

FHWA TEXAS DIVISION		SHEET NO. 1	
STATE	DISTRICT	COUNTY	
TEXAS	PAR	LAMAR	
CONTROL	SECTION	JOB	HIGHWAY NO.
0045	09	110, ETC	US82, ETC

DESIGN SPEED= 55 MPH MAIN LANES
 A.D.T.(2021)= 21,093
 A.D.T.(2041)= 29,530

INDEX OF SHEETS
 SEE SHEET 2 FOR INDEX OF SHEETS

STATE OF TEXAS DEPARTMENT OF TRANSPORTATION

PLANS OF PROPOSED STATE HIGHWAY IMPROVEMENT

FEDERAL AID PROJECT.

STP 2024(382)HES, ETC.

NET LENGTH OF PROJECT= 3,801 FT. = 0.719 MI.

US 82, ETC. HSIP LAMAR LAMAR COUNTY

LIMITS: 33RD ST TO 42ND ST

CONSTRUCTION OF RAISED MEDIAN, TURNING LANES, AND STORAGE
 CONSISTING OF INSTALLATION OF CURB AND GUTTER, CONCRETE MEDIAN,
 ADJUSTMENT OF CULVERTS, AND INSTALLATION OF SIDEWALKS

FINAL PLANS

LETTING DATE: _____

DATE CONTRACTOR BEGAN WORK: _____

DATE WORK WAS COMPLETED: _____

DATE WORK WAS ACCEPTED: _____

ORIGINAL CONTRACT WORKING DAYS: _____

USED _____ OF _____ WORKING DAYS

NO. OF CHANGE ORDERS: _____

FINAL CONTRACT COST: _____

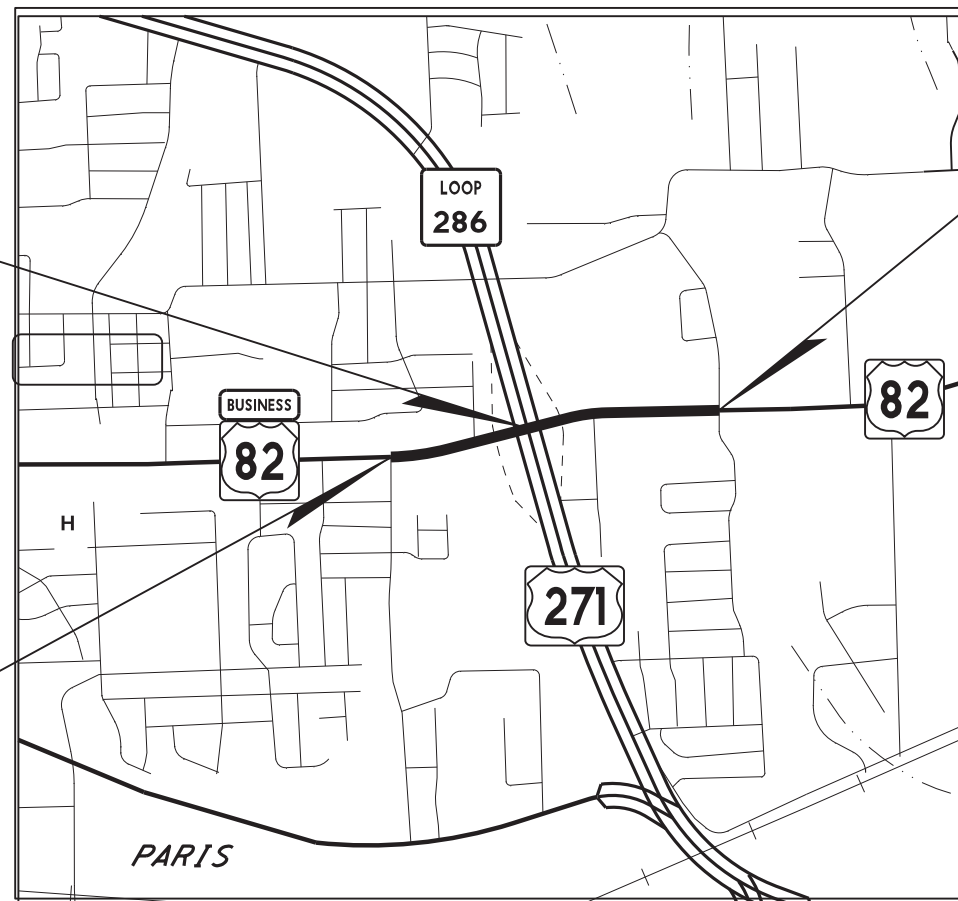
PERCENT OVER/UNDER RUN: _____

CONTRACTOR: _____

END CSJ: 0045-09-111
 BEGIN CSJ: 0045-09-110
 STA: 77+00

END PROJECT 42ND ST
 END CSJ: 0045-09-110
 STA: 98+83

BEGIN PROJECT 33RD ST
 BEGIN CSJ: 0045-09-111
 STA: 60+55
 REF MRK:



EXCEPTIONS: N/A
 EQUATIONS: N/A
 RAILROAD CROSSINGS: N/A



I CERTIFY THAT THIS PROJECT WAS BUILT IN ACCORDANCE WITH PLANS AND SPECIFICATIONS.

AREA ENGINEER _____ DATE _____

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



SUBMITTED FOR LETTING: Aug 31, 2023

Monte R. Pater P.E.
 DESIGN ENGINEER

RECOMMENDED FOR LETTING: 9/1/2023

DocuSigned by:
 Samuel H. Taylor, P.E.
 AREA ENGINEER

APPROVED FOR LETTING: 9/4/2023

DocuSigned by:
 Noel Paramanathan
 DISTRICT ENGINEER

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION, NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT: REQUIRED CONTRACT PROVISIONS FOR ALL FEDERAL-AID CONSTRUCTION CONTRACTS (FORM FHWA 1273, JULY 5, 2022)

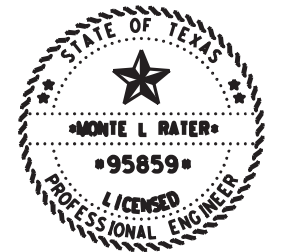
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FILE: T:\PARTDD\US 82 Raised Median\Design\CAD Plan Sheets\A100 Title Sheet.dgn DATE: 8/30/2023 5:31:34 PM

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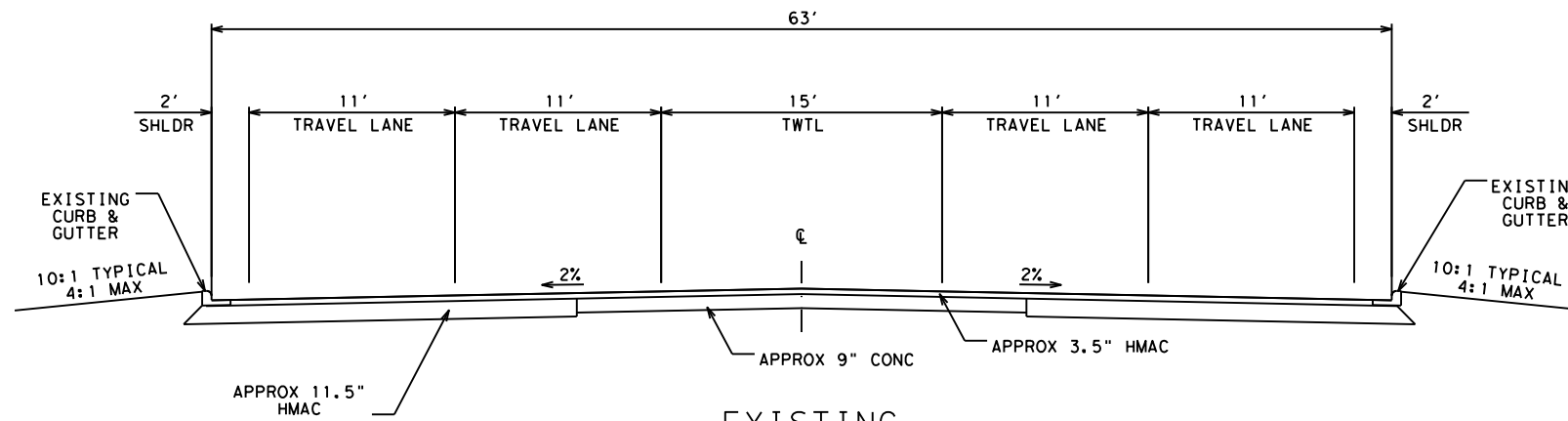


THE STANDARD SHEETS SPECIFICALLY IDENTIFIED WITH A "*" HAVE BEEN ISSUED BY ME AND ARE APPLICABLE TO THIS PROJECT.

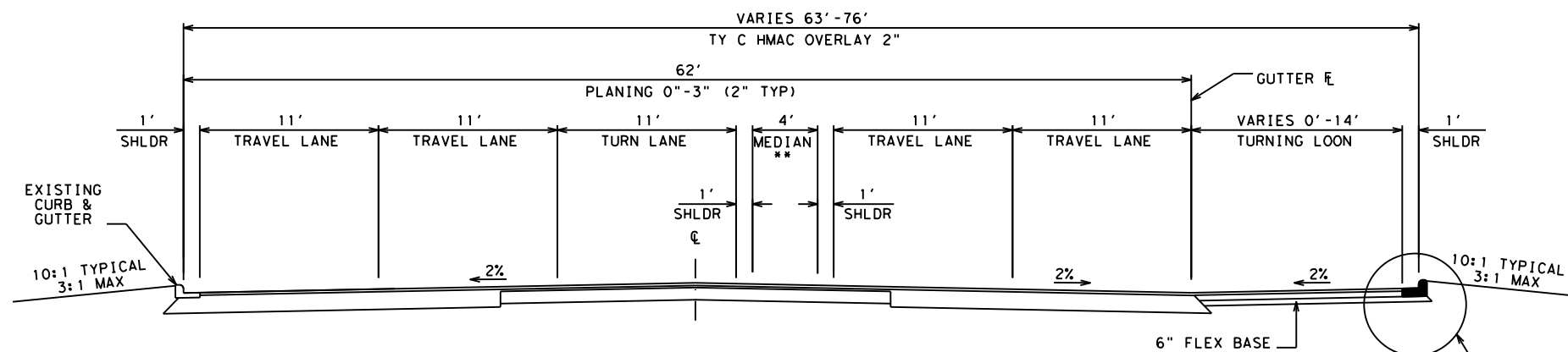
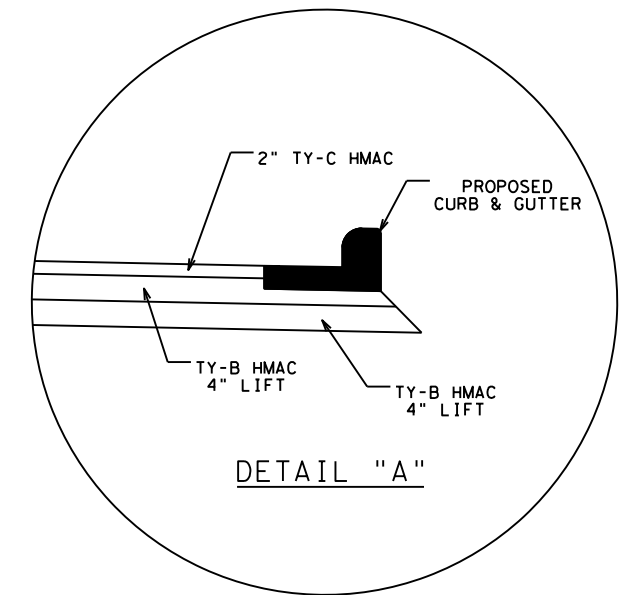
Monte R. Rater P.E.
Sept 4, 2023
 NAME DATE

US 82, ETC INDEX OF SHEETS

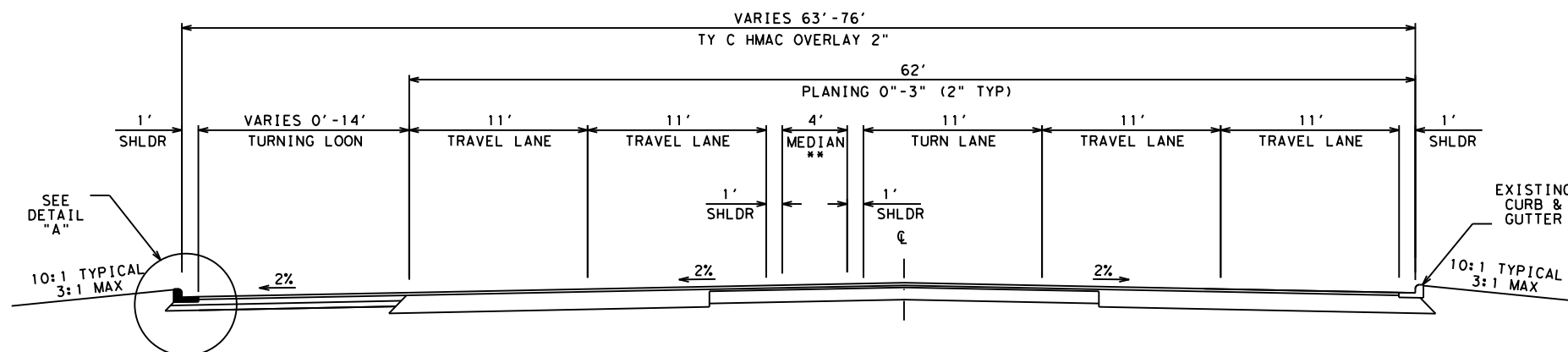
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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST		COUNTY	SHEET NO.
PAR		LAMAR	2



EXISTING
 FROM: STA. 60+95 TO STA. 62+01
 FROM: STA. 89+00 TO STA. 89+96
 FROM: STA. 97+73 TO STA. 98+75



PROPOSED- TURN LOONS
 FROM: STA. 60+95 TO STA. 62+01
 *** FROM: STA. 89+00 TO STA. 89+96



PROPOSED- 42ND ST TURN LOON
 FROM: STA. 97+73 TO STA. 98+75

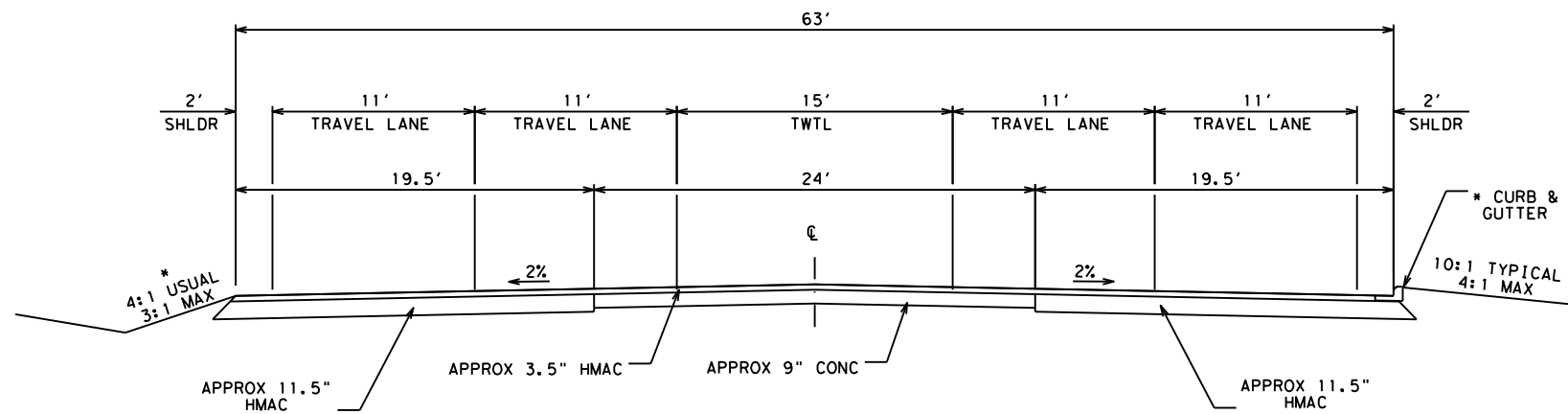
- NOTES:**
 * 1) CURB INTERMITTENT THROUGHOUT ROADWAY.
 ** 2) MEDIAN TRANSITIONS FROM PAINTED MEDIAN TO RAISED MEDIAN
 *** 3) TYPICAL SECTION IS MIRRORED AT THIS LOCATION



9.01.23
 Monte R. Rater P.E.
 US 82
 0045-09-110, ETC
 TYPICAL SECTIONS

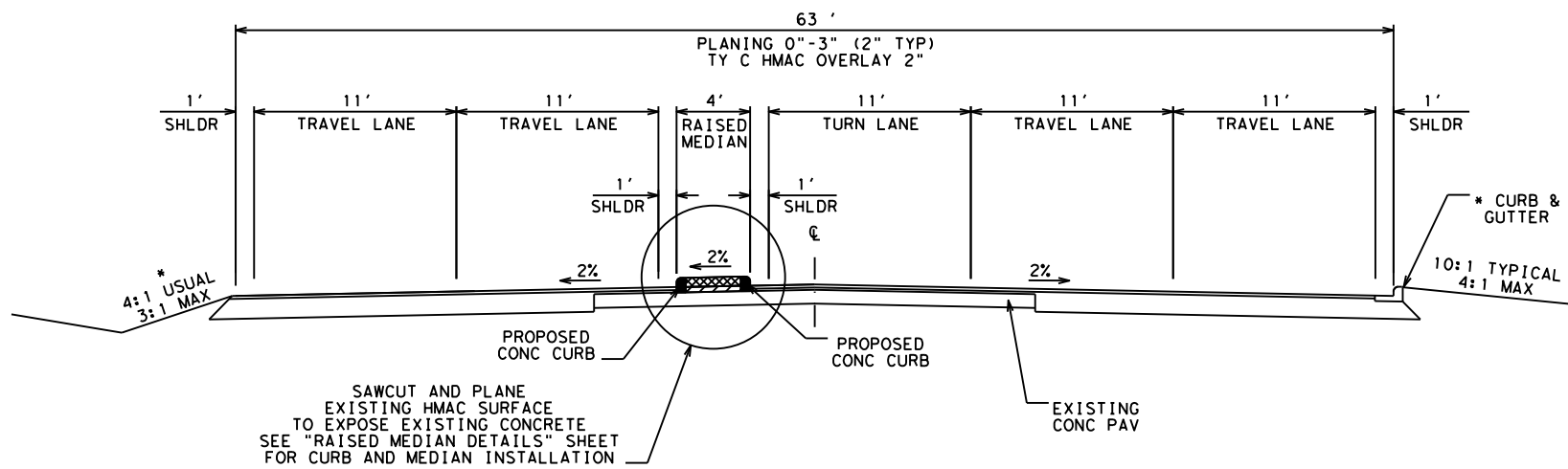
SHEET 1 OF 4

CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	3	



EXISTING

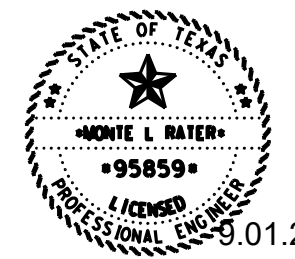
TRANSITION FROM: STA. 60+95 TO STA. 69+10
 FROM STA. 69+10 (63') TO STA. 71+23 (80')
 FROM: STA. 84+50 TO STA. 98+75



PROPOSED

TRANSITION FROM: STA. 62+01 TO STA. 69+10
 FROM STA. 69+10 (63') TO STA. 71+23 (80')
 *** FROM: STA. 84+50 TO STA. 89+00
 *** FROM: STA. 89+96 TO STA. 97+73

- NOTES:
- * 1) CURB INTERMITTENT THROUGHOUT THESE STATIONS
 - ** 2) MEDIAN TRANSITIONS FROM PAINTED MEDIAN TO RAISED MEDIAN
 - *** 3) TYPICAL SECTION IS MIRRORED IN THESE SECTIONS



Monte R. Rater P.E.

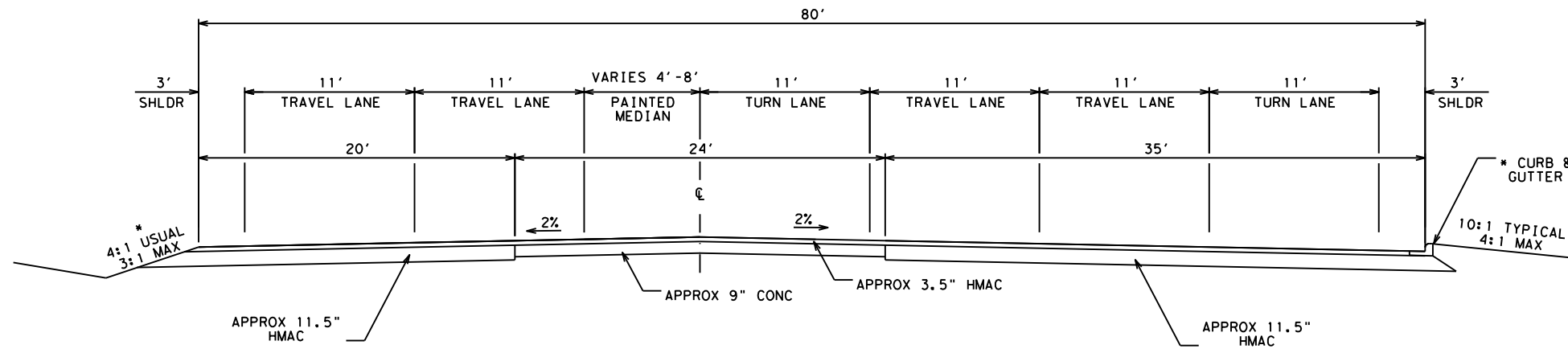
US 82
 0045-09-110, ETC
 TYPICAL SECTIONS



SHEET 2 OF 4

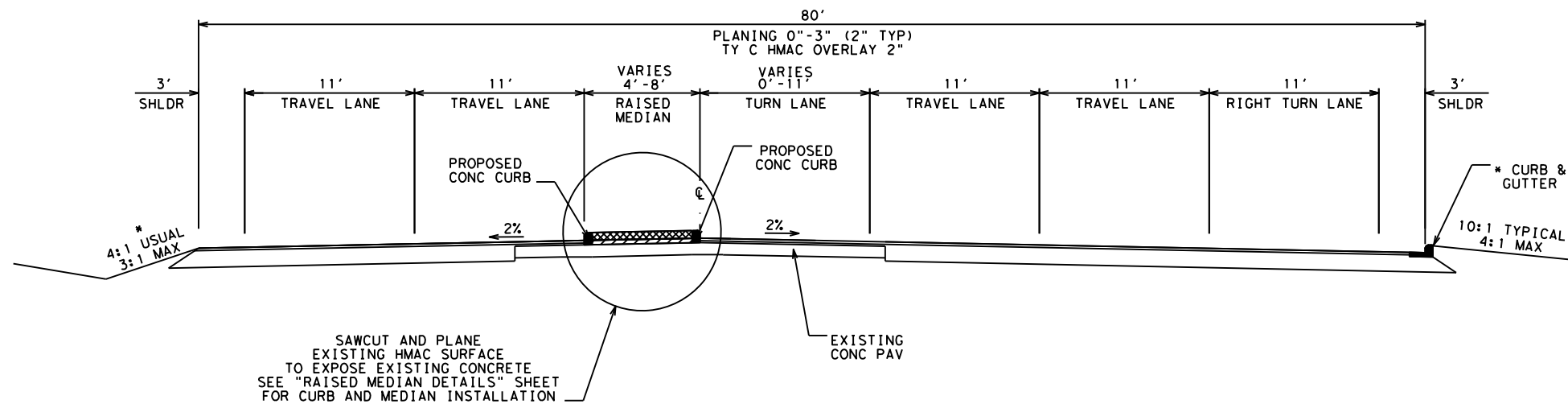
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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	4	



EXISTING

FROM: STA. 71+23 TO STA. 75+16
 TRANSITION FROM STA. 75+16 (80') TO STA. 75+72 (93')
 FROM: STA. 79+23 TO STA. 82+50
 TRANSITION FROM STA. 82+50 (80') TO STA. 84+50 (63')



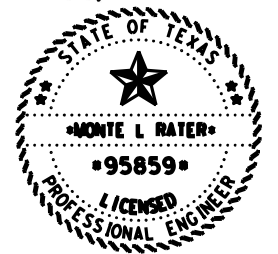
PROPOSED

FROM: STA. 71+23 TO STA. 75+16
 TRANSITION FROM STA. 75+16 (80') TO STA. 75+72 (93')
 *** FROM: STA. 79+23 TO STA. 82+50
 TRANSITION FROM STA. 82+50 (80') TO STA. 84+50 (63')

- NOTES:
 * 1) CURB INTERMITTENT THROUGHOUT ROADWAY.
 ** 2) MEDIAN TRANSITIONS FROM PAINTED MEDIAN TO RAISED MEDIAN
 *** 3) TYPICAL SECTION IS MIRRORED IN THESE SECTIONS



Monte R. Rater P.E.
 9.01.23



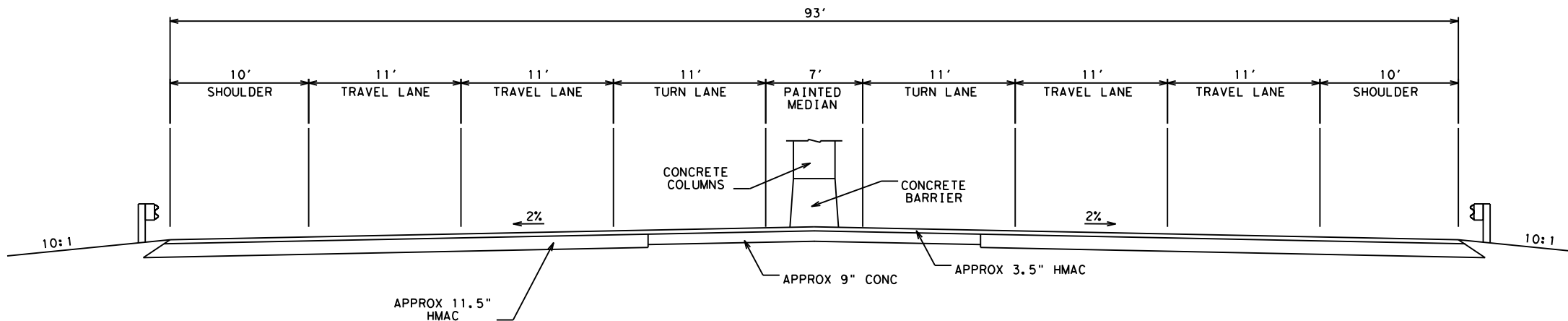
US 82
 0045-09-110, ETC
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SHEET 3 OF 4

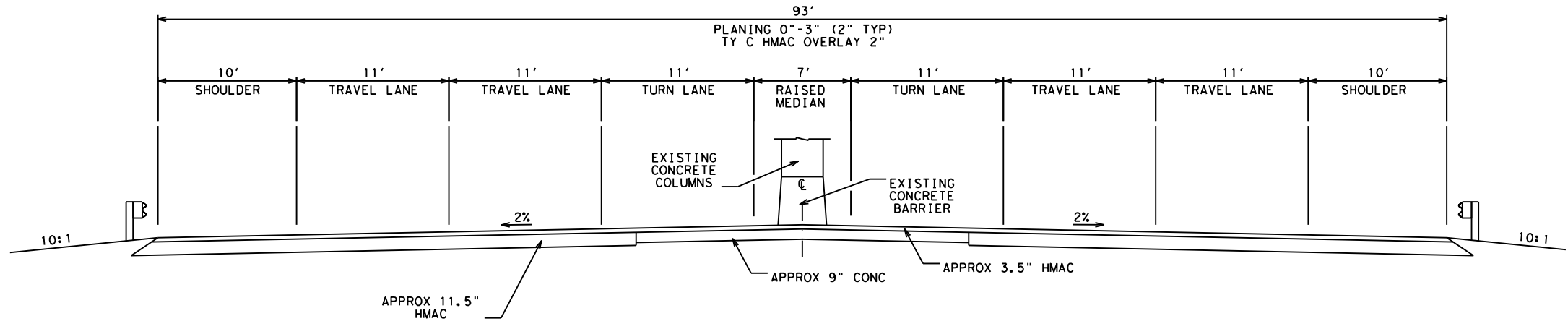
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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY	SHEET NO.	
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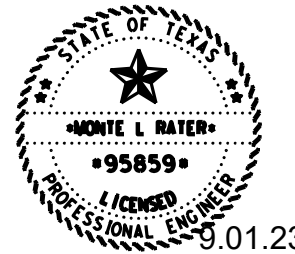
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FROM: STA. 75+72 TO STA. 78+25
 TRANSITION FROM STA. 78+25 (93') TO STA. 79+23 (80')

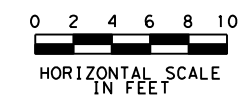


FROM: STA. 75+72 TO STA. 78+25
 TRANSITION FROM STA. 78+25 (93') TO STA. 79+23 (80')



Monte R. Rater P.E.

US 82
 0045-09-110, ETC
 TYPICAL SECTIONS



SHEET 4 OF 4

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY		SHEET NO.
PAR	LAMAR		6

County: Lamar

Control: 0045-09-110, Etc.

Highway: US 82, Etc.

Sheet:

GENERAL NOTES

General:

This project contains the following modified standard sheets: TCP(2-6)-18 MOD.

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

Paris Area Office

Daniel Taylor P.E. - Daniel.Taylor@txdot.gov

Zachary Smith P.E. - Zachary.Smith@txdot.gov

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

Questions may be submitted via the Letting Pre-Bid Q&A web page. This webpage can be accessed from the Notice to Contractors dashboard located at the following Address:

<https://tableau.txdot.gov/views/ProjectInformationDashboard/NoticetoContractors>

All contractor questions will be reviewed by the Engineer. All questions and any corresponding responses that are generated will be posted through the same Letting Pre-Bid Q&A web page.

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

On Contractor request, construction timelines will be posted to TxDOT's Public FTP at the following Address:

<https://ftp.dot.state.tx.us/pub/txdot-info/Pre-Letting%20Responses/>

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

Dispose of waste materials at an approved site. Furnish written approval from the property owner before disposal of waste materials.

Install traffic signal in accordance with the current Texas Manual on Uniform Traffic Control Devices and the current National Electrical Code unless otherwise specified on the plans.

Locate equipment a minimum of 30 feet from roadway when possible. Place signs and barricades as approved.

Stockpile sites for construction materials must be approved. Give at least 48 hours notification prior to stockpiling material.

Verify actual location of utilities and take adequate precautions to prevent damage to utilities, storm sewers, and existing signal equipment.

County: Lamar

Control: 0045-09-110, Etc.

Highway: US 82, Etc.

Sheet: 7

Item 5 Control of the Work:

The responsibility for the construction surveying on this contract will be in accordance with Section 5.9.3, Method C.

Working days will be computed and charged in accordance with Article 8.3.1.4 Standard Work Week.

Contractor shall limit work to nighttime operations with the standard schedule being Sunday-Thursday (9pm – 6am). Any deviation from these set hours must be approved by the Engineer at least 48 hours in advance.

Right and left are determined based upon the forward direction of stationing in the specific control section.

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

<https://www.txdot.gov/business/resources/highway/bridge/bridge-publications.html#design>.

Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.

Item 6 Control of Materials:

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

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

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

<https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html>

The Contractor shall determine availability of components, materials and supplies before construction begins. Long lead time components, materials and supplies shall be ordered with enough lead time to ensure traffic safety is maintained.

Item 7 Legal Relations and Responsibilities:

No significant traffic generator events identified.

County: Lamar

Control: 0045-09-110, Etc.

Highway: US 82, Etc.

Sheet:

Item 8 Prosecution and Progress:

Time will be computed according to Item 8.3.3.2.1. Night Time Work Only.

This project includes SP 008-003 and requires a mandatory 90-day delay before work can begin on the project to allow for acquisition of traffic signal materials.

SP 008-003 is required to allow for TxDOT to properly staff this project either with in-house or contract forces. This SP also allows the Contractor ample time to obtain and schedule resources, material and manpower to ensure continuous prosecution of the work.

Before beginning work on this project submit in writing, for approval, a plan of construction operations outlining in detail a sequence of work to be followed.

The number of working days for this project shall be 96 days.

Limit lane closures from 9:00 P.M. to 6:00 A.M.

No work or lane closure will be permitted from 6:00 A.M. Friday to 9:00 P.M. Sunday or the Night before and after a major holiday unless otherwise approved in writing by the Engineer.

Lane closure assessment fees will be charged for each hour the lane is closed outside of the allotted time frame. Lane closure assessment fees will be at a rate of \$1,000 per hour.

Provide a CPM schedule for this project.

Item 9 Measurement and Payment:

Items of work for the Monthly Estimate will be cut off on the 25th of each month. Items of work performed after the 25th will be processed and paid on the following month's estimate. Material On Hand (MOH) will cut off on the 20th of each month. Special circumstances will be considered on a case-by-case basis.

Item 110 Excavation:

Before excavation operations the existing topsoil shall be salvaged in a manner to preserve the vigor of the existing Bermuda grass sod per Item 160.

Item 112 Subgrade Widening:

Limit daily subgrade widening operations to the amount of base widening (proposed depth) that can be completed daily.

All pavement edge drop-offs, at end of day, shall be backfilled in accordance with Edge Treatment Condition I on the "Treatment for Various Edge Conditions" sheet. Backfill material shall be approved by the Engineer.

County: Lamar

Control: 0045-09-110, Etc.

Highway: US 82, Etc.

Sheet: 7A

Item 132 Embankment:

Test potential embankment sources using Tex-145-E to determine the presence and concentration of sulfates. Do not bring soil with greater than 3000 ppm sulfates into project.

Embankment sources containing sulfates that meet specification requirements may be used as fill material provided it is placed with at least one foot of separation from materials to be treated with lime, cement, or other calcium-based stabilizers. When soils are to be placed with less than one foot of separation from material to be treated with lime, cement, or other calcium-based stabilizers, process and treat such soils according to the Soil Sulfates Mitigation General Notes.

Excavation pits for project embankment made within 250 feet of State Right of Way must be approved.

Before embankment operations the existing topsoil shall be salvaged in a manner to preserve the vigor of the existing Bermuda grass sod per Item 160.

Item 134 Backfilling Pavement Edges:

The backfill material source shall be approved.

Dirt driveway shaping/construction will be subsidiary to Item 134.

Item 162 Sodding for Erosion Control:

Provide Bermuda grass sod.

All roll and block sod shall be pinned. Pin roll sod at five-foot intervals on both sides of the sod. Pin block sod with a least two pins per block with pins placed near block edges. Pins shall be 11-gauge steel, ungalvanized U shaped staples, having six-inch soil/sod penetration length or as directed by the Engineer.

Place sod within 14 days of local area construction completion.

Item 168 Vegetative Watering:

Use water trucks equipped with a sprinkler system adequate to permit coverage of the entire seeded area from the roadbed. This equipment must be available to perform watering throughout the duration of vegetative establishment.

Water all sodded areas the day sod is placed. Thereafter, maintain the sodded areas in a well-watered condition throughout the duration of vegetative establishment.

County: Lamar

Control: 0045-09-110, Etc.

Highway: US 82, Etc.

Sheet:

Item 354 Planing and Texturing Pavement:

Planing will be performed with a 12' milling machine.

RAP generated from this project can be used in the HMAC for this project.

During the planing operation, maintain the existing centerline stripe for overnight traffic operations unless full width planing is accomplished in one day. Plane all vertical longitudinal faces with a 3:1 slope to meet Edge Condition I as shown on sheet "Worksheet for Edge Condition Treatment Types".

The planing operation will be followed closely by the hot-mix asphalt (HMA) overlay operation. If inclement weather or other unexpected factors do not allow planed areas to be overlaid, warning signs per Standard Sheet WZ(UL) will be maintained until the hot-mix asphalt overlay operation is completed.

Saw cutting butt joints shall be subsidiary to this item.

Immediately after planing operations, sweep the planed surface with a vacuum sweeper. Equipment, materials and labor shall be subsidiary to Item 354.

RAP that is not to be used on this project will become the property of TXDOT. Transfer these millings directly into trucks, and transport directly to the stockpile site located at Paris Area Office, or as approved. At the end of the project, shape each stockpile for measurement as directed.

Provide a RAP accountability plan that is acceptable to the Area Engineer.

RAP that is not to be used on this project will become the property of the Contractor.

During the planing operation, construction limits are to be with full width planing of the roadway, while maintaining only one lane of closure for each direction of traffic (one lane closed in the northbound direction, and one lane closed in the southbound direction).

Item 400 Excavation and Backfill for Structures:

Excavation and backfill for bridge, culvert and Safety End Treatment construction/installation will be subsidiary to Item 464.

Item 402 Trench Excavation Protection

Submit a Trench Excavation Protection Plan to the Engineer a minimum of three weeks prior to use. The excavation support plan shall address excavation/protection methods, work sequencing, traffic control, backfill operations, etc.

County: Lamar

Control: 0045-09-110, Etc.

Highway: US 82, Etc.

Sheet: 7B

Item 416 Drill shaft foundations:

The locations shown on the plans for pole foundations are approximate. Achieve the correct signal head placement and clearance before drilling and pouring signal pole foundations. Extend all traffic signal pole foundations at least ten feet below ground.

Dispose of all excavated material off right-of-way at an approved location.

Item 464 Reinforced Concrete Pipe:

Required excavation and backfill will be subsidiary to this Item.

Backfill to top of pipe using HES flowable fill. Use an accelerator that produces a minimum strength of 250 psi in 4 hours. Provide rheofill or equivalent to ensure flowability. Anchor pipes to ensure no movement or displacement by the flowable fill. Furnish paper type cylinder test molds. Place flowable fill from the top of the pipe to the bottom of the proposed roadway pavement.

Concrete pipe collars shall be subsidiary this item.

Item 465 Manholes and Inlets:

Required excavation and backfill will be subsidiary to this item.

Set the proposed curb inlet box on a mortar bed. Materials, equipment and labor shall be subsidiary to Item 465.

Item 496 Removing Structure:

The Contractor shall retain and dispose of waste materials.

Item 502 Barricades, Signs and Traffic Handling:

Signing and traffic control for traffic signal work is in accordance with standard sheets WZ (BTS-1)-13, WZ (BTS-2)-13, BC (1)-21 thru BC (12)-21, and the current Texas Manual on Uniform Traffic Control Devices. The standard sheets WZ (BTS-1)-13 and WZ (BTS-2)-13 govern when they conflict with BC (1)-21 – BC (12)-21 sheets. Use major street Traffic Control on all on-system approaches.

Furnish and place portable 48" x 48" stop signs with an all-way placard at the intersection when signal is placed in flash or power is off. Portable signs will not be paid for directly but will be considered subsidiary to various bid items. All signing must be approved by the Engineer before work begins.

Cover all signal heads with satisfactory material specified or point down when not in operation. Furnish a phone number reachable 24 hours a day. Be available to return call within two hours.

County: Lamar

Control: 0045-09-110, Etc.

Highway: US 82, Etc.

Sheet:

Item 502 Barricades, Signs and Traffic Handling (Cont.):

Ensure that all travel lanes are open in day unless daytime lane closure is approved in writing by Engineer.

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

The following items will be required for flagger on this project:

1. Flaggers are required to wear a white hard hat while performing flagging operations.
2. Flaggers will be required at the intersection of all State maintained roadways.
3. Flaggers may be required at other high traffic generating intersections as deemed necessary by the Area Engineer.

The traffic control plan for this contract consists of the installation and maintenance of warning signs and other traffic control devices shown in the plans, specification data which may be included in the general notes, applicable provisions of the Texas Manual on Uniform Traffic Control Devices (TMUTCD), traffic control plan sheets included in the plans, standard BC sheets and Item 502 of the Standard Specifications.

Do not begin Item 502, Barricades, Signs, and Traffic Handling, on the roadway until both of the following conditions are met:

1. The work schedule is approved.
2. No more than 5 workdays will pass between the beginning of Item 502 and the actual commencement of roadway work bid items.

The final estimate will be withheld until all disturbed areas are covered with at least 70% perennial vegetative cover.

Correct all deficiencies within the time frame noted on the Traffic Control Device Inspection Form 599. Failure to make corrections within time frame specified may result in no payment for this Item for the month of the noted deficiency.

Provide shadow vehicles equipped with Truck Mounted Attenuators (TMA) as shown on Traffic Control Plan (TCP) standards.

Lane closures must be approved by the Engineer. Provide a five-day advance notice to the Engineer prior to desired lane closure period. Begin display of closure information on PCMBs ten days prior to roadway closure.

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Item 506 Temporary Erosion, Sedimentation & Environmental Controls:

It is the intent of this contract that no disturbance of vegetation occurs as a result of the roadway operations except for turn loon construction. However, if vegetation is disturbed outside of turn loon construction, treat the disturbed area as follows at no additional costs to the department.

Place temporary sediment control fence, or an alternative material as approved, to minimize and control the amount of sediment that might enter receiving waters from the disturbed area(s). Maintain the sediment controls in a satisfactory manner until the disturbed area(s) is stabilized. After the area(s) has been stabilized, remove the sediment controls. The location and length of the sediment controls will be determined.

The work performed, materials furnished, equipment, labor, tools, and incidentals will not be measured or paid for directly, but will be considered subsidiary to the various bid items.

Item 528 Colored Textured Concrete:

Payment for concrete dye shall be subsidiary to this item.

Concrete to be tinted prior to installation. Final color to be determined by Engineer in the field prior to installation. Provide 3ft x 3ft color and texture specimens three weeks before construction.

Concrete medians shall be reinforced longitudinally with #4 rebar along curb edges (place 3" from edge of curb) and #4 rebar at 16" c-c spacing maximum between the longitudinal bars. Where median width is less than 2' from face of curb to face of curb, place lateral #4 U rebar at 24" c-c spacing. Where median width is greater than 24" from face of curb to face of curb, place lateral #4 U rebar at 48" c-c spacing. Center rebar vertically in the median. Use grade 60 rebar. Refer to median detail sheet.

Joints shall be tooled or saw-cut every 4' to a depth of 1 1/2" unless otherwise directed. All expansion joints shall consist of fiberboard and sealed with a Class 8 silicone sealant according to DMS-6310.

All longitudinal joints adjacent to curb shall have expansion joints, sealed with a Class 7 silicone sealant according to DMS-6310.

Payment for concrete stamping (form liners) shall be subsidiary to this item.

Item 529 Concrete Curb, Gutter, And Combined Curb and Gutter:

Concrete curb and gutter shall be measured by linear foot along the face of the curb. As such, each foot of monolithic curb poured back-to-back shall be measured as two linear feet of standard curb length.

Reinforcing steel shall be required in all curb/curb and gutter unless otherwise directed by the Engineer.

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Item 531 Sidewalks:

Five-foot-wide sidewalk shall be reinforced longitudinally with #4 rebar along sidewalk edges (place 3" from face of sidewalk edge) and #3 rebar at 18" c-c spacing between the #4 bars. Place lateral #3 rebar at 18" c-c spacing. Center rebar vertically in the sidewalk. Use grade 60 rebar.

Joints shall be tooled or saw-cut every 4' to a depth of 1 1/2" unless otherwise directed. All expansion joints shall consist of fiberboard and sealed with a Class 8 silicone sealant according to DMS-6310.

All longitudinal joints adjacent to curb shall have expansion joints, sealed with a Class 8 sealant according to DMS-6310.

The surfaces of sloped areas shall be broomed to provide a slip resistant finish.

ADA Ramps ~ Concrete shall be placed around existing features such as signs, fireplugs, utility poles, and etc. when located within the limits of the new ramp to provide a four foot (4') minimum pathway. Any excavation/embankment necessary for establishing ramps to proper grade shall be considered subsidiary to the various bid items. Ramps shall be added, deleted, and/or changed as directed by the Engineer.

Item 585 Ride Quality for Pavement Surfaces:

Use Surface Test Type B Pay Adjustment Schedule 3 to evaluate ride quality of the final pavement surface on travel lanes and shoulders in accordance with Item 585, "Ride Quality for Pavement Surfaces." A localized roughness penalty of \$500 per occurrence will be assessed. Leave out areas will default to Surface Test Type A : Dedicated turn lanes.

Item 618 Conduit:

Use rigid metal sweep ells for all conduits entering the controller base.

Rigid metallic conduit elbows that are required to be installed on conduit system will not be paid for directly but will be considered subsidiary to the various bid items.

Where the rigid metal conduit is exposed at any point, and where rigid metal conduit extends into ground boxes, bond the metal conduit to the grounding conductor with grounding type bushings or by other UL listed grounding connectors as approved. Attach all conduits to any type pole with conduit straps spaced at maximum intervals of five feet and within three feet of each side of any enclosure.

Provide boring equipment capable of tracking location and depth of bore head at all times. Bore head must be able to change bore direction without removing bore head. Mark depth of conduit at ten feet intervals along the length of bore and provide a copy of depth and location information.

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Make all threaded conduit and conduit fittings wrench tight.

Shore pits for jacking or boring conduit when closer than five feet to the back of the curb. Consider shoring subsidiary to this item.

Maintain a minimum vertical cover of 24 inches on all conduits except when it crosses flow line at which point it is a minimum of 36 inches.

Maximum depth of sweep ells will be 36 inches unless otherwise shown.

Item 620 Electric Conductor:

Install a continuous #6 AWG XHHW green ground wire throughout the traffic signal system. Bond grounding conductors that share the same conduit, junction box, ground box or structure at every accessible point in accordance with the current National Electric Code and TxDOT Standard Sheets.

Item 621 Tray Cable:

Identify signal system luminaire wiring at the fuse holder in the pole base as to line side, load side, and luminaire number.

Label tray Cable in the load center within 2 inches of termination as to what they serve. (FB A, FB C, ILLUM A, ILLUM B, etc.)

Item 628 Electrical services:

Install according to utility company requirements. Coordinate service with Engineer.

Item 644 Small Roadside Sign Support and Assemblies:

Use the Southern Plains style triangular slip base for all post types.

Stake proposed sign locations and obtain Engineer's approval of locations prior to placing foundations.

Item 662 Work Zone Pavement Markings:

Non-removable markings may be paint and beads.

Place flexible reflective roadway tabs in accordance with the current WZ (STPM) prior to seal coat operations. Place tabs to indicate the beginning and ending of no passing zones.

Cut, remove and properly dispose of the upright portions of all work zone tabs prior to acceptance of any roadway. Remove entire tab when located on HMAC or concrete surfaces.

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Item 666 ReflectORIZED Pavement Markings:

No stripe will be placed unless the inspector is present and at least 24 hours advance notice has been given by the Contractor.

Lay out pilot lines for approval 24 hours prior to all final pavement marking applications.

Use equipment with footage counters capable of measuring the linear footage placed. Calibrate counters prior to the beginning of striping operations.

Reduce paint truck speed enough to ensure that the beads drop onto the stripe and do not roll in the paint film.

Due to problems in traffic handling, do not place a dash center stripe and edge line at the same time.

Item 680 Installation of Highway Traffic Signals:

Send all signal related material submittals to District Traffic Operations for approval.

Use pre-qualified materials and products from the TxDOT "Material Producer List" on the TxDOT website.

Traffic Signal Cabinet for US 82 at Walmart will be supplied by the Department. Install as shown on the plans or as directed by engineer.

Installation of signs on traffic signal poles will be paid for under this item.

All signal control equipment furnished has been shop tested. The contractor must sign for the equipment received from TxDOT Signal Shop.

Electrical licenses and certifications for this project will be as per Item 7 of the current Texas Standard Specifications and any special provisions to Item 7.

Furnish all materials and repair any sod, pavement, sidewalk, or other property damaged during the course of the construction, this is according to Article 7.15 of the standard specification.

Ensure that all materials furnished are corrosion resistant and exhibit no rust.

Verify actual location of utilities and take adequate precautions to prevent damage to utilities, storm sewers, and existing signal equipment.

Return removed material to TxDOT unless otherwise approved by engineer.

Pick up all TxDOT furnished equipment at one time at the District Signal Shop located at 1365 North Main Street in Paris for the intersection location. Assume responsibility for all such

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equipment until final acceptance of the project.

After all signal construction is complete and the equipment is ready to turn on, District Transportation Operation will perform a preliminary check of all signal plan details. When the installation is complete, all safety related items on the punch list are completed, the equipment will be activated. This will start the thirty-day test period.

Item 682 Vehicle and Pedestrian Signal Heads:

Mount vehicle heads vertical except where noted on plans.

All vehicle heads are Type A (vertical) for traffic signals unless otherwise noted on plans.

Mount signal heads so that the bottom of the head is between eighteen and nineteen feet above the pavement surface. Mount at the same elevation when there are two or more heads on the same support.

Mount each signal head plumb and aim parallel with the lane it is controlling, unless otherwise directed.

Adjust the location of signal heads as needed so that one head does not block the view of another head.

Item 684 Traffic Signal Cable:

Expose no cables unless shown on plans.

Do not strip back the outer jacket of Type A signal cable entering the head until it is inside the signal head. Terminate all field wiring in the bottom section of the signal head.

Strip back the outer jacket of Type A signal cable to within two inches above conduit in the controller cabinet.

Leave an extra length of five feet coiled in the controller cabinet for each cable run to the controller cabinet.

Label all cables going to signal heads in the hand hole according to phase, direction and position (ex: 02 NB RT). Label field wiring terminated in the cabinet within two inches of termination by phase and direction.

Tie together and bond all wires in pole access compartments colored solid green to pole ground.

All exposed cables shown on plans have a drip loop of two or more five to six-inch diameter turns.

Test conductors for continuity. Reject any conductor testing more than ten-ohms resistance.

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Item 686 Traffic Signal Pole Assemblies (Steel):

Plug all holes in signal poles and mast arms with metal plugs or caps colored to match poles. Replace terminal strips with marathon type strips and fuse blocks.

Item 687 Pedestal Pole Assemblies:

Furnish each pedestal pole with one 12-position terminal block of the same type furnished with mast arm poles.

Pedestrian foundations must be flush with finished grade. The locations shown on the plans for pole foundations are approximate.

Dispose of all excavated material off right-of-way at an approved location.

Item 688 Pedestrian Detectors:

Install Accessible (Audible) Pedestrian Signal (APS) systems as shown on the plans or as directed by the engineer. Contractor shall do a site survey to verify proper APS for each location and get approval for each APS prior to purchase and installation. Any wiring necessary in the signal pole and cabinet will not be paid for directly but will be considered subsidiary to the pay item.

To maintain clearance to button, use mounting extender iNavigator PBS or PBF2 either 6" or 12". To maintain close to the original button height, use the iN-EXTANG-XX extender. These extenders will be considered subsidiary to the pay item.

Item 3076 Dense-Graded Hot-Mix Asphalt:

All surface mixes are to be SAC A.

The use of PG 64-22 asphalt is required.

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

Specify Hot Mix Asphalt Concrete (HMAC) or Warm Mix Asphalt (WMA) at the time of design submittal. After design submittal, continue producing the chosen design unless otherwise approved.

RAP from contractor owned sources may be used if the RAP is fractionated. The course fraction of contractor owned RAP will not be allowed if it consists primarily of siliceous aggregates.

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A tack coat is required for all overlay areas and for all longitudinal joints unless otherwise directed.

Evaluation of the mixture for moisture susceptibility will be performed by using test method TEX 530-C (boil test) and there shall be no evidence of stripping during design verification or at any time during production.

The maximum nighttime paved surface vertical differential will be limited to two inches. Prevent ponding of water on any travel ways that are exposed to traffic.

Preparation and construction of permanent / temporary transitions, terminations of mix courses and transitions to driveways and intersecting roadways is subsidiary to Item 341. This includes all labor, machinery, materials and incidentals to complete the work including planing, removal, hauling and stockpiling of materials and necessary clean-up.

Place HMAC for road widening operations with a road widening machine.

Item 3096 Asphalts, Oils, and Emulsions:

Provide 1L (1qt.) clean and dry screw top or friction-lid sampling cans as directed.

Furnish at least one sample of each type of asphalt used on the project for QA/QC purposes.

Item 6001 Portable Changeable Message Board:

Four (4) portable changeable message boards are required for advance warning.

Item 6004 Networking Intelligent Transportation System (ITS) Communications Cable:

Communication cable shall consist of Cat 5e or Cat 6 as called for in the plans. The cable shall be rated for outdoor direct burial, shielded, and gel field or with waterblock tape as approved by Engineer.

Item 6010 Closed Circuit Television (CCTV) Field Equipment:

Install CCTV as shown on plans or as directed by engineer. If mounting location is less than 30 feet high use two astro clamps (AB 3040-84-SS-PNC) installed at the top of the pole with a minimum of 16 feet of 2" galvanized TWT (Thin Wall Tubing) to attach CCTV or approved by engineer.

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Item 6058 Battery Backup System (BBU):

Install battery backup system as called for and, in a manner, as directed by Engineer. The BBU enclosure shall have an external locking generator access door with a L5-30 F1 plug, be a minimum of 21" wide, and include a remote battery management system (example Myers MP2000E-TBE UPS, PTS-722535-G PTS/MBPS with generator option, and ICBM Battery Manager Kit for 48v 1 string in a minimum 21" wide cabinet or equal).

Cat 5e cable shall be installed to connect the BBU to the switch in the signal cabinet and any wire/material needed to connect existing service conductors to the BBU and back to the signal cabinet are to be installed and are considered subsidiary to the pay item.

Item 6083 Video Imaging and Radar Vehicle Detection System (VIRVDS):

Leave an extra 5 ft. of cable inside controller cabinet. Secure the drip loop using cable ties suitable for outdoor use. Seal VIRVDS cable ends at all times to prevent moisture contamination. Identify VIRVDS communications cable runs by color tape on both ends of the runs and at hand holes. Use different color tape for each run.

Detection areas are in accordance to TTI guidelines (or as directed by engineer). Detection zones shown on plans are for informational purposes only.

Furnish documentation as to how the detection zones are setup, (example: where the detector is mapped to, how the detection cards are identified, if there are any extends or delays on the detection zones or in the VIRVDS system, etc.)

Install VIRVDS cameras directly to the mast arm in accordance with the details shown in the plans and shall be capable of monitoring 3 to 4 lanes of oncoming traffic. Provide a mounting bracket to mount VIRVDS cameras if needed which is subsidiary to the installation of this item.

The VIRVDS will be tested in a typical intersection application.

Provide ample personnel, equipment, and any necessary incidentals to perform testing for detection accuracy, count and flow rate accuracy, speed accuracy, occupancy accuracy and classification accuracy of the VIRVDS in accordance with this item and as directed by the Engineer.

Item 6185 Truck Mounted Attenuators:

Shadow vehicles with truck mounted attenuator (TMA) are required on the traffic control plan and TCP standards for this project. The contractor will be responsible for determining if one or more of these traffic control operations will be ongoing at the same time to determine the total number of TMAs needed for the project.

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Item 6306 Video Imaging Detection System:

Leave an extra 5 ft. of cable inside controller cabinet. Make a 2 turn drip loop at the camera leaving enough slack to make up connections to camera. Secure the drip loop using cable ties suitable for outdoor use. Seal VIVDS cable ends at all times to prevent moisture contamination. Identify VIVDS communications cable runs by color tape on both ends of the runs and at hand holes. Use different color tape for each run.

VIVDS communication cable consist of coaxial cable of the RG-59 type with a nominal impedance of 75 ohms, polyethylene dielectric with copper braid shield having a minimum of 98% shield coverage and a minimum of 16 AWG 3 conductor power cable. The power cable conductor insulation colors are black, white, and green and rated at 600 volts. Cover both coaxial and power cables with black PVC outer jackets suitable for outdoor use and that are sun light resistant. Example: Carol Brand I59PVCC-00 or equal.

Detection areas are in accordance to TTI guidelines. Detection zones shown on plans are for information purposes only.

Furnish a minimum 24-hour video recording of each camera view showing detectors to the District Signal Shop within 7 days of the system installation for evaluation of camera view, detector setup, and system operation. Furnish documentation as to how the detection zones are setup, (example: where the detector is mapped to, how the detection cards are identified, if there are any extends or delays on the detection zones or in the VIVDS system, etc.)

The VIVDS will transmit and receive all information needed for detection setup, monitoring vehicle detection, while viewing traffic flow and interrogating all required stored data. This information will transmit or receive at any remote location by any new or existing laptop computer that has Windows 98 software or later installed.



CONTROLLING PROJECT ID 0045-09-110

DISTRICT Paris
HIGHWAY BU 82H, US 82

COUNTY Lamar

Estimate & Quantity Sheet

ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL
	104-6015	REMOVING CONC (SIDEWALKS)	SY	14.000	
	104-6017	REMOVING CONC (DRIVEWAYS)	SY	10.000	
	104-6022	REMOVING CONC (CURB AND GUTTER)	LF	265.000	
	110-6003	EXCAVATION (SPECIAL)	CY	58.000	
	112-6004	SUBGRADE WIDENING (ORD COMP)	SY	229.000	
	132-6001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	18.000	
	134-6002	BACKFILL (TY B)	STA	3.000	
	162-6002	BLOCK SODDING	SY	120.000	
	168-6001	VEGETATIVE WATERING	MG	3.000	
	192-6015	LANDSCAPE EDGE	LF	24.000	
	354-6022	PLANE ASPH CONC PAV(0" TO 3")	SY	29,433.000	
	401-6001	FLOWABLE BACKFILL	CY	21.000	
	402-6001	TRENCH EXCAVATION PROTECTION	LF	18.000	
	416-6032	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	10.000	
	416-6034	DRILL SHAFT (TRF SIG POLE) (48 IN)	LF	40.000	
	420-6009	CL A CONC (COLLAR)	EA	3.000	
	464-6005	RC PIPE (CL III)(24 IN)	LF	18.000	
	465-6021	INLET (COMPL)(PCO)(5FT)(NONE)	EA	1.000	
	496-6023	REMOVE STR (JUNCTION BOX)	EA	1.000	
	500-6001	MOBILIZATION	LS	1.000	
	502-6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	6.000	
	506-6040	BIODEG EROSN CONT LOGS (IN STL) (8")	LF	20.000	
	506-6043	BIODEG EROSN CONT LOGS (REMOVE)	LF	20.000	
	528-6002	COLORLED TEXTURED CONC (6")	SY	1,334.000	
	529-6002	CONC CURB (TY II)	LF	6,863.000	
	529-6008	CONC CURB & GUTTER (TY II)	LF	318.000	
	530-6004	DRIVEWAYS (CONC)	SY	10.000	
	531-6002	CONC SIDEWALKS (5")	SY	28.000	
	531-6010	CURB RAMPS (TY 7)	EA	2.000	
	618-6023	CONDT (PVC) (SCH 40) (2")	LF	65.000	
	618-6029	CONDT (PVC) (SCH 40) (3")	LF	30.000	
	618-6030	CONDT (PVC) (SCH 40) (3") (BORE)	LF	195.000	
	618-6033	CONDT (PVC) (SCH 40) (4")	LF	20.000	
	620-6010	ELEC CONDR (NO.6) INSULATED	LF	1,120.000	
	621-6002	TRAY CABLE (3 CONDR) (12 AWG)	LF	1,055.000	
	624-6010	GROUND BOX TY D (162922)W/APRON	EA	8.000	
	624-6028	REMOVE GROUND BOX	EA	1.000	
	644-6001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	3.000	
	644-6067	IN SM RD SN SUP&AM (INST SIGN ONLY)	EA	1.000	
	662-6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	5,947.000	
	666-6029	REFL PAV MRK TY I (W)8"(DOT)(090MIL)	LF	362.000	

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DISTRICT Paris
HIGHWAY BU 82H, US 82

Estimate & Quantity Sheet

COUNTY Lamar

ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL
	666-6035	REFL PAV MRK TY I (W)8"(SLD)(090MIL)	LF	2,982.000	
	666-6047	REFL PAV MRK TY I (W)24"(SLD)(090MIL)	LF	521.000	
	666-6053	REFL PAV MRK TY I (W)(ARROW)(090MIL)	EA	21.000	
	666-6077	REFL PAV MRK TY I (W)(WORD)(090MIL)	EA	15.000	
	666-6101	REF PAV MRK TY I(W)36"(YLD TRI)(090MIL)	EA	24.000	
	666-6305	RE PM W/RET REQ TY I (W)6"(BRK)(090MIL)	LF	1,814.000	
	666-6308	RE PM W/RET REQ TY I (W)6"(SLD)(090MIL)	LF	7,258.000	
	666-6320	RE PM W/RET REQ TY I (Y)6"(SLD)(090MIL)	LF	7,258.000	
	672-6007	REFL PAV MRKR TY I-C	EA	97.000	
	672-6010	REFL PAV MRKR TY II-C-R	EA	141.000	
	677-6007	ELIM EXT PAV MRK & MRKS (24")	LF	865.000	
	680-6002	INSTALL HWY TRF SIG (ISOLATED)	EA	3.000	
	680-6004	REMOVING TRAFFIC SIGNALS	EA	1.000	
	682-6001	VEH SIG SEC (12")LED(GRN)	EA	22.000	
	682-6002	VEH SIG SEC (12")LED(GRN ARW)	EA	5.000	
	682-6003	VEH SIG SEC (12")LED(YEL)	EA	22.000	
	682-6004	VEH SIG SEC (12")LED(YEL ARW)	EA	10.000	
	682-6005	VEH SIG SEC (12")LED(RED)	EA	22.000	
	682-6006	VEH SIG SEC (12")LED(RED ARW)	EA	7.000	
	682-6018	PED SIG SEC (LED)(COUNTDOWN)	EA	6.000	
	682-6049	BACKPLATE W/REFL BRDR(4 SEC)	EA	3.000	
	682-6050	BACKPLATE W/REFL BRDR(5 SEC)	EA	2.000	
	682-6060	BACKPLATE W/REFL BRDR(3 SEC)	EA	22.000	
	684-6008	TRF SIG CBL (TY A)(12 AWG)(3 CONDR)	LF	470.000	
	684-6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	LF	1,228.000	
	684-6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	309.000	
	684-6014	TRF SIG CBL (TY A)(12 AWG)(9 CONDR)	LF	1,060.000	
	684-6017	TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	LF	295.000	
	686-6043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	1.000	
	686-6053	INS TRF SIG PL AM(S)1 ARM(50')	EA	1.000	
	686-6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	EA	1.000	
	690-6007	REPLACE OF GROUND BOXES	EA	3.000	
	690-6009	REMOVAL OF CABLES	LF	2,558.000	
	690-6024	REMOVAL OF SIGNAL HEAD ASSM	EA	10.000	
	690-6033	REMOVAL OF TRAFFIC SIGNAL POLE FND	LF	3.000	
	690-6051	REMOVAL OF SIGNAL POLE ASSM	EA	1.000	
	690-6123	RELOCATE OF PEDESTRIAN PUSH BUTTON	EA	1.000	
	3076-6003	D-GR HMA TY-B PG64-22 (EXEMPT)	TON	101.000	
	3076-6022	D-GR HMA TY-C SAC-B PG64-28	TON	3,263.000	
	3084-6001	BONDING COURSE	GAL	227.000	
	6001-6002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	4.000	

ESTIMATE & QUANTITY



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CONTROLLING PROJECT ID 0045-09-110

DISTRICT Paris
HIGHWAY BU 82H, US 82

COUNTY Lamar

Estimate & Quantity Sheet

ALT	BID CODE	DESCRIPTION	UNIT	EST.	FINAL
	6004-6031	ITS COM CBL (ETHERNET)	LF	130.000	
	6010-6012	RELOCATE CCTV FIELD EQUIPMENT	EA	1.000	
	6058-6001	BBU SYSTEM (EXTERNAL BATT CABINET)	EA	1.000	
	6083-6005	VID IMAGE AND RADAR COM CABLE (COAX)	LF	1,506.000	
	6185-6002	TMA (STATIONARY)	DAY	96.000	
	6185-6005	TMA (MOBILE OPERATION)	DAY	96.000	
	6212-6001	RELOCATE EXIST RADAR VEH SENSING DEVICE	EA	2.000	
	6306-6007	VIVDS CABLING	LF	615.000	
	6306-6010	VIVDS CAM ASSY (INSTALL ONLY)	EA	1.000	
	06	TRAFFIC SIGNAL CONTROLLER (PARTICIPATING)	LS	1.000	
	18	SAFETY CONTINGENCY: CONTRACTOR FORCE ACCOUNT WORK (PARTICIPATING)	LS	1.000	
		EROSION CONTROL MAINTENANCE: CONTRACTOR FORCE ACCOUNT WORK (PART)	LS	1.000	
	27	SIGNAL TECHNICIAN CHARGES	LS	1.000	

ESTIMATE & QUANTITY



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SUMMARY OF ROADWAY ITEMS

LOCATION	LENGTH (LF)	WIDTH (LF)	104	104	104	110	112	132	134	3076	3076	354	529	530	531	531	3084
			6015	6017	6022	6003	6004	6001	6002	6003	6022	6022	6022	6008	6004	6002	6010
STA.	STA.		REMOVING CONC (SIDEWALKS)	REMOVING CONC (DRIVEWAYS)	REMOVING CONC (CURB AND GUTTER)	EXCAVATION (SPECIAL)	SUBGRADE WIDENING (ORD COMP)	EMBANKMENT (FINAL) (ORD COMP) (TY A)	BACKFILL (TY B)	D-GR HMA TY-B PG64-22 (EXEMPT)	D-GR HMA TY-C SAC-A PG64-22 (EXEMPT)	PLANE ASPH CONC PAV (0" TO 3")	CONC CURB & GUTTER (TY II)	DRIVEWAYS (CONC)	CONC SIDEWALKS (5")	CURB RAMPS (TY 7)	BONDING COURSE
			SY	SY	LF	CY	SY	CY	STA	TON	TON	SY	LF	SY	SY	EA	GAL
CSJ: 0045-09--111																	
60+95	69+10	815	63														
69+10	71+23	213	72.5 *														
71+23	75+16	393	80														
75+16	75+72	56	82.5 *														
75+72	77+09	137	93														
CSJ TOTALS			14	10	62	17	69	0	1	30	1420	12843	83	10	28	2	99
CSJ: 0045-09-110																	
77+09	78+25	116	93								132	1199					9
78+25	79+23	98	82.5 *								99	898					7
79+23	82+50	327	80								320	2907					22
82+50	84+50	200	72.5 *								177	1611					12
84+50	88+00	350	63			102	19	74		1	33	278	2450	107			19
88+00	98+75	1075	63			101	22	86	18	1	38	837	7525	128			59
CSJ TOTALS			0	0	203	41	160	18	2	71	1843	16590	235	0	0	0	128
PROJECT TOTALS			14	10	265	58	229	18	3	101	3263	29433	318	10	28	2	227

* INDICATES AVERAGE WIDTH IN A TRANSITION
 BONDING COURSE BASED ON 0.07GAL/ SY
 HMAc BASED ON 110 LBS/ SY/ IN

SUMMARY OF RAISED MEDIAN ITEMS

LOCATION	LENGTH (LF)	529	528
		6002	6002
STA.	STA.	CONC CURB (TY II)	COLORED TEXTURED CONC (6")
		LF	SY
CSJ: 0045-09-111			
61+34	67+56	622	1252
67+12	70+72	360	723
69+85	75+20	535	1080
CSJ TOTALS=		3055	411
CSJ: 0045-09-110			
78+82	89+52	1070	2150
91+01	94+02	301	615
93+01	98+20	519	1043
CSJ TOTALS=		3808	923
PROJECT TOTALS=		6863	1334

1. STATIONING IN SUMMARY MAY OVERLAP DUE TO EACH RAISED MEDIAN BEING ITEMIZED INDIVIDUALLY
2. MEDIAN TO BE TINTED PRIOR TO POUR, CURB TO BE PAINTED AFTER

SUMMARY OF LANDSCAPE ITEMS

LOCATION	162	168	192	FERTILIZER 3-1-2
	6002	6001	6015	
BLOCK SODDING	VEGETATIVE WATERING	LANDSCAPE EDGE		
SY	MG	LF	LBS	
CSJ: 0045-09-111				
61+25	35	1	8	4
CSJ: 0045-09-110				
89+50	35	1	8	4
98+47	50	1	8	5
CSJ TOTALS=				
	85	2	16	9
PROJECT TOTALS				
	120	3	24	13

FOR CONTRACTORS INFORMATION ONLY: 2 CYCLES @ 50 LBS. NITROGEN PER ACRE @ 21-7-14 (NPK) ANALYSIS - 0.0492 LBS/ SY/ CYCLE

WATERING: BASED ON 2 APPLICATIONS. 0.5" RAINFALL EQUIVALENT = 0.003 MG/ SY/ CYCLE

SUMMARY OF EROSION CONTROL ITEMS

LOCATION	506	506
	6040	6043
BIODEG EROSN CONT LOGS (INSTL) (8")	BIODEG EROSN CONT LOGS (REMOVE)	
LF	LF	
CSJ: 0045-09-111		
62+00		
62+25	10	10
CSJ TOTALS=		
	10	10
CSJ: 0045-09-110		
93+40	10	10
PROJECT TOTALS		
	20	20

SUMMARY OF DRAINAGE ITEMS

LOCATION	401	402	420	464	465	496
	6001	6001	6009	6005	6021	6023
FLOWABLE BACKFILL	TRENCH EXCAVATION PROTECTION	CL A CONC (COLLAR)	RC PIPE (CL III) (24 IN)	INLET (COMPL) (PCO) (5FT) (NONE)	REMOVE STR (JUNCTION BOX)	
CY	LF	EA	LF	EA	EA	
CSJ: 0045-09-110						
98+45	21	18	3	18	1	1
PROJECT TOTALS						
	21	18	3	18	1	1

SUMMARY OF WORKZONE TRAFFIC CONTROL ITEMS

LOCATION	6001	6185	6185
	6002	6005	6002
PORTABLE CHANGEABLE MESSAGE SIGN	TMA (MOBILE OPERATION)	TMA (STATIONARY)	
EA	DAY	DAY	
0045-09-110			
	4	96	96
PROJECT TOTALS			
	4	96	96

SUMMARY OF PAVEMENT MARKING ITEMS

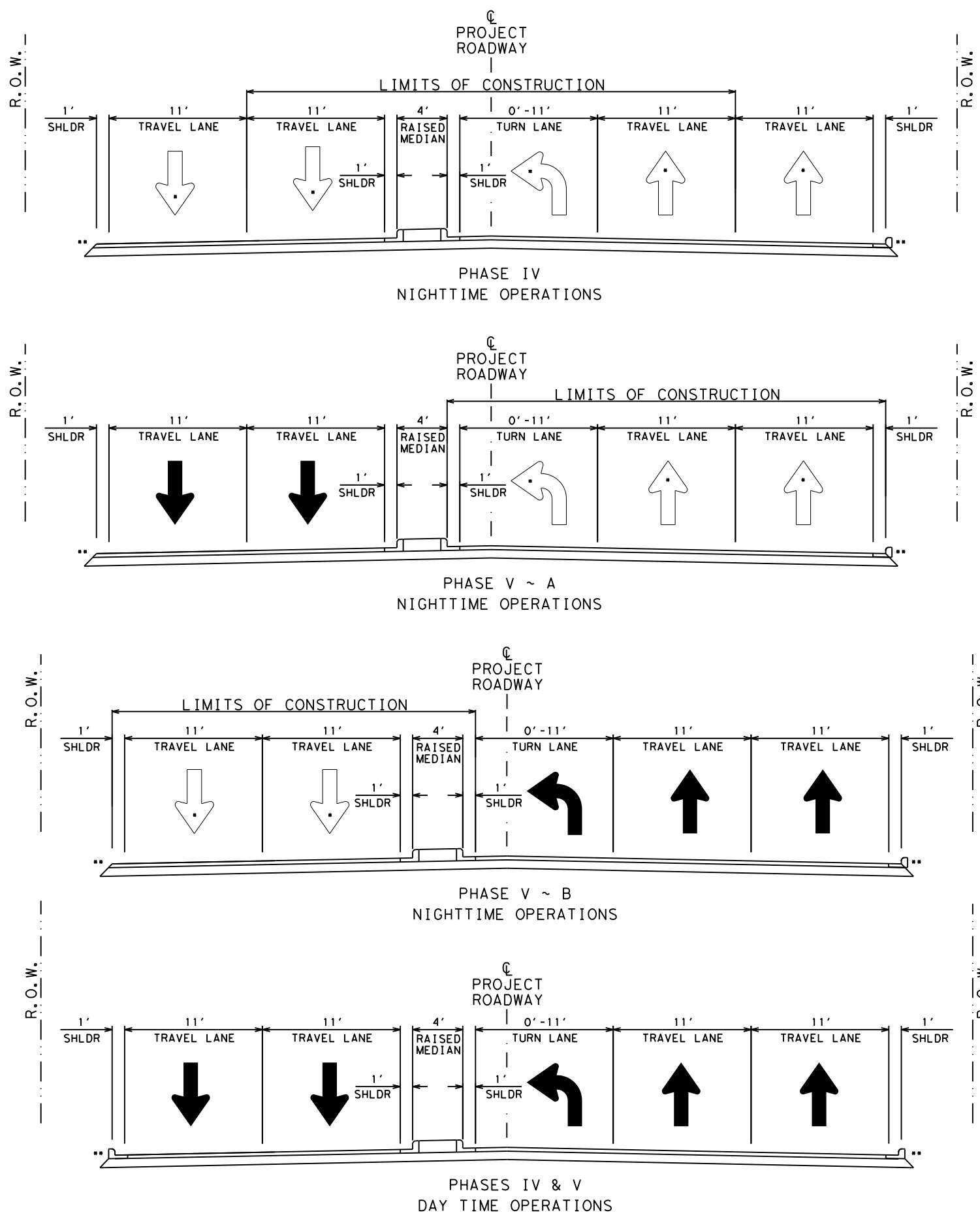
LOCATION	LENGTH (LF)	662	666	666	666	666	666	666	666	666	672	672	677
		6111	6029	6035	6047	6101	6053	6077	6320	6305	6308	6007	6010
WV ZN PAV MRK TY I (TAB) TY Y-2	REFL PAV MRK TY I (W) 8" (DO T) (090MIL)	REFL PAV MRK TY I (W) 8" (SL D) (090MIL)	REFL PAV MRK TY I (W) 24" (S LD) (090MIL)	REF PAV MRK TY I (W) 36" (YLD TRI) (090 MIL)	REFL PAV MRK TY I (W) (ARROW) (090MIL)	REFL PAV MRK TY I (W) (WORD) (090MIL)	RE PM W/RET REQ TY I (Y) 6" (SL D) (090MIL)	RE PM W/RET REQ TY I (W) 6" (BR K) (090MIL)	RE PM W/RET REQ TY I (W) 6" (SL D) (090MIL)	REFL PAV MRKR TY I-C	REFL PAV MRKR TY II-C-R	ELIM EXT PAV MRK & MRKS (24")	
EA	LF	LF	LF	EA	EA	EA	LF	LF	LF	EA	EA	LF	
CSJ: 0045-09-111													
60+55	60+95	40											60
60+95	68+50	755	1227	62	344	60		2	1	1510	378	1510	19
68+50	75+50	700	1167	109	946	60		8	5	1400	350	1400	19
75+50	77+09				150	66	12						47
CSJ TOTALS=			2394	171	1440	270	12	10	6	2910	728	2910	38
CSJ: 0045-09-110													
77+09	78+50	141	232		150	66	12	4	2	282	70	282	5
78+50	90+43	1193	1965	138	1144	125		6	6	2386	596	2386	31
90+43	98+83	840	1356	53	248	60		1	1	1680	420	1680	23
CSJ TOTALS=			3553	191	1542	251	12	11	9	4348	1086	4348	59
PROJECT TOTALS			5947	362	2982	521	24	21	15	7258	1814	7258	97
													141
													865

SUMMARY OF SIGNING ITEMS

LOCATION	644	644
	6001	6067
IN SM RD SN SUP&AM TY10BWG (1) SA (P)	IN SM RD SN SUP&AM (INST SIGN ONLY)	
EA	EA	
CSJ: 0045-09-111		
66+85	1	
70+60		1
70+95	1	
CSJ TOTALS=		
	2	1
CSJ: 0045-09-110		
92+70	1	
CSJ TOTALS=		
	1	
PROJECT TOTALS		
	3	1

US 82, ETC QUANTITY SUMMARY

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NOTES:
 * 1) ONE LANE IN EACH DIRECTION TO REMAIN OPEN FOR TRAFFIC DURING OPERATIONS
 ** 2' CURB & CUTTER INTERMITTANT THROUGHOUT ROADWAY
 MAINTAIN 1' MINIMUM SHOULDER WIDTH

Phase I ~ Initial Traffic Control

Install project limit traffic control devices (TCD) per the BC standard sheets. Utilize the applicable layout TCP (2-1)-18 and TCP (2-6a)-18 for TCP installation.

Phase II ~ Erosion Control

Install erosion control devices utilizing the applicable layout TCP (2-1)-18 or TCP (2-6a)-18.

Phase III ~ Traffic Signal Installation

Perform Traffic signal relocation construction using appropriate TCP.
 Stage signal construction to be completed at appropriate time for raised median construction.

Phase IV ~ Roadway widening and Install Curb, Gutter, and Raised median

Perform median pavement saw cutting and planing operations utilizing TCP (2-6b) MOD.
 Install doweled concrete curb for raised median utilizing TCP (2-6b) MOD.
 Install tinted and textured concrete median utilizing TCP (2-6b) MOD.
 Perform culvert work utilizing TCP (2-6a)-18.
 Perform roadway widening operations and install concrete curb and gutter for u-turn loons utilizing TCP (2-6a)-18.
 Roadway widening operations shall occur on only one side of roadway at a time

Phase V ~ Mill and Overlay roadway

Perform planing and HMAC overlay operations and install work zone pavement markings utilizing TCP(2-6)-18. Limit planing and overlay operations to a single lane with one lane open for travel.
 Prior to advancement to the next section, all backfilling and temporary seeding must be completed and the section be approved by the Engineer.
 Adhere to the Worksheet for Edge Condition Treatment Types.
 Refer to the Sequence of Work Typical Sections for construction work area and traffic flow.

Phase VI ~ Final Pavement Markings

Install final pavement markings using TCP(3-1)-13, TCP(3-2)-13, TCP(3-3)-14 or TCP(3-4)-13.

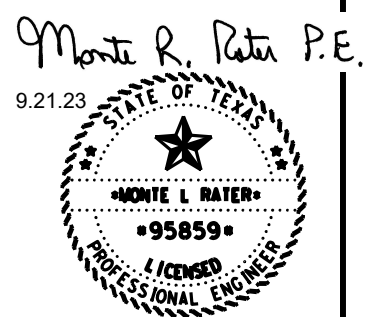
Phase VII ~ Backfill, Sign and Sodding Operations

Perform pavement backfill operations, sign installation and sodding utilizing TCP(2-1)-18, TCP(2-6a)-18, or TCP(2-6b)-18 MOD.
 Place sod within 14 days of local area construction completion.

Phase VIII ~ Project Clean Up

Remove erosion control devices, construction debris and waste material utilizing TCP (2-1)-18, TCP (2-6a)-18, and TCP (2-6b)-18 MOD.

Notes: Prior to a specific construction operation, the traffic control standard specified for the construction phase in this narrative must be evaluated thoroughly for appropriateness. All traffic control operations must adhere to the Texas Manual on Uniform Traffic Control Devices (TMUTDC) and the applicable Traffic Control Standards. Construction phase order may be varied when approved by the Engineer. Submit a Work and Traffic Control Sequence plan to the Engineer for approval. Ensure that both travel lanes are open at night. Provide access to private property and Public Roads at all times. Provide pilot car during one lane/two way traffic operations. Road closures must be approved by the Engineer.



PRELIMINARY DESIGN
 US 82
 0045-09-110, ETC
 SEQUENCE OF WORK

NOT TO SCALE
 SHEET 1 OF 1
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 Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	25	

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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

1. The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
2. The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
3. The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
4. The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
5. Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.
6. When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
7. The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
8. All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
9. The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
10. Where highway construction or maintenance work is being undertaken, other than mobile operations as defined by the Texas Manual on Uniform Traffic Control Devices, CSJ limit signs are required. CSJ limit signs are shown on BC(2). The OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits. For mobile operations, CSJ limit signs are not required.
11. Traffic control devices should be in place only while work is actually in progress or a definite need exists.
12. The Engineer has the final decision on the location of all traffic control devices.
13. Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY NOTES:

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

1. Only pre-qualified products shall be used. The "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources.
2. Work zone traffic control devices shall be compliant with the Manual for Assessing safety Hardware (MASH).

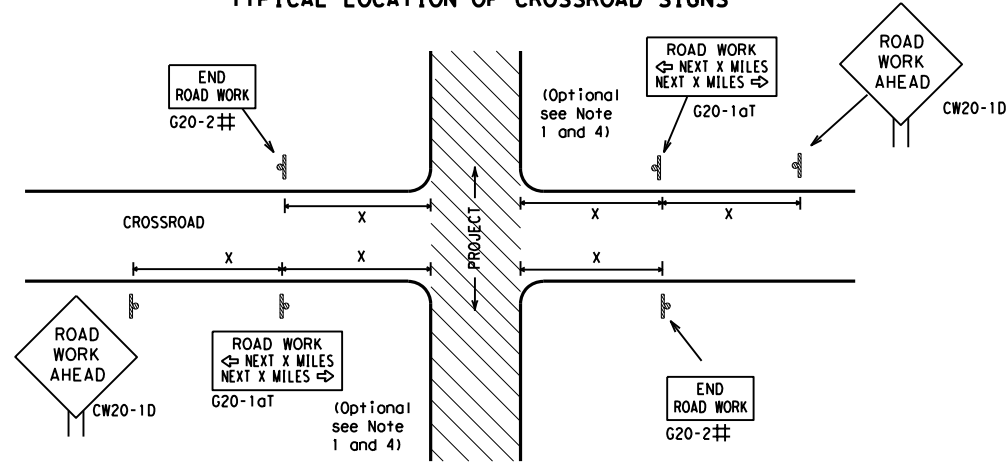
<p>THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT http://www.txdot.gov</p>
COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
MATERIAL PRODUCER LIST (MPL)
ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)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

SHEET 1 OF 12

Texas Department of Transportation		Traffic Safety Division Standard
<p>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</p> <p>BC (1) - 21</p>		
FILE:	bc-21.dgn	DN: TxDOT
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REVISIONS	CONT SECT	JOB
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9-07 8-14	DIST	COUNTY
5-10 5-21	PAR	LAMAR
HIGHWAY	SHEET NO.	11

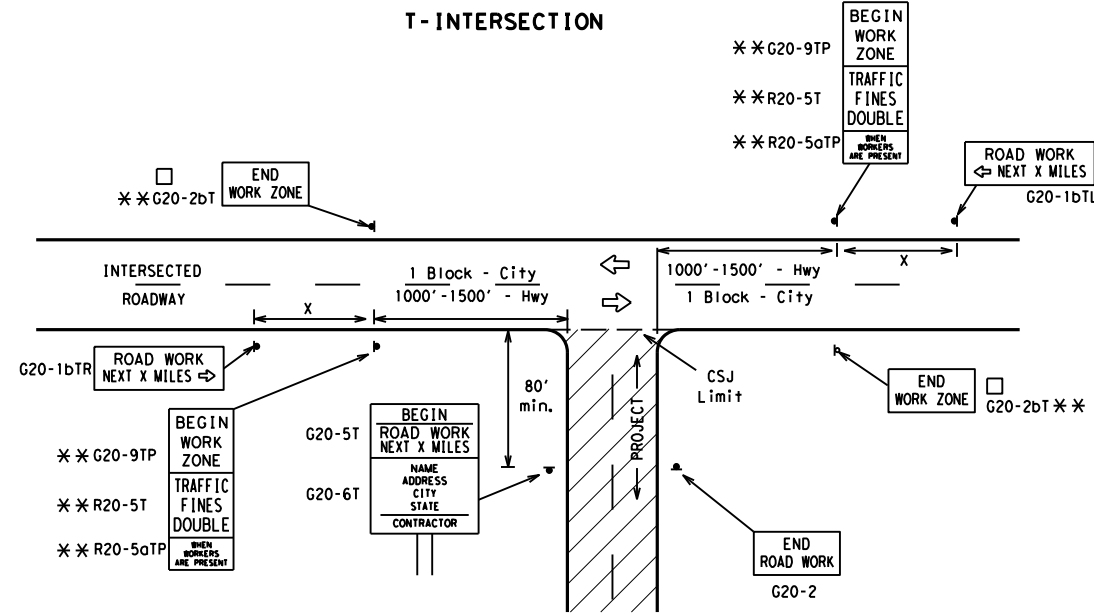
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TYPICAL LOCATION OF CROSSROAD SIGNS



- ## May be mounted on back of "ROAD WORK AHEAD" (CW20-1D) sign with approval of Engineer. (See note 2 below)
- 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.
 - The Engineer may use the reduced size 36" x 36" ROAD WORK AHEAD (CW20-1D) sign mounted back to back with the reduced size 36" x 18" "END ROAD WORK" (G20-2) sign on low volume crossroads (see Note 4 under "Typical Construction Warning Sign Size and Spacing"). See the "Standard Highway Sign Designs for Texas" manual for sign details. The Engineer may omit the advance warning signs on low volume crossroads. The Engineer will determine whether a road is low volume as per TMUTCD Part 5. This information shall be shown in the plans.
 - 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.
 - 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.
 - Additional traffic control devices may be shown elsewhere in the plans for higher volume crossroads.
 - 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

- 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.
- 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}

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Δ Spacing "x" Feet (Apprx.)
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	50	400
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 ²
			65	700 ²
			70	800 ²
			75	900 ²
			80	1000 ²
			*	* ³

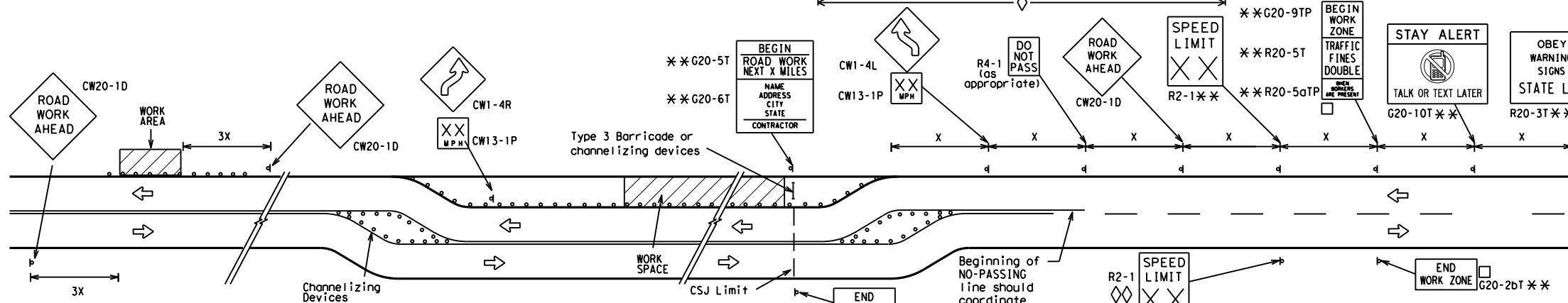
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

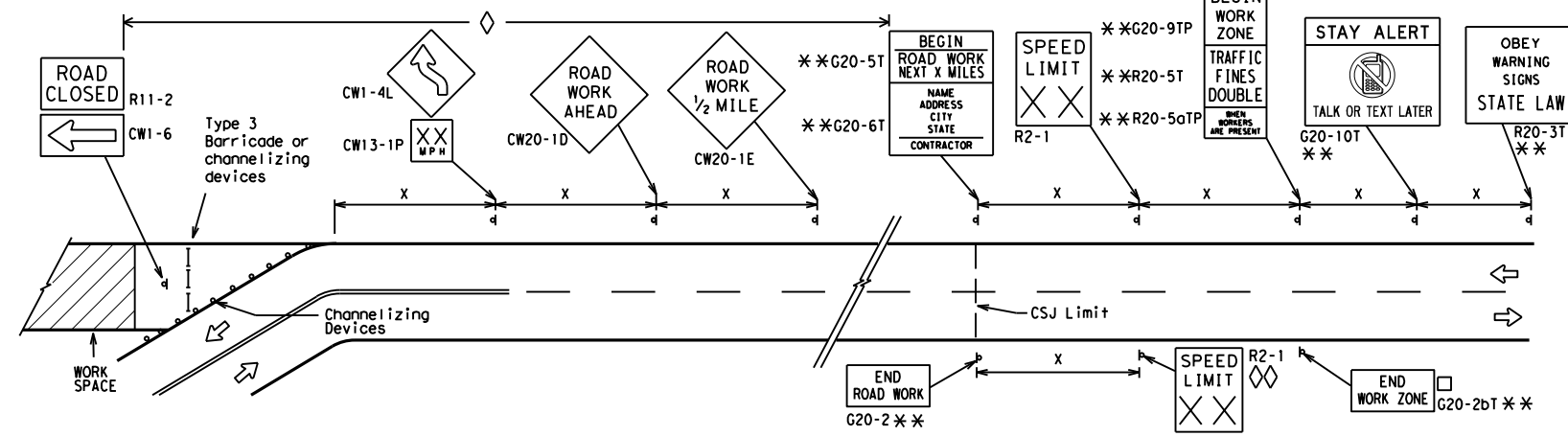
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

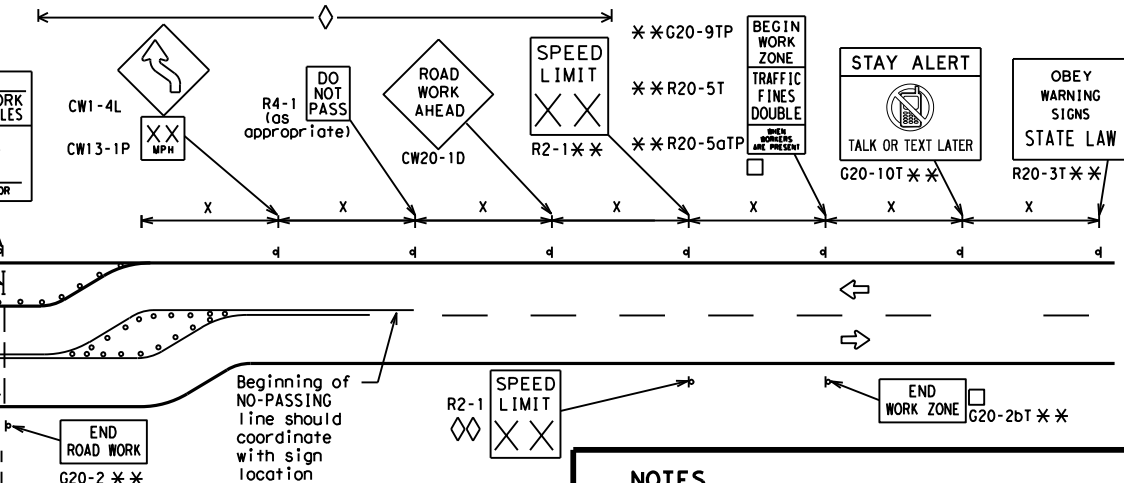


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



NOTES

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "x" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
 - CSJ limit signing is required for highway construction and maintenance work, with the exception of mobile operations.
 - Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
 - Contractor will install a regulatory speed limit sign at the end of the work zone.

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

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

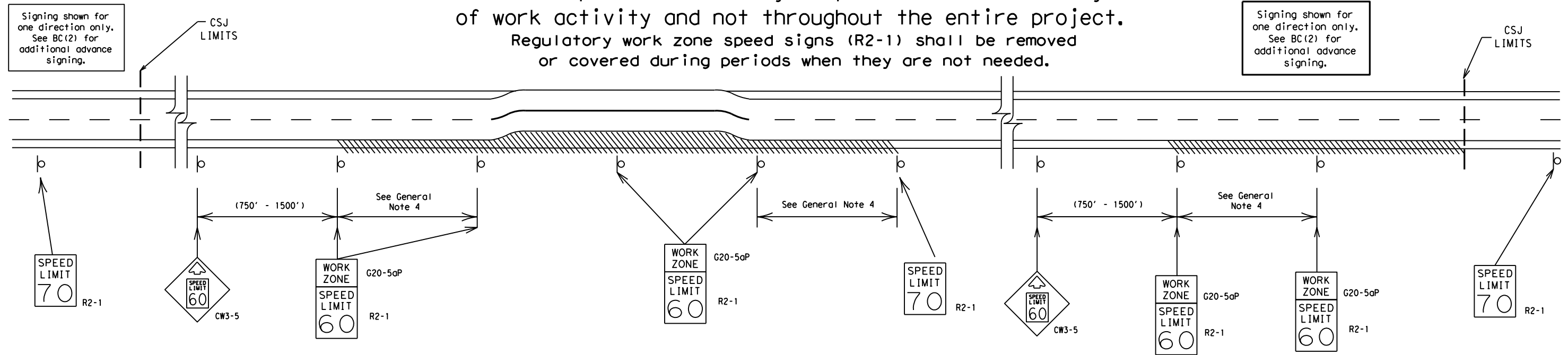
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REVISIONS	0045	09	110, ETC	US 82, ETC
9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	PAR	LAMAR	12	

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:

- rough road or damaged pavement surface
- substantial alteration of roadway geometrics (diversions)
- construction detours
- grade
- width
- other conditions readily apparent to the driver

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

- Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
- Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
- Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
- 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
- Regulatory speed limit signs shall have black legend and border on a white reflective background (See "Reflective Sheeting" on BC(4)).
- 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.
- Turning signs from view, laying signs over or down will not be allowed, unless as otherwise noted under "REMOVING OR COVERING" on BC(4).
- Techniques that may help reduce traffic speeds include but are not limited to:
 - Law enforcement.
 - Flagger stationed next to sign.
 - Portable changeable message sign (PCMS).
 - Low-power (drone) radar transmitter.
 - Speed monitor trailers or signs.
- Speeds shown on details above are for illustration only. Work Zone Speed Limits should only be posted as approved for each project.
- 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.

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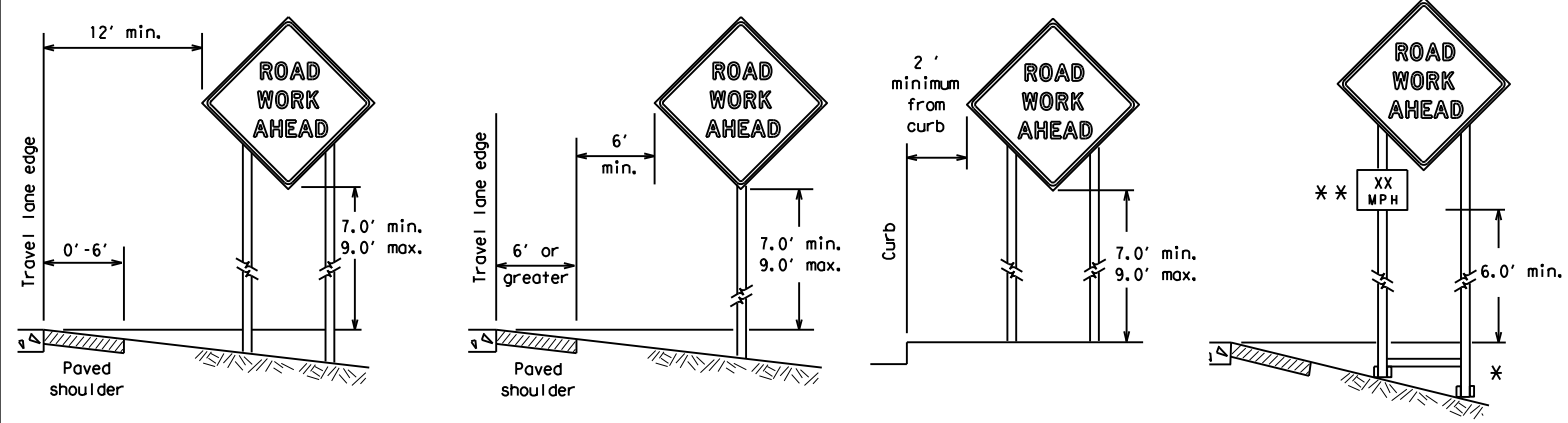
SHEET 3 OF 12

		Traffic Safety Division Standard	
<h2>BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT</h2>			
<h3>BC (3) - 21</h3>			
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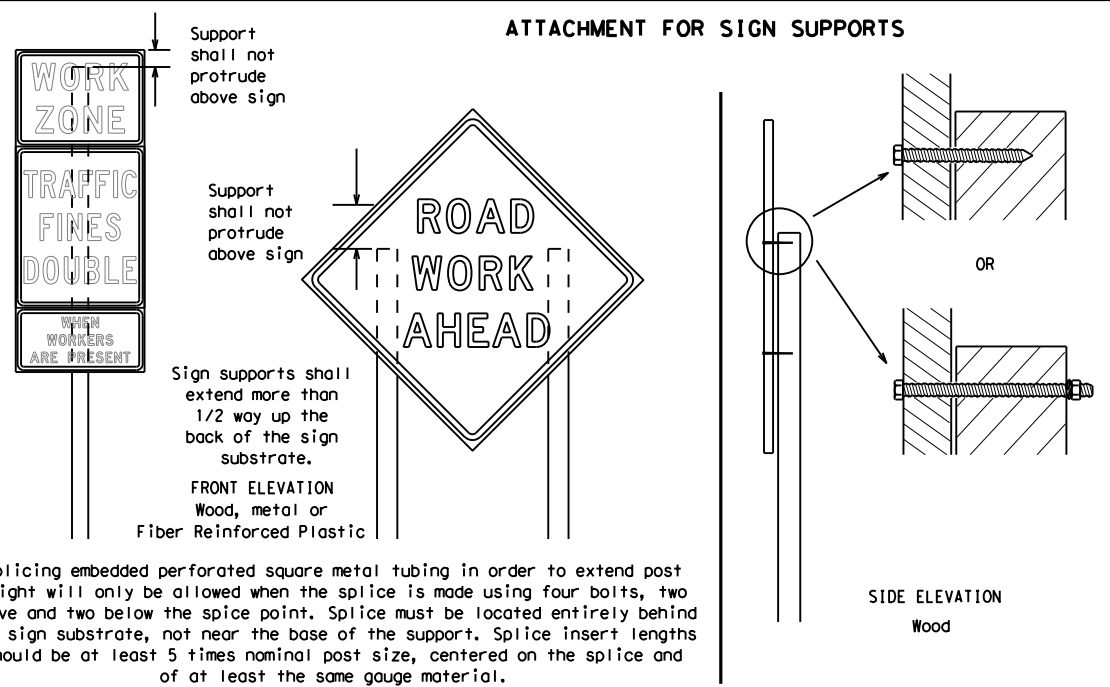
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



* 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



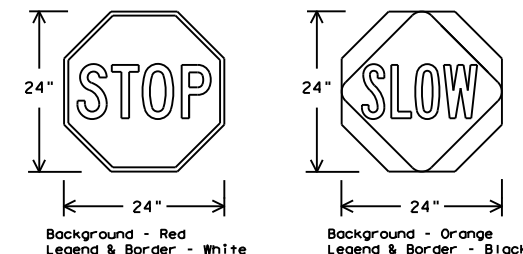
Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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



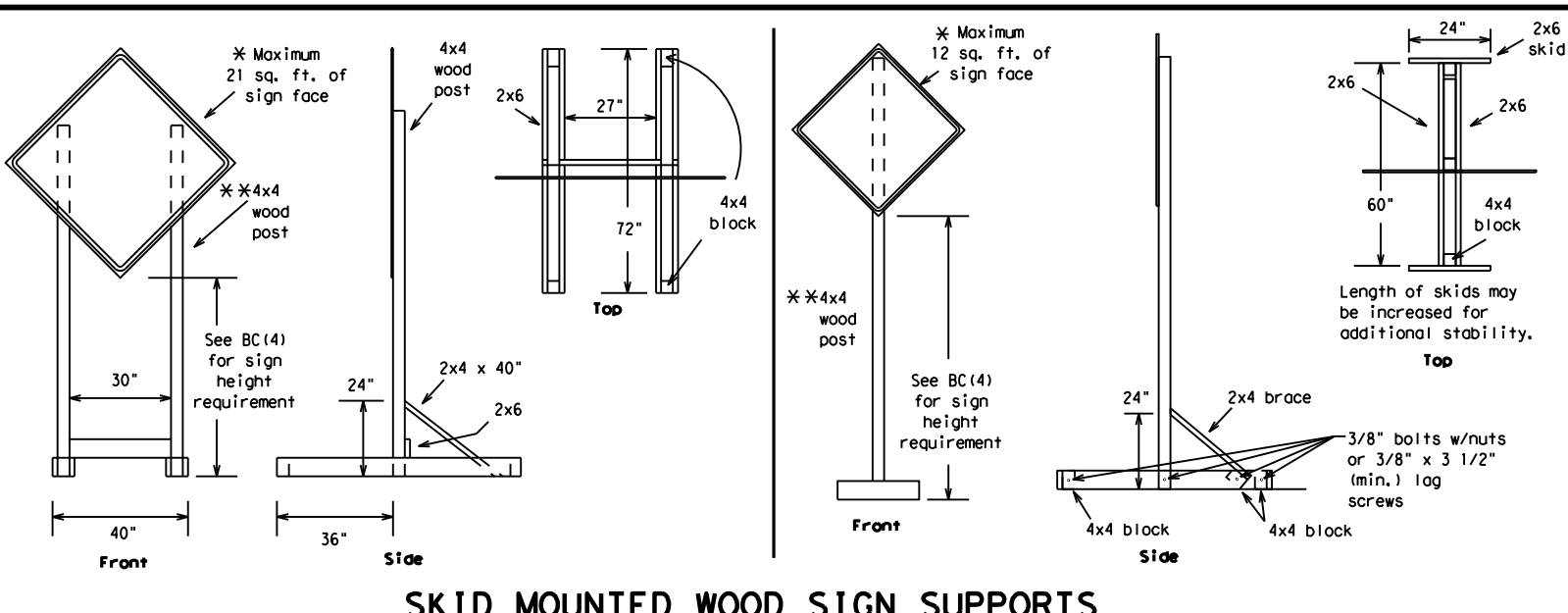
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

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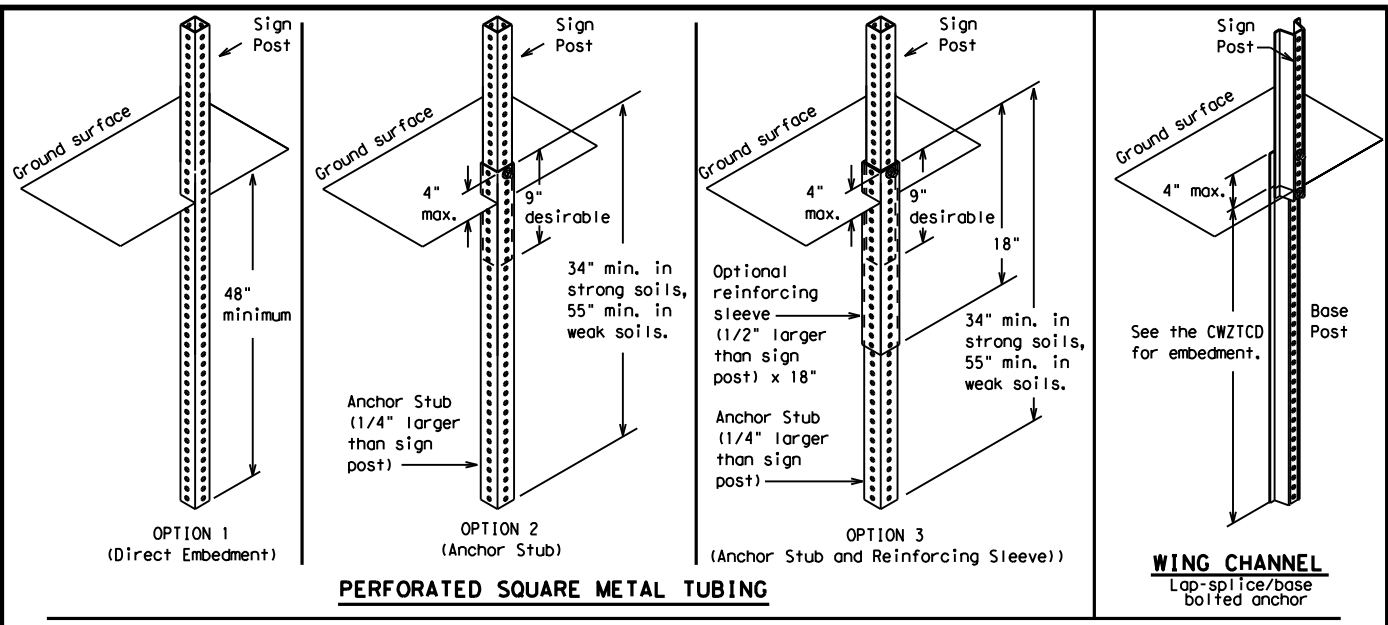
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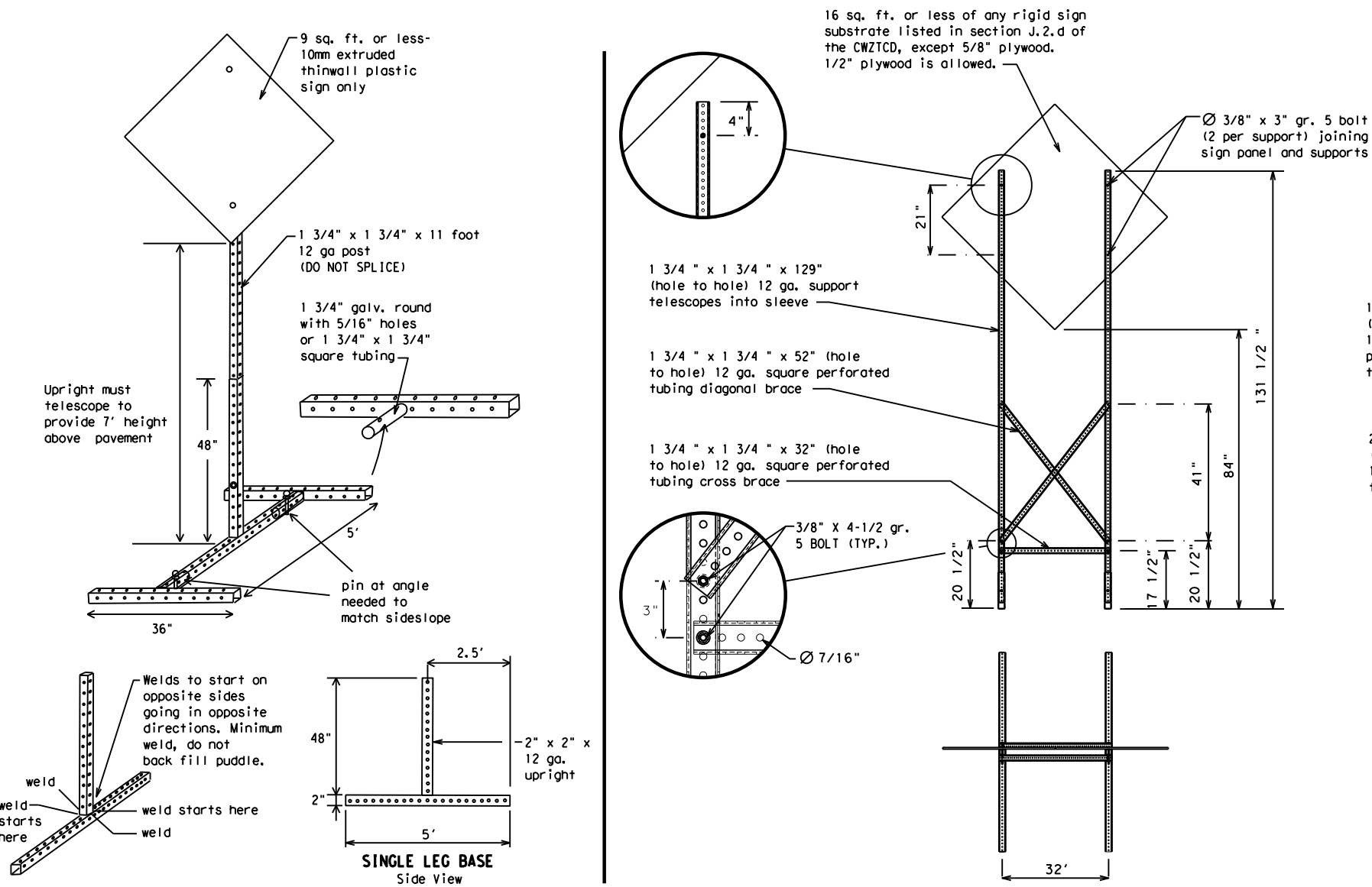
SKID MOUNTED WOOD SIGN SUPPORTS

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



GROUND MOUNTED SIGN SUPPORTS

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



SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

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

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

- GENERAL NOTES**
- 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.
 - No more than 2 sign posts shall be placed within a 7 ft. circle, except for specific materials noted on the CWZTCD List.
 - 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.

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 21

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7-13	5-21	PAR	LAMAR	15					

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

- The Engineer/Inspector shall approve all messages used on portable changeable message signs (PCMS).
- 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.
- 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.
- Use the word "EXIT" to refer to an exit ramp on a freeway; i.e., "EXIT CLOSED." Do not use the term "RAMP."
- Always use the route or interstate designation (IH, US, SH, FM) along with the number when referring to a roadway.
- When in use, the bottom of a stationary PCMS message panel should be a minimum 7 feet above the roadway, where possible.
- 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.
- 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.
- Do not "flash" messages or words included in a message. The message should be steady burn or continuous while displayed.
- 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.
- Do not use the word "Danger" in message.
- Do not display the message "LANES SHIFT LEFT" or "LANES SHIFT RIGHT" on a PCMS. Drivers do not understand the message.
- Do not display messages that scroll horizontally or vertically across the face of the sign.
- 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.
- 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.
- Each line of text should be centered on the message board rather than left or right justified.
- 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.

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
XXXXXXXX TO XXXXXX
US XXX TO FM XXXX

Warning List

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

** Advance Notice List

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

- Only 1 or 2 phases are to be used on a PCMS.
- The 1st phase (or both) should be selected from the "Road/Lane/Ramp Closure List" and the "Other Condition List".
- A 2nd phase can be selected from the "Action to Take/Effect on Travel, Location, General Warning, or Advance Notice Phase Lists".
- A Location Phase is necessary only if a distance or location is not included in the first phase selected.
- 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.
- 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

- The words RIGHT, LEFT and ALL can be interchanged as appropriate.
- Roadway designations IH, US, SH, FM and LP can be interchanged as appropriate.
- EAST, WEST, NORTH and SOUTH (or abbreviations E, W, N and S) can be interchanged as appropriate.
- Highway names and numbers replaced as appropriate.
- ROAD, HIGHWAY and FREEWAY can be interchanged as needed.
- AHEAD may be used instead of distances if necessary.
- FT and MI, MILE and MILES interchanged as appropriate.
- AT, BEFORE and PAST interchanged as needed.
- 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

- 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.
- 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.
- 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.
- 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.

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WORD OR PHRASE	ABBREVIATION	WORD OR PHRASE	ABBREVIATION
Access Road	ACCS RD	Major	MAJ
Alternate	ALT	Miles	MI
Avenue	AVE	Miles Per Hour	MPH
Best Route	BEST RTE	Minor	MNR
Boulevard	BLVD	Monday	MON
Bridge	BRDG	Normal	NORM
Canal	CANT	North	N
Center	CTR	Northbound	(route) N
Construction Ahead	CONST AHD	Parking	PKING
CROSSING	XING	Road	RD
Detour Route	DETOUR RTE	Right Lane	RT LN
Do Not	DONT	Saturday	SAT
East	E	Service Road	SERV RD
Eastbound	(route) E	Shoulder	SHLDR
Emergency	EMER	Slippery	SLIP
Emergency Vehicle	EMER VEH	South	S
Entrance, Enter	ENT	Southbound	(route) S
Express Lane	EXP LN	Speed	SPD
Expressway	EXPWY	Street	ST
XXXX Feet	XXXX FT	Sunday	SUN
Fog Ahead	FOG AHD	Telephone	PHONE
Freeway	FRWY, FWY	Temporary	TEMP
Freeway Blocked	FWY BLKD	Thursday	THURS
Friday	FRI	To Downtown	TO DWNTN
Hazardous Driving	HAZ DRIVING	Traffic	TRAF
Hazardous Material	HAZMAT	Travelers	TRVLR
High Occupancy Vehicle	HOV	Tuesday	TUES
Highway	HWY	Time Minutes	TIME MIN
Hour(s)	HR, HRS	Upper Level	UPR LEVEL
Information	INFO	Vehicles (s)	VEH, VEHS
It Is	ITS	Warning	WARN
Junction	JCT	Wednesday	WED
Left	LFT	Weight Limit	WT LIMIT
Left Lane	LFT LN	West	W
Lane Closed	LN CLOSED	Westbound	(route) W
Lower Level	LWR LEVEL	Wet Pavement	WET PVMT
Maintenance	MAINT	Will Not	WONT

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

Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

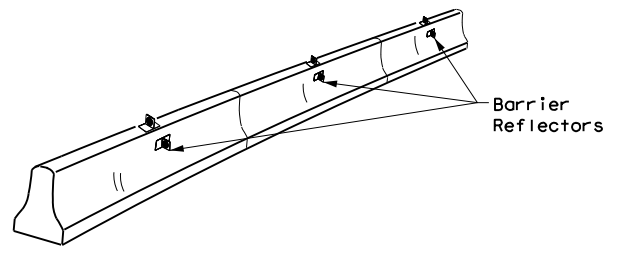
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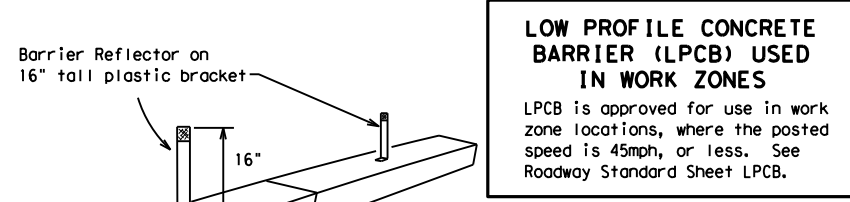
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



CONCRETE TRAFFIC BARRIER (CTB)

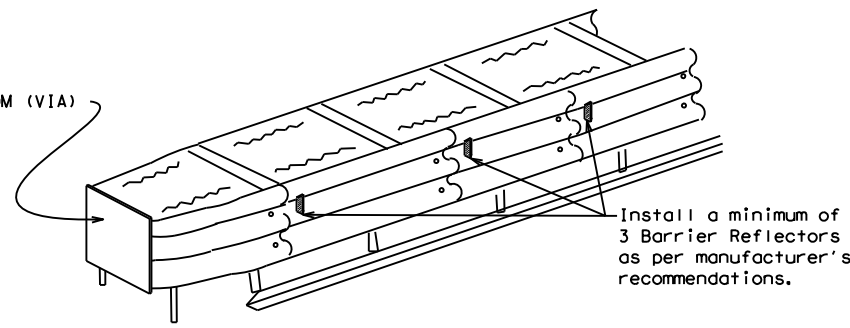
- Where traffic is on one side of the CTB, two (2) Barrier Reflectors shall be mounted in approximately the midsection of each section of CTB. An alternate mounting location is uniformly spaced at one end of each CTB. This will allow for attachment of a barrier grapple without damaging the reflector.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



LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

LOW PROFILE CONCRETE BARRIER (LPCB)



DELINEATION OF END TREATMENTS

END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

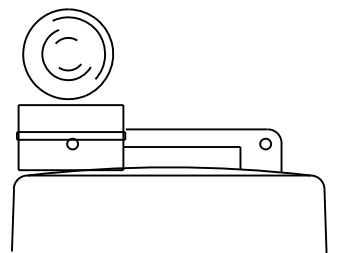
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet 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.
- 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".
- The Engineer/Inspector or the plans shall specify the location and type of warning lights to be installed on the traffic control devices.
- 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.
- 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.
- The location of warning lights and warning reflectors on drums shall be as shown elsewhere in the plans.

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

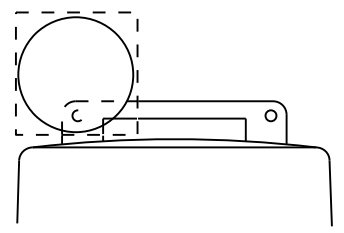
- Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
- Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
- A series of sequential flashing warning lights placed on channelizing 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.
- 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.
- Type A, Type C and Type D warning lights shall be installed at locations as detailed on other sheets in the plans.
- Warning lights shall not be installed on a drum that has a sign, chevron or vertical panel.
- 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

- 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.
- 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.
- The warning reflector shall have a minimum retroreflective surface area (one-side) of 30 square inches.
- Round reflectors shall be fully reflectorized, including the area where attached to the drum.
- 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.
- 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.
- When used near two-way traffic, both sides of the warning reflector shall be reflectorized.
- The warning reflector should be mounted on the side of the handle nearest approaching traffic.
- The maximum spacing for warning reflectors should be identical to the channelizing device spacing requirements.



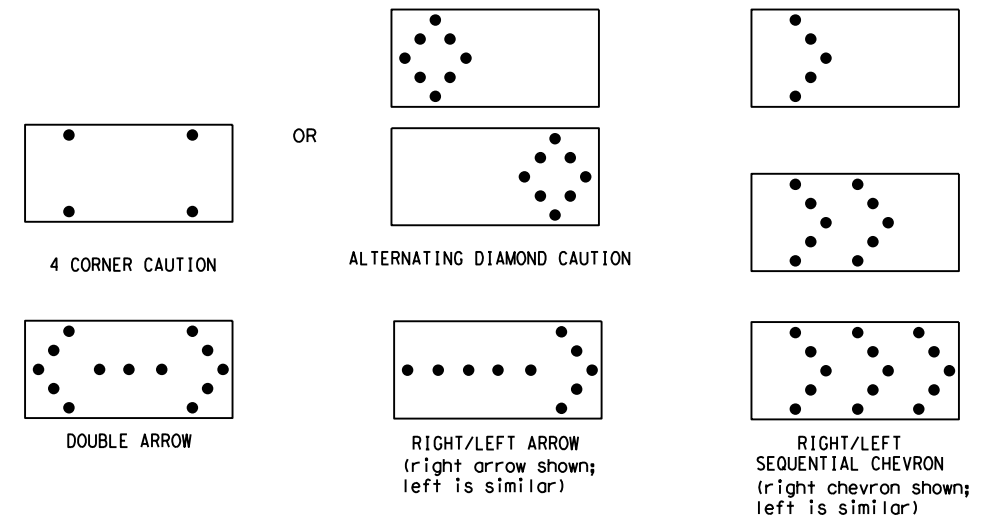
Type C Warning Light or approved substitute mounted on a drum adjacent to the travel way.



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

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.

- 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.
- 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.
- 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.
- The Flashing Arrow Board should be able to display the following symbols:



- The "CAUTION" display consists of four corner lamps flashing simultaneously, or the Alternating Diamond Caution mode as shown.
- The straight line caution display is NOT ALLOWED.
- 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.
- 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.
- The sequential arrow display is NOT ALLOWED.
- The flashing arrow display is the TxDOT standard; however, the sequential chevron display may be used during daylight operations.
- The Flashing Arrow Board shall be mounted on a vehicle, trailer or other suitable support.
- A Flashing Arrow Board SHALL NOT BE USED to laterally shift traffic.
- 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.
- 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

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

- Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the Manual for Assessing Safety Hardware (MASH).
- Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
- Refer to the CWZTCD for a list of approved TMAs.
- TMAs are required on freeways unless otherwise noted in the plans.
- 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.
- The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

Texas Department of Transportation
 Traffic Safety Division Standard

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

BC (7) - 21

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9-07 8-14	DIST	COUNTY	SHEET NO.	
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GENERAL NOTES

- For long term stationary work zones on freeways, drums shall be used as the primary channelizing device.
- 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.
- 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.
- 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).
- 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.
- 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:

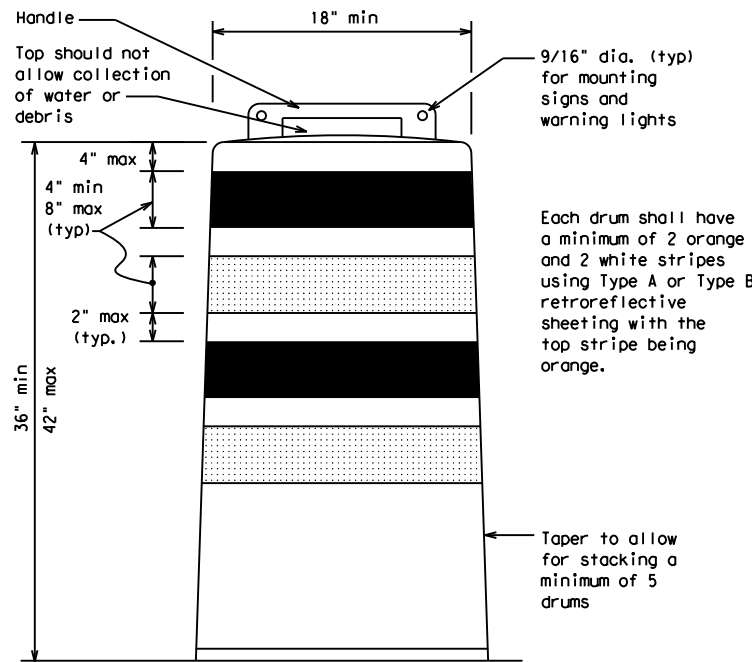
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents accidental separation due to normal handling and/or air turbulence created by passing vehicles.
- 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.
- 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.
- 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.
- 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.
- 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.
- Plastic drums shall be constructed of ultra-violet stabilized, orange, high-density polyethylene (HDPE) or other approved material.
- Drum body shall have a maximum unballasted weight of 11 lbs.
- Drum and base shall be marked with manufacturer's name and model number.

RETROREFLECTIVE SHEETING

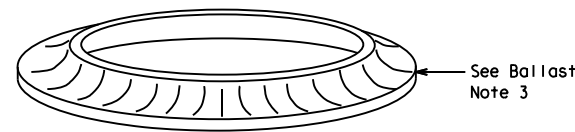
- The stripes used on drums shall be constructed of sheeting meeting the color and retroreflectivity requirements of Departmental Materials Specification DMS-8300, "Sign Face Materials." Type A or Type B reflective sheeting shall be supplied unless otherwise specified in the plans.
- The sheeting shall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

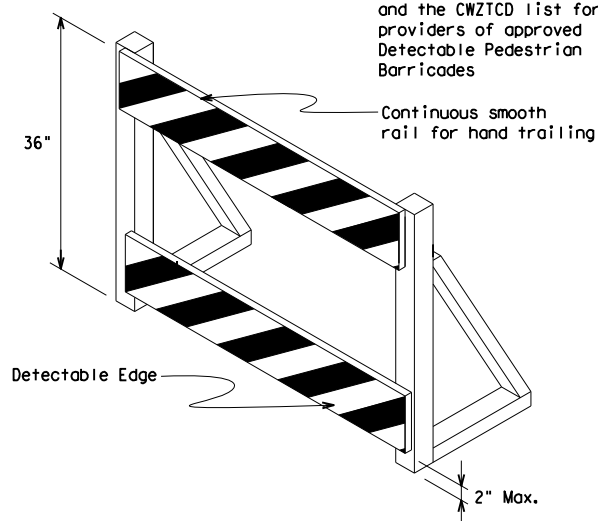
- Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other 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.
- 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.
- Recycled truck tire sidewalls may be used for ballast on drums approved for this type of ballast on the CWZTCD list.
- 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.
- 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.
- Ballast shall not be placed on top of drums.
- Adhesives may be used to secure base of drums to pavement.



Each drum shall have a minimum of 2 orange and 2 white stripes using Type A or Type B retroreflective sheeting with the top stripe being orange.

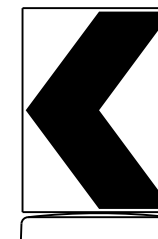


This detail is not intended for fabrication. See note 3 and the CWZTCD list for providers of approved Detectable Pedestrian Barricades

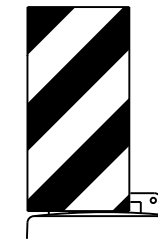


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- 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.
- Vertical Panels shall be manufactured with orange and white sheeting meeting the requirements of DMS-8300 Type A or Type B. Diagonal stripes on Vertical Panels shall slope down toward the intended traveled lane.
- 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.
- Signs shall be installed using a 1/2 inch bolt (nominal) and nut, two washers, and one locking washer for each connection.
- Mounting bolts and nuts shall be fully engaged and adequately torqued. Bolts should not extend more than 1/2 inch beyond nuts.
- 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.
- R9-9, R9-10, R9-11 and R9-11a Sidewalk Closed signs which are 24 inches wide may be mounted on plastic drums, with approval of the Engineer.

SHEET 8 OF 12



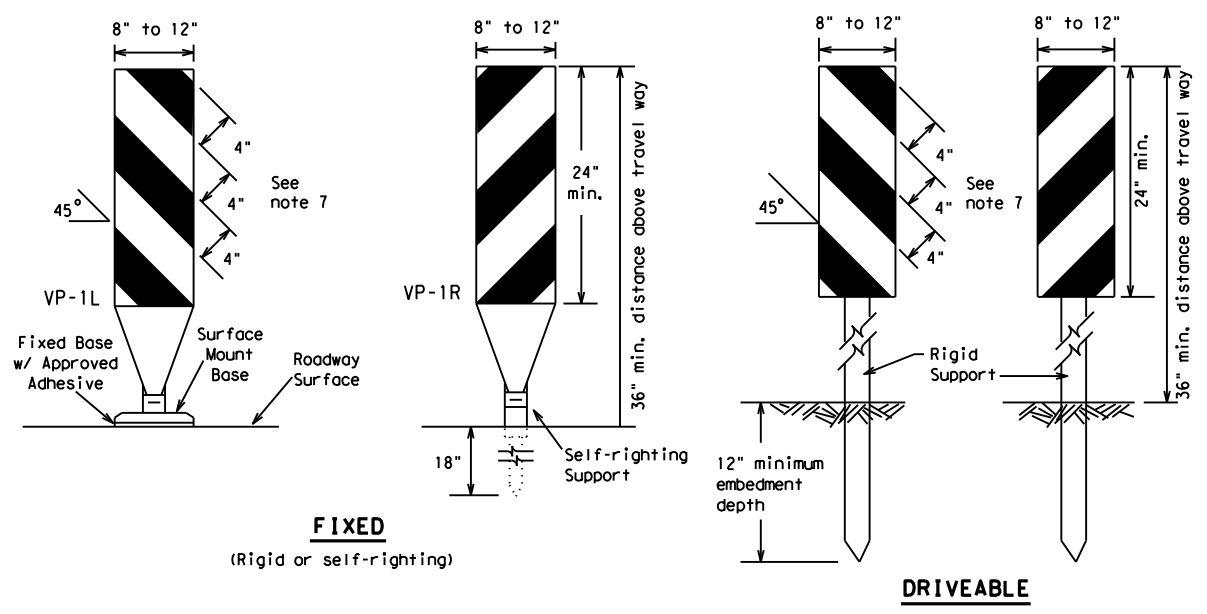
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (8) - 21

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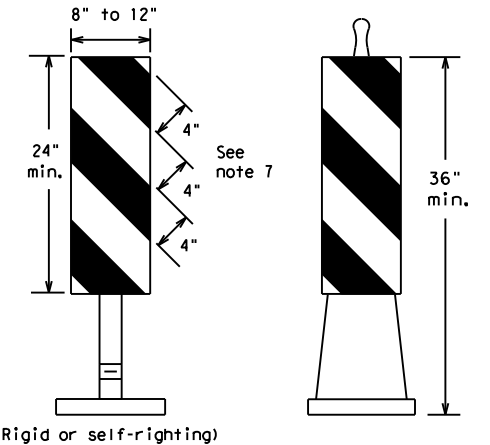
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FIXED
(Rigid or self-righting)

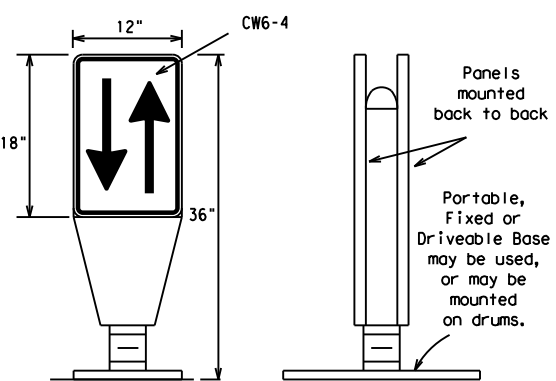
DRIVEABLE



PORTABLE

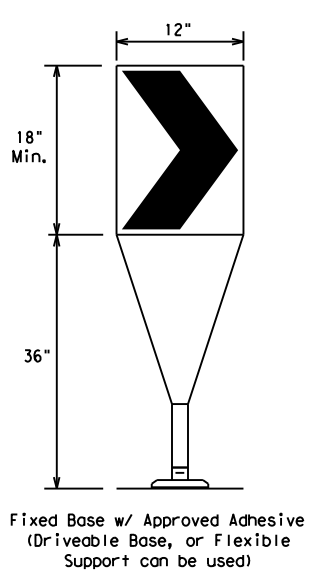
VERTICAL PANELS (VPs)

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



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

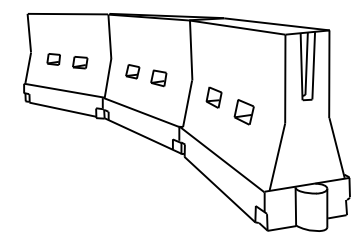
- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base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



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

- The chevron shall be a vertical rectangle with a minimum size of 12 by 18 inches.
- 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.
- 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.
- To be effective, the chevron should be visible for at least 500 feet.
- 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.
- 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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

- 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.
- LCDs may be used instead of a line of cones or drums.
- LCDs shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
- LCDs should not be used to provide positive protection for obstacles, pedestrians or workers.
- LCDs shall be supplemented with retroreflective delineation as required for temporary barriers on BC(7) when placed roughly parallel to the travel lanes.
- LCDs used as barricades placed perpendicular to traffic should have at least one row of reflective sheeting meeting the requirements for barricade rails as shown on BC(10). Place reflective sheeting near the top of the LCD along the full length of the device.

WATER BALLASTED SYSTEMS USED AS BARRIERS

- Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate Manual for Assessing Safety Hardware (MASH) crashworthiness requirements based on roadway speed and barrier application.
- 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.
- 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.
- 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.
- 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

GENERAL NOTES

- 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).
- 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.
- 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).
- 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.
- Portable bases shall be fabricated from virgin and/or recycled rubber. The portable bases shall weigh a minimum of 30 lbs.
- 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.
- 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.

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) - 21

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9-07 8-14	DIST	COUNTY	SHEET NO.	
7-13 5-21	PAR	LAMAR	19	

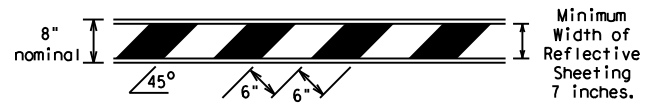
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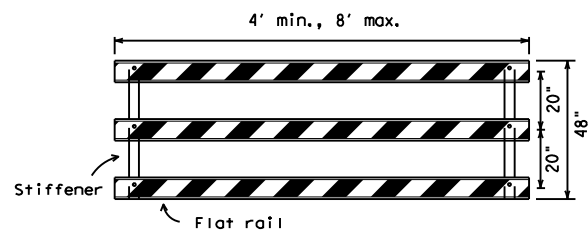
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



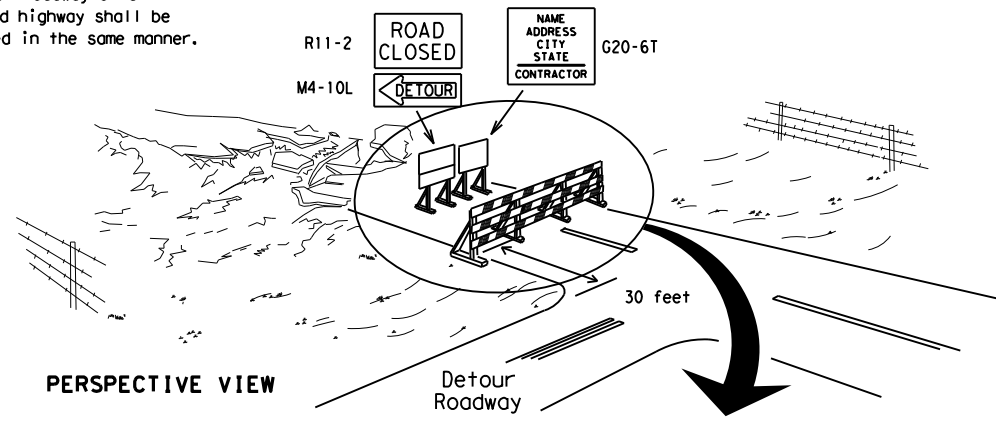
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

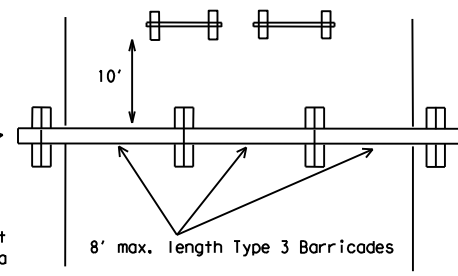
TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

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



PERSPECTIVE VIEW

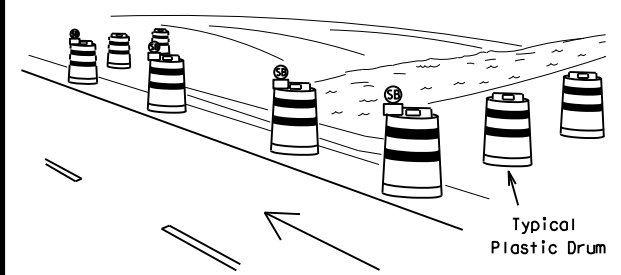
The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic. Barricade striping should slant downward in the direction of detour.



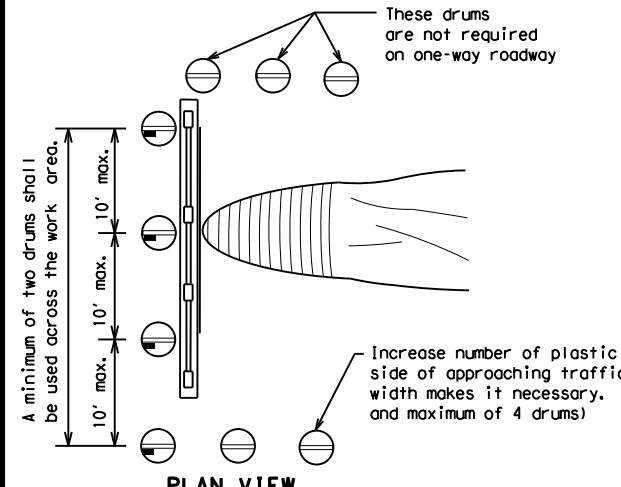
PLAN VIEW

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

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

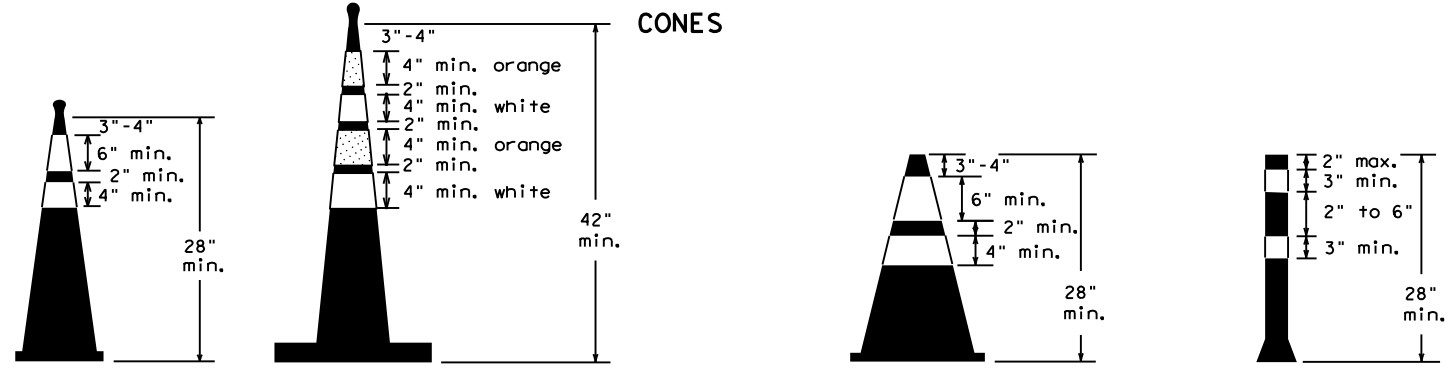


PLAN VIEW

CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS

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

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



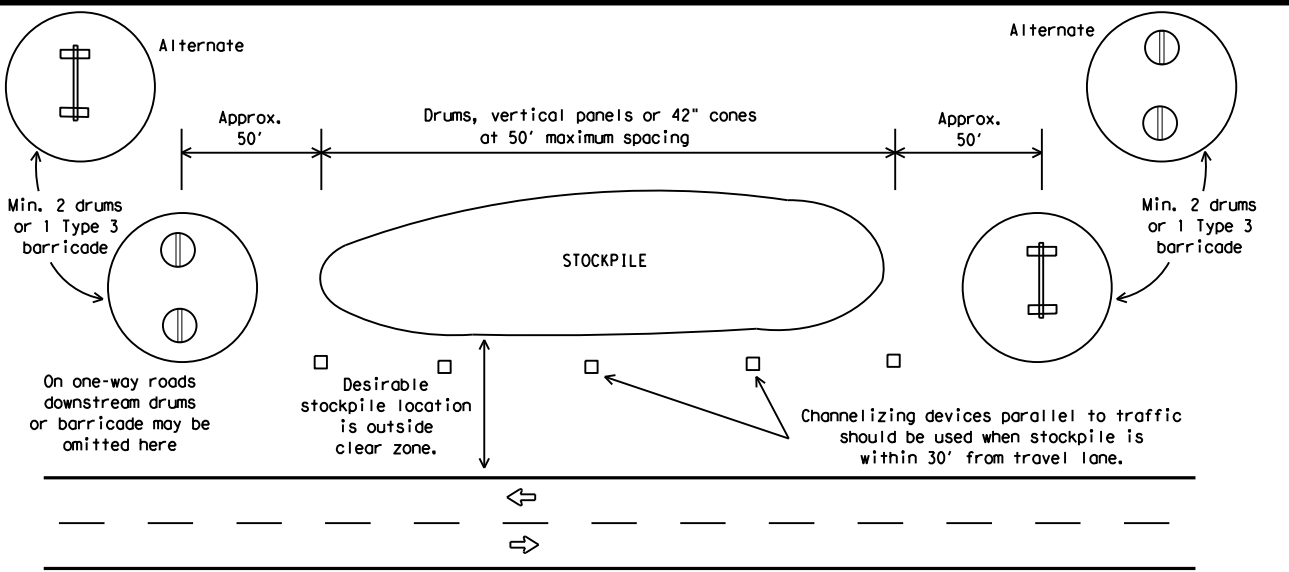
Two-Piece cones

One-Piece cones

Tubular Marker

28" Cones shall have a minimum weight of 9 1/2 lbs.
 42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (10) - 21

FILE:	bc-21.dgn	DN:	TxDOT	CK:	TxDOT	OW:	TxDOT	CR:	TxDOT
© TxDOT	November 2002	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0045	09	110, ETC	US 82, ETC				
9-07	8-14	DIST	COUNTY	SHEET NO.					
7-13	5-21	PAR	LAMAR	20					

WORK ZONE PAVEMENT MARKINGS

GENERAL

- 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.
- Color, patterns and dimensions shall be in conformance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- Additional supplemental pavement marking details may be found in the plans or specifications.
- Pavement markings shall be installed in accordance with the TMUTCD and as shown on the plans.
- 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).
- 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.
- All work zone pavement markings shall be installed in accordance with Item 662, "Work Zone Pavement Markings."

RAISED PAVEMENT MARKERS

- Raised pavement markers are to be placed according to the patterns on BC(12).
- 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

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

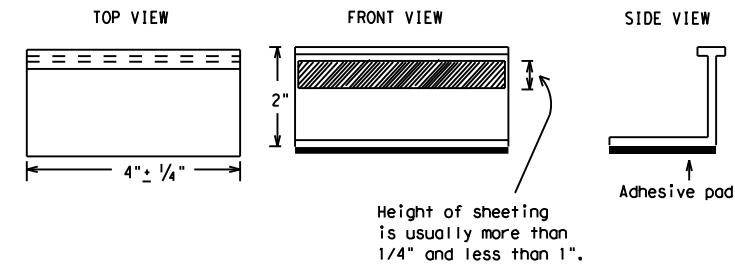
MAINTAINING WORK ZONE PAVEMENT MARKINGS

- The Contractor will be responsible for maintaining work zone pavement markings within the work limits.
- 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.
- 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.
- 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

- 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.
- 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.
- 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".
- The removal of pavement markings may require resurfacing or seal coating portions of the roadway as described in Item 677.
- Subject to the approval of the Engineer, any method that proves to be successful on a particular type pavement may be used.
- Blast cleaning may be used but will not be required unless specifically shown in the plans.
- Over-painting of the markings SHALL NOT BE permitted.
- Removal of raised pavement markers shall be as directed by the Engineer.
- 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.
- 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**

- Temporary flexible-reflective roadway marker tabs used as guidemarks shall meet the requirements of DMS-8242.
- 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.
 - 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.
 - 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.
- Small design variances may be noted between tab manufacturers.
- 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

- Raised pavement markers used as guidemarks shall be from the approved product list, and meet the requirements of DMS-4200.
- All temporary construction raised pavement markers provided on a project shall be of the same manufacturer.
- 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).

SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-21

FILE: bc-21.dgn	DN: TxDOT	CR: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT February 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS		0045	09	110, ETC
2-98	9-07	5-21		
1-02	7-13			
11-02	8-14			
	DIST	COUNTY		SHEET NO.
	PAR	LAMAR		21

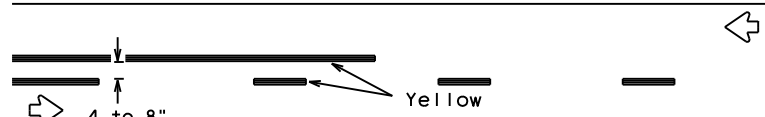
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PAVEMENT MARKING PATTERNS

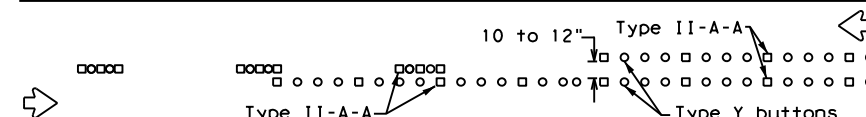


REFLECTORIZED PAVEMENT MARKINGS - PATTERN A

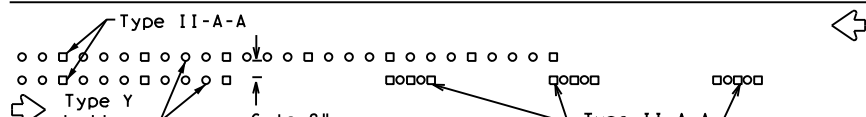


REFLECTORIZED PAVEMENT MARKINGS - PATTERN B

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.

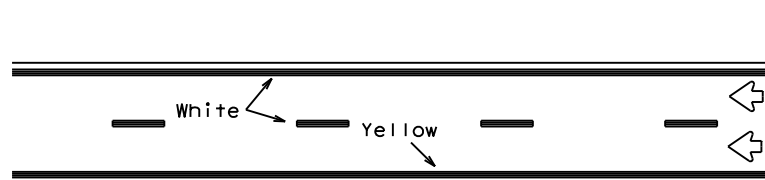


RAISED PAVEMENT MARKERS - PATTERN A



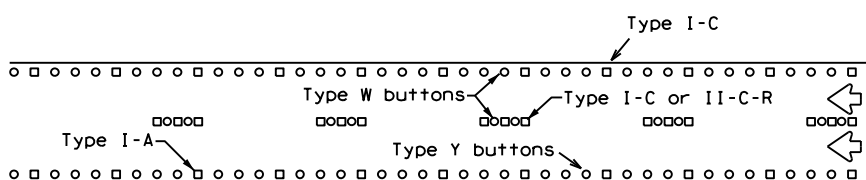
RAISED PAVEMENT MARKERS - PATTERN B

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



REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



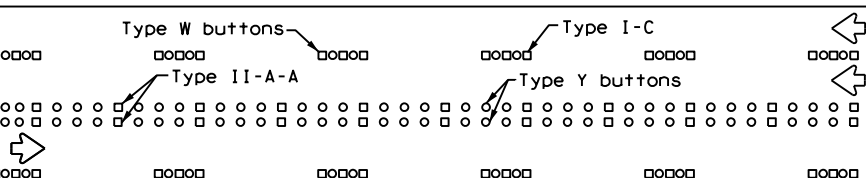
RAISED PAVEMENT MARKERS

EDGE & LANE LINES FOR DIVIDED HIGHWAY



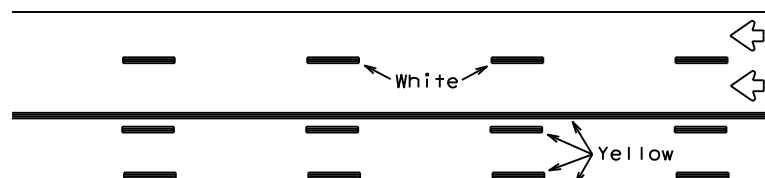
REFLECTORIZED PAVEMENT MARKINGS

Prefabricated markings may be substituted for reflectORIZED pavement markings.



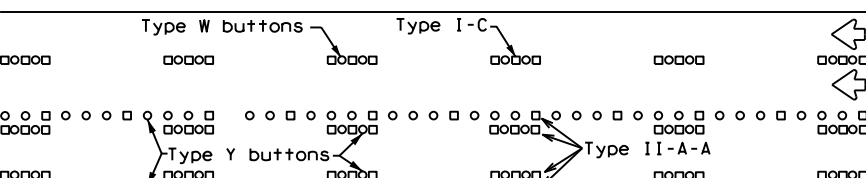
RAISED PAVEMENT MARKERS

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS

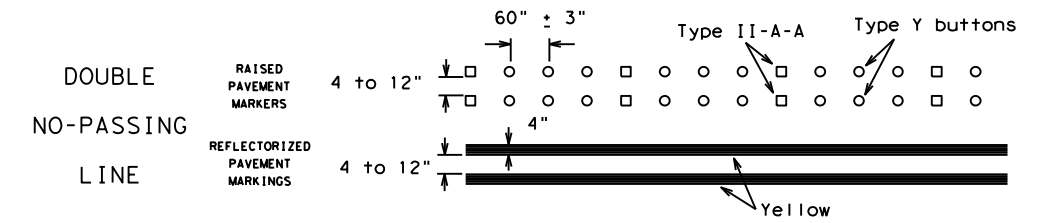
Prefabricated markings may be substituted for reflectORIZED pavement markings.



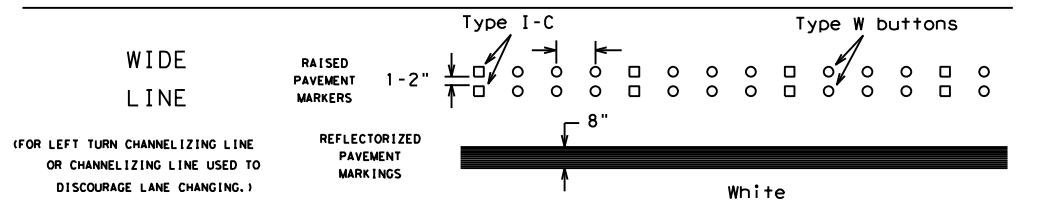
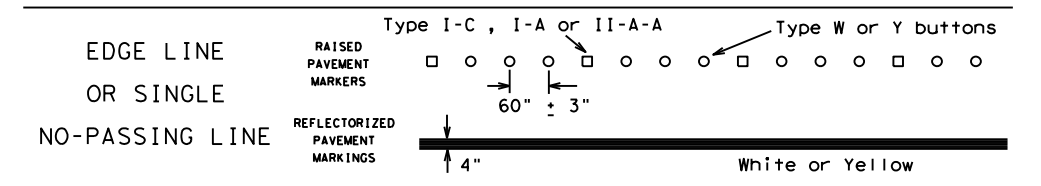
RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

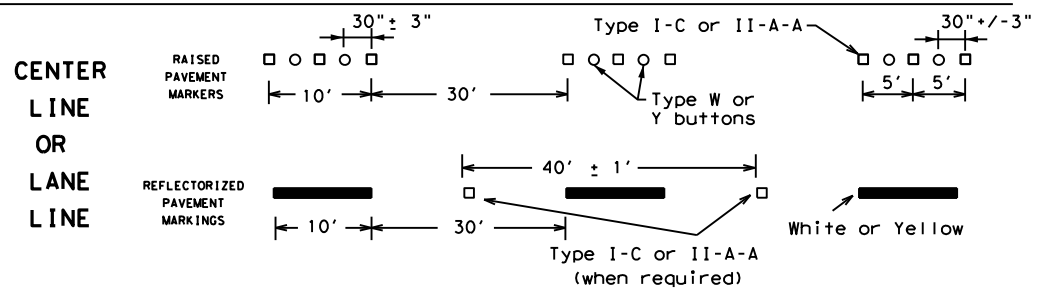
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



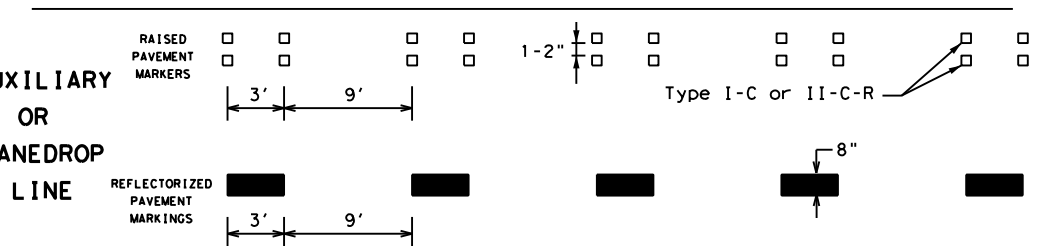
SOLID LINES



BROKEN LINES

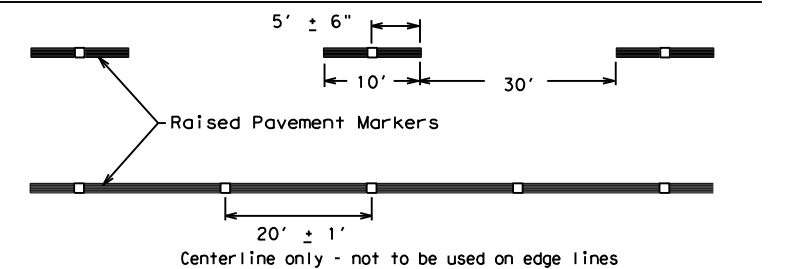


AUXILIARY OR LANEDROP LINE



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.



SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-21

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."

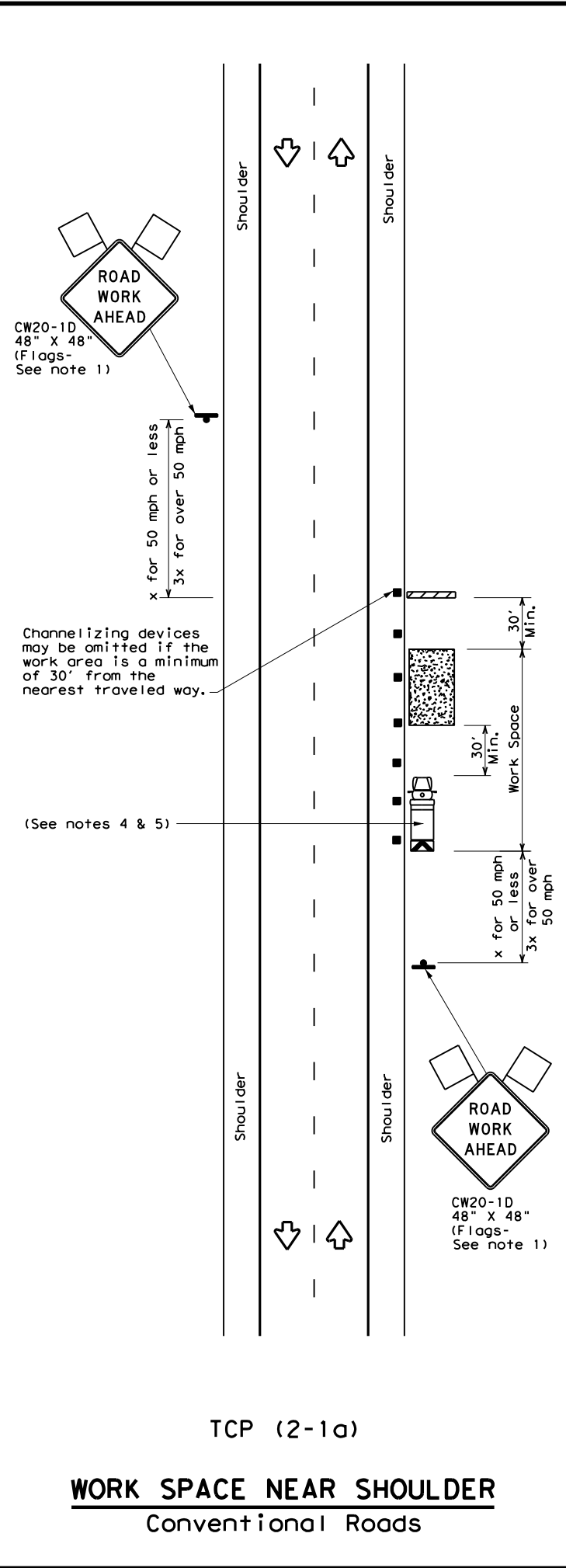
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1-97 9-07 5-21	DIST	COUNTY	SHEET NO.	
2-98 7-13	PAR	LAMAR	22	
11-02 8-14				

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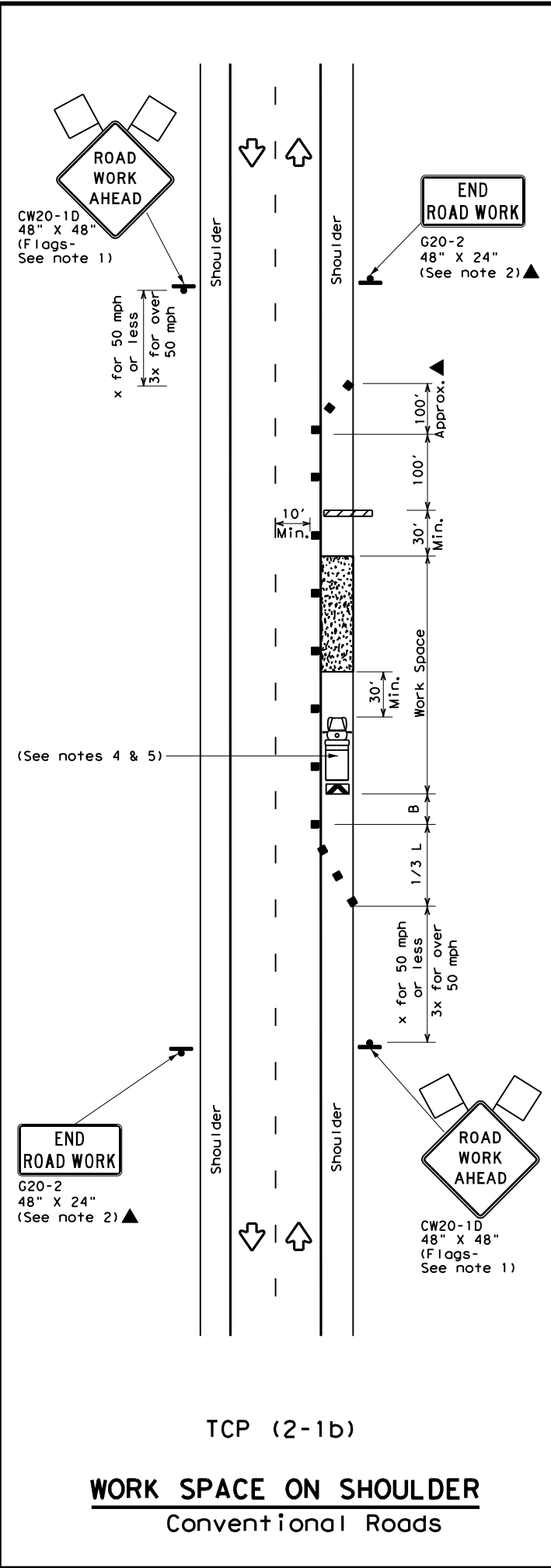
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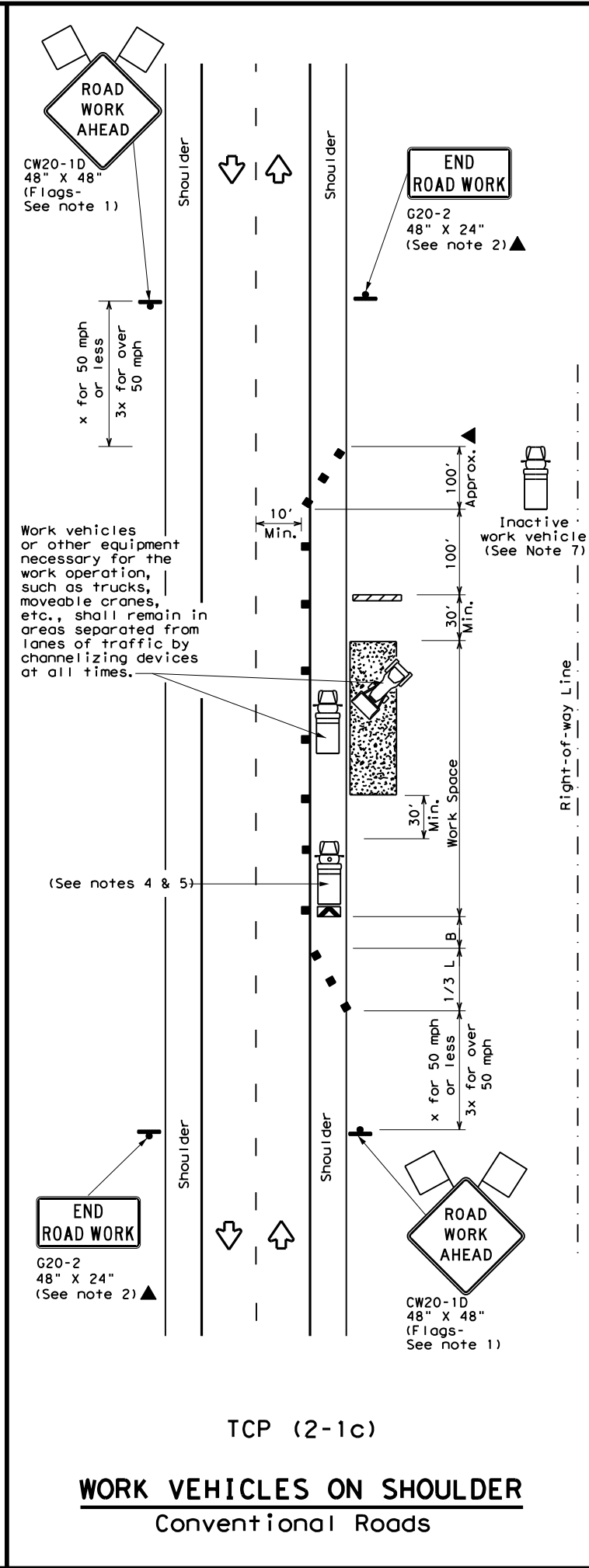
TCP (2-1a)

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		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
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**
- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - Stockpiled material should be placed a minimum of 30 feet from nearest traveled way.
 - 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.
 - Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.
 - See TCP(5-1) for shoulder work on divided highways, expressways and freeways.
 - Additional work vehicles or other equipment should be parked near the right-of-way line and not parked on the paved shoulder.
 - CW21-5 "SHOULDER WORK" signs may be used in place of CW20-1D "ROAD WORK AHEAD" signs for shoulder work on conventional roadways.



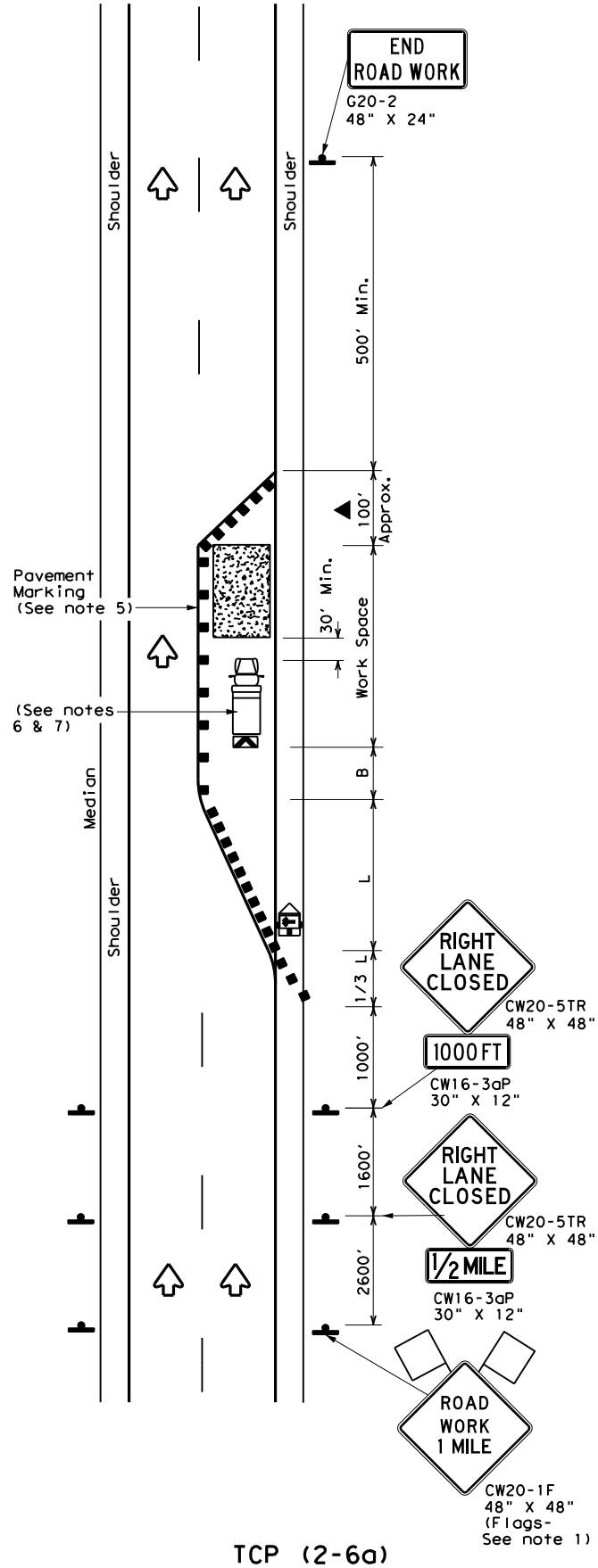
TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

TCP (2-1) - 18

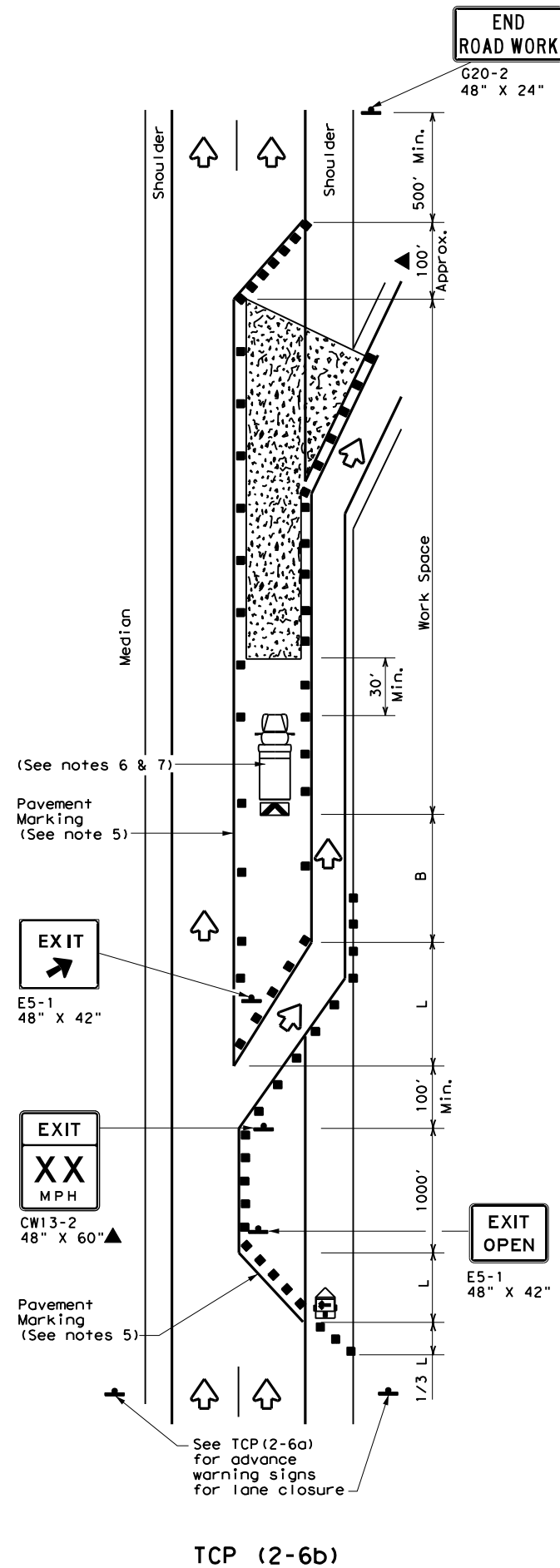
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8-95 2-12	PAR	LAMAR	23	
1-97 2-18				

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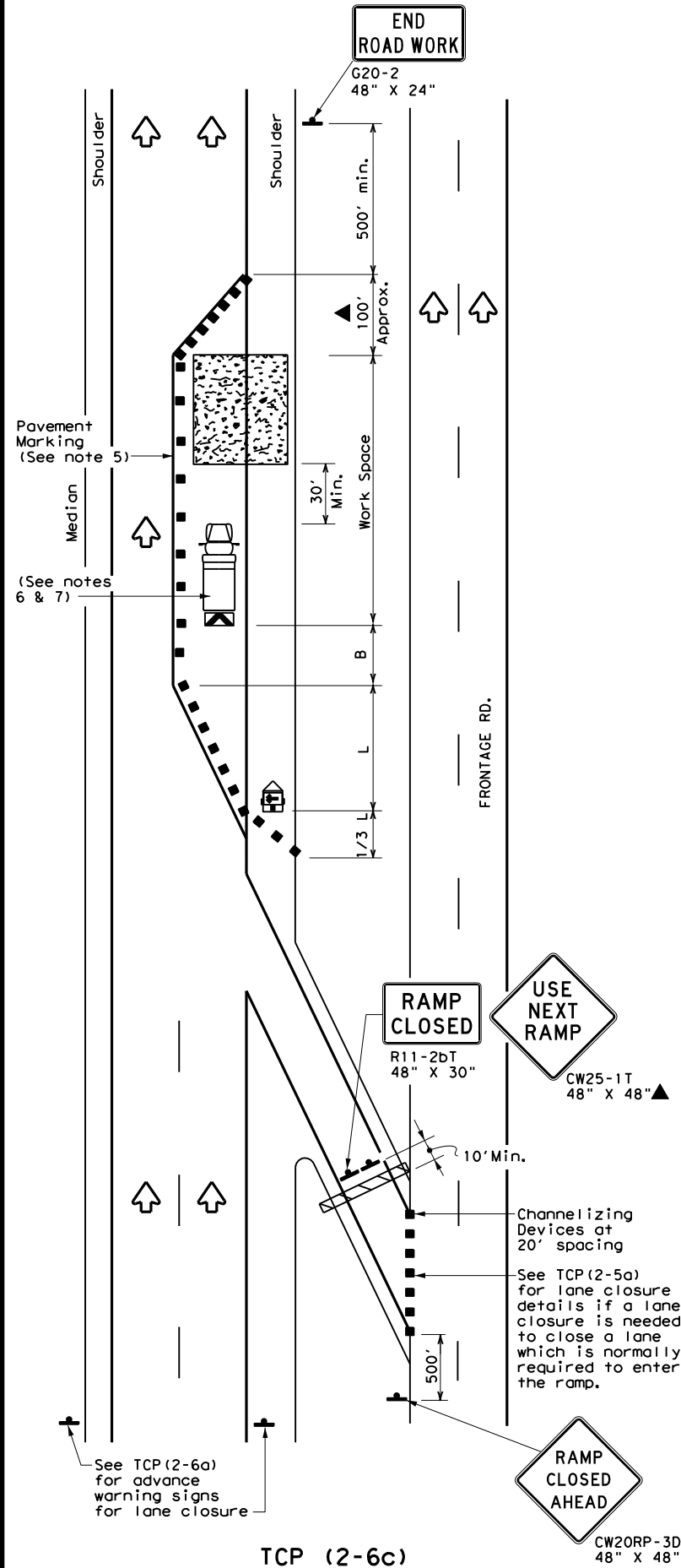
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TCP (2-6a)
ONE LANE CLOSURE



TCP (2-6b)
LANE CLOSURE NEAR EXIT RAMP



TCP (2-6c)
LANE CLOSURE NEAR ENTRANCE RAMP

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
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**
- Flags attached to signs where shown, are REQUIRED.
 - 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.
 - Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
 - Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on every other channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
 - The placement of pavement markings may be omitted on intermediate-term stationary work zones with the approval of the Engineer.
 - 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.
 - 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.

Texas Department of Transportation
 Traffic Operations Division Standard

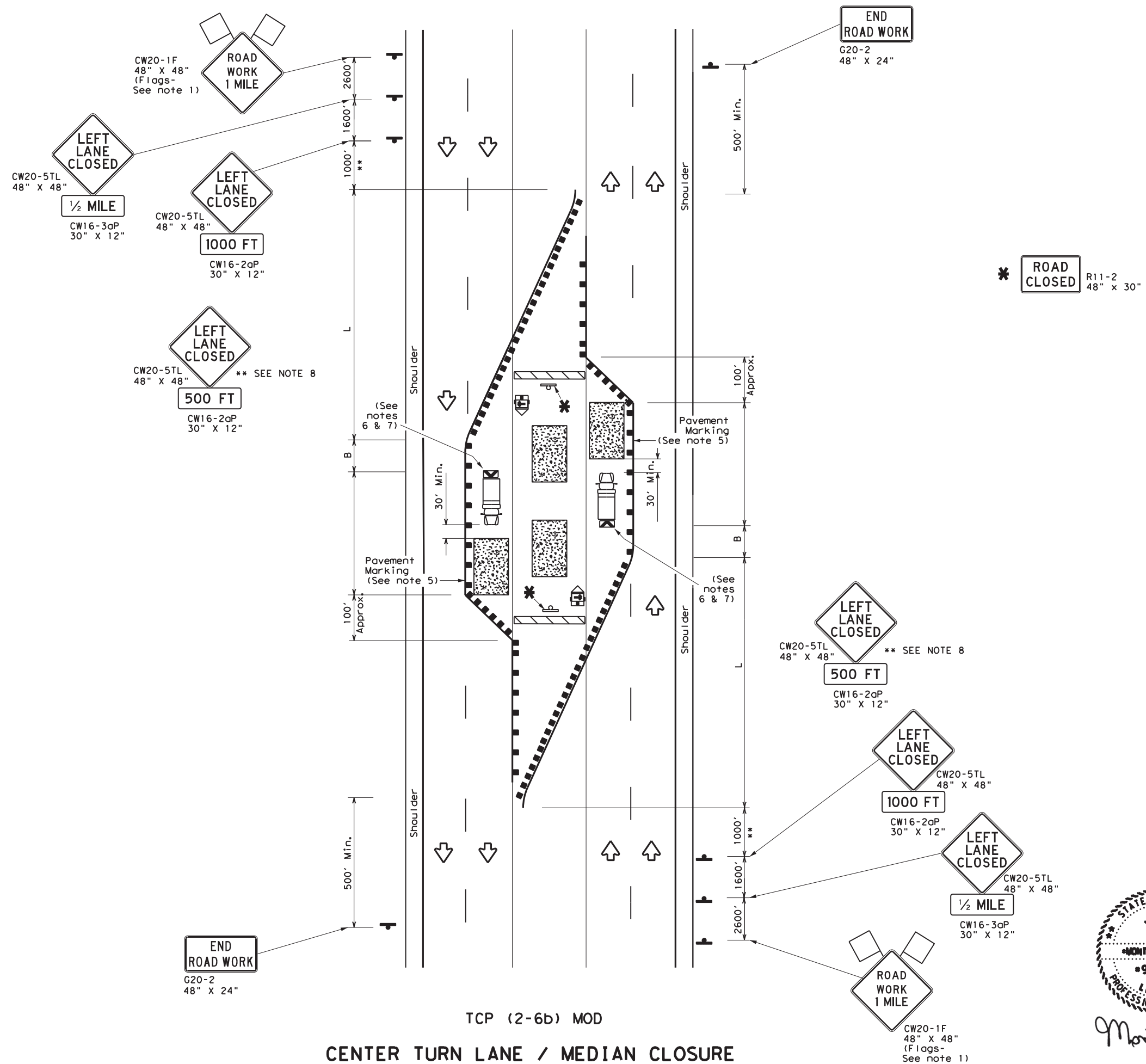
TRAFFIC CONTROL PLAN LANE CLOSURES ON DIVIDED HIGHWAYS

TCP (2-6) - 18

FILE: tcp2-6-18.dgn	DW: _____	CK: _____	DW: _____	CK: _____
© TxDOT December 1985	CONT: _____	SECT: _____	JOB: _____	HIGHWAY: _____
REVISIONS	0045	09	110, ETC	US 82, ETC
2-94 4-98			DIST: _____	COUNTY: _____
8-95 2-12			PAR: _____	LAMAR
1-97 2-18				SHEET NO. 24

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DATE: 04/12/2018 10:18:24 PM
 FILE: D:\CEN\PROJECTS\82 Raised Median\Design\CAD Standards\1 TRAFFIC CONTROL\TCP (2-6b) MOD.dwg



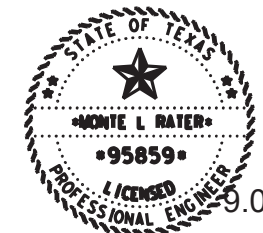
LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
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**
- Flags attached to signs where shown, are REQUIRED.
 - All traffic control devices illustrated are REQUIRED.
 - Channelizing devices used to close lanes may be supplemented with the Chevron Alignment Sign placed on every other channelizing device. Chevrons may be attached to plastic drums as per BC Standards.
 - Channelizing devices used along the work space or along tangent sections may be supplemented with vertical panels (VP) placed on every other channelizing device. If night time conditions make it difficult to see at least two VPs, the VPs may be placed on each channelizing device.
 - The placement of pavement markings may be omitted on Intermediate-term stationary work zones with the approval of the Engineer.
 - 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.
 - 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.
 - ** When directed by the Engineer install additional "Left Lane Closed" signs with "500 ft" placard.



Monte R. Rater P.E.
 09.05.23

Texas Department of Transportation
 Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN
 LANE CLOSURES ON
 DIVIDED HIGHWAYS**

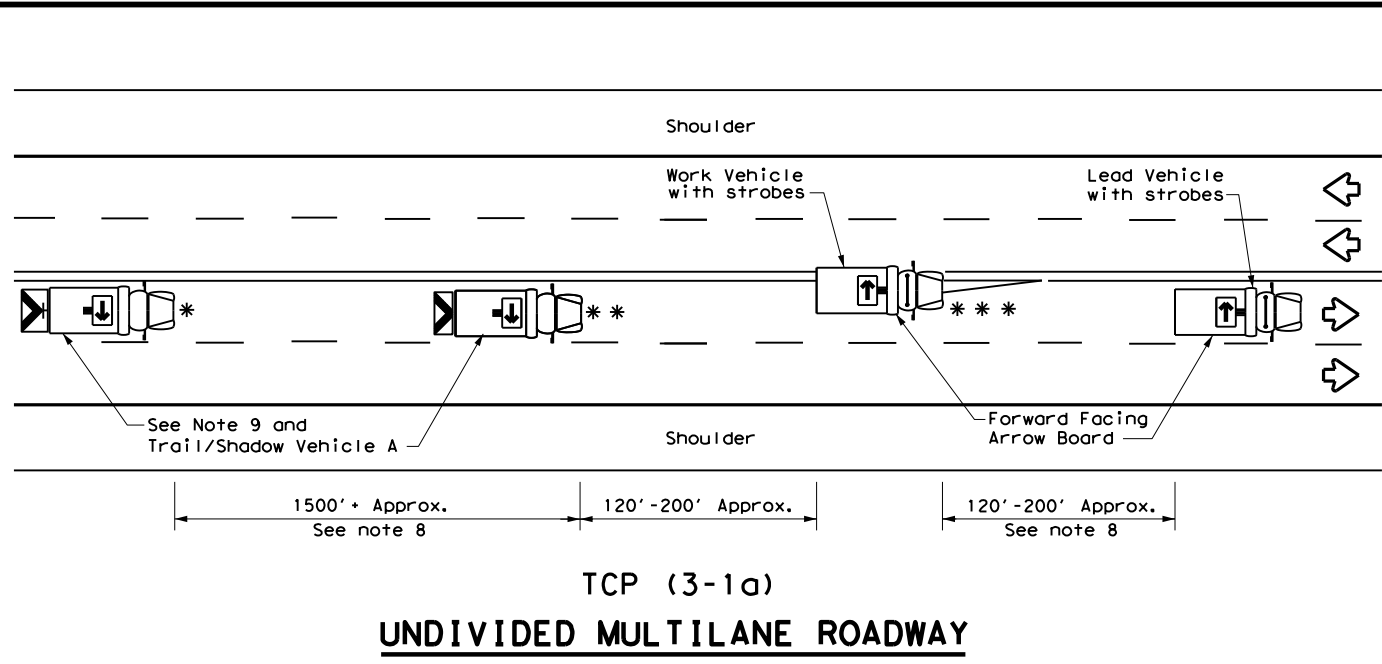
TCP (2-6) - 18 (MOD)

FILE: tcp2-6-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 2-12	PAR	LAMAR	25	
1-97 2-18				

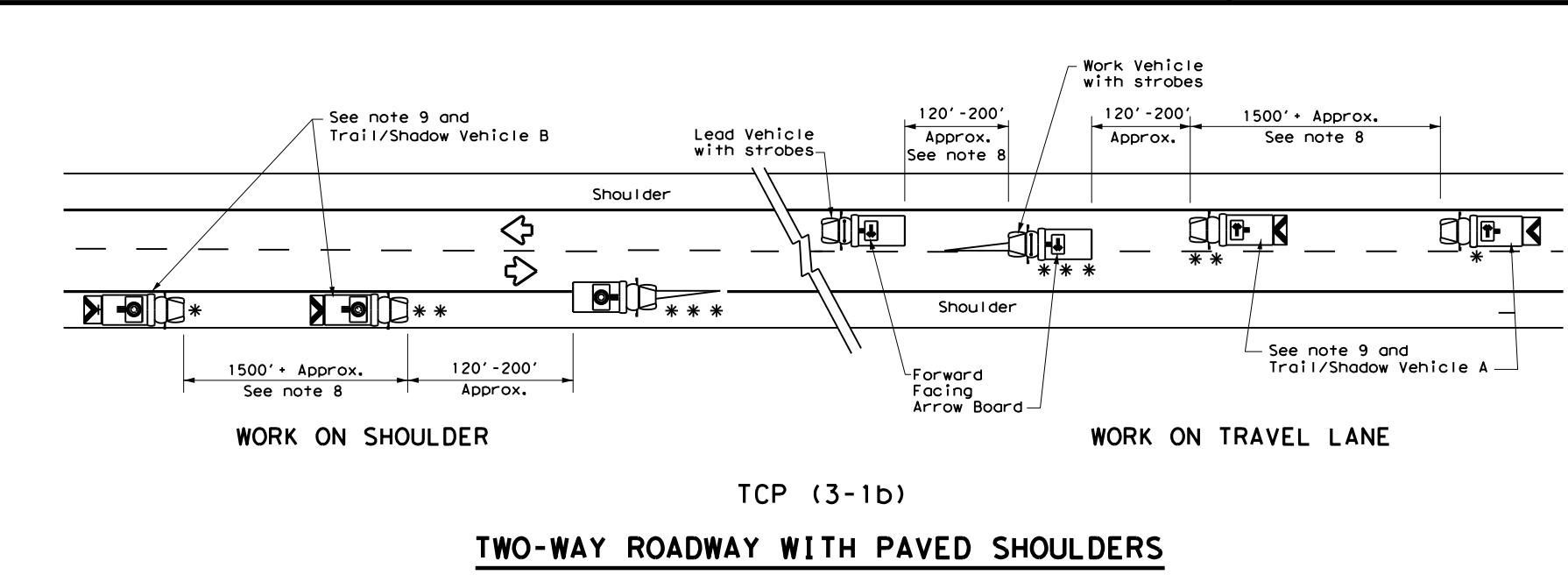
TCP (2-6b) MOD
CENTER TURN LANE / MEDIAN CLOSURE

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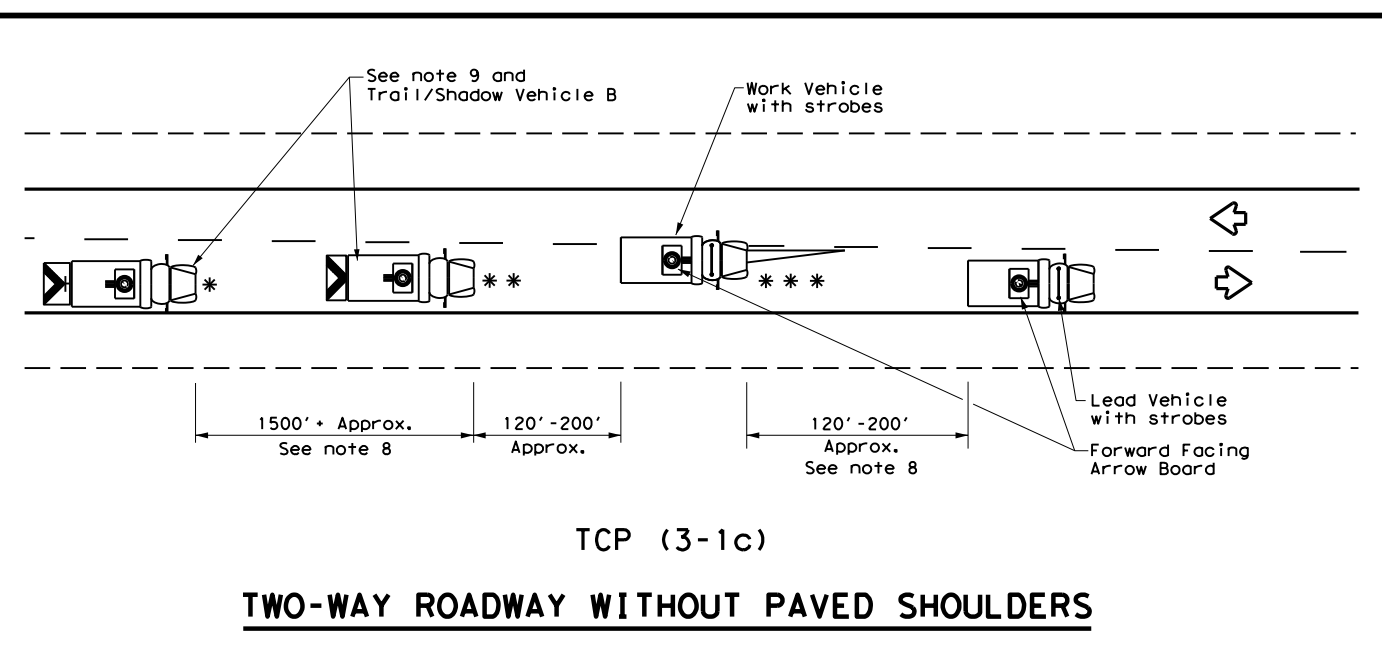
DATE: 8/31/2023 8:05:26 PM
 FILE: I:\PARTPDD\US 82 Raised Medain\Design\CAD Standards\1 TRAFFIC CONTROL\3 TMA



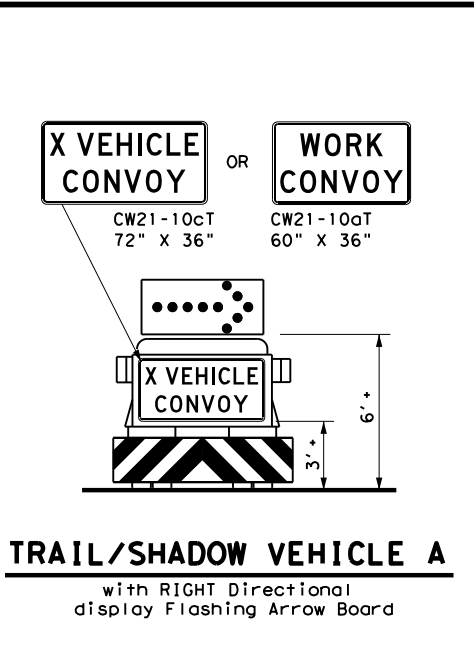
TCP (3-1a)
UNDIVIDED MULTILANE ROADWAY



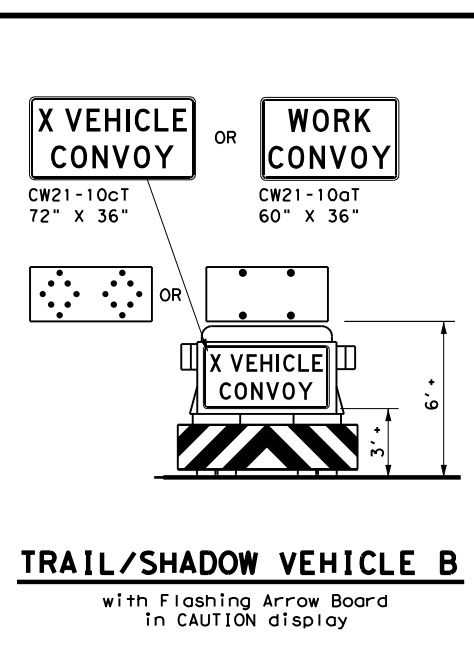
TCP (3-1b)
TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)
TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE A
 with RIGHT Directional display Flashing Arrow Board



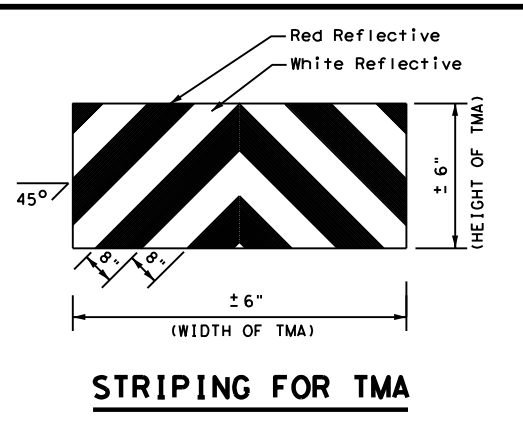
TRAIL/SHADOW VEHICLE B
 with Flashing Arrow Board in CAUTION display

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GENERAL NOTES

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



STRIPING FOR TMA

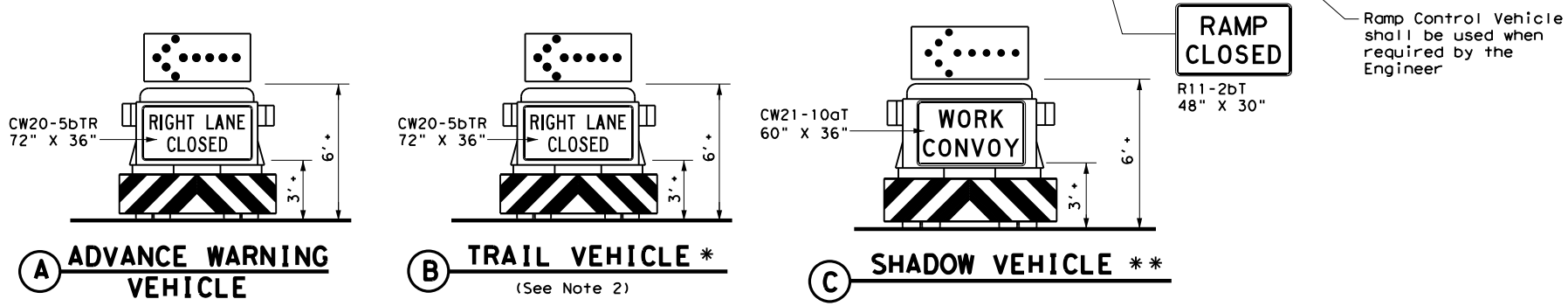
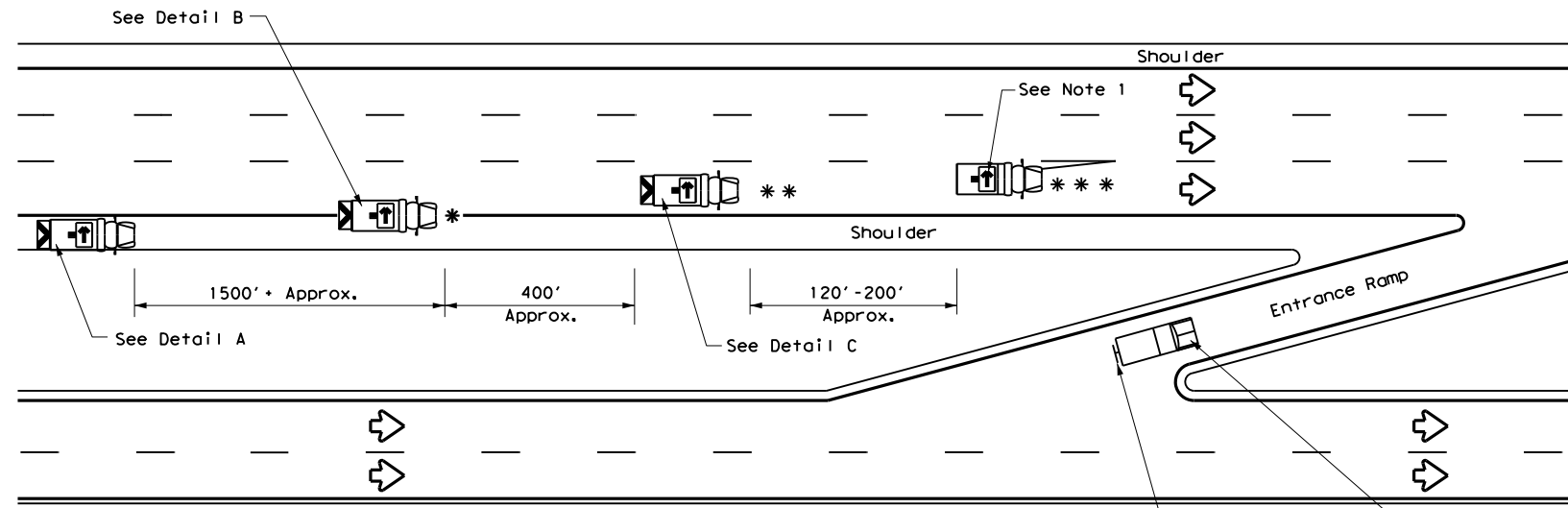
Texas Department of Transportation
 Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN
 MOBILE OPERATIONS
 UNDIVIDED HIGHWAYS**

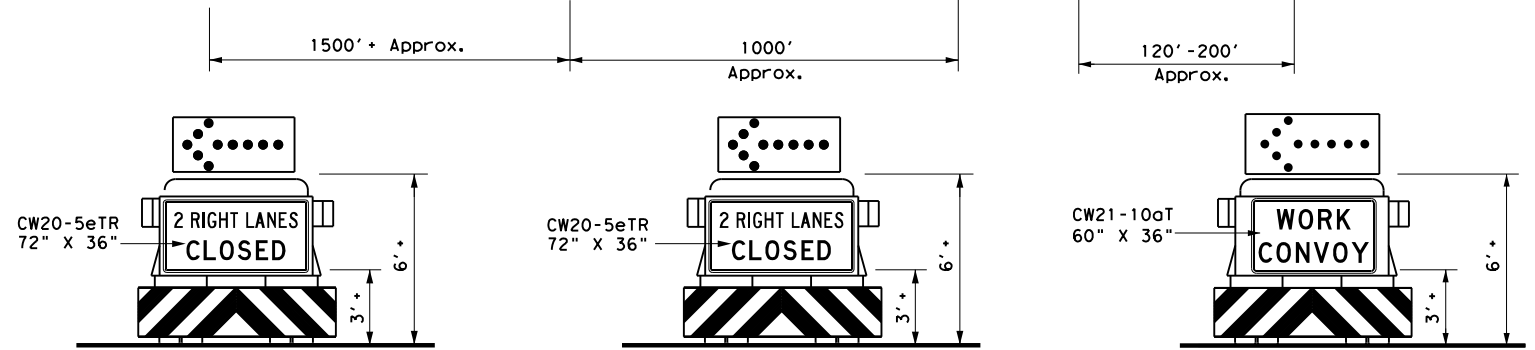
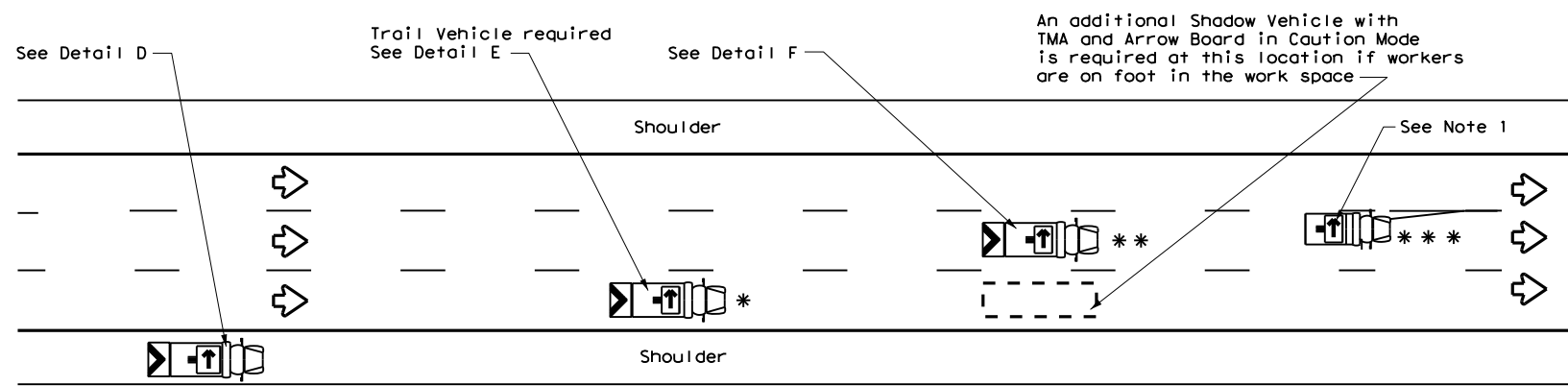
TCP (3-1) - 13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
2-94 4-98				
8-95 7-13				
1-97				
PAR		COUNTY	LAMAR	SHEET NO. 26

DATE: 8/31/2023 8:05:28 PM
 FILE: I:\PARTPDD\US 82 Raised Median\Design\CAD Standard\1 TRAFFIC CONTROL\3-2b.dgn
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RIGHT LANE CLOSURE ON DIVIDED HIGHWAY - TCP(3-2a)



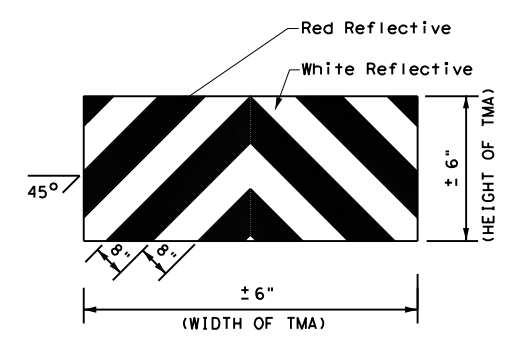
INTERIOR LANE CLOSURE ON MULTI-LANE DIVIDED HIGHWAY - TCP(3-2b)

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GENERAL NOTES

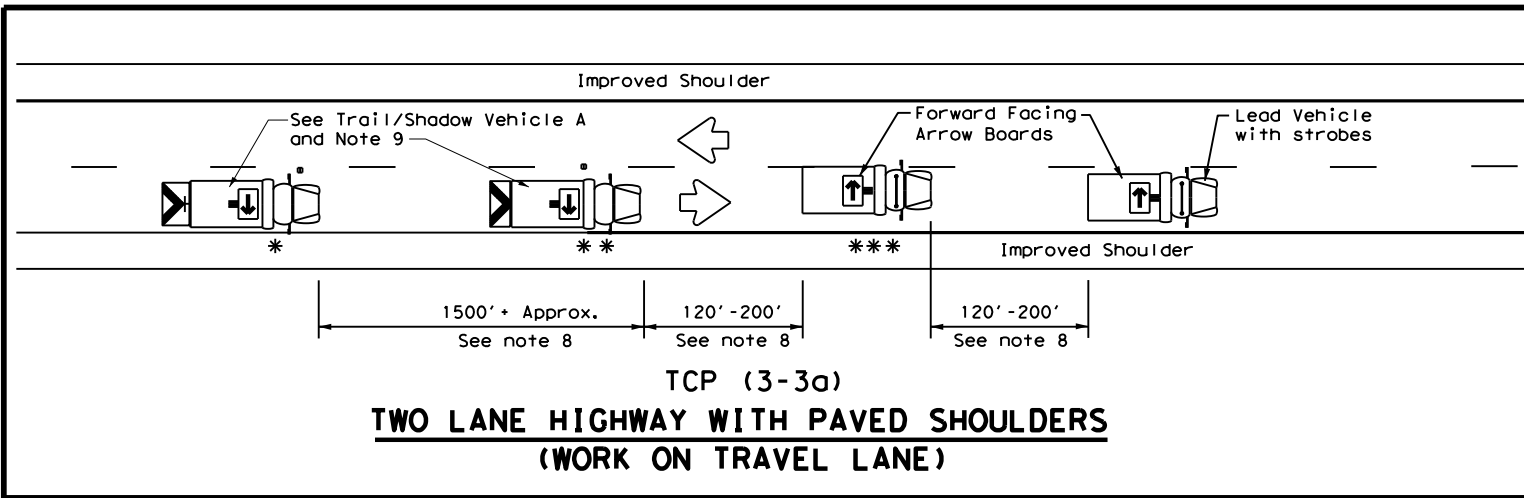
- ADVANCE WARNING, TRAIL and SHADOW vehicles shall be equipped with Type B or Type C flashing arrow boards as per the Barricade and Construction (BC) standards. Arrow boards on WORK vehicles will be optional based on the type of work being performed. The arrow boards shall be operated from inside the vehicle.
- For TCP(3-2a) the Engineer will determine if the TRAIL VEHICLE is required based on prevailing roadway conditions, traffic volume, and sight distance restrictions. All other vehicles shown for both TCP(3-2a) and TCP(3-2b) are required.
- The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
- The use of truck mounted attenuators (TMA) on the ADVANCE WARNING, SHADOW, and TRAIL vehicles are required.
- Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DMS 8300, Type A.
- Each vehicle shall have two-way radio communication capability.
- When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.
- Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE may vary according to terrain, work activity and other factors.
- Standard 48" X 48" diamond shaped warning signs with the same message as those shown may be used where adequate mounting space exists.
- The signs shown should be used on the Advance Warning Vehicle. As an option, a portable changeable message sign (PCMS) or a truck mounted changeable message sign (TMCMS) with a minimum character height of 12", and displaying the same legend may be substituted for these signs. An appropriate directional arrow display, simulating the size and legibility of the flashing arrow board, must be used in the second phase of the PCMS/TMCMS message. When this is done, the arrow board will not be required on the Advance Warning Vehicle.
- Standard diamond shape versions of the CW20-5 series signs may be used as an option if the rectangular signs shown are not available.
- The principles on this sheet may be used to close lanes from the left side of the roadway considering the number of lanes, shoulder width, sight distance, and ramp frequency.
- Signs and flashing arrow board modes shall be appropriately altered when implementing left lane closures or interior closures which close the left lanes.
- The Advance Warning Vehicle may straddle the edgeline when shoulder width makes it necessary.



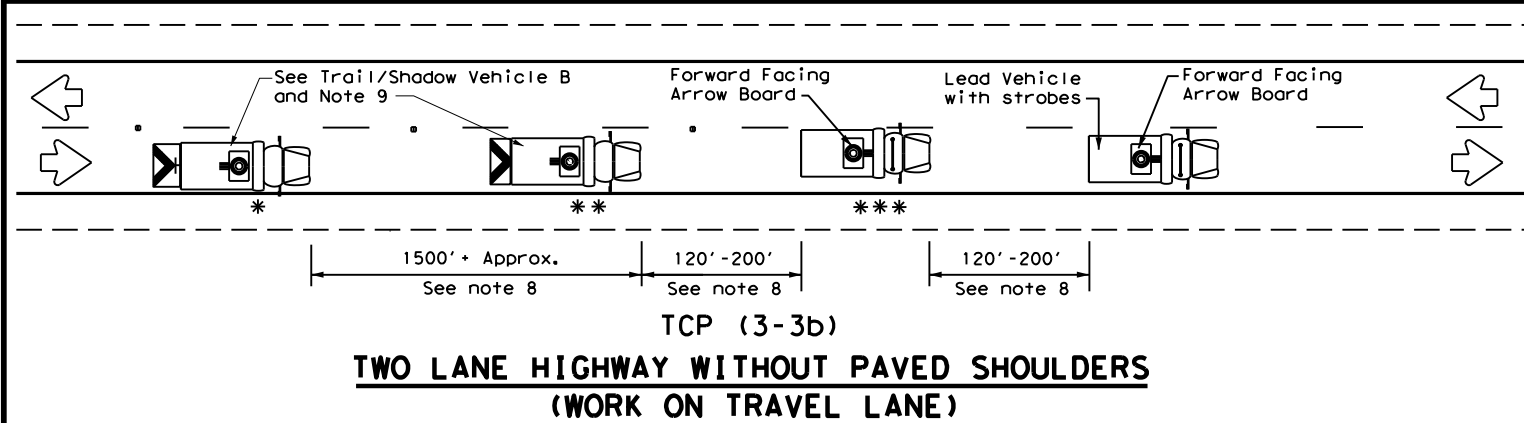
STRIPING FOR TMA

		Traffic Operations Division Standard	
TRAFFIC CONTROL PLAN MOBILE OPERATIONS DIVIDED HIGHWAYS			
TCP(3-2)-13			
FILE: tcp3-2.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT December 1985	CONT SECT	JOB	HIGHWAY
REVISIONS	0045 09	110, ETC	US 82, ETC
2-94 4-98			
8-95 7-13			
1-97			
PAR	COUNTY	SHEET NO.	
	LAMAR	27	

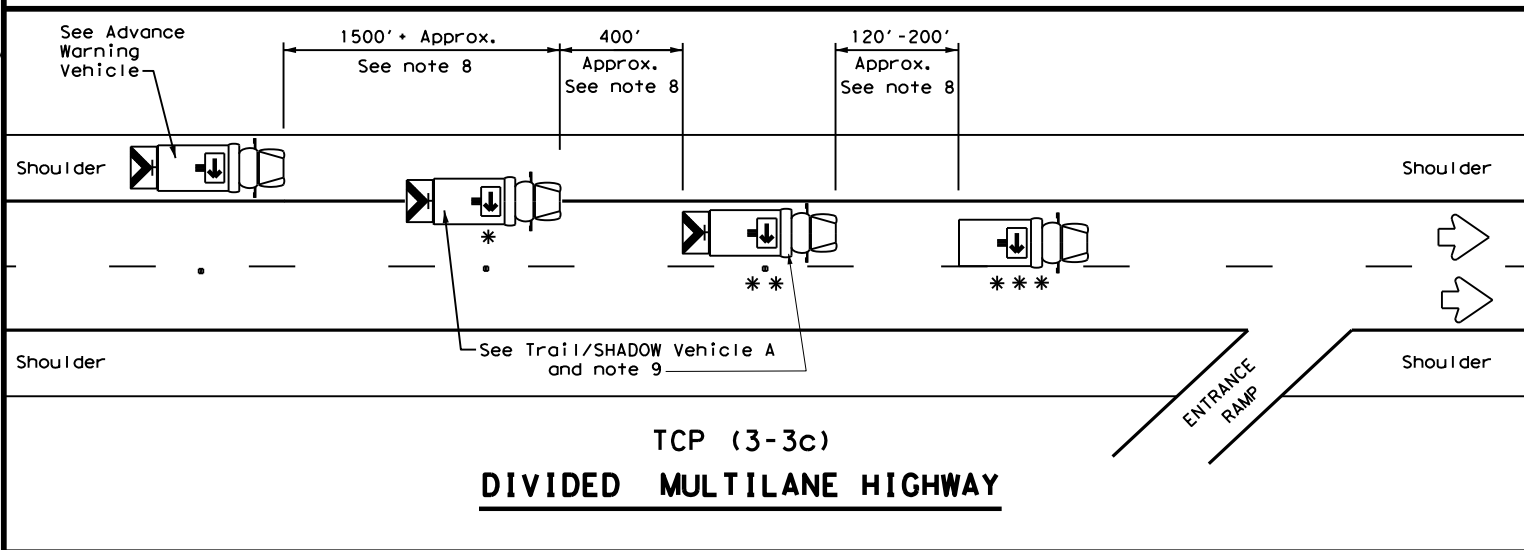
DATE: 8/31/2023 8:05:29 PM
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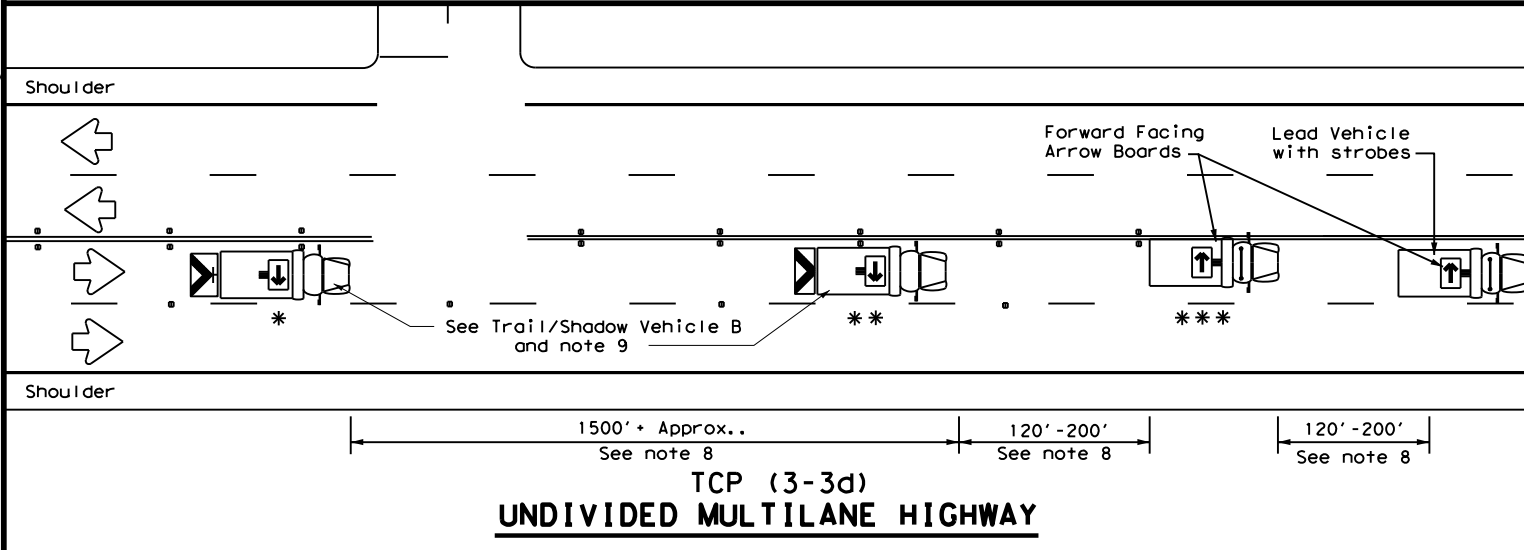
TCP (3-3a)
TWO LANE HIGHWAY WITH PAVED SHOULDERS
(WORK ON TRAVEL LANE)



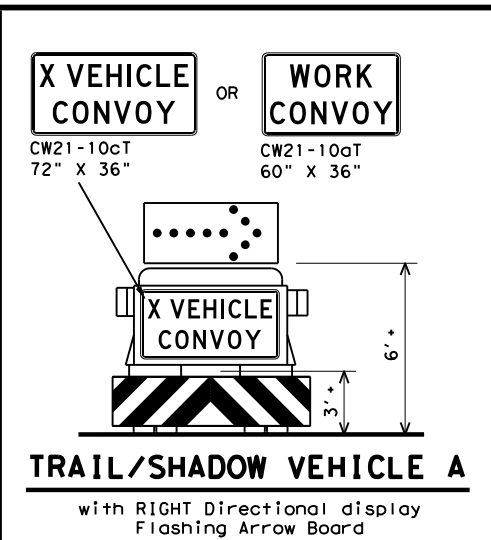
TCP (3-3b)
TWO LANE HIGHWAY WITHOUT PAVED SHOULDERS
(WORK ON TRAVEL LANE)



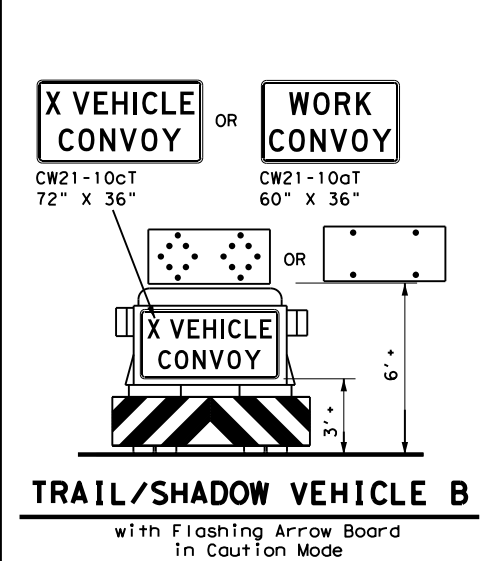
TCP (3-3c)
DIVIDED MULTILANE HIGHWAY



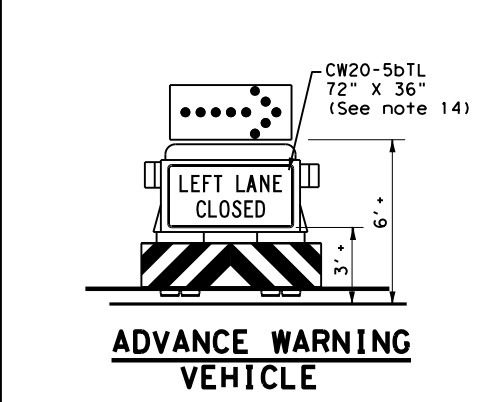
TCP (3-3d)
UNDIVIDED MULTILANE HIGHWAY



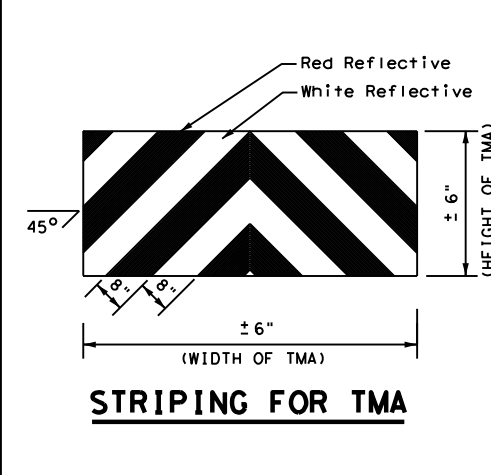
TRAIL/SHADOW VEHICLE A
 with RIGHT Directional display
 Flashing Arrow Board



TRAIL/SHADOW VEHICLE B
 with Flashing Arrow Board
 in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

LEGEND		
* Trail Vehicle	ARROW BOARD DISPLAY	
** Shadow Vehicle		
*** Work Vehicle		RIGHT Directional
		LEFT Directional
		Double Arrow
		CAUTION (Alternating Diamond or 4 Corner Flash)

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

GENERAL NOTES

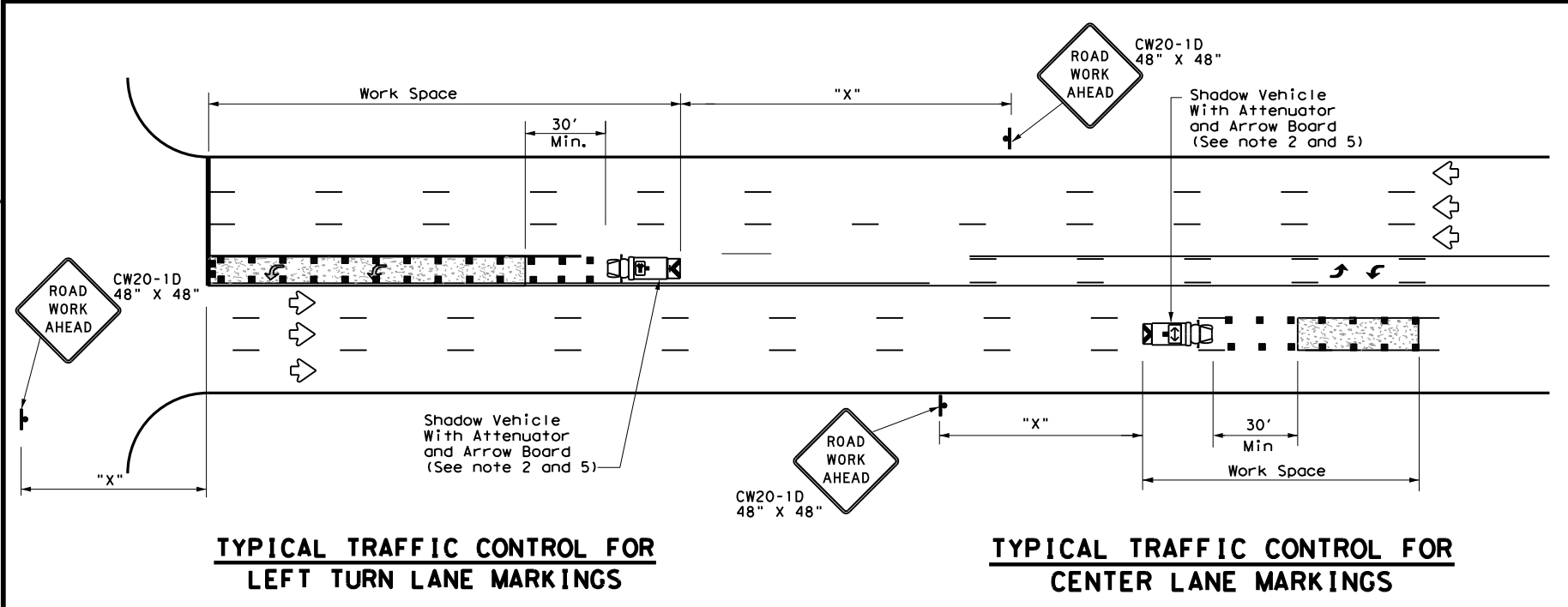
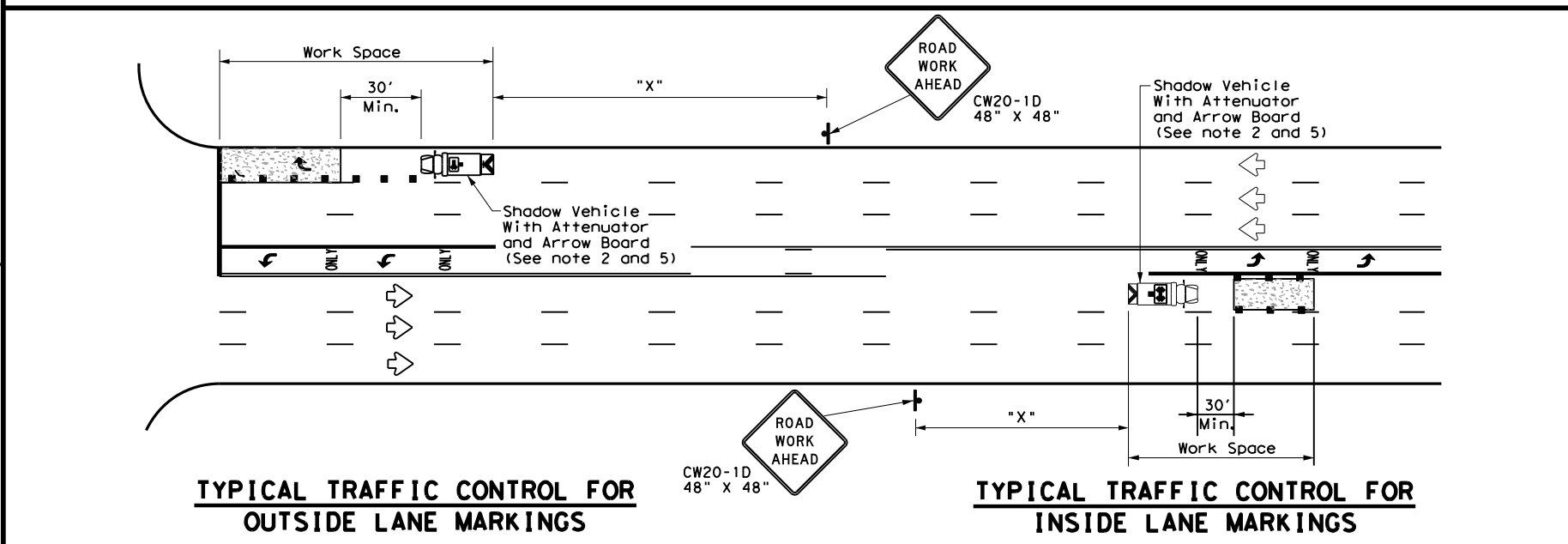
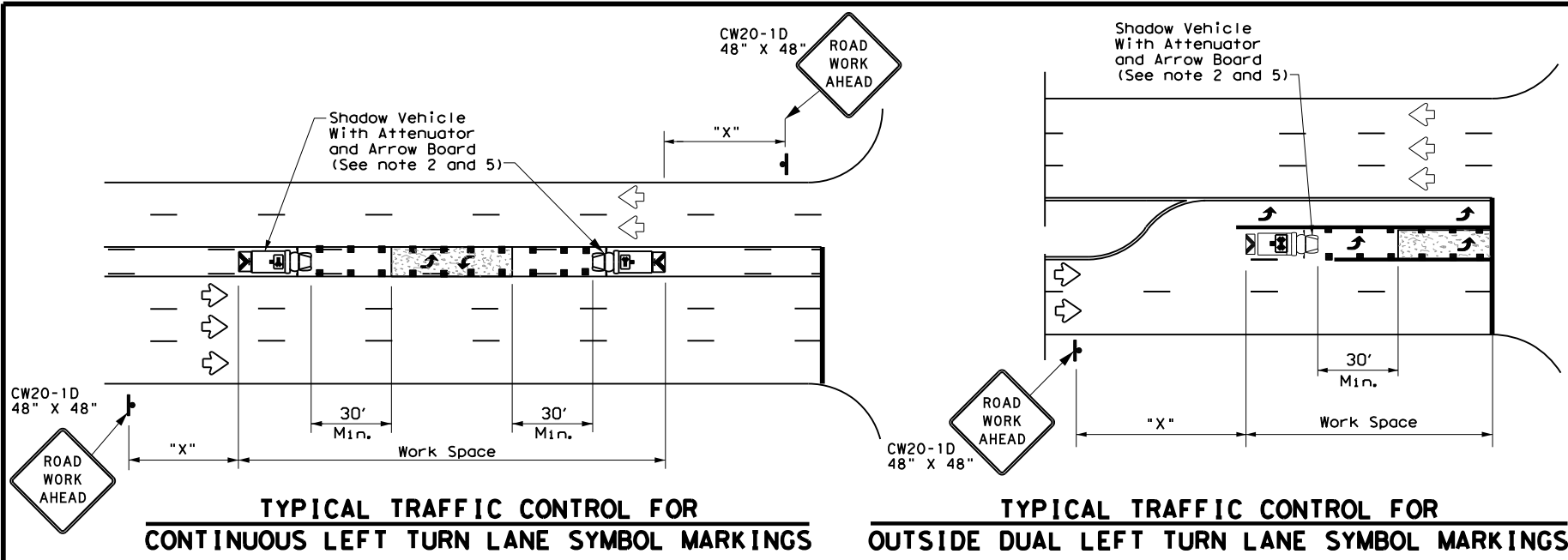
1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used on two way roads the WORK vehicle must have an arrow board. For divided roadways, the arrow board on the WORK vehicle is optional based on the type of work being performed. The Engineer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

Texas Department of Transportation
 Traffic Operations Division Standard

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

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	OW: TxDOT	CK: TxDOT
© TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
2-94 4-98	DIST	COUNTY	SHEET NO.	
8-95 7-13	PAR	LAMAR	28	
1-97 7-14				

DATE: 8/31/2023 8:05:31 PM
 FILE: T:\PARTPDD\US 82 Raised Medain\Design\CAD Standards\1 TRAFFIC CONTROL\3 Traffic Control.dwg
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LEGEND		
*	Trail Vehicle	ARROW BOARD DISPLAY
**	Shadow Vehicle	
***	Work Vehicle	RIGHT Directional
	Heavy Work Vehicle	LEFT Directional
	Truck Mounted Attenuator (TMA)	Double Arrow
	Traffic Flow	Channelizing Devices

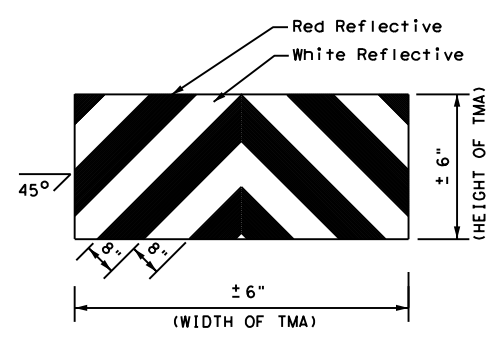
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = WS ² / 60	150'	165'	180'	30'	60'	120'	90'
35		205'	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. This traffic control plan is for use on conventional roads posted at 45 mph or less and is intended for mobile operations that move continuously or intermittently (stopping up to approximately 15 minutes) such as short-line striping and in-lane rumble strips. When activities are anticipated to take longer amounts of time or traffic conditions warrant, a short duration or short-term stationary traffic control plan should be used.
2. A Truck Mounted Attenuator shall be used on Shadow Vehicle. Striping on the back panel of all truck mounted attenuators shall be 8" red and white reflective sheeting placed in an inverted "V" design. Reflective sheeting shall meet or exceed the reflectivity and color requirements of departmental material specification DMS-8300, Type A.
3. All traffic control devices shall be in accordance with the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD), latest edition.
4. The use of yellow rotating beacons or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the drivers side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.
5. Flashing arrow board shall be used on Shadow Vehicle. Flashing arrow board shall be Type B or Type C as per BC Standards. The arrow board operation shall be controlled from inside the truck.



Texas Department of Transportation
 Traffic Operations Division Standard

**TRAFFIC CONTROL PLAN
 MOBILE OPERATIONS FOR
 ISOLATED WORK AREAS
 UNDIVIDED HIGHWAYS**

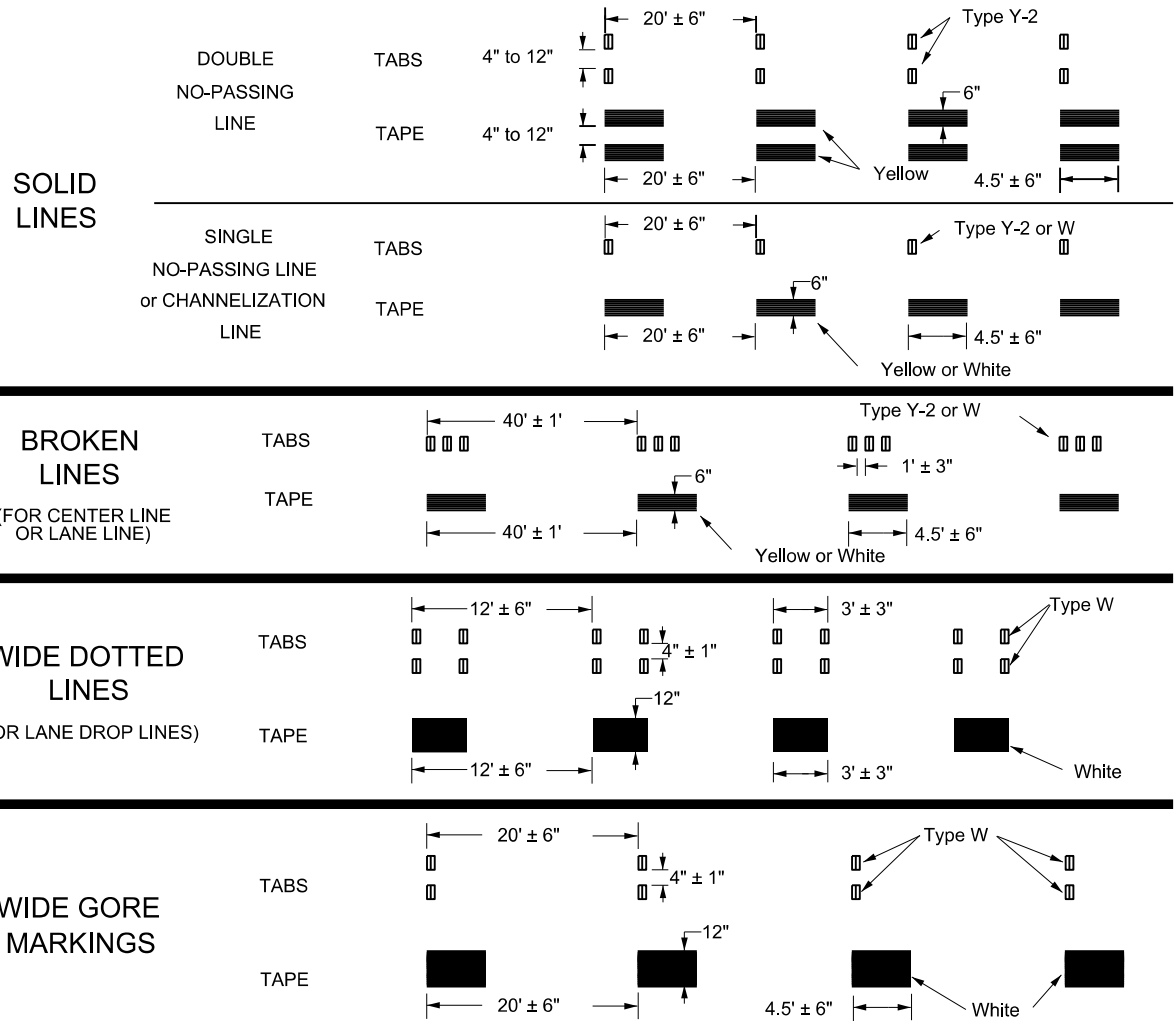
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© TxDOT	July, 2013	CONT	SECT	JOB	HIGHWAY				
REVISIONS	0045	09	110, ETC	US 82, ETC					
DIST	COUNTY	SHEET NO.							
PAR	LAMAR	29							

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WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



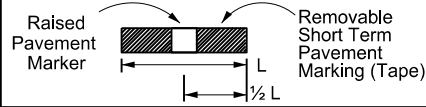
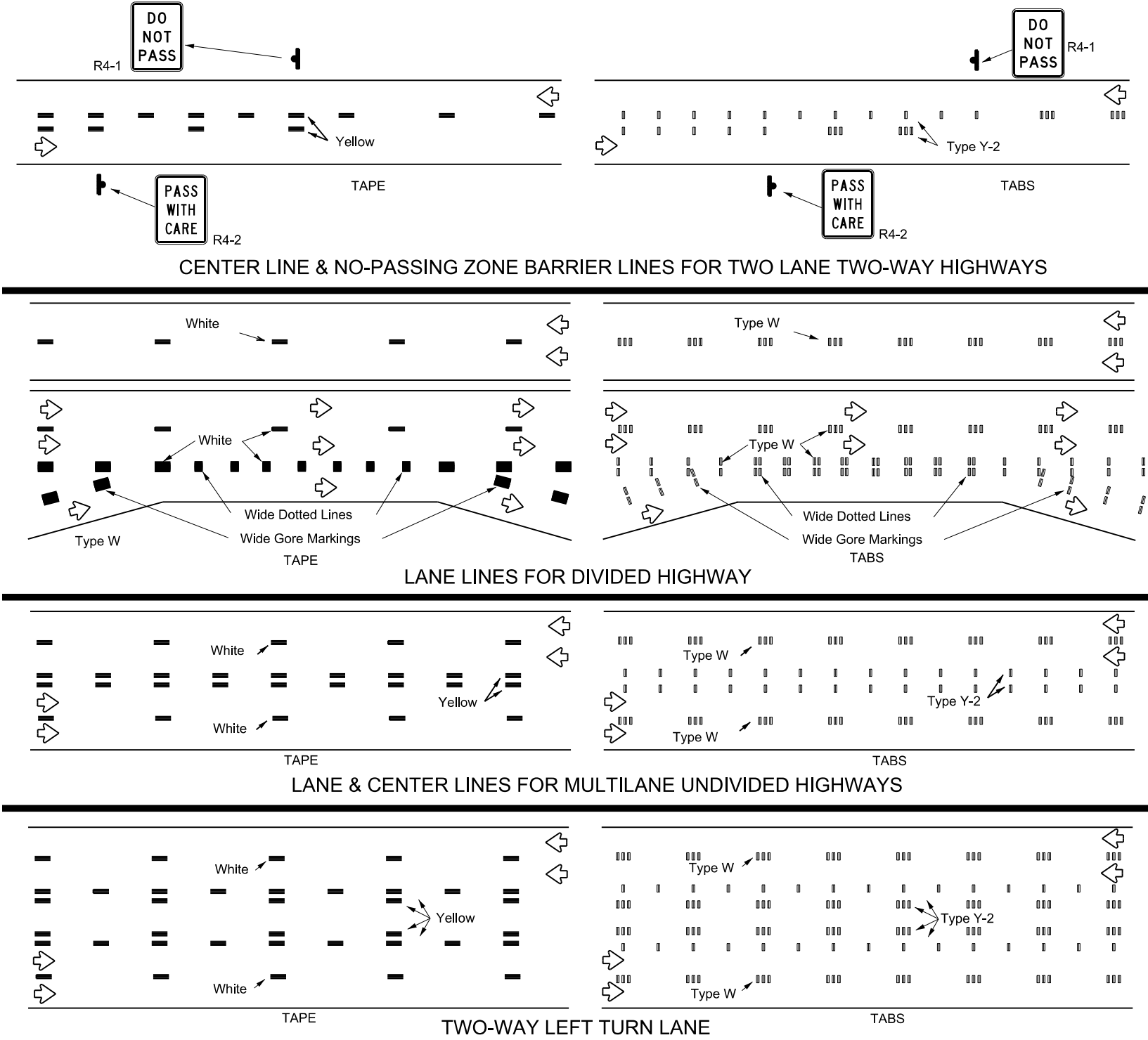
NOTES:

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

TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



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

PREFABRICATED PAVEMENT MARKINGS

- Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.

- Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Construction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

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

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

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

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



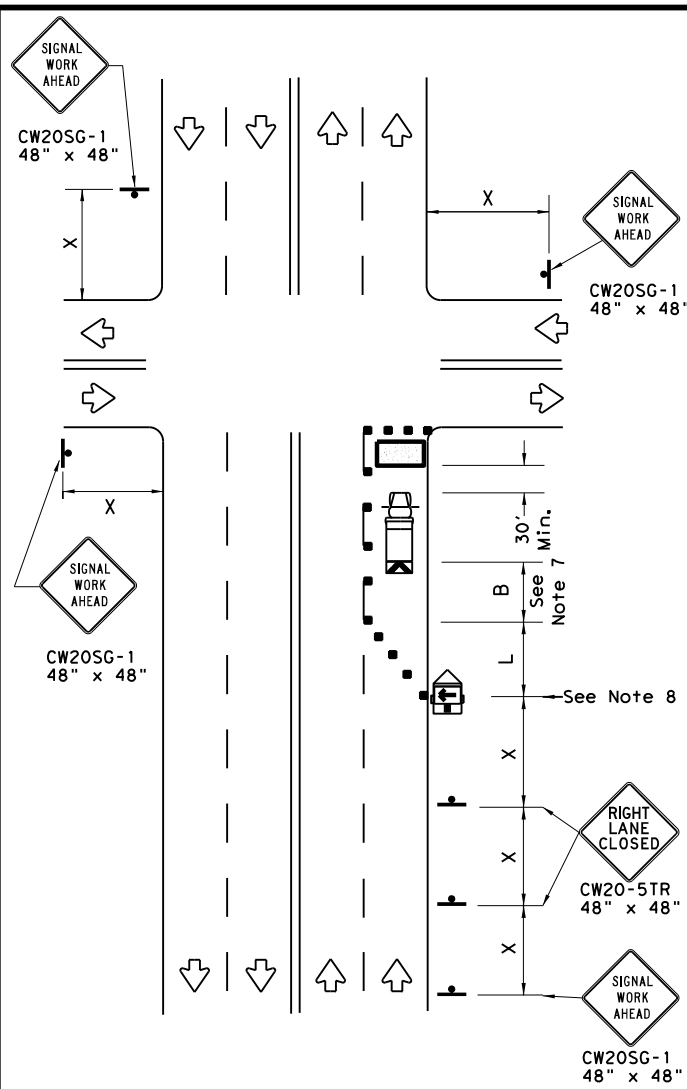
WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-23

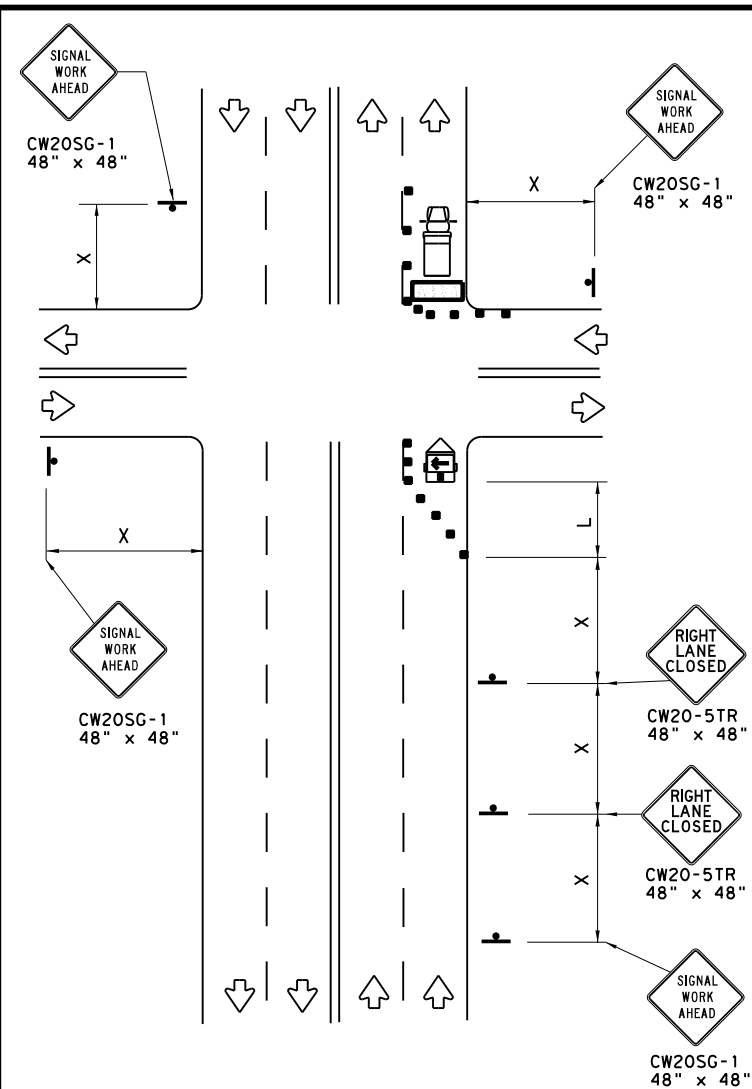
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© TxDOT	February 2023	CONT	SECT	HIGHWAY
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4-92	7-13	DIST	COUNTY	SHEET NO.
1-97	2-23	PAR	LAMAR	30
3-03				

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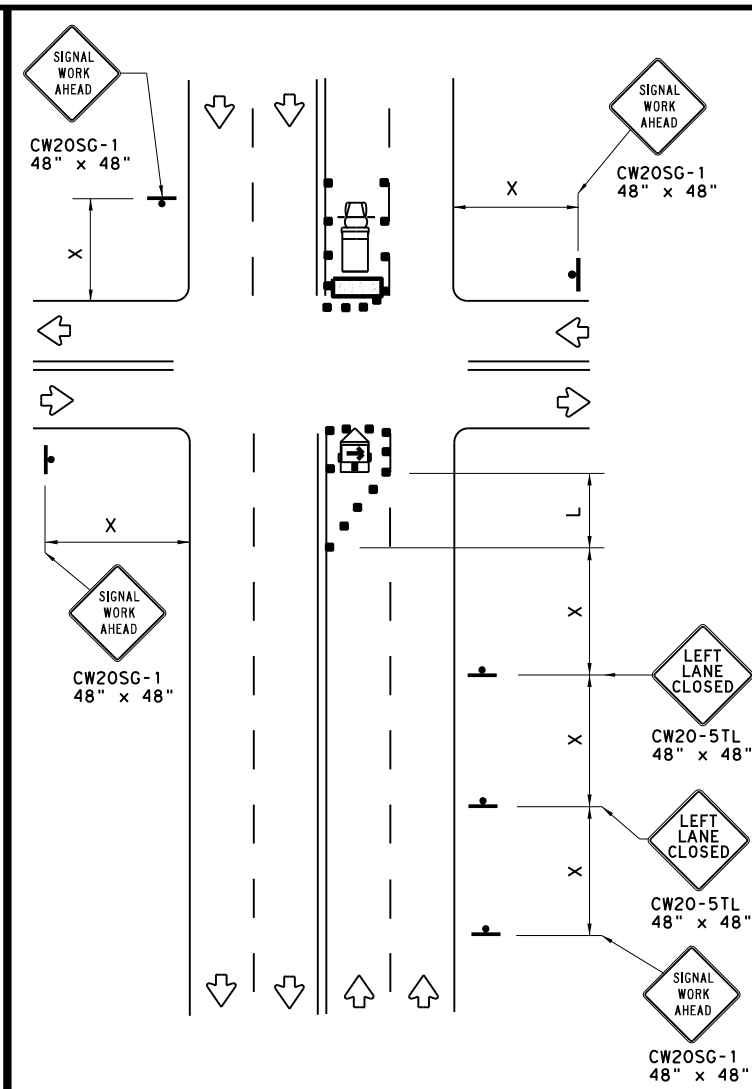
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NEAR SIDE LANE CLOSURE
 SHORT DURATION OR SHORT TERM STATIONARY



FAR SIDE RIGHT LANE CLOSURE
 SHORT DURATION OR SHORT TERM STATIONARY



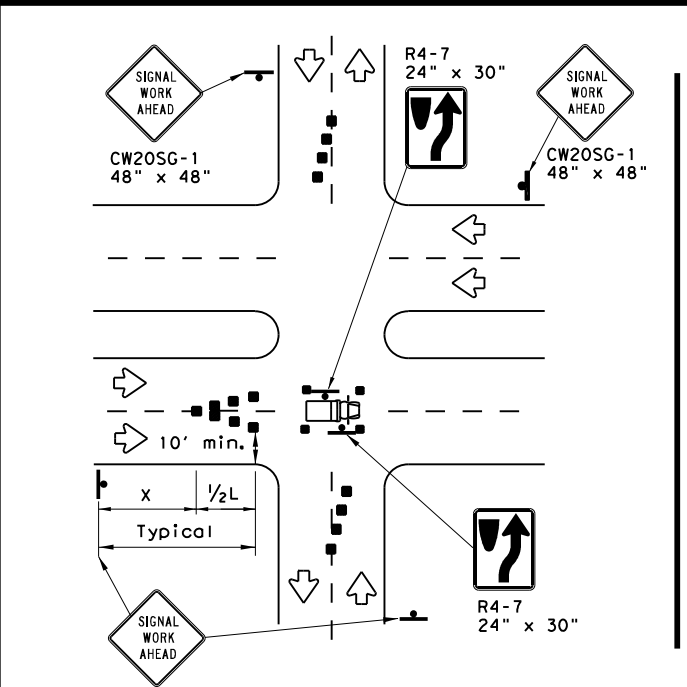
FAR SIDE LEFT LANE CLOSURE
 SHORT DURATION OR SHORT TERM STATIONARY

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

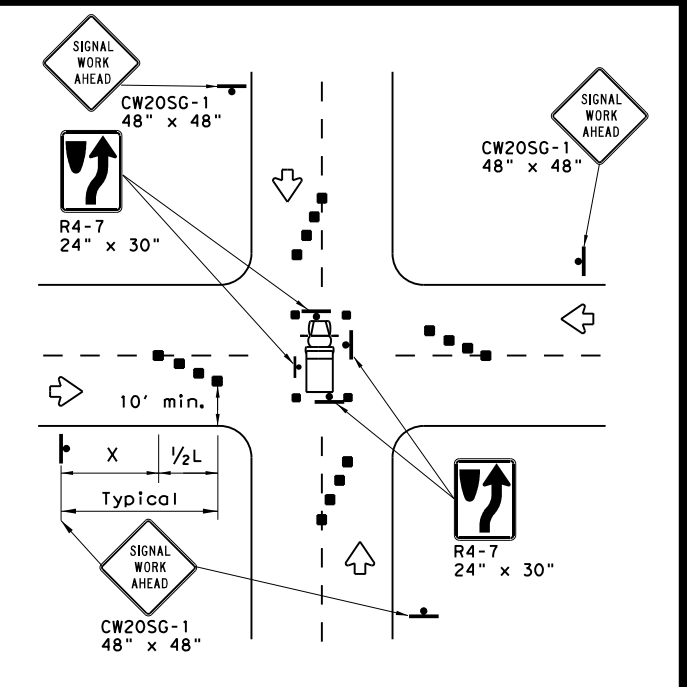
Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	$L = \frac{WS^2}{60}$	150'	165'	180'	30'	60'	120'	90'
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)

WORKERS IN BUCKET TRUCKS SHALL NOT WORK ABOVE OPEN LANES OF TRAFFIC.



OPERATIONS IN THE INTERSECTION
 SHORT DURATION



GENERAL NOTES

- The minimum size channelizing device is the 28" cone. 42" Two-piece cones, drums, vertical panels or barricades will be required when the device must be left unattended at night.
- Obstructions or hazards at the work area shall be clearly marked and delineated at all times.
- Flaggers and Flagger Symbol (CW20-7) signs may be required according to field conditions.
- Vehicles parked in roadway shall be equipped with at least two high intensity rotating, flashing, oscillating or strobe type lights.
- High level warning devices (flag trees) may be used at corners of the vehicle.
- When work operations are performed on existing signals, the signals may be placed in flashing red mode when approved by the engineer. If existing signals do not have power, All-Way Stop (R1-1 and R1-3P) signs may be implemented when approved by the engineer.
- For Short-Term Stationary work the buffer space "B" from the above table should be used if field conditions permit. For Short Duration (less than 1 hour) any buffer space provided will enhance the safety of the setup.
- The arrow board at this location may be omitted for Short Duration work if the work vehicle has an arrow board in operation. As an option, the arrow board may be placed at the end of the taper in the closed lane if space is not available at the beginning of the taper.
- Signs and devices for the NEAR SIDE LANE CLOSURE may be altered for a left lane closure by using a LEFT LANE CLOSED (CW20-5TL) and adding channelizing devices on the centerline to protect the work space from opposing traffic.

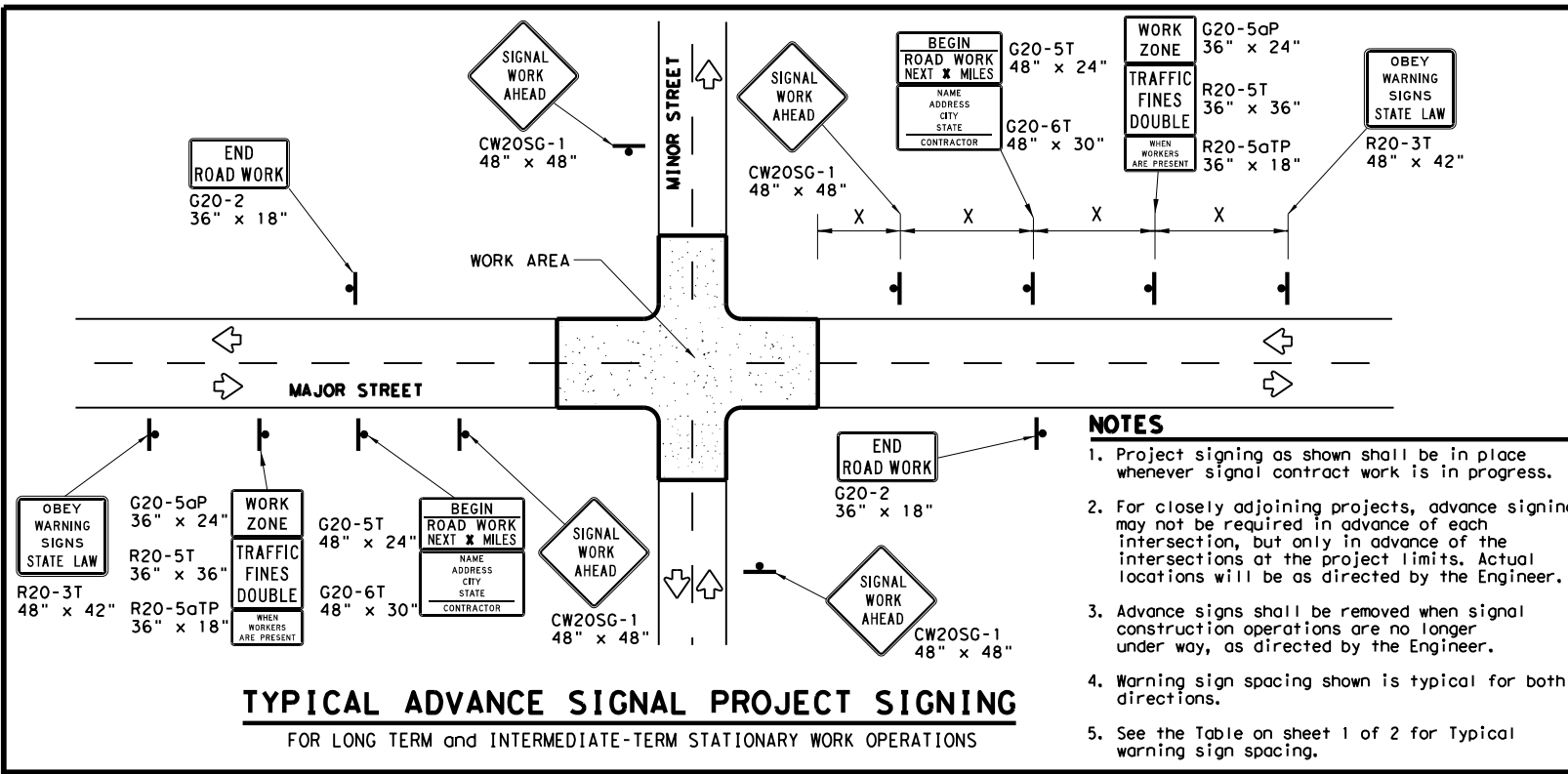


TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ (BTS-1) - 13

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2-98 10-99 7-13	DIST	COUNTY	SHEET NO.	
4-98 3-03	PAR	LAMAR	31	

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TYPICAL ADVANCE SIGNAL PROJECT SIGNING
FOR LONG TERM and INTERMEDIATE-TERM STATIONARY WORK OPERATIONS

- NOTES**
1. Project signing as shown shall be in place whenever signal contract work is in progress.
 2. For closely adjoining projects, advance signing may not be required in advance of each intersection, but only in advance of the intersections at the project limits. Actual locations will be as directed by the Engineer.
 3. Advance signs shall be removed when signal construction operations are no longer under way, as directed by the Engineer.
 4. Warning sign spacing shown is typical for both directions.
 5. See the Table on sheet 1 of 2 for Typical warning sign spacing.

GENERAL NOTES FOR WORK ZONE SIGNS

1. Signs shall be installed and maintained in a straight and plumb condition.
2. Wooden sign posts shall be painted white.
3. Barricades shall NOT be used as sign supports.
4. Nails shall NOT be used to attach signs to any support.
5. All signs shall be installed in accordance with the plans or as directed by the Engineer.
6. The Contractor shall furnish the sign design shown in the plans or in the "Standard Highway Sign Designs for Texas" (SHSD).
7. The Contractor shall furnish sign supports and substrates listed in the "Compliant Work Zone Traffic Control Device List" (CWZTCD), installed as per the manufacturer's recommendations.
8. Temporary signs that have damaged or cracked substrates and/or damaged or marred reflective sheeting shall be replaced as directed by the Engineer.
9. 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".
10. Damaged wood posts shall be replaced. Splicing wood posts will not be allowed.

DURATION OF WORK

1. Work zone durations are defined in Part 6, Section 60.02 of the Texas Manual on Uniform Traffic Control Devices (TMUTCD).

SIGN MOUNTING HEIGHT

1. Sign height of Long-term/Intermediate-term warning signs shall be as shown on Figure 6F-1 of the TMUTCD.
2. Sign height of Short-term/Short Duration warning signs shall be as shown on Figure 6F-2 of the TMUTCD.
3. Regulatory signs shall be mounted at least 7 feet, but not more than 9 feet, above the paved surface regardless of work duration.

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. 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. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes back filled upon completion of the work.

REFLECTIVE SHEETING

1. All signs shall be retroreflective and constructed of sheeting meeting the requirements of the DMS and color usage table shown on this sheet.

SIGN SUPPORT WEIGHTS

1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
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 will 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 fire 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.

LEGEND

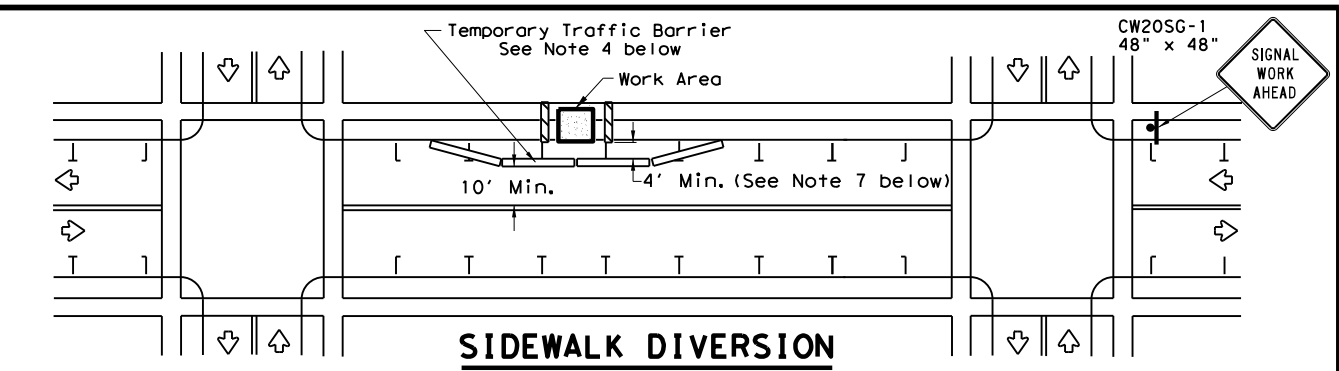
	Sign
	Channelizing Devices
	Type 3 Barricade

DEPARTMENTAL MATERIAL SPECIFICATIONS

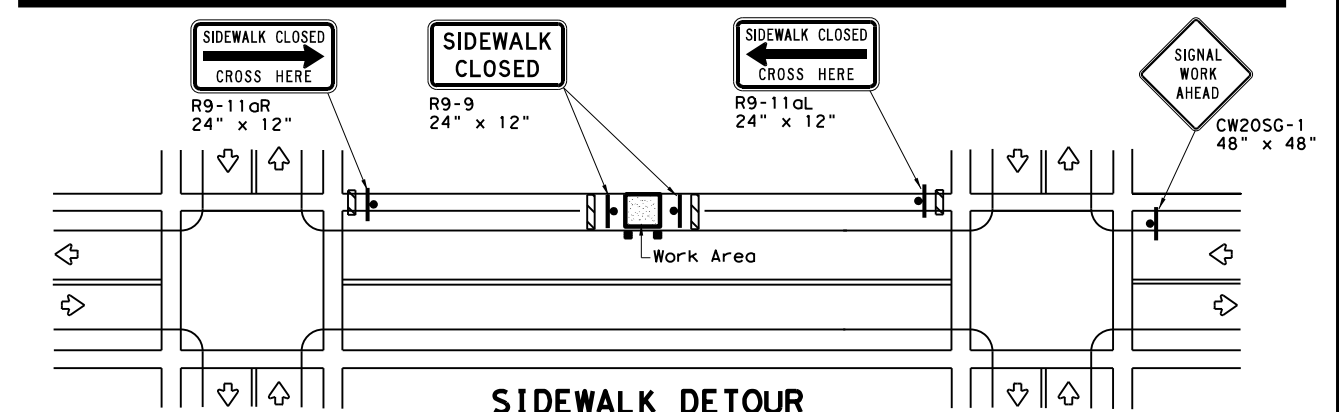
SIGN FACE MATERIALS	DMS-8300
FLEXIBLE ROLL-UP REFLECTIVE SIGNS	DMS-8310

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B _{FL} OR TYPE C _{FL} SHEETING
WHITE	BACKGROUND	TYPE A SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

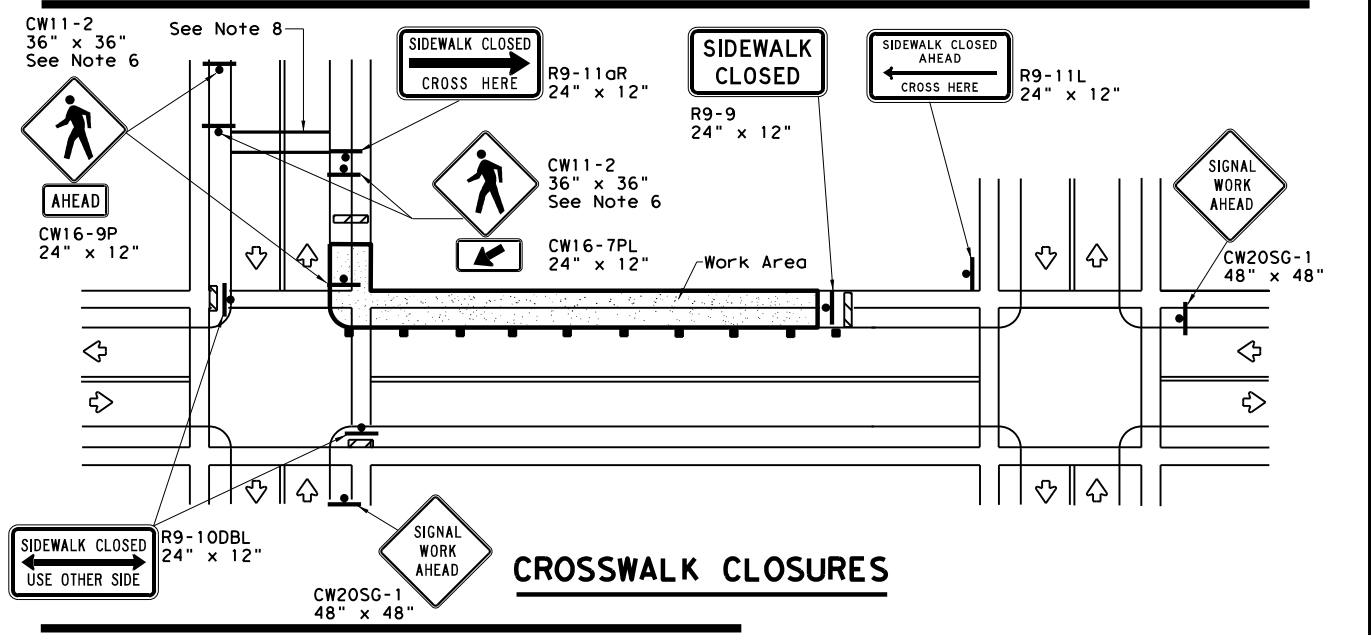
Only pre-qualified products shall be used. A copy of the "Compliant Work Zone Traffic Control Devices List" (CWZTCD) describes pre-qualified products and their sources and may be found at the following web address:
http://www.txdot.gov/txdot_library/publications/construction.htm



SIDEWALK DIVERSION



SIDEWALK DETOUR



CROSSWALK CLOSURES

PEDESTRIAN CONTROL

1. Holes, trenches or other hazards shall be adequately protected by covering, delineating or surrounding the hazard with orange plastic pedestrian fencing or longitudinal channelizing devices, or as directed by the Engineer.
2. "CROSSWALK CLOSURES" as detailed above will require the Engineer's approval prior to installation.
3. R9 series signs shown may be placed on supports detailed on the BC standards or CWZTCD list, or when fabricated from approved lightweight plastic substrates, they may be mounted on top of a plastic drum at or near the location shown.
4. For speeds less than 45 mph longitudinal channelizing devices may be used instead of traffic barriers when approved by the Engineer. Attenuation of blunt ends and installation of water filled devices shall be as per BC(9) and manufacturer's recommendations.
5. Location of devices are for general guidance. Actual device spacing and location must be field adjusted to meet actual conditions.
6. Where pedestrians with visual disabilities normally use the closed sidewalk Detectable Pedestrian Barricades should be used instead of the Type 3 Barricades shown.
7. The width of existing sidewalk should be maintained if practical.
8. Pavement markings for mid-block crosswalks shall be paid for under the appropriate bid items.
9. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.

SHEET 2 OF 2

Texas Department of Transportation
 Traffic Operations Division Standard

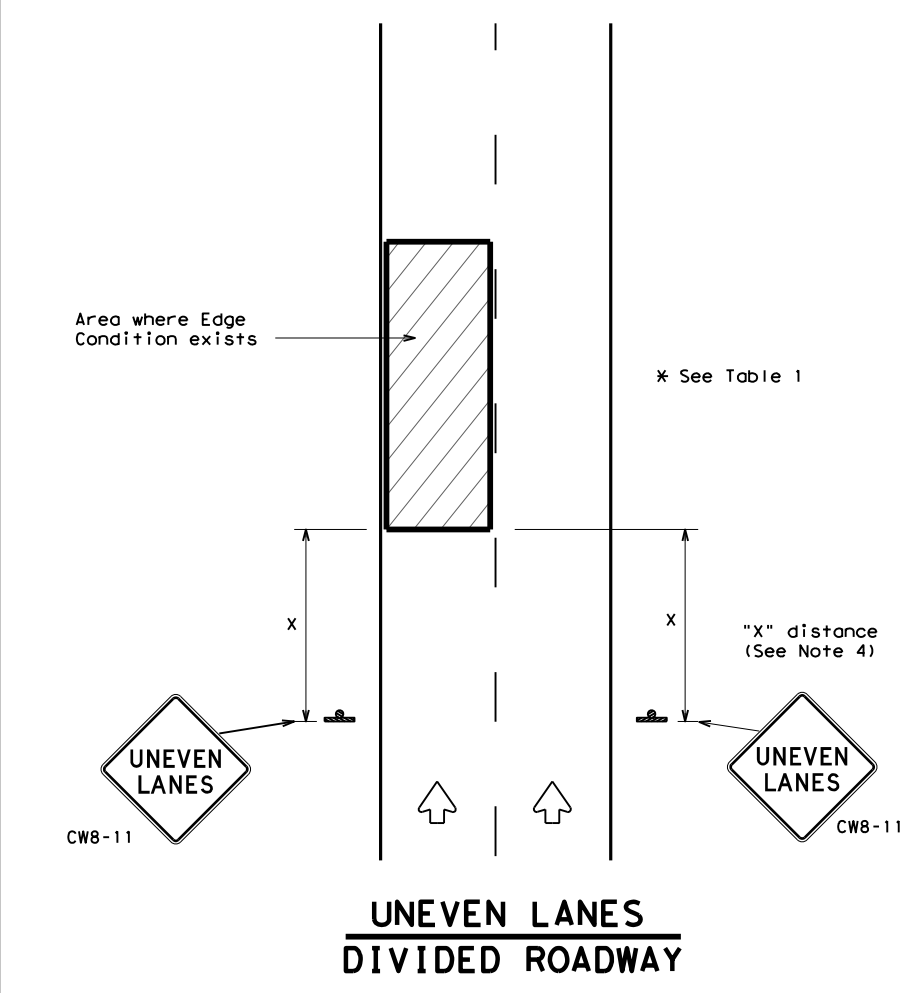
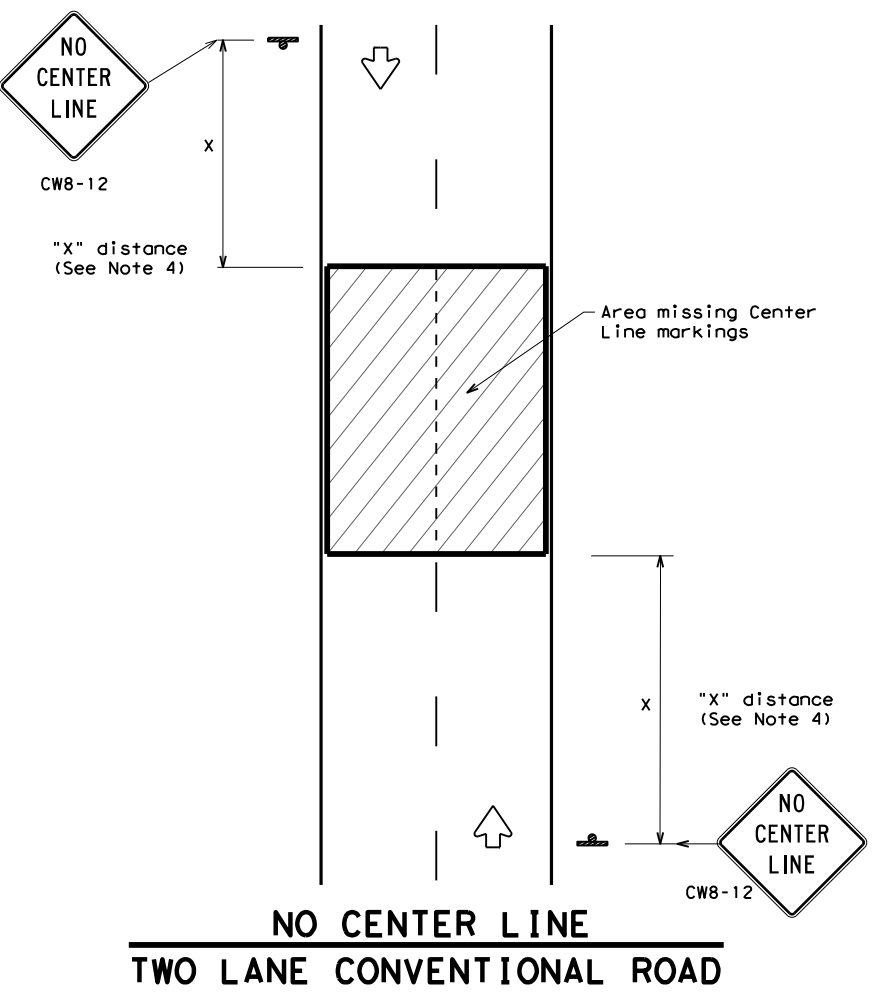
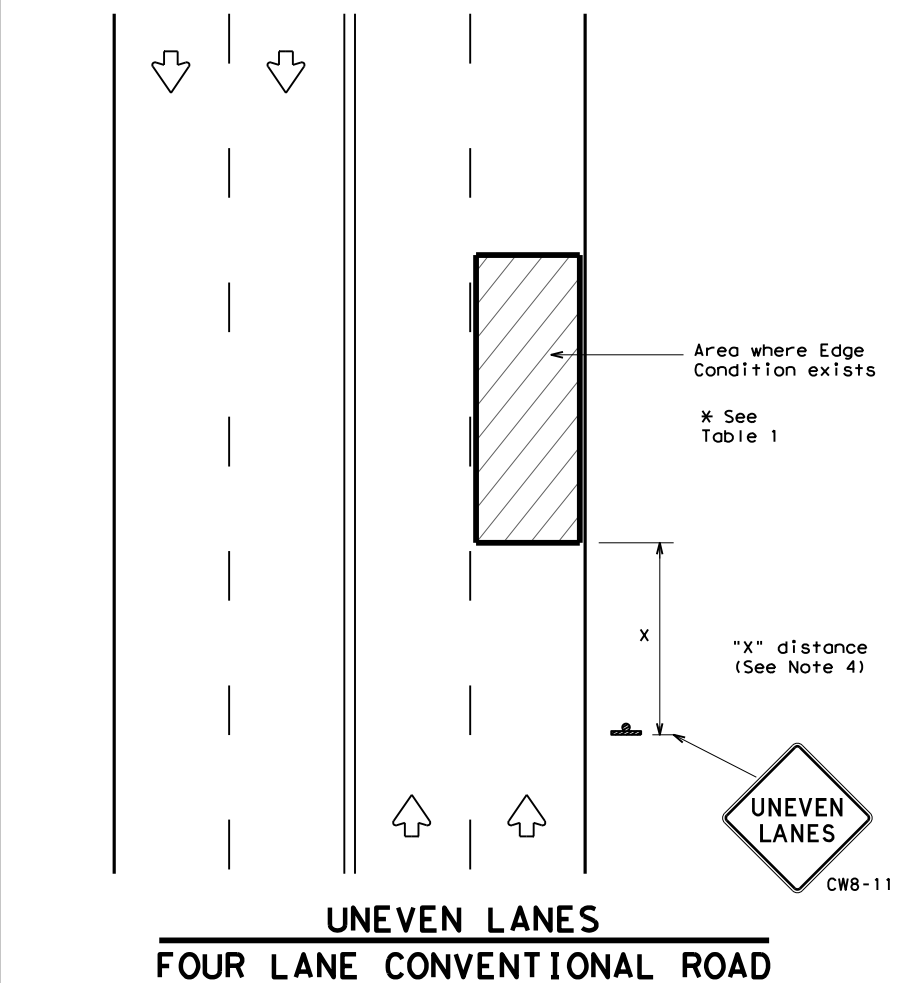
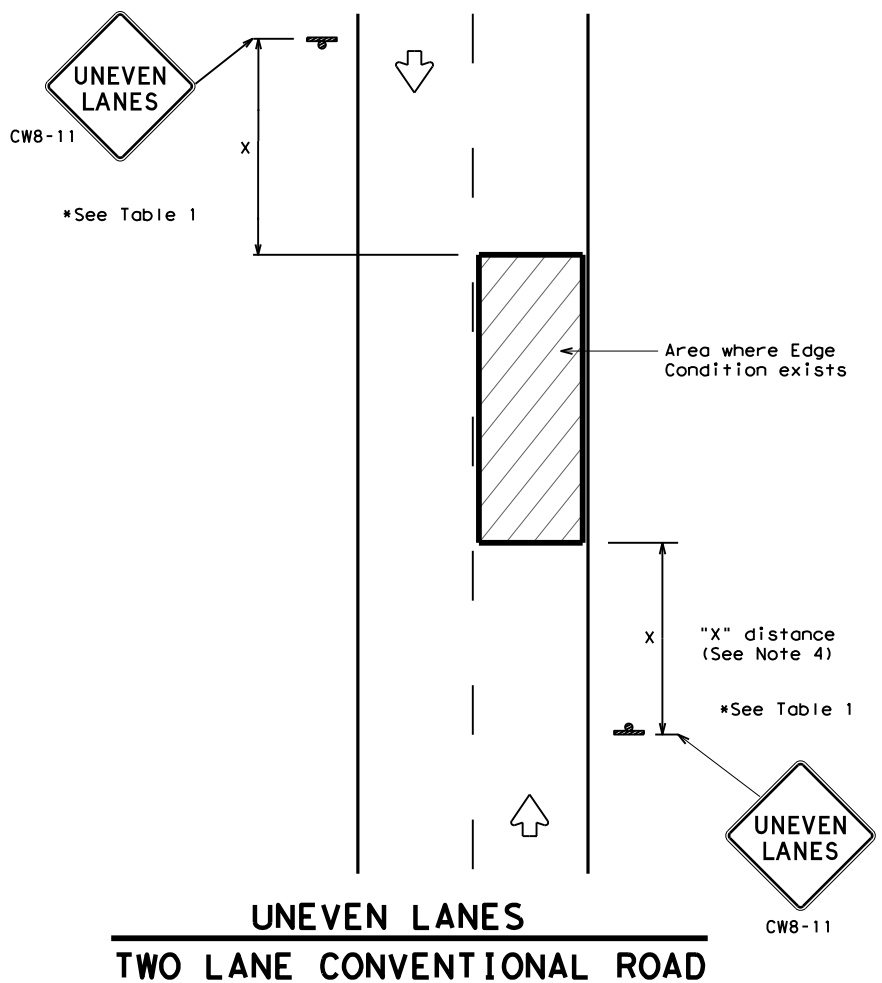
TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ (BTS-2) - 13

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2-98 10-99 7-13	DIST	COUNTY	SHEET NO.	
4-98 3-03	PAR	LAMAR	32	

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

COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B _{FL} OR TYPE C _{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

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

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

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

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



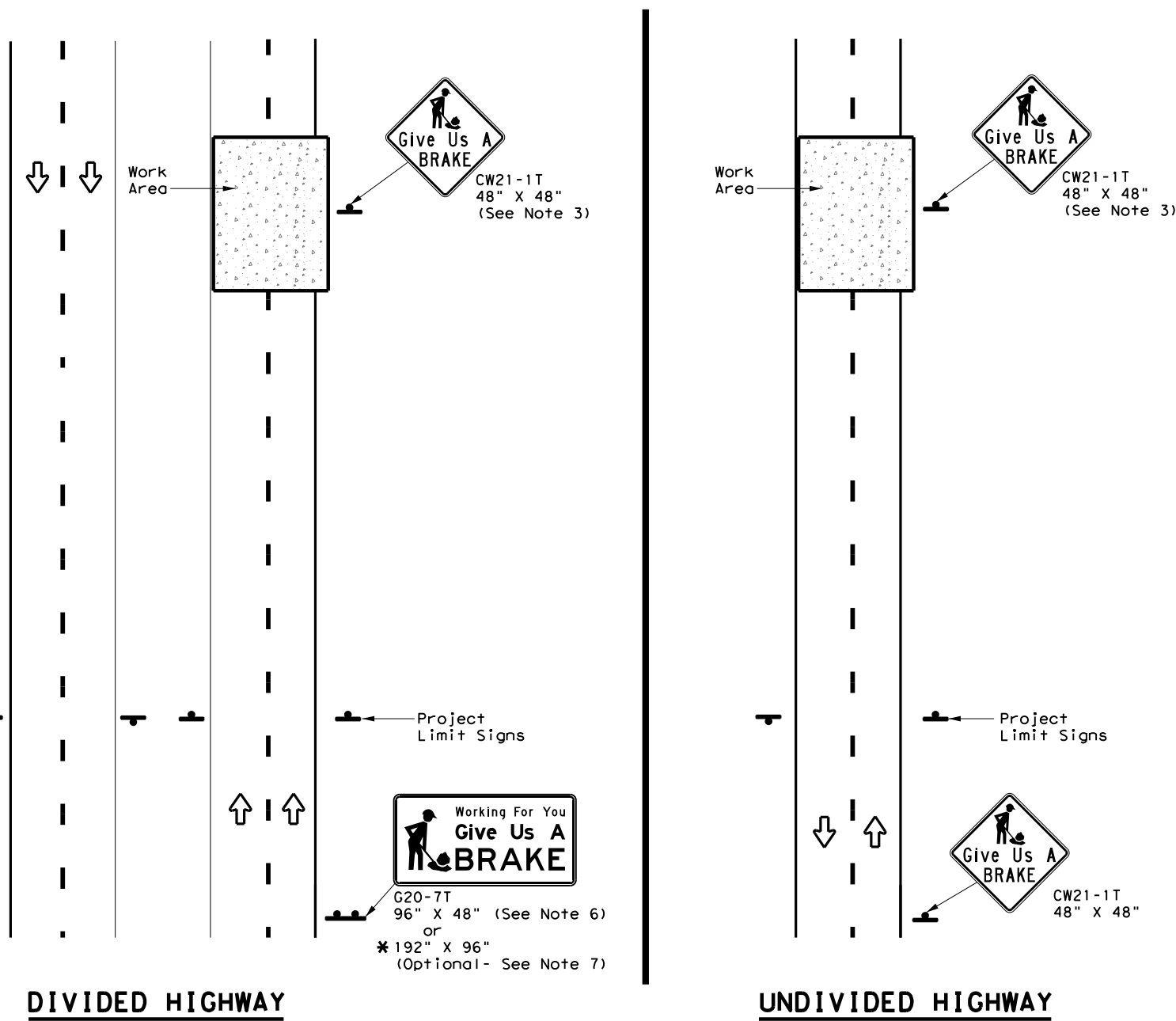
SIGNING FOR UNEVEN LANES

WZ (UL) - 13

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© TxDOT	April 1992	CONT	SECT	JOB	HIGHWAY				
REVISIONS		0045	09	110, ETC	US 82, ETC				
8-95	2-98	7-13	DIST	COUNTY	SHEET NO.				
1-97	3-03	PAR	LAMAR		33				

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DIVIDED HIGHWAY

UNDIVIDED HIGHWAY

SIGNS ARE SHOWN FOR ONE DIRECTION OF TRAVEL

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

SUMMARY OF LARGE SIGNS

BACKGROUND COLOR	SIGN DESIGNATION	SIGN	SIGN DIMENSIONS	REFLECTIVE SHEETING	SQ FT	GALVANIZED STRUCTURAL STEEL		DRILLED SHAFT
						Size	(LF)	
							① ②	24" DIA. (LF)
Orange	G20-7T		96" X 48"	Type B _{FL} or C _{FL}	32	▲	▲ ▲	▲
Orange	G20-7T		192" X 96"	Type B _{FL} or C _{FL}	128	W8x18	16 17	12

▲ See Note 6 Below

LEGEND

	Sign
	Large Sign
	Traffic Flow

DEPARTMENTAL MATERIAL SPECIFICATIONS

PLYWOOD SIGN BLANKS	DMS-7100
ALUMINUM SIGN BLANKS	DMS-7110
SIGN FACE MATERIALS	DMS-8300

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

GENERAL NOTES

- See BC and SMD sheets for additional sign support details.
- Sign locations shall be approved by the Engineer.
- For projects more than two miles in length, Give Us a BRAKE signs should be repeated halfway through the project. The Give Us a Brake (CW21-1T) may be used for this purpose.
- Work zone speed limits are sometimes used in conjunction with GIVE US A BRAKE signing. See BC(3) for location and spacing of construction speed zone signing when required.
- Give Us a Brake (CW21-1T) signs and supports shall be considered subsidiary to Item 502, "Barricades, Signs and Traffic Handling."
- The 96" X 48" Working For You Give Us A BRAKE (G20-7T) may use a 1/2" or 5/8" plywood substrate or 0.125" aluminum sheeting substrate and may be supported by two 4" x 6" wood posts with drilled holes for breakaway as per BC(5) and will be subsidiary to Item 502.
- The Working For You Give Us A BRAKE (G20-7T) 192" X 96" sign shall be paid for under the following specification items:
 Item 636 - Aluminum Signs
 Item 647 - Large Roadside Sign Supports and Assemblies.
 Item 416 - Drilled Shaft Foundations
- All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.

Texas Department of Transportation
 Traffic Operations Division Standard

**WORK ZONE
 "GIVE US A BRAKE"
 SIGNS**

WZ (BRK) - 13

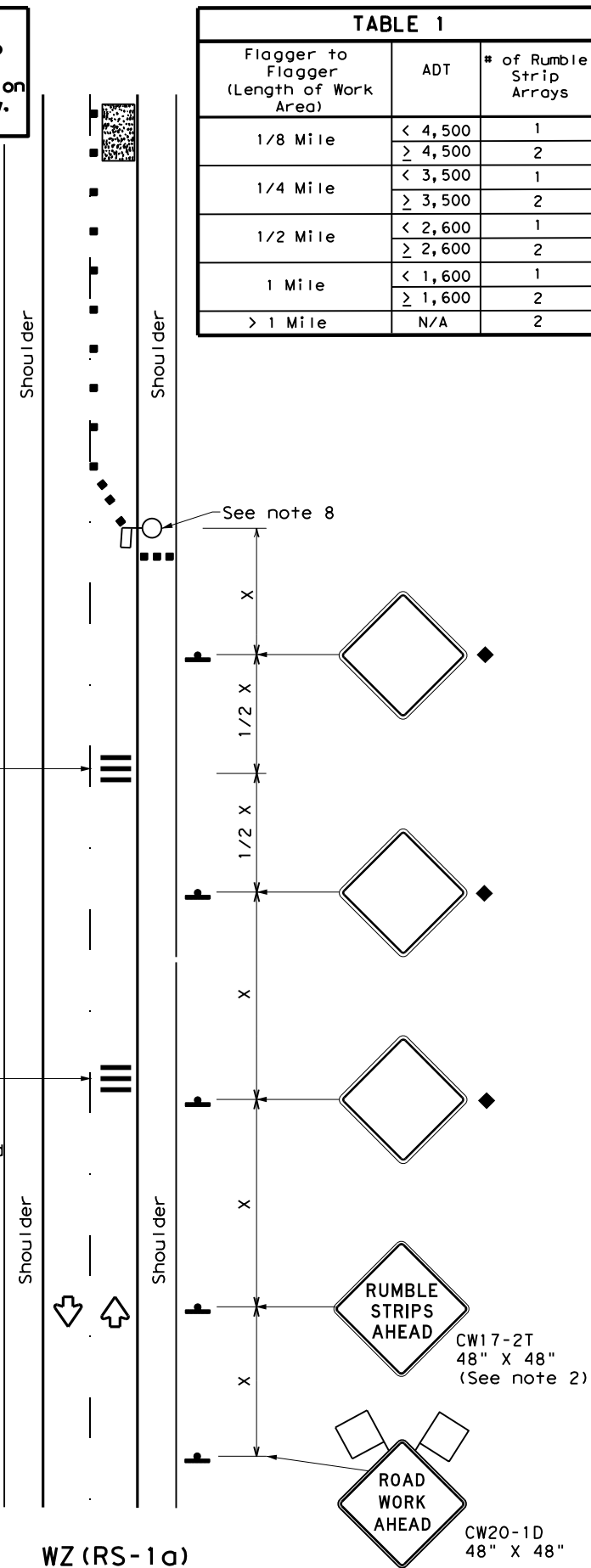
FILE: wzbrk-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT August 1995	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
6-96 5-98 7-13	DIST	COUNTY	SHEET NO.	
8-96 3-03	PAR	LAMAR	34	

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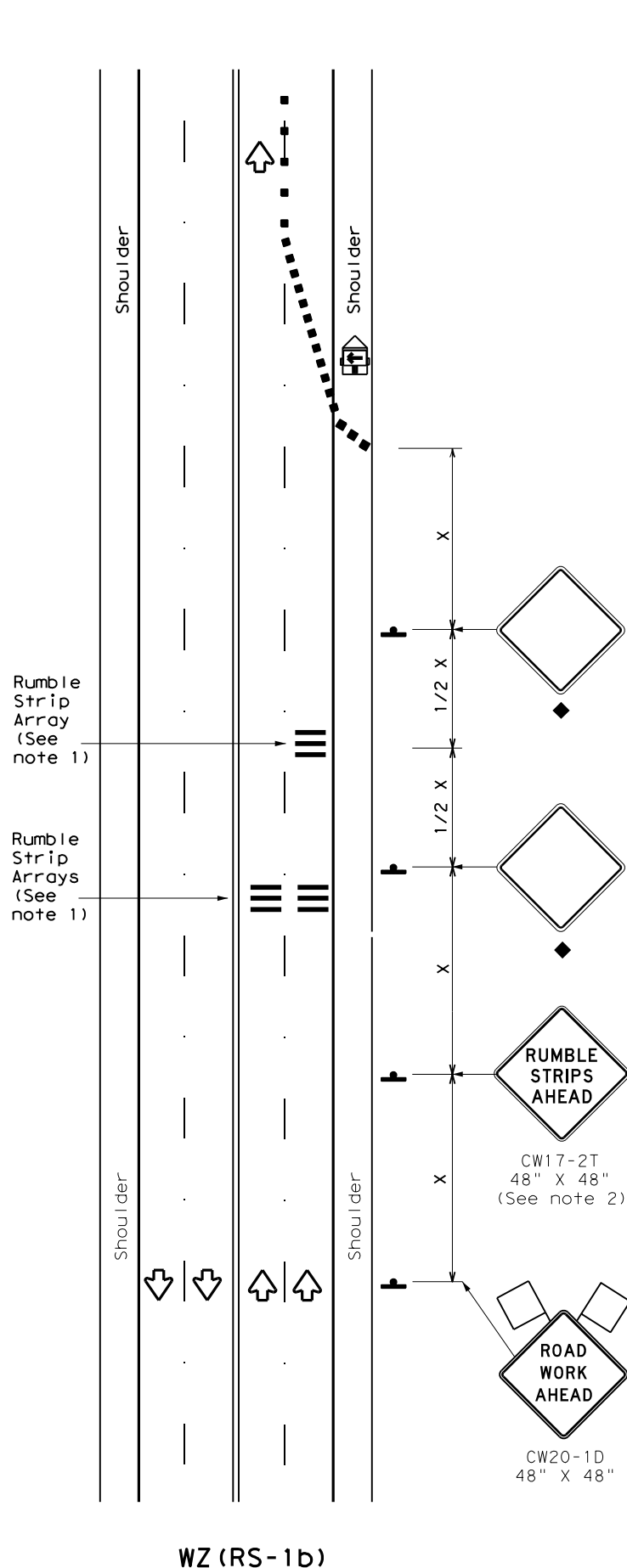
DATE: 8/31/2023 8:05:40 PM
 FILE: T:\PARTPDD\US 82 Raised Medain\Design\CAD Standards\1 TRAFFIC CONTROL\WZ (RS) Rumble Strips.dgn

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

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



RUMBLE STRIPS ON ONE-LANE TWO-WAY APPLICATION



RUMBLE STRIPS FOR LANE CLOSURE ON CONVENTIONAL ROADWAY

GENERAL NOTES

- 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.
- 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.
- Temporary Rumble Strips will be considered subsidiary to Item 502, and shall be a product listed on the Compliant Work Zone Traffic Control Devices.
- Remove Temporary Rumble Strips before removing the advanced warning signs.
- Temporary Rumble Strips should not be used on horizontal curves, loose gravel, soft or bleeding asphalt, heavily rutted pavements or unpaved surfaces.
- Temporary Rumble Strips shall be installed and maintained as per manufacturer's recommendations.
- This standard sheet shall be used in conjunction with other appropriate TCP standard, TMUTCD typical application or project specific detail for the project.
- The one-lane two-way application may utilize a flagger, an Automated Flagger Assistance Device (AFAD) or a Portable Traffic Signal (PTS).
- Replace defective Temporary Rumble Strips as directed by the Engineer.
- Temporary Rumble Strips may be used on freeways or expressways based on engineering judgment and written direction from the Engineer.

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

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

Posted Speed *	Formula	Minimum Desirable Taper Lengths **			Suggested Maximum Spacing of Channelizing Devices		Minimum Sign Spacing "X" Distance	Suggested Longitudinal Buffer Space "B"
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent		
30	L = 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)

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

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

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

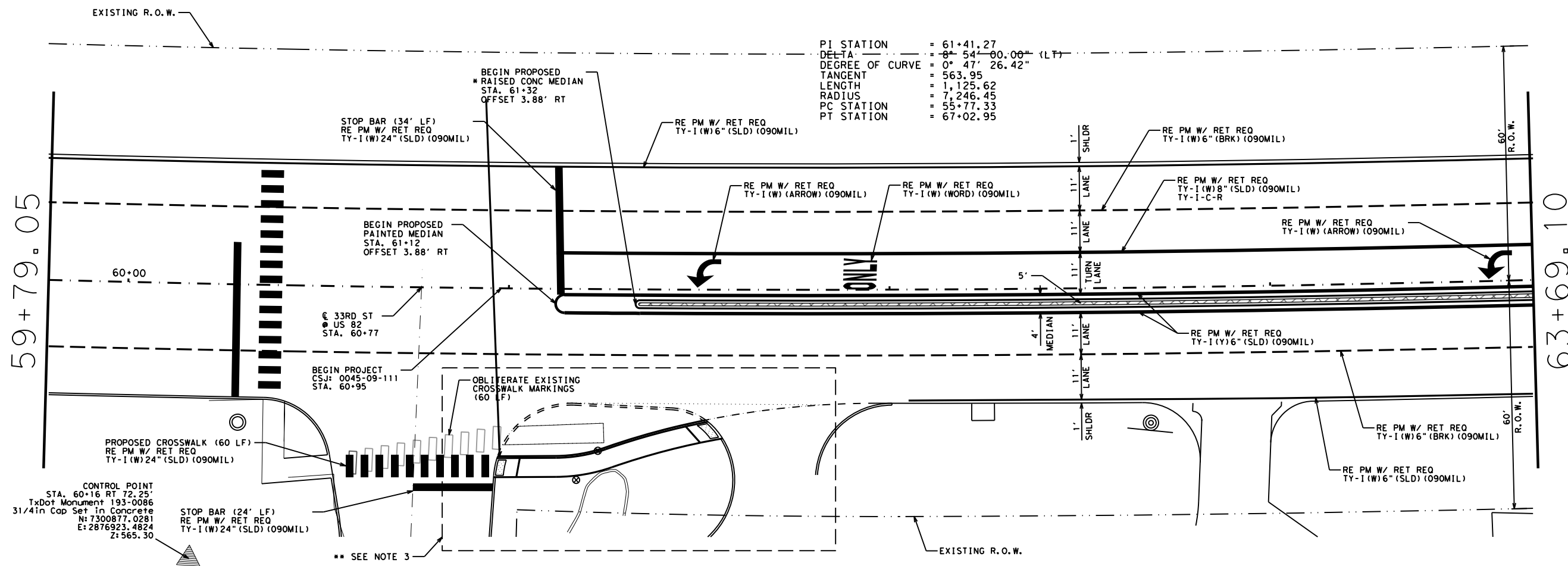
Texas Department of Transportation
 Traffic Safety Division Standard

TEMPORARY RUMBLE STRIPS

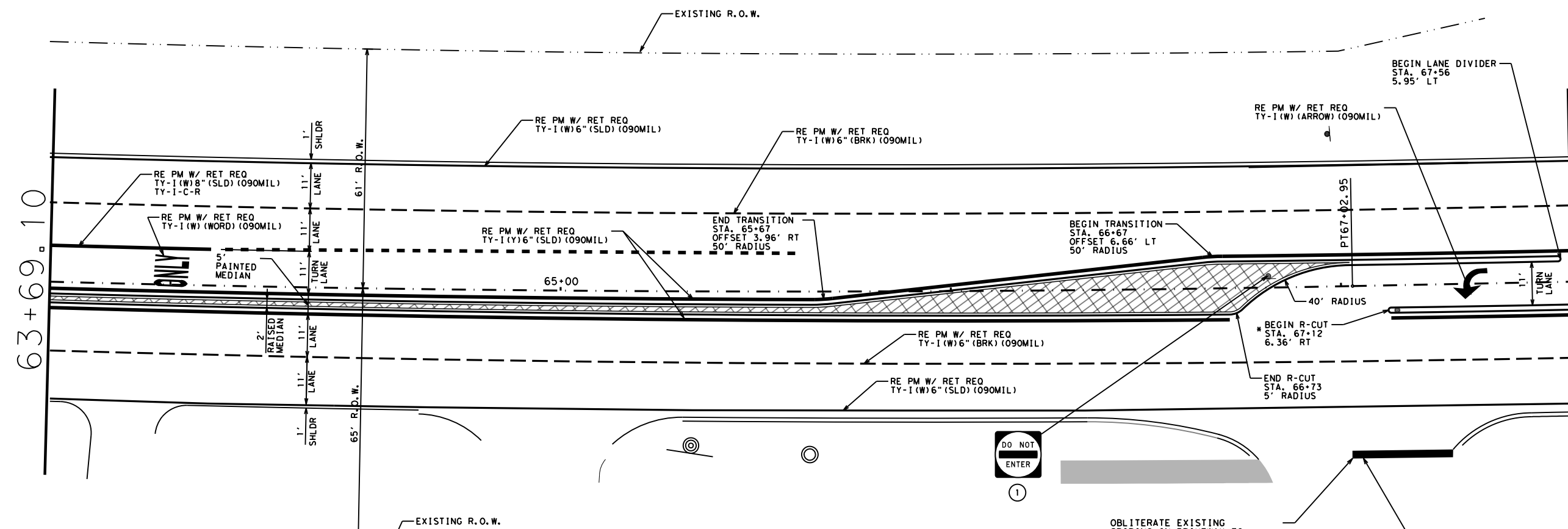
WZ (RS) - 22

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© TxDOT November 2012	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
2-14 1-22	DIST	COUNTY	SHEET NO.	
4-16	PAR	LAMAR	35	

C&G
D&E
C&G
D&E



PI STATION = 61+41.27
 DELTA = 8° 54' 00.00" (LT)
 DEGREE OF CURVE = 0° 47' 26.42"
 TANGENT = 563.95
 LENGTH = 1,125.62
 RADIUS = 7,246.45
 PC STATION = 55+77.33
 PT STATION = 67+02.95



Monte R. Rater P.E.
 9.02.2023
 STATE OF TEXAS
 MONTE L. RATER
 95859
 LICENSED PROFESSIONAL ENGINEER

US 82
 PLAN
 LAYOUT

SHEET 1 OF 5
 © 2023

CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	36	

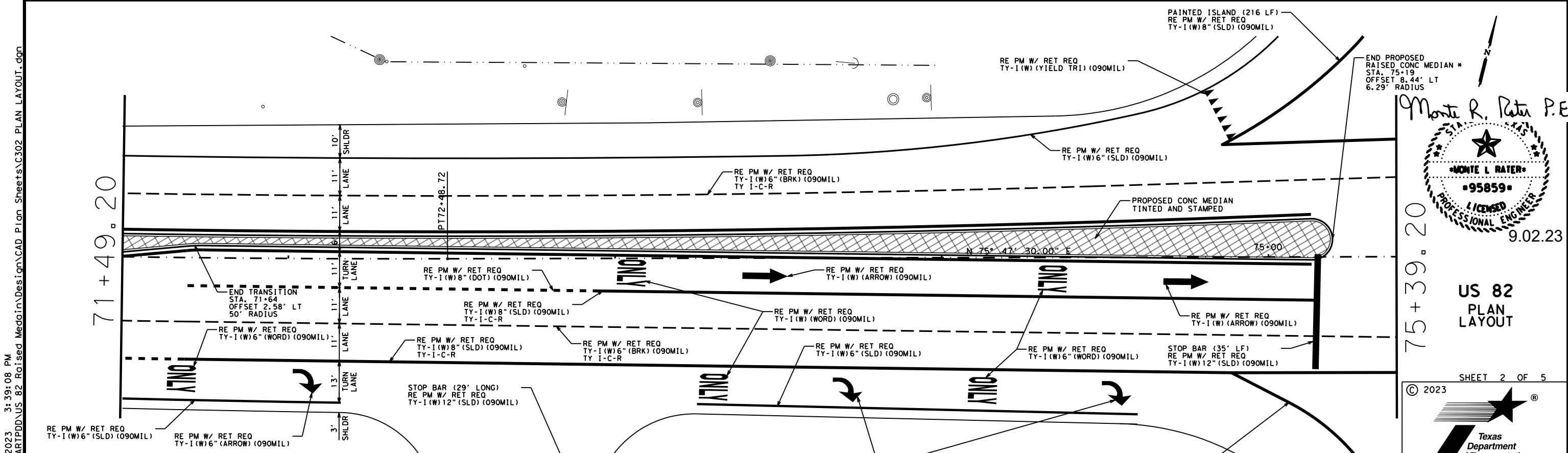
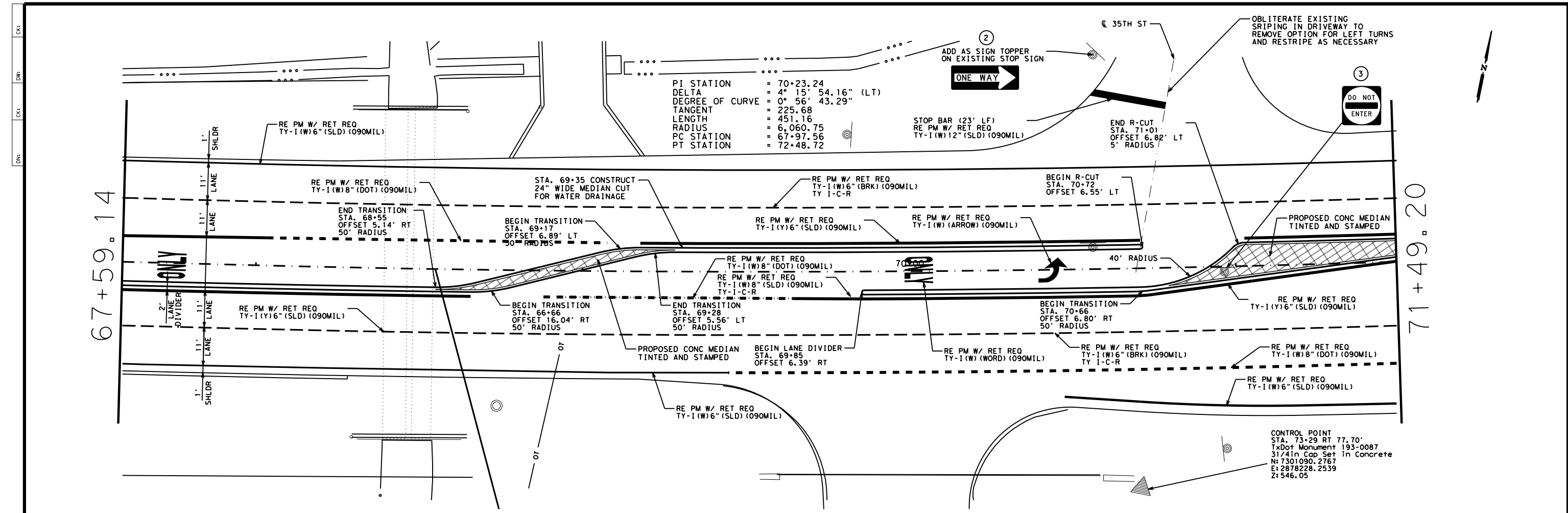
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NOTES:
 1. REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
 * 2. TAPER IN MEDIAN NOSE AS SHOWN IN "RAISED MEDIAN DETAIL" SHEET.
 * 3. SEE "INTERSECTION DETAILS" SHEET FOR 6" CURB & GUTTER AND SIGNAL RELOCATING DETAILS.

OBLITERATE EXISTING STRIPING IN DRIVEWAY TO REMOVE OPTION FOR LEFT TURNS AND RESTRIPE AS NECESSARY



STOP BAR (26' LF)
 RE PM W/ RET REQ
 TY-I (W) 24" (SLD) (090MIL)



DATE: 9/2/2023 3:39:08 PM
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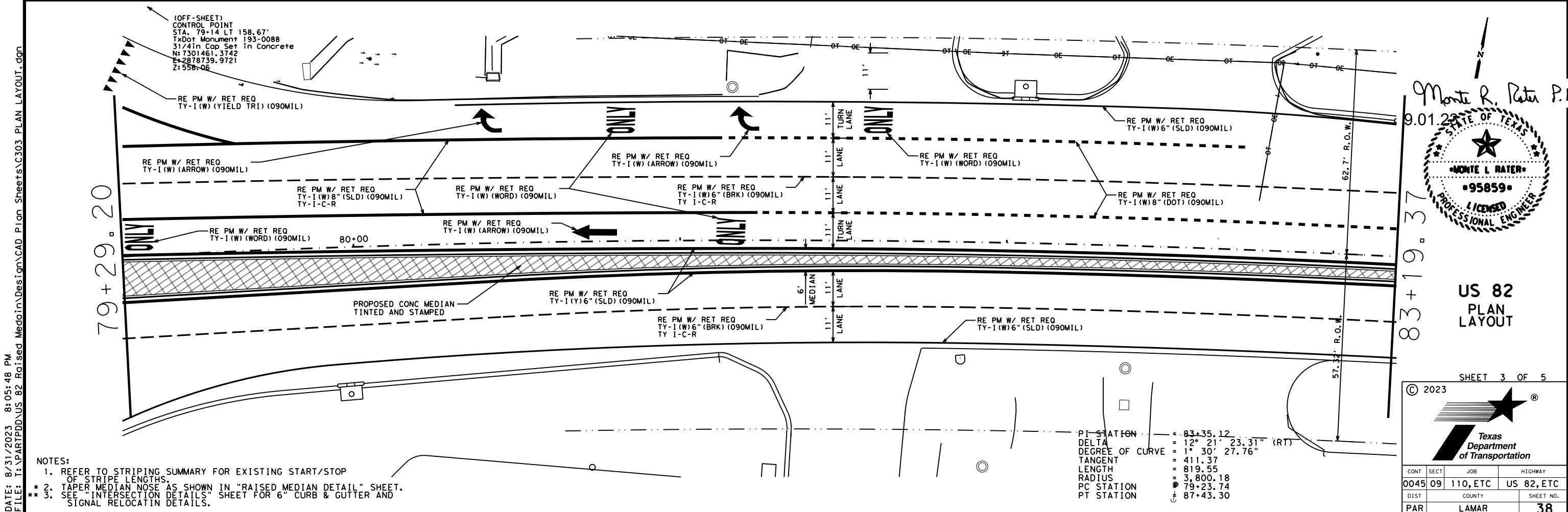
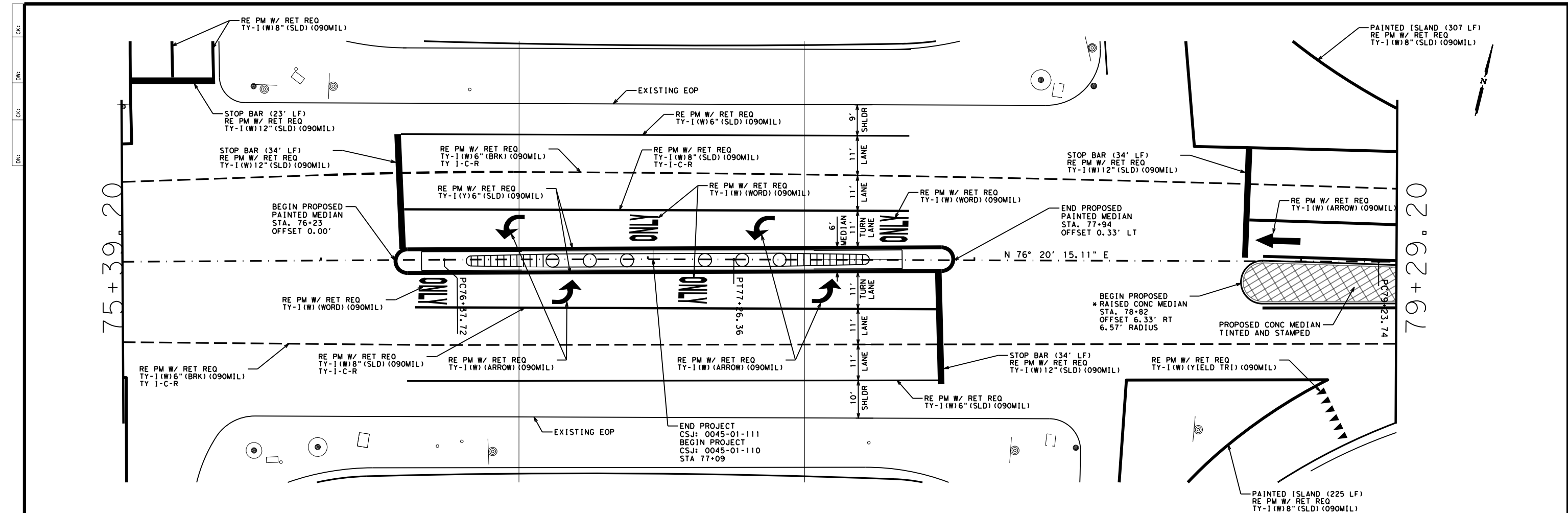
NOTES:
 1. REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
 * 2. TAPER IN MEDIAN NOSE AS SHOWN IN "RAISED MEDIAN DETAIL" SHEET.
 * 3. SEE INTERSECTION DETAILS, SHEET FOR 6" CURB & GUTTER AND SIGNAL RELOCATIN DETAILS.

Monte R. Rater P.E.
 MONTE L. RATER
 #95859
 LICENSED PROFESSIONAL ENGINEER
 9.02.23

US 82
 PLAN LAYOUT

SHEET 2 OF 5

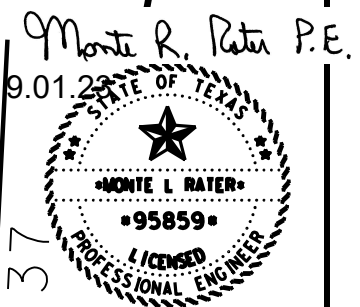
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Texas Department of Transportation			
CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	37	



DATE: 8/31/2023 8:05:48 PM
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- NOTES:
1. REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
 - * 2. TAPER MEDIAN NOSE AS SHOWN IN "RAISED MEDIAN DETAIL" SHEET.
 - * 3. SEE "INTERSECTION DETAILS" SHEET FOR 6" CURB & GUTTER AND SIGNAL RELOCATIN DETAILS.

PI STATION	= 83+35.12
DELTA	= 12° 21' 23.31" (RT)
DEGREE OF CURVE	= 1° 30' 27.76"
TANGENT	= 411.37
LENGTH	= 819.55
RADIUS	= 3,800.18
PC STATION	= 79+23.74
PT STATION	= 87+43.30



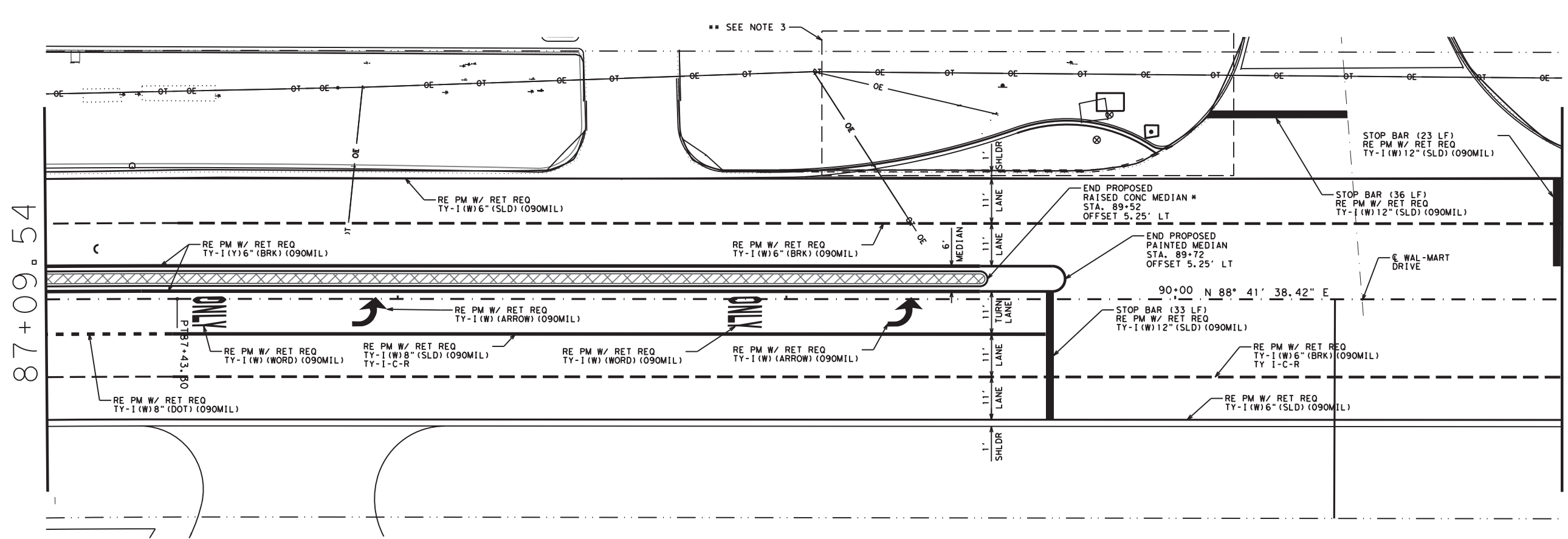
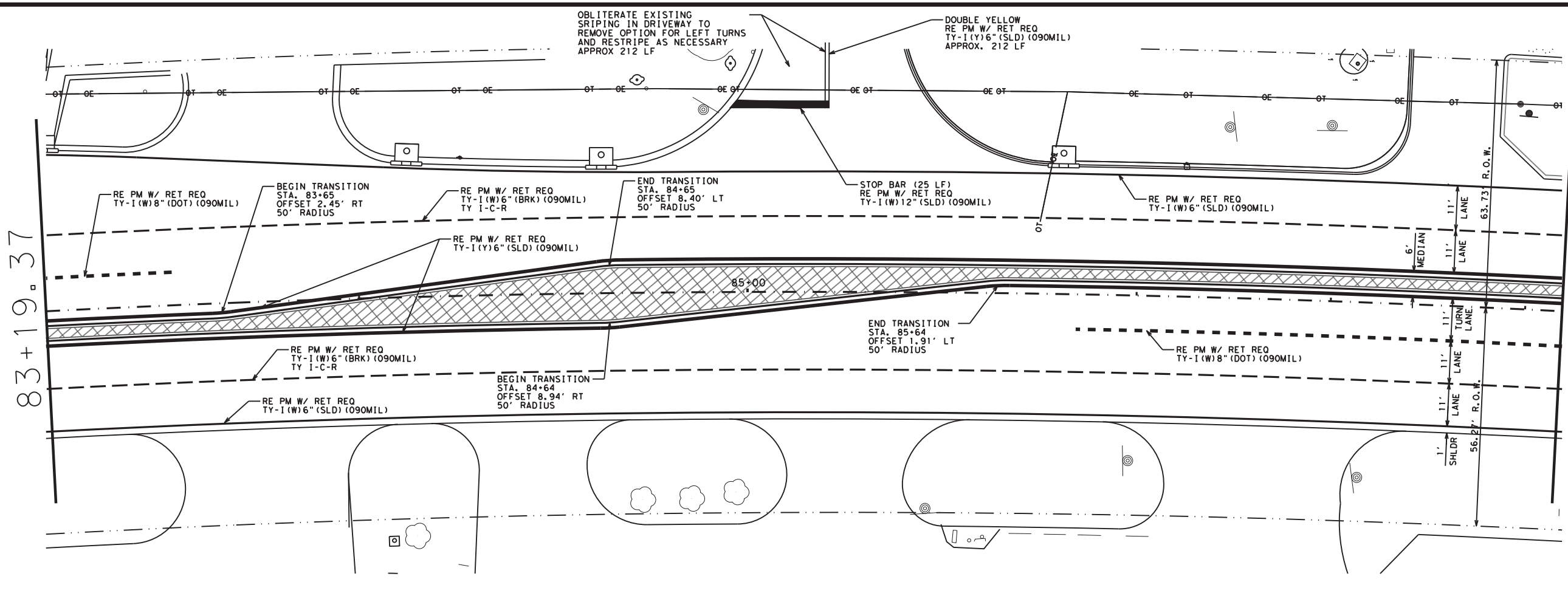
9.01.22
 83+19.37
 79+29.20
 US 82
 PLAN
 LAYOUT

SHEET 3 OF 5

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY		SHEET NO.
PAR	LAMAR		38

DATE: 9/2/2023 3:39:10 PM
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NOTES:
1. REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
* 2. TAPER IN MEDIAN NOSE AS SHOWN IN "RAISED MEDIAN DETAIL" SHEET.
* 3. SEE "INTERSECTION DETAILS" SHEET FOR 6" CURB & GUTTER AND SIGNAL RELOCATING DETAILS.

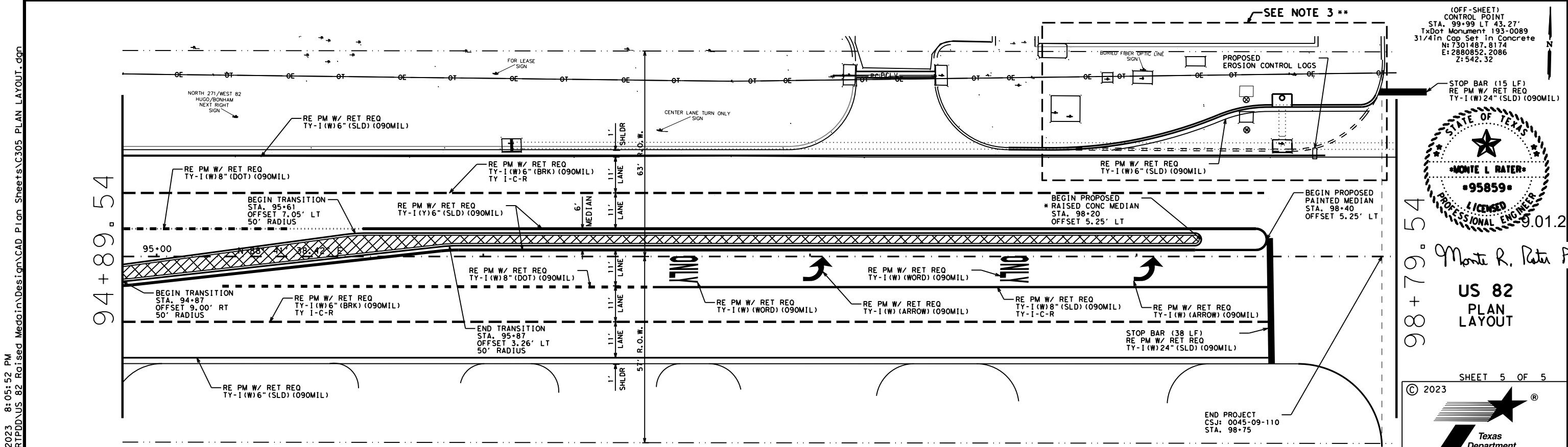
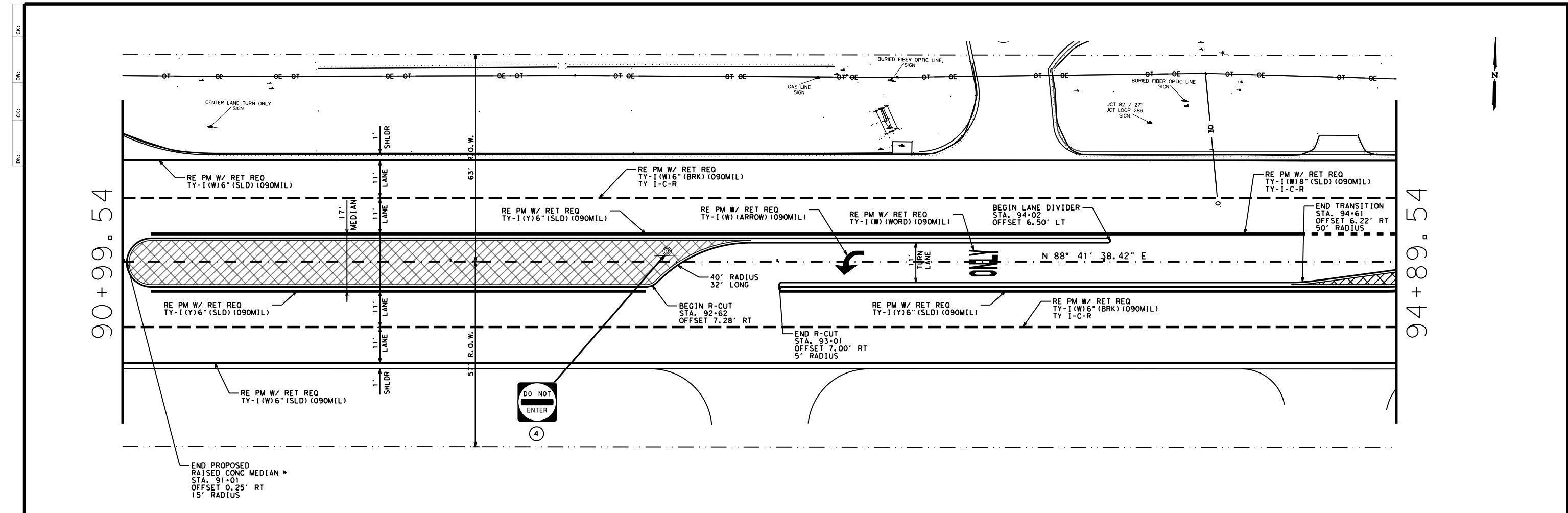
Monte R. Rater P.E.
STATE OF TEXAS
MONTE L. RATER
95859
LICENSED PROFESSIONAL ENGINEER
9.02.23

US 82
PLAN LAYOUT

SHEET 4 OF 5
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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	39	



DATE: 8/31/2023 8:05:52 PM
 FILE: I:\PARTPDD\US 82 Raised Median\Design\CAD Plan Sheets\VC305 PLAN LAYOUT.dgn

- NOTES:
- REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS.
 - TAPER IN MEDIAN NOSE AS SHOWN IN "RAISED MEDIAN DETAIL" SHEET.
 - SEE INTERSECTION DETAILS SHEET FOR 6" CURB & GUTTER AND SIGNAL RELOCATING DETAILS.

(OFF-SHEET) CONTROL POINT
 STA. 99+99 LT 43.27'
 TxDOT Monument 193-0089
 31/4in Cap Set in Concrete
 N: 7301487.8174
 E: 2880852.2086
 Z: 542.32

STOP BAR (15 LF)
 RE PM W/ RET REQ
 TY-I(W)24" (SLD) (090MIL)

STATE OF TEXAS
 MONTE L. RATER
 95859
 LICENSED PROFESSIONAL ENGINEER

9.01.23
 Monte R. Rater P.E.

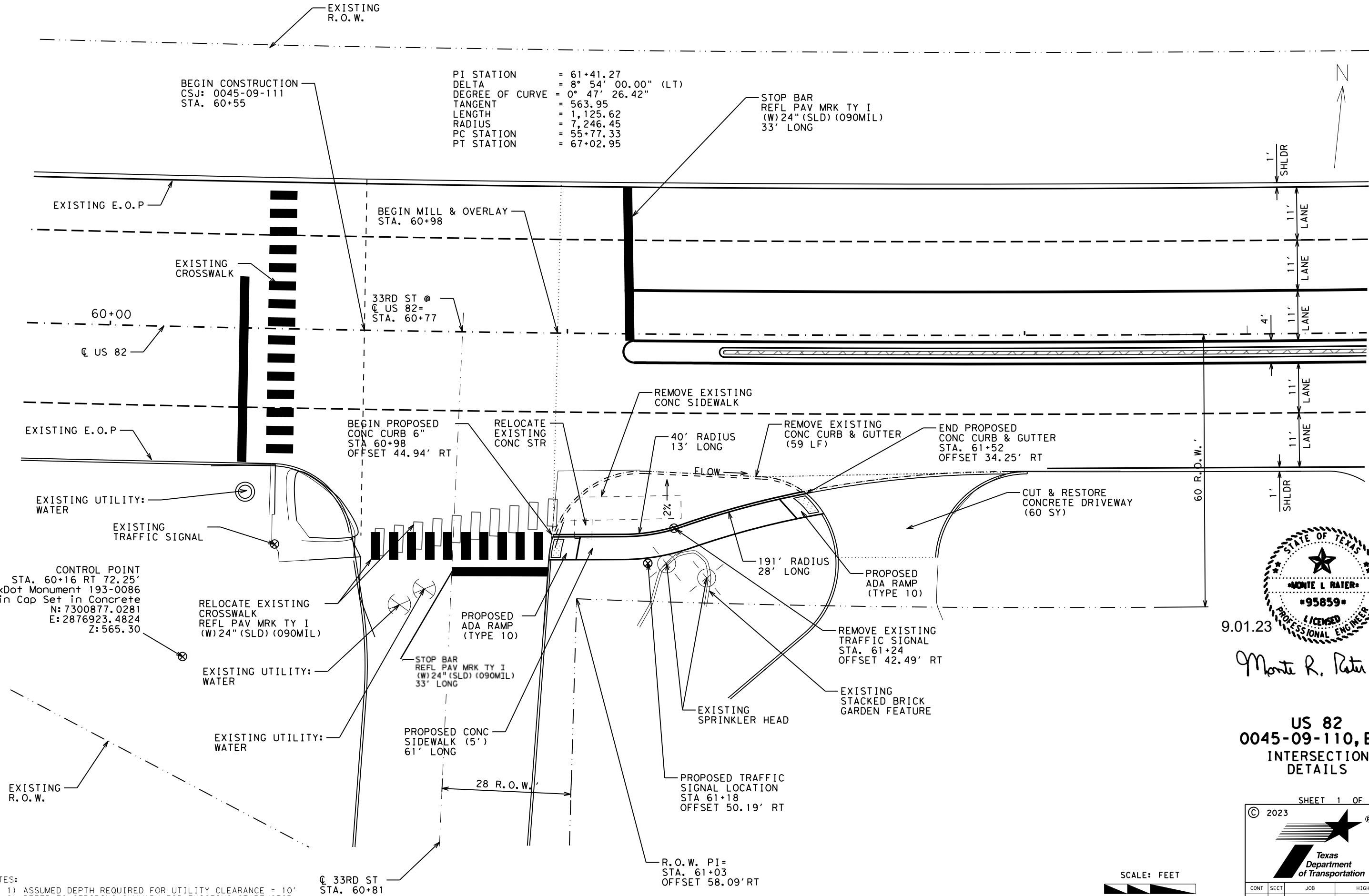
US 82
 PLAN LAYOUT

SHEET 5 OF 5
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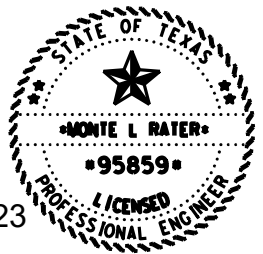
Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY	SHEET NO.	
PAR	LAMAR	40	

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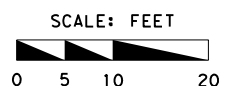


NOTES:
1) ASSUMED DEPTH REQUIRED FOR UTILITY CLEARANCE = 10'
2) REFER TO STRIPING SUMMARY FOR EXISTING START/STOP OF STRIPE LENGTHS



9.01.23
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US 82
0045-09-110, ETC
INTERSECTION
DETAILS

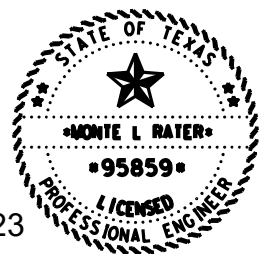
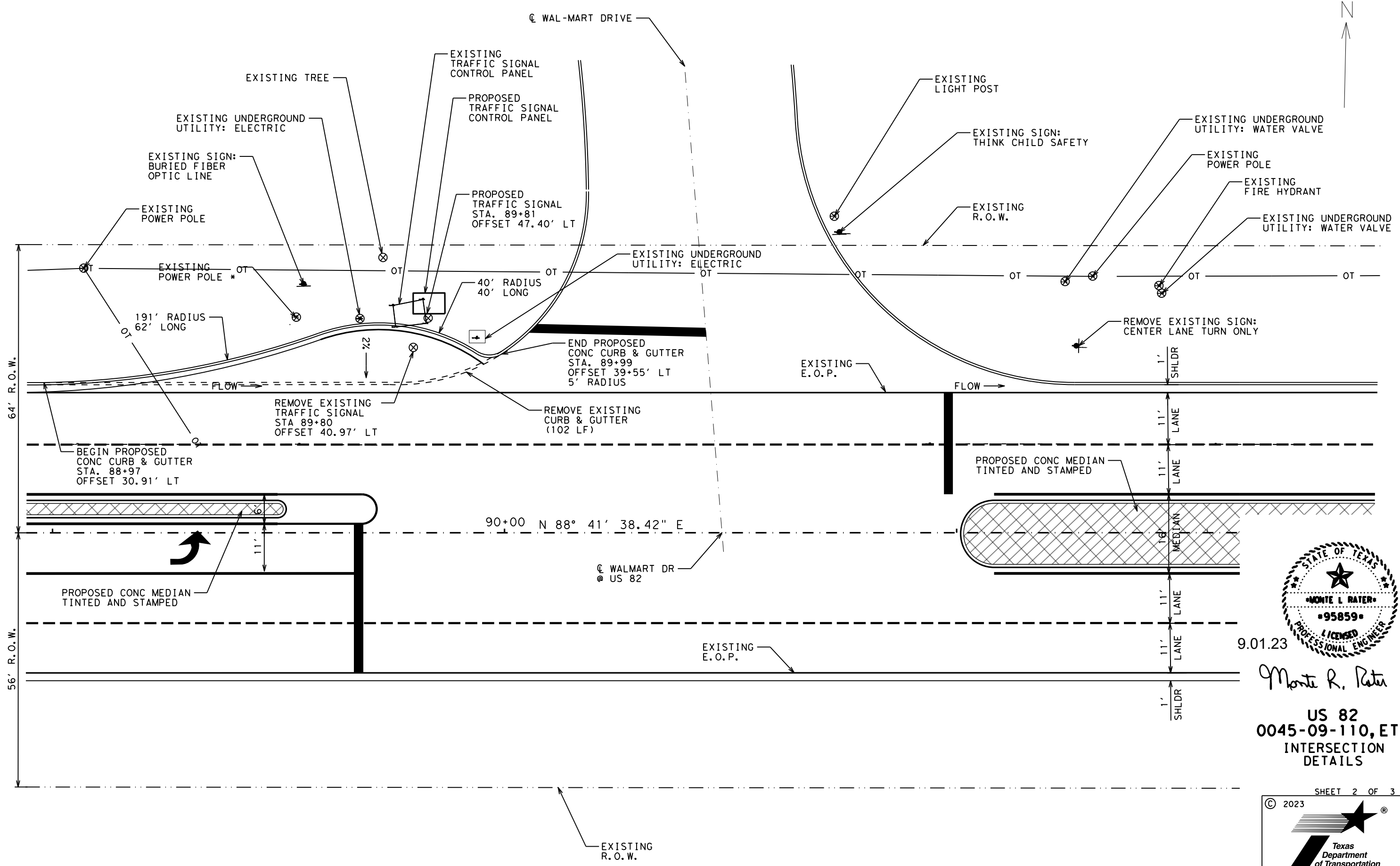


SHEET 1 OF 3

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	41	

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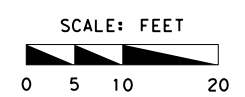


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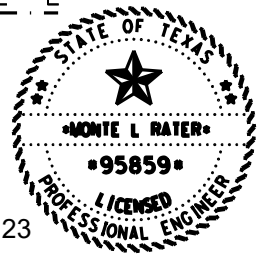
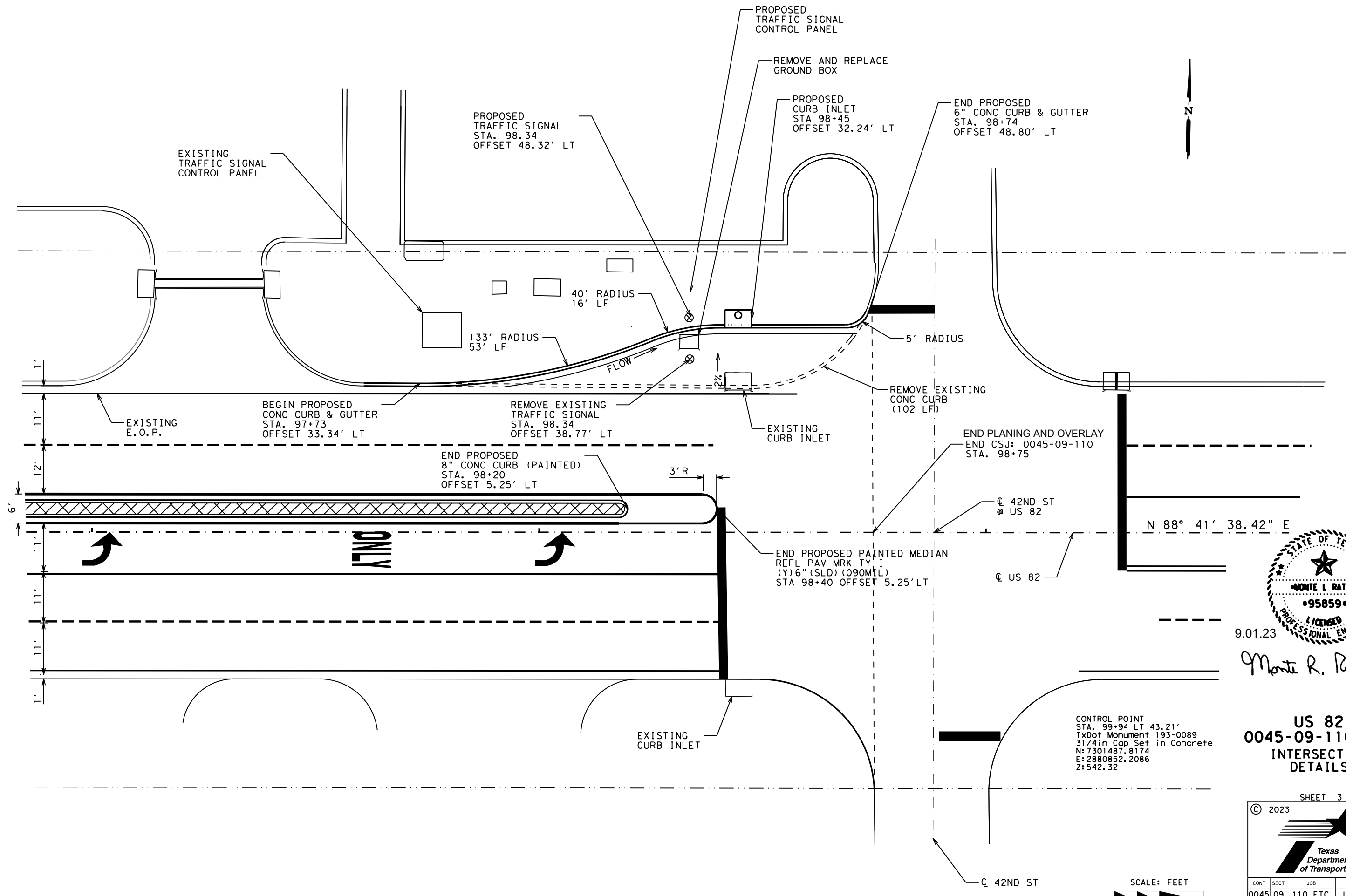
US 82
0045-09-110, ETC
INTERSECTION
DETAILS

SHEET 2 OF 3

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	42	



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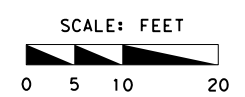
**US 82
 0045-09-110, ETC
 INTERSECTION
 DETAILS**

CONTROL POINT
 STA. 99+94 LT 43.21'
 TxDot Monument 193-0089
 31/4in Cap Set in Concrete
 N: 7301487.8174
 E: 2880852.2086
 Z: 542.32

SHEET 3 OF 3

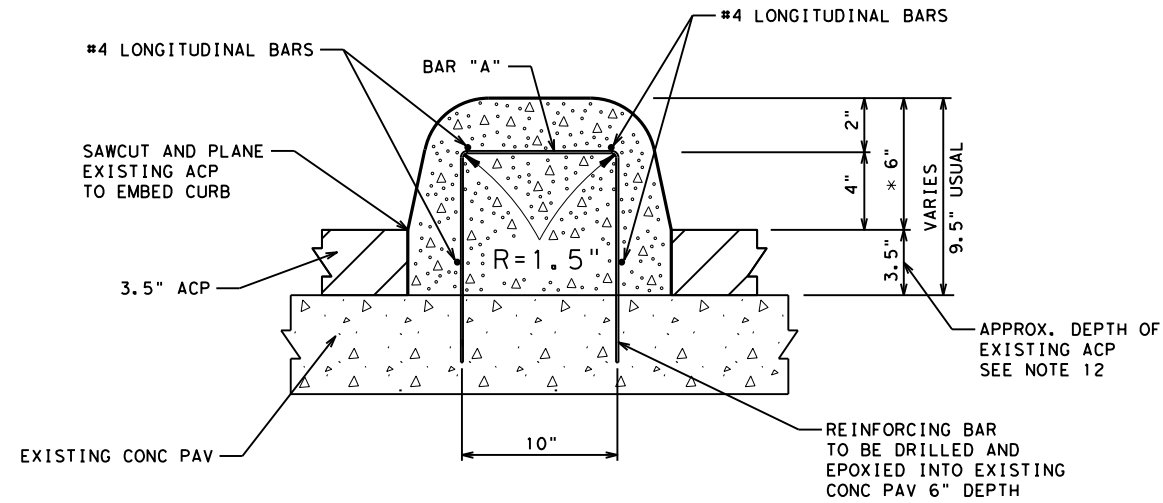
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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY		SHEET NO.
PAR	LAMAR		43



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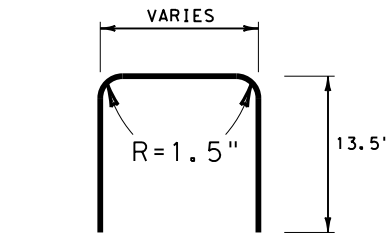
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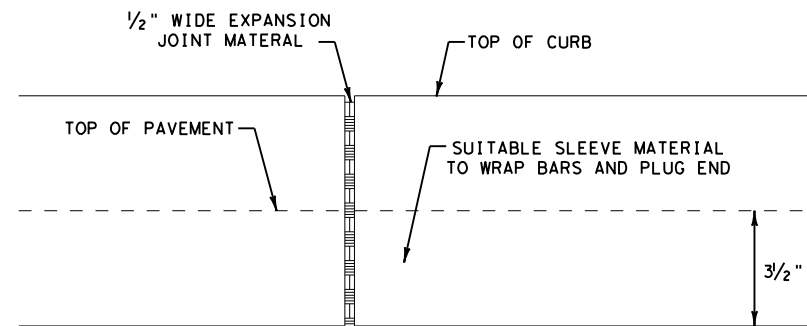
*NOTE: EXISTING SURFACE ELEVATION= PROPOSED SURFACE ELEVATION
FINAL CURB HEIGHT TO BE 6" ABOVE FINISHED GRADE

CURBED LANE DIVIDER DETAIL

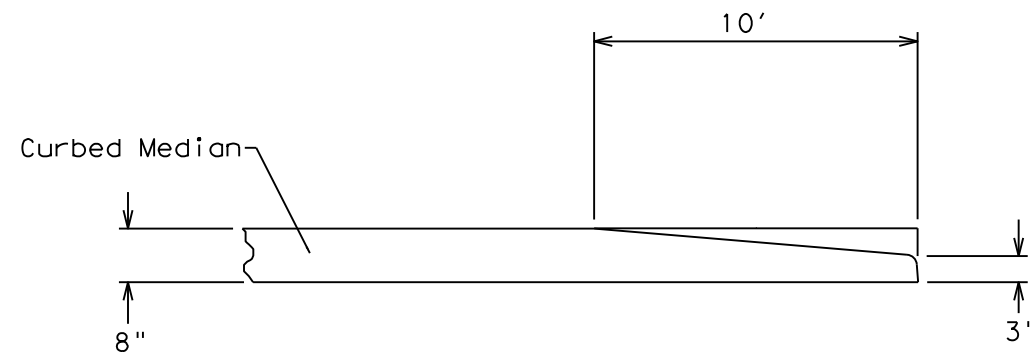
BACK TO BACK CURB TO BE COMPLETED AS A MONOLITHIC POUR TYPE II CURB 6" HEIGHT
DOWELED VERTICAL JOINT
REFER TO STANDARD CCCG-22



FOR EXISTING PAVEMENT,
DRILL 6" DEPTH INTO PAVEMENT.
SECURE WITH TY III EPOXY,
CLASS "E" OR "F".



EXPANSION JOINT DETAIL
SEE NOTE 13



**TAPERED MEDIAN NOSE DETAIL
PROFILE VIEW**

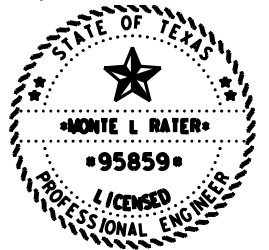
TAPERED NOSE IS ONLY TO BE USED ON
RAISED MEDAIN. DO NOT TAPER NOSE OF
BACK TO BACK MONOLITHIC CURBED LANE DIVIDERS.

GENERAL NOTES

- ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH ITEM 529, "CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER".
- ALL CONCRETE SHALL BE CLASS "A".
- ALL REINFORCING BARS SHALL BE #4, GRADE 60, UNLESS OTHERWISE SHOWN.
- TYPE II CURB TO BE 6" IN HEIGHT FROM FINISHED GRADE OF ROADWAY.
- ROUND EXPOSED SHARP EDGES WITH A ROUNDING TOOL, TO A MINIMUM RADIUS OF 1/4".
- ALL EXISTING ACP, CURBS, AND DRIVEWAYS TO REMOVED SHALL BE SAW CUT FULL DEPTH OR REMOVED AT EXISTING JOINTS.
- WHERE CONCRETE CURB IS PLACED ON EXISTING CONCRETE PAVEMENT, A HOLE SHALL BE DRILLED 6" INTO EXISTING PAVEMENT AND REBAR SECURED WITH TY III EPOXY, CLASS "E" OR "F".
- EXPANSION AND CONTRACTION JOINTS SHALL BE CONSTRUCTED TO MATCH EXISTING CONCRETE 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 AT 50' INTERVALS AND SHALL BE PROVIDED AT STRUCTURES, CURB RETURNS AT STREETS OR DRIVEWAYS, AND AT LOCATIONS DIRECTED BY THE ENGINEER.
- WHERE CONC MEDIAN IS LESS THAN 2' WIDTH FROM FACE OF CURB TO FACE OF CURB "BAR B" REINFORCEMENT SHALL BE PLACED EVERY 2' C-C. WHERE MEDIAN IS GREATER THAN 2' WIDTH FROM FACE OF CURB TO FACE OF CURB, REINFORCING "BAR B" SHALL BE PLACED EVERY 4' C-C.
- A SEALED, 1/2" EXPANSION JOINT SHALL BE PROVIDED WHERE CURB AND GUTTER IS ADJACENT TO SIDEWALK OR RIPRAP.
- EXPANSION JOINTS SHALL BE EVENLY SPACED WITH A 50' MAXIMUM DISTANCE BETWEEN JOINTS
- DUE TO THE POSSIBLE VARYING EXISTING ACP DEPTH, THE TOTAL CURB DEPTH MAY VARY. ADDITIONAL COSTS FOR THE MATERIAL QUANTITY (CONCRETE, ETC), LABOR, ETC., SHALL BE SUBSIDIARY TO MAINTAIN 6" PROPOSED CURB HEIGHT ABOVE PROPOSED HMAC SURFACE
- SEAL EXPANSION JOINTS WITH CLASS 8 SEALANT

Monte R. Rater P.E.

9.01.23



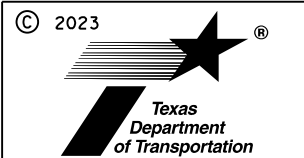
MEDIAN GENERAL NOTES:

- STAMPING OF THE TYPE A CONCRETE WILL NOT BE PAID FOR DIRECTLY BUT IS CONSIDERED SUBSIDIARY TO ITEM 528 "COLORED TEXTURED CONC (6)".
- THE TINT COLOR OF THE CONCRETE SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER. PAYMENT FOR MIXED TINT IN THE STAMPED CONCRETE WILL SUBSIDIARY TO ITEM 528 "COLORED TEXTURED CONC (6)".
- THE CONTRACTOR SHALL PROVIDE A DIE STAMP TO PRODUCE THE TEXTURE IN THE CONCRETE AS SHOWN IN THE DETAIL. ANY DEVIATION FROM THIS TEXTURE PATTERN MUST BE APPROVED BY THE ENGINEER.
- MODIFIED CURB TO BE PAID FOR BY LF ALONG THE FACE OF THE CURB UNDER ITEM 529 "CONC CURB (TY II)". WHERE CURB IS POURED BACK TO BACK FOR CURBED LANE DIVIDER, DIVIDER LENGTH IS DOUBLED TO REPRESENT BOTH FACES OF CURB LENGTH.
- THE CONTRACTOR SHALL PROVIDE A 3' x 3' COLOR AND TEXTURE SPECIMEN THREE WEEKS PRIOR TO MEDIAN CONSTRUCTION

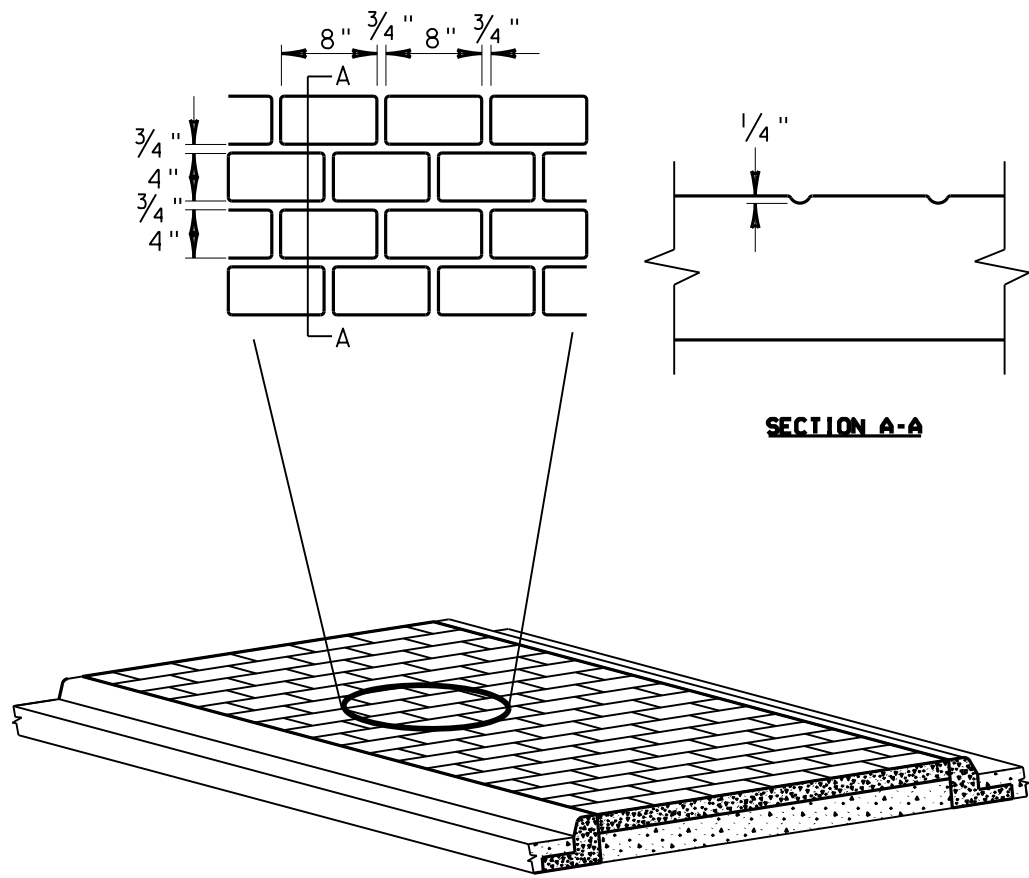
US 82
0045-09-110, ETC
RAISED MEDIAN
DETAILS

NOT TO SCALE

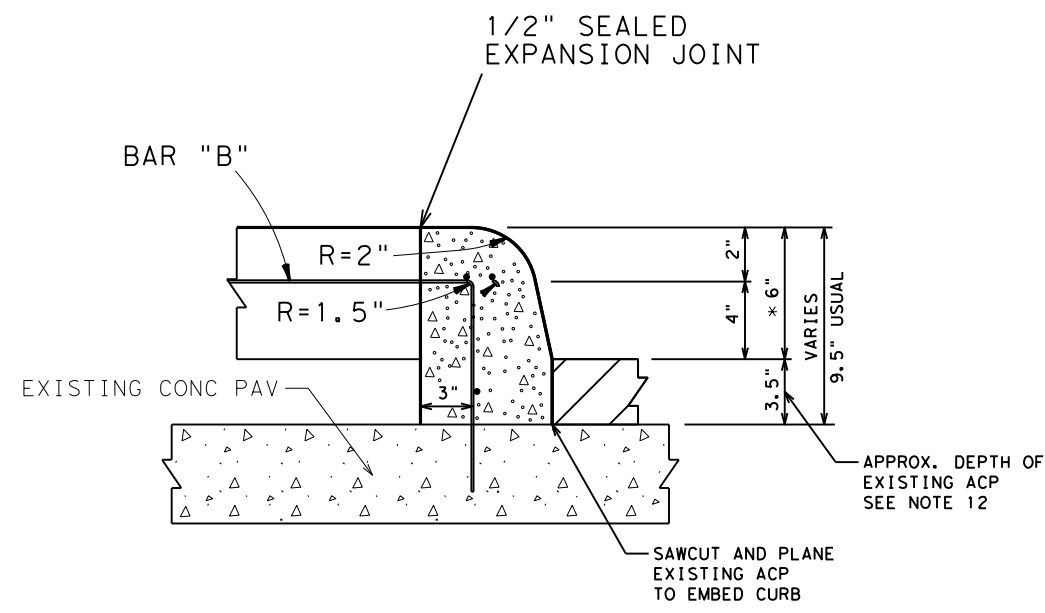
SHEET 1 OF 2



CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY		SHEET NO.
PAR	LAMAR		44



STAMPED AND STAINED CONCRETE MEDIAN



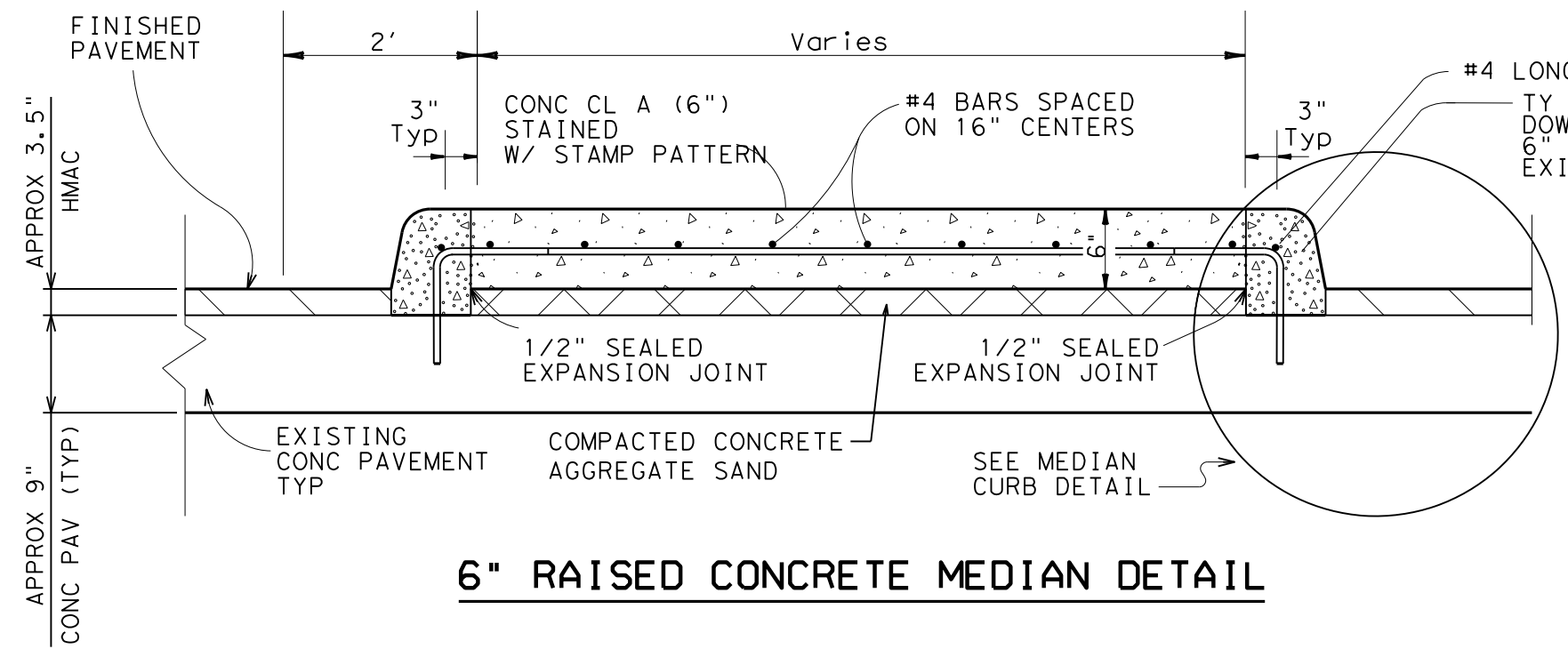
*NOTE: EXISTING SURFACE ELEVATION= PROPOSED SURFACE ELEVATION
FINAL CURB HEIGHT TO BE 6" ABOVE FINISHED GRADE

MEDIAN CURB DETAIL

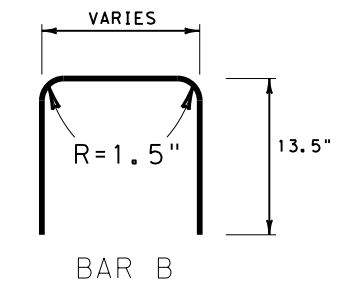
CURB TO BE COMPLETED AS A MONOLITHIC POUR
TYPE II CURB 6" HEIGHT
DOWELED VERTICAL JOINT
REFER TO STANDARD CCCG-22

GENERAL NOTES

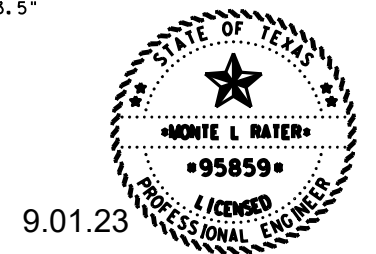
1. ALL MATERIALS AND CONSTRUCTION SHALL BE IN ACCORDANCE WITH ITEM 529, "CONCRETE CURB, GUTTER, AND COMBINED CURB AND GUTTER".
2. ALL CONCRETE SHALL BE CLASS "A".
3. ALL REINFORCING BARS SHALL BE #4, GRADE 60, UNLESS OTHERWISE SHOWN.
4. TYPE II CURB TO BE 6" IN HEIGHT FROM FINISHED GRADE OF ROADWAY.
5. ROUND EXPOSED SHARP EDGES WITH A ROUNDING TOOL, TO A MINIMUM RADIUS OF 1/4".
6. ALL EXISTING ACP, CURBS, AND DRIVEWAYS TO REMOVED SHALL BE SAW CUT FULL DEPTH OR REMOVED AT EXISTING JOINTS.
7. WHERE CONCRETE CURB IS PLACED ON EXISTING CONCRETE PAVEMENT, A HOLE SHALL BE DRILLED 6" INTO EXISTING PAVEMENT AND REBAR SECURED WITH TY III EPOXY, CLASS "E" OR "F".
8. EXPANSION AND CONTRACTION JOINTS SHALL BE CONSTRUCTED TO MATCH EXISTING CONCRETE 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 AT 50' INTERVALS AND SHALL BE PROVIDED AT STRUCTURES, CURB RETURNS AT STREETS OR DRIVEWAYS, AND AT LOCATIONS DIRECTED BY THE ENGINEER.
9. WHERE CONC MEDIAN IS LESS THAN 2' WIDTH FROM FACE OF CURB TO FACE OF CURB "BAR B" REINFORCEMENT SHALL BE PLACED EVERY 2' C-C. WHERE MEDIAN IS GREATER THAN 2' WIDTH FROM FACE OF CURB TO FACE OF CURB, REINFORCING "BAR B" SHALL BE PLACED EVERY 4' C-C.
10. A SEALED, 1/2" EXPANSION JOINT SHALL BE PROVIDED WHERE CURB AND GUTTER IS ADJACENT TO SIDEWALK OR RIPRAP.
11. EXPANSION JOINTS SHALL BE EVENLY SPACED WITH A 50' MAXIMUM DISTANCE BETWEEN JOINTS.
12. DUE TO THE POSSIBLE VARYING EXISTING ACP DEPTH, THE TOTAL CURB DEPTH MAY VARY. ADDITIONAL COSTS FOR THE MATERIAL QUANTITY (CONCRETE, ETC), LABOR, ETC., SHALL BE SUBSIDIARY TO MAINTAIN 6" PROPOSED CURB HEIGHT ABOVE PROPOSED HMA SURFACE.
13. SEAL EXPANSION JOINTS WITH CLASS 8 SEALANT.
14. PROVISION AND INSTALLATION OF CONCRETE AGGREGATE SAND BACKFILL SHALL BE SUBSIDIARY TO ITEM 528.



6" RAISED CONCRETE MEDIAN DETAIL



FOR EXISTING PAVEMENT, DRILL 6" INTO PAVEMENT. SECURE WITH TY III EPOXY, CLASS "E" OR "F".



Monte R. Rater P.E.

US 82
0045-09-110, ETC
RAISED MEDIAN
DETAILS

NOT TO SCALE

SHEET 2 OF 2

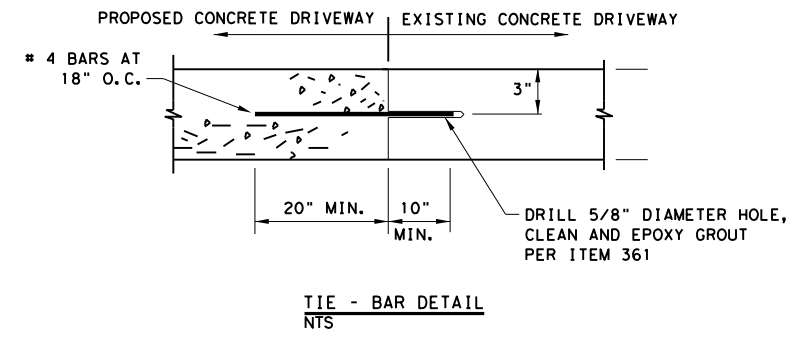
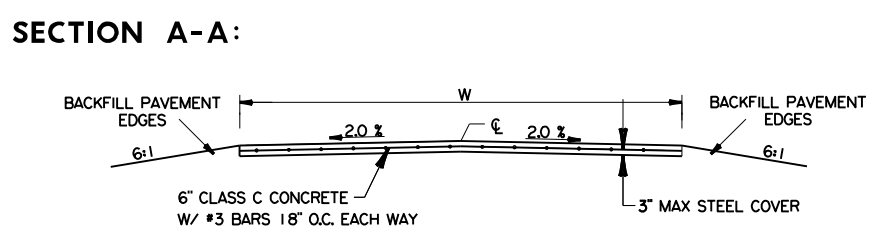
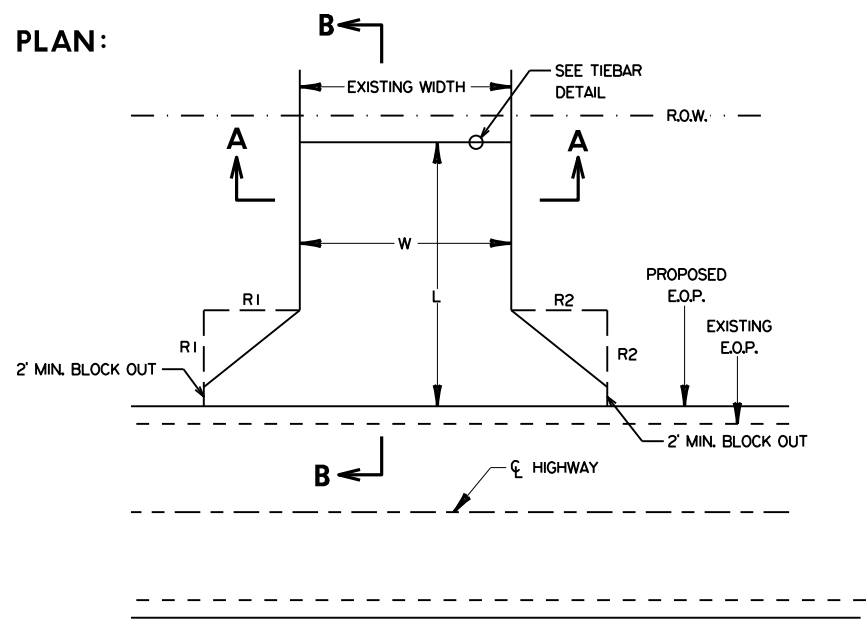
MEDIAN GENERAL NOTES:

1. STAMPING OF THE TYPE A CONCRETE WILL NOT BE PAID FOR DIRECTLY BUT IS CONSIDERED SUBSIDIARY TO ITEM 528 "COLORED TEXTURED CONC (6")".
2. THE TINT COLOR OF THE CONCRETE SHALL BE DETERMINED IN THE FIELD BY THE ENGINEER. PAYMENT FOR MIXED TINT IN THE STAMPED CONCRETE WILL SUBSIDIARY TO ITEM 528 "COLORED TEXTURED CONC (6")".
3. THE CONTRACTOR SHALL PROVIDE A DIE STAMP TO PRODUCE THE TEXTURE IN THE CONCRETE AS SHOWN IN THE DETAIL. ANY DEVIATION FROM THIS TEXTURE PATTERN MUST BE APPROVED BY THE ENGINEER.
4. MODIFIED CURB TO BE PAID FOR BY LF ALONG THE FACE OF THE CURB UNDER ITEM 529 "CONC CURB (TY II)". WHERE CURB IS POURED BACK TO BACK FOR CURBED LANE DIVIDER, DIVIDER LENGTH IS DOUBLED TO REPRESENT BOTH FACES OF CURB LENGTH.
5. THE CONTRACTOR SHALL PROVIDE A 3' x 3' COLOR AND TEXTURE SPECIMEN THREE WEEKS PRIOR TO MEDIAN CONSTRUCTION.

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY		SHEET NO.
PAR	LAMAR		45

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DWG: CJK: DWG: CJK: DWG: CJK:



NOTES:
 1. THIS WORK WILL BE MEASURED AND PAID FOR AS: DRIVEWAYS (CONC)
 2. DIMENSIONS W, L, RI AND R2 ARE PROVIDED IN THE QUANTITY SUMMARY FOR DRIVEWAYS.

CONCRETE DRIVEWAY
NTS

Monte R. Rater P.E.
 9.01.23

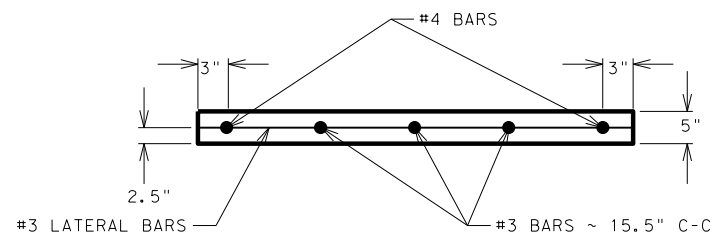
**US 82, ETC
 INTERSECTION
 AND
 DRIVEWAY DETAILS**

NOT TO SCALE

CONT	SECT	JOB	HIGHWAY
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DIST	COUNTY		SHEET NO.
PAR	LAMAR		46

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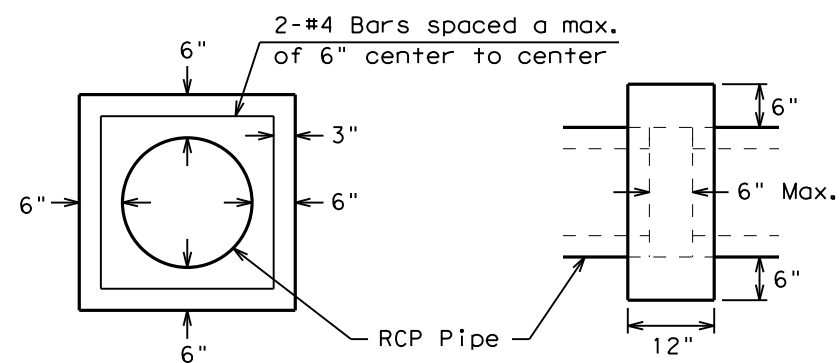
DN:
 CK:
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NOTE:
 PLACE LATERAL REBARS #3 @ 16" C-C.
 USE GRADE 60 REBAR.

SIDEWALK REBAR DETAIL

NOT TO SCALE

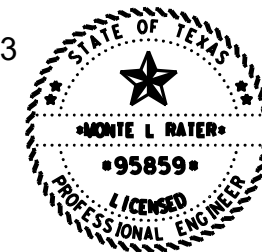


CONCRETE PIPE COLLAR DETAIL

Concrete for collar shall be Class A
 COLLAR DETAIL - NOT TO SCALE

Monte R. Rater P.E.

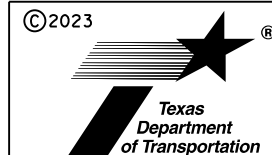
9.01.23



US 82, ETC
 0045-09-110, ETC
 MISCELLANEOUS
 DETAILS

NOT TO SCALE

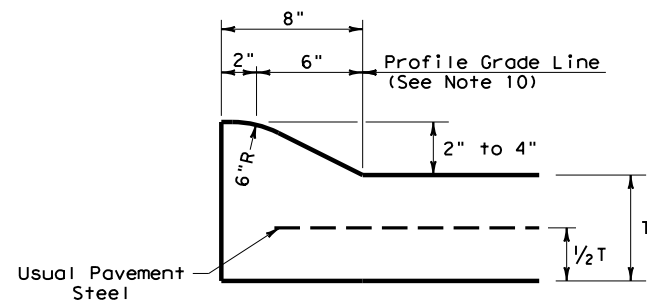
SHEET 1 OF 1



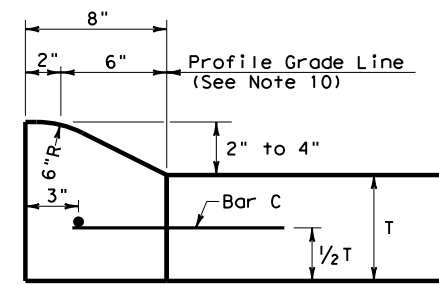
CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82, ETC
DIST	COUNTY		SHEET NO.
PAR	LAMAR		47

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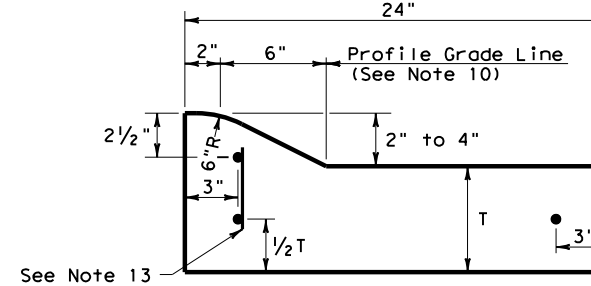
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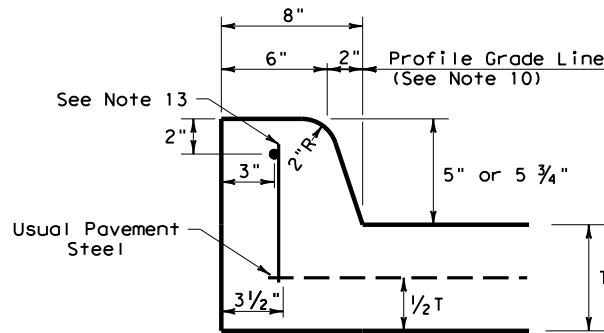
**TYPE I CURB (MONOLITHIC)
 2" - 4" HEIGHT**



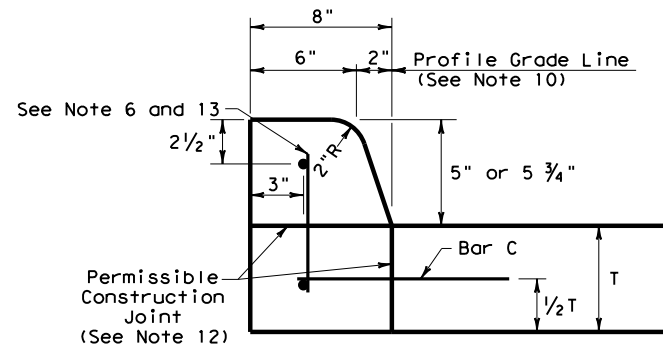
**TYPE I CURB
 2" - 4" HEIGHT**



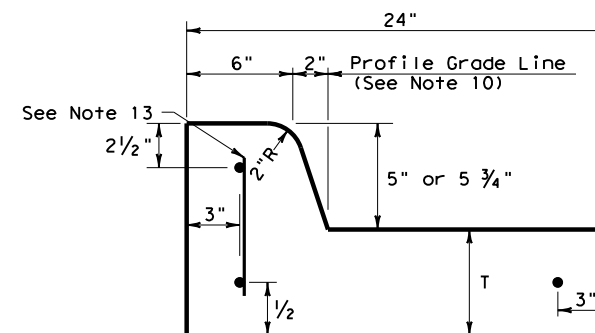
**TYPE I CURB AND GUTTER
 2" - 4" HEIGHT**



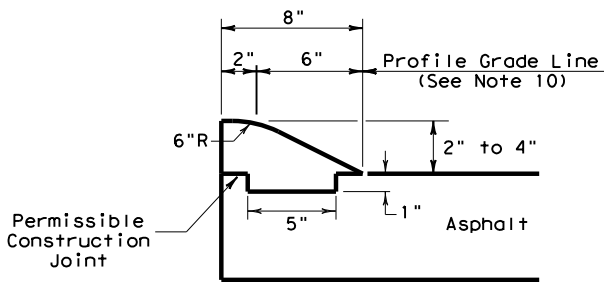
**TYPE II CURB (MONOLITHIC)
 5" - 5 3/4" HEIGHT**



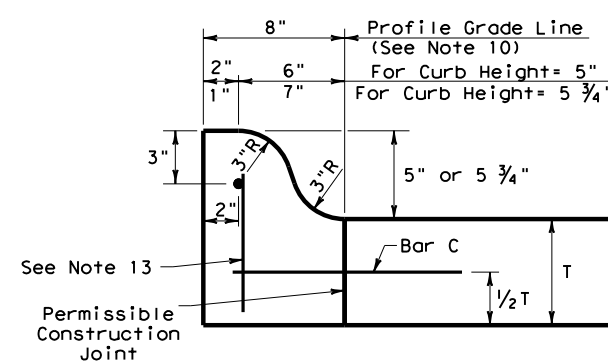
**TYPE II CURB
 5" - 5 3/4" HEIGHT**



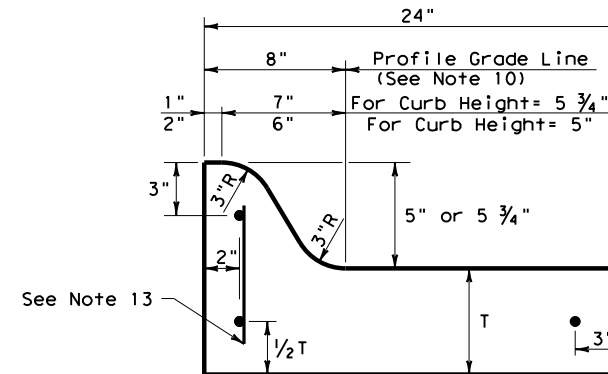
**TYPE II CURB AND GUTTER
 5" - 5 3/4" HEIGHT**



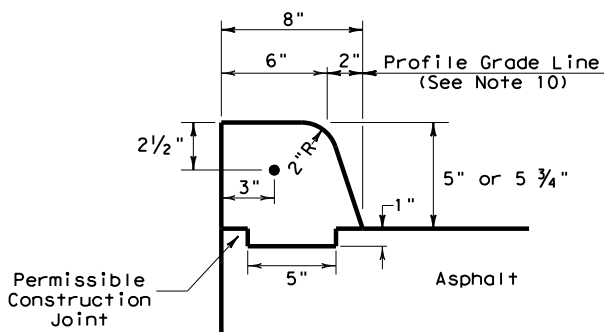
**TYPE III CURB (KEYED)
 2" - 4" HEIGHT**



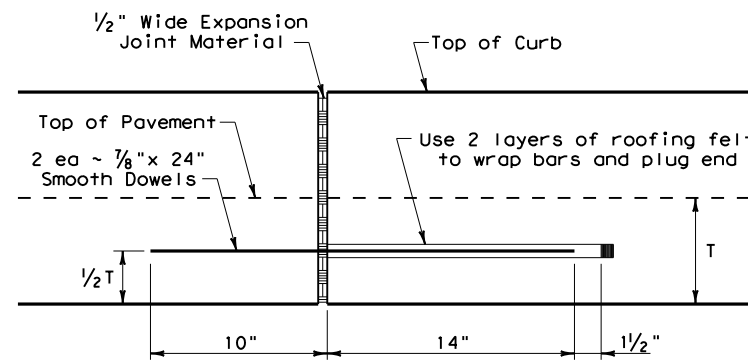
**TYPE IIa CURB
 5" - 5 3/4" HEIGHT**



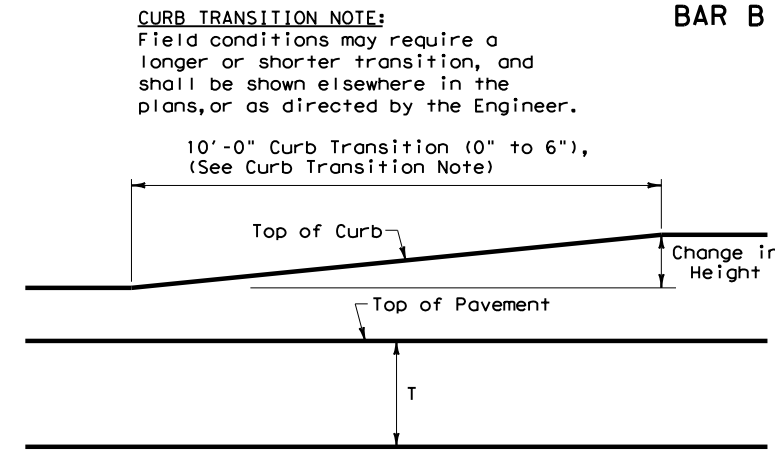
**TYPE IIa CURB AND GUTTER
 5" - 5 3/4" HEIGHT**



**TYPE IV CURB (KEYED)
 5" - 5 3/4" HEIGHT**



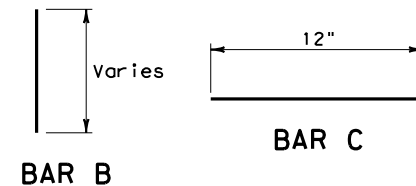
EXPANSION JOINT DETAIL



CURB TRANSITION
 Note: To be paid for as Highest Curb

GENERAL NOTES

- All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- Concrete shall be Class A.
- When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of fiber reinforced concrete in lieu of reinforcing steel is acceptable. Use fibers meeting the requirements of DMS 4550, "Fibers for Concrete," and dose fibers in accordance with Material Producers List (MPL) "Fibers for Class A and B Concrete Applications."
- Round exposed sharp edges with a rounding tool, to a minimum radius of 1/4 inch.
- All existing curbs and driveways to be removed shall be sawed or removed at existing joints.
- Where concrete curb is to be placed on existing concrete pavement, Bar B may be drilled and grouted in place, or may be inserted into fresh concrete.
- Expansion and contraction joints shall be constructed to match pavement joints in all curbs and 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, and at locations directed by The Engineer.
- Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at four feet C-C.
- Dimension 'T' shown is the thickness of concrete pavement. When curb is installed adjacent to flexible pavement dimension 'T' is 8" maximum.
- Usual profile grade line. Refer to typical sections and plan-profile sheets for exact locations.
- One-half inch expansion joint material shall be provided where curb or curb and gutter is adjacent to sidewalk or riprap.
- When horizontal permissible construction joints are used, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans. Reinforcing steel for curb section shall then conform to that required for concrete curb.
- Bar B placement as needed (typically at four ft. C-C) to support curb reinforcing steel during concrete placement.



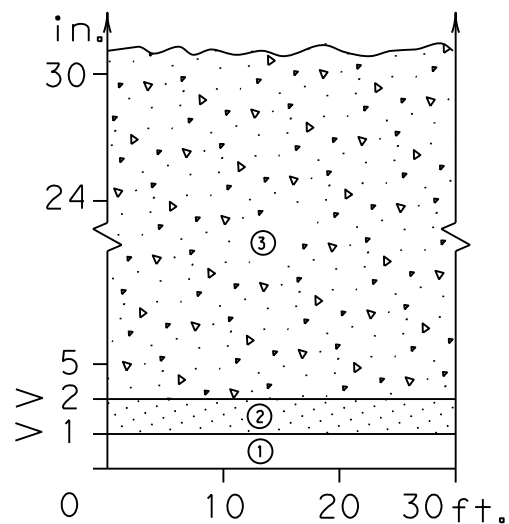
CURB TRANSITION NOTE:
 Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.

		Design Division Standard	
CONCRETE CURB AND GUTTER			
CCCG-22			
FILE: cccg22.dgn	DN: TxDOT	CK: AN	DW: CS
© TxDOT: JUNE 2022	CONT: 0045	SECT: 09	JOB: 110, ETC
REVISIONS	US 82, ETC	HIGHWAY	
DIST: PAR	COUNTY: LAMAR	SHEET NO.	48

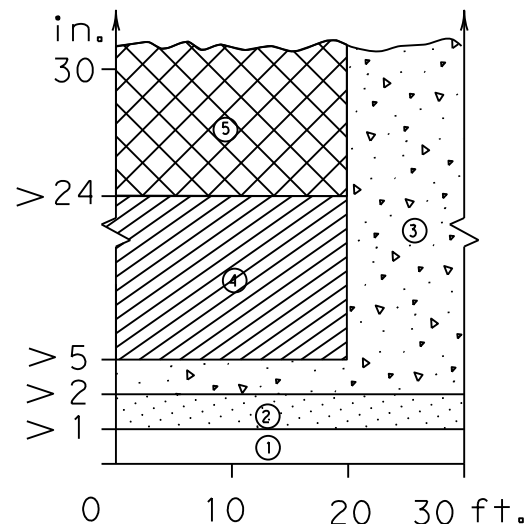
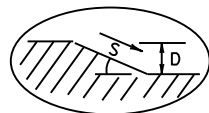
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DEFINITION OF TREATMENT ZONES FOR VARIOUS EDGE CONDITIONS

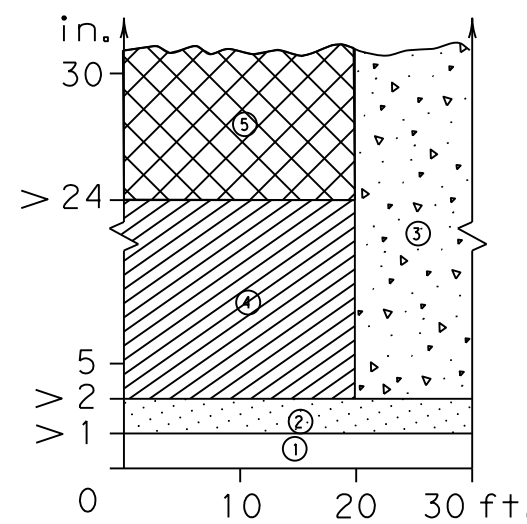
Edge Height (D) in Inches versus Lateral Clearance (Y) in Feet



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)

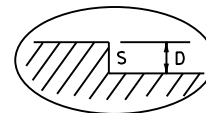
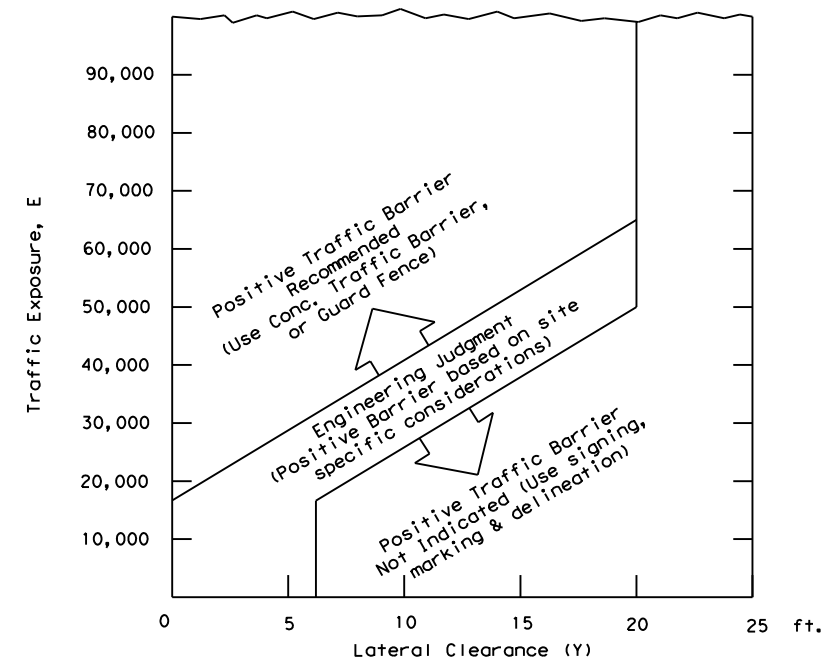


FIGURE-1: CONDITIONS INDICATING USE OF POSITIVE BARRIER FOR ZONE 5 ([Cross-hatched symbol])

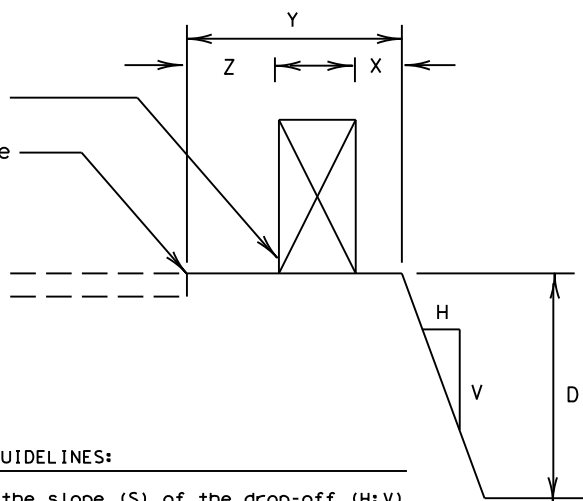


- E = ADT x T
Where ADT is that portion of the average daily traffic volume traveling within 20 feet (generally two adjacent lanes) of the edge dropoff condition; and, T is the duration time in years of the dropoff condition.
- Figure-1 provides a practical approach to the use of positive barriers for 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.
- 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.

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.

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.

Warning Device or Traffic Barrier
4" White Edge Line or Edge of Lanes being used for maintenance of traffic.

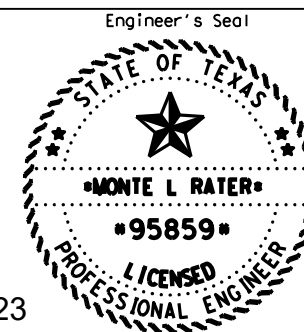


FACTORS CONSIDERED IN THE GUIDELINES:

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

Edge Condition Notes:

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



9.01.23

Monte R. Rater P.E.

Texas Department of Transportation
Traffic Operations Division

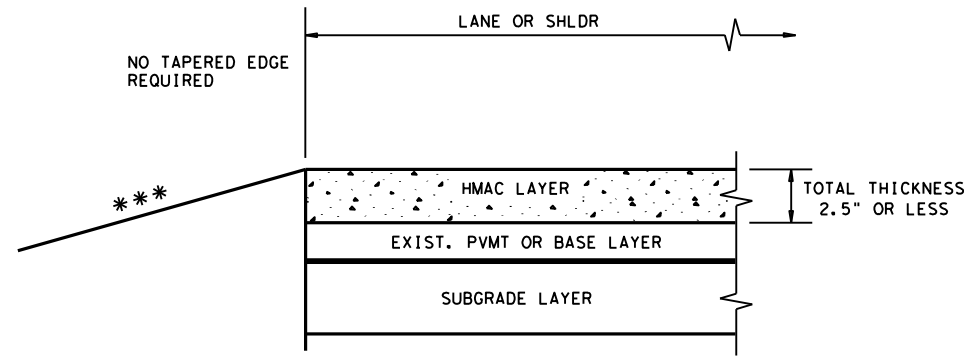
TREATMENT FOR VARIOUS EDGE CONDITIONS

© TxDOT August 2000		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS					
CONT	SECT	JOB	HIGHWAY		
0045	09	110, ETC	US 82, ETC		
DIST	COUNTY		SHEET NO.		
PAR	LAMAR		49		

DATE:
FILE:

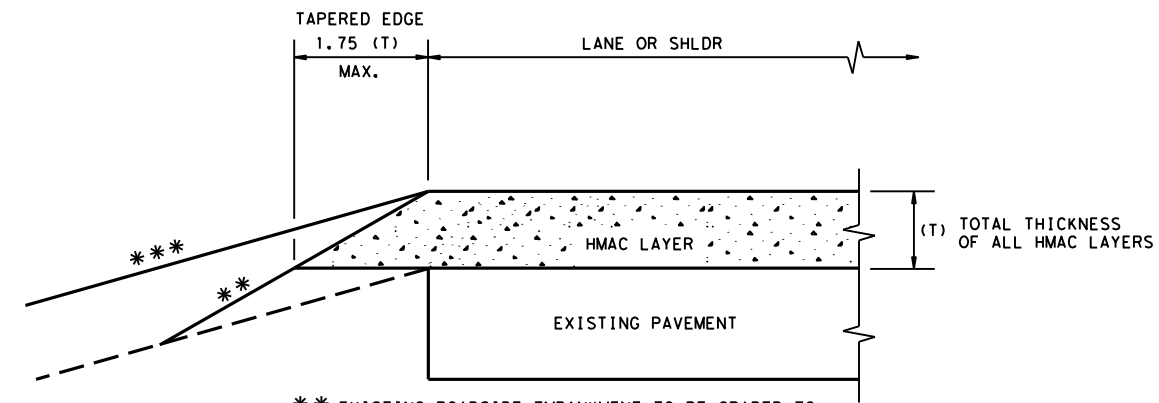
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DATE: 8/31/2023
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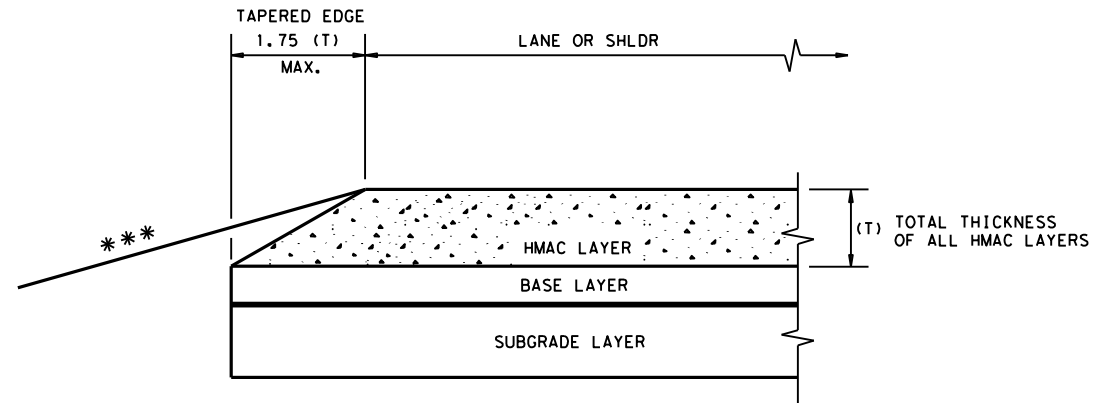
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 1
 THIN HMAC SURFACES OR HMAC OVERLAY
 WITH THICKNESS OF 2.5" OR LESS



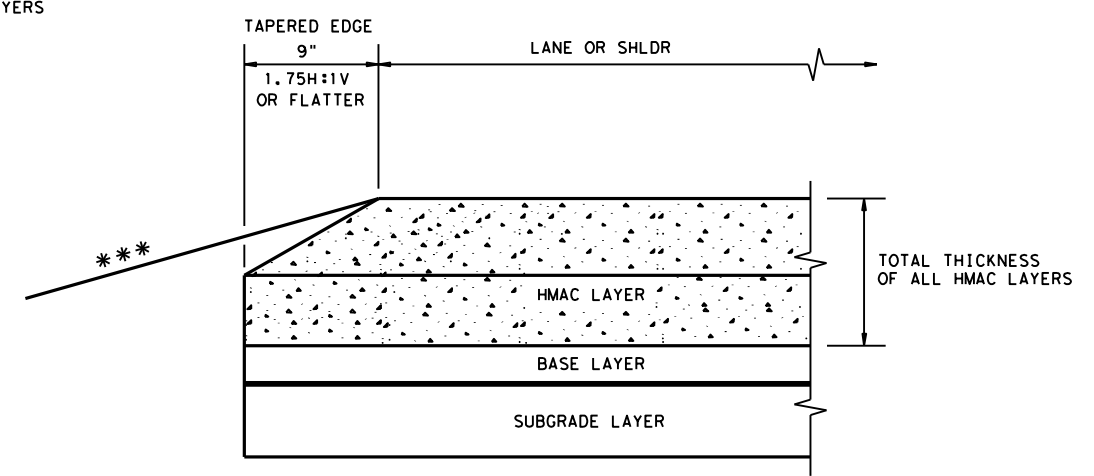
*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 2
 OVERLAY OF EXISTING PAVEMENT
 HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 3
 NEW OR RECONSTRUCTED PAVEMENT
 HMAC THICKNESS 2.5" TO 5"



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

CONDITION - 4
 NEW OR RECONSTRUCTED PAVEMENT
 HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

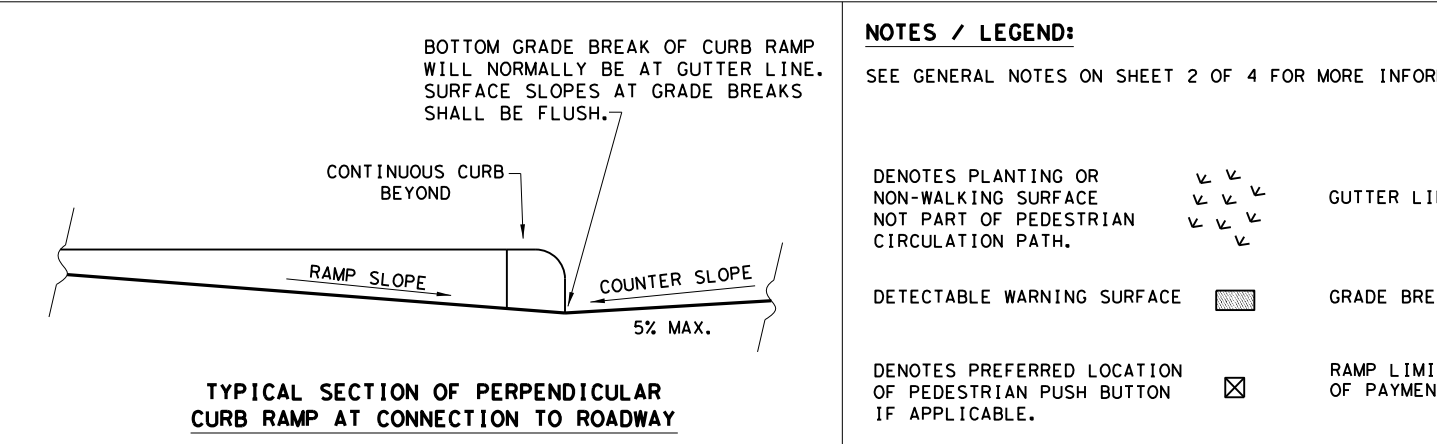
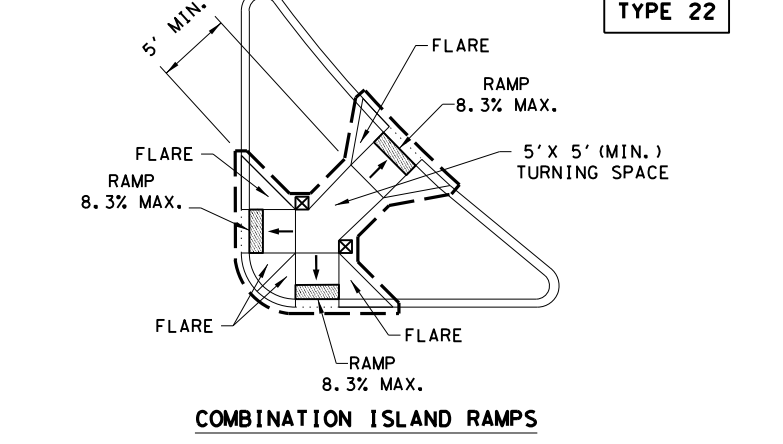
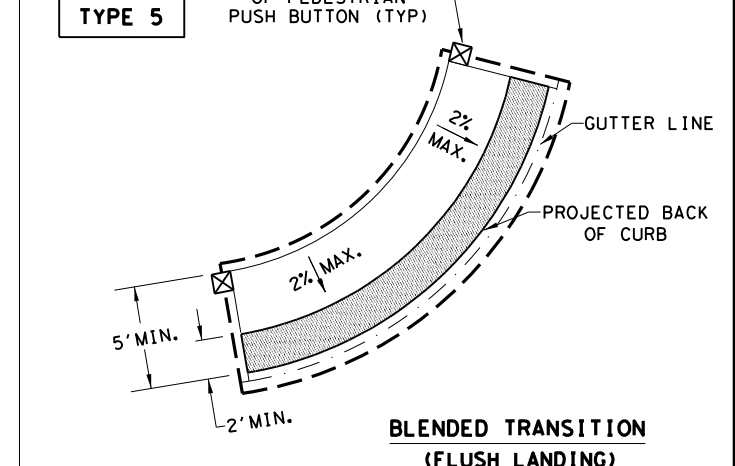
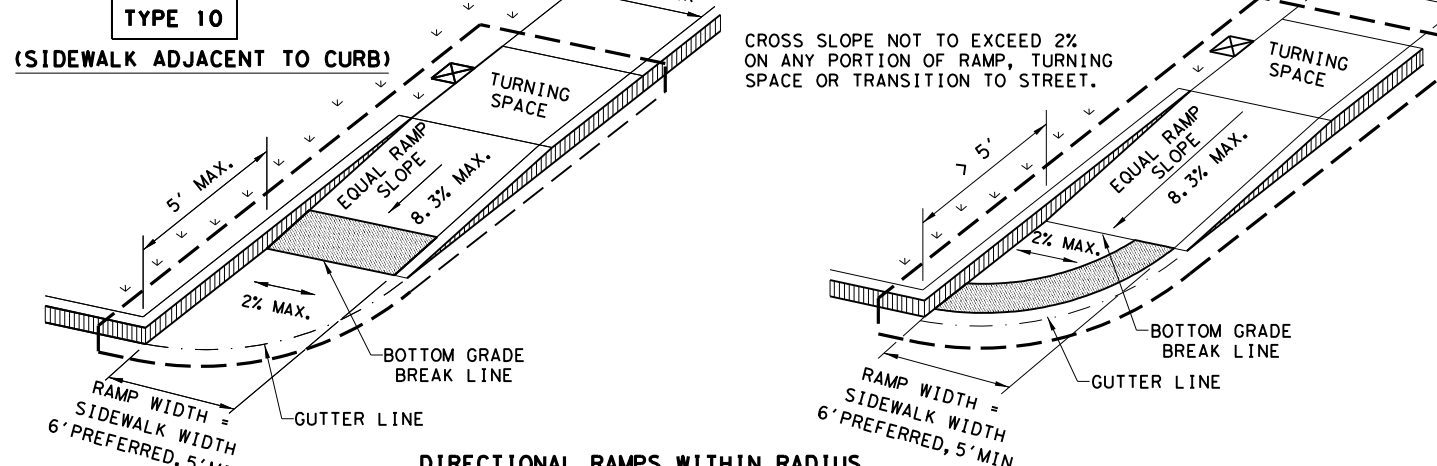
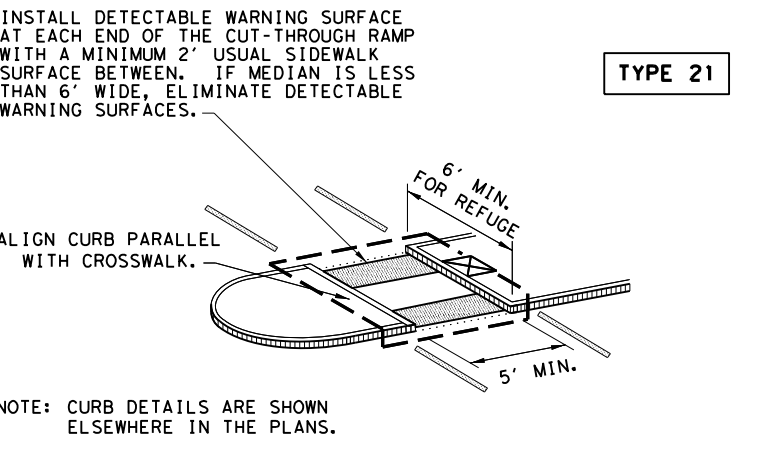
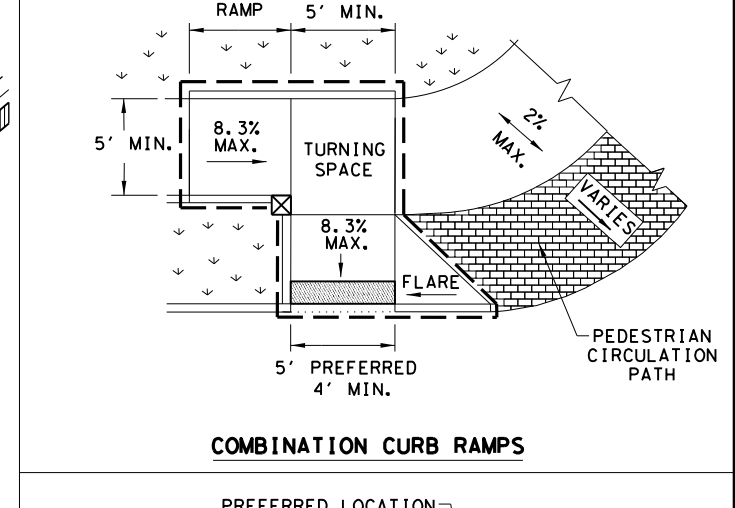
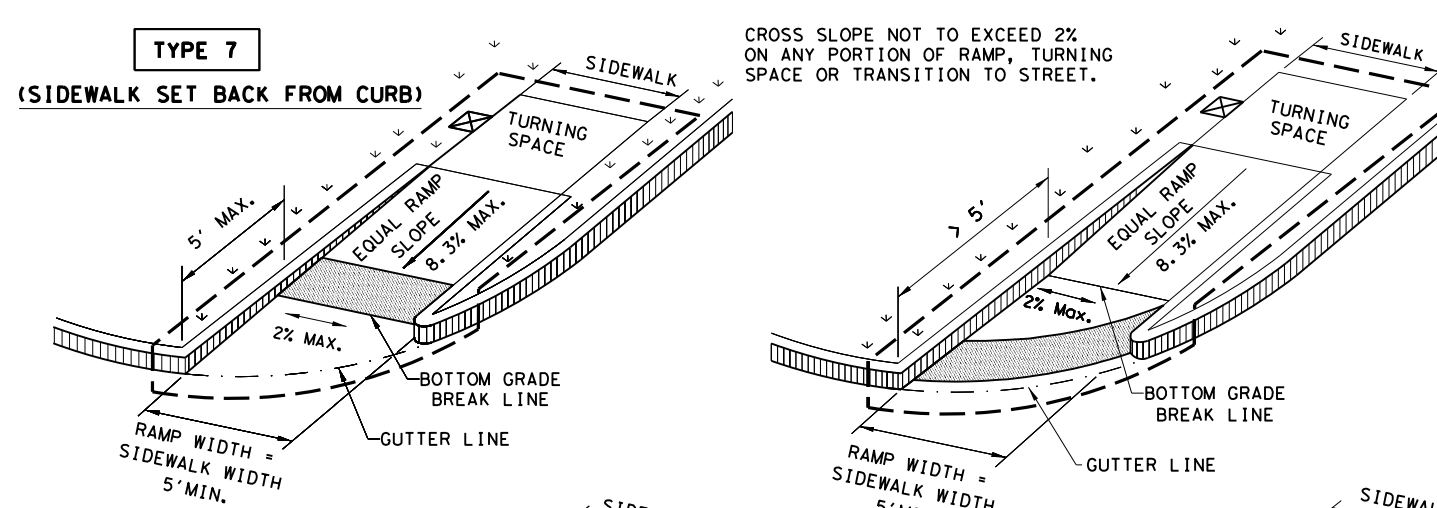
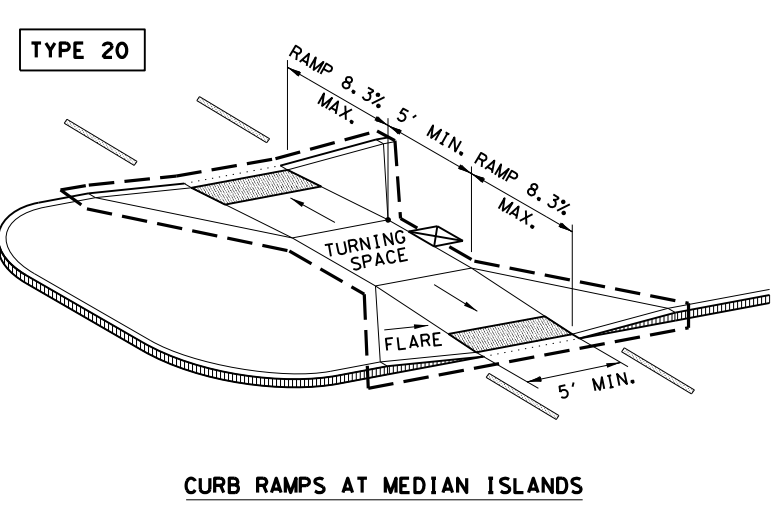
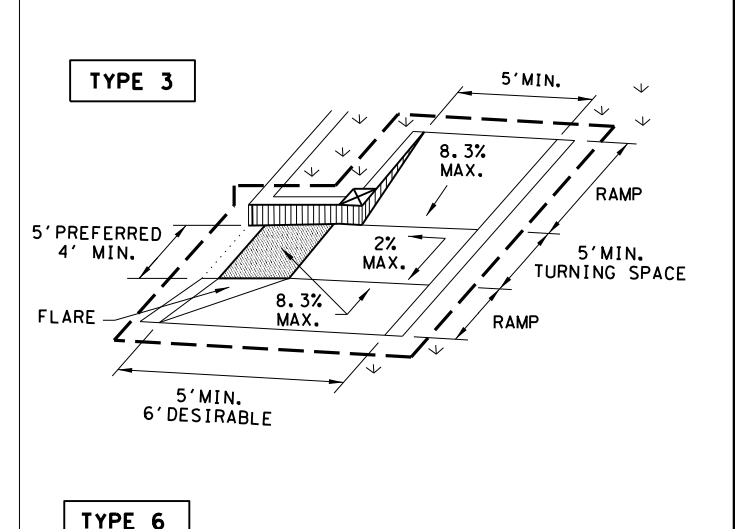
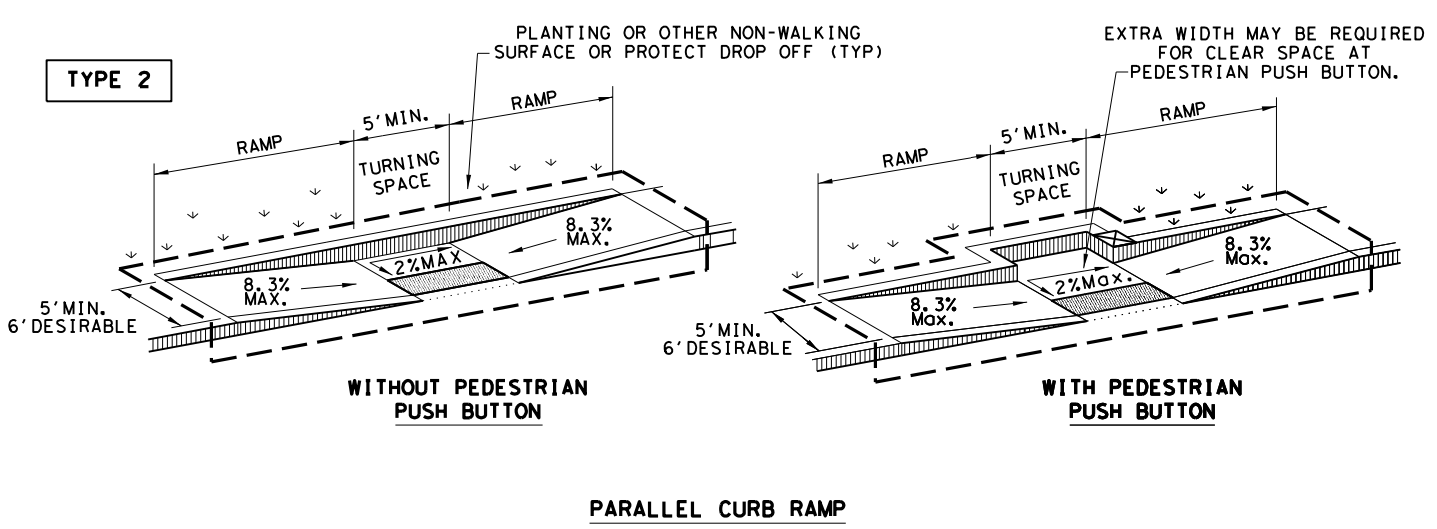
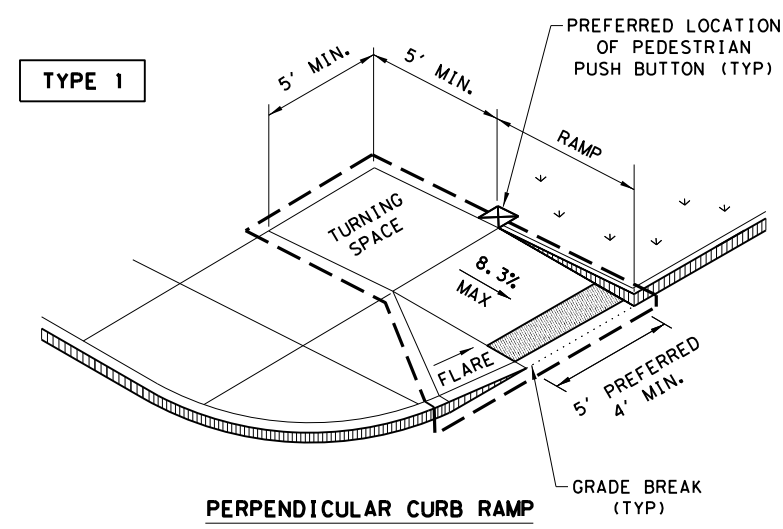
GENERAL NOTES

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

				Design Division Standard	
TAPERED EDGE DETAILS HMAC PAVEMENT					
TE (HMAC) - 11					
FILE:	tehmac11.dgn	DN:	TxDOT	CK:	RL
		DW:	KB	CK:	
© TxDOT	January 2011	CON:	SECT:	JOB:	HIGHWAY:
REVISIONS		0045	09	110, ETC	US 82, ETC
		DIST:	COUNTY:	SHEET NO.	
		PAR:	LAMAR	50	

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DATE: 8/31/2023
 FILE: T:\PARTPDD\US 82 Raised Median\Design\CAD Standards\2 ROADWAY DETAILS\5 PED(1)-18.dgn



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.

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

Detectable Warning Surface: [Symbol]

Grade Break: [Symbol]

Ramp Limits of Payment: [Symbol]

Gutter Line: [Symbol]

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	0045	09	110, ETC	US 82, ETC
REVISED 08, 2005	DIST	COUNTY		SHEET NO.
REVISED 06, 2012	PAR	LAMAR		51
REVISED 01, 2018				

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DATE: 8/31/2023
 FILE: T:\PARTPDD\US 82 Raised Median\Design\CAD Standards\2 ROADWAY DETAILS\5 PED(11)-18.dgn

GENERAL NOTES

CURB RAMP

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 applicable standards may remain in place unless otherwise shown on the plans.

DETECTABLE WARNING MATERIAL

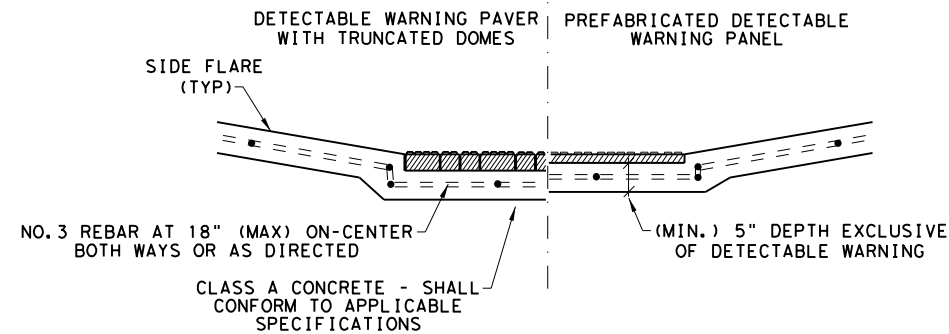
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material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

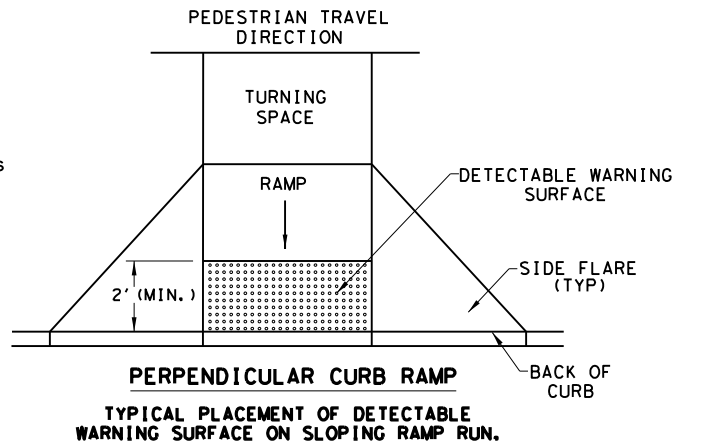
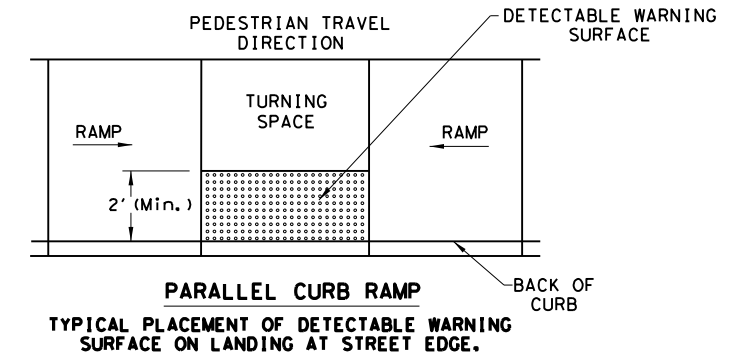
SIDEWALKS

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.

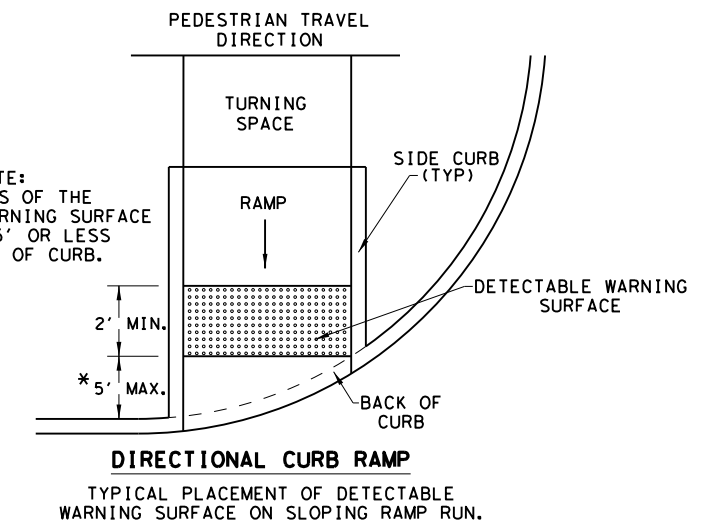


**SECTION VIEW DETAIL
 CURB RAMP AT DETECTIBLE WARNINGS**

DETECTABLE WARNING SURFACE DETAILS



* NOTE: BOTH ENDS OF THE DETECTABLE WARNING SURFACE SHALL BE 5' OR LESS FROM BACK OF CURB.

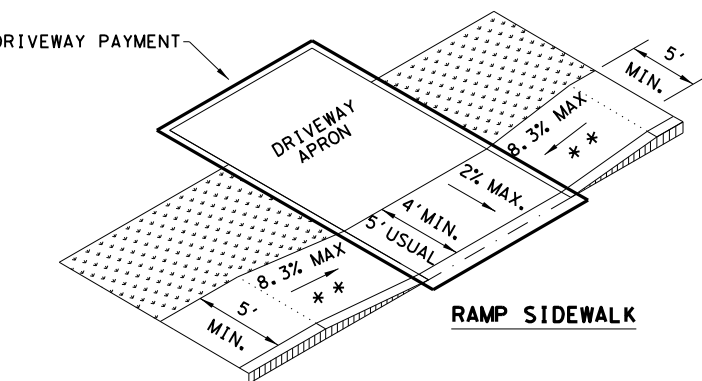
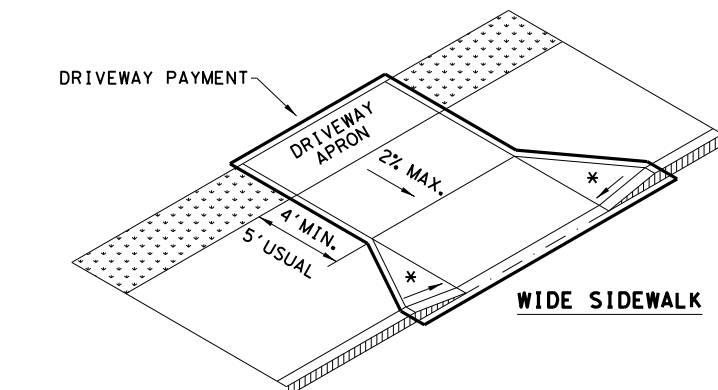
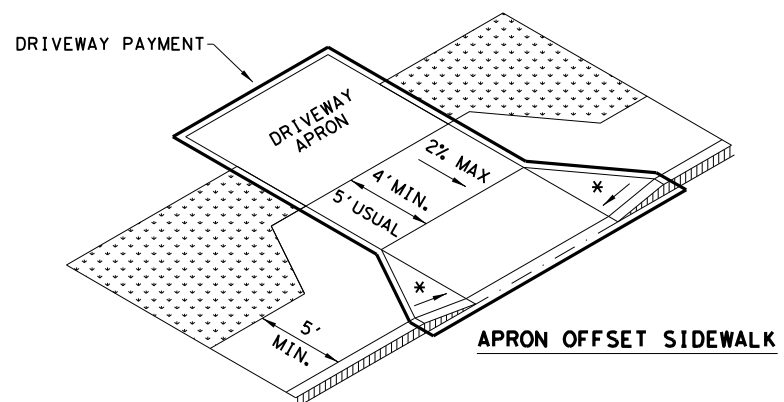
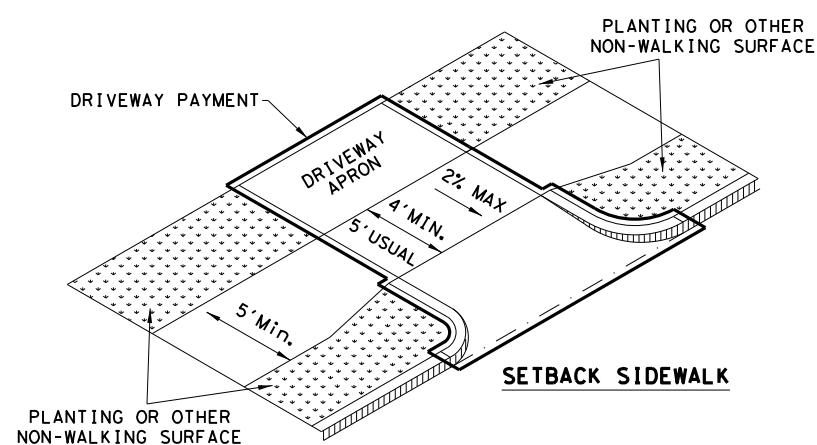


SHEET 2 OF 4

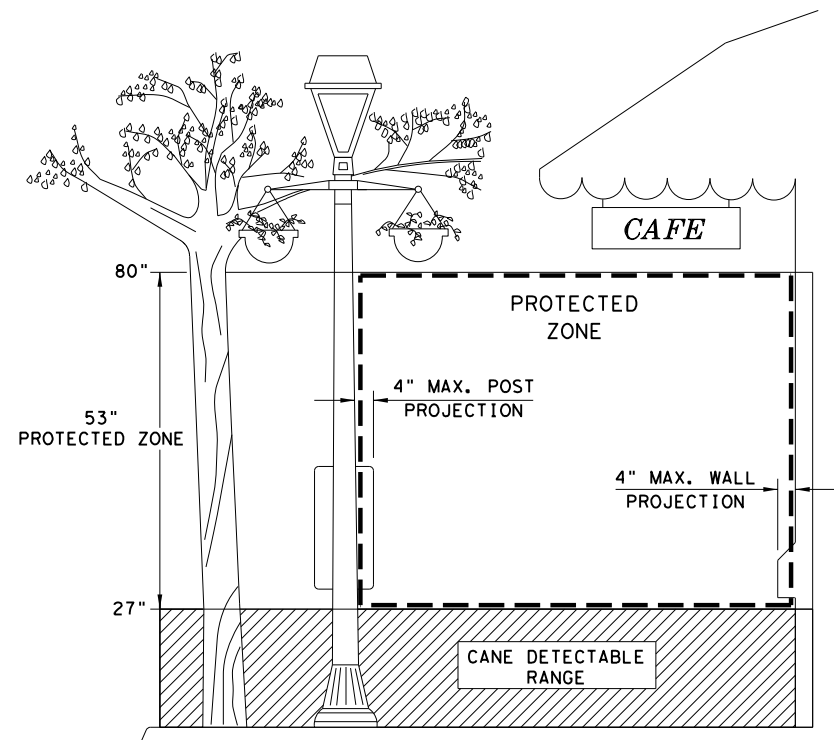
		Design Division Standard	
<h1>PEDESTRIAN FACILITIES CURB RAMP</h1> <h2>PED-18</h2>			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT	SECT	JOB
REVISIONS	0045	09	110, ETC
REVISED 08, 2005	DIST	COUNTY	SHEET NO.
REVISED 06, 2012	PAR	LAMAR	52
REVISED 01, 2018			

DATE: 8/31/2023
 FILE: T:\PARTPDD\US 82 Raised Medain\Design\CAD Standards\2 ROADWAY DETAILS\5 PED(11)-18.dgn
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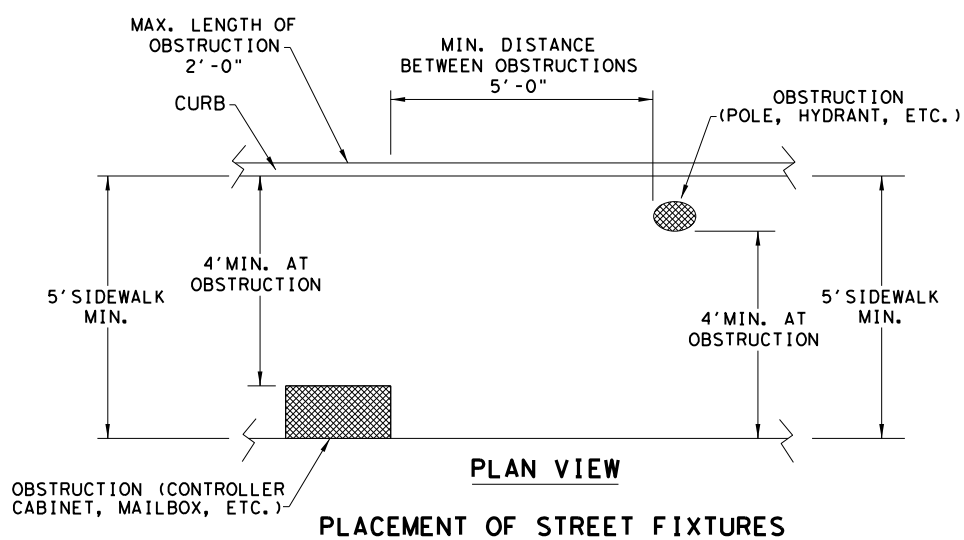
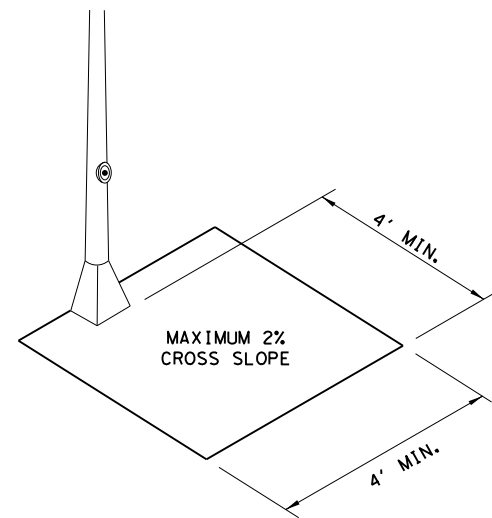
SIDEWALK TREATMENT AT DRIVEWAYS



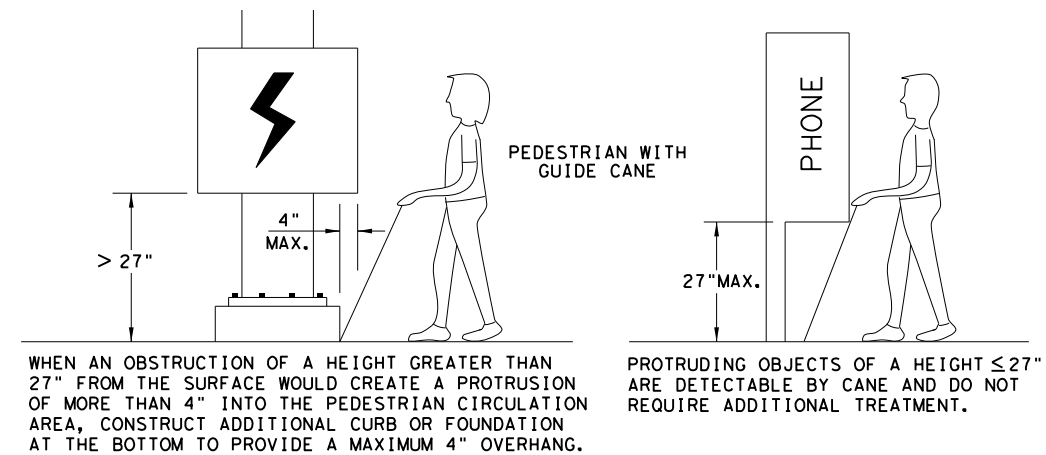
NOTES:
 * WHERE DRIVEWAYS CROSS THE PEDESTRIAN ROUTE, SIDES SHALL BE FLARED AT 10% MAX SLOPE.
 * * IF CURB HEIGHT IS GREATER THAN 6 INCHES, USE GRADE LESS THAN OR EQUAL TO 5%. HANDRAIL AND DETECTABLE WARNING ARE NOT REQUIRED.



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



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



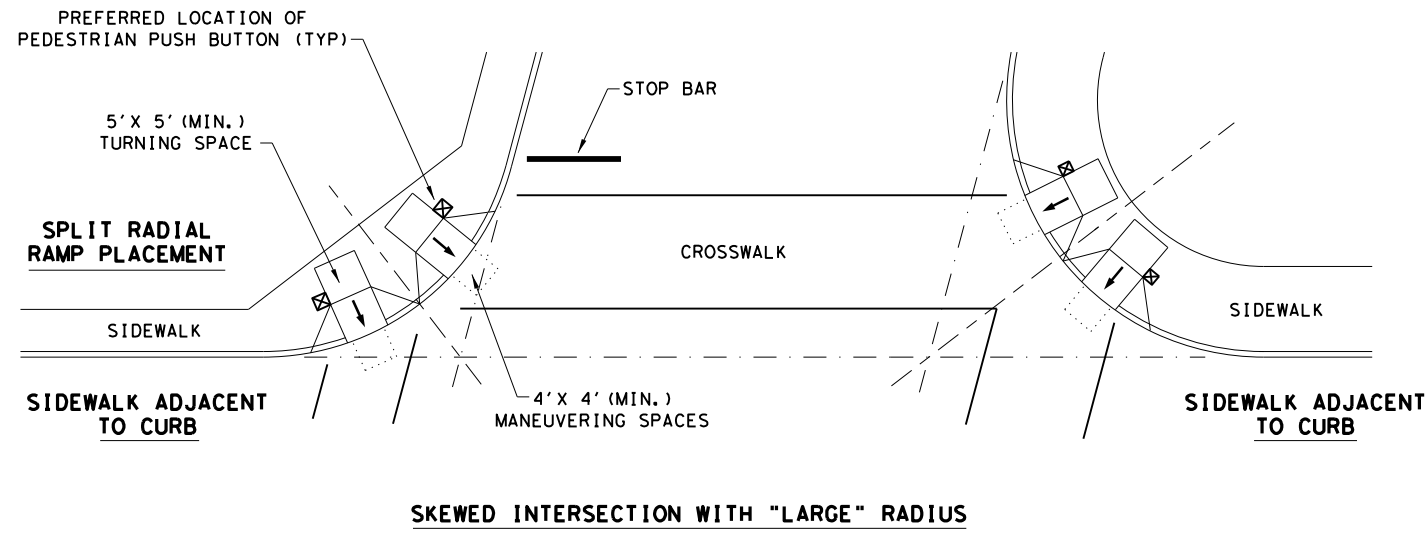
SHEET 3 OF 4

		Design Division Standard	
PEDESTRIAN FACILITIES CURB RAMPS PED-18			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT	SECT	JOB
REVISIONS	0045	09	110, ETC
REVISED 08, 2005	DIST	COUNTY	SHEET NO.
REVISED 06, 2012	PAR	LAMAR	53
REVISED 01, 2018			

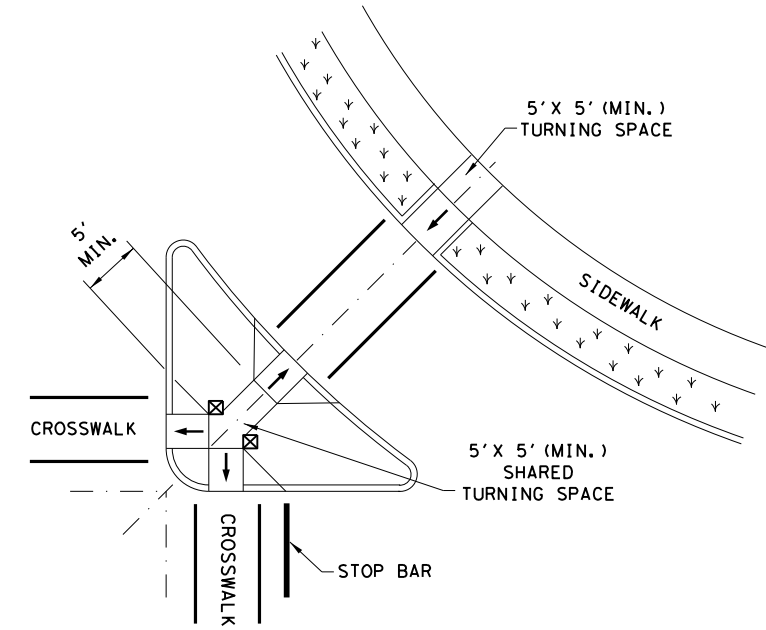
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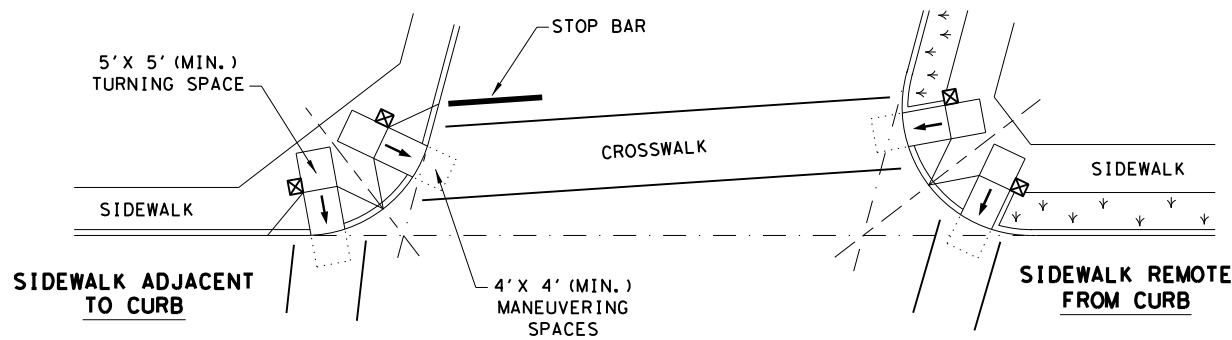
TYPICAL CROSSING LAYOUTS
 SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



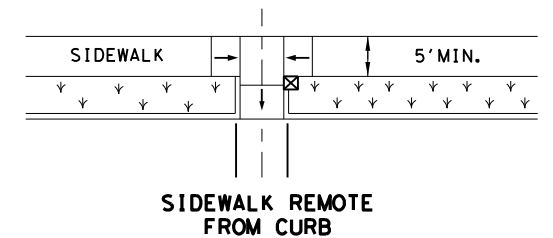
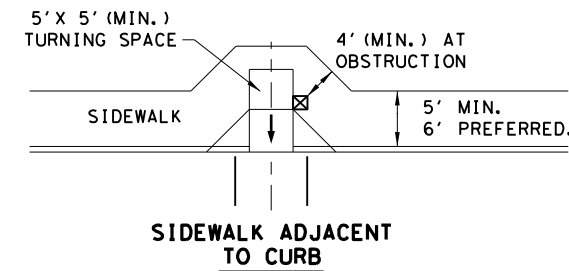
SKewed INTERSECTION WITH "LARGE" RADIUS



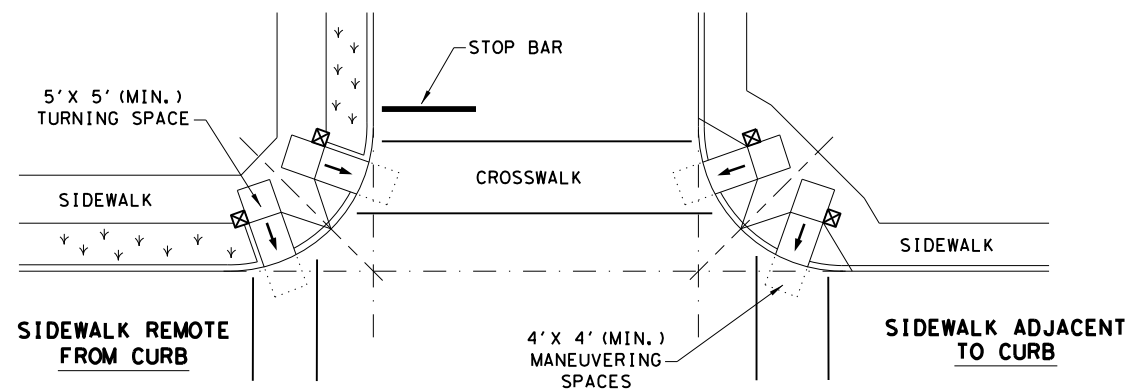
AT INTERSECTION
 W/FREE RIGHT TURN & ISLAND



SKewed INTERSECTION WITH "SMALL" RADIUS



MID-BLOCK PLACEMENT
 PERPENDICULAR RAMPS



NORMAL INTERSECTION WITH "SMALL" RADIUS

LEGEND:

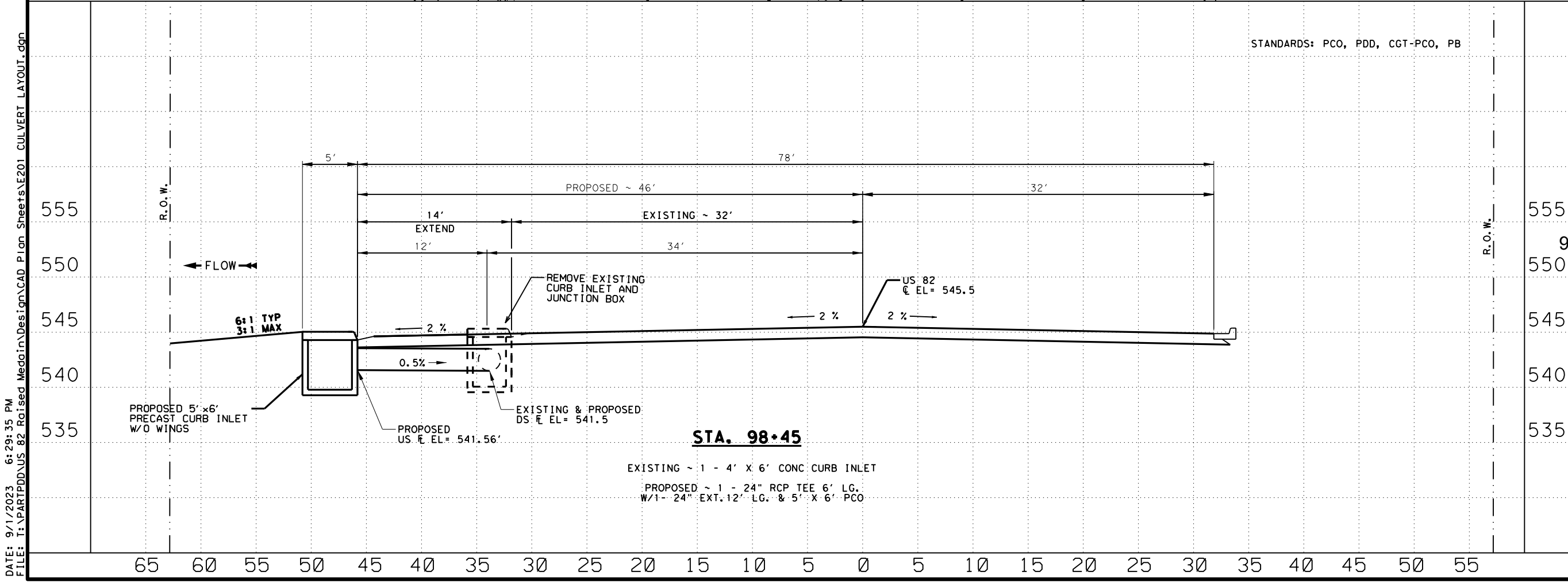
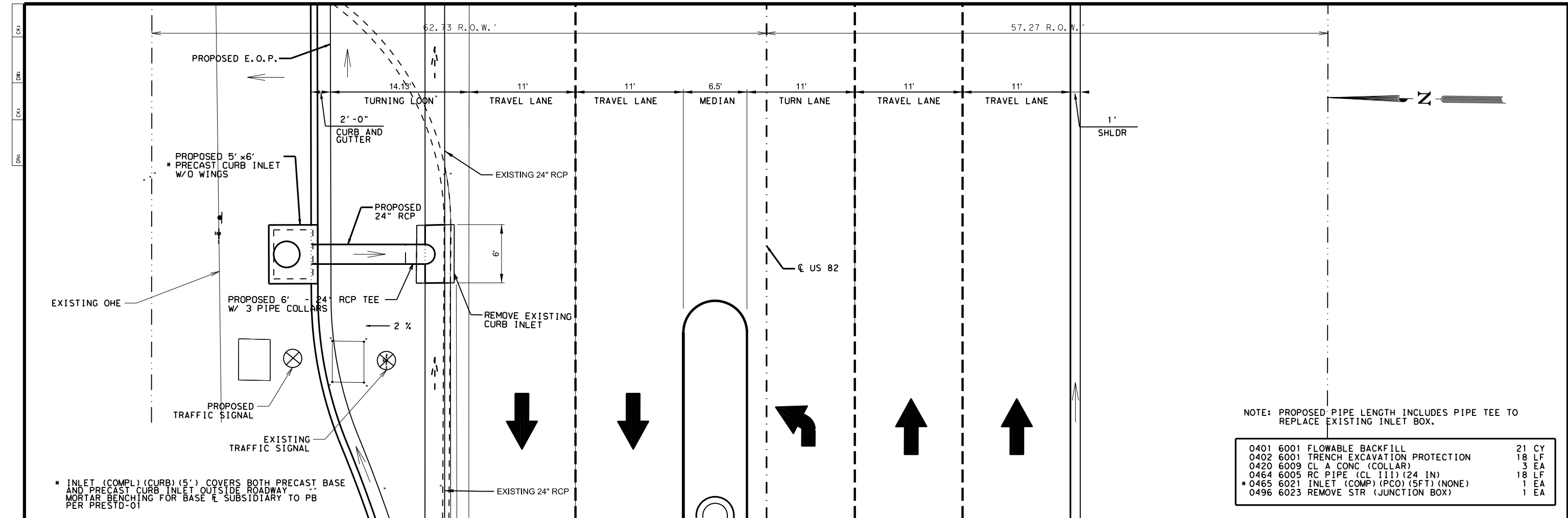
SHOWS DOWNWARD SLOPE. →

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

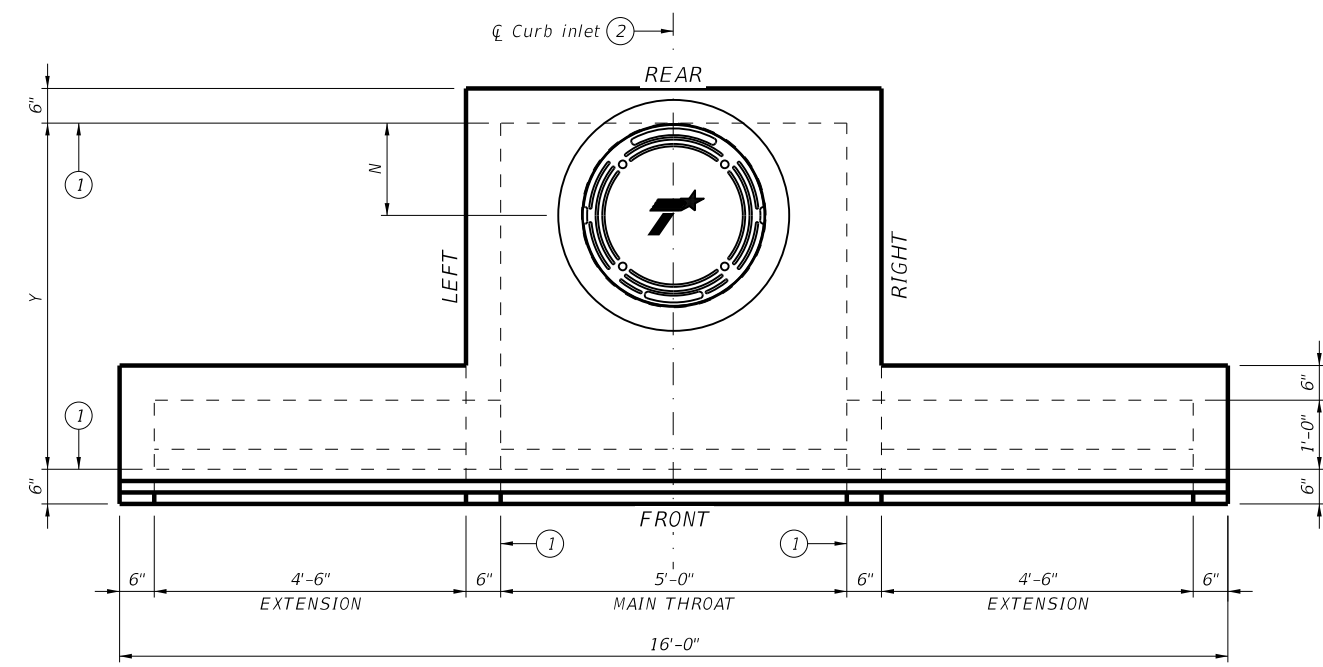
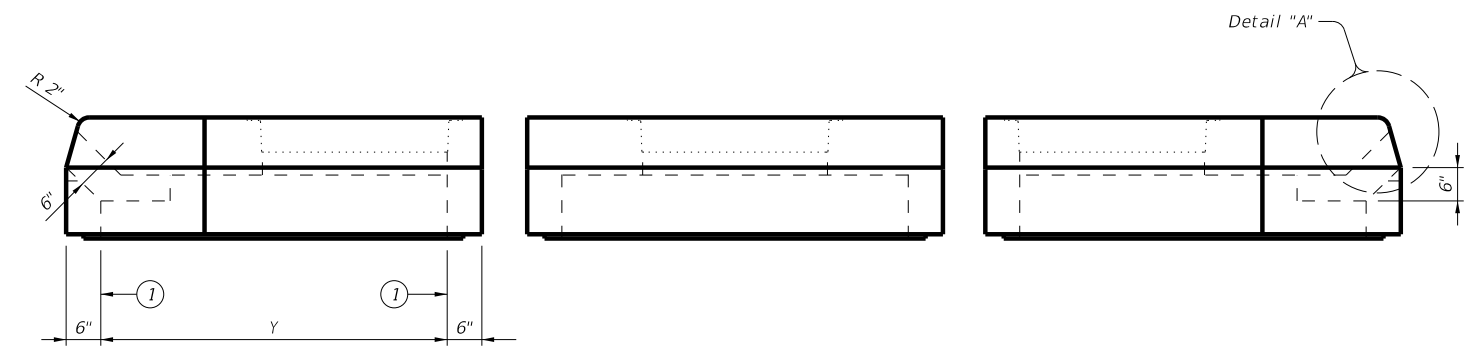
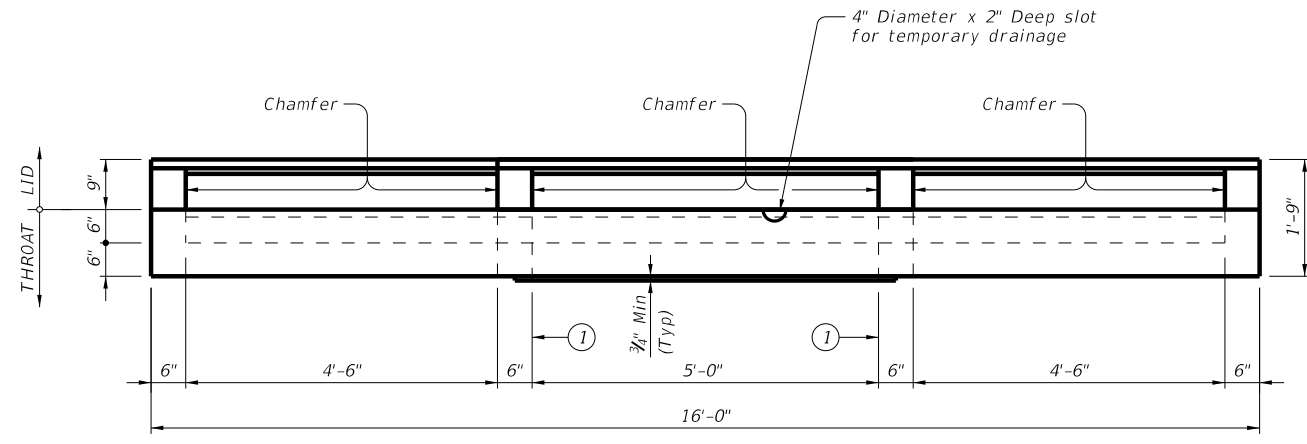
DENOTES PLANTING OR NON-WALKING SURFACE NOT PART OF PEDESTRIAN CIRCULATION PATH. ↙ ↘ ↗ ↖

SHEET 4 OF 4

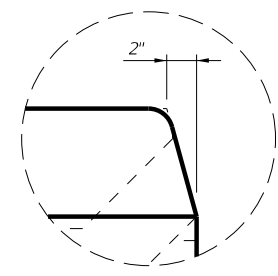
		Design Division Standard	
<h2>PEDESTRIAN FACILITIES</h2> <h3>CURB RAMPS</h3> <h1>PED-18</h1>			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT: 0045	SECT: 09	JOB: 110, ETC
REVISIONS	0045	09	US 82, ETC
REVISED 08, 2005	DIST: PAR	COUNTY: LAMAR	SHEET NO. 54
REVISED 06, 2012			
REVISED 01, 2018			



DATE: 8/31/2023 8:06:15 PM
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- ① Matches inside face of wall of precast base or riser below inlet.
- ② Reference point is located where the \square of the main throat intersects the normal gutter line. See Curb and Gutter Transition Details for PCO Inlet (CGT-PCO) standard for more information.

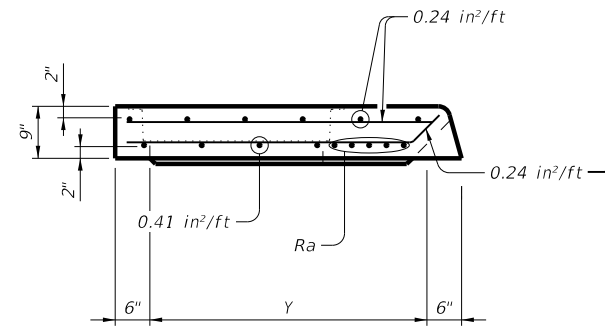


HS20 LOADING SHEET 1 OF 2

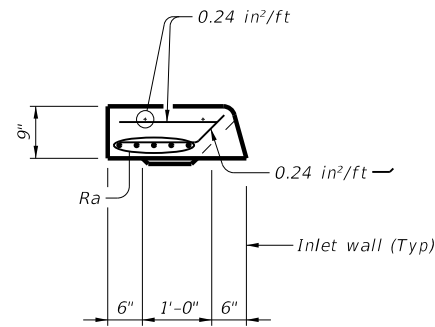
		Bridge Division Standard	
<h3>PRECAST CURB INLET OUTSIDE ROADWAY</h3>			
<h4>PCO</h4>			
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT February 2020	CONT	SECT	HIGHWAY
REVISIONS	0045	09	110, ETC US 82, ETC
06-2023: Added reference point.	DIST	COUNTY	SHEET NO.
PAR	LAMAR		56

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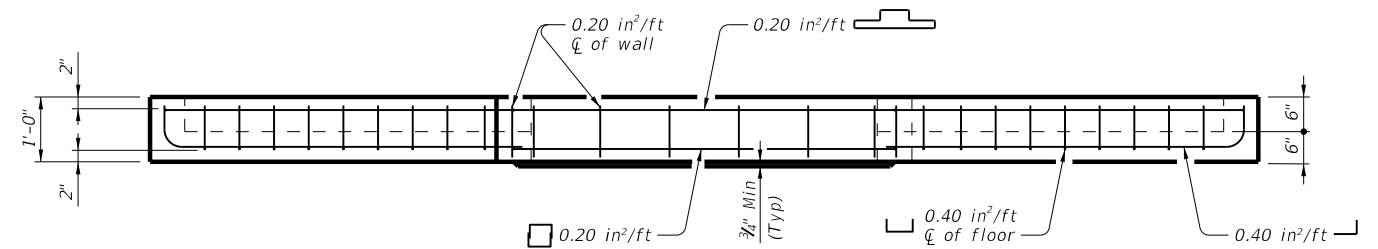
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LID SECTION A-A

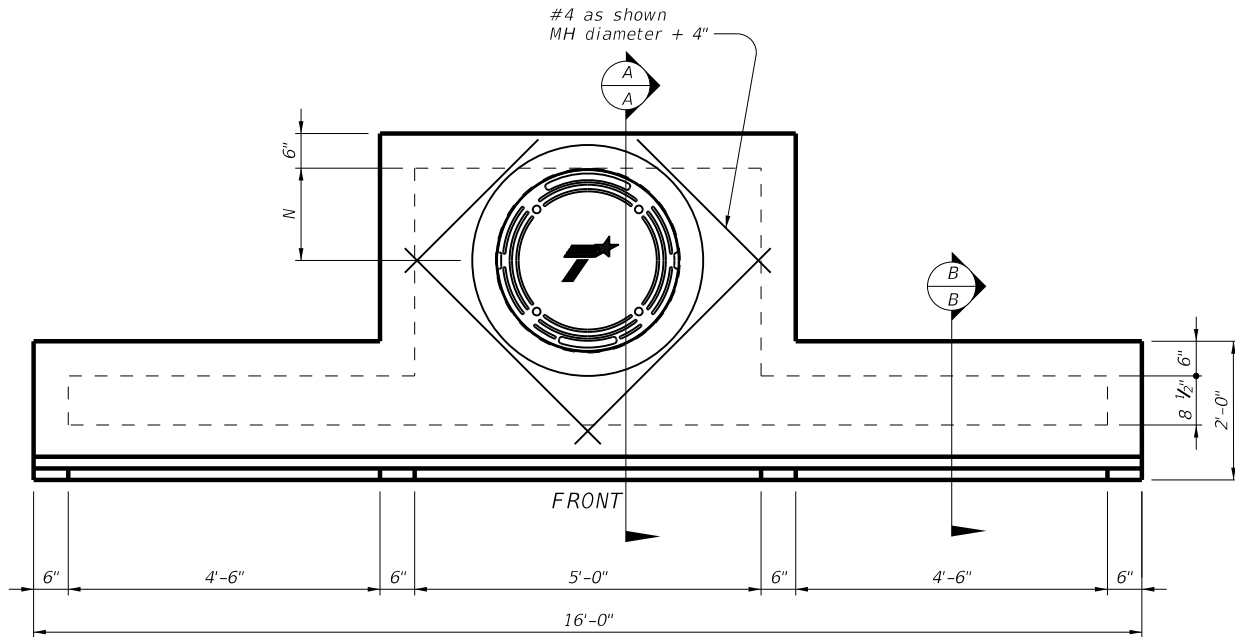


LID SECTION B-B



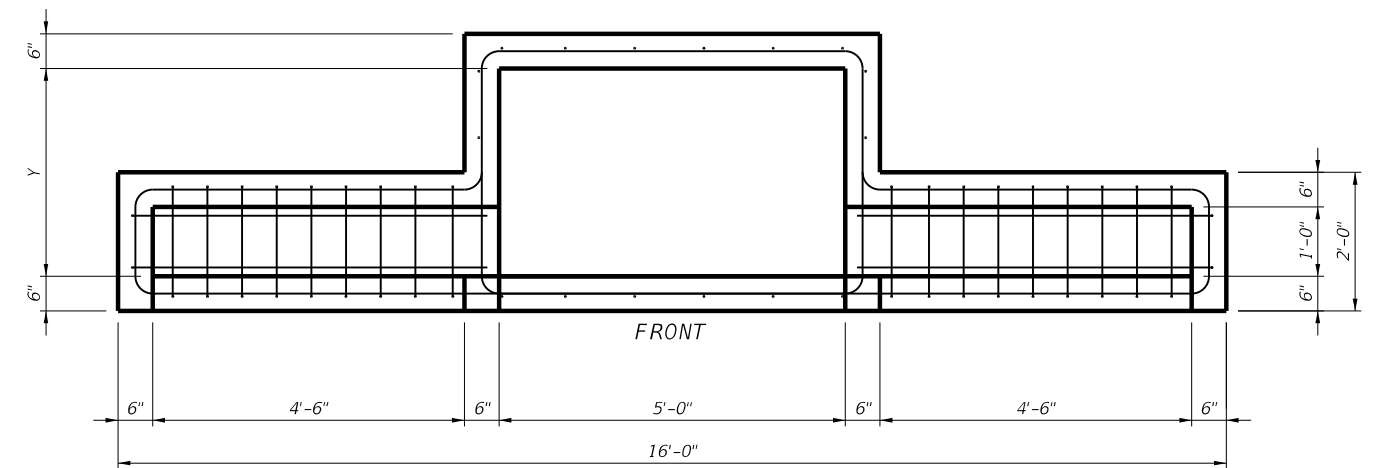
THROAT ELEVATION VIEW

(Showing left and right extensions)



LID PLAN VIEW

(Showing left and right extensions)



THROAT PLAN VIEW

(Showing left and right extensions)

FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Extensions may be right, left, both or none. Provide extensions as specified elsewhere in the plans.
4. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is 3/4". Lid may employ a butt joint with dowels at the Contractor's option.
5. Provide lifting devices in conformance with Manufacturer's recommendations.
6. Provide cast iron solid cover, unless noted otherwise elsewhere in the plans.
7. Chamfer vertical edges of inlet lid 3/4" as shown in Front View, sheet 1.

INSTALLATION NOTES:

1. Inlet throat and lid are not intended for direct traffic. Do not place in roadway.
2. Seal tongue and groove joints and butt joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or 1/2 the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.

GENERAL NOTES:

1. Designed according to ASTM C913.
2. Open area of main throat = 360 sq in. Open area of one extension throat = 324 sq in.
3. Payment for inlet is per Item 465, "Junction Boxes, Manholes, and Inlets" by type, size, and extension placement. Extensions are subsidiary to inlet.

Cover dimensions are clear dimensions, unless noted otherwise.

Size (Y)	N	MH Dia*	Ra
3'	9"	18"	(4) #5 Additional
4'	16"	32"	(4) #5 Additional
5'	16"	32"	(4) #5 Additional
6'	16"	32"	(4) #5 Additional

*Nominal ring and cover size.

HS20 LOADING SHEET 2 OF 2



**PRECAST CURB INLET
 OUTSIDE ROADWAY**

PCO

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
06-2023: Added reference point.	DIST	COUNTY	SHEET NO.	
	PAR	LAMAR	57	

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FILE: T:\PARTPDD\US 82 Roi\sed Medoim\Design\CAD Standard\3 DRA IMAGE DETAILS\2 CD-PDD-20.dgn

Size	MAX DEPTH = 15 ft. to top of BASE SLAB											MAX DEPTH = 25 ft. to top of BASE SLAB											Min Height (See Gen Note 3)	Max HOLE DIA (See Fab Note 2)	Max KO DIA (See Fab Note 2)
	Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)					Base Slab			Base Unit or Riser Walls			Below Grade Slab (w/PJB) Reducing Slab (w/PB)							
	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Reduced Riser Size	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Reduced Riser Size	Short Span Reinf. Steel Area	Long Span Reinf. Steel Area	Thickness	Reduced Riser Size	Short Span Reinf. Steel Area			
X x Y	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	Ashort	Along	BS	Bshort	Blong	W	RWSxRWL or ID	Dshort	Dlong	TS	BH MIN	HOLE DIA	KO DIA		
ft.	in ² /ft	in ² /ft	in.	in ² /ft	in ² /ft	in.	ft. **	in ² /ft	in ² /ft	in.	in ² /ft	in ² /ft	in.	in ² /ft	in ² /ft	in.	ft. **	in ² /ft	in ² /ft	in.	ft.	in.	in.		
Precast Junction Box (PJB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	0.37	0.37	9	0.29	0.29	6	0.24	0.24	6	N/A	0.37	0.37	9	3.5	36	36	
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	0.41	0.41	9	0.47	0.47	6	0.38	0.38	6	N/A	0.41	0.41	9	4.5	48	48	
	3x5	0.29	0.18	6	0.19	0.35	6	N/A	0.48	0.48	9	0.39	0.18	6	0.23	0.59	6	N/A	0.48	0.48	9	3.5	36/60	36/60	
	4x5	0.36	0.18	6	0.22	0.34	6	N/A	0.42	0.42	9	0.53	0.26	6	0.39	0.59	6	N/A	0.42	0.42	9	4.5	48/60	48/60	
	5x5	0.36	0.36	6	0.34	0.34	6	N/A	0.43	0.43	9	0.62	0.62	6	0.59	0.59	6	N/A	0.43	0.43	9	5.5	60	60	
	5x6	0.27	0.27	9	0.34	0.45	6	N/A	0.48	0.48	9	0.47	0.45	9	0.38	0.54	8	N/A	0.48	0.48	9	5.5	60/72	60/72	
	6x6	0.27	0.27	9	0.45	0.45	6	N/A	0.56	0.56	9	0.52	0.52	9	0.54	0.54	8	N/A	0.56	0.56	9	6.5	72	72	
	8x8	0.46	0.46	9	0.51	0.51	8	N/A	0.45	0.45	12	0.87	0.87	9	0.59	0.59	10	N/A	0.45	0.45	12	8.5	96	72	
Precast Base (PB)	3x3	0.23	0.23	6	0.19	0.19	6	N/A	N/A	N/A	N/A	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	3.5	36	36	
	4x4	0.29	0.29	6	0.24	0.24	6	N/A	N/A	N/A	N/A	0.47	0.47	6	0.38	0.38	6	N/A	N/A	N/A	N/A	4.5	48	48	
	3x5	0.29	0.18	6	0.19	0.35	6	3x3	0.30	0.34	9	0.39	0.18	6	0.23	0.59	6	3x3	0.40	0.40	9	3.5	36/60	36/60	
	4x5	0.36	0.18	6	0.22	0.34	6	3x3	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	3x3	0.46	0.37	9	4.5	48/60	48/60	
	4x5	0.36	0.18	6	0.22	0.34	6	4x4	0.30	0.30	9	0.53	0.26	6	0.39	0.59	6	4x4	0.39	0.39	9	4.5	48/60	48/60	
	4x5	0.36	0.18	6	0.22	0.34	6	48"	0.39	0.39	9	0.53	0.26	6	0.39	0.59	6	48"	0.47	0.47	9	4.5	48/60	48/60	
	4x5	0.36	0.18	6	0.22	0.34	6	3x5	0.33	0.40	9	0.53	0.26	6	0.39	0.59	6	3x5	0.48	0.48	9	4.5	48/60	48/60	
	5x5	0.36	0.36	6	0.34	0.34	6	3x3	0.34	0.34	9	0.62	0.62	6	0.59	0.59	6	3x3	0.53	0.53	9	5.5	60	60	
	5x5	0.36	0.36	6	0.34	0.34	6	4x4	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	4x4	0.64	0.64	9	5.5	60	60	
	5x5	0.38	0.38	6	0.34	0.34	6	48"	0.36	0.36	9	0.62	0.62	6	0.59	0.59	6	48"	0.64	0.64	9	5.5	60	60	
	5x5	0.36	0.36	6	0.34	0.34	6	3x5	0.34	0.40	9	0.62	0.62	6	0.59	0.59	6	3x5	0.53	0.53	9	5.5	60	60	
	5x6	0.31	0.31	9	0.34	0.45	6	3x3	0.34	0.34	9	0.47	0.45	9	0.38	0.54	8	3x3	0.61	0.50	9	5.5	60/72	60/72	
	5x6	0.27	0.27	9	0.34	0.45	6	4x4	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	4x4	0.74	0.57	9	5.5	60/72	60/72	
	5x6	0.29	0.29	9	0.34	0.45	6	48"	0.36	0.45	9	0.47	0.45	9	0.38	0.54	8	48"	0.74	0.57	9	5.5	60/72	60/72	
	5x6	0.29	0.29	9	0.34	0.45	6	3x5	0.45	0.45	9	0.47	0.45	9	0.38	0.54	8	3x5	0.61	0.61	9	5.5	60/72	60/72	
	6x6	0.29	0.29	9	0.45	0.45	6	3x3	0.41	0.41	9	0.52	0.52	9	0.54	0.54	8	3x3	0.74	0.74	9	6.5	72	72	
	6x6	0.27	0.27	9	0.45	0.45	6	4x4	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	4x4	0.87	0.87	9	6.5	72	72	
	6x6	0.29	0.29	9	0.45	0.45	6	48"	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	48"	0.87	0.87	9	6.5	72	72	
	6x6	0.29	0.29	9	0.45	0.45	6	3x5	0.45	0.45	9	0.52	0.52	9	0.54	0.54	8	3x5	0.87	0.87	9	6.5	72	72	
	8x8	0.52	0.52	9	0.51	0.51	8	3x3	0.61	0.61	12	0.91	0.91	9	0.70	0.70	10	3x3	0.85	0.85	12	8.5	96	72	
8x8	0.52	0.52	9	0.51	0.51	8	4x4	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	4x4	1.01	1.01	12	8.5	96	72		
8x8	0.52	0.52	9	0.51	0.51	8	48"	0.70	0.70	12	0.87	0.87	9	0.70	0.70	10	48"	1.01	1.01	12	8.5	96	72		
8x8	0.52	0.52	9	0.51	0.51	8	3x5	0.70	0.85	12	0.87	0.87	9	0.70	0.70	10	3x5	1.01	1.01	12	8.5	96	72		

** Unless otherwise indicated.


FABRICATION NOTES:

1. Maximum spacing of reinforcement is 8".
2. At manufacturer's option, provide cast or cored holes or thin wall panels (KO) to the maximum diameter shown for each. When no penetration is required, it is acceptable to provide a wall with no sectional reduction.

GENERAL NOTES:

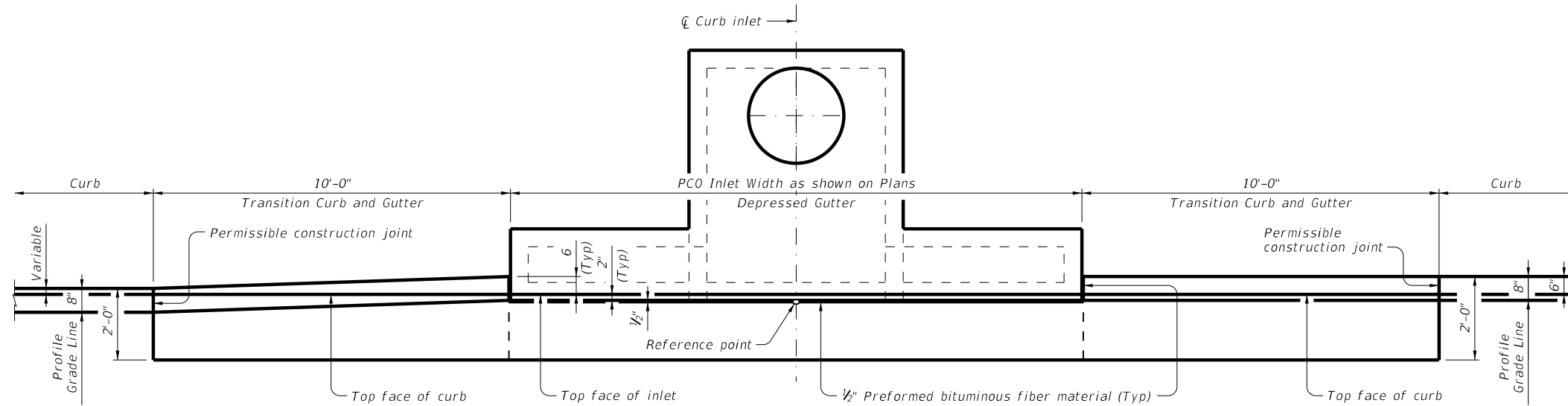
1. Precast Junction Box consists of base slab, base unit, risers (as required), and below grade slab. See sheet PJB for details.
2. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PB for details.
3. Min Height shown is for stock base units. Use stock base units whenever practical. Smaller height base units can be used in special installation circumstances, when noted elsewhere in the plans. Absolute minimum height of base units is 2'-6".

HL93 LOADING

 Texas Department of Transportation		Bridge Division Standard	
<h2>DESIGN DATA FOR PRECAST BASE AND JUNCTION BOX</h2>			
<h3>PDD</h3>			
FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT February 2020	CONT	SECT	JOB
REVISIONS	0045	09	110, ETC
DIST	COUNTY		SHEET NO.
PAR	LAMAR		58

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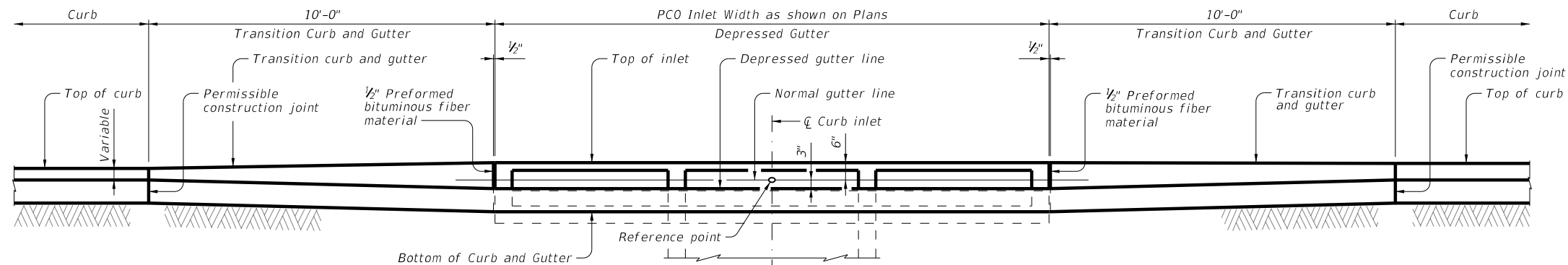
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SHOWING TYPE I, IIa & III Curb and Gutter

SHOWING TYPE II & IV Curb and Gutter

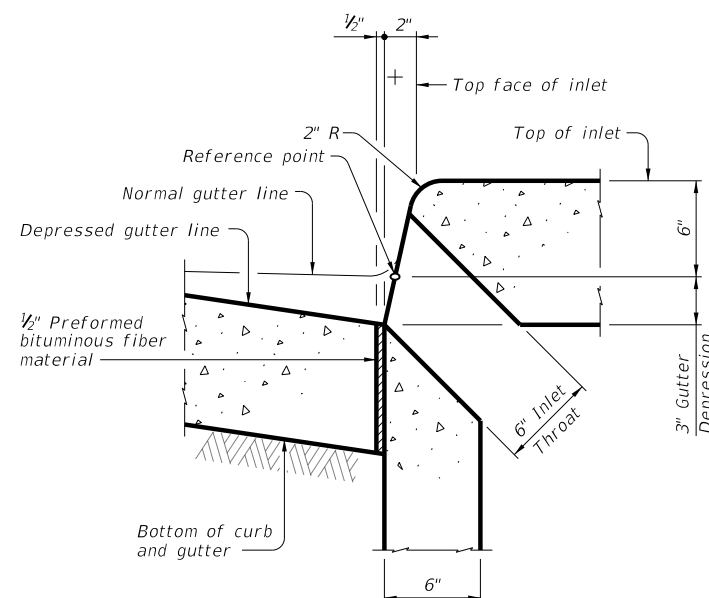
PLAN



SHOWING TYPE I, IIa & III Curb and Gutter

SHOWING TYPE II & IV Curb and Gutter

ELEVATION



SECTION AT GUTTER AND INLET

(Reinforcing steel not shown for clarity.)

CONSTRUCTION NOTES:
 Align top face of curb with PCO Inlet as shown.

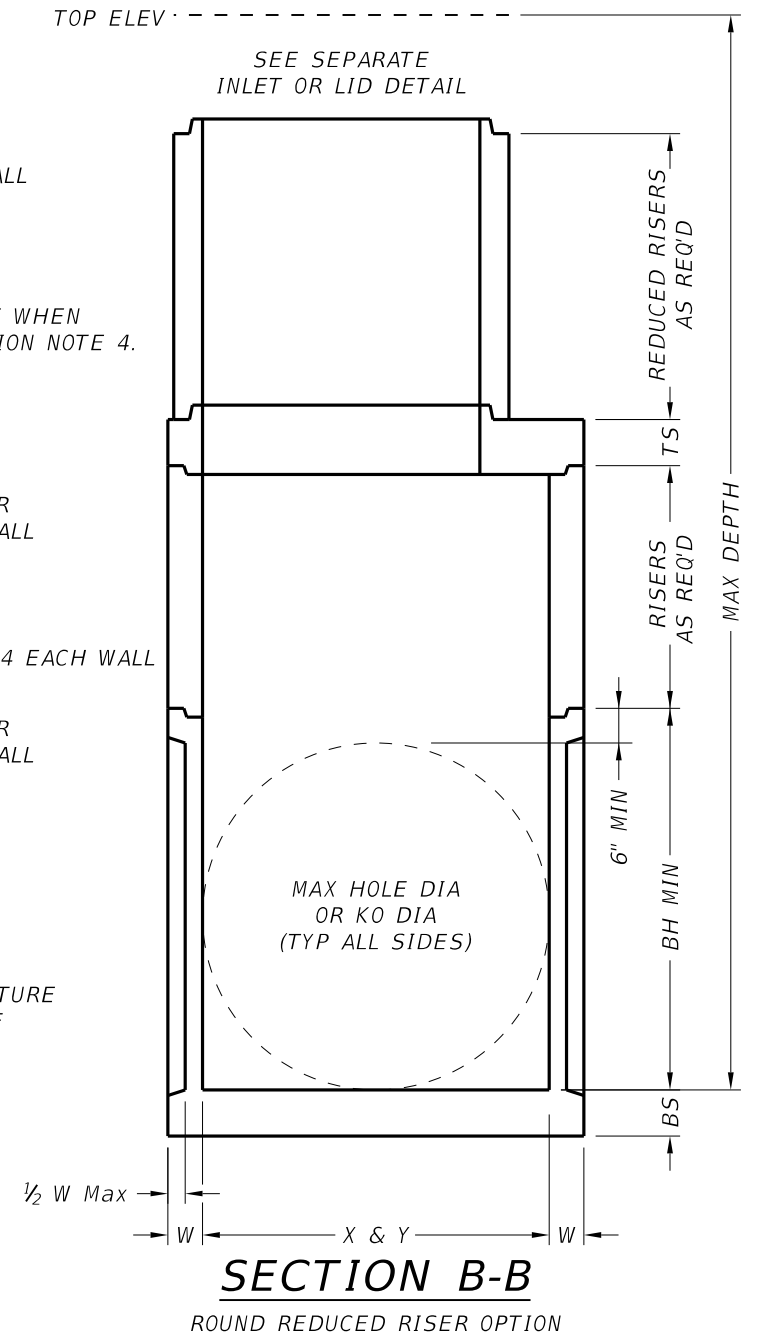
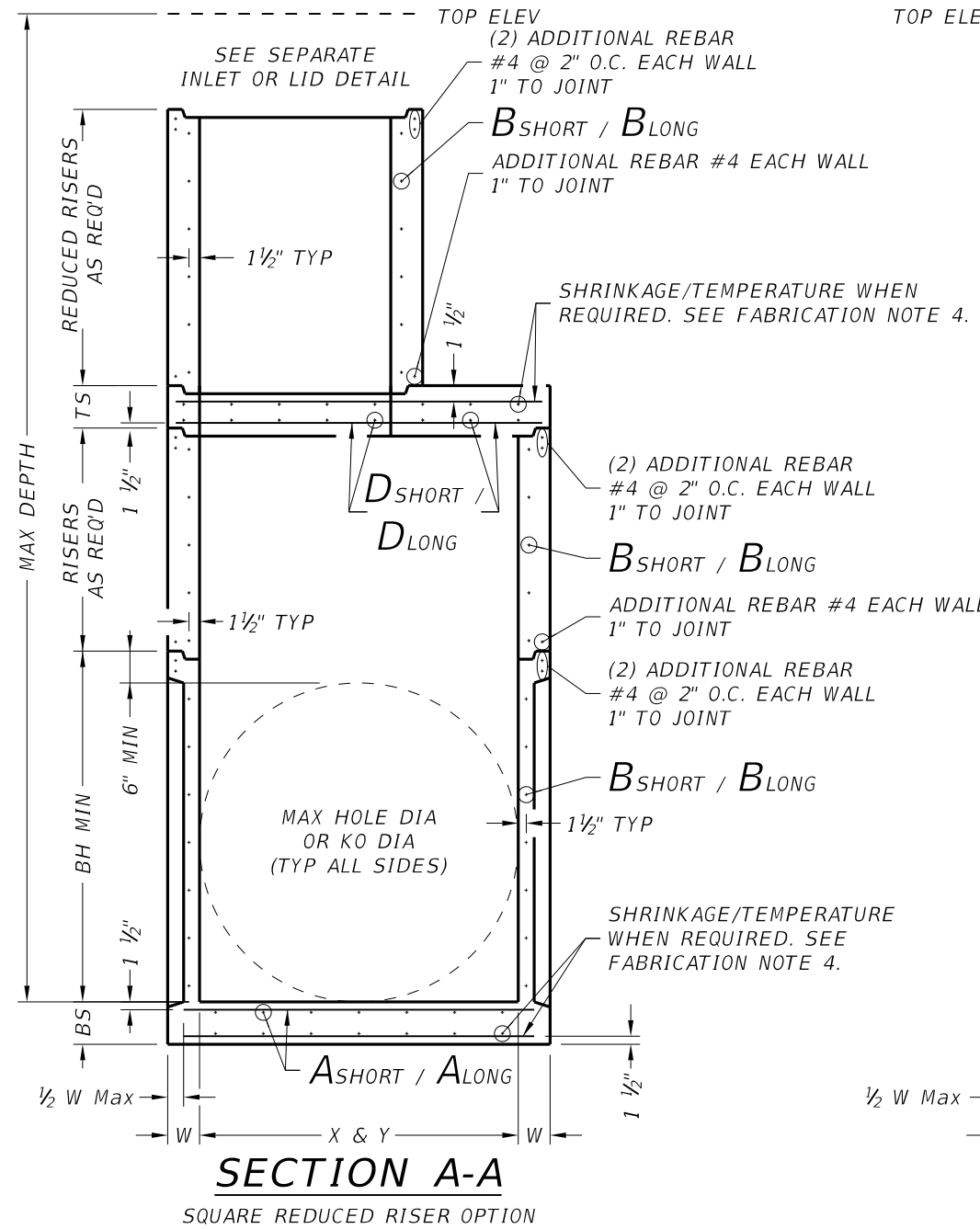
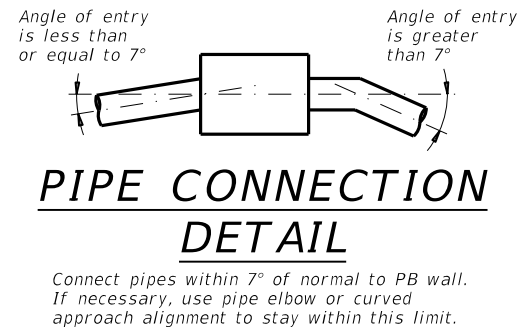
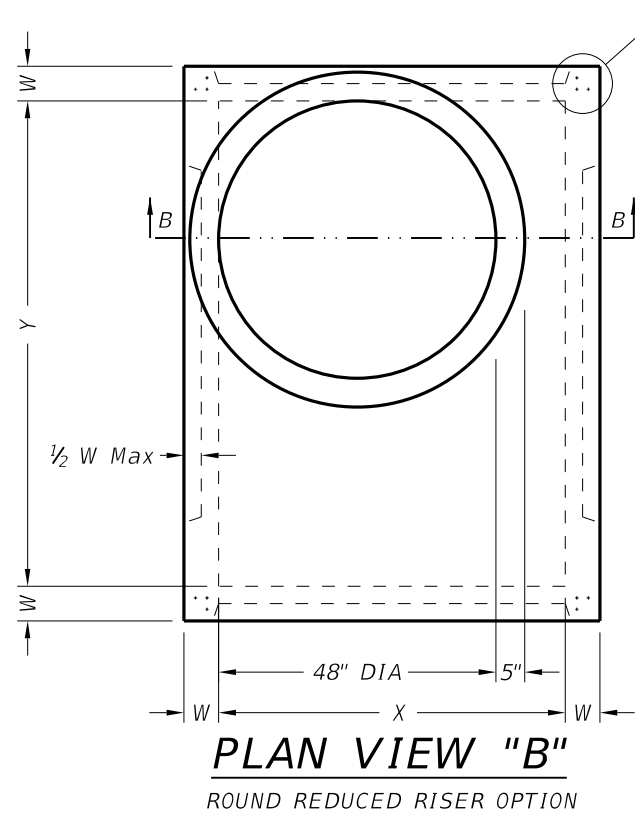
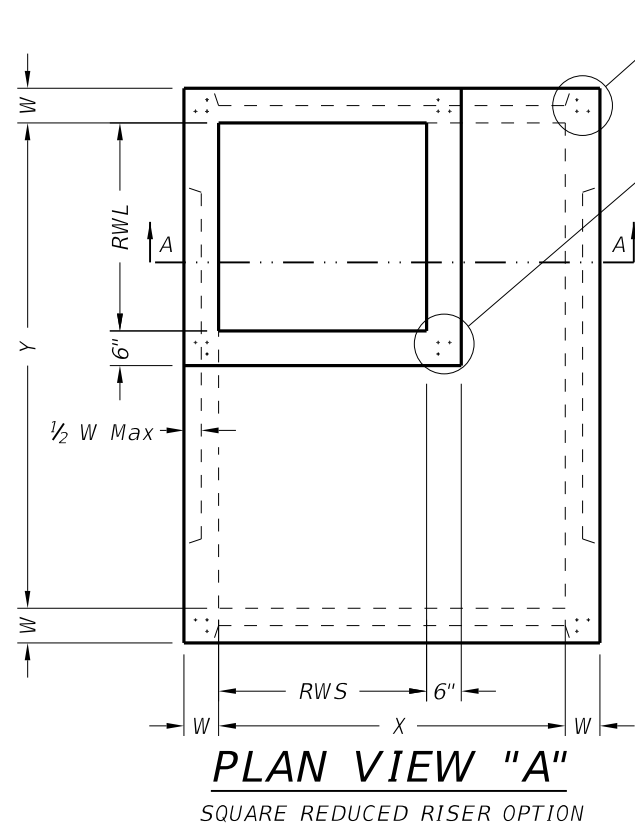
MATERIAL NOTES:
 Provide 1/2" preformed bituminous fiber material.

GENERAL NOTES:
 Reference point is located where the centerline of the main throat intersects the normal gutter line.
 See Precast Curb Inlet Outside Roadway (PCO) standard for details and notes not shown.
 See Concrete Curb and Curb and Gutter (CCCG-22) standard for details and notes not shown.
 Curb and Gutter Transitions is paid for and in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
 Preformed bituminous fiber material is subsidiary to PCO Inlet.

				Bridge Division Standard	
CURB AND GUTTER TRANSITION DETAILS FOR PCO INLET					
CGT-PCO					
FILE:	DN: TxDOT	CK: AES	DW: JTR	CK: AES	
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0045	09	110, ETC	US 82, ETC	
06-2023: Added reference point.	DIST	COUNTY	SHEET NO.		
	PAR	LAMAR	59		

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FABRICATION NOTES:

1. Provide Class "H" concrete in accordance with Item 421 and having a minimum compressive strength of 5,000 psi.
2. Provide Grade 60 reinforcing steel or equivalent area of WWR.
3. Provide typical clear cover of 1 1/2" to reinforcing steel at interior or exterior walls.
4. Walls or slabs with a thickness of 8" or greater require shrinkage and temperature reinforcing steel. Provide steel area = 0.11 in²/ft each way.
5. No substitution is allowed for vertical and horizontal #4 bars in corners.
6. Manufacture base and risers to nearest 3" increment.
7. Design tongue and groove joints for full closure on both shoulders. Minimum spigot depth is 3/4".
8. Provide lifting devices in conformance with Manufacturer's recommendations.
9. See sheet PDD for sizes, dimensions, and reinforcing steel not shown.

INSTALLATION NOTES:

1. If required elsewhere. Inverts (benching) to be provided by Contractor. Concrete or mortar used for invert is subsidiary to specified inlet or manhole.
2. Seal tongue and groove joints with preformed or bulk mastic in conformance with Manufacturer's recommendations. Tongue and groove joints may be grouted no more than 1" between each section, or 1/2 the joint depth, whichever is greater.
3. Do not grout rubber gasket joints without Manufacturer's recommendation.
4. For rigid pipe, cut hole in thin wall panel (KO) 4" Max, 2" Min larger than pipe OD.
5. For flexible pipe, consult boot/seal Manufacturer's specification for placement tolerance and hole size. Center pipe in hole and install boot/seal per Manufacturer's specification.

GENERAL NOTES:

1. Precast Base consists of base slab, base unit, risers (as required), reducing slab (as required), and reduced risers (as required). See sheet PDD for sizes.
2. Designed according to ASTM C913.
3. Payment for precast base is subsidiary to the specified inlet, per Item 465, "Junction Boxes, Manholes, and Inlets."

Cover dimensions are clear dimensions, unless noted otherwise.

HL93 LOADING

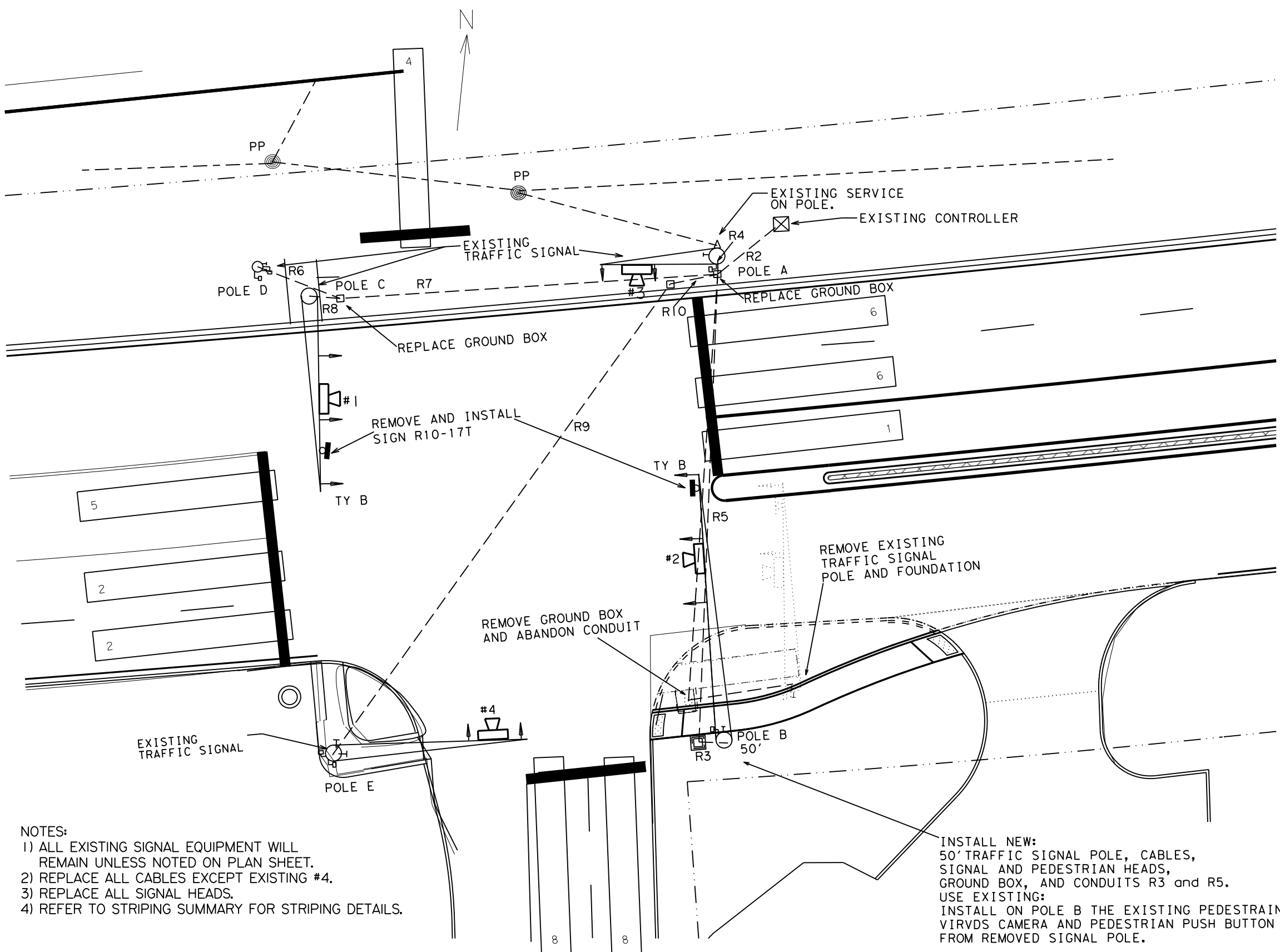


PRECAST BASE

PB

FILE:	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
	DIST	COUNTY	SHEET NO.	
	PAR	LAMAR	60	

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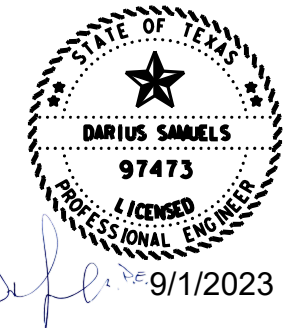


- NOTES:
- 1) ALL EXISTING SIGNAL EQUIPMENT WILL REMAIN UNLESS NOTED ON PLAN SHEET.
 - 2) REPLACE ALL CABLES EXCEPT EXISTING #4.
 - 3) REPLACE ALL SIGNAL HEADS.
 - 4) REFER TO STRIPING SUMMARY FOR STRIPING DETAILS.

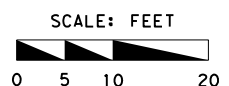
INSTALL NEW:
 50' TRAFFIC SIGNAL POLE, CABLES,
 SIGNAL AND PEDESTRIAN HEADS,
 GROUND BOX, AND CONDUITS R3 and R5.
 USE EXISTING:
 INSTALL ON POLE B THE EXISTING PEDESTRIAN SIGN,
 VIRVDS CAMERA AND PEDESTRIAN PUSH BUTTON
 FROM REMOVED SIGNAL POLE.

LEGEND

- TRAFFIC SIGNAL CONTROLLER
- POLE & MAST ARM
- VEHICLE HEAD
- UTILITY POLE
- #1 VIRVDS CAMERA
- 2 DETECTION ZONE
- PEDESTRIAN HEAD AND PUSH BUTTON
- PEDESTAL POLE W/ PED HEAD AND PUSH BUTTON
- EXISTING GROUND BOX
- OVERHEAD POWERLINE
- ROW
- CONDUIT
- NEW GROUND BOX
- SIGN



TRAFFIC SIGNAL LAYOUT
BU 82 AT
33RD STREET
0045-09-111, ETC



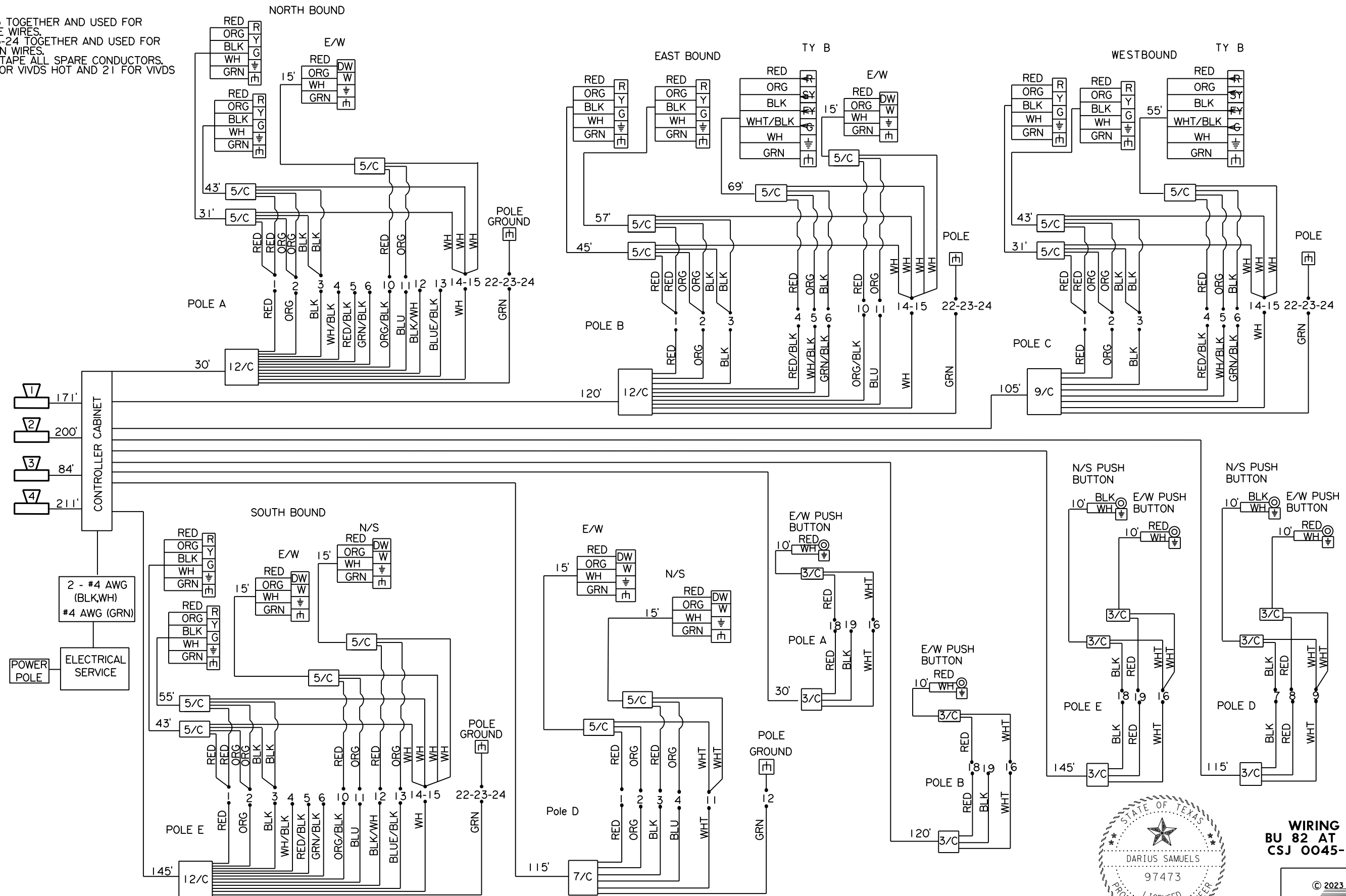
SHEET 1 OF 1

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	61	

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NOTE:
 TIE 14-15 TOGETHER AND USED FOR ALL WHITE WIRES.
 TIE 22-23-24 TOGETHER AND USED FOR ALL GREEN WIRES.
 CAP AND TAPE ALL SPARE CONDUCTORS.
 USE 20 FOR VIVDS HOT AND 21 FOR VIVDS NEUTRAL.



STATE OF TEXAS
 DARIUS SAMUELS
 97473
 LICENSED PROFESSIONAL ENGINEER
 9/1/2023

WIRING DIAGRAM
 BU 82 AT 33RD STREET
 CSJ 0045-09-111, ETC.

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	62	

DATE: 8/31/2023
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CHK: DWF: CKE: DNE:

CONDUIT TABLE

RUN NO.	LENGTH(LF)	CONDUIT SIZE(IN)	3 COND	7 COND	9 COND	12 COND	VIVDS CABLE	#6 COND	#4☆ COND
* 2	25	4	4	1	1	3	4	1	2
** 3	5	3	1			1	1	1	
* 4	5	2	1			1	1	1	2
** 5	90	3	1			1	1	1	
* 6	20	3	1	1				1	
* 7	70	3	1	1	1		1	1	
* 8	10	2			1		1	1	
* 9	110	3	1			1	1	1	
* 10	10	3	1			1	2	1	

**NEW PVC (SCHD 40) R3-TRENCHED; R5-BORED
 * EXISTING CONDUIT
 ☆KEEP THE EXISTING #4 IN EXISTING CONDUIT R2 AND R4.

CONDUIT SUMMARY

0618 6029 CONDT (PVC) (SCH 40) (3")	5 LF
0618 6030 CONDT (PVC) (SCH 40) (3")(BORE)	90 LF


POLE ASSEMBLY SUMMARY

0686 6053 INS TRF SIG PL AM(S)1 ARM(50')	B	1 EA
--	---	------

CONDUCTORS AND TRAFFIC SIGNAL CABLE

0620 6010 ELEC CONDR (NO.6) INSULATED	345 LF
0684 6008 TRF SIG CBL (TY A)(12 AWG)(3 CONDR)	470 LF
0684 6010 TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	562 LF
0684 6012 TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	115 LF
0684 6014 TRF SIG CBL (TY A)(12 AWG)(9 CONDR)	105 LF
0684 6017 TRF SIG CBL (TY A)(12 AWG)(12 CONDR)	295 LF
6083 6005 VID IMAGE AND RADAR COM CABLE (COAX)	666 LF

SUMMARY OF SMALL SIGNS

POLE NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS	ALUMINUM TYPE A EACH	TYPE OF MOUNT
B C	R10-17T		36"x42"	2 EACH	NOTE: MOUNTED ON SIGNAL MAST ARM PAID FOR UNDER ITEM 680.

SIGNAL HEAD SUMMARY

0682 6001 VEH SIG SEC (12")LED(GRN)	8 EA
0682 6002 VEH SIG SEC (12")LED(GRN ARW)	2 EA
0682 6003 VEH SIG SEC (12")LED(YEL)	8 EA
0682 6004 VEH SIG SEC (12")LED(YEL ARW)	4 EA
0682 6005 VEH SIG SEC (12")LED(RED)	8 EA
0682 6006 VEH SIG SEC (12")LED(RED ARW)	2 EA
0682 6018 PED SIG SEC (LED)(COUNTDOWN)	6 EA
0682 6049 BACKPLATE W/REFL BRDR(4 SEC)	2 EA
0682 6060 BACKPLATE W/REFL BRDR(3 SEC)	8 EA

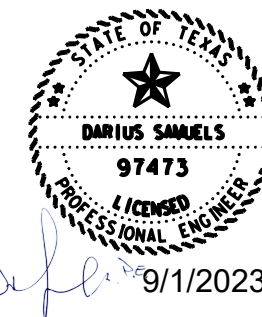
TRAFFIC SIGNAL ITEMS

# 0416 6034 DRILL SHAFT (TRF SIG POLE) (48 IN)	20 LF
0624 6010 GROUND BOX TY D (162922)W/APRON	1 EA
0680 6002 INSTALL HWY TRF SIG (ISOLATED)	1 EA
0690 6007 REPLACE OF GROUND BOXES	3 EA
0690 6123 RELOCATE OF PEDESTRIAN PUSH BUTTON	1 EA
6212 6001 RELOCATE EXIST RADAR VEH SENSING DEVICE	1 EA
# POLE B-20LF	

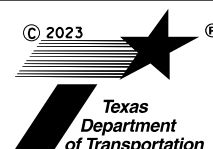
REMOVAL TRAFFIC SIGNAL ITEMS❖

0624 6028 REMOVE GROUND BOX	1 EA
0690 6009 REMOVAL OF CABLES	2558 LF
0690 6024 REMOVAL OF SIGNAL HEAD ASSM	10 EA
0690 6033 REMOVAL OF TRAFFIC SIGNAL POLE FND	3 LF
0690 6051 REMOVAL OF SIGNAL POLE ASSM	1 EA

❖ AT THE INTERSECTION OF BU 82 AT 33RD STREET RETURN LUMINAIRE AND POLE TO THE SIGNAL SHOP LOCATED AT 1365 NORTH MAIN IN PARIS. REMOVE ALL EXISTING WIRE FROM CONDUITS AND ABANDON OR REPLACE GROUND BOXES AS NOTED ON PLANS. ALL OTHER TRAFFIC SIGNAL EQUIPMENT REMOVED PER PLANS BECOMES THE PROPERTY OF THE CONTRACTOR.



QUANTITY SUMMARY
 BU 82 AT 33RD STREET
 CSJ 0045-09-111, ETC.

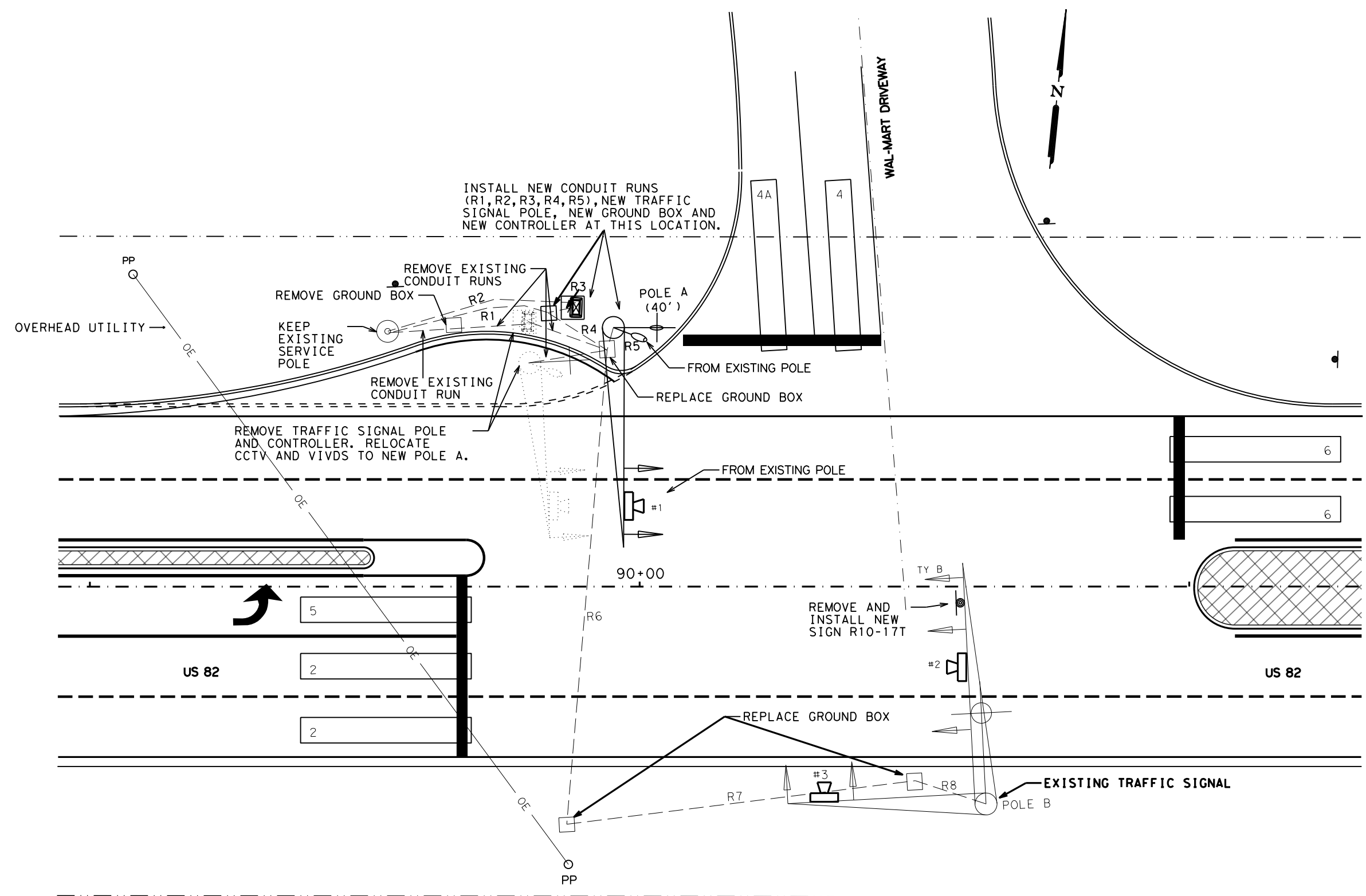
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 Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	63	

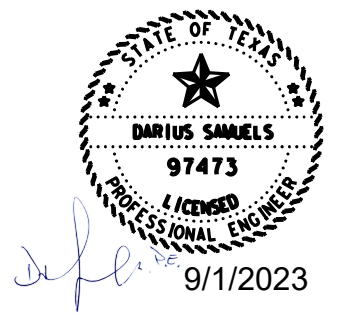
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LEGEND

- CONDUIT
- - - BORED CONDUIT
- TRAFFIC CONTROLLER, PEDESTAL SERVICE AND GROUND BOX
- POLE & MAST ARM
- VEHICLE HEAD
- GROUND BOX
- VIRVDS CAMERA
- TTI DETECTION ZONE
- 24" STOP LINE
- POWER POLE
- CCTV
- SIGN

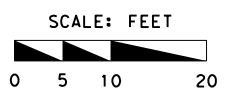


- NOTES:
- 1) ALL EXISTING SIGNAL EQUIPMENT WILL REMAIN UNLESS NOTED ON PLAN SHEET.
 - 2) REPLACE ALL SIGNAL HEADS AND CABLES.
 - 3) REFER TO STRIPING SUMMARY FOR STRIPING DETAILS



TRAFFIC SIGNAL LAYOUT

US 82 @ WALMART DRIVEWAY
 0045-09-110, ETC

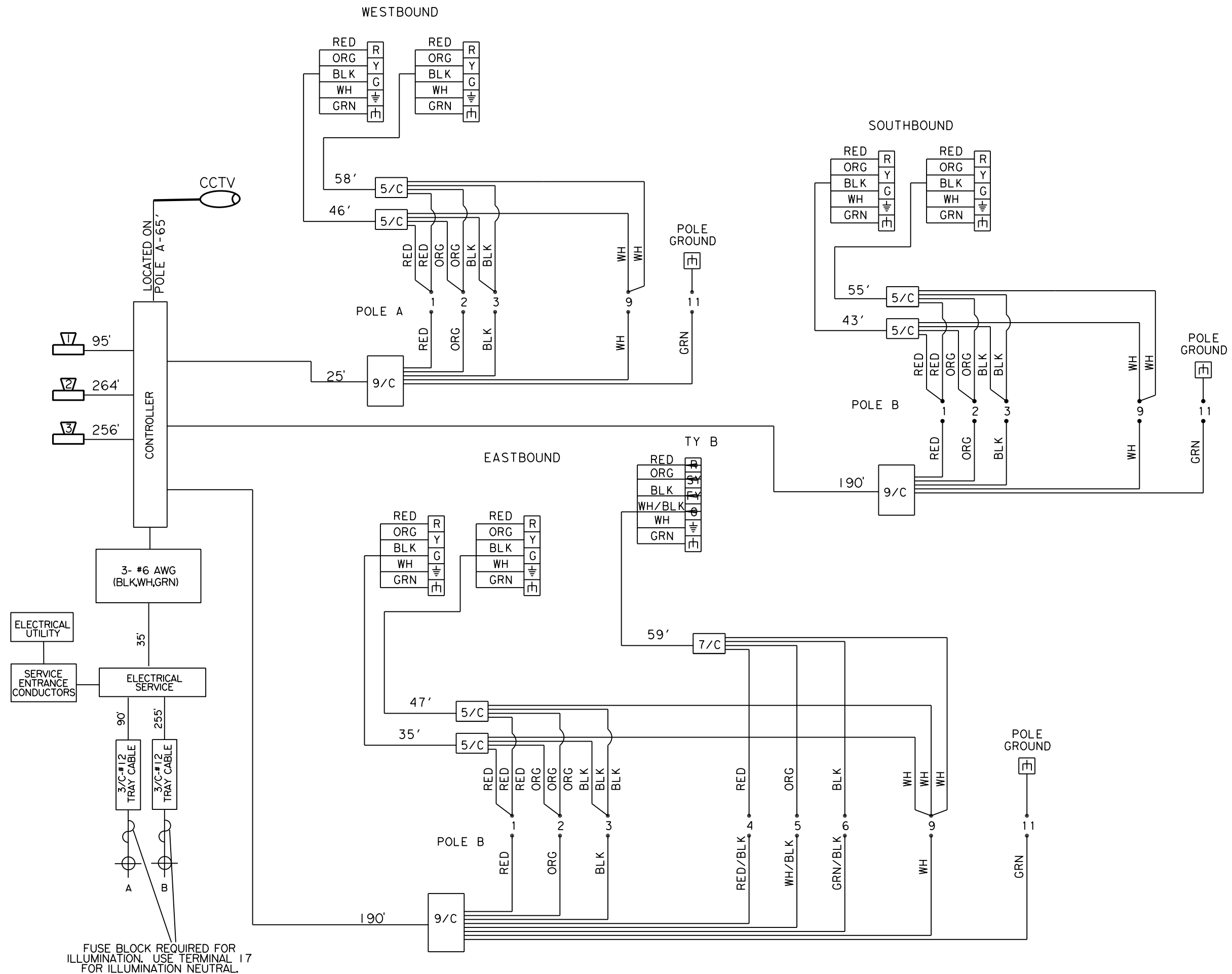


SHEET 1 OF 1

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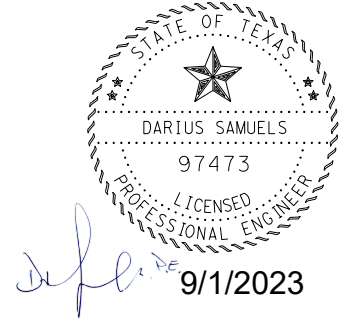
CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US 82
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	64	

FILE: U:\TAUSHA\dgnfiles\Lamar\BU82 AT 33RD AND WALMART\NEW\US82-Walmart.dgn



FUSE BLOCK REQUIRED FOR ILLUMINATION. USE TERMINAL 17 FOR ILLUMINATION NEUTRAL.

NOTE:
 TIE 14-15 TOGETHER AND USED FOR ALL WHITE WIRES ON SIGNAL POLE. TIE 22-23-24 TOGETHER AND USED FOR ALL GREEN WIRES ON SIGNAL POLE. CAP AND TAPE ALL SPARE CONDUCTORS. USE 20 FOR VIVDS HOT AND 21 FOR VIVDS NEUTRAL.
 CAP AND TAPE ALL SPARE CONDUCTORS NOT SHOWN TERMINATED.



WIRING DIAGRAM
 US 82 AT WALMART
 DRIVEWAY
 CSJ 0045-09-110, ETC.



CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	65	

DATE: 8/31/2023
 FILE: U:\TAUSHA\conf\files\Lamar\NEW\US82_Walmar.t.dgn


CONDUIT TABLE							
RUN NO.	LENGTH	#6 COND	TRAY CABLE	VIRVDS CABLE	ITS COMM CABLE	9 COND #12	CONDUIT SIZE
** 1	30	1	2				2 INCH
** 2	35	3					2 INCH
** 3	5	1		3	2	3	4 INCH
** 4	15	1	2	3	2	3	4 INCH
** 5	5	1	1	1	2	1	3 INCH
* 6	90	1	1	2		2	3 INCH
* 7	65	1	1	2		2	3 INCH
* 8	15	1	1	2		2	3 INCH
● 9	10						3 INCH
● 10	10						3 INCH

- **NEW TRENCHED PVC (SCHD 40)
- * EXISTING CONDUIT
- NOT SHOWN ON PLANS. FOR FUTURE USE PER TS-CF INSTALL AS DIRECTED.

CONDUIT SUMMARY	
0618 6023 CONDT (PVC) (SCH 40) (2")	65 LF
0618 6029 CONDT (PVC) (SCH 40) (3")	5 LF
0618 6033 CONDT (PVC) (SCH 40) (4")	20 LF

POLE ASSEMBLY SUMMARY		
0686 6043 INS TRF SIG PL AM(S)1 ARM(40')LUM	A	1 EA

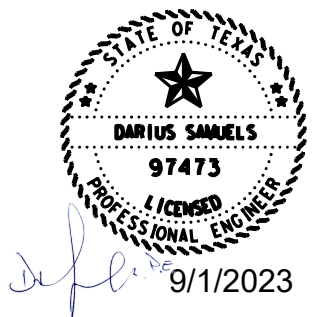
CONDUCTORS AND TRAFFIC SIGNAL CABLE	
0620 6010 ELEC CONDR (NO.6) INSULATED	350 LF
0621 6002 TRAY CABLE (3 CONDR) (12 AWG)	345 LF
0684 6010 TRF SIG CBL (TY A)(12 AWG)(5 CONDR)	284 LF
0684 6012 TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	59 LF
0684 6014 TRF SIG CBL (TY A)(12 AWG)(9 CONDR)	405 LF
6004 6031 ITS COM CBL(ETHERNET)	130 LF
6306 6007 VIVDS CABLING	615 LF

SUMMARY OF SMALL SIGNS					
POLE NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENSIONS	ALUMINUM TYPE A EACH	TYPE OF MOUNT
B	R10-17T		36"x42"	1 EACH	NOTE: MOUNTED ON SIGNAL MAST ARM PAID FOR UNDER ITEM 680.

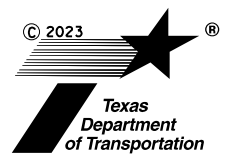
SIGNAL HEAD SUMMARY	
0682 6001 VEH SIG SEC (12")LED(GRN)	6 EA
0682 6002 VEH SIG SEC (12")LED(GRN ARW)	1 EA
0682 6003 VEH SIG SEC (12")LED(YEL)	6 EA
0682 6004 VEH SIG SEC (12")LED(YEL ARW)	2 EA
0682 6005 VEH SIG SEC (12")LED(RED)	6 EA
0682 6006 VEH SIG SEC (12")LED(RED ARW)	1 EA
0682 6049 BACKPLATE W/REFL BRDR(4 SEC)	1 EA
0682 6060 BACKPLATE W/REFL BRDR(3 SEC)	6 EA

TRAFFIC SIGNAL ITEMS	
# 0416 6032 DRILL SHAFT (TRF SIG POLE) (36 IN)	10 LF
0624 6010 GROUND BOX TY D (162922)W/APRON	4 EA
0680 6002 INSTALL HWY TRF SIG (ISOLATED)	1 EA
# 0680 6004 REMOVING TRAFFIC SIGNAL	1 EA
6010 6012 RELOCATE CCTV FIELD EQUIPMENT	1 EA
6058 6001 BBU SYSTEM (EXTERNAL BATT CABINET)	1 EA
6306 6010 VIVDS CAM ASSY (INSTALL ONLY)	1 EA

POLE A-10LF
 # THIS ITEM IS USED TO PAY FOR ALL REMOVED TRAFFIC SIGNAL ITEMS FOR WALMART DR. AND 42ND STREET SIGNAL LOCATIONS. AT THE INTERSECTIONS OF US 82 AT WALMART RETURN CONTROLLER CABINET AND ITS REMAINING CONTENTS, LUMINAIRE, SERVICE, AND POLE TO THE SIGNAL SHOP LOCATED AT 1365 NORTH MAIN IN PARIS. AT THE INTERSECTIONS OF US 82 AT 42ND STREET RETURN LUMINAIRE AND POLE TO THE SIGNAL SHOP LOCATED AT 1365 NORTH MAIN IN PARIS. REMOVE ALL EXISTING WIRE FROM CONDUITS AND ABANDON OR REPLACE GROUND BOXES AS NOTED ON PLANS. ALL OTHER TRAFFIC SIGNAL EQUIPMENT REMOVED PER PLANS BECOMES THE PROPERTY OF THE CONTRACTOR.



QUANTITY SUMMARY
 US 82 AT WALMART DRIVEWAY
 CSJ 0045-09-110, ETC.


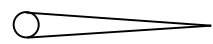
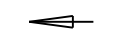
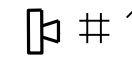
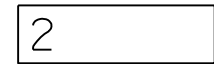
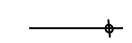


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 Texas Department of Transportation

CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	66	

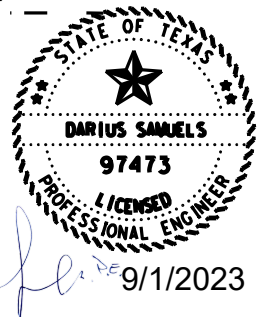
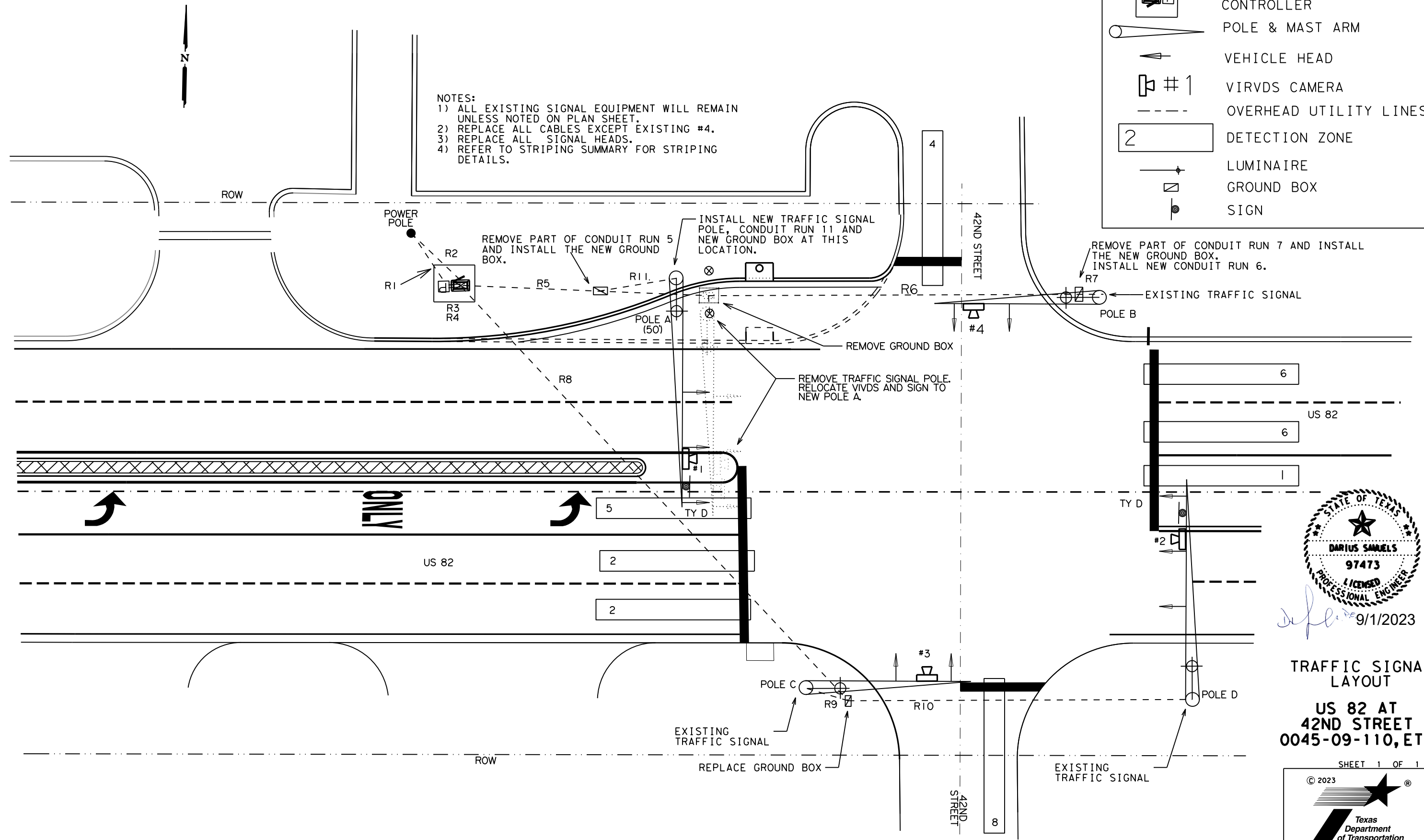
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C&G
 DWG
 C&G
 DWG

LEGEND

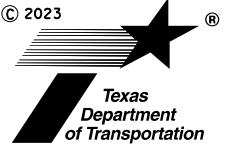
- CONDUIT
-  TRAFFIC SIGNAL CONTROLLER
-  POLE & MAST ARM
-  VEHICLE HEAD
-  #1 VIRVDS CAMERA
- OVERHEAD UTILITY LINES
-  2 DETECTION ZONE
-  LUMINAIRE
-  GROUND BOX
-  SIGN

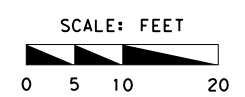
NOTES:
 1) ALL EXISTING SIGNAL EQUIPMENT WILL REMAIN UNLESS NOTED ON PLAN SHEET.
 2) REPLACE ALL CABLES EXCEPT EXISTING #4.
 3) REPLACE ALL SIGNAL HEADS.
 4) REFER TO STRIPING SUMMARY FOR STRIPING DETAILS.



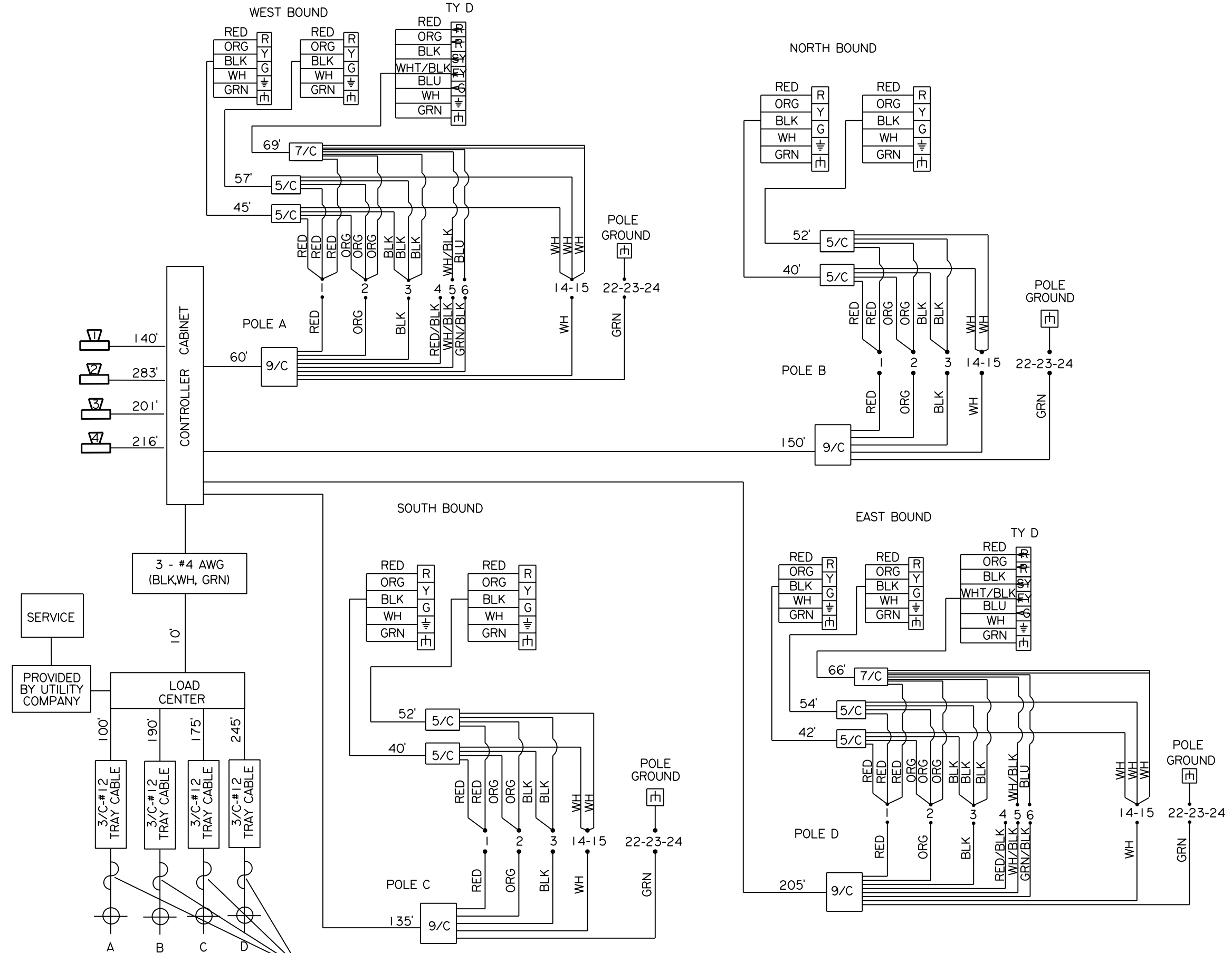
TRAFFIC SIGNAL LAYOUT
 US 82 AT
 42ND STREET
 0045-09-110, ETC

SHEET 1 OF 1

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	67	



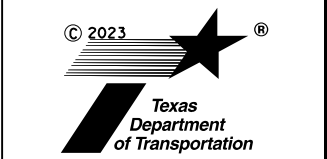
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FUSE BLOCK REQUIRED FOR ILLUMINATION.
USE TERMINAL 17 FOR ILLUMINATION NEUTRAL.

STATE OF TEXAS
DARIUS SAMUELS
97473
LICENSED PROFESSIONAL ENGINEER
9/1/2023

WIRING DIAGRAM
US 82 AT 42ND STREET
CSJ 0045-09-110, ETC.



CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	68	

DATE: 8/31/2023
 FILE: U:\TAUSHA\conf\files\Lamar\BU82_AT_33RD_AND_WALMART\NEW\US82_42nd.dgn

C&E
 DWG
 C&E

CONDUIT TABLE							
RUN NO.	LENGTH	#6 COND	#4 [☆] COND	TRAY CABLE	VIRVDS CABLE	9 COND #12	CONDUIT SIZE
** 1	15						2 INCH
** 2	15						1 INCH
** 3	10		3				2 INCH
** 4	10	1		4			2 INCH
** 5	30	1		2	2	2	3 INCH
* 6	105	1		1	1	1	3 INCH
** 7	5	1		1	1	1	3 INCH
** 8	125	1		2	2	2	3 INCH
** 9	10	1		1	1	1	3 INCH
** 10	80	1		1	1	1	3 INCH
* 11	20	1		1	1	1	3 INCH

* NEW PVC (SCHD 40) R11-TRENCHED; R6-BORED
 ** EXISTING CONDUIT
 ☆ KEEP THE EXISTING #4 IN EXISTING CONDUIT R3.

CONDUIT SUMMARY		
0618 6029	CONDT (PVC) (SCH 40) (3")	20 LF
0618 6030	CONDT (PVC) (SCH 40) (3")(BORE)	105 LF

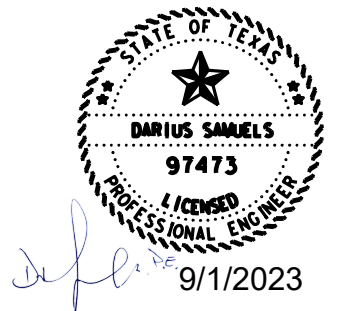
POLE ASSEMBLY SUMMARY			
0686 6055	INS TRF SIG PL AM(S)1 ARM(50')LUM	A	1 EA

SIGNAL HEAD SUMMARY	
0682 6001	VEH SIG SEC (12")LED(GRN) 8 EA
0682 6002	VEH SIG SEC (12")LED(GRN ARW) 2 EA
0682 6003	VEH SIG SEC (12")LED(YEL) 8 EA
0682 6004	VEH SIG SEC (12")LED(YEL ARW) 4 EA
0682 6005	VEH SIG SEC (12")LED(RED) 8 EA
0682 6006	VEH SIG SEC (12")LED(RED ARW) 4 EA
0682 6050	BACKPLATE W/REFL BRDR(5 SEC) 2 EA
0682 6060	BACKPLATE W/REFL BRDR(3 SEC) 8 EA

TRAFFIC SIGNAL ITEMS	
# 0416 6034	DRILL SHAFT (TRF SIG POLE) (48 IN) 20 LF
0624 6010	GROUND BOX TY D (162922)W/APRON 3 EA
0680 6002	INSTALL HWY TRF SIG (ISOLATED) 1 EA
** 0680 6004	REMOVING TRAFFIC SIGNAL -----
6212 6001	RELOCATE EXIST RADAR VEH SENSING DEVICE 1 EA

POLE A-20LF
 ## THIS ITEM IS USED TO PAY FOR ALL REMOVED TRAFFIC SIGNAL ITEMS FOR WALMART DR. AND 42ND STREET SIGNAL LOCATIONS.

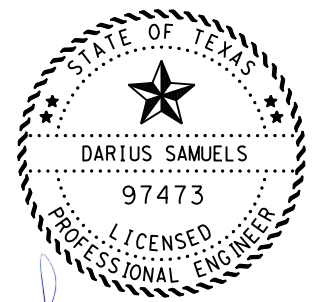
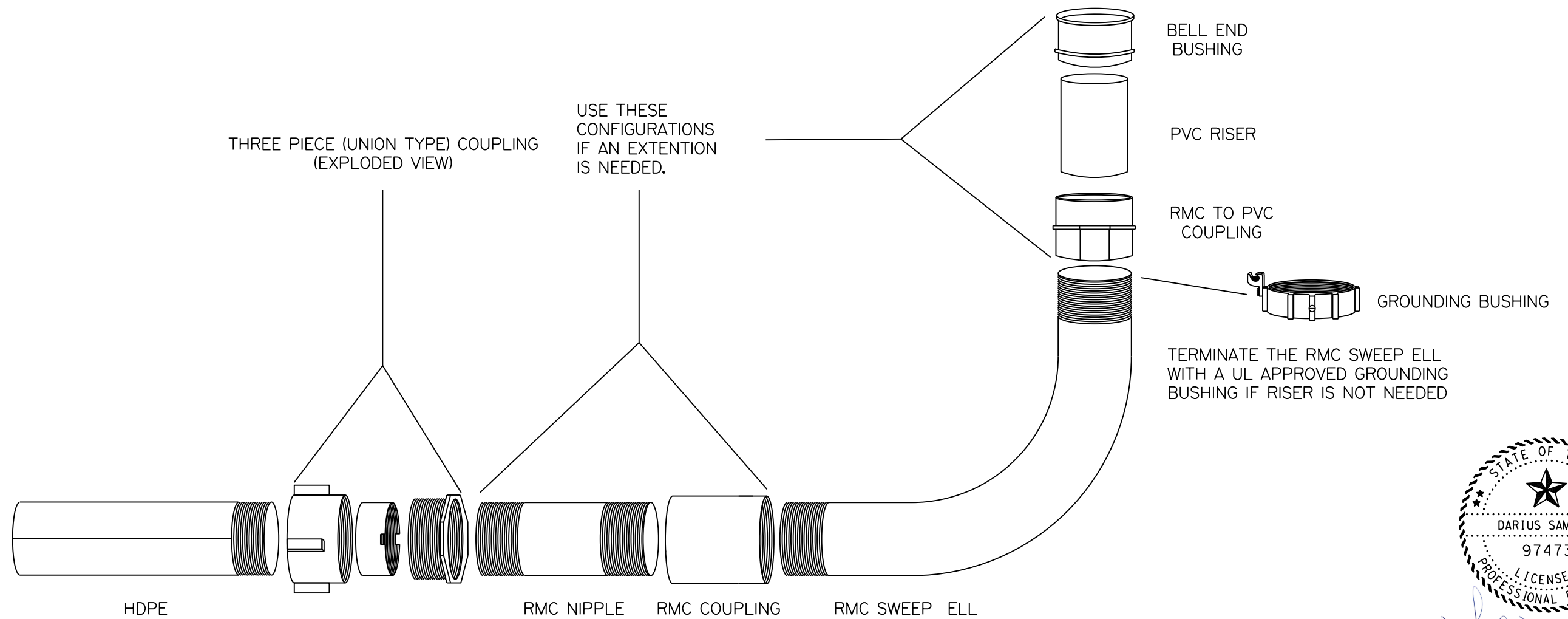
CONDUCTORS AND TRAFFIC SIGNAL CABLE	
0620 6010	ELEC CONDR (NO.6) INSULATED 425 LF
0621 6002	TRAY CABLE (3 CONDR) (12 AWG) 710 LF
0684 6010	TRF SIG CBL (TY A)(12 AWG)(5 CONDR) 382 LF
0684 6012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR) 135 LF
0684 6014	TRF SIG CBL (TY A)(12 AWG)(9 CONDR) 550 LF
6083 6005	VID IMAGE AND RADAR COM CABLE (COAX) 840 LF



QUANTITY SUMMARY
 US 82 AT 42ND STREET
 CSJ 0045-09-110, ETC.

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY		SHEET NO.
PAR	LAMAR		69



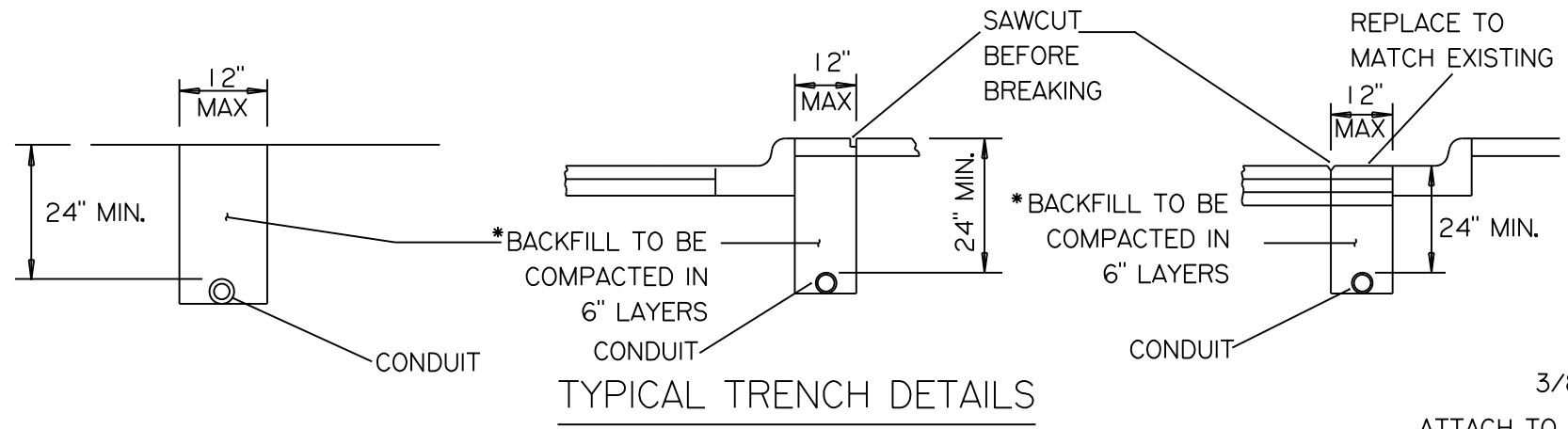
Darius Samuels 9/1/2023

RIGID METAL CONDUIT SWEEP ELL

NOT TO SCALE

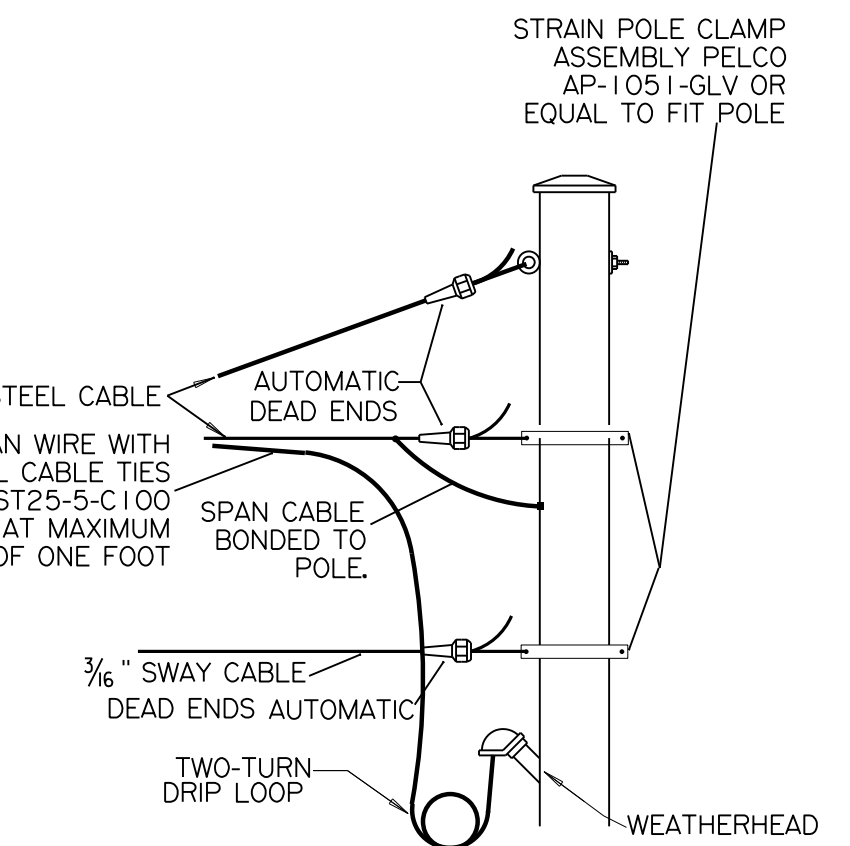


CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY		SHEET NO.
PAR	LAMAR		70



TYPICAL TRENCH DETAILS

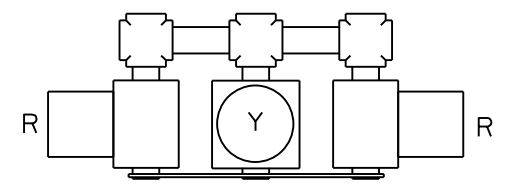
*Stabilize all backfill material under pavement with Portland Cement and mix in a concrete mixer or transit mix equipment. Use pit run sand and gravel, and stabilize with two sacks of cement per cubic yard. Mechanically tamp backfill in a moist condition or add water to provide a free flowing mixture.



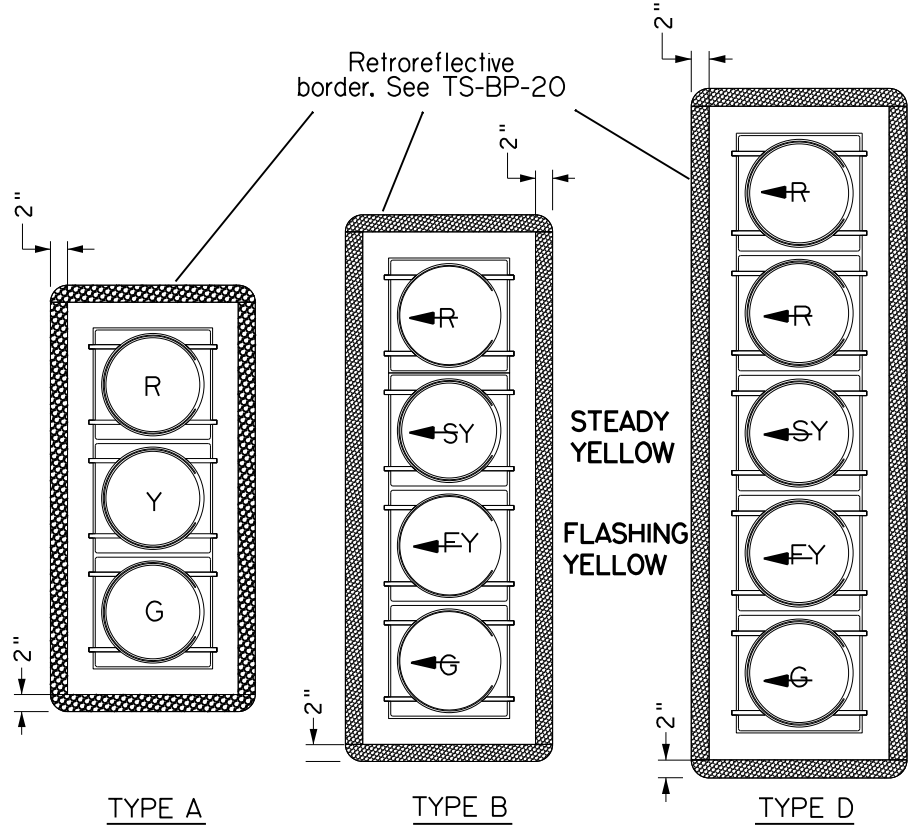
TYPICAL SPAN WIRE ATTACHMENT



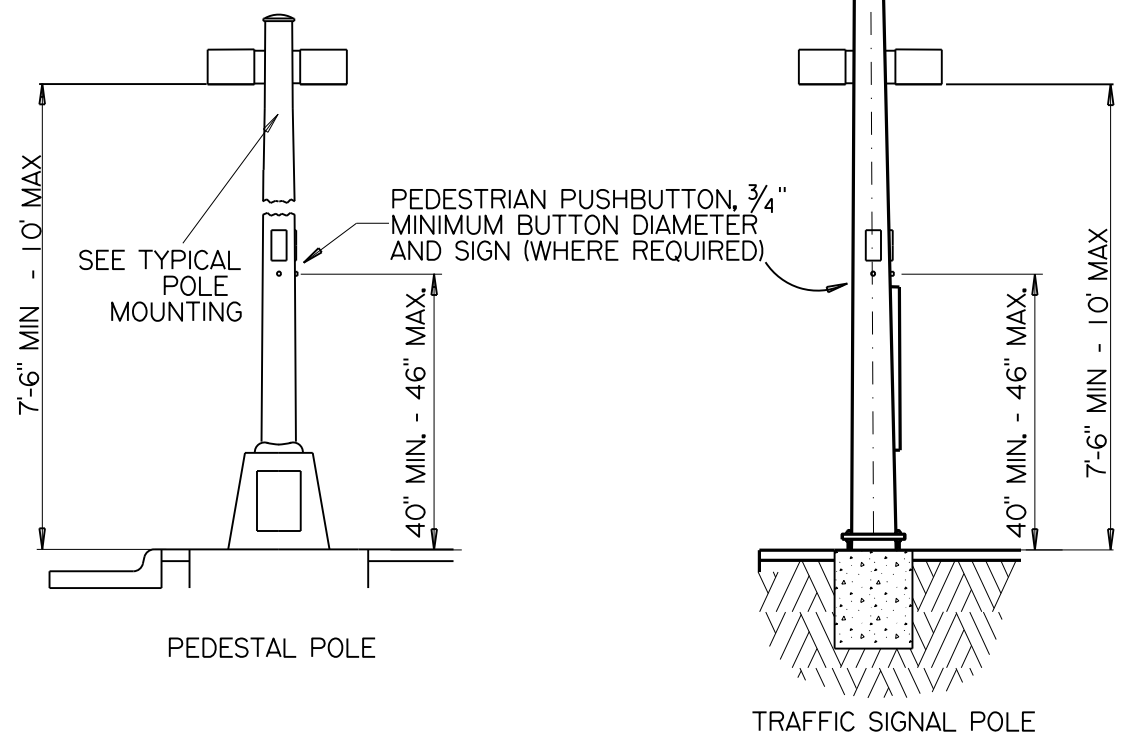
PEDESTRIAN HEAD (ONE-SECTION HEAD DISPLAYS WALK AND DON'T WALK SYMBOLS AND COUNTDOWN MODULE)



TYPE C (ONE- TO FOUR-WAY, AS SHOWN ON SIGNAL LAYOUT)



SIGNAL HEAD INDICATIONS



TYPICAL PEDESTRIAN HEAD MOUNTINGS

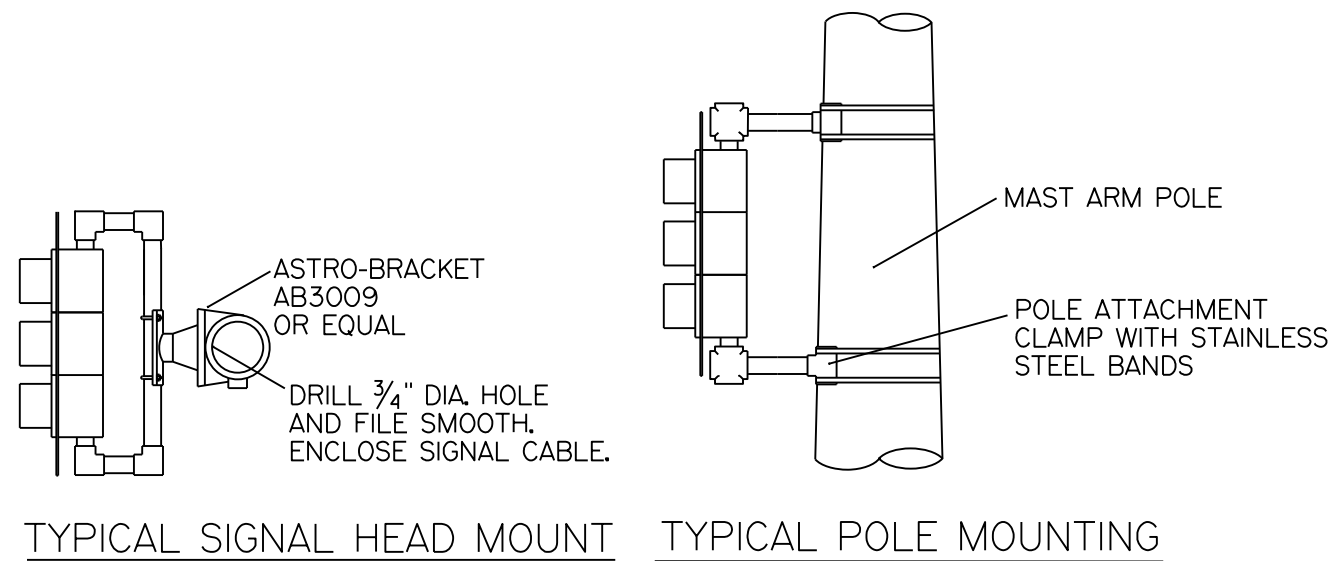
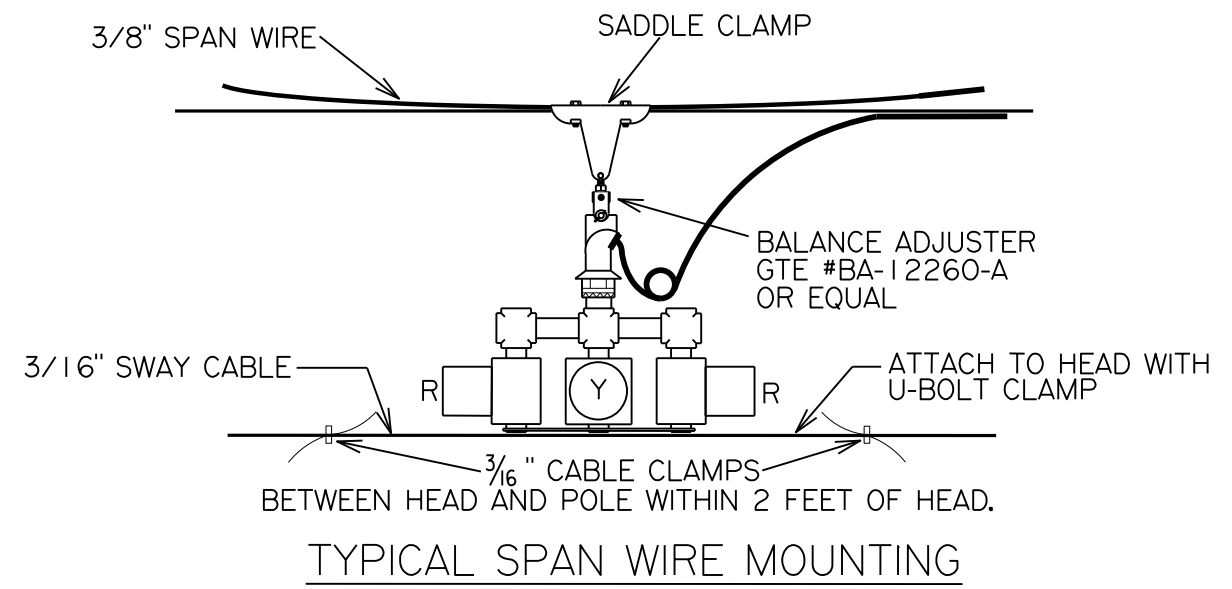
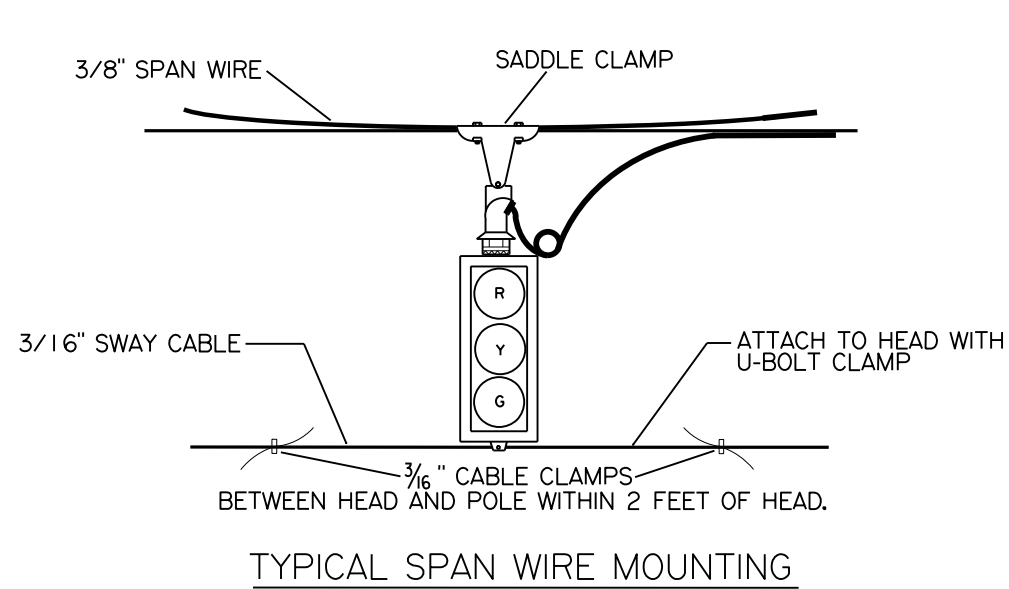


SIGNAL CONSTRUCTION DETAILS 1 OF 2

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	71	

REV. 2/2012

33RD AND WALMART STANDARDS - s02det1a1s2020.dwg



SIGNAL HEAD MOUNTING DETAILS

NOTES:

- 1) MOUNT POLE MOUNTED SIGNAL HEADS A MINIMUM HORIZONTAL CLEARANCE OF 2 FEET FROM THE FACE OF CURB OR EDGE OF SHOULDER.
- 2) POSITION THE BASE OF ALL SIGNAL SUPPORTS A MINIMUM OF 2 FEET FROM THE FACE OF CURB OR EDGE OF SHOULDER.
- 3) SIGNAL SUPPORTS SHOULD NOT OBSTRUCT A SIDEWALK.
- 4) SELF TAPPING SCREWS ARE NOT ALLOWED.
- 5) ALL CONDUIT FITTINGS ARE WATERTIGHT.

STATE OF TEXAS
DARIUS SAMUELS
97473
LICENSED PROFESSIONAL ENGINEER

dsf 9/1/2023

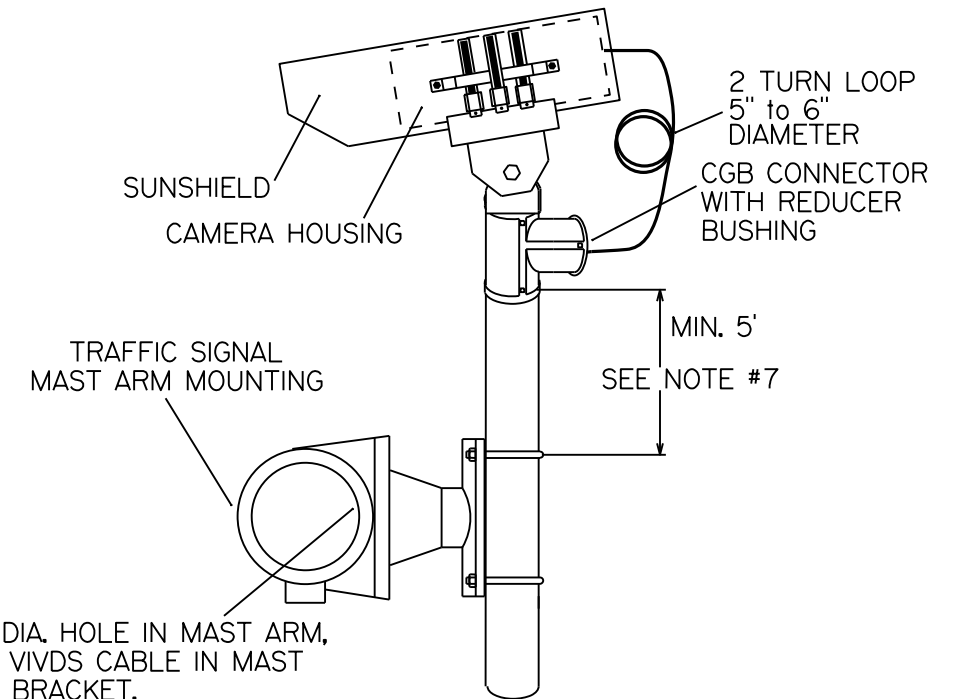
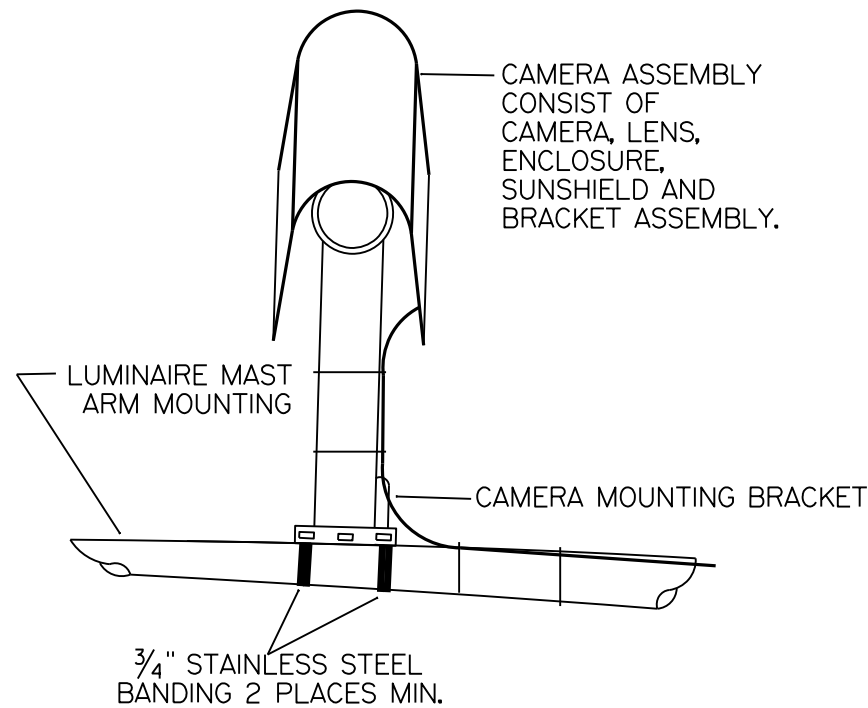
**SIGNAL
CONSTRUCTION
DETAILS
2 OF 2**

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY		SHEET NO.
PAR	LAMAR		72

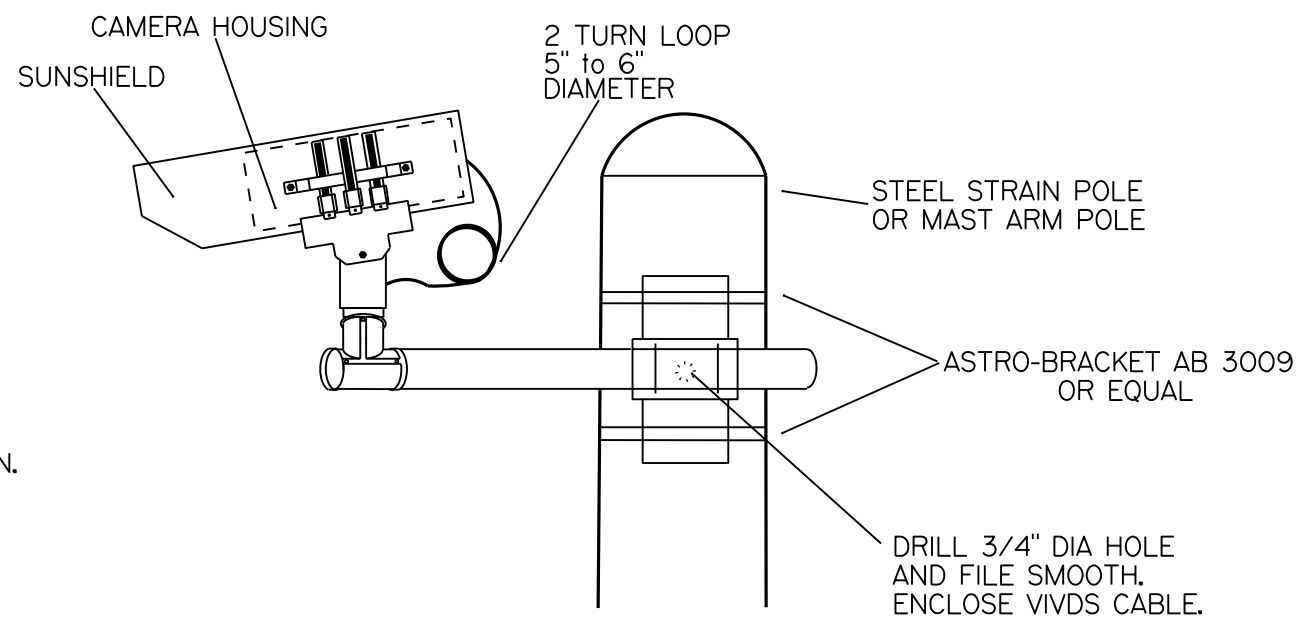
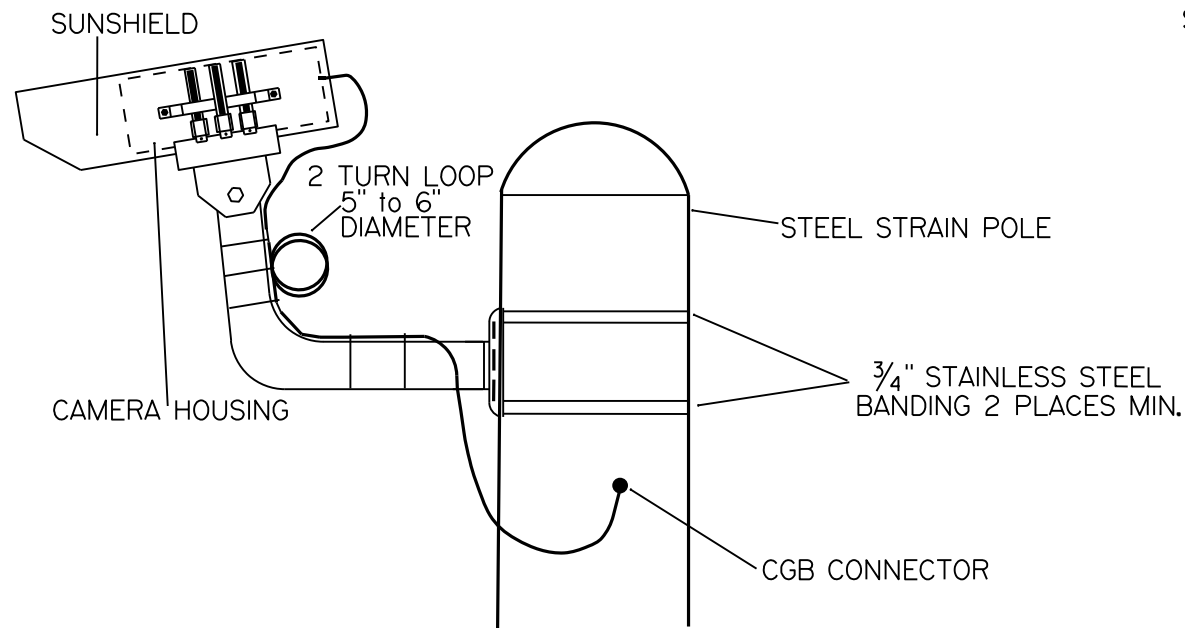
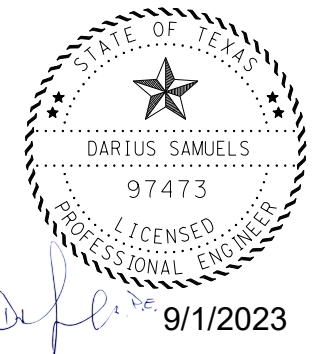
REV. 2/2012

NOTES:
VIDEO DETECTION

1. INSTALL VIDEO DETECTION PROCESSOR UNIT INSIDE CONTROLLER CABINET.
2. INSTALL VIDEO DETECTION CAMERA & BRACKET AS DETAILED.
3. MOUNT CAMERAS AS SHOWN ON PLANS OR AS DIRECTED.
4. AIM CAMERA SO THAT HORIZON IS NOT VISIBLE IN THE FIELD OF VIEW.
5. INSTALL CAMERA ENCLOSURE ASSEMBLY SO THAT IT IS ROTATABLE AFTER INSTALLATION TO PROVIDE PROPER ALIGNMENT.
6. MAKE ALL CABLE ENTRY AND EXITS POINTS IN THE MAST ARM AND/OR POLES WATER TIGHT.
7. USE A SIX-FOOT PIPE EXTENSION ON TRAFFIC SIGNAL MAST ARM FOR A MAST ARM SENSOR MOUNTING BRACKET. (EXAMPLE: PELCO AS-0166-74-62-SS-PNC OR EQUAL)
8. SECURE VIVDS CABLE TO CAMERA MOUNTING BRACKET USING BLACK NYLON UV STABILIZED CABLE TIES.

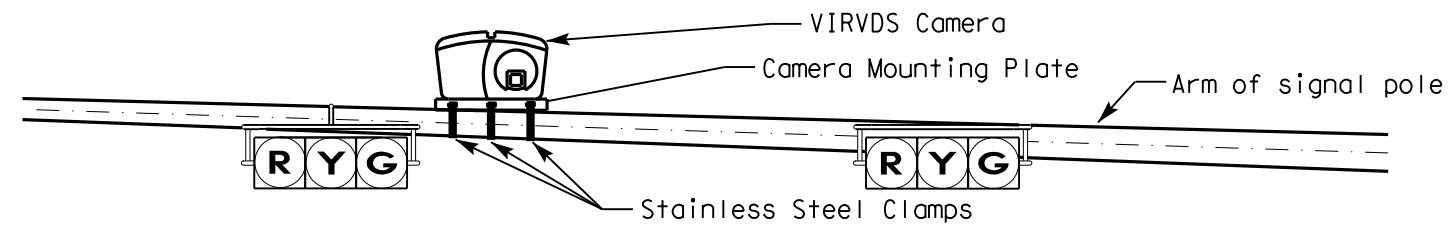


DRILL $\frac{3}{4}$ " DIA. HOLE IN MAST ARM, ENCLOSE VIVDS CABLE IN MAST ARM AND BRACKET.

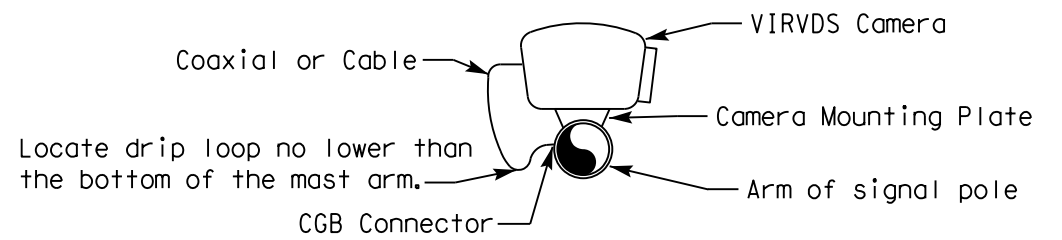


**VIVDS
DETAIL
SHEET**

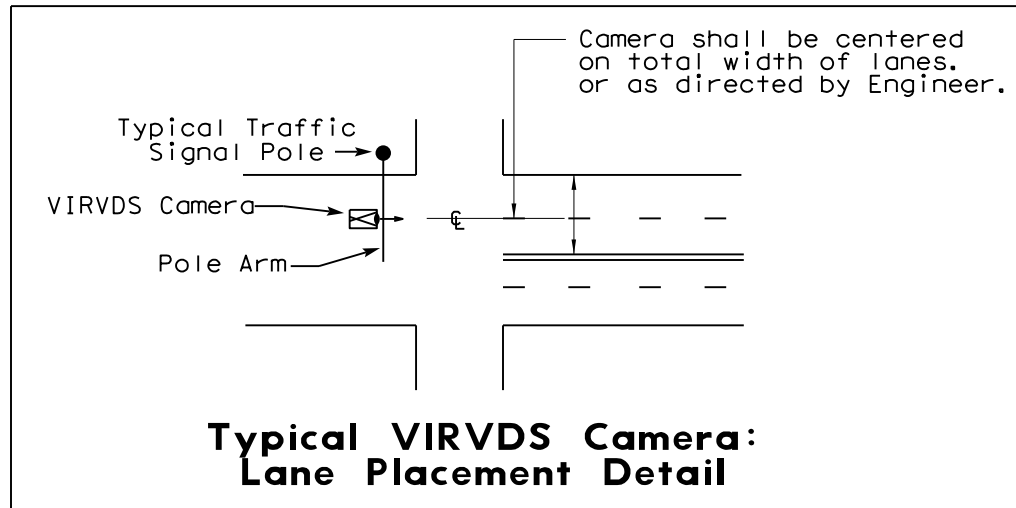
CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC.	US82, ETC.
DIST	COUNTY		SHEET NO.
PAR	LAMAR		73



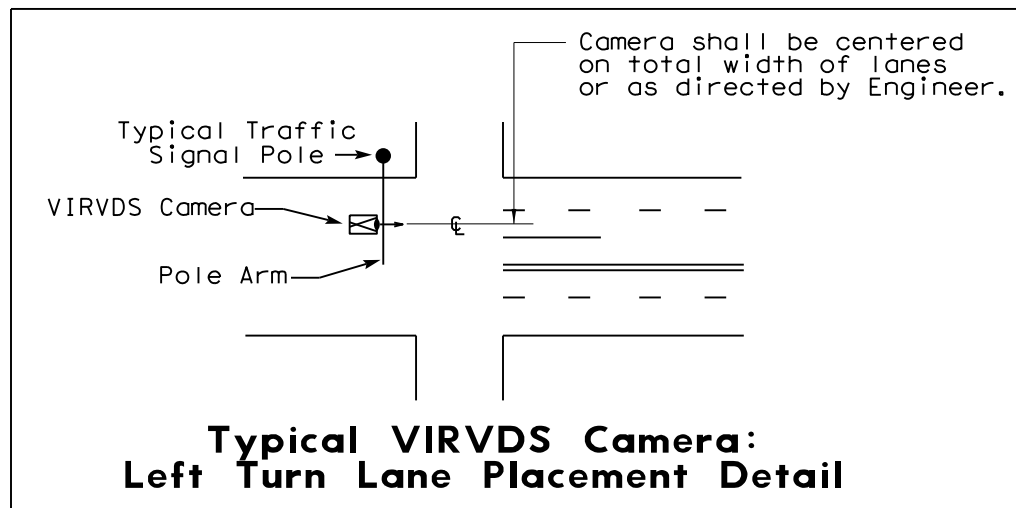
Elevation View



Side View



**Typical VIRVDS Camera:
Lane Placement Detail**

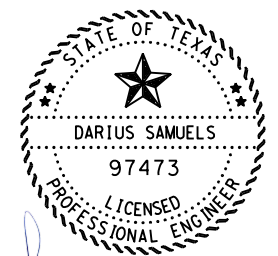


**Typical VIRVDS Camera:
Left Turn Lane Placement Detail**

Notes:

1. INSTALL VIDEO DETECTION PROCESSOR UNIT(S) INSIDE THE CONTROLLER CABINET.
2. INSTALL VIDEO DETECTION CAMERA & BRACKET AS DETAILED OR AS APPROVED BY THE ENGINEER.
3. USE STAINLESS STEEL CLAMPS TO INSTALL CAMERA MOUNTS OR METHOD APPROVED BY ENGINEER.
4. AIM THE CAMERA SO THAT THE HORIZON IS NOT VISIBLE IN THE FIELD OF VIEW.
5. INSURE WATER TIGHT CABLE ENTRY AND EXIT POINTS ARE IN THE MAST ARM.

VIDEO IMAGING AND RADAR VEHICLE DETECTION SYSTEM (VIRVDS)



Darius Samuels 9/1/2023

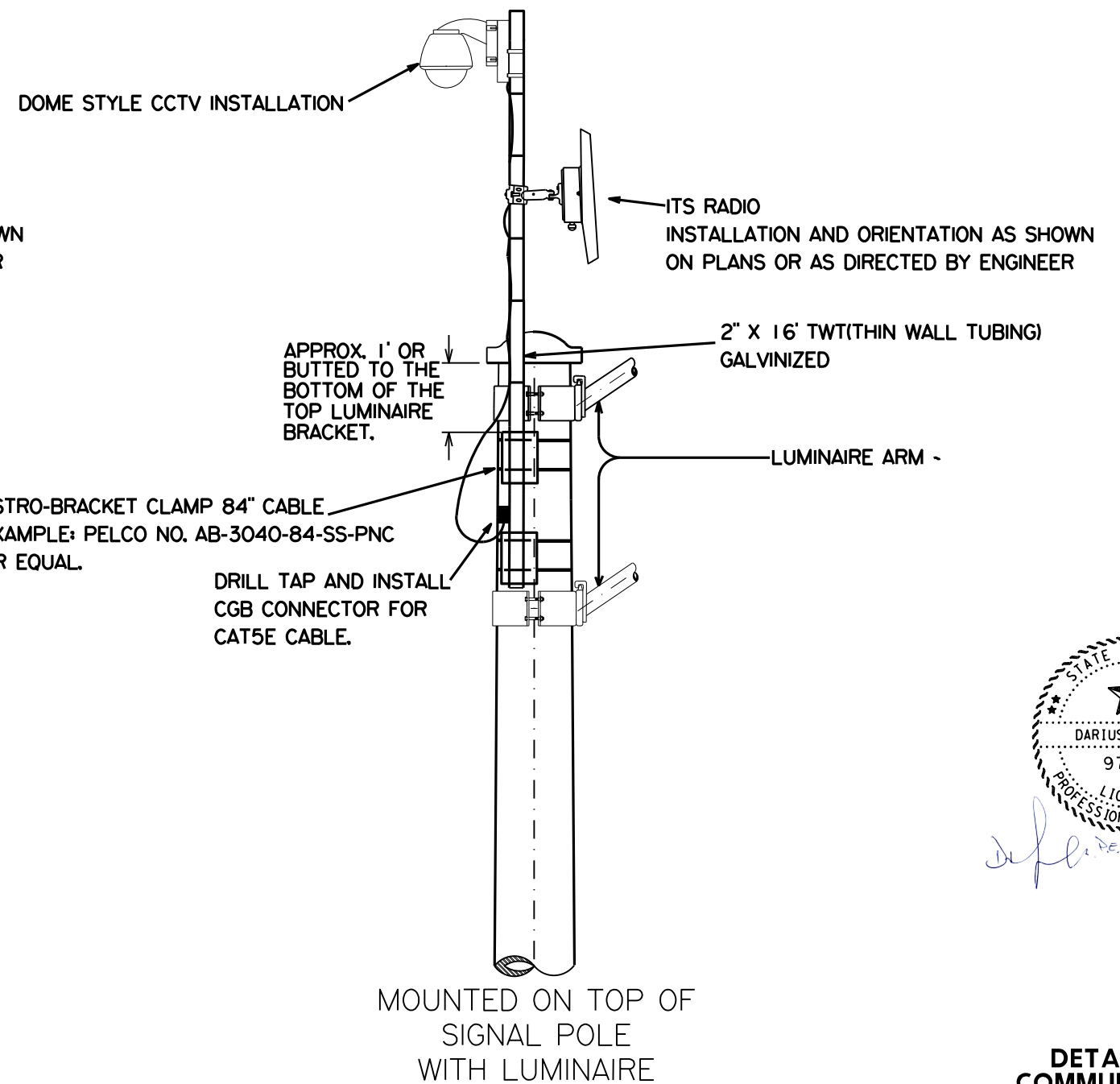
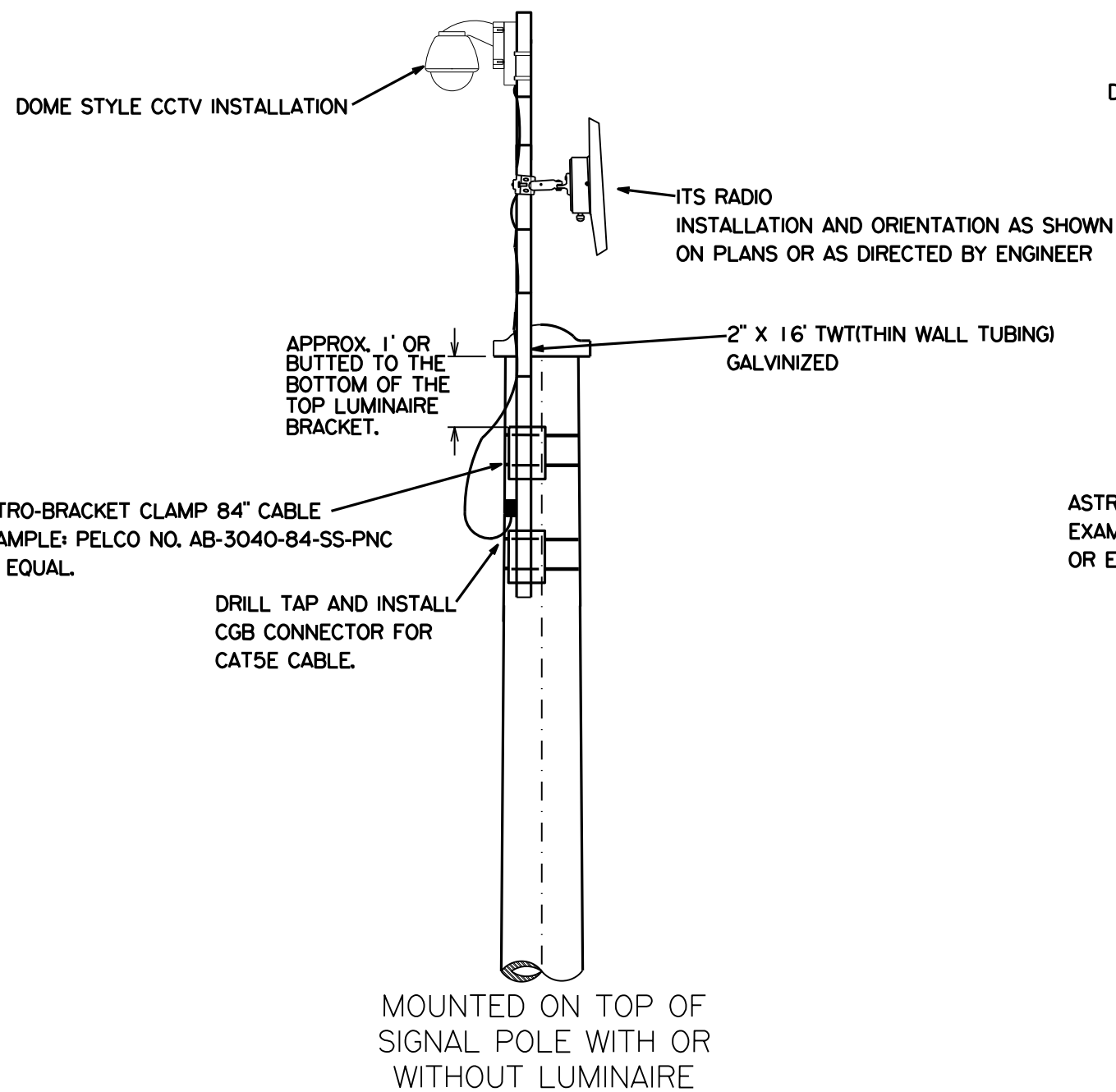
**TYPICAL VIRVDS
CAMERA MOUNTING
DETAILS**



CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	74	


NOT TO SCALE

DATE: 8/31/2023
 FILE: t:\parrtrof\ashley\projects\safety Lighting let_5-23\STANDARDS\eqcomm-IIS.dgn



STATE OF TEXAS
 DARTUS SAMUELS
 97473
 LICENSED PROFESSIONAL ENGINEER
D. Samuels 9/1/2023

DETAIL FOR COMMUNICATION EQUIPMENT

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CONT	SECT	JOB	HIGHWAY
0045	09	110, ETC	US82, ETC.
DIST	COUNTY		SHEET NO.
PAR	LAMAR		75

DATE: 8/31/2023 8:06:58 PM
 FILE: I:\PARTPDD\US 82 Raised Medain\Design\CAD Standard\4 TRAFFIC SIGNAL\ED(1)-14.dwg
 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.

GENERAL NOTES FOR ALL ELECTRICAL WORK

- The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.
- 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.
- Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 1/2 in. or less in diameter.
- 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.
- 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.
- 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

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

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

- 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.
- 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.
- 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.

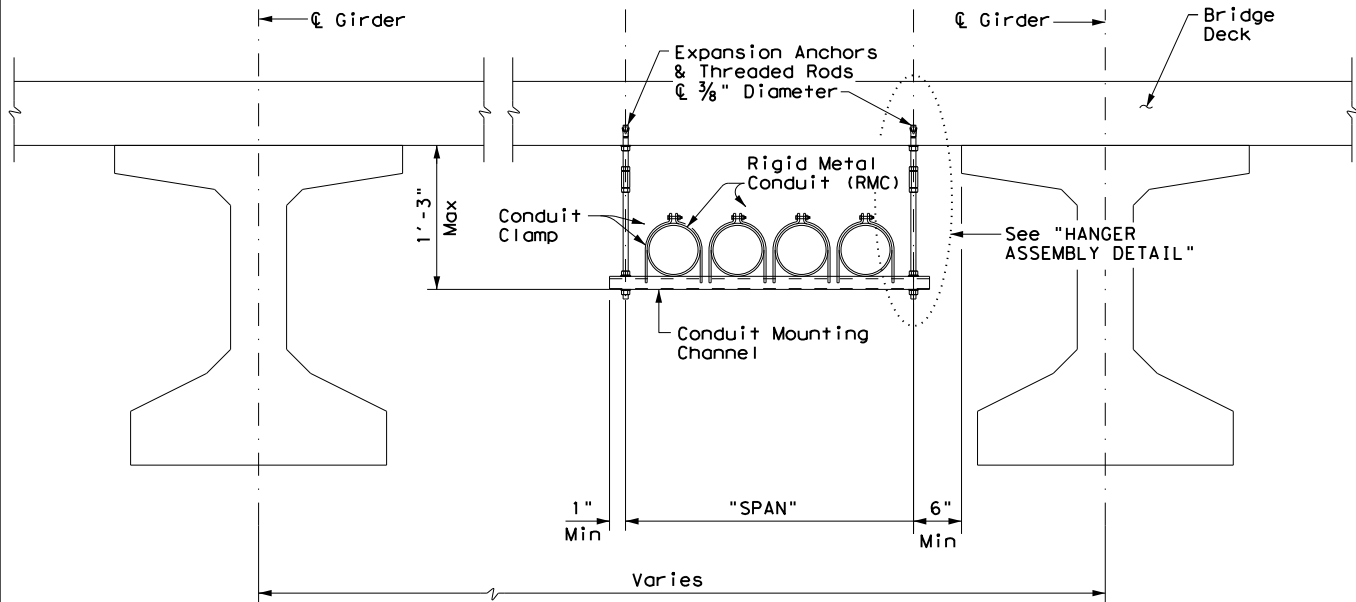
B. CONSTRUCTION METHODS

- 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.
- 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.
- Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.
- 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.
- 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."
- Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
- 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.
- 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.
- 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.
- 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.
- At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
- 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).
- 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.
- 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.

		Traffic Operations Division Standard	
<h1>ELECTRICAL DETAILS CONDUITS & NOTES</h1>			
<h2>ED(1) - 14</h2>			
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		110, ETC	
		US 82, ETC	
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	76	

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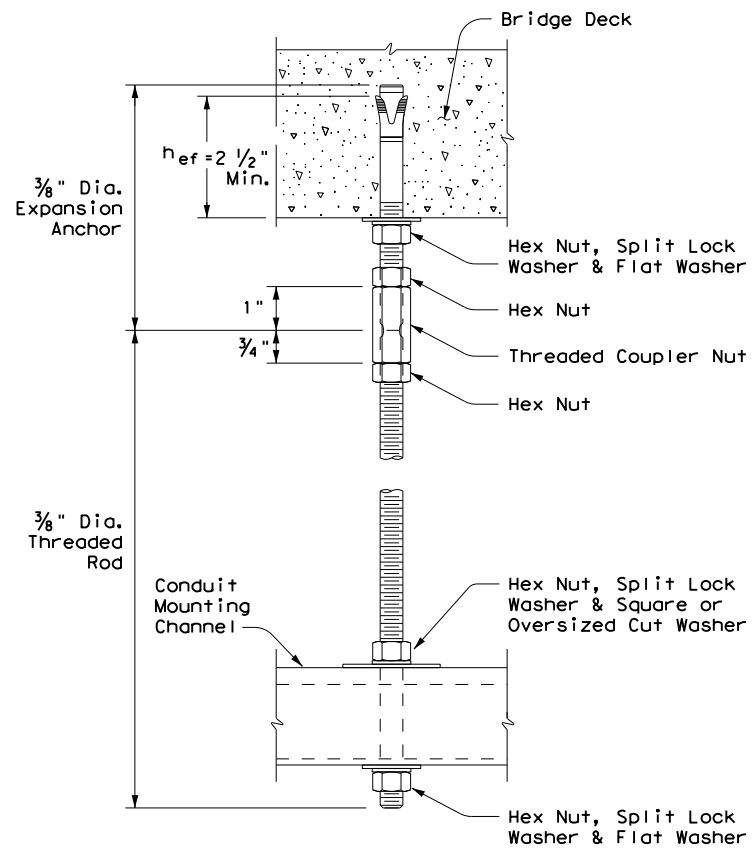
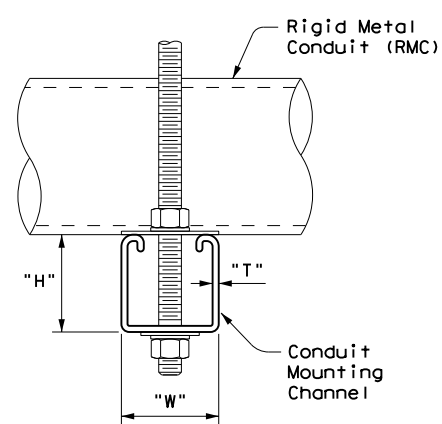
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CONDUIT HANGING DETAIL

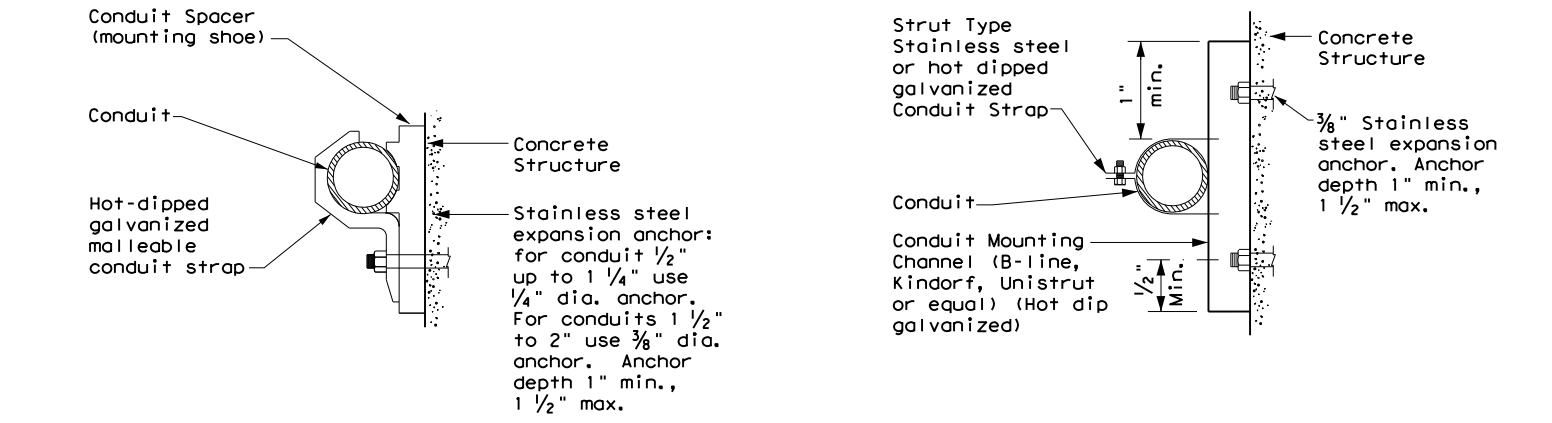
"SPAN"	"W" x "H"	"T"
less than 2'	1 5/8" x 1 3/8"	12 Ga.
2'-0" to 2'-6"	1 5/8" x 1 5/8"	12 Ga.
>2'-6" to 3'-0"	1 5/8" x 2 1/16"	12 Ga.

Channels with round or short slotted hole patterns are allowed, if the load carrying capacity is not reduced by more than 15%.



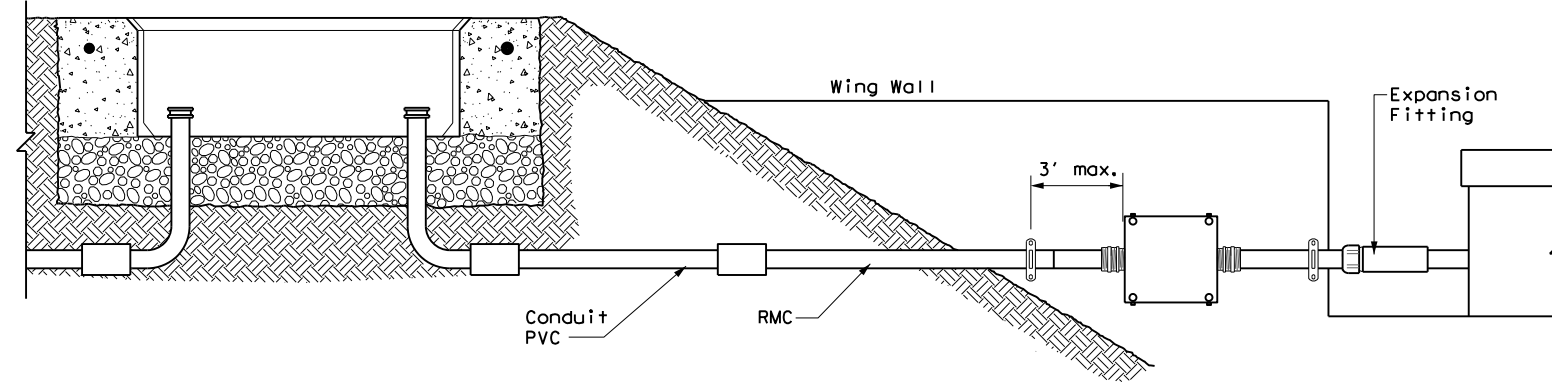
HANGER ASSEMBLY DETAIL

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 torquing 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.

		Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS CONDUIT SUPPORTS</h2>			
<h3>ED(2) - 14</h3>			
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REVISIONS	0045 09	110, ETC	US 82, ETC
	DIST	COUNTY	SHEET NO.
	PAR	LAMAR	77

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.

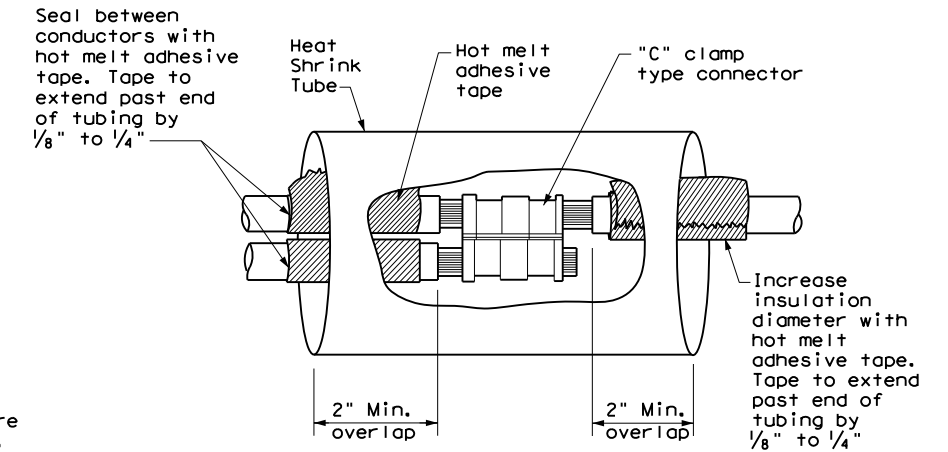
B. CONSTRUCTION METHODS

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.



**SPLICE OPTION 1
Compression Type**

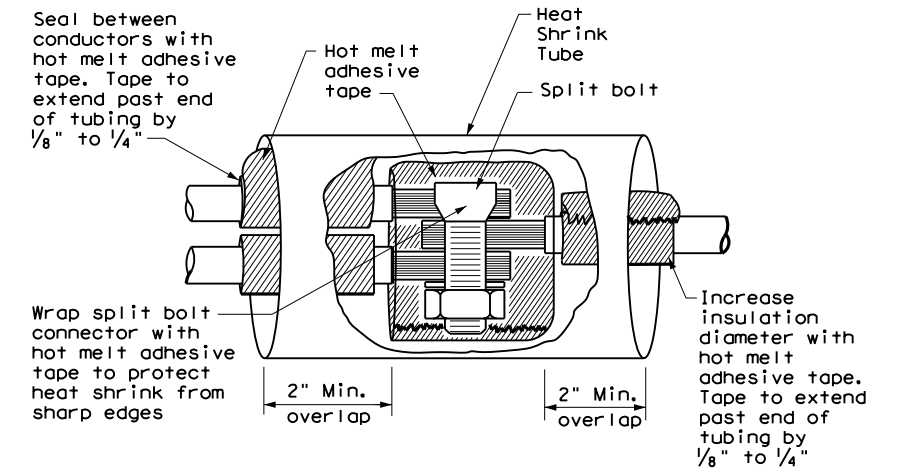
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

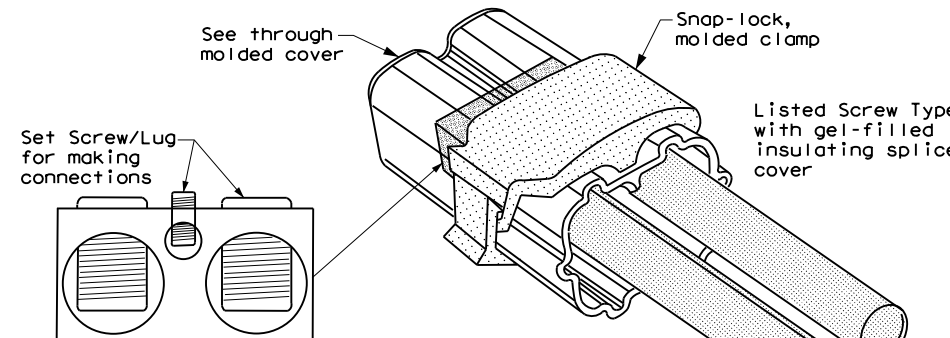
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in 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 2
Split Bolt Type**



**SPLICE OPTION 3
Listed Screw Type**

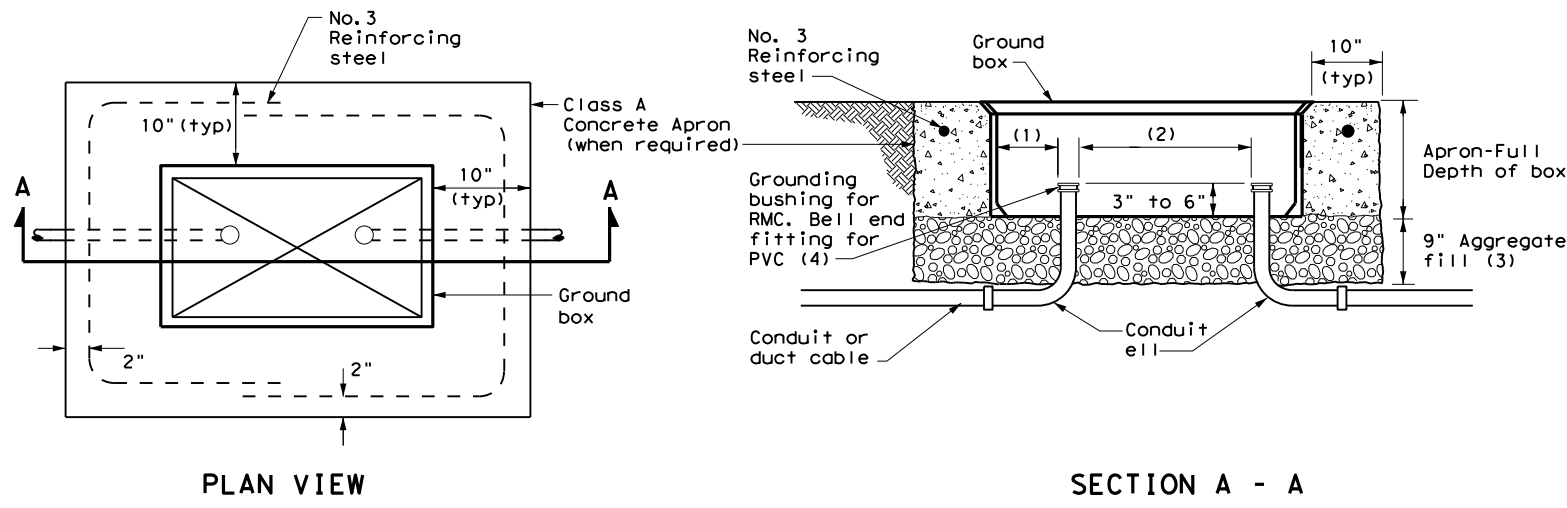
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		Traffic Operations Division Standard	
<h1>ELECTRICAL DETAILS CONDUCTORS</h1>			
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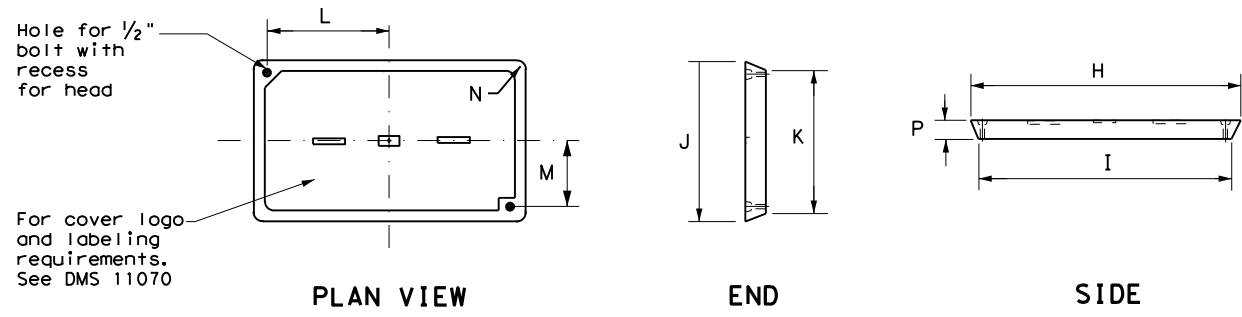


APRON FOR GROUND BOX

- (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



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.

				Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS</h2> <h2>GROUND BOXES</h2> <h3>ED(4) - 14</h3>					
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ELECTRICAL SERVICES NOTES

- 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.
- 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.
- Provide all work, materials, services, and any incidentals needed to install a complete electrical service as specified in the plans.
- 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.
- 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.
- 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.
- When galvanized is specified for nuts, screws, bolts or miscellaneous hardware, stainless steel may be used.
- 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.
- 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.
- Provide rigid metal conduit (RMC) for all conduits on service, except for the 1/2 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.
- 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.
- Ensure all mounting hardware and installation details of services conform to utility company specifications.
- 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 1/2 in. x 11 in. before laminating. If the installation differs from the plan sheets, the installing contractor is to redline plan sheets before laminating.
- 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 1/2 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.
- 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

- Provide threaded hub for all conduit entries into the top of enclosure.
- 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 photoceII or lighting contactor. Provide GS enclosures in accordance with DMS 11080, 11082, 11083, and 11084.
- 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.
- 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

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

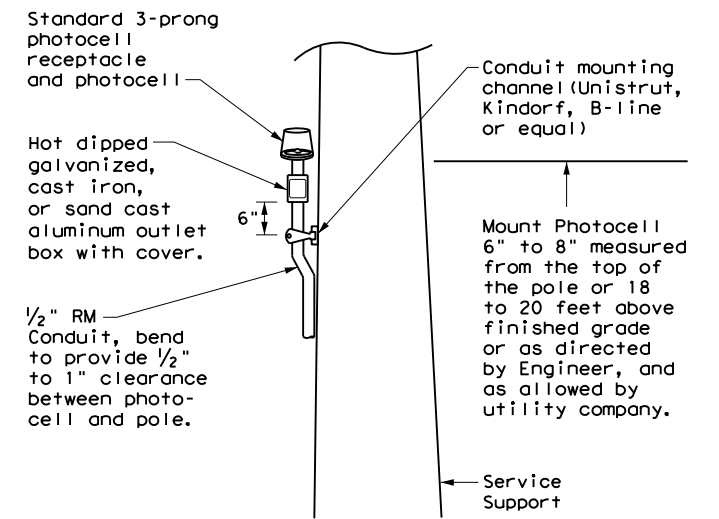
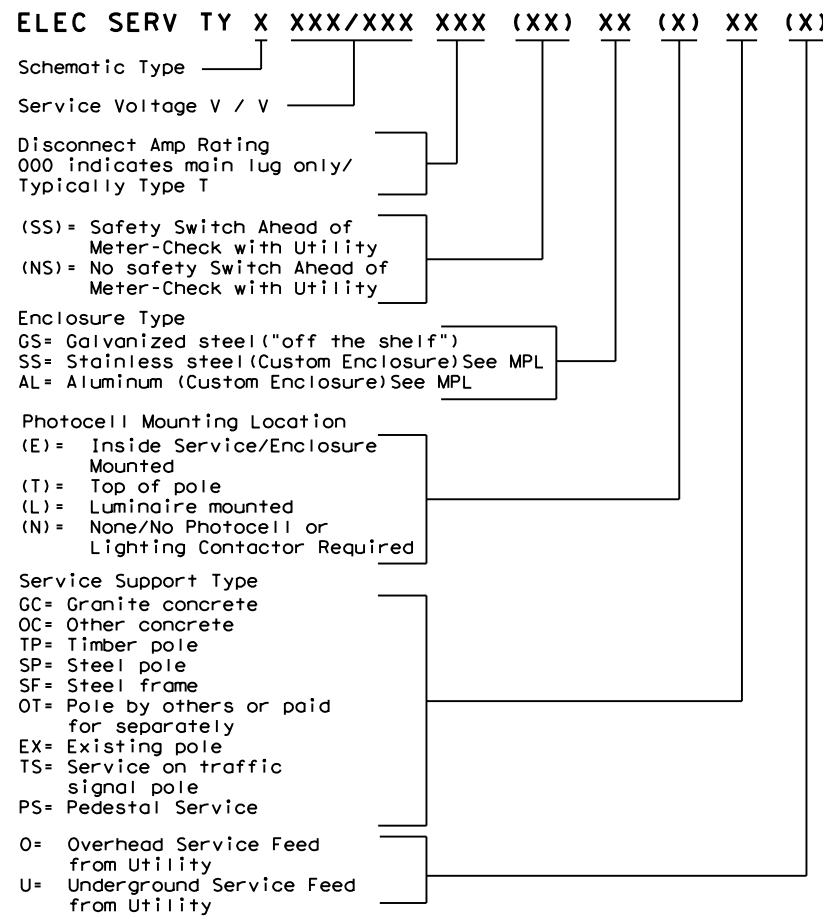
PHOTOELECTRIC CONTROL

- 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 *xSize	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 1/4"	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
							30		Luminares	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 1/4"	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



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

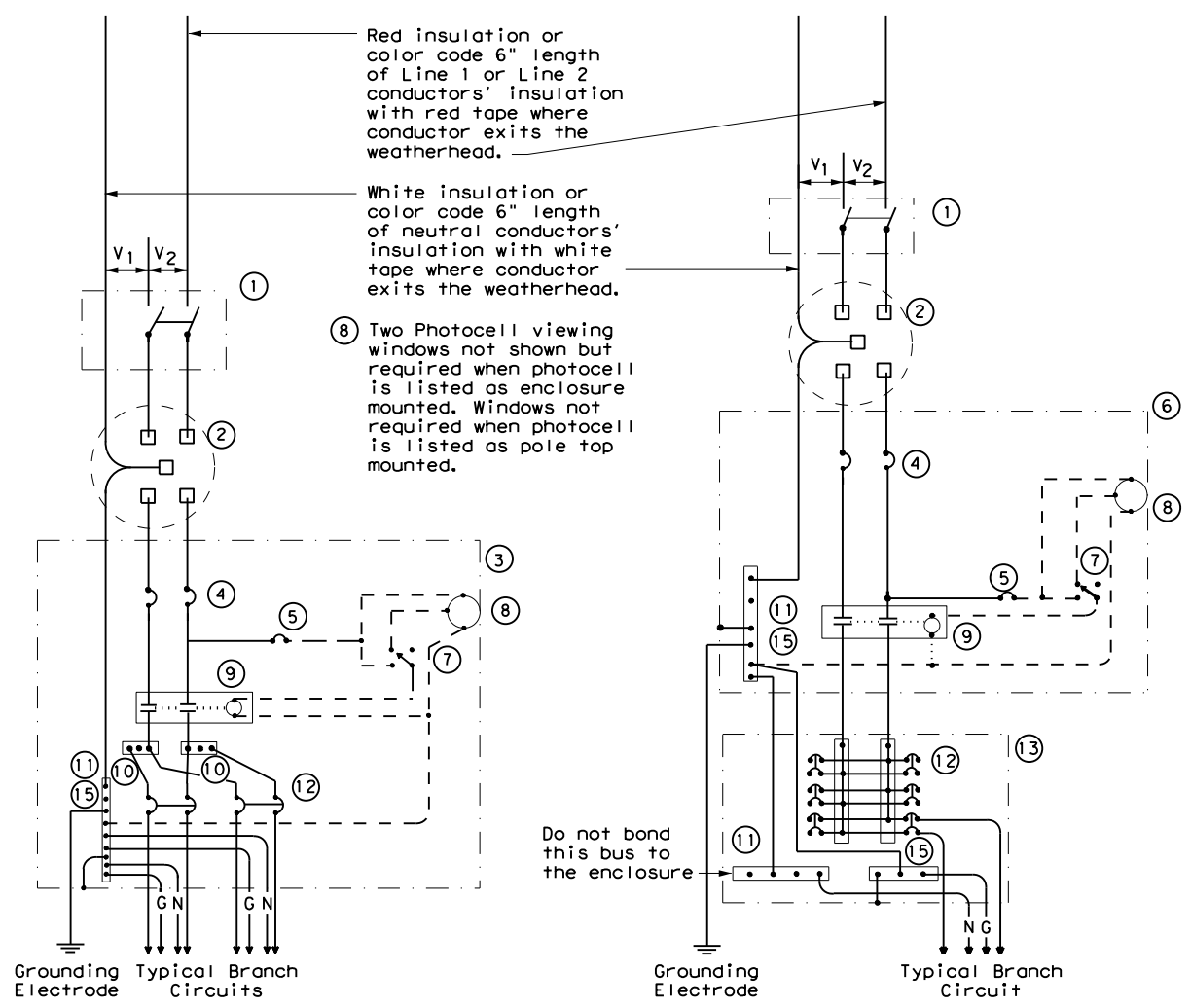
ED(5) - 14

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© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
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PAR	LAMAR		80	

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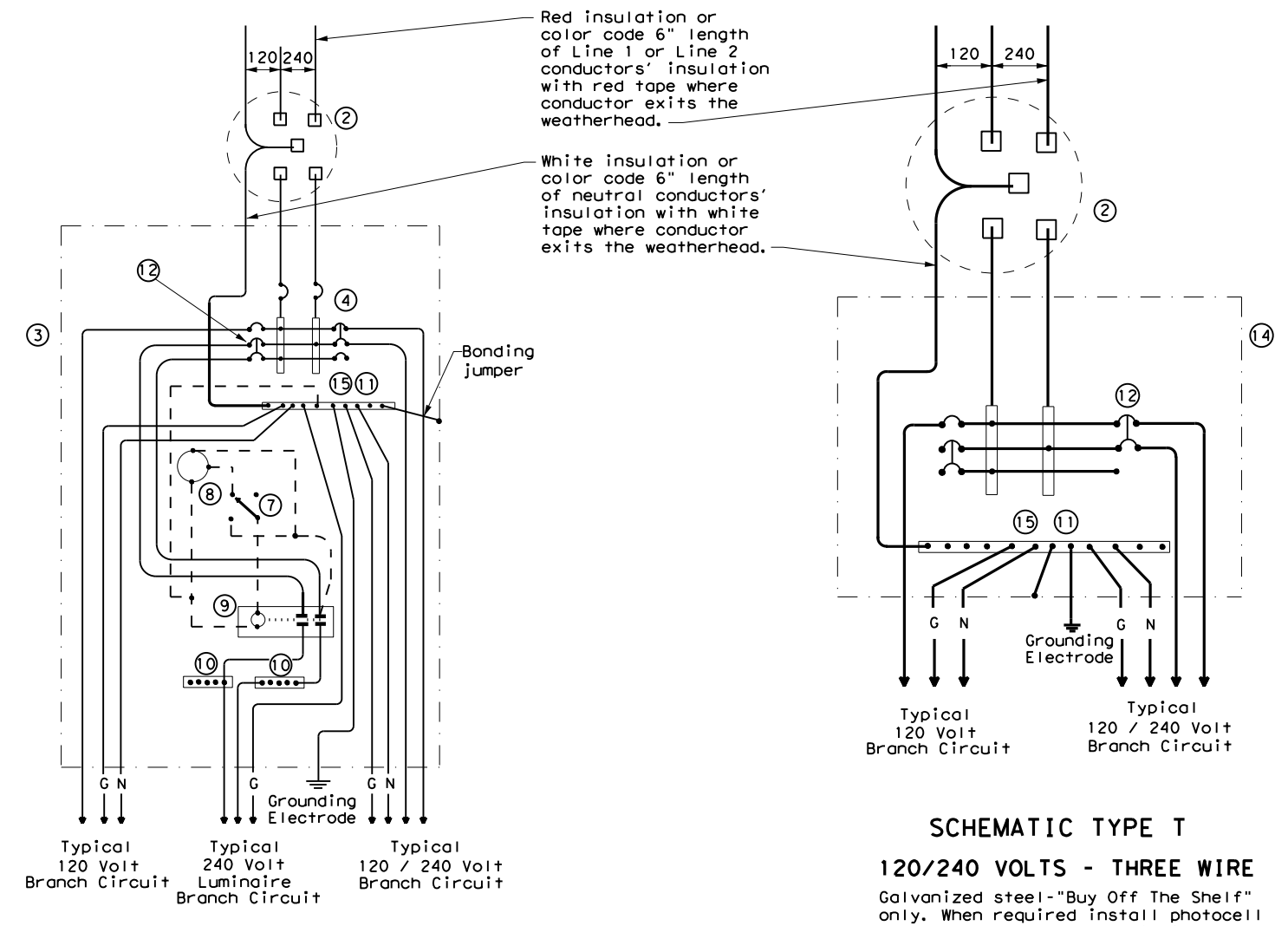
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SCHEMATIC TYPE A
THREE WIRE

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

				Traffic Operations Division Standard	
ELECTRICAL DETAILS SERVICE ENCLOSURE AND NOTES					
ED(6) - 14					
FILE:	ed6-14.dgn	DN:	TxDOT	CK:	TxDOT
© TxDOT	October 2014	CONT:	0045	SECT:	09
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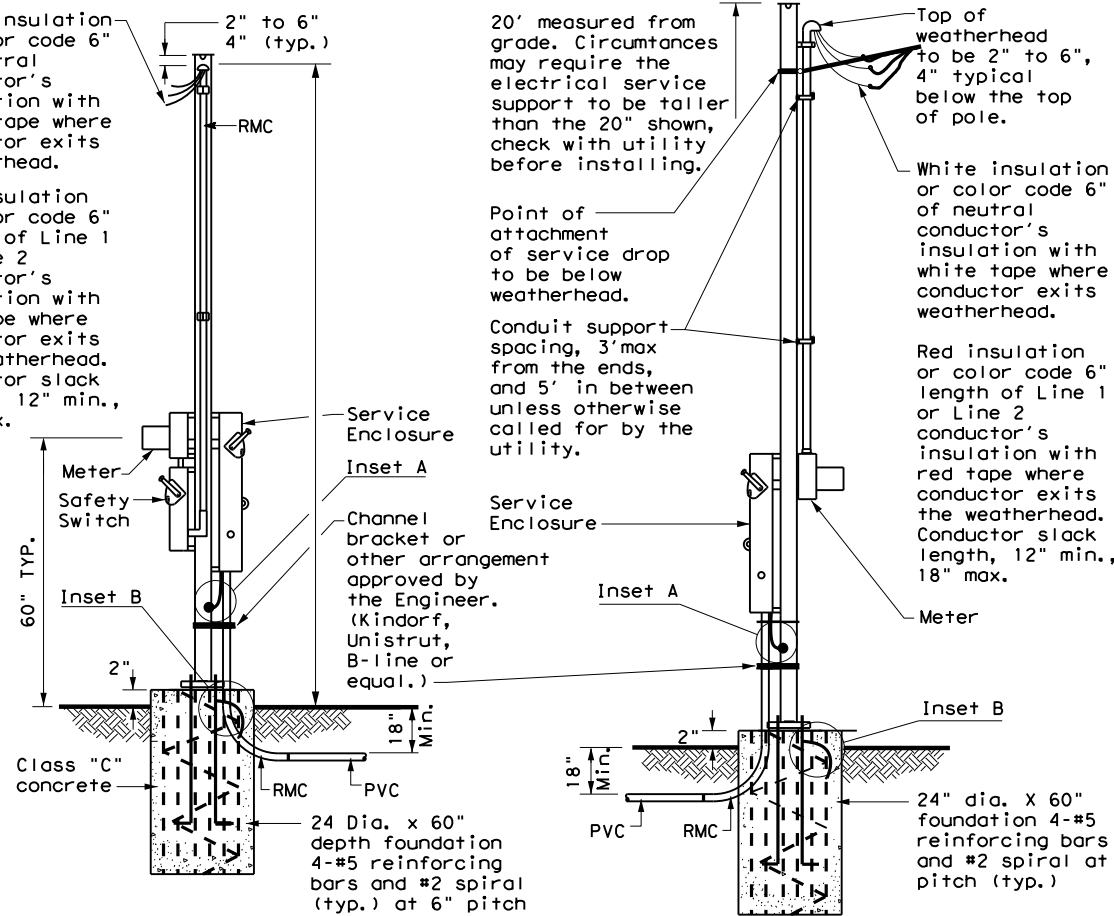
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SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

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 1/2 in. or 1 3/8 in. wide by 1 in. up to 3 3/4 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 3/4 in. x 18 in. x 4 in. (dia. x length x hook length) anchor bolts for underground service supports. Provide and install galvanized 3/4 in. x 56 in. x 4 in. anchor bolts for overhead service supports. Ensure anchor bolts have 3 in of thread, with 3 1/4 in. to 3 1/2 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 ellis 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 1/2 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 1/4" - 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.

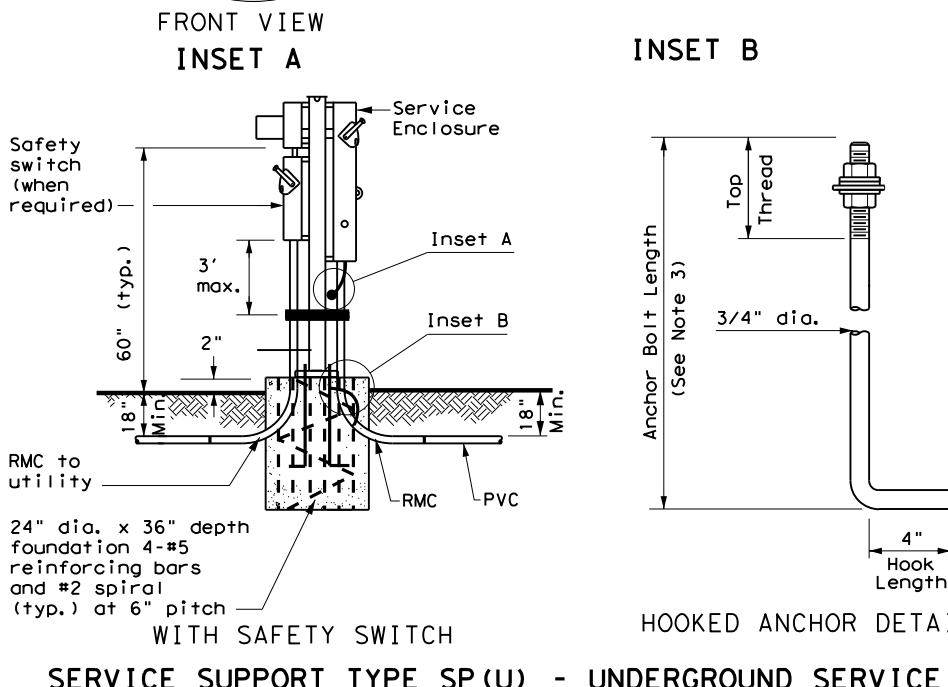
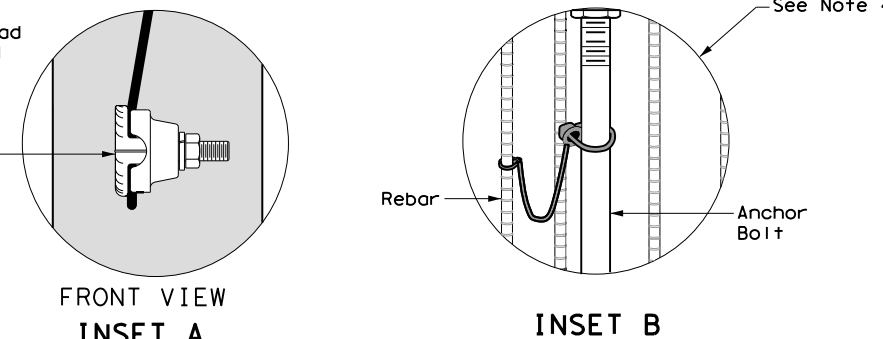
White insulation or color code 6" of neutral conductor's insulation with white tape where conductor exits weatherhead.

Red insulation or color code 6" length of Line 1 or Line 2 conductor's insulation with red tape where conductor exits the weatherhead. Conductor slack length, 12" min., 18" max.

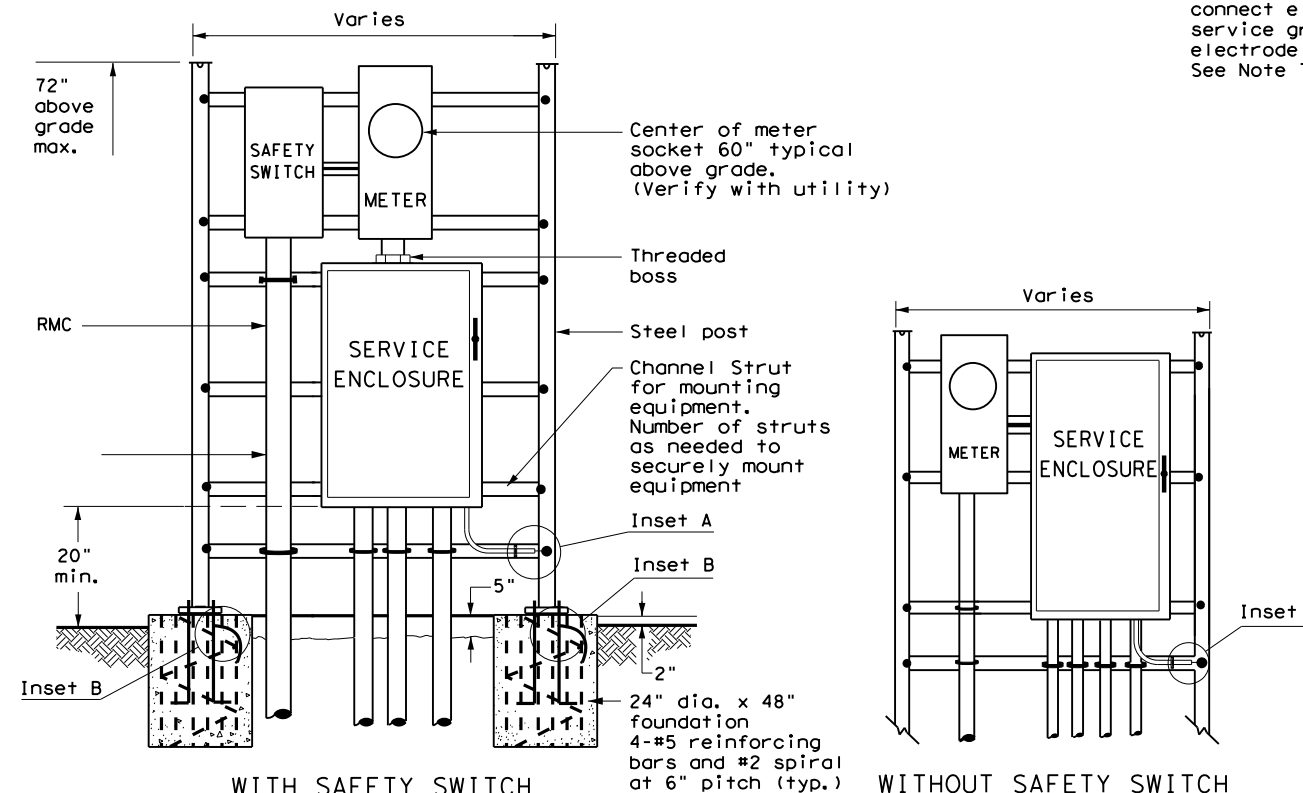


WITH SAFETY SWITCH WITHOUT SAFETY SWITCH
SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE

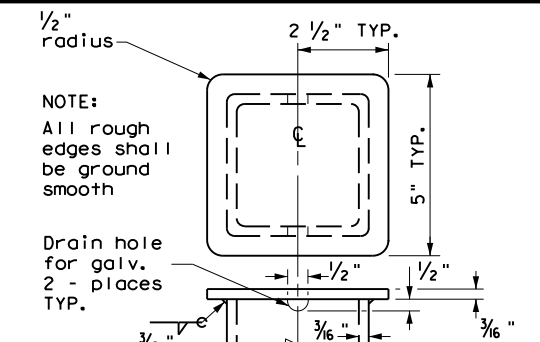
Drill, tap, and thread 1/2" X 13 UNC. Install tank ground fitting, connect electrical service grounding electrode conductor. See Note 7.



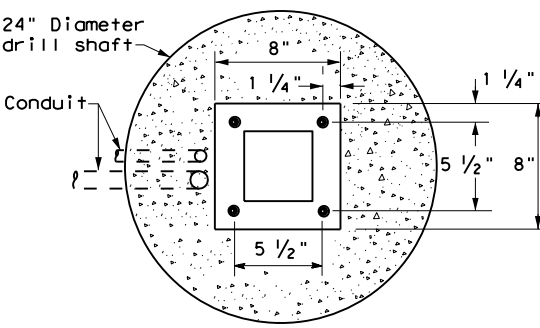
WITH SAFETY SWITCH HOOKED ANCHOR DETAIL
SERVICE SUPPORT TYPE SP(U) - UNDERGROUND SERVICE



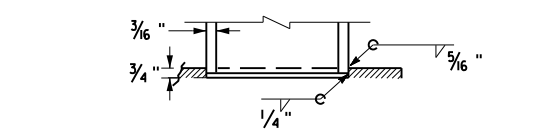
WITH SAFETY SWITCH WITHOUT SAFETY SWITCH
SERVICE SUPPORT TYPE SF (U) - UNDERGROUND SERVICE



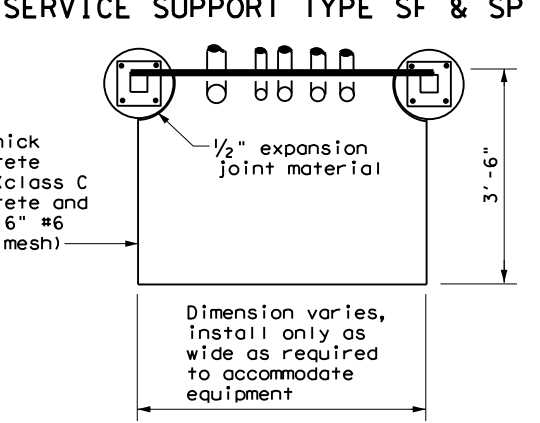
POLE TOP PLATE



BASE PLATE DETAIL



BOTTOM OF POLE



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

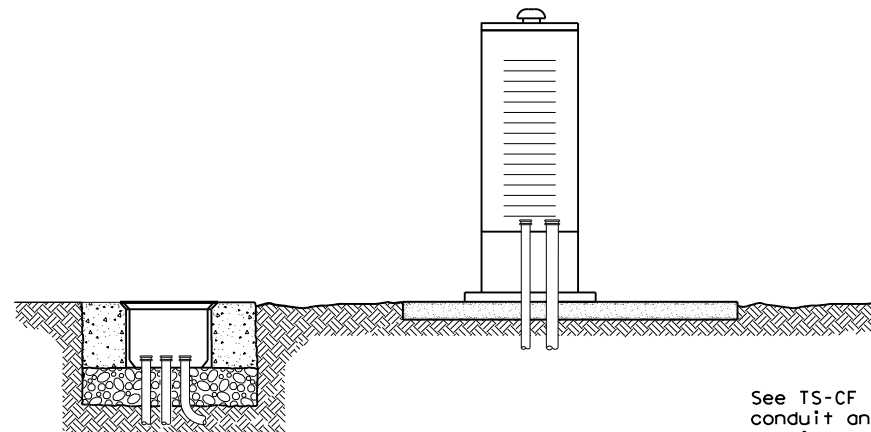
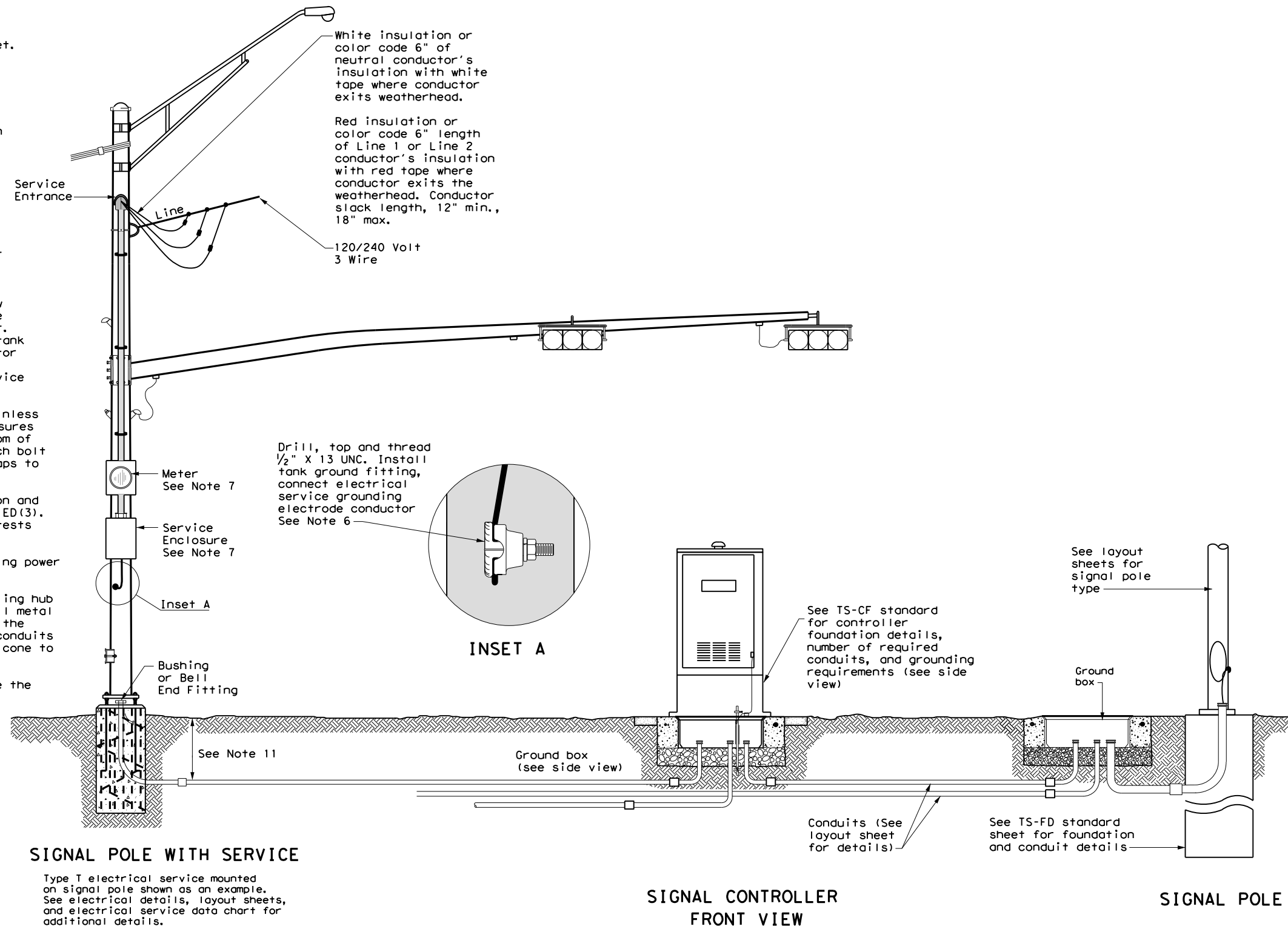
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ELECTRICAL DETAILS SERVICE SUPPORT TYPES SF & SP ED(7)-14			
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©TxDOT October 2014	CON: 0045	SECT: 09	JOB: 110, ETC
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DIST: PAR	COUNTY: LAMAR	SHEET NO. 82	

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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 1/2 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 3/4 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 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.

ELECTRICAL DETAILS TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS

ED(8) - 14

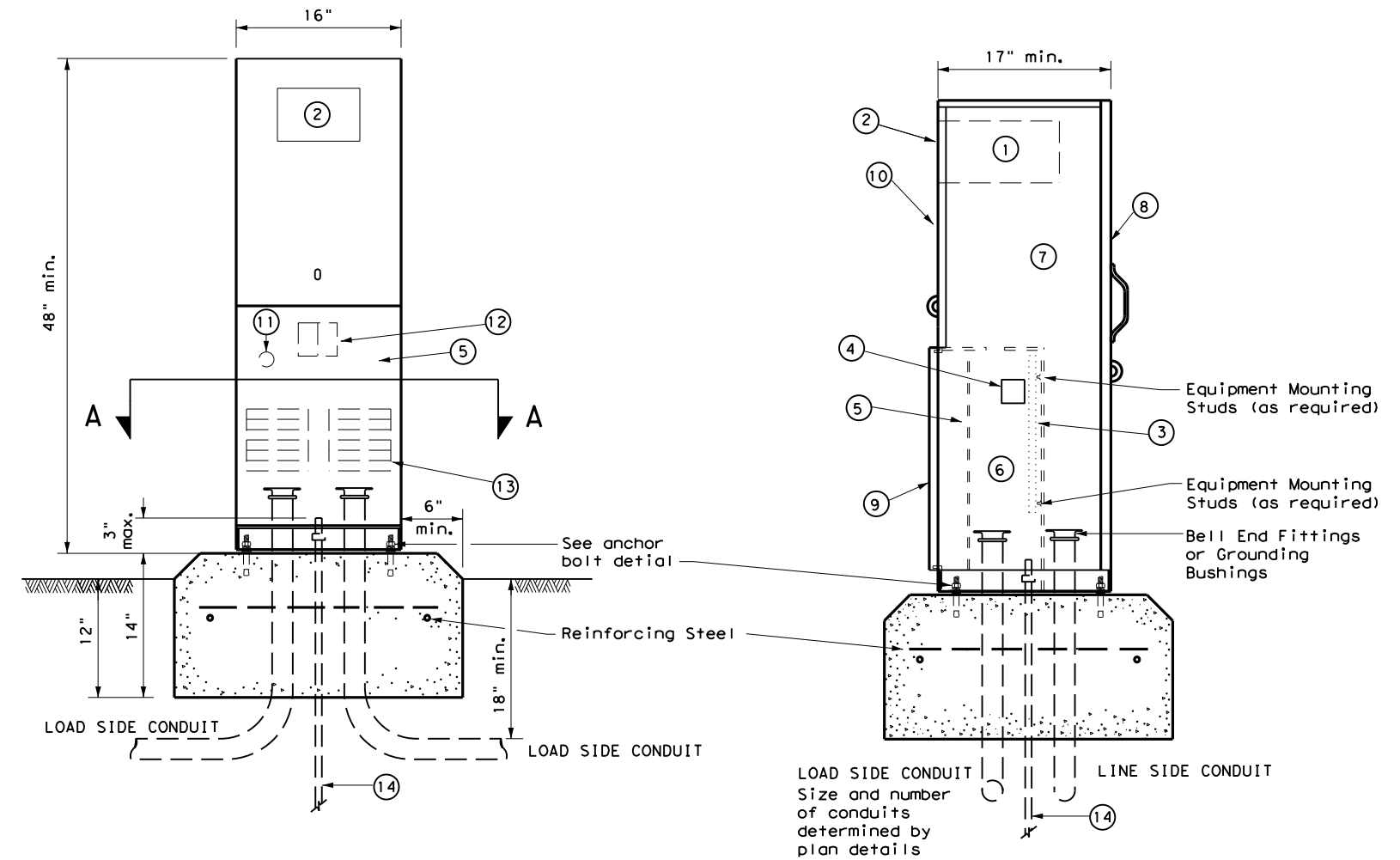
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PEDESTAL SERVICE NOTES

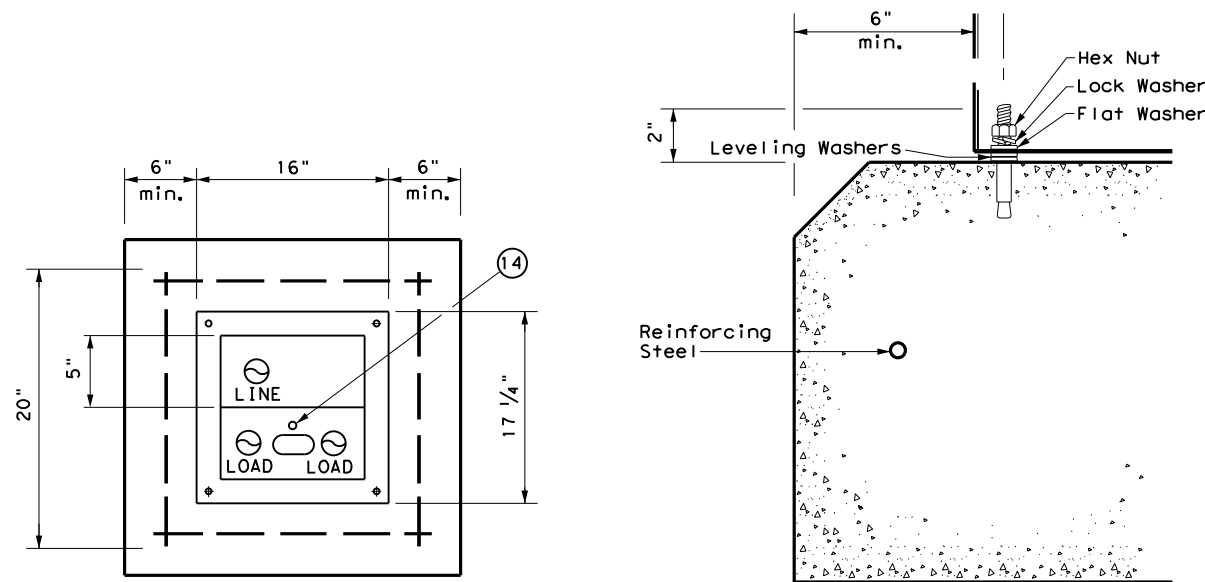
1. Manufacture pedestal electrical services in accordance with Departmental Material Specifications (DMS) 11080 "Electrical Services", 11085 "Electrical Services-Pedestal (PS)" and Item 628 "Electrical Services." Provide pedestal electrical services as listed on the Material Producers List (MPL) on the 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 1/2 in. X 2 1/16 in. minimum length concrete single expansion type anchors for mounting pedestal enclosure to foundation. Anchor location to match mounting holes in each corner of enclosure. Secure each of the four corners of the pedestal enclosure to the anchors in the foundation with a 1/2 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 1/8 in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of 1/8 in. per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within 1/4 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

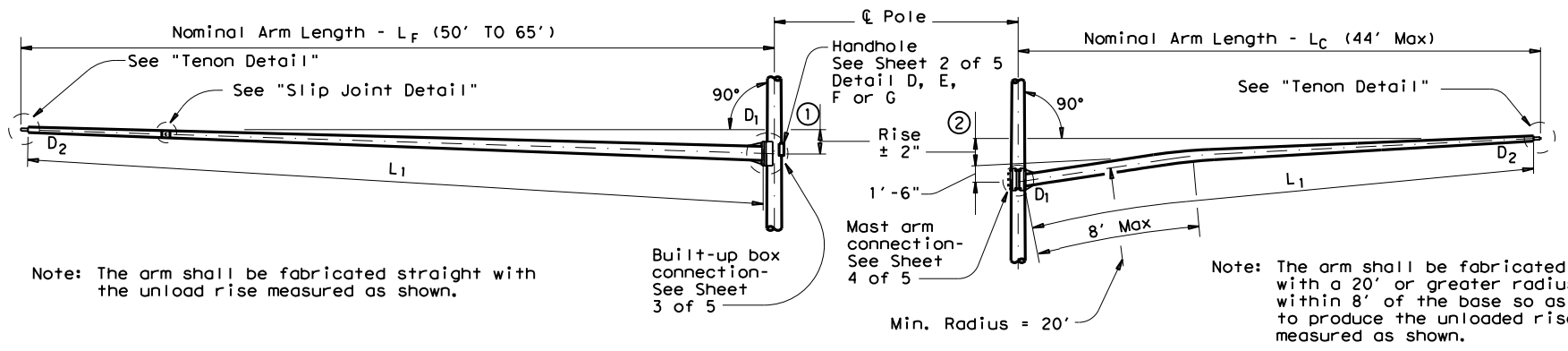
LEGEND

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'

		Traffic Operations Division Standard	
ELECTRICAL DETAILS ELECTRICAL SERVICE SUPPORT PEDESTAL SERVICE TYPE PS			
ED(9) - 14			
FILE: ed9-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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Note: The arm shall be fabricated straight with the unload rise measured as shown.

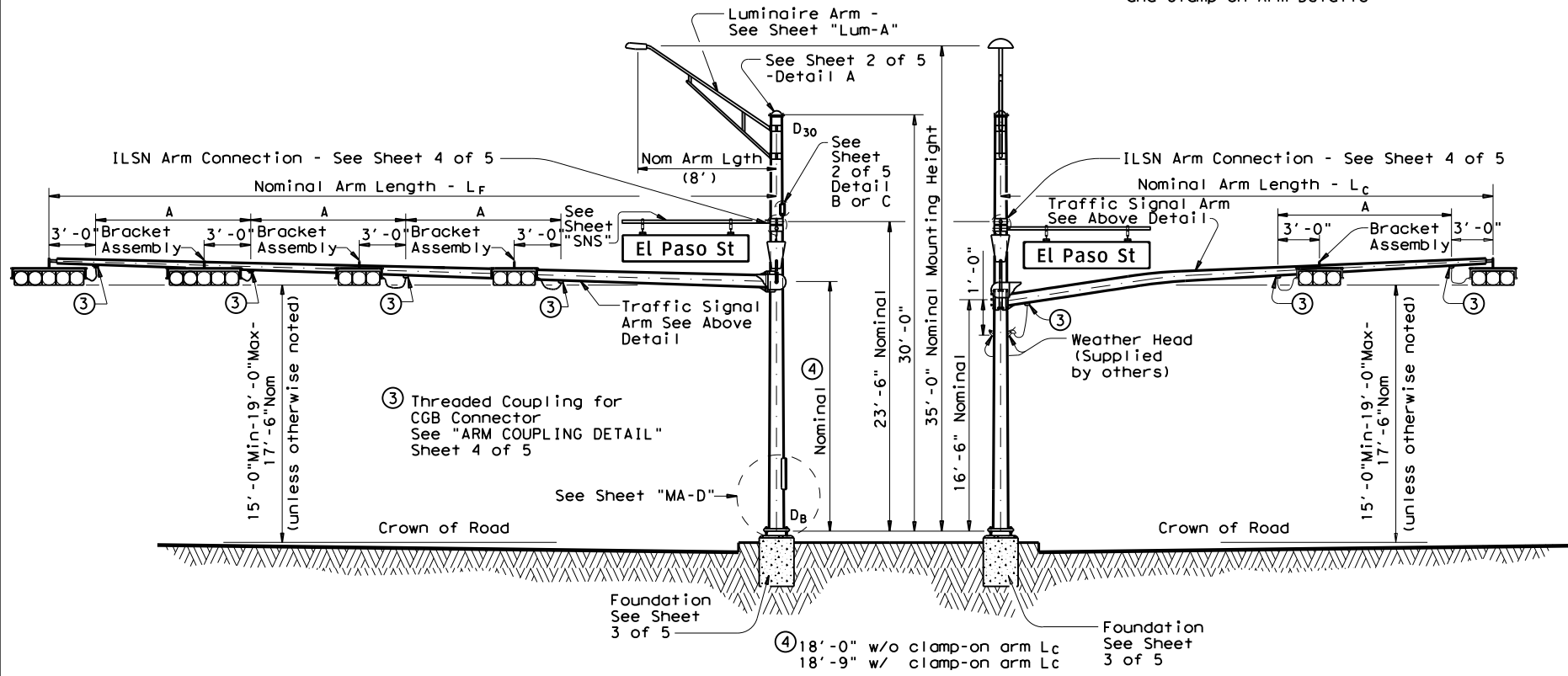
Note: The arm shall be fabricated with a 20' or greater radius within 8' of the base so as to produce the unloaded rise measured as shown.

FIXED MOUNT TRAFFIC SIGNAL ARM

① See Sheet 3 of 5 for Arm Rise

CLAMP-ON TRAFFIC SIGNAL ARM (IF REQUIRED)

② See Sheet 4 of 5 for Arm Rise and Clamp-on Arm Details



ELEVATION

(Showing fixed mount arm)

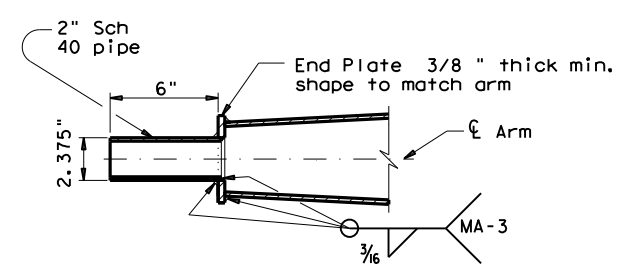
STRUCTURE ASSEMBLY

ELEVATION

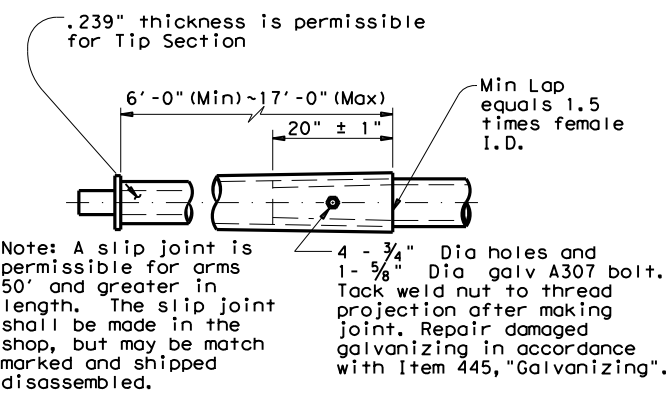
(Showing clamp-on arm)

TABLE OF DIMENSIONS "A"

Arm Length	24'	28'	32'	36'	40'	44'	50'	55'	60'	65'
Arm Type II	10'	11'	12'	13'						
Arm Type III			10'	11'	12'	12'				
Arm Type IV							12'	12'	12'	12'



TENON DETAIL



SLIP JOINT DETAIL (FIXED MOUNT ARM)

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed can be either 100 mph or 80 mph plus a 1.3 gust factor. If clamp-on traffic signal is required, designs are based on an arm included angle of 90 degrees or more. Angles of less than approximately 75 degrees will require a special design.

Poles are designed to support one 8'-0" luminaire arm, two 9'-0" internally lighted street name (ILSN) signs and two traffic signal arms with limited length combinations.

Each arm with its related attachment is shown below

Arm	Equivalent DL ⑤	WL EPA ⑤⑥
8' Luminaire Arm	Luminaire 60 lbs	1.6 sq ft
9' ILSN Arm	Sign 85 lbs	11.5 sq ft
50' to 65' Fixed Mount Arm	Signal Loads 310 lbs	52 sq ft
Up to 44' Clamp-on Arm	Signal Loads 180 lbs	32.4 sq ft

⑤ Equivalent dead load plus horizontal wind load applied at the end of arm except ILSN arm, which applied 4.5' from the centerline of the pole.

⑥ Effective projected area (actual area times drag coefficient) for the application of horizontal wind load.

Except as noted in Sheet 1 thru 5 of 5, other details not covered shall refer to Standard Sheet "MA-D" for pole details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Material, fabrication tolerances, and shipping practices shall also meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing" after fabrication.

Deviations from the details and dimensions shown herein require submission of shop drawings in accordance with the Item 441, "Steel Structures". Alternate designs are not acceptable.

Installation of damping plate for the long mast arm is not recommended.

Provision of the bracket assembly used to support the traffic signal heads shall be under the direction of the Engineer for approval.

Design also conforms to NCHRP Report 412 for fatigue resistance except that there are no stiffeners at the base plate. TxDOT is conducting tests to determine if stiffeners at the base plate will or will not result in optimal performance; depending upon the results of the tests, poles may need a retrofit to ensure optimal fatigue performance.

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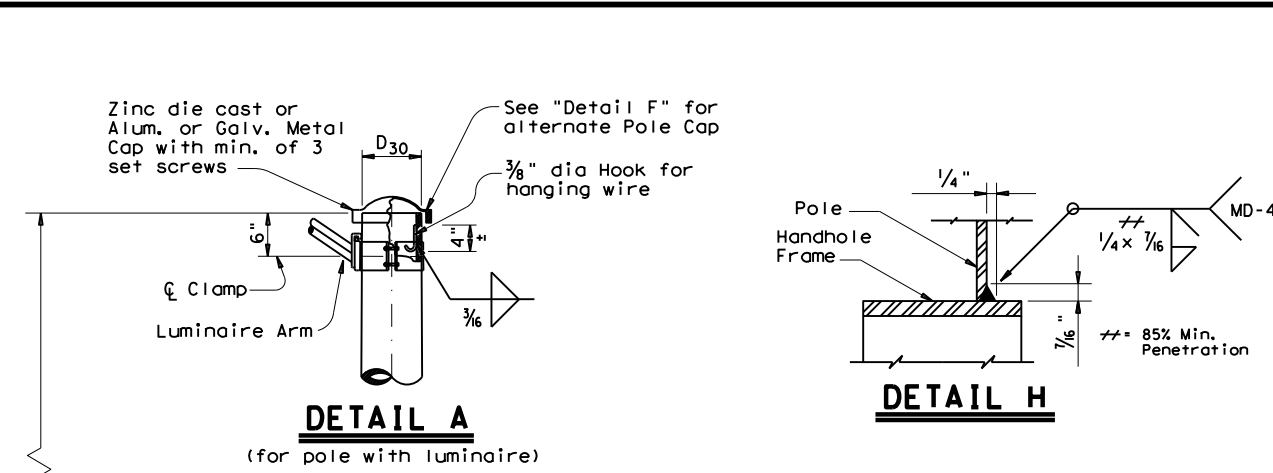
**TRAFFIC SIGNAL SUPPORT STRUCTURES
 LONG MAST ARM ASSEMBLY
 (50 TO 65 FT)
 (80 AND 100 MPH WIND ZONE)
 LMA(1)-12**

Sheet 1 of 5

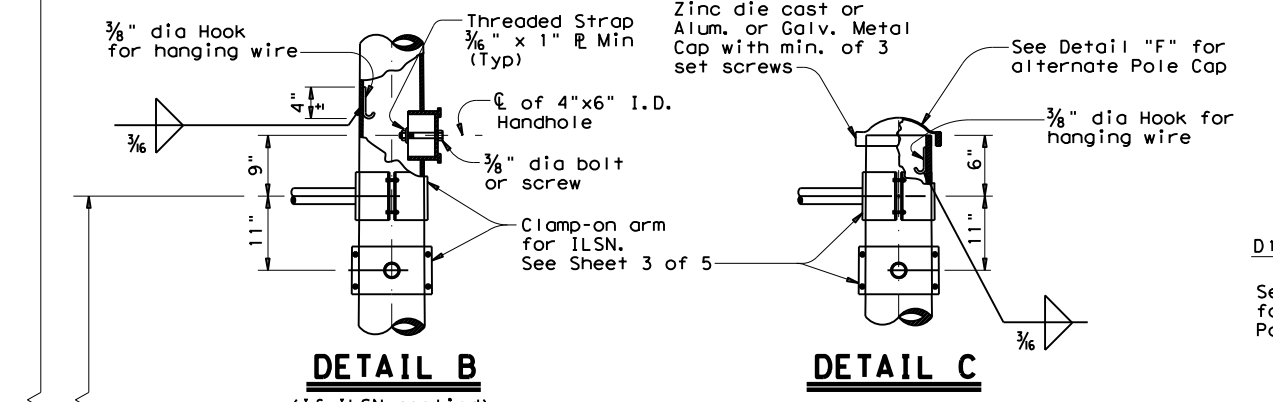
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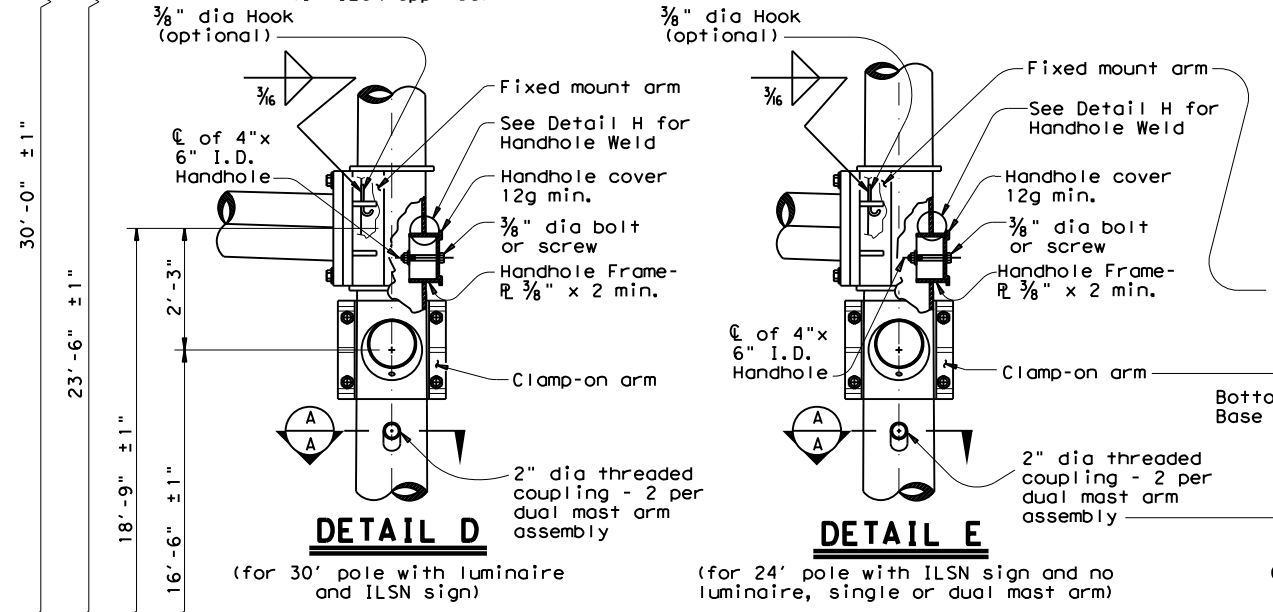
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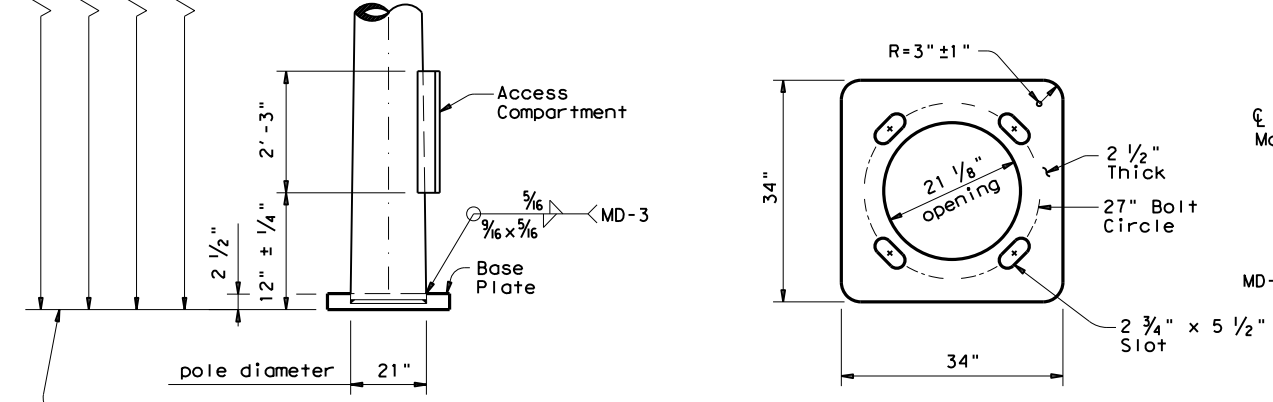
DETAIL A
(for pole with luminaire)



DETAIL B
(If ILSN applied)



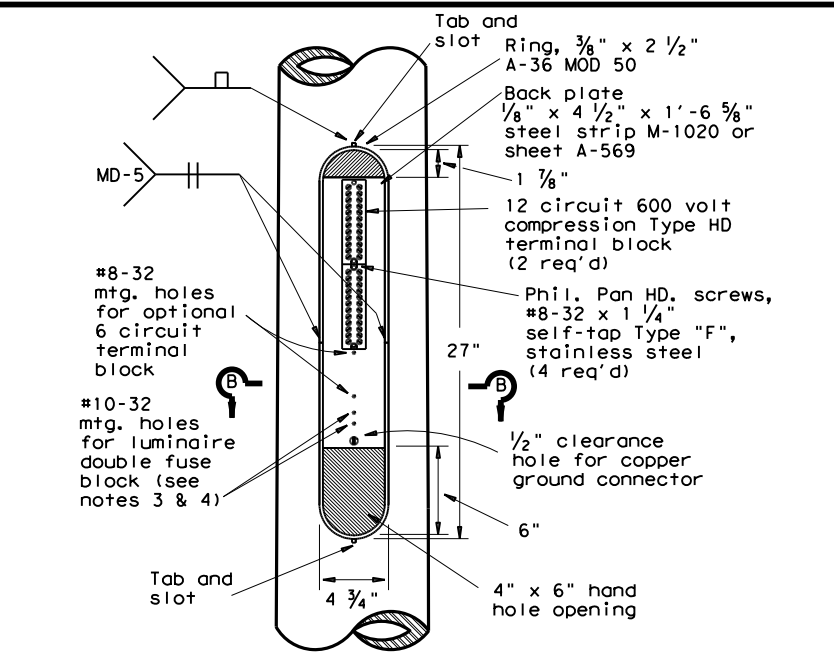
DETAIL C



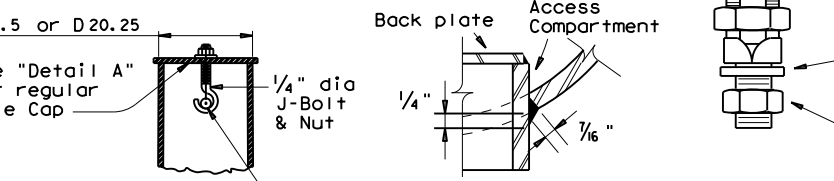
DETAIL D
(for 30' pole with luminaire and ILSN sign)



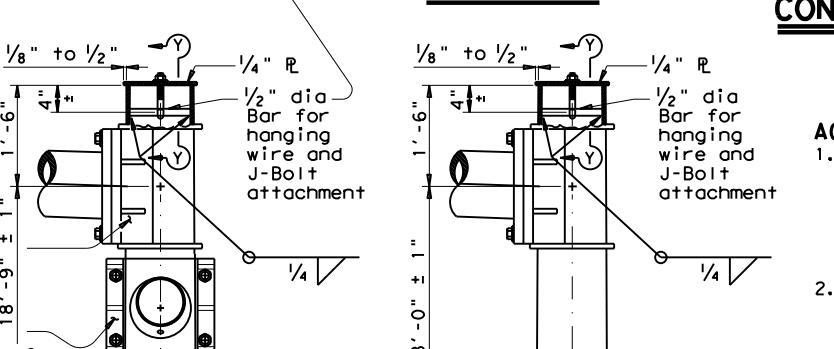
DETAIL E
(for 24' pole with ILSN sign and no luminaire, single or dual mast arm)



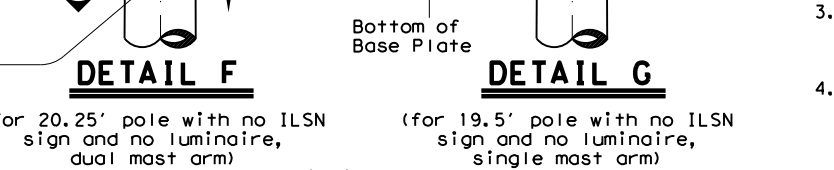
ACCESS COMPARTMENT



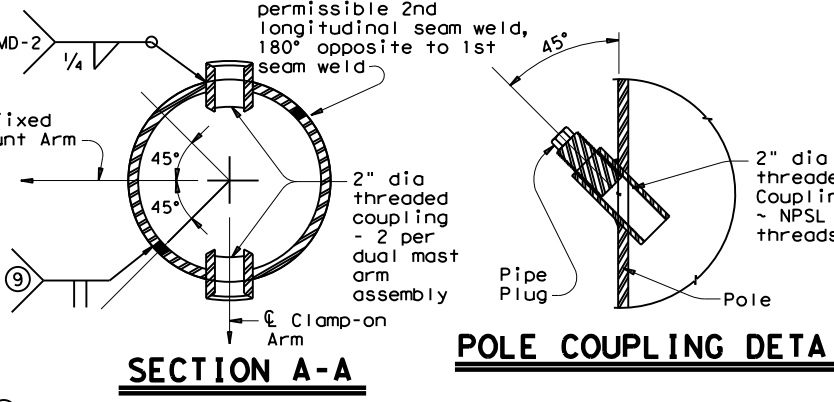
SECTION Y-Y



DETAIL F
(for 20.25' pole with no ILSN sign and no luminaire, dual mast arm)



DETAIL G
(for 19.5' pole with no ILSN sign and no luminaire, single mast arm)



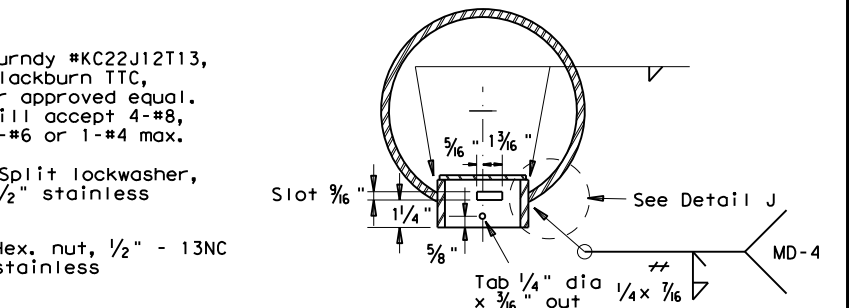
SECTION A-A

⑨ Longitudinal seam weld must be oriented within 90° (45° rotation each side) along the fixed mount arm. 60% min penetration required, 100% penetration within 6" of circumferential base weld.

MATERIALS	
Round Shafts or Polygonal Shafts ⑦	ASTM A595 Gr. A, A588, A1008 HSLAS Gr. 50 Class 2, A1011 HSLAS Gr. 50 Class 2, A572 Gr. 50 or A1011 SS Gr. 50 ⑧
Plates ⑦	ASTM A36, A588, or A572 Gr. 50
Connection Bolts	ASTM A325, or A449 except where noted
Pin Bolts	ASTM A325
Pipe ⑦	ASTM A53 Gr. B, A501, A1008 HSLAS-F Gr. 50, A1011 HSLAS-F Gr. 50
Misc. Hardware	Galvanized steel or stainless steel or as noted

⑦ ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F, or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.

⑧ ASTM A1011 SS Gr. 50 shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.



COPPER GROUND CONNECTOR

- ACCESS COMPARTMENT NOTES:**
- 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.
 - 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 Ilco SSS-5). The traffic signal contractor shall install the kit items in the field.
 - The screw hole spacing on the enclosure back plate shall be for two Marathon #985GP12 terminal strips, one Marathon #985GP6CU terminal strip, and one Bussmann #BM6032B fuse block.
 - Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.

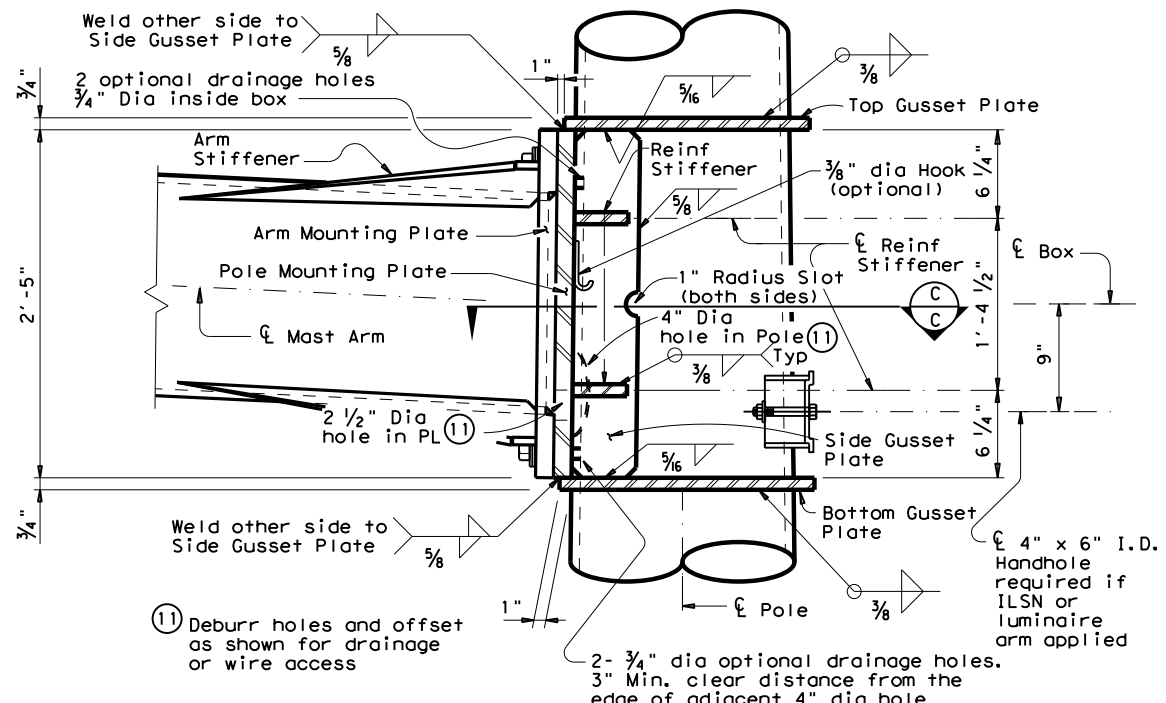
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TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY
(50 TO 65 FT)
(80 AND 100 MPH WIND ZONE)
LMA(2)-12

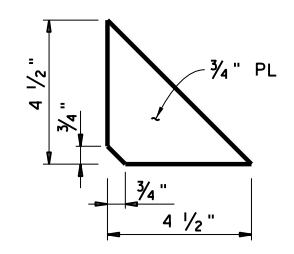
Sheet 2 of 5

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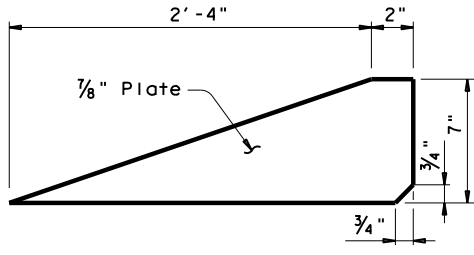
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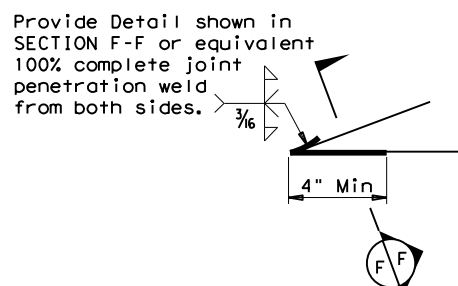
BUILT-UP BOX CONNECTION



REINFORCING STIFFENER

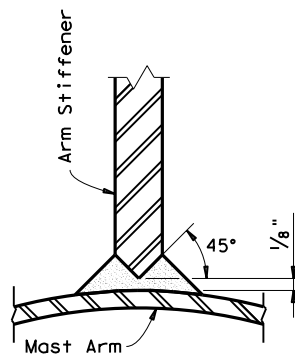


ARM STIFFENER
(Cut to match arm inclination and taper)

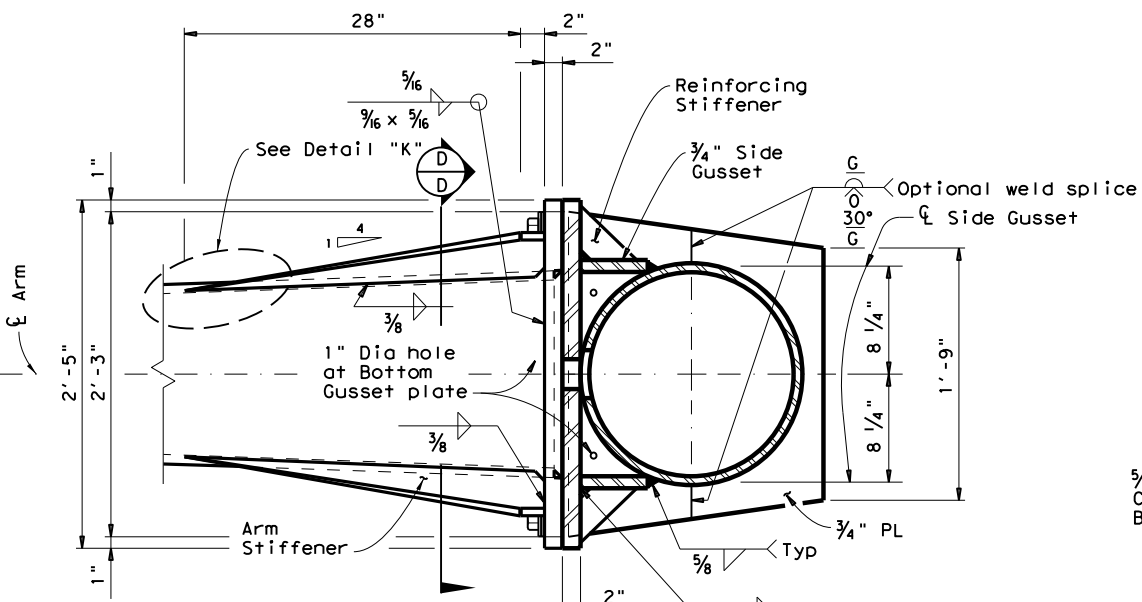


Only 4" length at tip of Arm Stiffener requires a complete joint penetration weld. Smooth weld radius to connect Stiffener. Only a fillet weld is required for the remaining weld length.

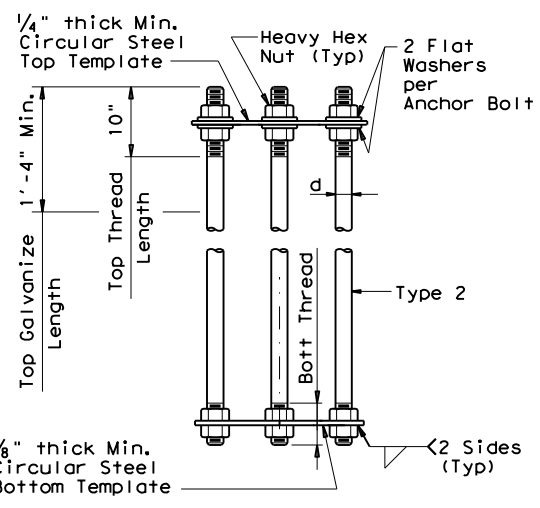
DETAIL "K"



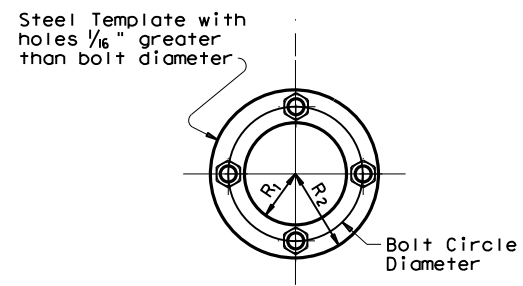
SECTION F-F



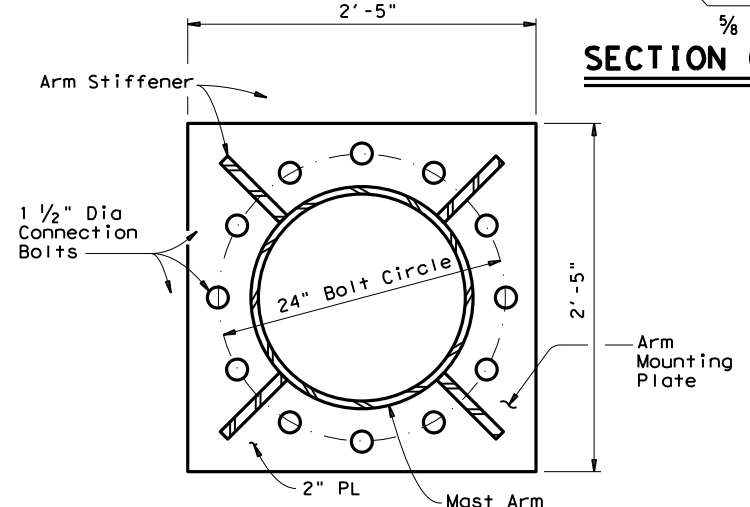
SECTION C-C



NUT ANCHOR (TYPE 2)
ANCHOR BOLT ASSEMBLY



TEMPLATE DETAIL



SECTION D-D

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		DRILLED SHAFT LENGTH-ft (16), (17), (18)			ANCHOR BOLT DESIGN (14)			FOUNDATION DESIGN LOAD (15)		TYPICAL APPLICATION	
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N blows/ft			ANCHOR BOLT DIA	Fy (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft		SHEAR Kips
				10	15	40							
48-A	48"	20 #9	#4 at 6"	21.9	19.5	14.7	2 1/2"	55	27"	2	490	10	50' to 65' Mast arm assembly.

SEE SHEET "TS-FD" FOR ADDITIONAL DETAILS.

- (14) Anchor bolt design develops the foundation capacity given under Foundation Design Loads.
- (15) Foundation Design Loads are the allowable moments and shears at the base of the structure.
- (16) Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.
- (17) If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.
- (18) Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Fixed Mount Arm L F	ROUND POLES (13)					Foundation Type
	D _B	D _{19.5}	D _{20.25}	D ₂₄	D ₃₀	
ft.	in.	in.	in.	in.	(12)thk in.	
50', 55', 60', 65'	21.0	18.2	17.6	16.8	.3125	48-A

Fixed Mount Arm L F	ROUND ARMS (13)				
	L ₁	D ₁	D ₂	(12)thk in.	Rise
ft.	ft.	in.	in.	in.	
50	49	18.5	11.7	.3125	3'- 3"
55	54	18.5	11.0	.3125	3'- 7"
60	59	18.5	10.3	.3125	3'- 11"
65	64	18.5	9.6	.3125	4'- 4"

- D_B = Pole Base O.D.
- D_{19.5} = Pole Top O.D. with no Luminaire and no ILSN (single mast arm)
- D_{20.25} = Pole Top O.D. with no Luminaire and no ILSN (dual mast arm)
- D₂₄ = Pole Top O.D. with ILSN w/out Luminaire
- D₃₀ = Pole Top O.D. with Luminaire
- D₁ = Arm Base O.D.
- D₂ = Arm End O.D.
- L₁ = Shaft Length
- L F = Fixed Arm Length

- (12) Thickness shown is minimum, thicker materials may be used.
- (13) Shaft profile 16-sided or 18-sided is considered to be equivalent to round section.

GENERAL NOTES:

Built-up Box Connection: For the welded arm-to-pole connection as a built-up box configuration illustrated here is an example only, fabricators are required to submit a shop drawing of box connection for approval. The drawing shall specify the details of each box element, welds of arm-to-pole connection, arm-to-plate socket connection, and arm rise creation. Specify the proper location of drain holes along the pole. 2 1/2" dia hole in the pole mounting plate and 4" dia hole in the pole need to be aligned for wiring access or drainage. Arm stiffeners cut to match arm inclination and taper shall also be included.

The deviation from flat for either arm or pole mounting plate shall not exceed 1/32 in., which is measured along the center of mounting plate to a radial distance of 13.5 in. The deformed-from-flat connection between arm and pole mounting plates shall not be allowed if the center of both mounting plates cannot contact directly.

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

ANCHOR BOLT & TEMPLATE SIZE						
Bolt Dia in.	Length #	Top Thread	Bottom Thread	Bolt Circle	R ₂	R ₁
2 1/2"	5'-2"	10"	6 1/2"	27"	16"	11"

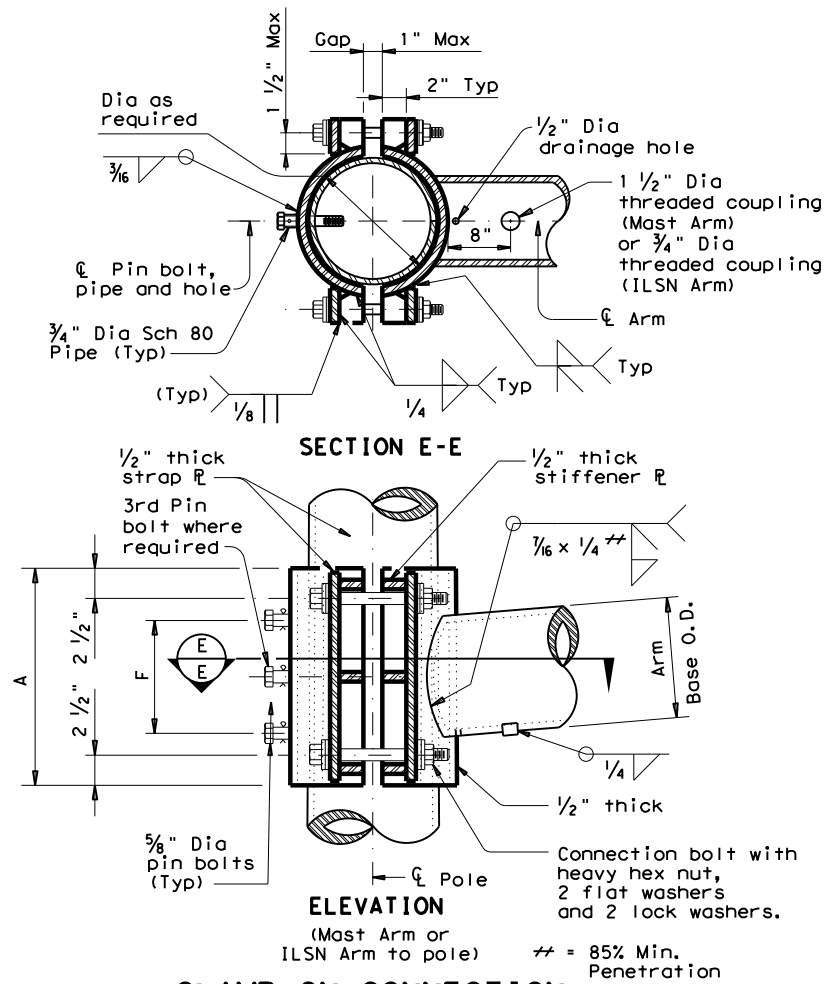
*Min dimension given, longer bolts are acceptable.

Texas Department of Transportation
 Traffic Operations Division
TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY
(50 TO 65 FT)
(80 AND 100 MPH WIND ZONE)
 Sheet 3 of 5 LMA(3)-12

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CLAMP-ON CONNECTION

80 MPH WIND										
Clamp-on Arm LC	ROUND ARMS					POLYGONAL ARMS				
	L ₁	D ₁	D ₂	thk (12)	Rise	L ₁	D ₁	D ₂	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.179	2'-0"	31.0	9.0	3.5	.179	2'-0"
36	35.0	9.5	4.6	.179	2'-4"	35.0	10.0	3.5	.179	2'-1"
40	39.0	9.5	4.1	.239	2'-8"	39.0	9.5	3.5	.239	2'-3"
44	43.0	10.0	4.1	.239	2'-11"	43.0	10.0	3.5	.239	2'-6"

100 MPH WIND										
Clamp-on Arm LC	ROUND ARMS					POLYGONAL ARMS				
	L ₁	D ₁	D ₂	thk (12)	Rise	L ₁	D ₁	D ₂	thk (12)	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	8.0	5.3	.179	1'-8"	19.1	8.0	3.5	.179	1'-7"
24	23.1	9.0	5.8	.179	1'-9"	23.1	9.0	3.5	.179	1'-8"
28	27.1	9.5	5.7	.179	1'-10"	27.1	10.0	3.5	.179	1'-9"
32	31.0	9.5	5.2	.239	1'-11"	31.0	9.5	3.5	.239	1'-10"
36	35.0	10.0	5.1	.239	2'-0"	35.0	10.0	3.5	.239	1'-11"
40	39.0	10.5	5.1	.239	2'-3"	39.0	11.0	3.5	.239	2'-1"
44	43.0	11.0	5.1	.239	2'-8"	43.0	11.5	4.0	.239	2'-3"

D₁ = Arm Base O.D.
 D₂ = Arm End O.D.
 L₁ = Shaft Length
 LC = Clamp-on Arm Length

(12) Thickness shown is minimum, thicker materials may be used.

CLAMP-ON ARM CONNECTION					
ILSN Arm Size		A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
Sch 40 pipe Dia	Thick				
in.	in.	in.	in.	in.	ea
3	.216	10	4	3/4	2

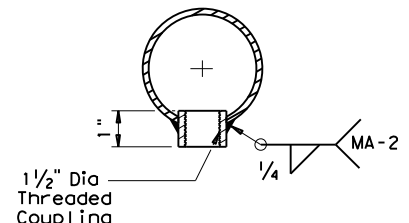
Mast Arm Size					
Base Dia	Thick	A	F	4 Conn. Bolts	5/8" Dia. Pin Bolts
6.5	.179	12	6	1	2
7.5	.179	14	8	1	2
8.0	.179	14	8	1	2
9.0	.179	16	10	1	2
9.5	.179	18	12	1 1/4	3
9.5	.239	18	12	1 1/4	3
10.0	.239	18	12	1 1/4	3
10.5	.239	18	12	1 1/4	3
11.0	.239	18	12	1 1/4	3
11.5	.239	18	12	1 1/4	3

GENERAL NOTES:

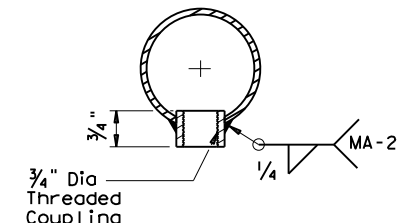
Clamp-on details are used for the second arm on dual mast arm assemblies or ILSN arm support. For a clamp-on mast arm, a maximum 1 1/2" wide vertical slotted hole may be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1". For an ILSN arm, a 1 1/2" diameter hole shall be cut in the front clamp plate for wire access. A matched hole shall be field drilled through the pole to provide wire access after arm is oriented. Deburr both holes.

Where duplicate parts occur on a detail, welds shown for part shall apply to all similar parts on the detail.

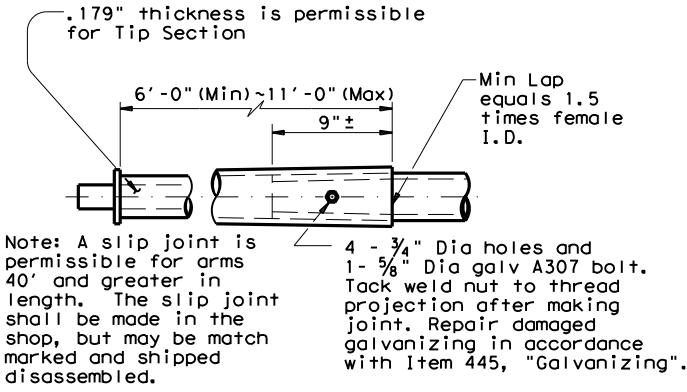
Pin bolts are required to prevent rotation of clamp-on arms under design wind forces. Pin bolts shall be ASTM A325 with threads excluded from the shear plane. Pin bolt and 3/4" diameter pipe shall have 3/16" diameter holes for a 1/8" diameter galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" diameter hole for each pin bolt. An 1/16" diameter hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.



ARM COUPLING DETAIL



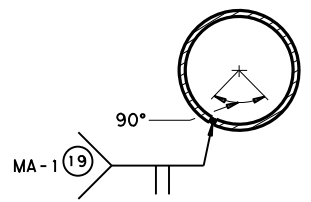
ILSN ARM COUPLING DETAIL



SLIP JOINT DETAIL (CLAMP-ON ARM)

Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 1/2" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

(19) Longitudinal Seam Weld must be oriented within the lower 90° of the signal arm. 60% Min penetration 100% penetration within 6" of circumferential base welds.

Texas Department of Transportation
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TRAFFIC SIGNAL SUPPORT STRUCTURES
LONG MAST ARM ASSEMBLY
 (50 TO 65 FT)
 (80 AND 100 MPH WIND ZONE)
 Sheet 4 of 5 **LMA(4)-12**

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Shipping Parts List							
Ship each pole with the following attached: enlarged hand hole, pole cap, fixed arm connection bolts and washers, and any additional hardware listed in the table.							
Nominal Arm Length	30' Poles with Luminaire		24' Poles with ILSN		19.50' (Single Mast Arm) 20.25' (Dual Mast Arm) Poles with no Luminaire and no ILSN		
	See note above plus: one (or two if ILSN attached) small hand hole, clamp-on simplex		See note above plus one small hand hole		See note above		
Single Mast Arm							
Lf ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity	
50	50L		50S		50		
55	55L		55S		55		
60	60L		60S		60		
65	65L		65S		65		
Dual Mast Arm							
Lf ft.	Lc ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
50	20	5020L		5020S		5020	
	24	5024L		5024S		5024	
	28	5028L		5028S		5028	
	32	5032L		5032S		5032	
	36	5036L		5036S		5036	
	40	5040L		5040S		5040	
55	20	5520L		5520S		5520	
	24	5524L		5524S		5524	
	28	5528L		5528S		5528	
	32	5532L		5532S		5532	
	36	5536L		5536S		5536	
	40	5540L		5540S		5540	
60	20	6020L		6020S		6020	
	24	6024L		6024S		6024	
	28	6028L		6028S		6028	
	32	6032L		6032S		6032	
	36	6036L		6036S		6036	
	40	6040L		6040S		6040	
65	20	6520L		6520S		6520	
	24	6524L		6524S		6524	
	28	6528L		6528S		6528	
	32	6532L		6532S		6532	
	36	6536L		6536S		6536	
	40	6540L		6540S		6540	
	44	6544L		6544S		6544	

Foundation Summary Table **

Location Ident.	Avg. N Blow/ft.	No. Each	Drill Shaft *** Length (feet)
			48-A
Total Drill Shaft Length			

Notes

- ** Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.
- *** Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

Abbreviations

- Lf= Fixed Arm Length
- Lc= Clamp-on Arm Length (44' Max.)

Shipping Parts List							
Traffic Signal Arms (Fixed Mount) (1 per pole) Ship each arm with listed equipment attached							
Nominal Arm Length	Type IV Arm (4 Signals) 3 Bracket Assembly and 4 CGB Connectors			Luminaire Arms (1 per 30' pole)			
	ft.	Designation	Quantity	Nominal Arm Length		Quantity	
50	50IV			ILSN Arm (Max. 2 per pole) Ship with clamps, bolts and washers			
55	55IV			Nominal Arm Length		Quantity	
60	60IV			7' Arm			
65	65IV			9' Arm			
Traffic Signal Arms (80 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached							
Nominal Arm Length	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp w/bolts and washers		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp w/bolts and washers		
	ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-80						
24	24I-80			24II-80			
28	28I-80			28II-80			
32				32II-80		32III-80	
36				36II-80		36III-80	
40						40III-80	
44						44III-80	
Traffic Signal Arms (100 MPH Clamp-On Mount) (1 per pole) Ship each arm with listed equipment attached							
Nominal Arm Length	Type I Arm (1 Signal) 2 CGB connector and 1 clamp w/bolts and washers		Type II Arm (2 Signals) 1 Bracket Assembly and 3 CGB connectors, and 1 clamp		Type III Arm (3 Signals) 2 Bracket Assembly and 4 CGB connectors, and 1 clamp		
	ft.	Designation	Quantity	Designation	Quantity	Designation	Quantity
20	20I-100						
24	24I-100			24II-100			
28	28I-100			28II-100			
32				32II-100		32III-100	
36				36II-100		36III-100	
40						40III-100	
44						44III-100	
Anchor Bolt Assemblies (1 per pole) 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 "IS-FD". Templates may be removed for shipment.							
Anchor Bolt Diameter	Anchor Bolt Length	Quantity					
2 1/2 "	5' - 3"						



**LONG MAST
ARM ASSEMBLY
PARTS LIST**

LMA (5) - 12

Sheet 5 of 5

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REVISIONS		CONT	SECT	JOB	HIGHWAY
4-20-01 1-12	0045	09		110, ETC	US 82, ETC
DIST		COUNTY		SHEET NO.	
PAR		LAMAR		89	

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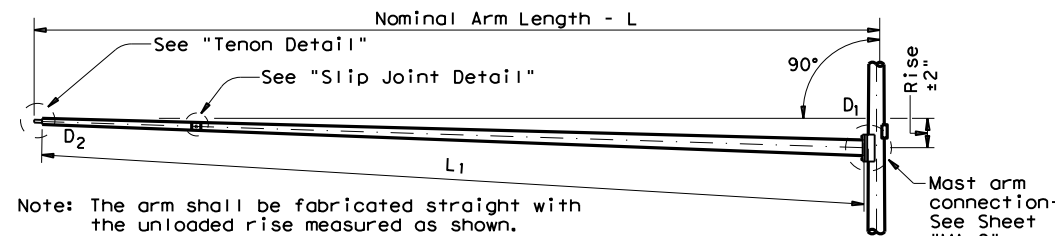
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Arm Length	ROUND POLES					POLYGONAL POLES					Foundation Type
	D _B	D ₁₉	D ₂₄	D ₃₀	① thk	D _B	D ₁₉	D ₂₄	D ₃₀	① thk	
ft.	in.	in.	in.	in.	in.	in.	in.	in.	in.	in.	
20	10.5	7.8	7.1	6.3	.179	11.5	8.5	7.7	6.8	.179	30-A
24	11.0	8.3	7.6	6.8	.179	12.0	9.0	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

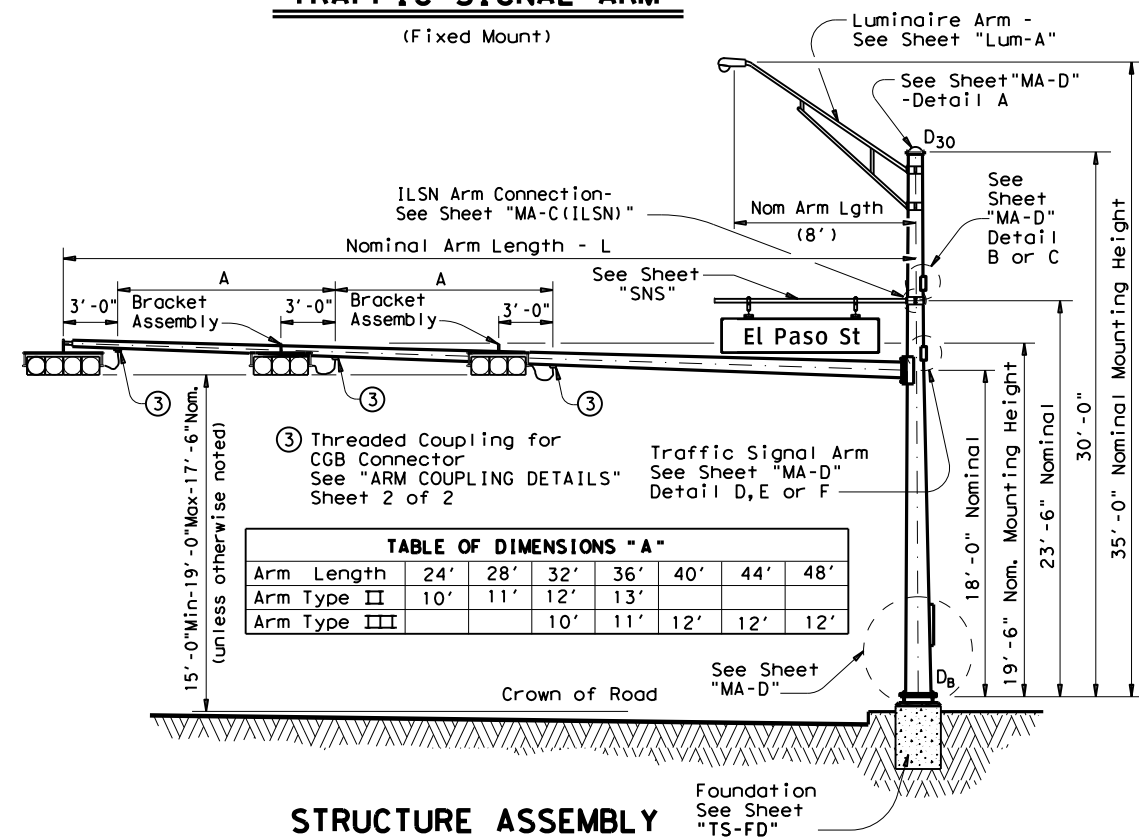
Arm Length	ROUND ARMS					POLYGONAL ARMS				
	L ₁	D ₁	D ₂	① thk	Rise	L ₁	D ₁	② D ₂	① thk	Rise
ft.	ft.	in.	in.	in.		ft.	in.	in.	in.	
20	19.1	6.5	3.8	.179	1'-9"	19.1	7.0	3.5	.179	1'-8"
24	23.1	7.5	4.3	.179	1'-10"	23.1	7.5	3.5	.179	1'-9"
28	27.1	8.0	4.2	.179	1'-11"	27.1	8.0	3.5	.179	1'-10"
32	31.0	9.0	4.7	.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.
 D₁₉ = Pole Top O.D. with no Luminaire and no ILSN
 D₂₄ = Pole Top O.D. with ILSN w/out Luminaire
 D₃₀ = Pole Top O.D. with Luminaire
 D₁ = Arm Base O.D.
 D₂ = Arm End O.D.
 L₁ = Shaft Length
 L = Nominal Arm Length

- ① Thickness shown are minimums, thicker materials may be used.
- ② D₂ may be increased by up to 1" for polygonal arms.



TRAFFIC SIGNAL ARM
(Fixed Mount)



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	
	Designation	Quantity	Designation	Quantity	Designation	Quantity
ft	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	
44	44L-80		44S-80		44-80	
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)	
	Designation	Quantity	Designation	Quantity	Designation	Quantity
ft	20I-80		20II-80		20III-80	
24	24I-80		24II-80		24III-80	
28	28I-80		28II-80		28III-80	
32			32II-80		32III-80	
36			36II-80		36III-80	
40					40III-80	
44					44III-80	
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
1 1/2"	3'-4"	
1 3/4"	3'-10"	

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.



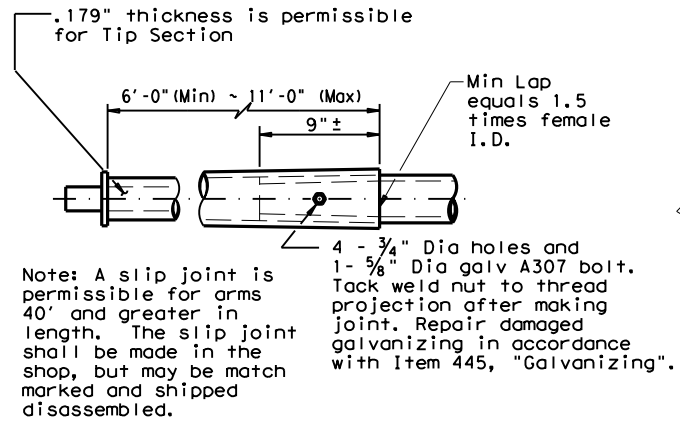
TRAFFIC SIGNAL SUPPORT STRUCTURES
SINGLE MAST ARM ASSEMBLY
(80 MPH WIND ZONE)
SMA-80(1)-12

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REVISIONS					
5-96	11-99	0045	09	110, ETC	US 82, ETC
1-12		PAR		LAMAR	90

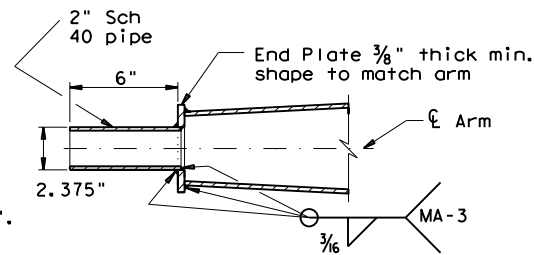
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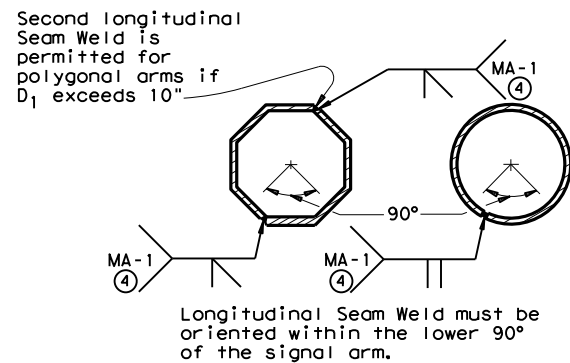
SLIP JOINT DETAIL



TENON DETAIL

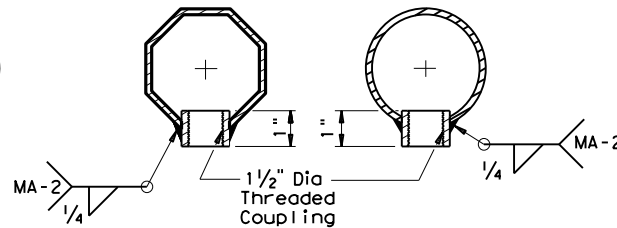
Stainless steel bands (or Cables) and cast bracket as in "Astro-Brac", "Sky Bracket" or "Easy Bracket" with 1 1/2" Dia Threaded Coupling.

BRACKET ASSEMBLY



ARM WELD DETAIL

④ 60% Min. penetration
 100% penetration within 6" of circumferential base welds.



ARM COUPLING DETAILS

VIBRATION WARNING

Mast Arms of SMA and DMA structures and clamp-on Arms of LMA structures of approximately 40 ft or longer are subject to harmonic vertical vibrations in light wind conditions due to the aeroelastic characteristics of a few of the myriads of possible combinations of the following: signal numbers, weights and positions; existence/solidity of backplates; presence of additional attachments to the arm, such as signs and cameras; arm-wind orientation; and arm-pole stiffness.

Such vibrations may cause fatigue damage to the structure and may lead to galloping in moderate wind conditions which may further damage the structure and alarm the public. Tests have indicated that when wind is blowing toward the back side of signal heads having un-vented backplates attached the probability of unacceptable harmonic vibration and/or galloping is rather high.

If backplates are not required for improved visibility they should not be applied to the signal heads or, if they must be applied, they should be vented as a first and inexpensive measure to mitigate vibrations.

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required backplates. If vertical movements with a total excursion (maximum upward excursion to maximum downward excursion) of more than approximately 8" are observed at the arm tip, a damping plate shall be fitted to the arm. See "Damping Plate Mounting Details" on standard sheet, MA-DPD-10.

This visual inspection shall be repeated after each modification of the structure that could affect its aeroelastic response. Excessive vibrations shall not be allowed to continue for more than two days.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Specifications thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor.

Poles are designed to support one 8'-0" luminaire arm, one 9'-0" internally lighted street name sign and one traffic signal arm with a length as tabulated. The specified luminaire load applied at the end of the luminaire arm equals 60 lbs vertical dead load plus the horizontal wind load on an effective projected area of 1.6 sq ft. The specified internally lighted street name sign load applied 4.5 ft from the centerline of the pole equals 85 lbs vertical dead load plus horizontal wind load on an effective projected area of 11.5 sq ft. The specified signal load applied at the end of the traffic signal arm equals 180 lbs vertical dead load plus the horizontal wind load on an effective projected area of 32.4 sq ft (actual area times drag coefficient).

See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt and foundation details. See "MA-C" for material specifications.

Fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. Materials, fabrication tolerances, and shipping practices shall meet the requirements of this sheet and Item 686, "Traffic Signal Pole Assemblies (Steel)".

Unless otherwise noted, all parts shall be galvanized in accordance with Item 445, "Galvanizing", after fabrication.

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

SHEET 2 OF 2



TRAFFIC SIGNAL SUPPORT STRUCTURES SINGLE MAST ARM ASSEMBLY (80 MPH WIND ZONE)

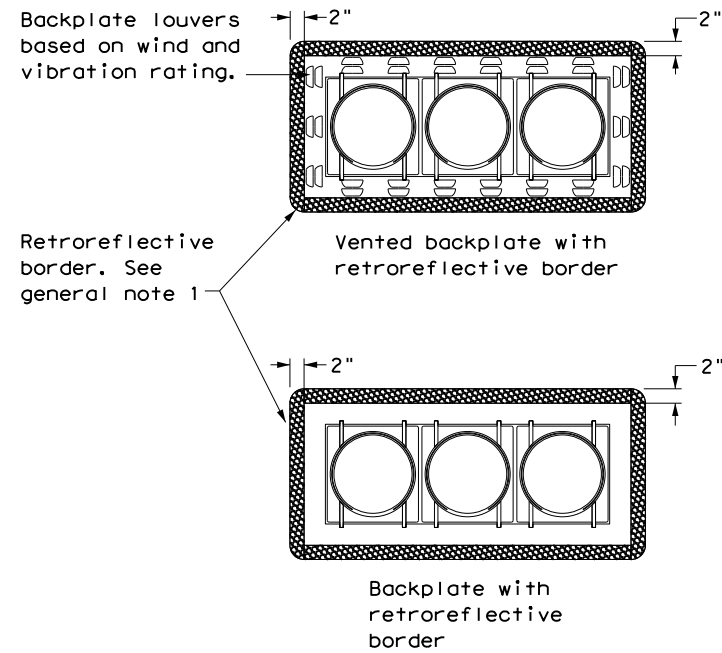
SMA-80(2)-12

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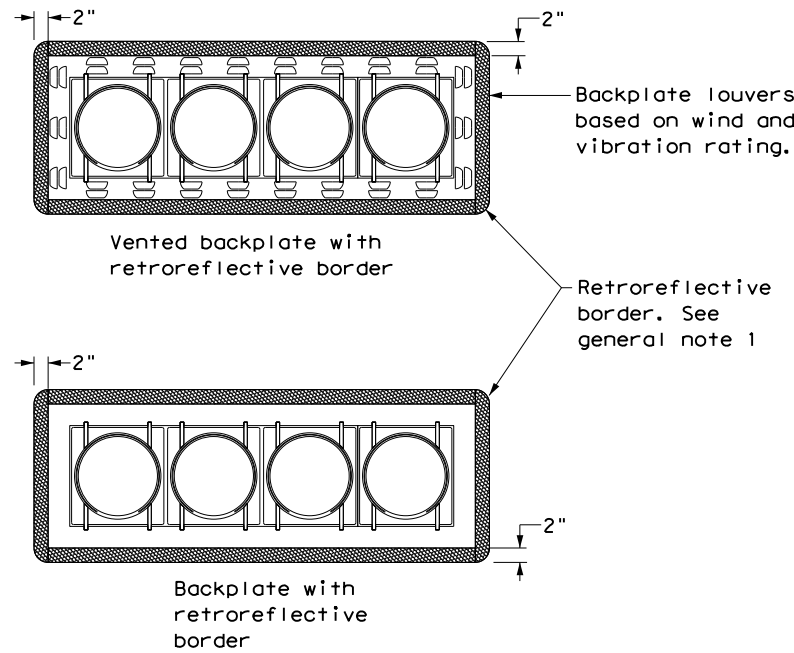
122B

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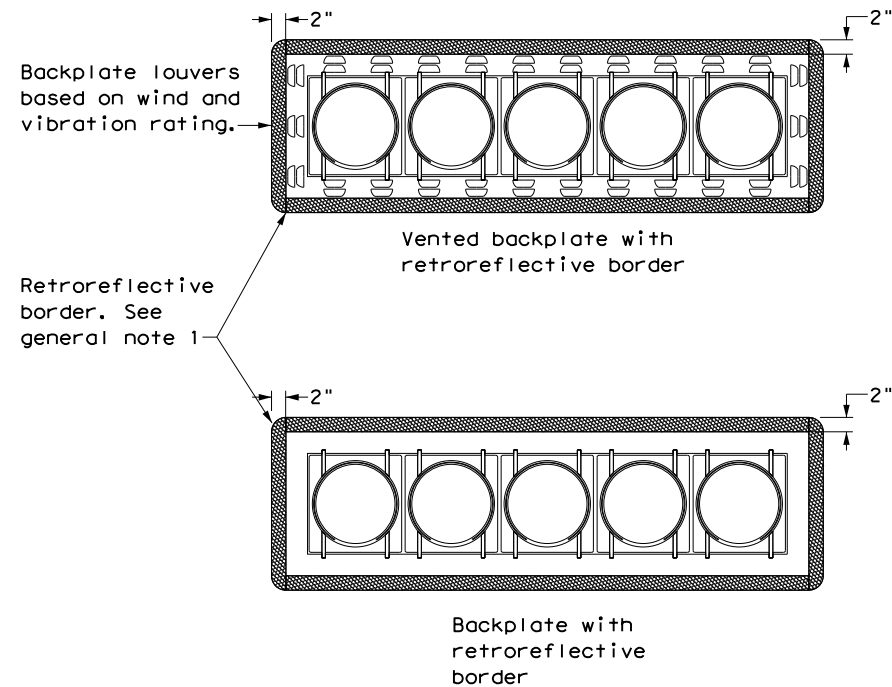
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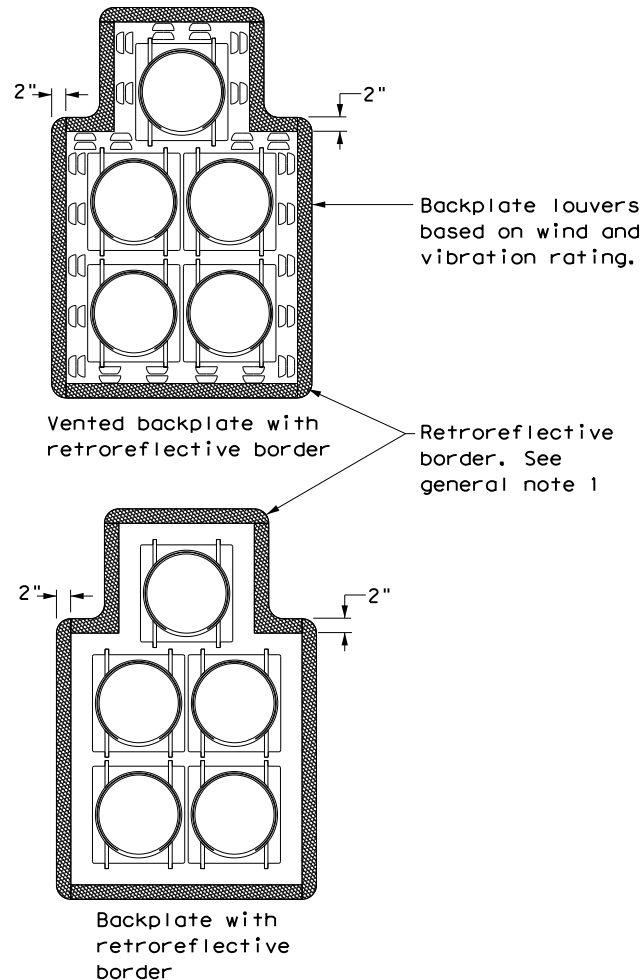
THREE-SECTION HEAD
 HORIZONTAL OR VERTICAL



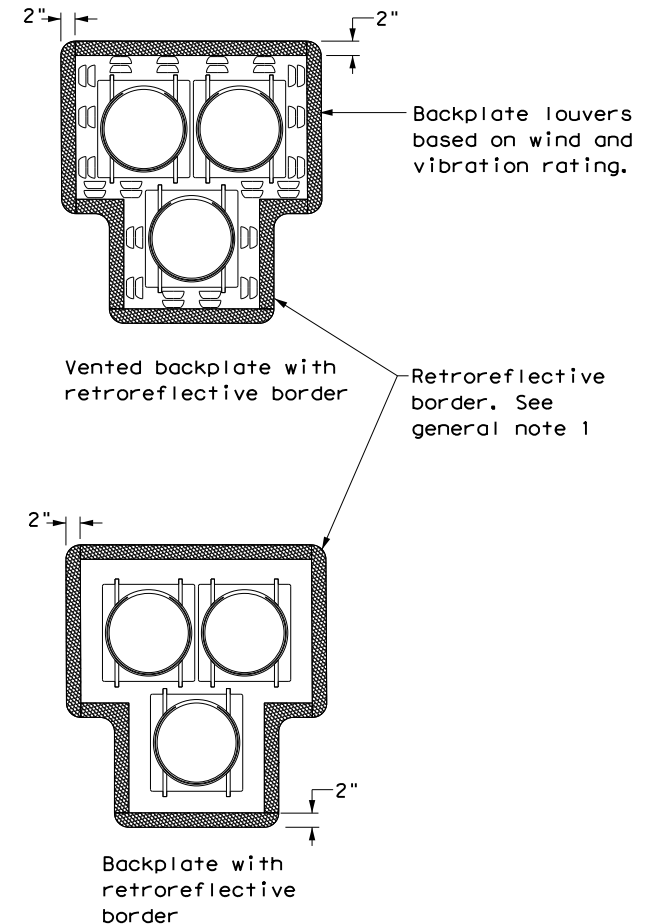
FOUR-SECTION HEAD
 HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
 HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
 CLUSTER



PEDESTRIAN HYBRID
 BEACON

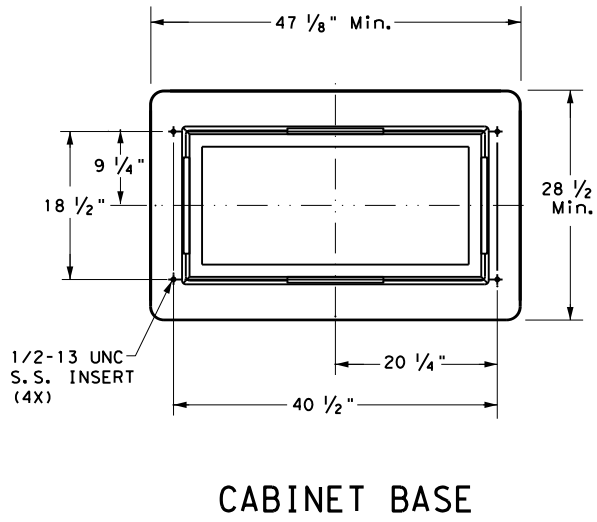
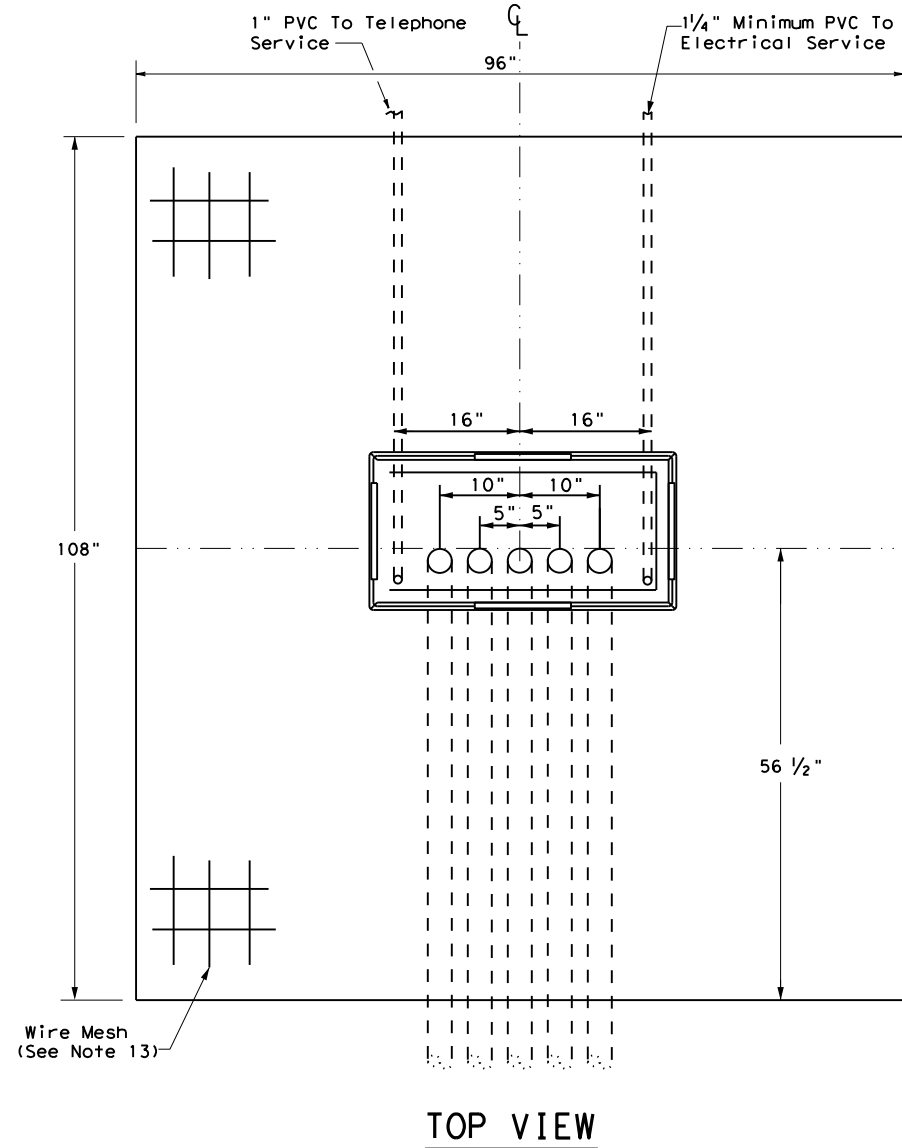
GENERAL NOTES:

1. Backplates are optional for traffic signals and pedestrian hybrid beacons. When backplates are used, a 2-inch wide fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 is required. Place on all approaches when used.
2. Signal head and backplate compatibility must be verified by the contractor prior to installation.
3. When using backplates on signal heads, venting is preferred to reduce cyclic vibration stress.
4. When a vented backplate is used, the retroreflective border must not be placed over the louvers.
5. This standard sheet applies to all signal heads with backplates, including but not limited to:
 - Pole mounted
 - Overhead mounted
 - Span wire mounted
 - Mast arm mounted
 - Vertical signal heads
 - Horizontal signal heads
 - Clustered signal heads
 - Pedestrian hybrid beacons

		Texas Department of Transportation		Traffic Safety Division Standard	
TRAFFIC SIGNAL HEAD WITH BACKPLATE TS-BP-20					
FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT	
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY	
REVISIONS	0045	09	110, ETC	US 82, ETC	
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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 Safety Division.
2. The polymer concrete material must have a minimum compressive strength of 10,300 pounds per square inch (psi), minimum flexural strength of 3600 psi, and minimum shear strength of 3600 psi.
3. The polymer concrete cabinet base must conform to the dimensions shown and must accommodate a standard TxDOT basemount cabinet.
4. Supply the cabinet base with four 1#2"-13 UNC stainless steel inserts for attachment of the cabinet to the base. Inserts must withstand a minimum torque of 50 ft-lb and a minimum straight pull out strength of 750 lbs.
5. Provide the cabinet base with 4 cable racks mounted one on each side of the base 2" to 7" from the top edge of the base. Unless approved otherwise, cable racks must be 1-1/2 x 9#16x 3#16inch steel channel with eight T-slots spaced at 1-1/2 inches. The cable racks must easily accommodate the insertion of tie wraps to attach field wiring to the racks to serve as strain relief. Secure cable racks to the base using 1#2"-13 UNC stainless steel screws and inserts.
6. The cabinet base, when secured to the concrete slab with controller cabinet attached, must withstand a minimum wind load of 125 mph or a 850 lb force applied at 49" above the bottom of the base without causing the base or cabinet to come out of their anchored position or cause any permanent deformation. The manufacturer must supply certification by an independent testing laboratory or sealed by a Texas Licensed Professional Engineer. Provide the cabinet base with hardware for attachment to a concrete slab.
7. The traffic signal base must be permanently marked either by impress or by permanent ink with the manufacturer's model number and name or logo.
8. Seal the base to the concrete with a silicone caulk bead and fastened to the slab per manufacturer's instructions.

CONCRETE SLAB:

9. Traffic signal controller pad must be a portland cement concrete slab poured in place, must conform to the dimensions shown, and must be level.
10. Grade earthwork such that it is flush with the concrete pad on all four sides, unless otherwise shown on the plans. Subsidiary to ITEM 680, four inch rip rap may be used in lieu of earthwork. Slopes shall gradually contour to match plans.
11. Bond a #8 AWG copper ground wire and an 8 ft ground rod bonded to the reinforcing mesh by a suitable UL Listed clamp and terminated to the cabinet grounding bus for the purpose of providing a local ground for the electrical grounding conductor. The electrical grounding conductor specified in Item 680-3.A.4 is required and must be terminated to the cabinet ground bus.
12. Install a PVC sleeve to prevent the ground rod from direct embedment in the slab.
13. Provide welded wire mesh 6X6-W2.9 X W2.9 for reinforcement. Provide joints and splices in the mesh with a minimum 6-inch overlap. Center the mesh between top and bottom and provide a minimum 3 inch cover on the edges.
14. Provide Class B concrete minimum for the slab in accordance with Item 421. Construct the slab in accordance with Item 531.

CONDUITS:

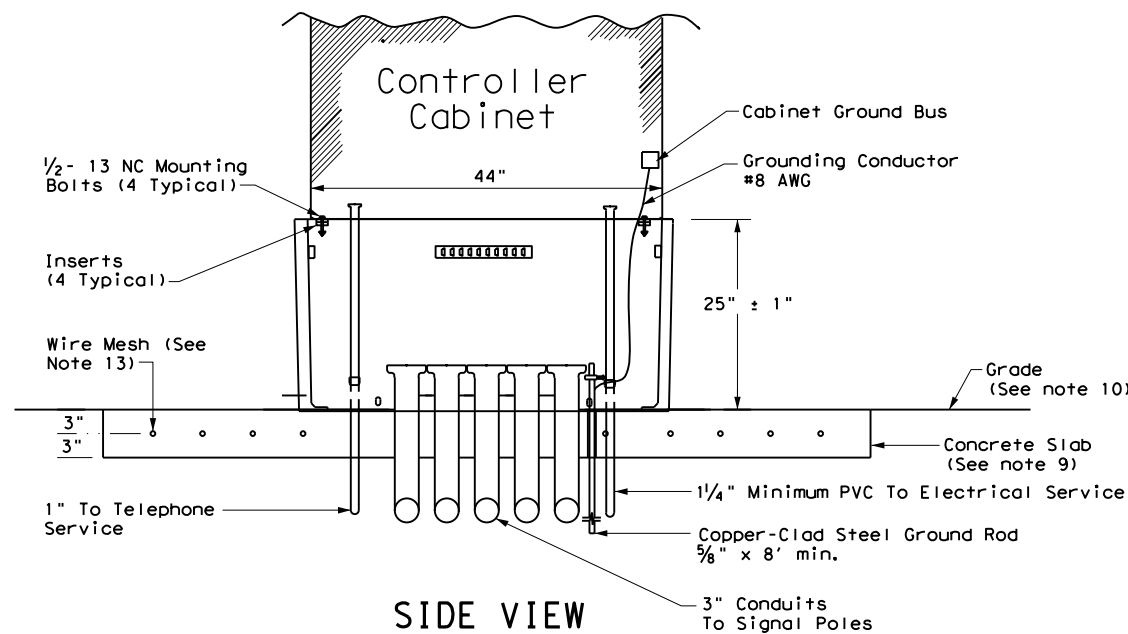
15. Stub up and run 3-inch conduits through the slab to the various traffic signal poles and ground boxes as shown on the layouts. Install the number of conduits as shown on layouts plus two additional 3 inch conduits for future use. Terminate the conduits with a bushing between 2 and 4-inches above the slab.
16. Extend conduits for future use at least 18-inches from the edge of the slab, terminate underground with a coupling, and cap and seal so that the seal can be removed without damaging the coupling. This must also apply to unused telephone conduit.
17. Stub up two separate conduits through the slab from the electrical and telephone services. Run the conduit for the electrical feed directly to the electrical service enclosure. Run the conduit for the telephone line directly to the telephone service, usually located on the same pole as the electrical service. Telephone must not under any circumstance share a conduit with any other function.
18. Terminate electric and telephone conduits above the slab with a coupling. After the base is installed, extend the conduits above the top of the base and secure to the base using a steel one-hole strap or similar suitable substitute.

CONTROLLER CABINET:

19. Anchor the controller cabinet to the base using four stainless steel 1/2-13 NC bolts.
20. The silicone caulk bead specified in Item 680.3.B must be RTV 133.

PAYMENT:

21. Bid TS-CF as subsidiary to Item 680.



SIDE VIEW

		Traffic Safety Division Standard	
TRAFFIC SIGNAL CONTROLLER CABINET BASE AND PAD TS-CF-21			
FILE: ts-cf-21.dgn	DN:	CK:	DW:
© TxDOT October 2000	CONT	SECT	JOB
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	PAR	LAMAR	SHEET NO. 93

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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	F _y (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	3/4"	36	12 3/4"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 1/2"	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 3/4"	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 1/4"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

NOTES:

- Anchor bolt design develops the foundation capacity given under Foundation Design Loads.
- Foundation Design Loads are the allowable moments and shears at the base of the structure.
- Foundations may be listed separately or grouped according to similarity of location and type. Quantities are for the Contractor's information only.
- Field Penetrometer readings at a depth of approximately 3 to 5 feet may be used to adjust shaft lengths.
- If rock is encountered, the Drilled Shaft shall extend a minimum of two diameters into solid rock.
- Decimal lengths in Design Table are to allow interpolation for other penetrometer values. Round to nearest foot for entry into Summary Table.

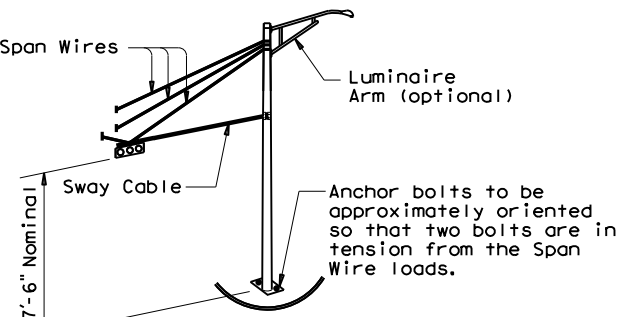
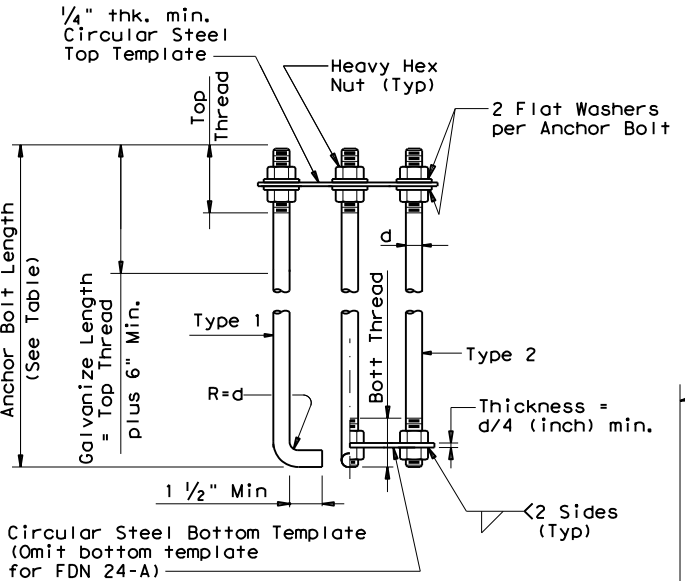
FOUNDATION SUMMARY TABLE (3)

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	
WALMART POLE A		36-A				10			
TOTAL DRILLED SHAFT LENGTHS								10	

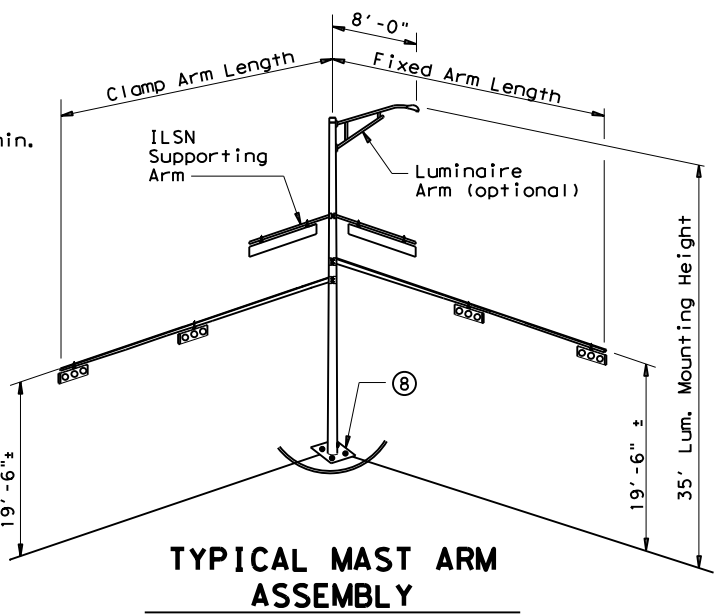
FOUNDATION SELECTION TABLE FOR STANDARD MAST ARM PLUS ILSN SUPPORT ASSEMBLIES (ft)

80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A
		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'
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' x 24'

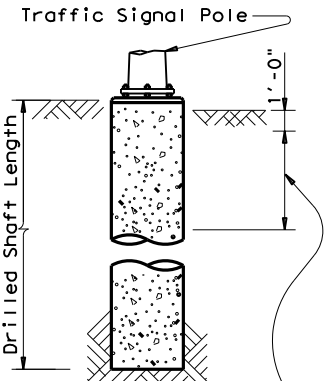
- EXAMPLE:**
- For 80mph design wind speed, foundation 30-A can support up to a 32' arm with another arm up to 28'
 - For 100mph design wind speed, foundation 36-A can support a single 36' mast arm.



TYPICAL STRAIN POLE ASSEMBLY



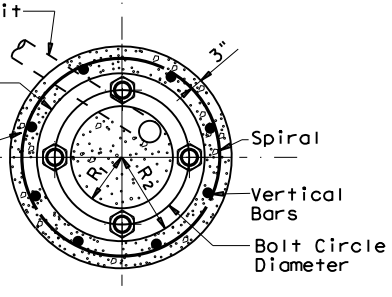
TYPICAL MAST ARM ASSEMBLY



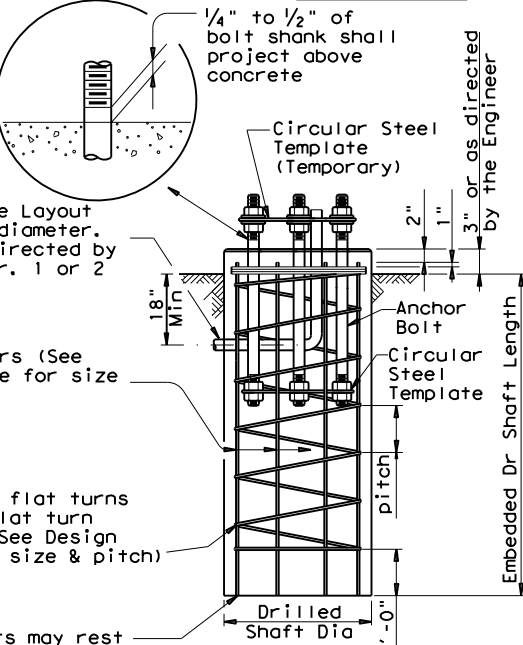
Use average N value over the top third of the embedded shaft. Ignore the top 1' of soil.

ANCHOR BOLT & TEMPLATE SIZES						
BOLT DIA IN.	(7) BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R ₂	R ₁
3/4"	1'-6"	3"	---	12 3/4"	7 1/8"	5 5/8"
1 1/2"	3'-4"	6"	4"	17"	10"	7"
1 3/4"	3'-10"	7"	4 1/2"	19"	11 1/4"	7 3/4"
2"	4'-3"	8"	5"	21"	12 1/2"	8 1/2"
2 1/4"	4'-9"	9"	5 1/2"	23"	13 3/4"	9 1/4"

(7) Min dimensions given, longer bolts are acceptable.



TOP VIEW



ELEVATION

FOUNDATION DETAILS

GENERAL NOTES:

- Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminares 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".

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TRAFFIC SIGNAL POLE FOUNDATION

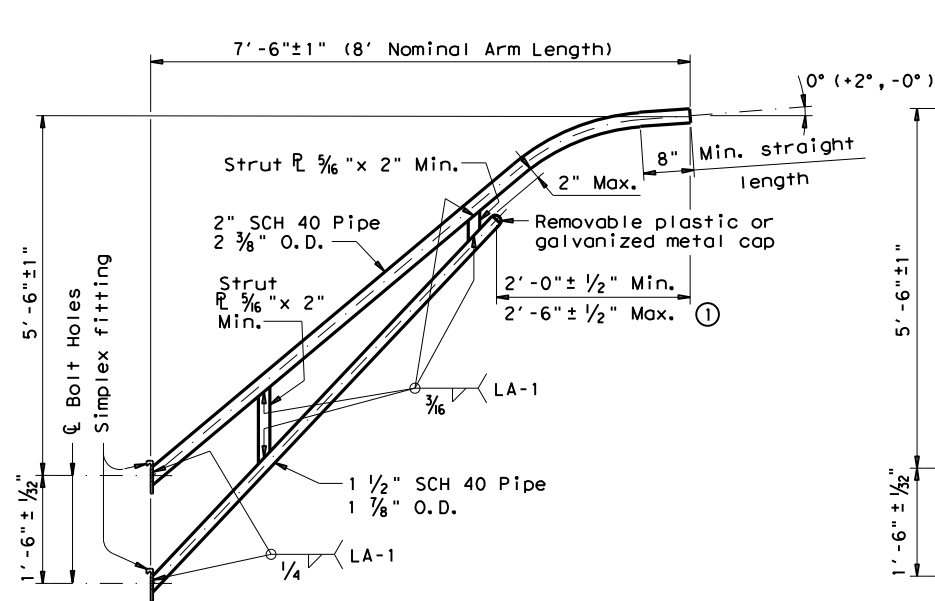
TS-FD-12

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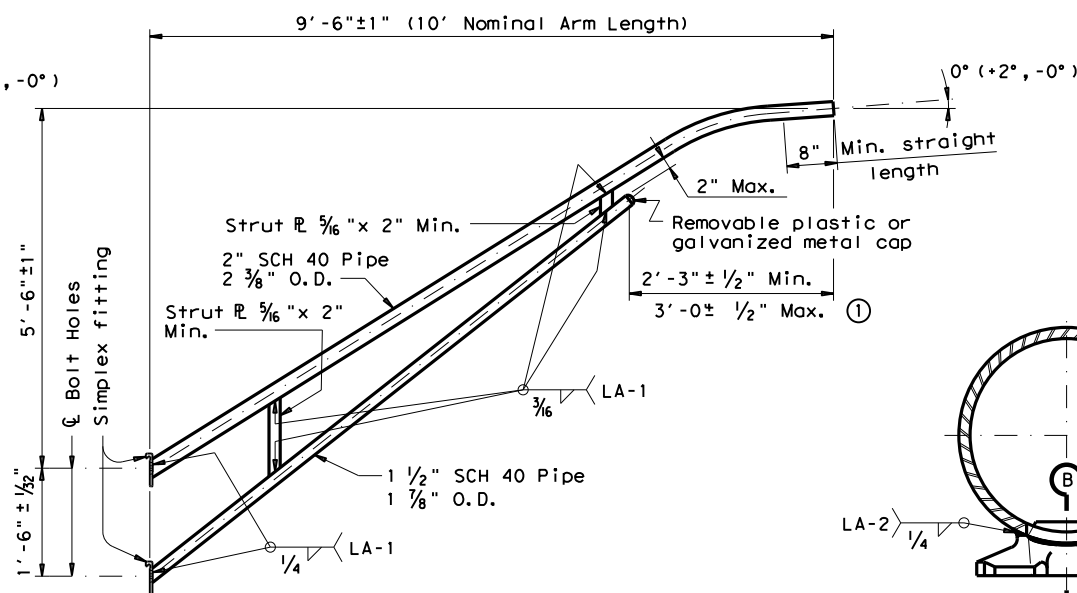
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CON: 0045	SECT: 09	JOB: 110, ETC	HIGHWAY: US82, ETC.
DIST: PAR	COUNTY: LAMAR	SHEET NO. 94	

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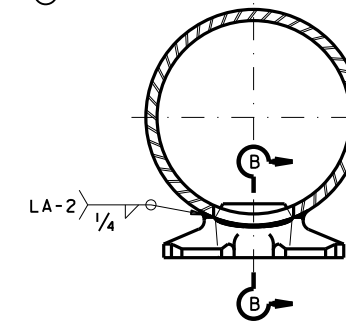
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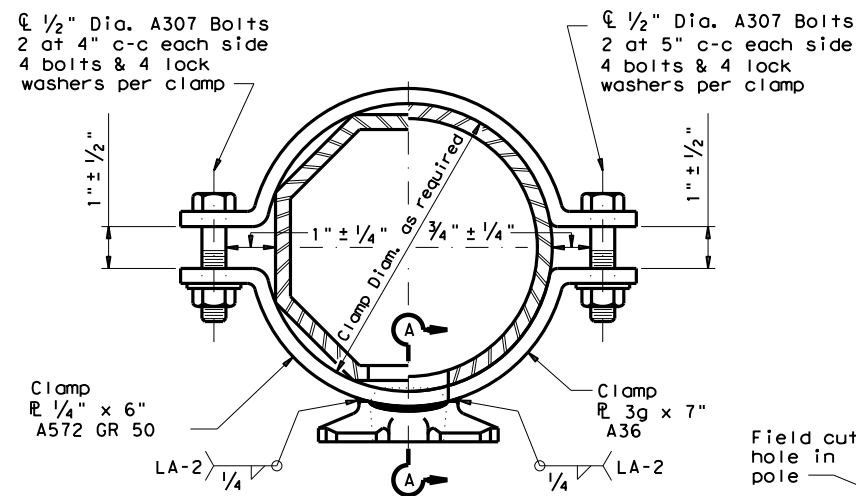
8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM

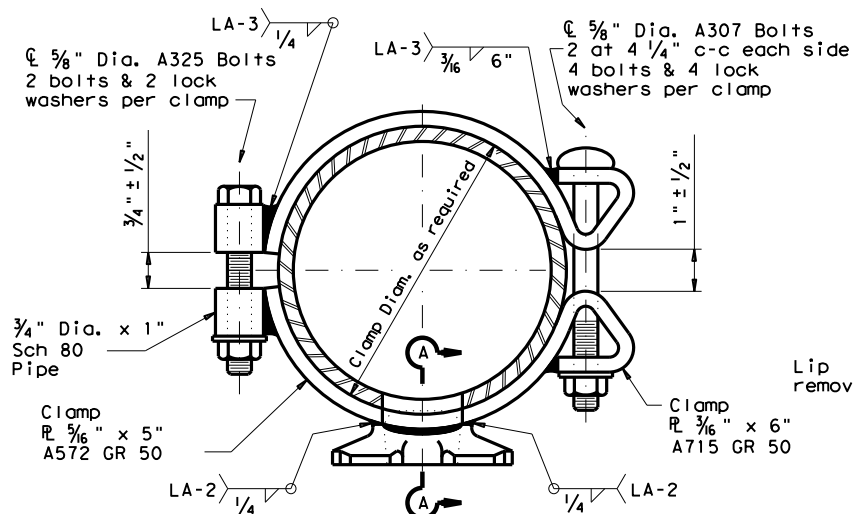


DIRECT ATTACHMENT DETAIL



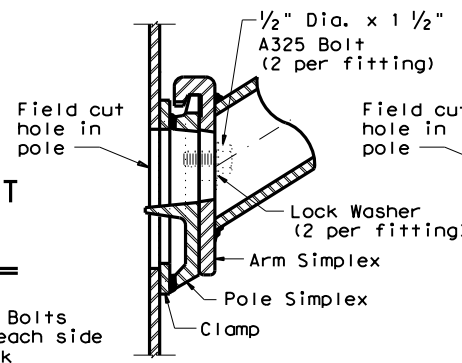
CLAMP ATTACHMENT DETAIL NO. 1 (HALF SECTION)

CLAMP ATTACHMENT DETAIL NO. 2 (HALF SECTION)

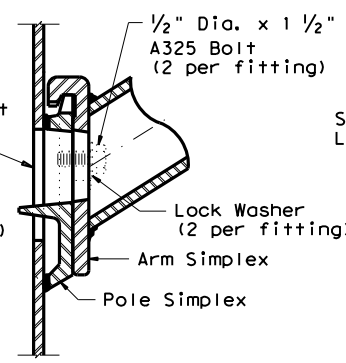


CLAMP ATTACHMENT DETAIL NO. 3 (HALF SECTION)

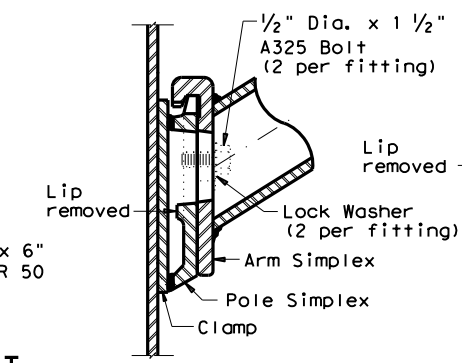
CLAMP ATTACHMENT DETAIL NO. 4 (HALF SECTION)



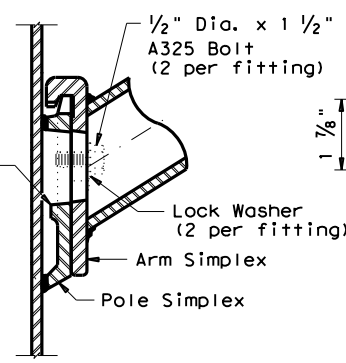
UPPER SIMPLEX FITTING



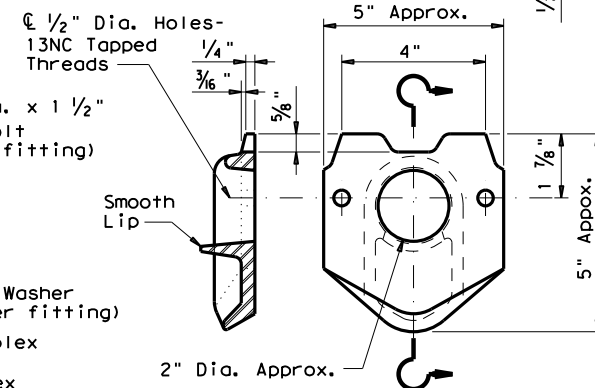
UPPER SIMPLEX FITTING



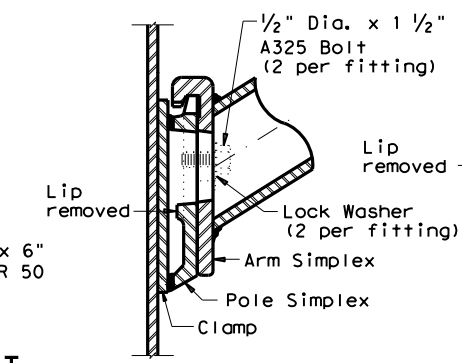
LOWER SIMPLEX FITTING



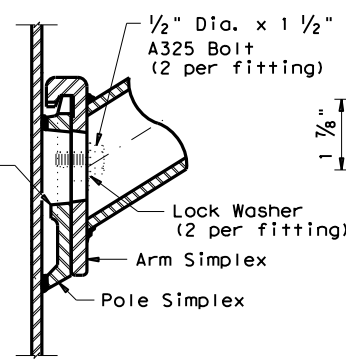
LOWER SIMPLEX FITTING



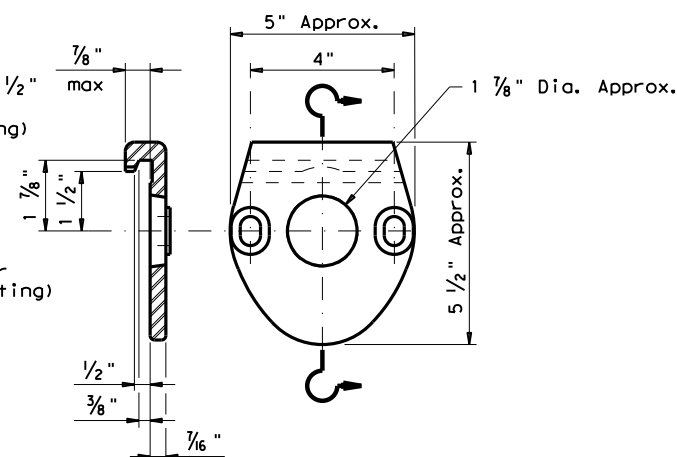
POLE SIMPLEX DETAIL



SECTION A-A



SECTION B-B



ARM SIMPLEX DETAIL

MATERIALS	
Pole or Arm Simplex	ASTM A27 Gr. 65-35 or A148 Gr. 80-50, A576 Gr. 1021 (3), or A36 (Arm only)
Arm Pipes	ASTM A53 Gr. B, A501, A1008 HSLAS-F Gr. 50 (4), or A1011 HSLAS-F Gr. 50 (4)
Arm Strut Plates (2)	ASTM A36, A572 Gr. 50 (4), or A588
Misc.	ASTM designations as noted

- Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.
- Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.
- A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.
- ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals and Interim Revisions thereto. Design Wind Speed equals 90 mph plus a 1.3 gust factor. Arms are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq. ft.

Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified Fabricator tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.

Unless otherwise noted, all parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing".

Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

Each pole simplex fitting shall be supplied with 2 ASTM A325 bolts and 2 lock washers of the size specified. The bolts and lock washers shall be secured to the pole with the other hardware items called for in the plans. When clamp attachment is specified, the Fabricator shall ship the clamp assembly securely attached to the pole at the location shown on the plans.

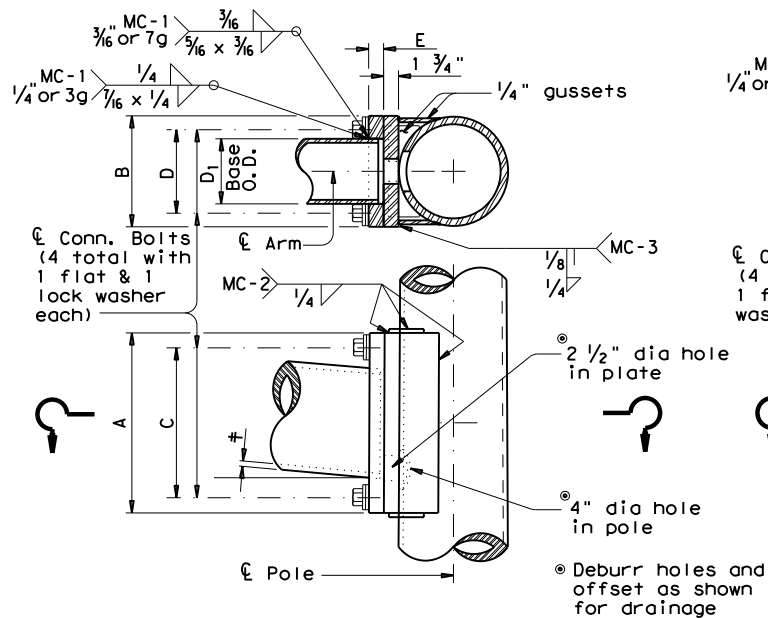
If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.

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STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES
ARM DETAILS
LUM-A-12

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5-96	REVISIONS	CONT	SECT	JOB	HIGHWAY
1-99		0045	09	110, ETC	US 82, ETC
1-12		DIST	COUNTY		SHEET NO.
		PAR	LAMAR		95

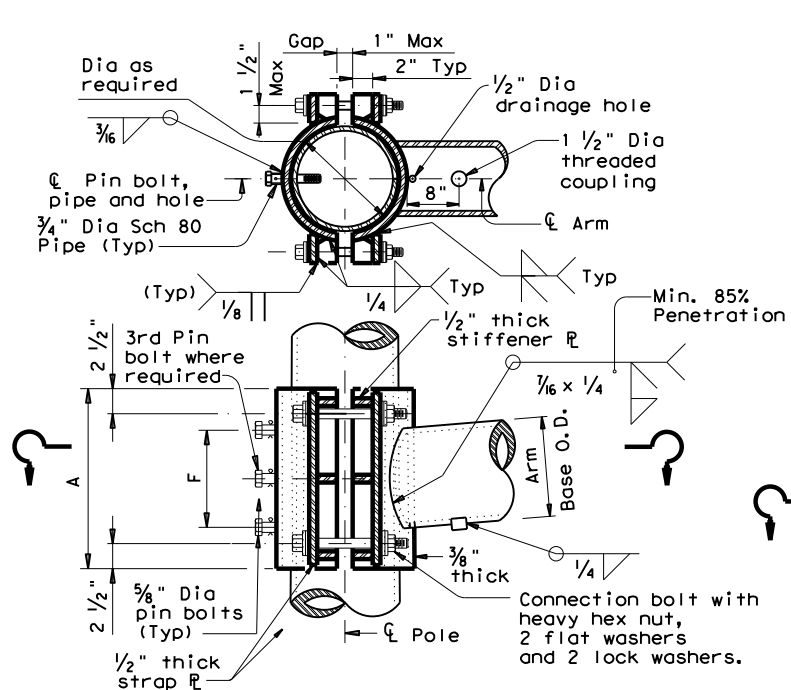
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ARM SIZE		A	B	C	D	E	CONN. BOLT DIA
D ₁	Ø	in.	in.	in.	in.	in.	in.
6.5	.179	12	9	9	6	1 3/4	1
7.5	.179	13	9	10	6	1 3/4	1
8.0	.179	14	10	11	7	2	1 1/4
9.0	.179	16	11	13	8	2	1 1/4
9.5	.179	17	12	14	9	2	1 1/4
9.5	.239	18	12	15	9	2	1 1/4
10.0	.239	18	12	15	9	2	1 1/4
10.5	.239	18	13	15	10	3	1 1/2
11.0	.239	18	13	15	10	3	1 1/2



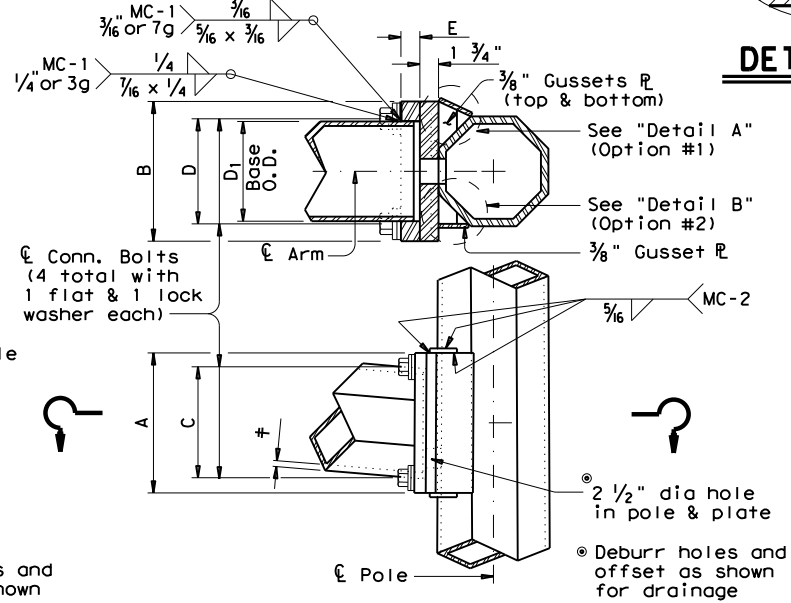
FIXED MOUNT DETAIL 1

ARM SIZE		A	F	CONN. BOLTS		PIN BOLTS	
D ₁	Ø	in.	in.	No.	Dia	No.	Dia
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



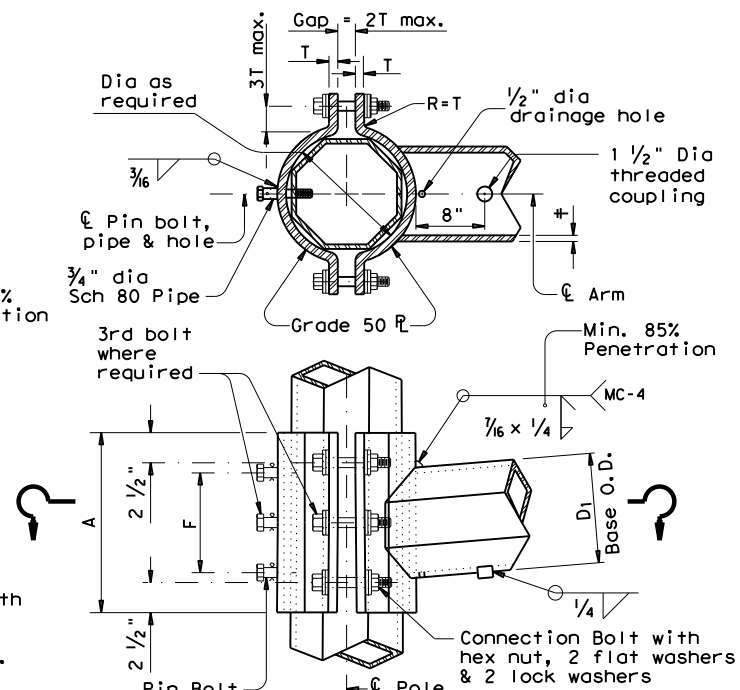
CLAMP-ON DETAIL 1

ARM SIZE		A	B	C	D	E	CONN. BOLT DIA
D ₁	Ø	in.	in.	in.	in.	in.	in.
7.0	.179	11	11	8	8	1 3/4	1 1/4
7.5	.179	11	11	8	8	1 3/4	1 1/4
8.0	.179	11	11	8	8	2	1 1/4
9.0	.179	13	13	10	10	2	1 1/4
10.0	.179	13	13	10	10	2	1 1/4
9.5	.239	13	13	10	10	2	1 1/4
10.0	.239	14	14	11	11	2	1 1/2
11.0	.239	14	14	11	11	3	1 1/2
11.5	.239	14	14	11	11	3	1 1/2

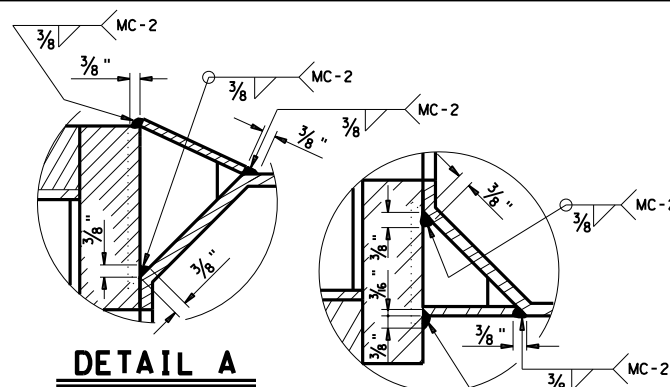


FIXED MOUNT DETAIL 2

ARM SIZE		A	F	T	CONN. BOLTS		PIN BOLTS	
D ₁	Ø	in.	in.	in.	No.	Dia	No.	Dia
7.0	.179	12	6	3/4	4	3/4	2	5/8
7.5	.179	14	8	3/4	4	3/4	2	5/8
8.0	.179	14	8	3/4	4	3/4	2	5/8
9.0	.179	16	10	7/8	4	1	2	5/8
10.0	.179	18	10	7/8	4	1	2	5/8
9.5	.239	18	10	1	6	1	3	5/8
10.0	.239	18	10	1	6	1	3	5/8

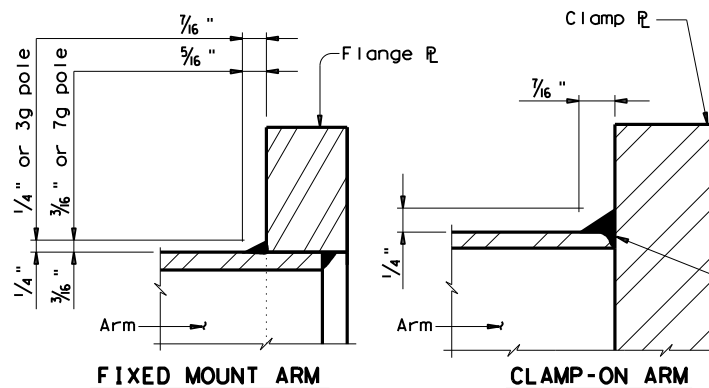


CLAMP-ON DETAIL 2



DETAIL A

DETAIL B

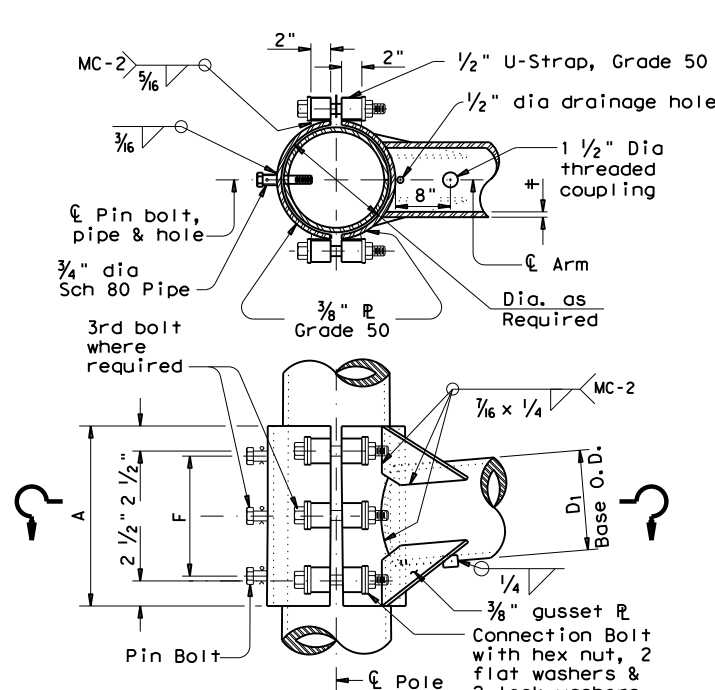


FIXED MOUNT ARM

CLAMP-ON ARM

ARM BASE WELD DETAILS

ARM SIZE		A	F	CONN. BOLTS		PIN BOLTS	
D ₁	Ø	in.	in.	No.	Dia	No.	Dia
6.5	.179	12	6	4	1	2	5/8
7.5	.179	14	8	4	1	2	5/8
8.0	.179	14	8	4	1	2	5/8
9.0	.179	16	10	4	1	2	5/8
9.5	.179	18	12	6	1	3	5/8
9.5	.239	18	12	6	1	3	5/8
10.0	.239	18	12	6	1	3	5/8



CLAMP-ON DETAIL 3

MATERIALS	
Round Shafts or Polygonal Shafts ①	ASTM A595 Gr. A, A588, A1008 HSLAS Gr. 50 Class 2, A1011 HSLAS Gr. 50 Class 2, A572 Gr. 50 or A1011 SS Gr. 50 ②
Plates ①	ASTM A36, A588, or A572 Gr. 50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr. B, A501, A1008 HSLAS-F Gr. 50, A1011 HSLAS-F Gr. 50
Misc. Hardware	Galvanized steel or stainless steel or as noted

- ① ASTM A572, A1008 HSLAS, A1011 HSLAS, A1008 HSLAS-F, A1011 HSLAS-F or A1011 SS may have higher yield strengths but shall not have less elongation than the grade indicated.
- ② ASTM A1011 SS Gr. 50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.

GENERAL NOTES:

Clamp-on details are used for the second arm on dual mast arm assemblies. A Maximum 1 1/2" wide vertical slotted hole shall be cut in the front clamp plate to facilitate drainage during galvanizing. The slot shall be centered behind the arm and shall be no longer than the arm diameter minus 1"

Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

Pin bolts are required to prevent rotation of clamp-on arms under design wind forces.

NOTE:

Pin bolts shall be A325 with threads excluded from the shear plane. Pin bolt and 3/4" dia pipe shall have 3/16" dia holes for a 1/8" dia galvanized cotter pin. Back clamp plate shall be furnished with a 3/4" dia hole for each pin bolt. An 1/16" 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

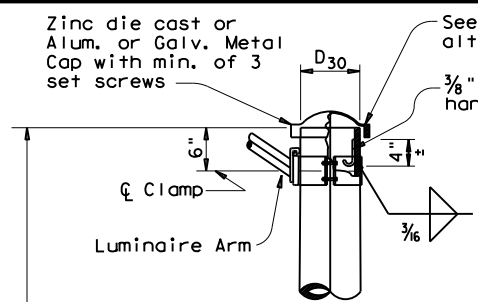
**STANDARD ASSEMBLY
FOR TRAFFIC SIGNAL
SUPPORT STRUCTURES
MAST ARM CONNECTIONS
MA-C-12**

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1-12					
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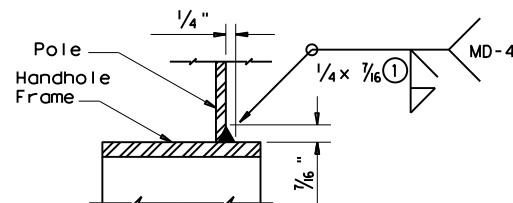
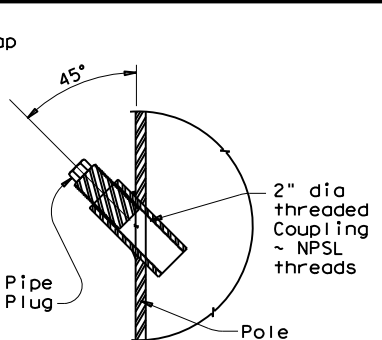
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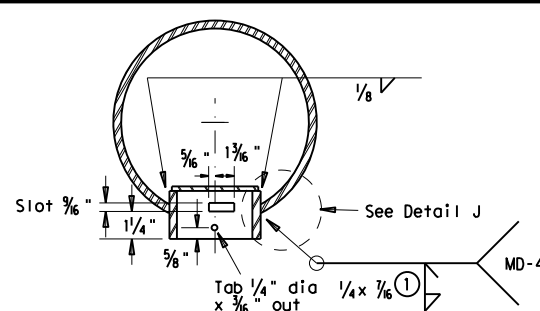
DETAIL A

(for pole with luminaire)

POLE COUPLING DETAIL

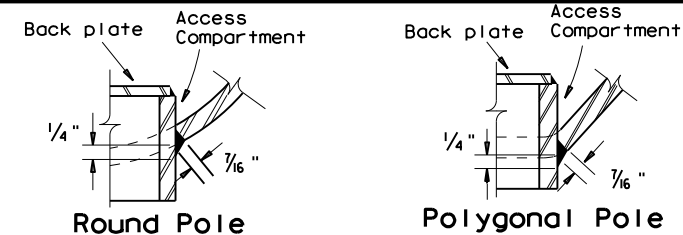


DETAIL G

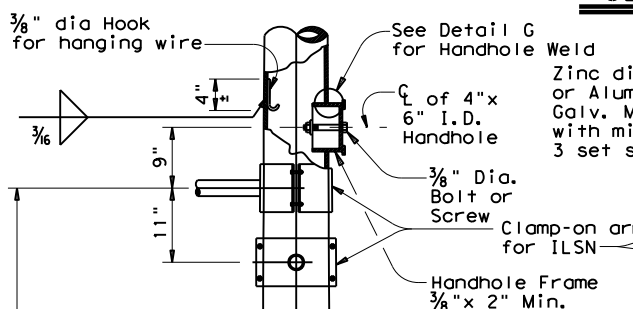


SECTION X-X

Opening for access compartment shall be no more than 1/16 inch wider than the access compartment itself.

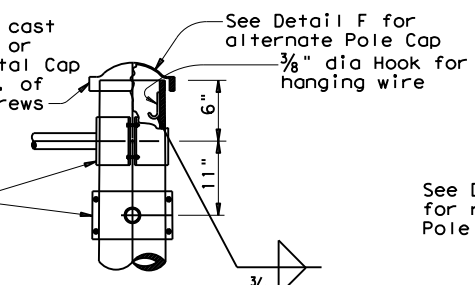


DETAIL J

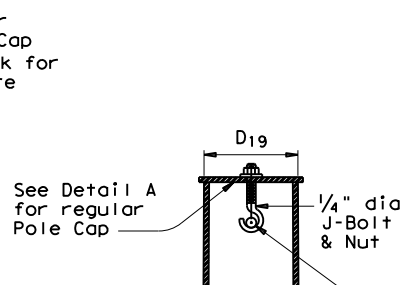


DETAIL B

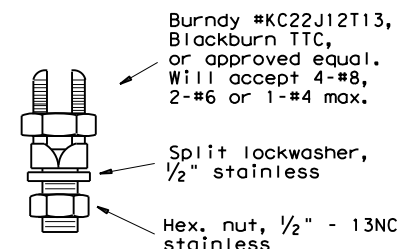
(If ILSN applied)



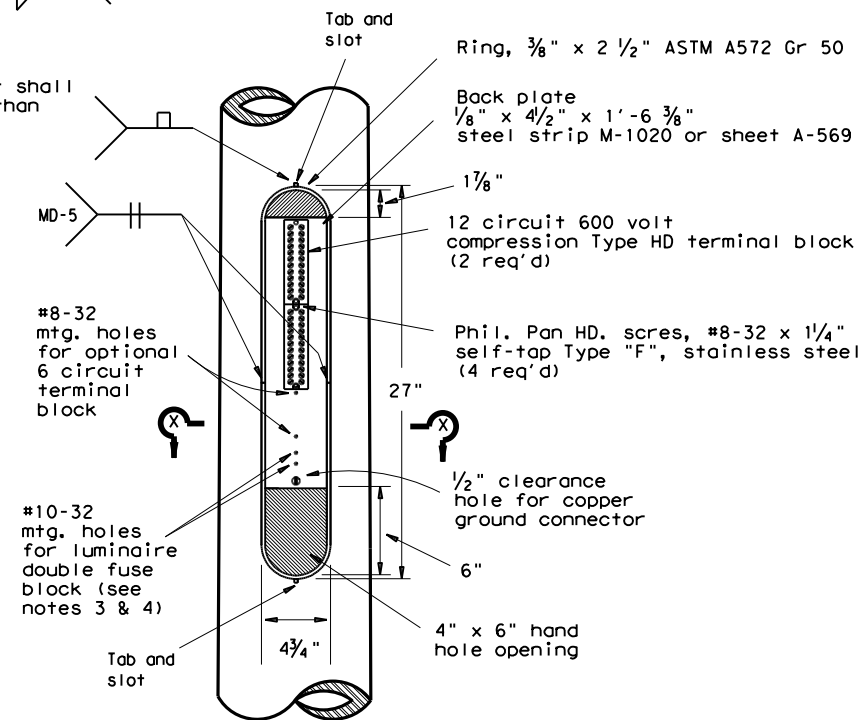
DETAIL C



SECTION Y-Y



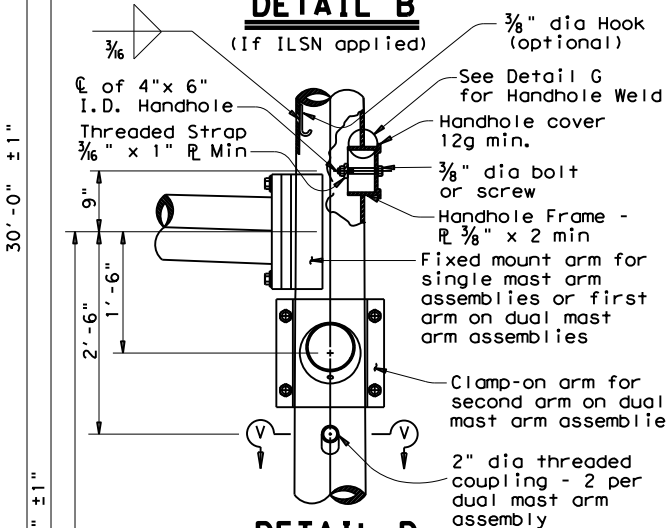
COPPER GROUND CONNECTOR



ACCESS COMPARTMENT

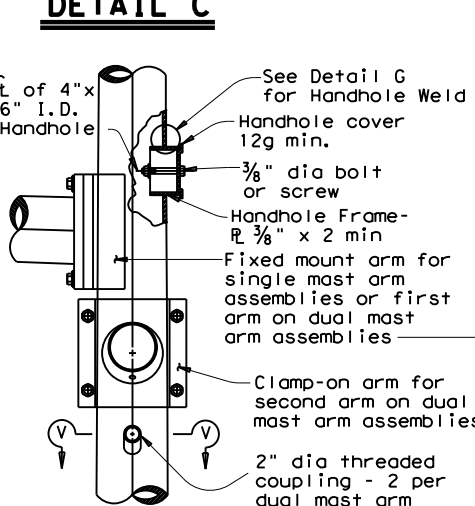
NOTES:

- 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.
- 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 Ilco SSS-5). The traffic signal contractor shall install the kit items in the field.
- 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.
- Install one Bussmann #BM6032B, Littelfuse #L60030M-2C, or Ferraz-Shawmut #30352 fuse block for poles where luminaires are to be installed.



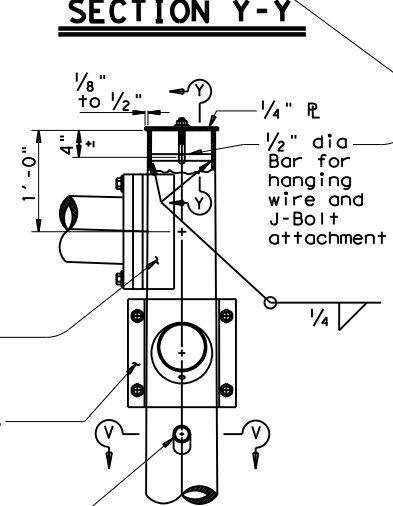
DETAIL D

(for 30 inch pole with luminaire and ILSN sign)



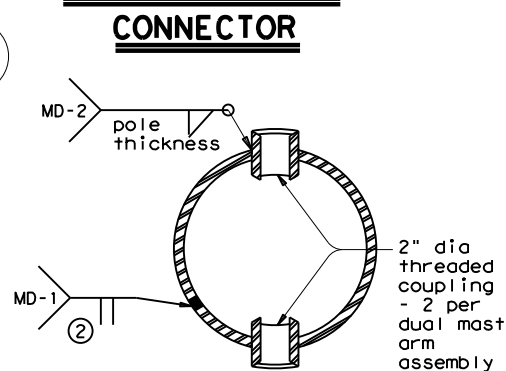
DETAIL E

(for 24 inch pole with ILSN sign and no luminaire)



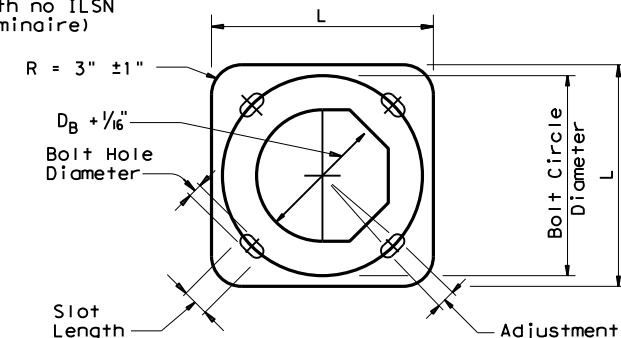
DETAIL F

(for 19 inch pole with no ILSN sign and no luminaire)



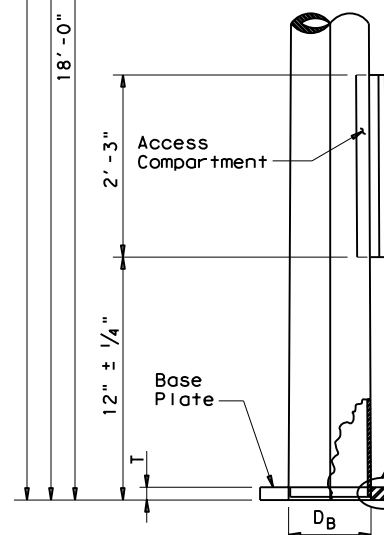
SECTION V-V

Anchor Bolt Diameter	Bolt Hole Diameter	Slot Length	Bolt Circle Diameter	Base R 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°

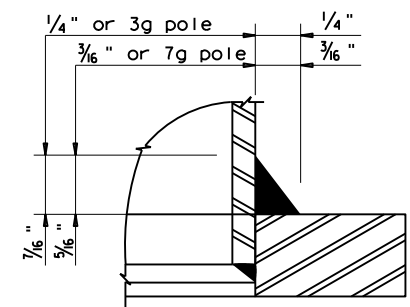


BASE PLATE PLAN

- 85% Min. penetration
- 60% Min. penetration 100% penetration within 6" of circumferential base welds.



POLE ELEVATION



DETAIL H

Texas Department of Transportation
Traffic Operations Division

TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

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DIST		COUNTY		SHEET NO.	
PAR		LAMAR		97	

SUMMARY OF SMALL SIGNS

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STATION	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)				BRIDGE MOUNT CLEARANCE SIGNS (See Note 2) TY = TYPE TY N TY S
							POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION	
							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	PREFABRICATED P = "Plain" T = "T" U = "U"	
66+85	1	R5-1	DO NOT ENTER	36 x 36		X	10BWG	1	SA	P	
70+60	2	R6-1R	ONE WAY -->	36 x 12		X	TOPPER				
70+95	3	R5-1	DO NOT ENTER	36 x 36		X	10BWG	1	SA	P	
92+70	4	R5-1	DO NOT ENTER	36 x 36		X	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:**
- 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.
 - For installation of bridge mount clearance signs, see Bridge Mounted Clearance Sign Assembly (BMCS) Standard Sheet.
 - For Sign Support Descriptive Codes, see Sign Mounting Details Small Roadside Signs General Notes & Details SMD(GEN).



SUMMARY OF SMALL SIGNS

SOSS

FILE: slms16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CR: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
4-16	DIST	COUNTY	SHEET NO.	
8-16	PAR	LAMAR	100	

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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

FRP = Fiberglass Reinforced Plastic Pipe (see SMD(FRP))
 TWT = Thin-Walled Tubing (see SMD(TWT))
 10BWG = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
 S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

Number of Posts (1 or 2)

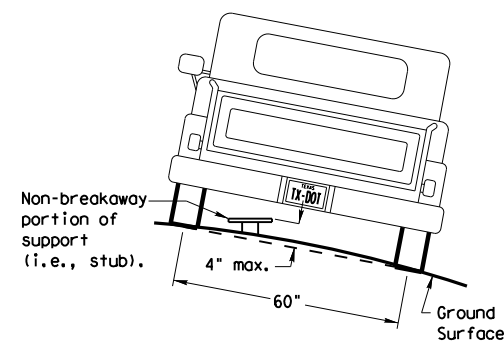
Anchor Type

UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
 UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
 WS = Wedge Anchor Steel - (see SMD(TWT))
 WP = Wedge Anchor Plastic (see SMD(TWT))
 SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
 SB = Slipbase - Bolted Down (see SMD(SLIP-1) to (SLIP-3))

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
 T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
 U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))
 IF REQUIRED
 1EXT or 2EXT = Number of Extensions (see SMD(SLIP-1) to (SLIP-3), (TWT))
 BM = Extruded Wind Beam (see SMD(SLIP-1) to (SLIP-3))
 WC = 1.12 #/ft Wing Channel (see SMD(SLIP-1) to (SLIP-3))
 EXAL = Extruded Aluminum Sign Panels (see SMD(SLIP-3))

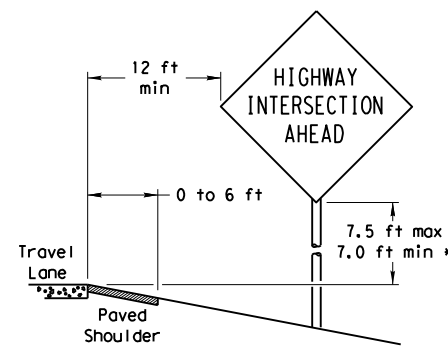
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



To avoid vehicle undercarriage snagging, any substantial remains of a breakaway support, when it is broken away, should not project more than 4 inches above a 60-inch chord (i.e., typical space between wheel paths).

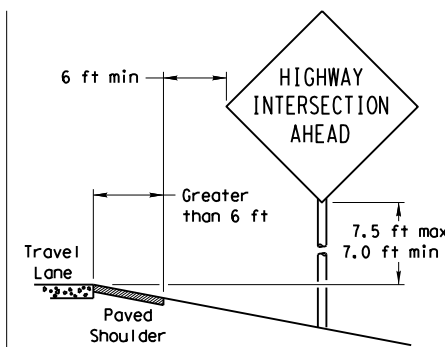
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

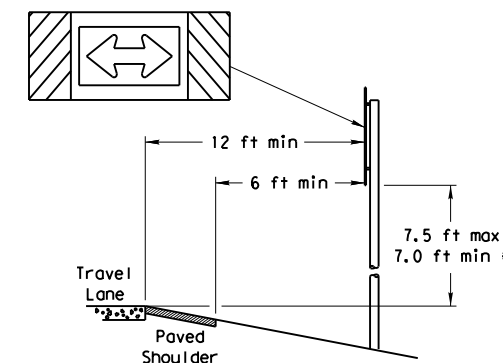
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



GREATER THAN 6 FT. WIDE

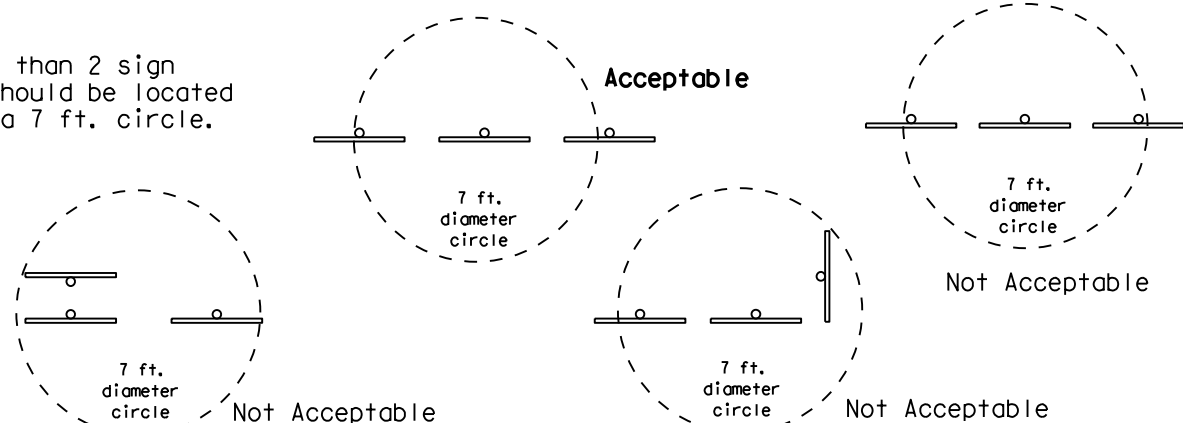
When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

T-INTERSECTION

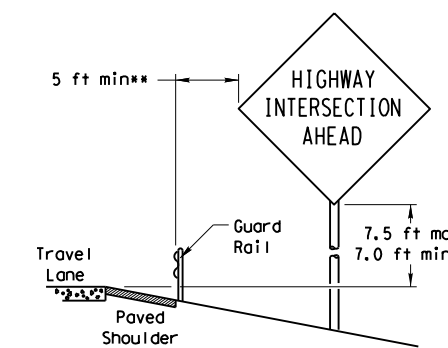


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

No more than 2 sign posts should be located within a 7 ft. circle.

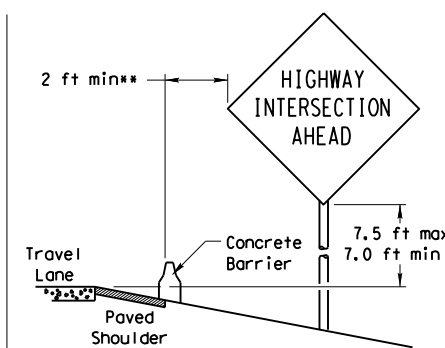


BEHIND BARRIER

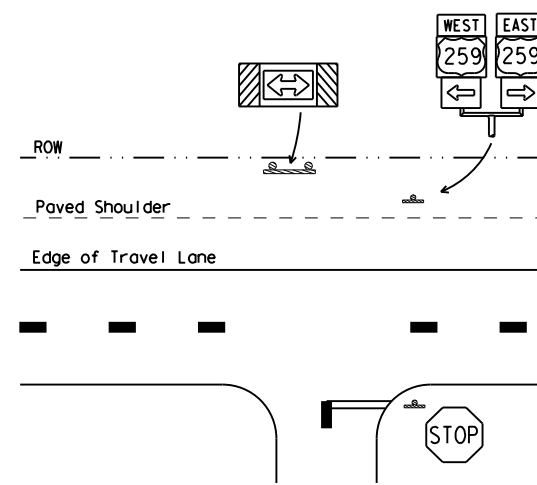


BEHIND GUARDRAIL

**Sign clearance based on distance required for proper guard rail or concrete barrier performance.



BEHIND CONCRETE BARRIER



* Signs shall be mounted using the following condition that results in the greatest sign elevation:

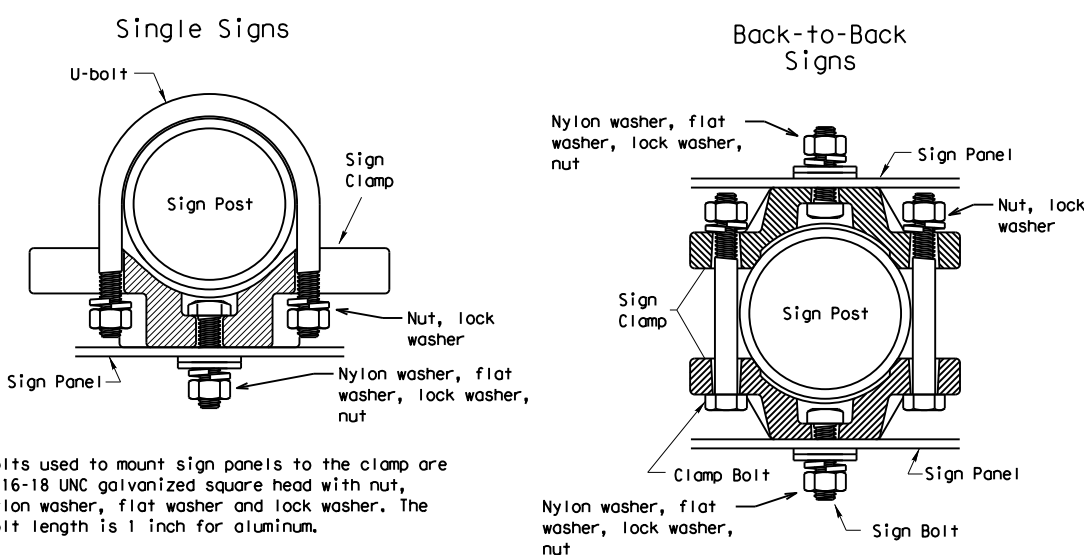
- (1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or
- (2) a minimum of 7 to a maximum of 7.5 feet above the grade at the base of the support when sign is installed on the backslope.

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>

TYPICAL SIGN ATTACHMENT DETAIL



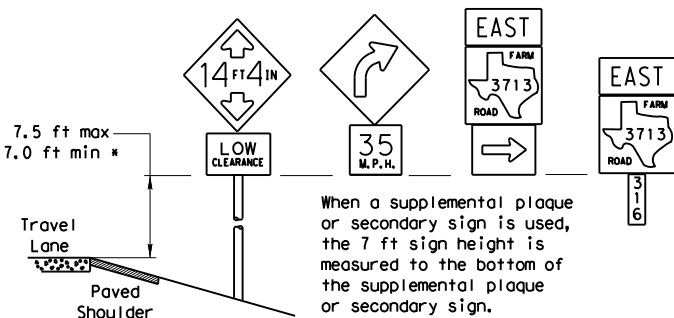
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

When two sign clamps are used to mount signs back-to-back, use a 5/16-18 UNC galvanized hex head per ASTM A307 with nut and helical-spring lock washer. The approximate bolt lengths for various post sizes and sign clamp types are given in the table at right. The bolt length may need to be adjusted depending upon field conditions.

Sign clamps may be either the specific size clamp or the universal clamp.

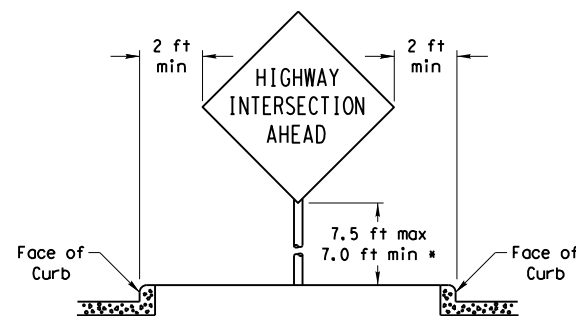
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES

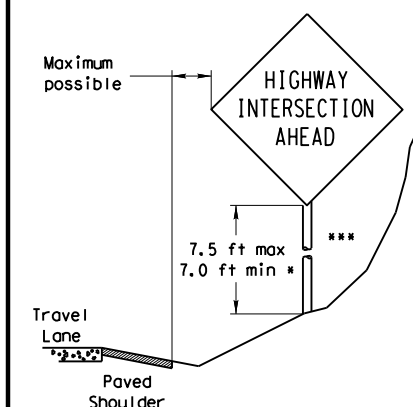


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY (When 6 ft min. is not possible.)



Right-of-way restrictions may be created by rocks, water, vegetation, forest, buildings, a narrow island, or other factors.

In situations where a lateral restriction prevents the minimum horizontal clearance from the edge of the travel lane, signs should be placed as far from the travel lane as practical.

*** Post may be shorter if protected by guardrail or if Engineer determines the post could not be hit due to extreme slope.

Texas Department of Transportation
 Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

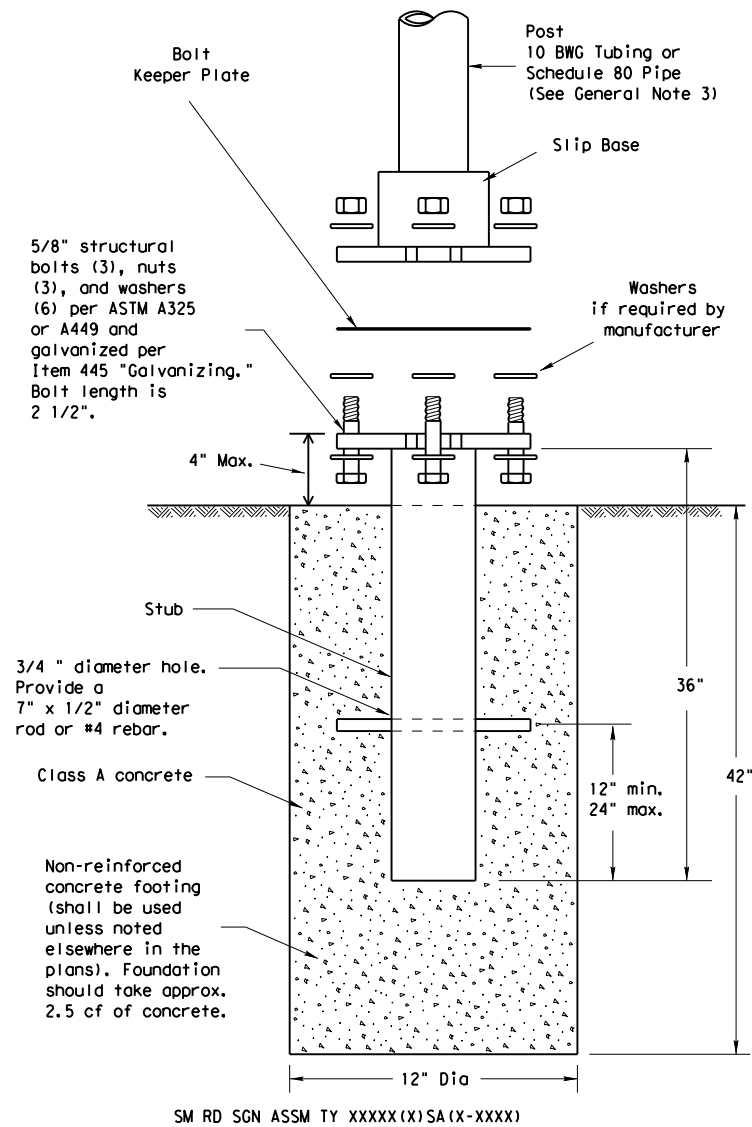
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TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



NOTE

There are various devices approved for the Triangular Slipbase System. Please reference the Material Producer List for approved slip base systems. http://www.txdot.gov/business/producer_list.htm
 The devices shall be installed per manufacturers' recommendations. Installation procedures shall be provided to the Engineer by Contractor.

GENERAL NOTES:

- Slip base shall be permanently marked to indicate manufacturer. Method, design, and location of marking are subject to approval of the TxDOT Traffic Standards Engineer.
- Material used as post with this system shall conform to the following specifications:
 - 10 BWG Tubing (2.875" outside diameter)
 - 0.134" nominal wall thickness
 - Seamless or electric-resistance welded steel tubing or pipe
 - Steel shall be HSLAS Gr 55 per ASTM A1011 or ASTM A1008
 - Other steels may be used if they meet the following:
 - 55,000 PSI minimum yield strength
 - 70,000 PSI minimum tensile strength
 - 20% minimum elongation in 2"
 - Wall thickness (uncoated) shall be within the range of 0.122" to 0.138"
 - Outside diameter (uncoated) shall be within the range of 2.867" to 2.883"
 - Galvanization per ASTM A123 or ASTM A653 G210. For precoated steel tubing (ASTM A653), recoat tube outside diameter weld seam by metallizing with zinc wire per ASTM B833.
 - Schedule 80 Pipe (2.875" outside diameter)
 - 0.276" nominal wall thickness
 - Steel tubing per ASTM A500 Gr C
 - Other seamless or electric-resistance welded steel tubing or pipe with equivalent outside diameter and wall thickness may be used if they meet the following:
 - 46,000 PSI minimum yield strength
 - 62,000 PSI minimum tensile strength
 - 21% minimum elongation in 2"
 - Wall thickness (uncoated) shall be within the range of 0.248" to 0.304"
 - Outside diameter (uncoated) shall be within the range of 2.855" to 2.895"
 - Galvanization per ASTM A123
- See the Traffic Operations Division website for detailed drawings of sign clamps and Texas Universal Triangular Slipbase System components. The website address is: <http://www.txdot.gov/publications/traffic.htm>
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.

ASSEMBLY PROCEDURE

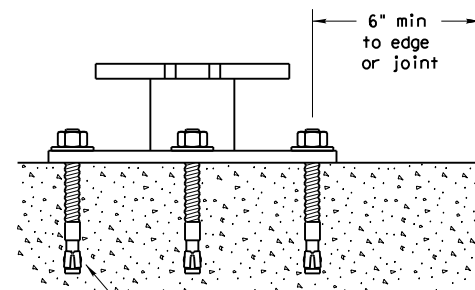
Foundation

- Prepare 12-inch diameter by 42-inch deep hole. If solid rock is encountered, the depth of the foundation may be reduced such that it is embedded a minimum of 18 inches into the solid rock.
- The Engineer may permit batches of concrete less than 2 cubic yards to be mixed with a portable, motor-driven concrete mixer. For small placements less than 0.5 cubic yards, hand mixing in a suitable container may be allowed by Engineer. Concrete shall be Class A.
- Push the pipe end of the slip base stub into the center of the concrete. Rotate the stub back and forth while pushing it down into the concrete to assure good contact between the concrete and stub. Continue to work the stub into the concrete until it is between 2 to 4 inches above the ground.
- Plumb the stub. Allow a minimum of 4 days to set, unless otherwise directed by the Engineer.
- The triangular slipbase system is multidirectional and is designed to release when struck from any direction.

Support

- Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
- Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



5/8" diameter Concrete Anchor -
 8 places (embed a minimum of
 5 1/2" and torque to min. of
 50 ft-lbs). Anchor may be
 expansion or adhesive type.

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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxyes and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.



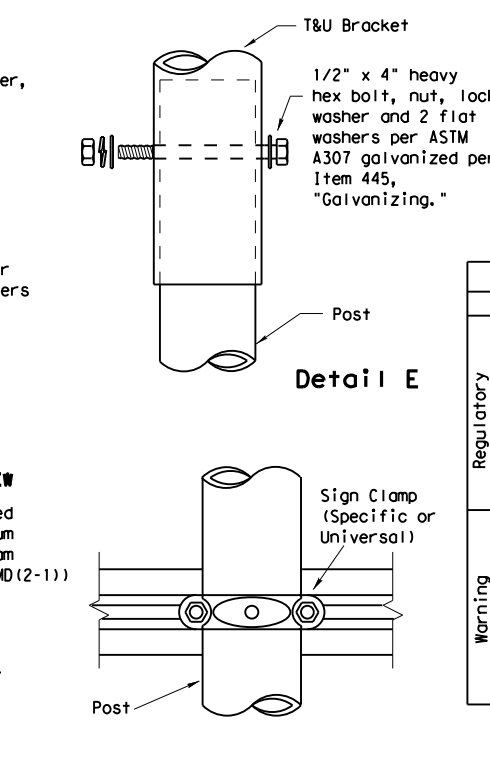
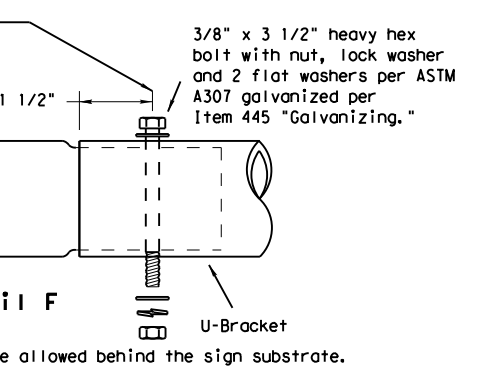
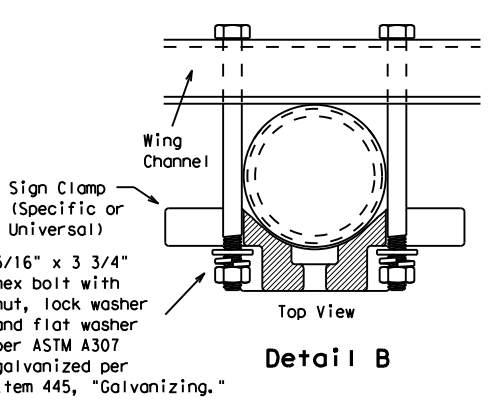
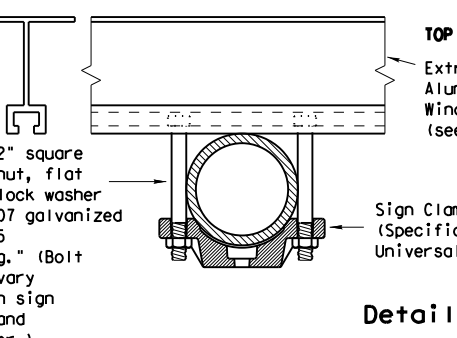
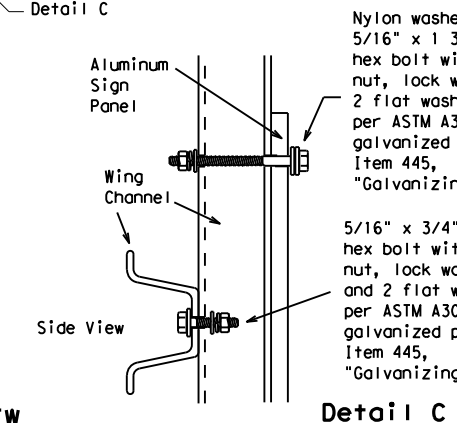
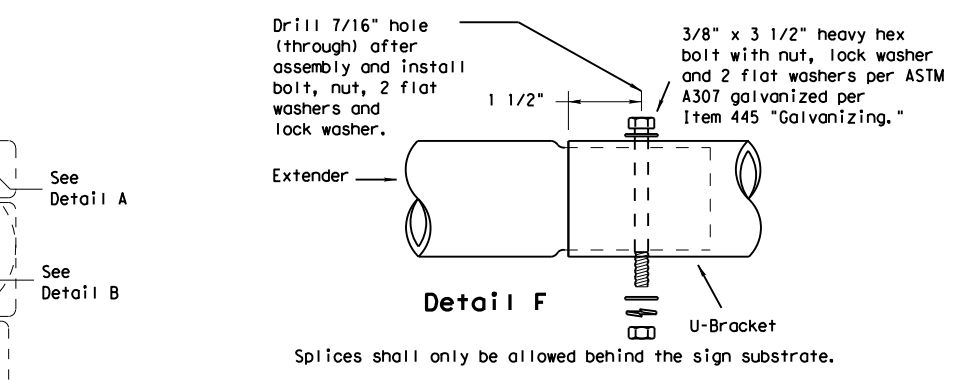
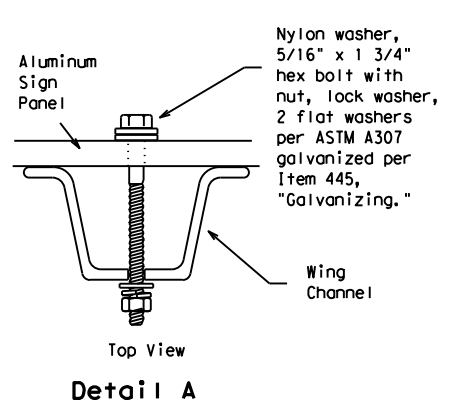
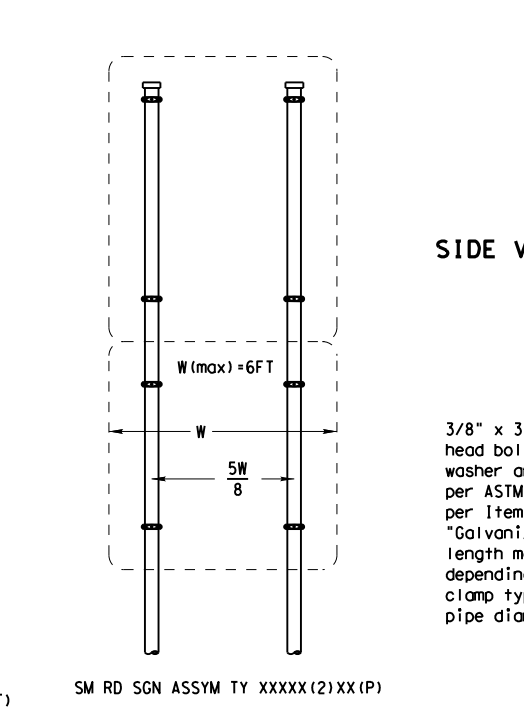
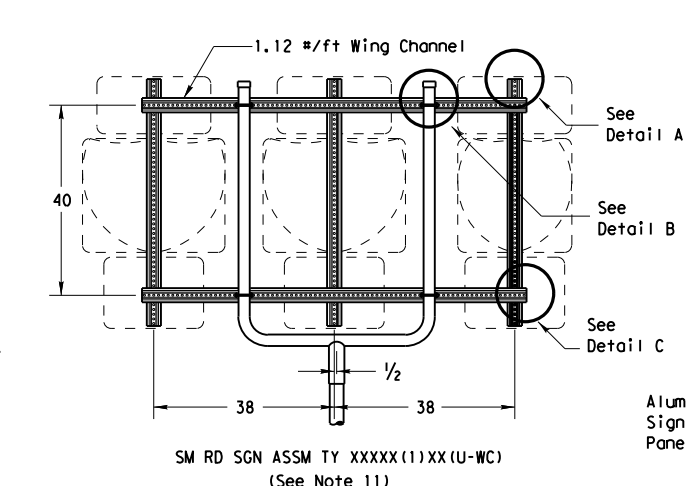
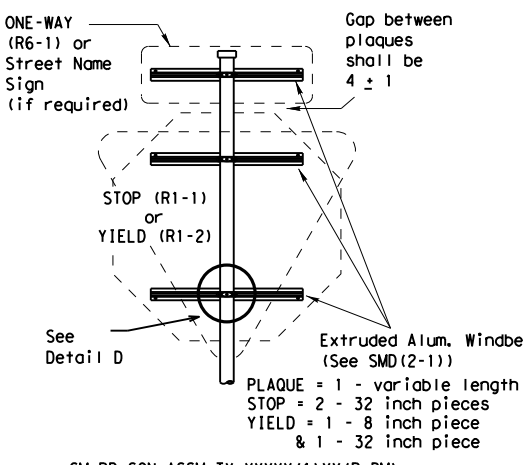
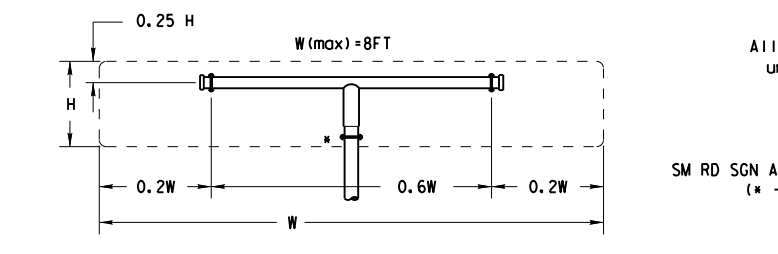
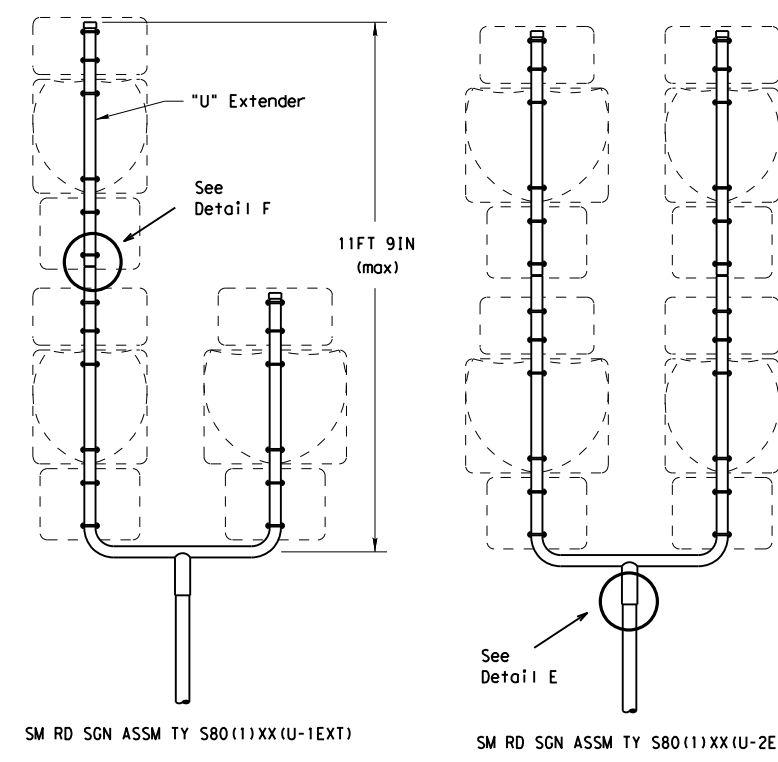
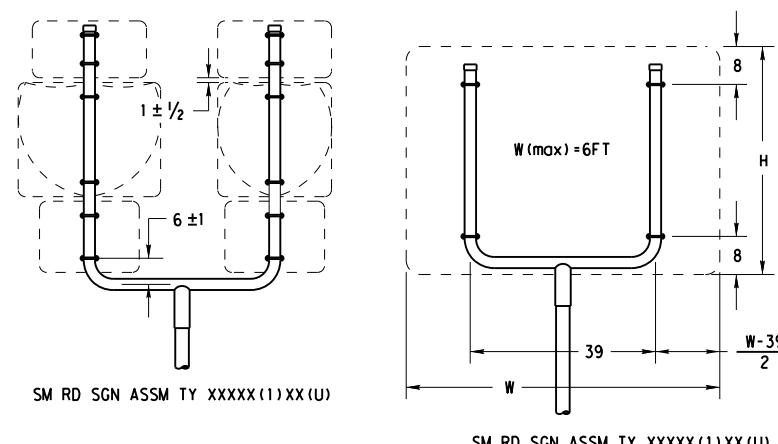
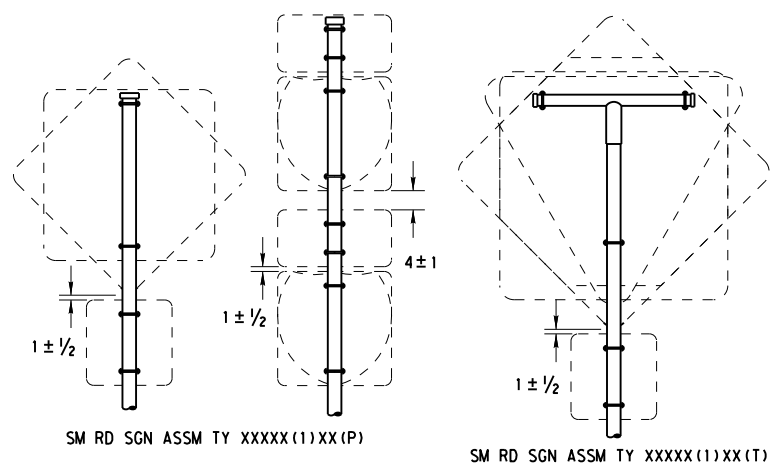
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

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			DIST	COUNTY		SHEET NO.
		PAR	LAMAR		102	

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All dimensions are in english unless detailed otherwise.

SM RD SGN ASSM TY XXXX(1)XX(T) (* - See Note 12)

GENERAL NOTES:

1. SIGN SUPPORT # OF POSTS MAX. SIGN AREA

10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.

REQUIRED SUPPORT		
SIGN DESCRIPTION	SUPPORT	
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
Warning	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)	
Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)	

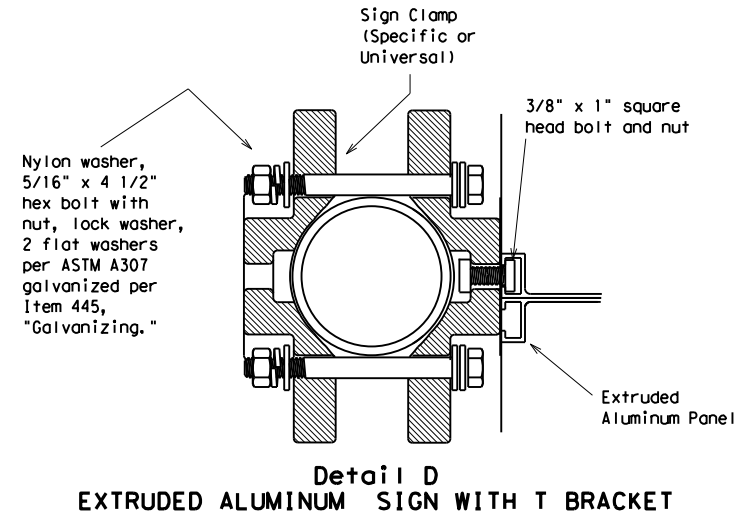
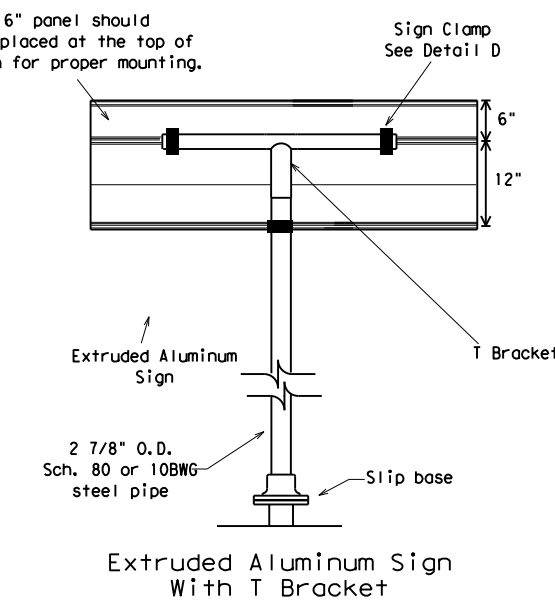
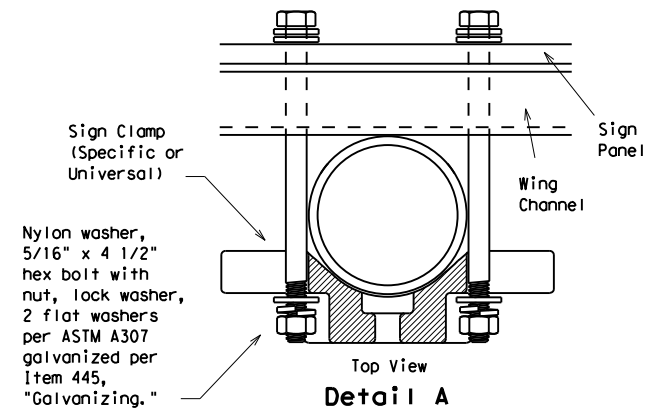
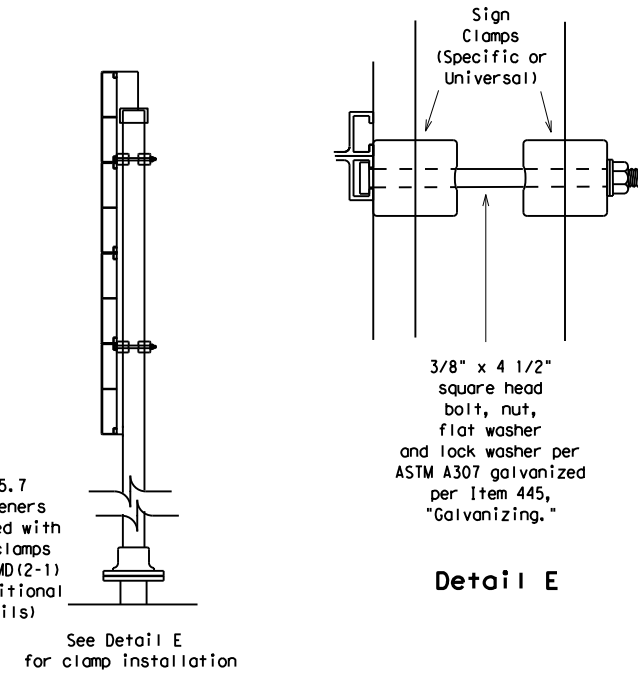
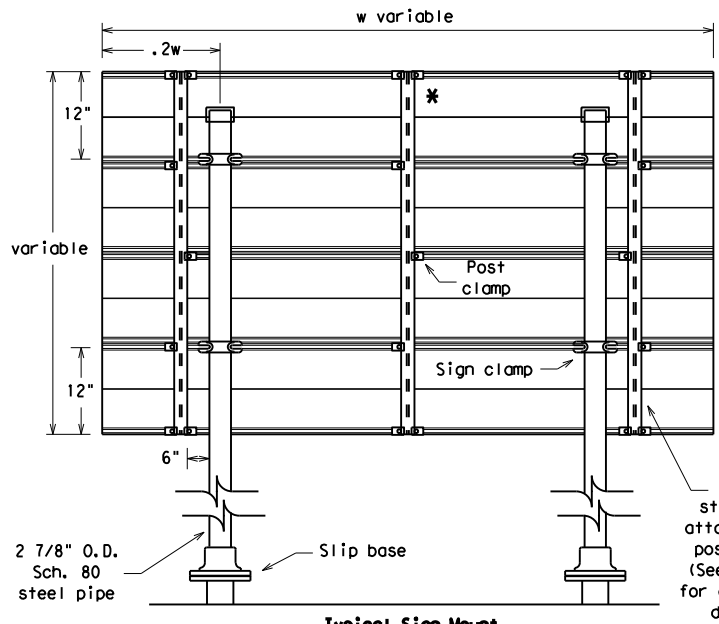
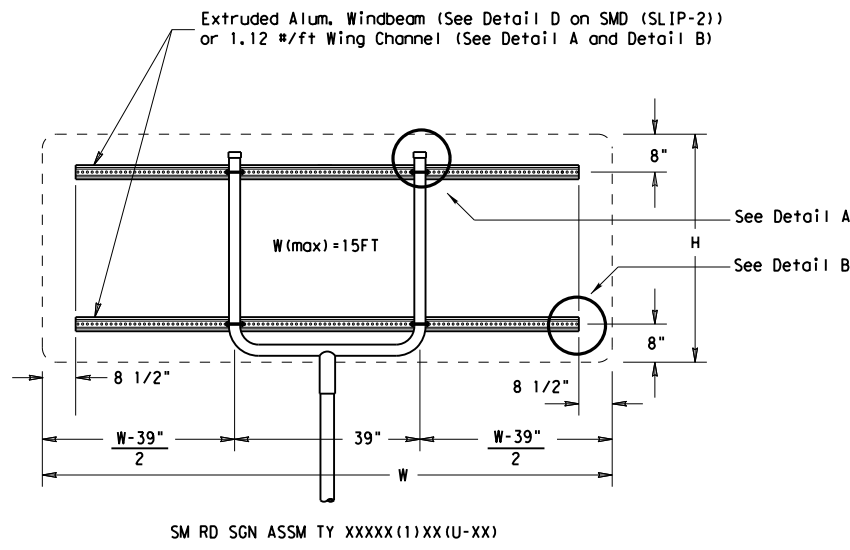
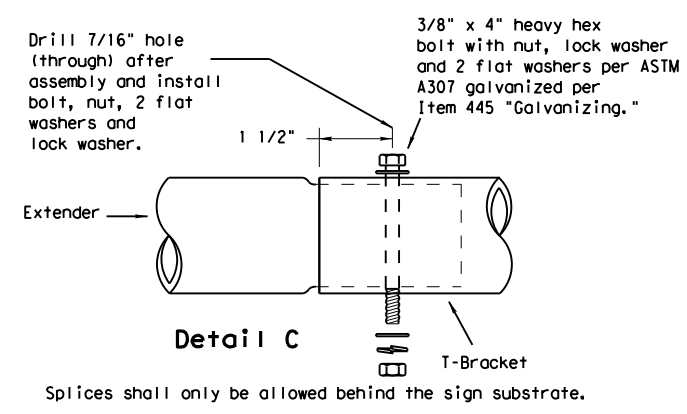
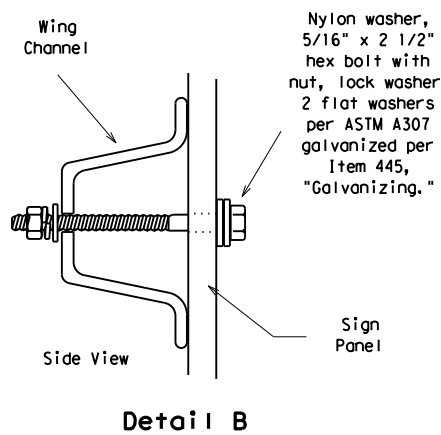
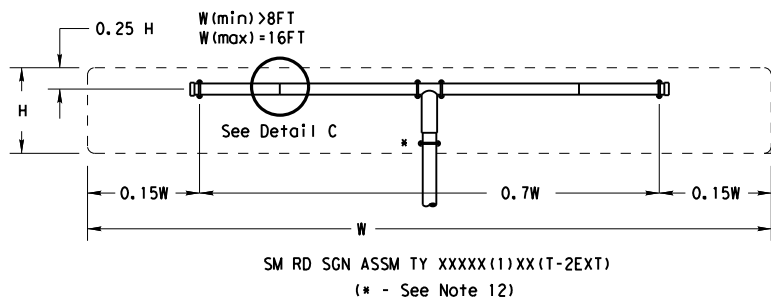


SIGN MOUNTING DETAILS
 SMALL ROADSIDE SIGNS
 TRIANGULAR SLIPBASE SYSTEM
 SMD(SLIP-2)-08

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9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0045	09	110, ETC	US 82, ETC
		DIST	COUNTY		SHEET NO.
		PAR	LAMAR		103

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GENERAL NOTES:

- | SIGN SUPPORT | # OF POSTS | MAX. SIGN AREA |
|--------------|------------|----------------|
| 10 BWG | 1 | 16 SF |
| 10 BWG | 2 | 32 SF |
| Sch 80 | 1 | 32 SF |
| Sch 80 | 2 | 64 SF |
- The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
- Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
- Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
- Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
- For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
- When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
- Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
- Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
- Sign blanks shall be the sizes and shapes shown on the plans.
- Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
- Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
Warning	48x60-inch signs	TY S80(1)XX(T)
	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



**SIGN MOUNTING DETAILS
 SMALL ROADSIDE SIGNS
 TRIANGULAR SLIPBASE SYSTEM
 SMD(SLIP-3)-08**

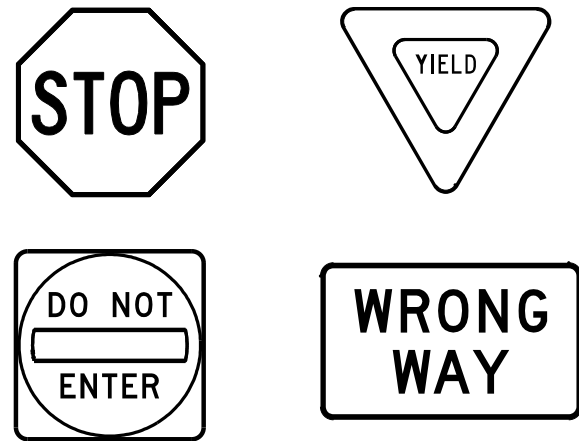
© TxDOT July 2002		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		0045	09	110, ETC	US 82, ETC
		DIST	COUNTY		SHEET NO.
		PAR	LAMAR		104

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REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

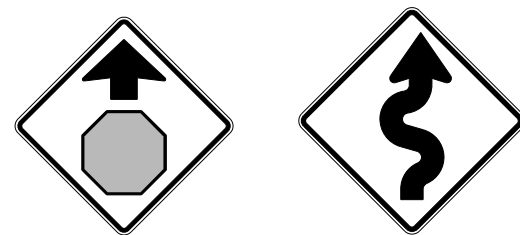
(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND, BORDERS AND SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B _{FL} OR C _{FL} SHEETING
LEGEND, BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

GENERAL NOTES

- Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
- Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
- Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
- Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
- White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
- Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
- Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
- Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

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

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website:
<http://www.txdot.gov/>

		<i>Traffic Operations Division Standard</i>	
<h2>TYPICAL SIGN REQUIREMENTS</h2>			
<h3>TSR(4) - 13</h3>			
FILE:	tsr4-13.dgn	DN:	TxDOT
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REVISIONS		DW:	TxDOT
12-03	7-13	CONT	SECT
9-08		0045	09
		JOB	HIGHWAY
		110, ETC	US 82, ETC
		DIST	COUNTY
		PAR	LAMAR
		SHEET NO.	105

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REFLECTOR UNIT SIZES FOR DELINEATORS AND OBJECT MARKERS				DELINEATORS				D & OM DESCRIPTIVE CODES	
DEVICE	SIZE 1	SIZE 2	SIZE 3	SIZE 4	DEVICE	SINGLE	DOUBLE	INSTL DEL ASSM (D-XX)SZ X (XXXX)XXX(XX)	
								NUMBER OF REFLECTORS S = Single D = Double COLOR OF REFLECTORS W = White Y = Yellow R = Red REFLECTOR UNIT SIZE 1 or 2 TYPE OF POST OR DELINEATOR WC = Wing Channel Post YFLX = Yellow Flexible Post WFLX = White Flexible Post BRF = Barrier Reflector TYPE OF MOUNT GND = Embedded (drivable or set in concrete) CTB = Concrete Barrier Mount GF1 or GF2 = Guard Fence Attachment SRF = Surface Mount	
SHEETING	Yellow, White or Red Type B or C reflective sheeting				SHEETING	Yellow, White or Red Type B or C Reflective Sheeting			
NOTE	1. Size 1 and 4 - Direct applied reflective sheeting for use on flexible post (fix). 2. Size 2 and 3 - For use on wing channel (wc) post only. Use approved metal, plastic or fiberglass backplate with 17/64" mounting holes.				POST TYPE	WC	YFLX, WFLX	WC	YFLX, WFLX
					MOUNT TYPE	GND	GND, SRF	GND	GND, SRF

OBJECT MARKERS								D & OM DESCRIPTIVE CODES		
DEVICE	Type 1 (OM-1)	Type 2 (OM-2)			Type 3 (OM-3)			Type 4 (OM-4)	INSTL OM ASSM (OM-XX) (XXXX)XXX(XX)	
		OM-1	OM-2X	OM-2Y	OM-2Z	OM-3L	OM-3R	OM-3C	OM-4	TYPE OF OBJECT MARKER 1, 2, 3, or 4 NUMBER OF REFLECTORS OR DIRECTION X = 3-Size 2 reflector units (Type 2 only) Y = 1-Size 3 reflector unit (Type 2 only) Z = 3-Size 1 or 1-Size 4 reflector unit(s) (Type 2 only) L = Left Side (Type 3 Object Marker only) R = Right Side (Type 3 Object Marker only) C = Center (Type 3 Object Marker only) TYPE OF POST WC = Wing Channel Post WFLX = White Flexible Post TWT = Thin Walled Tubing TYPE OF MOUNT GND = Embedded (drivable) SRF = Surface Mount WAS = Wedge Anchor Steel WAP = Wedge Anchor Plastic DIRECTION If Required BI = Bi-Directional
SHEETING	Yellow-Type B _{FL} or C _{FL} Sheeting	Yellow - Type B or C Sheeting			Alternating acrylic black and retroreflective yellow - Type B _{FL} or C _{FL} Sheeting			Red -Type B _{FL} or C _{FL} Sheeting	DEPARTMENTAL MATERIAL SPECIFICATIONS FLEXIBLE DELINEATOR & OBJECT MARKER POSTS (EMBEDDED & SURFACE MOUNT TYPES) DMS-4400 SIGN FACE MATERIALS DMS-8300 DELINEATORS, OBJECT MARKERS AND BARRIER REFLECTORS DMS-8600	
POST TYPE	TWT	WC	WC	WFLX	TWT			TWT		
MOUNT TYPE	WAS, WAP	GND	GND	GND, SRF	WAS, WAP			WAS, WAP		

BARRIER REFLECTORS (BRF)			CHEVRONS				ONE DIRECTION LARGE ARROW		NOTE: Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.		
DEVICE	GF1	GF2	CTB	W1-8				W1-6			
SHEETING	Yellow, White, Red			SIZE (W x L)	18"x 24" (Conventional)	24"x 30" (Conventional Oversize)	30"x 36" (Expressway)	36" x 48" (Freeway)	SIZE (W x L)	48" x 24" (Conventional)	60" x 30" (Expressway & Freeway)
NOTE	1. Barrier reflectors shall meet the requirements of DMS 8600. 2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov.			MOUNTING HEIGHT	4'-0" or 7'-0"		7'-0" Only	MOUNTING HEIGHT	7'-0"		
				NOTE	1. CHEVRON (W1-8) signs and ONE DIRECTION LARGE ARROW (W1-6) Signs shall be installed per Sign Mounting Details (SMD) Standard Sheets and paid under Item 644 (Small Roadside Sign Assemblies). 2. When there is a need to increase conspicuity, the Texas version of the ONE DIRECTION LARGE ARROW sign (W1-9T) may be used instead of the ONE DIRECTION LARGE ARROW (W1-6).						

Texas Department of Transportation
 Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER MATERIAL DESCRIPTION

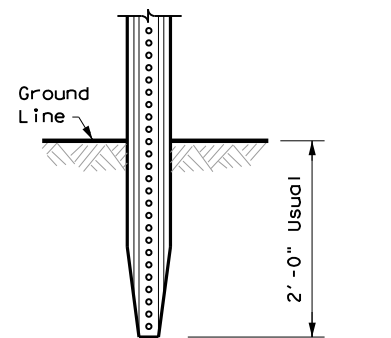
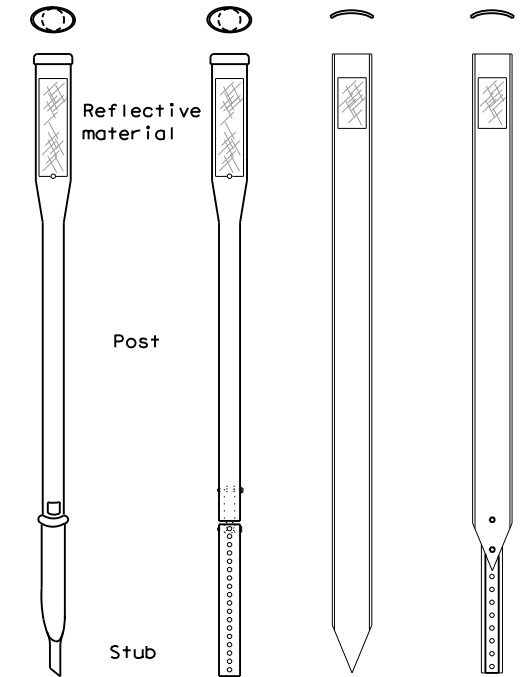
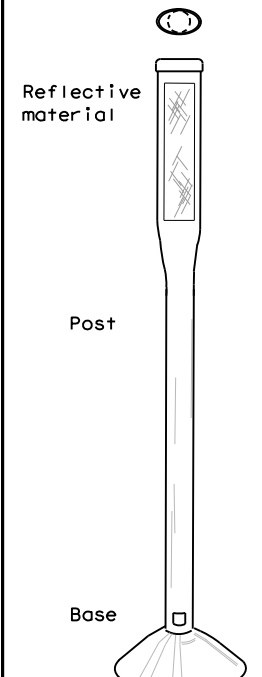
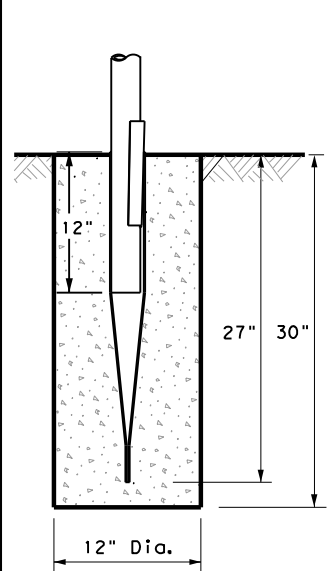
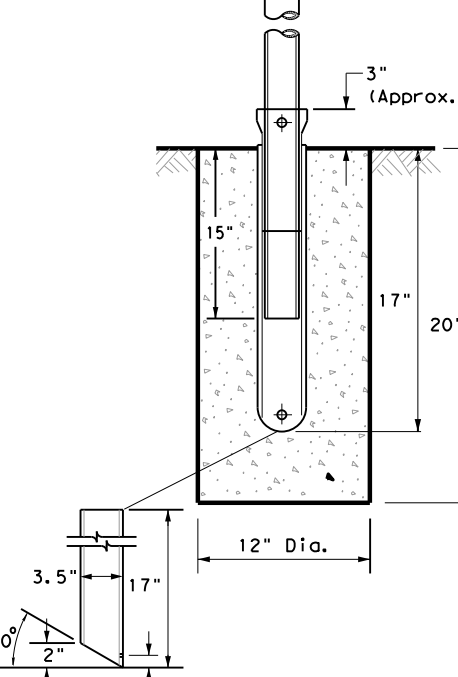
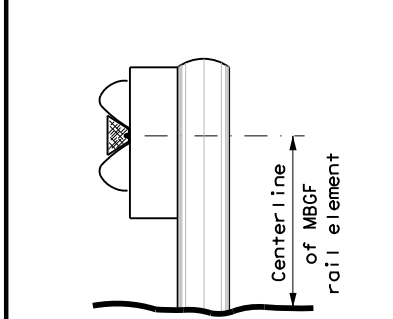
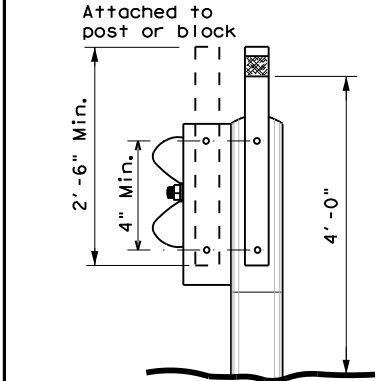
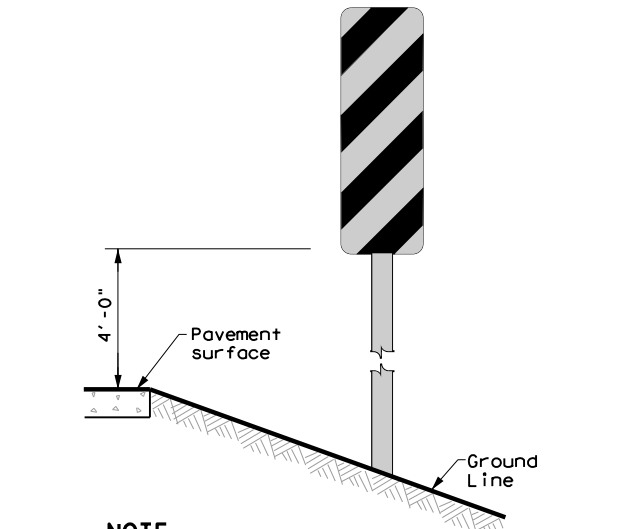
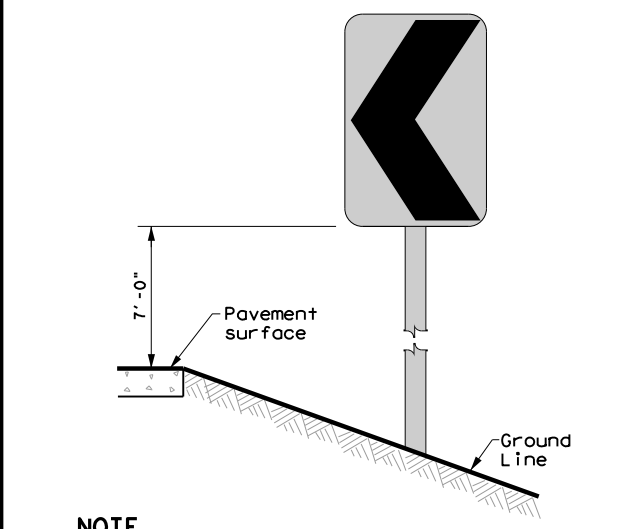
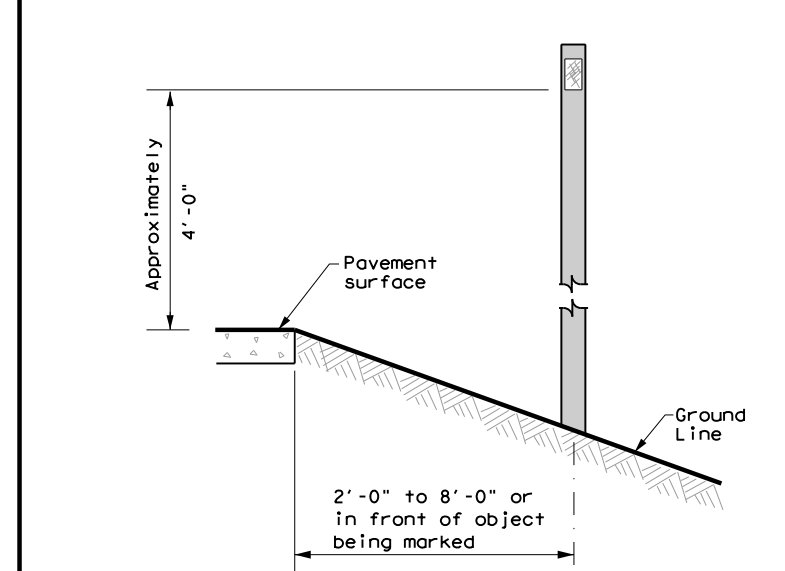
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REVISIONS	0045	09	110, ETC	US 82, ETC
10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	PAR	LAMAR	106	

20A

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POST TYPE AND SUPPORT FOUNDATION DETAILS				TYPE OF BARRIER MOUNTS		
WING CHANNEL (WC)	FLEXIBLE POSTS (YFLX, WFLX)		WEDGE ANCHOR SYSTEMS		GUARD FENCE ATTACHMENT	
GND	GND	SRF	WAS	WAP	GF 1	
 <p style="text-align: center;">2'-0" Usual</p>	 <p style="text-align: center;">Reflective material</p> <p style="text-align: center;">Post</p> <p style="text-align: center;">Stub</p>	 <p style="text-align: center;">Reflective material</p> <p style="text-align: center;">Post</p> <p style="text-align: center;">Base</p>	 <p style="text-align: center;">12" Dia.</p> <p style="text-align: center;">12" 27" 30"</p>	 <p style="text-align: center;">3" (Approx.)</p> <p style="text-align: center;">15" 17" 20"</p> <p style="text-align: center;">12" Dia.</p> <p style="text-align: center;">3.5" 17" 30° 2" 1"</p>	 <p style="text-align: center;">Centerline of MBCF rail element</p>	 <p style="text-align: center;">Attached to post or block</p> <p style="text-align: center;">2'-6" Min. 4" Min. 4'-0"</p>
	EMBEDDED	SURFACE MOUNT	STEEL	PLASTIC	CONCRETE TRAFFIC BARRIER (CTB)	
<p>NOTES</p> <ol style="list-style-type: none"> 1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only. 2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499. 			<p>NOTE</p> <ol style="list-style-type: none"> 1. Install per manufacturer's recommendations. 		<p>GENERAL NOTES</p> <ol style="list-style-type: none"> 1. Place delineators on a section of roadway at a consistent distance from the edge of pavement. 2. Where a restriction prevents consistent placement from the pavement edge, place the affected object markers in line with the innermost edge of the obstruction. 3. When Type 2 object markers and delineators are more than 8'-0" from the edge of the pavement, it may not be possible to maintain a height of approximately 4'-0". If this is the case, place the object marker or delineator as close to the desired height as possible. 4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation. 5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface. 6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane. 	
<p>NOTES</p> <ol style="list-style-type: none"> 1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices. 2. Install per manufacturer's recommendations. 3. Post length may vary to meet field conditions. 4. When using yellow delineators with flexible posts to separate opposing direction of travel, such as centerline or median use, the flexible posts shall be yellow. 						
TYPES 1,3, AND 4 OBJECT MARKERS AND CHEVRONS		CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN		DELINEATORS AND TYPE 2 OBJECT MARKERS		
 <p style="text-align: center;">4'-0" Pavement surface Ground Line</p>		 <p style="text-align: center;">7'-0" Pavement surface Ground Line</p>		 <p style="text-align: center;">Approximately 4'-0" Pavement surface Ground Line</p> <p style="text-align: center;">2'-0" to 8'-0" or in front of object being marked</p>		
<p>NOTE</p> <p>Mounting at 4 feet to the bottom of the chevron is permitted for chevrons that will not exceed a height of 6'-6" to the top of the chevron (sizes 24" x 30" and smaller)</p>		<p>NOTE</p> <p>Chevrons 30" x 36" and larger shall be mounted at a height of 7' to the bottom of the chevron. Chevron sign and ONE DIRECTION LARGE ARROW sign (W1-9T) shall be installed per SMD standard sheets and paid under item 644.</p>		<p>See general notes 1, 2 and 3.</p>		



Texas Department of Transportation

Traffic Safety Division Standard

DELINEATOR & OBJECT MARKER INSTALLATION

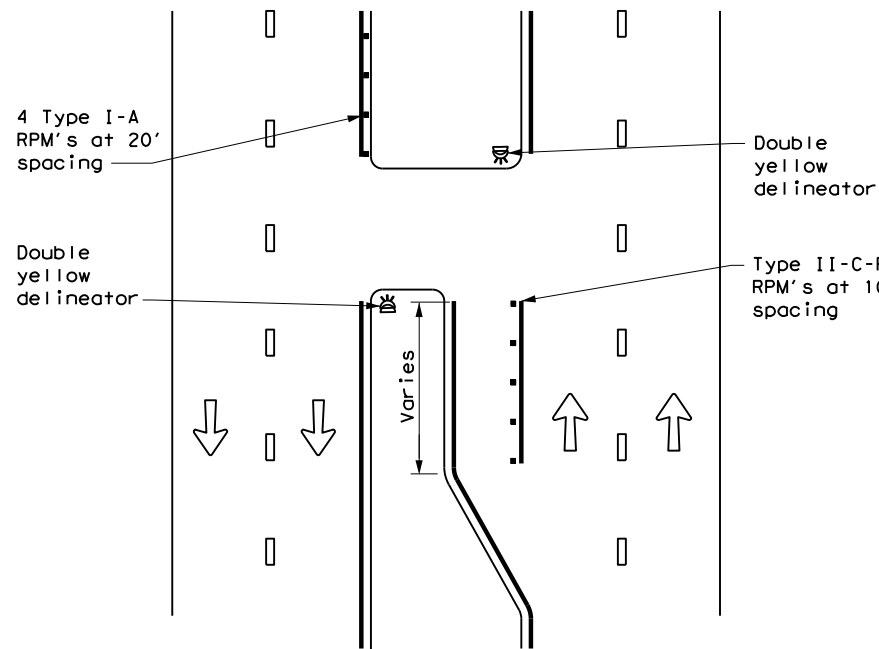
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© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
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10-09 3-15	DIST	COUNTY	SHEET NO.	
4-10 7-20	PAR	LAMAR	107	

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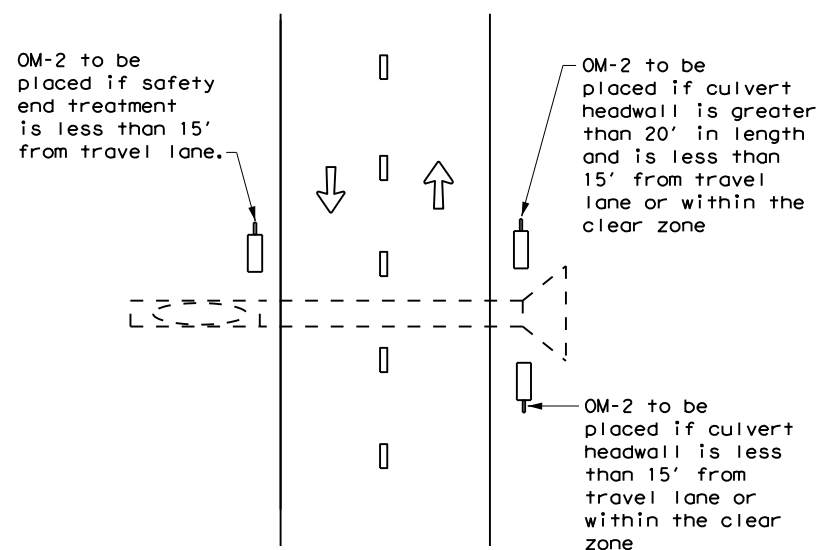
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CROSSOVERS



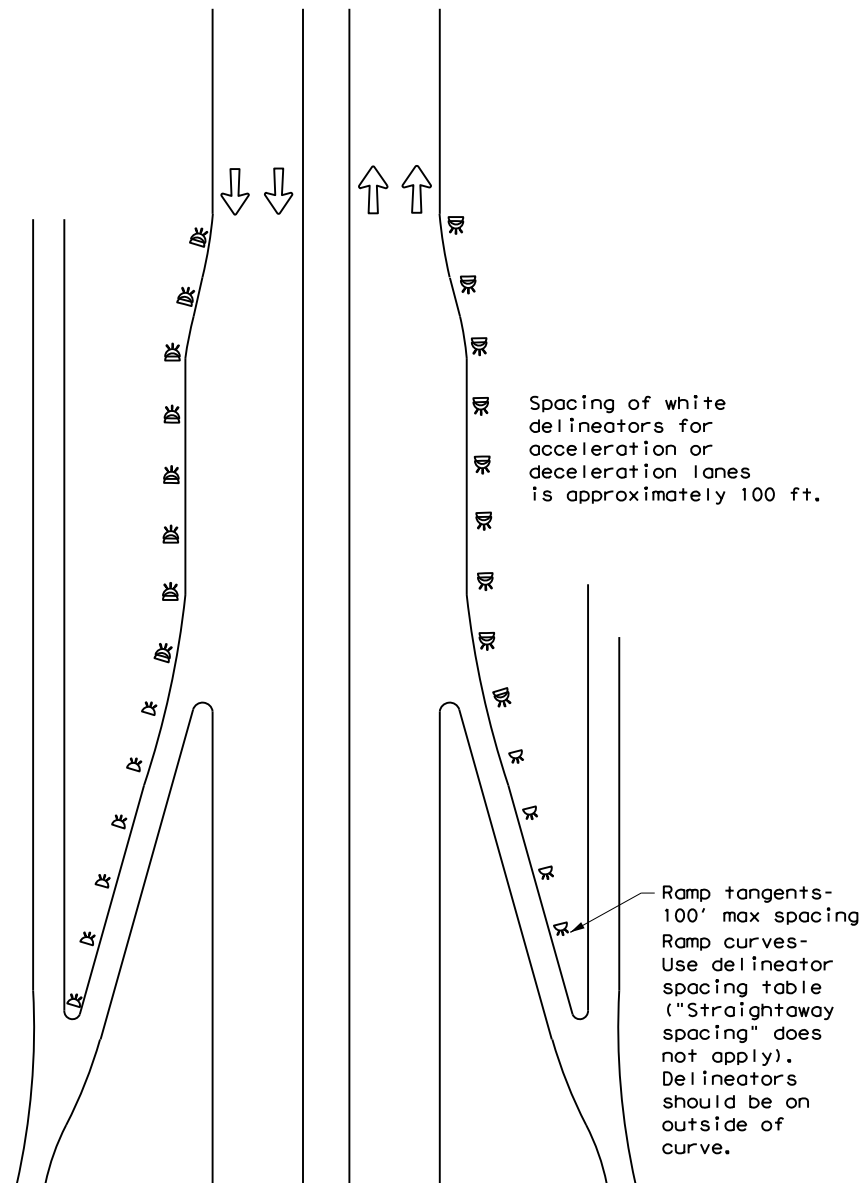
DETAIL 1

FOR CULVERTS WITHOUT MBGF



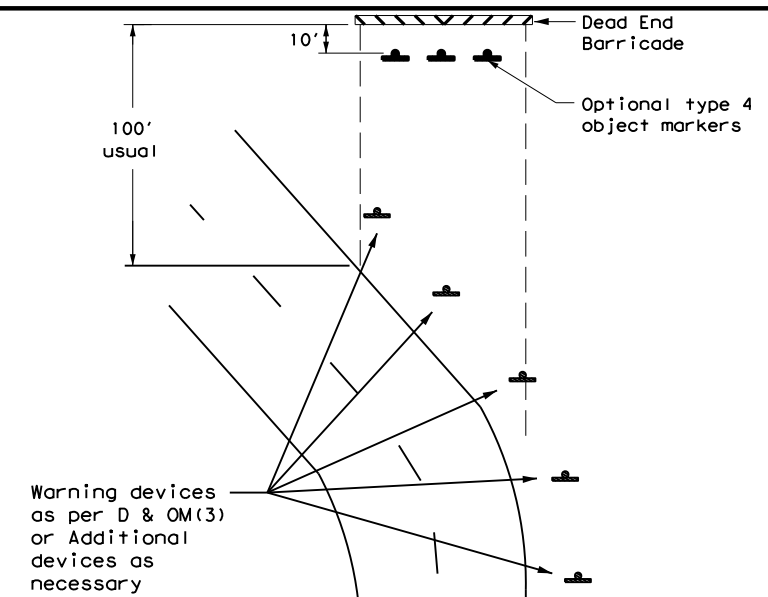
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



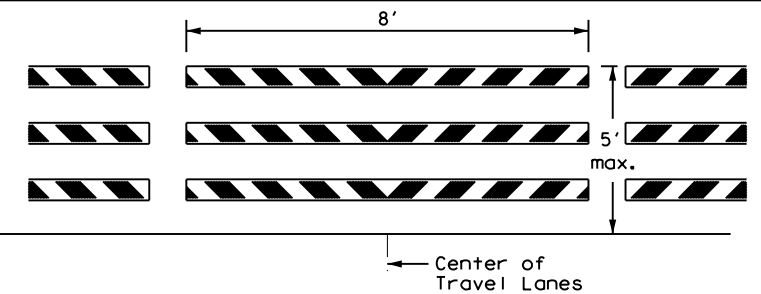
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

- Barricade striping shall be red and white reflective sheeting for all permanent road closures.
- Barricade striping is red and white sloping toward the center of the roadway.
- Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator



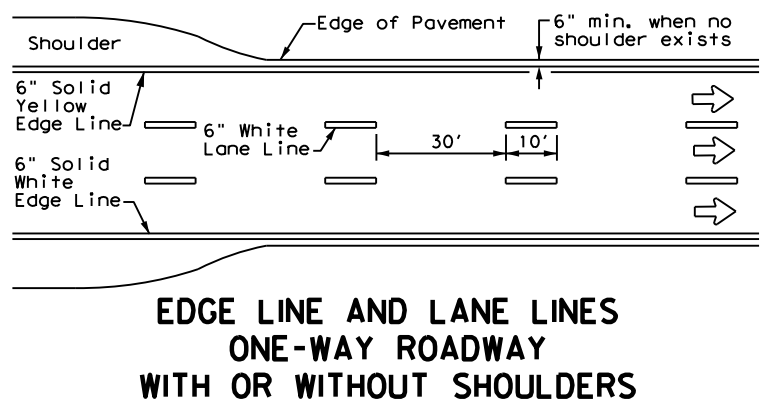
DELINEATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4) -20

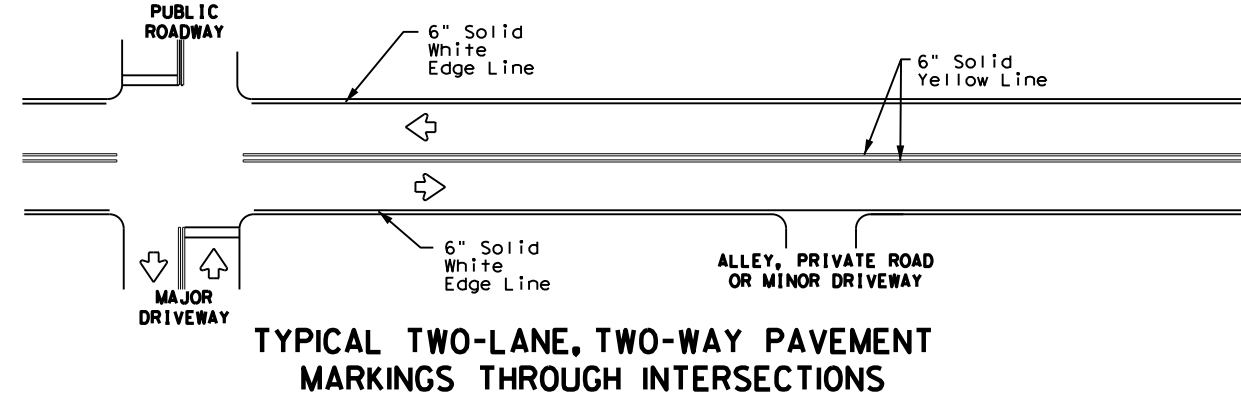
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© TXDOT August 2004	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
3-15	DIST	COUNTY	SHEET NO.	
7-20	PAR	LAMAR	108	

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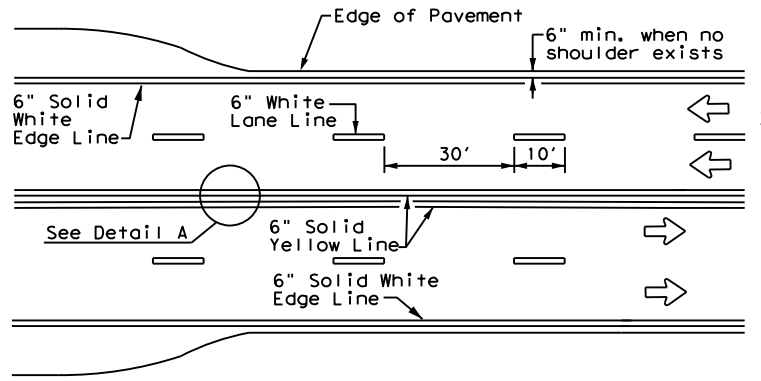
DATE: 9/5/2023 12:07:59 AM
 FILE: T:\PARTPDD\US 82 Rai\std Medain\Design\CAD Standards\6 PAVEMENT MARKINGS.dwg



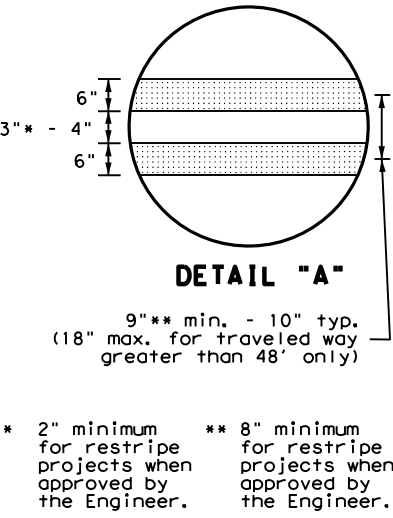
**EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



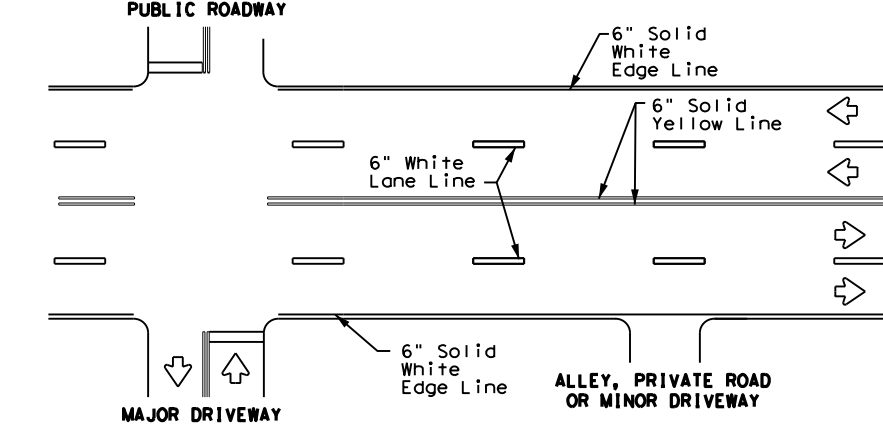
**TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS**



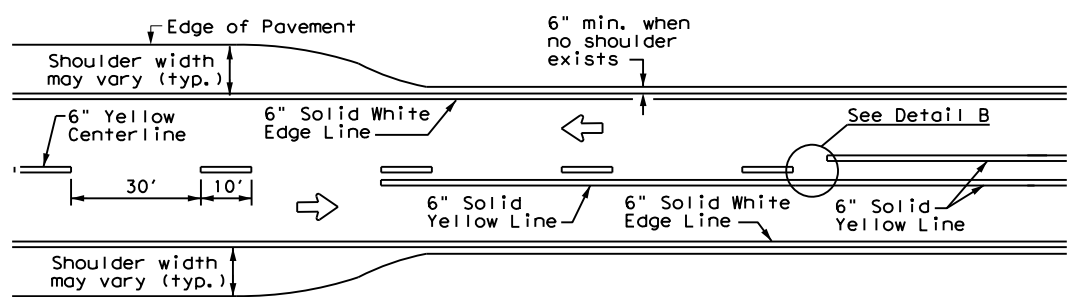
**CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



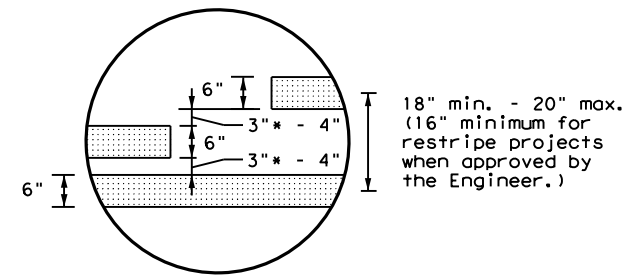
* 2" minimum for restripe projects when approved by the Engineer.
 ** 8" minimum for restripe projects when approved by the Engineer.



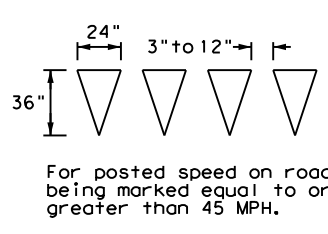
**TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS**



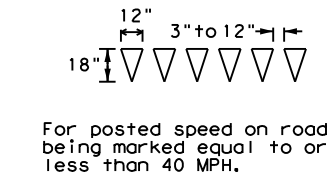
**TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS**



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



YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.

NOTES

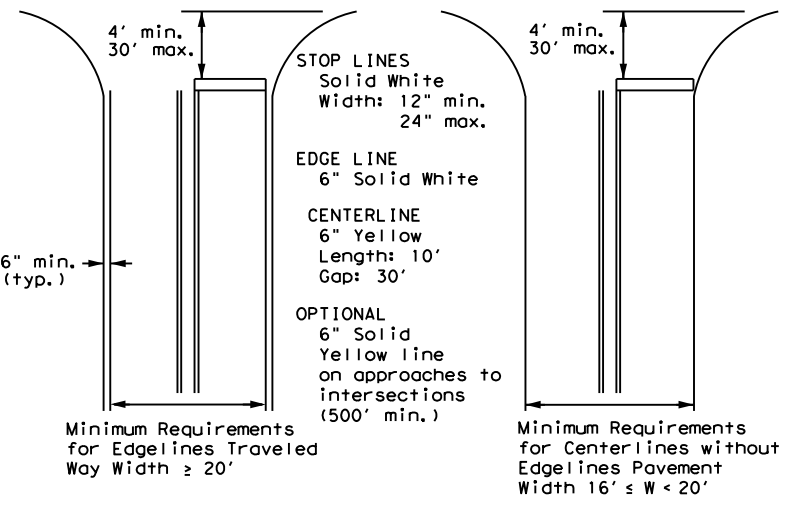
- Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
- Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
- 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

- Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
- The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

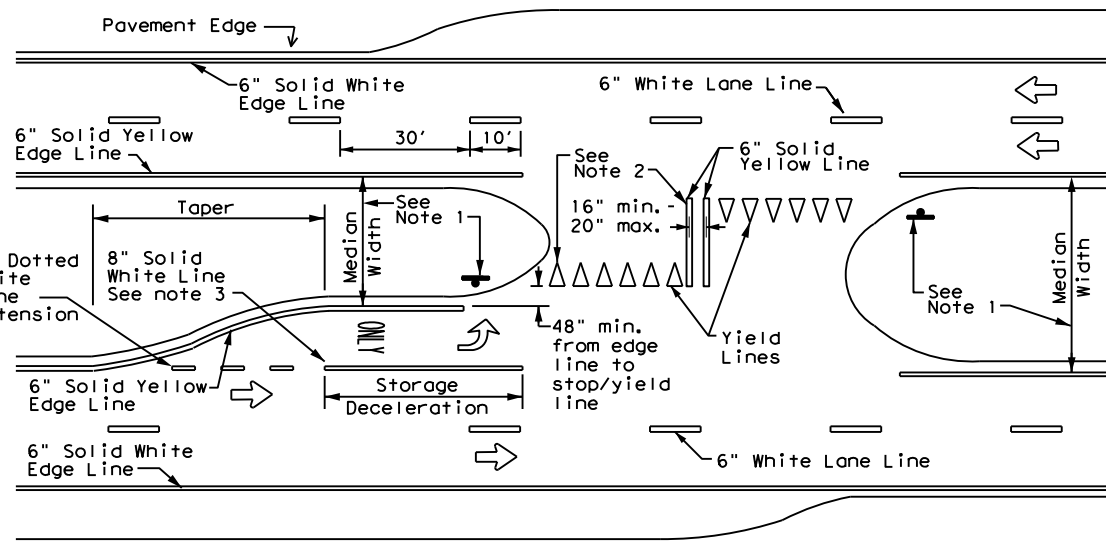
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

**GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE**
 Based on Traveled Way and Pavement Widths for Undivided Roadways



FOUR LANE DIVIDED ROADWAY CROSSOVERS

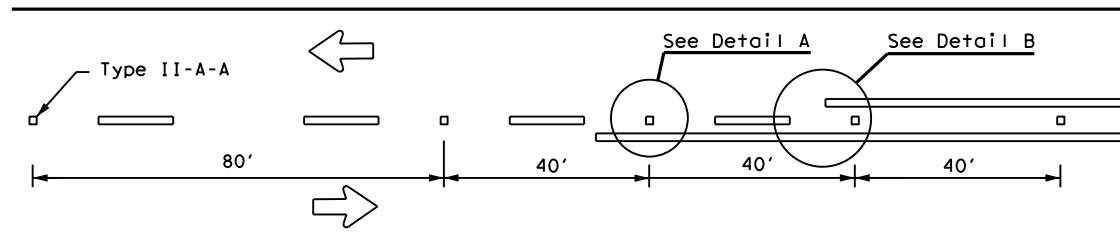
**TYPICAL STANDARD
PAVEMENT MARKINGS**

PM(1) - 22

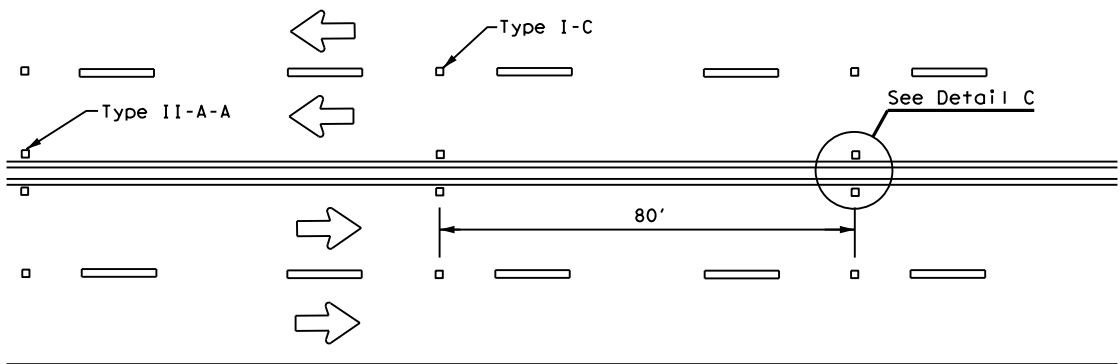
FILE:	pml-22.dgn	DN:	CK:	DW:	CK:
© TxDOT	December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC	
11-78	8-00	6-20			
8-95	3-03	12-22			
5-00	2-12				
	PAR	COUNTY	LAMAR	SHEET NO.	109

REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

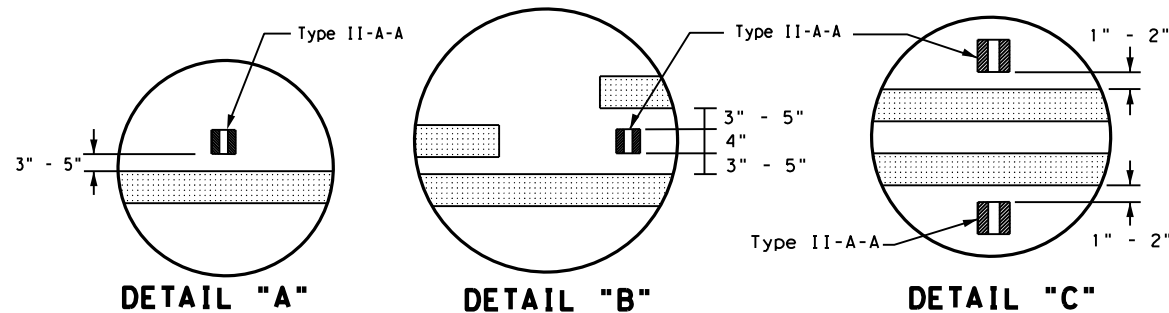
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CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



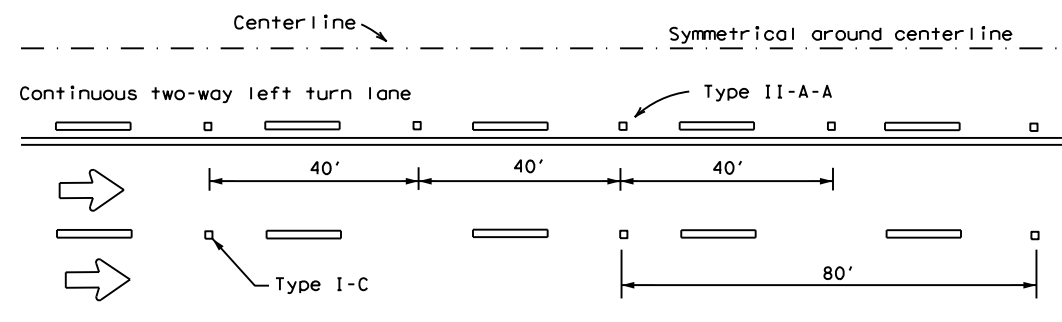
**CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS**



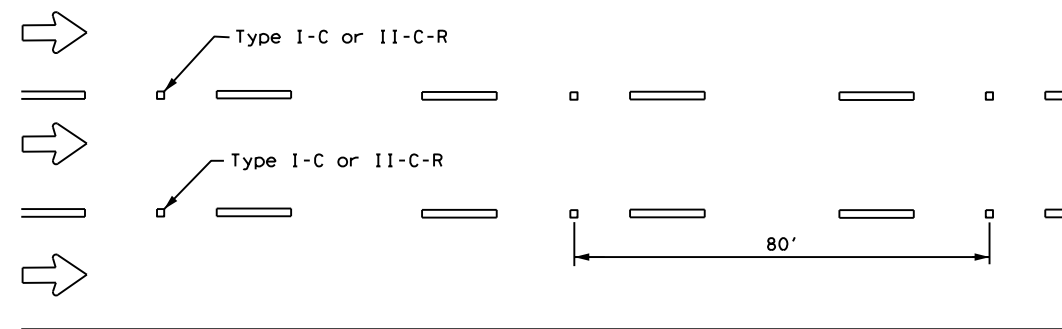
DETAIL "A"

DETAIL "B"

DETAIL "C"

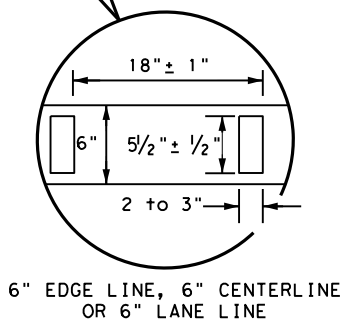
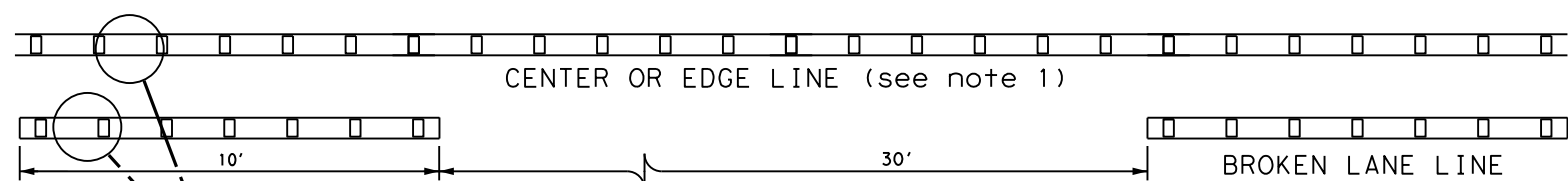


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



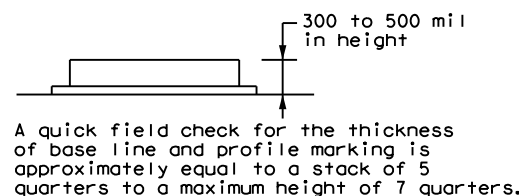
LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.
 See Note 3.



**REFLECTORIZED PROFILE
PATTERN DETAIL**

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



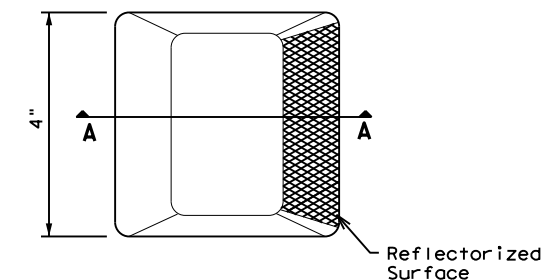
A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTES

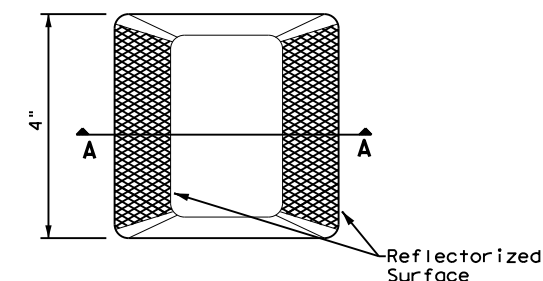
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

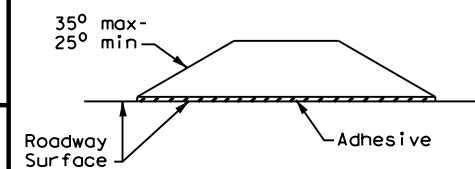
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS



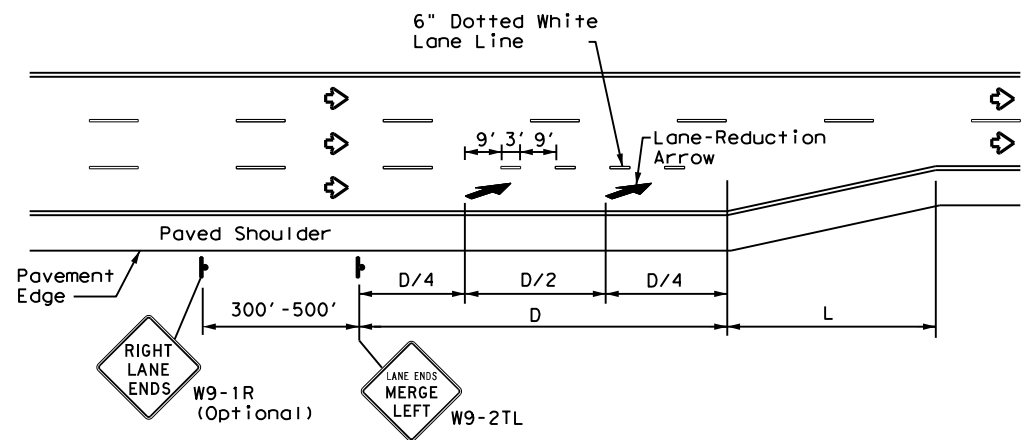
**POSITION GUIDANCE USING
RAISED MARKERS
REFLECTORIZED PROFILE
MARKINGS
PM(2) - 22**

FILE: pm2-22.dgn	DN:	CK:	DW:	CK:
© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
4-77 8-00 6-20	DIST	COUNTY	SHEET NO.	
4-92 2-10 12-22	PAR	LAMAR	110	
5-00 2-12				

DATE: 9/5/2023 12:08:03 AM
 FILE: T:\PARTPDD\US 82 Raised Medain\Design\CAD Standards\6 PAVEMENT MARKINGS\6 REFLECTORIZED PROFILE MARKINGS.dgn

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DATE: 9/5/2023 12:08:07 AM
 FILE: T:\PARTPDD\US 82 Raised Medain\Design\CAD Standards\6 PAVEMENT MARKINGS\82-PM(3)-22.dgn



LANE REDUCTION

NOTES

- 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.
- On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
- 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.
- For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

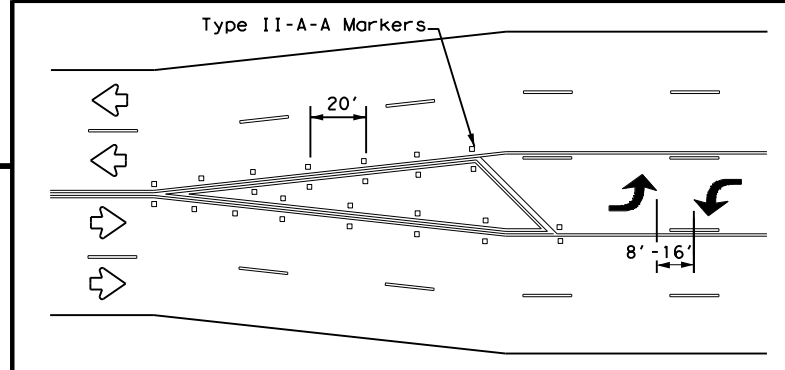
ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L = \frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	L=WS
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

GENERAL NOTES

- 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.
- 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.
- 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.
- Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

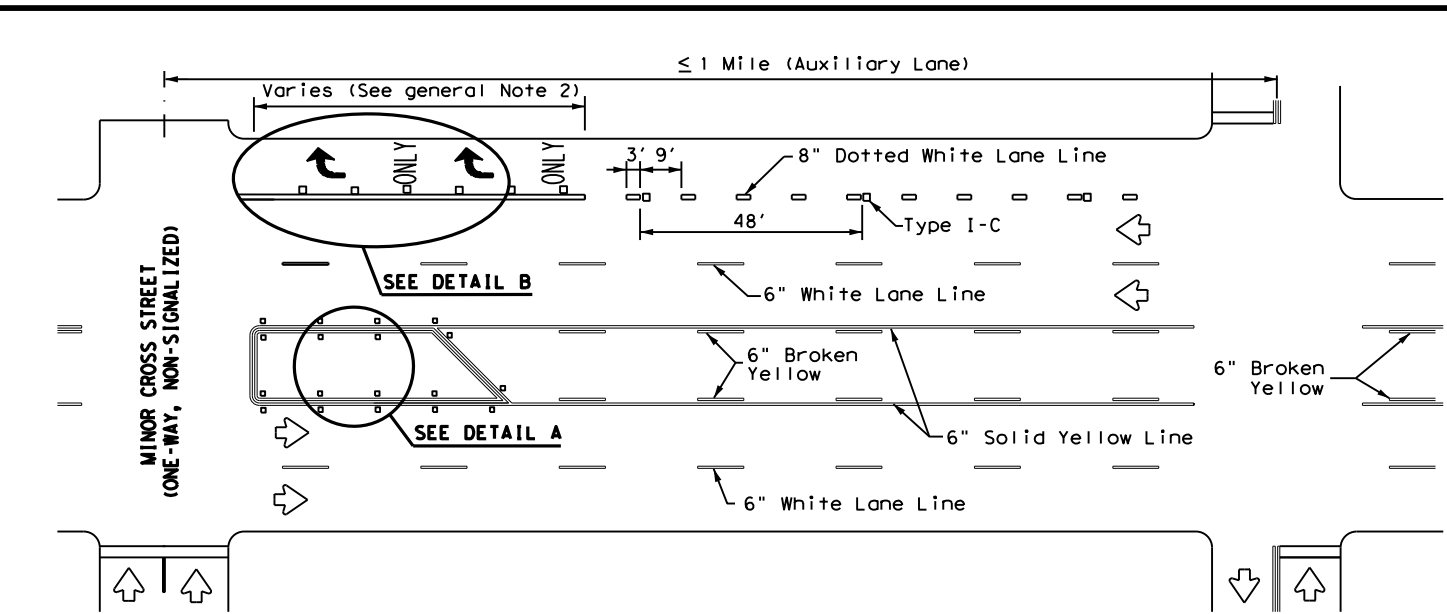
MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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

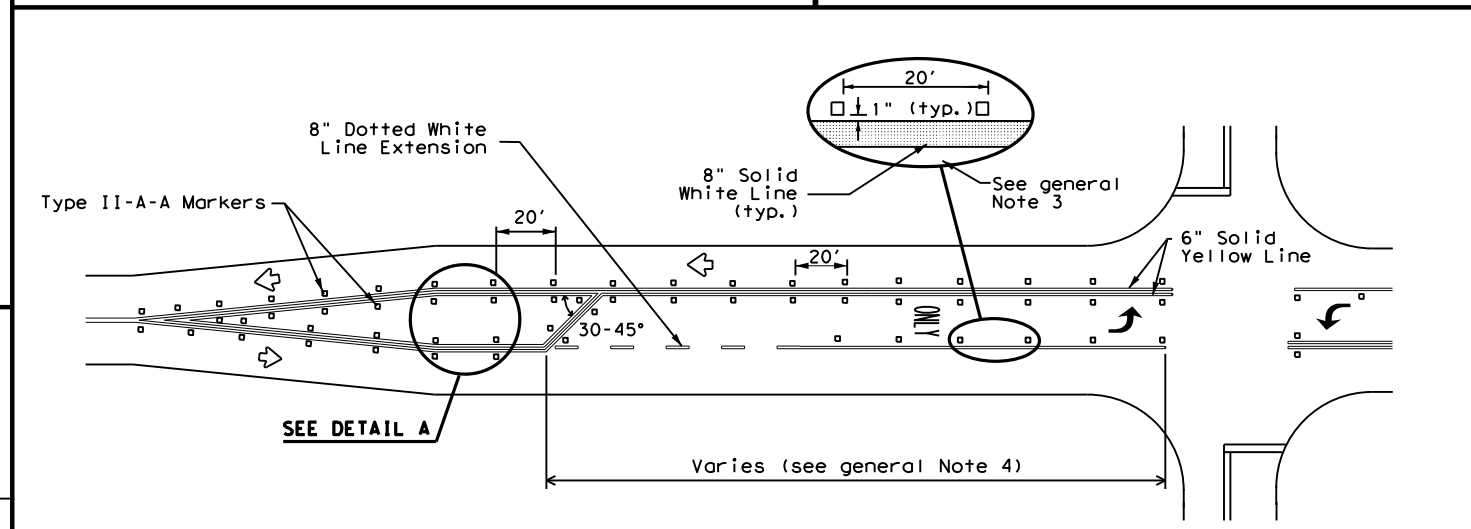


A two-way left-turn (TWLTL) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

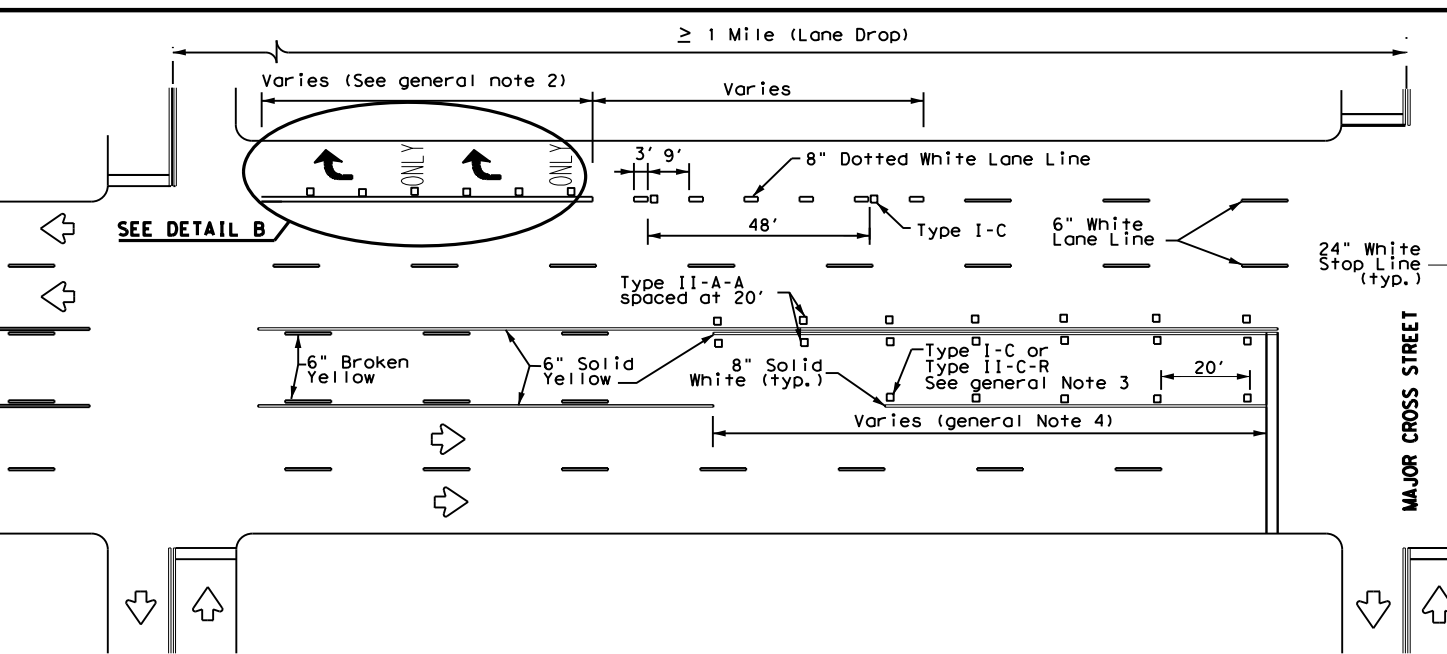
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY



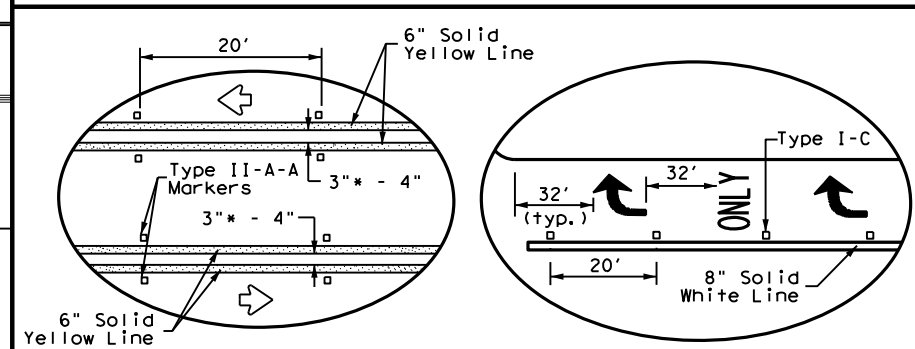
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP



DETAIL A

DETAIL B

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

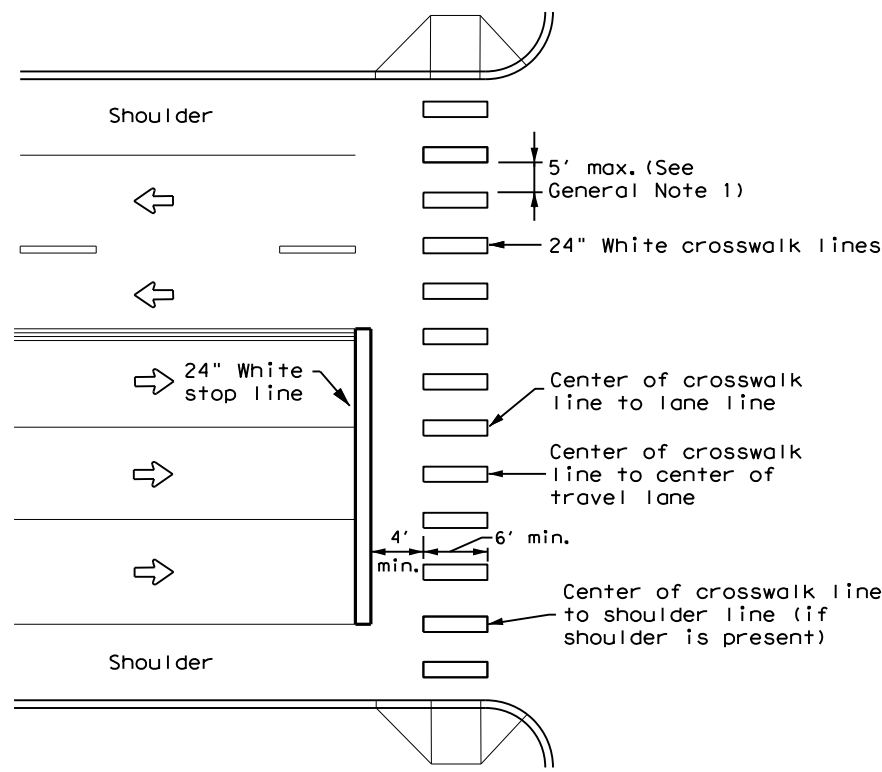
Texas Department of Transportation
 Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3) - 22

FILE: pm3-22.dgn	DN:	CK:	DW:	CK:
© TxDOT 2022	CONT	SECT	JOB	HIGHWAY
REVISIONS	0045	09	110, ETC	US 82, ETC
4-98 3-03 6-20	DIST	COUNTY	SHEET NO.	
5-00 2-10 12-22	PAR	LAMAR	111	
8-00 2-12				

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DATE: 9/5/2023 12:13:40 AM
 FILE: T:\PARTPDD\US 82 Raised Median\Design\CAD Standards\6 PAVEMENT MARKINGS\PM(4)-22A.dgn



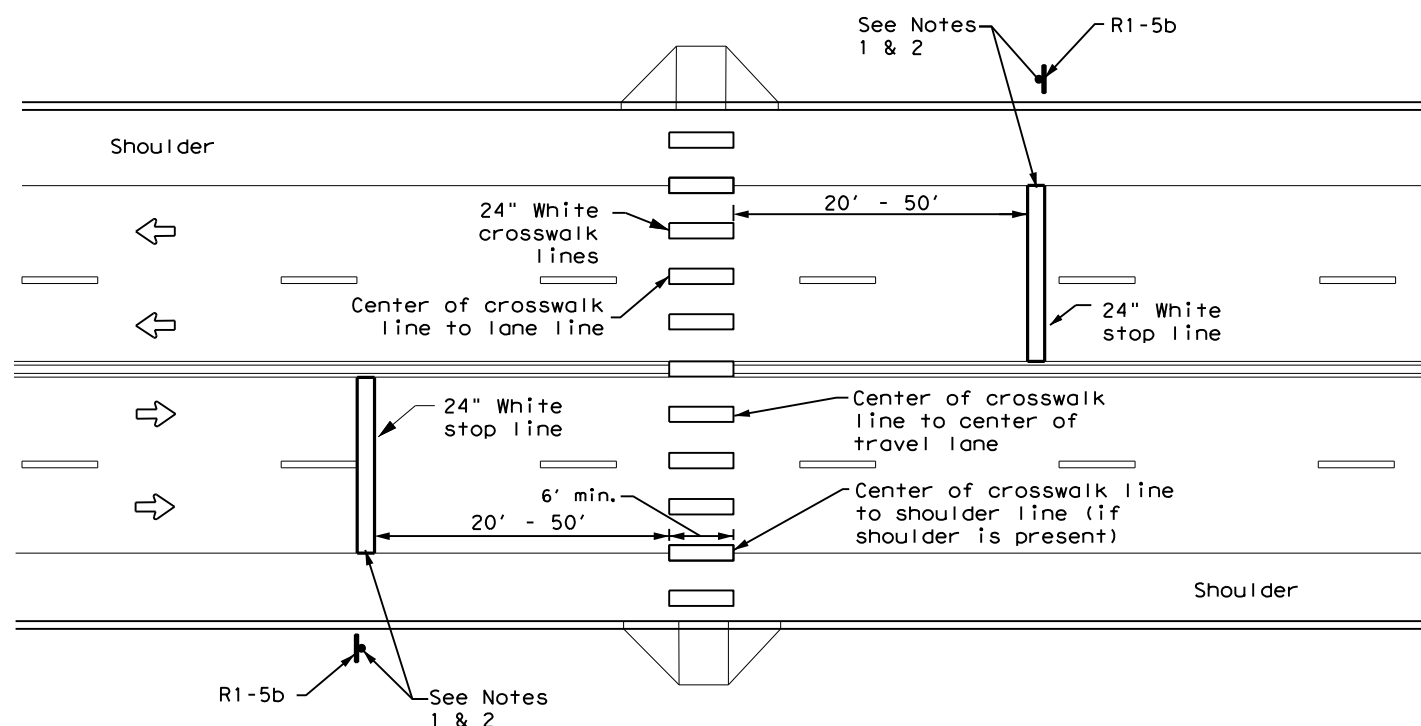
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

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



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock crosswalks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at midblock crosswalks controlled by traffic signals or pedestrian hybrid beacons.

<p>CROSSWALK PAVEMENT MARKINGS</p> <p>PM(4) - 22A</p>			
FILE: pm4-22a.dgn	DN:	CK:	DW:
© TxDOT December 2022	CONT	SECT	JOB
REVISIONS	0045	09	110, ETC
6-20	DIST	COUNTY	SHEET NO.
6-22	PAR	LAMAR	112
12-22			

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with TxDOT policy for projects disturbing less than 1 acre of soil, and not part of a larger common plan of development.

For all projects with any soil disturbing activities, TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office. If no field office is available, then this SWP3 shall be kept at the appropriate TxDOT Area Office.

This SWP3 is consistent with requirements specified in applicable stormwater plans, and the project's environmental permits, issues, and commitments (EPICs).

1.0 SITE/PROJECT DESCRIPTION
BRIDGE REPLACEMENT

1.1 PROJECT CONTROL SECTION JOB (CSJ):
0045-09-110

1.2 PROJECT LIMITS:

From: 42ND ST
To: 33RD ST

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 33.661858° ,(Long) -095.502626°

END: (Lat) 33.660821° ,(Long) -095.515040°

1.4 TOTAL PROJECT AREA (Acres): 6.25

1.5 TOTAL AREA TO BE DISTURBED (Acres): .02 (0.001%)

1.6 NATURE OF CONSTRUCTION ACTIVITY:

INCLUDES ROAD WIDENING, BACKFILL FOR PAVEMENT EDGES, EROSION AND SEDIMENTARY CONTROLS, AND TOPSOIL WORK FOR FINAL SODDING.

1.7 MAJOR SOIL TYPES:

Soil Type	Description
HICOTA	CONSISTING OF URBAN FREESTONE

1.8 PROJECT SPECIFIC LOCATIONS (PSLs):

PSLs must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. PSLs may be identified during preconstruction meetings or during the construction process. Please choose from the options below:

- PSLs determined during preconstruction meeting
- PSLs determined during construction
- No PSLs planned for construction

Type	Sheet #s

All off-ROW PSLs required by the Contractor are the Contractor's responsibility. The Contractor shall secure all permits required by local, state, federal laws for off-ROW PSLs. The contractor shall provide diagrams, areas of disturbance, acreage, and BMPs for all off-ROW PSLs within one mile of the project.

1.9 CONSTRUCTION ACTIVITIES:

(Use the following list as a starting point when developing the Construction Activity Schedule and Ceasing Record in Attachment 2.3.)

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

Other: _____
 Other: _____
 Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- Sediment laden stormwater from stormwater conveyance over disturbed area
- Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- Solvents, paints, adhesives, etc. from various construction activities
- Transported soils from offsite vehicle tracking
- Construction debris and waste from various construction activities
- Contaminated water from excavation or dewatering pump-out water
 - Sanitary waste from onsite restroom facilities
- Trash from various construction activities/receptacles
- Long-term stockpiles of material and waste
- Other: _____
- Other: _____
- Other: _____

1.11 RECEIVING WATERS:

Receiving waters must be depicted on the Environmental Layout Sheets in Attachment 1.2 of this SWP3. Include Segment # for receiving waters.

Tributaries	Classified Waterbody

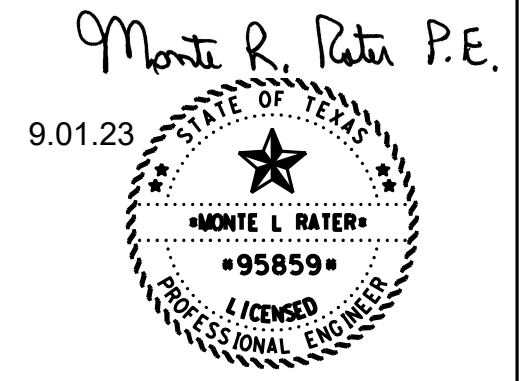
* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- Development of plans and specifications
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Other: _____
- Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- Day To Day Operational Control
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Other: _____
- Other: _____



STORMWATER POLLUTION PREVENTION PLAN (SWP3)
(Less Than 1 Acre)

FED. RD. DIV. NO.				SHEET NO.
				113
STATE	STATE DIST.	COUNTY		
TEXAS	PAR	LAMAR		
CONT.	SECT.	JOB	HIGHWAY NO.	
0045	09	110, ETC	US 82, ETC	

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

2.0 BEST MANAGEMENT PRACTICES (BMPs) AND CONTROLS, INSPECTION, AND MAINTENANCE

The Contractor shall be the responsible party for implementing the BMPs described herein and for complying with the SWP3 for control of erosion and sedimentation during day-to-day operations. The Contractor shall implement changes to this SWP3 approved by TxDOT within the times specified in this SWP3 or the CGP.

2.1 EROSION CONTROL AND SOIL STABILIZATION BMPs:

T / P

- Protection of Existing Vegetation
- Vegetated Buffer Zones
- Soil Retention Blankets
- Geotextiles
- Mulching/ Hydromulching
- Soil Surface Treatments
- Temporary Seeding
- Permanent Planting, Sodding or Seeding
- Biodegradable Erosion Control Logs
- Rock Filter Dams/ Rock Check Dams
- Vertical Tracking
- Interceptor Swale
- Riprap
- Diversion Dike
- Temporary Pipe Slope Drain
- Embankment for Erosion Control
- Paved Flumes
- Other: _____
- Other: _____
- Other: _____
- Other: _____

2.2 SEDIMENT CONTROL BMPs:

T / P

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

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

2.3 PERMANENT CONTROLS:

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

BMPs To Be Left In Place Post Construction:

Type	Stationing	
	From	To

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

2.4 OFFSITE VEHICLE TRACKING CONTROLS:

- Excess dirt/mud on road removed daily
- Haul roads dampened for dust control
- Loaded haul trucks to be covered with tarpaulin
- Stabilized construction exit
- Other: _____

- Other: _____
- Other: _____
- Other: _____

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

2.5 POLLUTION PREVENTION MEASURES:

- Chemical Management
- Concrete and Materials Waste Management
- Debris and Trash Management
- Dust Control
- Sanitary Facilities
- Other: _____
- Other: _____
- Other: _____
- Other: _____

2.6 VEGETATED BUFFER ZONES:

Natural vegetated buffers shall be maintained as feasible to protect adjacent surface waters. If vegetated natural buffer zones are not feasible due to site geometry, the appropriate additional sediment control measures have been incorporated into this SWP3.

Type	Stationing	
	From	To

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

2.7 ALLOWABLE NON-STORMWATER DISCHARGES:

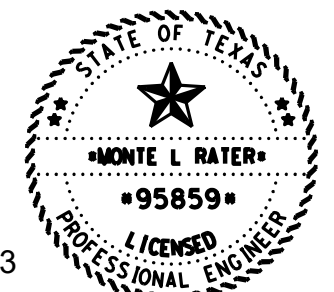
- Fire hydrant flushings
- Irrigation drainage
- Pavement washwater (where spills or leaks have not occurred, and detergents are not used)
- Potable water sources
- Springs
- Uncontaminated groundwater
- Water used to wash vehicles or control dust
- Other allowable non-stormwater discharges as allowed by TPDES GP TXR150000.

2.8 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3 .

2.9 MAINTENANCE:

Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.3 of this SWP3.



9.01.23

Monte R. Rater P.E.

**STORMWATER POLLUTION PREVENTION PLAN (SWP3)
(Less Than 1 Acre)**



Sheet 2 of 2

FED. RD. DIV. NO.	PROJECT NO.			SHEET NO.
				114
STATE	STATE DIST.	COUNTY		
TEXAS	PAR	LAMAR		
CONT.	SECT.	JOB	HIGHWAY NO.	
0045	09	110, ETC	US 82, ETC	

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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.

- Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000
- Comply with the SW3P and revise when necessary to control pollution or required by the Engineer.
- Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and TCEQ, EPA or other inspectors.
- 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
<input type="checkbox"/> Temporary Vegetation	<input type="checkbox"/> Silt Fence	<input type="checkbox"/> Vegetative Filter Strips
<input type="checkbox"/> Blankets/Matting	<input type="checkbox"/> Rock Berm	<input type="checkbox"/> Retention/Irrigation Systems
<input type="checkbox"/> Mulch	<input type="checkbox"/> Triangular Filter Dike	<input type="checkbox"/> Extended Detention Basin
<input checked="" type="checkbox"/> Sodding	<input type="checkbox"/> Sand Bag Berm	<input type="checkbox"/> Constructed Wetlands
<input type="checkbox"/> Interceptor Swale	<input type="checkbox"/> Straw Bale Dike	<input type="checkbox"/> Wet Basin
<input type="checkbox"/> Diversion Dike	<input type="checkbox"/> Brush Berms	<input type="checkbox"/> Erosion Control Compost
<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Erosion Control Compost	<input type="checkbox"/> Mulch Filter Berm and Socks
<input checked="" type="checkbox"/> Mulch Filter Berm and Socks	<input checked="" type="checkbox"/> Mulch Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks
<input type="checkbox"/> Compost Filter Berm and Socks	<input type="checkbox"/> Compost Filter Berm and Socks	<input checked="" type="checkbox"/> Vegetation Lined Ditches
	<input type="checkbox"/> Stone Outlet Sediment Traps	<input type="checkbox"/> Sand Filter Systems
	<input type="checkbox"/> Sediment Basins	<input type="checkbox"/> Grassy Swales

III. CULTURAL RESOURCES

Refer to TxDOT Standard Specifications in the event historical issues or archeological artifacts are found during construction. Upon discovery of archeological artifacts (bones, burnt rock, flint, pottery, etc.) cease work in the immediate area and contact the Engineer immediately.

- No Action Required Required Action

Action No.

1.
2.
3.
4.

IV. VEGETATION RESOURCES

Preserve native vegetation to the extent practical. Contractor must adhere to Construction Specification Requirements Specs 162, 164, 192, 193, 506, 730, 751, 752 in order to comply with requirements for invasive species, beneficial landscaping, and tree/brush removal commitments.

- No Action Required Required Action

Action No.

1.
2.
3.
4.

V. FEDERAL LISTED, PROPOSED THREATENED, ENDANGERED SPECIES, CRITICAL HABITAT, STATE LISTED SPECIES, CANDIDATE SPECIES AND MIGRATORY BIRDS.

- No Action Required Required Action

Action No.

1.
2.
3.
4.

If any of the listed species are observed, cease work in the immediate area, do not disturb species or habitat and contact the Engineer immediately. The work may not remove active nests from bridges and other structures during nesting season of the birds associated with the nests. If caves or sinkholes are discovered, cease work in the immediate area, and contact the Engineer immediately.

LIST OF ABBREVIATIONS

BMP: Best Management Practice	SPCC: Spill Prevention Control and Countermeasure
CGP: Construction General Permit	SW3P: Storm Water Pollution Prevention Plan
DSHS: Texas Department of State Health Services	PCN: Pre-Construction Notification
FHWA: Federal Highway Administration	PSL: Project Specific Location
MOA: Memorandum of Agreement	TCEQ: Texas Commission on Environmental Quality
MOU: Memorandum of Understanding	TPDES: Texas Pollutant Discharge Elimination System
MS4: Municipal Separate Stormwater Sewer System	TPWD: Texas Parks and Wildlife Department
MBTA: Migratory Bird Treaty Act	TxDOT: Texas Department of Transportation
NOT: Notice of Termination	T&E: Threatened and Endangered Species
NWP: Nationwide Permit	USACE: U.S. Army Corps of Engineers
NOI: Notice of Intent	USFWS: U.S. Fish and Wildlife Service

VI. HAZARDOUS MATERIALS OR CONTAMINATION ISSUES

General (applies to all projects):

Comply with the Hazard Communication Act (the Act) for personnel who will be working with hazardous materials by conducting safety meetings prior to beginning construction and making workers aware of potential hazards in the workplace. Ensure that all workers are provided with personal protective equipment appropriate for any hazardous materials used. Obtain and keep on-site Material Safety Data Sheets (MSDS) for all hazardous products used on the project, which may include, but are not limited to the following categories: Paints, acids, solvents, asphalt products, chemical additives, fuels and concrete curing compounds or additives. Provide protected storage, off bare ground and covered, for products which may be hazardous. Maintain product labelling as required by the Act. Maintain an adequate supply of on-site spill response materials, as indicated in the MSDS. In the event of a spill, take actions to mitigate the spill as indicated in the MSDS, in accordance with safe work practices, and contact the District Spill Coordinator immediately. The Contractor shall be responsible for the proper containment and cleanup of all product spills.

Contact the Engineer if any of the following are detected:

- * Dead or distressed vegetation (not identified as normal)
- * Trash piles, drums, canister, barrels, etc.
- * Undesirable smells or odors
- * Evidence of leaching or seepage of substances

Does the project involve any bridge class structure rehabilitation or replacements (bridge class structures not including box culverts)?

- Yes No

If "No", then no further action is required.

If "Yes", then TxDOT is responsible for completing asbestos assessment/inspection.

Are the results of the asbestos inspection positive (is asbestos present)?

- Yes No

If "Yes", then TxDOT must retain a DSHS licensed asbestos consultant to assist with the notification, develop abatement/mitigation procedures, and perform management activities as necessary. The notification form to DSHS must be postmarked at least 15 working days prior to scheduled demolition.

If "No", then TxDOT is still required to notify DSHS 15 working days prior to any scheduled demolition.

In either case, the Contractor is responsible for providing the date(s) for abatement activities and/or demolition with careful coordination between the Engineer and asbestos consultant in order to minimize construction delays and subsequent claims.

Any other evidence indicating possible hazardous materials or contamination discovered on site. Hazardous Materials or Contamination Issues Specific to this Project:

- No Action Required Required Action

Action No.

- 1.


VII. OTHER ENVIRONMENTAL ISSUES

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

- No Action Required Required Action

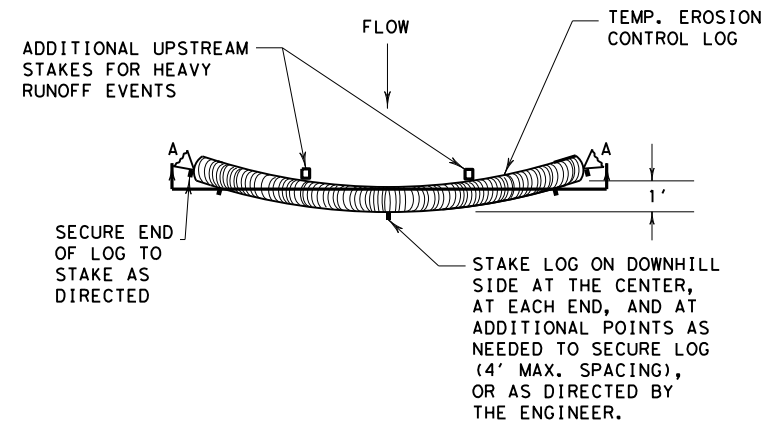
Action No.

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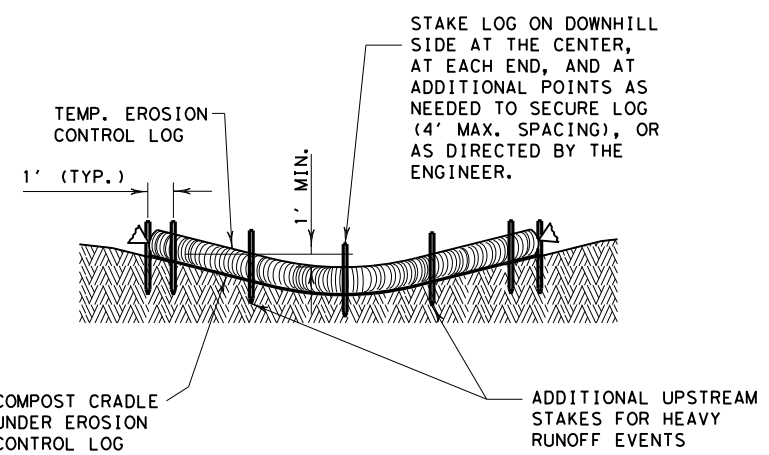
 Texas Department of Transportation		<i>Design Division Standard</i>	
ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS EPIC			
FILE: epic.dgn	DN: TxDOT	CK: RG	DW: VP
©TxDOT: February 2015	CONT	SECT	JOB
12-12-2011 (DS) REVISIONS	0045 09	110, ETC	US 82, ETC
05-07-14 ADDED NOTE SECTION IV.	DIST	COUNTY	SHEET NO.
01-23-2015 SECTION I (CHANGED ITEM 1122 TO ITEM 506, ADDED GRASSY SWALES.	PAR	LAMAR	115

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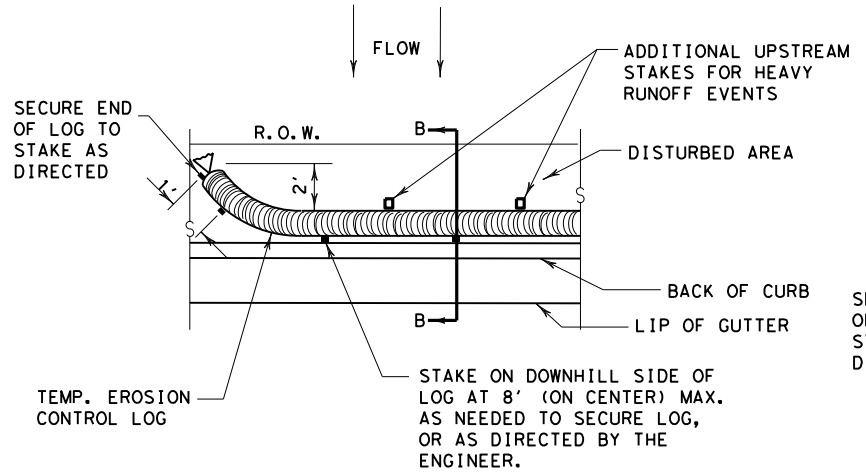


PLAN VIEW

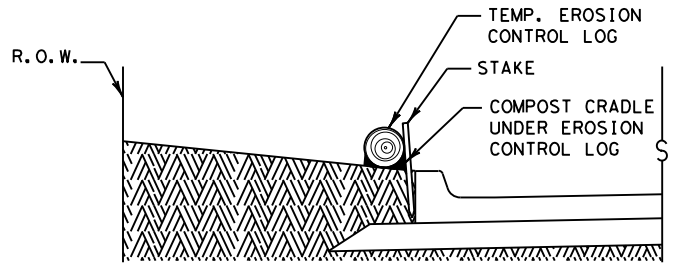


SECTION A-A
EROSION CONTROL LOG DAM

CL-D

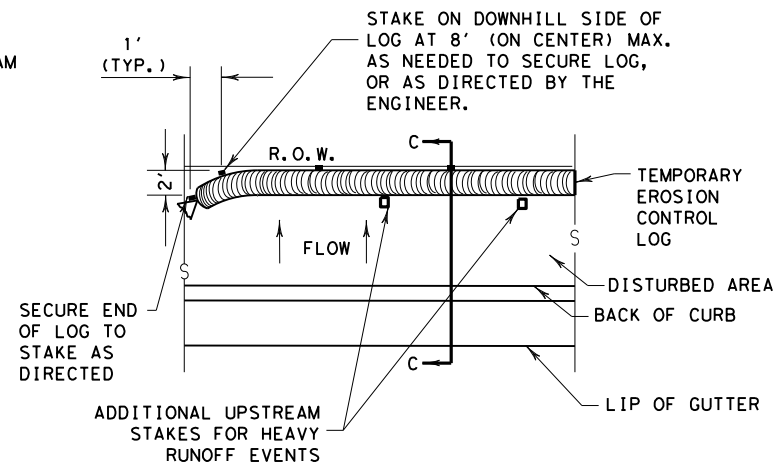


PLAN VIEW

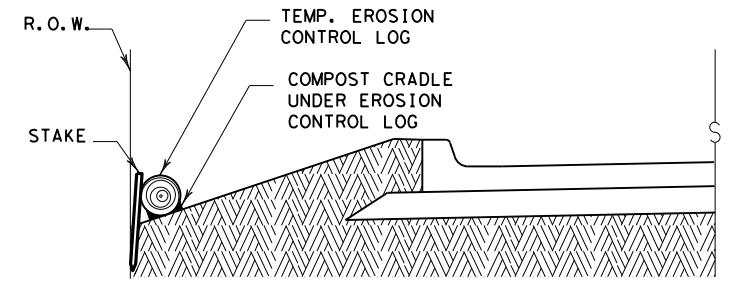


SECTION B-B
EROSION CONTROL LOG AT BACK OF CURB

CL-BOC



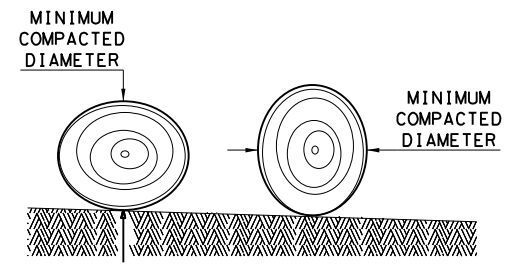
PLAN VIEW



SECTION C-C

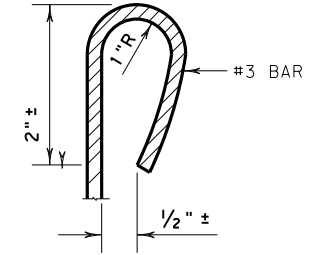
EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

- LEGEND**
- CL-D EROSION CONTROL LOG DAM
 - CL-BOC EROSION CONTROL LOG AT BACK OF CURB
 - CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
 - CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
 - CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
 - CL-DI EROSION CONTROL LOG AT DROP INLET
 - CL-CI EROSION CONTROL LOG AT CURB INLET
 - CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET



REBAR STAKE DETAIL

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

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

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

GENERAL NOTES:

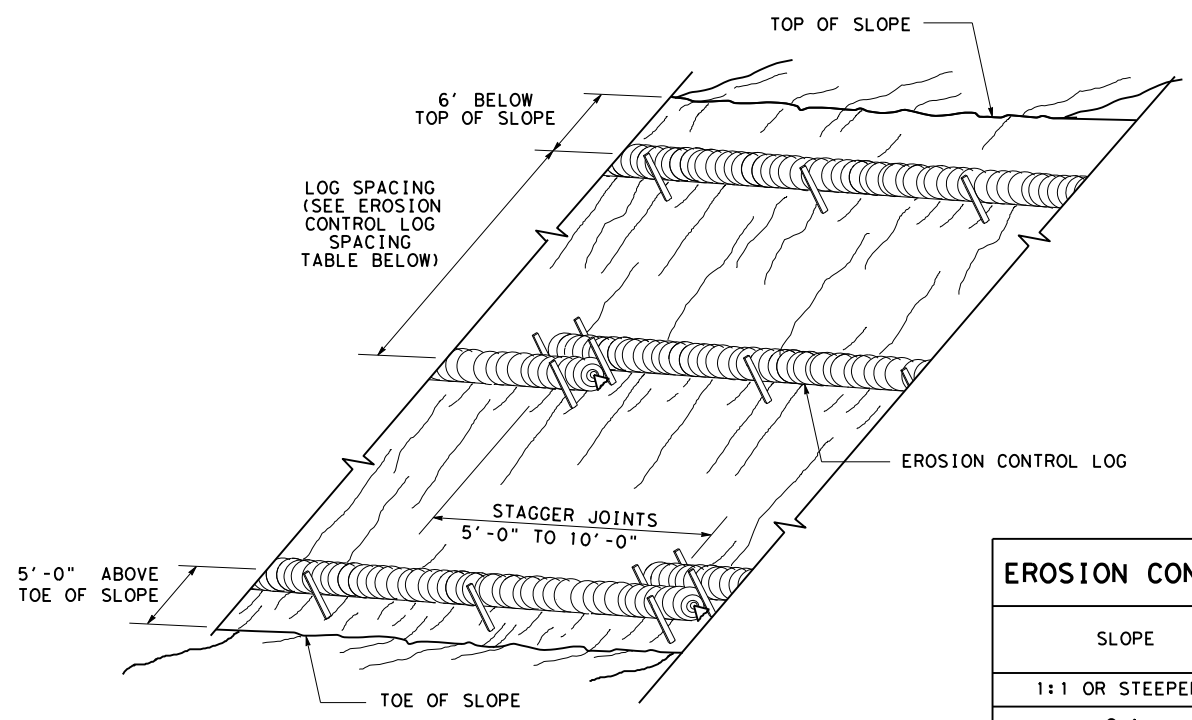
1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

SHEET 1 OF 3

		<i>Design Division Standard</i>	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT SECT	JOB	HIGHWAY
REVISIONS	0045 09	110, ETC	US 82, ETC
	DIST	COUNTY	SHEET NO.
	PAR	LAMAR	116

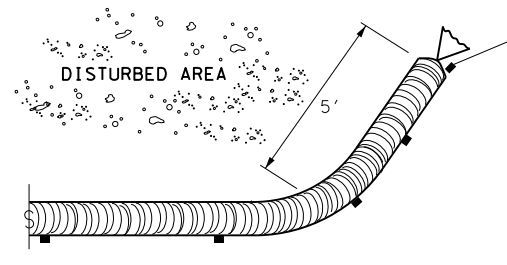
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**EROSION CONTROL LOGS ON SLOPES
 STAKE AND TRENCHING ANCHORING**

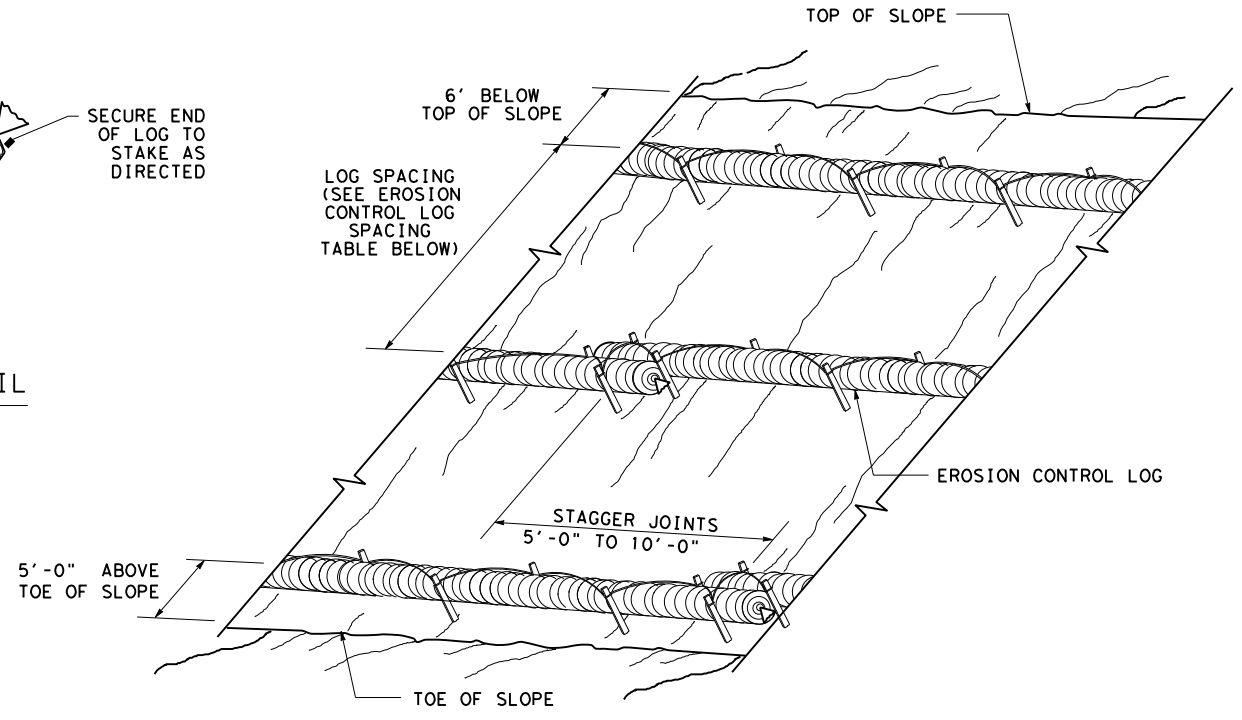
CL-SST



END SECTION RAP DETAIL

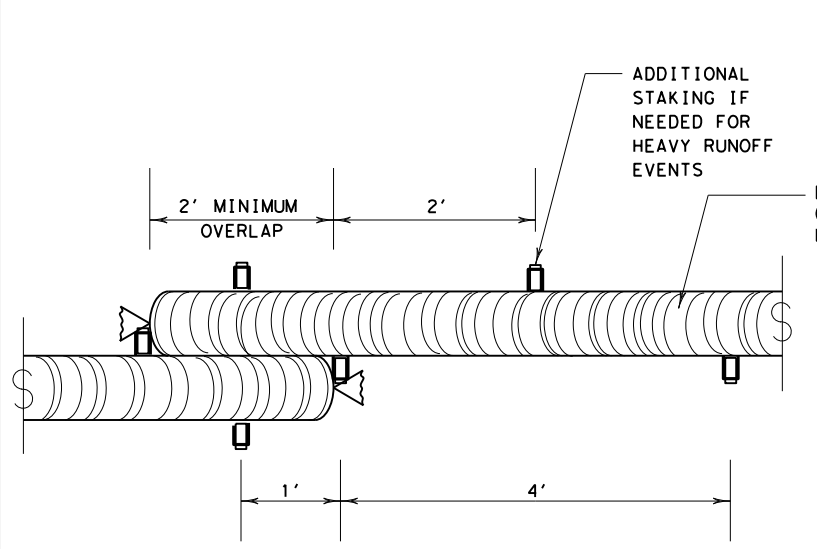
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

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



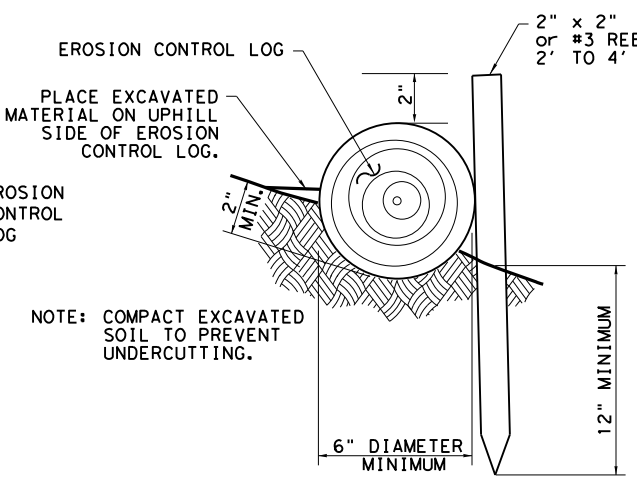
**EROSION CONTROL LOGS ON SLOPES
 STAKE AND LASHING ANCHORING**

CL-SSL

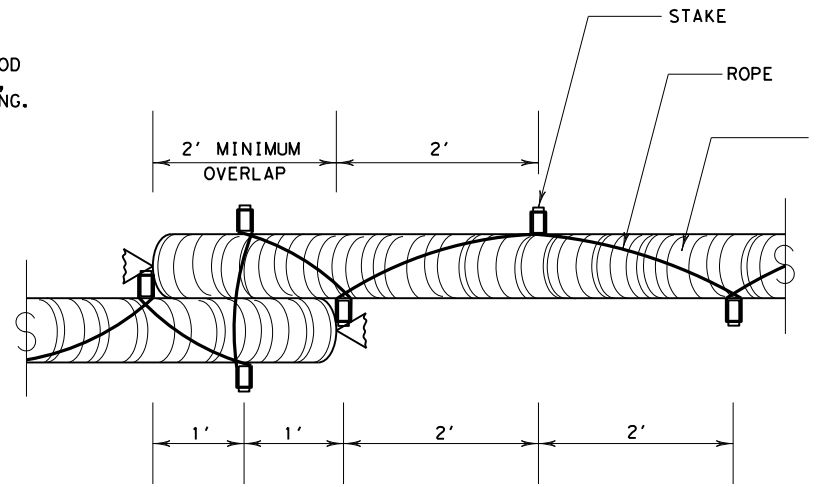


STAKE AND TRENCHING ANCHORING DETAIL

CL-SST

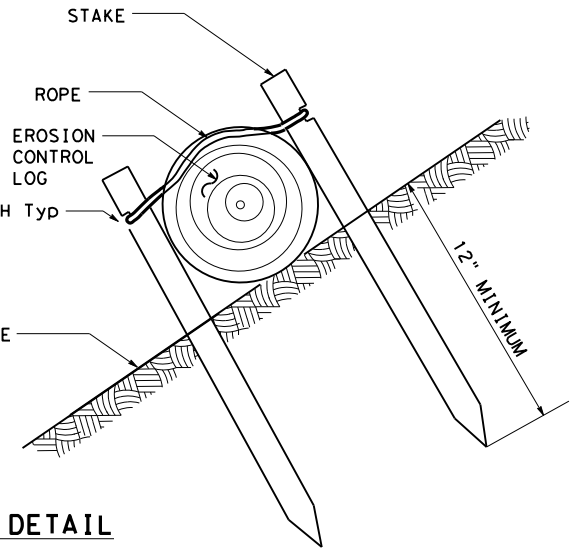


NOTE: COMPACT EXCAVATED SOIL TO PREVENT UNDERCUTTING.



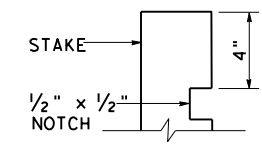
STAKE AND LASHING ANCHORING DETAIL

CL-SSL



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

TRENCH DEPTH TABLE



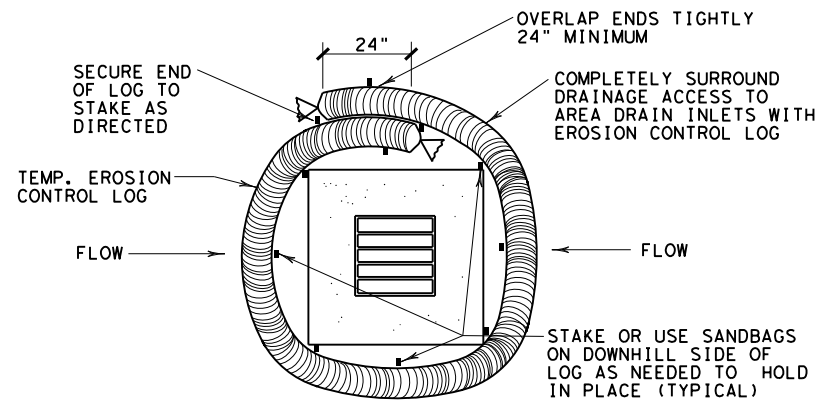
STAKE NOTCH DETAIL

SHEET 2 OF 3

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC(9) - 16			
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PAR	LAMAR	117	

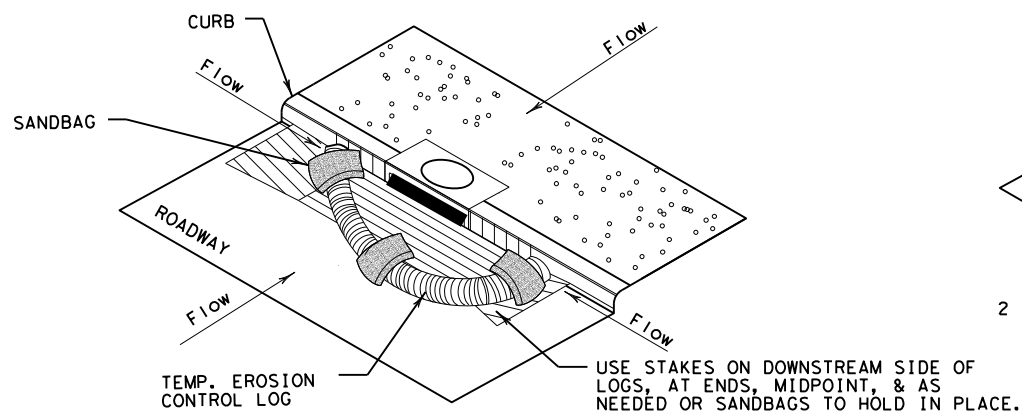
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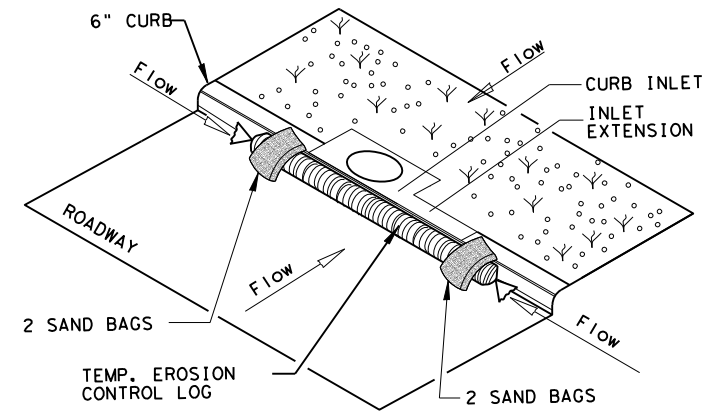
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

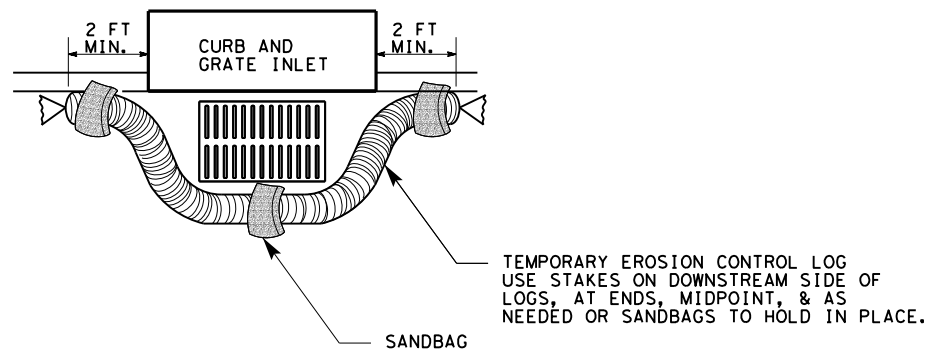
CL-CI



EROSION CONTROL LOG AT CURB INLET

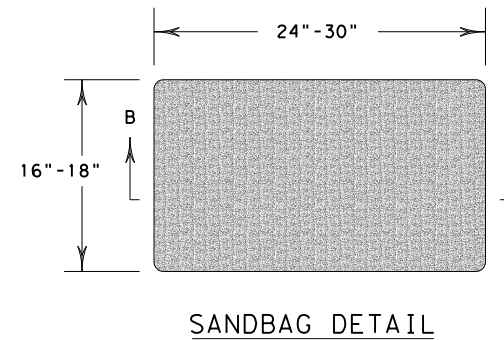
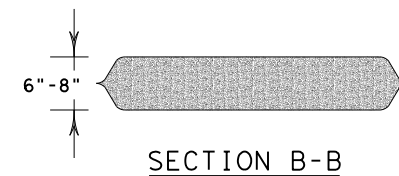
CL-CI

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



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



SHEET 3 OF 3

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
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REVISIONS	0045 09	110, ETC	US 82, ETC
DIST	COUNTY	SHEET NO.	
PAR	LAMAR	118	