100% SUBMITTAL

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	STP 2024(593)VRU		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	1
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

INDEX OF SHEETS

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT

PROJECT NO. STP 2024(593)VRU
CSJ: 0171-05-101

TARRANT COUNTY
HIGHWAY: SH 199

DESIGN SPEED = 45 MPH
SH 199
A.D.T=SPECIFIED BELOW
HIGHWAY CLASSIFICATION: URBAN DIVIDED

DESIGN SPEED = 40 MPH
ROBERTS CUT OFF RD & SKYLINE DR
A.D.T. (2022) = 28190

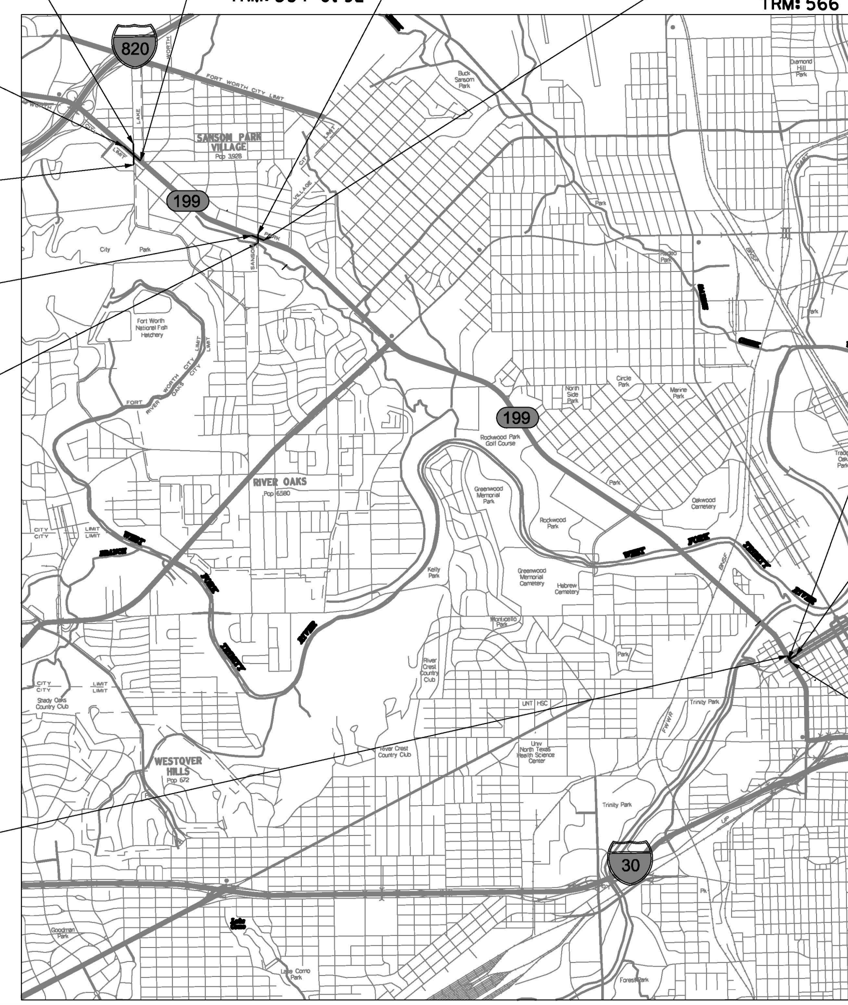
DESIGN SPEED = 30 MPH
BELKNAP ST
A.D.T. (2022) = 32290

LIMITS: FROM 0.1 MI. NW OF ROBERTS CUT OFF
TO 0.1 MI. S OF WEATHERFORD ST

FOR THE CONSTRUCTION OF INTERSECTION AND OPERATIONAL IMPROV WORK
CONSISTING OF FLEX PVMT REPAIR, CONC CURB, PVMNT MARKINGS AND TRAFFIC SIGNAL IMPROV

CSJ 0171-05-101 PROJECT LENGTH = 30,460.32 FT = 5.769 MI
NET LENGTH OF PROJECT = 30,460.32 FT = 5.769 MI

STATE OF TEXAS
MUHAMMAD UZAIR
100011
LICENSED
PROFESSIONAL ENGINEER
Muhammad Uzair
4/11/2024
F-2677



FINAL PLANS

LETTING DATE: ______________________
CONTRACTOR: ______________________
WORK BEGAN: ______________________
WORK COMPLETED: ______________________
WORK ACCEPTED: ______________________
CHANGE ORDERS: ______________________

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION
REQUIRED TDLR NO. EABPRJ: **TABS2024016575**

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014, AND THE CONTRACT PROVISION LISTED AND DATED AS FOLLOWS SHALL GOVERN ON THE PROJECT: REQUIRED CONTRACT PROVISTIONS FOR ALL FEDRAL-AID CONSTRUCTION CONTRACTS (FROM FHWA 1273, OCTOBER 23, 2023)

Texas Department of Transportation

SUBMITTED FOR LETTING: 4/19/2024
DocuSigned by:
7B89CC87CF28477...
AREA ENGINEER

RECOMENDED FOR LETTING: 4/22/2024
DocuSigned by:
7879B0B92E5D403...
DISTRICT DIRECTOR OF TRANSPORTATION PLANNING AND DEVELOPMENT

APPROVED FOR LETTING: 4/24/2024
DocuSigned by:
David M Salazar, P.E.
B741E64FAD82411...
DISTRICT ENGINEER

PLOT DRIVER: V8i_BAKER_WIN_BW_PDF.pltcfg
PENTABLE: 193605_SH 199_TxDOT_FTW_PSE.tbl
SCALE: 1:6666.67
USER: AMohammed
FILE: ...\1. General\SH199TS-01.dgn
DATE: 4/11/2024 TIME: 1:26:03 PM

100% SUBMITTAL

INDEX OF SHEETS

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "#" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

NAME _____ DATE 4/11/2024

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

NAME Elizabeth Shelton DATE 4/11/2024

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "$" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

NAME Paul E Stellians, PE DATE 4/11/2024

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "%" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

NAME _____ DATE 4/11/2024

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650, Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

Texas Department of Transportation

SH 199
INDEX OF SHEETS

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	2
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

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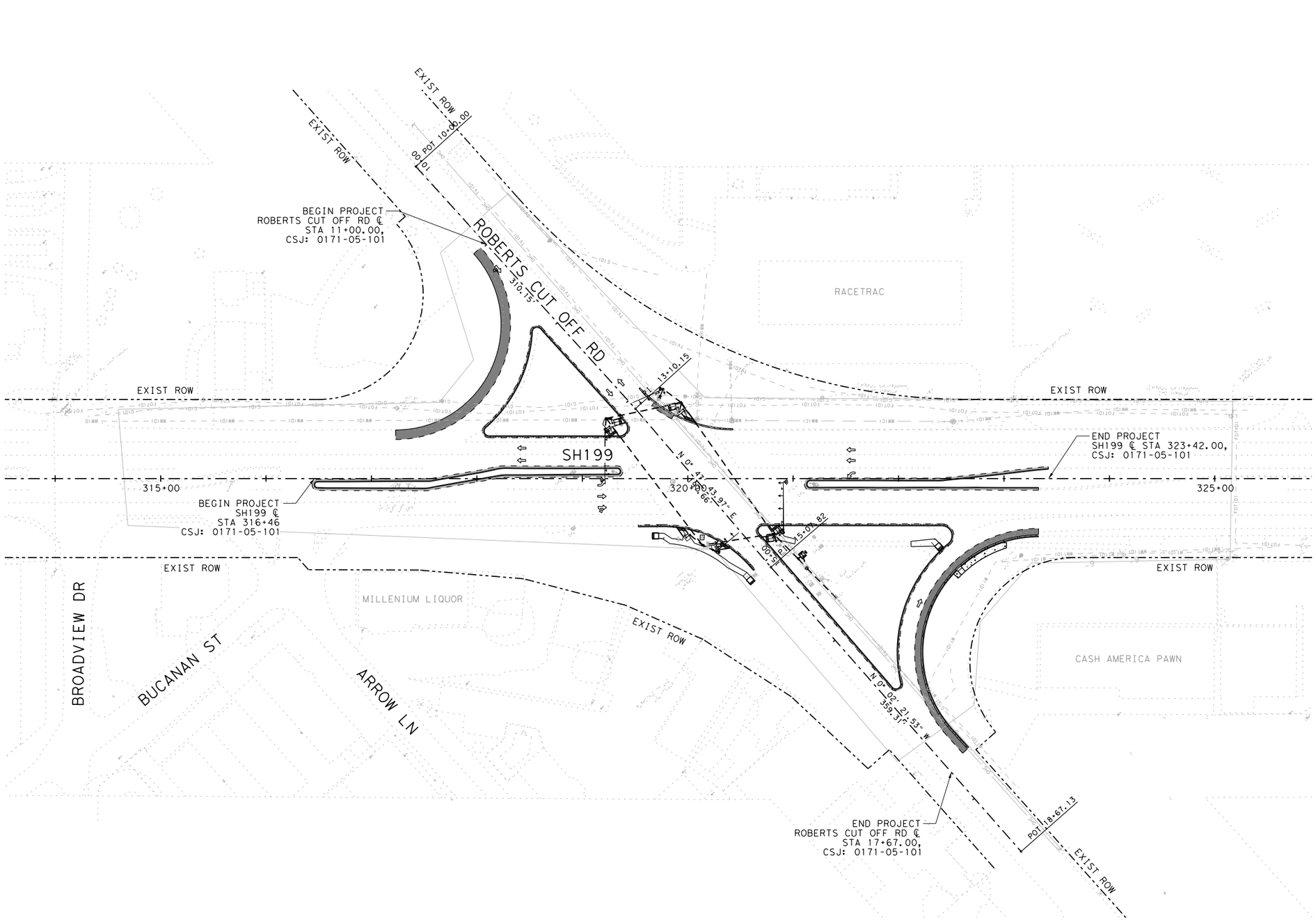
100% SUBMITTAL



NOTES:
1. ALL STATIONING AND OFFSETS REFER TO SH199 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING SHEETS FOR SIGNING AND STRIPING INFORMATION.
3. REFER TO "HORIZONTAL DATA" SHEETS FOR ADDITIONAL INFORMATION.
4. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.
5. ROW LINES ARE APPROXIMATE.

0′ 50′ 100′
SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650,
Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

Texas Department of Transportation

SH 199
PROJECT LAYOUT
ROBERTS CUT OFF RD

SHEET 1 OF 3

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	3
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

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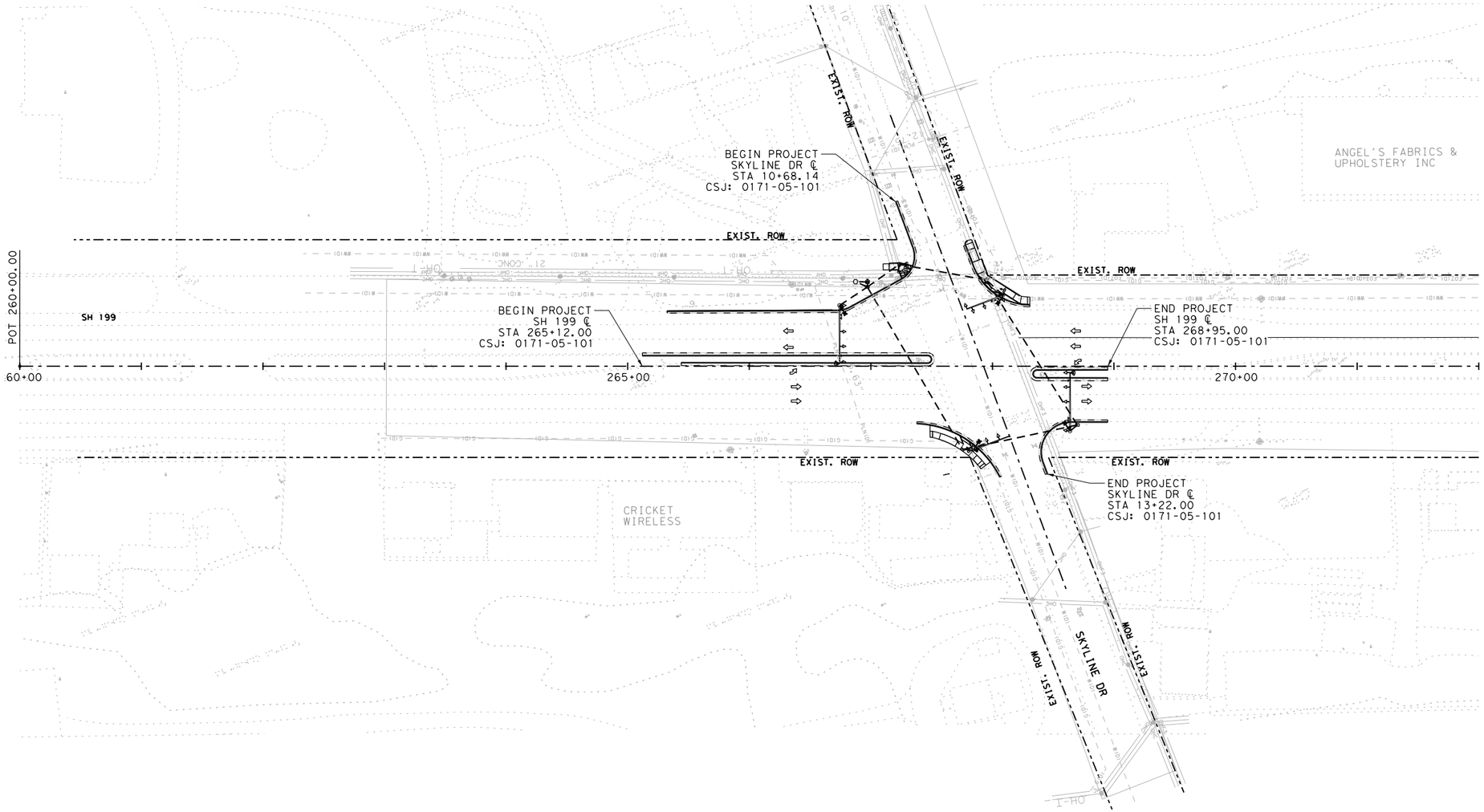
100% SUBMITTAL



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5. ROW LINES ARE APPROXIMATE.

0′ 50′ 100′
SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
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Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

SH 199

PROJECT LAYOUT

SKYLINE DR

SHEET 2 OF 3

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	4
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

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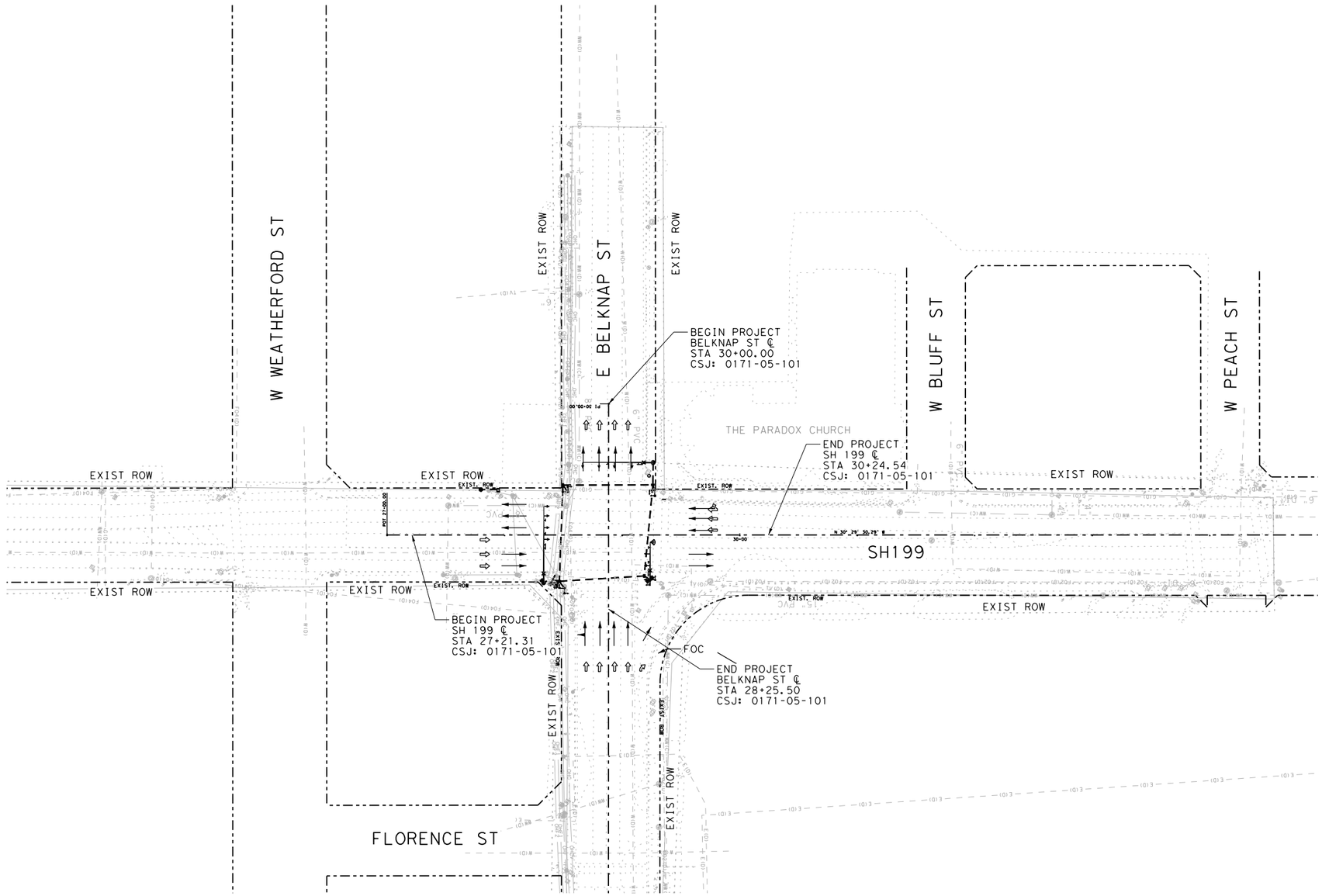
100% SUBMITTAL



NOTES:
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0′ 50′ 100′
SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650, Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

SH 199
PROJECT LAYOUT
E BELKNAP ST

SHEET 3 OF 3

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	5
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

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PENTABLE:193605_SH 199_TxDOT_FTW_PSE.tbl
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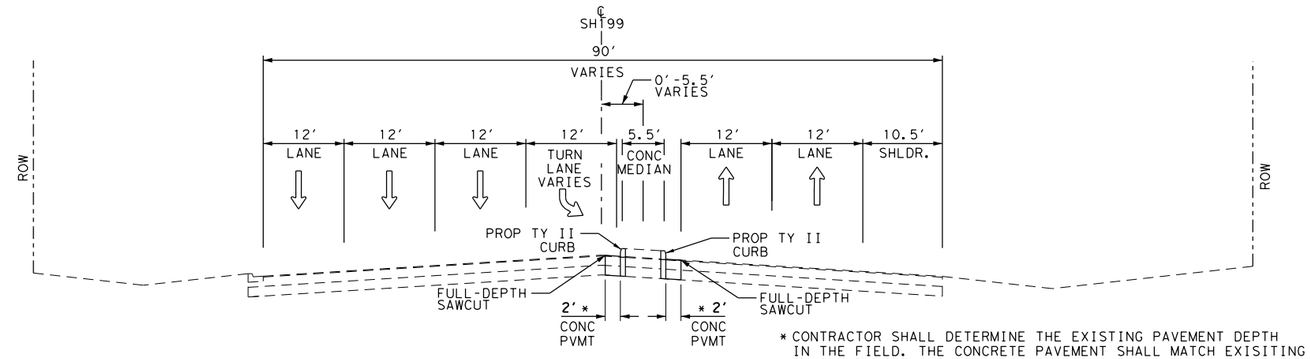
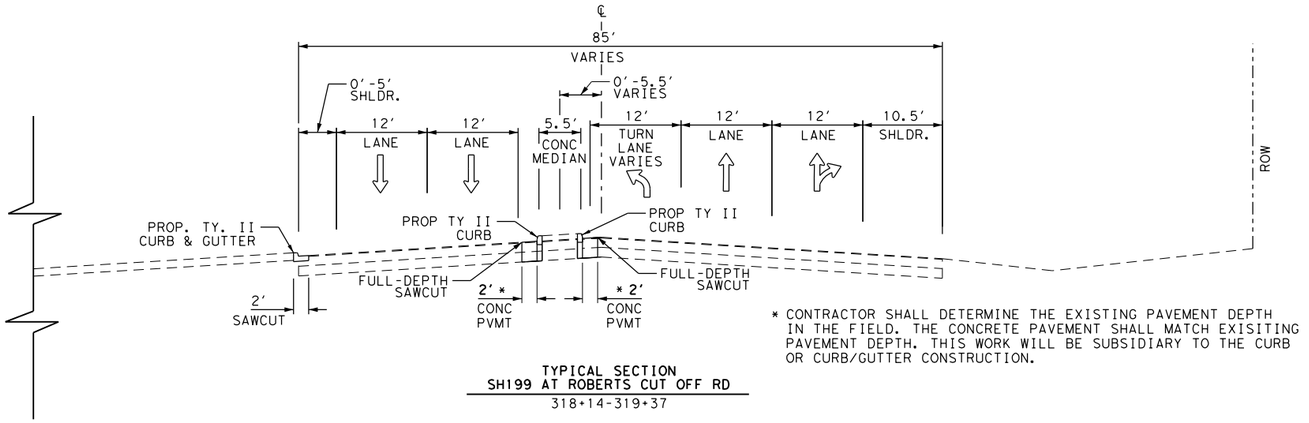


* CONTRACTOR SHALL DETERMINE THE EXISTING PAVEMENT DEPTH IN THE FIELD. THE CONCRETE PAVEMENT SHALL MATCH EXISITING PAVEMENT DEPTH. THIS WORK WILL BE SUBSIDIARY TO THE CURB OR CURB/GUTTER CONSTRUCTION.

TYPICAL SECTION
SH199 AT ROBERTS CUT OFF RD
316+46-318+14



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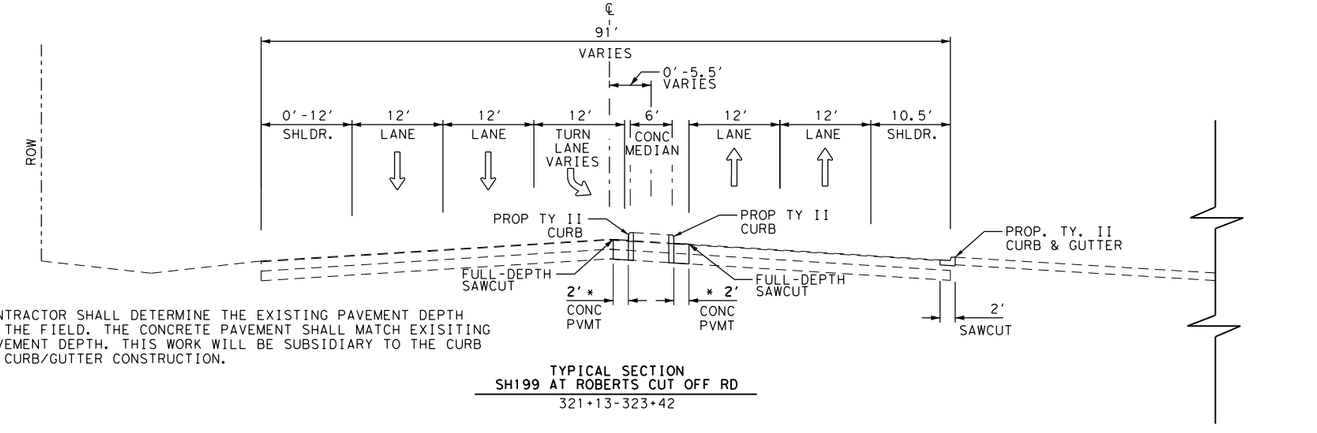
TYPICAL SECTION
SH199 AT ROBERTS CUT OFF RD
318+14-319+37



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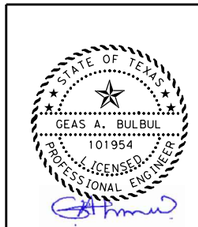
TYPICAL SECTION
SH199 AT ROBERTS CUT OFF RD
321+13-323+42

LEGEND

⇦ TRAFFIC FLOW

NOT TO SCALE



4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650,
Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

SH 199

PROPOSED AND EXISTING

TYPICAL SECTIONS

ROBERTS CUT OFF INTERSECTION

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	6
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

100% SUBMITTAL

PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.pltcfg
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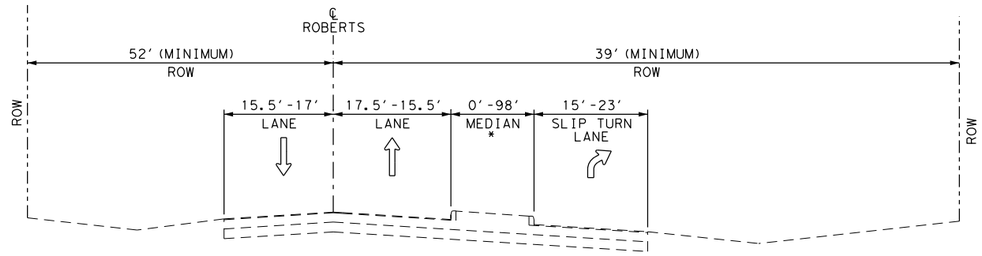
USER:Cory.Colley

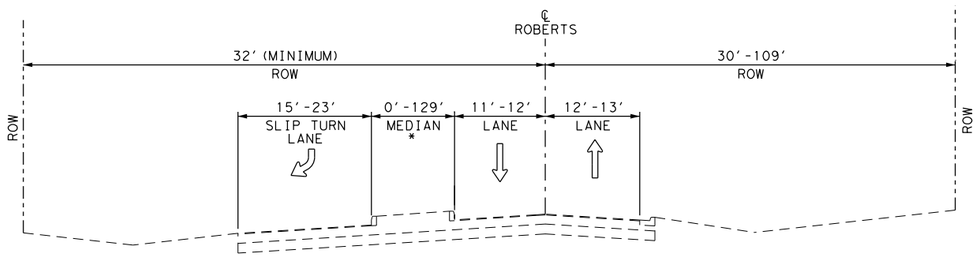
LEGEND

⇦ TRAFFIC FLOW



* MEDIAN STATION RANGE
11+95.01-13+21.61

EXISTING TYPICAL SECTION
ROBERTS CUT OFF RD AT SH199
11+00.00-13+23.81



* MEDIAN STATION RANGE
14+83.81-16+66.98

EXISTING TYPICAL SECTION
ROBERTS CUT OFF RD AT SH199
14+69.35-17+66.37

NOT TO SCALE

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650,
Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

Texas Department of Transportation

SH 199

EXISTING TYPICAL SECTIONS

ROBERTS CUTOFF RD

AT SH199

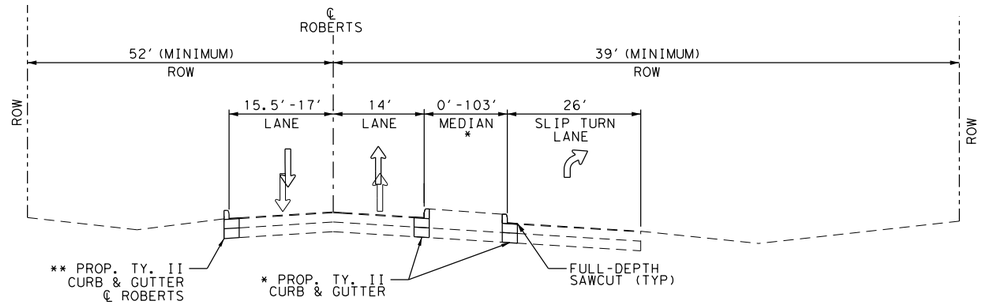
SHEET 1 OF 1

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	7
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

100% SUBMITTAL

LEGEND

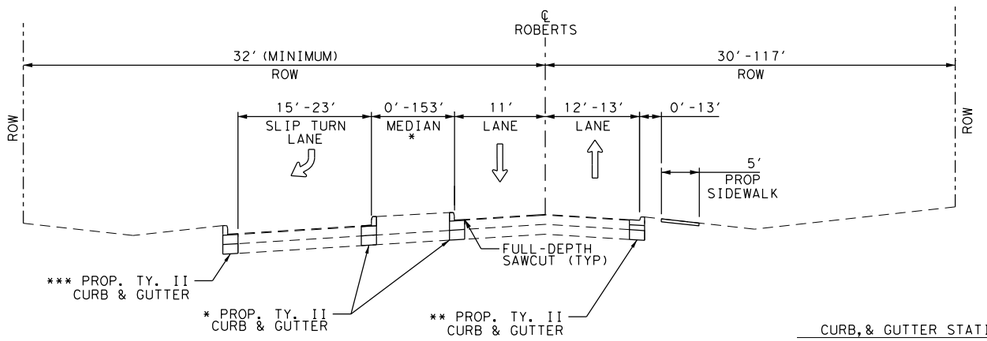
⇦ TRAFFIC FLOW



PROPPOSED TYPICAL SECTION
ROBERTS CUT OFF RD AT SH199
11+00.00-13+23.81

CURB & GUTTER STATION RANGES
*STA 11+88.49 - STA 13+23.81
**STA 13+00.00 - STA 13+84.48

NOTE:
CONTRACTOR SHALL DETERMINE THE EXISTING PAVEMENT DEPTH IN THE FIELD. THE CONCRETE PAVEMENT SHALL MATCH EXISITING PAVEMENT DEPTH. THIS WORK WILL BE SUBSIDIARY TO THE CURB OR CURB/GUTTER CONSTRUCTION.



PROPOSED TYPICAL SECTION
ROBERTS CUT OFF RD AT SH199
14+69.35-17+66.37

CURB,& GUTTER STATION RANGES
*STA 14+83.81 - STA 16+75.19
**STA 13+95.08 - STA 14+46.81
***STA 16+23.96 - STA 17+66.37

NOTE:
CONTRACTOR SHALL DETERMINE THE EXISTING PAVEMENT DEPTH IN THE FIELD. THE CONCRETE PAVEMENT SHALL MATCH EXISITING PAVEMENT DEPTH. THIS WORK WILL BE SUBSIDIARY TO THE CURB OR CURB/GUTTER CONSTRUCTION.

NOT TO SCALE

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650,
Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

Texas Department of Transportation

SH 199

PROPOSED TYPICAL SECTIONS

ROBERTS CUT OFF RD

AT SH199

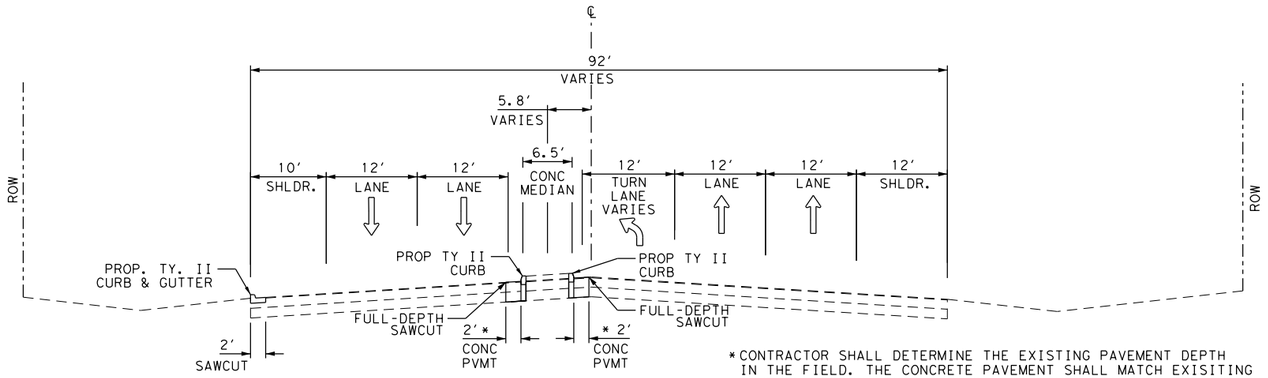
SHEET 1 OF 1

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	8
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

100% SUBMITTAL

LEGEND

⇦ TRAFFIC FLOW



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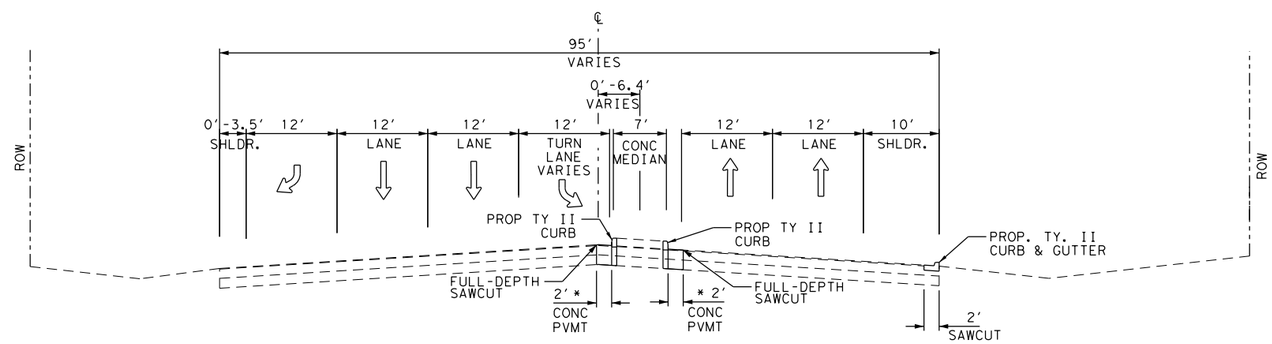
TYPICAL SECTION
SH199 AT SKYLINE DR
265+12-267+50



TYPICAL SECTION
SH199 AT SKYLINE DR
268+33-268+95

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NOT TO SCALE

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650,
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MBAKERINTL.COM
TBPE Registration No. F-2677

Texas Department of Transportation

SH 199

PROPOSED AND EXISTING

TYPICAL SECTIONS

SKYLINE DR INTERSECTION

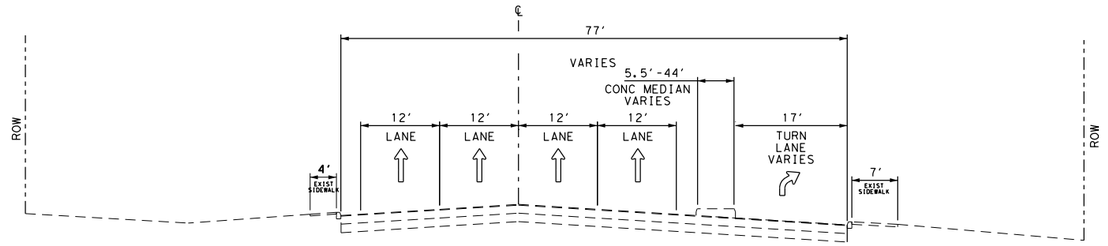
SHEET 1 OF 1

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	9
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

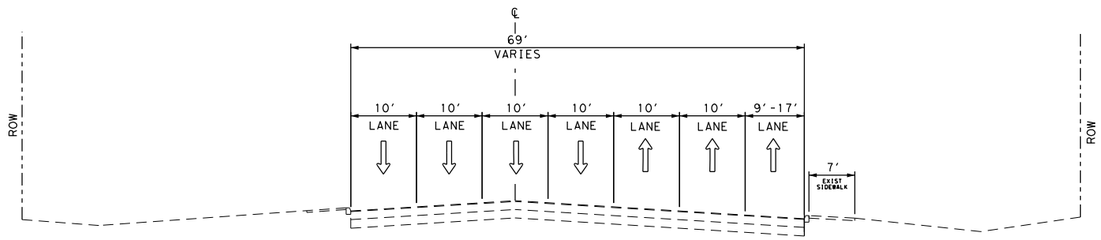
100% SUBMITTAL

LEGEND

⇦ TRAFFIC FLOW



TYPICAL SECTION
BELKNAP ST
28+14-28+58



TYPICAL SECTION
SH 199 AT BELKNAP ST
29+55-30+25

NOT TO SCALE

GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650,
Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

Texas Department of Transportation

SH 199

EXISTING

TYPICAL SECTIONS

BELKNAP ST INTERSECTION

SHEET 1 OF 1

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	10
MBI	0171	05	101	
VERIFIED BY				
MBI				

Specification Data

Special Notes

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

Area Engineer's Email: Minh.Tran@txdot.gov
Assistant Area Engineer's Email: Alfredo.Luera@txdot.gov
Design Manager's Email: Sam.Yacoub@txdot.gov

Submit any questions about this project via the Letting Pre-Bid Q&A web page, located at: https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors

The Letting Pre-Bid Q&A web page for each project can be accessed by scrolling or filtering the dashboard using the controls on the left side to navigate to the project. Hover over the blue hyperlink of the project to view the Q&A and click on the link in the window that pops up.

Electronic files containing project related design information will continue to be placed in the following FTP site:

Index of /pub/txdot-info/Pre-Letting Responses (state.tx.us)

The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

Check this site for new information. Notices of new postings will not be sent out by the Engineer.

All files in the FTP site are subject to the License Agreement shown on the FTP site.

The data located in these files is for non-construction purposes.

Access is read-only.

For Q&A's on Proposals navigate to https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors. Use the dashboard to navigate to the project you are interested in by scrolling or filtering the dashboard using the controls on the left. Hover over the blue hyperlink for the project you want to view the Q&A for and click on the link in the window that pops up.

Modifications to Lane Closure / Work Restrictions:

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Submit a request in writing for approval by the Engineer a minimum of 10 days in advance of implementing a change to lane closure restrictions.

When deemed necessary, the Engineer will lengthen, shorten, or otherwise modify lane closure restrictions as traffic conditions warrant.

When deemed necessary, the Engineer will modify the list of major events when new events develop, existing events are rescheduled, or when warranted.

Special Events/ Special Situations will be handled on a case-by-case basis. No work restricting lane closures is allowed from 3 PM a day before to 9 AM the day after the Special Event or Special Situation.

Remove all existing fences within the right of way and remove and replace all existing fences within easements where such fences conflict with the work. Protect the remaining fence from damage due to slacking. Erect temporary fencing in the easement areas as necessary to secure the property. Provide at least one week notice to the property owner prior to removing or relocating the fence. Restore permanent fencing to an equal or better condition.

Provide all-weather surface for temporary ingress and egress to adjacent property, as directed. Materials, labor, equipment and incidentals necessary to provide temporary ingress and egress will not be paid for directly, but will be subsidiary to the various bid items.

Where necessary, the governing slopes indicated herein may be varied from the limits shown, to the extent approved.

Locations and lengths of all private entrances are approximate only. The actual locations, lengths, lines and grades are to be determined by the Engineer and shall conform to the regulations of The City of Fort Worth.

Do not discolor or damage existing curb and curb and gutter during construction operations. In the event of discoloration or damage, clean or repair as directed.

Remove the grass from the crown of shoulders or pavement edges by blading or other approved methods. Payment for this work will not be made directly, but will be subsidiary to the various items of the contract.

Provide temporary drain openings at all low points or other drainage structures, as required, at the Contractor's expense.

Remove any obstructions to existing drainage due to the contractor's operations, as required, at the Contractor's expense.

Item 4 – Scope of Work

Reimbursement for project overhead will not be considered until project completion has extended beyond the original Contract Time.

Item 5. Control of the Work

When supplementary bridge plans, shop drawings, shop details, erection drawings, working drawings, forming plans, or other drawings are required, prepare and submit drawings on sheets 8-1/2 by 11 inches, 17 by 22 inches, or full size drawings reduced to half scale if completely legible. If, in the opinion of the Engineer, the drawings are not completely legible, prepare and submit on sheets 22 by 34 inches, with a 1-1/2 inch left margin, and 1/2 inch top, right, and bottom margins.

Submit all sheets with a title in the lower right hand corner. The title must include the sheet index data shown on the lower right corner of the project plans, name of the structure or element or stream, sheet numbering for the shop drawings, name of the fabricator and the name of the Contractor.

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.

Item 6. Control of Materials

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

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

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

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

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Item 7. Legal Relations and Responsibilities

Do not initiate activities in a project specific location (PSL) associated with a U.S. Army Corps of Engineers (USACE) permit area that has 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. "Associated" as defined here means materials are delivered to or from the PSL. The permit area includes all waters of the U.S. or associated wetlands affected by activities associated with this project. Special restrictions may be required for such work. The contractor will be responsible for all consultations with the USACE regarding activities, including project specific locations (PSLs) that have not been previously evaluated by the USACE. Provide the Department with a copy of all consultations or approvals from the USACE prior to initiating activities.

The Contractor may proceed with activities in PSLs that do not affect a USACE permit area if a self-determination has been made that the PSL is non-jurisdictional or proper USACE clearances have been obtained in jurisdictional areas or have been previously evaluated by the USACE as part of the permit review of this project. The contractor is solely responsible for documenting any determinations that their activities do not affect a USACE permit area. Maintain copies of these determinations for review by the Department or any regulatory agency.

Document and coordinate with the USACE, if required, prior to any excavation hauled from or embankment hauled into a USACE permit area by either (1) or (2) below.

(1) Restricted Use of Materials for Previously Evaluated Permit Areas. Document both the project specific location (PSL) and its authorization. Maintain copies for review by the Department or any regulatory agency. When an area within the project limits has been evaluated by the USACE as part of the permit process for this project:

a. Suitable excavation of required material in the areas shown on the plans and cross sections as specified in Item 110 is used for permanent or temporary fill (Item 132, Embankment) within a USACE permit area;
b. Suitable embankment (Item 132) from within the USACE permit area is used as fill within a USACE evaluated area; and,
c. Unsuitable excavation or excess excavation ["Waste"] (Item 110) that is disposed of at a location approved by the Engineer within a USACE evaluated area.

(2) Contractor Materials from Areas Other than Previously Evaluated Areas. Provide the Department with a copy of all USACE coordination or approvals prior to initiating any activities for an area within the project limits that has not been evaluated by the USACE or for any off right of way locations used for the following, but not limited to haul roads, equipment staging areas, borrow and disposal sites:

a. Item 132, Embankment, used for temporary or permanent fill within a USACE permit area; and,

b. Unsuitable excavation or excess excavation ["Waste"] (Item 110, Excavation) that is disposed of outside a USACE evaluated area.

The total area disturbed for this project is 0.28 acres. The disturbed area in this project, all project locations in the Contract, and the Contractor project specific locations (PSLs), within 1 mile of the project limits, for the Contract will further establish the authorization requirements for storm water discharges. The Department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction activities shown on the plans. The Contractor is to obtain required authorization from the TCEQ for Contractor PSLs for construction support activities on or off the right of way. When the total area disturbed in the Contract and PSLs within 1 mile of the project limits exceeds 5 acres, provide a copy of the Contractor NOI for PSLs on the right of way to the Engineer and to the local government that operates a separate storm sewer system.

When a bridge deck is milled, seal coated and overlaid, remove excess material. Do not just broom to the sides of the bridge, under guardrail, etc. Cover or protect all sealed expansion joints and rails on bridges and all railroad tracks encountered as approved. Clean and repair all of these features if they weren't properly protected at contractor's expense. This work is subsidiary work to applicable bid items.

Prevention of Migratory Bird Nesting

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

Structures

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

1. By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the bridge and culverts. The Engineer will inspect the bridges and culverts for nest building activity. If swallows begin nest building, scrape or wash down all nest sites. Perform these activities daily unless the Engineer determines

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the need to do this work more frequently. Remove nests and mud through October 1 or until bridge and culvert construction operations are completed.

2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts.

No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows. This work is subsidiary to the various bid items.

The following Holiday/Event lane closure restriction requirements apply to this project:
No work that restricts or interferes with traffic shall be allowed between 3 PM on the day preceding a Holiday or Event and 9 AM on the day after the Holiday or Event.

Holiday Lane Closure Restrictions	
New Year's Eve and New Year's Day (December 31 through January 1)	3 PM December 30 through 9 AM January 2
Easter Holiday Weekend (Friday through Sunday)	3PM Thursday through 9 AM Monday
Memorial Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Independence Day (July 3 through July 5)	3 PM July 2 through 9 AM July 6
Labor Day Weekend (Friday through Monday)	3 PM Thursday through 9 AM Tuesday
Thanksgiving Holiday (Wednesday through Sunday)	3 PM Tuesday through 9 AM Monday
Christmas Holiday (December 23 through December 26)	3 PM December 22 through 9 AM December 27

Plan work schedules around the appropriate dates above to ensure productive work is performed without lane closures.

Event Lane Closure Restrictions 3 PM the day before Event to 9 AM the day after the Event			
NASCAR Races at Texas Motor Speedway (generally 3 events):	NASCAR Nationwide and Sprint Cup Series (Held in late	NASCAR Nationwide and Sprint Cup Series (Held in Late October/early	Indy Series Racing and NASCAR Truck Series (Held in

	March/early April)	November)	June)
Within one mile radius of major retail traffic generators i.e. malls (Thanksgiving Day through January 2)			
Fort Worth Stock Show and Rodeo			
Arlington Entertainment District			
Grapevine Festivals (Including but not limited to: Carol of Lights, Black Friday Weekend, Christmas Parade, and weekends during Christmas Capital of Texas)			
MayFest			
Weatherford Peach Festival			

Item 8. Prosecution and Progress

Working days will be computed and charged in accordance with Section 8.3.1.1, 'Five-Day Workweek.'

The number of working days for final acceptance will be 14 working days.

Substantially complete the project in 107 working days.

Item 502. Barricades, Signs, and Traffic Handling

The contractor force account 'safety contingency' that has been established for this project is intended to be utilized for work zone enhancements to improve the effectiveness of the traffic control plan that could typically 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.

Permanent signs may be installed when construction in an area is complete and they will not conflict with the traffic control plan for the remainder of the job.

Existing signs are to remain as long as they do not interfere with construction and they do not conflict with the traffic control plan.

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Any sign not detailed in the plans but called for in the layout will be as shown in the current "Standard Highway Sign Designs for Texas".

When traffic is obstructed, arrange warning devices in accordance with the latest edition of the "Texas Manual on Uniform Traffic Control Devices".

Cover or remove any work zone signs when work or condition referenced is not occurring.

Do not place barricades, signs, or any other traffic control devices where they interfere with sight distance at driveways or side streets. Provide access to all driveways during all phases of construction unless otherwise noted in the plans or as directed.

Item 504. Field Office and Laboratory

Furnish the following structures for this project:

Type	No.
Field Lab (Ty. A)	1
Field Office and Lab (Ty. B)	1
Field Lab (Ty. D)	1

Field office will require at least a 3' by 3' landing on the outside of each exit door and a concrete landing at the bottom of exit stairs. The concrete landing will be the width of the stairs and extend at least 4' in front of the bottom step.

Furnish the following for the Field Office structure:

Item	No.
Laptop Computer	1
Printer	1
Internet Service	1

Provide Laptop Computer with an Intel i5 (2.8 GHz) processor, or greater.

Integrated printer/copier/scanner/fax units will be permitted.

Item 506. Temporary Erosion, Sedimentation, and Environmental Controls

The SW3P for this project will consist of using the following items as directed:

- Construction exits
- Erosion control logs

Remove accumulated sediment or replace SW3P controls when the capacity has been reduced by 50% or when the depth of sediment at the control structure exceeds one foot.

Item 512. Portable Concrete Traffic Barrier

"*Furnish and Install*" barrier in compliance with Concrete Safety Barrier (CSB), Single-Slope Concrete Barrier (SSCB), or Low Profile Concrete Barrier (LPCB) standards as shown on the plans.

Furnish Class H Concrete with a minimum 28 day compressive strength of 3,600 psi.

Provide the hardware assemblies to join barrier sections, including barrier from stockpile.

Provide welded tie bar assembly at the assembly joints when using slotted-end PCTB as shown on Fort Worth Standard PCTB(1)-03(FW) joint tie details.

For permanent installations, grout the joints with an approved non-shrink grout material when using slotted-end PCTB.

Provide (2) 1-1/4" x 2'2" threaded rods, (4) standard USS washers, grade 5, (4) 1-1/4" hex nuts, and (2) 5" x 10" x 3/8" plate washers for each section of LPCB.

Connection hardware will remain the property of the State upon completion of the project and will not be paid for directly but will be subsidiary to Item 512,"Portable Concrete Traffic Barrier". Deliver hardware to the location specified by the Engineer.

Delineate all barriers in accordance with Barricade and Construction (BC) Standard sheets. Barrier delineation will not be paid for directly, but will be subsidiary to Item 512,"Portable Concrete Traffic Barrier".

Remove and replace traffic barrier damaged by the traveling public and no longer serviceable as directed. Replace traffic barrier with Department-furnished barrier from designated stockpile as directed. Additional payment will be provided as compensation to remove and replace the traffic barrier damaged by the traveling public in accordance with Item 512. Return the damaged traffic barrier to the stockpile site as directed.

Items 530 And 531. Intersections, Driveways and Turnouts, and Sidewalks

The furnishing and installation of the sand cushion in proposed sidewalks, sidewalk ramps, and driveways will not be paid for directly but will be subsidiary to this bid item.

Item 618. Conduit

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After installing conduit and pulling conductor, leave a high tensile strength polyester fiber pull tape in the conduit for future use.

Item 620. Electrical Conductors

Clearly and permanently mark each illumination conductor installed in a signal pole as "ILLUMINATION" where it can be clearly seen from the hand hole. Use plastic zip ties with labeling plate to mark conductor.

Item 624. Ground Boxes

Slack conductors required by Standard Sheet ED(3) will be subsidiary to Item 624.

Concrete removal required for installation of ground boxes will be subsidiary to Item 624.

Ground all junction boxes mounted on bridges and underpasses with a ground rod in the nearest ground box.

Item 628. Electrical Services

Before installing any electrical service, consult with the appropriate utility company before beginning work and verify all metering equipment requirements with the provider have been met. Provide a commercial grade, meter base with by-pass switch if required by the utility company.

Contractor shall obtain 911 address and EISD from electric utility company then contact the TXDOT Signal Shop to receive the Contract Request for Electrical Service Meter form to complete and return. TXDOT will make application to the Electric Utility Company for service, unless otherwise maintained by the following Cities: Arlington, Bedford, Colleyville, Euless, Fort Worth, Grand Prairie, Grapevine, Hurst, Mansfield, North Richland Hills, and Weatherford.

Item 656. Foundations for Traffic Control Devices

Contractor shall stake foundation as shown on plans. Engineer or Engineers designee will verify and approve staked locations before installing foundations.

For traffic signal controller foundation, use reinforcing bars or deformed Welded Wire Reinforcing (WWR). Provide #3 reinforcing bars spaced at 16" Spaced Center-Center. Provide deformed Welded Wire Reinforcing (WWR) as 6x6-D3xD3. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.

Item 666. Reflectorized Pavement Markings with Retroreflective Requirements

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Collection of retroreflectivity readings using a mobile retroreflectometer is the preferred method. If retroreflectivity readings are collected using a portable or handheld unit, then measurement is defined as a collective average of at least 20 readings taken along a 200-foot test section. A minimum of three measurements will be required per mile of roadway. Measurements collected on a centerline stripe will be averaged separately for stripe in each direction of travel. A TxDOT inspector must witness the calibration and collection of all retro-reflectivity data.

Item 680. Installation of Highway Traffic Signals

Contractor shall contact Fort Worth District TMC 817-370-3661 prior to starting any signal modifications. Provide qualified personnel reachable by telephone and available to receive calls on a 24-hour basis. Respond to reported calls and make field assessment within 2 hours and make appropriate repairs within 24 hours.

Removal. Salvageable signal controllers and related equipment shall remain the property of TXDOT. Deliver to the TXDOT Signal Shop at 2501 SW Loop 820, Fort Worth.

Item 682. Vehicle and Pedestrian Signal Heads

Vehicle signal heads shall be yellow aluminum with 5 inch, black, aluminum, vented back plates unless otherwise shown on plans.

Signal heads shall be installed level and plumb and aimed as directed. Cover all signal faces until placed in operation.

All new mast arm mounted signal heads to be mounted horizontally.

Item 684. Traffic Signal Cables

Clearly and permanently mark each cable as shown on the plans (CABLE 1, etc.) at each signal head, ground box, terminal block, pole base and controller. Use plastic zip ties with labeling plate to mark cable.

Provide an extra 10' for each cable terminating in the controller cabinet and coil an extra 5' of cable in each ground box.

Terminate all electrical conductors from the controller (including spares) at the termination block in the signal pole hand hole.

Item 686. Traffic Signal Pole Assemblies (Steel)

Provide all signal poles from the same manufacturer.

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Dampers for LMA poles may be required as directed by the Engineer.

Plug any unused openings in the mast arms or poles with an approved material.

Item 688. Pedestrian Detectors and Vehicle Loop Detectors

For Accessible Pedestrian Signals. Provide a completed final system operational check list, completed schematic diagram for pushbutton station locations, and a completed default and field settings sheet as provided in the APS manufacturer's manual. Provide a qualified personnel for testing and set up of the equipment at the time of signal flash and turn on.

Estimate & Quantity Sheet

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						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0171-05-101**			
		PROJECT ID		**A00178882**			
		COUNTY		**Tarrant**			
		HIGHWAY		**SH 199**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	104-6015	REMOVING CONC (SIDEWALKS)	SY	21.000		21.000	
	104-6028	REMOVING CONC (MISC)	SY	1.000		1.000	
	104-6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	2,883.000		2,883.000	
	105-6041	REMOVING STAB BASE AND ASPH PAV(8")	SY	1,221.000		1,221.000	
	110-6003	EXCAVATION (SPECIAL)	CY	68.000		68.000	
	351-6004	FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")	SY	442.000		442.000	
	416-6031	DRILL SHAFT (TRF SIG POLE) (30 IN)	LF	60.000		60.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	56.000		56.000	
	416-6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	44.000		44.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	5.000		5.000	
	506-6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	3,120.000		3,120.000	
	506-6024	CONSTRUCTION EXITS (REMOVE)	SY	3,120.000		3,120.000	
	506-6040	BIODEG EROSN CONT LOGS (INSTL) (8")	LF	24.000		24.000	
	506-6041	BIODEG EROSN CONT LOGS (INSTL) (12")	LF	96.000		96.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	120.000		120.000	
	512-6009	PORT CTB (FUR & INST)(LOW PROF)(TY 1)	LF	1,960.000		1,960.000	
	512-6010	PORT CTB (FUR & INST)(LOW PROF)(TY 2)	LF	80.000		80.000	
	512-6057	PORT CTB (REMOVE)(LOW PROF)(TY 1)	LF	1,960.000		1,960.000	
	512-6058	PORT CTB (REMOVE)(LOW PROF)(TY 2)	LF	80.000		80.000	
	529-6002	CONC CURB (TY II)	LF	1,616.000		1,616.000	
	529-6008	CONC CURB & GUTTER (TY II)	LF	1,977.000		1,977.000	
	531-6002	CONC SIDEWALKS (5")	SY	101.000		101.000	
	531-6005	CURB RAMPS (TY 2)	EA	1.000		1.000	
	531-6010	CURB RAMPS (TY 7)	EA	15.000		15.000	
	618-6046	CONDT (PVC) (SCH 80) (2")	LF	170.000		170.000	
	618-6058	CONDT (PVC) (SCH 80) (4")	LF	435.000		435.000	
	618-6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	1,255.000		1,255.000	
	620-6009	ELEC CONDR (NO.6) BARE	LF	1,790.000		1,790.000	
	620-6010	ELEC CONDR (NO.6) INSULATED	LF	120.000		120.000	
	621-6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	2,150.000		2,150.000	
	624-6009	GROUND BOX TY D (162922)	EA	1.000		1.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	13.000		13.000	
	624-6028	REMOVE GROUND BOX	EA	16.000		16.000	
	628-6187	ELC SRV TY D 120/240 070(NS)SS(E)PS(U)	EA	3.000		3.000	
	628-6188	ELC SRV TY D 120/240 070(NS)SS(E)SP(O)	EA	1.000		1.000	
	662-6060	WK ZN PAV MRK REMOV (W)4"(BRK)	LF	1,955.000		1,955.000	

Estimate & Quantity Sheet

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				CONTROL SECTION JOB		0171-05-101		TOTAL EST.	TOTAL FINAL
				PROJECT ID		A00178882			
				COUNTY		Tarrant			
				HIGHWAY		SH 199			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL				
	662-6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	3,493.000		3,493.000			
	662-6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	600.000		600.000			
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	1,350.000		1,350.000			
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	1,490.000		1,490.000			
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	17.000		17.000			
	666-6057	REFL PAV MRK TY I(W)(DBL ARROW)(100MIL)	EA	1.000		1.000			
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	17.000		17.000			
	666-6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF	52.000		52.000			
	666-6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	800.000		800.000			
	666-6174	REFL PAV MRK TY II (W) 6" (SLD)	LF	2,370.000		2,370.000			
	666-6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	1,350.000		1,350.000			
	666-6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	1,490.000		1,490.000			
	666-6184	REFL PAV MRK TY II (W) (ARROW)	EA	17.000		17.000			
	666-6185	REFL PAV MRK TY II (W) (DBL ARROW)	EA	1.000		1.000			
	666-6192	REFL PAV MRK TY II (W) (WORD)	EA	17.000		17.000			
	666-6210	REFL PAV MRK TY II (Y) 6" (SLD)	LF	1,660.000		1,660.000			
	666-6214	REFL PAV MRK TY II (Y) 24" (SLD)	LF	52.000		52.000			
	666-6306	RE PM W/RET REQ TY I (W)6"(BRK)(100MIL)	LF	800.000		800.000			
	666-6309	RE PM W/RET REQ TY I (W)6"(SLD)(100MIL)	LF	2,370.000		2,370.000			
	666-6321	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)	LF	1,660.000		1,660.000			
	672-6009	REFL PAV MRKR TY II-A-A	EA	84.000		84.000			
	672-6010	REFL PAV MRKR TY II-C-R	EA	149.000		149.000			
	677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	4,830.000		4,830.000			
	677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	1,350.000		1,350.000			
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	703.000		703.000			
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	1,079.000		1,079.000			
	677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	14.000		14.000			
	677-6009	ELIM EXT PAV MRK & MRKS (DBL ARROW)	EA	1.000		1.000			
	677-6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	14.000		14.000			
	680-6002	INSTALL HWY TRF SIG (ISOLATED)	EA	3.000		3.000			
	680-6004	REMOVING TRAFFIC SIGNALS	EA	3.000		3.000			
	682-6001	VEH SIG SEC (12")LED(GRN)	EA	34.000		34.000			
	682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	10.000		10.000			
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	36.000		36.000			
	682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	8.000		8.000			
	682-6005	VEH SIG SEC (12")LED(RED)	EA	36.000		36.000			
	682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	4.000		4.000			

Estimate & Quantity Sheet

Texas Department of Transportation

CONTROLLING PROJECT ID 0171-05-101 **DISTRICT** Fort Worth **COUNTY** Tarrant
HIGHWAY SH 199

				CONTROL SECTION JOB		TOTAL EST.	TOTAL FINAL
				0171-05-101			
				PROJECT ID			
				A00178882			
				COUNTY			
				Tarrant			
				HIGHWAY			
				SH 199			
ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL		
	682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	20.000		20.000	
	682-6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	32.000		32.000	
	682-6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	6.000		6.000	
	684-6031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	200.000		200.000	
	684-6033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	4,430.000		4,430.000	
	684-6042	TRF SIG CBL (TY A)(14 AWG)(16 CONDR)	LF	1,670.000		1,670.000	
	684-6079	TRF SIG CBL (TY C)(12 AWG)(2 CONDR)	LF	2,700.000		2,700.000	
	686-6031	INS TRF SIG PL AM(S)1 ARM(28')LUM	EA	1.000		1.000	
	686-6035	INS TRF SIG PL AM(S)1 ARM(32')LUM	EA	4.000		4.000	
	686-6051	INS TRF SIG PL AM(S)1 ARM(48')LUM	EA	4.000		4.000	
	686-6063	INS TRF SIG PL AM(S)1 ARM(60')LUM	EA	1.000		1.000	
	686-6067	INS TRF SIG PL AM(S)1 ARM(65')LUM	EA	1.000		1.000	
	687-6001	PED POLE ASSEMBLY	EA	9.000		9.000	
	688-6001	PED DETECT PUSH BUTTON (APS)	EA	20.000		20.000	
	688-6003	PED DETECTOR CONTROLLER UNIT	EA	3.000		3.000	
	6045-6001	INSTALL OF (RADD) VEHICLE DETECTORS	EA	5.000		5.000	
	6046-6001	INSTALL OF (RPD) VEHICLE DETECTORS	EA	11.000		11.000	
	6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	3.000		3.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	

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PLOT DRIVER:V8i_BAKER_WIN_BW_PDF.plt<cfg
PENTABLE:193605_SH 199_TxDOT_FTW_PSE.tbl

SCALE:1:1
USER:pee66

FILE:...\2. TCP\199TCPQUANT.dgn
DATE:4/11/2024 TIME:10:34:15 AM

SUMMARY OF SIGNING ITEMS

LOCATION	512 6009	512 6010	512 6057	512 6058	662 6060	662 6063	662 6095
	PORT CTB (FUR & INST) (LOW PROF) (TY 1)	PORT CTB (FUR & INST) (LOW PROF) (TY 2)	PORT CTB (REMOVE) (LOW PROF) (TY 1)	PORT CTB (REMOVE) (LOW PROF) (TY 2)	WZ ZN PAV MRK REMOV (W)4"(BRK)	WZ ZN PAV MRK REMOV (W)4"(SLD)	WZ ZN PAV MRK REMOV (Y)4"(SLD)
	LF	LF	LF	LF	LF	LF	LF
SH 199 @ SKYLINE DRIVE	800	40	800	40	870	1866	0
SH 199 @ ROBERTS CUT OFF	1160	40	1160	40	1085	1627	600
CSJ: 0171-05-101 TOTAL	1960	80	1960	80	1955	3493	600

NO	DATE	REVISION	APPROVED

Texas Department of Transportation

SH 199
QUANTITY SUMMARY
TCP

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	13
	0094	02	137, ETC.	
VERIFIED BY				

100% SUBMITTAL

SUMMARY OF REMOVAL ITEMS CSJ 0171-05-101	105 6041 REMOVING STAB BASE AND ASPH PAV(8")*	104 6029 REMOVING CONC (CURB OR CURB & GUTTER)	104 6015 REMOVING CONC (SIDEWALKS)	110 6003 EXCAVATION (SPECIAL)
LOCATION	SY	LF	SY	CY
ROBERTS CUTOFF - STA 316+46 TO STA 317+00	26	112		
ROBERTS CUTOFF - STA 317+01 TO STA 321+00	576	905.2	9	
ROBERTS CUTOFF - STA 321+00 TO END	191	1172	12	68
SKYLINE DR	428	694		
PROJECT TOTALS	1221	2883	21	68

* CONTRACTOR SHALL DETERMINE THE EXISTING PAVEMENT DEPTH IN THE FIELD. THE CONCRETE PAVEMENT SHALL MATCH EXISITING PAVEMENT DEPTH. THIS WORK WILL BE SUBSIDIARY TO THE CURB OR CURB/GUTTER CONSTRUCTION.

PLOT DRIVER:V8i_BAKER_WIN_BW_PDF.plt cfg
PENTABLE:193605_SH 199_TxDOT_FTW_PSE.tbl

FILE:...\SH199 SUMMARY OF REMOVAL QUANTITY.dgn SCALE:1:1
DATE:4/11/2024 TIME:7:53:46 AM USER:AMohammed

NO	DATE	REVISION	APPROVED

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MBAKERINTL.COM
TBPE Registration No. F-2677

SH 199

SUMMARY OF REMOVAL

QUANTITIES

SHEET 1 OF 1

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	14
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

100% SUBMITTAL

SUMMARY OF ROADWAY ITEMS CSJ 0171-05-101	351 6004 FLEXIBLE PAVEMENT STRUCTURE REPAIR(8")*	529 6002 CONC CURB (TY II)**	529 6008 CONC CURB & GUTTER (TY II)**	531 6002 CONC SIDEWALKS (5")	531 6005 CURB RAMPS (TY 2)	531 6010 CURB RAMPS (TY 7)
LOCATION	SY	LF	LF	SY	EA	EA
ROBERTS CUTOFF - STA 316+46 TO STA 317+00		112				
ROBERTS CUTOFF - STA 317+01 TO STA 321+00	251	479	701	64		10
ROBERTS CUTOFF - STA 321+00 TO END	191	453	745	13	1	1
SKYLINE DR		572	531	24		4
PROJECT TOTALS	**442**	**1616**	**1977**	**101**	**1**	**15**

* CONTRACTOR SHALL DETERMINE THE EXISTING PAVEMENT DEPTH IN THE FIELD.

** THE CONCRETE PAVEMENT SHALL MATCH EXISITING PAVEMENT DEPTH. THIS WORK WILL BE SUBSIDIARY TO THE CURB OR CURB/GUTTER CONSTRUCTION.

NO	DATE	REVISION	APPROVED

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Texas Department of Transportation

SH 199

SUMMARY OF ROADWAY

QUANTITIES

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	15
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

PLOT DRIVER:V8i_BAKER_WIN_BW_PDF.pltcfg
PENTABLE:193605_SH 199_TxDOT_FTW_PSE.tbl
FILE:...\SH199 SUMMARY OF ROADWAY QUANTITY.dgn SCALE:1:1
DATE:4/11/2024 TIME:10:09:39 AM USER:AMohammed

100% SUBMITTAL

BID ITEM #	DESCRIPTION	UNIT	QUANTITY			
			SH 199@ ROBERTS CUT OFF	SH 199@ SKYLINE	SH 199@ BELKNAP	TOTAL
104-6028	REMOVING CONC (RIPRAP)	SY			1	1
416-6031	DRILL SHAFT (TRF SIG POLE) (30 IN)	LF	24	24	12	60
416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	28	28		56
416 6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF			44	44
618-6046	CONDT (PVC) (SCH 80) (2")	LF	80	30	60	170
618-6058	CONDT (PVC) (SCH 80) (4")	LF	180	155	100	435
618-6059	CONDT (PVC) (SCH 80) (4") (BORE)	LF	455	480	320	1255
620-6009	ELEC CONDR (NO.6) BARE	LF	665	665	460	1790
620-6010	ELEC CONDR (NO.6) INSULATED	LF	30	30	60	120
621-6005	TRAY CABLE (4 CONDR) (12 AWG)	LF	890	830	430	2150
624-6009	GROUND BOX TY D (162922)	EA		1		1
624-6010	GROUND BOX TY D (162922) W/APRON	EA	5	4	4	13
624-6028	REMOVE GROUND BOX	EA	5	2	9	16
628-6187	*ELC SRV TY D 120/240 070(NS)SS(E)PS(U)	EA	1	1	1	3
628-6188	ELC SRV TY D 120/240 070(NS)SS(E)SP(O)	EA			1	1
680-6002	INSTALL HWY TRF SIG (ISOLATED)	EA	1	1	1	3
680-6004	REMOVING TRAFFIC SIGNALS	EA	1	1	1	3
682-6001	VEH SIG SEC (12")LED(GRN)	EA	12	13	9	34
682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	4	4	2	10
682-6003	VEH SIG SEC (12")LED(YEL)	EA	12	13	11	36
682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	4	4		8
682-6005	VEH SIG SEC (12")LED(RED)	EA	12	13	11	36
682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	2	2		4
682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8	4	8	20
682-6054	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	10	11	11	32
682-6055	BACKPLATE W/REF BRDR(4 SEC)(VENT)ALUM	EA	2	4		6
684-6031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	80	40	80	200
684-6033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	1940	1075	1415	4430
684-6042	TRF SIG CBL (TY A)(14 AWG)(16 CONDR)	LF	705	645	320	1670
684-6079	TRF SIG CBL (TY C)(12 AWG)(2 CONDR)	LF	1410	460	830	2700
686-6031	*INS TRF SIG PL AM(S)1 ARM(28')LUM	EA	1			1
686-6035	*INS TRF SIG PL AM(S)1 ARM(32')LUM	EA	1	2	1	4
686-6051	INS TRF SIG PL AM(S)1 ARM(48')LUM	EA	2	2		4
686-6063	INS TRF SIG PL AM(S)1 ARM(60')LUM	EA			1	1
686-6067	INS TRF SIG PL AM(S)1 ARM(65')LUM	EA			1	1
687-6001	PED POLE ASSEMBLY	EA	4	2	3	9
688-6001	PED DETECT PUSH BUTTON (APS)	EA	8	4	8	20
688-6003	PED DETECTOR CONTROLLER UNIT	EA	1	1	1	3
6045-6001	INSTALL OF (RADD) VEHICLE DETECTORS	EA	2	2	1	5
6046-6001	INSTALL OF (RPD) VEHICLE DETECTORS	EA	4	4	3	11
6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1	1	1	3

NO	DATE	REVISION	APPROVED

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TBPE Registration No. F-2677

SH 199

SUMMARY OF QUANTITIES

TRAFFIC SIGNAL

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	16
MBI	0171	05	101	
VERIFIED BY				
MBI				

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DATE:4/11/2024 TIME:11:26:53 AM USER:AMohammed

BID ITEM #	DESCRIPTION	UNIT	QUANTITY			
			SH 199 @ ROBERTS CUT OFF	SH 199 @ SKYLINE	SH 199 @BELKNAP	TOTAL
666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	635	445	270	1350
666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	546	421	523	1490
666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	5	4	8	17
666-6057	REFL PAV MRK TY I(W)(DBL	EA			1	1
666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	5	4	8	17
666-6147	REFL PAV MRK TY I (Y)24"(SLD)(100MIL)	LF	52			52
666-6171	REFL PAV MRK TY II (W) 6" (BRK)	LF	300	200	300	800
666-6174	REFL PAV MRK TY II (W) 6" (SLD)	LF	1550	820		2370
666-6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	635	445	270	1350
666-6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	546	421	523	1490
666-6184	REFL PAV MRK TY II (W) (ARROW)	EA	5	4	8	17
666-6185	REFL PAV MRK TY II (W) (DBL ARROW)	EA			1	1
666-6192	REFL PAV MRK TY II (W) (WORD)	EA	5	4	8	17
666-6210	REFL PAV MRK TY II (Y) 6" (SLD)	LF	730	530	400	1660
666-6214	REFL PAV MRK TY II (Y) 24" (SLD)	LF	52			52
666-6306	RE PM W/RET REQ TY I	LF	300	200	300	800
666-6309	RE PM W/RET REQ TY I	LF	1550	820		2370
666-6321	RE PM W/RET REQ TY I	LF	730	530	400	1660
672-6009	REFL PAV MRKR TY II-A-A	EA	37	27	20	84
672-6010	REFL PAV MRKR TY II-C-R	EA	62	43	44	149
677-6002	ELIM EXT PAV MRK & MRKS (6")	LF	2580	1550	700	4830
677-6003	ELIM EXT PAV MRK & MRKS (8")	LF	635	445	270	1350
677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	90	145	468	703
677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	546	421	112	1079
677-6008	ELIM EXT PAV MRK & MRKS (ARROW)	EA	4	4	6	14
677-6009	ELIM EXT PAV MRK & MRKS (DBL ARROW)	EA			1	1
677-6012	ELIM EXT PAV MRK & MRKS (WORD)	EA	4	4	6	14

NO	DATE	REVISION	APPROVED

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SH 199

SUMMARY OF QUANTITIES

SIGNING & PAVEMENT MARKINGS

SHEET 1 OF 1

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	17
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

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PLOT DRIVER:V8i_BAKER_WIN_BW_PDF.pltcfg
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SCALE:1:1
USER:AMohammed
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DATE:4/11/2024 TIME:10:49:53 AM

100% SUBMITTAL

SW3P SUMMARY					
SHEET NO.	STATION LIMITS	0506-6020 CONSTRUCTION EXITS (INSTALL) (TY 1)	0506-6024 CONSTRUCTION EXITS (REMOVE)	0506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")	0506-6043 BIODEG EROSN CONT LOGS (REMOVE)
		SY	SY	LF	LF
ROBERTS INT (1 OF 3)	STA 316+46 TO STA 317+00				
ROBERTS INT (2 OF 3)	STA 317+00 TO STA 321+00			22	22
ROBERTS INT (3 OF 3)	STA 321+00 TO END			16	16
	PROJECT TOTAL	1560	1560	38	38

SW3P SUMMARY						
SHEET NO.	STATION LIMITS	0506-6020 CONSTRUCTION EXITS (INSTALL) (TY 1)	0506-6024 CONSTRUCTION EXITS (REMOVE)	0506-6040 BIODEG EROSN CONT LOGS (INSTL)(8")	0506-6041 BIODEG EROSN CONT LOGS (INSTL)(12")	0506-6043 BIODEG EROSN CONT LOGS (REMOVE)
		SY	SY	LF	LF	LF
SKYLINE INT	BEGIN TO END			24	58	82
	PROJECT TOTAL	1560	1560	24	58	82

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
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Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No, F-2677

SANCHEZ-SALAZAR & ASSOCIATES, LLC
4630 N. Loop 1604 W., Ste, 115
San Antonio, TX 78249
Phone: (210) 314-5458
TBPE Registration No, 15685

SH 199

STORM WATER POLLUTION PREVENTION PLAN SUMMARY

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
SSA	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
SSA	TEXAS	FTW	TARRANT	18
CHECKED BY	CONTROL	SECTION	JOB	
SSA	0171	05	101	
VERIFIED BY				
SSA				

PLOT DRIVER:V8i_BAKER_WIN_BW_PDF.pltcfg
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100% SUBMITTAL

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PENTABLE:193605_SH 199_TxDOT_FTW_PSE.tbl

SCALE:1:1
USER:pee66

FILE:...\2. TCP\199TCPN.dgn
DATE:4/11/2024 TIME:10:34:21 AM

SH 199 TRAFFIC CONTROL PLAN NARRATIVE

BELKNAP STREET

I. PHASE I

A. STAGE 1

A. TRAFFIC

I. SHIFT EXISTING TRAFFIC ON BELKNAP STREET AND SH 199 TO CONFIGURATION SHOWN. REDUCE NORTHBOUND TRAFFIC ON SH 199 TO ONE LANE AND SOUTHBOUND TRAFFIC TO 3 LANES AS SHOWN.

II. INSTALL ALL APPLICABLE CHANNELIZING DEVICES AND TCP SIGNS.

B. CONSTRUCTION

I. INSTALL ALL CURB AND GUTTER FROM STATION 28+14 TO STATION 28+58 ON BELKNAP STREET AND ALL CURB AND GUTTER FROM STATION 29+55 TO STATION 38+25 ON SH 199 AS SHOWN.

SKYLINE DRIVE

I. PHASE I

A. STAGE 1

A. TRAFFIC

I. EXISTING TRAFFIC ON SH 199 AND SKYLINE REMAINS AS IS.

II. INSTALL ALL APPLICABLE CHANNELIZING DEVICES AND TCP SIGNS.

B. CONSTRUCTION

I. INSTALL TYPE II CURB & GUTTER ON THE NORTHBOUND SIDE OF SH 199 FROM STATION 265+12 TO STATION 267+50 AND FROM STATION 268+33 TO 268+95 AS SHOWN.

B. STAGE 2

A. TRAFFIC

I. SHIFT TRAFFIC ON SH 199 TO CONFIGURATION AS SHOWN

II. INSTALL ALL APPLICABLE CHANNELIZING DEVICES, STRIPING AND TCP SIGNS.

B. CONSTRUCTION

I. CUT AND RESTORE CURB AND PAVEMENT AT MEDIAN ON SH 199 AS SHOWN FROM STATION 265+12 TO STATION 267+50 AND FROM STATION 268+33 TO STATION 268+95.

ROBERTS CUT OFF ROAD

I. PHASE I

A. STAGE 1

A. TRAFFIC

I. EXISTING TRAFFIC ON SH 199 AND ROBERTS CUT OFF ROAD REMAINS AS IS.

II. INSTALL ALL APPLICABLE CHANNELIZING DEVICES AND TCP SIGNS.

B. CONSTRUCTION

I. INSTALL TYPE II CURB & GUTTER ON SH 199 FROM STATION 318+14 TO STATION 319+37 AND FROM STATION 321+13 TO 323+42 AS SHOWN. INSTALL TYPE II CURB AND GUTTER ON ROBERTS CUT OFF FROM STATION 11+88 TO 13+24 AND FROM STATION 14+36 TO 17+66 AS SHOWN.

B. STAGE 2

A. TRAFFIC

I. SHIFT TRAFFIC ON SH 199 TO CONFIGURATION AS SHOWN

II. INSTALL ALL APPLICABLE CHANNELIZING DEVICES, STRIPING AND TCP SIGNS.

B. CONSTRUCTION

I. CUT AND RESTORE CURB AND PAVEMENT AT MEDIAN ON SH 199 AS SHOWN FROM STATION 316+46 TO STATION 318+14, STATION 318+14 TO STATION 319+37 AND FROM STATION 321+13 TO STATION 323+42. INSTALL CURB AND GUTTER ON SH 199 FROM 319+53 TO STATION 320+00 AND ON ROBERTS CUT OFF FROM STATION 11+38 TO STATION 13+24 AND FROM STATION 14+83 TO STATION 16+76 AS SHOWN.

STATE OF TEXAS
PAUL E WILLIAMS
73822
REGISTERED
PROFESSIONAL ENGINEER

Paul E. Williams, P.E.

4-11-2024

NO	DATE	REVISION	APPROVED

PRIORITY GROUP, INC.
3939 E US HWY 80, STE 143P, MESQUITE, TX 75150 | FIRM # F-14194

Texas Department of Transportation
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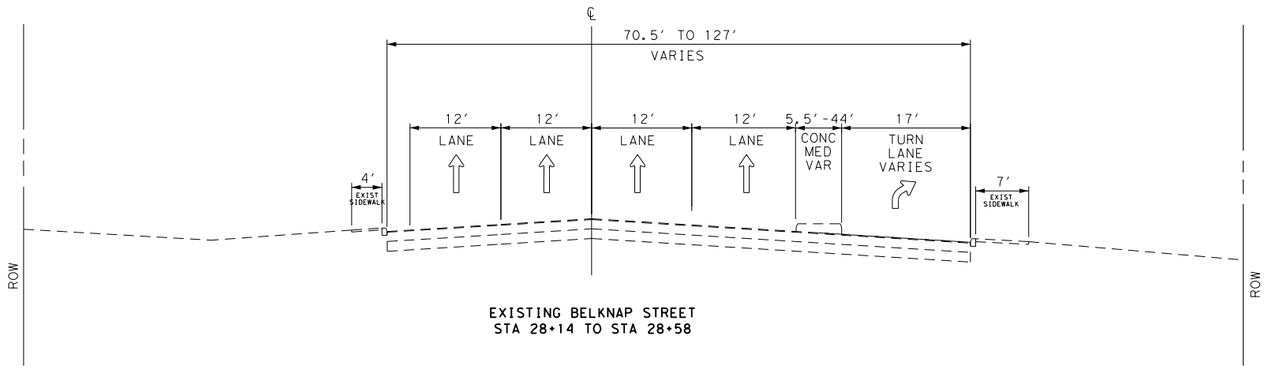
SH 199

TRAFFIC CONTROL PLAN

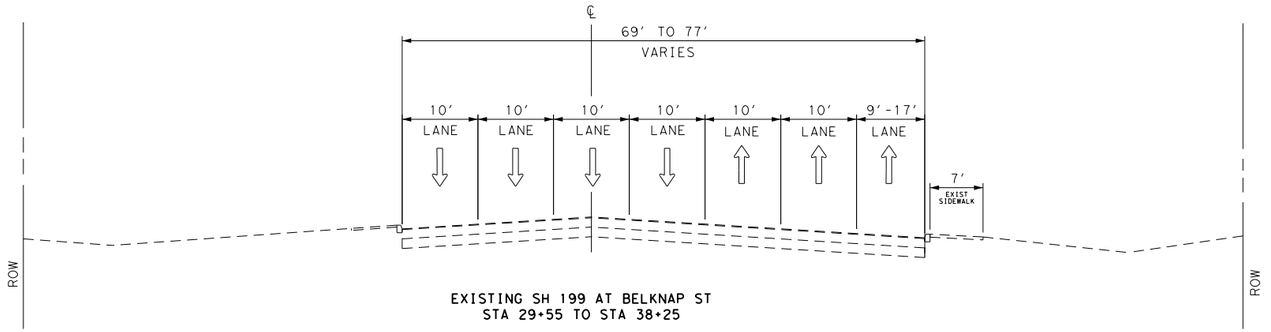
NARRATIVE

SHEET 1 OF 1

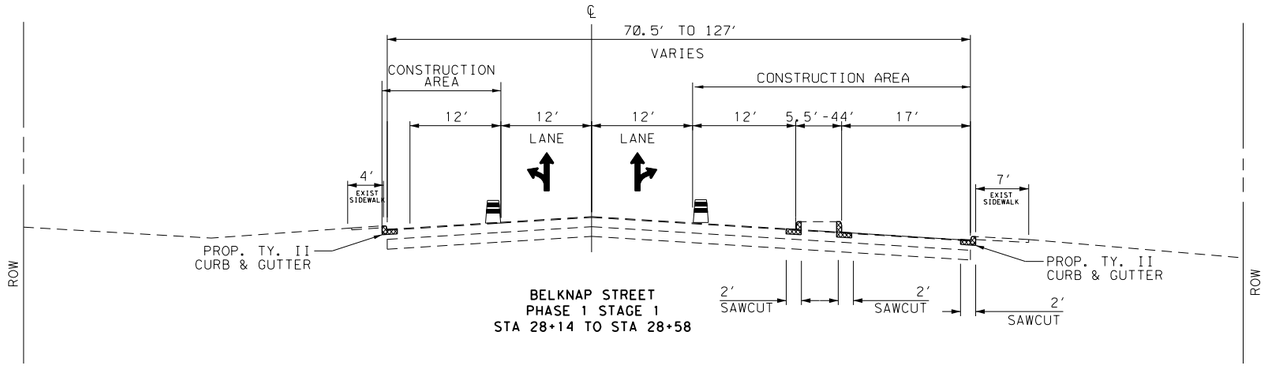
DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	19
	0171	05	101	
VERIFIED BY				



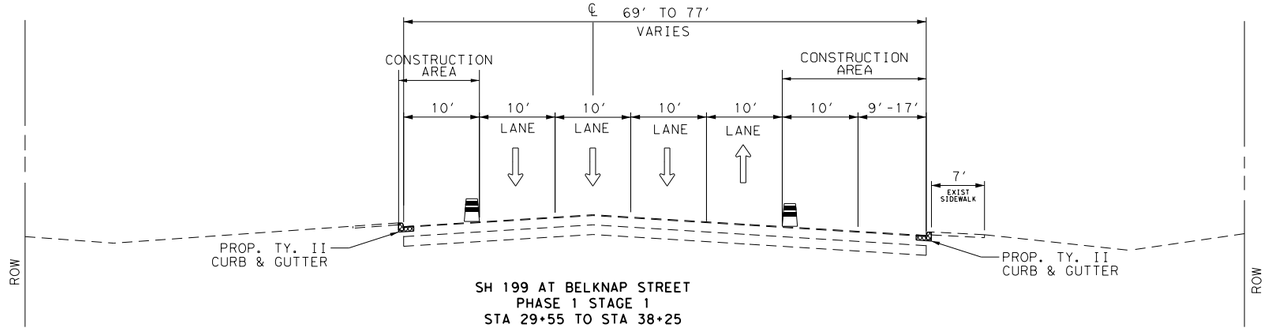
EXISTING BELKNAP STREET
STA 28+14 TO STA 28+58



EXISTING SH 199 AT BELKNAP ST
STA 29+55 TO STA 38+25



BELKNAP STREET
PHASE 1 STAGE 1
STA 28+14 TO STA 28+58



SH 199 AT BELKNAP STREET
PHASE 1 STAGE 1
STA 29+55 TO STA 38+25

LEGEND

- CONSTRUCTION THIS PHASE/STAGE
- CONSTRUCTION PREVIOUS PHASE/STAGE
- DIRECTION OF EXISTING TRAFFIC
- DIRECTION OF PROPOSED TRAFFIC
- LOW PROFILE TRAFFIC CONCRETE TRAFFIC BARRIER
- CHANNELIZING DEVICES
- (A) 4" DOUBLE YELLOW SLD (REMOV)
- (B) 4" WHITE SLD (REMOV)
- (C) 4" WHITE BRK (REMOV)

NOTES

1. SEE THE APPLICABLE BC AND/OR TCP STANDARDS FOR WORK ZONE SIGNING, CHANNELIZATION, AND TAPER DETAILS.

STATE OF TEXAS
PAUL E WILLIAMS
73822
REGISTERED PROFESSIONAL ENGINEER

Paul E. Williams, P.E.

4-11-2024

NO	DATE	REVISION	APPROVED

PRIORITY GROUP, INC.
3939 E US HWY 80, STE 143P, MESQUITE, TX 75150 | FIRM # F-14194

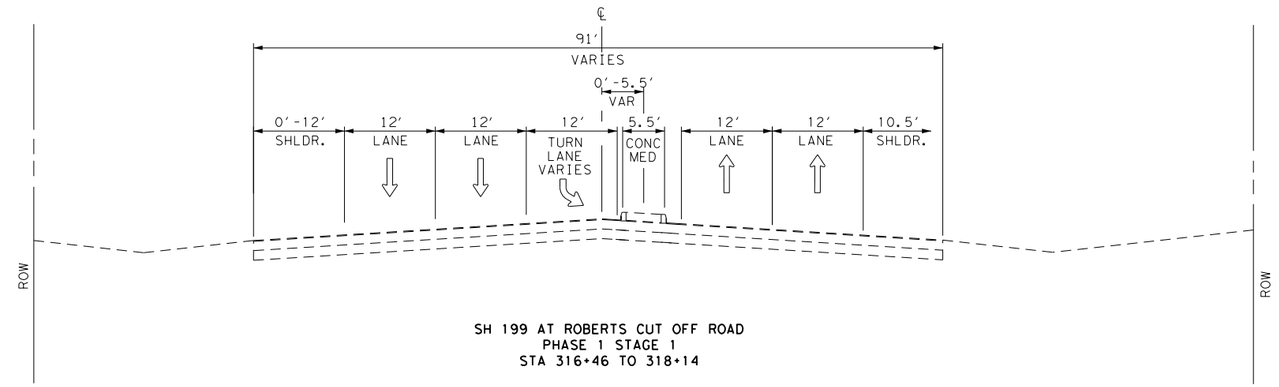
SH 199

TCP TYPICAL SECTIONS
SH 199 AND BELKNAP STREET INTERSECTION

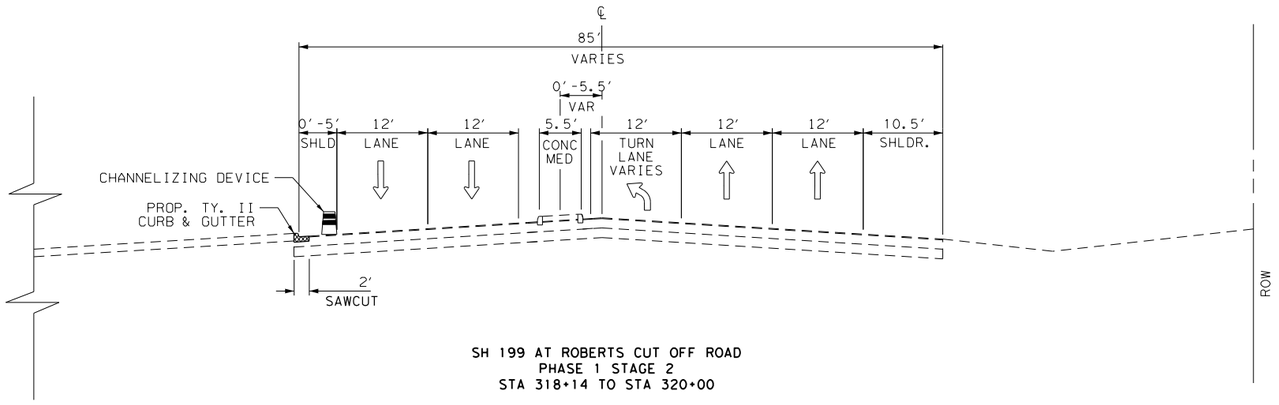
PHASE 1

SHEET 1 OF 1

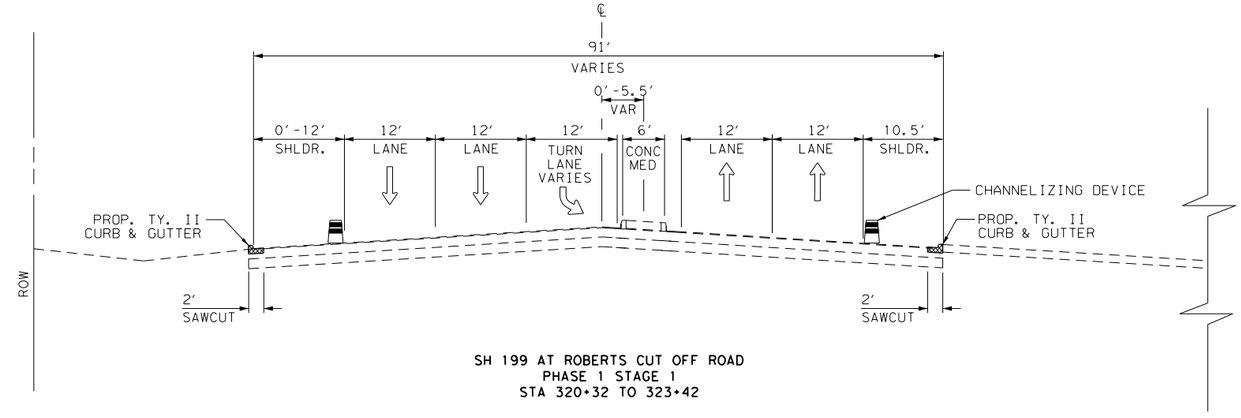
DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
DRAWN BY	6	SEE TITLE SHEET		SH 199
CHECKED BY	STATE	DISTRICT	COUNTY	SHEET NO.
VERIFIED BY	TEXAS	FTW	TARRANT	20
	CONTROL	SECTION	JOB	
	0171	05	101	



SH 199 AT ROBERTS CUT OFF ROAD
PHASE 1 STAGE 1
STA 316+46 TO 318+14



SH 199 AT ROBERTS CUT OFF ROAD
PHASE 1 STAGE 2
STA 318+14 TO STA 320+00



SH 199 AT ROBERTS CUT OFF ROAD
PHASE 1 STAGE 1
STA 320+32 TO 323+42

LEGEND

- CONSTRUCTION THIS PHASE/STAGE
- CONSTRUCTION PREVIOUS PHASE/STAGE
- DIRECTION OF EXISTING TRAFFIC
- DIRECTION OF PROPOSED TRAFFIC
- LOW PROFILE TRAFFIC CONCRETE TRAFFIC BARRIER
- CHANNELIZING DEVICES
- (A) 4" DOUBLE YELLOW SLD (REMOV)
- (B) 4" WHITE SLD (REMOV)
- (C) 4" WHITE BRK (REMOV)

NOTES

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STATE OF TEXAS
PAUL E. WILLIAMS
73822
REGISTERED PROFESSIONAL ENGINEER

Paul E. Williams, P.E.
4-11-2024

NO	DATE	REVISION	APPROVED

PRIORITY GROUP, INC.
3939 E US HWY 80, STE 143P, MESQUITE, TX 75150 | FIRM # F-14194

Texas Department of Transportation

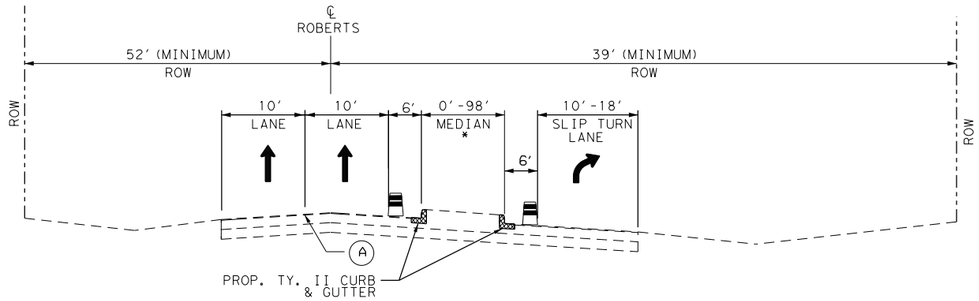
SH 199

TCP TYPICAL SECTIONS
SH 199 AND ROBERTS CUT OFF INTERSECTION

PHASE 1 STAGE 1

SHEET 1 OF 4

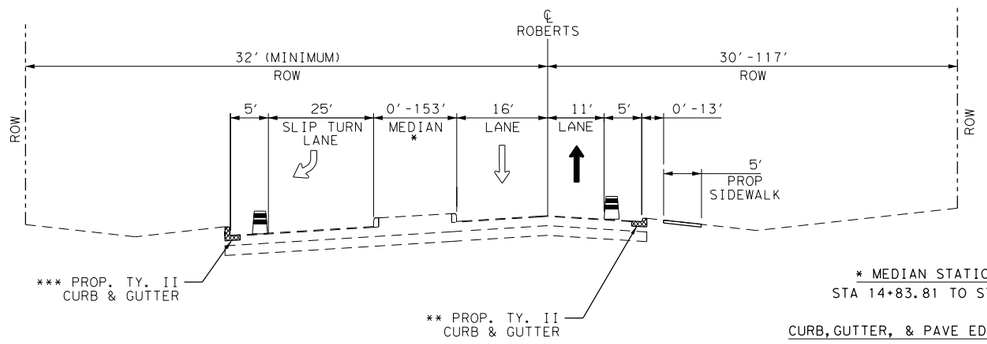
DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
DRAWN BY	6	SEE TITLE SHEET		SH 199
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECKED BY	TEXAS	FTW	TARRANT	
VERIFIED BY	CONTROL	SECTION	JOB	21
	0171	05	101	



* MEDIAN STATION RANGE
STA 11+88.49 TO STA 13+23.81

** CURB STATION RANGES
STA 13+00.00 TO STA 13+84.48

ROBERTS CUT OFF RD AT SH199
PHASE 1 STAGE 1



* MEDIAN STATION RANGE
STA 14+83.81 TO STA 16+75.19

CURB, GUTTER, & PAVE EDGE STATION RANGES
** STA 13+95.08 TO STA 14+36.34
** STA 14+36.34 TO STA 14+46.81
*** STA 16+23.96 TO STA 17+66.37

ROBERTS CUT OFF RD AT SH199
PHASE 1 STAGE 1

LEGEND

- CONSTRUCTION THIS PHASE/STAGE
- CONSTRUCTION PREVIOUS PHASE/STAGE
- DIRECTION OF EXISTING TRAFFIC
- DIRECTION OF PROPOSED TRAFFIC
- LOW PROFILE TRAFFIC CONCRETE TRAFFIC BARRIER
- CHANNELIZING DEVICES
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NOTES

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STATE OF TEXAS
PAUL E WILLIAMS
73822
REGISTERED PROFESSIONAL ENGINEER

Paul E. Williams, P.E.

4-11-2024

NO	DATE	REVISION	APPROVED

PRIORITY GROUP, INC.
3939 E US HWY 80, STE 143P, MESQUITE, TX 75150 | FIRM # F-14194

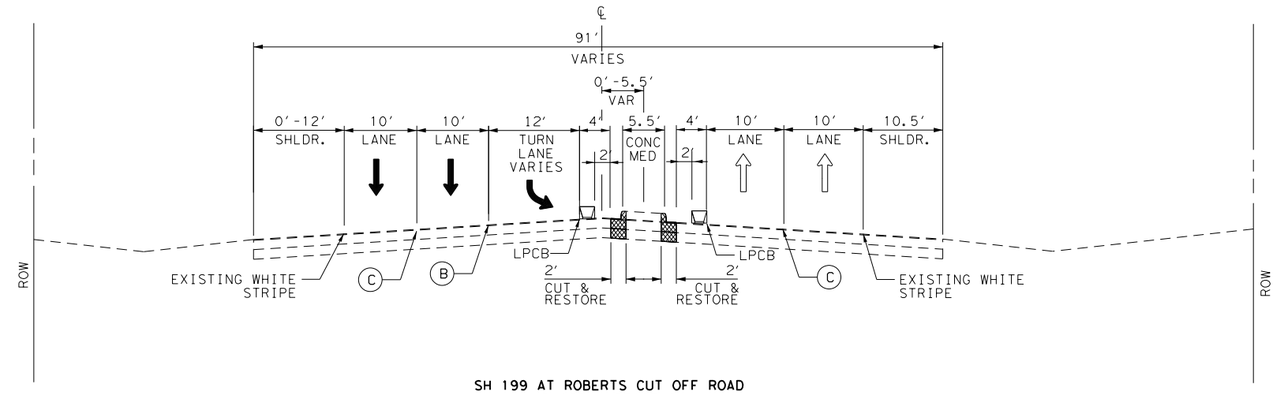
Texas Department of Transportation

SH 199

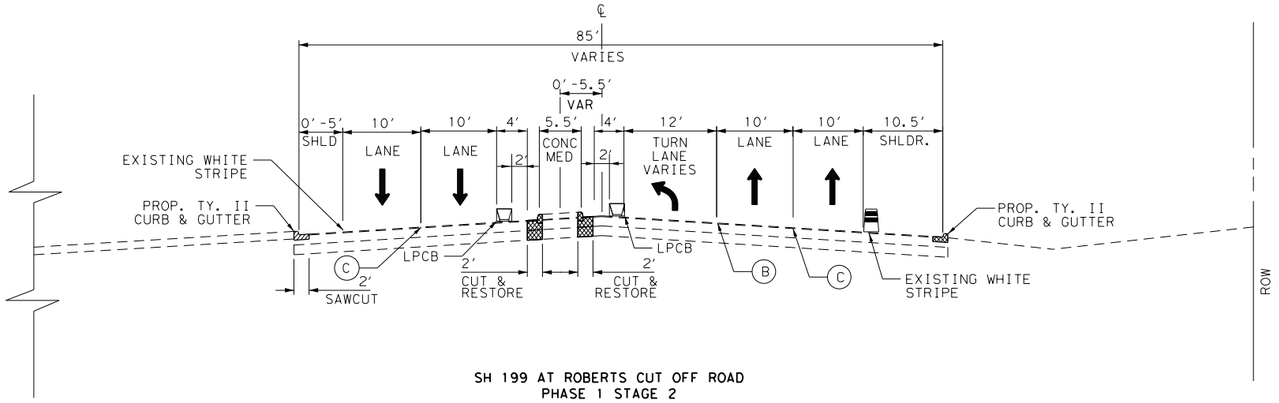
TCP TYPICAL SECTIONS
SH 199 AND ROBERTS CUT OFF INTERSECTION

PHASE 1 STAGE 1

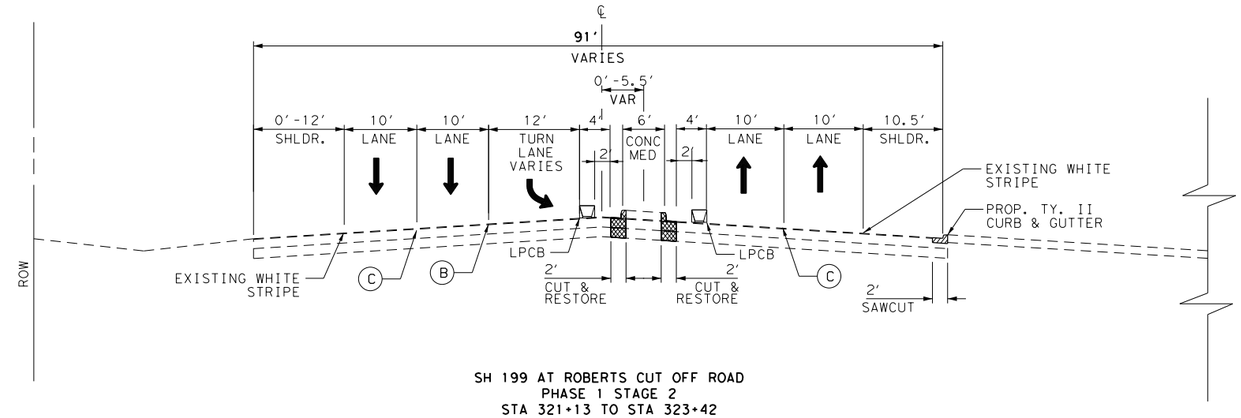
DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	22
VERIFIED BY	0171	05	101	



SH 199 AT ROBERTS CUT OFF ROAD
PHASE 1 STAGE 2
STA 316+46 TO STA 318+14



SH 199 AT ROBERTS CUT OFF ROAD
PHASE 1 STAGE 2
STA 318+14 TO STA 320+00



SH 199 AT ROBERTS CUT OFF ROAD
PHASE 1 STAGE 2
STA 321+13 TO STA 323+42

LEGEND

- CONSTRUCTION THIS PHASE/STAGE
- CONSTRUCTION PREVIOUS PHASE/STAGE
- DIRECTION OF EXISTING TRAFFIC
- DIRECTION OF PROPOSED TRAFFIC
- LOW PROFILE TRAFFIC CONCRETE TRAFFIC BARRIER
- CHANNELIZING DEVICES
- (A) 4" DOUBLE YELLOW SLD (REMOV)
- (B) 4" WHITE SLD (REMOV)
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NOTES

1. SEE THE APPLICABLE BC AND/OR TCP STANDARDS FOR WORK ZONE SIGNING, CHANNELIZATION, AND TAPER DETAILS.

STATE OF TEXAS
PAUL E WILLIAMS
73822
REGISTERED PROFESSIONAL ENGINEER

Paul E Williams, P.E.
4-11-2024

NO	DATE	REVISION	APPROVED

PRIORITY GROUP, INC.
3939 E US HWY 80, STE 143P, MESQUITE, TX 75150 | FIRM # F-14194

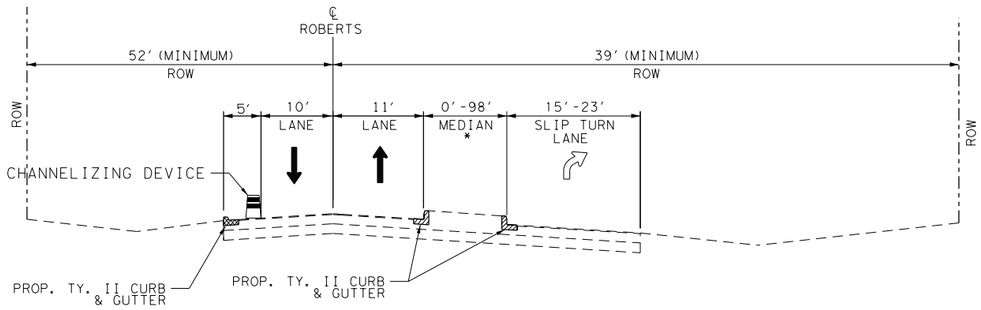
SH 199

TCP TYPICAL SECTIONS
SH 199 AND ROBERTS CUT OFF INTERSECTION

PHASE 1 STAGE 2

SHEET 3 OF 4

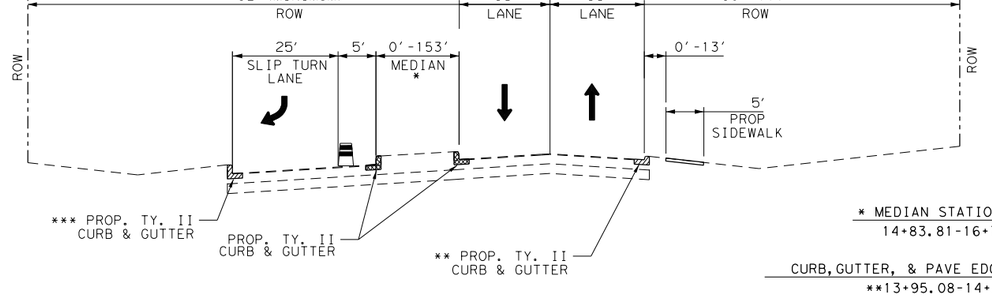
DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
DRAWN BY	6	SEE TITLE SHEET		SH 199
	STATE	DISTRICT	COUNTY	SHEET NO.
CHECKED BY	TEXAS	FTW	TARRANT	
VERIFIED BY	CONTROL	SECTION	JOB	23
	0171	05	101	



* MEDIAN STATION RANGE
11+88.49-13+23.81

** CURB STATION RANGES
13+00.00-13+84.48

ROBERTS CUT OFF RD AT SH199
PHASE 1 STAGE 2



* MEDIAN STATION RANGE
14+83.81-16+75.19

CURB, GUTTER, & PAVE EDGE STATION RANGES
**13+95.08-14+36.34
**14+36.34-14+46.81
***16+23.96-17+66.37

ROBERTS CUT OFF RD AT SH199
PHASE 1 STAGE 2

LEGEND

- CONSTRUCTION THIS PHASE/STAGE
- CONSTRUCTION PREVIOUS PHASE/STAGE
- DIRECTION OF EXISTING TRAFFIC
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STATE OF TEXAS
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Paul E Williams, P.E
4-11-2024

NO	DATE	REVISION	APPROVED

PRIORITY GROUP, INC.
3939 E US HWY 80, STE 143P, MESQUITE, TX 75150 | FIRM # F-14194

Texas Department of Transportation

SH 199

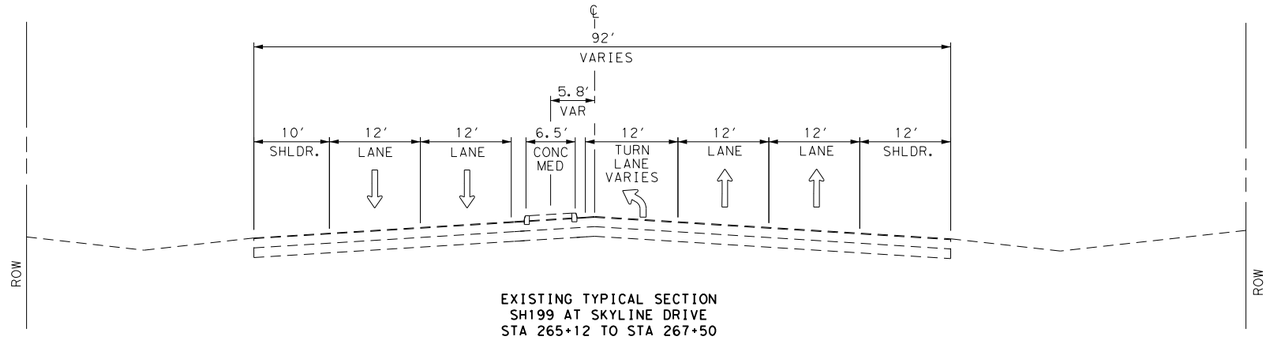
TCP TYPICAL SECTIONS
SH 199 AND ROBERTS CUT OFF INTERSECTION

PHASE 1 STAGE 2

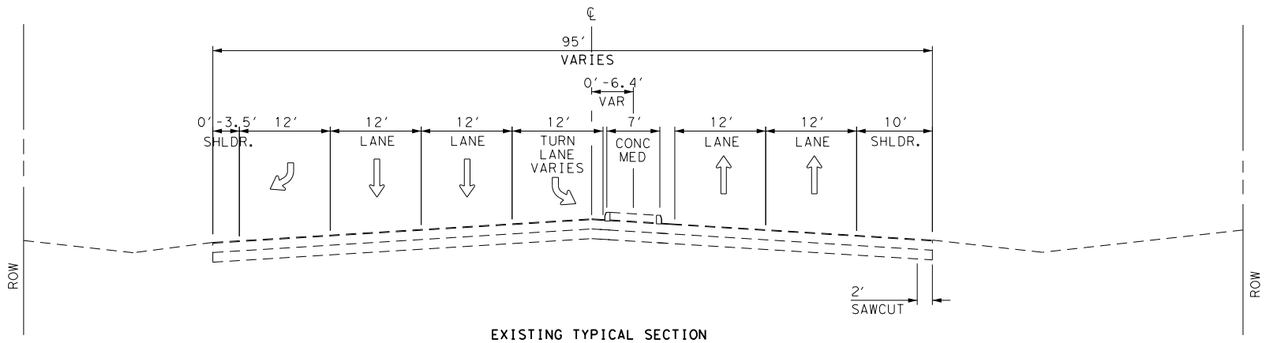
SHEET 4 OF 4

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	24
VERIFIED BY	0171	05	101	

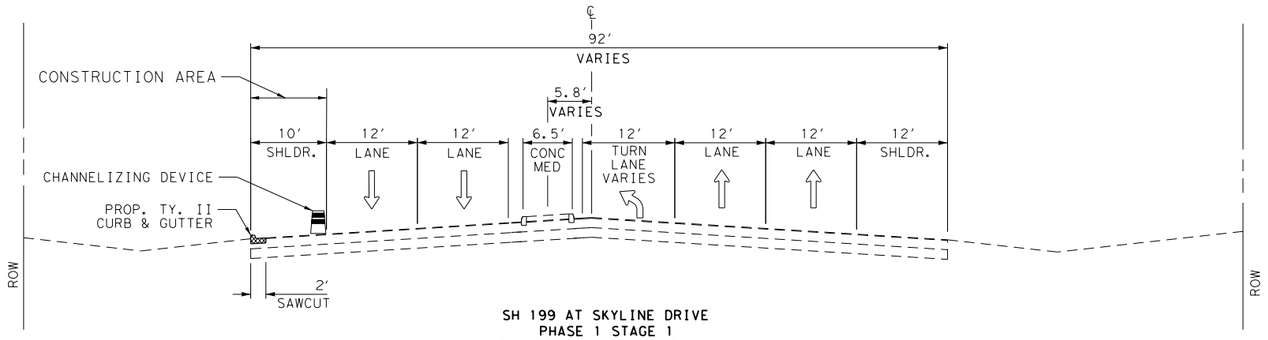
100% SUBMITTAL



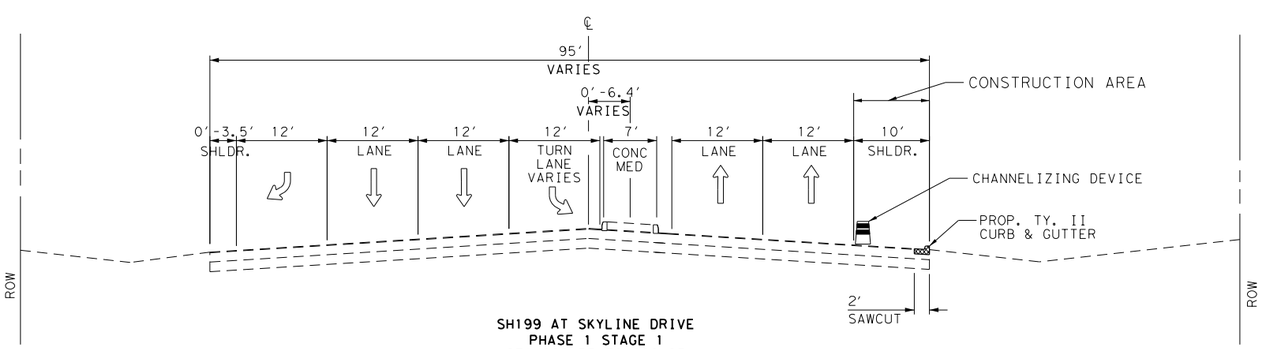
EXISTING TYPICAL SECTION
SH199 AT SKYLINE DRIVE
STA 265+12 TO STA 267+50



EXISTING TYPICAL SECTION
SH199 AT SKYLINE DRIVE
STA 268+33 TO STA 268+95



SH 199 AT SKYLINE DRIVE
PHASE 1 STAGE 1
STA 265+12 TO STA 267+50



SH199 AT SKYLINE DRIVE
PHASE 1 STAGE 1
STA 268+33 TO 268+95

LEGEND

- CONSTRUCTION THIS PHASE/STAGE
- CONSTRUCTION PREVIOUS PHASE/STAGE
- DIRECTION OF EXISTING TRAFFIC
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NOTES

1. SEE THE APPLICABLE BC AND/OR TCP STANDARDS FOR WORK ZONE SIGNING, CHANNELIZATION, AND TAPER DETAILS.

STATE OF TEXAS
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73822
REGISTERED
PROFESSIONAL ENGINEER

Paul E Williams, P.E

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NO	DATE	REVISION	APPROVED

PRIORITY GROUP, INC.
3939 E US HWY 80, STE 143P, MESQUITE, TX 75150 | FIRM # F-14194

Texas Department of Transportation
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SH 199

TCP TYPICAL SECTIONS
SH 199 AND SKYLINE DRIVE INTERSECTION

PHASE 1 STAGE 1

SHEET 1 OF 2

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	25
VERIFIED BY	0171	05	101	

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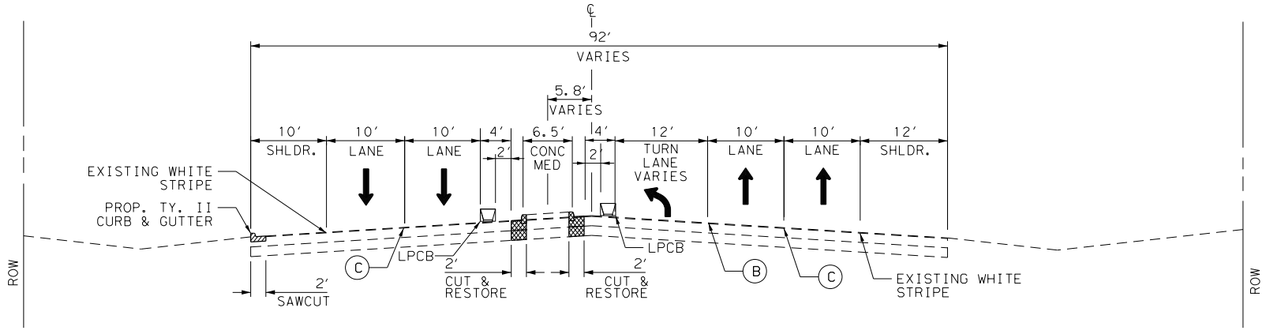
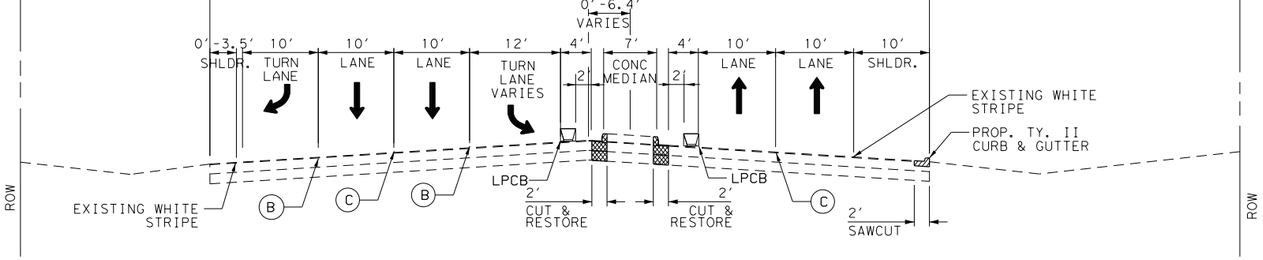


SH 199 AT SKYLINE DRIVE
PHASE 1 STAGE 2
STA 265+12 TO STA 267+50



SH 199 AT SKYLINE DRIVE
PHASE 1 STAGE 2
STA 268+33 TO STA 268+96

LEGEND

- CONSTRUCTION THIS PHASE/STAGE
- CONSTRUCTION PREVIOUS PHASE/STAGE
- DIRECTION OF EXISTING TRAFFIC
- DIRECTION OF PROPOSED TRAFFIC
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Texas Department of Transportation

SH 199

TCP TYPICAL SECTIONS
SH 199 AND SKYLINE DRIVE INTERSECTION

PHASE 1 STAGE 2

SHEET 2 OF 2

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
DRAWN BY	6	SEE TITLE SHEET		SH 199
CHECKED BY	STATE	DISTRICT	COUNTY	SHEET NO.
VERIFIED BY	TEXAS	FTW	TARRANT	26
	CONTROL	SECTION	JOB	
	0171	05	101	

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USER:pee66
FILE:...\2. TCP\199TCPSD2.dgn
DATE:4/11/2024 TIME:10:35:02 AM

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

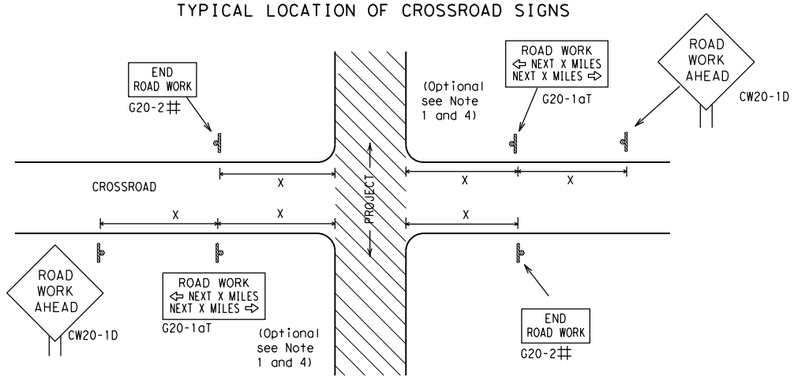
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

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	0171	05	101	SH 199
9-07 8-14	DIST	COUNTY		SHEET NO.
5-10 5-21	6	TARRANT		27

DATE:
FILE:

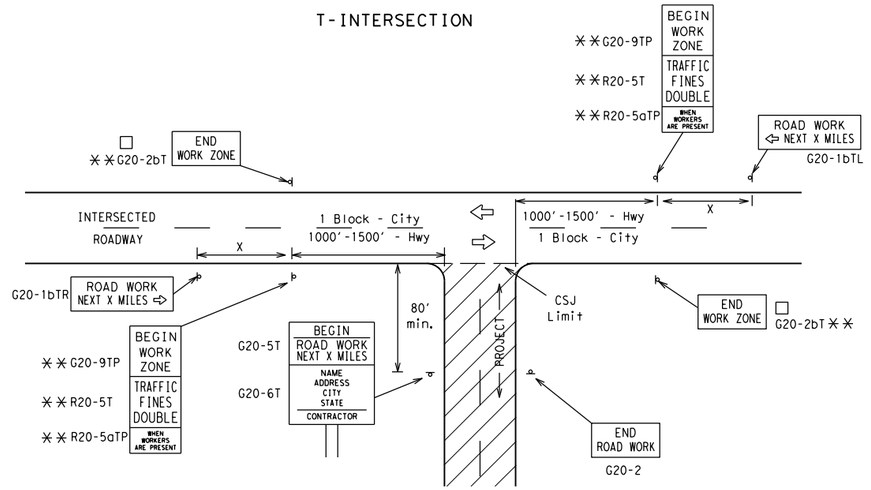
TYPICAL LOCATION OF CROSSROAD SIGNS



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.

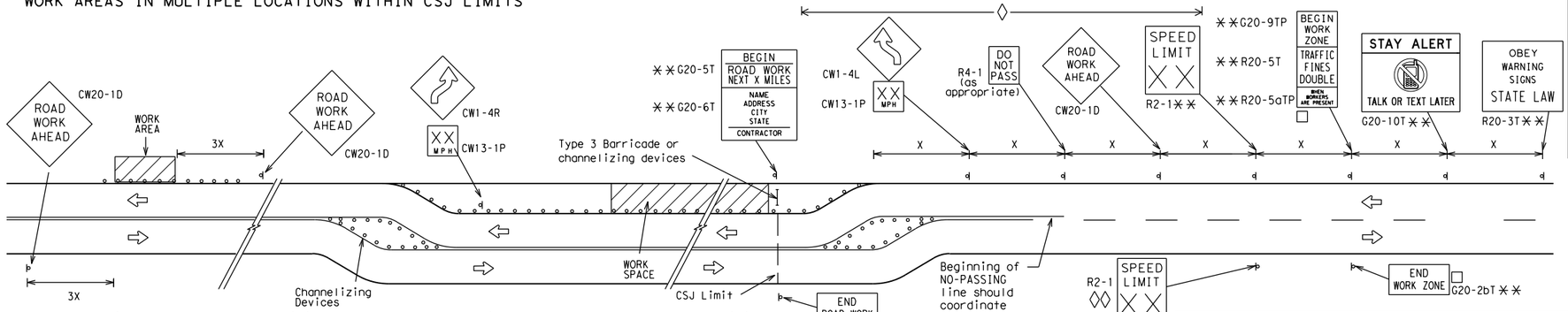
△ Minimum distance from work area to first Advance Warning sign nearest the work area and/or distance between each additional sign.

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.

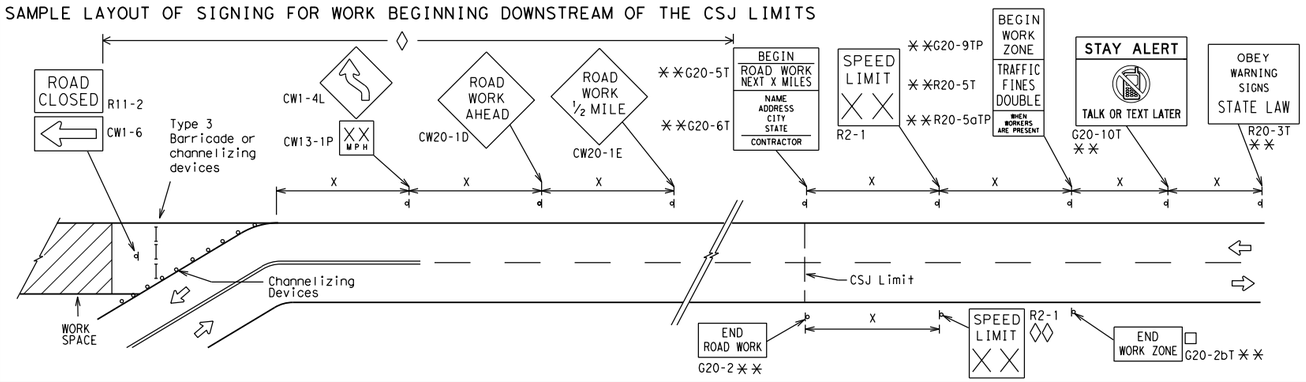
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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

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



NOTES

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

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

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0171	05	101	SH 199
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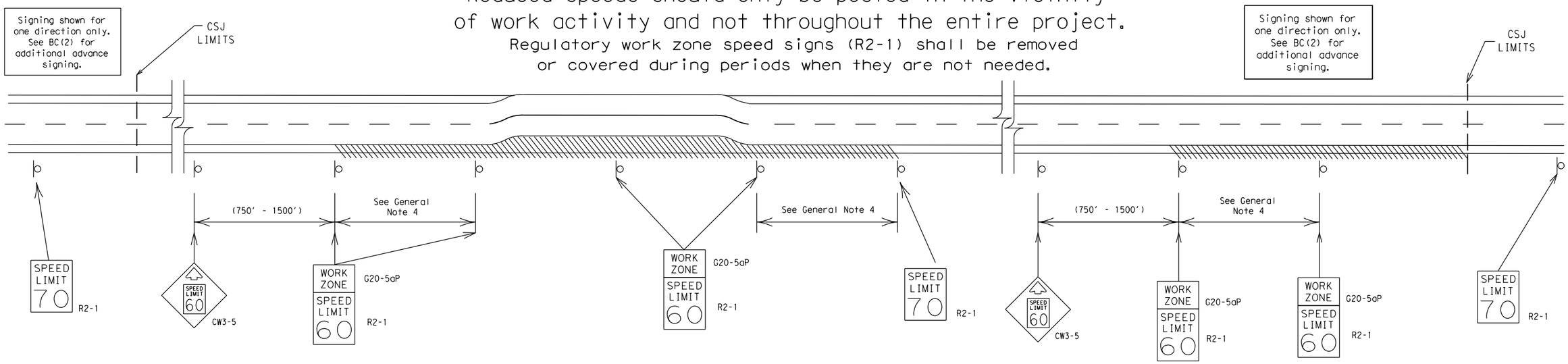
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-21

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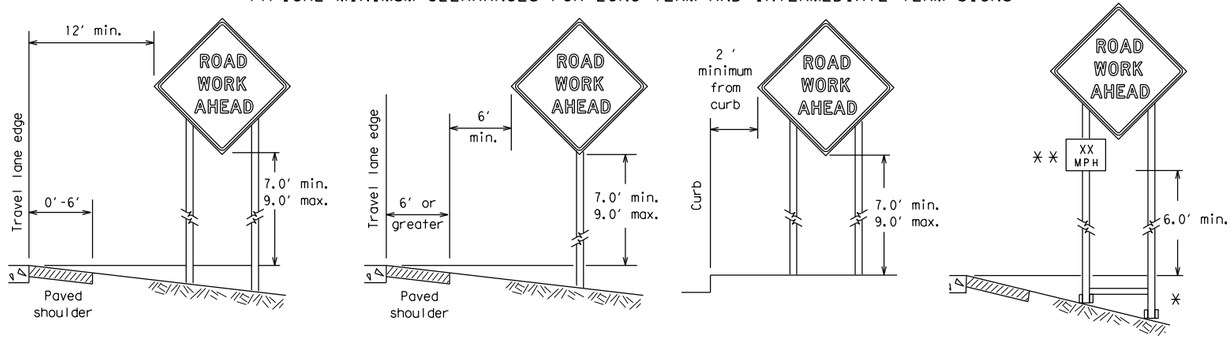
FILE:

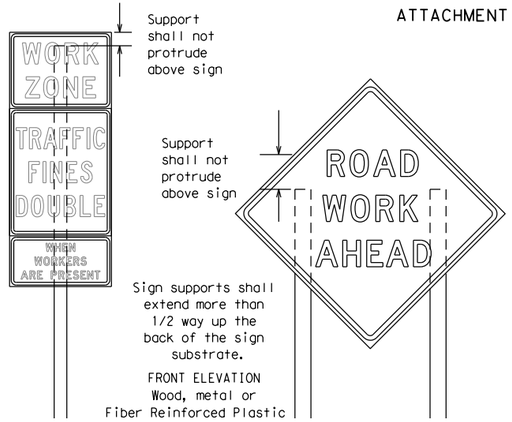
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



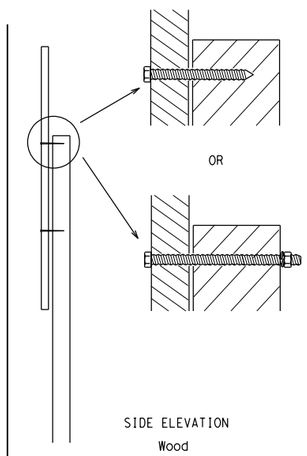
⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

⁎⁎ 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



FRONT ELEVATION
Wood, metal or
Fiber Reinforced Plastic



SIDE ELEVATION
Wood

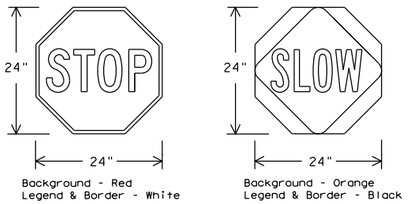
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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
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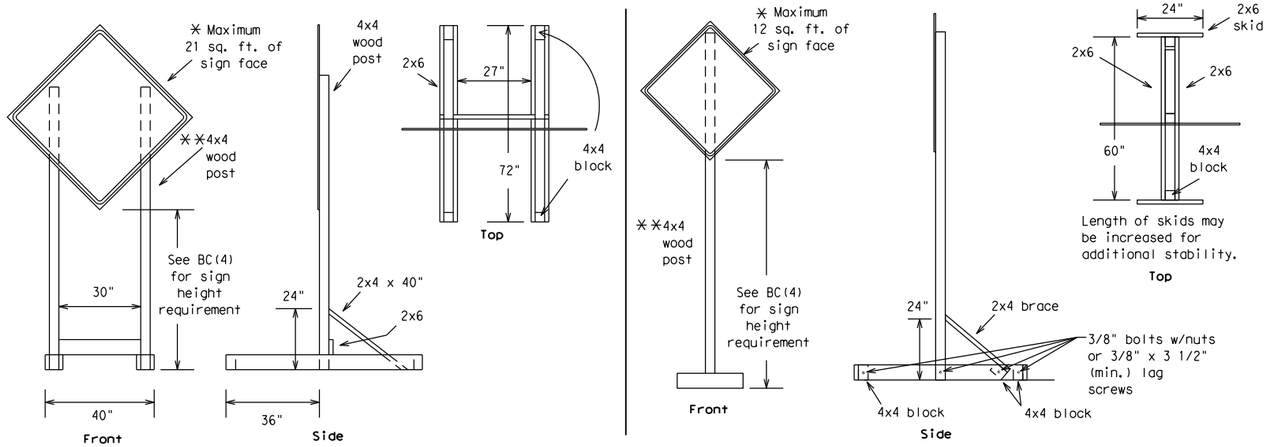
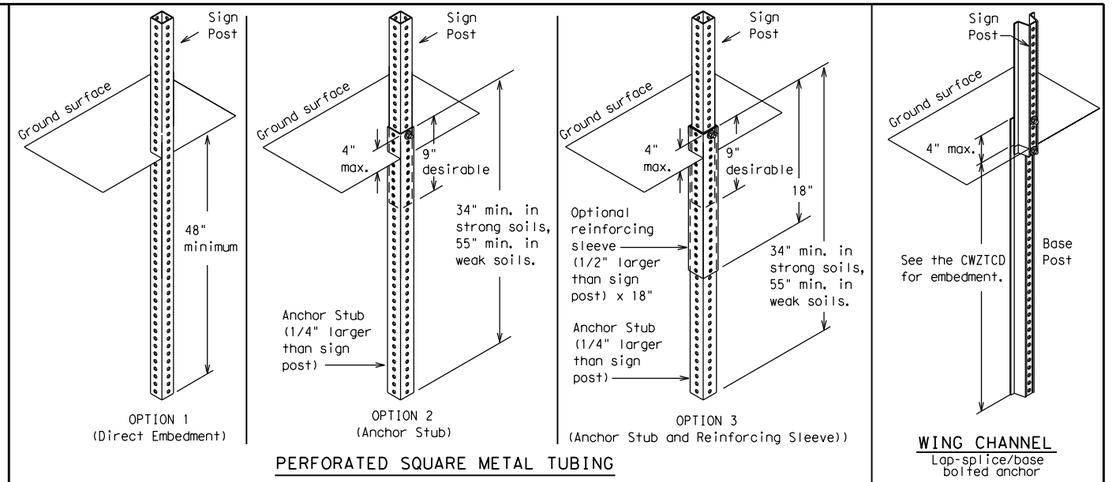


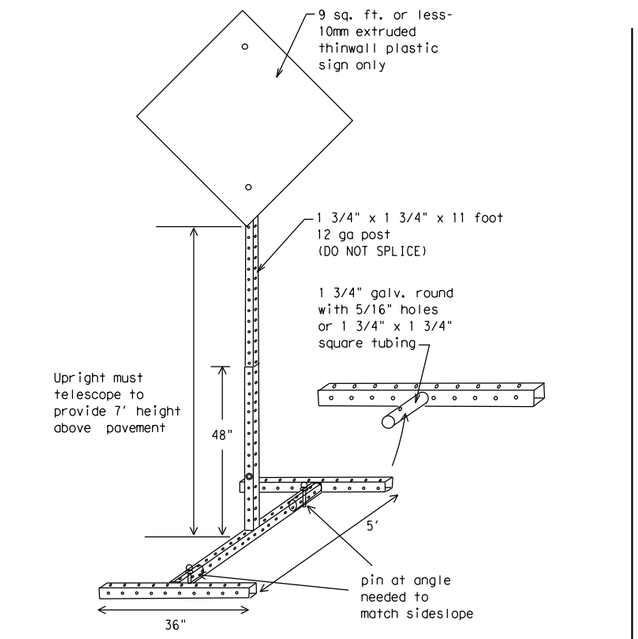
SKID MOUNTED WOOD SIGN SUPPORTS

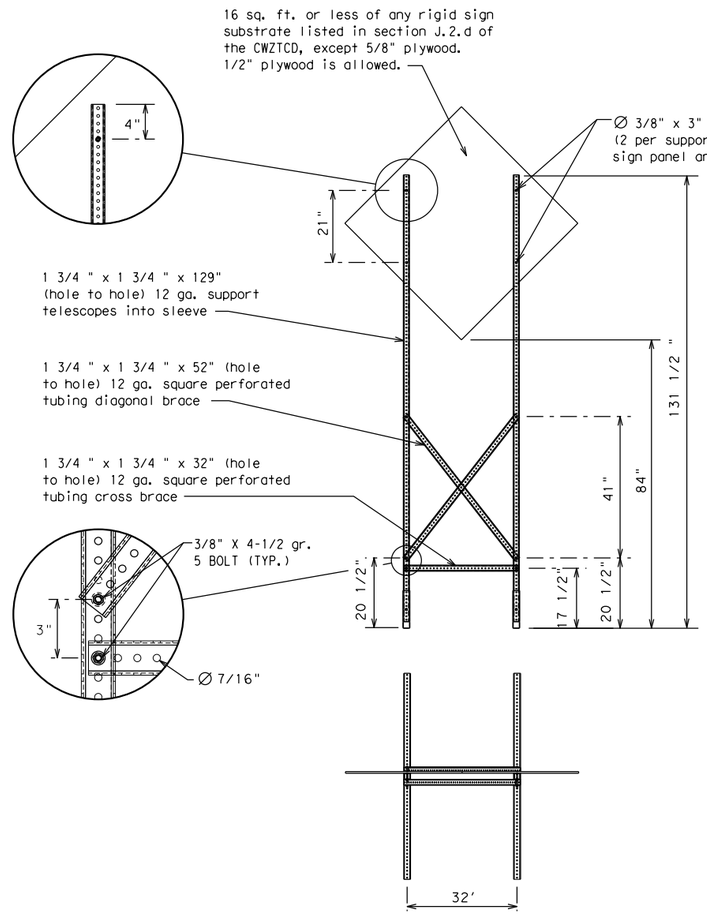
* LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS

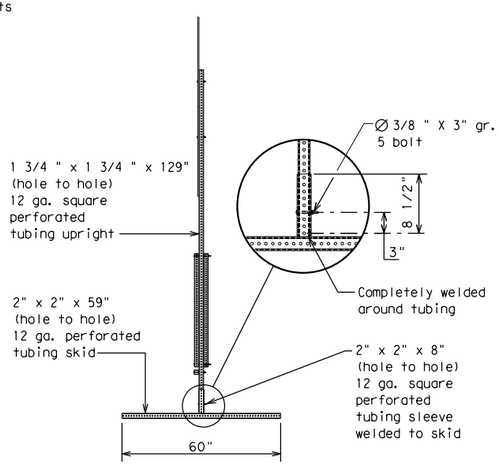


GROUND MOUNTED SIGN SUPPORTS

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







SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	6	TARRANT		31

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

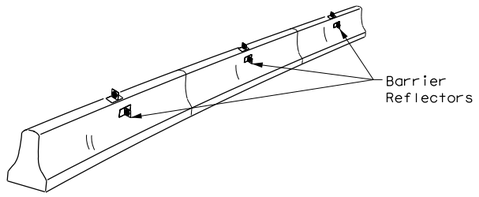
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0171	05	101	SH 199
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	6	TARRANT		32

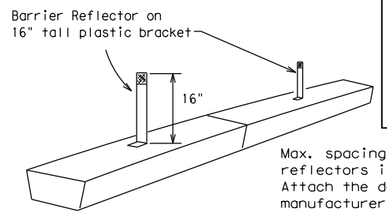
DATE:
FILE:

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.

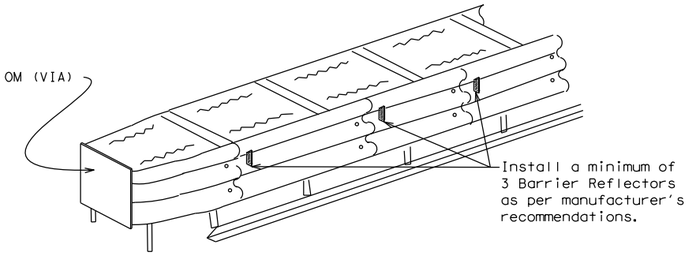


Max. spacing of barrier reflectors is 20 feet. Attach the delineators as per manufacturer's recommendations.

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.

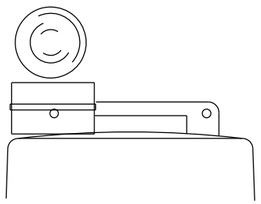


DELINEATION OF END TREATMENTS

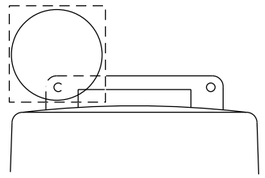
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

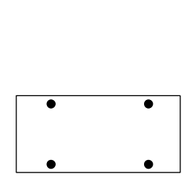
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

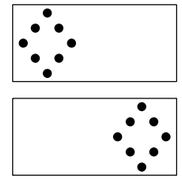
Arrow Boards may be located behind channelizing devices in place for a shoulder taper or merging taper, otherwise they shall be delineated with four (4) channelizing devices placed perpendicular to traffic on the upstream side of traffic.

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:

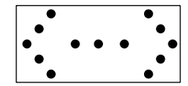


4 CORNER CAUTION

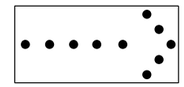
OR



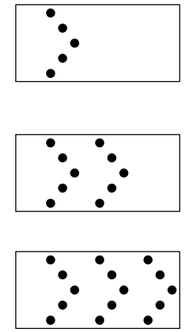
ALTERNATING DIAMOND CAUTION



DOUBLE ARROW



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



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

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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

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

Texas Department of Transportation

Traffic Safety Division Standard

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

BC(7)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0171	05	101	SH 199
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	6	TARRANT		33

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:

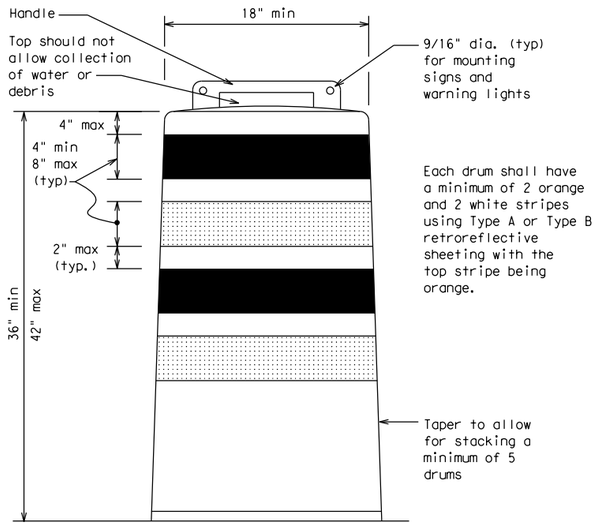
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

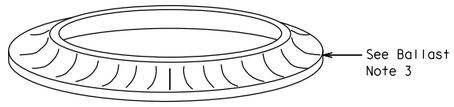
RETROREFLECTIVE SHEETING

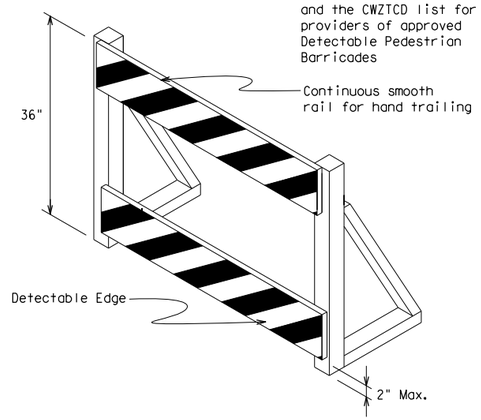
1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials," Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
2. The sheeting shall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

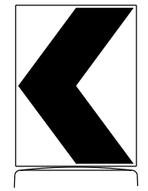




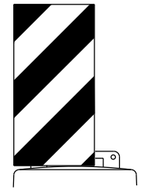


DETECTABLE PEDESTRIAN BARRICADES

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.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-21

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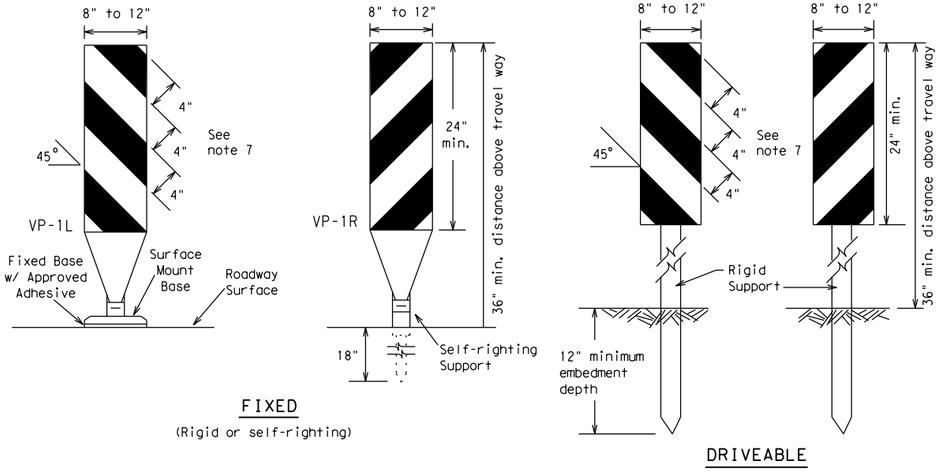
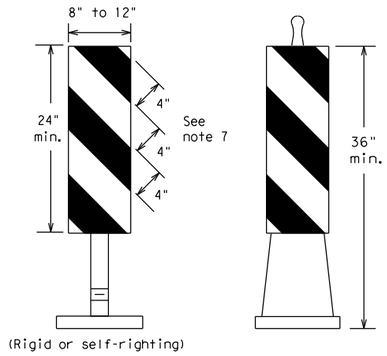


FIXED

(Rigid or self-righting)

DRIVEABLE

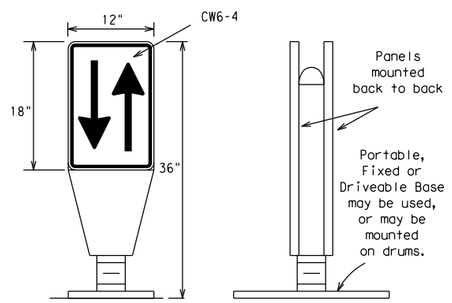


(Rigid or self-righting)

PORTABLE

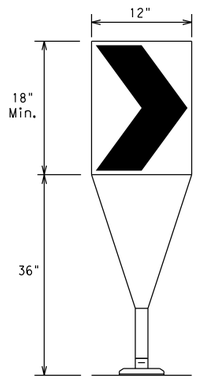
VERTICAL PANELS (VPs)

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)



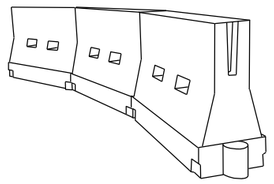
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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 ✻✻			Suggested Maximum Spacing of Channelizing Devices	
		10′ Offset	11′ Offset	12′ Offset	On a Taper	On a Tangent
30	$L = \frac{WS^2}{60}$	150′	165′	180′	30′	60′
35		205′	225′	245′	35′	70′
40		265′	295′	320′	40′	80′
45	L = WS	450′	495′	540′	45′	90′
50		500′	550′	600′	50′	100′
55		550′	605′	660′	55′	110′
60		600′	660′	720′	60′	120′
65		650′	715′	780′	65′	130′
70		700′	770′	840′	70′	140′
75		750′	825′	900′	75′	150′
80		800′	880′	960′	80′	160′

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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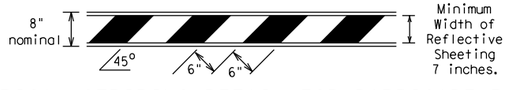
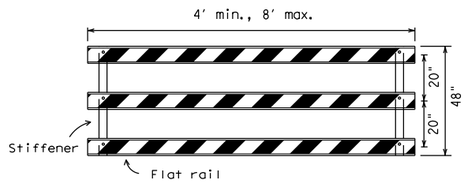
TYPE 3 BARRICADES

1. Refer to the Compliant Work Zone Traffic Control Devices List (CWZTCD) for details of the Type 3 Barricades and a list of all materials used in the construction of Type 3 Barricades.
2. Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
3. Barricades extending across a roadway should have stripes that slope downward in the direction toward which traffic must turn in detouring. When both right and left turns are provided, the chevron striping may slope downward in both directions from the center of the barricade. Where no turns are provided at a closed road, striping should slope downward in both directions toward the center of roadway.
4. Striping of rails, for the right side of the roadway, should slope downward to the left. For the left side of the roadway, striping should slope downward to the right.
5. Identification markings may be shown only on the back of the barricade rails. The maximum height of letters and/or company logos used for identification shall be 1".
6. Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
7. Warning lights shall NOT be installed on barricades.
8. Where barricades require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand is recommended. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight. Sand bags shall not be stacked in a manner that covers any portion of a barricade rails reflective sheeting. Rock, concrete, iron, steel or other solid objects will NOT be permitted. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber (such as tire inner tubes) shall not be used for sandbags. Sandbags shall only be placed along or upon the base supports of the device and shall not be suspended above ground level or hung with rope, wire, chains or other fasteners.
9. Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



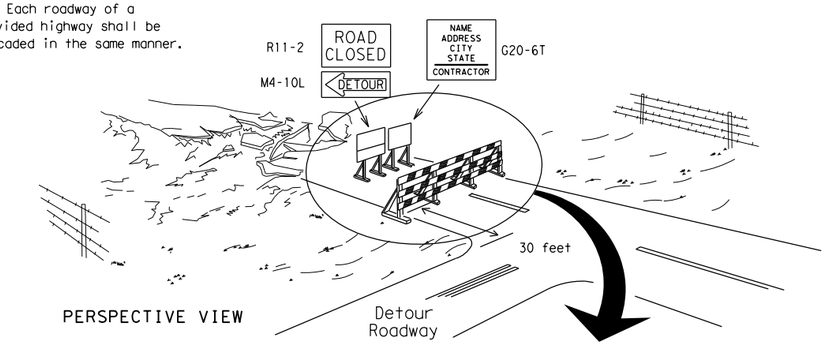
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

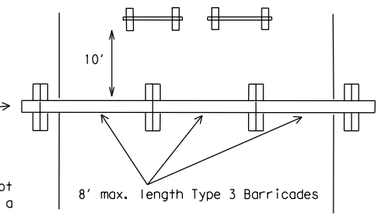
TYPICAL PANEL DETAIL
FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

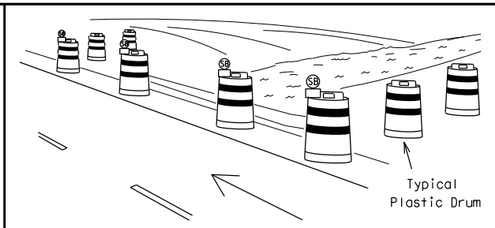
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

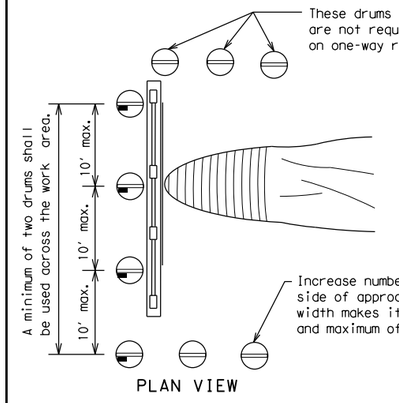
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

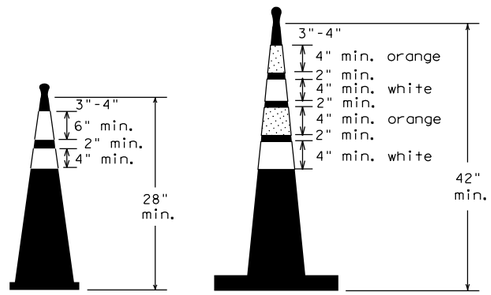
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder width is greater than 12 feet, steady-burn lights may be omitted if drums are used.
5. Drums must extend the length of the culvert widening.



PLAN VIEW

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

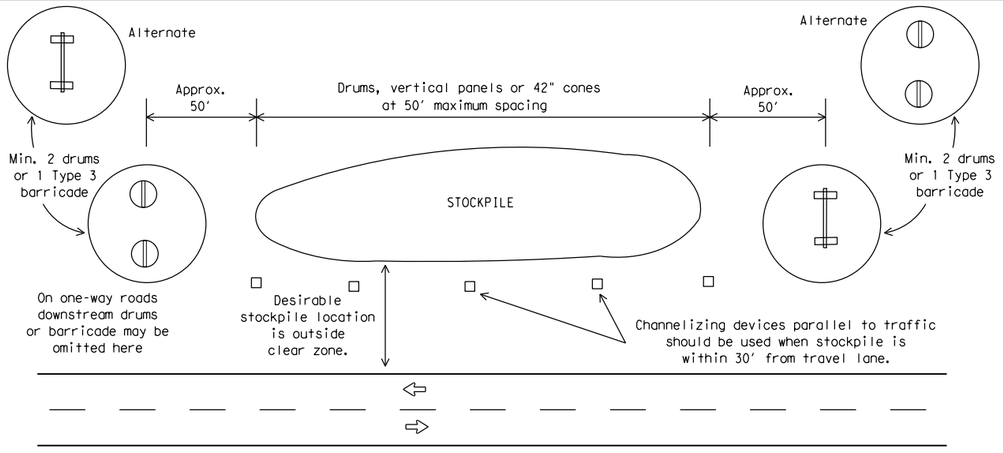
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

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

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-21

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

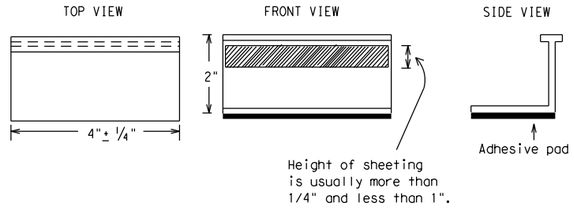
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

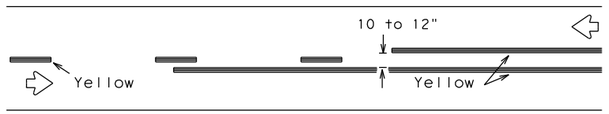
BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	0171	05	101	SH 199
2-98 9-07 5-21	DIST	COUNTY		SHEET NO.
1-02 7-13	6	TARRANT		37
11-02 8-14				

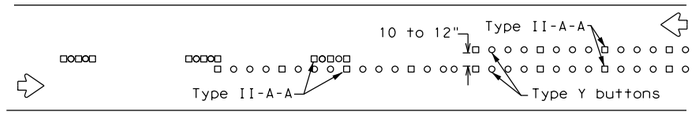
105

DATE:
FILE:

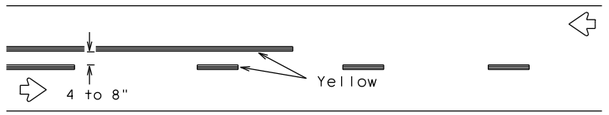
PAVEMENT MARKING PATTERNS



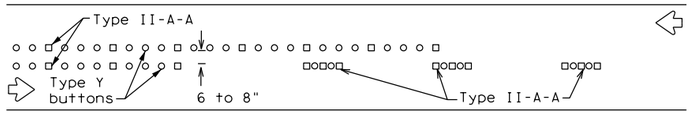
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



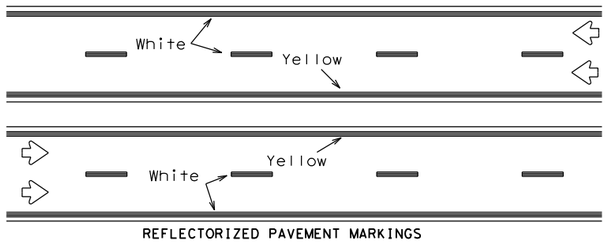
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



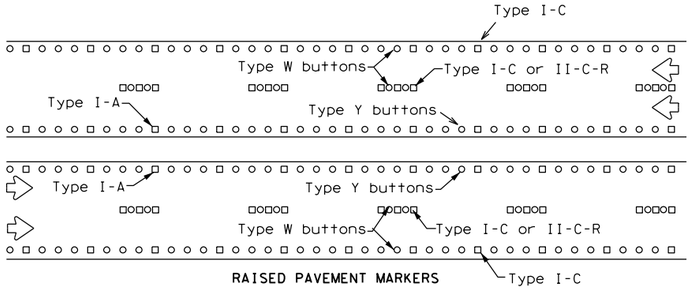
RAISED PAVEMENT MARKERS - PATTERN B

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



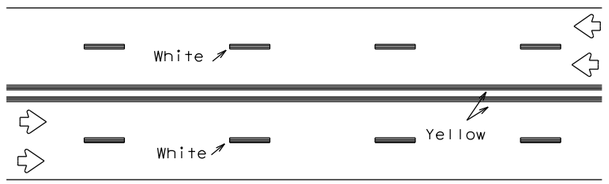
REFLECTORIZED PAVEMENT MARKINGS



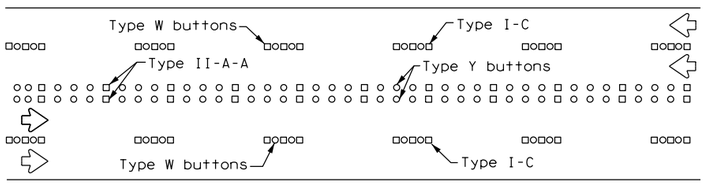
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



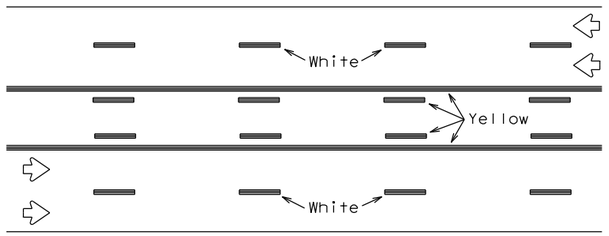
REFLECTORIZED PAVEMENT MARKINGS



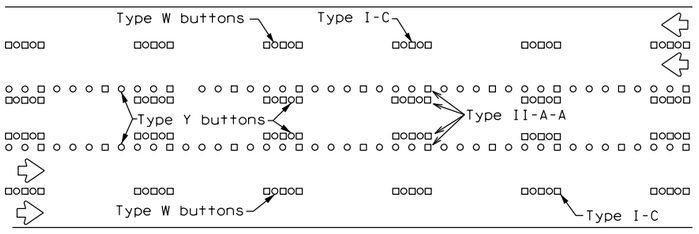
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

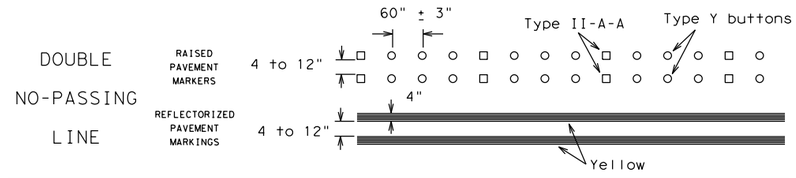
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

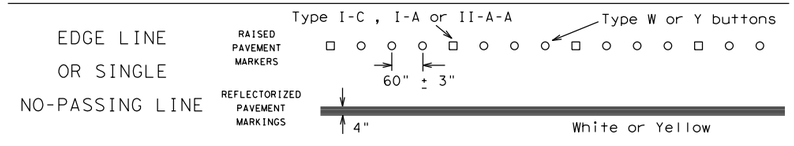
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

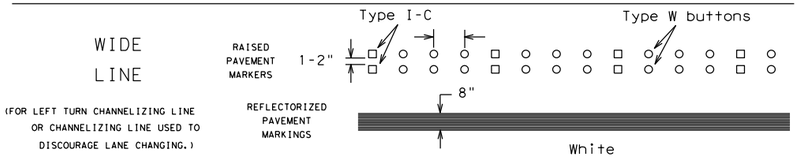


EDGE LINE OR SINGLE NO-PASSING LINE



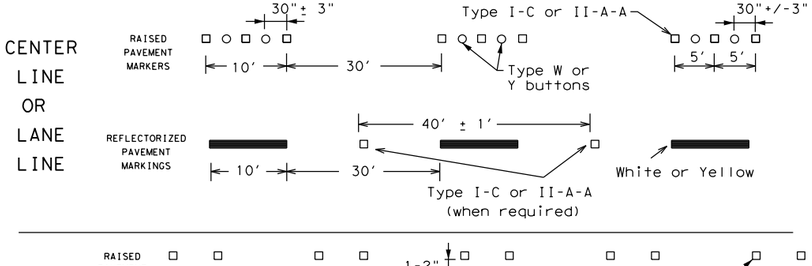
WIDE LINE

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

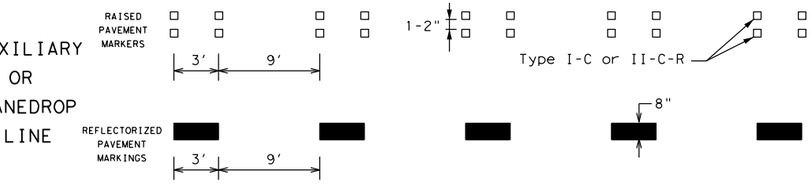


BROKEN LINES

CENTER LINE OR LANE LINE

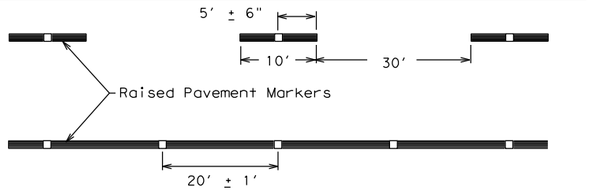


AUXILIARY OR LANEDROP LINE



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

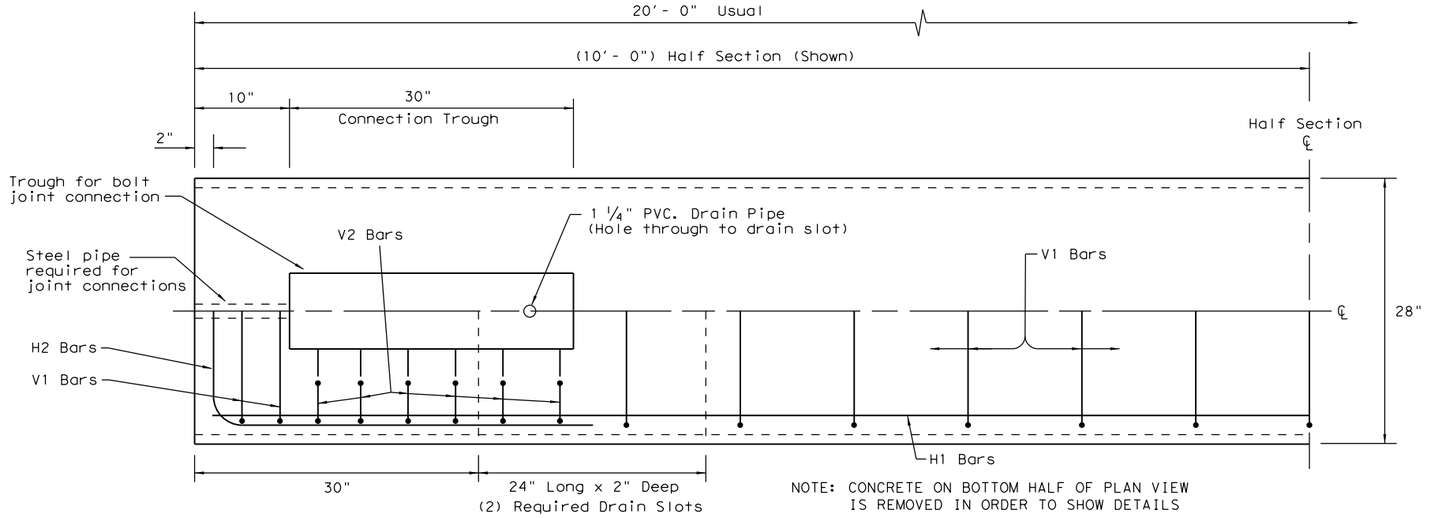
Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

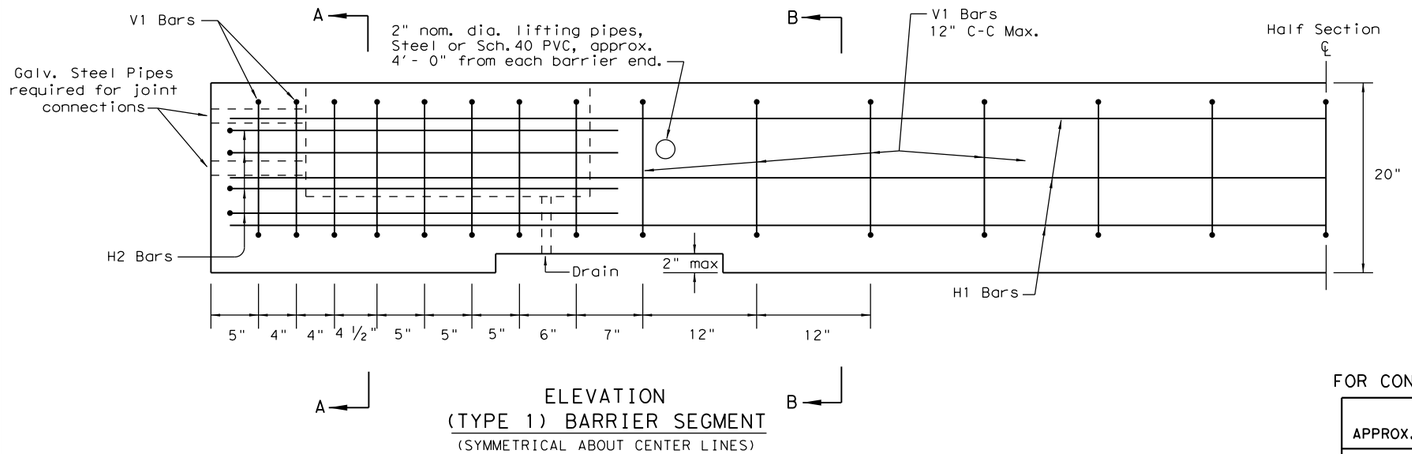
BC(12)-21

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	0171	05	101	SH 199
	DIST	COUNTY		SHEET NO.
	6	TARRANT		38

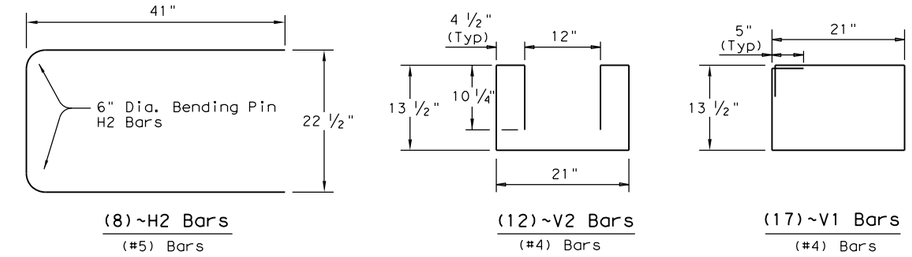
DATE:
FILE:



PLAN
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)

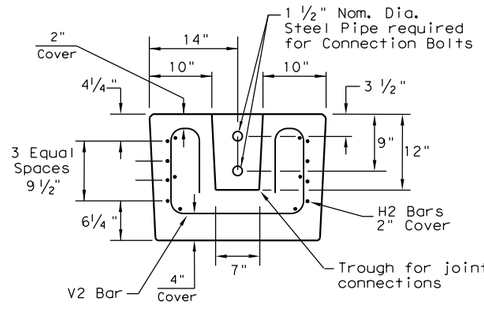


ELEVATION
(TYPE 1) BARRIER SEGMENT
(SYMMETRICAL ABOUT CENTER LINES)

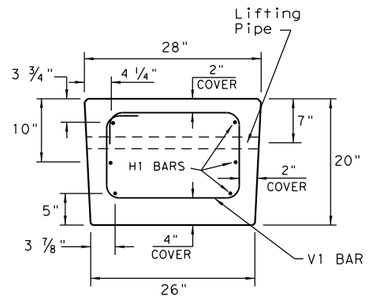


REINFORCING STEEL DETAILS
TYPE 1 - BARRIER SEGMENT

Note: Use 2" Dia. Bending Pin, unless otherwise shown



SECTION A-A



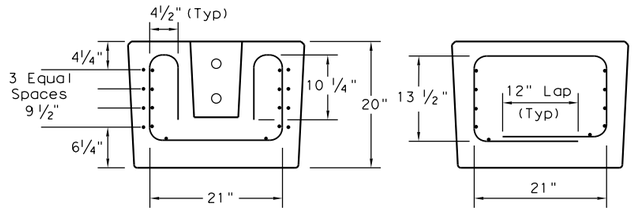
SECTION B-B

GENERAL NOTES

1. Low Profile Concrete Barrier (LPCB), is approved for use in temporary work zone locations, where the posted speed is 45 mph, or less.
2. Concrete shall be Class H for precast barrier with a minimum compressive strength of 3,600 psi.
3. Where used, rebar reinforcement shall be Grade 60 and conform to ASTM A615.
4. Precast LPCB barrier length shall be 20 ft.
5. All barrier edges shall have ¾" chamfer or a tooled radius.
6. Joint connection hardware shall be in accordance with Item 449, "Anchor Bolts." and is considered subsidiary.
7. Steel pipe required for joint connection bolts shall be galvanized in accordance with Item 445,"Galvanizing."
8. Welded wire reinforcement (WWR) may be used in lieu of conventional reinforcement for Type 1 barrier, and shall meet the requirements shown.

FOR CONTRACTORS INFORMATION ONLY

(TYPE 1) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	2.6
REINFORCING STEEL	LBS	330
TOTAL BARRIER WT.	LBS	11000



SECTION A-A SECTION B-B

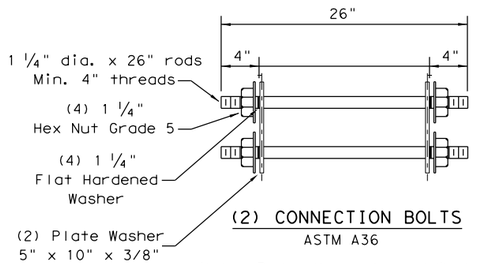
(WWR) GENERAL NOTES

1. Deformed Welded Wire Reinforcement shall conform to ASTM A497.
2. Welded wire cage may be cut or bent, if necessary, but must be approved by the Engineer.
3. Combinations of reinforcing steel and WWR are permitted, as directed by the Engineer. The dimensions from the end of the barrier section to the first wire shall not exceed 3".

REQUIRED (WWR) WIRE DESIGN

8 ~ (D31) Horizontal Wires (Equally spaced)
10 ~ (D20) Horizontal Wires (Equally spaced)
29 ~ (D20) Vertical Wires (Spaced as shown in Elevation View)

WELDED WIRE REINFORCEMENT (WWR)- OPTIONAL REINFORCING



(2) CONNECTION BOLTS
ASTM A36

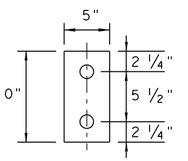


PLATE WASHER
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

SHEET 1 OF 2

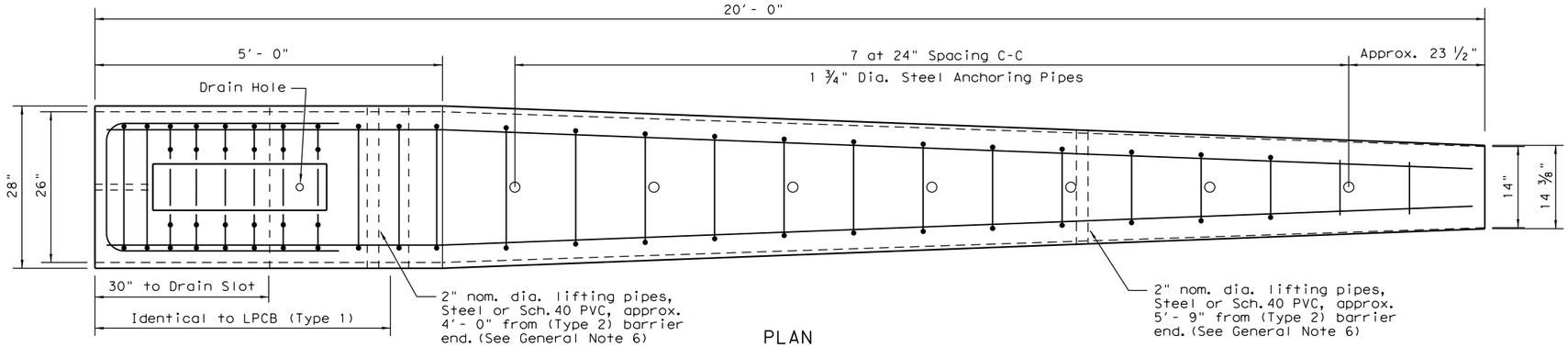
Texas Department of Transportation

Design Division Standard

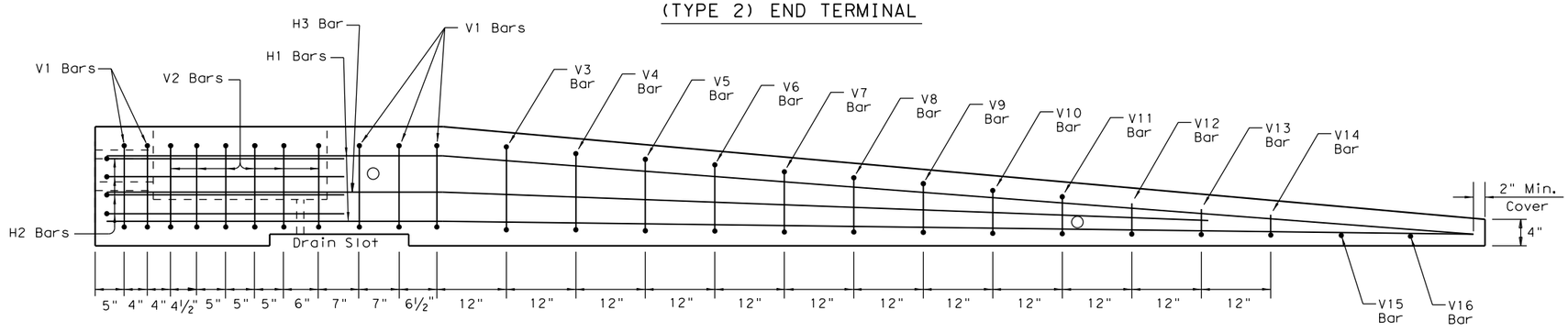
LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 1)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
©TxDOT December 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS	0171	05	101	SH 199
	DIST	COUNTY		SHEET NO.
	6	TARRANT		39

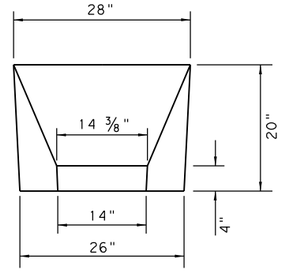
DATE:
FILE:



PLAN
(TYPE 2) END TERMINAL



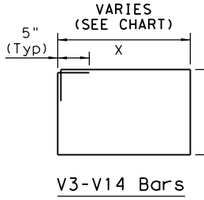
ELEVATION
(TYPE 2) END TERMINAL



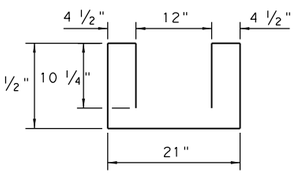
APPROACH VIEW

TYPE 2 - NOTES

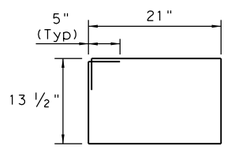
1. Welded wire reinforcment (WWR) is "not" an option for Type 2 Barrier.
2. Type 2 Barrier shall be used as an end treatment for the Type 1 barrier segments, when applicable.
3. The end treatment can be used without the anchor pins in locations that can accommodate approximately 4 ft. of lateral displacement of the end treatment. The use of non-pinned end treatment does not affect the performance or the deflection of the Low-Profile barrier system.
4. The anchor pins are all the same length and are to be driven flush with the top of the (Type 2) barrier surface.
5. The bends in the H3 and H1 bars are slight, no formal bend is necessary.
6. The Type 2 barrier segment must be lifted from the rear first, to prevent cracking of sloped section.
7. See LPCB sheet 1 for additional information.



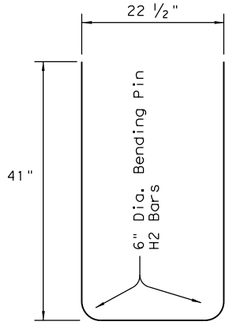
V3-V14 Bars



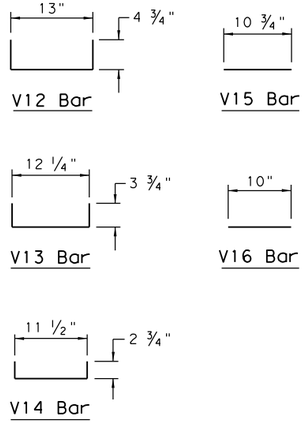
(6)~V2 Bars



(5)~V1 Bars



(4)~H2 Bars
(#5) Bars

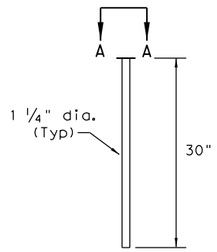


Note: All V Bars are (#4)

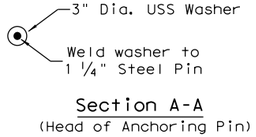
BAR (#4)	X (IN.)	Y (IN.)
V3 BAR	20 ¼	14 ½
V4 BAR	19 ½	13 ½
V5 BAR	18 ½	12 ¼
V6 BAR	17 ½	11 ¼
V7 BAR	17	10 ¼
V8 BAR	16 ¼	9
V9 BAR	15 ½	8
V10 BAR	14 ½	7
V11 BAR	13 ¾	6

REINFORCING STEEL DETAILS
TYPE 2 - END TERMINAL

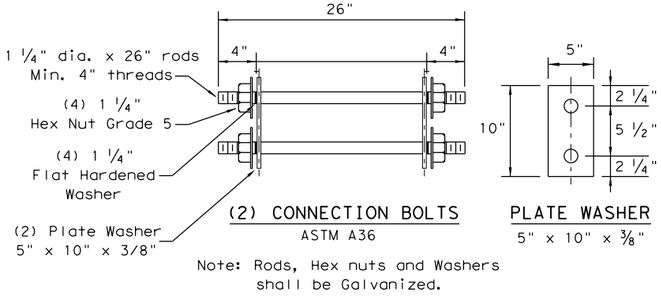
Note:
Anchoring pipes not shown in Elevation View



(7) Anchor Pins
ASTM A36 Steel
(See Note 3)



Section A-A
(Head of Anchoring Pin)

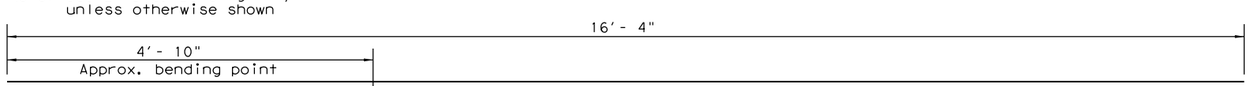


(2) CONNECTION BOLTS
ASTM A36

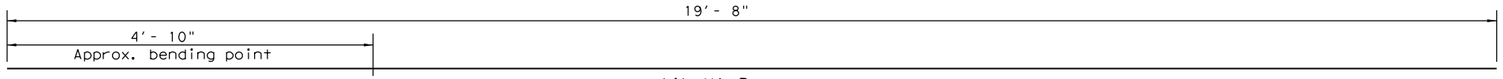
PLATE WASHER
5" x 10" x ⅜"

Note: Rods, Hex nuts and Washers shall be Galvanized.

Note: Use 2" Dia. Bending Pin, unless otherwise shown



(2)~H3 Bars
(#5) Bar



Note: Bends on H1 and H3 bars are slight and do not require formal bends.

(4)~H1 Bars
(#5) Bar

FOR CONTRACTORS INFORMATION ONLY

(TYPE 2) APPROX. QUANTITIES 20 FT. SECTION		
CONCRETE	CY	1.65
REINFORCING STEEL	LBS	240
TOTAL BARRIER WT.	LBS	7000

Texas Department of Transportation
Design Division Standard

LOW PROFILE CONCRETE BARRIER
PRECAST BARRIER (TYPE 2)
LPCB-13

FILE: lpcb13.dgn	DN: TxDOT	CK: AM	DW: VP	CK:
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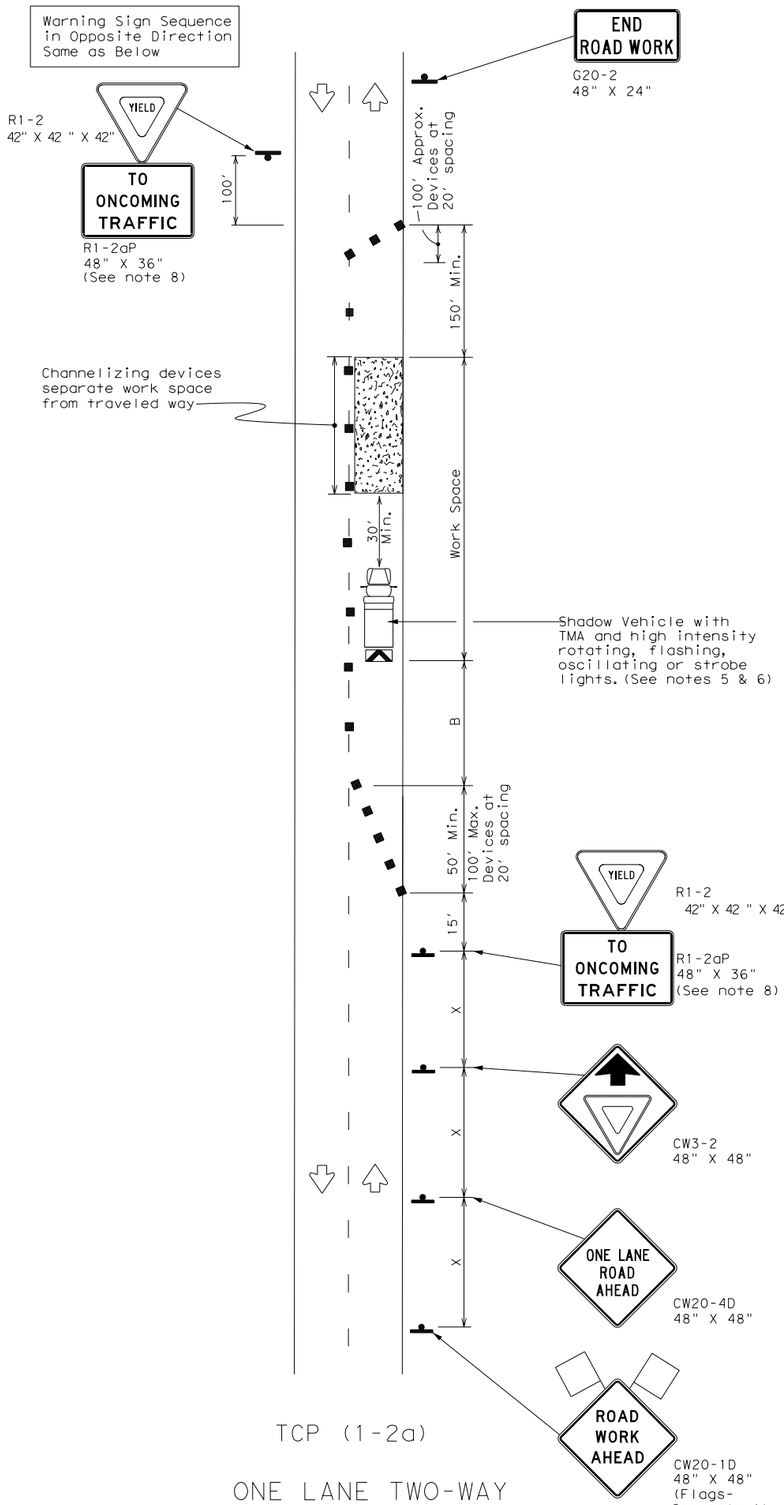
REVISIONS	0171	05	101	SH 199
	DIST	COUNTY		SHEET NO.
	6	TARRANT		40

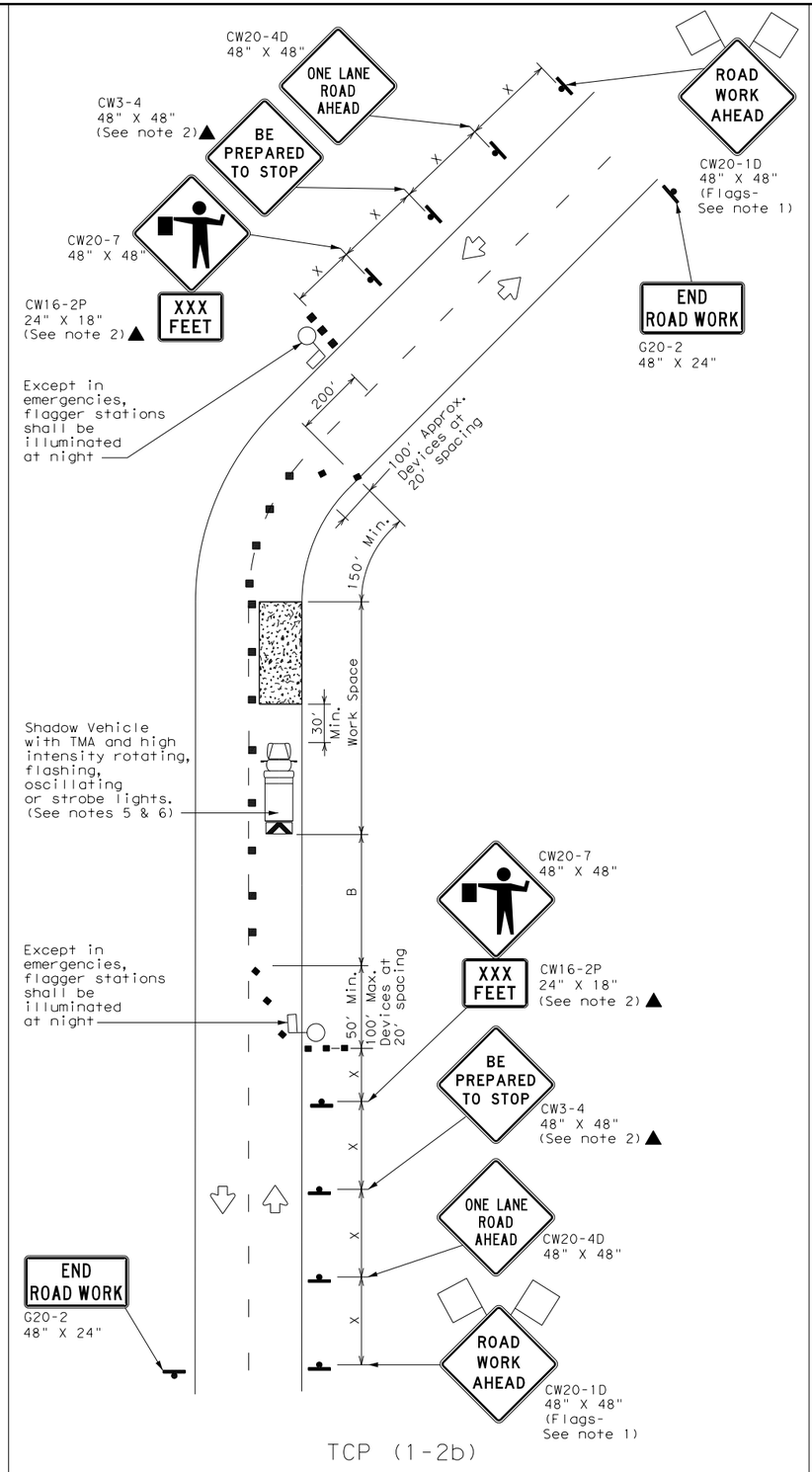
DATE:
FILE:



TCP (1-2a)

ONE LANE TWO-WAY CONTROL WITH YIELD SIGNS

(Less than 2000 ADT - See note 7)



TCP (1-2b)

ONE LANE TWO-WAY CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
4. Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-2a)

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

TCP (1-2b)

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

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(1-2)-18

FILE: tcp1-2-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-90 4-98	0171	05	101	SH 199
2-94 2-12	DIST	COUNTY		SHEET NO.
1-97 2-18	6	TARRANT		41

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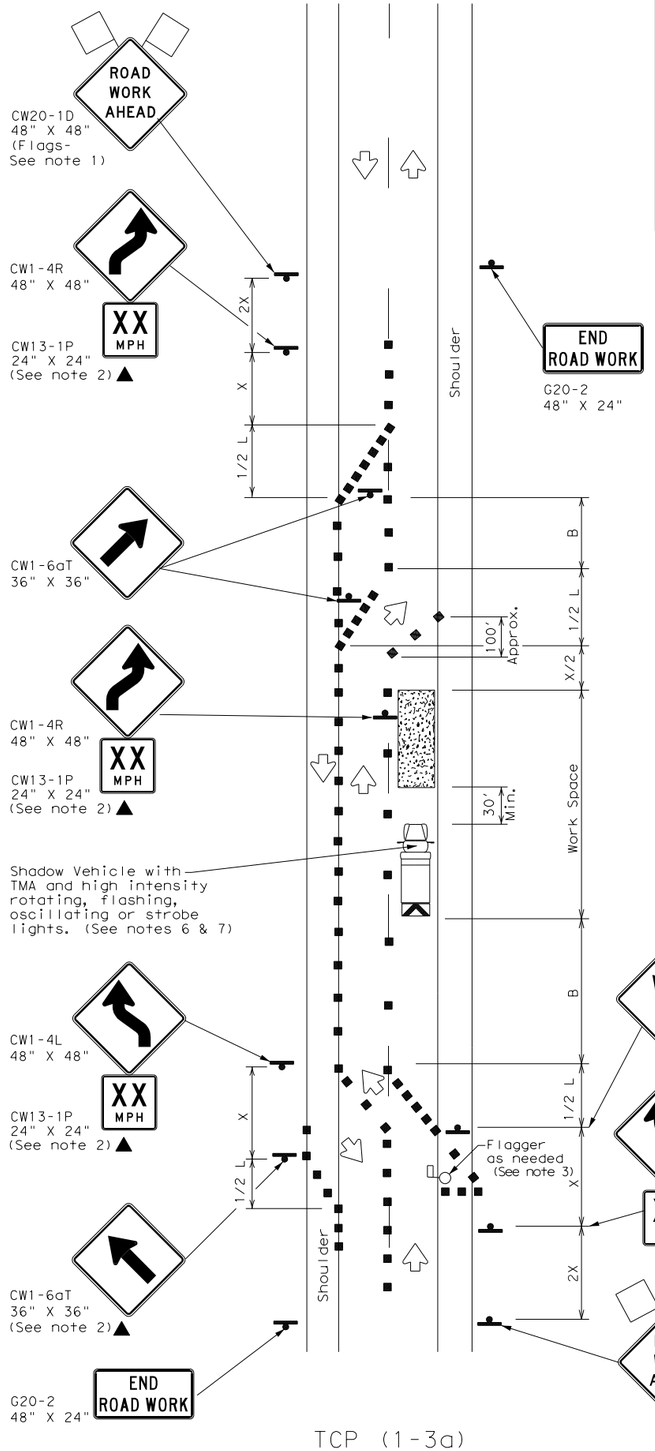
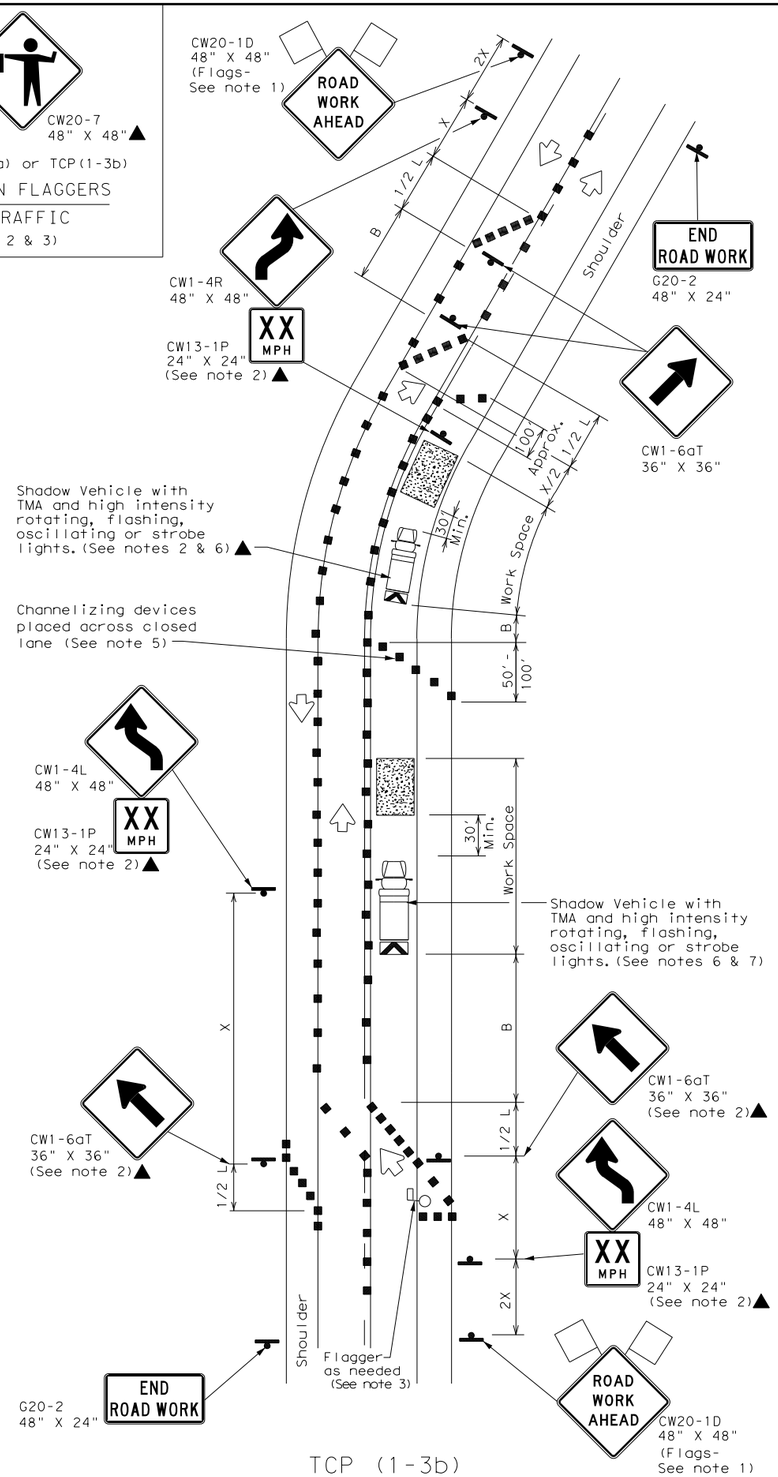
DATE:
FILE:



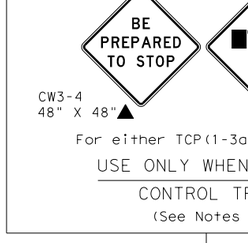
TCP (1-3a)
2-LANE ROADWAY WITH PAVED SHOULDERS

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



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

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW



For either TCP(1-3a) or TCP(1-3b)

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

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Additional flaggers may be positioned in advance of traffic queues to alert traffic to reduce speed.
4. DO NOT PASS, PASS WITH CARE and construction regulatory speed zone signs may be installed downstream of the ROAD WORK AHEAD signs.
5. When the work zone is made up of several work spaces, channelizing devices should be placed laterally across the closed lane to re-emphasize closure. Laterally placed channelizing devices should be repeated every 500 to 1000 feet in urban areas and every 1/4 to 1/2 mile in rural areas.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.
8. Where traffic is directed over a yellow centerline, channelizing devices which separate two-way traffic should be spaced on tapers at 20', or 15' if posted speed are 35 mph or slower, and for tangent sections, at 1/2S where S is the speed in mph. This tighter device spacing is intended for the area of conflicting markings not the entire work zone.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
TRAFFIC SHIFTS ON TWO LANE ROADS

TCP(1-3)-18

FILE: tcp1-3-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0171	05	101	SH 199
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12				
1-97 2-18	6	TARRANT		42

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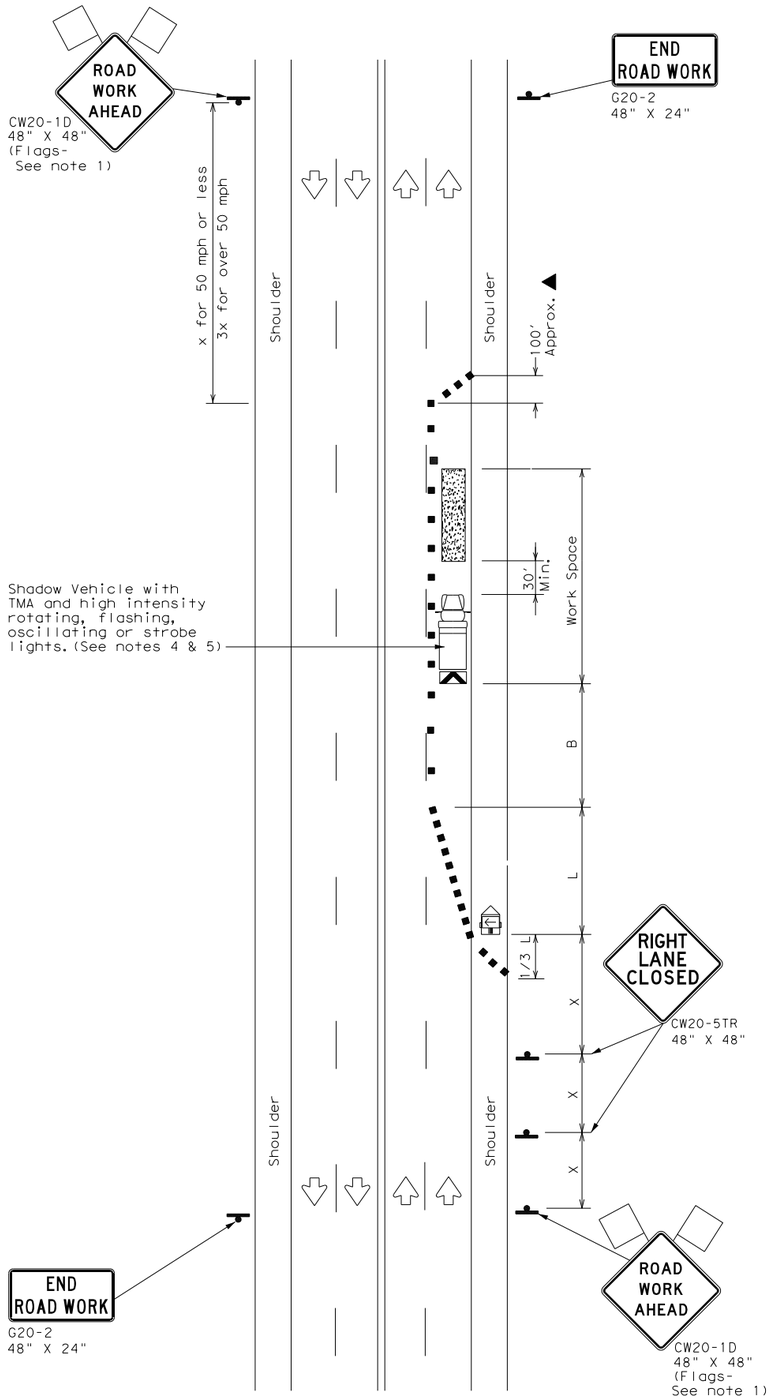
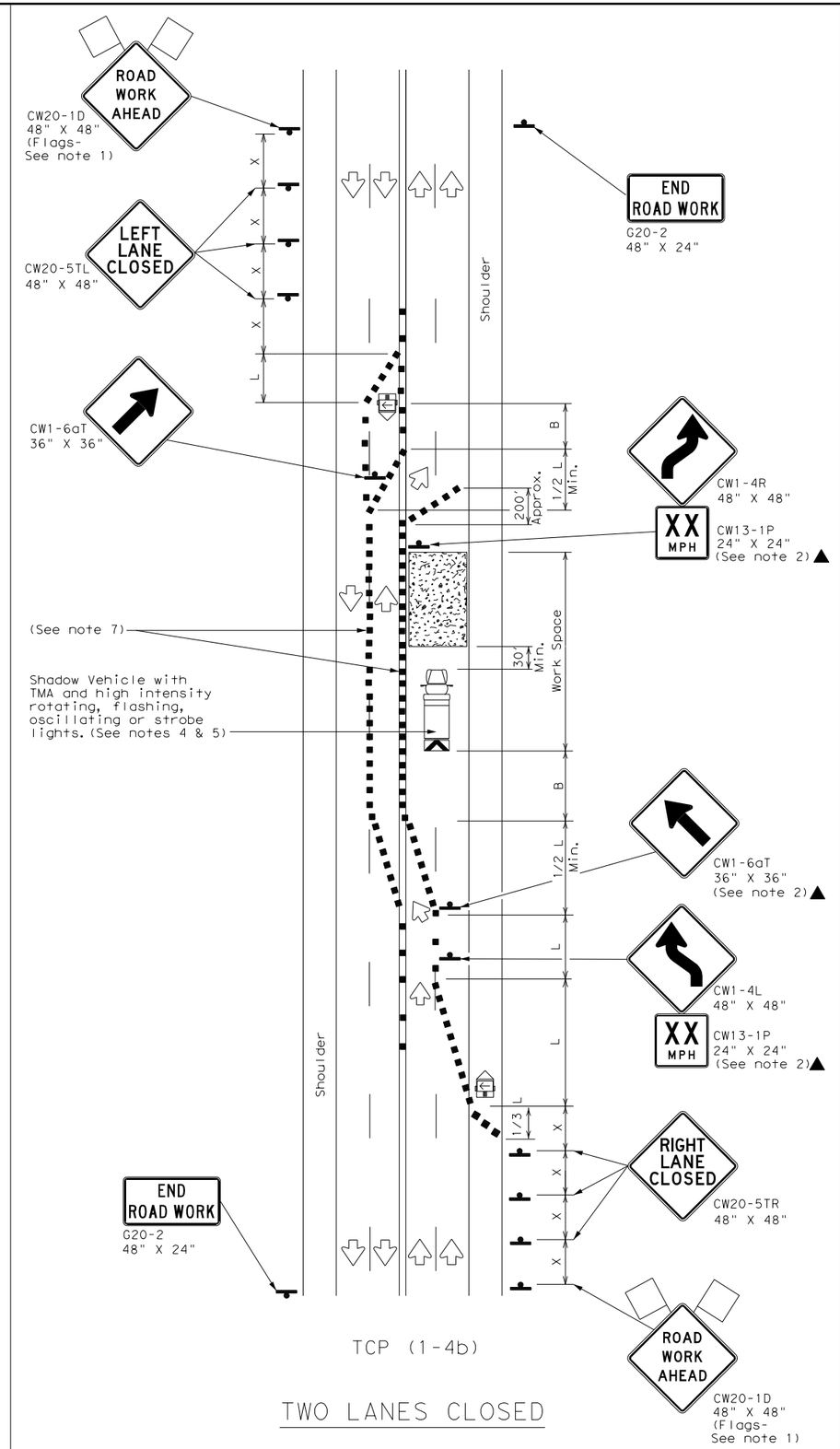
DATE:
FILE:



TCP (1-4a)

ONE LANE CLOSED



TCP (1-4b)

TWO LANES CLOSED

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW20-1D "ROAD WORK AHEAD" sign may be repeated if the visibility of the work zone is less than 1500 feet.
4. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect wider work spaces.

TCP (1-4a)

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

TCP (1-4b)

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

Texas Department of Transportation

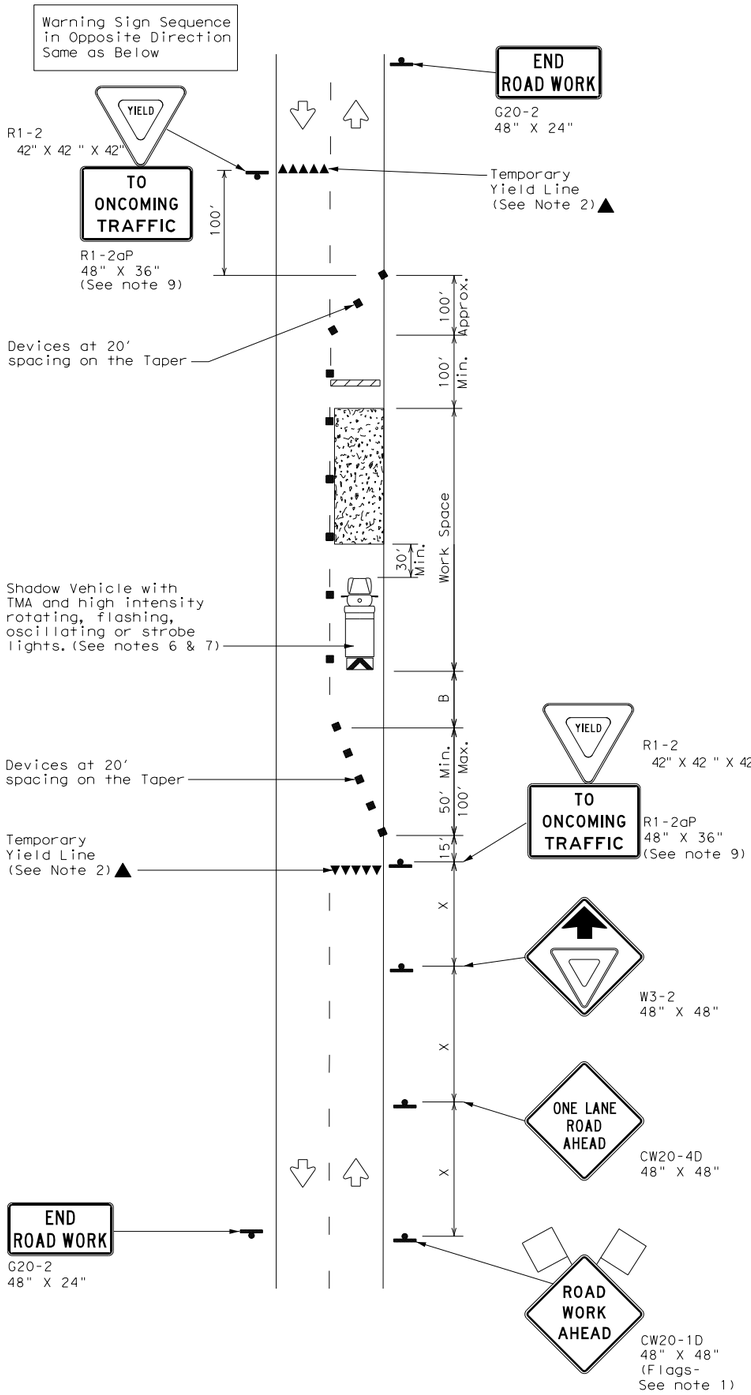
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

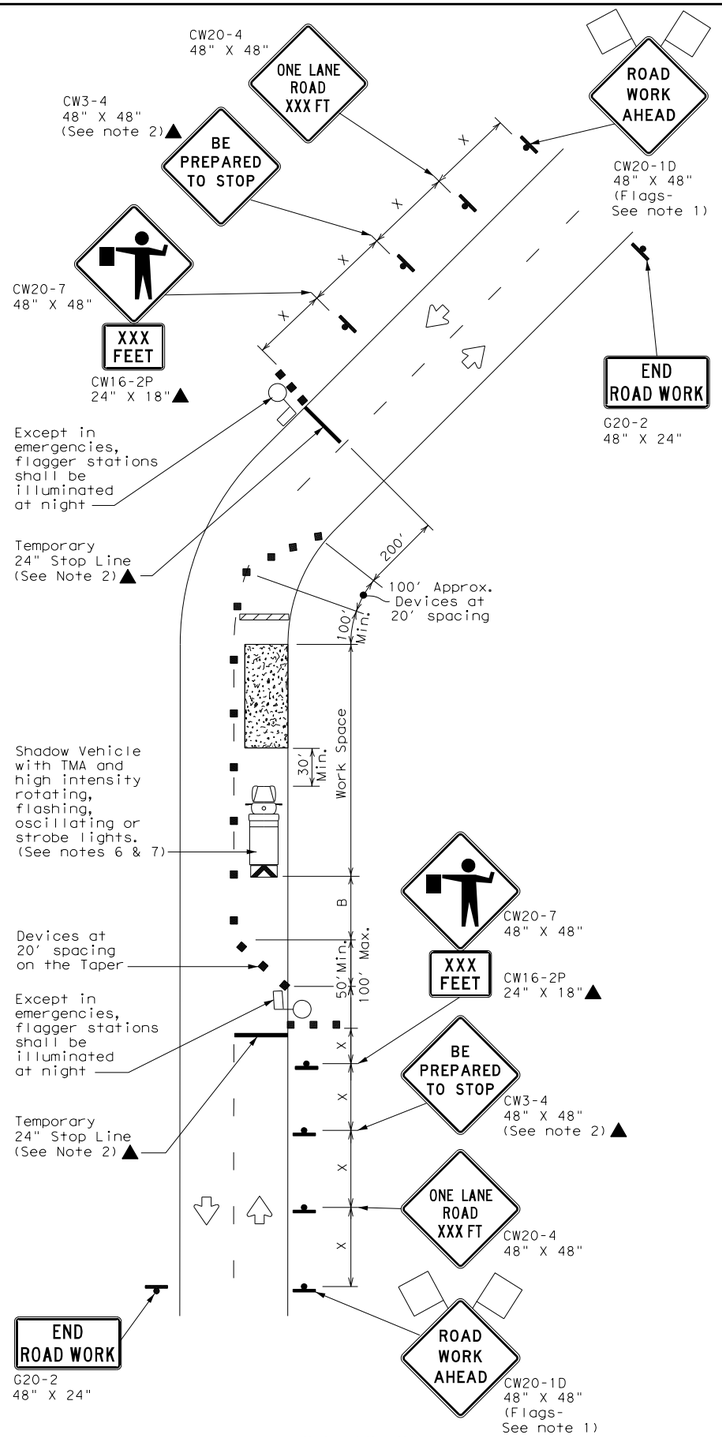
TCP(1-4)-18

FILE: tcp1-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0171	05	101	SH 199
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	6	TARRANT		43
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

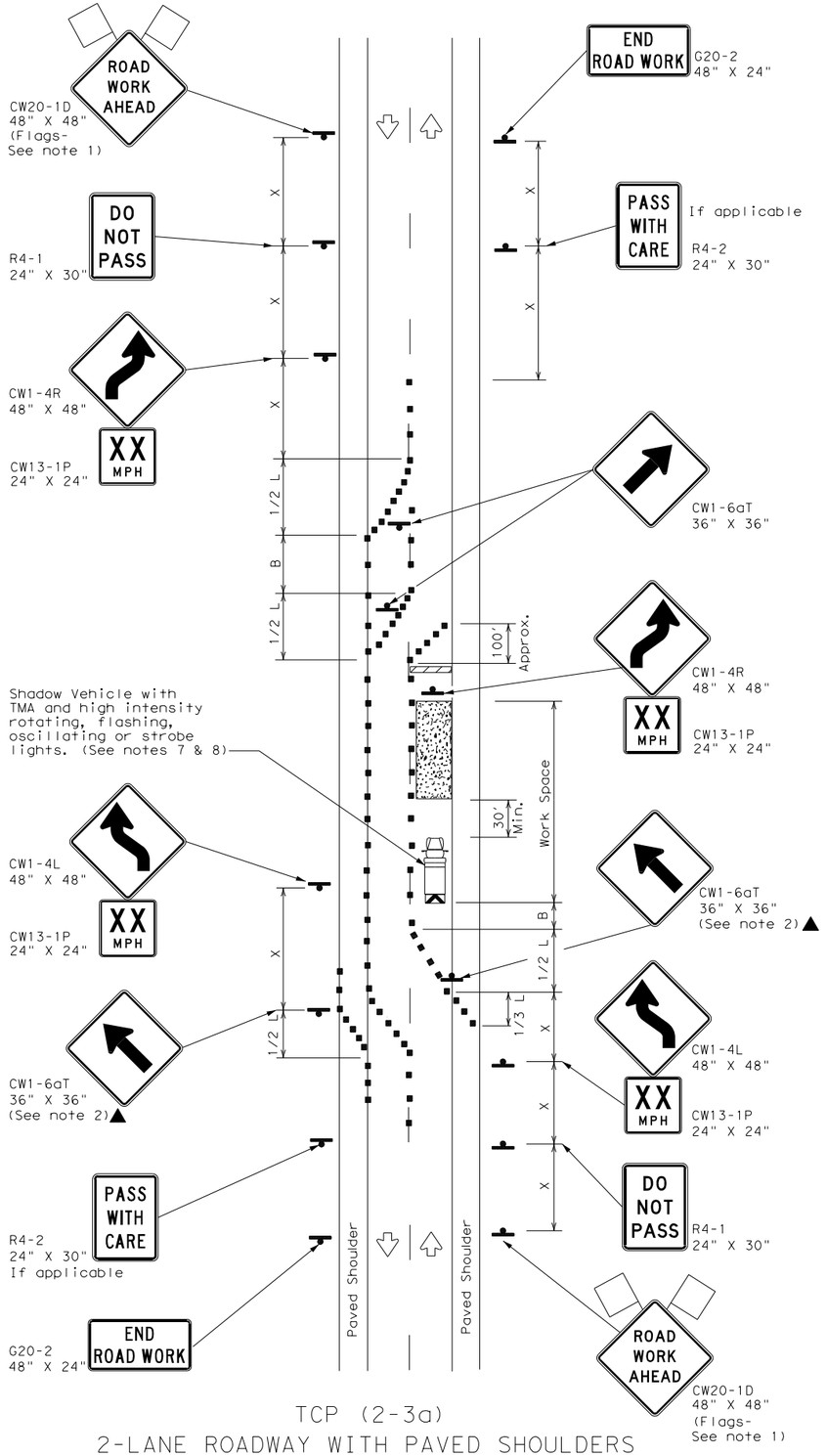
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

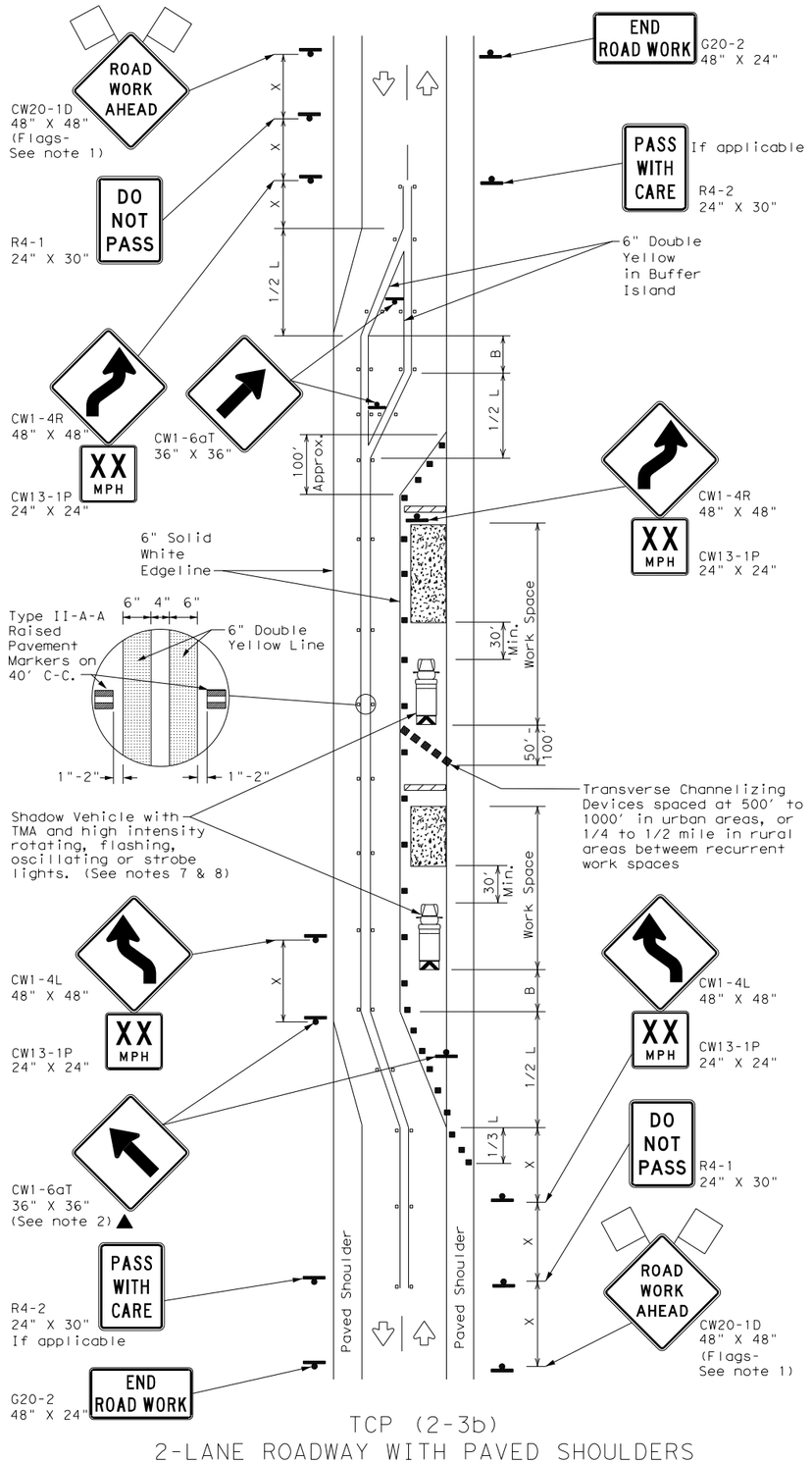
FILE: tcp2-2-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0171	05	101	SH 199
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	6	TARRANT		44

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 Safety Division Standard

TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-23

FILE: tcp(2-3)-23.dgn	DN:	CK:	DW:	CK:
© TxDOT April 2023	CONT	SECT	JOB	HIGHWAY
REVISIONS 12-85 4-98 2-18	0171	05	101	SH 199
8-95 3-03 4-23	DIST	COUNTY		SHEET NO.
1-97 2-12	6	TARRANT		45

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DATE:
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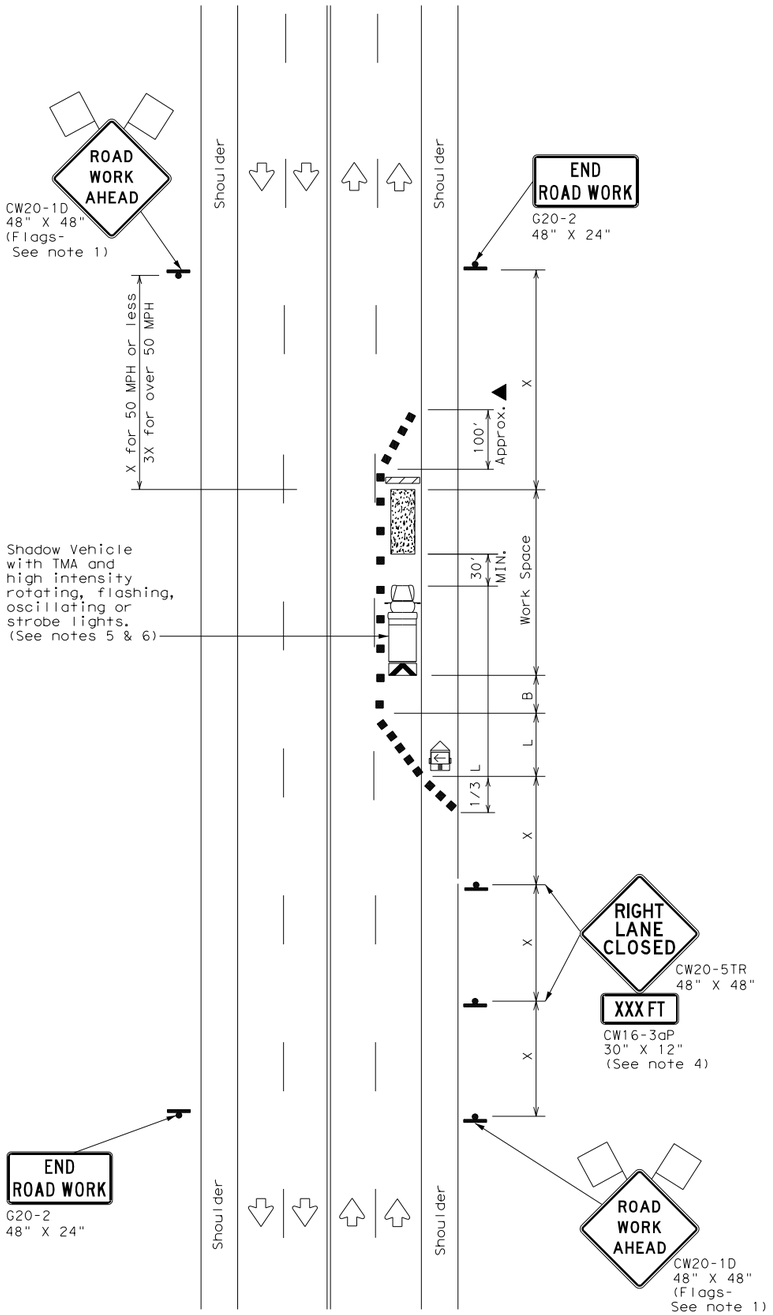
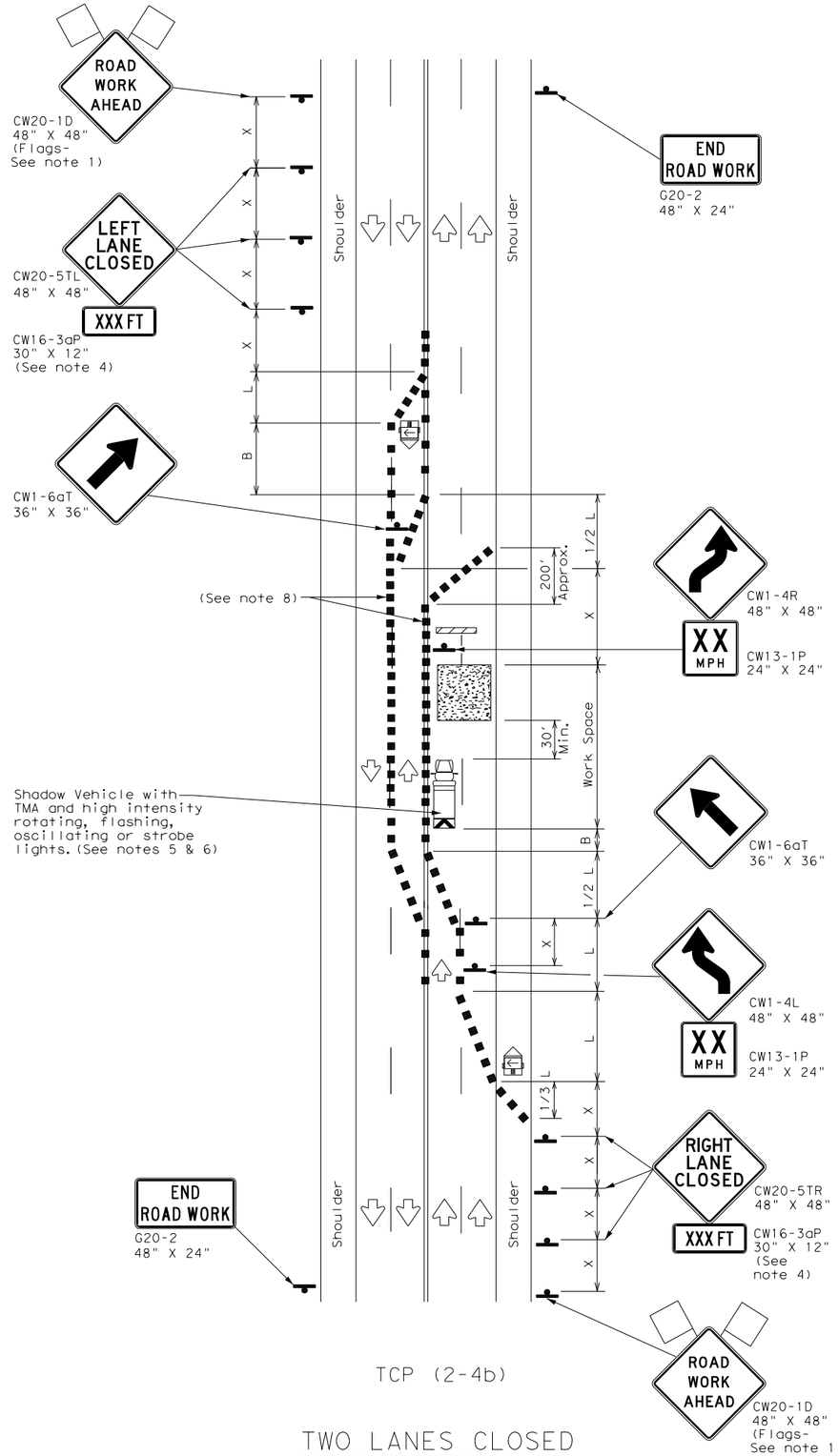


TCP (2-4a)

ONE LANE CLOSED



TCP (2-4b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The downstream taper is optional. When used, it should be 100 feet minimum length per lane.
4. For short term applications, when post mounted signs are not used, the distance legend may be shown on the sign face rather than on a CW16-3aP supplemental plaque.
5. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
6. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-4a)

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

TCP (2-4b)

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

Texas Department of Transportation

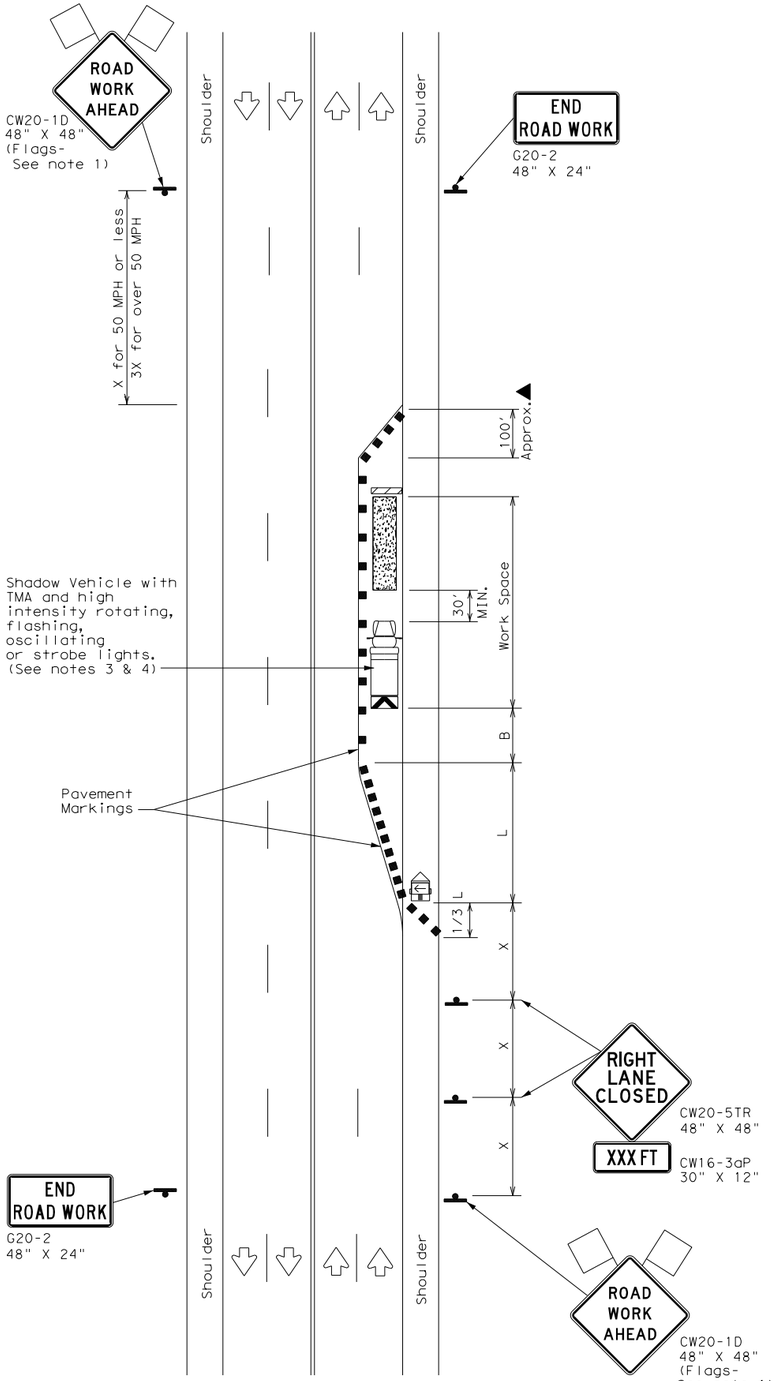
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN LANE CLOSURES ON MULTILANE CONVENTIONAL ROADS

TCP(2-4)-18

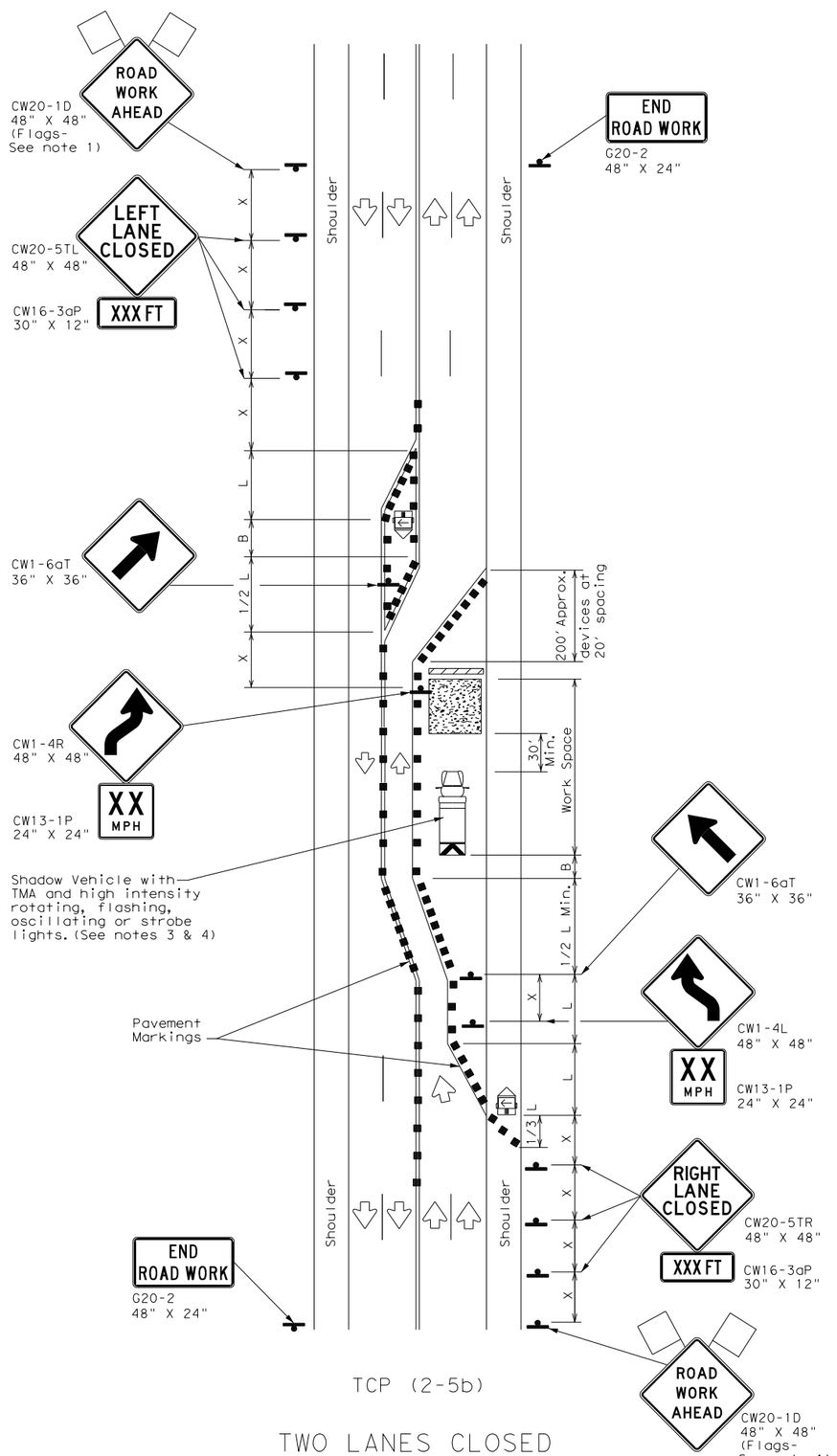
FILE: tcp2-4-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0171	05	101	SH 199
1-97 2-12	DIST	COUNTY		SHEET NO.
4-98 2-18	6	TARRANT		46

DATE:
FILE:



TCP (2-5a)

ONE LANE CLOSED



TCP (2-5b)

TWO LANES CLOSED

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. 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 eposure 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 substitutued for the Shadow Vehicle and TMA.
4. Additional Shadow Vehicles with TMAs may be positioned in each closed lane, on the shoulder or off the paved surface, next to those shown in order to protect a wider work space.
5. The downstream taper is optional. When used, it should be 100 feet approximately per lane, with channelizing devices spaced at 20 feet.

TCP (2-5a)

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

TCP (2-5b)

7. Conflicting pavement markings shall be removed for long-term projects.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
LONG TERM LANE CLOSURES
MULTILANE CONVENTIONAL RDS.

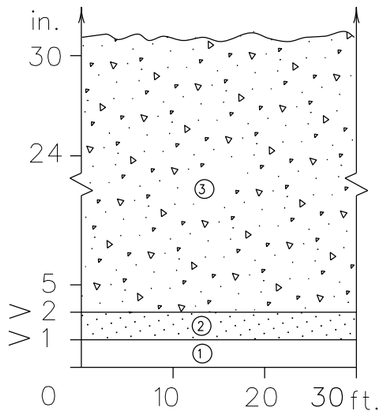
TCP(2-5)-18

FILE: tcp2-5-18.dgn	DN:	CK:	DW:	CK:
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 2-12	0171	05	101	SH 199
1-97 3-03	DIST	COUNTY		SHEET NO.
4-98 2-18	6	TARRANT		47

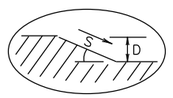
DATE:
FILE:

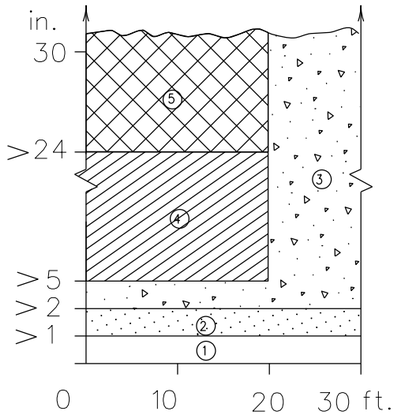
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet

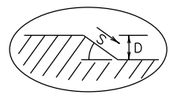


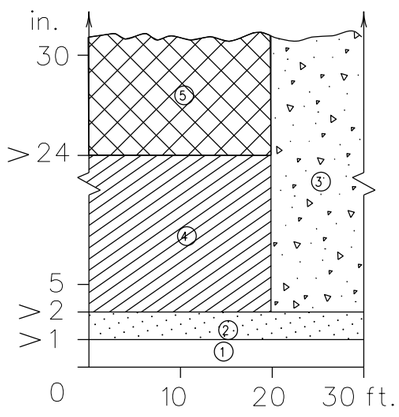
Edge Condition I
S = (3:1) (or flatter)



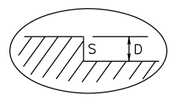


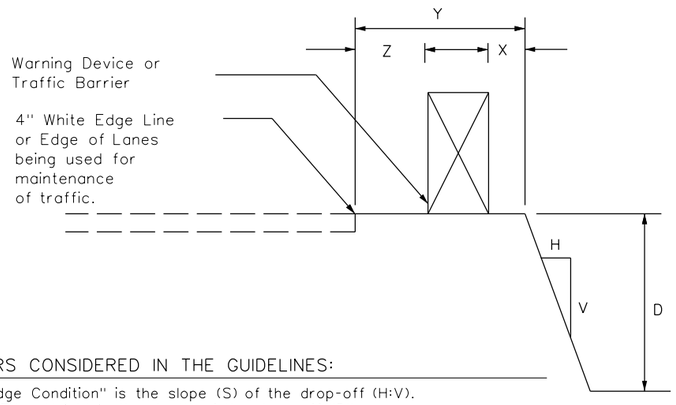
Edge Condition II
S = ((2.99):1) to (1:1)





Edge Condition III
S is steeper than (1:1)





FACTORS CONSIDERED IN THE GUIDELINES:

1. The "Edge Condition" is the slope (S) of the drop-off (H:V). The "Edge Height is the depth of the drop-off "D".

2. Distance "X" is to be the maximum practical under job conditions. Two feet minimum for high speed conditions. Distance "Y" is the lateral clearance from edge of travel lane to edge of dropoff. Distance "Z" does not have a minimum.

3. In addition to the factors considered in the guidelines, each construction zone drop-off situation should be analyzed individually, taking into account other variables, such as: traffic mix, posted speed in the construction zone, horizontal curvature, and the practicality of the treatment options.

4. The conditions for indicating the use of positive or protective barriers are given by Zone-5 and Figure-1. Traffic barriers are primarily applicable for high speed conditions. Urban areas with speeds of 30 mph or less may have a lesser need for signing, delineation, and barriers. Right-angled edges, however, with "D" greater than 2 inches and located within a lateral offset of 6 feet, may indicate a higher level of treatment.

5. If the distance "Y" must be less than 3 feet, the use of a positive barrier may not be feasible. In such a case, consider either: 1) narrowing the lanes to a desired 11 to 12 feet or 10 foot minimum (see CW20-8 sign), or 2) provide an edge slope such as Edge Condition I.

Zone	Treatment Types Guidelines:
①	No treatment
②	CW 8-11 "Uneven Lanes" signs.
③	CW 8-9a Shoulder Drop-Off" or CW 8-11 signs plus vertical panels.
④	CW8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge slope to that of the profered Edge Condition I.
⑤	Check indications (Figure-1) for possitive barrier. Where positive barrier is not indicated, the treatment shown above for Zone-4 may be used after consideration of other applicable factors.

Edge Condition Notes:

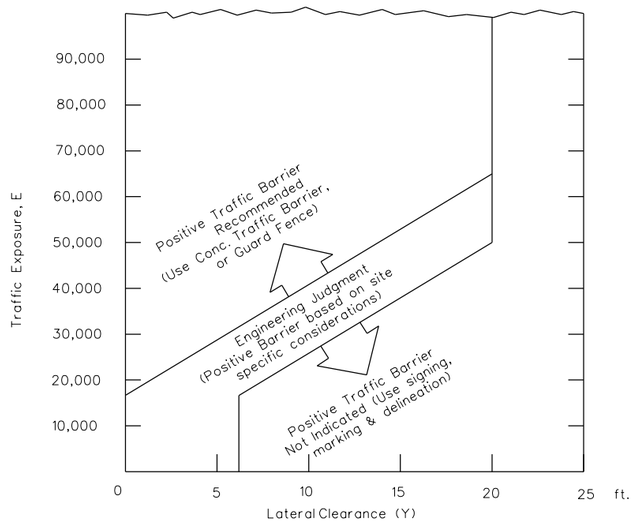
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1 to 1) so long as "D" does not exceed 5 inches. Under-carriage drag on most automobiles will occur when "D" exceeds 6 inches. As "D" exeeds 24 inches, the possibility for rollover is greater in most vehicles.

3. Edge Condition III: When slopes are greater than (1 to 1) and where "D" is greater than 2 inches, a more difficult control factor may exist for some vehicles, if not properly treated. For example, where "D" is greater than 2 inches and up to 24 inches different types of vehicles may experience different steering control at different edge heights. Automobiles might experience more steering control differential when "D" is greater than 2 inches and up to 5 inches. Trucks, particularly those with high loads, have more steering control differential when "D" is greater than 5 inches and up to 24 inches. When "D" exceeds 24 inches, the possibility of rollover is greater for most vehicles.

4. Milling or overlay operations that result in Edge Condition III should not be in place without appropriate warning treatments, and these conditions should not be left in place for extended periods of time.

FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 ( )



1. E = ADT x T
   Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.

2. Figure-1 provides a practical approach to the use of positive barriers for the protection of vehicles from pavement drop-offs. Other factors, such as the presence of heavy machinery, construction workers, or the mix and volume of traffic may make the use of positive barriers appropriate, even when the edge condition alone may not justify the use of a barrier.

3. An approved end treatment should be provided for any positive barrier end located within the clear zone.

These guidelines apply to temporary traffic control areas or work zones where continuous pavement edges or drop-offs exists parallel and adjacent to a lane used by traffic. The edge conditions may be present between shoulders and travel lanes, between adjacent or opposing travel lanes, or at intermediate points across the width of the paved surface. Due to the variability in construction operations, tolerances in the variables may be allowed by the engineer. These guidelines do not apply to short term operations. These guidelines do not constitute a rigid standard or policy; rather, they are guidance to be used in conjunction with engineering judgement. These guidelines may be updated on the Design Division's on-line manuals.

Engineer's Seal

STATE OF TEXAS
PAUL E WILLIAMS
73822
REGISTERED
PROFESSIONAL ENGINEER

Paul E. Williams, P.E.

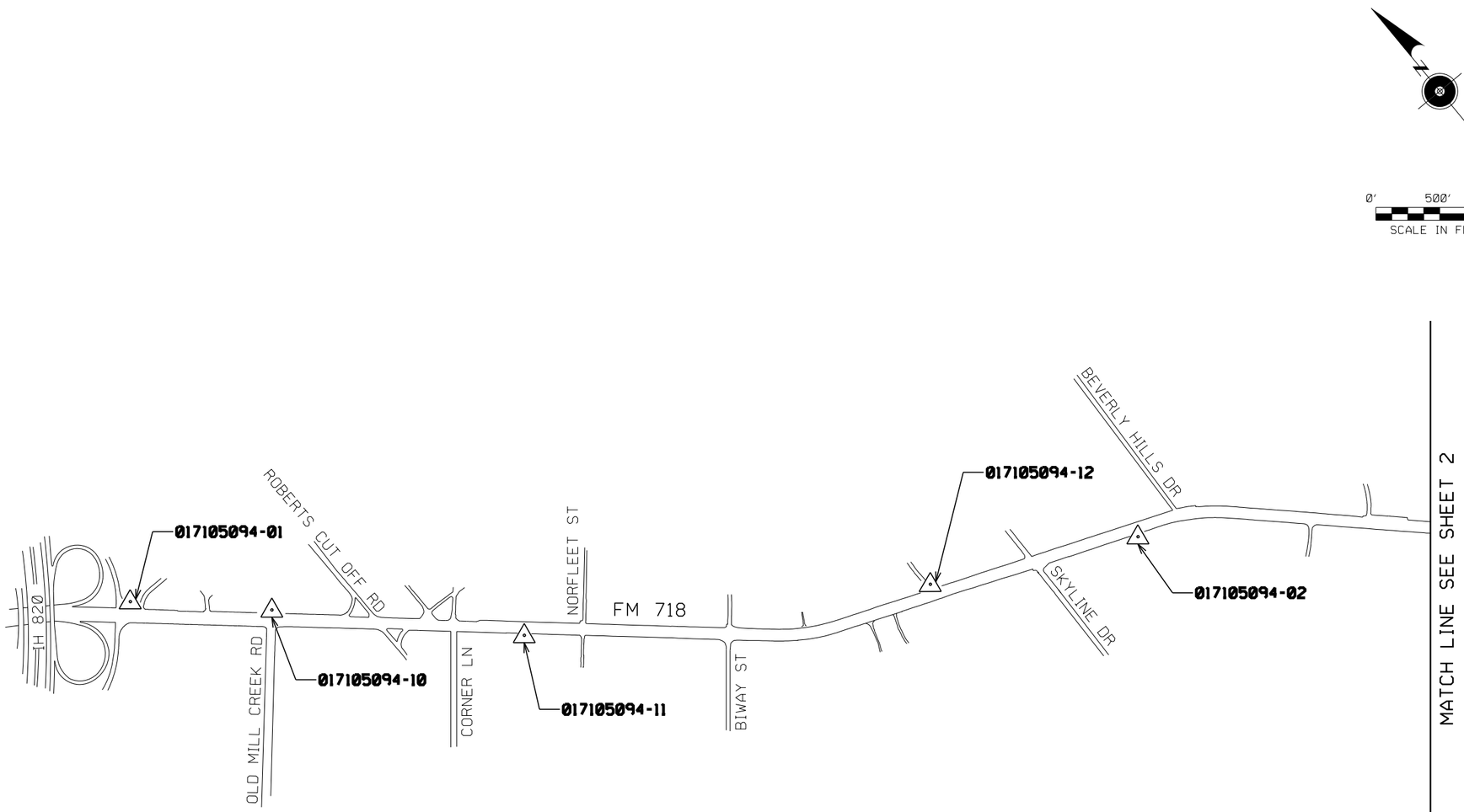
Date 04/11/2024

Texas Department of Transportation

Traffic Safety Division Standard

TREATMENT FOR VARIOUS EDGE CONDITIONS

FILE: edgecon.dgn	DN:	CK:	DW:	CK:
© TxDOT August 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	0171	05	101	SH 199
03-01 08-01 9-21	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		47A



NOTES:

1.ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (NAD83, 2011 ADJUSTMENT).

2.ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00012.

3.ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), 1991 ADJUSTMENT USING GEOID12A.

Eric A. Kreiner
Registered Professional Land Surveyor
No. 5320

TBPELS # 10064301

HORIZONTAL / VERTICAL CONTROL

SURFACE COORDINATES

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
017105094-01	6,979,389.279	2,301,666.613	744.25'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND
017105094-10	6,978,627.076	2,302,472.075	762.54'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE SET
017105094-11	6,977,220.031	2,303,877.167	736.74'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE SET
017105094-12	6,975,503.568	2,306,583.202	675.22'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE SET
017105094-02	6,974,754.792	2,308,074.076	661.06'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND

NO	DATE	REVISION	APPROVED

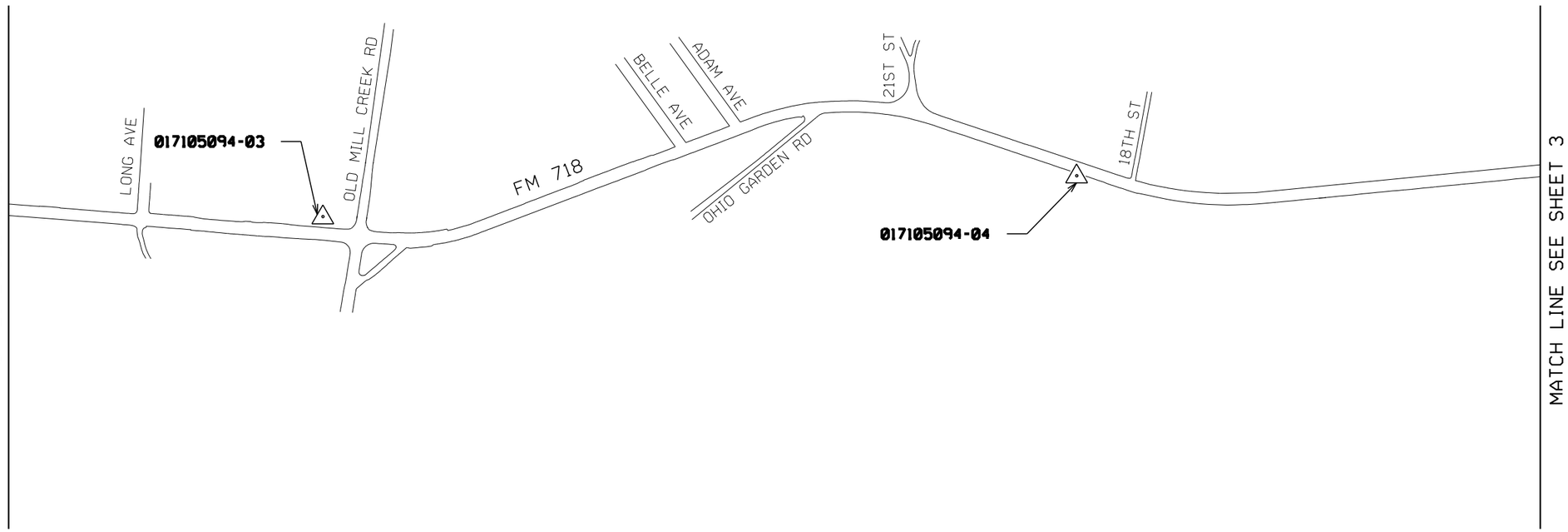
Surveying and Mapping, LLC. (SAM)
1341 W. Mockingbird Lane, Suite 400W
Dallas, Tx 75247 • (214) 631-7888
FIRM REGISTRATION NO. F-1937
TBPLS REGISTRATION NO. 10064301

SH 199

CONTROL INDEX SHEET

SHEET 1 OF 3

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
AS	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	048
EK	Ø171	Ø5	Ø94	
VERIFIED BY				



0′ 500′ 1000′

SCALE IN FEET

NOTES:

1.ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (NAD83, 2011 ADJUSTMENT).

2.ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00012.

3.ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), 1991 ADJUSTMENT USING GEOID12A.

STATE OF TEXAS REGISTERED ERIC A. KREINER 5320 PROFESSIONAL LAND SURVEYOR

Eric A. Kreiner
Registered Professional Land Surveyor
No. 5320

TBPELS # 10064301

HORIZONTAL / VERTICAL CONTROL

SURFACE COORDINATES

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
017105094-03	6,971,721.102	2,311,773.926	598.66'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND
017105094-04	6,968,161.445	2,316,591.043	592.00'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND

NO	DATE	REVISION	APPROVED

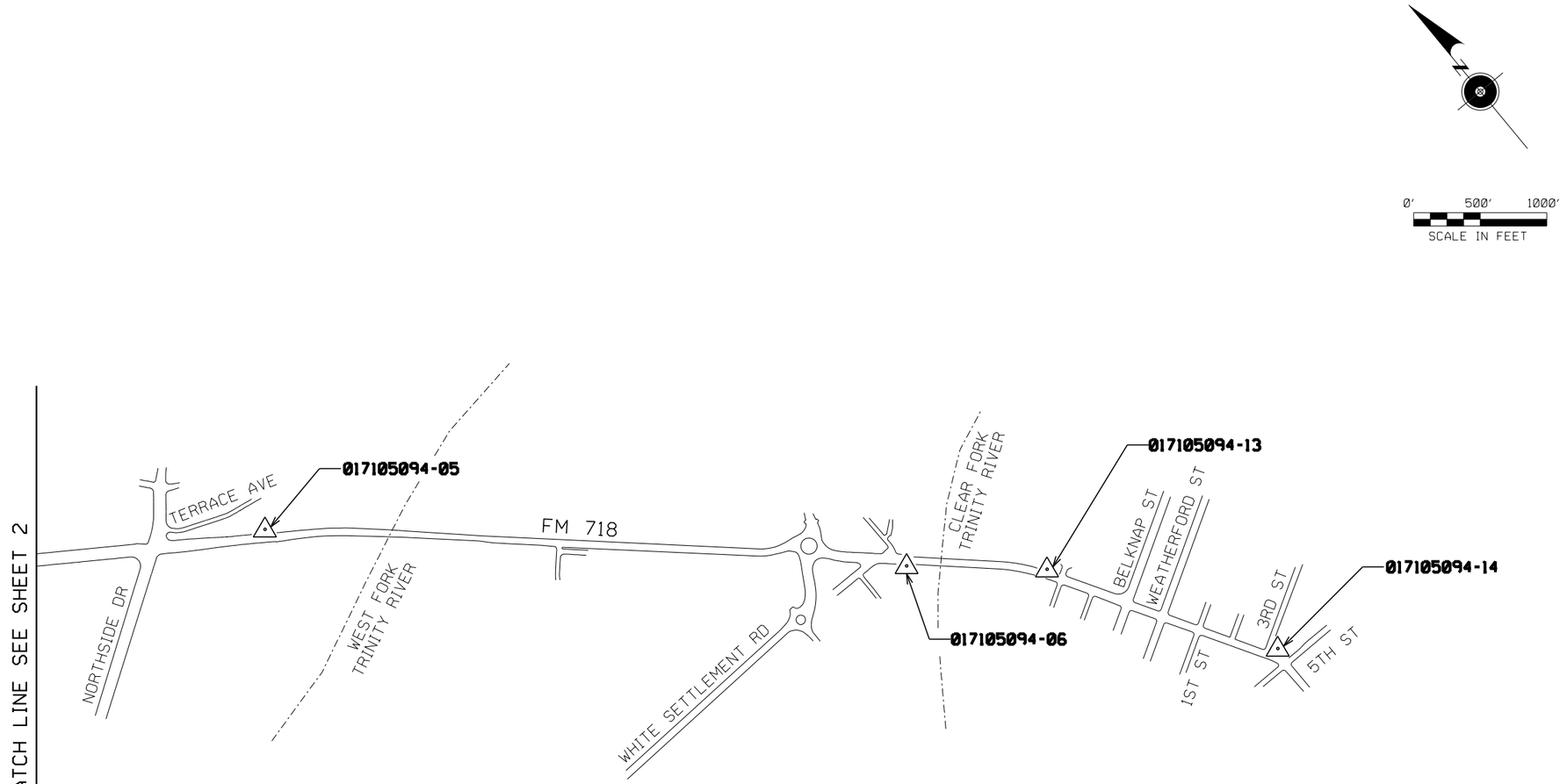
Surveying and Mapping, LLC. (SAM)
1341 W. Mockingbird Lane, Suite 400W
Dallas, Tx 75247 • (214) 631-7888
FIRM REGISTRATION NO. F-1937
TBPLS REGISTRATION NO. 10064301

SH 199

CONTROL INDEX SHEET

SHEET 2 OF 3

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
DRAWN BY	6	SEE TITLE SHEET		SH 199
AS	STATE	DISTRICT	COUNTY	SHEET NO.
CHECKED BY	TEXAS	FTW	TARRANT	049
EK	CONTROL	SECTION	JOB	
VERIFIED BY	Ø171	Ø5	Ø94	



0′ 500′ 1000′

SCALE IN FEET

NOTES:

1.ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (NAD83, 2011 ADJUSTMENT).

2.ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00012.

3.ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), 1991 ADJUSTMENT USING GEOID12A.

STATE OF TEXAS
REGISTERED
ERIC A. KREINER
5320
PROFESSIONAL
LAND SURVEYOR

Eric A. Kreiner
Registered Professional Land Surveyor
No. 5320

TBPELS # 10064301

HORIZONTAL / VERTICAL CONTROL

SURFACE COORDINATES

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
017105094-05	6,964,933.104	2,320,921.602	550.73'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND
017105094-06	6,961,650.108	2,324,463.900	552.57'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND
017105094-13	6,960,958.125	2,325,261.029	550.56'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE SET
017105094-14	6,959,394.786	2,326,218.048	607.18'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE SET

NO	DATE	REVISION	APPROVED

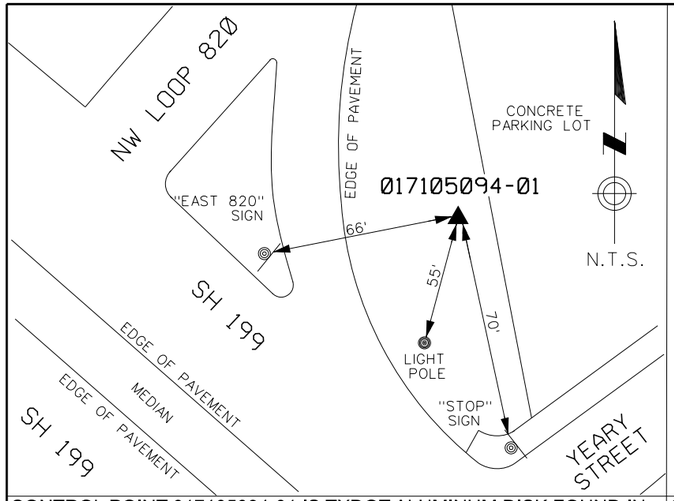
Surveying and Mapping, LLC. (SAM)
1341 W. Mockingbird Lane, Suite 400W
Dallas, Tx 75247 • (214) 631-7888
FIRM REGISTRATION NO. F-1937
TBPLS REGISTRATION NO. 10064301

SH 199

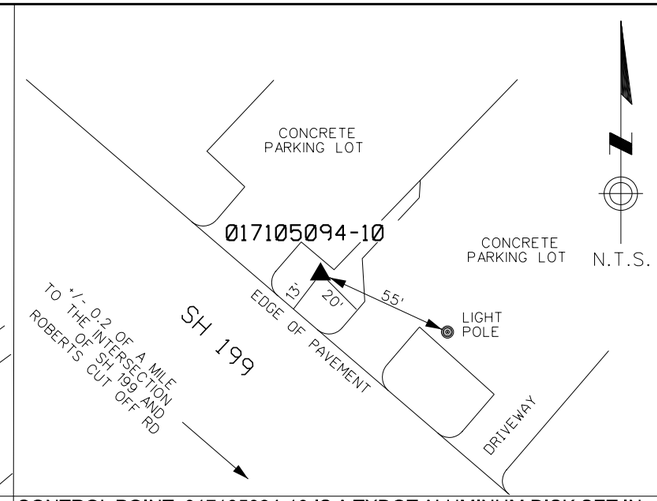
CONTROL INDEX SHEET

SHEET 3 OF 3

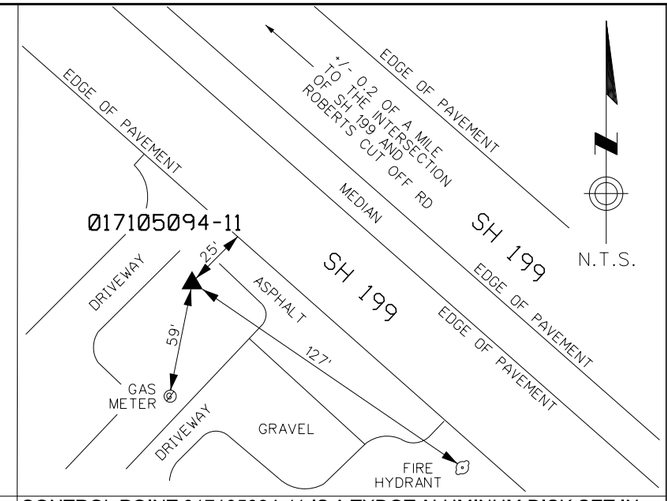
DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
AS	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	050
EK	Ø171	Ø5	Ø94	
VERIFIED BY				



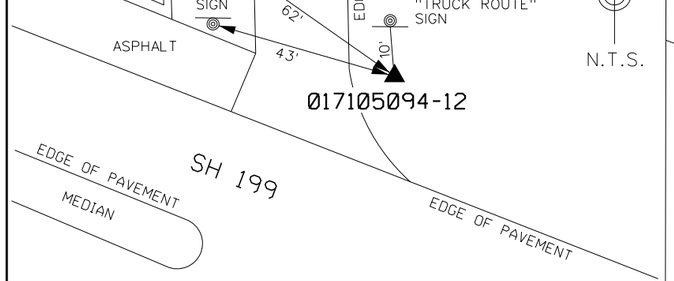
CONTROL POINT 017105094-01 IS TXDOT ALUMINUM DISK FOUND IN CONCRETE NEAR THE EAST CORNER OF THE INTERSECTION OF SH 199 AND NW LOOP 820, 55' NORTH OF A LIGHT POLE, 66' EAST OF AN "EAST 820" SIGN, AND 70' NORTH OF A "STOP" SIGN.



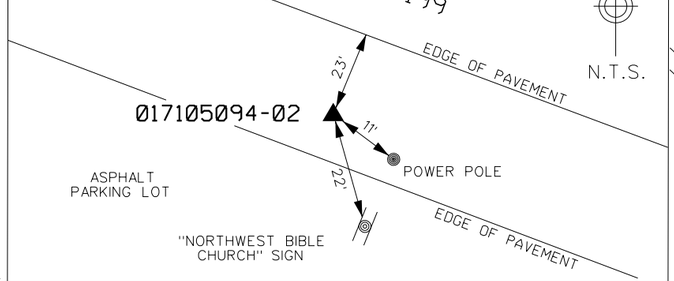
CONTROL POINT 017105094-10 IS A TXDOT ALUMINUM DISK SET IN CONCRETE +/- 0.2 OF A MILE NORTHWEST OF THE INTERSECTION OF SH 199 AND ROBERTS CUT OFF RD, 13' NORTHEAST OF THE NORTHEAST EDGE OF PAVEMENT OF SH 199, 20' NORTHWEST OF A DRIVEWAY, AND 55' WEST OF A LIGHT POLE.



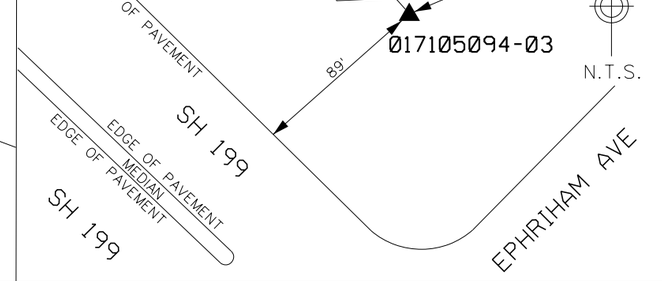
CONTROL POINT 017105094-11 IS A TXDOT ALUMINUM DISK SET IN CONCRETE +/- 0.2 OF A MILE SOUTHEAST OF THE INTERSECTION OF SH 199 AND ROBERTS CUT OFF RD, 25' SOUTHWEST OF THE SOUTHWEST EDGE OF PAVEMENT OF SH 199, 59' NORTH OF A GAS METER, AND 127' NORTHWEST OF A FIRE HYDRANT.



CONTROL POINT 017105094-12 IS A TXDOT ALUMINUM DISK SET IN CONCRETE NEAR THE EAST CORNER OF THE INTERSECTION OF SH 199 AND CHEYENNE ST, 10' SOUTH OF A "TRUCK ROUTE" SIGN, 43' EAST OF A "STOP" SIGN, AND 62' SOUTHEAST OF A POWER POLE.



CONTROL POINT 017105094-02 IS A TXDOT ALUMINUM DISK FOUND IN CONCRETE +/- 0.2 OF A MILE SOUTHEAST OF THE INTERSECTION OF SH 199 AND SKYLINE DR, 11' NORTHEAST OF A POWER POLE, 22' NORTH OF A "NORTHWEST BIBLE CHURCH" SIGN, AND 23' SOUTHWEST OF THE SOUTHWEST EDGE OF PAVEMENT OF SH 199.



CONTROL POINT 017105094-03 IS A TXDOT ALUMINUM DISK FOUND IN CONCRETE NEAR THE NORTH CORNER OF THE INTERSECTION OF SH 199 AND EPHRIHAM AVE, 17' SOUTH OF A LIGHT POLE, 33' SOUTHWEST OF ANOTHER LIGHT POLE, AND 89' NORTHEAST OF THE NORTHEAST EDGE OF PAVEMENT OF SH 199.

NOTES:

1.ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (NAD83, 2011 ADJUSTMENT).

2.ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00012.

3.ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), 1991 ADJUSTMENT USING GEOID18.

Eric A. Kreiner
Registered Professional Land Surveyor
No. 5320

TBPELS # 10064301

HORIZONTAL / VERTICAL CONTROL

SURFACE COORDINATES

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
017105094-01	6,979,389.279	2,301,666.613	744.25'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND
017105094-10	6,978,627.076	2,302,472.075	762.54'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE SET
017105094-11	6,977,220.031	2,303,877.167	736.74'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE SET
017105094-12	6,975,503.568	2,306,583.202	675.22'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE SET
017105094-02	6,974,754.792	2,308,074.076	661.06'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND
017105094-03	6,971,721.102	2,311,773.926	598.66'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND

NO	DATE	REVISION	APPROVED

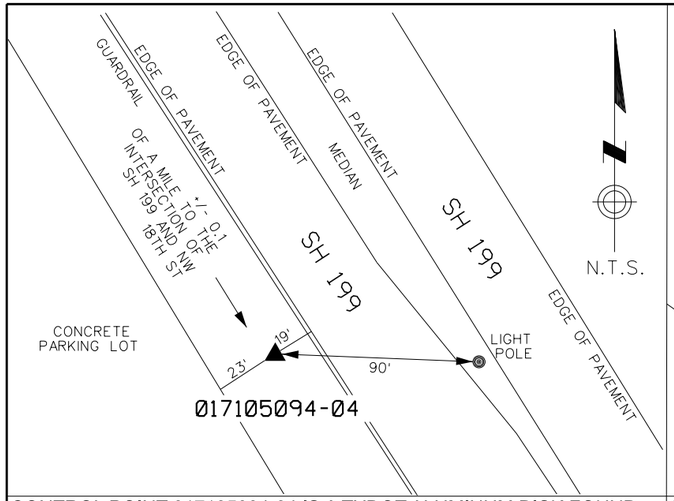
Surveying and Mapping, LLC. (SAM)
1341 W. Mockingbird Lane, Suite 400W
Dallas, Tx 75247 • (214) 631-7888
FIRM REGISTRATION NO. F-1937
TBPLS REGISTRATION NO. 10064301

SH 199

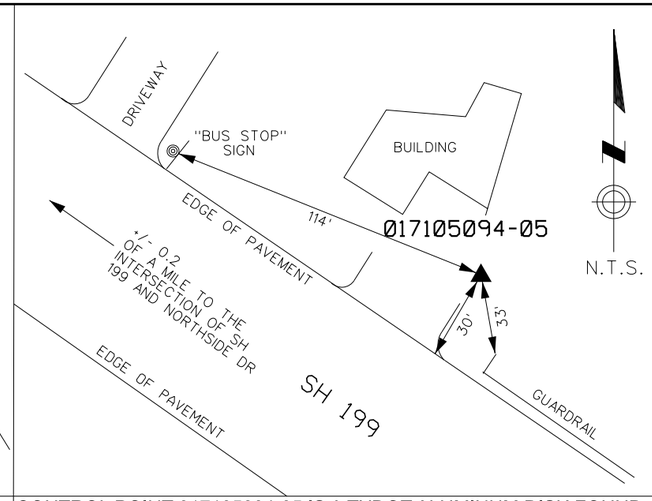
HORIZONTAL & VERTICAL CONTROL SHEETS

SHEET 1 OF 2

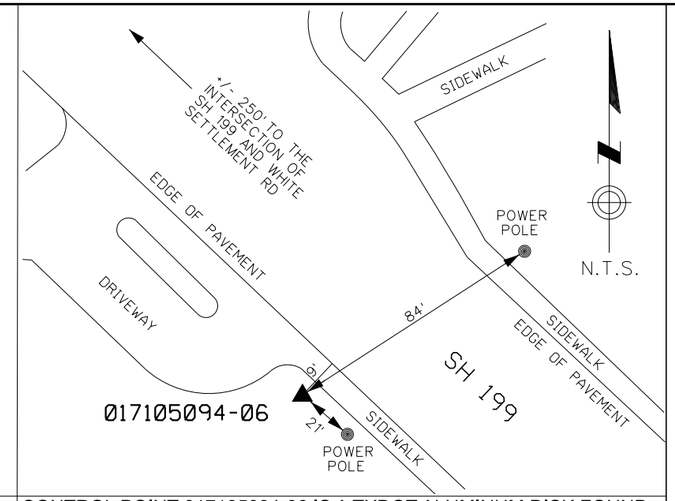
DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
AS	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	051
EK	0171	05	094	
VERIFIED BY				



CONTROL POINT 017105094-04 IS A TXDOT ALUMINUM DISK FOUND IN CONCRETE +/- 0.1 OF A MILE SOUTHEAST OF THE INTERSECTION OF SH 199 AND NW 18TH ST, 19' SOUTHWEST OF THE SOUTHWEST EDGE OF PAVEMENT OF SH 199, 23' NORTHEAST OF A CONCRETE PARKING LOT, AND 90' WEST OF A LIGHT POLE.

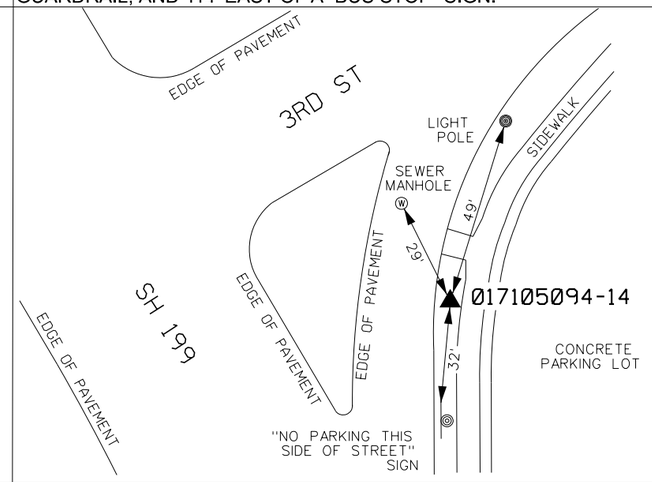


CONTROL POINT 017105094-05 IS A TXDOT ALUMINUM DISK FOUND IN CONCRETE +/- 0.2 OF A MILE SOUTHEAST OF THE INTERSECTION OF SH 199 AND NORTHSIDE DR, 30' NORTHEAST OF THE NORTHEAST EDGE OF PAVEMENT OF SH 199, 33' NORTH OF A GUARDRAIL, AND 114' EAST OF A "BUS STOP" SIGN.



CONTROL POINT 017105094-06 IS A TXDOT ALUMINUM DISK FOUND IN CONCRETE +/- 250' SOUTHEAST OF THE INTERSECTION OF SH 199 AND WHITE SETTLEMENT RD, 9' SOUTHWEST OF THE SOUTHWEST EDGE OF PAVEMENT OF SH 199, 21' NORTHWEST OF A POWER POLE, AND 84' SOUTHWEST OF ANOTHER POWER POLE.

CONTROL POINT 017105094-13 IS A TXDOT ALUMINUM DISK SET IN CONCRETE NEAR THE NORTH CORNER OF THE INTERSECTION OF SH 199 AND PEACH ST, 13' NORTHEAST OF THE NORTHEAST EDGE OF PAVEMENT OF SH 199, 47' SOUTHEAST OF A "BUS STOP" SIGN, AND 81' NORTH OF A TRAFFIC LIGHT POLE.



CONTROL POINT 017105094-13 IS A TXDOT ALUMINUM DISK SET IN CONCRETE NEAR THE NORTH CORNER OF THE INTERSECTION OF SH 199 AND PEACH ST, 13' NORTHEAST OF THE NORTHEAST EDGE OF PAVEMENT OF SH 199, 47' SOUTHEAST OF A "BUS STOP" SIGN, AND 81' NORTH OF A TRAFFIC LIGHT POLE.

NOTES:

1.ALL BEARINGS AND COORDINATES ARE REFERENCED TO THE TEXAS COORDINATE SYSTEM OF 1983, NORTH CENTRAL ZONE (NAD83, 2011 ADJUSTMENT).

2.ALL DISTANCES AND COORDINATES ARE IN US SURVEY FEET DISPLAYED IN SURFACE VALUES WITH THE TXDOT SURFACE ADJUSTMENT FACTOR OF 1.00012.

3.ALL ELEVATIONS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), 1991 ADJUSTMENT USING GEOID18.

STATE OF TEXAS
REGISTERED
ERIC A. KREINER
5320
PROFESSIONAL
LAND SURVEYOR

Eric A. Kreiner
Registered Professional Land Surveyor
No. 5320

TBPELS # 10064301

HORIZONTAL / VERTICAL CONTROL

SURFACE COORDINATES

POINT	NORTHING	EASTING	ELEVATION	DESCRIPTION
017105094-04	6,968,161.445	2,316,591.043	592.00'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND
017105094-05	6,964,933.104	2,320,921.602	550.73'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND
017105094-06	6,961,650.108	2,324,463.900	552.57'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE FOUND
017105094-13	6,960,958.125	2,325,261.029	550.56'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE SET
017105094-14	6,959,394.786	2,326,218.048	607.18'	3 1/4 IN TXDOT ALUMINUM DISC IN CONCRETE SET

NO	DATE	REVISION	APPROVED

Surveying and Mapping, LLC. (SAM)
1341 W. Mockingbird Lane, Suite 400W
Dallas, Tx 75247 • (214) 631-7888
FIRM REGISTRATION NO. F-1937
TBPLS REGISTRATION NO. 10064301

SH 199

HORIZONTAL & VERTICAL CONTROL SHEETS

SHEET 2 OF 2

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
AS	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	052
EK	Ø171	Ø5	Ø94	
VERIFIED BY				

SH199 ℄ AT ROBERTS CUT OFF RD

Point 9	X	2,305,345.16	Y	6,976,009.13	Sta	289+60.95
Course from 9 to 10 N 48° 41′ 19.58" W Dist 5,496.80						
Point 10	X	2,301,216.32	Y	6,979,637.83	Sta	344+57.75
Course from 10 to 11 N 48° 43′ 13.74" W Dist 31.25						
Point 11	X	2,301,192.84	Y	6,979,658.45	Sta	344+89.00
Course from 11 to 12 N 49° 04′ 25.43" W Dist 31.25						
Point 12	X	2,301,169.23	Y	6,979,678.92	Sta	345+20.25
Course from 12 to 13 N 49° 39′ 28.65" W Dist 31.25						
Point 13	X	2,301,145.41	Y	6,979,699.15	Sta	345+51.50
Course from 13 to 14 N 50° 38′ 10.48" W Dist 31.25						
Point 14	X	2,301,121.25	Y	6,979,718.97	Sta	345+82.75

Ending chain SH199_ROBERTS description

Beginning chain SH199 SKYLINE ℄

Point 7	X	2,308,051.47	Y	6,974,834.44	Sta	260+00.00
Course from 7 to 8 N 68° 33′ 19.58" W Dist 1,344.92						
Point 8	X	2,306,799.66	Y	6,975,326.15	Sta	273+44.92

Ending chain SH199 SKYLINE ℄

Beginning chain SKYLINE ℄ description

Point BP200	X	2,307,309.49	Y	6,974,903.89	Sta	10+00.00
Course from BP200 to BP201 N 1° 08′ 25.79" E Dist 138.38						
Point BP201	X	2,307,312.24	Y	6,975,042.25	Sta	11+38.38
Course from BP201 to BP202 N 0° 59′ 16.28" E Dist 82.02						
Point BP202	X	2,307,313.66	Y	6,975,124.25	Sta	12+20.40
Course from BP202 to BP203 N 1° 07′ 43.18" E Dist 197.13						
Point BP203	X	2,307,317.54	Y	6,975,321.35	Sta	14+17.53

Ending chain SKYLINE ℄ description

ROBERTS CUT OFF RD ℄

Point BP100	X	2,303,060.71	Y	6,977,622.77	Sta	10+00.00
Course from BP100 to BP101 N 0° 53′ 13.42" W Dist 310.15						
Point BP101	X	2,303,055.91	Y	6,977,932.89	Sta	13+10.15
Course from BP101 to BP102 N 0° 47′ 43.97" E Dist 197.66						
Point BP102	X	2,303,058.65	Y	6,978,130.53	Sta	15+07.82
Course from BP102 to BP103 N 0° 02′ 21.53" W Dist 359.31						
Point BP103	X	2,303,058.41	Y	6,978,489.84	Sta	18+67.13

Ending chain ROBERTS CUT OFF RD ℄

SH199 ℄ AT BELKNAP

Point 5	X	2,326,419.96	Y	6,960,878.71	Sta	18+88.40
Course from 5 to 6 S 59° 31′ 29.71" W Dist 1,000.00						
Point 6	X	2,325,558.11	Y	6,960,371.54	Sta	28+88.40
Course from 6 to PC SH199_BELKNAP_5 N 30° 29′ 30.29" W Dist 615.30						

Curve Data

Curve SH199_BELKNAP_5

P.I. Station		35+76.87	X	2,325,208.77	Y	6,960,964.80
Delta	=	5° 50′ 54.61" (LT)				
Degree	=	4° 00′ 00.00"				
Tangent	=	73.17				
Length	=	146.21				
Radius	=	1,432.39				
External	=	1.87				
Long Chord	=	146.15				
Mid. Ord.	=	1.87				
P.C. Station		35+03.70	X	2,325,245.90	Y	6,960,901.75
P.T. Station		36+49.91	X	2,325,165.41	Y	6,961,023.74
C.C.			X	2,324,011.60	Y	6,960,174.93
Back	= N	30° 29′ 30.00" W				
Ahead	= N	36° 20′ 24.61" W				
Chord Bear	= N	33° 24′ 57.30" W				

Ending chain SH199 ℄ AT BELKNAP description

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/11/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650,
Dallas, TX 75234
Phone:(469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

SH 199

ROADWAY HORIZONTAL

ALIGNMENT DATA

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	53
MBI	0171	05	101	
VERIFIED BY				
MBI				

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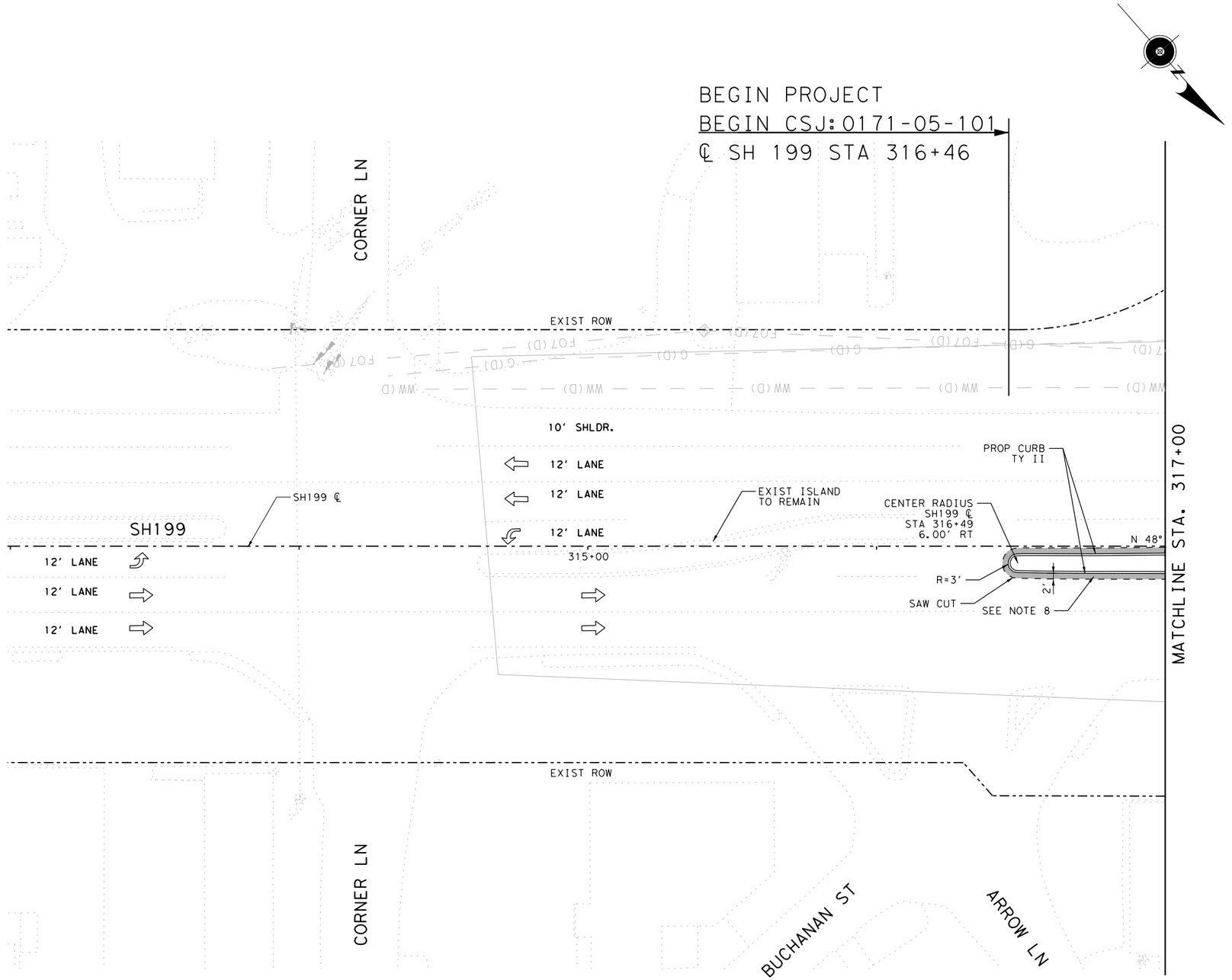
100% SUBMITTAL



LEGEND

- TRAFFIC FLOW
- PROP ASPH PVMT
- PROP CONC PVMT
- SIDEWALK
- CONC CURB & GUTTER

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO SH199 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING SHEETS FOR SIGNING AND STRIPING INFORMATION.
3. REFER TO "HORIZONTAL DATA" SHEETS FOR ADDITIONAL INFORMATION.
4. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.
5. ROW LINES ARE APPROXIMATE.
6. FOR SIGNAL DESIGN REFER TO SIGNAL DESIGN LAYOUT.
7. PAVEMENT DESIGN REPORT TO BE DONE BY TXDOT
8. CONTRACTOR SHALL DETERMINE THE EXISTING PAVEMENT DEPTH IN THE FIELD. THE CONCRETE PAVEMENT SHALL MATCH EXISITING PAVEMENT DEPTH. THIS WORK WILL BE SUBSIDIARY TO THE CURB OR CURB/GUTTER CONSTRUCTION.

0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650,
Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

SH 199

ROADWAY LAYOUT

ROBERTS CUT OFF INTERSECTION
BEGIN TO STA 317+00

SHEET 1 OF 3

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	54
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

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100% SUBMITTAL

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USER: Wei.Liew

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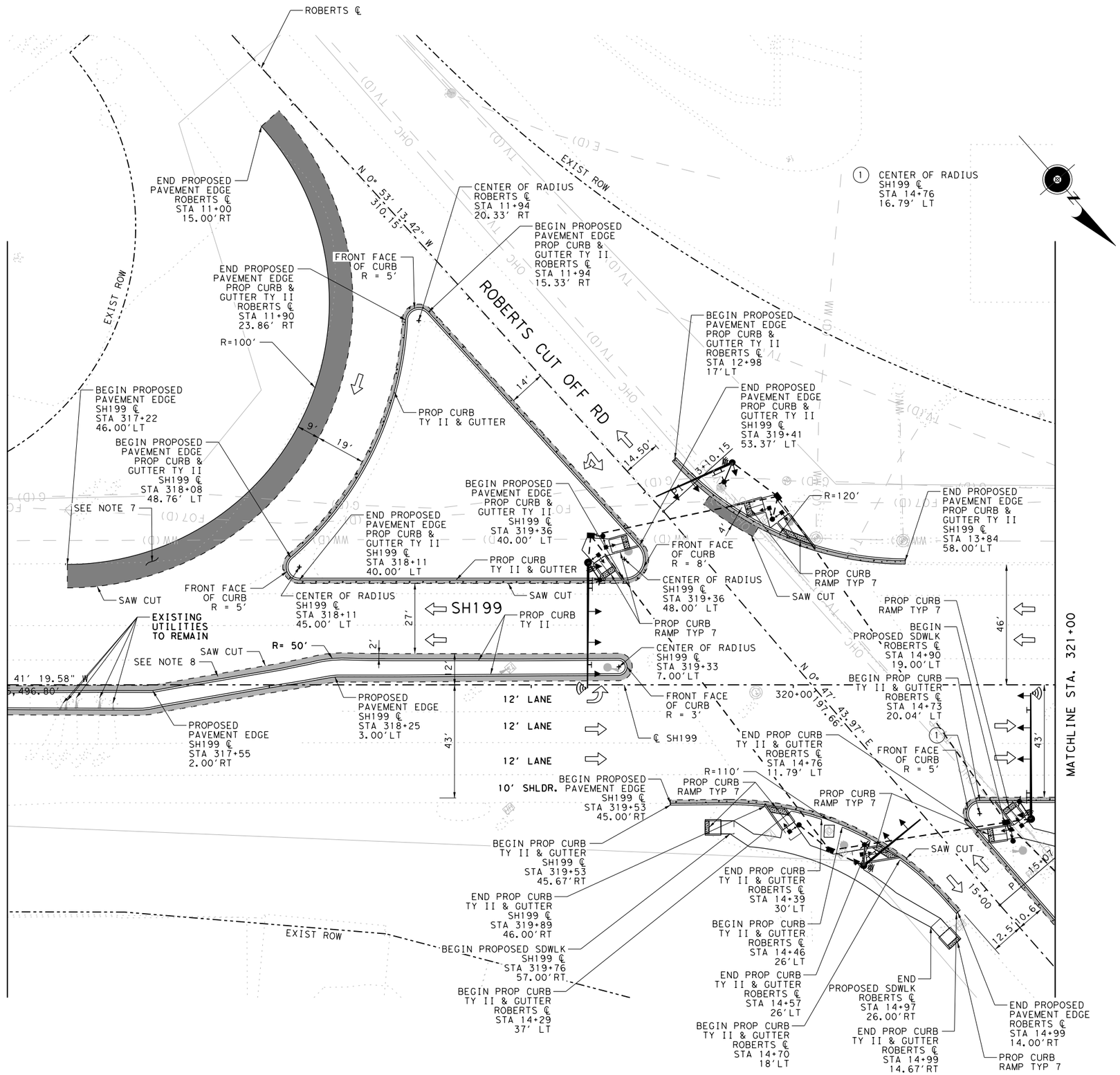

LEGEND

- TRAFFIC FLOW
- PROP ASPH PVMT
- PROP CONC PVMT
- SIDEWALK
- CONC CURB & GUTTER

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO SH199 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING SHEETS FOR SIGNING AND STRIPING INFORMATION.
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0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650, Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

Texas Department of Transportation

SH 199

ROADWAY LAYOUT

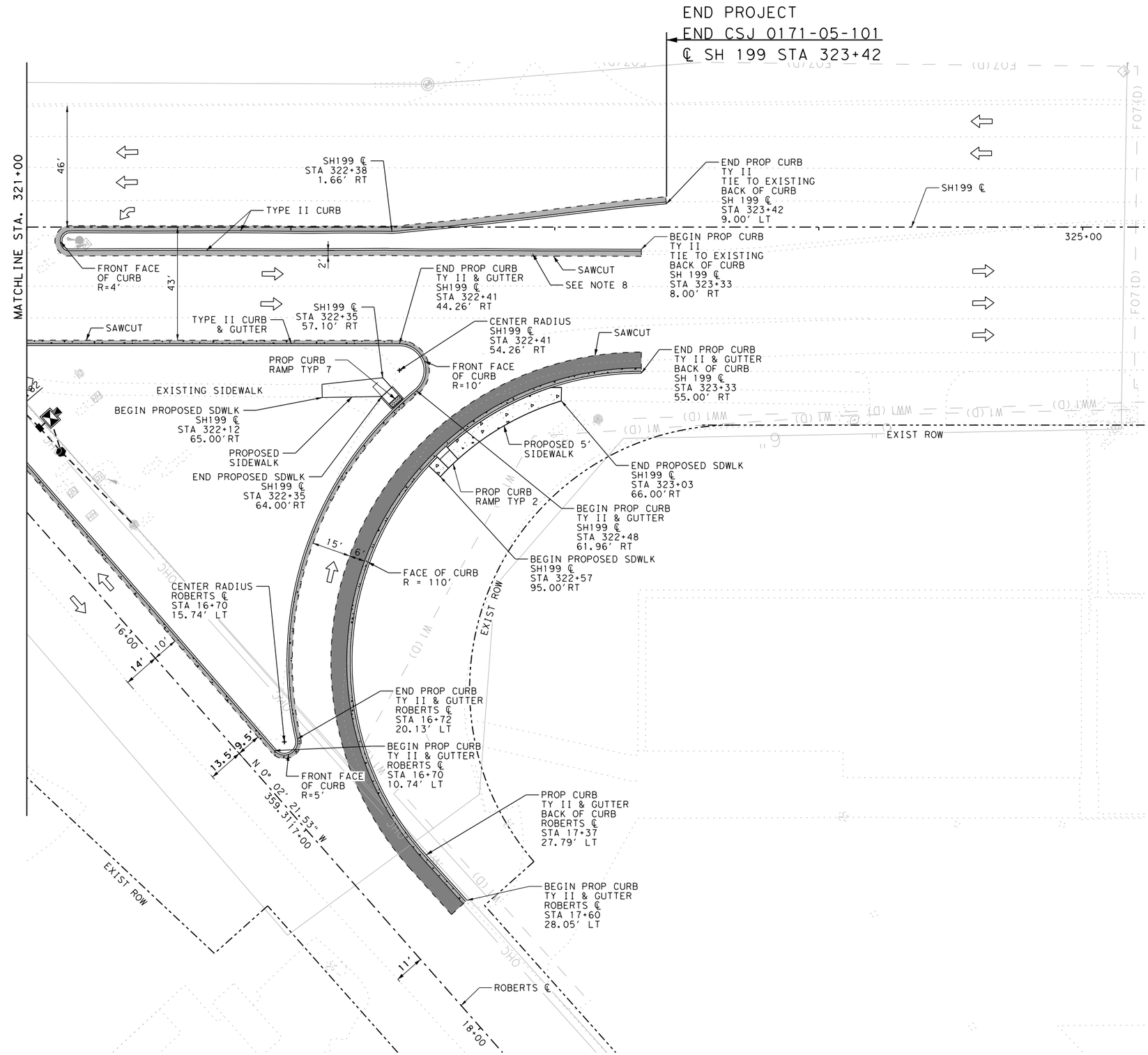
ROBERTS CUT OFF INTERSECTION

STA 317+00 TO STA 321+00

SHEET 2 OF 3

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	55
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

100% SUBMITTAL



LEGEND

- TRAFFIC FLOW
- PROP ASPH PVMT
- PROP CONC PVMT
- SIDEWALK
- CONC CURB & GUTTER

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO SH199 ℄ UNLESS NOTED OTHERWISE.
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0' 20' 40'
SCALE IN FEET

GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
STATE OF TEXAS

4/11/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650,
Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

SH 199

ROADWAY LAYOUT

ROBERTS CUT OFF INTERSECTION
STA 321+00 TO END STA

SHEET 3 OF 3

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	56
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

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USER: Wei.Liew
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DATE: 4/11/2024 TIME: 4:21:33 PM

100% SUBMITTAL

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SCALE:1:40
USER:Wei.Liew

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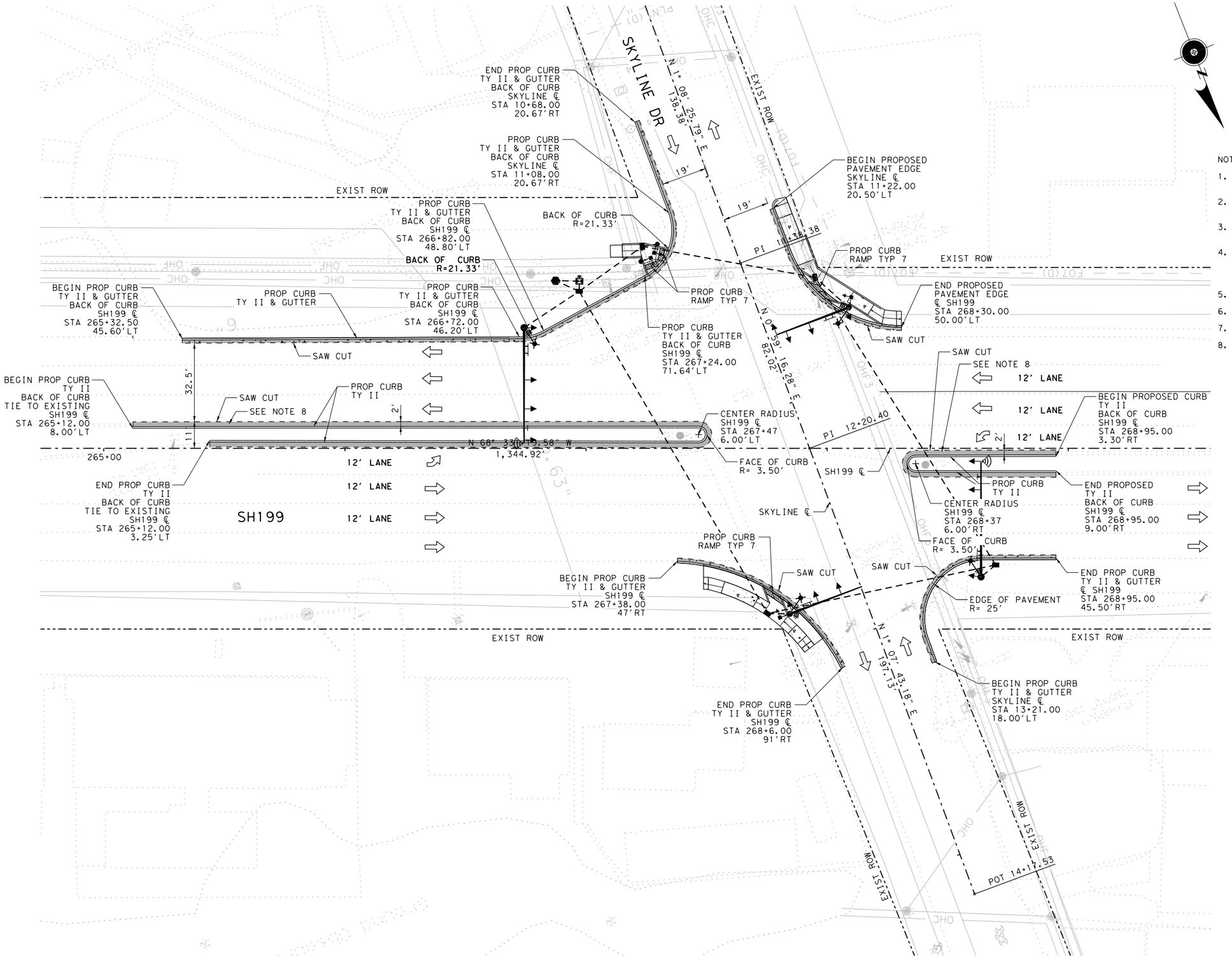

LEGEND

- TRAFFIC FLOW
- PROP ASPH PVMT
- PROP CONC PVMT
- SIDEWALK
- CONC CURB & GUTTER

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO SH199 ℄ UNLESS NOTED OTHERWISE.
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3. REFER TO "HORIZONTAL DATA" SHEETS FOR ADDITIONAL INFORMATION.
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0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/11/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650, Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

SH 199

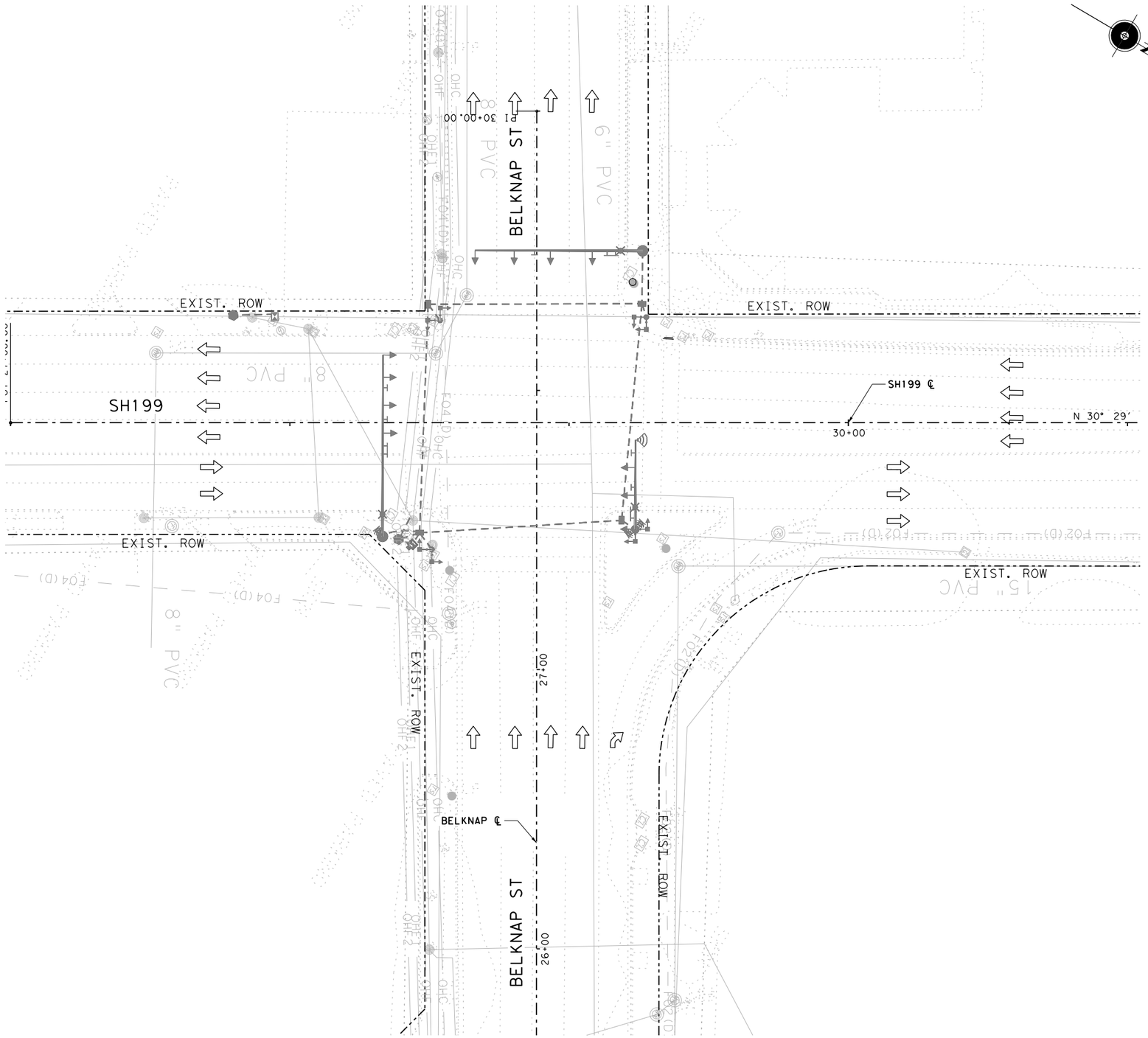
ROADWAY LAYOUT

AT SKYLINE DR INTERSECTION

SHEET 1 OF 1

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	57
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

100% SUBMITTAL



LEGEND

- TRAFFIC FLOW
- PROP ASPH PVMT
- PROP CONC PVMT
- SIDEWALK
- CONC CURB & GUTTER

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO SH199 ℄ UNLESS NOTED OTHERWISE.
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0′ 20′ 40′
SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER

4/11/2024
F-2677

NO	DATE	REVISION	APPROVED

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1501 LBJ Freeway, Suite 650,
Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

SH 199

ROADWAY LAYOUT

BELKNAPP ST INTERSECTION

STA 26+54.50 TO STA 30+50.00

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	58
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

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SCALE:1:40
USER:Wei.Liew
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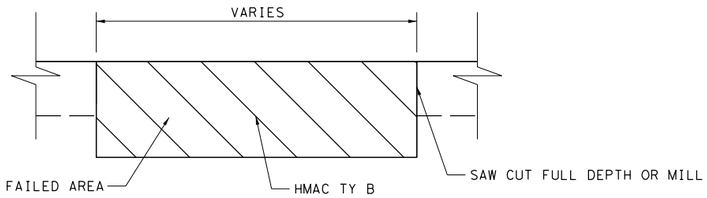
DATE:4/11/2024 TIME:10:43:45 AM

100% SUBMITTAL



FLEXIBLE PAVEMENT STRUCTURE REPAIR

NOTE: FLEXIBLE PAVEMENT REPAIR SHALL BE FEILD VERIFIED OR AS DIRECTED BY THE ENGINEER. CONTRACTOR SHALL DETERMINE THE EXISTING PAVEMENT DEPTH IN THE FIELD. THE FLEXIBLE PAVEMENT SHALL MATCH EXISITING PAVEMENT DEPTH.

N.T.S.

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/11/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650,
Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

SH 199

MISCELLANEOUS
ROADWAY DETAILS

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	59
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

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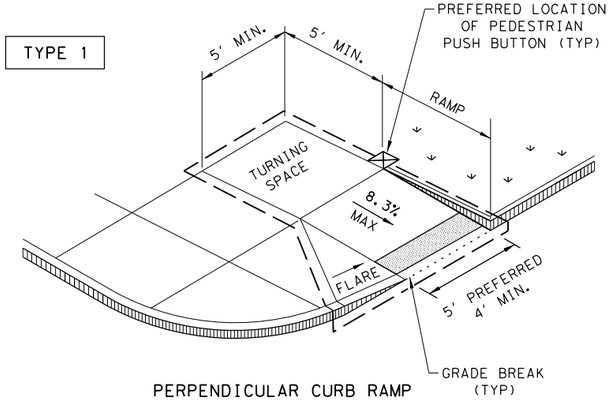
FILE:...\SH 199 MISC RDWY DETAILS.dgn
DATE:4/11/2024 TIME:9:02:45 AM

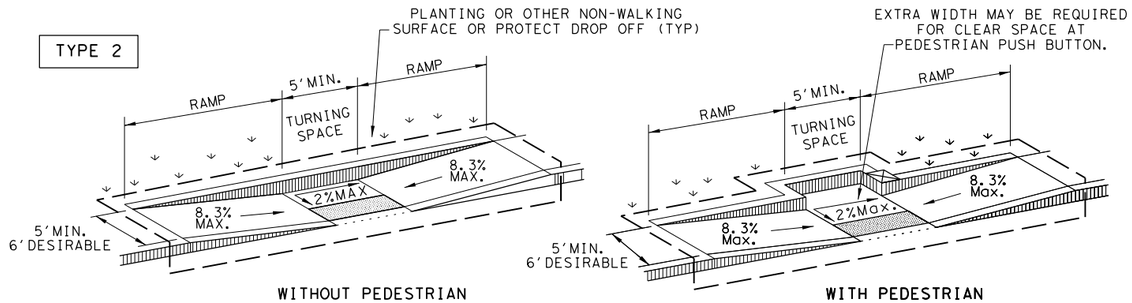
DATE: 4/10/2024
FILE: ...\3. Roadway\Standards\ped18.dgn

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

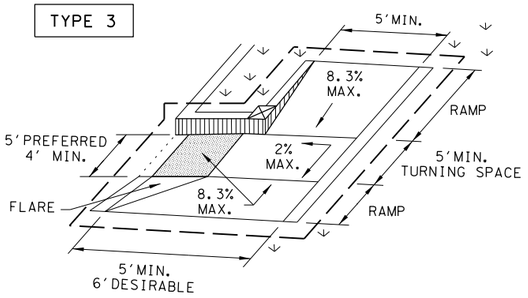


WITHOUT PEDESTRIAN PUSH BUTTON

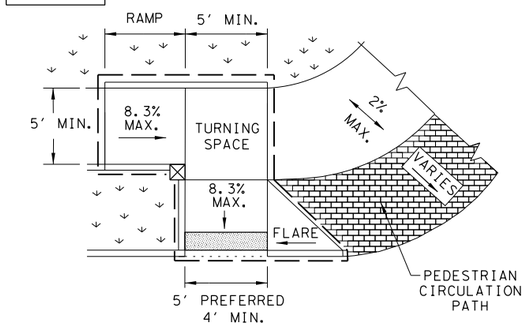
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

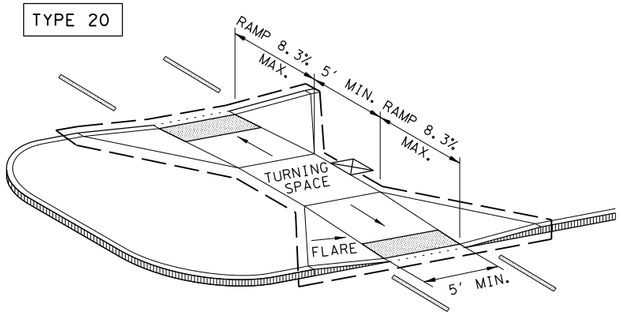


TYPE 6



COMBINATION CURB RAMPS

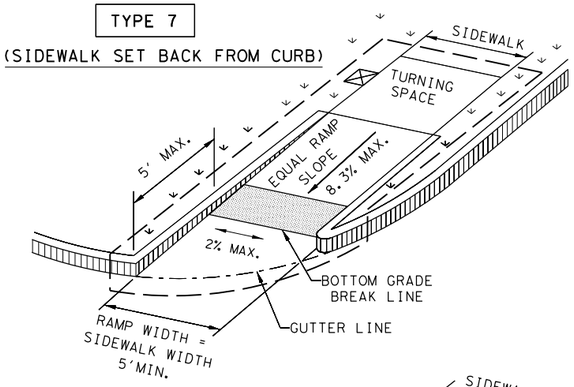
TYPE 20



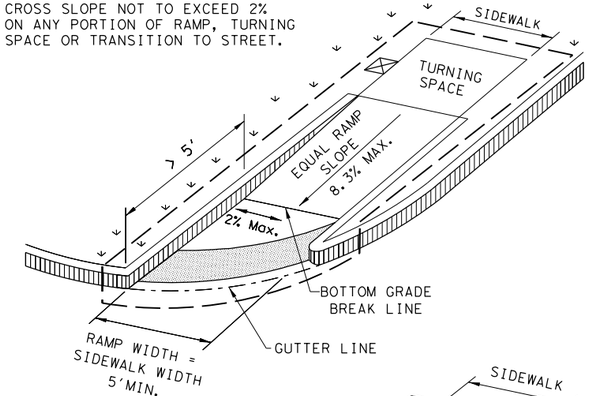
CURB RAMPS AT MEDIAN ISLANDS

TYPE 7

(SIDEWALK SET BACK FROM CURB)

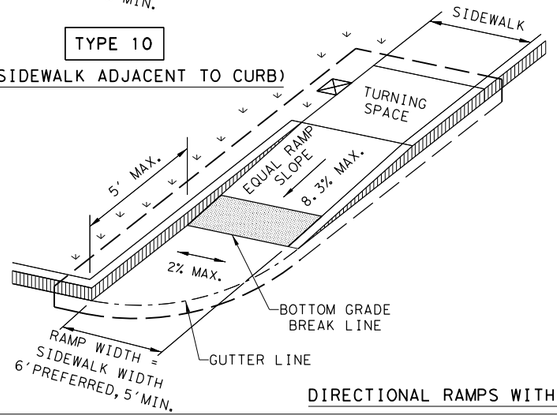


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.

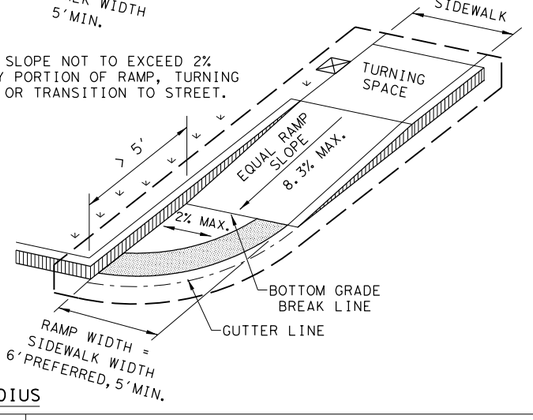


TYPE 10

(SIDEWALK ADJACENT TO CURB)

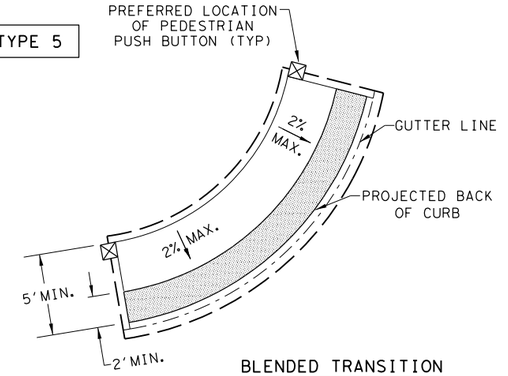


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

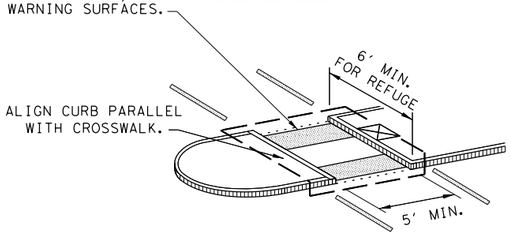
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

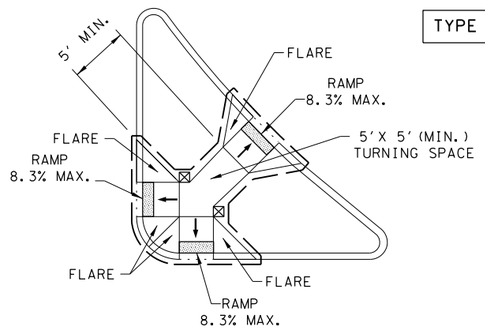
INSTALL DETECTABLE WARNING SURFACE AT EACH END OF THE CUT-THROUGH RAMP WITH A MINIMUM 2' USUAL SIDEWALK SURFACE BETWEEN. IF MEDIAN IS LESS THAN 6' WIDE, ELIMINATE DETECTABLE WARNING SURFACES.

TYPE 21



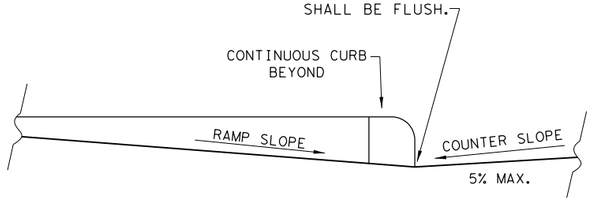
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

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



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

SEE GENERAL NOTES ON SHEET 2 OF 4 FOR MORE INFORMATION.

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

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0171	05	101	FM 199
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		60

DATE: 4/10/2024
FILE: ...\3. Roadway\Standards\ped18.dgn

GENERAL NOTES

CURB RAMPS

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

DETECTABLE WARNING MATERIAL

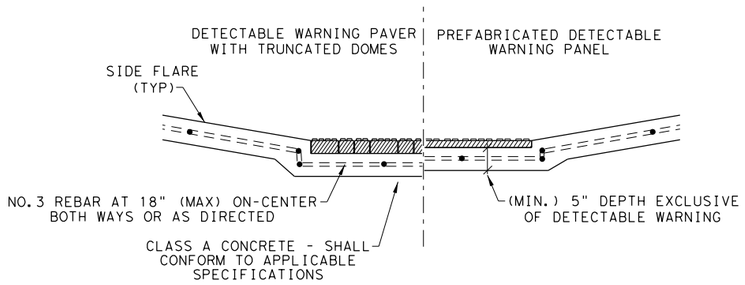
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material adjacent to uncolored concrete, unless specified elsewhere in the plans.
20. Detectable Warning Materials must meet TxDOT Departmental Materials Specification DMS 4350 and be listed on the Material Producer List. Install products in accordance with manufacturer's specifications.
21. Detectable warning surfaces must be firm, stable and slip resistant.
22. Detectable warning surfaces shall be a minimum of 24 inches in depth in the direction of pedestrian travel, and extend the full width of the curb ramp or landing where the pedestrian access route enters the street.
23. Detectable warning surfaces shall be located so that the edge nearest the curb line is at the back of curb and neither end of that edge is greater than 5 feet from the back of curb. Detectable warning surfaces may be curved along the corner radius.
24. Shaded areas on Sheet 1 of 4 indicate the approximate location for the detectable warning surface for each curb ramp type.

DETECTABLE WARNING PAVERS (IF USED)

25. Furnish detectable warning paver units meeting all requirements of ASTM C-936, C-33. Lay in a two by two unit basket weave pattern or as directed.
26. Lay full-size units first followed by closure units consisting of at least 25 percent (25%) of a full unit. Cut detectable warning paver units using a power saw.

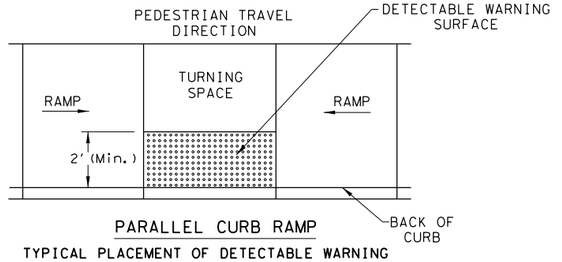
SIDEWALKS

27. Provide clear ground space at operable parts, including pedestrian push buttons. Operable parts shall be placed within unobstructed reach range specified in PROWAG section R406.
28. Place traffic signal or illumination poles, ground boxes, controller boxes, signs, drainage facilities and other items so as not to obstruct the pedestrian access route or clear ground space.
29. Street grades and cross slopes shall be as shown elsewhere in the plans.
30. Changes in level greater than 1/4 inch are not permitted.
31. The least possible grade should be used to maximize accessibility. The running slope of sidewalks and crosswalks within the public right of way may follow the grade of the parallel roadway. Where a continuous grade greater than five percent (5%) must be provided, handrails may be desirable to improve accessibility. Handrails may also be needed to protect pedestrians from potentially hazardous conditions. If provided, handrails shall comply with PROWAG R409.
32. Handrail extensions shall not protrude into the usable landing area or into intersecting pedestrian routes.
33. Driveways and turnouts shall be constructed and paid for in accordance with Item "Intersections, Driveways and Turnouts". Sidewalks shall be constructed and paid for in accordance with Item, "Sidewalks".
34. Sidewalk details are shown elsewhere in the plans.

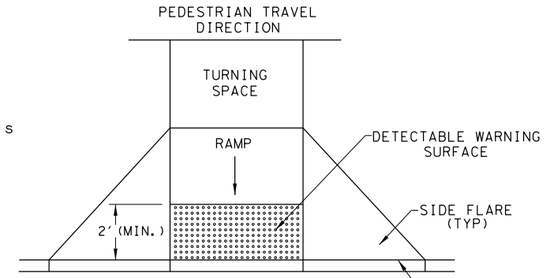


SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

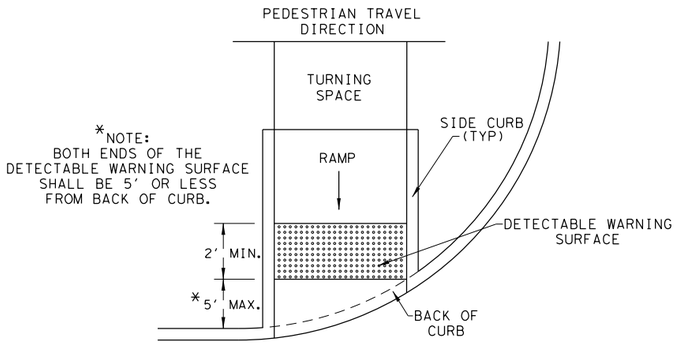
DETECTABLE WARNING SURFACE DETAILS



PARALLEL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON LANDING AT STREET EDGE.



PERPENDICULAR CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.



DIRECTIONAL CURB RAMP
TYPICAL PLACEMENT OF DETECTABLE WARNING SURFACE ON SLOPING RAMP RUN.

Texas Department of Transportation | Design Division Standard

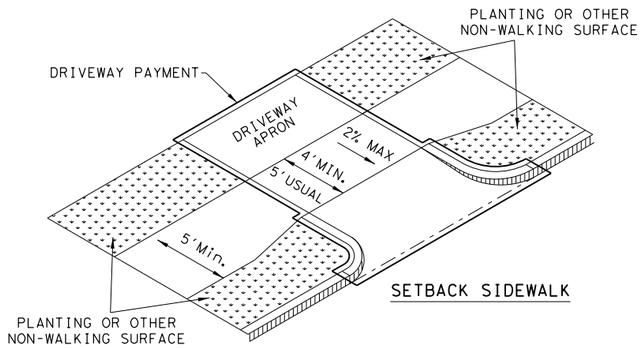
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

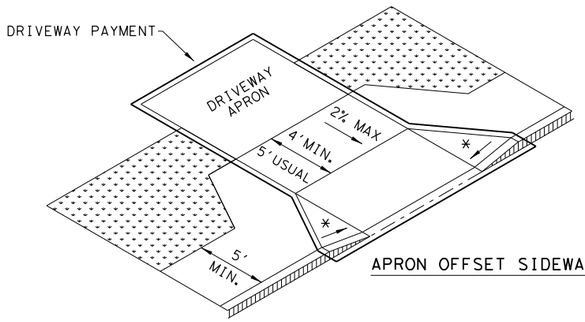
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0171	05	101		FM 199
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	FTW	TARRANT			61

DATE: 4/10/2024
FILE: ...\3. Roadway\Standards\ped18.dgn

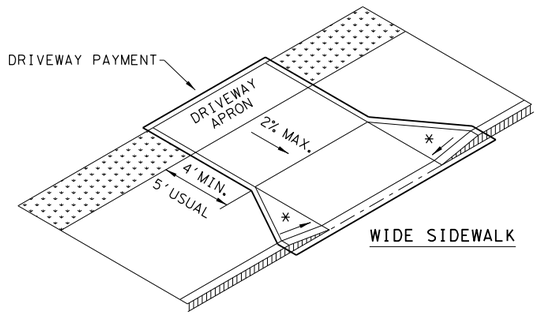
SIDEWALK TREATMENT AT DRIVEWAYS



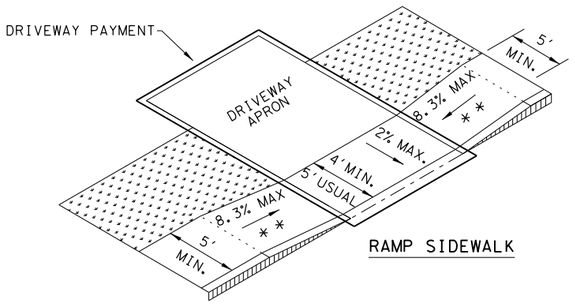
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

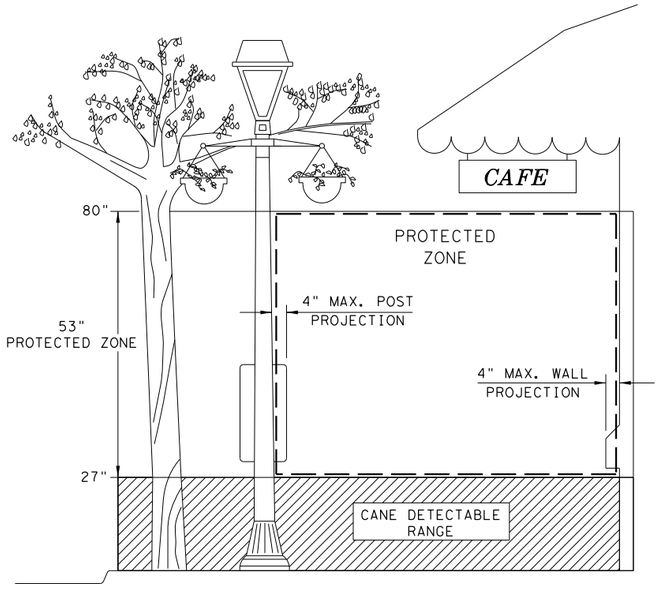


RAMP SIDEWALK

NOTES:

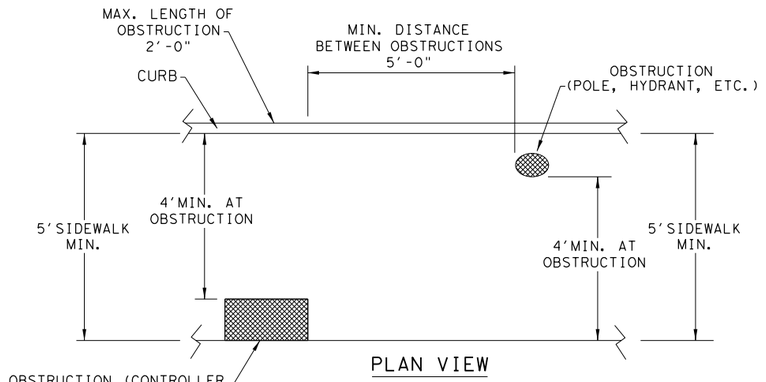
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

* * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.



PROTECTED ZONE

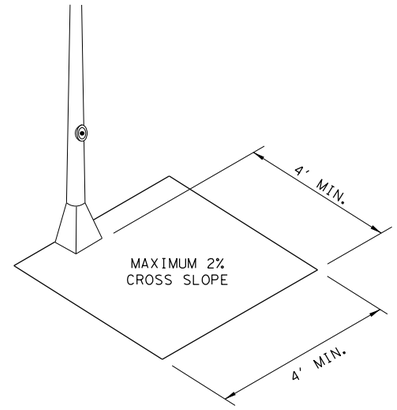
NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



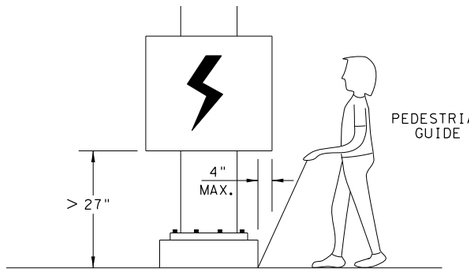
PLAN VIEW

PLACEMENT OF STREET FIXTURES

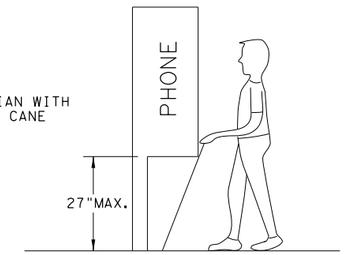
NOTE: ITEMS NOT INTENDED FOR PUBLIC USE. MINIMUM 4' X 4' CLEAR GROUND SPACE REQUIRED AT PUBLIC USE FIXTURES.



CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



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



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

DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES
CURB RAMPS

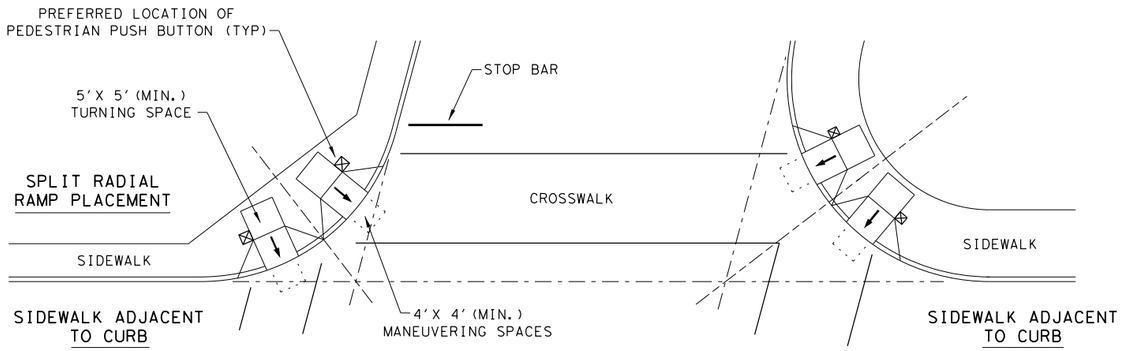
PED-18

FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0171	05	101		FM 199
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	FTW	TARRANT			62

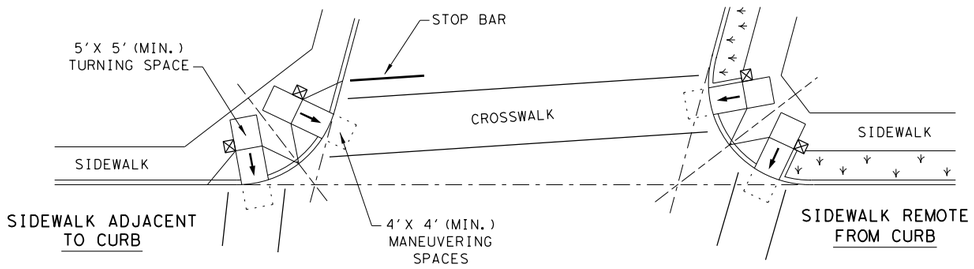
DATE: 4/10/2024
FILE: ...\3. Roadway\Standards\ped18.dgn

TYPICAL CROSSING LAYOUTS

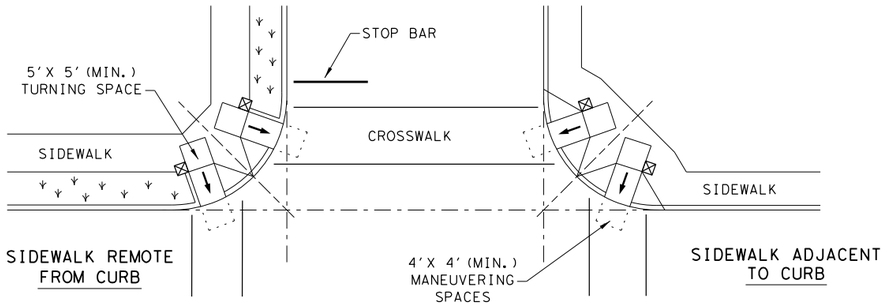
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



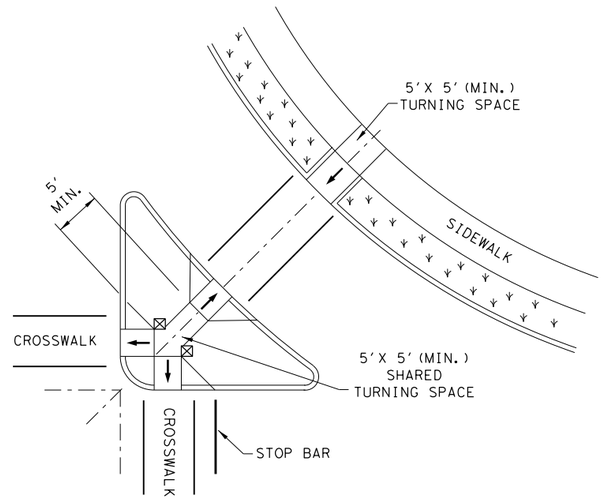
SKEWED INTERSECTION WITH "LARGE" RADIUS



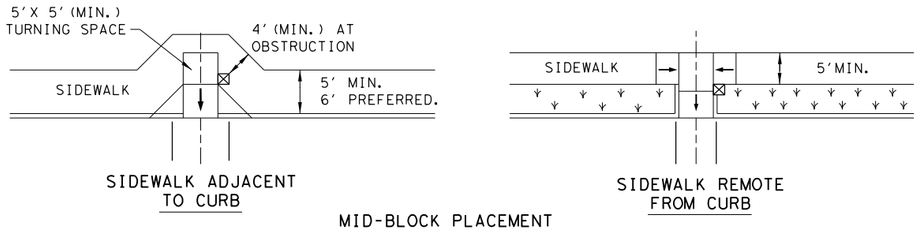
SKEWED INTERSECTION WITH "SMALL" RADIUS



NORMAL INTERSECTION WITH "SMALL" RADIUS



AT INTERSECTION
W/FREE RIGHT TURN & ISLAND



MID-BLOCK PLACEMENT
PERPENDICULAR RAMPS

LEGEND:

SHOWS DOWNWARD SLOPE. →

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

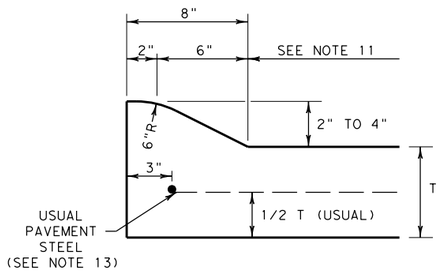
DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH.

Texas Department of Transportation — Design Division Standard

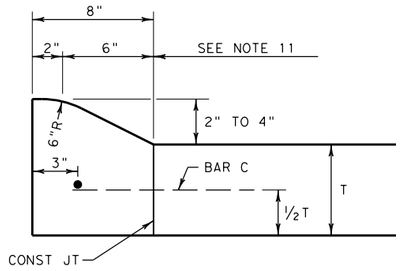
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

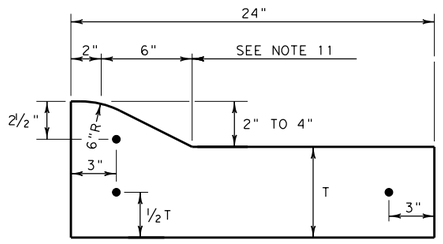
FILE: ped18	DN: TxDOT		DW: VP	CK: KM	CK: PK & JG
	CONT	SECT	JOB		HIGHWAY
REVISIONS	0171	05	101		FM 199
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY			SHEET NO.
	FTW	TARRANT			63



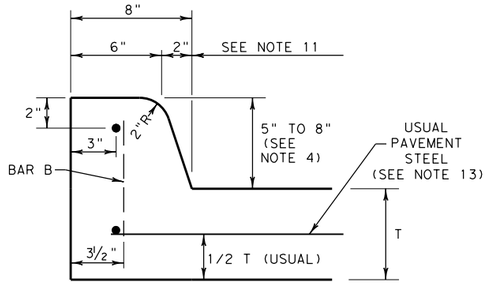
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



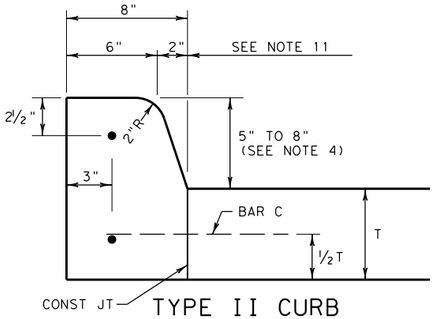
TYPE I CURB
2" - 4" HEIGHT



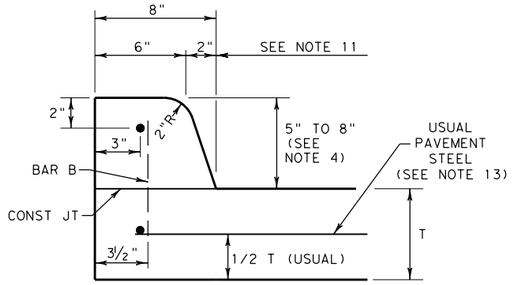
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



TYPE II CURB (MONOLITHIC)
5" - 8" HEIGHT



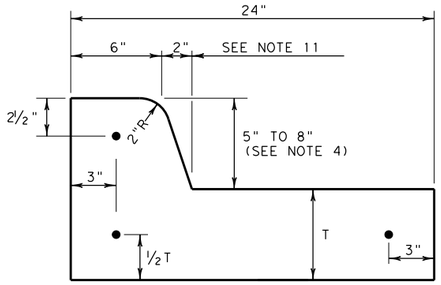
TYPE II CURB
5" - 8" HEIGHT
DOWELED VERTICAL JOINT



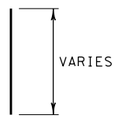
TYPE II CURB
5" - 8" HEIGHT
DOWELED HORIZONTAL JOINT

GENERAL NOTES

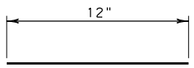
1. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH ITEM 529, "CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER".
2. ALL CONCRETE SHALL BE CLASS "A".
3. ALL REINFORCING BARS SHALL BE #4, UNLESS OTHERWISE SHOWN.
4. UNLESS OTHERWISE SHOWN, ALL TYPE II CURB SHALL BE 6" HEIGHT .
5. ROUND EXPOSED SHARP EDGES WITH A ROUNDING TOOL, TO A MINIMUM RADIUS OF 1/4".
6. ALL EXISTING CURBS AND DRIVEWAYS TO BE REMOVED SHALL BE SAW CUT FULL DEPTH OR REMOVED AT EXISTING JOINTS.
7. WHERE CONCRETE CURB IS PLACED ON EXISTING CONCRETE PAVEMENT, THE PAVEMENT SHALL BE DRILLED AND THE REINFORCING BARS GROUTED OR EPOXIED IN PLACE.
8. EXPANSION AND CONTRACTION JOINTS SHALL BE CONSTRUCTED TO MATCH PAVEMENT JOINTS IN ALL CURBS OR CURB AND GUTTER ADJACENT TO JOINTED CONCRETE PAVEMENT. WHERE PLACEMENT OF CURB OR CURB AND GUTTER IS NOT ADJACENT TO CONCRETE PAVEMENT, EXPANSION JOINTS SHALL BE PROVIDED AT STRUCTURES, CURB RETURNS AT STREETS OR DRIVEWAYS, AND AT LOCATIONS DIRECTED BY THE ENGINEER.
9. VERTICAL AND HORIZONTAL DOWELS BARS AND TRANSVERSE REINFORCING BARS SHALL BE PLACED AT 4' C-C.
10. DIMENSION "T" SHOWN IS THE THICKNESS OF ADJACENT CONCRETE PAVEMENT, OR, WHEN CURB IS INSTALLED ADJACENT TO FLEXIBLE PAVEMENT, "T" IS 6" MINIMUM, 8" MAXIMUM.
11. USUAL PROFILE GRADE LINE. REFER TO TYPICAL SECTIONS AND PLAN-PROFILE SHEETS FOR EXACT LOCATIONS.
12. A SEALED, 1/2" EXPANSION JOINT SHALL BE PROVIDED WHERE CURB AND GUTTER IS ADJACENT TO SIDEWALK OR RIPRAP.
13. LONGITUDINAL AND TRANSVERSE PAVEMENT STEEL SHALL BE PLACED IN ACCORDANCE WITH PAVEMENT DETAILS SHOWN ELSEWHERE IN THE PLANS.



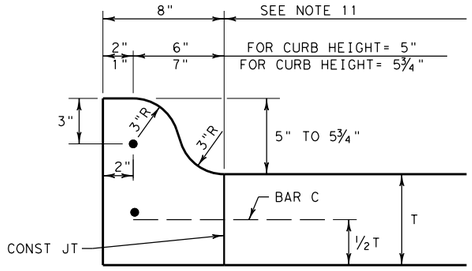
TYPE II CURB AND GUTTER
5" - 8" HEIGHT



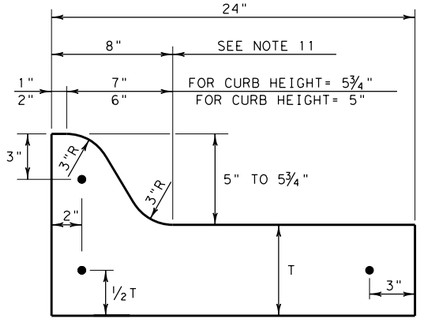
BAR B
L = (T/2) + (H- 1 1/2")
WHERE "H" = CURB HEIGHT
FOR NEW PAVEMENT, EMBED T/2 INTO FRESH CONCRETE.
FOR EXISTING PAVEMENT, DRILL 3/8" DIAM HOLE T/2 + 1/4" INTO PAVEMENT. SECURE WITH TY III EPOXY, CLASS "E" OR "F".



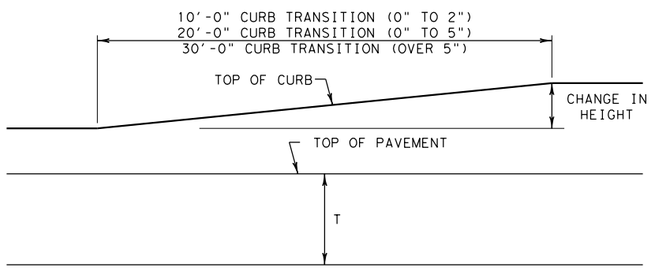
BAR C
EMBED 6" INTO EXISTING CONCRETE PAVEMENT.
DRILL 3/8" X 6 1/4" HOLE SECURE WITH TY III EPOXY, CLASS "E" OR "F".



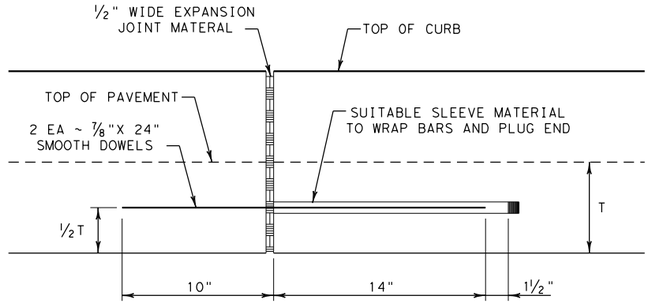
TYPE IIA CURB
5" - 5 3/4" HEIGHT



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



CURB TRANSITION
NOTE: TO BE PAID FOR AS HIGHEST CURB



EXPANSION JOINT DETAIL

Texas Department of Transportation

Fort Worth District Standard

CONCRETE CURB AND CURB AND GUTTER DETAILS

CCCG (FTW)

ORIGINAL DRAWING: 05/2019	cccg-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.			SHEET NO.
DATE	REVISIONS	6	SEE TITLE SHEET			64
05/2019	NEW STANDARD	STATE	STATE DIST.NO.	COUNTY		
07/2022	DESIGNATE USUAL 6" HEIGHT	TEXAS	FTW	TARRANT		
		CONT.	SECT.	JOB	HIGHWAY NO.	
		0171	05	101	FM 199	

100% SUBMITTAL

PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.pltcfg
PENTABLE: SH 199.tbl

SCALE: $SCALESHORT$
USER: jclonessy

FILE:SH199_SGNL_ROBERTS_01.dgn
DATE:4/11/2024 TIME:9:17:37 AM

EXISTING SIGNS

ROBERTS CUT OFF ← 3000 2600 → (S1)

LEFT ON GREEN ARROW ONLY (S2)

ROBERTS CUT OFF ← 2600 3000 → (S4)

NO PEDESTRIAN CROSSING (S3, S5)

EXISTING SIGNALS

V3 — SH: 1,2,3, 5,8,9,10,11

V3 — SH: 6,12

V4LT — SH: 4,7

EXISTING SIGNAL LEGEND

- SIGNAL POLE
- SIGNAL HEAD
- PEDESTRIAN SIGNAL HEAD (W/ PUSH BUTTON)
- SIGNAL MOUNTED SIGNS
- LED LUMINARE (250W EQ)
- EXISTING SIGNAL CONTROLLER CABINET
- EXISTING GROUND BOX
- EXISTING SPAN WIRE
- 1 — SIGNAL HEAD NUMBER
- S1 — SIGN LABEL
- EXISTING ELECTRICAL SERVICE
- E-# — EXISTING SIGNAL POLE NUMBER

EXIST. ROW

ROBERTS CUT OFF (30 MPH)

JACKSBORO HWY (SH199) (40 MPH)

320+00

REMOVE EXISTING TRAFFIC SIGNAL AND CONC (FND) (1 CY)(SUB TO ITEM 680) — E-1

REMOVE EXISTING TRAFFIC SIGNAL AND CONC (FND) (1 CY)(SUB TO ITEM 680) — E-2

REMOVE EXISTING TRAFFIC SIGNAL AND CONC (FND) (1 CY)(SUB TO ITEM 680) — E-3

REMOVE EXISTING TRAFFIC SIGNAL AND CONC (FND) (1 CY)(SUB TO ITEM 680) — E-4

REMOVE EXISTING TRAFFIC SIGNAL AND CONC (FND) (1 CY)(SUB TO ITEM 680) — E-5

REMOVE EXISTING TRAFFIC SIGNAL AND CONC (FND) (1 CY)(SUB TO ITEM 680) — E-6

EXISTING GROUND BOX (TO BE REMOVED)

EXISTING GROUND BOX (TO BE REMOVED)

REMOVE EXISTING TRAFFIC SIGNAL CONTROLLER CABINET & FOUNDATION (BASE MT) (SUB TO ITEM 680)

REMOVE EXISTING ELECTRICAL SERVICE (SUB TO ITEM 680)

EXISTING GROUND BOXES (TO BE REMOVED)

0′ 20′ 40′
SCALE IN FEET

NOTES:
1. THE EXISTING TRAFFIC SIGNAL SHALL REMAIN OPERATIONAL UNTIL THE PERMANENT TRAFFIC SIGNAL IS OPERATIONAL.
2. CONTRACTOR SHALL REMOVE AND SALVAGE ALL EXISTING TRAFFIC SIGNAL EQUIPMENT AFTER PROPOSED SIGNAL EQUIPMENT IS OPERATIONAL.
3. SIGNAL POLE FOUNDATIONS SHALL BE REMOVED TO A MINIMUM OF 2′ BELOW EXISTING GRADE SURFACE. THE EXISTING GROUND BOXES AND SIGNAL FOUNDATIONS IDENTIFIED FOR REMOVAL SHALL BE BACKFILLED WITH SIMILAR MATERIAL AND TO AN EQUIVALENT CONDITION AS THE SURROUNDING AREA UNLESS IT IS IDENTIFIED TO REMAIN.
4. REMOVE ALL GROUND BOXES, ABANDON CONDUITS AND CABLES THAT WILL NOT BE REUSED AS PART OF THE PROPOSED SIGNAL INSTALLATION.

REMOVAL SUMMARY

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
0624	6028	REMOVE GROUND BOX	EA	5
0680	6004	REMOVING TRAFFIC SIGNALS	EA	1

STATE OF TEXAS
ELIZABETH SHELTON
107729
LICENSED PROFESSIONAL ENGINEER
4/11/2024
Elizabeth Shelton

NO	DATE	REVISION	APPROVED

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

SH 199
EXISTING TRAFFIC SIGNAL LAYOUT
SH 199 AT ROBERTS CUT OFF

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	65
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.plt<fg
PENTABLE:SH 199.tbl

SCALE:$SCALESHORT$
USER:jclohessy

FILE:SH199_SGNL_ROBERTS_02.dgn
DATE:4/11/2024 TIME:9:17:44 AM

PROPOSED SIGNS

R10-3EL

S1 S4 S5 S8

R10-3ER

S2 S3 S6 S7

R10-17T

S9 S12

3000 Roberts Cut Off 2600 S10

6000 Jacksboro Hwy 5900 S11

2600 Roberts Cut Off 3000 S13

5900 Jacksboro Hwy 6000 S14

PROPOSED SIGNALS

COUNTDOWN PEDESTRIAN SIGNAL HEAD

SH 1, 2, 3, 4, 5, 6, 7, 8

TYPE H3

SH 10, 11, 14, 17, 18, 21

TYPE V3

SH 12, 15, 19, 22

TYPE H4FYA

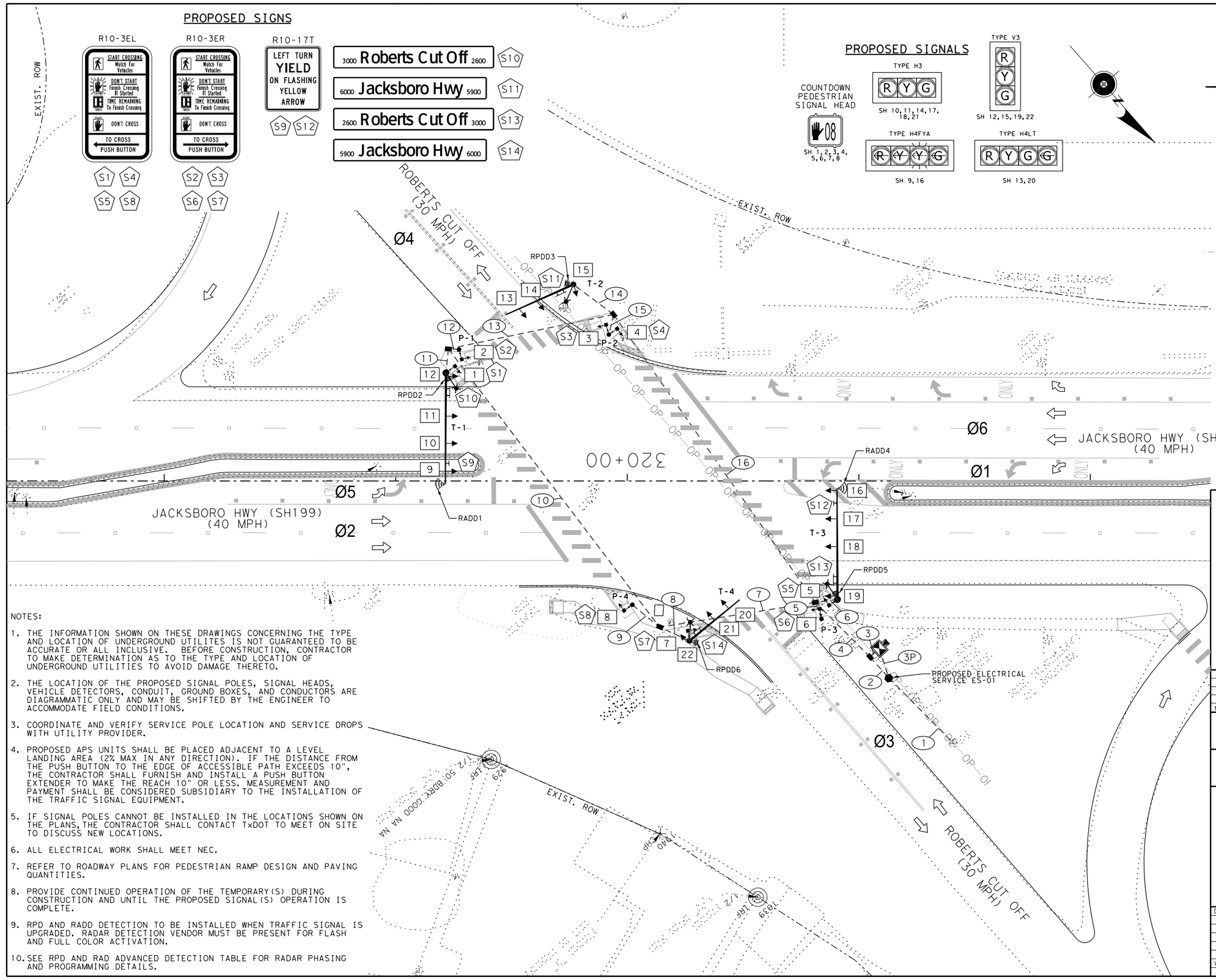
SH 9, 16

TYPE H4LT

SH 13, 20

PROPOSED SIGNAL LEGEND

- SIGNAL POLE (W/ MAST ARM)
- SIGNAL HEAD
- PEDESTRIAN SIGNAL HEAD (W/ PUSH BUTTON)
- SIGNAL MOUNTED SIGNS
- LED LUMINARE (250W EQ)
- ADVANCED RADAR DETECTION
- PRESENCE RADAR DETECTION
- TRAFFIC SIGNAL CABINET W/ BBU
- TYPE D GROUND BOX
- CONDUIT
- (1) CONDUIT RUN NUMBER
- 1 SIGNAL HEAD NUMBER
- S1 SIGN LABEL
- ELECTRICAL SERVICE
- P-# PROPOSED TRAFFIC SIGNAL POLE NUMBER



0' 20' 40'
SCALE IN FEET

NOTES:

1. THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. BEFORE CONSTRUCTION, CONTRACTOR TO MAKE DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES TO AVOID DAMAGE THERETO.
2. THE LOCATION OF THE PROPOSED SIGNAL POLES, SIGNAL HEADS, VEHICLE DETECTORS, CONDUIT, GROUND BOXES, AND CONDUCTORS ARE DIAGRAMMATIC ONLY AND MAY BE SHIFTED BY THE ENGINEER TO ACCOMMODATE FIELD CONDITIONS.
3. COORDINATE AND VERIFY SERVICE POLE LOCATION AND SERVICE DROPS WITH UTILITY PROVIDER.
4. PROPOSED APS UNITS SHALL BE PLACED ADJACENT TO A LEVEL LANDING AREA (2% MAX IN ANY DIRECTION). IF THE DISTANCE FROM THE PUSH BUTTON TO THE EDGE OF ACCESSIBLE PATH EXCEEDS 10", THE CONTRACTOR SHALL FURNISH AND INSTALL A PUSH BUTTON EXTENDER TO MAKE THE REACH 10" OR LESS. MEASUREMENT AND PAYMENT SHALL BE CONSIDERED SUBSIDIARY TO THE INSTALLATION OF THE TRAFFIC SIGNAL EQUIPMENT.
5. IF SIGNAL POLES CANNOT BE INSTALLED IN THE LOCATIONS SHOWN ON THE PLANS, THE CONTRACTOR SHALL CONTACT TxDOT TO MEET ON SITE TO DISCUSS NEW LOCATIONS.
6. ALL ELECTRICAL WORK SHALL MEET NEC.
7. REFER TO ROADWAY PLANS FOR PEDESTRIAN RAMP DESIGN AND PAVING QUANTITIES.
8. PROVIDE CONTINUED OPERATION OF THE TEMPORARY(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED SIGNAL(S) OPERATION IS COMPLETE.
9. RPD AND RADD DETECTION TO BE INSTALLED WHEN TRAFFIC SIGNAL IS UPGRADED. RADAR DETECTION VENDOR MUST BE PRESENT FOR FLASH AND FULL COLOR ACTIVATION.
10. SEE RPD AND RAD ADVANCED DETECTION TABLE FOR RADAR PHASING AND PROGRAMMING DETAILS.

STATE OF TEXAS
ELIZABETH SHELTON
107729
LICENSED PROFESSIONAL ENGINEER
4/11/2024

NO	DATE	REVISION	APPROVED

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation
© 2024

SH 199

PROPOSED TRAFFIC SIGNAL LAYOUT

SH 199 AT ROBERTS CUT OFF

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	66
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.pltcfg
PENTABLE: SH 199.tbl

SCALE: $SCALESHORT$
USER: jclonessy

FILE:SH199_SGNL_ROBERTS_03.dgn
DATE:4/11/2024 TIME:9:17:51 AM

LEGEND OF CONDUIT

RUN NO	CONDUIT SIZE (IN)*	CONDUIT LENGTH (FT)	ELECTRICAL CONDUCTORS: 6 AWG XHHW	6 AWG BARE	4/C #12 TRAY LUM	TRAFFIC SIGNAL CABLES: TY A 7/C 14 AWG	TY A 16/C 14 AWG	TY C 2/C 12 AWG	RADAR DETECTION CABLE (RAD) **	RADAR DETECTION CABLE (RPD) ***	RUN NO
1	2-T	50	ELECTRIC UTILITY TO PROVIDE CONDUCTORS								1
2	2-T	15		1	4						2
3	4-T	10		1		8		8	2	4	3
3	4-T	10		1			4				3
3P	2-T	15	2	1							3P
4	4-T	35		1	4	8	4	8	2	4	4
5	4-T	10		1		1		1			5
6	4-T	15		1	1	1	1	1	1	1	6
7	4-B	70		1	1	4	2	4	1	2	7
8	4-T	20		1	1	1	1	1		1	8
9	4-T	20		1		1		1			9
10	4-B	155		1		2	1	2	1	1	10
11	4-T	15		1	1	1	1	1	1	1	11
12	4-T	10		1		1		1			12
13	4-B	75		1	1						13
14	4-T	25		1	1		1			1	14
15	4-T	10		1		2		2			15
16	4-B	155		1	2	2	1	2		1	16

*NOTE: T=TRENCH AND B=BORE.

** NOTE: RADAR DETECTION CABLE TO BE SUPPLIED BY TXDOT AND INSTALLED BY THE CONTRACTOR. PAYMENTS SHALL BE SUBSIDIARY TO ITEM 6045.

*** NOTE: RADAR DETECTION CABLE TO BE SUPPLIED BY TXDOT AND INSTALLED BY THE CONTRACTOR. PAYMENTS SHALL BE SUBSIDIARY TO ITEM 6046.

SIGNS SUMMARY

SIGN *	SIGN TYPE	SIGN LEGEND	STATUS	SUPPORT	SIGN DIMENSION
S1	R10-3EL	PED PUSH BUTTON	I	T-1	9" x 15"
S2	R10-3ER	PED PUSH BUTTON	I	P-1	9" x 15"
S3	R10-3ER	PED PUSH BUTTON	I	P-2	9" x 15"
S4	R10-3EL	PED PUSH BUTTON	I	P-2	9" x 15"
S5	R10-3EL	PED PUSH BUTTON	I	T-3	9" x 15"
S6	R10-3ER	PED PUSH BUTTON	I	P-3	9" x 15"
S7	R10-3ER	PED PUSH BUTTON	I	P-4	9" x 15"
S8	R10-3EL	PED PUSH BUTTON	I	P-5	9" x 15"
S9	R10-17T	LEFT TURN YIELD ON FLASHING YELLOW ARROW	I	T-1	30" x 30"
S10	STREET NAMES	ROBERTS CUT OFF	I	T-1	18" x 132"
S11	STREET NAMES	JACKSBORO HWY	I	T-2	18" x 126"
S12	R10-17T	LEFT TURN YIELD ON FLASHING YELLOW ARROW	I	T-3	30" x 30"
S13	STREET NAMES	ROBERTS CUT OFF	I	T-3	18" x 132"
S14	STREET NAMES	JACKSBORO HWY	I	T-4	18" x 126"

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

APS MESSAGE CHART

POLE LOCATION	PEDESTRIAN MOVEMENT	FUNCTIONS	SPEECH MESSAGE/SOUND DETAILS
T-4	Phase 2	BUTTON PUSH ON DW	WAIT
		EXTENDED BUTTON PUSH	WAIT TO CROSS ROBERTS CUT OFF AT JACKSBORO HWY
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	RAPID TICK
P-3	Phase 2	BUTTON PUSH ON DW	WAIT
		EXTENDED BUTTON PUSH	WAIT TO CROSS ROBERTS CUT OFF AT JACKSBORO HWY
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	RAPID TICK
T-1	Phase 4	BUTTON PUSH ON DW	WAIT
		EXTENDED BUTTON PUSH	WAIT TO CROSS JACKSBORO HWY AT ROBERTS CUT OFF
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	RAPID TICK
P-4	Phase 4	BUTTON PUSH ON DW	WAIT
		EXTENDED BUTTON PUSH	WAIT TO CROSS JACKSBORO HWY AT ROBERTS CUT OFF
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	RAPID TICK
P-2	Phase 6	BUTTON PUSH ON DW	WAIT TO CROSS ROBERTS CUT OFF AT JACKSBORO HWY
		EXTENDED BUTTON PUSH	WAIT TO CROSS ROBERTS CUT OFF AT JACKSBORO HWY
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	ROBERTS CUT OFF, WALK SIGN IS ON TO CROSS ROBERTS CUT OFF
P-1	Phase 6	BUTTON PUSH ON DW	WAIT
		EXTENDED BUTTON PUSH	WAIT TO CROSS ROBERTS CUT OFF AT JACKSBORO HWY
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	WAIT
T-4	Phase 3	BUTTON PUSH ON DW	WAIT
		EXTENDED BUTTON PUSH	WAIT TO CROSS JACKSBORO HWY AT ROBERTS CUT OFF
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	RAPID TICK
P-2	Phase 3	BUTTON PUSH ON DW	WAIT TO CROSS JACKSBORO HWY AT ROBERTS CUT OFF
		EXTENDED BUTTON PUSH	WAIT TO CROSS JACKSBORO HWY AT ROBERTS CUT OFF
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	JACKSBORO HWY, WALK SIGN IS ON TO CROSS JACKSBORO HWY

ELECTRICAL SERVICE DATA

ELEC. SERVICE ID	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5)-14)	SERVICE CONDUIT SIZE**	SERVICE CONDUCTORS NO. / SIZE	SAFETY SWITCH AMPS	MAIN DISCONNECT CKT. BRK. POLE / AMP	TWO-POLE CONTACTOR AMPS	PANELBD. / LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE / AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
1	TY D (120/240) 070 (NS) SS (E) PS (U)	2"	3 / #6	N/A	2P / 70	30	100	T.S. LIGHTING	1P / 30 2P / 15	24 4	<7.1

** - VERIFY SERVICE CONDUIT SIZE & TYPE WITH UTILITY. SIZE MAY CHANGE DUE TO THE UTILITY METER REQUIREMENTS. ENSURE CONDUIT SIZE MEETS THE NATIONAL ELECTRICAL CODE.

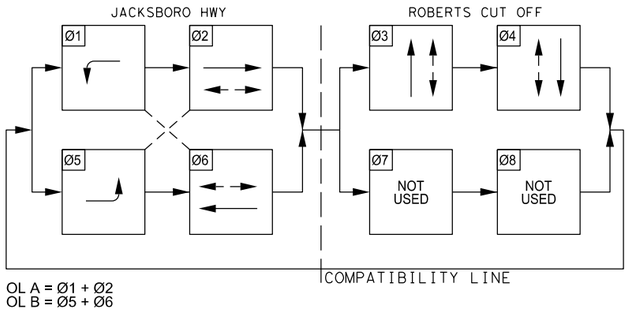
GROUND BOX SUMMARY

ITEM	CODE	DESCRIPTION	UNIT	QTY.
624	6010	GROUND BOX TY D (162922)W/APRON	EA	5

CABLE IN POLE AND ARM

SIGNAL POLE NUMBER	4/C #12 TRAY LUM	TY A 5/C 14 AWG	TY A 7/C 14 AWG	TY C 2/C 12 AWG	RADAR DETECTION CABLE (RAD) *	RADAR DETECTION CABLE (RPD) **
T-1	40	10	175	5	50	20
T-2	40		105			20
T-3	40	10	190	5	50	20
T-4	40	10	100	5		20
P-1		10		5		
P-2		20		10		
P-3		10		5		
P-4		10		5		
TOTAL =	160	80	570	40	100	80

PHASE SEQUENCE



OL A = Ø1 + Ø2
OL B = Ø5 + Ø6

SIGNAL POLE CHART

POLE NUMBER	T-1	T-2	T-3	T-4	P-1	P-2	P-3	P-4
MAST ARM LENGTH	48'	32'	48'	28'	N/A	N/A	N/A	N/A
FOUNDATION TYPE	36-A	30-A	36-A	30-A	24-A	24-A	24-A	24-A
WITH LUMINAIRE	YES	YES	YES	YES	NO	NO	NO	NO
MAST ARM SIGNS	R10-3EL, R10-17T, STREET NAME	STREET NAME	R10-3EL, R10-17T, STREET NAME	R10-3ER, STREET NAME	R10-3ER	R10-13ER, R10-13EL	R10-3ER	R10-3EL
SIZE OF LENS	12" X	12" X	12" X	12" X	X	X	X	X
SIGNAL TYPE	H4FYA H3 H3 V3 PED	H4L T H3 V3 PED	H4F YA H3 H3 V3 PED	H4L T H3 V3 PED	PED	PED	PED	PED
SIGNAL FACE NO.	9 10 11 12 1	13 14 15	16 17 18 19 5	20 21 22 7	2	3	4	6 8
LED SIGNAL INDICATIONS	<-R R R R <-Y Y Y Y <-Y* G G G <-G	R R R Y Y Y G G G <-G	<-R R R R <-Y Y Y Y <-Y* G G G <-G	R R R Y Y Y G G G <-G				

<- DENOTES SIGNAL HEADS WITH ARROWS.
* DENOTES SIGNAL HEADS WITH FLASHING ARROW
ALL SIGNAL HEADS SHALL HAVE VENTED BLACK ALUMINUM BACK PLATES AS STATED IN THE GENERAL NOTES.

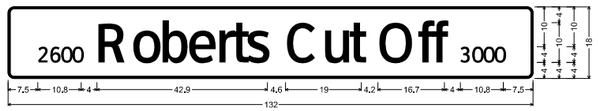
MINIMUM PEDESTRIAN TIMING

PED PHASE	SIGNAL HEAD NUMBERS	WALK TIME (SECONDS)	FLASHING DONT WALK TIME (SECONDS)	TOTAL PED TIMING (SECONDS)
PHASE 2	6, 7	15	4	19
PHASE 4	1, 8	34	4	38
PHASE 6	2, 3	14	4	18
PHASE 3	4, 5	40	4	44

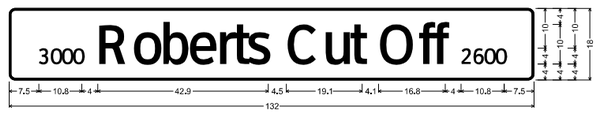
PEDESTRIAN TIMINGS ARE BASED ON EXISTING GEOMETRICS AS SHOWN ON THIS LAYOUT

D3-1G(1) 8in:
1,5" Radius, 0,5" Border, White on Green:
ClearviewHwy-3-W: "Jacksboro Hwy", ClearviewHwy-3-W: "6000", ClearviewHwy-3-W:

D3-1G(1) 8in:
1,5" Radius, 0,5" Border, White on Green:
"6000", ClearviewHwy-3-W: "Jacksboro Hwy", ClearviewHwy-3-W: "5900", ClearviewHwy-3-W:



D3-1G(1) 8in:
1,5" Radius, 0,5" Border, White on Green:
"2600", ClearviewHwy-3-W: "Roberts Cut Off", ClearviewHwy-3-W: "3000", ClearviewHwy-3-W:



D3-1G(1) 8in:
1,5" Radius, 0,5" Border, White on Green:
"3000", ClearviewHwy-3-W: "Roberts Cut Off", ClearviewHwy-3-W: "2600", ClearviewHwy-3-W:

STATE OF TEXAS
ELIZABETH SHELTON
107729
LICENSED PROFESSIONAL ENGINEER
4/11/2024

NO	DATE	REVISION	APPROVED

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation
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SH 199

PROPOSED TRAFFIC SIGNAL TABLES

SH 199 AT ROBERTS CUT OFF

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	67
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.pltcfg
PENTABLE:SH 199.tbl

SCALE:$SCALESHORT$
USER:jclohessy

FILE:SH199_SGNL_ROBERTS_04.dgn
DATE:4/11/2024 TIME:9:17:57 AM

CABLE TERMINATION CHART

CNDR. NO.	CONDUCTOR COLOR	CABLE 1 16 CNDR.	CABLE 2 16 CNDR.	CABLE 3 16 CNDR.	CABLE 4 16 CNDR.	CABLE 5 7 CNDR.	CABLE 6 7 CNDR.	CABLE 7 7 CNDR.	CABLE 8 7 CNDR.
		FROM T-1 TO CNTRL.	FROM T-2 TO CNTRL.	FROM T-3 TO CNTRL.	FROM T-4 TO CNTRL.	FROM P-1 TO CNTRL.	FROM P-2 TO CNTRL.	FROM P-3 TO CNTRL.	FROM P-4 TO CNTRL.
1	BLACK	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
2	WHITE	SH COMMON	SH COMMON	SH COMMON	SH COMMON	SH COMMON	SH COMMON	SH COMMON	SH COMMON
3	RED	SH10, SH11, SH12 - PHASE 6 R	SH13, SH14, SH15 - PHASE 3 R	SH17, SH18, SH19 - PHASE 2 R	SH20, SH21, SH22 - PHASE 4 R	SH 2 PHASE 6 DW	SH 3 PHASE 6 DW	SH 6 PHASE 2 DW	SH 8 PHASE 4 DW
4	GREEN	SH10, SH11, SH12 - PHASE 6 G	SH13, SH14, SH15 - PHASE 3 G	SH17, SH18, SH19 - PHASE 2 G	SH20, SH21, SH22 - PHASE 4 G	SH 2 PHASE 6 W	SH 3 PHASE 6 W	SH 6 PHASE 2 W	SH 8 PHASE 4 W
5	ORANGE	SH10, SH11, SH12 - PHASE 6 Y	SH13, SH14, SH15 - PHASE 3 Y	SH17, SH18, SH19 - PHASE 2 Y	SH20, SH21, SH22 - PHASE 4 Y	SPARE	SPARE	SPARE	SPARE
6	BLUE	SH 1 PHASE 4 DW	SPARE	SH 5 PHASE 3 DW	SH 7 PHASE 2 DW	SPARE	SH 4 PHASE 3 DW	SPARE	SPARE
7	WHITE/BLACK	SH 1 PHASE 4 W	SPARE	SH 5 PHASE 3 W	SH 7 PHASE 2 W	SPARE	SH 4 PHASE 3 W	SPARE	SPARE
8	RED/BLACK	SH9 - PHASE 1 R (LT ARW)	SPARE	SH16 - PHASE 5 R (LT ARW)	SPARE				
9	GREEN/BLACK	SH9 - PHASE 1 G (LT ARW)	SPARE	SH16 - PHASE 5 G (LT ARW)	SPARE				
10	ORANGE/BLACK	SH9 - PHASE 1 Y (LT ARW)	SPARE	SH16 - PHASE 5 Y (LT ARW)	SPARE				
11	BLUE/BLACK	SH9 - PHASE 1 FY (LT ARW)	SH13 - PHASE 3 G (LT ARW)	SH16 - PHASE 5 FY (LT ARW)	SH20 - PHASE 4 G (LT ARW)				
12	BLACK/WHITE	SPARE	SPARE	SPARE	SPARE				
13	RED/WHITE	SPARE	SPARE	SPARE	SPARE				
14	GREEN/WHITE	SPARE	SPARE	SPARE	SPARE				
15	BLUE/WHITE	SPARE	SPARE	SPARE	SPARE				
16	BLACK/RED	SPARE	SPARE	SPARE	SPARE				

*NOTE: HOME RUN 2 CNDR TO ALL POLES WITH APS BUTTONS

RPD PRESENCE AND RAD ADVANCED DETECTION
CLICK 656

SENSOR 1	PHASE 2, PHASE 5	RADD1
SENSOR 2	PHASE 2, PHASE 5	RPDD2
SENSOR 3	PHASE 4	RPDD3
SENSOR 4	PHASE 1, PHASE 6	RADD4
SENSOR 5	PHASE 1, PHASE 6	RPDD5
SENSOR 6	PHASE 3	RPDD6

CONTROLLER (BIU 9)

DETECTOR CHANNEL	1	2	3	4	5	6	7	8
PHASE ASSIGNMENT	PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5	PHASE 6		
MATRIX OUTPUT CHANNEL	1	2	3	4	5	6		
DETECTOR CHANNEL	9	10	11	12	13	14	15	16
PHASE ASSIGNMENT								
MATRIX OUTPUT CHANNEL								

CONTROLLER (BIU 10)

DETECTOR CHANNEL	17	18	19	20	21	22	23	24
PHASE ASSIGNMENT		PHASE 2				PHASE 6		
MATRIX OUTPUT CHANNEL		18				22		
DETECTOR CHANNEL	25	26	27	28	29	30	31	32
PHASE ASSIGNMENT		PHASE 2				PHASE 6		
MATRIX OUTPUT CHANNEL		26				30		

STATE OF TEXAS
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4/11/2024

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FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

SH 199

PROPOSED TRAFFIC SIGNAL TABLES

SH 199 AT ROBERTS CUT OFF

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	68
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.pltcfg
PENTABLE:SH 199.tbl

SCALE:$SCALESHORT$
USER:jclohessy

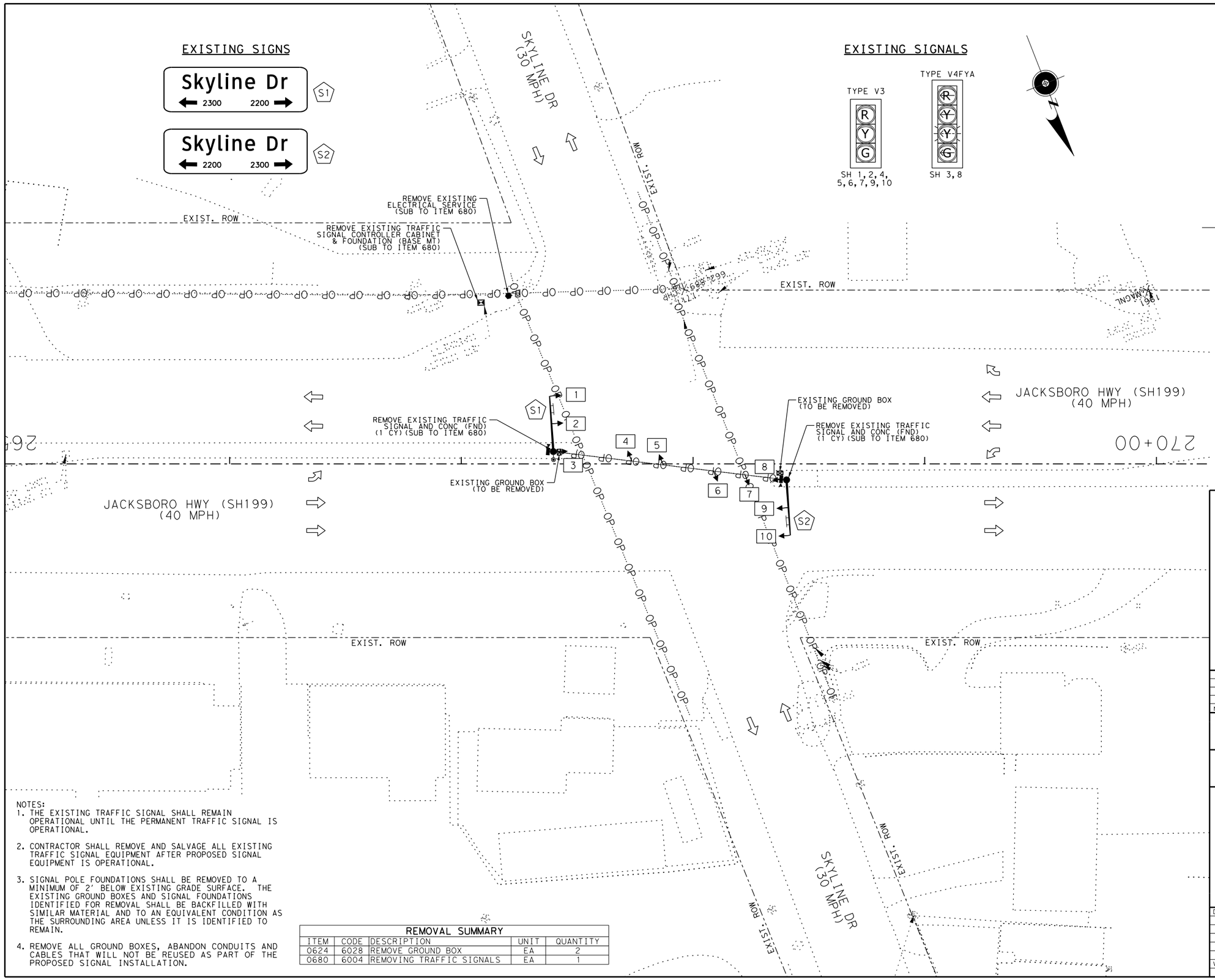
FILE:SH199_SGNL_SKYLINE_01.dgn
DATE:4/11/2024 TIME:9:18:03 AM

EXISTING SIGNS

EXISTING SIGNALS

EXISTING SIGNAL LEGEND

- SIGNAL POLE
- SIGNAL HEAD
- PEDESTRIAN SIGNAL HEAD (W/ PUSH BUTTON)
- SIGNAL MOUNTED SIGNS
- LED LUMINARE (250W EQ)
- EXISTING SIGNAL CONTROLLER CABINET
- EXISTING GROUND BOX
- EXISTING SPAN WIRE
- 1 — SIGNAL HEAD NUMBER
- S1 — SIGN LABEL
- EXISTING ELECTRICAL SERVICE
- E-# — EXISTING SIGNAL POLE NUMBER



0′ 20′ 40′
SCALE IN FEET

NOTES:
1. THE EXISTING TRAFFIC SIGNAL SHALL REMAIN OPERATIONAL UNTIL THE PERMANENT TRAFFIC SIGNAL IS OPERATIONAL.
2. CONTRACTOR SHALL REMOVE AND SALVAGE ALL EXISTING TRAFFIC SIGNAL EQUIPMENT AFTER PROPOSED SIGNAL EQUIPMENT IS OPERATIONAL.
3. SIGNAL POLE FOUNDATIONS SHALL BE REMOVED TO A MINIMUM OF 2′ BELOW EXISTING GRADE SURFACE. THE EXISTING GROUND BOXES AND SIGNAL FOUNDATIONS IDENTIFIED FOR REMOVAL SHALL BE BACKFILLED WITH SIMILAR MATERIAL AND TO AN EQUIVALENT CONDITION AS THE SURROUNDING AREA UNLESS IT IS IDENTIFIED TO REMAIN.
4. REMOVE ALL GROUND BOXES, ABANDON CONDUITS AND CABLES THAT WILL NOT BE REUSED AS PART OF THE PROPOSED SIGNAL INSTALLATION.

REMOVAL SUMMARY

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
0624	6028	REMOVE GROUND BOX	EA	2
0680	6004	REMOVING TRAFFIC SIGNALS	EA	1

STATE OF TEXAS
ELIZABETH SHELTON
107729
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4/11/2024
Elizabeth Shelton

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FIRM REGISTRATION NO. F-1471

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SH 199
EXISTING TRAFFIC SIGNAL LAYOUT
SH 199 AT SKYLINE DR

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	69
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

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USER:jclohessy

FILE:SH199_SGNL_SKYLINE_02.dgn
DATE:4/11/2024 TIME:9:18:12 AM

PROPOSED SIGNS

R10-3EL

S1 S4

R10-3ER

S2 S3

R10-17T

S5 S8

S6 2300 Skyline Dr 2200

S7 5100 Jacksboro Hwy 5200

S9 2200 Skyline Dr 2300

S10 5200 Jacksboro Hwy 5100

PROPOSED SIGNALS

COUNTDOWN PEDESTRIAN SIGNAL HEAD — SH 1,2,3,4

TYPE H3 — SH 6,7,9,11,14,15,18

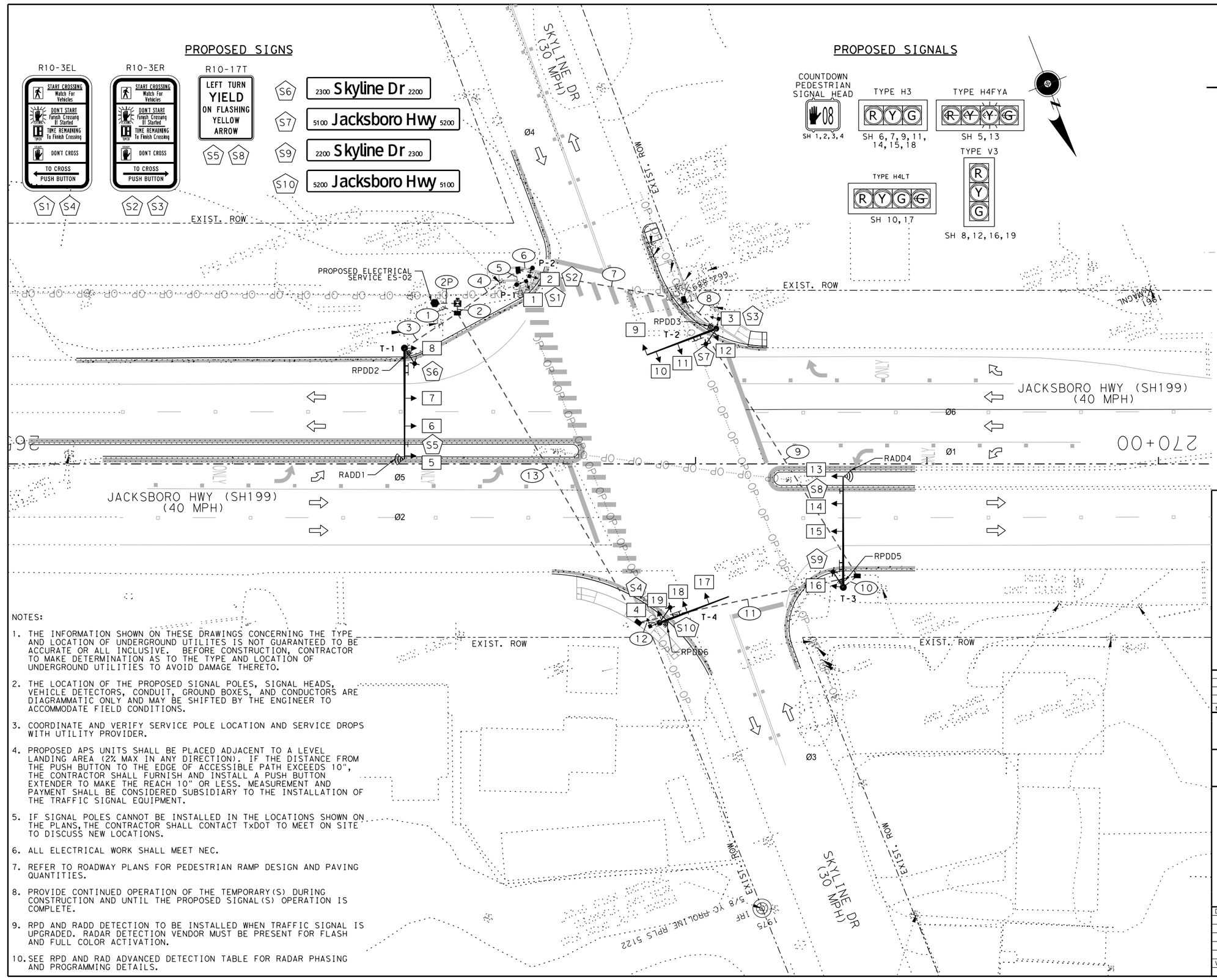
TYPE H4FYA — SH 5,13

TYPE H4LT — SH 10,17

TYPE V3 — SH 8,12,16,19

PROPOSED SIGNAL LEGEND

- SIGNAL POLE (W/ MAST ARM)
- SIGNAL HEAD
- PEDESTRIAN SIGNAL HEAD (W/ PUSH BUTTON)
- SIGNAL MOUNTED SIGNS
- LED LUMINARE (250W EQ)
- ADVANCED RADAR DETECTION
- PRESENCE RADAR DETECTION
- TRAFFIC SIGNAL CABINET W/ BBU
- TYPE D GROUND BOX
- CONDUIT
- (1) CONDUIT RUN NUMBER
- 1 SIGNAL HEAD NUMBER
- S1 SIGN LABEL
- ELECTRICAL SERVICE
- P-# PROPOSED TRAFFIC SIGNAL POLE NUMBER



NOTES:

1. THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. BEFORE CONSTRUCTION, CONTRACTOR TO MAKE DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES TO AVOID DAMAGE THERETO.
2. THE LOCATION OF THE PROPOSED SIGNAL POLES, SIGNAL HEADS, VEHICLE DETECTORS, CONDUIT, GROUND BOXES, AND CONDUCTORS ARE DIAGRAMMATIC ONLY AND MAY BE SHIFTED BY THE ENGINEER TO ACCOMMODATE FIELD CONDITIONS.
3. COORDINATE AND VERIFY SERVICE POLE LOCATION AND SERVICE DROPS WITH UTILITY PROVIDER.
4. PROPOSED APS UNITS SHALL BE PLACED ADJACENT TO A LEVEL LANDING AREA (2% MAX IN ANY DIRECTION). IF THE DISTANCE FROM THE PUSH BUTTON TO THE EDGE OF ACCESSIBLE PATH EXCEEDS 10", THE CONTRACTOR SHALL FURNISH AND INSTALL A PUSH BUTTON EXTENDER TO MAKE THE REACH 10" OR LESS. MEASUREMENT AND PAYMENT SHALL BE CONSIDERED SUBSIDIARY TO THE INSTALLATION OF THE TRAFFIC SIGNAL EQUIPMENT.
5. IF SIGNAL POLES CANNOT BE INSTALLED IN THE LOCATIONS SHOWN ON THE PLANS, THE CONTRACTOR SHALL CONTACT TxDOT TO MEET ON SITE TO DISCUSS NEW LOCATIONS.
6. ALL ELECTRICAL WORK SHALL MEET NEC.
7. REFER TO ROADWAY PLANS FOR PEDESTRIAN RAMP DESIGN AND PAVING QUANTITIES.
8. PROVIDE CONTINUED OPERATION OF THE TEMPORARY(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED SIGNAL(S) OPERATION IS COMPLETE.
9. RPD AND RADD DETECTION TO BE INSTALLED WHEN TRAFFIC SIGNAL IS UPGRADED. RADAR DETECTION VENDOR MUST BE PRESENT FOR FLASH AND FULL COLOR ACTIVATION.
10. SEE RPD AND RAD ADVANCED DETECTION TABLE FOR RADAR PHASING AND PROGRAMMING DETAILS.

STATE OF TEXAS
ELIZABETH SHELTON
107729
LICENSED PROFESSIONAL ENGINEER
4/11/2024

NO	DATE	REVISION	APPROVED

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FIRM REGISTRATION NO. F-1471

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SH 199

PROPOSED TRAFFIC SIGNAL LAYOUT

SH 199 AT SKYLINE DR

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	70
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

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SCALE: $SCALESHORT$
USER: jclohessy

FILE:SH199_SGNL_SKYLINE_03.dgn
DATE:4/11/2024 TIME:9:18:18 AM

LEGEND OF CONDUIT

RUN NO	CONDUIT SIZE (IN)*	CONDUIT LENGTH (FT)	ELECTRICAL CONDUCTORS 6 AWG XHHW	6 AWG BARE	4/C #12 TRAY LUM	TRAFFIC SIGNAL CABLES TY A 7/C 14 AWG	TY A 16/C 14 AWG	TY C 2/C 12 AWG	RADAR DETECTION CABLE (RAD) **	RADAR DETECTION CABLE (RPD) ***	RUN NO
1	2-T	15		1	4						1
2	4-T	10		1		4		4	2	4	2
2	4-T	10		1			4				2
2P	2-T	15	2	1							2P
3	4-T	30		1	1		1		1	1	3
4	4-T	35		1	1	3	2	3	1	2	4
5	4-T	10		1		1		1			5
6	4-T	10		1		1		1			6
7	4-B	75		1	1	1	2	1	1	2	7
8	4-T	25		1	1	1	1	1		1	8
9	4-B	145		1			1		1	1	9
10	4-T	10		1	1		1		1	1	10
11	4-B	100		1	1						11
12	4-T	15		1	1	1	1	1		1	12
13	4-B	160		1	2	1	1	1		1	13

*NOTE: T=TRENCH AND B=BORE.

** NOTE: RADAR DETECTION CABLE TO BE SUPPLIED BY TXDOT AND INSTALLED BY THE CONTRACTOR. PAYMENTS SHALL BE SUBSIDIARY TO ITEM 6045.

*** NOTE: RADAR DETECTION CABLE TO BE SUPPLIED BY TXDOT AND INSTALLED BY THE CONTRACTOR. PAYMENTS SHALL BE SUBSIDIARY TO ITEM 6046.

CABLE IN POLE AND ARM

	4/C #12 TRAY LUM	TY A 5/C 14 AWG	TY A 7/C 14 AWG	TY C 2/C 12 AWG	RADAR DETECTION CABLE (RAD) *	RADAR DETECTION CABLE (RPD) **
T-1	40		185		50	20
T-2	40	10	160	5		20
T-3	40		190		50	20
T-4	40	10	100	5		20
P-1		10		5		
P-2		10		5		
TOTAL =	160	40	635	20	100	80

GROUND BOX SUMMARY

ITEM	CODE	DESCRIPTION	UNIT	QTY.
624	6008	GROUND BOX TY C (162911)W/APRON	EA	1
624	6009	GROUND BOX TY D (162922)	EA	4

MINIMUM PEDESTRIAN TIMING

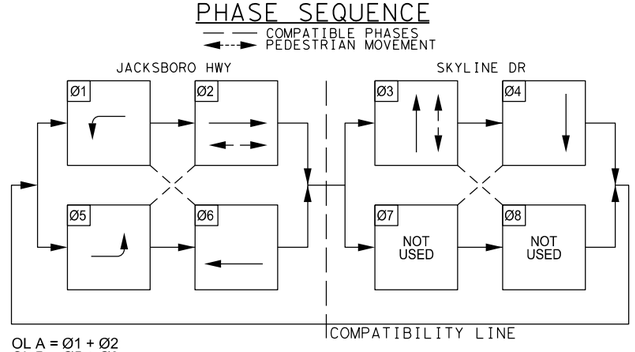
PED PHASE	SIGNAL HEAD NUMBERS	WALK TIME (SECONDS)	FLASHING DONT WALK TIME (SECONDS)	TOTAL PED TIMING (SECONDS)
4	1,4	20	4	24
6	2,3	42	4	46

PEDESTRIAN TIMINGS ARE BASED ON EXISTING GEOMETRICS AS SHOWN ON THIS LAYOUT

APS MESSAGE CHART

POLE LOCATION	PEDESTRIAN MOVEMENT	FUNCTIONS	SPEECH MESSAGE/SOUND DETAILS
P-1	Phase 4	BUTTON PUSH ON DW	WAIT
		EXTENDED BUTTON PUSH	WAIT TO CROSS JACKSBORO HWY AT SKYLINE
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	RAPID TICK
T-4	Phase 4	BUTTON PUSH ON DW	WAIT
		EXTENDED BUTTON PUSH	WAIT TO CROSS JACKSBORO HWY AT SKYLINE
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	RAPID TICK
T-2	Phase 6	BUTTON PUSH ON DW	WAIT
		EXTENDED BUTTON PUSH	WAIT TO CROSS SKYLINE AT JACKSBORO HWY
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	RAPID TICK
P-2	Phase 6	BUTTON PUSH ON DW	WAIT
		EXTENDED BUTTON PUSH	WAIT TO CROSS SKYLINE AT JACKSBORO HWY
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	WAIT

PHASE SEQUENCE



OL A = Ø1 + Ø2
OL B = Ø5 + Ø6

SIGNAL POLE CHART

POLE NUMBER	T-1				T-2					T-3				T-4				P-1	P-2
MAST ARM LENGTH	48'				32'					48'				32'				N/A	N/A
FOUNDATION TYPE	36-A				30-A					36-A				30-A				24-A	24-A
WITH LUMINAIRE	YES				YES					YES				YES				NO	NO
WITH SIGNS	R10-17T, STREET NAME				R10-3ER, STREET NAME					R10-17T, STREET NAME				R10-3EL, STREET NAME				R10-3EL	R10-3ER
SIZE OF LENS	12"				12"				X	12"				12"			X	X	X
SIGNAL TYPE	H4FYA	H3	H3	V3	H3	H4L	H3	V3	PED	H4FYA	H3	H3	V3	H4L	H3	V3	PED	PED	PED
SIGNAL FACE NO.	5	6	7	8	9	10	11	12	3	13	14	15	16	17	18	19	4	1	2
LED SIGNAL INDICATIONS	<-R	R	R	R	R	R	R	R		<-R	R	R	R	R	R	R			
	<-Y	Y	Y	Y	Y	Y	Y	Y		<-Y	Y	Y	Y	Y	Y	Y			
	<-Y*	G	G	G	G	G	G	G		<-Y*	G	G	G	G	G	G			
	<-G					<-G				<-G				<-G					

<- DENOTES SIGNAL HEADS WITH ARROWS.
* DENOTES SIGNAL HEADS WITH FLASHING ARROW.
ALL SIGNAL HEADS SHALL HAVE VENTED BLACK ALUMINUM BACK PLATES AS STATED IN THE GENERAL NOTES.

SIGNS SUMMARY

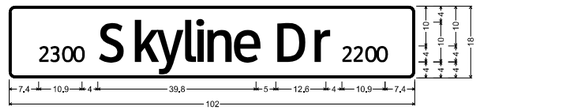
SIGN *	SIGN TYPE	SIGN LEGEND	STATUS	SUPPORT	SIGN DIMENSION
S1	R10-3EL	PED PUSH BUTTON	I	P-1	9" x 15"
S2	R10-3ER	PED PUSH BUTTON	I	P-2	9" x 15"
S3	R10-3ER	PED PUSH BUTTON	I	T-2	9" x 15"
S4	R10-3EL	PED PUSH BUTTON	I	T-4	9" x 15"
S5	R10-17T	LEFT TURN YIELD ON FLASHING YELLOW ARROW	I	T-1	30" x 30"
S6	STREET NAMES	SKYLINE	I	T-1	18" x 102"
S7	STREET NAMES	JACKSBORO HWY	I	T-2	18" x 126"
S8	R10-17T	LEFT TURN YIELD ON FLASHING YELLOW ARROW	I	T-3	30" x 30"
S9	STREET NAMES	SKYLINE	I	T-3	18" x 102"
S10	STREET NAMES	JACKSBORO HWY	I	T-4	18" x 126"

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

ELECTRICAL SERVICE DATA

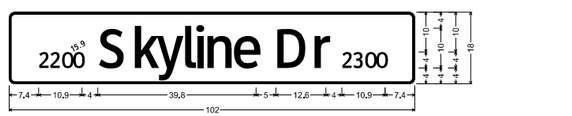
ELEC. SERVICE ID	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5)-14)	SERVICE CONDUIT SIZE**	SERVICE CONDUCTORS NO. / SIZE	SAFETY SWITCH AMPS	MAIN DISCONNECT CKT. BRK. POLE / AMP	TWO-POLE CONTACTOR AMPS	PANELBD. / LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE / AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
2	TY D (120/240) 070 (NS) SS (E) PS (U)	2"	3 / #6	N/A	2P / 70	30	100	T.S. LIGHTING	1P / 50 2P / 20	24 4	<7.1

** - VERIFY SERVICE CONDUIT SIZE & TYPE WITH UTILITY. SIZE MAY CHANGE DUE TO THE UTILITY METER REQUIREMENTS. ENSURE CONDUIT SIZE MEETS THE NATIONAL ELECTRICAL CODE.



D3-1G(1) 8in:
1,5" Radius, 0,5" Border, White on Green:
"2300", ClearviewHwy-3-W; "Skyline Dr", ClearviewHwy-3-W; "2200", ClearviewHwy-3-W;

D3-1G(1) 8in:
1,5" Radius, 0,5" Border, White on Green:
"5100", ClearviewHwy-3-W; "Jacksboro Hwy", ClearviewHwy-3-W; "5200", ClearviewHwy-3-W;



D3-1G(1) 8in:
1,5" Radius, 0,5" Border, White on Green:
"2200", ClearviewHwy-3-W; "Skyline Dr", ClearviewHwy-3-W; "2300", ClearviewHwy-3-W;

D3-1G(1) 8in:
1,5" Radius, 0,5" Border, White on Green:
"5200", ClearviewHwy-3-W; "Jacksboro Hwy", ClearviewHwy-3-W; "5100", ClearviewHwy-3-W;

NO	DATE	REVISION	APPROVED

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

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SH 199
PROPOSED TRAFFIC SIGNAL TABLES
SH 199 AT SKYLINE DR

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	71
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.plt cfg
PENTABLE: SH 199.tbl

SCALE: $SCALESHORT$
USER: jclohessy

FILE:SH199_SGNL_SKYLINE_04.dgn
DATE:4/11/2024 TIME:9:18:25 AM

CABLE TERMINATION CHART

CNDR. NO.	CONDUCTOR COLOR	CABLE 1 16 CNDR. FROM T-1 TO CNTRL.	CABLE 2 16 CNDR. FROM T-2 TO CNTRL.	CABLE 3 16 CNDR. FROM T-3 TO CNTRL.	CABLE 4 16 CNDR. FROM T-4 TO CNTRL.	CABLE 5 7 CNDR. FROM P-1 TO CNTRL.	CABLE 6 7 CNDR. FROM P-2 TO CNTRL.
1	BLACK	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
2	WHITE	SH COMMON	SH COMMON	SH COMMON	SH COMMON	SH COMMON	SH COMMON
3	RED	SH6, SH7, SH8 - PHASE 6 R	SH10, SH11, SH12 - PHASE 8 R	SH14, SH15, SH16 - PHASE 2 R	SH17, SH18, SH19 - PHASE 4 R	SH 1 PHASE 4 DW	SH 2 PHASE 6 DW
4	GREEN	SH6, SH7, SH8 - PHASE 6 G	SH10, SH11, SH12 - PHASE 8 G	SH14, SH15, SH16 - PHASE 2 G	SH17, SH18, SH19 - PHASE 4 G	SH 1 PHASE 4 W	SH 1 PHASE 6 W
5	ORANGE	SH6, SH7, SH8 - PHASE 6 Y	SH10, SH11, SH12 - PHASE 8 Y	SH14, SH15, SH16 - PHASE 2 Y	SH17, SH18, SH19 - PHASE 4 Y	SPARE	SPARE
6	BLUE	SPARE	SH 3 PHASE 6 DW	SPARE	SH 4 PHASE 4 DW	SPARE	SPARE
7	WHITE/BLACK	SPARE	SH 3 PHASE 6 W	SPARE	SH 4 PHASE 4 W	SPARE	SPARE
8	RED/BLACK	SH5 - PHASE 1 R (LT ARW)	SH9 - PHASE 4 R	SH13 - PHASE 5 R (LT ARW)	SPARE		
9	GREEN/BLACK	SH5 - PHASE 1 G (LT ARW)	SH9 - PHASE 4 G	SH13 - PHASE 5 G (LT ARW)	SPARE		
10	ORANGE/BLACK	SH5 - PHASE 1 Y (LT ARW)	SH9 - PHASE 4 Y	SH13 - PHASE 5 Y (LT ARW)	SPARE		
11	BLUE/BLACK	SH5 - PHASE 1 FY (LT ARW)	SPARE	SH13 - PHASE 5 FY (LT ARW)	SPARE		
12	BLACK/WHITE	SPARE	SPARE	SPARE	SPARE		
13	RED/WHITE	SPARE	SPARE	SPARE	SPARE		
14	GREEN/WHITE	SPARE	SPARE	SPARE	SPARE		
15	BLUE/WHITE	SPARE	SPARE	SPARE	SPARE		
16	BLACK/RED	SPARE	SPARE	SPARE	SPARE		

*NOTE: HOME RUN 2 CNDR TO ALL POLES WITH APS BUTTONS

RPD PRESENCE AND RAD ADVANCED DETECTION
CLICK 656

SENSOR 1	PHASE 2, PHASE 5	RADD1
SENSOR 2	PHASE 2, PHASE 5	RPDD2
SENSOR 3	PHASE 4	RPDD3
SENSOR 4	PHASE 1, PHASE 6	RADD4
SENSOR 5	PHASE 1, PHASE 6	RPDD5
SENSOR 6	PHASE 3	RPDD6

CONTROLLER (BIU 9)

DETECTOR CHANNEL	1	2	3	4	5	6	7	8
PHASE ASSIGNMENT	PHASE 1	PHASE 2	PHASE 3	PHASE 4	PHASE 5	PHASE 6		
MATRIX OUTPUT CHANNEL	1	2	3	4	5	6		
DETECTOR CHANNEL	9	10	11	12	13	14	15	16
PHASE ASSIGNMENT								
MATRIX OUTPUT CHANNEL								

CONTROLLER (BIU 10)

DETECTOR CHANNEL	17	18	19	20	21	22	23	24
PHASE ASSIGNMENT		PHASE 2				PHASE 6		
MATRIX OUTPUT CHANNEL		18				22		
DETECTOR CHANNEL	25	26	27	28	29	30	31	32
PHASE ASSIGNMENT		PHASE 2				PHASE 6		
MATRIX OUTPUT CHANNEL		26				30		

STATE OF TEXAS
ELIZABETH SHELTON
107729
LICENSED
PROFESSIONAL ENGINEER
4/11/2024

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Texas Department of Transportation

SH 199

PROPOSED TRAFFIC SIGNAL TABLES

SH 199 AT SKYLINE DR

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	72
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

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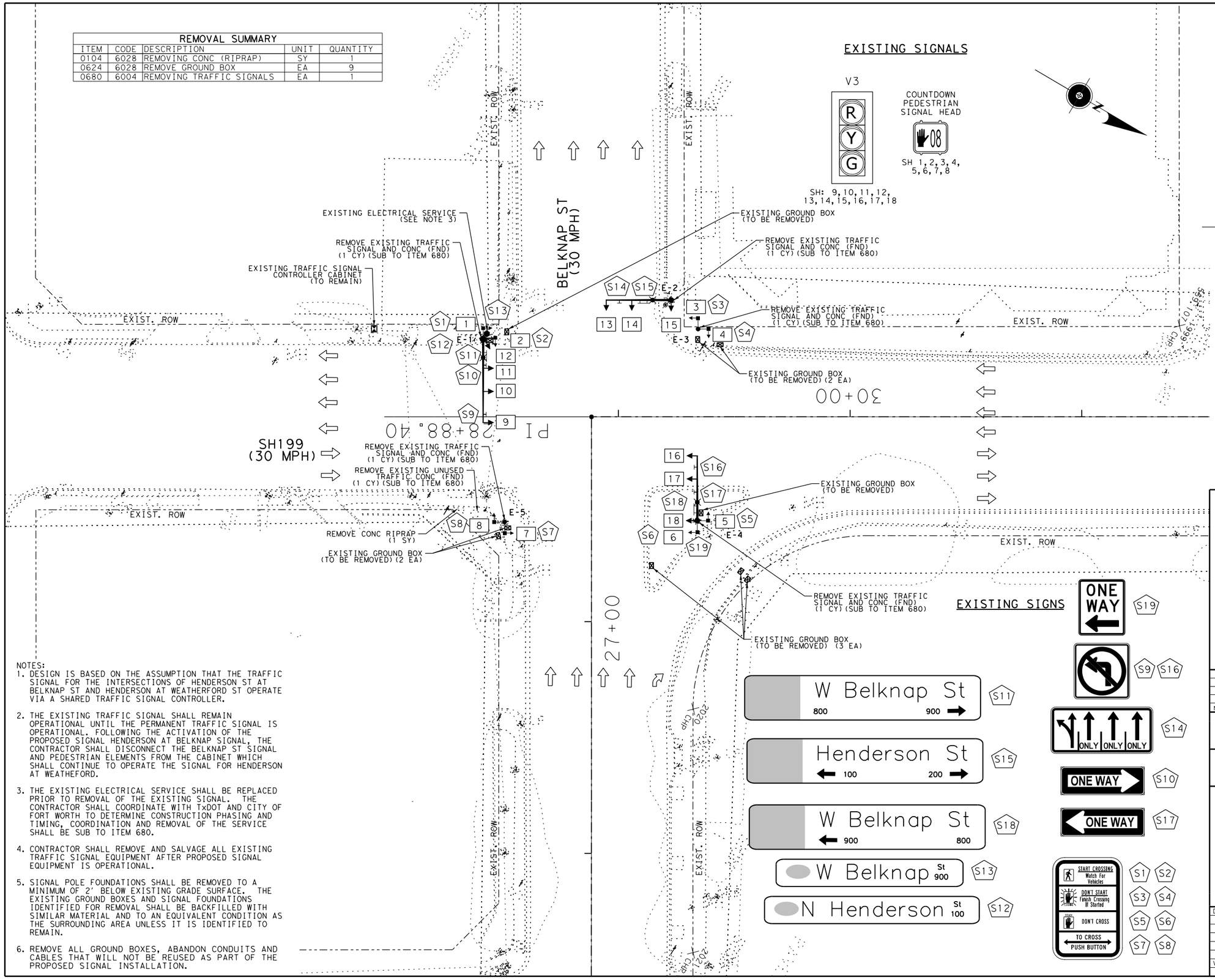
PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.pltcfg
PENTABLE:SH 199.tbl

SCALE:$SCALESHORT$
USER:jclohessy

FILE:SH199_SGNL_BELKNAP_01.dgn
DATE:4/11/2024 TIME:9:18:31 AM

REMOVAL SUMMARY

ITEM	CODE	DESCRIPTION	UNIT	QUANTITY
0104	6028	REMOVING CONC (RIPRAP)	SY	1
0624	6028	REMOVE GROUND BOX	EA	9
0680	6004	REMOVING TRAFFIC SIGNALS	EA	1



NOTES:

1. DESIGN IS BASED ON THE ASSUMPTION THAT THE TRAFFIC SIGNAL FOR THE INTERSECTIONS OF HENDERSON ST AT BELKNAP ST AND HENDERSON AT WEATHERFORD ST OPERATE VIA A SHARED TRAFFIC SIGNAL CONTROLLER.
2. THE EXISTING TRAFFIC SIGNAL SHALL REMAIN OPERATIONAL UNTIL THE PERMANENT TRAFFIC SIGNAL IS OPERATIONAL. FOLLOWING THE ACTIVATION OF THE PROPOSED SIGNAL HENDERSON AT BELKNAP SIGNAL, THE CONTRACTOR SHALL DISCONNECT THE BELKNAP ST SIGNAL AND PEDESTRIAN ELEMENTS FROM THE CABINET WHICH SHALL CONTINUE TO OPERATE THE SIGNAL FOR HENDERSON AT WEATHERFORD.
3. THE EXISTING ELECTRICAL SERVICE SHALL BE REPLACED PRIOR TO REMOVAL OF THE EXISTING SIGNAL. THE CONTRACTOR SHALL COORDINATE WITH TxDOT AND CITY OF FORT WORTH TO DETERMINE CONSTRUCTION PHASING AND TIMING, COORDINATION AND REMOVAL OF THE SERVICE SHALL BE SUB TO ITEM 680.
4. CONTRACTOR SHALL REMOVE AND SALVAGE ALL EXISTING TRAFFIC SIGNAL EQUIPMENT AFTER PROPOSED SIGNAL EQUIPMENT IS OPERATIONAL.
5. SIGNAL POLE FOUNDATIONS SHALL BE REMOVED TO A MINIMUM OF 2' BELOW EXISTING GRADE SURFACE. THE EXISTING GROUND BOXES AND SIGNAL FOUNDATIONS IDENTIFIED FOR REMOVAL SHALL BE BACKFILLED WITH SIMILAR MATERIAL AND TO AN EQUIVALENT CONDITION AS THE SURROUNDING AREA UNLESS IT IS IDENTIFIED TO REMAIN.
6. REMOVE ALL GROUND BOXES, ABANDON CONDUITS AND CABLES THAT WILL NOT BE REUSED AS PART OF THE PROPOSED SIGNAL INSTALLATION.

STATE OF TEXAS
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107729
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SH 199
EXISTING TRAFFIC SIGNAL LAYOUT
SH 199 AT BELKNAP STREET

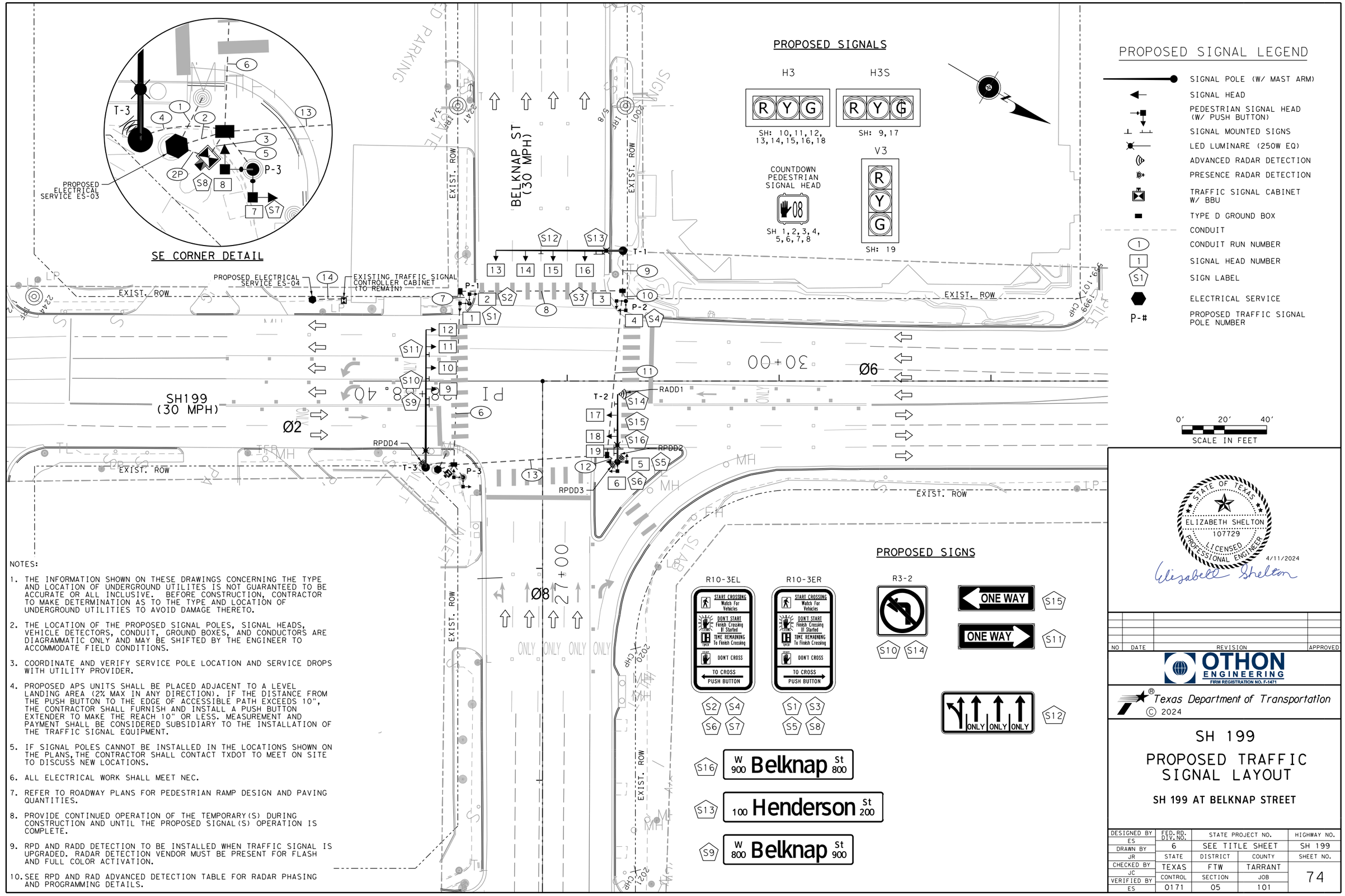
DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	73
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.pltcfg
PENTABLE: SH 199.tbl

SCALE: $SCALESHORT$
USER: jclohessy

FILE:SH199_SGNL_BELKNAP_02.dgn
DATE:4/11/2024 TIME:9:18:39 AM



NOTES:

1. THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING THE TYPE AND LOCATION OF UNDERGROUND UTILITES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. BEFORE CONSTRUCTION, CONTRACTOR TO MAKE DETERMINATION AS TO THE TYPE AND LOCATION OF UNDERGROUND UTILITIES TO AVOID DAMAGE THERETO.
2. THE LOCATION OF THE PROPOSED SIGNAL POLES, SIGNAL HEADS, VEHICLE DETECTORS, CONDUIT, GROUND BOXES, AND CONDUCTORS ARE DIAGRAMMATIC ONLY AND MAY BE SHIFTED BY THE ENGINEER TO ACCOMMODATE FIELD CONDITIONS.
3. COORDINATE AND VERIFY SERVICE POLE LOCATION AND SERVICE DROPS WITH UTILITY PROVIDER.
4. PROPOSED APS UNITS SHALL BE PLACED ADJACENT TO A LEVEL LANDING AREA (2% MAX IN ANY DIRECTION). IF THE DISTANCE FROM THE PUSH BUTTON TO THE EDGE OF ACCESSIBLE PATH EXCEEDS 10", THE CONTRACTOR SHALL FURNISH AND INSTALL A PUSH BUTTON EXTENDER TO MAKE THE REACH 10" OR LESS. MEASUREMENT AND PAYMENT SHALL BE CONSIDERED SUBSIDIARY TO THE INSTALLATION OF THE TRAFFIC SIGNAL EQUIPMENT.
5. IF SIGNAL POLES CANNOT BE INSTALLED IN THE LOCATIONS SHOWN ON THE PLANS, THE CONTRACTOR SHALL CONTACT TXDOT TO MEET ON SITE TO DISCUSS NEW LOCATIONS.
6. ALL ELECTRICAL WORK SHALL MEET NEC.
7. REFER TO ROADWAY PLANS FOR PEDESTRIAN RAMP DESIGN AND PAVING QUANTITIES.
8. PROVIDE CONTINUED OPERATION OF THE TEMPORARY(S) DURING CONSTRUCTION AND UNTIL THE PROPOSED SIGNAL(S) OPERATION IS COMPLETE.
9. RPD AND RADD DETECTION TO BE INSTALLED WHEN TRAFFIC SIGNAL IS UPGRADED. RADAR DETECTION VENDOR MUST BE PRESENT FOR FLASH AND FULL COLOR ACTIVATION.
10. SEE RPD AND RAD ADVANCED DETECTION TABLE FOR RADAR PHASING AND PROGRAMMING DETAILS.

PROPOSED SIGNS

R10-3EL

S2 S4 S6 S7

R10-3ER

S1 S3 S5 S8

R3-2

S10 S14

S15

S11

S12

S16

S13

S9

STATE OF TEXAS
ELIZABETH SHELTON
107729
LICENSED PROFESSIONAL ENGINEER
4/11/2024

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SH 199

PROPOSED TRAFFIC SIGNAL LAYOUT

SH 199 AT BELKNAP STREET

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	74
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.pltcfg
PENTABLE:SH 199.tbl

SCALE:$SCALESHORT$
USER:jclohessy

FILE:SH199_SGNL_BELKNAP_03.dgn
DATE:4/11/2024 TIME:9:18:45 AM

LEGEND OF CONDUIT

RUN NO	CONDUIT SIZE (IN)*	CONDUIT LENGTH (FT)	ELECTRICAL CONDUCTORS: 6 AWG XHHW	6 AWG BARE	4/C #12 TRAY LUM	TRAFFIC SIGNAL CABLES: TY A 7/C 14 AWG	TY A 16/C 14 AWG	TY C 2/C 12 AWG	RADAR DETECTION CABLE (RAD) **	RADAR DETECTION CABLE (RPD) ***	RUN NO
1	2-T	20	ELECTRIC UTILITY TO PROVIDE CONDUCTORS								1
2	2-T	10		1	3						2
3	4-T	10		1		8		8	1	3	3
3	4-T	10		1			3				3
3P	2-T	10	2	1							3P
4	4-T	20		1	1		1			1	4
5	4-T	10		1		2		2			5
6	4-B	85		1		2	1	2			6
7	4-T	10		1		2		2			7
8	4-B	80		1			1				8
9	4-T	20		1	1		1				9
10	4-T	10		1		2		2			10
11	4-B	80		1	1	2		2			11
12	4-T	10		1	1	2	1	2	1	2	12
13	4-B	75		1	2	4	1	4	1	2	13
14	2-T	20	2	1							14

*NOTE: T=TRENCH AND B=BORE.

** NOTE: RADAR DETECTION CABLE TO BE SUPPLIED BY TXDOT AND INSTALLED BY THE CONTRACTOR. PAYMENTS SHALL BE SUBSIDIARY TO ITEM 6045.

*** NOTE: RADAR DETECTION CABLE TO BE SUPPLIED BY TXDOT AND INSTALLED BY THE CONTRACTOR. PAYMENTS SHALL BE SUBSIDIARY TO ITEM 6046.

CABLE IN POLE AND ARM							
SIGNAL POLE NUMBER	4/C #12 TRAY LUM	TY A 5/C 14 AWG	TY A 7/C 14 AWG	TY C 2/C 12 AWG	RADAR DETECTION CABLE (RAD) *	RADAR DETECTION CABLE (RPD) **
T-1	40		240			
T-2	40	20	290	10	35	40
T-3	40		95			20
P-1		20		10		
P-2		20		10		
P-3		20		10		
TOTAL =	120	80	625	40	35	60

SIGNAL POLE CHART

POLE NUMBER	T-1	T-2	T-3	P-1	P-2	P-3
MAST ARM LENGTH	60'	32'	65'	N/A	N/A	N/A
FOUNDATION TYPE	48-A	30-A	48-A	24-A	24-A	24-A
WITH LUMINAIRE	YES	YES	YES	NO	NO	NO
WITH SIGNS	R3-8MSSS, STREET NAME	R10-13ER, R10-13EL, R3-2, R6-1L, STREET NAME	R3-2, R6-1R, STREET NAME	R10-13ER, R10-13EL	R10-13ER, R10-13EL	R10-13ER, R10-13EL
SIZE OF LENS	12"	12" X X	12"	X X	X X	X X
SIGNAL TYPE	H3 H3 H3 H3	H3S H3 V3 PED PED	H3S H3 H3 H3	PED PED	PED PED	PED PED
SIGNAL FACE NO.	13 14 15 16	17 18 19 5 6	9 10 11 12	1 2	3 4	7 8
LED SIGNAL INDICATIONS	R R R R	R R R	R R R R			
	Y Y Y Y	Y Y	Y Y Y Y			
	G G G G	<-G G G	<-G G G G			

<- DENOTES SIGNAL HEADS WITH ARROWS.
ALL SIGNAL HEADS SHALL HAVE VENTED BLACK ALUMINUM BACK PLATES AS STATED IN THE GENERAL NOTES.

SIGNS SUMMARY

SIGN *	SIGN TYPE	SIGN LEGEND	STATUS	SUPPORT	SIGN DIMENSION
S1	R10-3ER	PED PUSH BUTTON	I	P-1	9" x 15"
S2	R10-3EL	PED PUSH BUTTON	I	P-1	9" x 15"
S3	R10-3ER	PED PUSH BUTTON	I	P-2	9" x 15"
S4	R10-3EL	PED PUSH BUTTON	I	P-2	9" x 15"
S5	R10-3ER	PED PUSH BUTTON	I	T-2	9" x 15"
S6	R10-3EL	PED PUSH BUTTON	I	T-2	9" x 15"
S7	R10-3EL	PED PUSH BUTTON	I	P-3	9" x 15"
S8	R10-3ER	PED PUSH BUTTON	I	P-3	9" x 15"
S9	STREET NAMES	BELKNAP	I	T-3	18" x 78"
S10	R3-2	NO LEFT TURN	I	T-3	36" x 36"
S11	R6-1R	ONE WAY	I	T-3	54" x 18"
S12	R3-8MSSS	LANE ASSIGNMENT	I	T-1	66" x 30"
S13	STREET NAMES	HENDERSON	I	T-1	18" x 96"
S14	R3-2	NO LEFT TURN	I	T-2	36" x 36"
S15	R6-1L	ONE WAY	I	T-2	54" x 18"
S16	STREET NAMES	BELKNAP	I	T-2	18" x 78"

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

ELECTRICAL SERVICE DATA

ELEC. SERVICE ID	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5)-14)	SERVICE CONDUIT SIZE**	SERVICE CONDUCTORS NO. / SIZE	SAFETY SWITCH AMPS	MAIN DISCONNECT CKT. BRK. POLE / AMP	TWO-POLE CONTACTOR AMPS	PANELBD. / LOADCENTER AMP RATING (MIN)	CIRCUIT NO.	BRANCH CKT. BRK. POLE / AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
3	TY D (120/240) 070 (NS) SS (E) PS (U)	2"	3 / #6	N/A	2P / 70	30	100	T.S. LIGHTING	1P / 50 2P / 20	24 4	<7.1
4	ELC SRV TY D 120/240 070(NS)SS(E)SP(O)	2"	3 / #6	N/A	2P / 70	30	100	T.S. LIGHTING	1P / 50 2P / 20	24 4	<7.1

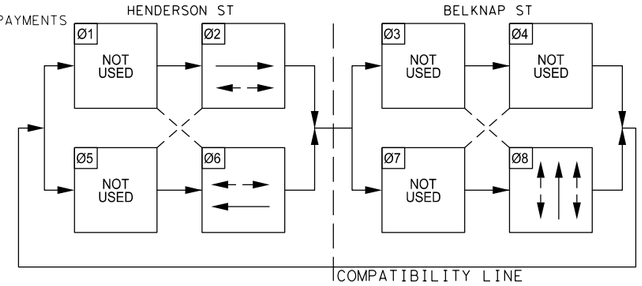
** - VERIFY SERVICE CONDUIT SIZE & TYPE WITH UTILITY. SIZE MAY CHANGE DUE TO THE UTILITY METER REQUIREMENTS. ENSURE CONDUIT SIZE MEETS THE NATIONAL ELECTRICAL CODE.

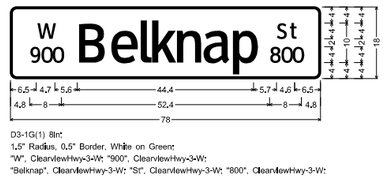
GROUND BOX SUMMARY

ITEM	CODE	DESCRIPTION	UNIT	QTY.
624	6010	GROUND BOX TY D (162922)W/APRON	EA	4

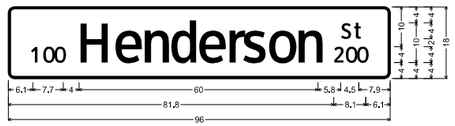
PHASE SEQUENCE

COMPATIBLE PHASES
PEDESTRIAN MOVEMENT

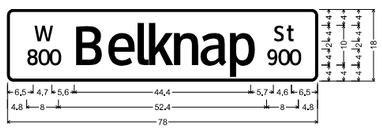




D3-1G(1) 8in:
1.5" Radius, 0.5" Border, White on Green:
"W", ClearviewHwy-3-W: "900", ClearviewHwy-3-W:
"Belknap", ClearviewHwy-3-W: "St", ClearviewHwy-3-W: "800", ClearviewHwy-3-W:



D3-1G(1) 8in:
1.5" Radius, 0.5" Border, White on Green:
"100", ClearviewHwy-3-W: "Henderson", ClearviewHwy-3-W: "St", ClearviewHwy-3-W: "200", ClearviewHwy-3-W:



D3-1G(1) 8in:
1.5" Radius, 0.5" Border, White on Green:
"W", ClearviewHwy-3-W: "800", ClearviewHwy-3-W:
"Belknap", ClearviewHwy-3-W: "St", ClearviewHwy-3-W: "900", ClearviewHwy-3-W:

APS MESSAGE CHART

POLE LOCATION	PEDESTRIAN MOVEMENT	FUNCTIONS	SPEECH MESSAGE/SOUND DETAILS
P-3	Phase 2	BUTTON PUSH ON DW	WAIT TO CROSS BELKNAP ST AT HENDERSON ST
		EXTENDED BUTTON PUSH	WAIT TO CROSS BELKNAP ST AT HENDERSON ST
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BELKNAP ST, WALK SIGN IS ON TO CROSS BELKNAP ST
T-2	Phase 2	BUTTON PUSH ON DW	WAIT TO CROSS BELKNAP ST AT HENDERSON ST
		EXTENDED BUTTON PUSH	WAIT TO CROSS BELKNAP ST AT HENDERSON ST
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BELKNAP ST, WALK SIGN IS ON TO CROSS BELKNAP ST
P-1	Phase 8	BUTTON PUSH ON DW	WAIT TO CROSS HENDERSON ST AT BELKNAP ST
		EXTENDED BUTTON PUSH	WAIT TO CROSS HENDERSON ST AT BELKNAP ST
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	HENDERSON ST, WALK SIGN IS ON TO CROSS HENDERSON ST
P-3	Phase 8	BUTTON PUSH ON DW	WAIT TO CROSS HENDERSON ST AT BELKNAP ST
		EXTENDED BUTTON PUSH	WAIT TO CROSS HENDERSON ST AT BELKNAP ST
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	HENDERSON ST, WALK SIGN IS ON TO CROSS HENDERSON ST
P-2	Phase 6	BUTTON PUSH ON DW	WAIT TO CROSS BELKNAP ST AT HENDERSON ST
		EXTENDED BUTTON PUSH	WAIT TO CROSS BELKNAP ST AT HENDERSON ST
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BELKNAP ST, WALK SIGN IS ON TO CROSS BELKNAP ST
P-1	Phase 6	BUTTON PUSH ON DW	WAIT TO CROSS BELKNAP ST AT HENDERSON ST
		EXTENDED BUTTON PUSH	WAIT TO CROSS BELKNAP ST AT HENDERSON ST
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	BELKNAP ST, WALK SIGN IS ON TO CROSS BELKNAP ST
T-2	Phase 8	BUTTON PUSH ON DW	WAIT TO CROSS HENDERSON ST AT BELKNAP ST
		EXTENDED BUTTON PUSH	WAIT TO CROSS HENDERSON ST AT BELKNAP ST
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	HENDERSON ST, WALK SIGN IS ON TO CROSS HENDERSON ST
P-2	Phase 8	BUTTON PUSH ON DW	WAIT TO CROSS HENDERSON ST AT BELKNAP ST
		EXTENDED BUTTON PUSH	WAIT TO CROSS HENDERSON ST AT BELKNAP ST
		LOCATOR TONE	SLOW TICK
		WALK INDICATION	HENDERSON ST, WALK SIGN IS ON TO CROSS HENDERSON ST

MINIMUM PEDESTRIAN TIMING

PED PHASE	SIGNAL HEAD NUMBERS	WALK TIME (SECONDS)	FLASHING DONT WALK TIME (SECONDS)	TOTAL PED TIMING (SECONDS)
2	6, 7	15	4	19
6	2, 4	18	4	22
8	1, 3, 5, 8	19	4	23

PEDESTRIAN TIMINGS ARE BASED ON EXISTING GEOMETRICS AS SHOWN ON THIS LAYOUT

STATE OF TEXAS
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LICENSED
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FIRM REGISTRATION NO. F-1471

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SH 199

PROPOSED TRAFFIC SIGNAL TABLES

SH 199 AT BELKNAP STREET

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	75
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

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PENTABLE:SH 199.tbl

SCALE:$SCALESHORT$
USER:jclohessy

FILE:SH199_SGNL_BELKNAP_04.dgn
DATE:4/11/2024 TIME:9:18:51 AM

CABLE TERMINATION CHART

CNDR. NO.	CONDUCTOR COLOR	CABLE 1 16 CNDR.	CABLE 2 16 CNDR.	CABLE 3 16 CNDR.	CABLE 4 7 CNDR.	CABLE 5 7 CNDR.	CABLE 6 7 CNDR.
		FROM T-1 TO CNTRL.	FROM T-2 TO CNTRL.	FROM T-3 TO CNTRL.	FROM P-1 TO CNTRL.	FROM P-2 TO CNTRL.	FROM P-3 TO CNTRL.
1	BLACK	SPARE	SPARE	SPARE	SPARE	SPARE	SPARE
2	WHITE	SH COMMON	SH COMMON	SH COMMON	SH COMMON	SH COMMON	SH COMMON
3	RED	SH13, SH14, SH15, SH16 - PHASE 8 R	SH17, SH18, SH19 - PHASE 2 R	SH9, SH10, SH11, SH12 - PHASE 6 R	SH 1 PHASE 8 DW	SH 3 PHASE 8 DW	SH 7 PHASE 2 DW
4	GREEN	SH13, SH14, SH15, SH16 - PHASE 8 G	SH17, SH18, SH19 - PHASE 2 G	SH9, SH10, SH11, SH12 - PHASE 6 G	SH 1 PHASE 8 W	SH 3 PHASE 8 W	SH 7 PHASE 2 W
5	ORANGE	SH13, SH14, SH15, SH16 - PHASE 8 Y	SH17, SH18, SH19 - PHASE 2 Y	SH9, SH10, SH11, SH12 - PHASE 6 Y	SPARE	SPARE	SPARE
6	BLUE	SPARE	SH 5 PHASE 8 DW	SPARE	SH 2 PHASE 6 DW	SH 4 PHASE 6 DW	SH 8 PHASE 8 DW
7	WHITE/BLACK	SPARE	SH 5 PHASE 8 W	SPARE	SH 2 PHASE 6 W	SH 4 PHASE 6 W	SH 8 PHASE 8 W
8	RED/BLACK	SPARE	SPARE	SPARE			
9	GREEN/BLACK	SPARE	SH 6 PHASE 2 DW	SPARE			
10	ORANGE/BLACK	SPARE	SH 6 PHASE 2 W	SPARE			
11	BLUE/BLACK	SPARE	SPARE	SPARE			
12	BLACK/WHITE	SPARE	SPARE	SPARE			
13	RED/WHITE	SPARE	SPARE	SPARE			
14	GREEN/WHITE	SPARE	SPARE	SPARE			
15	BLUE/WHITE	SPARE	SPARE	SPARE			
16	BLACK/RED	SPARE	SPARE	SPARE			

*NOTE: HOME RUN 2 CNDR TO ALL POLES WITH APS BUTTONS

RPD PRESENCE AND RAD ADVANCED DETECTION

	CLICK 656	
SENSOR 1	PHASE 6	RADD1
SENSOR 2	PHASE 6	RPDD2
SENSOR 3	PHASE 8	RPDD3
SENSOR 4	PHASE 2	RPDD4

CONTROLLER (BIU 9)

DETECTOR CHANNEL	1	2	3	4	5	6	7	8
PHASE ASSIGNMENT		PHASE 2				PHASE 6		PHASE 8
MATRIX OUTPUT CHANNEL		2				6		8
DETECTOR CHANNEL	9	10	11	12	13	14	15	16
PHASE ASSIGNMENT								
MATRIX OUTPUT CHANNEL								

CONTROLLER (BIU 10)

DETECTOR CHANNEL	17	18	19	20	21	22	23	24
PHASE ASSIGNMENT		PHASE 2				PHASE 6		PHASE 8
MATRIX OUTPUT CHANNEL		18				22		24
DETECTOR CHANNEL	25	26	27	28	29	30	31	32
PHASE ASSIGNMENT		PHASE 2				PHASE 6		PHASE 8
MATRIX OUTPUT CHANNEL		26				30		32

STATE OF TEXAS
ELIZABETH SHELTON
107729
LICENSED
PROFESSIONAL ENGINEER
4/11/2024

NO	DATE	REVISION	APPROVED

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

SH 199

PROPOSED TRAFFIC SIGNAL TABLES

SH 199 AT BELKNAP STREET

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	76
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

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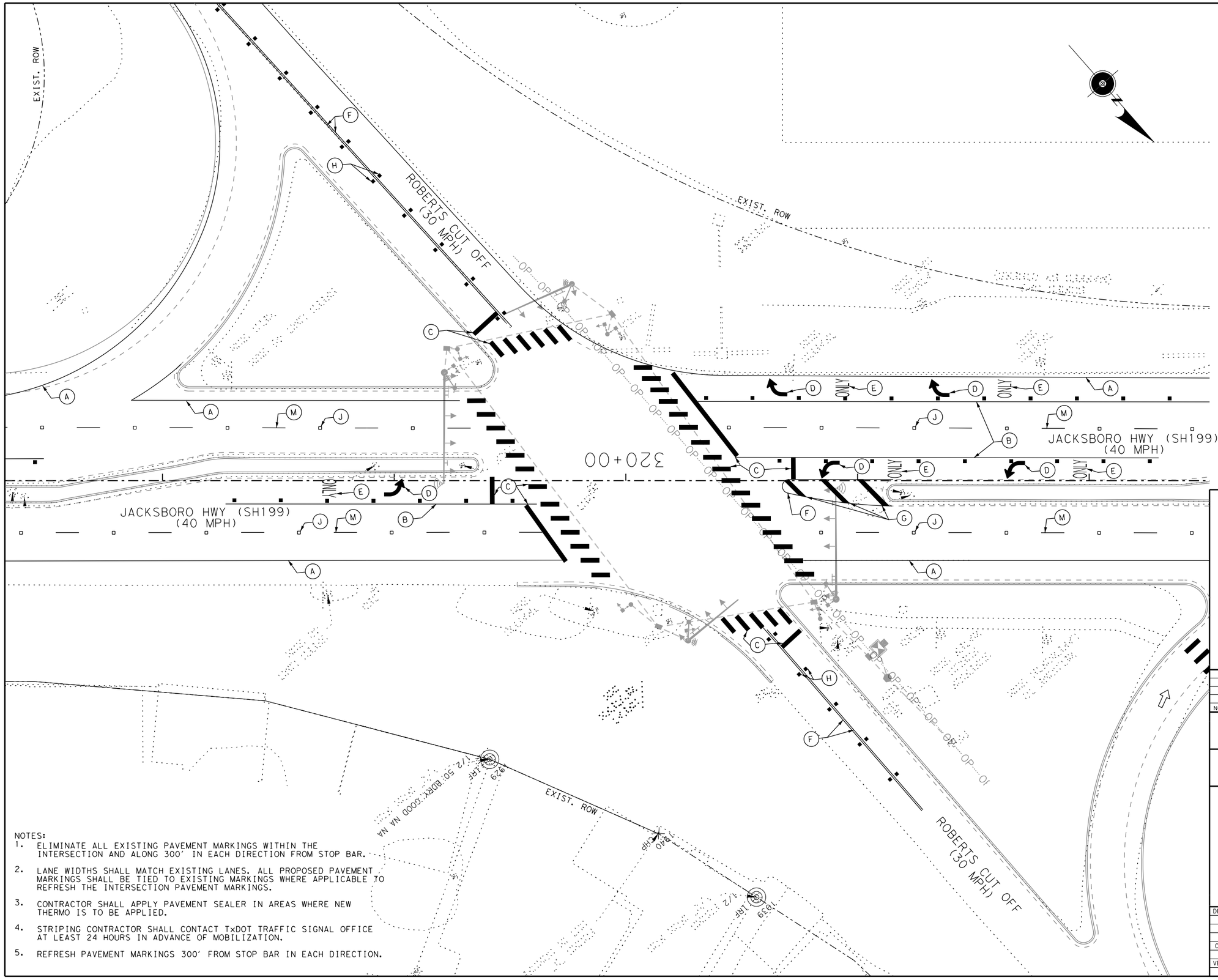

PAVEMENT MARKING LEGEND

- (A) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(8")(SLD)(100 MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100 MIL)
- (D) REFL PAV MRK TY I (W)(ARROW)(100 MIL)
- (E) REFL PAV MRK TY I (W)(WORD)(100 MIL)
- (F) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (G) REFL PAV MRK TY I (Y)(24")(SLD)(100 MIL)
- (H) REFL PAV MRK TY II-A-A
- (J) REFL PAV MRK TY II-C-R
- (M) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)

0' 20' 40'
SCALE IN FEET

NOTES:
1. ELIMINATE ALL EXISTING PAVEMENT MARKINGS WITHIN THE INTERSECTION AND ALONG 300' IN EACH DIRECTION FROM STOP BAR.
2. LANE WIDTHS SHALL MATCH EXISTING LANES. ALL PROPOSED PAVEMENT MARKINGS SHALL BE TIED TO EXISTING MARKINGS WHERE APPLICABLE TO REFRESH THE INTERSECTION PAVEMENT MARKINGS.
3. CONTRACTOR SHALL APPLY PAVEMENT SEALER IN AREAS WHERE NEW THERMO IS TO BE APPLIED.
4. STRIPING CONTRACTOR SHALL CONTACT TxDOT TRAFFIC SIGNAL OFFICE AT LEAST 24 HOURS IN ADVANCE OF MOBILIZATION.
5. REFRESH PAVEMENT MARKINGS 300' FROM STOP BAR IN EACH DIRECTION.

STATE OF TEXAS
ELIZABETH SHELTON
107729
LICENSED PROFESSIONAL ENGINEER
4/11/2024

NO	DATE	REVISION	APPROVED

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FIRM REGISTRATION NO. F-1471

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SH 199

PROPOSED TRAFFIC SIGNAL LAYOUT

SH 199 AT ROBERTS CUT OFF

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	77
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.plt
PENTABLE: SH 199.tbl

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USER: jclonessy

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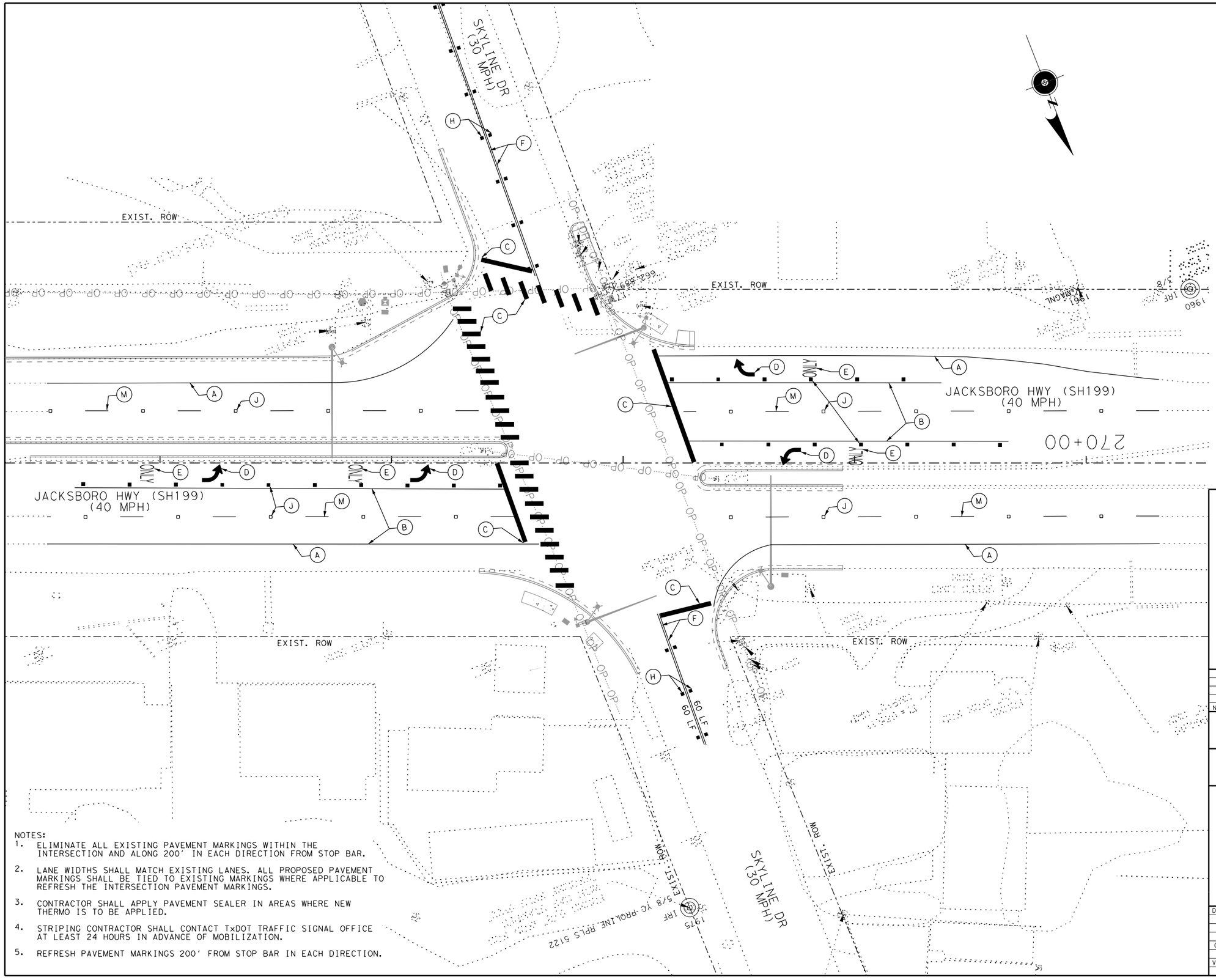

PAVEMENT MARKING LEGEND

- (A) RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
- (B) REFL PAV MRK TY I (W)(8")(SLD)(100 MIL)
- (C) REFL PAV MRK TY I (W)(24")(SLD)(100 MIL)
- (D) REFL PAV MRK TY I (W)(ARROW)(100 MIL)
- (E) REFL PAV MRK TY I (W)(WORD)(100 MIL)
- (F) RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
- (G) REFL PAV MRK TY I (Y)(24")(SLD)(100 MIL)
- (H) REFL PAV MRK TY II-A-A
- (J) REFL PAV MRK TY II-C-R
- (M) RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)

0' 20' 40'
SCALE IN FEET

NOTES:
1. ELIMINATE ALL EXISTING PAVEMENT MARKINGS WITHIN THE INTERSECTION AND ALONG 200' IN EACH DIRECTION FROM STOP BAR.
2. LANE WIDTHS SHALL MATCH EXISTING LANES. ALL PROPOSED PAVEMENT MARKINGS SHALL BE TIED TO EXISTING MARKINGS WHERE APPLICABLE TO REFRESH THE INTERSECTION PAVEMENT MARKINGS.
3. CONTRACTOR SHALL APPLY PAVEMENT SEALER IN AREAS WHERE NEW THERMO IS TO BE APPLIED.
4. STRIPING CONTRACTOR SHALL CONTACT TxDOT TRAFFIC SIGNAL OFFICE AT LEAST 24 HOURS IN ADVANCE OF MOBILIZATION.
5. REFRESH PAVEMENT MARKINGS 200' FROM STOP BAR IN EACH DIRECTION.

STATE OF TEXAS
ELIZABETH SHELTON
107729
LICENSED PROFESSIONAL ENGINEER
4/11/2024

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OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

Texas Department of Transportation

SH 199
PAVEMENT MARKING LAYOUT
SH 199 AT SKYLINE DR

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
JR	TEXAS	FTW	TARRANT	78
CHECKED BY	CONTROL	SECTION	JOB	
JC	0171	05	101	
VERIFIED BY				
ES				

100% SUBMITTAL

PLOT DRIVER:V8i_BAKER_WIN_BW_PDF.pltcfg
PENTABLE: SH 199.tbl

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USER: jclohessy

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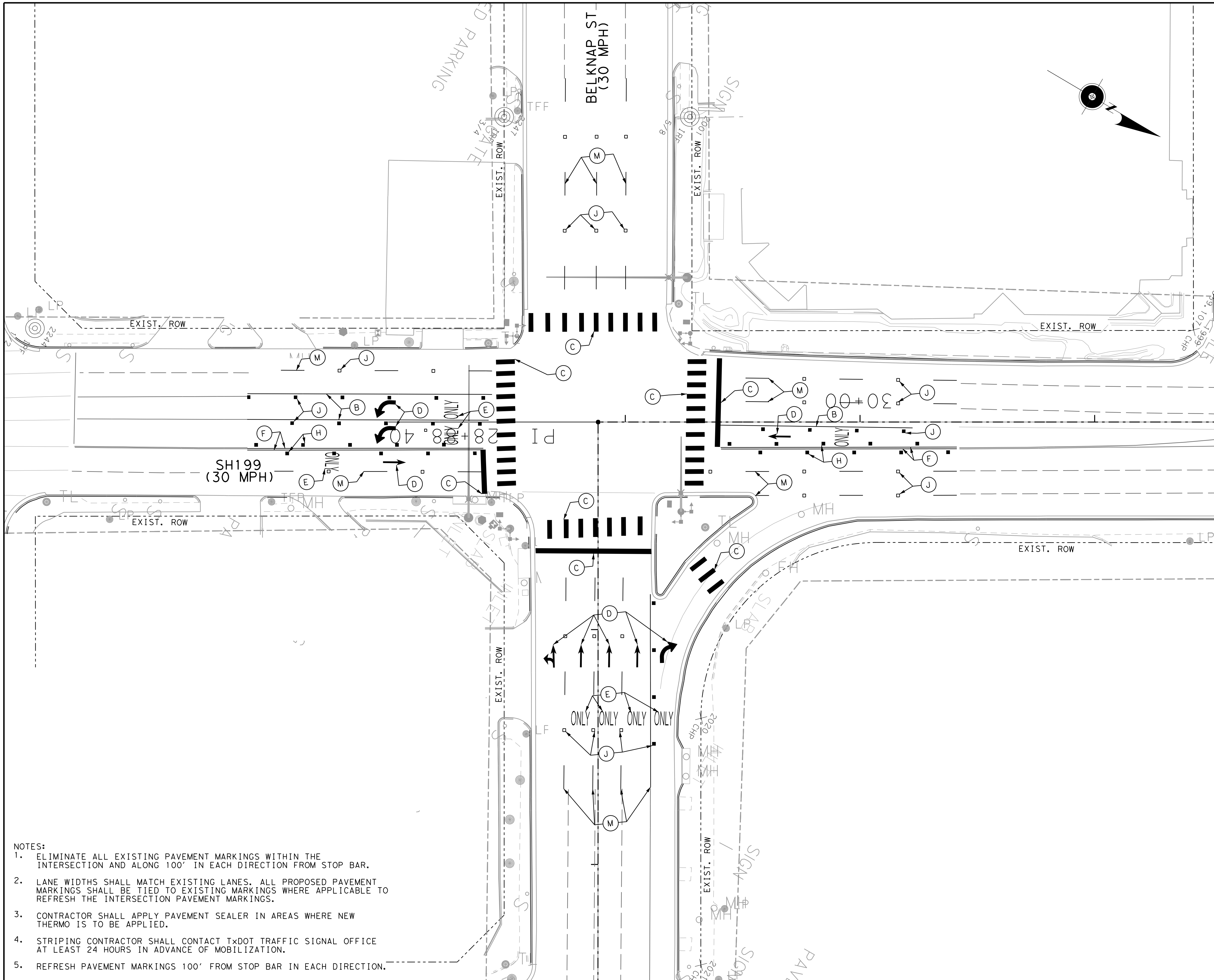


PAVEMENT MARKING LEGEND

A	RE PM W/RET REQ TY I (W)(6")(SLD)(100MIL)
B	REFL PAV MRK TY I (W)(8")(SLD)(100 MIL)
C	REFL PAV MRK TY I (W)(24")(SLD)(100 MIL)
D	REFL PAV MRK TY I (W)(ARROW)(100 MIL)
E	REFL PAV MRK TY I (W)(WORD)(100 MIL)
F	RE PM W/RET REQ TY I (Y)6"(SLD)(100MIL)
G	REFL PAV MRK TY I (Y)(24")(SLD)(100 MIL)
H	REFL PAV MRK TY II-A-A
J	REFL PAV MRK TY II-C-R
M	RE PM W/RET REQ TY I (W)(6")(BRK)(100MIL)

0′ 20′ 40′
SCALE IN FEET

NOTES:

1. ELIMINATE ALL EXISTING PAVEMENT MARKINGS WITHIN THE INTERSECTION AND ALONG 100′ IN EACH DIRECTION FROM STOP BAR.
2. LANE WIDTHS SHALL MATCH EXISTING LANES. ALL PROPOSED PAVEMENT MARKINGS SHALL BE TIED TO EXISTING MARKINGS WHERE APPLICABLE TO REFRESH THE INTERSECTION PAVEMENT MARKINGS.
3. CONTRACTOR SHALL APPLY PAVEMENT SEALER IN AREAS WHERE NEW THERMO IS TO BE APPLIED.
4. STRIPING CONTRACTOR SHALL CONTACT TxDOT TRAFFIC SIGNAL OFFICE AT LEAST 24 HOURS IN ADVANCE OF MOBILIZATION.
5. REFRESH PAVEMENT MARKINGS 100′ FROM STOP BAR IN EACH DIRECTION.

STATE OF TEXAS
ELIZABETH SHELTON
107729
LICENSED
PROFESSIONAL ENGINEER
4/11/2024
Elizabeth Shelton

NO	DATE	REVISION	APPROVED

OTHON ENGINEERING
FIRM REGISTRATION NO. F-1471

SH 199
PAVEMENT MARKING LAYOUT
SH 199 AT BELKNAP STREET

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
ES	6	SEE TITLE SHEET		SH 199
DRAWN BY JR	STATE	DISTRICT	COUNTY	SHEET NO.
CHECKED BY JC	TEXAS	FTW	TARRANT	79
VERIFIED BY ES	CONTROL 0171	SECTION 05	JOB 101	

DATE:
FILE:

GENERAL NOTES FOR ALL ELECTRICAL WORK

1. The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.

2. Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.

3. Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is ½ in. or less in diameter.

4. Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.

5. Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.

6. When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

1. Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.

2. Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.

3. Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

AWG	3 CONDUCTORS	5 CONDUCTORS	7 CONDUCTORS
#1	10" x 10" x 4"	12" x 12" x 4"	16" x 16" x 4"
#2	8" x 8" x 4"	10" x 10" x 4"	12" x 12" x 4"
#4	8" x 8" x 4"	10" x 10" x 4"	10" x 10" x 4"
#6	8" x 8" x 4"	8" x 8" x 4"	10" x 10" x 4"
#8	8" x 8" x 4"	8" x 8" x 4"	8" x 8" x 4"

4. Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.

5. Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.

6. Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.

7. Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

8. Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.

9. When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.

10. Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

1. Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.

2. Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.

3. Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.

4. Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.

5. When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."

6. Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.

7. During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.

8. Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.

9. Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.

10. Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.

11. At all electrical services, install a 6 AWG solid copper grounding electrode conductor.

12. Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).

13. Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.

14. File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

FILE:	ed1-14.dgn	DN:	CK:	DW:	CK:
© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
	REVISIONS	171	5	101	SH 199
		DIST	COUNTY		SHEET NO.
		FTW	TARRANT		80

71A

DATE:
FILE:

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

1. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the conduit system. After installing conductors in conduit, perform conductor pull test. If a conductor cannot be freely pulled, make any needed alterations or repairs at no additional cost to the department. Perform insulation resistance tests in accordance with Item 620. Coordinate with the Engineer to witness the tests.
2. Leave 2 ft. minimum, 3 ft. maximum length for each conductor up to the splice in ground boxes. Leave 3 ft. minimum, 4 ft. maximum length of conductor in ground boxes when pulled through with no splice. Leave 1 ft. minimum, 1.5 ft. maximum length of conductor at enclosures, weatherheads and pole bases.
3. Make splices only in junction boxes, ground boxes, pole bases, or electrical enclosures and use only listed compression or screw type pressure connectors, terminal blocks, or split bolt connectors. Insulate splices with heavy wall heat shrink tubing or gel-filled insulating splice covers to provide a watertight splice. Overlap conductor insulation with heat shrink tubing a minimum of 2 in. past both sides of the splice. Where heat shrink tubing may not shrink sufficiently to provide a watertight seal around the individual conductors, prior to heating the tubing, increase the diameter of the conductor insulation using hot melt adhesive tape to provide a watertight seal between the individual conductors and the heat shrink tubing. Ensure the tape extends past the heat shrink tubing. Use hot melt adhesive tape to fill the gap and seal the ends of heat shrink tubing. Heat shrink tubing that appears to have been burned, or overheated, is considered defective and must be replaced.
4. Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
5. Wire nuts with factory applied waterproof sealant may be used for 8 AWG or smaller conductors in above ground junction boxes, but not in pole bases or ground boxes. Install wire nuts in an upright position to prevent the accumulation of water.
6. Support conductors in illumination poles with a J-hook at the top of the pole.
7. When terminating conductors, remove the insulation and jacketing material without nicking the individual strands of the conductor. Conductors with nicked individual conductor strands or removed strands will be considered damaged.
8. Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
9. Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
10. Do not terminate more than one conductor under a single connector, unless the connector is rated for multiple conductors. Do not exceed the pressure connector's listing for maximum number and size of conductors allowed.
11. Install breakaway connectors on conductors bid under Item 620 whenever those conductors pass through a breakaway support device. Follow manufacturer's instructions when terminating conductors to breakaway connectors. Properly torque threaded connections. Proper terminations are critical to the safe operation of breakaway devices. Trim waterproofing boots on breakaway connectors to fit snugly around the conductor to ensure waterproof connection. Only one conductor may enter a single opening in a boot. Provide waterproof boots with the correct number of openings. Leave unused openings factory sealed. Use prequalified breakaway connectors as shown on the MPL.
12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

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

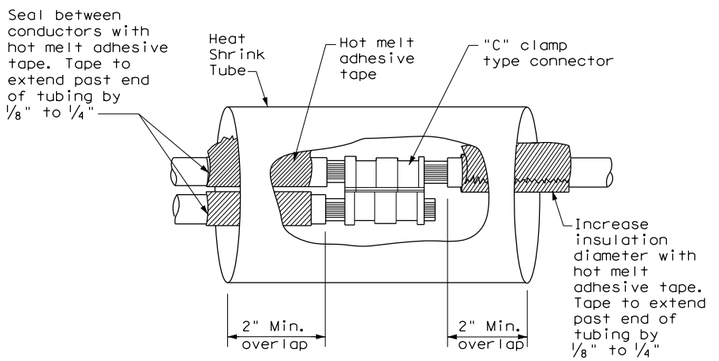
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

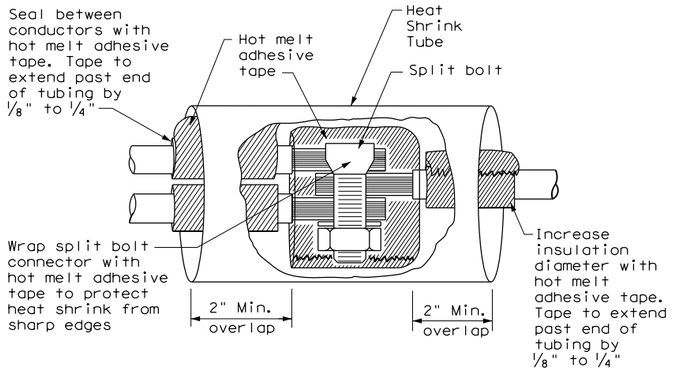
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in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

B. CONSTRUCTION METHODS

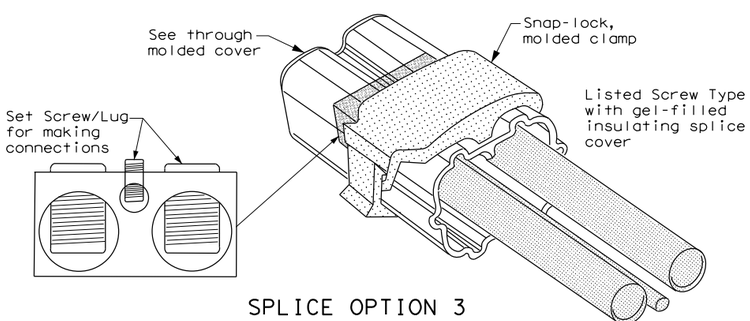
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil,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



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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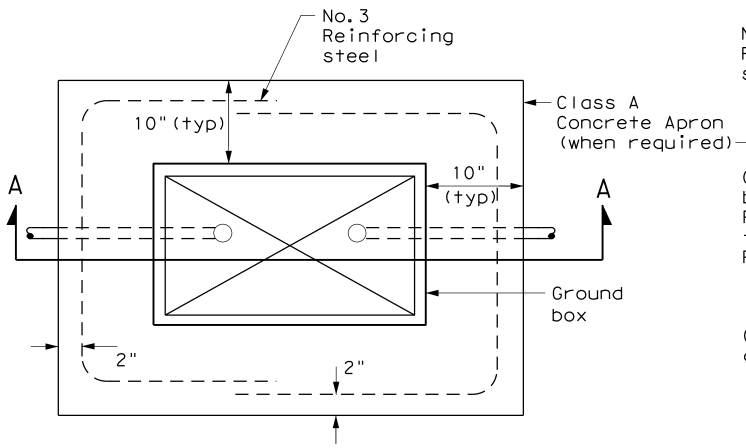
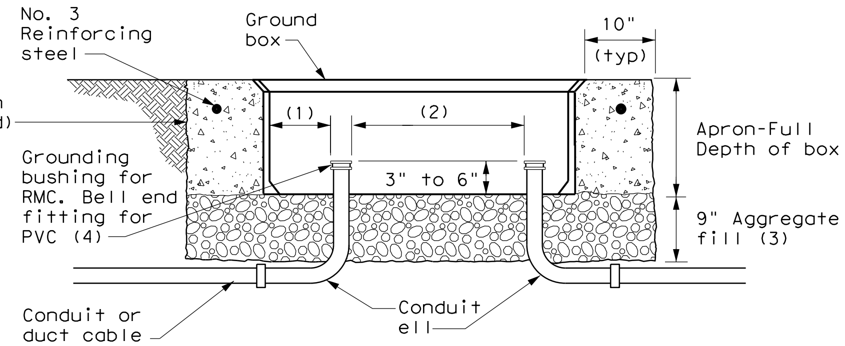


PLAN VIEW



SECTION A - A

APRON FOR GROUND BOX

(1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.

(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

(3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.

(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND BOXES

A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."

2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.

3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.

4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

B. CONSTRUCTION METHODS

1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the ground box. Install ground box on top of aggregate.

2. Cast ground box aprons in place. Reinforcing steel may be field bent. Ensure the depth of concrete for the apron extends from finished grade to the top of the aggregate bed under the box. Ground box aprons, including concrete and reinforcing steel, are subsidiary to ground boxes when called for by descriptive code.

3. Keep bolt holes in the box clear of dirt. Bolt covers down when not working in ground boxes.

4. Install all conduits and ells in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.

5. Temporarily seal all conduits in the ground box until conductors are installed.

6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.

7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.

8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.

9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.

10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.

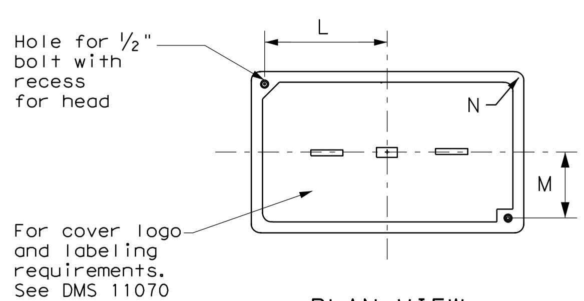
11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

GROUND BOX DIMENSIONS

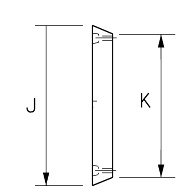
TYPE	OUTSIDE DIMENSIONS (INCHES) (Width x Length X Depth)
A	12 X 23 X 11
B	12 X 23 X 22
C	16 X 29 X 11
D	16 X 29 X 22
E	12 X 23 X 17

GROUND BOX COVER DIMENSIONS

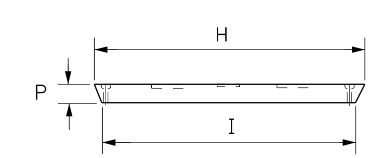
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



END



SIDE

GROUND BOX COVER

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS GROUND BOXES

ED(4)-14

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ELECTRICAL SERVICES NOTES

1. Provide new materials. Ensure installation and materials comply with the applicable provisions of the National Electrical Code (NEC) and National Electrical Manufacturers Association (NEMA) standards. Ensure material is Underwriters Laboratories (UL) listed. Provide and install electrical service conduits, conductors, disconnects, contactors, circuit breaker panels, and branch circuit breakers as shown on the Electrical Service Data chart in the plans. Faulty fabrication or poor workmanship in material, equipment, or installation is justification for rejection. Where manufacturers provide warranties and guarantees as a customary trade practice, furnish these to the State.

2. Provide electrical services in accordance with Electrical Details standard sheets, Departmental Material Specification (DMS) 11080 "Electrical Services,"DMS 11081 "Electrical Services-Type A," DMS 11082 "Electrical Services-Type C," DMS 11083 "Electrical Services-Type D," DMS 11084 "Electrical Services-Type T," DMS 11085 "Electrical Services-Pedestal (PS)", and Item 628 "Electrical Services" of the Standard Specifications. Provide electrical service types A, C, and D, as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 628. Provide other service types as detailed on the plans.

3. Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.

4. Coordinate with the Engineer and the utility provider for metering and compliance with utility requirements. Primary line extensions, connection charges, meter charges, and other charges by the utility company to provide power to the location are paid for in accordance with Item 628. Get approval for the costs associated with these charges prior to engaging the utility company to do the work. Consult with the utility provider to determine costs and requirements, and coordinate the work as approved.

5. The enclosure manufacturer will provide Master Lock Type 2 with brass tumblers keyed #2195 for all custom electrical enclosures. Installing Contractor is to provide Master Lock #2195 Type 2 with brass tumblers for "off the shelf" enclosures. Master Lock #2195 keys and locks become property of the State. Unless otherwise approved, do not energize electrical service equipment until locks are installed.

6. Enclosures with external disconnects that de-energize all equipment inside the enclosure do not need a dead front trim. Protect incoming line terminations from incidental contact as required by the NEC.

7. When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.

8. Provide wiring and electrical components rated for 75°C. Provide red, black, and white colored XHHW service entrance conductors of minimum size 6 American Wire Gauge (AWG). Identify size 6 AWG conductors by continuous color jacket. Identify electrical conductors sized 4 AWG and larger by continuous color jacket or by colored tape. Mark at least 6 inches of the conductor's insulation with half laps of colored tape, when identifying conductors. Ensure each service entrance conductor exits through a separately bushed non-metallic opening in the weatherhead. The lengths of the conductors outside the weatherhead are to be 12 inches minimum, 18 inches maximum, or as required by utility.

9. All electrical service conduit and conductors attached to the electrical service including the riser or the elbow below ground are subsidiary to the electrical service. For an underground utility feed, all service conduit and conductors after the elbow, including service conduit and conductors for the utility pole riser when furnished by the Contractor, will be paid for separately.

10. Provide rigid metal conduit (RMC) for all conduits on service, except for the ½ in. PVC conduit containing the electrical service grounding electrode conductor. Size the service entrance conduit as shown in the plans. Ensure conduit for branch circuit entry to enclosure is the same size as that shown on the layout sheets for branch circuit conduit. Extend all rigid metal conduits a minimum of 6 inches underground and then couple to the type and schedule of the conduit shown on the layout for that particular branch circuit. Install a grounding bushing on the RMC where it terminates in the service enclosure.

11. Use of liquidtight flexible metal conduit (LFMC) is allowed between the meter and service enclosure when they are mounted 90 to 180 degrees to each other. Size the LFMC the same size as service entrance conduit. LFMC must not exceed 3 feet in length. Strap LFMC within 1 foot of each end. LFMC less than 12 inches in length need not be strapped. Each end of LFMC must have a grounding bushing or be terminated with a grounding fitting. The LFMC must contain a grounded (neutral) conductor. Ensure any bend in LFMC never exceeds 180 degrees. A pull test is required on all installed conductors, with at least six inches of free conductor movement demonstrated to the satisfaction of the Engineer.

12. Ensure all mounting hardware and installation details of services conform to utility company specifications.

13. For all electrical service enclosures listed under Item 628 on the MPL, the UL 508 enclosure manufacturers will prepare and submit a schematic drawing unique to each service. Before shipment to the job site, place the applicable laminated schematic drawings and the laminated plan sheet showing the electrical service data chart used to build the enclosure in the enclosure's data pocket. The installing contractor will copy and laminate the actual project plan sheets detailing all equipment and branch circuits supplied by that service. The laminated plan sheets are to be placed in the service enclosure's document pocket. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.

14. When providing an "Off The Shelf" Type D or Type T service, provide laminated plan sheets detailing equipment and branch circuits supplied by that service. Reduce 11 in. x 17 in. plan sheets to 8 ½ in. x 11 in before laminating. Deliver these drawings before completion of the work to the Engineer, instead of placing in enclosure that has no door pocket.

15. Do not install conduit in the back wall of a service enclosure where it would penetrate the equipment mounting panel inside the enclosure. Provide grounding bushings on all metal conduits, and terminate bonding jumpers to grounding bus. Grounding bushings are not required when the end of the metal conduit is fitted with a conduit sealing hub or threaded boss, such as a meter base hub.

SERVICE ASSEMBLY ENCLOSURE

1. Provide threaded hub for all conduit entries into the top of enclosure.

2. Type galvanized steel (GS) enclosures may be used for Type C panelboards and for Type D and T services that do not use an enclosure mounted photocell or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.

3. Provide aluminum (AL) and stainless steel (SS) enclosures for Types A, C, and D in accordance with DMS 11080, 11081, 11082, 11083, and 11084. Do not paint stainless steel.

4. Provide pedestal service (PS) enclosures in accordance with ED(9) and DMS 11080 and 11085. Do not provide GS pedestal services. If GS is shown in the PS descriptive code, provide an AL enclosure.

MAIN DISCONNECT & BRANCH CIRCUIT BREAKERS

1. Field drill flange-mounted remote operator handle if needed, to ensure handle is lockable in both the "On" and "Off" positions.

2. When the utility company provides a transformer larger than 50 KVA, verify that the available fault current is less than the circuit breaker's ampere interrupting capacity (AIC) rating and provide documentation from the electric utility provider to the Engineer.

PHOTOELECTRIC CONTROL

1. Provide photocell as listed on the MPL. Move, adjust, or shield the photocell from stray or ambient night time light to ensure proper operation. Mount photocell facing north when practical. Mount top of pole photocells as shown on Top Mounted Photocell Detail.

* ELECTRICAL SERVICE DATA

Elec. Service ID	Plan Sheet Number	Electrical Service Description	Service Conduit **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/ Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit Amps	KVA Load
SB 183	289	ELC SRV TY A 240/480 100(SS)AL(E)SF(U)	2"	3/#2	100	2P/100	100	N/A	Lighting NB	2P/40	26	28.1
									Lighting SB	2P/40	25	
									Underpass	1P/20	15	
NB Access	30	ELC SRV TY D 120/240 060(NS)SS(E)TS(O)	1 ¼"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 ¼"	3/#6	N/A	N/A	N/A	70	Flashing Beacon 1	1P/20	4	1.0
									Flashing Beacon 2	1P/20	4	

* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** Verify service conduit size with utility. Size may change due to utility meter requirements. Ensure conduit size meets the National ELectrical Code.

EXPLANATION OF ELECTRICAL SERVICE DESCRIPTIVE CODE

ELEC SERV TY X XXX/XXX XXX (XX) XX (X) XX (X)

Schematic Type

Service Voltage V / V

Disconnect Amp Rating
000 indicates main lug only/
Typically Type T

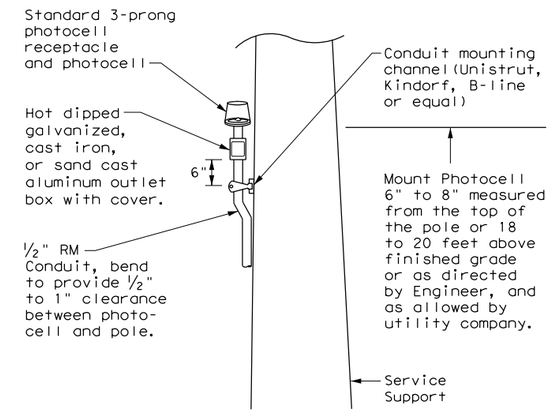
(SS)= Safety Switch Ahead of Meter-Check with Utility
(NS)= No safety Switch Ahead of Meter-Check with Utility

Enclosure Type
GS= Galvanized steel("off the shelf")
SS= Stainless steel(Custom Enclosure)See MPL
AL= Aluminum (Custom Enclosure)See MPL

Photocell Mounting Location
(E)= Inside Service/Enclosure Mounted
(T)= Top of pole
(L)= Luminaire mounted
(N)= None/No Photocell or Lighting Contactor Required

Service Support Type
GC= Granite concrete
OC= Other concrete
TP= Timber pole
SP= Steel pole
SF= Steel frame
OT= Pole by others or paid for separately
EX= Existing pole
TS= Service on traffic signal pole
PS= Pedestal Service

O= Overhead Service Feed from Utility
U= Underground Service Feed from Utility



TOP MOUNTED PHOTOCELL

Install conduit strap maximum 3 feet from box. 5 foot maximum spacing between straps supporting conduit.

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Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

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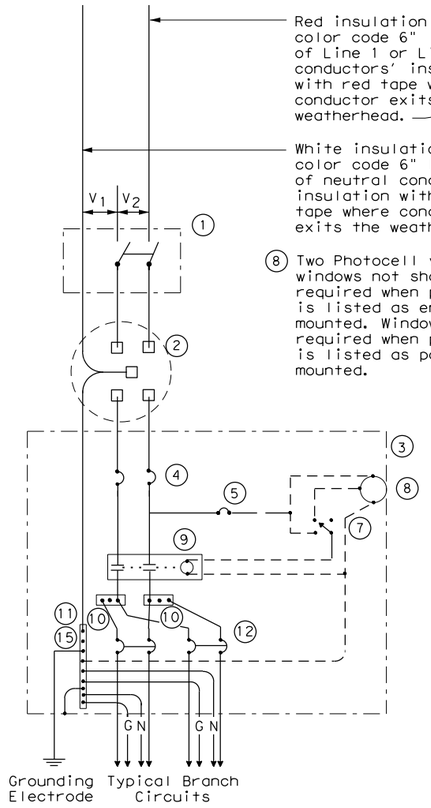
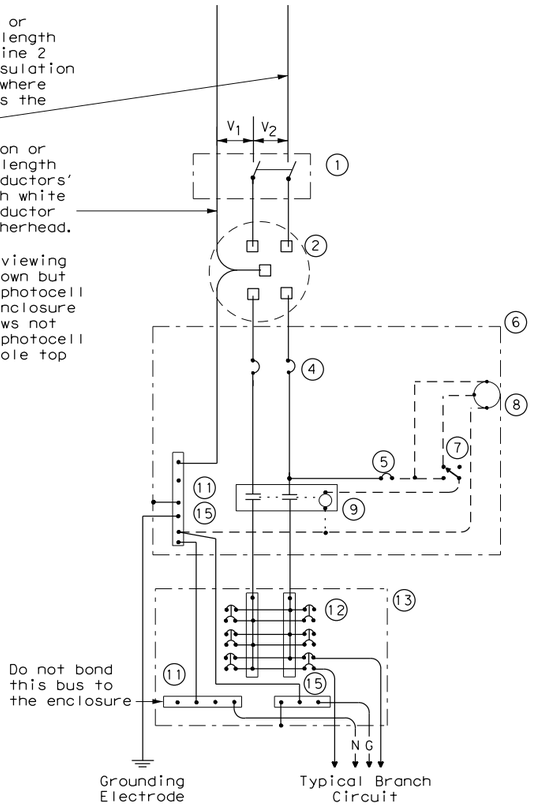
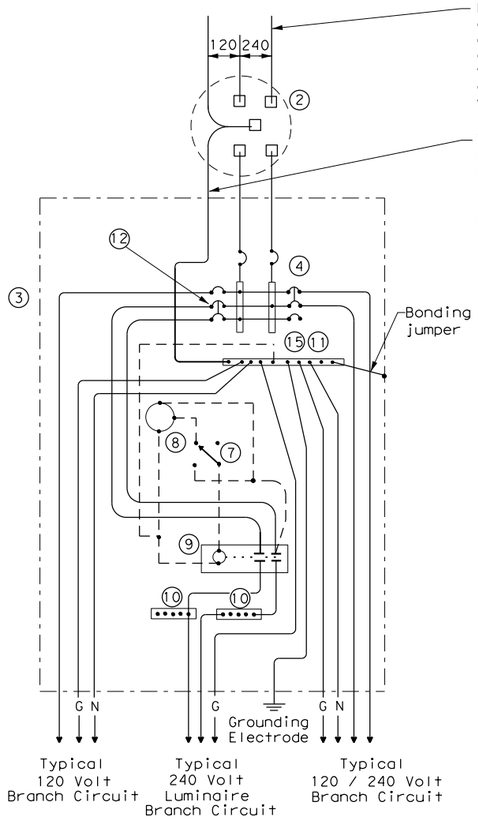


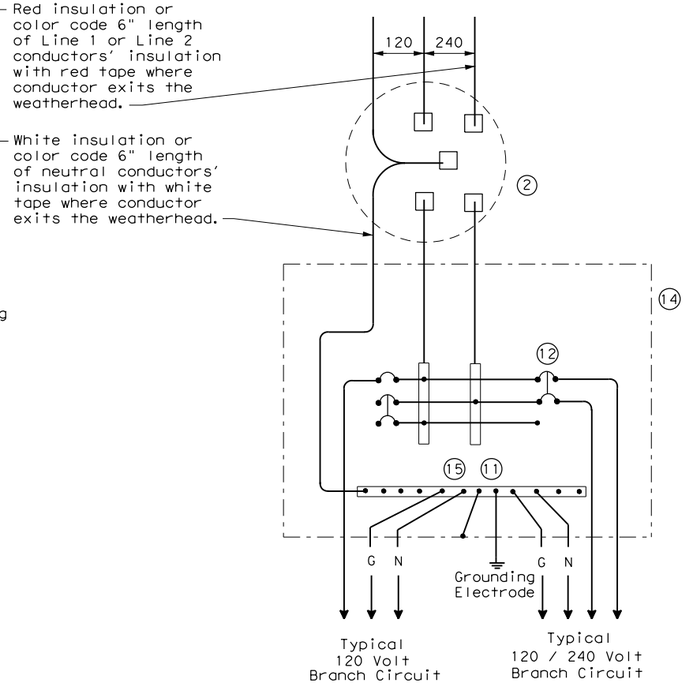
SCHEMATIC TYPE A
THREE WIRE



SCHEMATIC TYPE C
THREE WIRE



SCHEMATIC TYPE D - CUSTOM
120/240 VOLTS - THREE WIRE



SCHEMATIC TYPE T
120/240 VOLTS - THREE WIRE

Galvanized steel-"Buy Off The Shelf" only. When required install photocell top of the pole or on luminaire only, no lighting contractor will be installed.

WIRING LEGEND	
———	Power Wiring
- - - -	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

SCHEMATIC LEGEND	
1	Safety Switch (when required)
2	Meter (when required-verify with electric utility provider)
3	Service Assembly Enclosure
4	Main Disconnect Breaker (See Electrical Service Data)
5	Circuit Breaker, 15 Amp (Control Circuit)
6	Auxiliary Enclosure
7	Control Station ("H-O-A" Switch)
8	Photo Electric Control (enclosure-mounted shown)
9	Lighting Contactor
10	Power Distribution Terminal Blocks
11	Neutral Bus
12	Branch Circuit Breaker (See Electrical Service Data)
13	Separate Circuit Breaker Panelboard
14	Load Center
15	Ground Bus

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES

ED(6)-14

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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

1. Provide steel pole and steel frame supports as per TxDOT Departmental Material Specification (DMS)11080 "Electrical Services." Mount all equipment and conduit on 12 gauge galvanized steel or stainless steel channel strut, 1 ½ in. or 1 ⅝ in. wide by 1 in. up to 3 ¾ in. deep Unistrut, Kindorf, B-line or equal. Bolt or weld all channel and hardware to vertical members as approved. Do not stack channel. File smooth and paint field cut ends of all channel with zinc-rich paint before installing.

2. Provide poles for overhead service with an eyebolt or similar fitting for attachment of the service drop to the pole in conformance with the electric utility provider's specifications.

3. Provide and install galvanized ¾ in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized ¾ in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 ¼ in. to 3 ½ in. of the exposed anchor bolt projecting above finished foundation. Provide and install leveling nuts for all anchor bolts.

4. Bond one of the anchor bolts to the rebar cage with 6 AWG bare stranded copper conductor. Use listed mechanical connectors rated for embedment in concrete. See Inset B.

5. Furnish and install rigid metallic ells in all steel pole and steel frame foundations for all conduits entering the service from underground.

6. Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.

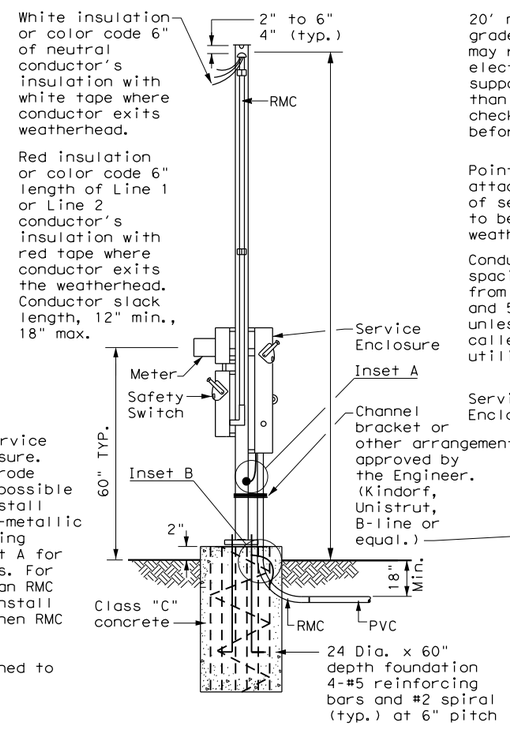
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. For steel frame service supports, provide and install tank ground fitting on steel frame post. Install service grounding electrode conductor in a non-metallic conduit or tubing from the enclosure to the steel frame post. Connect electrical service grounding electrode conductor to the tank ground fitting. See steel frame and steel pole details and Inset A for more information. Size service entrance conduit and branch circuit conduit as shown in the plans. For underground conduit runs from the electrical service, extend RMC from the service enclosure to an RMC elbow, and then connect the schedule type and size of conduit shown in the plans. Provide and install grounding bushings where RMC terminates in the enclosure. Grounding bushings are not required when RMC is fitted into a sealing hub or threaded boss.

8. If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.

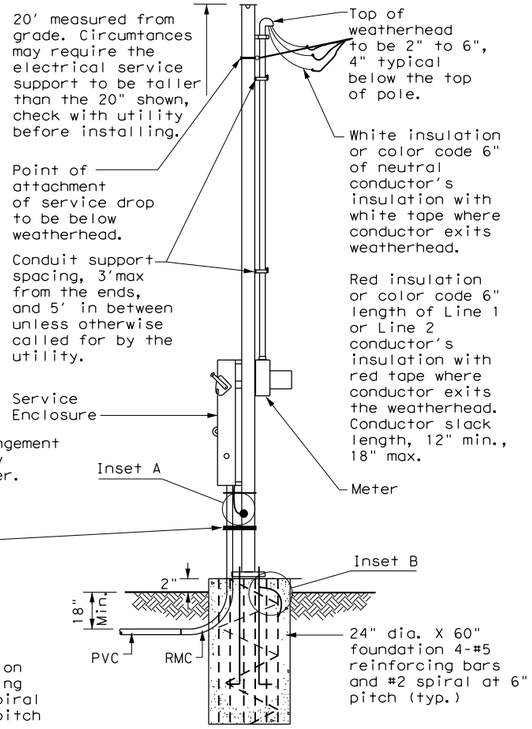
9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

10. Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.

11. Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

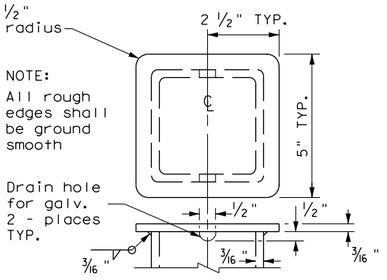


WITH SAFETY SWITCH

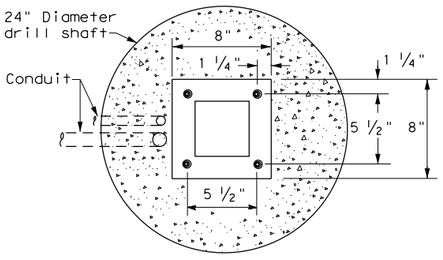


WITHOUT SAFETY SWITCH

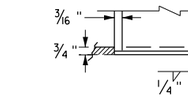
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



POLE TOP PLATE

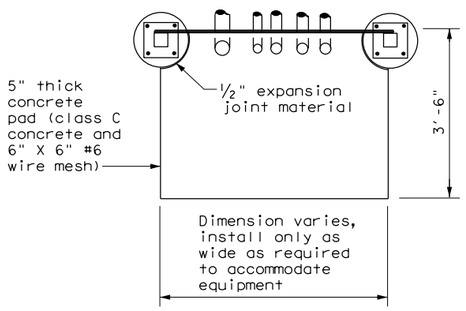


BASE PLATE DETAIL



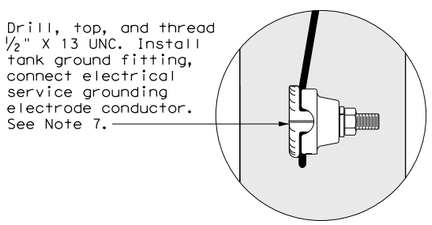
BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



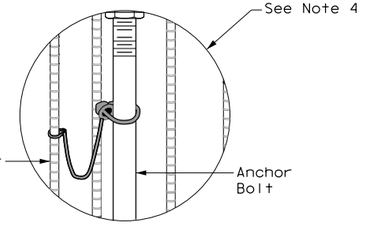
TOP VIEW

SERVICE SUPPORT TY SF (O) & SF (U)

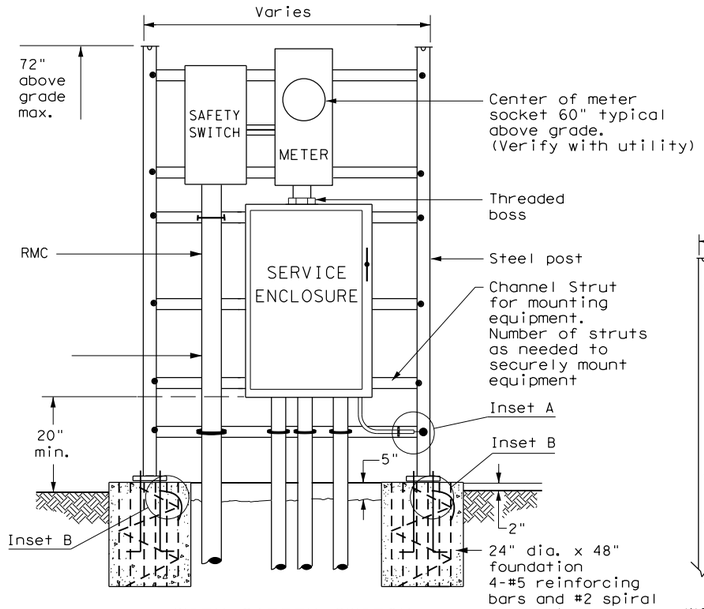


FRONT VIEW

INSET A

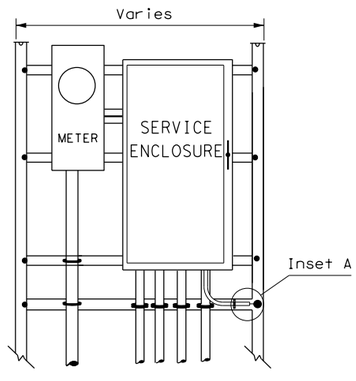


INSET B

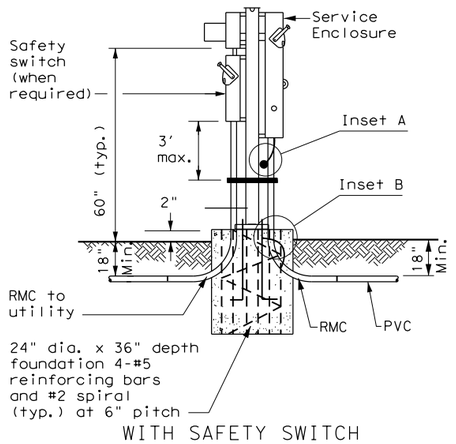


WITH SAFETY SWITCH

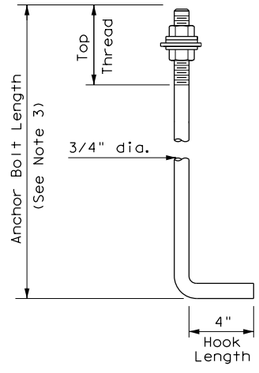
FRONT VIEW



WITHOUT SAFETY SWITCH



WITH SAFETY SWITCH



HOOKED ANCHOR DETAIL

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE

SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

ED(7)-14

FILE: ed7-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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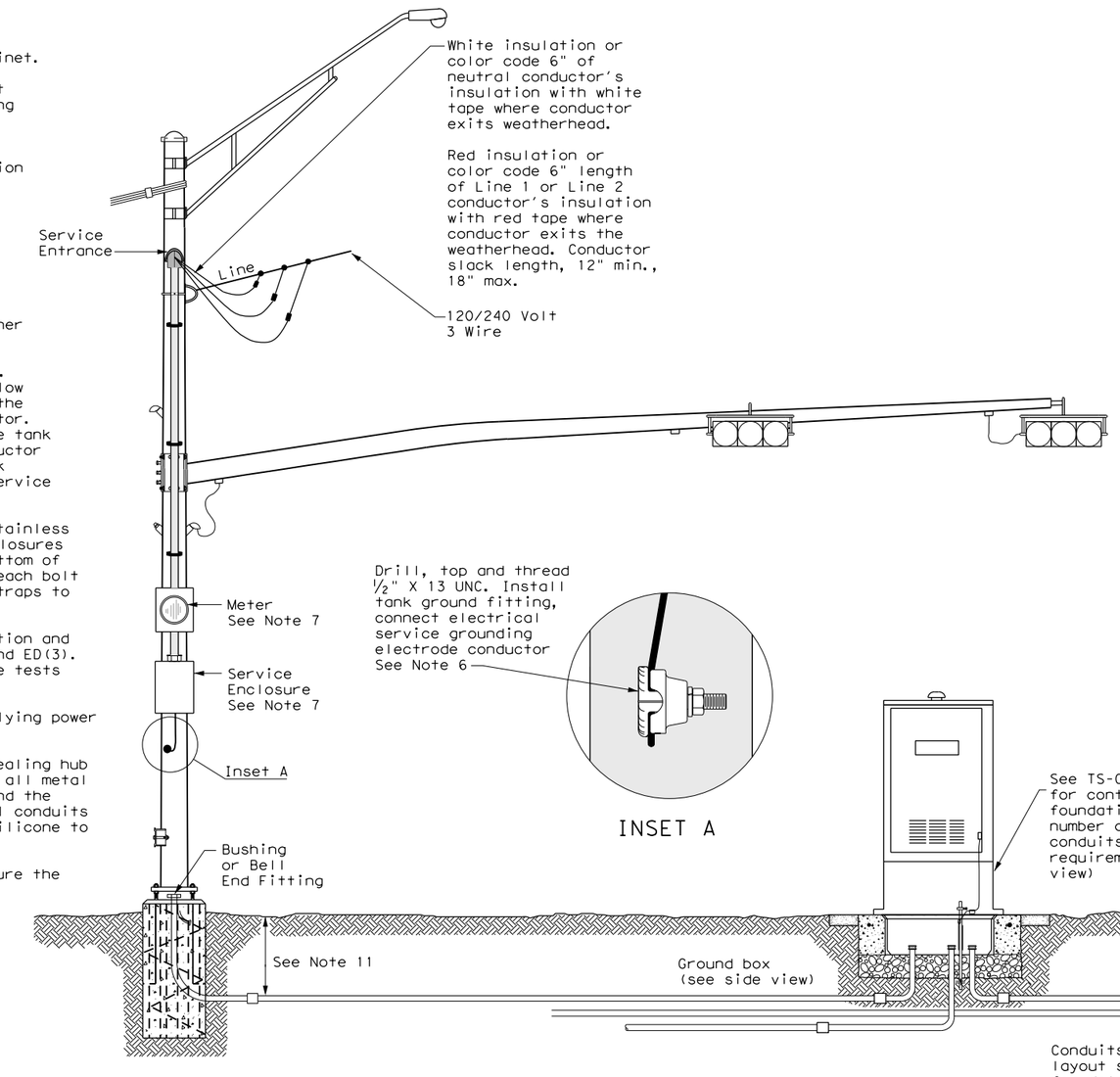
TRAFFIC SIGNAL NOTES

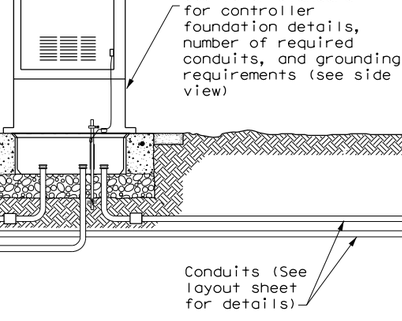
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material and construction sections of Item 610, "Roadway Illumination Assemblies," except for performance testing of luminaires. Test installed roadway luminaires for proper operation as a part of the associated traffic signal system test.
4. If internally illuminated street name signs are approved for use, ground the fixture to the pole with a 12 AWG green XHHW conductor.
5. Bond anchor bolts to rebar cage in two locations using #3 bars or 6 AWG stranded copper conductors. Use listed mechanical connectors rated for embedment in concrete. See TXDOT standard TS-FD for further details.
6. Drill and tap signal poles for ½ in. X 13 UNC tank ground fitting. Provide and install tank ground fitting 4 in. to 6 in. directly below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode conductor. Connect the electrical service grounding electrode conductor to the tank ground fitting. Ensure electrical service grounding electrode conductor is as short and straight as possible from the enclosure to the tank ground fitting. See Inset A detail for further information. Size service entrance conduit and branch circuit conduit as shown in the plans.
7. Mount electrical service enclosure and meter to signal pole with stainless steel bands. Ensure bands are a minimum width of ¾ in. Secure enclosures to bands using two-bolt brackets. Install brackets near top and bottom of each enclosure. Install properly sized stainless steel washers on each bolt in the enclosure. Band or drill and tap properly sized stand-off straps to signal pole for attaching conduit.
8. Conduct pull tests and insulation resistance tests on all illumination and power conductors as required in Item 620 "Electrical Conductors" and ED(3). To prevent electronics damage, do not conduct insulation resistance tests on traffic signal cables after termination.
9. Lock all enclosures and bolt down all ground box covers before applying power to the signal installation.
10. Terminate conduits entering the top of enclosures with a conduit-sealing hub or threaded boss such as meter hub. Install a grounding bushing on all metal conduits not connected to conduit-sealing hub or threaded boss. Bond the grounding bushing to the ground bus with a bonding jumper. Seal all conduits entering enclosures with duct seal or expanding foam. Do not use silicone to seal conduit ends.
11. For all conduits, ensure the burial depth is a minimum of 18". Ensure the minimum burial depth for conduit placed under a roadway is 24".



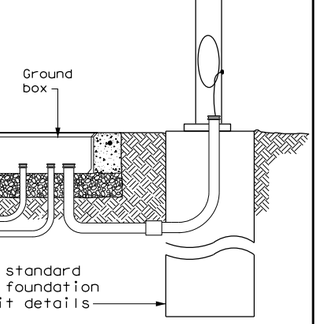
SIGNAL POLE WITH SERVICE

Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

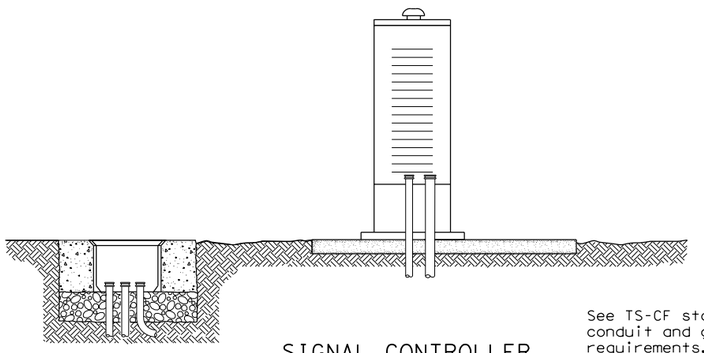
INSET A



SIGNAL CONTROLLER FRONT VIEW



SIGNAL POLE



SIGNAL CONTROLLER SIDE VIEW

See TS-CF standard for conduit and grounding requirements. See layout sheets for ground box locations and any additional conduits that are required.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

FILE: ed8-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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PEDESTAL SERVICE NOTES

1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS)11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 628 "Electrical Services. "Provide pedestal electrical services as listed on the Material Producers list (MPL) on the Department's web site under "Roadway Illumination and Electrical Supplies," Item 628. Ensure all mounting hardware and installation details of services meet utility company specifications. Contact the local utility company for approval of pedestal details prior to installing the electrical pedestal service. Submit any changes required by the utility company prior to manufacturing the pedestal enclosure.

2. When a meter socket is required, provide a socket with a minimum 100 amp rating that complies with local utility requirements.

3. Provide Class A or C concrete for pedestal service foundations in accordance with Item 420, "Concrete Substructures," except that concrete will not be paid for directly but is considered subsidiary to Item 628.

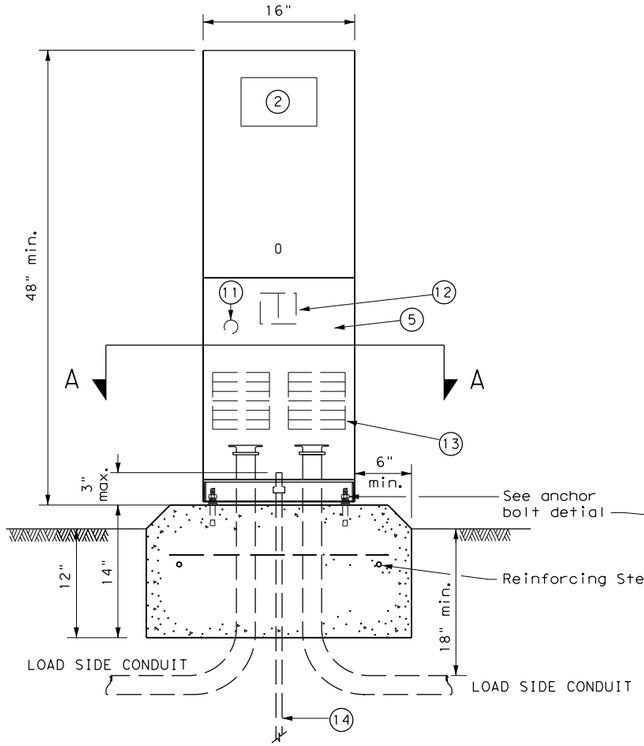
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."

5. Install ½ in. X 2 1/16 in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a ½ in. galvanized or stainless steel machine thread bolt, a properly sized locknut and a flat washer.

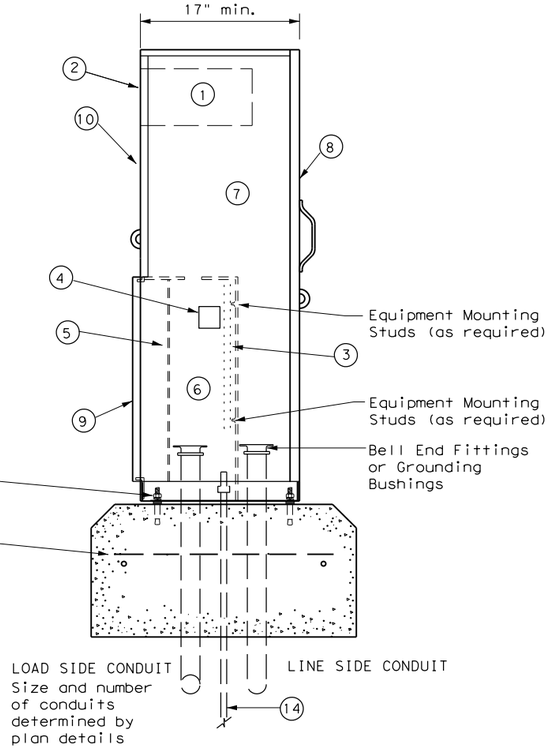
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than ⅛ in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of ⅛ in. per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within ¼ in. Repair rocking or movement of the service enclosure at no additional cost to the department.

7. Do not use liquidtight flexible metal conduit (LFMC) on pedestal type services.

8. Ensure all elbows in the foundation are sized as per utility provider's conduit requirements for underground conduit and feeders. PVC extensions may be installed provided the ends of the rigid metal conduits are more than 2 in. below the top of the concrete foundation. Where extension conduits are metal, grounding bushings must be installed with a bonding jumper properly terminated.

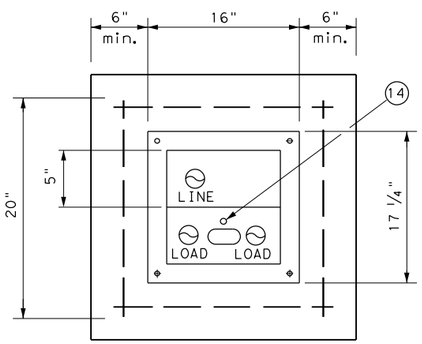


FRONT VIEW

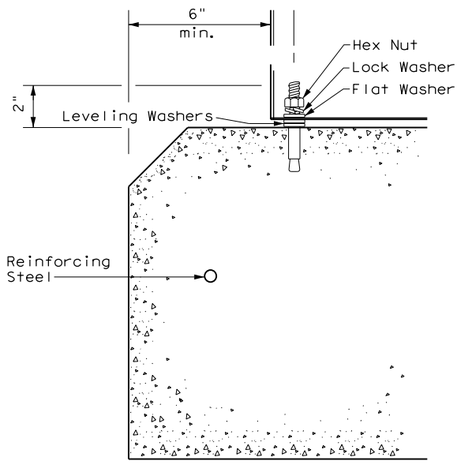


SIDE VIEW

TYPE C shown, TYPE A similar except that TYPE A shall have individual circuit breakers (CB) mounted on an equipment mounting panel. CB Handles shall protrude through hinged deadfront trim.



SECTION A-A



ANCHOR BOLT DETAIL

LEGEND	
1	Meter Socket, (when required)
2	Meter Socket Window, (when required)
3	Equipment Mounting Panel
4	Photo Electric Control Window, (When required)
5	Hinged Deadfront Trim
6	Load Side Conduit Trim
7	Line Side Conduit Area
8	Utility Access Door, with handle
9	Pedestal Door
10	Hinged Meter Access
11	Control Station (H-O-A Switch)
12	Main Disconnect
13	Branch Circuit Breakers
14	Copper Clad Ground Rod - 5/8" X 10'

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS
ELECTRICAL SERVICE SUPPORT
PEDESTAL SERVICE TYPE PS

ED(9)-14

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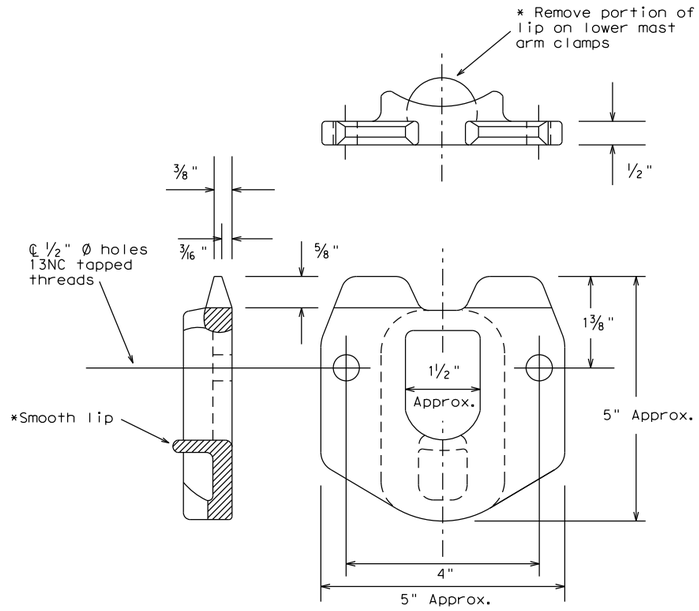
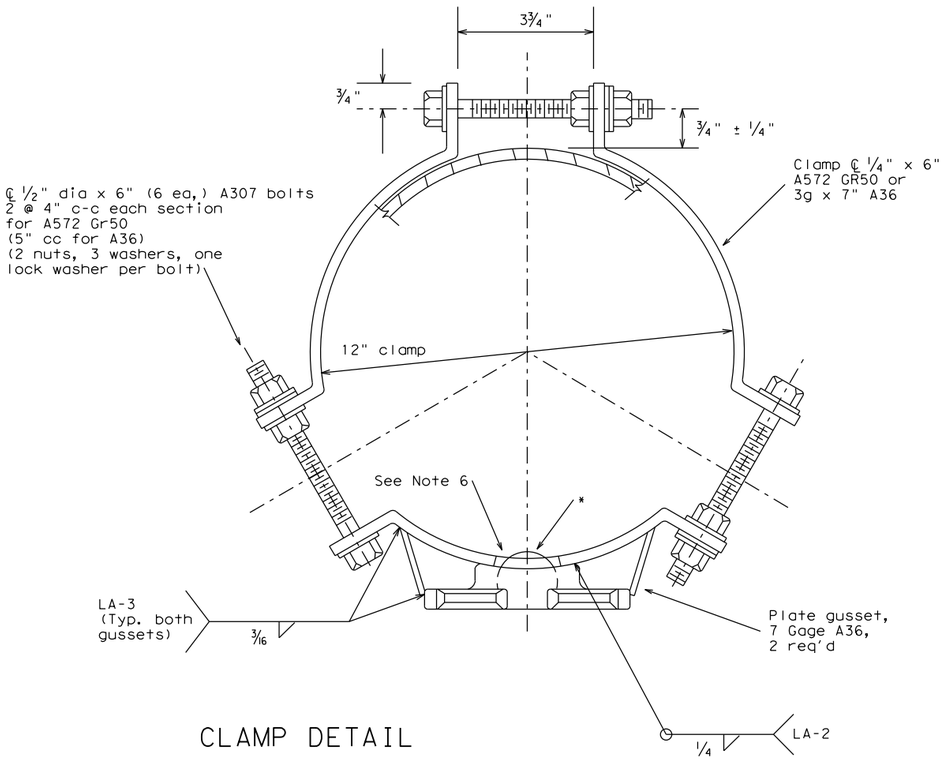
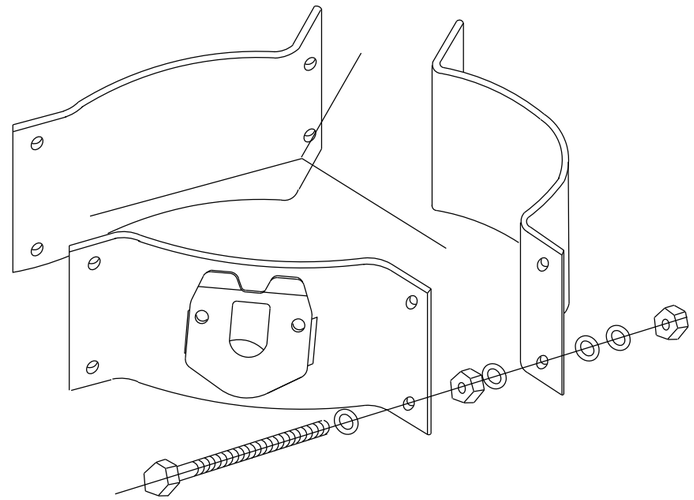


POLE SIMPLEX DETAILS



CLAMP DETAIL



PROJECTION

OTHER MATERIALS:

1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.
2. Welded tabs and backplates shall be ASTM A-36 steel or better.
3. Nylon insert locknuts shall conform to ASTM A563.

GENERAL NOTES:

1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts, 1/2in. X 1 1/2in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft.,12 ft. maximum arm length.
5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
6. Approximately 2 in. diameter hole in upper mast arm clamp.

For 8.9 - 12 inch diameter Signal Poles
(Two req'd for each mast arm)

Texas Department of Transportation
Traffic Operations Division

CLAMP ON FITTING ASSEMBLY FOR LUMINAIRE MAST ARM

CFA-12

DN: KAB	CK: RES	DW: FDN	CK: CAL

REVISIONS
11-99
1-12

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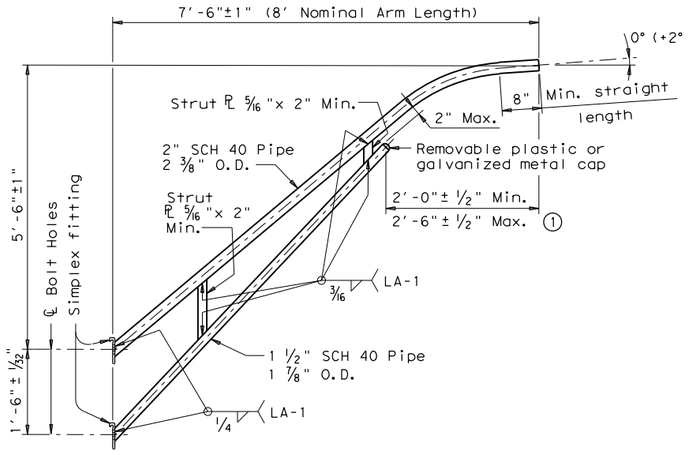
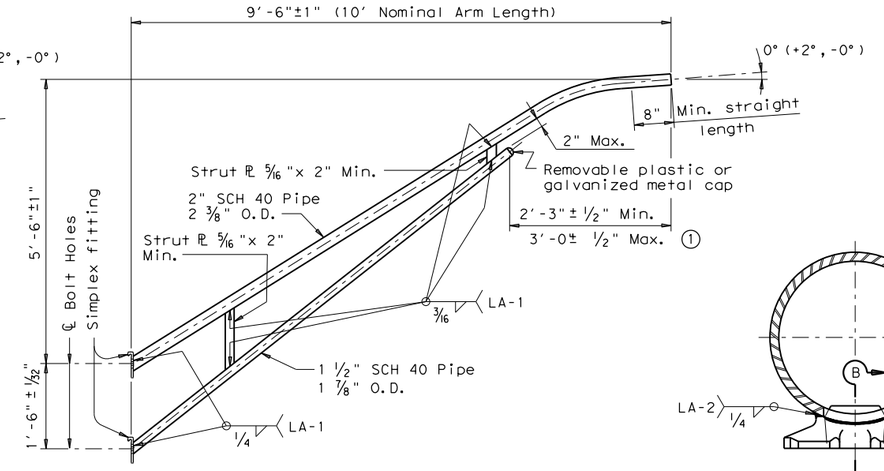
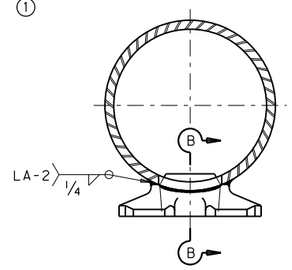


8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM



DIRECT ATTACHMENT DETAIL

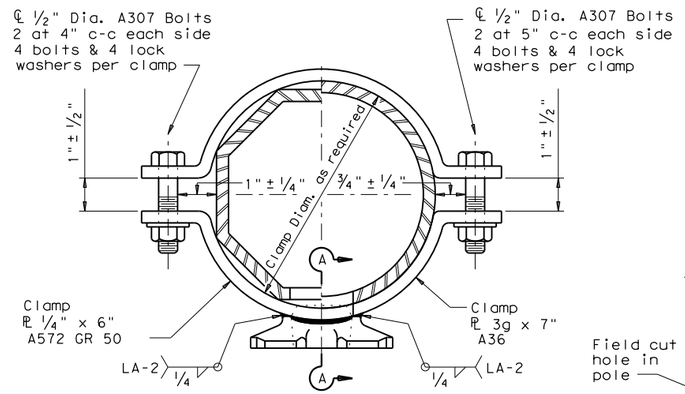
MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr.65-35 or A148 Gr.80-50, A576 Gr.1021 (3), or A36 (Arm only)
Arm Pipes	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50 (4), or A1011 HSLAS-F Gr.50 (4)
Arm Strut Plates (2)	ASTM A36, A572 Gr.50 (4), or A588
Misc.	ASTM designations as noted

(1) Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

(2) Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

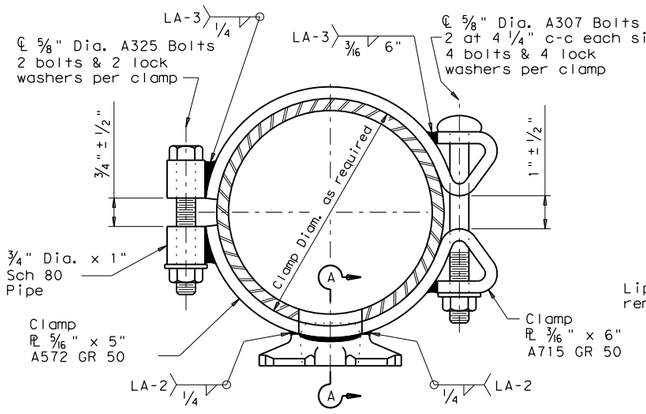
(3) A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

(4) ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.



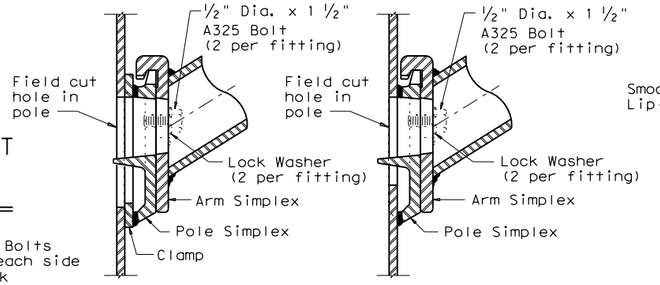
CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)



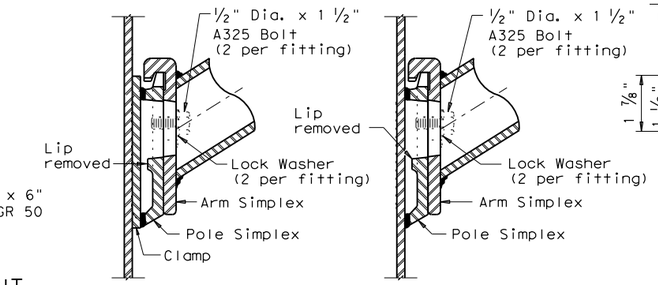
CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)



UPPER SIMPLEX FITTING

UPPER SIMPLEX FITTING

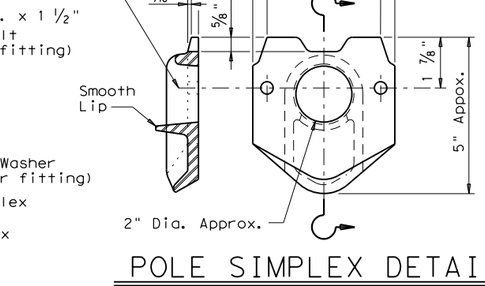


LOWER SIMPLEX FITTING

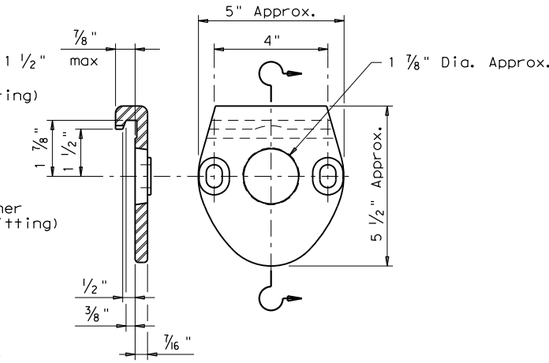
SECTON A-A

LOWER SIMPLEX FITTING

SECTON B-B



POLE SIMPLEX DETAIL



ARM SIMPLEX DETAIL

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

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

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

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

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

If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

ARM DETAILS

LUM-A-12

DN: LEH.	CK: JSY.	DW: LII.	CK: TEH.

REVISIONS
5-96
1-99
1-12

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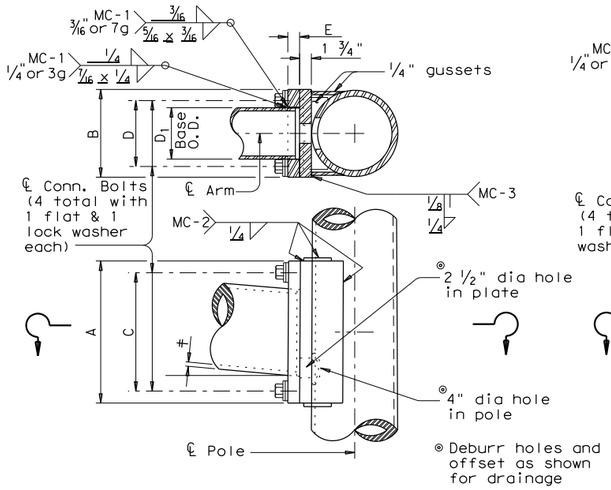
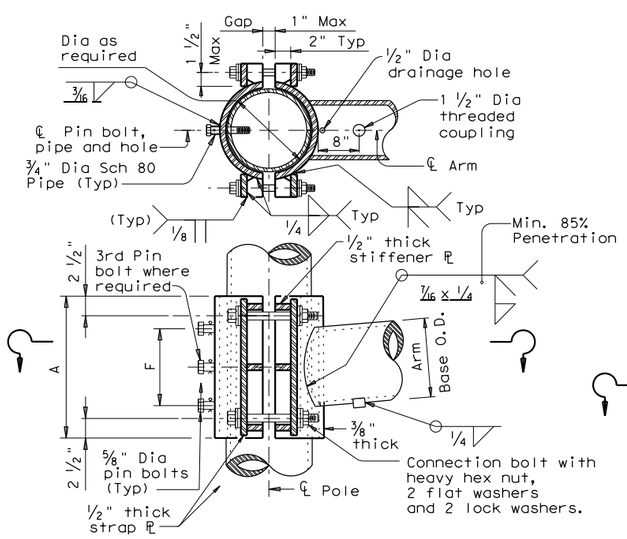
DATE:
FILE:

ARM SIZE D_1	ARM SIZE ǂ	A	B	C	D	E	CONN BOLT DIA
in.	in.	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2



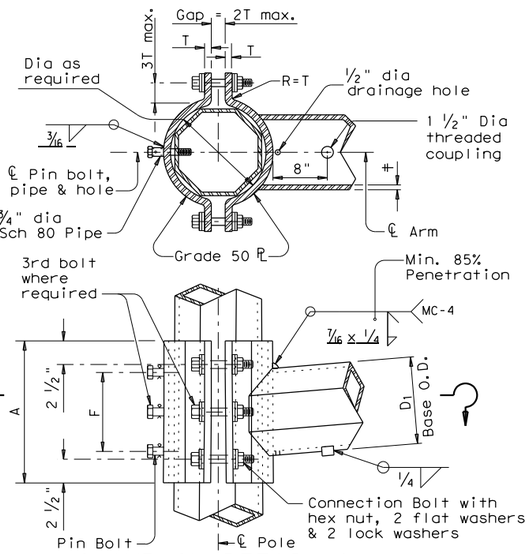
FIXED MOUNT DETAIL 1

ARM SIZE D_1	ARM SIZE ǂ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	4	1 1/4	3	5/8
9.5	.239	18	12	4	1 1/4	3	5/8
10.0	.239	18	12	4	1 1/4	3	5/8

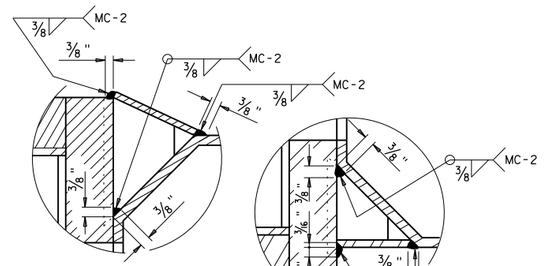


CLAMP-ON DETAIL 1

ARM SIZE D_1	ARM SIZE ǂ	A	F	T	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	in.	ea.	in.	ea.	in.
7.0	.179	12	6	3/4	4	3/4	2	5/8
7.5	.179	14	8	3/4	4	3/4	2	5/8
8.0	.179	14	8	3/4	4	3/4	2	5/8
9.0	.179	16	10	7/8	4	1	2	5/8
10.0	.179	18	10	7/8	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8

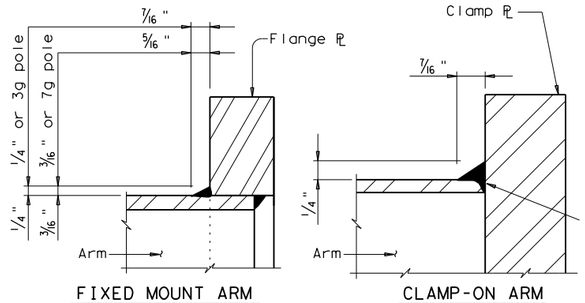


CLAMP-ON DETAIL 2



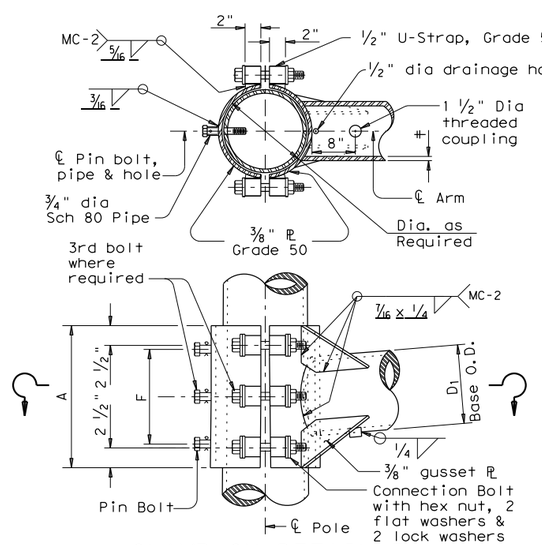
DETAIL A

DETAIL B



ARM BASE WELD DETAILS

ARM SIZE D_1	ARM SIZE ǂ	A	F	CONN. BOLTS No.	CONN. BOLTS Dia	PIN BOLTS No.	PIN BOLTS Dia
in.	in.	in.	in.	ea.	in.	ea.	in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8



CLAMP-ON DETAIL 3

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

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 1/2" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 3/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

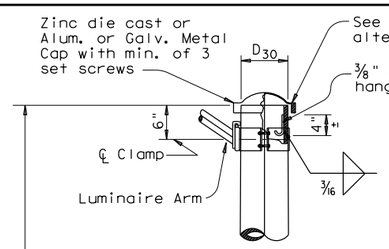
MA-C-12

REVISIONS	DN: MS	CK: JSY	DW: MMF	CK: JSY
5-96	CONT	SECT	JOB	HIGHWAY
5-09	171	5	101	SH 199
1-12	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		90

126A

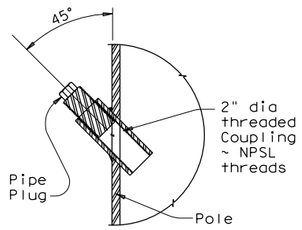
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for errors or omission of this standard to other formats or for incorrect results or damages resulting from its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

DATE:
FILE:

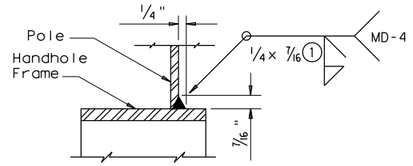


DETAIL A

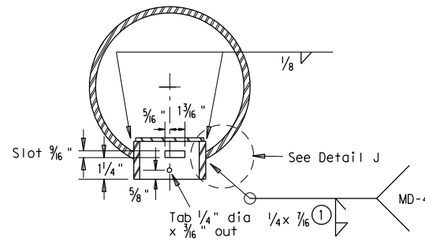
(for pole with luminaire)



POLE COUPLING DETAIL

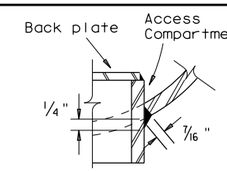


DETAIL G

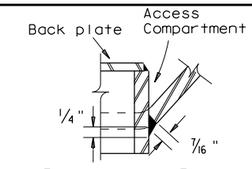


SECTION X-X

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

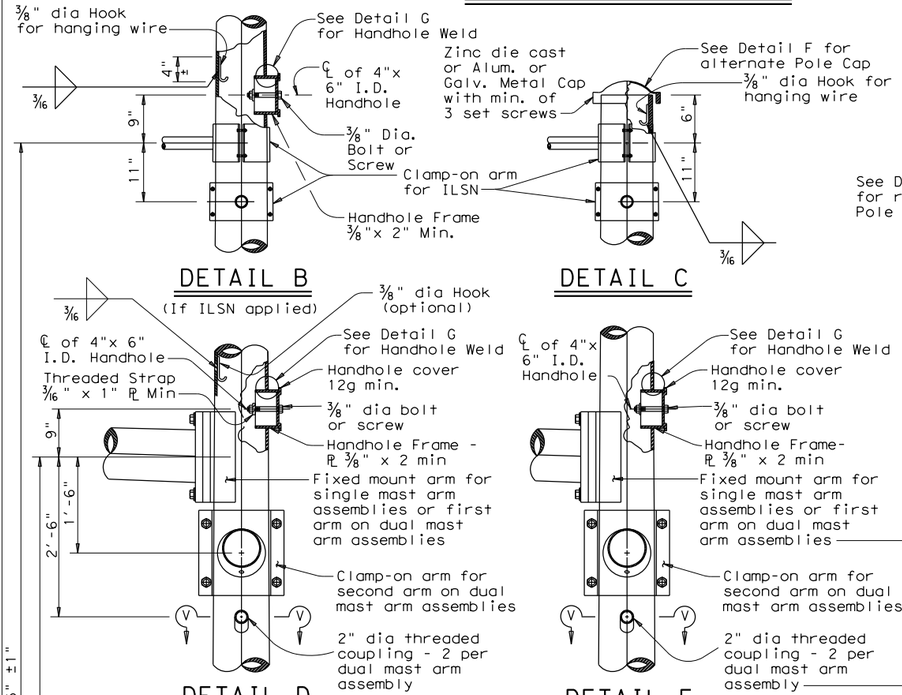


Round Pole



Polygonal Pole

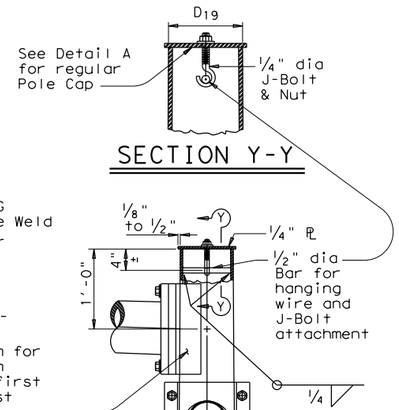
DETAIL J



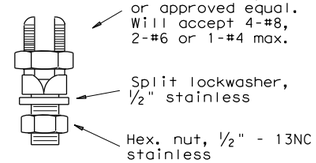
DETAIL B

(If ILSN applied)

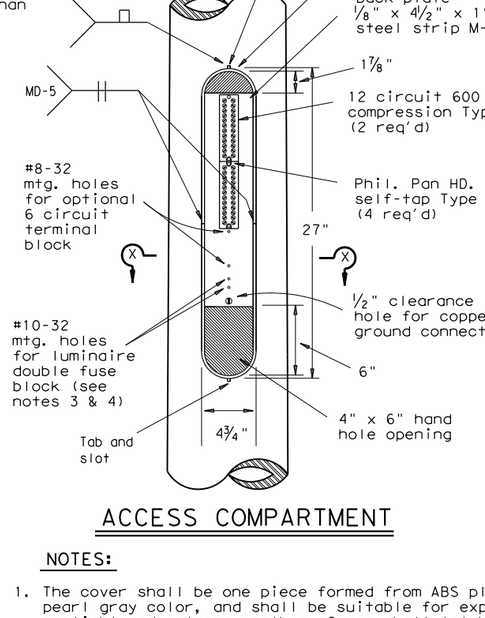
DETAIL C



SECTION Y-Y



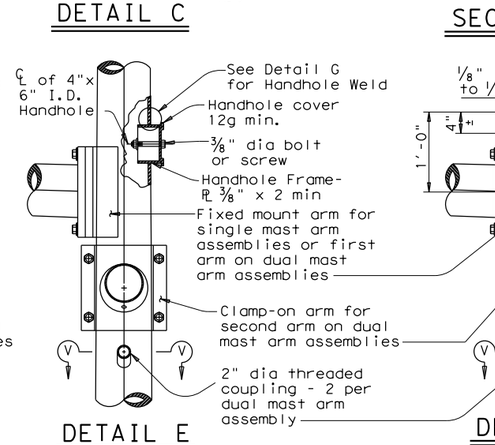
COPPER GROUND CONNECTOR



ACCESS COMPARTMENT

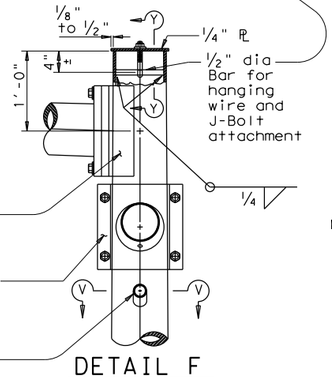
DETAIL D

(for 30' pole with luminaire and ILSN sign)



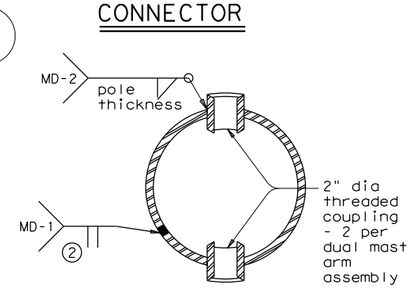
DETAIL E

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

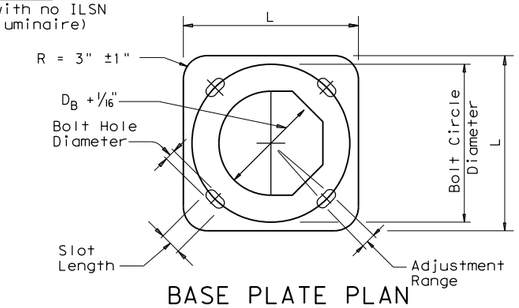


DETAIL F

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

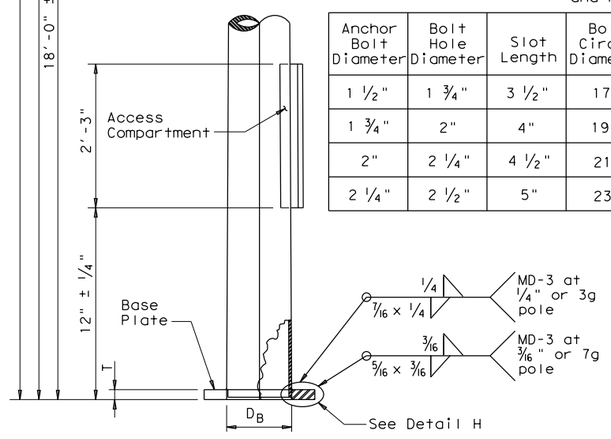


SECTION V-V

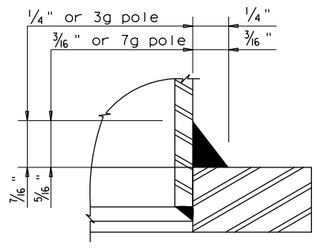


BASE PLATE PLAN

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



POLE ELEVATION



DETAIL H

(1) 85% Min. penetration

(2) 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

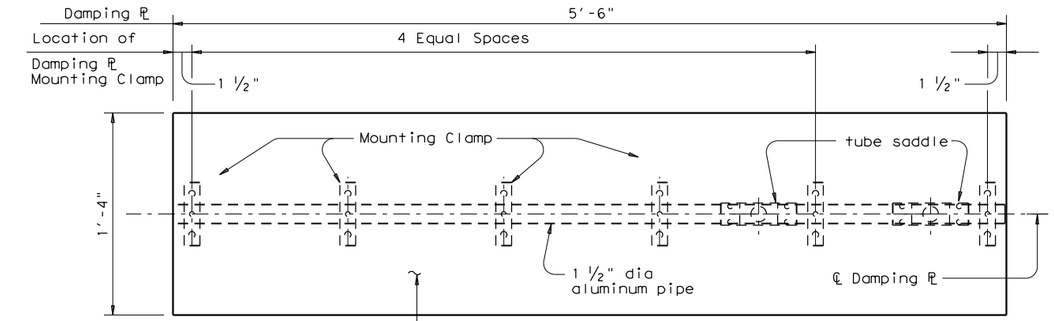
MA-D-12

DN: MS	CK: JSY	DW: FDN	CK: CAL

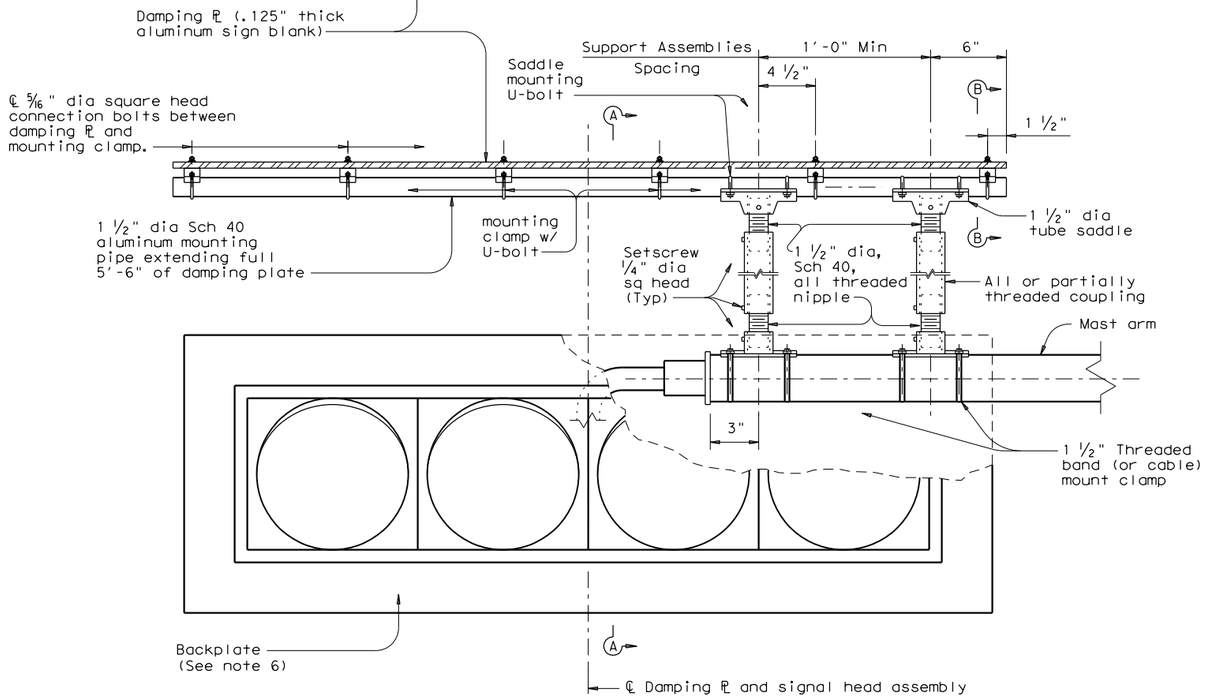
REVISIONS
8-99
1-12

CONT	SECT	JOB	HIGHWAY
171	5	101	SH 199
DIST	COUNTY		SHEET NO.
FTW	TARRANT		91

DATE:
FILE:



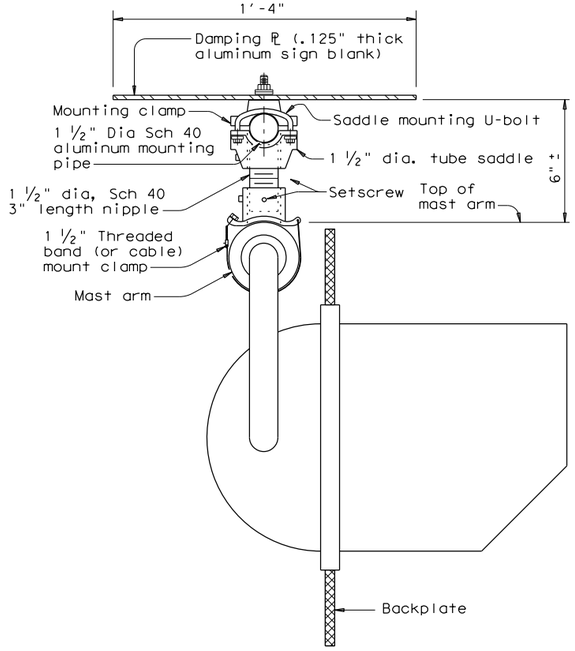
PLAN



ELEVATION

DAMPING PLATE MOUNTING DETAILS

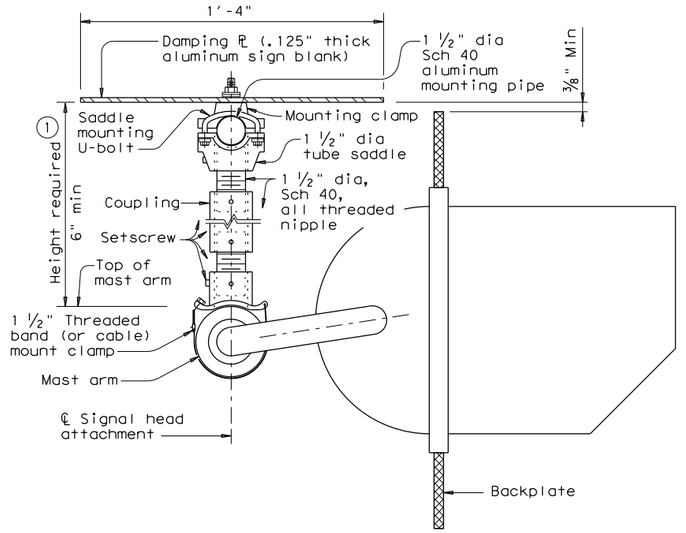
(Showing alternate placement of signal head)



SECTION A-A

(Showing standard placement of signal head)

(Mounting clamp U-bolt is not shown for clarity)

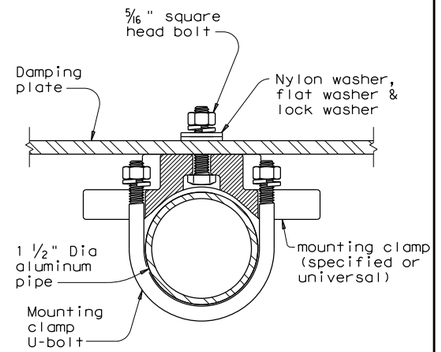


SECTION A-A

(Showing alternate placement of signal head)

(Mounting clamp U-bolt is not shown for clarity)

① Recommended supporting assemblies to achieve required height for horizontal section heads			
Height required	One nipple each length	Two nipples each length plus	One coupling each length
6"-6 ¾"	3"	-	-
7"-8 ½"	4"	-	-
9"-10 ½"	6"	-	-
11"-15 ½"	-	4"	5"
16"-24"	-	6"	10"



SECTION B-B

(Showing damping plate attachment)

GENERAL NOTES:

1. In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.

2. Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD(GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.

3. Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate) and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.

4. Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".

5. Contractor will verify applicable field dimensions before the installation.

6. Backplates are optional for traffic signals. When backplates are used, Backplates will have a 2-inch fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.

Texas Department of Transportation

Traffic Safety Division Standard

MAST ARM DAMPING PLATE DETAILS

MA-DPD-20

FILE: ma-dpd-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	171	5	101	SH 199
6-20	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		92

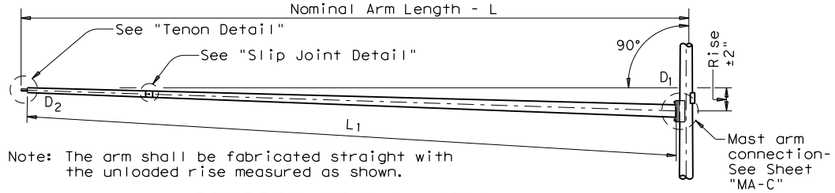
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179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

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1′-9"	19.1	7.0	3.5	.179	1′-8"
24	23.1	7.5	4.3	.179	1′-10"	23.1	7.5	3.5	.179	1′-9"
28	27.1	8.0	4.2	.179	1′-11"	27.1	8.0	3.5	.179	1′-10"
32	31.0	9.0	4.7	.179	2′-1"	31.0	9.0	3.5	.179	2′-0"
36	35.0	9.5	4.6	.179	2′-4"	35.0	10.0	3.5	.179	2′-1"
40	39.0	9.5	4.1	.239	2′-8"	39.0	9.5	3.5	.239	2′-3"
44	43.0	10.0	4.1	.239	2′-11"	43.0	10.0	3.5	.239	2′-6"
48	47.0	10.5	4.1	.239	3′-4"	47.0	11.0	3.5	.239	2′-9"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② D_2 may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)

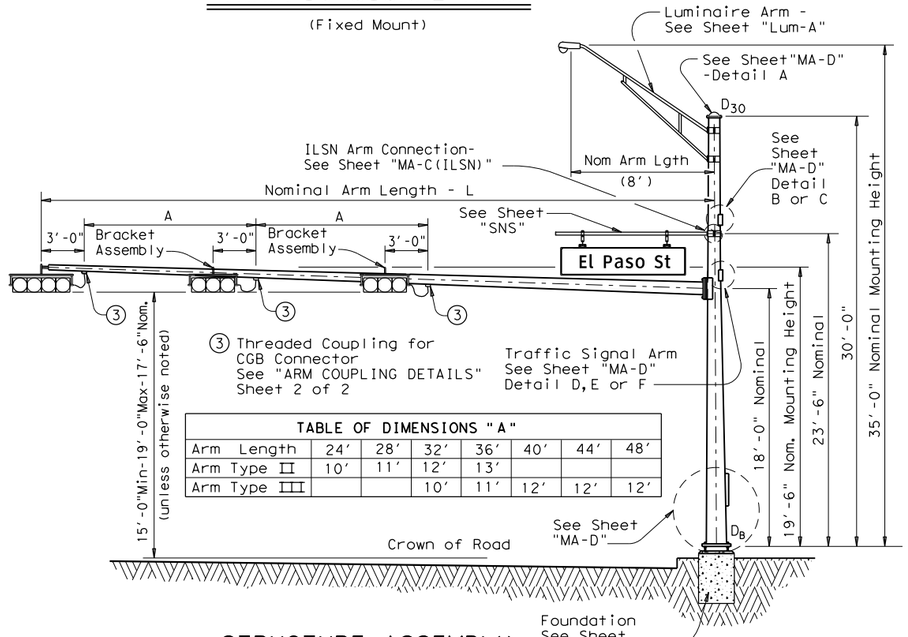


TABLE OF DIMENSIONS "A"

Arm Length	24′	28′	32′	36′	40′	44′	48′
Arm Type II	10′	11′	12′	13′			
Arm Type III			10′	11′	12′	12′	12′

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

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

Nominal Arm Length	30′ Poles With Luminaire		24′ Poles With ILSN		19′ Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80		24S-80		24-80	
28	28L-80	1	28S-80		28-80	
32	32L-80	4	32S-80		32-80	
36	36L-80		36S-80		36-80	
40	40L-80		40S-80		40-80	
44	44L-80		44S-80		44-80	
48	48L-80	4	48S-80		48-80	

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

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80	1		
32			32II-80	3	32III-80	1
36			36II-80		36III-80	
40					40III-80	
44					44III-80	
48					48III-80	4

Luminaire Arms (1 per 30′ pole)

Nominal Arm Length	Quantity
8′ Arm	9

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7′ Arm	
9′ Arm	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
1 ½"	3′-4"	4
1 ¾"	3′-10"	5

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(1)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

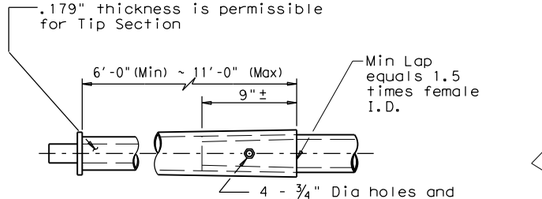
REVISIONS
5-96
11-99
1-12

CONT	SECT	JOB	HIGHWAY
171	5	101	SH 199
DIST	COUNTY		SHEET NO.
FTW	TARRANT		93

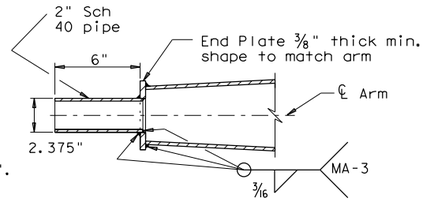
122A

DATE:
FILE:

DATE:
FILE:

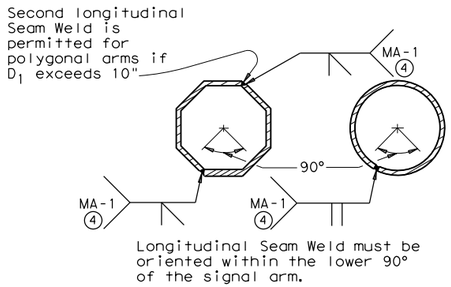


SLIP JOINT DETAIL



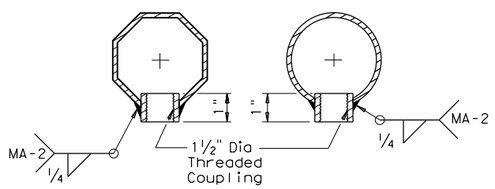
TENON DETAIL

BRACKET ASSEMBLY



ARM WELD DETAIL

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



ARM COUPLING DETAILS

VIBRATION WARNING

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

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

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

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

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

GENERAL NOTES:

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

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

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

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

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

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

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

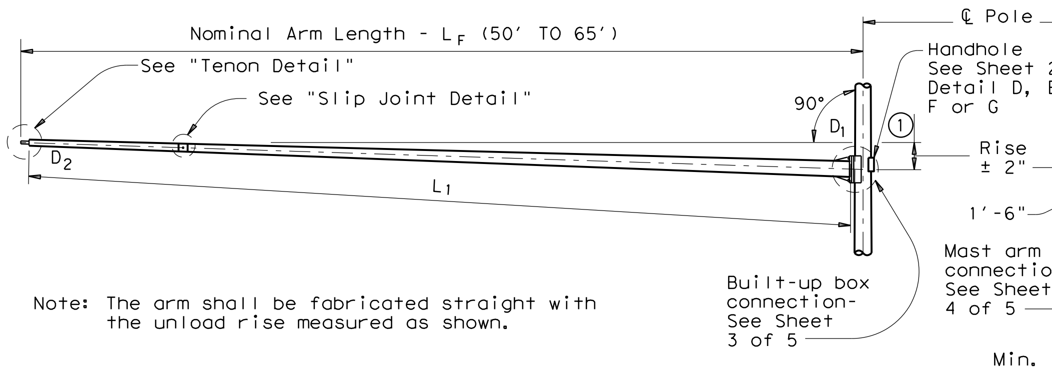
SMA-80(2)-12

DN: MS	CK: JSY	DW: MMF	CK: JSY

REVISIONS
5-96
1-12

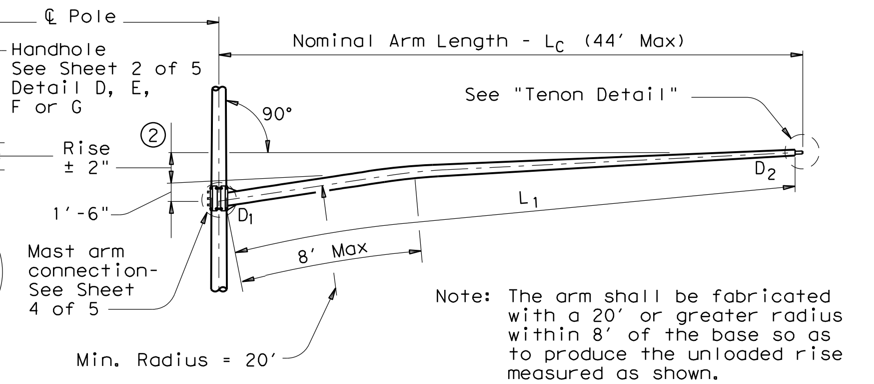
CONT	SECT	JOB	HIGHWAY
171	5	101	SH 199
DIST	COUNTY		SHEET NO.
FTW	TARRANT		94

122B



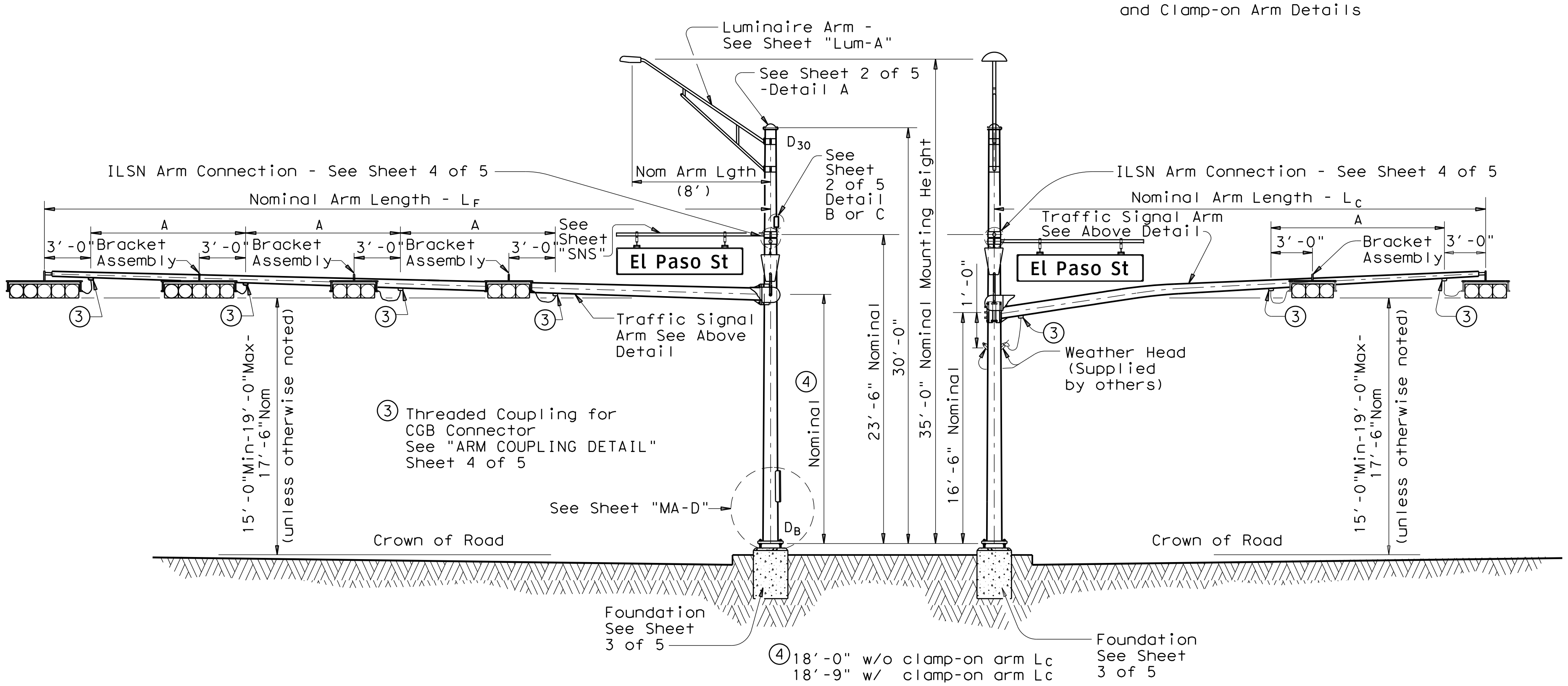
FIXED MOUNT TRAFFIC SIGNAL ARM

① See Sheet 3 of 5 for Arm Rise



CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details

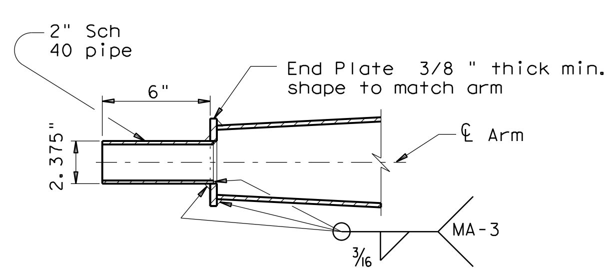


ELEVATION
(Showing fixed mount arm)

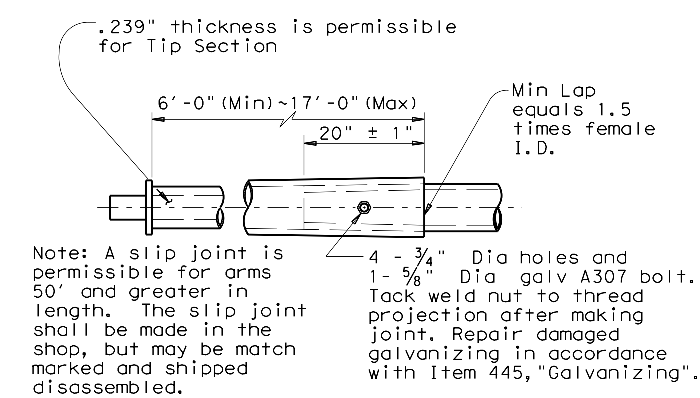
STRUCTURE ASSEMBLY

ELEVATION
(Showing clamp-on arm)

TABLE OF DIMENSIONS "A"										
Arm Length	24'	28'	32'	36'	40'	44'	50'	55'	60'	65'
Arm Type II	10'	11'	12'	13'						
Arm Type III			10'	11'	12'	12'				
Arm Type IV							12'	12'	12'	12'



TENON DETAIL



Note: A slip joint is permissible for arms 50' and greater in length. The slip joint shall be made in the shop, but may be match marked and shipped disassembled.

SLIP JOINT DETAIL (FIXED MOUNT ARM)

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

Arm	Equivalent DL ⑤	WL EPA ⑤⑥
8' Luminaire Arm	Luminaire 60 lbs	1.6 sq ft
9' ILSN Arm	Sign 85 lbs	11.5 sq ft
50' to 65' Fixed Mount Arm	Signal Loads 310 lbs	52 sq ft
Up to 44' Clamp-on Arm	Signal Loads 180 lbs	32.4 sq ft

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

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

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

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

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)
LMA(1)-12

Sheet 1 of 5

	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS 4-20-01 1-12	CONT 171	SECT 5	JOB 101	HIGHWAY SH 199
	DIST FTW	COUNTY TARRANT		SHEET NO. 95

131A

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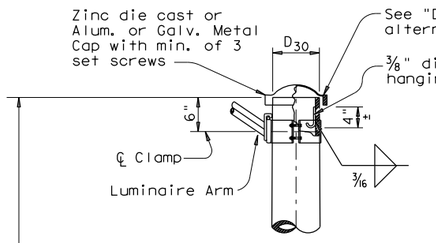
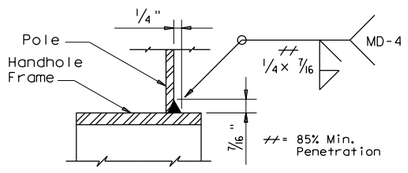
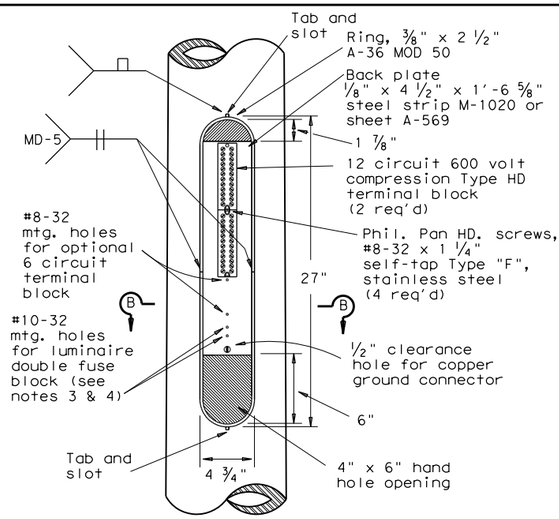


DETAIL A

(for pole with luminaire)



DETAIL H

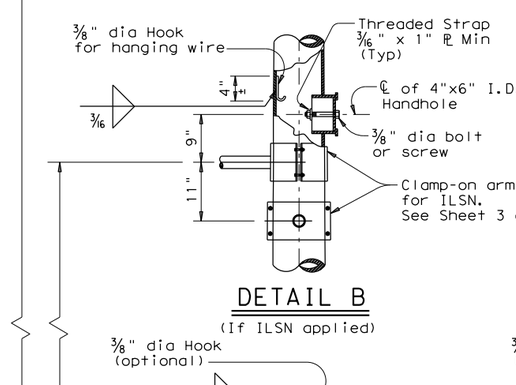


ACCESS COMPARTMENT

MATERIALS	
Round Shafts or Polygonal Shafts (7)	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 (8)
Plates (7)	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325, or A449 except where noted
Pin Bolts	ASTM A325
Pipe (7)	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

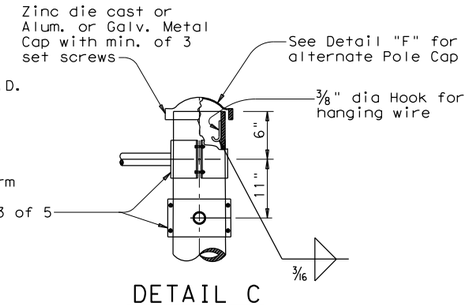
(7) ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

(8) ASTM A1011 SS Gr.50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

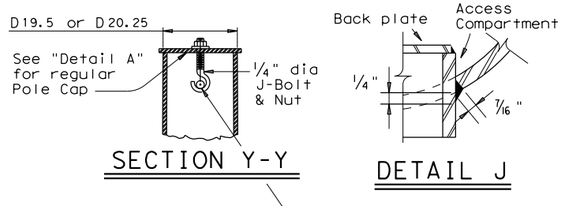


DETAIL B

(If ILSN applied)

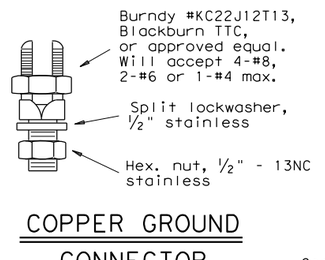


DETAIL C

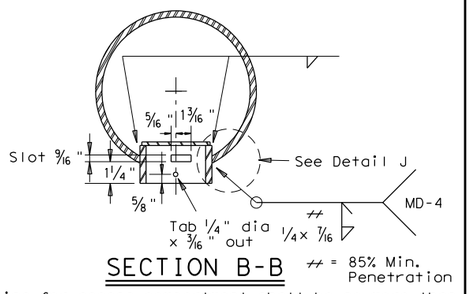


SECTION Y-Y

DETAIL J

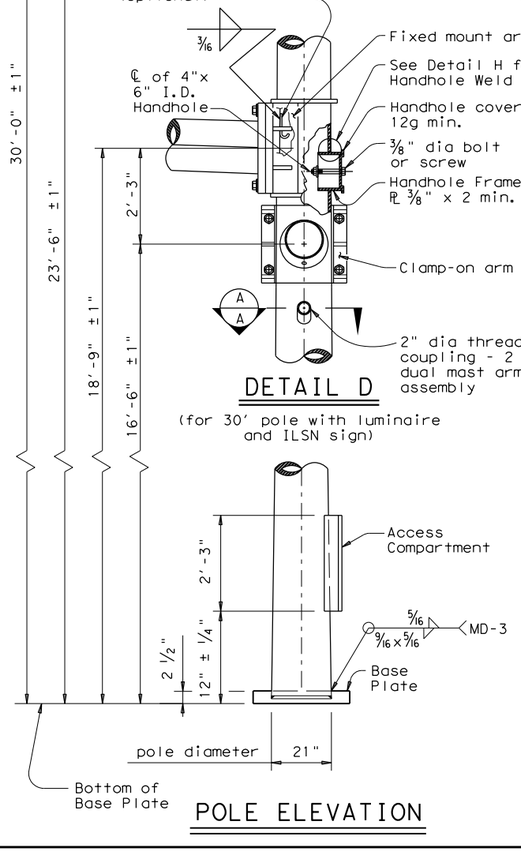


COPPER GROUND CONNECTOR



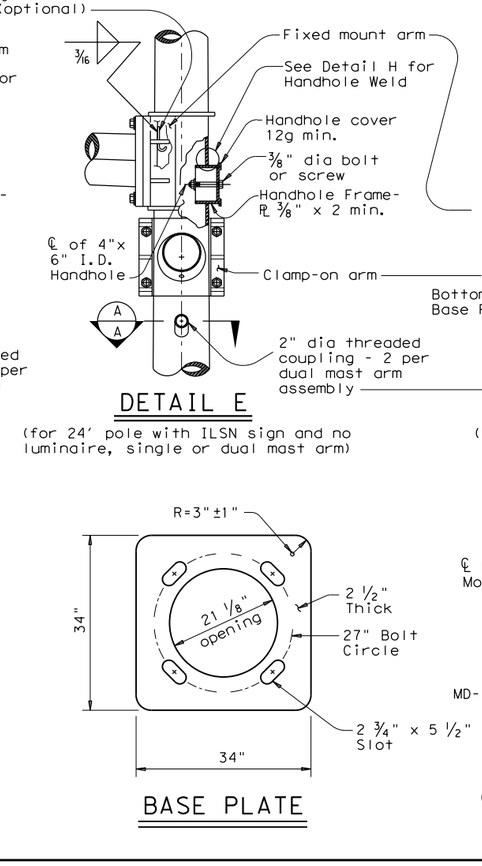
SECTION B-B

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



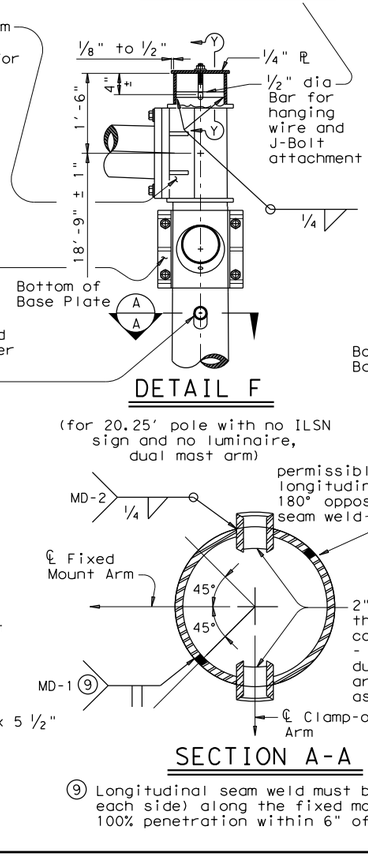
DETAIL D

(for 30' pole with luminaire and ILSN sign)



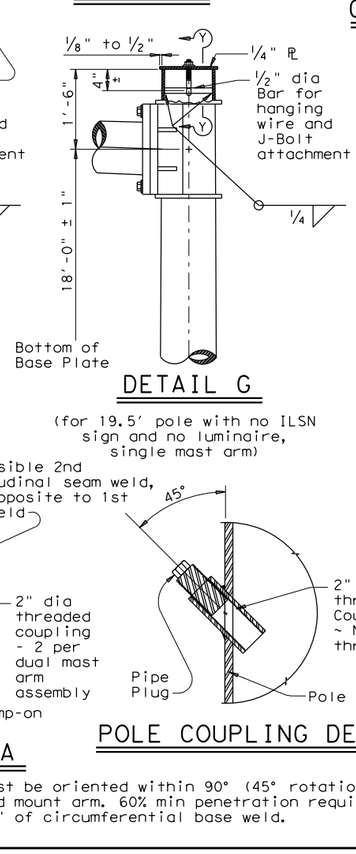
DETAIL E

(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)



DETAIL F

(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)



DETAIL G

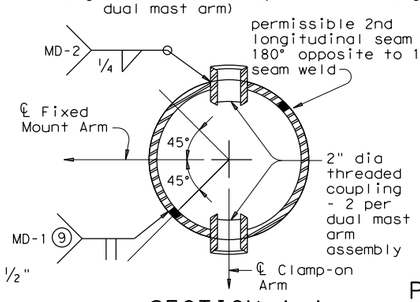
(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)

ACCESS COMPARTMENT NOTES:

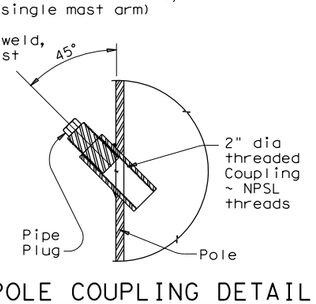
1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 ¼" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

POLE ELEVATION

BASE PLATE



SECTION A-A



POLE COUPLING DETAIL

(9) Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 2 of 5 — LMA(2)-12

DN: JSY	CK: ARC	DW: TGG	CK: JSY

REVISIONS
4-20-01
1-12

CONT	SECT	JOB	HIGHWAY
171	5	101	SH 199
DIST	COUNTY		SHEET NO.
FTW	TARRANT		96

131B

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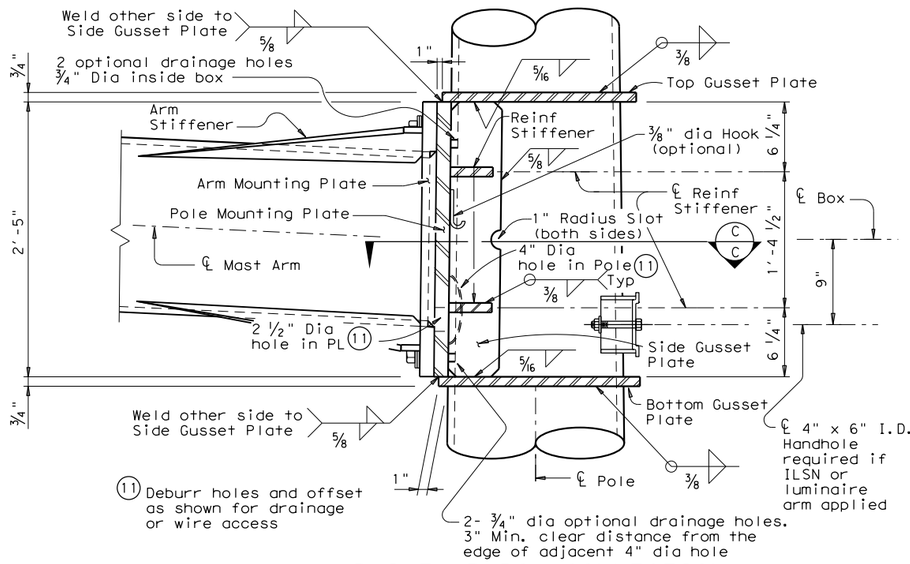
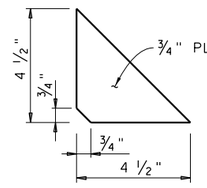
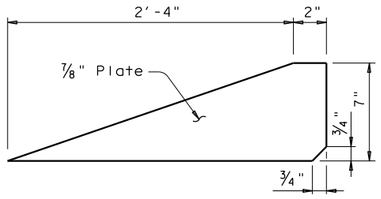


BUILT-UP BOX CONNECTION

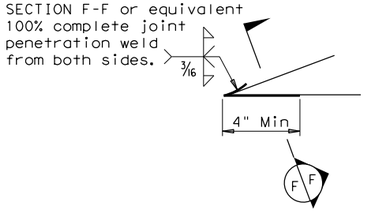


REINFORCING STIFFENER



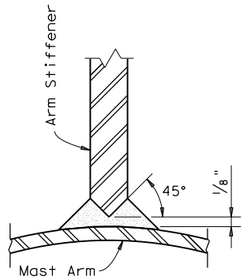
ARM STIFFENER
(Cut to match arm inclination and taper)

Provide Detail shown in SECTION F-F or equivalent 100% complete joint penetration weld from both sides.



Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

DETAIL "K"



SECTION F-F

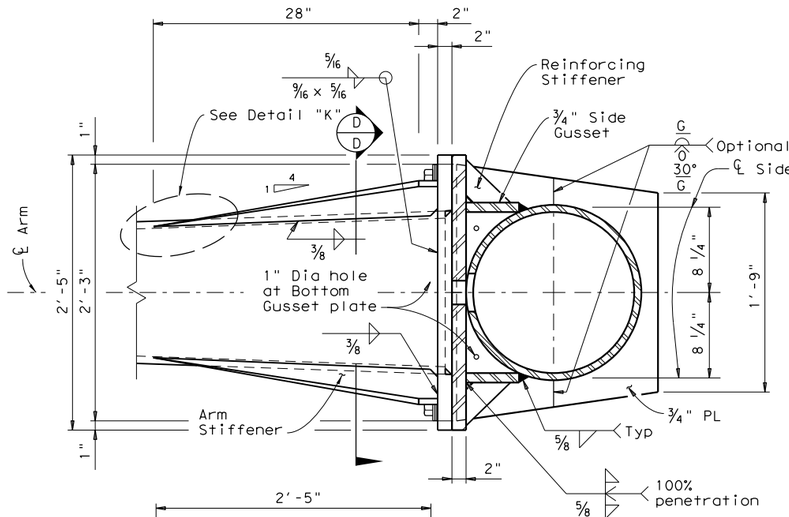
Fixed Mount Arm L_F	ROUND POLES (13)					Foundation Type
	D_B	$D_{19.5}$ or $D_{20.25}$	D_{24}	D_{30}	(12) thk	
ft.	in.	in.	in.	in.	in.	
50', 55' 60', 65'	21.0	18.2	17.6	16.8	.3125	48-A

Fixed Mount Arm L_F	ROUND ARMS (13)				
	L_1	D_1	D_2	(12) thk	Rise
ft.	ft.	in.	in.	in.	
50	49	18.5	11.7	.3125	3'- 3"
55	54	18.5	11.0	.3125	3'- 7"
60	59	18.5	10.3	.3125	3'-11"
65	64	18.5	9.6	.3125	4'- 4"

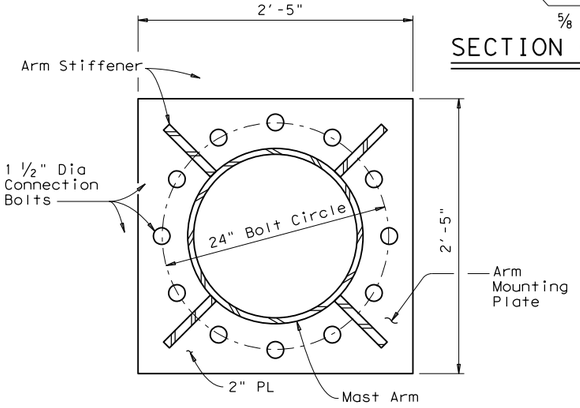
D_B = Pole Base O.D.
$D_{19.5}$ = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
$D_{20.25}$ = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L_F = Fixed Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

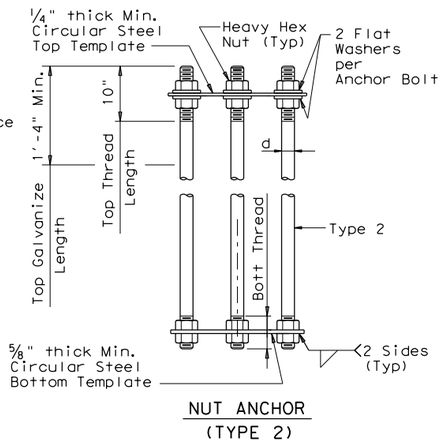
(13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.



SECTION C-C

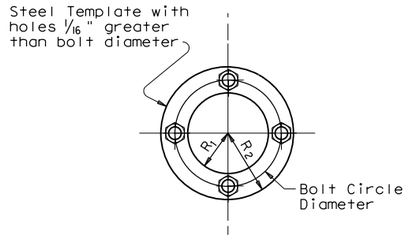


SECTION D-D



NUT ANCHOR
(TYPE 2)

ANCHOR BOLT ASSEMBLY



TEMPLATE DETAIL

ANCHOR BOLT & TEMPLATE SIZE						
Bolt Dia in.	Length ‡	Top Thread	Bottom Thread	Bolt Circle	R_2	R_1
2 ½"	5'-2"	10"	6 ½"	27"	16"	11"

‡ Min dimension given, longer bolts are acceptable.

FOUNDATION DESIGN TABLE													
FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		DRILLED SHAFT LENGTH-ft (16), (17), (18)			ANCHOR BOLT DESIGN (14)				FOUNDATION DESIGN LOAD (15)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
48-A	48"	20 #9	#4 at 6"	21.9	19.5	14.7	2 ½"	55	27"	2	490	10	50' to 65' Mast arm assembly.

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

(14) Anchor bolt design develops the foundation capacity given under Foundation Design Laods.

(15) Foundation Design Loads are the allowable moments and shears at the base of the structure.

(16) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

(17) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

(18) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

GENERAL NOTES:

Built-up Box Connection: For the welded arm-to-pole connection as a build-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 ½" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 3 of 5 LMA(3)-12

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CONT	SECT	JOB	HIGHWAY
171	5	101	SH 199
DIST	COUNTY		SHEET NO.
FTW	TARRANT		97

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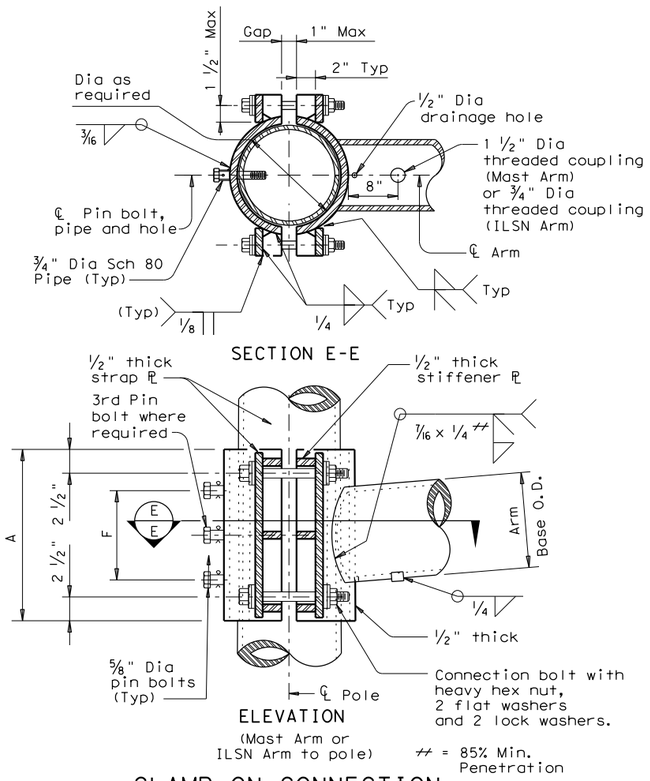


CLAMP-ON CONNECTION

80 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L1	D1	D2	thk (12)	Rise	L1	D1	D2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-1"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"

100 MPH WIND

Clamp-on Arm Lc	ROUND ARMS					POLYGONAL ARMS				
	L1	D1	D2	thk (12)	Rise	L1	D1	D2	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

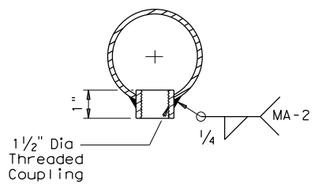
D1 = Arm Base O.D.
D2 = Arm End O.D.
L1 = Shaft Length
Lc = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

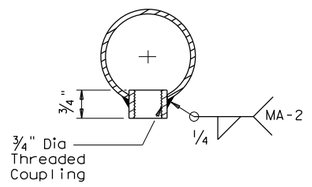
CLAMP-ON ARM CONNECTION

ILSN Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Sch 40 pipe Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
3	.216	10	4	¾	2

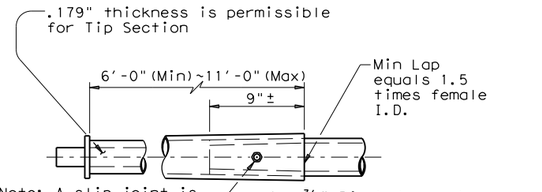
Mast Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Base Dia	Thick			Dia	No.
in.	in.	in.	in.	in.	ea
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 ¼	3
9.5	.239	18	12	1 ¼	3
10.0	.239	18	12	1 ¼	3
10.5	.239	18	12	1 ¼	3
11.0	.239	18	12	1 ¼	3
11.5	.239	18	12	1 ¼	3



ARM COUPLING DETAIL



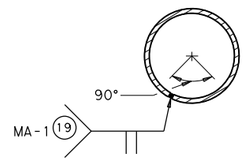
ILSN ARM COUPLING DETAIL



SLIP JOINT DETAIL (CLAMP-ON ARM)

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm.
60% Min penetration
100% penetration within 6" of circumferential base welds.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 ½" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 ½" diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and ¾" diameter pipe shall have 3/16" diameter holes for a 1/8" diameter galvanized cotter pin. Back clamp plate shall be furnished with a ¾" diameter hole for each pin bolt. An 11/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY (50 TO 65 FT) (80 AND 100 MPH WIND ZONE)

Sheet 4 of 5 LMA(4)-12

DN: JK	CK: GRB	DW: FDN	CK: CAL

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1-12

CONT	SECT	JOB	HIGHWAY
171	5	101	SH 199
DIST	COUNTY		SHEET NO.
FTW	TARRANT		98

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Shipping Parts List

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

Nominal Arm Length	30' Poles with Luminaire: See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex		24' Poles with ILSN: See note above plus one small hand hole		19.50' (Single Mast Arm) 20.25' (Dual Mast Arm) Poles with no Luminaire and no ILSN: See note above	
Single Mast Arm						
Lf ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50	50L		50S		50	
55	55L		55S		55	
60	60L	1	60S		60	
65	65L	1	65S		65	
Dual Mast Arm						
Lf ft. / Lc ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50 / 20	5020L		5020S		5020	
50 / 24	5024L		5024S		5024	
50 / 28	5028L		5028S		5028	
50 / 32	5032L		5032S		5032	
50 / 36	5036L		5036S		5036	
50 / 40	5040L		5040S		5040	
50 / 44	5044L		5044S		5044	
55 / 20	5520L		5520S		5520	
55 / 24	5524L		5524S		5524	
55 / 28	5528L		5528S		5528	
55 / 32	5532L		5532S		5532	
55 / 36	5536L		5536S		5536	
55 / 40	5540L		5540S		5540	
55 / 44	5544L		5544S		5544	
60 / 20	6020L		6020S		6020	
60 / 24	6024L		6024S		6024	
60 / 28	6028L		6028S		6028	
60 / 32	6032L		6032S		6032	
60 / 36	6036L		6036S		6036	
60 / 40	6040L		6040S		6040	
60 / 44	6044L		6044S		6044	
65 / 20	6520L		6520S		6520	
65 / 24	6524L		6524S		6524	
65 / 28	6528L		6528S		6528	
65 / 32	6532L		6532S		6532	
65 / 36	6536L		6536S		6536	
65 / 40	6540L		6540S		6540	
65 / 44	6544L		6544S		6544	

Foundation Summary Table **

Location Ident.	Avg. N Blow/ft.	No. Each	Drill Shaft *** Length (feet)
			48-A
SH 199 AT BELKNAP T-1			22
SH 199 AT BELKNAP T-3			22
Total Drill Shaft Length			44

Notes

** Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

*** Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Shipping Parts List

Traffic Signal Arms (Fixed Mount) (1 per pole)
Ship each arm with listed equipment attached

Nominal Arm Length	Type IV Arm (4 Signals) 3 Bracket Assembly and 4 CGB Connectors	
ft.	Designation	Quantity
50	50IV	
55	55IV	
60	60IV	1
65	65IV	1

Luminaire Arms (1 per 30' pole)

Nominal Arm Length	Quantity
8' Arm	2

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7' Arm	
9' Arm	

Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	

Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached

Nominal Arm	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp	
ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100					
24	24I-100		24II-100			
28	28I-100		28II-100			
32			32II-100		32III-100	
36			36II-100		36III-100	
40					40III-100	
44					44III-100	

Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
2 1/2 "	5' - 3"	2

Each anchor bolt assembly consists of the following: Top and bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers and 4 nut anchor devices (type 2) per Standard Drawing "TS-FD". Templates may be removed for shipment.

Abbreviations
Lf= Fixed Arm Length
Lc= Clamp-on Arm Length (44' Max.)

Texas Department of Transportation
Traffic Operations Division

LONG MAST ARM ASSEMBLY PARTS LIST

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CONT	SECT	JOB	HIGHWAY
171	5	101	SH 199
DIST	COUNTY		SHEET NO.
FTW	TARRANT		99

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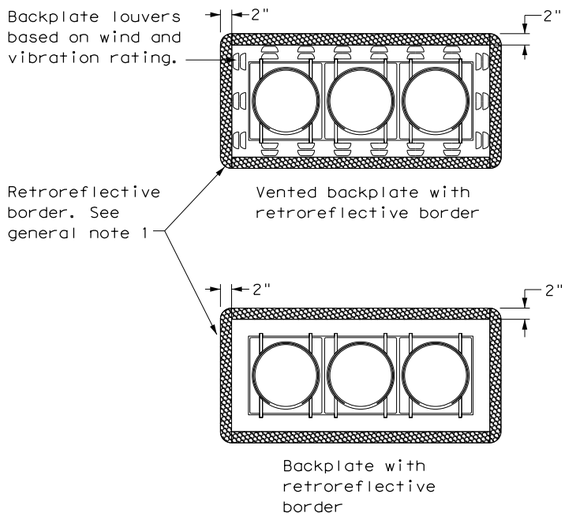
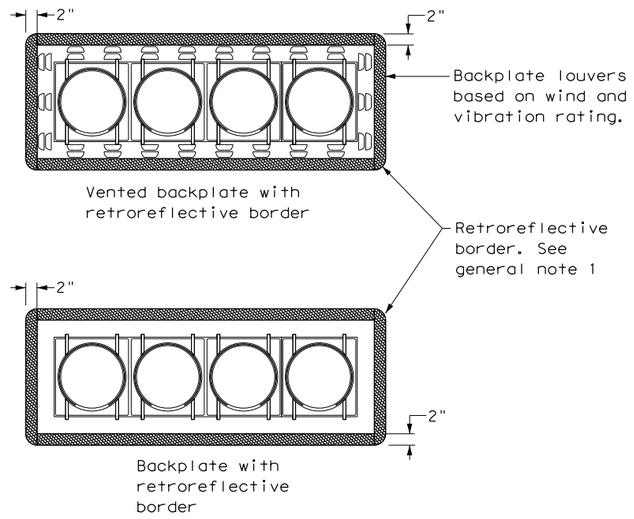
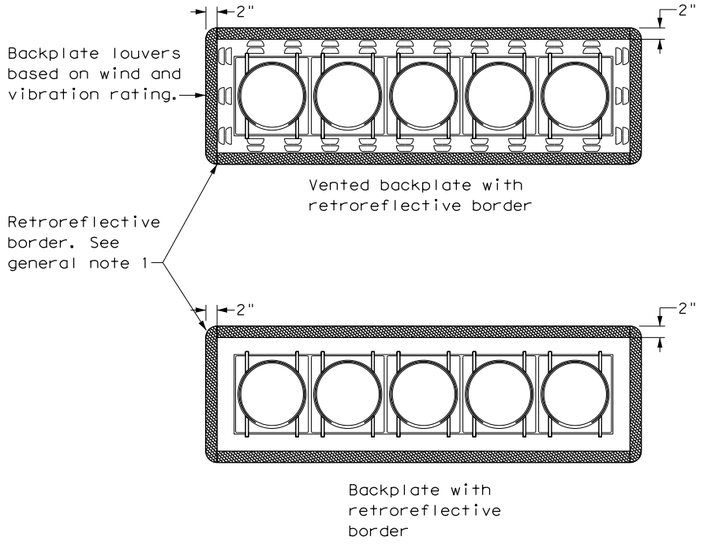


THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
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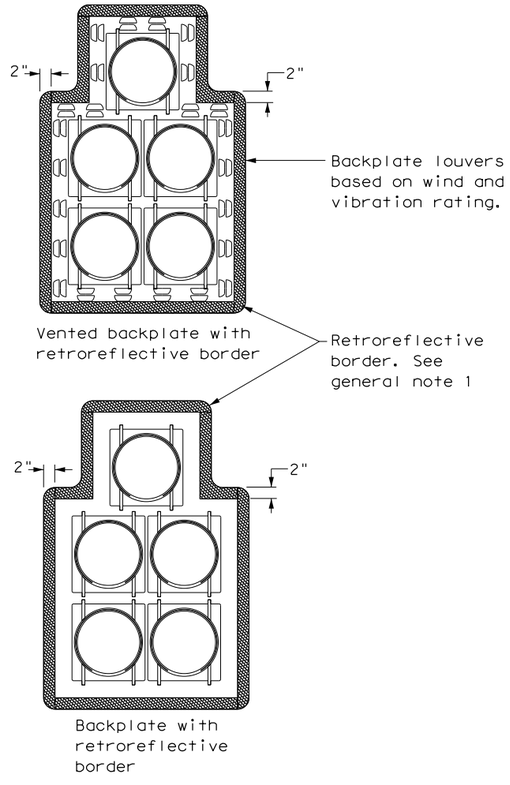
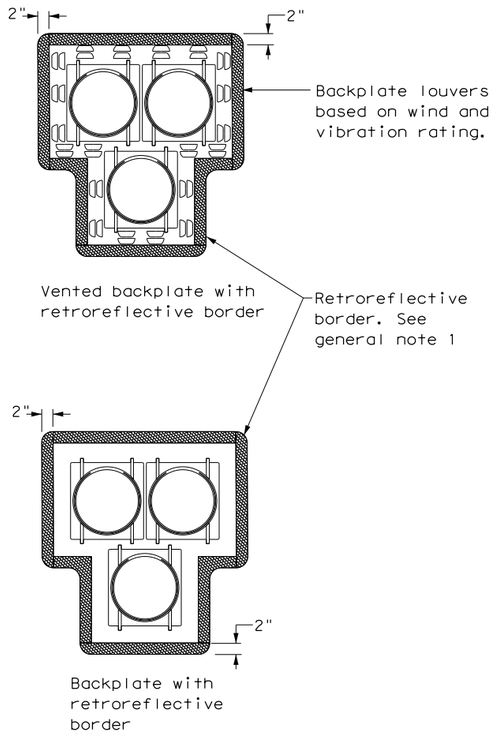


FIVE-SECTION HEAD
CLUSTER



PEDESTRIAN HYBRID
BEACON

GENERAL NOTES:

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

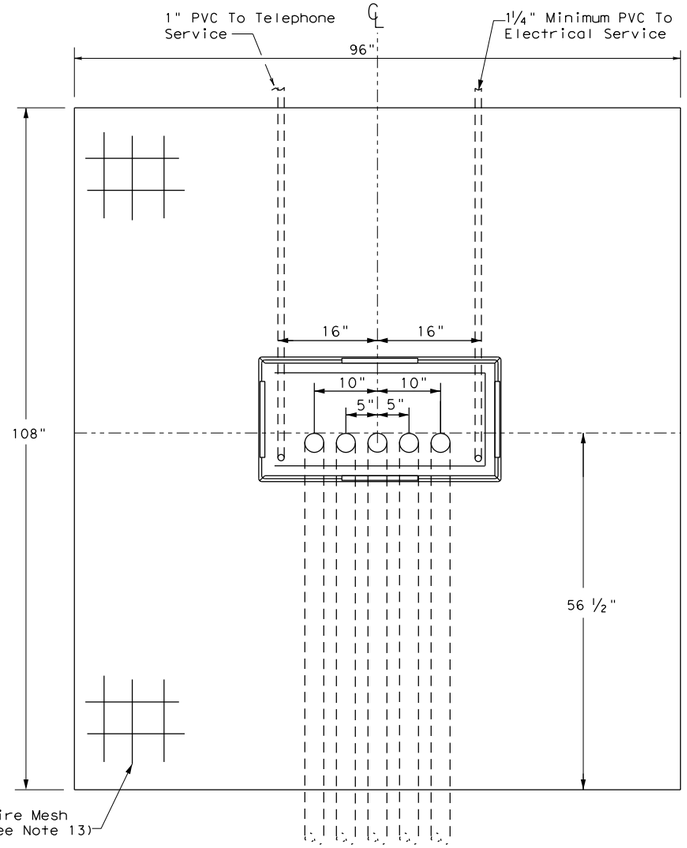
Texas Department of Transportation

Traffic Safety Division Standard

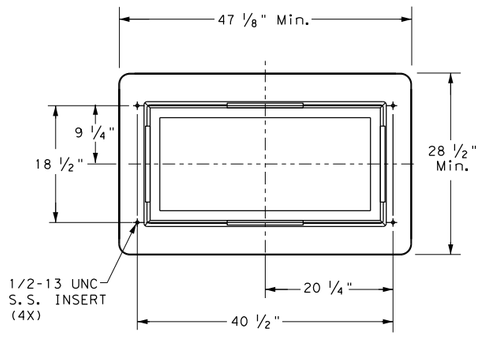
TRAFFIC SIGNAL HEAD WITH BACKPLATE

TS-BP-20

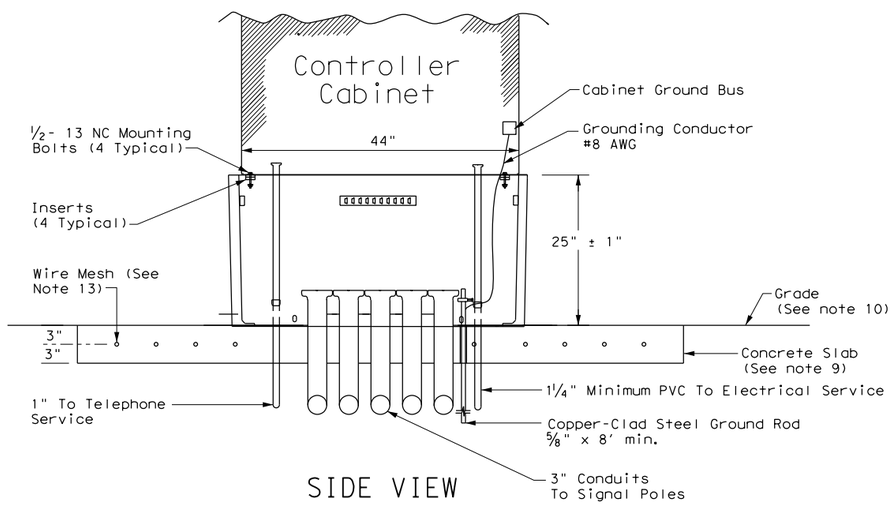
FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	171	5	101	SH 199
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		100



TOP VIEW



CABINET BASE



SIDE VIEW

TRAFFIC SIGNAL CONTROLLER BASE:

1. Provide a traffic signal controller base (cabinet base) manufactured of polymer concrete material consisting of calcareous and siliceous stone; glass fibers and thermoset polyester resin. The polymer concrete cabinet base must be reinforced on the inside of the cabinet base with fiberglass matting. Provide one of the following bases: Armorcast Part # A6001848X24, Quazite Model # PG3048Z709, or other as approved by TxDOT Traffic Safety Division.
2. The polymer concrete material must have a minimum compressive strength of 10,300 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard TxDOT basemount cabinet.
4. Supply the cabinet base with four 1#2"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-lb and a minimum straight pull out strength of 750 lbs.
5. Provide the cabinet base with 4 cable racks mounted one on each side of the base 2" to 7 " from the top edge of the base. Unless approved otherwise, cable racks must be 1-1/2 x 9#16x 3#16inch steel channel with eight T-slots spaced at 1-1/2 inches. The cable racks must easily accommodate the insertion of tie wraps to attach field wiring to the racks to serve as strain relief. Secure cable racks to the base using 1#2"-13 UNC stainless steel screws and inserts.
6. The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 850 lb force applied at 49" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must supply certification by an independent testing laboratory or sealed by a Texas Licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
7. The traffic signal base must be permanently marked either by impress or by permanent ink with the manufacturer's model number and name or logo.
8. Seal the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's instructions.

CONCRETE SLAB:

9. Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to the dimensions shown, and must be level.
10. Grade earthwork such that it is flush with the concrete pad on all four sides, unless otherwise shown on the plans. Subsidiary to ITEM 680, four inch rip rap may be used in lieu of earthwork. Slopes shall gradually contour to match plans.
11. Bond a #8 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL Listed clamp and terminated to the cabinet grounding bus for the purpose of providing a local ground for the electrical grounding conductor. The electrical grounding conductor specified in Item 680-3.A.4 is required and must be terminated to the cabinet ground bus.
12. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
13. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
14. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

15. Stub up and run 3-inch conduits through the slab to the various traffic signal poles and ground boxes as shown on the layouts. Install the number of conduits as shown on layouts plus two additional 3 inch conduits for future use. Terminate the conduits with a bushing between 2 and 4-inches above the slab.
16. Extend conduits for future use at least 18-inches from the edge of the slab, terminate underground with a coupling, and cap and seal so that the seal can be removed without damaging the coupling. This must also apply to unused telephone conduit.
17. Stub up two separate conduits through the slab from the electrical and telephone services. Run the conduit for the electrical feed directly to the electrical service enclosure. Run the conduit for the telephone line directly to the telephone service, usually located on the same pole as the electrical service. Telephone must not under any circumstance share a conduit with any other function.
18. Terminate electric and telephone conduits above the slab with a coupling. After the base is installed, extend the conduits above the top of the base and secure to the base using a steel one-hole strap or similar suitable substitute.

CONTROLLER CABINET:

19. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
20. The silicone caulk bead specified in Item 680.3.B must be RTV 133.

PAYMENT:

21. Bid TS-CF as subsidiary to Item 680.

Texas Department of Transportation

Traffic Safety Division Standard

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD

TS-CF-21

FILE: ts-cf-21.dgn	DN:	CK:	DW:	CK:
© TxDOT October 2000	CONT	SECT	JOB	HIGHWAY
REVISIONS	171	5	101	SH 199
12-04	DIST	COUNTY		SHEET NO.
2-21	FTW	TARRANT		101

132

DATE:
FILE:

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DATE:
FILE:

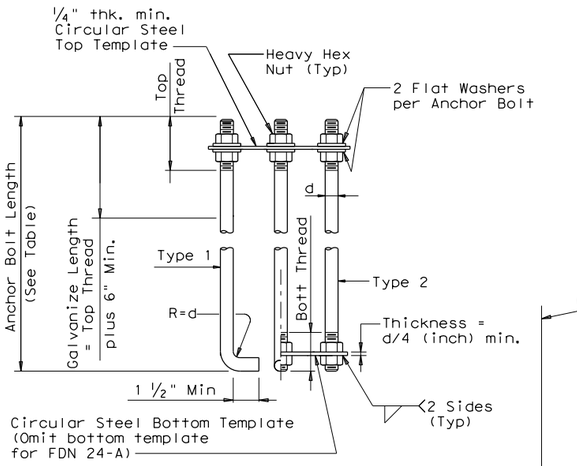
FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft (4), (5), (6)			ANCHOR BOLT DESIGN (1)				FOUNDATION DESIGN LOAD (2)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	¾"	36	12 ¾"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 ½"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 ¾"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 ¼"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

		FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	32'	48'		
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'			
		28' X 28'			
		32' X 28'	32' X 32'		
			36' X 36'		
			40' X 36'		
			44' X 28'	44' X 36'	
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH		36'	44'	
	MAXIMUM DOUBLE ARM LENGTH COMBINATIONS		24' X 24'		
			28' X 28'		
			32' X 24'	32' X 32'	
				36' X 36'	
				40' x24'	40' X 36'
					44' x 36'

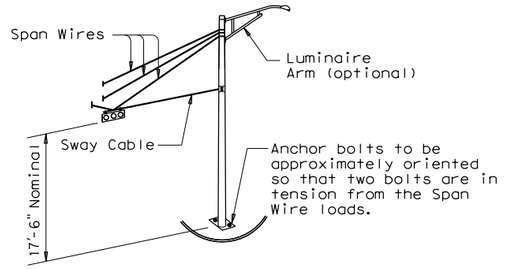
EXAMPLE:
1. For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
2. For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



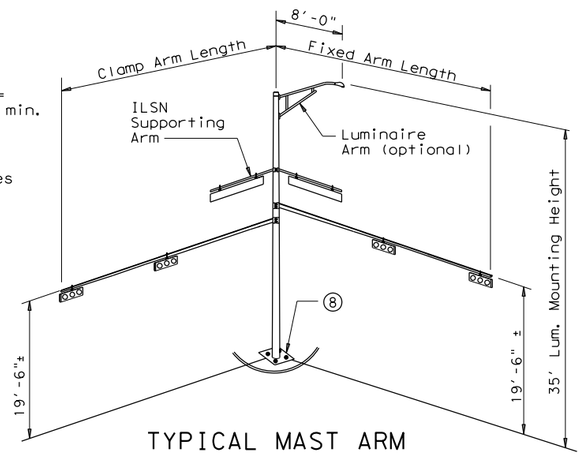
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

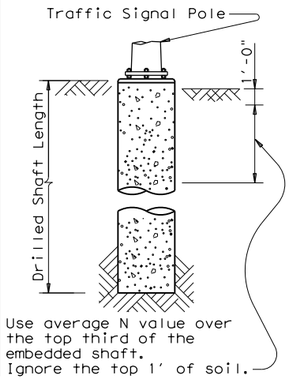
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL STRAIN POLE ASSEMBLY



TYPICAL MAST ARM ASSEMBLY



NOTES:

① Anchor bolt design develops the foundation capacity given under Foundation Design Loads.

② Foundation Design Loads are the allowable moments and shears at the base of the structure.

③ Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.

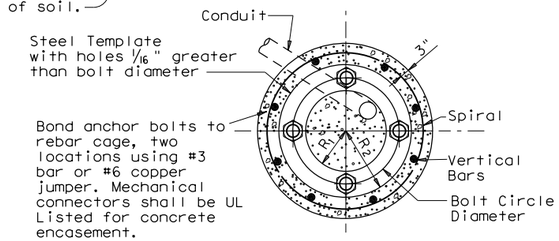
④ Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.

⑤ If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.

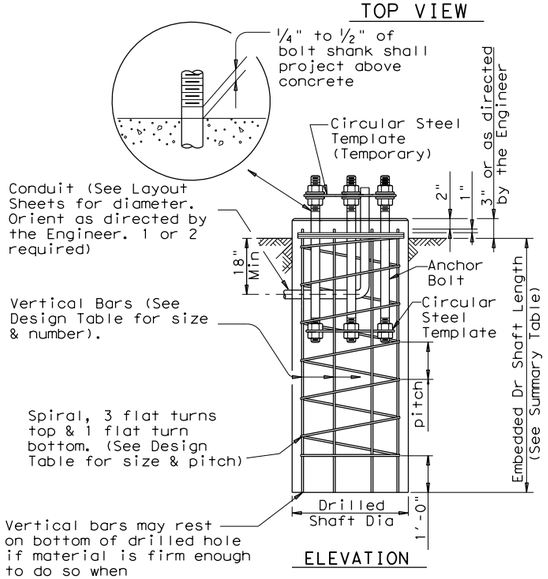
⑥ Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

ANCHOR BOLT & TEMPLATE SIZES						
BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given, longer bolts are acceptable.



TOP VIEW



ELEVATION

FOUNDATION DETAILS

FOUNDATION SUMMARY TABLE ③

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH ⑥ (FEET)				
				24-A	30-A	36-A	36-B	42-A
ROBERTS CUT OFF								
T-1		36-A	1			14		
T-2		30-A	1		12			
T-3		36-A	1			14		
T-4		30-A	1		12			
P-1		24-A	1	6				
P-2		24-A	1	6				
P-3		24-A	1	6				
P-4		24-A	1	6				
SKYLINE DR								
T-1		36-A	1			14		
T-2		30-A	1		12			
T-3		36-A	1			14		
T-4		30-A	1		12			
P-1		24-A	1	6				
P-2		24-A	1	6				
BELKNAP ST								
T-1		48-A	1					
T-2		30-A	1		12			
T-3		48-A	1					
P-1		24-A	1	6				
P-2		24-A	1	6				
P-3		24-A	1	6				
TOTAL DRILLED SHAFT LENGTHS				54	60	56		

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

REVISIONS	DN: MS	CK: JSY	DW: MAO/MMF	CK:JSY/TEB
5-96 11-98 1-12	CONT	SECT	JOB	HIGHWAY
	171	5	101	SH 199
	DIST	COUNTY		SHEET NO.
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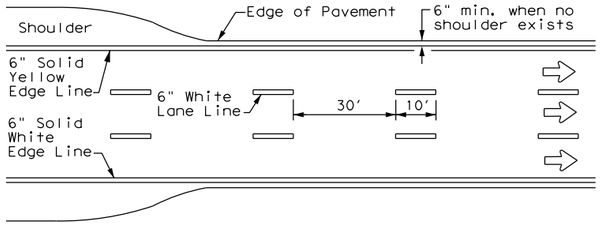
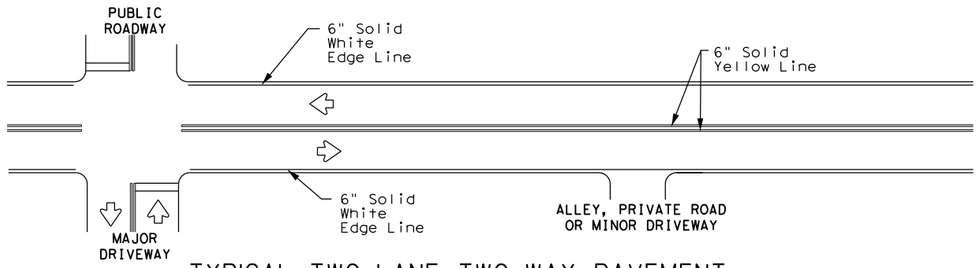
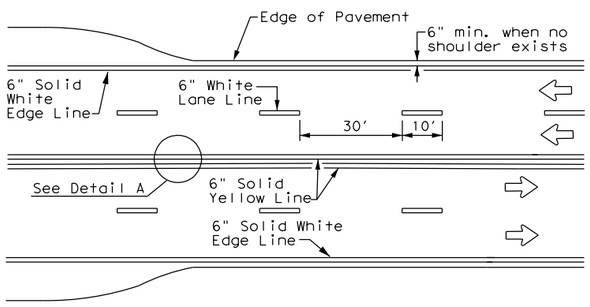
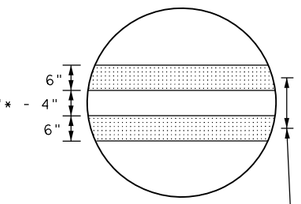


EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



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





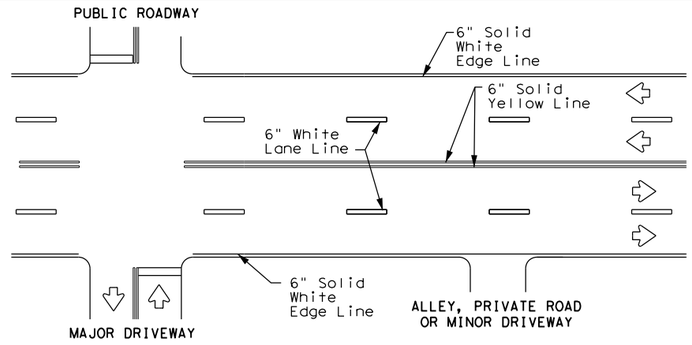
DETAIL "A"

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

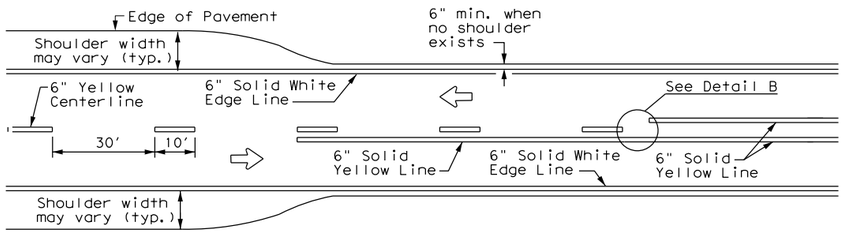
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

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

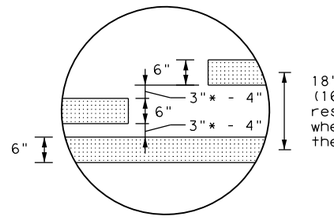
** 8" minimum for restripe projects when approved by the Engineer.



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



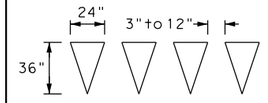
TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



18" min. - 20" max.
(16" minimum for restripe projects when approved by the Engineer.)

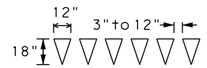
DETAIL "B"

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

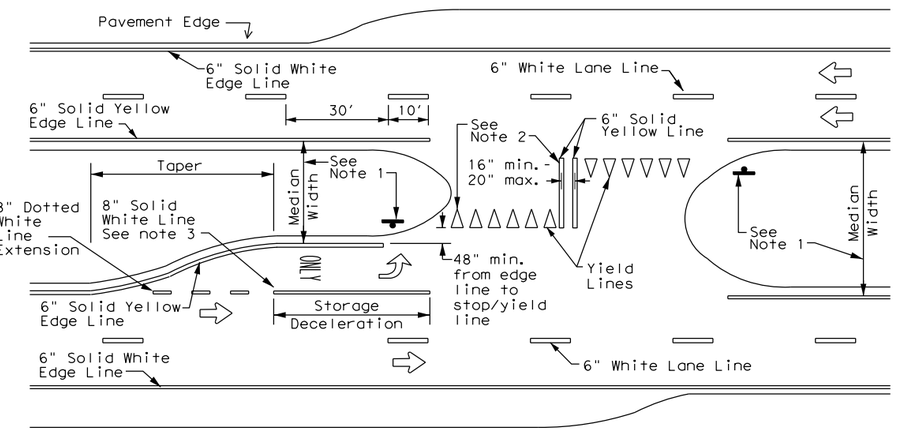


For posted speed on road being marked equal to or greater than 45 MPH.

YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

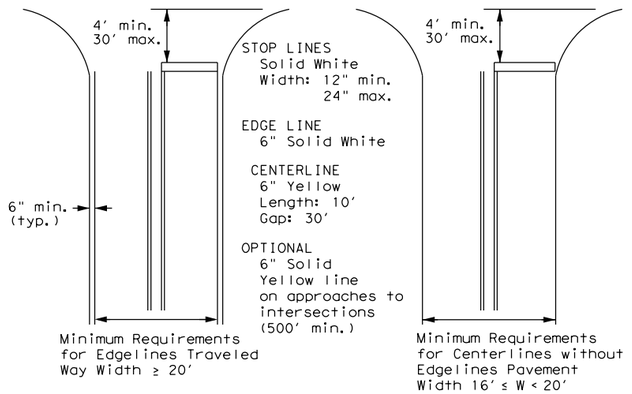
GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths
for Undivided Roadways

Texas Department of Transportation

Traffic Safety Division Standard

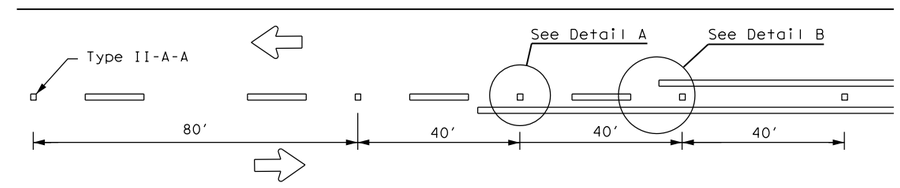
TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-22

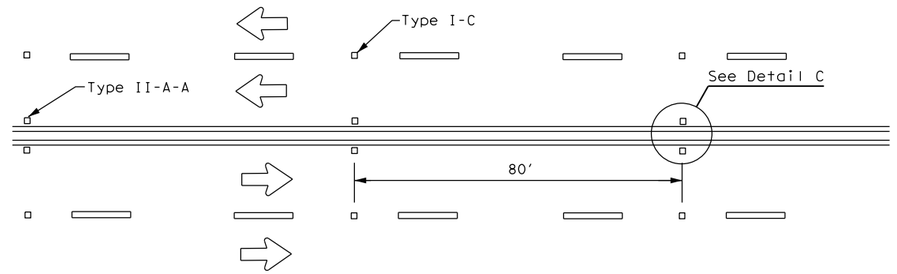
FILE: pm1-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 11-78 8-00 6-20 8-95 3-03 12-22 5-00 2-12	171	5	101	SH 199
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		103

22A

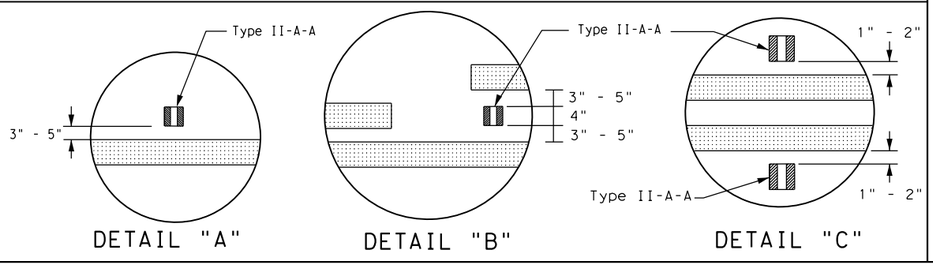
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



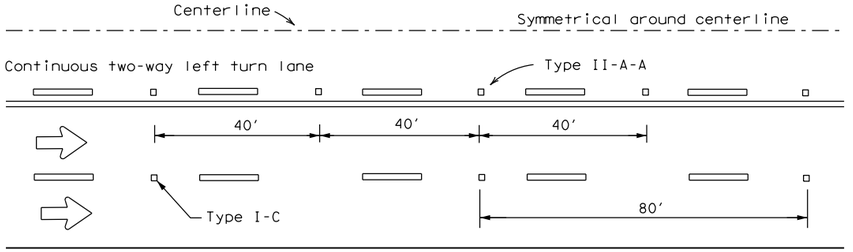
CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



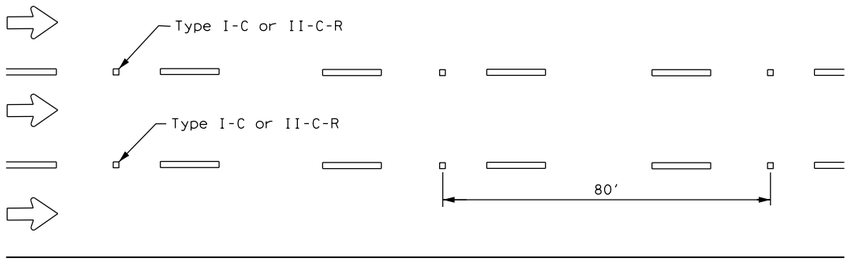
CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS



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



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



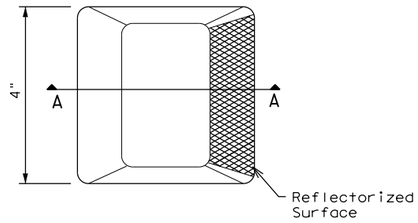
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

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

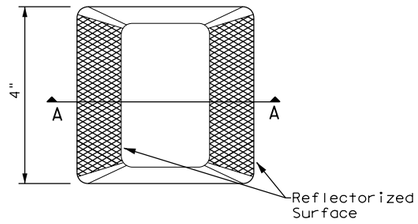
See Note 3.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

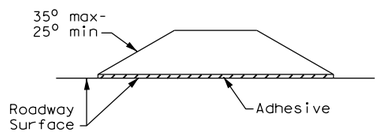
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

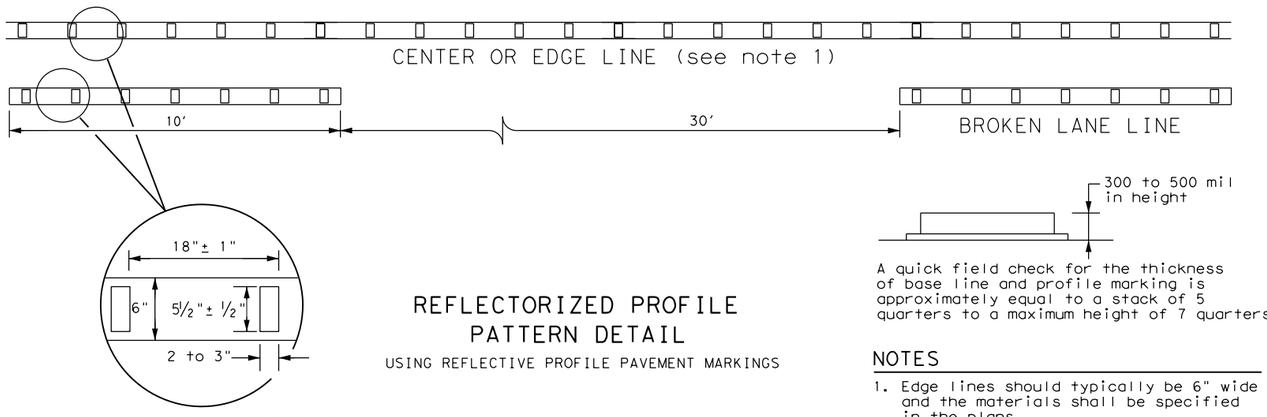


Type II (Top View)



SECTION A

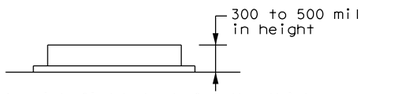
RAISED PAVEMENT MARKERS



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

REFLECTORIZED PROFILE
PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



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

NOTES

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Safety Division Standard

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

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	171	5	101	SH 199
4-77 8-00 6-20	DIST	COUNTY		SHEET NO.
4-92 2-10 12-22	FTW	TARRANT		104
5-00 2-12				

22B

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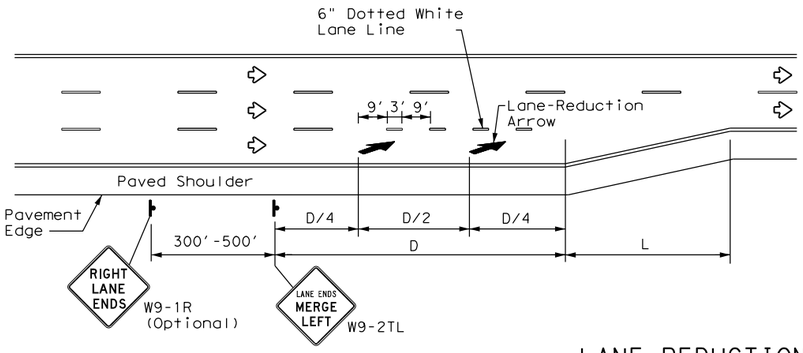
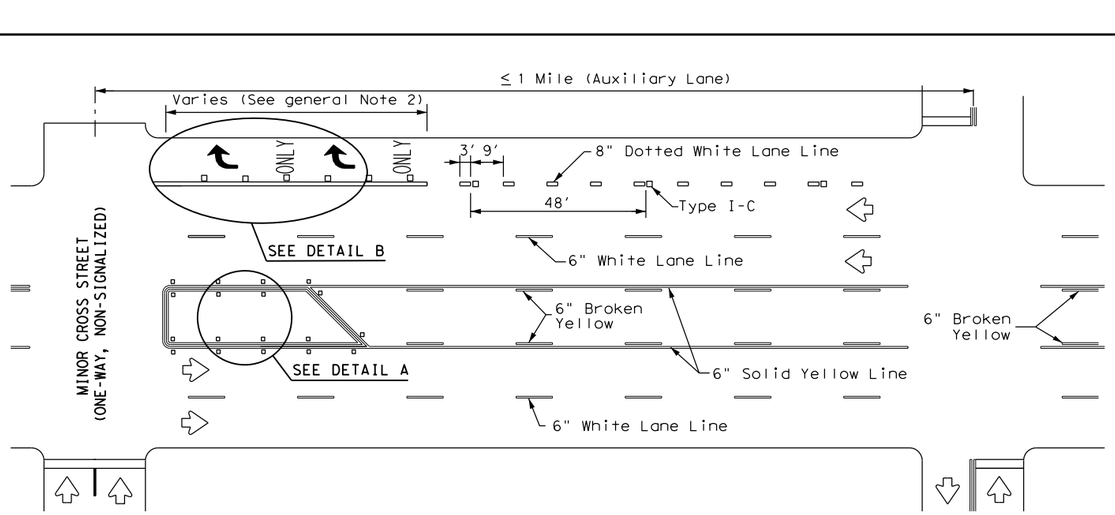


LANE REDUCTION

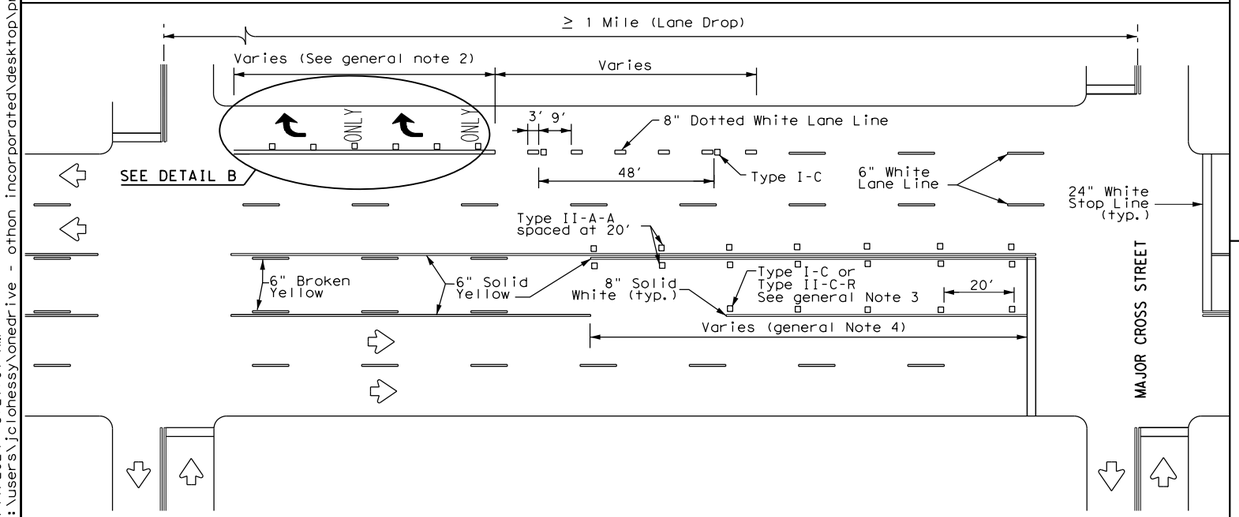
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

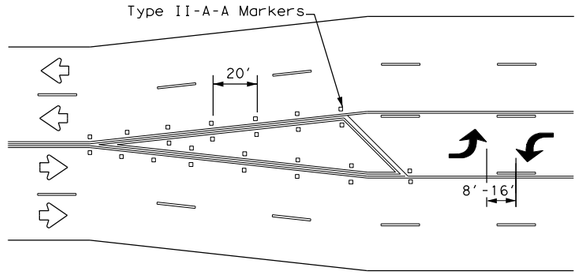
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	



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



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



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

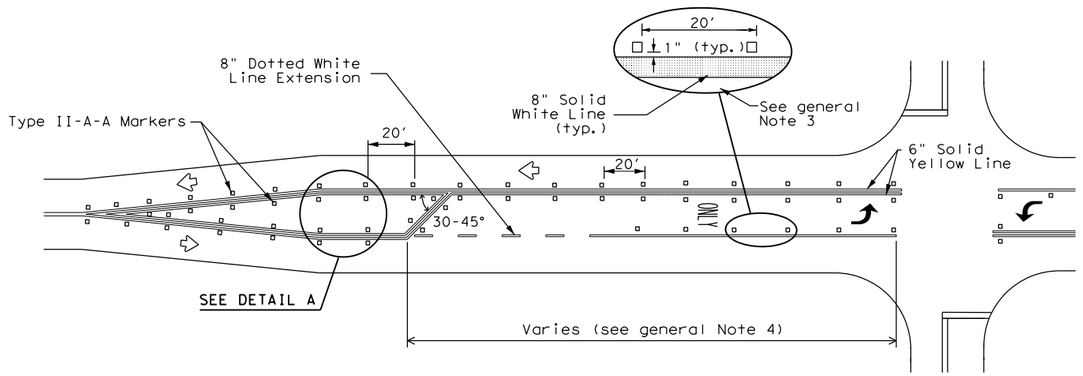
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

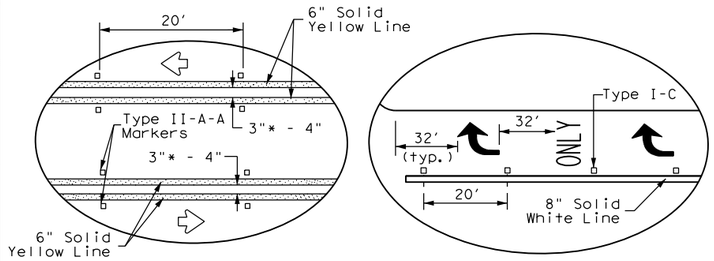
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



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

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS

PM(3)-22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
©TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-98 3-03 6-20 5-00 2-10 12-22 8-00 2-12	171	5	101	SH 199
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		105

22C

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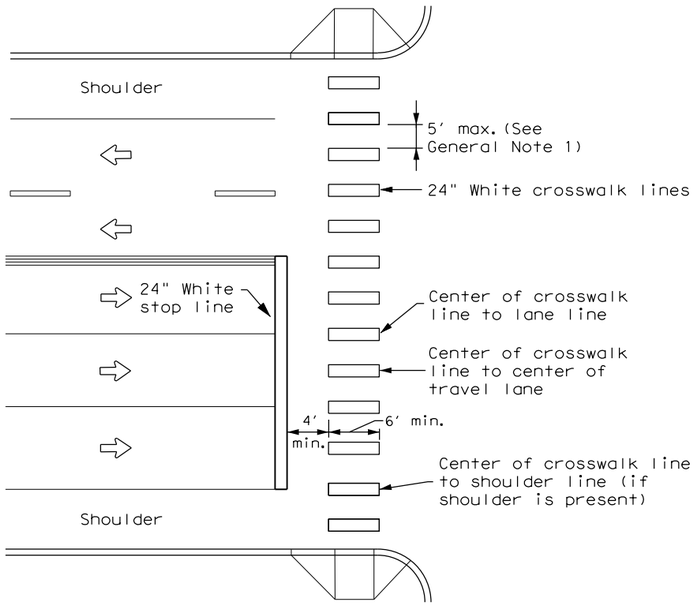


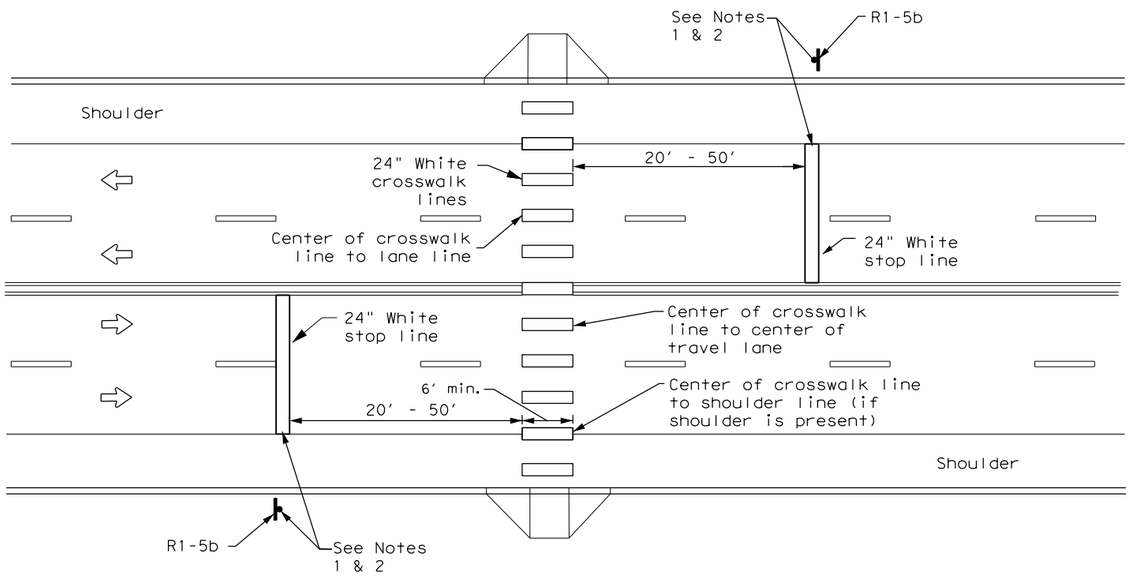
HIGH-VISIBILITY LONGITUDINAL CROSSWALK
AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6′ wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY
LONGITUDINAL CROSSWALK

NOTES:

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

Texas Department of Transportation

Traffic Safety Division Standard

CROSSWALK PAVEMENT MARKINGS

PM(4)-22A

FILE: pm4-22a.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	171	5	101	SH 199
6-20	DIST	COUNTY		SHEET NO.
6-22	FTW	TARRANT		106
12-22				
22D				

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

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

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

1.0 SITE/PROJECT DESCRIPTION

1.1 PROJECT CONTROL SECTION JOB (CSJ):

0717-05-101

1.2 PROJECT LIMITS:

From:ROBERTS RD

To:HENDERSON AT BELKNAP ST

1.3 PROJECT COORDINATES:

BEGIN: (Lat)32.804958, (Long)-97.413222

END: (Lat)32.753583, (Long)-97.338519

1.4 TOTAL PROJECT AREA (Acres):13.54

1.5 TOTAL AREA TO BE DISTURBED (Acres): 0.28

1.6 NATURE OF CONSTRUCTION ACTIVITY:

IMPROVE TRAFFIC SIGNALS, INSTALL PEDESTRIAN SIGNAL

1.7 MAJOR SOIL TYPES:

Soil Type	Description

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

☐ PSLs determined during preconstruction meeting
☐ PSLs determined during construction
☒ No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

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

1.10 POTENTIAL POLLUTANTS AND SOURCES:

☐ Sediment laden stormwater from stormwater conveyance over disturbed area
☒ Fuels, oils, and lubricants from construction vehicles, equipment, and storage
☒ Solvents, paints, adhesives, etc. from various construction activities
☒ Transported soils from offsite vehicle tracking
☒ Construction debris and waste from various construction activities
☐ Contaminated water from excavation or dewatering pump-out water
☐ Sanitary waste from onsite restroom facilities
☒ Trash from various construction activities/receptacles
☒ Long-term stockpiles of material and waste
☐
☐ Other: _____
☐ Other: _____
☐ Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody

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

1.12 ROLES AND RESPONSIBILITIES: TxDOT

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

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

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

STATE OF TEXAS
GREGORIO GARCIA
101077
LICENSED
PROFESSIONAL ENGINEER

04/11/2024

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

July 2023 Sheet 1 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		107
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	TARRANT	
CONT.	SECT.	JOB	HIGHWAY NO.
0171	05	101	SH 199

STORMWATER POLLUTION PRVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- ☐ X Protection of Existing Vegetation
- ☐ ☐ Vegetated Buffer Zones
- ☐ ☐ Soil Retention Blankets
- ☐ ☐ Geotextiles
- ☐ ☐ Mulching/ Hydromulching
- ☐ ☐ Soil Surface Treatments
- ☐ ☐ Temporary Seeding
- ☐ X Permanent Planting, Sodding or Seeding
- X ☐ Biodegradable Erosion Control Logs
- ☐ ☐ Rock Filter Dams/ Rock Check Dams
- ☐ ☐ Vertical Tracking
- ☐ ☐ Interceptor Swale
- ☐ ☐ Riprap
- ☐ ☐ Diversion Dike
- ☐ ☐ Temporary Pipe Slope Drain
- ☐ ☐ Embankment for Erosion Control
- ☐ ☐ Paved Flumes
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____
- ☐ ☐ Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- X Excess dirt/mud on road removed daily
- ☐ Haul roads dampened for dust control
- ☐ Loaded haul trucks to be covered with tarpaulin
- X Stabilized construction exit
- ☐ Daily street sweeping
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- ☐ Chemical Management
- X Concrete and Materials Waste Management
- X Debris and Trash Management
- X Dust Control
- ☐ Sanitary Facilities
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____
- ☐ Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

- X Fire hydrant flushings
- X Irrigation drainage
- X Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- X Potable water sources
- X Springs
- X Uncontaminated groundwater
- X Water used to wash vehicles or control dust
- X Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 DEWATERING:

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.10 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.

STATE OF TEXAS
GREGORIO GARCIA
101077
LICENSED
PROFESSIONAL ENGINEER

04/11/2024

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

July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
6	SEE TITLE SHEET		108
STATE	STATE DIST.	COUNTY	
TEXAS	FTW	TARRANT	
CONT.	SECT.	JOB	HIGHWAY NO.
0171	05	101	SH 199

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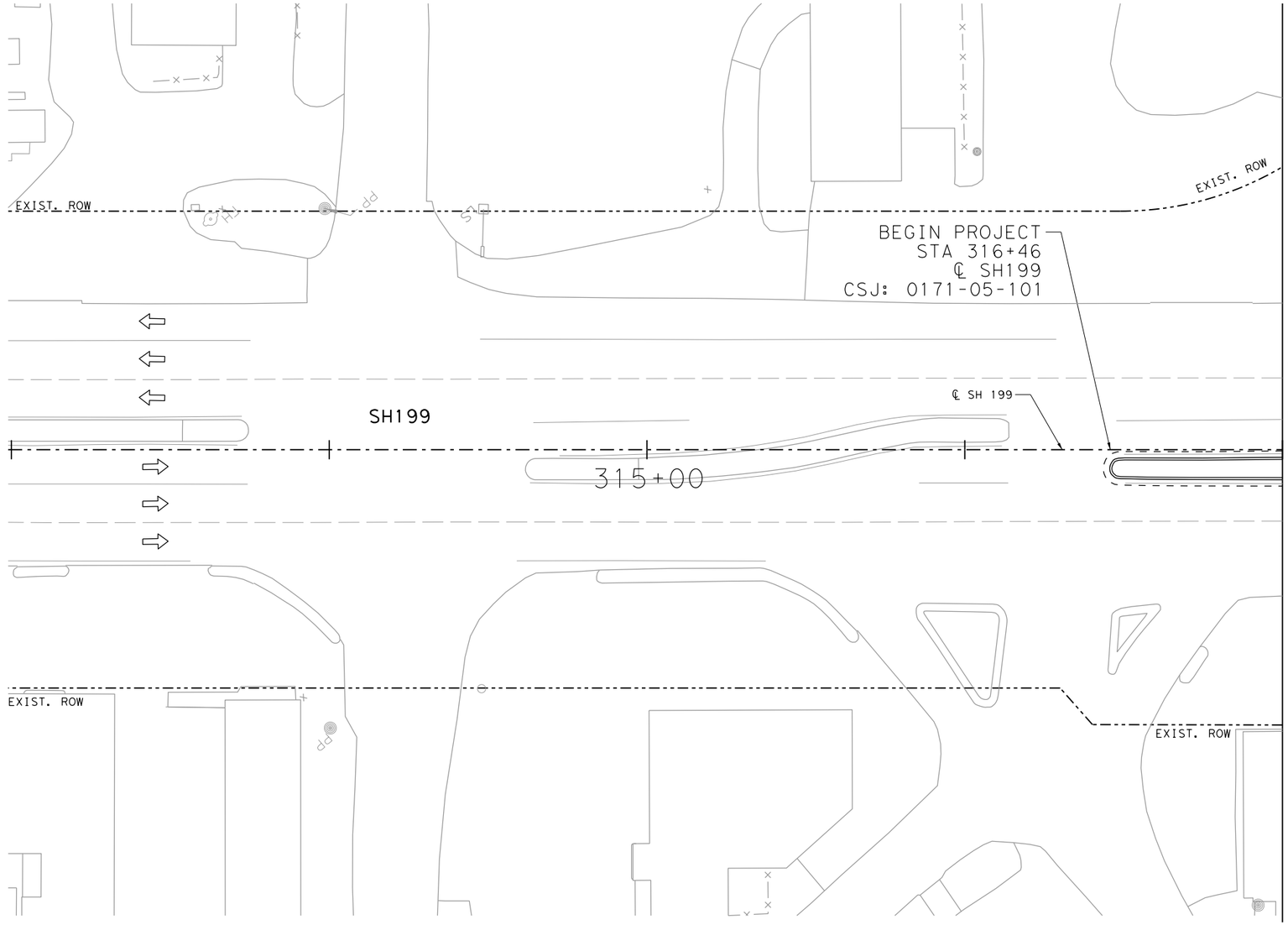

LEGEND

- 8" DIAMETER EROSION CONROL LOG
- 12" DIAMETER EROSION CONROL LOG
- DRAINAGE FLOW ARROW
- TRAFFIC FLOW

NOTES:

1. REFER TO SW3P STANDARD SHEETS FOR DETAILS.
2. INSTALLED MEASURES SHALL REMAIN IN PLACE AND SHALL BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY THE ENGINEER.
3. SW3P MEASURES ARE SHOWN ARE MINIMUM REQUIRMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE AS SHOWN AND MODIFIED TO ACCOMMODATE ACTUAL FIELD CONDITIONS.
4. CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRUCTION EXIT WILL BE 75 SY (50'X14') REFER TO STANDARD EC(3) FOR DETAILS.

0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GREGORIO GARCIA
101077
LICENSED
PROFESSIONAL ENGINEER

04/11/2024

DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Sulte 650, Dallas, TX 75234
Phone: (469)901-8500
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TBPE Registration No, F-2677

SANCHEZ-SALAZAR & ASSOCIATES, LLC
4630 N. Loop 1604 W., Ste, 115 San Antonio, TX 78249
Phone: (210) 314-5458
TBPE Registration No, 15685

SH 199

SW3P LAYOUT

AT ROBERTS CUT OFF RD

BEGIN PROJECT TO STA 317+00

SHEET 1 OF 3

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
SSA	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
SSA	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	109
SSA	0171	05	101	
VERIFIED BY				
SSA				

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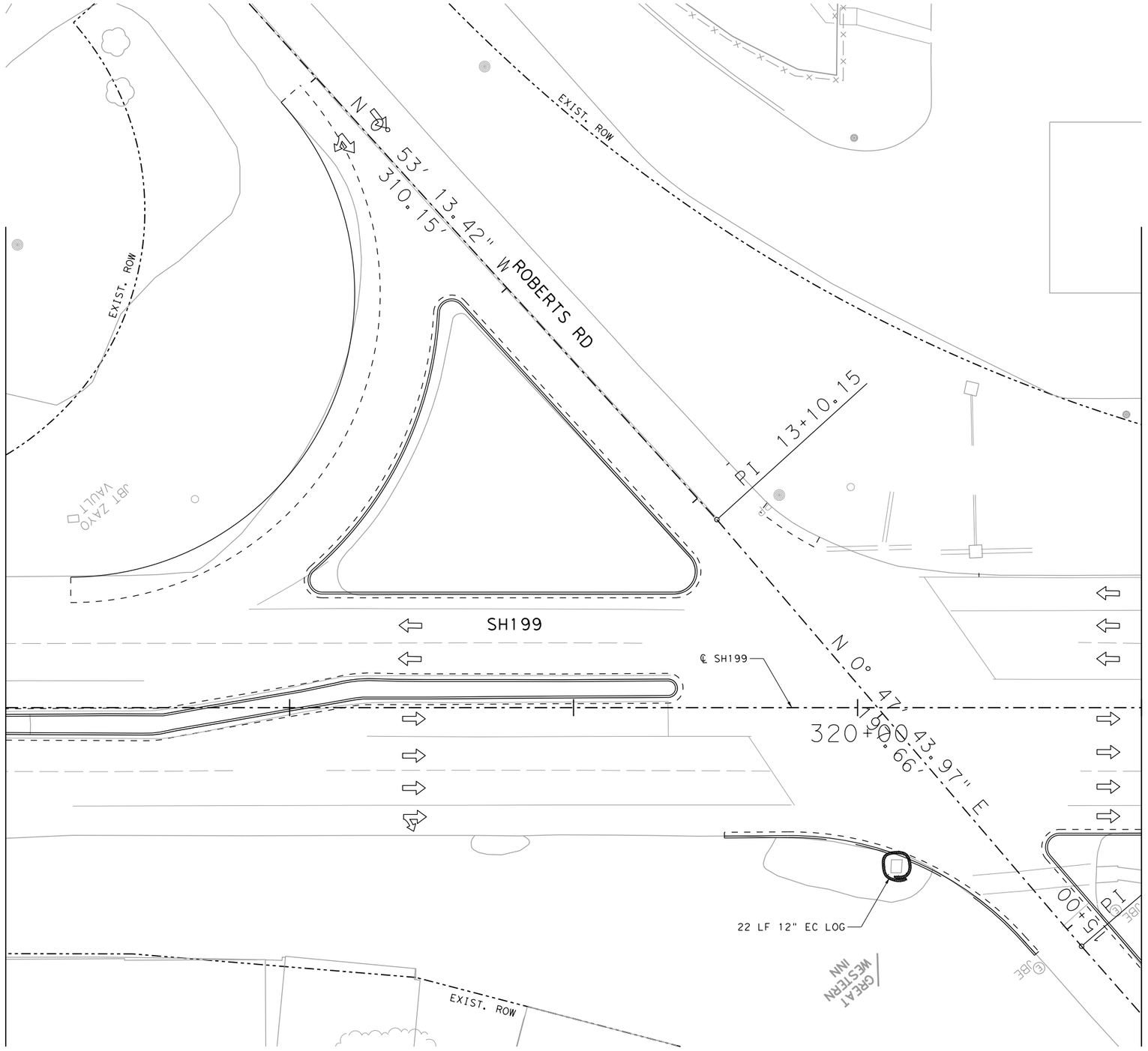

LEGEND

- 8" DIAMETER EROSION CONROL LOG
- 12" DIAMETER EROSION CONROL LOG
- DRAINAGE FLOW ARROW
- TRAFFIC FLOW

NOTES:

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0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GREGORIO GARCIA
101077
LICENSED
PROFESSIONAL ENGINEER

04/11/2024

DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650, Dallas, TX 75234
Phone: (469)801-8500
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TBPE Registration No, F-2677

SANCHEZ-SALAZAR & ASSOCIATES, LLC
4630 N, Loop 1604 W., Ste, 115 San Antonio, TX 78249
Phone: (210) 314-5458
TBPE Registration No, 15685

SH 199

SW3P LAYOUT

AT ROBERTS CUT OFF RD

STA 317+00 TO STA 321+00

SHEET 2 OF 3

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
SSA	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
SSA	TEXAS	FTW	TARRANT	110
CHECKED BY	CONTROL	SECTION	JOB	
SSA	0171	05	101	
VERIFIED BY				
SSA				

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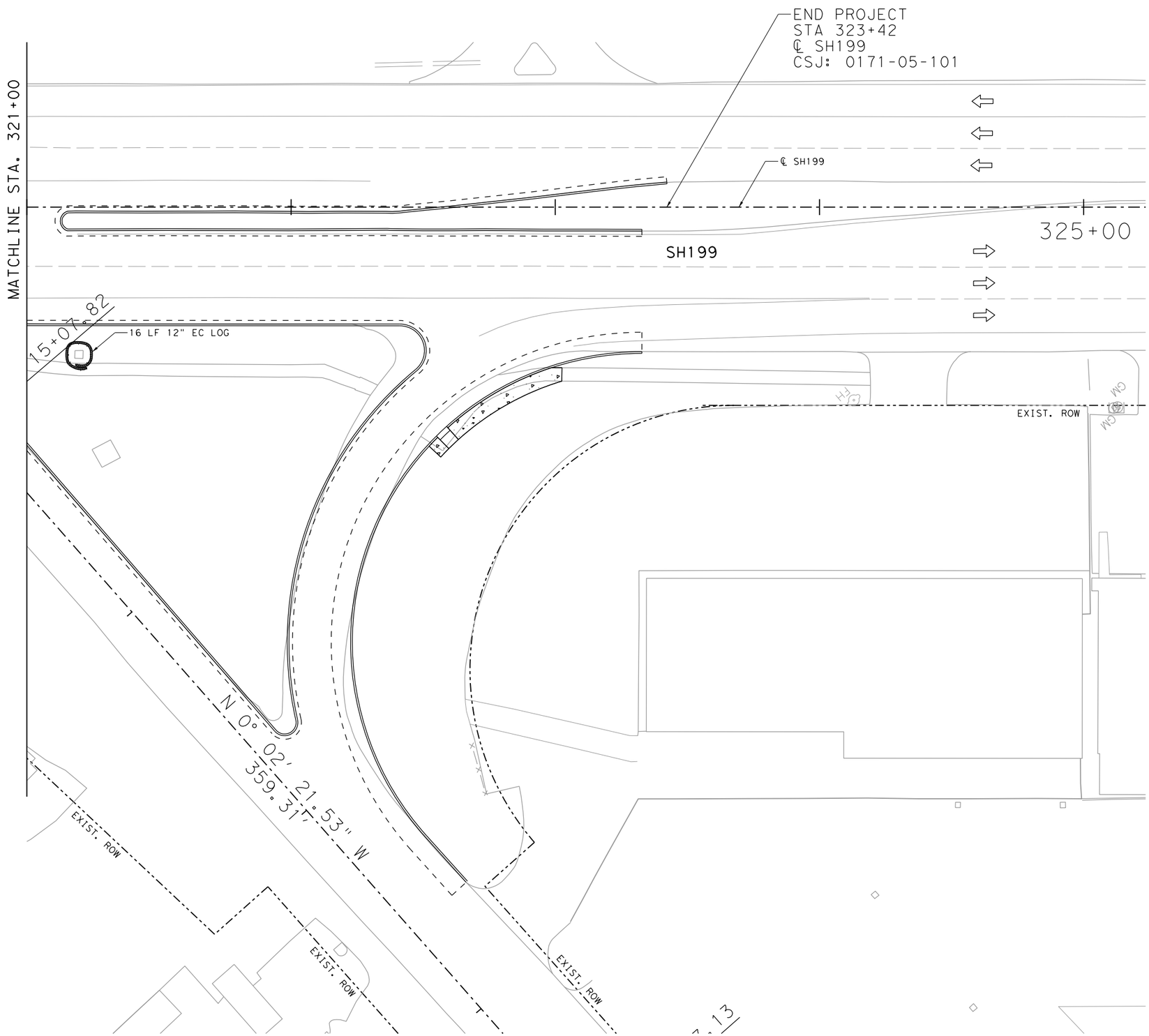
DATE:4/11/2024 TIME:11:22:49 AM USER:rortiz

90% SUBMITTAL



LEGEND

- 8" DIAMETER EROSION CONROL LOG
- 12" DIAMETER EROSION CONROL LOG
- DRAINAGE FLOW ARROW
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NOTES:

1. REFER TO SW3P STANDARD SHEETS FOR DETAILS.
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0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GREGORIO GARCIA
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LICENSED
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04/11/2024

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SH 199

SW3P LAYOUT

AT ROBERTS CUT OFF RD

STA 321+00 TO END PROJECT

SHEET 3 OF 3

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
SSA	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
SSA	TEXAS	FTW	TARRANT	111
CHECKED BY	CONTROL	SECTION	JOB	
SSA	0171	05	101	
VERIFIED BY				
SSA				

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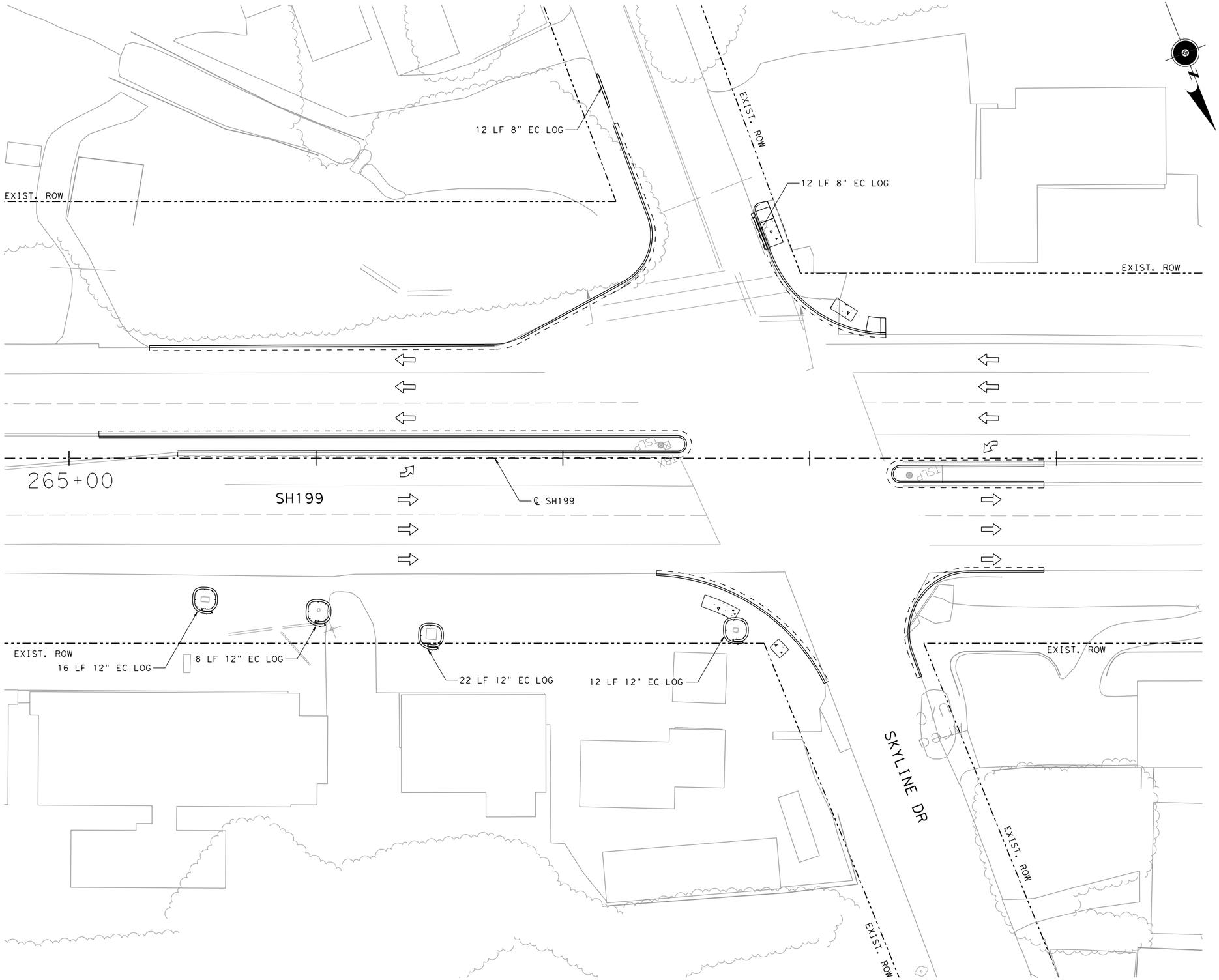
90% SUBMITTAL



LEGEND

- 8" DIAMETER EROSION CONROL LOG
- 12" DIAMETER EROSION CONROL LOG
- DRAINAGE FLOW ARROW
- TRAFFIC FLOW

NOTES:

1. REFER TO SW3P STANDARD SHEETS FOR DETAILS.
2. INSTALLED MEASURES SHALL REMAIN IN PLACE AND SHALL BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY THE ENGINEER.
3. SW3P MEASURES ARE SHOWN ARE MINIMUM REQUIRMENTS BASED UPON PROJECT DESIGN. INSTALLATION OF SW3P MEASURES WILL BE AS SHOWN AND MODIFIED TO ACCOMMODATE ACTUAL FIELD CONDITIONS.
4. CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRUCTION EXIT WILL BE 75 SY (50'X14') REFER TO STANDARD EC(3) FOR DETAILS.

0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GREGORIO GARCIA
101077
LICENSED PROFESSIONAL ENGINEER

04/11/2024

DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650, Dallas, TX 75234
Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

SANCHEZ-SALAZAR & ASSOCIATES, LLC
4630 N. Loop 1604 W., Ste. 115 San Antonio, TX 78249
Phone: (210) 314-5458
TBPE Registration No. 15685

SH 199
SW3P LAYOUT
AT SKYLINE DR

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
SSA	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
SSA	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	112
SSA	0171	05	101	
VERIFIED BY				
SSA				

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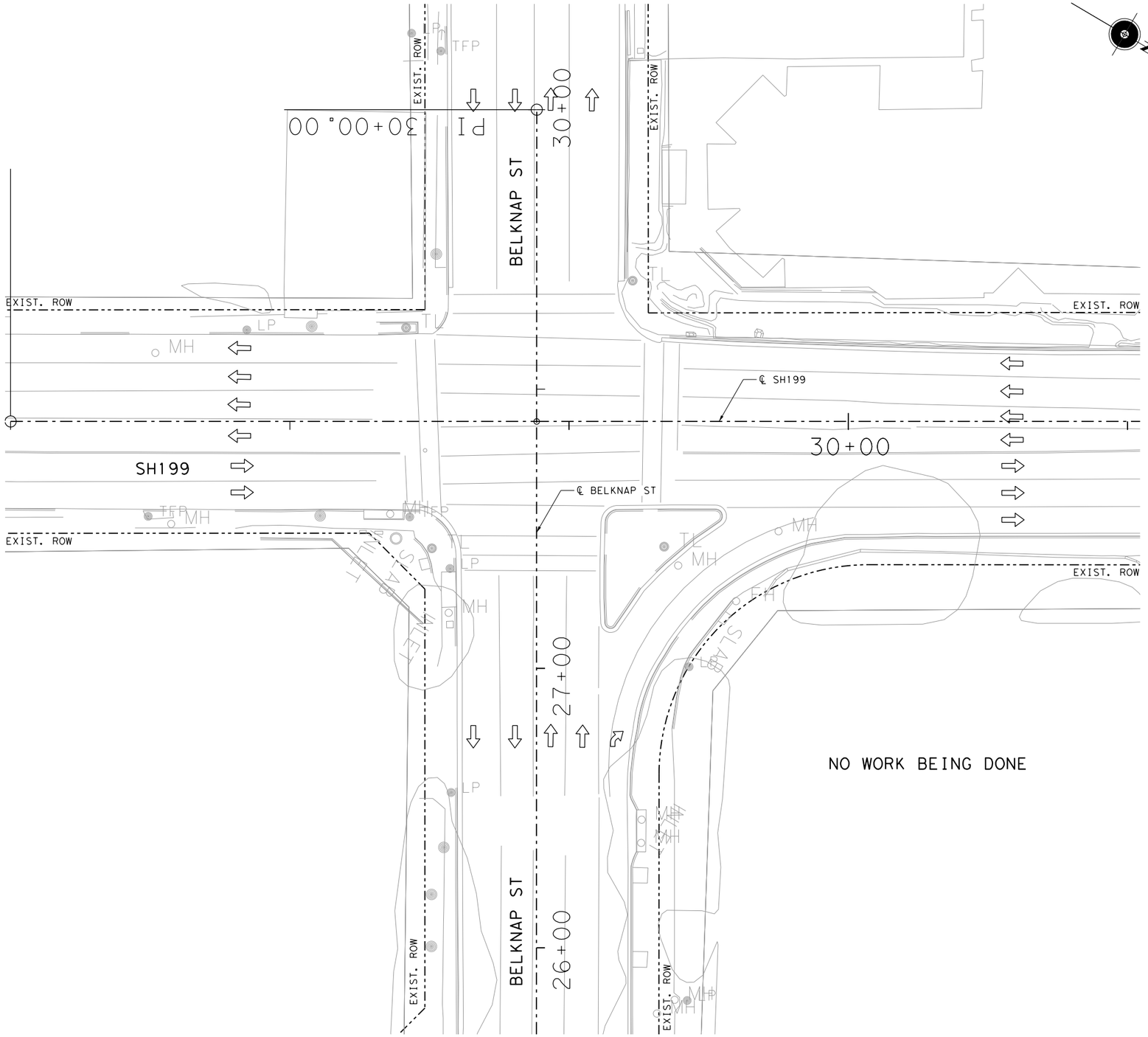

NO WORK BEING DONE

LEGEND

- 8" DIAMETER EROSION CONROL LOG
- 12" DIAMETER EROSION CONROL LOG
- DRAINAGE FLOW ARROW
- TRAFFIC FLOW

NOTES:

1. REFER TO SW3P STANDARD SHEETS FOR DETAILS.
2. INSTALLED MEASURES SHALL REMAIN IN PLACE AND SHALL BE MAINTAINED THROUGHOUT DURATION OF PROJECT OR AS DIRECTED BY THE ENGINEER.
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4. CONSTRUCTION EXITS TO BE LOCATED IN THE FIELD AND APPROVED BY THE ENGINEER. THE SIZE OF THE CONSTRUCTION EXIT WILL BE 75 SY (50'X14') REFER TO STANDARD EC(3) FOR DETAILS.

0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GREGORIO GARCIA
101077
LICENSED
PROFESSIONAL ENGINEER

04/11/2024

DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Sulte 650,
Dallas, TX 75234
Phone:(469)801-8500
MBAKERINTL.COM
TBPE Registration No, F-2677

SANCHEZ-SALAZAR & ASSOCIATES, LLC
4630 N.Loop 1604 W., Ste, 115
San Antonio, TX 78249
Phone: (210) 314-5458
TBPE Registration No, 15685

SH 199

SW3P LAYOUT

AT BELKNAP ST

STA 316+46 TO STA 317+00

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
SSA	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
SSA	TEXAS	FTW	TARRANT	113
CHECKED BY	CONTROL	SECTION	JOB	
SSA	0171	05	101	
VERIFIED BY				
SSA				

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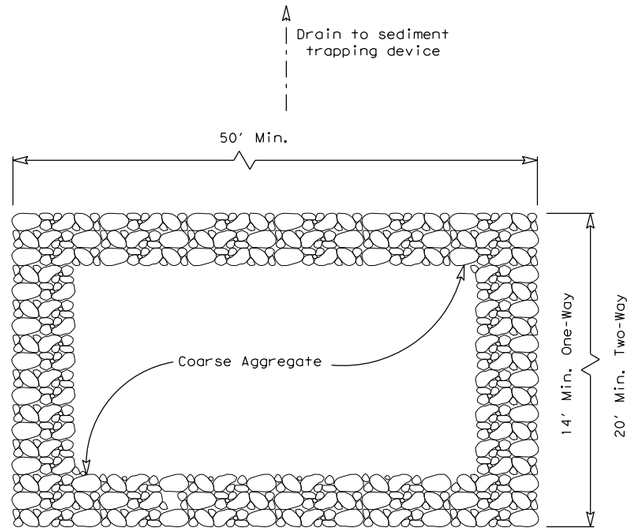
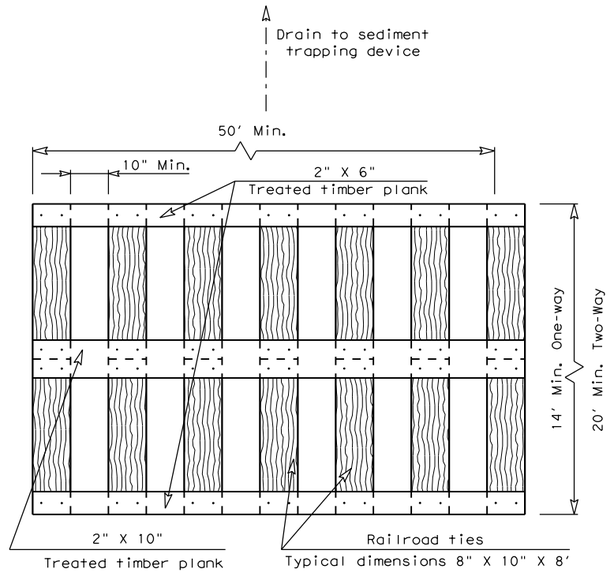
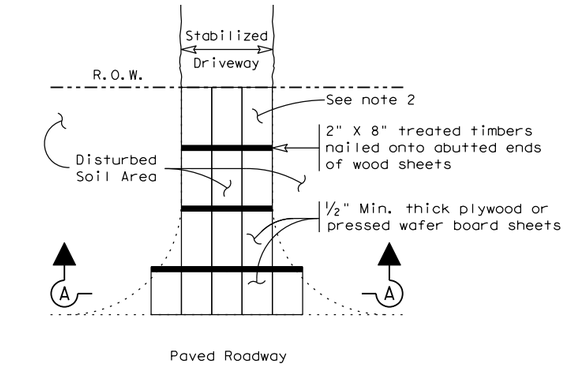


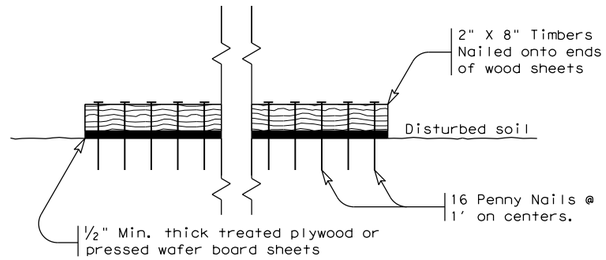
PLAN VIEW



PLAN VIEW



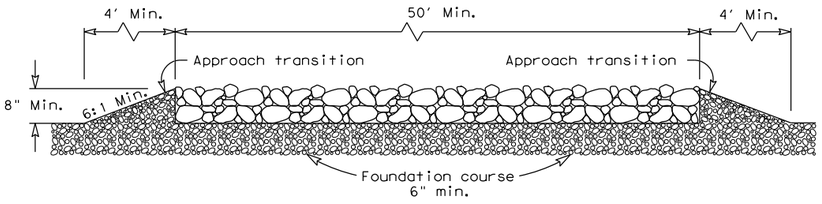
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

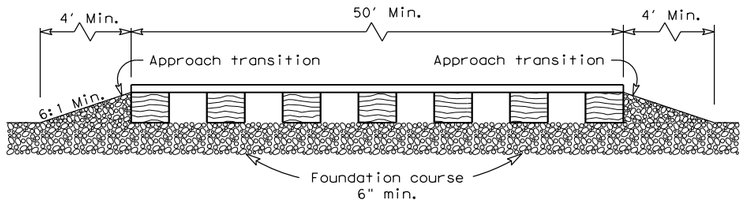
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50′.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materialas approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50′.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Texas Department of Transportation

Design Division Standard

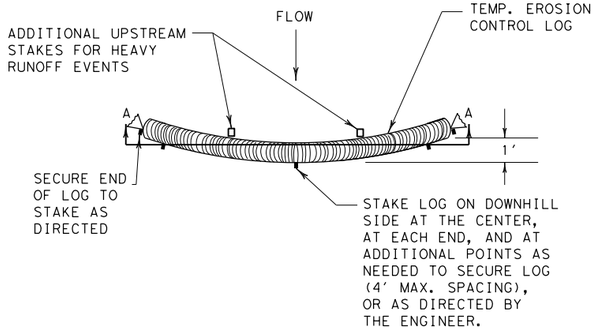
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

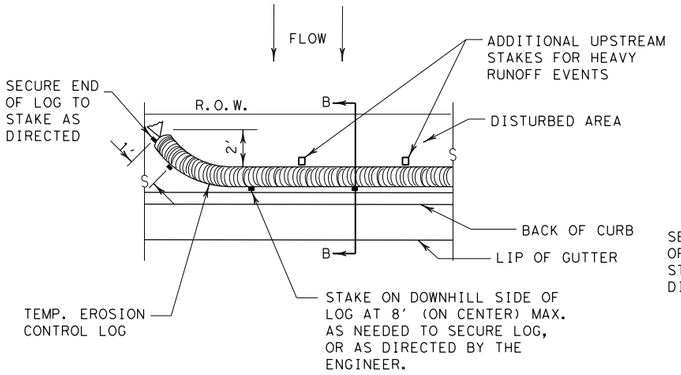
EC(3)-16

FILE: ec316	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0171	05	101	SH 199
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		114

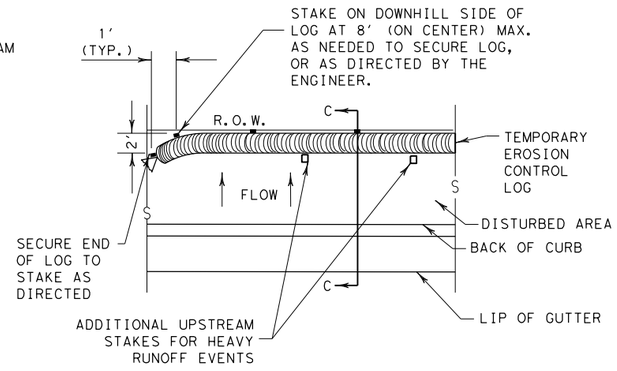
DATE: 4/11/2024
FILE: ...\SW3P STANDARDS\ec316.dgn



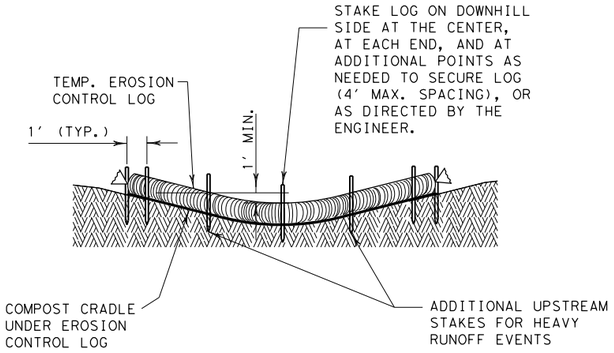
PLAN VIEW



PLAN VIEW



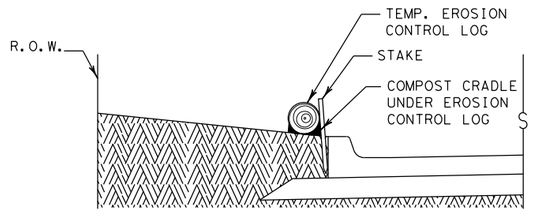
PLAN VIEW



SECTION A-A

EROSION CONTROL LOG DAM

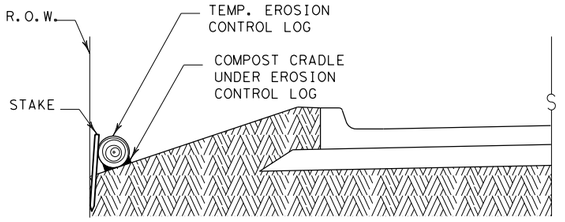
CL-D



SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

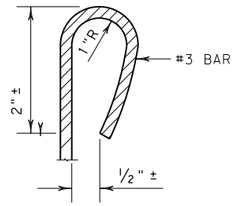
CL-BOC



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



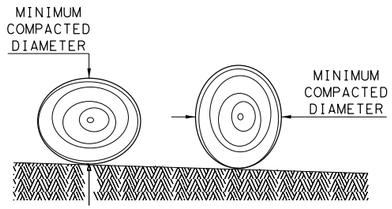
REBAR STAKE DETAIL

LEGEND

- CL-D — EROSION CONTROL LOG DAM
- CL-BOC — EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW — EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST — EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL — EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI — EROSION CONTROL LOG AT DROP INLET
- CL-CI — EROSION CONTROL LOG AT CURB INLET
- CL-GI — EROSION CONTROL LOG AT CURB & GRATE INLET

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

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

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

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

Texas Department of Transportation

Design Division Standard

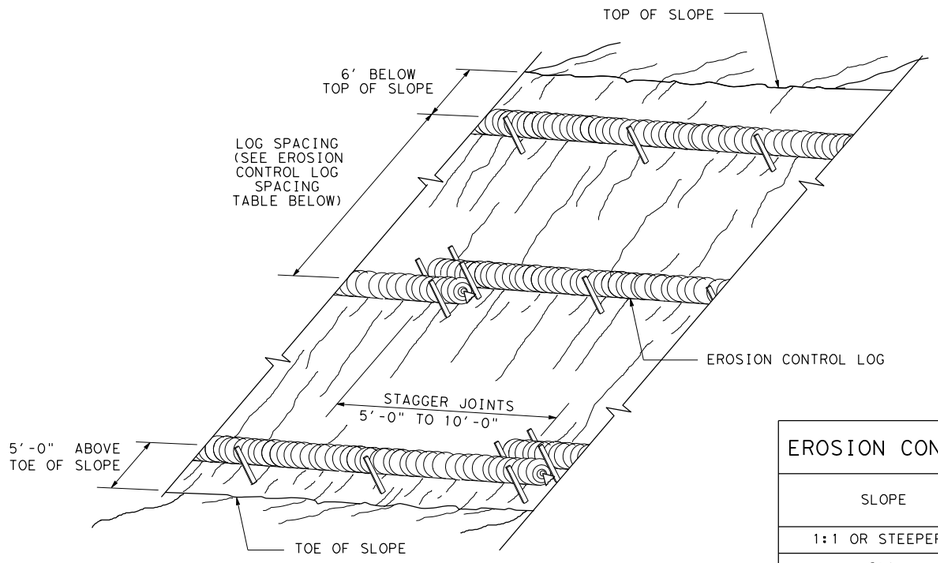
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

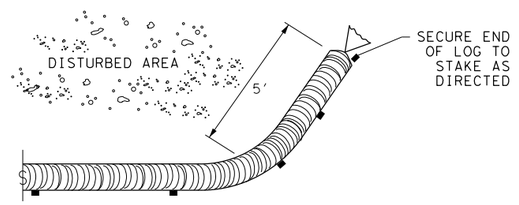
FILE: ec916		DN: TxDOT		CK: KM	DW: LS/PT		CK: LS
© TxDOT: JULY 2016		CONT	SECT	JOB		HIGHWAY	
REVISIONS		0171	05	101		SH 199	
		DIST		COUNTY			SHEET NO.
		FTW		TARRANT			115

DATE: 4/11/2024
FILE: ...\SW3P STANDARDS\ec916.dgn



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

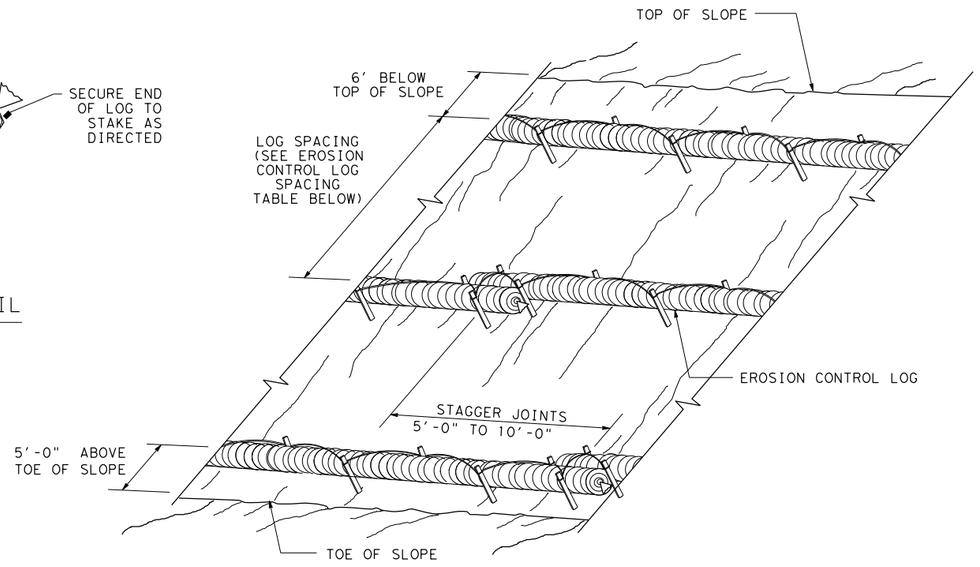
CL-SST



END SECTION RAP DETAIL

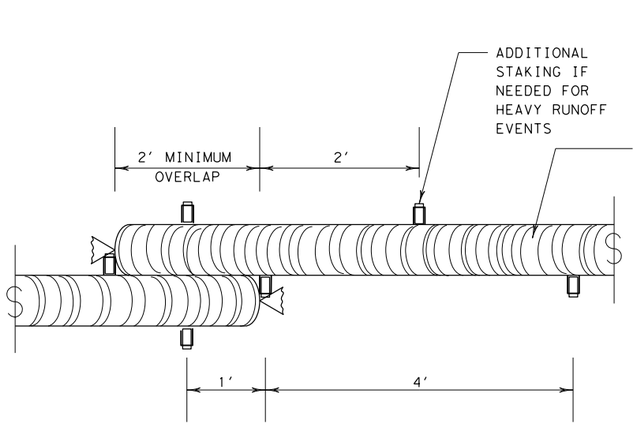
EROSION CONTROL LOG SPACING TABLE				
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

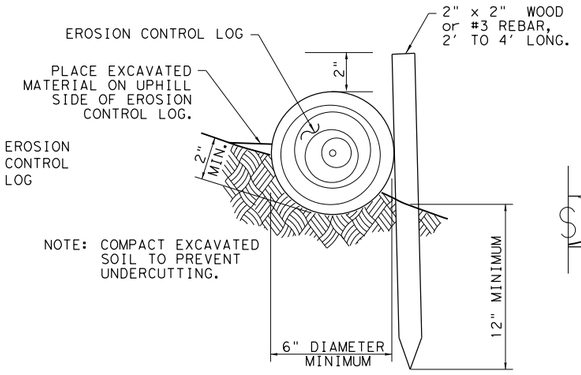
* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL

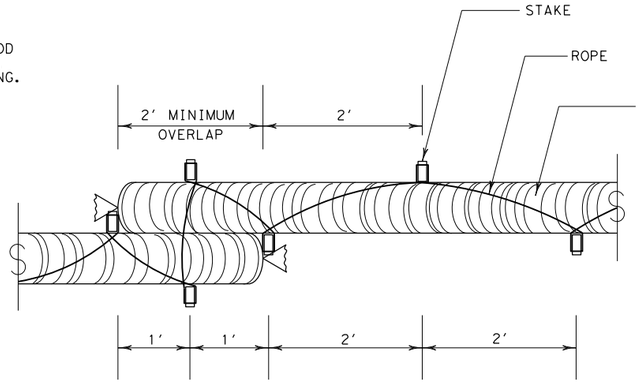


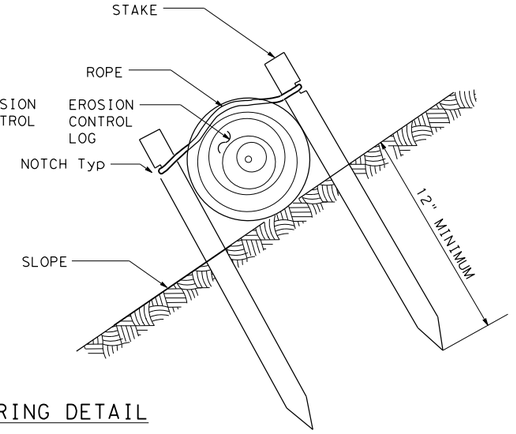


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

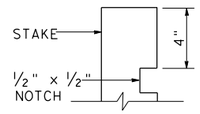
TRENCH DEPTH TABLE	
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"





STAKE AND LASHING ANCHORING DETAIL

CL-SSL



STAKE NOTCH DETAIL

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES
EROSION CONTROL LOG
EC(9)-16

FILE: ec116	DN: TxDOT		CK: KM		DW: LS/PT	CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY	
REVISIONS	0171	05	101		SH 199	
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	FTW	TARRANT			116	

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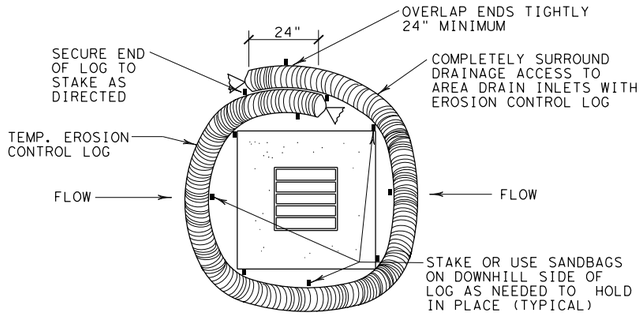
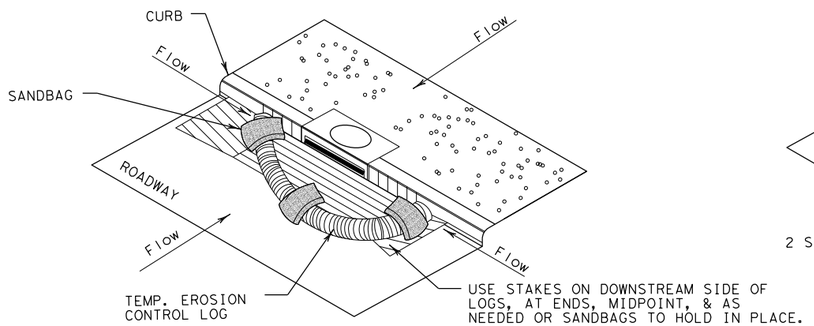


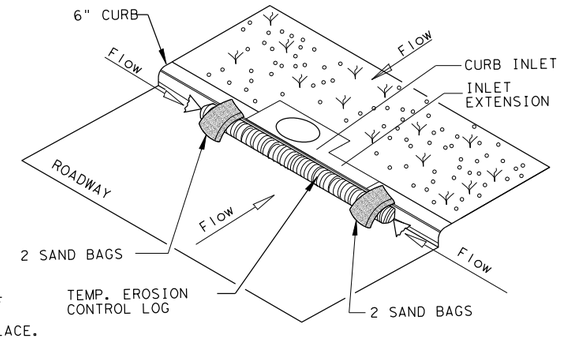
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

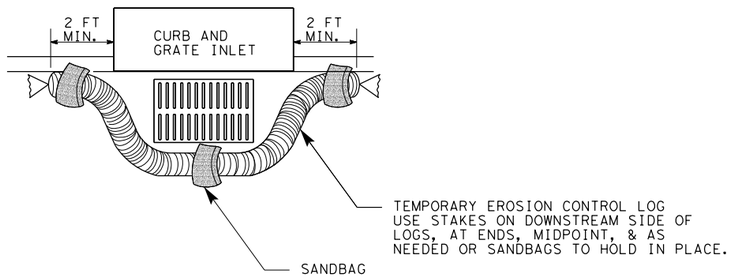
CL-CI



EROSION CONTROL LOG AT CURB INLET

CL-CI

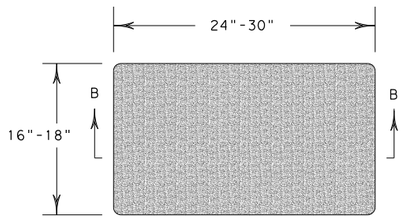
NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI

SECTION B-B



SANDBAG DETAIL

SHEET 3 OF 3

Texas Department of Transportation | Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

EROSION CONTROL LOG

EC(9)-16

FILE: ec916	DN: TxDOT		CK: KM		DW: LS/PT		CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB		HIGHWAY		
REVISIONS	0171	05	101		SH 199		
	DIST	COUNTY			SHEET NO.		
	FTW	TARRANT			117		

DATE: 4/11/2024
FILE: ...\SW3P STANDARDS\ec916.dgn

DATE:
FILE:

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

TPDES TXR 150000: Stormwater Discharge Permit or Construction General Permit required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

List MS4 Operator(s) that may receive discharges from this project. They may need to be notified prior to construction activities.

1.

2.

☐ No Action Required ☒ Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000

(2) Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.

(3) Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.

4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, submit NOI to TCEQ and the Engineer.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

USACE Permit required for filling, dredging, excavating or other work in any water bodies, rivers, creeks, streams, wetlands or wet areas.

The Contractor must adhere to all of the terms and conditions associated with the following permit(s):

☒ No Permit Required

☐ Nationwide Permit 14 - PCN not Required (less than 1/10th acre waters or wetlands affected)

☐ Nationwide Permit 14 - PCN Required (1/10 to <1/2 acre, 1/3 in tidal waters)

☐ Individual 404 Permit Required

☐ Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices planned to control erosion, sedimentation and post-project TSS.

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The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☐ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☐ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☐ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☒ No Action Required ☐ Required Action

Action No.

1.

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3.

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IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical.
Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP:	Best Management Practice	SPCC:	Spill Prevention Control and Countermeasure
CGP:	Construction General Permit	SW3P:	Storm Water Pollution Prevention Plan
DSHS:	Texas Department of State Health Services	PCN:	Pre-Construction Notification
FHWA:	Federal Highway Administration	PSL:	Project Specific Location
MOA:	Memorandum of Agreement	TCEQ:	Texas Commission on Environmental Quality
MOU:	Memorandum of Understanding	TPDES:	Texas Pollutant Discharge Elimination System
MS4:	Municipal Separate Stormwater Sewer System	TPWD:	Texas Parks and Wildlife Department
MBTA:	Migratory Bird Treaty Act	TxDOT:	Texas Department of Transportation
NOT:	Notice of Termination	T&E:	Threatened and Endangered Species
NWP:	Nationwide Permit	USACE:	U.S. Army Corps of Engineers
NOI:	Notice of Intent	USFWS:	U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used.

Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act.

Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:
* Dead or distressed vegetation (not identified as normal)
* Trash piles, drums, canister, barrels, etc.
* Undesirable smells or odors
* Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

☐ Yes ☒ No

If "No", then no further action is required.
If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

☐ Yes ☒ No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

VII. OTHER ENVIRONMENTAL ISSUES

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

☒ No Action Required ☐ Required Action

Action No.

1.

2.

3.

STATE OF TEXAS
GREGORIO GARCIA
101077
LICENSED
PROFESSIONAL ENGINEER

04/11/2024

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	0171	05	101	SH 199
12-12-2011 (DS)	DIST	COUNTY		SHEET NO.
05-07-14 ADDED NOTE SECTION IV.	FTW	TARRANT		118
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.				

100% SUBMITTAL

PLOT DRIVER:v8i_BAKER_WIN_BW_PDF.pltcfg
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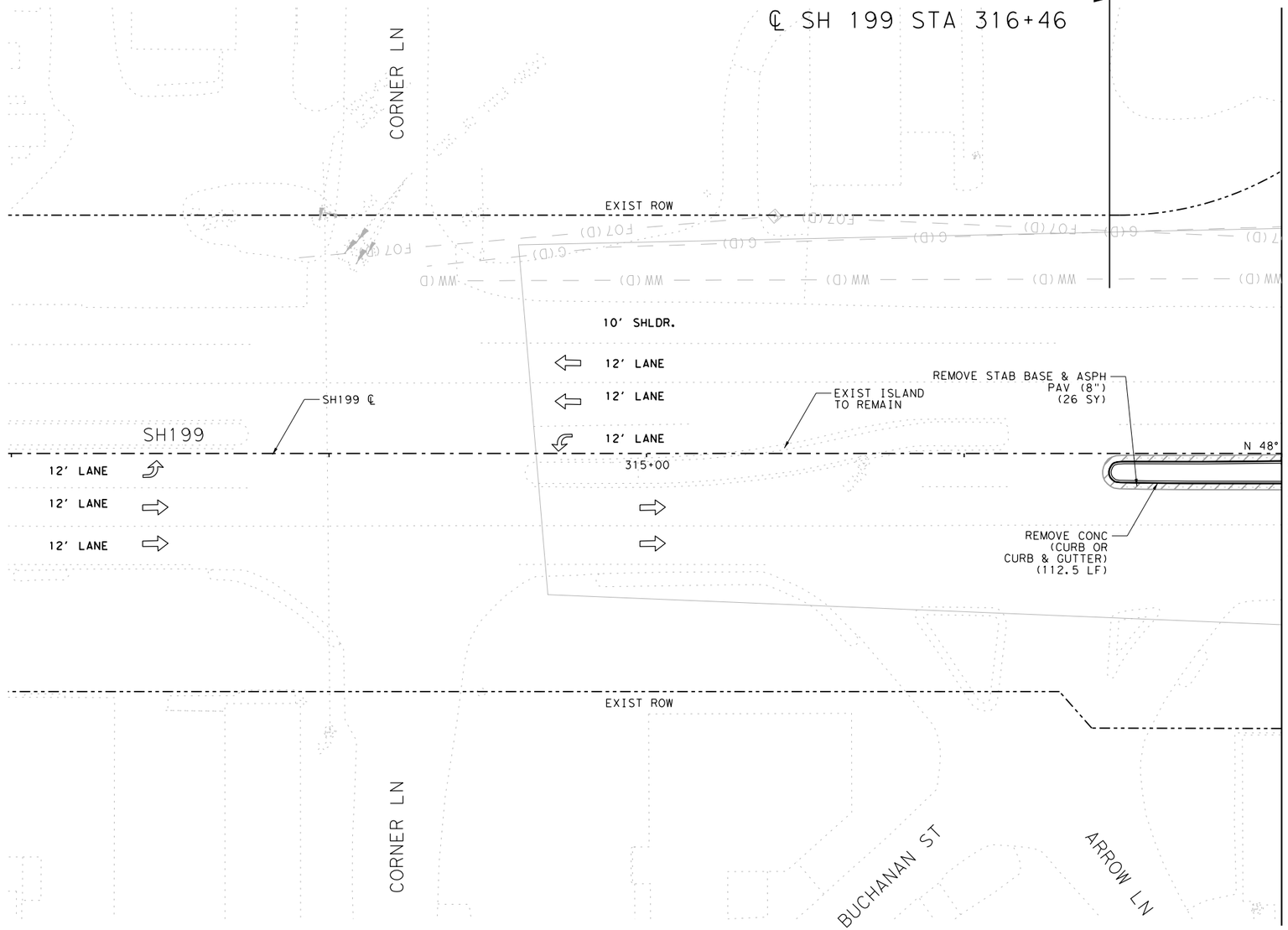

LEGEND

- TRAFFIC FLOW
- REMOVE STAB BASE & ASPH PAV (8")
- REMOVE CONC (SIDEWALK OR RAMP)
- REMOVE CONC (CURB OR CURB & GUTTER)
- EXCAVATION

NOTES:

1. ALL STATIONING AND OFFSETS REFER TO SH199 ℄ UNLESS NOTED OTHERWISE.
2. REFER TO SIGNING AND PAVEMENT MARKING SHEETS FOR SIGNING AND STRIPING INFORMATION.
3. REFER TO "HORIZONTAL DATA" SHEETS FOR ADDITIONAL INFORMATION.
4. LOCATION OF EXISTING UTILITIES ARE APPROXIMATE. CONTRACTOR TO VERIFY ALL LOCATIONS OF EXISTING UTILITIES WITHIN LIMITS OF CONSTRUCTION PRIOR TO EXCAVATING.
5. ROW LINES ARE APPROXIMATE.
6. FOR SIGNAL DESIGN REFER TO SIGNAL DESIGN LAYOUT

0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
1501 LBJ Freeway, Suite 650, Dallas, TX 75234
Phone:(469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

Texas Department of Transportation

SH 199

REMOVAL LAYOUT

ROBERTS CUT OFF INTERSECTION
BEGIN TO STA 317+00

SHEET 1 OF 3

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	
CHECKED BY	CONTROL	SECTION	JOB	119
MBI	0171	05	101	
VERIFIED BY				
MBI				

100% SUBMITTAL

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USER:Cory.Colley

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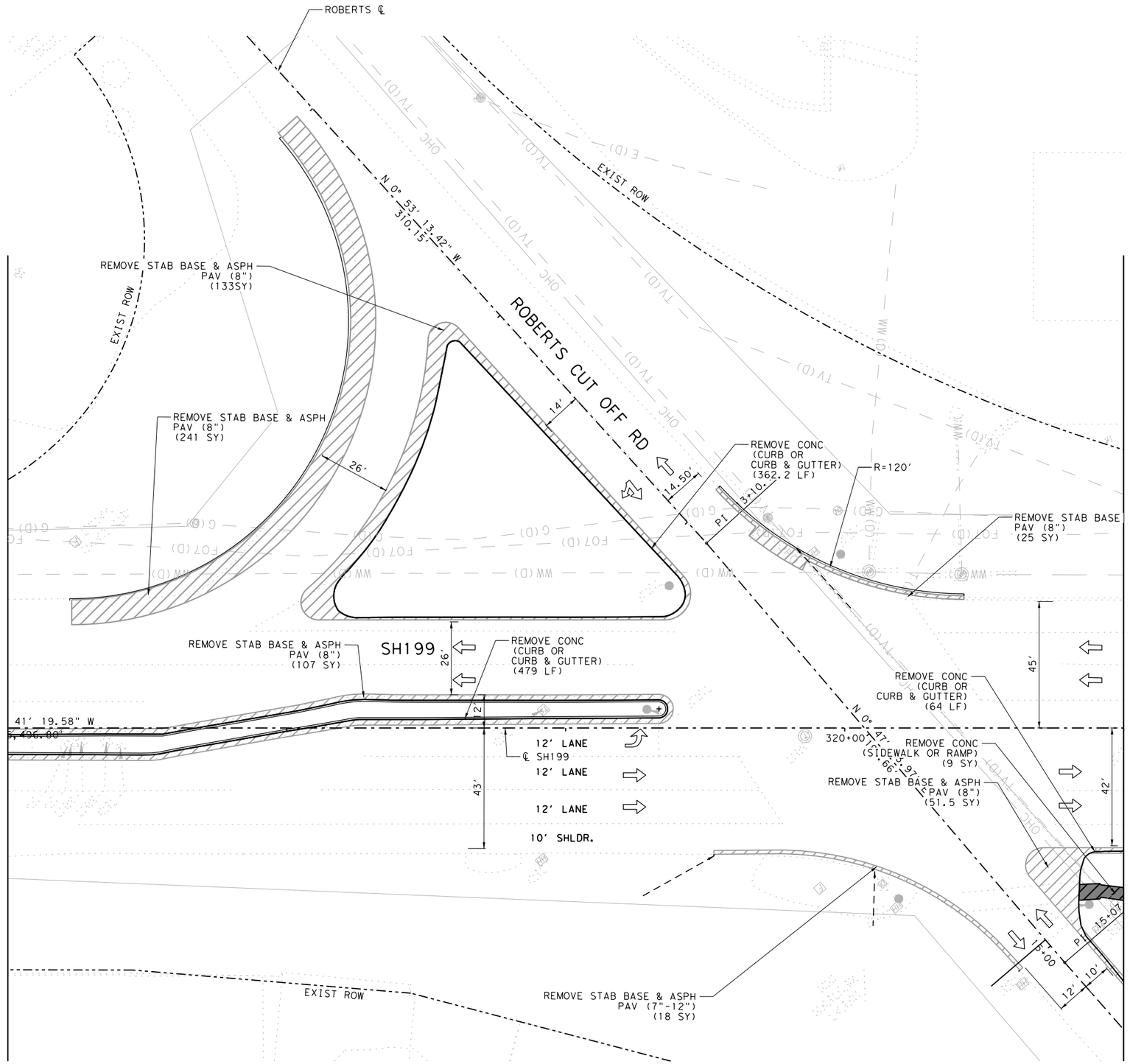

LEGEND

- TRAFFIC FLOW
- PROP ASPH PVMT
- PROP CONC PVMT
- SIDEWALK
- CONC CURB & GUTTER

NOTES:

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6. FOR SIGNAL DESIGN REFER TO SIGNAL DESIGN LAYOUT.
7. PAVEMENT DESIGN REPORT TO BE DONE BY TXDOT
8. CONTRACTOR SHALL DETERMINE THE EXISTING PAVEMENT DEPTH IN THE FIELD. THE CONCRETE PAVEMENT SHALL MATCH EXISITING PAVEMENT DEPTH. THIS WORK WILL BE SUBSIDIARY TO THE CURB OR CURB/GUTTER CONSTRUCTION.

0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

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Texas Department of Transportation

SH 199

REMOVAL LAYOUT

ROBERTS CUT OFF INTERSECTION
STA 317+00 TO STA 321+00

SHEET 2 OF 3

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	120
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

100% SUBMITTAL

END PROJECT
END CSJ 0171-05-101
℄ SH 199 STA 323+42

MATCHLINE STA. 321+00

45'

42'

REMOVE CONC
(CURB OR
CURB & GUTTER)
(455 LF)

REMOVE STAB BASE & ASPH
PAV (8")
(102 SY)

REMOVE CONC
(CURB OR
CURB & GUTTER)
(435 LF)

REMOVE STAB BASE & ASPH
PAV (8")
(158 SY)

SH199 ℄

325+00

EXISTING SIDEWALK

REMOVE CONC
(SIDEWALK OR RAMP)
(1 SY)

REMOVE CONC
(SIDEWALK OR RAMP)
(11SY)

EXCAVATION
(43 SY)

EXIST ROW

20'

16'-00"

9'

14'

13'

9'

N 0° 02' 21.53" W
359.31'
17+00

EXIST ROW

REMOVE STAB BASE & ASPH
PAV (8")
(168 SY)

EXCAVATION
(25 SY)

REMOVE CONC
(CURB OR
CURB & GUTTER)
(282 LF)

11'

ROBERTS ℄

18+00

LEGEND

- TRAFFIC FLOW
- REMOVE STAB BASE & ASPH PAV (8")
- REMOVE CONC (SIDEWALK OR RAMP)
- REMOVE CONC (CURB OR CURB & GUTTER)
- EXCAVATION

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0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

Michael Baker INTERNATIONAL
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Dallas, TX 75234
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MBAKERINTL.COM
TBPE Registration No. F-2677

SH 199

REMOVAL LAYOUT

ROBERTS CUT OFF INTERSECTION
STA 321+00 TO END STA

SHEET 3 OF 3

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	121
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

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100% SUBMITTAL

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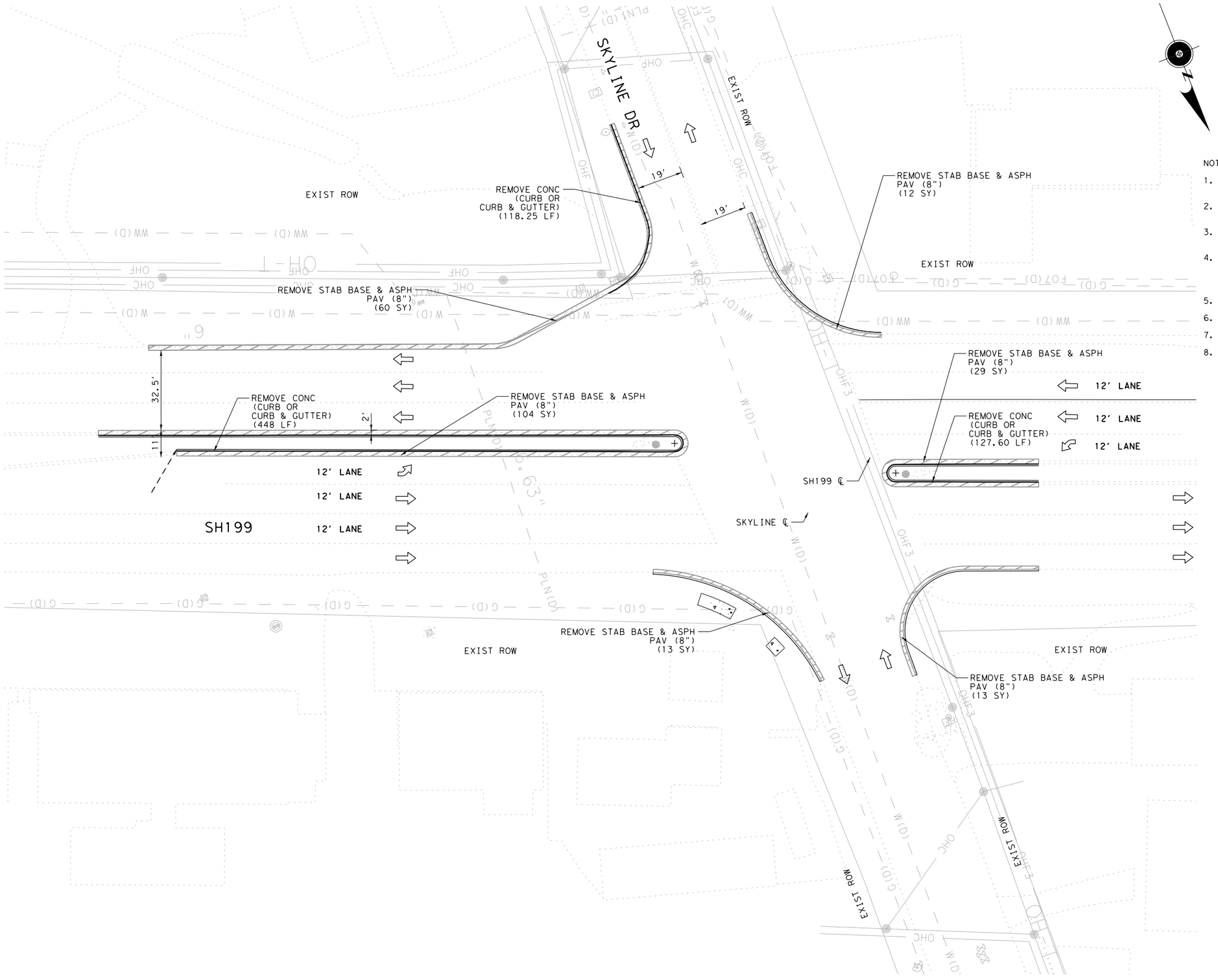

LEGEND

- TRAFFIC FLOW
- PROP ASPH PVMT
- PROP CONC PVMT
- SIDEWALK
- CONC CURB & GUTTER

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0' 20' 40'
SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER
4/10/2024
F-2677

NO	DATE	REVISION	APPROVED

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Phone: (469)801-8500
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TBPE Registration No. F-2677

SH 199
REMOVAL LAYOUT
AT SKYLINE DR INTERSECTION

SHEET 1 OF 1

DESIGNED BY	FED. RD. DIV. NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	122
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				

100% SUBMITTAL

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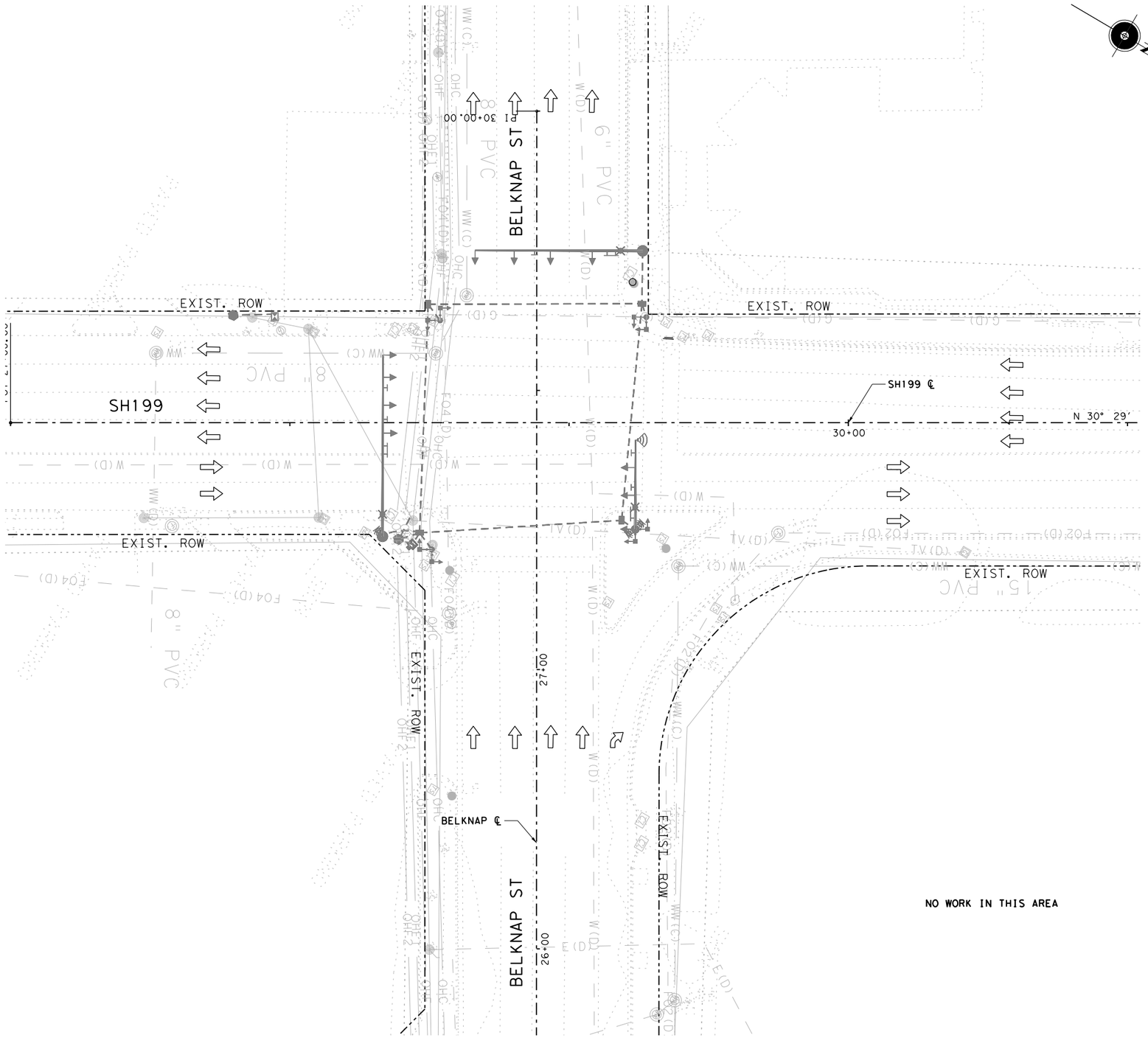

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SCALE IN FEET

STATE OF TEXAS
GEAS A. BULBUL
101954
LICENSED
PROFESSIONAL ENGINEER

4/11/2024
F-2677

NO	DATE	REVISION	APPROVED

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Phone: (469)801-8500
MBAKERINTL.COM
TBPE Registration No. F-2677

Texas Department of Transportation

SH 199

REMOVAL LAYOUT

BELKNAPP ST INTERSECTION

STA 26+54.50 TO STA 30+50.00

SHEET 1 OF 1

DESIGNED BY	FED.RD. DIV.NO.	STATE PROJECT NO.		HIGHWAY NO.
MBI	6	SEE TITLE SHEET		SH 199
DRAWN BY	STATE	DISTRICT	COUNTY	SHEET NO.
MBI	TEXAS	FTW	TARRANT	123
CHECKED BY	CONTROL	SECTION	JOB	
MBI	0171	05	101	
VERIFIED BY				
MBI				