft)	0.61
Delta WS (ft)	4.94	Q Weir (cfs)	65.33
E.G. IC (ft)	502.27	Weir Sta Lft (ft)	611.42
E.G. OC (ft)	501.65	Weir Sta Rgt (ft)	1043.63
Culvert Control	Inlet	Weir Submerg	0
Culv WS Inlet (ft)	499.42	Weir Max Depth (ft)	0.21
Culv WS Outlet (ft)	497.35	Weir Avg Depth (ft)	0.14
Culv Nml Depth (ft)	2.74	Weir Flow Area (sq ft)	62.47
Culv Crt Depth (ft)	3.66	Min El Weir Flow (ft)	502.06

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ph 3 Culv 9	1676.1	25-yr	Exist	138.81	501.5	502.63		502.7	0.003729	2.01	69.17	82.99	0.39
Ph 3 Culv 9	1676.1	25-yr	Prop	138.81	501.5	502.63		502.7	0.003729	2.01	69.17	82.99	0.39
Ph 3 Culv 9	1676.1	100-yr	Exist	320.57	501.5	503.17		503.29	0.003917	2.77	115.64	88.58	0.43
Ph 3 Culv 9	1676.1	100-yr	Prop	320.57	501.5	503.17		503.29	0.003944	2.78	115.39	88.56	0.43
Ph 3 Culv 9	1393.7*	25-yr	Exist	138.81	500.75	502.03	501.46	502.05	0.001488	1.21	115.18	149.31	0.24
Ph 3 Culv 9	1393.7*	25-yr	Prop	138.81	500.75	502.03	501.46	502.05	0.001488	1.21	115.18	149.31	0.24
Ph 3 Culv 9	1393.7*	100-yr	Exist	320.57	500.75	502.43		502.48	0.002133	1.8	177.61	164.54	0.31
Ph 3 Culv 9	1393.7*	100-yr	Prop	320.57	500.75	502.45		502.51	0.001930	1.75	183.16	165.41	0.29
Ph 3 Culv 9	1111.3	25-yr	Exist	138.81	500	500.71	500.71	500.89	0.033839	3.41	40.65	115.08	1.01
Ph 3 Culv 9	1111.3	25-yr	Prop	138.81	500	500.71	500.71	500.89	0.033839	3.41	40.65	115.08	1.01
Ph 3 Culv 9	1111.3	100-yr	Exist	320.57	500	502.21	500.99	502.22	0.000465	0.95	338.36	263.13	0.15
Ph 3 Culv 9	1111.3	100-yr	Prop	320.57	500	502.27	500.99	502.28	0.00041	0.91	354.22	268.12	0.14
Ph 3 Culv 9	875.7	25-yr	Exist	233.81	496.6	499.13	497.54	499.15	0.000349	1.05	253.24	335.85	0.14
Ph 3 Culv 9	875.7	25-yr	Prop	246.81	496.6	499.42	497.57	499.43	0.000206	0.89	340.79	401.95	0.11
Ph 3 Culv 9	875.7	100-yr	Exist	535.57	496.6	502.21	498.04	502.21	0.000017	0.45	1476.28	690.52	0.04
Ph 3 Culv 9	875.7	100-yr	Prop	542.57	496.6	502.27	498.06	502.27	0.000011	0.34	2014.3	690.52	0.03
Ph 3 Culv 9	814.8			Culvert	SH 304								
Ph 3 Culv 9	734.1	25-yr	Exist	233.81	495	497.05	497.06	497.31	0.032646	4.12	61.51	307.52	0.77
Ph 3 Culv 9	734.1	25-yr	Prop	246.81	495	497.08	497.08	497.34	0.033465	4.22	63.47	309.32	0.78
Ph 3 Culv 9	734.1	100-yr	Exist	535.57	495	497.33	497.21	497.46	0.013409	3.16	193.67	337.22	0.52
Ph 3 Culv 9	734.1	100-yr	Prop	542.57	495	497.32	497.21	497.46	0.014464	3.26	190.52	336.2	0.54
Ph 3 Culv 9	601.8	25-yr	Exist	233.81	490.56	495.92	493.87	495.95	0.001019	1.71	177.64	160.39	0.17
Ph 3 Culv 9	601.8	25-yr	Prop	246.81	490.56	496.12	493.93	496.14	0.000756	1.53	212.04	183.15	0.14
Ph 3 Culv 9	601.8	100-yr	Exist	535.57	490.56	497.2	495.2	497.22	0.000505	1.5	454.2	297.96	0.12
Ph 3 Culv 9	601.8	100-yr	Prop	542.57	490.56	497.18	495.2	497.2	0.000531	1.53	449.34	294.79	0.13
Ph 3 Culv 9	582.5			Culvert	ST MARYS RD								
Ph 3 Culv 9	566.9	25-yr	Exist	233.81	490.88	494.41	494.06	494.91	0.023333	5.76	43.36	43.03	0.72
Ph 3 Culv 9	566.9	25-yr	Prop	246.81	490.88	494.45	494.2	494.97	0.024135	5.93	44.92	45.4	0.74
Ph 3 Culv 9	566.9	100-yr	Exist	535.57	490.88	495.23	495.26	495.78	0.018033	6.45	106.45	108.87	0.67
Ph 3 Culv 9	566.9	100-yr	Prop	542.57	490.88	495.29	495.29	495.79	0.017954	6.46	107.92	110.19	0.67
Ph 3 Culv 9-10	374.1	25-yr	Exist	437.74	489.5	492.13	491.38	492.29	0.009799	3.22	135.77	89.24	0.46
Ph 3 Culv 9-10	374.1	25-yr	Prop	437.74	489.5	492.13	491.38	492.29	0.009799	3.22	135.77	89.24	0.46
Ph 3 Culv 9-10	374.1	100-yr	Exist	779.22	489.5	492.88	491.9	493.09	0.00964	3.7	210.55	111.12	0.47
Ph 3 Culv 9-10	374.1	100-yr	Prop	779.22	489.5	492.88	491.9	493.09	0.00964	3.7	210.55	111.12	0.47
Ph 3 Culv 9-10	0	25-yr	Exist	437.74	486.5	488.67	487.91	488.84	0.008702	3.26	134.2	79.66	0.44
Ph 3 Culv 9-10	0	25-yr	Prop	437.74	486.5	488.67	487.91	488.84	0.008702	3.26	134.2	79.66	0.44
Ph 3 Culv 9-10	0	100-yr	Exist	779.22	486.5	489.42	488.42	489.66	0.008707	3.98	195.63	85.92	0.47
Ph 3 Culv 9-10	0	100-yr	Prop	779.22	486.5	489.42	488.42	489.66	0.008707	3.98	195.63	85.92	0.47

NOTES

1. HEC-RAS 5.0.5 USED FOR HYDRAULIC ANALYSIS.
2. N-VALUES: CHANNEL = 0.04, OVERBANKS = 0.04
3. CROSS SECTION GEOMETRY SURVEYED ELEVATIONS FOR TOP OF ROAD AND CHANNEL.
4. DOWNSTREAM BOUNDARY CONDITION BASED ON NORMAL DEPTH USING AVERAGE CHANNEL SLOPE OF 0.0087 FT/FT.
5. PEAK FLOW COMPUTED USING HEC-HMS VERSION 4.3. REFER TO HYDROLOGIC DATA SHEET FOR PEAK FLOW COMPUTATIONS.
6. PEAK FLOW RATES FROM CULVERT 10 OVERTOP DRAINAGE DIVIDE WITH CULVERT 9 UPSTREAM OF SH 304. BETWEEN HEC-RAS STATIONS 0 AND 374.1 PEAK FLOW RATES ARE FROM A COMBINED HEC-HMS MODEL OF CULVERTS 9 AND 10. BETWEEN HEC-RAS STATIONS 566.9 AND 875.7 FLOW RATES INCREASED FROM CULVERT 10 FLOW RATES UNTIL WSEL UPSTREAM OF SH 304 MATCH CULVERT 10 FOR THE 100-YR STORM; FOR THE 25-YR STORM FLOW RATES ARE INCREASED FOR CULVERT 9 FROM CULVERT 10 UNTIL CULVERT 10 25-YR WSEL MATCH THE DRAINAGE DIVIDE ELEVATION. FROM HEC-RAS STATION 1111.3 TO 1676.1 FLOW RATES ARE FROM CULVERT 9 DRAINAGE AREA.
7. CULVERT 9 HAS FIS DELINEATED ZONE A FLOODPLAIN. NO DETAILED ANALYSIS AVAILABLE.
8. PROPOSED PROJECT CONSISTS OF LENGTHENING 2- 6' X4' RCB BY 30.0 FT WITH FLARED WINGWALLS.
9. COORDINATION WITH LOCAL FLOODPLAIN ADMINISTRATOR WAS DONE ON MARCH 6, 2020.





HYDROLOGIC SUMMARY

DRAINAGE AREA ID	CUVLERT STATION	DRAINAGE AREA (ACRES)	PEAK FLOW - Q (cfs)					
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
9	970+35.88	213.78	3.79	23.52	59.43	138.81	218.90	320.57
9+10		358.71	81.64	164.19	263.24	437.74	594.18	779.22

STATE OF TEXAS
RICHARD KRAUS
57390
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Richard A. Kraus, PE, CFM
DN: cn=Richard A. Kraus, PE, CFM, o=P&D Professional Services, Inc., ou, email=rkraus@pdproservices.com, c=US
Date: 2021.09.23 22:36:13 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

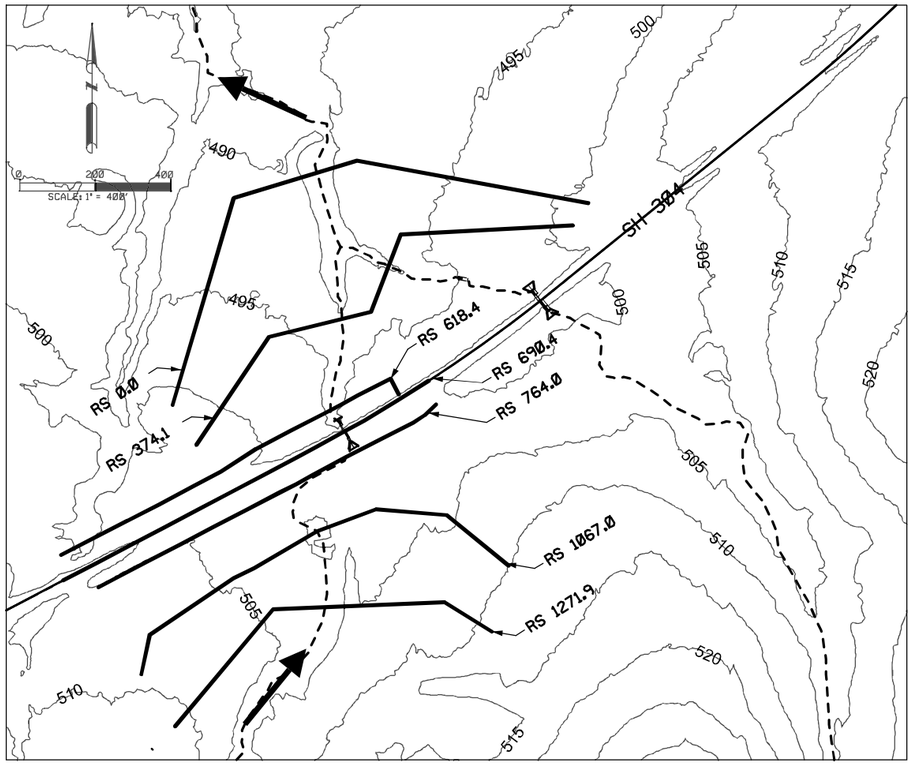
Texas Department of Transportation

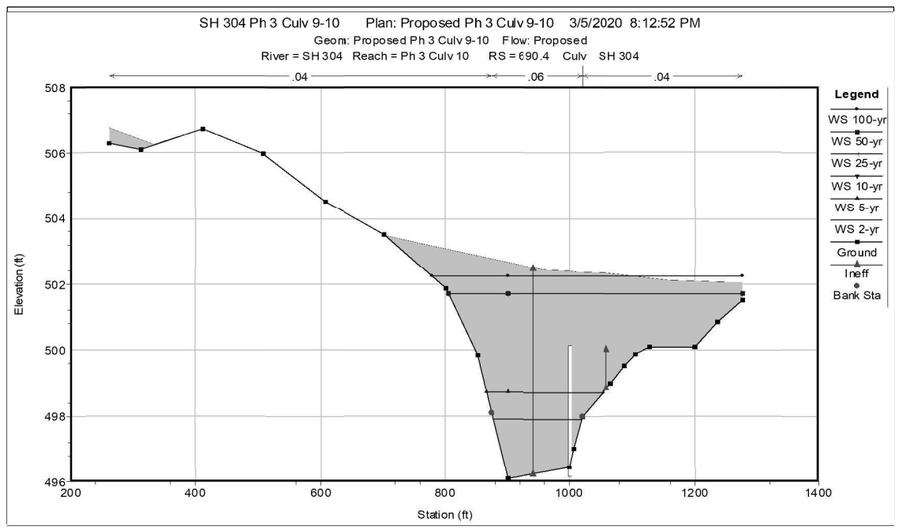
SH 304
HYDRAUIC DATA
CULVERT No. 9

STA 970+35.89

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		117

DATE: 9/23/2021 10:12:39 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034_HYD_9.dgn





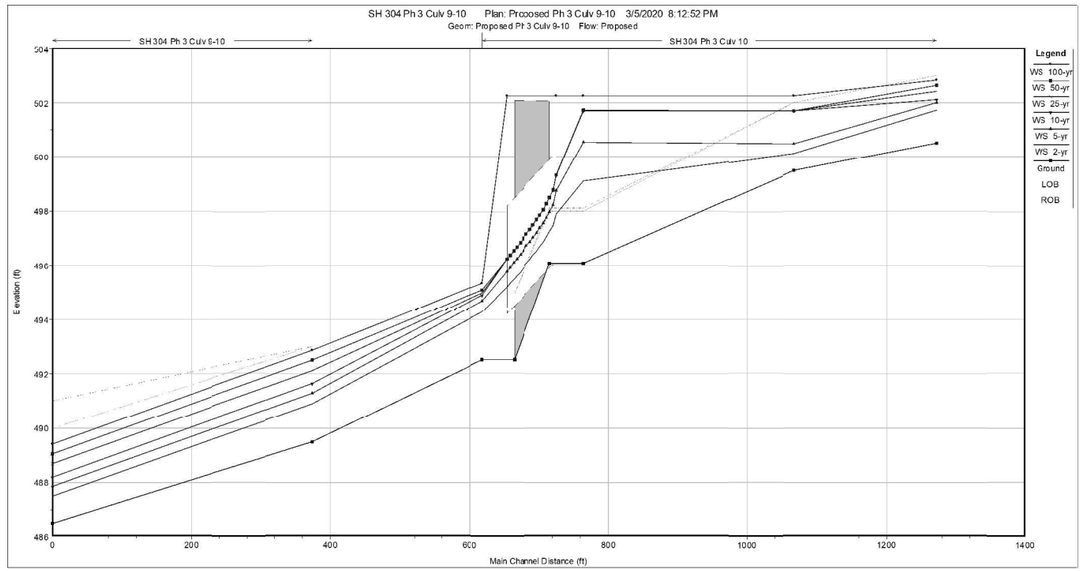
Plan: Prop SH 304 Ph 3 Culv 10 RS: 690.4		Culv Group: Culvert #1 Profile: 25-YR	
Q Culv Group (cfs)	190.93	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	10.08
Q Barrel (cfs)	190.93	Culv Vel DS (ft/s)	15.78
E.G. US. (ft)	501.71	Culv Inv El Up (ft)	496.15
W.S. US. (ft)	501.71	Culv Inv El Dn (ft)	494.22
E.G. DS (ft)	495.18	Culv Frctn Ls (ft)	0.78
W.S. DS (ft)	495	Culv Exit Loss (ft)	4.92
Delta EG (ft)	6.53	Culv Entr Loss (ft)	0.82
Delta WS (ft)	6.71	Q Weir (cfs)	
E.G. IC (ft)	501.71	Weir Sta Lft (ft)	
E.G. OC (ft)	501.52	Weir Sta Rgt (ft)	
Culvert Control	Inlet	Weir Submerg	
Culv WS Inlet (ft)	499.31	Weir Max Depth (ft)	
Culv WS Outlet (ft)	496.24	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	1.63	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	3.16	Min El Weir Flow (ft)	502.09

Plan: Prop SH 304 Ph 3 Culv 10 RS: 690.4		Culv Group: Culvert #1 Profile: 100-YR	
Q Culv Group (cfs)	212.46	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	8.85
Q Barrel (cfs)	212.46	Culv Vel DS (ft/s)	17
E.G. US. (ft)	502.26	Culv Inv El Up (ft)	496.15
W.S. US. (ft)	502.25	Culv Inv El Dn (ft)	494.22
E.G. DS (ft)	495.5	Culv Frctn Ls (ft)	0.97
W.S. DS (ft)	495.36	Culv Exit Loss (ft)	5.29
Delta EG (ft)	6.75	Culv Entr Loss (ft)	0.49
Delta WS (ft)	6.9	Q Weir (cfs)	24.19
E.G. IC (ft)	502.26	Weir Sta Lft (ft)	1104.31
E.G. OC (ft)	501.91	Weir Sta Rgt (ft)	1277.67
Culvert Control	Inlet	Weir Submerg	0
Culv WS Inlet (ft)	500.15	Weir Max Depth (ft)	0.21
Culv WS Outlet (ft)	496.3	Weir Avg Depth (ft)	0.14
Culv Nml Depth (ft)	1.77	Weir Flow Area (sq ft)	23.71
Culv Crt Depth (ft)	3.39	Min El Weir Flow (ft)	502.09

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Ph 3 Culv 10	1271.9	25-yr	Exist	298.93	500.5	502.42	501.61	502.5	0.005185	2.25	133.11	94.02	0.33
Ph 3 Culv 10	1271.9	25-yr	Prop	298.93	500.5	502.42	501.61	502.5	0.005164	2.24	133.29	94.05	0.33
Ph 3 Culv 10	1271.9	100-yr	Exist	458.65	500.5	502.84	501.87	502.95	0.0054	2.64	173.71	99.16	0.35
Ph 3 Culv 10	1271.9	100-yr	Prop	458.65	500.5	502.84	501.87	502.95	0.005402	2.64	173.69	99.16	0.35
Ph 3 Culv 10	1067	25-yr	Exist	298.93	499.5	501.63	500.61	501.68	0.003128	1.68	178.39	133.96	0.26
Ph 3 Culv 10	1067	25-yr	Prop	298.93	499.5	501.7	500.61	501.74	0.002718	1.59	187.63	136.78	0.24
Ph 3 Culv 10	1067	100-yr	Exist	458.65	499.5	502.21	500.86	502.25	0.002227	1.7	286.26	280.33	0.23
Ph 3 Culv 10	1067	100-yr	Prop	458.65	499.5	502.25	500.86	502.29	0.002036	1.65	296.99	284.97	0.22
Ph 3 Culv 10	764	25-yr	Exist	203.93	496.08	501.64	497.05	501.64	0.000015	0.29	836.01	470.54	0.02
Ph 3 Culv 10	764	25-yr	Prop	190.93	496.08	501.71	497.02	501.71	0.000012	0.26	859.06	472.23	0.02
Ph 3 Culv 10	764	100-yr	Exist	243.65	496.08	502.22	497.14	502.22	0.000011	0.26	1029.63	496.97	0.02
Ph 3 Culv 10	764	100-yr	Prop	236.65	496.08	502.25	497.13	502.26	0.00001	0.25	1042.04	499.18	0.02
Ph 3 Culv 10	690.4			Culvert	SH 304								
Ph 3 Culv 10	618.4	25-yr	Exist	203.93	492.5	495.04	494.67	495.23	0.019984	3.5	58.35	59.09	0.62
Ph 3 Culv 10	618.4	25-yr	Prop	190.93	492.5	495	494.62	495.18	0.01977	3.39	56.25	58.17	0.61
Ph 3 Culv 10	618.4	100-yr	Exist	243.65	492.5	495.37	494.79	495.52	0.010663	3.1	79.73	67.8	0.47
Ph 3 Culv 10	618.4	100-yr	Prop	236.65	492.5	495.36	494.78	495.5	0.010503	3.05	78.81	67.38	0.47
Ph 3 Culv 9-10	374.1	25-yr	Exist	437.74	489.5	492.13	491.38	492.29	0.009799	3.22	135.77	89.24	0.46
Ph 3 Culv 9-10	374.1	25-yr	Prop	437.74	489.5	492.13	491.38	492.29	0.009799	3.22	135.77	89.24	0.46
Ph 3 Culv 9-10	374.1	100-yr	Exist	779.22	489.5	492.88	491.9	493.09	0.00964	3.7	210.55	111.12	0.47
Ph 3 Culv 9-10	374.1	100-yr	Prop	779.22	489.5	492.88	491.9	493.09	0.00964	3.7	210.55	111.12	0.47
Ph 3 Culv 9-10	0	25-yr	Exist	437.74	486.5	488.67	487.91	488.84	0.008702	3.26	134.2	79.66	0.44
Ph 3 Culv 9-10	0	25-yr	Prop	437.74	486.5	488.67	487.91	488.84	0.008702	3.26	134.2	79.66	0.44
Ph 3 Culv 9-10	0	100-yr	Exist	779.22	486.5	489.42	488.42	489.66	0.008707	3.98	195.63	85.92	0.47
Ph 3 Culv 9-10	0	100-yr	Prop	779.22	486.5	489.42	488.42	489.66	0.008707	3.98	195.63	85.92	0.47

NOTES

1. HEC-RAS 5.0.5 USED FOR HYDRAULIC ANALYSIS.
2. N-VALUES: CHANNEL = 0.04, OVERBANKS = 0.04
3. CROSS SECTION GEOMETRY SURVEYED ELEVATIONS FOR TOP OF ROAD AND CHANNEL.
4. DOWNSTREAM BOUNDARY CONDITION BASED ON NORMAL DEPTH USING AVERAGE CHANNEL SLOPE OF 0.0087 FT/FT.
5. PEAK FLOW COMPUTED USING HEC-HMS VERSION 4.3. REFER TO HYDROLOGIC DATA SHEET FOR PEAK FLOW COMPUTATIONS.
6. PEAK FLOW RATES FROM CULVERT 10 OVERTOP DRAINAGE DIVIDE WITH CULVERT 9 UPSTREAM OF SH 304. BETWEEN HEC-RAS STATIONS 0 AND 374.1 PEAK FLOW RATES ARE FROM A COMBINED HEC-HMS MODEL OF CULVERTS 9 AND 10. BETWEEN HEC-RAS STATIONS 618.4 AND 764.0 FLOW RATES DECREASED FROM CULVERT 10 TO CULVERT 9 UNTIL WSEL UPSTREAM OF SH 304 MATCH CULVERT 9 FOR THE 100-YR STORM; FOR THE 25-YR STORM FLOW RATES ARE DECREASED FROM CULVERT 10 TO CULVERT 9 UNTIL CULVERT 10 25-YR WSEL MATCH THE DRAINAGE DIVIDE ELEVATION, FROM HEC-RAS STATION 1067 TO 1271.9 FLOW RATES ARE FROM CULVERT 10 DRAINAGE AREA.
7. CULVERT 10 HAS FIS DELINEATED ZONE A FLOODPLAIN. NO DETAILED ANALYSIS AVAILABLE.
8. PROPOSED PROJECT CONSISTS OF LENGTHENING 6' X4' RCB BY 35.0 FT WITH FLARED WINGWALLS LEFT AND PARALLEL HEADWALL RIGHT.
9. COORDINATION WITH LOCAL FLOODPLAIN ADMINISTRATOR WAS DONE ON MARCH 6, 2020.



HYDROLOGIC SUMMARY

DRAINAGE AREA ID	CUVLERT STATION	DRAINAGE AREA (ACRES)	PEAK FLOW - Q (cfs)					
			2-YR	5-YR	10-YR	25-YR	50-YR	100-YR
10	976+58.75	144.93	77.85	140.67	203.81	298.93	375.28	458.65
9+10		358.71	81.64	164.19	263.24	437.74	594.18	779.22

STATE OF TEXAS
RICHARD KRAUS
57390
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Richard A. Kraus, PE, CFM
DN: cn=Richard A. Kraus, PE, CFM, o=P&D Professional Services, Inc., ou, email=rkraus@pdproservices.com, c=US
Date: 2021.09.23 22:34:08 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

SH 304
HYDRAUIC DATA
CULVERT No.10

STA 976+58.75

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	BASTROP		118

DATE: 9/23/2021 10:29:25 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034_HYD_10.dgn

HY-8 Analysis Report - Existing

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straight Culvert

Inlet Elevation (invert): 500.59 ft, Outlet Elevation (invert): 500.36ft

Culvert Length: 71.00ft, Culvert Slope: 0.0032

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
503.32	2 year	25.97	25.97	0	1
503.68	5 year	32.13	32.13	0	1
503.98	10 year	37.28	37.28	0	1
504.4	25 year	44.25	44.25	0	1
504.89	50 year	49.4	49.4	0	1
505.49	100 year	55.02	55.02	0	1
508.43	Overtopping	73.93	73.93	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)
2 year	25.97	25.97	503.32	2.476	2.731	2-M2c	1.727	1.645	1.645	0.492	6.543	4.076
5 year	32.13	32.13	503.68	2.864	3.095	7-M2c	1.992	1.839	1.839	0.554	7.074	4.357
10 year	37.28	37.28	503.98	3.23	3.393	7-M2c	2.235	1.986	1.986	0.601	7.507	4.561
25 year	44.25	44.25	504.4	3.806	3.805	7-M2c	3	2.167	2.167	0.66	8.094	4.806
50 year	49.4	49.4	504.89	4.299	4.125	7-M2c	3	2.288	2.288	0.7	8.541	4.968
100 year	55.02	55.02	505.49	4.902	4.506	7-M2c	3	2.407	2.407	0.742	9.051	5.133

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 500.59 ft
Outlet Station: 71.00 ft
Outlet Elevation: 500.36 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 10.00 ft
Side Slope (H:V): 6.00 (_:1)
Channel Slope: 0.0410
Channel Manning's n: 0.0400
Channel Invert Elevation: 500.36 ft

Culvert Data Summary

Barrel Shape: Circular
Barrel Diameter: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
25.97	500.85	0.49	4.08	1.26	1.13
32.13	500.91	0.55	4.36	1.42	1.15
37.28	500.96	0.6	4.56	1.54	1.17
44.25	501.02	0.66	4.81	1.69	1.18
49.4	501.06	0.7	4.97	1.79	1.19
55.02	501.1	0.74	5.13	1.9	1.2

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	98550.00	507.94
1	98600.00	508.43
2	98700.00	509.71

Roadway Surface: Paved
Roadway Top Width: 25.00 ft

HY-8 Analysis Report - Proposed

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straight Culvert

Inlet Elevation (invert): 500.60 ft, Outlet Elevation (invert): 500.35 ft

Culvert Length: 77.00ft, Culvert Slope: 0.0032

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
503.33	2 year	25.97	25.97	0	1
503.69	5 year	32.13	32.13	0	1
503.99	10 year	37.28	37.28	0	1
504.41	25 year	44.25	44.25	0	1
504.9	50 year	49.4	49.4	0	1
505.5	100 year	55.02	55.02	0	1
508.64	Overtopping	75.33	75.33	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)
2 year	25.97	25.97	503.33	2.476	2.731	2-M2c	1.726	1.645	1.645	0.492	6.543	4.076
5 year	32.13	32.13	503.69	2.864	3.094	7-M2c	1.991	1.839	1.839	0.554	7.074	4.357
** 10 year	37.28	37.28	503.99	3.23	3.393	7-M2c	2.233	1.986	1.986	0.601	7.507	4.561
25 year	44.25	44.25	504.41	3.806	3.804	7-M2c	3	2.167	2.167	0.66	8.094	4.806
50 year	49.4	49.4	504.9	4.299	4.126	7-M2c	3	2.288	2.288	0.7	8.541	4.968
**100 year	55.02	55.02	505.5	4.902	4.512	7-M2c	3	2.407	2.407	0.742	9.051	5.133

* Full Flow Headwater elevation is below inlet invert.

** THE INCREASE IN HEADWATER ELEVATION DOES NOT AFFECT THE SURROUNDING PRIVATE PROPERTIES.

*** STREAM BED AND BANK PROTECTION SHOULD BE PROVIDED WHEN OUTLET VELOCITIES ARE GREATER THAN 8 FT/S.

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 500.60 ft
Outlet Station: 77.00 ft
Outlet Elevation: 500.35 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 10.00 ft
Side Slope (H:V): 6.00 (_:1)
Channel Slope: 0.0410
Channel Manning's n: 0.0400
Channel Invert Elevation: 500.35 ft

Culvert Data Summary

Barrel Shape: Concrete Box
Barrel Diameter: 3.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Mitered to Conform to Slope
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
25.97	500.84	0.49	4.08	1.26	1.13
32.13	500.9	0.55	4.36	1.42	1.15
37.28	500.95	0.6	4.56	1.54	1.17
44.25	501.01	0.66	4.81	1.69	1.18
49.4	501.05	0.7	4.97	1.79	1.19
55.02	501.09	0.74	5.13	1.9	1.2

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	98550.00	508.15
1	98600.00	508.64
2	98700.00	509.92

Roadway Surface: Paved
Roadway Top Width: 44.00 ft

STATE OF TEXAS
PAULA PRICE
90265
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Paula N. Price, P.E, CFM
DN: cn=Paula N. Price, P.E, CFM, o=P&D Professional Services, Inc., ou, email=pprice@pdproservices.com, c=US
Date: 2021.05.31 20:37:48 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

SH 304

HYDRAULIC DATA
CULVERT No. 11

STA 985+56.62

DS:	CK:	CONT	SECT	JOB	HIGHWAY
PNP	RAK	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
PNP	RAK	AUS	BASTROP		119

DATE: 5/31/2021 7:58:43 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034 HYD_1_3_5_11_12_13.dgn

HY-8 Analysis Report - Existing

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straight Culvert

Inlet Elevation (invert): 505.04 ft, Outlet Elevation (invert): 504.78ft

Culvert Length: 41.00ft, Culvert Slope: 0.0063

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
506.18	2 year	18.25	18.25	0.00	1
506.35	5 year	22.58	22.58	0.00	1
506.49	10 year	26.20	26.20	0.00	1
506.66	25 year	31.09	31.09	0.00	1
506.79	50 year	34.71	34.71	0.00	1
506.92	100 year	38.65	38.65	0.00	1
512.44	Overtopping	256.27	256.27	0.00	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)
2 year	18.25	18.25	506.18	1.138	0.498	1-S2n	0.598	0.745	0.614	0.598	5.944	2.783
5 year	22.58	22.58	506.35	1.312	0.618	1-S2n	0.688	0.859	0.71	0.661	6.357	2.944
10 year	26.20	26.20	506.49	1.449	0.714	1-S2n	0.76	0.948	0.787	0.708	6.655	3.062
25 year	31.09	31.09	506.66	1.624	0.84	1-S2n	0.851	1.063	0.887	0.767	7.01	3.202
50 year	34.71	34.71	506.79	1.748	0.93	1-S2n	0.916	1.144	0.958	0.806	7.247	3.295
100 year	38.65	38.65	506.92	1.877	1.026	1-S2n	0.985	1.229	1.034	0.847	7.479	3.388

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 505.04 ft
Outlet Station: 41.00 ft
Outlet Elevation: 504.78 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 5.00 ft
Side Slope (H:V): 10.00 (_:1)
Channel Slope: 0.0200
Channel Manning's n: 0.0400
Channel Invert Elevation: 504.78 ft

Culvert Data Summary

Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (30-75º flare) Wingwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
18.25	505.38	0.60	2.78	0.75	0.79
22.58	505.44	0.66	2.94	0.82	0.80
26.20	505.49	0.71	3.06	0.88	0.81
31.09	505.55	0.77	3.20	0.96	0.82
34.71	505.59	0.81	3.29	1.01	0.82
38.65	505.63	0.85	3.39	1.06	0.83

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	100900.00	514.44
1	101000.00	513.09
2	101050.00	512.44

Roadway Surface: Paved
Roadway Top Width: 25.00 ft

HY-8 Analysis Report - Proposed

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straigh: Culvert

Inlet Elevation (invert): 505.13 ft, Outlet Elevation (invert): 504.65 ft

Culvert Length: 75.00ft, Culvert Slope: 0.0064

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
506.27	2 year	18.25	18.25	0	1
506.44	5 year	22.58	22.58	0	1
506.58	10 year	26.20	26.20	0	1
506.75	25 year	31.09	31.09	0	1
506.88	50 year	34.71	34.71	0	1
507.01	100 year	38.65	38.65	0	1
512.65	Overtopping	260.21	260.21	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)
2 year	18.25	18.25	506.27	1.138	0.279	1-S2n	0.596	0.745	0.603	0.598	6.052	2.783
5 year	22.58	22.58	506.44	1.312	0.399	1-S2n	0.686	0.859	0.696	0.661	6.492	2.944
** 10 year	26.20	26.20	506.58	1.449	0.496	1-S2n	0.757	0.948	0.768	0.708	6.82	3.062
25 year	31.09	31.09	506.75	1.624	0.622	1-S2n	0.848	1.063	0.864	0.767	7.196	3.202
50 year	34.71	34.71	506.88	1.747	0.713	1-S2n	0.914	1.144	0.933	0.806	7.439	3.295
**100 year	38.65	38.65	507.01	1.877	0.809	1-S2n	0.982	1.229	1.006	0.847	7.686	3.388

** THE INCREASE IN HEADWATER ELEVATION DOES NOT AFFECT THE SURROUNDING PRIVATE PROPERTIES.

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 505.13 ft
Outlet Station: 75.00 ft
Outlet Elevation: 504.65 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 5.00 ft
Side Slope (H:V): 10.00 (_:1)
Channel Slope: 0.0200
Channel Manning's n: 0.0400
Channel Invert Elevation: 504.65 ft

Culvert Data Summary

Barrel Shape: Concrete Box
Barrel Span: 5.00 ft
Barrel Rise: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (30-75º flare) Wingwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
18.25	505.25	0.60	2.78	0.75	0.79
22.58	505.31	0.66	2.94	0.82	0.80
26.20	505.36	0.71	3.06	0.88	0.81
31.09	505.42	0.77	3.20	0.96	0.82
34.71	505.46	0.81	3.29	1.01	0.82
38.65	505.50	0.85	3.39	1.06	0.83

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	100900.00	514.65
1	101000.00	513.30
2	101050.00	512.65

Roadway Surface: Paved
Roadway Top Width: 44.00 ft

STATE OF TEXAS
PAULA PRICE
90265
LICENSED
PROFESSIONAL ENGINEER

Digitally signed by Paula N. Price, P.E, CFM
DN: cn=Paula N. Price, P.E, CFM, o=P&D Professional Services, Inc., ou, email=pprice@pdproservices.com, c=US
Date: 2021.10.24 22:34:30 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

SH 304

HYDRAULIC DATA

CULVERT No. 12

STA 1010+31.05

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		120

DS: PNP CK: RAK
DW: PNP CK: RAK

DATE: 10/24/2021 10:31:02 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034 HYD_1-3_5-11_12-13.dgn

HY-8 Analysis Report - Existing

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straight Culvert

Inlet Elevation (invert): 494.63 ft, Outlet Elevation (invert): 494.28 ft

Culvert Length: 37.17 ft, Culvert Slope: 0.0094

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
496	2 year	33.92	33.92	0	1
497.42	5 year	97.65	97.65	0	1
498.82	10 year	178.19	178.19	0	1
501.19	25 year	317.89	317.89	0	1
501.97	50 year	438.83	356.46	81.74	7
502.16	100 year	582.19	364.89	216.71	5
501.59	Overtopping	338.14	338.14	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)
2 year	33.92	33.92	496	1.371	0.572	1-S2n	0.617	0.9	0.671	0.714	7.224	2.07
5 year	97.65	97.65	497.42	2.786	1.652	1-S2n	1.232	1.822	1.439	1.237	9.691	2.804
10 year	178.19	178.19	498.82	4.187	2.971	1-S2n	1.858	2.72	2.233	1.663	11.398	3.304
25 year	317.89	317.89	501.19	6.558	6.064	5-S2n	2.807	4.001	3.405	2.189	13.338	3.852
50 year	438.83	356.46	501.97	7.343	6.715	5-S2n	3.053	4.318	3.701	2.541	13.758	4.191
100 year	582.19	364.89	502.16	7.526	6.864	5-S2n	3.106	4.386	3.765	2.889	13.845	4.51

* Full Flow Headwater elevation is below inlet invert.

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 494.63 ft
Outlet Station: 37.17 ft
Outlet Elevation: 494.28 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 15.80 ft
Side Slope (H:V): 10.00 (_:1)
Channel Slope: 0.0070
Channel Manning's n: 0.0400
Channel Invert Elevation: 494.28 ft

Culvert Data Summary

Barrel Shape: Concrete Box
Barrel Span: 7.00 ft
Barrel Rise: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (30-75º flair) Wingwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
33.92	494.99	0.71	2.07	0.31	0.49
97.65	495.52	1.24	2.80	0.54	0.53
178.19	495.94	1.66	3.30	0.73	0.56
317.89	496.47	2.19	3.85	0.96	0.58
438.83	496.82	2.54	4.19	1.11	0.59
582.19	497.17	2.89	4.51	1.26	0.60

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	102900.00	502.44
1	103000.00	502.02
2	103100.00	501.79
3	103200.00	501.59
4	103300.00	501.92
5	103400.00	502.58

Roadway Surface: Paved
Roadway Top Width: 23.00 ft

HY-8 Analysis Report - Proposed

Crossing Discharge Data

Discharge Selection Method: Recurrence

****

Straight Culvert

Inlet Elevation (invert): 494.86 ft, Outlet Elevation (invert): 494.15 ft

Culvert Length: 64.00 ft Culvert Slope: 0.0111

****

Table 1 - Summary of Culvert Flows:

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	Discharge (cfs)	Roadway Discharges (cfs)	Iterations
496.23	2 year	33.92	33.92	0	1
497.64	5 year	97.65	97.65	0	1
499.04	10 year	178.19	178.19	0	1
501.41	25 year	317.89	317.89	0	1
502.18	50 year	438.83	355.76	82.26	7
502.37	100 year	582.19	364.2	217.41	5
501.8	Overtopping	337.36	337.36	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)
2 year	33.92	33.92	496.23	1.369	0.213	1-S2n	0.585	0.9	0.615	0.714	7.873	2.07
5 year	97.65	97.65	497.64	2.782	1.3	1-S2n	1.166	1.822	1.321	1.237	10.564	2.804
** 10 year	178.19	178.19	499.04	4.182	2.639	1-S2n	1.755	2.72	2.065	1.663	12.328	3.304
25 year	317.89	317.89	501.41	6.554	5.791	5-S2n	2.644	4.001	3.18	2.189	14.281	3.852
50 year	438.83	355.76	502.18	7.324	6.452	5-S2n	2.87	4.313	3.458	2.541	14.699	4.191
**100 year	582.19	364.2	502.37	7.507	6.606	5-S2n	2.92	4.381	3.519	2.889	14.785	4.51

** THE INCREASE IN HEADWATER ELEVATION DOES NOT AFFECT THE SURROUNDING PRIVATE PROPERTIES.

*** STREAM BED AND BANK PROTECTION SHOULD BE PROVIDED WHEN OUTLET VELOCITIES ARE GREATER THAN 8 FT/S.

Site Data

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 494.86 ft
Outlet Station: 64.00 ft
Outlet Elevation: 494.15 ft
Number of Barrels: 1

Tailwater Channel Data

Tailwater Channel Option: Trapezoidal Channel
Bottom Width: 15.80 ft
Side Slope (H:V): 10.00 (_:1)
Channel Slope: 0.0070
Channel Manning's n: 0.0400
Channel Invert Elevation: 494.15 ft

Culvert Data Summary

Barrel Shape: Concrete Box
Barrel Span: 7.00 ft
Barrel Rise: 5.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge (30-75º flare) Wingwall
Inlet Depression: None

Table 3 - Downstream Channel Rating Curve

Flow (cfs)	Water Surface Elevation (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
33.92	494.87	0.71	2.07	0.31	0.49
97.65	495.39	1.24	2.80	0.54	0.53
178.19	495.82	1.66	3.30	0.73	0.56
317.89	496.34	2.19	3.85	0.96	0.58
438.83	496.70	2.54	4.19	1.11	0.59
582.19	497.04	2.89	4.51	1.26	0.60

Roadway Data for Crossing:

Roadway Profile Shape: Irregular Roadway Shape (coordinates)
Irregular Roadway Cross-Section:

Coord No.	Station (ft)	Elevation (ft)
0	102900.00	502.65
1	103000.00	502.23
2	103100.00	502.00
3	103200.00	501.80
4	103300.00	502.13
5	103400.00	502.79

Roadway Surface: Paved
Roadway Top Width: 44.00 ft

STATE OF TEXAS
PAULA PRICE
90265
LICENSED
PROFESSIONAL ENGINEER

Paula N. Price

Digitally signed by Paula N. Price, P.E. CFM
DN: cn=Paula N. Price, P.E. CFM, o=P&D Professional Services, Inc., ou, email=pprice@pdpros ervices.com, c=US
Date: 2021.05.31 20:39:03 -06'00'

P&D PROFESSIONAL SERVICES, INC.
617 CAROLINE ST, SUITE 11
HOUSTON, TEXAS 77002
281-743-4475
TEXAS FIRM NO. F-14117

Texas Department of Transportation

SH 304

HYDRAULIC DATA

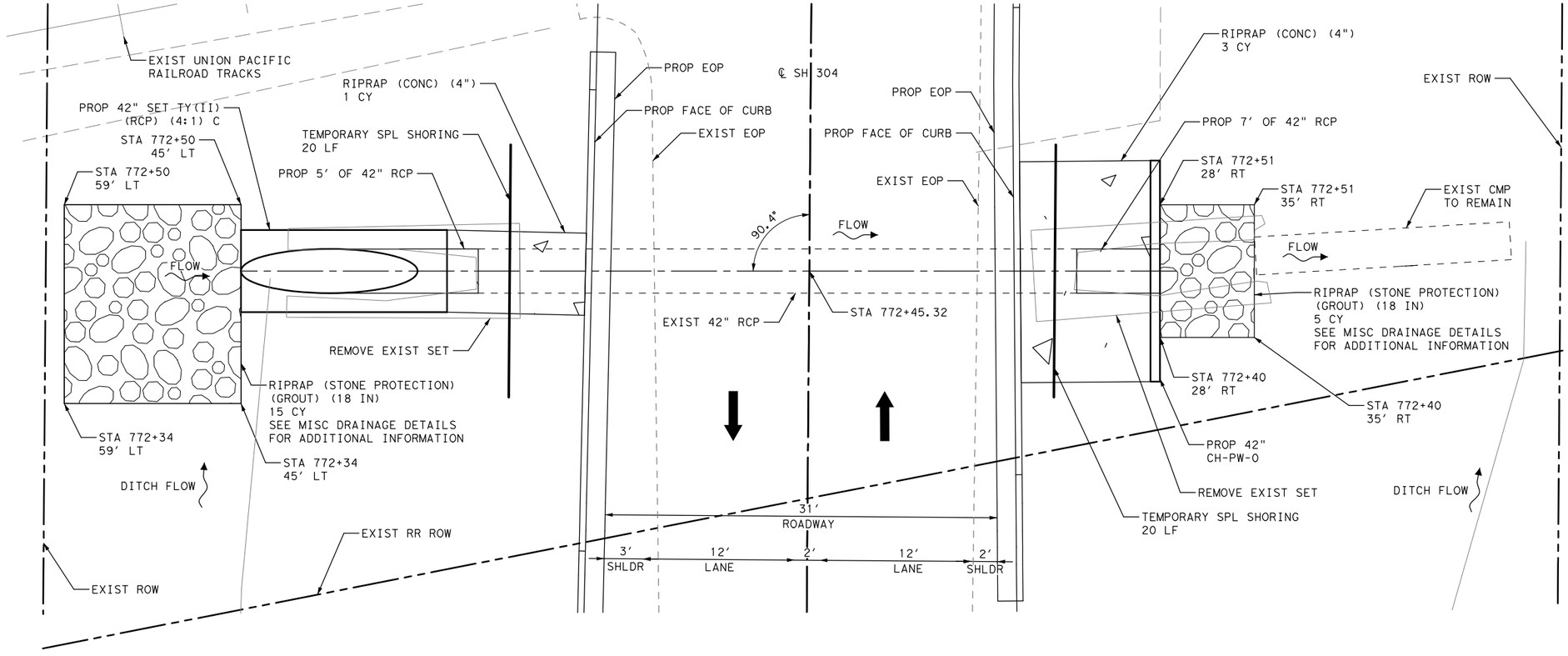
CULVERT No. 13

STA 1032+83.91

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		121

DS: CK:
DW: CK:

DATE: 5/31/2021 8:01:12 PM
FILE: Z:\02 Engineering Projects\PGAL-SH304\Work\03 DRAWINGS\034\SH 304 034 HYD_13_5_11_12_13.dgn

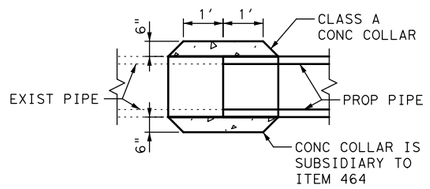


EXISTING 42" RCP

PROP: REMOVE EXIST SET'S, EXTEND 5' LT & 7' RT 42" RCP

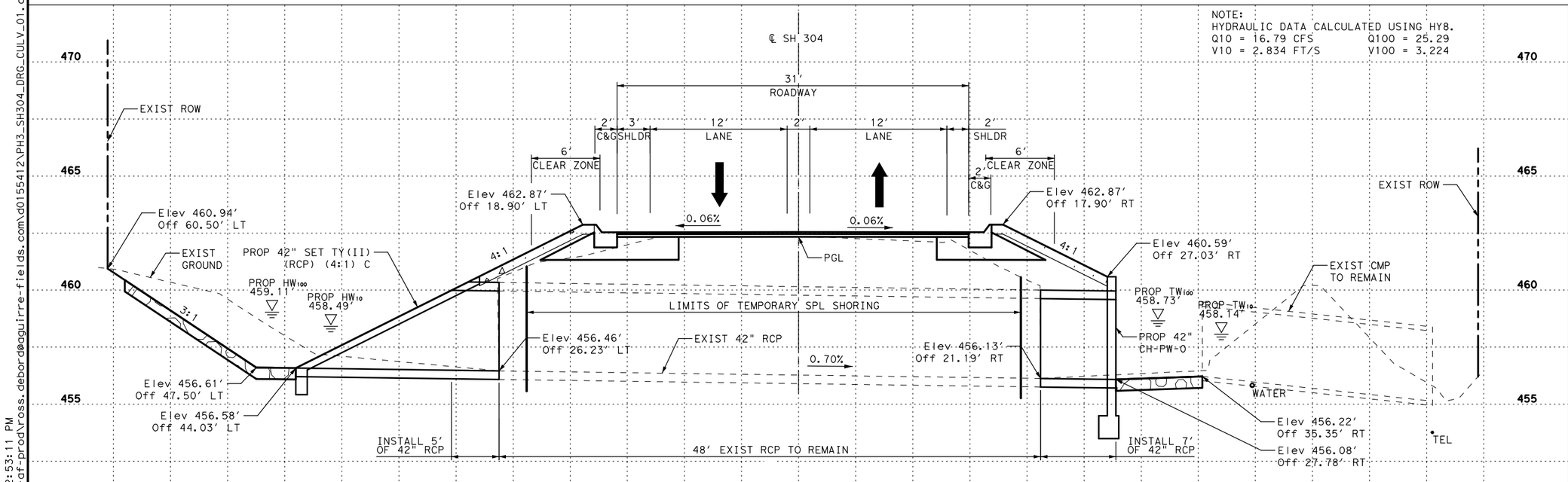
PLACE 42" SET TY (II) (RCP) (4:1) C (LT)

PLACE CONCRETE HEADWALL WITH PARALLEL WINGS 42" CH-PW-0 (RT)



TYPICAL CONCRETE COLLAR DETAIL

TO BE USED AT ALL JOINT LOCATIONS OR OTHER LOCATIONS AS DIRECTED BY THE ENGINEER.



CULVERT 1 LAYOUT
STA 772+45.32

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

9/30/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

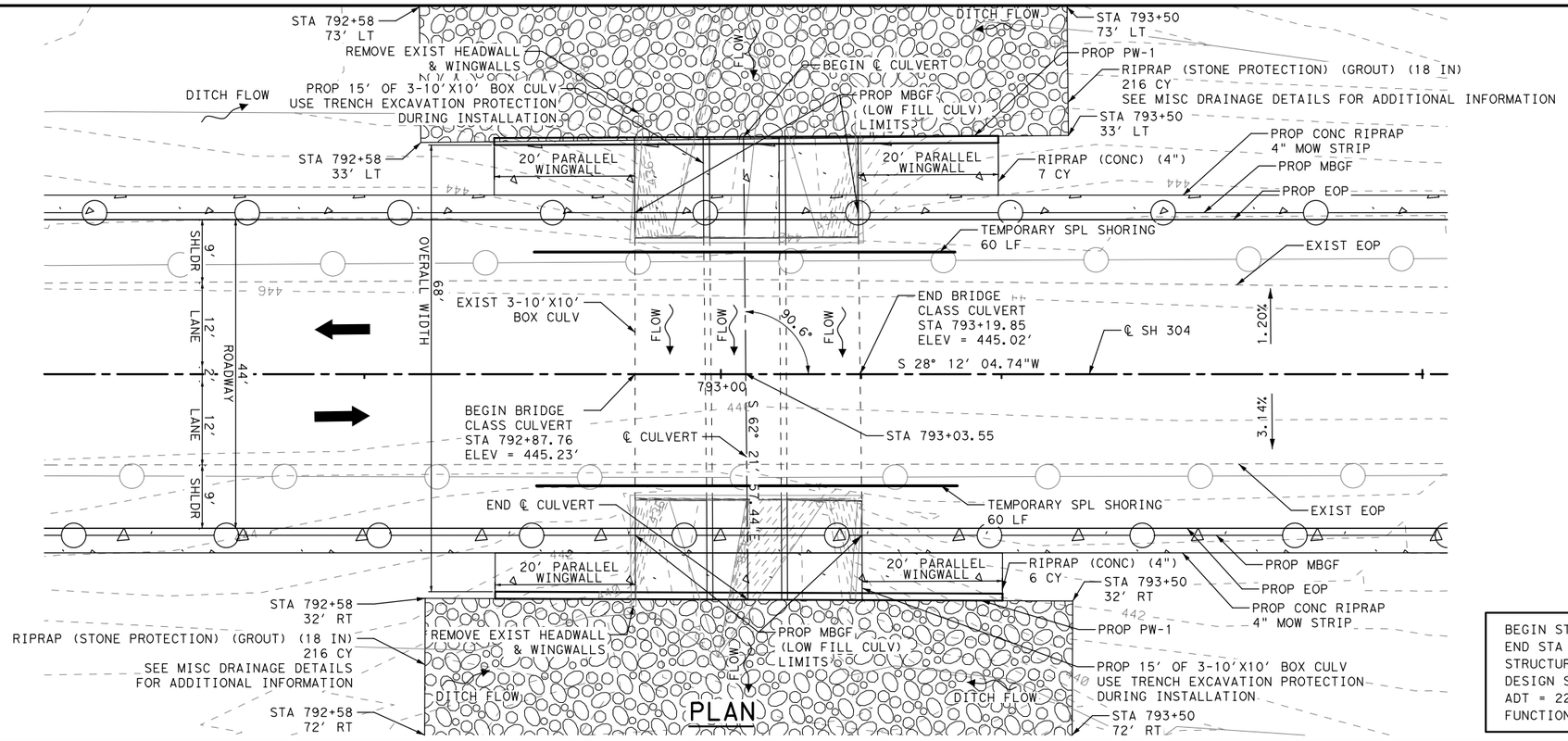
Texas Department of Transportation

SH 304
CULVERT 1 LAYOUT
STA 772+45.32

SHEET 1 OF 11

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		122

DATE: 9/30/2021 2:53:11 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde\aguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_01.dgn



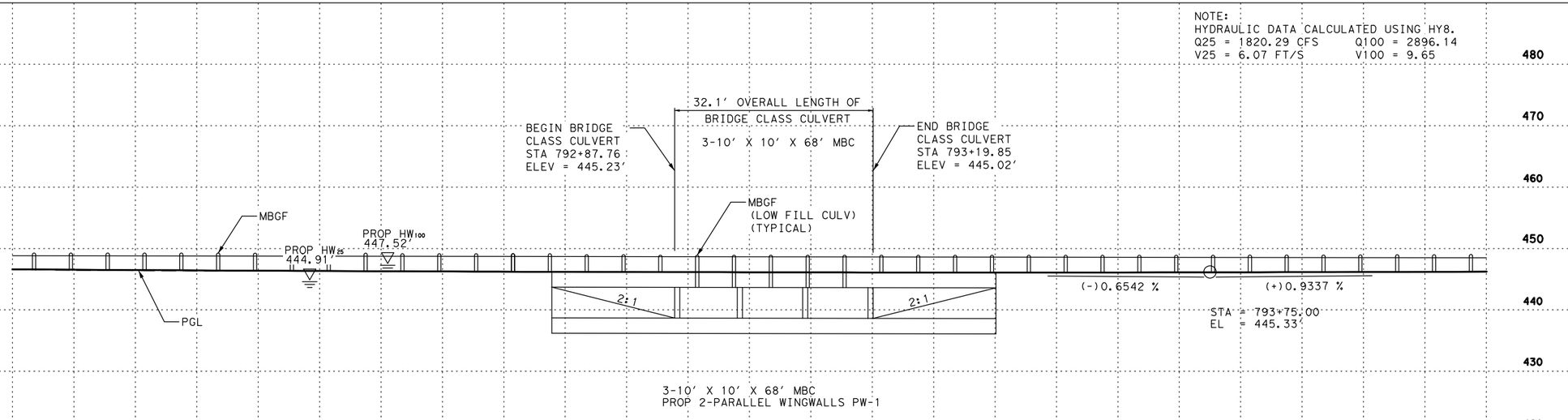
EXISTING 3-10'X10' BOX CULV

PROP: REMOVE EXIST HEADWALLS & WINGWALLS

EXTEND 3-10'X10' BOX CULV 15' LT & 15' RT

PLACE CONCRETE HEADWALL WITH PARALLEL WINGS PW-1 (LT & RT)

BEGIN STA 792+87.76
END STA 793+19.85
STRUCTURE# 14-011-0-0573-01-019
DESIGN SPEED = 65 MPH
ADT = 2251 CURRENT (FROM TXDOT STATEWIDE PLANNING MAP)
FUNCTION CLASS: RURAL MAJOR COLLECTOR



ELEVATION

HORZ SCALE: 1" = 20'
VERT SCALE: 1" = 20'

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

SH 304
BRIDGE CLASS CULVERT 2 LAYOUT
STA 793+03.55

SHEET 2 OF 11

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		123

DATE: 9/23/2021 3:13:14 PM
FILE: c:\pw-gf\pw-gf-prod\ross.debord@aguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_02_ELEV.dgn

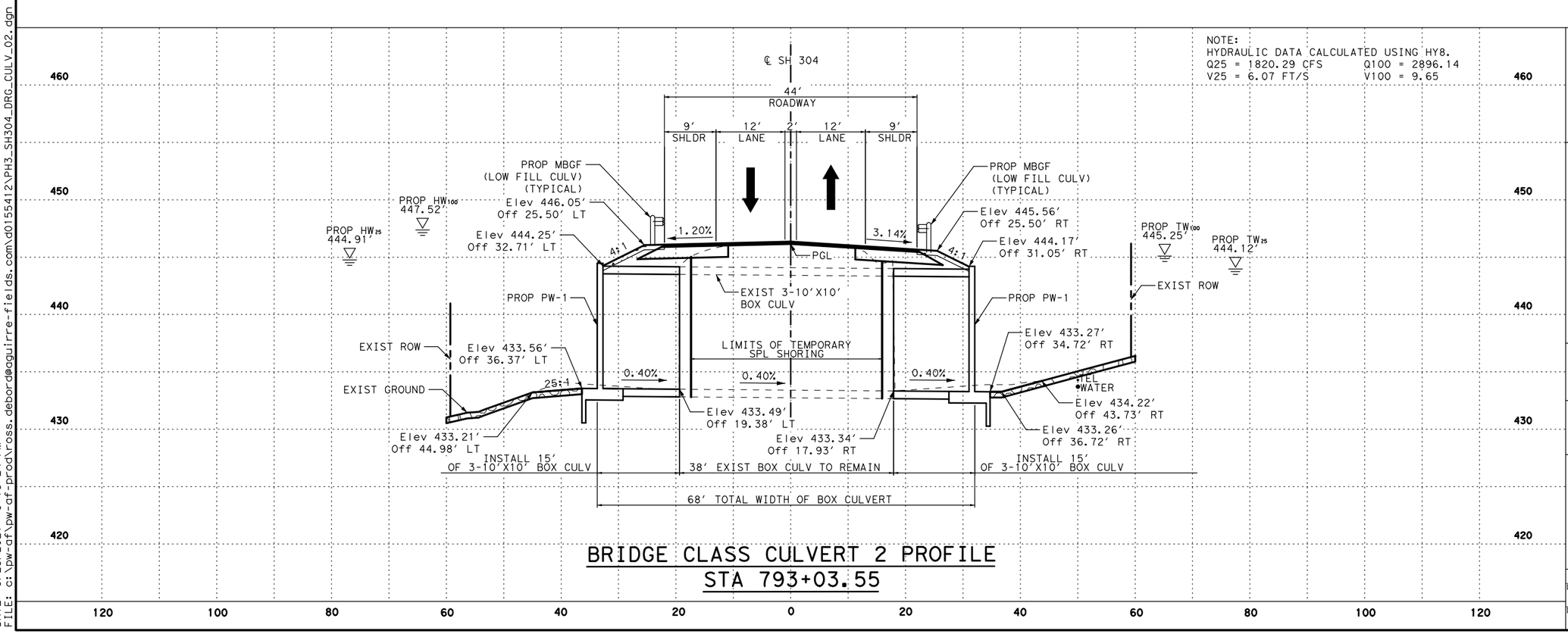
EXISTING 3-10'X10' BOX CULV

PROP: REMOVE EXIST HEADWALLS &
WINGWALLS

EXTEND 3-10'X10'
BOX CULV 15' LT & 15' RT

PLACE CONCRETE HEADWALL WITH
PARALLEL WINGS PW-1 (LT & RT)

STRUCTURE# 14-011-0-0573-01-019
DESIGN SPEED = 65 MPH
ADT = 2251 CURRENT (FROM TXDOT STATEWIDE PLANNING MAP)
FUNCTION CLASS: RURAL MAJOR COLLECTOR



BRIDGE CLASS CULVERT 2 PROFILE
STA 793+03.55

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

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

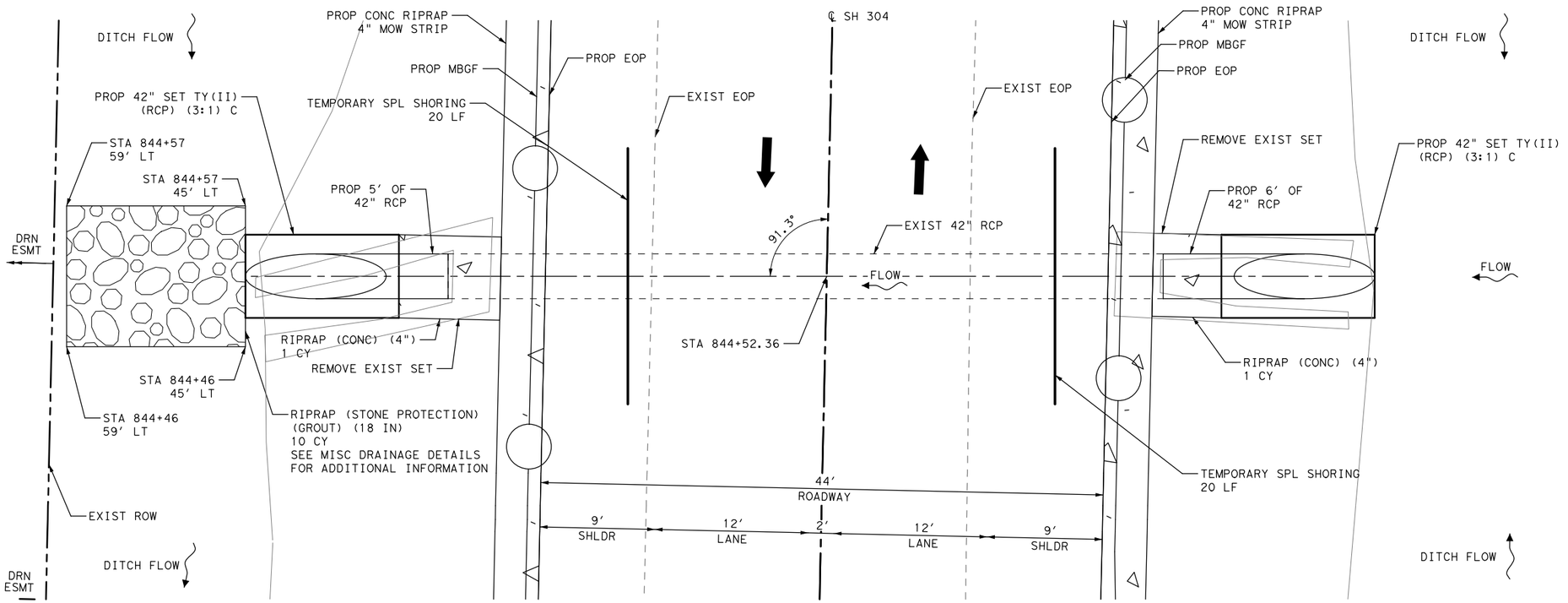
Texas Department of Transportation

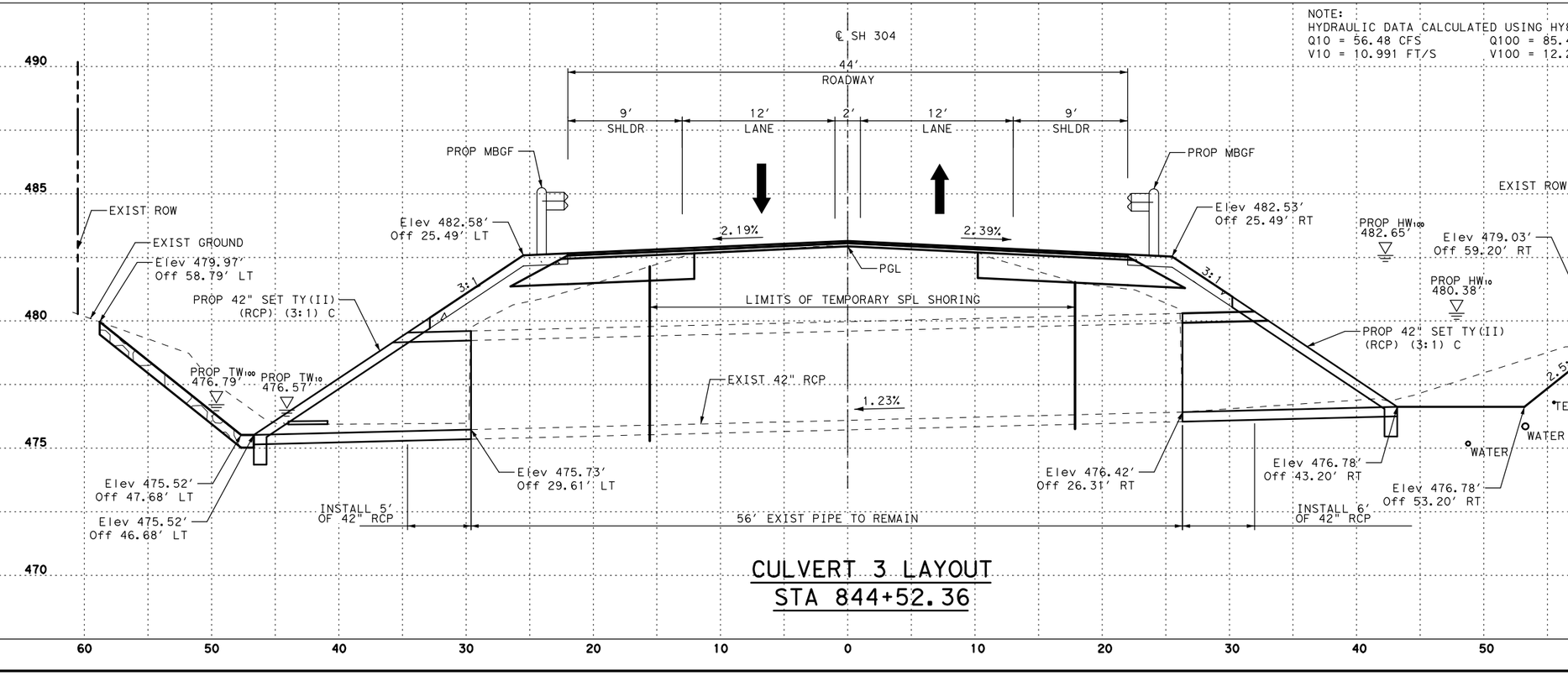
SH 304
BRIDGE CLASS
CULVERT 2 LAYOUT
STA 793+03.55

SHEET 3 OF 11

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		124

DATE: 9/23/2021 3:13:24 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_02.dgn





CULVERT 3 LAYOUT
STA 844+52.36

NOTE:
HYDRAULIC DATA CALCULATED USING HY8.
Q10 = 56.48 CFS Q100 = 85.41
V10 = 10.991 FT/S V100 = 12.286

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

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

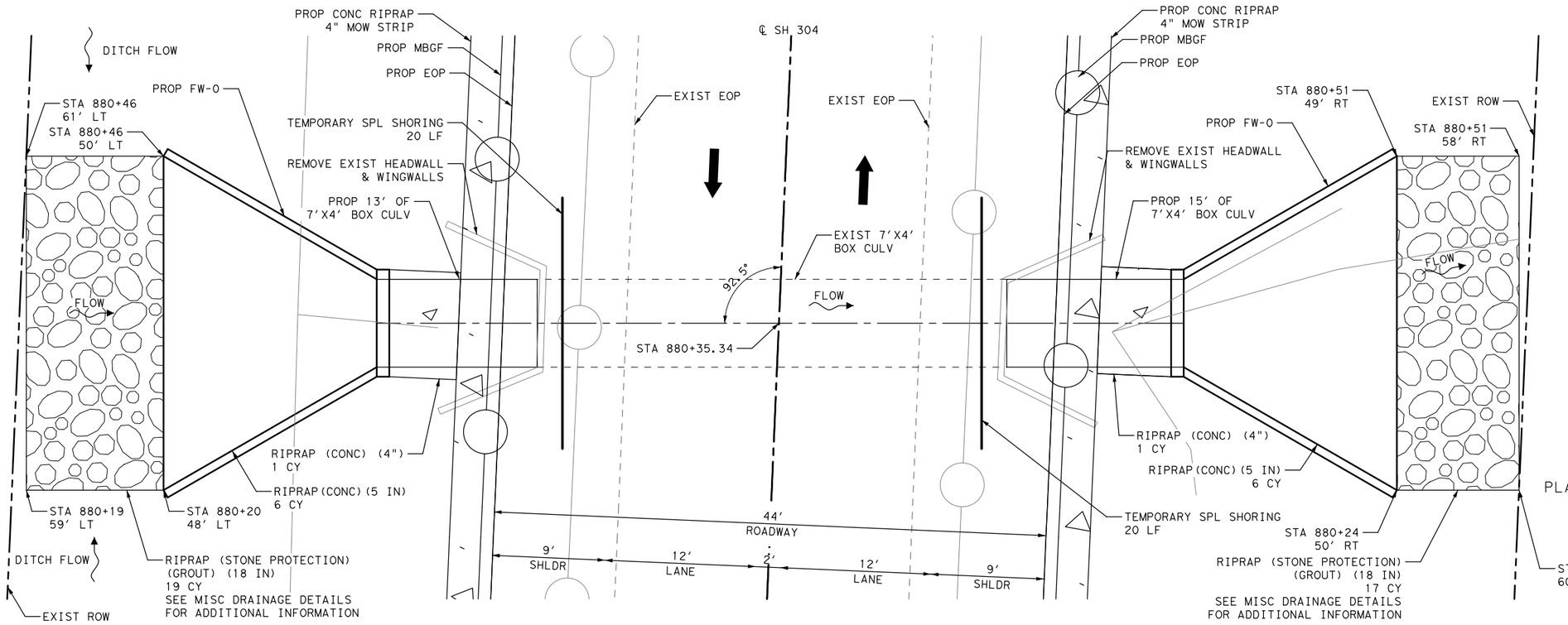
Texas Department of Transportation

SH 304
CULVERT 3 LAYOUT
STA 844+52.36

SHEET 4 OF 11

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		125

DATE: 9/23/2021 3:13:35 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde aguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_03.dgn



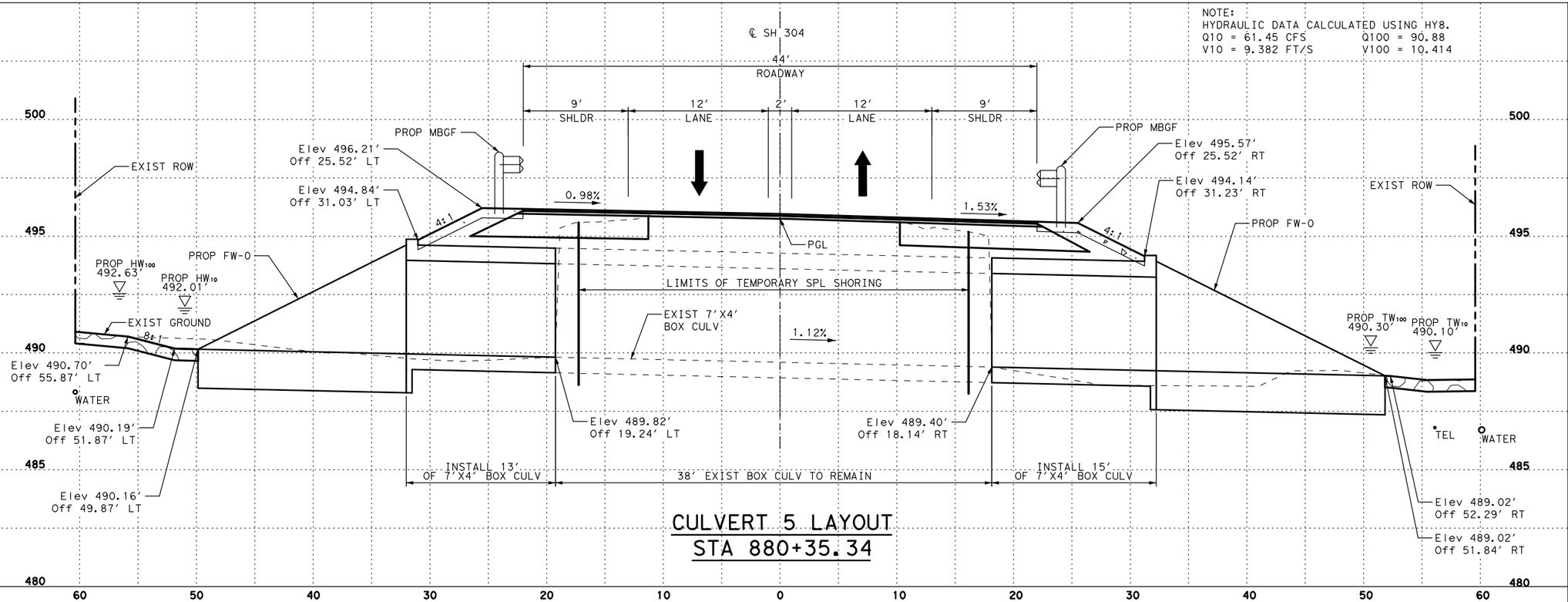
EXISTING 7'X4' BOX CULV

PROP: REMOVE EXIST HEADWALLS & WINGWALLS

EXTEND 7'X4' BOX CULV
13' LT & 15' RT

PLACE CONCRETE HEADWALL WITH FLARED WINGS FW-0 (LT & RT)

NOTE:
HYDRAULIC DATA CALCULATED USING HY8.
Q10 = 61.45 CFS Q100 = 90.88
V10 = 9.382 FT/S V100 = 10.414



CULVERT 5 LAYOUT
STA 880+35.34

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

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

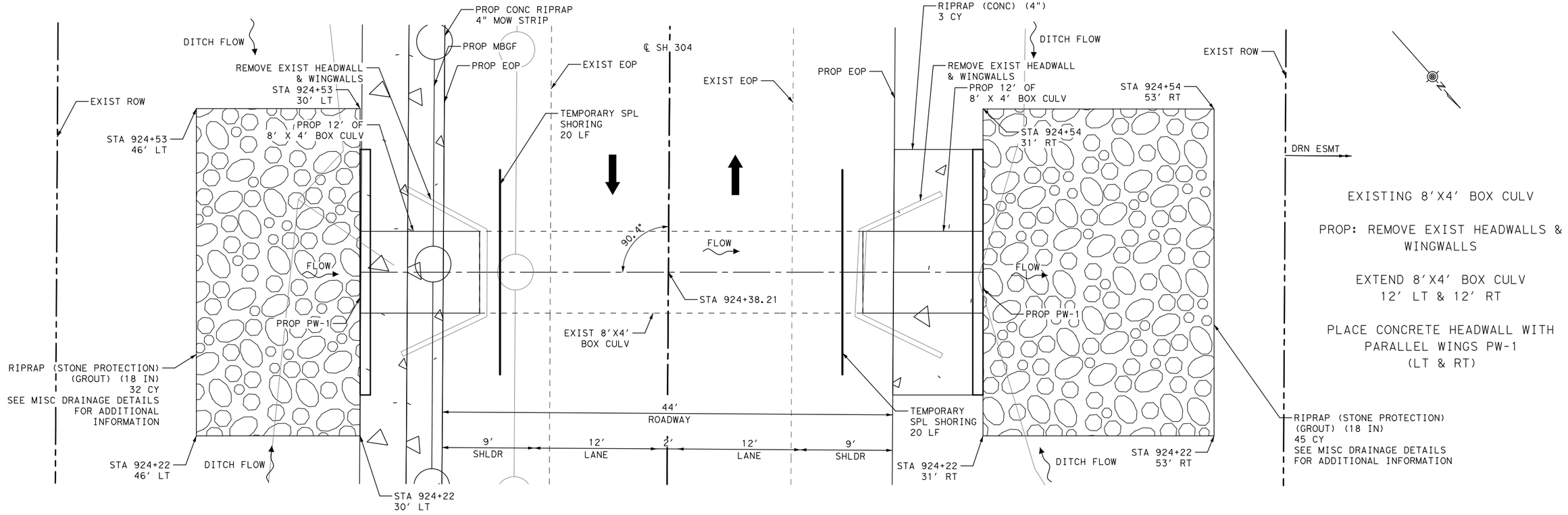
Texas Department of Transportation

SH 304
CULVERT 5 LAYOUT
STA 880+35.34

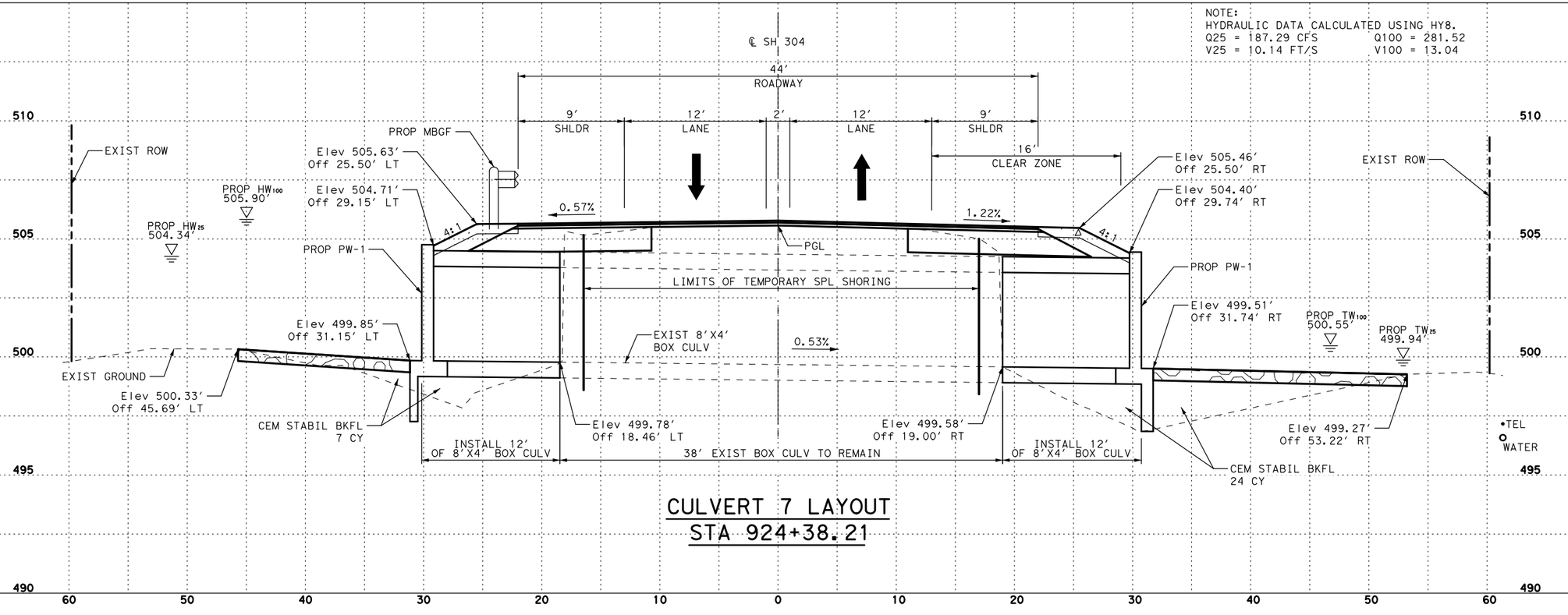
SHEET 5 OF 11

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		126

DATE: 9/23/2021 3:13:45 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde\aguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_04.dgn



NOTE:
HYDRAULIC DATA CALCULATED USING HY8.
Q25 = 187.29 CFS Q100 = 281.52
V25 = 10.14 FT/S V100 = 13.04



CULVERT 7 LAYOUT
STA 924+38.21

HORZ SCALE: 1" = 10'
VERT SCALE: 1" = 5'

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

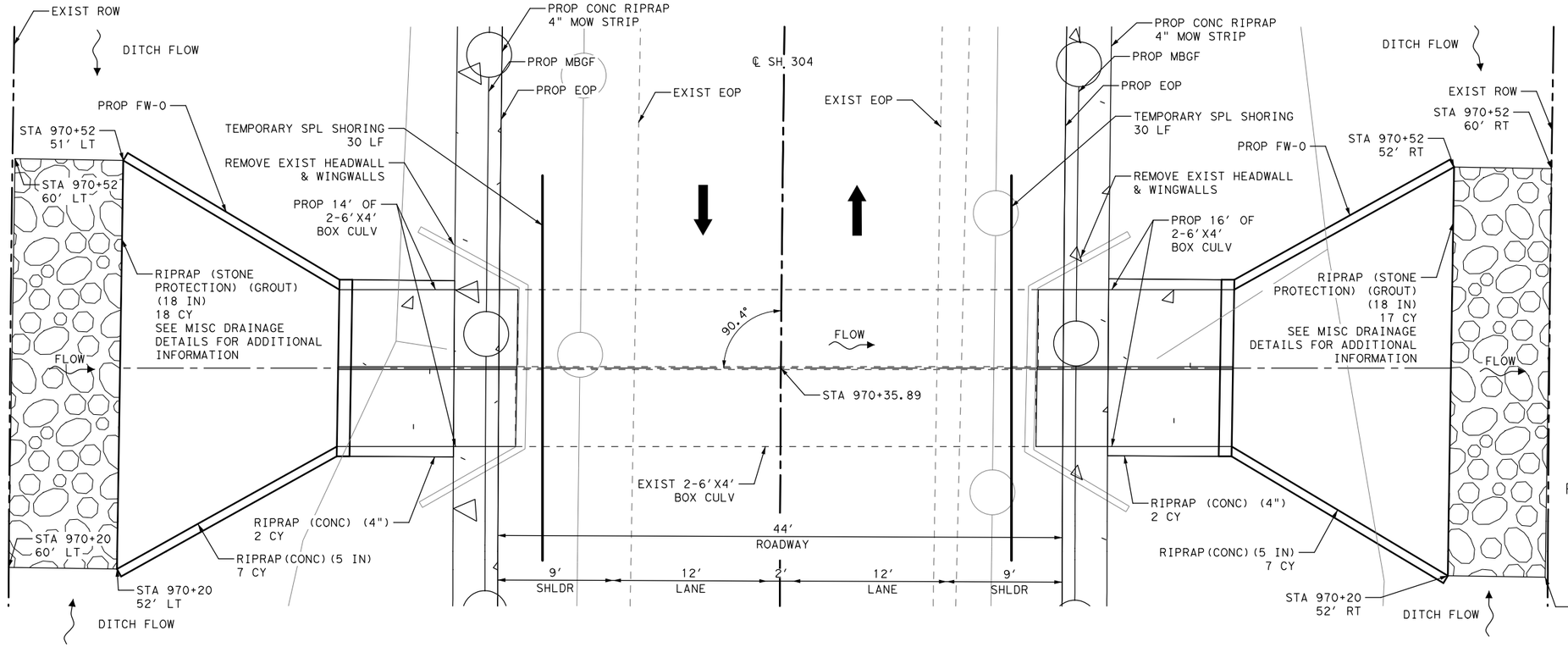
Texas Department of Transportation

SH 304
CULVERT 7 LAYOUT
STA 924+38.21

SHEET 6 OF 11

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		127

DATE: 9/23/2021 3:13:54 PM
FILE: c:\pw-df\pw-df-prod\ross.deborde@aguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_05.dgn

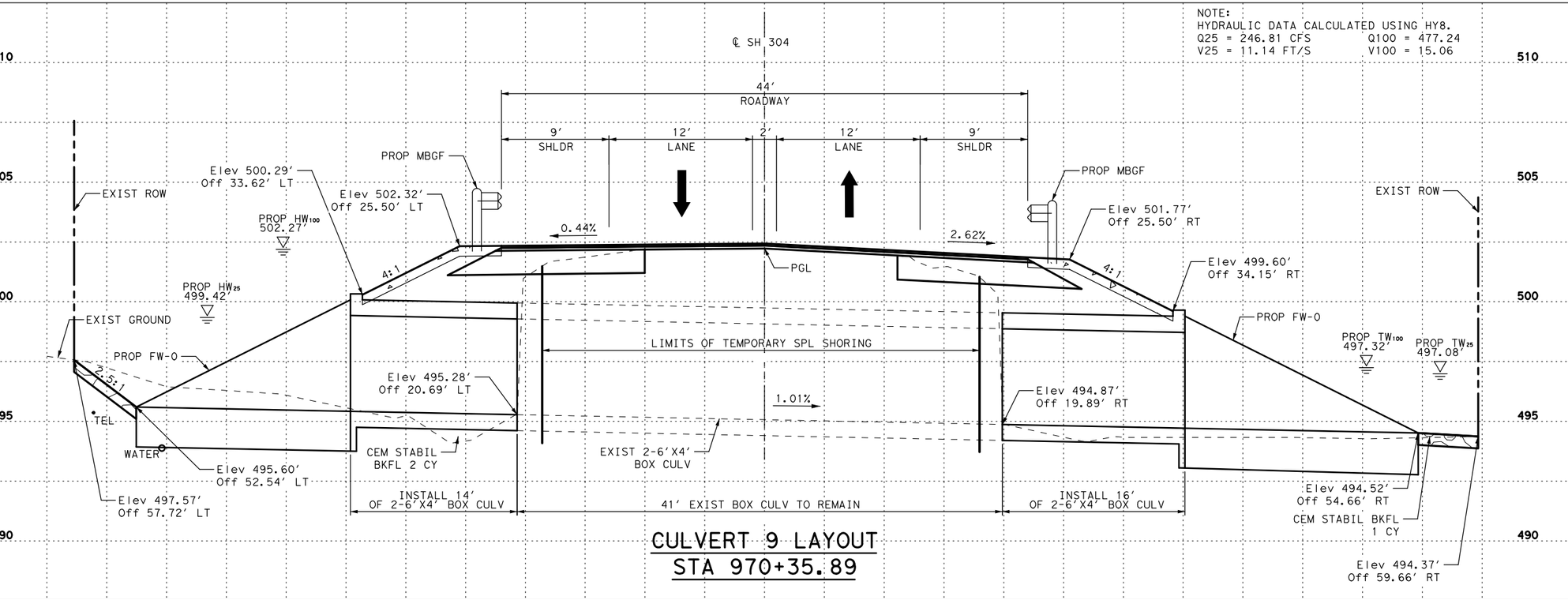


EXISTING 2-6'X4' BOX CULV

PROP: REMOVE EXIST HEADWALLS & WINGWALLS

EXTEND 2-6'X4' BOX CULV
14' LT & 16' RT

PLACE CONCRETE HEADWALL WITH FLARED WINGS FW-0
(LT & RT)



CULVERT 9 LAYOUT
STA 970+35.89

HORZ SCALE: 1" = 10'
VERT SCALE: 1" = 5'

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

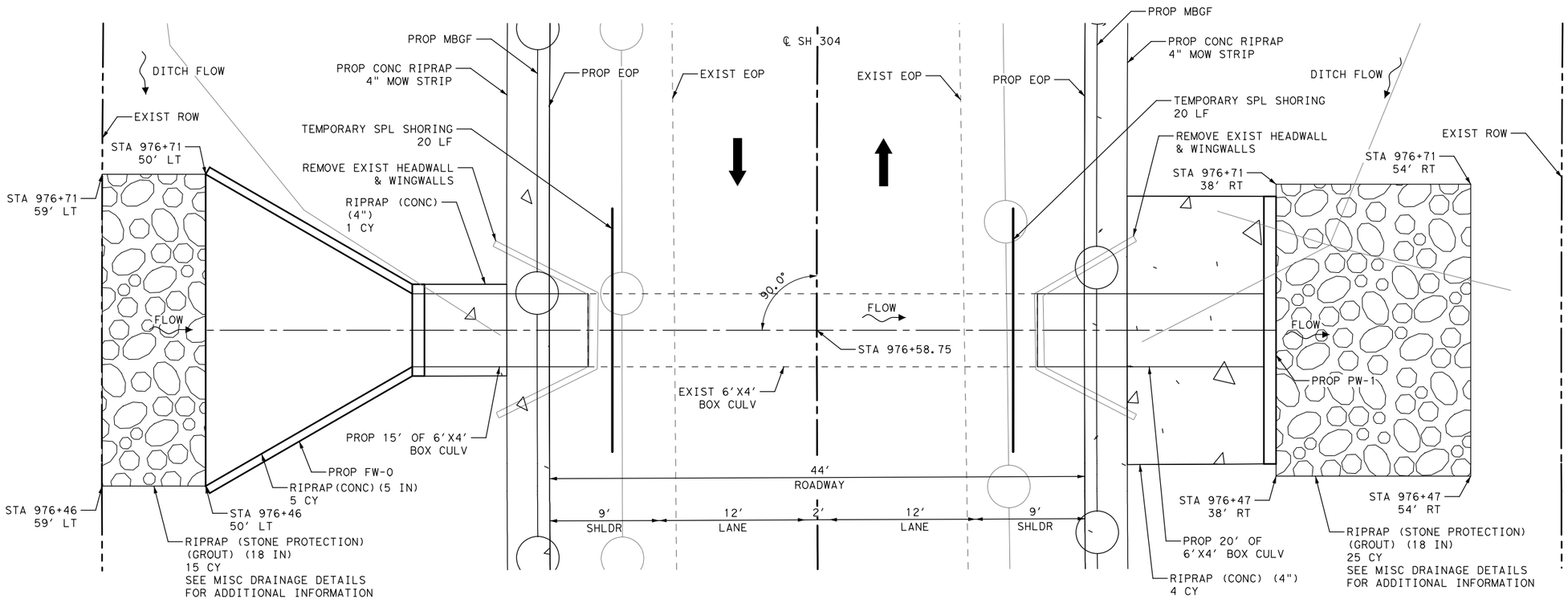
Texas Department of Transportation

SH 304
CULVERT 9 LAYOUT
STA 970+35.89

SHEET 7 OF 11

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		128

DATE: 9/23/2021 3:14:04 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_06.dgn

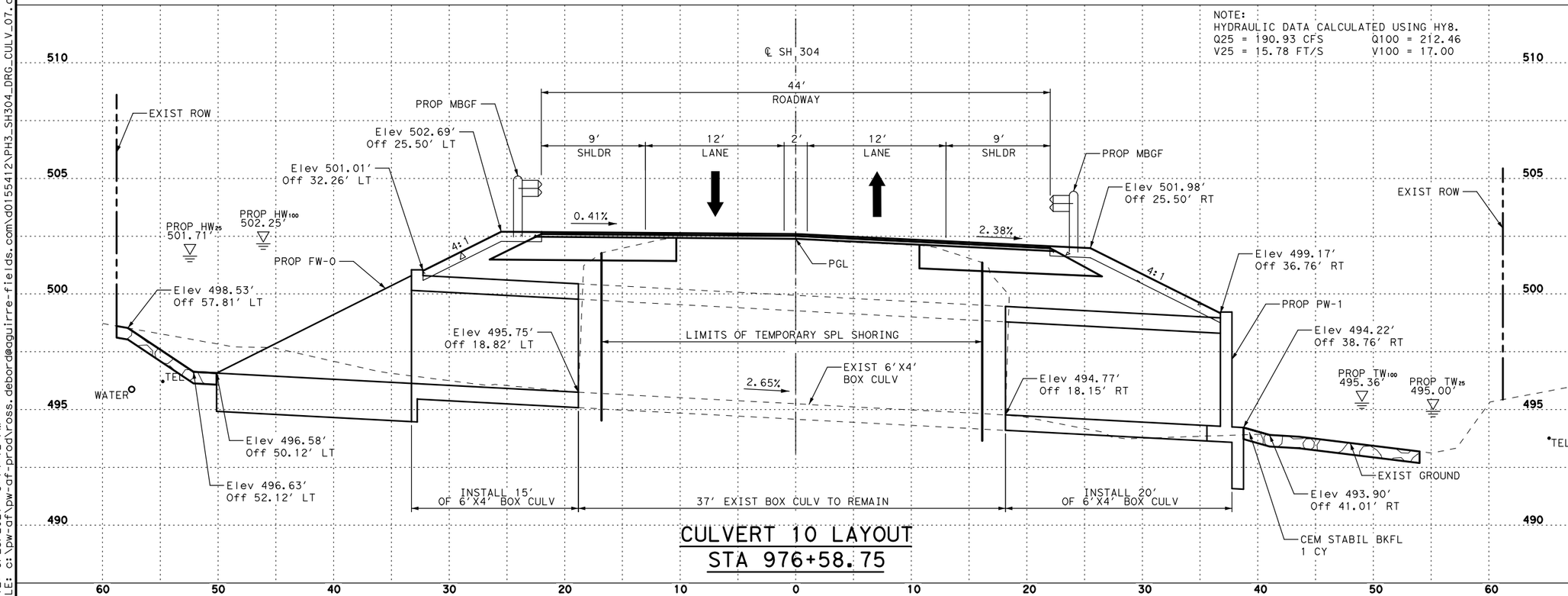


EXISTING 6'X4' BOX CULV

PROP: REMOVE EXIST HEADWALLS & WINGWALLS

EXTEND 6'X4' BOX CULV
15' LT & 20' RT

PLACE CONCRETE HEADWALL WITH FLARED WINGS FW-0 (LT) & PARALLEL WINGS PW-1 (RT)



CULVERT 10 LAYOUT
STA 976+58.75

HORZ SCALE: 1" = 10'
VERT SCALE: 1" = 5'

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

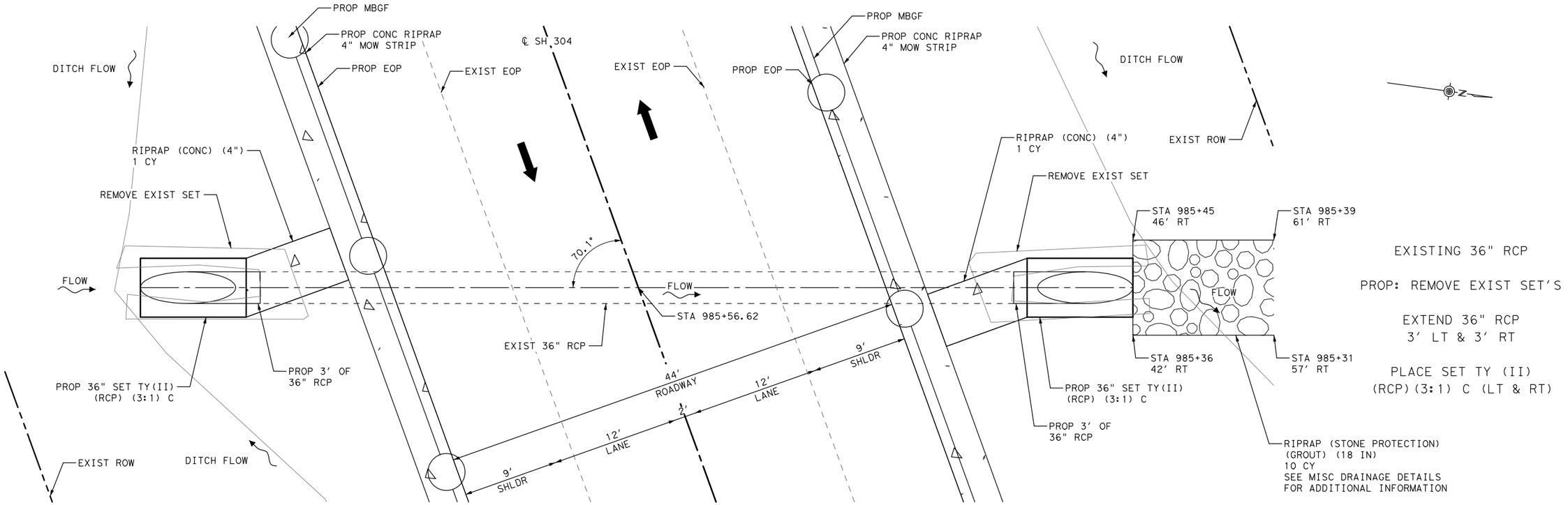
Texas Department of Transportation

SH 304
CULVERT 10 LAYOUT
STA 976+58.75

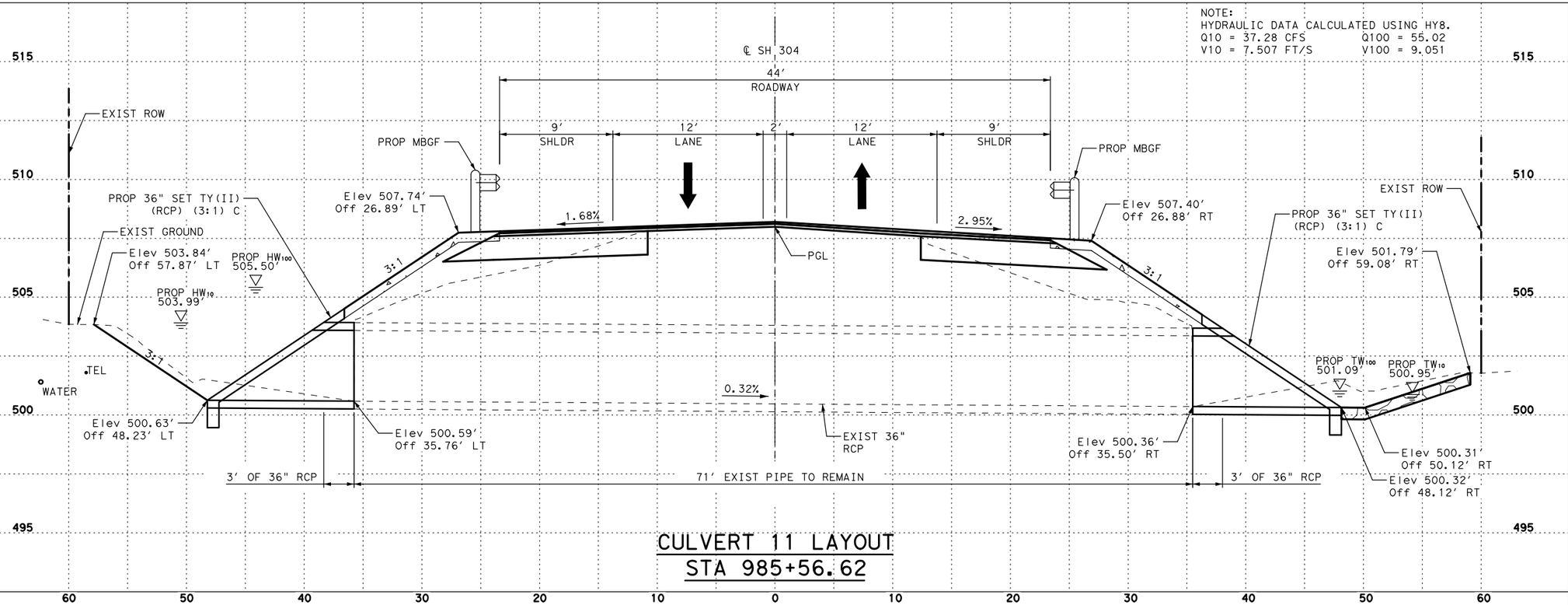
SHEET 8 OF 11

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		129

DATE: 9/23/2021 3:14:12 PM
FILE: c:\pw-df\pw-df-prod\ross.deborde\aguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_07.dgn



NOTE:
HYDRAULIC DATA CALCULATED USING HY8.
Q10 = 37.28 CFS Q100 = 55.02
V10 = 7.507 FT/S V100 = 9.051



CULVERT 11 LAYOUT
STA 985+56.62

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

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

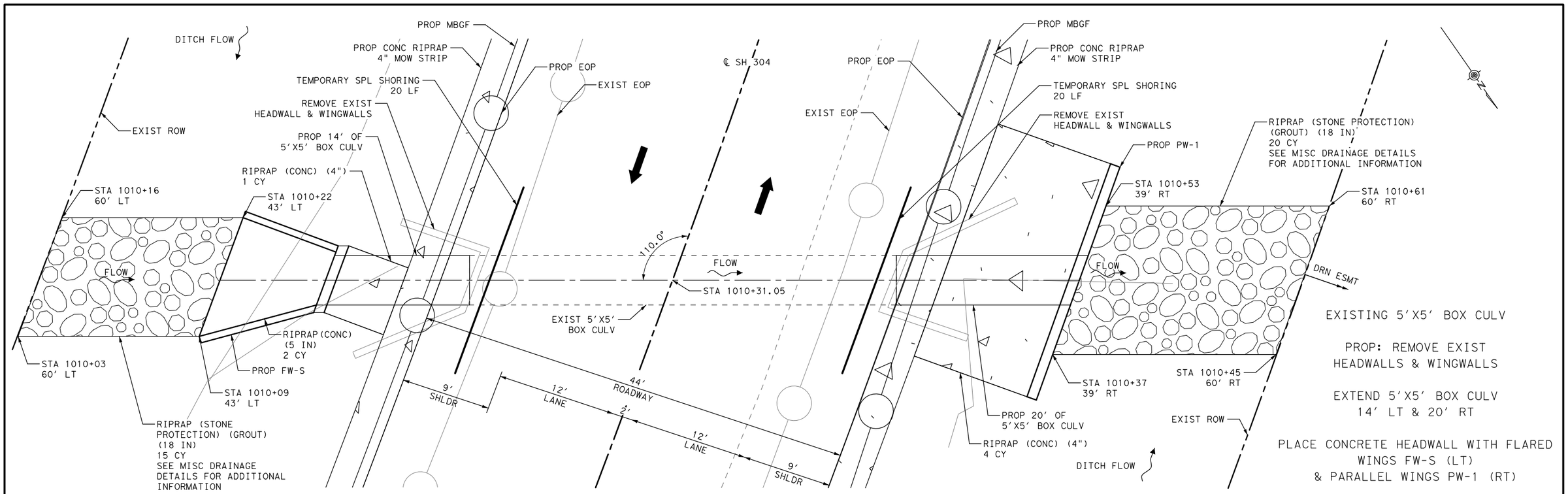
Texas Department of Transportation

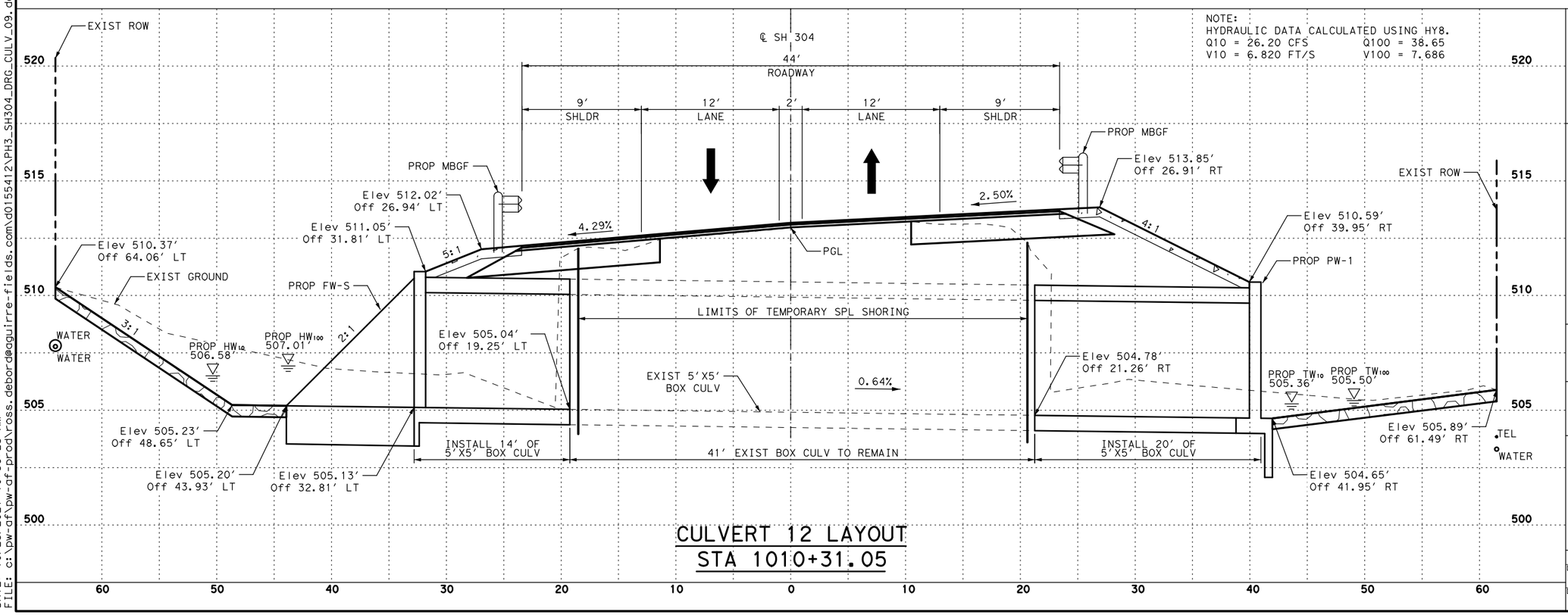
SH 304
CULVERT 11 LAYOUT
STA 985+56.62

SHEET 9 OF 11

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		130

DATE: 9/23/2021 3:14:23 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde\aguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_08.dgn





CULVERT 12 LAYOUT
STA 1010+31.05

HORZ SCALE: 1" = 10'
VERT SCALE: 1" = 5'

10/25/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

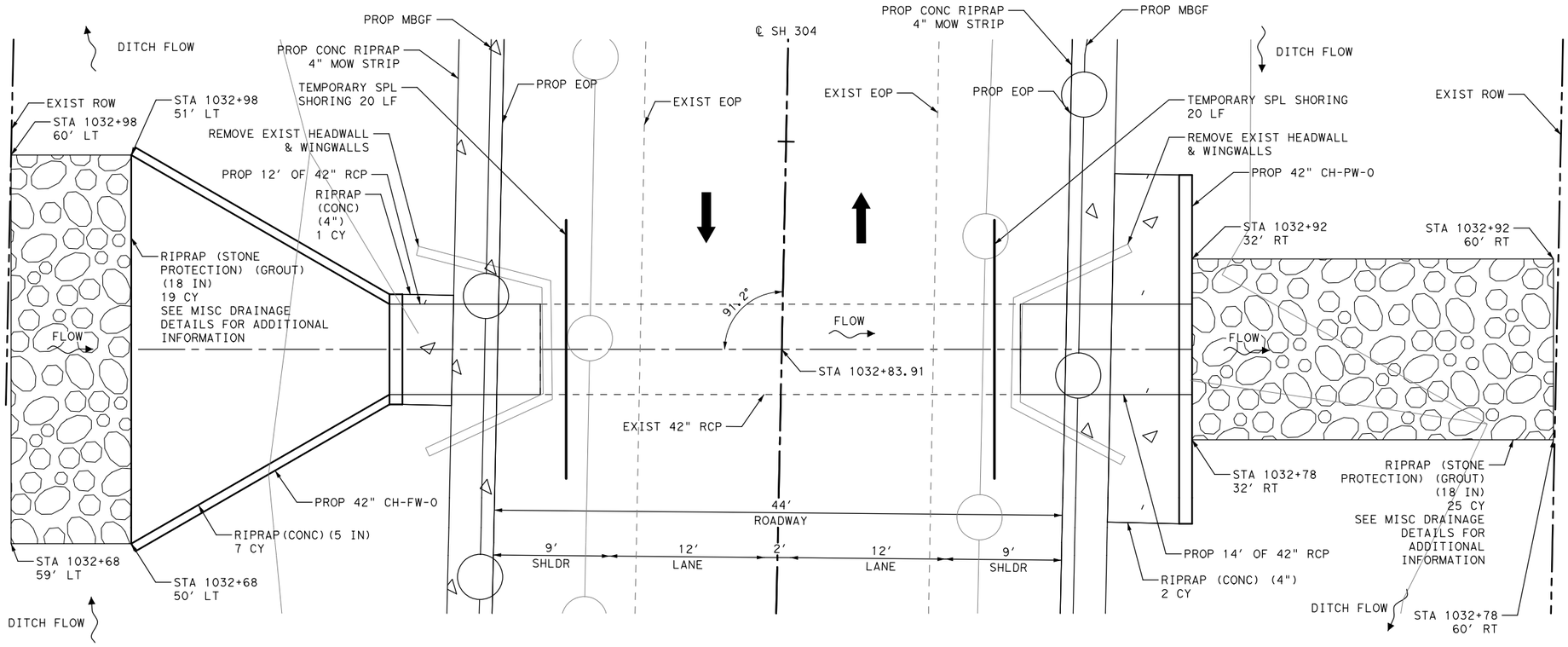
Texas Department of Transportation

SH 304
CULVERT 12 LAYOUT
STA 1010+31.05

SHEET 10 OF 11

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		131

DATE: 10/25/2021 10:58:23 AM
FILE: c:\pw-gf\pw-gf-prod\ross.debordeaguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_09.dgn

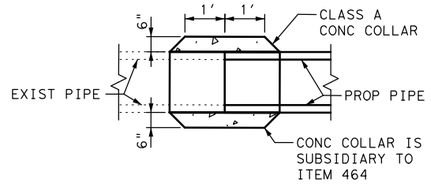


EXISTING 42" RCP

PROP: REMOVE EXIST HEADWALLS & WINGWALLS

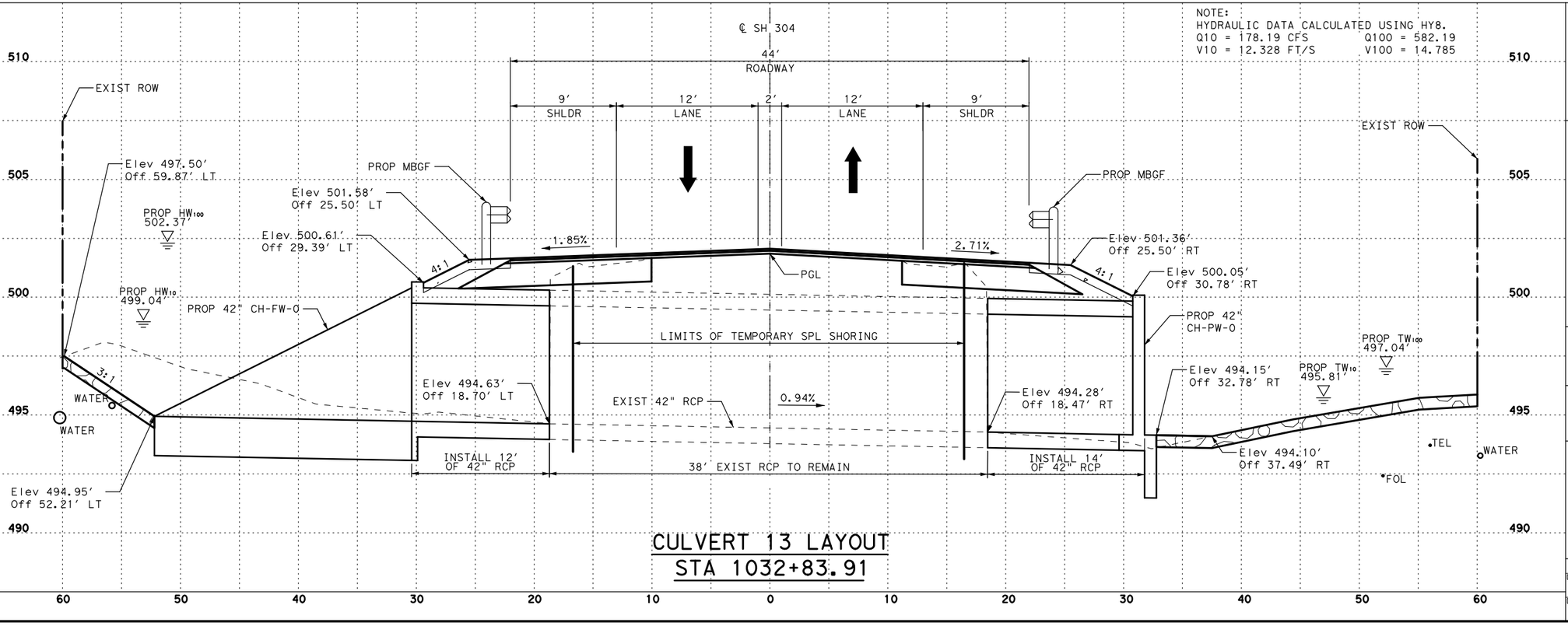
EXTEND 42" RCP
12' LT & 14' RT

PLACE CONCRETE HEADWALL WITH PARALLEL WINGS 42" CH-FW-0 (LT) & PARALLEL WINGS 42" CH-PW-0 (RT)



TYPICAL CONCRETE COLLAR DETAIL

TO BE USED AT ALL JOINT LOCATIONS OR OTHER LOCATIONS AS DIRECTED BY THE ENGINEER.



NOTE:
HYDRAULIC DATA CALCULATED USING HY8.
Q10 = 178.19 CFS Q100 = 582.19
V10 = 12.328 FT/S V100 = 14.785

CULVERT 13 LAYOUT
STA 1032+83.91

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

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

SH 304
CULVERT 13 LAYOUT
STA 1032+83.91

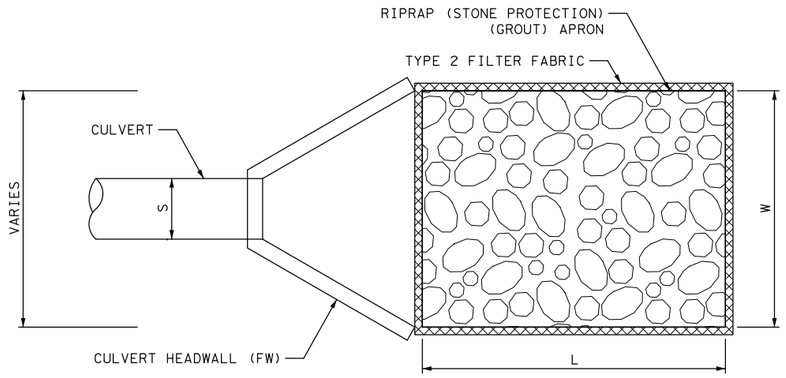
SHEET 11 OF 11

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		132

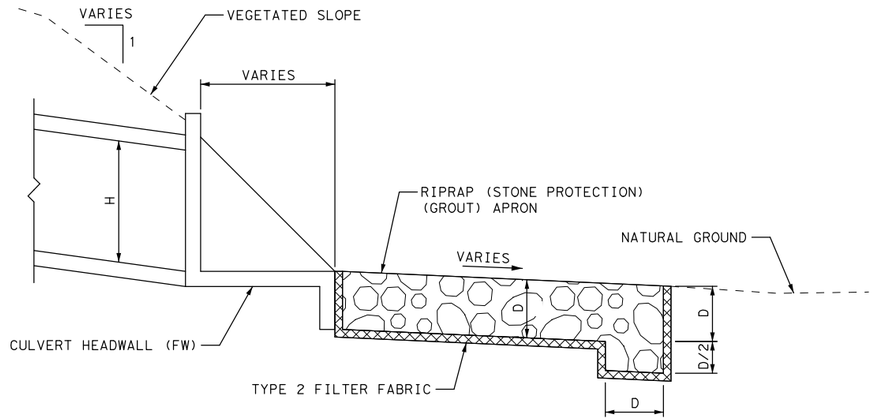
DATE: 9/24/2021 2:40:50 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_10.dgn

STONE RIPRAP EROSION PROTECTION

DOWNSTREAM OF FW

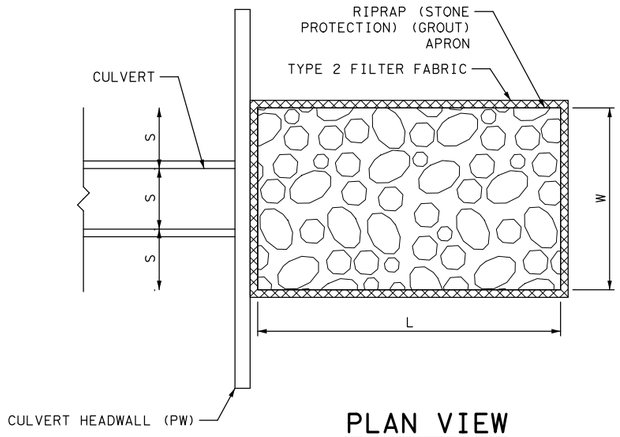


PLAN VIEW

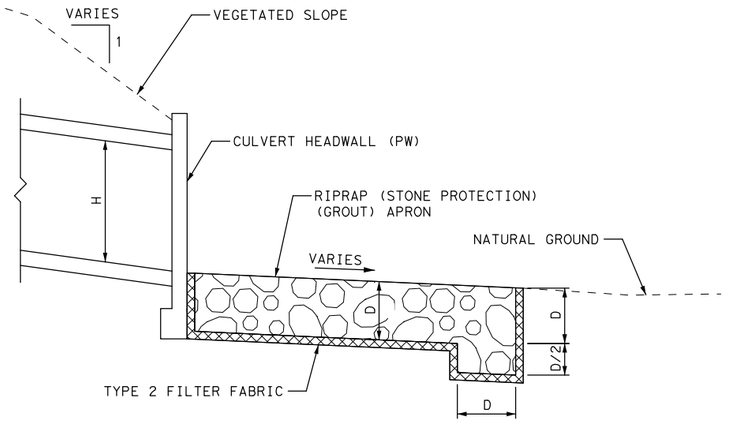


PROFILE VIEW

DOWNSTREAM OF PW



PLAN VIEW



PROFILE VIEW

DOWNSTREAM DIMENSION TABLES

CULVERT ID	W (ft)	L (ft)	D (in)
CULVERT 1	11	6	18
CULVERT 2	92	40	18
CULVERT 3	11	21	18
CULVERT 5	27	10	18
CULVERT 7	32	22	18
CULVERT 9	32	8	18
CULVERT 10	24	16	18
CULVERT 11	9	18	18
CULVERT 12	16	24	18
CULVERT 13	14	28	18

UPSTREAM DIMENSION TABLES

CULVERT ID	W (ft)	L (ft)	D (in)
CULVERT 1	16	14	18
CULVERT 2	92	40	18
CULVERT 5	27	11	18
CULVERT 7	31	16	18
CULVERT 9	32	8	18
CULVERT 10	25	9	18
CULVERT 12	13	17	18
CULVERT 13	30	9	18

NOTES:

1. STONE RIPRAP SHALL BE SOUND MATERIAL AND GRADED PER REQUIREMENTS SPECIFIED IN STANDARD SPECIFICATION ITEM NO. 432.

2. TYPE 2 FILTER FABRIC SHALL MEET THE REQUIREMENTS SPECIFIED IN DMS-6200 & IS SUBSIDIARY TO RIPRAP (STONE COMMON) (GROUT) ITEMS 432 6030 & 432 6051.

DIMENSIONS:

H = CULVERT RISE
S = CULVERT SPAN
D = STONE RIPRAP LAYER THICKNESS
L = LENGTH OF RIPRAP
W = WIDTH OF RIPRAP

NOT TO SCALE

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

SH 304
MISCELLANEOUS DRAINAGE DETAILS

SHEET 1 OF 1

DSI:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		133

DATE: 9/23/2021 3:14:52 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155412\PH3_SH304_DRG_CULV_DET_01.dgn

Culvert Station and/or Creek Name followed by applicable end (Lt, Rt or Both)	Description of Box Culvert No. Spans ~ Span X Height	Max Fill Height (Ft)	Applicable Box Culvert Standard (4)	Applicable Wingwall or End Treatment Standard	Skew Angle (0°,15°, 30° or 45°)	Side Slope or Channel Slope Ratio (SL:1)	T Culvert Top Slab Thickness (In)	U Culvert Wall Thickness (In)	C Estimated Curb Height (Ft)	Hw Height of Wingwall (1) (Ft)	A Curb to End of Wingwall (Ft)	B Offset of End of Wingwall (Ft)	Lw Length of Longest Wingwall (Ft)	Ltw Culvert Toewall Length (Ft)	Atw Anchor Toewall Length (Ft)	Riprap Apron (CY)	Class "C" Conc (Curb) (2) (CY)	Class "C" Conc (Wingwall) (3) (CY)	Total Wingwall Area (SF)
(5) STA 793+03.55 (LT) 14-011-0-0573-01-019	3 - 10'x10'	2.0	MC-10-7	PW-1	0°	2:1	10"	10"	0.250'	11.083'	N/A	N/A	22.167'	36.000'	N/A	0.0	0.3	36.9	491
(5) STA 793+03.55 (RT) 14-011-0-0573-01-019	3 - 10'x10'	2.0	MC-10-7	PW-1	0°	2:1	10"	10"	0.250'	11.083'	N/A	N/A	22.167'	36.000'	N/A	0.0	0.3	36.9	491
STA 880+35.34 (LT)	1 - 7'x4'	2.0	SCP-7	FW-0	0°	2:1	8"	8"	0.250'	4.667'	8.667'	5.0004'	10.007'	8.333'	N/A	6.0	0.1	3.7	50
STA 880+35.34 (RT)	1 - 7'x4'	2.0	SCP-7	FW-0	0°	2:1	8"	8"	0.250'	4.667'	8.667'	5.0004'	10.007'	8.333'	N/A	6.0	0.1	3.7	50
STA 924+38.21 (LT)	1 - 8'x4'	2.0	SCP-8	PW-1	0°	2:1	8"	8"	0.250'	4.917'	N/A	N/A	9.833'	9.333'	N/A	0.0	0.1	6.9	97
STA 924+38.21 (RT)	1 - 8'x4'	2.0	SCP-8	PW-1	0°	2:1	8"	8"	0.250'	4.917'	N/A	N/A	9.833'	9.333'	N/A	0.0	0.1	6.9	97
STA 970+35.89 (LT)	2 - 6'x4'	2.5	MC-6-16	FW-0	0°	2:1	7"	7"	0.250'	4.583'	8.500'	4.907'	9.815'	14.833'	N/A	7.0	0.1	3.9	48
STA 970+35.89 (RT)	2 - 6'x4'	2.5	MC-6-16	FW-0	0°	2:1	7"	7"	0.250'	4.583'	8.500'	4.907'	9.815'	14.833'	N/A	7.0	0.1	3.9	48
STA 976+58.75 (LT)	1 - 6'x4'	3.0	SCP-6	FW-0	0°	2:1	7"	7"	0.250'	4.583'	8.500'	4.907'	9.815'	7.167'	N/A	5.0	0.1	3.6	48
STA 976+58.75 (RT)	1 - 6'x4'	3.0	SCP-6	PW-1	0°	2:1	7"	7"	0.250'	4.833'	N/A	N/A	9.667'	7.167'	N/A	0.0	0.1	6.6	93
STA 1010+31.05 (LT)	1 - 5'x5'	2.5	SCP-5	FW-S	20°	2:1	7"	7"	0.250'	5.920'	10.333'	10.333'	14.614'	6.928'	N/A	5.0	0.1	4.7	73
STA 1010+31.05 (RT)	1 - 5'x5'	2.5	SCP-5	PW-1	20°	2:1	7"	7"	0.250'	5.940'	N/A	N/A	13.279'	6.928'	N/A	0.0	0.1	10.2	153

DATE: 10/28/2021 1:28:14 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155414\BCS.dgn

NOTES:
Skew = 0° on SW-0, FW-0, SETB-CD, SETB-SW-0, and SETB-FW-0 standard sheets;
30° maximum for safety end treatment

SL:1 = Horizontal : 1 Vertical
- Side slope at culvert for flared or straight wingwalls.
- Channel slope for parallel wingwalls.
- Slope must be 3:1 or flatter for safety end treatments.

T = Box culvert top slab thickness. Dimension can be found on the applicable box culvert standard sheet.

U = Box culvert wall thickness. Dimension can be found on the applicable box culvert standard sheet.

C = Curb height

See applicable wing or end treatment standard sheets for calculations of Hw, A, B, Lw, Ltw, Atw, and Total Wingwall Area.

Hw = Height of wingwall

A = Distance from face of curb to end of wingwall (not applicable to parallel or straight wingwalls)

B = Offset of end of wingwall (not applicable to parallel or straight wingwalls)

Lw = Length of longest wingwall.

Ltw = Length of culvert toewall (not applicable when using riprap apron)

Atw = Length of anchor toewall (applicable to safety end treatment only)
Total Wingwall Area = Wingwall area in sq. ft. for two wingwalls (one structure end) if Lt or Rt.
Area for four wingwalls (two structure ends) if Both.

(1) Round the wall heights shown to the nearest foot for bidding purposes.

(2) Concrete volume shown is for box culvert curb only. For curbs using the Box Culvert Rail Mounting Details (RAC) standard sheet quantities shown must be increased by a factor of 2.25. If Class S concrete is required for the top slab of the culvert, also provide Class S concrete for the curb. Curb concrete is considered part of the Box Culvert for payment.

(3) Concrete volume shown is total of wings, footings, culvert toewall (if any), anchor toewalls (if any) and wingwall toewalls. Riprap aprons, culverts, and curb quantities are not included.

(4) Regardless of the type of culvert shown on this sheet, the Contractor has the option of furnishing cast-in-place or precast culverts unless otherwise shown elsewhere on the plans. If the Contractor elects to provide culverts of a different type than those shown on this sheet, it is the Contractor's responsibility to make the necessary adjustments to the dimensions and quantities shown.

(5) Painting PSN on structure is subsidiary to Item 462, "Concrete Box Culverts and Drains." See PSN for details.

SPECIAL NOTE:

This sheet is a supplement to the box culvert standards. It is to be filled out by the culvert specifier and provides dimensions for the construction of the box culvert wingwalls and safety end treatments.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER
10/28/2021

Texas Department of Transportation

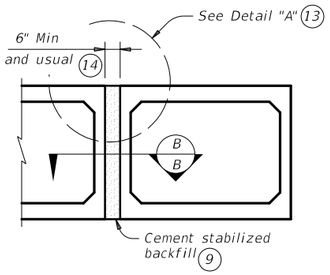
Bridge Division Standard

BOX CULVERT SUPPLEMENT
WINGS AND END TREATMENTS

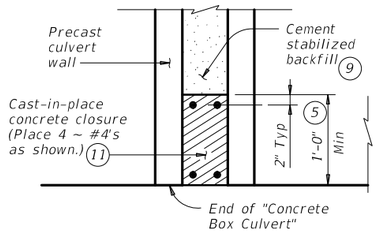
BCS

FILE: bcsstde1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		134

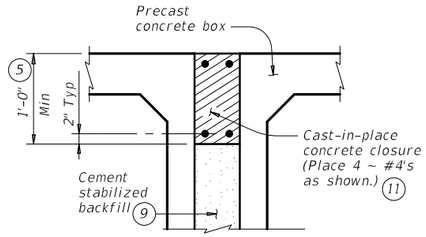
DATE: 9/23/2021 3:15:10 PM
FILE: c:\pw-af\pw-af-prod\ross.deborde\aguirre-fields.com\d0155414\SCP-MD.dgn



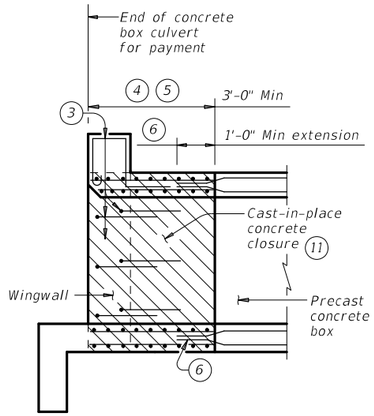
MULTIPLE UNIT PLACEMENT



SECTION B-B

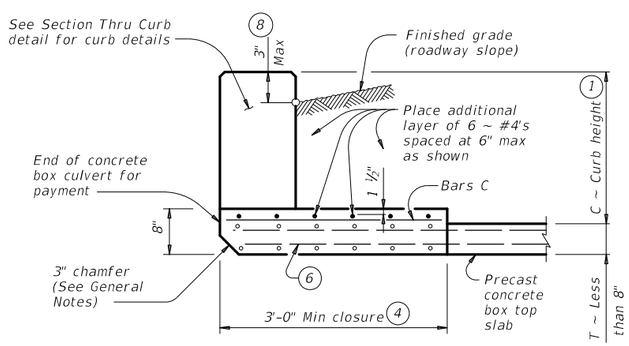


DETAIL "A" (13)

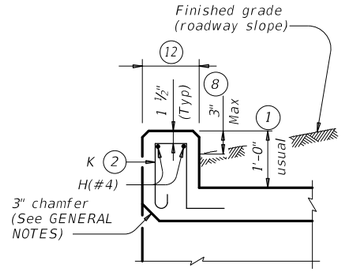


WINGWALL CONNECTION

(Also applies to safety end treatment.)

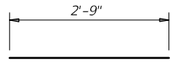


SECTION THRU TOP SLABS LESS THAN 8"

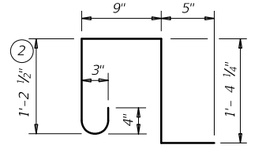


SECTION THRU CURB

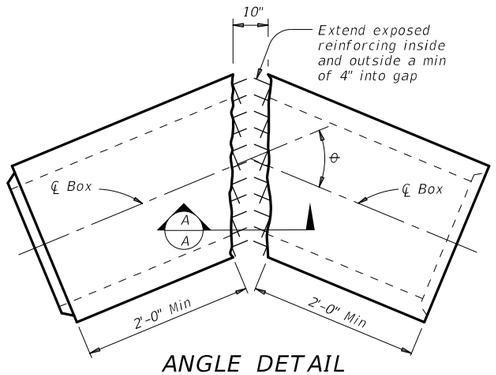
QUANTITIES PER FOOT OF CURB (10)	
Reinforcing Steel	4.12 Lb
Concrete	0.037 CY



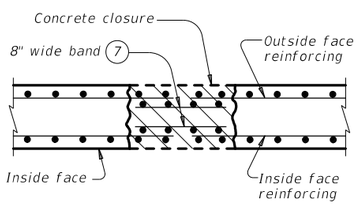
BARS C (#4)
(Spa = 1'-0" Max)



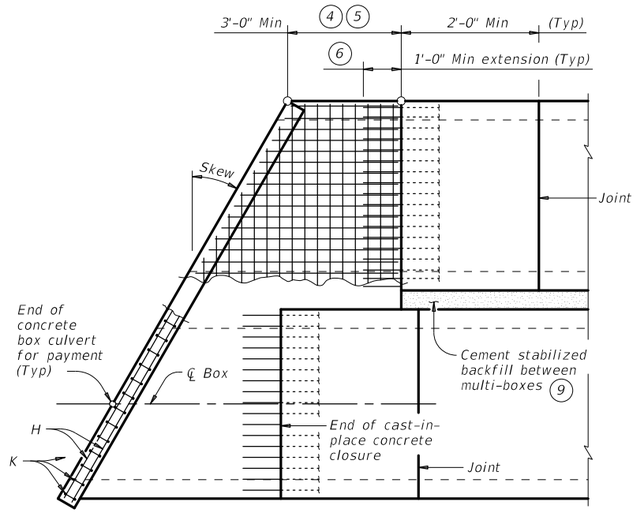
BARS K (#4)
(Spa = 1'-0" Max)
(Length = 4'-2")



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

(Showing multi-box placement.)

1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail, or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
2. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
3. Extend curb, wingwall, or safety end treatment reinforcing into concrete closure. Bend or trim, as necessary, any reinforcing that does not fit into closure area.
4. Provide a 3'-0" Min cast-in-place concrete closure. Break back boxes in the field or cast boxes short. Provide bands of reinforcing in the closure that are the same size and spacing as in the precast box section. Provide #4 longitudinal reinforcement spaced at 12 inches Max within the closure. Except where shown otherwise, construct the cast-in-place closure flush with the inside and outside faces of the precast box section.
5. For multiple unit placements, adjust the length of the closure for the interior walls as necessary. Provide a 3'-0" Min cast-in-place closure in the top slab, bottom slab, and exterior wall. See Section B-B detail when interior walls are cast full length.
6. Extend precast box reinforcing a minimum of 1'-0" into concrete closure (Typ).
7. Place bands of reinforcing matching the inside and outside face reinforcing in the gaps of the top and bottom slabs. Place a band matching the outside face reinforcing of the wall in the gaps of the walls (placed in the outside face only). Tack weld the bands to the exposed reinforcing at each point of contact.
8. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
9. Cement stabilized backfill between boxes is considered part of the box culvert for payment.
10. All curb concrete and reinforcing is considered part of the box culvert for payment.
11. Any additional concrete and reinforcing required for the closures will be considered subsidiary to the box culvert for payment.
12. 1'-0" typical. 2'-3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elsewhere in the plans.
13. For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in Detail "A".
14. This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide ASTM A1064 welded wire reinforcement.
Provide Class C concrete (f'c = 3,600 psi) for the closures.
Provide cement stabilized backfill meeting the requirements of Item 400, "Excavation and Backfill for Structures."
Any additional concrete required for the closures will be considered subsidiary to the box culvert.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to the Single Box Culverts Precast (SCP) standard sheets for details and notes not shown.
Chamfer the bottom edge of the top slab closure 3 inches at culvert closure ends.

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

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

BOX CULVERTS PRECAST MISCELLANEOUS DETAILS

SCP-MD

FILE: scpmdsts-20.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		135

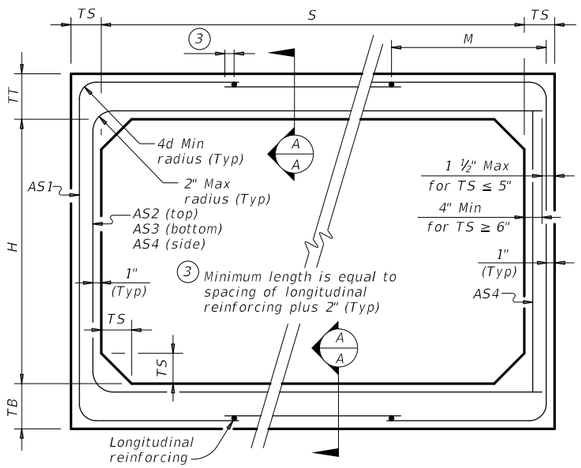
DATE: 9/23/2021 3:15:21 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155414\SCP-5.dgn

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
5	2	8	7	6	< 2	–	0.19	0.27	0.18	0.14	0.19	0.19	0.17	6.0
5	2	6	6	6	2 < 3	44	0.22	0.20	0.16	0.14	–	–	–	5.1
5	2	6	6	6	3 – 5	44	0.16	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	10	36	0.15	0.14	0.14	0.14	–	–	–	5.1
5	2	6	6	6	15	36	0.20	0.18	0.18	0.14	–	–	–	5.1
5	2	6	6	6	20	36	0.26	0.23	0.24	0.14	–	–	–	5.1
5	2	6	6	6	25	36	0.33	0.29	0.29	0.14	–	–	–	5.1
5	2	6	6	6	30	36	0.39	0.34	0.35	0.14	–	–	–	5.1
5	3	8	7	6	< 2	–	0.19	0.31	0.21	0.14	0.19	0.19	0.17	6.6
5	3	6	6	6	2 < 3	45	0.18	0.24	0.19	0.14	–	–	–	5.7
5	3	6	6	6	3 – 5	36	0.14	0.17	0.16	0.14	–	–	–	5.7
5	3	6	6	6	10	36	0.14	0.16	0.17	0.14	–	–	–	5.7
5	3	6	6	6	15	35	0.16	0.21	0.22	0.14	–	–	–	5.7
5	3	6	6	6	20	35	0.21	0.27	0.28	0.14	–	–	–	5.7
5	3	6	6	6	25	35	0.26	0.34	0.34	0.14	–	–	–	5.7
5	3	6	6	6	30	35	0.31	0.41	0.41	0.14	–	–	–	5.7
5	4	8	7	6	< 2	–	0.19	0.33	0.24	0.14	0.19	0.19	0.17	7.2
5	4	6	6	6	2 < 3	45	0.16	0.27	0.22	0.14	–	–	–	6.3
5	4	6	6	6	3 – 5	45	0.14	0.19	0.18	0.14	–	–	–	6.3
5	4	6	6	6	10	36	0.14	0.18	0.18	0.14	–	–	–	6.3
5	4	6	6	6	15	35	0.14	0.23	0.24	0.14	–	–	–	6.3
5	4	6	6	6	20	35	0.17	0.30	0.31	0.14	–	–	–	6.3
5	4	6	6	6	25	35	0.21	0.37	0.38	0.14	–	–	–	6.3
5	4	6	6	6	30	35	0.25	0.44	0.45	0.14	–	–	–	6.3
5	5	8	7	6	< 2	–	0.19	0.35	0.26	0.14	0.19	0.19	0.17	7.8
5	5	6	6	6	2 < 3	45	0.14	0.29	0.24	0.14	–	–	–	6.9
5	5	6	6	6	3 – 5	45	0.14	0.21	0.20	0.14	–	–	–	6.9
5	5	6	6	6	10	45	0.14	0.19	0.20	0.14	–	–	–	6.9
5	5	6	6	6	15	36	0.14	0.24	0.25	0.14	–	–	–	6.9
5	5	6	6	6	20	35	0.15	0.31	0.32	0.14	–	–	–	6.9
5	5	6	6	6	25	35	0.18	0.38	0.39	0.14	–	–	–	6.9
5	5	6	6	6	30	35	0.21	0.46	0.47	0.14	–	–	–	6.9

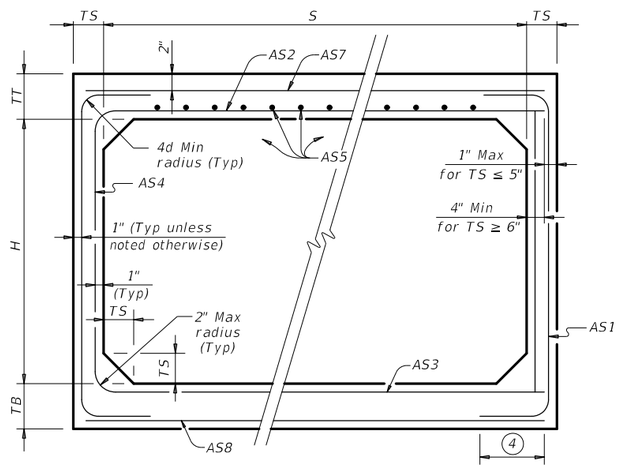
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

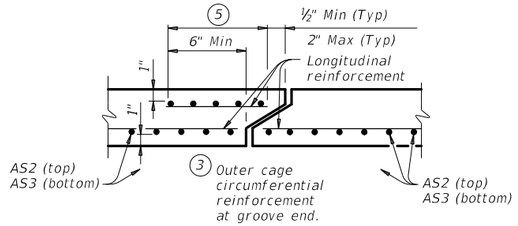
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

5'-0" SPAN

SCP-5

FILE: scp05sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		136

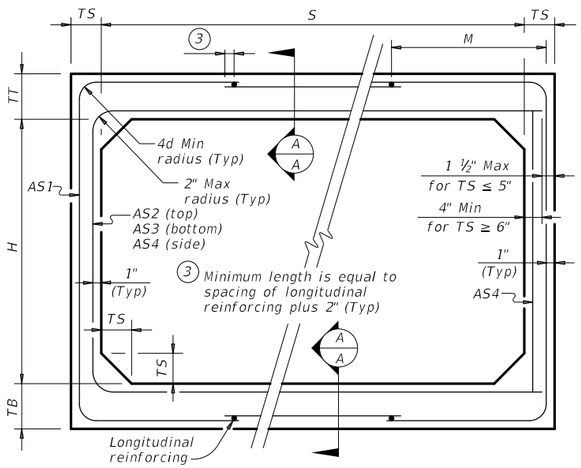
DATE: 9/23/2021 3:15:31 PM
FILE: c:\pw-af\pw-af-prod\ross.deborde@aguirre-fields.com\d0155414\SCP-6.dgn

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
6	2	8	7	7	< 2	–	0.23	0.27	0.19	0.17	0.19	0.19	0.17	7.2
6	2	7	7	7	2 < 3	43	0.25	0.21	0.17	0.17	–	–	–	6.8
6	2	7	7	7	3 – 5	43	0.20	0.17	0.17	0.17	–	–	–	6.8
6	2	7	7	7	10	39	0.20	0.17	0.17	0.17	–	–	–	6.8
6	2	7	7	7	15	39	0.26	0.20	0.20	0.17	–	–	–	6.8
6	2	7	7	7	20	39	0.34	0.26	0.26	0.17	–	–	–	6.8
6	2	7	7	7	25	39	0.43	0.32	0.32	0.17	–	–	–	6.8
6	2	7	7	7	30	39	0.52	0.38	0.39	0.17	–	–	–	6.8
6	3	8	7	7	< 2	–	0.20	0.31	0.22	0.17	0.19	0.19	0.17	7.9
6	3	7	7	7	2 < 3	43	0.21	0.24	0.19	0.17	–	–	–	7.5
6	3	7	7	7	3 – 5	39	0.17	0.18	0.17	0.17	–	–	–	7.5
6	3	7	7	7	10	39	0.17	0.18	0.19	0.17	–	–	–	7.5
6	3	7	7	7	15	38	0.22	0.24	0.24	0.17	–	–	–	7.5
6	3	7	7	7	20	38	0.28	0.31	0.31	0.17	–	–	–	7.5
6	3	7	7	7	25	38	0.35	0.38	0.39	0.17	–	–	–	7.5
6	3	7	7	7	30	38	0.42	0.46	0.46	0.17	–	–	–	7.5
6	4	8	7	7	< 2	–	0.19	0.34	0.25	0.17	0.19	0.19	0.17	8.6
6	4	7	7	7	2 < 3	43	0.19	0.27	0.21	0.17	–	–	–	8.2
6	4	7	7	7	3 – 5	39	0.17	0.21	0.19	0.17	–	–	–	8.2
6	4	7	7	7	10	39	0.17	0.20	0.21	0.17	–	–	–	8.2
6	4	7	7	7	15	38	0.18	0.27	0.27	0.17	–	–	–	8.2
6	4	7	7	7	20	38	0.24	0.34	0.35	0.17	–	–	–	8.2
6	4	7	7	7	25	38	0.29	0.43	0.42	0.17	–	–	–	8.2
6	4	7	7	7	30	38	0.35	0.51	0.52	0.17	–	–	–	8.2
6	5	8	7	7	< 2	–	0.19	0.37	0.28	0.17	0.19	0.19	0.17	9.3
6	5	7	7	7	2 < 3	43	0.17	0.30	0.24	0.17	–	–	–	8.9
6	5	7	7	7	3 – 5	43	0.17	0.23	0.21	0.17	–	–	–	8.9
6	5	7	7	7	10	39	0.17	0.22	0.23	0.17	–	–	–	8.9
6	5	7	7	7	15	38	0.17	0.28	0.29	0.17	–	–	–	8.9
6	5	7	7	7	20	38	0.20	0.37	0.38	0.17	–	–	–	8.9
6	5	7	7	7	25	38	0.25	0.45	0.46	0.17	–	–	–	8.9
6	5	7	7	7	30	38	0.30	0.54	0.55	0.17	–	–	–	8.9
6	6	8	7	7	< 2	–	0.19	0.38	0.30	0.17	0.19	0.19	0.17	10
6	6	7	7	7	2 < 3	52	0.17	0.32	0.26	0.17	–	–	–	9.6
6	6	7	7	7	3 – 5	52	0.17	0.24	0.22	0.17	–	–	–	9.6
6	6	7	7	7	10	43	0.17	0.23	0.24	0.17	–	–	–	9.6
6	6	7	7	7	15	39	0.17	0.29	0.31	0.17	–	–	–	9.6
6	6	7	7	7	20	39	0.18	0.38	0.39	0.17	–	–	–	9.6
6	6	7	7	7	25	38	0.23	0.46	0.48	0.17	–	–	–	9.6
6	6	7	7	7	30	38	0.27	0.55	0.57	0.17	–	–	–	9.6

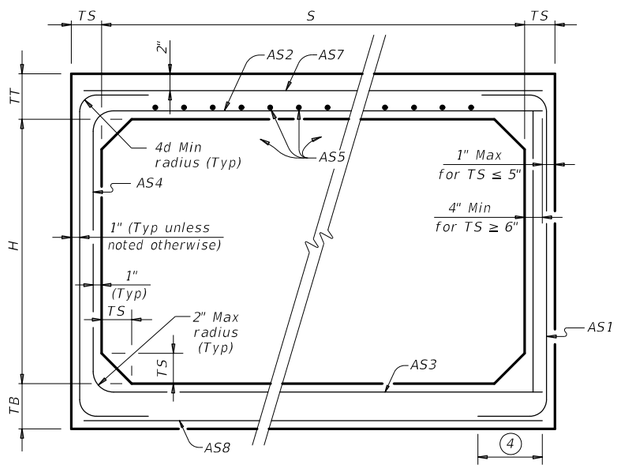
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

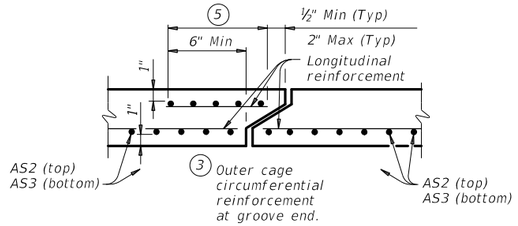
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation | Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

6'-0" SPAN

SCP-6

FILE: scp06sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		137

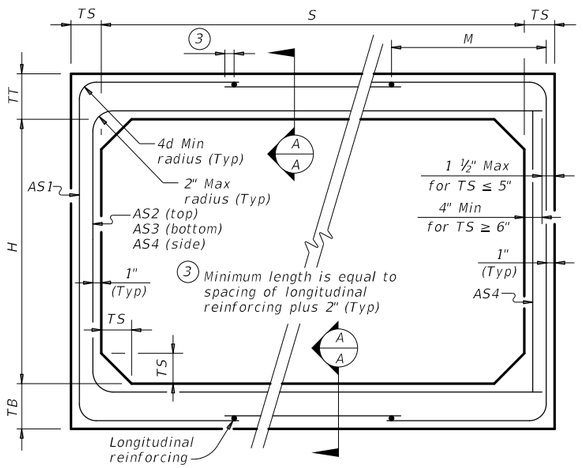
DATE: 9/23/2021 3:15:39 PM
FILE: c:\pw-df\pw-df-prod\ross.deborde@aguirre-fields.com\d0155414\SCP-7.dgn

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
7	3	8	8	8	< 2	–	0.23	0.31	0.22	0.19	0.19	0.19	0.19	9.6
7	3	8	8	8	2 < 3	47	0.27	0.25	0.24	0.19	–	–	–	9.6
7	3	8	8	8	3 – 5	43	0.19	0.19	0.19	0.19	–	–	–	9.6
7	3	8	8	8	10	43	0.21	0.20	0.21	0.19	–	–	–	9.6
7	3	8	8	8	15	43	0.28	0.26	0.27	0.19	–	–	–	9.6
7	3	8	8	8	20	43	0.36	0.34	0.35	0.19	–	–	–	9.6
7	3	8	8	8	25	43	0.45	0.42	0.43	0.19	–	–	–	9.6
7	3	8	8	8	30	43	0.54	0.50	0.51	0.19	–	–	–	9.6
7	4	8	8	8	< 2	–	0.21	0.34	0.25	0.19	0.19	0.19	0.19	10.4
7	4	8	8	8	2 < 3	43	0.23	0.28	0.28	0.19	–	–	–	10.4
7	4	8	8	8	3 – 5	43	0.19	0.22	0.19	0.19	–	–	–	10.4
7	4	8	8	8	10	43	0.19	0.23	0.23	0.19	–	–	–	10.4
7	4	8	8	8	15	41	0.24	0.30	0.30	0.19	–	–	–	10.4
7	4	8	8	8	20	41	0.31	0.38	0.39	0.19	–	–	–	10.4
7	4	8	8	8	25	41	0.38	0.47	0.48	0.19	–	–	–	10.4
7	4	8	8	8	30	41	0.46	0.57	0.57	0.19	–	–	–	10.4
7	5	8	8	8	< 2	–	0.19	0.36	0.27	0.19	0.19	0.19	0.19	11.2
7	5	8	8	8	2 < 3	47	0.21	0.31	0.31	0.19	–	–	–	11.2
7	5	8	8	8	3 – 5	43	0.19	0.24	0.21	0.19	–	–	–	11.2
7	5	8	8	8	10	43	0.19	0.25	0.26	0.19	–	–	–	11.2
7	5	8	8	8	15	41	0.21	0.32	0.33	0.19	–	–	–	11.2
7	5	8	8	8	20	41	0.27	0.41	0.42	0.19	–	–	–	11.2
7	5	8	8	8	25	41	0.33	0.51	0.52	0.19	–	–	–	11.2
7	5	8	8	8	30	41	0.40	0.61	0.62	0.19	–	–	–	11.2
7	6	8	8	8	< 2	–	0.19	0.38	0.30	0.19	0.19	0.19	0.19	12.0
7	6	8	8	8	2 < 3	59	0.19	0.33	0.34	0.19	–	–	–	12.0
7	6	8	8	8	3 – 5	47	0.19	0.25	0.23	0.19	–	–	–	12.0
7	6	8	8	8	10	43	0.19	0.26	0.27	0.19	–	–	–	12.0
7	6	8	8	8	15	41	0.19	0.34	0.35	0.19	–	–	–	12.0
7	6	8	8	8	20	41	0.24	0.43	0.45	0.19	–	–	–	12.0
7	6	8	8	8	25	41	0.29	0.53	0.55	0.19	–	–	–	12.0
7	6	8	8	8	30	41	0.35	0.64	0.65	0.19	–	–	–	12.0
7	7	8	8	8	< 2	–	0.19	0.40	0.33	0.19	0.19	0.19	0.19	12.8
7	7	8	8	8	2 < 3	59	0.19	0.36	0.37	0.19	–	–	–	12.8
7	7	8	8	8	3 – 5	59	0.19	0.27	0.25	0.19	–	–	–	12.8
7	7	8	8	8	10	47	0.19	0.27	0.29	0.19	–	–	–	12.8
7	7	8	8	8	15	43	0.19	0.35	0.37	0.19	–	–	–	12.8
7	7	8	8	8	20	43	0.22	0.44	0.46	0.19	–	–	–	12.8
7	7	8	8	8	25	43	0.27	0.54	0.57	0.19	–	–	–	12.8
7	7	8	8	8	30	41	0.32	0.65	0.67	0.19	–	–	–	12.8

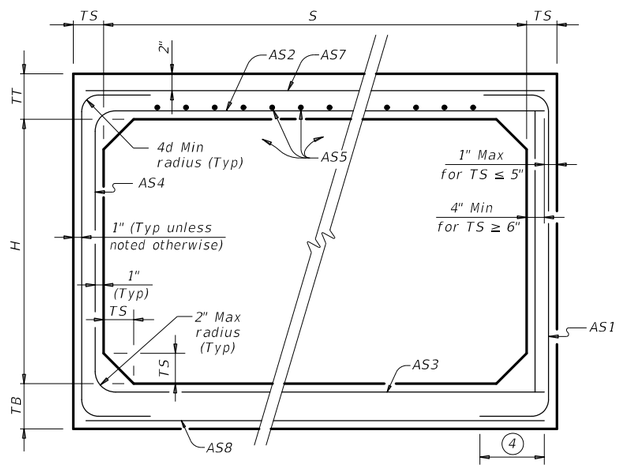
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

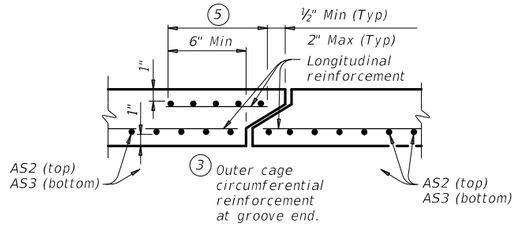
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

7'-0" SPAN

SCP-7

FILE: scp07sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		138

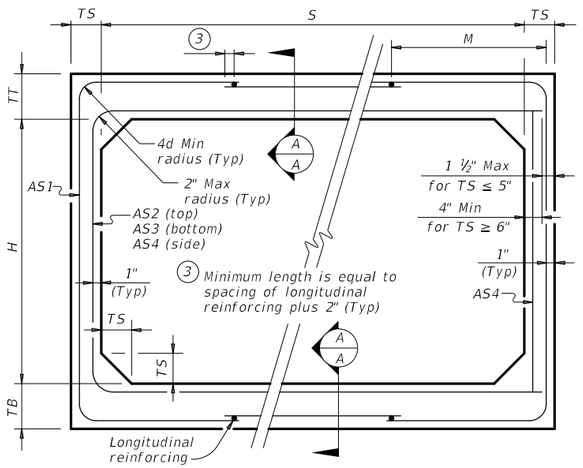
DATE: 9/23/2021 3:15:49 PM
FILE: c:\pw-df\pw-df-prod\ross.deborde@aguirre-fields.com\d0155414\SCP-8.dgn

BOX DATA

SECTION DIMENSIONS					Fill Height	M (Min)	REINFORCING (sq. in. / ft.) (2)							(1) Lift Weight
S (ft.)	H (ft.)	TT (in.)	TB (in.)	TS (in.)	(ft.)	(in.)	AS1	AS2	AS3	AS4	AS5	AS7	AS8	(tons)
8	3	8	8	8	< 2	–	0.31	0.35	0.25	0.19	0.19	0.19	0.19	10.4
8	3	8	8	8	2 < 3	55	0.35	0.29	0.28	0.19	–	–	–	10.4
8	3	8	8	8	3 – 5	50	0.28	0.23	0.24	0.19	–	–	–	10.4
8	3	8	8	8	10	45	0.29	0.25	0.26	0.19	–	–	–	10.4
8	3	8	8	8	15	45	0.39	0.33	0.34	0.19	–	–	–	10.4
8	3	8	8	8	20	45	0.51	0.43	0.44	0.19	–	–	–	10.4
8	3	8	8	8	25	45	0.63	0.53	0.54	0.19	–	–	–	10.4
8	4	8	8	8	< 2	–	0.27	0.38	0.29	0.19	0.19	0.19	0.19	11.2
8	4	8	8	8	2 < 3	50	0.31	0.34	0.32	0.19	–	–	–	11.2
8	4	8	8	8	3 – 5	50	0.25	0.27	0.27	0.19	–	–	–	11.2
8	4	8	8	8	10	45	0.26	0.28	0.29	0.19	–	–	–	11.2
8	4	8	8	8	15	41	0.34	0.37	0.38	0.19	–	–	–	11.2
8	4	8	8	8	20	41	0.44	0.48	0.49	0.19	–	–	–	11.2
8	5	8	8	8	< 2	–	0.24	0.40	0.32	0.19	0.19	0.19	0.19	12.0
8	5	8	8	8	2 < 3	50	0.28	0.37	0.35	0.19	–	–	–	12.0
8	5	8	8	8	3 – 5	45	0.23	0.29	0.30	0.19	–	–	–	12.0
8	5	8	8	8	10	45	0.23	0.31	0.32	0.19	–	–	–	12.0
8	5	8	8	8	15	41	0.30	0.41	0.42	0.19	–	–	–	12.0
8	5	8	8	8	20	41	0.39	0.52	0.54	0.19	–	–	–	12.0
8	6	8	8	8	< 2	–	0.22	0.42	0.35	0.19	0.19	0.19	0.19	12.8
8	6	8	8	8	2 < 3	50	0.25	0.40	0.38	0.19	–	–	–	12.8
8	6	8	8	8	3 – 5	50	0.21	0.32	0.33	0.19	–	–	–	12.8
8	6	8	8	8	10	45	0.22	0.33	0.34	0.19	–	–	–	12.8
8	6	8	8	8	15	41	0.28	0.43	0.45	0.19	–	–	–	12.8
8	6	8	8	8	20	41	0.36	0.55	0.57	0.19	–	–	–	12.8
8	7	8	8	8	< 2	–	0.20	0.44	0.37	0.19	0.19	0.19	0.19	13.6
8	7	8	8	8	2 < 3	55	0.23	0.43	0.41	0.19	–	–	–	13.6
8	7	8	8	8	3 – 5	55	0.19	0.34	0.35	0.19	–	–	–	13.6
8	7	8	8	8	10	50	0.20	0.34	0.36	0.19	–	–	–	13.6
8	7	8	8	8	15	41	0.26	0.45	0.47	0.19	–	–	–	13.6
8	7	8	8	8	20	41	0.33	0.57	0.60	0.19	–	–	–	13.6
8	8	8	8	8	< 2	–	0.20	0.45	0.40	0.19	0.19	0.19	0.19	14.4
8	8	8	8	8	2 < 3	65	0.21	0.45	0.44	0.19	–	–	–	14.4
8	8	8	8	8	3 – 5	65	0.19	0.36	0.38	0.19	–	–	–	14.4
8	8	8	8	8	10	55	0.19	0.35	0.38	0.19	–	–	–	14.4
8	8	8	8	8	15	45	0.24	0.46	0.49	0.19	–	–	–	14.4
8	8	8	8	8	20	45	0.31	0.59	0.62	0.19	–	–	–	14.4

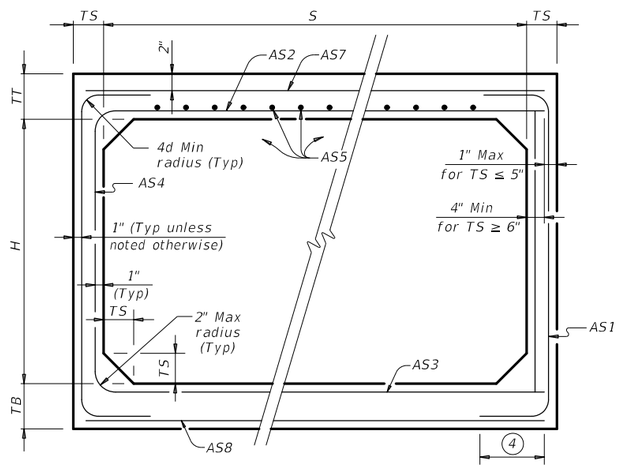
(1) For box length = 8'-0"

(2) AS1 thru AS4, AS7 and AS8 are minimum required areas of reinforcement per linear foot of box length. AS5 is minimum required area of reinforcement per linear foot of box width.



CORNER OPTION "A" CORNER OPTION "B"

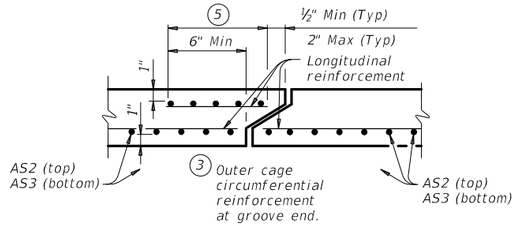
FILL HEIGHT 2 FT AND GREATER



CORNER OPTION "A" CORNER OPTION "B"

FILL HEIGHT LESS THAN 2 FT

(4) Length is equal to spacing of longitudinal reinforcing plus 2". (10" Min) (Typ)



SECTION A-A

(Showing top and bottom slab joint reinforcement.)

MATERIAL NOTES:

Provide 0.03 sq. in./ft. minimum longitudinal reinforcement at each face in slabs and walls. This minimum requirement may be met by the transverse wires when wire mesh reinforcement is used.

Provide Class H concrete (f`c = 5,000 psi).

GENERAL NOTES:

Designs shown conform to ASTM C1577. Refer to ASTM C1577 for information or details not shown.

See Box Culverts Precast Miscellaneous Details (SCP-MD) standard sheet for details and notes not shown.

In lieu of furnishing the designs shown on this sheet, the contractor may furnish an alternate design that is equal to or exceeds the box design for the design fill height in the table. Submit shop plans for alternate designs in accordance with Item "Precast Concrete Structural Members (Fabrication)".

HL93 LOADING

Texas Department of Transportation

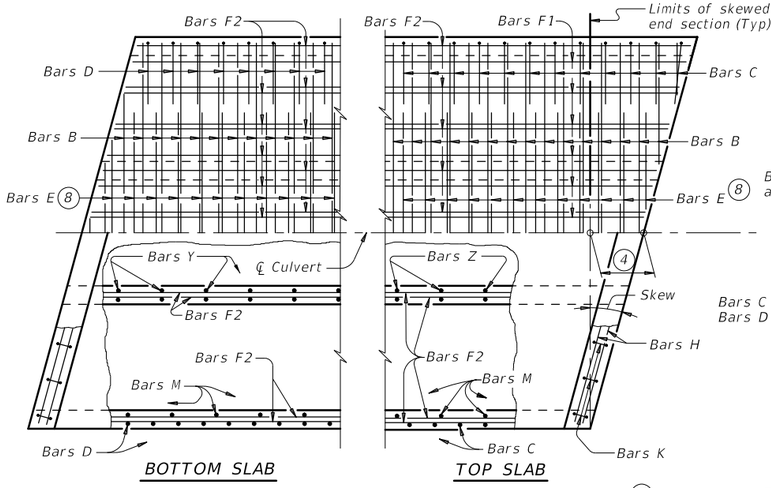
Bridge Division Standard

SINGLE BOX CULVERTS PRECAST

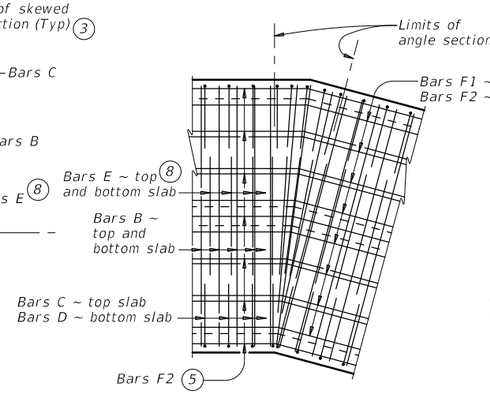
8'-0" SPAN

SCP-8

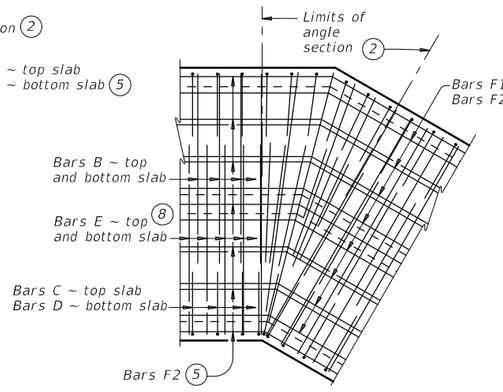
FILE: scp08sts-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		139



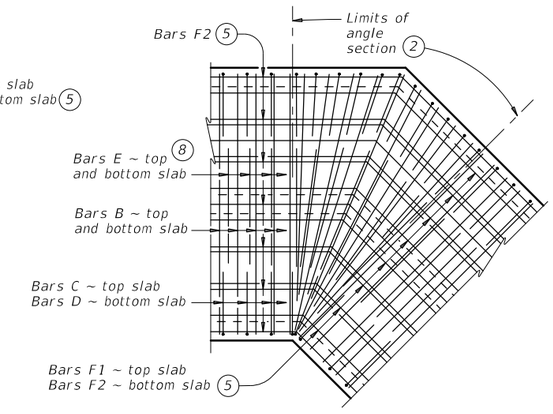
PLAN OF SKEWED ENDS ~ FROM 0° TO 15° 7



PLAN OF ANGLE SECTION ~ FROM 0° TO 15°

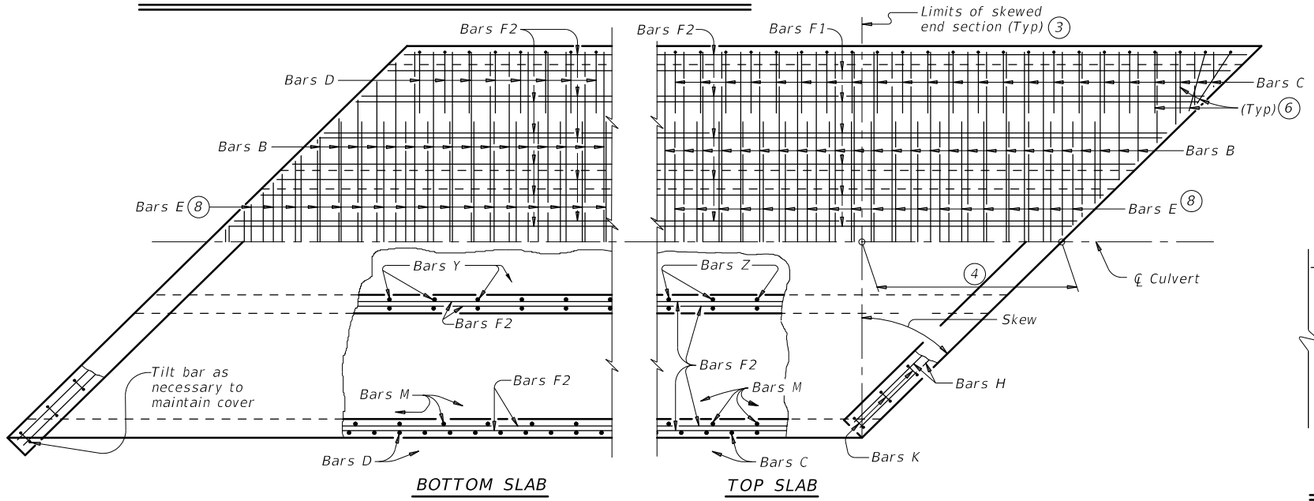


PLAN OF ANGLE SECTION ~ OVER 15° TO 30°

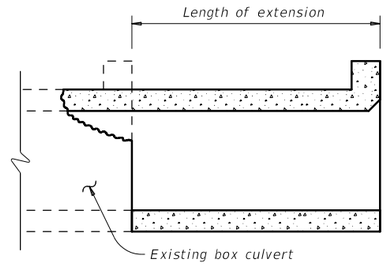


PLAN OF ANGLE SECTION ~ OVER 30° TO 45°

PLAN OF SKEWED ENDS ~ OVER 15° TO 30°



PLAN OF SKEWED ENDS ~ OVER 30° TO 45°



LENGTHENING DETAIL 1

(1) For skewed box culverts with less than 2'-0" of fill, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension.

For non-skewed box culverts with less than 2'-0" of fill and for skewed or non-skewed culverts with a fill depth of 2'-0" or greater, break back the top slab to provide a 1'-10" minimum lap of the existing longitudinal bars with the longitudinal bars in the extension. Alternatively, if the box is non-skewed, embed #6 anchor bars with a Type III, Class C, D, E, or F anchor adhesive into the existing walls, top and bottom slab at 1'-6" center-to-center spacing. Minimum embedment depth is 8". Anchor adhesive chosen must be able to achieve a basic bond strength in tension, Nba, of 26.4 kips. Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Test adhesive anchors in accordance with Item 450.3.3, "Tests." Test 3 anchors per 100 anchors installed.

Break back wings and apron as necessary to install the extension. Clean and extend the exposed wingwall and apron reinforcing into the extension. When lengthening existing box culverts with dimensions different than current standard dimensions, form horizontal and vertical transitions as directed by the Engineer. Match bottom slabs to maintain an uninterrupted flow line. Field bend existing and new reinforcing into transitions and maintain specified cover requirements. For top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface, adjust the "H" dimension to provide a smooth riding surface.

(2) When the spacing between Bars B or Bars E becomes less than half of the normal spacing, cut bars to avoid conflict.

(3) The length of Bars B and Bars E will vary in the skewed end sections.

(4) [One half of overall width] x [tangent of the skew angle]

(5) Place Bars F1 and F2 continuously through the angle section. Bend Bars F1 and F2 to remain parallel to the walls of the box culvert.

(6) When necessary to avoid conflict in acute corners, shorten the slab extension leg of Bars C and Bars D to a minimum of 1'-6" for skews of 30° thru 45°.

(7) At the Contractor's option, for skews of 15° or less, place Bars B, C, D, and E parallel to the skewed end while maintaining spacing along centerline of box. Increase lengths of Bars B and Bars E shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets to accommodate the skew.

(8) Extend Bars E as shown on the MC standard sheet for direct traffic culverts.

CONSTRUCTION NOTES:

Do not use permanent forms.
When required, lap Bars H 1'-8" for uncoated or galvanized bars.
Provide a minimum of 1 ½" clear cover.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel, if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) with these exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of culverts with overlay, with 1-to-2 course surface treatment, or with the top slab as the final riding surface.

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.
Refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for details of straight sections of culvert.
For skewed sections and angle sections, refer to Multiple Box Culverts Cast-in-Place (MC) standard sheets for slab and wall dimensions, bar sizes, maximum bar spacing, and any other details not shown.
For skewed ends with curbs, adjust length of Bars H, number of Bars K, curb concrete volume, and reinforcing steel weight by dividing the values shown on the Multiple Box Culverts Cast-In-Place (MC) standard sheets by the cosine of the skew angle.

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

Texas Department of Transportation

Bridge Division Standard

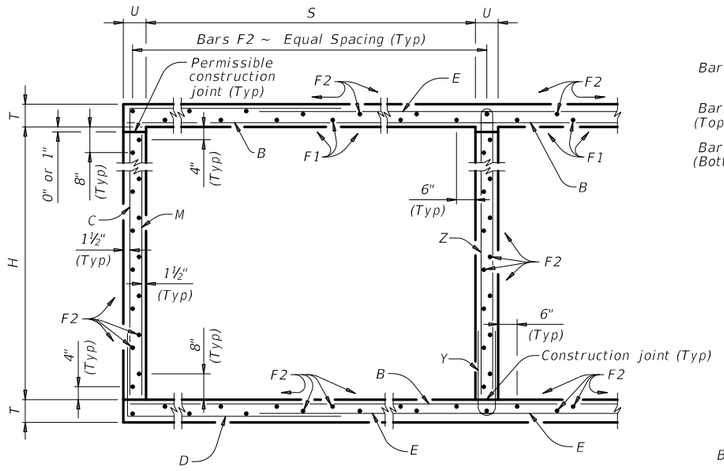
MULTIPLE BOX CULVERTS CAST-IN-PLACE MISCELLANEOUS DETAILS

MC-MD

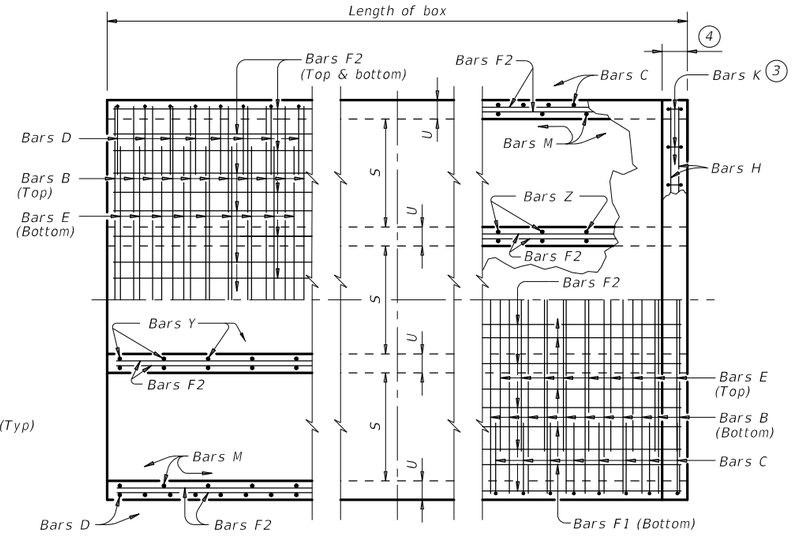
FILE: mc-mdste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		140

DATE: 9/23/2021 3:16:00 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde\aguirre-fields.com\d0155414\MC-MD.dgn

DATE: 9/23/2021 3:16:11 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155414\MC-6-16-ST.dgn

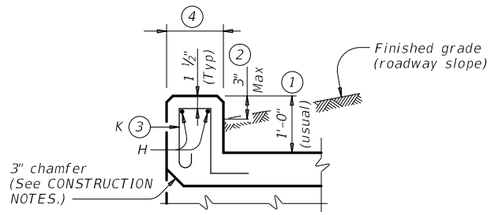


TYPICAL SECTION



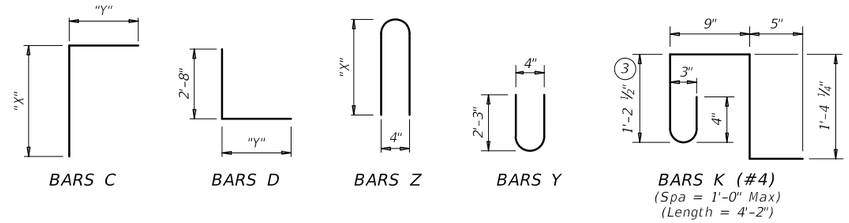
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
2'-0"	2'-7 ½"	4'-1"
3'-0"	3'-7 ½"	4'-1"
4'-0"	4'-7 ½"	4'-1"
5'-0"	5'-7 ½"	4'-1"
6'-0"	6'-7 ½"	4'-1"



1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Multiple Box Culverts Cast-In-Place Miscellaneous Detail (MC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE 6'-0" SPAN 0' TO 16' FILL

MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		141

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																																QUANTITIES					
					Bars B					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4								Bars H 4 ~ #4		Bars K		Per Foot of Barrel		Curb		Total	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Bars C Length	Bars C Wt	Bars D Length	Bars D Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Bars Y Length	Bars Y Wt	Bars Z Length	Bars Z Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	6' – 0"	2' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	44	18"	39' – 9"	1,168	108	9"	2' – 0"	144	54	9"	4' – 9"	171	5' – 5"	195	13' – 6"	36	30	84	0.894	182.4	1.0	120	36.8	7,414
3	6' – 0"	2' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	63	18"	39' – 9"	1,673	108	9"	2' – 0"	144	108	9"	4' – 9"	343	5' – 5"	391	20' – 1"	54	44	122	1.302	260.9	1.5	176	53.6	10,611
4	6' – 0"	2' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	82	18"	39' – 9"	2,177	108	9"	2' – 0"	144	162	9"	4' – 9"	514	5' – 5"	586	26' – 8"	71	56	156	1.711	339.4	2.0	227	70.4	13,801
5	6' – 0"	2' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	101	18"	39' – 9"	2,682	108	9"	2' – 0"	144	216	9"	4' – 9"	685	5' – 5"	782	33' – 3"	89	70	195	2.120	417.9	2.5	284	87.3	16,999
6	6' – 0"	2' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	6' – 8"	751	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	120	18"	39' – 9"	3,186	108	9"	2' – 0"	144	270	9"	4' – 9"	857	5' – 5"	977	39' – 10"	106	82	228	2.529	496.4	3.0	334	104.1	20,189
2	6' – 0"	3' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	50	18"	39' – 9"	1,328	108	9"	3' – 0"	216	54	9"	4' – 9"	171	7' – 5"	268	13' – 6"	36	30	84	0.958	192.8	1.0	120	39.3	7,832
3	6' – 0"	3' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	71	18"	39' – 9"	1,885	108	9"	3' – 0"	216	108	9"	4' – 9"	343	7' – 5"	535	20' – 1"	54	44	122	1.389	274.4	1.5	176	57.1	11,152
4	6' – 0"	3' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	92	18"	39' – 9"	2,443	108	9"	3' – 0"	216	162	9"	4' – 9"	514	7' – 5"	803	26' – 8"	71	56	156	1.819	356.1	2.0	227	74.7	14,469
5	6' – 0"	3' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	113	18"	39' – 9"	3,000	108	9"	3' – 0"	216	216	9"	4' – 9"	685	7' – 5"	1,070	33' – 3"	89	70	195	2.250	437.7	2.5	284	92.5	17,790
6	6' – 0"	3' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	7' – 8"	864	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	134	18"	39' – 9"	3,558	108	9"	3' – 0"	216	270	9"	4' – 9"	857	7' – 5"	1,338	39' – 10"	106	82	228	2.681	519.3	3.0	334	110.2	21,107
2	6' – 0"	4' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	50	18"	39' – 9"	1,328	108	9"	4' – 0"	289	54	9"	4' – 9"	171	9' – 5"	340	13' – 6"	36	30	84	1.023	199.2	1.0	120	41.9	8,089
3	6' – 0"	4' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	71	18"	39' – 9"	1,885	108	9"	4' – 0"	289	108	9"	4' – 9"	343	9' – 5"	679	20' – 1"	54	44	122	1.475	282.6	1.5	176	60.5	11,481
4	6' – 0"	4' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	92	18"	39' – 9"	2,443	108	9"	4' – 0"	289	162	9"	4' – 9"	514	9' – 5"	1,019	26' – 8"	71	56	156	1.927	366.1	2.0	227	79.1	14,870
5	6' – 0"	4' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	113	18"	39' – 9"	3,000	108	9"	4' – 0"	289	216	9"	4' – 9"	685	9' – 5"	1,359	33' – 3"	89	70	195	2.380	449.5	2.5	284	97.7	18,264
6	6' – 0"	4' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	8' – 8"	976	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	134	18"	39' – 9"	3,558	108	9"	4' – 0"	289	270	9"	4' – 9"	857	9' – 5"	1,698	39' – 10"	106	82	228	2.832	533.0	3.0	334	116.2	21,652
2	6' – 0"	5' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	56	18"	39' – 9"	1,487	108	9"	5' – 0"	361	54	9"	4' – 9"	171	11' – 5"	412	13' – 6"	36	30	84	1.088	209.6	1.0	120	44.5	8,505
3	6' – 0"	5' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	79	18"	39' – 9"	2,098	108	9"	5' – 0"	361	108	9"	4' – 9"	343	11' – 5"	824	20' – 1"	54	44	122	1.562	296.2	1.5	176	64.0	12,024
4	6' – 0"	5' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	102	18"	39' – 9"	2,708	108	9"	5' – 0"	361	162	9"	4' – 9"	514	11' – 5"	1,235	26' – 8"	71	56	156	2.035	382.7	2.0	227	83.4	15,536
5	6' – 0"	5' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	125	18"	39' – 9"	3,319	108	9"	5' – 0"	361	216	9"	4' – 9"	685	11' – 5"	1,647	33' – 3"	89	70	195	2.509	469.3	2.5	284	102.8	19,056
6	6' – 0"	5' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	9' – 8"	1,089	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	148	18"	39' – 9"	3,930	108	9"	5' – 0"	361	270	9"	4' – 9"	857	11' – 5"	2,059	39' – 10"	106	82	228	2.983	555.9	3.0	334	122.3	22,570
2	6' – 0"	6' – 0"	9"	7"	108	#6	9"	13' – 6"	2,190	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	10' – 2"	1,649	10	18"	39' – 9"	266	62	18"	39' – 9"	1,646	108	9"	6' – 0"	433	54	9"	4' – 9"	171	13' – 5"	484	13' – 6"	36	30	84	1.153	220.0	1.0	120	47.1	8,921
3	6' – 0"	6' – 0"	9"	7"	108	#6	9"	20' – 1"	3,258	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	16' – 9"	2,717	15	18"	39' – 9"	398	87	18"	39' – 9"	2,310	108	9"	6' – 0"	433	108	9"	4' – 9"	343	13' – 5"	968	20' – 1"	54	44	122	1.648	309.7	1.5	176	67.4	12,565
4	6' – 0"	6' – 0"	9"	7"	108	#6	9"	26' – 8"	4,326	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	23' – 4"	3,785	20	18"	39' – 9"	531	112	18"	39' – 9"	2,974	108	9"	6' – 0"	433	162	9"	4' – 9"	514	13' – 5"	1,452	26' – 8"	71	56	156	2.144	399.4	2.0	227	87.7	16,204
5	6' – 0"	6' – 0"	9"	7"	108	#6	9"	33' – 3"	5,394	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	29' – 11"	4,853	25	18"	39' – 9"	664	137	18"	39' – 9"	3,638	108	9"	6' – 0"	433	216	9"	4' – 9"	685	13' – 5"	1,936	33' – 3"	89	70	195	2.639	489.1	2.5	284	108.0	19,849
6	6' – 0"	6' – 0"	9"	7"	108	#6	9"	39' – 10"	6,462	108	#5	9"	10' – 8"	1,202	6' – 9"	760	108	#6	9"	36' – 6"	5,921	30	18"	39' – 9"	797	162	18"	39' – 9"	4,302	108	9"	6' – 0"	433	270	9"	4' – 9"	857	13' – 5"	2,420	39' – 10"	106	82	228	3.134	578.9	3.0	334	128.3	23,488

DATE: 9/23/2021 3:16:18 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155414\MC-6-16-02.dgn

HL93 LOADING SHEET 2 OF 2

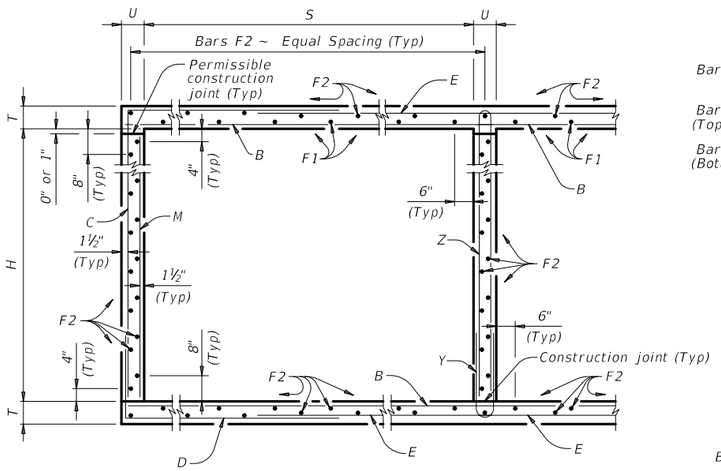
Texas Department of Transportation | Bridge Division Standard

MULTIPLE BOX CULVERTS
CAST-IN-PLACE
6'-0" SPAN
0' TO 16' FILL

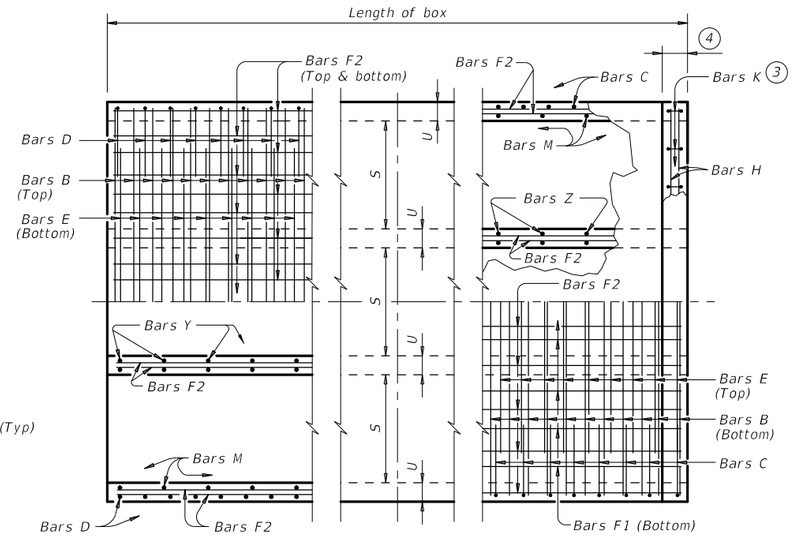
MC-6-16

FILE: mc616ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT	
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0573	01	034	SH 304	
	DIST	COUNTY		SHEET NO.	
	AUS	BASTROP		142	

DATE: 9/23/2021 3:16:25 PM
FILE: c:\pw-af\pw-af-prod\ross.deboard@aguirre-fields.com\d0155414\MC-10-7_07.dgn

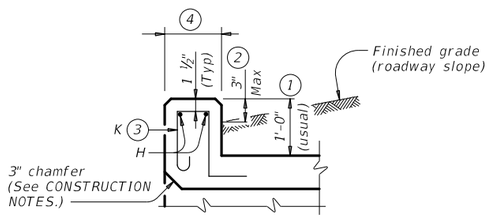


TYPICAL SECTION



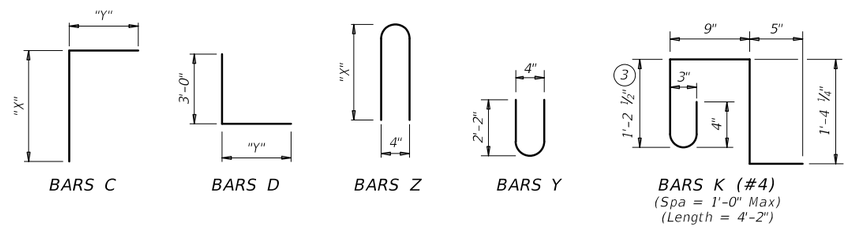
BOTTOM SLAB TOP SLAB

PART PLANS



SECTION THRU CURB

TABLE OF BAR DIMENSIONS		
H	"X"	"Y"
4'-0"	4'-6 ½"	5'-9"
5'-0"	5'-6 ½"	5'-9"
6'-0"	6'-6 ½"	5'-9"
7'-0"	7'-6 ½"	5'-9"
8'-0"	8'-6 ½"	5'-9"
9'-0"	9'-6 ½"	5'-9"
10'-0"	10'-6 ½"	5'-9"



1. 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0", refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Rail Anchorage Curb (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

2. For vehicle safety, the following requirements must be met:
   - For structures without bridge rail, construct curbs no more than 3" above finished grade.
   - For structures with bridge rail, construct curbs flush with finished grade.

   Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

3. For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.

4. 1'-0" typical. 2'-3" when the Rail Anchorage Curb (RAC) standard sheet is referred to elsewhere in the plans.

The Contractor may replace Bars B, C, D, E, F1, F2, M, Y, and/or Z with deformed welded wire reinforcement (WWR) meeting the requirements of ASTM A1064. The area of required reinforcement may be reduced by the ratio of 60 ksi / 70 ksi. Spacing of WWR is limited to 4" Min and 18" Max. When required, provide lap splices in the WWR of the same length required for the equivalent bar size, rounded up for wire sizes between conventional bar sizes. The lap length required for WWR is never less than the lap length required for uncoated #4 bars.

Example conversion: Replacing No. 6 Gr 60 at 6" Spacing with WWR
Required WWR = (0.44 sq. in. per 0.5 ft.) x (60 ksi / 70 ksi) = 0.755 sq. in. per ft.
If D30.6 wire is used to meet the 0.755 sq. in. per ft. requirement in this example, the required spacing = (0.306 sq. in.) / (0.755 sq. in. per ft.) x (12 in. per ft.) = 4.86" Max spacing. Required lap length for the provided D30.6 wire is 2'-1" (the same minimum lap length required for uncoated #5 bars, as listed under MATERIAL NOTES).

CONSTRUCTION NOTES:

Do not use permanent forms.
Chamfer the bottom edge of the top slab 3" at the entrance.
Optionally, raise construction joints shown at the flow line by a maximum of 6". If this option is taken, Bars M may be cut off or raised, Bars C and D may be reversed, and Bars Y and Z may be reversed.

MATERIAL NOTES:

Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
Provide Class C concrete (f'c = 3,600 psi) for culvert barrel and curb, with the following exceptions: provide Class S concrete (f'c = 4,000 psi) for top slabs of:
- culverts with overlay,
- culverts with 1-to-2 course surface treatment, or
- culverts with the top slab as the final riding surface.

Provide bar laps, where required, as follows:
- Uncoated or galvanized ~ #4 = 1'-8" Min
- Uncoated or galvanized ~ #5 = 2'-1" Min
- Uncoated or galvanized ~ #6 = 2'-6" Min

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications for the range of fill heights shown.
See the Multiple Box Culverts Cast-In-Place Miscellaneous Detail (MC-MD) standard sheet for details pertaining to skewed ends, angle sections, and lengthening.

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

HL93 LOADING SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE
10'-0" SPAN
0' TO 7' FILL

MC-10-7

FILE: mc107ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		143

NUMBER OF SPANS	SECTION DIMENSIONS				BILLS OF REINFORCING STEEL (For Box Length = 40 feet)																																QUANTITIES					
					Bars B (5)					Bars C & D							Bars E					Bars F1 ~ #4				Bars F2 ~ #4				Bars M ~ #4				Bars Y & Z ~ #4							Bars H 4 ~ #4 (5)		Bars K		Per Foot of Barrel		Curb		Total	
	S	H	T	U	No.	Size	Spa	Length	Wt	No.	Size	Spa	Bars C Length	Bars C Wt	Bars D Length	Bars D Wt	No.	Size	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Length	Wt	No.	Spa	Bars Y Length	Bars Y Wt	Bars Z Length	Bars Z Wt	Length	Wt	No.	Wt	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)	Conc (CY)	Renf (Lb)
2	10' – 0"	4' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	108	#6	9"	10' – 4"	1,676	8' – 10"	1,433	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	66	18"	39' – 9"	1,752	108	9"	4' – 0"	289	54	9"	4' – 7"	165	9' – 3"	334	21' – 6"	57	46	128	1.333	374.6	1.6	185	54.9	15,168
3	10' – 0"	4' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	108	#6	9"	10' – 4"	1,676	8' – 10"	1,433	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	95	18"	39' – 9"	2,523	108	9"	4' – 0"	289	108	9"	4' – 7"	331	9' – 3"	667	32' – 1"	86	68	189	1.942	539.8	2.4	275	80.1	21,865
4	10' – 0"	4' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	108	#6	9"	10' – 4"	1,676	8' – 10"	1,433	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	124	18"	39' – 9"	3,293	108	9"	4' – 0"	289	162	9"	4' – 7"	496	9' – 3"	1,001	42' – 8"	114	88	245	2.551	704.9	3.2	359	105.2	28,553
5	10' – 0"	4' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	108	#6	9"	10' – 4"	1,676	8' – 10"	1,433	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	153	18"	39' – 9"	4,063	108	9"	4' – 0"	289	216	9"	4' – 7"	661	9' – 3"	1,335	53' – 3"	142	110	306	3.160	870.0	3.9	448	130.3	35,248
6	10' – 0"	4' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	108	#6	9"	10' – 4"	1,676	8' – 10"	1,433	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	182	18"	39' – 9"	4,833	108	9"	4' – 0"	289	270	9"	4' – 7"	827	9' – 3"	1,668	65' – 6"	175	130	362	3.770	1,050.3	4.7	537	155.5	42,550
2	10' – 0"	5' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	108	#6	9"	11' – 4"	1,838	8' – 10"	1,433	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	72	18"	39' – 9"	1,912	108	9"	5' – 0"	361	54	9"	4' – 7"	165	11' – 3"	406	21' – 6"	57	46	128	1.398	386.2	1.6	185	57.5	15,634
3	10' – 0"	5' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	108	#6	9"	11' – 4"	1,838	8' – 10"	1,433	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	103	18"	39' – 9"	2,735	108	9"	5' – 0"	361	108	9"	4' – 7"	331	11' – 3"	812	32' – 1"	86	68	189	2.029	554.5	2.4	275	83.5	22,456
4	10' – 0"	5' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	108	#6	9"	11' – 4"	1,838	8' – 10"	1,433	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	134	18"	39' – 9"	3,558	108	9"	5' – 0"	361	162	9"	4' – 7"	496	11' – 3"	1,217	42' – 8"	114	88	245	2.659	722.7	3.2	359	109.5	29,268
5	10' – 0"	5' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	108	#6	9"	11' – 4"	1,838	8' – 10"	1,433	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	165	18"	39' – 9"	4,381	108	9"	5' – 0"	361	216	9"	4' – 7"	661	11' – 3"	1,623	53' – 3"	142	110	306	3.290	891.0	3.9	448	135.5	36,088
6	10' – 0"	5' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	108	#6	9"	11' – 4"	1,838	8' – 10"	1,433	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	196	18"	39' – 9"	5,204	108	9"	5' – 0"	361	270	9"	4' – 7"	827	11' – 3"	2,029	65' – 6"	175	130	362	3.921	1,074.5	4.7	537	161.6	43,516
2	10' – 0"	6' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	108	#6	9"	12' – 4"	2,001	8' – 10"	1,433	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	78	18"	39' – 9"	2,071	108	9"	6' – 0"	433	54	9"	4' – 7"	165	13' – 3"	478	21' – 6"	57	46	128	1.463	397.9	1.6	185	60.1	16,100
3	10' – 0"	6' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	108	#6	9"	12' – 4"	2,001	8' – 10"	1,433	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	111	18"	39' – 9"	2,947	108	9"	6' – 0"	433	108	9"	4' – 7"	331	13' – 3"	956	32' – 1"	86	68	189	2.115	569.3	2.4	275	87.0	23,047
4	10' – 0"	6' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	108	#6	9"	12' – 4"	2,001	8' – 10"	1,433	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	144	18"	39' – 9"	3,824	108	9"	6' – 0"	433	162	9"	4' – 7"	496	13' – 3"	1,434	42' – 8"	114	88	245	2.767	740.7	3.2	359	113.8	29,986
5	10' – 0"	6' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	108	#6	9"	12' – 4"	2,001	8' – 10"	1,433	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	177	18"	39' – 9"	4,700	108	9"	6' – 0"	433	216	9"	4' – 7"	661	13' – 3"	1,912	53' – 3"	142	110	306	3.420	912.1	3.9	448	140.7	36,931
6	10' – 0"	6' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	108	#6	9"	12' – 4"	2,001	8' – 10"	1,433	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	210	18"	39' – 9"	5,576	108	9"	6' – 0"	433	270	9"	4' – 7"	827	13' – 3"	2,390	65' – 6"	175	130	362	4.072	1,098.7	4.7	537	167.6	44,484
2	10' – 0"	7' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	108	#6	9"	13' – 4"	2,163	8' – 10"	1,433	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	78	18"	39' – 9"	2,071	108	9"	7' – 0"	505	54	9"	4' – 7"	165	15' – 3"	550	21' – 6"	57	46	128	1.528	405.5	1.6	185	62.7	16,406
3	10' – 0"	7' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	108	#6	9"	13' – 4"	2,163	8' – 10"	1,433	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	111	18"	39' – 9"	2,947	108	9"	7' – 0"	505	108	9"	4' – 7"	331	15' – 3"	1,100	32' – 1"	86	68	189	2.202	578.8	2.4	275	90.5	23,425
4	10' – 0"	7' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	108	#6	9"	13' – 4"	2,163	8' – 10"	1,433	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	144	18"	39' – 9"	3,824	108	9"	7' – 0"	505	162	9"	4' – 7"	496	15' – 3"	1,650	42' – 8"	114	88	245	2.876	751.9	3.2	359	118.2	30,436
5	10' – 0"	7' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	108	#6	9"	13' – 4"	2,163	8' – 10"	1,433	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	177	18"	39' – 9"	4,700	108	9"	7' – 0"	505	216	9"	4' – 7"	661	15' – 3"	2,200	53' – 3"	142	110	306	3.549	925.1	3.9	448	145.9	37,453
6	10' – 0"	7' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	108	#6	9"	13' – 4"	2,163	8' – 10"	1,433	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	210	18"	39' – 9"	5,576	108	9"	7' – 0"	505	270	9"	4' – 7"	827	15' – 3"	2,750	65' – 6"	175	130	362	4.223	1,113.5	4.7	537	173.7	45,078
2	10' – 0"	8' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	108	#6	9"	14' – 4"	2,325	8' – 10"	1,433	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	84	18"	39' – 9"	2,230	108	9"	8' – 0"	577	54	9"	4' – 7"	165	17' – 3"	622	21' – 6"	57	46	128	1.593	417.2	1.6	185	65.3	16,871
3	10' – 0"	8' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	108	#6	9"	14' – 4"	2,325	8' – 10"	1,433	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	119	18"	39' – 9"	3,160	108	9"	8' – 0"	577	108	9"	4' – 7"	331	17' – 3"	1,244	32' – 1"	86	68	189	2.288	593.5	2.4	275	93.9	24,016
4	10' – 0"	8' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	108	#6	9"	14' – 4"	2,325	8' – 10"	1,433	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	154	18"	39' – 9"	4,089	108	9"	8' – 0"	577	162	9"	4' – 7"	496	17' – 3"	1,867	42' – 8"	114	88	245	2.984	769.8	3.2	359	122.5	31,152
5	10' – 0"	8' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	108	#6	9"	14' – 4"	2,325	8' – 10"	1,433	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	189	18"	39' – 9"	5,019	108	9"	8' – 0"	577	216	9"	4' – 7"	661	17' – 3"	2,489	53' – 3"	142	110	306	3.679	946.2	3.9	448	151.1	38,295
6	10' – 0"	8' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	108	#6	9"	14' – 4"	2,325	8' – 10"	1,433	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	224	18"	39' – 9"	5,948	108	9"	8' – 0"	577	270	9"	4' – 7"	827	17' – 3"	3,111	65' – 6"	175	130	362	4.374	1,137.7	4.7	537	179.7	46,045
2	10' – 0"	9' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	162	#6	6"	15' – 4"	3,731	8' – 10"	2,149	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	90	18"	39' – 9"	2,390	108	9"	9' – 0"	649	54	9"	4' – 7"	165	19' – 3"	694	21' – 6"	57	46	128	1.657	477.8	1.6	185	67.9	19,297
3	10' – 0"	9' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	162	#6	6"	15' – 4"	3,731	8' – 10"	2,149	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	127	18"	39' – 9"	3,372	108	9"	9' – 0"	649	108	9"	4' – 7"	331	19' – 3"	1,389	32' – 1"	86	68	189	2.374	657.3	2.4	275	97.3	26,567
4	10' – 0"	9' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	162	#6	6"	15' – 4"	3,731	8' – 10"	2,149	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	164	18"	39' – 9"	4,355	108	9"	9' – 0"	649	162	9"	4' – 7"	496	19' – 3"	2,083	42' – 8"	114	88	245	3.092	836.7	3.2	359	126.8	33,828
5	10' – 0"	9' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	162	#6	6"	15' – 4"	3,731	8' – 10"	2,149	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	201	18"	39' – 9"	5,337	108	9"	9' – 0"	649	216	9"	4' – 7"	661	19' – 3"	2,778	53' – 3"	142	110	306	3.809	1,016.2	3.9	448	156.3	41,096
6	10' – 0"	9' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	162	#6	6"	15' – 4"	3,731	8' – 10"	2,149	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	238	18"	39' – 9"	6,320	108	9"	9' – 0"	649	270	9"	4' – 7"	827	19' – 3"	3,472	65' – 6"	175	130	362	4.526	1,210.9	4.7	537	185.8	48,972
2	10' – 0"	10' – 0"	8"	7"	162	#6	6"	21' – 6"	5,231	162	#6	6"	16' – 4"	3,974	8' – 10"	2,149	162	#6	6"	15' – 4"	3,731	14	18"	39' – 9"	372	90	18"	39' – 9"	2,390	108	9"	10' – 0"	721	54	9"	4' – 7"	165	21' – 3"	767	21' – 6"	57	46	128	1.722	487.5	1.6	185	70.5	19,685
3	10' – 0"	10' – 0"	8"	7"	162	#6	6"	32' – 1"	7,807	162	#6	6"	16' – 4"	3,974	8' – 10"	2,149	162	#6	6"	25' – 11"	6,306	21	18"	39' – 9"	558	127	18"	39' – 9"	3,372	108	9"	10' – 0"	721	108	9"	4' – 7"	331	21' – 3"	1,533	32' – 1"	86	68	189	2.461	668.8	2.4	275	100.8	27,026
4	10' – 0"	10' – 0"	8"	7"	162	#6	6"	42' – 8"	10,382	162	#6	6"	16' – 4"	3,974	8' – 10"	2,149	162	#6	6"	36' – 6"	8,881	28	18"	39' – 9"	743	164	18"	39' – 9"	4,355	108	9"	10' – 0"	721	162	9"	4' – 7"	496	21' – 3"	2,300	42' – 8"	114	88	245	3.200	850.0	3.2	359	131.2	34,360
5	10' – 0"	10' – 0"	8"	7"	162	#6	6"	53' – 3"	12,957	162	#6	6"	16' – 4"	3,974	8' – 10"	2,149	162	#6	6"	47' – 1"	11,457	35	18"	39' – 9"	929	201	18"	39' – 9"	5,337	108	9"	10' – 0"	721	216	9"	4' – 7"	661	21' – 3"	3,066	53' – 3"	142	110	306	3.938	1,031.3	3.9	448	161.5	41,699
6	10' – 0"	10' – 0"	8"	7"	162	#6	6"	66' – 4"	16,140	162	#6	6"	16' – 4"	3,974	8' – 10"	2,149	162	#6	6"	57' – 8"	14,032	42	18"	39' – 9"	1,115	238	18"	39' – 9"	6,320	108	9"	10' – 0"	721	270	9"	4' – 7"	827	21' – 3"	3,833	65' – 6"	175	130	362	4.677	1,227.8	4.7	537	191.8	49,648

(5) Bar lengths over 60' include one bar lap; refer to MATERIAL NOTES for minimum lap lengths.

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

MULTIPLE BOX CULVERTS CAST-IN-PLACE

10'-0" SPAN

0' TO 7' FILL

MC-10-7

FILE: mc107ste-20.dgn	DN: TBE	CK: BMP	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		144

DATE: 9/23/2021 3:16:33 PM
FILE: c:\pw-af\pw-af-prod\ross.deborde@aguirre-fields.com\d0155414\MC-10-7-02.dgn

DATE: 9/23/2021 3:16:40 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155414\FW-0.dgn

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing length (2~wings) (3)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
D	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
R	#5	6	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

WING DIMENSION FORMULAS:
(All values are in feet.)

Hw = H + T + C – 0.250'
A = (Hw – 0.333') (SL)
B = (A) tangent (30°)
Lw = (A) ÷ cosine (30°)

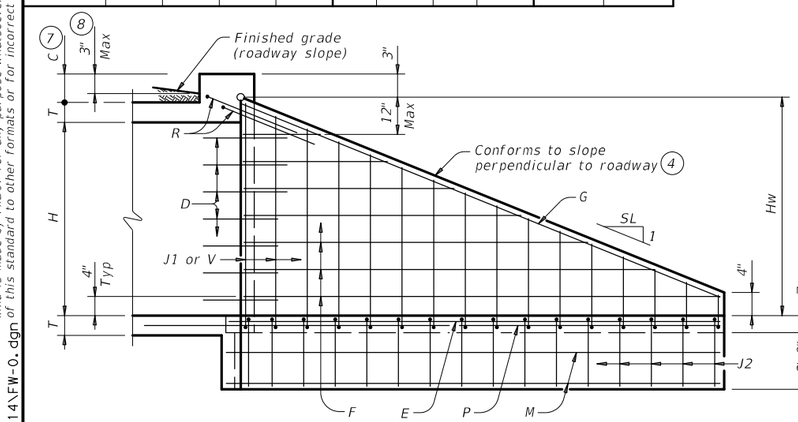
For cast–in–place culverts:
Ltw = (N) (S) + (N + 1) (U)

For precast culverts:
Ltw = (N) (2U + S) + (N – 1) (0.5')

Total wingwall area (two wings ~ SF) = (Hw + 0.333') (Lw)

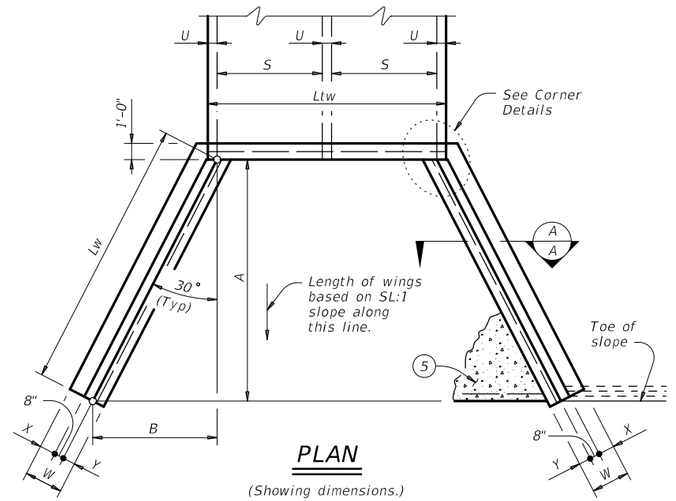
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans

See applicable box culvert standard sheet for H, S, T, and U values.



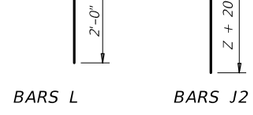
INSIDE ELEVATION

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)



PLAN

(Showing dimensions.)

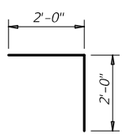


BARS D

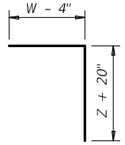
BARS R

BARS J1

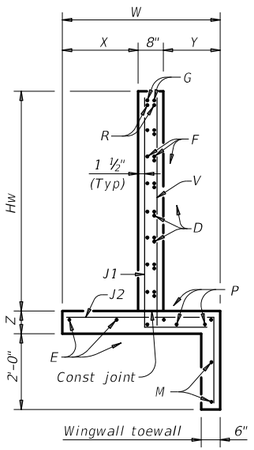
BARS V



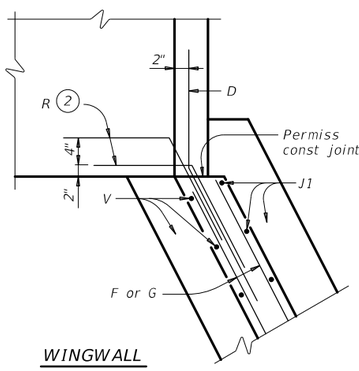
BARS L



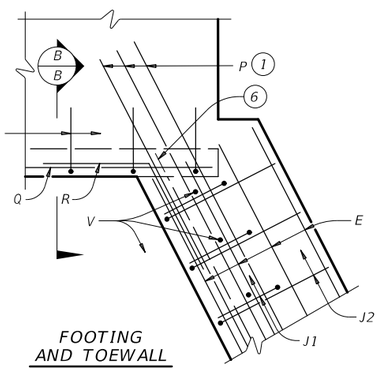
BARS J2



SECTION A-A



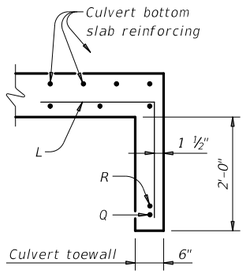
WINGWALL



FOOTING AND TOEWALL

CORNER DETAILS

(Culvert and culvert toewall reinforcing not shown for clarity.)



SECTION B-B (5)

(1) Extend Bars P 3'-0" minimum into bottom slab of box culvert.

(2) Adjust as necessary to maintain 1 1#2" clear cover and 4" minimum between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by Lw.

(4) Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B–B will not be required.

(6) At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.

(7) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

(8) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing unless noted otherwise.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

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

Texas Department of Transportation

Bridge Division Standard

CONCRETE WINGWALLS WITH FLARED WINGS FOR 0° SKEW BOX CULVERTS

FW-0

FILE: fw-0std-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		145

DATE: 9/23/2021 3:16:48 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155414\FW-S.dgn

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing length (2~wings) (3)	
					Bars J1		Bars J2			
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)
2'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	33.73	0.248
3'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.07	0.261
3'-6"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	37.74	0.273
4'-0"	2'-5"	1'-0"	9"	7"	#4	1'-0"	#4	1'-0"	38.41	0.285
4'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	41.75	0.330
5'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.09	0.343
5'-6"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	45.75	0.355
6'-0"	3'-2"	1'-6"	1'-0"	7"	#4	1'-0"	#4	1'-0"	46.42	0.367
7'-0"	3'-8"	1'-9"	1'-3"	7"	#4	1'-0"	#4	1'-0"	52.77	0.414
8'-0"	4'-2"	2'-0"	1'-6"	8"	#5	1'-0"	#4	1'-0"	60.19	0.486
9'-0"	4'-8"	2'-3"	1'-9"	8"	#4	6"	#4	6"	81.49	0.535
10'-0"	5'-2"	2'-6"	2'-0"	8"	#5	6"	#4	6"	97.25	0.584
11'-0"	5'-8"	2'-9"	2'-3"	8"	#6	6"	#5	6"	133.65	0.634
12'-0"	6'-2"	3'-0"	2'-6"	9"	#7	6"	#5	6"	162.29	0.721
13'-0"	6'-8"	3'-3"	2'-9"	11"	#7	6"	#5	6"	178.80	0.856
14'-0"	7'-2"	3'-6"	3'-0"	1'-0"	#8	6"	#5	6"	216.78	0.959
15'-0"	7'-8"	4'-0"	3'-0"	1'-1"	#9	6"	#6	6"	283.06	1.068
16'-0"	8'-2"	4'-6"	3'-0"	1'-3"	#9	6"	#6	6"	297.02	1.234

TABLE OF WINGWALL REINFORCING
(2~wings)

Bar	Size	No.	Spa
DL	#5	~	1'-0"
DS	#5	~	1'-0"
E	#4	~	1'-0"
F	#4	~	1'-0"
G	#6	4	~
M	#4	4	~
P	#4	~	1'-0"
RS	#5	3	~
RL	#5	3	~
V	#4	~	1'-0"

TABLE OF ESTIMATED CULVERT TOEWALL QUANTITIES

Bar	Size	No.	Spa
L	#4	~	1'-6"
Q	#4	1	~
Reinf (Lb/Ft)			2.45
Conc (CY/Ft)			0.037

WING DIMENSION FORMULAS:
(All values are in feet.)

Hw = H + T + C - 0.250'
A = (Hw - 0.333')(Sc)
B = (A) [tanget (θ + 15°)]
Lw = (A) ÷ [cosine (θ + 15°)]

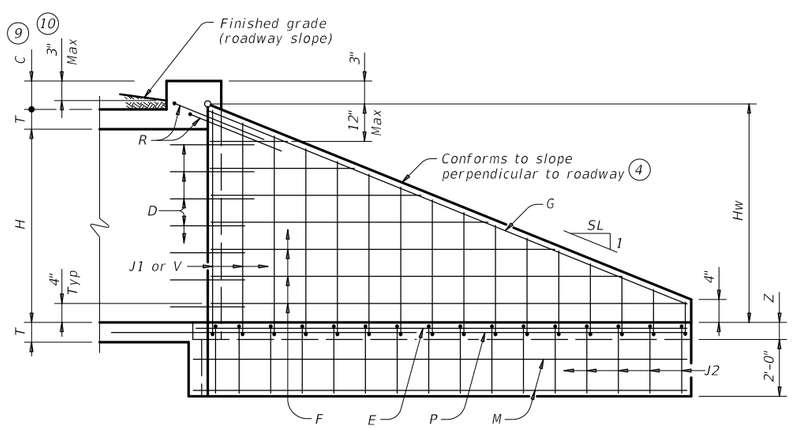
For cast-in-place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine θ

For precast culverts:
Ltw = [(N) (2U + S) + (N - 1) (0.5')] ÷ cosine θ

Total wingwall area (two wings ~ SF) = 0.5 (Hw + 0.333') (Lw + A)

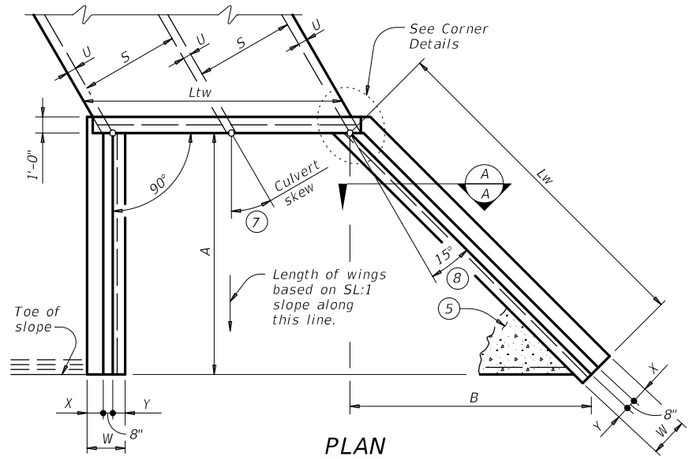
Hw = Height of wingwall
SL:1 = Side slope ratio (horizontal:1 vertical)
A = Length of short wingwalls
Lw = Length of long wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
θ = Culvert skew

See applicable box culvert standard sheet for H, S, T, and U values.



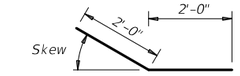
INSIDE ELEVATION

(Showing reinforcing. Culvert and culvert toewall reinforcing not shown for clarity.)

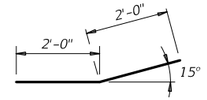


PLAN

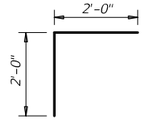
(Showing dimensions and 30° skew.)



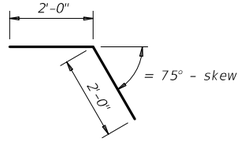
BARS DS
(Short wing)



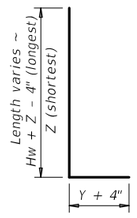
BARS DL
(Long wing)



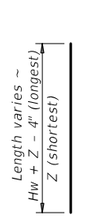
BARS RS
(Short wing)



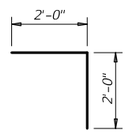
BARS RL
(Long wing)



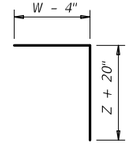
BARS J1



BARS V



BARS L



BARS J2

(1) Extend Bars P 3'-0" minimum into bottom slab of box culvert.

(2) Adjust as necessary to maintain 1 1#2" clear cover and 4" minimum between bars.

(3) Quantities shown are based on an average wing height for two wings (one structure end). To determine total quantities for two wings, multiply the tabulated values by 0.5 x (A + Lw).

(4) Recommended values of side slope are: 2:1, 3:1, 4:1, and 6:1.

(5) When shown elsewhere on the plans, construct 5" deep concrete riprap. Payment for riprap is as required by Item 432, "Riprap". Unless otherwise shown on the plans or directed by the Engineer, provide a 6" wide by 1'-6" deep reinforced concrete toewall along all edges of the riprap adjacent to natural ground; reinforce the toewall by extending typical riprap reinforcing into the toewall; and extend construction joints or grooved joints oriented in the direction of flow across the full distance of the riprap at intervals of approximately 20'. When such riprap is provided, the culvert toewall shown in SECTION B-B will not be required.

(6) At Contractor's option, culvert toewall may be ended flush with wingwall toewall. Adjust reinforcing as needed.

(7) Applicable values of skew are: 15°, 30°, and 45°.

(8) Typical wingwall angle for all skews.

(9) 0" Min to 5'-0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'-0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631-CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.

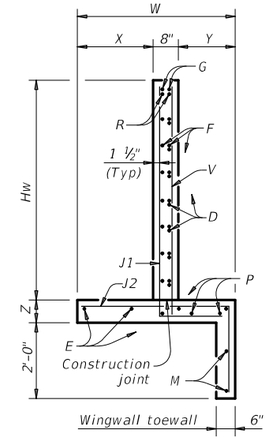
(10) For vehicle safety, the following requirements must be met:
- For structures without bridge rail, construct curbs no more than 3" above finished grade.
- For structures with bridge rail, construct curbs flush with finished grade.

Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

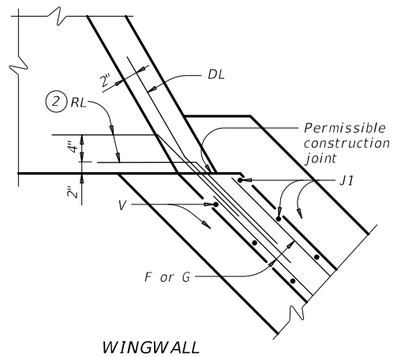
MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforcing steel if required elsewhere in the plans.
In riprap concrete, synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
When structure is founded on solid rock, depth of toewalls for culverts and wingwalls may be reduced or eliminated as directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for additional dimensions and information.
The quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for Contractor's information only.

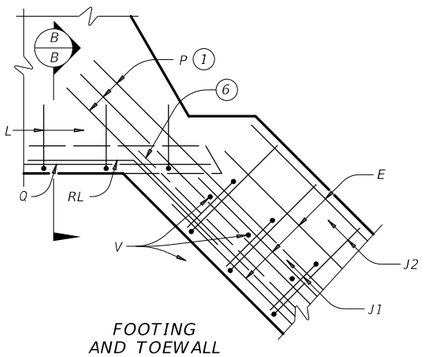
Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing dimensions are out-to-out of bars.



SECTION A-A



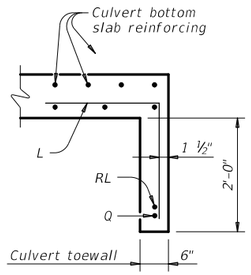
WINGWALL



FOOTING AND TOEWALL

CORNER DETAILS

(Culvert and culvert toewall reinforcing not shown for clarity.)



SECTION B-B (5)

Texas Department of Transportation

Bridge Division Standard

CONCRETE WINGWALLS WITH FLARED WINGS FOR SKEWED BOX CULVERTS

FW-S

FILE: fw-sstde-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		146

DATE: 9/23/2021 3:16:55 PM
FILE: c:\pw-df\pw-df-prod\ross.debor@aguirre-fields.com\d0155414\PW.dgn

TABLE OF DIMENSIONS AND REINFORCING STEEL
(Wings for one structure end)

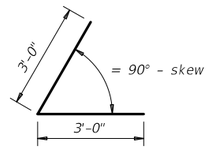
Dimensions					Variable Reinforcing				Estimated Quantities per ft of wing (2–wings) (4)		Estimated Quantities per ft of Toewall (1–toewall)	
					Bars J1		Bars J2					
Maximum Wingwall Height Hw	W	X	Y	Z	Size	Spa	Size	Spa	Reinf (Lb/Ft)	Conc (CY/Ft)	Reinf (Lb/Ft)	Conc (CY/Ft)
2'–6"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	48.64	0.406	6.85	0.071
2'–9"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	49.31	0.424	6.85	0.071
3'–0"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	49.98	0.444	6.85	0.071
3'–3"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	53.32	0.462	6.85	0.071
3'–6"	2'–10"	10"	1'–0"	7"	#4	1'–0"	#4	1'–0"	53.98	0.480	6.85	0.071
4'–0"	3'–2"	1'–2"	1'–0"	7"	#4	1'–0"	#4	1'–0"	55.77	0.532	6.85	0.071
4'–6"	3'–2"	1'–2"	1'–0"	7"	#4	1'–0"	#4	1'–0"	59.77	0.568	6.85	0.071
5'–0"	3'–9"	1'–7"	1'–2"	7"	#4	1'–0"	#4	1'–0"	63.45	0.632	6.96	0.075
5'–6"	3'–9"	1'–7"	1'–2"	7"	#4	1'–0"	#4	1'–0"	67.46	0.668	6.96	0.075
6'–0"	4'–4"	2'–0"	1'–4"	7"	#5	1'–0"	#5	1'–0"	80.67	0.730	7.07	0.078
6'–6"	4'–4"	2'–0"	1'–4"	7"	#5	1'–0"	#5	1'–0"	85.05	0.768	7.07	0.078
7'–0"	5'–0"	2'–3"	1'–9"	8"	#5	1'–0"	#5	1'–0"	92.15	0.864	8.07	0.093
7'–6"	5'–0"	2'–3"	1'–9"	8"	#5	1'–0"	#5	1'–0"	96.54	0.902	8.07	0.093
8'–0"	5'–6"	2'–8"	1'–10"	8"	#5	6"	#5	6"	139.04	0.962	8.13	0.095
8'–6"	5'–6"	2'–8"	1'–10"	8"	#5	6"	#5	6"	144.47	1.000	8.13	0.095
9'–6"	6'–0"	2'–10"	2'–2"	9"	#5	6"	#5	6"	156.93	1.136	8.41	0.110
10'–6"	6'–5"	3'–0"	2'–5"	9"	#6	6"	#5	6"	196.27	1.234	8.57	0.117
11'–6"	7'–2"	3'–6"	2'–8"	11"	#6	6"	#6	6"	230.13	1.438	9.52	0.140
12'–6"	7'–8"	3'–9"	2'–11"	1'–0"	#7	6"	#6	6"	283.41	1.592	9.74	0.157
13'–6"	8'–2"	4'–0"	3'–2"	1'–2"	#8	6"	#6	6"	348.72	1.804	10.02	0.186
14'–6"	8'–10"	4'–5"	3'–5"	1'–4"	#9	6"	#6	6"	432.94	2.046	10.30	0.218
15'–6"	9'–6"	4'–10"	3'–8"	1'–6"	#9	6"	#7	6"	489.52	2.302	11.24	0.253
16'–0"	9'–11"	5'–0"	3'–11"	1'–7"	#9	6"	#7	6"	505.72	2.448	11.47	0.279

TABLE OF WINGWALL REINFORCING
(2–wings)

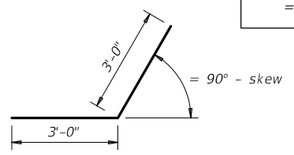
Bar	Size	No.	Spa
D1	#6	~	1'–0"
D2	#6	~	1'–0"
E1	#4	~	1'–0"
F	#4	~	1'–0"
G	#6	~	8"
M1	#4	4	~
P	#4	~	1'–0"
V	#4	~	1'–0"

TABLE OF TOEWALL REINFORCING

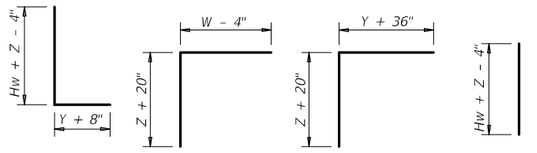
Bar	Size	No.	Spa
J3	#4	~	1'–0"
M2	#4	2	~
E2	#4	~	1'–0"



BARS D1



BARS D2



BARS J1 BARS J2 BARS J3 BARS V

WING DIMENSION FORMULAS:

(All values are in feet.)

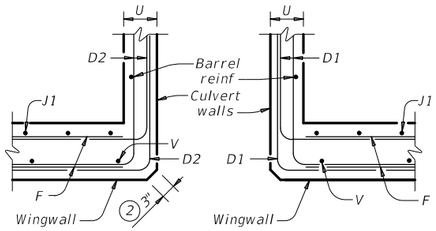
Hw = H + T + C
Lw = (Hw) (SL) ÷ cosine (θ) for Type PW–1
= (Hw – 1') (SL) ÷ cosine (θ) for Type PW–2 and Hw ≥ 4'
= (Hw – 0.5') (SL) ÷ cosine (θ) for Type PW–2 and Hw < 4'

For cast–in–place culverts:
Ltw = [(N) (S) + (N + 1) (U)] ÷ cosine (θ)

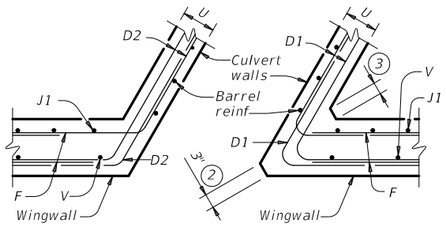
For precast culverts:
Ltw = [(N) (2 U + S) + (N – 1) (0.5')] ÷ cosine (θ)
Total Wingwall Area (two wings ~ SF)
= (2)(Hw)(Lw) for Type PW–1
= (2)(Hw)(Lw) – 6 SF for Type PW–2 and Hw ≥ 4'
= (2)(Hw)(Lw) – 1.5 SF for Type PW–2 and Hw < 4'

Hw = Height of wingwall
Lw = Length of wingwall
Ltw = Culvert toewall length
N = Number of culvert spans
SL:1 = Channel slope ratio. (horizontal: 1 vertical, usual value is 2:1)
θ = Culvert skew

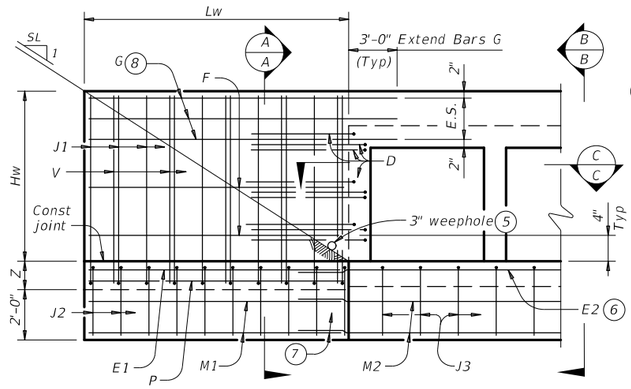
See applicable box culvert standard sheet for S, H, T, and U values.



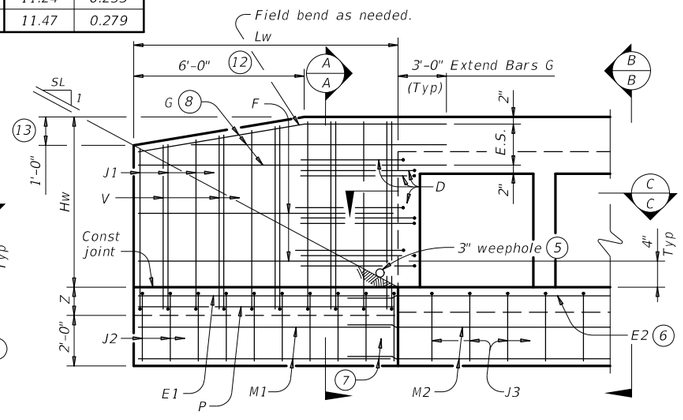
SECTION C-C - PW-1



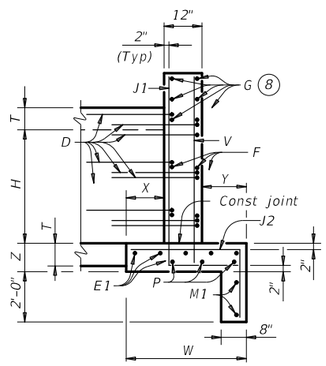
SECTION C-C - PW-2



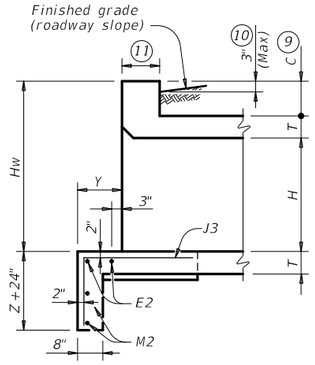
PARTIAL ELEVATION - PW-1



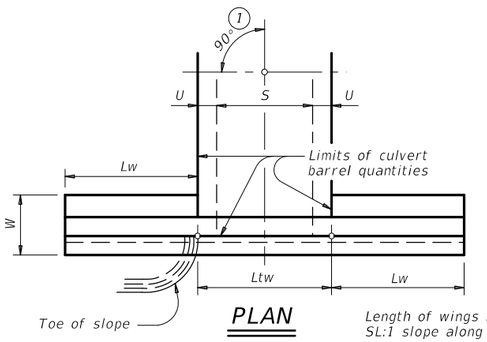
PARTIAL ELEVATION - PW-2



SECTION A-A
(Showing wing reinforcement.)

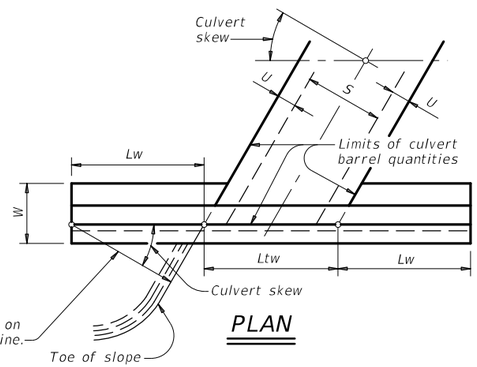


SECTION B-B
(Showing wing reinforcement.)



PLAN

DETAILS FOR NON-SKEWED BOX CULVERTS



PLAN

DETAILS FOR SKEWED BOX CULVERTS
(Showing 30° skew.)

1. Skew = 0°
2. At discharge end, chamfer may be ¾" minimum.
3. For 15° skew ~ 1"
   For 30° skew ~ 2"
   For 45° skew ~ 3"
4. Quantities shown are for two Type PW–1 wings. Adjust concrete volume for Type PW–2 wings. To determine estimated quantities for two wings, multiply the tabulated values by Lw. Quantities shown do not include weight of Bars D.
5. Provide weepholes for Hw = 5'–0" and greater. Fill around weepholes with coarse gravel.
6. Extend Bars E2 1'–6" minimum into the wingwall footing.
7. Lap Bars M1 1'–6" minimum with Bars M2.
8. Place Bars G as shown, equally spaced at 8" maximum. Provide at least two pairs of Bars G per wing.
9. 0" Min to 5'–0" Max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail or curbs taller than 1'–0, refer to the Extended Curb Details (ECD) standard sheet. For structures with T631 or T631LS bridge rail, refer to the Mounting Details for T631 & T631LS Rails (T631–CM) standard sheet. Refer to the Box Culvert Rail Mounting Details (RAC) standard sheet for structures with bridge rail other than T631 or T631LS.
10. For vehicle safety, the following requirements must be met:
    - For structures without bridge rail, construct curbs no more than 3" above finished grade.
    - For structures with bridge rail, construct curbs flush with finished grade.

    Reduce curb heights, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
11. 1'–0" typical. 2'–3" when the Box Culvert Rail Mounting Details (RAC) standard sheet is referred to elswhere in the plans.
12. 3'–0" for Hw < 4'.
13. 6" for Hw < 4'.

DESIGNER NOTES:
Type PW–1 can be used for all applications and must be used if railing is to be mounted to the wingwall.
Type PW–2 can only be used for applications without a railing mounted to the wingwall.

MATERIAL NOTES:
Provide Class C concrete (f'c=3,600 psi).
Provide Grade 60 reinforcing steel.
Provide galvanized reinforing steel if required elsewhere in the plans.

GENERAL NOTES:
Designed in accordance with AASHTO LRFD Bridge Design Specifications.
Depth of toewalls for wingwalls and culverts may be reduced or eliminated when founded on solid rock, when directed by the Engineer.
See Box Culvert Supplement (BCS) standard sheet for wingwall type and additional dimensions and information.
Quantities for concrete and reinforcing steel resulting from the formulas given on this sheet are for the Contractor's information only.

Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing dimensions are out–to–out of bars.

Texas Department of Transportation
Bridge Division Standard

CONCRETE WINGWALLS
WITH PARALLEL WINGS FOR BOX CULVERTS
TYPES PW-1 AND PW-2

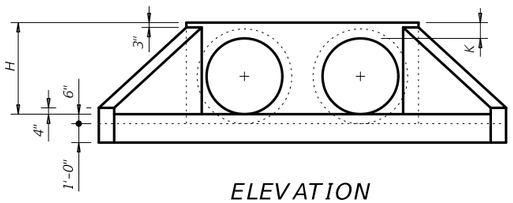
PW

FILE: pwstde01-20.dgn	DN: GAF	CK: CAT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		147

DATE: 9/23/2021 3:17:02 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155414\CH-FW-0.dgn

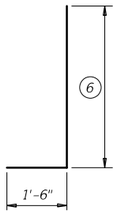
TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

Slope	Dia of Pipe (D)	Values for One Pipe						Values to be Added for Each Addt'l Pipe		
		W	X	Y	L	Reinf (Lbs)	Conc (CY) (1)	X and W	Reinf (Lbs)	Conc (CY) (1)
2:1	12"	4' – 7 ½"	2' – 6"	2' – 10"	3' – 3 ¼"	88	0.6	1' – 9"	20	0.2
	15"	5' – 5 ¾"	2' – 9 ½"	3' – 4"	3' – 10 ¼"	103	0.7	2' – 2"	24	0.3
	18"	6' – 4 ¼"	3' – 1"	3' – 10"	4' – 5"	124	0.9	2' – 8"	32	0.3
	21"	7' – 2 ¾"	3' – 4 ½"	4' – 4"	5' – 0"	143	1.1	3' – 1"	43	0.4
	24"	8' – 2 ½"	3' – 9 ½"	4' – 10"	5' – 7"	164	1.3	3' – 7"	50	0.5
	27"	9' – 1"	4' – 1"	5' – 4"	6' – 2"	179	1.5	3' – 11"	56	0.6
	30"	9' – 11 ½"	4' – 4 ½"	5' – 10"	6' – 8 ¾"	203	1.7	4' – 4"	65	0.8
	33"	10' – 10"	4' – 8"	6' – 4"	7' – 3 ¾"	224	2.0	4' – 8"	71	0.9
	36"	11' – 8 ¼"	4' – 11 ½"	6' – 10"	7' – 10 ¾"	249	2.2	5' – 1"	81	1.0
	42"	13' – 5 ¼"	5' – 6 ½"	7' – 10"	9' – 0 ½"	298	2.8	5' – 10"	97	1.3
	48"	15' – 9"	6' – 1 ½"	9' – 4"	10' – 9 ¼"	360	3.8	6' – 7"	117	1.7
	54"	17' – 5 ¾"	6' – 8 ½"	10' – 4"	11' – 11 ¼"	427	4.5	7' – 6"	151	2.1
	60"	19' – 2 ¾"	7' – 3 ½"	11' – 4"	13' – 1"	481	5.3	8' – 3"	174	2.5
	66"	20' – 11 ½"	7' – 10 ½"	12' – 4"	14' – 3"	544	6.2	8' – 9"	194	2.9
	72"	22' – 8 ½"	8' – 5 ½"	13' – 4"	15' – 4 ¾"	601	7.1	9' – 4"	213	3.3
3:1	12"	6' – 3"	2' – 6"	4' – 3"	4' – 11"	118	0.8	1' – 9"	22	0.2
	15"	7' – 5"	2' – 9 ½"	5' – 0"	5' – 9 ¼"	137	1.1	2' – 2"	28	0.3
	18"	8' – 6 ¾"	3' – 1"	5' – 9"	6' – 7 ¾"	170	1.3	2' – 8"	37	0.5
	21"	9' – 8 ¾"	3' – 4 ½"	6' – 6"	7' – 6"	195	1.6	3' – 1"	48	0.6
	24"	11' – 0"	3' – 9 ½"	7' – 3"	8' – 4 ½"	227	2.0	3' – 7"	58	0.7
	27"	12' – 2"	4' – 1"	8' – 0"	9' – 2 ¾"	251	2.3	3' – 11"	67	0.8
	30"	13' – 4"	4' – 4 ½"	8' – 9"	10' – 1 ¼"	293	2.7	4' – 4"	77	1.0
	33"	14' – 5 ¾"	4' – 8"	9' – 6"	10' – 11 ¾"	318	3.1	4' – 8"	84	1.2
	36"	15' – 7 ¾"	4' – 11 ½"	10' – 3"	11' – 10"	351	3.5	5' – 1"	96	1.4
	42"	17' – 11 ½"	5' – 6 ½"	11' – 9"	13' – 6 ¾"	432	4.5	5' – 10"	119	1.7
	48"	21' – 1 ¾"	6' – 1 ½"	14' – 0"	16' – 2"	537	6.1	6' – 7"	146	2.3
	54"	23' – 5 ½"	6' – 8 ½"	15' – 6"	17' – 10 ¾"	630	7.3	7' – 6"	186	2.9
	60"	25' – 9 ¼"	7' – 3 ½"	17' – 0"	19' – 7 ½"	719	8.7	8' – 3"	219	3.4
	66"	28' – 1"	7' – 10 ½"	18' – 6"	21' – 4 ¼"	811	10.1	8' – 9"	242	3.9
	72"	30' – 4 ¾"	8' – 5 ½"	20' – 0"	23' – 1 ¼"	924	11.7	9' – 4"	272	4.4
4:1	12"	7' – 10 ¾"	2' – 6"	5' – 8"	6' – 6 ½"	148	1.1	1' – 9"	24	0.3
	15"	9' – 4"	2' – 9 ½"	6' – 8"	7' – 8 ½"	181	1.5	2' – 2"	32	0.4
	18"	10' – 9 ½"	3' – 1"	7' – 8"	8' – 10 ¼"	221	1.9	2' – 8"	42	0.5
	21"	12' – 2 ¾"	3' – 4 ½"	8' – 8"	10' – 0"	260	2.3	3' – 1"	57	0.7
	24"	13' – 9 ½"	3' – 9 ½"	9' – 8"	11' – 2"	301	2.8	3' – 7"	67	0.9
	27"	15' – 3"	4' – 1"	10' – 8"	12' – 3 ¾"	334	3.3	3' – 11"	77	1.0
	30"	16' – 8 ¼"	4' – 4 ½"	11' – 8"	13' – 5 ¾"	385	3.8	4' – 4"	89	1.3
	33"	18' – 1 ¾"	4' – 8"	12' – 8"	14' – 7 ½"	425	4.5	4' – 8"	101	1.4
	36"	19' – 7"	4' – 11 ½"	13' – 8"	15' – 9 ¼"	472	5.1	5' – 1"	115	1.7
	42"	22' – 5 ¾"	5' – 6 ½"	15' – 8"	18' – 1"	583	6.5	5' – 10"	141	2.1
	48"	26' – 6 ¼"	6' – 1 ½"	18' – 8"	21' – 6 ¾"	730	8.9	6' – 7"	175	2.8
	54"	29' – 5"	6' – 8 ½"	20' – 8"	23' – 10 ¼"	875	10.7	7' – 6"	226	3.6
	60"	32' – 3 ¾"	7' – 3 ½"	22' – 8"	26' – 2"	996	12.7	8' – 3"	264	4.3
	66"	35' – 2 ½"	7' – 10 ½"	24' – 8"	28' – 5 ¾"	1,140	14.9	8' – 9"	300	4.9
	72"	38' – 1 ¼"	8' – 5 ½"	26' – 8"	30' – 9 ½"	1,297	17.3	9' – 4"	334	5.6
6:1	12"	11' – 2"	2' – 6"	8' – 6"	9' – 9 ¾"	224	1.9	1' – 9"	28	0.4
	15"	13' – 2 ¼"	2' – 9 ½"	10' – 0"	11' – 6 ½"	268	2.5	2' – 2"	37	0.5
	18"	15' – 2 ½"	3' – 1"	11' – 6"	13' – 3 ¼"	330	3.2	2' – 8"	50	0.7
	21"	17' – 2 ¾"	3' – 4 ½"	13' – 0"	15' – 0 ¼"	387	3.9	3' – 1"	69	0.9
	24"	19' – 4 ½"	3' – 9 ½"	14' – 6"	16' – 9"	453	4.8	3' – 7"	80	1.2
	27"	21' – 4 ¾"	4' – 1"	16' – 0"	18' – 5 ¾"	512	5.7	3' – 11"	96	1.4
	30"	23' – 5 ¼"	4' – 4 ½"	17' – 6"	20' – 2 ½"	593	6.7	4' – 4"	110	1.7
	33"	25' – 5 ½"	4' – 8"	19' – 0"	21' – 11 ¼"	675	7.8	4' – 8"	127	2.0
	36"	27' – 5 ¾"	4' – 11 ½"	20' – 6"	23' – 8"	735	9.0	5' – 1"	144	2.3
	42"	31' – 6 ¼"	5' – 6 ½"	23' – 6"	27' – 1 ½"	922	11.5	5' – 10"	179	3.0
	48"	37' – 3 ½"	6' – 1 ½"	28' – 0"	32' – 4"	1,191	15.9	6' – 7"	231	4.0
	54"	41' – 4 ¼"	6' – 8 ½"	31' – 0"	35' – 9 ½"	1,424	19.2	7' – 6"	300	5.0
	60"	45' – 4 ¾"	7' – 3 ½"	34' – 0"	39' – 3"	1,631	22.9	8' – 3"	353	6.0

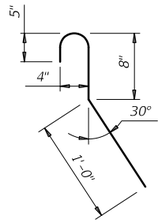


ELEVATION

(Showing dimensions.)



BARS V



BARS CL

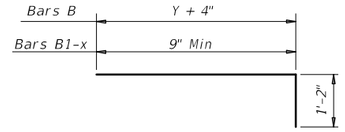
(Length = 2'-5")

TABLE OF (5) REINFORCING STEEL

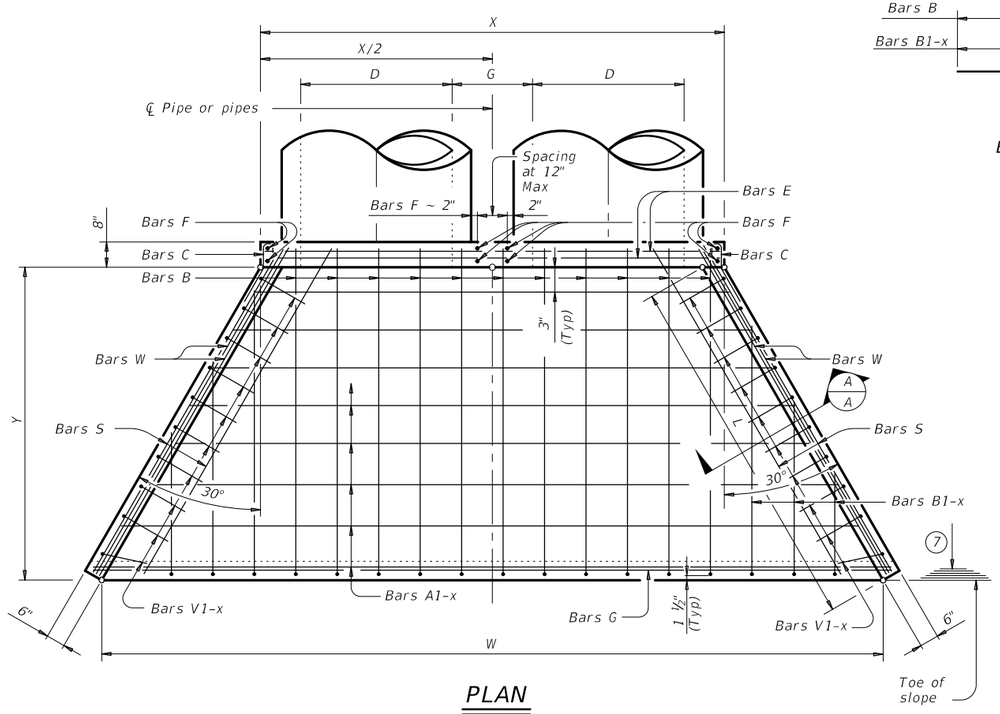
Bar	Size	Spa	No.
A	#4	1' – 0"	~
B	#3	1' – 6"	~
C	#4	1' – 0"	~
D	#3	1' – 0"	~
E	#5	~	4
F	#5	~	~
G	#3	~	2
S	#4	~	6
V	#4	1' – 0"	~
W	#5	~	4

TABLE OF CONSTANT DIMENSIONS

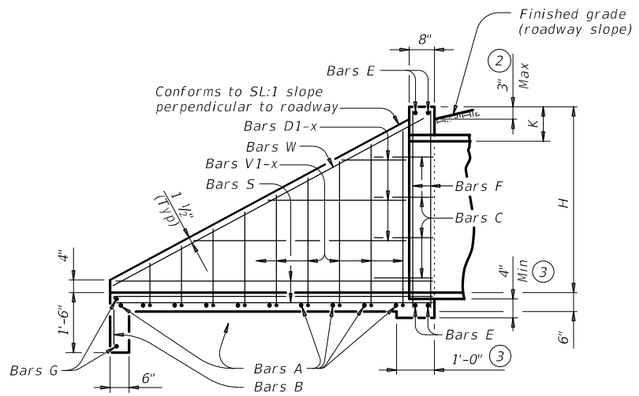
Dia of Pipe (D)	G	K (4)	H
12"	0' – 9"	1' – 0"	2' – 0"
15"	0' – 11"	1' – 0"	2' – 3"
18"	1' – 2"	1' – 0"	2' – 6"
21"	1' – 4"	1' – 0"	2' – 9"
24"	1' – 7"	1' – 0"	3' – 0"
27"	1' – 8"	1' – 0"	3' – 3"
30"	1' – 10"	1' – 0"	3' – 6"
33"	1' – 11"	1' – 0"	3' – 9"
36"	2' – 1"	1' – 0"	4' – 0"
42"	2' – 4"	1' – 0"	4' – 6"
48"	2' – 7"	1' – 3"	5' – 3"
54"	3' – 0"	1' – 3"	5' – 9"
60"	3' – 3"	1' – 3"	6' – 3"
66"	3' – 3"	1' – 3"	6' – 9"
72"	3' – 4"	1' – 3"	7' – 3"



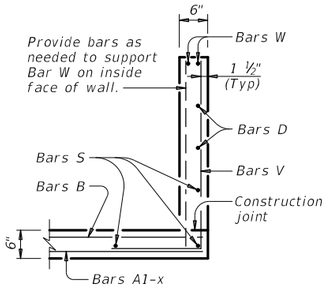
BARS B and B1-x



PLAN



TYPICAL WING ELEVATION



SECTION A-A

(1) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(2) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(3) Provide a 1'-0" footing as shown where required to maintain 4" minimum cover for pipes.

(4) Dimensions shown are usual and maximum.

(5) Quantities shown are for one structure end only (one headwall).

(6) Min Length = $6" + 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right)$

Max Length = $12 \times H - 3" \times \left(\frac{12 \times H - 7}{12 \times L}\right) - 1"$

(7) Lengths of wings based on SL:1 slope along this line.

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

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

Texas Department of Transportation

Bridge Division Standard

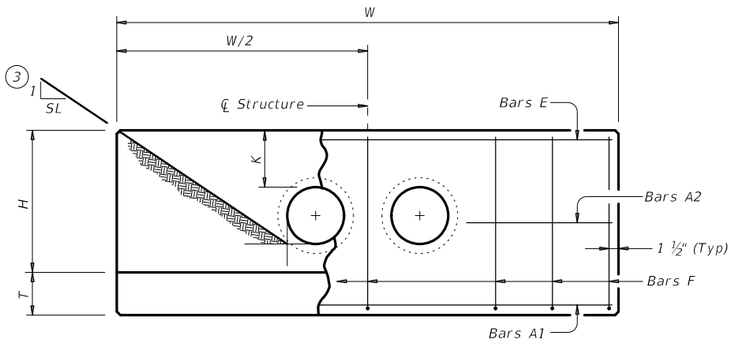
CONCRETE HEADWALLS WITH FLARED WINGS FOR 0° SKEW PIPE CULVERTS

CH-FW-0

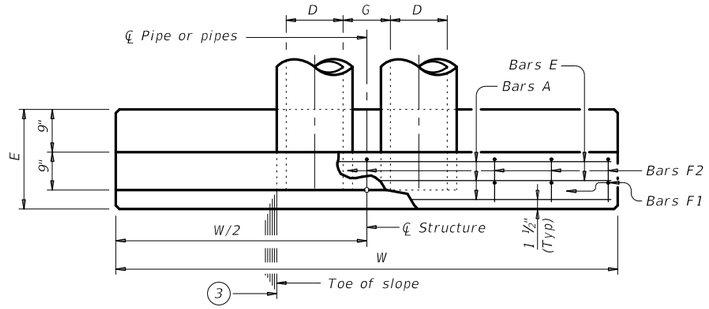
FILE: chfw00se-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		148

TABLE OF VARIABLE DIMENSIONS AND QUANTITIES FOR ONE HEADWALL (5)

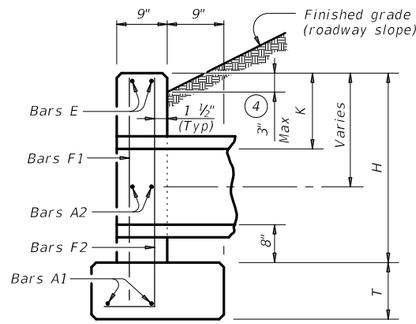
Slope	Dia of Pipe (D)	Values for One Pipe			Values To Be Added for Each Addt'l Pipe		
		W	Reinf (Lbs) (1)	Conc (CY) (2)	W	Reinf (Lbs) (1)	Conc (CY) (2)
2:1	12"	9' – 0"	122	1.1	1' – 9"	15	0.2
	15"	10' – 3"	136	1.3	2' – 2"	16	0.2
	18"	11' – 6"	163	1.5	2' – 8"	19	0.3
	21"	12' – 9"	200	1.8	3' – 1"	31	0.4
	24"	14' – 0"	217	2.1	3' – 7"	34	0.4
	27"	15' – 3"	254	2.4	3' – 11"	37	0.5
	30"	16' – 6"	272	2.7	4' – 4"	40	0.6
	33"	17' – 9"	314	3.1	4' – 8"	43	0.6
	36"	19' – 0"	371	3.9	5' – 1"	46	0.8
	42"	21' – 6"	442	4.9	5' – 10"	52	1.0
	48"	25' – 0"	569	6.4	6' – 7"	59	1.3
	54"	27' – 6"	701	7.5	7' – 6"	82	1.6
	60"	30' – 0"	794	8.8	8' – 3"	90	1.8
	66"	32' – 6"	894	10.2	8' – 9"	96	2.0
	72"	35' – 0"	1,055	11.7	9' – 4"	103	2.3
3:1	12"	13' – 0"	175	1.6	1' – 9"	14	0.2
	15"	14' – 9"	193	1.9	2' – 2"	17	0.2
	18"	16' – 6"	228	2.2	2' – 8"	19	0.3
	21"	18' – 3"	299	2.6	3' – 1"	31	0.4
	24"	20' – 0"	323	3.0	3' – 7"	33	0.4
	27"	21' – 9"	371	3.5	3' – 11"	37	0.5
	30"	23' – 6"	415	4.0	4' – 4"	40	0.5
	33"	25' – 3"	469	4.6	4' – 8"	43	0.6
	36"	27' – 0"	556	5.7	5' – 1"	46	0.8
	42"	30' – 6"	675	7.1	5' – 10"	52	1.0
	48"	35' – 6"	837	9.2	6' – 7"	59	1.3
	54"	39' – 0"	1,015	11.0	7' – 6"	84	1.6
	60"	42' – 6"	1,171	12.9	8' – 3"	91	1.8
	66"	46' – 0"	1,298	14.9	8' – 9"	98	2.0
	72"	49' – 6"	1,561	17.1	9' – 4"	103	2.3
4:1	12"	17' – 0"	229	2.0	1' – 9"	15	0.2
	15"	19' – 3"	266	2.4	2' – 2"	17	0.2
	18"	21' – 6"	308	2.9	2' – 8"	19	0.3
	21"	23' – 9"	382	3.5	3' – 1"	31	0.3
	24"	26' – 0"	430	3.9	3' – 7"	34	0.4
	27"	28' – 3"	486	4.7	3' – 11"	37	0.5
	30"	30' – 6"	539	5.2	4' – 4"	40	0.6
	33"	32' – 9"	603	6.0	4' – 8"	42	0.6
	36"	35' – 0"	738	7.5	5' – 1"	47	0.8
	42"	39' – 6"	881	9.3	5' – 10"	52	1.0
	48"	46' – 0"	1,102	12.1	6' – 7"	61	1.3
	54"	50' – 6"	1,364	14.4	7' – 6"	84	1.6
	60"	55' – 0"	1,547	16.9	8' – 3"	91	1.8
	66"	59' – 6"	1,741	19.5	8' – 9"	98	2.0
	72"	64' – 0"	2,077	22.4	9' – 4"	102	2.3
6:1	12"	25' – 0"	336	3.0	1' – 9"	14	0.2
	15"	28' – 3"	384	3.6	2' – 2"	17	0.2
	18"	31' – 6"	452	4.2	2' – 8"	19	0.3
	21"	34' – 9"	581	5.1	3' – 1"	31	0.4
	24"	38' – 0"	644	5.8	3' – 7"	34	0.4
	27"	41' – 3"	737	6.9	3' – 11"	37	0.5
	30"	44' – 6"	807	7.7	4' – 4"	39	0.6
	33"	47' – 9"	912	8.9	4' – 8"	44	0.6
	36"	51' – 0"	1,108	11.0	5' – 1"	48	0.8
	42"	57' – 6"	1,318	13.7	5' – 10"	54	1.0
	48"	67' – 0"	1,682	17.9	6' – 7"	59	1.3
	54"	73' – 6"	2,072	21.3	7' – 6"	83	1.6
	60"	80' – 0"	2,351	24.9	8' – 3"	89	1.8
	66"	86' – 6"	2,643	28.9	8' – 9"	96	2.0
	72"	93' – 0"	3,121	33.1	9' – 4"	101	2.3



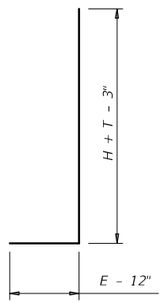
ELEVATION



PLAN OF NON-SKEWED PIPES



SECTION AT CENTER OF PIPE



BARS F2

(1) Total quantities include one 3'-1" lap for bars over 60' in length.

(2) Quantities shown are for concrete pipe and will increase slightly for metal pipe installations.

(3) Indicated slope is perpendicular to centerline pipe or pipes.

(4) For vehicle safety, construct curbs no more than 3" above finished grade. Reduce curb heights, if necessary, to meet these requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.

(5) Dimensions shown are usual and maximum.

(6) Quantities shown are for one structure end only (one headwall).

TABLE OF CONSTANT DIMENSIONS

Dia of Pipe (D)	G	K (5)	H	T	E
12"	0' – 9"	1' – 0"	2' – 8"	0' – 9"	1' – 9"
15"	0' – 11"	1' – 0"	2' – 11"	0' – 9"	1' – 9"
18"	1' – 2"	1' – 0"	3' – 2"	0' – 9"	1' – 9"
21"	1' – 4"	1' – 0"	3' – 5"	0' – 9"	2' – 0"
24"	1' – 7"	1' – 0"	3' – 8"	0' – 9"	2' – 0"
27"	1' – 8"	1' – 0"	3' – 11"	0' – 9"	2' – 3"
30"	1' – 10"	1' – 0"	4' – 2"	0' – 9"	2' – 3"
33"	1' – 11"	1' – 0"	4' – 5"	0' – 9"	2' – 6"
36"	2' – 1"	1' – 0"	4' – 8"	1' – 0"	2' – 6"
42"	2' – 4"	1' – 0"	5' – 2"	1' – 0"	2' – 9"
48"	2' – 7"	1' – 3"	5' – 11"	1' – 0"	3' – 0"
54"	3' – 0"	1' – 3"	6' – 5"	1' – 0"	3' – 3"
60"	3' – 3"	1' – 3"	6' – 11"	1' – 0"	3' – 6"
66"	3' – 3"	1' – 3"	7' – 5"	1' – 0"	3' – 9"
72"	3' – 4"	1' – 3"	7' – 11"	1' – 0"	4' – 0"

TABLE OF REINFORCING STEEL (6)

Bar	Size	Spa	No.
A1	#5	~	2
A2	#5	1' – 6"	~
E	#5	~	2
F	#5	1' – 0"	~

MATERIAL NOTES:
Provide Grade 60 reinforcing steel.
Provide Class C concrete (f'c = 3,600 psi).

GENERAL NOTES:
Designed according to AASHTO LRFD Bridge Design Specifications.
Do not mount bridge rails of any type directly to these culvert headwalls.
This standard may not be used for wall heights, H, exceeding the values shown.

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

DATE: 9/23/2021 3:17:10 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155414\CH-PW-0.dgn

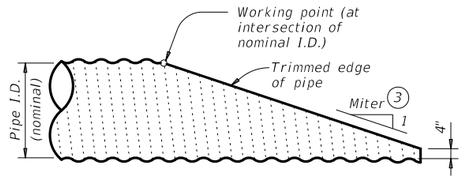
Texas Department of Transportation | Bridge Division Standard

CONCRETE HEADWALLS WITH PARALLEL WINGS FOR NON-SKEWED PIPE CULVERTS

CH-PW-0

FILE: chpw0ste-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		149

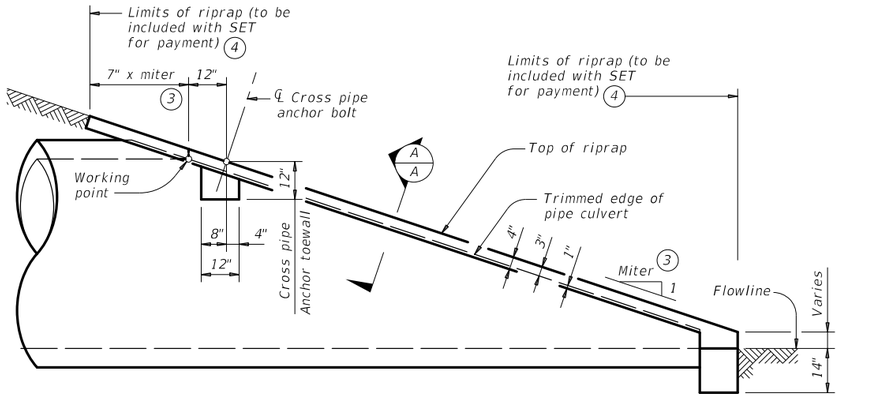
DATE: 9/23/2021 3:17:17 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155414\SETP-CD-01.dgn



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

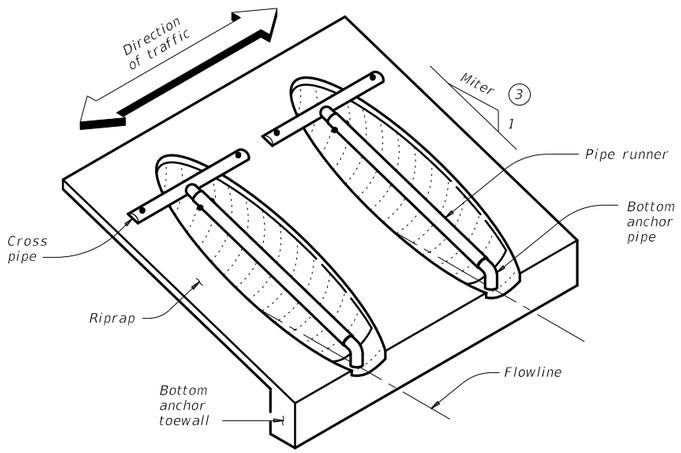
SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

(Showing reinforced concrete pipe (RCP) culvert. Details of corrugated metal pipe (CMP) culvert are similar. Pipe runners not shown for clarity)



ISOMETRIC VIEW OF TYPICAL INSTALLATION

(Showing installation with no skew.)

CROSS PIPE LENGTHS AND PIPE RUNNER LENGTHS (1) (2)

Nominal Culvert I.D.	Pipe Culvert Spa ~ G	Cross Pipe Length	Pipe Runner Length											
			3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
			0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
24"	1' – 7"	3' – 5"	N/A	N/A	N/A	5' – 10"	N/A	N/A	N/A	8' – 1"	N/A	N/A	N/A	12' – 9"
27"	1' – 8"	3' – 8"	N/A	N/A	5' – 5"	6' – 11"	N/A	N/A	7' – 7"	9' – 7"	N/A	N/A	11' – 11"	14' – 11"
30"	1' – 10"	3' – 11"	N/A	N/A	6' – 4"	8' – 0"	N/A	N/A	8' – 9"	11' – 0"	N/A	N/A	13' – 8"	17' – 0"
33"	1' – 11"	4' – 2"	6' – 2"	6' – 5"	7' – 3"	9' – 1"	8' – 6"	8' – 10"	10' – 0"	12' – 5"	13' – 3"	13' – 9"	15' – 5"	19' – 2"
36"	2' – 1"	4' – 5"	6' – 11"	7' – 3"	8' – 2"	10' – 2"	9' – 6"	9' – 11"	11' – 2"	13' – 10"	14' – 9"	15' – 3"	17' – 2"	21' – 3"
42"	2' – 4"	4' – 11"	8' – 6"	8' – 10"	9' – 11"	12' – 4"	11' – 7"	12' – 0"	13' – 6"	16' – 8"	17' – 9"	18' – 5"	20' – 8"	25' – 7"
48"	2' – 7"	5' – 5"	10' – 1"	10' – 5"	11' – 9"	N/A	13' – 7"	14' – 2"	15' – 10"	N/A	20' – 9"	21' – 6"	24' – 2"	N/A
54"	3' – 0"	5' – 11"	11' – 8"	12' – 1"	N/A	N/A	15' – 8"	16' – 3"	N/A	N/A	23' – 10"	24' – 8"	N/A	N/A
60"	3' – 3"	6' – 5"	13' – 3"	N/A	N/A	N/A	17' – 9"	N/A	N/A	N/A	26' – 10"	N/A	N/A	N/A

TYPICAL PIPE CULVERT MITERS (3)

Side Slope	0° Skew	15° Skew	30° Skew	45° Skew
3:1	3:1	3.106:1	3.464:1	4.243:1
4:1	4:1	4.141:1	4.619:1	5.657:1
6:1	6:1	6.212:1	6.928:1	8.485:1

CONDITIONS WHERE PIPE RUNNERS ARE NOT REQUIRED (2)

Nominal Culvert I.D.	Single Pipe Culvert	Multiple Pipe Culverts
12" thru 21"	Skews thru 45°	Skews thru 45°
24"	Skews thru 45°	Skews thru 30°
27"	Skews thru 30°	Skews thru 15°
30"	Skews thru 15°	Skews thru 15°
33"	Skews thru 15°	Always required
36"	Normal (no skew)	Always required
42" thru 60"	Always required	Always required

STANDARD PIPE SIZES AND MAX PIPE RUNNER LENGTHS (1)

Pipe Size	Pipe O.D.	Pipe I.D.	Max Pipe Runner Length
2" STD	2.375"	2.067"	N/A
3" STD	3.500"	3.068"	10' – 0"
4" STD	4.500"	4.026"	19' – 8"
5" STD	5.563"	5.047"	34' – 2"

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) (5)

Nominal Culvert I.D.	3:1 Side Slope				4:1 Side Slope				6:1 Side Slope			
	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew	0° Skew	15° Skew	30° Skew	45° Skew
12"	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.6	0.7	0.7	0.7	0.8
15"	0.5	0.5	0.5	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9
18"	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.8	0.8	0.8	0.9	1.0
21"	0.6	0.6	0.6	0.7	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.2
24"	0.6	0.7	0.7	0.8	0.8	0.8	0.8	1.0	1.0	1.0	1.1	1.3
27"	0.7	0.7	0.8	0.9	0.8	0.9	0.9	1.1	1.1	1.1	1.2	1.4
30"	0.8	0.8	0.8	0.9	0.9	0.9	1.0	1.2	1.2	1.2	1.3	1.6
33"	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.3	1.3	1.4	1.5	1.7
36"	0.9	0.9	0.9	1.1	1.1	1.1	1.2	1.4	1.4	1.5	1.6	1.8
42"	1.0	1.0	1.1	1.3	1.2	1.3	1.3	1.6	1.6	1.7	1.8	2.1
48"	1.1	1.1	1.2	N/A	1.4	1.4	1.5	N/A	1.9	1.9	2.1	N/A
54"	1.3	1.3	N/A	N/A	1.6	1.6	N/A	N/A	2.1	2.1	N/A	N/A
60"	1.4	N/A	N/A	N/A	1.7	N/A	N/A	N/A	2.3	N/A	N/A	N/A

(1) *Provide pipe runner of the size shown in the tables. Provide cross pipe of the same size as the pipe runner. Provide cross pipe stub out and bottom anchor pipe of the next smaller size pipe as shown in the Standard Pipe Sizes and Max Pipe Runner Lengths table.*

(2) *This standard allows for the placement of only one pipe runner across each culvert pipe opening. In order to limit the clear opening to be traversed by an errant vehicle, the following conditions must be met:*

For 60" culvert pipes, the skew must not exceed 0°.
For 54" culvert pipes, the skew must not exceed 15°.
For 48" culvert pipes, the skew must not exceed 30°.
For all culvert pipe sizes 42" and less, the skew must not exceed 45°.

If the above conditions cannot be met, the designer should consider using a safety end treatment with flared wings. For further information, refer to the TxDOT Roadway Design Manual.

(3) *Miter = slope of mitered end of pipe culvert.*

(4) *Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".*

(5) *Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.*

Texas Department of Transportation

Bridge Division Standard

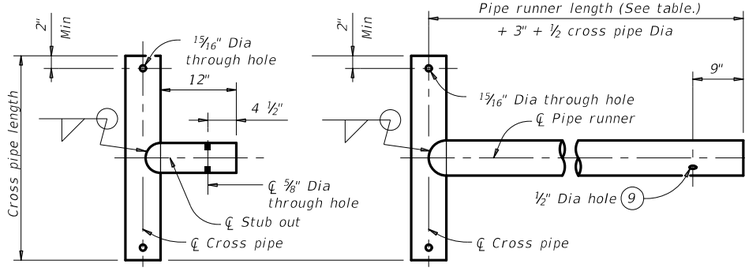
SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

SETP-CD

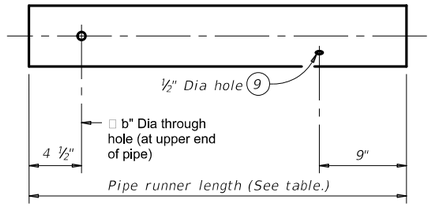
FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		150

DATE: 9/23/2021 3:17:24 PM
FILE: c:\pw-df\pw-df-prod\cross.debord@aguirre-fields.com\d0155414\SETP-CD-02.dgn



OPTION A1 OPTION A2

CROSS PIPE AND CONNECTIONS DETAILS

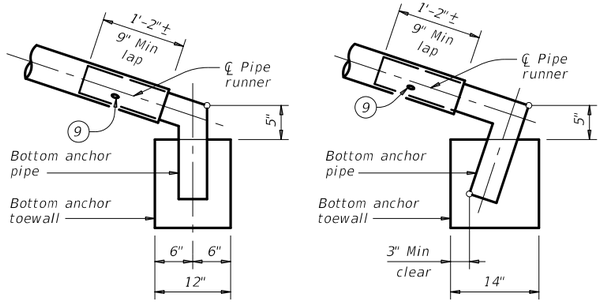


NOTE: The separate pipe runner shown is required when Cross Pipe Connection Option A1 is used.

PIPE RUNNER DETAILS

OPTION B1 OPTION B2

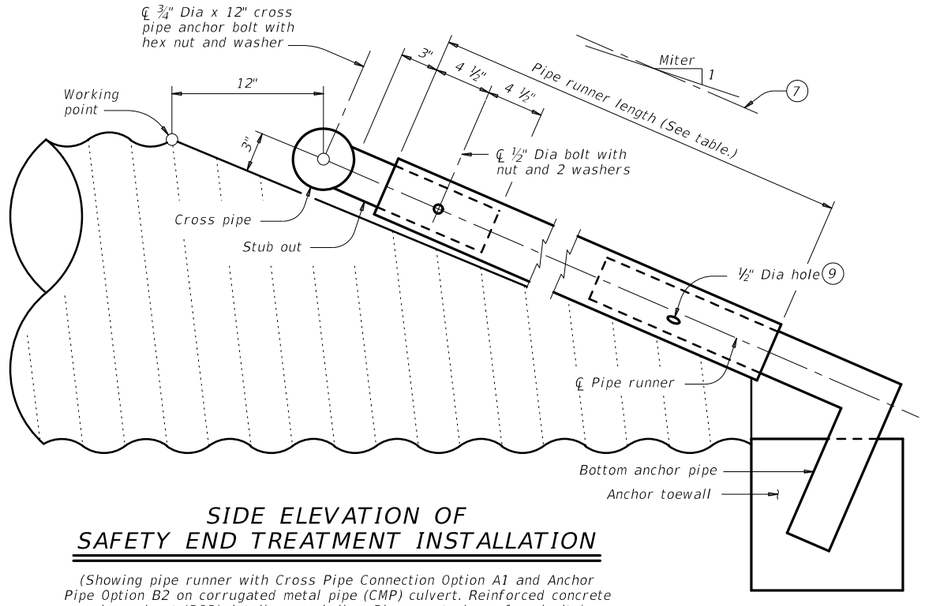
BOTTOM ANCHOR PIPE DETAILS (10)



OPTION B1 OPTION B2

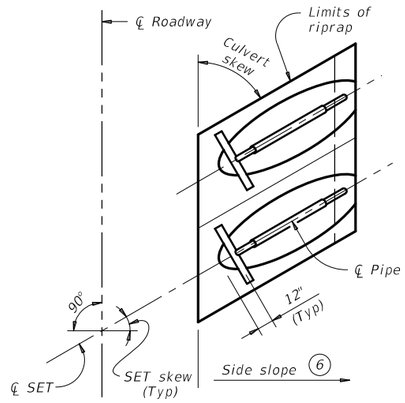
BOTTOM ANCHOR TOEWALL DETAILS

(Culvert and riprap not shown for clarity.)

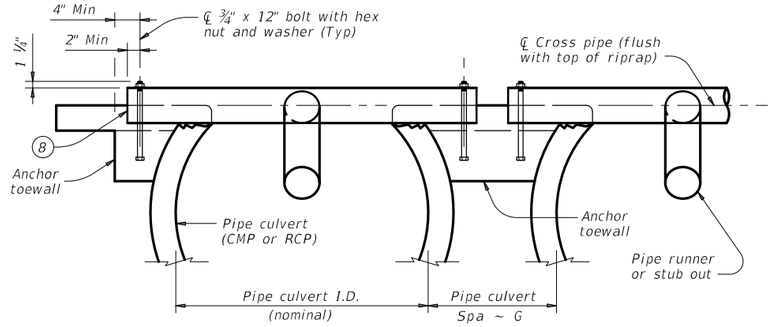


SIDE ELEVATION OF SAFETY END TREATMENT INSTALLATION

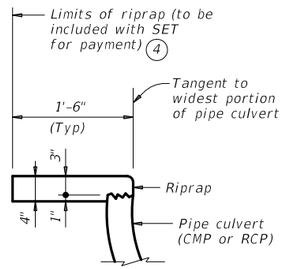
(Showing pipe runner with Cross Pipe Connection Option A1 and Anchor Pipe Option B2 on corrugated metal pipe (CMP) culvert. Reinforced concrete pipe culvert (RCP) details are similar. Riprap not shown for clarity)



PLAN OF SKEWED INSTALLATION



SHOWING CROSS PIPE AND ANCHOR TOEWALL



SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SECTION A-A

(4) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Recommended values of side slope are 3:1, 4:1, and 6:1. All quantities, calculations, and dimensions shown herein are based on these recommended values. Slope of 3:1 or flatter is required for vehicle safety.

(7) Note that actual slope of pipe runner may vary slightly from side slope of riprap and trimmed culvert pipe edge.

(8) Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access.

(9) After installation, inspect the 1/2" hole to ensure that the lap of the pipe runner with the bottom anchor pipe is adequate.

(10) At fabricator's option, a heat bend to a smooth 5" radius or a manufactured elbow (of the same material as the runner) may be substituted for the mitered and welded joint in the bottom anchor pipe.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide pipe runners, cross pipes, and anchor pipes conforming to the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication.

Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Pipe runners are designed for a traversing load of 1,800 pounds at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the pipe runners.

Payment for riprap and toewall is included in the price bid for each safety end treatment.

Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

SHEET 2 OF 2

Texas Department of Transportation | Bridge Division Standard

SAFETY END TREATMENT

FOR 12" DIA TO 60" DIA
PIPE CULVERTS
TYPE II ~ CROSS DRAINAGE

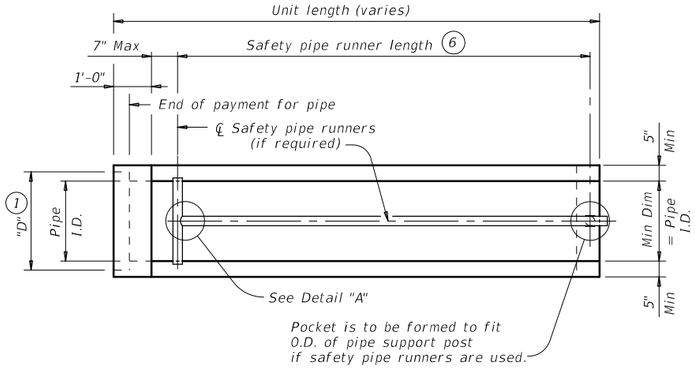
SETP-CD

FILE: setpcdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		151

DATE: 9/23/2021 3:17:31 PM
FILE: c:\pw-df\pw-df-prod\ross.debordeaguirre-fields.com\d0155414\PSET-SC-01.dgn

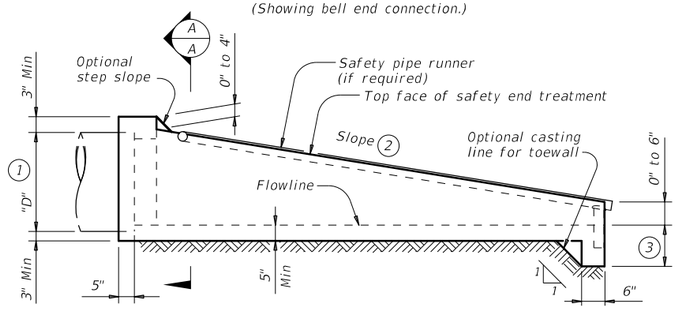
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (8)	"D" (1)	Slope	Min Length of Unit	Single Pipe Skew	Single Pipe Pipe Runners Required	Multiple Pipes Skew	Multiple Pipes Pipe Runners Required
12"	2"	1.15"	17.00"	3:1	2' – 11"	≤ 45°	No	≤ 45°	No
				4:1	3' – 6"				
				6:1	4' – 9"				
15"	2 ¼"	1.30"	20.50"	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
				4:1	4' – 7"				
				6:1	6' – 5"				
18"	2 ½"	1.60"	24.00"	3:1	4' – 6"	≤ 45°	No	≤ 45°	No
				4:1	5' – 8"				
				6:1	8' – 0"				
24"	3"	1.95"	31.00"	3:1	6' – 2"	≤ 45°	No	= 30°	No
				4:1	7' – 10"			> 30°	Yes
				6:1	11' – 3"				
30"	3 ½"	2.65"	38.50"	3:1	7' – 10"	= 15°	No	= 15°	No
				4:1	10' – 1"	> 15°	Yes	> 15°	Yes
				6:1	14' – 8"				
36"	4"	2.75"	45.50"	3:1	9' – 5"	= 0°	No	≥ 0°	Yes
				4:1	12' – 3"	> 0°	Yes		
				6:1	17' – 11"				
42"	4 ½"	N/A	52.50"	3:1	11' – 1"	≥ 0°	Yes	≥ 0°	Yes
				4:1	14' – 5"				
				6:1	21' – 2"				



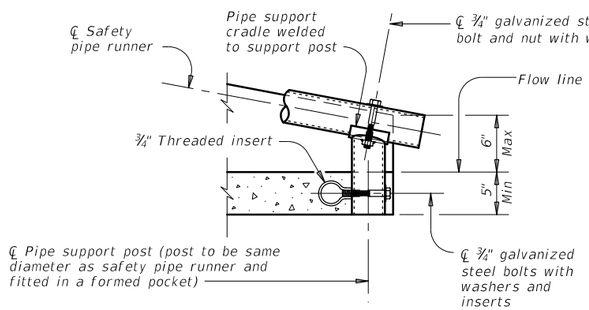
PLAN

(Showing bell end connection.)



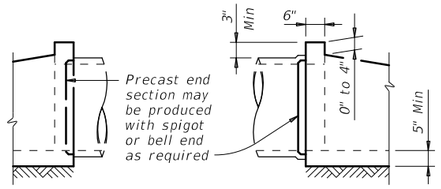
LONGITUDINAL ELEVATION

(Showing bell end connection.)



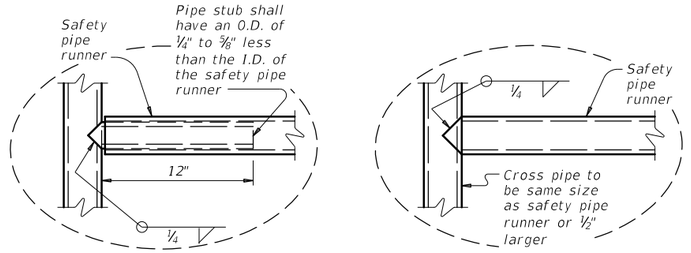
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

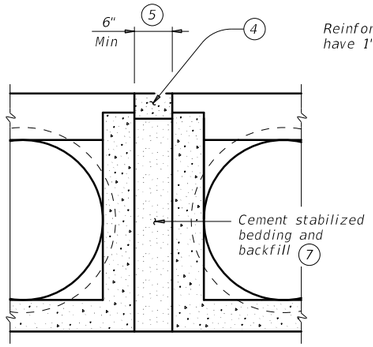
(If required)



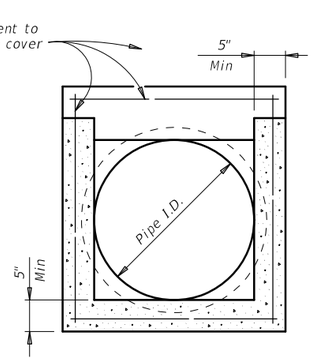
OPTIONAL JOINT FOR RCP

(Showing joint between RCP and precast safety end treatment)

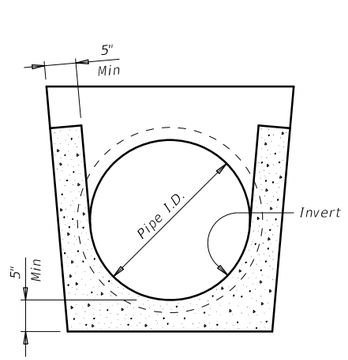




MULTIPLE PIPE INSTALLATION

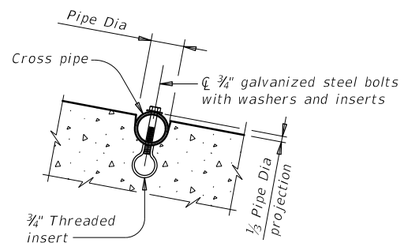


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

SAFETY PIPE RUNNER DIMENSIONS

Max Safety Pipe Runner Length	Required Pipe Runner Size: Pipe Size	Pipe O.D.	Pipe I.D.
11' – 2"	3" STD	3.500"	3.068"
15' – 6"	3 ½" STD	4.000"	3.548"
20' – 10"	4" STD	4.500"	4.026"
35' – 4"	5" STD	5.563"	5.047"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in plans. Slope of 3:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Measured along slope.

(7) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(8) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).
B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor, the next larger size of safety end treatment may be furnished as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464 "Reinforced Concrete Pipe". Connect TP by grouting. See PBGC standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

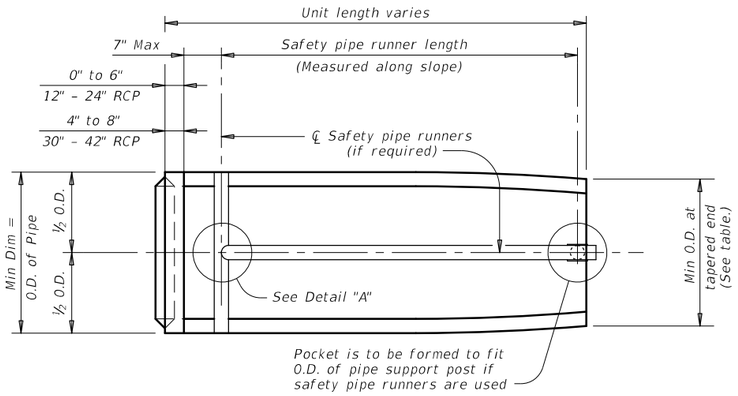
PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

PSET-SC

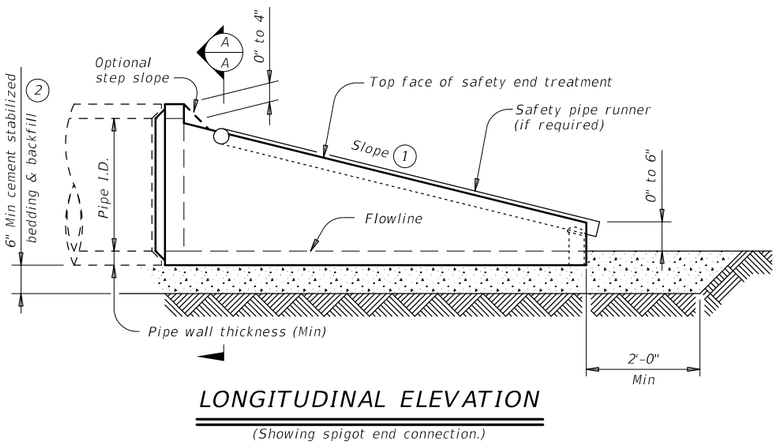
FILE: psetscss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		152

DATE: 9/23/2021 3:17:39 PM
FILE: c:\pw-af\pw-af-prod\ross.deborde@aguirre-fields.com\d0155414\PSET-RC-01.dgn



PLAN VIEW

(Showing spigot end connection.)



LONGITUDINAL ELEVATION

(Showing spigot end connection.)

MAX SAFETY PIPE RUNNER LENGTHS AND REQUIRED SAFETY PIPE RUNNER SIZES

Max Safety Pipe Runner Length	Required Pipe Runner Size		
	Pipe Size	Pipe O.D.	Pipe I.D.
11' – 2"	3" STD	3.500"	3.068"
15' – 6"	3 ½" STD	4.000"	3.548"
20' – 10"	4" STD	4.500"	4.026"
35' – 4"	5" STD	5.563"	5.047"

(1) Slope as shown elsewhere in the plans. Slope of 3:1 or flatter is required for vehicle safety.

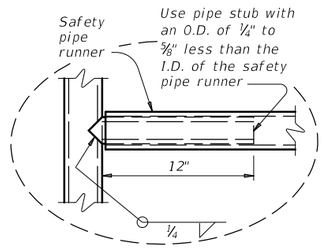
(2) Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(3) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap be considered subsidiary to the Item "Safety End Treatment".

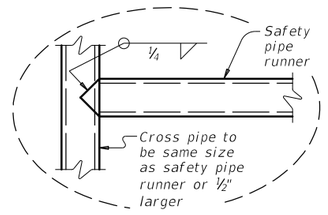
(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. / ft. of pipe)	Slope	Minimum Length of Unit	Single Pipe		Multiple Pipe	
							Skew	Pipe Runners Required	Skew	Pipe Runners Required
12"	2"	16"	16"	0.07 Circ.	3:1	2' – 0"	≤ 45°	No	≤ 45°	No
					4:1	2' – 8"				
					6:1	4' – 0"				
15"	2 ¼"	19 ½"	19"	0.07 Circ.	3:1	2' – 10"	≤ 45°	No	≤ 45°	No
					4:1	3' – 9"				
					6:1	5' – 8"				
18"	2 ½"	23"	21 ½"	0.07 Circ.	3:1	3' – 8"	≤ 45°	No	≤ 45°	No
					4:1	4' – 10"				
					6:1	7' – 3"				
24"	3"	30"	27"	0.07 Circ.	3:1	5' – 3"	≤ 45°	No	≤ 30°	No
					4:1	7' – 0"			> 30°	Yes
					6:1	10' – 6"				
30"	3 ½"	37"	31"	0.18 Circ.	3:1	6' – 3"	≤ 15°	No	≤ 15°	No
					4:1	8' – 2"	> 15°	Yes	> 15°	Yes
					6:1	12' – 1"				
36"	4"	44"	36"	0.19 Ellip.	3:1	7' – 10"	= 0°	No	≥ 0°	Yes
					4:1	10' – 4"	> 0°	Yes		
					6:1	15' – 4"				
42"	4 ½"	51"	41 ½"	0.23 Ellip.	3:1	9' – 6"	≥ 0°	Yes	≥ 0°	Yes
					4:1	12' – 6"				
					6:1	18' – 7"				

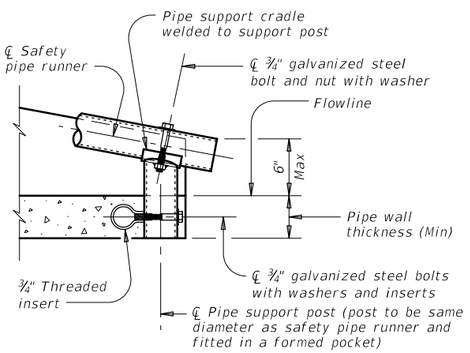


OPTION A



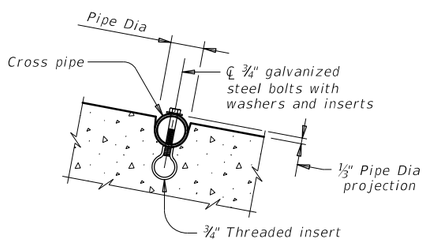
OPTION B

DETAIL A



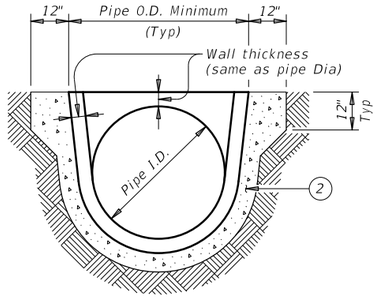
END DETAIL FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)

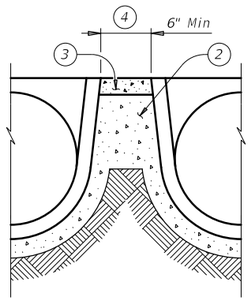


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



SECTION A-A



MULTIPLE PIPE INSTALLATION

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide safety pipe runners, cross pipes, pipe support posts, and pipe stubs meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (CRP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading, and installation.

Pipe runners are designed for a traversing load of 1,800 Lbs at yield as recommended by Research Report 280-1, "Safety Treatment of Roadside Cross-Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation | Bridge Division Standard

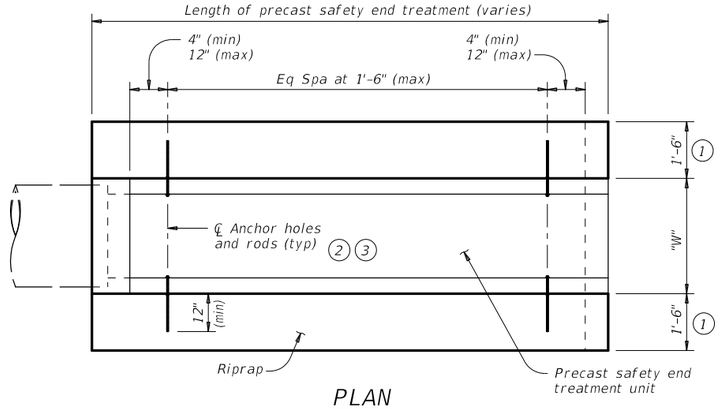
PRECAST SAFETY END TREATMENT

TYPE II ~ CROSS DRAINAGE

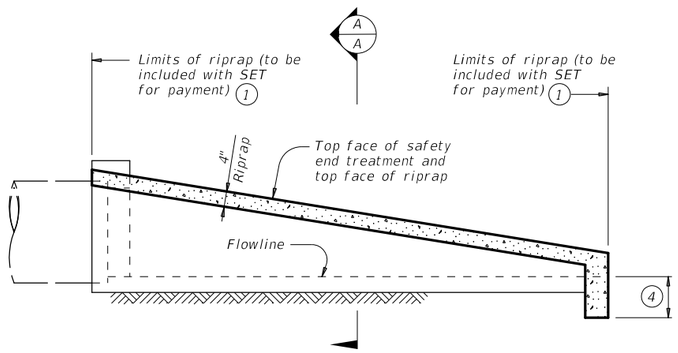
PSET-RC

FILE: psetrcss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		153

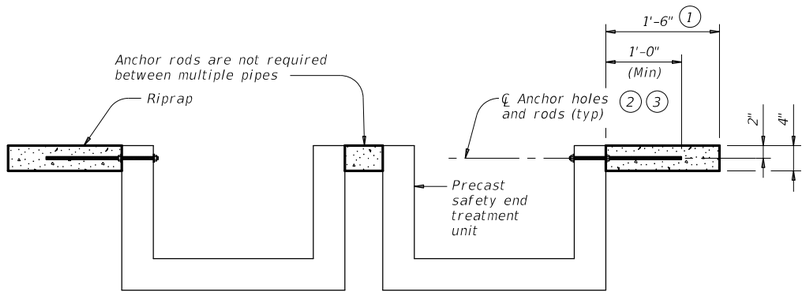
DATE: 9/23/2021 3:17:46 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155414\PSET-RR-01.dgn



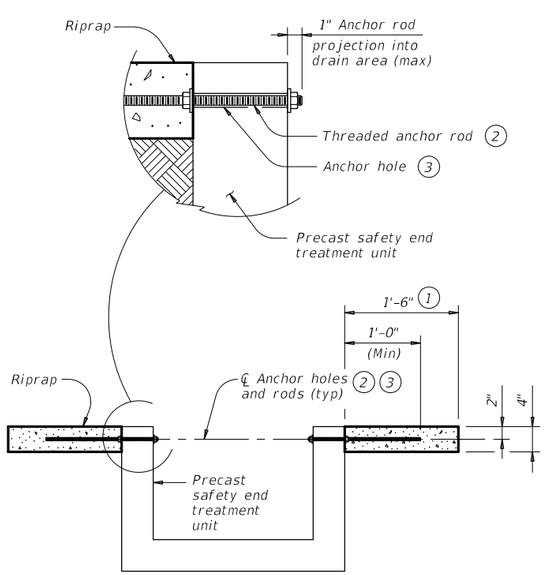
PLAN



LONGITUDINAL ELEVATION



MULTIPLE PIPE INSTALLATION



SINGLE PIPE INSTALLATION

SECTION A-A

ESTIMATED CONCRETE RIPRAP QUANTITIES (CY) 5

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

(1) Riprap placed beyond the limits shown will be paid as concrete riprap in accordance with Item 432, "Riprap". When riprap is cast integrally with the precast safety end treatment, this dimension is 1'-0" minimum.

(2) 1#2" Dia ASTM A307 Gr A threaded anchor rod with 2 nuts and 2 washers. Galvanize all components in accordance with Item 445, "Galvanizing". Repair galvanizing that is damaged during transport or construction in accordance with the specifications.

(3) 3#4" through holes in walls of safety end treatment for riprap anchor rods may be drilled with rotary (coring or masonry) type drilling equipment or may be formed. Do not use percussive (star) type drilling equipment. If holes are drilled, patch spalls in the inside face of the wall exceeding 1#2" from the holes.

(4) Provide riprap toe wall when dimension is shown elsewhere in the plans or when field conditions require a toe wall.

(5) Quantities shown are for one end of one reinforced concrete pipe culvert. For multiple pipe culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only. Quantities are based on the minimum unit lengths shown on the Precast Saftey End Treatment (SET) standard sheets.

MATERIAL NOTES:

Provide Class "B" riprap in accordance with Item 432, "Riprap".

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

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

Refer to PSET-SC or PSET-SP standard sheets for details of square safety end treatments not shown. Refer to PSET-RC or PSET-RP standard sheets for details of round safety end treatments not shown.

For precast units with integrally cast riprap, substitute reinforcing steel in the amount on 0.26 in./ft. minimum for the threaded anchor rods shown. When requested, submit sealed engineering drawings for approval prior to construction. Shop drawings will not be required. Note that a proprietary precast unit with integral riprap is available from L&R Precast Concrete Works, Inc. (956) 583-6293 or www.lrprecast.com.

Payment for riprap and toewalls is included in the price bid for each safety end treatment.

These riprap details are only applicable when notes that require placement of riprap with precast safety end treatments are shown elsewhere in the plans.

Precast units with integrally cast riprap are permitted unless noted otherwise on the plans.

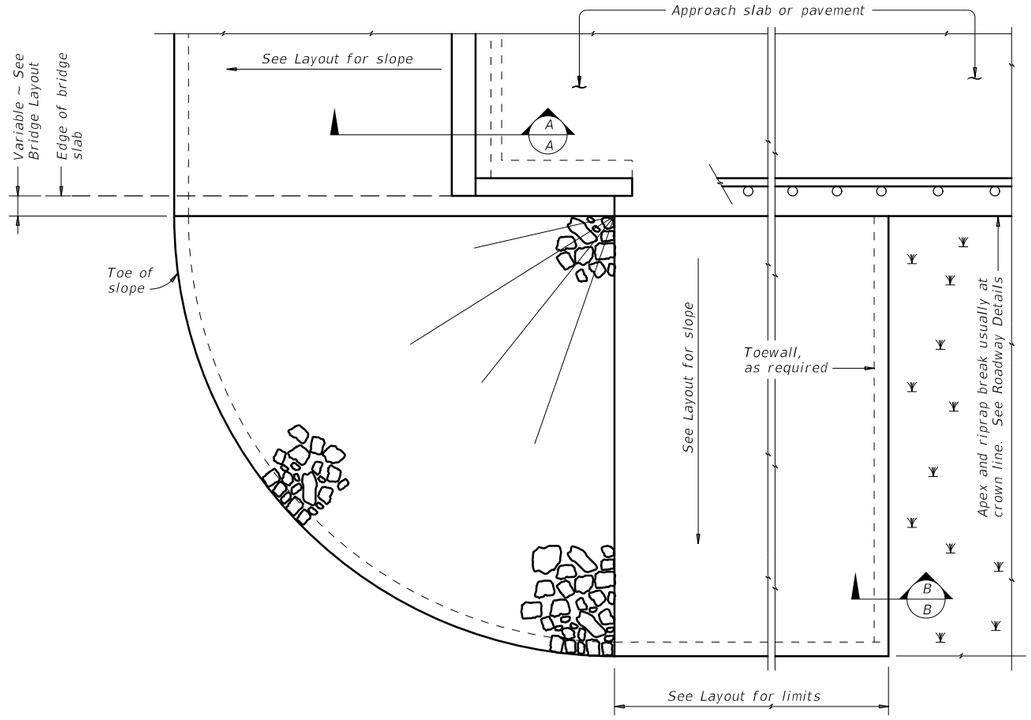
Texas Department of Transportation

Bridge Division Standard

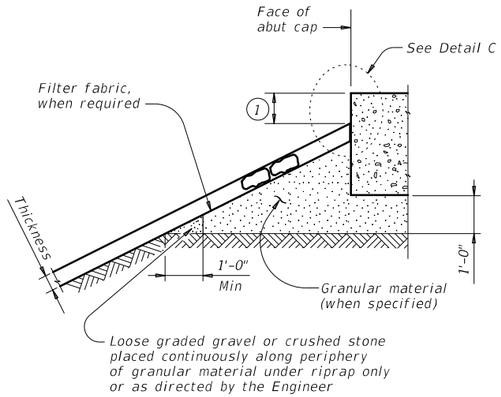
PRECAST SAFETY END TREATMENT
TYPE II
RIPRAP DETAILS

PSET-RR

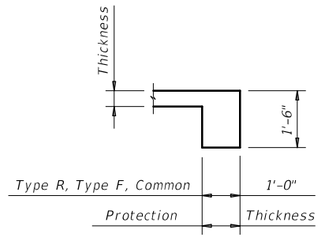
FILE: psetrrse-20.dgn	DN: GAF	CK: TxDOT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		154



PLAN

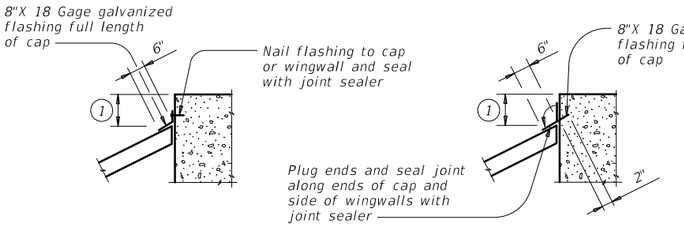


SECTION A-A AT CAP



SECTION B-B

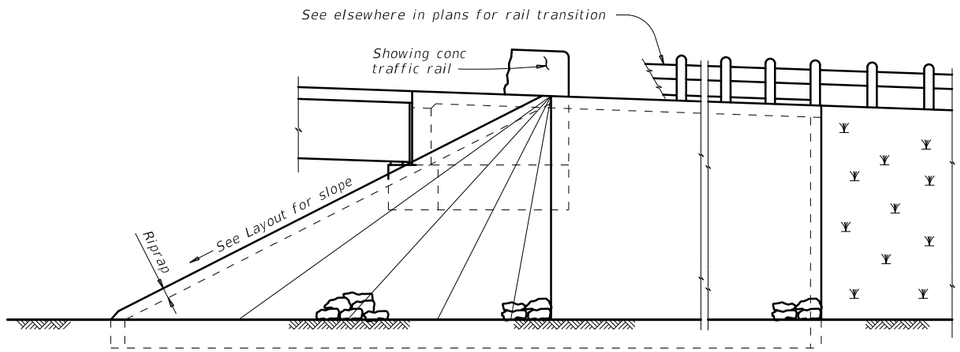
Provide toewall when shoulder drain is located adjacent to limits of stone riprap. Omit toewall when thickness of protection riprap is greater than 18".



CAP OPTION A

CAP OPTION B

DETAIL C



ELEVATION

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.

(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.

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	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		155

DATE: 9/23/2021 3:17:53 PM
FILE: c:\pw-af\pw-af-prod\ross.deborda@aguirre-fields.com\d0155414\SRR-01.dgn

DATE: 9/23/2021 3:18:00 PM
FILE: c:\pw-df\pw-df-prodvross.debord@aguirre-fields.com\d0155414\SRR-02.dgn

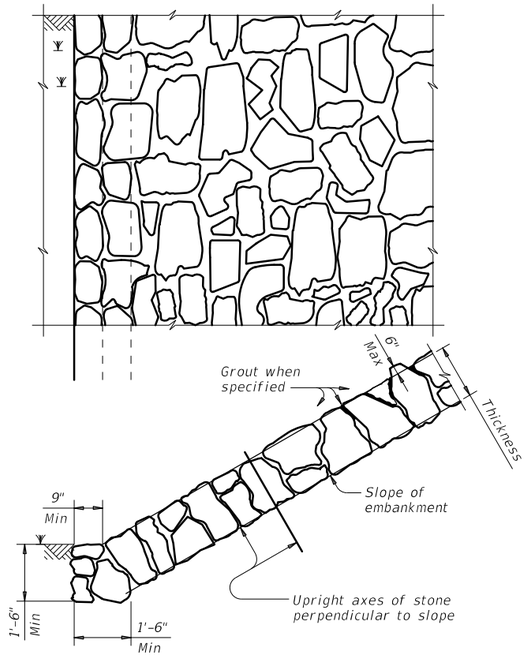


FIGURE 1 ~ TYPE R STONE RIPRAP
dry or grouted

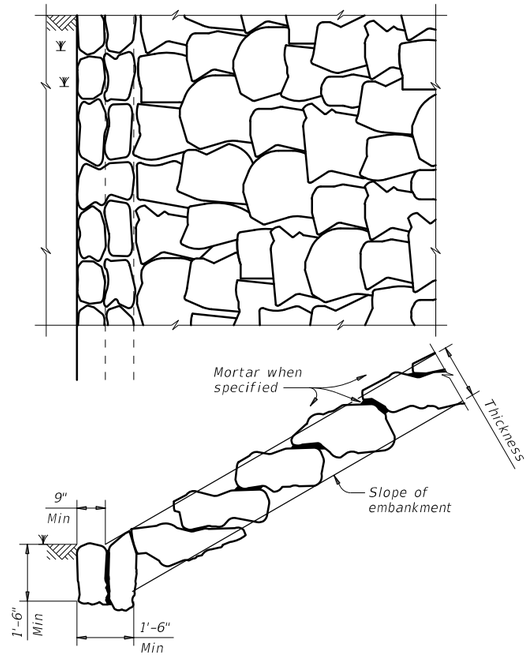


FIGURE 2 ~ TYPE F STONE RIPRAP
dry or mortared

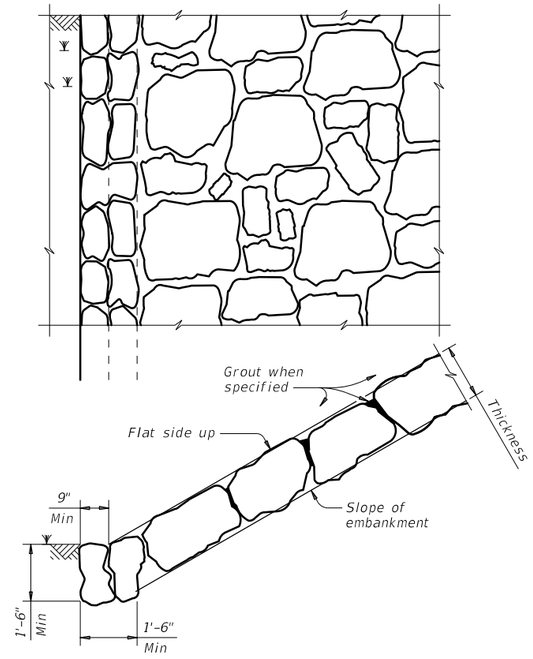


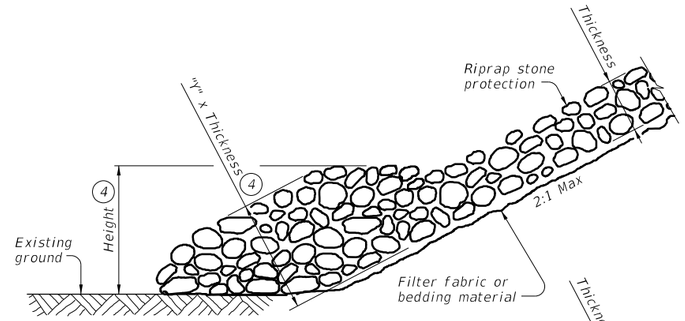
FIGURE 3 ~ TYPE F STONE RIPRAP
grouted

(2) Provide bedding material instead of filter fabric if shown elsewhere in plans. See Layout for thickness of bedding material.

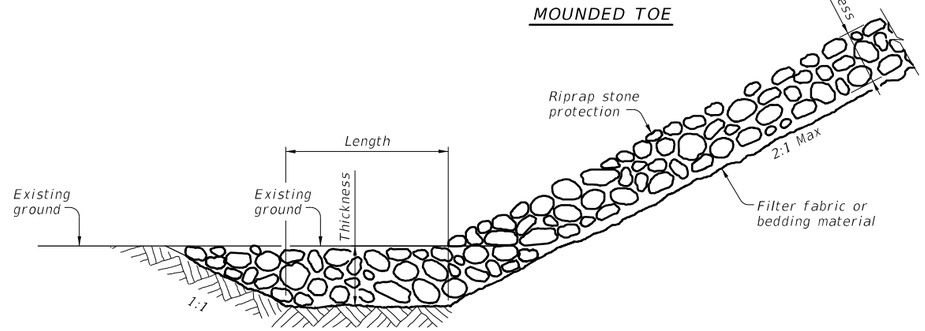
(3) Minimum toe depth is the larger of the maximum scour depth or 2 times the riprap thickness.

(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)

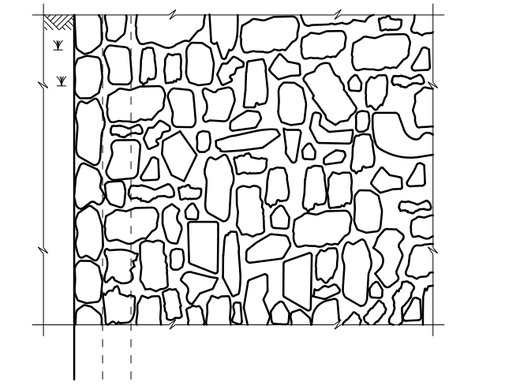


FIGURE 4 ~ COMMON STONE RIPRAP
dry or grouted

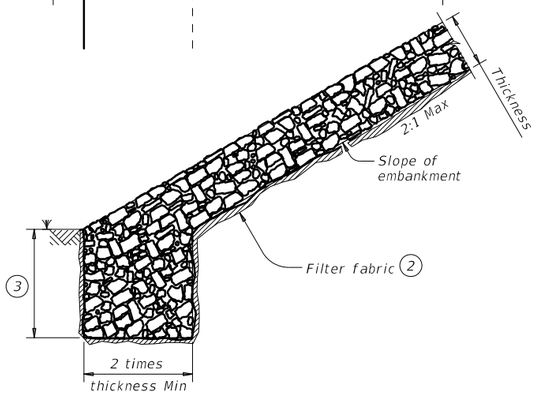


FIGURE 5 ~ PROTECTION STONE RIPRAP (5)

SHEET 2 OF 2

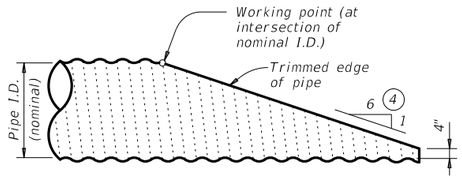
Texas Department of Transportation | Bridge Division Standard

STONE RIPRAP

SRR

FILE: srrstde1-19.dgn	DN: AES	CK: JGD	DW: BWH	CK: AES
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		156

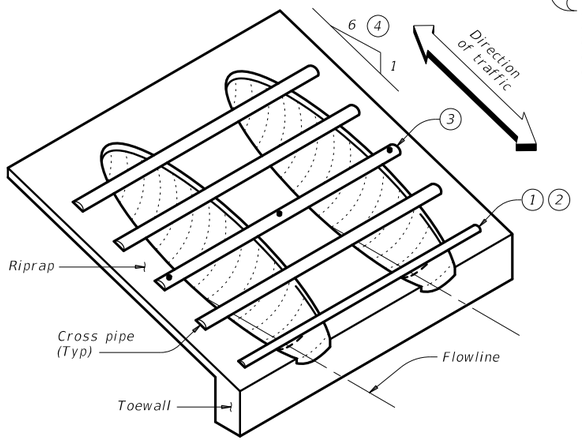
DATE:
FILE:



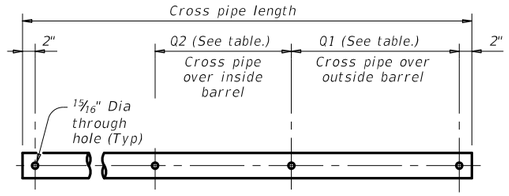
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

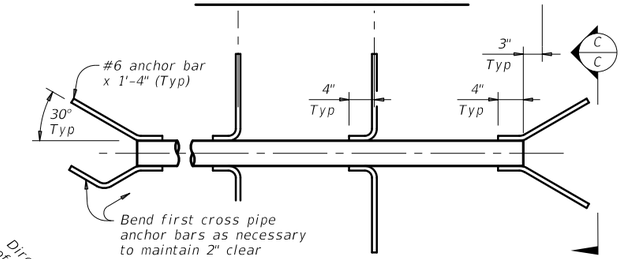
(Showing corrugated metal pipe (CMP) culvert Details at reinforced concrete pipe (RCP) culvert are similar.)



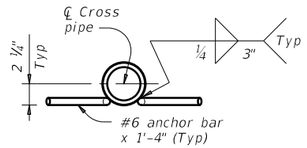
ISOMETRIC VIEW OF TYPICAL INSTALLATION



PIPE WITH BOLTED ANCHOR

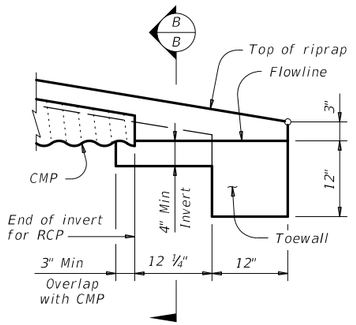


PIPE WITH ANCHOR BARS



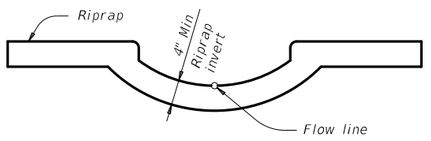
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

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



SECTION B-B

(Cross pipes not shown for clarity.)

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES (2)

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1	Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
12"	0.6	0' – 9"	N/A	2' – 1"	1' – 9"	3 or more pipe culverts	3" Std (3.500" O.D.)
15"	0.7	0' – 11"	N/A	2' – 5"	2' – 2"		
18"	0.8	1' – 2"	N/A	2' – 10"	2' – 8"		
21"	0.9	1' – 4"	N/A	3' – 2"	3' – 1"		
24"	0.9	1' – 7"	N/A	3' – 6"	3' – 7"		
27"	1.0	1' – 8"	N/A	3' – 10"	3' – 11"	3 or more pipe culverts	3 ½" Std (4.000" O.D.)
30"	1.1	1' – 10"	N/A	4' – 2"	4' – 4"	2 or more pipe culverts	
33"	1.2	1' – 11"	4' – 2"	4' – 5"	4' – 8"	All pipe culverts	
36"	1.3	2' – 1"	4' – 5"	4' – 9"	5' – 1"	All pipe culverts	4" Std (4.500" O.D.)
42"	1.5	2' – 4"	4' – 11"	5' – 5"	5' – 10"		
48"	1.7	2' – 7"	5' – 5"	6' – 0"	6' – 7"	All pipe culverts	5" Std (5.563" O.D.)
54"	2.0	3' – 0"	5' – 11"	6' – 9"	7' – 6"		
60"	2.2	3' – 3"	6' – 5"	7' – 4"	8' – 3"		
66"	2.4	3' – 3"	6' – 11"	7' – 10"	8' – 9"		
72"	2.7	3' – 4"	7' – 5"	8' – 5"	9' – 4"		

(1) The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

(2) Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1#2" standard pipe (4" O.D.) for the first bottom pipe.

(3) Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

(4) Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

(5) Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap".

(6) Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

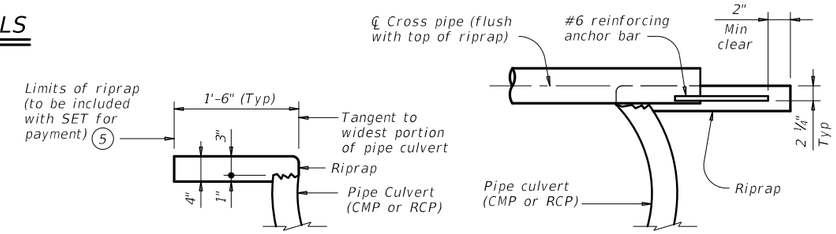
GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

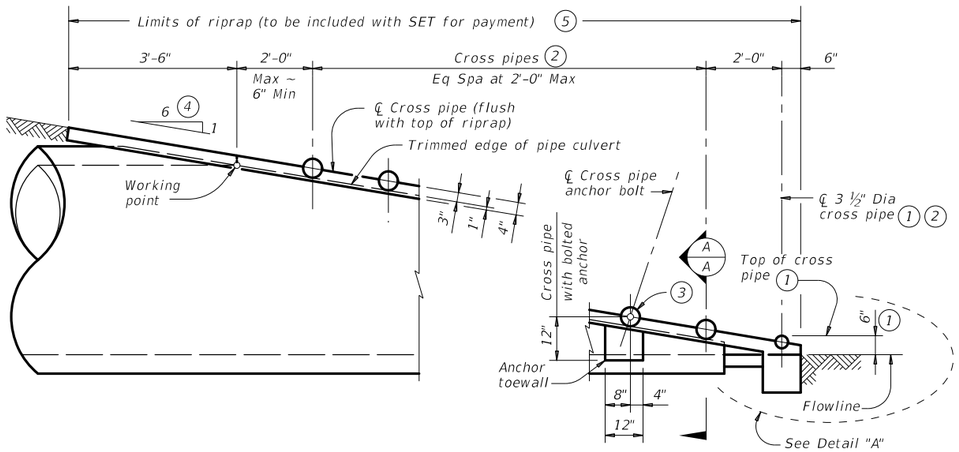
Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap".

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



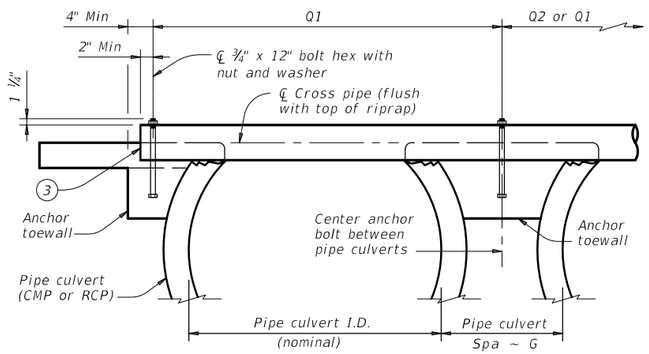
SHOWING TYPICAL PIPE CULVERT AND RIPRAP

SHOWING CROSS PIPE WITH ANCHOR BAR



SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

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



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Texas Department of Transportation

Bridge Division Standard

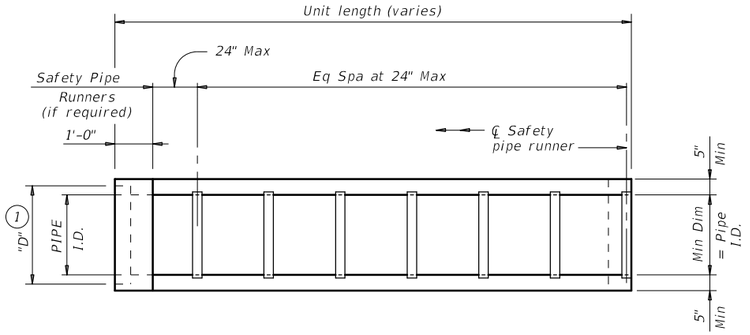
SAFETY END TREATMENT

FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE

SETP-PD

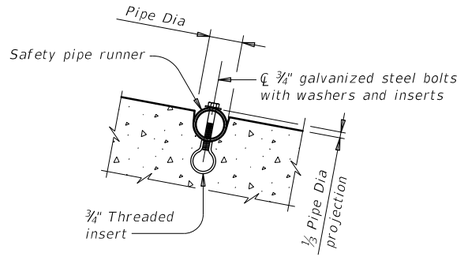
FILE: setppdse-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		157

DATE:
FILE:



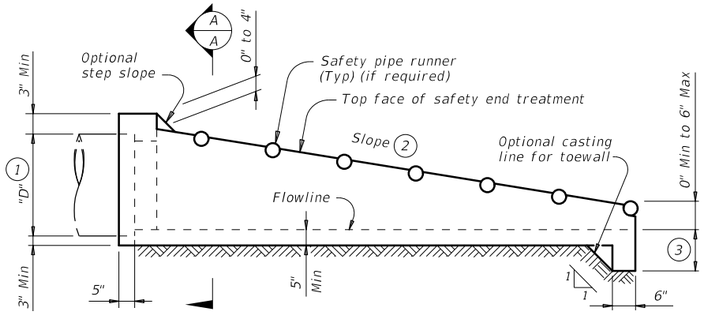
PLAN

(Showing bell end connection.)



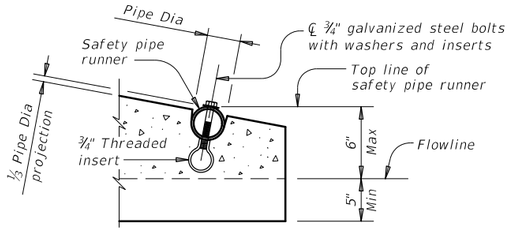
INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)

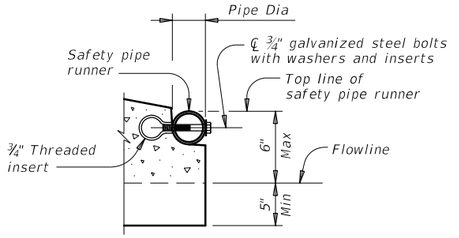


LONGITUDINAL ELEVATION

(Showing bell end connection.)



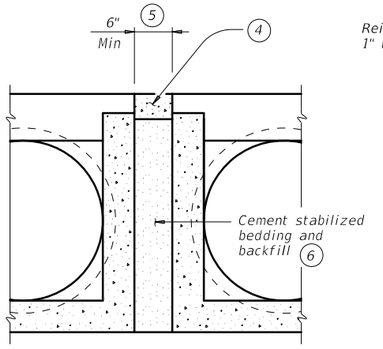
OPTION A



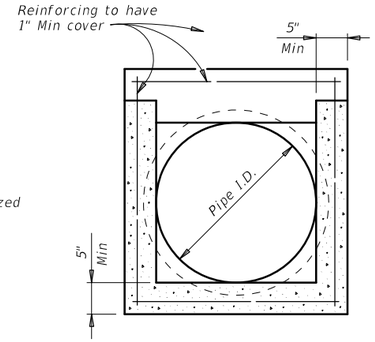
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

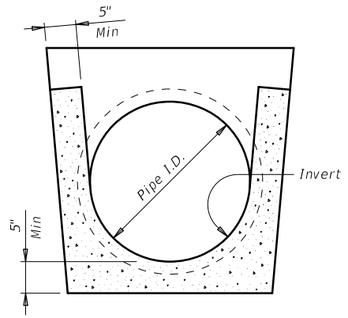
(If required)



MULTIPLE PIPE INSTALLATION

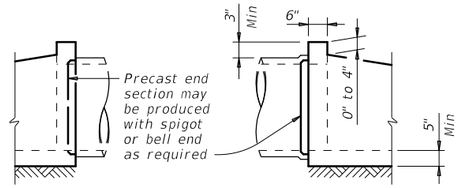


OPTION WITH SQUARE BOTTOM



OPTION WITH INVERT BOTTOM

SECTION A-A



OPTIONAL JOINT FOR RCP

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

REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	RCP Wall "B" Thickness	TP Wall Thickness (7)	"D" (1)	Slope	Min Length	Pipe Runners Required		Required Pipe Runner Size		
						Single Pipe	Multiple Pipe	Nominal Dia.	O.D.	I.D.
12"	2"	1.15"	17.00"	6:1	4' – 9"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
15"	2 ¼"	1.30"	20.50"	6:1	6' – 5"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
18"	2 ½"	1.60"	24.00"	6:1	8' – 0"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
24"	3"	1.95"	31.00"	6:1	11' – 3"	No	Yes, for > 2 pipes	3" STD	3.500"	3.068"
30"	3 ½"	2.65"	38.50"	6:1	14' – 8"	No	Yes	4" STD	4.500"	4.026"
36"	4"	2.75"	45.50"	6:1	17' – 11"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	N/A	52.50"	6:1	21' – 2"	Yes	Yes	4" STD	4.500"	4.026"

(1) Dimension "D" is based on reinforced concrete pipe (RCP) meeting the requirements of ASTM C-76, Class III, (RCP Wall "B" thickness). Adjust "D" for any other wall thickness used. For thermoplastic pipe (TP) take into account the annular space requirements for grouted connections.

(2) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(3) Toewall to be used only when dimension is shown elsewhere in the plans.

(4) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(5) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(6) Provide cement stabilized bedding and backfill in accordance with the Item 400, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

(7) Thermoplastic pipe wall thickness may vary. Adjust accordingly. Thermoplastic pipe requires the safety end treatments to have a bell end for grouted connections.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP), and thermoplastic pipe (TP) may be used for TYPE II end treatment as specified in Item "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Manufacture this product in accordance with Item 467, "Safety End Treatment" except as noted below :

A. Provide minimum reinforcing of #4 at 6" (Grade 40) or #4 at 9" (Grade 60) each way or 6"x6" – D12 x D12 or 5"x5" – D10 x D10 welded wire reinforcement (WWR).

B. For precast (steel formed) sections, provide Class "C" concrete (f'c = 3,600 psi).

At the option and expense of the Contractor the next larger size of safety end treatment may be furnished; as long as the "D" dimension cast is that of the required size of pipe.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52.

Galvanize all steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

Connect RCP using the Optional Joint for RCP detail shown or in accordance with Item 464, "Reinforced Concrete Pipe". Connect TP by grouting. See PBGC standard for grouted connections with TP and precast safety end treatment.

Texas Department of Transportation

Bridge Division Standard

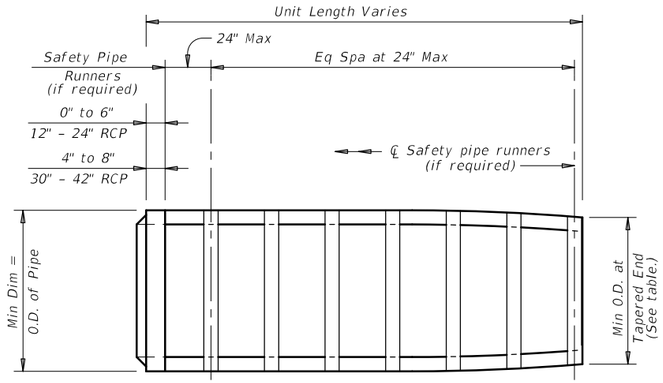
PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-SP

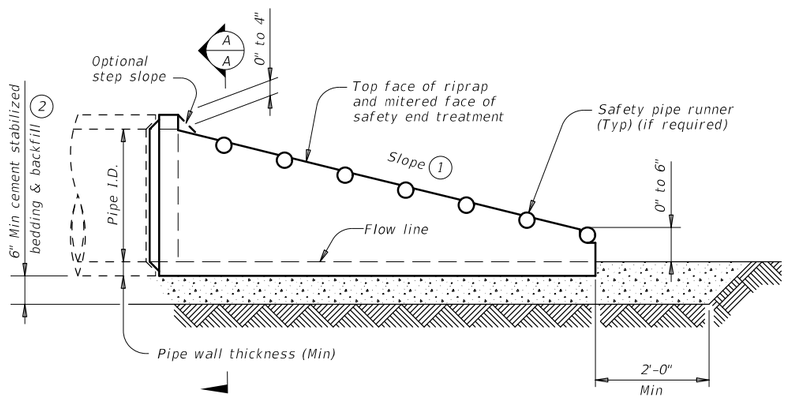
FILE: psetspss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		158

DATE:
FILE:



PLAN VIEW – 12" THRU 24"

(Showing spigot end connection.)



LONGITUDINAL ELEVATION - 12" THRU 24"

(Showing spigot end connection.)

(1) Slope as shown elsewhere in the plans. Slope of 6:1 or flatter is required for vehicle safety.

(2) Provide cement stabilized bedding and backfill in accordance with the Item, "Excavation and Backfill for Structures". Bedding and backfill is considered subsidiary to the Item 467, "Safety End Treatment". When concrete riprap is specified around the safety end treatment, backfill as directed by Engineer.

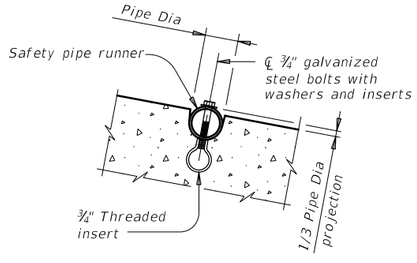
(3) Fill the top 4" of void between precast end treatments with concrete riprap. Concrete riprap is considered subsidiary to the Item 467, "Safety End Treatment".

(4) Adjust clear distance between pipes to provide for the minimum distance between safety end treatments.

(5) Safety pipe runners are required for multiple pipe culverts with more than two pipes.

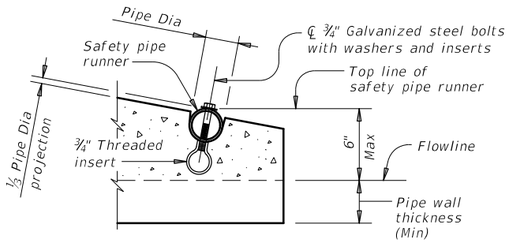
REQUIREMENTS FOR CULVERT PIPES AND SAFETY PIPE RUNNERS

Pipe I.D.	Min Wall Thickness	Min O.D.	Min O.D. at Tapered End	Min Reinf Requirements (sq. in. per ft. of Pipe)	Max Slope	Min Length of Unit	Pipe Runner Requirements		Required Pipe Runner Sizes		
							Single Pipe	Multiple Pipe	Nominal Dia	O.D.	I.D.
12"	2"	16"	16"	0.07 Circ.	6:1	4'–0"	No	(5)	3" STD	3.500"	3.068"
15"	2 ¼"	19 ½"	19"	0.07 Circ.	6:1	5'–8"	No	(5)	3" STD	3.500"	3.068"
18"	2 ½"	23"	21 ½"	0.07 Circ.	6:1	7'–3"	No	(5)	3" STD	3.500"	3.068"
24"	3"	30"	27"	0.07 Circ.	6:1	10'–6"	No	(5)	3" STD	3.500"	3.068"
30"	3 ½"	37"	31"	0.18 Circ.	6:1	12'–1"	No	Yes	4" STD	4.500"	4.026"
36"	4"	44"	36"	0.19 Ellip.	6:1	15'–4"	Yes	Yes	4" STD	4.500"	4.026"
42"	4 ½"	51"	41 ½"	0.23 Ellip.	6:1	18'–7"	Yes	Yes	4" STD	4.500"	4.026"

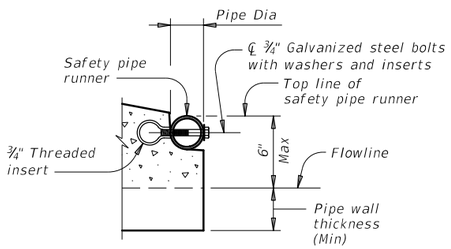


INSTALLATION DETAIL FOR SAFETY PIPE RUNNERS

(If required)



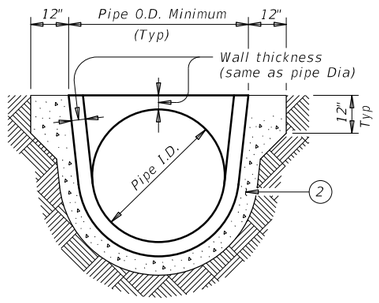
OPTION A



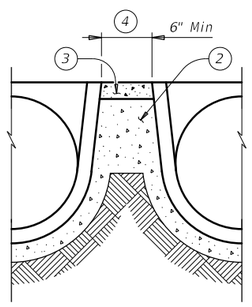
OPTION B

END DETAILS FOR INSTALLATION OF SAFETY PIPE RUNNERS

(If required)



SECTION A-A



MULTIPLE PIPE INSTALLATION

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide pipe runners meeting the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 Gr B, or API 5LX52.

Galvanize steel components except reinforcing steel after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Precast safety end treatment for reinforced concrete pipe (RCP) may be used for TYPE II end treatment as specified in Item 467, "Safety End Treatment".

When precast safety end treatment is used as a Contractor's alternate to mitered RCP, riprap will not be required unless noted otherwise on the plans.

Manufacture precast concrete end sections in accordance with Item 464, "Reinforced Concrete Pipe" and in accordance with ASTM Specification C-76, Class III, Wall B for circular pipe.

Provide precast concrete end sections with a spigot or bell end for compatibility to upstream or downstream end conditions with sufficient annular space to allow for grout, mortar, cold applied asphalt joint compound or pre-formed plastic gasket material.

Methods of lifting shall be provided by the manufacturer for ease of loading, unloading and installation.

Pipe runners are designed for a traversing load of 10,000 Lbs at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Texas Department of Transportation

Bridge Division Standard

PRECAST SAFETY END TREATMENT

TYPE II ~ PARALLEL DRAINAGE

PSET-RP

FILE: psetrpss-20.dgn	DN: RLW	CK: KLR	DW: JTR	CK: GAF
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		159

14-XXX-0-XXXX-XX-XXX

4" minimum

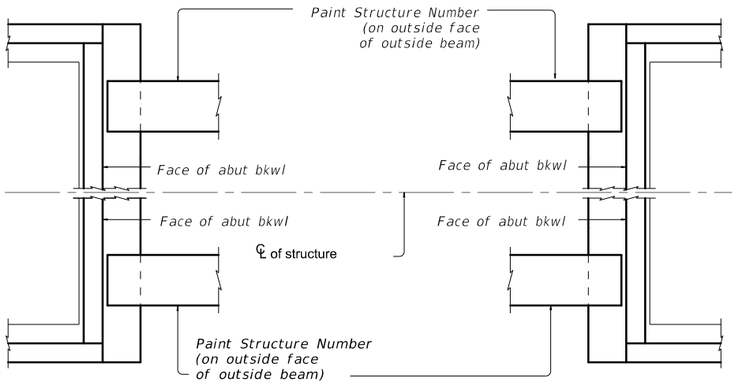
District designation | County designation | Placeholder | Control | Section | Structure number

PAINTED STRUCTURE NUMBER LEGEND

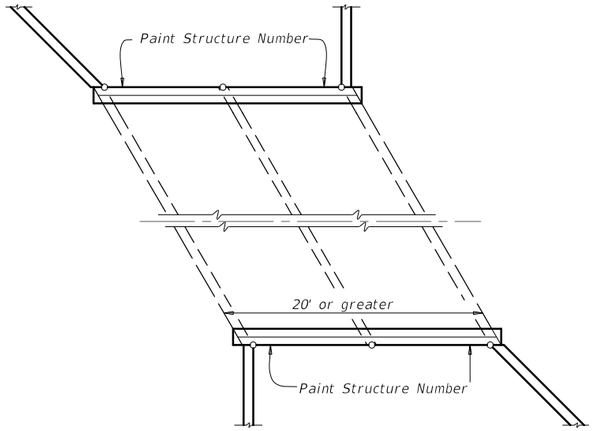
14-XXX-0-XXXX-XX-XXX

- District designation
  14 = Austin District
- County designation
- Placeholder required for national inventory purposes
- Control
- Section
- Structure number

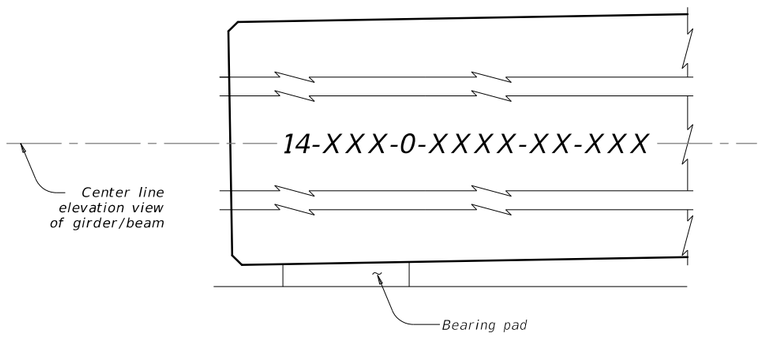
011 = Bastrop
016 = Blanco
027 = Burnet
028 = Caldwell
087 = Gillespie
106 = Hays
144 = Lee
150 = Llano
157 = Mason
227 = Travis
246 = Williamson



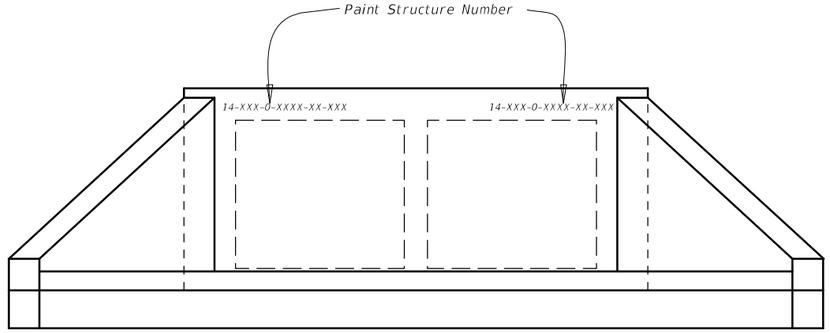
AT BRIDGE LOCATIONS



AT CULVERT LOCATIONS



ELEVATION VIEW DETAIL



ELEVATION VIEW DETAIL

GENERAL NOTES:

Permanently mark each structure with the painted structure number in accordance with the plans.

Each Structure shall have 4 (four) Structure numbers painted per structure.

Painting structure number work will not be measured or paid for directly but will be considered subsidiary to other pertinent items.

MATERIAL:

Provide black, lead free, CFC free, and CFHC free paint that is water proof, weather resistant, and dries instantly on all surfaces without smearing, smudging, or rippling

Texas Department of Transportation

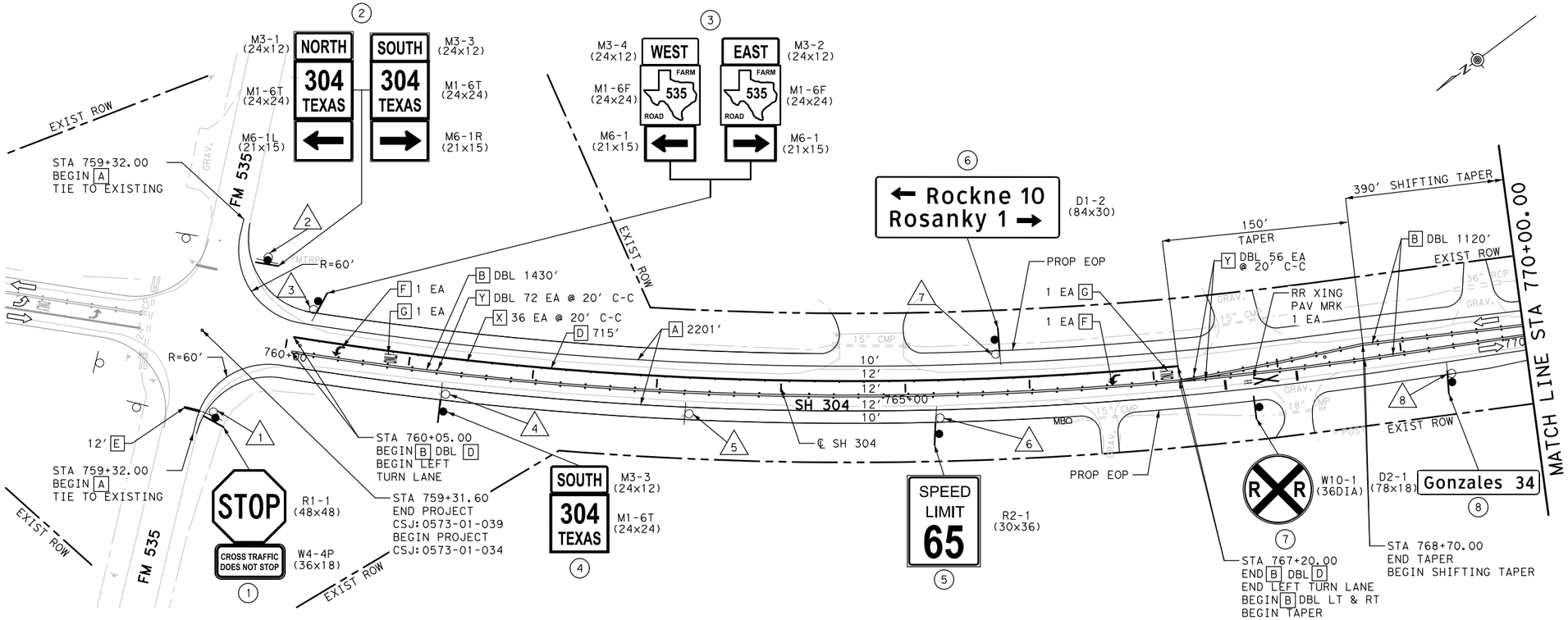
Austin District Standard

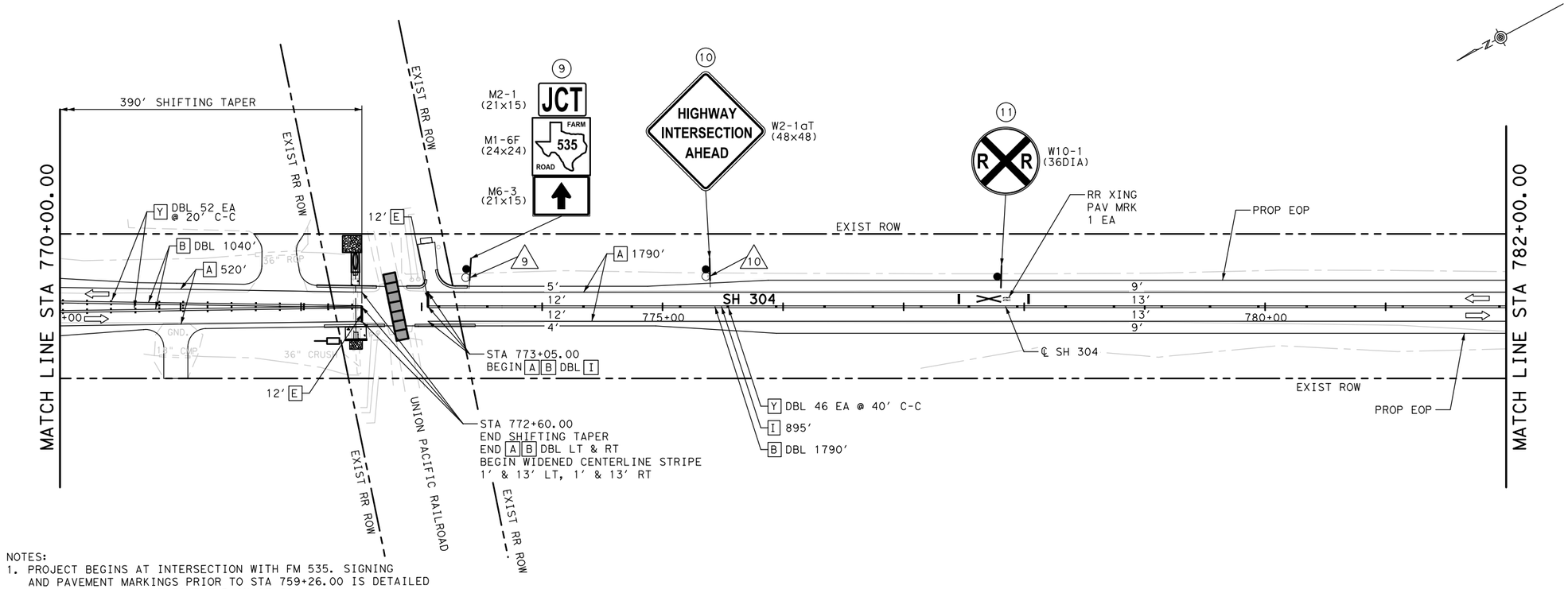
PAINTING STRUCTURE NUMBERS

PSN-19 (AUS)

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		160

DATE: 10/14/2021 1:14:05 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0341\5. DRAINAGE\SH304_DRN_DETAILS_05.dgn





NOTES:
1. PROJECT BEGINS AT INTERSECTION WITH FM 535. SIGNING AND PAVEMENT MARKINGS PRIOR TO STA 759+26.00 IS DETAILED AND PAID FOR IN SUBSEQUENT PACKAGE CSJ: 0573-01-039.

LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2' BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET): 0 100

9/30/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

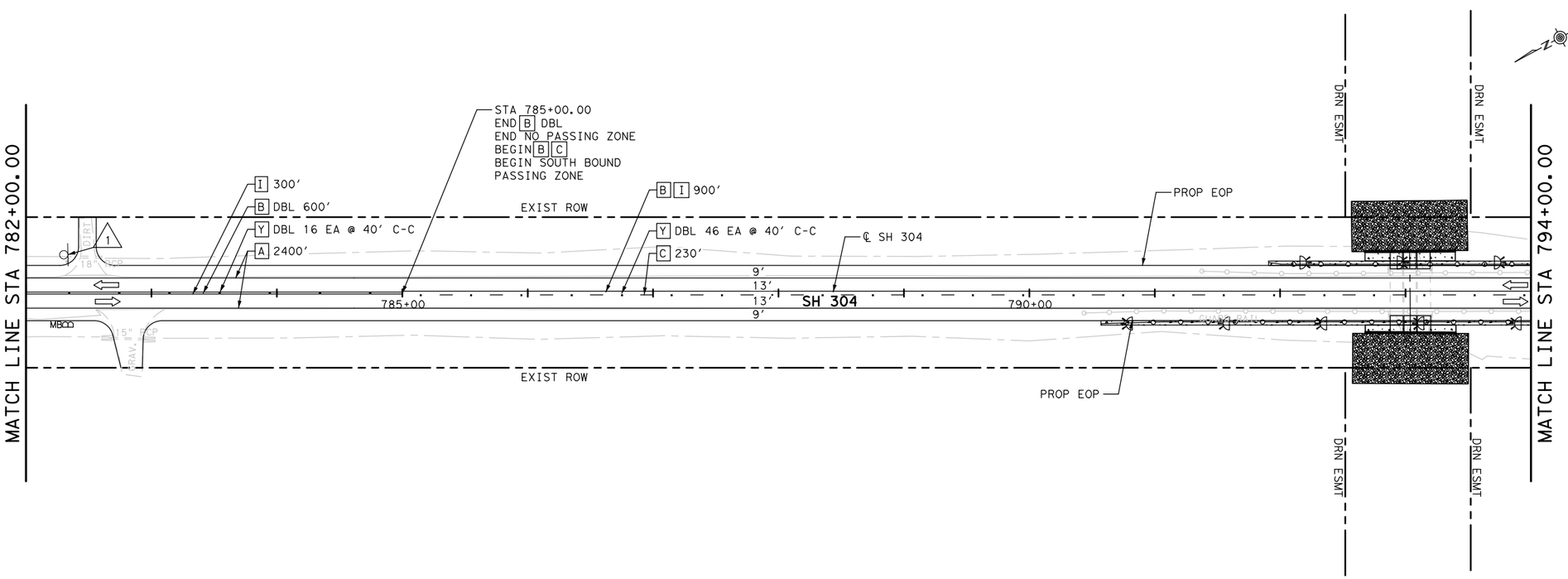
Texas Department of Transportation

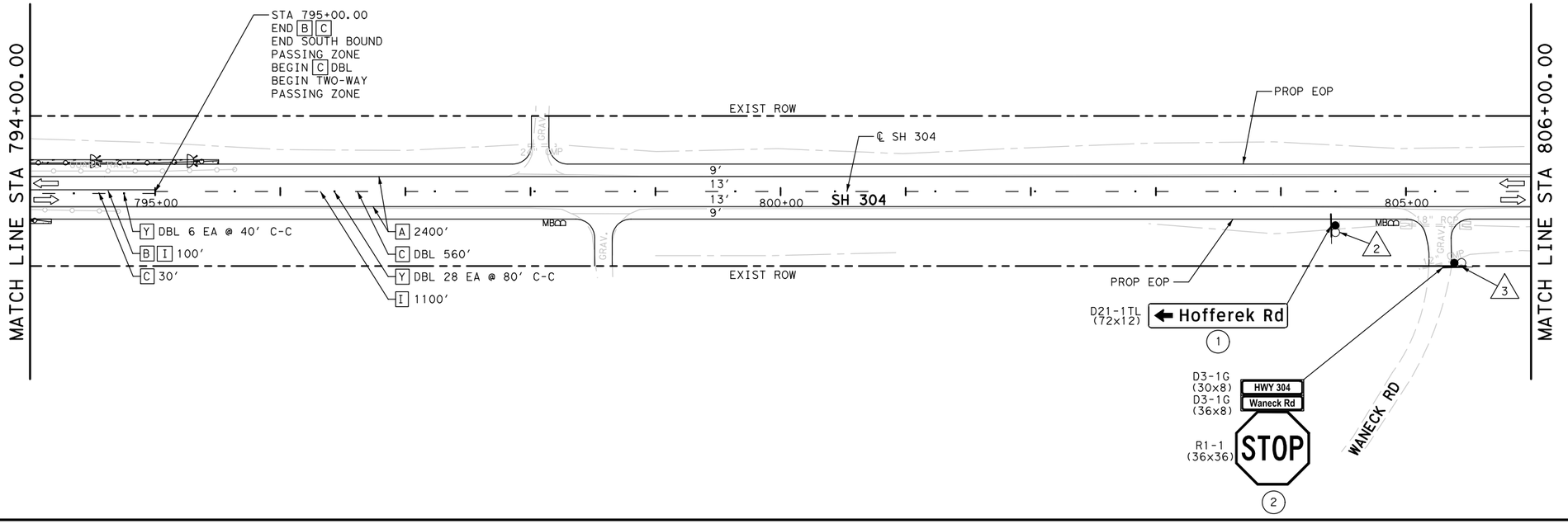
SH 304
SIGNING AND PAVEMENT MARKING
BEGIN TO STA 782+00

SHEET 1 OF 14

© 2022	CONT	SECT	JOB	HIGHWAY
DS: BTG CK: RCD	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
DW: TML CK: TRF	AUS	BASTROP		161

DATE: 9/30/2021 2:53:21 PM
FILE: c:\pw-gf\pw-gf-prod\ross.debord@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_01.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- △X EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2' BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

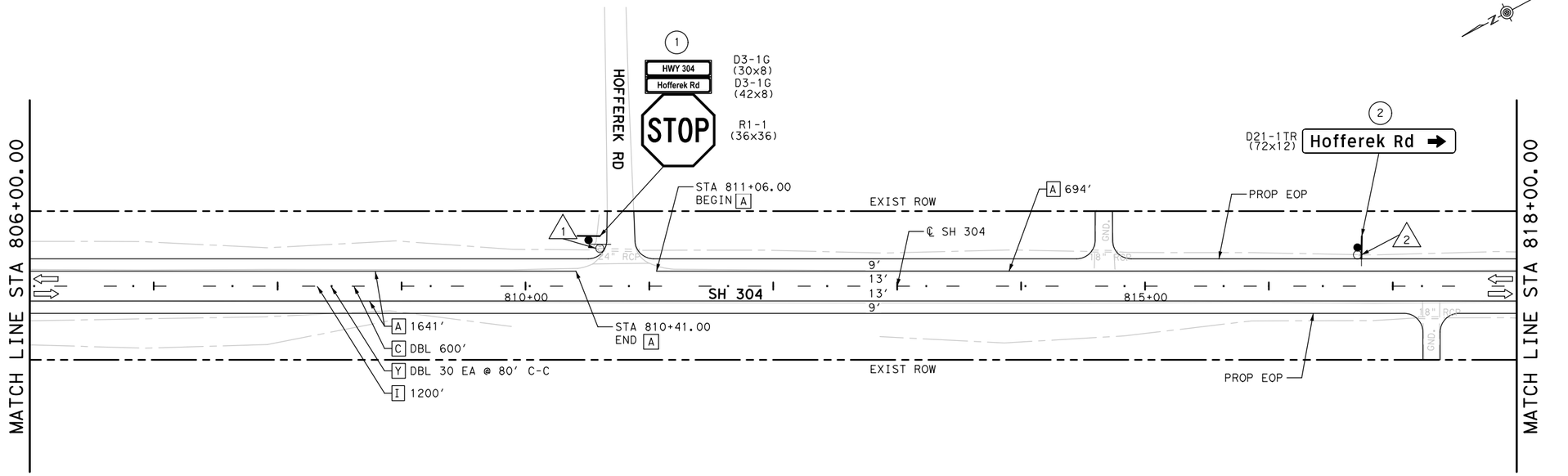
Texas Department of Transportation

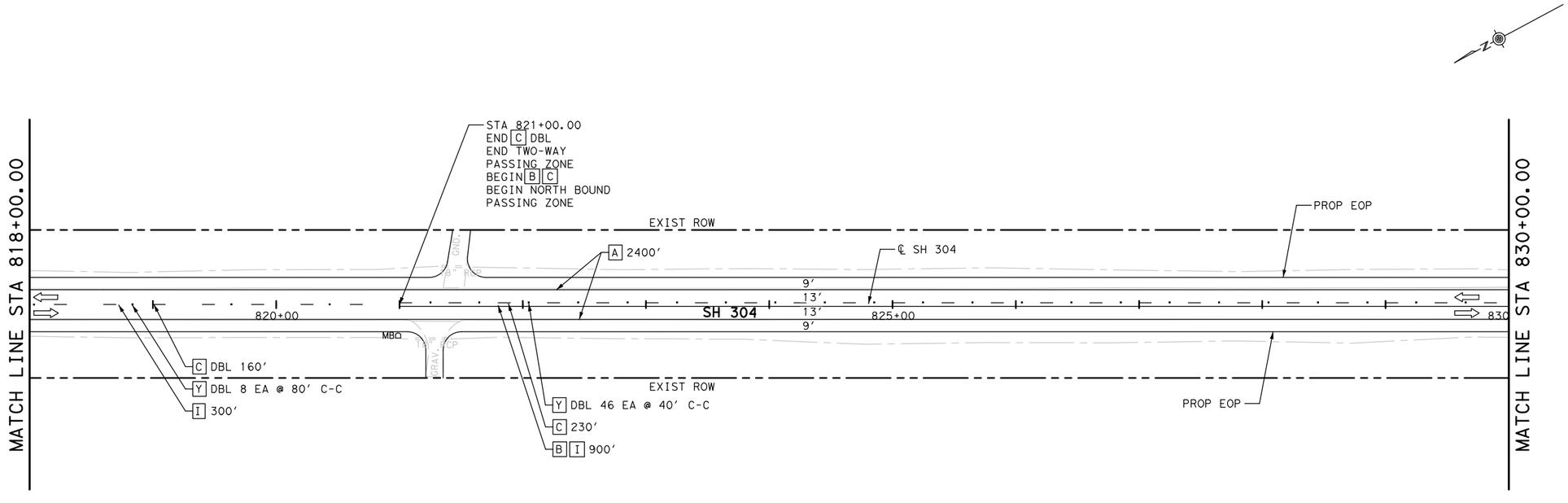
SH 304
SIGNING AND PAVEMENT MARKING
STA 782+00 TO 806+00

SHEET 2 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		162

DATE: 9/23/2021 3:18:16 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_02.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- △X EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2′ BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

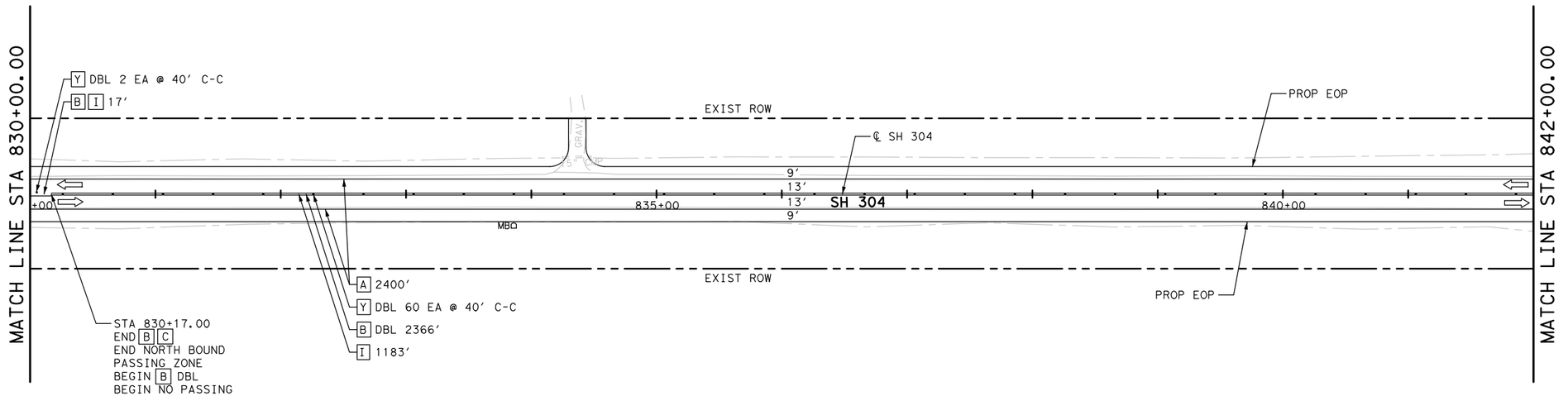
Texas Department of Transportation

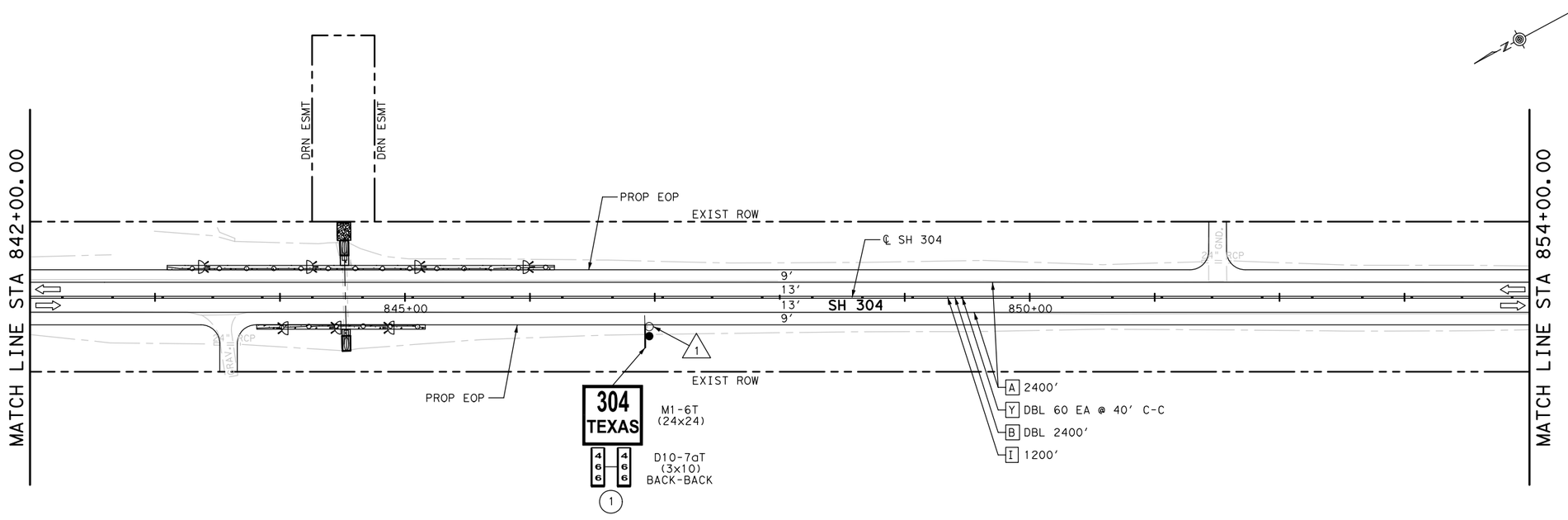
SH 304
SIGNING AND PAVEMENT MARKING
STA 806+00 TO 830+00

SHEET 3 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW: TML	CK: TRF	AUS	BASTROP		163

DATE: 9/23/2021 3:18:23 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_03.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- X EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2' BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

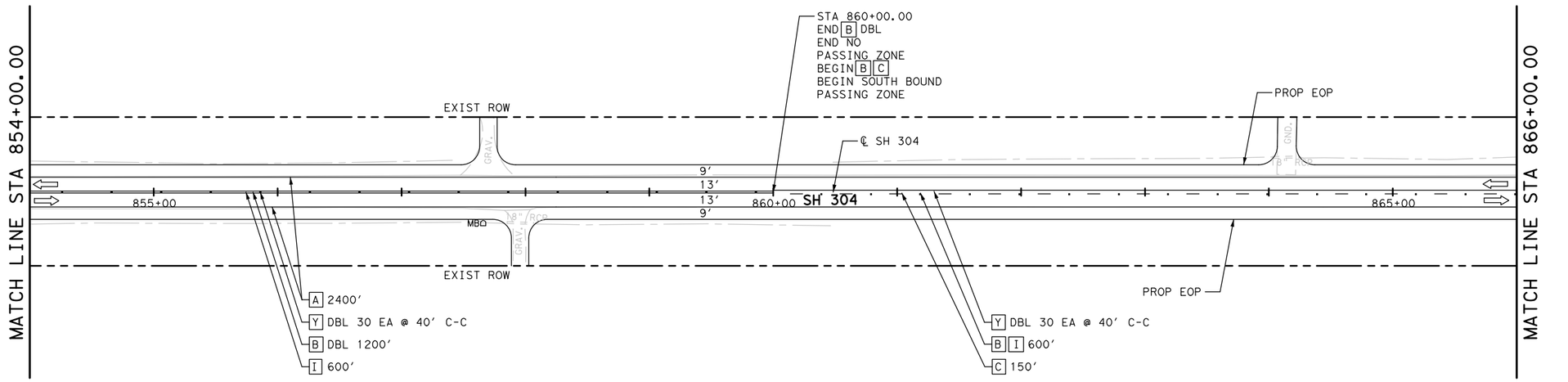
AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

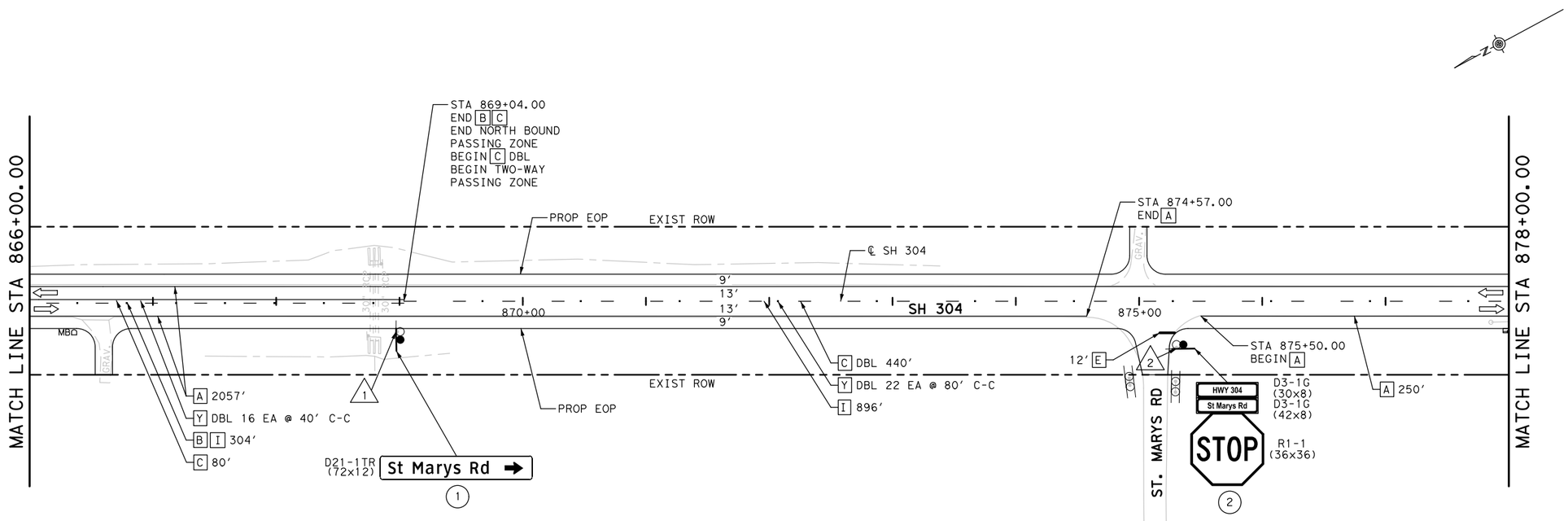
Texas Department of Transportation

SH 304
SIGNING AND PAVEMENT MARKING
STA 830+00 TO 854+00

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		164

DATE: 9/23/2021 3:18:30 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_04.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- △X EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2' BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

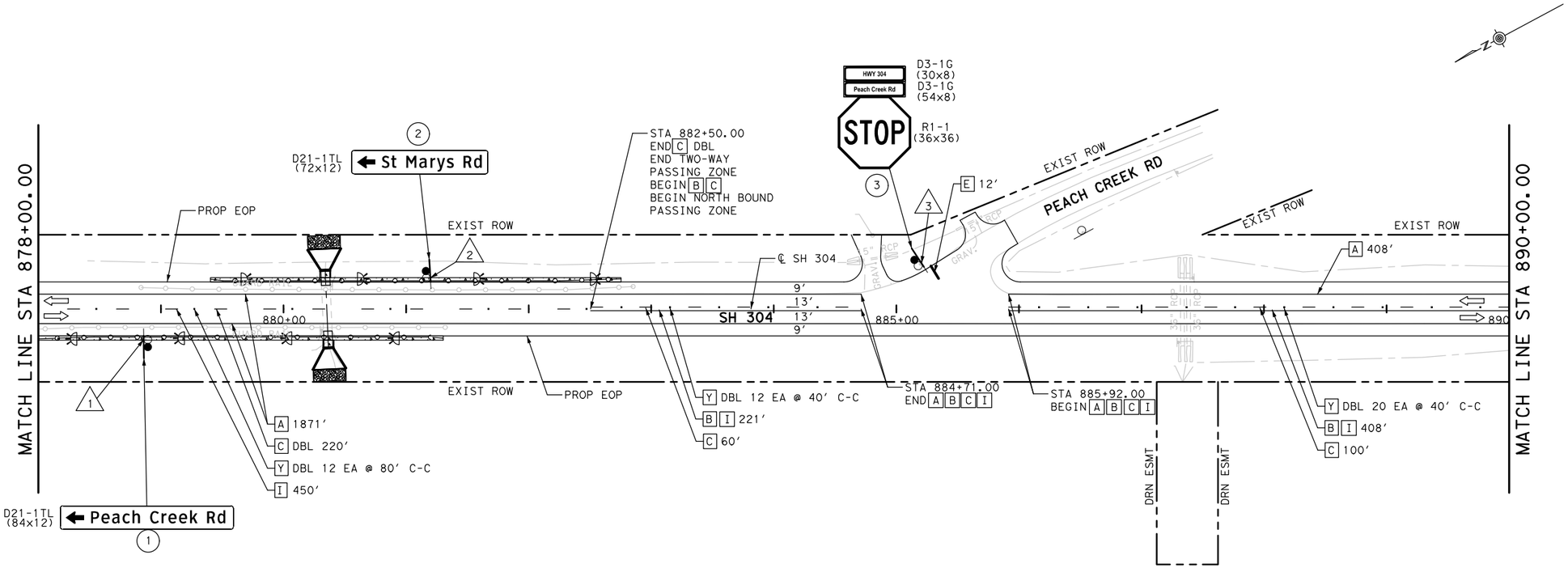
Texas Department of Transportation

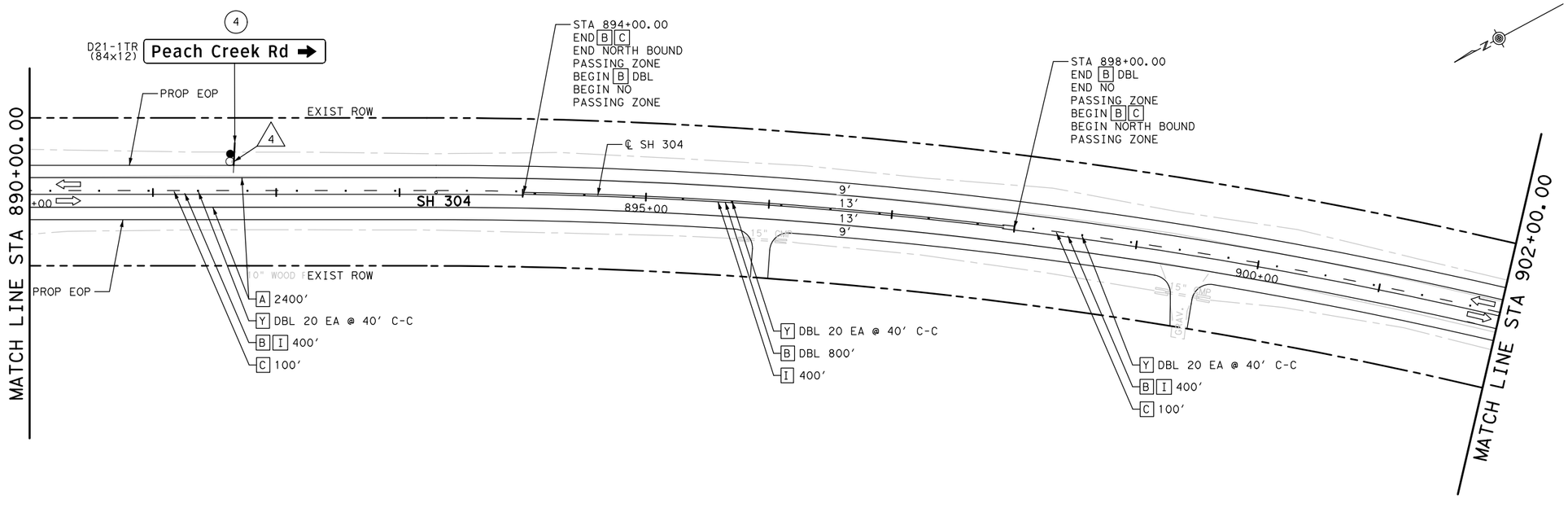
SH 304
SIGNING AND PAVEMENT MARKING
STA 854+00 TO 878+00

SHEET 5 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		165

DATE: 9/23/2021 3:18:37 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_05.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- △X EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2′ BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

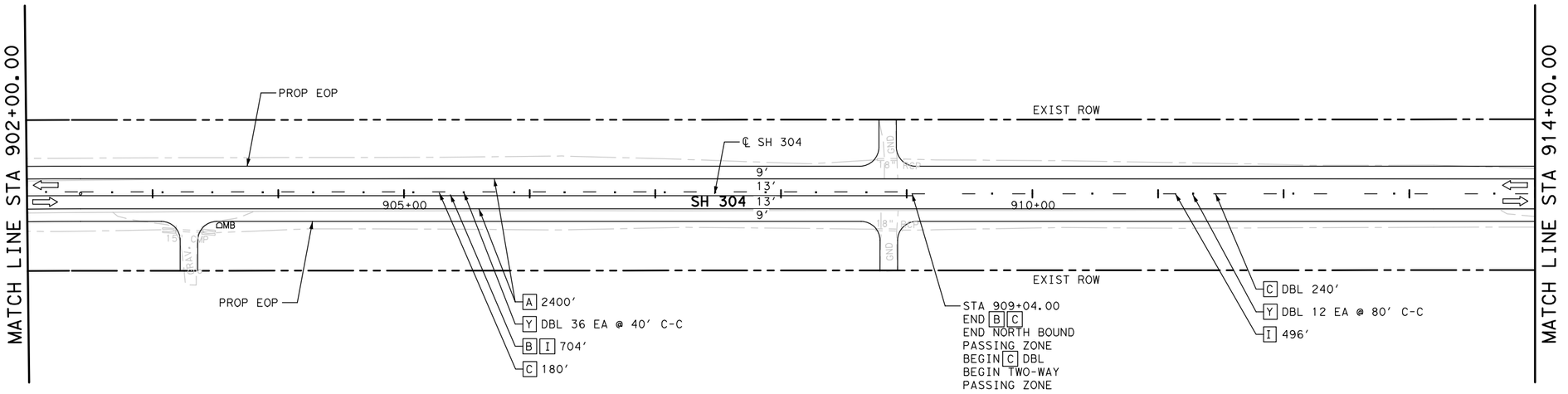
AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

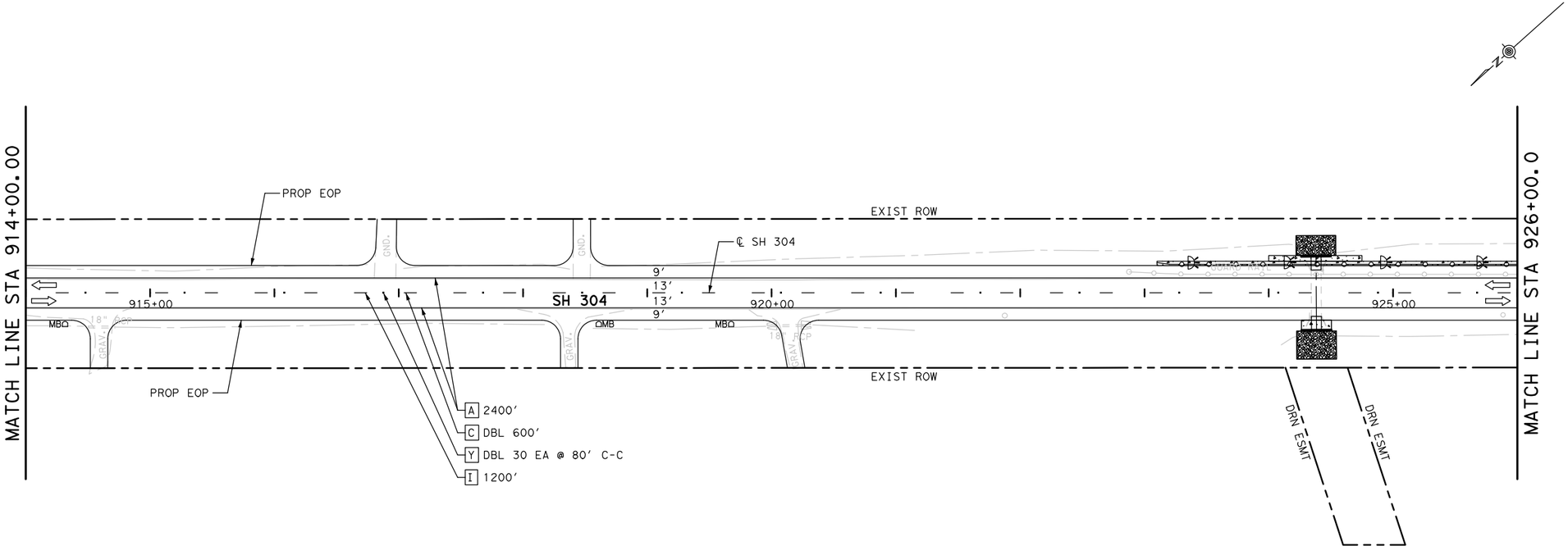
Texas Department of Transportation

SH 304
SIGNING AND PAVEMENT MARKING
STA 878+00 TO 902+00

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		166

DATE: 9/23/2021 3:18:44 PM
FILE: c:\pw-gf\pw-gf-prod\ross.debord@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_06.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- X EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2′ BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

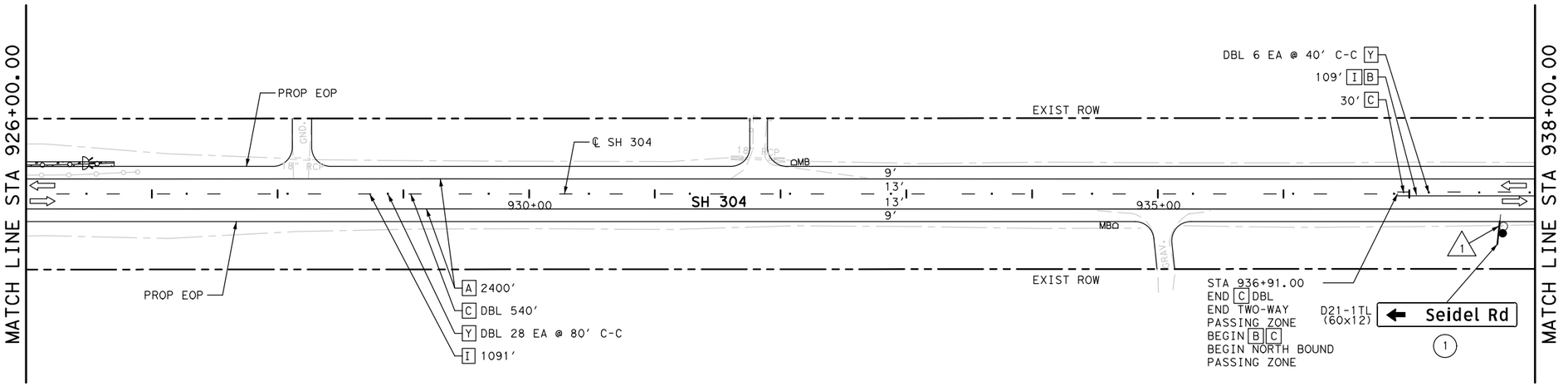
Texas Department of Transportation

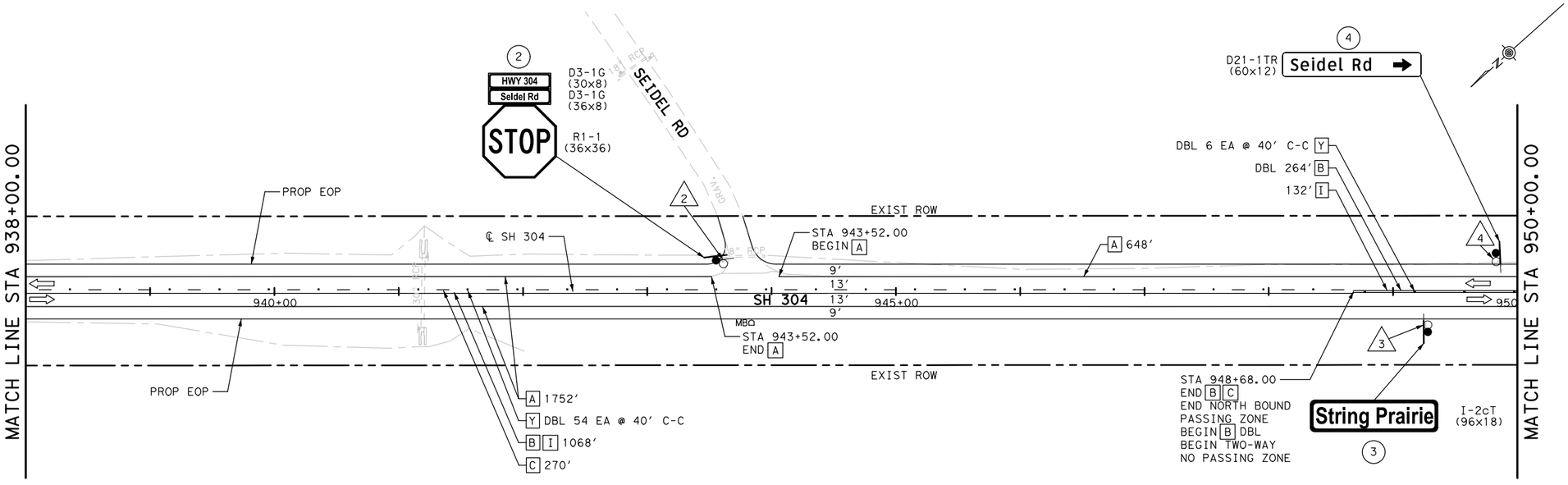
SH 304
SIGNING AND PAVEMENT MARKING
STA 902+00 TO 926+00

SHEET 7 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		167

DATE: 9/23/2021 4:27:46 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_07.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- (X) EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2′ BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

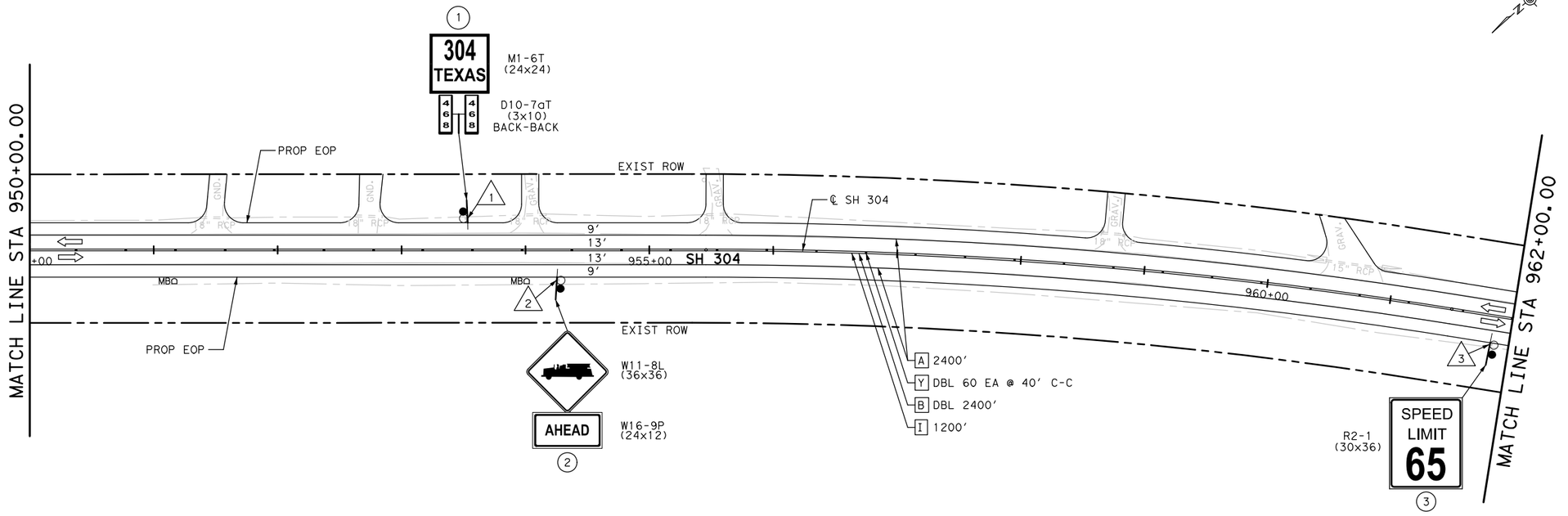
Texas Department of Transportation

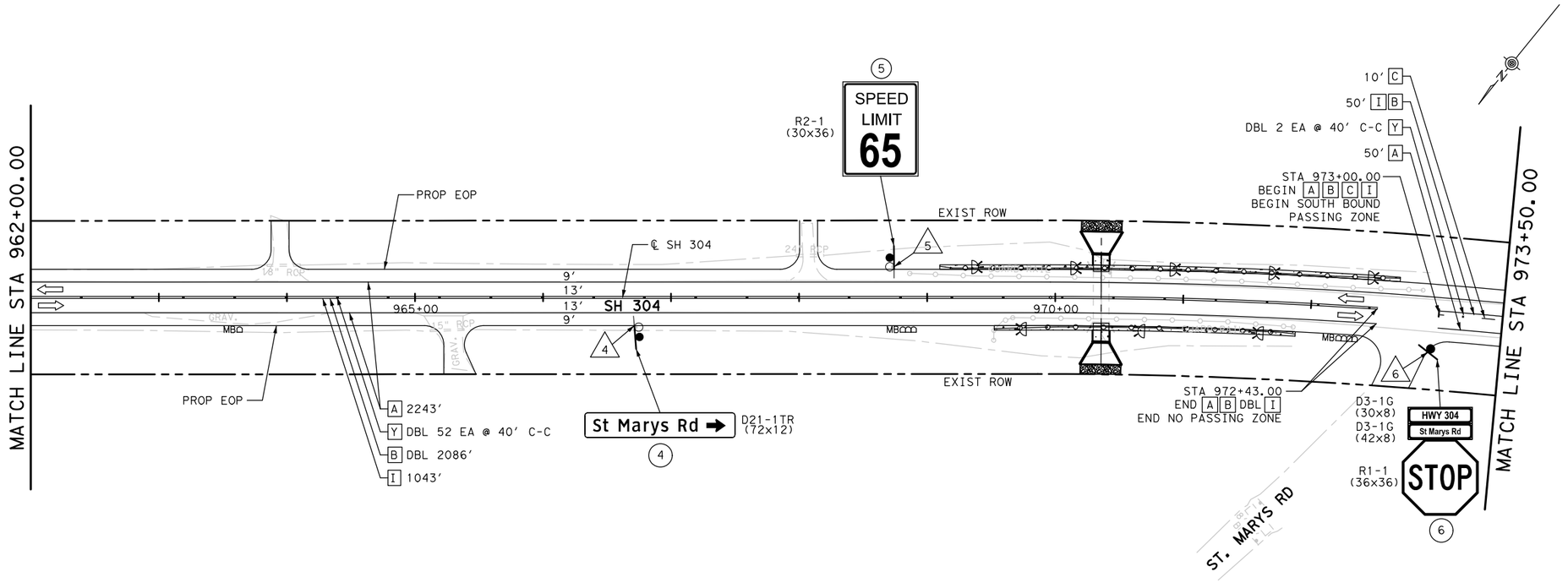
SH 304
SIGNING AND PAVEMENT MARKING
STA 926+00 TO 950+00

SHEET 8 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		168

DATE: 9/23/2021 3:18:59 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_08.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- △X EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2′ BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

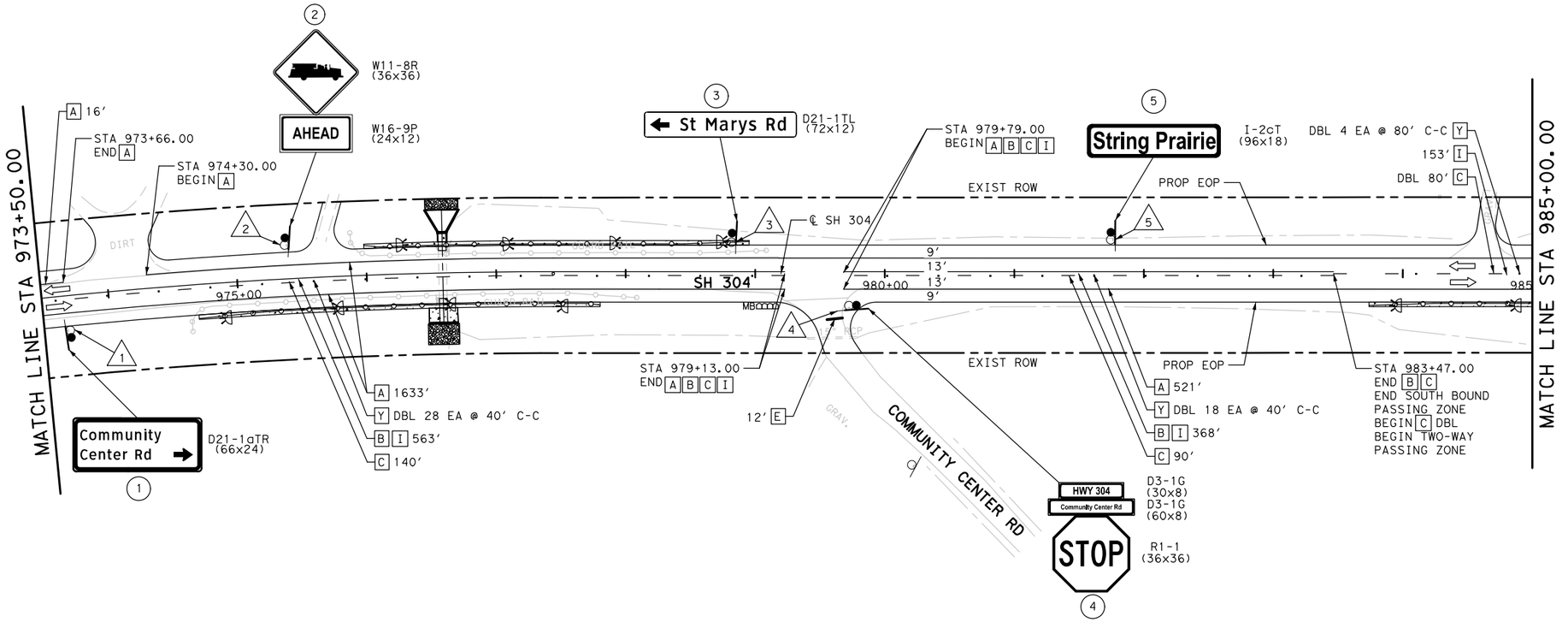
Texas Department of Transportation

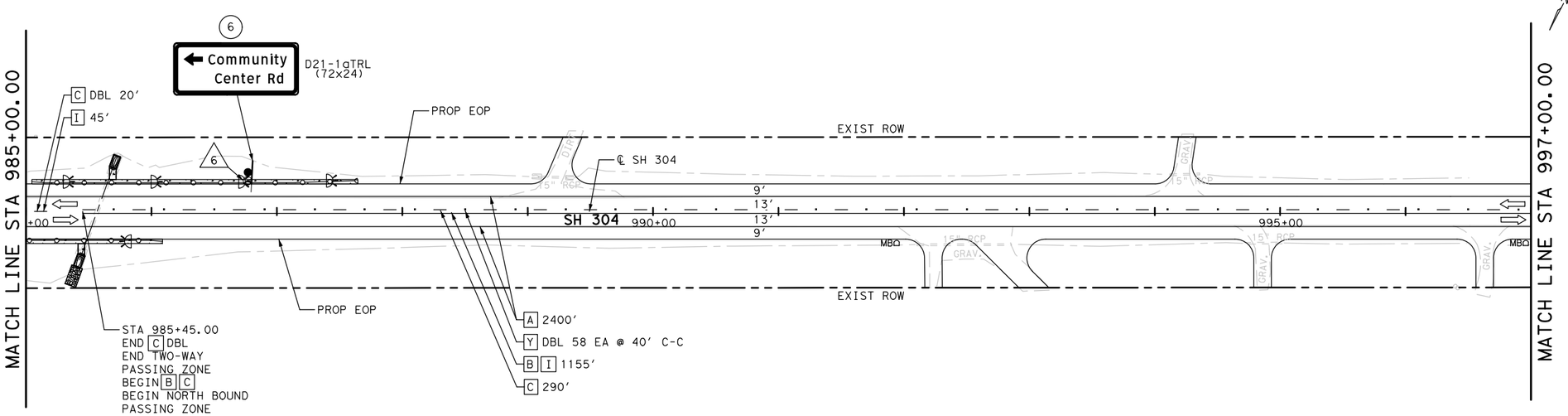
SH 304
SIGNING AND PAVEMENT MARKING
STA 950+00 TO 973+50

SHEET 9 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		169

DATE: 9/23/2021 3:19:06 PM
FILE: c:\pw-gf\pw-gf-prod\ross.debord@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_09.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- △X EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2′ BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

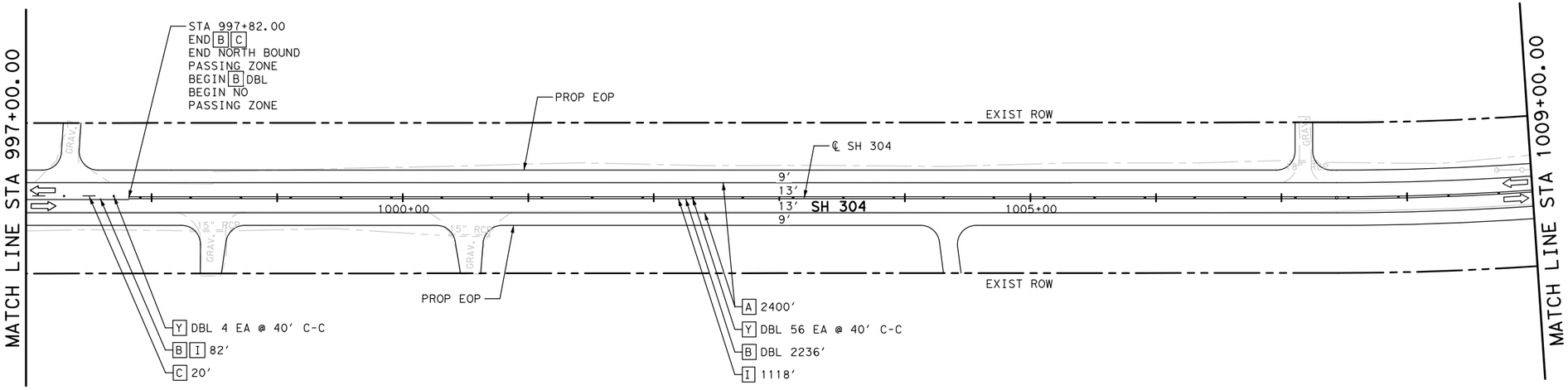
Texas Department of Transportation

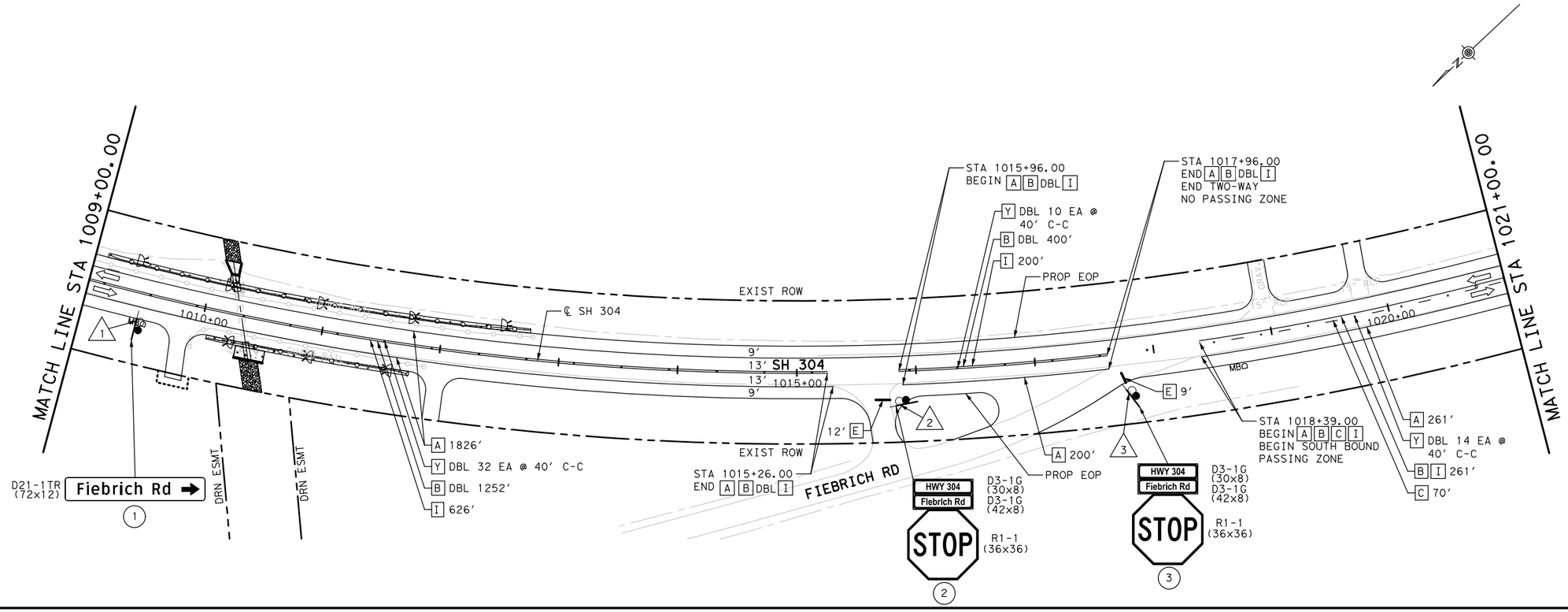
SH 304
SIGNING AND PAVEMENT MARKING
STA 973+50 TO 997+00

SHEET 10 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW: TML	CK: TRF	AUS	BASTROP		170

DATE: 9/23/2021 3:19:13 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_10.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- △X EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2′ BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

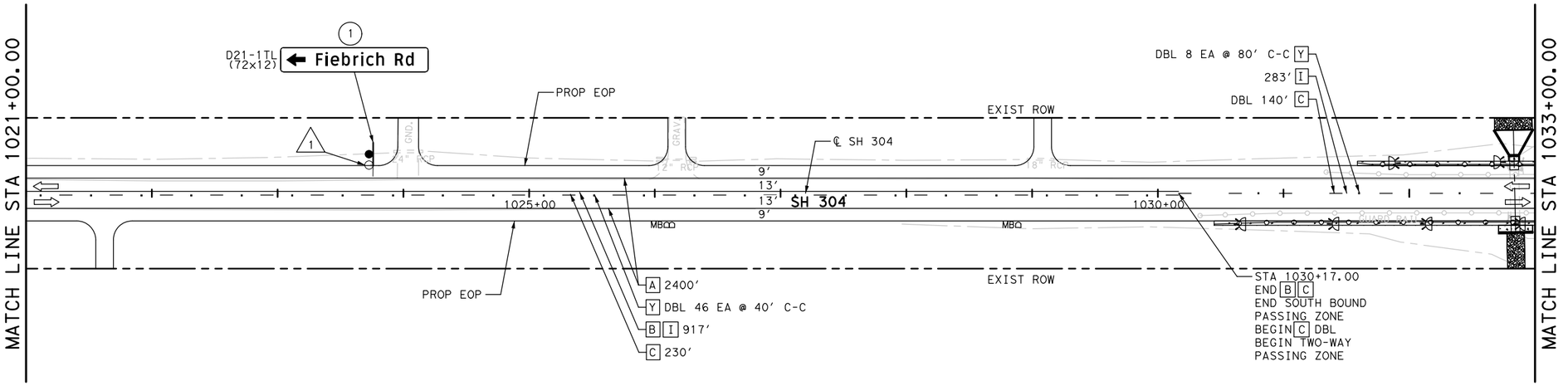
Texas Department of Transportation

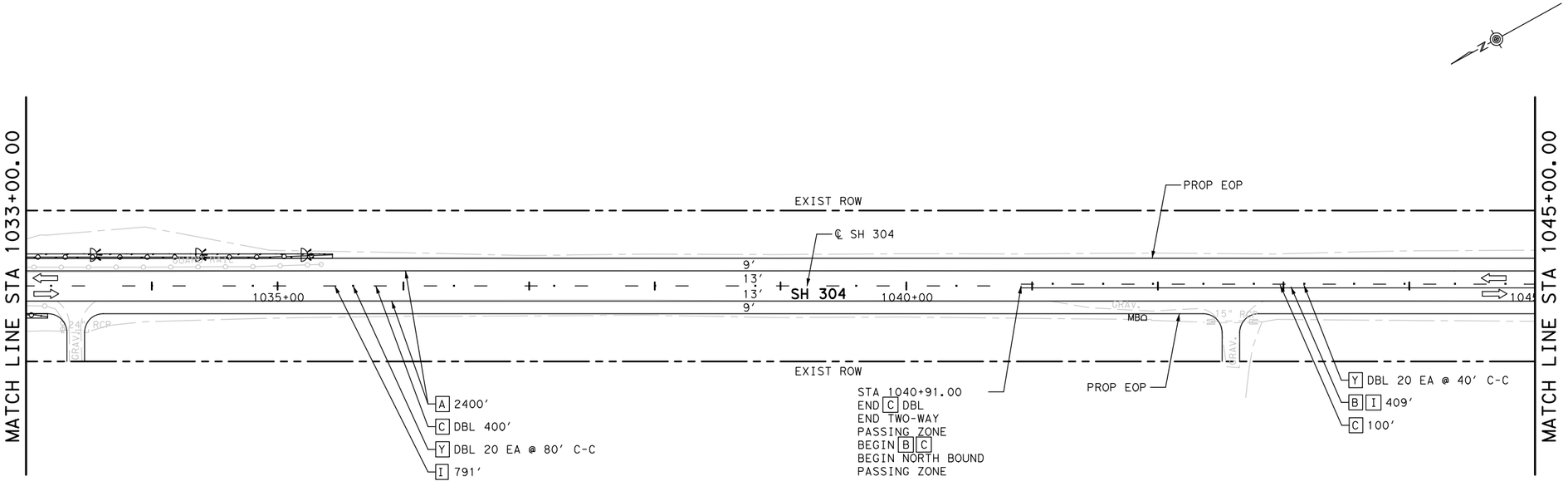
SH 304
SIGNING AND PAVEMENT MARKING
STA 997+00 TO STA 1021+00

SHEET 11 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		171

DATE: 9/23/2021 3:19:20 PM
FILE: c:\pw-gf\pw-gf-prod\ross.debord@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_11.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2' BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

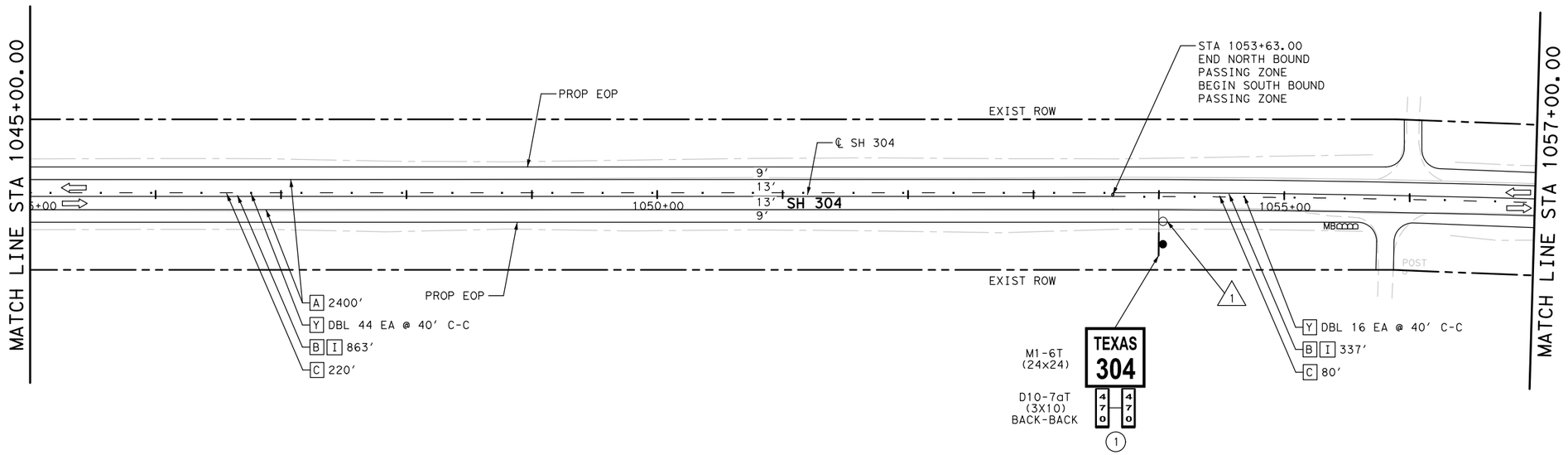
Texas Department of Transportation

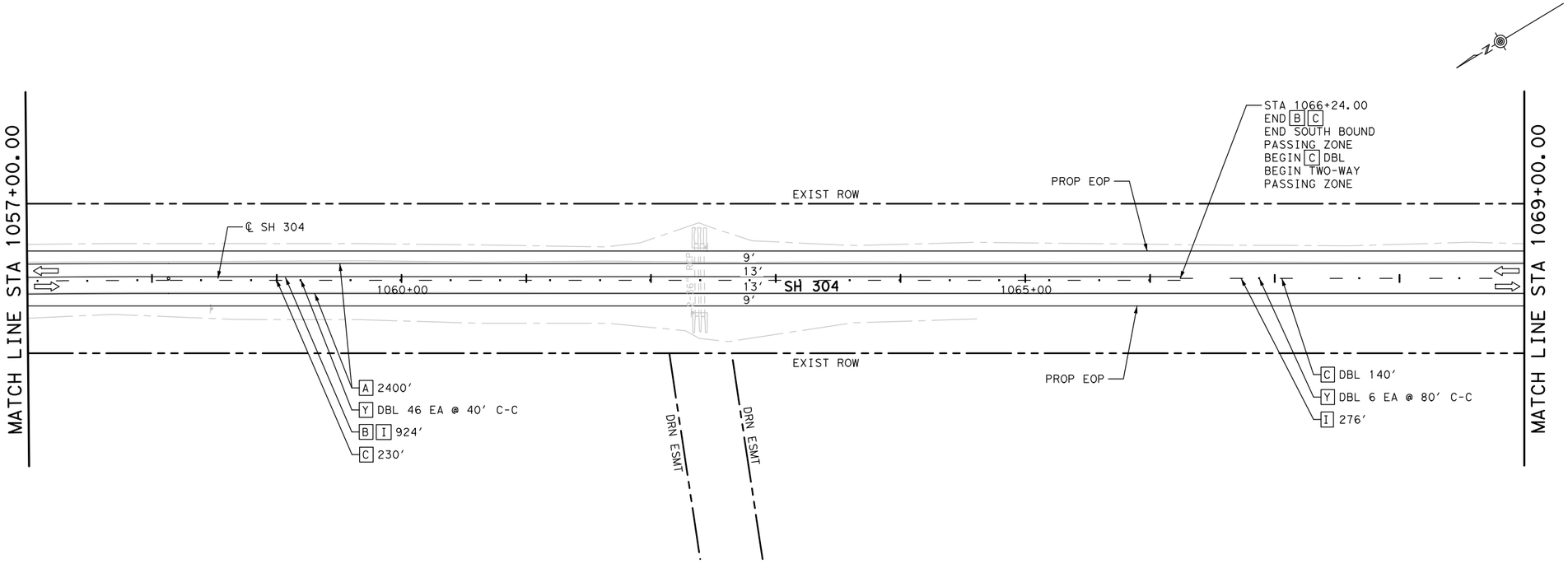
SH 304
SIGNING AND PAVEMENT MARKING
STA 1021+00 TO 1045+00

SHEET 12 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		172

DATE: 9/23/2021 3:19:28 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_12.dgn





LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- △X EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2′ BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

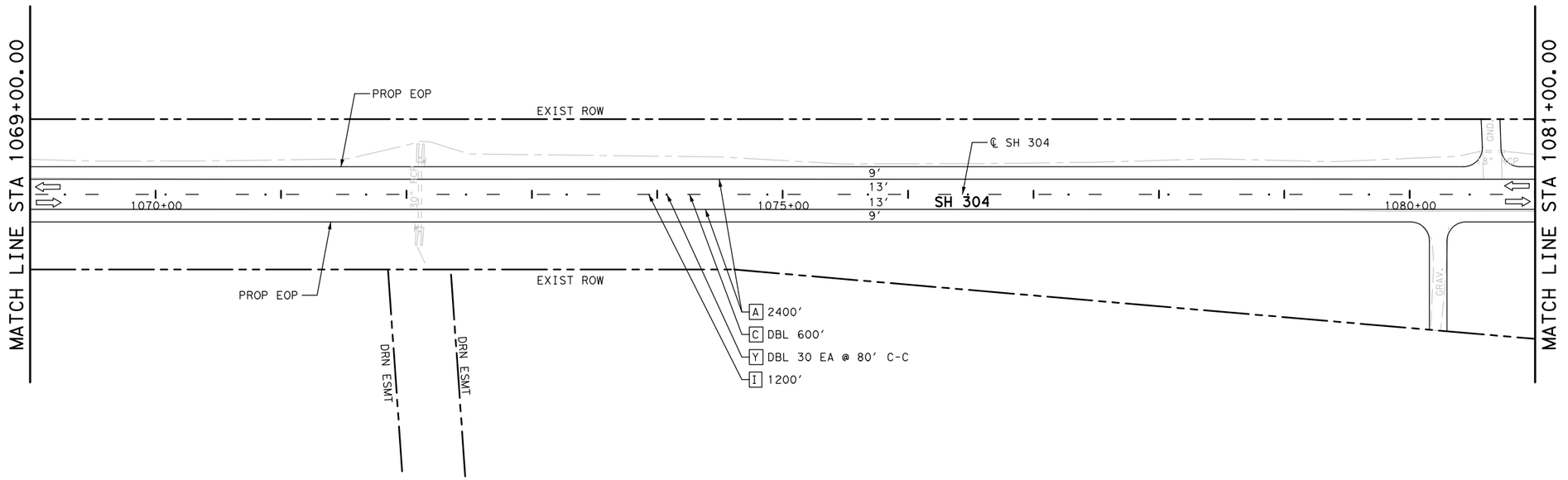
Texas Department of Transportation

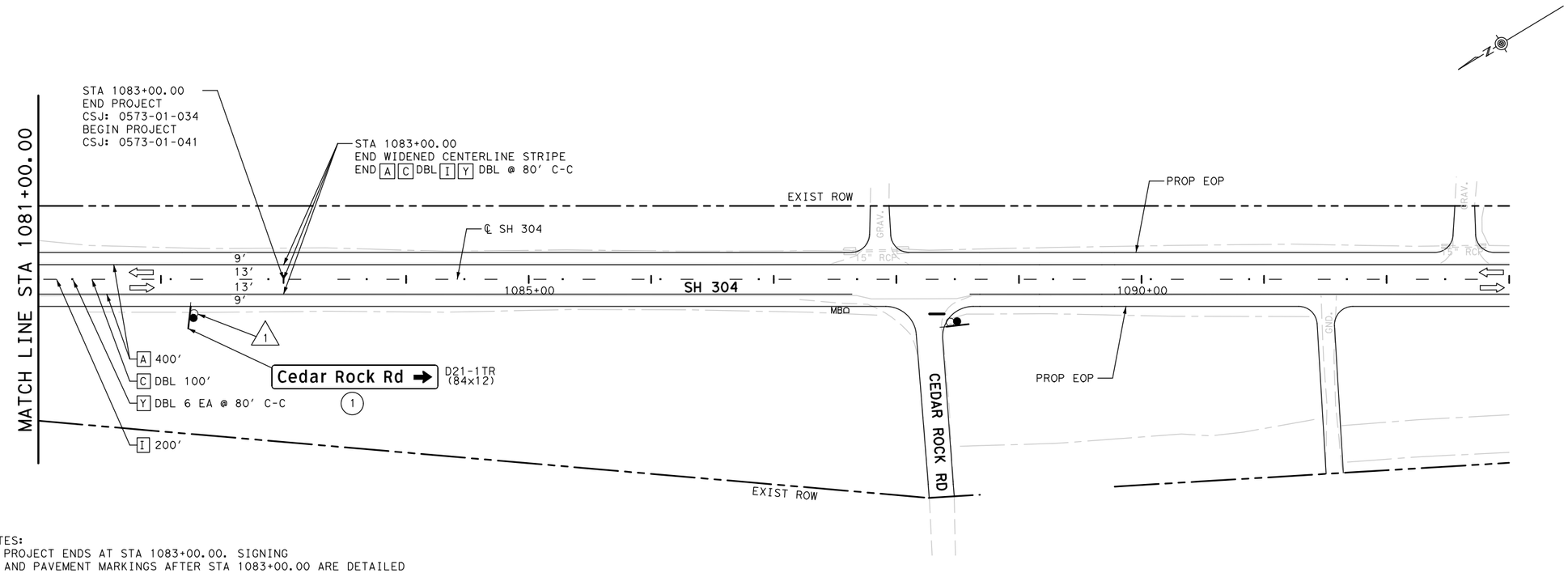
SH 304
SIGNING AND PAVEMENT MARKING
STA 1045+00 TO 1069+00

SHEET 13 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		173

DATE: 9/23/2021 3:19:35 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_13.dgn





NOTES:
1. PROJECT ENDS AT STA 1083+00.00. SIGNING AND PAVEMENT MARKINGS AFTER STA 1083+00.00 ARE DETAILED AND PAID FOR IN SUBSEQUENT PACKAGE CSJ: 0573-01-041.

LEGEND

- A 4" (W) SLD
- B 4" (Y) SLD
- C 4" (Y) BRK
- D 8" (W) SLD
- E 24" (W) SLD
- F WHITE ARROW
- G WHITE WORD
- H YELLOW MED NOSE
- I RUMBLE STRIPS (CENTERLINE)
- X TY I-C PAV MRKR
- Y TY II-A-A PAV MRKR
- DIRECTION OF TRAFFIC
- (X) PROPOSED SMALL SIGN ASSEMBLY
- EXISTING SMALL SIGN ASSEMBLY TO BE REMOVED
- PROPOSED DELINEATOR (D-SW)SZ 1(BRF)GF2(BI)
- PROPOSED OBJECT MARKER (OM-2Z)(WFLX)(GND)(BI)
- PROPOSED SIGN POST
- EXISTING SIGN POST

NOTES:

1. WHERE WIDENED CENTERLINE STRIPE ARE NOTED IN PLANS, 2′ BUFFER IS REQUIRED BETWEEN EACH CENTERLINE STRIPE. SEE WIDENED CENTERLINE STRIPING DETAIL ON PAVEMENT MARKING DETAIL SHEET FOR CENTERLINE STRIPING DETAILS.

2. WHERE CENTERLINE RUMBLE STRIPS ARE ADJACENT TO WIDENED CENTERLINE STRIPE, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- 1/2".

SCALE (IN FEET):
0 100

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

SH 304
SIGNING AND PAVEMENT MARKING
STA 1069+00 TO 1083+00

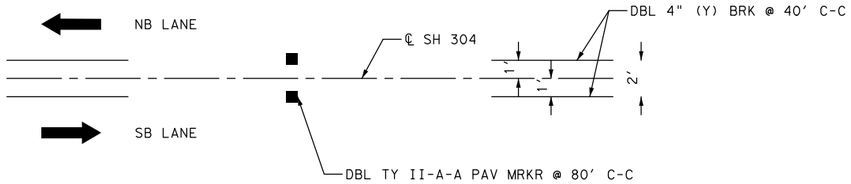
SHEET 14 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW: TML	CK: TRF	AUS	BASTROP		174

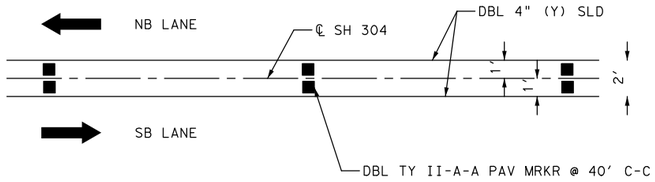
DATE: 9/23/2021 3:19:42 PM
FILE: c:\pw-gf\pw-gf-prod\ross.debord@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_14.dgn

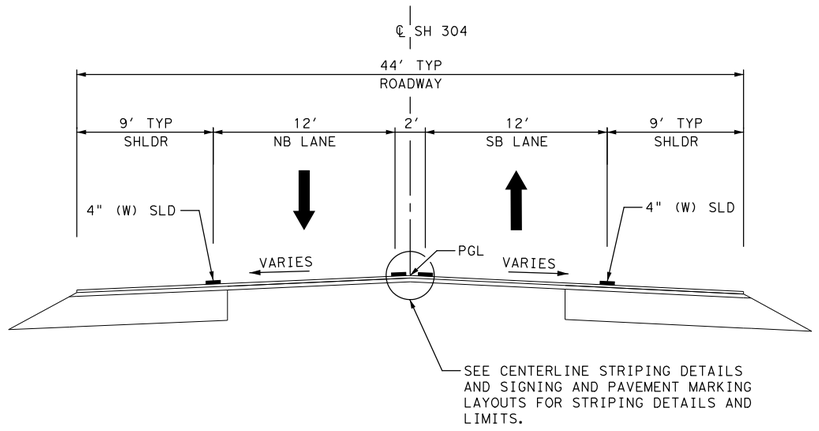
WIDENED CENTERLINE STRIPING DETAILS

TWO-WAY PASSING ZONE STRIPING

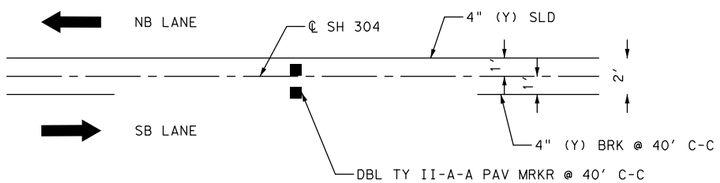


NO PASSING ZONE STRIPING

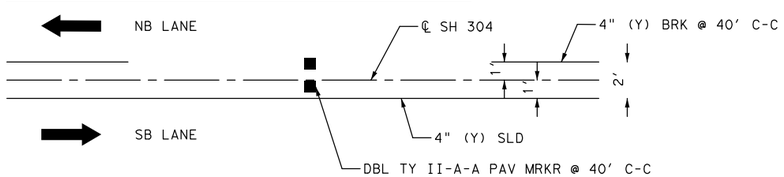




SOUTH BOUND (S.B.) PASSING ZONE



NORTH BOUND (N.B.) PASSING ZONE



NOTES;

1. SEE SIGNING AND PAVEMENT MARKING LAYOUT SHEETS FOR LIMITS OF WIDENED CENTERLINE STRIPING.

2. WHERE CENTERLINE RUMBLE STRIPES ARE NOTED IN SIGNING AND PAVEMENT MARKING LAYOUTS NEXT TO WIDENED CENTERLINE STRIPING, MILLED RUMBLE STRIPS ARE TO BE 28" WIDTH +OR- ½".

NOT TO SCALE

10/18/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

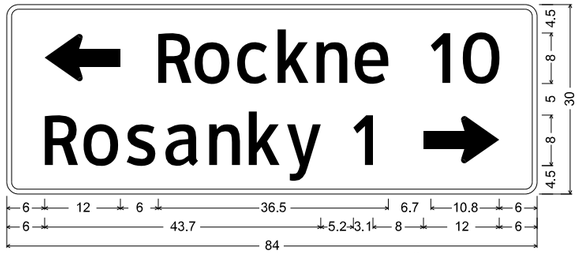
AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

SH 304
PAVEMENT MARKING
DETAIL SHEET

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		174A

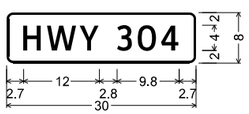
DATE: 10/18/2021 12:45:58 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155465\PH3_SH304_TRF_PM_Detail_01.dgn



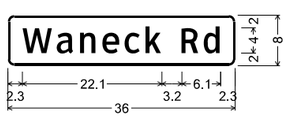
SIGNING AND PAVEMARK MARKING SHEET 1 OF 14 SIGN #6
Identifier : D1-2;
1.875" Radius, 0.75" Border, White on Green;
Standard Arrow Custom 12.0" X 8.0" 180^; [Rockne 10] ClearviewHwy-3-W;
[Rosanky 1] ClearviewHwy-3-W; Standard Arrow Custon 12.0" X 8.0" 0^;

SIGNING AND PAVEMARK MARKING SHEET 1 OF 14 SIGN #8
Identifier : D2-1 6in;
1.5" Radius, 0.5" Border, White on Green;
[Bastrop] ClearviewHwy-3-W 40} spacing; [26] ClearviewHwy-3-W;

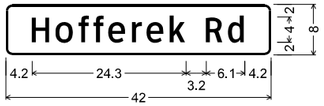
SIGNING AND PAVEMARK MARKING SHEET 2 OF 14 SIGN #1
Identifier : D21-1TR;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.2" 180^;
[Hofferek] ClearviewHwy-3-W;



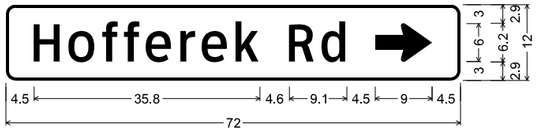
SIGNING AND PAVEMARK MARKING SHEET 2 OF 14 SIGN #2, SHEET 3 OF 14 SIGN #1,
SHEET 5 OF 14 SIGN #2, SHEET 6 OF 14, SIGN #3, SHEET 8 OF 14 SIGN #2,
SHEET 9 OF 14 SIGN #6, SHEET 10 OF 14 SIGN #4, SHEET 11 OF 14 SIGN #2 & #3,
Identifier : D3-1G(4) 6in (Principal legend with or without descending strokes);
1.0" Radius, 0.4" Border, White on Green;
[HWY 304] ClearviewHwy-3-W;



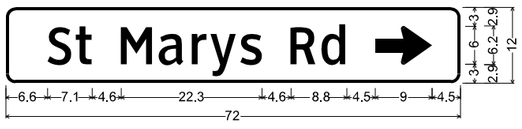
SIGNING AND PAVEMARK MARKING SHEET 2 OF 14 SIGN #2,
Identifier : D3-1G(4) 6in (Principal legend with or without descending strokes);
1.0" Radius, 0.4" Border, White on Green;
[Waneck Rd] ClearviewHwy-3-W;



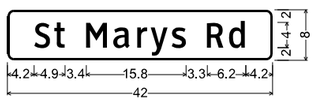
SIGNING AND PAVEMARK MARKING SHEET 3 OF 14 SIGN #1,
Identifier : D3-1G(4) 6in (Principal legend with or without descending strokes);
1.0" Radius, 0.4" Border, White on Green;
[Hofferek Rd] ClearviewHwy-3-W;



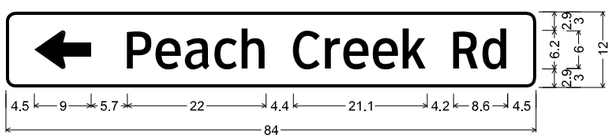
SIGNING AND PAVEMARK MARKING SHEET 3 OF 14 SIGN #2,
Identifier : D21-1TR;
1.5" Radius, 0.5" Border, White on Green;
[Hofferek Rd] ClearviewHwy-3-W 91} spacing;
Standard Arrow Custom 9.0" X 6.2" 0^;



SIGNING AND PAVEMARK MARKING SHEET 5 OF 14 SIGN #1, SHEET 9 OF 14 SIGN #4,
Identifier : D21-1TR;
1.5" Radius, 0.5" Border, White on Green;
[St Marys Rd] ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0{;



SIGNING AND PAVEMARK MARKING SHEET 5 OF 14 SIGN #2, SHEET 9 OF 14 SIGN #6
Identifier : D3-1G(4) 6in (Principal legend with or without descending strokes)◇;
1.0" Radius, 0.4" Border, White on Green;
[St Marys Rd] ClearviewHwy-3-W;



SIGNING AND PAVEMARK MARKING SHEET 6 OF 14 SIGN #1,
Identifier : D21-1TR;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180{;
[Peach Creek Rd] ClearviewHwy-3-W 50} spacing;

NOT TO SCALE

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

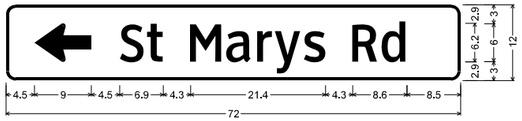
SH 304

SMALL SIGN DETAILS

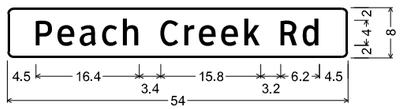
SHEET 1 OF 3

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
DW: TML	CK: TRF	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		175

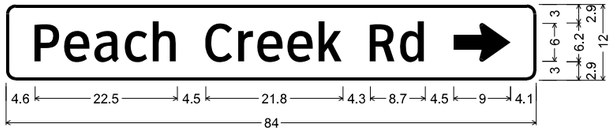
DATE: 9/23/2021 3:19:56 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155465\PH3_SH304_TRF_SSD_01.dgn



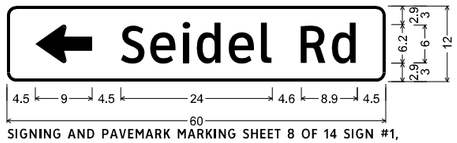
SIGNING AND PAVEMARK MARKING SHEET 6 OF 14 SIGN #2, SHEET 10 OF 14 SIGN #3,
Identifier : D21-1TR;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180{;
[St Marys Rd] ClearviewHwy-3-W 50} spacing;



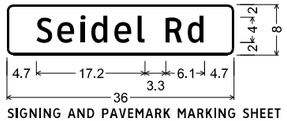
SIGNING AND PAVEMARK MARKING SHEET 6 OF 14 SIGN #3,
Identifier : D3-1G(4) 6in (Principal legend with or without descending strokes);
1.0" Radius, 0.4" Border, White on Green;
[Peach Creek Rd] ClearviewHwy-3-W;



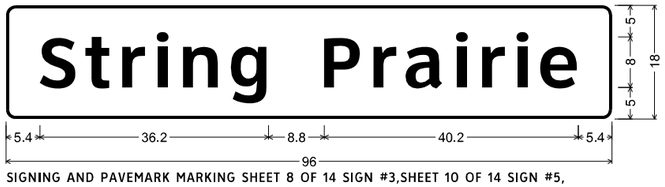
SIGNING AND PAVEMARK MARKING SHEET 6 OF 14 SIGN #4,
Identifier : D21-1TR;
1.5" Radius, 0.5" Border, White on Green;
[Peach Creek Rd] ClearviewHwy-3-W 61} spacing;
Standard Arrow Custom 9.0" X 6.1" 0{;



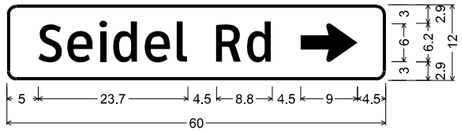
SIGNING AND PAVEMARK MARKING SHEET 8 OF 14 SIGN #1,
Identifier : D21-1TR;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180{;
[Seidel Rd] ClearviewHwy-3-W 74} spacing;



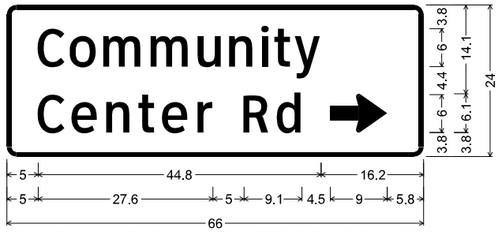
SIGNING AND PAVEMARK MARKING SHEET 8 OF 14 SIGN #2,
Identifier : D3-1G(4) 6in (Principal legend with or without descending strokes);
1.0" Radius, 0.4" Border, White on Green;
[Seidel Rd] ClearviewHwy-3-W;



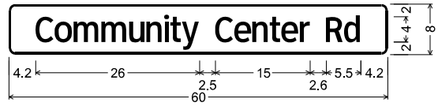
SIGNING AND PAVEMARK MARKING SHEET 8 OF 14 SIGN #3,SHEET 10 OF 14 SIGN #5,
Identifier : D3-1G(4) 6in (Principal legend with or without descending strokes)◇;
1.5" Radius, 0.5" Border, White on Green;
[String Prairie] ClearviewHwy-5-W 80} spacing;



SIGNING AND PAVEMARK MARKING SHEET 8 OF 14 SIGN #4,
Identifier : D21-1TR;
1.5" Radius, 0.5" Border, White on Green;
[Seidel Rd] ClearviewHwy-3-W 70} spacing;
Standard Arrow Custom 9.0" X 6.1" 0{;



SIGNING AND PAVEMARK MARKING SHEET 10 OF 14 SIGN #1,
Identifier : D21-1aTR;
1.5" Radius, 0.8" Border, White on Green;
[Community] ClearviewHwy-3-W 72} spacing;
[Center Rd] ClearviewHwy-3-W;
Standard Arrow Custom 9.0" X 6.1" 0{;



SIGNING AND PAVEMARK MARKING SHEET 10 OF 14 SIGN #4,
Identifier : D3-1G(4) 6in (Principal legend with or without descending strokes);
1.0" Radius, 0.4" Border, White on Green;
[Community Center Rd] ClearviewHwy-3-W 20} spacing;

SIGNING AND PAVEMARK MARKING SHEET 10 OF 14 SIGN #6,
Identifier : D21-1aTL;
1.5" Radius, 0.8" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180{;
[Community] ClearviewHwy-3-W 117} spacing;
[Center Rd] ClearviewHwy-3-W 117} spacing;

NOT TO SCALE

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

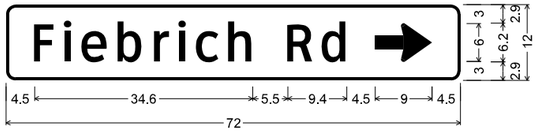
SH 304

SMALL SIGN DETAILS

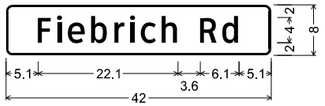
SHEET 2 OF 3

© 2022		CONT	SECT	JOB	HIGHWAY
DS: BTG	CK: RCD	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW: TML	CK: TRF	AUS	BASTROP		176

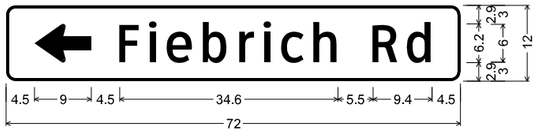
DATE: 9/23/2021 3:20:03 PM
FILE: c:\pw-gf\pw-gf-prod\ross.deborde@aguirre-fields.com\d0155465\PH3_SH304_TRF_SSD_02.dgn



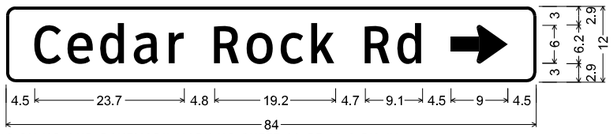
SIGNING AND PAVEMARK MARKING SHEET 11 OF 14 SIGN #1,
Identifier : D21-1TR;
1.5" Radius, 0.5" Border, White on Green;
[Fiebrich Rd] ClearviewHwy-3-W 114} spacing;
Standard Arrow Custom 9.0" X 6.1" O{;



SIGNING AND PAVEMARK MARKING SHEET 11 OF 14 SIGN #2 & #3
Identifier : D3-1G(4) 6in (Principal legend with or without descending strokes);
1.0" Radius, 0.4" Border, White on Green;
[Fiebrich Rd] ClearviewHwy-3-W;



SIGNING AND PAVEMARK MARKING SHEET 12 OF 14 SIGN #1,
Identifier : D21-1TR;
1.5" Radius, 0.5" Border, White on Green;
Standard Arrow Custom 9.0" X 6.1" 180{;
[Fiebrich Rd] ClearviewHwy-3-W 114} spacing;



SIGNING AND PAVEMARK MARKING SHEET 14 OF 14 SIGN #1,
Identifier : D21-1TR;
1.5" Radius, 0.5" Border, White on Green;
[Cedar Rock Rd] ClearviewHwy-3-W 92} spacing;
Standard Arrow Custom 9.0" X 6.1" O{;

NOT TO SCALE

9/24/2021

STATE OF TEXAS
ROSS C. DEBORD
130296
LICENSED
PROFESSIONAL ENGINEER

AGUIRRE & FIELDS
ENGINEERING INNOVATORS
TBPE FIRM REGISTRATION # 739

Texas Department of Transportation

SH 304

SMALL SIGN DETAILS

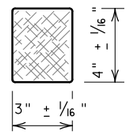
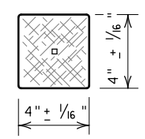
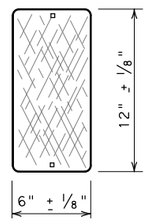
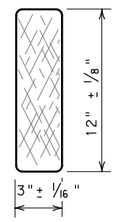
SHEET 3 OF 3

DS:	CK:	CONT	SECT	JOB	HIGHWAY
BTG	RCD	0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
TML	TRF	AUS	BASTROP		177

DATE: 9/23/2021 3:20:10 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155465\PH3_SH304_TRF_SSD_03.dgn

DATE: 9/23/2021 3:20:18 PM
FILE: c:\pw-af\pw-af-prodvross.debor@aguirre-fields.com\d0155467\D&OM(1)-20.dgn

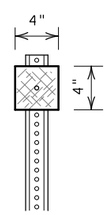
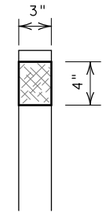
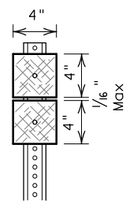
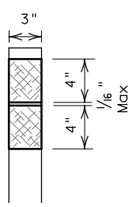
REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS

	SIZE 1	SIZE 2	SIZE 3	SIZE 4
DEVICE				
SHEETING	Yellow, White or Red Type B or C reflective sheeting			

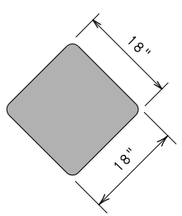
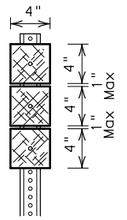
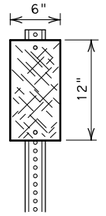
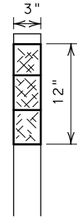
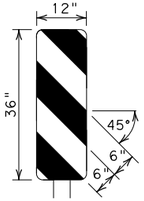
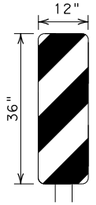
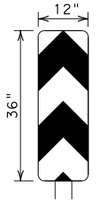
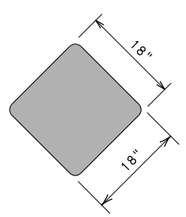
NOTE

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.

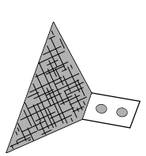
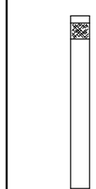
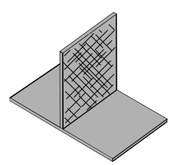
DELINEATORS

	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

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_{FL} or C_{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroflective yellow - Type B_{FL} or C_{FL} Sheeting			Red -Type B_{FL} or C_{FL} 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.

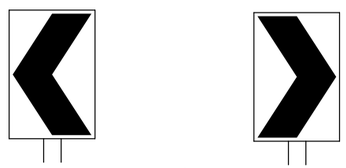
SHEETING: Yellow, White, Red

NOTE

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

CHEVRONS

DEVICE



W1-8

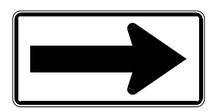
SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)
MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	

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"	

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

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

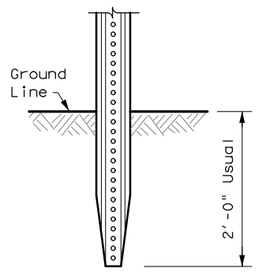
FILE: dom1-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	AUS	BASTROP		178

20A

POST TYPE AND SUPPORT FOUNDATION DETAILS

WING CHANNEL (WC)

GND

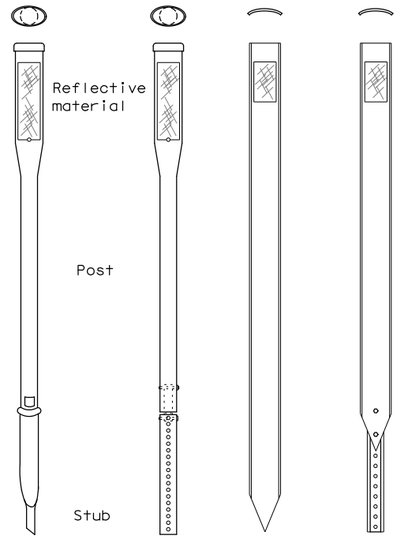


NOTES

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.

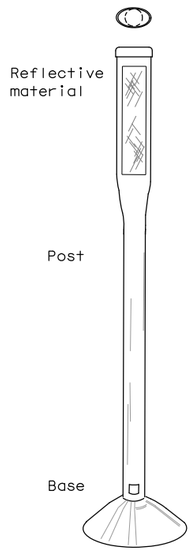
FLEXIBLE POSTS (YFLX, WFLX)

GND



EMBEDDED

SRF



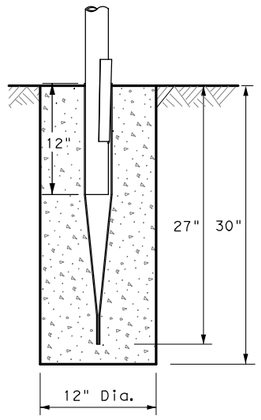
SURFACE MOUNT

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.

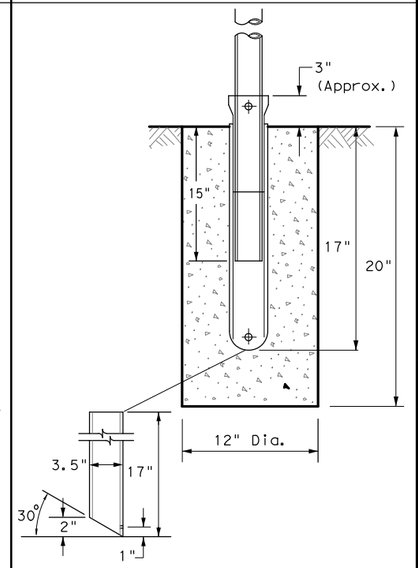
WEDGE ANCHOR SYSTEMS

WAS



STEEL

WAP



PLASTIC

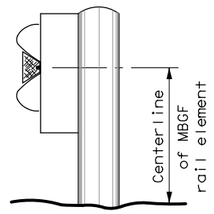
NOTE

1. Install per manufacturer's recommendations.

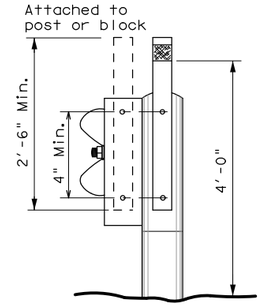
TYPE OF BARRIER MOUNTS

GUARD FENCE ATTACHMENT

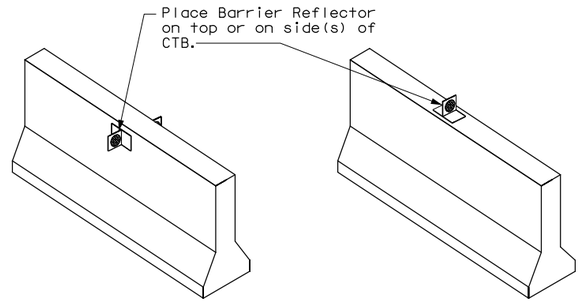
GF1



GF2



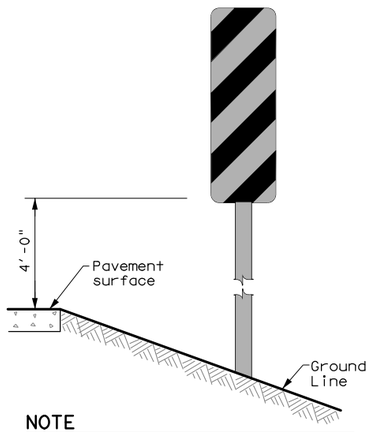
CONCRETE TRAFFIC BARRIER (CTB)



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.

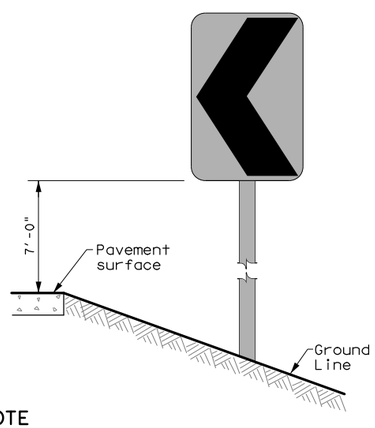
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS



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)

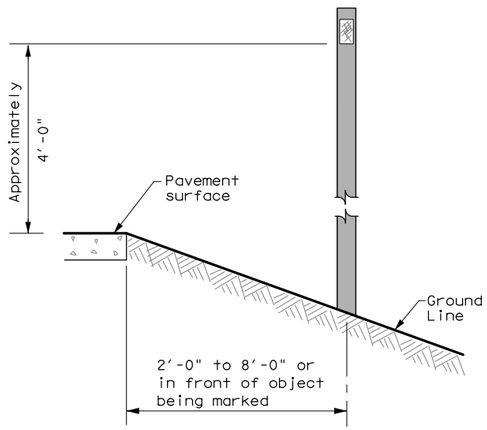
CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN



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	0573	01	034	SH 304
10-09 3-15	DIST	COUNTY		SHEET NO.
4-10 7-20	AUS	BASTROP		179

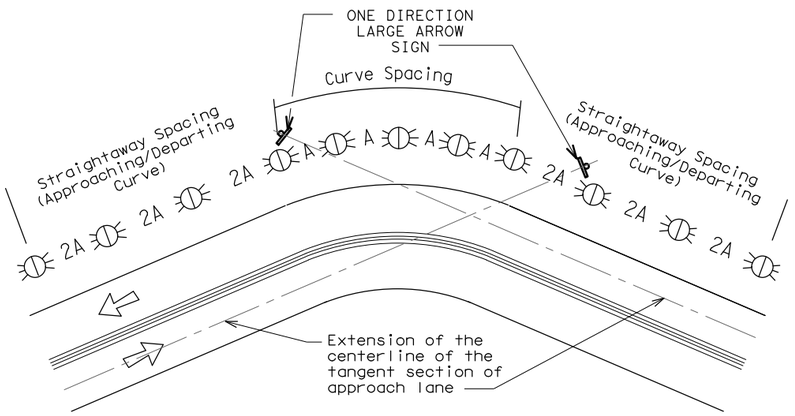
20B

DATE: 9/23/2021 3:20:37 PM
FILE: c:\pw-af\pw-af-prodvross.debord@aguirre-fields.com\d0155467\D&OM(3)-20.dgn

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

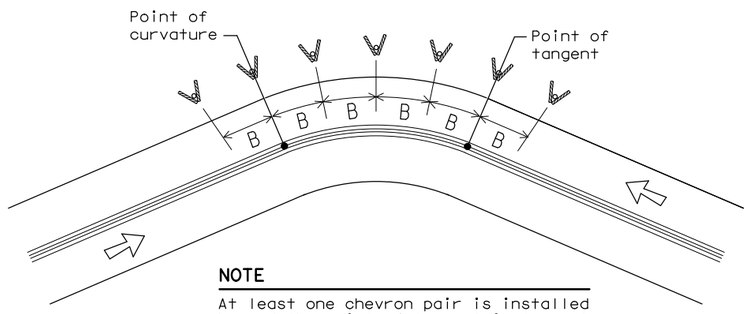
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



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

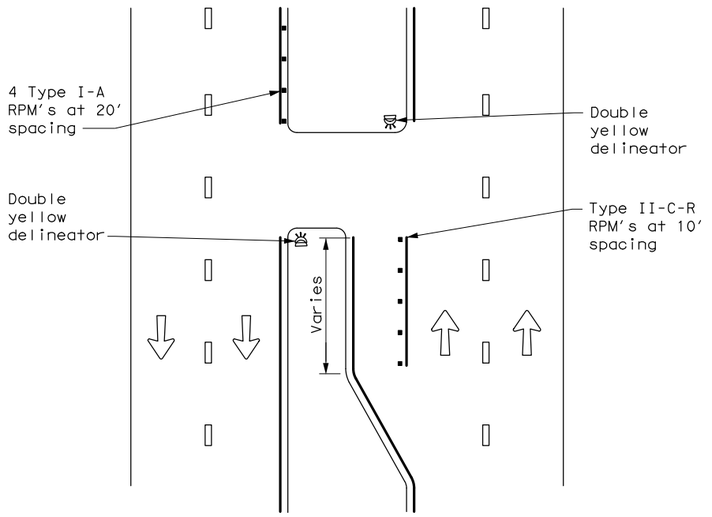
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	AUS	BASTROP		180

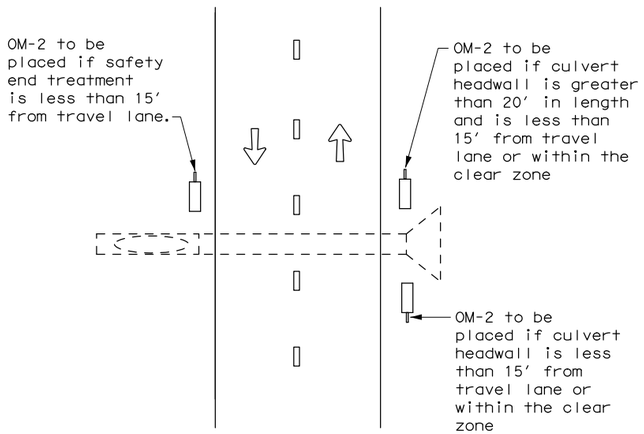
20C

CROSSOVERS



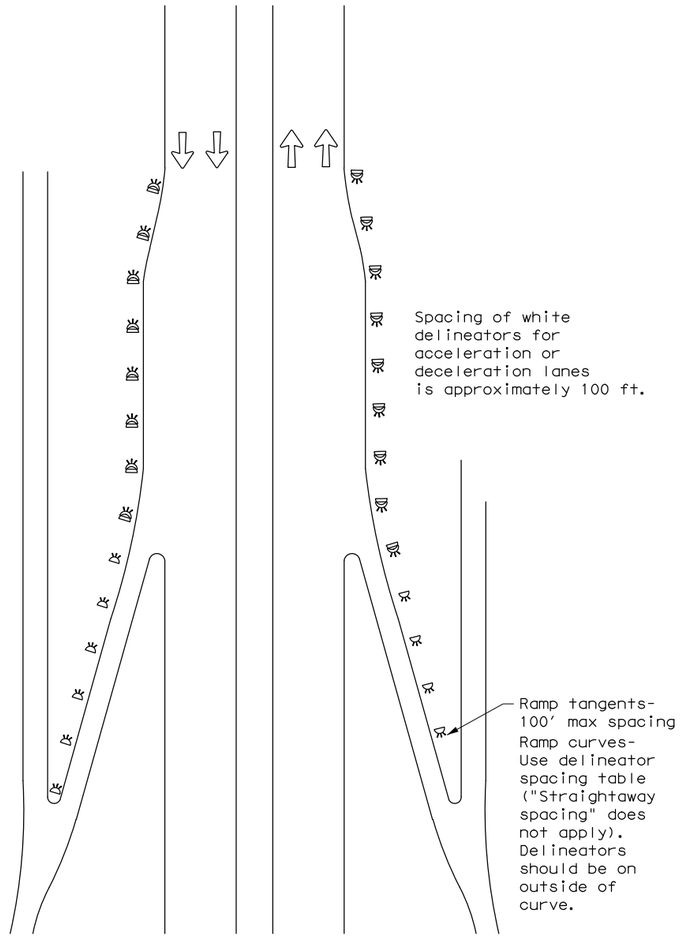
DETAIL 1

FOR CULVERTS WITHOUT MBGF



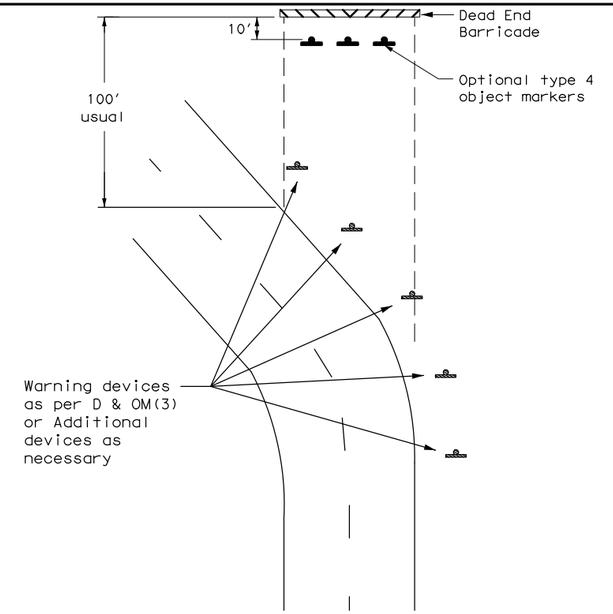
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



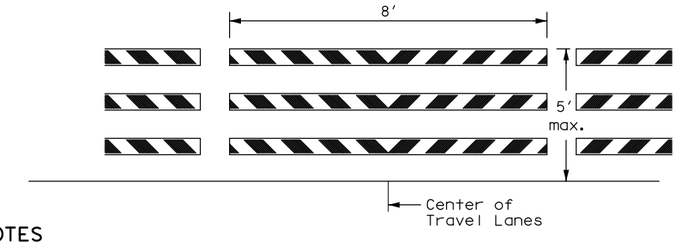
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator

Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

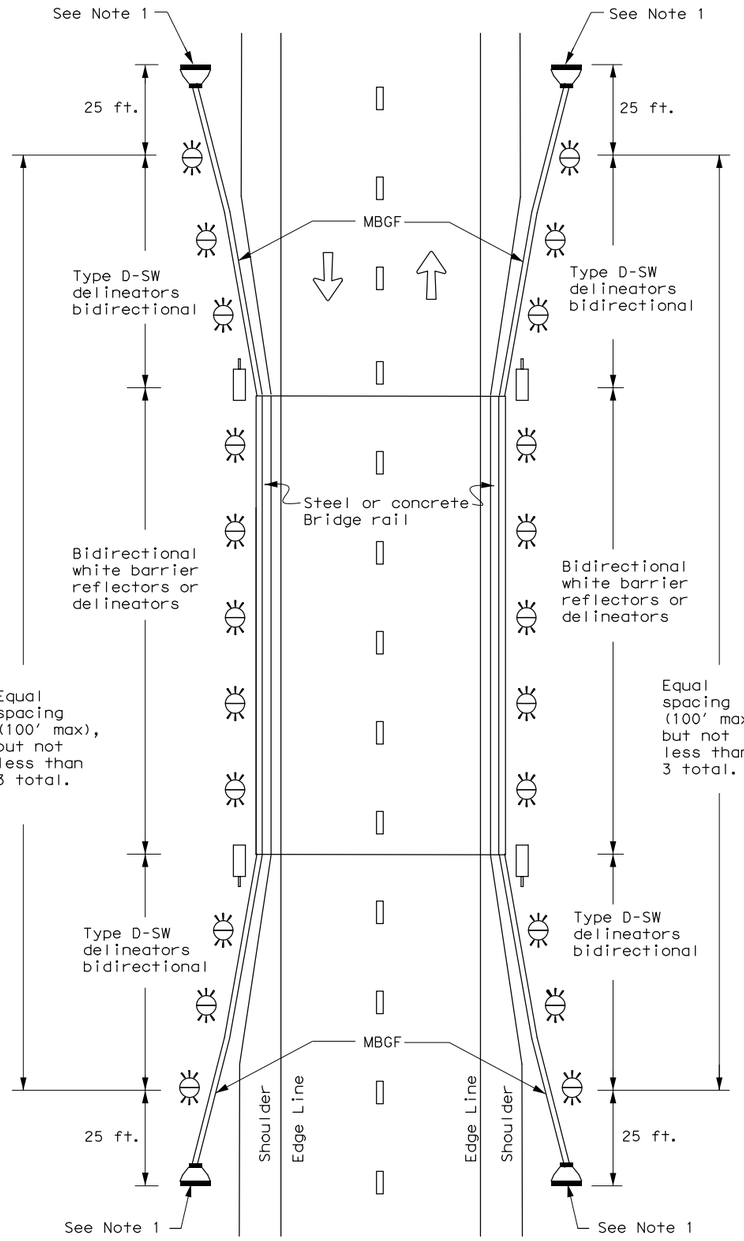
FILE: dom4-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
3-15 7-20	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		181

20D

DATE: 9/23/2021 3:20:44 PM
FILE: c:\pw-af\pw-af-prod\ross.deborde\aguirre-fields.com\d0155467\D&OM(4)-20.dgn

DATE: 9/23/2021 3:20:51 PM
FILE: c:\pw-df\pw-df-prod\ross.deborde\aguirre-fields.com\d0155467\D&OM(5)-20.dgn

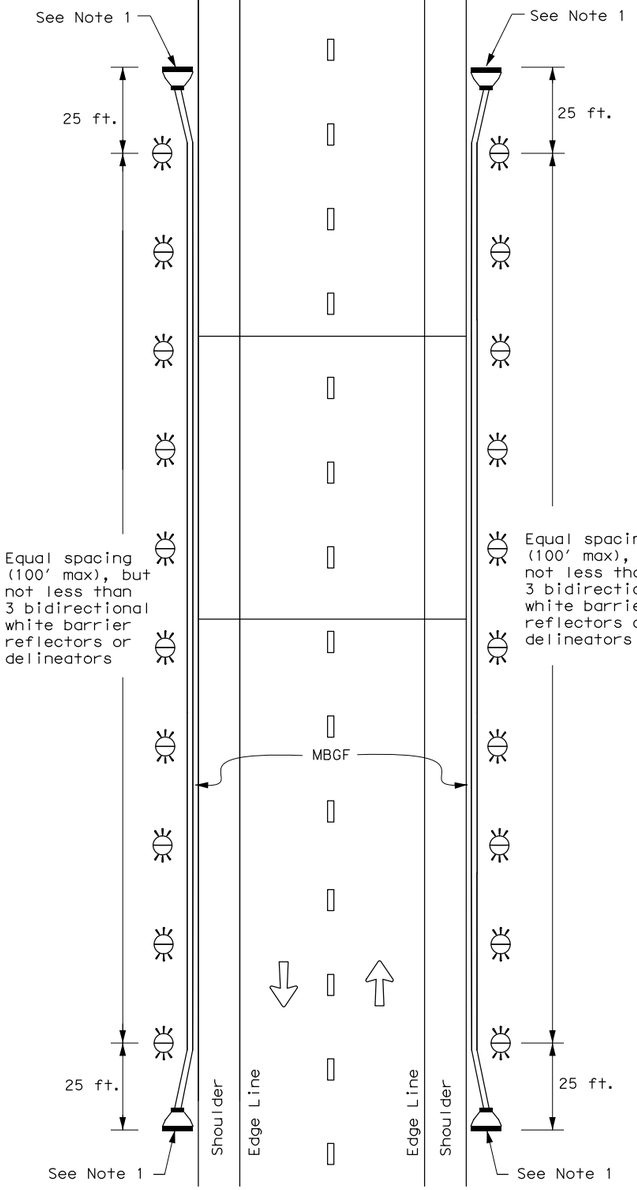
TWO-WAY, TWO LANE ROADWAY WITH REDUCED WIDTH APPROACH RAIL



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.

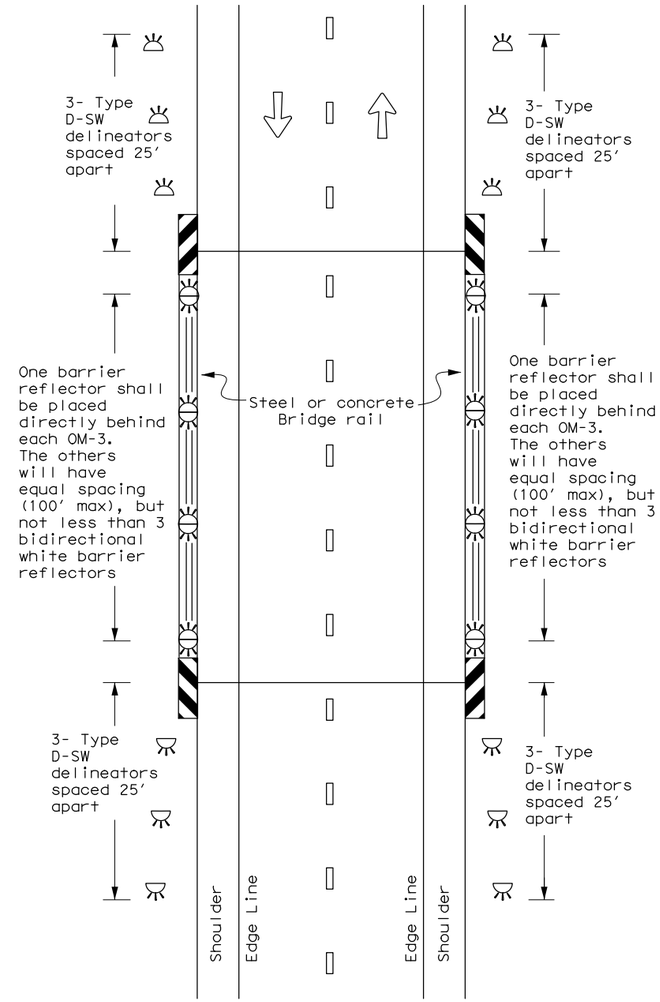
TWO-WAY, TWO LANE ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



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

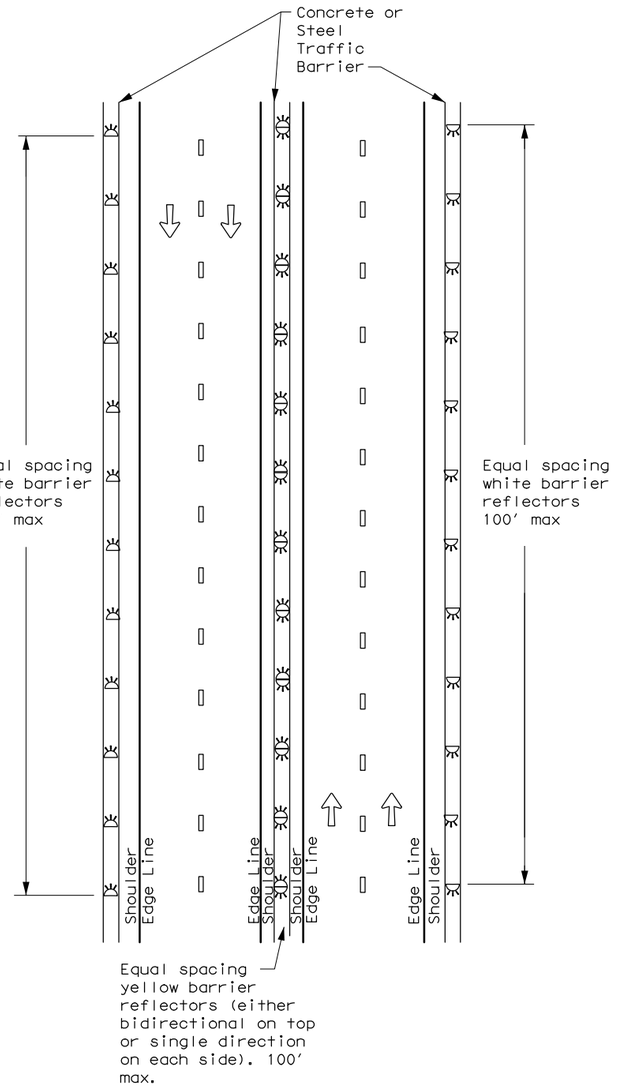
D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
7-20	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		182

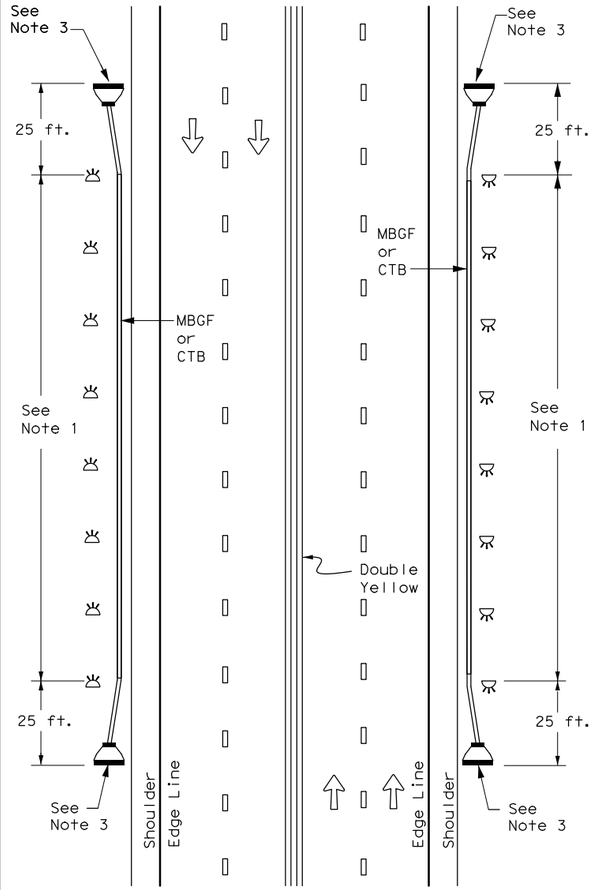
20E

DATE: 9/23/2021 3:20:59 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155467\D&OM(6)-20.dgn

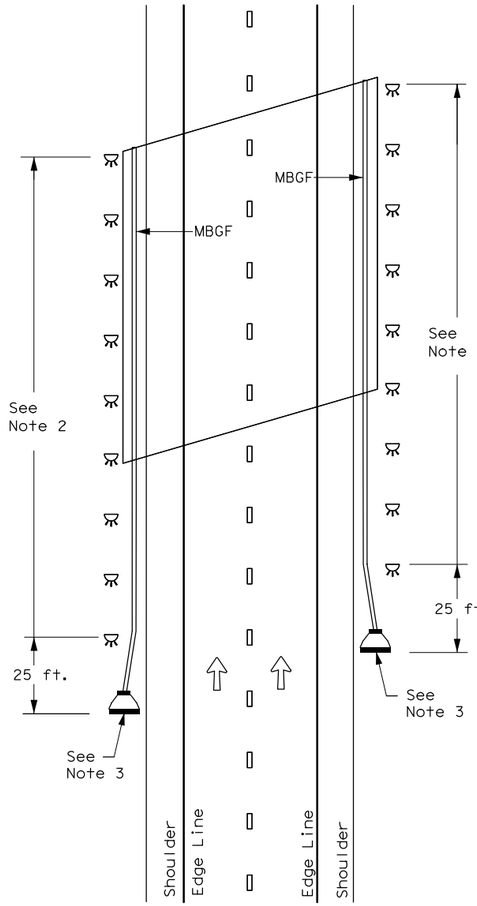
CONTINUOUS CONCRETE OR STEEL BARRIER



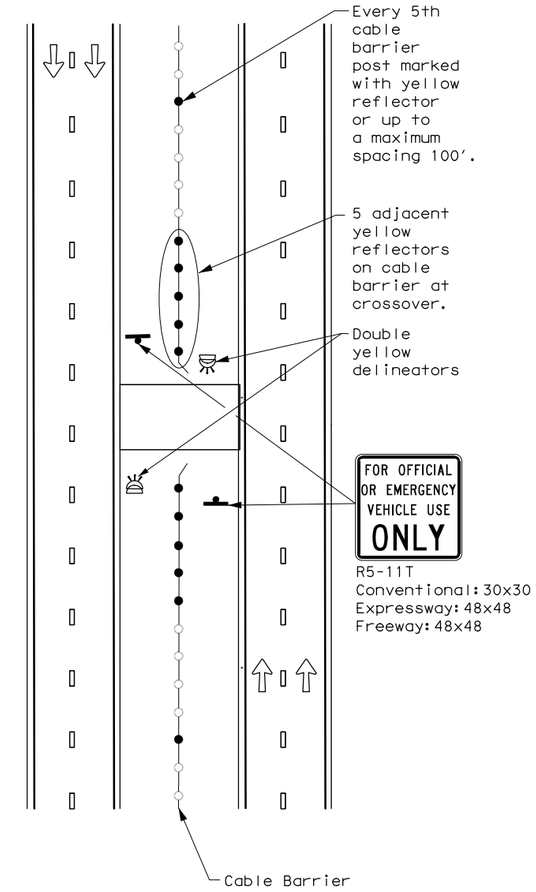
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100′ max), but not less than 3 single directional white barrier reflectors or delineators. On Continuos Barrier, equal spacing (100′ max.)
2. Equal spacing (100′ max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. 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.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

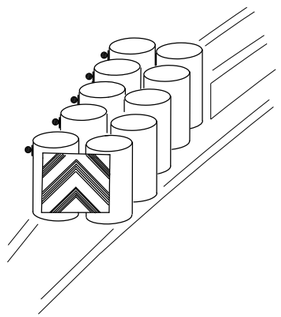
Texas Department of Transportation

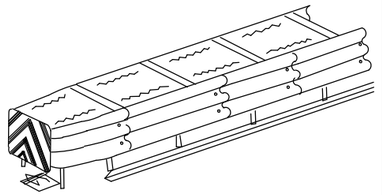
Traffic Safety Division Standard

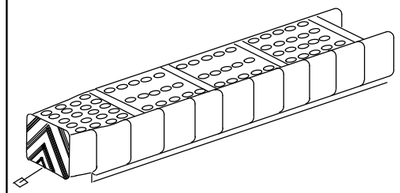
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

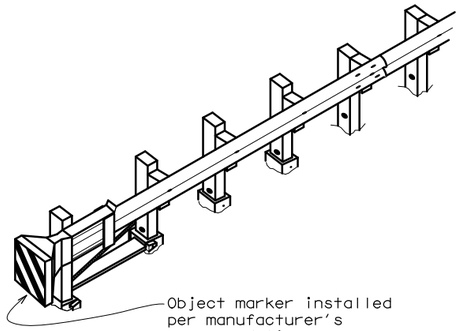
D & OM(6)-20

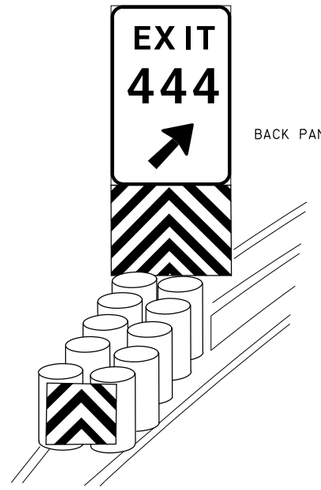
FILE: dom6-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
7-20	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		183

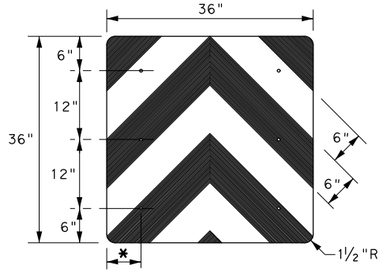


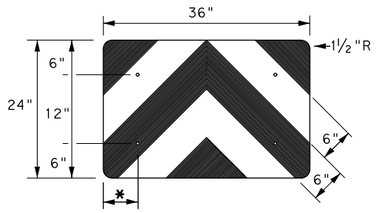




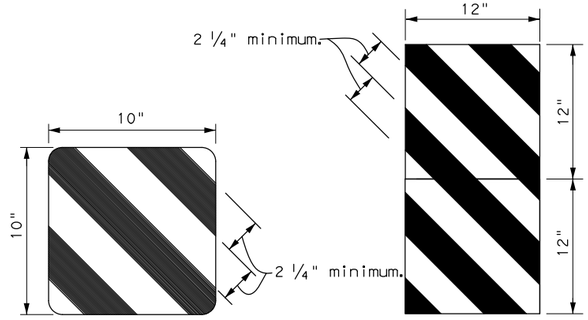




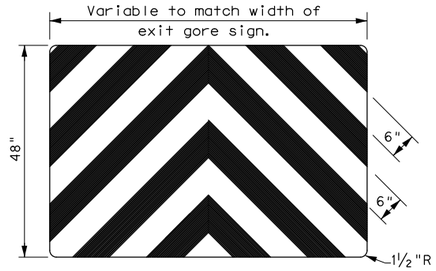


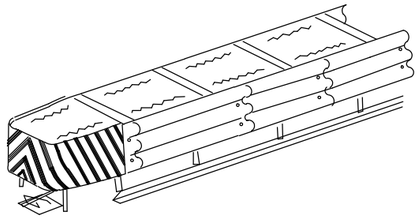


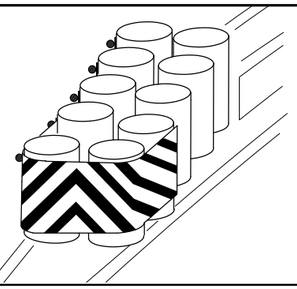
* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer

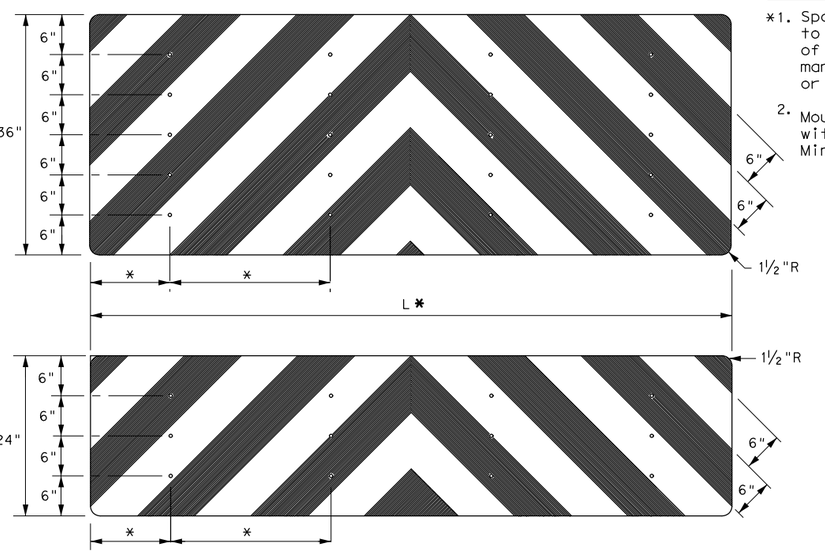


OBJECT MARKERS SMALLER THAN 3 FT^2









NOTES

*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

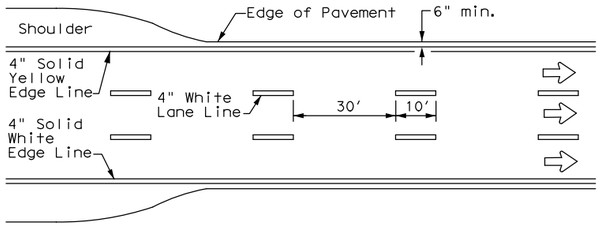
DELINEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS

D & OM(VIA)-20

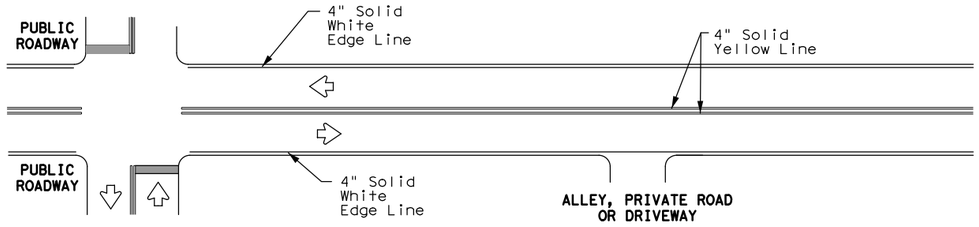
FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
4-92 8-04	DIST	COUNTY		SHEET NO.
8-95 3-15	AUS	BASTROP		184
4-98 7-20				
20G				

DATE: 9/23/2021 3:21:06 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155467\D&OM(VIA)-20.dgn

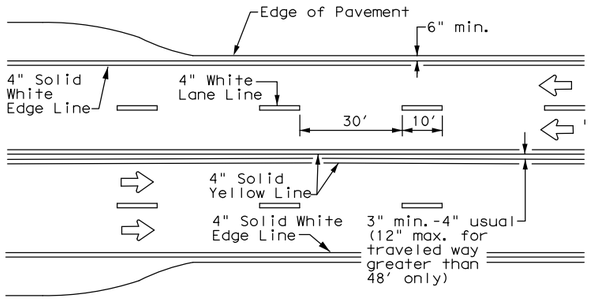
DATE: 9/23/2021 3:21:13 PM
FILE: c:\pw-af\pw-af-prodvross.debord@aguirre-fields.com\d0155467\PM(1)-20.dgn



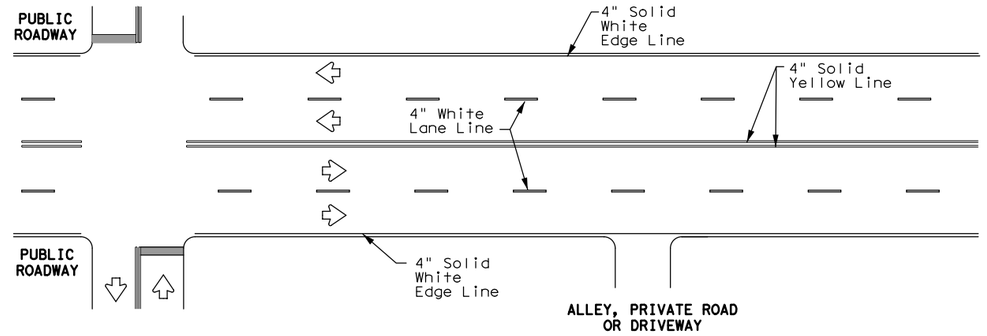
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



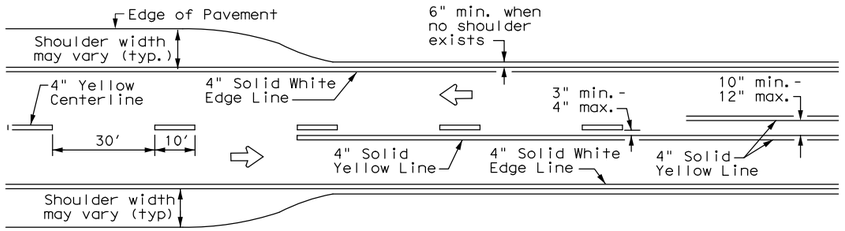
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



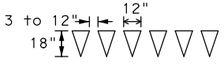
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



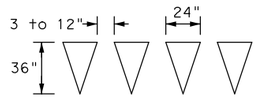
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

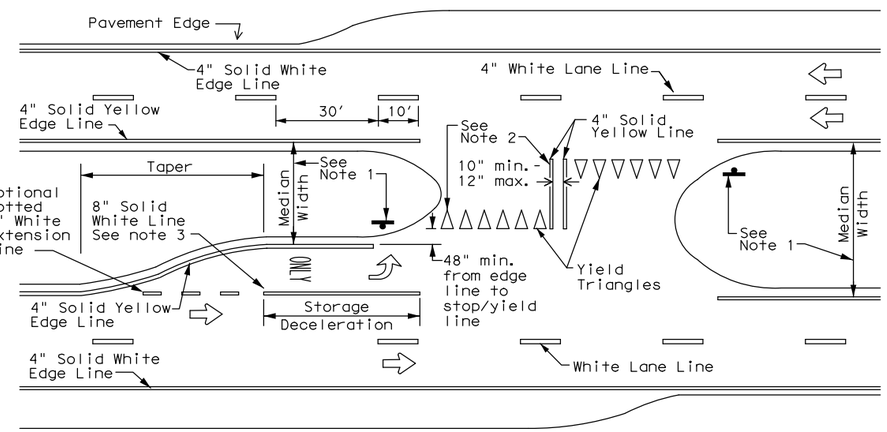


For posted speed on road being marked equal to or less than 40 MPH.



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.

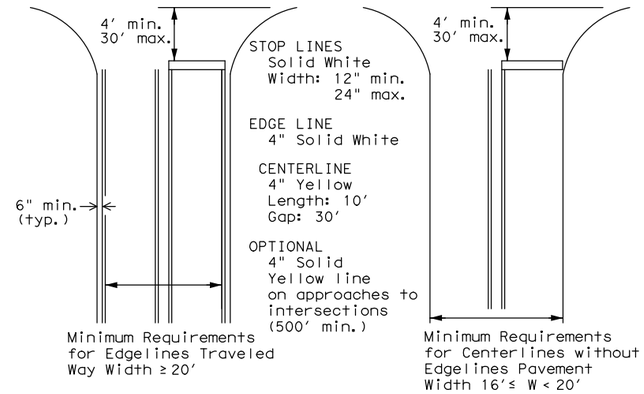
GENERAL NOTES

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

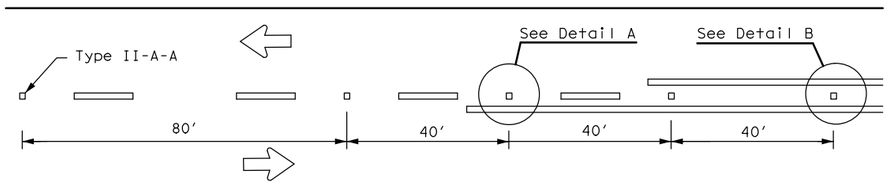
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

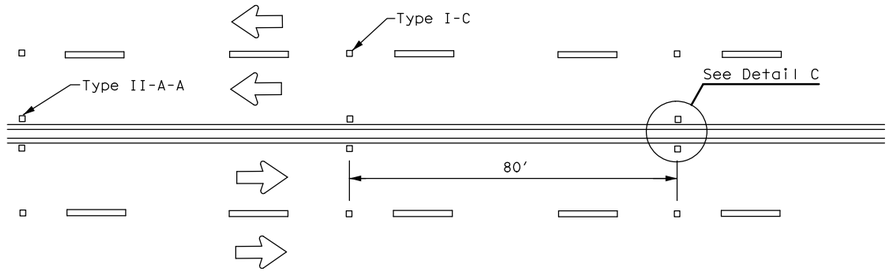
FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0573	01	034	SH 304
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	AUS	BASTROP		185

22A

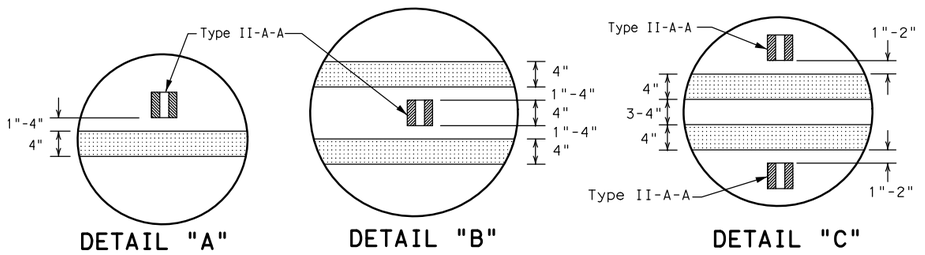
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



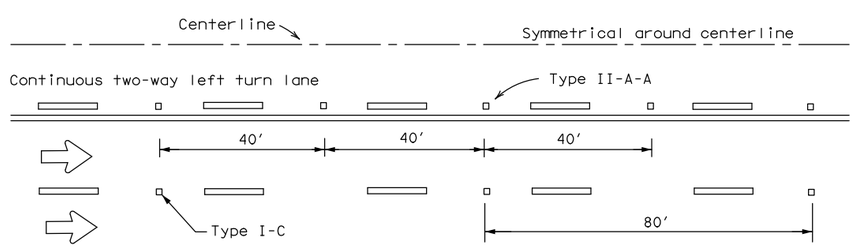
CENTERLINE FOR ALL TWO LANE ROADWAYS



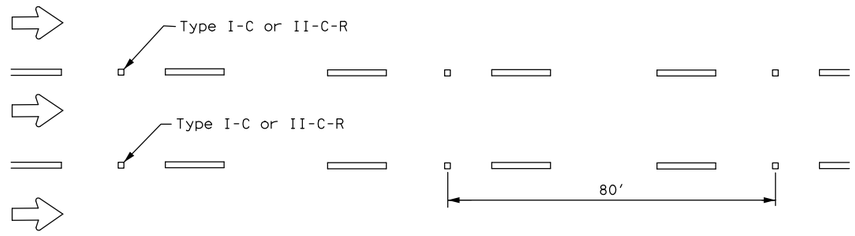
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



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

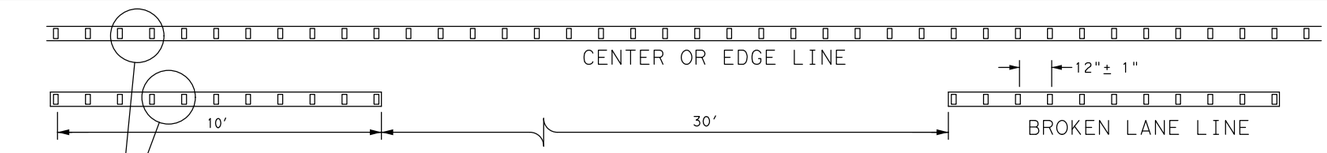


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



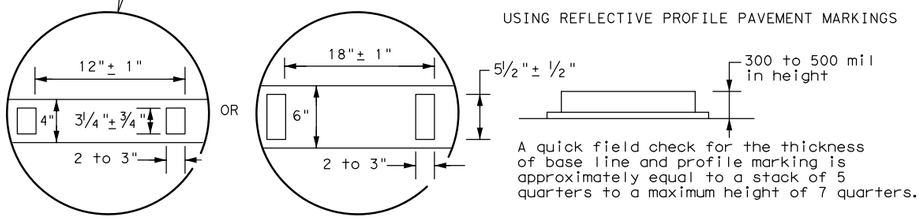
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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



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

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

NOTE

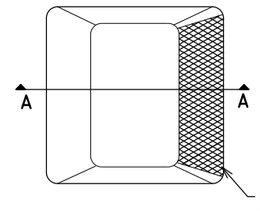
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

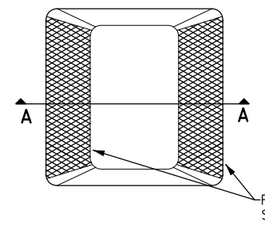
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

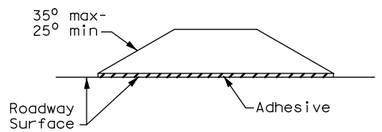
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation

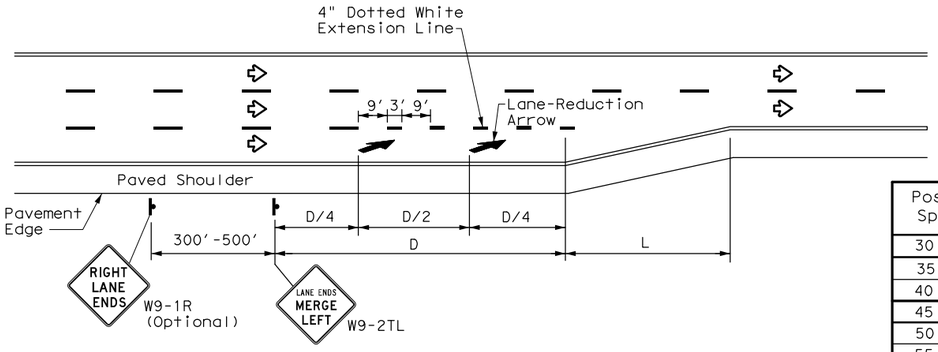
Traffic Safety Division Standard

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 5-00 2-12 8-00 6-20	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		186

22B

DATE: 9/23/2021 3:21:20 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155467\PM(2)-20.dgn

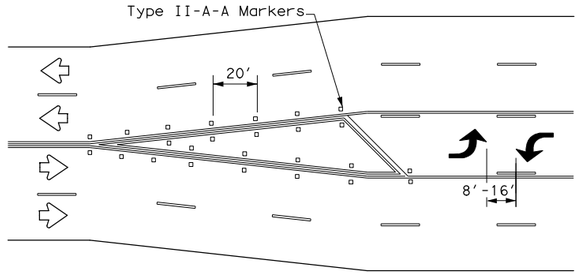


LANE REDUCTION

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.

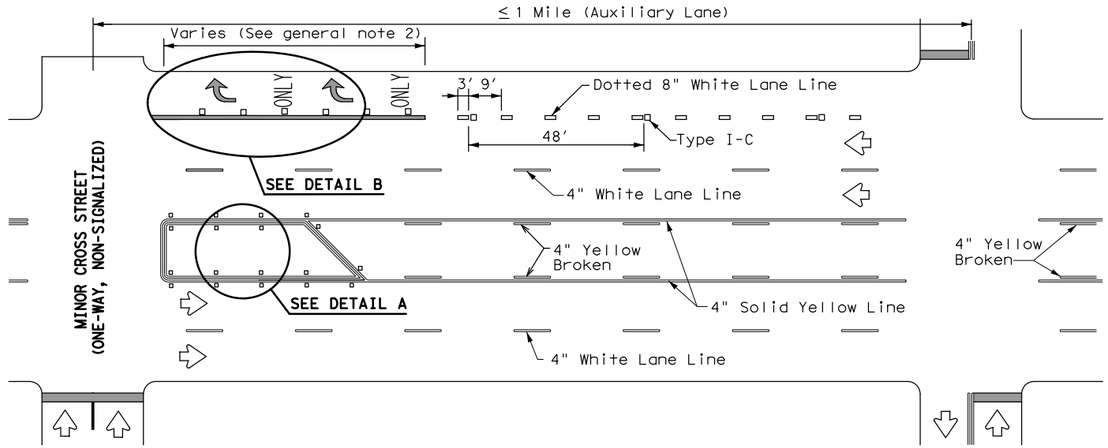
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

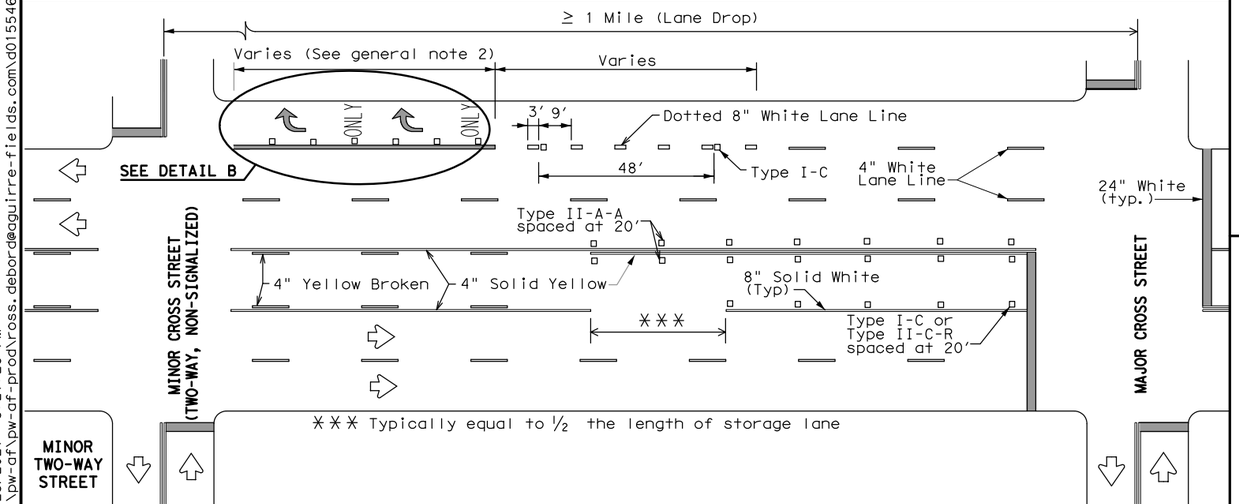
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn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

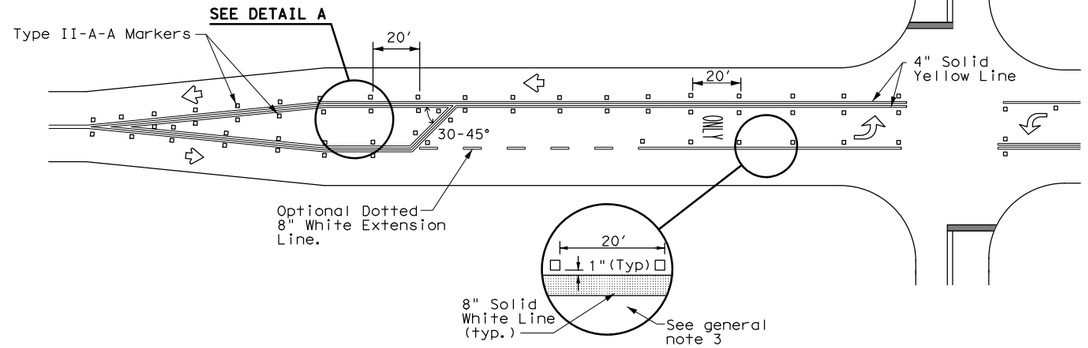
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



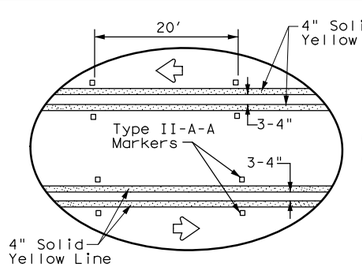
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



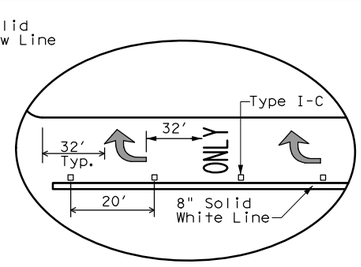
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



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

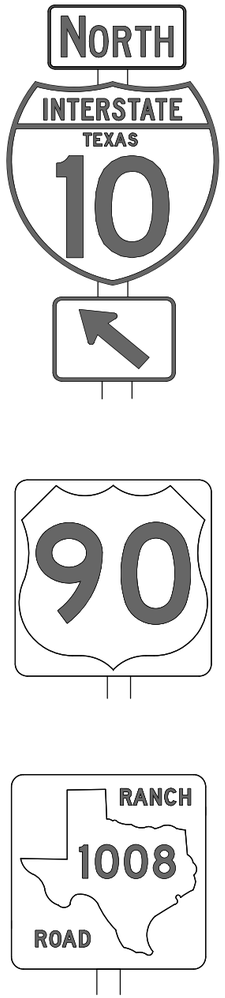
FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	AUS	BASTROP		187
3-03 6-20				

22C

DATE: 9/23/2021 3:21:35 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155467\TSR(3)-13.dgn

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

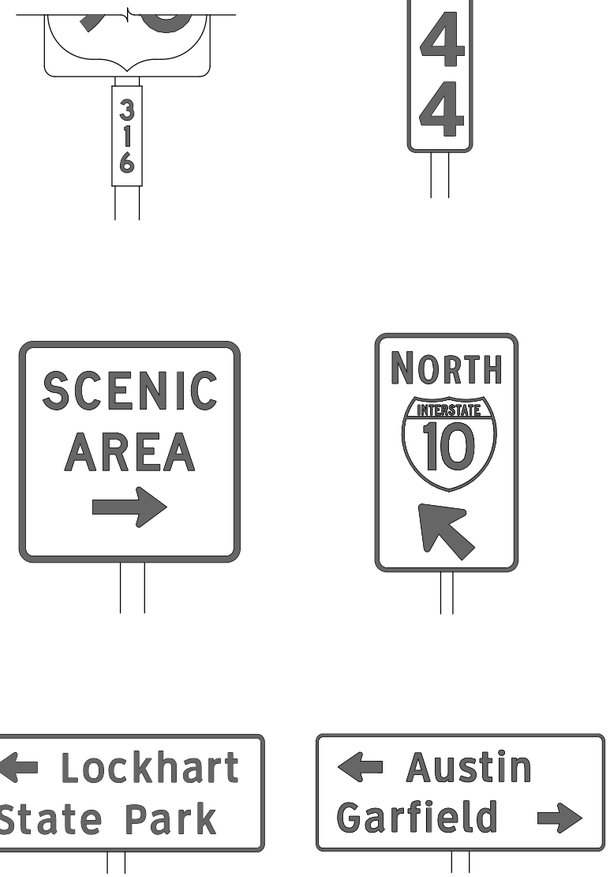
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

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

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



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).

2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

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

3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F).

4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.

5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.

6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.

7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.

8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

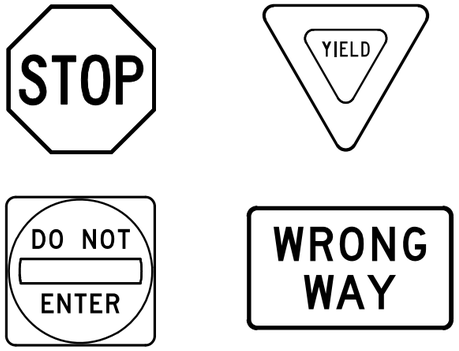
TSR(3)-13

FILE:	tsr3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT	October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS		0573	01	034	SH 304
12-03 7-13		DIST	COUNTY		SHEET NO.
9-08		AUS	BASTROP		188

DATE: 9/23/2021 3:21:42 PM
FILE: c:\pw-cf\pw-cf-prod\ross.deborde\aguirre-fields.com\d0155467\TSR(4)-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

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



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

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

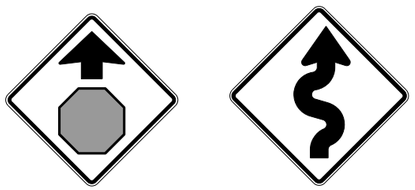
REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

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

TYPICAL EXAMPLES

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

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

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

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

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

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

http://www.txdot.gov/

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

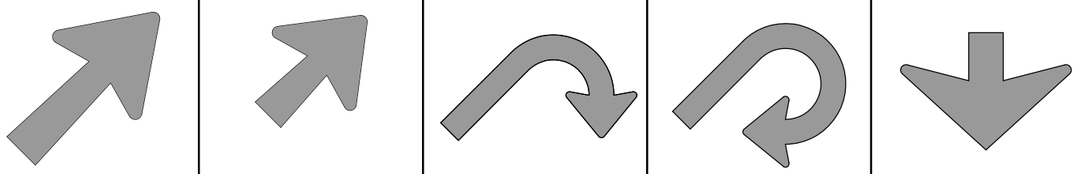
FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	AUS	BASTROP		189

4

DATE: 9/23/2021 3:21:49 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155467\TSR(5)-13.dgn

ARROW DETAILS

for Large Ground-Mounted and Overhead Guide Signs



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

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

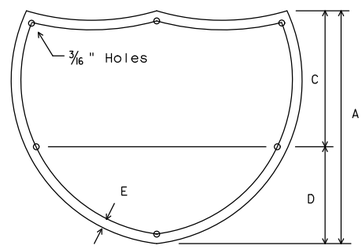
NOTE

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

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

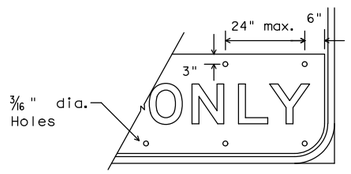
http://www.txdot.gov/

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

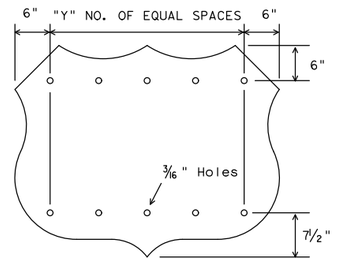


INTERSTATE ROUTE MARKERS

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

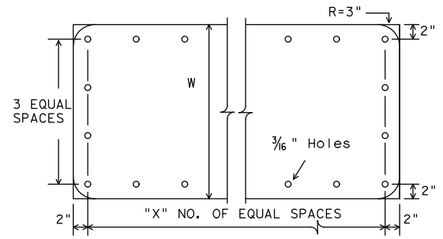


EXIT ONLY PANEL



U.S. ROUTE MARKERS

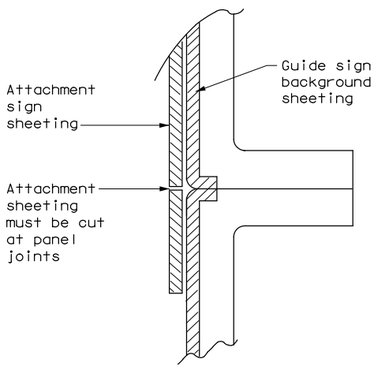
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5



STATE ROUTE MARKERS

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

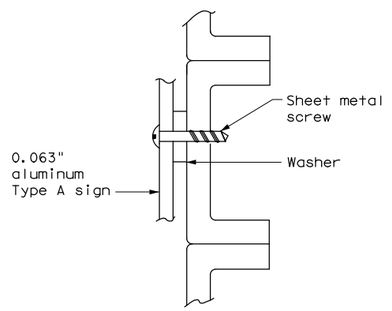
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



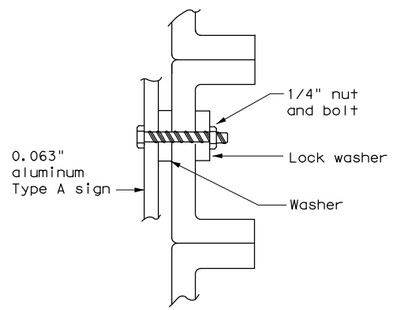
DIRECT APPLIED ATTACHMENT

NOTE:

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



SCREW ATTACHMENT



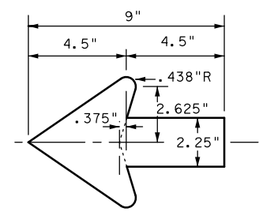
NUT/BOLT ATTACHMENT

NOTE:

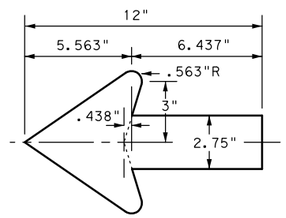
Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

ARROW DETAILS

for Destination Signs (Type D)



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

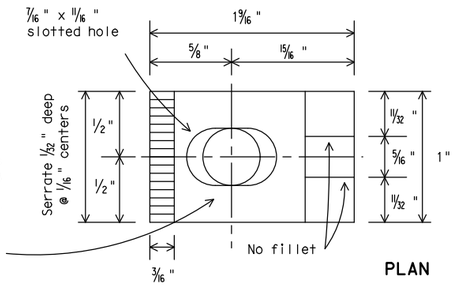
Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

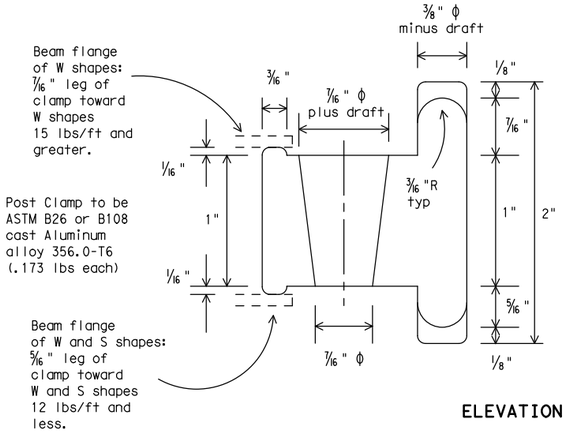
TSR(5)-13

FILE: tsr5-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	AUS	BASTROP		190



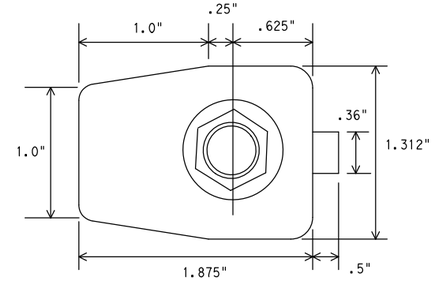
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.

PLAN

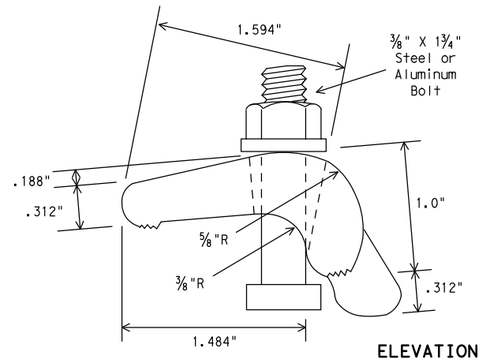


ELEVATION

POST CLAMP DETAIL

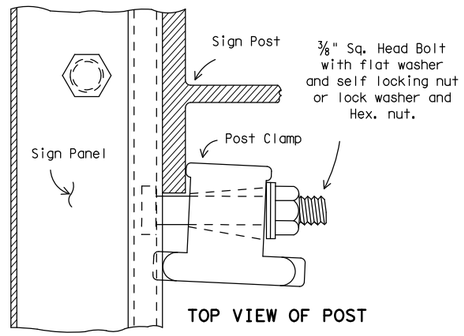


PLAN

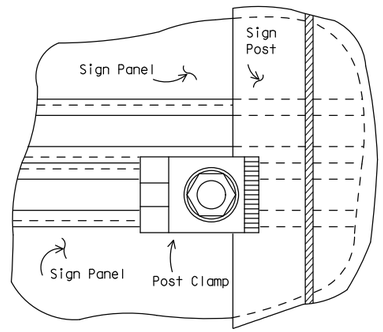


ELEVATION

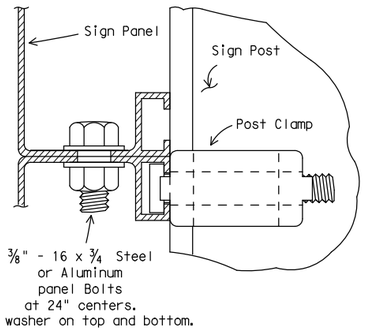
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST



TOP VIEW OF CLAMP



SIDE VIEW OF PANELS

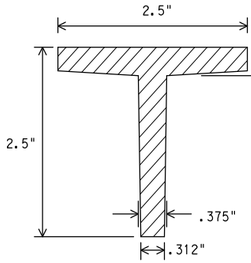
CONNECTION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS

SIGN HARDWARE	DMS-7120

GENERAL NOTES:

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

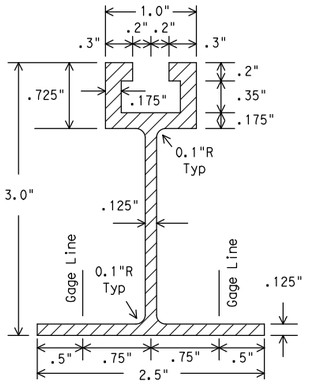


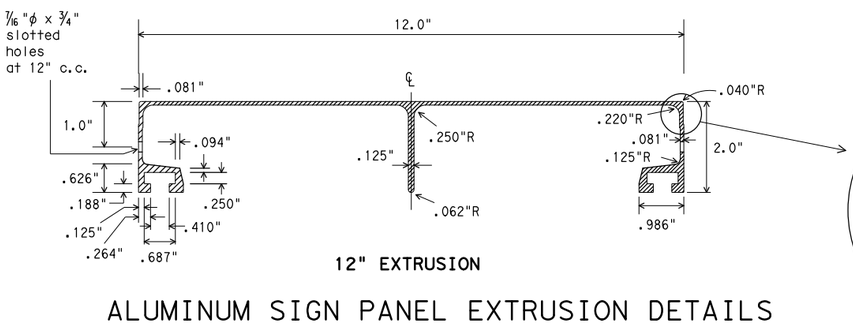
1.912 lbs/ft

ALUMINUM
T SECTION
OR
APPROVED
ALTERNATIVE

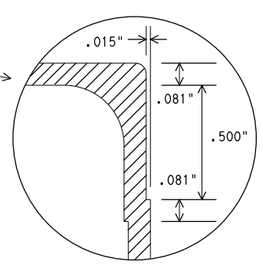
WINDBEAM
CROSS
SECTION

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

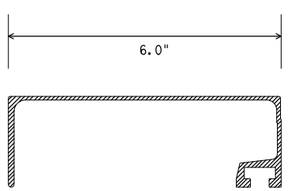




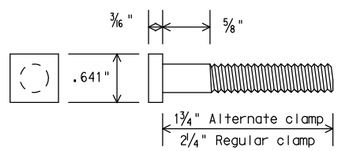
12" EXTRUSION



ALUMINUM SIGN PANEL EXTRUSION DETAILS



6" EXTRUSION



POST CLAMP
BOLT DETAIL

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		191

27A

DATE: 9/23/2021 3:21:56 PM
FILE: c:\pw-af\pw-af-prod\ross.deborde\aguirre-fields.com\d0155467\SMD(2-1)-08.dgn

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

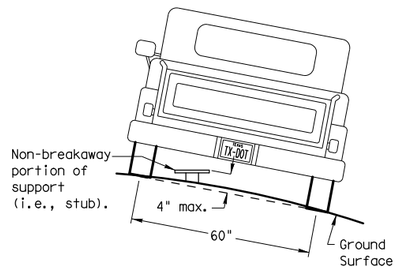
Anchor Type

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

Sign Mounting Designation

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

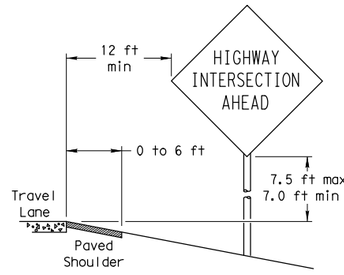
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

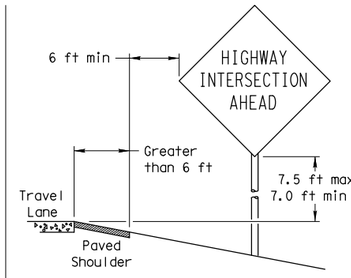
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

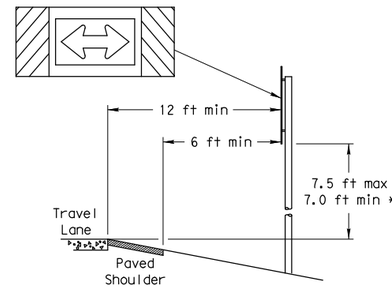
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



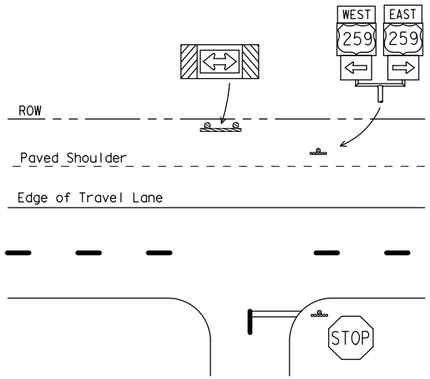
GREATER THAN 6 FT. WIDE

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.

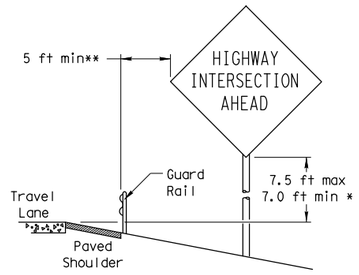
T-INTERSECTION



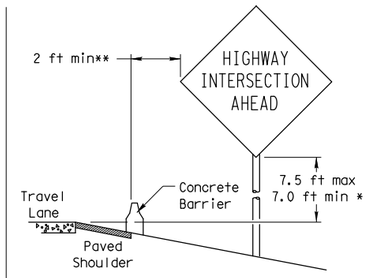
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



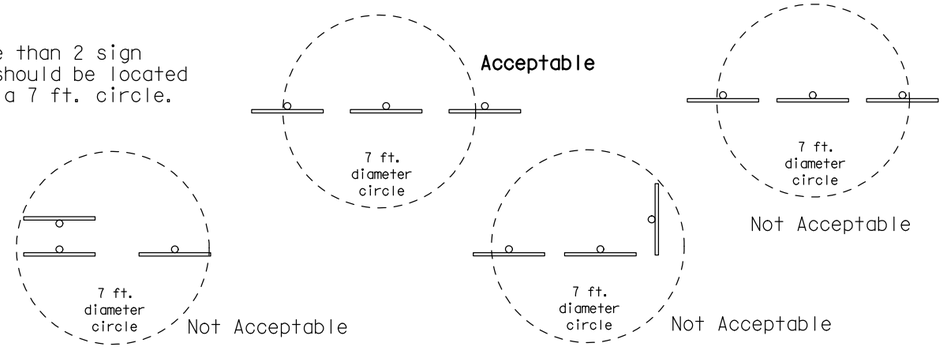
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

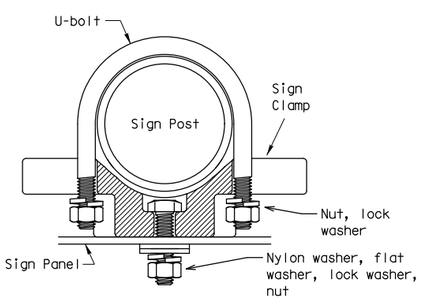
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

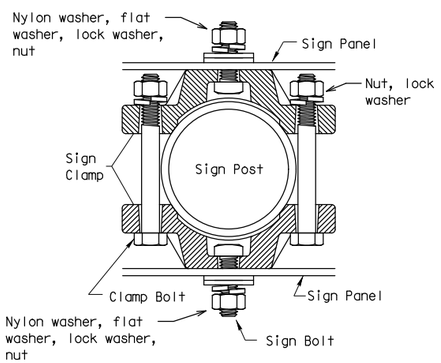


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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.

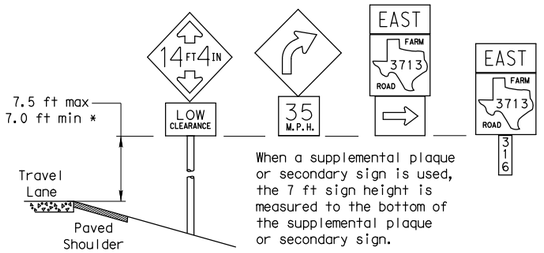
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



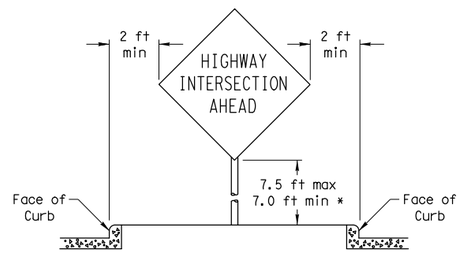
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



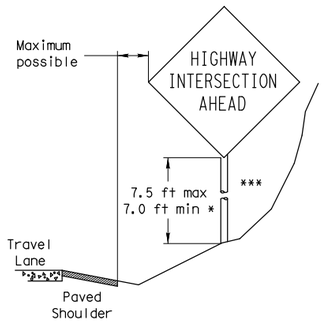
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

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

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

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

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

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

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

REVISIONS
9-08

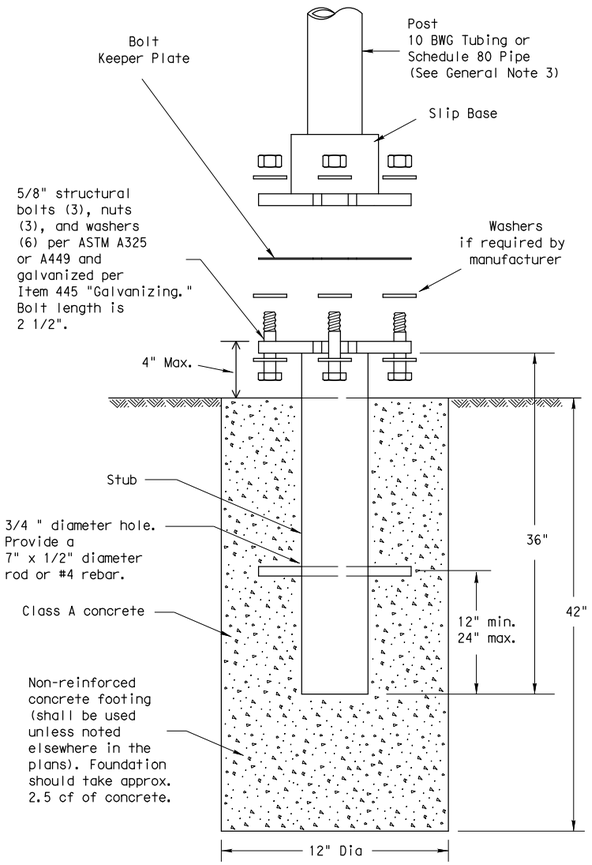
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304

DIST	COUNTY	SHEET NO.
AUS	BASTROP	192

DATE: 9/23/2021 3:22:03 PM
FILE: c:\pw-af\pw-af-prod\ross.debor@aguirre-fields.com\d0155467\SMD(GEN)-08.dgn

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.

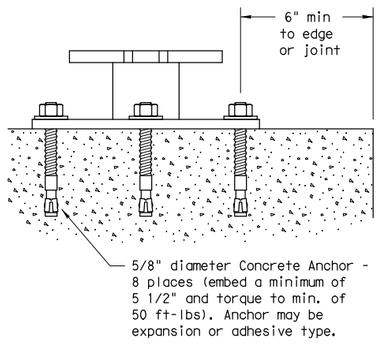
   Schedule 80 Pipe (2.875" outside diameter)
   - 0.276" nominal wall thickness
   - Steel tubing per ASTM A500 Gr C
   - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
     - 46,000 PSI minimum 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

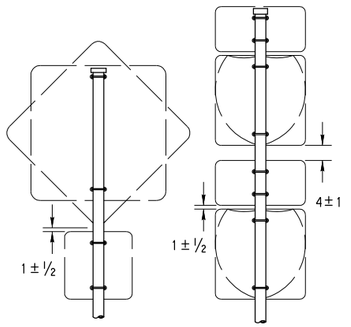
SMD(SLIP-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
REVISIONS 9-08			

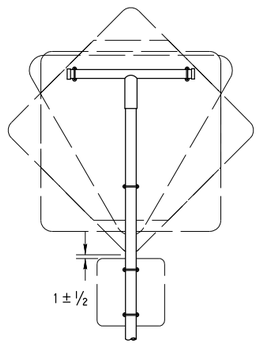
CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		193

26B

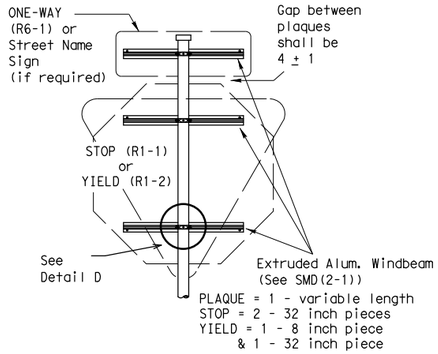
DATE: 9/23/2021 3:22:10 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155467\SMD(SLIP-1)-08.dgn



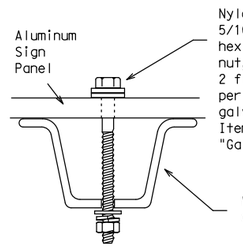
SM RD SGN ASSM TY XXXXX(1)XX(P)



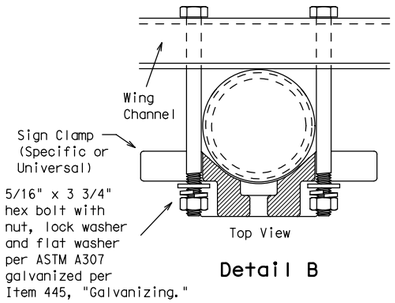
SM RD SGN ASSM TY XXXXX(1)XX(T)



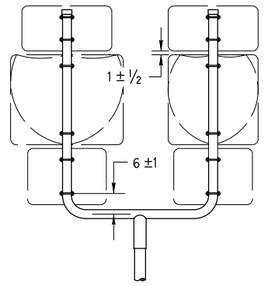
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



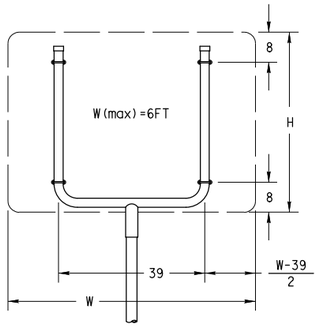
Detail A



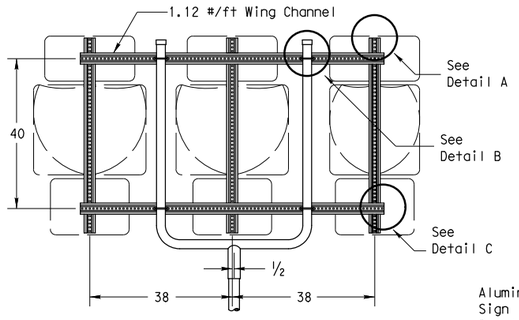
Detail B



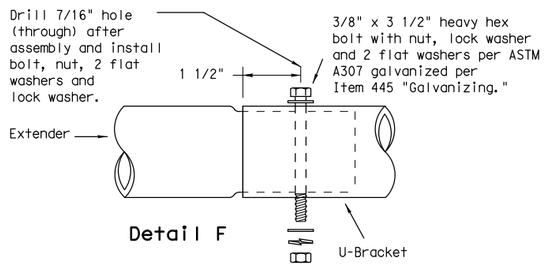
SM RD SGN ASSM TY XXXXX(1)XX(U)



SM RD SGN ASSM TY XXXXX(1)XX(U)

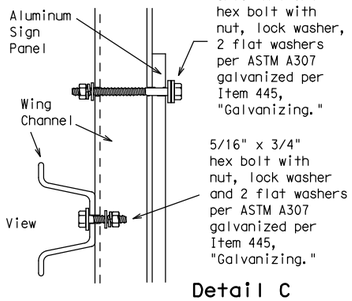


SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

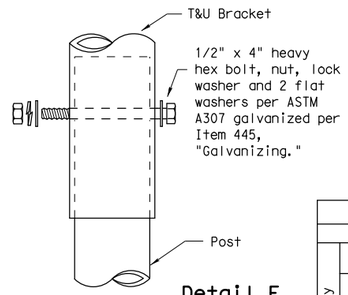


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



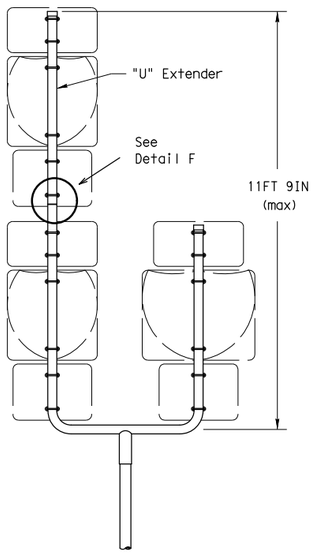
Detail E

GENERAL NOTES:

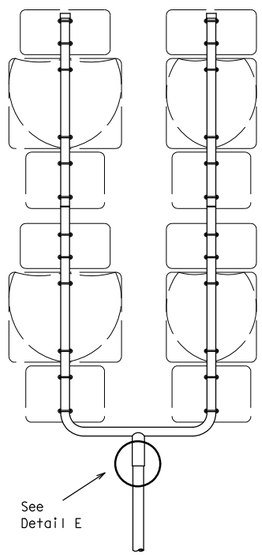
1.

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

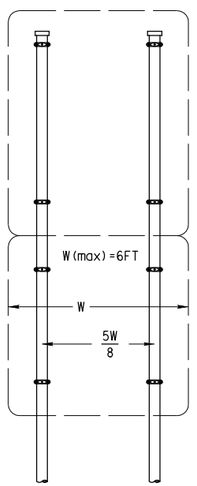
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material 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 S80(1)XX(U-1EXT)

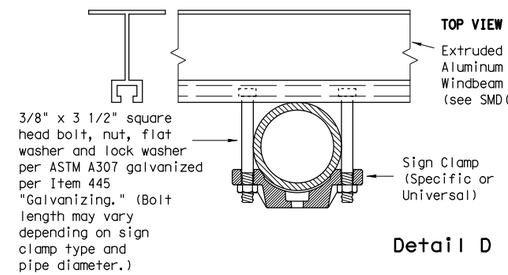


SM RD SGN ASSM TY S80(1)XX(U-2EXT)

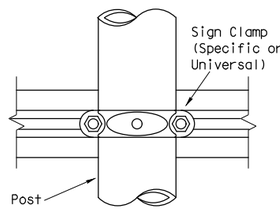


SM RD SGN ASSYM TY XXXXX(2)XX(P)

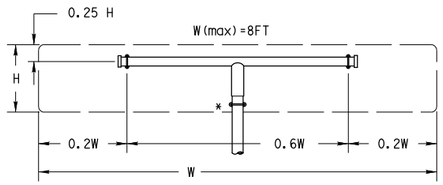
SIDE VIEW



Detail D



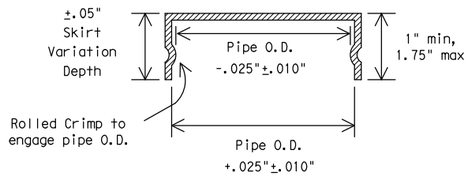
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	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

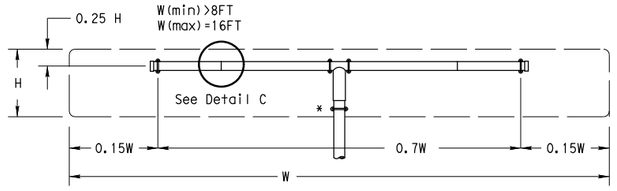
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		194

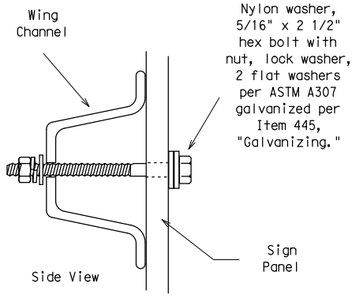
26C

DATE: 9/23/2021 3:22:18 PM
FILE: c:\pw-df\pw-df-prod\ross.debord@aguirre-fields.com\d0155467\SMD(SLIP-2)-08.dgn

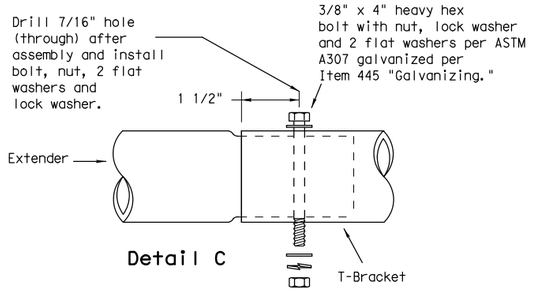
DATE: 9/23/2021 3:22:25 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155467\SMD(SLIP-3)-08.dgn



SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)
(* - See Note 12)



Detail B



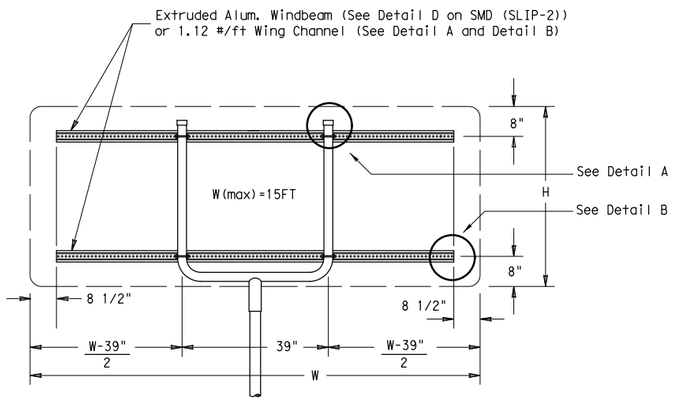
Detail C

Splices shall only be allowed behind the sign substrate.

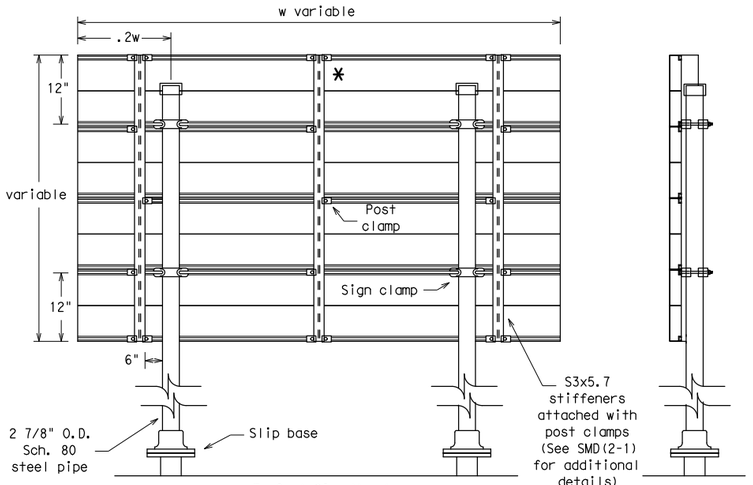
GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

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



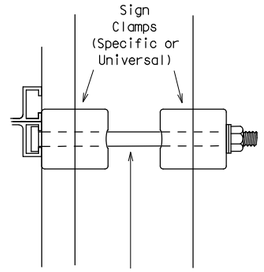
SM RD SGN ASSM TY XXXXX(1)XX(U-XX)



Typical Sign Mount

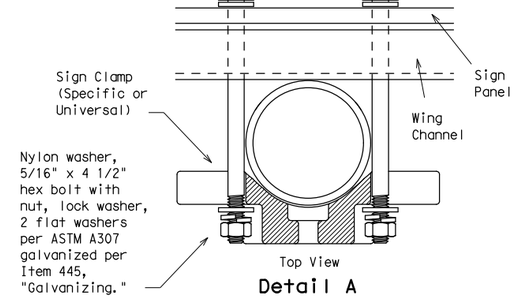
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.

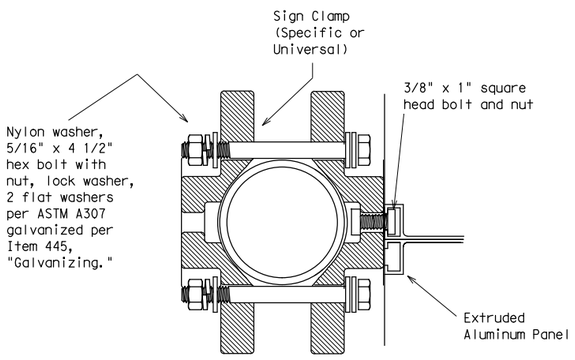


Detail E

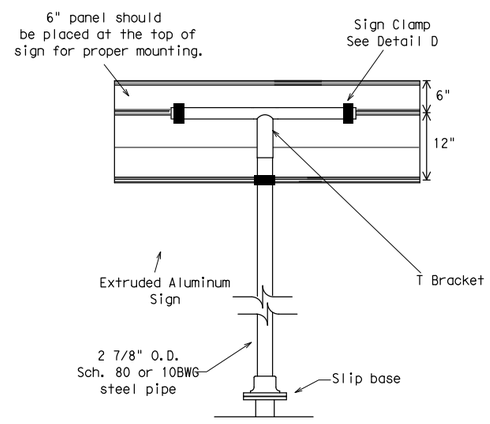
See Detail E for clamp installation



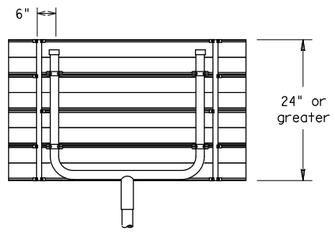
Detail A



Detail D
EXTRUDED ALUMINUM SIGN WITH T BRACKET



Extruded Aluminum Sign
With T Bracket



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

See Detail E
for clamp installation

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-3)-08

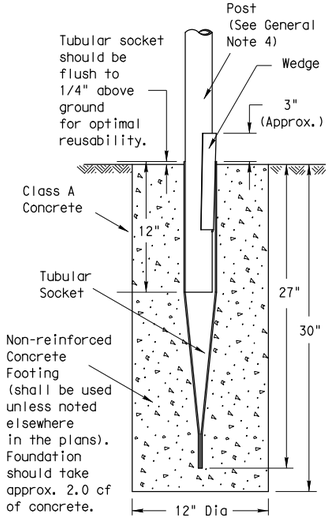
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS
9-08

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304

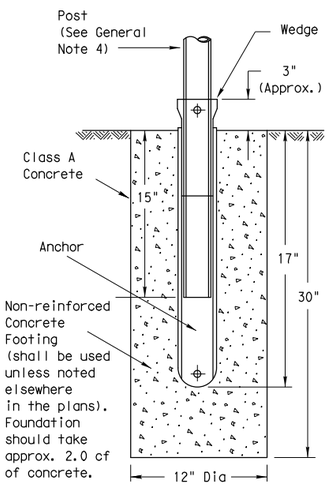
DIST	COUNTY	SHEET NO.
AUS	BASTROP	195

Wedge Anchor Steel System



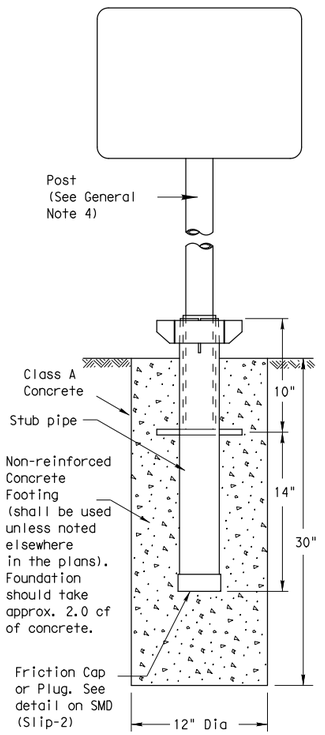
SM RD SGN ASSM TY TWT(X)WS(X)

Wedge Anchor High Density Polyethylene (HDPE) System

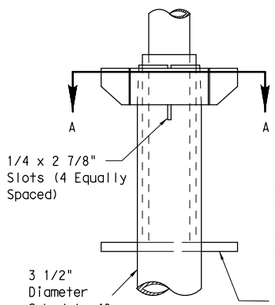


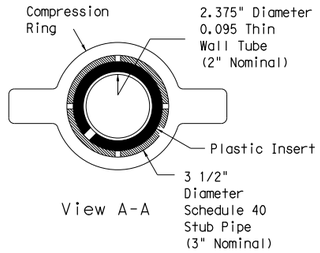
SMD RD SGN ASSM TY TWT(X)WP(X)

Universal Anchor System with Thin-Walled Tubing Post



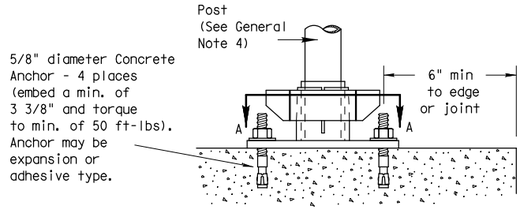
SM RD SGN ASSM TY TWT(X)UA(P)



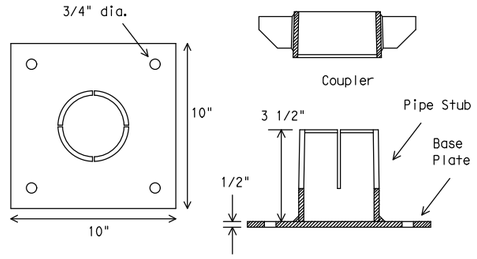


View A-A

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

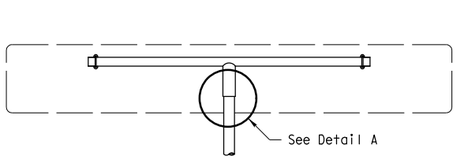


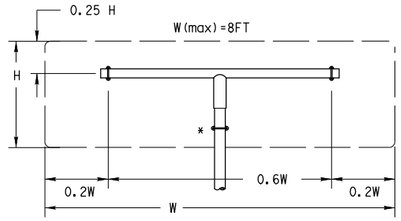
Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. A heavy hex nut per ASTM A563 and hardened washer per ASTM F436. The stud bolt shall have minimum yield and ultimate tensile strengths of 50 and 75 ksi, respectively. Nuts, bolts and washers shall be galvanized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



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

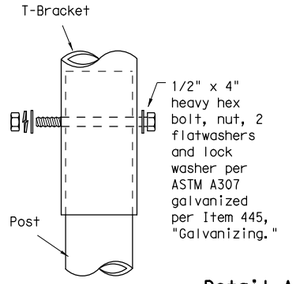
Sign Installation Using a Prefabricated T-Bracket for Thin-Wall Tubing Post





SM RD SGN ASSM TY TWT(X)XX(T)

(* - See General Note 6)



Detail A

9/16" hole may need to be drilled through post to accommodate bolt.

NOTE

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

GENERAL NOTES:

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

WEDGE ANCHOR SYSTEM INSTALLATION PROCEDURE

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

UNIVERSAL ANCHOR SYSTEM INSTALLATION PROCEDURE

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

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS WEDGE & UNIVERSAL ANCHOR WITH THIN WALL TUBING POST

SMD(TWT)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		196

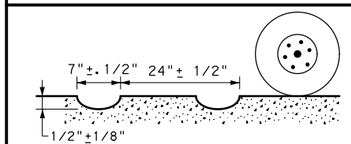
26E

DATE: 9/23/2021 3:22:32 PM
FILE: c:\pw-af\pw-af-prod\ross.deborde@aguirre-fields.com\d0155467\SMD(TWT)-08.dgn

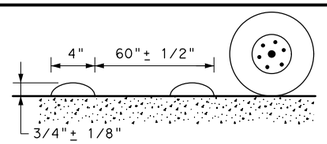
DISCLAIMER:
The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: 9/23/2021 3:22:40 PM
FILE: c:\pw-af\pw-af-prod\ross.debord@aguirre-fields.com\d0155467\RS(3)-13.dgn

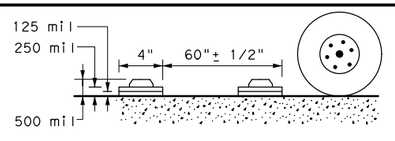
CENTERLINE RUMBLE STRIPS



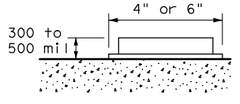
MILLED RUMBLE STRIPS



RAISED TRAFFIC BUTTONS

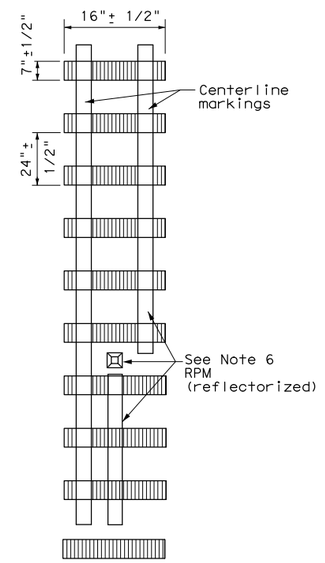


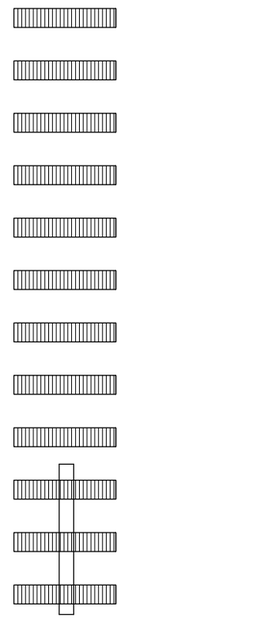
PREFORMED THERMOPLASTIC STRIPS



PROFILE MARKINGS

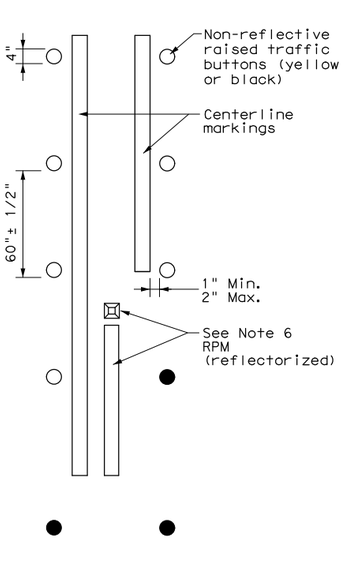
PROFILE VIEW

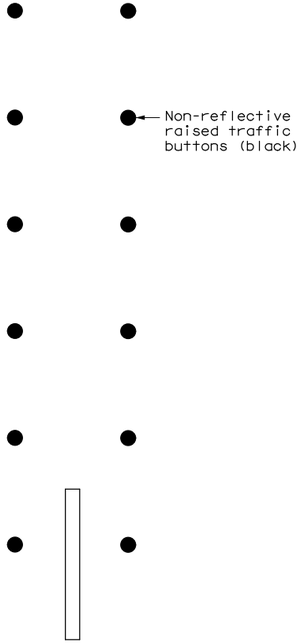




PLAN VIEW
OPTION 1

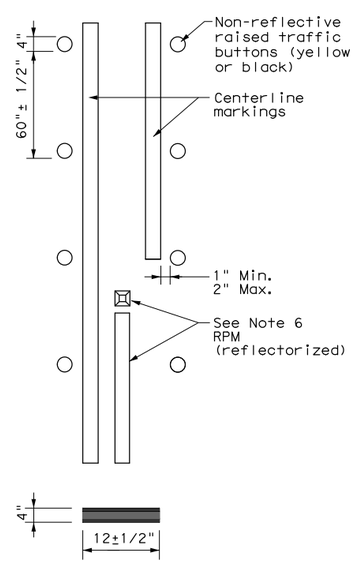
MILLED CENTERLINE RUMBLE STRIPS

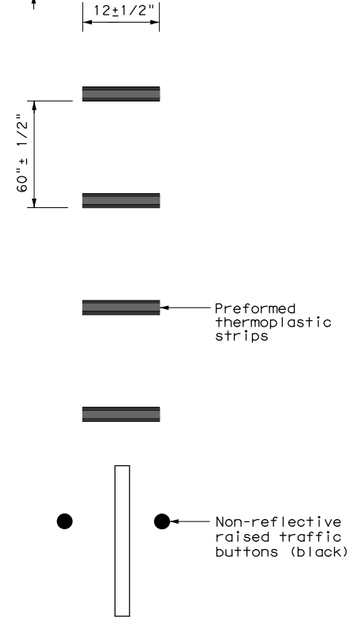




PLAN VIEW
OPTION 2

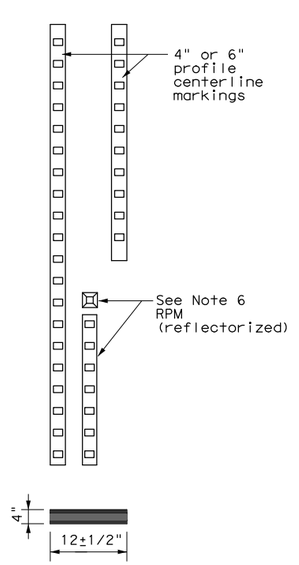
RAISED CENTERLINE RUMBLE STRIPS

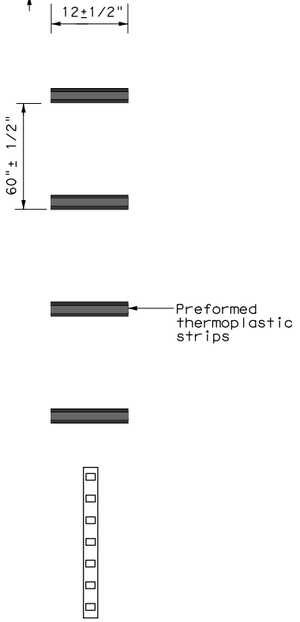




PLAN VIEW
OPTION 3

RAISED CENTERLINE RUMBLE STRIPS AND PREFORMED THERMOPLASTIC STRIPS





PLAN VIEW
OPTION 4

PROFILE CENTERLINE MARKINGS AND PREFORMED THERMOPLASTIC STRIPS

GENERAL NOTES

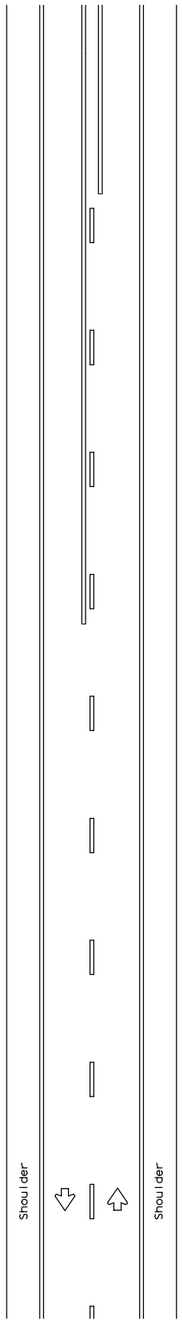
1. This standard sheet provides guidelines for installing centerline rumble strips on two-lane highways with or without shoulders.
2. Centerline and edgeline rumble strips or profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.
3. Milled rumble strips are preferred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

WHEN INSTALLING CENTERLINE RUMBLE STRIPS:

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

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

12. See standard sheet RS(4).



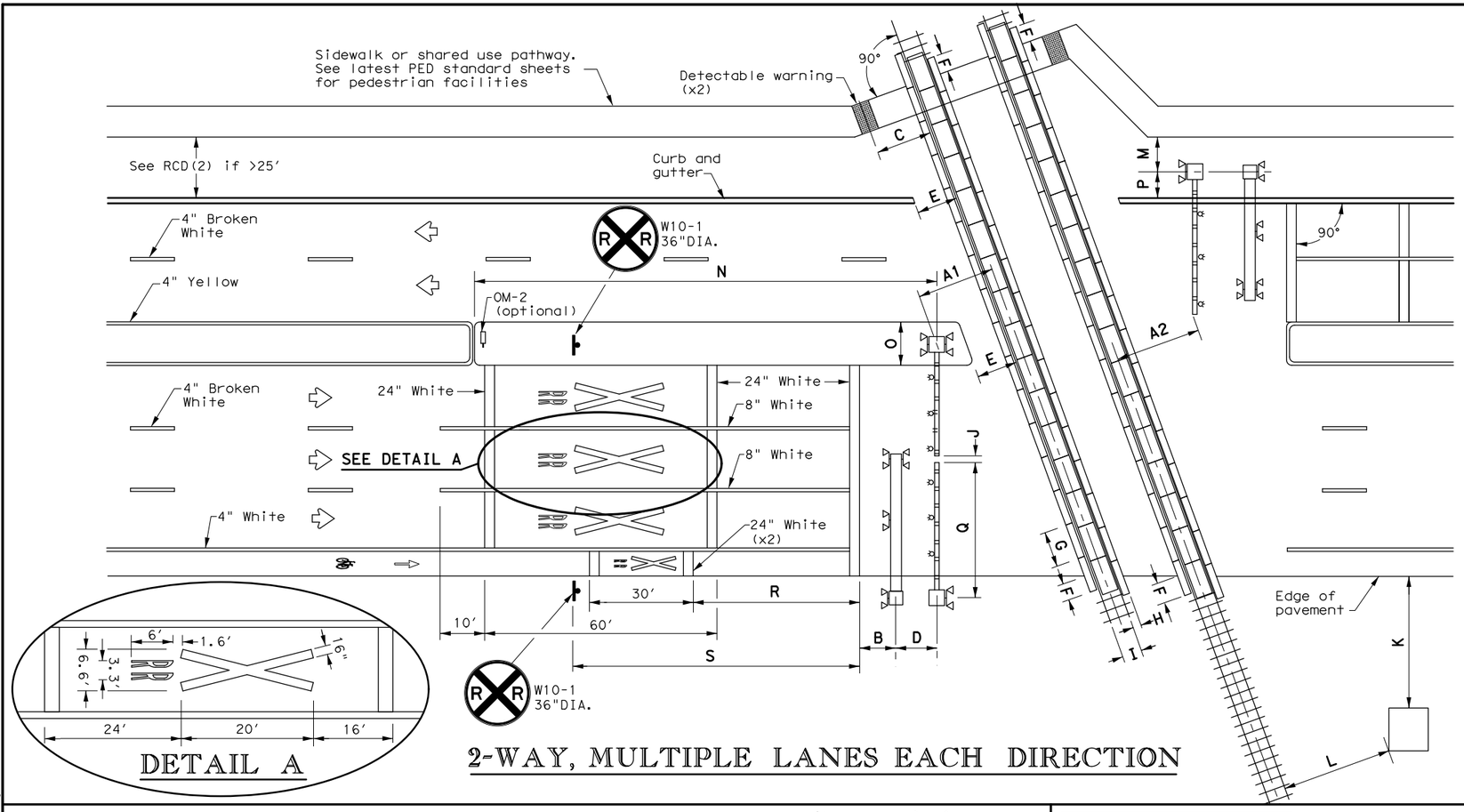
TWO LANE TWO-WAY ROADWAYS

Texas Department of Transportation®

CENTERLINE RUMBLE STRIPS ON TWO LANE TWO-WAY HIGHWAYS

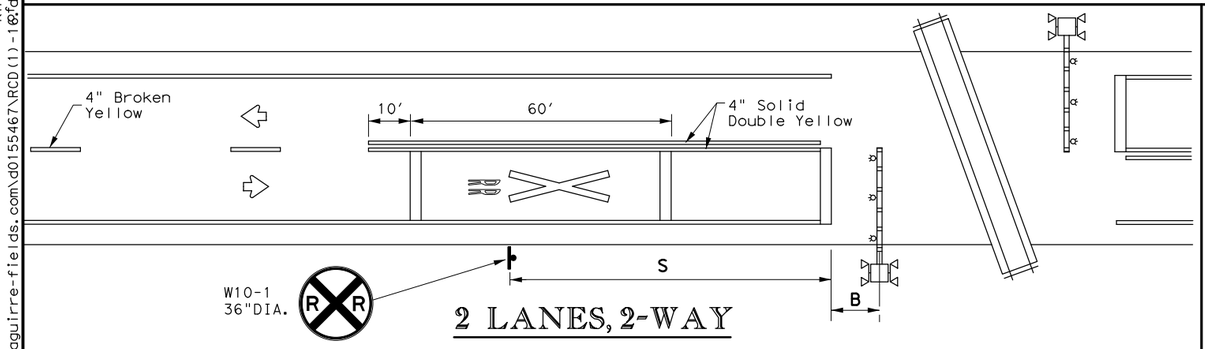
RS(3)-13

FILE: rs(3)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2013	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		197

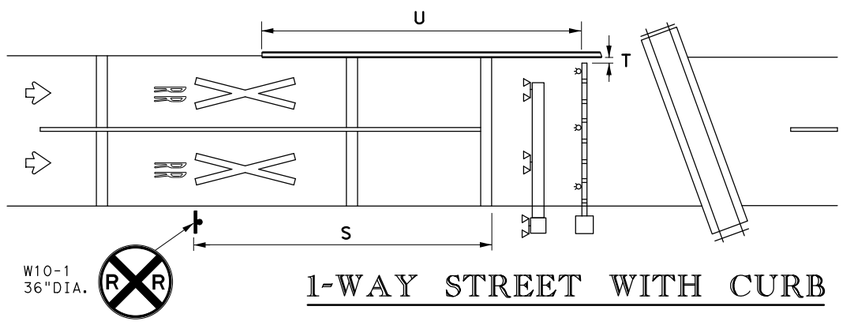


DETAIL A

2-WAY, MULTIPLE LANES EACH DIRECTION



2 LANES, 2-WAY

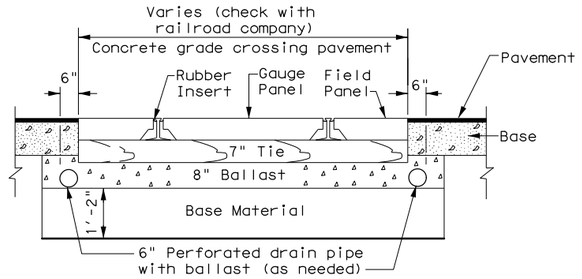


1-WAY STREET WITH CURB

NOTES

T: Tip of gate to edge of curb: 1' max for Quiet Zone SSM, 90% of traveled way covered by gates for all other locations

U: Non-traversable curb length from gate: 100' min. for a Quiet Zone SSM, 10' min for all other locations.



CROSSING SURFACE CROSS SECTION

NOTES

A1: Center of RR mast to center of rail: 12' minimum, 15' typical.

A2: Tip of gate to center of rail: 12' minimum, 15' typical.

B: Center of mast (cantilever, gate, or mast flasher) of nearest active traffic control device to stop line: 8' (NOTE: Stop line may be moved as needed, but should be at least 8' back from gates, if present).

C: Center of detectable warning device to nearest rail: 6' minimum

D: Center of gate mast to center of cantilever mast: 6' typical. NOTE: Cantilever may be located in front or behind gates.

E: Edge of median or curb to nearest rail: 10' typical. NOTE: Design median edge to be parallel with rail.

F: Edge of planking panel from edge of pavement or sidewalk: 3' minimum. NOTE: Field panels need not be in line with gauge panels.

G: Length of panels along rail: 8' typical.

H: Width of field panel: 2' typical (check with railroad company).

I: Distance between rails: 4'-8.5".

J: Tip of gate to tip of gate: 2' maximum for Quiet Zone SSM or 90% of traveled way covered by gates for all other locations.

K: Nearest edge of RR cabin from edge of pavement: 30' typical. NOTE: Cabinet not required to be parallel to edge of pavement.

L: Nearest edge of RR cabin from nearest rail: 25' typical.

M: Center of RR mast to edge of sidewalk: 6' minimum.

N: Center of gate mast to leading edge of non-traversable median: 100' minimum to qualify as a Quiet Zone SSM. NOTE: 60'will suffice if there is a street intersection within the 100' and all street intersections within 60' are closed.

O: Width of median: 8'-6" minimum, 10' typical when using median gates. NOTE: Center of gate mast minimum 4'-3" from face of curb.

P: Center of RR mast to face of curb: 4'-3" minimum.
Center of RR mast to edge of pavement (with shoulder): 6' minimum
Center of RR mast to edge of pavement (no shoulder): 8'-3" minimum
NOTE: BNSF prefers 5'-3", 7', and 9'-3" minimums, respectively.

Q: Gate length: 28' or less typical, but railroad company may allow up to 32'under special circumstances.

R: Stop line to first RR Crossing transverse line (bike lane): 50' typical.

S: Stop line to GRADE CROSSING ADVANCE WARNING (W10-1) sign and adjacent RR Crossing pavement markings. See Table 1. See RCD(2) for other signs.

TABLE 1	
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

LEGEND	
	Sign
	Object Marker
	Traffic Flow
	Cantilever
	Gate Assembly
	Mast Flasher Pair

GENERAL NOTES

1. Medians and curbs must be non-traversable to qualify as a Quiet Zone Supplementary Safety Measure (SSM). Non-traversable curbs in Quiet Zones are 6" tall minimum and used on roadways where speed does not exceed 40 mph.
2. Raised pavement markers may be used to supplement striping. See PM(2) and PM(3) standard sheets.
3. Medians preferred whenever possible to prevent vehicles from driving around gates.
4. Longitudinal edge striping may be continued thru crossing as needed. Illumination may also be considered for nighttime visibility.
5. See SMD standard sheets for sign mounting details.
6. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.

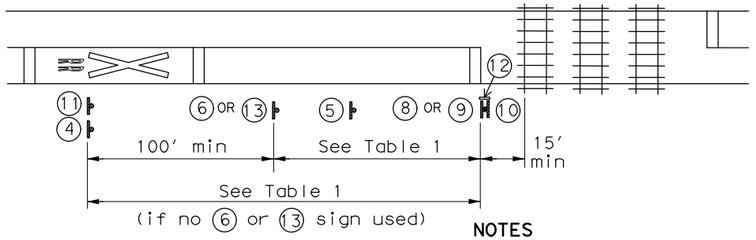
Texas Department of Transportation

Traffic Operations Division Standard

RAILROAD CROSSING DETAILS SIGNING, STRIPING, AND DEVICE PLACEMENT RCD(1)-16

FILE: rcd1-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		198

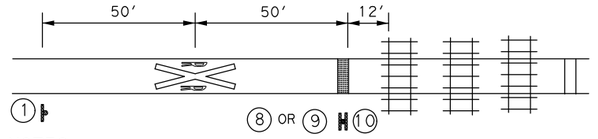
DATE: 9/23/2021 3:22:54 PM
FILE: c:\pw-af\pw-af-prodvross.debord@aguirre-fields.com\d0155467\RCD(2)-16.dgn



NOTES

1. Stop or yield sign may also be installed to the left of the crossbuck sign, rather than below it.
2. A 2" white retroreflective strip shall be installed on front and back of crossbuck sign post.

PASSIVE CROSSING



NOTES

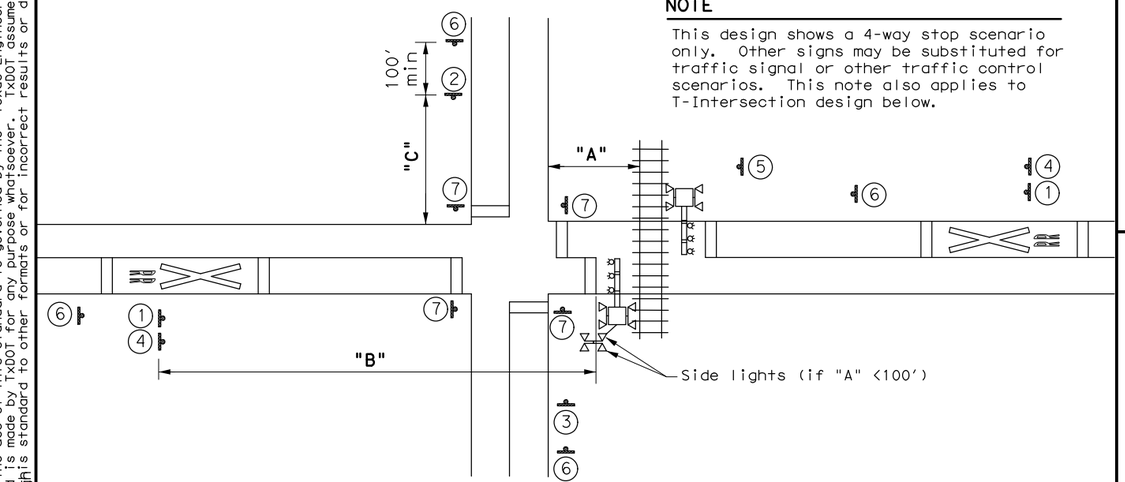
1. A shared use pathway is considered a separate pathway crossing when more than 25′ from traveled way of adjacent roadway.
2. Detectable warning used at stop bar.
3. Smaller sign sizes preferred than shown to the right on this sheet.

PATHWAY CROSSING

TABLE 1	
Approach Speed (mph)	Desirable Placement (feet)
20	100
25	100
30	100
35	100
40	125
45	175
50	250
55	325
60	400
65	475
70	550
75	650

GENERAL NOTES

1. Railroad company to provide active traffic control devices, CROSSBUCK (R15-1), NUMBER OF TRACKS Plaque (R15-2P) (if more than 1 track), and EMERGENCY NOTIFICATION (I-13) signs.
2. LOW GROUND CLEARANCE (W10-5) signs may be relocated further upstream of crossing to provide advance warning of alternate route.
3. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2) signs may be modified as needed to fit roadway geometry.
4. Table 1 placement distances may vary per Sect. 2C.05 of the TMUTCD.
5. See Table 1 to determine placement of STOP AHEAD (W3-1) and YIELD AHEAD (W3-2) signs unless shown otherwise.
6. DO NOT STOP ON TRACKS (R8-8) signs installed when potential for vehicles stopping on tracks is significant as determined by sealing engineer. Install so sign does not block view of RR mast.
7. See the Standard Highway Sign Design for Texas (SHSD) manual for sign and pavement marking details.

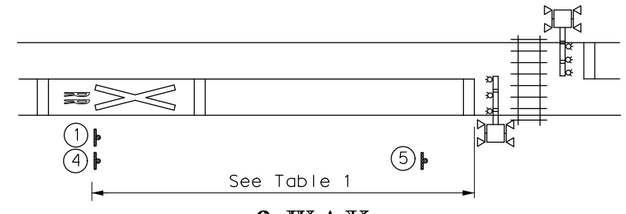


NOTE

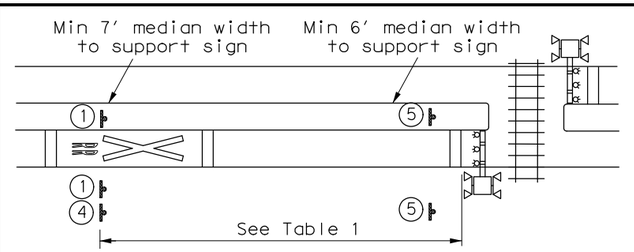
This design shows a 4-way stop scenario only. Other signs may be substituted for traffic signal or other traffic control scenarios. This note also applies to T-Intersection design below.

	"A" <100′	"A" ≥100′
"B"	See Table 1. Place pavement markings and signs on opposite side of intersection from rail if spacing from Table 1 would put markings within intersection.	See Table 1. Place pavement markings and signs between rail and intersection if spacing from Table 1 would put markings within intersection.
"C"	See Table 1.	GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-2, W10-3, W10-4) signs should only be installed if W10-1 sign is not between intersection and railroad crossing. If needed, see Table 1.

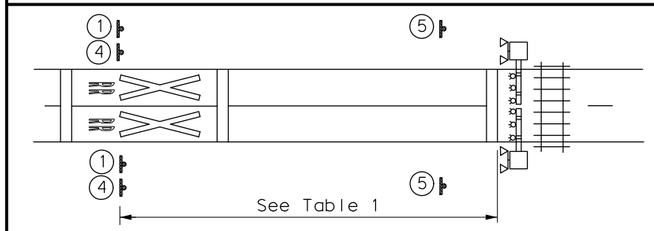
GRADE CROSSING NEAR A PARALLEL STREET



2-WAY



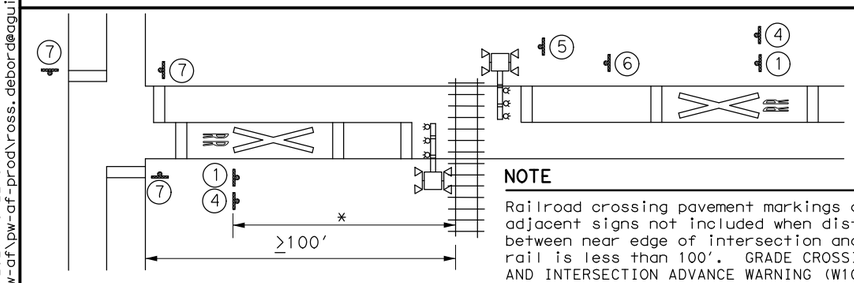
2-WAY WITH MEDIAN



1-WAY

SIGNS

** R R — 1 W10-1 36"DIA.	** — 2 W10-2L 36"X36"	** — 3 W10-2R 36"X36"	IF NEEDED — 4 W10-5 36"X36" / LOW GROUND CLEARANCE W10-5P 30"x24"
IF NEEDED — DO NOT STOP ON TRACKS — 5 R8-8 24"X30"	IF NEEDED — 6 W3-1 30"X30"	STOP R1-1 36"X36" / ALL WAY R1-3P 18"X6" — 7	RAIL CROSSING ROAD 3 TRACKS R15-1 48"X9" / R15-2P 27"X18" — STOP R1-1 36"X36" — 8
RAIL CROSSING ROAD 3 TRACKS R15-1 48"X9" / R15-2P 27"X18" — YIELD — 9 R1-2 48"X48"X48"	RAIL CROSSING ROAD 3 TRACKS R15-1 48"X9" / R15-2P 27"X18" — 10	R R W10-1 36"DIA. / NO GATES OR LIGHTS W10-13P 30"X24" — 11 **	REPORT EMERGENCY OR PROBLEM 1-800-555-5555 CROSSING 836 597 H — Sign may be placed perpend. to travel lanes. — 12 I-13 15"X9"
IF NEEDED — 13 W3-2 30"X30"	** Includes a NO TRAIN HORN Plaque (W10-9P) if crossing is in a Quiet Zone. LOW GROUND CLEARANCE Plaque (W10-5P) if needed is mounted below W10-2/W10-3/W10-4 signs.		
NO TRAIN HORN W10-9P 30"X24"	LOW GROUND CLEARANCE W10-5P 30"X24"		

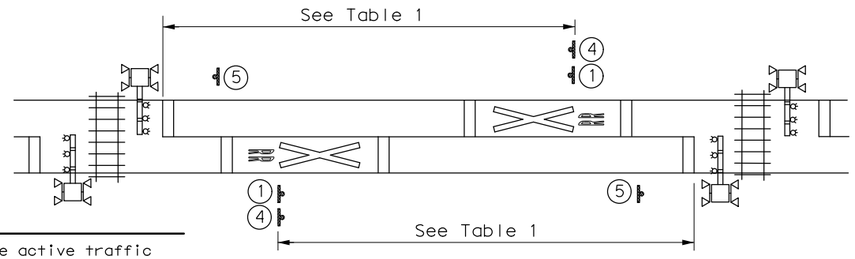


*Use Table 1 if sufficient space exists.

NOTE

Railroad crossing pavement markings and adjacent signs not included when distance between near edge of intersection and near rail is less than 100′. GRADE CROSSING AND INTERSECTION ADVANCE WARNING (W10-3) signs installed on roadway parallel with rail in this case.

T-INTERSECTION



NOTE

Separate active traffic control devices, railroad crossing pavement markings, and adjacent signs required when tracks are more than 100′ apart.

2 ADJACENT CROSSINGS

Texas Department of Transportation

Traffic Operations Division Standard

RAILROAD CROSSING DETAILS SIGNING & STRIPING

RCD(2)-16

FILE: rcd2-16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT FEBRUARY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		199

A. GENERAL SITE DATA

1. PROJECT LIMITS: FROM FM 535 TO 6.13 MILES SOUTH OF FM 535
   PROJECT LENGTH = 32,368.40 FT. = 6.13 MILES

   PROJECT COORDINATES:
   BEGIN PROJECT : 29.932080° N, -97.309690° W
   END PROJECT : 29.863410° N, -97.37152° W

2. PROJECT SITE MAPS:

* PROJECT LOCATION MAP: TITLE SHEET
* DRAINAGE PATTERNS: EROSION CONTROL LAYOUT
* SLOPES ANTICIPATED AFTER MAJOR GRADINGS OR AREAS OF SOIL DISTURBANCE: EXISTING AND PROPOSED TYPICAL SECTIONS
* LOCATION OF EROSION AND SEDIMENT CONTROLS: EROSION CONTROL LAYOUT
* SURFACE WATERS AND DISCHARGE LOCATIONS: N/A
* PROJECT SPECIFIC LOCATIONS: TO BE SPECIFIED BY THE PROJECT FIELD OFFICE DURING CONSTRUCTION AND LOCATED IN THE PROJECT SW3P FILE. REFERENCE ITEM #10 BELOW

3. PROJECT DESCRIPTION: CONSTRUCTION CONSISTING OF PAVEMENT OVERLAY AND WIDENING, AND CROSS CULVERT EXTENSIONS.

4. MAJOR SOIL DISTURBING ACTIVITIES:
   GRADING, EXCAVATION AND EMBANKMENT OF ROADWAY.
   TOPSOIL WORK FOR FINAL PLANTING AND SEEDING.

5. EXISTING CONDITION OF SOIL & VEGETATIVE
   COVER AND % OF EXISTING VEGETATIVE COVER: GRASS SLOPES 100%

6. TOTAL PROJECT AREA: 88.83 ACRES

7. TOTAL AREA TO BE DISTURBED: 44.24 ACRES

8. WEIGHTED RUNOFF COEFFICIENT
   BEFORE CONSTRUCTION: 0.5
   AFTER CONSTRUCTION: 0.5

9. NAME OF RECEIVING WATERS: (SEGMENT NUMBER OF RECEIVING WATERS)

   PINEY CREEK TRIBUTARY

10. PROJECT SW3P FILE: FOR PROJECTS DISTURBING ONE ACRE OR MORE, TXDOT WILL MAINTAIN AN SW3P FILE WITH ALL PERTINENT ENVIRONMENTAL DOCUMENTS, CORRESPONDENCE, ETC. AT THE PROJECT FIELD OFFICE. IF NO FIELD OFFICE IS AVAILABLE THEN THE SW3P FILE SHALL BE KEPT IN THE INSPECTOR'S TRUCK.

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES:

- [X] TEMPORARY SEEDING
- [X] PERMANENT PLANTING, SODDING, OR SEEDING
- [ ] MULCHING
- [X] SOIL RETENTION BLANKET
- [ ] BUFFER ZONES
- [ ] PRESERVATION OF NATURAL RESOURCES

OTHER:

2. STRUCURAL PRACTICES:

- [X] SILT FENCES
- [X] 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
- [ ] 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:

3. STORM WATER MANAGEMENT:

STORM WATER DRAINAGE WILL BE PROVIDED BY EXISTING DITCHES AND PROPOSED DITCHES. THIS SYSTEM WILL CARRY THE DRAINAGE WITHIN THE RIGHT-OF-WAY TO CREEK

4. STORM WATER MANAGEMENT ACTIVITIES: (SEQUENCE OF CONSTRUCTION)

1. INSTALL TEMPORARY EROSION CONTROL DEVICES. SEDIMENT CONTROL FENCE AS SHOWN IN EROSION CONTROL PLANS.
2. SET UP TRAFFIC CONTROL & ADVANCED WARNING SIGNS.
3. EXCAVATE AND PREPARE SUBGRADE FOR PLACEMENT OF NEW PAVEMENT SECTION.
4. CONSTRUCT NEW PAVEMENT AS PER THE PROJECT LAYOUT AND TYPICAL SECTIONS.
5. COMPLETE TOPSOIL / SEED ON SLOPES.
6. ESTABLISH GRASS GROWTH ON PERMANENT SLOPES UTILIZING TOPSOIL / SEED.
7. WHEN ALL CONSTRUCTION ACTIVITY IS COMPLETE AND THE SITE IS ESTABLISHED AND APPROVED BY THE PROJECT ENGINEER, THEN REMOVE ALL TEMPORARY STRUCTURAL CONTROLS AND RESEED ANY AREAS DISTURBED BY THEIR REMOVAL.

5. NON-STORM WATER DISCHARGES:

FILTER NON-STORM WATER DISCHARGES, OR HOLD RETENTION BASINS, BEFORE BEING ALLOWED TO MIX WITH STORM WATER. THESE DISCHARGES CONSIST OF NON-POLLUTED GROUND WATER, SPRING WATER, FOUNDATION AND/OR FOOTING DRAIN WATER; AND WATER USED FOR DUST CONTROL, PAVEMENT WASHING AND VEHICLE WASHWATER CONTAINING NO DETERGENTS.

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

MAINTENANCE WILL BE PERFORMED AS INDICATED ON FIELD INSPECTION AND MAINTENANCE REPORT FORM 2118.

2. INSPECTION:

INSPECTION WILL BE PERFORMED AS INDICATED ON FIELD INSPECTION AND MAINTENANCE REPORT FORM 2118.

3. WASTE MATERIALS:

ALL WASTE MATERIALS WILL BE COLLECTED, STORED AND DISPOSED OF IN A LEGAL AND PROPER MANNER. NO CONSTRUCTION WASTE MATERIAL WILL BE BURIED ON SITE.

4. HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

AT A MINIMUM, ANY PRODUCTS IN THE FOLLOWING CATEGORIES ARE CONSIDERED TO BE HAZARDOUS. PAINTS, ACIDS FOR CLEANING MASONRY SURFACES, CLEANING SOLVENTS, ASPHALT PRODUCTS, CHEMICAL ADDITIVES FOR SOIL STABILIZATION, OR CONCRETECURING COMPOUNDS AND ADDITIVES. IN THE EVENT A SPILL WHICH MAY BE HAZARDOUS, THE SPILL COORDINATOR MUST BE CONTACTED IMMEDIATELY.

5. SANITARY WASTE:

ALL SANITARY WASTE WILL BE COLLECTED FROM THE PORTABLE UNITS AS NECESSARY OR AS REQUIRED BY LOCAL REGULATION BY A LICENSED SANITARY WASTE MANAGEMENT CONTRACTOR.

OFFSITE VEHICLE TRACKING:

- [ ] HAUL ROADS DAMPENED FOR DUST CONTROL
- [X] LOADED HAUL TRUCKS TO BE COVERED WITH TARPAULIN
- [X] EXCESS DIRT ON ROAD REMOVED DAILY
- [ ] STABILIZED CONSTRUCTION ENTRANCE

OTHER:

REMARKS: DISPOSAL AREAS, STOCKPILES AND HAUL ROADS SHALL BE CONSTRUCTED IN A MANNER THAT WILL MINIMIZE AND CONTROL SEDIMENT FROM ENTERING RECEIVING WATERS. DISPOSAL AREAS SHALL NOT BE LOCATED IN ANY WATERBODY OR STREAMBED.

CONSTRUCTION STAGING AREAS AND VEHICLE MAINTENANCE AREAS SHALL BE CONSTRUCTED TO MINIMIZE THE RUNOFF OF POLLUTANTS.

11/16/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

SH 304 STORM WATER POLLUTION PREVENTION PLAN (SW3P)

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		200

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1. N/A

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
2. Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☐ No Permit Required

☐ Nationwide Permit 14 - PCN not required; temporary vegetation, blankets/matting, silt fence, rock berm, vegetative filter strips.

☒ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

See the table of waters of the US located under Item 7 of the general notes.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☒ Temporary Vegetation	☒ Silt Fence	☐ Vegetative Filter Strips
☒ Blankets/Matting	☒ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

DATE:
FILE:

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.

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. The contractor is responsible for following proper procedures to prevent the spread of oak wilt. See Prep ROW Pruning Detail and General Notes.
2. During construction, the Contractor should avoid impacts to woody vegetation. Tree and brush trimming, cutting, and removal will be kept to a minimum and implemented only when necessary to complete project work.
3. Minimize the amount of vegetation cleared. Removal of native vegetation, particularly mature native trees and shrubs should be avoided to the greatest extent practicable. This includes areas within the existing ROW, but outside construction limits.
4. If revegetation is needed, disturbed areas would be revegetated according to TXDOT's standard practices, which to the extent practicable, complies with Executive Memorandum on Environmentally and Economically Beneficial Landscaping.
5. Any revegetation of disturbed area would be in compliance with the Executive Order on Invasive Species (EO 13112). Regionally native and non-invasive plants will be used to the extent practicable in landscaping and revegetation.

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. The contractor's attention is directed to the fact that there is the possibility that migratory birds may be nesting in any woody vegetation or existing structures within the project limits. The contractor shall remove all woody vegetation, and old migratory bird nests from any structures, between September 16 and February 28 while any nests are not occupied by a bird. In addition, the contractor must be prepared to prevent migratory birds from re-nesting on any structures between March 1 and September 15. All methods must be approved by a qualified professional well in advance of planned use.
2. See the special provisions for reptiles, including the timber rattlesnake and Texas garter snake, in Item 7 of the general notes.
3. See the special provisions for amphibians in Item 7 of the general notes.
4. See the special provisions for bats, including the cave myotis, in Item 7 of the general notes.
5. See the special provisions for working in and around waterbodies and wetlands in Item 7 of the general notes.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☐ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☐ No Action Required ☒ Required Action

Action No.

1. Implement EO 13312, as applicable.
2. A portion of the project is located in a Federal Emergency Management Agency mapped floodplain. Notify the local floodplain administrator as necessary and to comply with all applicable rules and regulations regarding the hydraulic design of the project.

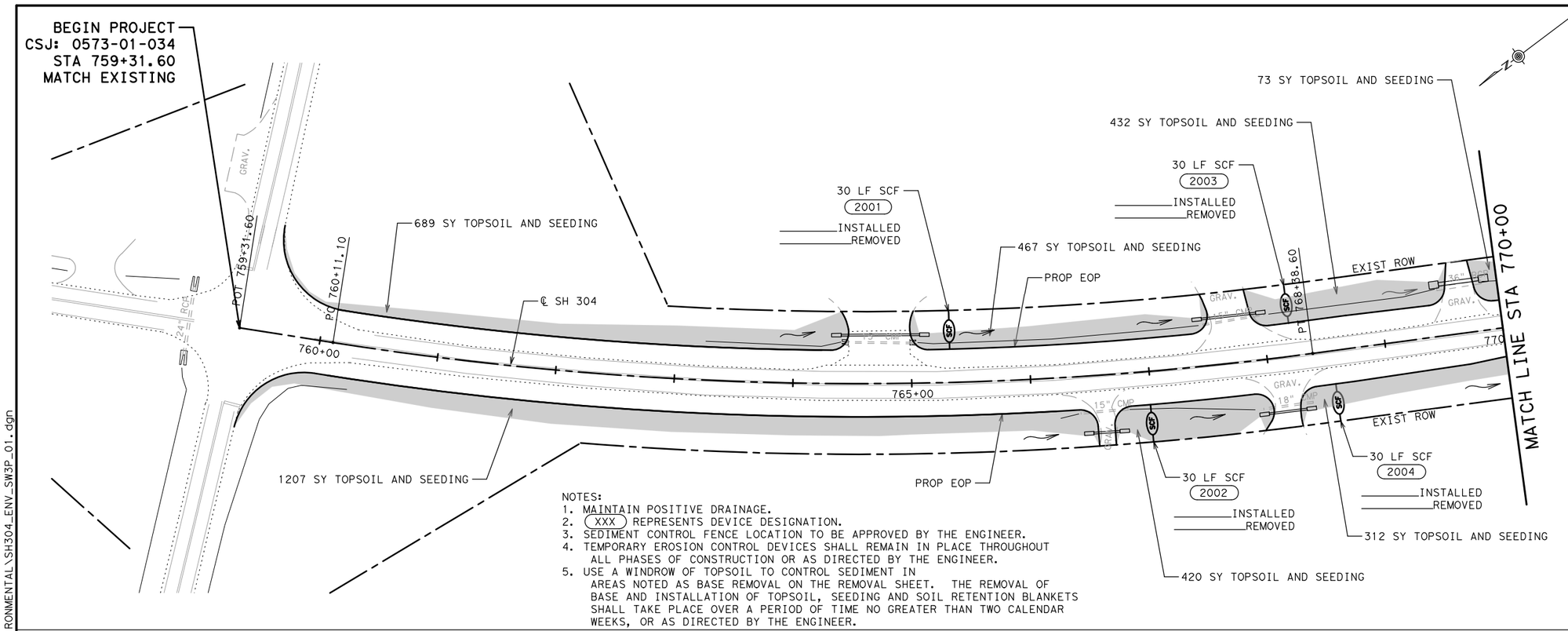
Texas Department of Transportation

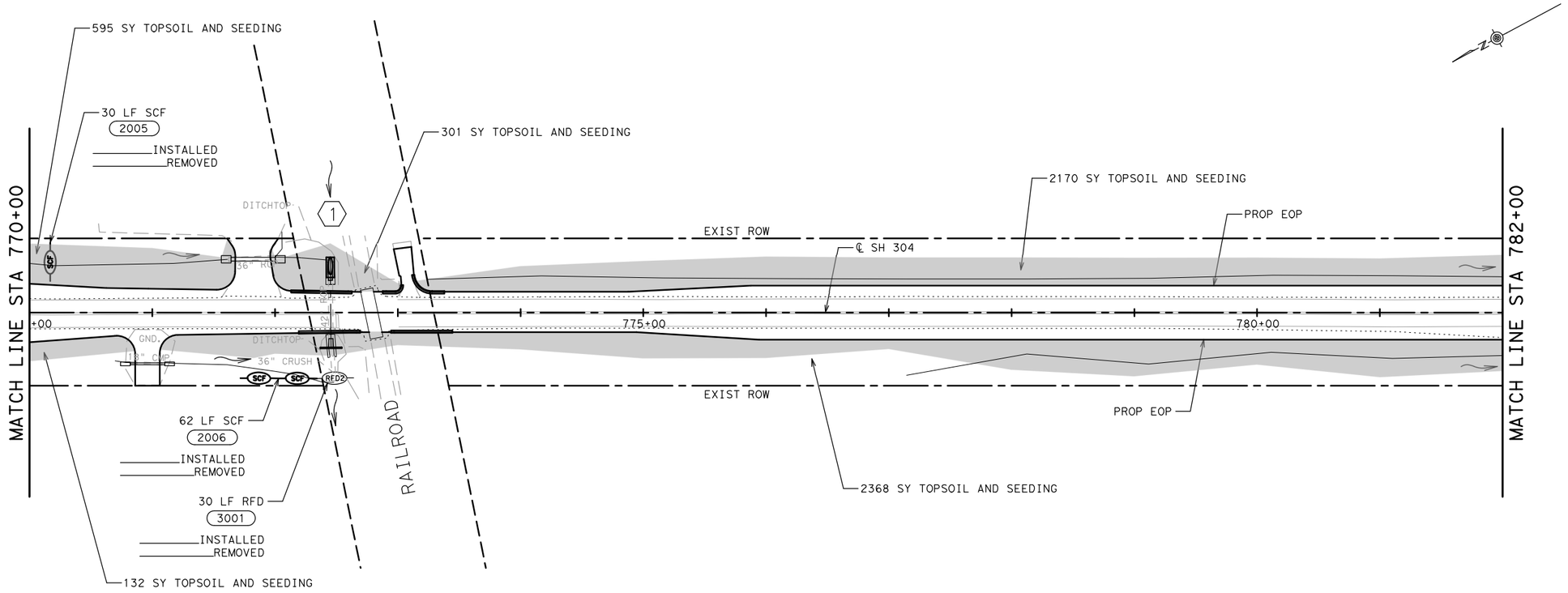
Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP	CK: AR	
©TxDOT: February 2015	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0573	01	034	SH 304	
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.	
05-07-14 ADDED NOTE SECTION IV.	AUS	BASTROP		201	
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.					





SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

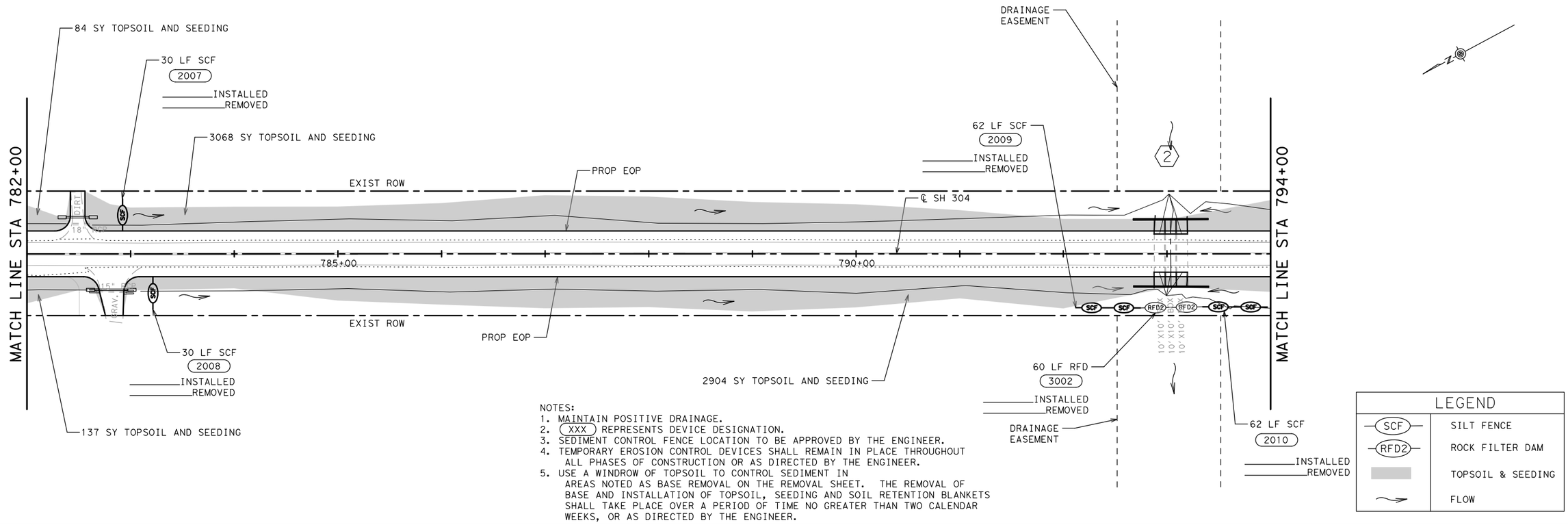
Texas Department of Transportation

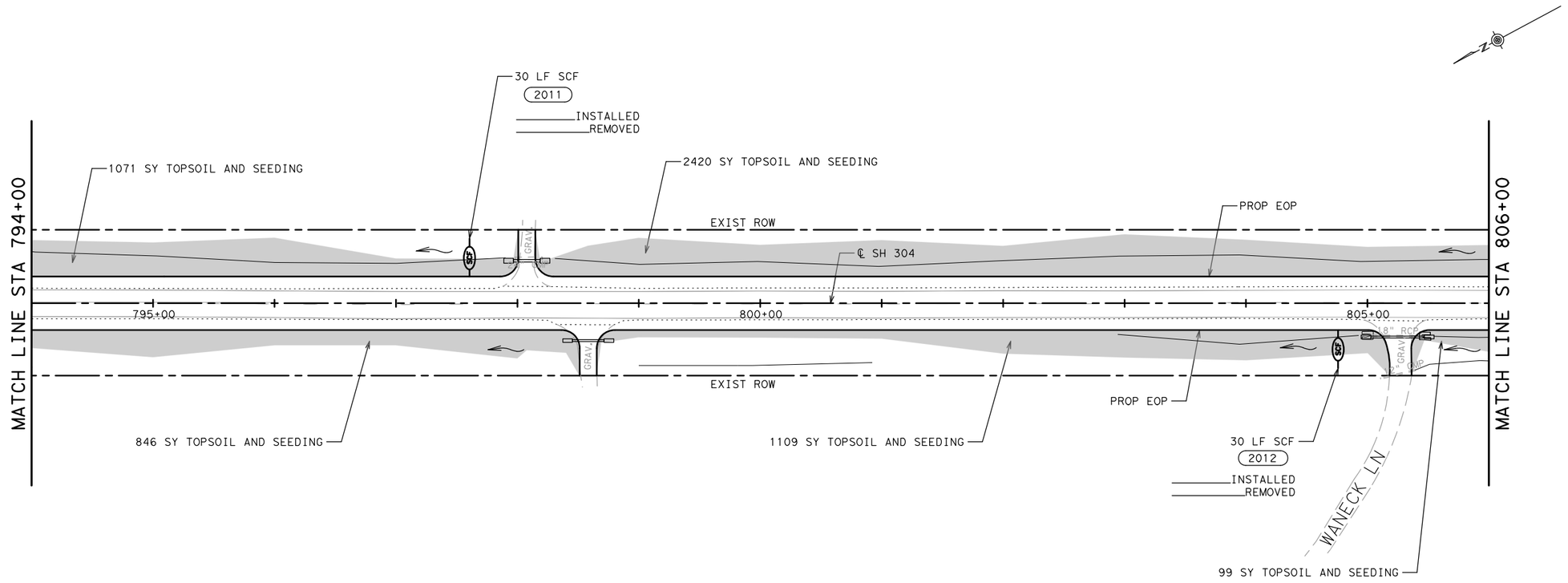
SH 304
EROSION CONTROL LAYOUT

SHEET 1 OF 14

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		202

DATE: 10/14/2021 1:14:23 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0349. ENVIRONMENTAL\SH304_ENV_SW3P_01.dgn





SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

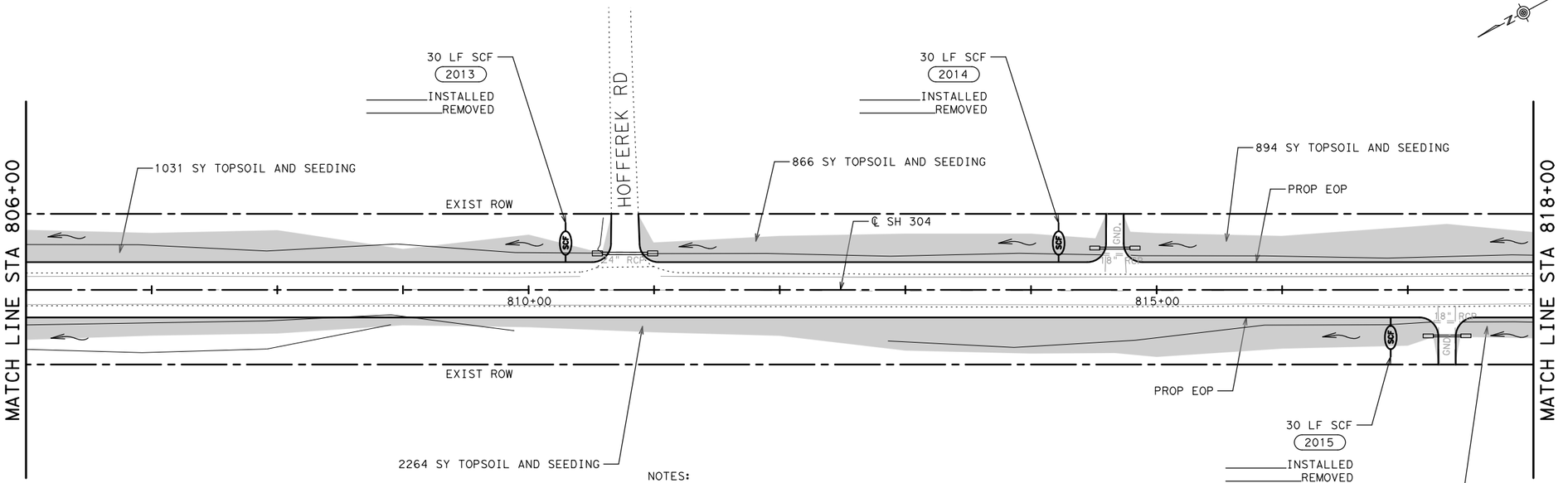
SH 304
EROSION CONTROL LAYOUT

SHEET 2 OF 14

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		203

DS: CK:
DW: CK:

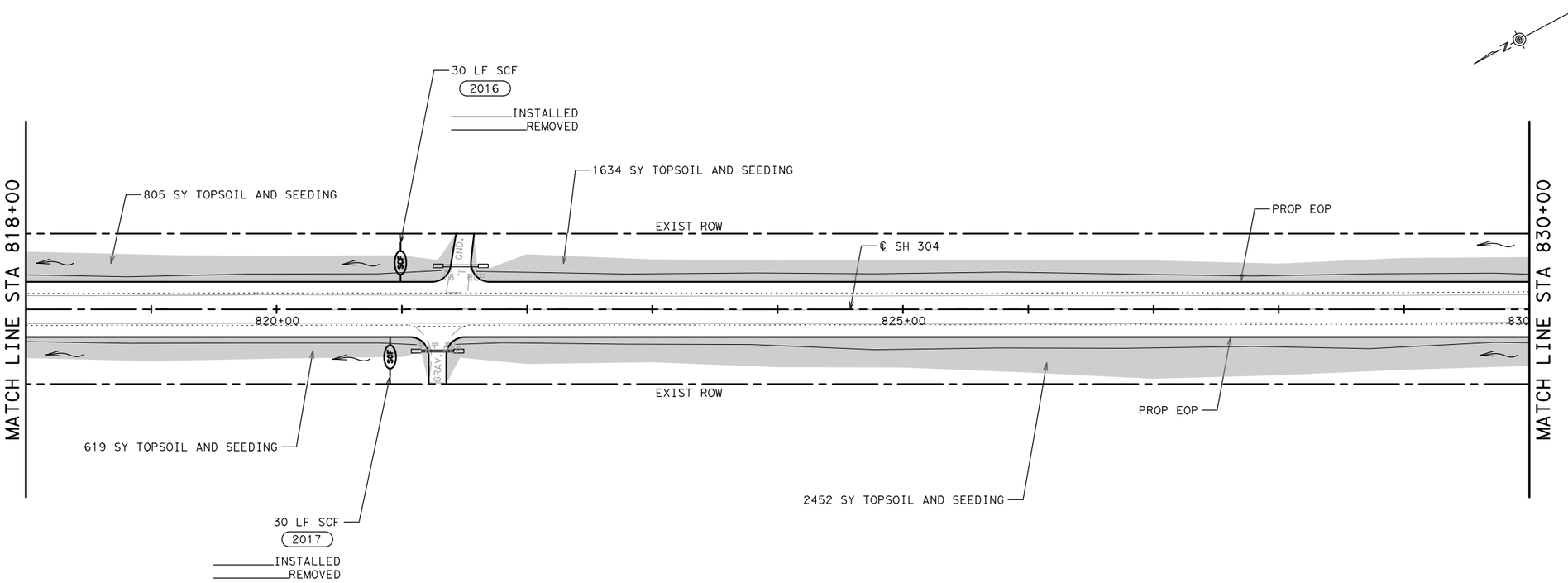
DATE: 10/14/2021 1:14:32 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0349. ENVIRONMENTAL\SH304_ENV_SW3P_02.dgn



NOTES:
1. MAINTAIN POSITIVE DRAINAGE.
2. (XXX) REPRESENTS DEVICE DESIGNATION.
3. SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
4. TEMPORARY EROSION CONTROL DEVICES SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
5. USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

LEGEND

SCF	SILT FENCE
RFD2	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

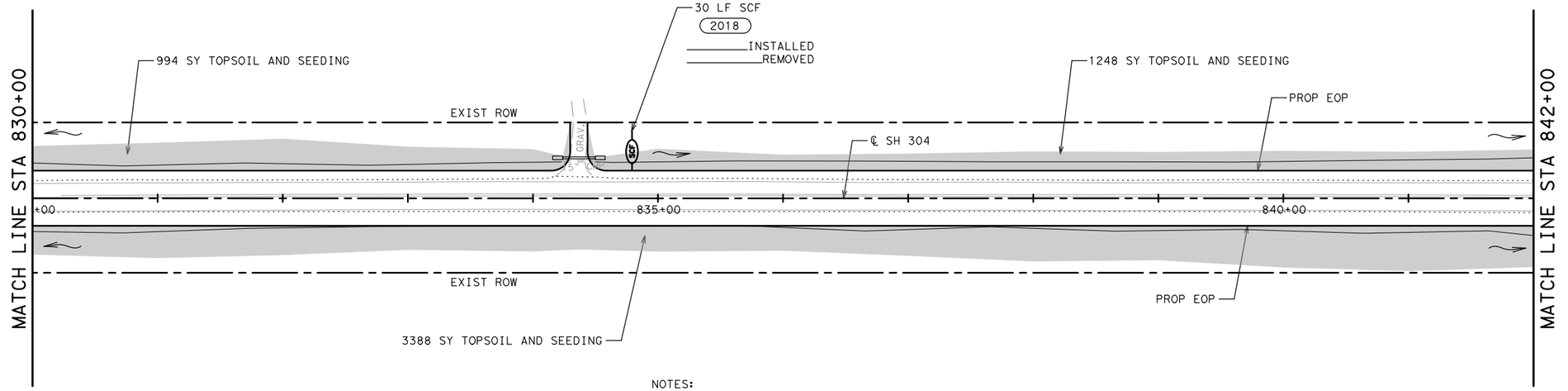
Texas Department of Transportation

SH 304
EROSION CONTROL LAYOUT

SHEET 3 OF 14

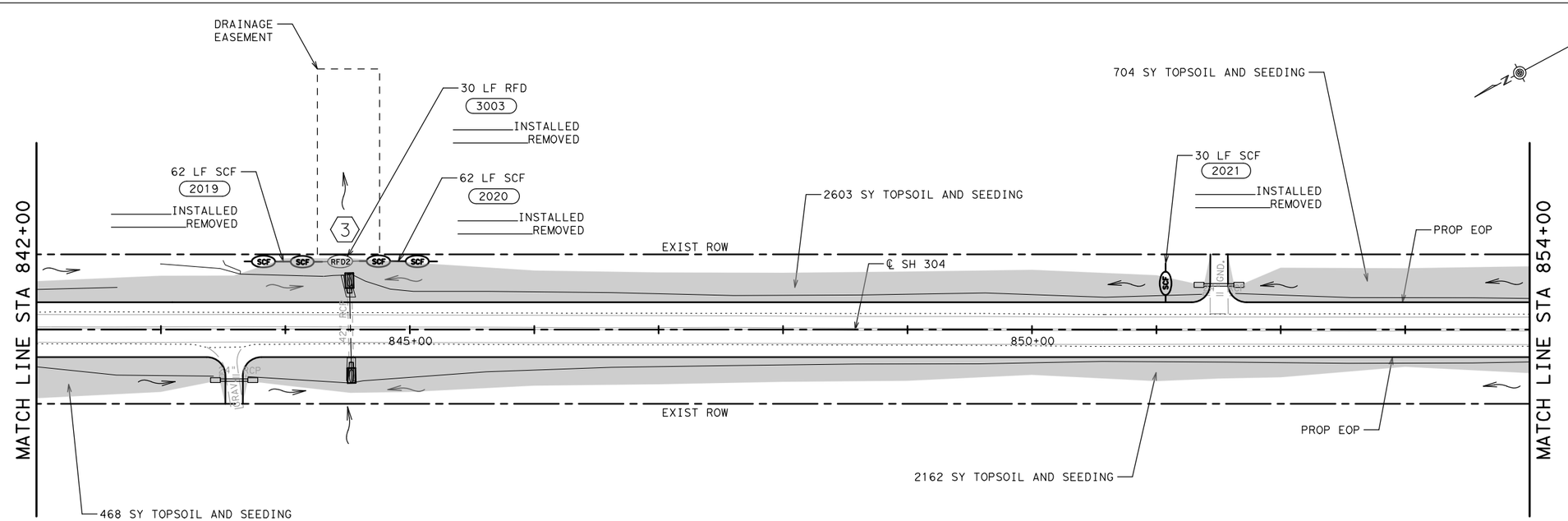
© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	BASTROP		204

DATE: 10/14/2021 1:14:34 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0349. ENVIRONMENTAL\SH304_ENV_SW3P_03.dgn



NOTES:
1. MAINTAIN POSITIVE DRAINAGE.
2. (XXX) REPRESENTS DEVICE DESIGNATION.
3. SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
4. TEMPORARY EROSION CONTROL DEVICES SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
5. USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

LEGEND	
SCF	SILT FENCE
RFD2	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

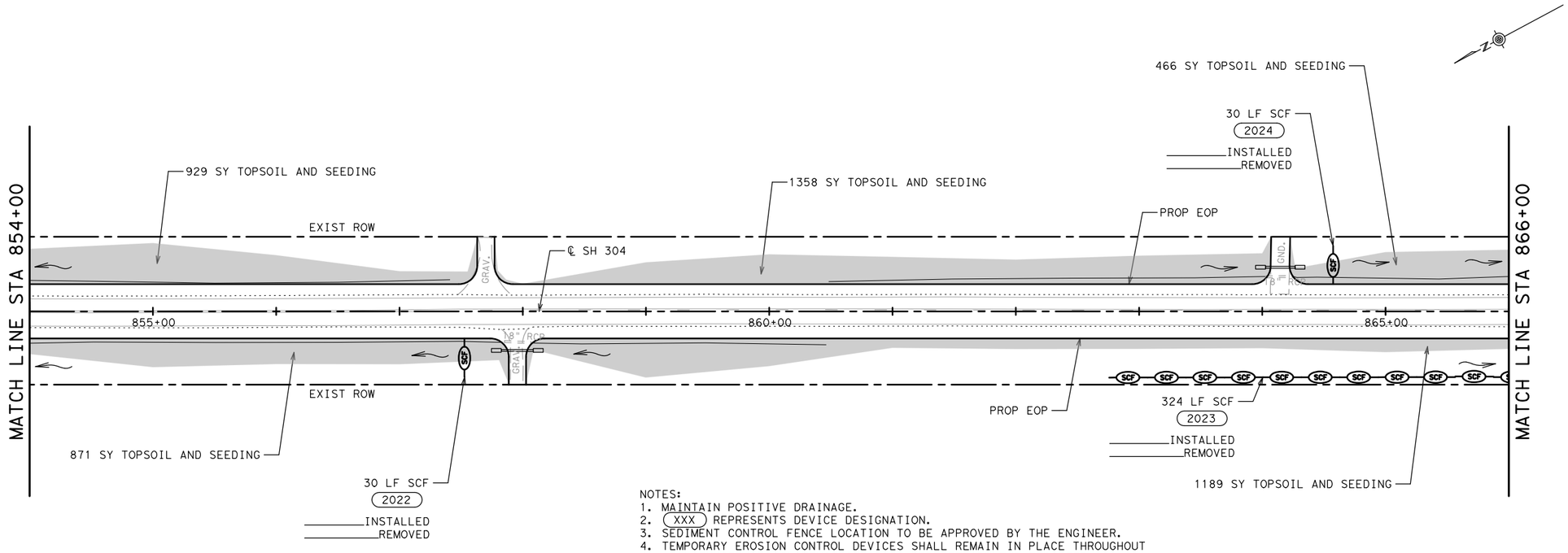
SH 304
EROSION CONTROL LAYOUT

SHEET 4 OF 14

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		205

DS: CK:
DW: CK:

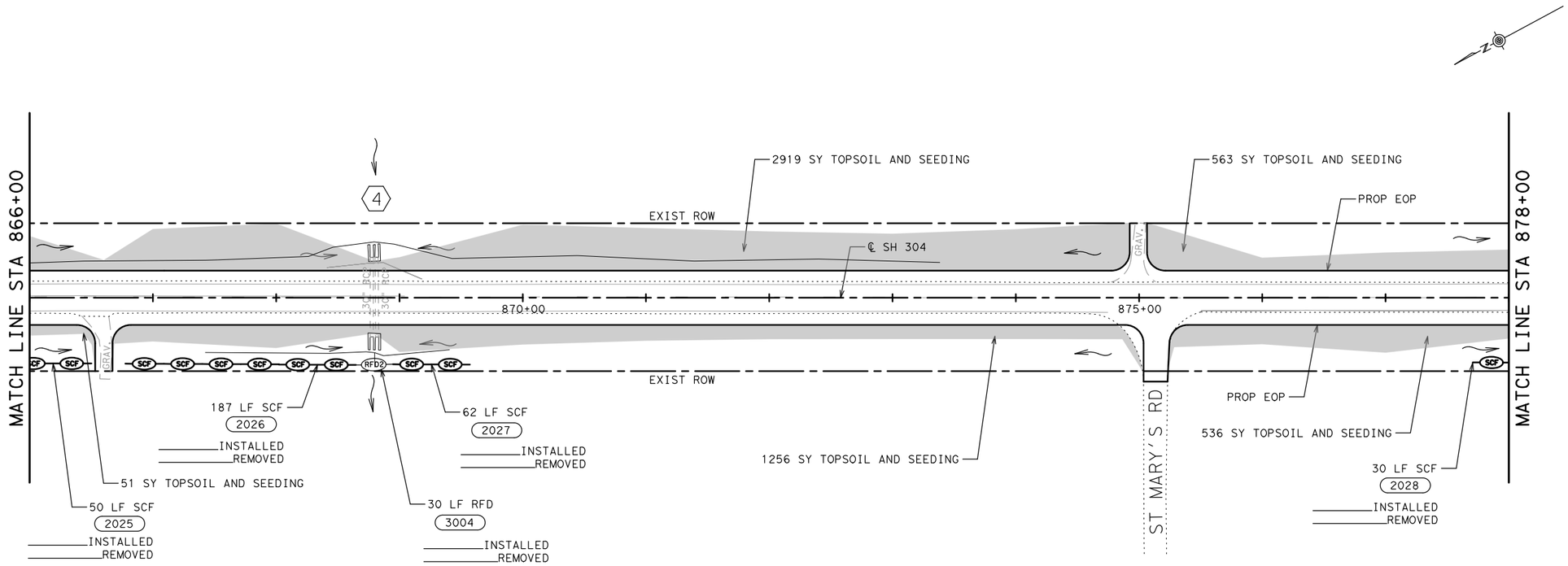
DATE: 10/14/2021 1:14:35 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0349. ENVIRONMENTAL\SH304_ENV_SW3P_04.dgn



NOTES:
1. MAINTAIN POSITIVE DRAINAGE.
2. (XXX) REPRESENTS DEVICE DESIGNATION.
3. SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
4. TEMPORARY EROSION CONTROL DEVICES SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
5. USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

LEGEND

SCF	SILT FENCE
RFD2	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

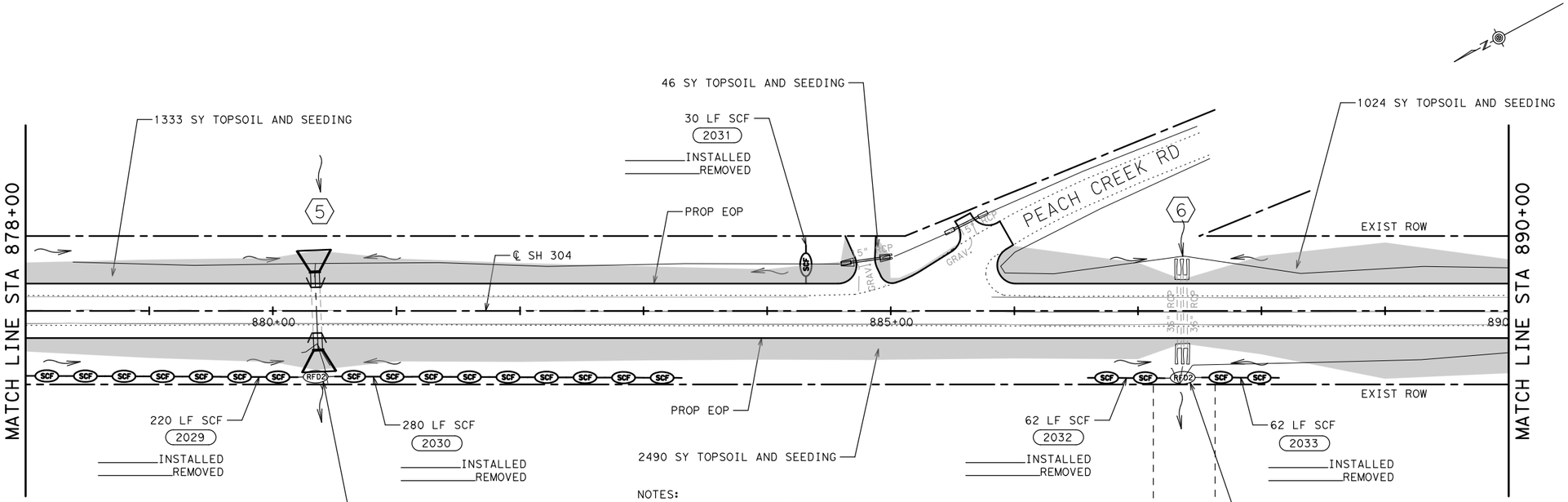
SH 304
EROSION CONTROL LAYOUT

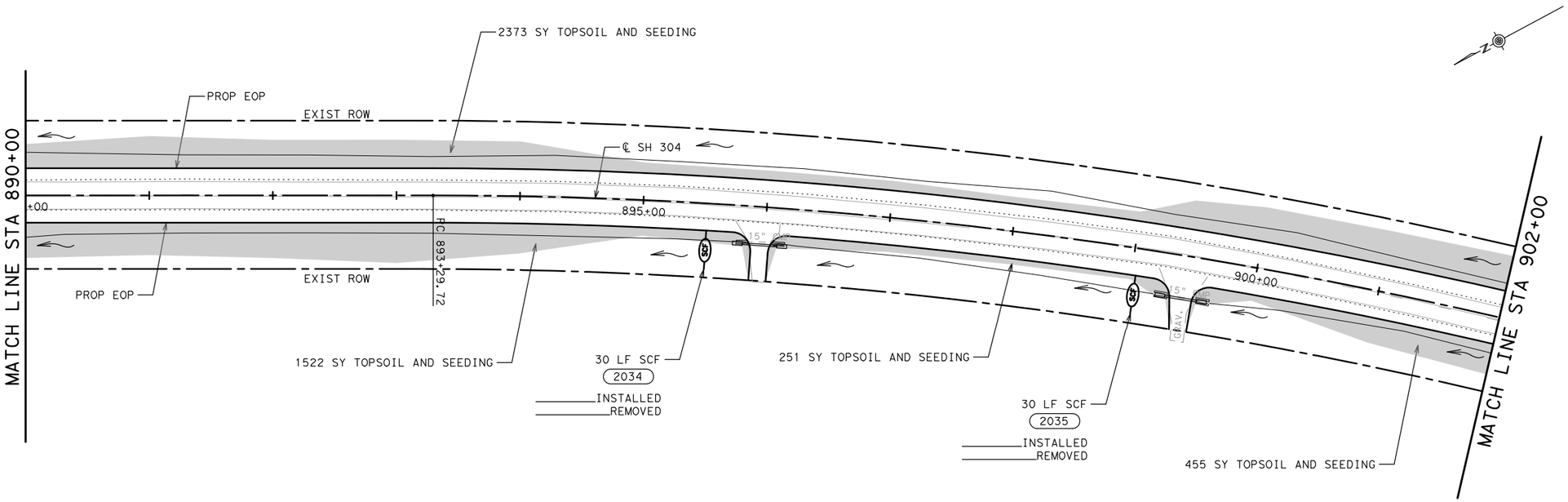
SHEET 5 OF 14

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		206

DS: CK:
DW: CK:

DATE: 10/14/2021 1:14:36 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0349. ENVIRONMENTAL\SH304_ENV_SW3P_05.dgn





SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

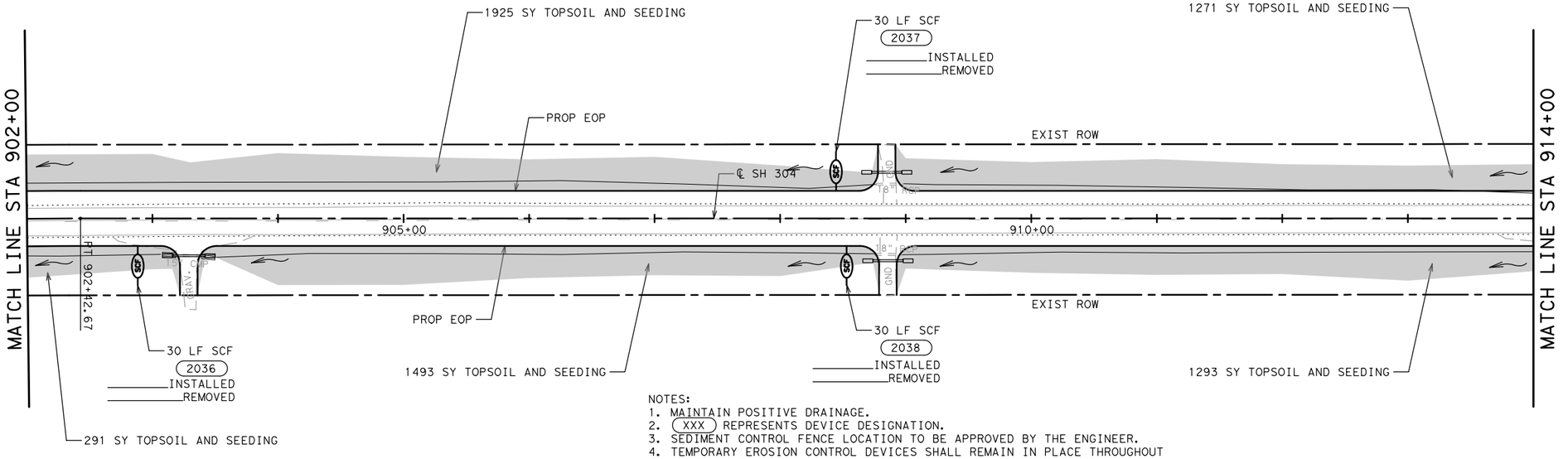
Texas Department of Transportation

SH 304
EROSION CONTROL LAYOUT

SHEET 6 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	BASTROP		207

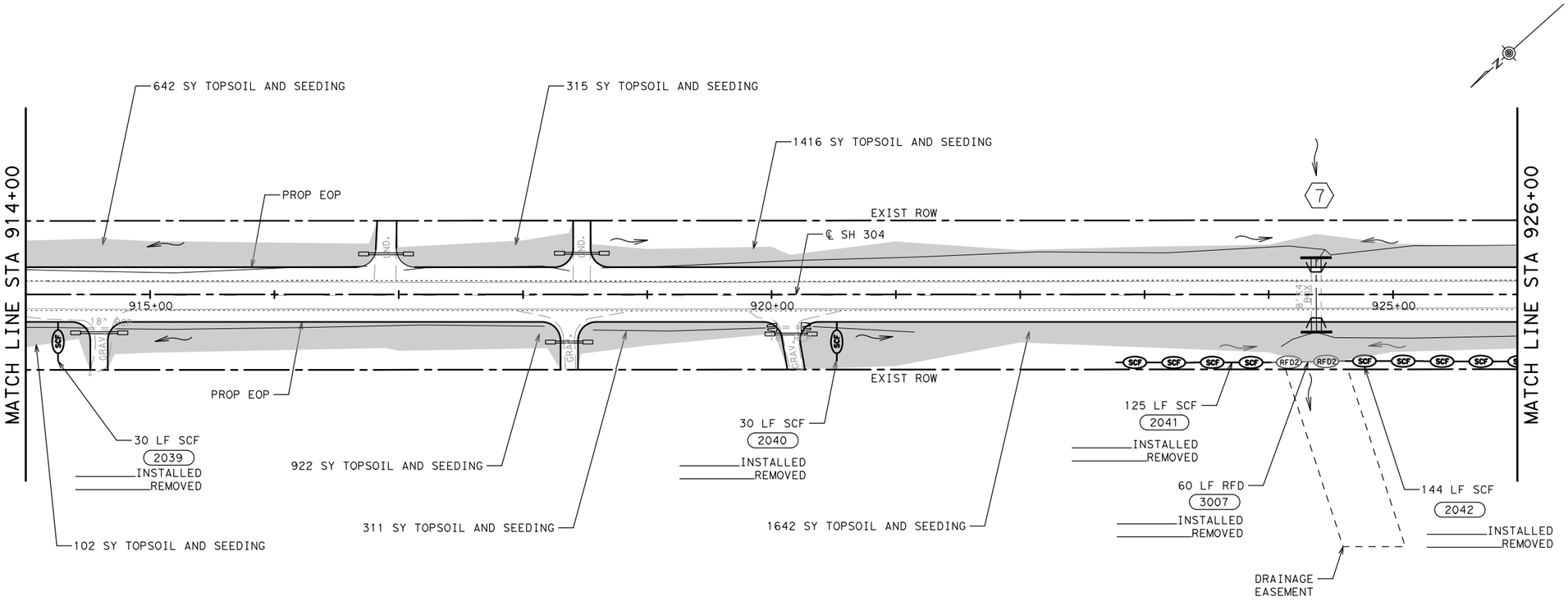
DATE: 10/14/2021 1:14:37 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0349. ENVIRONMENTAL\SH304_ENV_SW3P_06.dgn



NOTES:
1. MAINTAIN POSITIVE DRAINAGE.
2. (XXX) REPRESENTS DEVICE DESIGNATION.
3. SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
4. TEMPORARY EROSION CONTROL DEVICES SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
5. USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

LEGEND

SCF	SILT FENCE
RFD2	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

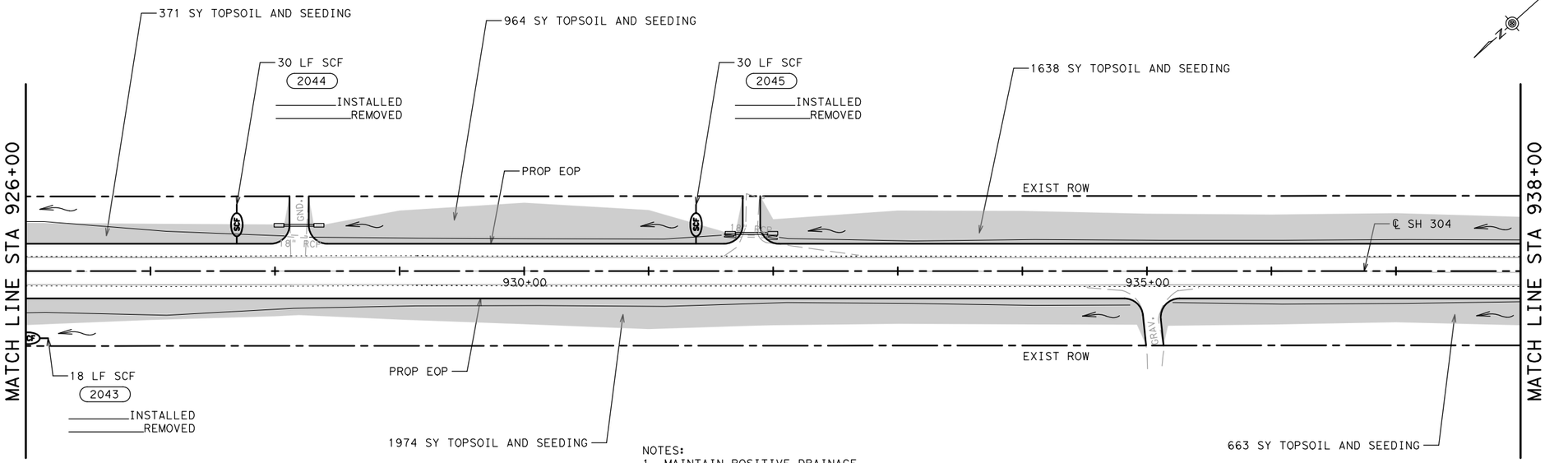
Texas Department of Transportation

SH 304
EROSION CONTROL LAYOUT

SHEET 7 OF 14

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		208

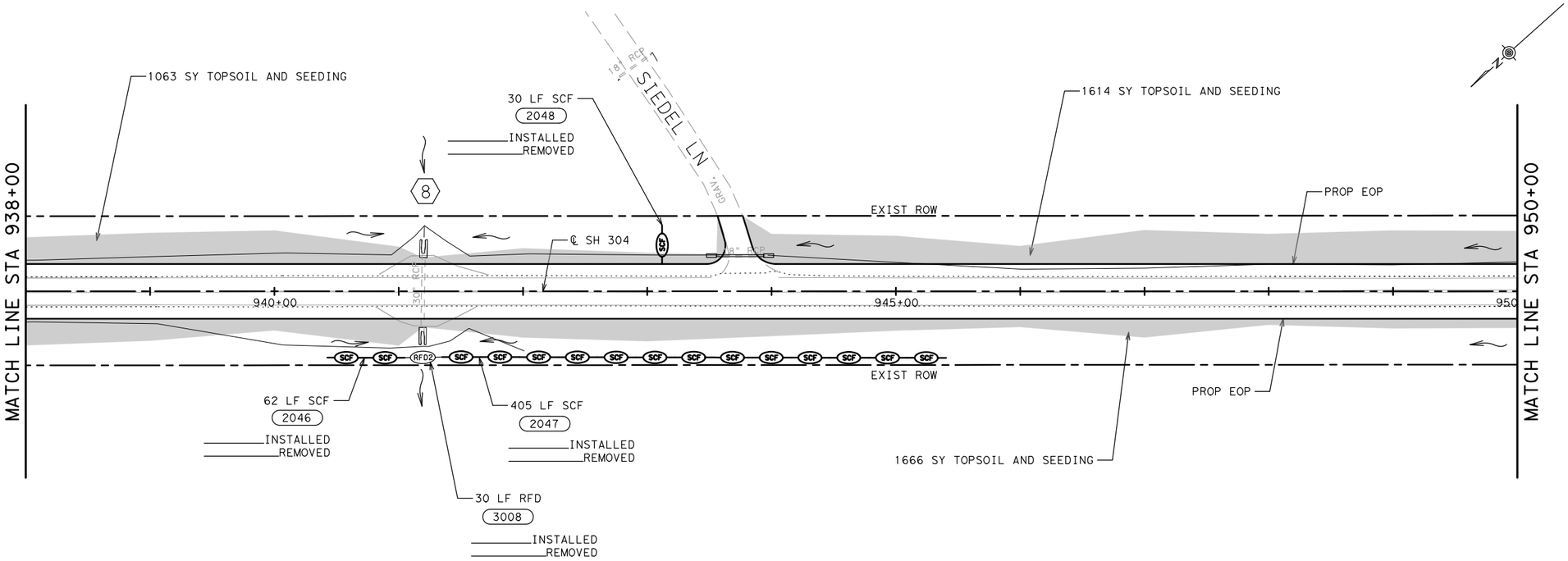
DATE: 10/14/2021 1:14:38 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\9. ENVIRONMENTAL\SH304_ENV_SW3P_07.dgn



NOTES:
1. MAINTAIN POSITIVE DRAINAGE.
2. (XXX) REPRESENTS DEVICE DESIGNATION.
3. SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
4. TEMPORARY EROSION CONTROL DEVICES SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
5. USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

LEGEND

SCF	SILT FENCE
RFD2	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

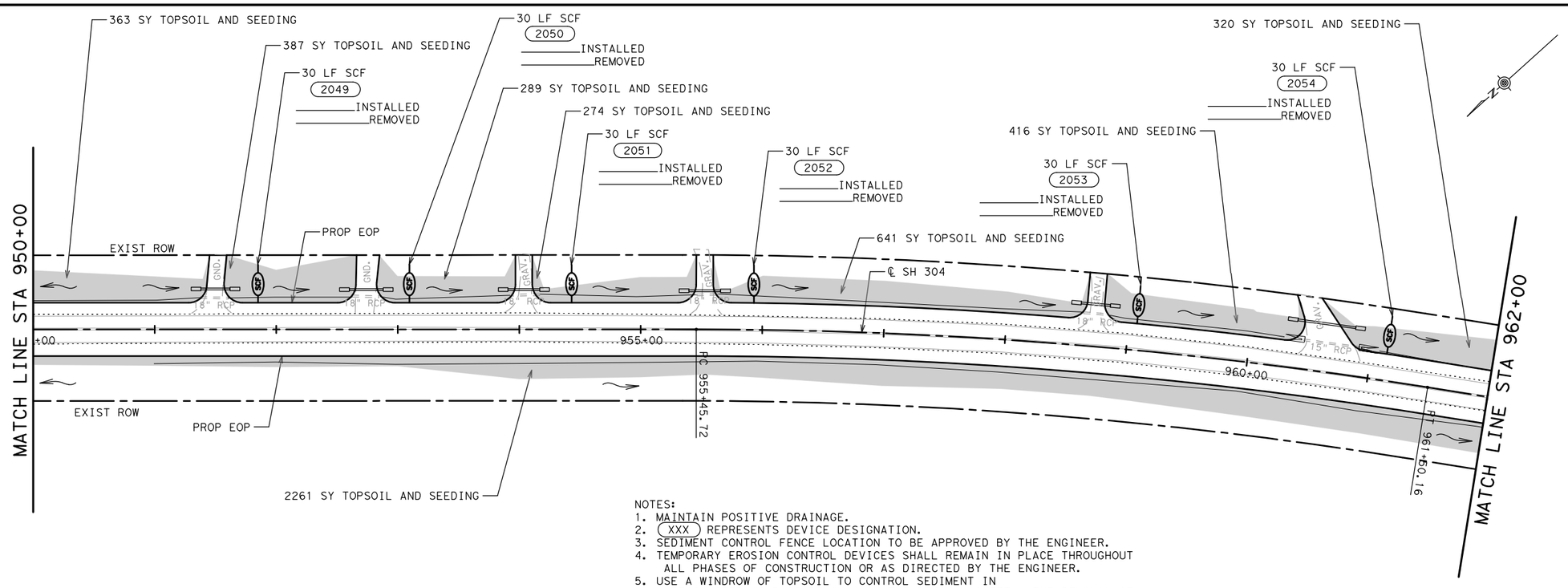
SH 304
EROSION CONTROL LAYOUT

SHEET 8 OF 14

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		209

DS: CK:
DW: CK:

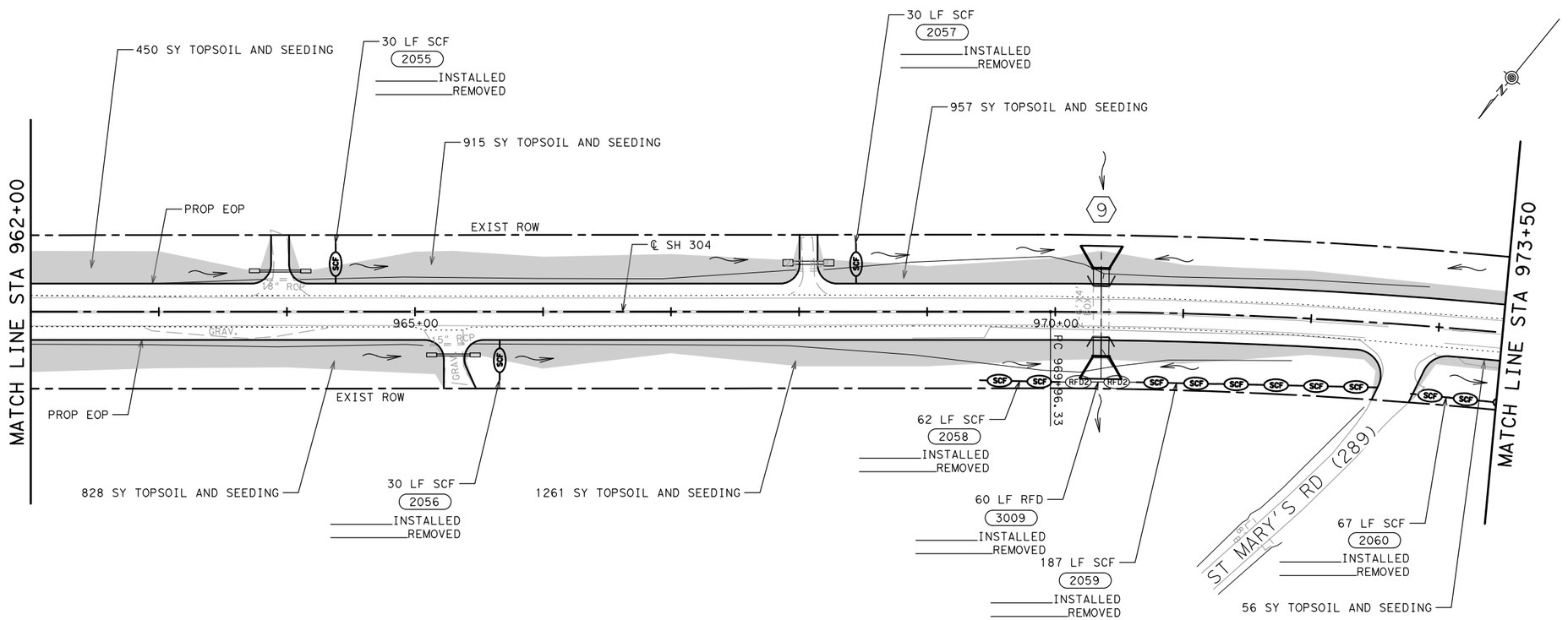
DATE: 10/14/2021 1:14:39 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0349. ENVIRONMENTAL\SH304_ENV_SW3P_08.dgn



NOTES:
1. MAINTAIN POSITIVE DRAINAGE.
2. (XXX) REPRESENTS DEVICE DESIGNATION.
3. SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
4. TEMPORARY EROSION CONTROL DEVICES SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
5. USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

LEGEND

SCF	SILT FENCE
RFD2	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

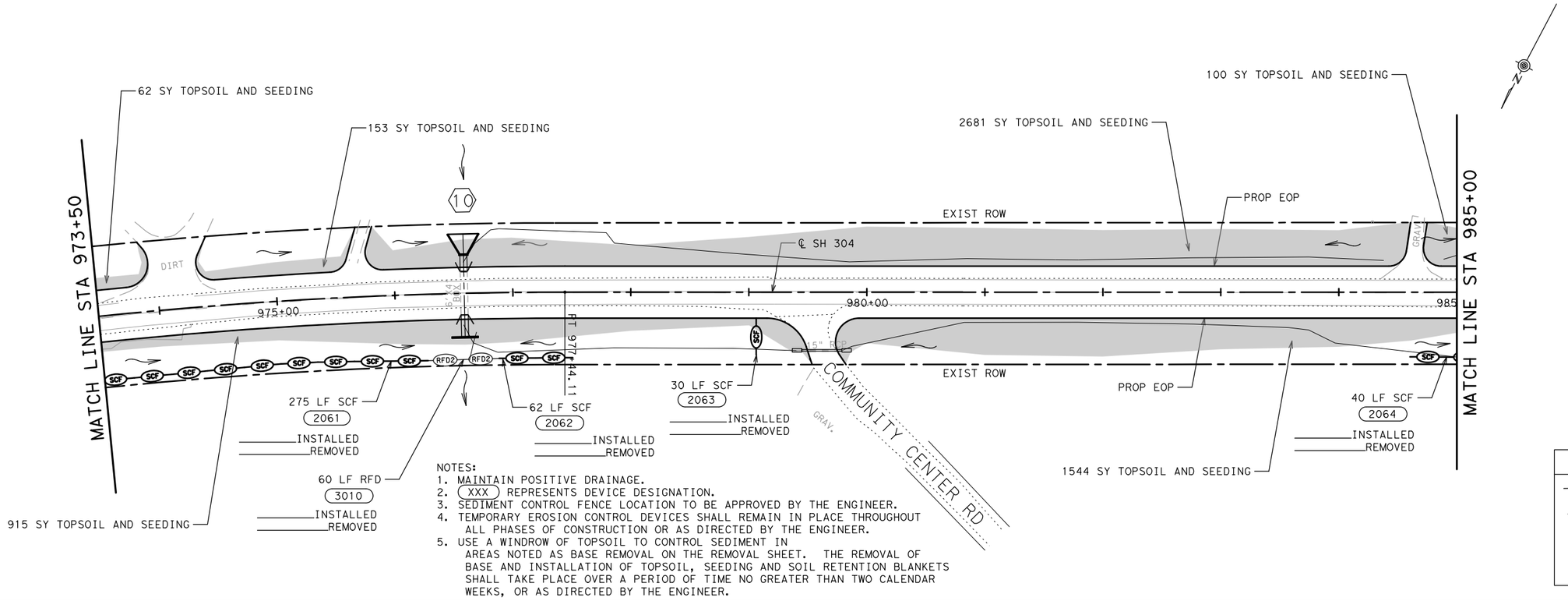
SH 304
EROSION CONTROL LAYOUT

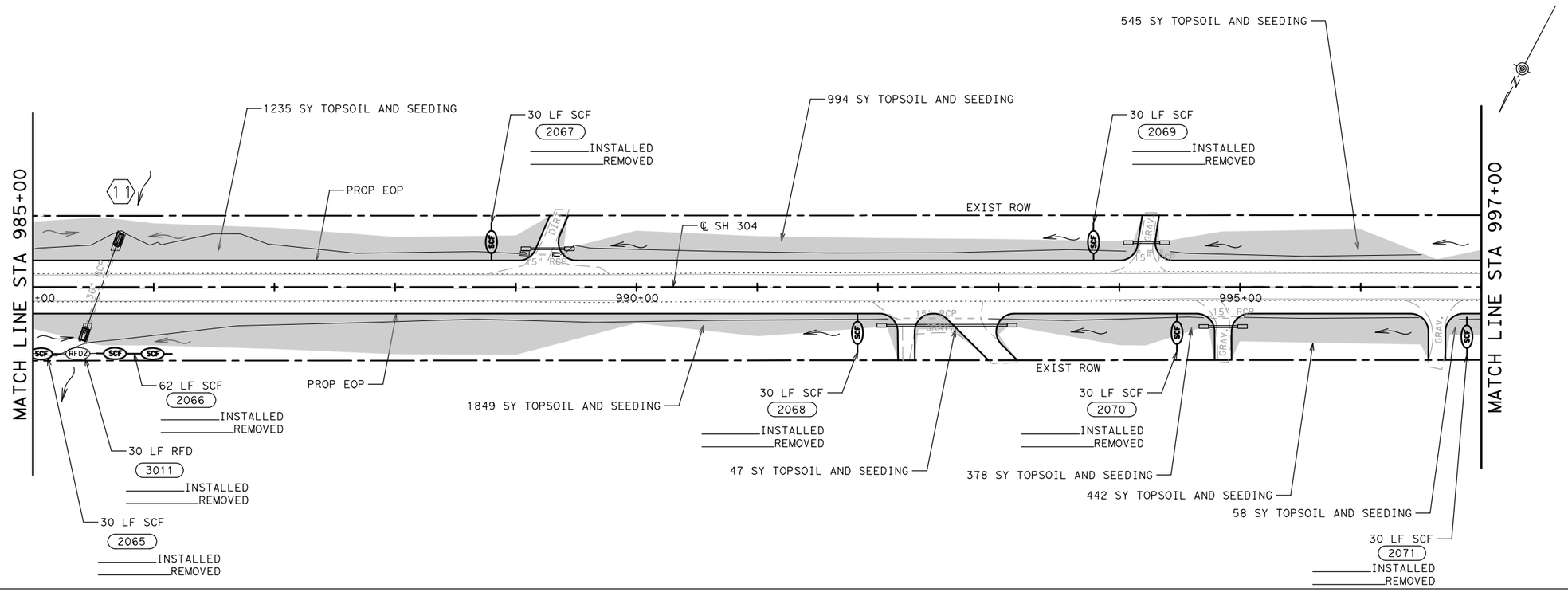
SHEET 9 OF 14

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		210

DS: CK:
DW: CK:

DATE: 10/14/2021 1:14:40 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0349. ENVIRONMENTAL\SH304_ENV_SW3P_09.dgn





SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

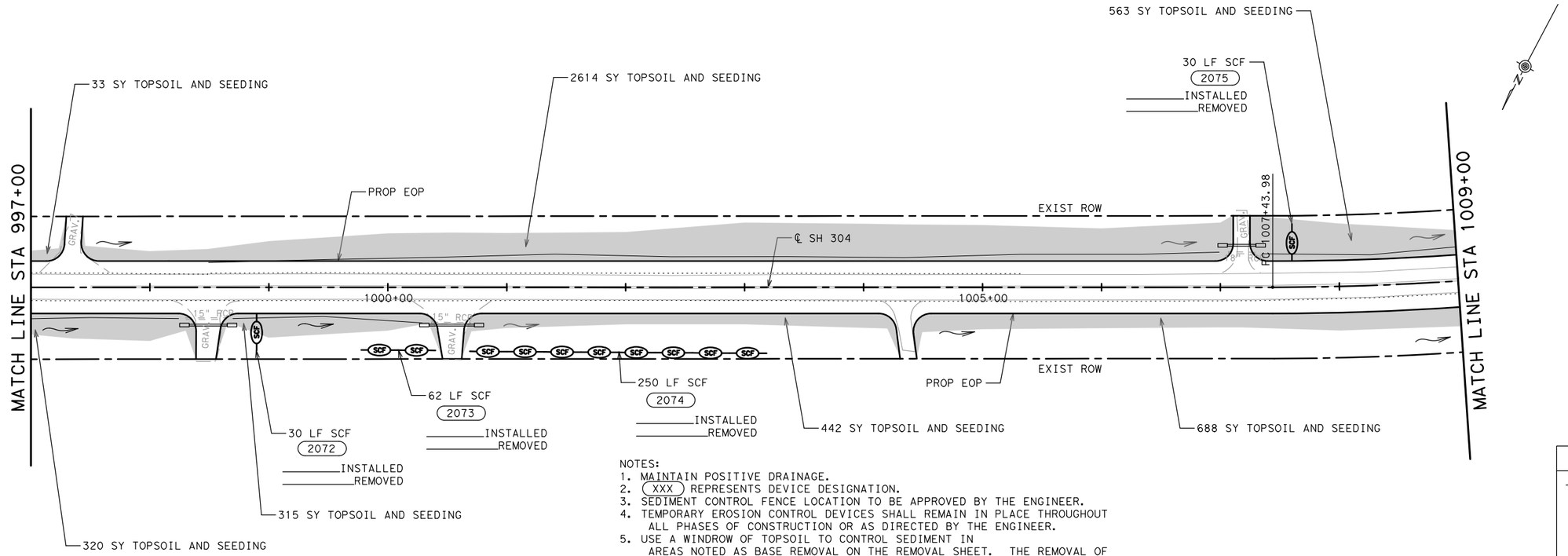
Texas Department of Transportation

SH 304
EROSION CONTROL LAYOUT

SHEET 10 OF 14

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		211

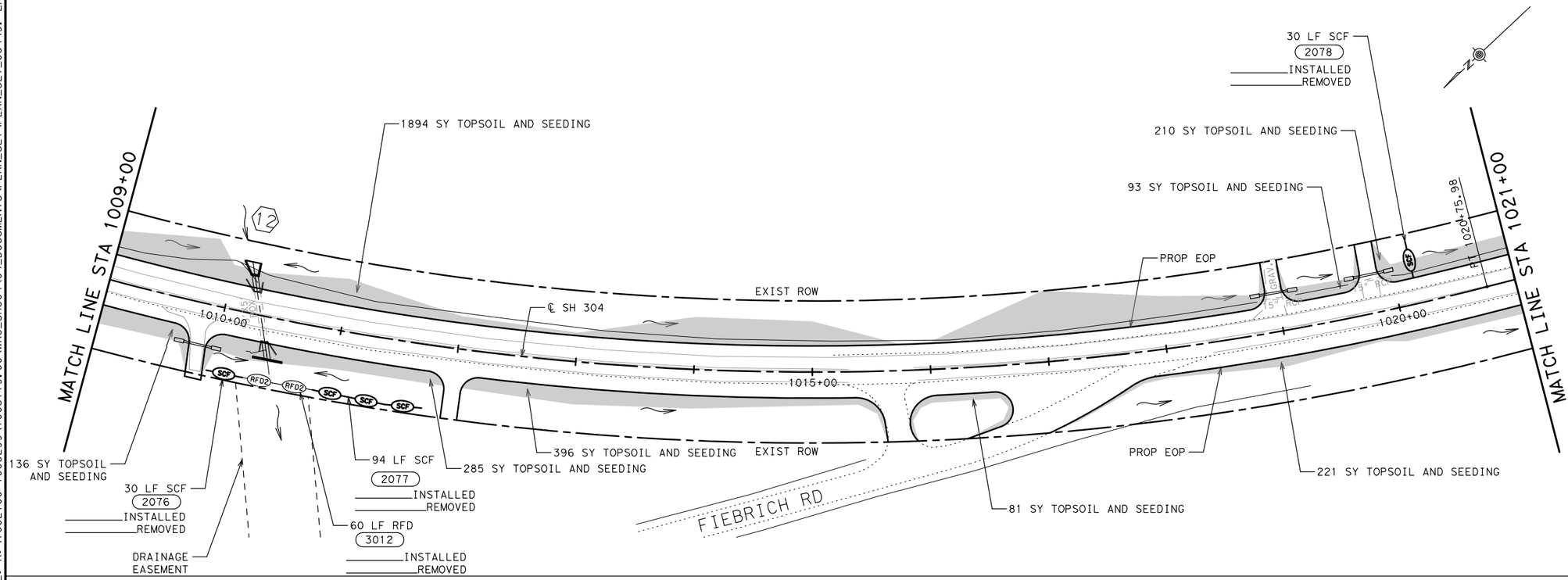
DATE: 10/14/2021 1:14:42 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0349. ENVIRONMENTAL\SH304_ENV_SW3P_10.dgn



NOTES:
1. MAINTAIN POSITIVE DRAINAGE.
2. (XXX) REPRESENTS DEVICE DESIGNATION.
3. SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
4. TEMPORARY EROSION CONTROL DEVICES SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
5. USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

LEGEND

SCF	SILT FENCE
RFD2	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

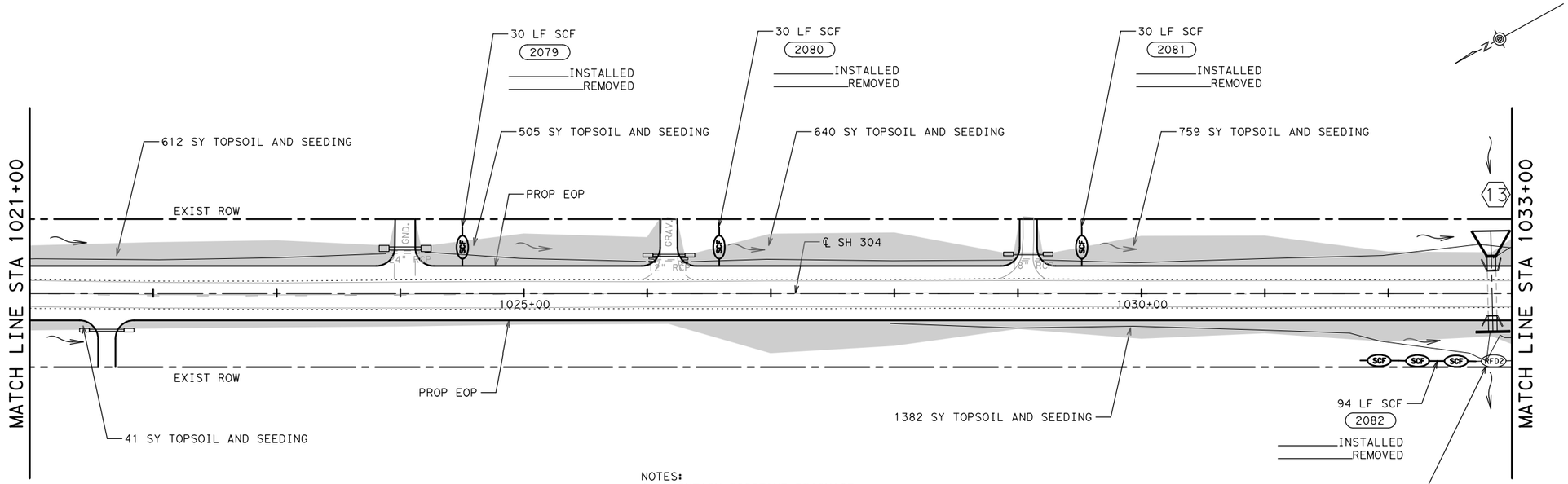
Texas Department of Transportation

SH 304
EROSION CONTROL LAYOUT

SHEET 11 OF 14

© 2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	BASTROP		212

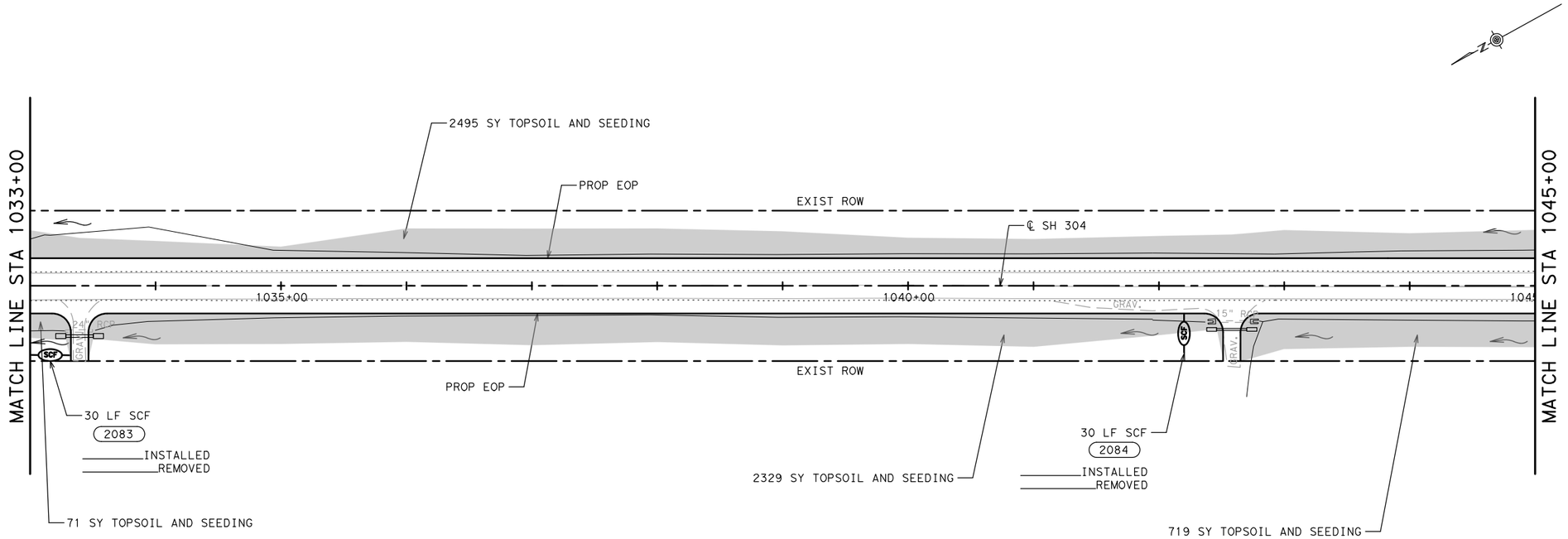
DATE: 10/14/2021 1:14:43 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0341 9. ENVIRONMENTAL\SH304_ENV_SWP3_11.dgn



NOTES:
1. MAINTAIN POSITIVE DRAINAGE.
2. (XXX) REPRESENTS DEVICE DESIGNATION.
3. SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
4. TEMPORARY EROSION CONTROL DEVICES SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
5. USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

LEGEND

SCF	SILT FENCE
RFD2	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

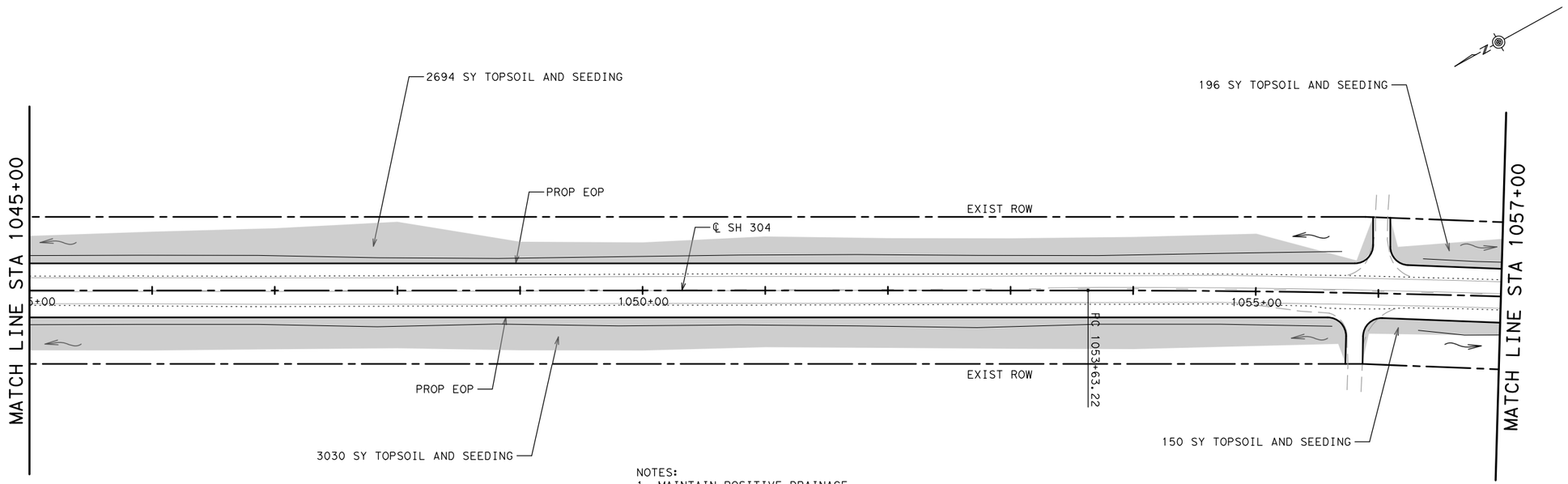
Texas Department of Transportation

SH 304
EROSION CONTROL LAYOUT

SHEET 12 OF 14

© 2022	CONT	SECT	JOB	HIGHWAY
DS: CK:	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
DW: CK:	AUS	BASTROP		213

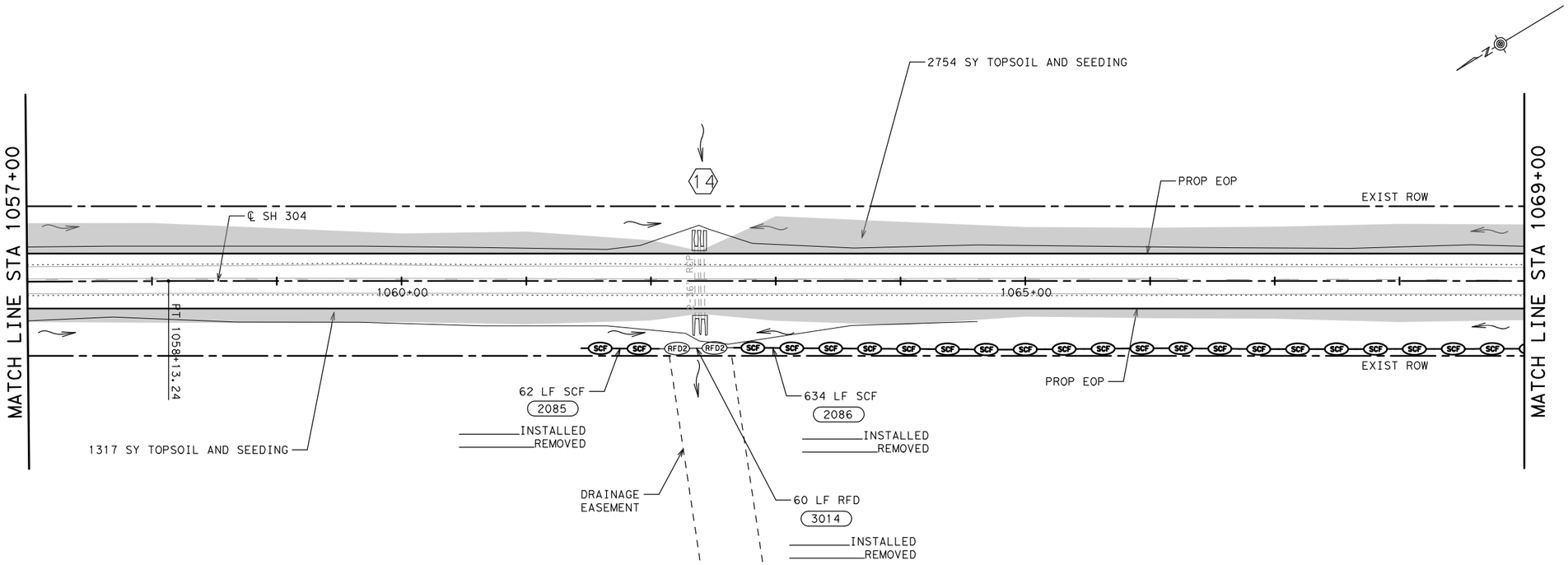
DATE: 10/14/2021 1:14:44 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_0341 9. ENVIRONMENTAL\SH304_ENV_SW3P_12.dgn



NOTES:
1. MAINTAIN POSITIVE DRAINAGE.
2. (XXX) REPRESENTS DEVICE DESIGNATION.
3. SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
4. TEMPORARY EROSION CONTROL DEVICES SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
5. USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

LEGEND

SCF	SILT FENCE
RFD2	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

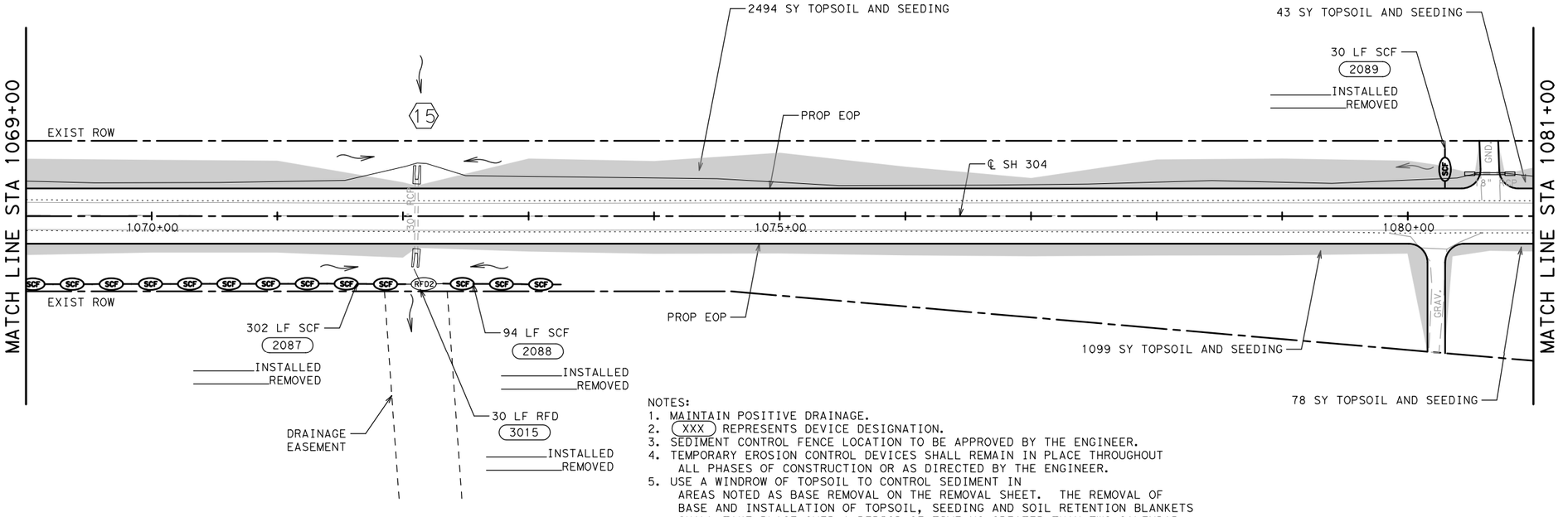
SH 304
EROSION CONTROL LAYOUT

SHEET 13 OF 14

CONT	SECT	JOB	HIGHWAY
0573	01	034	SH 304
DIST	COUNTY		SHEET NO.
AUS	BASTROP		214

DS: CK: DW: CK:

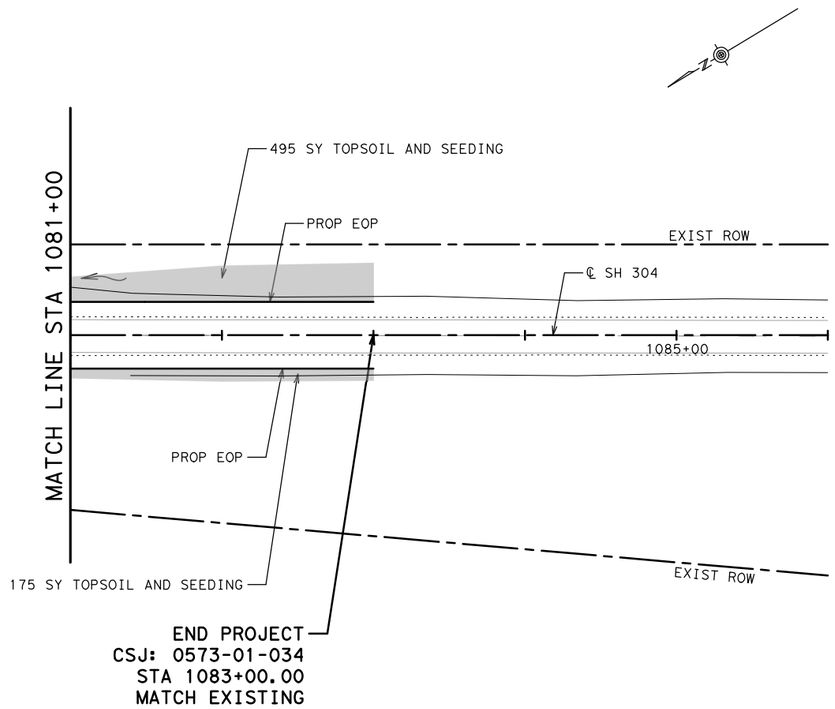
DATE: 10/14/2021 1:14:45 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\9. ENVIRONMENTAL\SH304_ENV_SW3P_13.dgn



NOTES:
1. MAINTAIN POSITIVE DRAINAGE.
2. (XXX) REPRESENTS DEVICE DESIGNATION.
3. SEDIMENT CONTROL FENCE LOCATION TO BE APPROVED BY THE ENGINEER.
4. TEMPORARY EROSION CONTROL DEVICES SHALL REMAIN IN PLACE THROUGHOUT ALL PHASES OF CONSTRUCTION OR AS DIRECTED BY THE ENGINEER.
5. USE A WINDROW OF TOPSOIL TO CONTROL SEDIMENT IN AREAS NOTED AS BASE REMOVAL ON THE REMOVAL SHEET. THE REMOVAL OF BASE AND INSTALLATION OF TOPSOIL, SEEDING AND SOIL RETENTION BLANKETS SHALL TAKE PLACE OVER A PERIOD OF TIME NO GREATER THAN TWO CALENDAR WEEKS, OR AS DIRECTED BY THE ENGINEER.

LEGEND

SCF	SILT FENCE
RFD2	ROCK FILTER DAM
	TOPSOIL & SEEDING
	FLOW



SCALE (IN FEET):
0 100

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

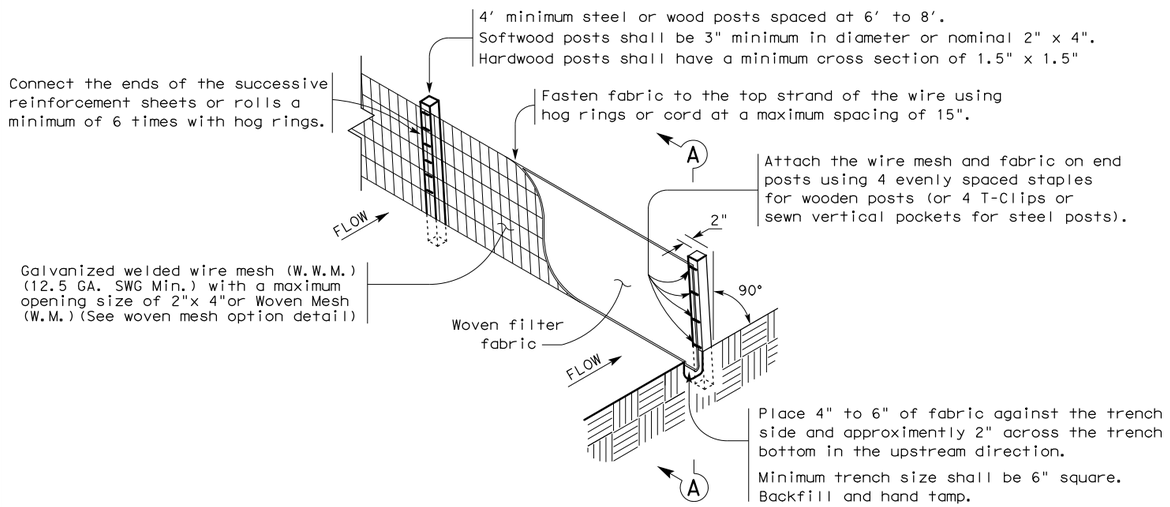
SH 304
EROSION CONTROL LAYOUT

SHEET 14 OF 14

DS:	CK:	CONT	SECT	JOB	HIGHWAY
		0573	01	034	SH 304
DW:	CK:	DIST	COUNTY		SHEET NO.
		AUS	BASTROP		215

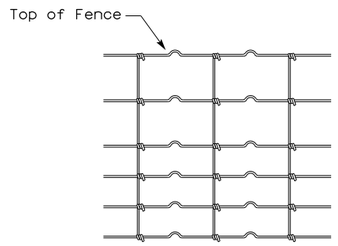
DATE: 10/14/2021 1:14:46 PM
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\9. ENVIRONMENTAL\SH304_ENV_SW3P_14.dgn

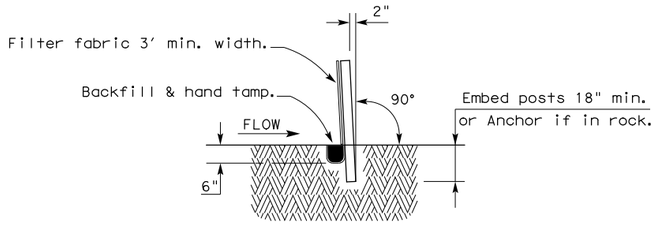
DATE: 8/2021
FILE: D002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\9. ENVIRONMENTAL\SH304_ENV_DETAILS_01.dgn



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.

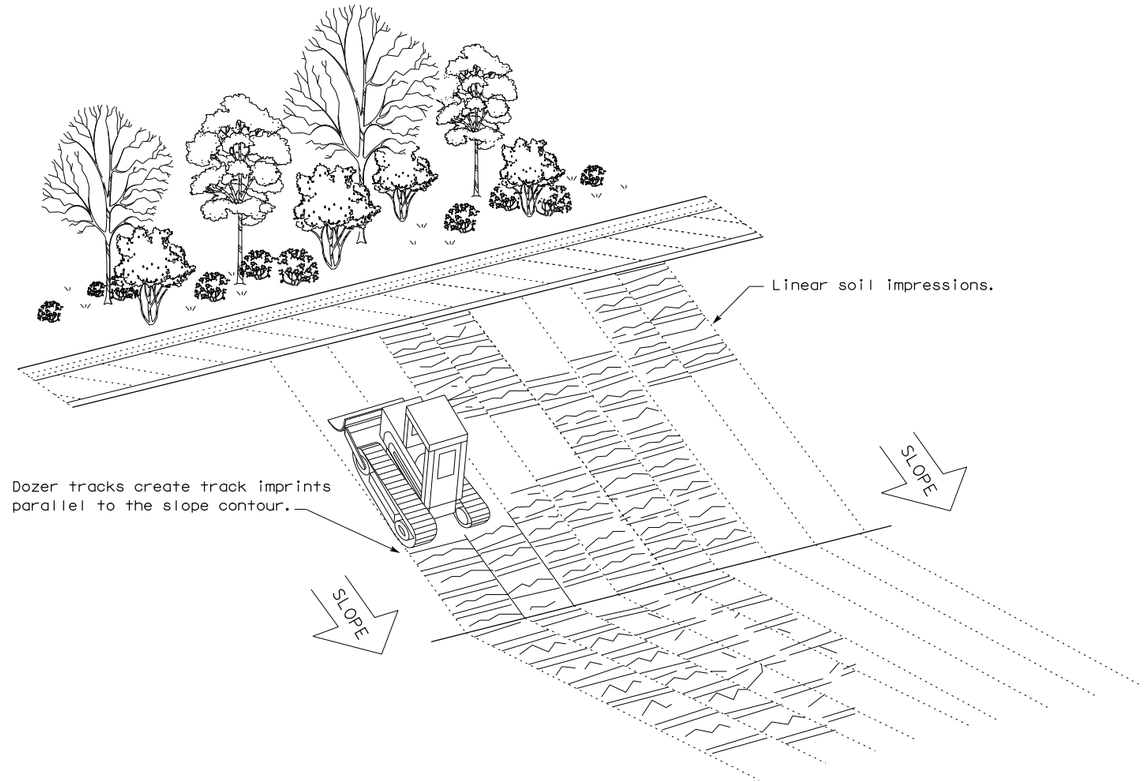
LEGEND

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

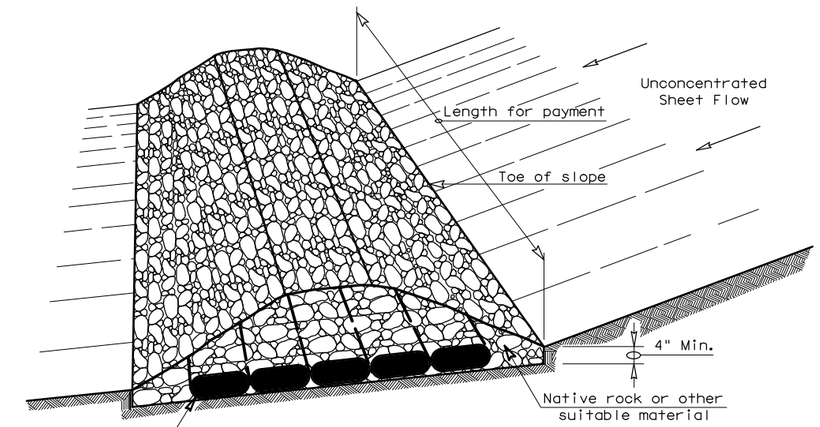
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

EC(1)-16

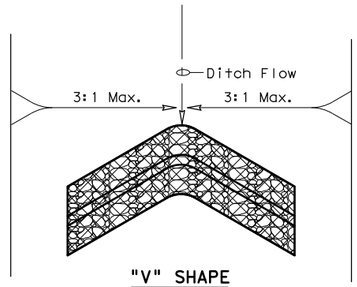
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		216

DATE: 10/14/2021
FILE: R:\1002700-1003299\1003179.00\WA3_SH304\04_DOCUMENTS\PLAN_SET\PLAN_SET_034\9. ENVIRONMENTAL\SH304_ENV_DETAILS_02.dgn

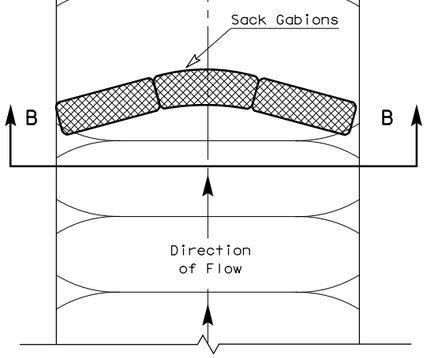


FILTER DAM AT TOE OF SLOPE

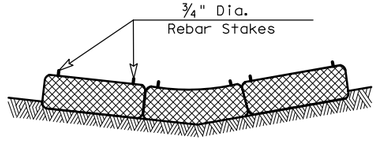
RFD1



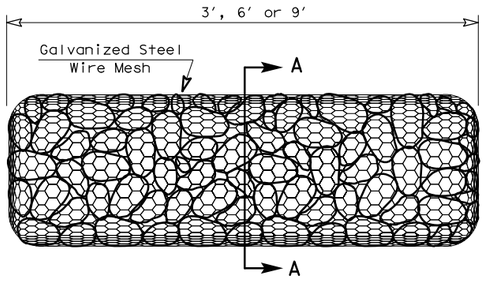
"V" SHAPE PLAN VIEW



PLAN VIEW

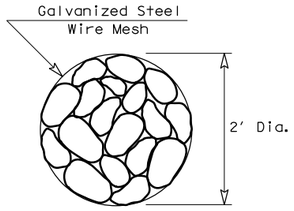


SECTION B-B

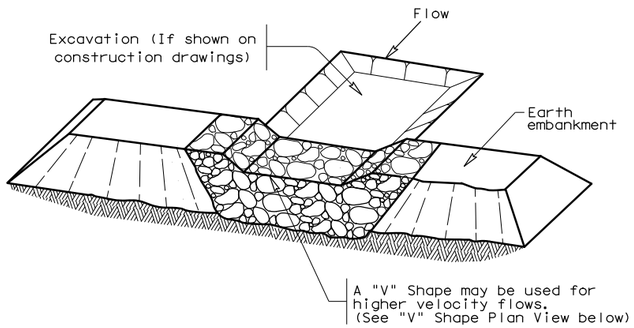


TYPE 4 (SACK GABIONS)

RFD4

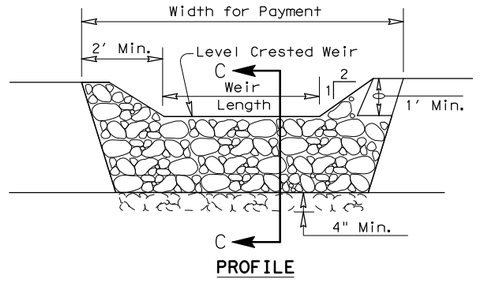


SECTION A-A

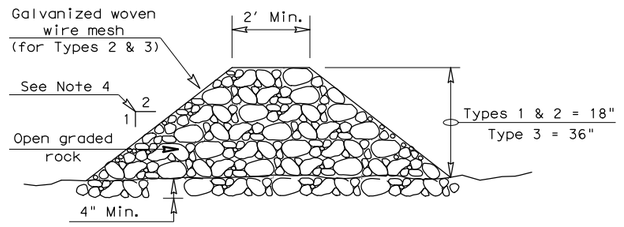


FILTER DAM AT SEDIMENT TRAP

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.

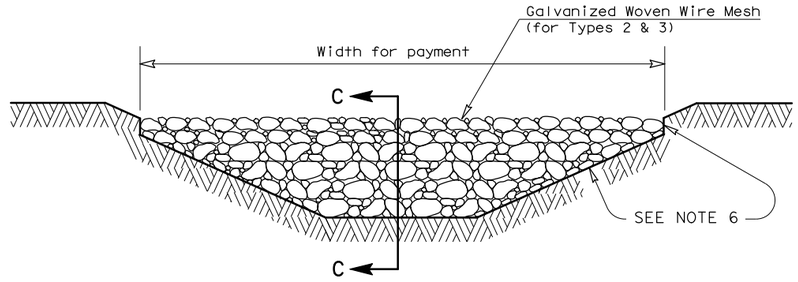
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity 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 ¾" dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of 2 ½" x 3 ¼"
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	0573	01	034	SH 304		
	DIST	COUNTY		SHEET NO.		
	AUS	BASTROP		217		

I. WORK AT CROSSING LOCATIONS (AT GRADE, HIGHWAY OVERPASS, HIGHWAY UNDERPASS, PEDESTRIAN, OR CLOSED/ABANDONED)

DOT #: 415746U
Crossing Type: AT GRADE
RR Company Owning Track at Crossing: UPRR
Operating RR Company at Track: UPRR
RR MP: 11.73
RR Subdivision: LOCKHART SUB
City: ROSANKY
County: BASTROP
CSJ at this Crossing: 0573-01-034
Highway/Roadway name crossing the railroad: SH 304
# of regularly scheduled trains per day at this crossing: 12
# of switching movements per day at this crossing: NONE
% of estimated contract cost of work within railroad ROW: NONE

Scope of Work at this Crossing to Be Performed by State Contractor:
EXTEND EXISTING CULVERT AND ADD SAFETY END TREATMENTS. REHAB OF EXISTING ROAD CONSISTING OF PAVEMENT RESURFACING AND WIDENING TO 33', AND CONSTRUCTION OF TYPE I AND II CURB AND GUTTER.

Scope of Work at this Crossing to Be Performed by Railroad Company:
FLAGGING AND INSTALL NEW CONCRETE PLANKING.

** Choose: Highway Overpass, Highway Underpass, At Grade, Pedestrian, or Closed/Abandoned

II. OTHER PROJECT WORK WITHIN RAILROAD RIGHTS-OF-WAY (ROW)

III. FLAGGING & INSPECTION

of Days of Railroad Flagging Expected: 6

On this project, night or weekend flagging is:

- [ ] Expected
- [X] Not Expected

Flagging services will be provided by:

- [ ] Railroad Company: TxDOT will pay flagging invoices
- [X] Outside Party: Contractor will pay flagging invoices, to be reimbursed by TxDOT

Contractor must incorporate flaggers into anticipated construction schedule. The Railroad requires a 30 day notice if their flaggers are to be utilized. If Contractor falls behind schedule due to their own negligence and is not ready for scheduled flaggers, any flagging charges will be paid by Contractor.

Contact Information for Flagging:

- [X] UPRR - UP.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
- [ ] BNSF - BNSF.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
- [ ] KCS - KCS.info@railpros.com
  Call Center 877-315-0513, Select #1 for flagging
  - Bottom Line On-Track Safety Services
  bottomline076@aol.com, 903-767-7630
- [ ] OTHERS

Contractor must incorporate Construction Inspection into anticipated construction schedule.

- [ ] Not Required
- [X] Required: Contact Information for Construction Inspection:

UPRR

IV. CONSTRUCTION WORK TO BE PERFORMED BY THE RAILROAD

On this project, construction work to be performed by a railroad company is:

- [X] Required
- [ ] Not Required

Coordinate with TxDOT for any work to be performed by the Railroad Company. TxDOT must issue a work order for any work done by the Railroad Company prior to the work being performed.

V. RAILROAD INSURANCE REQUIREMENTS

Railroad reference number shall be provided by TxDOT CST or DO.

The Contractor shall confirm the insurance requirements with the Railroad as the insurance limits are subject to change without notice.

Insurance policies must be issued for and on behalf of the Railroad. Where more than one Railroad Company is operating on the same right of way or where several Railroad Companies are involved and operate on their own separate rights of way, provide separate insurance policies in the name of each Railroad Company.

No direct compensation will be made to the Contractor for providing the insurance coverages shown below or any deductibles. These costs are incidental to the various bid items.

Type of Insurance	Amount of Coverage (Minimum)
Workers Compensation	$500,000 / $500,000 / $500,000
Commercial General Liability	$2,000,000 / $4,000,000
Business Automobile	$2,000,000 combined single limit
Railroad Protective Liability	
[ ] Not Required	
[X] Non - Bridge Projects	$2,000,000 / $6,000,000
[ ] Bridge Projects	$5,000,000 / $10,000,000
[ ] Other	

VI. CONTRACTOR'S RIGHT OF ENTRY (ROE) AGREEMENT

On this project, an ROE agreement is:

- [ ] Not Required
- [X] Required: TxDOT CST to assist in obtaining with the UPRR (see Item 5, Article 8.3)
- [ ] Required: Contractor to obtain (see Item 5, Article 8.4)

With the following railroad companies: _____

To view previously approved ROE Agreement templates agreed upon between the State and Railroad, see:

http://www.txdot.gov/inside-txdot/division/rail/samples.html

Approved ROE Agreement templates are not to be modified by the Contractor.

Contractor shall not operate within Railroad Right of Way without an executed Construction & Maintenance Agreement between the State and the Railroad and an executed ROE agreement between the Contractor and the Railroad if required on project.

VII. RAILROAD COORDINATION MEETING

On this project, a Railroad Coordination Meeting is:

- [ ] Not Required
- [X] Required

See Item 5, Article 8.1 for more details.

VIII. SUBCONTRACTORS

Contractor shall not subcontract work without written consent of TxDOT. Subcontractors are required to maintain the same insurance coverage as required of the Contractor.

IX. EMERGENCY NOTIFICATION

In Case of Railroad Emergency
Call Union Pacific Railroad Emergency Line
at 888-877-7267
Location: DOT # 415746U
RR Milepost 11.73 Lockhart Subdivision

Texas Department of Transportation | Rail Division

RAILROAD SCOPE OF WORK

PROJECT SPECIFIC DETAILS

FILE: RR Scope of Work.dgn	DN: TxDOT	CK:	DW:	CK:
©TxDOT June 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0573	01	034	SH 304
3/2020	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		218

DATE: DATE TIME
FILE: DOCUMENT NAME

PART 1 - GENERAL

1.01 DESCRIPTION

This project includes construction work within the right of way and/or properties of the Railroad and adjacent to its tracks, wire lines and other facilities. These sheets describe the minimum special requirements for coordination with the Railroad when working upon, over or under Railroad Right of Way or when impacting current or future Railroad operations. Coordinate with the Railroad while performing the work outlined herein, and afford the same cooperation with the Railroad as with TxDOT. Complete all submittals and work in accordance with TxDOT Standard Specifications, Railroad Guidelines and AREMA recommendations as modified by these minimum special requirements or as directed in writing by the Railroad Designated Representative.

For purposes of this project, the Railroad Designated Representative is the person or persons designated by the Railroad Manager of Industry and Public Projects to handle specific tasks related to the project.

1.02 REQUEST FOR INFORMATION / CLARIFICATION

Submit Requests for Information ("RFI") involving work within any Railroad Right of Way to the TxDOT Engineer. The TxDOT Engineer will submit the RFI to the Railroad Designated Representative for review and approval for RFI's corresponding to work within Railroad Right of Way. Allow six (6) weeks total time for review and approval, which includes four (4) weeks for review and approval by the Railroad.

1.03 PLANS / SPECIFICATIONS

TxDOT has received written Railroad approval of the plans and specifications for this project. Any revisions or changes in the plans after award of the Contract must have the approval of TxDOT and the Railroad.

PART 2 - UTILITIES AND FIBER OPTIC

Construct all utility installations in accordance with current AREMA recommendations, Railroad, TxDOT and owning utility specifications and requirements. Railroad general guidelines can be found on the Railroad website or by contacting the Railroad Designated Representative.

PART 3 - CONSTRUCTION

3.01 GENERAL

A. Perform all work in compliance with all applicable Railroad, Federal Railroad Administration (FRA), and TxDOT rules and regulations. Arrange and conduct work in a manner that does not endanger or interfere with the safe operation of the tracks and property of the Railroad and the traffic moving on such tracks, or the wires, signals and other property of the Railroad, its tenants or licensees, at or in the vicinity of the Work. The safe operation of railroad train movements takes precedence over any work to be performed by the Contractor. The Contractor is responsible for train delay cost and lost revenue claims due to any delays or interruption of train operations resulting from Contractor's construction or other activities.

B. Construction activities within 15 feet of the operational tracks will only be allowed if absolutely necessary and the Railroad's Designated Representative grants approval. Construction activities within 15 feet of the operational track(s) preferably allow the tracks to stay operational. In such cases, coordination and approval by the Railroad Track Manager is required with regard to schedule, flagging, and slow orders. See Sections 3.07 and 3.08 for additional information.

C. Provide track protection for all work equipment (including rubber tired equipment) operating within 25 feet from nearest rail. When not in use, keep Contractor machinery and materials at least 50 feet from the Railroad's nearest track.

D. Vehicular crossings of railroad track are allowed only at existing crossings, or haul road crossings developed with Railroad approval.

E. The Contractor is also advised that new railroad facilities within the project may be built by the Railroad. If applicable, these facilities are delineated in the plans. Be aware of the limits of responsibilities and coordinate efforts with the Railroad and TxDOT.

F. Railroad requirements do not allow work within 50 feet of track centers when a train passes the work site and all personnel must clear the area within 50 feet of the track centerline and secure all equipment. Additional allowances may be pursued as outlined in 3.02 and 3.03.

G. All permanent clearances shall be verified before project closing.

3.02 RAILROAD OPERATIONS

A. Trains and/or equipment are expected on any track, at any time, in either direction. Become familiar with the train schedules in this location and structure bid assuming intermittent track windows in this period, as defined in Paragraph B that follows.

B. All railroad tracks within and adjacent to the contract site are active, and rail traffic over these facilities shall be maintained throughout the Project. Activities may include both through moves and switching moves to local customers. railroad traffic and operations will occur continuously throughout the day and night on these tracks and shall be maintained at all times as defined herein. Coordinate and schedule the work so that construction activities do not interfere with railroad operations.

C. Coordinate work windows with TxDOT and the Railroad's Designated Representative. Types of work windows include Conditional Work Windows and Absolute Work Windows, as defined below:

1. Conditional Work Window: A Conditional Work Window is a period of time that railroad operations have priority over construction activities. When construction activities may occur on and/or adjacent to the railroad tracks within 25 feet of the nearest track, a railroad flag person will be required. At the direction of the railroad flag person, upon approach of a train, and when trains are present on the tracks, the tracks must be cleared (i.e., no construction equipment, materials or personnel within 25 feet, or as directed by the Railroad Designated Representative, from the tracks). Conditional Work Windows are available for the Project.

2. Absolute Work Window: An Absolute Work Window is a period of time that construction activities are given priority over railroad operations. During this time frame, the designated railroad track(s) will be inactive for train movements and may be fouled by the Contractor. At the end of an Absolute Work Window, the railroad tracks and/or signals must be completely operational for train operations and all Railroad, Public Utilities Commission (PUC) and FRA requirements, codes and regulations for operational tracks must be satisfied. In the situation where the operating tracks and/or signals have been affected, the Railroad will perform inspections of the work prior to placing that track back into service. Railroad flag persons will be required for construction activities requiring an Absolute Work Window. Absolute Work Windows will not generally be granted. Any request will require a detailed explanation for Railroad review.

3.03 RIGHT OF ENTRY, ADVANCE NOTICE AND WORK STOPPAGES

A. Do not perform any work within Railroad Right of Way without a valid executed Right of Entry Agreement if required on this project.

B. Give advance notice to the Railroad as required in the "Contractor's Right of Entry Agreement" before commencing work in connection with construction upon or over Railroad Right of Way and observe the Railroad's rules and regulations with respect thereto.

C. Perform all work upon Railroad Right of Way in a manner to avoid interference with or endanger the operations of the Railroad. Whenever work may affect the operations or safety of trains, submit the work method to the Railroad Designated Representative for approval. Approval does not relieve the Contractor from liability. Do not commence any work which requires flagging service or inspection service until the flagging protection required by the Railroad is available at the job site. See Section 3.15 for railroad flagging requirements.

D. Make requests in writing for both Absolute and Conditional Work Windows, at least 30 days in advance of any work. Include in the written request:
1. Exactly what the work entails.
2. The days and hours that work will be performed.
3. The exact location of work, and proximity to the tracks.
4. The type of window requested and the amount of time requested.
5. The designated contact person.

Provide a written confirmation notice to the Railroad at least 48 hours before commencing work in connection with approved work windows when work is within 25 feet of nearest rail. Perform all work in accordance with previously approved work plans.

E. Make provisions to protect operations and property of the Railroad should a condition arising from, or in connection with the work, require immediate and unusual action. If in the judgment of the Railroad Designated Representative such provisions are insufficient, the Railroad Designated Representative may require or provide such provisions as deemed necessary. In any event, such provisions shall be at the Contractor's expense and without cost to the Railroad or TxDOT. The Railroad or TxDOT shall have the right to order the Contractor to temporarily cease operations in the event of an emergency or, if in the opinion of the Railroad Designated Representative, the Contractor's operations could endanger railroad operations. In the event of such an order, immediately notify TxDOT of the order.

3.04 INSURANCE

Do not begin work upon or over Railroad Right of Way until furnishing the Railroad with the insurance policies, binders, certificates and endorsements required by the "Contractor's Right of Entry Agreement", and until the Railroad Designated Representative has advised TxDOT that such insurance is in accordance with the Agreement.

3.05 RAILROAD SAFETY ORIENTATION

A. Complete the railroad course "Orientation for Contractor's Safety", and maintain current registration prior to working on railroad property. This course is required to be completed annually by Contractor and Subcontractor personnel working on site.

"UPRR, BNSF, KCS/TEXMEX will not accept on-track safety training certificates from other railroads. Refer to Railroad specific contractor right of entry for training information."

B. Know and follow the "Contractor's Right of Entry Agreement" EXHIBIT D, MINIMUM SAFETY REQUIREMENTS regarding clothing, personal protective equipment, and general safety requirements.

3.06 COOPERATION

The Railroad will cooperate with Contractor so that work may be conducted in an efficient manner, and will cooperate with Contractor in enabling use of Railroad Right of Way in performing the work.

3.07 MINIMUM CONSTRUCTION CLEARANCES FOR FALSEWORK AND OTHER TEMPORARY STRUCTURES

Abide by the following minimum temporary clearances during the course of construction:
A. 15' - 0" (BNSF)(UPRR)and 14'-0" (KCS) horizontal from centerline of track
B. 22' (KCS) and 21' - 6" (UPRR & BNSF) vertically above top of rail.

For construction clearance less than listed above, obtain local Railroad Operating Unit review and approval.

3.08 APPROVAL OF REDUCED CLEARANCES

A. Maintain minimum track clearances during construction as specified in Section 3.07.

B. Submit any proposed infringement on the specified minimum clearances to the Railroad Designated Representative through TxDOT at least 30 days in advance of the work. Do not proceed with such infringement without written approval by the Railroad Designated Representative.

C. Do not commence work involving an approved infringement without receiving written assurance from the Railroad Designated Representative that arrangements have been made for any necessary flagging service.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		219

3.09 MAINTENANCE OF RAILROAD FACILITIES

A. Maintain all ditches and drainage structures free of silt or other obstructions resulting from Contractor's operations. Repair eroded areas and any other damage within Railroad Right of Way and repair any other damage to the property of the Railroad, or its tenants.

B. Perform all such maintenance and repair of damages due to the Contractors's operations at Contractor's expense.

C. Submit a proposed method of erosion control for review by the Railroad prior to beginning any grading on the project site. Comply with all applicable local, state and federal regulations when developing and implementing such erosion control.

3.10 SITE INSPECTIONS BY RAILROAD's DESIGNATED REPRESENTATIVE

A. In addition to the office reviews of construction submittals, site inspections may be performed by the Railroad Designated Representative at significant points during construction, including the following if applicable:
   1. Pre-construction meetings.
   2. Pile driving/drilling of caissons or drilled shafts.
   3. Reinforcement and concrete placement for railroad bridge substructure and/or superstructure.
   4. Erection of precast concrete or steel bridge superstructure.
   5. Placement of waterproofing (prior to placing ballast on bridge deck).
   6. Completion of the bridge structure.

B. Site inspection is not limited to the milestone events listed above. Site visits to check progress of the work may be performed at any time throughout the construction as deemed necessary by the Railroad.

C. Provide a detailed construction schedule, including the proposed temporary horizontal and vertical clearances and construction sequence for all work to TxDOT for submittal to the Railroad Designated Representative for review prior to commencement of work. Include the anticipated dates when the above listed events will occur. Update this schedule for the above listed events as necessary and each month at a minimum to allow the Railroad to schedule site inspections.

3.11 RAILROAD REPRESENTATIVES

Railroad representatives, conductors, flag person or watch person will be provided by the Railroad at expense of TxDOT to protect Railroad facilities, property and movements of its trains or engines. In general, the Railroad will furnish such personnel or other protective services as follows:

A. When any part of any equipment is standing or being operated within 25 feet, measured horizontally, from nearest rail of any track on which trains may operate, or when any object is off the ground and any dimension thereof could extend inside the 25 foot limit, or when any erection or construction activities are in progress within such limits, regardless of elevation above or below track.

B. For any excavation below elevation of track subgrade if, in the opinion of the Railroad Designated Representative, track or other railroad facilities may be subject to settlement or movement.

C. During any clearing, grubbing, excavation or grading in proximity to railroad facilities, which, in the opinion of the Railroad Designated Representative, may endanger railroad facilities or operations.

D. During any Contractor's operations when, in the opinion of the Railroad Designated Representative, railroad facilities, including, but not limited to, tracks, buildings, signals, wire lines, or pipe lines, may be endangered.

E. Arrange with the Railroad Designated Representative to provide the adequate number of flag persons to accomplish the work.

3.12 COMMUNICATIONS AND SIGNAL LINES

If required, the Railroad will rearrange its communications and signal lines, its grade crossing warning devices, train signals and tracks, and facilities that are in use and maintained by the Railroad's forces in connection with its operation at expense of TxDOT. This work by the Railroad will be done by its own forces and it is not a part of the Work under this Contract.

3.13 TRAFFIC CONTROL

Coordinate any operations that control traffic across or around railroad facilities with the Railroad Designated Representative.

3.14 CONSTRUCTION EXCAVATIONS AND BORING ACTIVITIES UNDER TRACK

A. Take special precaution and care in connection with excavating and shoring. Excavations for construction of footings, piers, columns, walls or other facilities that require shoring shall comply with requirements of TxDOT, OSHA, AREMA and Railroad "Guidelines for Temporary Shoring".

B. The project plans indicate whether there are fiber optic lines or other such telecommunications systems that require consideration. Regardless, contact the necessary call center to determine if such cable systems are present:

   UPRR 1-800-336-9193
   7:00 AM to 9:00 PM CST Monday-Friday except holidays,
   staffed 24 hrs/day for emergencies
   48 hrs notice required

   BNSF 1-800-533-2891
   24 hour number
   5 working days notice required

   KCS 1-800-344-8377
   Texas One Call, a 24 hour number
   48 hrs notice required, excluding weekends and holidays

   If a telecommunications system is buried anywhere on or near railroad property, coordinate with TxDOT, the Railroad and the Telecommunication Company(ies) to arrange for relocation or protective measures prior to beginning work on or near railroad property. Refer to the project General Notes for additional information.

C. Projects involving a boring or jack and bore operation under track such as drainage pipes or culverts and utilities require an installation plan reviewed and approved by the Railroad and TxDOT prior to proceeding with such construction. A railroad inspector and contractor assisted monitoring of ground and track movement is required to maintain safe passage of rail traffic. Stop installation and do not allow passage of trains if movements in excess of 1/4 inch vertical or horizontal is detected in the tracks. Immediately repair the damage to the satisfaction of TxDOT and the Railroad before proceeding.

3.15 RAILROAD FLAGGING

Per the Right of Entry Agreement for flagging, notify the Railroad Representative at least 10 working days in advance of Contractor's work and at least 30 working days in advance of any Contractor's work in which any person or equipment will be within 25 feet of nearest rail or as specified in the Contractor Right of Entry (CROE).

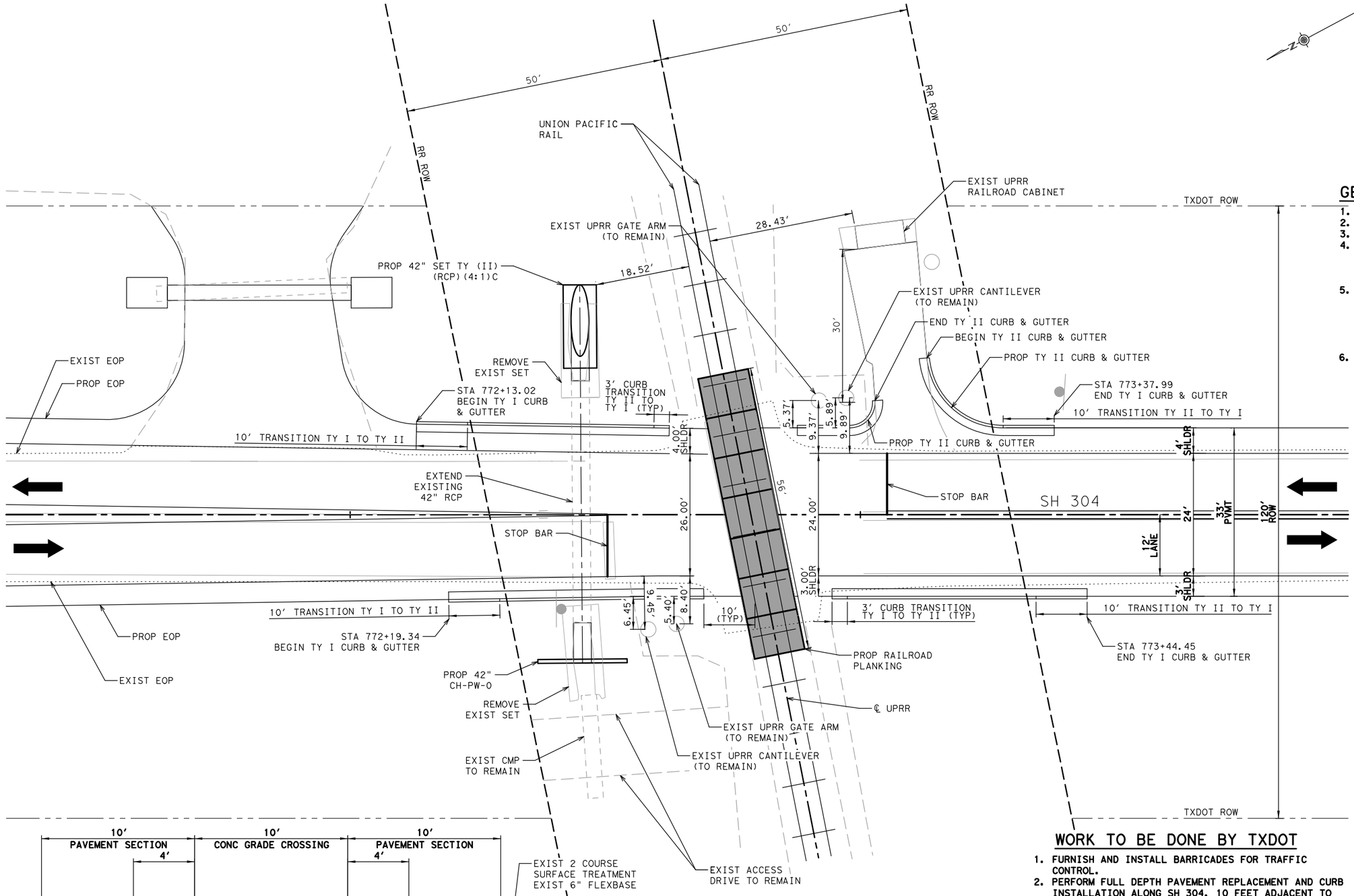
3.16 CLEANING OF RIGHT-OF-WAY

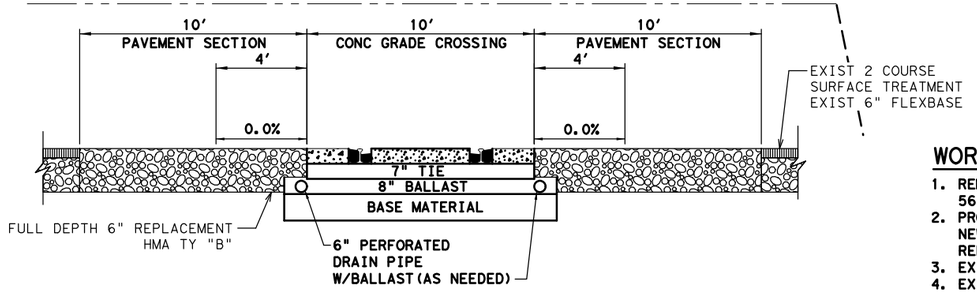
When work is complete, remove all tools, implements, and other materials brought into Railroad Right of Way and leave the right of Way in a clean and presentable condition to the satisfaction of TxDOT and the Railroad.

Texas Department of Transportation | Rail Division

RAILROAD REQUIREMENTS FOR NON-BRIDGE CONSTRUCTION PROJECTS

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS March 2020	0573	01	034	SH 304
	DIST	COUNTY		SHEET NO.
	AUS	BASTROP		220





CROSSING SURFACE CROSS SECTION

WORK TO BE DONE BY UP RAILROAD

1. REMOVE EXISTING RR PLANKING AND REPLACE WITH NEW 56' PLANKING.
2. PROVIDE ONSITE INSPECTION OF CONNECTION BETWEEN NEW PAVING AND EXISTING CONCRETE PLANKING (TO BE REPLACED WITH NEW).
3. EXISTING RAILROAD CANTILEVERS TO REMAIN IN SERVICE.
4. EXISTING UPRR GATE ARMS TO REMAIN IN SERVICE.

WORK TO BE DONE BY TXDOT

1. FURNISH AND INSTALL BARRICADES FOR TRAFFIC CONTROL.
2. PERFORM FULL DEPTH PAVEMENT REPLACEMENT AND CURB INSTALLATION ALONG SH 304, 10 FEET ADJACENT TO RAILROAD CONCRETE PLANKING TO AN ELEVATION MATCHING THE TOP OF THE CONCRETE PLANKING.
3. SCARIFY THE HMA TY "B" PAVEMENT REPLACEMENT AND FURNISH AND INSTALL 1.5" TY "D" HMA AND 1" TOM OVERLAY, TRANSITIONING FROM CONCRETE PLANKING TO SH 304 ROADWAY PROFILE PER PLANS. TOP OF TOM LAYER SHALL MATCH TOP OF CONCRETE PLANKING WITHIN THE 10 FOOT SPAN ADJACENT TO THE PLANKING. REFER TO PAVEMENT TRANSITION DETAIL IN THE PLANS FOR ADDITIONAL INFORMATION ON TRANSITION LENGTH AND LOCATION.
4. FURNISH AND INSTALL CULVERT EXTENSIONS AND END TREATMENTS.

LEGEND

TRAFFIC FLOW

CONCRETE PLANKING

GENERAL NOTES

1. 12 TRAINS PER DAY AT 40 MPH (MAX).
2. 2,099 VEHICLES PER DAY.
3. 65 MPH POSTED VEHICLE SPEED.
4. THE STATE'S CONTRACTOR FORCES SHALL INSTALL A CONTINUOUS ORANGE CONSTRUCTION BARRIER FENCE MARKER 26' FROM NEAREST UPRR RAIL.
5. THE STATE'S CONTRACTOR FORCES OR ITS EQUIPMENT SHALL NOT ENCROACH/BOOM BEYOND THE ORANGE CONSTRUCTION BARRIER FENCE OR WITHIN THE UPRR RIGHT-OF-WAY UNLESS DIRECTLY AUTHORIZED BY THE RAILROAD COMPANY.
6. ANY OTHER LOCATIONS WHERE WORK WILL OCCUR WITHIN 25' OF NEAREST RAIL WILL REQUIRE COORDINATION FOR FLAGGING WITH THE RAILROAD COMPANY.

SH 304
CSJ: 0573-01-034
UNION PACIFIC
RAILROAD
RRMP 11.73
DOT NO. 415746U

SCALE (IN FEET):
0 10 20
SCALE: 1" = 20'

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

Megan E. Houtchens

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr, Suite 200
Houston, Texas 77042
(713) 622-1444

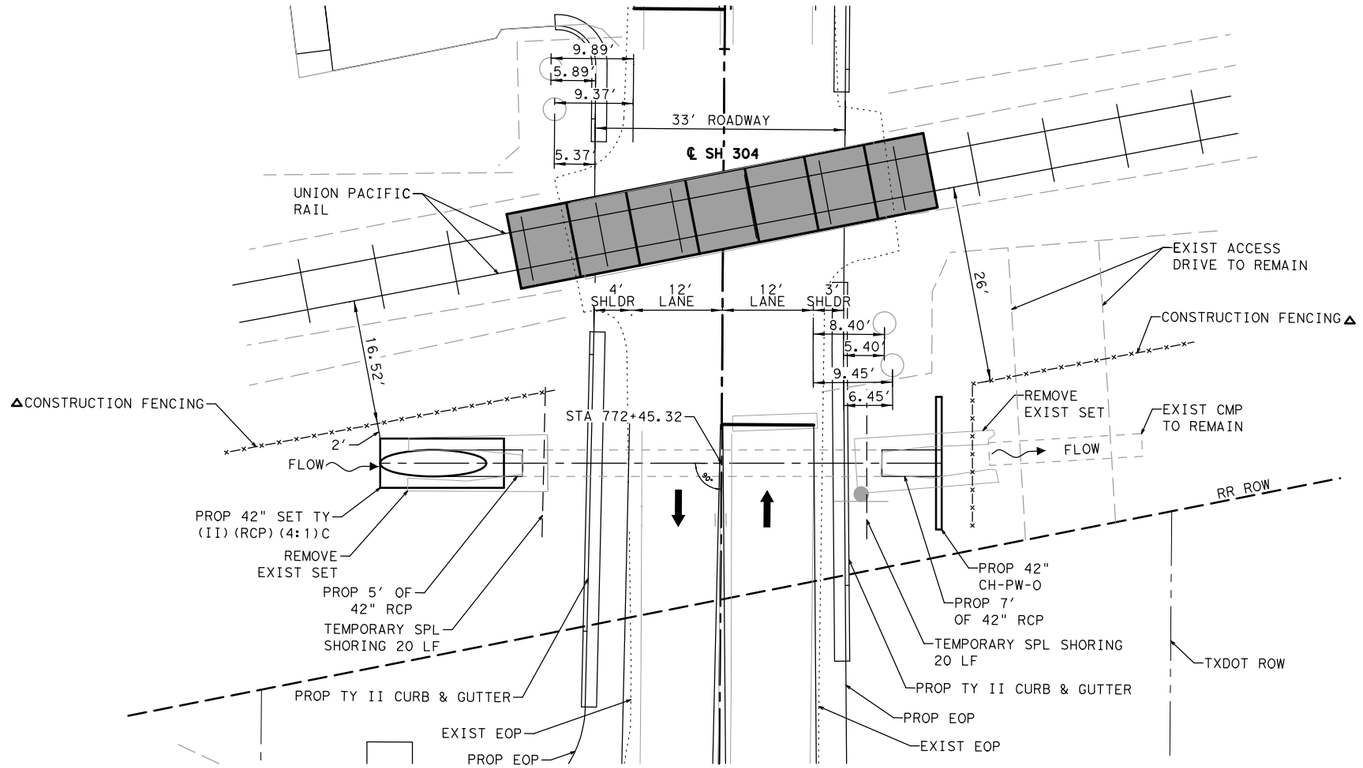
Texas Department of Transportation

SH 304
EXHIBIT A
PROJECT LAYOUT

SHEET 1 OF 2

2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	BASTROP		221

DATE:
FILE:



NOTE:

EXISTING 42" RCP

PROP: REMOVE EXIST SET'S.
EXTEND 5' LT & 8' RT 42" RCP

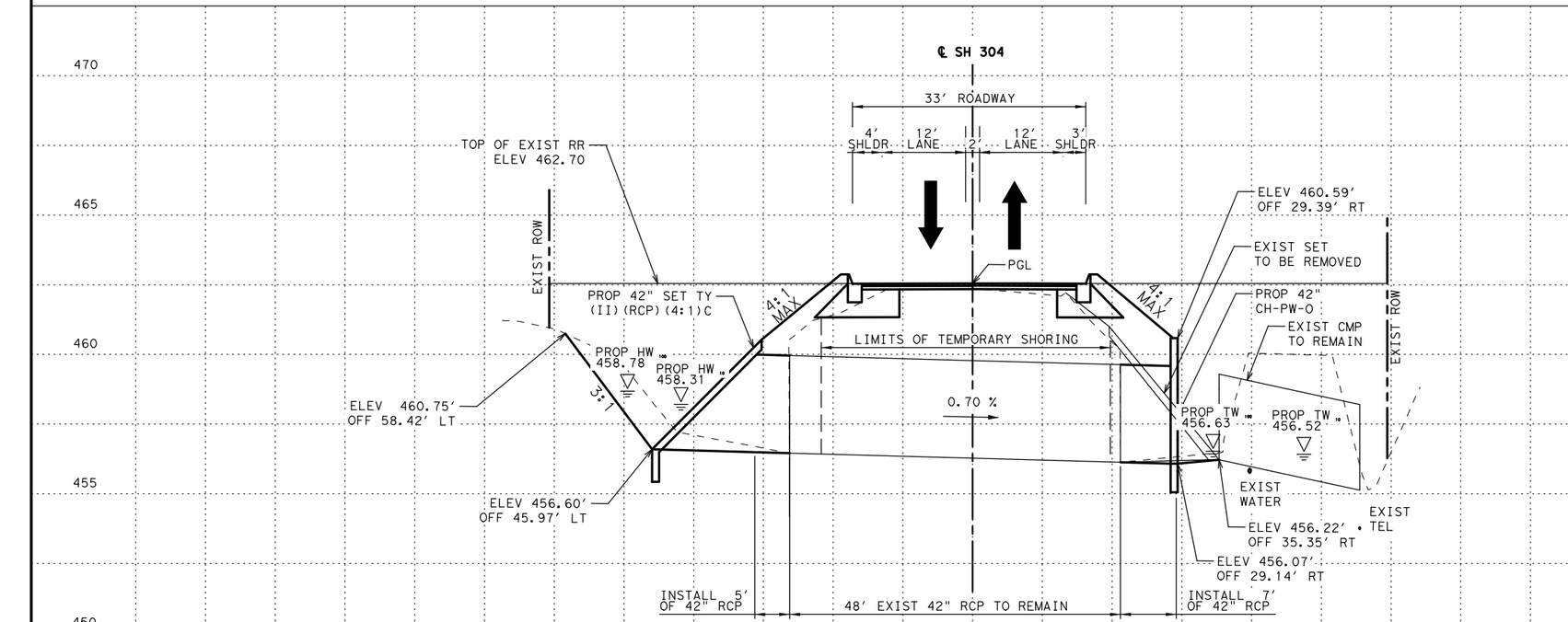
PLACE 42" SET TY (II) (RCP)
(4:1)C(LT)

PLACE CONCRETE HEADWALL WITH
PARALLEL WINGS 42" CH-PW-O (RT)

△EXTEND TEMPORARY CONSTRUCTION FENCING DURING THE CONSTRUCTION OF SET.

EXISTING TOP OF RR ELEVATION = 462.70
EXISTING 100-YR WSEL = 458.74
PROPOSED 100-YR WSEL = 458.78

THE ROADWAY CONSTRUCTION MAINTAINS THE 100 YR WSEL 3.92' BELOW THE EXISTING TOP OF THE RR TRACKS



STA 772+45.32

HORZ SCALE: 1" = 20'
VERT SCALE: 1" = 5'

10/14/2021

STATE OF TEXAS
MEGAN E. HOUTCHENS
114293
LICENSED
PROFESSIONAL ENGINEER

PGAL
TBPE REG. NO. F-2742
3131 Briarpark Dr. Suite 200
Houston, Texas 77042
(713) 622-1444

Texas Department of Transportation

SH 304
EXHIBIT A
CULVERT LAYOUT

SHEET 2 OF 2

2022		CONT	SECT	JOB	HIGHWAY
DS:	CK:	0573	01	034	SH 304
		DIST	COUNTY		SHEET NO.
DW:	CK:	AUS	BASTROP		222

DATE:
FILE: