CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		1

INDEX OF SHEETS

SEE SHEET 2 FOR INDEX

STATE OF TEXAS
DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED
STATE HIGHWAY IMPROVEMENT
FEDERAL AID PROJECT NUMBER STP 2021 (863)

NET LENGTH OF PROJECT = 9,150.24 FEET = 1.733 MILES

TARRANT COUNTY
SH 180 (E LANCASTER AVE)

FROM: NORTH KENTUCKY AVE
TO: BEACH ST

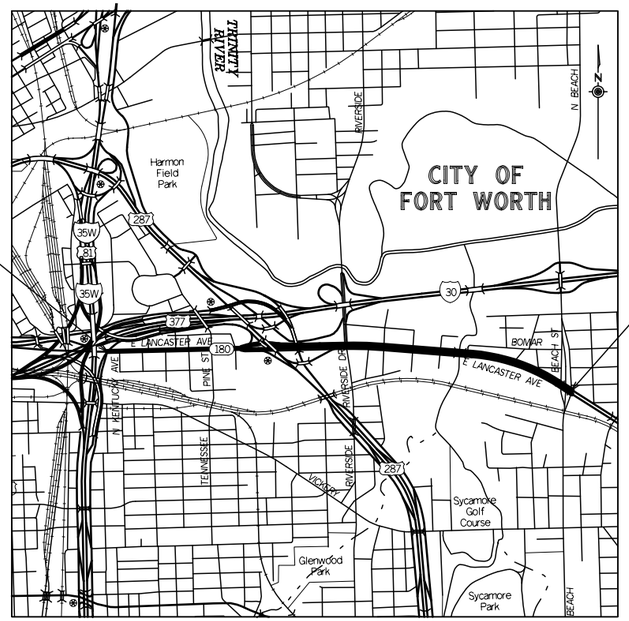
FOR THE CONSTRUCTION OF PEDESTRIAN, SIDEWALKS & CURB RAMPS

CONSISTING OF SIDEWALKS, CROSSWALKS, PEDESTRIAN SIGNALS, DRIVEWAYS, PAVEMENT MARKINGS

POSTED SPEED

N KENTUCKY AVE TO PINE ST: 30 MPH
PINE ST TO WINDHAM ST: 35 MPH
WINDHAM ST TO BEACH ST: 40 MPH
N KENTUCKY AVE TO PINE ST
A.D.T. (2019)= 12,624
PINE ST TO BEACH ST
A.D.T. (2019)= 14,367

BEGIN PROJECT
CSJ: 0008-05-031
STA 2+50.00
REF MRKR: 620+0
MILE PT: 13.959
DFO: 0.099



LOCATION MAP NOT TO SCALE

EXCEPTIONS: NONE
EQUATIONS: NONE
RAILROAD CROSSINGS: NONE

END PROJECT
CSJ: 0008-05-031
STA 94+00.24
REF MRKR: 620+1.687
MILE PT: 15.646
DFO: 1.786

Registered Accessibility Specialist (RAS) Inspection Required

TDLR No. TABS 2021 014198

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION ON NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, MAY 2012).

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER

CORRECT: 6/3/2021

CARLA VERRANDO, P.E. P.E.
CONSULTING ENG. (TBPE FIRM REG. F-3580)

RECOMMENDED FOR LETTING: 6/8/2021

DocuSigned by:
Carl L. Johnson, PE
2FE36139F0614C3...
DISTRICT ENGINEER

SUBMITTED FOR LETTING: 6/4/2021

DocuSigned by:
David Hall, P.E.
2F552E37025E4A8...
AREA ENGINEER

APPROVED FOR LETTING: 6/7/2021

DocuSigned by:
7879B0B92E5D403...
DIRECTOR TP&D

FILE: c:\pwworking\aecom*ds16*na\janell.steigerwald@aecom.com\d0383259\SH180*AEC*GN*CO*001.dgn
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GENERAL

1	TITLE SHEET
2	INDEX OF SHEETS
3-4	PROJECT LAYOUT
5-7	TYPICAL SECTIONS
8, 8A-8F	GENERAL NOTES
9, 9A&9B	ESTIMATE & QUANTITY
10-12	QUANTITY SUMMARY
13-17	SOSS
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* 147	EC(1)-16
* 148	CURB INLET SEDIMENT PROTECTION

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER

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

CARLA VERRANDO, P.E. P.E. — DATE: 7/2/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
INDEX OF SHEETS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		2

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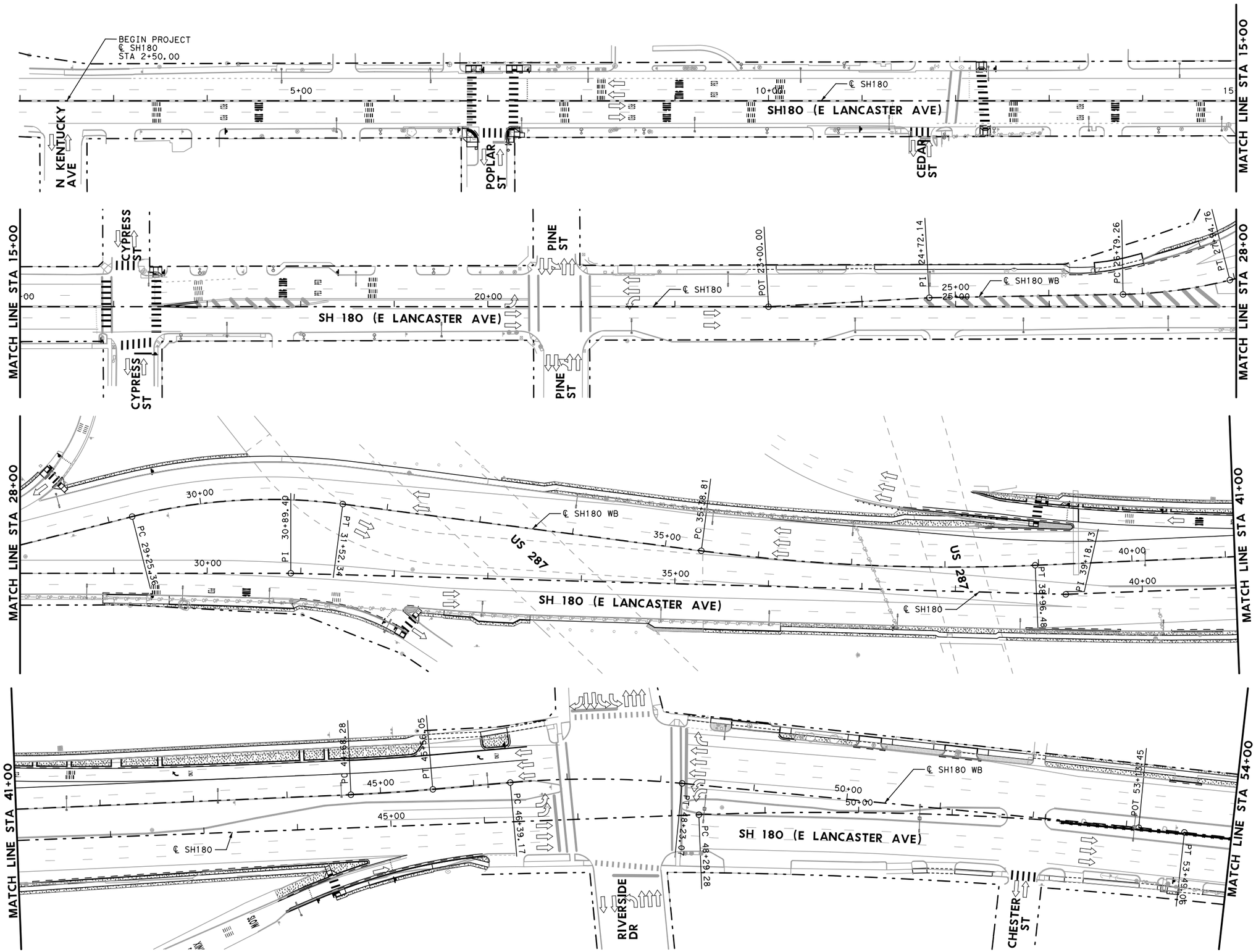


N

0′ 50′ 100′
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- EXISTING ROW
- TRAFFIC DIRECTION ARROW

NOTES:

1. ROW SURVEY IS BASED ON 1936 ROW PLAN. CONTRACTOR TO VERIFY.

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/25/2021

NO.	REVISION	DATE

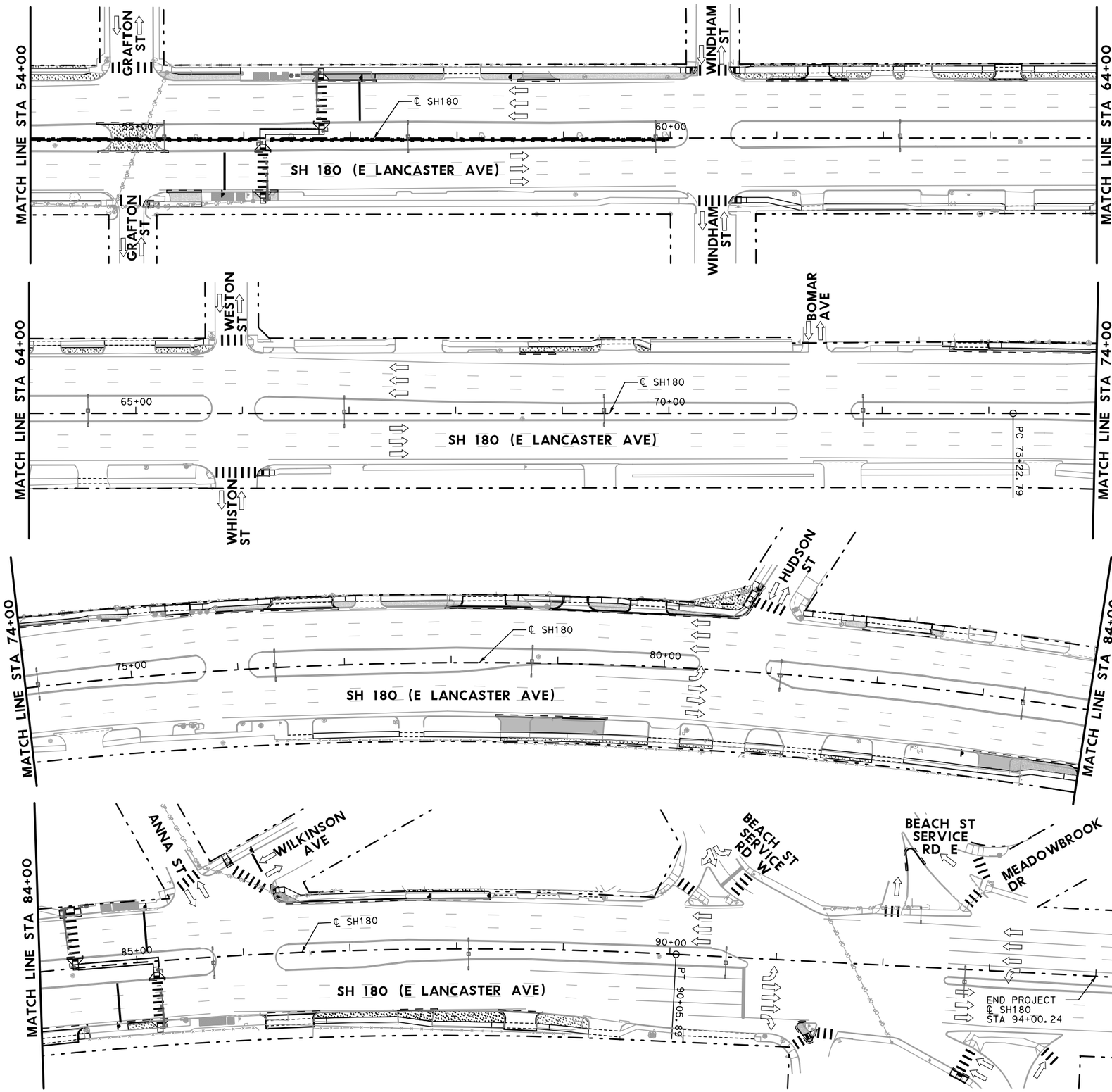
AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
PROJECT LAYOUT

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		3



LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- EXISTING ROW
- TRAFFIC DIRECTION ARROW

NOTES:

1. ROW SURVEY IS BASED ON 1936 ROW PLAN. CONTRACTOR TO VERIFY.

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/25/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
PROJECT LAYOUT

SHEET 2 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		4

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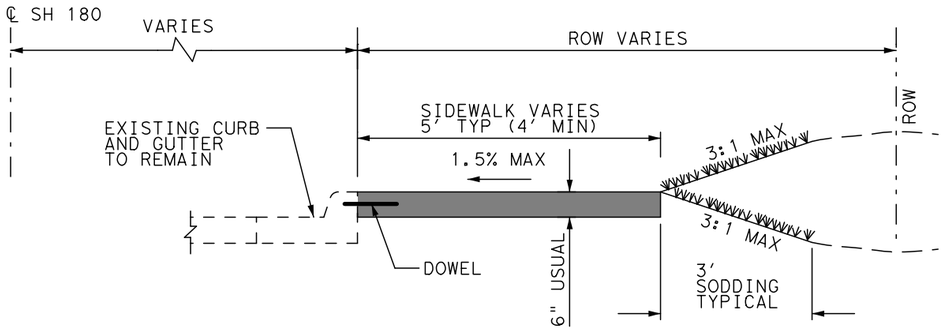
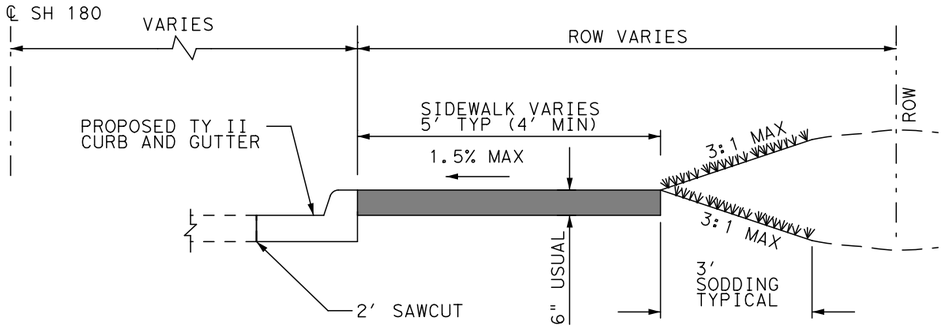


PROPOSED SIDEWALK ADJACENT TO EXISTING CURB

SH 180 WB STA 07+36.00 TO STA 07+46.00
SH 180 WB STA 27+90.00 TO STA 28+44.00
SH 180 WB STA 28+62.00 TO STA 33+64.00
SH 180 WB STA 87+56.00 TO STA 89+98.00
SH 180 EB STA 32+26.00 TO STA 32+54.00
SH 180 EB STA 33+46.00 TO STA 34+74.00
NOT TO SCALE

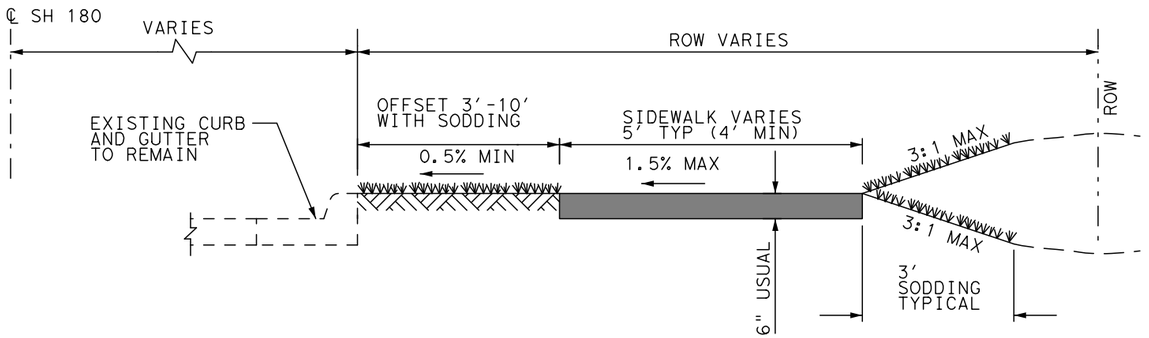


PROPOSED SIDEWALK ADJACENT TO PROPOSED CURB

SH 180 WB STA 26+22.00 TO STA 26+50.00
SH 180 WB STA 39+12.00 TO STA 39+30.00
SH 180 WB STA 86+54.00 TO STA 87+56.00
SH 180 EB STA 06+84.00 TO STA 06+90.00
SH 180 EB STA 31+00.00 TO STA 32+06.00
SH 180 EB STA 44+48.00 TO STA 44+74.00
SH 180 EB STA 45+42.00 TO STA 46+00.00
NOT TO SCALE

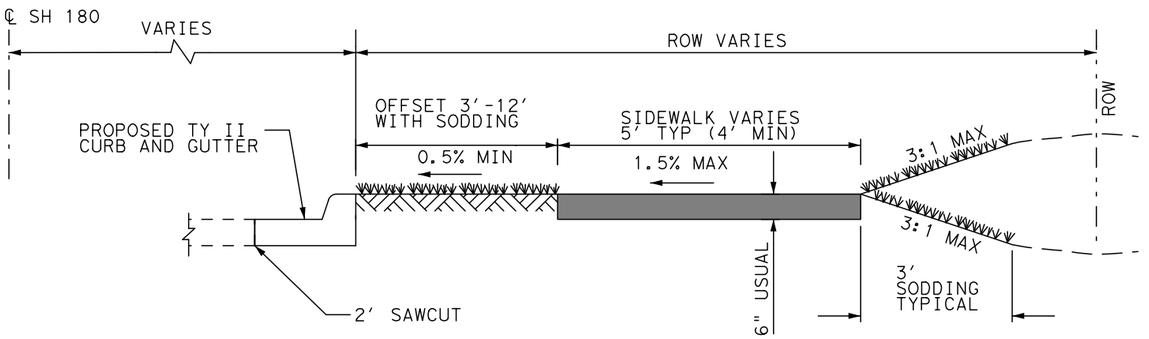
NOTES:

1. SEE MISCELLANEOUS CONSTRUCTION DETAIL SHEETS FOR SIDEWALK DETAILS.
2. GAPS IN STATIONING REFLECT NO SIDEWALK IMPROVEMENTS.
3. STATION LIMITS ROUNDED TO CLOSEST EVEN STATION.



PROPOSED SIDEWALK OFFSET FROM EXISTING CURB

SH 180 WB STA 33+64.00 TO STA 38+36.00
SH 180 WB STA 49+40.00 TO STA 50+06.00
SH 180 WB STA 52+06.00 TO STA 54+70.00
SH 180 WB STA 60+60.00 TO STA 60+90.00
SH 180 WB STA 61+68.00 TO STA 65+72.00
SH 180 WB STA 68+94.00 TO STA 69+82.00
SH 180 EB STA 28+88.00 TO STA 29+60.00
SH 180 EB STA 36+14.00 TO STA 38+76.00
SH 180 EB STA 39+76.00 TO STA 40+30.00
SH 180 EB STA 40+86.00 TO STA 41+16.00
SH 180 EB STA 86+64.00 TO STA 87+40.00
SH 180 EB STA 87+82.00 TO STA 89+26.00
NOT TO SCALE



PROPOSED SIDEWALK OFFSET FROM PROPOSED CURB

SH 180 WB STA 39+26.00 TO STA 46+40.00
SH 180 WB STA 49+20.00 TO STA 49+40.00
SH 180 WB STA 60+90.00 TO STA 61+68.00
SH 180 WB STA 68+60.00 TO STA 68+94.00
SH 180 EB STA 38+76.00 TO STA 39+76.00
SH 180 EB STA 40+30.00 TO STA 40+86.00
SH 180 EB STA 41+16.00 TO STA 44+38.00
SH 180 EB STA 45+86.00 TO STA 46+00.00
SH 180 EB STA 84+38.00 TO STA 84+50.00
SH 180 EB STA 87+40.00 TO STA 87+82.00
NOT TO SCALE

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
TYPICAL SECTIONS

SHEET 1 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		5

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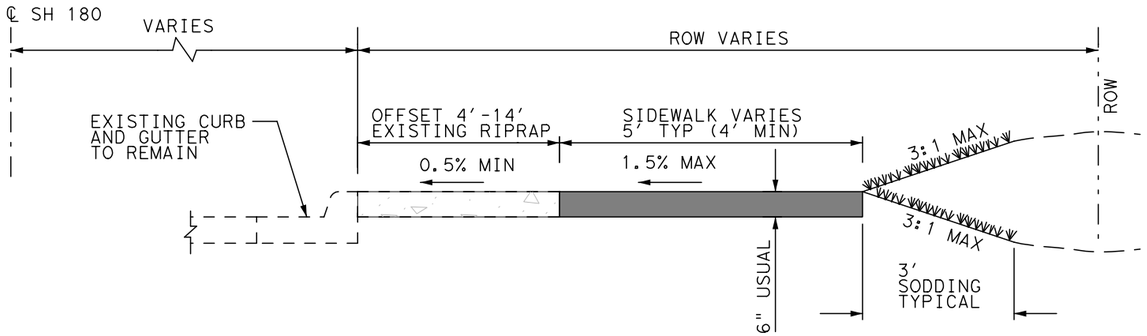
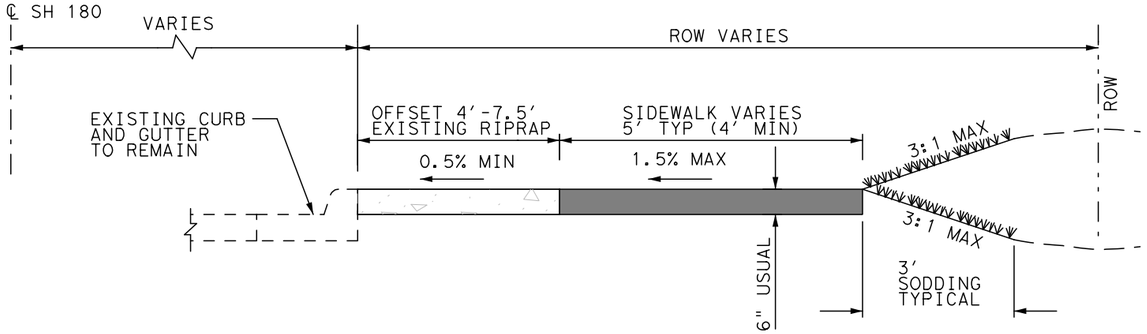


PROPOSED SIDEWALK OFFSET FROM EXISTING CURB

SH 180 WB STA 23+10.00 TO STA 26+22.00
SH 180 EB STA 06+90.00 TO STA 07+40.00
SH 180 EB STA 50+58.00 TO STA 55+28.00
SH 180 EB STA 60+60.00 TO STA 63+98.00
SH 180 EB STA 76+68.00 TO STA 83+00.00
NOT TO SCALE

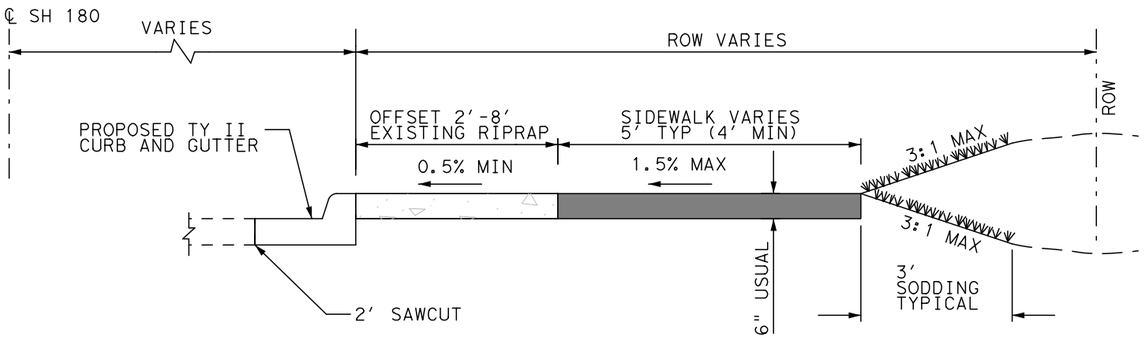


PROPOSED SIDEWALK OFFSET FROM EXISTING CURB

SH 180 WB STA 48+48.00 TO STA 48+70.00
SH 180 WB STA 50+30.00 TO STA 51+94.00
SH 180 WB STA 55+20.00 TO STA 55+70.00
SH 180 WB STA 57+24.00 TO STA 58+56.00
SH 180 WB STA 58+96.00 TO STA 60+20.00
SH 180 WB STA 76+34.00 TO STA 77+94.00
SH 180 WB STA 81+62.00 TO STA 82+58.00
SH 180 EB STA 30+92.00 TO STA 31+00.00
NOT TO SCALE

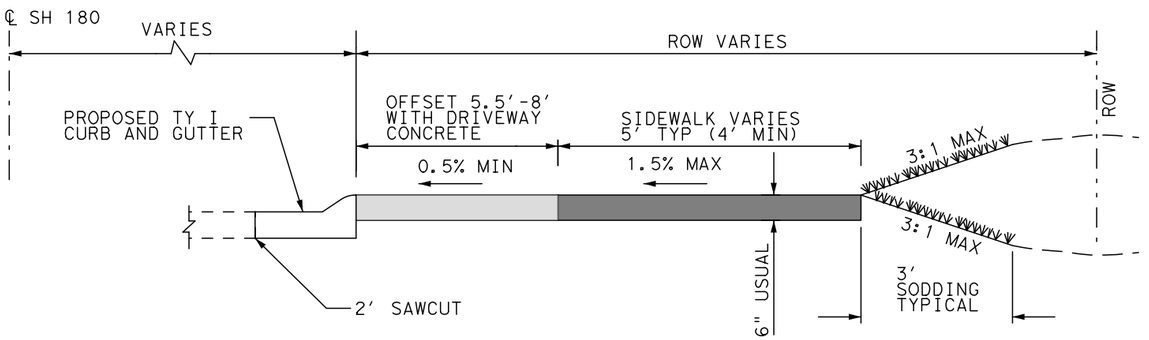
NOTES:

1. SEE MISCELLANEOUS CONSTRUCTION DETAIL SHEETS FOR SIDEWALK DETAILS.
2. GAPS IN STATIONING REFLECT NO SIDEWALK IMPROVEMENTS.
3. STATION LIMITS ROUNDED TO CLOSEST EVEN STATION.



PROPOSED SIDEWALK OFFSET FROM PROPOSED CURB

SH 180 WB STA 38+54.00 TO STA 38+96.00
SH 180 WB STA 56+64.00 TO STA 57+24.00
SH 180 WB STA 72+62.00 TO STA 76+32.00
SH 180 WB STA 77+94.00 TO STA 80+88.00
SH 180 WB STA 86+30.00 TO STA 86+54.00
SH 180 EB STA 55+28.00 TO STA 55+60.00
SH 180 EB STA 55+08.00 TO STA 56+32.00
SH 180 EB STA 83+38.00 TO STA 84+00.00
NOT TO SCALE



PROPOSED SIDEWALK OFFSET FROM PROPOSED CURB

SH 180 WB STA 56+75.00 TO STA 57+24.00
SH 180 WB STA 58+56.00 TO STA 58+96.00
SH 180 EB STA 83+00.00 TO STA 83+34.00
NOT TO SCALE

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
TYPICAL SECTIONS

SHEET 2 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		6

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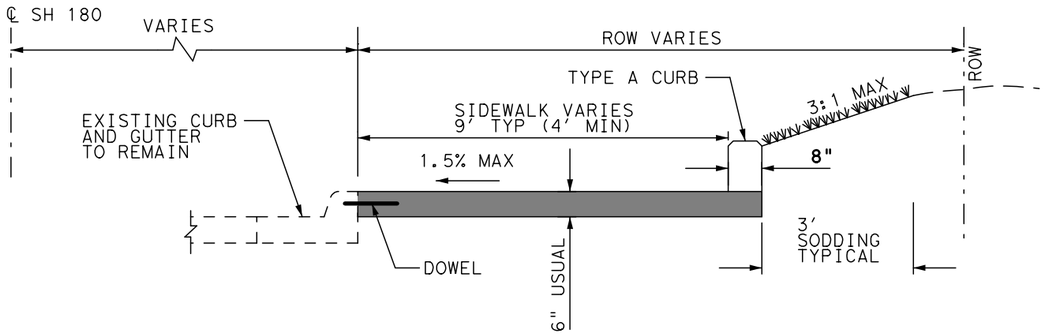
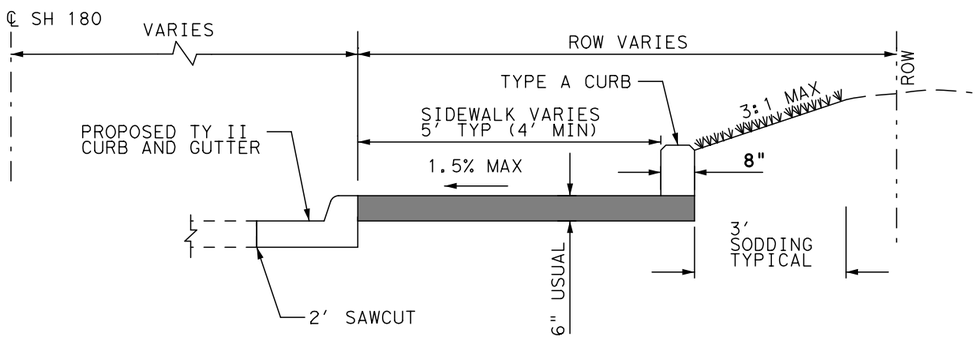


PROPOSED SIDEWALK TYPE A ADJACENT TO EXISTING CURB

SH 180 EB STA 29+60.00 TO STA 30+92.00
SH 180 EB STA 32+54.00 TO STA 33+46.00
SH 180 EB STA 34+74.00 TO STA 36+14.00
NOT TO SCALE



PROPOSED SIDEWALK TYPE A ADJACENT TO PROPOSED CURB

SH 180 WB STA 27+04.00 TO STA 27+70.00
SH 180 EB STA 44+74.00 TO STA 45+42.00
NOT TO SCALE

NOTES:

1. SEE MISCELLANEOUS CONSTRUCTION DETAIL SHEETS FOR SIDEWALK DETAILS.
2. GAPS IN STATIONING REFLECT NO SIDEWALK IMPROVEMENTS.
3. STATION LIMITS ROUNDED TO CLOSEST EVEN STATION.

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
TYPICAL SECTIONS

SHEET 3 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		7

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Project Number: STP 2021(863)

County: Tarrant **Control:** 0008-05-031

Highway: SH 180

Specification Data

Basis of Estimate

Item	Description	Rate	Unit
168	Vegetative Watering	169,400 gal./acre	1,000 gal.

Special Notes

Electronic files containing answered pre-letting questions and other project related design information will be placed in the following FTP site periodically.

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

The data located in these files is for non-construction purposes only and can be found at

TxDOT's public FTP site at https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting Responses/.

Access is read-only.

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

To obtain a copy of the project plans free of charge, submit a request from the following site: http://www.txdot.gov/business/letting-bids/plans-online.html

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

Area Engineer's Email: David.Neeley@txdot.gov
Assistant Area Engineer's Email: Russell.Poer@txdot.gov
Design Manager's Email: Ngozi.Lopez@txdot.gov

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

All contractor questions will be reviewed by the Engineer. Once a response is developed, it will be posted to TxDOT's Public FTP at the following Address:
https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20 Responses/

Project Number: STP 2021(863)

County: Tarrant **Control:** 0008-05-031

Highway: SH 180

All questions submitted that generate a response will be posted through this site. The site is organized by District, Project Type (Construction or Maintenance), Letting Date, CCSJ/Project Name.

Single lane closures, except as otherwise shown in the plans, will be restricted to off-peak hours as defined in the following table:

Peak Hours		Off-Peak Hours	
6 to 9 AM Monday through Friday	3 to 7 PM Monday through Friday	9 AM to 3 PM and 7 PM to 6 AM Monday through Friday	All day Saturday and Sunday

Work that requires closure of multiple travel lanes in the same direction, except as otherwise shown in the plans, are restricted to night hours between 9 PM and 6 AM.

Existing storm sewers and utilities are shown from the best available information. Verify the location of all underground facilities prior to starting work.

For dimensions of right-of-way not shown on the plans, see right-of-way map on file at the TxDOT District Office.

Modifications to Lane Closure / Work Restrictions:

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.

Mail box manipulation made necessary because of construction will be in accordance with Item 560 "Mailbox Assemblies," except that this work will not be paid for directly but will subsidiary to the pertinent bid items.

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.

All driveway openings will be determined by the Engineer and will conform with Texas Department of Transportation "Regulations for Access Driveways to State Highways" adopted September 1953, and revised June 2004.

Locations and lengths of all private entrances are approximate only. The actual locations, lengths, lines, and grades are to be established in the field 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.

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.

Install all required concrete riprap flumes immediately following the construction of ditches in which they are to be placed. In addition, apply all erosion control measures as shown on the plans or as directed, immediately following construction of channels to their required line, grade, and section.

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 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,

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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.

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 2.75 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.

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
Within one mile radius of major retail traffic generators i.e. malls (Thanksgiving Day through January 2)
Fort Worth Stock Show and Rodeo
MayFest

Item 8. Prosecution and Progress

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

Progress schedule must be CPM.

Item 104. Removing Concrete

When associated with a structure to be removed, removal of riprap as required, approach slabs, and shoulder drains are to be included in the unit price bid for Item 496, "Removing Structures."

Item 161. Compost

Place approximately 4" of compost manufactured topsoil (CMT) on all cut and fill slopes (except drainage channels where flexible channel liners are indicated), at other locations shown on the plans, or as directed.

Where "pre-blended" CMT is specified, amend suitable soil material, as directed, with 25% compost, by volume, to produce the compost manufactured topsoil. Place the compost manufactured topsoil in a loose layer approximately 4" thick, as shown on the plans.

Item 162. Sodding for Erosion Control

Furnish and place Bermudagrass sod.

Item 168. Vegetative Watering

Furnish and install an approved rain gauge at the project site, as directed. Furnishing and installation of the rain gauge will not be paid for directly, but will be subsidiary to Item 168.

Apply vegetative watering for an establishment period of thirteen weeks following application of seed or installation of sod, at a rate of 1/2 inch of water depth per week (approximately 13,030 gallons per acre). During the first four weeks after seeding, apply water twice per week, on non-consecutive days, each at half the weekly application rate. For the remainder of the establishment period, apply vegetative watering once per week during the months of January through June or September through December, at the weekly application rate; apply watering twice per week, on non-consecutive days during the months of July and August, each at one-half the weekly application rate.

Average weekly rainfall rates for the District are:

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January—0.39"	April—0.86"	July—0.48"	October—0.68"
February—0.46"	May—1.00"	August—0.47"	November—0.46"
March—0.48"	June—0.63"	September—0.74"	December—0.37"

Item 432. Riprap

Provide weep holes as directed.

The quantities for riprap at the location indicated may be varied to the extent necessary to ensure proper functioning for the purpose intended.

All concrete riprap will be 6" (0.5') in thickness, unless otherwise shown on the plans, and must be reinforced.

An 8 inch (.67 ft.) by 18 inch (1.5 ft.) toe wall is required at the exposed edges of all concrete riprap, unless otherwise directed.

Provide a toe wall at all exposed edges of all protection stone riprap, unless otherwise directed.

Locations and lengths of riprap flumes shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

Welded Wire Reinforcement (WWR) may be used for construction joint and toe wall reinforcing with the approval of the Engineer.

Item 440. Reinforcement for Concrete

Top and bottom layers of slab reinforcing steel shall be epoxy coated.

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.

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 506. Temporary Erosion, Sedimentation, and Environmental Controls

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.

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.

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

All compliant ramps are to remain in place.

Install an approved cast in place detectable warning surface on all new curb ramps.

Construct compliant curb ramps based upon referenced design criteria, Texas Accessibility Standards and TxDOT Pedestrian Facilities Standards. Consider the locations of existing traffic and pedestrian control devices including loop detectors and pedestrian push buttons during curb ramp construction at signalized intersections, and construct ramps to allow such existing facilities to remain undisturbed and reused to the fullest extent possible while providing for full ADA compliance. All corners are unique and it may be necessary to use various combinations of ramp elements to achieve a compliant ramp configuration.

Review the curb ramp location and layout with TxDOT's inspector prior to demolition so that both parties agree that the curb ramp can be installed properly. Should it become apparent at any

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time during the ramp layout and construction process that a curb ramp cannot be installed as indicated on the Project Drawings, promptly notify the TxDOT inspector.

Any approval, inspection, or checking of the contractor's layout by TxDOT and the acceptance of all or any part of it shall not relieve the contractor of his responsibility to secure the proper dimensions, grades and elevations of the various parts of the work.

Construction of each curb ramp is to be completed within seven (7) working days after start of construction process. Construction process of curb ramps shall include: demolition of existing conditions, placement of concrete or brick, removal of lips, street surface patching in front of the curb or ramp, adjustment of counter slope within 24-inches of the bottom of the ramp or curb and gutter, street level landings, backfill, placement of topsoil, grading and sodding, and clean-up. All other related work such as adjustment of crosswalk, special heat-welds, asphalt overlays, and other work that does not affect accessibility shall be completed per a schedule pre-approved by TxDOT.

Furnish and install #3 dia. reinforcing steel bars @ 18" O.C./B.W. for sidewalk, curb ramps and curb ramp components.

Proposed curb ramps, sidewalks, curbs, and riprap is to be doweled 8in minimum into existing, using 1/2in reinforcement placed on 12in centers.

The curb ramp locations shown in the plans have taken into account the geometric features of the intersection, traffic signals, and the pavement markings. If anything changes during construction, the location of curb ramps must be adjusted to ensure they meet PROWAG requirements.

Contractor is to match existing concrete color and texturing at various locations which, as directed by the engineer, require matching.

PROTECTION NOTES FOR THE REMOVAL OF EXISTING PAVEMENT, CURB OR SIDEWALK AND CONSTRUCTION OF NEW PAVEMENT, CURB OR SIDEWALK ADJACENT TO HISTORIC BUILDINGS, MATERIALS, FENCES, AND RETAINING WALLS

Where proposed work is in proximity to historic buildings or other structures (walls, retaining walls, fences, stone markers, curb tile), planting beds, and vegetation/groundcover, follow the procedures listed below for demolition and construction at these locations:

- 1212 East Lancaster Street (Parker-Brown Company Building)
- 1324 East Lancaster Avenue
- Northwest corner of E. Lancaster Avenue and Anna Street (curb tile)
- Southeast corner of Wilkinson Avenue and Anna Street (curb tile)

To minimize potential damage to historic structures and materials, contractor must saw cut existing sidewalk 8 to 12 inches away from the historic resource.

1. Contractor shall construct new sidewalk next to the saw cut edge with installation of expansion joint in between. If existing sidewalk is to be removed entirely, the remaining 8 to 12 inches next to the historic structure, material, fence, or retaining wall must be removed by hand. Expansion joint must be placed between historic structure, material, fence, or retaining wall and new sidewalk.

2. Contractor must prevent damage to historic structure, materials, fences, retaining walls, curb tile, including garden elements (planting beds, plantings) during the entire construction project, especially during removal of existing pavement, curb, or sidewalk. During the saw cut and hand removal process, contractor shall exercise utmost caution and shall physically protect historic structure foundation, materials, elevations, entryways with decorative flooring, fences, retaining walls, curb tile, and landscape elements. When pouring concrete for repair or new install, contractor shall prevent splashback of concrete onto historic resource.

3. Contractor must repair or replace in kind, at his own expense, any historic materials damaged in the course of executing the work. Contractor shall locate replacement source for historic materials damaged in the course of the work. TxDOT-Environmental Affairs Division shall be informed of proposed repairs to facilitate consultation with Texas Historical Commission prior to execution of repair work.

Item 540. Metal Beam Guard Fence

The locations and lengths of guard fence shown on the plans are approximate. Actual lengths and locations are to be determined in the field.

The tops of timber posts will be domed. Beveled tops will not be permitted for timber or steel posts.

When holes for timber posts are drilled below bottom of proposed grade, backfill the excessive depth with an acceptable sand. The furnishing and installation of the sand backfill will not be paid for directly but will be subsidiary to this Item.

When guardrail posts are placed in a finished surface, backfill the top 4 inches with an asphaltic material, domed to carry water away from the posts or as shown on the plans. The furnishing and installation of the asphaltic material backfill will not be paid for directly but will be subsidiary to this Item.

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

Item 542. Removing Metal Beam Guard Fence

Remove existing metal beam guard fence only when authorized.

Item 666. Reflectorized Pavement Markings with Retroreflective Requirements

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 6001. Portable Changeable Message Signs

Provide all portable changeable message signs and arrow panels with a photoelectric device to allow for automatic dimming of operations to approximately 50% of their normal brightness when ambient light drops to approximately five footcandles, and then increase back again for daytime operations.

2 electronic portable changeable message sign unit(s) will be required. Individual or collective use of signs will be required by the Engineer when deemed necessary to supplement the traffic control plan.

Each sign must have programmed in its permanent memory the following 15 messages:

1. Exit Closed Ahead
2. Use Other Routes
3. Right Lane
4. Left Lane
5. Closed Ahead
6. Two Lane
7. Detour Ahead
8. Thru Traffic
9. Prepare To Stop
10. Merging Traffic
11. Expect 15 Minute Delay
12. Max Speed ** MPH

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13. Merge Right
14. Merge Left
15. No Exit Next ** Miles

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						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0008-05-031**			
		PROJECT ID		**A00140541**			
		COUNTY		**Tarrant**			
		HIGHWAY		**SH 180**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	870.000		870.000	
	104-6029	REMOVING CONC (CURB OR CURB & GUTTER)	LF	2,286.000		2,286.000	
	104-6036	REMOVING CONC (SIDEWALK OR RAMP)	SY	92.000		92.000	
	105-6096	REMOV STAB BASE AND ASPH PAV (0"-12")	SY	1,174.000		1,174.000	
	161-6022	GENERAL USE COMPOST (4")	SY	3,219.000		3,219.000	
	162-6002	BLOCK SODDING	SY	3,219.000		3,219.000	
	168-6001	VEGETATIVE WATERING	MG	0.110		0.110	
	351-6036	FLEX PAVEMENT STRUCTURE REPAIR (2-8")	SY	19.000		19.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	56.000		56.000	
	432-6003	RIPRAP (CONC)(6 IN)	CY	118.000		118.000	
	432-6047	RIPRAP (MOW STRIP)(6 IN)	CY	22.000		22.000	
	450-6048	RAIL (HANDRAIL)(TY B)	LF	214.000		214.000	
	500-6001	MOBILIZATION	LS	1.000		1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	14.000		14.000	
	506-6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	20.000		20.000	
	506-6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	20.000		20.000	
	529-6002	CONC CURB (TY II)	LF	415.000		415.000	
	529-6007	CONC CURB & GUTTER (TY I)	LF	475.000		475.000	
	529-6008	CONC CURB & GUTTER (TY II)	LF	3,059.000		3,059.000	
	530-6004	DRIVEWAYS (CONC)	SY	1,012.000		1,012.000	
	531-6003	CONC SIDEWALKS (6")	SY	4,273.000		4,273.000	
	531-6004	CURB RAMPS (TY 1)	EA	12.000		12.000	
	531-6005	CURB RAMPS (TY 2)	EA	10.000		10.000	
	531-6006	CURB RAMPS (TY 3)	EA	5.000		5.000	
	531-6008	CURB RAMPS (TY 5)	EA	1.000		1.000	
	531-6010	CURB RAMPS (TY 7)	EA	5.000		5.000	
	531-6016	CURB RAMPS (TY 21)	EA	1.000		1.000	
	531-6032	CONC SIDEWALKS (SPECIAL) (TYPE A)	SY	459.000		459.000	
	540-6001	MTL W-BEAM GD FEN (TIM POST)	LF	112.500		112.500	
	542-6001	REMOVE METAL BEAM GUARD FENCE	LF	137.500		137.500	
	544-6001	GUARDRAIL END TREATMENT (INSTALL)	EA	1.000		1.000	
	618-6023	CONDT (PVC) (SCH 40) (2")	LF	110.000		110.000	
	618-6029	CONDT (PVC) (SCH 40) (3")	LF	275.000		275.000	
	618-6030	CONDT (PVC) (SCH 40) (3") (BORE)	LF	225.000		225.000	
	620-6007	ELEC CONDR (NO.8) BARE	LF	225.000		225.000	
	620-6008	ELEC CONDR (NO.8) INSULATED	LF	270.000		270.000	
	620-6009	ELEC CONDR (NO.6) BARE	LF	520.000		520.000	

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		PROJECT ID		**A00140541**			
		COUNTY		**Tarrant**			
		HIGHWAY		**SH 180**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	620-6010	ELEC CONDR (NO.6) INSULATED	LF	40.000		40.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	10.000		10.000	
	628-6188	ELC SRV TY D 120/240 070(NS)SS(E)SP(O)	EA	2.000		2.000	
	636-6001	ALUMINUM SIGNS (TY A)	SF	99.000		99.000	
	636-6009	REPLACE EXISTING ALUMINUM SIGNS(TY O)	SF	169.000		169.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	19.000		19.000	
	644-6004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	2.000		2.000	
	644-6068	RELOCATE SM RD SN SUP&AM TY 10BWG	EA	7.000		7.000	
	644-6070	RELOCATE SM RD SN SUP&AM TY S80	EA	1.000		1.000	
	644-6076	REMOVE SM RD SN SUP&AM	EA	1.000		1.000	
	644-6078	REMOVE SM RD SN SUP&AM (SIGN ONLY)	EA	2.000		2.000	
	666-6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	1,694.000		1,694.000	
	666-6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	1,979.000		1,979.000	
	666-6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	2.000		2.000	
	666-6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	31.000		31.000	
	666-6099	REF PAV MRK TY I(W)18"(YLD TRI)(100MIL)	EA	41.000		41.000	
	666-6224	PAVEMENT SEALER 4"	LF	1,083.000		1,083.000	
	666-6226	PAVEMENT SEALER 8"	LF	1,694.000		1,694.000	
	666-6230	PAVEMENT SEALER 24"	LF	1,979.000		1,979.000	
	666-6231	PAVEMENT SEALER (ARROW)	EA	2.000		2.000	
	666-6232	PAVEMENT SEALER (WORD)	EA	31.000		31.000	
	666-6243	PAVEMENT SEALER (YLD TRI)	EA	41.000		41.000	
	666-6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	773.000		773.000	
	666-6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	455.000		455.000	
	677-6001	ELIM EXT PAV MRK & MRKS (4")	LF	1,334.000		1,334.000	
	677-6005	ELIM EXT PAV MRK & MRKS (12")	LF	246.000		246.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	66.000		66.000	
	677-6018	ELIM EXT PAV MRK & MRKS (18")(YLD TRI)	EA	27.000		27.000	
	678-6001	PAV SURF PREP FOR MRK (4")	LF	1,083.000		1,083.000	
	678-6004	PAV SURF PREP FOR MRK (8")	LF	1,694.000		1,694.000	
	678-6008	PAV SURF PREP FOR MRK (24")	LF	1,979.000		1,979.000	
	678-6009	PAV SURF PREP FOR MRK (ARROW)	EA	2.000		2.000	
	678-6016	PAV SURF PREP FOR MRK (WORD)	EA	31.000		31.000	
	678-6022	PAV SURF PREP FOR MRK (18")(YLD TRI)	EA	41.000		41.000	
	680-6002	INSTALL HWY TRF SIG (ISOLATED)	EA	2.000		2.000	
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	30.000		30.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	24.000		24.000	

Estimate & Quantity Sheet

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HIGHWAY SH 180

						TOTAL EST.	TOTAL FINAL
		CONTROL SECTION JOB		**0008-05-031**			
		PROJECT ID		**A00140541**			
		COUNTY		**Tarrant**			
		HIGHWAY		**SH 180**			
ALT	**BID CODE**	**DESCRIPTION**	**UNIT**	EST.	FINAL		
	682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	8.000		8.000	
	682-6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	12.000		12.000	
	684-6007	TRF SIG CBL (TY A)(12 AWG)(2 CONDR)	LF	1,000.000		1,000.000	
	684-6009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	279.000		279.000	
	684-6031	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	LF	1,000.000		1,000.000	
	684-6033	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	LF	505.000		505.000	
	685-6004	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)	EA	9.000		9.000	
	686-6041	INS TRF SIG PL AM(S)1 ARM(40')	EA	2.000		2.000	
	686-6045	INS TRF SIG PL AM(S)1 ARM(44')	EA	2.000		2.000	
	687-6001	PED POLE ASSEMBLY	EA	4.000		4.000	
	688-6001	PED DETECT PUSH BUTTON (APS)	EA	8.000		8.000	
	688-6003	PED DETECTOR CONTROLLER UNIT	EA	2.000		2.000	
	752-6005	TREE REMOVAL (4" - 12" DIA)	EA	3.000		3.000	
	4193-6001	ORNAMENTAL FENCE	LF	770.000		770.000	
	6001-6001	PORTABLE CHANGEABLE MESSAGE SIGN	DAY	30.000		30.000	
	6056-6002	PREFORMED CENTERLINE RUMBLE STRIP	LF	1,120.000		1,120.000	
	6185-6002	TMA (STATIONARY)	DAY	7.000		7.000	
	7012-6001	CURB INLET SEDIMENT PROTECTION	LF	314.000		314.000	
	18	EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000		1.000	
		SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000		1.000	

DN: AECOM | CK: AECOM | DW: AECOM | CK: AECOM Lynda

SUMMARY OF ROADWAY ITEMS

LOCATION	104 6017	104 6029	104 6036	105 6096	161 6022	162 6002	168 6001	351 6036	432 6003	432 6047	450 6048	529 6002	529 6007	529 6008	530 6004	531 6003
	REMOVING CONC (DRIVEWAYS)	REMOVING CONC (CURB OR CURB & GUTTER)	REMOVING CONC (SIDEWALK OR RAMP)	REMOV STAB BASE AND ASPH PAV (0"-12")	GENERAL USE COMPOST (4")	BLOCK SODDING	VEGETATIVE WATERING	FLEX PAV STRUCTURE REPAIR (2-8")	RIPRAP (CONC) (6 IN)	RIPRAP (MOW STRIP) (6 IN)	RAIL (HANDRAIL) (TY B)	CONC CURB (TY II)	CONC CURB & GUTTER (TY I)	CONC CURB & GUTTER (TY II)	DRIVEWAYS (CONC)	CONC SIDEWALKS (6")
	SY	LF	SY	SY	SY	SY	MG	SY	CY	CY	LF	LF	LF	LF	SY	SY
SHEET 1 OF 31									0.5							17
SHEET 2 OF 31																
SHEET 3 OF 31																
SHEET 4 OF 31																118
SHEET 5 OF 31	61	108			30	30	0.001							109	61	87
SHEET 6 OF 31					122	122	0.004						51			229
SHEET 7 OF 31		123			77	77	0.003		1.6					133		261
SHEET 8 OF 31					162	162	0.006		3.4							240
SHEET 9 OF 31		63			350	350	0.012		1.6					63		203
SHEET 10 OF 31		292		138	344	344	0.012		7.3			32		539		285
SHEET 11 OF 31		354		216	431	431	0.015					60		450		306
SHEET 12 OF 31		526		471	568	568	0.020	19				48		663		258
SHEET 13 OF 31		91		64	65	65	0.002							110		46
SHEET 14 OF 31	81	29			35	35	0.001		4.9			38			81	89
SHEET 15 OF 31	44	17			89	89	0.003		9.2	2.5		16			47	211
SHEET 16 OF 31		111		124	252	252	0.009		8.5	7			35	152		196
SHEET 17 OF 31									16.6	7	62		45	20	29	158
SHEET 18 OF 31			18						16.8	5.5			40		18	125
SHEET 19 OF 31	34	6			131	131	0.005					23		31	34	244
SHEET 20 OF 31	40	22			88	88	0.003					20			40	149
SHEET 21 OF 31					63	63	0.002							34		57
SHEET 22 OF 31	25								5.9			10		148	25	92
SHEET 23 OF 31	88	9							7.3			18	72	77	88	104
SHEET 24 OF 31	237	88		20	34	34	0.001		13.8			40	187	33	237	219
SHEET 25 OF 31	65	152	54	49	140	140	0.005		6.5			24		97	65	169
SHEET 26 OF 31	92	71		76	5	5	0.000		10.8		8	39	45	45	168	110
SHEET 27 OF 31	46	65		16	38	38	0.001		1.9		144	19		106	62	103
SHEET 28 OF 31	57	60	20		195	195	0.007					28		175	57	197
SHEET 29 OF 31		25							1.4					29		
SHEET 30 OF 31		74												45		
SHEET 31 OF 31																
PROJECT TOTALS	870	2286	92	1174	3219	3219	0.1127	19	118	22	214	415	475	3059	1012	4273

SUMMARY OF ROADWAY ITEMS

LOCATION	531 6004	531 6005	531 6006	531 6008	531 6010	531 6016	531 6032	540 6001	542 6001	544 6001	752 6005	4099 6001
	CURB RAMPS (TY 1)	CURB RAMPS (TY 2)	CURB RAMPS (TY 3)	CURB RAMPS (TY 5)	CURB RAMPS (TY 7)	CURB RAMPS (TY 21)	CONC SIDEWALKS (SPECIAL) (TYPE A)	MTL W-BEAM GD FEN (TIM POST)	REMOVE METAL BEAM GUARD FENCE	GUARDRAIL END TREATMENT (INSTALL)	TREE REMOVAL (4" - 12" DIA)	ORNAMENTAL STEEL FENCE
	EA	EA	EA	EA	EA	EA	SY	LF	LF	EA	EA	LF
SHEET 1 OF 31		2	2	1								
SHEET 2 OF 31			2									
SHEET 3 OF 31			1									
SHEET 4 OF 31												
SHEET 5 OF 31							45					
SHEET 6 OF 31	1	1					97				3	
SHEET 7 OF 31	1	1					71					
SHEET 8 OF 31							126					
SHEET 9 OF 31							70	112.5	112.5			
SHEET 10 OF 31		2							25	1		
SHEET 11 OF 31												
SHEET 12 OF 31	1	1					45					
SHEET 13 OF 31												
SHEET 14 OF 31												
SHEET 15 OF 31												84
SHEET 16 OF 31					1		5					250
SHEET 17 OF 31	4											238
SHEET 18 OF 31					1							198
SHEET 19 OF 31					2							
SHEET 20 OF 31												
SHEET 21 OF 31					1							
SHEET 22 OF 31												
SHEET 23 OF 31												
SHEET 24 OF 31												
SHEET 25 OF 31		1										
SHEET 26 OF 31	1	1										
SHEET 27 OF 31	4											
SHEET 28 OF 31												
SHEET 29 OF 31						1						
SHEET 30 OF 31		1										
SHEET 31 OF 31												
PROJECT TOTALS	12	10	5	1	5	1	459	112.5	137.5	1	3	770

SUMMARY OF RETAINING WALL ITEMS

LOCATION	481 * 6013
	PIPE (PVC) (SCH 40) (6 IN)
	LF
SHEET 1 OF 5	68
SHEET 2 OF 5	120
SHEET 3 OF 5	98
SHEET 4 OF 5	162
SHEET 5 OF 5	67
PROJECT TOTALS	525

*SUBSIDIARY TO ITEMS 5316032 AND 5316033

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SH 180
SIDEWALK CORRIDOR
QUANTITY SUMMARY

SHEET 1 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		10

DATE: 5/25/2021 6:39:14 PM
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SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	666 6036	666 6048	666 6054	666 6078	666 6099	666 6224	666 6226	666 6230	666 6231	666 6232	666 6243	666 6303	666 6315	677 6001	677 6005	677 6007	677 6018	678 6001	678 6004	678 6008
	REFL PAV MRK TY I (W)8"(SLD) (100MIL)	REFL PAV MRK TY I (W)24"(SLD) (100MIL)	REFL PAV MRK TY I (W)(ARROW) (100MIL)	REFL PAV MRK TY I (W)(WORD) (100MIL)	REF PAV MRK TY I(W)18"(YLD TRI)(100MIL)	PAVEMENT SEALER 4"	PAVEMENT SEALER 8"	PAVEMENT SEALER 24"	PAVEMENT SEALER (ARROW)	PAVEMENT SEALER (WORD)	PAVEMENT SEALER (YLD TRI)	RE PM W/RET REQ TY I (W)4"(SLD (100MIL)	RE PM W/RET REQ TY I (Y)4"(SLD) (100MIL)	ELIM EXT PAV MRK & MRKS (4")	ELIM EXT PAV MRK & MRKS (12")	ELIM EXT PAV MRK & MRKS (24")	ELIM EXT PAV MRK & MRKS (18")(YLD TRI)	PAV SURF PREP FOR MRK (4")	PAV SURF PREP FOR MRK (8")	PAV SURF PREP FOR MRK (24")
	LF	LF	EA	EA	EA	LF	LF	LF	EA	EA	EA	LF	LF	LF	LF	LF	EA	LF	LF	LF
SHEET 1 OF 31		220		4	11			220		4	11					54				220
SHEET 2 OF 31		142		8				142		8					110	12	13			142
SHEET 3 OF 31		300		4				300		4			145	220	136		14			300
SHEET 4 OF 31				4						4										
SHEET 5 OF 31																				
SHEET 6 OF 31		20		2	6			20		2	6									20
SHEET 7 OF 31		30			6			30			6									30
SHEET 8 OF 31																				
SHEET 9 OF 31						238						200	38	230				238		
SHEET 10 OF 31	245	30			6	482	245	30			6	357	125	329				482	245	30
SHEET 11 OF 31	751		1	3			751		1	3				125					751	
SHEET 12 OF 31	501	20			12	316	501	20			12	169	147	262				316	501	20
SHEET 13 OF 31	197		1	1		47	197		1	1		47		168				47	197	
SHEET 14 OF 31																				
SHEET 15 OF 31		50						50												50
SHEET 16 OF 31		110						110												110
SHEET 17 OF 31		192						192												192
SHEET 18 OF 31		80						80												80
SHEET 19 OF 31		20						20												20
SHEET 20 OF 31																				
SHEET 21 OF 31		110						110												110
SHEET 22 OF 31																				
SHEET 23 OF 31																				
SHEET 24 OF 31																				
SHEET 25 OF 31		50						50												50
SHEET 26 OF 31		60						60												60
SHEET 27 OF 31		255						255												255
SHEET 28 OF 31																				
SHEET 29 OF 31		120						120												120
SHEET 30 OF 31		170						170												170
SHEET 31 OF 31				5						5										
PROJECT TOTALS	1694	1979	2	31	41	1083	1694	1979	2	31	41	773	455	1334	246	66	27	1083	1694	1979

SUMMARY OF PAVEMENT MARKING ITEMS

LOCATION	678 6009	678 6016	678 6022	6056 6002
	PAV SURF PREP FOR MRK (ARROW)	PAV SURF PREP FOR MRK (WORD)	PAV SURF PREP FOR MRK (18")(YLD TRI)	PREFORMED CENTERLINE RUMBLE STRIP
	EA	EA	EA	LF
SHEET 1 OF 31		4	11	160
SHEET 2 OF 31		8		400
SHEET 3 OF 31		4		160
SHEET 4 OF 31		4		80
SHEET 5 OF 31				
SHEET 6 OF 31		2	6	40
SHEET 7 OF 31			6	40
SHEET 8 OF 31				
SHEET 9 OF 31				
SHEET 10 OF 31			6	40
SHEET 11 OF 31	1	3		40
SHEET 12 OF 31			12	
SHEET 13 OF 31	1	1		
SHEET 14 OF 31				
SHEET 15 OF 31				
SHEET 16 OF 31				
SHEET 17 OF 31				
SHEET 18 OF 31				
SHEET 19 OF 31				
SHEET 20 OF 31				
SHEET 21 OF 31				
SHEET 22 OF 31				
SHEET 23 OF 31				
SHEET 24 OF 31				
SHEET 25 OF 31				
SHEET 26 OF 31				
SHEET 27 OF 31				
SHEET 28 OF 31				
SHEET 29 OF 31				
SHEET 30 OF 31				
SHEET 31 OF 31		5		160
PROJECT TOTALS	2	31	41	1120

SUMMARY OF SIGNING ITEMS

LOCATION	636 6001	636 6009	644 6001	644 6004	644 6068	644 6070	644 6076	644 6078	685 6004 *
	ALUMINUM SIGNS (TY A)	REPLACE EXISTING ALUMINUM SIGNS(TY O)	IN SM RD SN SUP&AM TY10BWG(1) SA(P)	IN SM RD SN SUP&AM TY10BWG(1) SA(T)	RELOCATE SM RD SN SUP&AM TY 10BWG	RELOCATE SM RD SN SUP&AM TY S80	REMOVE SM RD SN SUP&AM	REMOVE SM RD SN SUP&AM (SIGN ONLY)	INSTL RDSD FLSH BCN ASSM (SOLAR PWRD)
	SF	SF	EA	EA	EA	EA	EA	EA	EA
SHEET 1 OF 31	11		2		2			1	1
SHEET 2 OF 31	22							1	2
SHEET 3 OF 31	22					1	1		2
SHEET 4 OF 31			1						
SHEET 5 OF 31									
SHEET 6 OF 31	11		2		1				1
SHEET 7 OF 31	11		1						1
SHEET 8 OF 31									
SHEET 9 OF 31			1						
SHEET 10 OF 31	11	169	2						1
SHEET 11 OF 31									
SHEET 12 OF 31	11		1	1					1
SHEET 13 OF 31				1					
SHEET 14 OF 31									
SHEET 15 OF 31									
SHEET 16 OF 31			1						
SHEET 17 OF 31			2						
SHEET 18 OF 31			1						
SHEET 19 OF 31									
SHEET 20 OF 31									
SHEET 21 OF 31									
SHEET 22 OF 31									
SHEET 23 OF 31									
SHEET 24 OF 31									
SHEET 25 OF 31					1				
SHEET 26 OF 31			1						
SHEET 27 OF 31			2		2				
SHEET 28 OF 31			1		1				
SHEET 29 OF 31									
SHEET 30 OF 31									
SHEET 31 OF 31			1						
PROJECT TOTALS	99	169	19	2	7	1	1	2	9

* NOTE: SEE SUMMARY OF TRAFFIC SIGNAL FOR ADDITIONAL INCLUDED ITEMS

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SH 180
SIDEWALK CORRIDOR
QUANTITY SUMMARY

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		11

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

DATE: 7/2/2021 12:03:19 AM
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SUMMARY OF TRAFFIC SIGNAL ITEMS												
LOCATION	416 6032	618 6023	618 6029	618 6030	620 6007	620 6008	620 6009	620 6010	624 6010	628 6188	680 6002	682 6003
	DRILL SHAFT (TRF SIG POLE) (36 IN)	CONDT (PVC) (SCH 40) (2")	CONDT (PVC) (SCH 40) (3")	CONDT (PVC) (SCH 40) (3") (BORE)	ELEC CONDR (NO. 8) BARE	ELEC CONDR (NO. 8) INSULATED	ELEC CONDR (NO. 6) BARE	ELEC CONDR (NO. 6) INSULATED	GROUND BOX TY D (162922) W/APRON	ELC SRV TY D 120/240 070(NS)SS (E)SP(O)	INSTALL HWY TRF SIG (ISOLATED)	VEH SIG SEC (12")LED(YEL)
	LF	LF	LF	LF	LF	LF	LF	LF	EA	EA	EA	EA
PEDESTRIAN HYBRID BEACON LAYOUT												
SHEET 1 OF 2	28	10	130	105			245	20	5	1	1	6
SHEET 2 OF 2	28	10	145	120			275	20	5	1	1	6
SOLAR POWERED RFBA		90			225	270						18
PROJECT TOTALS	56	110	275	225	225	270	520	40	10	2	2	30

SUMMARY OF TRAFFIC SIGNAL ITEMS												
LOCATION	682 6005	682 6018	682 6060	684 6007	684 6009	684 6031	684 6033	686 6041	686 6045	687 6001	688 6001	688 6003
	VEH SIG SEC (12")LED(RED)	PED SIG SEC (LED) (COUNTDOWN)	BACKPLATE W/REFL BRDR (3 SEC)	TRF SIG CBL (TY A)(12 AWG)(2 CONDR)	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	TRF SIG CBL (TY A)(14 AWG)(5 CONDR)	TRF SIG CBL (TY A)(14 AWG)(7 CONDR)	INS TRF SIG PL AM(S)1 ARM(40')	INS TRF SIG PL AM(S)1 ARM(44')	PED POLE ASSEMBLY	PED DETECT PUSH BUTTON (APS)	PED DETECTOR CONTROLLER UNIT
	EA	EA	EA	LF	LF	LF	LF	EA	EA	EA	EA	EA
PEDESTRIAN HYBRID BEACON LAYOUT												
SHEET 1 OF 2	12	4	6	450		450	230	1	1	2	4	1
SHEET 2 OF 2	12	4	6	550		550	275	1	1	2	4	1
SOLAR POWERED RFBA					279							
PROJECT TOTALS	24	8	12	1000	279	1000	505	2	2	4	8	2

SUMMARY OF EROSION CONTROL ITEMS			
LOCATION	506 6038	506 6039	7012 6001
	TEMP SEDMT CONT FENCE (INSTALL)	TEMP SEDMT CONT FENCE (REMOVE)	CURB INLET SEDIMENT PROTECTION
	LF	LF	LF
SHEET 1 OF 6			35
SHEET 2 OF 6			54
SHEET 3 OF 6			41
SHEET 4 OF 6			23
SHEET 5 OF 6	20	20	138
SHEET 6 OF 6			23
PROJECT TOTALS	20	20	314

SUMMARY OF TRAFFIC CONTROL ITEMS				
LOCATION	500 6001	502 6001	6001 6001	6185 6002
	MOBILIZATION	BARRICADES, SIGNS AND TRAFFIC HANDLING	PORTABLE CHANGEABLE MESSAGE SIGN	TMA (STATIONARY)
	LS	MO	DAY	DAY
PROJECT TOTALS	1	14	30	7

NO.	REVISION	DATE

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SH 180
SIDEWALK CORRIDOR
QUANTITY SUMMARY

SHEET 3 OF 3

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		12

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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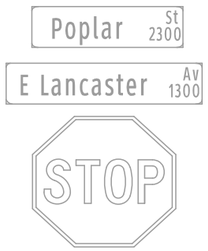
SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
SH180 1 OF 31	1	W11-2 W16-9P		36X36 12X24	✓		10BWG	1	SA	P		
1 OF 31	2	W11-2 W16-9P		EXISTING SIGN TO BE RELOCATED EXISTING SIGN TO BE RELOCATED	✓		10BWG	1	SA	P		
1 OF 31	5	R1-5L		36X36	✓		10BWG	1	SA	P		
1 OF 31	7	D3-1 D3-1 R1-1		EXISTING SIGN TO BE RELOCATED EXISTING SIGN TO BE RELOCATED EXISTING SIGN TO BE RELOCATED	✓		10BWG	1	SA	P	BM	
2 OF 31	8	R1-5L		EXISTING SIGN TO BE REMOVED								
3 OF 31	10	R1-5L		EXISTING SIGN TO BE REMOVED								

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 1 OF 5

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
4-16 8-16	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		13

18

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
SH180												
3 OF 31		N/A		EXISTING SIGN								
				TO BE RELOCATED								
		D3-1		EXISTING SIGN								
				TO BE RELOCATED								
		D3-1		EXISTING SIGN								
				TO BE RELOCATED								
	13	R1-1		EXISTING SIGN	✓		S80	1	SA	P	BM	
				TO BE RELOCATED								
		N/A		EXISTING SIGN								
				TO BE RELOCATED								
		R7-201P		EXISTING SIGN								
4 OF 31		W11-2		36X36								
	14				✓		10BWG	1	SA	P		
		W16-9P		12X24								
6 OF 31	15	R1-5L		36X36	✓		10BWG	1	SA	P		
6 OF 31	16	R5-1a		EXISTING SIGN TO BE RELOCATED	✓		10BWG	1	SA	T		
6 OF 31		W11-2		36X36								
	17				✓		10BWG	1	SA	P		
		W16-9P		12X24								
7 OF 31	18	R1-5L		36X36	✓		10BWG	1	SA	P		

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 2 OF 5

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	0008	05	031	SH 180
4-16	DIST	COUNTY		SHEET NO.
8-16	FTW	TARRANT		14

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SUMMARY OF SMALL SIGNS

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX) POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION PREFABRICATED	MOUNTING DESIGNATION 1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE
							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1 or 2	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"		TY N TY S
SH180												
9 OF 31												
	19	W9-2TL		36X36	✓		10BWG	1	SA	P		
10 OF 31												
	20	R1-5L		36X36	✓		10BWG	1	SA	P		
10 OF 31												
	21	W11-2 / W16-9P		36X36 / 12X24	✓		10BWG	1	SA	P		
12 OF 31												
	23	R1-5L		36X36	✓		10BWG	1	SA	P		
12 OF 31												
	24	R1-2		30X30	✓		10BWG	1	SA	T		
13 OF 31												
	25	R3-33aTR		48X48	✓		10BWG	1	SA	T		
16 OF 31												
	26	W11-2 / W16-9P		36X36 / 12X24	✓		10BWG	1	SA	P		

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 3 OF 5

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4-16	DIST	COUNTY		SHEET NO.
8-16	FTW	TARRANT		15

18

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SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
SH180 17 OF 31	27	R10-6L		24X36	✓		10BWG	1	SA	P		
17 OF 31	28	R10-6L		24X36	✓		10BWG	1	SA	P		
18 OF 31	29	W11-2 W16-9P		36X36 12X24	✓		10BWG	1	SA	P		
25 OF 31	30	D3-1 D3-1 R1-1		EXISTING SIGN TO BE RELOCATED EXISTING SIGN TO BE RELOCATED EXISTING SIGN TO BE RELOCATED	✓		10BWG	1	SA	P	BM	
26 OF 31	31	W11-2 W16-9P		36X36 12X24	✓		10BWG	1	SA	P		
27 OF 31	32	R10-6L		24X36	✓		10BWG	1	SA	P		

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 4 OF 5

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4-16 8-16	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		16

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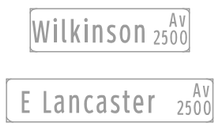
SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	POSTS 1 or 2	ANCHOR TYPE UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	MOUNTING DESIGNATION PREFABRICATED P = "Plain" T = "T" U = "U"	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
SH180 27 OF 31	33	R1-1		EXISTING SIGN TO BE RELOCATED	✓		10BWG	1	SA	P		
27 OF 31	D3-1 34 D3-1			EXISTING SIGN TO BE RELOCATED EXISTING SIGN TO BE RELOCATED	✓		10BWG	1	SA	P	BM	
27 OF 31	35	R10-6L		24X36	✓		10BWG	1	SA	P		
28 OF 31	M3-4B 36 M1-6T			EXISTING SIGN TO BE RELOCATED EXISTING SIGN TO BE RELOCATED	✓		10BWG	1	SA	P		
28 OF 31	W11-2 37 W16-9P			36X36 12X24	✓		10BWG	1	SA	P		
31 OF 31	W11-2 38 W16-9P			36X36 12X24	✓		10BWG	1	SA	P		

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

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

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NOTE:

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3. For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 5 OF 5

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©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
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4-16 8-16	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		17

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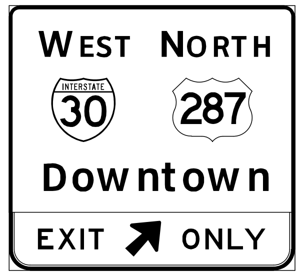
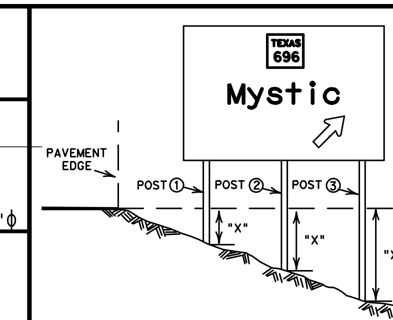
SUMMARY OF LARGE SIGNS

PLAN NO.	SIGN NO.	SIGN BACK-GROUND COLOR	SIGN TEXT	SIGN DIMENSIONS	PLAQUES, & OTHER ATTACHMENTS: DIRECT APPLY	PLAQUES, & OTHER ATTACHMENTS: * ALUMINUM (TYPE A)	BACKGROUND SUBSTRATE (SQ FT): GROUND MOUNT (TYPE G)	BACKGROUND SUBSTRATE (SQ FT): OVERHEAD (TYPE O)	TYPE OF MOUNT	"X" DIMENSION ◒: post ①	"X" DIMENSION ◒: post ②	"X" DIMENSION ◒: post ③	GALVANIZED STRUCTURAL STEEL: SIZE	GALVANIZED STRUCTURAL STEEL: LINEAR FEET post ①	GALVANIZED STRUCTURAL STEEL: LINEAR FEET post ②	GALVANIZED STRUCTURAL STEEL: LINEAR FEET post ③	GALVANIZED STRUCTURAL STEEL: TOTAL WEIGHT LBS.	DRILLED SHAFT: LINEAR FEET NON-REINF 12"ϕ	DRILLED SHAFT: LINEAR FEET REINFORCED 24"ϕ	DRILLED SHAFT: LINEAR FEET REINFORCED 30"ϕ	DRILLED SHAFT: LINEAR FEET REINFORCED 36"ϕ
10 OF 31				13.5'X12.5'	20.25			168.75	EX. OSB												
		GREEN																			
		YELLOW			32.5																
PAGE TOTALS								168.75						PAGE TOTALS							



◒ The "X" dimension is the elevation difference at the post between the ground and the edge of pavement or top of curb.

Sign supports shall be located as shown on the plans, except that the Engineer may shift the sign supports, within design guidelines, where necessary to secure a more desirable location or to avoid conflict with utilities. Unless otherwise shown on the plans, the Contractor shall stake and the Engineer will verify all sign support locations.

The post lengths listed here are approximations, The corrected post lengths will be furnished by the Contractor after the stud posts are placed.

Tower heights shall be verified with the Engineer before fabrication.

* This column is for aluminum Type A and not direct apply. Direct apply is subsidiary to the sign.

SIGN TYPE

SIGN TYPE 1 3 0
- 1 — Wind Design Zone
- 3 — No. of Posts
- 0 — Series No.
  - 0 Aluminum/Fiberglass
  - 1 Aluminum
  - 2 Fiberglass

See sheet SMD(8W1)

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SUMMARY OF LARGE SIGNS

SOLS

DN.: TxDOT	REVISIONS	
CK.: TxDOT	11-93	1-04
DW.: TxDOT	8-95	9-08
CK.: TxDOT	5-01	

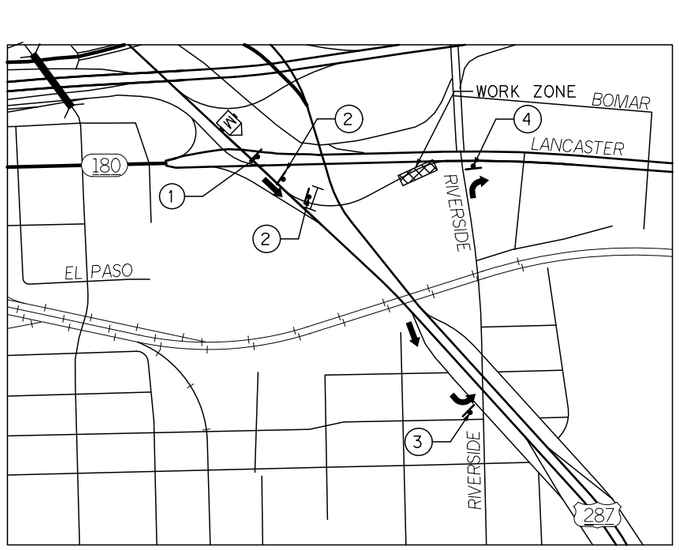
CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180

DIST	COUNTY	SHEET NO.
FTW	TARRANT	18

SUGGESTED SEQUENCE OF CONSTRUCTION

PERFORM WORK IN SEQUENTIAL SEGMENTS ALONG THE CORRIDOR:

1. INSTALL BARRICADES, SIGNS, AND TRAFFIC CONTROL DEVICES PRIOR TO BEGINNING CONSTRUCTION AS SHOWN IN STANDARDS.
2. ALL TRAFFIC TO REMAIN IN EXISTING LANES. CLOSE OUTSIDE LANE IF NECESSARY ACCORDING TO TCP (2-4).
3. DEMOLISH EXISTING SIDEWALK AND RAMPS TO BE REMOVED ALONG THE SEGMENT.
4. CONSTRUCT ANY RETAINING WALLS OR SPECIAL DETAILS.
5. CONSTRUCT SIDEWALKS, RAMPS, CURBS AND DRIVEWAYS ALONG THE SEGMENT. ACCESS TO PROPERTIES MUST BE MAINTAINED AT ALL TIMES. DETOUR RECOMMENDED FOR CONSTRUCTION ON RAMP FROM SOUTHBOUND US 287 TO EASTBOUND SH 180. SEE DETOUR PLAN.
6. INSTALL SIGNALS, PERMANENT PAVEMENT MARKINGS AND PROPOSED SIGNS. RELOCATE SPECIFIED EXISTING SIGNS.
7. REMOVE AND RESET BARRICADES, SIGNS, AND TRAFFIC CONTROL DEVICES FOR THE NEXT SEGMENT OF SIDEWALK TO BE CONSTRUCTED.
8. PERFORM FINAL CLEAN-UP.
9. REMOVE PROJECT SIGNS.



DETOUR PLAN
NOT TO SCALE

1 — RAMP CLOSED AHEAD — CW20RP-3D 48"x48"

2 — RAMP CLOSED — R11-2bT 48"X30"

3 — DETOUR / EAST / 180 TEXAS — M1-6F 24"X24"; M3-3 24"X12"; M1-6F 24"X24"; M5-1BL 21"X15"

4 — DETOUR / EAST / 180 TEXAS — M1-6F 24"X24"; M3-3 24"X12"; M1-6F 24"X24"; M5-1BR 21"X15"

GENERAL NOTES

1. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN DRAINAGE DURING ALL PHASES OF CONSTRUCTION. TEMPORARY DRAINAGE STRUCTURES MAY BE INSTALLED AS APPROVED BY THE ENGINEER.
2. PERMANENT SIGNS AND PAVEMENT MARKINGS SHALL BE INSTALLED AS APPROPRIATE PRIOR TO OPENING COMPLETED SECTIONS OF THE SIDEWALK. IN ADDITION, CHANNELIZING DEVICES AND BARRICADES SHALL BE INSTALLED AND REMAIN IN PLACE TO CLOSE ROADWAYS NOT OPEN TO TRAFFIC AS SHOWN ON THE PLANS OR AS APPROVED BY THE ENGINEER.
3. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ADJACENT PROPERTY AT ALL TIMES DURING CONSTRUCTION. DRUMS AND SIGNS SHALL BE PLACED IN SUCH A MANNER THAT THEY DO NOT BLOCK THE DRIVEWAY OPERATIONS .
4. CONTRACTOR TO PERFORM WORK ON RAMPS IN ACCORDANCE WITH STANDARDS TCP(6-2)-12 THRU TCP(6-4)-12.
5. IF, AT THE END OF EACH WORK DAY, REQUIRED EXCAVATION NEXT TO A PAVEMENT LANE HAS LEFT A DROP OFF PARALLEL AND ADJACENT TO A LANE USED BY TRAFFIC, THE CONTRACTOR WILL BE REQUIRED TO PLACE SUFFICIENT BACKFILL OF A TYPE ACCEPTABLE TO THE ENGINEER AGAINST THE EDGE OF PAVEMENT TO PROVIDE A USUAL 3: 1 SLOPE SUFFICIENT TO ADEQUATELY SUPPORT VEHICULAR TRAFFIC. AT THE BEGINNING OF THE FOLLOWING WORK DAY THIS BACKFILL SHALL BE CAREFULLY REMOVED AND STOCKPILED BY THE CONTRACTOR AT LOCATIONS APPROVED BY THE ENGINEER FOR USE AT THE END OF THAT WORK DAY. THIS PROCESS SHALL CONTINUE UNTIL IT IS NO LONGER REQUIRED AT WHICH TIME THE BACKFILL SHALL BE REMOVED AND DISPOSED OF BY THE CONTRACTOR. MATERIALS AND LABOR FOR THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT SHALL BE CONSIDERED SUBSIDIARY TO ITEM 502, "BARRICADES, SIGNS AND TRAFFIC HANDLING".
6. CONTRACTOR IS NOT TO OPEN ANY PORTION OF THE SIDEWALK UNTIL THAT SECTION IS COMPLETELY CONSTRUCTED AS SHOWN IN PLANS.
7. ALL SIDEWALKS AND RAMPS ARE TO BE CONSTRUCTED TO MEET CURRENT ADA STANDARDS.
8. REPLACE SIDEWALK WITHIN 7 WORKING DAYS OF DEMOLITION UNLESS DIRECTED BY THE ENGINEER. ALL WORK SHOULD BE LIMITED TO 3 BLOCKS AT A TIME AND ONE SECTION MUST BE COMPLETED BEFORE MOVING ON TO THE NEXT SECTION.
9. IF IRRIGATION SYSTEMS ARE ENCOUNTERED, CUT AND PLUG. CONTACT ENGINEER. PAY WITH FORCE ACCOUNT.
10. PORTABLE CHANGEABLE MESSAGE SIGNS SHOULD BE PLACED TO PROVIDE 7 DAYS ADVANCED WARNING FOR SH 180 ON EITHER SIDE OF THE PROJECT NEAR KENTUCKY AVE AND NEAR BEACH ST, 14 DAYS ADVANCED WARNING FOR CLOSURE OF RAMP FROM US 287 TO SH 180 AND 7 DAYS TO PERFORM WORK ON THE RAMP

DETOUR NOTES:

1. SIGN SPACING SHALL BE AS PER THE LATEST BC STANDARDS AND AS DIRECTED BY THE FIELD ENGINEER.
2. ADDITIONAL SIGNS AND TRAFFIC HANDLING MAY BE NECESSARY TO COMPLETE THE WORK SHOWN HEREIN AND WILL BE CONSIDERED SUBSIDIARY TO BID ITEM 502, BARRICADES, SIGNS AND TRAFFIC HANDLING (REFER TO CURRENT BC STANDARDS).
3. ALL TRAFFIC CONTROL SHALL CONFORM TO THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS PART VI & ALL APPLICABLE TXDOT STANDARDS.
5. SIGN LOCATIONS ARE SCHEMATICALLY SHOWN.

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
5/25/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc, F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
TRAFFIC CONTROL NARRATIVE

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		19

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

10. As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.

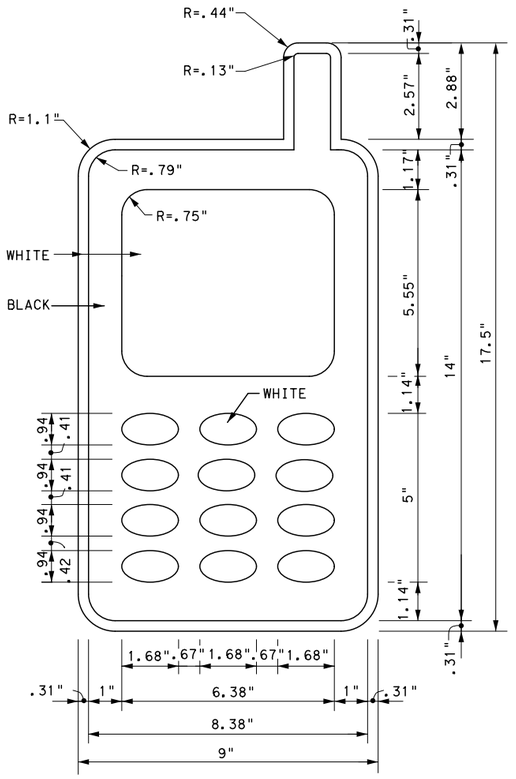
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

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 APPAREL 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.



3.0" Radius, 1.25" Border, 0.75" Indent, Black on Yellow;
[STAY ALERT] Font: D
3.0" Radius, 1.25" Border, 0.75" Indent, Black on Orange;
[TALK OR TEXT LATER] Font: C specified length;

SIGN DETAIL (G20-10T)

Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found on-line at the web address given below or by contacting:

Texas Department of Transportation
Traffic Operations Division - TE
Phone (512) 416-3118

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 Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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9-07 7-13	FTW	TARRANT		20

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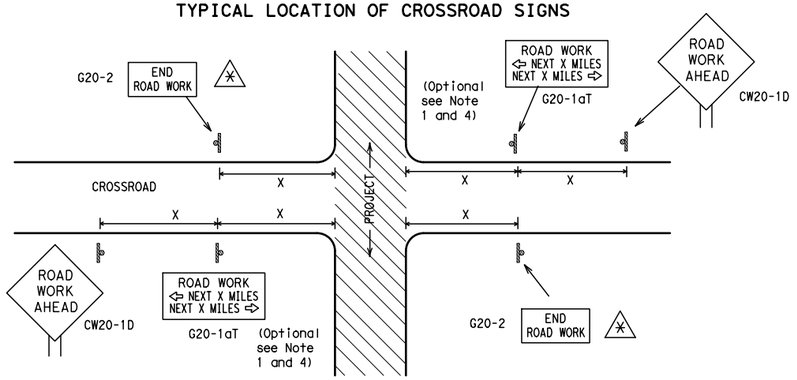
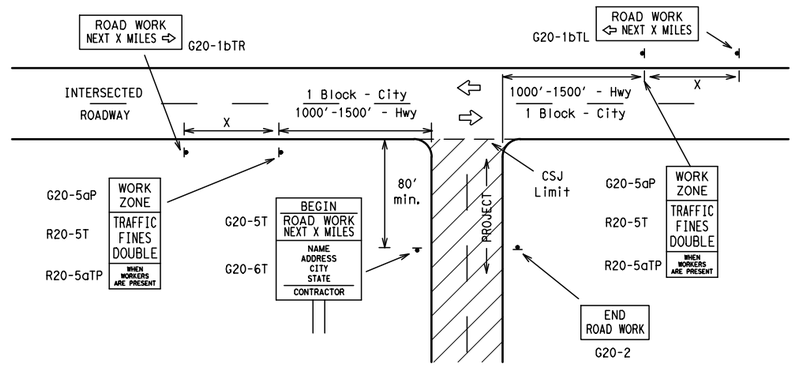
TYPICAL LOCATION OF CROSSROAD SIGNS



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

1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D)sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK"(G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume. 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]

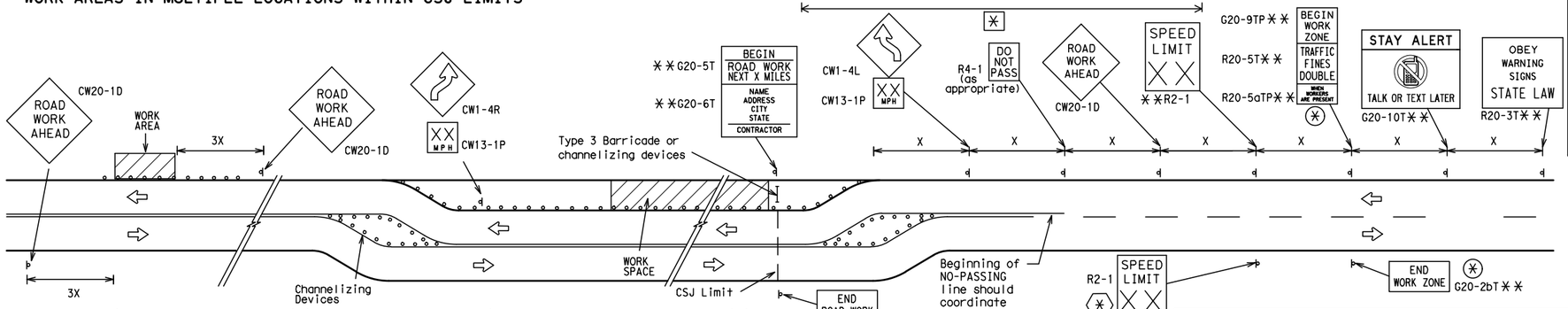
✳ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

△ 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. See Note 2 under "Typical Location of Crossroad Signs".
5. Only diamond shaped warning sign sizes are indicated.
6. See sign size listing in "TMUTCD", Sign Appendix or the "Standard Highway Sign Designs for Texas" manual for complete list of available sign design sizes.

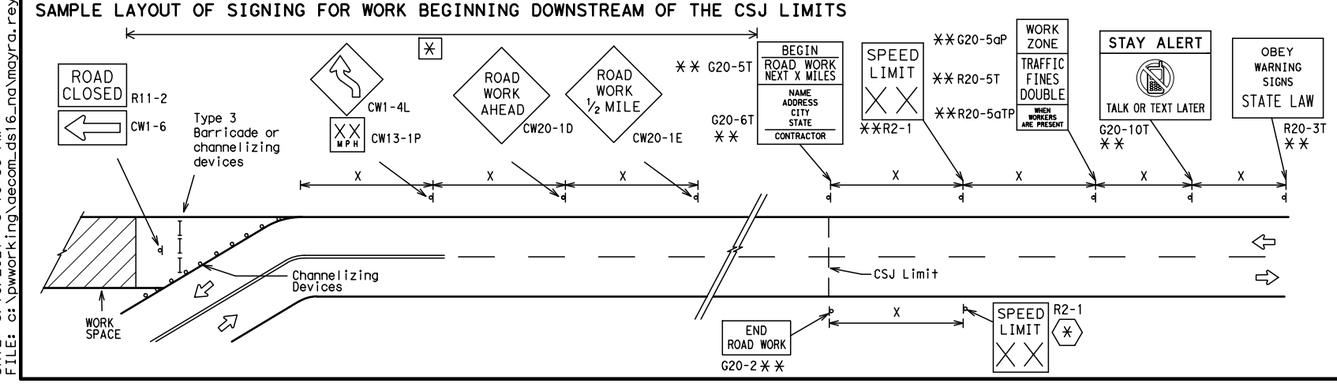
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

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

✳✳ Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.

✳ 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 Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	FTW	TARRANT		21

DATE: 5/18/2021 5:18:37 PM
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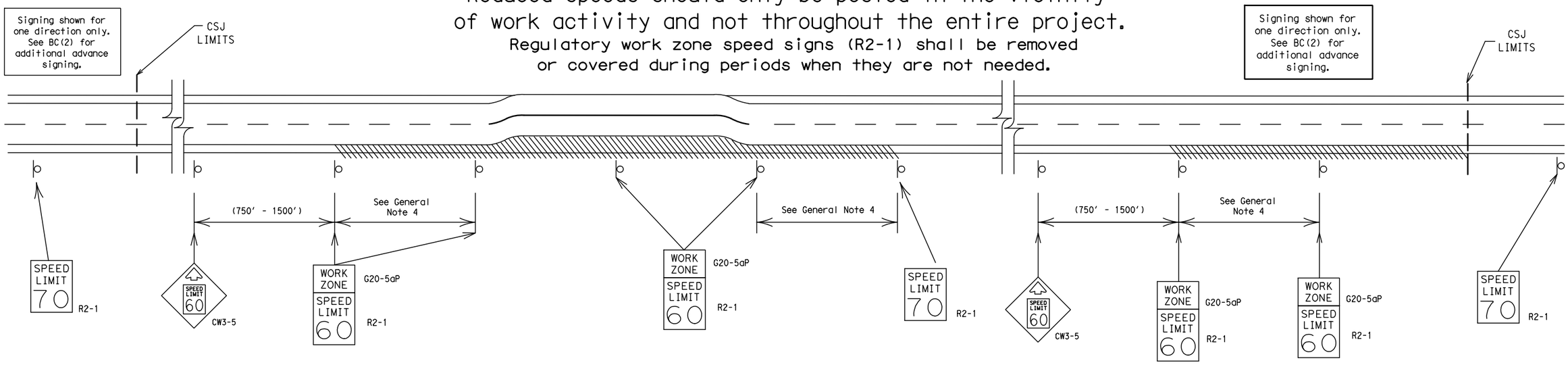
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS 9-07 8-14 7-13	0008	05	031	SH 180
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	FTW	TARRANT		22

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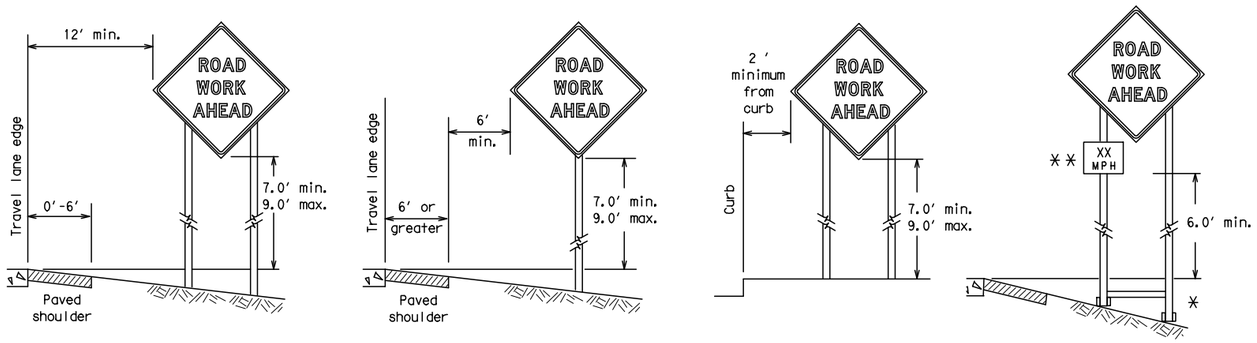
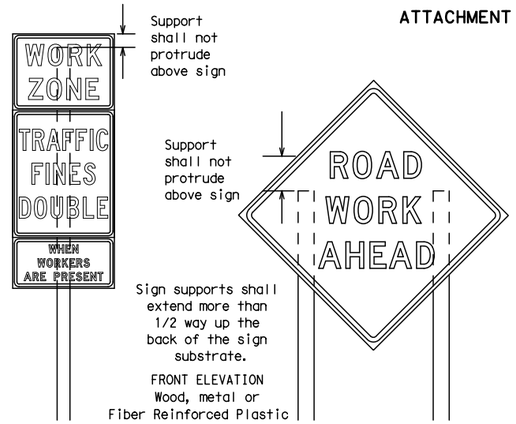
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



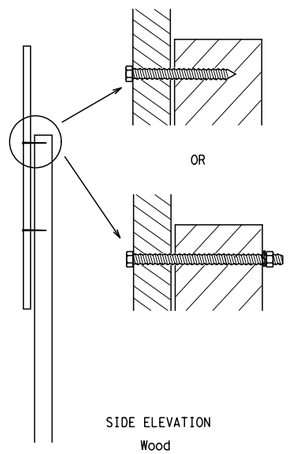
⁎ When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



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

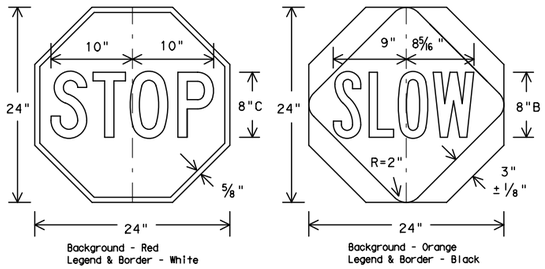


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

STOP/SLOW PADDLES

1. STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24" as detailed below.
2. When used at night, the STOP/SLOW paddle shall be retroreflectorized.
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.



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, 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.
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 sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards 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). 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 Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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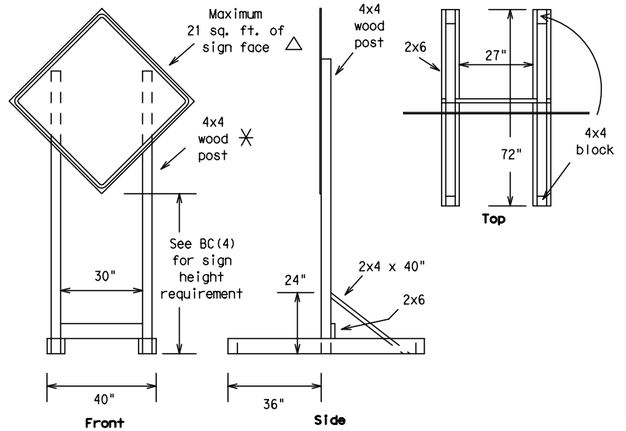
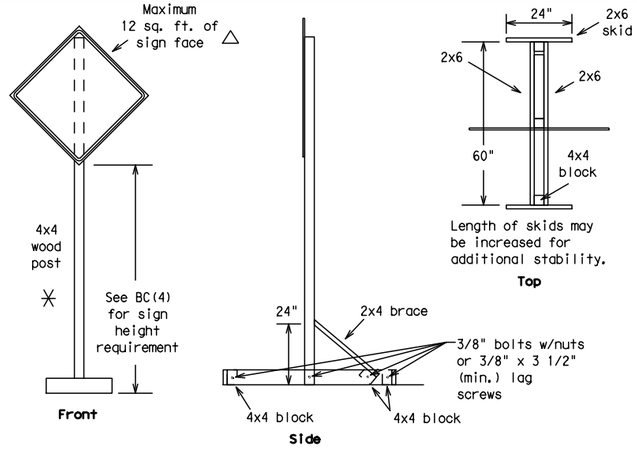
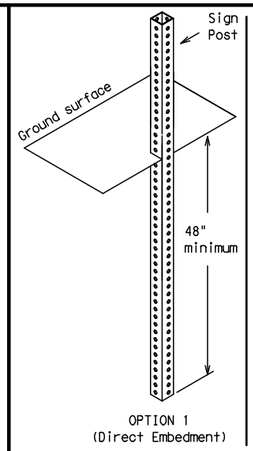
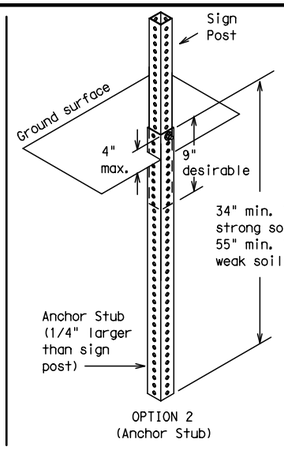


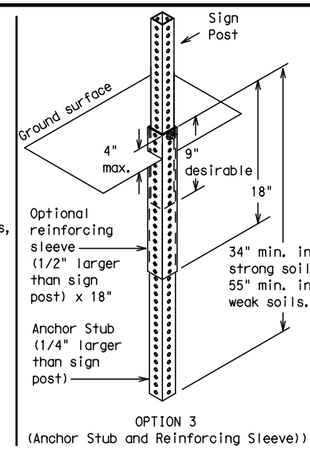


SKID MOUNTED WOOD SIGN SUPPORTS

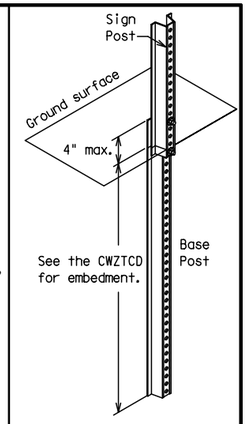
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □







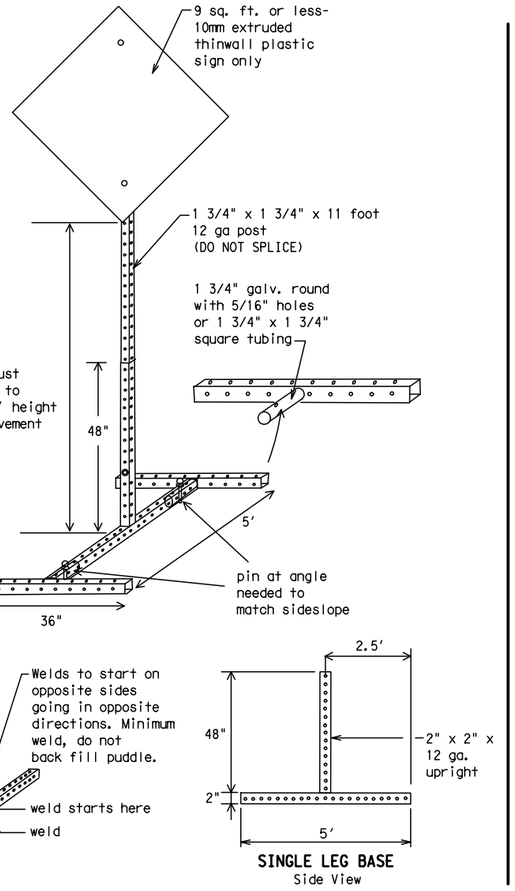
PERFORATED SQUARE METAL TUBING

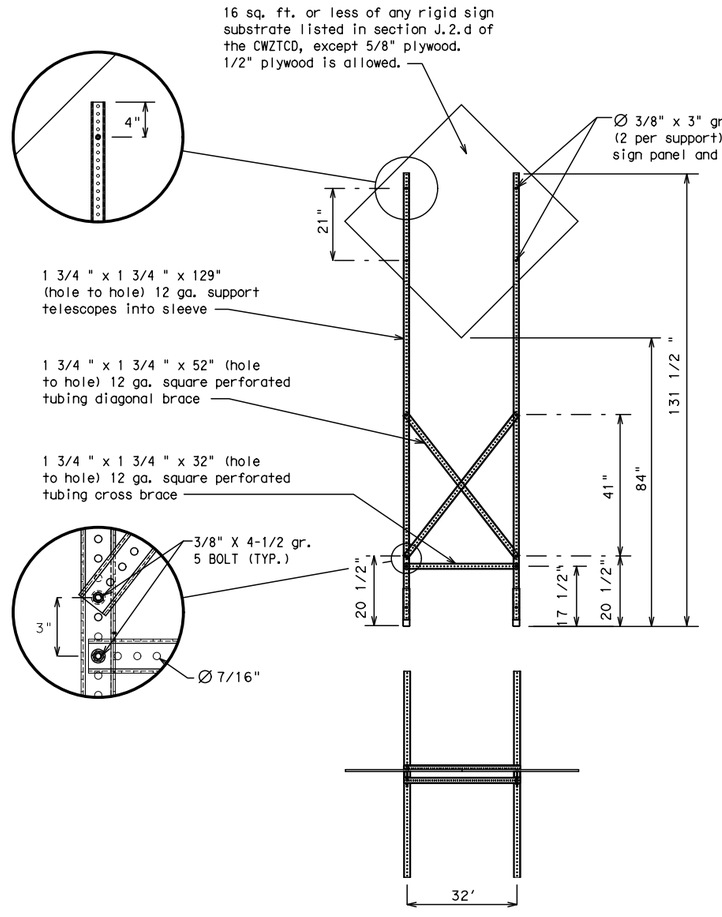


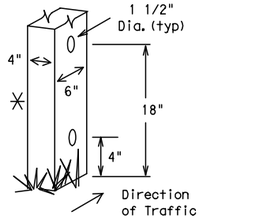
WING CHANNEL
Lap-splice/base bolted anchor

GROUND MOUNTED SIGN SUPPORTS

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

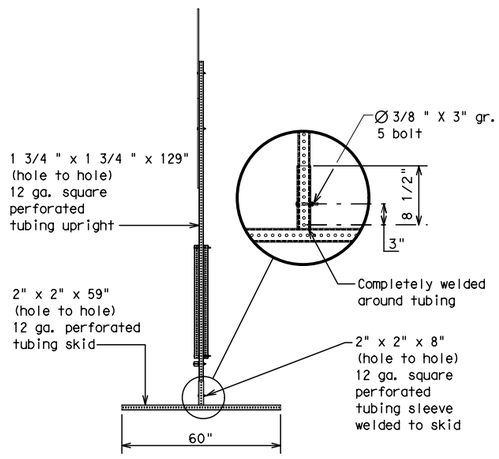






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



SKID MOUNTED PERFORATED SQUARE STEEL TUBING 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.

SHEET 5 OF 12

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	FTW	TARRANT		24

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List

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

Location List

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

Warning List

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

** Advance Notice List

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

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	FTW	TARRANT		25

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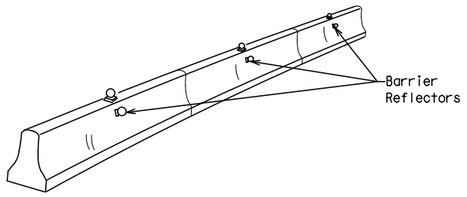
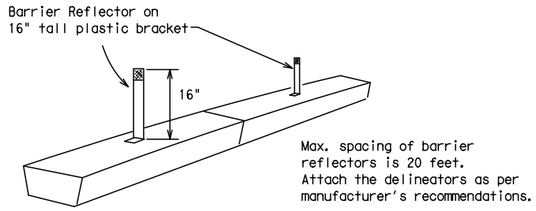
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

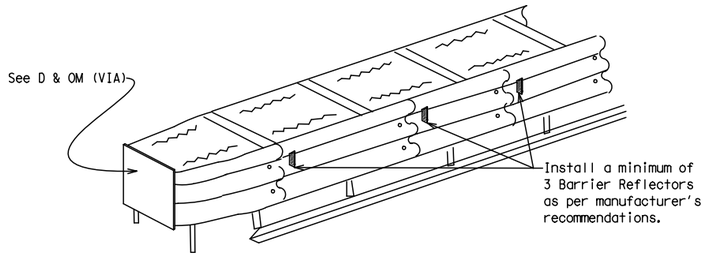


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

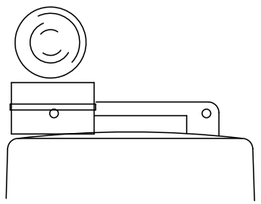


DELINEATION OF END TREATMENTS

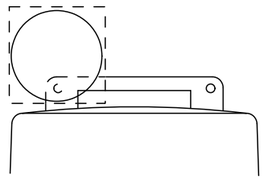
END TREATMENTS FOR CTB'S USED IN WORK ZONES

End treatments used on CTB's in work zones shall meet crashworthy standards as defined in the National Cooperative Highway Research Report 350. Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

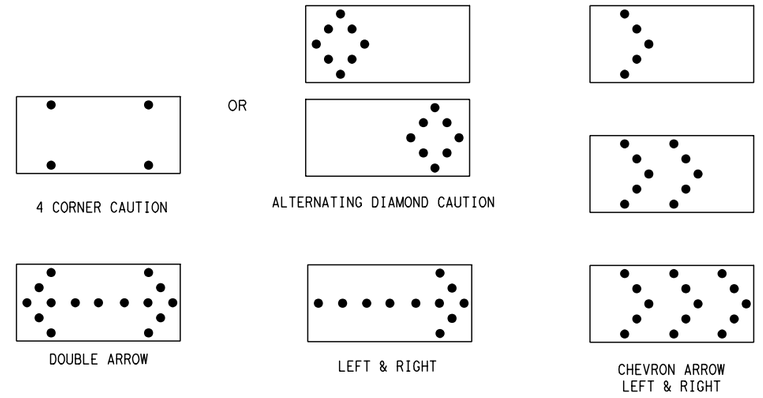
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

ATTENTION

Flashing Arrow Boards shall be equipped with automatic dimming devices.

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or 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 Operations Division Standard

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

BC(7)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
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9-07 8-14	DIST	COUNTY		SHEET NO.
7-13	FTW	TARRANT		26

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

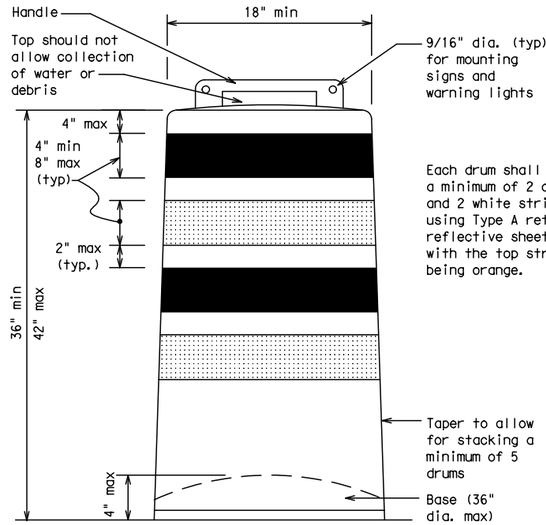
1. Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

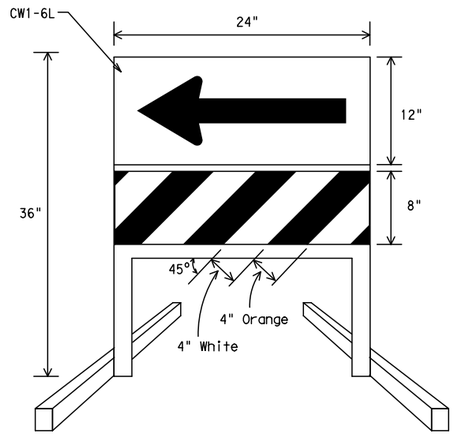
RETROREFLECTIVE SHEETING

1. The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A 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.





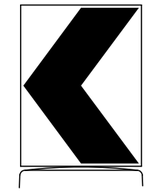
DIRECTION INDICATOR BARRICADE

1. The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.
2. If used, the Direction Indicator Barricade should be used in series to direct the driver through the transition and into the intended travel lane.
3. The Direction Indicator Barricade shall consist of One-Direction Large Arrow (CW1-6) sign in the size shown with a black arrow on a background of Type B_{FL} or Type C_{FL} Orange retroreflective sheeting above a rail with Type A retroreflective sheeting in alternating 4" white and orange stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Sheeting types shall be as per DMS 8300.
4. Double arrows on the Direction Indicator Barricade will not be allowed.
5. Approved manufacturers are shown on the CWZTCD List. Ballast shall be as approved by the manufacturers instructions.

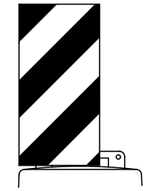
This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

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.
2. Where pedestrians with visual disabilities normally use the closed sidewalk, a device that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.
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 for Buildings and Facilities (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 may 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 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)-14

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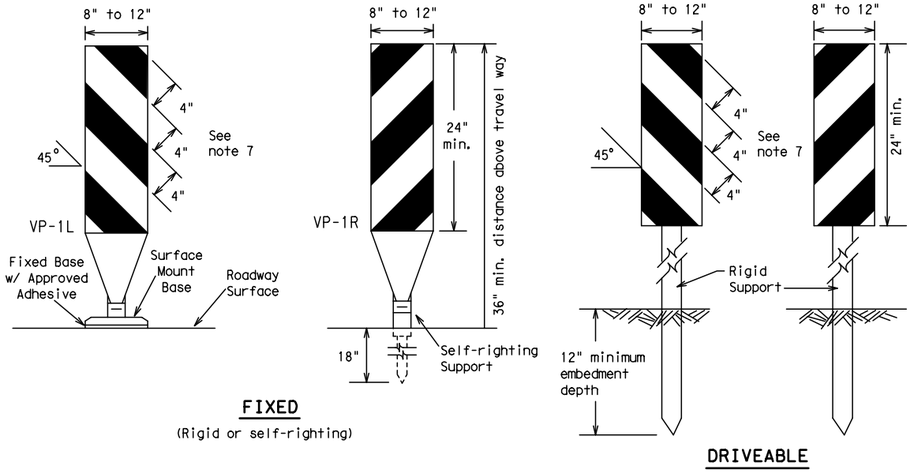
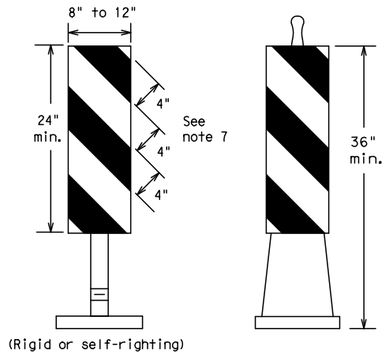


FIXED
(Rigid or self-righting)

DRIVEABLE

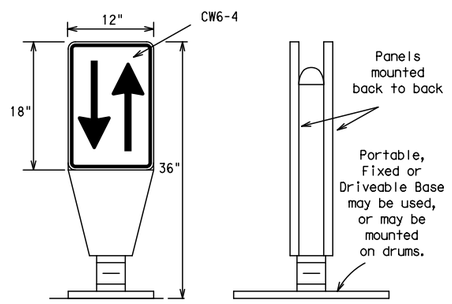


(Rigid or self-righting)

PORTABLE

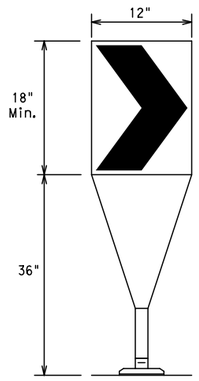
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is required. The Engineer/Inspector shall refer to the Roadway Design Manual Appendix B "Treatment of Pavement Drop-offs in Work Zones" for additional guidelines on the use of 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 conforming to Departmental Material Specification DMS-8300, unless noted otherwise.
7. Where the height of reflective material on the vertical panel is 36 inches or greater, a panel stripe of 6 inches shall be used.

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



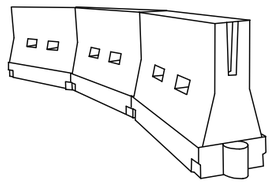
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

1. LCDs are crashworthy, lightweight, deformable devices that are highly visible, have good target value and can be connected together. They are not designed to contain or redirect a vehicle on impact.
2. LCDs may be used instead of a line of cones or drums.
3. LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
5. LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
6. LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10) placed 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 NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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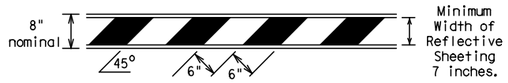
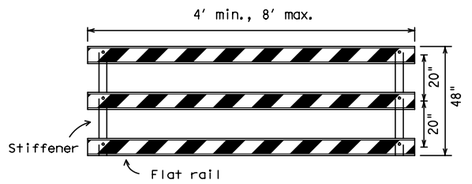
TYPE 3 BARRICADES

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 conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

Barricades shall NOT be used as a sign support.



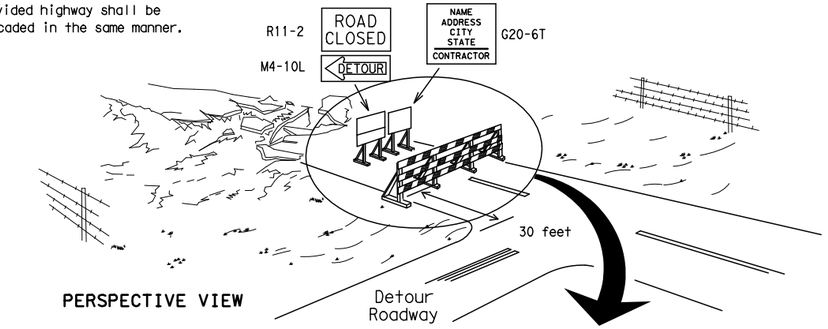
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

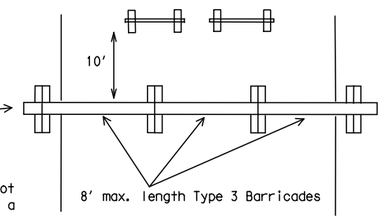
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

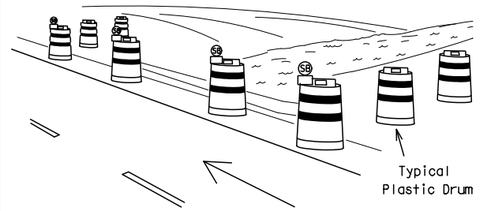
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

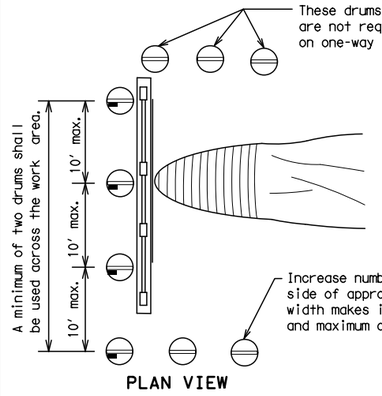
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

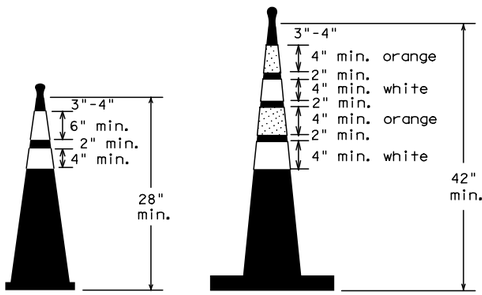
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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

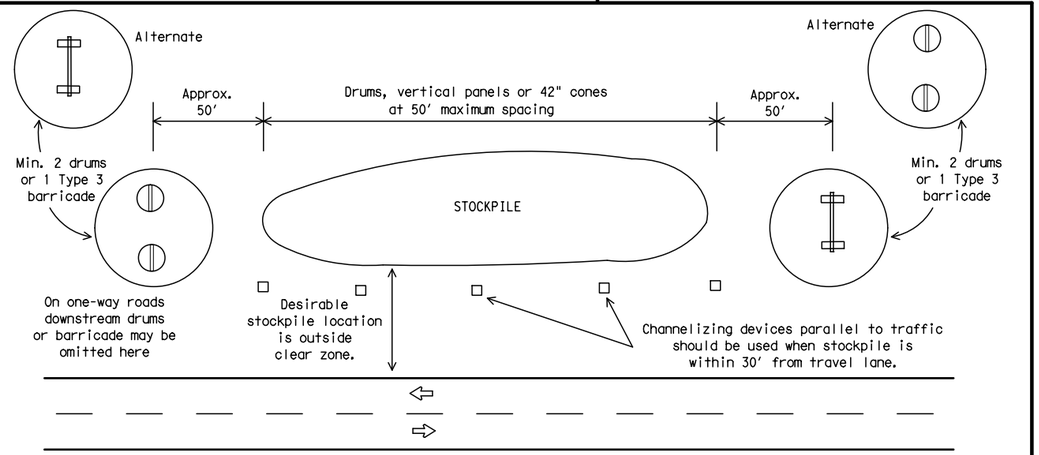
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

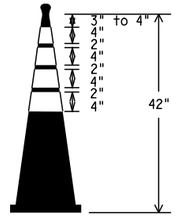
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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 used at night 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.
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

THIS DEVICE SHALL NOT BE USED ON PROJECTS LET AFTER MARCH 2014.



EDGELINE CHANNELIZER

1. This device is intended only for use in place of a vertical panel to channelize traffic by indicating the edge of the travel lane. It is not intended to be used in transitions or tapers.
2. This device shall not be used to separate lanes of traffic (opposing or otherwise) or warn of objects.
3. This device is based on a 42 inch, two-piece cone with an alternate striping pattern: four 4 inch retroreflective bands, with an approximate 2 inch gap between bands. The color of the band should correspond to the color of the edgeline (yellow for left edgeline, white for right edgeline) for which the device is substituted or for which it supplements. The reflectorized bands shall be retroreflective Type A conforming to Departmental Material Specification DMS-8300, unless otherwise noted.
4. The base must weigh a minimum of 30 lbs.

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BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

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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.

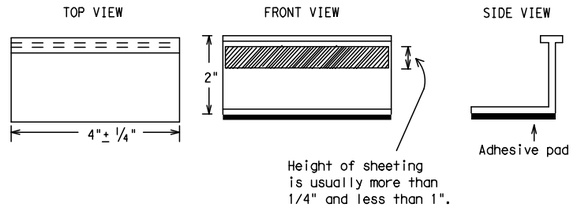
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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 Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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1-02 7-13	FTW	TARRANT		30
11-02 8-14				

DATE: 5/18/2021 5:18:41 PM
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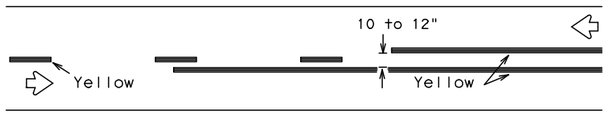
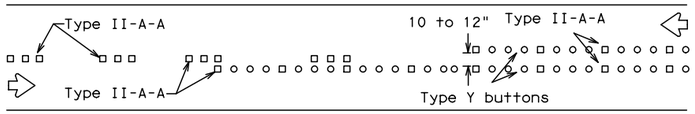
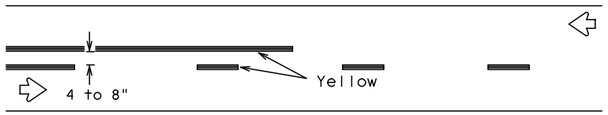
PAVEMENT MARKING PATTERNS



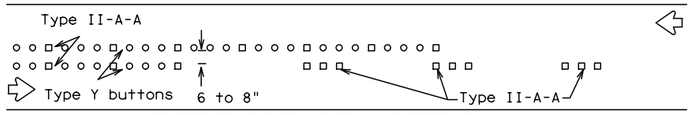
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



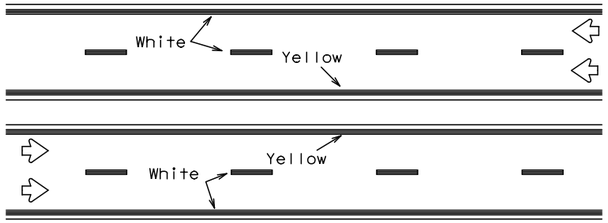
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



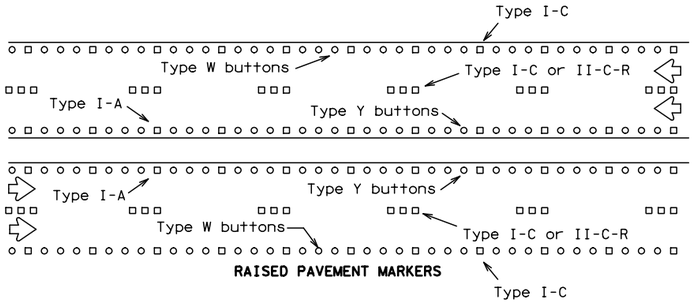
RAISED PAVEMENT MARKERS - PATTERN B

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

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



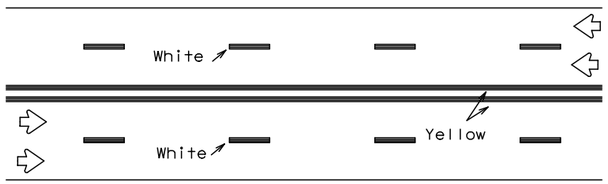
REFLECTORIZED PAVEMENT MARKINGS



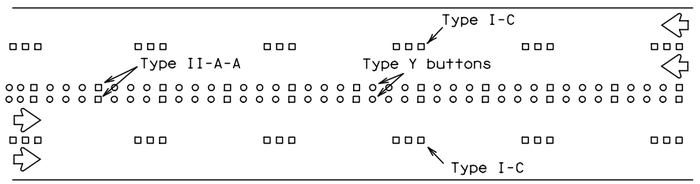
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



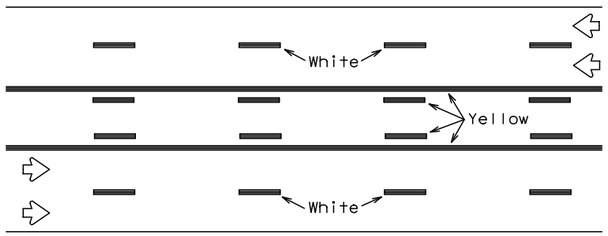
REFLECTORIZED PAVEMENT MARKINGS



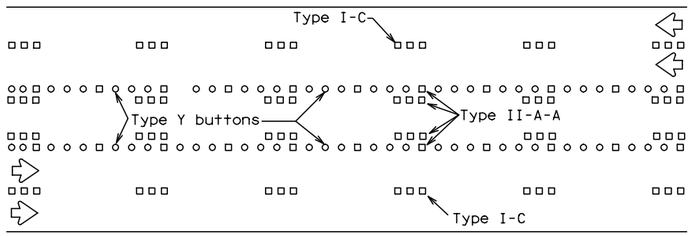
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

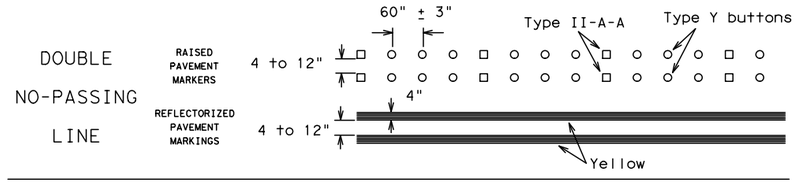
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

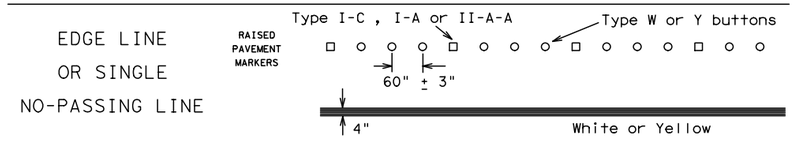
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

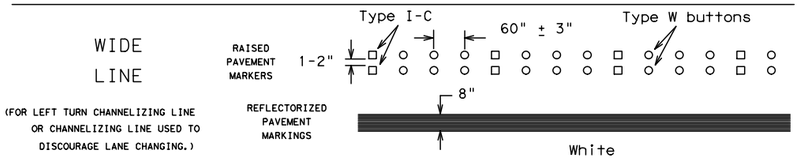


EDGE LINE OR SINGLE NO-PASSING LINE



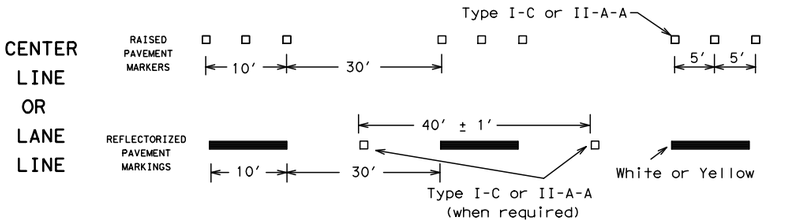
WIDE LINE

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

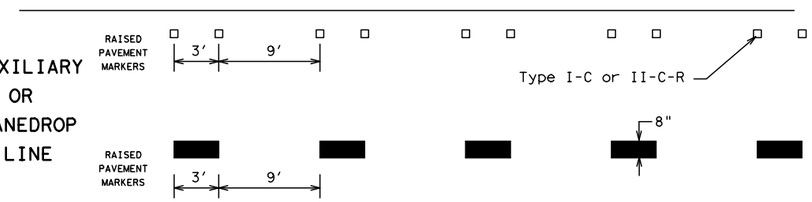


BROKEN LINES

CENTER LINE OR LANE LINE

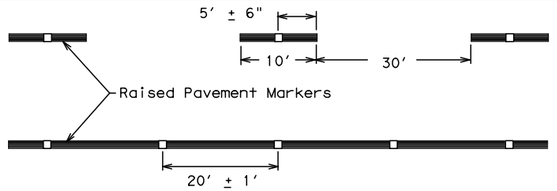


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

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©TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
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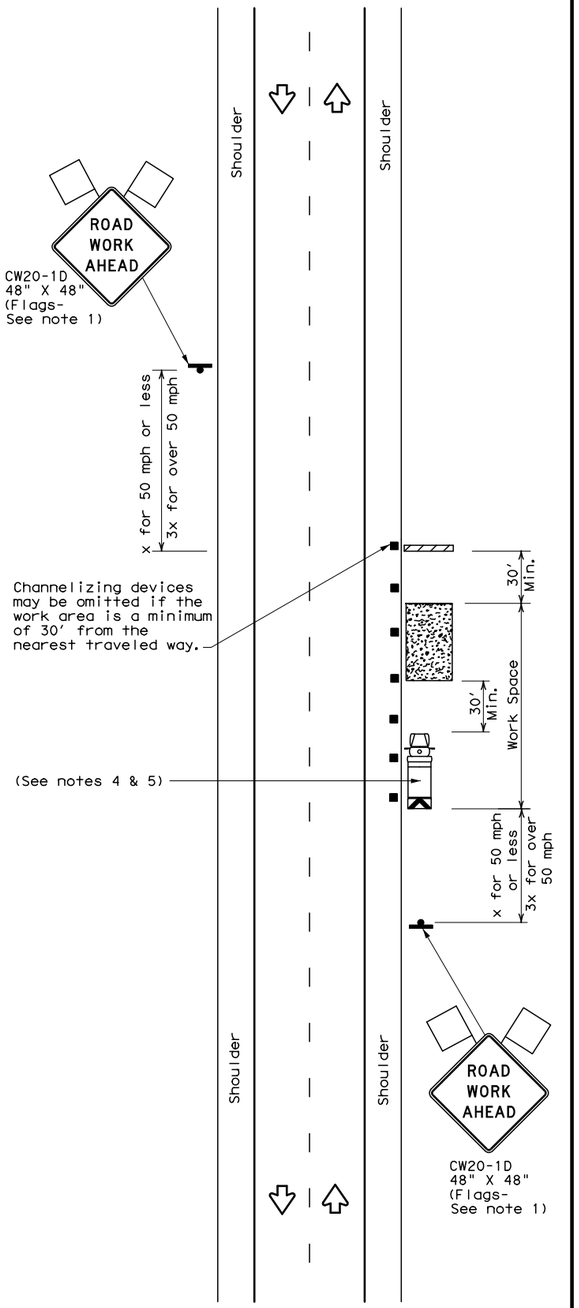
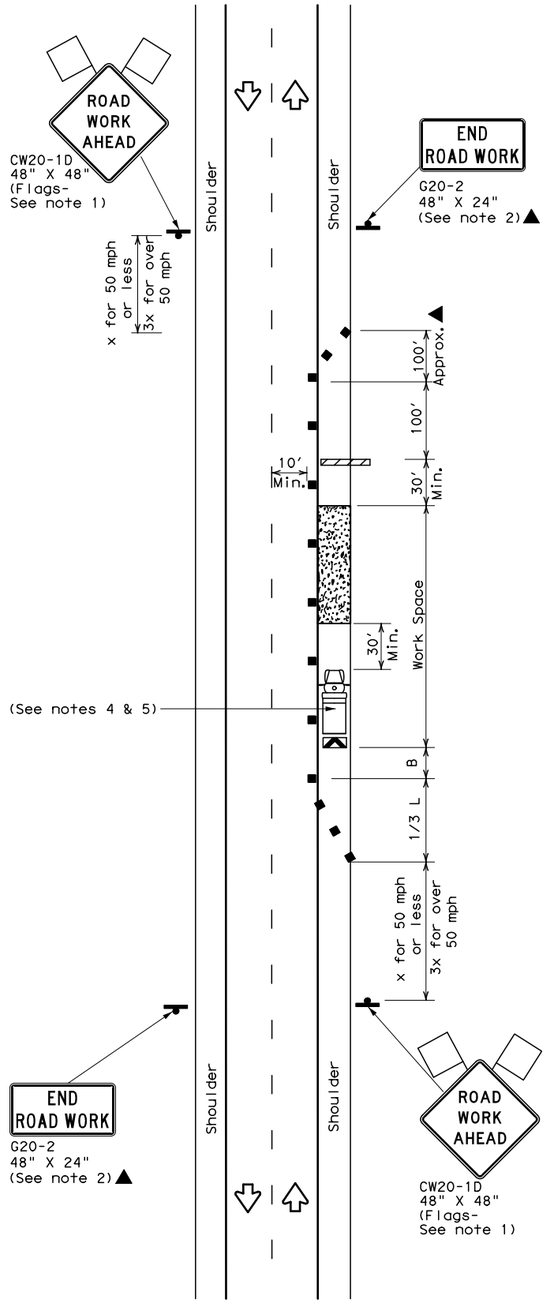


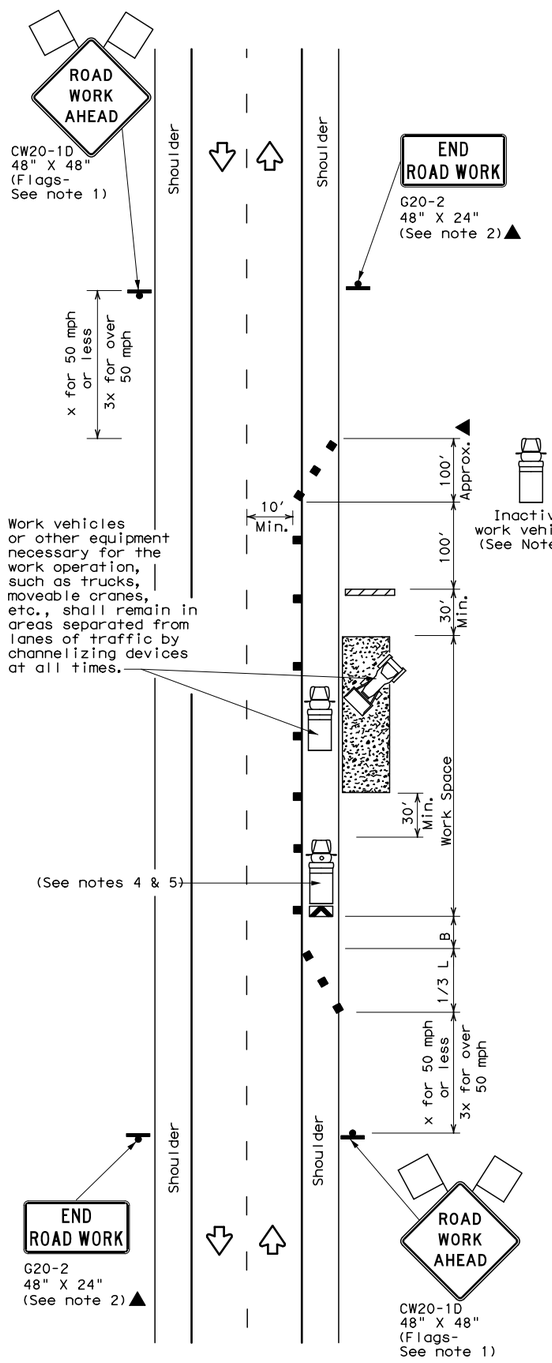
TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

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

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

* Conventional Roads Only

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated in the plans, or for routine maintenance work, when approved by the Engineer.
3. Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
4. Shadow Vehicle with TMA and high intensity rotating, flashing, oscillating or strobe lights. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
5. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
6. See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
7. Inactive work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
8. CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP(2-1)-18

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2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 2-12	FTW	TARRANT		32
1-97 2-18				

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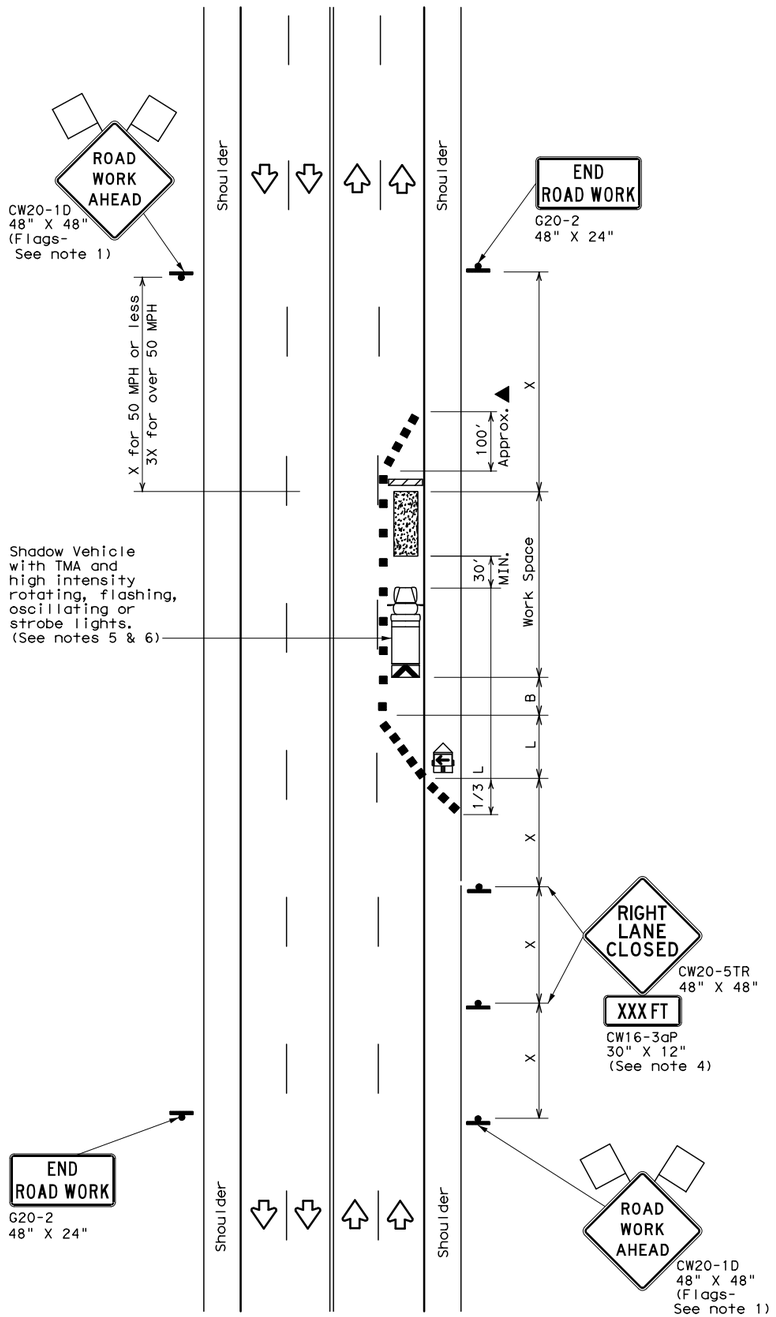
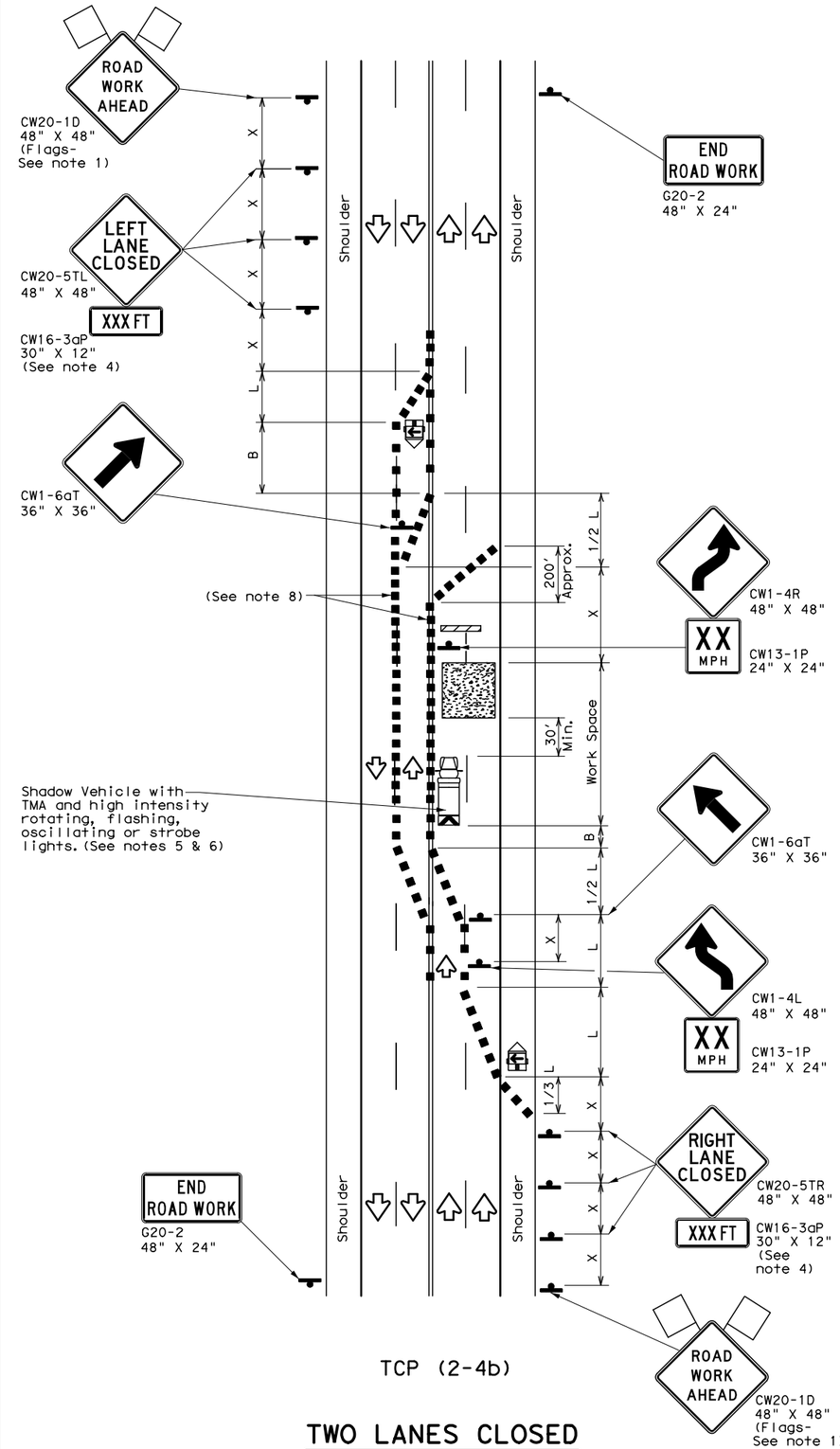


TCP (2-4a)

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

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© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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1-97 2-12	FTW	TARRANT		33
4-98 2-18				

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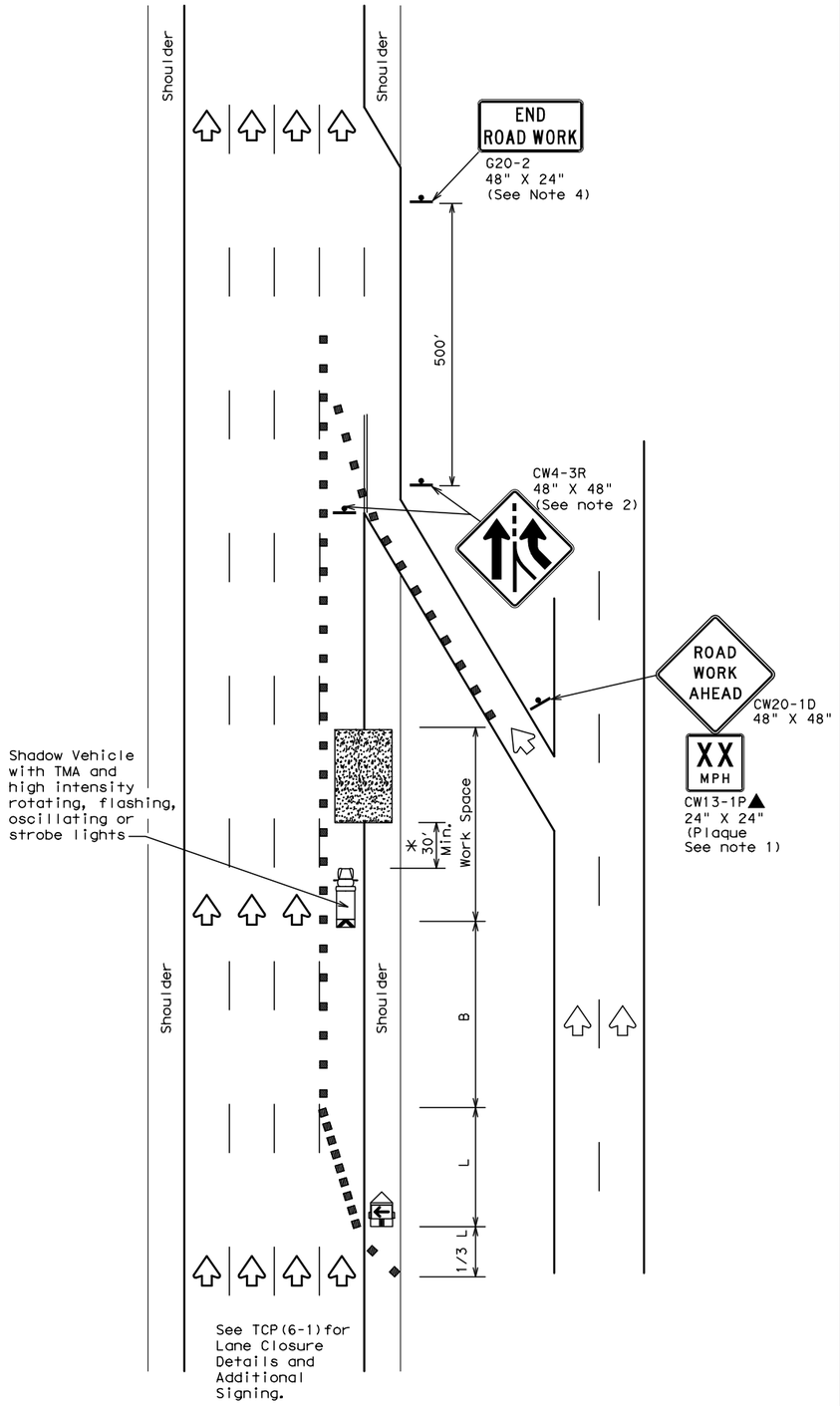
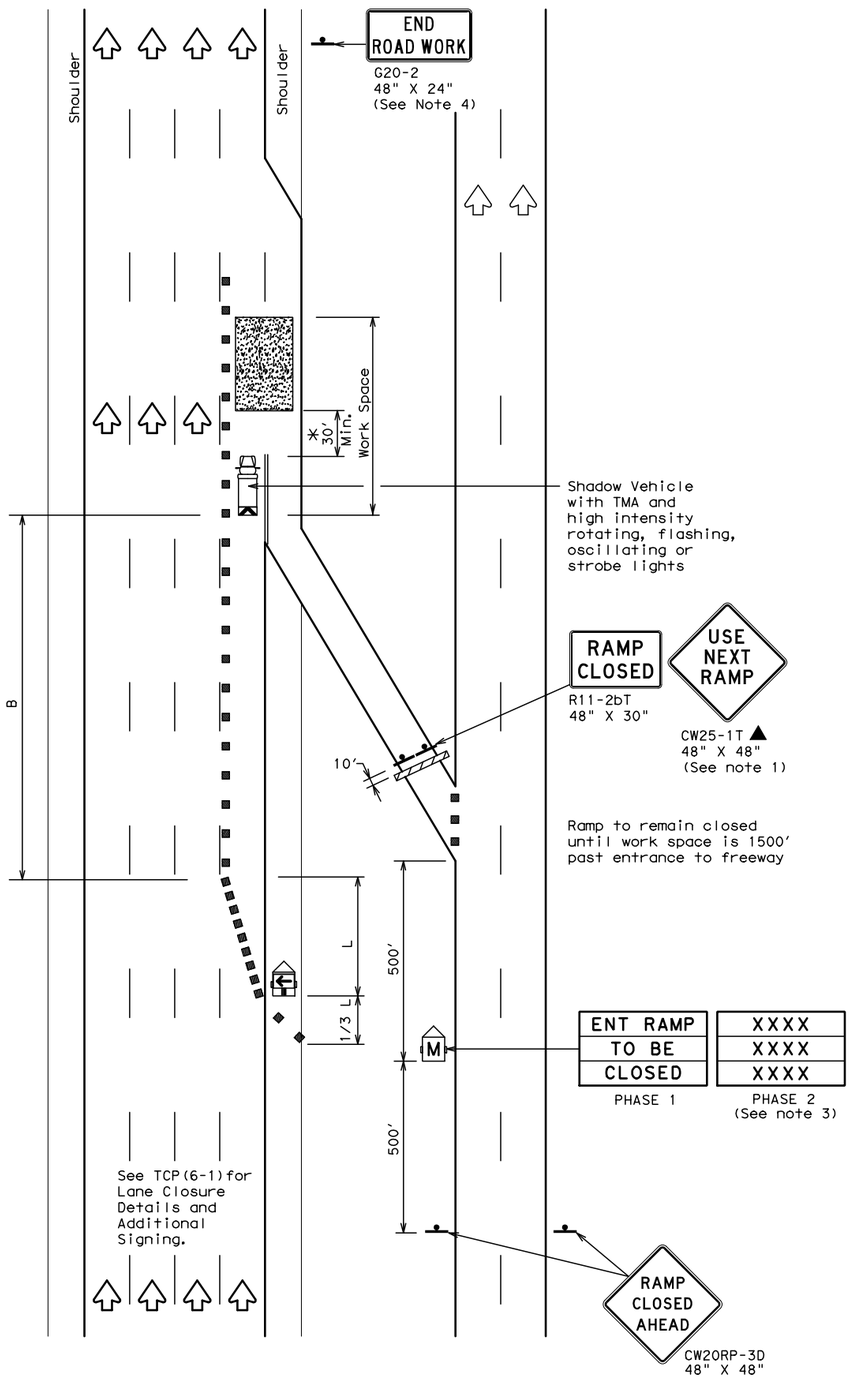


TCP (6-2a)

ENTRANCE RAMP OPEN
WORK WITHIN 500' OF RAMP



TCP (6-2b)

ENTRANCE RAMP 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 "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. ADDED LANE Symbol (CW4-3) sign may be omitted when sign between ramp and mainlane can be seen from both roadways.
3. See "Advance Notice List" on BC(6) for recommended date and time formatting options for PCMS Phase 2 message.
4. The END ROAD WORK (G20-2) sign may be omitted when it conflicts with G20-2 signs already in place on the project.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA NEAR RAMP

TCP(6-2)-12

FILE: tcp6-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	FTW	TARRANT		34

DATE: 5/18/2021 5:18:51 PM
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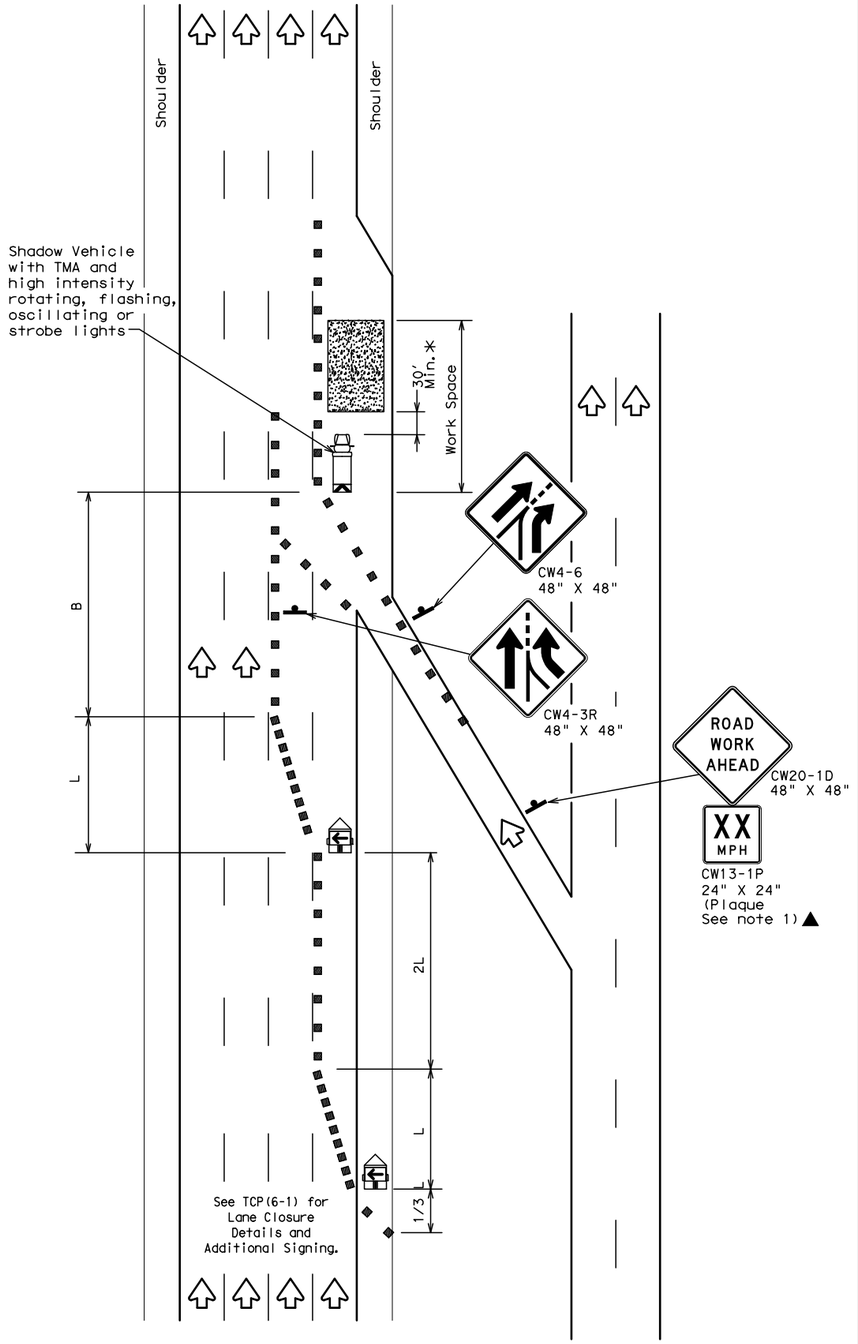
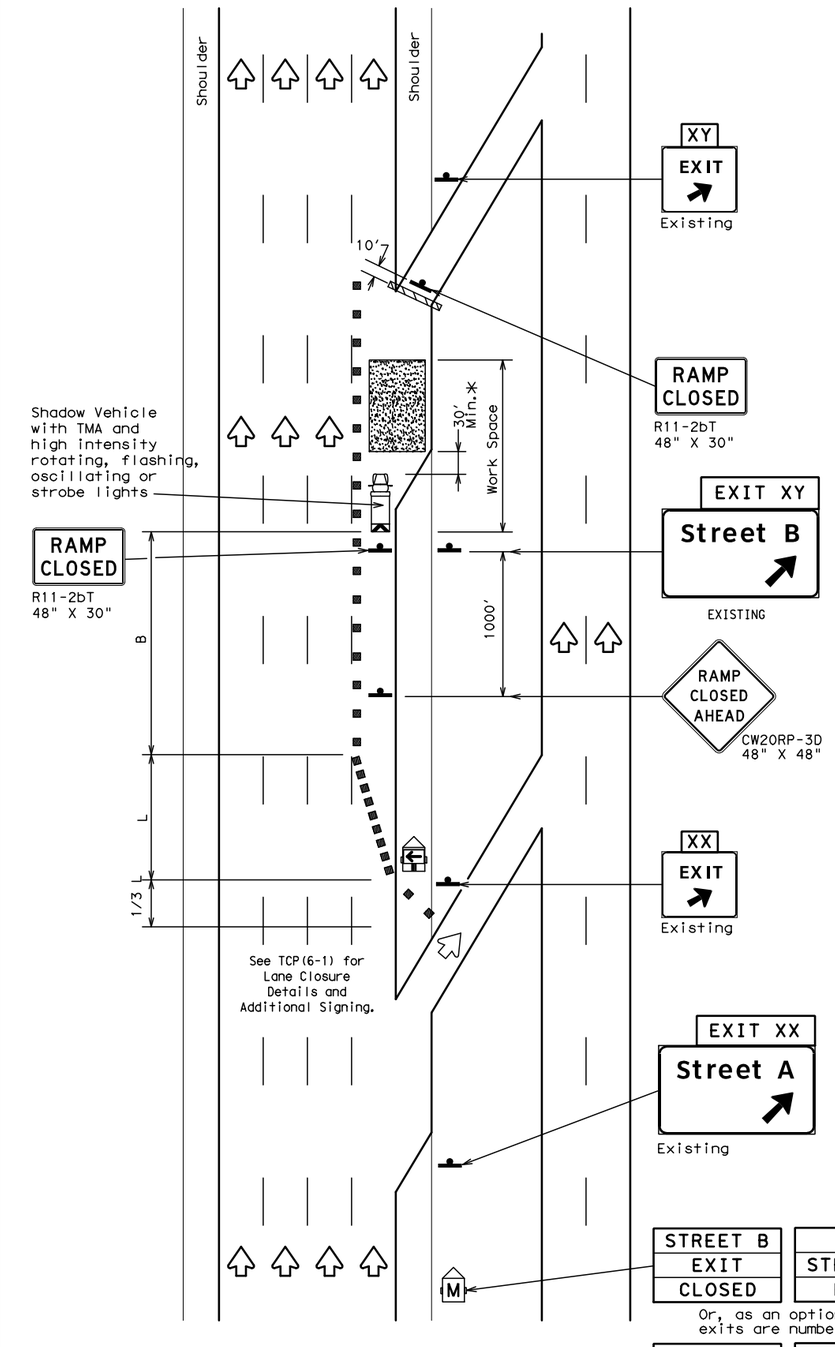


TCP (6-3a)

ENTRANCE RAMP OPEN



STREET B	USE
EXIT	STREET A
CLOSED	EXIT

Or, as an option when exits are numbered

EXIT XY	USE
CLOSED	EXIT XX

Place 1 mile (approx.) in advance of Street A exit.

TCP (6-3b)

EXIT RAMP CLOSED
TRAFFIC EXITS PRIOR TO CLOSED RAMP

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 "L" ✳✳			Suggested Maximum Spacing of Channelizing Devices		Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent	
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

✳✳ 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.

✳A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

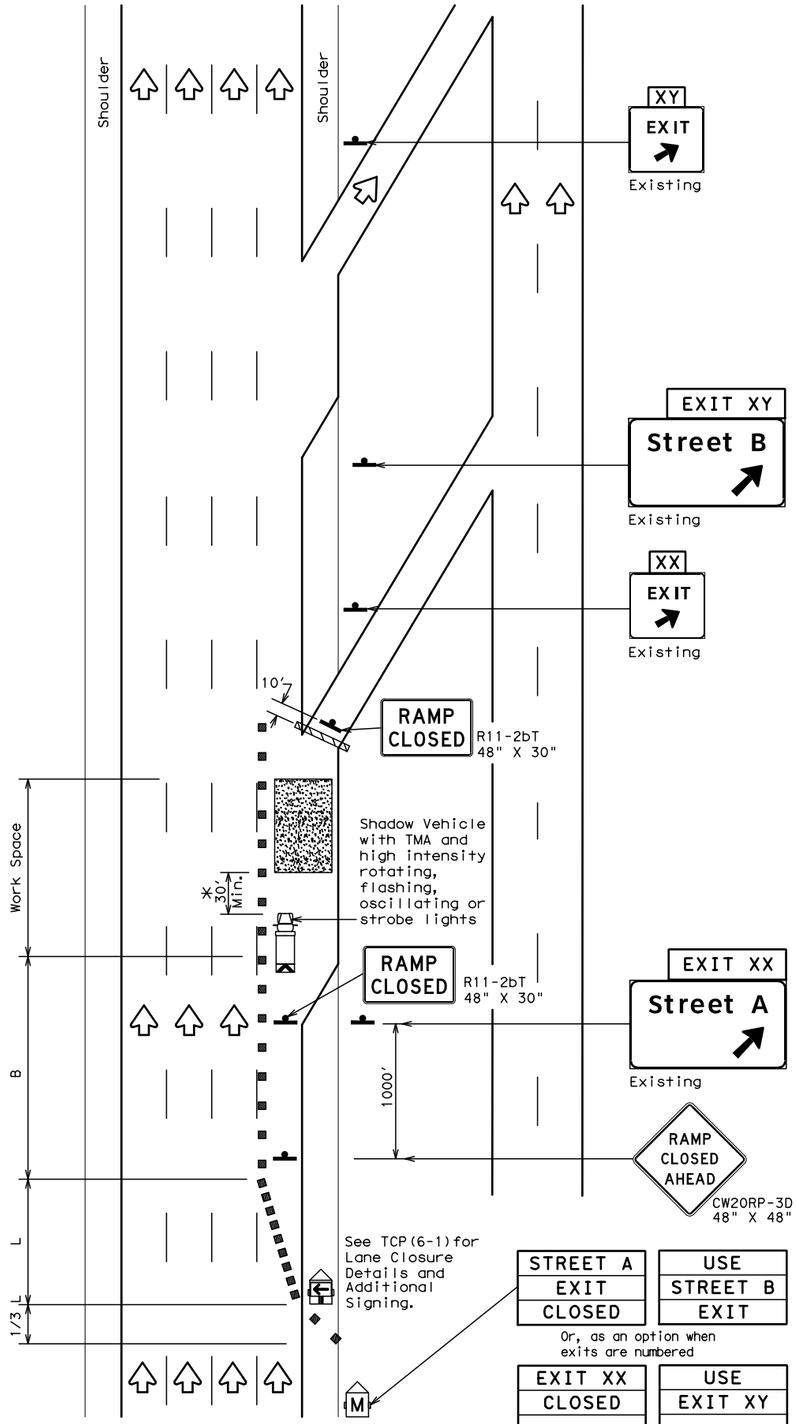
Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA BEYOND RAMP

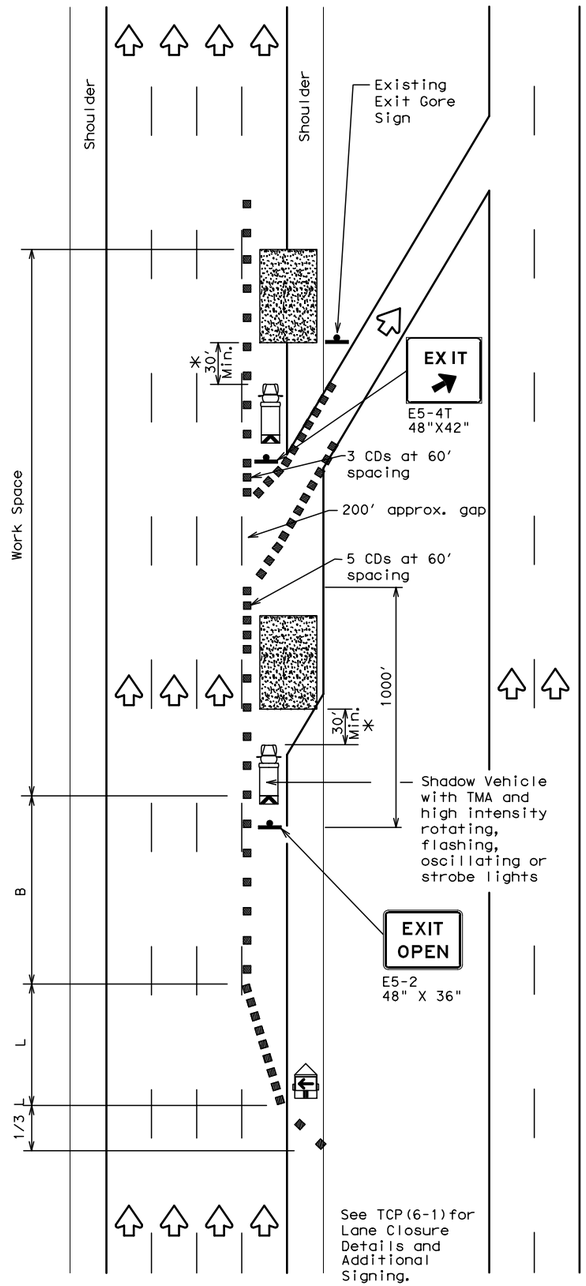
TCP(6-3)-12

FILE: tcp6-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	FTW	TARRANT		35



TCP (6-4a)

EXIT RAMP CLOSED
TRAFFIC EXITS PAST CLOSED RAMP



TCP (6-4b)

EXIT RAMP OPEN

LEGEND			
	Type 3 Barricade		Channelizing Devices (CDs)
	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 "L" ** 10' Offset	11' Offset	12' Offset	Suggested Maximum Spacing of Channelizing Devices: On a Taper	On a Tangent	Suggested Longitudinal Buffer Space "B"
45	L=WS	450'	495'	540'	45'	90'	195'
50		500'	550'	600'	50'	100'	240'
55		550'	605'	660'	55'	110'	295'
60		600'	660'	720'	60'	120'	350'
65		650'	715'	780'	65'	130'	410'
70		700'	770'	840'	70'	140'	475'
75		750'	825'	900'	75'	150'	540'
80		800'	880'	960'	80'	160'	615'

** 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. All traffic control devices illustrated are REQUIRED. Devices denoted with the triangle symbol may be omitted when stated elsewhere in the plans.
2. See BC Standards for sign details.

*A shadow vehicle equipped with a Truck Mounted Attenuator is typically required. A shadow vehicle equipped with a TMA shall be used if it can be positioned 30' to 100' in advance of the area of crew exposure without adversely affecting the work performance.

Additional requirements for lane closures and advance signing shall be as shown on TCP (6-1) or as directed by the Engineer.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
WORK AREA AT EXIT RAMP

TCP(6-4)-12

FILE: tcp6-4.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT Feburary 1994	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
1-97 8-98	DIST	COUNTY		SHEET NO.
4-98 8-12	FTW	TARRANT		36

DATE: 5/18/2021 5:18:53 PM
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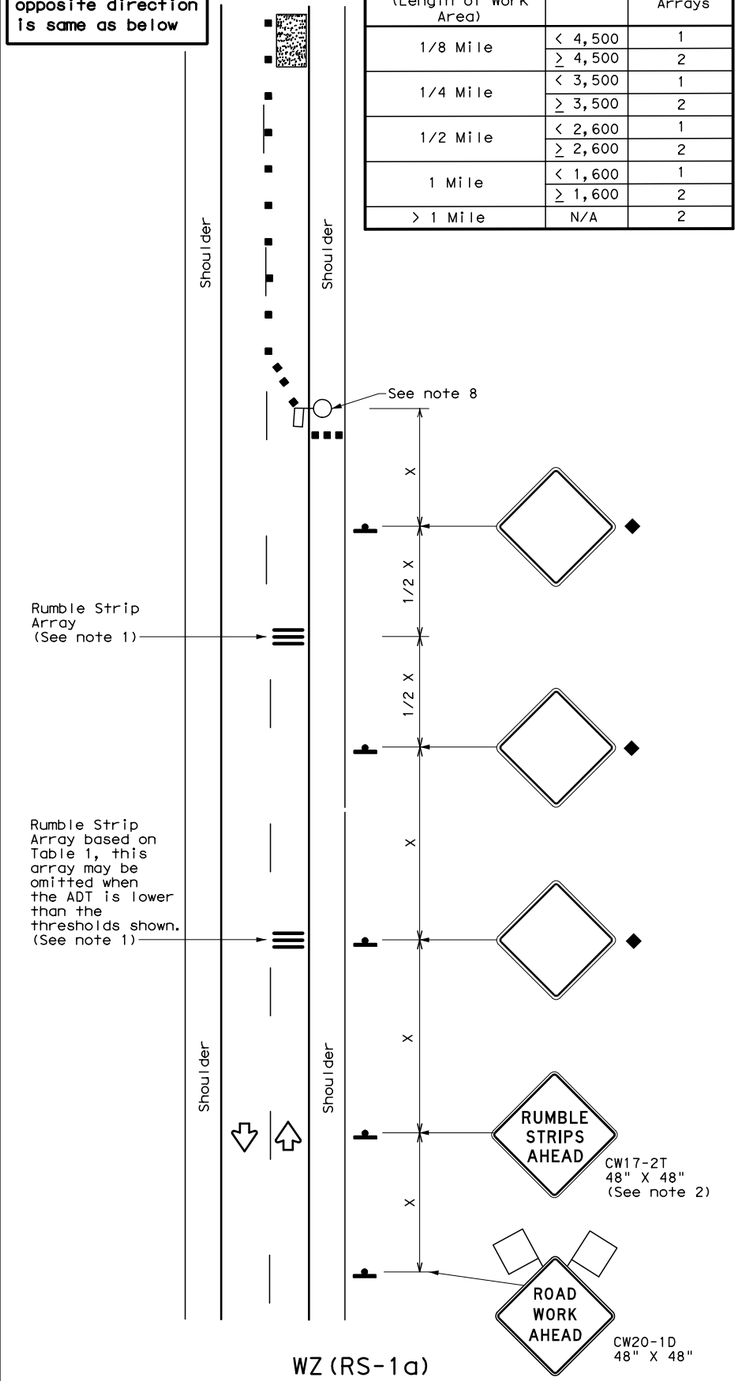
DATE: 5/18/2021 5:18:56 PM
FILE: c:\pwworking\aecom_dsi6_na\mayra.reynazul@aecom.com\d0383261\wzrs16.dgn

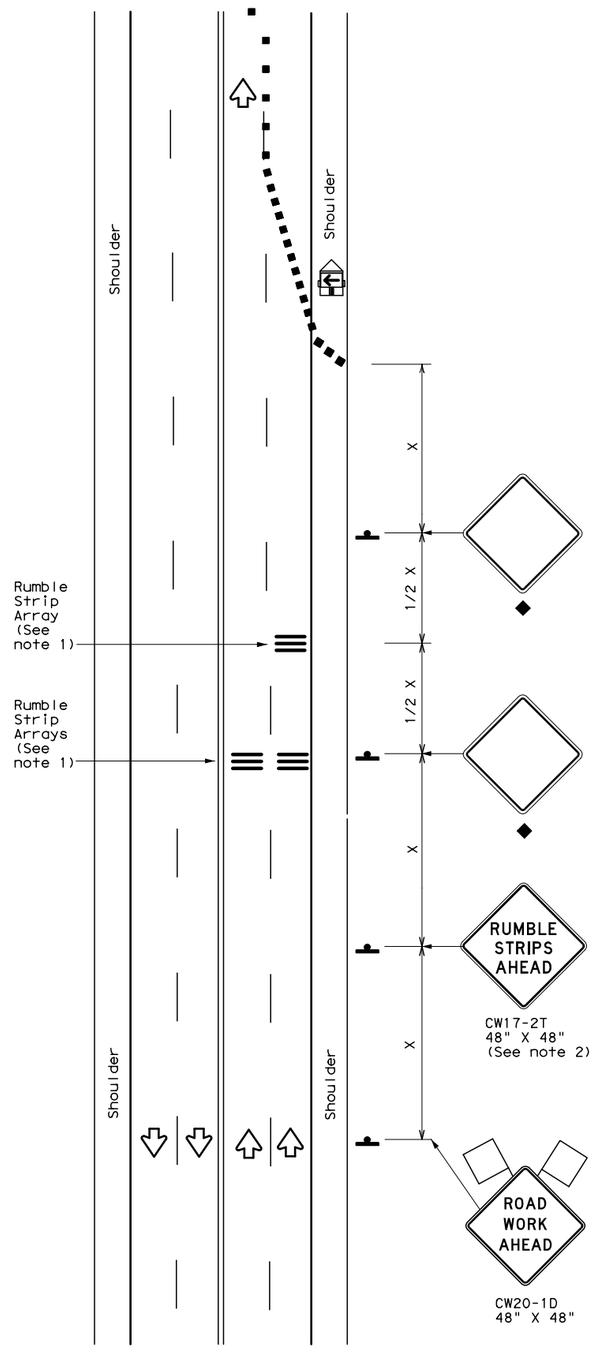
Warning sign and rumble strip sequence in opposite direction is same as below

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



WZ(RS-1a)
75 mph or Less

RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



WZ(RS-1b)
75 mph or Less

RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

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

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

TEMPORARY RUMBLE STRIPS

WZ(RS)-16

FILE: wzrs16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
2-14 4-16	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		37

DATE: 5/25/2021 6:40:02 PM
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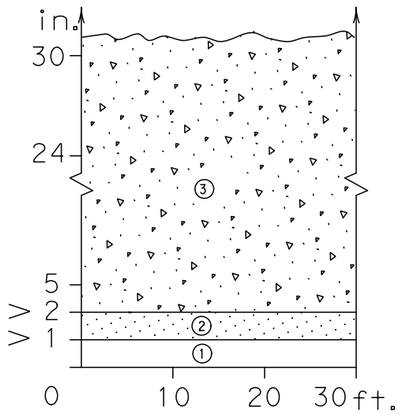
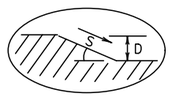
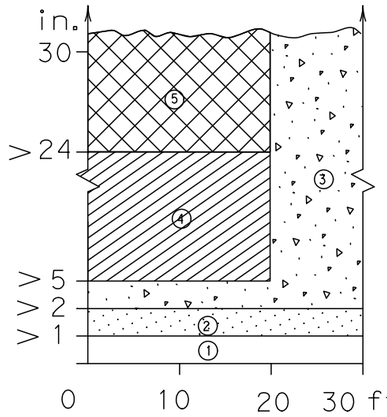
DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

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

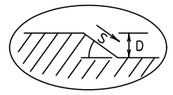


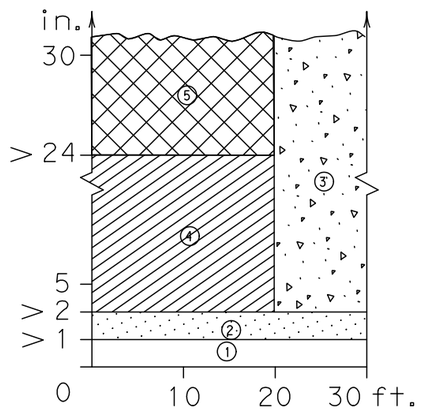
Edge Condition I
S = (3:1) (or flatter)



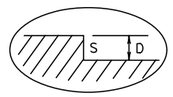


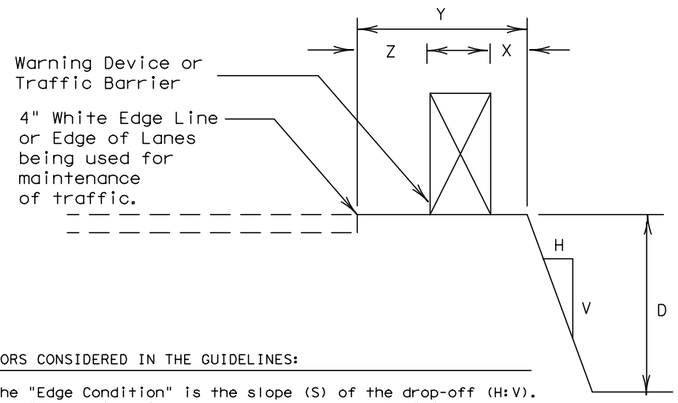
Edge Condition II
S = ((2.99):1) to (1:1)





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	CW 8-9a or CW 8-11, signs plus drums. Where restricted space precludes the use of drums, use vertical panels. An edge fill may be provided to change the edge slope to that of the preferable Edge Condition I.
⑤	Check indications (Figure-1) for positive 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:

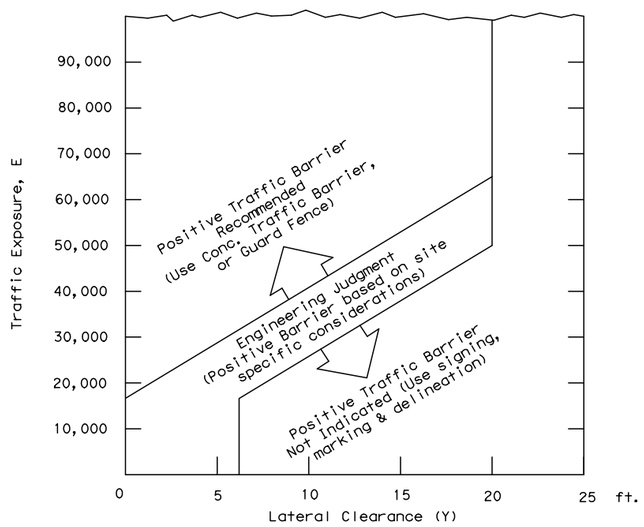
1. Edge Condition I: Most vehicles are able to traverse an edge condition with a slope rate of (3 to 1) or flatter. The slope must be constructed with a compacted material capable of supporting vehicles.

2. Edge Condition II: Most vehicles are able to traverse an edge condition with a slope between (2.99 to 1) and (1to 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 a lateral offset of 20 feet from the edge of the travel lane.

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

Date 5/25/2021

Texas Department of Transportation
Traffic Operations Division

TREATMENT FOR VARIOUS EDGE CONDITIONS

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
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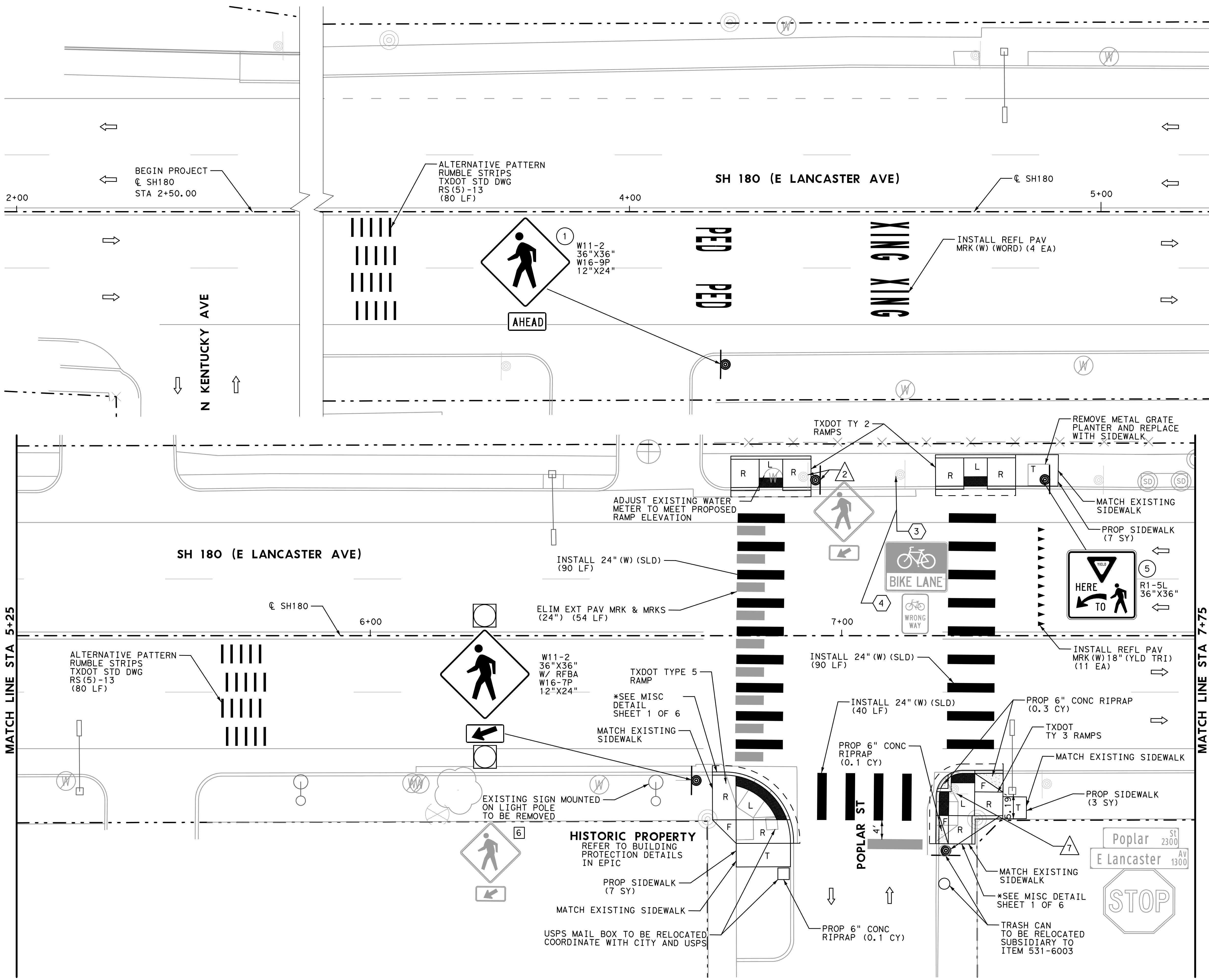
08-01 correct typos	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		37A



N

0' 10' 20'
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- PROPOSED SMALL SIGN NUMBER
- EXISTING SIGN NUMBER (TO BE RELOCATED)
- EXISTING SIGN NUMBER (TO BE REMOVED)
- EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- MANHOLE
- WATER METER
- WATER VALVE
- FIRE HYDRANT
- R RAMP
- L LANDING PAD
- F FLARE
- SL SLOPED PAVEMENT
- T TRANSITION
- TRAVERSABLE PATH - CROSS SLOPE MUST BE <2%

NOTES:

1. VISUAL REPRESENTATION OF EXISTING FEATURES IS BASED ON AERIAL PHOTOGRAPHY AND SUPPLEMENTAL SURVEY.
2. ALL SIDEWALK SHALL MAINTAIN A CROSS SLOPE OF < OR = 1.5%.
3. CONTRACTOR TO MAINTAIN INTEGRITY OF INLET.
4. UTILITY ADJUSTMENTS SUBSIDIARY TO ITEM 531.
5. REFER TO BUILDING PROTECTION DETAILS PER EPIC FOR HISTORICAL BUILDING ON THE SOUTHWEST CORNER OF POPLAR ST.

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
7/2/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 1 OF 31

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST		COUNTY	SHEET NO.
FTW		TARRANT	38

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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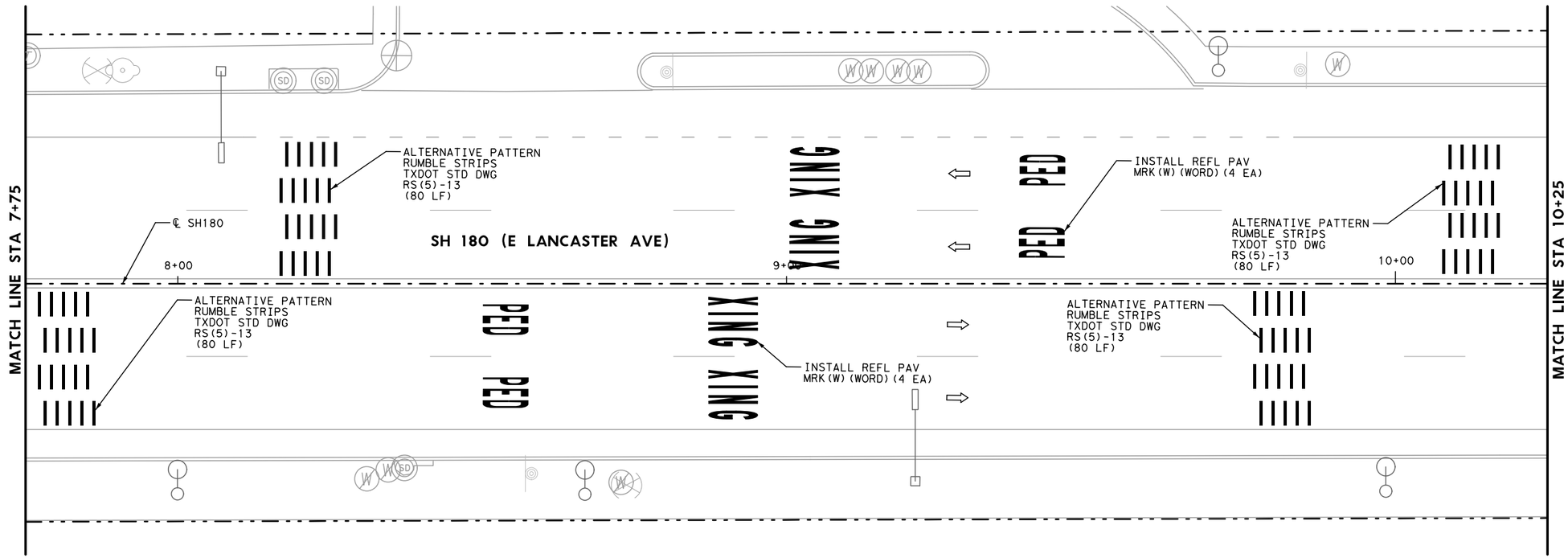

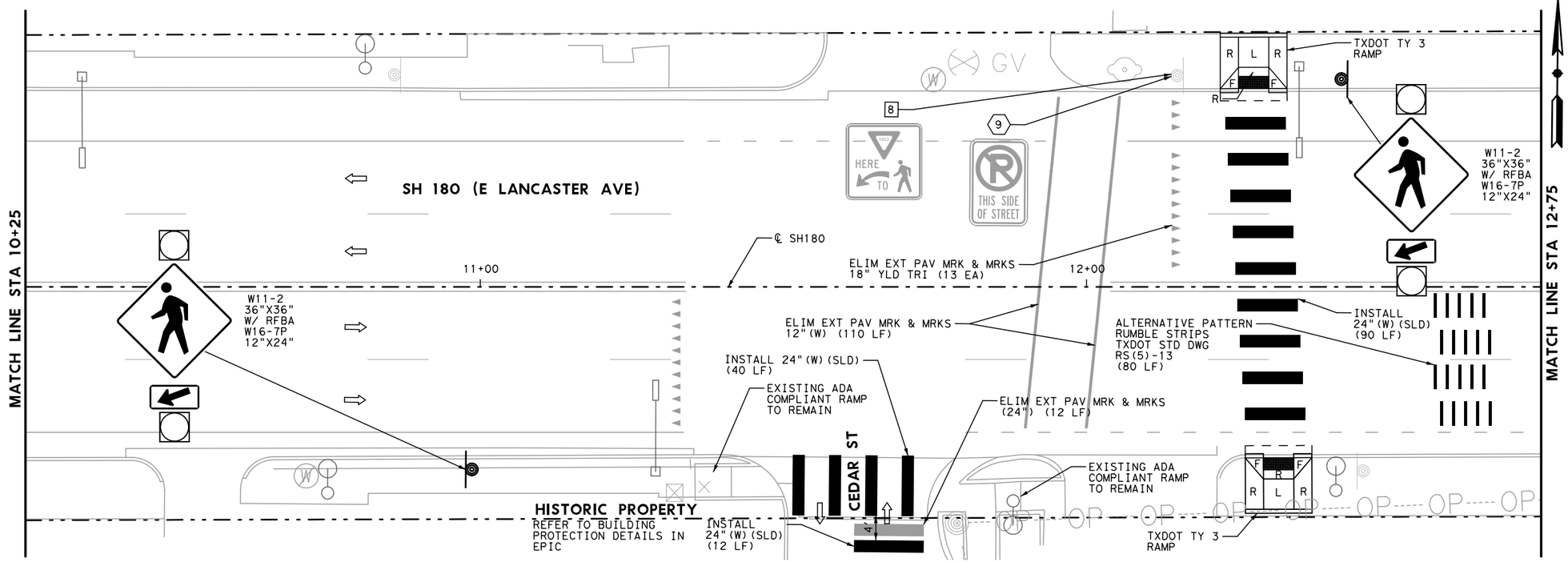

0' 10' 20'
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- PROPOSED SMALL SIGN NUMBER
- EXISTING SIGN NUMBER (TO BE RELOCATED)
- EXISTING SIGN NUMBER (TO BE REMOVED)
- EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- MANHOLE
- WATER METER
- WATER VALVE
- FIRE HYDRANT
- RAMP
- LANDING PAD
- FLARE
- SLOPED PAVEMENT
- TRANSITION
- TRAVERSABLE PATH - CROSS SLOPE MUST BE <2%

NOTES:

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2. ALL SIDEWALK SHALL MAINTAIN A CROSS SLOPE OF < OR = 1.5%.
3. CONTRACTOR TO MAINTAIN INTEGRITY OF INLET.
4. UTILITY ADJUSTMENTS SUBSIDIARY TO ITEM 531.
5. REFER TO BUILDING PROTECTION DETAILS PER EPIC FOR HISTORICAL BUILDING ON THE SOUTHWEST CORNER OF POPLAR ST.

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
7/2/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 2 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		39

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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MATCH LINE STA 12+75

SH 180 (E LANCASTER AVE)

13+00

14+00

℄ SH180

15+00

ALTERNATIVE PATTERN RUMBLE STRIPS TXDOT STD DWG RS(5)-13 (80 LF)

INSTALL REFL PAV MRK(W)(WORD)(4 EA)

PED XING

PED XING

MATCH LINE STA 15+25

EXISTING ADA COMPLIANT RAMP TO REMAIN

INSTALL 24"(W)(SLD) (40 LF)

EXISTING ADA COMPLIANT RAMP TO REMAIN

R L R F R

TXDOT TY 3 RAMP

10

HERE TO

W11-2 36"X36" W/ RFBA W16-7P 12"X24"

ELIM EXT PAV MRK & MRKS 18" YLD TRI (14 EA)

INSTALL 24"(W)(SLD) (90 LF)

ELIM EXT PAV MRK & MRKS 12"(W) (120 LF)

ELIM EXT PAV MRK & MRKS 4"(Y) (220 LF)

INSTALL 24"(W)(SLD) (100 LF)

SH 180 (E LANCASTER AVE)

16+00

℄ SH180

17+00

CYPRESS ST

INSTALL REFL PAV MRK(Y)4"(SLD) (145 LF)

ALTERNATIVE PATTERN RUMBLE STRIPS TXDOT STD DWG RS(5)-13 (80 LF)

ELIM EXT PAV MRK & MRKS 12"(W) (12 LF)

BIKE LANE ENDS

11

12

HERE TO

EXISTING ADA COMPLIANT RAMP TO REMAIN

INSTALL 24"(W)(SLD) (60 LF)

EAST NEAR SIDE

Cypress St 2300

E Lancaster Av 1500

13

STOP

THIS SIDE OF STREET

W11-2 36"X36" W/ RFBA W16-7P 12"X24"

4'

INSTALL 24"(W)(SLD) (20 LF)

EXISTING ADA COMPLIANT RAMPS TO REMAIN

EXISTING ILLUMINATION ELECTRIC SERVICE

MATCH LINE STA 17+75

N

0' 10' 20'
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- PROPOSED SMALL SIGN NUMBER
- EXISTING SIGN NUMBER (TO BE RELOCATED)
- EXISTING SIGN NUMBER (TO BE REMOVED)
- EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- MANHOLE
- WATER METER
- WATER VALVE
- FIRE HYDRANT
- R RAMP
- L LANDING PAD
- F FLARE
- SL SLOPED PAVEMENT
- T TRANSITION
- TRAVERSABLE PATH - CROSS SLOPE MUST BE <2%

NOTES:

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STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
7/2/2021

NO.	REVISION	DATE

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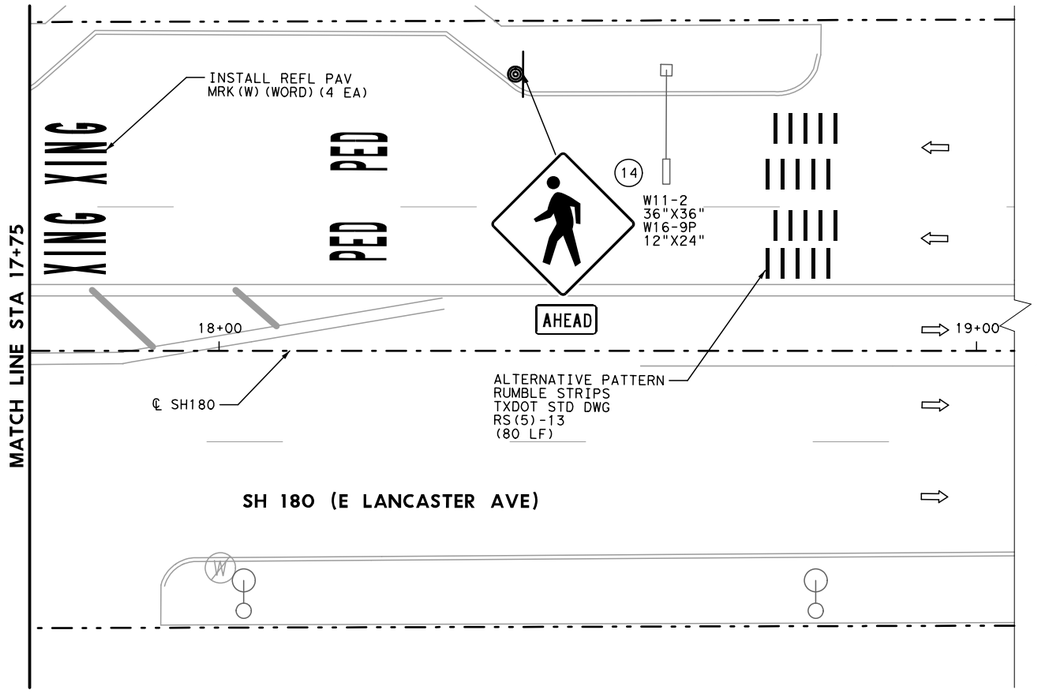
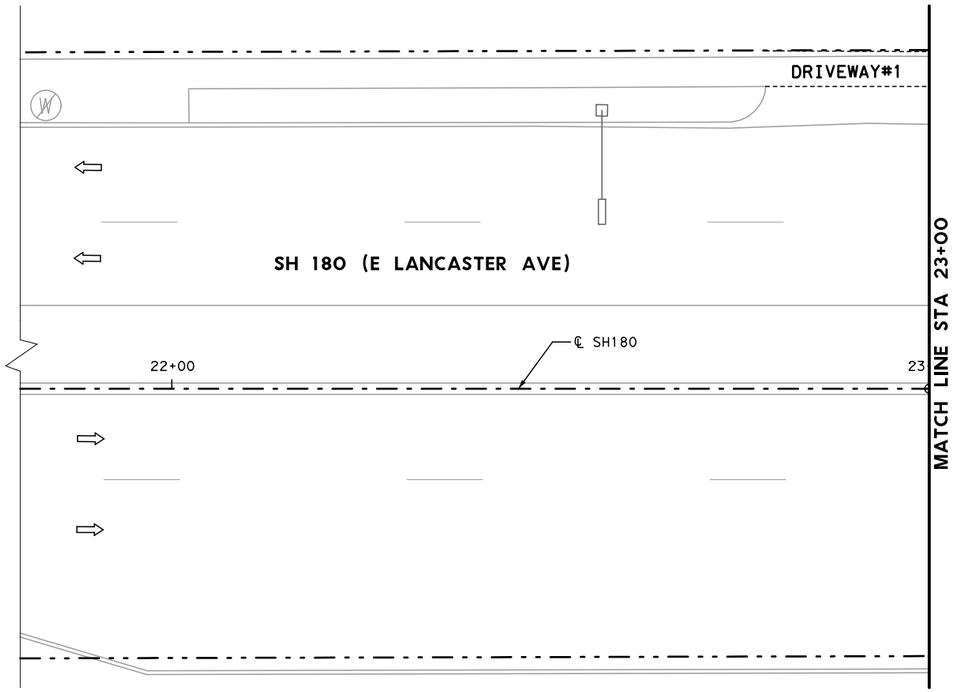
SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

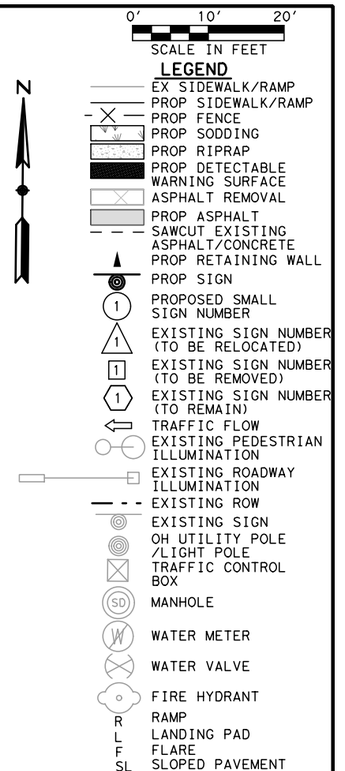
SHEET 3 OF 31

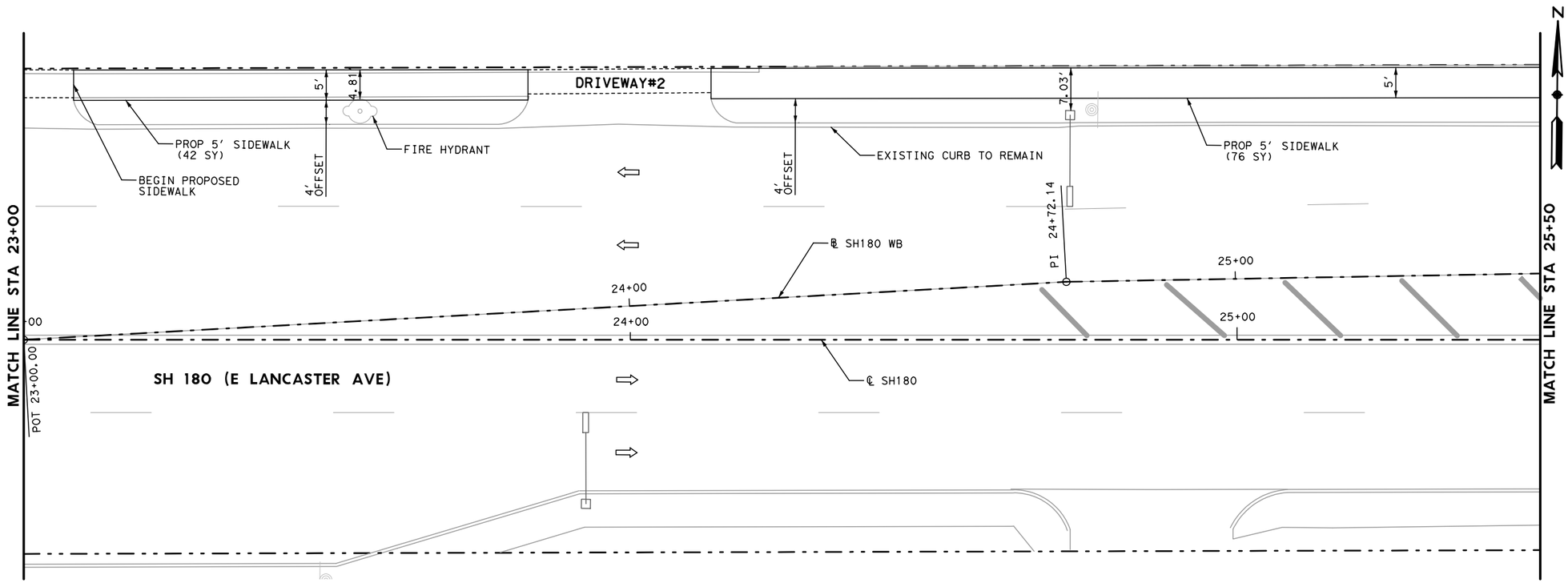
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		40









NOTES:

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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 4 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		41

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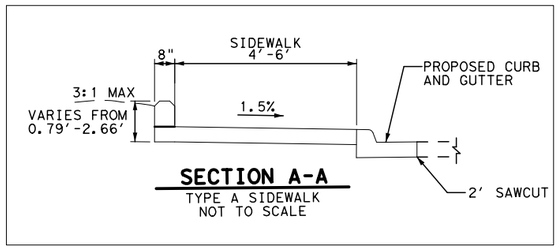
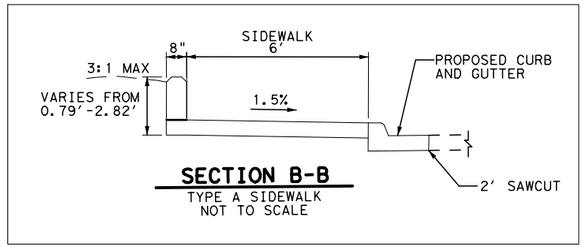


SECTION A-A
TYPE A SIDEWALK
NOT TO SCALE



SECTION B-B
TYPE A SIDEWALK
NOT TO SCALE

0' 10' 20'
SCALE IN FEET

N

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- (1) PROPOSED SMALL SIGN NUMBER
- (1) EXISTING SIGN NUMBER (TO BE RELOCATED)
- [1] EXISTING SIGN NUMBER (TO BE REMOVED)
- 1 EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- (SD) MANHOLE
- (W) WATER METER
- WATER VALVE
- FIRE HYDRANT
- R RAMP
- L LANDING PAD
- F FLARE
- SL SLOPED PAVEMENT
- T TRANSITION
- TRAVERSABLE PATH - CROSS SLOPE MUST BE <2%

NOTES:

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STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

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Suite 400
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(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 5 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		42

DN: AECOM | CK: AECOM | DW: AECOM | CK: AECOM Lynda

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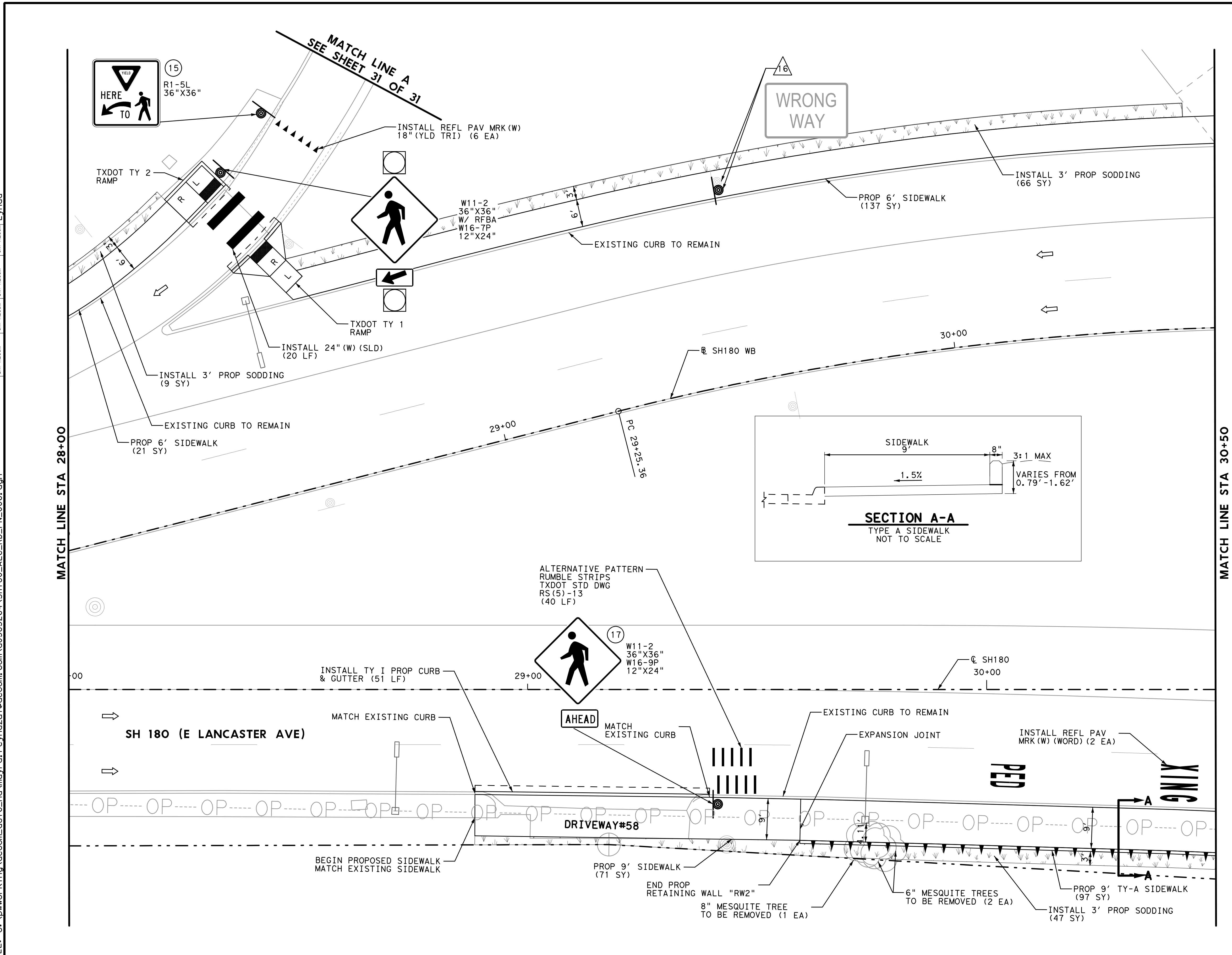

0' 10' 20'
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
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STATE OF TEXAS
CARLA VERRANDO
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7/2/2021

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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST		COUNTY	SHEET NO.
FTW		TARRANT	43

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda
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MATCH LINE STA 30+50

MATCH LINE STA 33+00

BRIDGE COLUMN

BRIDGE COLUMN

EXISTING CURB TO REMAIN

BRIDGE COLUMN

PROP 6' SIDEWALK (170 SY)

PROPOSED SIDEWALK TO MATCH EXISTING INLET TOP ELEVATION

31+00

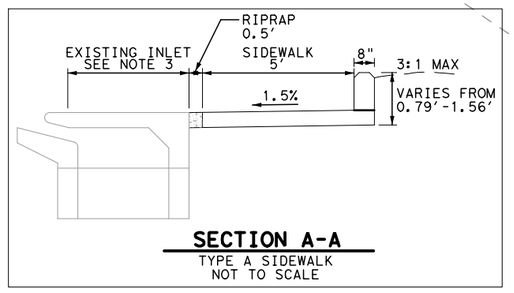
℄ SH180 WB

PT 31+52.34

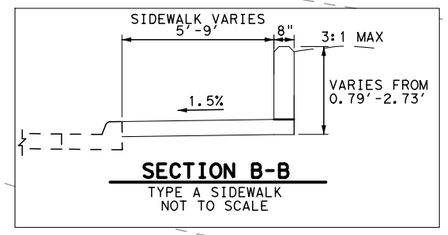
32+00

33+00

US 287 OVERPASS



SECTION A-A
TYPE A SIDEWALK
NOT TO SCALE



SECTION B-B
TYPE A SIDEWALK
NOT TO SCALE

PI 30+89.40

31+00

32+00

℄ SH180

SH 180 (E LANCASTER AVE)

EXISTING CURB TO REMAIN

REMOVE CURB (123 LF)

INSTALL TY II PROP CURB & GUTTER (110 LF)

ALTERNATIVE PATTERN RUMBLE STRIPS TXDOT STD DWG RS(5)-13 (40 LF)

SAWCUT EXISTING ASPHALT

MATCH EXISTING CURB

PROP 6" CONC RIPRAP (0.5 CY)

INSTALL 3' PROP SODDING (52 SY)

PROP 5' TY-A SIDEWALK (36 SY)

EXPANSION JOINT

BEGIN PROP RETAINING WALL "RW2"

PROP 6' SIDEWALK (77 SY)

W11-2 36"X36" W/ RFBA W16-7P 12"X24"

R1-5L 36"X36"

TXDOT TY 2 RAMP

INSTALL REFL PAV MRK (W) 18"(YLD TRI) (6 EA)

SAWCUT EXISTING ASPHALT

INSTALL TY II PROP CURB & GUTTER (23 LF)

PROP 6" CONC RIPRAP (1.1 CY)

PROP 5' SIDEWALK (14 SY)

EXISTING CURB TO REMAIN

EXPANSION JOINT

TXDOT TY 1 RAMP

END PROP RETAINING WALL "RW3"

PROP 5' TY-A SIDEWALK (35 SY)

INSTALL 3' PROP SODDING (25 SY)

INSTALL 24"(W)(SLD) (30 LF)

0' 10' 20'
SCALE IN FEET

N

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
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- EXISTING SIGN NUMBER (TO BE REMOVED)
- EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
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- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
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- TRAFFIC CONTROL BOX
- MANHOLE
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- WATER VALVE
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- SL SLOPED PAVEMENT
- T TRANSITION
- TRAVERSABLE PATH - CROSS SLOPE MUST BE <2%

NOTES:

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STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
7/2/2021

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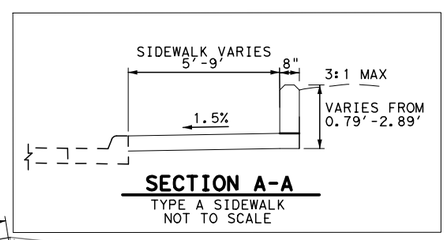
SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

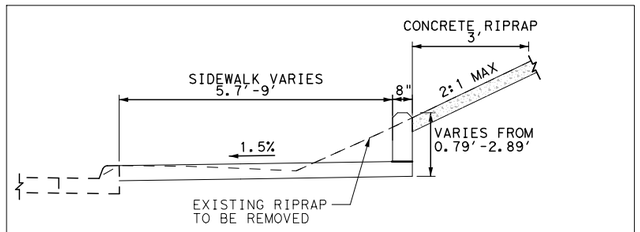
SHEET 7 OF 31

Texas Department of Transportation

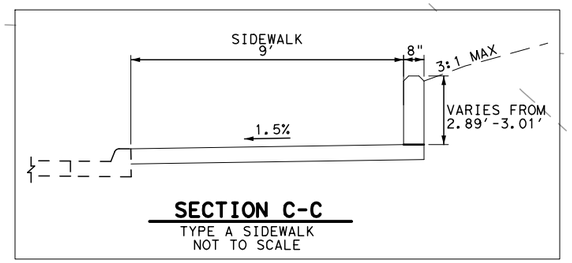
CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		44



SECTION A-A
TYPE A SIDEWALK
NOT TO SCALE



SECTION B-B
TYPE A SIDEWALK
NOT TO SCALE



SECTION C-C
TYPE A SIDEWALK
NOT TO SCALE

0' 10' 20'
SCALE IN FEET

N

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
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- PROP SIGN
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- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
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- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
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- (SD) MANHOLE
- (W) WATER METER
- WATER VALVE
- FIRE HYDRANT
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STATE OF TEXAS
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5/18/2021

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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 8 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		45

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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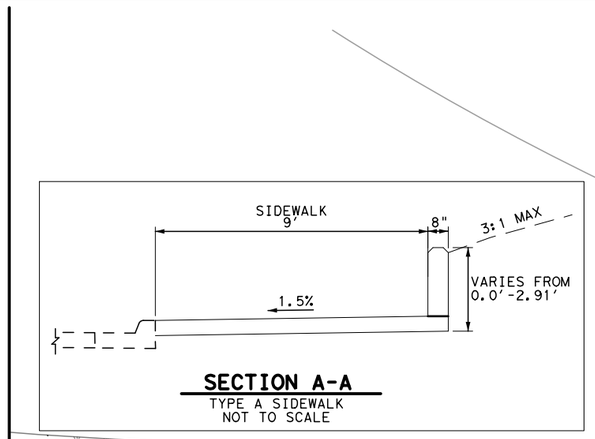

SECTION A-A
TYPE A SIDEWALK
NOT TO SCALE

MATCH LINE STA 35+50

INSTALL 3' PROP SODDING (76 SY)
EXISTING CURB TO REMAIN
PROP 6' SIDEWALK (160 SY)
3' OFFSET
6'
3'
INSTALL PROP SODDING (112 SY)
6.32'
REMOVE GUARDRAIL (112.5 LF)
INSTALL PROP GUARDRAIL (112.5 LF)
MATCH EXISTING CURB
INSTALL REFL PAV MRK (Y) 4" (SLD) (37 LF)
REMOVE CURB (63 LF)
RADIUS=330'
SAWCUT EXISTING ASPHALT
ELIM EXT PAV MRK & MRKS 4" (10 LF)
PROP 6" CONC RIPRAP (1.6 CY)
INSTALL TY II PROP CURB & GUTTER (63 LF)
12'
5'
5'
INSTALL REFL PAV MRK (W) 4" (SLD) (200 LF)
7' OFFSET
ELIM EXT PAV MRK & MRKS 4" (220 LF)

℄ SH180 WB
36+00
37+00
38+00

℄ SH180
36+00
37+00
US 287 OVERPASS
38

SH 180 (E LANCASTER AVE)

PROP 9' TY-A SIDEWALK (70 SY)
EXISTING CURB TO REMAIN
INSTALL PROP SODDING (85 SY)
4' OFFSET
PROP 5' SIDEWALK (43 SY)
LANE ENDS MERGE LEFT
19
W9-2TL 36"X36"
ADJUST EXISTING JUNCTION BOX TO MEET PROPOSED SIDEWALK ELEVATION
BRIDGE COLUMN
5.5' OFFSET
A
A
9'
5.66'
5'
3'
6.07'
5'
5'
1.5%
BEGIN PROP RETAINING WALL "RW4"
EXPANSION JOINT
INSTALL 3' PROP SODDING (77 SY)

MATCH LINE STA 38+00

0' 10' 20'
SCALE IN FEET

N

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- (1) PROPOSED SMALL SIGN NUMBER
- 1 EXISTING SIGN NUMBER (TO BE RELOCATED)
- [1] EXISTING SIGN NUMBER (TO BE REMOVED)
- (1) EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- (SD) MANHOLE
- (W) WATER METER
- WATER VALVE
- FIRE HYDRANT
- R RAMP
- L LANDING PAD
- F FLARE
- SL SLOPED PAVEMENT
- T TRANSITION
- TRAVERSABLE PATH - CROSS SLOPE MUST BE <2%

NOTES:

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STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
5/25/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 9 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		46

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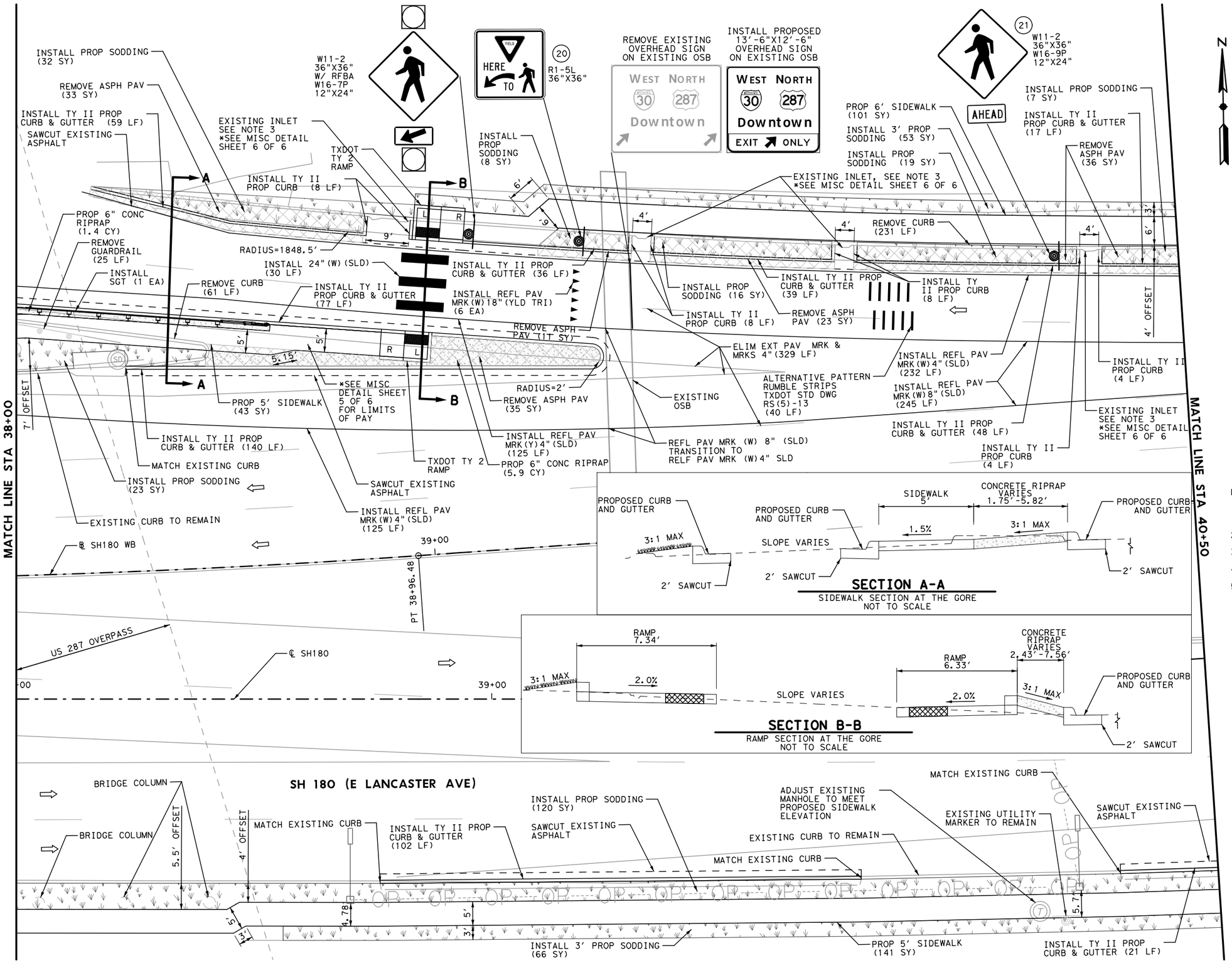

NOTES:

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STATE OF TEXAS
CARLA VERRANDO
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7/2/2021

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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 10 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		47

DATE: 7/2/2021 12:05:10 AM
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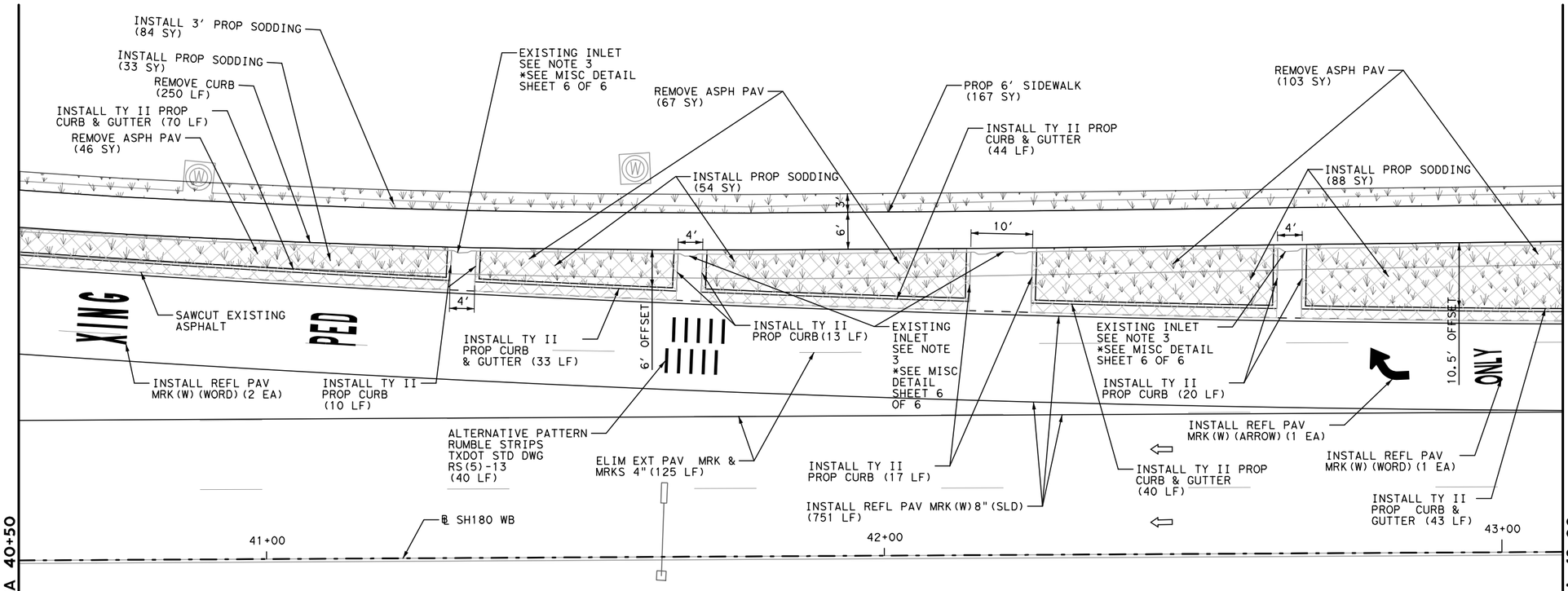

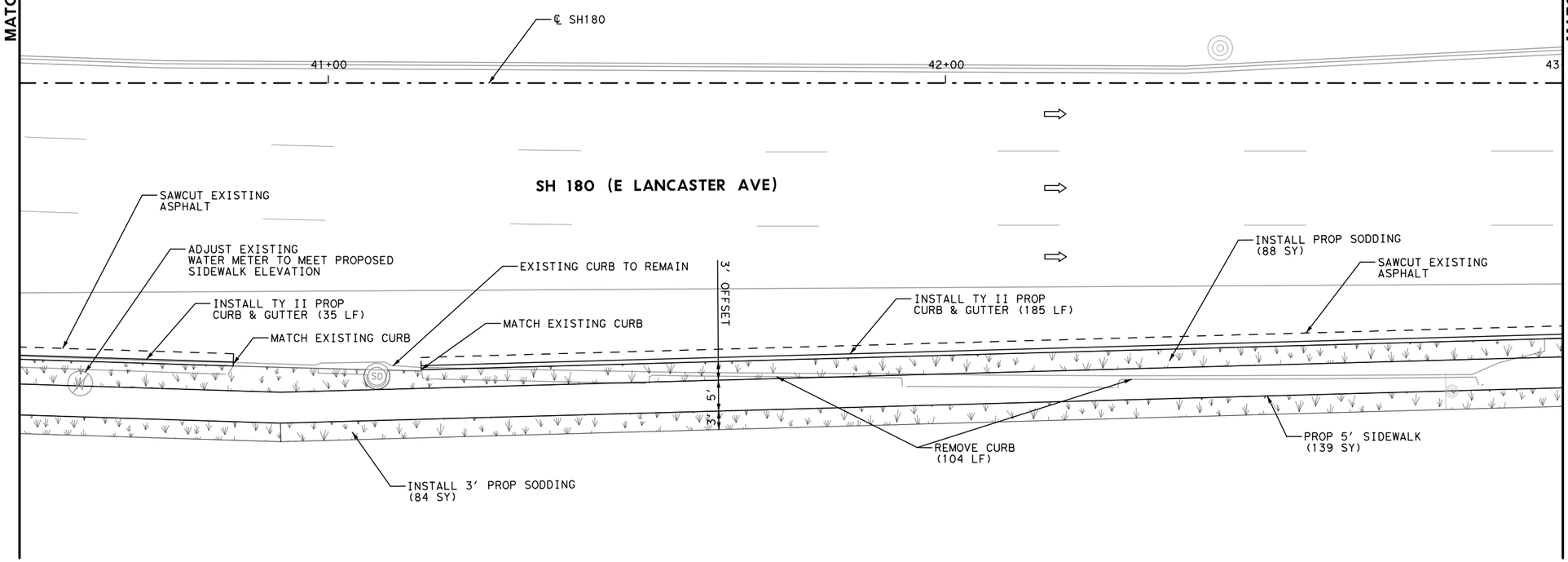

0' 10' 20'
SCALE IN FEET

N

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- PROPOSED SMALL SIGN NUMBER
- EXISTING SIGN NUMBER (TO BE RELOCATED)
- EXISTING SIGN NUMBER (TO BE REMOVED)
- EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- MANHOLE
- WATER METER
- WATER VALVE
- FIRE HYDRANT
- RAMP
- LANDING PAD
- FLARE
- SLOPED PAVEMENT
- TRANSITION
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STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

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13355 Noel Road
Suite 400
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(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 11 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		48

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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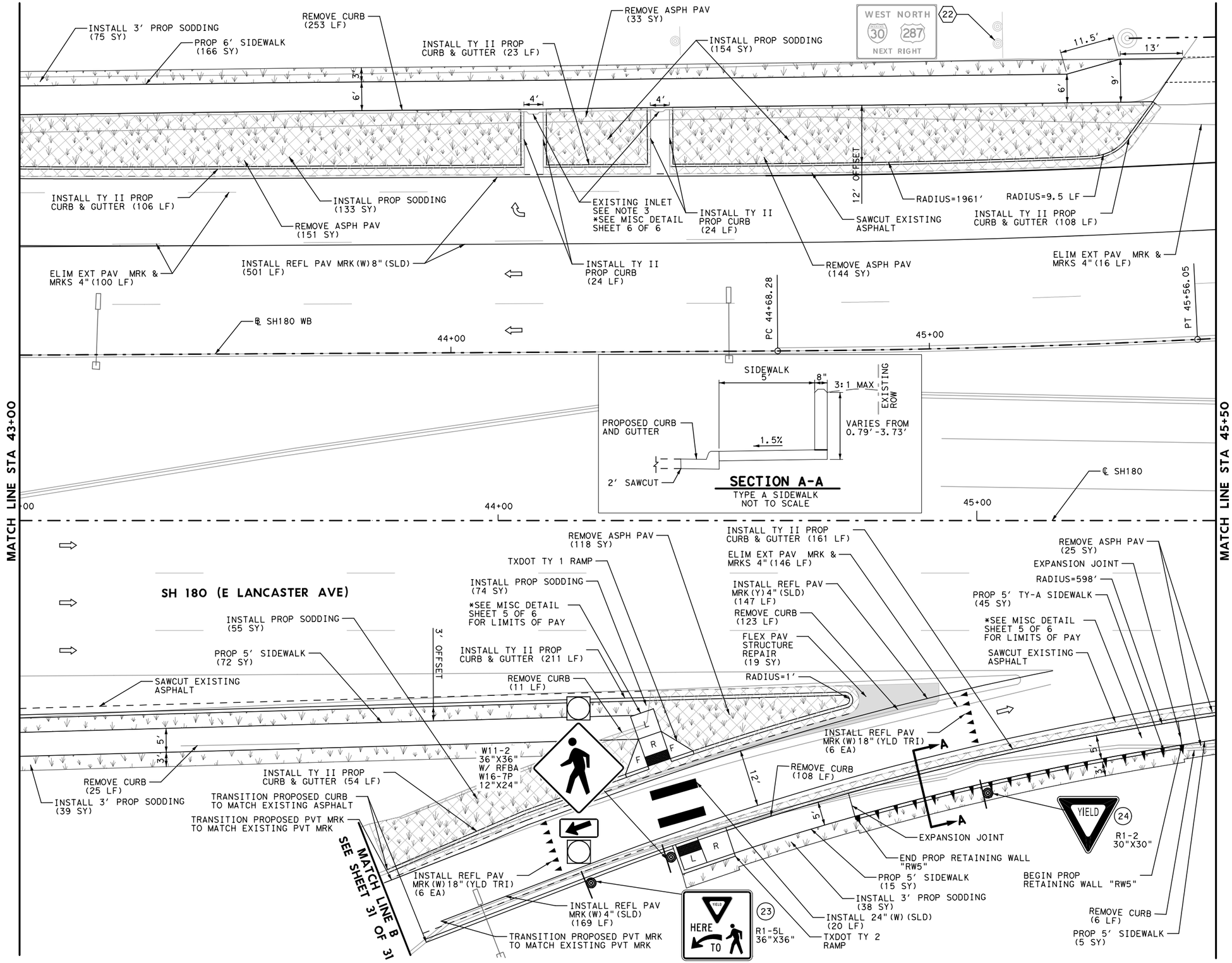

0' 10' 20'
SCALE IN FEET

N

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
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- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
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- (SD) MANHOLE
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- WATER VALVE
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STATE OF TEXAS
CARLA VERRANDO
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LICENSED PROFESSIONAL ENGINEER
7/2/2021

NO.	REVISION	DATE

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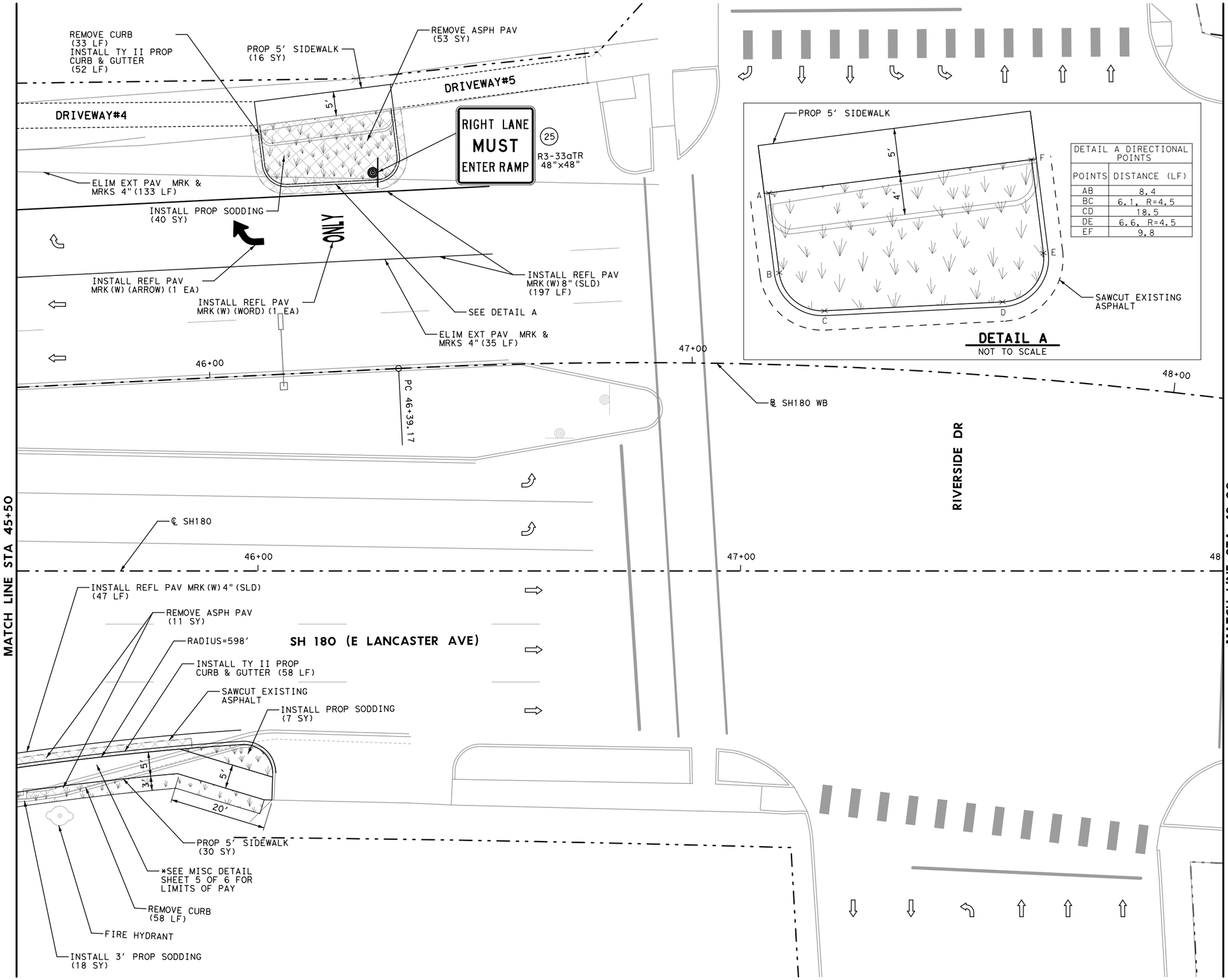
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 12 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		49



0' 10' 20'
SCALE IN FEET

N

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 13 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		50

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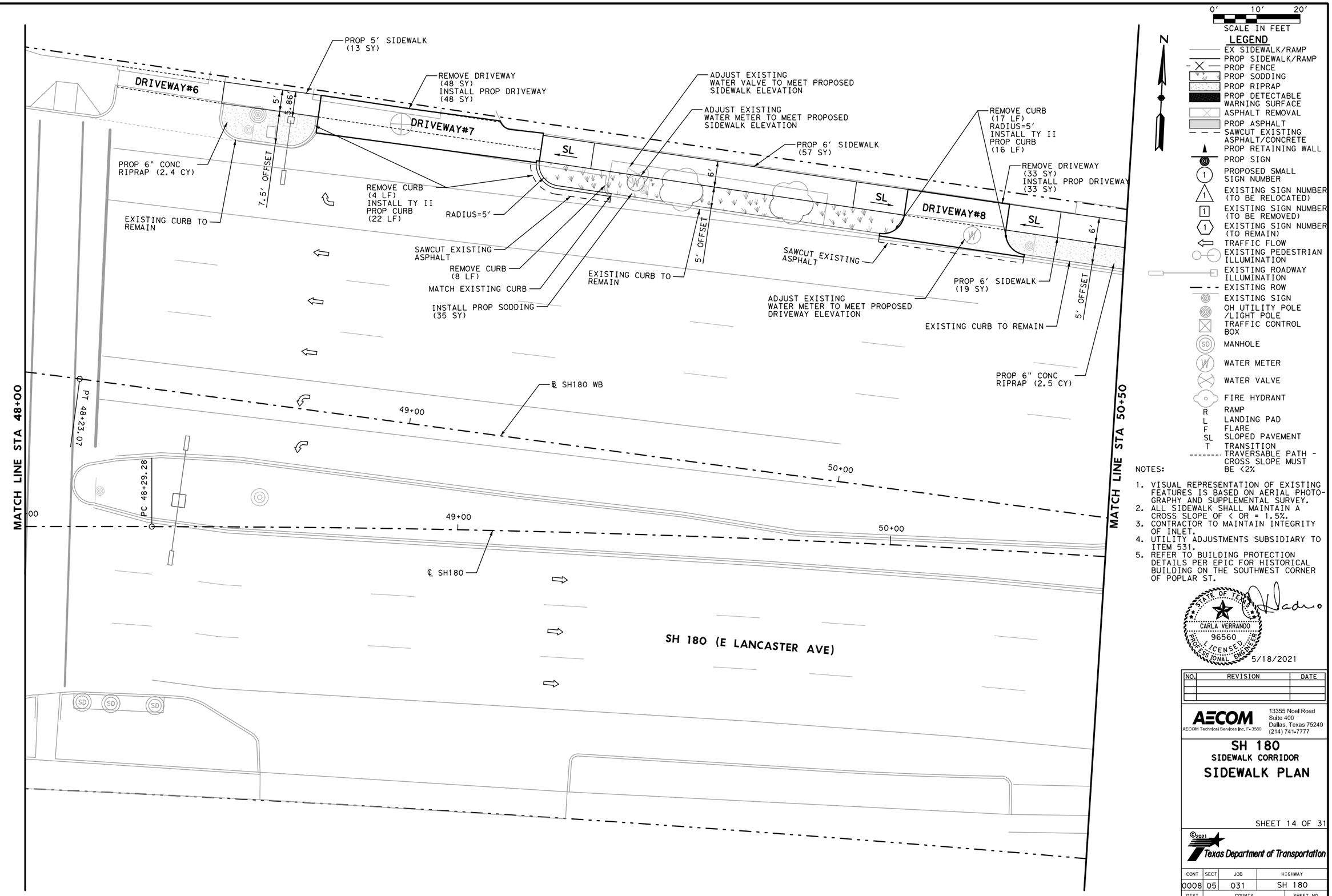

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5/18/2021

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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 14 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		51

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda
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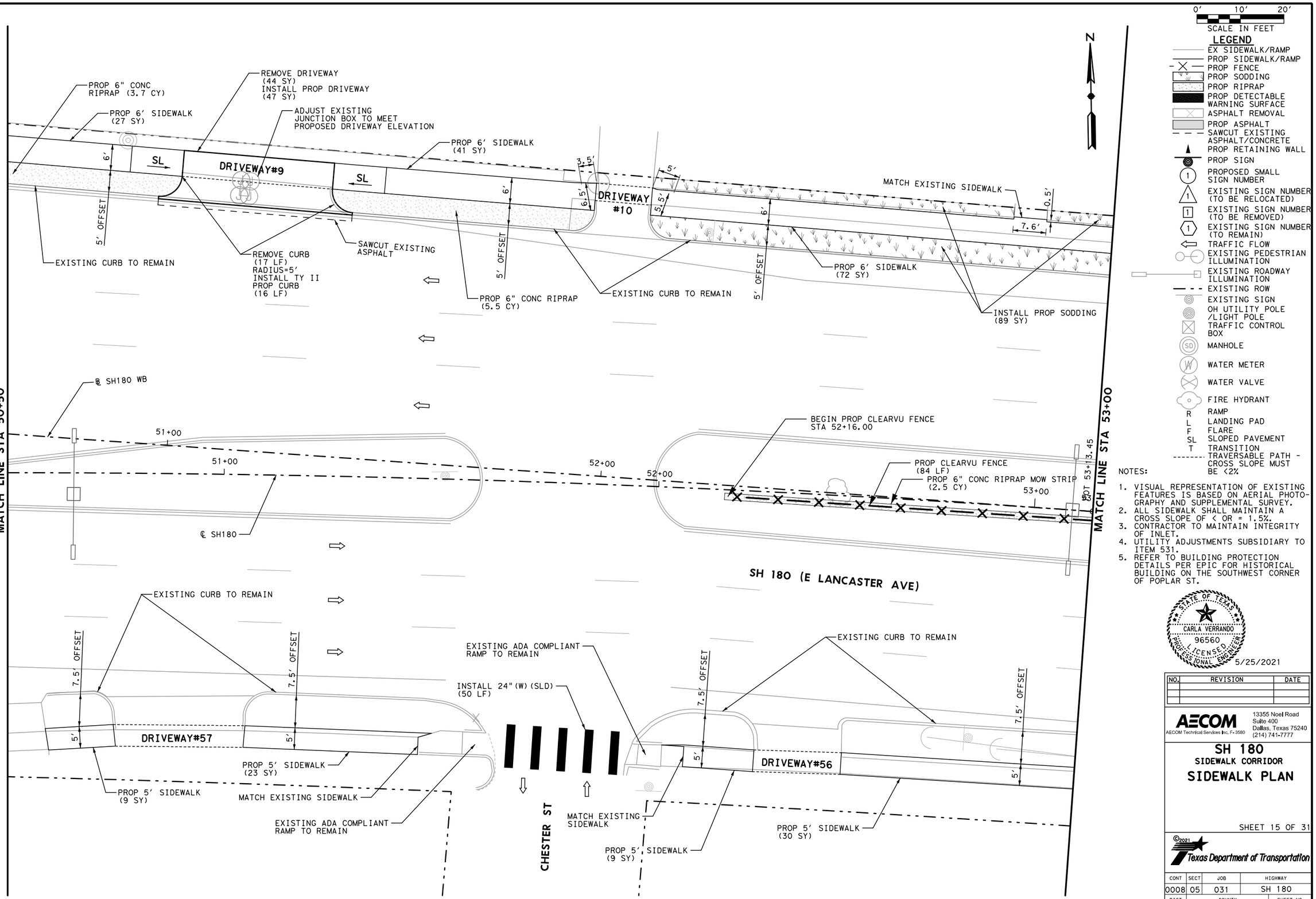

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STATE OF TEXAS
CARLA VERRANDO
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LICENSED PROFESSIONAL ENGINEER
5/25/2021

NO.	REVISION	DATE

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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 15 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		52

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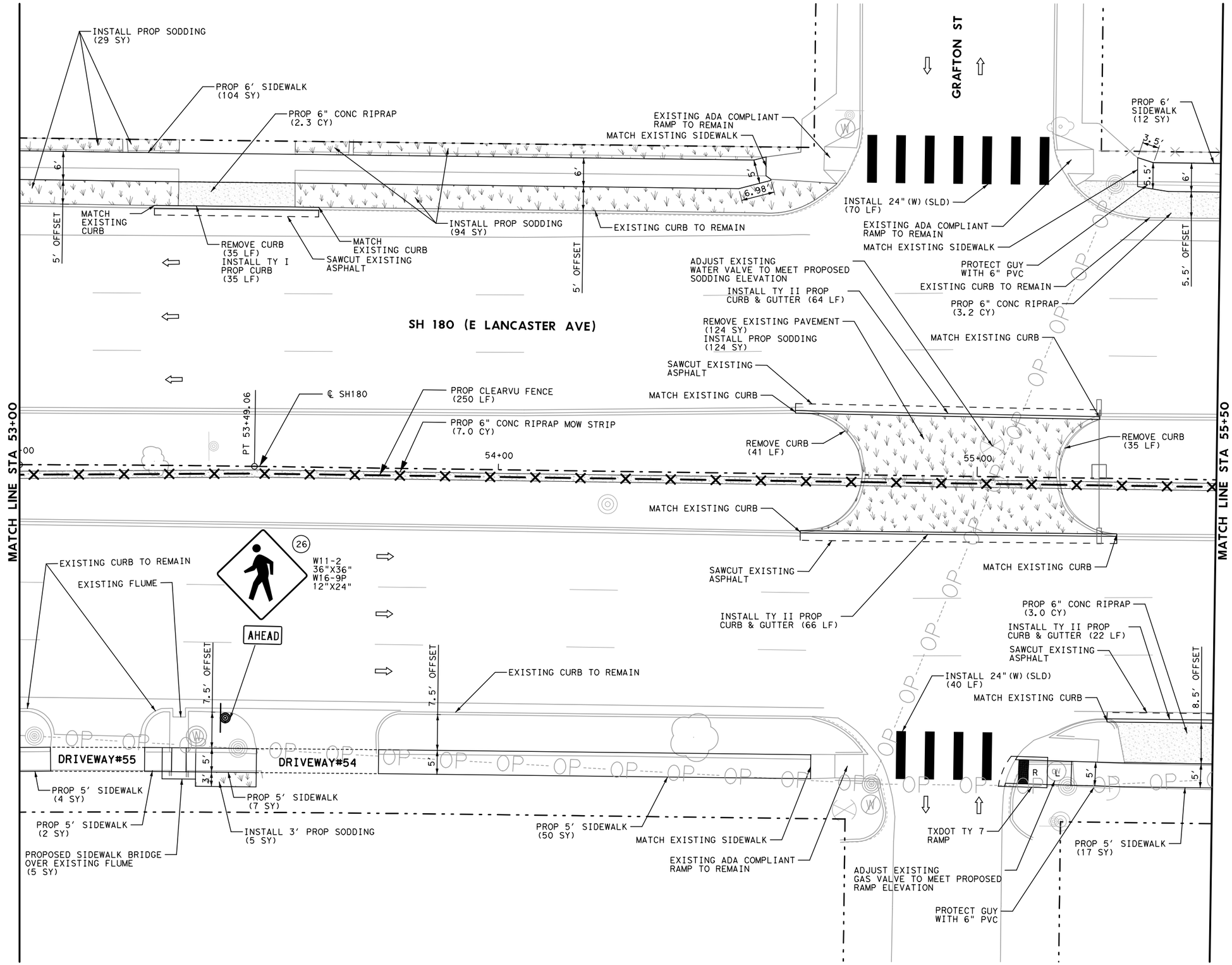

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STATE OF TEXAS
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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 16 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		53

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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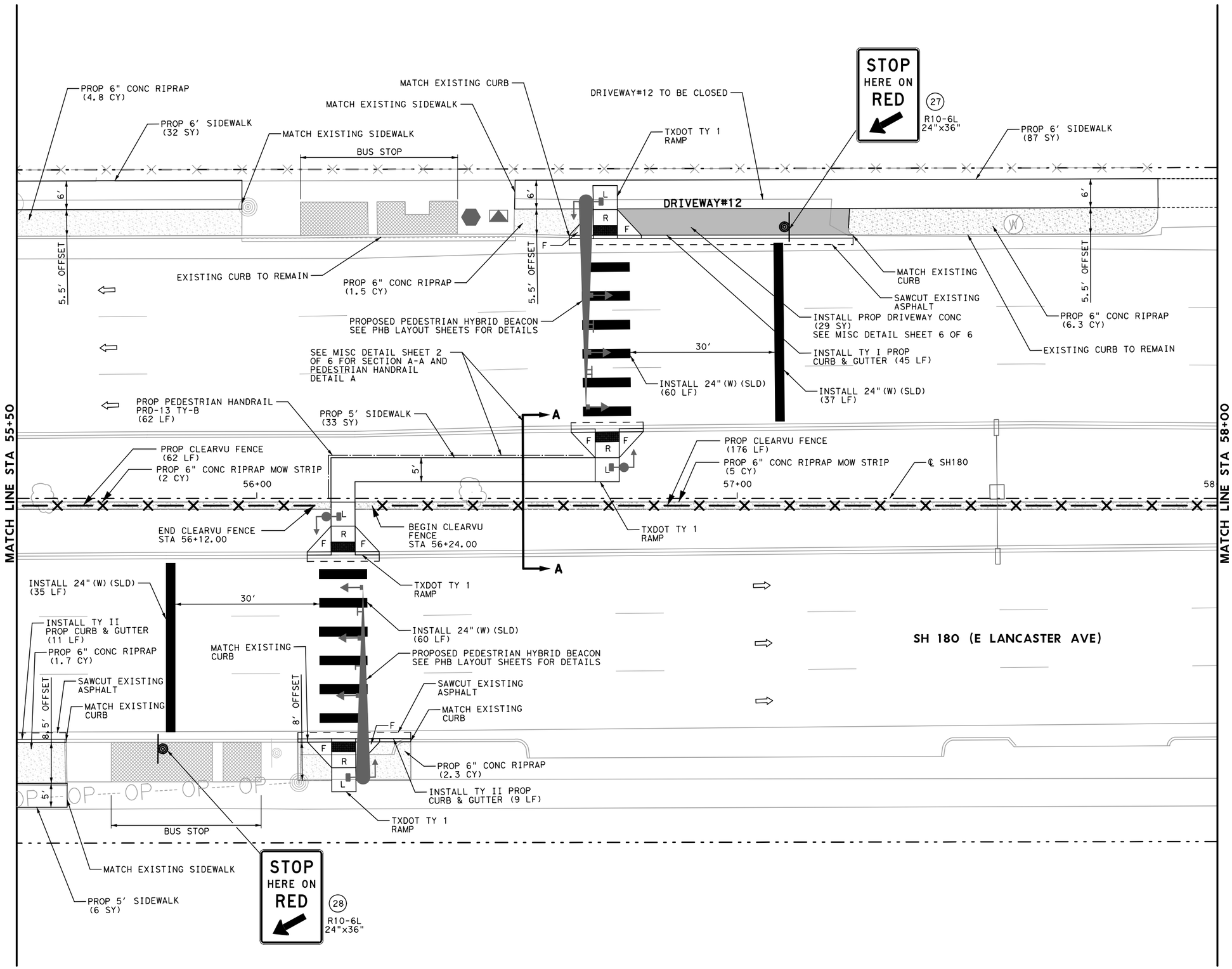

0' 10' 20'
SCALE IN FEET

N

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
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STATE OF TEXAS
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5/25/2021

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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 17 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		54

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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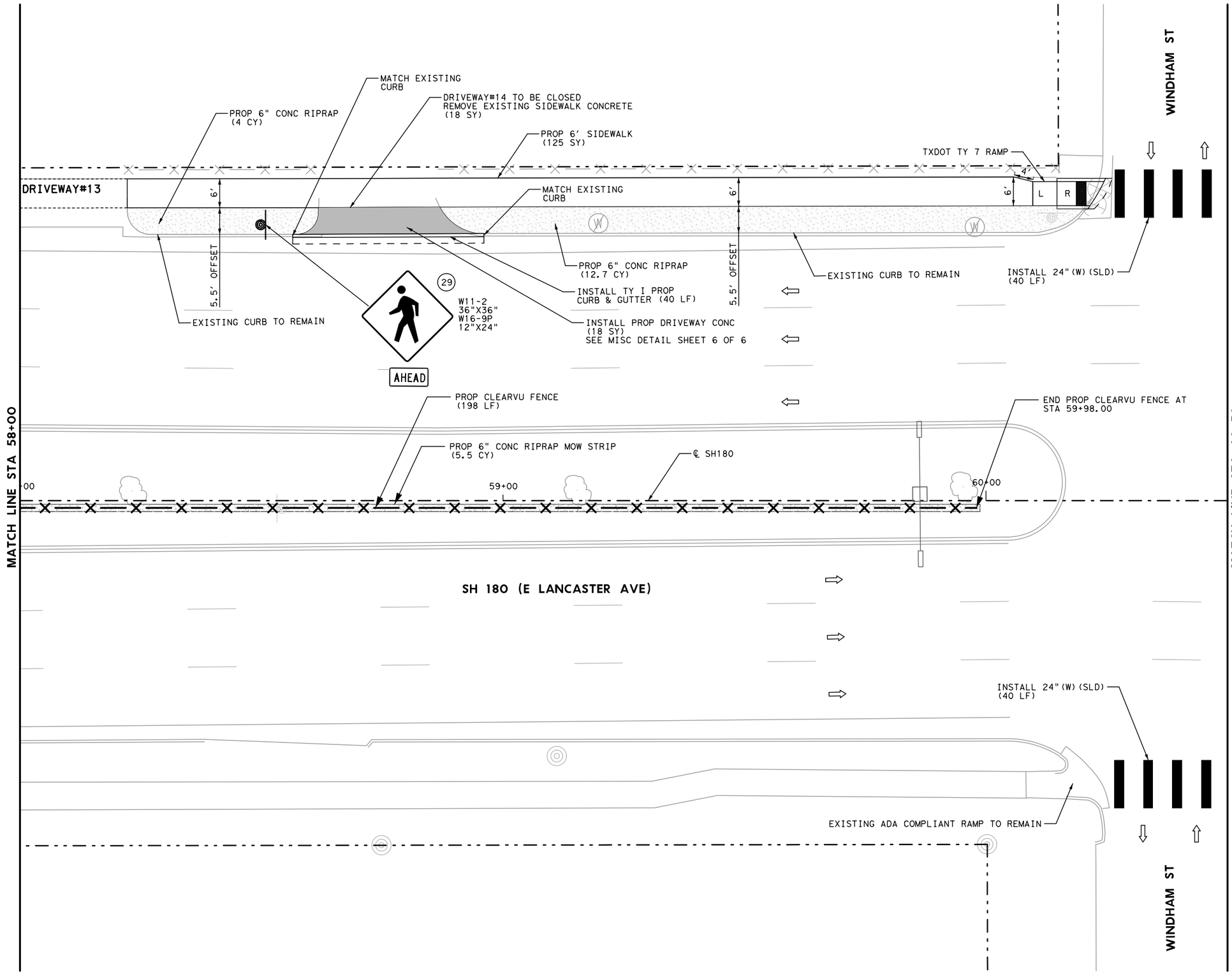

0' 10' 20'
SCALE IN FEET

N

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
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- PROP RIPRAP
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PROFESSIONAL ENGINEER
7/2/2021

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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 18 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		55

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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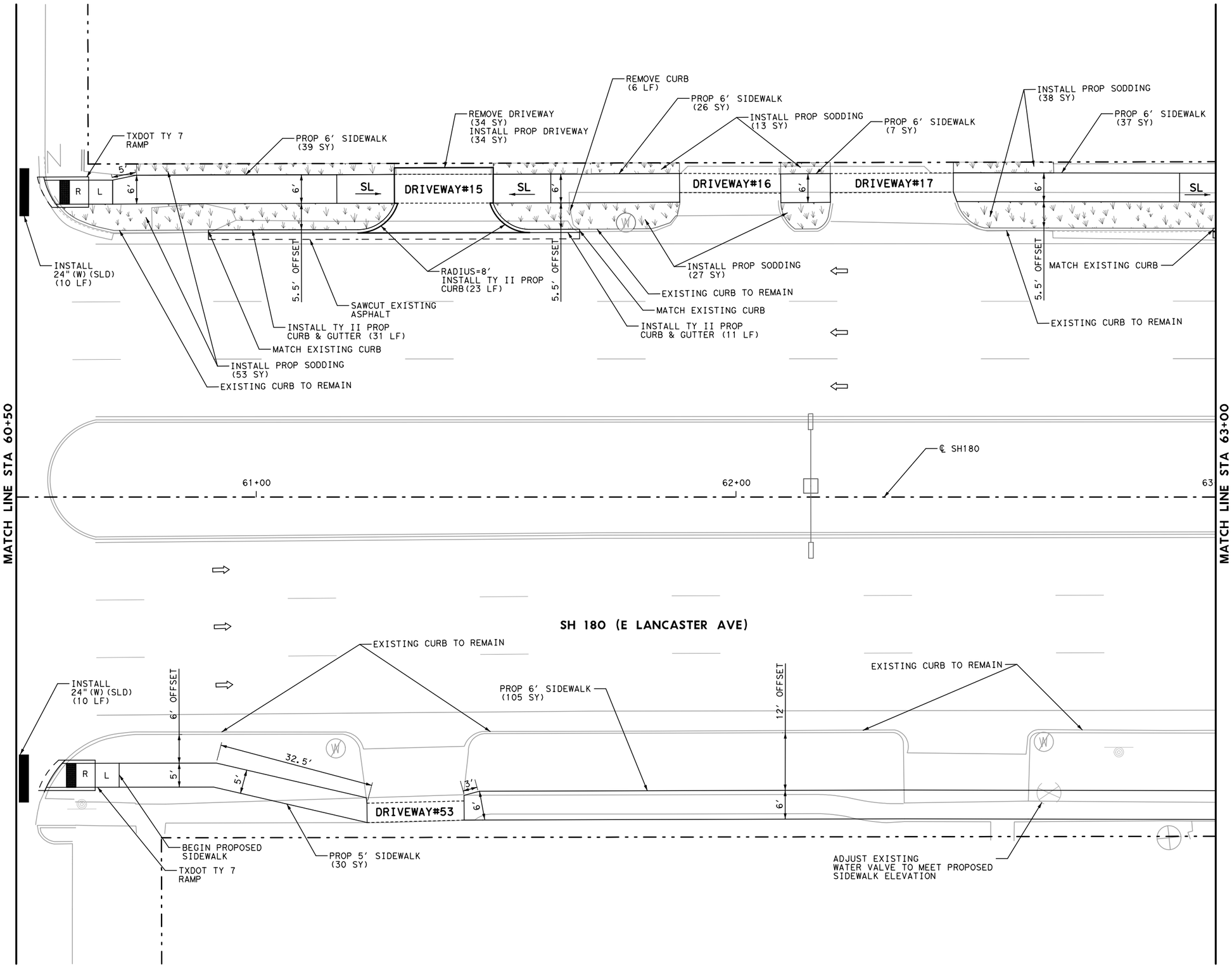

0' 10' 20'
SCALE IN FEET

N

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
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CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 19 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		56

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda
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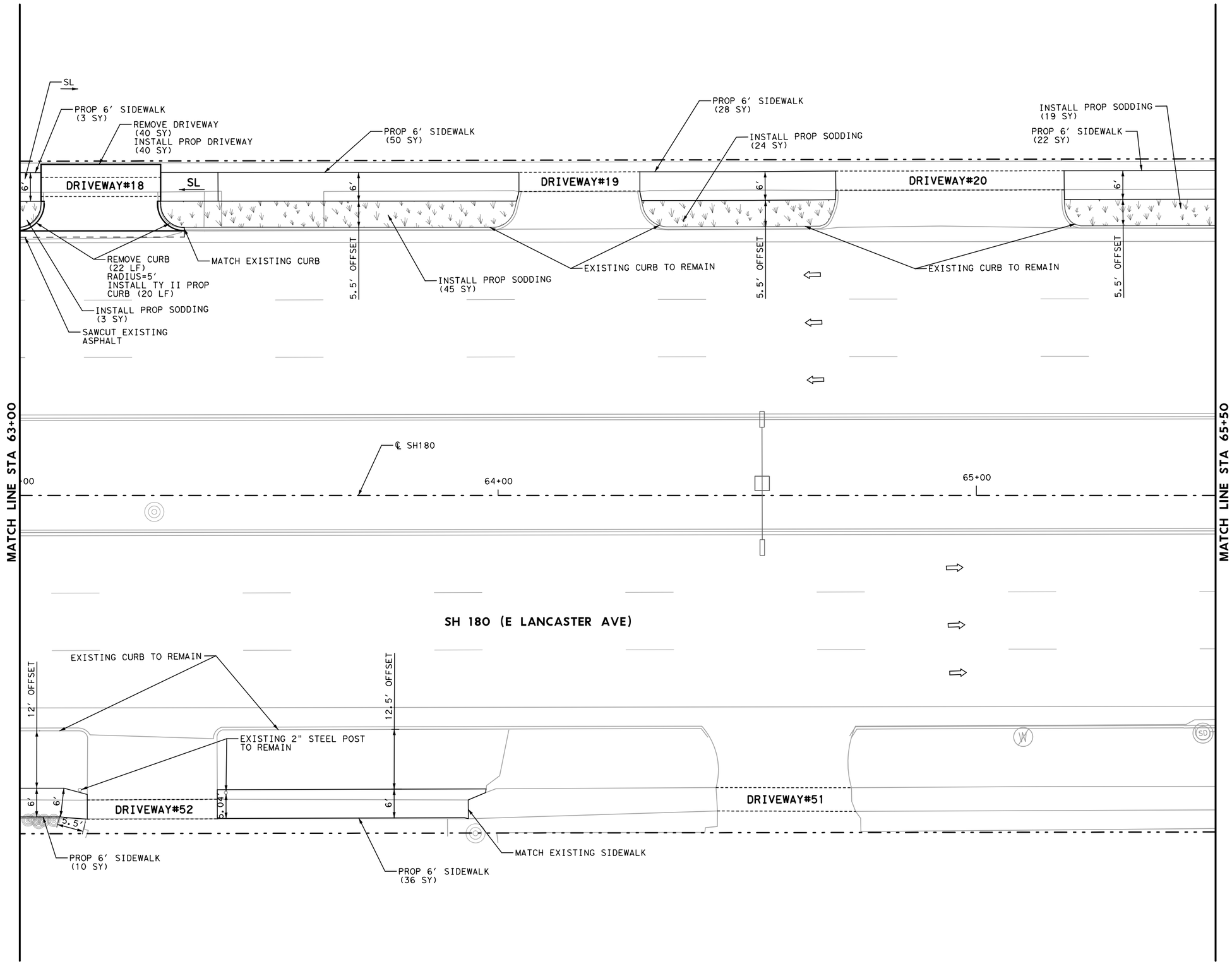

0' 10' 20'
SCALE IN FEET

N

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- (1) PROPOSED SMALL SIGN NUMBER
- (1) EXISTING SIGN NUMBER (TO BE RELOCATED)
- [1] EXISTING SIGN NUMBER (TO BE REMOVED)
- (1) EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- (SD) MANHOLE
- (W) WATER METER
- WATER VALVE
- FIRE HYDRANT
- R RAMP
- L LANDING PAD
- F FLARE
- SL SLOPED PAVEMENT
- T TRANSITION
- TRAVERSABLE PATH - CROSS SLOPE MUST BE <2%

NOTES:

1. VISUAL REPRESENTATION OF EXISTING FEATURES IS BASED ON AERIAL PHOTOGRAPHY AND SUPPLEMENTAL SURVEY.
2. ALL SIDEWALK SHALL MAINTAIN A CROSS SLOPE OF < OR = 1.5%.
3. CONTRACTOR TO MAINTAIN INTEGRITY OF INLET.
4. UTILITY ADJUSTMENTS SUBSIDIARY TO ITEM 531.
5. REFER TO BUILDING PROTECTION DETAILS PER EPIC FOR HISTORICAL BUILDING ON THE SOUTHWEST CORNER OF POPLAR ST.

STATE OF TEXAS
CARLA VERRANDO
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LICENSED PROFESSIONAL ENGINEER
5/18/2021

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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 20 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		57

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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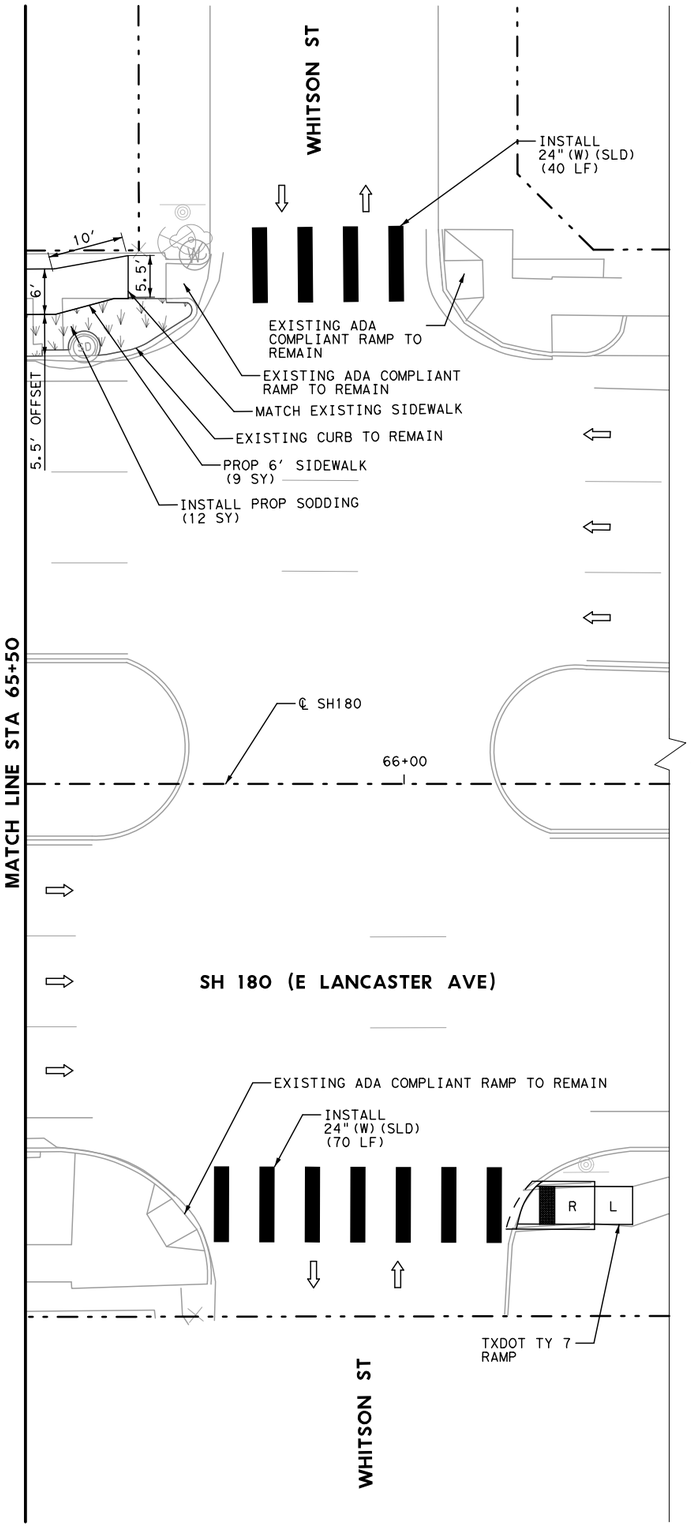

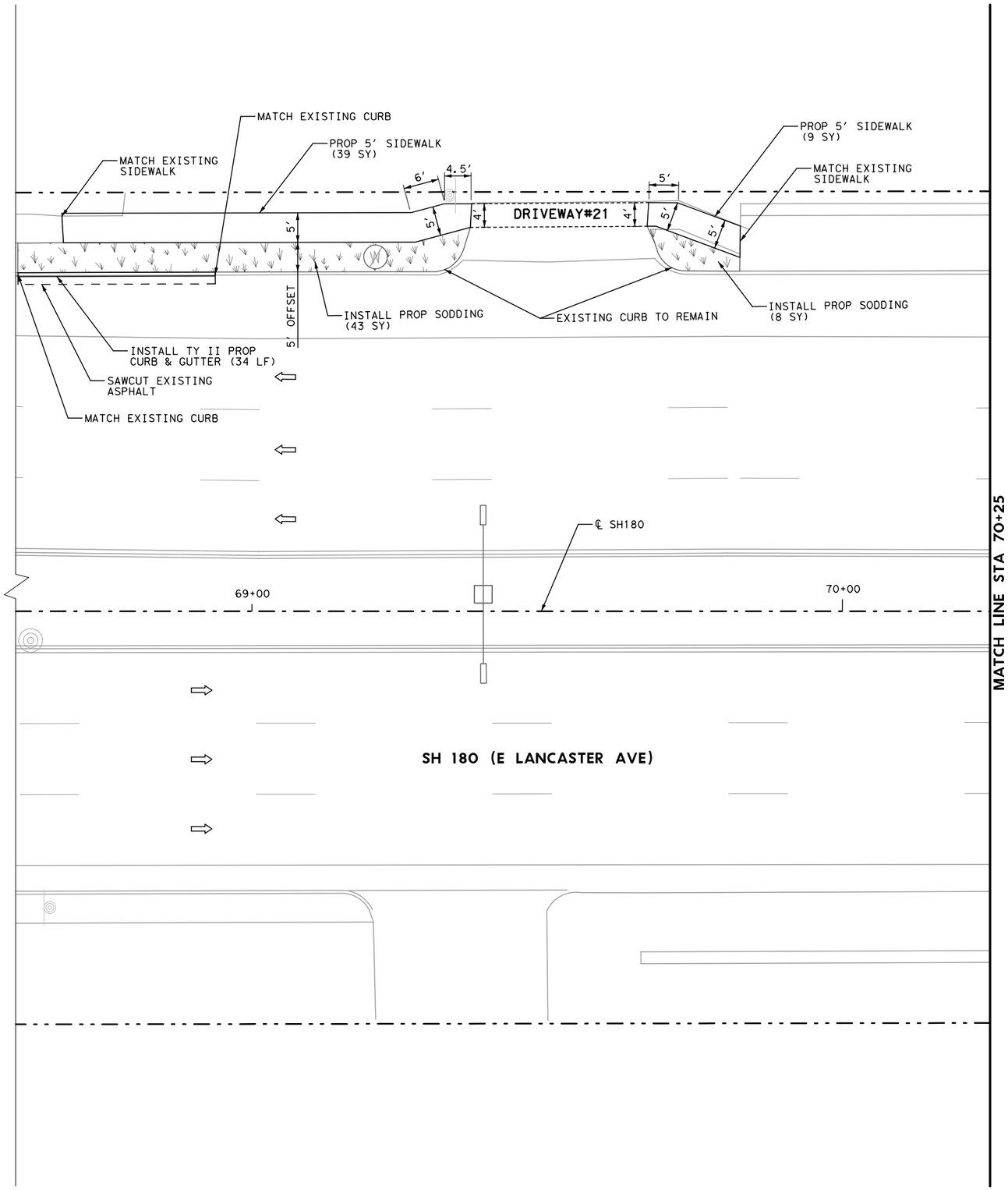

0' 10' 20'
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- (1) PROPOSED SMALL SIGN NUMBER
- (1) EXISTING SIGN NUMBER (TO BE RELOCATED)
- [1] EXISTING SIGN NUMBER (TO BE REMOVED)
- (1) EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- (SD) MANHOLE
- (W) WATER METER
- WATER VALVE
- FIRE HYDRANT
- R RAMP
- L LANDING PAD
- F FLARE
- SL SLOPED PAVEMENT
- T TRANSITION
- TRAVERSABLE PATH - CROSS SLOPE MUST BE <2%

NOTES:

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STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
5/18/2021

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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 21 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		58

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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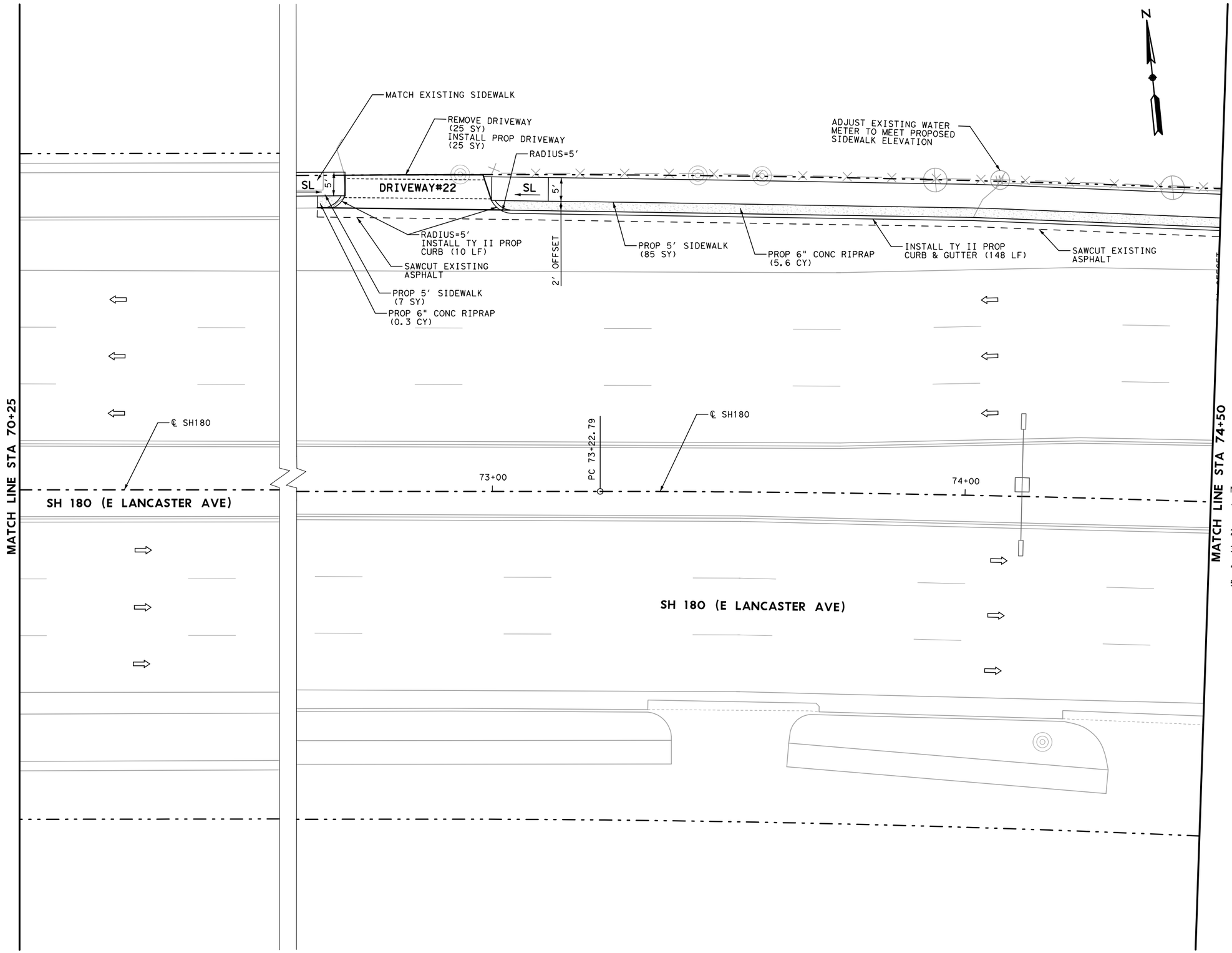

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
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- (1) PROPOSED SMALL SIGN NUMBER
- (1) EXISTING SIGN NUMBER (TO BE RELOCATED)
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STATE OF TEXAS
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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 22 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		59

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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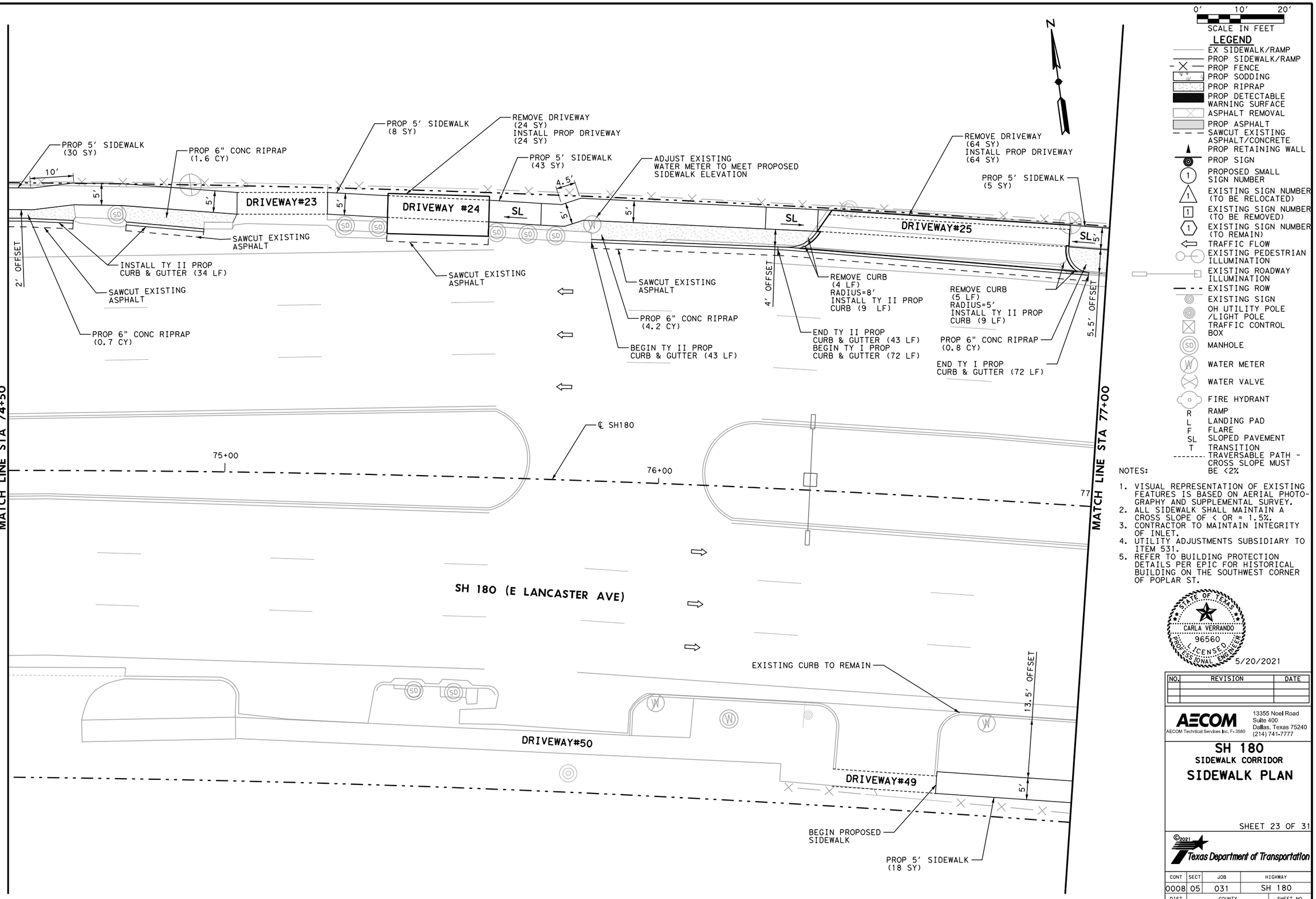

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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 23 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		60

DATE: 5/20/2021 11:42:23 PM
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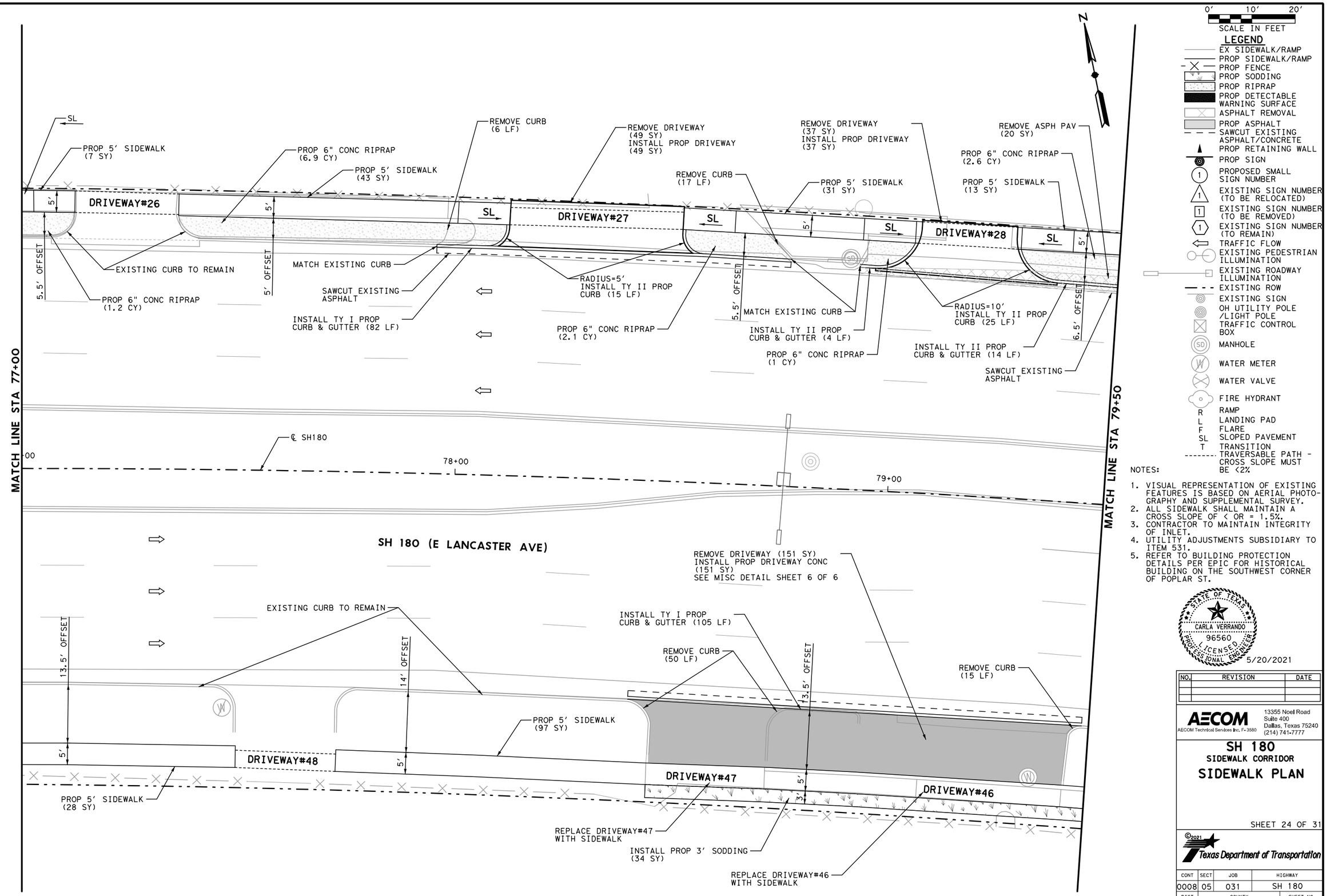

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- (1) PROPOSED SMALL SIGN NUMBER
- (1) EXISTING SIGN NUMBER (TO BE RELOCATED)
- [1] EXISTING SIGN NUMBER (TO BE REMOVED)
- (1) EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- (SD) MANHOLE
- (W) WATER METER
- WATER VALVE
- FIRE HYDRANT
- R RAMP
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STATE OF TEXAS
CARLA VERRANDO
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LICENSED PROFESSIONAL ENGINEER
5/20/2021

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13355 Noel Road
Suite 400
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(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 24 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		61

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda
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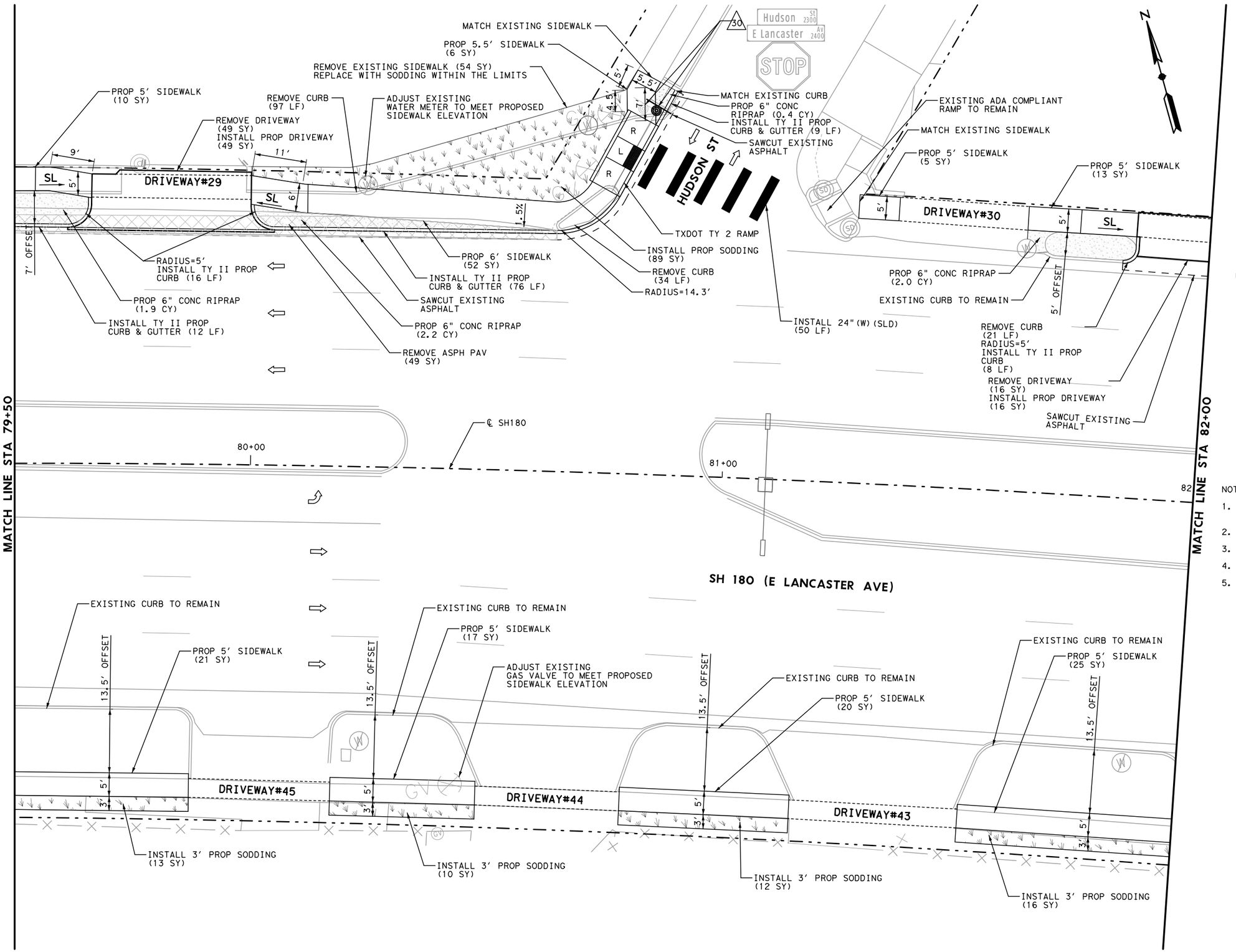

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
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- PROP SIGN
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- EXISTING SIGN NUMBER (TO BE REMOVED)
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- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
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- WATER METER
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STATE OF TEXAS
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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 25 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		62

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda
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0' 10' 20'
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- (1) PROPOSED SMALL SIGN NUMBER
- (1) EXISTING SIGN NUMBER (TO BE RELOCATED)
- [1] EXISTING SIGN NUMBER (TO BE REMOVED)
- (1) EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- (SD) MANHOLE
- (W) WATER METER
- WATER VALVE
- FIRE HYDRANT
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- SL SLOPED PAVEMENT
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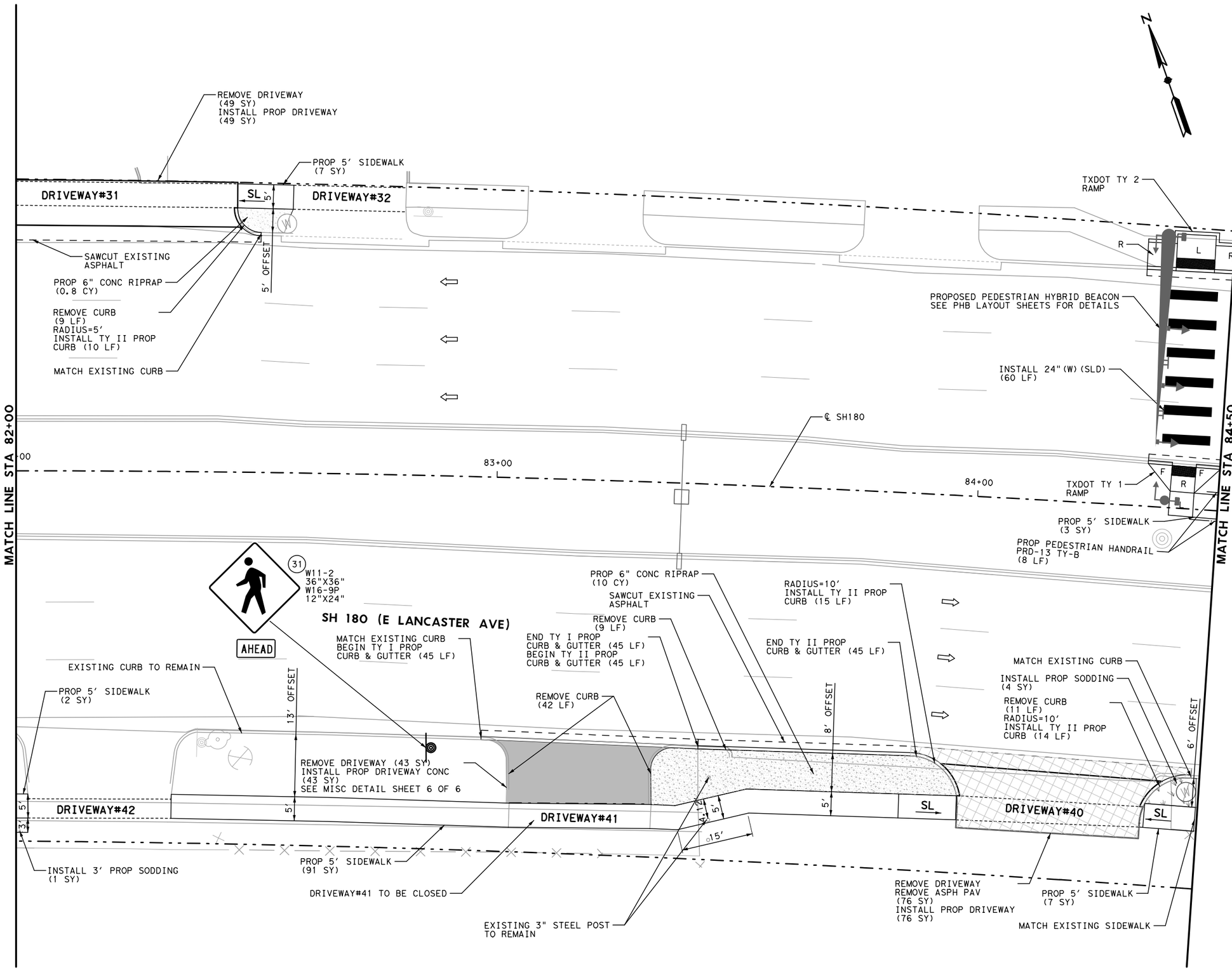

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
7/2/2021

NO.	REVISION	DATE

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13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 26 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		63

DN: AECOM CK: AECOM DW: AECOM CK: AECOM untitled

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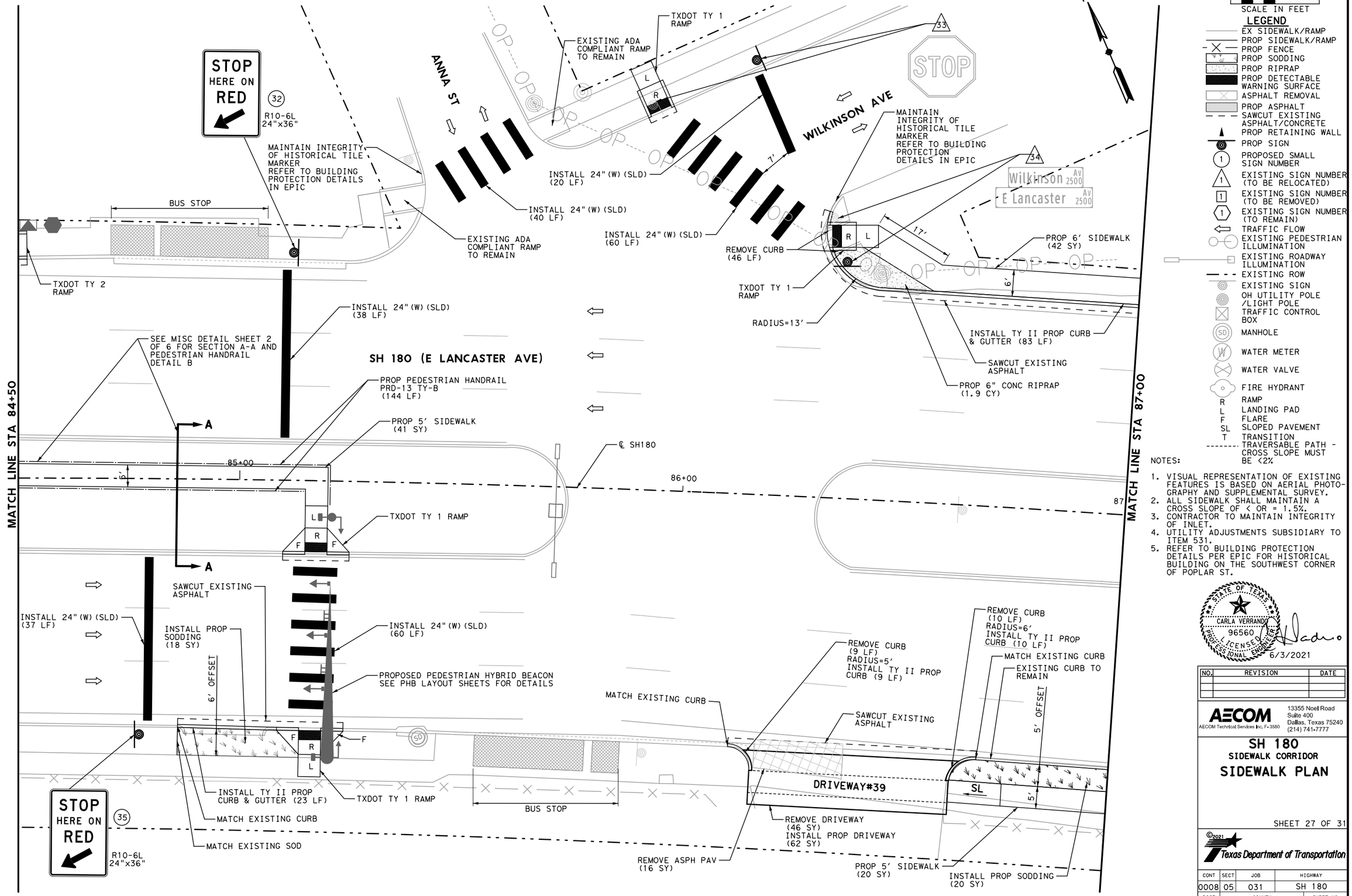

0' 10' 20'
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- (1) PROPOSED SMALL SIGN NUMBER
- 1 EXISTING SIGN NUMBER (TO BE RELOCATED)
- 1 EXISTING SIGN NUMBER (TO BE REMOVED)
- 1 EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- SD MANHOLE
- W WATER METER
- WATER VALVE
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STATE OF TEXAS
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6/3/2021

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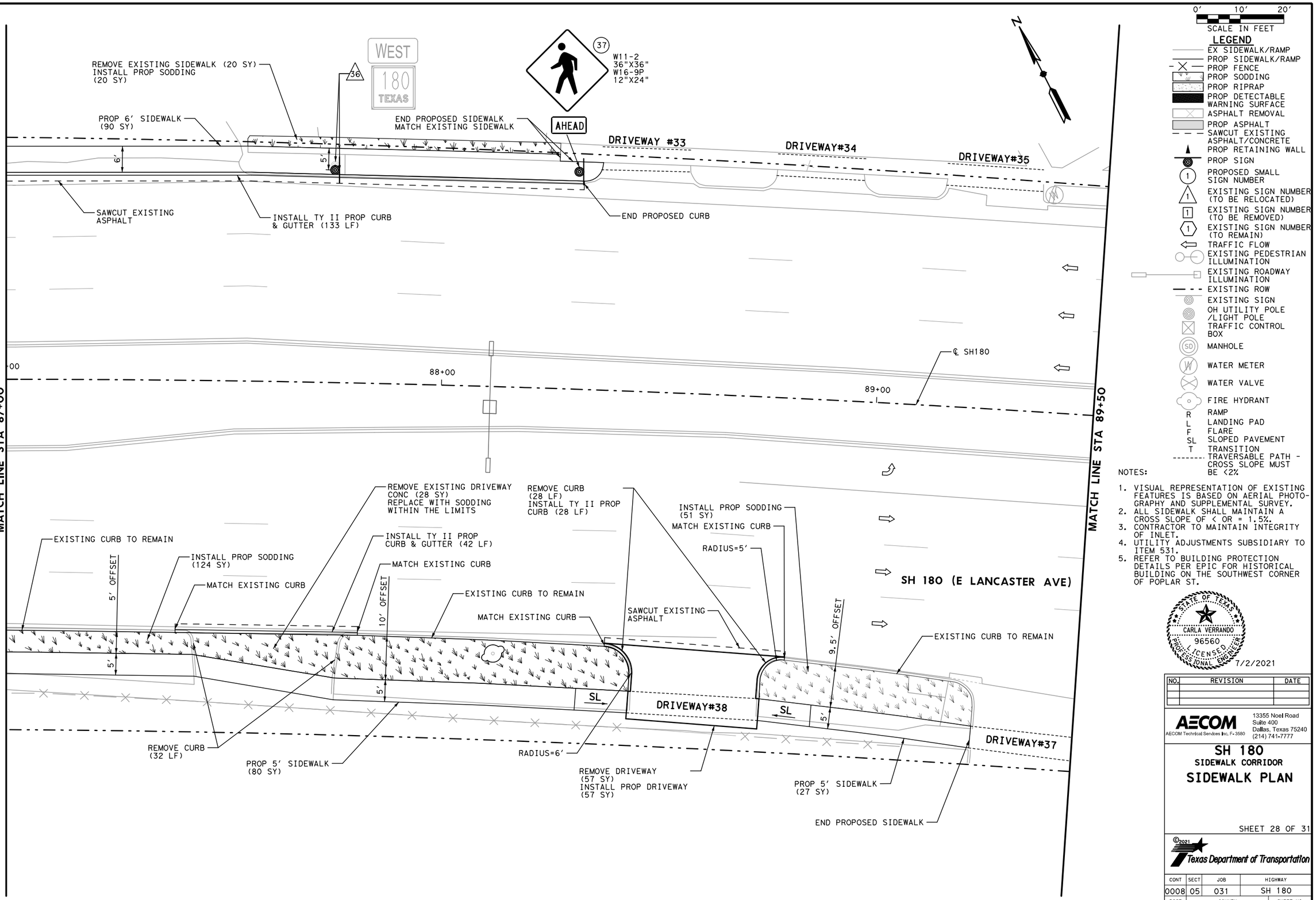
SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 27 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		64



0' 10' 20'
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
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- PROP RIPRAP
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SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 28 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		65

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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MATCH LINE STA 89+50

MATCH LINE STA 92+00

EXISTING ADA COMPLIANT RAMP TO REMAIN

BEACH ST SERVICE RD W

EXISTING ADA COMPLIANT RAMP TO REMAIN

BEACH ST

INSTALL 24" (W) (SLD) (40 LF)

EXISTING ADA COMPLIANT RAMPS TO REMAIN

EXISTING ADA COMPLIANT RAMP TO REMAIN

INSTALL 24" (W) (SLD) (30 LF)

90+05.89 PT

℄ SH180

90+00

SH 180 (E LANCASTER AVE)

DRIVEWAY#36

SEE CONCRETE ISLAND DETAIL A

REMOVE CURB (25 LF)

INSTALL TY II PROP CURB & GUTTER (29 LF)

PROP 6" CONC RIPRAP (1.3 CY)

INSTALL 24" (W) (SLD) (20 LF)

INSTALL 24" (W) (SLD) (30 LF)

EXISTING ADA COMPLIANT RAMP TO REMAIN

TXDOT TY 21 RAMP

PROP 6" CONC RIPRAP (0.1 CY)

EXISTING ADA COMPLIANT RAMP TO REMAIN

SAWCUT EXISTING ASPHALT

MATCH EXISTING CURB

MATCH EXISTING CURB

SAWCUT EXISTING ASPHALT

CONCRETE DIRECTIONAL ISLAND POINTS	
POINTS	DISTANCE (LF)
AB	7.4
BC	10.6, R=3
CD	4.4
EF	1.9
FG	7, R=2
GH	0.6
HA	5

CONCRETE ISLAND DETAIL A
NOT TO SCALE

* MAX CROSS SLOPE 1.5%
CONTRACTOR TO VERIFY SLOPES IN FIELD

0' 10' 20'
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- PROPOSED SMALL SIGN NUMBER
- EXISTING SIGN NUMBER (TO BE RELOCATED)
- EXISTING SIGN NUMBER (TO BE REMOVED)
- EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- MANHOLE
- WATER METER
- WATER VALVE
- FIRE HYDRANT
- R RAMP
- L LANDING PAD
- F FLARE
- SL SLOPED PAVEMENT
- T TRANSITION
- TRAVERSABLE PATH - CROSS SLOPE MUST BE <2%

NOTES:

1. VISUAL REPRESENTATION OF EXISTING FEATURES IS BASED ON AERIAL PHOTOGRAPHY AND SUPPLEMENTAL SURVEY.
2. ALL SIDEWALK SHALL MAINTAIN A CROSS SLOPE OF < OR = 1.5%.
3. CONTRACTOR TO MAINTAIN INTEGRITY OF INLET.
4. UTILITY ADJUSTMENTS SUBSIDIARY TO ITEM 531.
5. REFER TO BUILDING PROTECTION DETAILS PER EPIC FOR HISTORICAL BUILDING ON THE SOUTHWEST CORNER OF POPLAR ST.

STATE OF TEXAS
CARLA VERRANDO
96560
PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

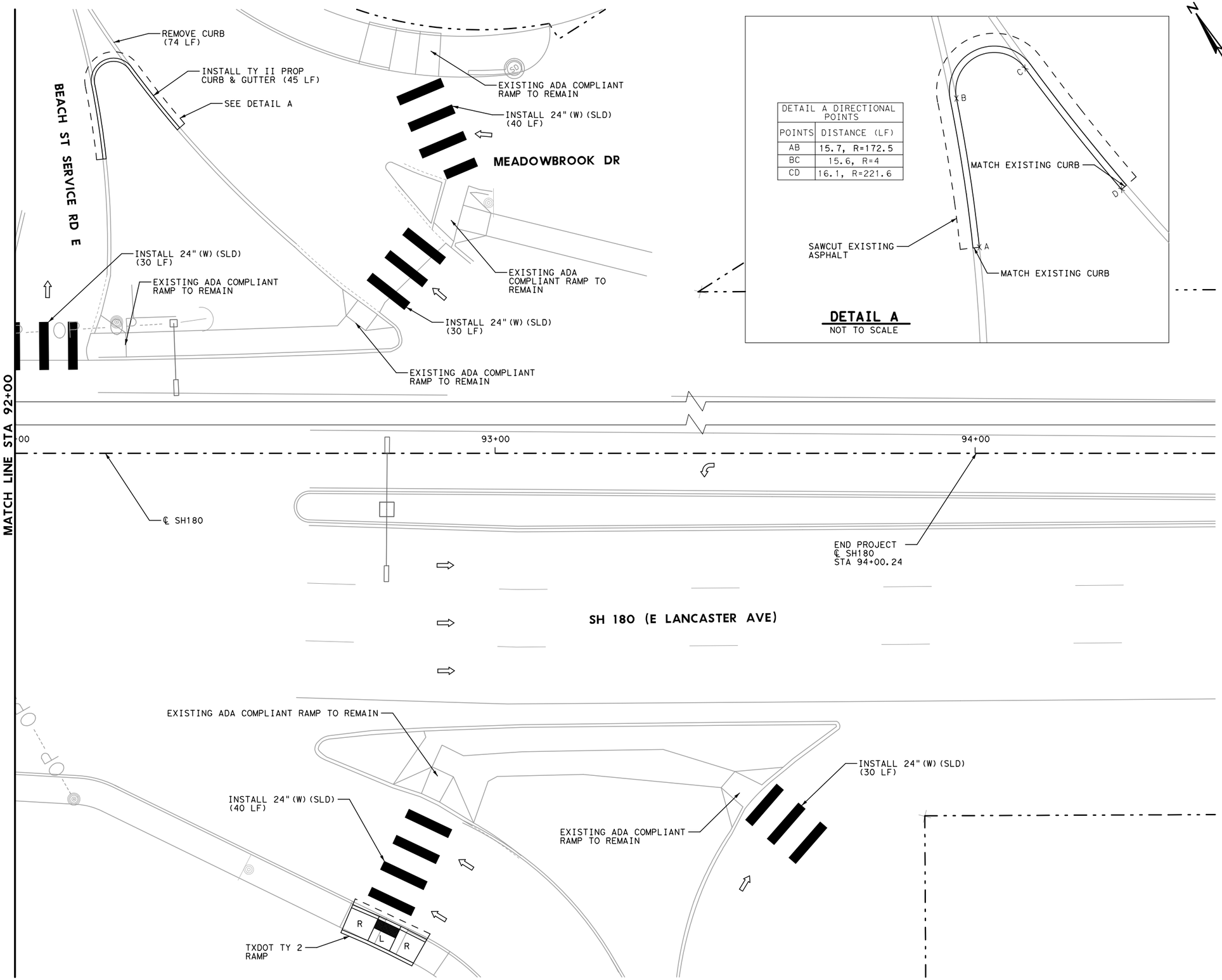
AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 29 OF 31

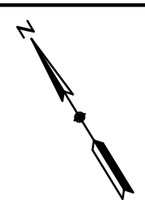
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		66



DETAIL A DIRECTIONAL POINTS	
POINTS	DISTANCE (LF)
AB	15.7, R=172.5
BC	15.6, R=4
CD	16.1, R=221.6

DETAIL A
NOT TO SCALE



0' 10' 20'
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- (1) PROPOSED SMALL SIGN NUMBER
- (1) EXISTING SIGN NUMBER (TO BE RELOCATED)
- [1] EXISTING SIGN NUMBER (TO BE REMOVED)
- (1) EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- (SD) MANHOLE
- (W) WATER METER
- WATER VALVE
- FIRE HYDRANT
- R RAMP
- L LANDING PAD
- F FLARE
- SL SLOPED PAVEMENT
- T TRANSITION
- TRAVERSABLE PATH - CROSS SLOPE MUST BE <2%

NOTES:

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2. ALL SIDEWALK SHALL MAINTAIN A CROSS SLOPE OF < OR = 1.5%.
3. CONTRACTOR TO MAINTAIN INTEGRITY OF INLET.
4. UTILITY ADJUSTMENTS SUBSIDIARY TO ITEM 531.
5. REFER TO BUILDING PROTECTION DETAILS PER EPIC FOR HISTORICAL BUILDING ON THE SOUTHWEST CORNER OF POPLAR ST.

5/25/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 30 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		67

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

DATE: 5/25/2021 6:39:43 PM
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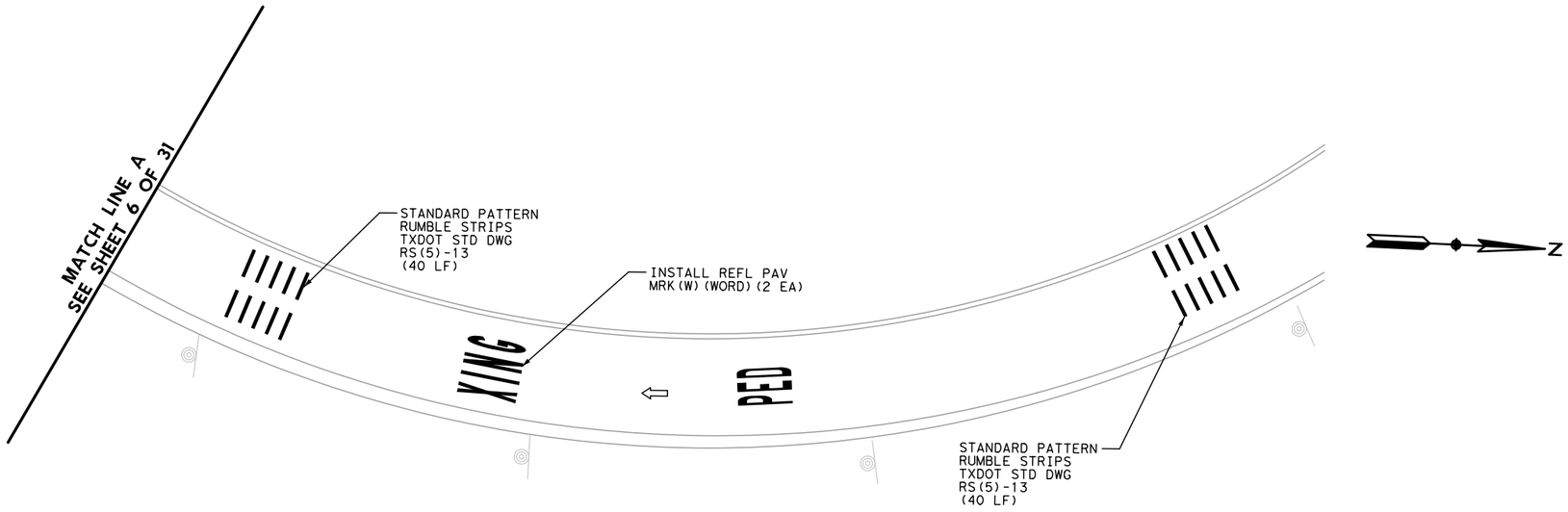

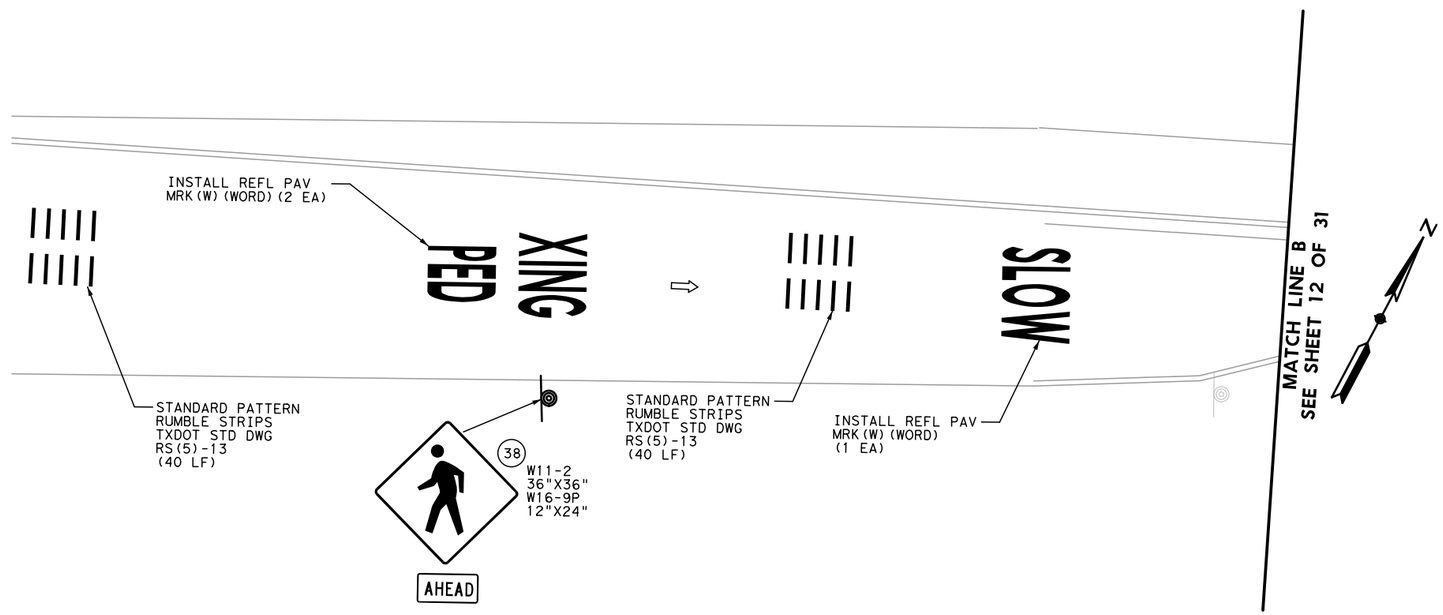

0' 10' 20'
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- PROP SIDEWALK/RAMP
- PROP FENCE
- PROP SODDING
- PROP RIPRAP
- PROP DETECTABLE WARNING SURFACE
- ASPHALT REMOVAL
- PROP ASPHALT
- SAWCUT EXISTING ASPHALT/CONCRETE
- PROP RETAINING WALL
- PROP SIGN
- (1) PROPOSED SMALL SIGN NUMBER
- 1 EXISTING SIGN NUMBER (TO BE RELOCATED)
- [1] EXISTING SIGN NUMBER (TO BE REMOVED)
- (1) EXISTING SIGN NUMBER (TO REMAIN)
- TRAFFIC FLOW
- EXISTING PEDESTRIAN ILLUMINATION
- EXISTING ROADWAY ILLUMINATION
- EXISTING ROW
- EXISTING SIGN
- OH UTILITY POLE /LIGHT POLE
- TRAFFIC CONTROL BOX
- SD MANHOLE
- W WATER METER
- WATER VALVE
- FIRE HYDRANT
- R RAMP
- L LANDING PAD
- F FLARE
- SL SLOPED PAVEMENT
- T TRANSITION
- TRAVERSABLE PATH - CROSS SLOPE MUST BE <2%

NOTES:

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2. ALL SIDEWALK SHALL MAINTAIN A CROSS SLOPE OF < OR = 1.5%.
3. CONTRACTOR TO MAINTAIN INTEGRITY OF INLET.
4. UTILITY ADJUSTMENTS SUBSIDIARY TO ITEM 531.
5. REFER TO BUILDING PROTECTION DETAILS PER EPIC FOR HISTORICAL BUILDING ON THE SOUTHWEST CORNER OF POPLAR ST.

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
7/2/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SIDEWALK PLAN

SHEET 31 OF 31

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		68

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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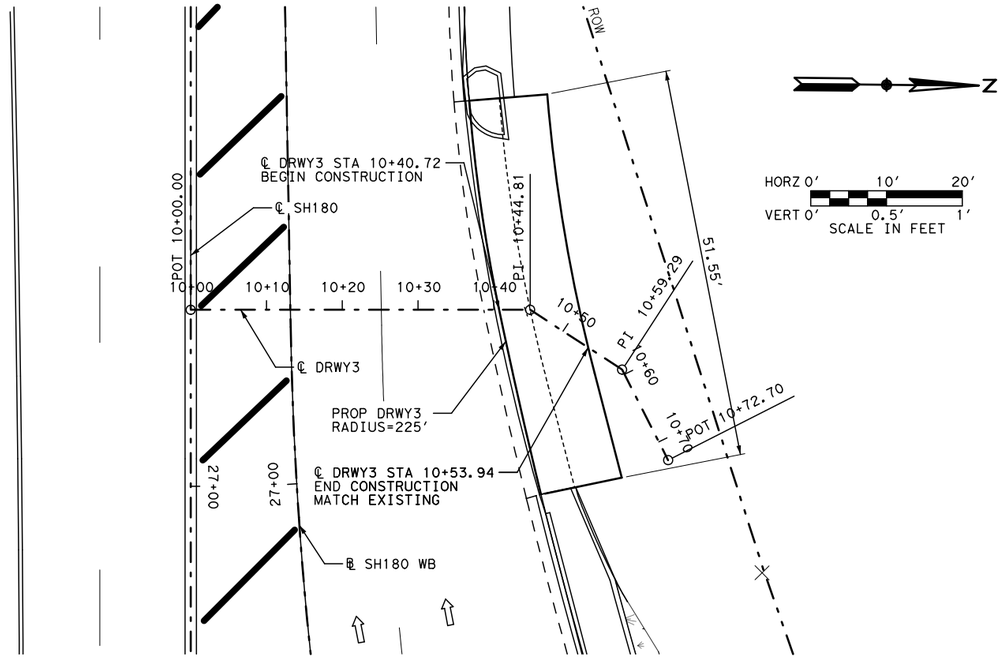
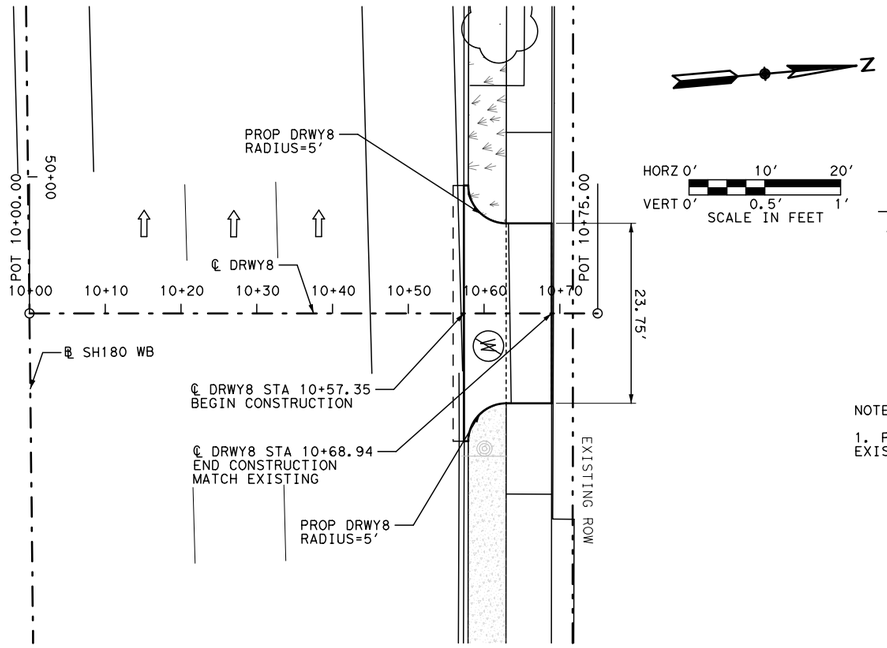


DRIVEWAY #3



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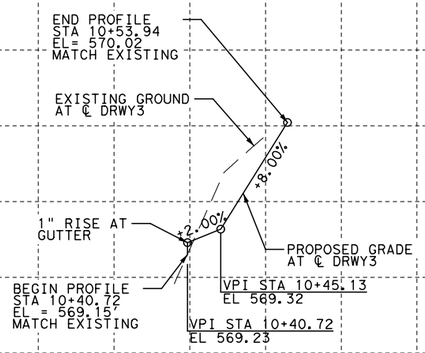

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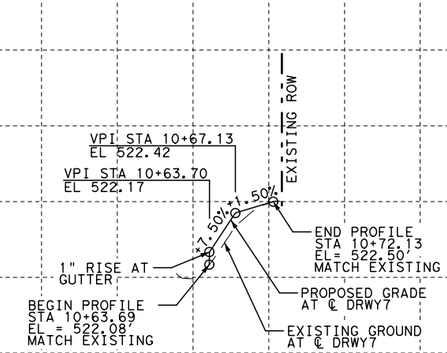

DRIVEWAY #7

CARLA VERRANDO
96560
PROFESSIONAL ENGINEER
LICENSED
STATE OF TEXAS
5/18/2021

NO.	REVISION	DATE

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Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
DRIVEWAY PLAN AND PROFILE
DRIVEWAY #3 AND #7

SHEET 1 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		69

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda
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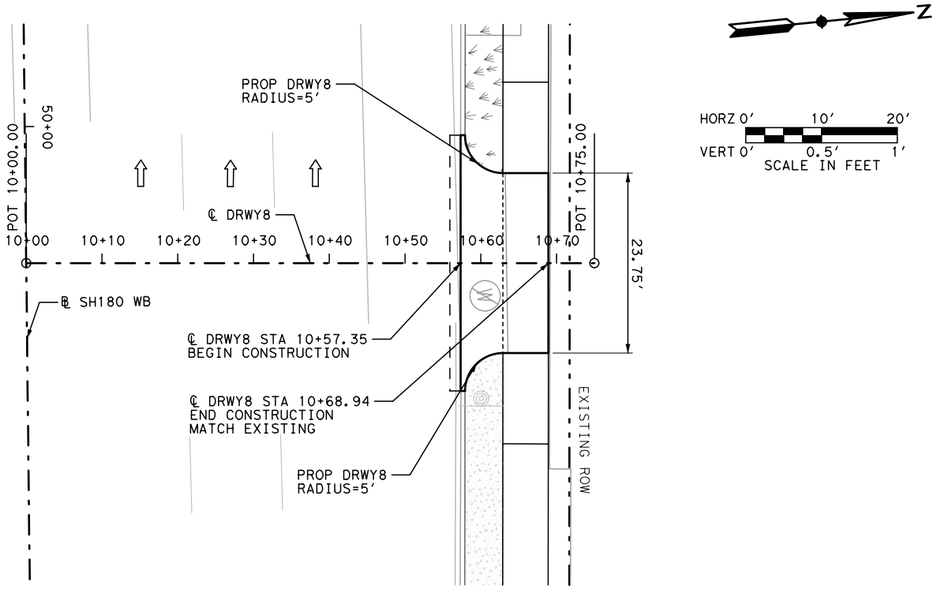

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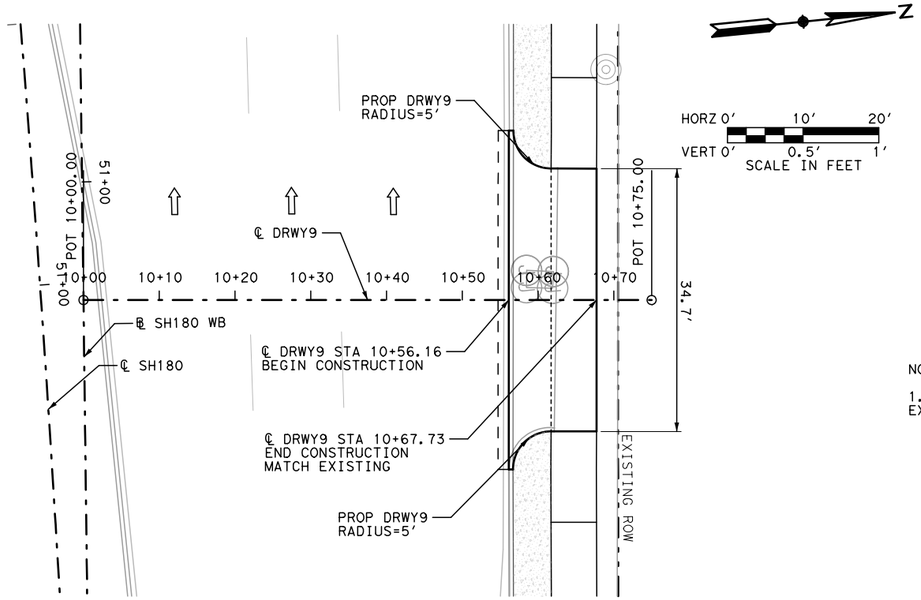


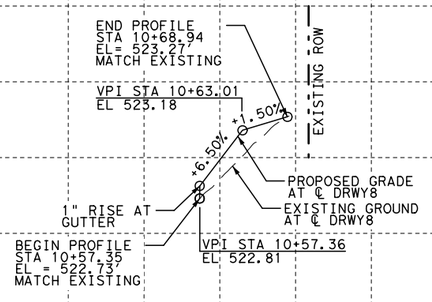
LEGEND

- - - EXISTING ROW
⇦ TRAFFIC FLOW

NOTES:

1. PROPOSED DRIVEWAY MATCH EXISTING DRIVEWAY WIDTH.

DRIVEWAY #9



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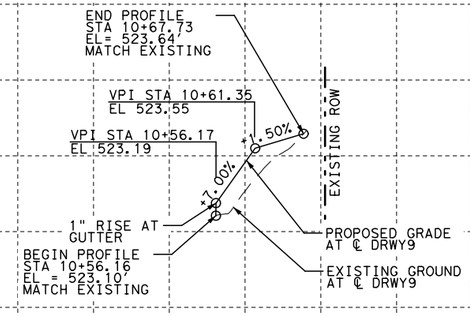

DRIVEWAY #9

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
DRIVEWAY PLAN AND PROFILE

DRIVEWAY #8 AND #9

SHEET 2 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		70

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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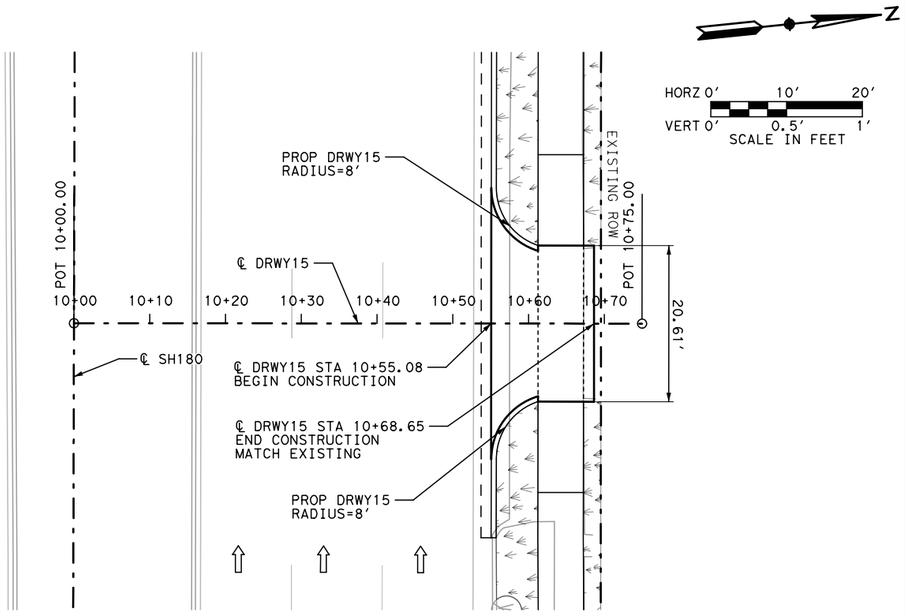

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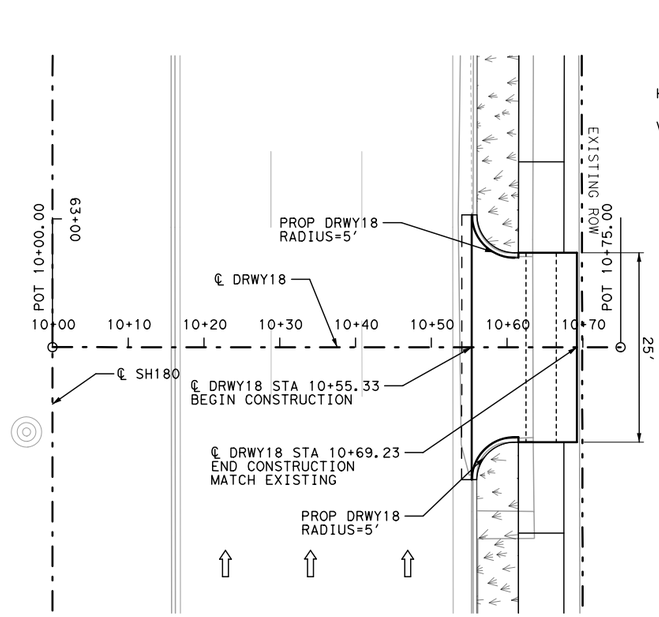


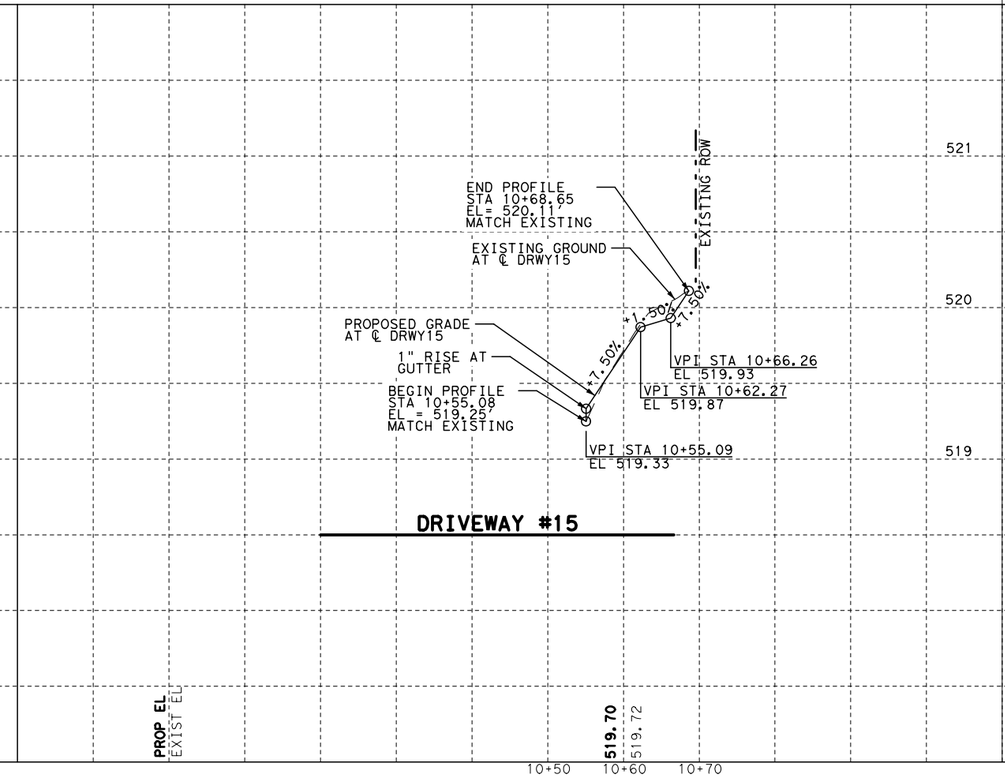
DRIVEWAY #18

LEGEND

- — - - EXISTING ROW
- ⇦ TRAFFIC FLOW

NOTES:

1. PROPOSED DRIVEWAY MATCH EXISTING DRIVEWAY WIDTH.



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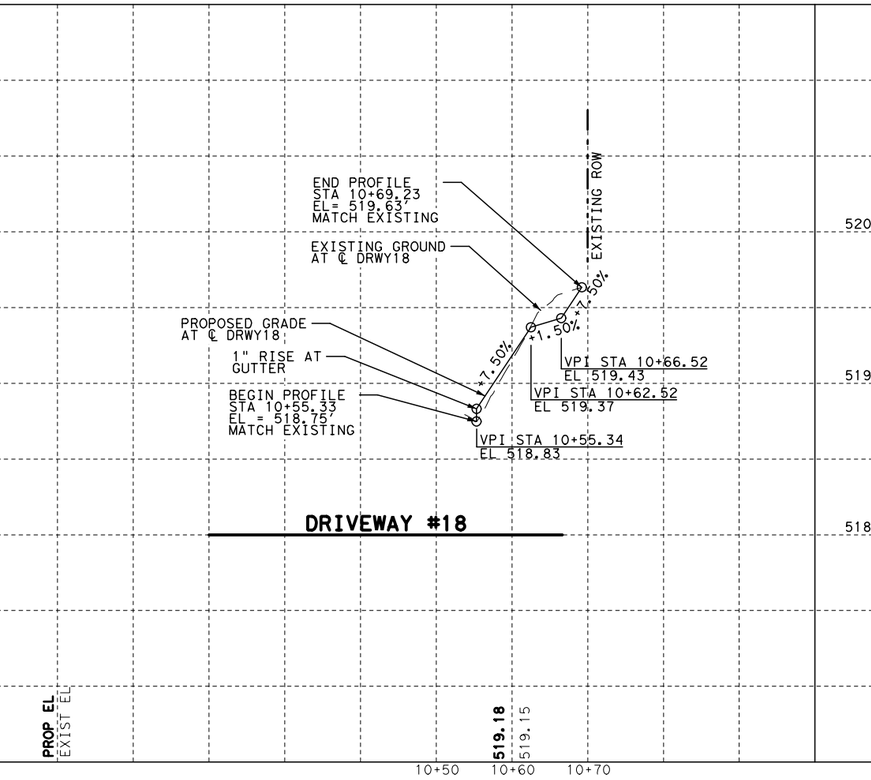

DRIVEWAY #18

CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
DRIVEWAY PLAN AND PROFILE

DRIVEWAY #15 AND #18

SHEET 3 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		71

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

DATE: 5/18/2021 5:24:39 PM
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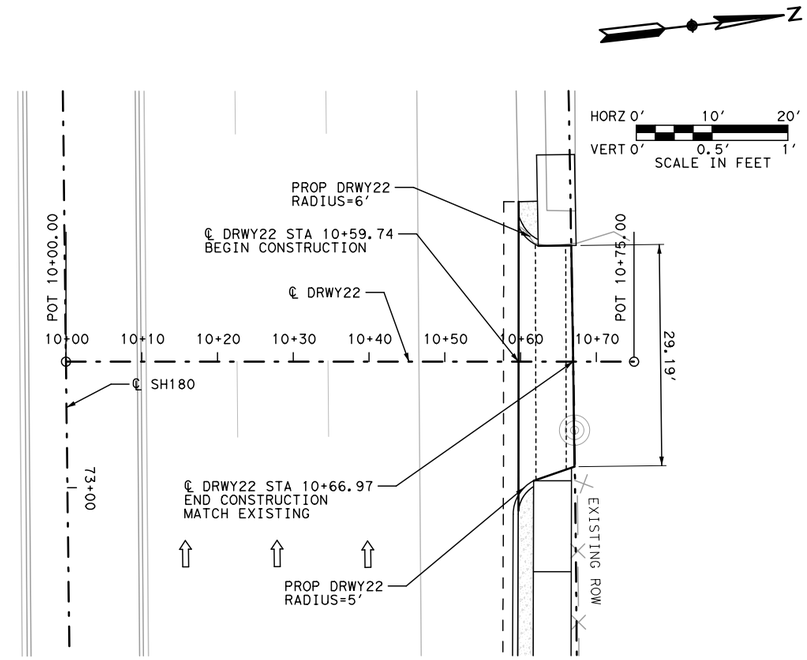

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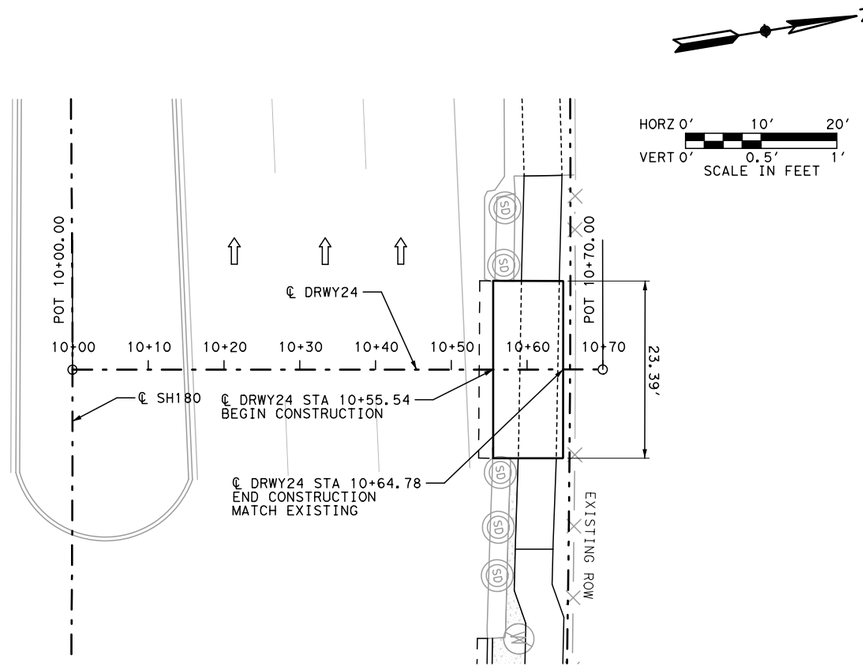


DRIVEWAY #24

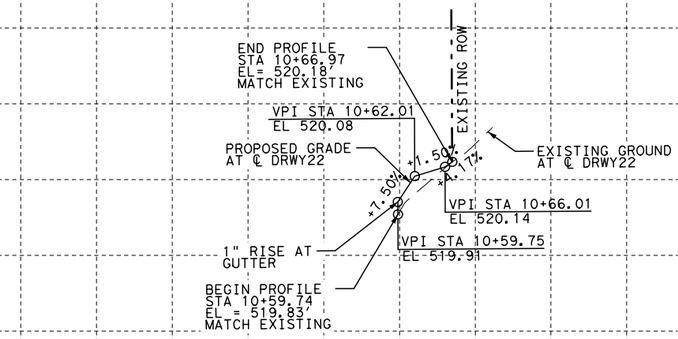
LEGEND

— - - EXISTING ROW

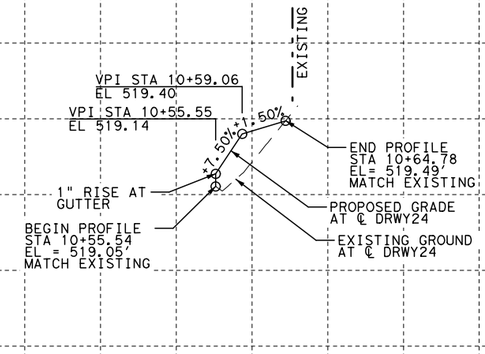
⇦ TRAFFIC FLOW

NOTES:

1. PROPOSED DRIVEWAY MATCH EXISTING DRIVEWAY WIDTH.



DRIVEWAY #22



DRIVEWAY #24

STATE OF TEXAS
CARLA VERRANDO
96560
PROFESSIONAL ENGINEER
LICENSED
5/18/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
DRIVEWAY PLAN AND PROFILE

DRIVEWAY #22 AND #24

SHEET 4 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		72

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

DATE: 5/18/2021 5:24:49 PM
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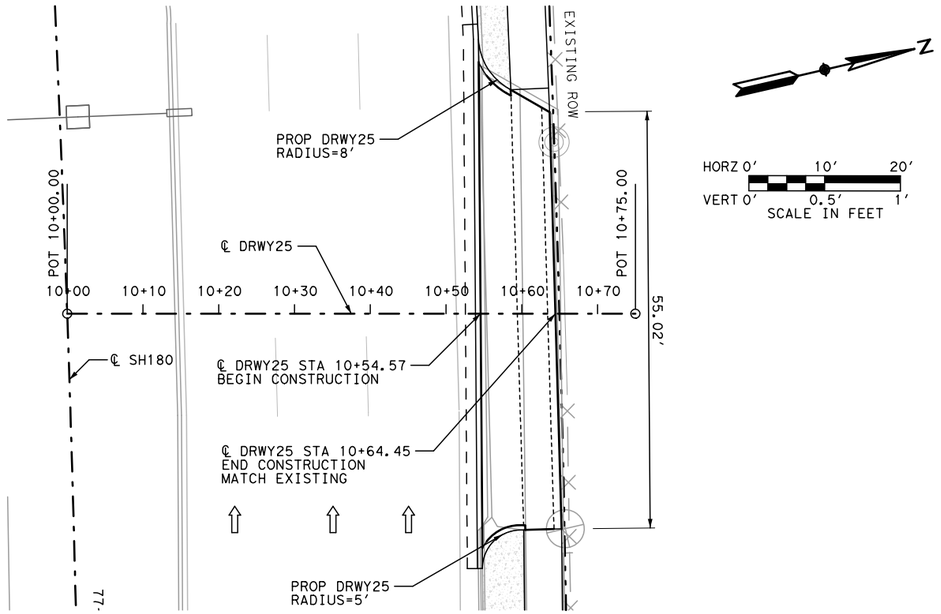
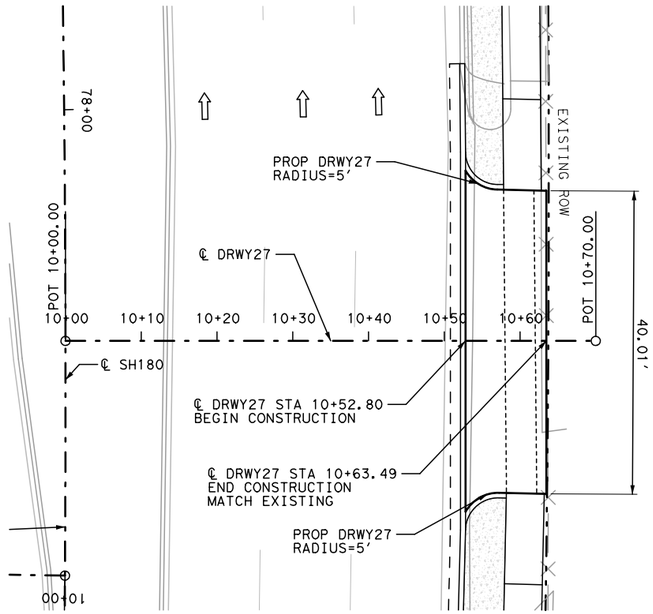
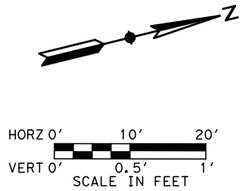


DRIVEWAY #25





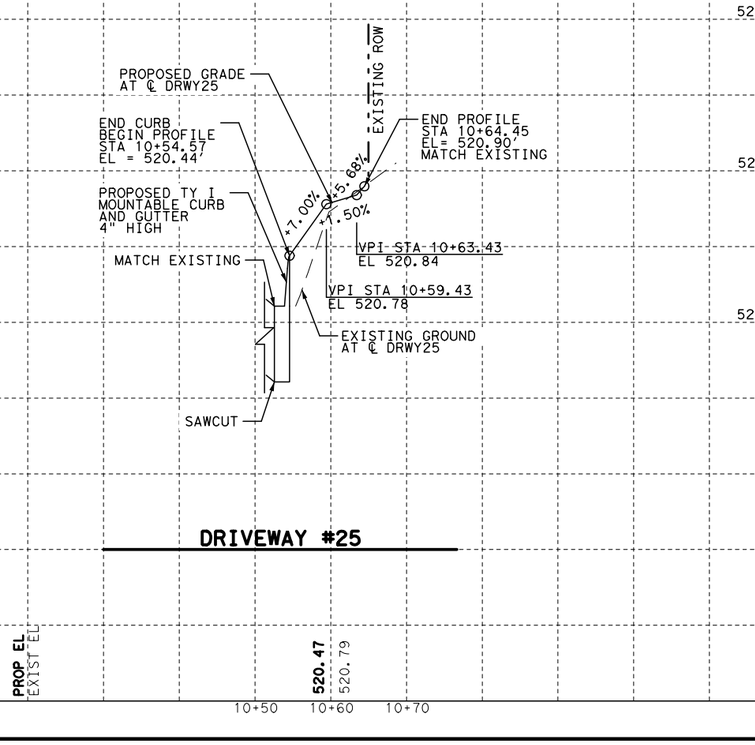
LEGEND

- - - EXISTING ROW
⇦ TRAFFIC FLOW

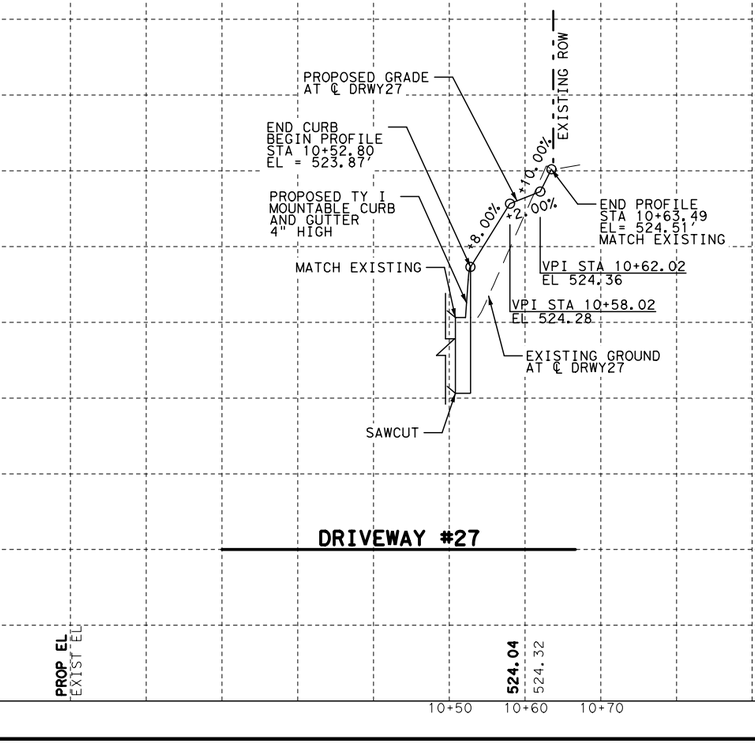
NOTES:

1. PROPOSED DRIVEWAY MATCH EXISTING DRIVEWAY WIDTH.

DRIVEWAY #27



DRIVEWAY #25



DRIVEWAY #27

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/21/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
DRIVEWAY PLAN AND PROFILE
DRIVEWAY #25 AND #27

SHEET 5 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		73

DN: AECOM | CK: AECOM | DW: AECOM | CK: AECOM Lynda

DATE: 5/21/2021 10:17:12 AM
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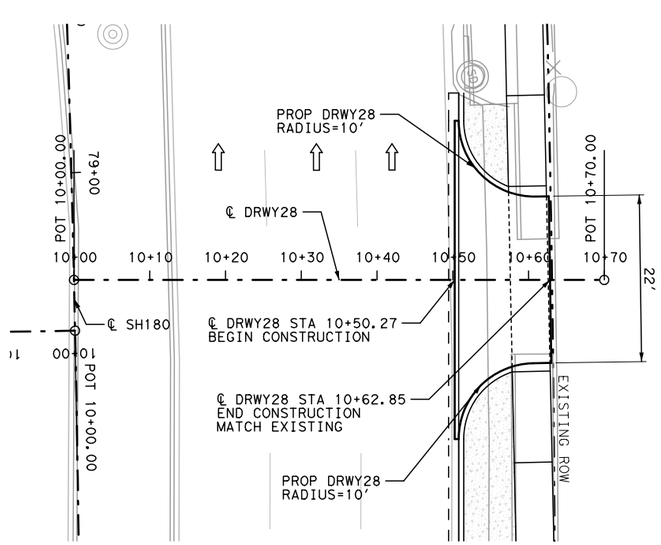
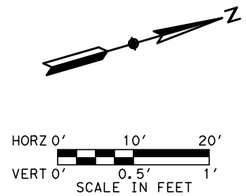
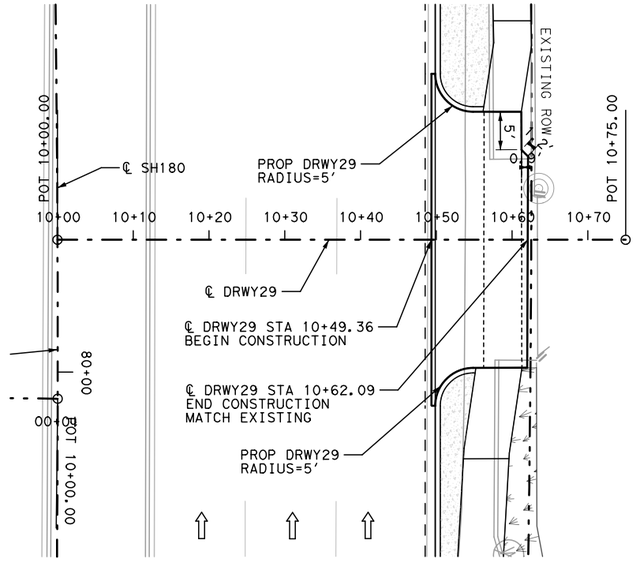
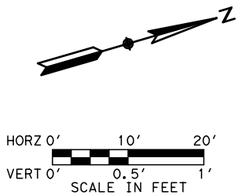




DRIVEWAY #28





LEGEND

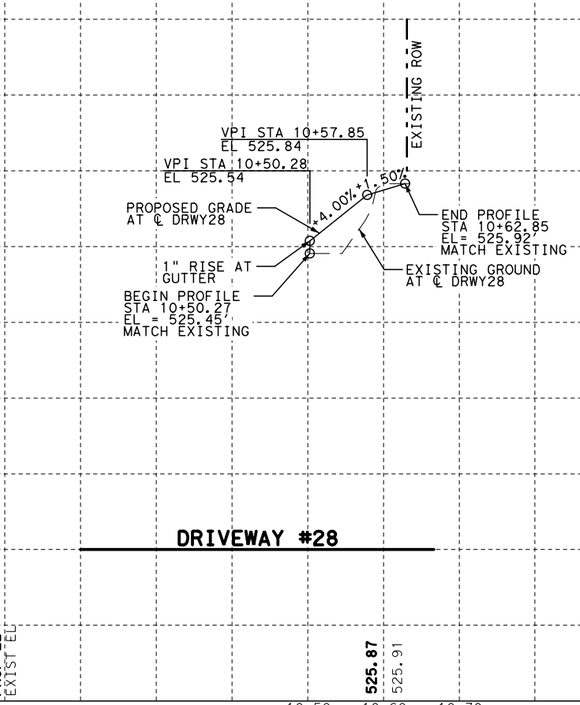
— - - EXISTING ROW

⇦ TRAFFIC FLOW

NOTES:

1. PROPOSED DRIVEWAY MATCH EXISTING DRIVEWAY WIDTH.

DRIVEWAY #29



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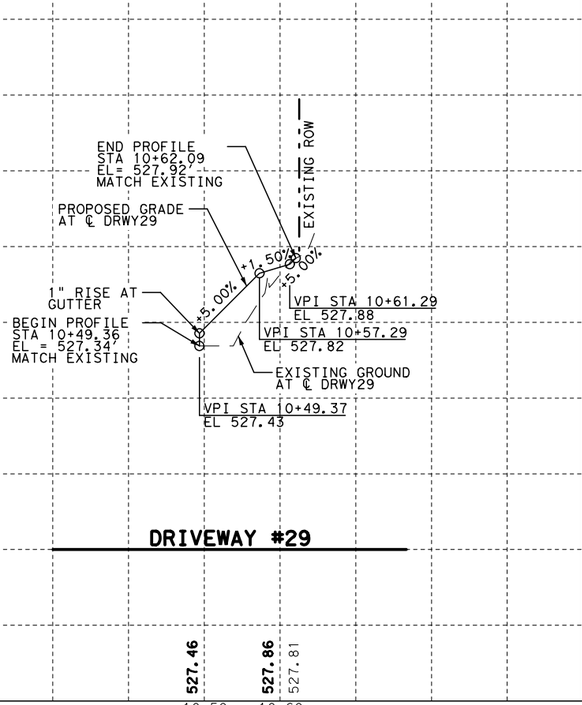

DRIVEWAY #29

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
5/18/2021

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13355 Noel Road
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(214) 741-7777

SH 180
SIDEWALK CORRIDOR
DRIVEWAY PLAN AND PROFILE
DRIVEWAY #28 AND #29

SHEET 6 OF 8

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		74

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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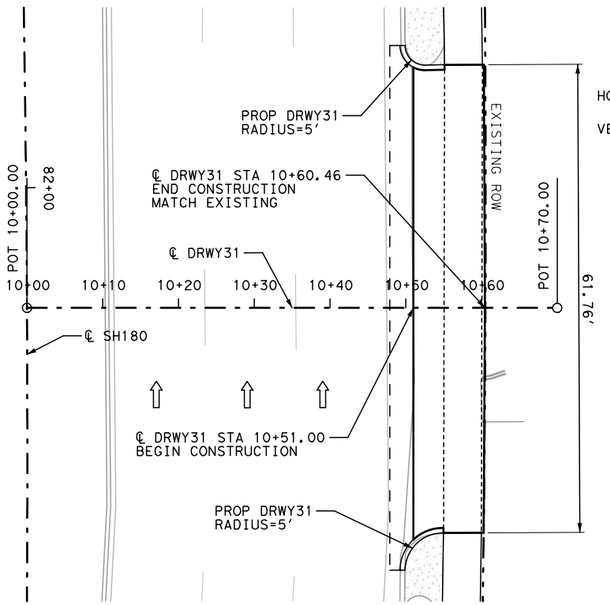
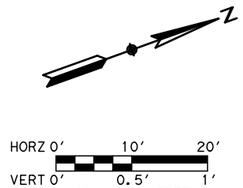
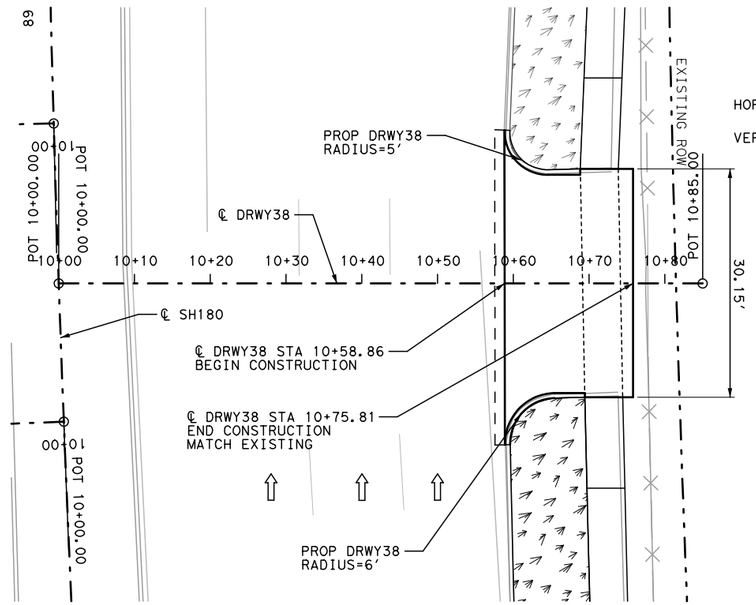
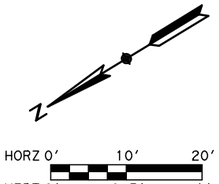




DRIVEWAY #31





LEGEND

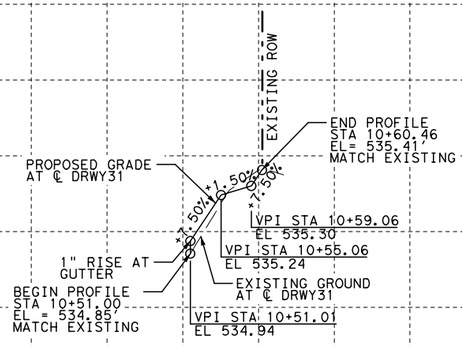
— - - EXISTING ROW

⇦ TRAFFIC FLOW

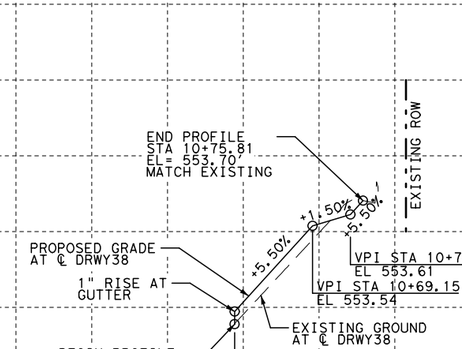
NOTES:

1. PROPOSED DRIVEWAY MATCH EXISTING DRIVEWAY WIDTH.

DRIVEWAY #38



DRIVEWAY #31



DRIVEWAY #38

CARLA VERRANDO
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STATE OF TEXAS
5/18/2021

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SH 180
SIDEWALK CORRIDOR
DRIVEWAY PLAN AND PROFILE

DRIVEWAY #31 AND #38

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		75

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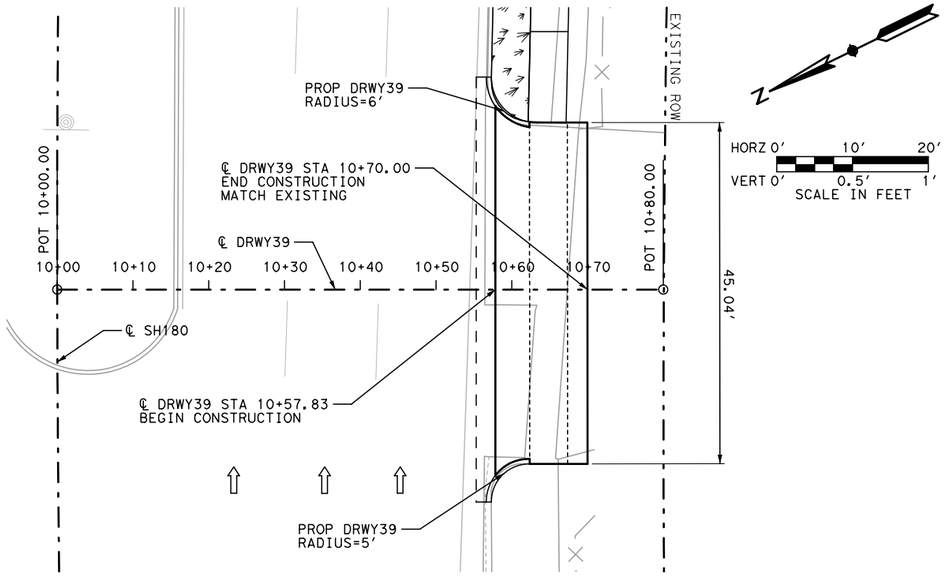
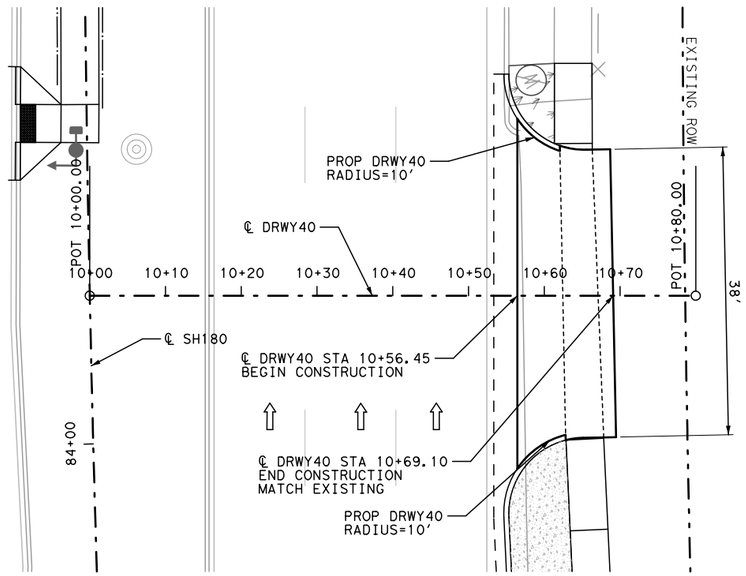


DRIVEWAY #39



LEGEND

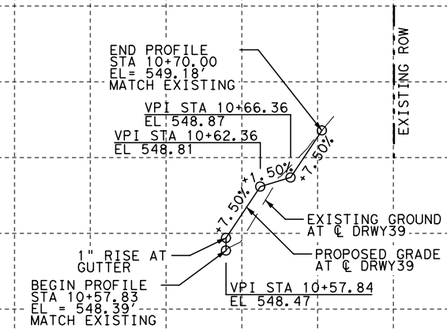
— - - EXISTING ROW

⇦ TRAFFIC FLOW

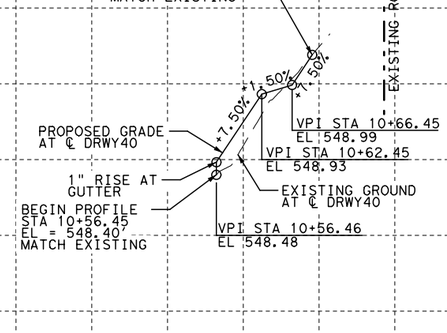
NOTES:

1. PROPOSED DRIVEWAY MATCH EXISTING DRIVEWAY WIDTH.

DRIVEWAY #40



DRIVEWAY #39



DRIVEWAY #40

STATE OF TEXAS
CARLA VERRANDO
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LICENSED PROFESSIONAL ENGINEER
5/18/2021

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SH 180
SIDEWALK CORRIDOR
DRIVEWAY PLAN AND PROFILE
DRIVEWAY #39 AND #40

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		76

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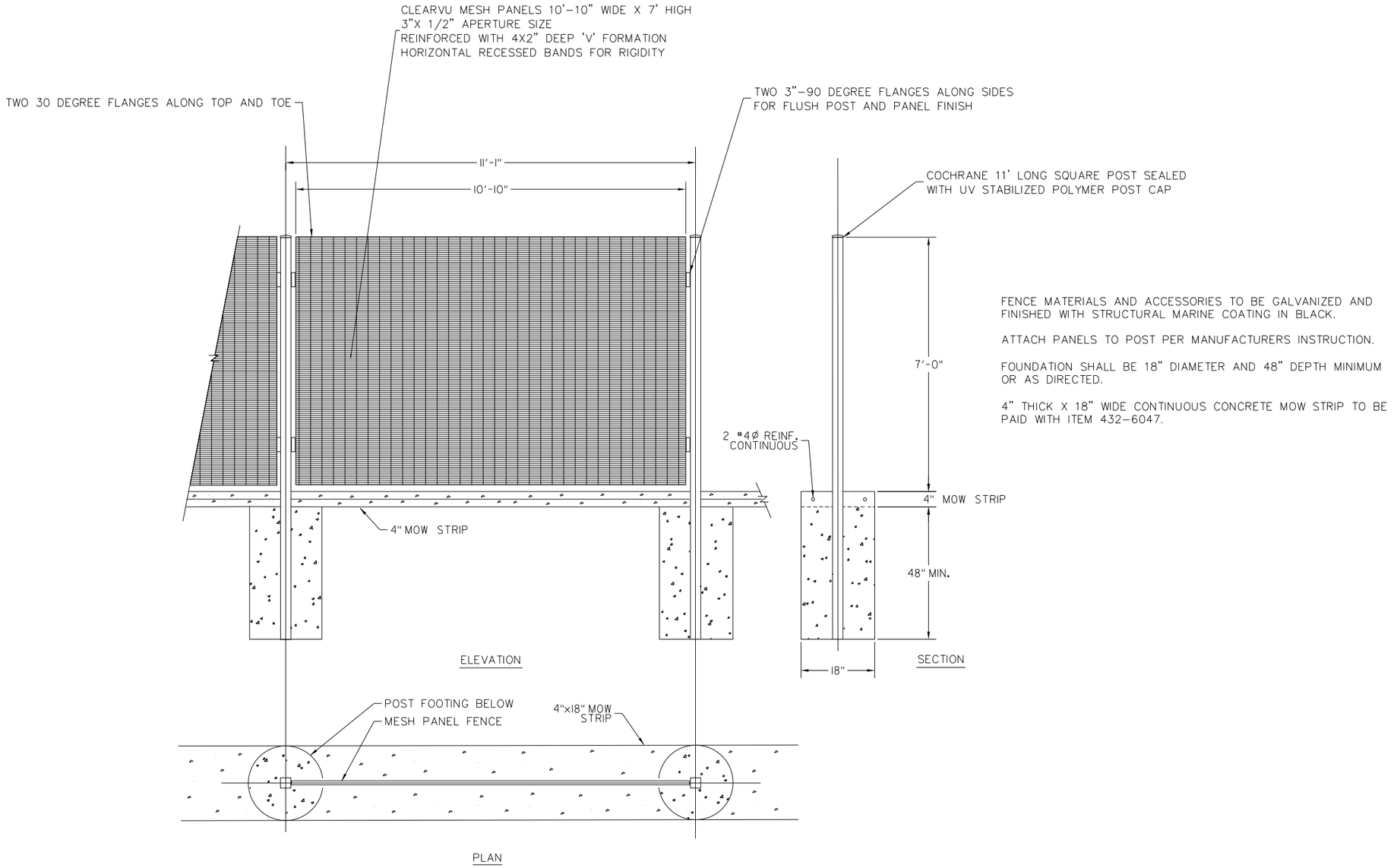


FENCE MATERIALS AND ACCESSORIES TO BE GALVANIZED AND FINISHED WITH STRUCTURAL MARINE COATING IN BLACK.

ATTACH PANELS TO POST PER MANUFACTURERS INSTRUCTION.

FOUNDATION SHALL BE 18" DIAMETER AND 48" DEPTH MINIMUM OR AS DIRECTED.

4" THICK X 18" WIDE CONTINUOUS CONCRETE MOW STRIP TO BE PAID WITH ITEM 432-6047.

SH 180 SIDEWALK CORRIDOR

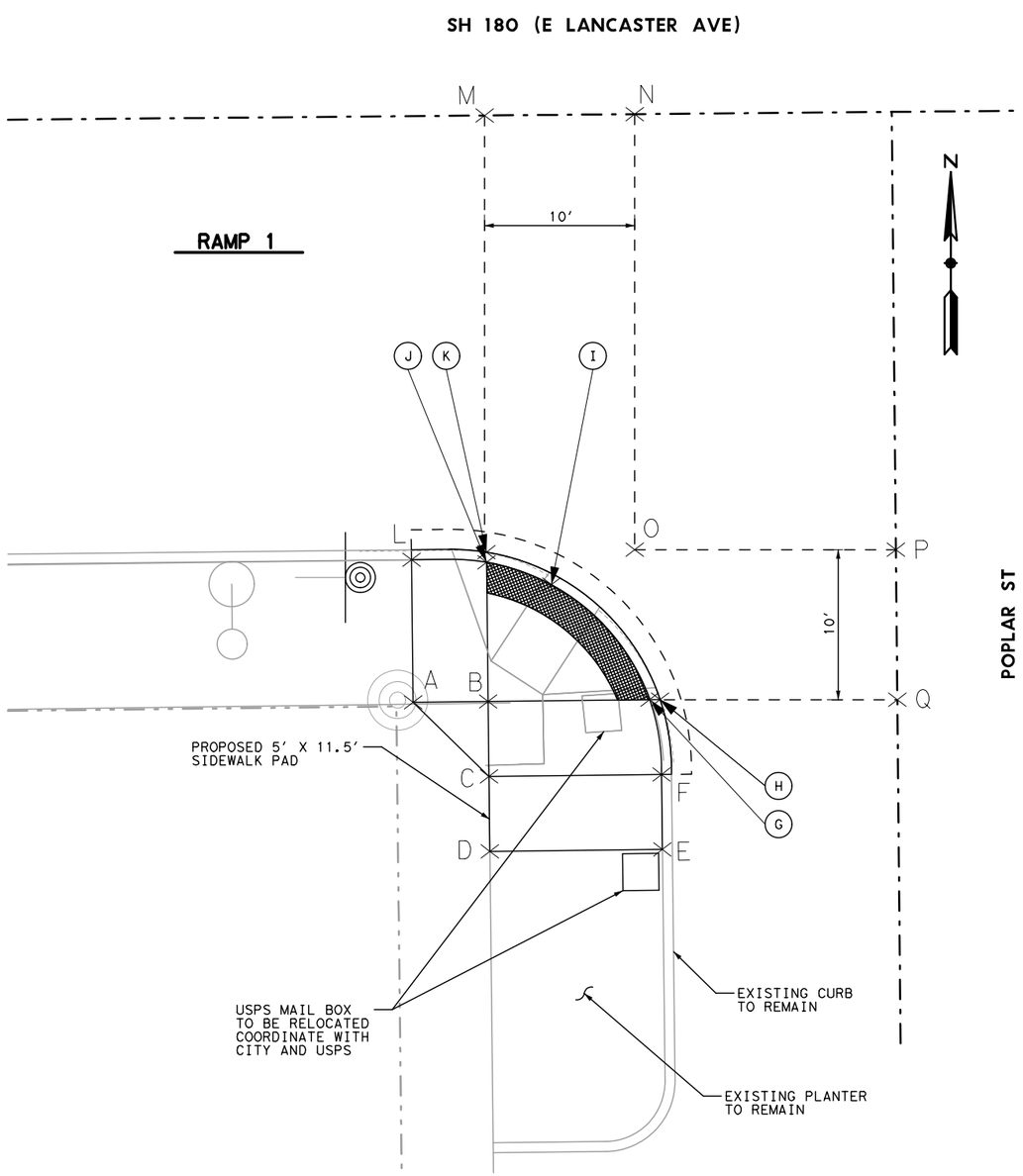
CLEARVU FENCE DETAILS

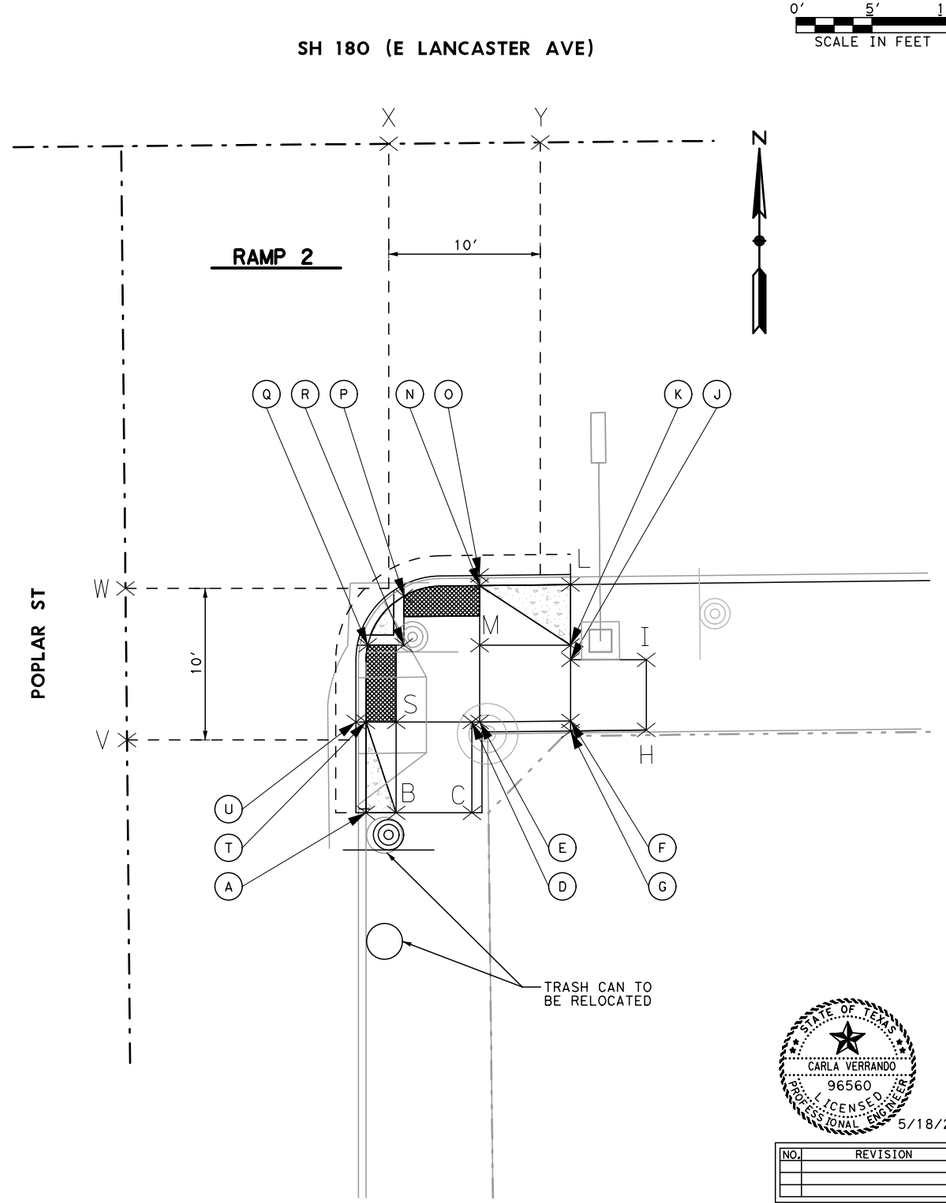
SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
02	TARRANT		77

DATE:
FILE:





0' 5' 10'
SCALE IN FEET

RAMP 1

POINTS	AB	AC	AL	BC	BG	BI	BJ	CD	CF	DE	EF	FG	GH	GJ	HK	HO	HQ	JK	JL	KM	KO	MN	NO	PQ
DISTANCE (LF)	5.0	7.1	10.2	5.0	10.8	8.9	9.3	5.0	11.5	11.5	5.0	5.0	0.7	14.2, R=14.0	15.2, R=14.7	10.1	15.8	0.7	5.1	29.1	9.9	10.0	29.0	10.0
SLOPE	-1.3%	+2.3%	-0.1%	+4.6%	-1.3%	-1.4%	-1.5%	+1.9%	-0.1%	-0.1%	-1.9%	-7.1%	-2.0%	0.0%	+0.0%	-1.2%	+5.7%	-2.0%	+3.7%	+3.9%	-1.3%	-0.1%	-4.3%	+0.5%

RAMP 2

POINTS	AB	BC	BS	CD	DE	DS	EF	EM	FG	FJ	GH	FG	GH	HI	IJ	JK	KL	KM	LN	MN	MR	MN	NO	NP	PQ	QR	RS	ST	TU	VW	XY
DISTANCE (LF)	2.0	5.0	6.0	6.0	0.5	5.0	6.0	5.1	0.7	4.0	5.0	5.0	0.7	4.6	5.0	1.0	4.0	6.0	6.0	3.9	5.0	10.0	0.7	5.0	4.0, R=4.8	2.4	5.1	2.0	0.7	10.0	10.0
SLOPE	+1.6%	+1.6%	-7.4%	-7.1%	+2.0%	-2.0%	+4.8%	-2.0%	+1.5%	-1.5%	-0.0%	-7.1%	-2.0%	-1.5%	0.0%	-1.5%	+2.1%	-5.2%	-7.9%	-2.0%	-0.6%	-0.1%	-2.0%	+1.1%	-0.4%	+0.6%	+0.4%	-2.0%	-2.0%	-0.5%	+23.3%

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
MISCELLANEOUS CONSTRUCTION DETAILS
PEDESTRIAN RAMP DETAILS

SHEET 1 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		78

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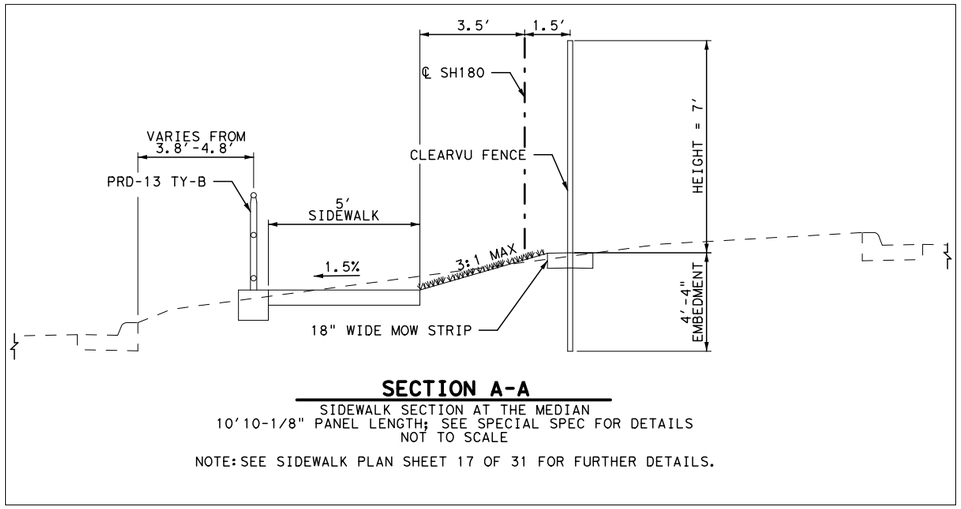
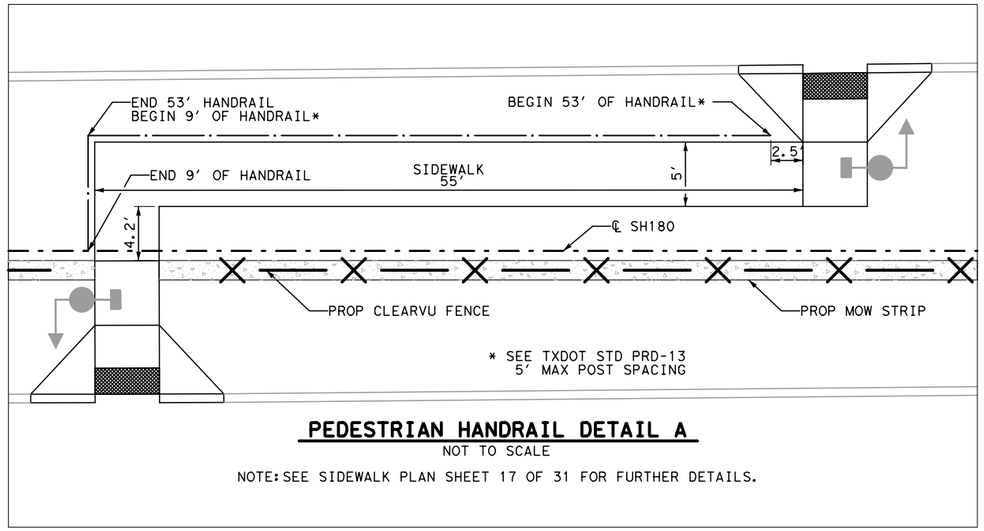


SECTION A-A

SIDEWALK SECTION AT THE MEDIAN
10'10-1/8" PANEL LENGTH; SEE SPECIAL SPEC FOR DETAILS
NOT TO SCALE

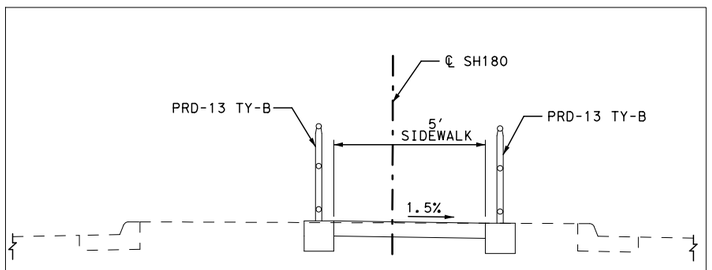
NOTE: SEE SIDEWALK PLAN SHEET 17 OF 31 FOR FURTHER DETAILS.



PEDESTRIAN HANDRAIL DETAIL A

NOT TO SCALE

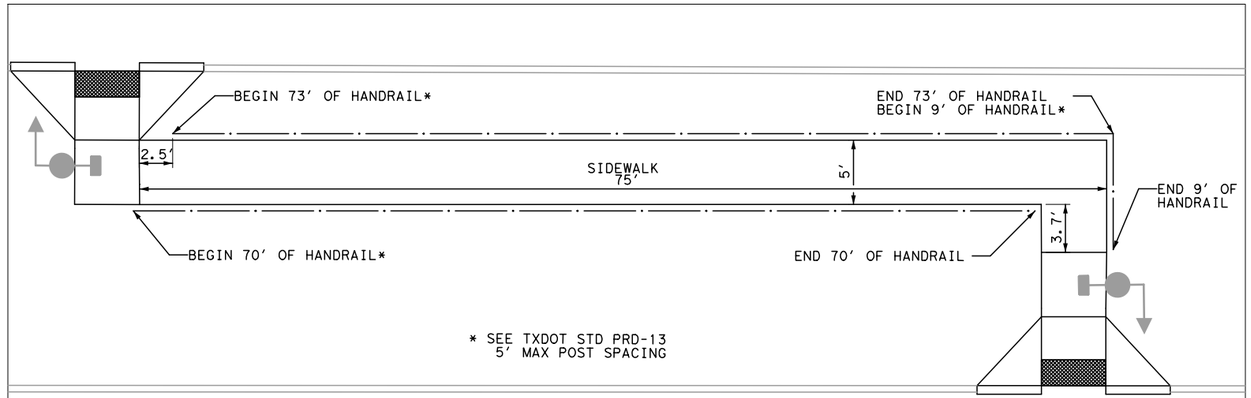
NOTE: SEE SIDEWALK PLAN SHEET 17 OF 31 FOR FURTHER DETAILS.



SECTION A-A

SIDEWALK SECTION AT THE MEDIAN
NOT TO SCALE

NOTE: SEE SIDEWALK PLAN SHEET 27 OF 31 FOR FURTHER DETAILS.



PEDESTRIAN HANDRAIL DETAIL B

NOT TO SCALE

NOTE: SEE SIDEWALK PLAN SHEET 27 OF 31 FOR FURTHER DETAILS.

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
6/8/2021

NO.	REVISION	DATE

AECOM
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13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
MISCELLANEOUS CONSTRUCTION DETAILS
PEDESTRIAN HANDRAIL DETAILS

SHEET 2 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		79

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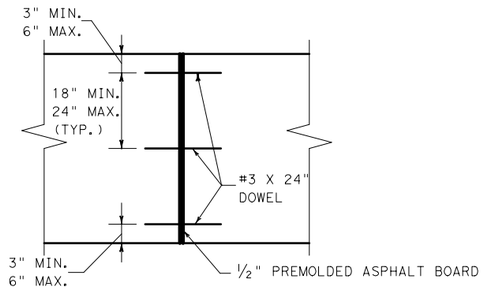
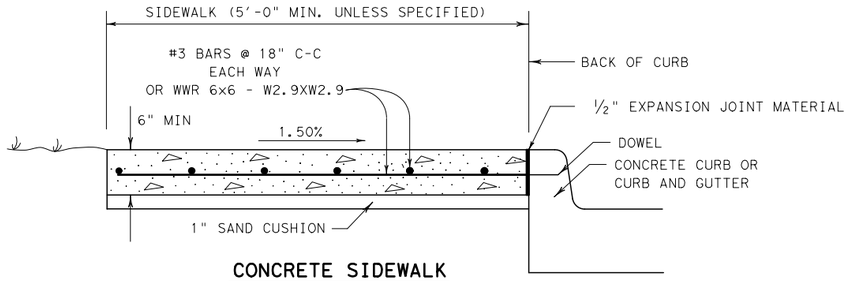
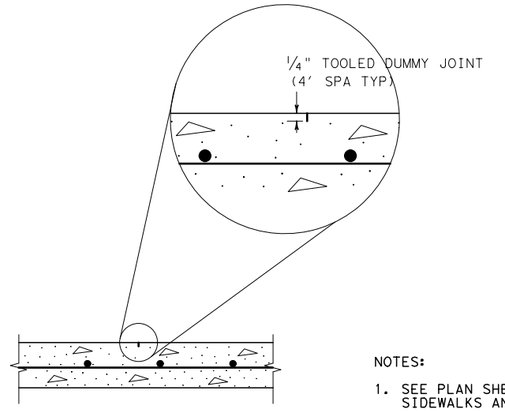


TRANSVERSE EXPANSION JOINT
NOT TO SCALE



CONCRETE SIDEWALK
(ADJACENT TO CURB)

CONCRETE SIDEWALK DETAIL
NOT TO SCALE



SECTION CONTROL JOINT
NOT TO SCALE

NOTES:

1. SEE PLAN SHEETS FOR LOCATIONS OF SIDEWALKS AND RETAINING WALLS.
2. EXPANSION JOINT TO BE PLACED AT THE END OF EACH CURB RADIUS AND SPACED AT A MAXIMUM DISTANCE OF 40'. MAXIMUM SPACING FOR CONTROL JOINTS SHALL BE 5'.

NO.	REVISION	DATE

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SH 180
SIDEWALK CORRIDOR
MISCELLANEOUS CONSTRUCTION DETAILS

SHEET 3 OF 6

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		80

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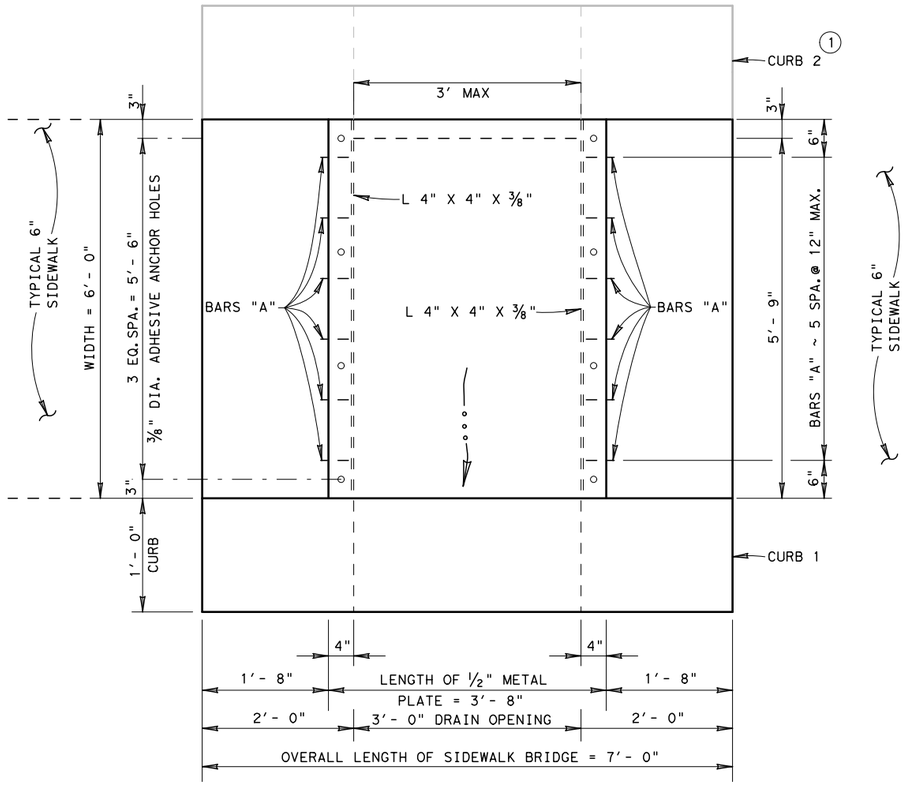
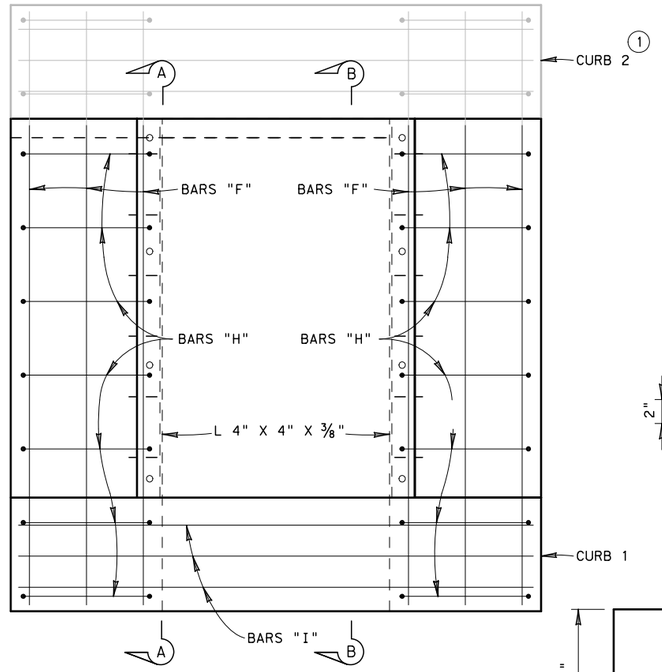
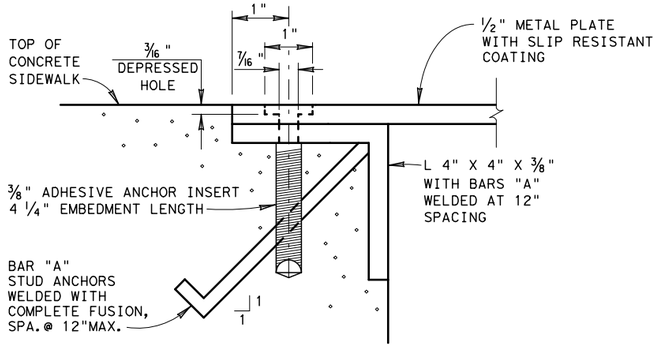


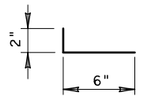
PLAN VIEW



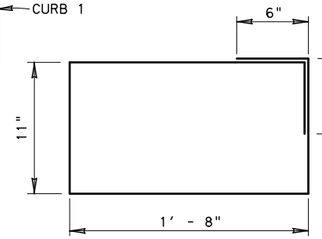
PLAN VIEW
(SHOWING REINF. STEEL)



DETAIL "A"
REFER TO GENERAL NOTES
FOR ANCHOR SPECIFICATIONS



BARS A



BARS H

(1) SEE PLANS FOR LOCATION OF CURB 2. SEE CURB 1 DETAILS FOR REINFORCE AND ADDITIONAL INFO

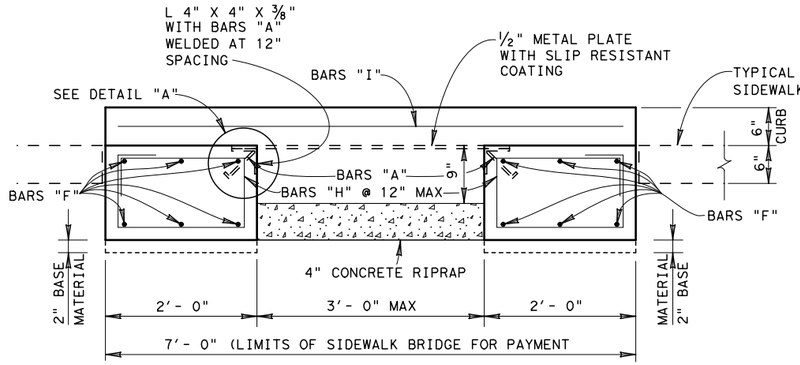
✳ TABLE OF ESTIMATED QUANTITIES FOR ONE SIDEWALK BRIDGE

BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#4	8"	5
F	12	#4	6'-3"	33
H	14	#4	6'-2"	51
I	3	#5	13'-9"	58
REINFORCING STEEL			LB	XXX
CL A CONC.			CY	X.X

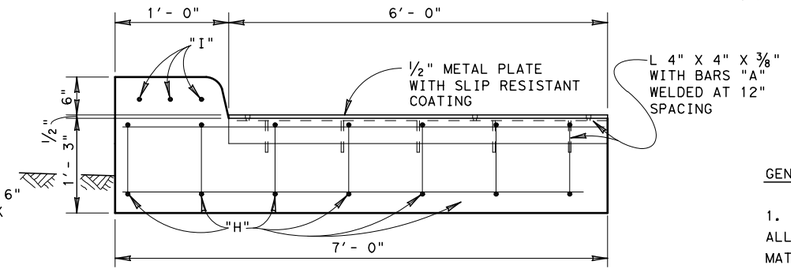
✳ STRUCTURAL STEEL FOR ONE SIDEWALK BRIDGE

FLOOR PLATE 1~5'X 1/2"X 3'-8"	LB	394
2 ~ 5 FT - L 4" X 4" X 3/8"	LB	98
TOTAL WT.	LB	492

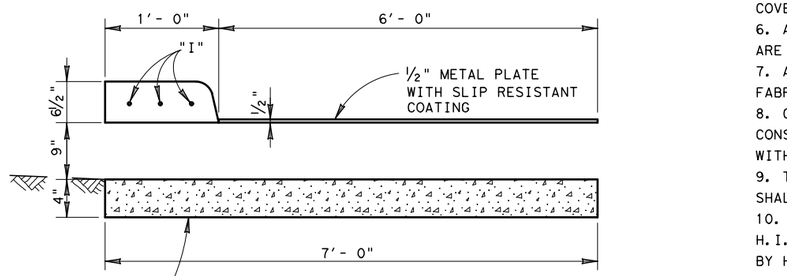
✳FOR CONTRACTORS INFORMATION ONLY



ELEVATION VIEW



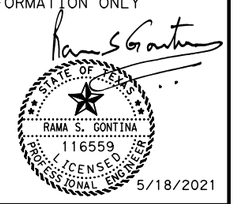
SECTION A-A



SECTION B-B

GENERAL NOTES

1. IT IS THE CONTRACTORS RESPONSIBILITY TO VERIFY ALL DIMENSIONS IN THE FIELD PRIOR TO ORDERING MATERIAL.
2. ALL CONCRETE SHALL BE CL. "A"
3. STRUCTURAL STEEL SHALL BE GRADE A36
4. ALL REINFORCING STEEL SHALL BE GRADE 60.
5. ALL REINFORCING STEEL SHALL HAVE A MINIMUM COVER OF 2 IN
6. ALL DIMENSIONS RELATING TO REINFORCING STEEL ARE OUT TO OUT OF BARS.
7. ALL METAL COMPONENTS SHALL BE GALVANIZED AFTER FABRICATION.
8. GALVANIZING DAMAGED DURING TRANSPORT OR CONSTRUCTION SHALL BE REPAIRED IN ACCORDANCE WITH THE SPECIFICATIONS.
9. THE SLIP RESISTANT COATING ON THE METAL PLATE SHALL BE AS APPROVED BY THE ENGINEER.
10. ADHESIVE ANCHOR SYSTEM SHALL BE HIT HY 150 H.I.S. INTERNALLY THREADED INSERTS, AS FURNISHED BY HILTI, INC. TULSA, OK. OR EQUIVALENT.
11. SIDEWALK BRIDGE, INCLUDING ALL LABOR, ARMOR CURB, AND ALL OTHER MATERIAL COMPLETE AND IN PLACE, SHALL BE PAID FOR UNDER ITEM 531, "CONC SIDEWALKS (SPECIAL)(TYPE A)" BY EACH LOCATION.



NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
MISCELLANEOUS CONSTRUCTION DETAILS
SIDEWALK TY-A BRIDGE INLET

SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		81

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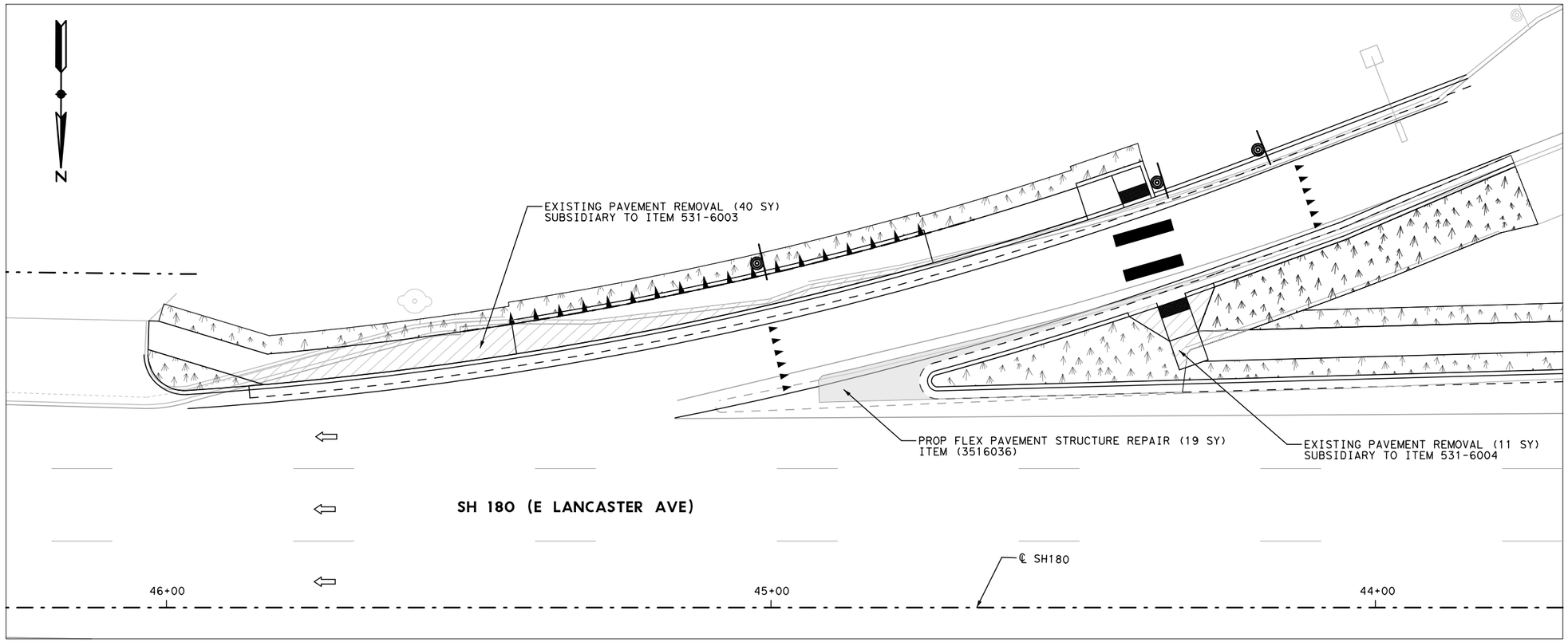
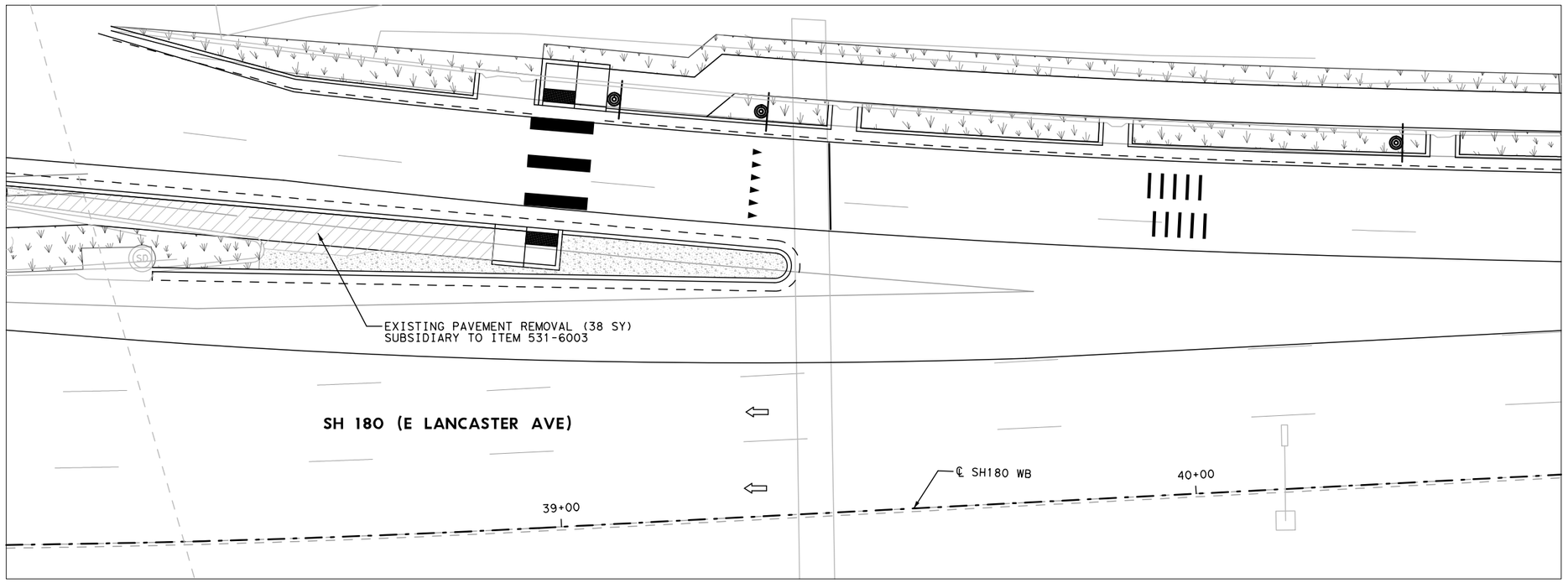


NOT TO SCALE

LEGEND

- PROP FLEX PAVEMENT STRUCTURE REPAIR
- PROP RIPRAP
- PROP SODDING
- EXISTING PAVEMENT REMOVAL SUBSIDIARY TO ITEM 531-XXXX



STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc, F-3580
13355 Noel Road
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Dallas, Texas 75240
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SH 180
SIDEWALK CORRIDOR
MISCELLANEOUS CONSTRUCTION DETAILS

SHEET 5 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		82

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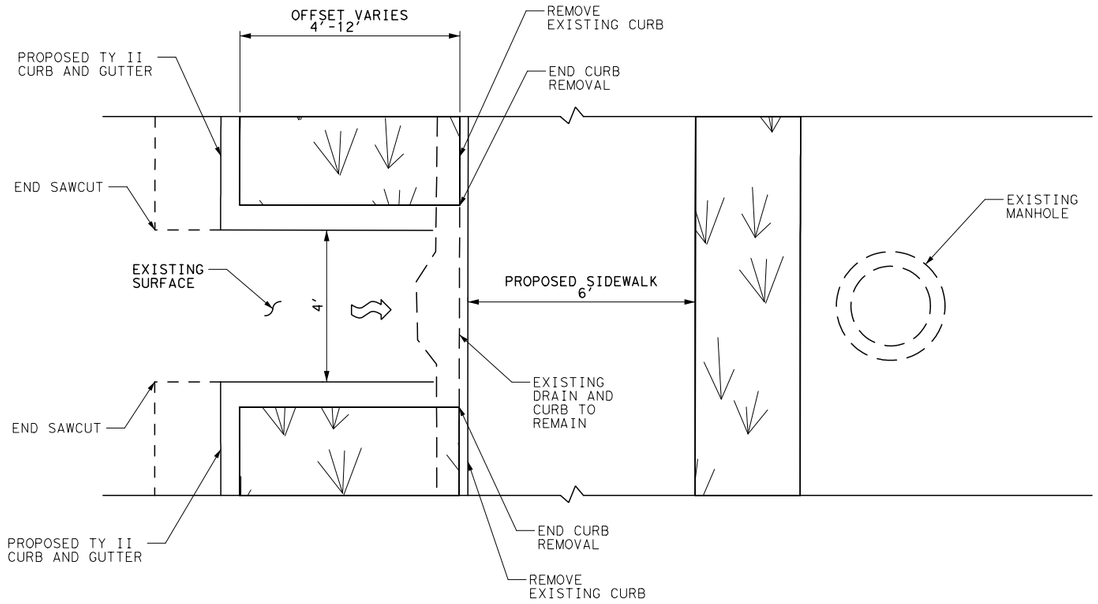
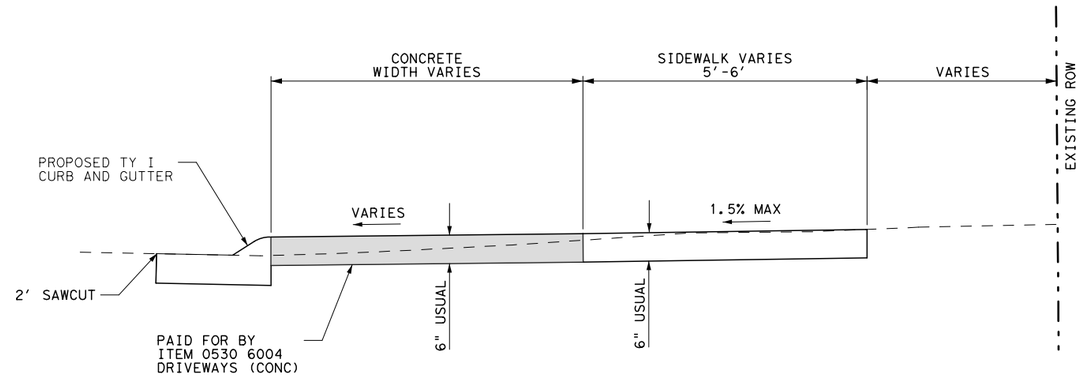


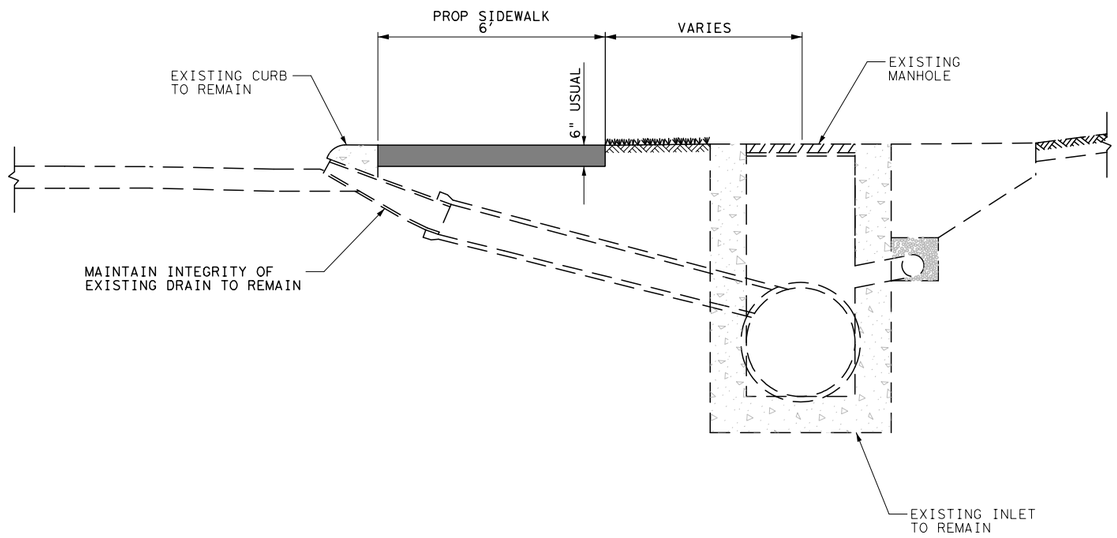
FLUME AND EXISTING INLET PLAN DETAIL

NOT TO SCALE



DRIVEWAY CONCRETE DETAIL

NOT TO SCALE



FLUME AND EXISTING INLET ELEVATION DETAIL

NOT TO SCALE

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
5/19/2021

NO.	REVISION	DATE

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SH 180
SIDEWALK CORRIDOR
MISCELLANEOUS CONSTRUCTION DETAILS

SHEET 6 OF 6

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		83

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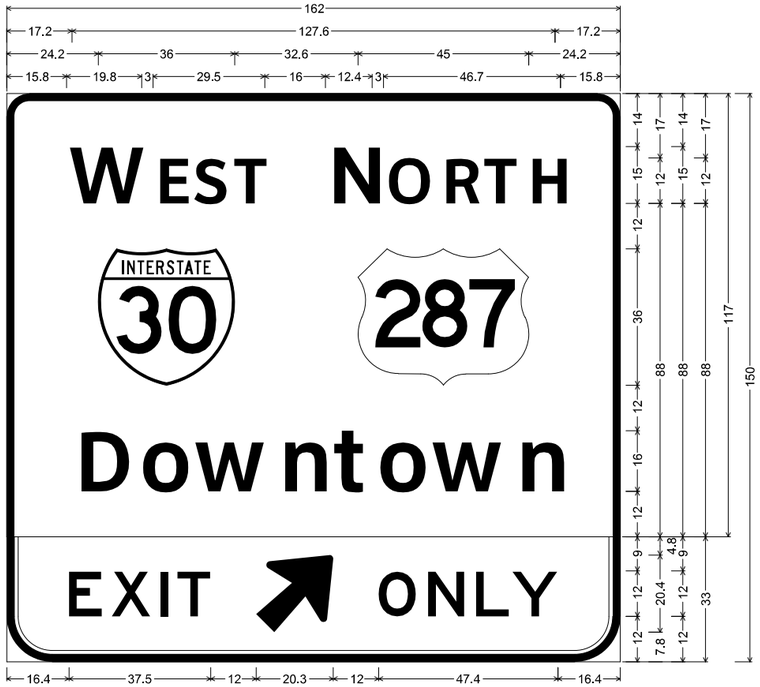

E11-1TR_VARxVAR;

6.0" Radius, 2.0" Border, White on, Green;
"W EST", ClearviewHwy-5-W-R; "N ORTH", ClearviewHwy-5-W-R; Interstate 30 M1-1;
"Downtown", ClearviewHwy-5-W-R;

1.0" Inner border Green, 12.0" Radius, 2.0" Outer border, White on, Yellow;
"EXIT" Black, E; Arrow B-3 - 25.0" 45' Black; "ONLY" Black, E;

SIDEWALK PLAN, SHEET 10 OF 31

NOTES:

1. ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED.

STATE OF TEXAS
AMBER HECKMANN
123567
LICENSED
PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
LARGE SIGN DETAILS

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		84

DN: AECOM | CK: AECOM | DW: AECOM | CK: AECOM Lynda
DATE: 5/18/2021 5:26:08 PM
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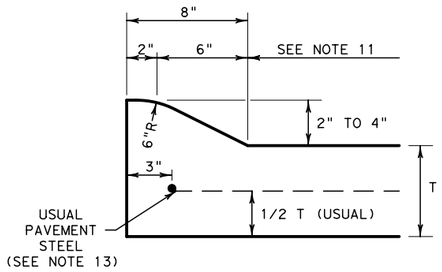
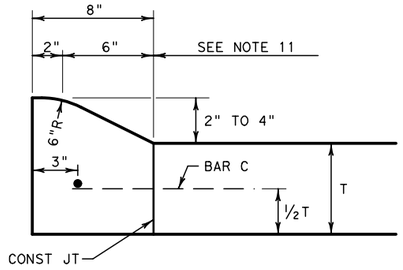
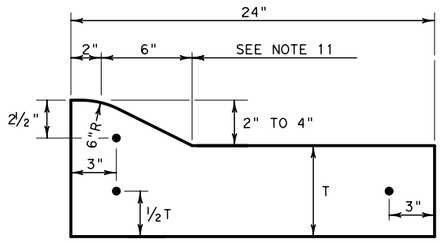


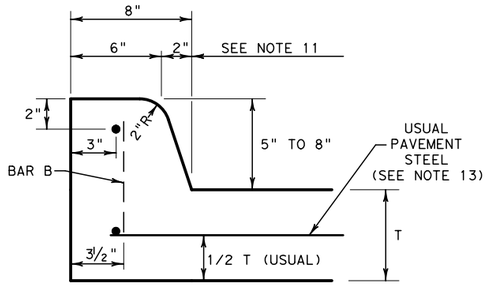
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



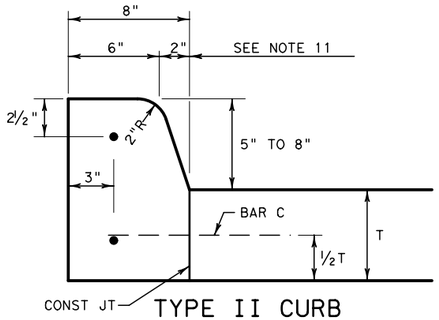
TYPE I CURB
2" - 4" HEIGHT



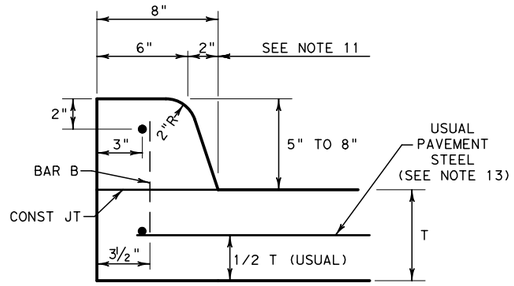
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



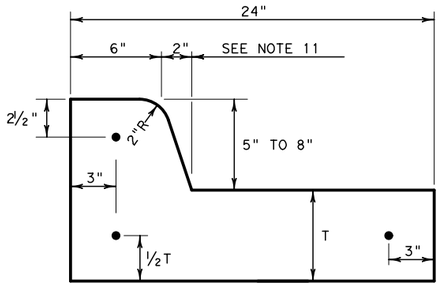
TYPE II CURB (MONOLITHIC)
5" - 8" HEIGHT



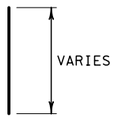
TYPE II CURB
5" - 8" HEIGHT
DOWELED VERTICAL JOINT



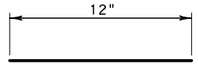
TYPE II CURB
5" - 8" HEIGHT
DOWELED HORIZONTAL JOINT



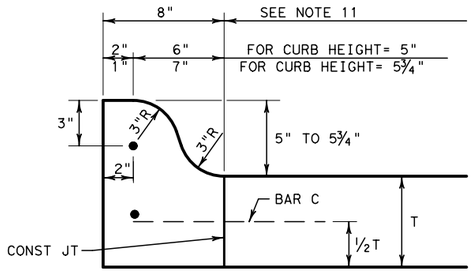
TYPE II CURB AND GUTTER
5" - 8" HEIGHT



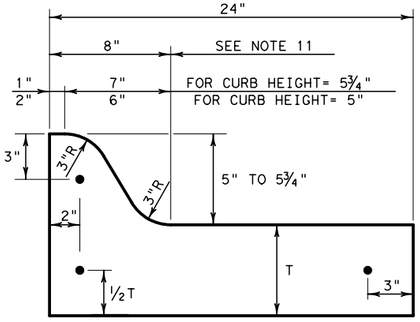
BAR B
L = (T/2) + (H- 1½")
WHERE "H" = CURB HEIGHT
FOR NEW PAVEMENT, EMBED T/2 INTO FRESH CONCRETE.
FOR EXISTING PAVEMENT, DRILL 3/8" DIAM HOLE T/2 + 1/4" INTO PAVEMENT. SECURE WITH TY III EPOXY, CLASS "E" OR "F".



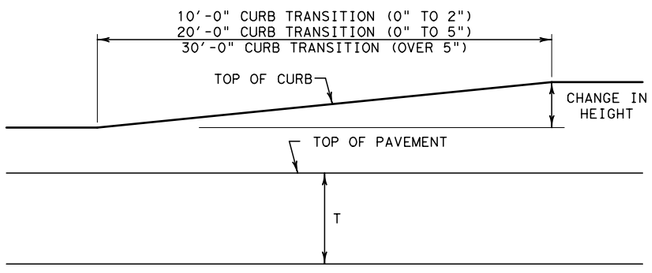
BAR C
EMBED 6" INTO EXISTING CONCRETE PAVEMENT.
DRILL 3/8" X 6 1/4" HOLE SECURE WITH TY III EPOXY, CLASS "E" OR "F".



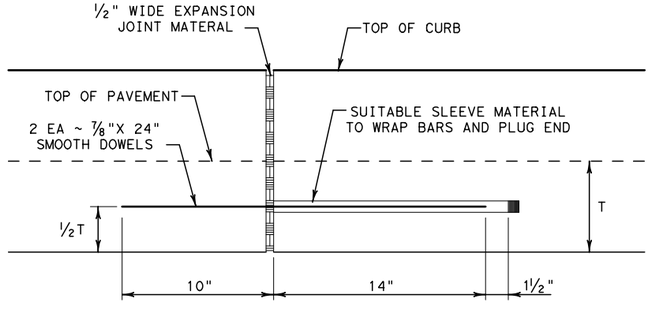
TYPE IIA CURB
5" - 5 3/4" HEIGHT



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



CURB TRANSITION
NOTE: TO BE PAID FOR AS HIGHEST CURB



EXPANSION JOINT DETAIL

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. CURB HEIGHT SHALL BE AS SHOWN ON TYPICAL SECTIONS OR PLAN-PROFILE SHEETS.
5. ROUND EXPOSED SHARP EDGES WITH A ROUNDING TOOL, TO A MINIMUM RADIUS OF ¼".
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, ½" 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.

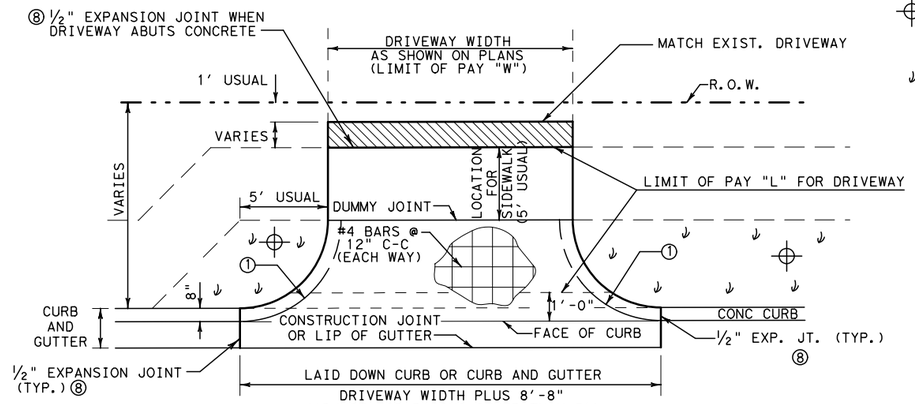
Texas Department of Transportation

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			85
05/2019	REPLACES CC-CG(FW)	STATE	STATE DIST.NO.	COUNTY	
		TEXAS	FTW	TARRANT	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0008	05	031	SH 180



SHOWING SIDEWALK ADJACENT TO CURB

SHOWING SIDEWALK REMOTE FROM CURB

PLAN VIEW

⊕ DO NOT PAVE AREA BETWEEN SIDEWALK AND DRIVEWAY CURB. SEED, SOD, OR LANDSCAPE AS DIRECTED.

ψ - SEEDING OR OTHER SURFACE NOT SUITABLE AS PEDESTRIAN WALKWAY.

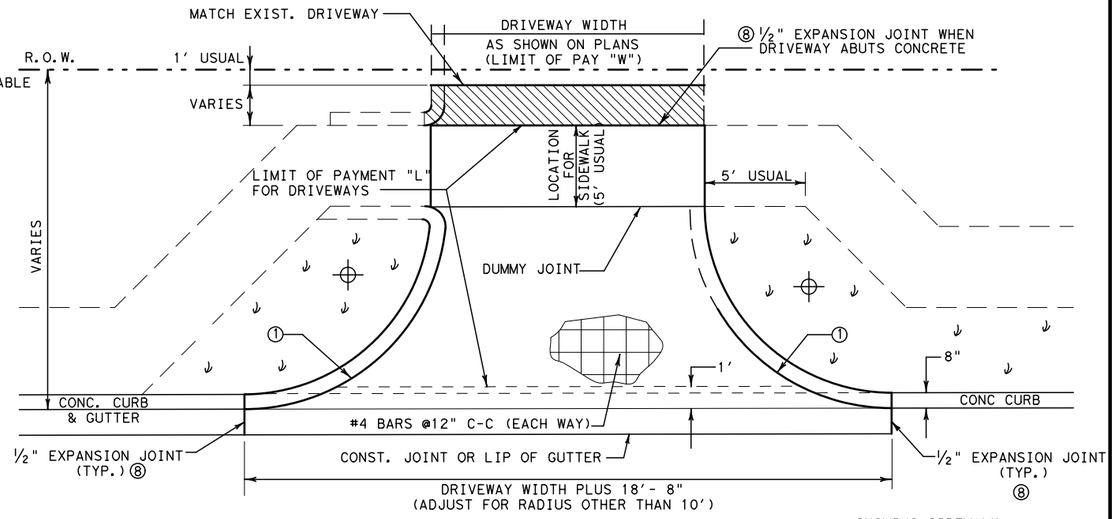
PAY AREA FOR DRIVEWAY SHALL BE THE PRODUCT OF "L" x "W"

S.Y. NON-PAY CONCRETE IN DRIVEWAY RADIUS	
2-90° RADII (FT)	NON-PAY CONC. (S.Y.)
5	0.42
10	3.04
15	10.73
20	15.36
25	29.81
30	37.19

① RADII AS SHOWN ON PLANS

SEE ROADWAY DESIGN MANUAL, APPENDIX C FOR RECOMMENDED RADII.

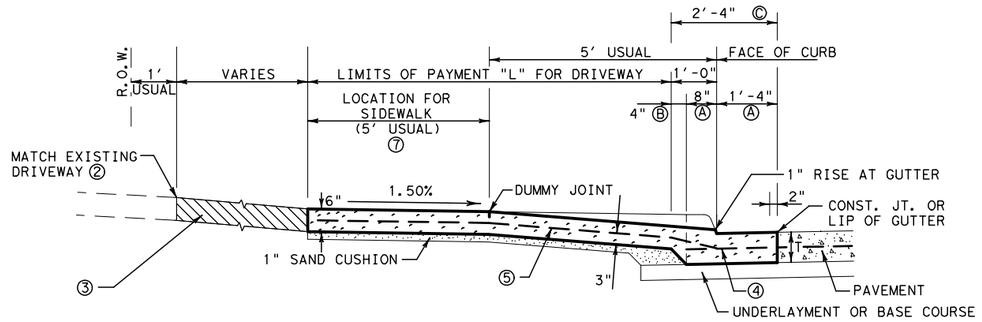
② FULL DEPTH SAW CUT IF CONCRETE



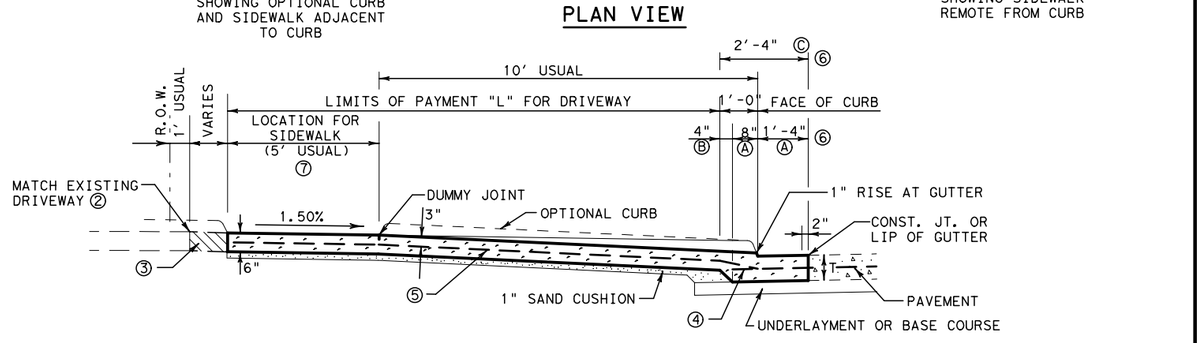
SHOWING OPTIONAL CURB AND SIDEWALK ADJACENT TO CURB

SHOWING SIDEWALK REMOTE FROM CURB

PLAN VIEW



SECTION VIEW
CONCRETE RESIDENTIAL DRIVEWAY



SECTION VIEW
CONCRETE COMMERCIAL DRIVEWAY

③ REPLACE EXISTING DRIVEWAY WITH EQUAL OR BETTER MATERIAL:

IF CONCRETE, PAY FOR AS CONCRETE DRIVEWAY.

IF HOT MIX OR OTHER MATERIAL, PAY FOR IN ACCORDANCE WITH APPROPRIATE BID ITEMS.

④ 36" - #4 TIE BAR, 12" EMBEDMENT INTO PAVEMENT (CAST-IN-PLACE OR DRILLED AND GROUTED). SPACING TO MATCH TRANSVERSE STEEL IN CONCRETE PAVEMENT.

MULTIPLE-PIECE TIE BARS OR 24" EXTENSION OF TRANSVERSE PAVING STEEL MAY BE USED IN LIEU OF TIE BARS.

LONGITUDINAL STEEL IN GUTTER PORTION TO MATCH CONCRETE PAVEMENT OR CONCRETE CURB AND GUTTER DETAILS.

⑤ #4 BARS @ 12" C-C EACH WAY (EXTEND TO FACE OF CURB) BEND AS REQ'D TO TIE TO PAVING STEEL OR TIE BARS.

⑥ IF ADJACENT TO CONCRETE PAVEMENT:
Ⓐ PAID FOR AS CONCRETE PAVEMENT,
Ⓑ PAID FOR AS CONCRETE CURB.

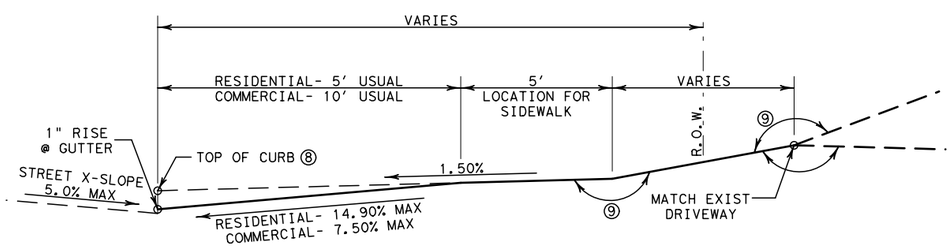
IF ADJACENT TO HOT MIX OR FLEXIBLE PAVEMENT:
Ⓒ PAID FOR AS CONCRETE CURB AND GUTTER.

T = THICKNESS OF CONCRETE PAVEMENT OR CONCRETE CURB AND GUTTER

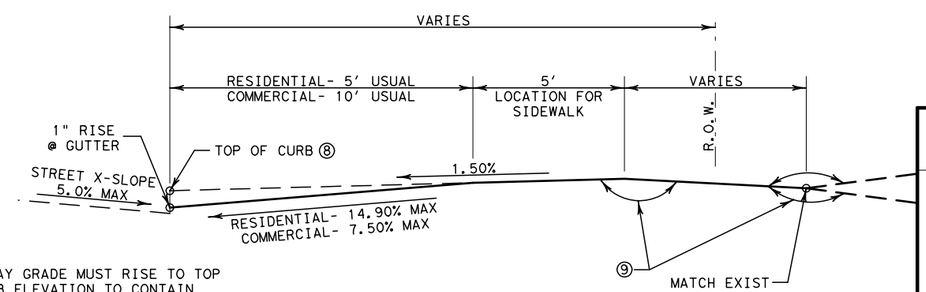
⑦ LOCATION FOR SIDEWALK TO BE PROVIDED ON ALL DRIVEWAYS

FOR SIDEWALK DETAILS, SEE STANDARD CSWD(FTW)

⑧ SEE STANDARD JS (FTW) FOR JOINT DETAILS.



SAG CONDITION



CREST CONDITION

⑧ DRIVEWAY GRADE MUST RISE TO TOP OF CURB ELEVATION TO CONTAIN DRAINAGE IN STREET GUTTER.

⑨ 8% MAX CHANGE IN GRADE

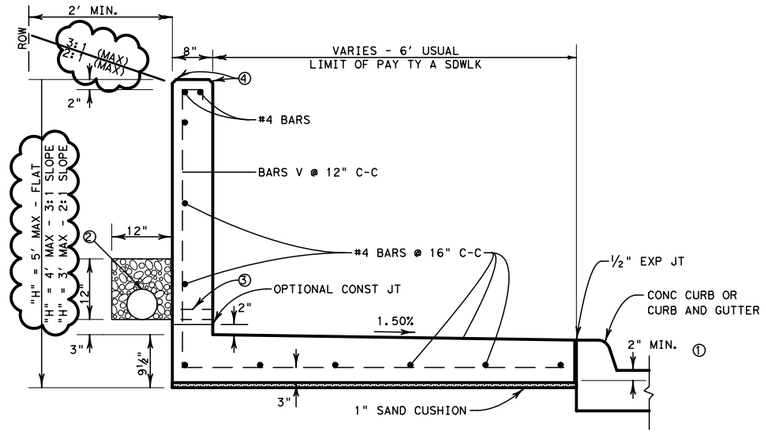
ALLOWABLE DRIVEWAY GRADES

Texas Department of Transportation

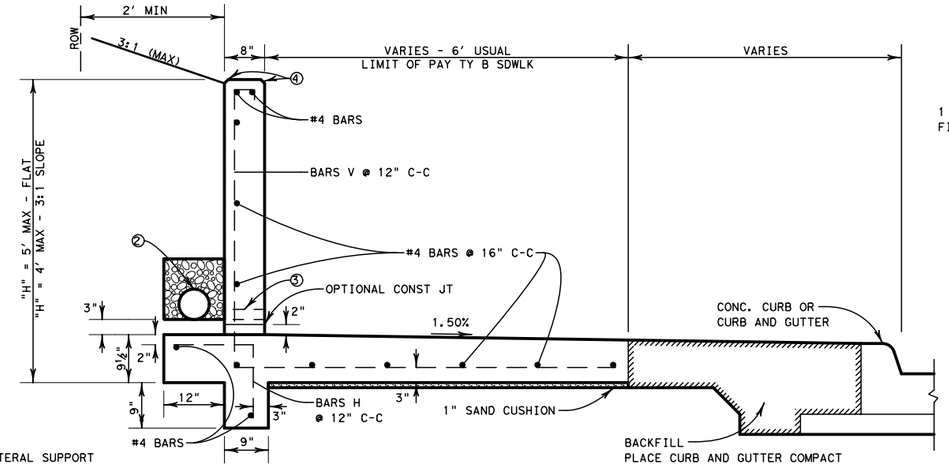
Fort Worth District Standard

CONCRETE DRIVEWAY DETAILS CDD (FTW)

ORIGINAL DRAWING: 05/2019	cdd-ftw.dgn	PROJECT NO.			SHEET NO.
DATE	REVISIONS				86
05/2019	NEW STANDARD	STATE	STATE DIST. NO.	COUNTY	
		TEXAS	FTW	TARRANT	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0008	05	031	SH 180



TYPE A SIDEWALK-ADJACENT TO CURB

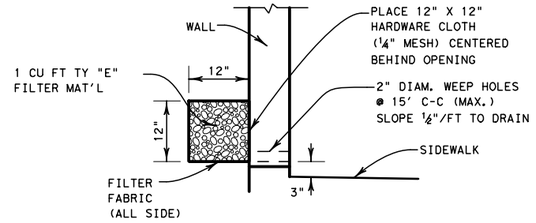


TYPE B SIDEWALK-REMOTE FROM CURB

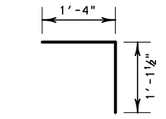
① 2" MINIMUM REQUIRED FOR LATERAL SUPPORT
② INSTALL 6" PIPE UNDERDRAIN (TY. 5, 6, 7, OR 8) ENTIRE LENGTH OF WALL. USE TY. "E" FILTER MATERIAL. SLOPE TO DRAIN AND CONNECT TO STORM DRAIN.
⑤ IF, IN THE OPINION OF THE ENGINEER, USE OF UNDERDRAIN IS IMPRACTICAL, INSTALL WEEP HOLES AS SHOWN.
④ ¾" CHAMFER

SPECIAL CONCRETE SIDEWALK w/ INTEGRATED RETAINING WALL

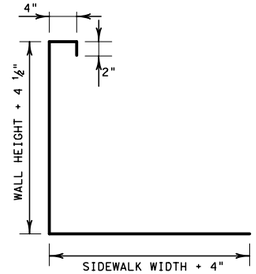
N. T. S.



WEEP HOLE DETAIL

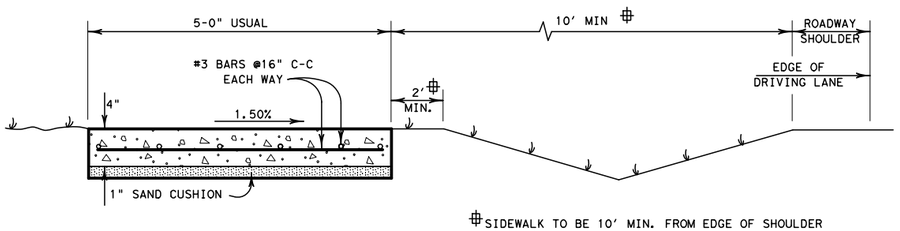


#4 BARS H @ 12" C-C



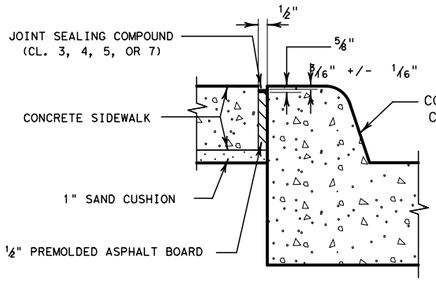
#4 BARS V @ 12" C-C

REINFORCING STEEL DETAILS



SIDEWALK TO BE 10' MIN. FROM EDGE OF SHOULDER OR 2' MIN. FROM TOP OF DITCH BACK SLOPE, WHICHEVER IS GREATER (10' MIN. FROM EDGE OF SHOULDER IF NO DITCH.)

CONCRETE SIDEWALK
(ROADWAY W/O CURB)

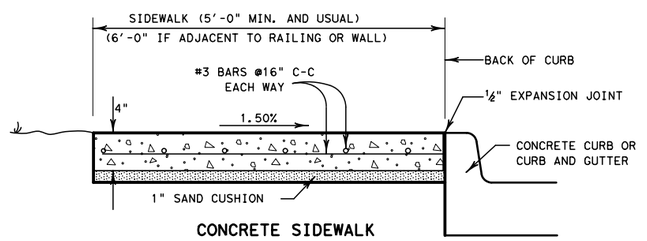


1#2" EXPANSION JOINT
(SIDEWALK ADJACENT TO CURB)

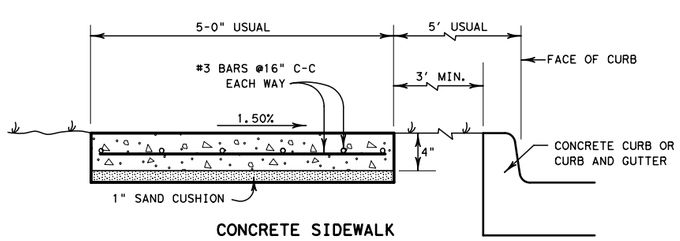
GENERAL NOTES:

1. ALL CONCRETE SHALL BE CLASS "C".
2. ALL REINFORCING STEEL SHALL BE GRADE 60, # 4 BARS UNLESS OTHERWISE INDICATED.
3. SEE PLAN SHEETS FOR LOCATIONS OF SIDEWALKS AND RETAINING WALLS.
4. LONGITUDINAL SLOPE OF SIDEWALKS SHALL NOT EXCEED 5% EXCEPT IN CASES WHERE THE ADJACENT ROADWAY SLOPE EXCEEDS 5%. IF ROADWAY SLOPE EXCEEDS 5%, LONGITUDINAL SLOPE OF SIDEWALK MAY MATCH THAT OF ROADWAY.
5. IF SIDEWALK WIDTH IS LESS THAN 5', PROVIDE 5' X 5' PASSING AREAS AT INTERVALS NOT TO EXCEED 200' SPACING.
6. RETAINING WALL WILL BE SUBSIDIARY TO THE ITEM, "CONC SIDEWALKS (SPECIAL) (TYPE A)" OR "CONC SIDEWALKS (SPECIAL)(TYPE B)", WITH LIMITS OF PAY AS SHOWN.
7. SURFACE TREATMENT OF RETAINING WALL FACE DETAILED ELSEWHERE IN THE PLANS.
8. SEE PED STANDARDS FOR TREATMENT AT INTERSECTIONS AND CROSSWALKS.
9. EXCAVATION AND BACKFILL SUBSIDIARY TO ITEM 531

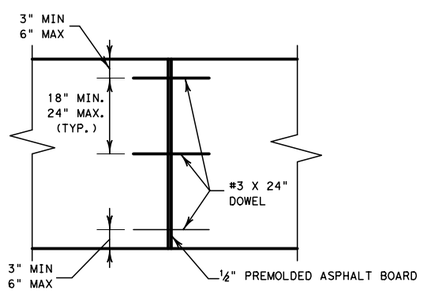
STATE OF TEXAS
RAMA S. CONTINA
116559
LICENSED PROFESSIONAL ENGINEER
5/18/2021



CONCRETE SIDEWALK
(ADJACENT TO CURB)



CONCRETE SIDEWALK
(REMOTE FROM CURB)



TRANSVERSE EXPANSION JOINT

CONCRETE SIDEWALK DETAILS

N. T. S.

Texas Department of Transportation

Fort Worth District Standard

CONCRETE SIDEWALK DETAILS
CSWD (FTW) (MOD)

ORIGINAL DRAWING: 05/2019	cswd-ftw.dgn	PROJECT NO.			SHEET NO.
DATE	REVISIONS				87
05/2019	NEW STANDARD	STATE	STATE DIST. NO.	COUNTY	
		TEXAS	FTW	TARRANT	
		CONT.	SECT.	JOB	HIGHWAY NO.
		0008	05	031	SH 180

DATE: 5/18/2021
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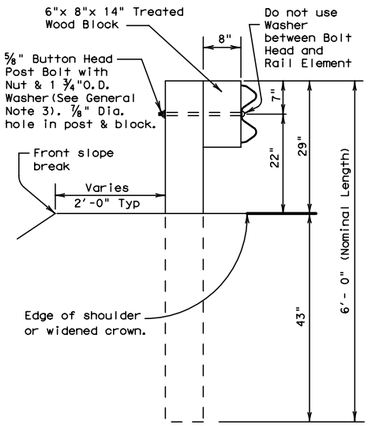
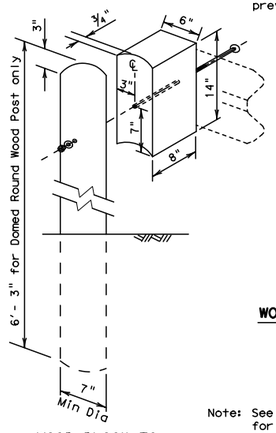
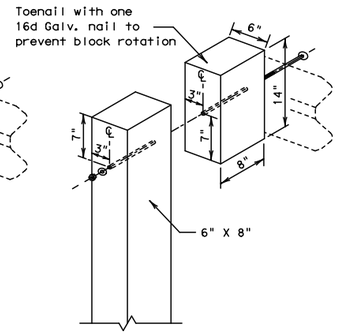


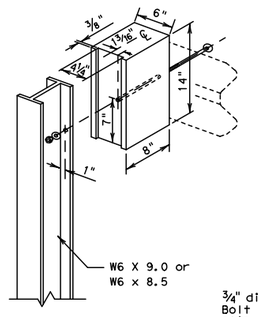
TYPICAL POST



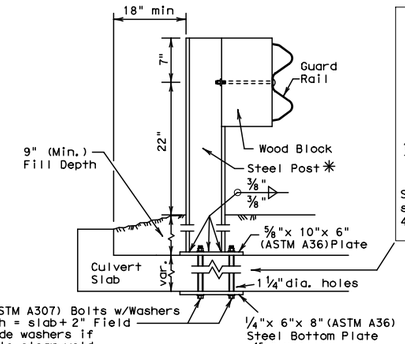
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

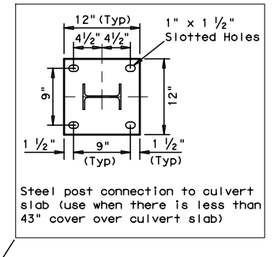


WOOD BLOCK TO STEEL POST

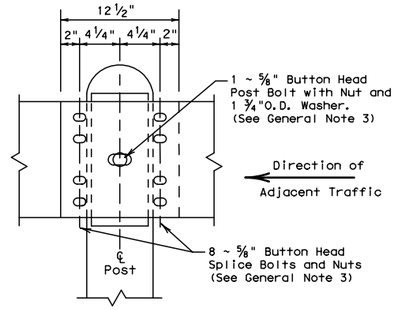


✳ **LOW FILL CULVERT POST**

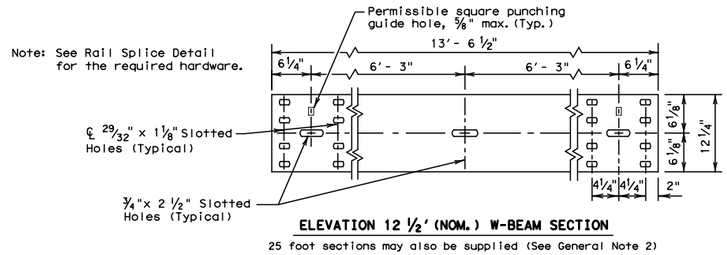
FOR USE ON NON-BRIDGE CLASS CULVERTS ONLY



✳ Post(s) may require field modifications to ensure proper guardrail height.



RAIL SPLICE DETAIL

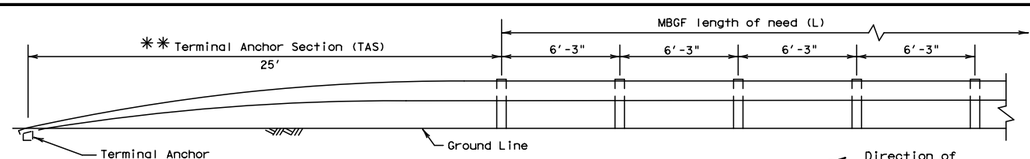


ELEVATION 12 ½' (NOM.) W-BEAM SECTION

25 foot sections may also be supplied (See General Note 2)

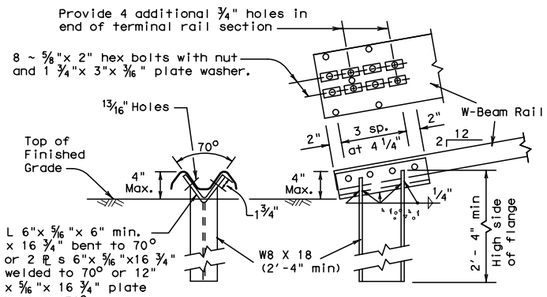
GENERAL NOTES

1. The type of post (round wood post, rectangular wood post, or steel post) will be shown elsewhere in the plans. The exact position of MBGF shall be shown elsewhere in the plans or as directed by the Engineer. Steel posts to be galvanized in accordance with Item 445, "Galvanizing."
2. Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified on the plans. The Contractor may furnish rail elements of 12 ½ or 25 foot nominal lengths.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 ¾" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are ⅝" x 1 ¼" (or 2" long at triple rail splices) with a ⅝" double recessed nut (ASTM A563).
4. Fittings (bolts, nuts, and washers) shall be galvanized in accordance with Item 445, "Galvanizing." Fittings shall be subsidiary to the bid item.
5. Crown shall be widened to accommodate the Metal Beam Guard Fence.
6. The lateral approach to the guard fence, shall have a slope rate of not more than 1V:10H.
7. Unless otherwise shown in the plans, guard fence placed in the vicinity of curbs shall be positioned so that the face of curb is located directly below or behind the face of the block. Rail placed over curbs shall be installed so that the post bolt is located approximately 21 inches above the gutter pan or roadway surface.
8. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, 24" into the rock, or drill two 12" dia. front to back overlapping holes, 24" into the rock. If solid rock is encountered below 18", drill a 12" dia. hole, 12" into the rock or to the standard embedment depth, whichever is less. Any excess post length, after meeting these depths, may be field cut to ensure proper guardrail mounting height. Backfill with a cohesionless material.
9. Posts shall not be set in concrete, of any depth.
10. Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
11. The terminal anchor section (TAS) post shall be set in Class A concrete (unless otherwise shown in the plans) in accordance with Item 421, "Hydraulic Cement Concrete." Concrete shall be subsidiary to the bid item requiring construction of the terminal anchor section (TAS). Terminal anchor post to be galvanized in accordance with Item 445, "Galvanizing."
12. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or blocks of similar dimensions. The Construction Division, TxDOT maintains a Material Producer List (MPL) for producers of materials conforming to DMS-7210. Only producers on the MPL can furnish composite material posts and/or blocks.



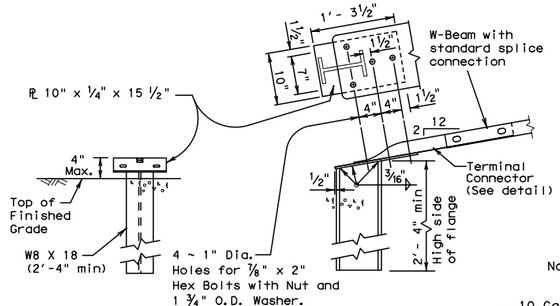
✳✳ TERMINAL ANCHOR SECTION (TAS)

Terminal anchor sections are only for downstream use, when located outside the horizontal clearance area of opposing traffic.



OPTION (1)

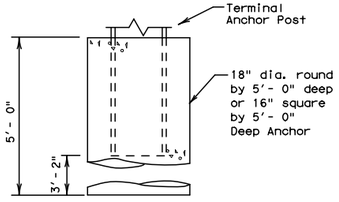
Note: This anchor post requires four additional ¾" holes (shop or field) in the rail member with eight ⅝" hex bolts with nut and plate washer.



OPTION (2)

Note: This anchor post requires the use of the 10 ga. terminal connector with four ⅞" hex bolts with nut and washer.

TERMINAL ANCHOR POST OPTIONS
(See General Note 11)



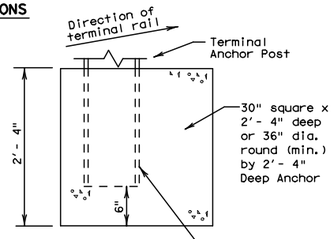
Notes:

Either concrete anchor may be used with either post option above.

No construction joint is allowed in the concrete anchor.

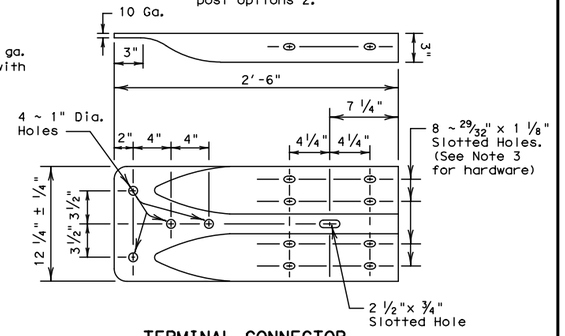
Terminal rail may be bolted to post and in twist position prior to placing concrete anchor.

If concrete anchor is precast, the area should be compacted as directed by the Engineer, when placed in the field.



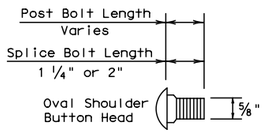
TERMINAL CONCRETE ANCHOR OPTIONS
(See General Note 11)

Note: Terminal Connector to be used with terminal anchor post options 2.



TERMINAL CONNECTOR

For connection hardware to concrete rails, see the MBGF transition standards.



BUTTON HEAD BOLT

Post and Splice Bolts (See General Note 3)

ONLY FOR USE IN MAINTENANCE REPAIRS OR HIGHLY CONSTRAINED SITE CONDITIONS.

Texas Department of Transportation

Design Division Standard

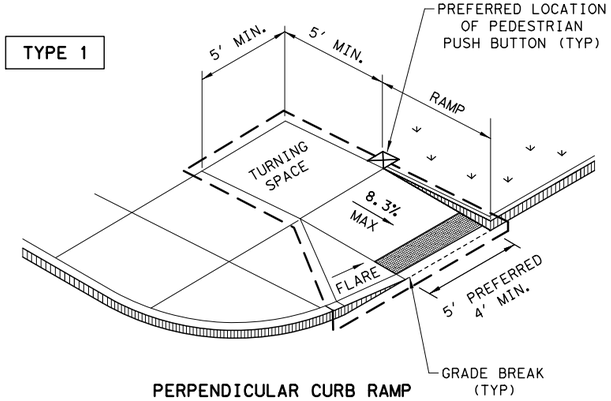
METAL BEAM GUARD FENCE

MBGF-19

FILE: mbgf19.dgn	DN: TxDOT	CK: KM	DW: BD	CK: VP
©TxDOT NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		88

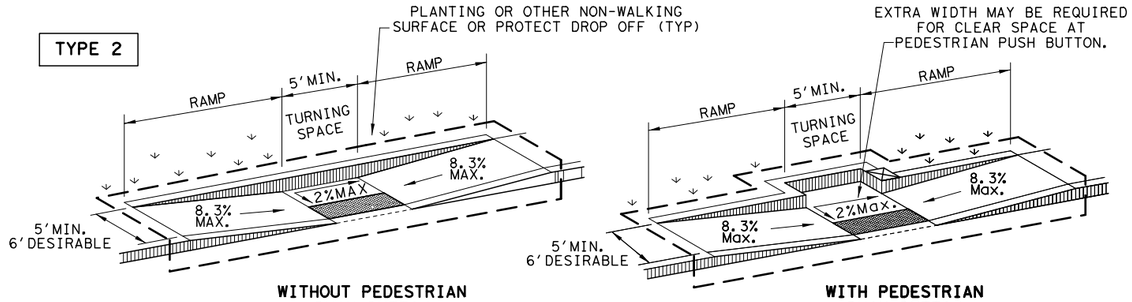
DATE: 5/18/2021
FILE: c:\pwworking\aecom_ds16_na\mayra.reynazul@aecom.com\d0383261\ped18.dgn

TYPE 1



PERPENDICULAR CURB RAMP

TYPE 2

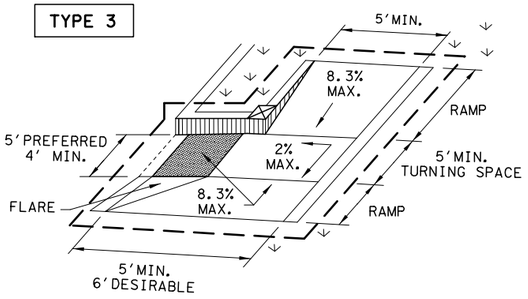


WITHOUT PEDESTRIAN PUSH BUTTON

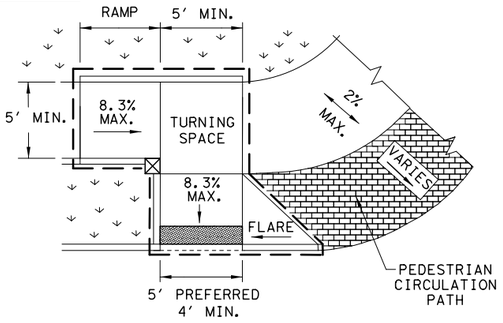
WITH PEDESTRIAN PUSH BUTTON

PARALLEL CURB RAMP

TYPE 3

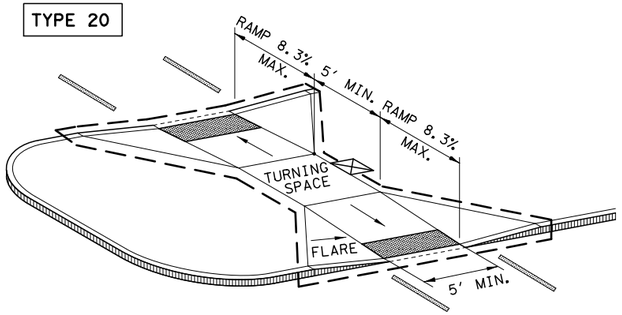


TYPE 6



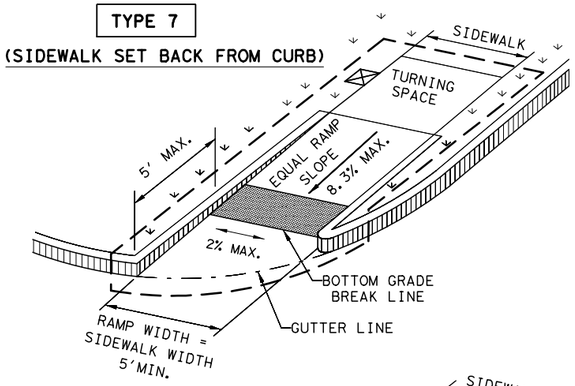
COMBINATION CURB RAMPS

TYPE 20

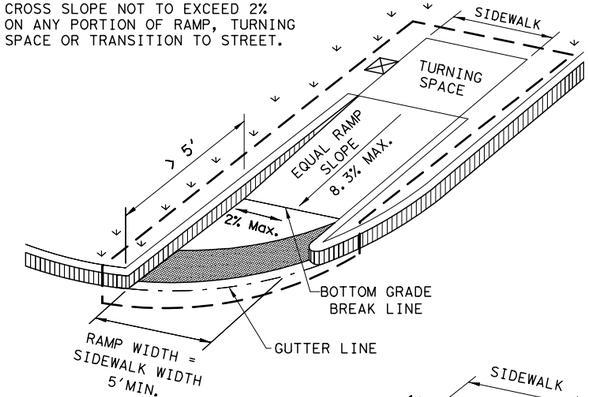


CURB RAMPS AT MEDIAN ISLANDS

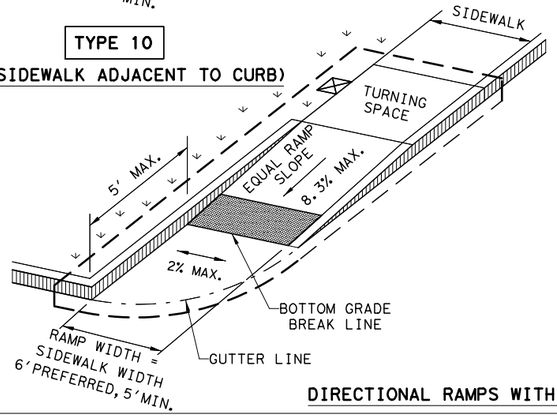
TYPE 7
(SIDEWALK SET BACK FROM CURB)



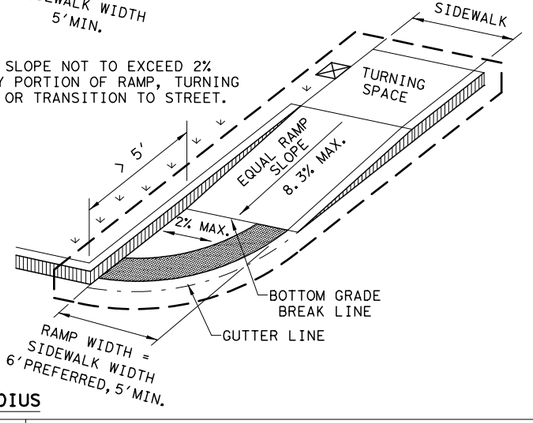
CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



TYPE 10
(SIDEWALK ADJACENT TO CURB)

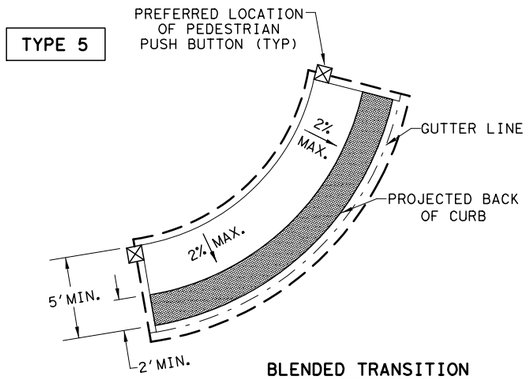


CROSS SLOPE NOT TO EXCEED 2% ON ANY PORTION OF RAMP, TURNING SPACE OR TRANSITION TO STREET.



DIRECTIONAL RAMPS WITHIN RADIUS

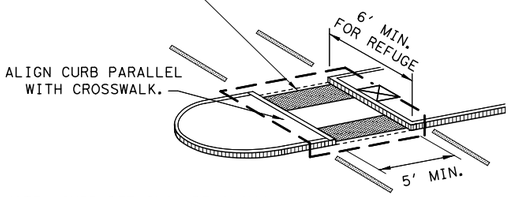
TYPE 5



BLENDED TRANSITION
(FLUSH LANDING)

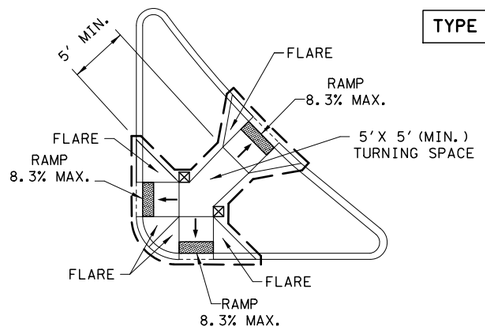
TYPE 21

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



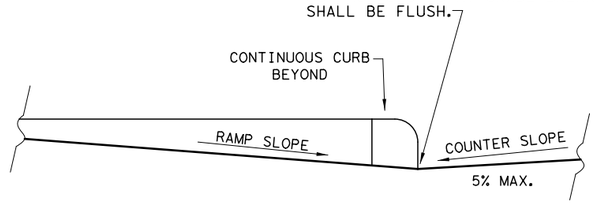
NOTE: CURB DETAILS ARE SHOWN ELSEWHERE IN THE PLANS.

TYPE 22



COMBINATION ISLAND RAMPS

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



TYPICAL SECTION OF PERPENDICULAR CURB RAMP AT CONNECTION TO ROADWAY

NOTES / LEGEND:

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

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

DETECTABLE WARNING SURFACE

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

SHEET 1 OF 4

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		89

DATE: 5/18/2021
FILE: c:\pwworking\aecom_ds16_na\mayra.reynazul@aecom.com\d0383261\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

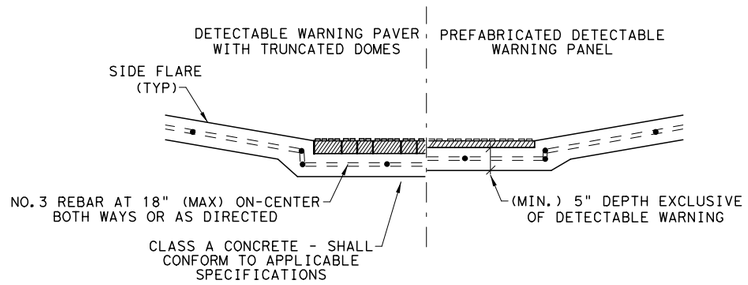
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material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

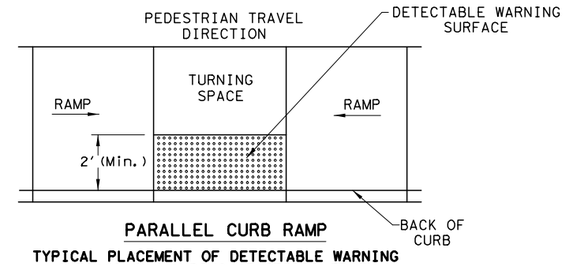
SIDEWALKS

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.



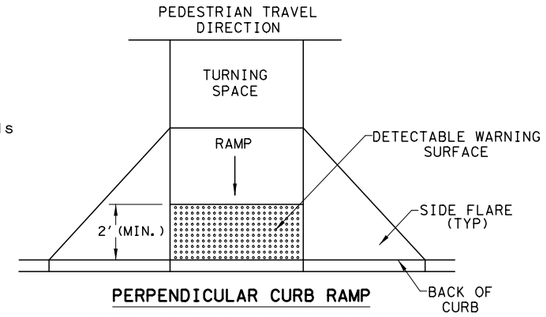
SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS

DETECTABLE WARNING SURFACE DETAILS



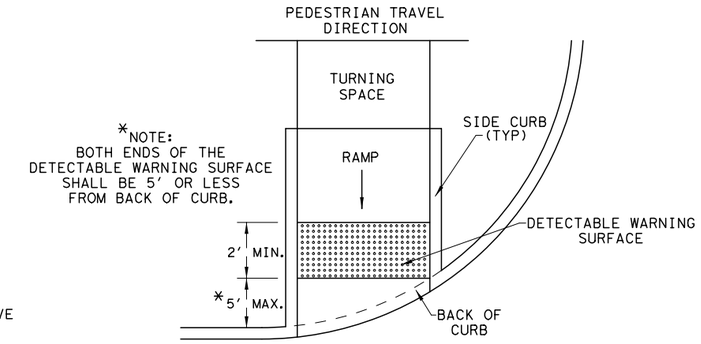
PARALLEL CURB RAMP

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.

SHEET 2 OF 4

Texas Department of Transportation | Design Division Standard

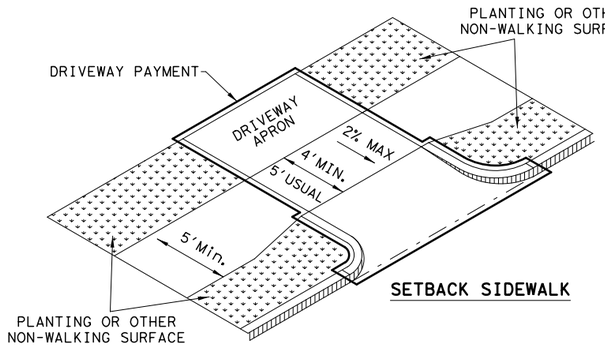
PEDESTRIAN FACILITIES CURB RAMPS

PED-18

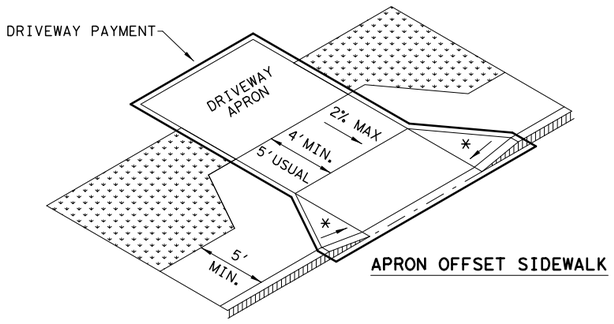
FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG	
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0008	05	031	SH 180	
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.	
	FTW	TARRANT		90	

DATE: 5/18/2021
FILE: c:\pwworking\aecom_ds16_na\mayra.reynazul@aecom.com\d0383261\ped18.dgn

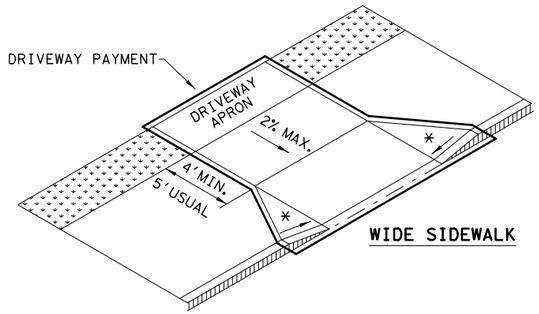
SIDEWALK TREATMENT AT DRIVEWAYS



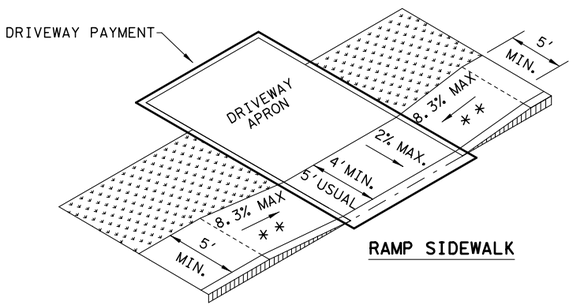
SETBACK SIDEWALK



APRON OFFSET SIDEWALK



WIDE SIDEWALK

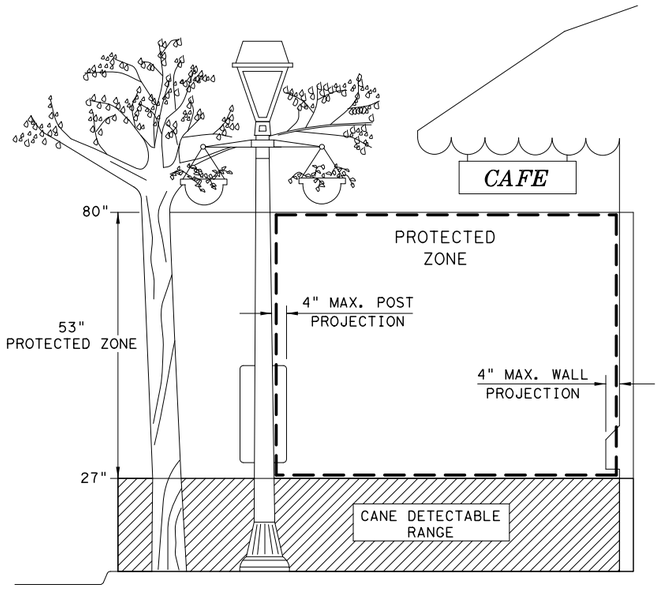


RAMP SIDEWALK

NOTES:

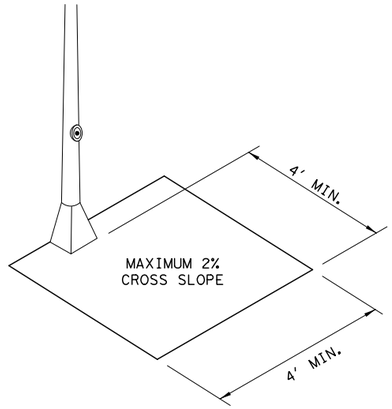
* WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.

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

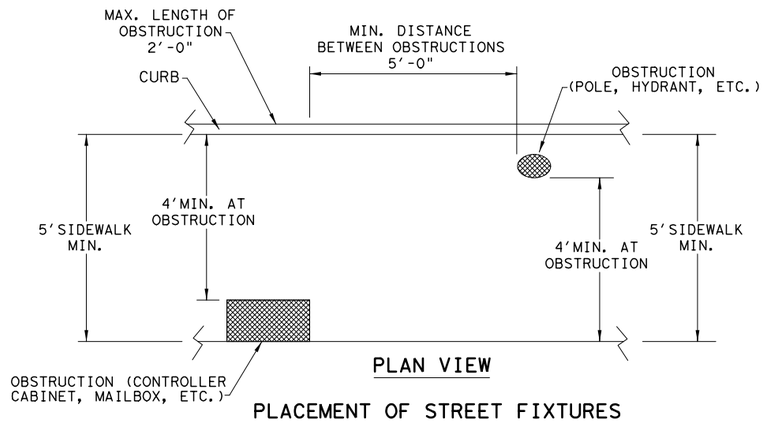


PROTECTED ZONE

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



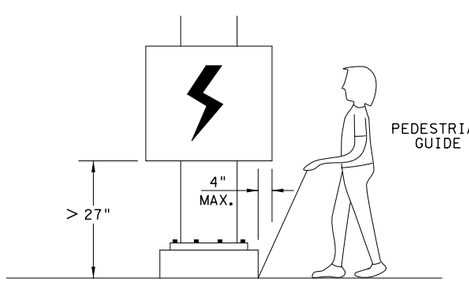
CLEAR SPACE ADJACENT TO PEDESTRIAN PUSH BUTTON



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.



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

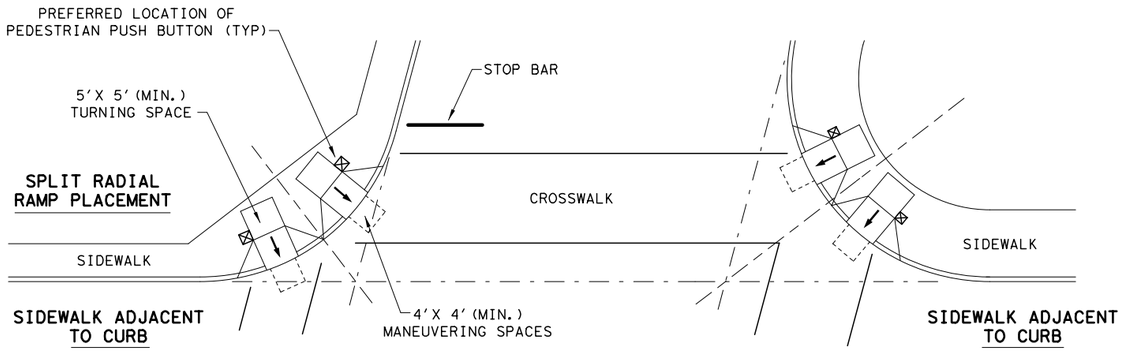
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		91

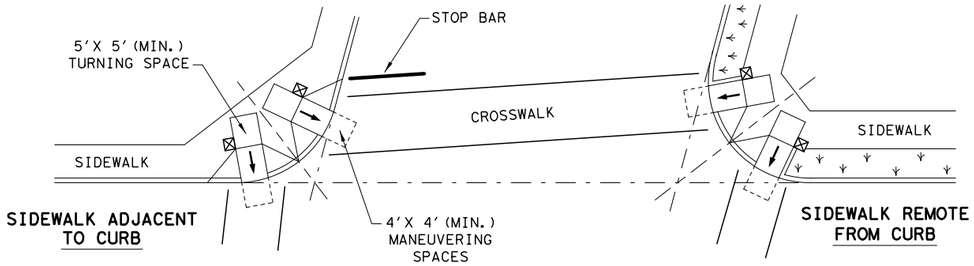
DATE: 5/18/2021
FILE: c:\pwworking\aecom_ds16_na\mayra.reynazul@aecom.com\d0383261\ped18.dgn

TYPICAL CROSSING LAYOUTS

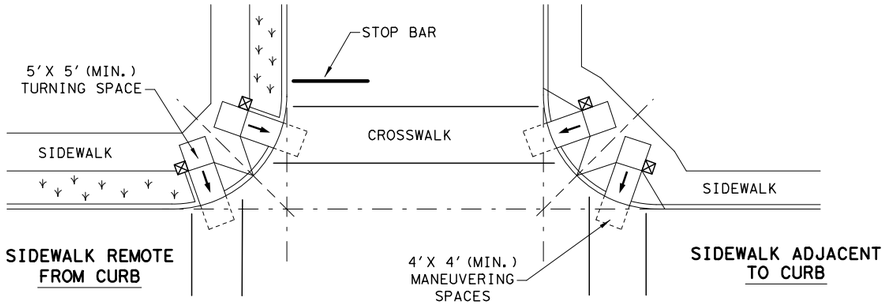
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



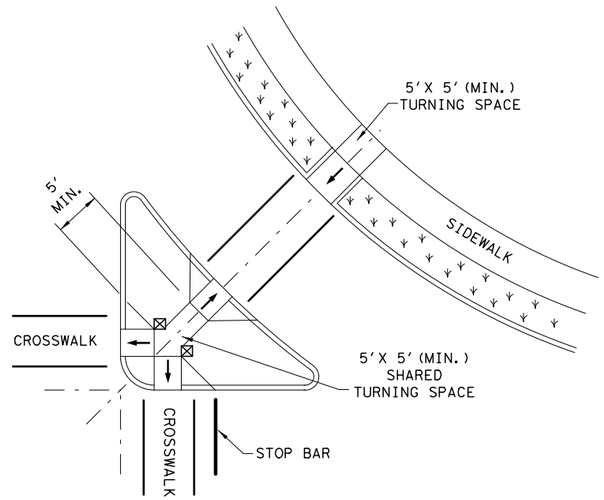
SKEWED INTERSECTION WITH "LARGE" RADIUS



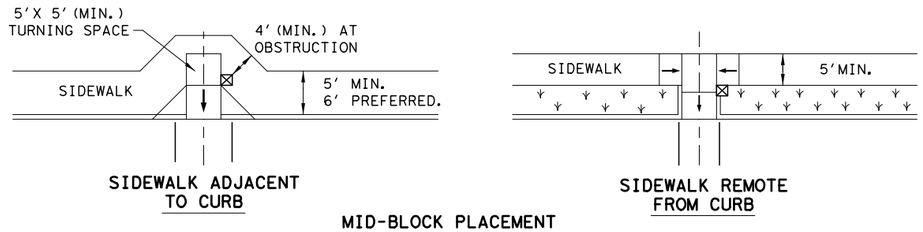
SKEWED INTERSECTION WITH "SMALL" RADIUS



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
© TxDOT: MARCH, 2002	CONT	SECT	JOB		HIGHWAY
REVISIONS	0008	05	031		SH 180
REVISED 08,2005 REVISED 06,2012 REVISED 01,2018	DIST	COUNTY			SHEET NO.
	FTW	TARRANT			92

DATE: 5/18/2021
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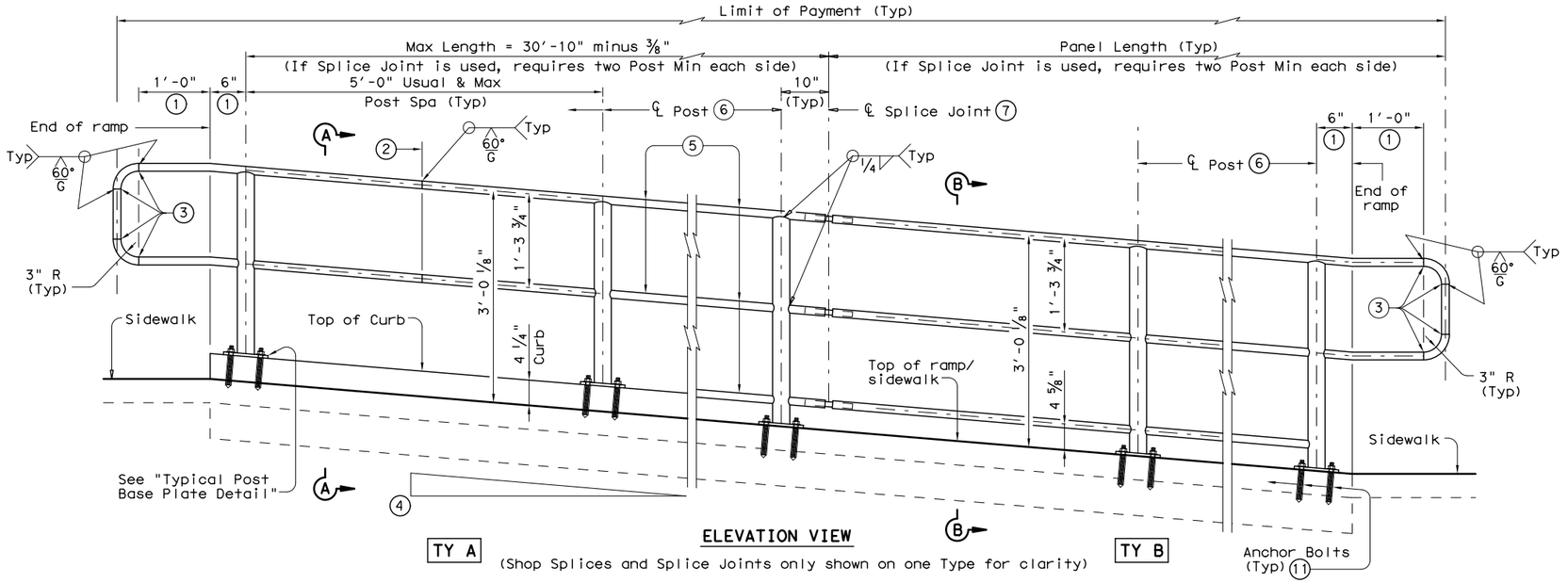
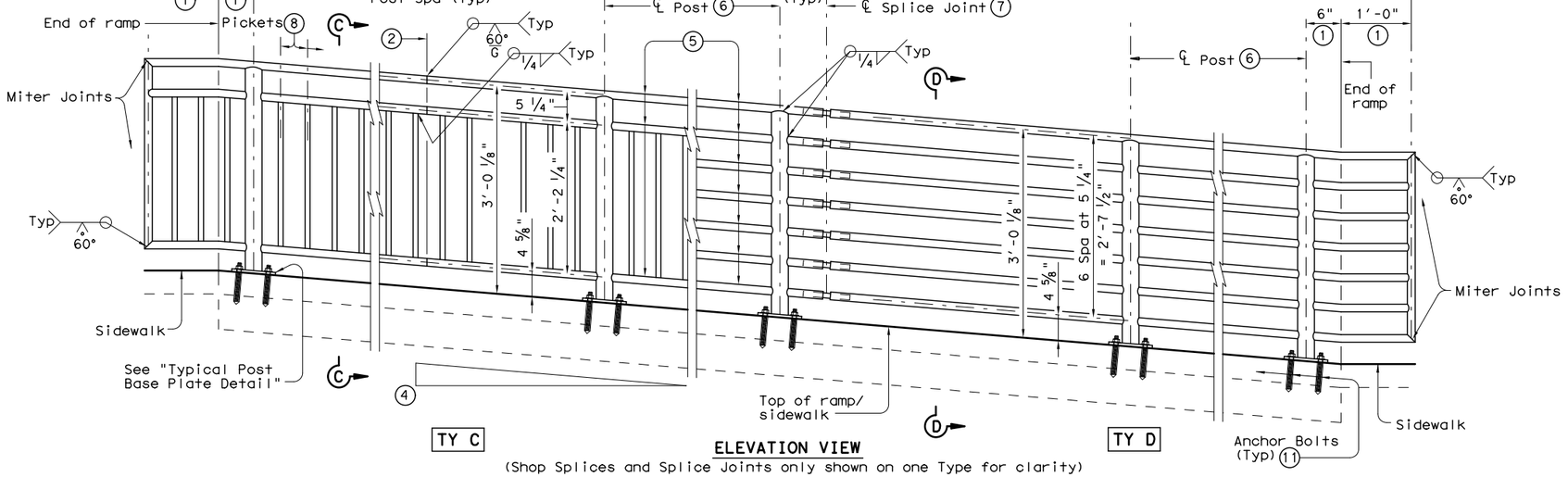


ELEVATION VIEW

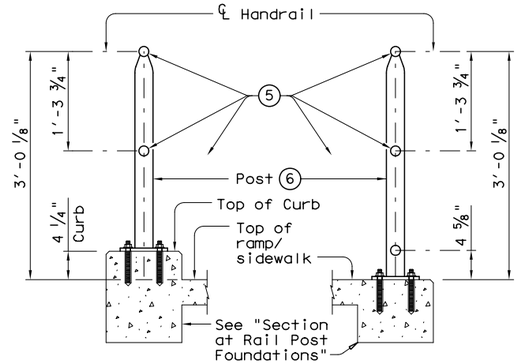
(Shop Splices and Splice Joints only shown on one Type for clarity)



ELEVATION VIEW

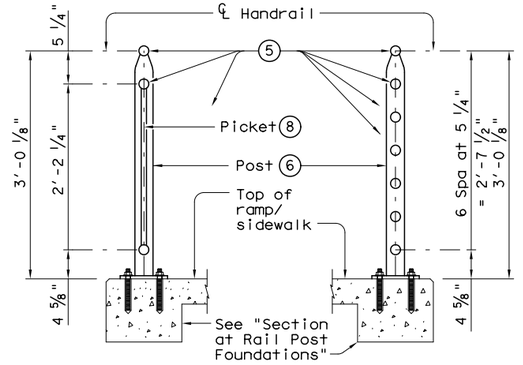
(Shop Splices and Splice Joints only shown on one Type for clarity)

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



SECTION A-A
(Showing Handrail **TY A**)

SECTION B-B
(Showing Handrail **TY B**)



SECTION C-C
(Showing Handrail **TY C**)

SECTION D-D
(Showing Handrail **TY D**)

(1) Parallel to ground.

(2) One shop splice per panel is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

(3) Shop splice is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

(4) See Ramp Details located elsewhere in plans for ramp slope and dimensions. Maximum ramp slope will not exceed 8.3 percent. Level landing required for each 30" rise if grade exceeds 5 percent.

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

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

(7) See "Handrail Fabrication Details" for Splice Joints.

(8) ℄ ⅝" Dia. Round Bar equal spacing at 4 ½" Max. Plumb all pickets.

(9) When needed for accessibility (grade > 5 percent) or as needed for pedestrian safety.

(10) Not to be used on bridges.

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

SHEET 1 OF 3

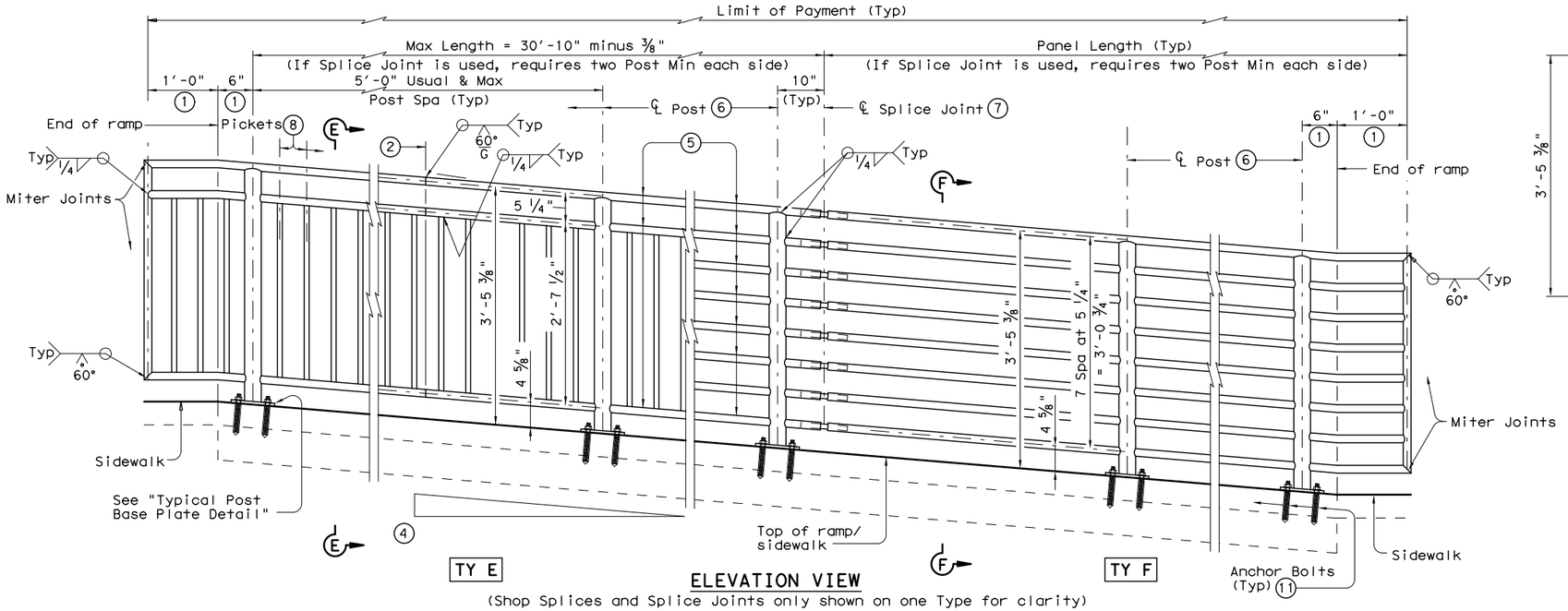
Texas Department of Transportation — Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

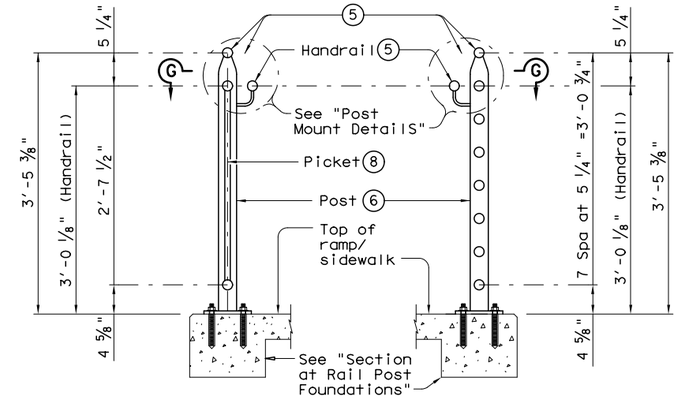
FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT Decmeber 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		93

DATE: 5/18/2021
FILE: c:\pwworking\aecom_ds16_na\mayra.reynazul@aecom.com\d0383261\PRD-13.dgn



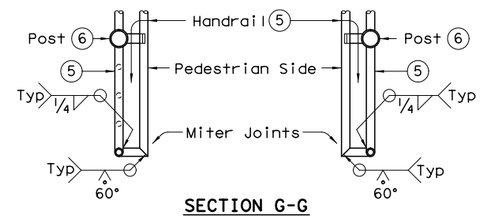
ELEVATION VIEW

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

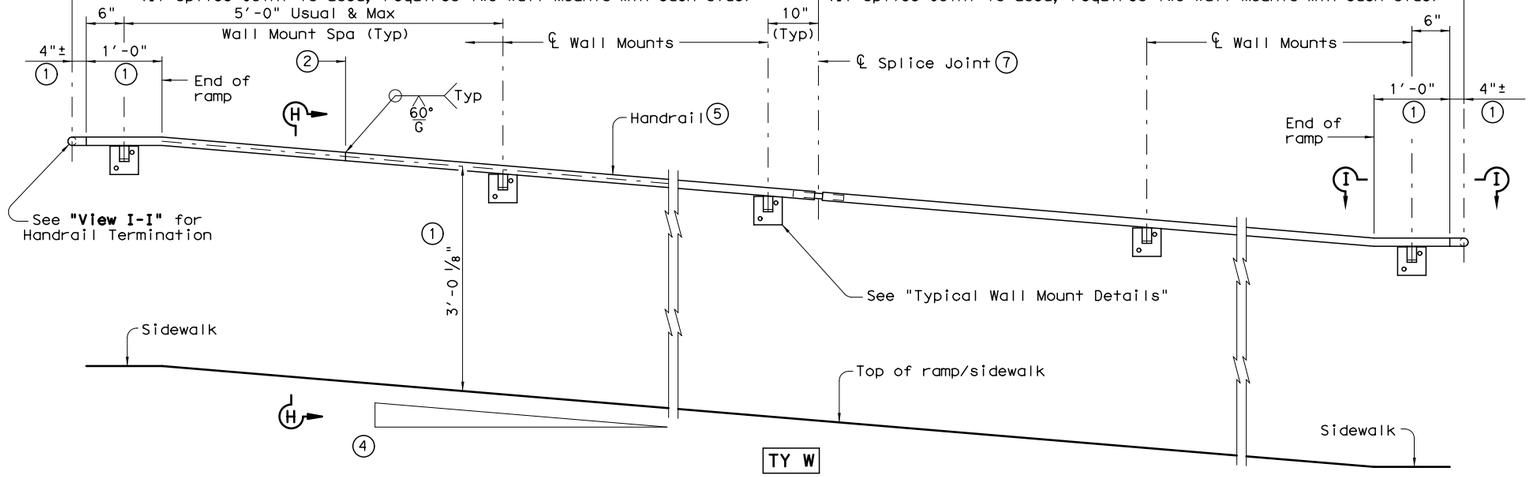


SECTION E-E
(Showing Handrail **TY E**)

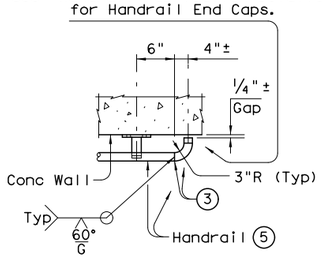
SECTION F-F
(Showing Handrail **TY F**)



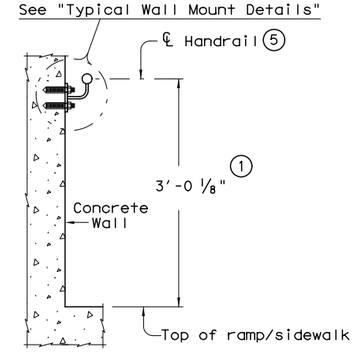
SECTION G-G
(Showing Handrail Termination)



ELEVATION VIEW



VIEW I-I
(Showing Handrail Termination)



SECTION H-H
(Showing Handrail **TY W**)

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

Texas Department of Transportation — Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS REVISED MAY, 2013 (VP)	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		94

DATE: 5/18/2021
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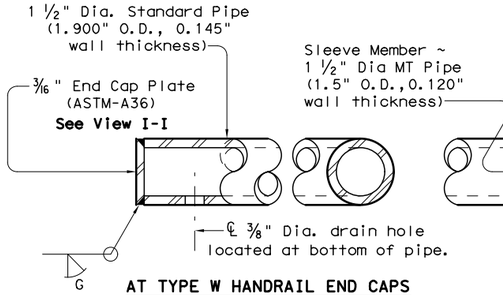
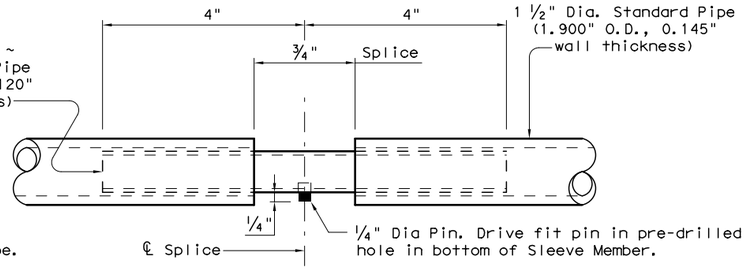
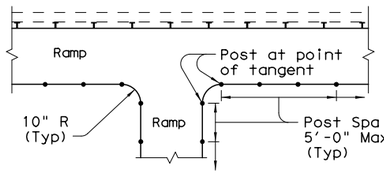


AT TYPE W HANDRAIL END CAPS

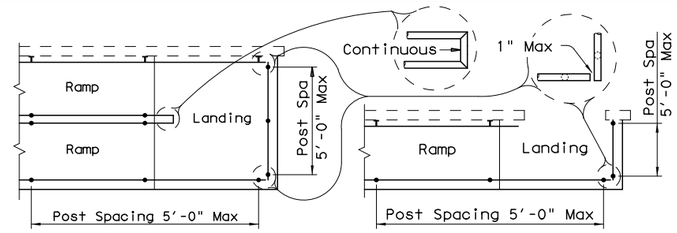


AT SPLICE JOINTS

HANDRAIL FABRICATION DETAILS



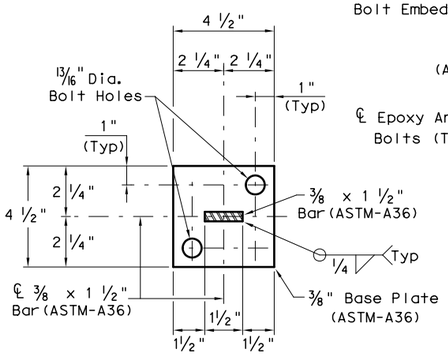
RAMP INTERSECTION



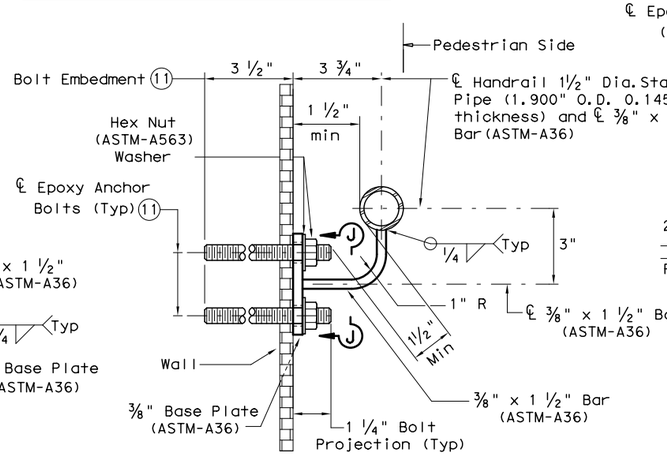
MULTI-LEVEL RAMP

SINGLE-LEVEL RAMP

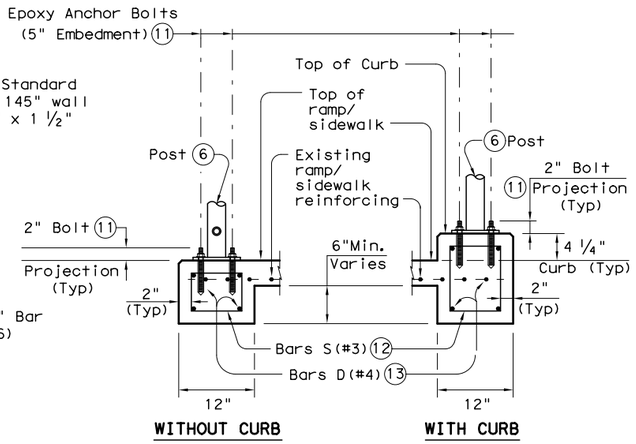
PLAN SHOWING RAIL AT RAMP CONDITIONS



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



SECTION AT WALL MOUNT



WITHOUT CURB

WITH CURB

SECTION AT RAIL POST FOUNDATIONS

TYPICAL WALL MOUNT DETAILS

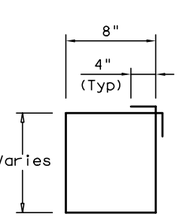
(5) 1 ½" Dia. Standard Pipe (1.900" O.D., 0.145" wall thickness). Parallel to ramp/sidewalk. Provide holes as needed in 1 ½" Dia. pipe for galvanizing drainage and venting.

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

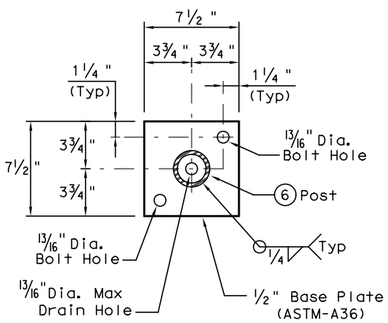
(11) See "General Notes" for anchor bolt information.

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

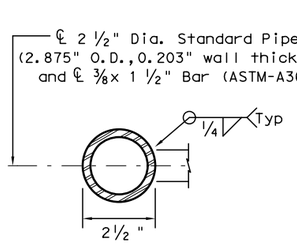
(13) Provide 1 ½" end cover to Bars D(#4) from outside edge of overall length of Ramp/Sidewalk.



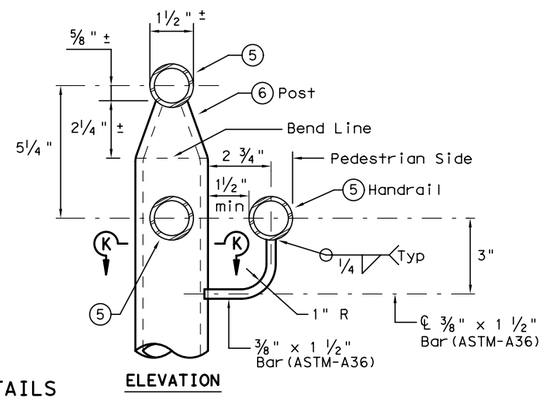
BARS S (#3)



TYPICAL POST BASE PLATE DETAIL



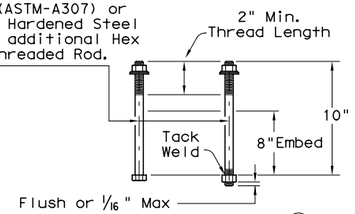
SECTION K-K



ELEVATION

POST MOUNT DETAILS

℄ 5/8" Dia. Hex Head Anchor Bolt (ASTM-A307) or Threaded Rod (ASTM-A36) with one Hardened Steel Washer placed under Hex Nut. One additional Hex Nut will be furnished for each Threaded Rod.



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

GENERAL NOTES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Design Division Standard

PEDESTRIAN HANDRAIL DETAILS

PRD-13

FILE: prd13.dgn	DN: TxDOT	CK: AM	DW: JTR	CK: CGL
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
REVISED MAY, 2013 (VP)	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		95

DATE: 5/18/2021
FILE: c:\pwworking\aecom_ds16_na\mayra.reynazul@aecom.com\d0383261\sgt10s3116.dgn

NOTE: STEEL I-BEAM POST W6 X 8.5 (6'-0") PN: 533G
STANDARD WOOD BLOCKOUTS (6"X8"X14") PN: 4076B
AT (POSTS 2 THRU 8)

⅝" X 10" HGR BOLT PN: 3500G
⅝" HGR NUT PN: 3340G

LINE AT THE BACK OF POST #2 THRU #8

FROM THE CENTERLINE OF POST(1) & POST(0)

ANCHOR PADDLE PN: 15204A

ANGLE STRUT PN: 15202G

16"

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(1) POST(0)

DO NOT BOLT ANCHOR RAIL TO - POST (2)

SEE DETAIL 1

BEGIN LENGTH OF NEED

PLAN VIEW

TRAFFIC FLOW

MASH TEST LEVEL 3 (TL-3) LENGTH OF SoftStop TERMINAL (50'-9 ½")

50'-9 ½" STANDARD INSTALLATION LENGTH (MASH TL-3 SoftStop)

BEGIN STANDARD MBGF

END PAYMENT FOR SGT

6¼" 3'-1 ½" 6'-3" 6'-3"

ANCHOR RAIL WITH SLOTS - (THREADED THRU HEAD)
SEE SoftStop MANUAL FOR COMPLETE DETAILS

MIDDLE SLOT CUTOUT (1) 1 ¾" X 6'-10 ¼"

OUTSIDE SLOTS CUTOUT (2)½" X 6'-9 ⅝"

SoftStop FACE SEE GN(3) & NOTE: B

MBGF LAPPED IN DIRECTION OF TRAFFIC FLOW

25'-0" DOWNSTREAM W-BEAM GUARDRAIL PN: 61G

SoftStop ANCHOR RAIL (12GA) PN: 15215G

3'-1 ½"(+/-) 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 6'-3" 5'-8" 4'-7"

SEE NOTE: C

ANCHOR PADDLE PN: 15204A

END OF ANCHOR RAIL PN: 15215G

SEE NOTE: A

POST 32" HEIGHT

31"

RAIL HEIGHT

RAIL 25'-0" PN: 61G

RAIL 25'-0" PN: 15215G

DO NOT BOLT ANCHOR RAIL TO POST(2)

SEE DETAIL 2

13/16" DIA. YIELDING HOLES

SEE DETAIL 3

6'-1⅜"

(8) ⅝"x 1- ¼" GR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

POST 40" DEPTH (TYP 1-8)

(8) ⅝"x 1- ¼" HGR BOLTS PN: 3360G
⅝" HEX NUTS PN: 3340G

POST(8) POST(7) POST(6) POST(5) POST(4) POST(3) POST(2) 6'-0" (SYTP) PN: 15000G POST(1) 4'-9 ½" SYTP PN: 15203G POST(0) 6'-5 ⅜" PN: 15205A

ELEVATION VIEW

HARDWARE FOR POST(2) THRU POST(8)
(1) ⅝"x 10" HGR BOLT PN: 3500G
(1) ⅝" HGR HEX NUT PN: 3340G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

4" X 7 ½" X 14" BLOCKOUT COMPOSITE PN: 6777B

6" X 8" X 14" BLOCKOUT WOOD PN: 4076B

NOTE: DO NOT BOLT ANCHOR RAIL TO POST(2)

8" 6" 14"

⅝" HGR NUT PN: 3340G

⅝" X 10" HGR POST BOLT PN: 3500G

13/16"DIAMETER YIELDING HOLES LOCATED IN FLANGES

FINISHED GRADE

(HOLES APROXIMATELY CENTERED AT FINISHED GRADE)

ISOMETRIC VIEW POST(1 & 2)

W6 X 8.5 I-BEAM POST SHOWING STANDARD WOOD BLOCKOUT

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

(1) ⅝" x 1 ¾" HEX HD BOLT PN 3391G

ANGLE STRUT PN: 15202G

(2) ⅝" WASHERS PN 4372G

(1) ⅝" HGR HEX NUT PN 3340G

DETAIL 1

SHOWN AT POST(1) NEAR GROUND

(1) ⅝" HEX NUT

(1) ⅝" x 1- ½" HEX HD BOLT-GR-5 PN: 105286

(2) ⅝" ROUND WASHERS PN: 3240G

DETAIL 2

SHOWN AT POST(1)

ANCHOR KEEPER PLATE (24 GA) PN: 15207G

ANCHOR PLATE WASHER ½" THICK PN: 15206G

1" ROUND WASHER F463 PN: 4902G

(2) ⅝" x 2 ½" HEX HD BOLT GR-5 PN: 105285G

ALTERNATE BLOCKOUT SEE GENERAL NOTE: 6

(2) ⅝" ROUND WASHER (WIDE) PN: 3240G

1" NUT PN: 3908G SHALL BE SECURELY TIGHTENED AFTER FINAL ASSEMBLY, BUT NOT DEFORMING THE KEEPER PLATE.

ANCHOR PADDLE PN: 15204A

(2) ⅝" HEX NUT A563 GR. DH PN: 3245G

W-BEAM FLATTENED (4 PLIES)

ANGLE STRUT PN: 15202G

SEE NOTE: A

(2) ¾" x 2 ½" HEX BOLT (TYP) PN: 3717G

(4) ¾" FLAT WASHER (TYP) PN: 3701G

(2) ¾" HEX NUT (TYP) PN: 3704G

6'-1 ⅜" POST DEPTH

(2) ANCHOR POST ANGLE PN: 15201G

DETAIL 3 AT POST(0)

6'-5 ⅜" (W6 X 15) I-BEAM POST PN: 15205A

TRAFFIC FLOW

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

LINE POST (3, 4, 5, 6, 7 & 8)

FINISHED GRADE

SECTION VIEW B-B

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

W-BEAM RAIL 25'-0"

6" X 8" X 14" BLOCKOUT WOOD

⅝" X 10" HGR POST BOLT PN: 3500G

⅝" HGR NUT PN: 3340G

POST HEIGHT 32"

31" RAIL HEIGHT

40"

POST(2)

FINISHED GRADE

SECTION VIEW A-A

6'-0" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15000G

NOTE: DO NOT BOLT ANCHOR RAIL PANEL TO POST(2)

POST 17"- ½" HEIGHT

4'- 9 ½"

13/16"DIA. YIELDING HOLES

40"

POST(1)

FRONT VIEW POST(1)

4'-9 ½" (W6 X 8.5)
(SYTP) I-BEAM POST PN: 15203G

NOTE: NO BLOCKOUT INSTALLED AT POST(1)

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

2'-0"

STANDARD MBGF

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX. RAIL OFFSET

APPROACH GRADING (1V:10H OR FLATTER) SEE PRODUCT ASSEMBLY MANUAL FOR ADDITIONAL GUIDANCE.

APPROACH GRADING AT GUARDRAIL END TREATMENTS

GENERAL NOTES

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

NOTE: A	THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-¾" MIN. TO 4" MAX. ABOVE FINISHED GRADE.
NOTE: B	PART PN: 5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN: 5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)
NOTE: C	W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN: 61G ANCHOR RAIL 25'-0" PN: 15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'- 0")
15205A	1	POST #0 - ANCHOR POST (6'- 5 ⅞")
15203G	1	POST #1 - (SYTP) (4'- 9 ½")
15000G	1	POST #2 - (SYTP) (6'- 0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 x 8.5) (6'- 0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" x 8" x 14")
6777B	7	BLOCKOUT - COMPOSITE (4" x 7 ½" x 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (½" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT
		HARDWARE
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR. DH
3717G	2	¾" x 2 ½" HEX BOLT A325
3701G	4	¾" ROUND WASHER F436
3704G	2	¾" HEAVY HEX NUT A563 GR. DH
3360G	16	⅝" x 1 ¼" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	⅝" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	⅝" x 10" HGR POST BOLT A307
3391G	1	⅝" x 1 ¾" HEX HD BOLT A325
4489G	1	⅝" x 9" HEX HD BOLT A325
4372G	4	⅝" WASHER F436
105285G	2	⅝" x 2 ½" HEX HD BOLT GR-5
105286G	1	⅝" x 1 ½" HEX HD BOLT GR-5
3240G	6	⅝" ROUND WASHER (WIDE)
3245G	3	⅝" HEX NUT A563 GR. DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

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

Texas Department of Transportation

Design Division Standard

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

FILE: sgt10s3116	DN: TxDOT	CK: KM	DW: VP	CK: MB/VP
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		96

DATE: 6/24/2021
FILE: c:\pwworking\aecom_ds16_na\janell.steigerwald@aecom.com\d0383261\sgt11s3118.dgn

(SEE GN NOTE 15)
STANDARD 31" MBGF

ITEM (6)
INNER SIDE SLIDER
(ISS) PANEL FOR RAIL 3

FIELD-SIDE
(RAIL 3)

NOTE:
RECESSED HEX NUTS FACING
TRAFFIC-SIDE **SEE DETAIL (C)**

REFERENCE LINE USED TO INSTALL
LINE POST(9) THRU POST(2)

POST 1 OFFSET DISTANCE MEASURED
7-⅝" FROM REFERENCE LINE

POST 9 POST 8 POST 7 POST 6 POST 5 POST 4 POST 3 POST 2

ITEM (10)
CABLE ASSEMBLY

ITEM (2)
GROUNDSTRUT

RAIL 4 RAIL 3 RAIL 2 RAIL 1

NO BLOCKOUT
AT (POST 1)

NOTES:
1. ITEM (12) COMPOSITE BLOCKOUTS INSTALLED AT LINE POST(9) THRU LINE POST(2).
2. DO NOT INSTALL A BLOCKOUT AT LINE POST(1).

PLAN VIEW

CABLES

ITEM (5)
TRAFFIC SIDE SLIDER
(TSS) PANEL FOR RAIL 2

NOTE: SECURE THE (TSS) PANEL TO OUTSIDE OF RAIL 2 WITH THE PANEL ARROWS POINTING TOWARDS THE HEAD.

INSTALL GUARD FENCE RECESSED
HEX NUTS ON TRAFFIC-SIDE

MBGF
RAIL 2

MBGF
RAIL 1

DETAIL (C)

TRAFFIC FLOW

ITEM (25)
MAX-TENSION HEAD
SEE DETAIL (A)

END PAYMENT (SGT) BY EACH

DO NOT BOLT
RAIL TO POST 6

BEGIN LENGTH OF NEED

INSTALLATION LENGTH 55'- ½"

49'-8 9/16"

6'-3" 6'-3" 6'-3" 6'- ¾" 6'-3" 6'-3" 6'-3" 37 ½" 5'-3 11/16"

RAIL
HEIGHT

31"

ARROWS

ITEM (13) RAIL 4

ITEM (13) RAIL 3

DETAIL (D)

ITEM (13) RAIL 2

ITEM (13) RAIL 1

RAIL
HEIGHT

31"

HEAD
HEIGHT

DETAIL (B)

32-¼"

FINISHED
GRADE

CABLES

FINISHED
GRADE

ITEM (10)
CABLE
ASSEMBLY

ITEM (2)
GROUNDSTRUT

68-⅛"

POST 9 POST 8 POST 7 POST 6 POST 5 POST 4 POST 3 POST 2

POST 1
ITEM (4)
I-BEAM
W6 X 9

NO BLOCKOUT
AT (POST 1)

(8) X-LITE LINE POST - ITEM (11)

ELEVATION VIEW

**SOIL
ANCHOR POST**
ITEM (1)

A

A

TSS PANEL
GALVANIZED
ITEM (5)

RSS PLATE
GALVANIZED
ITEM (8)

INSTALL THE TSS AND RSS
WITH THE ARROWS POINTING
TOWARDS THE MAX-HEAD

TSS PANEL AND RSS PLATE

DETAIL (D)

HEAD
HEIGHT

32-¼"

TOP OF POST

31-⅞"

FINISHED
GRADE

40-⅛"

68-⅛"
ANCHOR POST
DEPTH

ITEM (1)
ANCHOR

ITEM (11)
LINE POSTS
2 THRU 9
(NOTE: ITEM (4) POST 1 (NOT SHOWN),
TO BE INSTALLED AT SAME DEPTH
AS LINE POSTS.)

**SOIL ANCHOR, POST 1
& LINE POST 2 THRU 9**

SECTION VIEW A-A

NOTE:
USE THE MASH APPROVED
X-TENSION CABLE ASSEMBLY.

7 5/16"

2 ⅛"

UPPER CABLE
(BACK SIDE)

LOWER CABLE
(TRAFFIC SIDE)

DETAIL (B)

CABLE
FRICTION PLATE
HEAD UNIT
ITEM (9)

NOTE:
INSTALL ⅝" RECESSED HEX
NUTS ON TRAFFIC SIDE.

ITEM (24)

ITEM (21)

ITEM (20)
8X

ITEM (17)
8X

ITEM (23)
6X
3 SCREWS
EACH SIDE

(RAIL 1)

ITEM (22)
BRACKET
SHIPPED FLAT

ITEM (3)

ITEM (16)
4X

✳ ITEM (25)
HIGH INTENSITY
REFLECTIVE SHEETING

NOTE: DELINEATION MARKER IN
ACCORDANCE WITH TEXAS MUTCD.

SPLICE FOR IMPACT-HEAD
TO GUARD FENCE (RAIL1)

DETAIL (A)

✳ TO BE PROVIDED BY DISTRIBUTOR OR CONTRACTOR.

✳✳ ALTERNATIVE ITEMS NOT SHOWN.
ITEM(26) 8" WOOD-BLOCKOUTS
ITEM(27) 25'GUARD FENCE PANELS

APPROX 5'-10"

5'-0"

50' APPROACH GRADING

STANDARD
MBGF

2'-0"

EDGE OF PAVEMENT

NOTE: ADJUST WIDTH ACCORDINGLY WHEN OFFSET IS USED. (OFFSET "OPTION" SHOWN)

2'-0" MAX.
RAIL OFFSET

APPROACH GRADING
(1V:10H OR FLATTER)
SEE PRODUCT ASSEMBLY MANUAL
FOR ADDITIONAL GUIDANCE.

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

APPROACH GRADING AT GUARDRAIL END TREATMENTS

TRAFFIC FLOW

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

GENERAL NOTES

1. FOR SPECIFIC INFORMATION REGARDING INSTALLATION AND TECHNICAL GUIDANCE OF THE SYSTEM, CONTACT: LINDSAY TRANSPORTATION SOLUTIONS (LTS) - BARRIER SYSTEMS, INC. AT (707) 374-6800
2. FOR INSTALLATION, REPAIR, & MAINTENANCE REFER TO THE; MAX-TENSION INSTALLATION INSTRUCTION MANUAL. P/N MANMAX REV D (ECN 3516).
3. APPLY HIGH INTENSITY REFLECTIVE SHEETING, "OBJECT MARKER" ON THE FRONT FACE OF THE DEVICE PER MANUFACTURE'S RECOMMENDATIONS. OBJECT MARKER SHALL CONFORM TO THE STANDARDS REQUIRED IN TEXAS MUTCD.
4. FOR POST (LEAVE-OUT) INSTALLATION AND GUIDANCE SEE TXDOT'S LATEST ROADWAY MOW STRIP STANDARD.
5. ALL STEEL COMPONENTS ARE GALVANIZED PER ASTM A123 OR EQUIVALENT UNLESS OTHERWISE STATED.
6. SYSTEM SHOWN USING STEEL WIDE FLANGE POST WITH COMPOSITE BLOCKOUTS.
7. COMPOSITE MATERIAL BLOCKOUT THAT MEETS THE REQUIREMENTS OF DMS-7210, MAY BE SUBSTITUTED FOR BLOCKOUTS SIMILAR DIMENSIONS. SEE CONSTRUCTION DIVISION MATERIAL PRODUCER LIST(MPL)FOR CERTIFIED PRODUCERS.
8. REFER TO INSTALLATION MANUAL FOR SPECIFIC PANEL LAPPING GUIDANCE.
9. IF SOLID ROCK IS ENCOUNTERED SEE THE MANUFACTURER'S INSTALLATION MANUAL FOR INSTALLATION GUIDANCE.
10. POSTS SHALL NOT BE SET IN CONCRETE.
11. A DRIVING CAP WITH A TIMBER OR PLASTIC INSERT SHALL BE USED WHEN DRIVING POST TO PREVENT DAMAGE TO THE GALVANIZING ON TOP OF THE POST.
12. MAX-TENSION SYSTEM SHALL NEVER BE INSTALLED WITHIN A CURVED SECTION OF GUARDRAIL.
13. IF A DELINEATION MARKER IS REQUIRED, MARKER SHALL BE IN ACCORDANCE WITH TEXAS MUTCD.
14. THE SYSTEM IS SHOWN WITH 12'-6" MBGF PANELS, 25'-0" MBGF PANELS ARE ALSO ALLOWED.
15. A MINIMUM OF 12'-6" OF 12GA. MBGF IS REQUIRED IMMEDIATELY DOWNSTREAM OF THE MAX-TENSION SYSTEM.

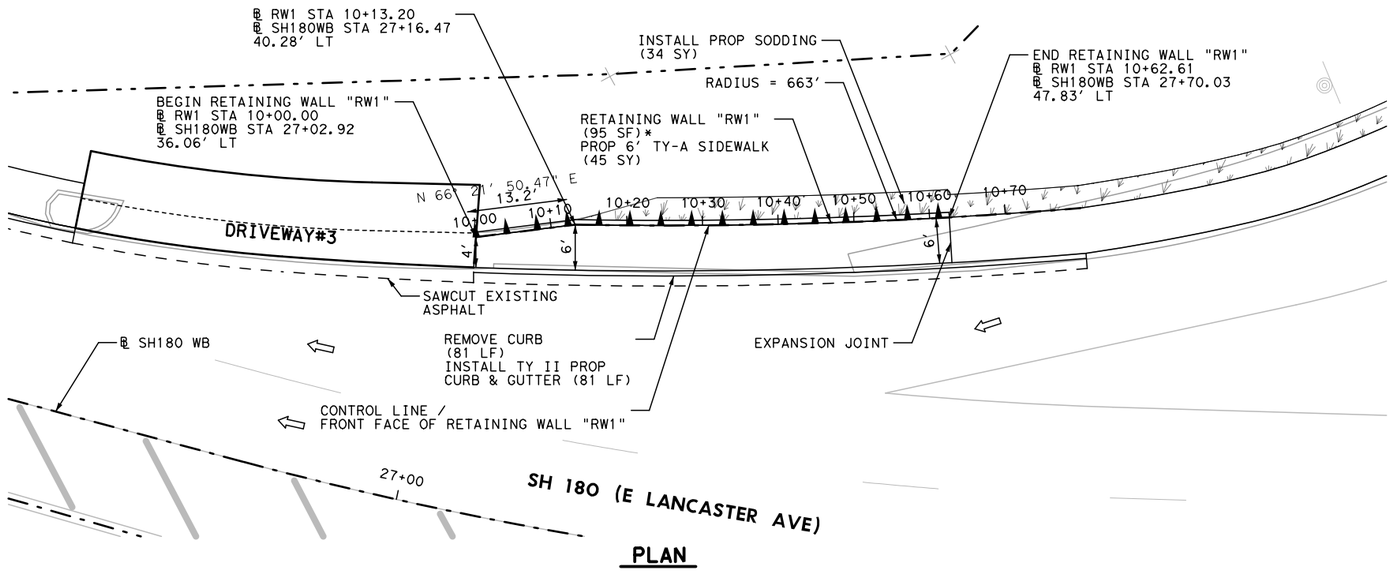
ITEM #	PART NUMBER	DESCRIPTION	QTY
1	BSI-1610060-00	SOIL ANCHOR - GALVANIZED	1
2	BSI-1610061-00	GROUND STRUT - GALVANIZED	1
3	BSI-1610062-00	MAX-TENSION IMPACT HEAD	1
4	BSI-1610063-00	W6x9 I-BEAM POST 6FT.-GALVANIZED	1
5	BSI-1610064-00	TSS PANEL - TRAFFIC SIDE SLIDER	1
6	BSI-1610065-00	ISS PANEL - INNER SIDE SLIDER	1
7	BSI-1610066-00	TOOTH - GEOMET	1
8	BSI-1610067-00	RSS PLATE - REAR SIDE SLIDER	1
9	B061058	CABLE FRICTION PLATE - HEAD UNIT	1
10	BSI-1610069-00	CABLE ASSEMBLY - MASH X-TENSION	2
11	BSI-1012078-00	X-LITE LINE POST-GALVANIZED	8
12	B090534	8" W-BEAM COMPOSITE-BLOCKOUT XT110	8
13	BSI-4004386	12'-6" W-BEAM GUARD FENCE PANELS 12GA.	4
14	BSI-1102027-00	X-LITE SQUARE WASHER	1
15	BSI-2001886	⅝" X 7" THREAD BOLT HH (GR.5)GEOMET	1
16	BSI-2001885	¾" X 3" ALL-THREAD BOLT HH (GR.5)GEOMET	4
17	4001115	⅝" X 1 ¼" GUARD FENCE BOLTS (GR.2)MGAL	48
18	2001840	⅝" X 10" GUARD FENCE BOLTS MGAL	8
19	2001636	⅝" WASHER F436 STRUCTURAL MGAL	2
20	4001116	⅝" RECESSED GUARD FENCE NUT (GR.2)MGAL	59
21	BSI-2001888	⅝" X 2" ALL THREAD BOLT (GR.5)GEOMET	1
22	BSI-1701063-00	DELINEATION MOUNTING (BRACKET)	1
23	BSI-2001887	¼" X ¾" SCREW SD HH 410SS	7
24	4002051	GUARDRAIL WASHER RECT AASHTO FWR03	1
✳ 25	SEE NOTE BELOW	HIGH INTENSITY REFLECTIVE SHEETING	1
✳✳ 26	4002337	8" W-BEAM TIMBER-BLOCKOUT, PDB01B	8
✳✳ 27	BSI-4004431	25' W-BEAM GUARDRAIL PANEL,8-SPACE,12GA.	2
28	MANMAX Rev-(D)	MAX-TENSION INSTALLATION INSTRUCTIONS	1

Texas Department of Transportation

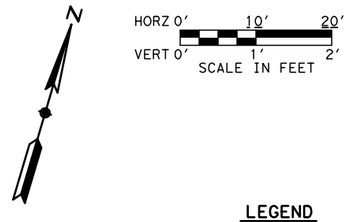
Design Division Standard

MAX-TENSION END TERMINAL
MASH - TL-3
SGT(11S)31-18

FILE: sgt11s3118.dgn	DN: TxDOT	CK: KM	DW: TxDOT	CK: CL
© TxDOT: FEBRUARY 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		96A



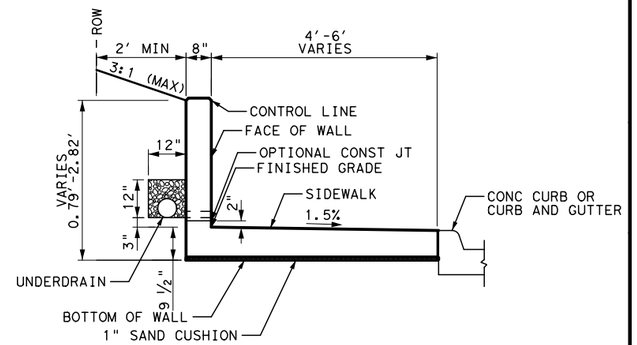
PLAN



LEGEND

— - - EXISTING ROW

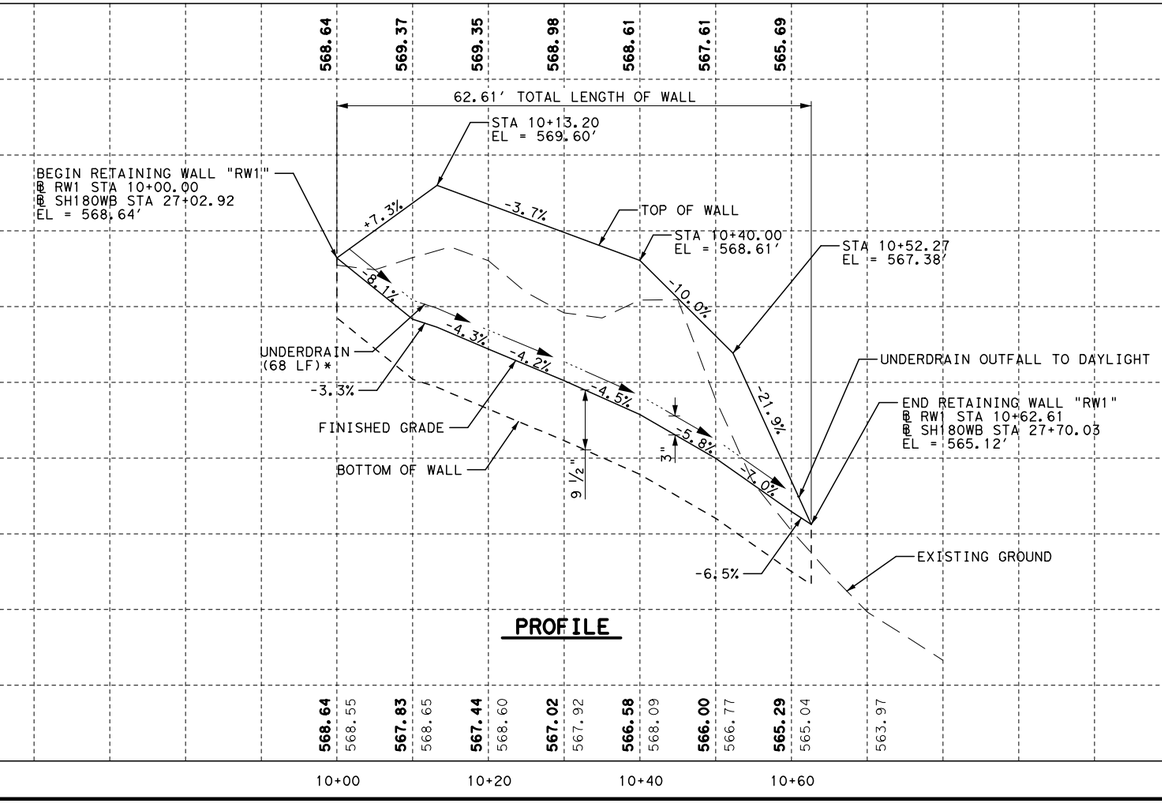
⇦ TRAFFIC FLOW



TYPICAL SECTION

NOT TO SCALE
*SEE STANDARD CSWD (FTW)

*PROVIDED FOR CONTRACTOR'S INFORMATION ONLY



PROFILE

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

AECOM
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(214) 741-7777

SH 180
SIDEWALK CORRIDOR
RETAINING WALL PLAN AND PROFILE

RETAINING WALL "RW1"

SHEET 1 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		97

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

DATE: 5/18/2021 5:26:52 PM
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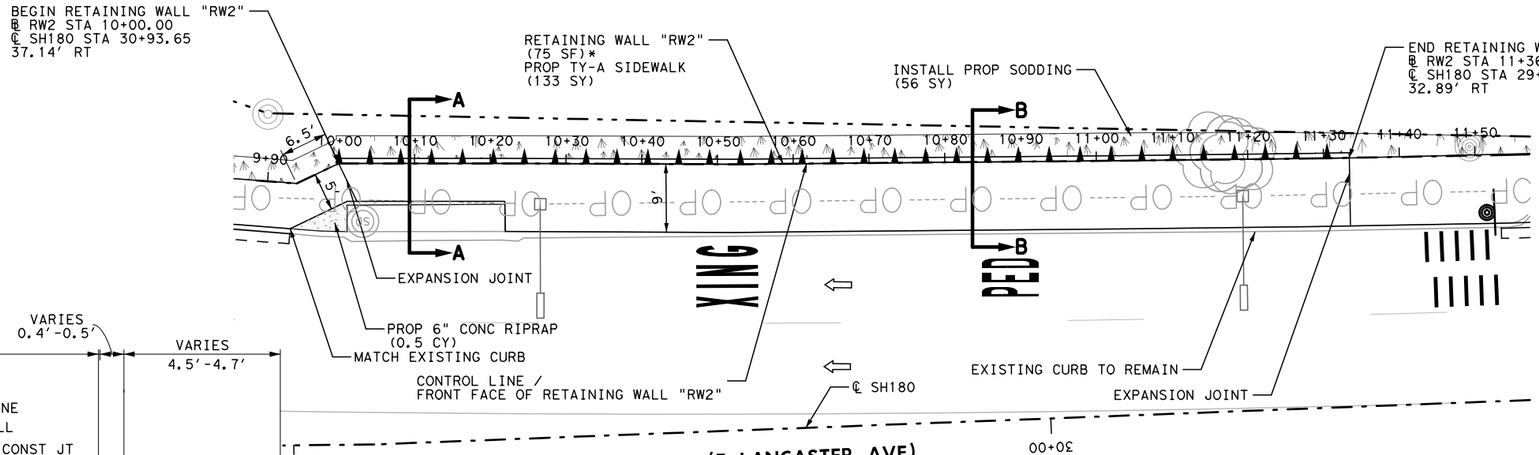


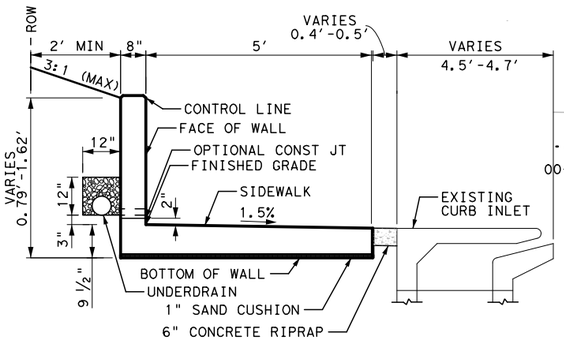
PLAN

HORZ 0' 10' 20'
VERT 0' 1' 2'
SCALE IN FEET

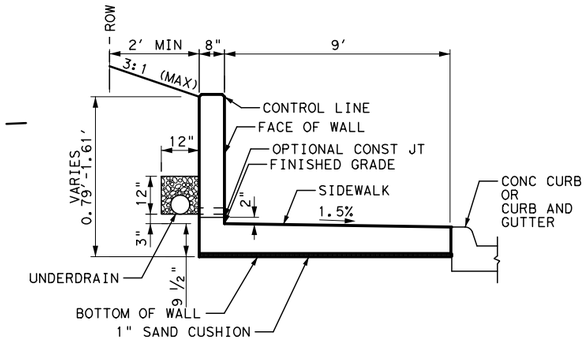
N

LEGEND

- - - EXISTING ROW
⇦ TRAFFIC FLOW

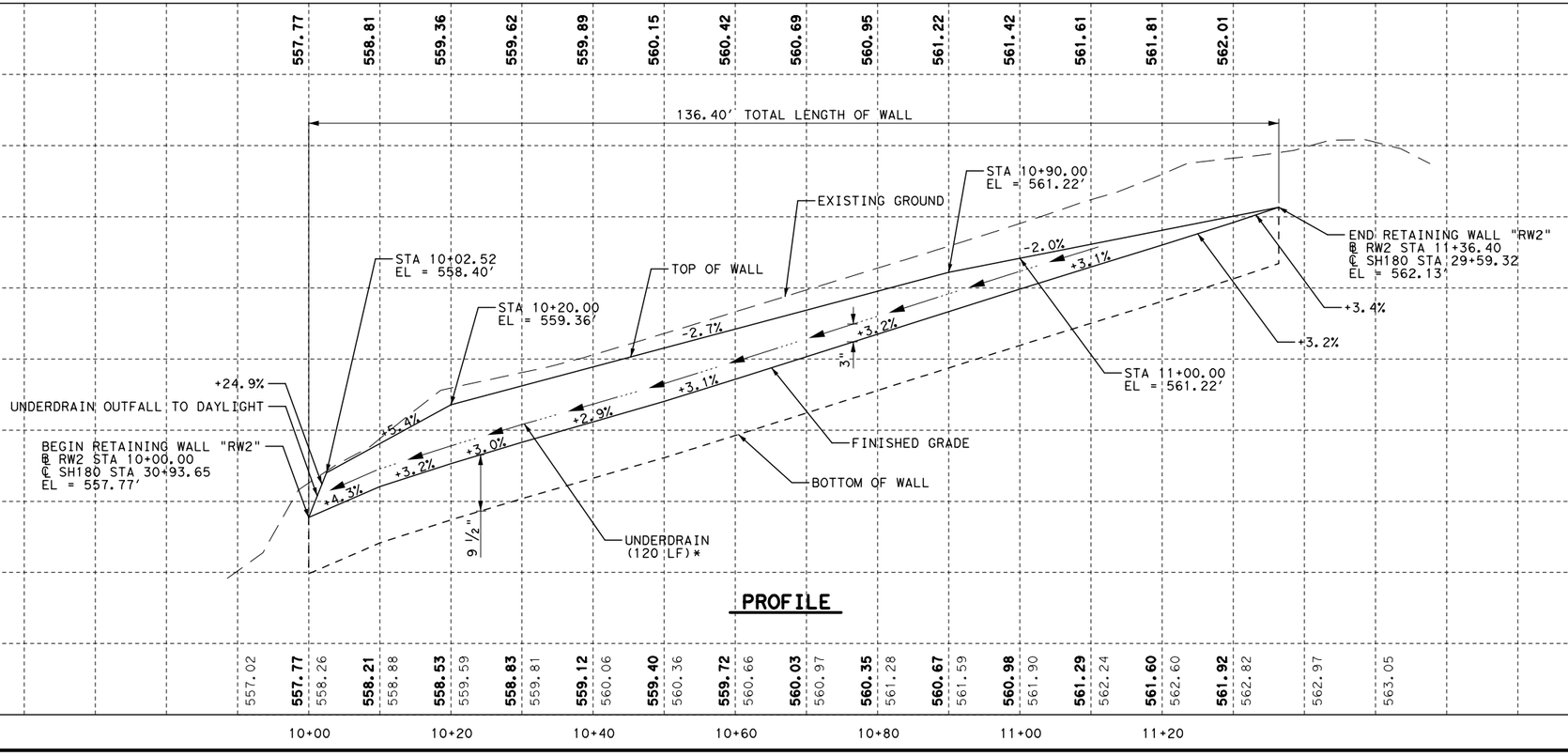


TYPICAL SECTION A-A
STA 10+00.00 TO STA 10+21.93
NOT TO SCALE
*SEE STANDARD CSWD (FTW)



TYPICAL SECTION B-B
STA 10+21.93 TO STA 11+36.40
NOT TO SCALE
*SEE STANDARD CSWD (FTW)

*PROVIDED FOR CONTRACTOR'S INFORMATION ONLY



PROFILE

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

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SH 180
SIDEWALK CORRIDOR
RETAINING WALL PLAN AND PROFILE

RETAINING WALL "RW2"

SHEET 2 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		98

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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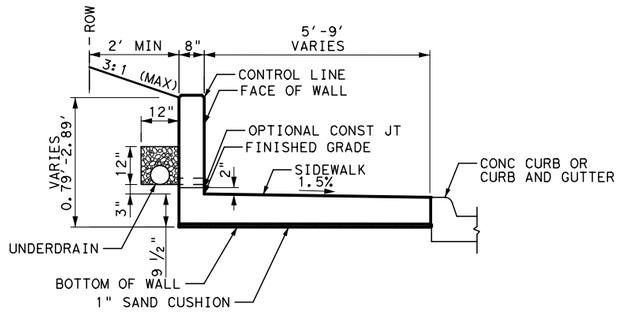
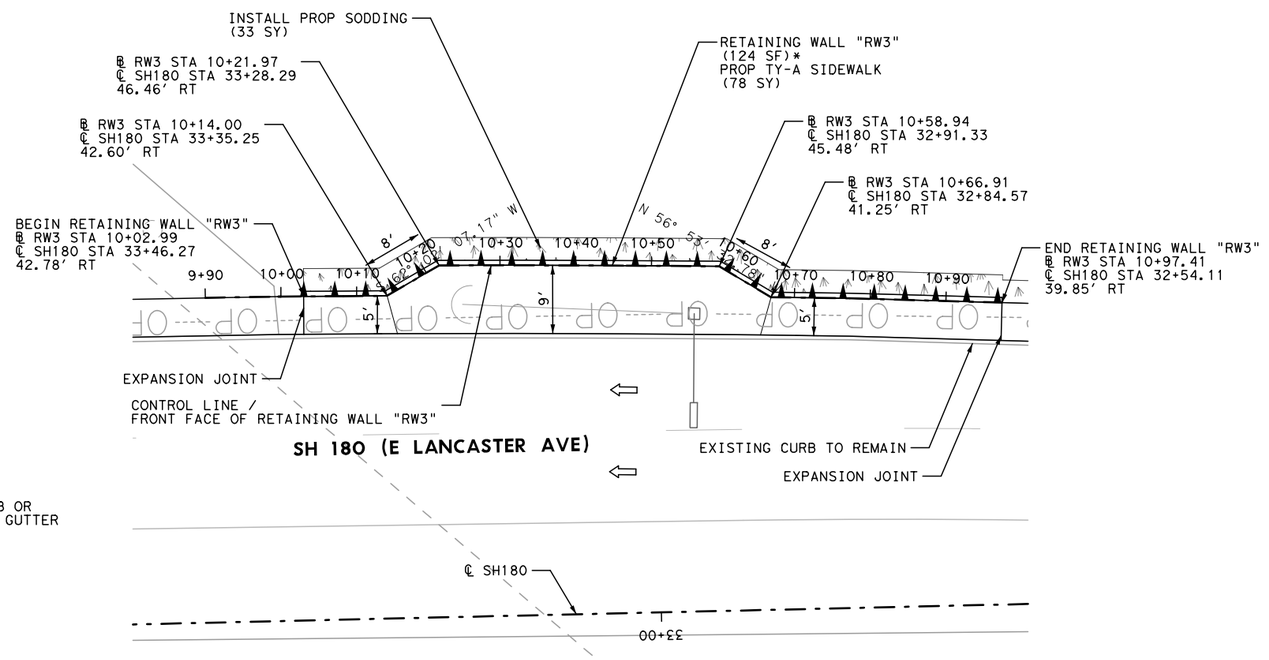
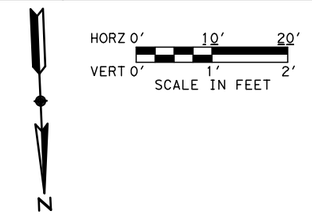


TYPICAL SECTION

NOT TO SCALE
*SEE STANDARD CSWD (FTW)



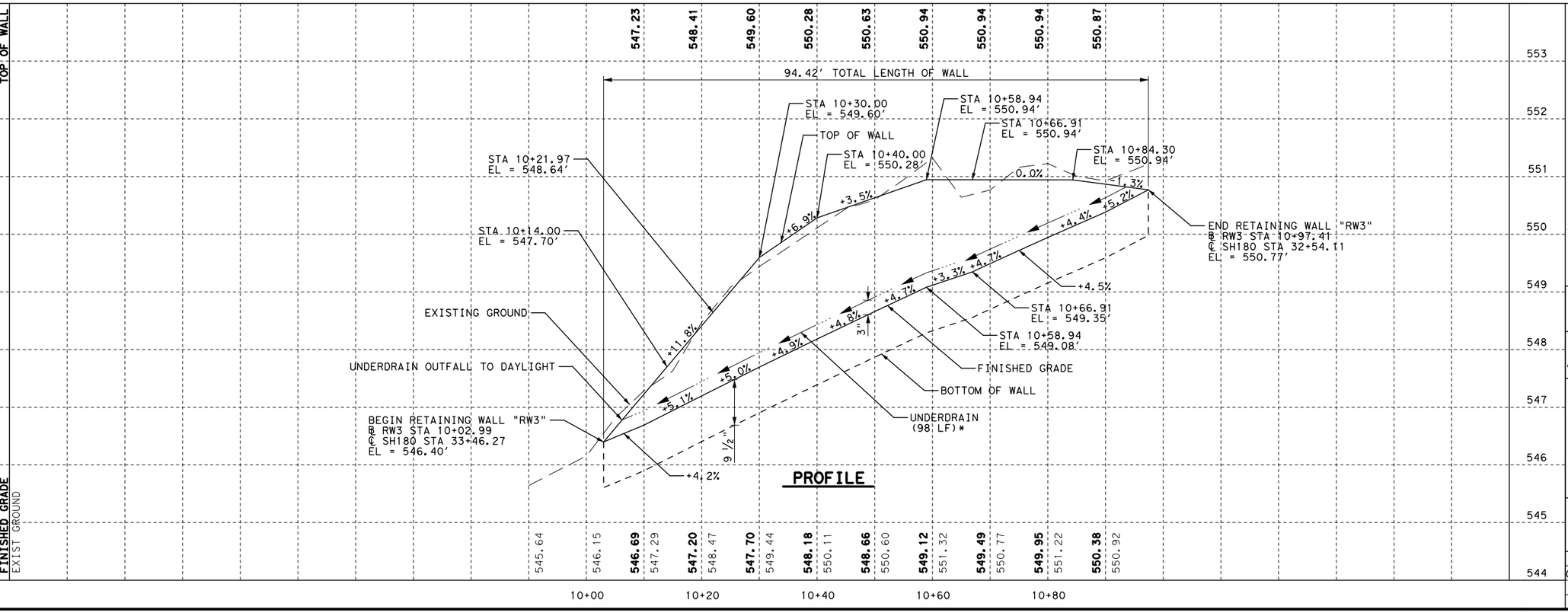
PLAN



LEGEND

— - - EXISTING ROW
⇦ TRAFFIC FLOW

*PROVIDED FOR CONTRACTOR'S INFORMATION ONLY



PROFILE

STATE OF TEXAS
CARLA VERRANDO
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LICENSED
5/18/2021

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SH 180
SIDEWALK CORRIDOR
RETAINING WALL PLAN AND PROFILE

RETAINING WALL "RW3"

SHEET 3 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		99

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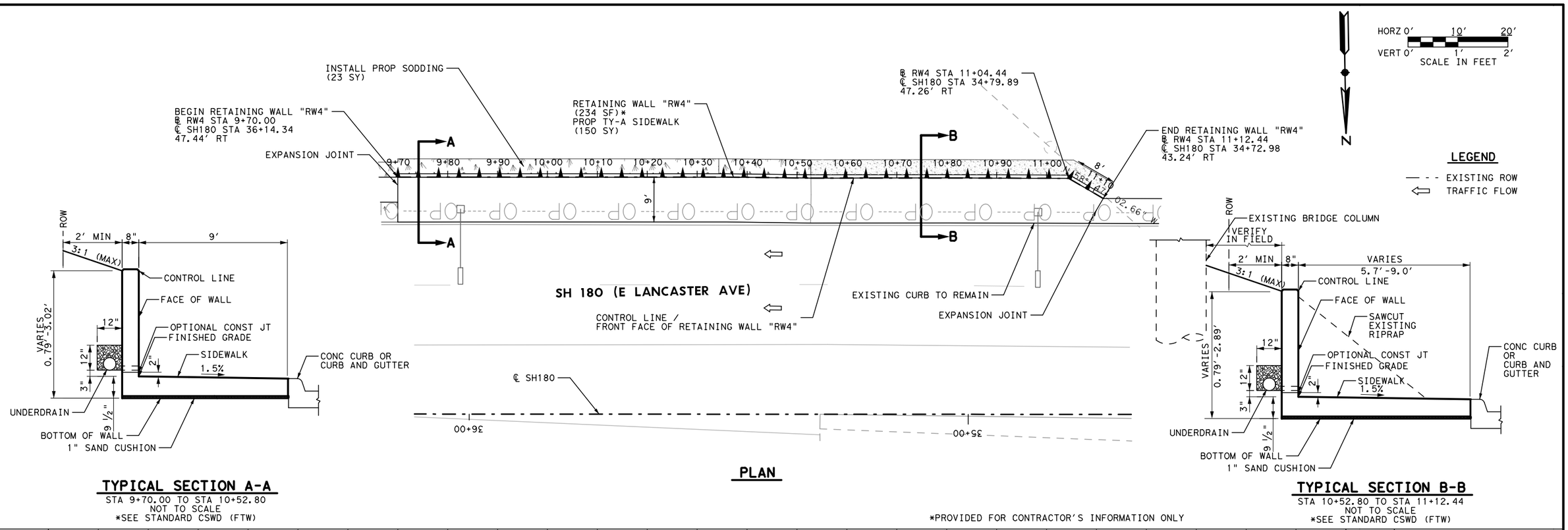
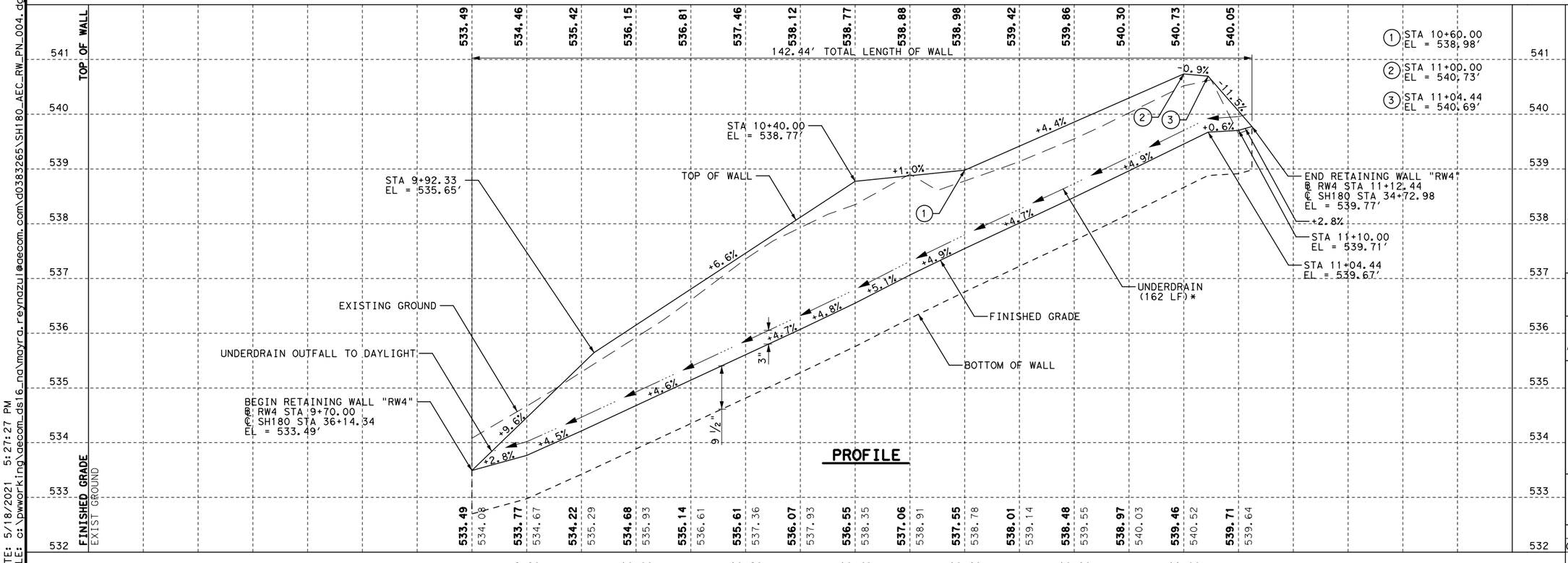
DW: AECOM
CK: AECOM
DN: AECOM



*PROVIDED FOR CONTRACTOR'S INFORMATION ONLY



CARLA VERRANDO
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5/18/2021

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SH 180
SIDEWALK CORRIDOR
RETAINING WALL PLAN AND PROFILE

RETAINING WALL "RW4"

SHEET 4 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180

DIST	COUNTY	SHEET NO.
FTW	TARRANT	100

DATE: 5/18/2021 5:27:27 PM
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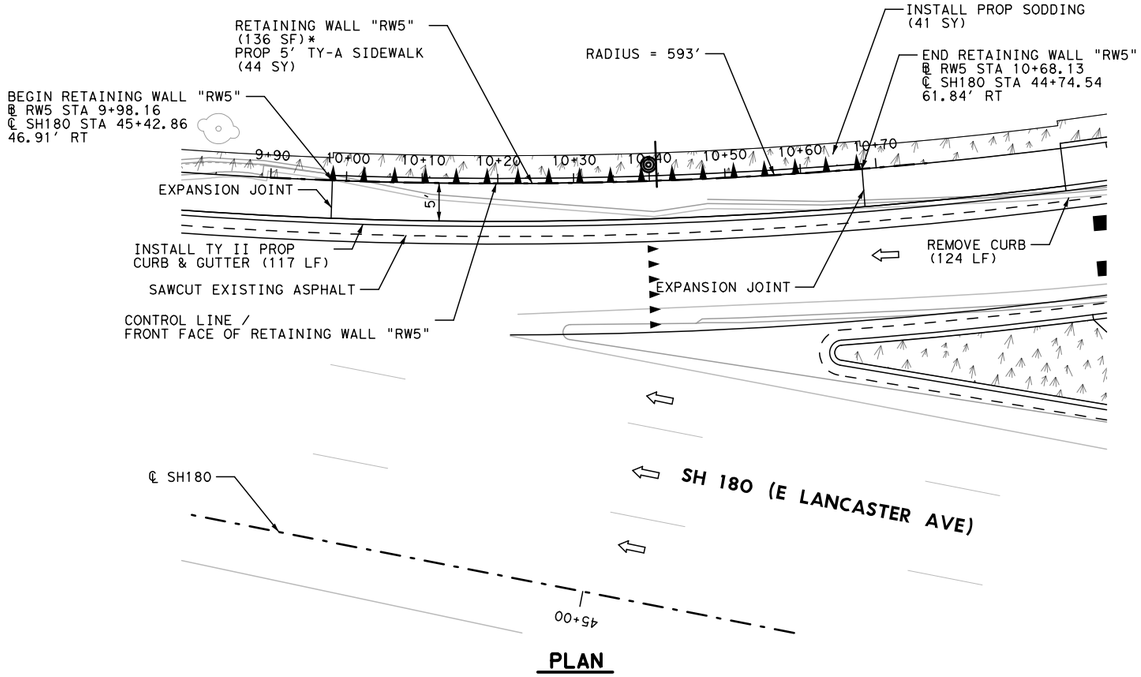
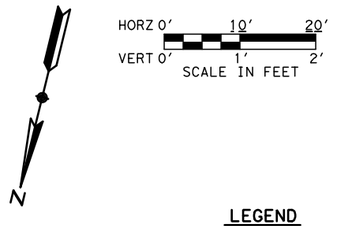
DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda



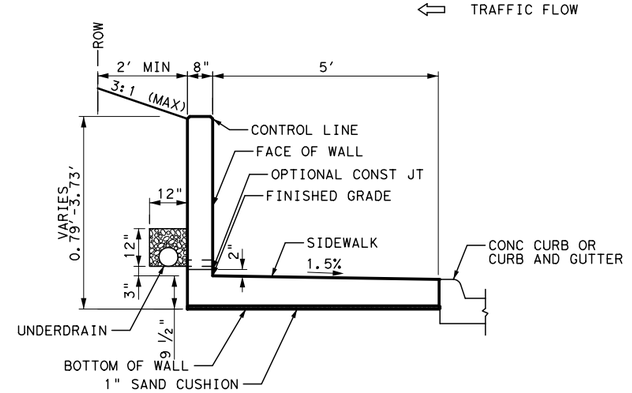
PLAN



LEGEND

— - - EXISTING ROW

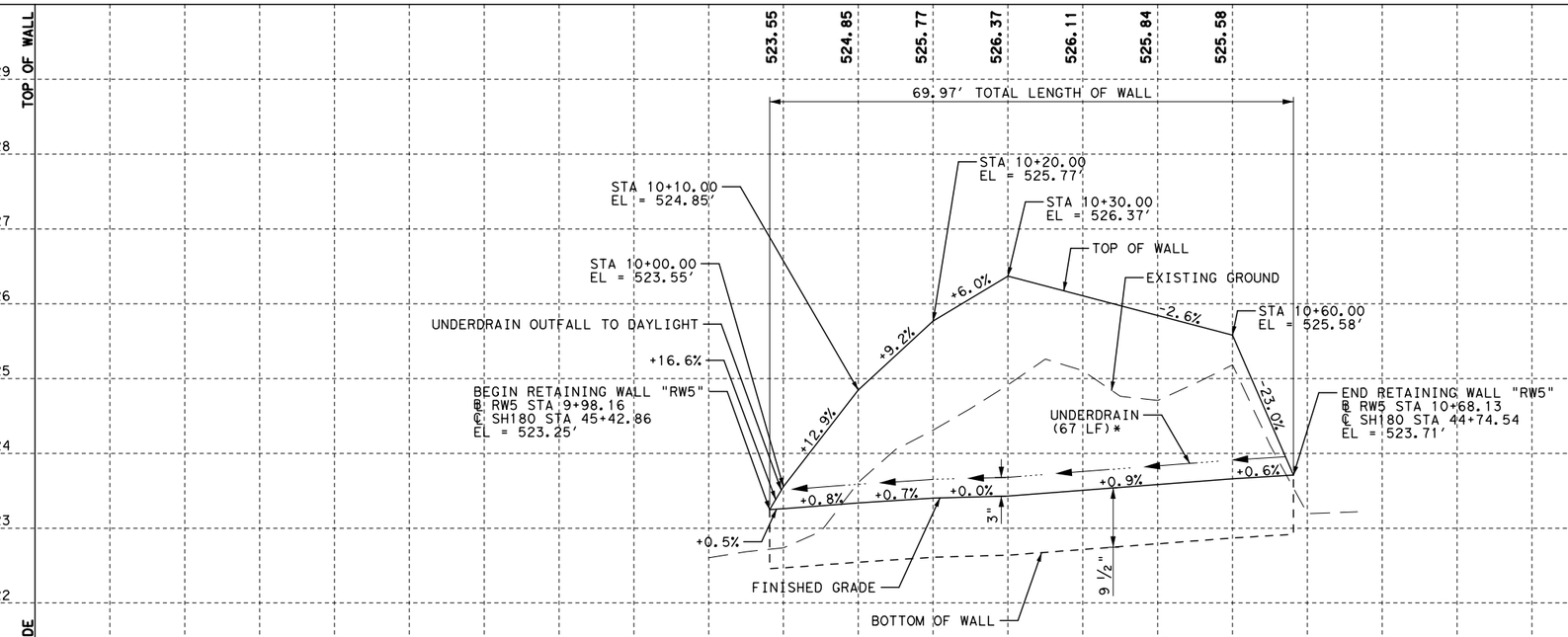
⇦ TRAFFIC FLOW



TYPICAL SECTION

NOT TO SCALE
*SEE STANDARD CSWD (FTW)

*PROVIDED FOR CONTRACTOR'S INFORMATION ONLY



PROFILE

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/18/2021

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SH 180
SIDEWALK CORRIDOR
RETAINING WALL PLAN AND PROFILE

RETAINING WALL "RW5"

SHEET 5 OF 5

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		101

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

DATE: 5/18/2021 5:27:37 PM
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DN: AECOM | CK: AECOM | DW: AECOM | CK: AECOM Lynda

DATE: 5/25/2021 6:39:48 PM
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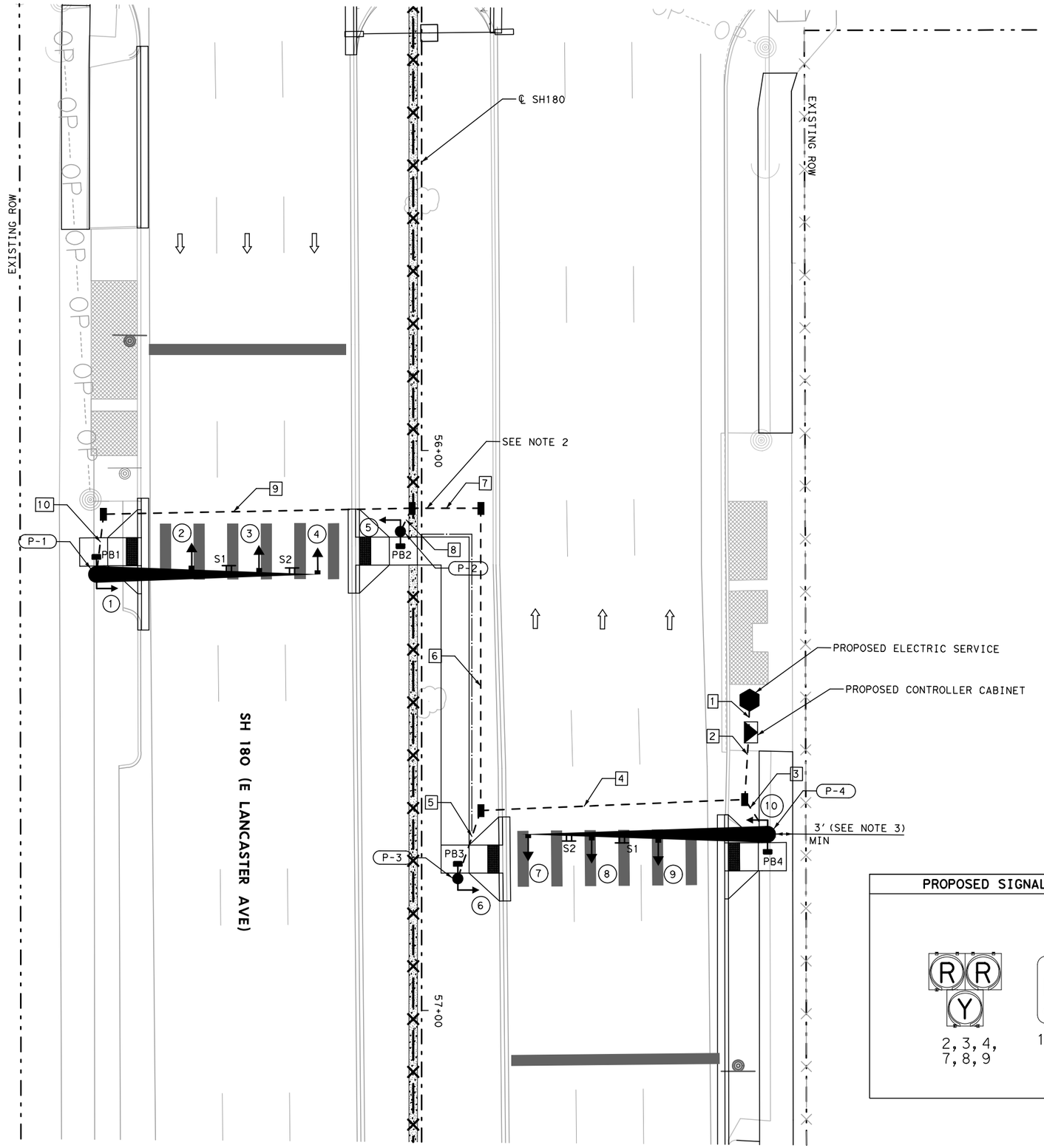


PROPOSED SIGNS

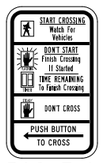
S1

R9-8
36"X18"

S2

R10-23
24"X30"

PB1, PB2,
PB3, PB4



R10-3eL
9"X15"

N

0' 10' 20'
SCALE IN FEET

LEGEND

- ELECTRICAL SERVICE
- CONTROLLER/CABINET
- TYPE D GROUND BOX
- PEDESTAL POLE
- STEEL POLE AND MAST ARM
- PROPOSED SIGNAL HEAD
- LED PED SIGNAL HEAD
- PUSHBUTTON
- POLE / ARM MOUNTED SIGN
- CONDUIT
- TRAFFIC FLOW

NOTES:

1. SH 180 SPEED LIMIT 40 MPH
2. CONTRACTOR SHALL ENSURE THAT PROPOSED CONDUIT RUN 7 DOES NOT CONFLICT WITH PROPOSED FENCE POST LOCATIONS
3. ENSURE MINIMUM OF 3 FT CLEAR SIDEWALK WIDTH BETWEEN SIGNAL FOUNDATION AND BACK OF SIDEWALK
4. SEE SHEETS 121 AND 123 FOR SMA-80(1)-12 AND TS-FD-12

PROPOSED SIGNAL HEADS

2, 3, 4,
7, 8, 9

1, 5, 6, 10

STATE OF TEXAS
AMBER HECKMANN
123567
LICENSED
PROFESSIONAL ENGINEER
5/25/2021

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13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
PEDESTRIAN HYBRID BEACON LAYOUT

SHEET 1 OF 2

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		102

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

DATE: 5/18/2021 5:27:50 PM
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PROPOSED SIGNS

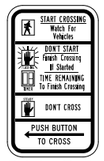
S1

R9-8
36"X18"

S2

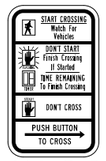
R10-23
24"X30"

PB1, PB4



R10-3eL
9"X15"

PB2, PB3

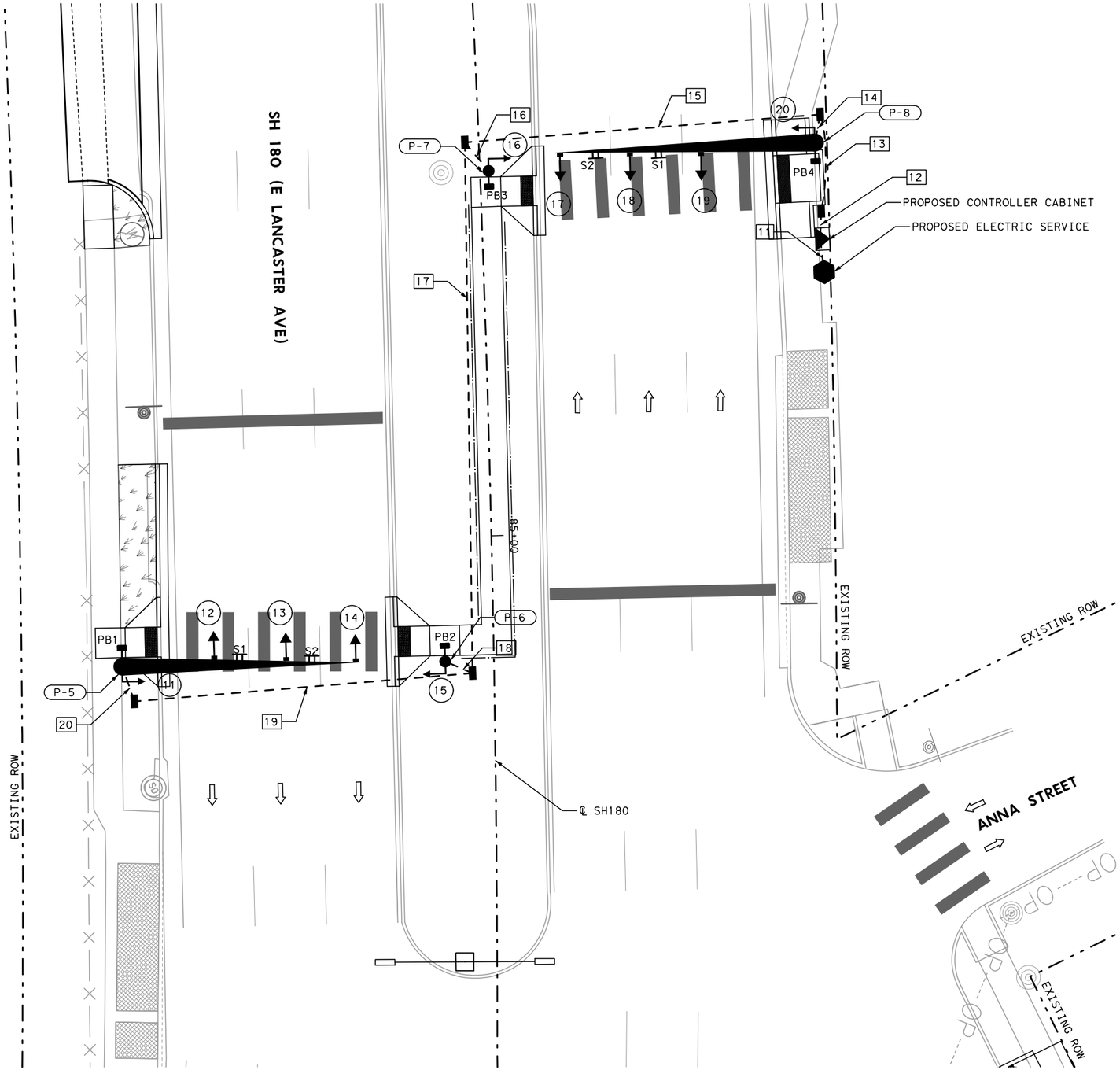


R10-3eR
9"X15"

PROPOSED SIGNAL HEADS

12, 13, 14,
17, 18, 19

11, 15,
16, 20



0′ 10′ 20′
SCALE IN FEET

LEGEND

- ELECTRICAL SERVICE
- CONTROLLER/CABINET
- TYPE D GROUND BOX
- PEDESTAL POLE
- STEEL POLE AND MAST ARM
- PROPOSED SIGNAL HEAD
- LED PED SIGNAL HEAD
- PUSHBUTTON
- POLE / ARM MOUNTED SIGN
- CONDUIT
- TRAFFIC FLOW

NOTES:

1. SH 180 SPEED LIMIT 40 MPH
2. SEE SHEETS 121 AND 123 FOR SMA-80(1)-12 AND TS-FD-12

STATE OF TEXAS
AMBER HECKMANN
123567
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SH 180
SIDEWALK CORRIDOR
PEDESTRIAN HYBRID BEACON LAYOUT

SHEET 2 OF 2

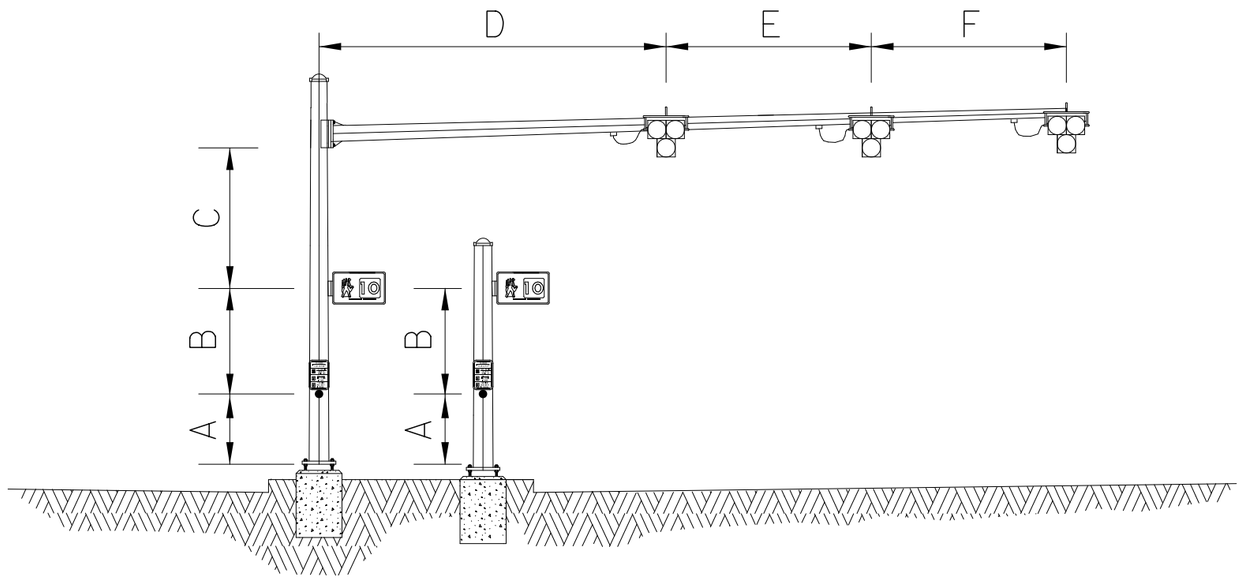
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		103

SIGNAL POLE/ARM CONDUCTOR QUANTITIES(LF)										
POLE	TYPE	LENGTH (FT)						HEADS SIG	HEADS PED	PUSH BUTTON
		A	B	C	D	E	F	7C#14	5C#14	2C#12
P-1	40-80	4	6	8	16	12	12	138	10	4
P-2	PED	4	6						10	4
P-3	PED	4	6						10	4
P-4	44-80	4	6	8	20	12	12	150	10	4
P-5	40-80	4	6	8	16	12	12	138	10	4
P-6	PED	4	6						10	4
P-7	PED	4	6						10	4
P-8	44-80	4	6	8	20	12	12	150	10	4
						TOTALS (LF)		576	80	32

ELECTRICAL SCHEDULE									
RUN NO.	CONDUIT (SCH 40) 2"	CONDUIT (SCH 40) 3"		LENGTH (FT)	GROUND #6	POWER 1C#6	SIGNAL 7C#14	PED 5C#14	APS 2C#12
	T	T	B		BARE	AWG	AWG	AWG	AWG
1	1			10	1	2			
2		1		15	1		2	4	4
3		1		10	1		1	1	1
4			1	50	1		1	3	3
5		1		15	1			1	1
6		1		55	1		1	2	2
7		1		15	1		1	2	2
8		1		5	1			1	1
9			1	55	1		1	1	1
10		1		15	1		1	1	1
11	1			10	1	2			
12		1		5	1		2	4	4
13		1		20	1		2	4	4
14		1		5	1		1	1	1
15			1	60	1		1	3	3
16		1		10	1			1	1
17		1		90	1		1	2	2
18		1		5	1			1	1
19			1	60	1		1	1	1
20		1		10	1		1	1	1
TOTALS(LF)	20	275	225		520	40	505	1000	1000

NOTES: 1. "T" = TRENCHED; "B" = BORED
2. TOTALS DO NOT INCLUDE QUANTITIES INSIDE THE SIGNAL POLE.



T.S. PED

ELECTRICAL SERVICE DATA												
LOCATION	PLAN SHEET NUMBER	ELECTRICAL SERVICE DESCRIPTION (SEE ED(5)-14)	SERVICE CONDUIT SIZE (RMC)	SERVICE CONDUCTORS	SAFETY SWITCH AMPS	MAIN DISCONNECT CKT. BRK. POLE/AMP	TWO-POLE CONTACTOR AMPS	PANEL BOARD LOAD CENTER AMP RATING	CIRCUIT NO.	BRANCH CKT. BRK. POLE/AMPS	BRANCH CIRCUIT AMPS	KVA LOAD
GRAFTON ST		ELC SRV TY D 120/240 070(NS)SS(E)SP(O)	1 1/2 "	3/#4	N/A	2P/70	N/A	70	SIGNAL CONTROLLER	1P/50	40	4.80
ANNA ST		ELC SRV TY D 120/240 070(NS)SS(E)SP(O)	1 1/2 "	3/#4	N/A	2P/70	N/A	70	SIGNAL CONTROLLER	1P/50	40	4.80

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SH 180
SIDEWALK CORRIDOR
PEDESTRIAN HYBRID BEACON TABLES

SHEET 1 OF 1

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		104

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda
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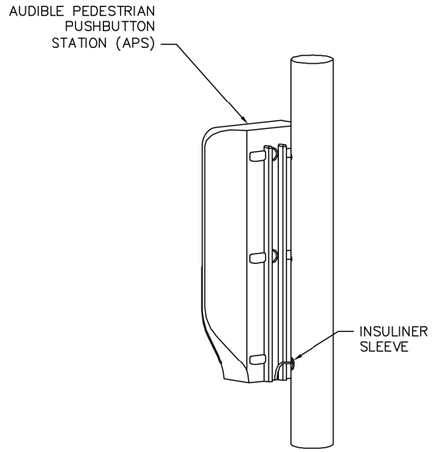
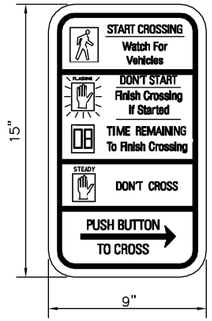
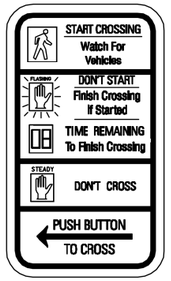


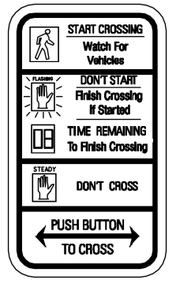
WIRE ROUTING
PERSPECTIVE VIEW



R10-3e (RIGHT)

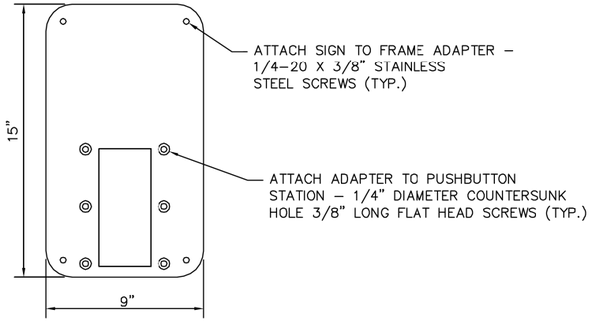


R10-3e (LEFT)



R10-3e (MOD.)

PEDESTRIAN PUSHBUTTON
INSTRUCTIONAL SIGN



PEDESTRIAN PUSHBUTTON
FRAME ADAPTER

AUDIBLE PEDESTRIAN SIGNAL NOTES:

1. APS PUSHBUTTON STATIONS SHOULD BE LOCATED IN ACCORDANCE WITH THE PROVISIONS OF SECTION 4E.08 OF THE TEXAS MUTCD

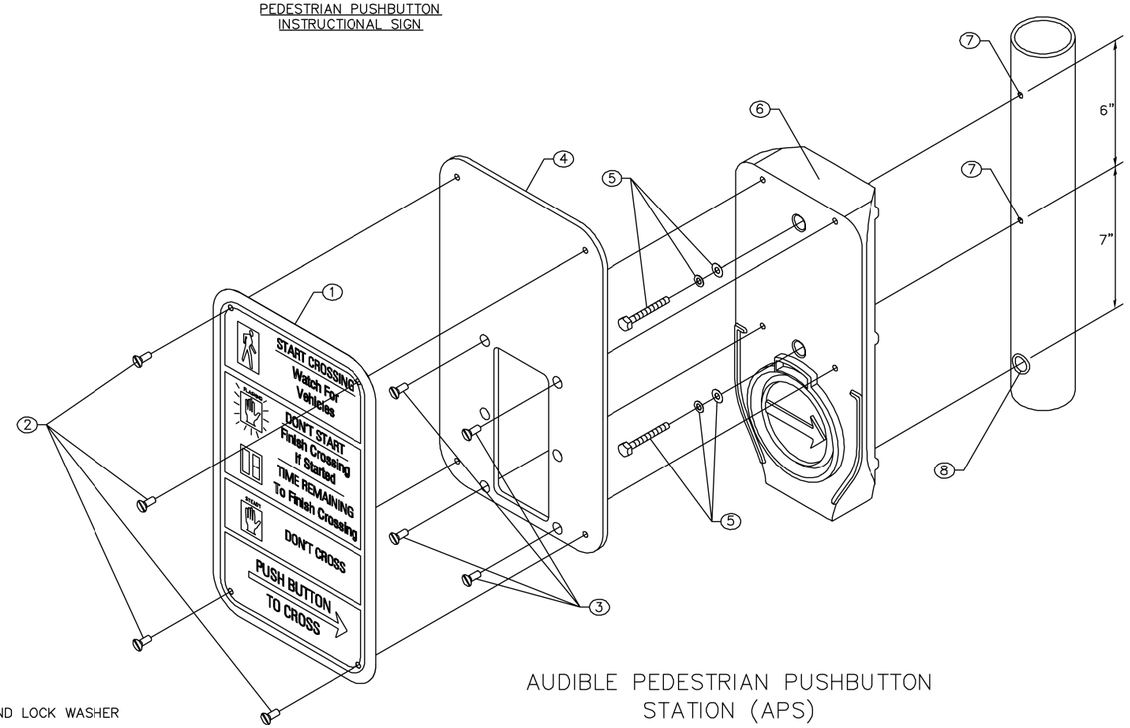
2. APS PUSHBUTTON STATIONS SHALL COMPLY WITH THE US ACCESS BOARD'S "DRAFT GUIDELINES FOR ACCESSIBLE PUBLIC RIGHTS OF WAY" (PROWAG) SECTION R 306.

3. APS PUSHBUTTON STATIONS INCLUDE A PEDESTRIAN SIGN, A PUSHBUTTON, VIBROTACTILE ARROW AND AN AUDIBLE SPEAKER CONTAINED IN ONE UNIT WITH THE FOLLOWING FEATURES:

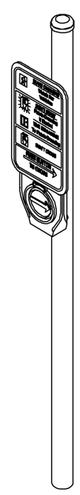
   3.1. VIBRATING TACTILE ARROW WITH HIGH VISUAL CONTRAST
   3.2. PUSHBUTTON LOCATOR TONE
   3.3. SPEECH WALK MESSAGE FOR THE WALKING PERSON INDICATION
   3.4. SPEECH PUSHBUTTON INFORMATION MESSAGE
   3.5. 9" X 15" PEDESTRIAN SIGN
   3.6. AUDIBLE TONE WALK INDICATIONS
   3.7. AUTOMATIC TONE WALK INDICATIONS
   3.8. AUTOMATIC VOLUME ADJUSTMENT
   3.9. PUSHBUTTON MUST BE ADA COMPLIANT AND ACTIVATE BOTH THE WALK INTERVAL AND ACCESSIBLE PEDESTRIAN SIGNAL.
   3.10. ACTUATION INDICATOR–TONE AND LIGHT
   3.11. EXTENDED BUTTON PRESS WHICH CAN BE USED TO REQUEST A LOUDER WALK SIGNAL AND LOCATOR TONE
   3.12. WEATHER–RESISTANT SPEAKER PROTECTED BY A VANDAL RESISTANT SCREEN

KEY:

① FACE PLATE
② 1/4"–20 X 3/8" LONG STAINLESS STEEL SCREW
③ 1/4"–20 STAINLESS STEEL SCREWS
④ PUSHBUTTON FRAME ADAPTER
⑤ 1/4"–20 STAINLESS STEEL BOLT W/ WASHER AND LOCK WASHER
⑥ PUSHBUTTON STATION
⑦ DRILL AND TAP SHAFT FOR 1/4" DIAM. BOLT
⑧ DRILL AND TAP SHAFT FOR 5/8" WIRE GUIDE HOLE – ADD INSULINER



AUDIBLE PEDESTRIAN PUSHBUTTON
STATION (APS)
METAL POLE INSTALLATION



ISOMETRIC VIEW
(5' PUSH BUTTON POLE SHOWN)

STATE OF TEXAS
AMBER HECKMANN
123567
LICENSED
PROFESSIONAL ENGINEER
5/18/2021

FORT WORTH

CITY OF FORT WORTH, TEXAS
AUDIBLE PEDESTRIAN PUSHBUTTON STATION (APS) DETAILS
SHEET 1 OF 2

DATE: 11-11-2013
34 41 10-D673

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		105

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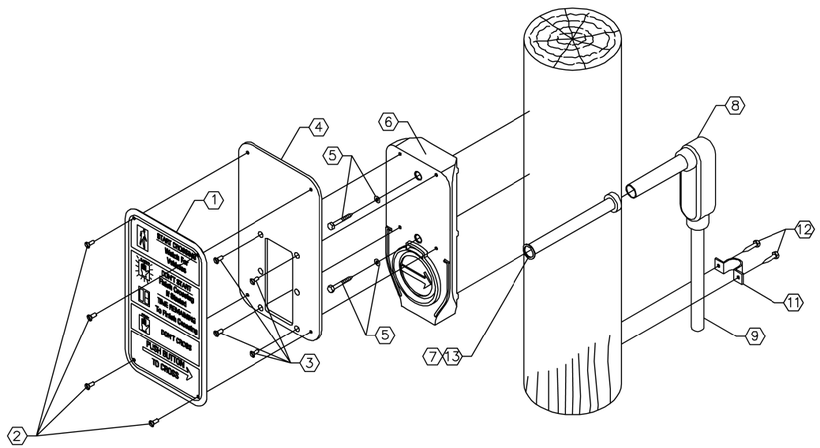
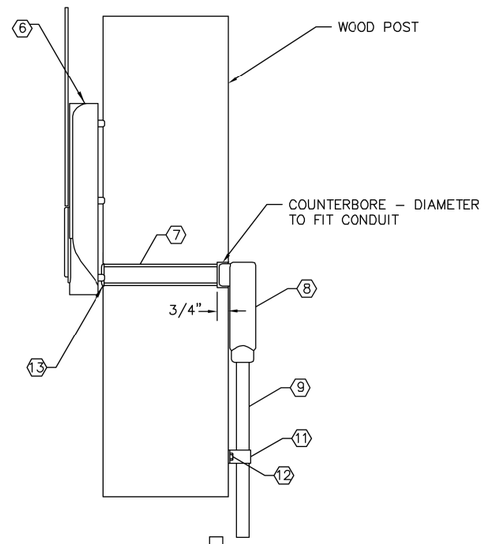
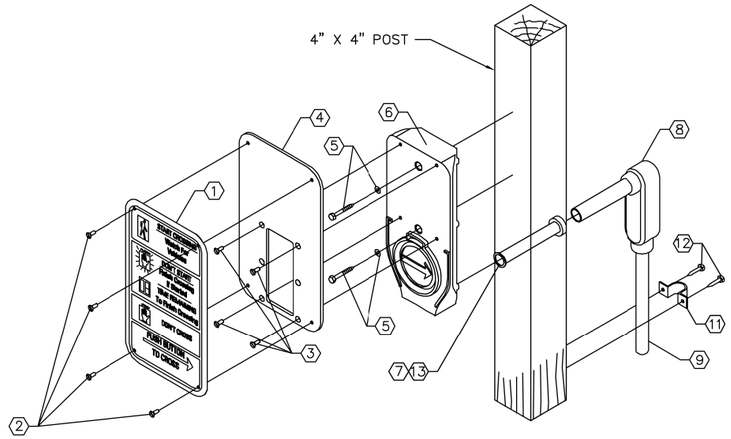


WOOD POLE INSTALLATION
ALTERNATIVE 1

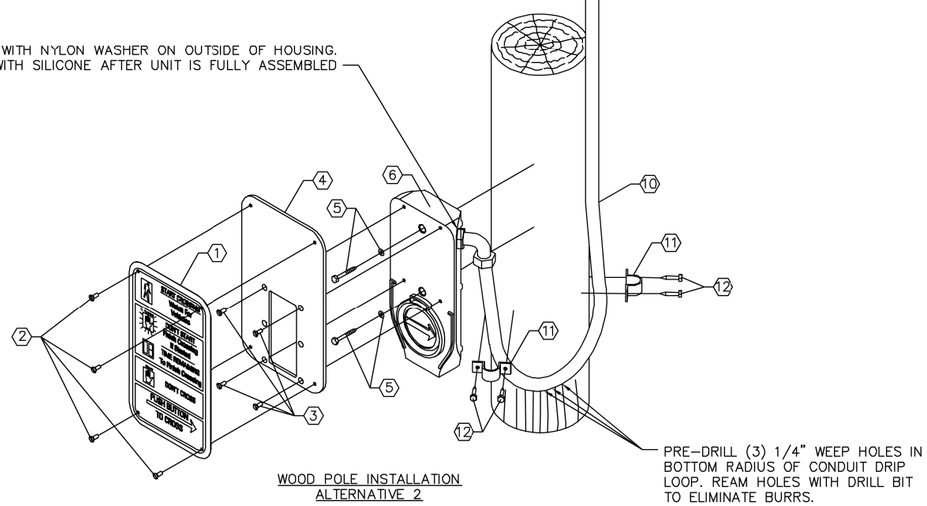
(AUDIBLE PEDESTRIAN PUSHBUTTON
STATION (APS) – TEMPORARY TIMBER STRAIN POLE)





WOOD POLE INSTALLATION
ALTERNATIVE 3

(AUDIBLE PEDESTRIAN PUSHBUTTON
STATION (APS) – TEMPORARY TIMBER POLE)



WOOD POLE INSTALLATION
ALTERNATIVE 2

(AUDIBLE PEDESTRIAN PUSHBUTTON
STATION (APS) – TEMPORARY TIMBER POLE)

KEY:

1. FACE PLATE
2. 1/4"–20 X 3/8" LONG STAINLESS STEEL SCREW
3. 1/4"–20 STAINLESS STEEL SCREWS
4. PUSHBUTTON FRAME ADAPTER
5. LAG BOLT WITH WASHER
6. PUSHBUTTON STATION
7. CONDUIT DIAMETER + 1/8" HOLE THRU POLE
8. CONDULET
9. 3/4" CONDUIT
10. 3/4" LIQUID–TITE FLEX CONDUIT
11. ONE PIECE TWO HOLE CLAMP
12. LAG BOLT
13. INSULINER SLEEVE

AUDIBLE PEDESTRIAN PUSHBUTTON STATION (APS)

STATE OF TEXAS
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123567
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PROFESSIONAL ENGINEER
5/18/2021

FORT WORTH

CITY OF FORT WORTH, TEXAS
AUDIBLE PEDESTRIAN PUSHBUTTON STATION (APS) DETAILS
SHEET 2 OF 2

DATE: 11-11-2013

34 41 10-D674

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		106

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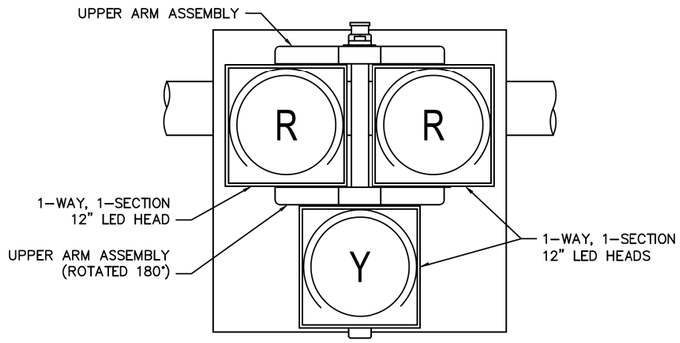
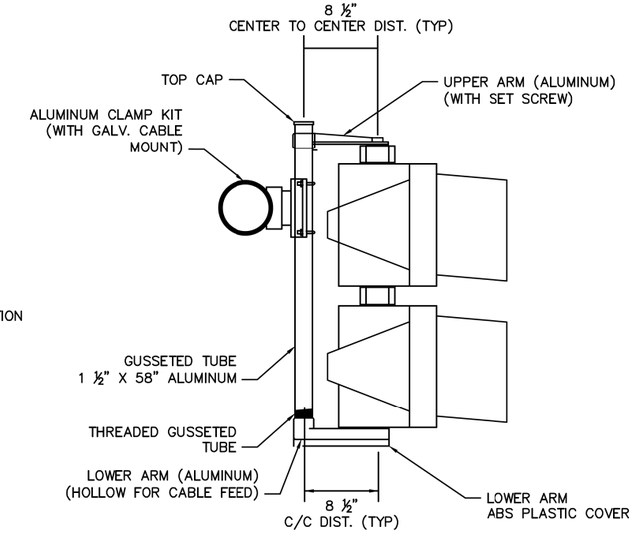
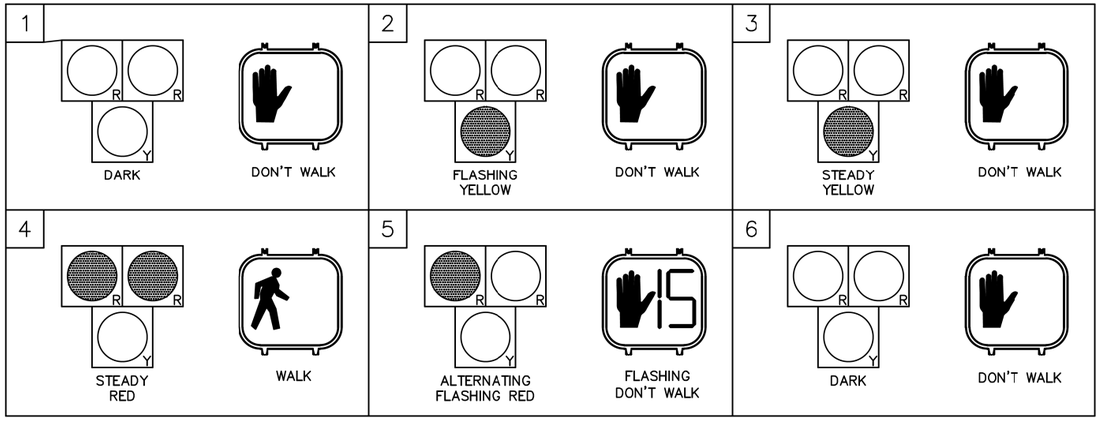


FRONT VIEW



SIDE VIEW

HAWK BEACON DETAIL



SEQUENCE FOR A HAWK SIGNAL

NOTE: PUSH BUTTONS FOR HAWK SIGNALS SHALL BE APS TYPE

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PROFESSIONAL ENGINEER
5/18/2021

FORT WORTH

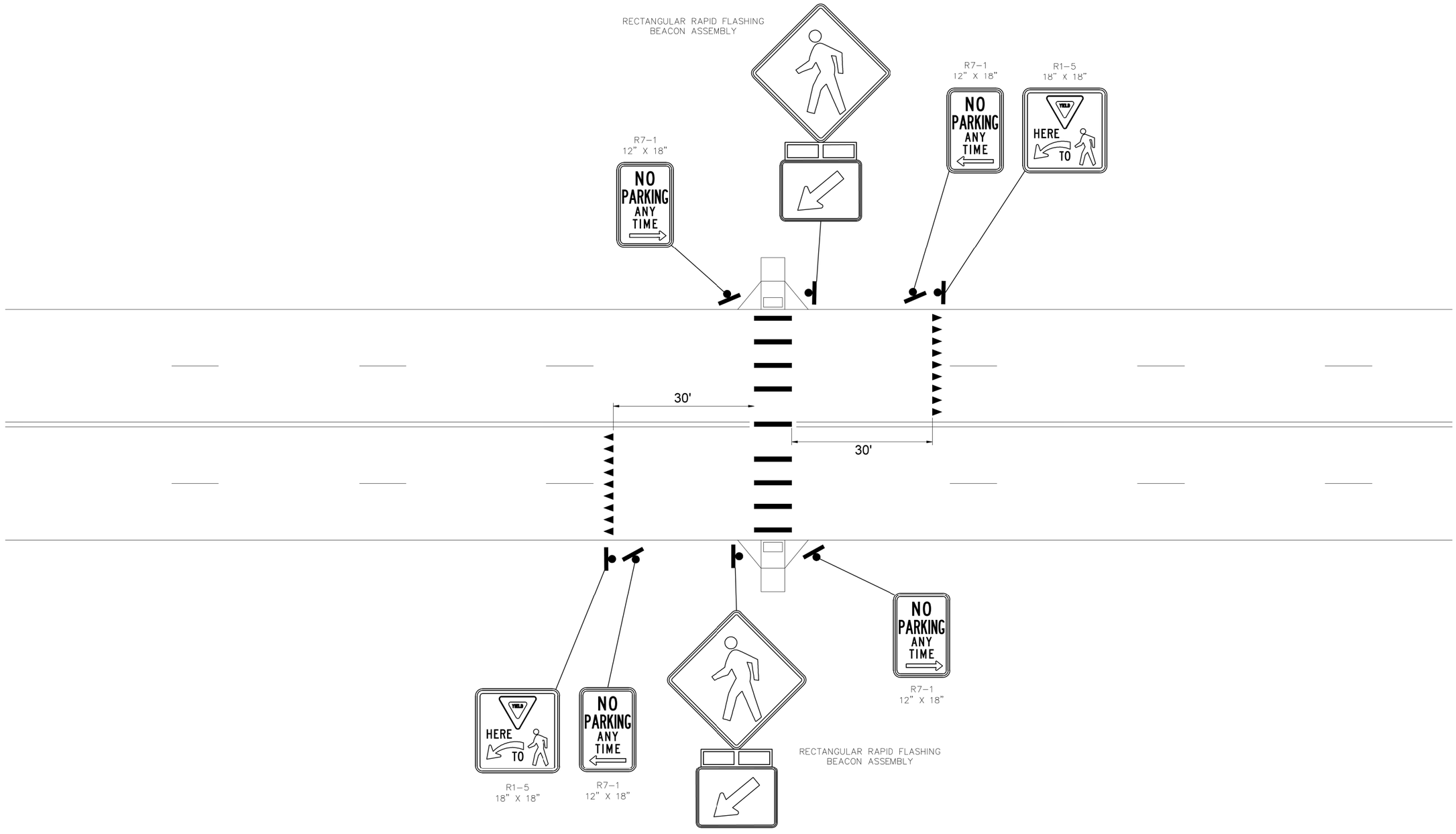
CITY OF FORT WORTH, TEXAS

PEDESTRIAN HYBRID SIGNAL (HAWK) DETAILS

DATE: 11-19-2015

34 41 16-D683

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		107



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LICENSED
PROFESSIONAL ENGINEER
5/18/2021

FORT WORTH

CITY OF FORT WORTH, TEXAS

RECTANGULAR RAPID FLASHING BEACON TYPICAL LAYOUT

DATE: 12-21-2015

34 41 16-D687

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		108

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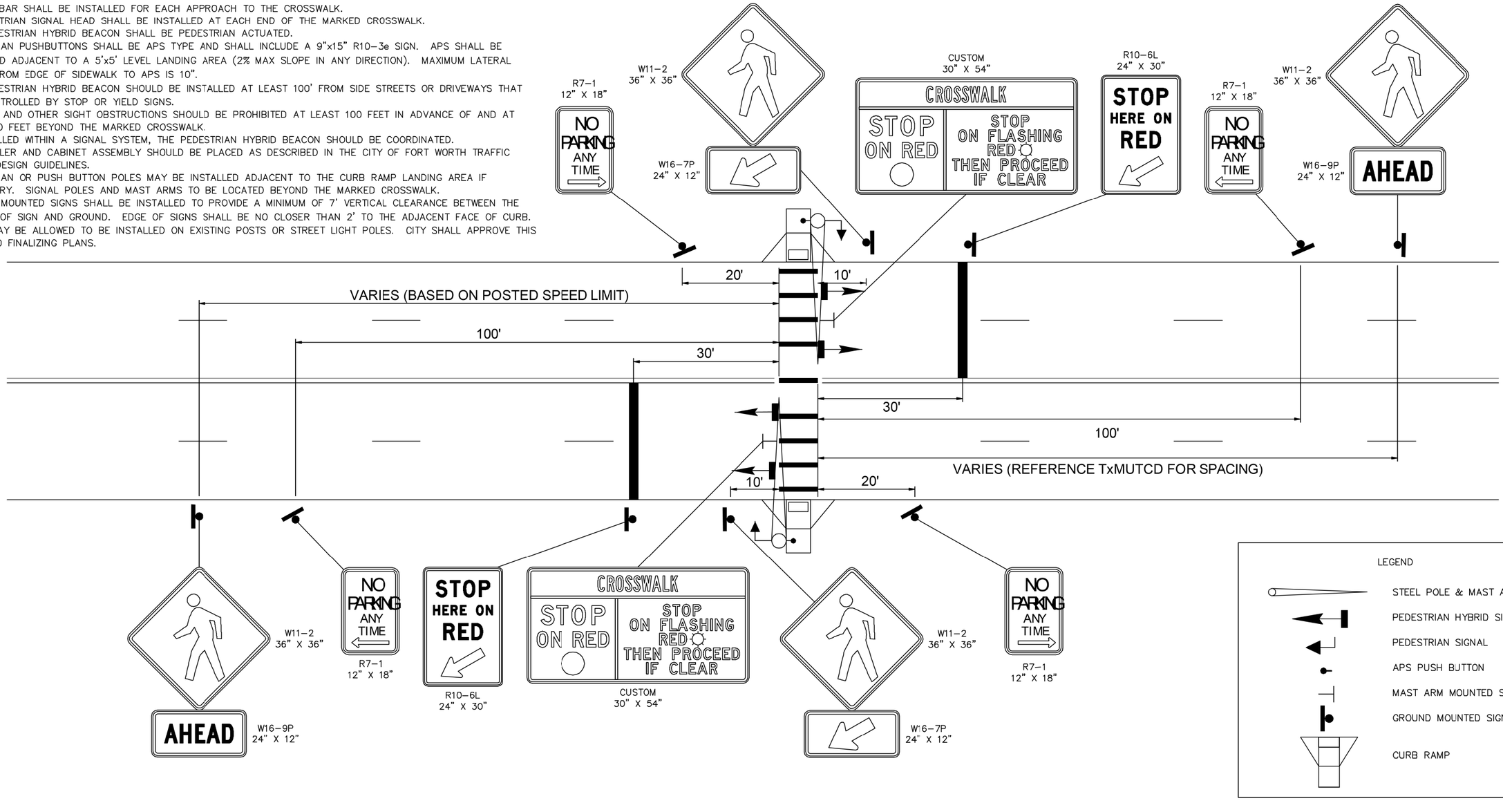
NOTES:

1. REFERENCE THE 2011 TEXAS MUTCD FOR GUIDANCE ON WHEN A PEDESTRIAN HYBRID BEACON (HAWK SIGNAL) IS AN APPROPRIATE TRAFFIC CONTROL DEVICE.
2. REFERENCE CITY OF FORT WORTH STANDARD DETAIL D683 FOR PEDESTRIAN HYBRID BEACON SIGNAL FACE DETAILS.
3. A PEDESTRIAN HYBRID BEACON SHALL ONLY BE INSTALLED AT A MARKED CROSSWALK.
4. REFERENCE CITY OF FORT WORTH STANDARD DETAIL D643 FOR CROSSWALK AND STOP BAR INSTALLATION DETAILS.
5. AT LEAST TWO PEDESTRIAN HYBRID BEACON FACES SHALL BE INSTALLED FOR EACH APPROACH OF THE MAJOR STREET.
6. A STOP BAR SHALL BE INSTALLED FOR EACH APPROACH TO THE CROSSWALK.
7. A PEDESTRIAN SIGNAL HEAD SHALL BE INSTALLED AT EACH END OF THE MARKED CROSSWALK.
8. THE PEDESTRIAN HYBRID BEACON SHALL BE PEDESTRIAN ACTUATED.
9. PEDESTRIAN PUSHBUTTONS SHALL BE APS TYPE AND SHALL INCLUDE A 9"x15" R10-3e SIGN. APS SHALL BE INSTALLED ADJACENT TO A 5'x5' LEVEL LANDING AREA (2% MAX SLOPE IN ANY DIRECTION). MAXIMUM LATERAL REACH FROM EDGE OF SIDEWALK TO APS IS 10".
10. THE PEDESTRIAN HYBRID BEACON SHOULD BE INSTALLED AT LEAST 100' FROM SIDE STREETS OR DRIVEWAYS THAT ARE CONTROLLED BY STOP OR YIELD SIGNS.
11. PARKING AND OTHER SIGHT OBSTRUCTIONS SHOULD BE PROHIBITED AT LEAST 100 FEET IN ADVANCE OF AND AT LEAST 20 FEET BEYOND THE MARKED CROSSWALK.
12. IF INSTALLED WITHIN A SIGNAL SYSTEM, THE PEDESTRIAN HYBRID BEACON SHOULD BE COORDINATED.
13. CONTROLLER AND CABINET ASSEMBLY SHOULD BE PLACED AS DESCRIBED IN THE CITY OF FORT WORTH TRAFFIC SIGNAL DESIGN GUIDELINES.
14. PEDESTRIAN OR PUSH BUTTON POLES MAY BE INSTALLED ADJACENT TO THE CURB RAMP LANDING AREA IF NECESSARY. SIGNAL POLES AND MAST ARMS TO BE LOCATED BEYOND THE MARKED CROSSWALK.
15. GROUND MOUNTED SIGNS SHALL BE INSTALLED TO PROVIDE A MINIMUM OF 7' VERTICAL CLEARANCE BETWEEN THE BOTTOM OF SIGN AND GROUND. EDGE OF SIGNS SHALL BE NO CLOSER THAN 2' TO THE ADJACENT FACE OF CURB.
16. SIGNS MAY BE ALLOWED TO BE INSTALLED ON EXISTING POSTS OR STREET LIGHT POLES. CITY SHALL APPROVE THIS PRIOR TO FINALIZING PLANS.



STATE OF TEXAS
AMBER HECKMANN
123567
LICENSED PROFESSIONAL ENGINEER
5/18/2021

FORT WORTH

CITY OF FORT WORTH, TEXAS

PEDESTRIAN HYBRID BEACON (HAWK SIGNAL) TYPICAL LAYOUT

DATE: 3/25/16

34 41 16-D688

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		109

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GENERAL NOTES FOR ALL ELECTRICAL WORK

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

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

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

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

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

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

CONDUIT

A. MATERIALS

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

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

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

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

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

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

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

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

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

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

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

B. CONSTRUCTION METHODS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUITS & NOTES

ED(1)-14

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© TxDOT	October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS		0008	05	031	SH 180
		DIST	COUNTY		SHEET NO.
		FTW	TARRANT		110

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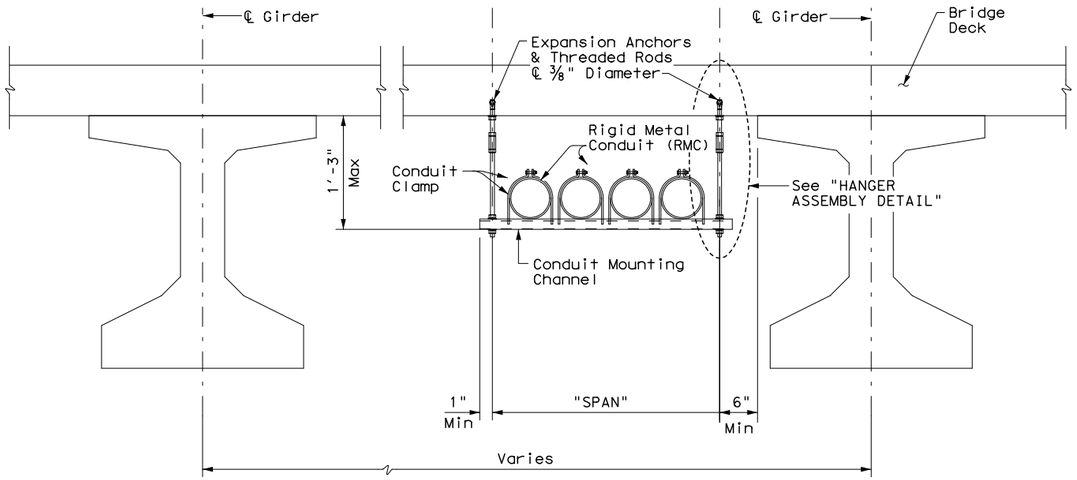
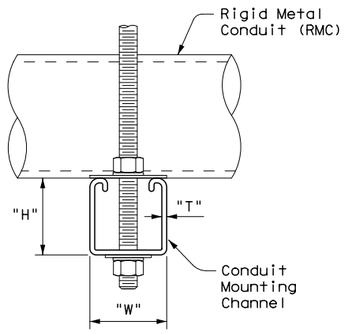
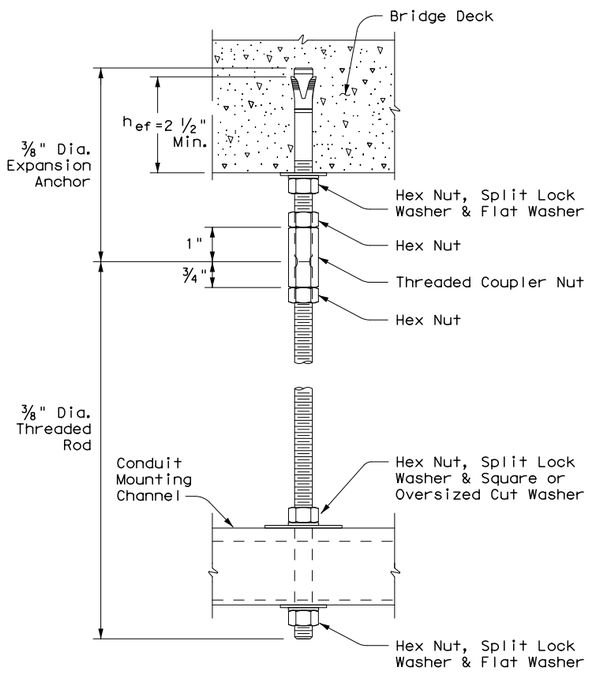


CONDUIT HANGING DETAIL

CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 7/16"	12 Ga.

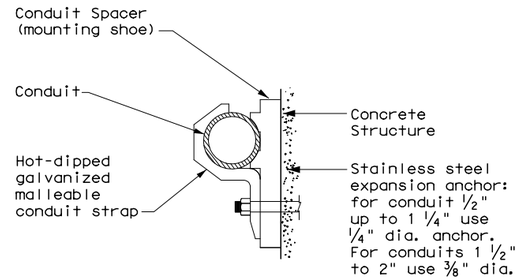
Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.

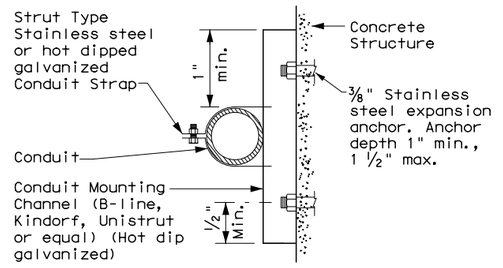




HANGER ASSEMBLY DETAIL

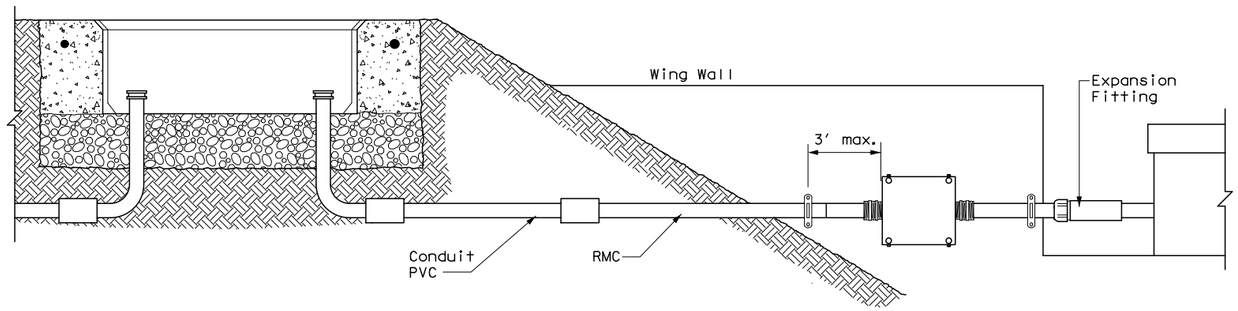
ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT





CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.
2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.
3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.
4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.
5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef})as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.
6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUIT SUPPORTS

ED(2)-14

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	FTW	TARRANT		111

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ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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

C. TEMPORARY WIRING

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

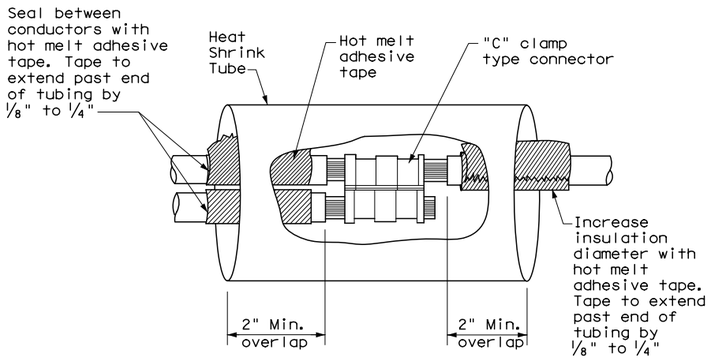
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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



SPLICE OPTION 1
Compression Type

SPLICE OPTION 2
Split Bolt Type

SPLICE OPTION 3
Listed Screw Type

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS CONDUCTORS

ED(3)-14

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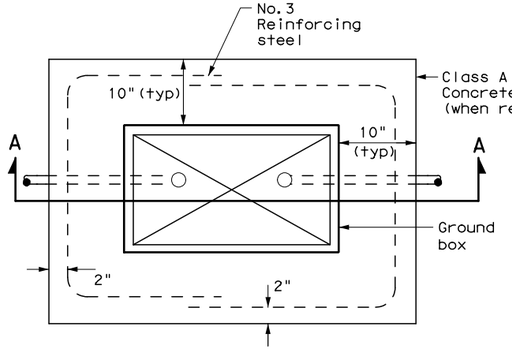
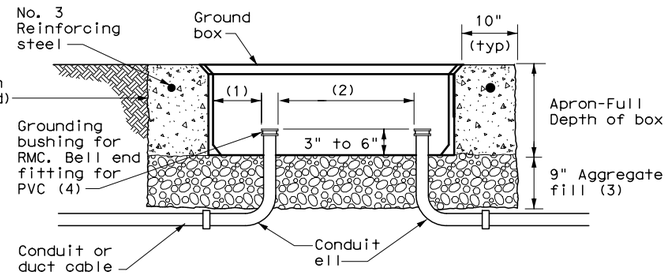


PLAN VIEW



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.

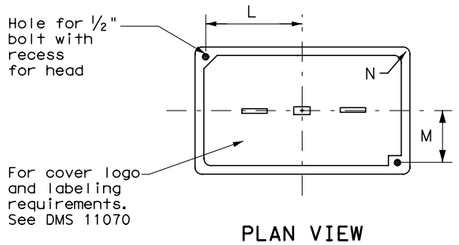
(2) Maintain sufficient space between conduits to allow for proper installation of bushing.

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

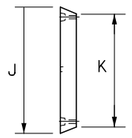
(4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

GROUND 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

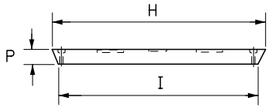
GROUND BOX COVER DIMENSIONS								
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW



END



SIDE

GROUND BOX COVER

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.

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	

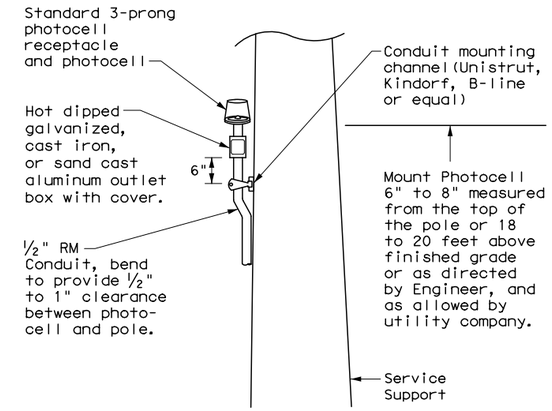
* Example only, not for construction. All new electrical services must have electrical service data chart specific to that service as shown in the plans.

** 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.

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE NOTES & DATA

ED(5)-14

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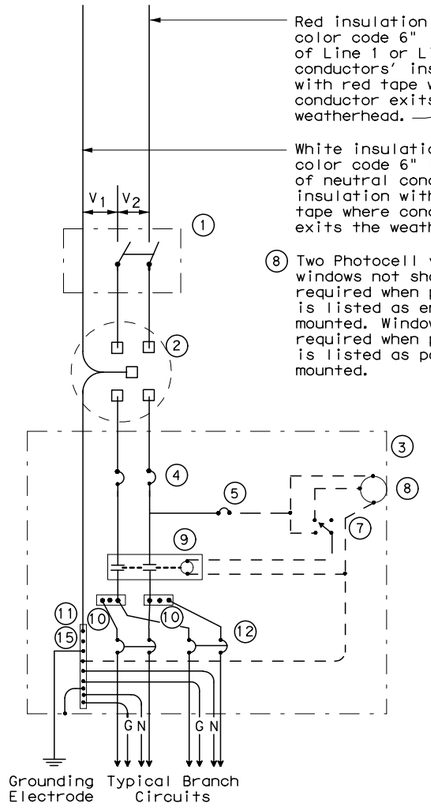
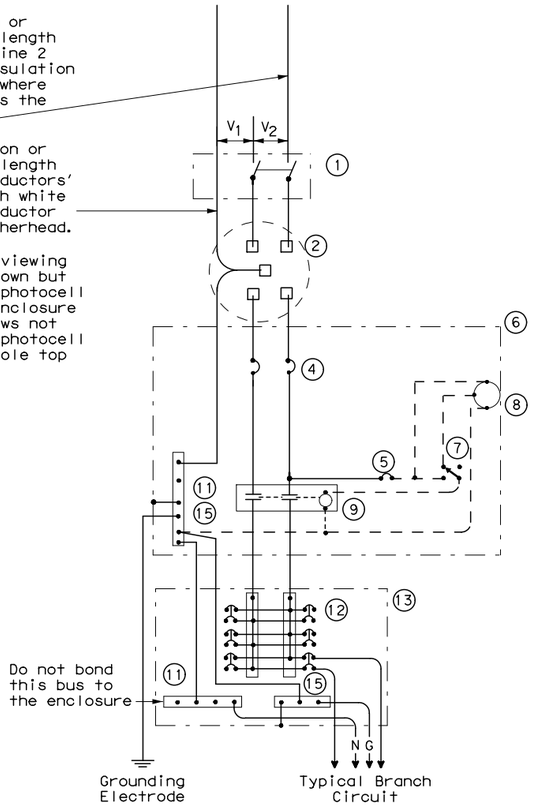
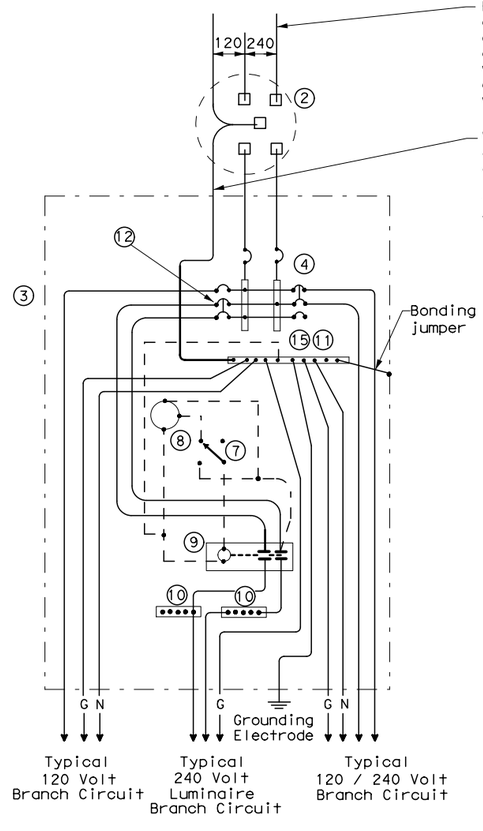


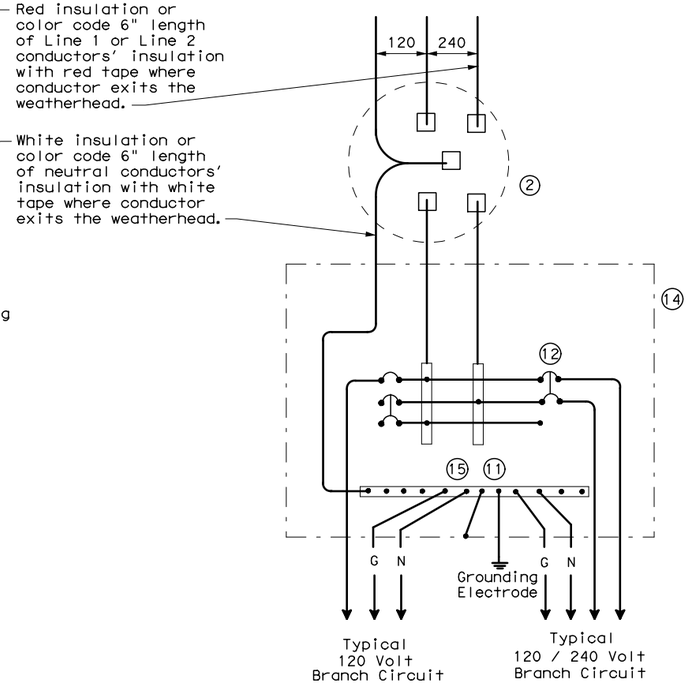
SCHEMATIC TYPE A
THREE WIRE



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.

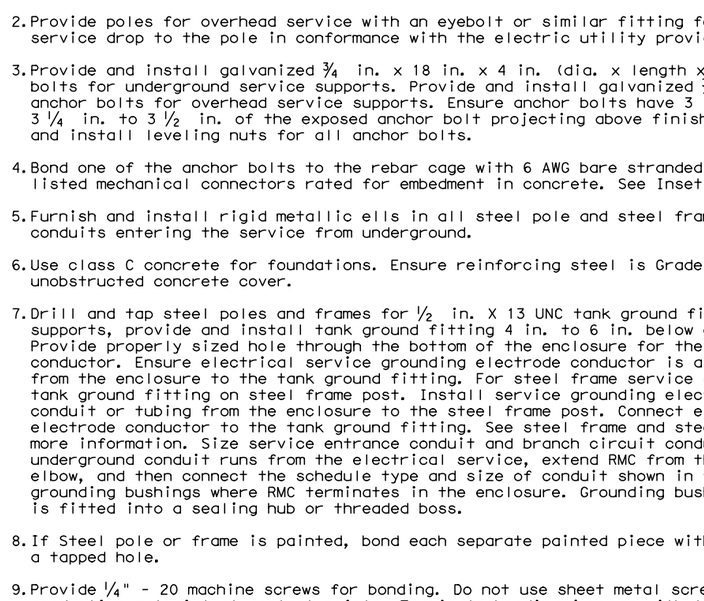
7. Drill and tap steel poles and frames for ½ in. X 13 UNC tank ground fitting. For steel pole service supports, provide and install tank ground fitting 4 in. to 6 in. below electrical service enclosure. Provide properly sized hole through the bottom of the enclosure for the service grounding electrode 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.

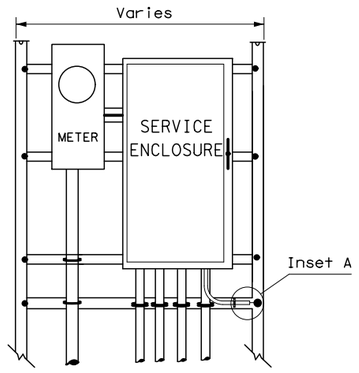
9. Provide ¼" - 20 machine screws for bonding. Do not use sheet metal screws. Remove all non-conductive material at contact points. Terminate bonding jumpers with listed devices. Install minimum size 6 AWG stranded copper bonding jumpers. Make up all threaded bonding connections wrench tight.

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.

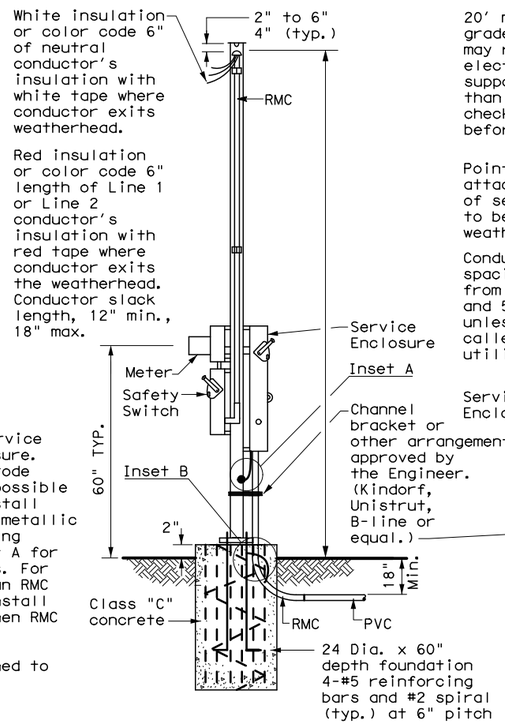


WITH SAFETY SWITCH
FRONT VIEW

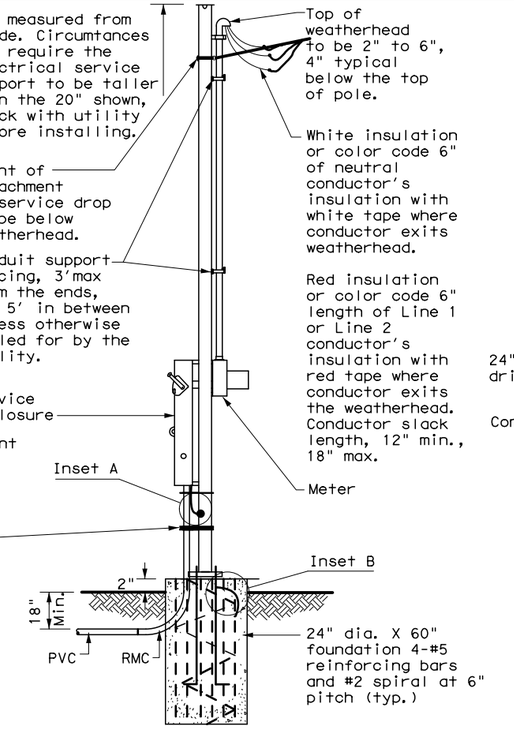


WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SF(U) - UNDERGROUND SERVICE

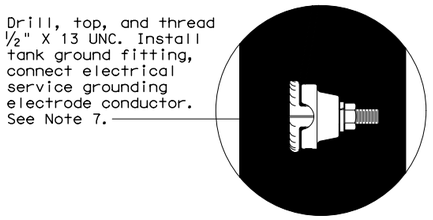


WITH SAFETY SWITCH

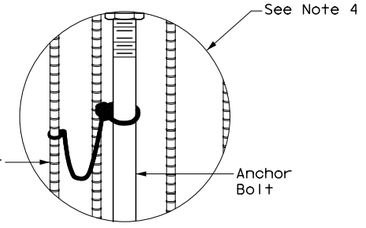


WITHOUT SAFETY SWITCH

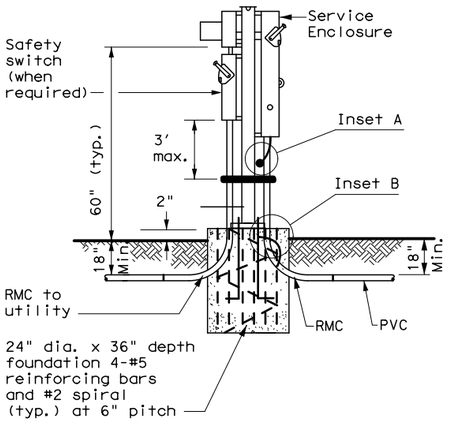
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE



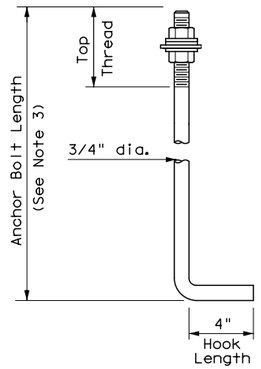
FRONT VIEW
INSET A



INSET B

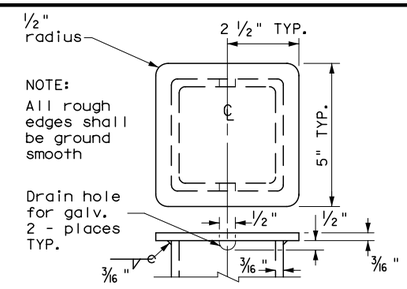


WITH SAFETY SWITCH

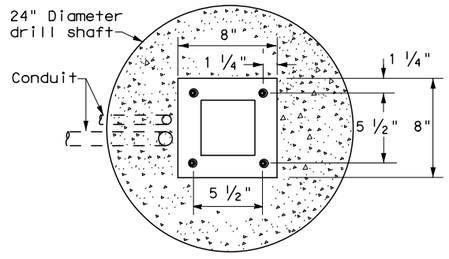


HOOKED ANCHOR DETAIL

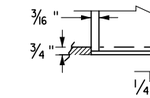
SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE



POLE TOP PLATE

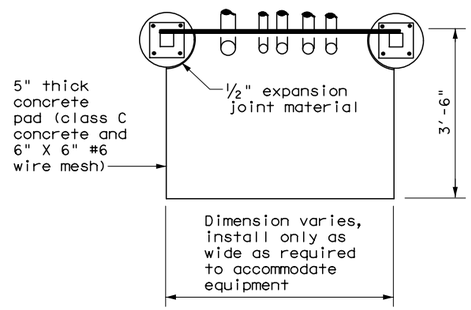


BASE PLATE DETAIL



BOTTOM OF POLE

SERVICE SUPPORT TYPE SF & SP



TOP VIEW

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

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP

ED(7)-14

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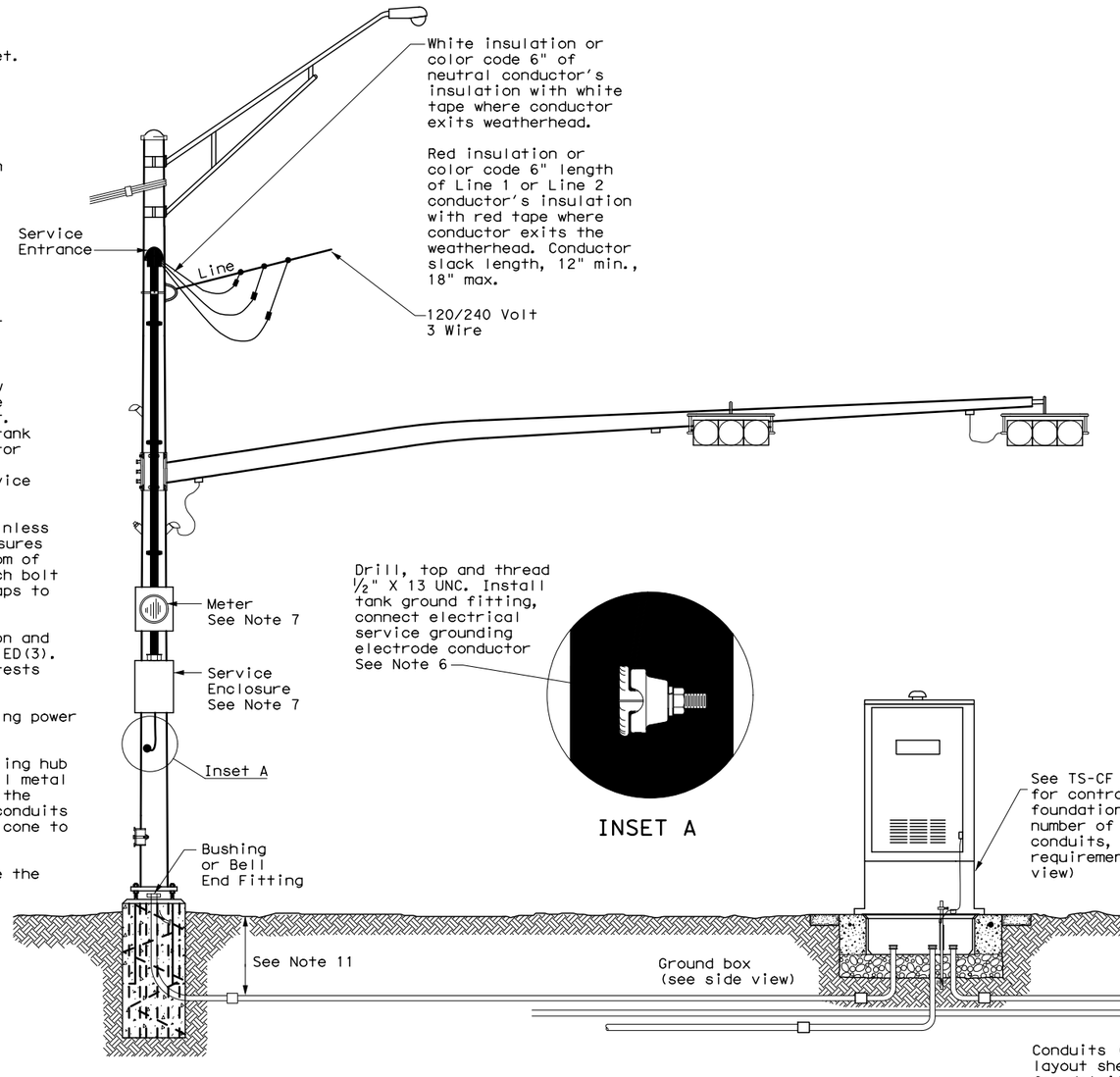
TRAFFIC SIGNAL NOTES

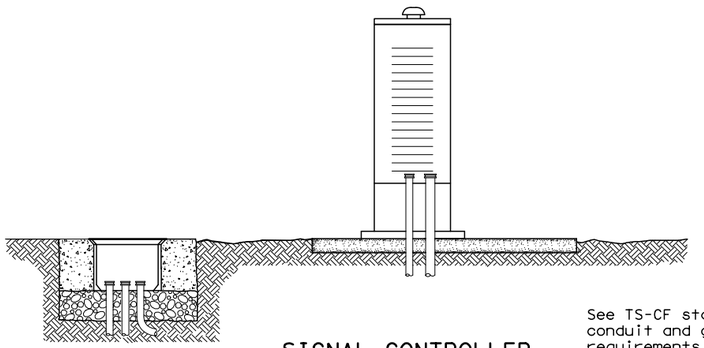
1. Do not pass luminaire conductors through the signal controller cabinet.
2. Include an equipment grounding conductor in all conduits throughout the electrical system. Bond all exposed metal parts to the grounding conductor.
3. Provide roadway luminaires, when required, in accordance with the material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



SIGNAL POLE WITH SERVICE

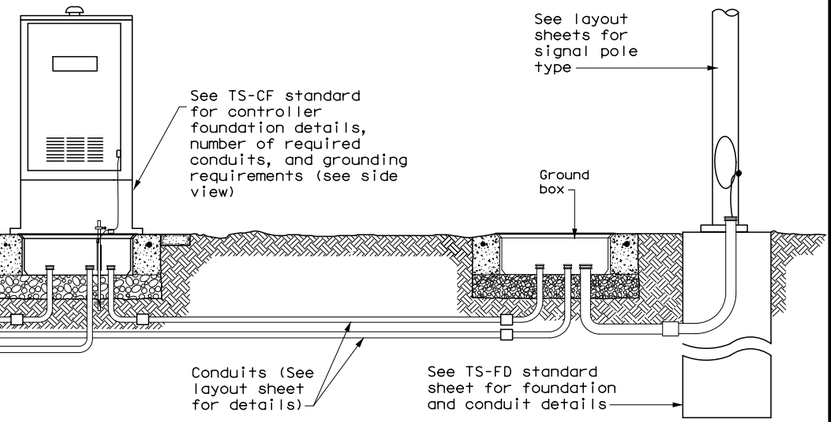
Type T electrical service mounted on signal pole shown as an example. See electrical details, layout sheets, and electrical service data chart for additional details.

INSET A



SIGNAL CONTROLLER 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.



SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE

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Texas Department of Transportation | Traffic Operations Division Standard

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8)-14

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PEDESTAL SERVICE NOTES

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

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

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

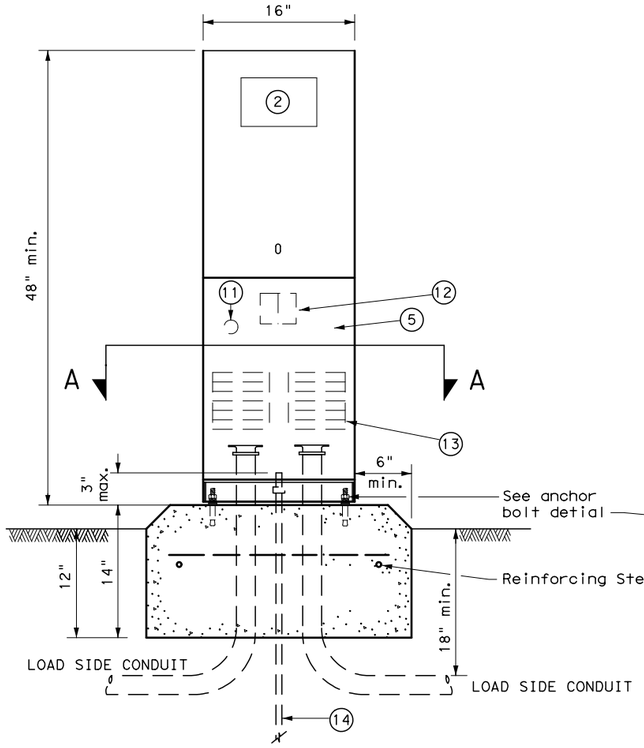
4. Provide #4 reinforcing steel for foundations in accordance with Item 440, "Reinforcement for Concrete."

5. Install ½ in. X 2 ⁷⁄₁₆ 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.

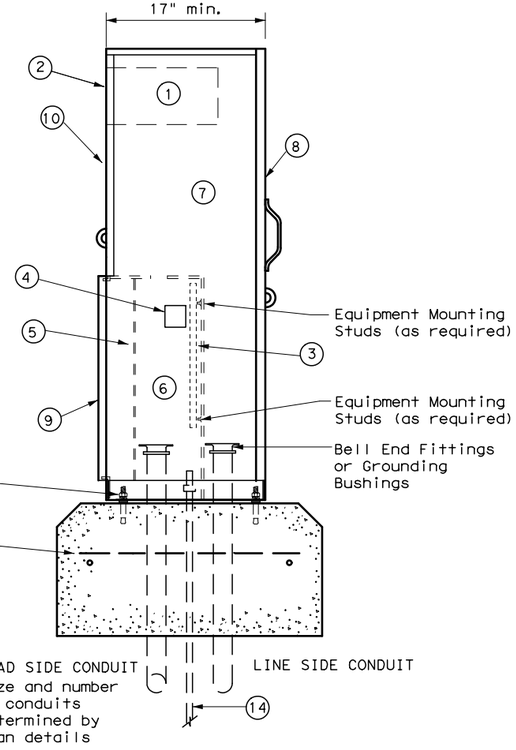
6. Finish top of concrete foundation in a neat and workmanlike manner. If leveling washers are used, ensure no more than ⅛ in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of ⅛ in. per foot. When properly installed, ensure the top of the service enclosure is level front to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

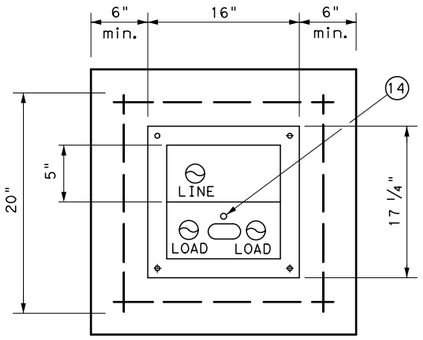


FRONT VIEW

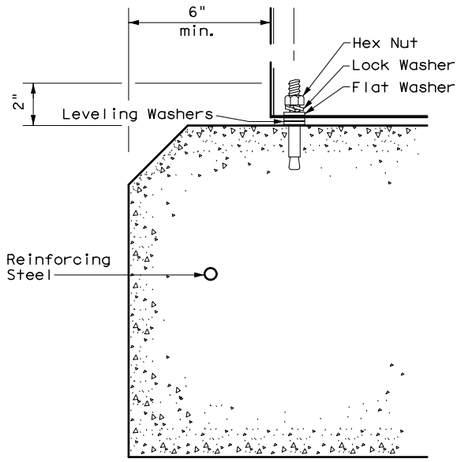


SIDE VIEW

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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TIMBER POLE (TP) SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.
2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrial service.
3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.
4. Gain pole as required to provide flat surface for each channel. Gain timber pole to 5/8 in. max. depth and 1 7/8 in. max. height. Gain pole in a neat and workmanlike manner.
5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to 3 3/4 in. maximum depth, and 1½ in. to 1⅝ in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, ¼ in. minimum diameter by 1½ in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.
6. When excess length must be trimmed from poles, trim from the top end only.

(1) Class 5 pole, height as required

(2) Service drop from utility company (attached below weatherhead)

(3) Service conduit (RMC) and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)

(4) Safety switch (when required)

(5) Meter (when required)

(6) Service enclosure

(7) 6 AWG bare grounding electrode conductor in ½ in. PVC to ground rod - extend ½ in. PVC 6 in. underground.

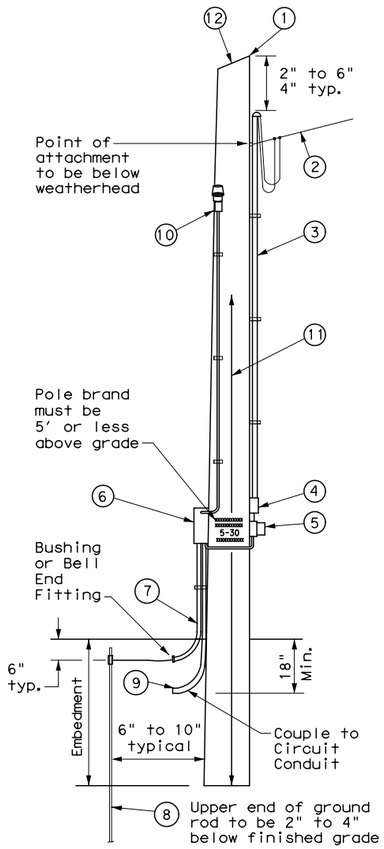
(8) 5/8 in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

(9) RMC same size as branch circuit conduit.

(10) See pole-top mounted photocell detail on ED(5).

(11) When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.

(12) When required by utility, cut top of pole at an angle to enhance rain run off.

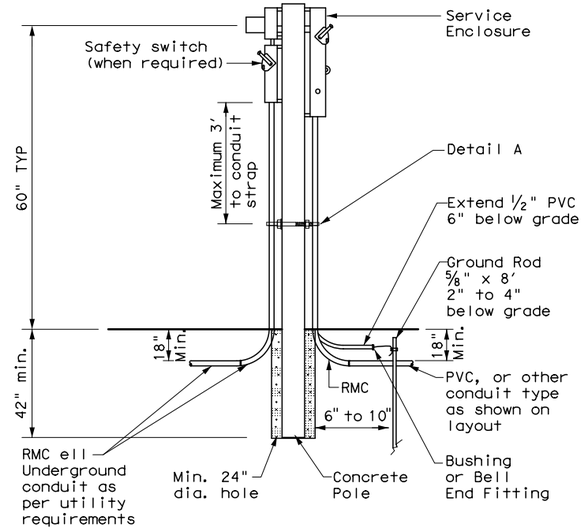


SERVICE SUPPORT TYPE TP (O)

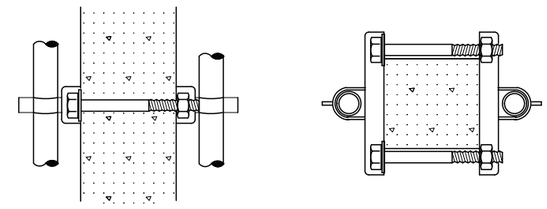
GRANITE CONCRETE (GC) & OTHER CONCRETE (OC) NOTES

Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two-point pickup locations when handling pole in horizontal position, and one-point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.
5. Ensure all installation details of services are in accordance with utility company specifications.
6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.
7. Furnish and install galvanized or stainless steel channel strut 1 ½ in. or 1 5/8 in. wide by 1 in. up to 3 3/4 in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.
8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.

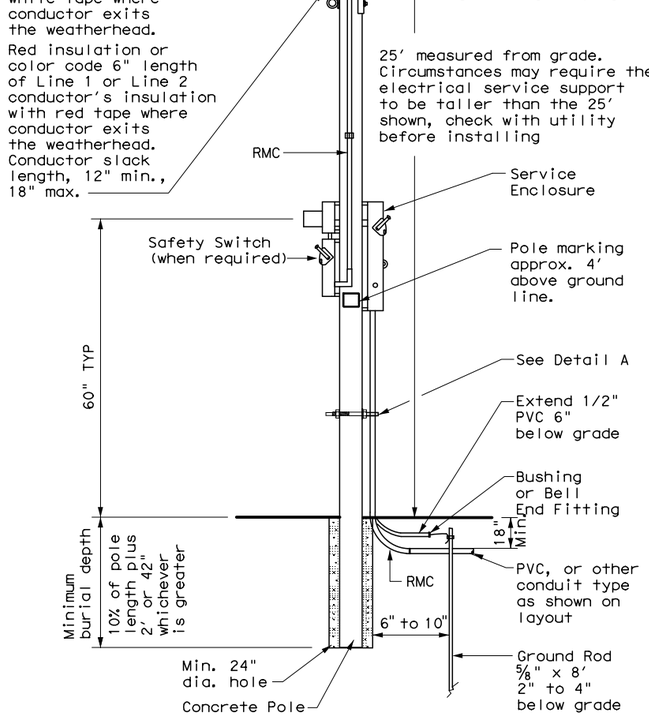


CONCRETE SERVICE SUPPORT
Underground (U)



DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.



CONCRETE SERVICE SUPPORT
Overhead (O)

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS SERVICE SUPPORT TYPES GC, OC, & TP

ED(10)-14

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DUCT CABLE & HDPE CONDUIT NOTES

1. Provide duct cable in accordance with Departmental Material Specification (DMS) 11060 "Duct Cable" and Item 622 "Duct Cable." Provide duct cable as listed on the Material Producer List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 622.

2. Provide High-Density Polyethylene (HDPE) conduit in accordance with DMS 11060 and Item 618, "Conduit." Provide HDPE as listed on the MPL on the Department web site under "Roadway Illumination and Electrical Supplies," Item 618.

3. Supply duct cable with a minimum 2 in. diameter, unless otherwise shown in the plans. Provide duct cable and HDPE conduit as shown by descriptive code or on the plans. Bend duct cable and HDPE conduit as recommended by the manufacturer, with a minimum bending radius of 26 in. for 2 in. duct. Follow manufacturers' recommendations when handling duct cable and HDPE conduit reels and during installation of duct cable and HDPE conduit.

4. Do not splice conductors within duct cable or HDPE conduit. Couple duct cable and HDPE entering a ground box or foundation to a PVC elbow. When galvanized steel RMC elbows are called for in the plans and any portion of the RMC elbow is buried less than 18" from possible contact, ground the RMC elbow.

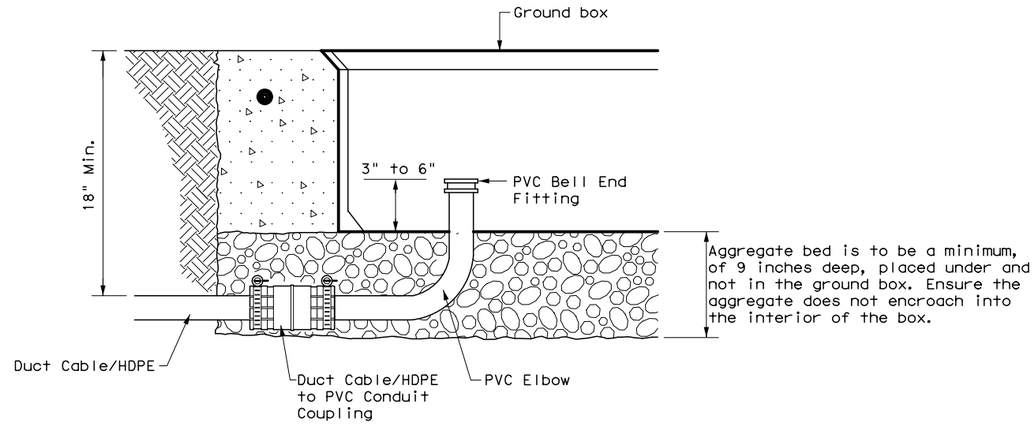
5. Furnish and install duct cable with factory installed conductors, sized as shown in the plans and as required by the National Electrical Code (NEC). The NEC contains specific requirements for duct cable in Article, "Nonmetallic Underground Conduit with Conductors: Type NUCC."

6. When conduit casing is called for in the plans, extend duct cable or HDPE conduit through the conduit casing in one continuous length without connection to the casing.

7. Seal the ends of duct cable or HDPE conduit with duct seal, expandable foam, or other approved method after completing the pull tests required by Item 622.

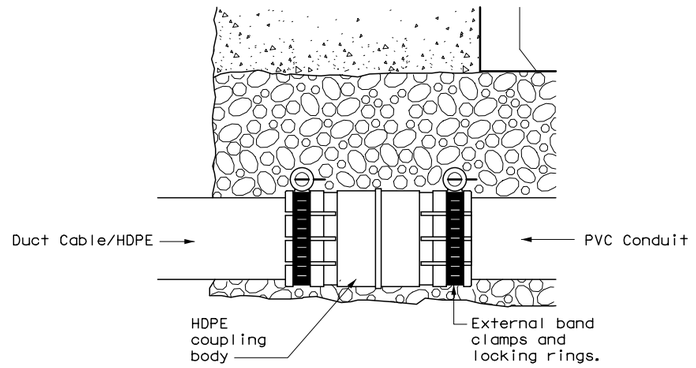
8. Provide minimum cover of 24 in. under roadways, 18 in. in other locations, or as shown on the plans.

9. Furnish and install listed fittings to couple duct cable or HDPE conduit to other types of conduit. Duct cable and HDPE conduit may be field-threaded and spliced with PVC or RMC threaded couplings; connected with listed tie-wrap fittings; connected using listed coupling made of HDPE with stainless steel external banding clamps and locking rings; connected with approved electrofusion conduit couplings; or connected using an approved chemical fusion method using an epoxy or adhesive specifically designed for HDPE couplings and connectors all installed in accordance with their manufacturer's instructions. Do not use PVC glue on HDPE. Do not use water pipe fittings, or connect conduit with heat shrink tubing.

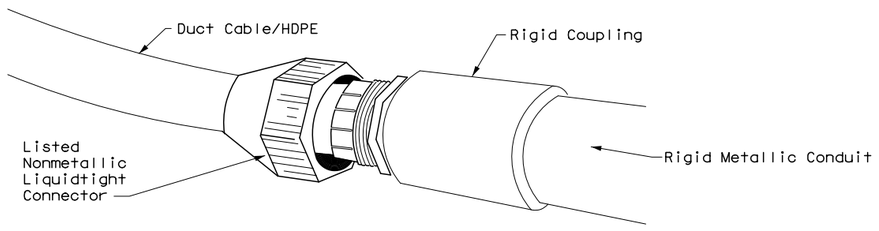


DUCT CABLE/HDPE AT GROUND BOX

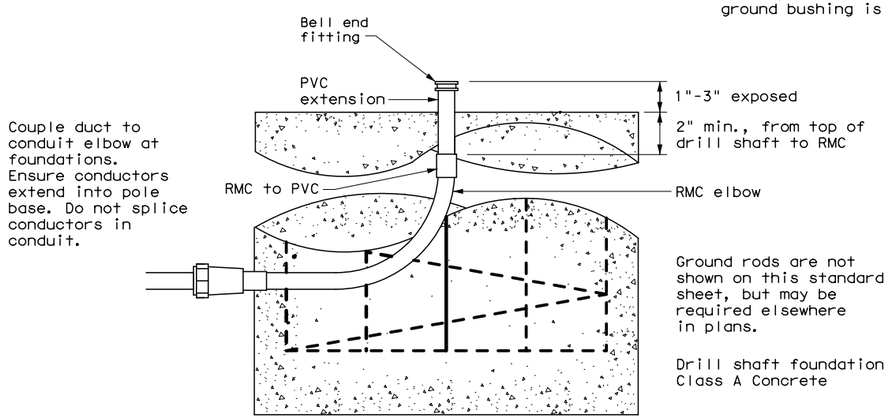
When the upper end of an RMC Ell does not enter the ground box, it may be extended with a SCH-40 PVC conduit nipple and bell end, provided there is a minimum of 18" of cover over all parts of the elbow. If not, a rigid extension and ground bushing is required.



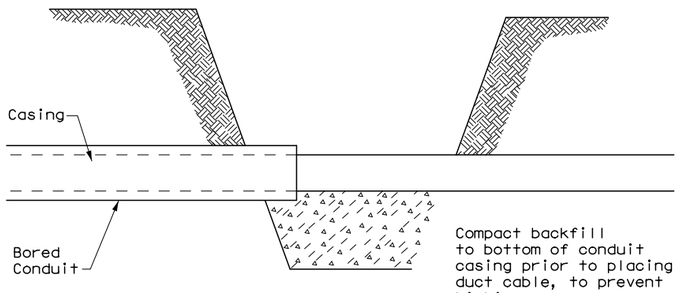
DUCT CABLE/HDPE TO PVC



DUCT CABLE/HDPE TO RMC



DUCT CABLE / HDPE AT FOUNDATION



BORE PIT DETAIL

Texas Department of Transportation

Traffic Operations Division Standard

ELECTRICAL DETAILS DUCT CABLE/ HDPE CONDUIT

ED(11)-14

FILE: ed11-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		120

71L

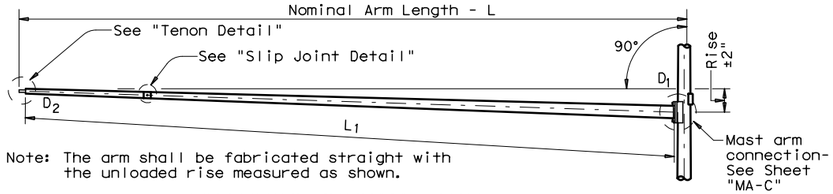
Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D_B	D_{19}	D_{24}	D_{30}	① thk	D_B	D_{19}	D_{24}	D_{30}	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	8.2	7.3	.179	30-A
28	11.5	8.8	8.1	7.3	.179	12.5	9.5	8.7	7.8	.179	30-A
32	12.5	9.8	9.1	8.3	.179	12.0	9.0	8.2	7.3	.239	30-A
36	12.0	9.3	8.6	7.8	.239	12.5	9.5	8.7	7.8	.239	36-A
40	12.0	9.3	8.6	7.8	.239	13.5	10.5	9.7	8.8	.239	36-A
44	12.5	9.8	9.1	8.3	.239	14.0	11.0	10.2	9.3	.239	36-A
48	13.0	10.3	9.6	8.8	.239	15.0	12.0	11.2	10.3	.239	36-A

Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L_1	D_1	D_2	① thk	Rise	L_1	D_1	② D_2	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1′-9"	19.1	7.0	3.5	.179	1′-8"
24	23.1	7.5	4.3	.179	1′-10"	23.1	7.5	3.5	.179	1′-9"
28	27.1	8.0	4.2	.179	1′-11"	27.1	8.0	3.5	.179	1′-10"
32	31.0	9.0	4.7	.179	2′-1"	31.0	9.0	3.5	.179	2′-0"
36	35.0	9.5	4.6	.179	2′-4"	35.0	10.0	3.5	.179	2′-1"
40	39.0	9.5	4.1	.239	2′-8"	39.0	9.5	3.5	.239	2′-3"
44	43.0	10.0	4.1	.239	2′-11"	43.0	10.0	3.5	.239	2′-6"
48	47.0	10.5	4.1	.239	3′-4"	47.0	11.0	3.5	.239	2′-9"

D_B = Pole Base O.D.
D_{19} = Pole Top O.D. with no Luminaire and no ILSN
D_{24} = Pole Top O.D. with ILSN w/out Luminaire
D_{30} = Pole Top O.D. with Luminaire
D_1 = Arm Base O.D.
D_2 = Arm End O.D.
L_1 = Shaft Length
L = Nominal Arm Length

① Thickness shown are minimums, thicker materials may be used.

② D_2 may be increased by up to 1" for polygonal arms.



Note: The arm shall be fabricated straight with the unloaded rise measured as shown.

TRAFFIC SIGNAL ARM

(Fixed Mount)

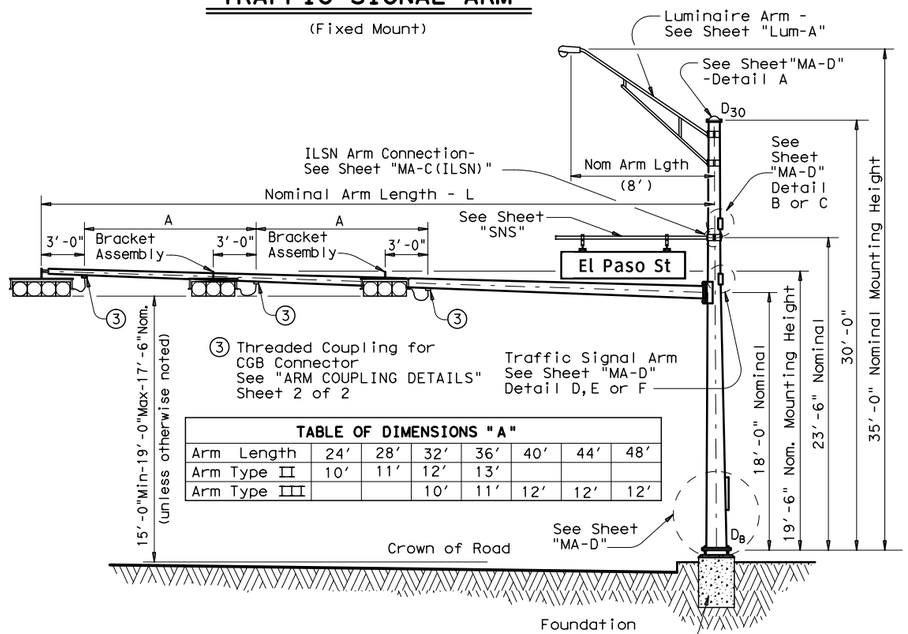


TABLE OF DIMENSIONS "A"

Arm Length	24′	28′	32′	36′	40′	44′	48′
Arm Type II	10′	11′	12′	13′			
Arm Type III			10′	11′	12′	12′	12′

STRUCTURE ASSEMBLY

SHIPPING PARTS LIST

Ship each pole with the following attached: enlarged hand hole, pole cap, fixed-arm connection bolts and washers and any additional hardware listed in the table.

Nominal Arm Length	30′ Poles With Luminaire		24′ Poles With ILSN		19′ Poles With No Luminaire and No ILSN	
	Above hardware plus: One (or two if ILSN attached) small hand hole, clamp-on simplex		Above hardware plus one small hand hole		See note above	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20L-80		20S-80		20-80	
24	24L-80		24S-80		24-80	
28	28L-80		28S-80		28-80	
32	32L-80		32S-80		32-80	
36	36L-80		36S-80		36-80	
40	40L-80		40S-80		40-80	2
44	44L-80		44S-80		44-80	2
48	48L-80		48S-80		48-80	

Traffic Signal Arms (1 per Pole) Ship each arm with the listed equipment attached

Nominal Arm Length	Type I Arm (1 Signal)		Type II Arm (2 Signals)		Type III Arm (3 Signals)	
	1 CGB connector		1 Bracket Assembly and 2 CGB Connectors		2 Bracket Assemblies and 3 CGB Connectors	
ft	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80					
24	24I-80		24II-80			
28	28I-80		28II-80			
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	2
44					44III-80	2
48					48III-80	

Luminaire Arms (1 per 30′ pole)

Nominal Arm Length	Quantity
8′ Arm	

ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers

Nominal Arm Length	Quantity
7′ Arm	
9′ Arm	

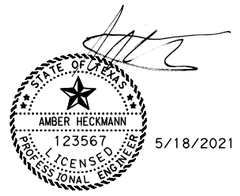
Anchor Bolt Assemblies (1 per pole)

Anchor Bolt Diameter	Anchor Bolt Length	Quantity
¾"	1′-6"	4
1 ½"	3′-4"	
1 ¾"	3′-10"	4

Each anchor bolt assembly consists of the following: Top and Bottom templates, 4 anchor bolts, 8 nuts, 8 flat washers, and 4 nut anchor devices (Type 2) per Standard Drawing "TS-FD".

Templates may be removed for shipment.

SHEET 1 OF 2



Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES

SINGLE MAST ARM ASSEMBLY

(80 MPH WIND ZONE)

SMA-80(1)-12

REVISIONS	DN: MS	CK: JSY	DW: MWF	CK: JSY
5-96	CONT	SECT	JOB	HIGHWAY
11-99	0008	05	031	SH 180
1-12	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		121

122A

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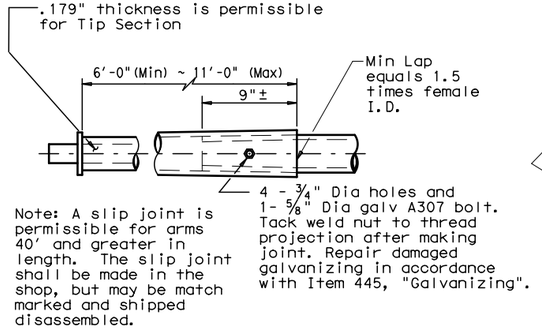
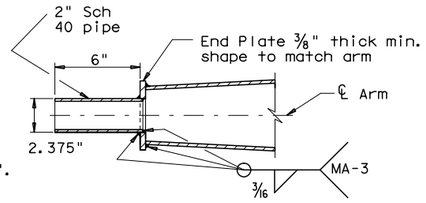


SLIP JOINT DETAIL



TENON DETAIL

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

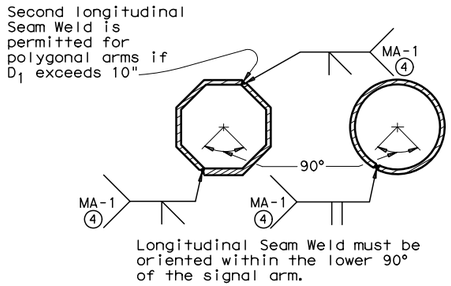
If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backpates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

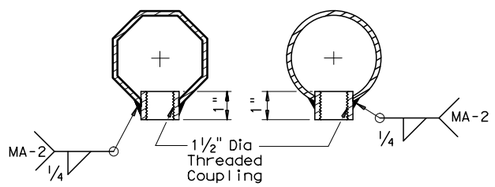
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 ½" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④ 60% Min. penetration 100% pemetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

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: MWF	CK: JSY

REVISIONS
5-96
1-12

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		122

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)

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.

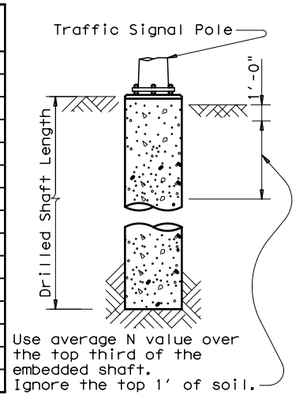
FOUNDATION SUMMARY TABLE ③

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
P-1	10	36-A	1			14		
P-2	10	24-A	1	6				
P-3	10	24-A	1	6				
P-4	10	36-A	1			14		
P-5	10	36-A	1			14		
P-6	10	24-A	1	6				
P-7	10	24-A	1	6				
P-8	10	36-A	1			14		
TOTAL DRILLED SHAFT LENGTHS				24*		56		

*SUBSIDIARY TO ITEM 687

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'



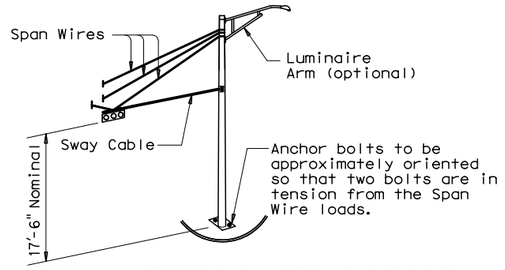
Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

ANCHOR BOLT & TEMPLATE SIZES

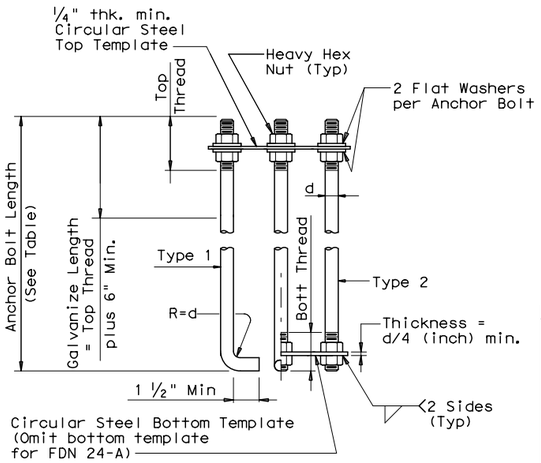
BOLT DIA IN.	⑦ BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
¾"	1'-6"	3"	—	12 ¾"	7 ⅛"	5 ⅝"
1 ½"	3'-4"	6"	4"	17"	10"	7"
1 ¾"	3'-10"	7"	4 ½"	19"	11 ¼"	7 ¾"
2"	4'-3"	8"	5"	21"	12 ½"	8 ½"
2 ¼"	4'-9"	9"	5 ½"	23"	13 ¾"	9 ¼"

⑦ Min dimensions given, longer bolts are acceptable.

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.



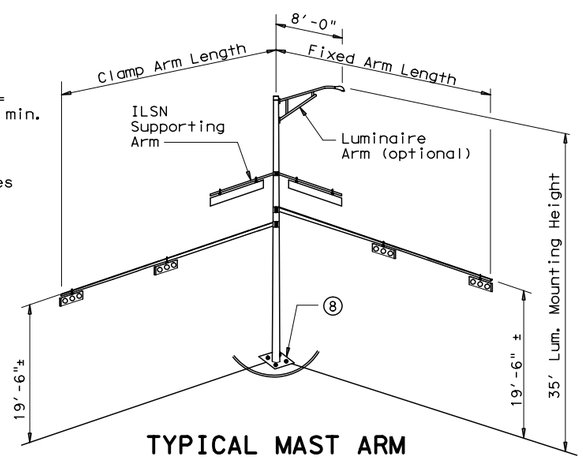
TYPICAL STRAIN POLE ASSEMBLY



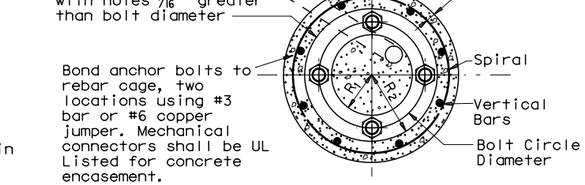
HOOKED ANCHOR (TYPE 1) NUT ANCHOR (TYPE 2)

ANCHOR BOLT ASSEMBLY

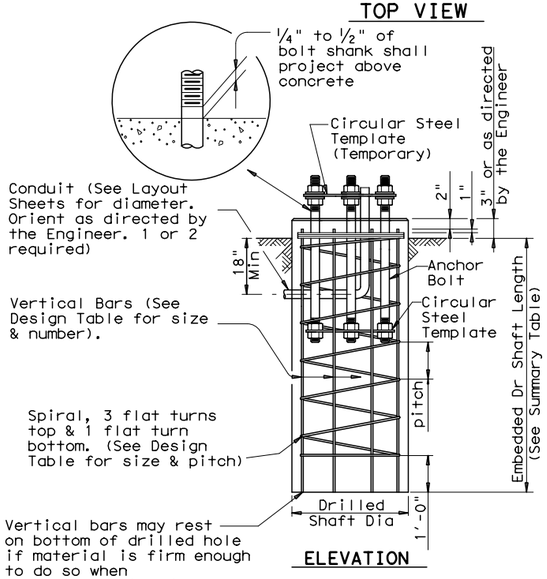
⑧ Orient anchor bolts orthogonal with the fixed arm direction to ensure that two bolts are in tension under dead load.



TYPICAL MAST ARM ASSEMBLY



TOP VIEW



ELEVATION

FOUNDATION DETAILS

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEB

REVISIONS: 5-96, 11-99, 1-12

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180

DIST	COUNTY	SHEET NO.
FTW	TARRANT	123

DATE: 5/18/2021 5:29:57 PM
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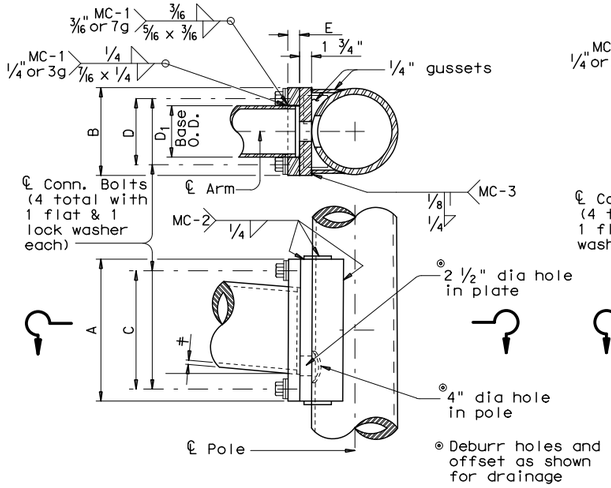
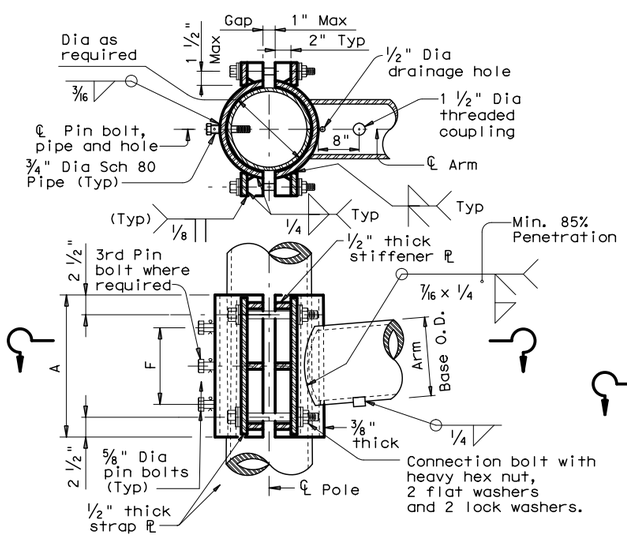
ARM SIZE D_1 in.	ARM SIZE ∓ in.	A in.	B in.	C in.	D in.	E in.	CONN BOLT DIA in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2



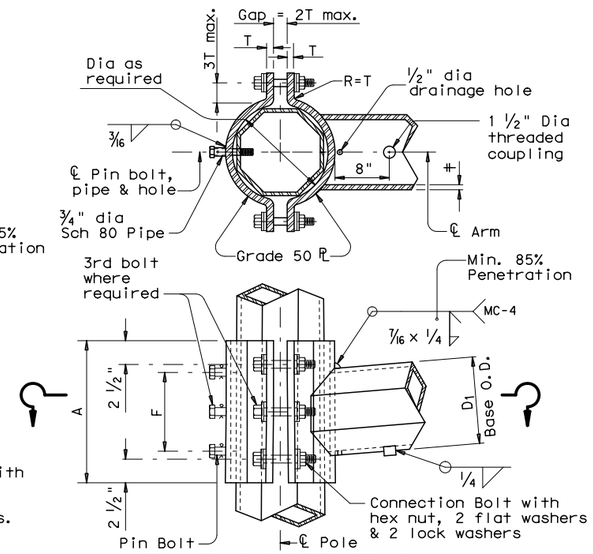
FIXED MOUNT DETAIL 1

ARM SIZE D_1 in.	ARM SIZE ∓ in.	A in.	F in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia 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



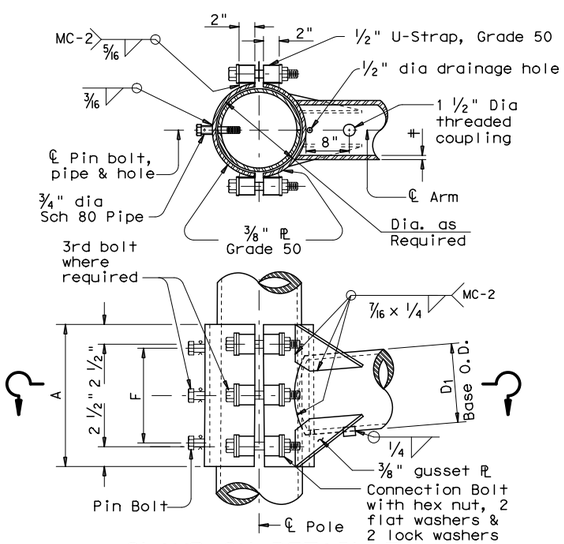
CLAMP-ON DETAIL 1

ARM SIZE D_1 in.	ARM SIZE ∓ in.	A in.	F in.	T in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia 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

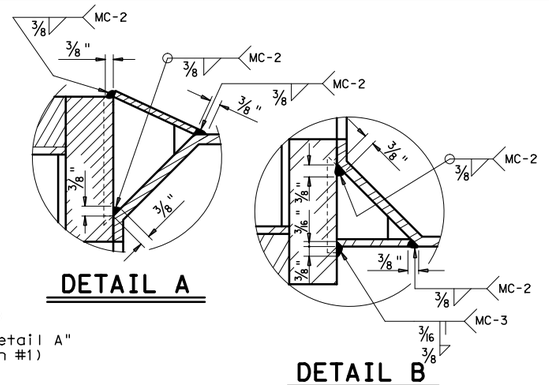


CLAMP-ON DETAIL 2

ARM SIZE D_1 in.	ARM SIZE ∓ in.	A in.	F in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia 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

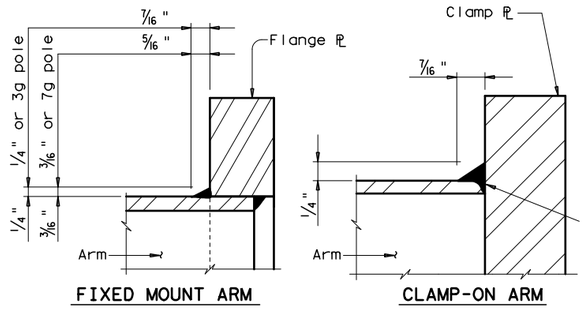


CLAMP-ON DETAIL 3



DETAIL A

DETAIL B



ARM BASE WELD DETAILS

ARM SIZE D_1 in.	ARM SIZE ∓ in.	A in.	F in.	CONN. BOLTS No. ea.	CONN. BOLTS Dia in.	PIN BOLTS No. ea.	PIN BOLTS Dia in.
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8

MATERIALS	
Round Shafts or Polygonal Shafts ①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, A572 Gr.50 or A1011 SS Gr.50 ②
Plates ①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, A1011 HSLAS-F Gr.50
Misc. Hardware	Galvanized steel or stainless steel or as noted

① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 1/2" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 3/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 11/16" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.

Texas Department of Transportation
Traffic Operations Division

STANDARD ASSEMBLY FOR TRAFFIC SIGNAL SUPPORT STRUCTURES

MAST ARM CONNECTIONS

MA-C-12

DN: MS	CK: JSY	DW: MMF	CK: JSY
REVISIONS	CONT	SECT	JOB	HIGHWAY
5-96	0008	05	031	SH 180
5-09	DIST	COUNTY		SHEET NO.
1-12	FTW	TARRANT		124

126A

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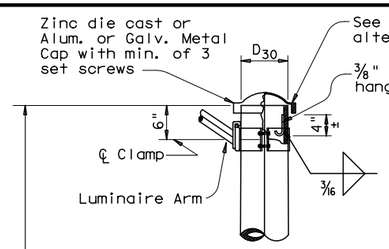
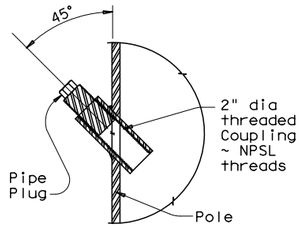
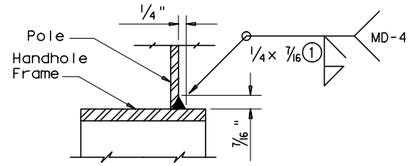


DETAIL A

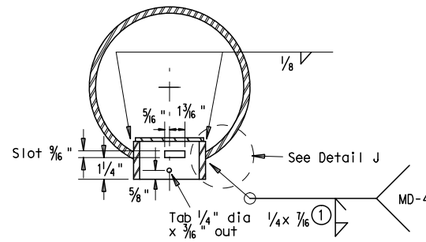
(for pole with luminaire)



POLE COUPLING DETAIL

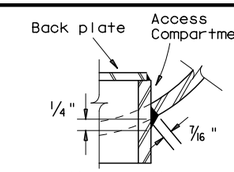


DETAIL G

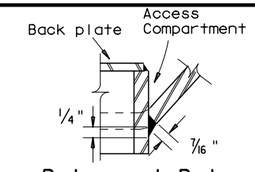


SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

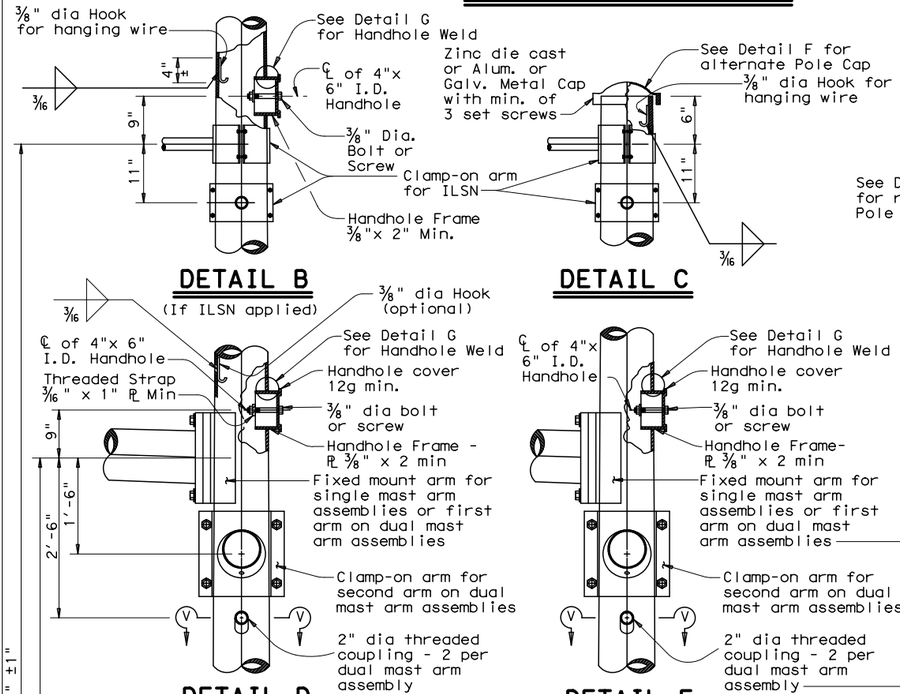


Round Pole



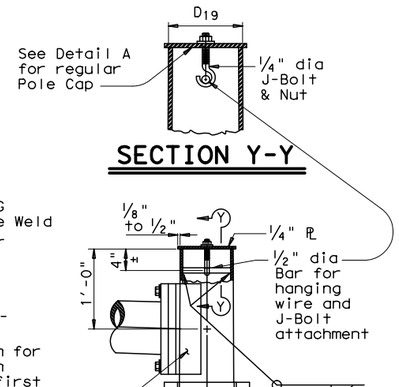
Polygonal Pole

DETAIL J

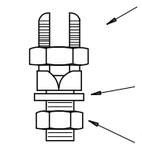


DETAIL B

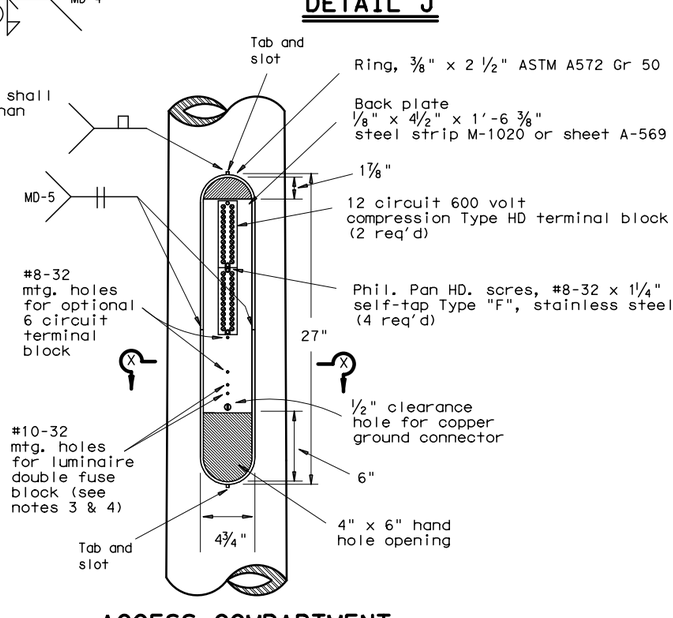
DETAIL C



SECTION Y-Y



COPPER GROUND CONNECTOR



ACCESS COMPARTMENT

DETAIL D

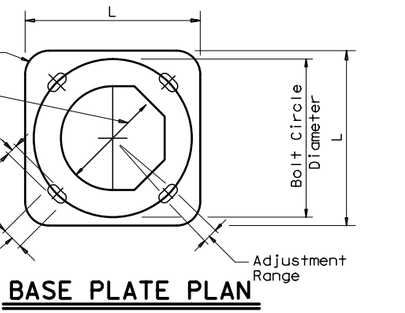
(for 30' pole with luminaire and ILSN sign)

DETAIL E

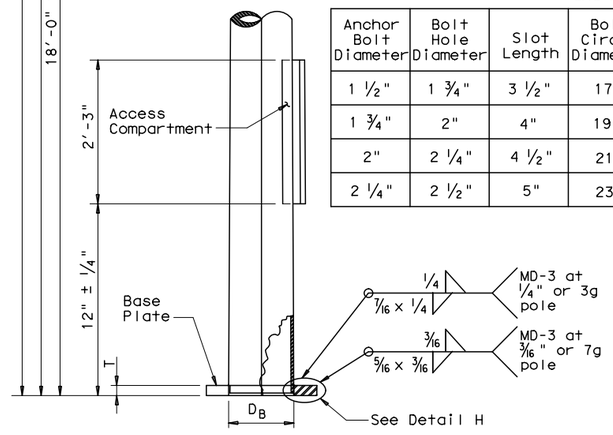
(for 24' pole with ILSN sign and no luminaire)

DETAIL F

(for 19' pole with no ILSN sign and no luminaire)

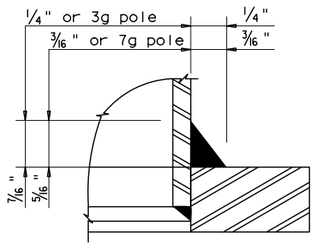


SECTION V-V



POLE ELEVATION

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°



DETAIL H

BASE PLATE PLAN

(1) 85% Min. penetration

(2) 60% Min. penetration 100% pemetration within 6" of circumferential base welds.

NOTES:

1. The cover shall be one piece formed from ABS plastic, shall be a pearl gray color, and shall be suitable for exposure to harsh sunlight and extreme weather. Cover shall latch with two screw latches and shall fit tightly to the enclosure ring to create a rainproof seal. Latch screws shall be 1/4-20 stainless flat socket head screws with tamper proof feature.
2. The pole manufacturer shall provide with each pole a separate kit consisting of: one cover with two latching assemblies, two terminal strips (Marathon #985GP12CU or approved equal), four #8-32 x 1 1/4" self tapping type "F" stainless steel pan head screws, and one ground connector (Blackburn TTC, Burndy KC22J12T13, or Ilsco SSS-5). The traffic signal contractor shall install the kit items in the field.
3. The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP06CU terminal strip, and one Bussmann #BM6032B fuse block.
4. Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

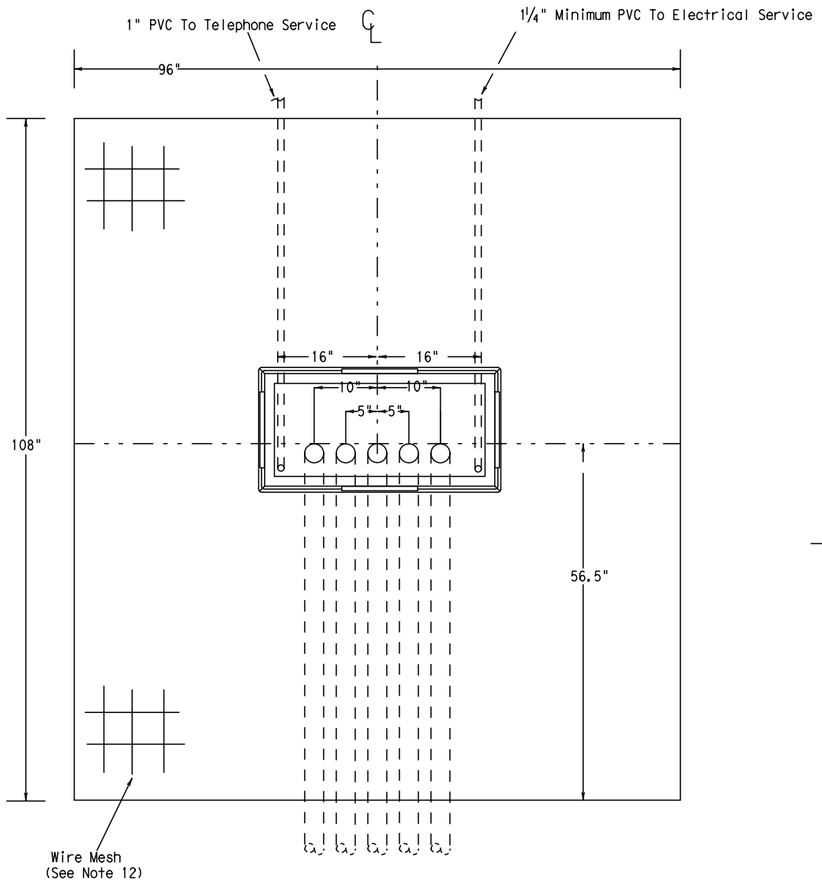
MA-D-12

DN: MS	CK: JSY	DW: FDN	CK: CAL

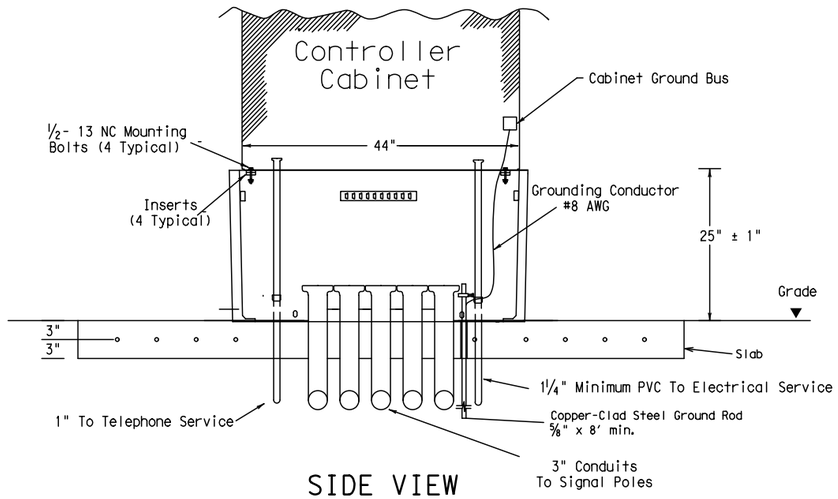
REVISIONS
8-99
1-12

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		125

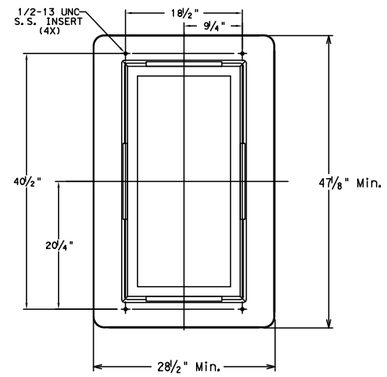
TOP VIEW
(Slab & Base)



SIDE VIEW
(Slab & Base)



CABINET BASE



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 Operation 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 ½"-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 ⅝ x ⅜ inch 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 ½"-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. 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.
11. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
12. 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.
13. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

14. 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.
15. 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.
16. 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.
17. 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:

18. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
19. The silicone caulk bead specified in Item 680.3.B must be RTV 133.

PAYMENT:

20. Bid TS-CF as subsidiary to Item 680.

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD

TS-CF-04

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

12-04 REVISIONS

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180

DIST	COUNTY	SHEET NO.
FTW	TARRANT	126

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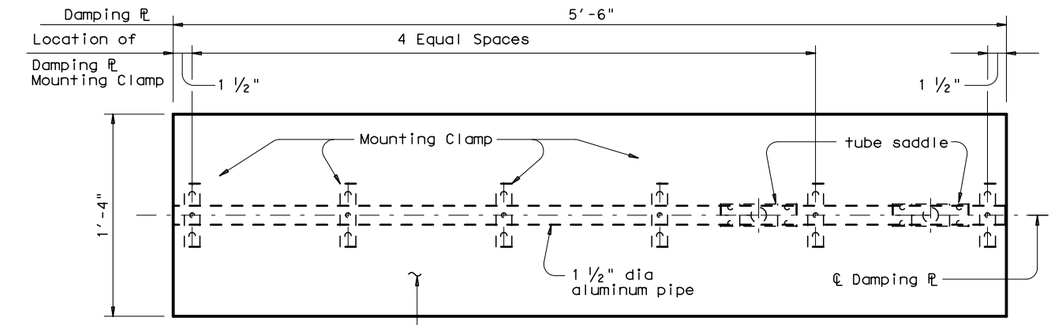
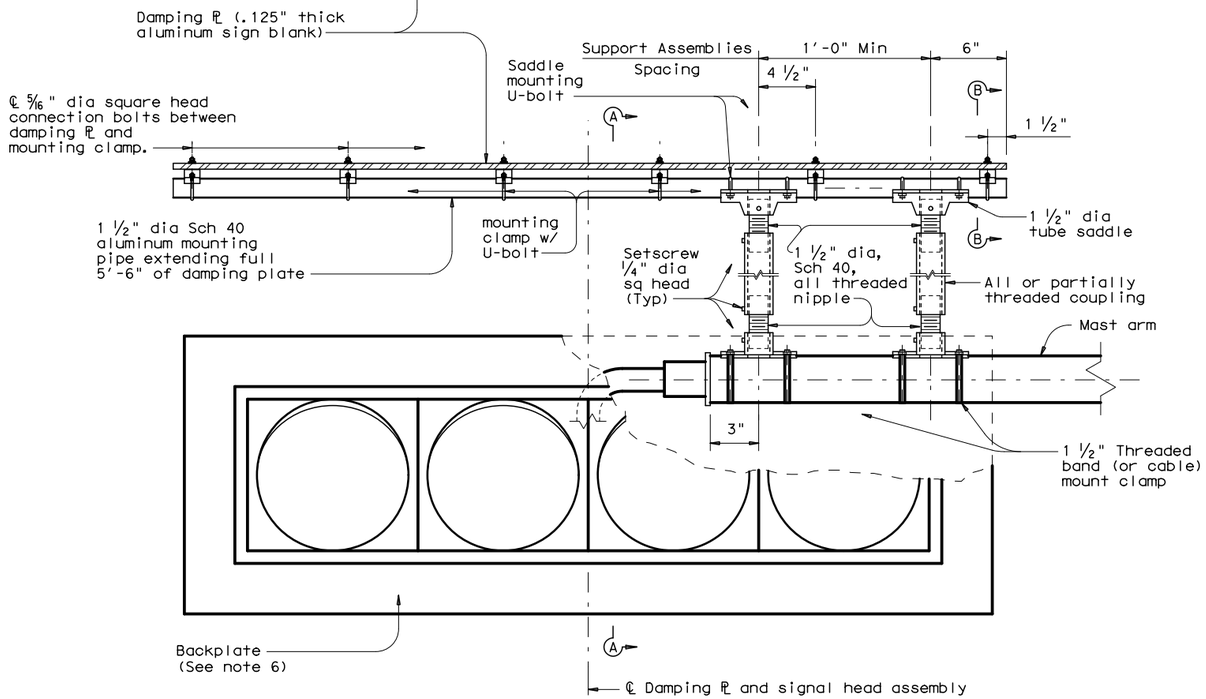


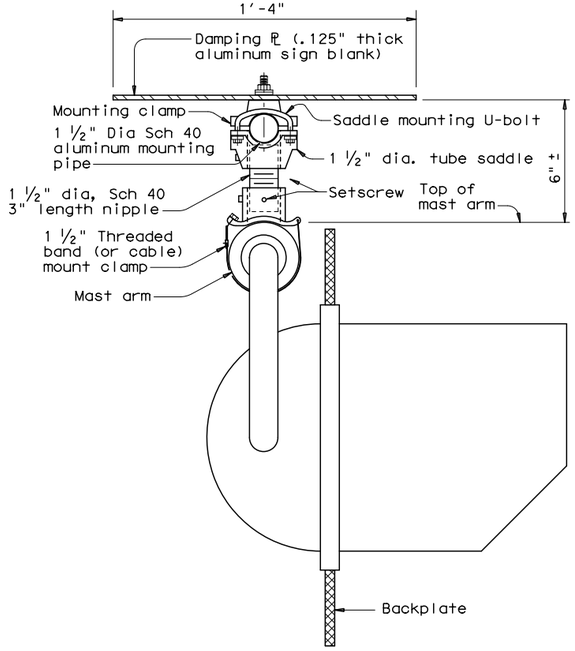
PLAN



ELEVATION

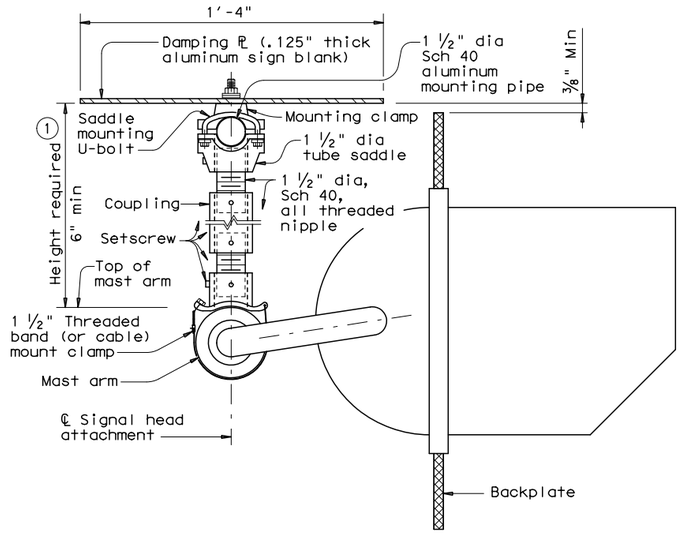
DAMPING PLATE MOUNTING DETAILS

(Showing alternate placement of signal head)



SECTION A-A

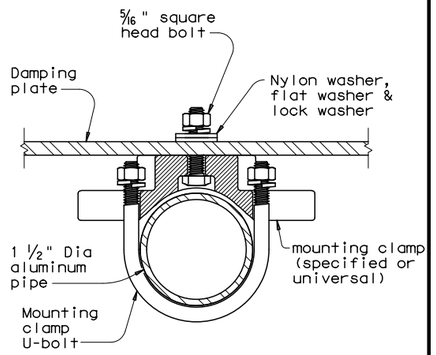
(Showing standard placement of signal head)
(Mounting clamp U-bolt is not shown for clarity)



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	0008	05	031	SH 180
6-20	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		127

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

DATE: 5/18/2021 5:30:10 PM
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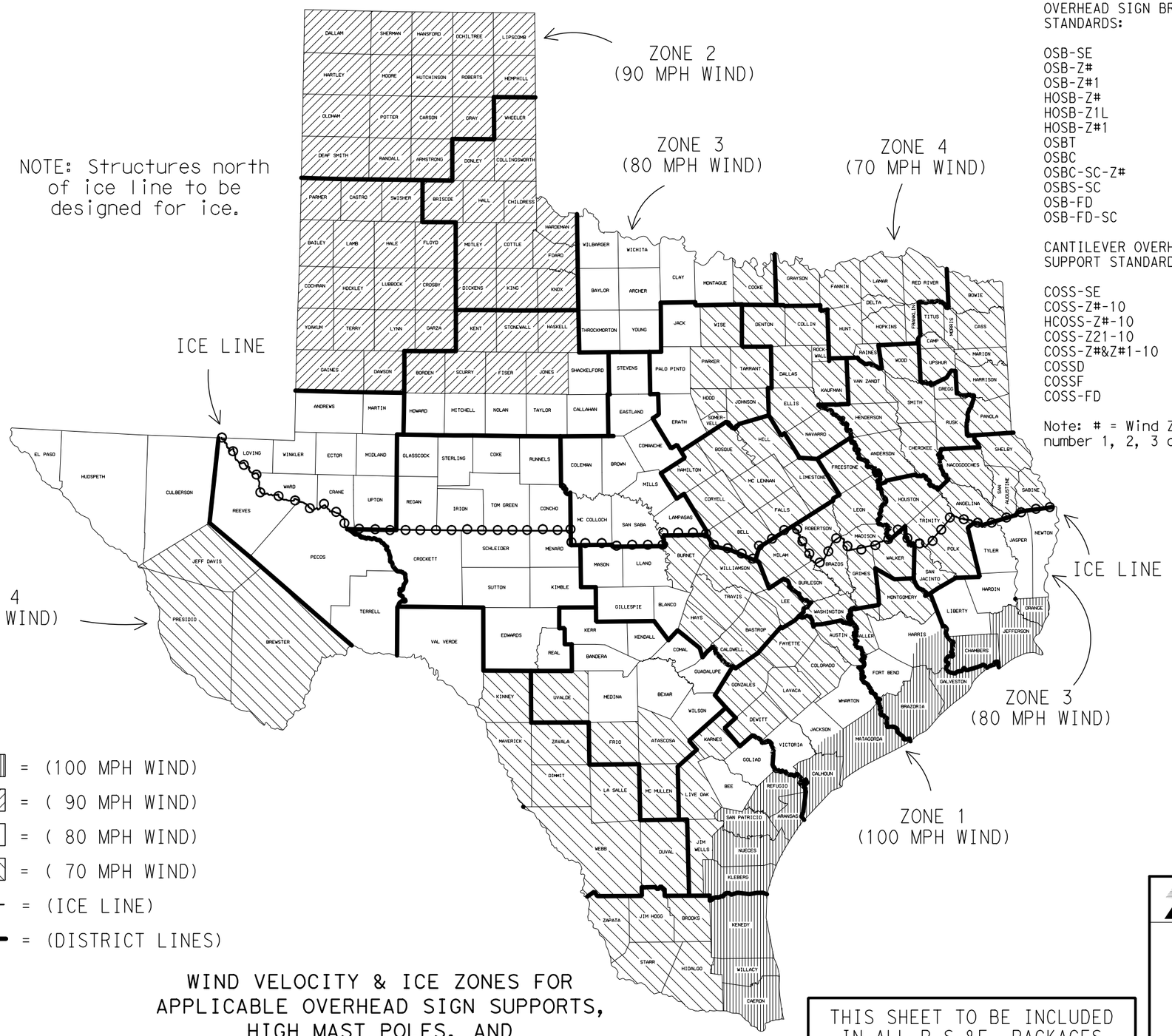

LEGEND

ZONE 1 - = (100 MPH WIND)
ZONE 2 - = (90 MPH WIND)
ZONE 3 - = (80 MPH WIND)
ZONE 4 - = (70 MPH WIND)
= (ICE LINE)
= (DISTRICT LINES)

WIND VELOCITY & ICE ZONES FOR APPLICABLE OVERHEAD SIGN SUPPORTS, HIGH MAST POLES, AND TRAFFIC SIGNAL POLES

Based on 50 Year Mean Recurrence Interval of Fastest Mile Wind Velocity at 33 feet height.

APPLICABLE STANDARDS SHEETS

OVERHEAD SIGN BRIDGE STANDARDS:

OSB-SE
OSB-Z#
OSB-Z#1
HOSB-Z#
HOSB-Z1L
HOSB-Z#1
OSBT
OSBC
OSBC-SC-Z#
OSBS-SC
OSB-FD
OSB-FD-SC

CANTILEVER OVERHEAD SIGN SUPPORT STANDARDS:

COSS-SE
COSS-Z#-10
HCOSS-Z#-10
COSS-Z21-10
COSS-Z#&Z#1-10
COSSD
COSSF
COSS-FD

Note: # = Wind Zone number 1, 2, 3 or 4

HIGH MAST ILLUMINATION POLE STANDARDS:

HMIP-98
HMIF-98

WALKWAYS AND BRACKETS STANDARDS:

SWW
SB(SWL-1)

TRAFFIC SIGNAL POLE STANDARDS:

SP-80
SP-100
SMA-80
SMA-100
DMA-80
DMA-100
MA-C
MAC(ILSN)
MAD-D
TS-FD
LUM-A
CFA
LMA
TS-C
MA-DPD

FOR HARRIS CO. ONLY
Zone line is just North of US 90, around on the North, West and South sides of IH 610 and down the West side of SH 288.

FOR JACKSON CO. ONLY
Zone line is just North of SH 616.

THIS SHEET TO BE INCLUDED IN ALL P.S.&E. PACKAGES CONTAINING ONE OR MORE OF THE APPLICABLE STANDARD SHEETS LISTED HEREON

Texas Department of Transportation

Traffic Operations Division Standard

WIND VELOCITY AND ICE ZONES

WV & IZ-14

FILE: windice.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1996	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
8-14-Added list of applicable standards, restricting use to structures designed for Fastest Mile wind speeds.	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		128

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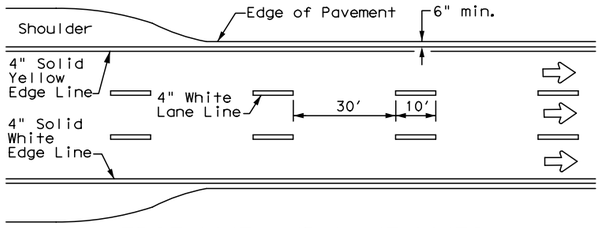
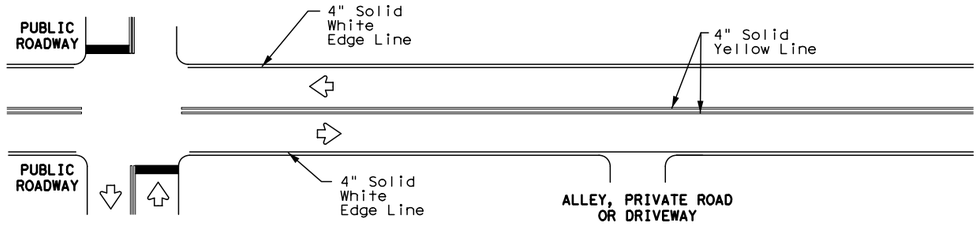
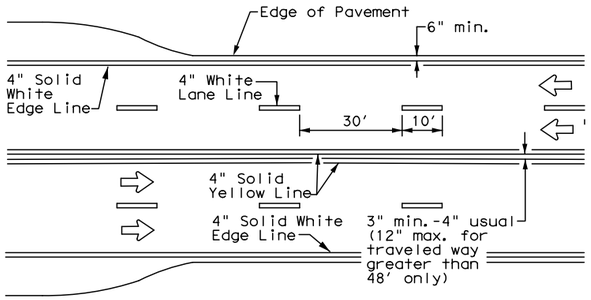


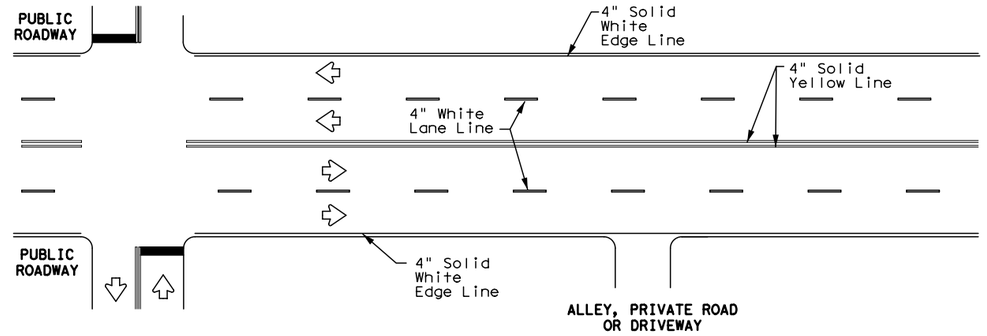
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



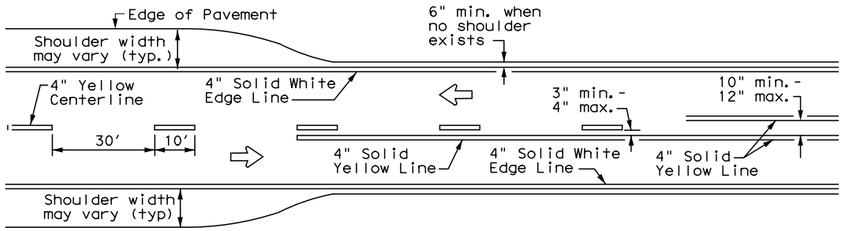
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



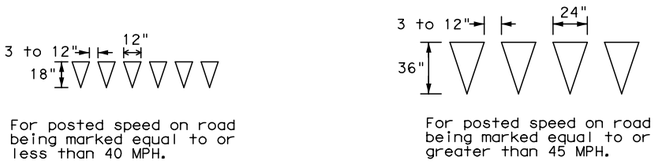
CENTERLINE AND LANE LINES FOUR LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



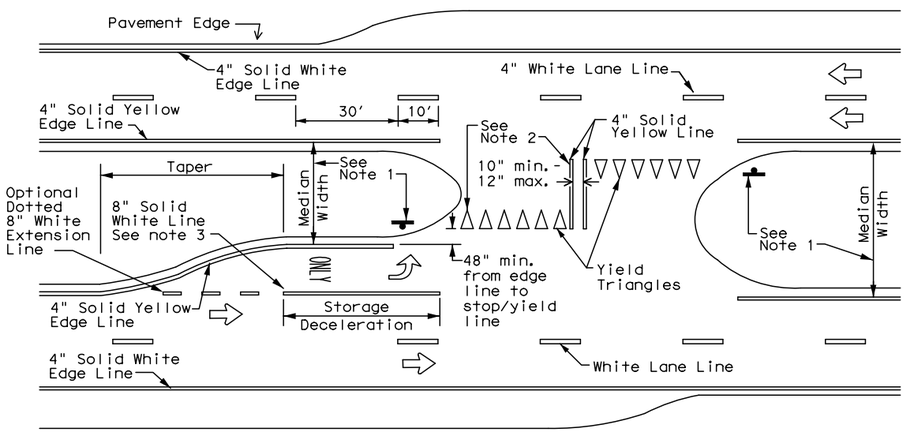
TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

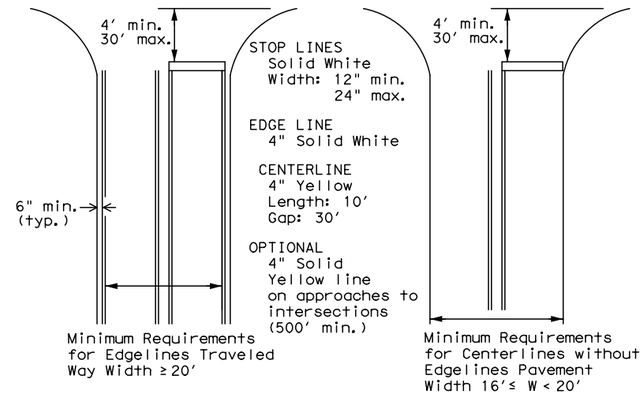
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
© TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	0008	05	031	SH 180
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	FTW	TARRANT		129

22A

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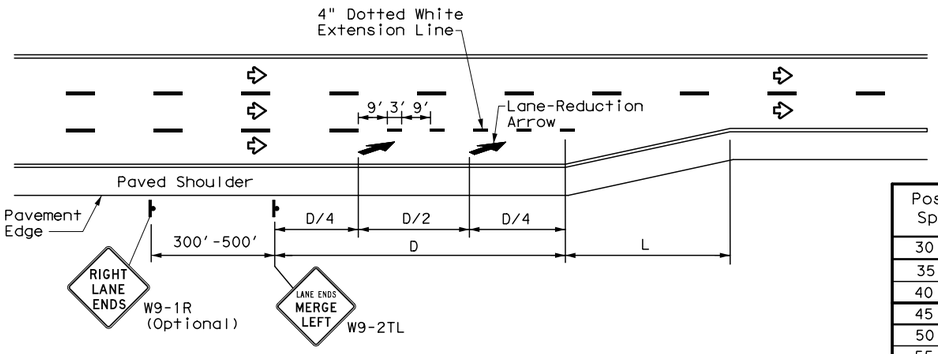
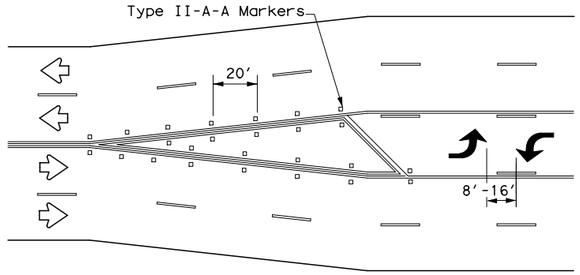


LANE REDUCTION

Posted Speed	D (ft)	L (ft)
30 MPH	460	$L=\frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional W9-1R "RIGHT LANE ENDS" sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.



A two-way left-turn (TWLT) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

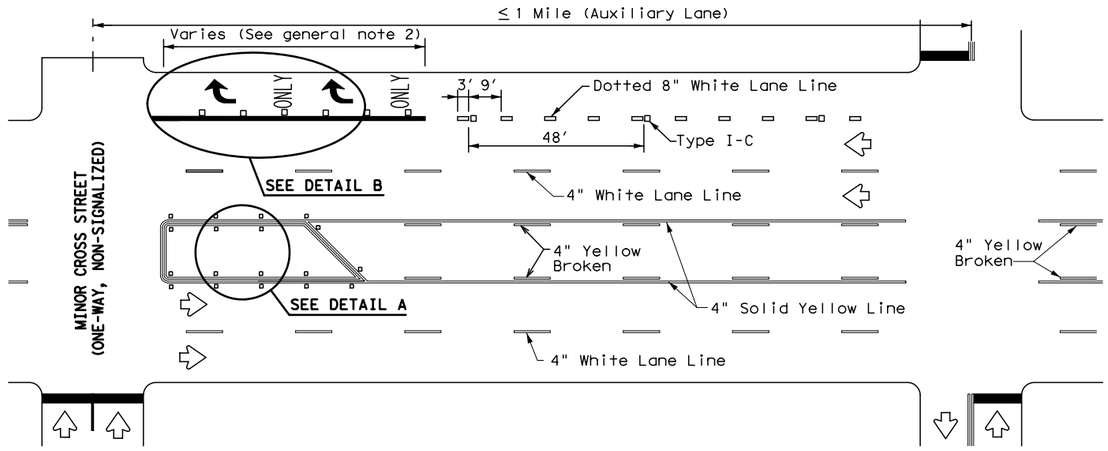
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

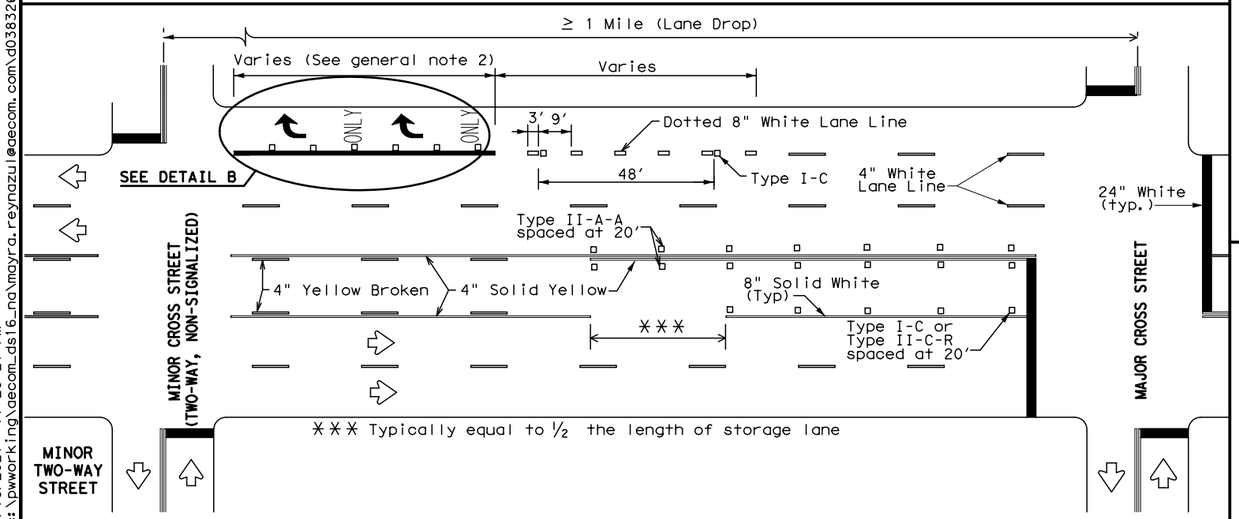
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

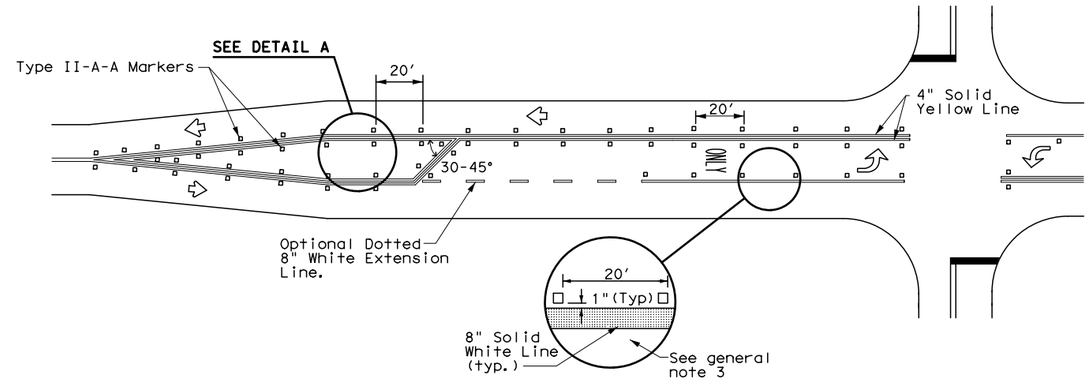
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



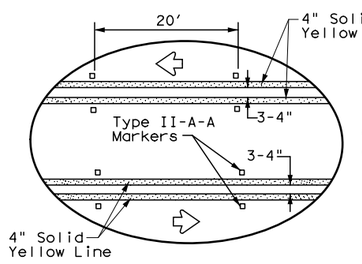
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



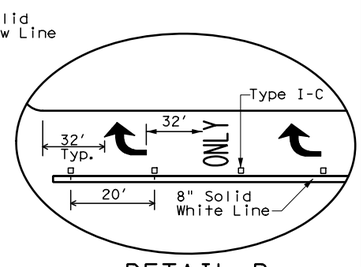
TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A



DETAIL B

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

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©TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
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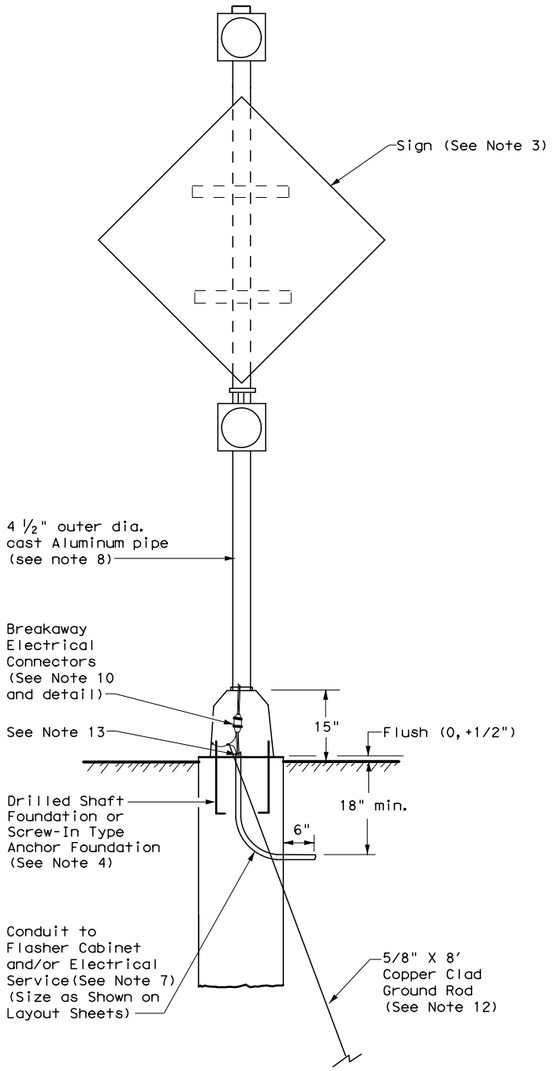
8-00 2-12	FTW	TARRANT		130
3-03 6-20				

22C

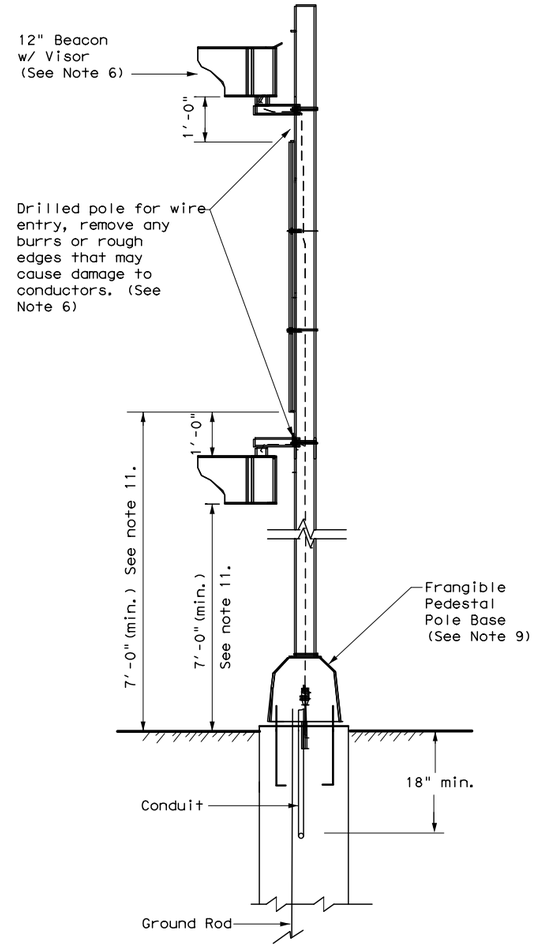
DATE: 5/18/2021 5:30:17 PM
FILE: c:\pwworking\aecom_ds16_ng\mayra.reynazul@aecom.com\d0383261\rfba-13.dgn

GENERAL NOTES:

1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
7. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
8. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening of connection.
10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
11. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
12. Make connections to ground rods according to NEC. Ground rod clamps shall be listed for their intended purpose.
13. Ensure height of conduit and ground rod is below top of anchor bolts.



FRONT



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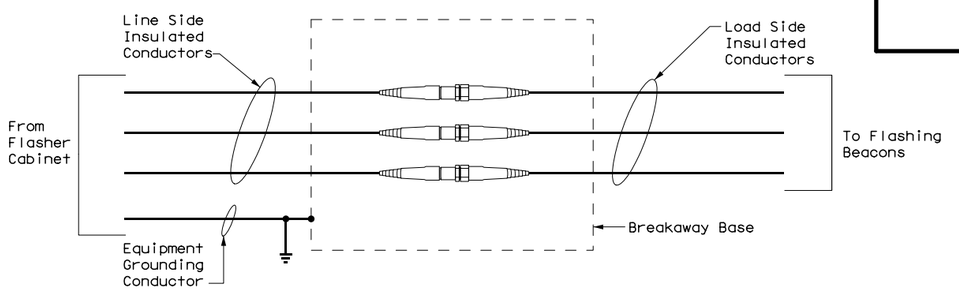
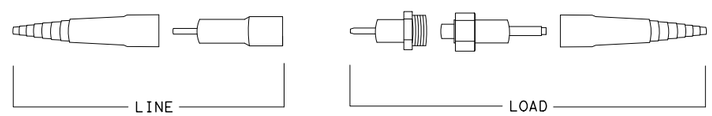


NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

ROADSIDE FLASHING BEACON ASSEMBLY

RFBA-13

FILE: rfba-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 1992	CONT	SECT	JOB	HIGHWAY
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4-98				

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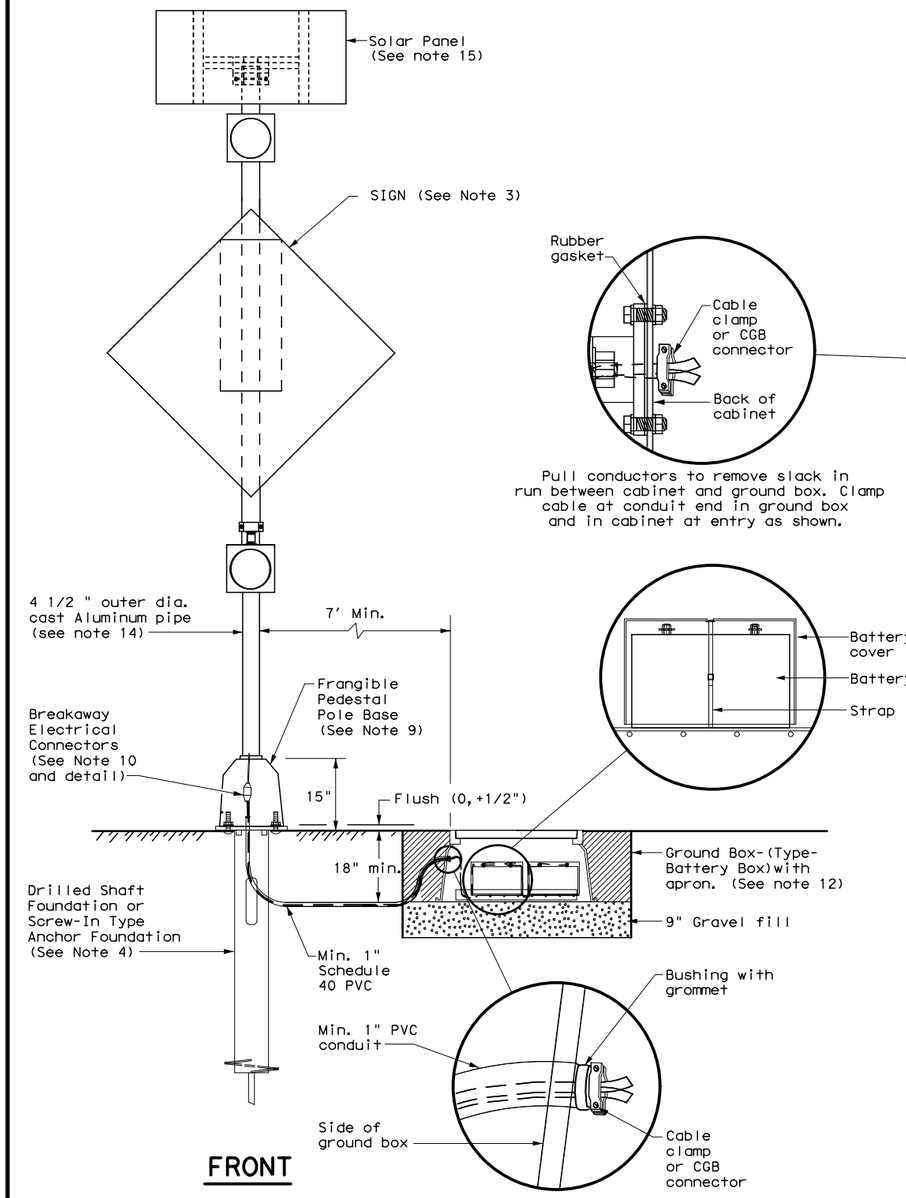
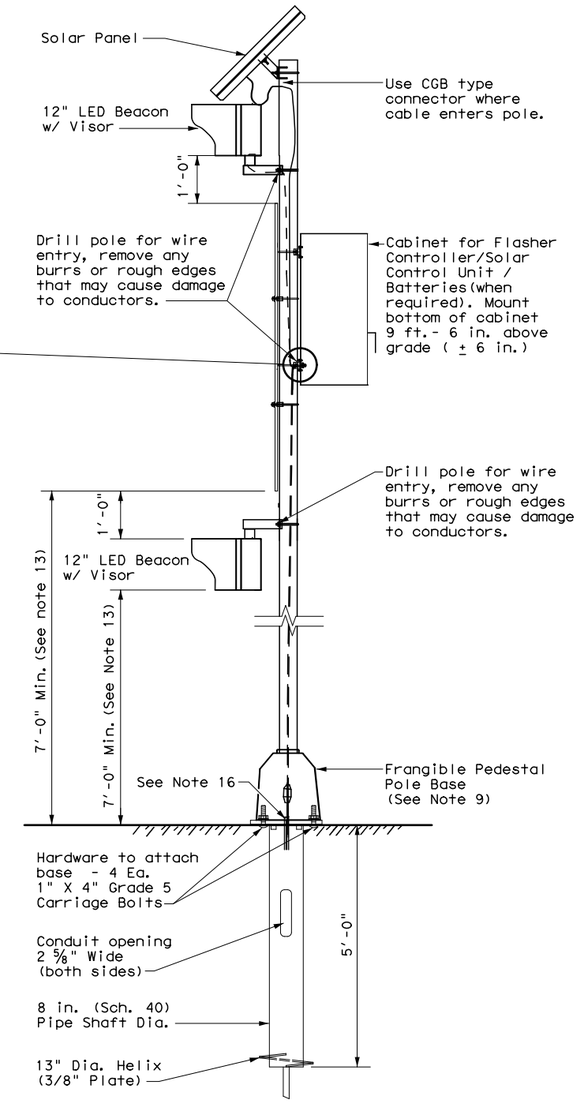
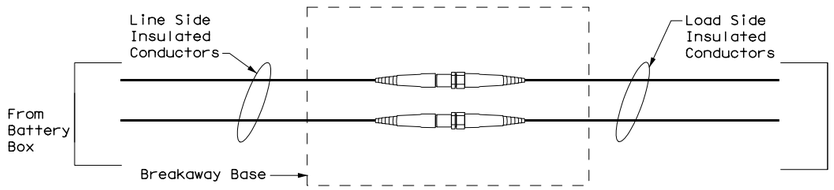
GENERAL NOTES:

1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.
7. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
8. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.
10. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies." Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
11. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16" plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.
12. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.
13. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
14. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
15. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
16. Ensure height of conduit is below top of anchor bolts.

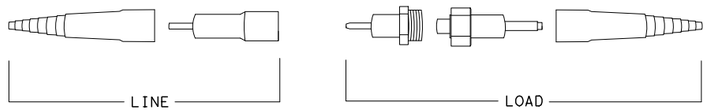


Pull conductors to remove slack in run between cabinet and ground box. Clamp cable at conduit end in ground box and in cabinet at entry as shown.





NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS
EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS

SPRFBA(1)-13

FILE: spb1-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
12-04 3-13	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		131A

75A

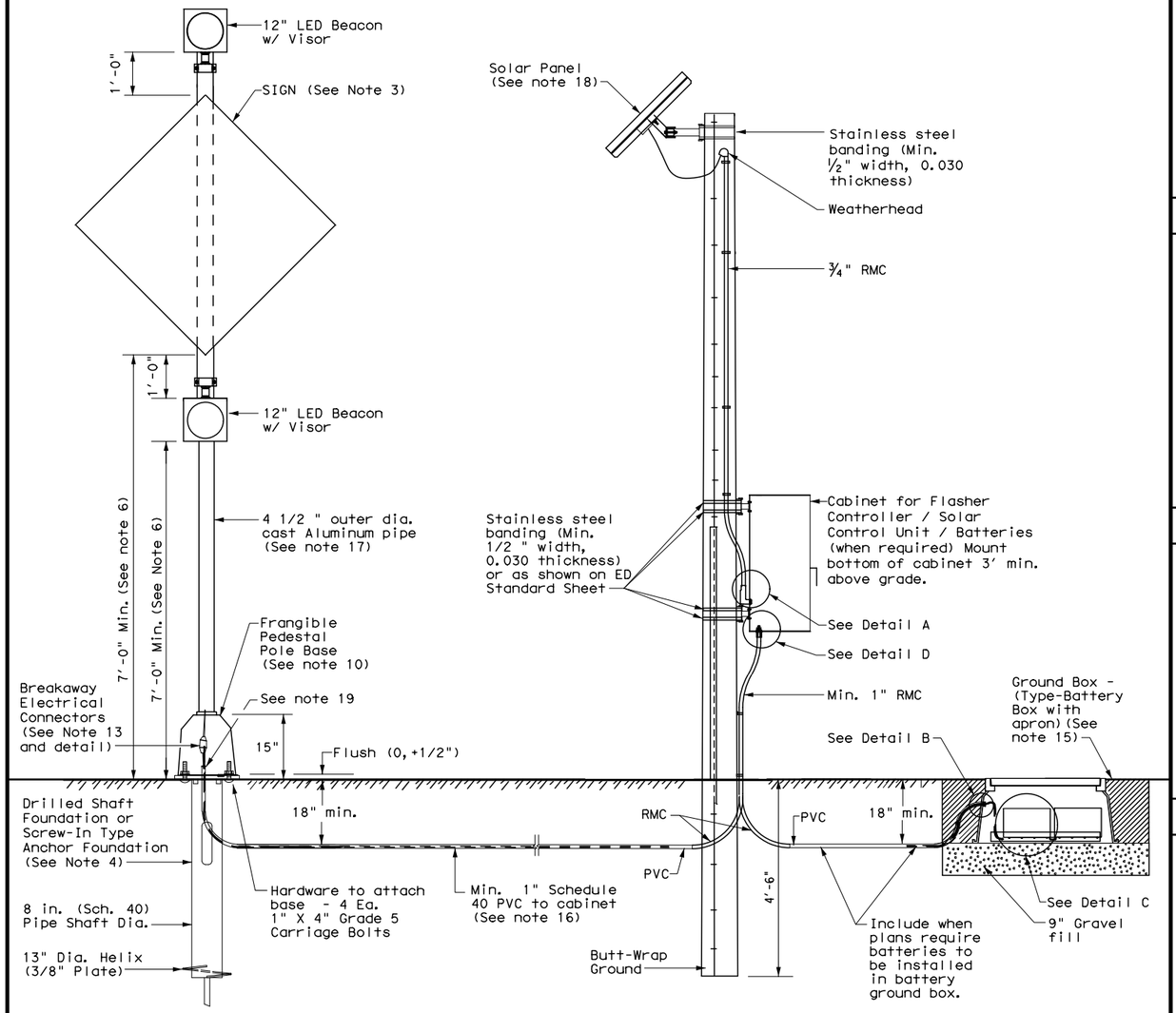
DATE: 7/2/2021 12:06:24 AM
FILE: c:\pwworking\aecom_ds16_na\mayra.reynazul@aecom.com\d0383261\spb2-13.dgn

GENERAL NOTES:

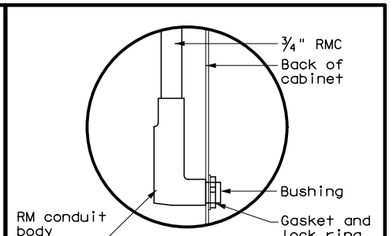
1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
7. Provide 20' in length ANSI class 5 timber poles. Install pole as shown or at the edge of the right of way. The timber pole is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
8. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.
9. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
10. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.
11. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
12. Install the Type LB conduit body attachment in the bottom third of the back of the cabinet. See Detail A.
13. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies". Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse (slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
14. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16 " plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.
15. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.
16. Unless otherwise shown on the plans or recommended by the manufacturer, use the following table to determine the wire size from cabinet to beacons.

Distance from Cabinet to Beacons (ft.)	Minimum Required Wire Size (AWG)
0 - 35	#14
35 - 60	#12
60 - 100	#10
> 100	#8

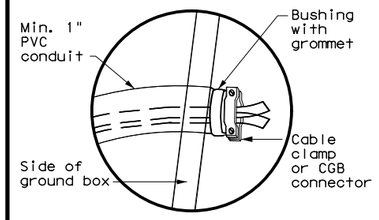
17. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
18. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
19. Ensure height of conduit is below top of anchor bolts.



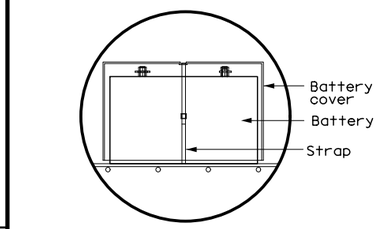
DETAIL FOR SOLAR PANEL, CABINET, AND BATTERIES LOCATED OUT OF CLEAR ZONE ON TIMBER POLE



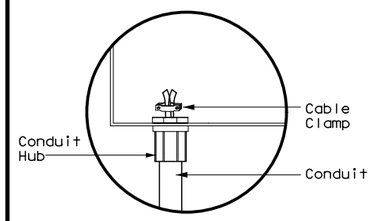
DETAIL A



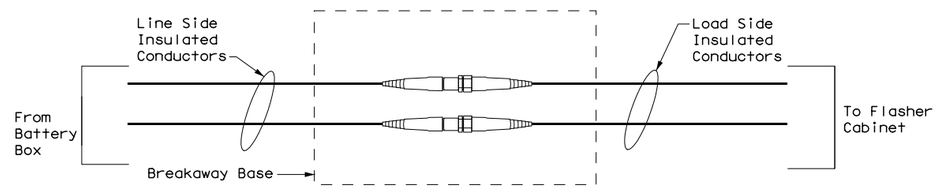
DETAIL B



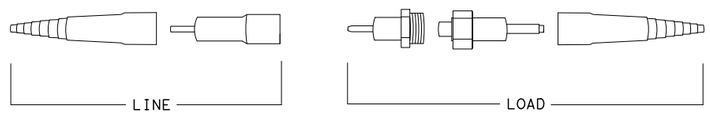
DETAIL C



DETAIL D



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS (TIMBER)

SPRFBA(2)-13

FILE: spb2-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
12-04 3-13	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		131B

75B

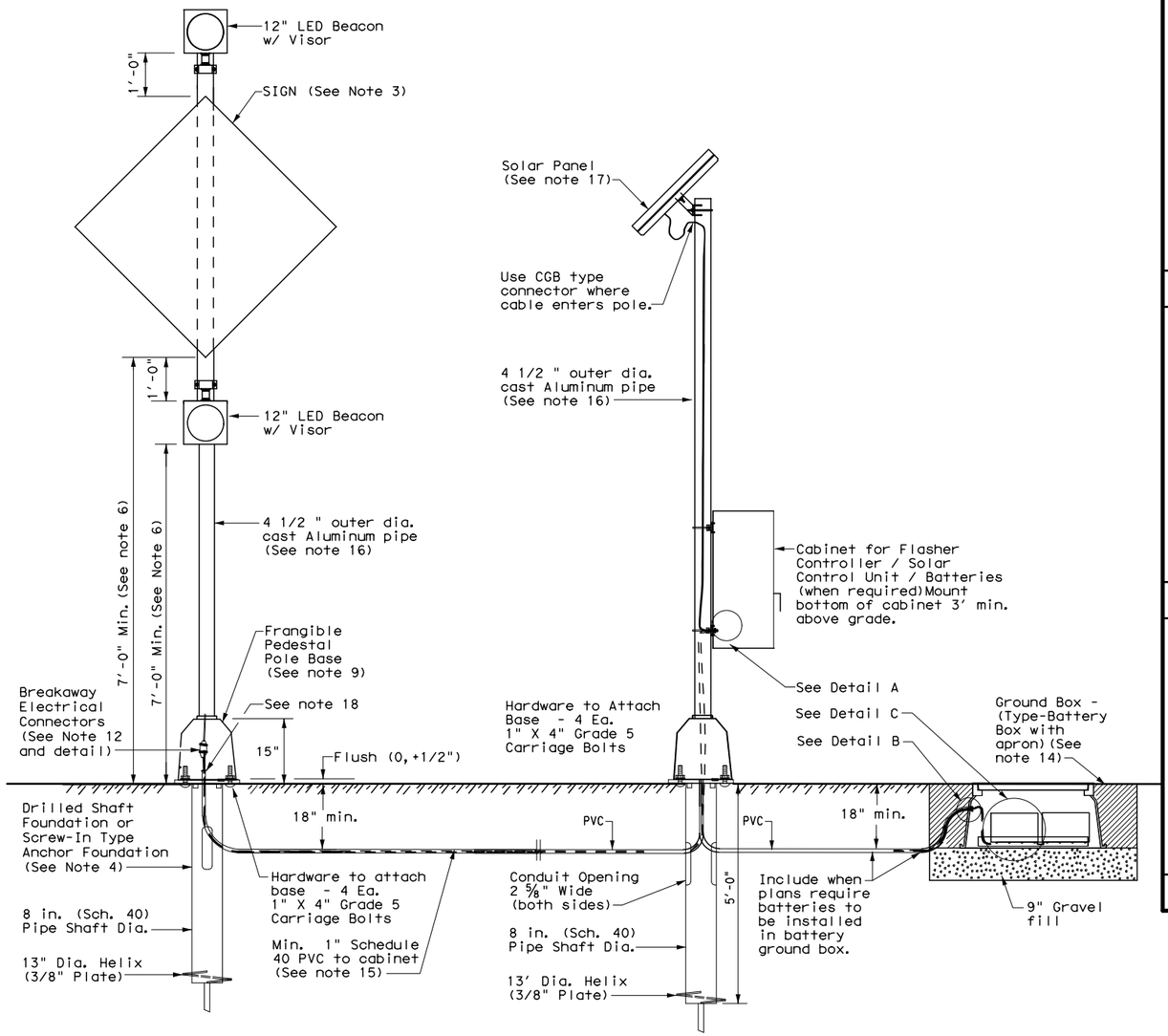
GENERAL NOTES:

1. Details show a typical warning sign with two flashing beacon heads, other arrangements are possible. When only one beacon is required, install the upper beacon.
2. See Item 685, "Roadside Flashing Beacon Assemblies" for further requirements.
3. See SMD standard sheets for lateral and vertical clearances and sign mounting details. Install signs as shown on the sign layout sheets.
4. Use either a Screw-In Type Anchor Foundation or a Drilled Shaft Foundation as shown elsewhere in the plans. When plans require a Drilled Shaft Foundation, see standard sheet TS-FD. Install the Screw-In Type Anchor Foundation as per manufacturer's recommendations. On a slope, install one edge at ground level. Screw-In/Drilled Shaft Foundation is subsidiary to Item 685. Installation of a ground rod is not required for solar powered flashing beacon assemblies.
5. When used, provide Screw-In Type Anchor Foundations as shown on TxDOT's Material Producer List (MPL) in the file "Highway Traffic Signals".
6. Provide clearance as shown above the sidewalk or pavement grade at the edge of the road. When a bottom beacon is not used, mount the bottom of the sign at least 7 ft. above the sidewalk or pavement grade at the edge of the road.
7. Use materials specifically designed for attaching cabinets, beacon heads, solar panels, etc., to poles.
8. Conduit in foundation and within 6 in. of foundation is subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies."
9. Per manufacturer's recommendations, engage all threads on the pedestal pole base and pipe unless the pipe is fully seated into base. In high winds, use a pole and base collar assembly to add strength and prevent loosening on connection.
10. Install beacon heads as shown here, as shown elsewhere on the plans, or as directed. Use hardware specifically designed for mounting beacon heads on poles.
11. Install the cable clamp in the bottom third of the back of the cabinet. See Detail A.
12. Provide single pole non-fused watertight breakaway electrical connectors for frangible pedestal pole bases, as shown on TxDOT's MPL in the file "Roadway Illumination and Electrical Supplies". Approved models are listed under Item 685. For ungrounded (hot) conductors, install a breakaway connector with a dummy fuse (slug). For grounded (neutral) conductors, install a breakaway connector with a white colored marking and a permanently installed dummy fuse (slug).
13. Install the batteries in a battery box. Place the batteries on a 3/16" thick plastic sheet and connect together. Place a plastic cover (battery bell jar) over the top of each battery and secure the battery bell jar to the battery with a strap. The batteries, bell jars, straps and 3/16 " plastic sheet are subsidiary to the Item 685, "Roadside Flashing Beacon Assemblies." When required, install batteries in the flasher cabinet. Wire batteries according to manufacturers recommendations. Provide the number of batteries as required by the manufacturer.
14. See standard sheet Electrical Details (ED) for additional requirements regarding the installation of ground boxes/battery boxes, conduit, and cabinets.
15. Unless otherwise shown on the plans or recommended by the manufacturer, use the following table to determine the wire size from cabinet to beacons.

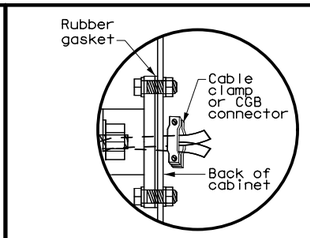
Distance from Cabinet to Beacons (ft.)	Minimum Required Wire Size (AWG)
0 - 35	#14
35 - 60	#12
60 - 100	#10
> 100	#8

16. Unless otherwise shown on the plans, pole shaft shall be one piece, Schedule 40 Aluminum pipe, ASTM B429 or B221 (Alloy 6061-T6 only). Aluminum conduit will not develop the necessary strength and will not be allowed.
17. Orient solar panel for optimum exposure to sunlight (face to the south). Prior to installation, check the location to ensure there is no overhead obstruction that would block the solar panel from receiving full sunlight. Unless specified elsewhere, mount a minimum of 14' above grade.
18. Ensure height of conduit is below top of anchor bolts.

DATE: 7/2/2021 12:06:27 AM
FILE: c:\pwworking\aecom_dsf6_na\mayra.reynazul@aecom.com\d0383261\spb3-13.dgn

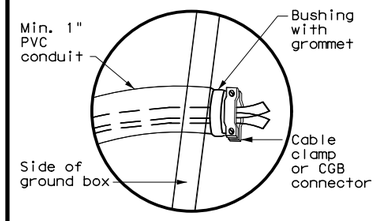


DETAIL FOR SOLAR PANEL, CABINET, AND BATTERIES LOCATED OUT OF CLEAR ZONE ON SEPARATE ALUMINUM POLE ASSEMBLY

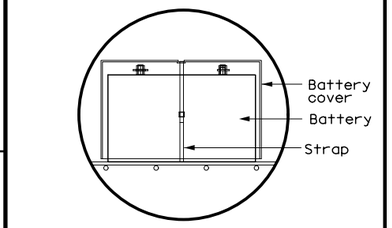


Pull conductors to remove slack in run between cabinet and ground box. Clamp cable at conduit end in ground box and in cabinet at entry as shown.

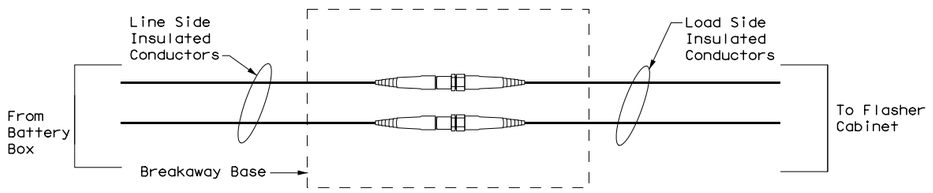
DETAIL A



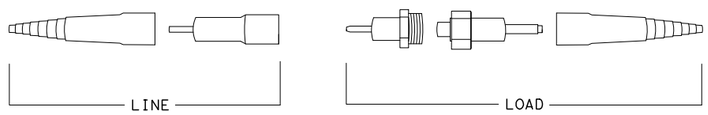
DETAIL B



DETAIL C



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS



NON-FUSED BREAKAWAY ELECTRICAL CONNECTORS EXPLODED VIEW

Texas Department of Transportation

Traffic Operations Division Standard

SOLAR POWERED ROADSIDE FLASHING BEACON ASSEMBLY DETAILS (ALUMINUM)

SPRFBA(3)-13

FILE: spb3-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT May 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
12-04	DIST	COUNTY		SHEET NO.
3-13	FTW	TARRANT		131C

75C

DATE: 5/18/2021 5:30:19 PM
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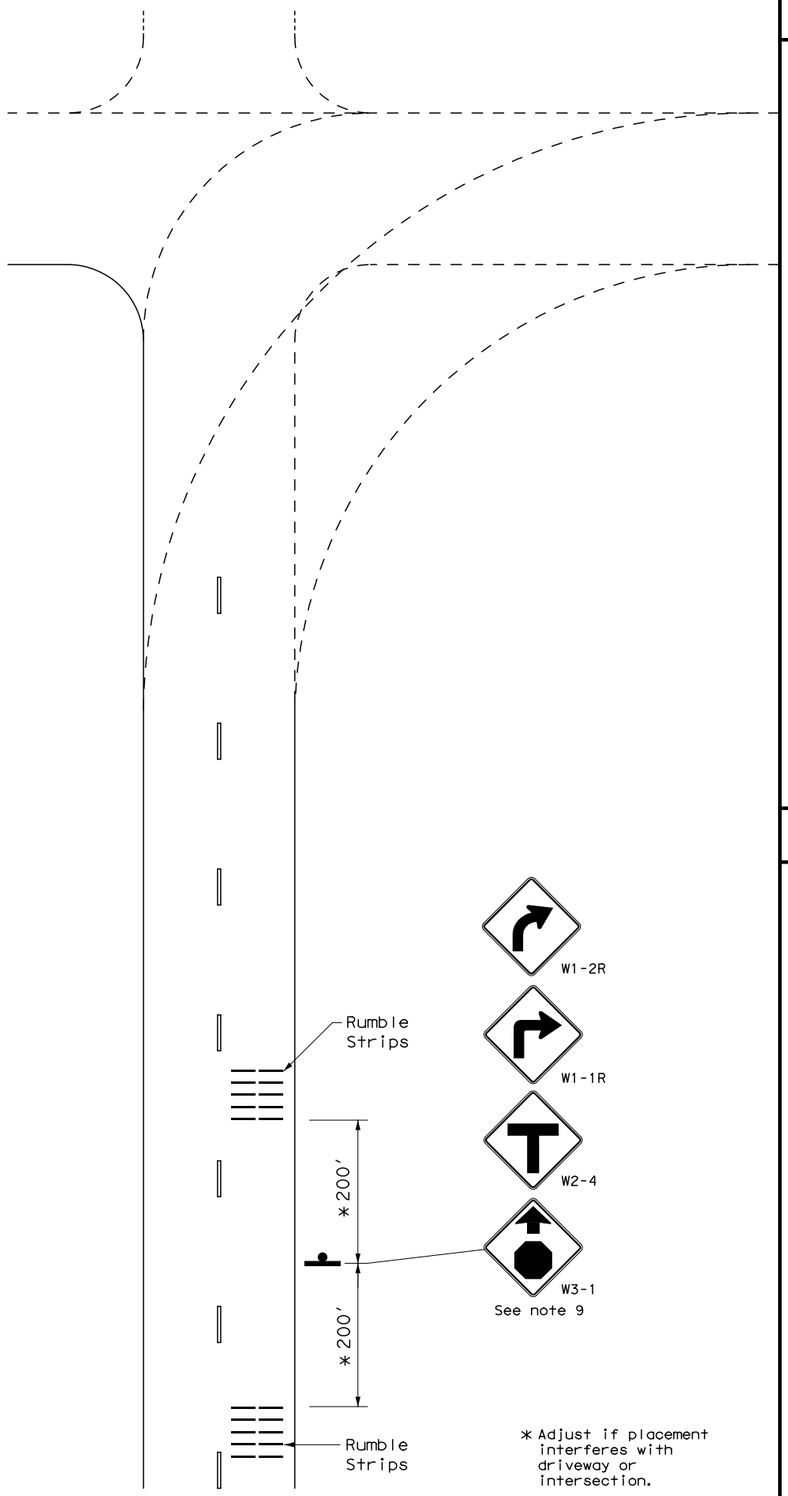
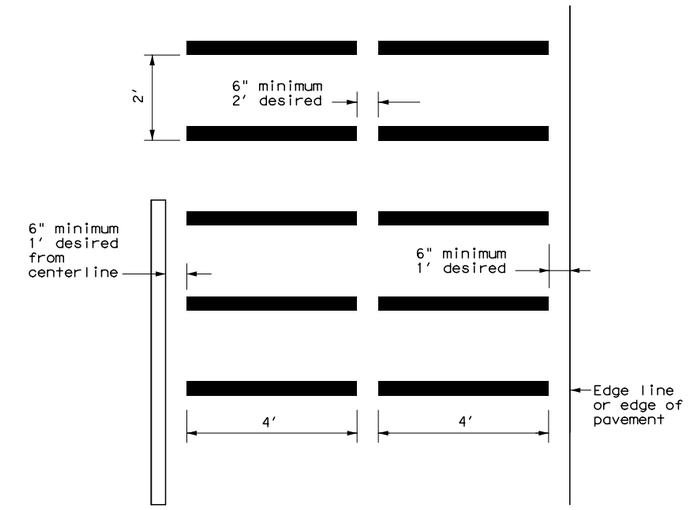
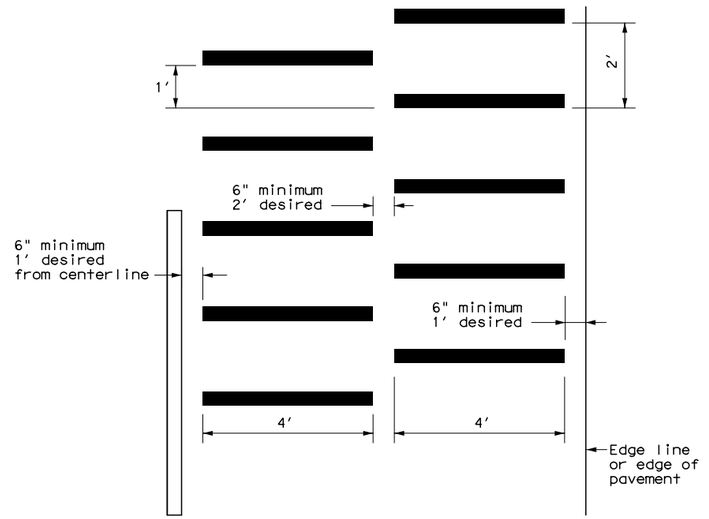


STANDARD PATTERN



ALTERNATIVE PATTERN



GENERAL NOTES

1. Transverse or in-lane rumble strips should only be used at high incident and special geometric locations. These special geometric locations may include: approaches to rural, high speed signalized or Stop -controlled intersections with sight restrictions and/or high crash rates, approaches to unexpected urban intersections, approaches to newly installed Stop or signalized controlled intersections, approaches to toll plazas, approaches to hazardous horizontal curves, and approaches to railroad grade crossings.

2. When used, the rumble strips shall be placed 200 feet prior to and after the placement of the warning device.

3. The use of rumble strips should not be widespread or used indiscriminately.

4. Preformed black raised rumble strips should be used. They should be installed in accordance with the manufacturer's recommendations.

5. A list of approved, preformed raised rumble strips can be obtained from the Traffic Operations Division.

6. Consideration should be given to noise levels when in -lane or transverse rumble strips are installed near residential areas, schools, churches, etc.

7. The use of the "Rumble Strips Ahead" sign may be used in advance of in -lane or transverse rumble strips, based on engineering judgement. This sign is typically not necessary for rumble strip installations built to the guidelines on this standard sheet. When used, this sign should be spaced in advance of the rumble strips based on the guidelines for advance placement of warning sign included in the "Texas Manual on Uniform Traffic Control Devices".

8. Consideration should be given to bicyclists. A 12 inch gap from the edge line may be used to accommodate bicyclists when a usable shoulder is not available. Additional gaps in the in -lane or transverse rumble strips are not recommended since they could cause motorists to swerve to avoid the rumble strips.

9. Other signs can be used as conditions warrant.

Texas Department of Transportation

Traffic Operations Division Standard

TRANSVERSE OR IN-LANE RUMBLE STRIPS

RS(5)-13

FILE: rs(5)-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
2-10	DIST	COUNTY		SHEET NO.
10-13	FTW	TARRANT		132

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
TWT = Thin-Walled Tubing (see SMD(TWT))
10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

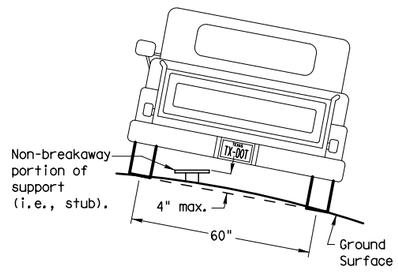
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
WS = Wedge Anchor Steel - (see SMD(TWT))
WP = Wedge Anchor Plastic (see SMD(TWT))
SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
IF REQUIRED
1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-1))

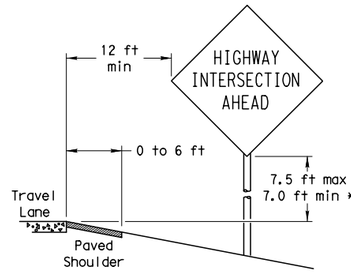
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

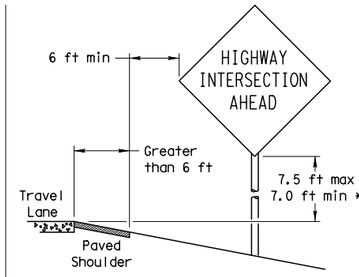
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

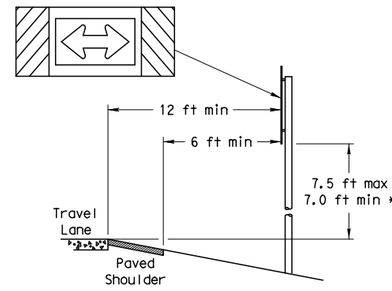
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



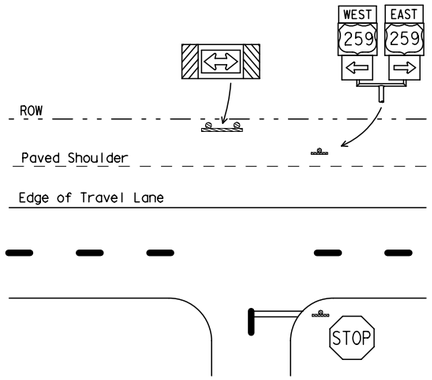
GREATER THAN 6 FT. WIDE

When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

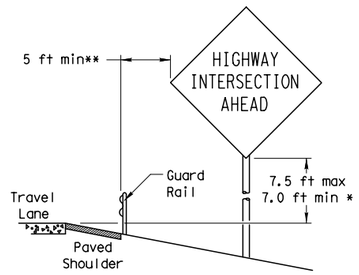
T-INTERSECTION



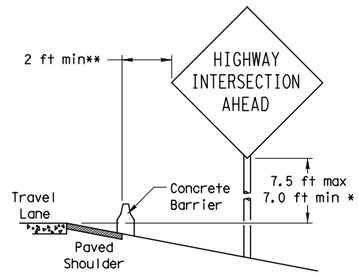
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

* Signs shall be mounted using the following condition that results in the greatest sign elevation:

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

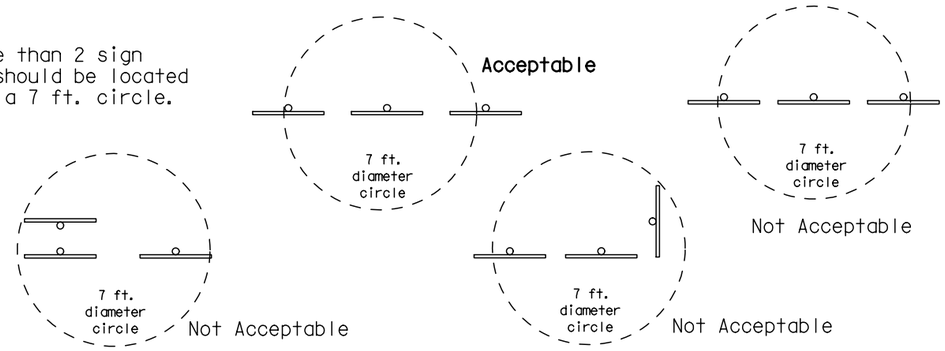
(2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

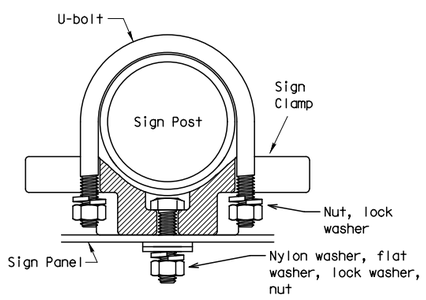
The website address is:
http://www.txdot.gov/publications/traffic.htm

No more than 2 sign posts should be located within a 7 ft. circle.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

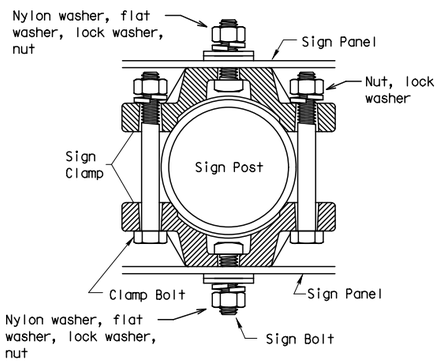


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

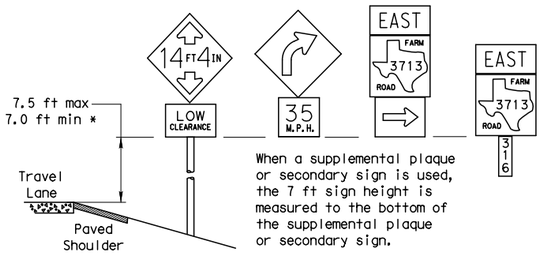
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



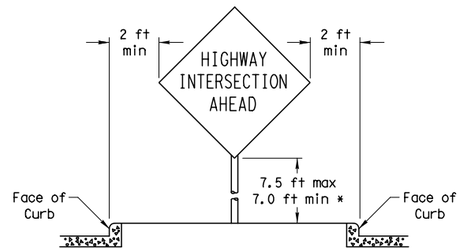
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



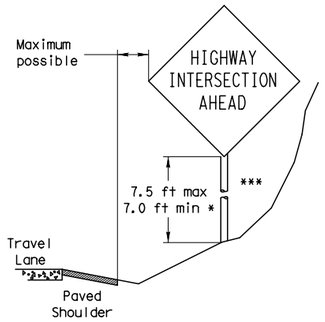
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		133

DATE: 5/18/2021 5:30:21 PM
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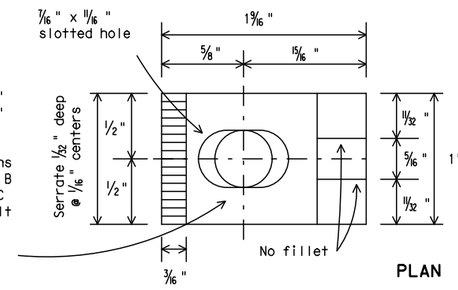
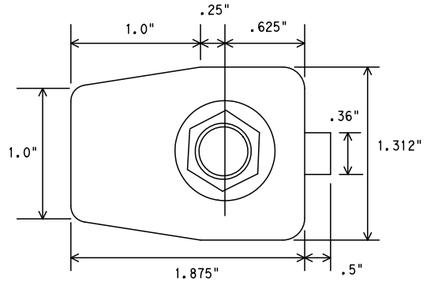
DATE: 5/18/2021 5:30:24 PM
FILE: c:\pwworking\aecom\dsl6\rna\mayra.reynazul@aecom.com\d0383261\smd21-08.dgn

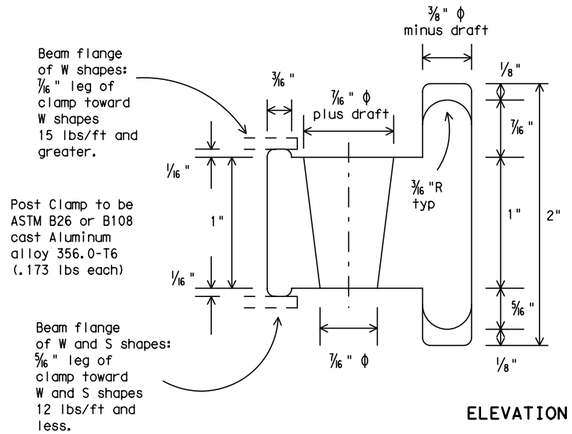
NOTE: centerline of hole for 3/8" diameter squarehead bolt x 2 1/4" long with a flat washer and self-locking nut, or lock washer and hex. nut. Bolt head dimensions shall be in accordance with ANSI B 18.2.1 as referred to in the AISC Manual of steel construction. Bolt assembly shall be galvanized.



PLAN

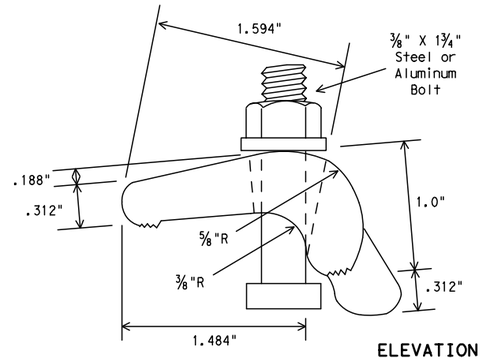


PLAN



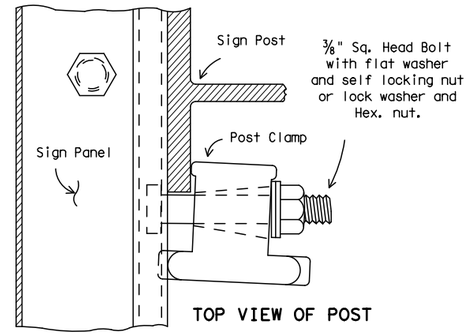
ELEVATION

POST CLAMP DETAIL

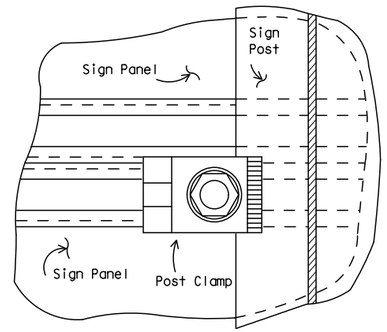


ELEVATION

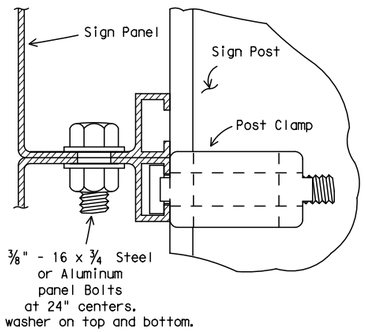
ALTERNATE POST CLAMP DETAIL



TOP VIEW OF POST



TOP VIEW OF CLAMP



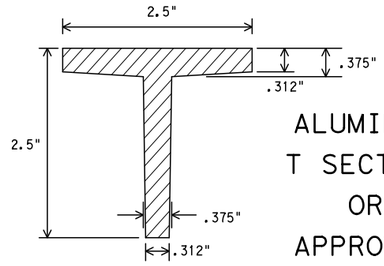
SIDE VIEW OF PANELS

CONNECTION DETAILS

DEPARTMENTAL MATERIAL SPECIFICATIONS	
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Design conforms with AASHTO Specifications for the design and construction of structural supports for highway signs.
2. Materials and fabrication shall conform to the requirements of the Department material specifications.
3. Structural steel shall be "low-alloy steel" for non-bridge structures per Item 442, "Metal For Structures."
4. For fiberglass substrate connection details, see manufacturer's recommendations.

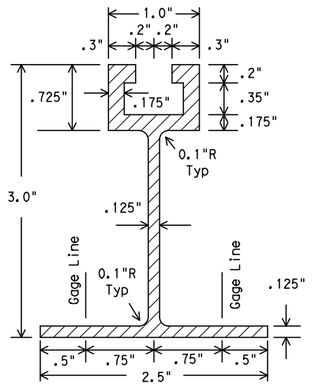


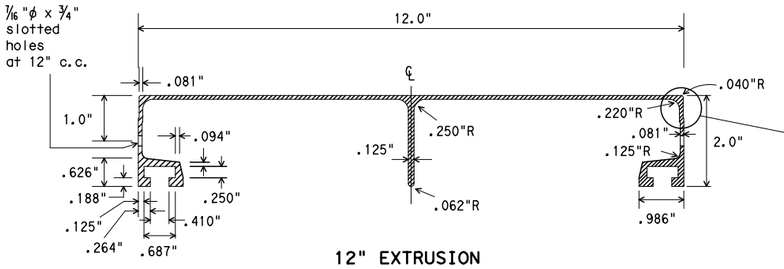
1.912 lbs/ft

ALUMINUM T SECTION OR APPROVED ALTERNATIVE

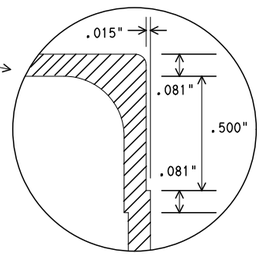
WINDBEAM CROSS SECTION

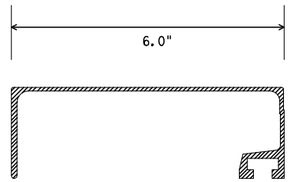
Windbeam to be extruded aluminum (1.175 lbs/ft) or approved alternative



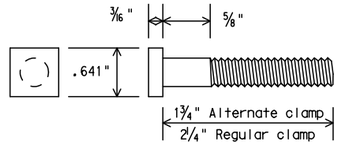


12" EXTRUSION





6" EXTRUSION



POST CLAMP BOLT DETAIL

ALUMINUM SIGN PANEL EXTRUSION DETAILS

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- EXTRUDED ALUMINUM SIGN PANELS & HARDWARE

SMD(2-1)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		134

DATE: 5/18/2021 5:30:26 PM
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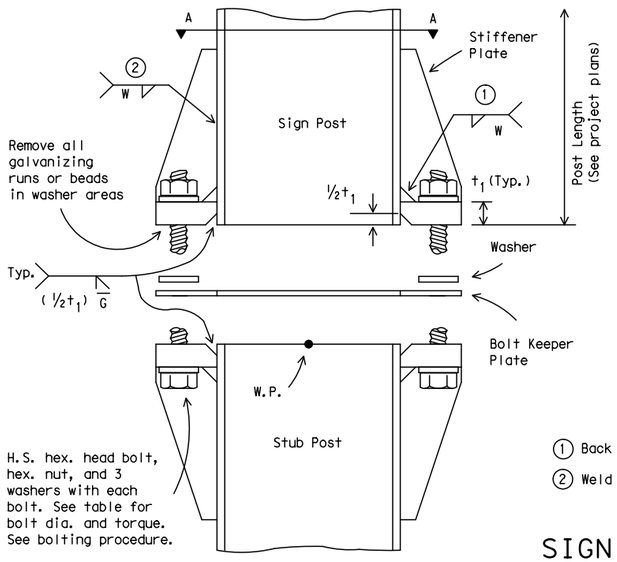
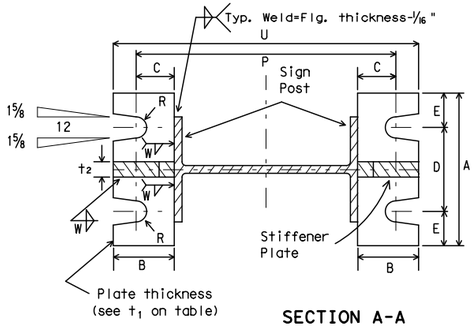
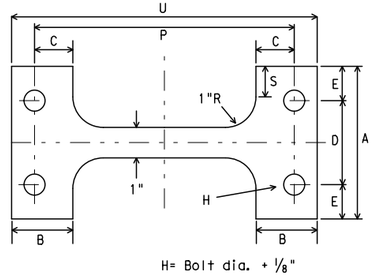


ELEVATION

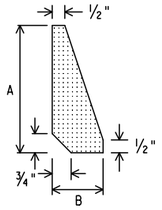


SECTION A-A



H= Bolt dia. + ⅛"

BOLT KEEPER PLATE
30 Ga galv. sheet steel



① Back up weld to be made before installing stiffener plate

② Weld W may be continued across clips to seal joint

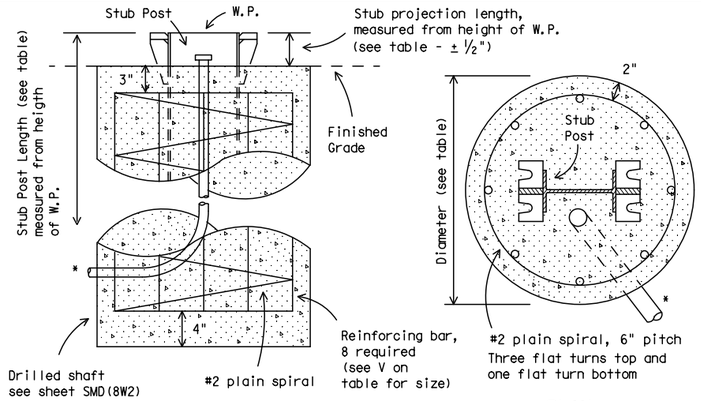
STIFFENER PLATE DETAIL

Steel Plate (thickness = t_2)

(See table for dimensions)

SIGN POST AND STUB POST

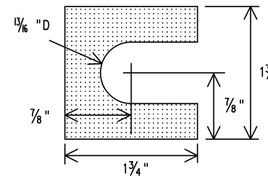
(For W Shapes)



ELEVATION PLAN

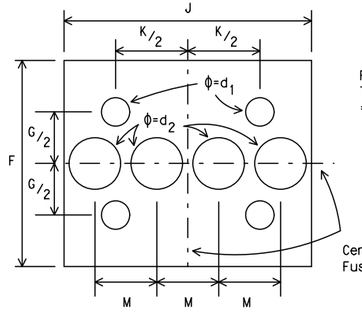
FOUNDATION DETAIL

*Note: For signs with electrical apparatus, see ED(10) for conduit required in founation.



SHIM DETAIL

Furnish two .012"+ thick and two .032"+ thick shims per post. Shims shall be fabricated from brass shim stock or strip conforming to ASTM B36.



PERFORATED FUSE PLATE DETAIL

Use H.S. hex head bolts, hex head nut and bevel or flat washer (where req'd) under nut. All holes shall be drilled, sub-punched and reamed. All plate cuts shall preferably be saw cuts. However, flame cutting will be permitted provided all edges are ground. Metal projecting beyond the plane of the plate face will not be permitted. Steel fuse plates shall conform to the requirements of ASTM A36. ASTM A572 Grade 50 or ASTM A588 may be substituted for A36 at the option of the fabricator. Mill test reports shall be submitted for Fuse Plates. Steel used shall have an ultimate tensile strength not to exceed 80 KSI. For alternative Fuse Plate contact Traffic Operations Division.

BOLTING PROCEDURE FOR ASSEMBLY OF BASE CONNECTION:

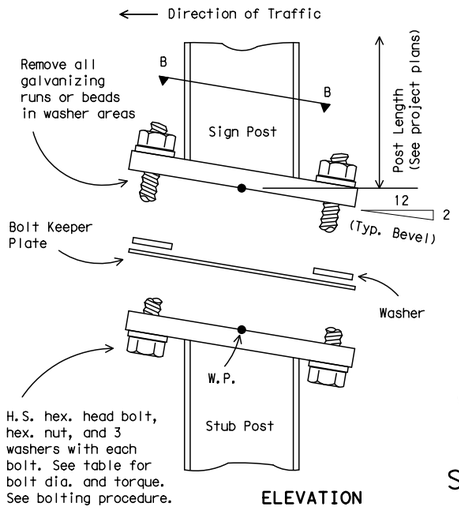
1. Assemble sign post, BOLT KEEPER PLATE and stub post with bolts and three flat washers per bolt as shown.
2. Shim as required to plumb post.
3. Tighten all bolts the maximum possible with a 12 to 15 inch wrench to clean bolt threads and to bed washers and shims.
4. Loosen each bolt in sequence and retighten bolts in a systematic order to the prescribed torque. Do not overtighten.
5. To prevent nut loosening, burr threads of bolt at junction with nut using a center punch.

Dimensions / Post Size	Base Connection Data Table: Bolt Size & Torque	A	B	C	D	E	t_1	t_2	W	R
W6x9	⅝"ϕ x 2¾" 440-450 inch pounds 36-38 foot pounds	5"	2"	1¼"	2¾"	1⅛"	¾"	½"	¼"	11/32"
W6x12										
W6x15										
W8x18										
W8x21	¾"ϕ x 3½" 740-750 inch pounds 62-63 foot pounds	6"	2¼"	1⅜"	3½"	1¼"	1"	¾"	5/16"	13/32"
W10x22										
W10x26										
W12x26										
S3x5.7	½"ϕ x 2½" 440-450 inch pounds 36-38 foot pounds	See Detail Below								
S4x7.7										

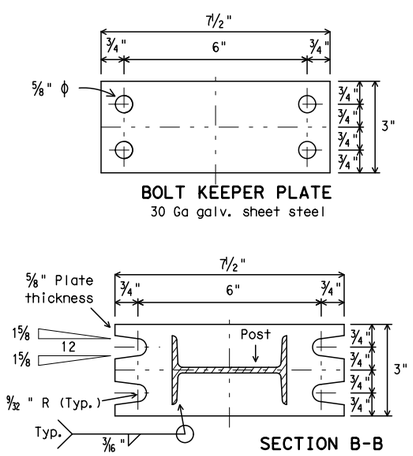
Perforated Fuse Plate Data Table											
F	G	J	K	M	d_1	d_2	t_3	Bolt Dia.	Wt. (ea.) (lbs.)	Bolt length
4¼"	2"	4"	2¼"	1"	9/16"	¾"	¼"	½"	1.01	1½"
5"	2½"	6"	3½"	1½"	11/16"	1¼"	⅜"	⅝"	2.51	2¼"
5"	2½"	5¼"	2¾"	1¼"	11/16"	1 1/16"	⅜"	⅝"	2.26	2¼"
5½"	2½"	5¼"	2¾"	1¼"	13/16"	1"	½"	¾"	3.35	2¼"
6"	3"	5¾"	2¾"	1⅜"	13/16"	1⅛"	½"	¾"	4.03	2¼"
6"	3"	6½"	3½"	1⅝"	13/16"	1 5/16"	½"	¾"	4.47	2¼"
3¾"	1½"	2⅝"	1½"	⅝"	9/16"	⅜"	¼"	½"	0.60	1½"

Bolt Keeper Data			Foundation Data			
P	S	U	Stub length	Stub projection	Dr. Shaft diameter	Bar V Size
8⅜"	1"	9⅞"	2'-0"	3"	24"	#5
8½"		10"	2'-0"	3"		#5
8½"		10"	2'-6"	3"		#6
10⅝"		12⅛"	2'-6"	3"		#7
11"	1½"	12¾"	3'-0"	2½"		#8
12⅞"		14⅝"	3'-0"	2½"		#9
13⅜"		14⅞"	3'-0"	2½"		#10
15"		16¾"	3'-0"	2½"		#11
See Detail Below			3'-3½"	3½"	12"	Non-reinforced ③

③ Foundation design shall be Type G Mount, see SMD (TY G).

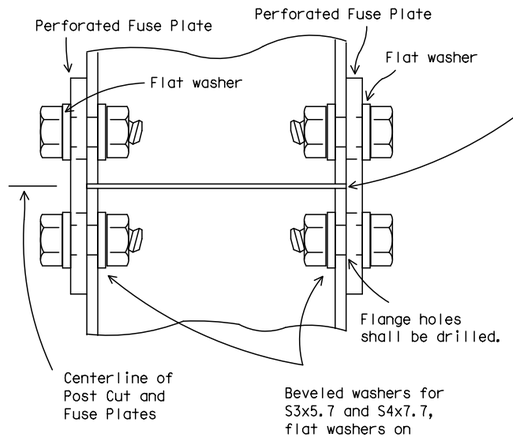


ELEVATION



SIGN POST AND STUB POST

(For S4x7.7 and S3x5.7)



DETAIL "A"

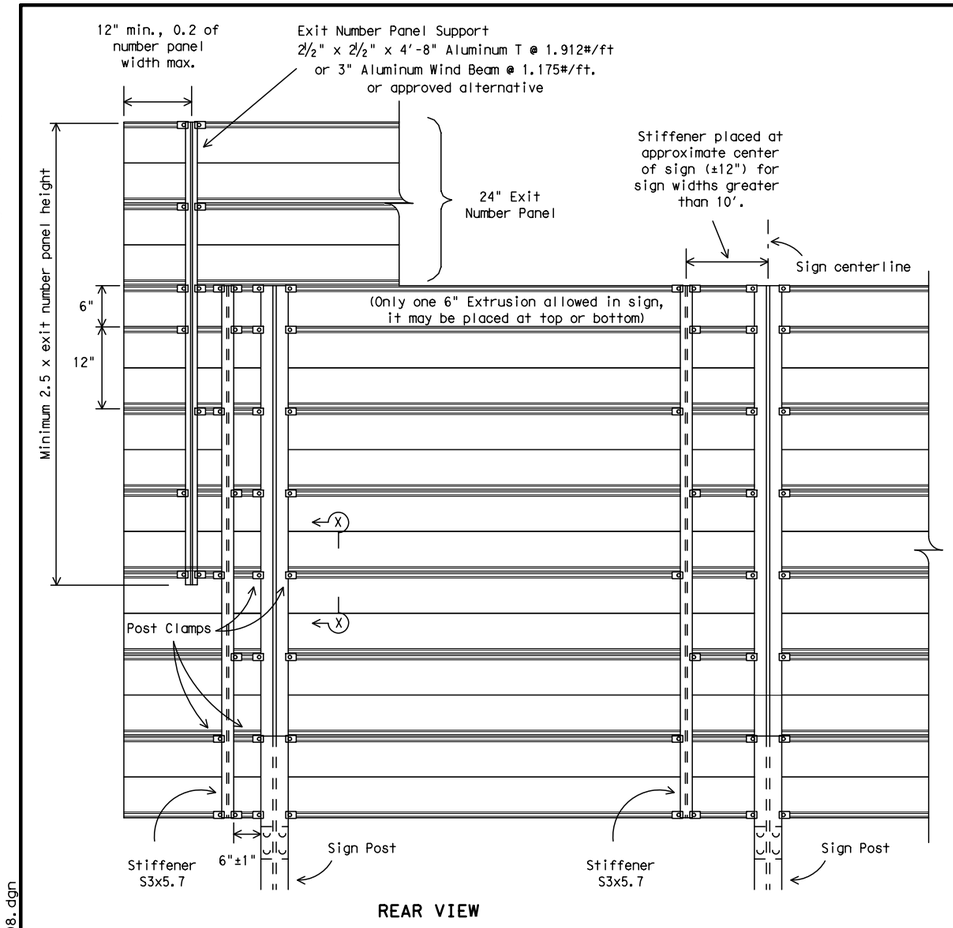
Parts shall be saw cut either before galvanizing and the galvanized cut cleaned of zinc build-up, or saw cut after galvanizing and the cut surface repaired per Item 445, "Galvanizing."

Texas Department of Transportation
Traffic Operations Division

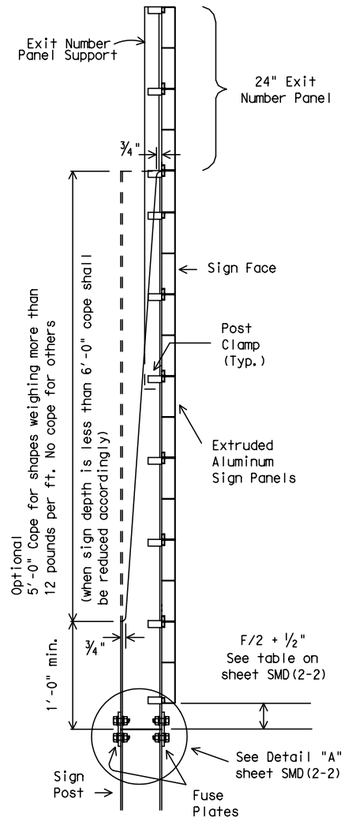
SIGN MOUNTING DETAILS- LARGE ROADSIDE SIGNS FOUNDATION & STUB

SMD(2-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
4-98	CONT	SECT	JOB	HIGHWAY
9-08	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		135

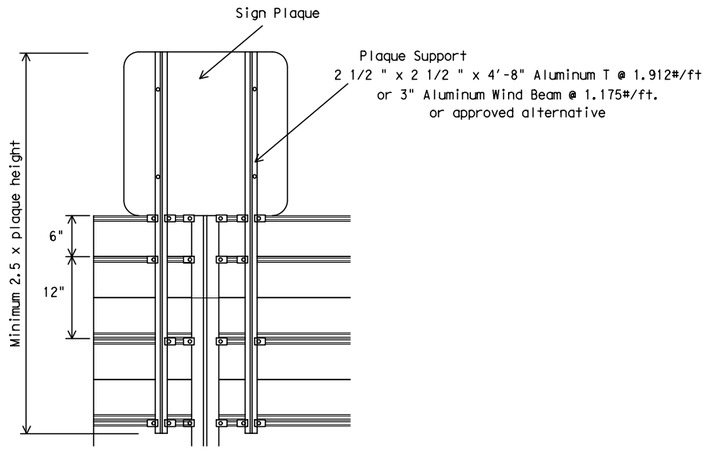


REAR VIEW



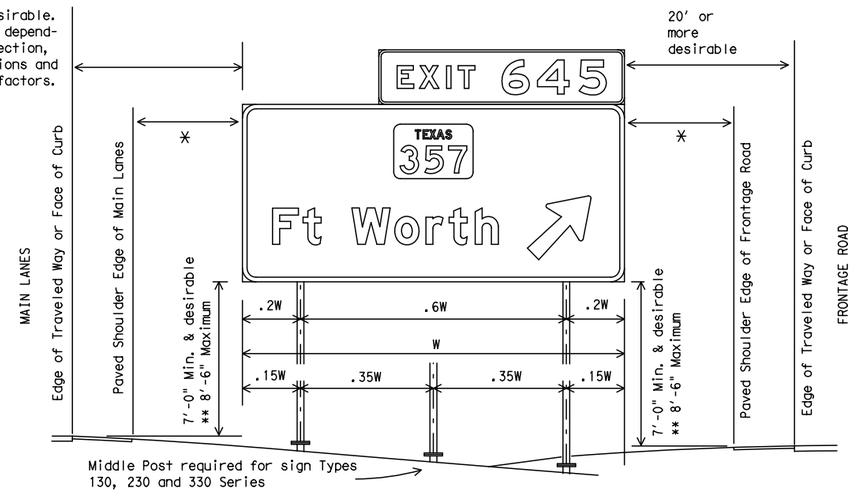
SIDE VIEW

ALUMINUM PARENT SIGN & EXIT NUMBER PANEL MOUNTING DETAILS



SIGN PLAQUE MOUNTING DETAIL TO ALUMINUM PARENT SIGN

30' or more desirable. May be reduced depending on cross section, viewing conditions and other related factors.



Middle Post required for sign Types 130, 230 and 330 Series

TYPICAL SIGN INSTALLATION AND LOCATION

LATERAL CLEARANCE NOTES:

Lateral clearances of signs mounted on median side of main lanes are the same as shown above where space will permit.

Where a sign is to be located behind guardrail, an allowable minimum clearance of five feet may be used, measured from the face of the guardrail to the near edge of sign.

✳ - 6' minimum and desirable may be used only in areas of limited lateral clearance and when approved by the Engineer.

POST SPACING NOTES:

Post spacing on a two post sign may vary a maximum of plus or minus 10% of total sign width to fit field conditions.

Post spacing on a three post sign may vary a maximum of plus or minus 5% of total sign width to fit field conditions.

SIGN HEIGHT NOTES:

** The 8' 6" maximum may be exceeded when placing signs on extreme slopes. In these conditions, a 7' minimum from natural ground to bottom of sign must be maintained.

DEPARTMENTAL MATERIAL SPECIFICATIONS	
ALUMINUM SIGN BLANKS	DMS-7110
SIGN HARDWARE	DMS-7120

GENERAL NOTES:

1. Exit number panel shall be mounted to the right hand side of the parent sign for right exits and to the left hand side for left exits. The number panel shall be mounted with two uprights so its right edge is even with the right edge of the parent sign or vice-versa for left hand exits.
2. Exit number panel support shall be symmetrical about number panel centerline.
3. Exit number panel support shall be ASTM A36 structural steel galvanized after fabrication, or ASTM B221 aluminum alloy 6061-T6 or approved alternative.
4. All bolts, nuts and washers shall be galvanized per ASTM Designation: B695 Class 50, or A153 Class C or D.
5. Posts, parent sign panels, and exit number panels shall comply with notes on sheets SMD(2-1) and SMD(2-2).
6. Signs (such as exit number panels) attached above a parent sign shall be made of the same type material as the parent sign. General Service and Routing signs may be fabricated from flat sheet aluminum.
7. Exit number panel support and other connection hardware required to fasten exit number panel to parent sign shall be subsidiary to "Aluminum Signs" or "Fiberglass Signs."
8. For fiberglass sign installation details, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS-LARGE ROADSIDE SIGNS

SMD(2-3)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		136

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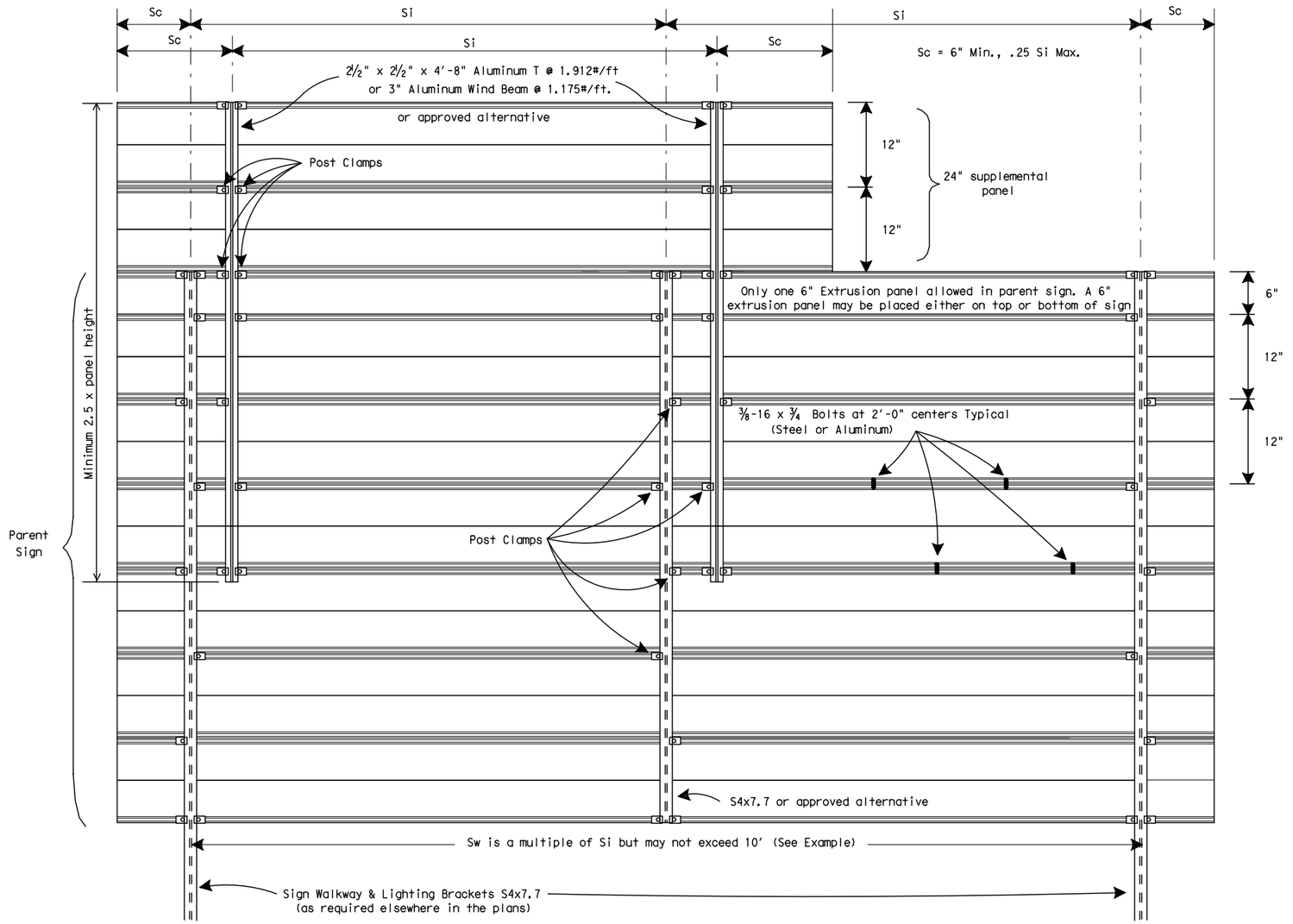
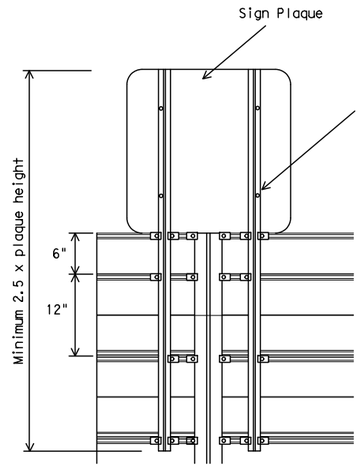


REAR VIEW

EXAMPLES (FOR DETERMINING Si and Sw)

NO.	ZONE	"d"	EXIT PANEL	WALKWAY	Si	Sw	COMMENT
1	1	15.0	YES	YES	4.5	9.0	Sw=2x(Si)
2	2	14.0	YES	NO	7.5	7.5	Sw = Si
3	1	15.0	NO	NO	8.5	8.5	Sw = Si
4	3	14.0	NO	YES	10.0	10.0	Sw = Si

Values shown for Si are maximum values. Si may be varied for different sign lengths and Truss mounting conditions. Sw should not exceed two times Si(Max.) or 10 feet.



SIGN PLAQUE MOUNTING DETAIL

MAXIMUM SIGN SUPPORT SPACING "Si" (FEET)

"d" Deepest Sign in Group (Ft.)	EXTRUDED ALUMINUM SIGN PANELS															
	WITH EXIT NUMBER PANELS								WITHOUT EXIT NUMBER PANELS							
	WITH WALKWAYS				WITHOUT WALKWAYS				WITH WALKWAYS				WITHOUT WALKWAYS			
	WIND ZONE				WIND ZONE				WIND ZONE				WIND ZONE			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
15	4.5	7	8	10	5	7	8	10	7	8	9	10	8.5	10	10	10
14	6	7.5	9.5	10	6	7.5	9.5	10	8	9	10	10	10	10	10	10
13	7.5	9	10	10	7.5	9	10	10	9	10	10	10	10	10	10	10
12	8.5	10	10	10	8.5	10	10	10	10	10	10	10	10	10	10	10
11 or less	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

For fiberglass sign installations, see manufacturer's recommendations.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS- OVERHEAD SIGNS EXTRUDED ALUMINUM

SMD(2-4)-08

DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

9-08 REVISIONS	CONT	SECT	JOB	HIGHWAY
	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		137

A. GENERAL SITE DATA

1. PROJECT LIMITS: *Highway: SH 180*
From: N KENTUCKY AVE
To: BEACH ST

LATTITUDE: 32° 44' 46.23'' N LONGITUDE: 97° 19' 4.69'' W

2. PROJECT SITE MAPS:

- *Project Location Map: Title Sheet (Sheet 1)*
- *Drainage Patterns: Drainage Area Maps N/A*
- *Approx. Slopes Anticipated After Major Gradings and Areas of Soil Disturbance: Typical Sections (Sheets 5-7)*
- *Major Controls and Locations of Stabilization Practices: (Sheets 125-131) SW3P Site Map Sheets*
- *Project Specific Locations:*
  To be specified by Project Field Office and located in the Project SW3P File
- *Surface Waters and Discharge Locations: Drainage and Culvert Layout Sheets*
  N/A

3. PROJECT DESCRIPTION:
CONSTRUCTION OF PEDESTRIAN SAFETY IMPROVEMENTS SIDEWALKS, CROSSWALKS,PEDESTRIAN SIGNALS, DRIVEWAYS, PAVEMENT MARKINGS, ILLUMINATION

4. MAJOR SOIL DISTURBING ACTIVITIES:
Preparing right of way, clearing and grubbing, grading, excavation and embankment for roadway and strom sewers/culverts.

5. EXISTING CONDITION OF SOIL & VEGETATIVE COVER AND % OF EXISTING VEGETATIVE COVER:
(Provide description of soil condition, vegetative cover and percentage)

6. TOTAL PROJECT AREA: *26.80* Acres

7. TOTAL AREA TO BE DISTURBED: *2.75* Acres (10.3 % OF TOTAL PROJECT AREA)

8. WEIGHTED RUNOFF COEFFICIENT
BEFORE CONSTRUCTION: *0.81*
AFTER CONSTRUCTION: *0.81*

9. NAME OF RECEIVING WATERS:
(Provide description of receiving waters) NAME OF THE CREEK

10. ENDANGERED SPECIES, DESIGNATED CRITICAL HABITAT AND HISTORIC PROPERTY:

No Endangered Species, Designated Critical Habitat or Historic Property has been found on this project site.

or

(Statement of What) has been found on this project site.

Note: Designer shall supply applicable statement.

The documentation satisfying TPDES Construction General Permit eligibility pertaining to the existence or of any protective action taken with regards to endangered species or designated critical habitat or historical property in this project area is contained in the project's Enviromental document (EA or EIS) and can be viewed under the State Open Records Act at the address shown below:

TEXAS DEPARTMENT OF TRANSPORTATION
FORT WORTH DISTRICT HEADQUARTERS
DISTRICT DESIGN SECTION
2501 SW LOOP
FORT WORTH, TX 76133
PHONE: 817-370-6500

B. EROSION AND SEDIMENT CONTROLS

1. SOIL STABILIZATION PRACTICES:

(Select T = Temporary or P = Permanent, as applicable)

____ TEMPORARY SEEDING	____ PRESERVATION OF NATURAL RESOURCES
____ MULCHING (Hay or Straw)	____ FLEXIBLE CHANNEL LINER
____ BUFFER ZONES	____ RIGID CHANNEL LINER
____ PLANTING	____ SOIL RETENTION BLANKET
____ SEEDING	__P__ COMPOST MANUFACTURED TOPSOIL
__P__ SODDING	____ OTHER: (Specify Practice)

2. STRUCTURAL PRACTICES:

(Select T = Temporary or P = Permanent, as applicable)

__T__ SILT FENCES	____ DIVERSION, INTERCEPTOR, OR PERIMETER DIKES
____ HAY BALES	____ DIVERSION, INTERCEPTOR, OR PERIMETER SWALES
____ ROCK FILTER DAMS	____ DIVERSION DIKE AND SWALE COMBINATIONS
____ PIPE SLOPE DRAINS	____ ROCK BEDDING AT CONSTRUCTION EXIT
____ PAVED FLUMES	____ TIMBER MATTING AT CONSTRUCTION EXIT
____ CHANNEL LINERS	____ STONE OUTLET STRUCTURES
____ SEDIMENT TRAPS	____ VELOCITY CONTROL DEVICES
____ SEDIMENT BASINS	__P__ CURBS AND GUTTERS
____ EROSION CONTROL LOGS	__T__ STORM INLET SEDIMENT TRAP
____ STORM SEWERS	
____ OTHER: *(Specify Practice)*	
____	
____	
____	
____	

3. STORM WATER MANAGEMENT: *(Example Below - May be used as applicable, revised or expanded)*

1. Storm water drainage will be provided by the ditches, inlets and storm water systems that will carry drainage within the R.O.W. to the low points within the roadway and project site which drain to natural facilities.

2. Other permanent erosion controls include hydraulic design to limit structure outlet velocities and grading design generally consisting of 4:1 or flatter slopes with permanent vegetative cover.

4. STORM WATER MANAGEMENT ACTIVITIES: (Sequence of Construction)

(Describe Storm Water Management Activities by Phases)

5. NON-STORM WATER DISCHARGES:
Non-storm water discharges should be filtered, or held in retention basins, before being allowed to mix with storm water. These discharges consist of non-polluted ground water, spring water, foundation and/or footing drain water, and water used for dust control, pavement washing and vehicle washwater containing no detergents.

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/19/2021

_____, P.E. 5/19/2021
Signature Date

AECOM
AECOM Technical Services Inc, F- 3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

Texas Department of Transportation

Fort Worth District Standard

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

SHEET 1 OF 2 SHEETS

ORIGINAL DRAWING: 09/2002	sw3p-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.			SHEET NO.
DATE	REVISIONS	6				138
09/2008	NPDES TO TPDES	STATE	STATE DIST.NO.	COUNTY		
01/2012	CLARIFY NOTE C.2.	TEXAS	FTW	TARRANT		
08/2013	ADDED SIGN	CONT.	SECT.	JOB	HIGHWAY NO.	
05/2019	2-SHEET FORMAT	0008	05	031	SH 180	

C. OTHER REQUIREMENTS & PRACTICES

1. MAINTENANCE:

All erosion and sediment controls shall be maintained in good working order. If a repair is necessary, it shall be performed at the earliest date possible but no later than 7 calendar days after the surrounding exposed ground has dried sufficiently to prevent further damage from heavy equipment. Disturbed areas on which construction activities have ceased, temporarily or permanently, shall be stabilized within 14 calendar days unless they are scheduled to and do resume within 21 calendar days. The areas adjacent to creeks and drainageways shall have priority followed by devices protecting storm sewer inlets.

2. INSPECTION:

An inspection shall be performed by a TxDOT inspector every 14 calendar days as well as within 24 hours after any rainfall of one-half inch or more is recorded on a non-freezing rain gauge to be located at the project site, or every 7 calendar days. An inspection and Maintenance Report shall be filed for each inspection. Based on the inspection results, the controls shall be revised in accordance with the inspection report.

3. WASTE MATERIALS:

Except as noted below, all waste materials shall be collected in a metal dumpster having a secure cover. The dumpster shall meet all state and local solid waste management regulations. All trash and debris from construction shall be deposited in the dumpster. The dumpster shall be emptied, as necessary or as required by local regulation, and hauled to a local approved land fill site. The burying of construction waste on the project site shall not be permitted.

Concrete washout areas shall be required and shall consist of a pit, lined with an impervious material, of sufficient size to contain, until evaporation, all water used and washout material produced during concrete washout operations. The concrete washout locations shall be as directed by the engineer.

Lime slaking tanks shall be surrounded by an earthen berm, capable of containing any overflow.

4. HAZARDOUS WASTE (INCLUDING SPILL REPORTING):

As a minimum, any products in the following categories are considered to be hazardous: paints, acids, solvents, asphalt products, chemical additives for soil stabilization, and concrete curing compounds or additives. In the event of a spill which may be hazardous, the spill coordinator shall be contacted immediately.

5. SANITARY WASTE:

All sanitary waste shall be collected from the portable units, as necessary or as required by local regulation, by a licensed sanitary waste management contractor.

6. OFFSITE VEHICLE TRACKING:

The Contractor shall be required, on a regular basis or as may be directed by the Engineer, to dampen haul roads for dust control, stabilize construction entrances and to remove excess dirt from the roadway.

7. MANAGEMENT PRACTICES: *(Example Below - May be used as applicable, revised or expanded)*

1. Disposal areas, stockpiles and haul roads shall be constructed in a manner that will minimize and control the amount of sediment that may enter receiving waters. Disposal areas shall not be located in any wetland, waterbody or streambed.

2. Construction staging areas and vehicle maintenance areas shall be constructed by the Contractor in a manner to minimize the runoff of pollutants.

3. All temporary fills placed in waterways shall be built of erosion resistant material. (NWP 14)

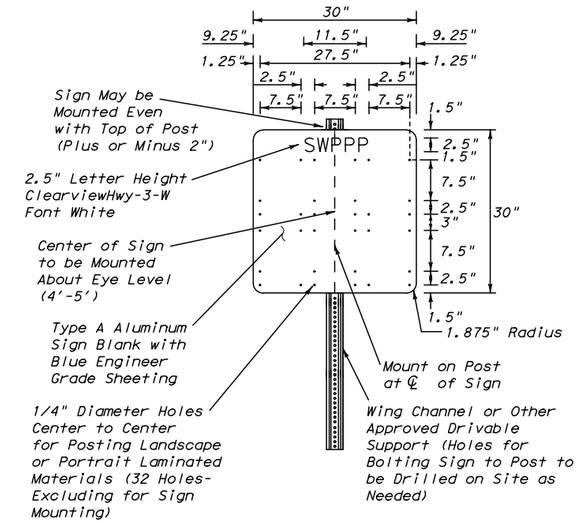
4. All waterways shall be cleared as soon as practicable of temporary embankment, temporary bridges, matting, falsework, piling, debris or other obstructions placed during construction operations that are not a part of the finished work.

8. OTHER:

1. Listing of construction materials stored on site to be provided by Project Field Office.

2. The Project SW3P File located at the project field office shall contain the N.O.I., CGP Coverage Notice, TCEQ TPDES Form, Signature Authorization, Certification/Qualification Statements, Inspection Reports, Required Maps, and a copy of the TPDES General Permit No. TXR150000.

STORM WATER POLLUTION PREVENTION PLAN PERMIT POSTING



No Permanent Installation Allowed.
Sign to be Removed After Project Completion.

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/19/2021

, P.E. 5/19/2021
Signature Date

AECOM
AECOM Technical Services Inc, F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

Texas Department of Transportation

Fort Worth District Standard

STORM WATER POLLUTION PREVENTION PLAN (SW3P)

SHEET 2 OF 2 SHEETS

ORIGINAL DRAWING: 09/2002	sw3p-ftw.dgn	FED.RD. DIV.NO.	PROJECT NO.		SHEET NO.
DATE	REVISIONS	6			139
09/2008	NPDES TO TPDES	STATE	STATE DIST.NO.	COUNTY	
01/2012	CLARIFY NOTE C.2.	TEXAS	FTW	TARRANT	
08/2013	ADDED SIGN	CONT.	SECT.	JOB	HIGHWAY NO.
05/2019	2-SHEET FORMAT	0008	05	031	SH 180

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.

1.

2.

3.

4.

The elevation of the ordinary high water marks of any areas requiring work to be performed in the waters of the US requiring the use of a nationwide permit can be found on the Bridge Layouts.

Best Management Practices:

Erosion	Sedimentation	Post-Construction TSS
☐ Temporary Vegetation	☐ Silt Fence	☐ Vegetative Filter Strips
☐ Blankets/Matting	☐ Rock Berm	☐ Retention/Irrigation Systems
☐ Mulch	☐ Triangular Filter Dike	☐ Extended Detention Basin
☒ Sodding	☐ Sand Bag Berm	☐ Constructed Wetlands
☐ Interceptor Swale	☐ Straw Bale Dike	☐ Wet Basin
☐ Diversion Dike	☐ Brush Berms	☐ Erosion Control Compost
☐ Erosion Control Compost	☐ Erosion Control Compost	☐ Mulch Filter Berm and Socks
☐ Mulch Filter Berm and Socks	☐ Mulch Filter Berm and Socks	☐ Compost Filter Berm and Socks
☐ Compost Filter Berm and Socks	☒ Compost Filter Berm and Socks	☐ Vegetation Lined Ditches
	☐ Stone Outlet Sediment Traps	☐ Sand Filter Systems
	☐ Sediment Basins	☒ Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

☐ No Action Required ☒ Required Action

Action No.

1. Two historic buildings and two historic resources (curb tile) are identified within the project limits.
2. Where proposed work is in proximity to historic locations, follow protection notes, in the general notes under Item 530 and 531, for demolition and construction.
3. Contractor must repair or replace in kind, at his own expense, any historic materials damaged in the course of executing work.

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. EO 13112 - Disturbed areas would be re-vegetated according to TxDOT's standard practices for rural area to the extent practical.
2. Vegetation Disturbance - Avoid and minimize disturbance of vegetation and soils. Take every effort to preserve trees.

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. MBTA - Remove old migratory bird nests between October 1 and February 15. Use nest prevention methods between February 15 and October 1.
2. Whooping Crane - Avoid adverse impacts and report all sightings to the Fort Worth District Environmental Staff.
3. Bird BMPs - Avoid disturbing, destroying,or removing active nests, including ground nesting birds, during nesting season.
4. Bald and Golden Eagle - Do not take, possess or commerce in eagles, parts, feathers, nests, or eggs with limited exceptions.

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.

Texas Department of Transportation

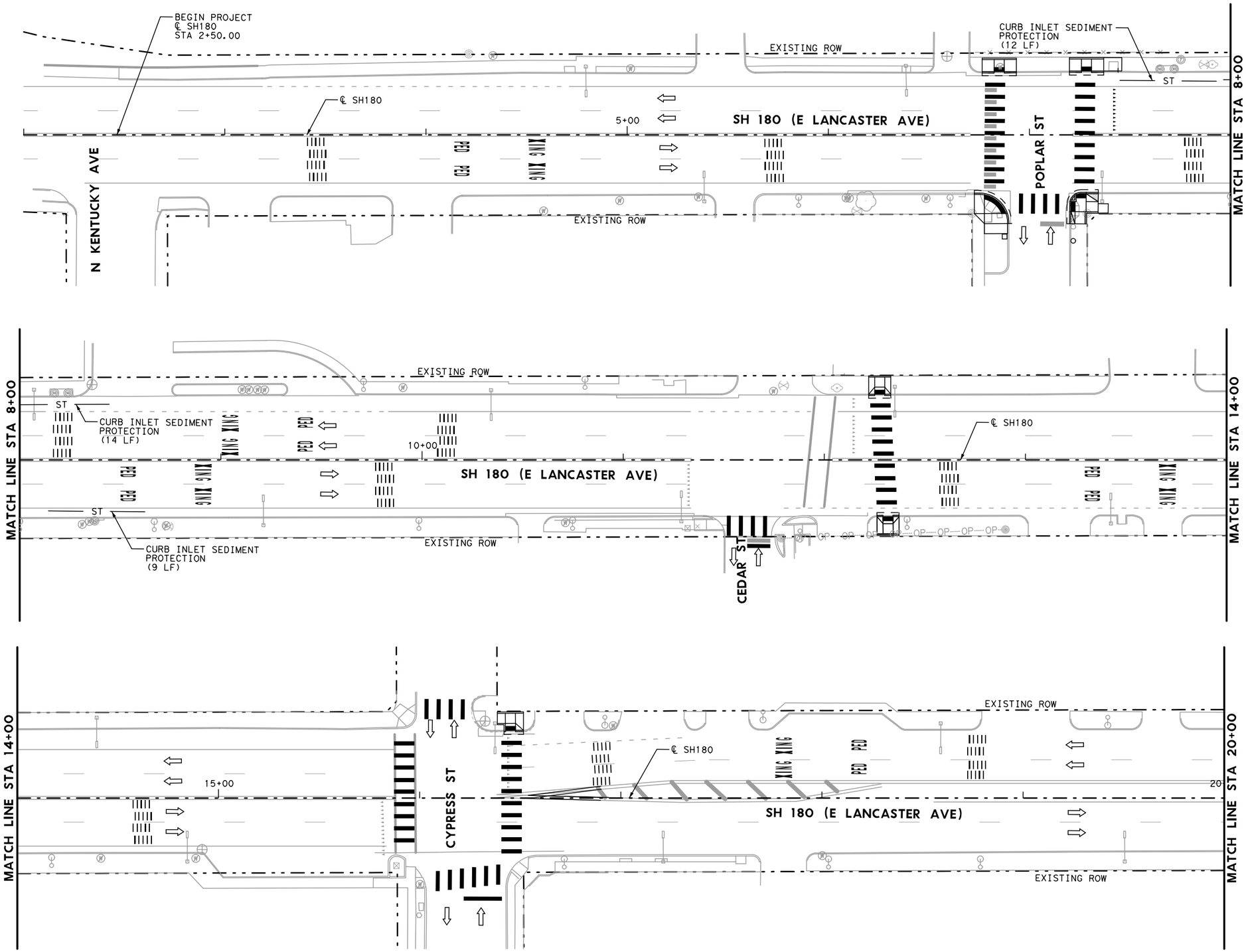
Design Division Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

REVISIONS
12-12-2011 (DS)
05-07-14 ADDED NOTE SECTION IV.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		140



N

0′ 25′ 50′

SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- EXISTING ROW
- PROP SIDEWALK/RAMP
- SF — SILT FENCE
- ST — CURB INLET SEDIMENT PROTECTION
- TRAFFIC FLOW

NOTES:

1. PROPOSED SODDING HAS BEEN QUANTIFIED ON ROADWAY PLAN SHEETS

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED
PROFESSIONAL ENGINEER
5/18/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc, F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SWPPP PLAN

SHEET 1 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		141

DN: AECOM CK: AECOM DW: AECOM CK: AECOM Lynda

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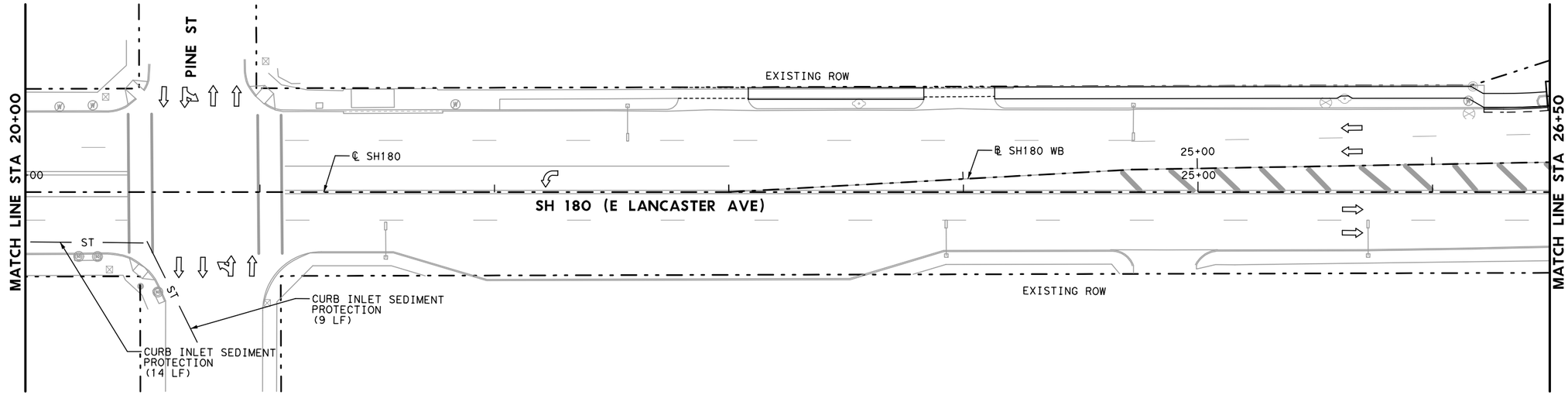

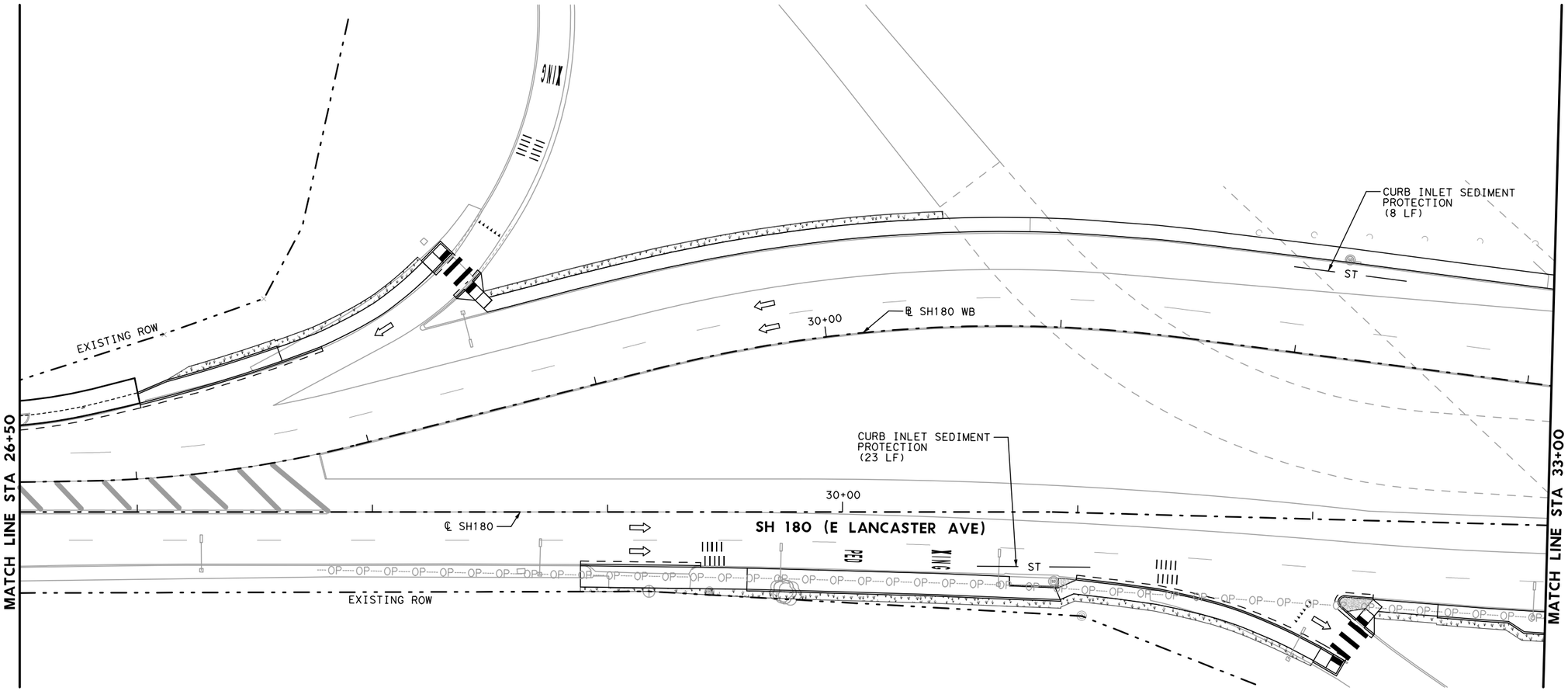

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SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
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NOTES:

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CARLA VERRANDO
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5/18/2021

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(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SWPPP PLAN

SHEET 2 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		142

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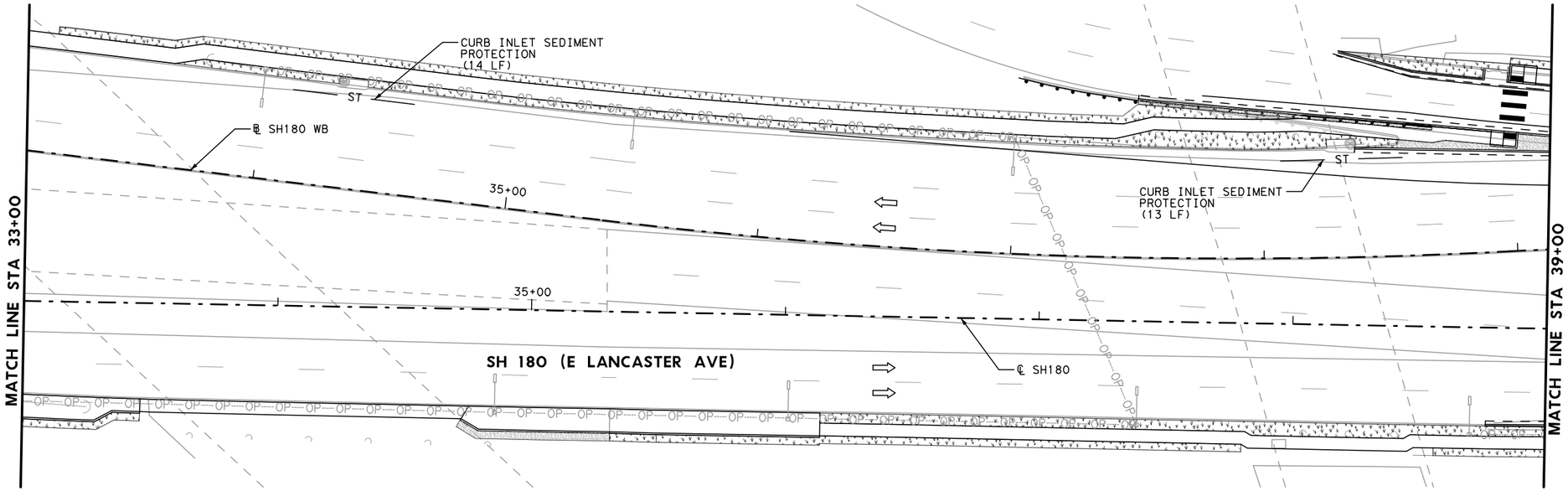

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0′ 25′ 50′

SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- EXISTING ROW
- PROP SIDEWALK/RAMP
- SF — SILT FENCE
- ST — CURB INLET SEDIMENT PROTECTION
- TRAFFIC FLOW

NOTES:

1. PROPOSED SODDING HAS BEEN QUANTIFIED ON ROADWAY PLAN SHEETS

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/25/2021

NO.	REVISION	DATE

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AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SWPPP PLAN

SHEET 3 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		143

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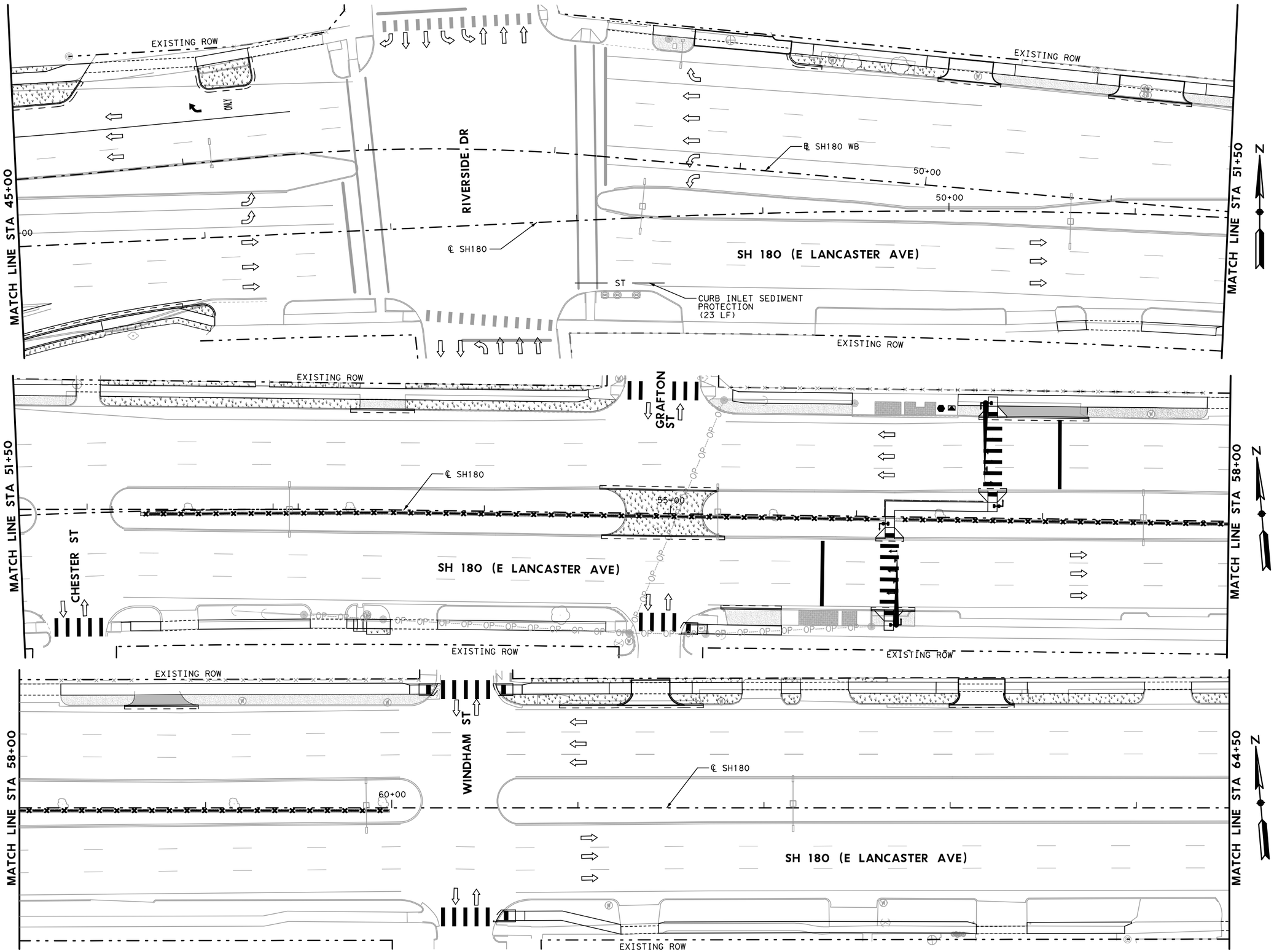

LEGEND

- EX SIDEWALK/RAMP
- EXISTING ROW
- PROP SIDEWALK/RAMP
- (SF) SILT FENCE
- ST CURB INLET SEDIMENT PROTECTION
- TRAFFIC FLOW

NOTES:

1. PROPOSED SODDING HAS BEEN QUANTIFIED ON ROADWAY PLAN SHEETS

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/25/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
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Suite 400
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SH 180
SIDEWALK CORRIDOR
SWPPP PLAN

SHEET 4 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		144

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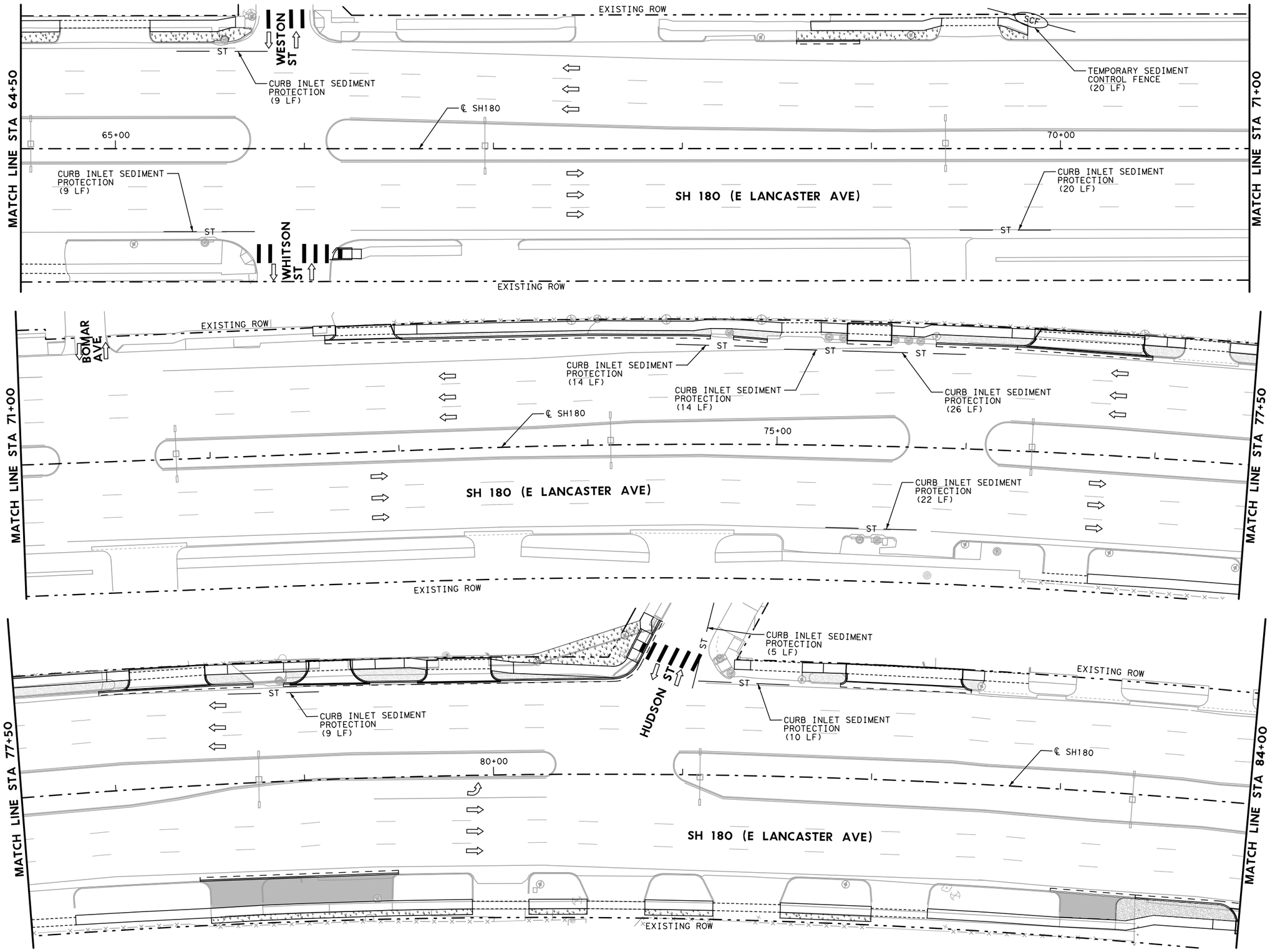

LEGEND

- EX SIDEWALK/RAMP
- EXISTING ROW
- PROP SIDEWALK/RAMP
- SF — SILT FENCE
- ST — CURB INLET SEDIMENT PROTECTION
- TRAFFIC FLOW

NOTES:

1. PROPOSED SODDING HAS BEEN QUANTIFIED ON ROADWAY PLAN SHEETS

STATE OF TEXAS
CARLA VERRANDO
96560
LICENSED PROFESSIONAL ENGINEER
5/20/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc, F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SWPPP PLAN

SHEET 5 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		145

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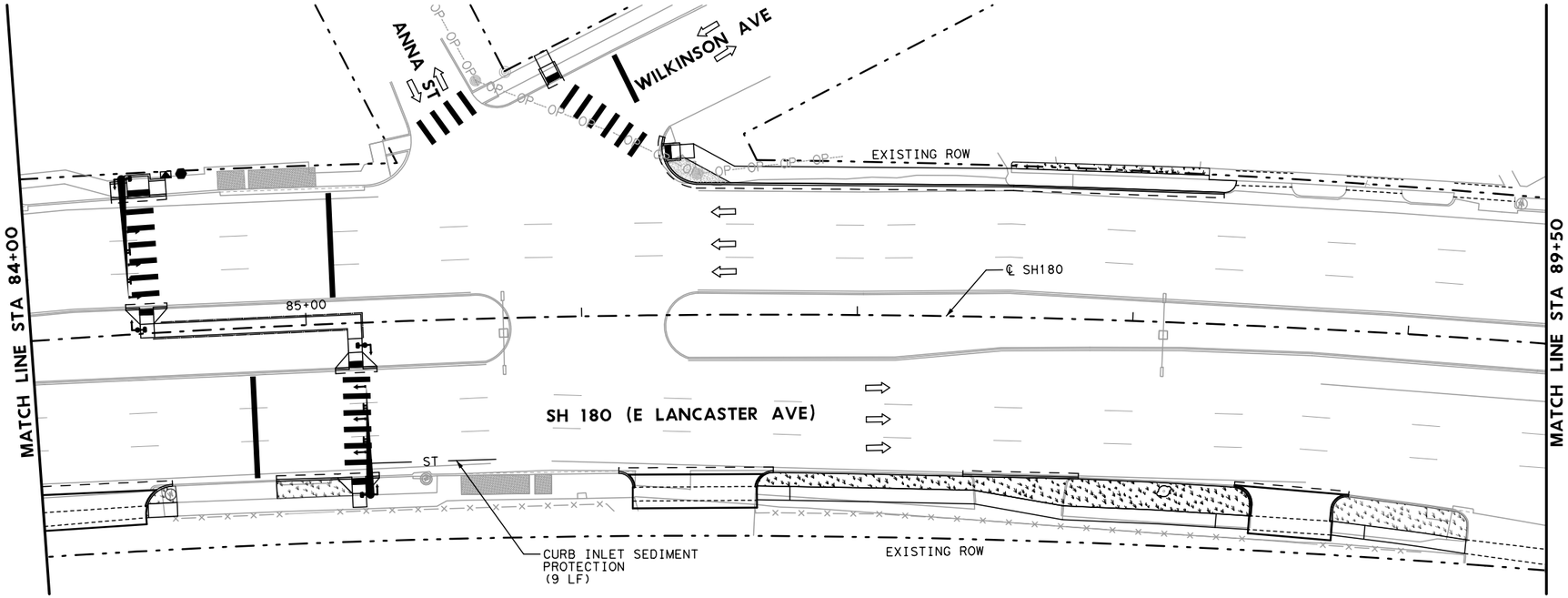


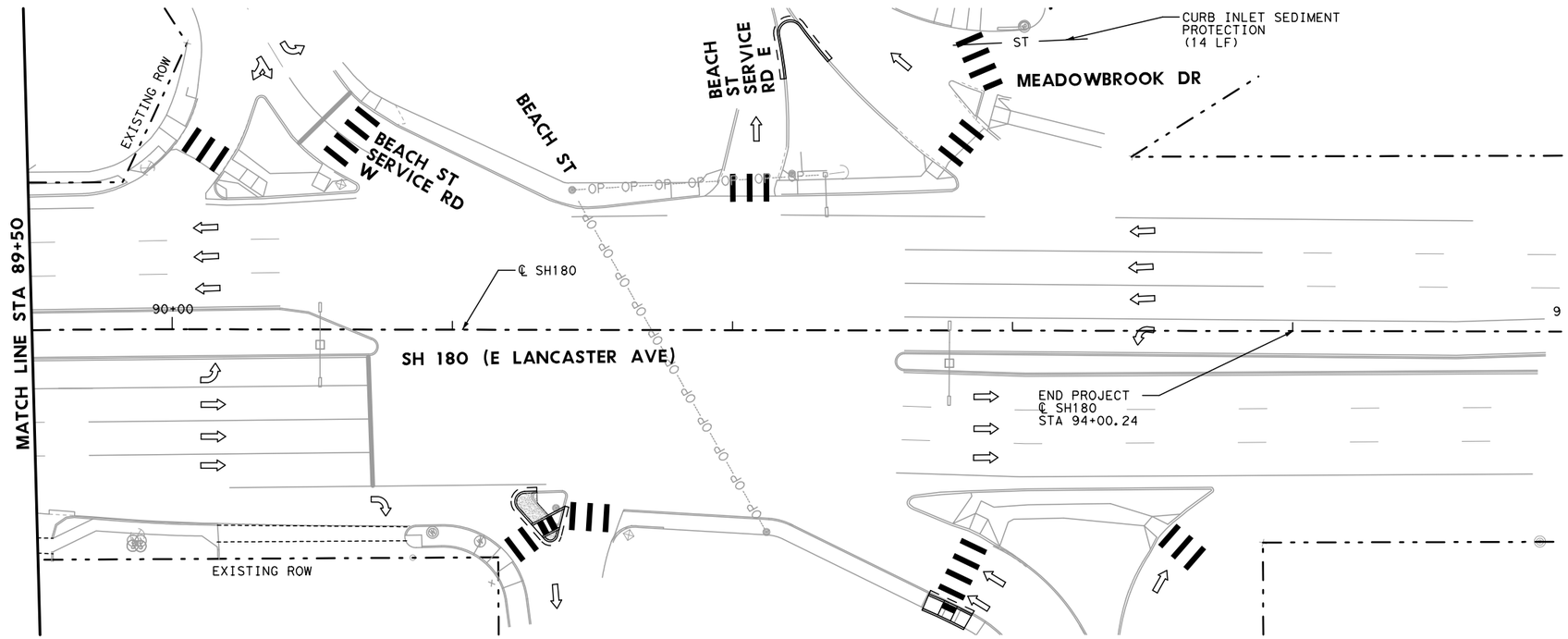
0′ 25′ 50′
SCALE IN FEET

LEGEND

- EX SIDEWALK/RAMP
- EXISTING ROW
- PROP SIDEWALK/RAMP
- SF — SILT FENCE
- ST — CURB INLET SEDIMENT PROTECTION
- TRAFFIC FLOW

NOTES:

1. PROPOSED SODDING HAS BEEN QUANTIFIED ON ROADWAY PLAN SHEETS



5/25/2021

NO.	REVISION	DATE

AECOM
AECOM Technical Services Inc. F-3580
13355 Noel Road
Suite 400
Dallas, Texas 75240
(214) 741-7777

SH 180
SIDEWALK CORRIDOR
SWPPP PLAN

SHEET 6 OF 6

Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0008	05	031	SH 180
DIST	COUNTY		SHEET NO.
FTW	TARRANT		146

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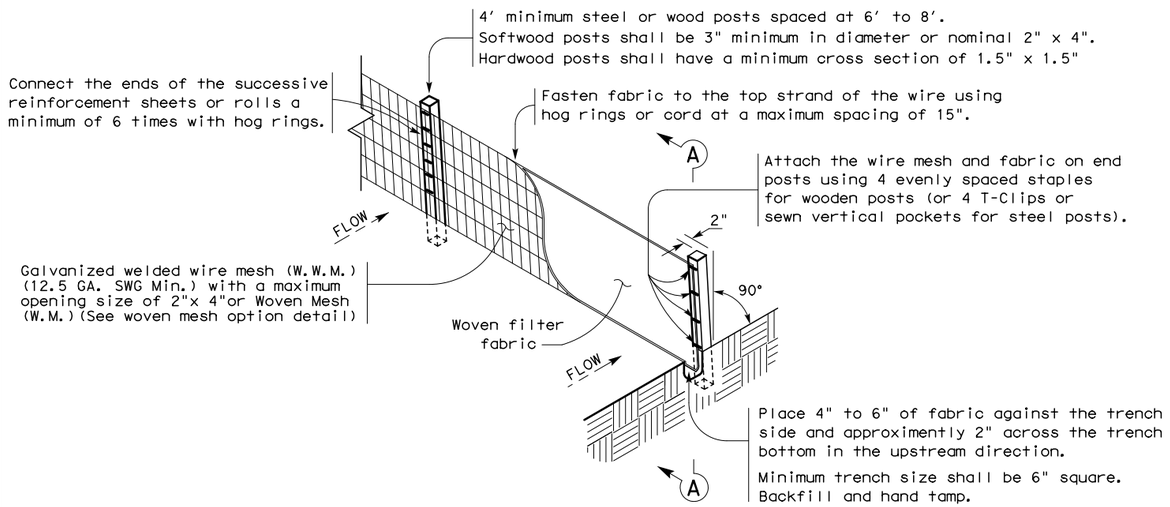
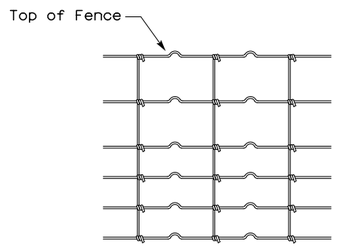
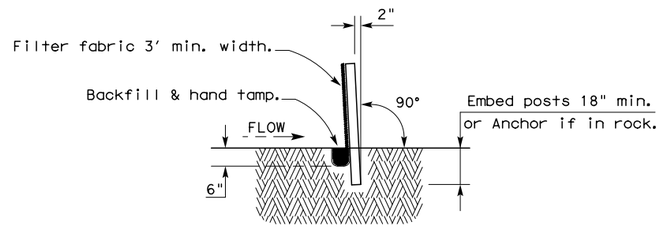


TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT^2. Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

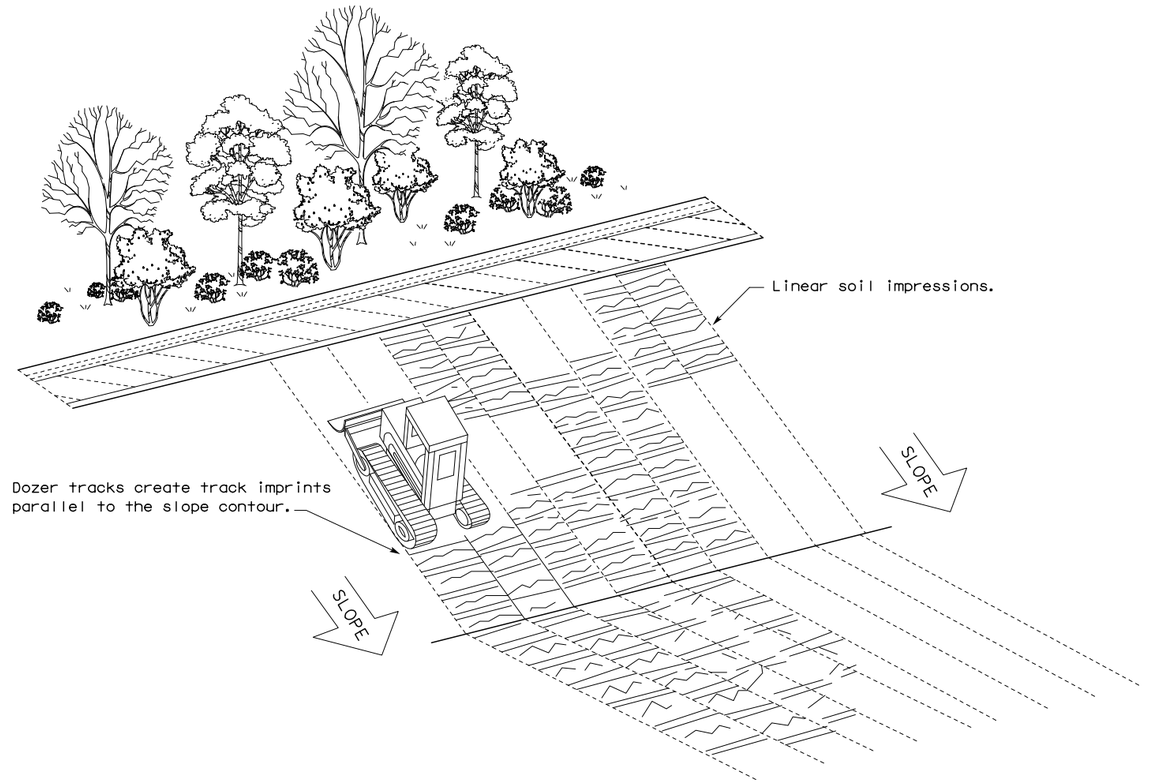
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



VERTICAL TRACKING

Texas Department of Transportation

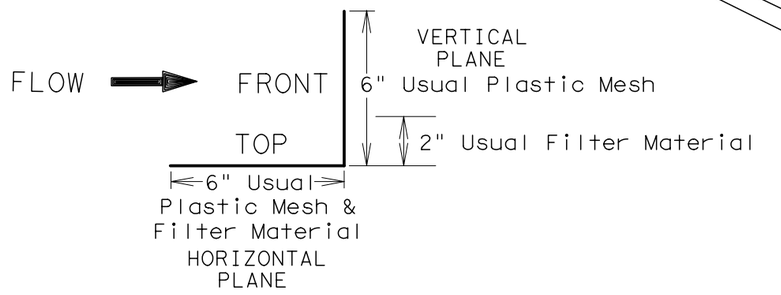
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

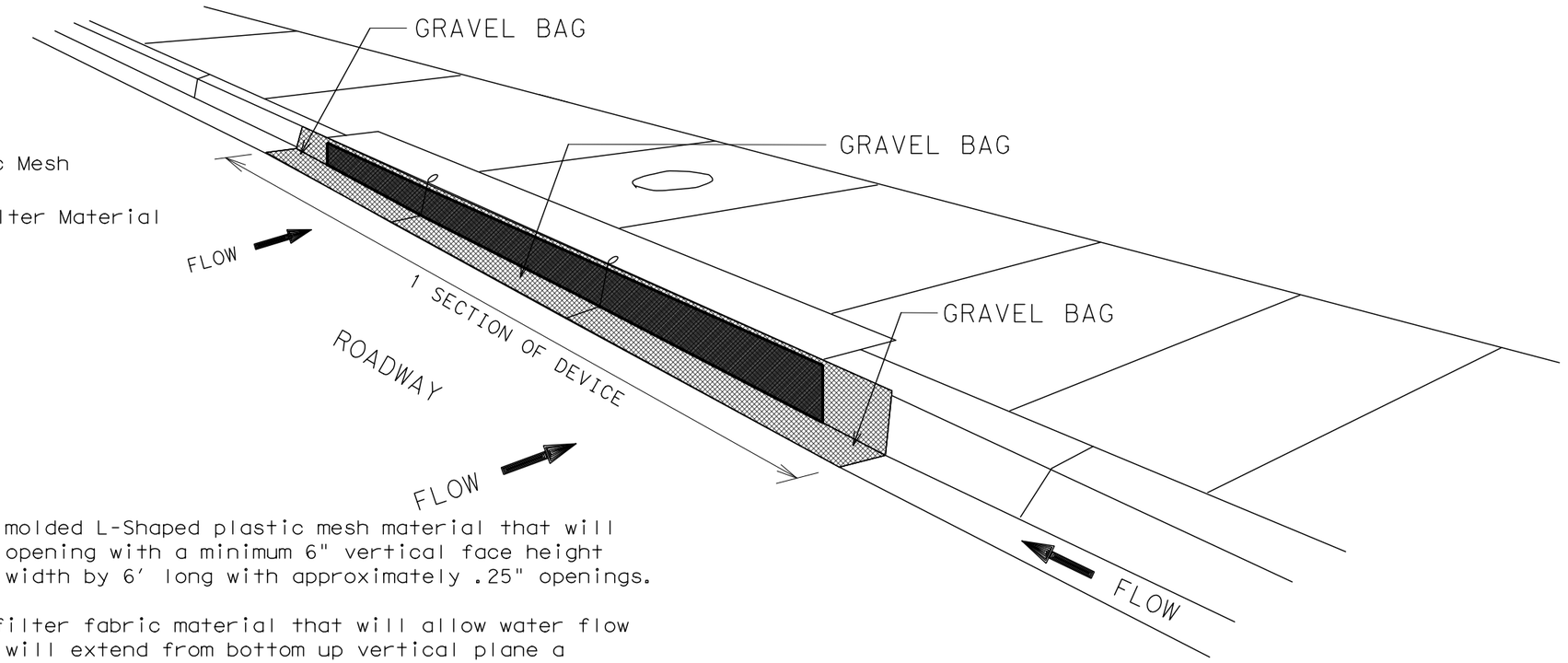
FENCE & VERTICAL TRACKING

EC(1)-16

FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	0008	05	031	SH 180
	DIST	COUNTY		SHEET NO.
	FTW	TARRANT		147



PLASTIC MESH L-SHAPE
CROSS SECTION



NOTES:

1. The device shall be a molded L-Shaped plastic mesh material that will cover the entire curb opening with a minimum 6" vertical face height by 6" horizonal plane width by 6' long with approximately .25" openings.

2. The device must have filter fabric material that will allow water flow but stop sediment. It will extend from bottom up vertical plane a minimum of 2" and full width of horizontal bottom plane. The filter fabric shall be attached to the back of the plastic mesh. It shall not cover more than 1/3 of the height of the vertical plane opening to allow overflow in larger strom events to prevent flooding of travel lanes.

Filter Fabric Physical Requirements Table

Apparent Opening Size (AOS)	400 to 600 microns
Percent Open Area (POA)	>10%
Flow Rate	130 gallons per SF per minute with clean water or greater.

3. Place with horizontal plane pointing away from curb.

4. For high openings, the device or attachment should extend above opening.

5. For long curb openings, overlap the segments 6". Tie together with 4 zip ties in 4 places, 2 at the top and 2 at the bottom.

6. Install gravel, not sand, bags at each end, at overlaps pass the inlet opening and in the middle of each section. Use 1/3 full bags for low profile and best traffic avoidance.

7. Overlap the fabric material pass the inlet opening 8" to 12".

8. Use bags that will have long-term resistance to UV exposure.

9. Sediment should be removed and device cleaned when sediment reaches 1" in depth.

REVISED ON 8/7/15

FORT WORTH DISTRICT STANDARD

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CURB INLET SEDIMENT PROTECTION

FED. RD. DIV. NO.	PROJECT NUMBER		SHEET NUMBER
6			148
STATE	DISTRICT	COUNTY	
TEXAS	FTW	TARRANT	
CONTROL	SECTION	SECTION	HIGHWAY NUMBER
0008	05	031	SH 180