

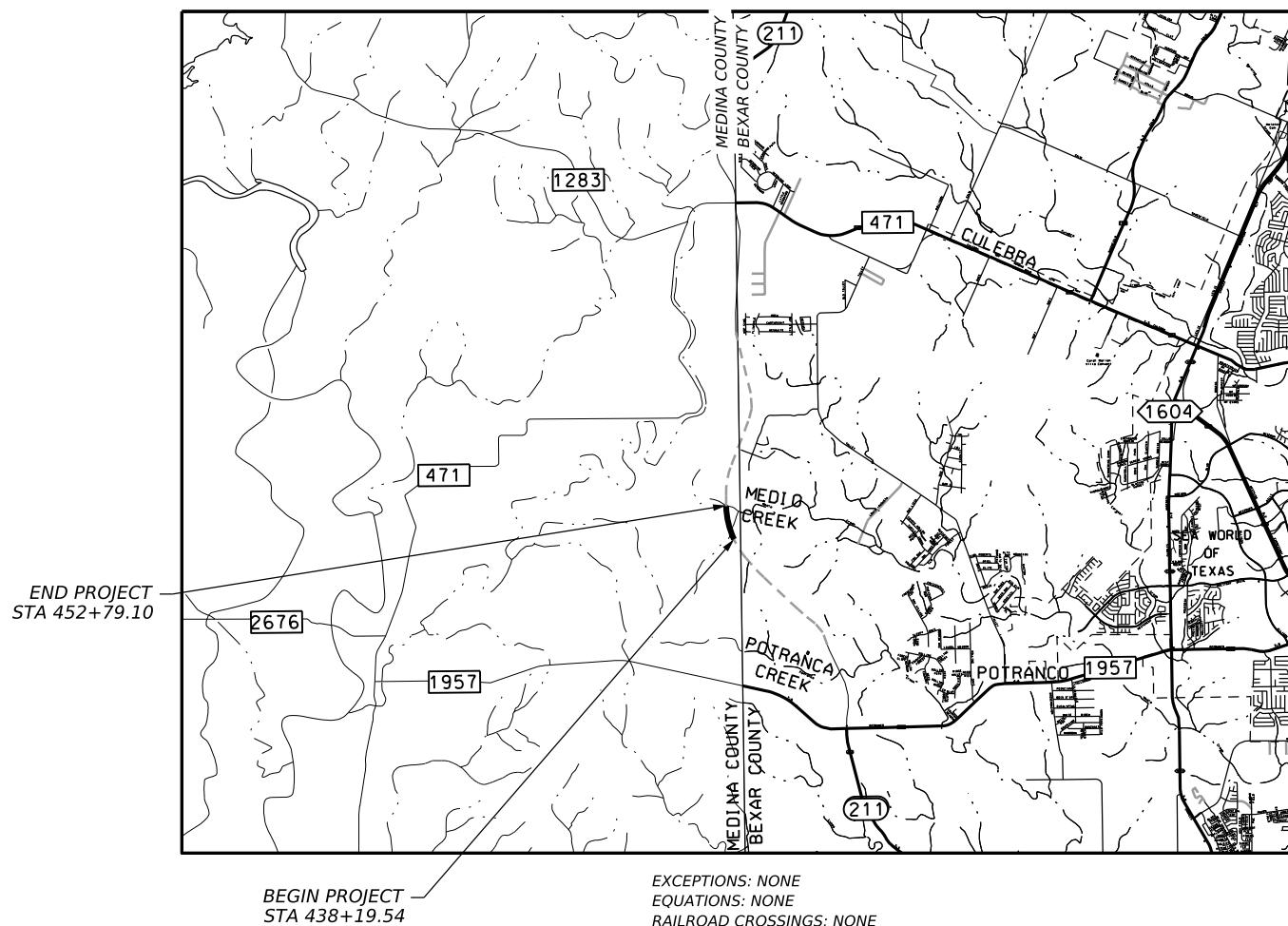
REDBIRD SUBDIVISION PHASE 2

PLANS OF PROPOSED SH 211 TURN LANES AT GALM RD

MEDINA COUNTY

FUNCTIONAL CLASS = MAJOR COLLECTOR
POSTED SPEED = 60 MPH
DESIGN SPEED = 60 MPH
TOTAL DISTURBED AREA = 1.65 AC

TOTAL PROJECT LENGTH = 0.28 MI
LIMITS: FROM 0.51 MI NORTH OF GOODENOUGH
TO 1.1 MI SOUTH OF TAMARON VALLEY



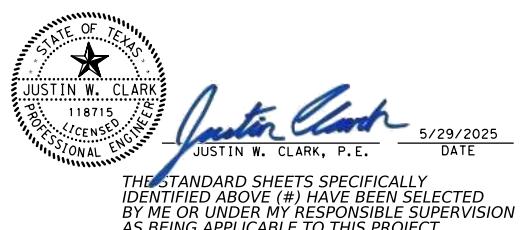
Dan Thoma, P.E. 6/13/2025
DATE

**PAPE-DAWSON
ENGINEERS**

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

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THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ABOVE (#) HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.



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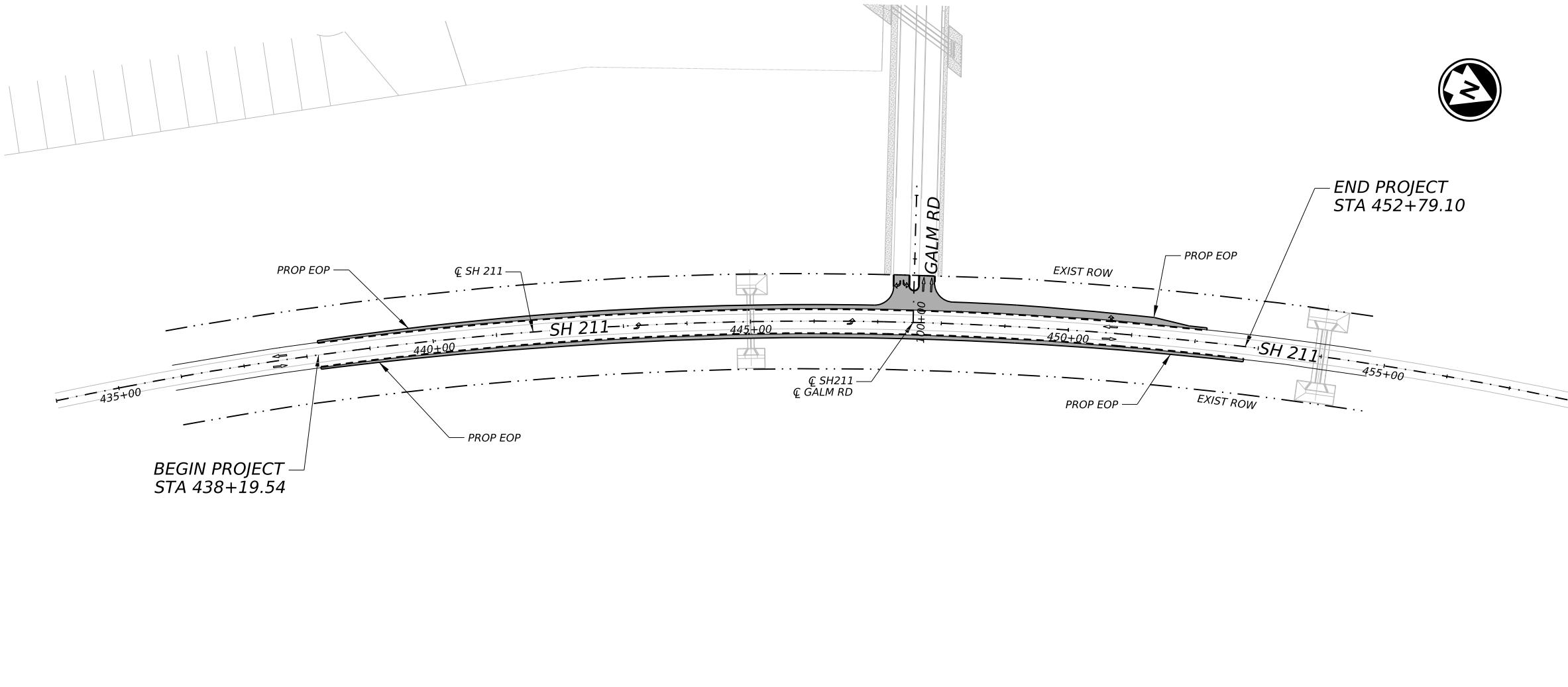
Texas Department of Transportation

SH 211 TURN LANES AT GALT RD

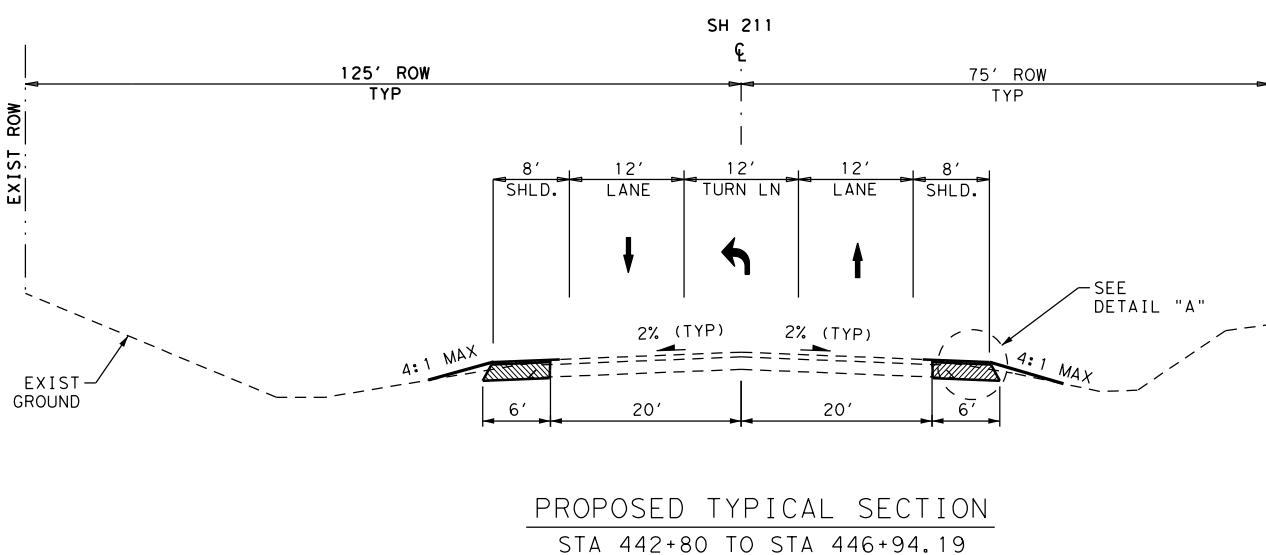
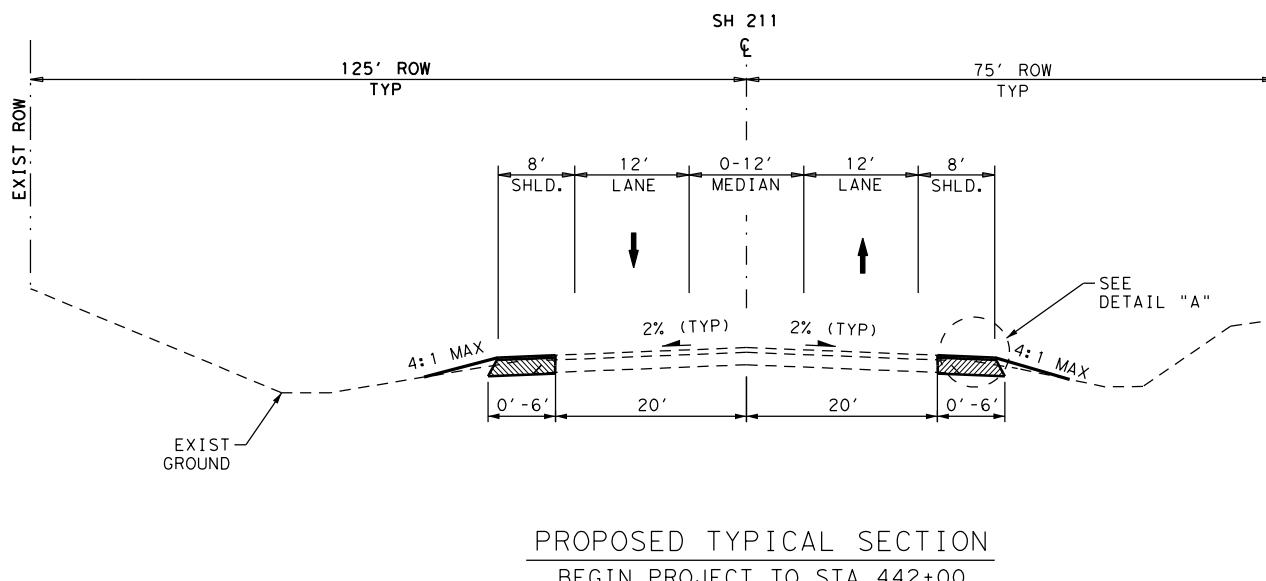
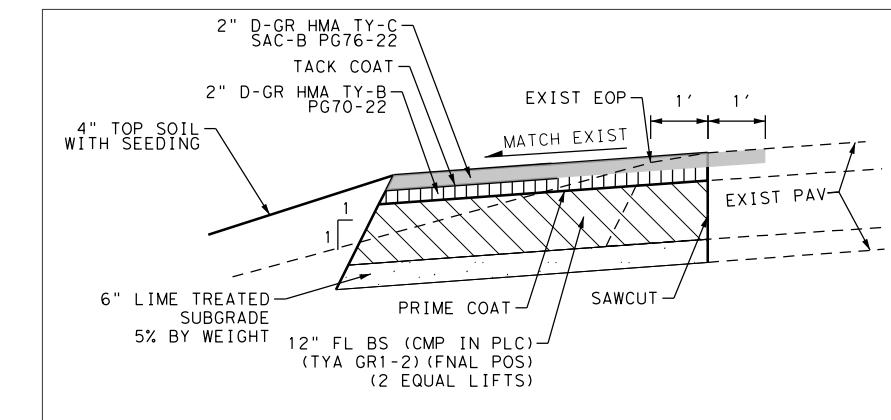
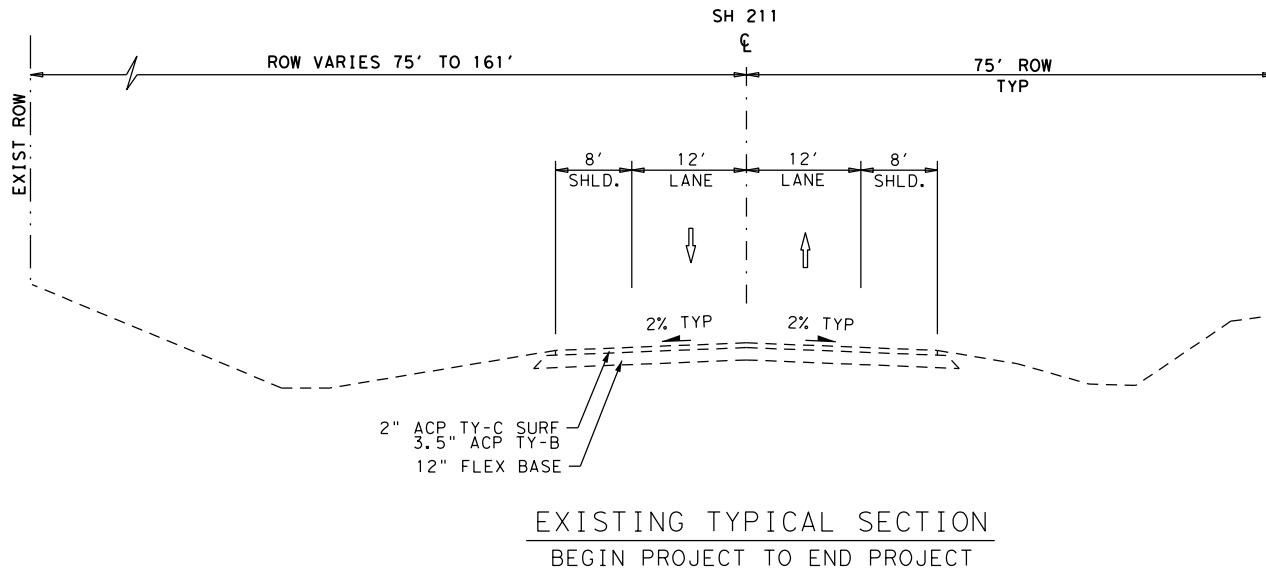
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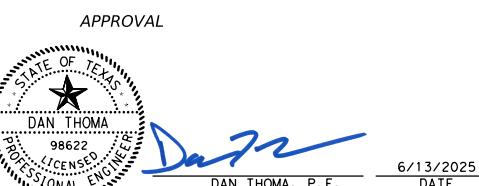


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Texas Department of Transportation			
SH 211 TURN LANES AT GALM RD			
PROJECT LAYOUT			
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NOTES

1. TACK COAT MUST BE APPLIED BETWEEN ALL HMA LIFTS
2. HMA WIDENING 4' MINIMUM WIDTH.
3. CONTRACTOR TO MATCH EXIST ROADWAY CROSS SLOPE ON WIDENING PAVEMENT.



NOT TO SCALE

REV. NO.	DATE	DESCRIPTION	BY
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**PAPE-DAWSON
ENGINEERS**

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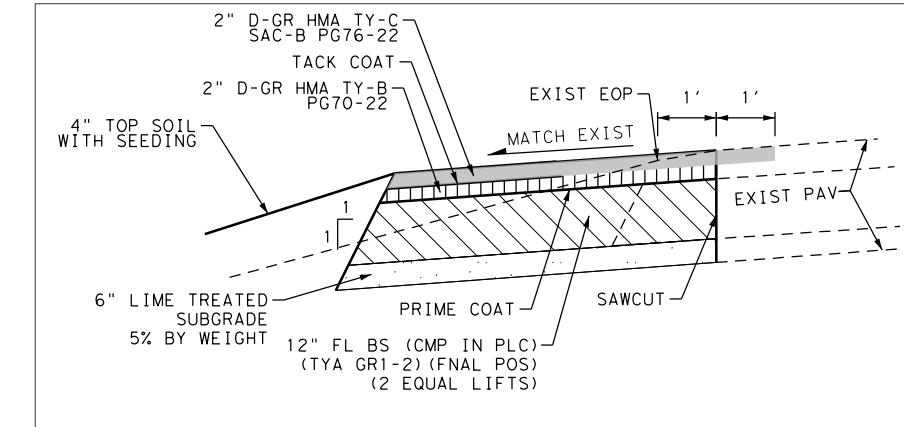
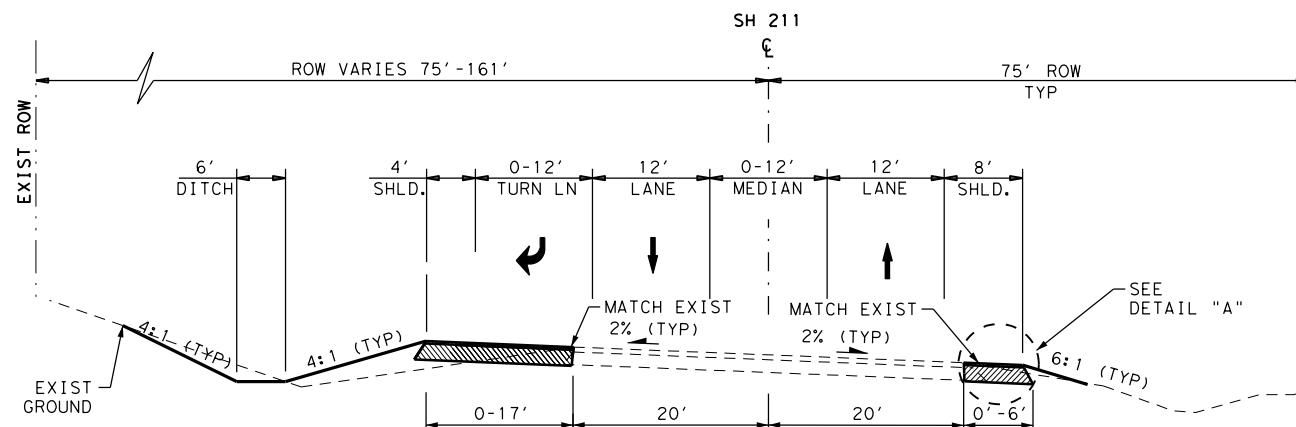
Texas Department of Transportation

SH 211 TURN LANES AT GALT RD

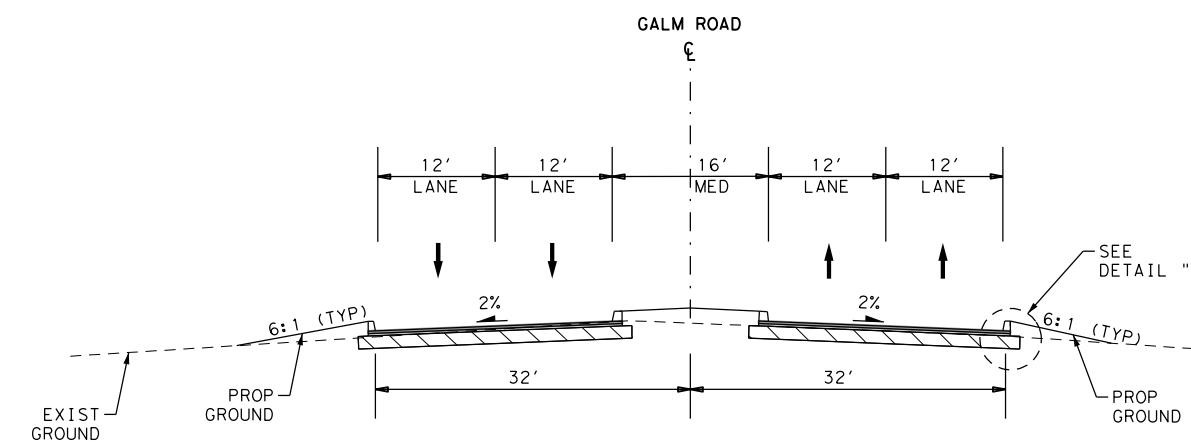
TYPICAL SECTIONS

SHEET 1 OF 2

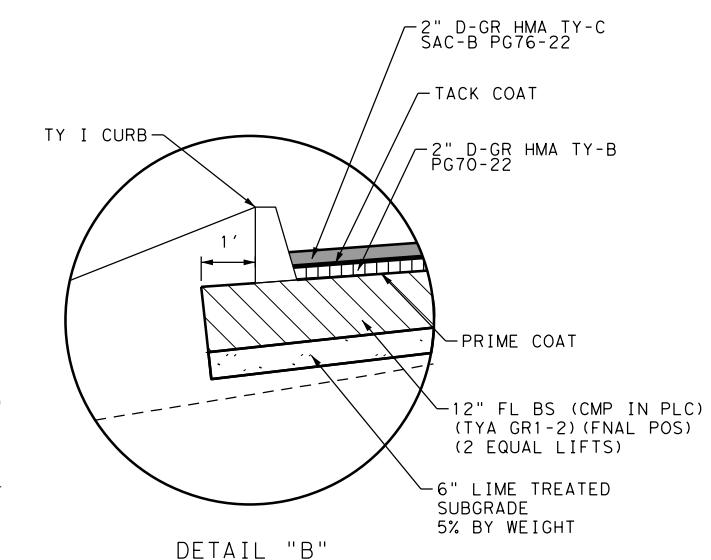
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
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PROPOSED TYPICAL SECTION
STA 448+16.91 TO END PROJECT



PROPOSED TYPICAL SECTION
STA 100+33.67 TO STA 100+73.80



NOTES

1. TACK COAT MUST BE APPLIED BETWEEN ALL HMA LIFTS
2. HMA WIDENING 4' MINIMUM WIDTH.
3. CONTRACTOR TO MATCH EXIST ROADWAY CROSS SLOPE ON WIDENING PAVEMENT.

DESIGN

STATE OF TEXAS
ERNESTO GARZA JR.
141557
PROFESSIONAL ENGINEER
ERNESTO GARZA JR., P.E. 6/13/2025 DATE

APPROVAL

STATE OF TEXAS
DAN THOMA
98622
PROFESSIONAL ENGINEER
DAN THOMA, P.E. 6/13/2025 DATE

NOT TO SCALE

REV. NO.	DATE	DESCRIPTION	BY

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2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
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Texas Department of Transportation

SH 211 TURN LANES AT GALM RD

TYPICAL SECTIONS

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
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21. "Proof rolling of subgrade is required and shall be witnessed by TxDOT prior to placement of pavement structure unless otherwise approved by the TxDOT Maintenance Supervisor. The requirement for proof-rolling of subgrade is not superseded by any other requirements including those of any Geotechnical Report."

22. "All Flexible Base will have a minimum Plasticity Index of 4."

23. "All courses of asphaltic concrete pavement (regardless of type) will be placed with a asphalt paving equipment meeting the requirements of TxDOT Item 320, "Equipment for Asphalt Concrete Pavement", unless otherwise approved by the Maintenance Supervisor."

23.5. "Tack coat will be applied with an asphalt distributor and spread across the surface receiving the tack coat by multiple passes of a pneumatic roller. The application of tack coat and the number of passes of the pneumatic roller will be sufficient to make the surface and exposed edges consistently black with no areas devoid of tack. Asphalt for tack coat shall meet TxDOT specs and be from a TxDOT approved source."

24. "All surface aggregates will meet the requirements of TxDOT friction classification "B" and will meet PG Binder grade 70-22."

25. "All surface Asphalt Concrete Pavement will be under-sealed with a One Course Surface Treatment."

26. "All Asphaltic Concrete Pavement used in base courses will be Type "A" or "B" and will meet PG binder grade 64-22."

27. "All pavement widening including shoulders will match the existing pavement cross slope."

28. "All pavement markings will be Type I thermoplastic (100 mil) with under-seal meeting the requirements of TxDOT Item 666, Reflectorized Pavement Markings. The contractor will place guide marks in accordance with Item 666 and will make arrangements for TxDOT inspection of the pavement marking layout prior to placement of striping. Equipment used for the placement of striping will meet the production requirements of Item 666 unless otherwise approved in advance by the TxDOT Maintenance Supervisor."

29. "Existing pavement markings that conflict with proposed pavement markings will be lightly ground in a manner that does not damage the pavement surface, to remove any pavement marking accumulation, and will be covered with a strip seal of 18" minimum width, consisting of precoated grade 5, friction class B aggregate."

30. "All materials and construction methods used in State Right Of Way will meet TxDOT specifications. This supersedes all other specifications in the plans."

31. "All turn lane concrete pavement in state ROW will meet the requirements of TxDOT Item 360 Class P concrete and will be batched at concrete plants having a current approved mix design. Class P concrete shall have 7 and 28 day compressive strength of 3200 psi and 4400 psi respectively."

32. "When widening existing concrete pavements, joints in the new pavement will match joints in existing pavement and curb."

33. "The contractor is responsible for ensuring that TxDOT approved materials, mix designs, approved sources and products are used for all work in state ROW. The contractor will arrange for the services of a qualified testing laboratory for all items requiring testing and will notify TxDOT of any discrepancies between test results and TxDOT specs in a timely manner. The contractor will provide to TxDOT invoices and testing results as soon they are available. Failure to do this will result in rejection of the work."

34. "Sawing of contraction/construction joints in concrete pavement will be accomplished as soon as personnel can walk on the concrete without damaging the surface regardless of time of day or weather conditions. Stand-by power driven concrete saws will be provided during the sawing operation. Curing compound will be re-applied to the sawed joint immediately upon sawing the joint."

35. "Guardrail SGT's will be type 3 unless otherwise approved by the TxDOT Maintenance Supervisor. Guardrail mow strip placed adjacent to other concrete rip-rap will be separated by a formed construction joint."

36. "Any concrete curb to be removed will be saw-cut at the limits of removal and be removed entirely. Slicing the top portion of the curb off and leaving remaining portion of curb in place is unacceptable."

37. "Any damage to TxDOT facilities will be repaired at no expense to the State, to TxDOT's satisfaction."

38. "Sidewalks placed in the highway right-of-way will be a minimum width of five feet or comply with the more stringent width as required by city ordinance and will meet all other requirements of the Americans with Disabilities Act. Pedestrian ramps will be provided at street and driveway intersections as shown on the current State Standard for Pedestrian Facilities. Color contrast and texturing of pedestrian ramps will be placed at street intersection ramps only as shown on the current State Standard for Pedestrian Facilities. Pedestrian ramps at driveway intersections will not receive any color contrast or texturing. Metal plating for sidewalk bridges will match the typical width of the approach sidewalk. This may result in a width that is greater than shown in the standard details included in the plans."

39. "The contractor will use Best Management Practices (BMP's) to minimize erosion and sedimentation in the State Right Of Way resulting from the proposed construction. Re-vegetation of disturbed areas will be completed in accordance with TxDOT Standard Specifications. Permanent vegetative cover must achieve 70% coverage prior to project acceptance. Soil Retention Blankets may be required to prevent erosion of topsoil prior to vegetation re-establishment"

40. "Prior to seeding or re-vegetation the front slopes will be shouldered up with topsoil to eliminate any pavement edge drop-off."

41. "Mud tracked onto the roadway from the site will be immediately removed to the satisfaction of TxDOT."

42. "It will be the developer/owner's responsibility to clean out, to the state's satisfaction, any drainage structure or storm sewer system that becomes silted as a result of their operations."

43. "The adjustment of any utilities in State Right Of Way or adjacent private easement will be the responsibility of the developer/owner's."

44. "The contractor is responsible for placing and maintaining existing signs on TxDOT approved temporary mounts until permanent signs are placed."

45. "The final placement of permanent signs will be coordinated prior to placement with the local TxDOT Maintenance Supervisor."

46. "For work within the State Right Of Way where removal of materials or debris within the construction limits and not incorporated in the finished roadway section of right of way, will be disposed of in a manner acceptable to the Maintenance Supervisor at no expense to the State. Materials that are not determined to be salvageable by the Maintenance Supervisor become the property of the Contractor for proper disposal at their expense. Materials determined to be salvageable will be returned to the State and delivered to the location as determined by the Maintenance Supervisor."

47. "Regardless of errors and omissions in information provided in the plans or cross-sections the permittee is responsible for providing for positive drainage outfalls within and off the limits of the project."

47.5. "Keep the signals in operation at all times except when necessary for specific installation operations, including any modifications to existing signal heads to maintain clear visibility at all times. When it is necessary for a signal to be turned off, hire off duty police officers to control the traffic until the signals are back in satisfactory condition."

48. **(For Work in City of New Braunfels)** "All traffic signals on the state highway system within the New Braunfels city limits, with the exception of signals on IH 35, are the responsibility of the City of New Braunfels and the City of New Braunfels will perform construction inspection. Contact Garry Ford, P.E. at (830) 221-4645, 48 hours prior to the need for any inspections. Also when non-traffic signal work is being performed within 400 feet of an existing signalized intersection, flashing beacon or school zone flasher or other type of signal; if within the City of New Braunfels area of responsibility contact Garry Ford, P.E. to determine/verify the location of loop detectors, conduit, ground-boxes, etc. For all other locations, contact TxDOT representative, Eduardo Villalon, P.E., at (210) 615-6308, e-mail is Eduardo.Villalon@txdot.gov. The contractor is responsible for repair or replacement of any signal equipment damaged by construction operations. The method of repair or replacement shall be pre-approved and inspected. Depending on the type and extent of the damage, the Engineer reserves the right to perform the repair or replacement work and the Contractor will be billed for this work. When working near aerial electrical lines or utility poles, comply with Federal, State and local regulations."

49. **(For areas other than City of New Braunfels)** "When non-traffic signal work is being performed within 400 feet of an existing signalized intersection, flashing beacon or school zone flasher or other type of signal, contact TxDOT representative, Eduardo Villalon, P.E., at (210) 615-6308, e-mail is Eduardo.Villalon@txdot.gov. The contractor is responsible for repair or replacement of any signal equipment damaged by construction operations. The method of repair or replacement shall be pre-approved and inspected. Depending on the type and extent of the damage, TxDOT reserves the right to perform the repair or replacement work and the Contractor will be billed for this work. When working near aerial electrical lines or utility poles, comply with Federal, State and local regulations."

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SAN ANTONIO AUSTIN HOUSTON FORT WORTH DALLAS			
2000 NW LOOP 410 SAN ANTONIO, TX 78213 210.375.9000			
TEXAS ENGINEERING FIRM #470 TEXAS SURVEYING FIRM #10028800			
 Texas Department of Transportation			
SH 211 TURN LANES AT GALM RD			
GENERAL NOTES			
SHEET 2 OF 2			
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST	COUNTY		SHEET NO.
SAT	MEDINA		7

Control: 3544-04 County: Medina Highway: SH 211		Sheet	Control: 3544-04 County: Medina Highway: SH 211		Sheet
	*****GENERAL NOTES***** 2024 Specification Book (Revised August 7, 2024)				
G-1	--General-- The following State, District, Local and/or Utility Standards have been modified: <u>SMA-80</u> <u>TS-FD</u>		G-10	If a sanitary sewer overflow (SSO) occurs: <ol style="list-style-type: none"> 1. Attempt to eliminate the source of the SSO. 2. Contain sewage from the SSO to the extent possible to prevent contamination of waterways. 3. Call SAWS at (210) 233-2015. 	
G-3	Any materials removed and not reused and determined to be salvageable shall be stored within the project limits at an approved location or delivered undamaged to the storage yard as directed. Deface traffic signs so that they will not reappear in public as signs.		G-11	The Contractor should be aware that the "San Antonio Water System" (SAWS) will be consulted by the Engineer in matters concerning the execution of the joint bid Water and/or Sanitary work. This may include reviewing material submittals and testing related to this work, as well as inspection and observation of the actual work. As such, a SAWS employee may be reviewing submittals and test results as well as observing the construction and related operations as they progress.	
G-4	Any sign panels that are adjusted or removed and replaced, shall be done the same workday unless otherwise approved. This work shall be considered subsidiary to Item 502.		G-12	Submit locate request for SAWS water and sewer to TXDOTLocates@saws.org .	
G-5	Notify the Engineer at least two weeks prior to a proposed traffic pattern change(s) that will require a revision to traffic signals.		G-13	In accordance with the Underground Facility Damage Prevention Act (One Call Bill) the phone number for a utility locator is 811. It is the Contractor's responsibility to plan for utility locators as needed.	
G-8	Hurricane Evacuation Hurricane Season is from June 1 thru November 30. As the closest metropolitan city inland from the Texas Coast, the City of San Antonio is a major shelter destination during mandatory hurricane evacuations. As such, planned work zone lane or road closures may be restricted and/or suspended during mandatory hurricane evacuation operations. The District will coordinate these restrictions at a minimum H-120 from any projected impact to the Texas Coast. No time charges will be made if the Engineer determines that work on the project was impacted by the hurricane. The Engineer may order changes in the Traffic Control Plan to accommodate evacuation traffic, and may suspend the work, all or in part, to ensure timely completion of this work. All work to implement changes in the Traffic Control Plan will be paid through existing bid prices or through Item 9.5, Force Account. However, the Department will not entertain any request for delay damages, loss of efficiency that may be attributed to the restriction or suspension of road or lane closures, or to changes in the Traffic Control Plan.		G-14	Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way. Call or email the TxDOT offices listed below for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages incurred to the above-mentioned utilities when working without having the utilities located prior to excavation. For signal and ITS locates call TransGuide at 210-731-5136 or email sat_its_locates@txdot.gov for ITS locates and signal.request@txdot.gov for signal locates.	
G-9	The Contractor should be aware that the "City Public Service" (CPS) will be consulted by the Engineer in matters concerning the execution of the work, materials and testing related to the		G-16	The Contractor must measure the vertical clearance at each structure after the final surface of the roadway is completed and provide the vertical clearance measurement to the Engineer.	
	General Notes	Sheet A	5-1	--Item 5-- Taper ACP placed at curb inlets, traffic inlets and slotted drains.	General Notes
					Sheet B

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 Texas Department of Transportation SH 211 TURN LANES AT GALT RD			
GENERAL NOTES			
SHEET 1 OF 6			
CONT	SECT	JOB	HIGHWAY
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Control: 3544-04		Sheet	Control: 3544-04		Sheet
	County: Medina			County: Medina	
	Highway: SH 211			Highway: SH 211	
5-2	A horizontal boom or equivalent equipment is required for construction in the vicinity of the CPS Energy electric lines to provide vertical clearance of equipment during construction. Contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of pole bracing. The estimated duration for pole bracing is 6 to 10 weeks (or longer if temporary construction easements are required) after invoice is paid. For de-energizing or sleeving of the overhead electrical lines depicted on the plans, please contact CPS Energy Utility Coordination Group sixteen (16) week in anticipation of needed de-energization. The estimated duration for de-energizing is approximately 4 to 6 weeks (after invoice is paid) but could vary on system scenario and back feed requirements. De-energizing may not be possible in all instances or may be restricted during specific periods of time due to load demand. Contractor will be reimbursed for the invoice cost for pole bracing and/or de-energizing or sleeving through force account.		5-4	No extension of time or compensation payment will be granted for a delay or suspension of work caused by nesting swallows.	
5-3	Prevention of Migratory Bird Nesting		5-5	Provide a non-intrusive back-up alarm system on all heavy equipment used in close proximity to residential areas. This item is subsidiary to various bid items.	
	It is anticipated that migratory birds, a protected group of species, may try to nest on bridges, culverts, vegetation, or gravel substrate, at any time of the year. The preferred nesting season for migratory birds is from February 15 through October 1. When practicable, schedule construction operations outside of the preferred nesting season. Otherwise, nests containing migratory birds must be avoided and no work will be performed in the nesting areas until the young birds have fledged.		5-6	When a precast or cast-in-place concrete element is included in the plans, a precast concrete alternate may be submitted in accordance with "Standard Operating Procedure for Alternate Precast Proposal Submission" found online at https://www.txdot.gov/inside-txdot/form-publications/consultants-contractors/publications/bridge.html#design . Acceptance or denial of an alternate is at the sole discretion of the Engineer. Impacts to the project schedule and any additional costs resulting from the use of alternates are the sole responsibility of the Contractor.	
	Structures		7-1B	Excavation within 5 feet of an existing CPS Energy pole will require pole bracing. Contact CPS Energy utility coordination to request pole bracing (Customer Engineering 210-353-4050). The estimated duration for the pole bracing process is approximately 10 to 15 weeks.	
	Bridge and culvert construction operations cannot begin until swallow nesting prevention is implemented, until after October 1 if it's determined that swallow nesting is actively occurring, or until it's determined swallow nests have been abandoned. If the State installed nesting deterrent on the bridges and culverts, maintain the existing nesting deterrent to prevent swallow nesting until October 1 or completion of the bridge and culvert work, whichever occurs earlier. If new nests are built and occupied after the beginning of the work, do not perform work that can interfere with or discourage swallows from returning to their nests. Prevention of swallow nesting can be performed by one of the following methods:		7-3A	--Item 7-- The total disturbed area within the project is anticipated at less than one (1) acre. Due to this type of construction, the project qualifies for exclusion under the Construction General Permit (CGP) issued by the Texas Commission on Environmental Quality (TCEQ). However, should the sum of the Engineer's anticipated disturbances and the Contractor's (On ROW and off ROW) PSL's equal or exceed the one (1) acre threshold; both TxDOT and the Contractor have project responsibilities under the CGP that reverts to non-exclusion status. Obtain approval for all non-depicted areas of disturbance that increases the initial soil and vegetation disturbed area estimates before work starts at these locations.	
	1. By February 15 begin the removal of any existing mud nests and all other mud placed by swallows for the construction of nests on any portion of the bridge and culverts. The Engineer will inspect the bridges and culverts for nest building activity. If swallows begin nest building, scrape, or wash down all nest sites. Perform these activities daily unless the Engineer determines the need to do this work more frequently. Remove nests and mud through October 1 or until bridge and culvert construction operations are completed.		7-4	No significant traffic generators events identified.	
	2. By February 15 place a nesting deterrent (which prevents access to the bridge and culvert by swallows) on the entire bridge (except deck and railing) and culverts. This work is subsidiary to the various bid items.		9-1	Law Enforcement patrol vehicles must be marked as "Police".	
	General Notes	Sheet C		--Item 9-- When approved, provide uniformed, off-duty law enforcement officers with marked vehicles during work that requires a lane closure. The officer in marked vehicles shall be located as approved to monitor or direct traffic during the closure. The method used to direct traffic at	Sheet D

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SHEET 2 OF 6			
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	9

Control: 3544-04		Sheet	Control: 3544-04		Sheet
	County: Medina			County: Medina	
	Highway: SH 211			Highway: SH 211	
502-4B	Moving or adjustment of traffic signal heads, VIVDS, and radar detection for the purpose of alignment with the shifting of lanes in conjunction with the traffic control plan will be subsidiary to various bid items.		618-1	It might be necessary to cut concrete for placement of conduit. Saw cut existing concrete, remove the concrete from the steel reinforcement (bars or fabric) and bend the steel to install the conduit. After the conduit has been placed, bend the steel back to its original position and backfill the trench with an approved concrete. This work is subsidiary to this Item.	
502-4C	Coordinate with the appropriate entity (City of San Antonio, City of New Braunfels, etc.) or TxDOT when left-turn lanes are closed and/or for signal timing revisions as necessary.		618-2	The conduit depth for illumination under the City of San Antonio streets is 36 inches.	
502-5	Hauling		628-1	--Item 628-- Make all arrangements for electrical service, and compliance with local standards and practices for proper installations.	
502-5A	The use of rubber-tired equipment will be required for moving dirt or other materials along or across pavement surfaces. Where the contractor desires to move any equipment not licensed for operation on public highways, on or across pavement, they shall protect the pavement from damage as directed/approved by the Engineer.		628-2	Refer to the San Antonio District guide for "Establishing Electrical Service with CPSE".	
502-5B	Throughout construction operations, the Contractor will be required to conduct their hauling operations in a manner such that vehicles will not haul over previously recompacted subgrade or compacted base material, except in short sections for dumping manipulations.		644-1	--Item 644-- The wedge anchor system shown on State Standard Sheet SMD (TWT) is not allowed.	
502-5C	The Contractor shall keep the roadway clean and free of dirt or other materials during hauling operations. If the Contractor does not maintain a clean roadway, they shall cease all construction operations, when directed by the Engineer, to clean the roadway to the satisfaction of the Engineer.		644-2	Triangular Slipbase Systems with set screws are not allowed.	
	--Item 506--		666-1	--Item 666-- Use TY II markings (vs. an acrylic or epoxy) on asphalt surfaces as the sealer for the TY I markings, unless otherwise approved by the Engineer.	
506-1B	The Storm Water Pollution Prevention Plan (SWP3) consists of temporary erosion control measures needed and provided for under this Item. The disturbed area is less than one acre and use of erosion control measures is not anticipated. If physical conditions encountered at the job site require necessary controls, BMP installation, maintenance, and removal will be paid as extra work on a force account basis per Articles 4.4 and 9.7. An Inspector will perform a regularly scheduled SW3P inspection every 7 calendar days if erosion control measures are installed.		672-1	--Item 672-- Place all adhesive material directly from the heated dispenser to the pavement. Do not use portable or non-heated containers. Use adhesive of sufficient thickness so that when the marker is pressed into the adhesive, 1/8" or more adhesive will remain under 100% of the marker. The adhesive should extend not less than 1/2" but not more than 1 1/2" beyond the perimeter of the marker.	
506-2	Failure to address items noted on the SW3P inspection report within two report cycles may result in the Department stopping all construction operations, exclusive of time charges, or withholding that month's estimate until the SW3P deficiencies are corrected unless the Engineer determines that the area is too wet to correct SW3P deficiencies.		677-1	--Item 677-- Obtain approval before using the mechanical method for the elimination of existing thermoplastic pavement markings.	
506-3	Failure to correctly maintain daily monitoring reports and submitting to TxDOT on a daily/weekly basis may result in the monthly estimate being withheld.		680-1	--Item 680-- Furnish and install all required materials and equipment necessary for the complete and operating traffic signal installation at the following intersection: <u>SH 211 and Galm Rd.</u>	
	--Item 618--		680-2	All workers installing electrical materials, including conduit in trenches, service poles and all other system electrical apparatus, will be directly supervised by persons who have completed a TxDOT approved course in electrical underground installations. Furnish evidence of satisfactory	
	General Notes	Sheet G		General Notes	Sheet H

REV. NO.	DATE	DESCRIPTION	BY
PAPE-DAWSON ENGINEERS			
SAN ANTONIO AUSTIN HOUSTON FORT WORTH DALLAS			
2000 NW LOOP 410 SAN ANTONIO, TX 78213 210.375.9000			
TEXAS ENGINEERING FIRM #470 TEXAS SURVEYING FIRM #1002880			
Texas Department of Transportation			
SH 211 TURN LANES AT GALM RD			
GENERAL NOTES			
SHEET 4 OF 6			
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	11

REV. NO.	DATE	DESCRIPTION	BY
 PAPE-DAWSON ENGINEERS			
SAN ANTONIO AUSTIN HOUSTON FORT WORTH DALLAS 2000 NW LOOP 410 SAN ANTONIO, TX 78213 210.375.9000 TEXAS ENGINEERING FIRM #470 TEXAS SURVEYING FIRM #10028800			
 Texas Department of Transportation			
SH 211 TURN LANES AT GALM RD			
GENERAL NOTES			
SHEET 5 OF 6			
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH211
DIST	COUNTY		SHEET NO.
SAT	MEDINA		12

Control: 3544-04	Sheet	Control: 3544-04	Sheet
County: Medina		County: Medina	
Highway: SH 211		Highway: SH 211	
be transmitted at a satisfactory rate from the field location to the central location. Demonstrate that the cellular modem(s) data packets are being received at the central site via a networked computer. Transportation, installation and incidentals for installation of the cellular modem(s) shall be considered subsidiary to item 680. For use when a cellular communication link will be established to Transguide.		Signal Timing Plan: The donor will prepare the traffic signal timing plan unless otherwise specified by the engineer. The traffic signal timing plan must be approved by the engineer prior to the programming and testing of the controller cabinet and assembly. Should traffic signal coordination be required, the donor will provide a coordination timing plan to enhance the operations of the system.	
680-15 Provide a submittal compliance matrix with all traffic signal submittals.	680-20 Security against theft and vandalism of all traffic signal equipment is the full responsibility of the contractor until the date of final acceptance of the project by the engineer.		
680-16 Contractor shall be responsible for field verifying the depths of the drill shafts to meet the minimum clearances specified in the plans before ordering materials.	680-21 Maintenance of all TMS equipment furnished and installed on this project is the full responsibility of the contractor until date of final acceptance of this project by the engineer. All required documentation must be turned in before TxDOT will accept project for maintenance.		
680-17 Damage to existing facilities such as traffic signal equipment, conduit, cables, etc. caused by the contractor during construction will be replaced by the contractor at no cost to TxDOT with equipment as approved by the engineer. Replace all pavements, sidewalk, curb, rip-rap or any item damaged during construction subsidiary to various bid items with no direct payment. Any damage that was not caused by the contractor during operations will be reimbursed for repair of damage caused by: motor vehicle, watercraft, aircraft, or railroad-train incident, vandalism or acts of God, such as earthquake, tidal wave, tornado, hurricane, or other cataclysmic phenomena of nature.	680-22 Perform all electrical work in accordance with the National Electrical Code and Texas Department of Transportation Specifications.		
680-18 Ensure that all TMS (Traffic Management System) equipment furnished and installed is completely compatible with the existing hardware and software located within the Transguide operations center (i.e. Transguide central software). The contractor shall contact the traffic management engineer for details on the system network architecture.	680-23 In accordance with the Underground Facility Damage Prevention Act (One Call Bill) the phone number for a utility locator is 1-800-545-6005. It is the Contractor's responsibility to make arrangements for utility locators as needed.		
680-19 Contractor shall be responsible for integrating and testing all new TMS equipment and any existing TMS equipment that is relocated into the existing network management system, subsidiary to the various bid items.	680-24 Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way. Call the TxDOT offices listed below for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages incurred to the above mentioned utilities when working without having the utilities located prior to excavation.		
Traffic signal communication package (Material and Installation subsidiary to item 680) Includes needed quantities of the following items:	--Item 682-- 682-1 Pedestrian signals may be by a different manufacturer than the vehicle signal heads.		
<ul style="list-style-type: none">- CELLULAR MODEM (CISCO MODEL IR1101) EA- ETHERNET SWITCH (MOXA MODEL EDR-810-VPN-2GSFP-T) EA- IP CAMERA (AXIS M5525-E) EA- IP CAMERA MOUNTING BRACKET (AXIS T94AO1D PENDANT KIT) EA- POWER STRIP EA- SWITCH POWER SUPPLY EA- POE POWER SUPPLY – FOR CAMERA ONLY EA- ETHERNET CABLE (COLOR CODED) LF	<ul style="list-style-type: none">682-2 Cover all signal faces until placed in operation. This work is subsidiary to various bid items.682-3 All mounting attachments shall be constructed of steel pipe and mounted as shown on the plans.682-4 All signal head backplates shall be vented aluminum with a retroreflective border.682-5 All pedestrian signal heads shall be LED countdown.		
	--Item 684-- 684-1 Provide an extra 10' for each cable terminating in the controller cabinet. All cables must be continuous without splices from terminal point to terminal point. All proposed signal cable must be #12 AWG stranded copper.		
General Notes	Sheet K	General Notes	Sheet L

REV. NO.	DATE	DESCRIPTION	BY
PAPE-DAWSON ENGINEERS			
SAN ANTONIO AUSTIN HOUSTON FORT WORTH DALLAS			
2000 NW LOOP 410 SAN ANTONIO, TX 78213 210.375.9000			
TEXAS ENGINEERING FIRM #470 TEXAS SURVEYING FIRM #10028800			
Texas Department of Transportation			
SH 211 TURN LANES AT GALT RD			
GENERAL NOTES			
SHEET 6 OF 6			
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	13

ITEM	DESCRIPTION	UNIT	QTY
0100-7002	PREPARING ROW	STA	15
0110-7001	EXCAV (ROADWAY)	CY	1925
0132-7001	EMBANK (FNL)(OC)(TY A)	CY	207
0161-7002	COMPOST MANUF TOPSOIL (4")	SY	5210
0164-7012	DRILL SEED (PERM_URBAN_CLAY)	SY	5210
0168-7001	VEGETATIVE WATERING	TGL	84
0247-7176	FL BS (CMP IN PLC)(TYA GR1-2)(FNAL POS)	CY	1016
0260-7001	LIME (COM OR QK)(SLURRY) OR QK(DRY)	TON	55
0260-7024	LIME TRT(SUBGRADE)(6")	SY	3290
0310-7013	PRIME COAT(MC-30 OR AE-P)	GAL	610
0341-7006	D-GR HMA TY-B PG70-22	TON	315
0341-7032	D-GR HMA TY-C SAC-B PG76-22	TON	344
0341-7082	TACK COAT	GAL	313
0416-7044	DRILL SHAFT (TRF SIG POLE) (36 IN)	LF	39
0464-7021	RC PIPE (CL IV)(24 IN)	LF	212
0467-7001	SET (PIPE RUNNER ASSEMBLY)	EA	2
0467-7328	SET (TY II) (24 IN) (RCP) (6: 1) (P)	EA	4
0502-7001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	4
0503-7002	PORTABLE CHANGEABLE MESSAGE SIGN	EA	2
0505-7001	TMA (STATIONARY)	DAY	120
0506-7002	ROCK FILTER DAMS (INSTALL) (TY 2)	LF	160
0506-7011	ROCK FILTER DAMS (REMOVE)	LF	160
0506-7020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	111
0506-7024	CONSTRUCTION EXITS (REMOVE)	SY	111
0529-7001	CONC CURB (TY I)	LF	85
0618-7054	COND (PVC) (SCH 80) (2")	LF	125
0618-7055	COND (PVC) (SCH 80) (2") (BORE)	LF	425
0618-7060	COND (PVC) (SCH 80) (3")	LF	100
0618-7061	COND (PVC) (SCH 80) (3") (BORE)	LF	850
0620-7009	ELEC CONDR (NO.6) BARE	LF	1590
0620-7010	ELEC CONDR (NO.6) INSULATED	LF	55
0621-7006	TRAY CABLE (4 CONDR) (12 AWG)	LF	780
0624-7008	GROUND BOX TY D (162922)W/APRON	EA	4
0628-7171	ELC SRV TY D 120/240 070(NS)AL(E)TP(O)	EA	1
0636-7001	ALUMINUM SIGNS (TY A)	SF	47
0644-7001	IN SM RD SN SUP&AM TY10BWG(1)SA(P)	EA	6
0644-7004	IN SM RD SN SUP&AM TY10BWG(1)SA(T)	EA	1
0658-7059	INSTL OM ASSM (OM-2Z)(WFLX)GND(BI)	EA	6
0666-7024	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	780
0666-7036	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	72

ITEM	DESCRIPTION	UNIT	QTY
0666-7042	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	4
0666-7066	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	4
0666-7132	REFL PAV MRK TY I(Y)(MED NOSE)(100MIL)	EA	1
0666-7175	RE PM TY II (W) 6" (SLD)	LF	2424
0666-7179	RE PM TY II (W) 8" (SLD)	LF	731
0666-7184	RE PM TY II (W) 24" (SLD)	LF	36
0666-7186	RE PM TY II (W) (ARROW)	EA	2
0666-7194	RE PM TY II (W) (WORD)	EA	2
0666-7213	RE PM TY II (Y) 6" (SLD)	LF	4520
0666-7220	RE PM TY II (Y) (MED NOSE)	EA	1
0666-7411	REFL PAV MRK TY I (W)6"(SLD)(100MIL)	LF	2798
0666-7423	REFL PAV MRK TY I (Y)6"(SLD)(100MIL)	LF	4520
0672-7002	REFL PAV MRKR TY I-C	EA	39
0672-7004	REFL PAV MRKR TY II-A-A	EA	236
0677-7001	ELIM EXT PM & MRKS (4")	LF	5840
0678-7002	PAV SURF PREP FOR MRK (6")	LF	6944
0678-7004	PAV SURF PREP FOR MRK (8")	LF	731
0678-7008	PAV SURF PREP FOR MRK (24")	LF	36
0678-7009	PAV SURF PREP FOR MRK (ARROW)	EA	2
0678-7016	PAV SURF PREP FOR MRK (WORD)	EA	2
0678-7024	PAV SURF PREP FOR MRK (MED NOSE)	EA	1
0680-7003	INSTALL HWY TRF SIG (SYSTEM)	EA	1
0680-XXX1*	TXDOT COMMUNICATION PACKAGE	EA	1
0680-XXX2*	TRAFFIC SIGNAL CONTROLLER (ECONOLITECOBALT)	EA	1
0682-7001	VEH SIG SEC (12")LED(GRN)	EA	8
0682-7002	VEH SIG SEC (12")LED(GRN ARW)	EA	1
0682-7003	VEH SIG SEC (12")LED(YEL)	EA	8
0682-7004	VEH SIG SEC (12")LED(YEL ARW)	EA	1
0682-7005	VEH SIG SEC (12")LED(RED)	EA	8
0682-7006	VEH SIG SEC (12")LED(RED ARW)	EA	1
0682-7042	BACKPLATE W/REF BRDR(3 SEC)(VENT)ALUM	EA	9
0684-7009	TRF SIG CBL (TY A)(12 AWG)(4 CONDR)	LF	910
0684-7012	TRF SIG CBL (TY A)(12 AWG)(7 CONDR)	LF	1785
0686-7039	INS TRF SIG PL AM(S)1 ARM(36')LUM	EA	1
0686-7043	INS TRF SIG PL AM(S)1 ARM(40')LUM	EA	1
0686-7047	INS TRF SIG PL AM(S)1 ARM(44')LUM	EA	1
6005-7001	ITS COM CBL (ETHERNET)	LF	215
6008-7001	RVDS (PRESENCE DETECTION ONLY)	EA	3
6008-7002	RVDS (ADVANCE DETENTION ONLY)	EA	2
6008-7009**	RADAR PRESENCE DETECTOR COMM CABLE	LF	1463

** ITEM IS SUBSIDIARY TO ITEM 0680 AND INCLUDED FOR CONTRACTOR INFORMATION ONLY
SEE GENERAL NOTES FOR A LIST OF TxDOT COMMUNICATION PACKAGE ITEMS TO
BE SUPPLIED AND INSTALLED BY THE CONTRACTOR.*

**** ITEM IS SUBSIDIARY TO ITEM 6008 AND INCLUDED FOR CONTRACTOR INFORMATION ONLY**

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Plotted on: 6/16/2025

SH 311 TURN LANES AT GALT RD

SUMMARY OF QUANTITIES

SHEET 1 OF 1

SHEET 1 OF 1			
ONT	SECT	JOB	HIGHWAY
544	04	XXX	SH 211
ST	COUNTY		SHEET NO.
AT	MEDINA		14

TCP SEQUENCE OF WORK

PHASE 1

1. INSTALL ADVANCE WARNING SIGNS ALONG PROJECT AS DIRECTED PER BC, TCP AND WZ STANDARDS SHEETS.
2. INSTALL TEMPORARY EROSION CONTROL MEASURES.
3. INSTALL TEMPORARY TRAFFIC CONTROL DEVICES INCLUDING CHANNELIZATION DEVICES AND SIGNAGE (USE TXDOT TCP (2-1)-18).
4. INSTALL PIPE RUNNER ASSEMBLY ON EXIST CULVERT J.
4. CONSTRUCT THE NORTHBOUND EMBANKMENT, AND PAVEMENT STRUCTURE WIDENING AS SHOWN IN THE PLANS.

PHASE 2

1. ADJUST TEMPORARY EROSION CONTROL MEASURES
2. INSTALL TEMPORARY TRAFFIC CONTROL DEVICES, INCLUDING CHANNELIZATION DEVICES AND SIGNAGE (USE TXDOT TCP (2-1)-18).
3. INSTALL PROPOSED CULVERT AT GALM RD.
3. INSTALL PIPE RUNNER ASSEMBLY ON PROPOSED CULVERT AT GALM RD.
3. CONSTRUCT THE SOUTHBOUND EMBANKMENT AND PAVEMENT STRUCTURE WIDENING AS SHOWN IN THE PLANS.
4. INSTALL PROPOSED TRAFFIC SIGNAL. SEE TRAFFIC SIGNAL LAYOUT FOR DETAILS.
5. INSTALL FINAL SIGNING AND SEEDING.

PHASE 3

1. PLACE FINAL PAVEMENT MARKINGS AND SIGNS AS SHOWN IN PLANS.
2. PLACE TOPSOIL AND SOD FOR PERMANENT EROSION CONTROL.
3. PERFORM FINAL CLEAN UP.
4. REMOVE EROSION CONTROL DEVICES ONCE VEGETATION IS ESTABLISHED.
5. REMOVED ADVANCED WARNING SIGNS UPON PROJECT COMPLETION.

TCP NOTES

1. CONTRACTOR SHALL PLACE 3:1 EDGE TAPER AT THE END OF EACH WORKDAY
2. CONTRACTOR TO MAINTAIN POSITIVE DRAINAGE AT ALL TIMES

DESIGN



APPROVAL



0 25 50 75

SCALE: 1" = 50'

REV. NO.	DATE	DESCRIPTION	BY
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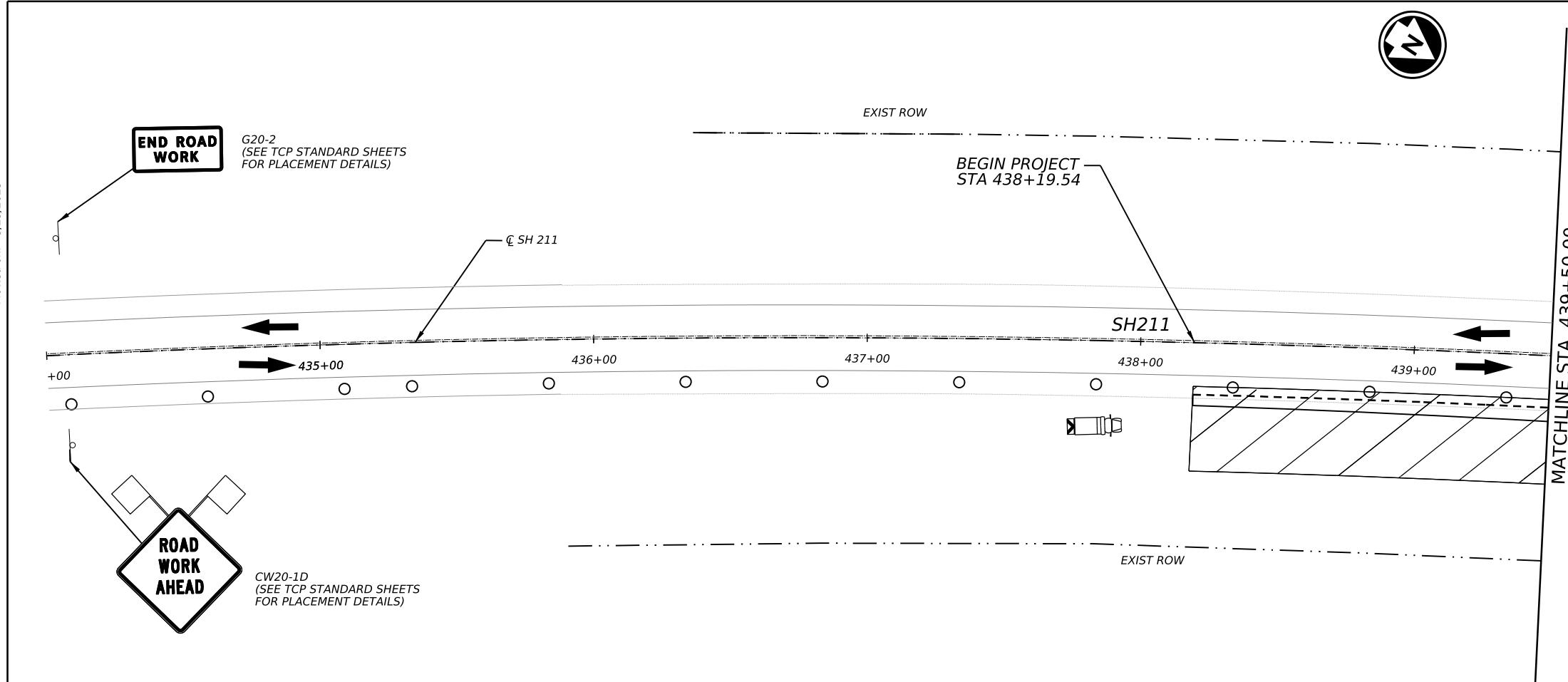
**PAPE-DAWSON
ENGINEERS**
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

Texas Department of Transportation
SH 211 TURN LANES AT GALM RD

TRAFFIC CONTROL PLAN NARRATIVE AND TYPICAL SECTIONS

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	15



DESIGN


5/29/2025

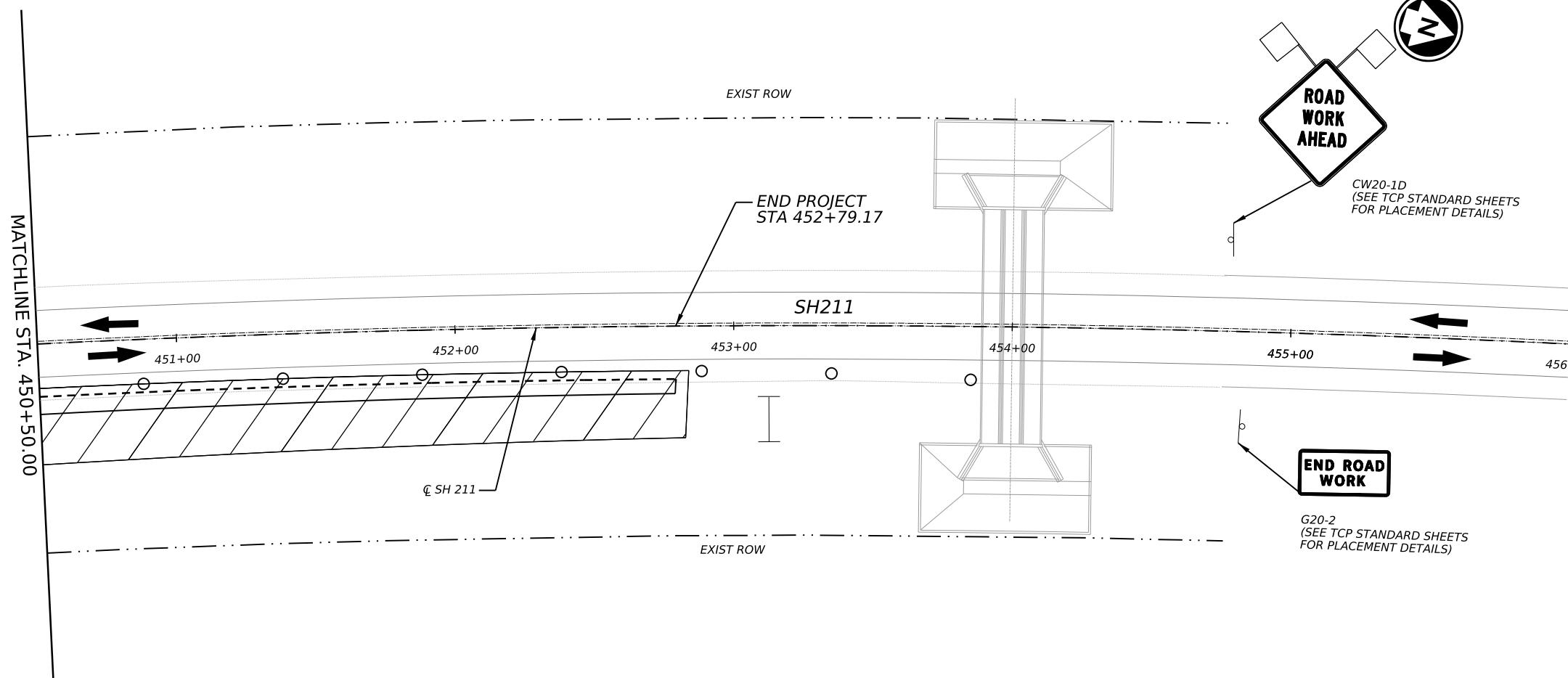
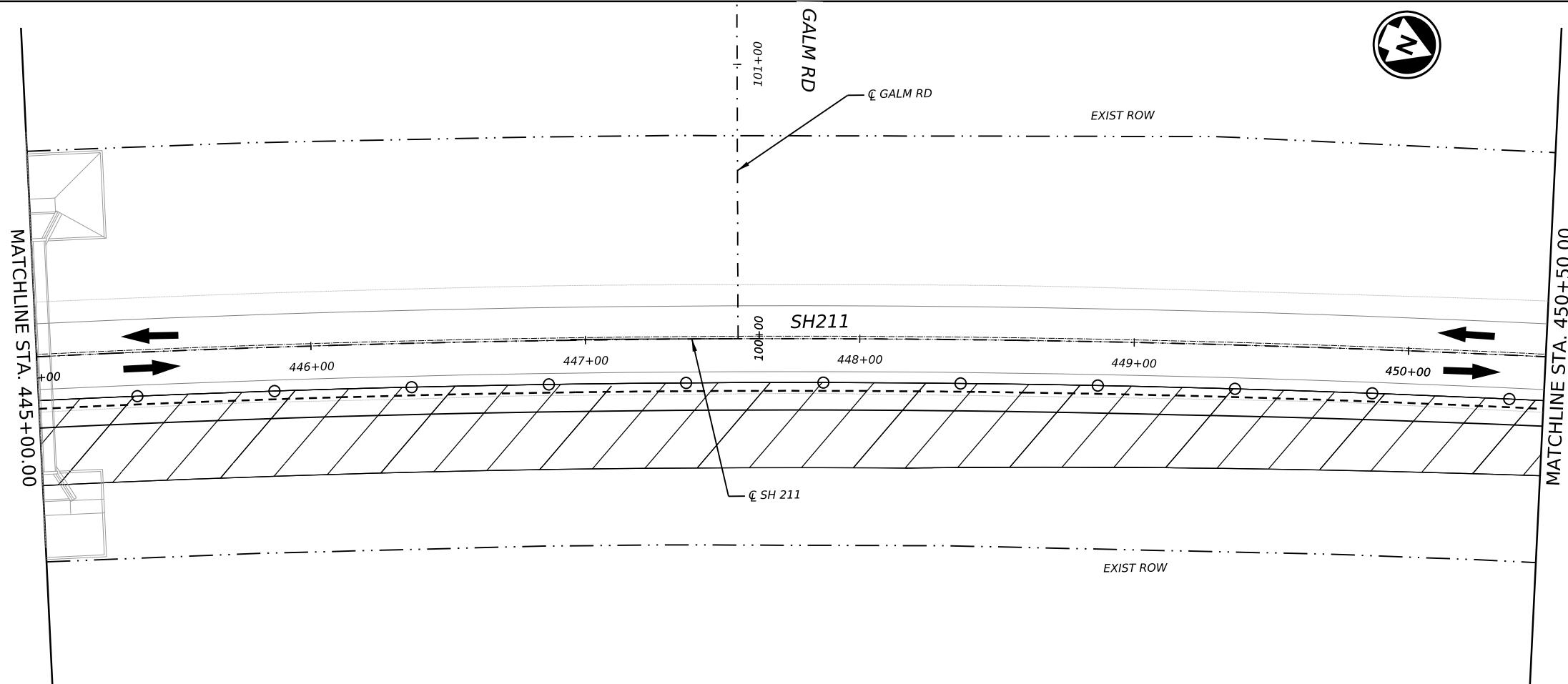
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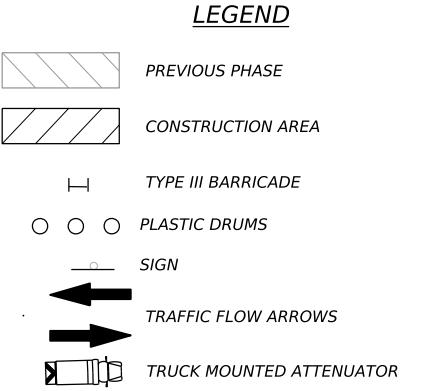
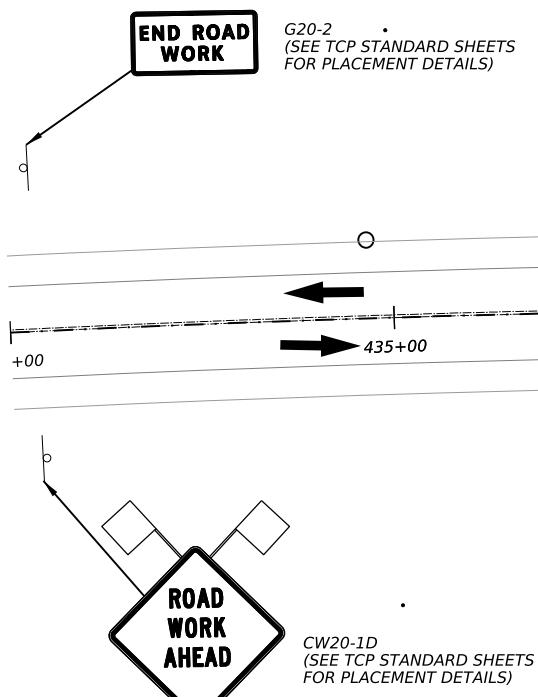
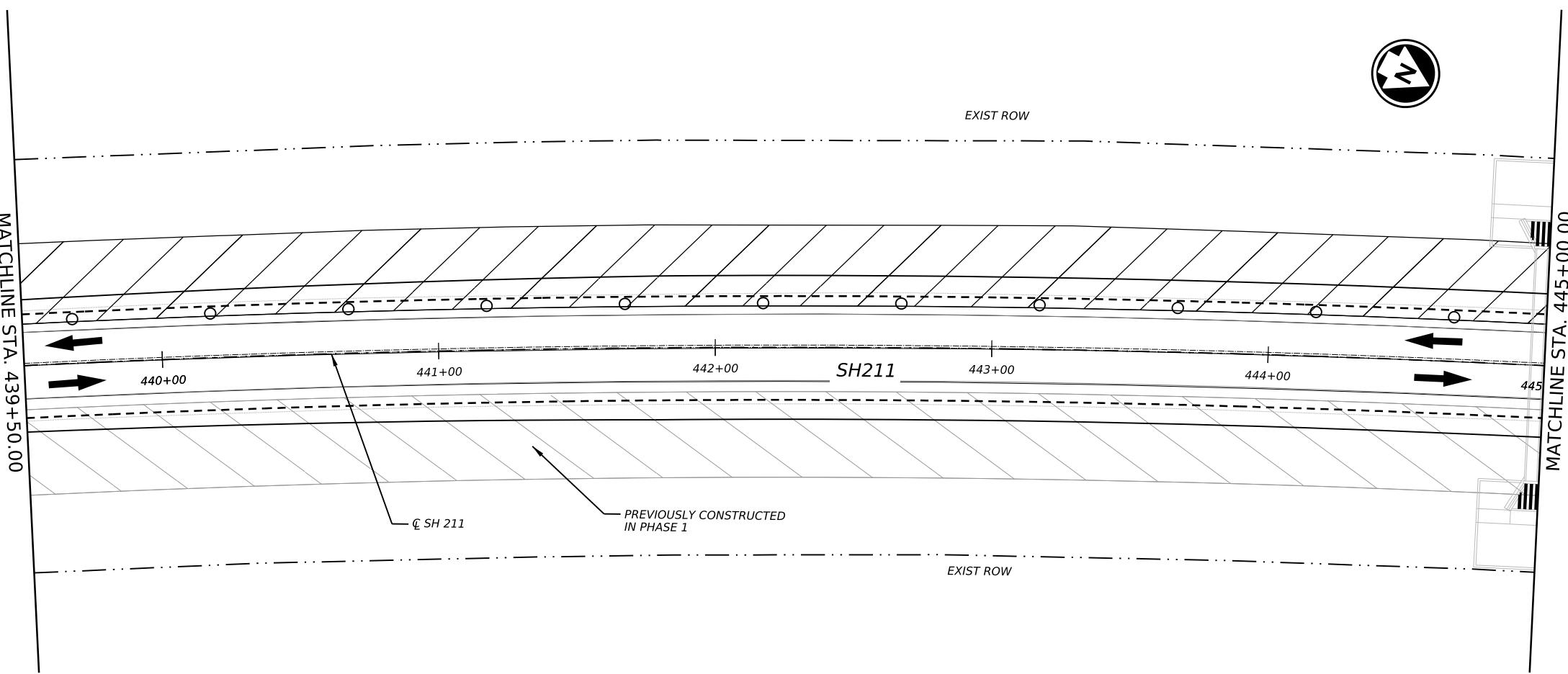

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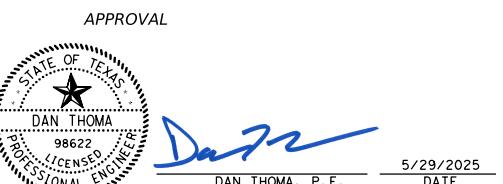
SCALE: 1" = 50'

REV. NO.	DATE	DESCRIPTION	BY
PAPE-DAWSON ENGINEERS			
SAN ANTONIO AUSTIN HOUSTON FORT WORTH DALLAS			
2000 NW LOOP 410 SAN ANTONIO, TX 78213 210.375.9000			
TEXAS ENGINEERING FIRM #470 TEXAS SURVEYING FIRM #10028800			
Texas Department of Transportation			
SH 211 TURN LANES AT GALT RD			
TRAFFIC CONTROL PLAN			
PHASE 1			
SHEET 1 OF 2			
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST	COUNTY		SHEET NO.
SAT	MEDINA		16



**NOTES:**

1. FOR ADDITIONAL DETAILS SEE TXDOT TCP STANDARD SHEETS.
2. EXISTING FEATURES ARE SHOWN SCREENED BACK.



0 25 50 75

SCALE: 1" = 50'

REV. NO. DATE DESCRIPTION BY

**PAPE-DAWSON
ENGINEERS**

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

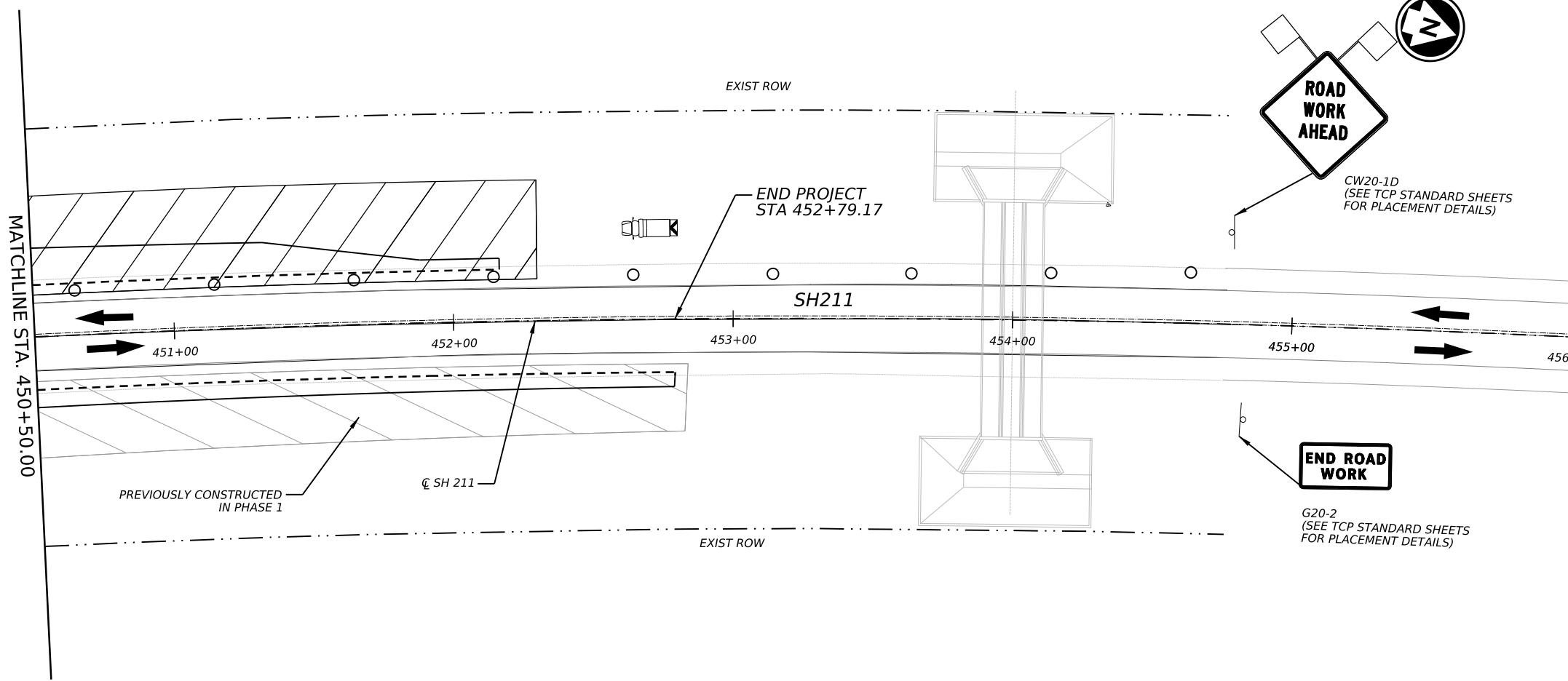
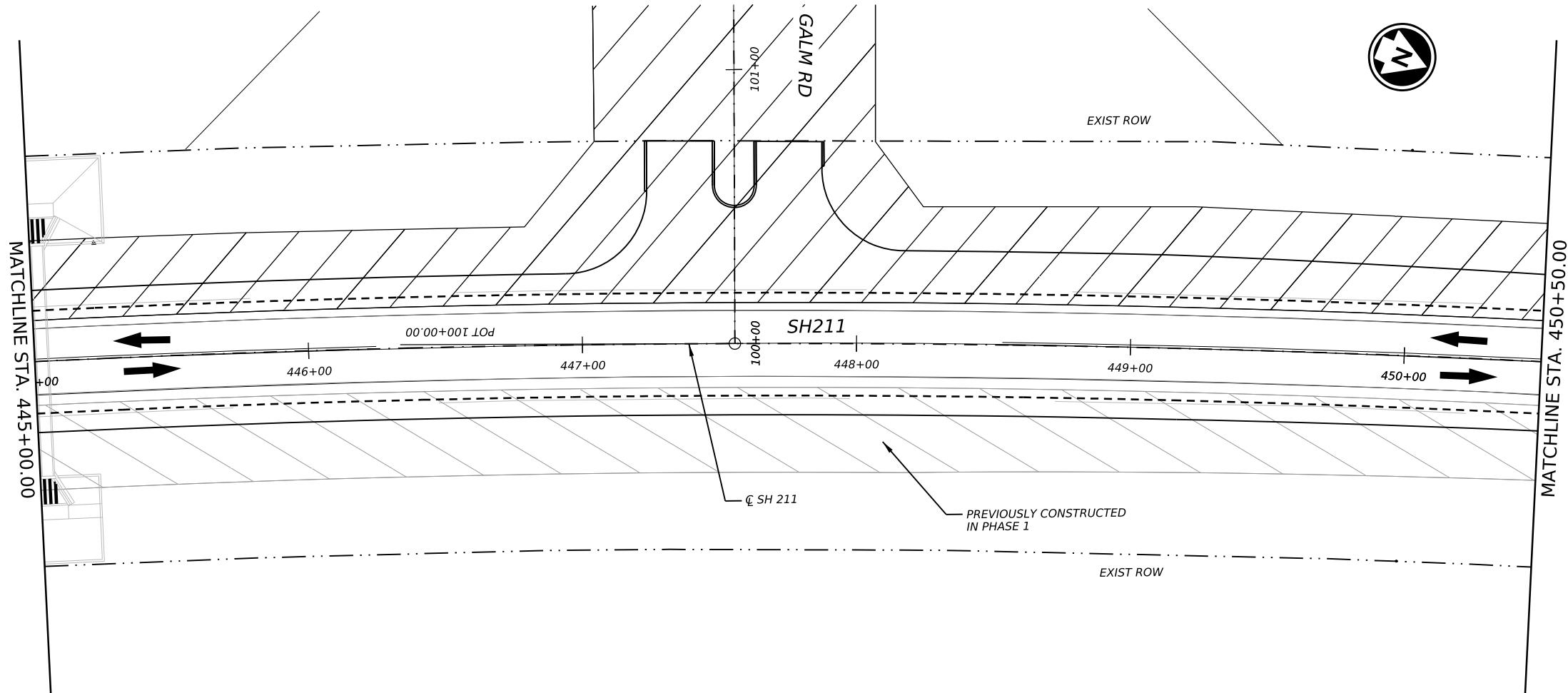
Texas Department of Transportation

SH 211 TURN LANES AT GALT RD
TRAFFIC CONTROL
PLAN

PHASE 2

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	18



BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- 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).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- 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:

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

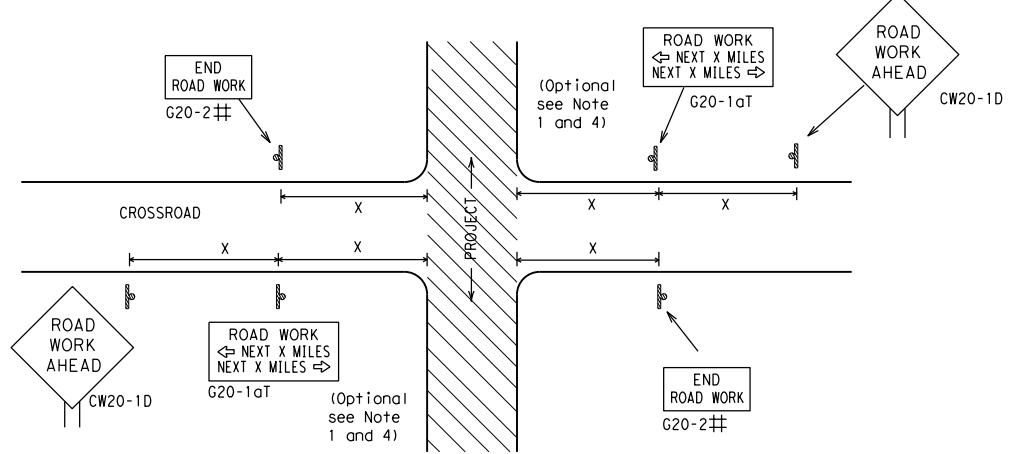
THE DOCUMENTS BELOW CAN BE FOUND ON-LINE AT
<http://www.txdot.gov>

- COMPLIANT WORK ZONE TRAFFIC CONTROL DEVICES LIST (CWZTCD)
- DEPARTMENTAL MATERIAL SPECIFICATIONS (DMS)
- MATERIAL PRODUCER LIST (MPL)
- ROADWAY DESIGN MANUAL - SEE "MANUALS (ONLINE MANUALS)"
- STANDARD HIGHWAY SIGN DESIGNS FOR TEXAS (SHSD)
- TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (TMUTCD)
- TRAFFIC ENGINEERING STANDARD SHEETS

SHEET 1 OF 12

 Texas Department of Transportation		Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS		
BC (1) - 21		
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT
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4-03	7-13	JOB
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5-10	5-21	DIST
		COUNTY
		SHEET NO.
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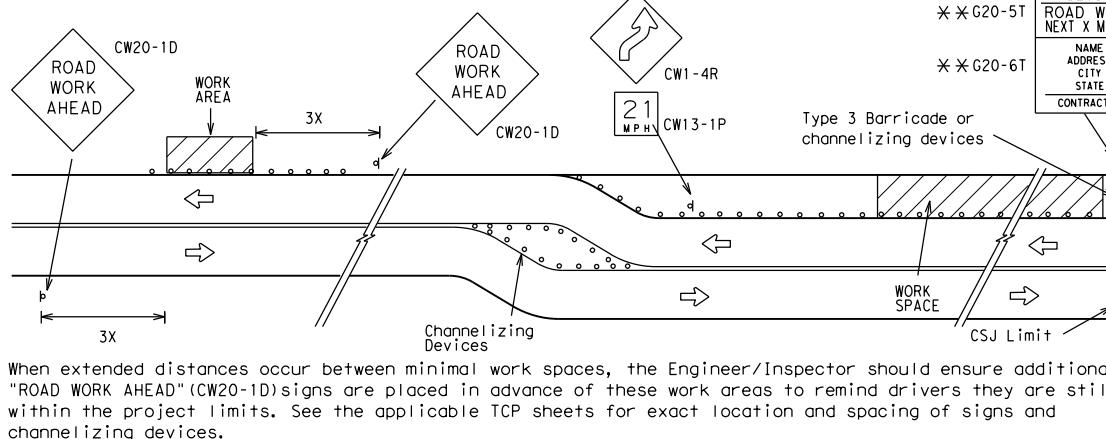
TYPICAL LOCATION OF CROSSROAD SIGNS



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

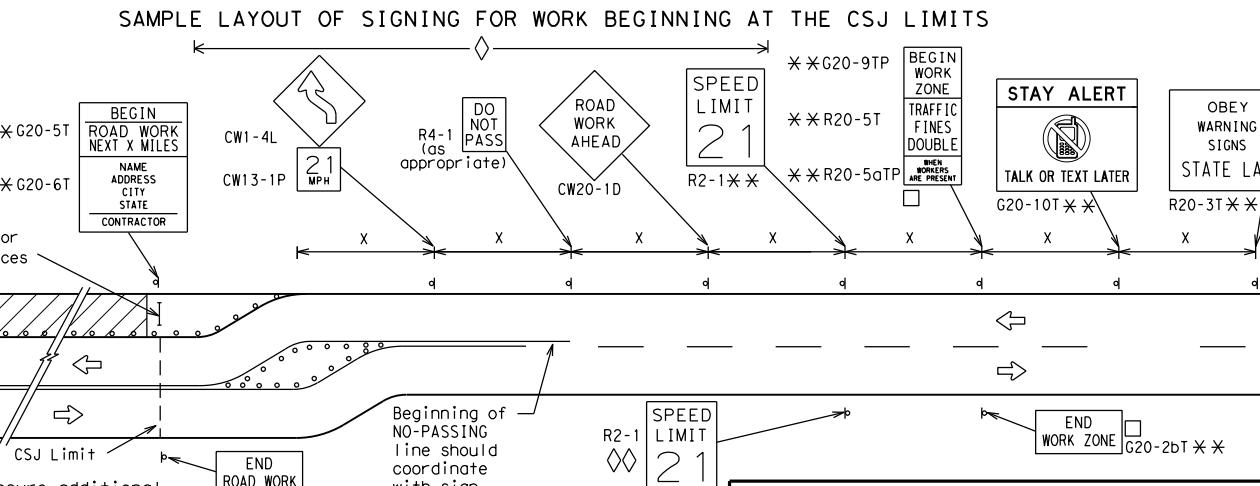
1. The typical minimum signing on a crossroad approach should be a "ROAD WORK AHEAD" (CW20-1D) sign and a (G20-2) "END ROAD WORK" sign, unless noted otherwise in plans.
2. The Engineer may use the reduced size 36" x 36" "ROAD WORK AHEAD" (CW20-1D) sign mounted back to back with the reduced size 36" x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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



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.

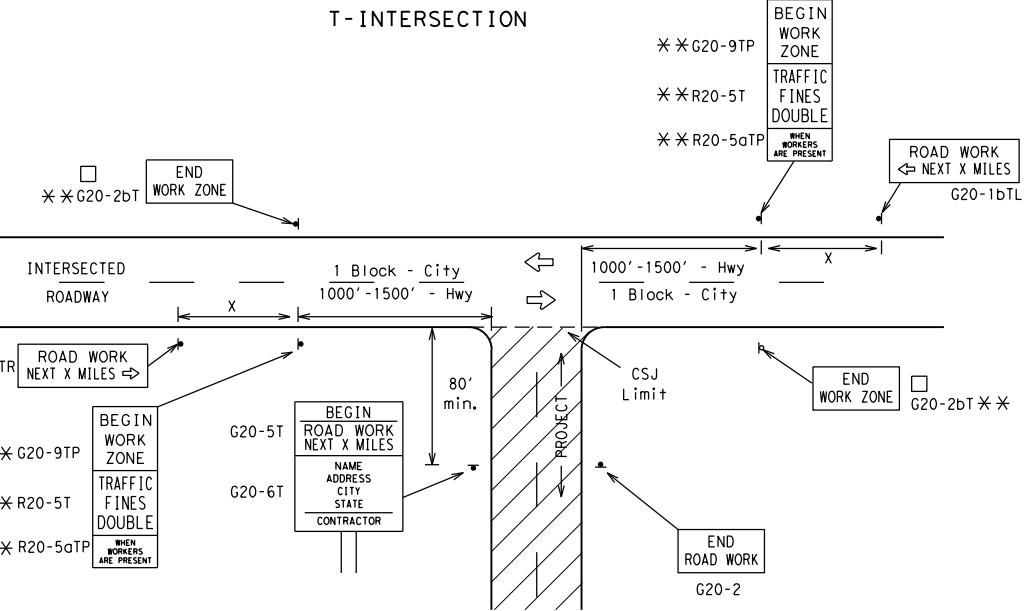
□ The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ limits where traffic fines may double if workers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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

1. The Engineer will determine the types and location of any additional traffic control devices, such as a flagger and accompanying signs, or other signs, that should be used when work is being performed at or near an intersection.
2. If construction closes the road at a T-intersection, the Contractor shall place the "CONTRACTOR NAME" (G20-6T) sign behind the Type 3 Barricades for the road closure (see BC10 also). The "ROAD WORK NEXT X MILES" left arrow (G20-1bTL) and "ROAD WORK NEXT X MILES" right arrow (G20-1bTR) signs shall be replaced by the detour signing called for in the plans.

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING^{1,5,6}

SIZE		SPACING		
Sign Number or Series	Conventional Road	Expressway/ Freeway	Posted Speed MPH	Sign △ Spacing "X"
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25			50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	55	500 ²
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
*			*	*

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

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

GENERAL NOTES

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

LEGEND

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

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 Texas Department of Transportation Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC (2) - 21

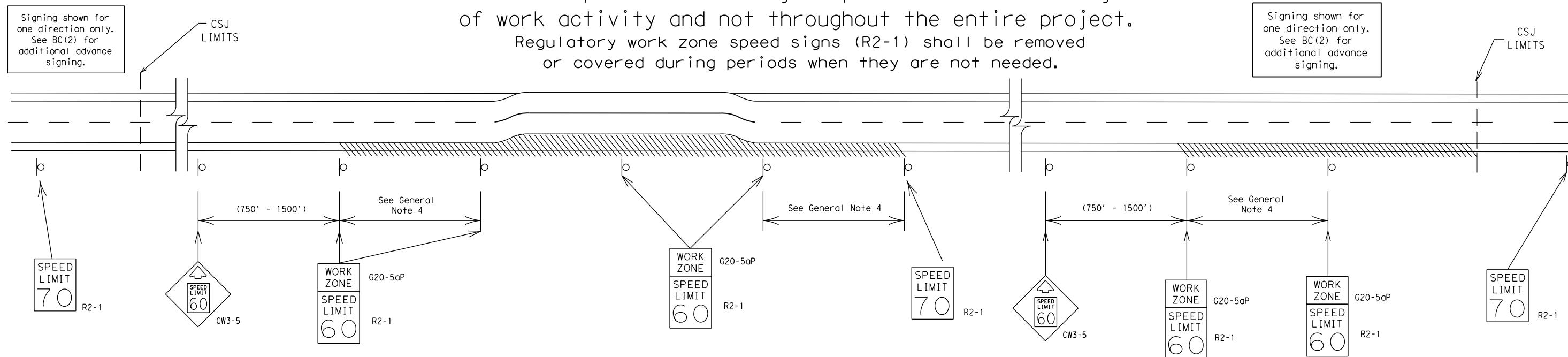
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TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

- a) rough road or damaged pavement surface
- b) substantial alteration of roadway geometrics (diversions)
- c) construction detours
- d) grade
- e) width

f) other conditions readily apparent to the driver

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

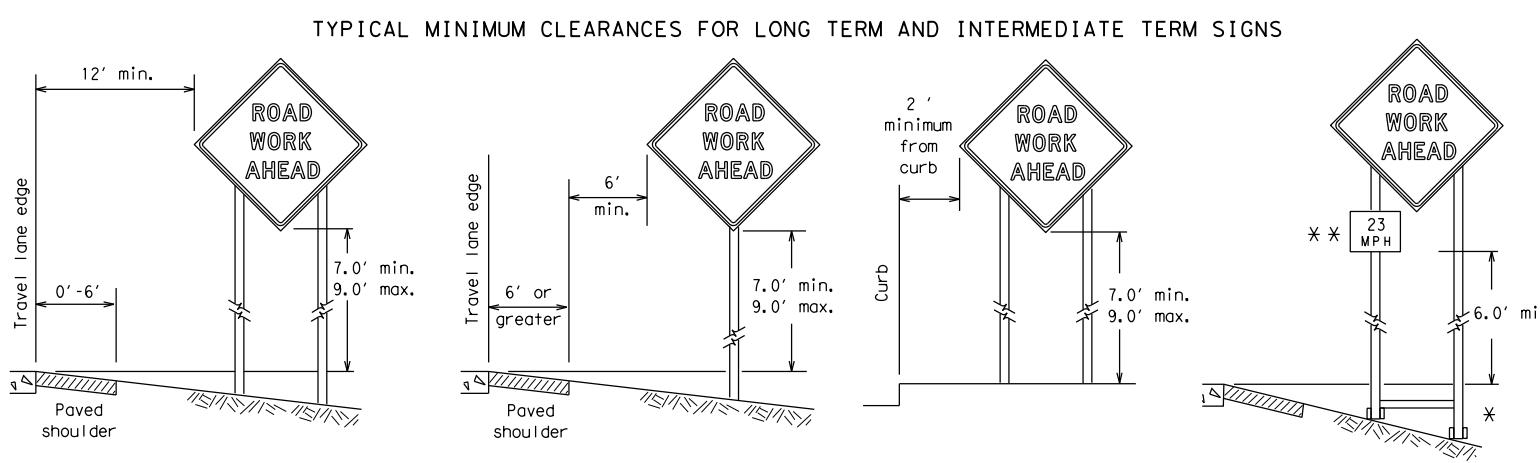
GENERAL NOTES

1. Regulatory work zone speed limits should be used only for sections of construction projects where speed control is of major importance.
2. Regulatory work zone speed limit signs shall be placed on supports at a 7 foot minimum mounting height.
3. Speed zone signs are illustrated for one direction of travel and are normally posted for each direction of travel.
4. Frequency of work zone speed limit signs should be:

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

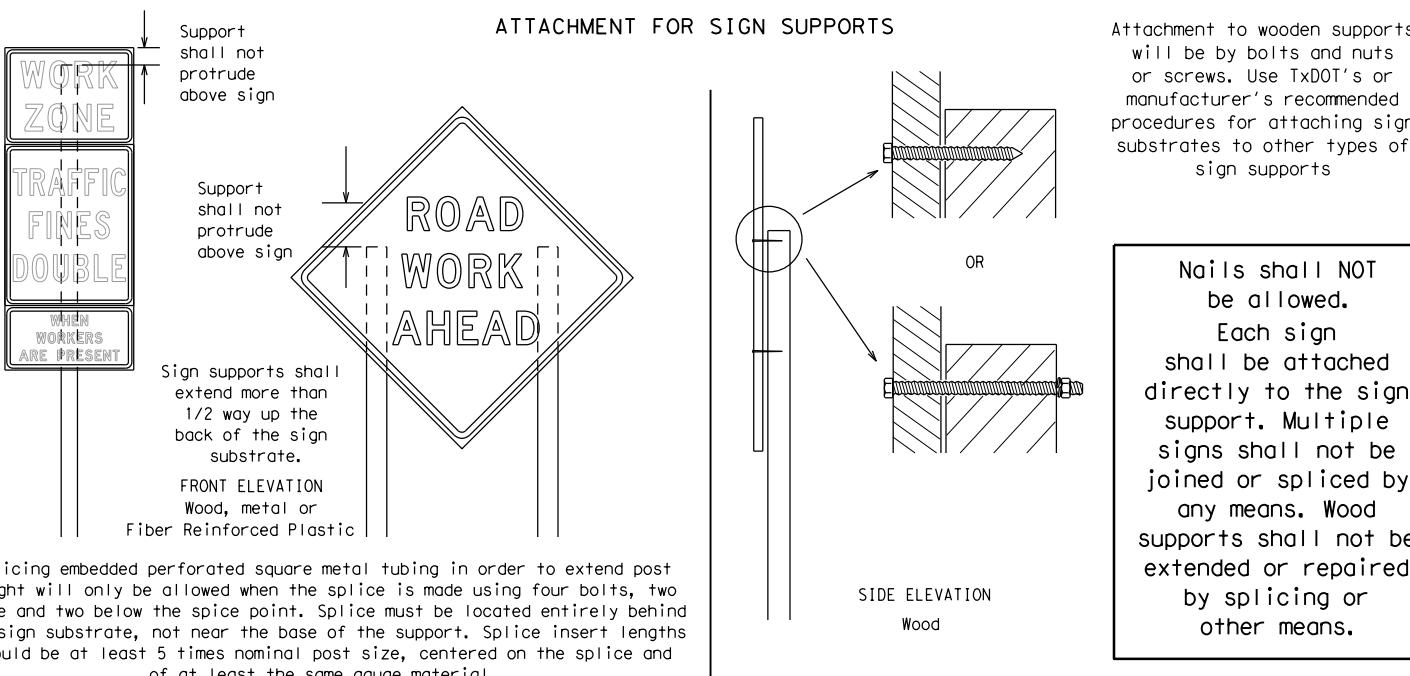
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 Texas Department of Transportation		Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT		
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* When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

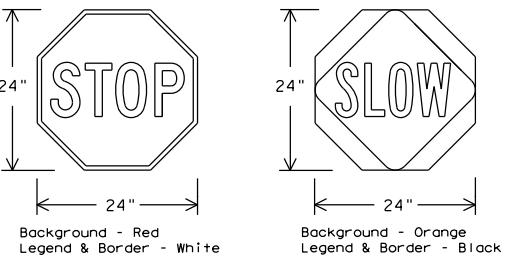
** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.



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

- STOP/SLOW paddles are the primary method to control traffic by flaggers. The STOP/SLOW paddle size should be 24" x 24".
- STOP/SLOW paddles shall be retroreflectorized when used at night.
- STOP/SLOW paddles may be attached to a staff with a minimum length of 6' to the bottom of the sign.
- 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

- 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.
- 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.
- When existing permanent signs are moved and relocated due to construction purposes, they shall be visible to motorists at all times.
- 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.
- 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.
- 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

- Contractor shall install and maintain signs in a straight and plumb condition and/or as directed by the Engineer.
- Wooden sign posts shall be painted white.
- Barricades shall NOT be used as sign supports.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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)

- 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.
 - Long-term stationary - work that occupies a location more than 3 days.
 - 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.
 - Short-term stationary - daytime work that occupies a location for more than 1 hour in a single daylight period.
 - Short, duration - work that occupies a location up to 1 hour.
 - Mobile - work that moves continuously or intermittently (stopping for up to approximately 15 minutes.)

SIGN MOUNTING HEIGHT

- 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.
- 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.
- Long-term/Intermediate-term Signs may be used in lieu of Short-term/Short Duration signing.
- 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.
- 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

- 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

- 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.
- "Mesh" type materials are NOT an approved sign substrate, regardless of the tightness of the weave.
- 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

- 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).
- White sheeting, meeting the requirements of DMS-8300 Type A, shall be used for signs with a white background.
- 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

- 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

- When sign messages may be confusing or do not apply, the signs shall be removed or completely covered.
- 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.
- 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.
- 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 shall NOT be used to cover signs.
- Duct tape or other adhesive material shall NOT be affixed to a sign face.
- Signs and anchor stabs shall be removed and holes backfilled upon completion of work.

SIGN SUPPORT WEIGHTS

- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not be permitted for use as sign support weights.
- 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.
- 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.
- 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.
- Sandbags shall NOT be placed under the skid and shall not be used to level sign supports placed on slopes.

FLAGS ON SIGNS

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

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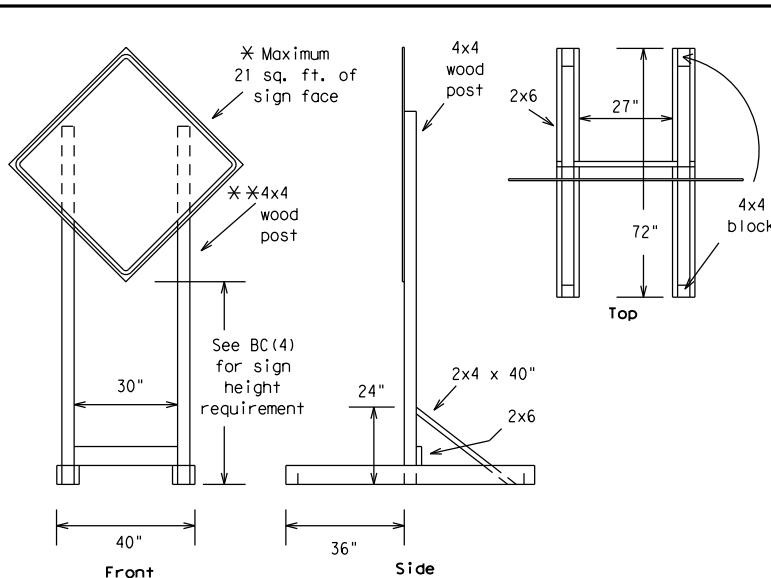
BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

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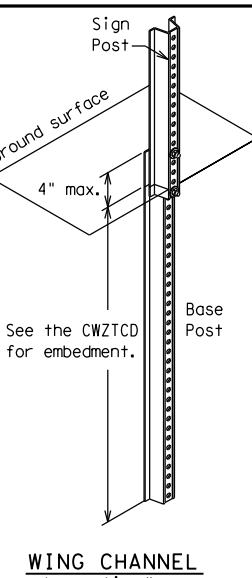
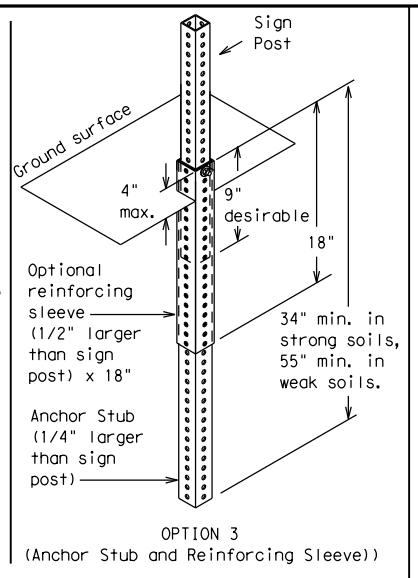
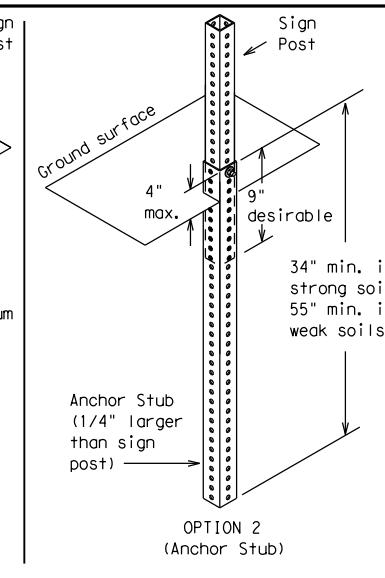
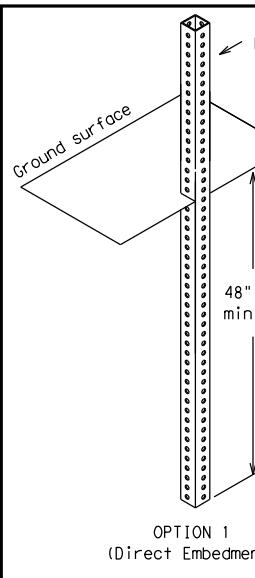
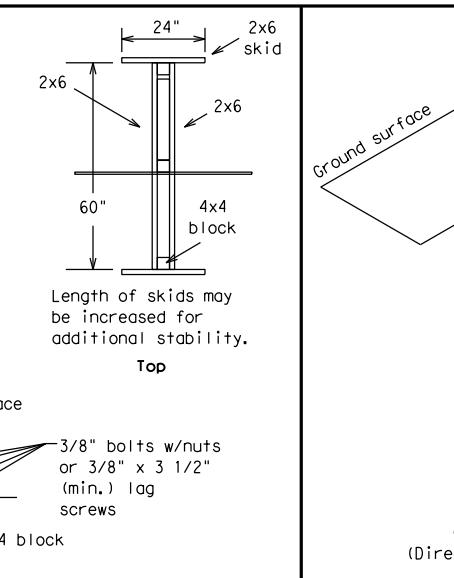
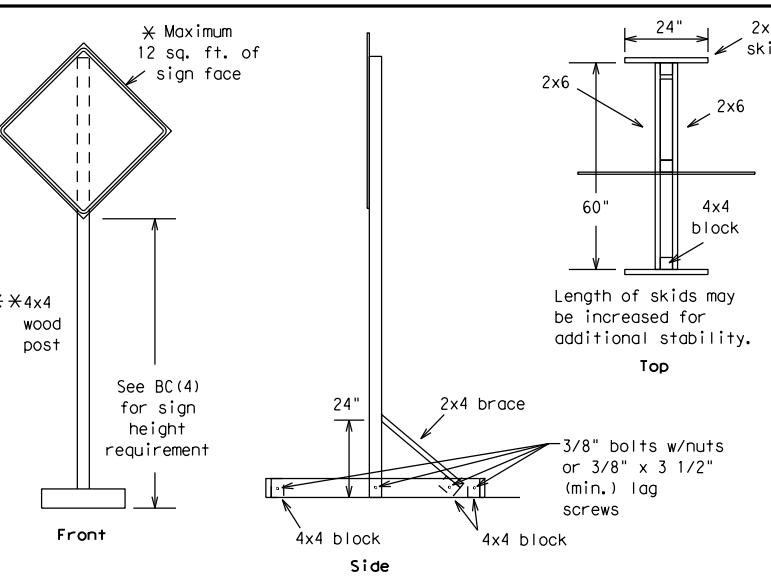
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SKID MOUNTED WOOD SIGN SUPPORTS

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



PERFORATED SQUARE METAL TUBING

GROUND MOUNTED SIGN SUPPORTS

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

WEDGE ANCHORS

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

OTHER DESIGNS

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

GENERAL NOTES

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

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

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

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

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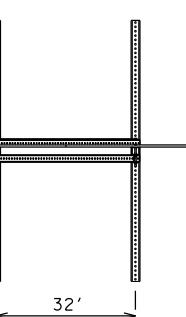
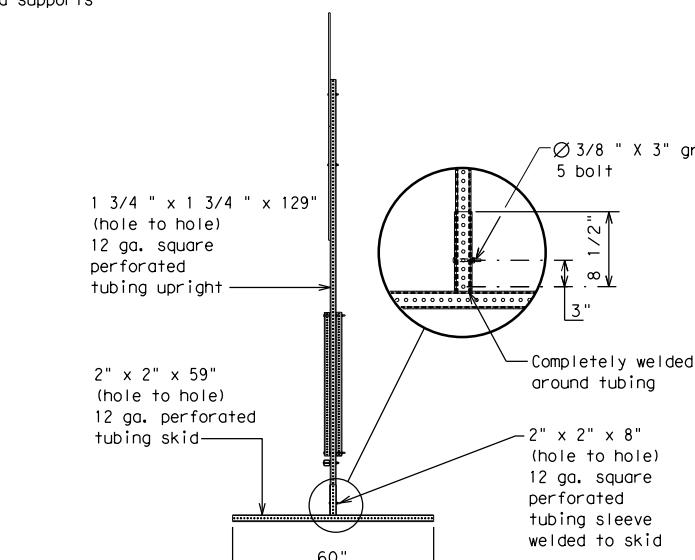
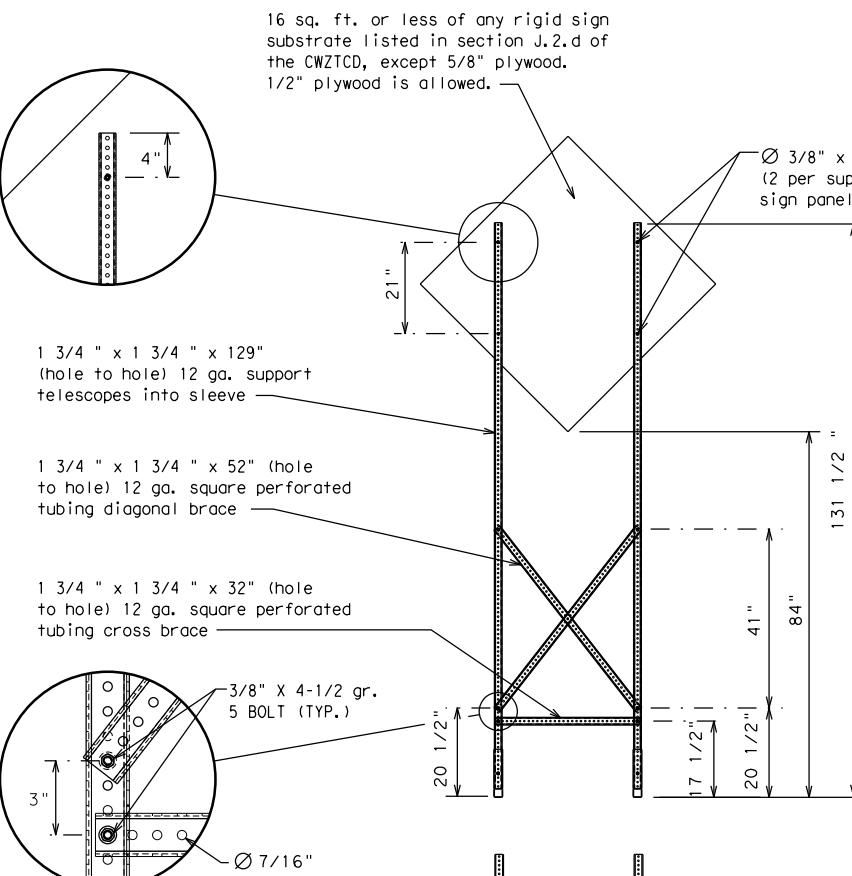
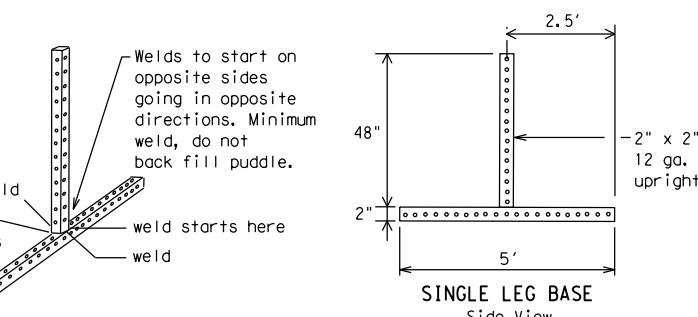
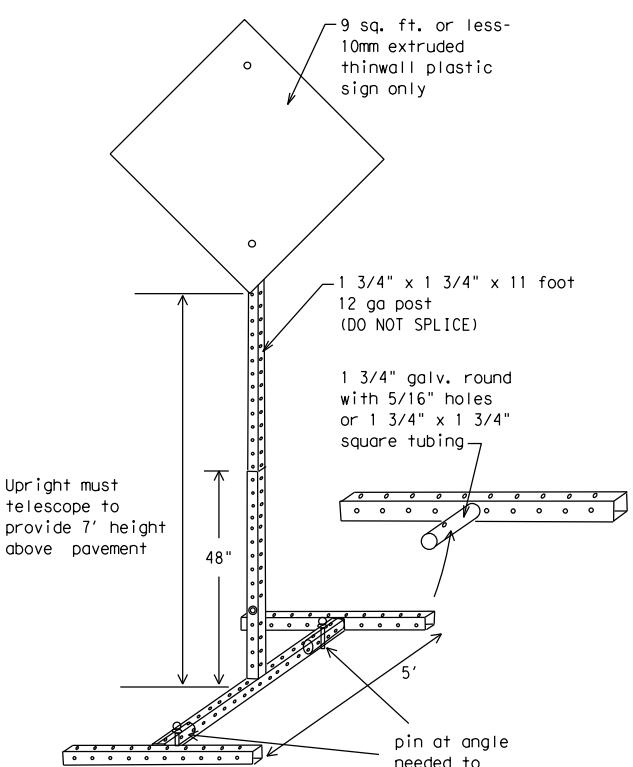


Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC (5) - 21

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SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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

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

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

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.

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
Cannot	CANT	North	N
Center	CTR	Northbound	(route) N
Construction	CONST AHD	Parking	PKNG
Ahead		Road	RD
CROSSING	XING	Right Lane	RT LN
Detour Route	DETOUR RTE	Saturday	SAT
Do Not	DONT	Service Road	SERV RD
East	E	Shoulder	SHLDR
Eastbound	(route) E	Slippery	SLIP
Emergency	EMER	South	S
Emergency Vehicle	EMER VEH	Southbound	(route) S
Entrance, Enter	ENT	Speed	SPD
Express Lane	EXP LN	Street	ST
Expressway	EXPWY	Sunday	SUN
XXXX Feet	XXXX FT	Telephone	PHONE
Fog Ahead	FOG AHD	Temporary	TEMP
Freeway	FRWY, FWY	Thursday	THURS
Freeway Blocked	FWY BLKD	To Downtown	TO DWTN
Friday	FRI	Traffic	TRAF
Hazardous Driving	HAZ DRIVING	Travelers	TRVLRS
Hazardous Material	HAZMAT	Tuesday	TUES
High-Occupancy	HOV	Time Minutes	TIME MIN
Vehicle	HWY	Upper Level	UPR LEVEL
Highway		Vehicles (s)	VEH, VEHs
Hour(s)	HR, HRS	Warning	WARN
Information	INFO	Wednesday	WED
It Is	ITS	Weight Limit	WT LIMIT
Junction	JCT	Left	LFT
Left		Left Lane	LEFT LN
Lane Closed	LN CLOSED	West	W
Lower Level	LWR LEVEL	Westbound	(route) W
Maintenance	MAINT	Wet Pavement	WET PVMT
		Will Not	WONT

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

FREEWAY CLOSED X MILE	FRONTAGE ROAD CLOSED	ROADWORK XXX FT	ROAD REPAIRS XXXX FT
ROAD CLOSED AT SH XXX	SHOULDER CLOSED XXX FT	FLAGGER XXXX FT	LANE NARROWS XXXX FT
ROAD CLSD AT FM XXXX	RIGHT LN CLOSED XXX FT	RIGHT LN NARROWS XXXX FT	TWO-WAY TRAFFIC XX MILE
RIGHT X LANES CLOSED	RIGHT X LANES OPEN	MERGING TRAFFIC XXXX FT	CONST TRAFFIC XXX FT
CENTER LANE CLOSED	DAYTIME LANE CLOSURES	LOOSE GRAVEL XXXX FT	UNEVEN LANES XXXX FT
NIGHT LANE CLOSURES	I-XX SOUTH EXIT CLOSED	DETOUR X MILE	ROUGH ROAD XXXX FT
VARIOUS LANES CLOSED	EXIT XXX CLOSED	ROADWORK PAST SH XXXX	ROADWORK NEXT FRI-SUN
EXIT CLOSED	RIGHT LN TO BE CLOSED	BUMP XXXX FT	US XXX EXIT X MILES
MALL DRIVEWAY CLOSED	X LANES CLOSED TUE - FRI	TRAFFIC SIGNAL XXXX FT	LANES SHIFT
XXXXXXXXX BLVD CLOSED			*

Other Condition List

* 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	AT FM XXXX	SPEED LIMIT XX MPH
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXX TO XXXXXX	RIGHT LANE EXIT
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION
EXPECT DELAYS	PREPARE TO STOP	REDUCE SPEED XXX FT	DRIVE SAFELY
REDUCE SPEED XXX FT	END SHOULDER USE	USE OTHER ROUTES	DRIVE WITH CARE
USE OTHER ROUTES	WATCH FOR WORKERS	STAY IN LANE	*

Location List

AT FM XXXX
BEFORE RAILROAD CROSSING
NEXT X MILES
PAST US XXX EXIT
XXXXXX TO XXXXXX
US XXX TO FM XXXX
REDUCE SPEED XXX FT
END SHOULDER USE
USE OTHER ROUTES
STAY IN LANE

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
TONIGHT XX PM-XX AM
XX AM TO XX PM
NEXT TUE AUG XX
NEXT FRI-SUN

** Advance Notice List

TUE-FRI XX AM-X PM
APR XX-25 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

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.

- 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.

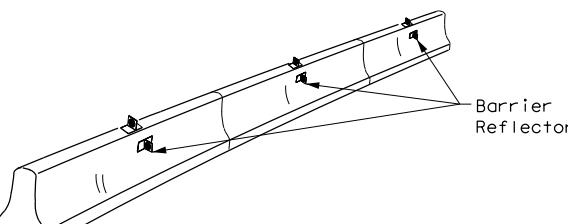
FULL MATRIX PCMS SIGNS

- 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.

SHEET 6 OF 12

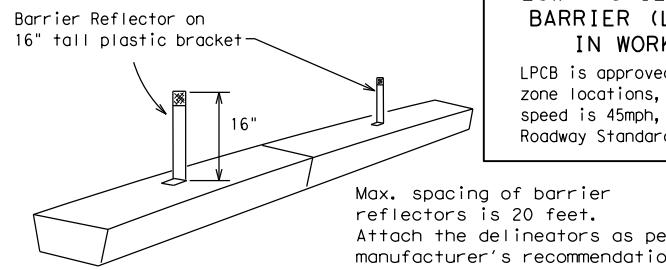
		Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)		
BC (6) - 21		
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT
	JOB	HIGHWAY
REVISIONS	3544	04
9-07	8-14	XXX
7-13	5-21	SH 211
DIST	COUNTY	SHEET NO.
SAT	MEDINA	25

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

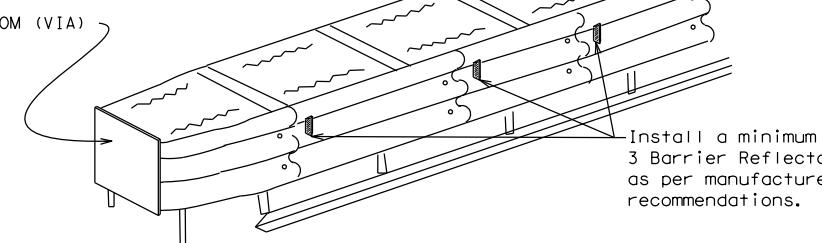


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)



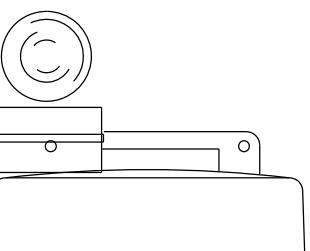
DELINEMENT OF END TREATMENTS

**END TREATMENTS FOR
CTB'S USED
IN WORK ZONES**

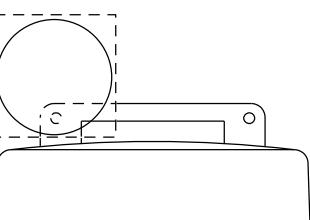
End treatments used on CTB's in work zones shall meet the appropriate crashworthy standards as defined in the Manual for Assessing Safety Hardware (MASH). Refer to the CWZTCD List for approved end treatments and manufacturers.

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS



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



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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

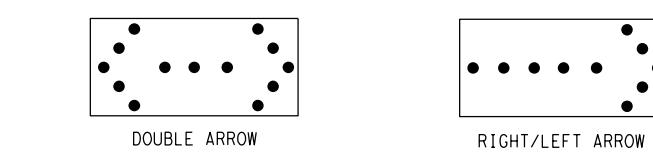
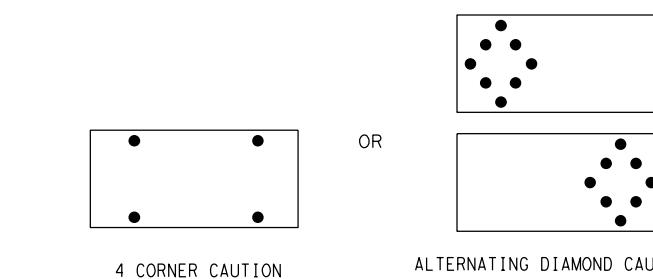
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

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

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

 Texas Department of Transportation Traffic Safety Division Standard	
BARRICADE AND CONSTRUCTION ARROW PANEL, REFLECTORS, WARNING LIGHTS & ATTENUATOR BC (7) - 21	

TRUCK-MOUNTED ATTENUATORS

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

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(C) TxDOT	November 2002	CONT	SECT	JOB		HIGHWAY			
		REVISIONS							
9-07	8-14	3544	04	XXX		SH 211			
7-13	5-21	DIST	COUNTY			SHEET NO.			
		SAT	MEDINA						

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:

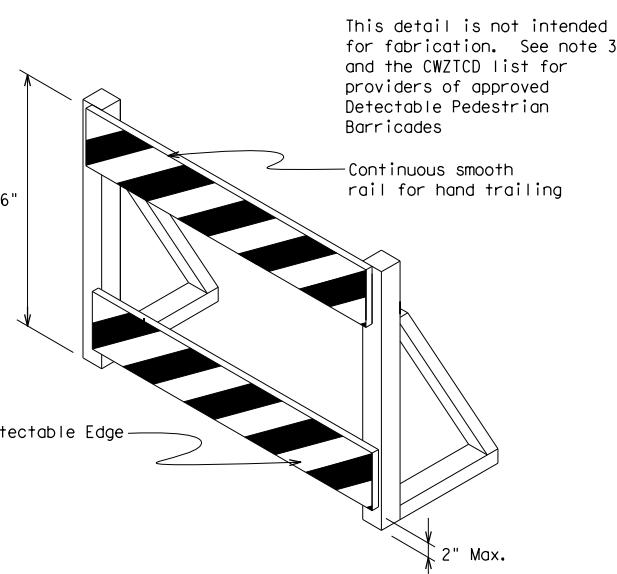
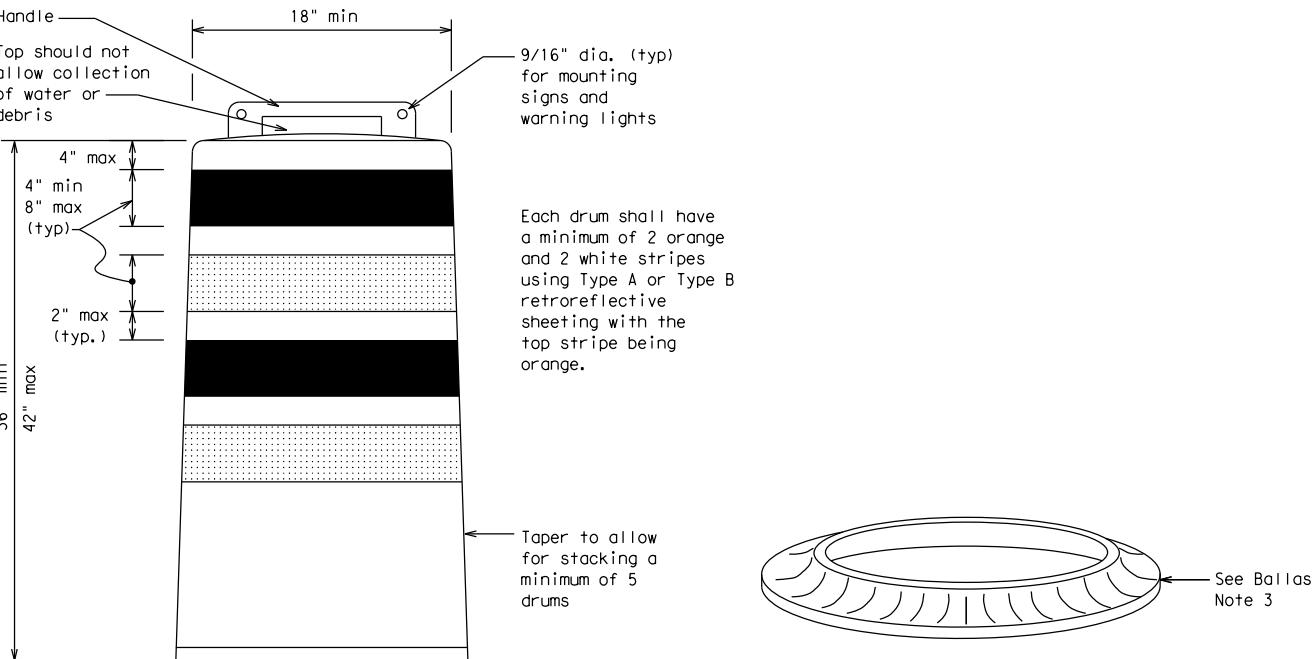
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

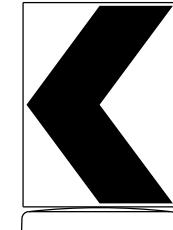
BALLAST

- 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.

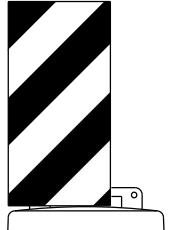


DETECTABLE PEDESTRIAN BARRICADES

- 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

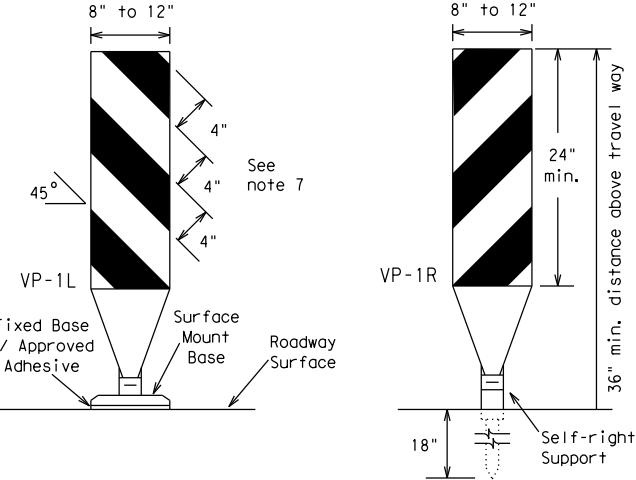
Plywood, Aluminum or Metal sign
substrates shall NOT be used on
plastic drums

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

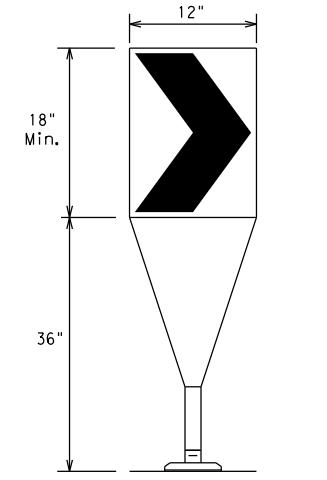
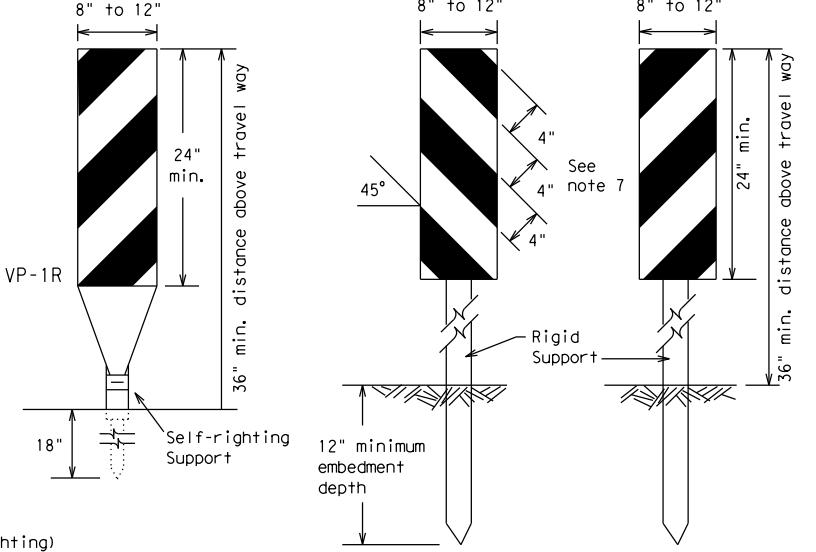
- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face 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

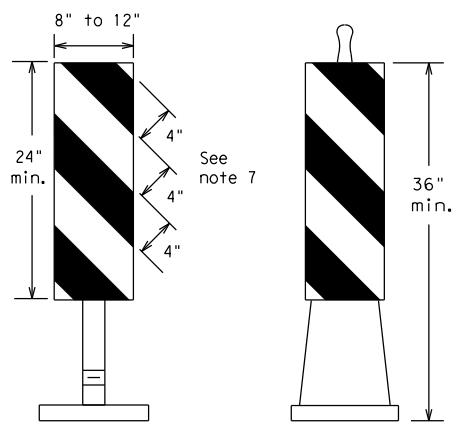
Texas Department of Transportation		Traffic Safety Division Standard
BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES		
BC (8) - 21		
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT
REVISIONS	JOB	HIGHWAY
4-03 8-14	3544 04	XXX SH 211
9-07 5-21	DIST	COUNTY SHEET NO.
7-13	SAT	MEDINA 27



FIXED
(Rigid or self-righting)



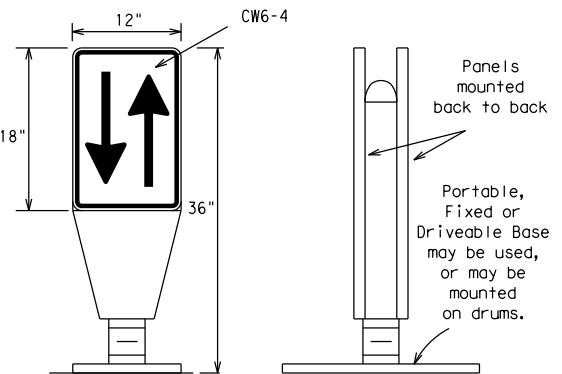
DRIVEABLE



PORTABLE

VERTICAL PANELS (VPs)

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

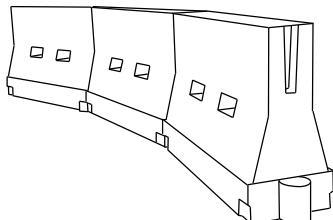


OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

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

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

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

GENERAL NOTES

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

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	WS^2	150'	165'	180'	30'	60'
35	$L = \frac{WS^2}{60}$	205'	225'	245'	35'	70'
40		265'	295'	320'	40'	80'
45		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

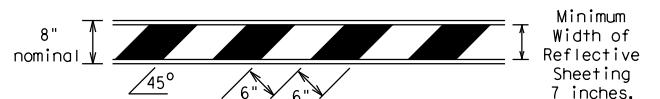
BC (9) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS	3544	04	XXX	SH 211
9-07 8-14	DIST	COUNTY		SHEET NO.
7-13 5-21	SAT	MEDINA		28

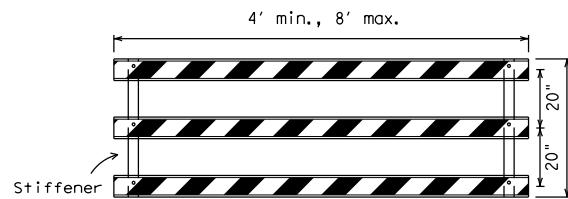
TYPE 3 BARRICADES

- 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.
- Type 3 Barricades shall be used at each end of construction projects closed to all traffic.
- 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.
- 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.
- 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".
- Barricades shall not be placed parallel to traffic unless an adequate clear zone is provided.
- Warning lights shall NOT be installed on barricades.
- 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.
- Sheeting for barricades shall be retroreflective Type A or Type B conforming to Departmental Material Specification DMS-8300 unless otherwise noted.

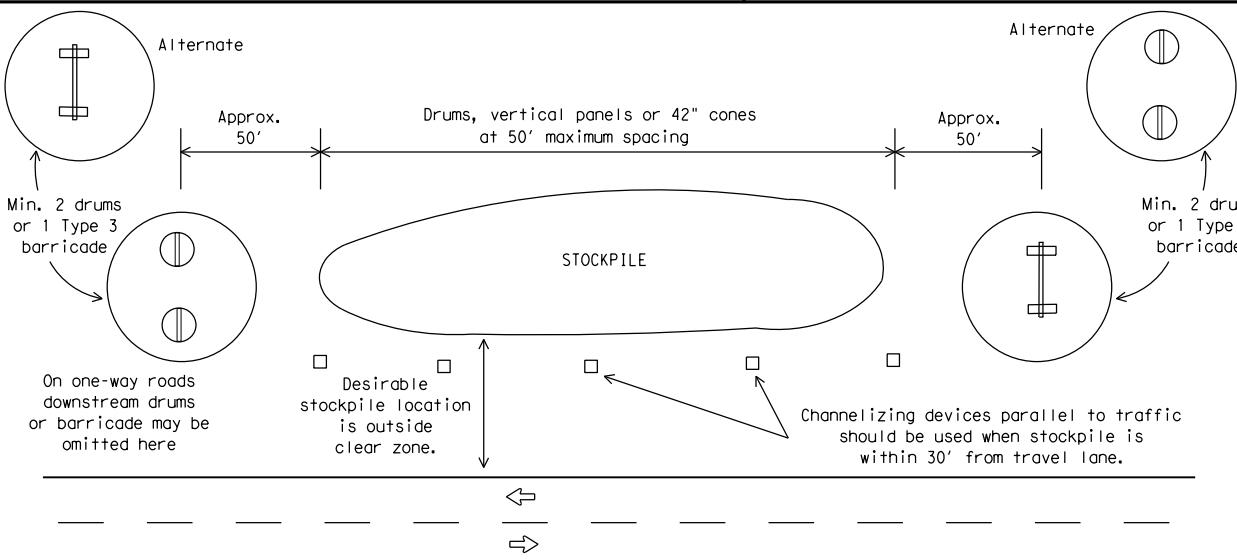
Barricades shall NOT be used as a sign support.



TYPICAL STRIPING DETAIL FOR BARRICADE RAIL

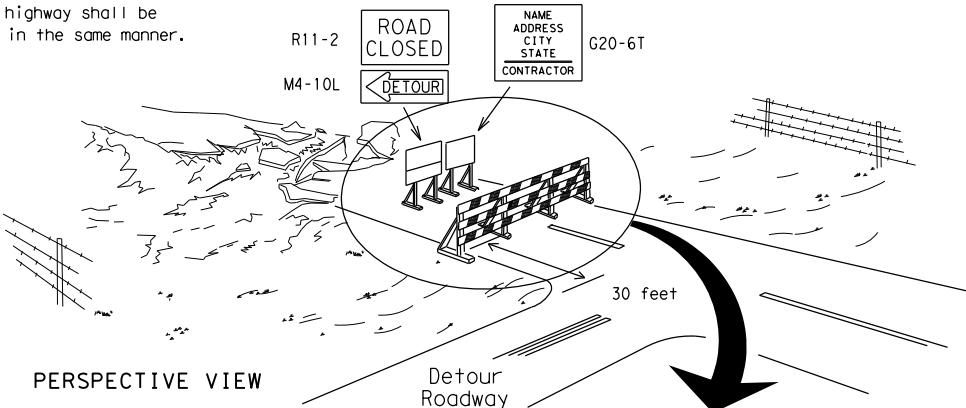


TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



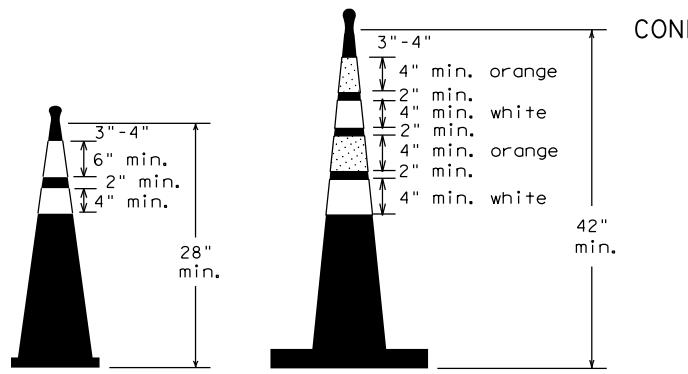
PERSPECTIVE VIEW

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.

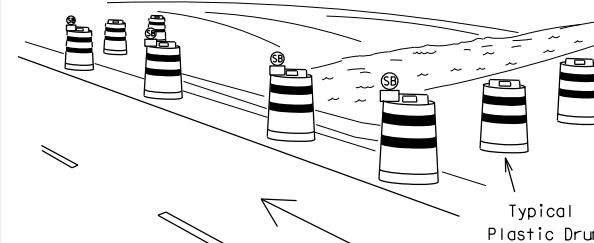
Barricade striping should slant downward in the direction of detour.

- 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.
- Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION

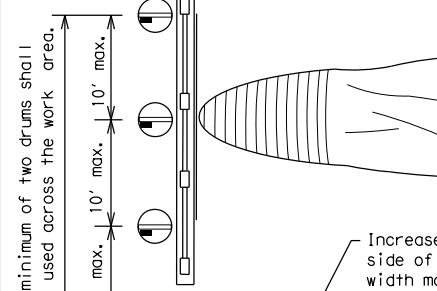


Two-Piece cones



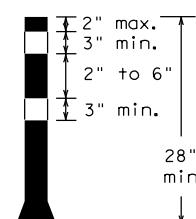
PERSPECTIVE VIEW

These drums are not required on one-way roadway



PLAN VIEW

Increase number of plastic drums on the side of approaching traffic if the crown width makes it necessary. (minimum of 2 and maximum of 4 drums)



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.

- Traffic cones and tubular markers shall be predominantly orange, and meet the height and weight requirements shown above.
- 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.
- 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.
- 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.
- 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.
- 42" two-piece cones, vertical panels or drums are suitable for all work zone durations.
- Cones or tubular markers used on each project should be of the same size and shape.

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

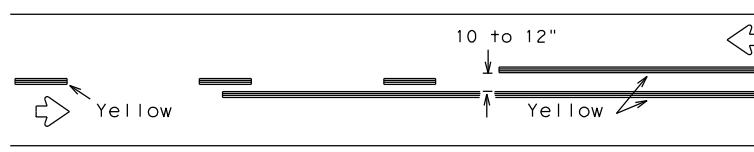
SHEET 10 OF 12

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES			
Texas Department of Transportation		Traffic Safety Division Standard	
BC (10) - 21			
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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7-13 5-21	DIST	COUNTY	SHEET NO.
	SAT	MEDINA	29

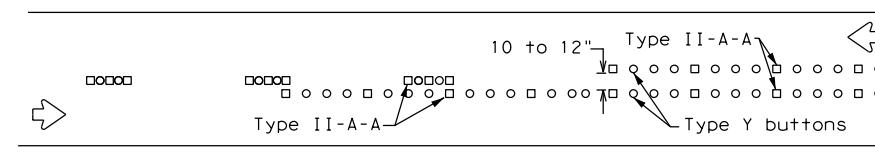
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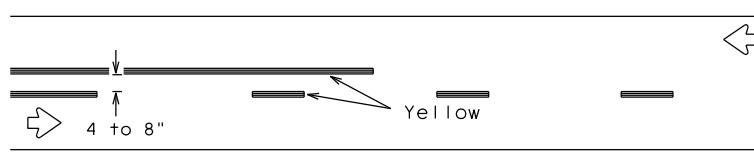
PAVEMENT MARKING PATTERNS



REFLECTORED PAVEMENT MARKINGS - PATTERN A



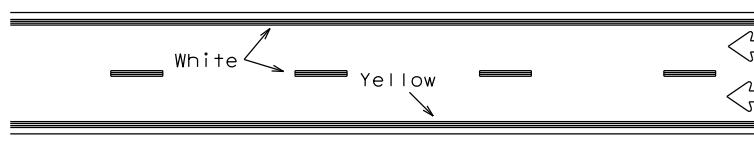
RAISED PAVEMENT MARKERS - PATTERN A



REFLECTORED PAVEMENT MARKINGS - PATTERN B

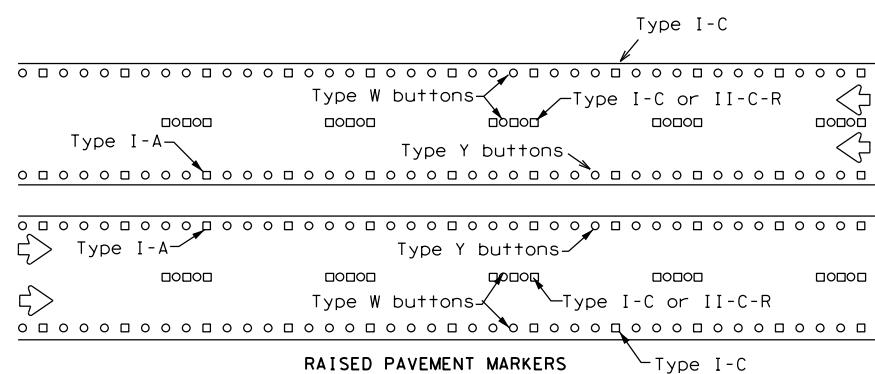
Pattern A is the TxDOT Standard, however Pattern B may be used if approved by the Engineer. Prefabricated markings may be substituted for reflectored pavement markings.

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

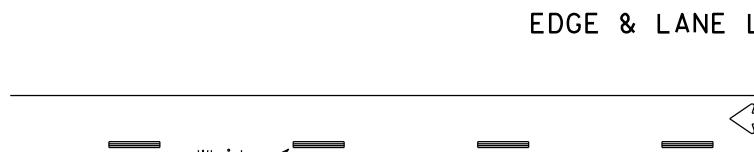


REFLECTORED PAVEMENT MARKINGS

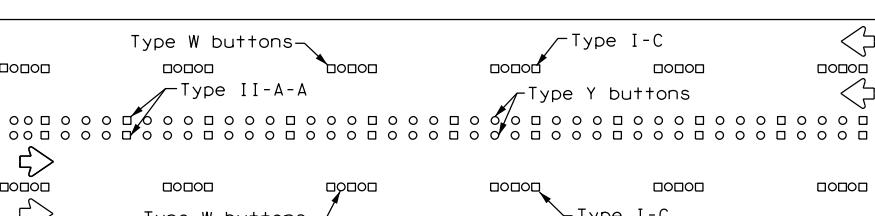
Prefabricated markings may be substituted for reflectored pavement markings.



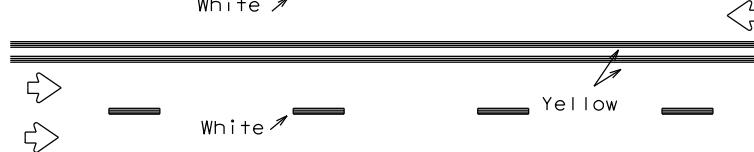
RAISED PAVEMENT MARKERS



EDGE & LANE LINES FOR DIVIDED HIGHWAY



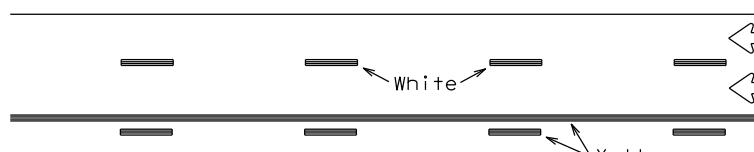
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REFLECTORED PAVEMENT MARKINGS

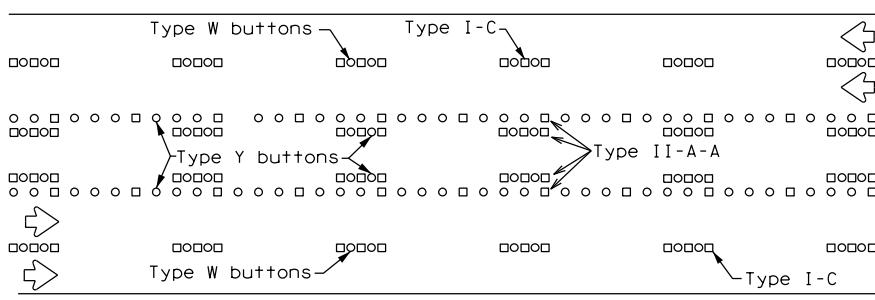
Prefabricated markings may be substituted for reflectored pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORED PAVEMENT MARKINGS

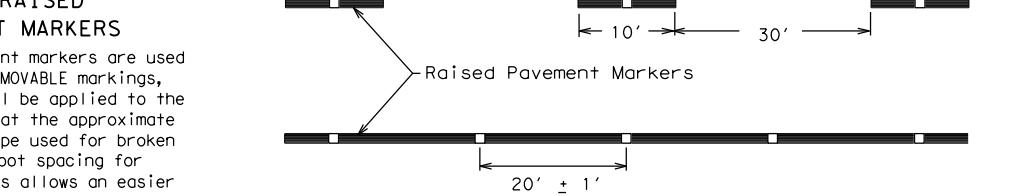
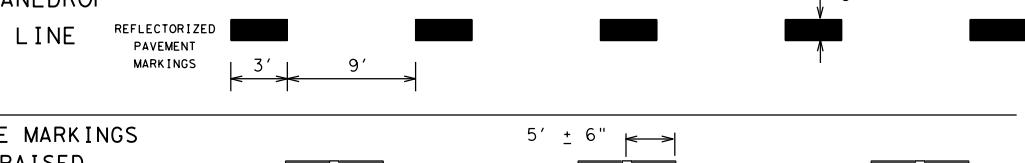
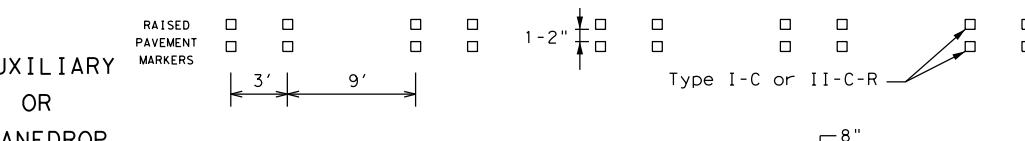
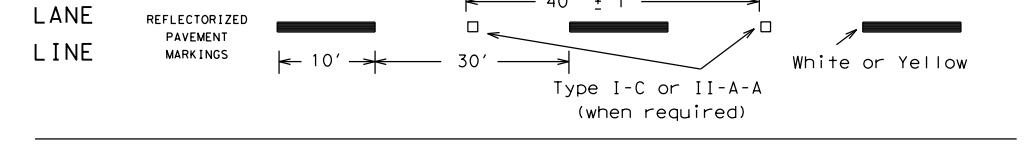
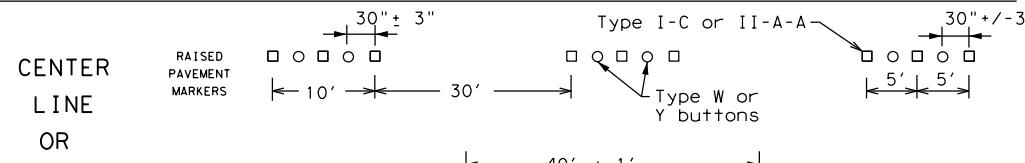
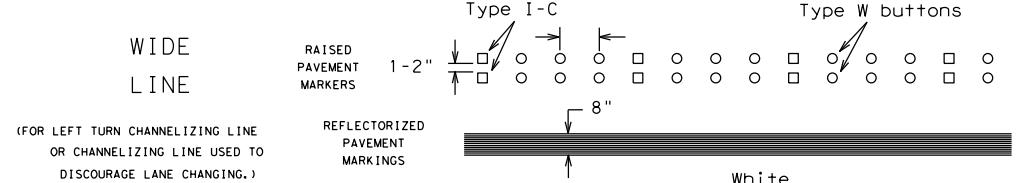
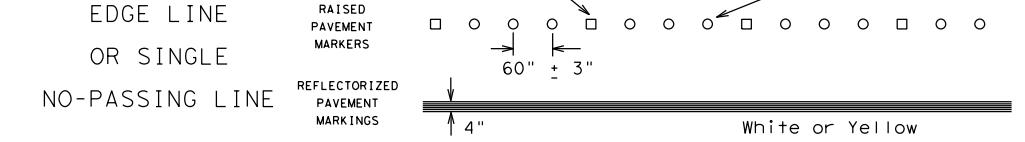
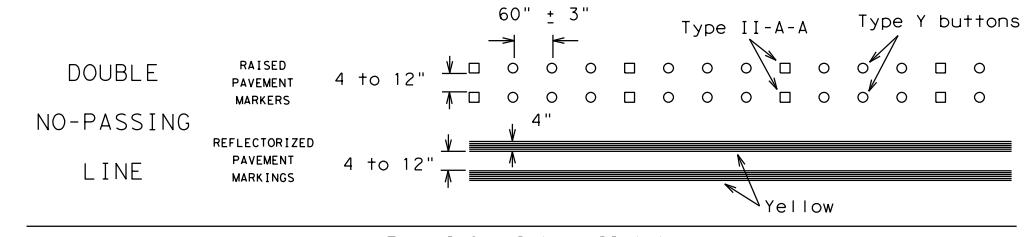
Prefabricated markings may be substituted for reflectored pavement markings.



RAISED PAVEMENT MARKERS

TWO-WAY LEFT TURN LANE

STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS



Centerline only - not to be used on edge lines

SHEET 12 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

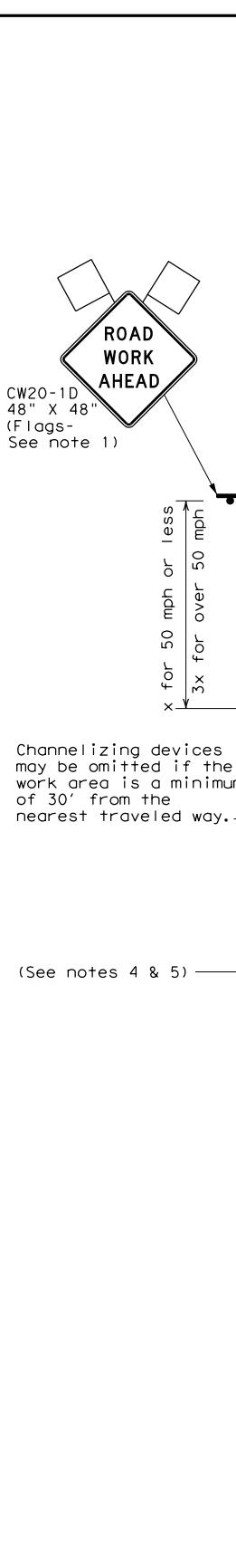
BC (12) - 21

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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2-98 7-13	DIST	COUNTY		SHEET NO.
11-02 8-14	SAT	MEDINA		31

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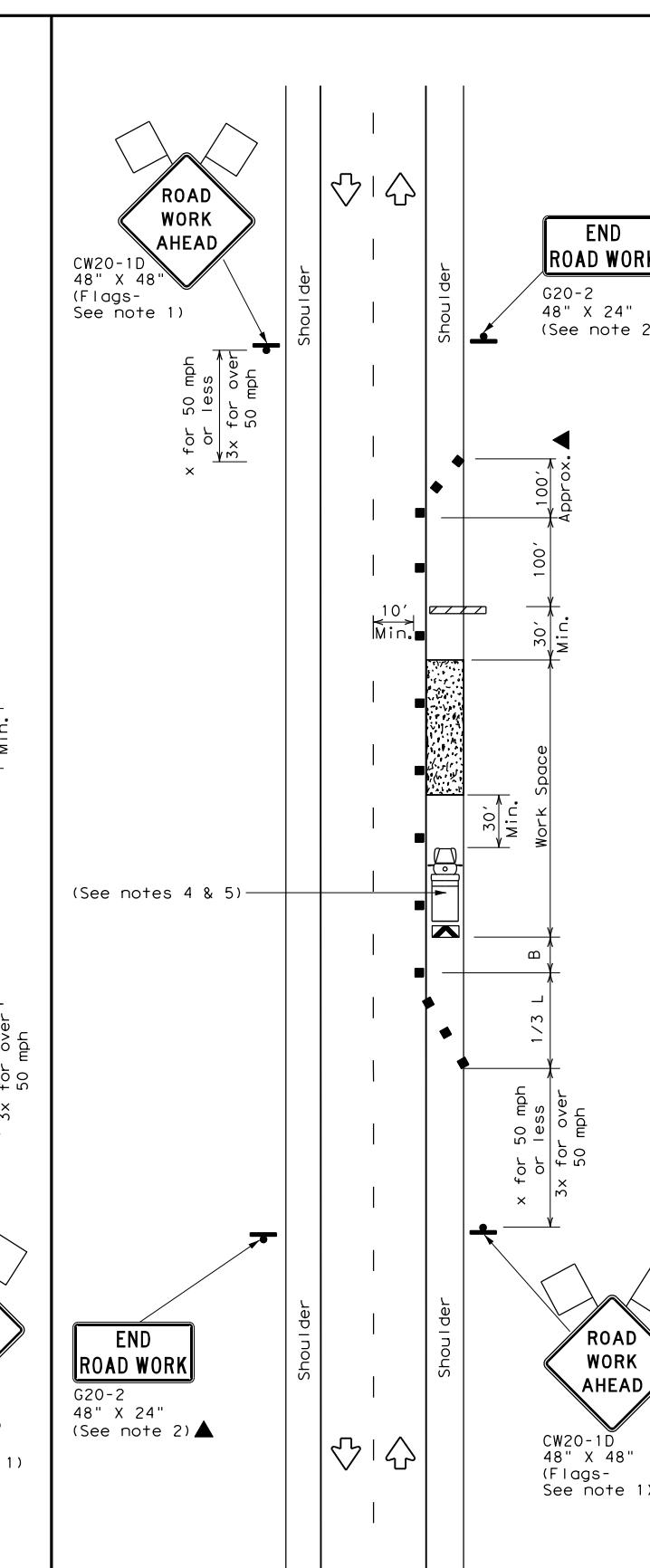
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TCP (2-1a)

WORK SPACE NEAR SHOULDER
Conventional Roads

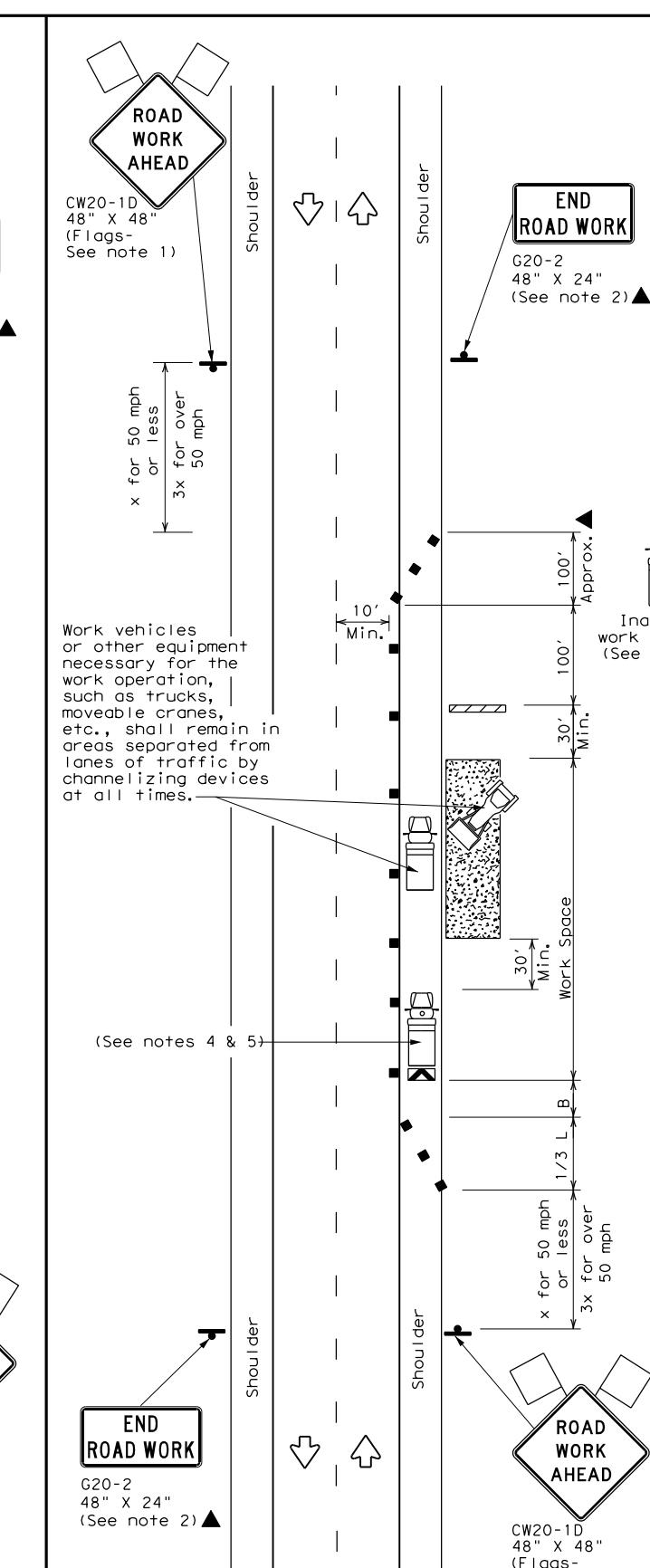
Shoulder



TCP (2-1b)

WORK SPACE ON SHOULDER
Conventional Roads

Shoulder



TCP (2-1c)

WORK VEHICLES ON SHOULDER
Conventional Roads

Shoulder

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		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.
- Inactive 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.

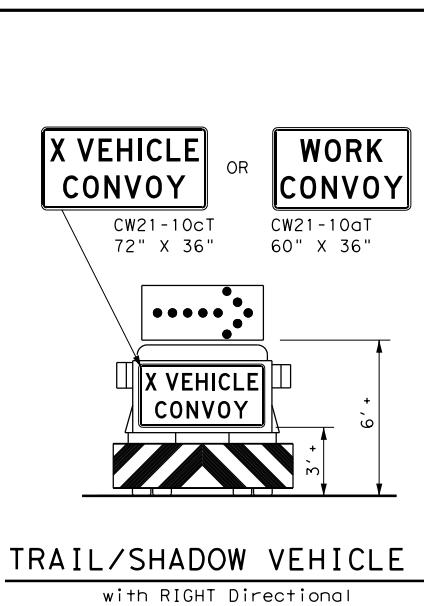
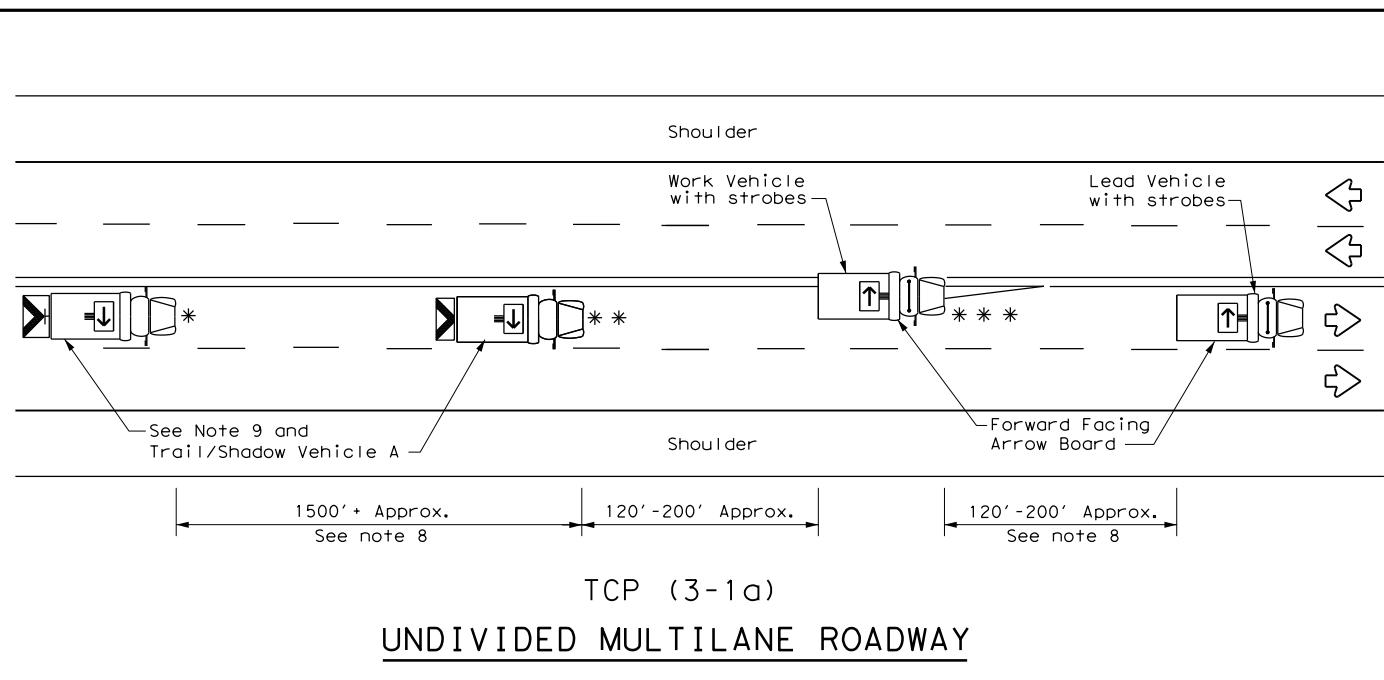


Texas Department of Transportation Traffic Operations Division Standard

TRAFFIC CONTROL PLAN CONVENTIONAL ROAD SHOULDER WORK

TCP (2-1) - 18

FILE: tcp2-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
	3544	04	XXX	SH 211
REVISIONS	DIST	COUNTY		SHEET NO.
2-94 4-98	1-97	2-12	1-97	2-18
8-95	SAT	MEDINA		32



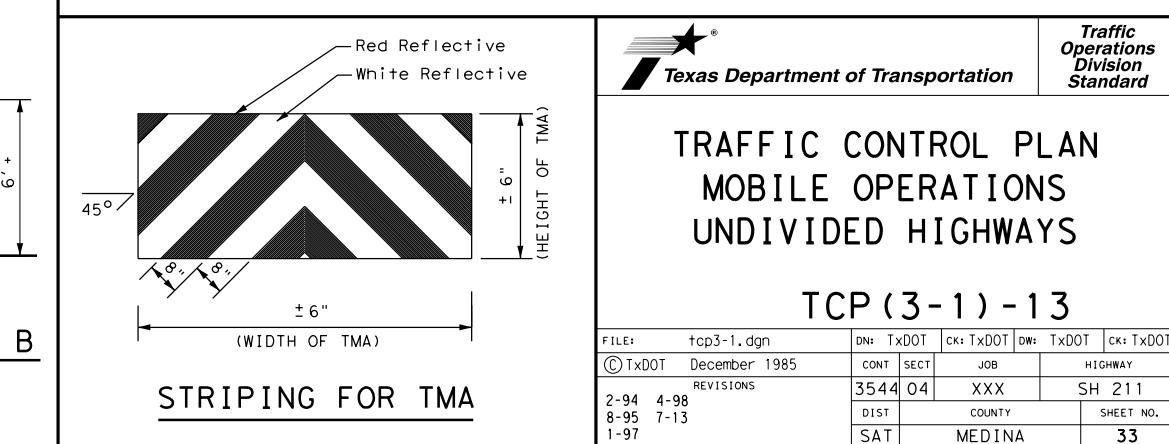
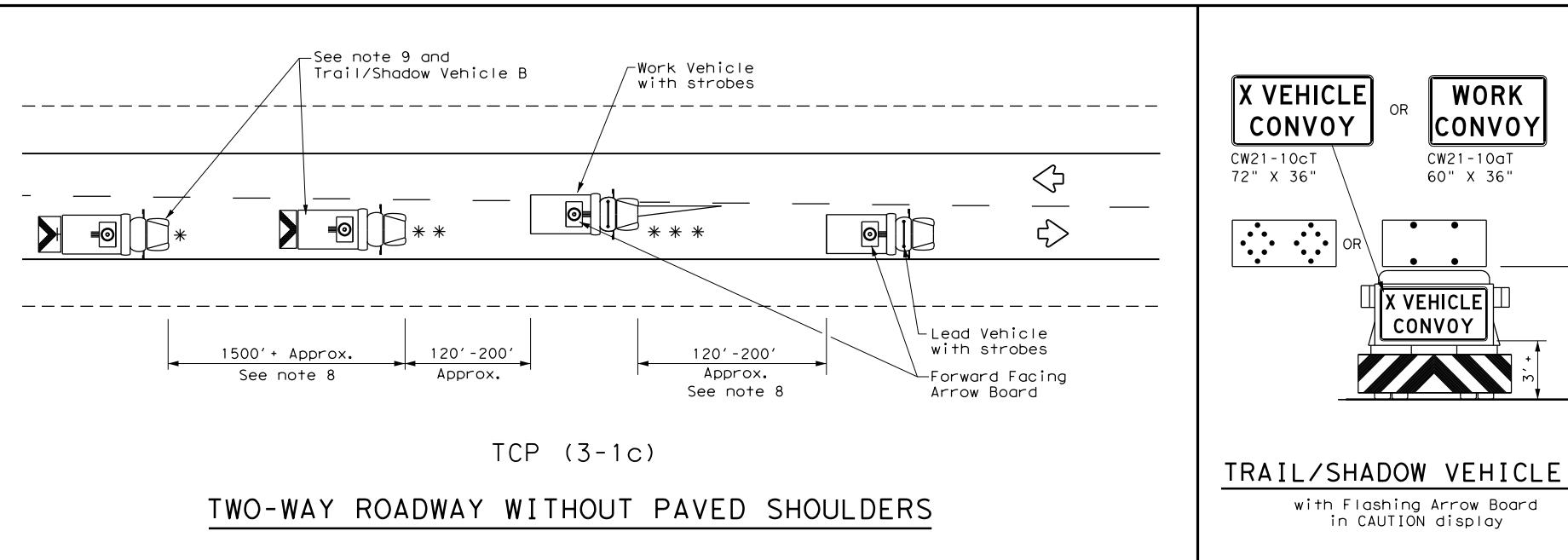
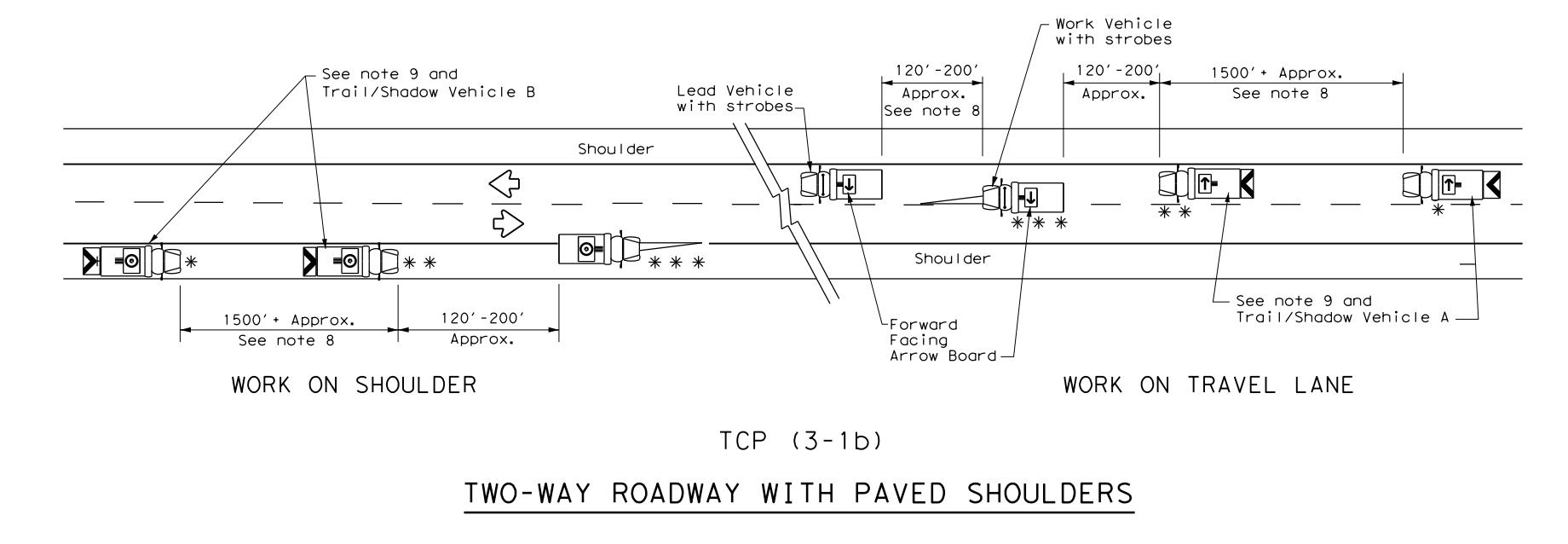
LEGEND	
*	Trail Vehicle
**	Shadow Vehicle
***	Work Vehicle
Heavy Work Vehicle	RIGHT Directional
Truck Mounted Attenuator (TMA)	LEFT Directional
Double Arrow	Double Arrow
Traffic Flow	CAUTION (Alternating Diamond or 4 Corner Flash)

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

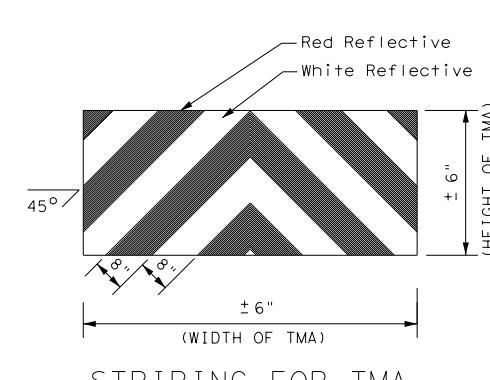
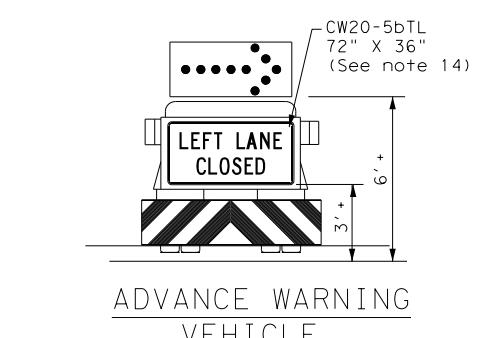
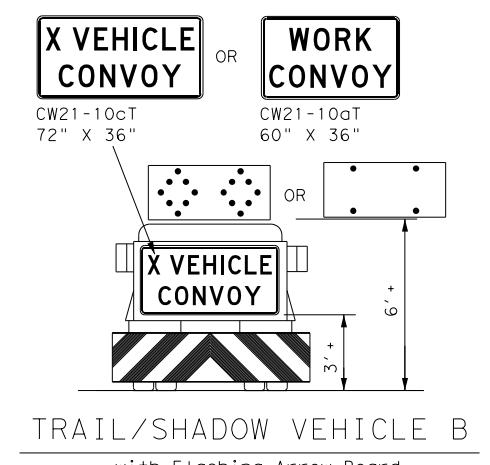
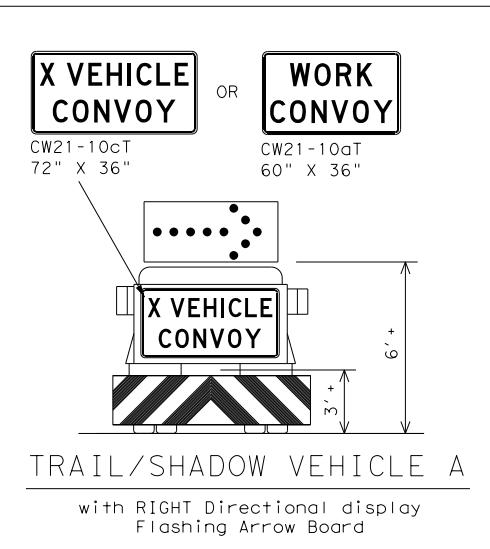
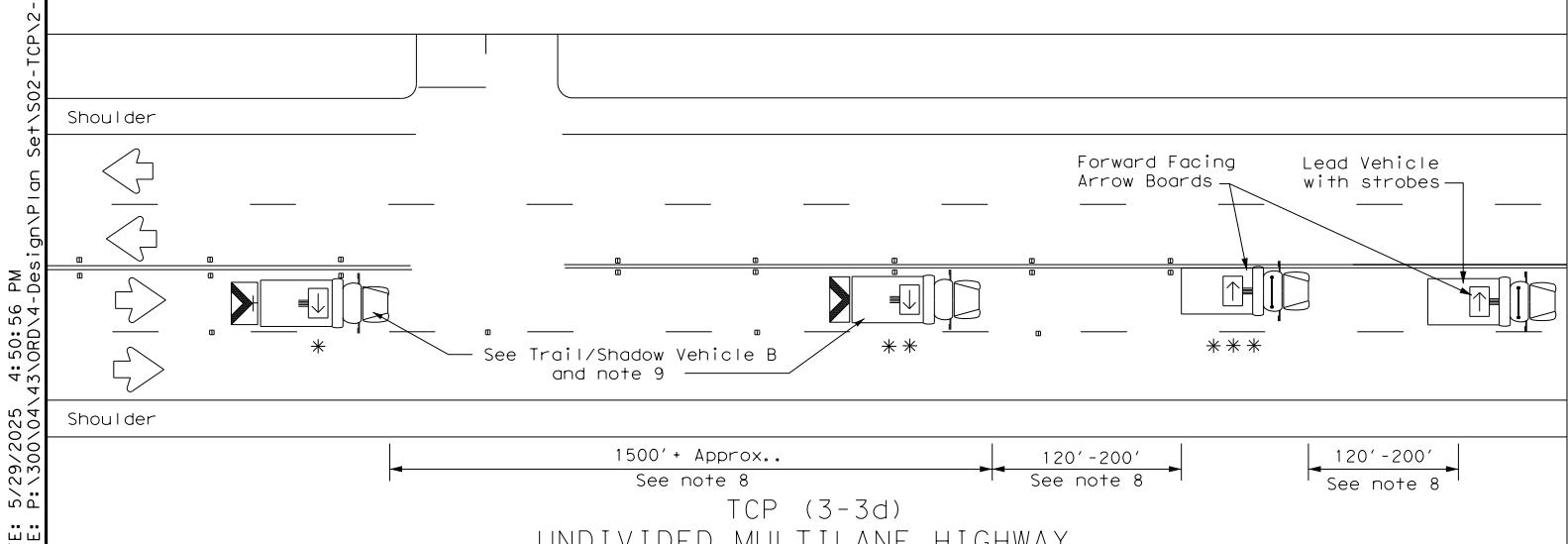
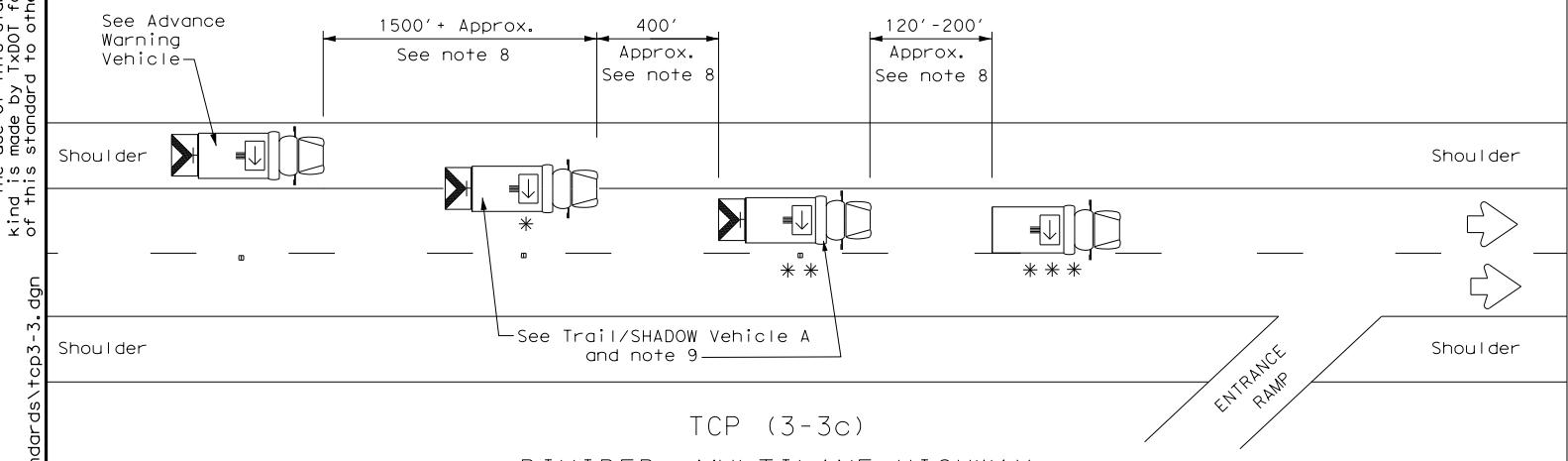
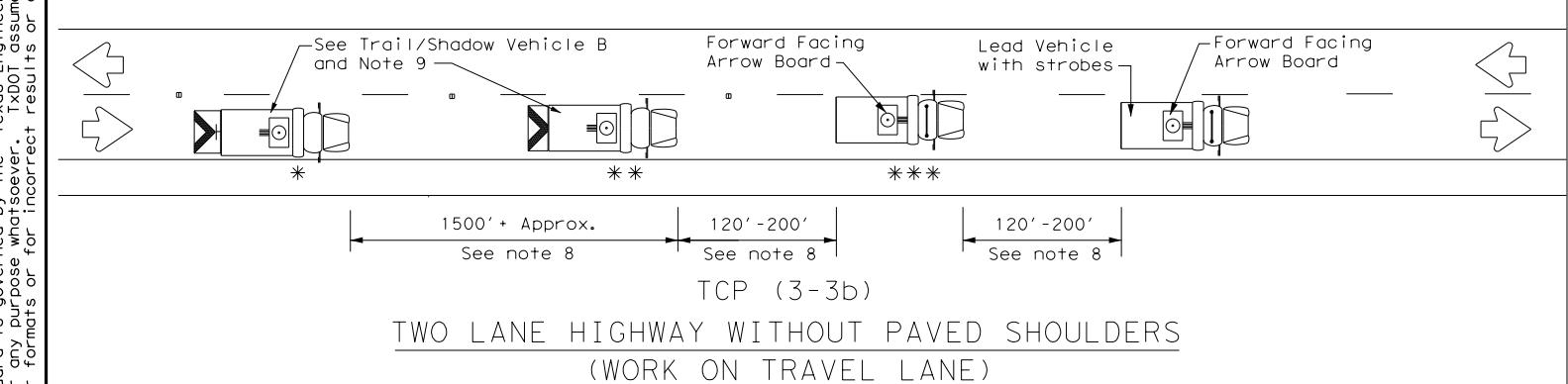
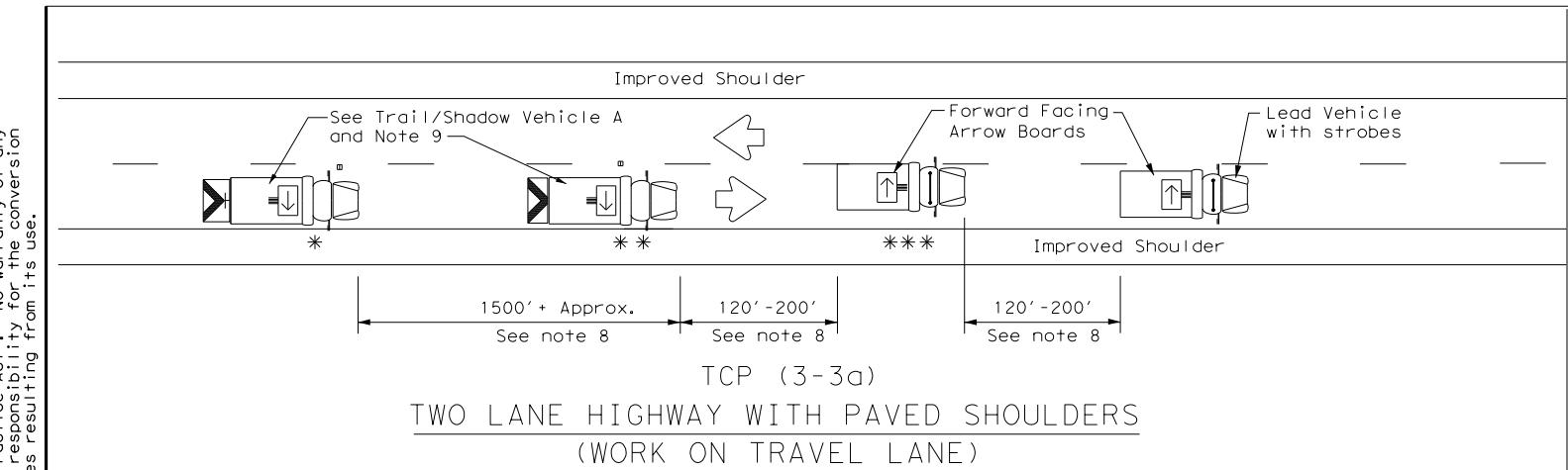
GENERAL NOTES

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

10. On two-lane two-way roadways, the work and protection vehicles should pull over periodically to allow motor vehicle traffic to pass. If motorists are not allowed to pass the work convoy, a "DO NOT PASS" (R4-1) sign should be placed on the back of the rearmost protection vehicle.



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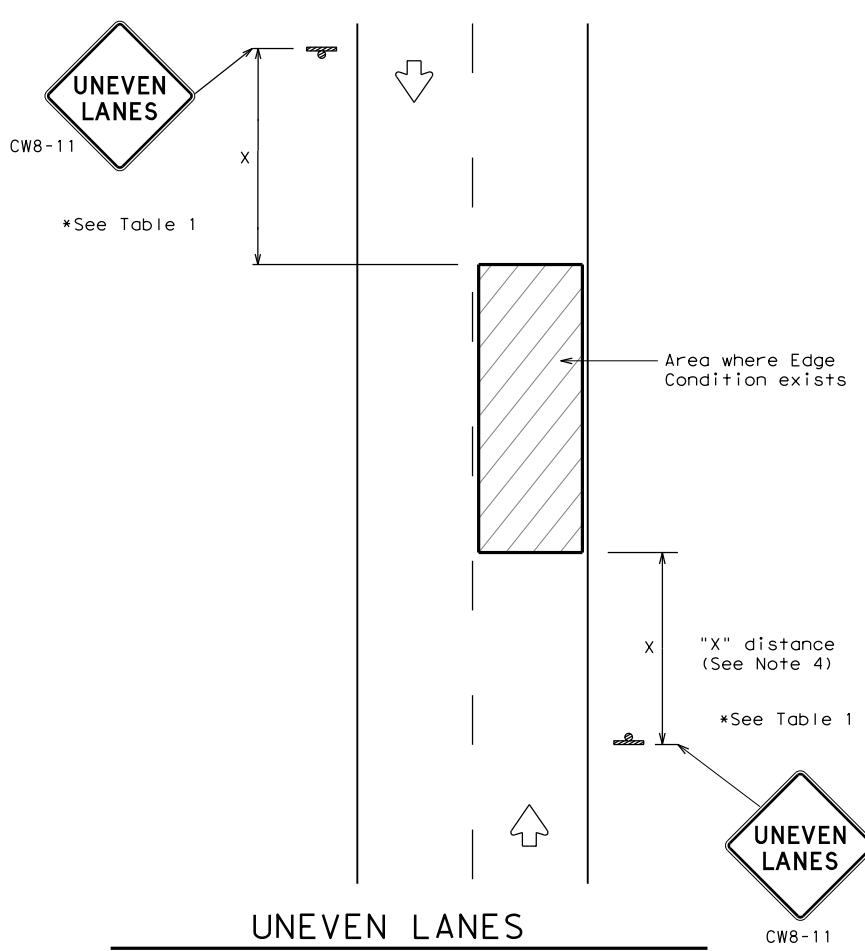
LEGEND	
*	Trail Vehicle
**	Shadow Vehicle
***	Work Vehicle
Heavy Work Vehicle	RIGHT Directional
Truck Mounted Attenuator (TMA)	LEFT Directional
	Double Arrow
	Traffic Flow
	CAUTION (Alternating Diamond or 4 Corner Flash)

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

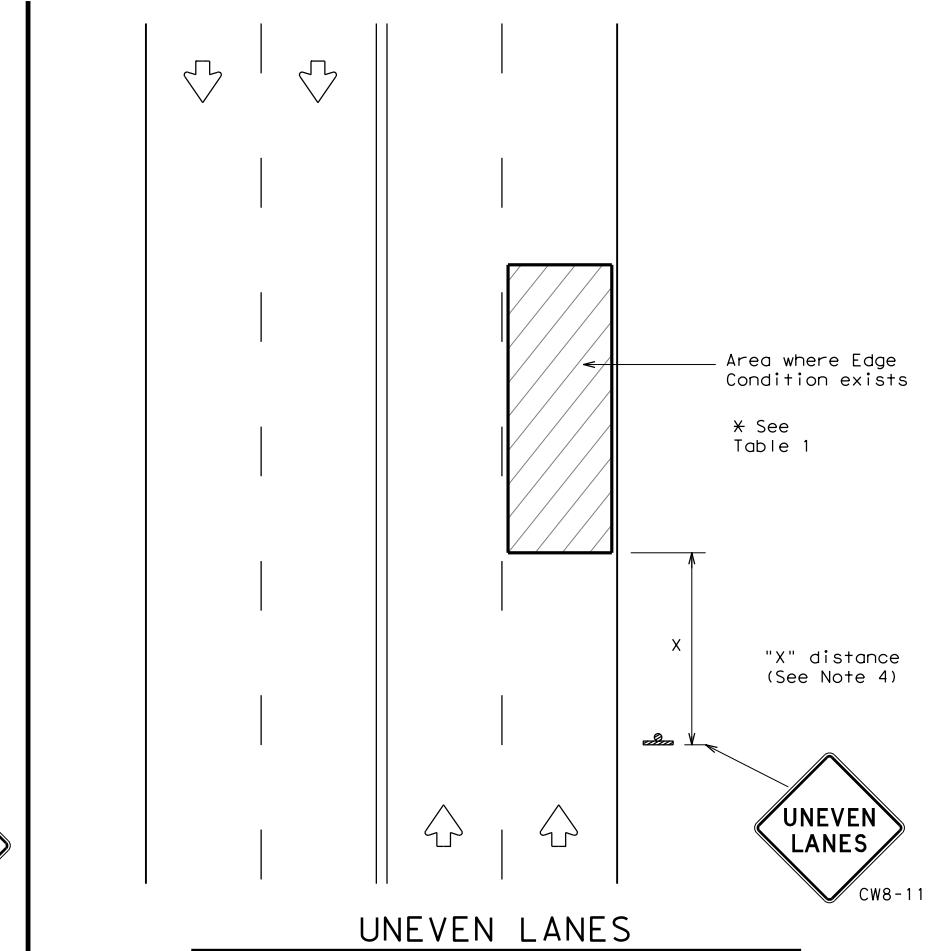
GENERAL NOTES

- 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.
- 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 SHADOW VEHICLE, ADVANCE WARNING and TRAIL VEHICLE are required.
- 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.
- 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.
- 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 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.
- 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 (CW21-10bT) 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.
- 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.
- A double arrow shall not be displayed on the arrow board on the Advance Warning Vehicle.
- For divided highways with three or four lanes in each direction, use TCP(3-2).
- 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 Advance Warning Vehicle may straddle the edgeline when Shoulder width makes it necessary.
- 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.

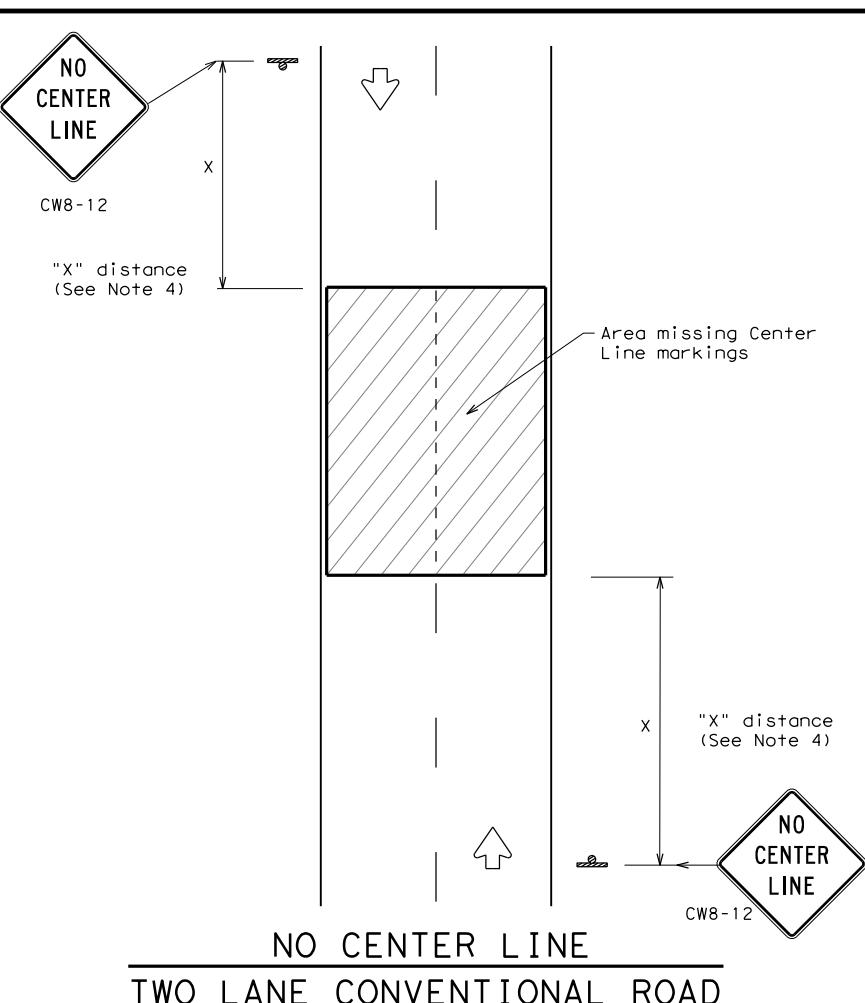
	Texas Department of Transportation	Traffic Operations Division Standard
TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL TCP (3-3) - 14		
FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT
© TxDOT September 1987	CONT: SECT	JOB: HIGHWAY
REVISIONS	3544 04	XXX SH 211
2-94 4-98	DIST: COUNTY	SHEET NO.
8-95 7-13	SAT: MEDINA	34
1-97 7-14		



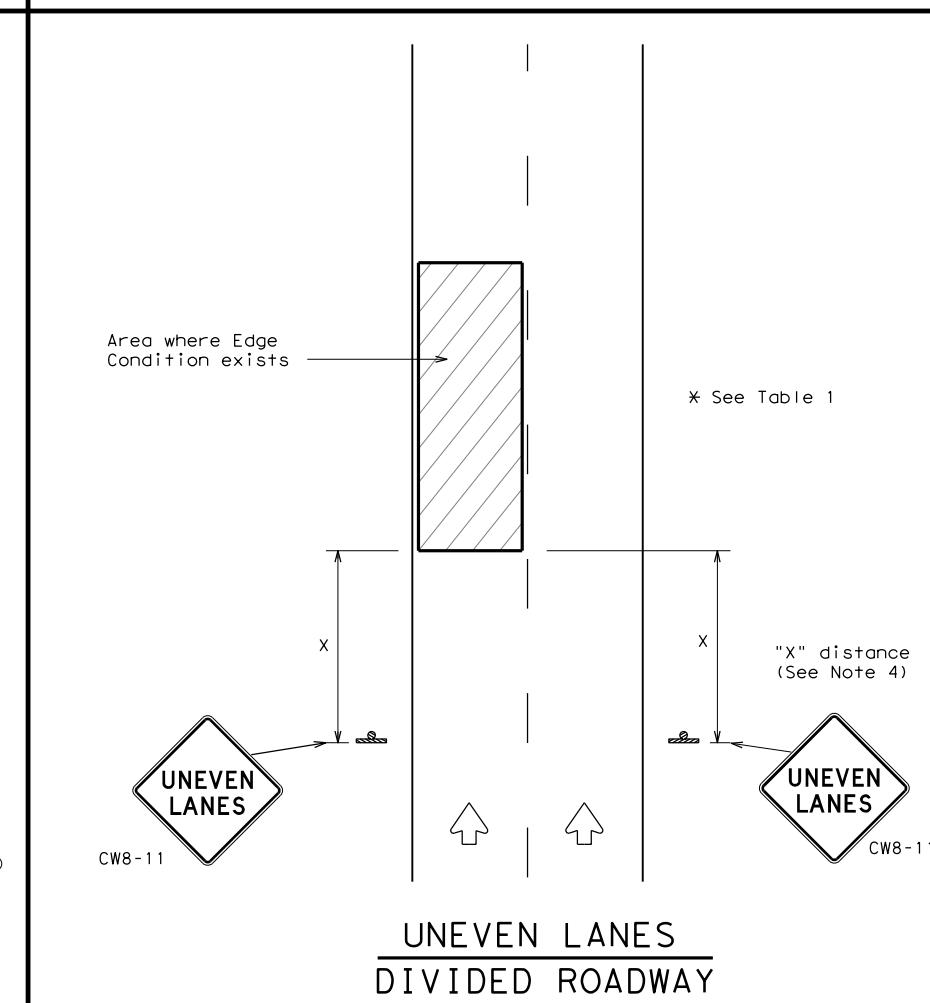
UNEVEN LANES
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
FOUR LANE CONVENTIONAL ROAD



NO CENTER LINE
TWO LANE CONVENTIONAL ROAD



UNEVEN LANES
DIVIDED ROADWAY

DEPARTMENTAL MATERIAL SPECIFICATIONS		
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240	
TEMPORARY (REMOVABLE) PREFABRICATED PAVEMENT MARKINGS	DMS-8241	
SIGN FACE MATERIALS	DMS-8300	
COLOR	USAGE	SHEETING MATERIAL
ORANGE	BACKGROUND	TYPE B _{FL} OR TYPE C _{FL} SHEETING
BLACK	LEGEND & BORDERS	ACRYLIC NON-REFLECTIVE SHEETING

GENERAL NOTES

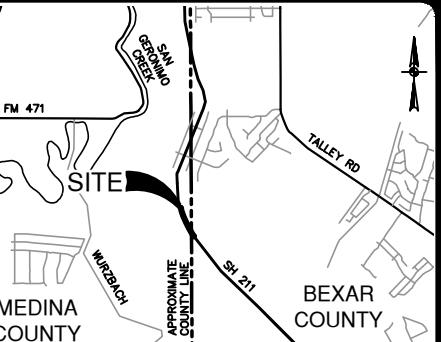
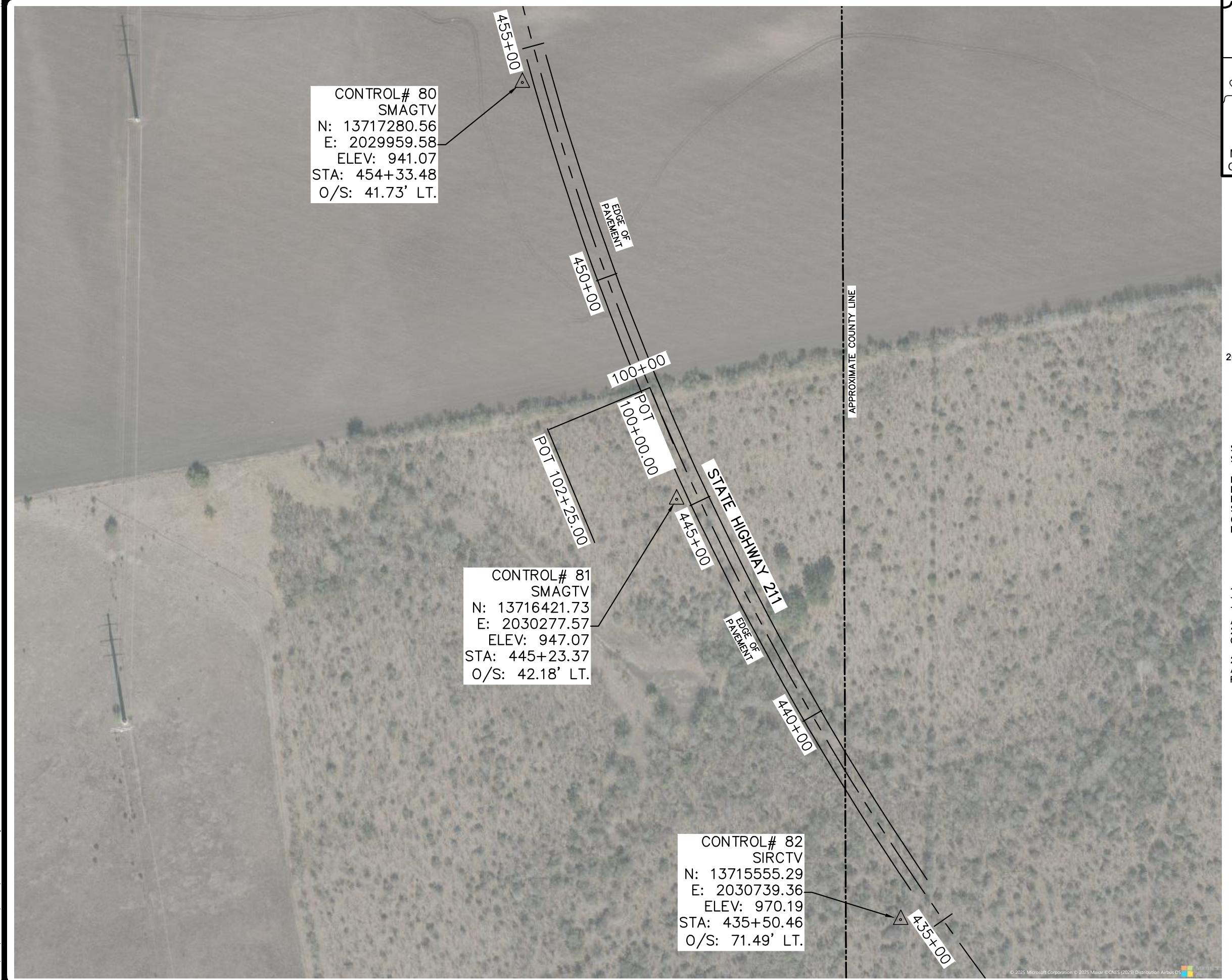
- If spalling or holes occur, ROUGH ROAD (CW8-8) signs should be placed in advance of the condition and be repeated every two miles where the condition persists.
- UNEVEN LANES (CW8-11) signs shall be installed in advance of the condition and repeated every mile. Signs installed along the uneven lane 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 1/4" (maximum-planing) 1 1/2" (typical-overlay)	Sign: CW8-11
	Distance "D" may be a maximum of 1 1/4" for planing operations and 2" for overlay operations if uneven lanes with edge condition 1 are open to traffic after work operations cease.	
②	Less than or equal to 3"	Sign: CW8-11
③	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".	
	Notched Wedge Joint	

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

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

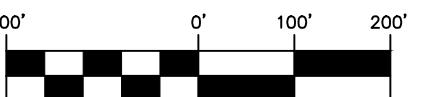
 Texas Department of Transportation		Traffic Operations Division Standard	
<h2>SIGNING FOR UNEVEN LANES</h2> <h3>WZ (UL) - 13</h3>			
FILE: wzul-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
① TxDOT	April 1992	CONT	SECT
		JOB	HIGHWAY
REVISIONS		3544 04	XXX
8-95 2-98 7-13			SH 211
1-97 3-03		DIST	COUNTY
		SAT	SHEET NO.
			35



LOCATION MAP
NOT-TO-SCALE



SCALE: 1" = 200'



LEGEND

SMAGTV	SET MAG NAIL W/WASHER
SIRCTV	SET IRON ROD W/CAP
	MARKED "TRAVERSE"
N	NORTHING
E	EASTING
ELEV	ELEVATION
STA	STATION
O/S	OFFSET
LT.	LEFT

NOTES

1. COORDINATES SHOWN ARE BASED ON THE TEXAS COORDINATE SYSTEM ESTABLISHED FOR THE SOUTH CENTRAL ZONE FROM THE NORTH AMERICAN DATUM OF 1983 (NA2011) EPOCH 2010.00 WITH A SURFACE ADJUSTMENT FACTOR OF 1.00017 APPLIED.

2. ELEVATIONS SHOWN ARE BASED ON ASSUMED DATUM BASED ON THE REDBIRD RANCH DEVELOPMENT.

C SH211

Bentley Horizontal Alignment Report

Alignment Name:

Alignment Description:

Alignment Style:

CL SH 211

Element: Linear

	(POT)	42800.000 R1	13715006.24	2031261.714
PC	(PC)	42976.402 R1	13715140.64	2031147.465

Tangential Direction: N40.366°W
Tangential Length: 176.402

Element: Circular

	(PC)	42976.402 R1	13715140.64	2031147.465
PI	(PI)	45051.250 R1	13716721.52	2029803.66
CC	(CC)		13718851.48	2035512.982
PT	(PT)	46957.763 R1	13718796.28	2029783.668

Radius: 5729.58
Delta: 39.814° Right

Degree of Curvature (Arc): 1.000°
Length: 3981.361

Tangent: 2074.848
Chord: 3901.742
Middle Ordinate: 342.355
External: 364.112
Back Tangent Direction: N40.366°W
Back Radial Direction: N49.634°E
Chord Direction: N20.459°W
Ahead Radial Direction: N89.448°E
Ahead Tangent Direction: N0.552°W

C GALM RD

Bentley Horizontal Geometry Report

Alignment Name:

Alignment Description:

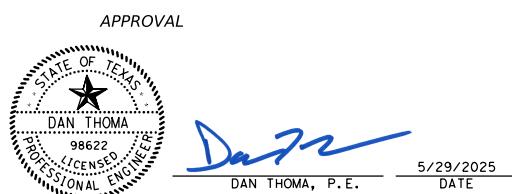
Alignment Style:

CL GALM

Element: Linear

	(POT)	10000.000 R1	13716652.08	2030222.356
POT	(POT)	10225.000 R1	13716565.71	2030014.595

Tangential Direction: S67.426°W
Tangential Length: 225



REV. NO.	DATE	DESCRIPTION	BY

**PAPE-DAWSON
ENGINEERS**

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #1002880

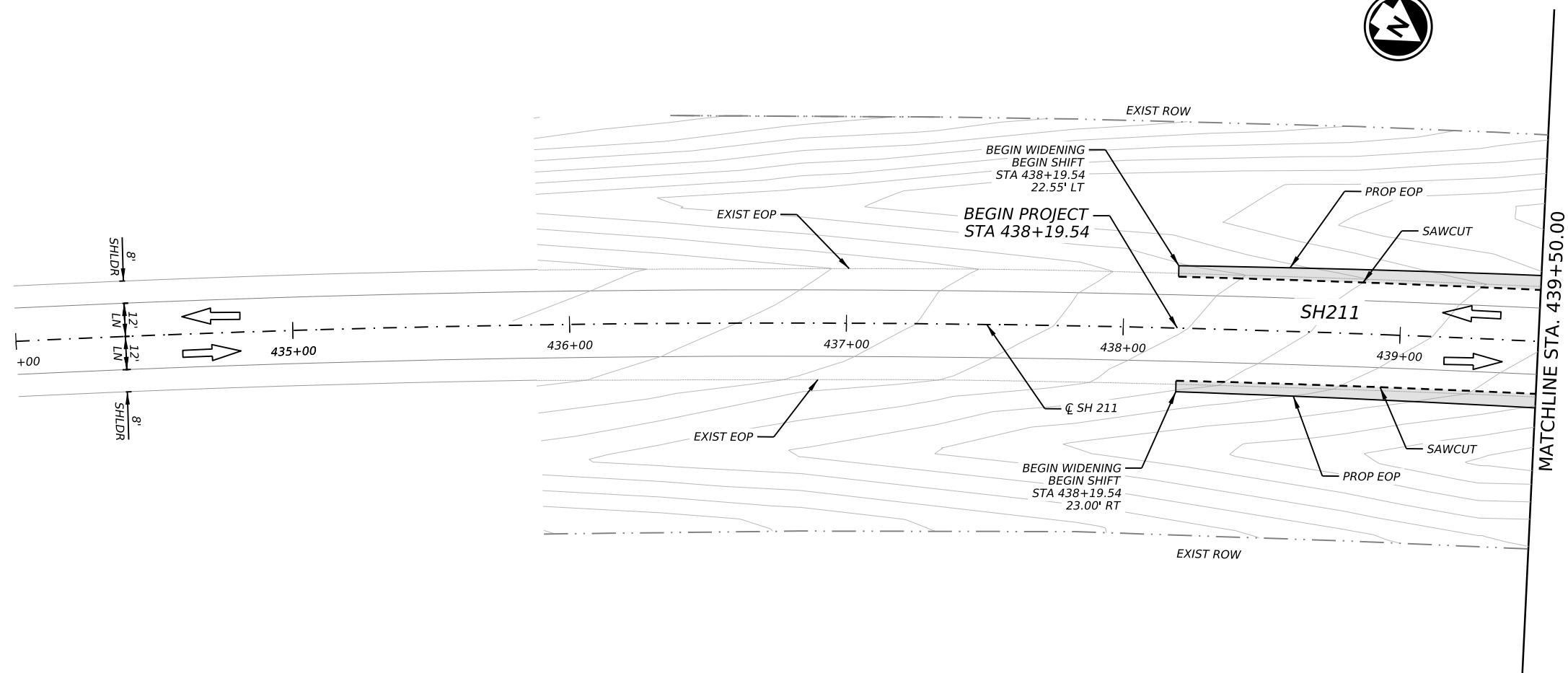
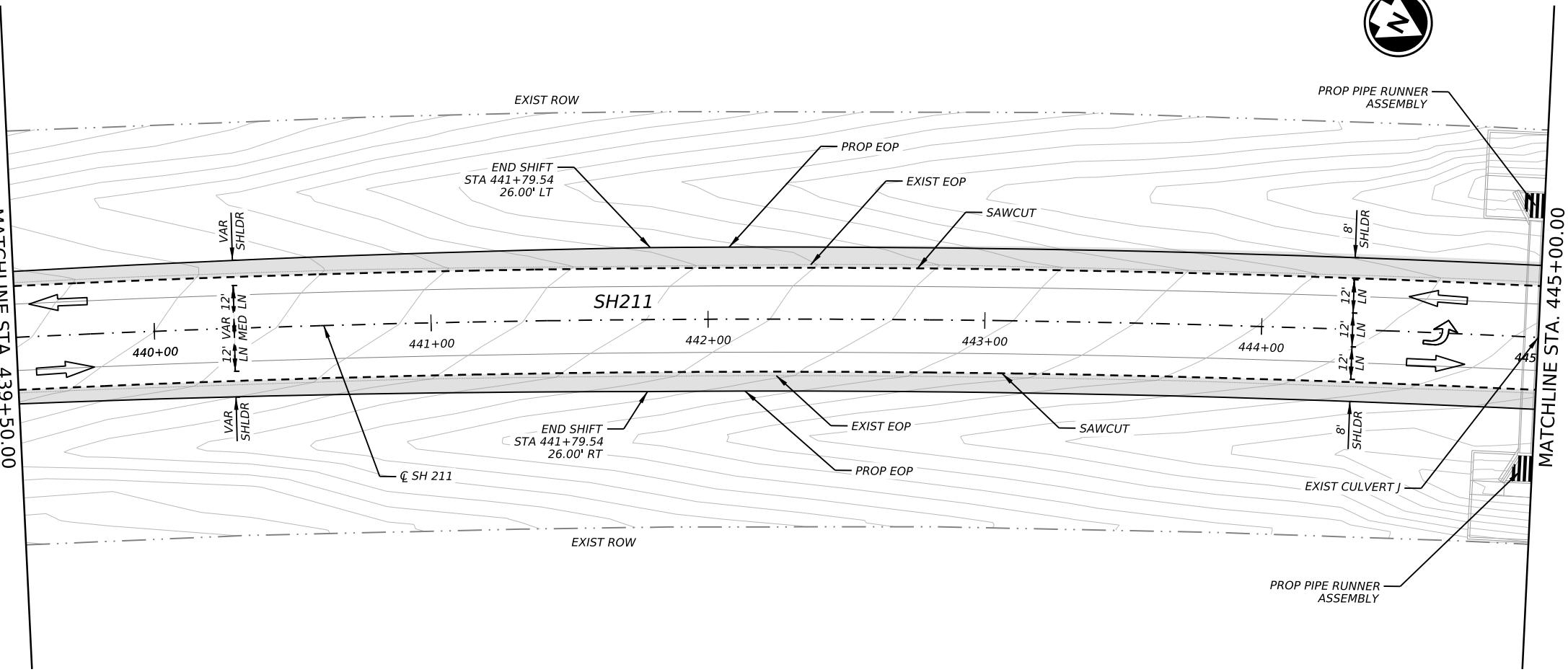
Texas Department of Transportation

SH 211 TURN LANES AT GALM RD

**HORIZONTAL ALIGNMENT
DATA**

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	37



LEGEND

	PROP EOP
	EXIST EOP
	SAWCUT
	TRAFFIC FLOW ARROW
	DITCH FLOW LINE
	ROADWAY WIDENING
	EXIST ROW LINE
	DITCH GRADE

NOTES

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR HORIZONTAL ALIGNMENT DATA.
2. SEE INTERSECTION PLAN & PROFILE SHEET FOR GALT RD DETAILS.
3. SEE PAVEMENT MARKING SHEETS FOR STRIPING AND TRAFFIC FLOW DETAILS.
4. EXISTING FEATURES ARE SHOWN SCREED BACK; I.E. FADED
5. CONTRACTOR TO MATCH EXIST ROADWAY CROSS SLOPES ON WIDENING PAVEMENT.
6. HMA WIDENING 4' MINIMUM WIDTH.

DESIGN



 5/29/2025
HESTON GARZA, JR., P.E. DATE

APPROVAL



Dan 5/29/2025
DAN THOMA, P.E. DATE

SCALE: 1" = 50'

PAPE-DAWSON ENGINEERS

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
100 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000

Texas Department of Transportation

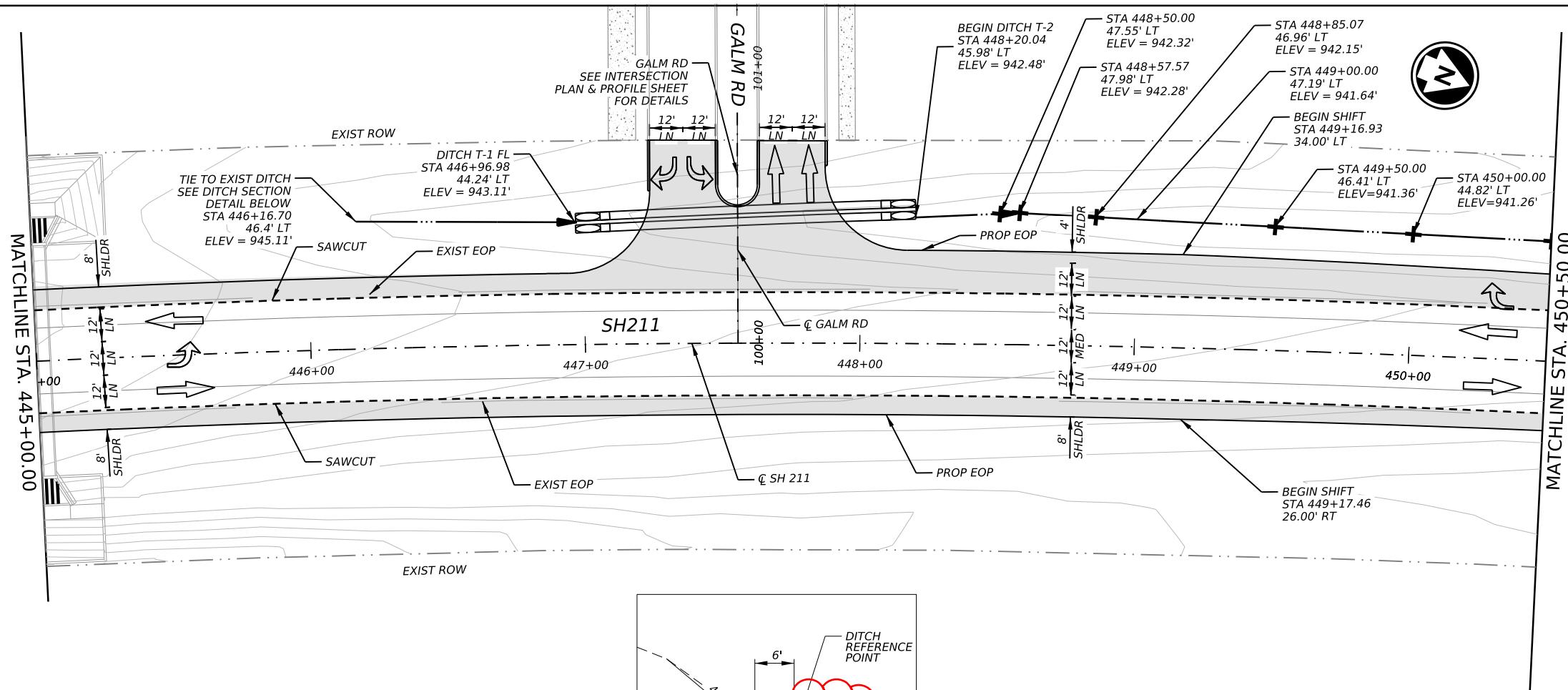
TEXAS DEPARTMENT OF TRANSPORTATION

ROADWAY PLAN

BEGIN TO STA 445+00

SHEET 1 OF 2

IT	SECT	JOB	HIGHWAY
4	04	XXX	SH 211
T	COUNTY		SHEET NO.
T	MEDINA		38

LEGEND

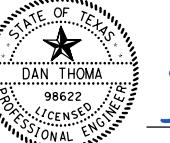
—	PROP EOP
—	EXIST EOP
- - -	SAWCUT
→	TRAFFIC FLOW ARROW
—→	DITCH FLOW LINE
■	ROADWAY WIDENING
—	EXIST ROW LINE
+	DITCH GRADE

NOTES

1. SEE HORIZONTAL ALIGNMENT DATA SHEETS FOR HORIZONTAL ALIGNMENT DATA.
2. SEE INTERSECTION PLAN & PROFILE SHEET FOR GALM RD DETAILS.
3. SEE PAVEMENT MARKING SHEETS FOR STRIPING AND TRAFFIC FLOW DETAILS.
4. EXISTING FEATURES ARE SHOWN SCREED BACK; I.E. FADED.
5. CONTRACTOR TO MATCH EXIST ROADWAY CROSS SLOPES ON WIDENING PAVEMENT.
6. HMA WIDENING 4' MINIMUM WIDTH.

DESIGN

5/29/2025 DATE

APPROVAL

5/29/2025 DATE

0 25 50 75 SCALE: 1" = 50'

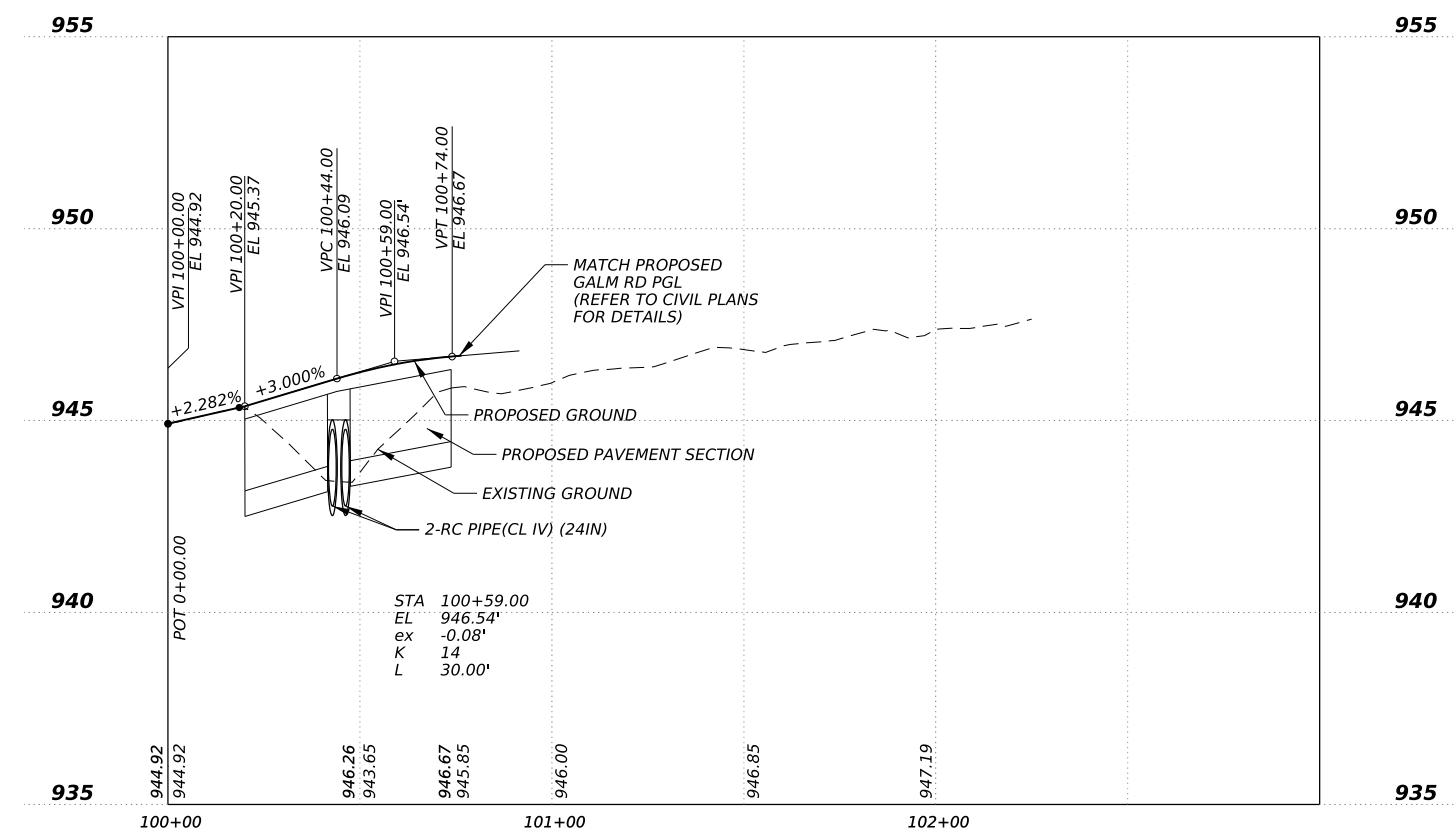
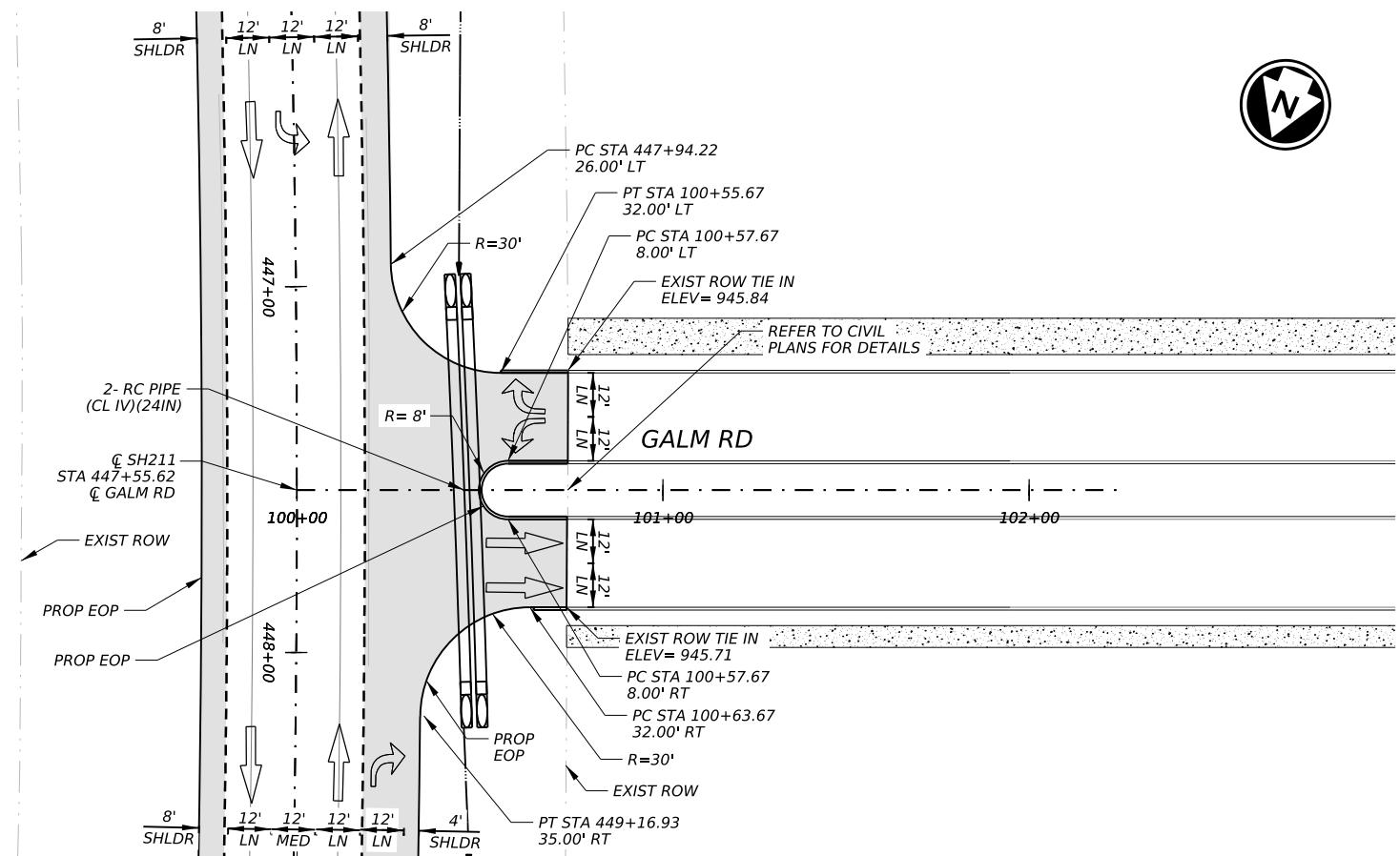
REV. NO. DATE DESCRIPTION BY

**PAPE-DAWSON
ENGINEERS**
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800


SH 211 TURN LANES AT GALM RD

ROADWAY PLANSTA 445+00 TO END
SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	39



DESIGN

STATE OF TEXAS
ERNESTO GARZA JR.
141557
LICENSED PROFESSIONAL ENGINEER
ERNESTO GARZA JR., P.E. 6/16/2025 DATE

APPROVAL

STATE OF TEXAS
DAN THOMA
98622
LICENSED PROFESSIONAL ENGINEER
DAN THOMA, P.E. 6/16/2025 DATE

0 25 50

SCALE: PLAN 1" = 50' PROFILE 1" = 5'

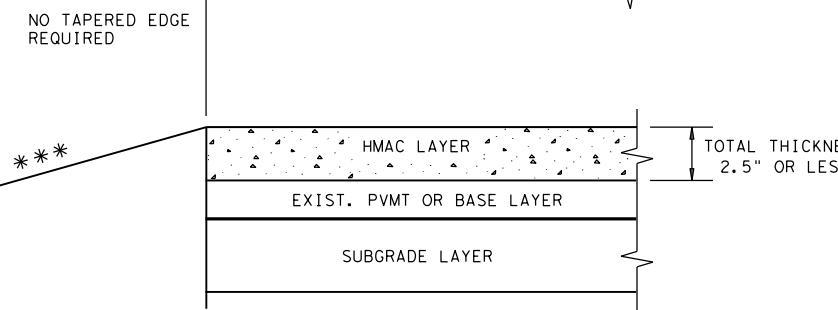
REV. NO.	DATE	DESCRIPTION	BY

**PAPE-DAWSON
ENGINEERS**
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

Texas Department of Transportation
SH 211 TURN LANES AT GALM RD
INTERSECTION PLAN AND PROFILE

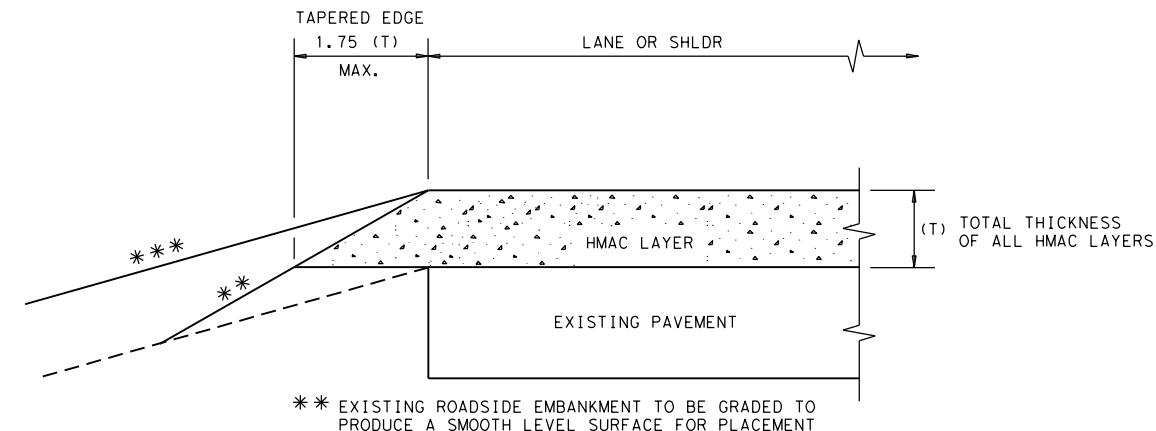
SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	40



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

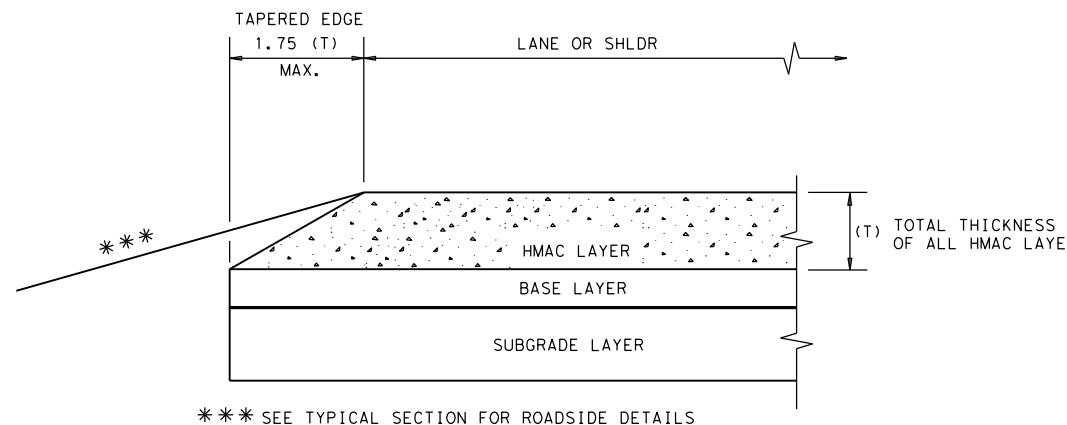
CONDITION - 1
THIN HMAC SURFACES OR HMAC OVERLAY
WITH THICKNESS OF 2.5" OR LESS



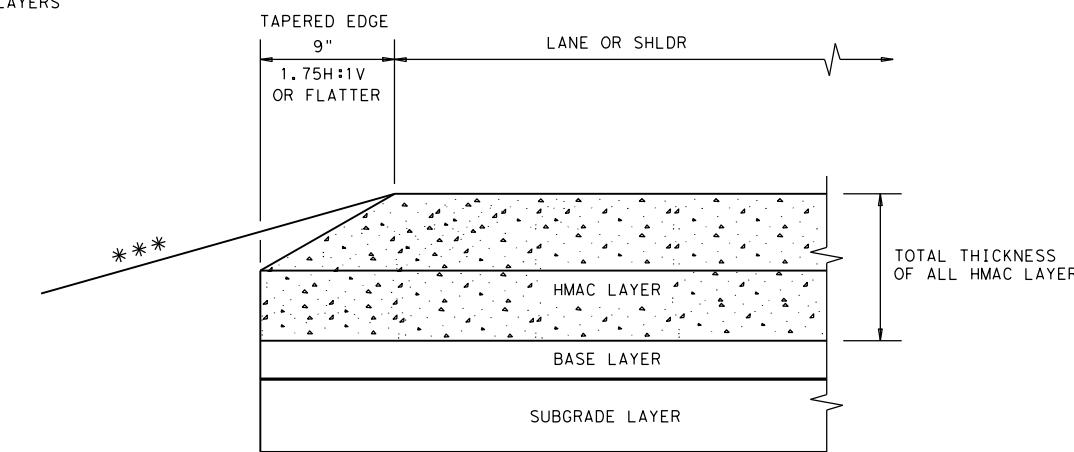
*** EXISTING ROADSIDE EMBANKMENT TO BE GRADED TO PRODUCE A SMOOTH LEVEL SURFACE FOR PLACEMENT OF TAPERED EDGE. THIS WORK IS SUBSIDIARY TO THE VARIOUS BID ITEMS.

*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

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



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



*** SEE TYPICAL SECTION FOR ROADSIDE DETAILS

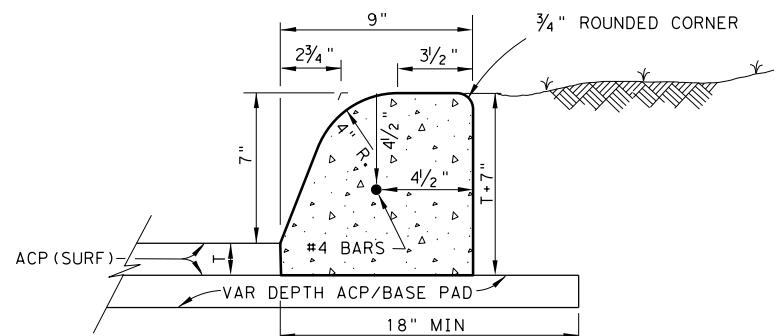
CONDITION - 4
NEW OR RECONSTRUCTED PAVEMENT
HMAC THICKNESS 5" OR GREATER

(NOT TO SCALE)

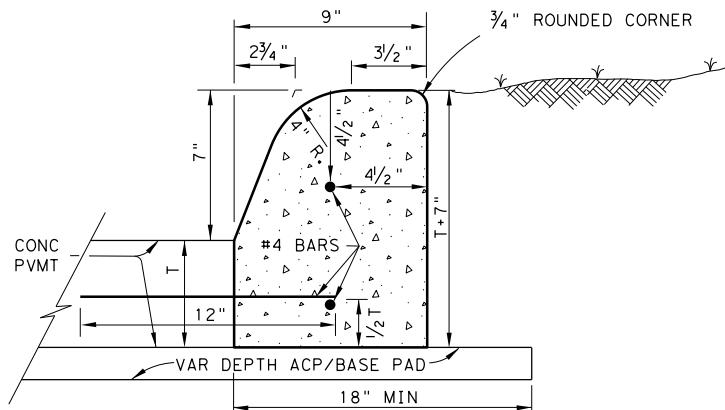
GENERAL NOTES

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.

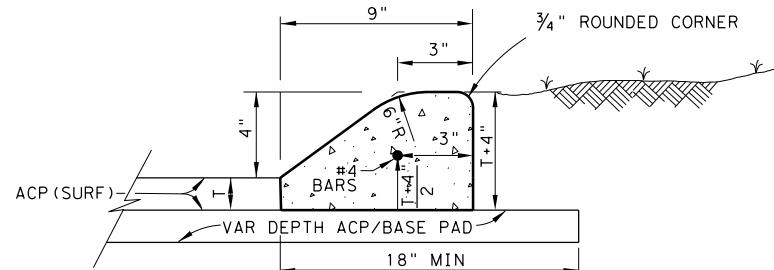
	Texas Department of Transportation	Design Division Standard
TAPERED EDGE DETAILS		
HMAC PAVEMENT		
TE (HMAC) - 11		
FILE: tehmac11.dgn	DN: TxDOT	CK: RL
© TxDOT January 2011	CONT SECT	JOB HIGHWAY
REVISIONS	3544 04	XXX SH 211
DIST	COUNTY	SHEET NO.
SAT	MEDINA	41



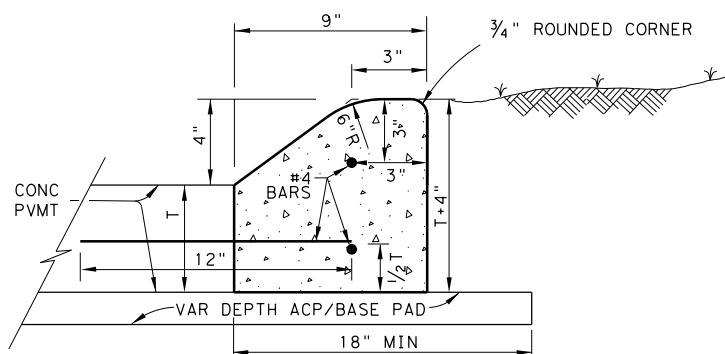
CONCRETE CURB (TYPE 1)
W/ ACP



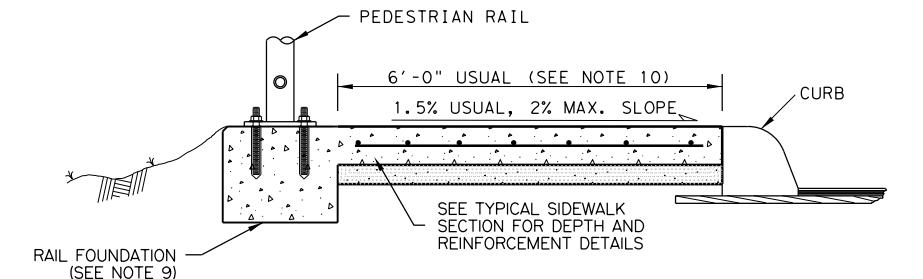
CONCRETE CURB (TYPE 1)
W/ CONC PAVEMENT



CONCRETE CURB (TYPE 2)
W/ ACP

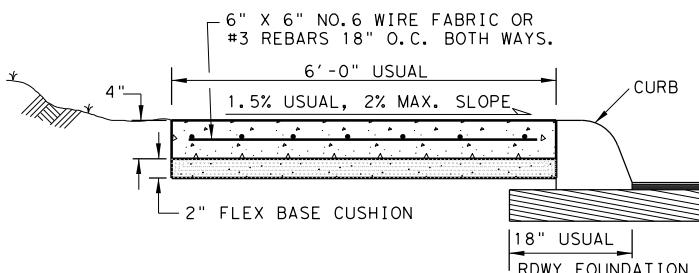


CONCRETE CURB (TYPE 2)
W/ CONC PAVEMENT



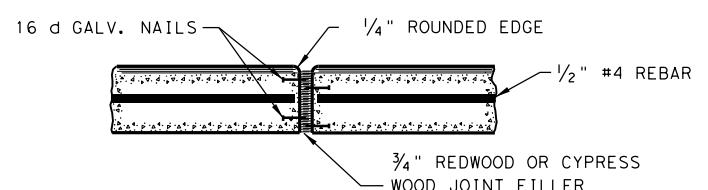
TYPICAL SIDEWALK SECTION
WITH PEDESTRIAN RAIL

SCALE: 1" = 30'



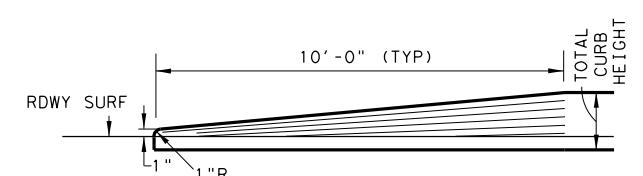
TYPICAL SIDEWALK SECTION

GROOVED JOINTS IN THE SIDEWALK SHALL BE AT A MAX. SPACING OF 10 FT. AND SHALL HAVE 3/4" EXPANSION JOINTS AT A MAX. SPACING OF 60' AND TO COINCIDE WITH THE CURB EXP. JOINTS.



TYPICAL CURB EXPANSION JOINT DETAIL

EXPANSION JOINTS TO BE PLACED AT BEGINNING AND END OF CURVES, DRIVEWAYS, WHEELCHAIR RAMPS, INLETS, ILLUMINATION/SIGNAL FOUNDATIONS AND OTHER FIXED OBJECTS.



TRANSITION FOR CONCRETE CURB ENDS

SEE CURB DETAIL FOR REINFORCEMENT

GENERAL NOTES:

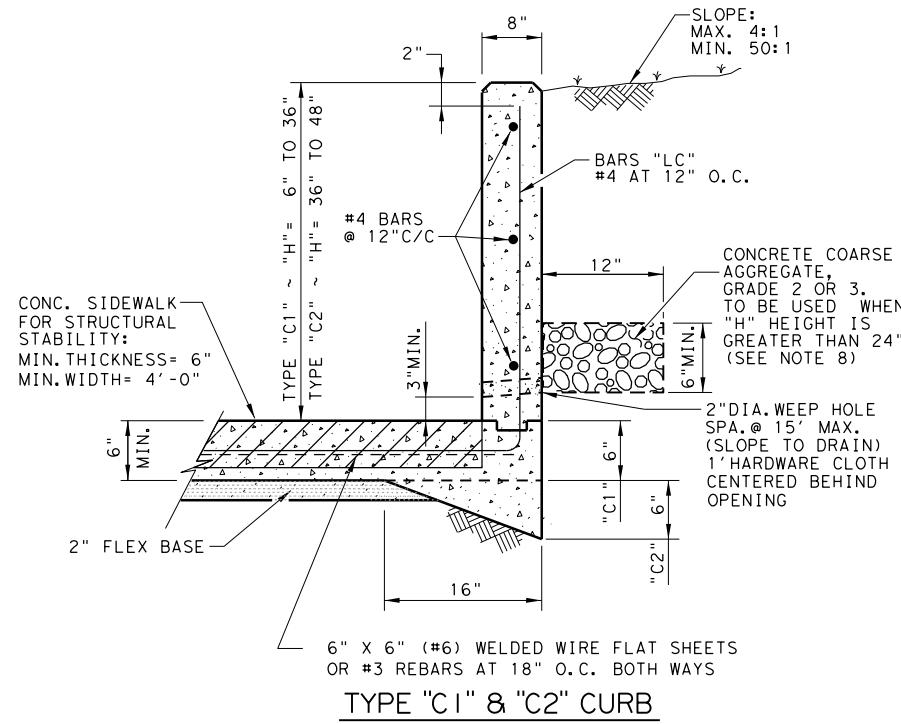
- CONCRETE CURB TYPE 1 AND 2 SHOWN SHALL MEET THE MINIMUM SPECIFICATION REQUIREMENTS OF CLASS "A" CONCRETE PER ITEM 529 AND 421.
- ALL REINFORCING STEEL SHALL BE GRADE 60.
- WHERE CONCRETE CURB IS PLACED ON EXISTING CONCRETE PAVEMENT, THE PAVEMENT SHALL BE DRILLED AND THE REINFORCING BARS GROUTED IN PLACE.
- 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 4 FEET C-C, UNLESS OTHERWISE SHOWN.
- ONE-HALF INCH EXPANSION JOINT MATERIAL SHALL BE PROVIDED WHERE CURB OR CURB AND GUTTER IS ADJACENT TO SIDEWALK OR RIPRAP. THIS IS SUBSIDIARY TO THE CURB, ITEM 529.
- LAYDOWN CURB AT DRIVEWAYS WILL BE PAID AS SUBSIDIARY TO ITEM 530.
- FOR SIDEWALK DETAILS AT DRIVEWAYS, SEE SAN ANTONIO DISTRICT STANDARD "DRIVEWAY DETAILS".
- SEE PEDESTRIAN HANDRAIL DETAILS STANDARD "PRD" FOR MORE INFORMATION. CONCRETE RAIL FOUNDATION TO BE POURED WITH THE SIDEWALK BUT PAYMENT IS SUBSIDIARY TO ITEM 450 "RAILING".
- CLEAR SIDEWALK WIDTH EXCLUDING THE PEDESTRIAN RAIL FOUNDATION SHALL BE 6' UNLESS OTHERWISE SPECIFIED IN THE PLANS.

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San Antonio District

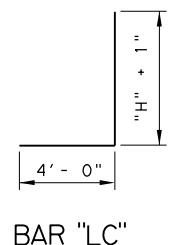
MISCELLANEOUS CURB
AND SIDEWALK DETAILS

San Antonio District Standard
Sheet (1 of 2)

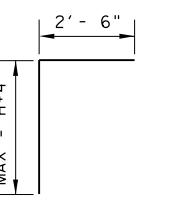
T:\Engdata\Standards\MiscCurbDetails.dgn			PREPARED BY AND FOR USE OF TxDOT.		
ORIGINAL DRAWING DATE:	STATE DISTRICT	FEDERAL AID PROJECT	REVISIONS	FEDERAL AID PROJECT	HEET
09-01-08	6				42
10-10-17 sidewalk width equals 6' usual 07-22-20 9' curb + curb w/ conc pvt det.					
--					
COUNTY	CONTROL SECTION	JOB HIGHWAY			
MEDINA	3544	04	XXX	SH 211	



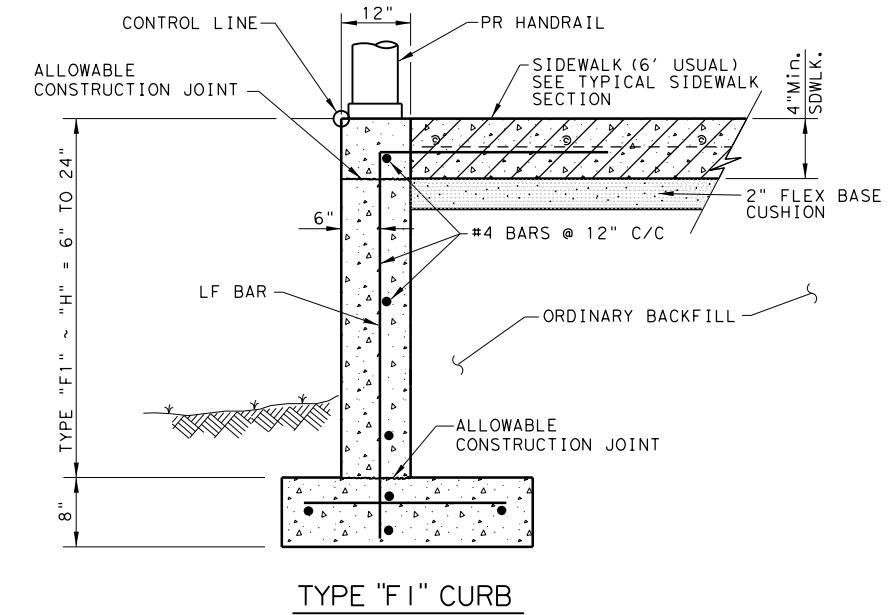
TYPE "C1" & "C2" CURB



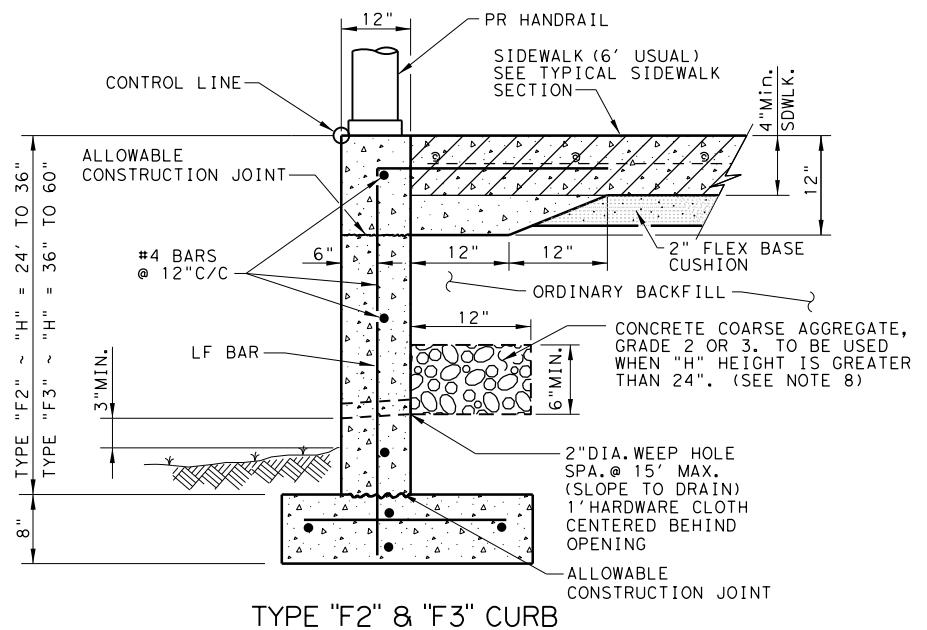
BAR "LC"



BAR "LF"



TYPE "F1" CURB



TYPE "F2" & "F3" CURB

GENERAL NOTES:

1. CONCRETE FOR CURB TYPE F AND C SHOWN SHALL MEET THE MINIMUM SPECIFICATION REQUIREMENTS OF CLASS "C" CONCRETE PER ITEM 421.
2. ALL REINFORCING STEEL SHALL BE GRADE 60.
3. 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.
4. VERTICAL AND HORIZONTAL DOWEL BARS AND TRANSVERSE REINFORCING BARS SHALL BE PLACED AT 4 FEET C-C, UNLESS OTHERWISE SHOWN.
5. UNTIL THE SIDEWALK IS COMPLETE, LATERAL SUPPORT FOR THE "F" CURBS WILL BE REQUIRED.
6. IF AGGREGATE IS REQUIRED PER THE DETAIL, IT IS PAID AS SUBSIDIARY TO THE CURB, ITEM 529.

DESIGN SOIL PARAMETERS:

Soil Unit Wt. = 120 pcf

Phi = 30 Degrees

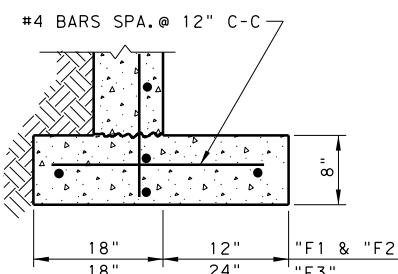
Cohesion = 50 psf

Min. PI = 15

Max. PI = 30

SURCHARGE:

TYPE F CURB $q = 2'$ Adjacent to sidewalk
 Max. slope behind TYPE C Curb = 4:1
 Min. Factor of Safety against sliding is 1.5.
 Designed in accordance with current AASHTO Standards and Interim Specifications.



FOOTING DETAIL

CLASS C CONCRETE PAID UNDER ITEM 531, SIDEWALK. (NOTE. ADDITIONAL CONCRETE TO MEET THE THICKENED SECTIONS REQUIRED BY THESE DETAILS IS SUBSIDIARY TO ITEM 531, CURB.)

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San Antonio District

MISCELLANEOUS CURB AND SIDEWALK DETAILS			
San Antonio District Standard Sheet (2 of 2)			
T:\Engdata\Standards\MiscCurbDetails.dgn PREPARED BY AND FOR USE OF TxDOT.			
ORIGINAL DRAWING DATE:	STATE DISTRICT	FEDERAL AID PROJECT	• SHEET
09-01-08	6	43	
10-10-17 sidewalk width equals 6' usual 07-22-20 9" curb + curb w/ conc pvt det.	COUNTY	CONTROL SECTION	JOB HIGHWAY
--	MEDINA	3544	04 XXX SH 211



EXISTING HYDROLOGY - RATIONAL METHOD									
AREA ID	AREA (AC)	C	Tc (min)	INTENSITIES (in/hr)			COMPUTED FLOW (cfs)		
				I5	I10	I100	Q5	Q10	Q100
J	30.30	0.58	19	4.8	5.6	8.7	83.5	99.2	152.6
T-1	3.89	0.58	10	6.2	7.3	11.0	14.0	16.5	24.9
T-2	1.59	0.39	10	6.2	7.3	11.0	3.9	4.6	6.9

PROPOSED HYDROLOGY - RATIONAL METHOD									
AREA ID	AREA (AC)	C	Tc (min)	INTENSITIES (in/hr)			COMPUTED FLOW (cfs)		
				I5	I10	I100	Q5	Q10	Q100
J	30.18	0.58	19	4.8	5.6	8.7	83.2	98.8	152.0
T-1	3.84	0.59	10	6.2	7.3	11.0	14.1	16.6	25.0
T-2	1.43	0.42	10	6.2	7.3	11.0	3.8	4.4	6.7

DITCH COMPUTATIONS - RATIONAL METHOD												
DITCH NAME	AREA ID	DRN AREA	COMPUTED FLOW	COMPUTED FLOW	LONG. SLOPE (%)	DITCH DEPTH (FT)	N-VALUE	BOTTOM WIDTH (FT)	FRONT SLOPE (H:1)	BACK SLOPE (H:1)	DITCH VEL.	DITCH FLOW DEPTH (FT)
T-1	T-1	3.84	14.1	25.0	2.5%	1	0.035	6	6	5	3.31	0.47
T-2	T-1+T-2	5.27	17.9	31.7	0.50%	2	0.035	6	4	4	2.18	0.87
												2.56
												1.16

change to 6:1/4:1

NOTES

1. DRAINAGE AREAS OUTSIDE OF RIGHT-OF-WAY WERE DRAWN BASED ON SURVEY DATA, 2021 LIDAR, AND PROPOSED DEVELOPMENT PLANS.
2. FREQUENCIES WERE CALCULATED BASED ON TXDOT 10-YR STORM EVENT.

LEGEND

—	DRAINAGE AREA BOUNDARY
—	EXISTING CONTOUR
—→	FLOW ARROW
○.XX AC	DRAINAGE AREA

DESIGN



APPROVAL



SCALE: 1" = 300'

REV. NO.	DATE	DESCRIPTION	BY

**PAPE-DAWSON
ENGINEERS**

SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

Texas Department of Transportation

SH 211 TURN LANES AT GALT RD

DRAINAGE AREA

SHEET 1 OF 1

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	44

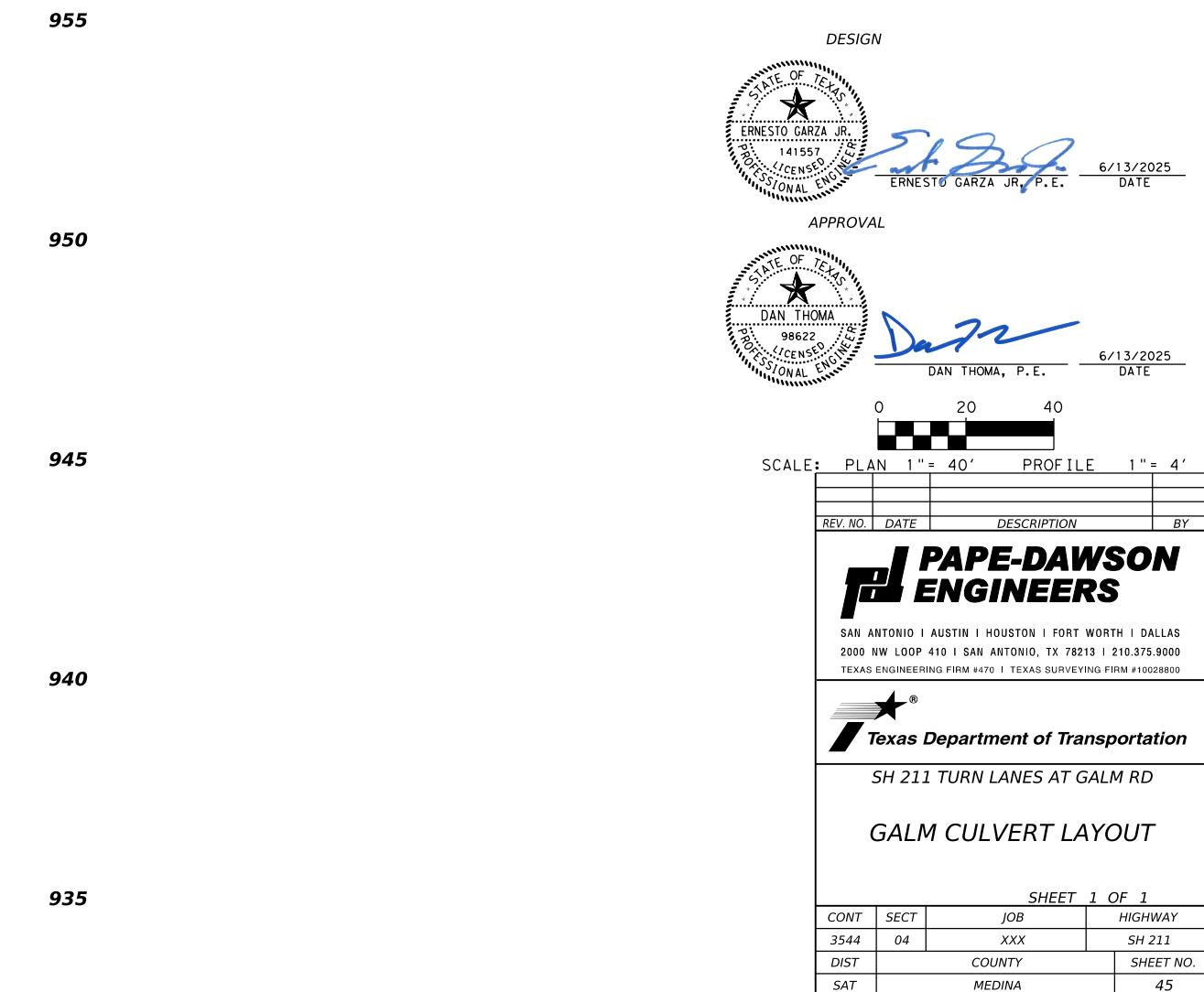
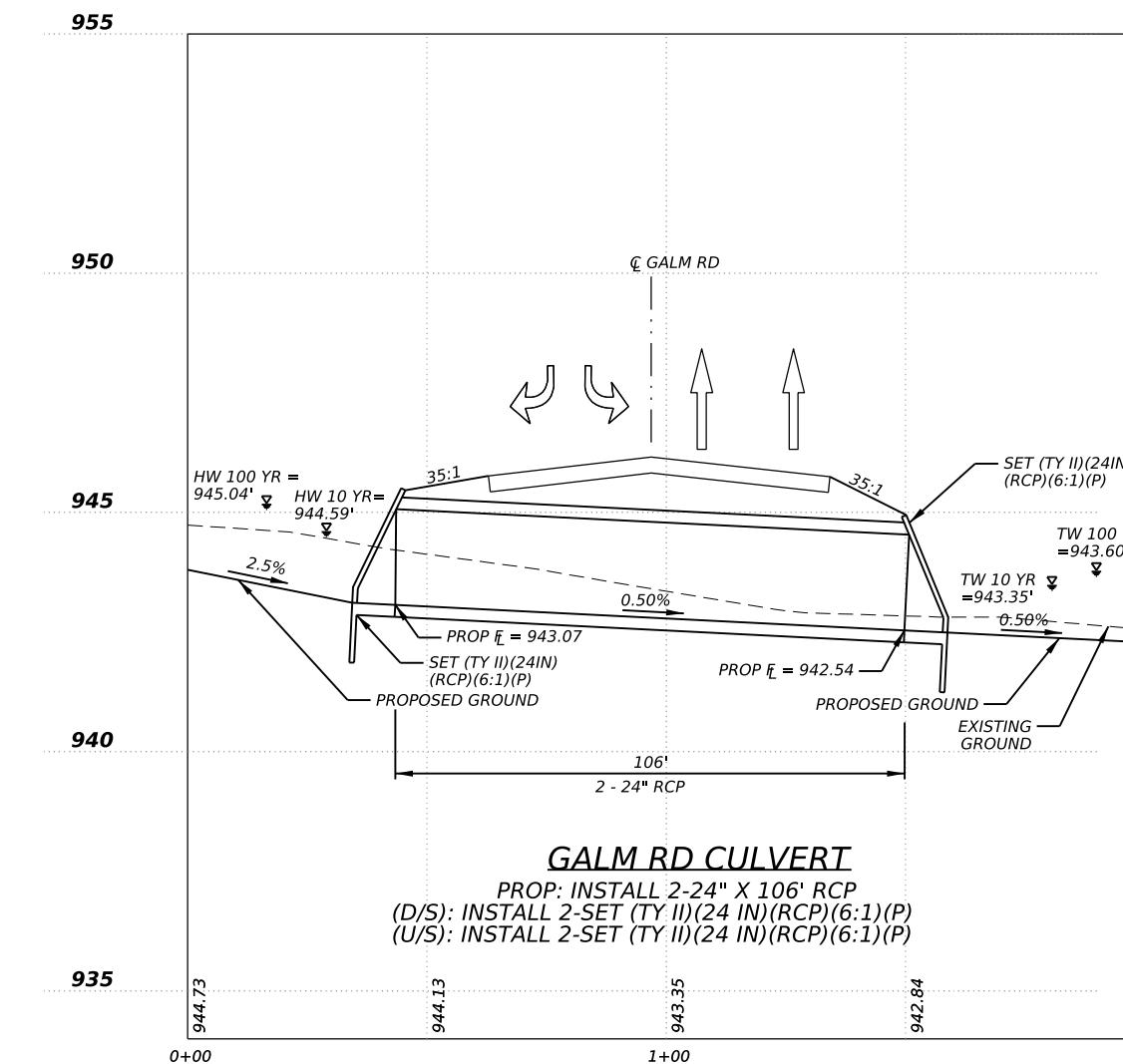
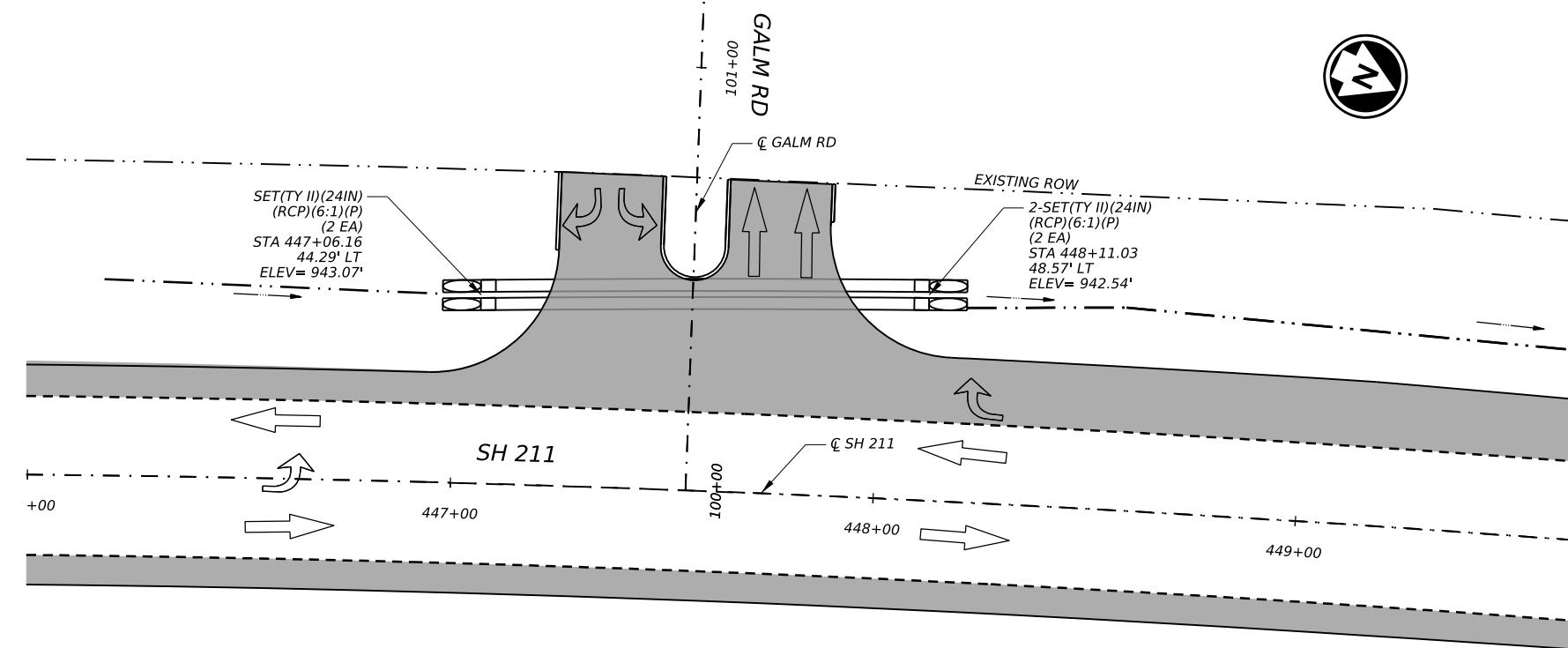
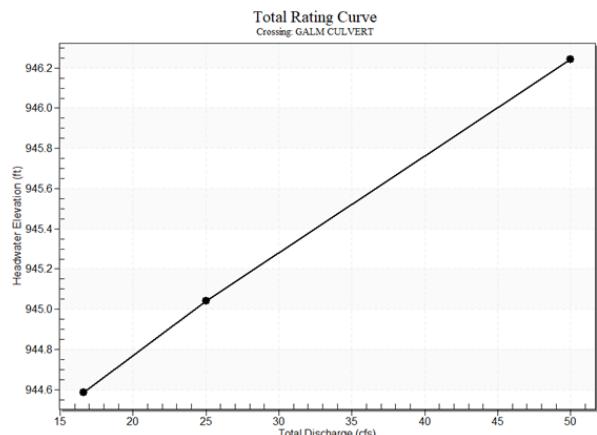


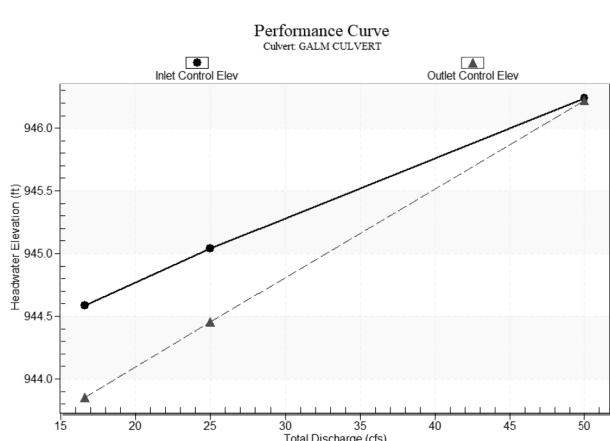
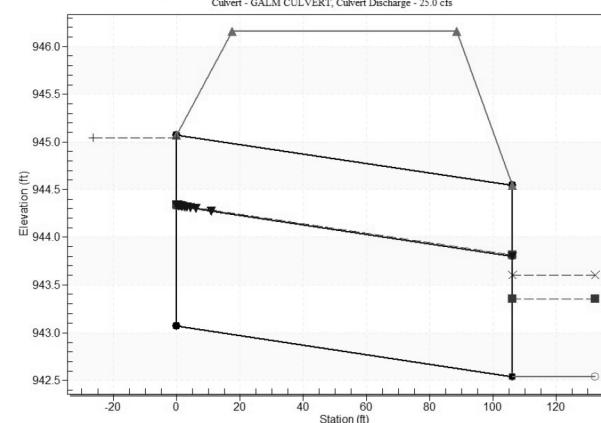
Table 1 - Summary of Culvert Flows at Crossing: GALM CULVERT

Headwater Elevation (ft)	Discharge Names	Total Discharge (cfs)	GALM CULVERT Discharge (cfs)	Roadway Discharge (cfs)	Iterations
944.59	10 year	16.60	16.60	0.00	1
945.04	100 year	25.00	25.00	0.00	1
946.16	Overtopping	41.87	41.87	0.00	Overtopping

Rating Curve Plot for Crossing: GALM CULVERT**Table 2 - Culvert Summary Table: GALM CULVERT**

Discharge Names	Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
10 year	16.60	16.60	944.59	1.52	0.78	1-S2n	0.97	1.03	0.97	0.81	5.47	3.44
100 year	25.00	25.00	945.04	1.97	1.38	1-S2n	1.26	1.27	1.26	1.06	6.02	3.94

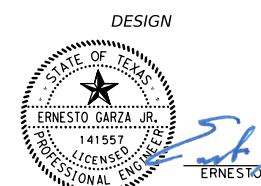
.....
Straight Culvert
Inlet Elevation (invert): 943.07 ft, Outlet Elevation (invert): 942.54 ft
Culvert Length: 106.00 ft, Culvert Slope: 0.0050

Culvert Performance Curve Plot: GALM CULVERTCrossing - GALM CULVERT, Design Discharge - 25.0 cfs
Culvert - GALM CULVERT, Culvert Discharge - 25.0 cfs**Site Data - GALM CULVERT**

Site Data Option: Culvert Invert Data
Inlet Station: 0.00 ft
Inlet Elevation: 943.07 ft
Outlet Station: 106.00 ft
Outlet Elevation: 942.54 ft
Number of Barrels: 2

Culvert Data Summary - GALM CULVERT

Barrel Shape: Circular
Barrel Diameter: 2.00 ft
Barrel Material: Concrete
Embedment: 0.00 in
Barrel Manning's n: 0.0120
Culvert Type: Straight
Inlet Configuration: Square Edge with Headwall
Inlet Depression: None



6/13/2025

Table 3 - Downstream Channel Rating Curve (Crossing: GALM CULVERT)

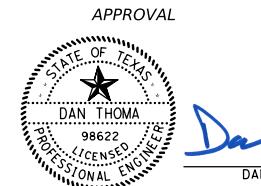
Flow (cfs)	Water Surface Elev (ft)	Depth (ft)	Velocity (ft/s)	Shear (psf)	Froude Number
16.60	943.35	0.81	3.44	0.60	0.67
25.00	943.60	1.06	3.94	0.79	0.68

Tailwater Channel Data - GALM CULVERT

Tailwater Channel Option: Rectangular Channel
Bottom Width: 6.00 ft
Channel Slope: 0.0120
Channel Manning's n: 0.0350
Channel Invert Elevation: 942.54 ft

Roadway Data for Crossing: GALM CULVERT

Roadway Profile Shape: Constant Roadway Elevation
Crest Length: 100.00 ft
Crest Elevation: 946.16 ft
Roadway Surface: Paved
Roadway Top Width: 71.00 ft



6/13/2025

0 25 50 75
SCALE: 1" = 50'

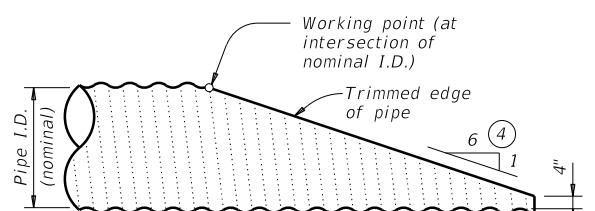
REV. NO. DATE DESCRIPTION BY

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ENGINEERS**
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

Texas Department of Transportation

SH 211 TURN LANES AT GALM RD
GALM CULVERT
HYDRAULIC DATA

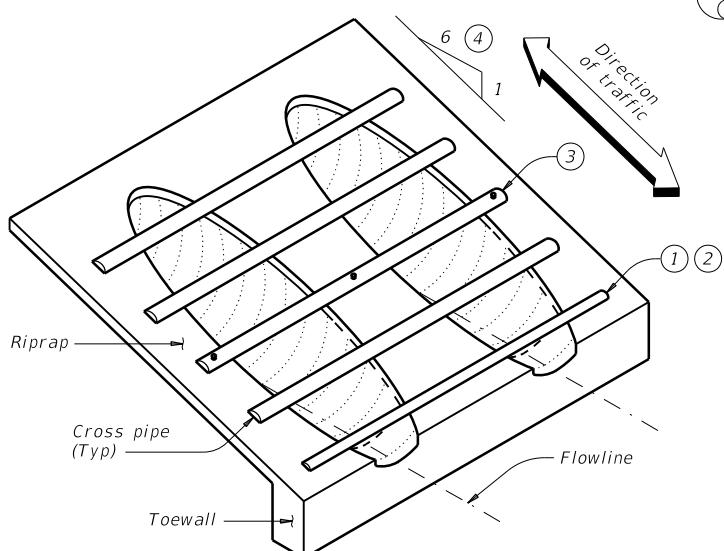
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST	COUNTY		SHEET NO.
SAT	MEDINA		46



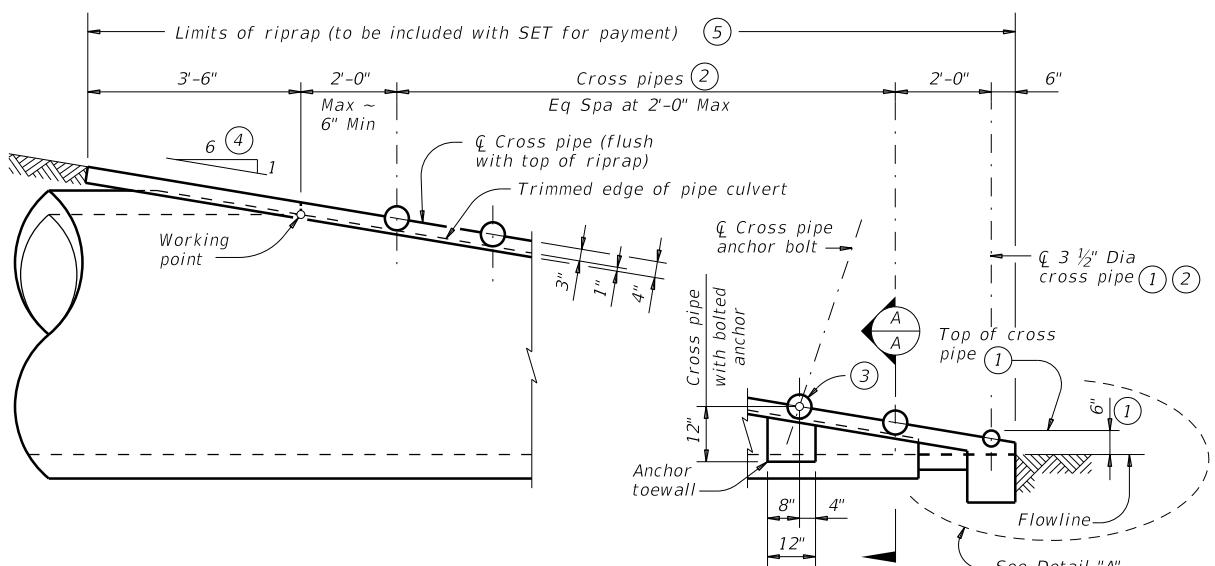
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing corrugated metal pipe (CMP) culvert. Details at reinforced concrete pipe (RCP) culvert are similar.)

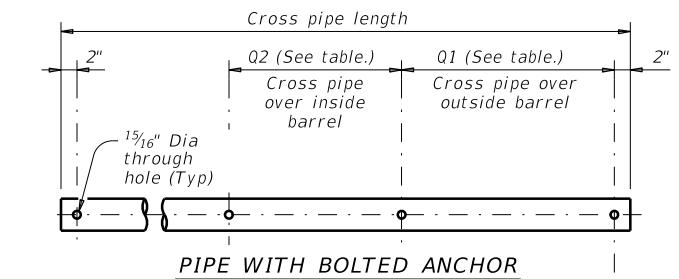


ISOMETRIC VIEW OF TYPICAL INSTALLATION

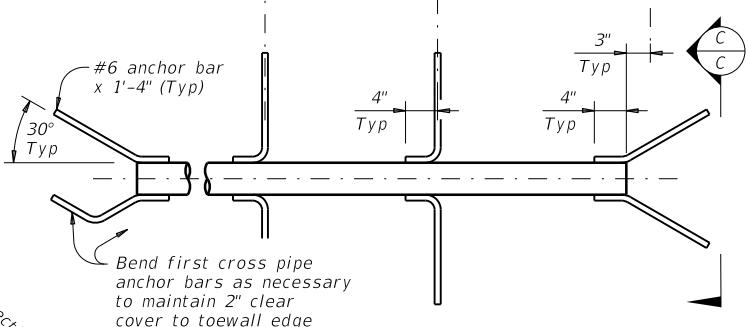


SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

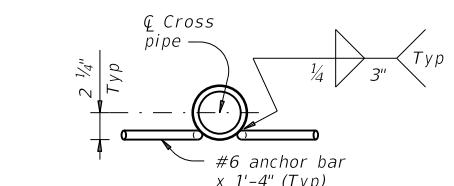
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



PIPE WITH BOLTED ANCHOR

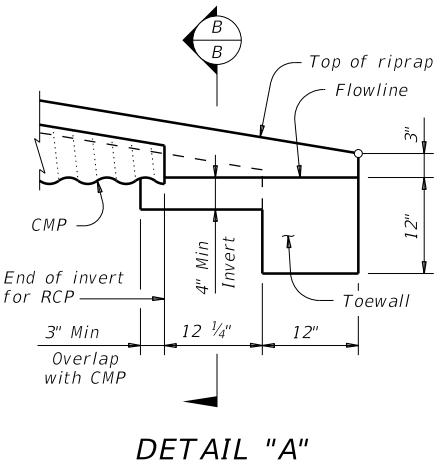


PIPE WITH ANCHOR BARS



SECTION C-C

CROSS PIPE DETAILS



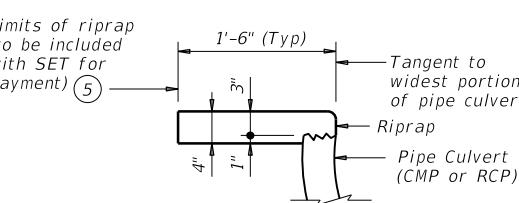
DETAIL "A"

(Showing invert with corrugated metal pipe (CMP) culvert. Reinforced concrete pipe (RCP) culvert details are similar. Cross pipes not shown for clarity.)

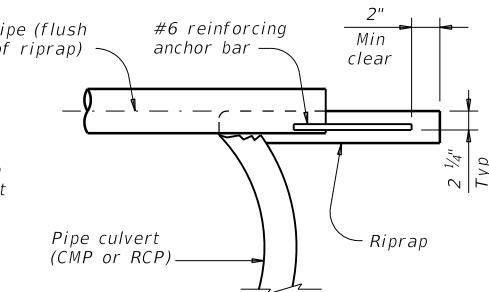


SECTION B-B

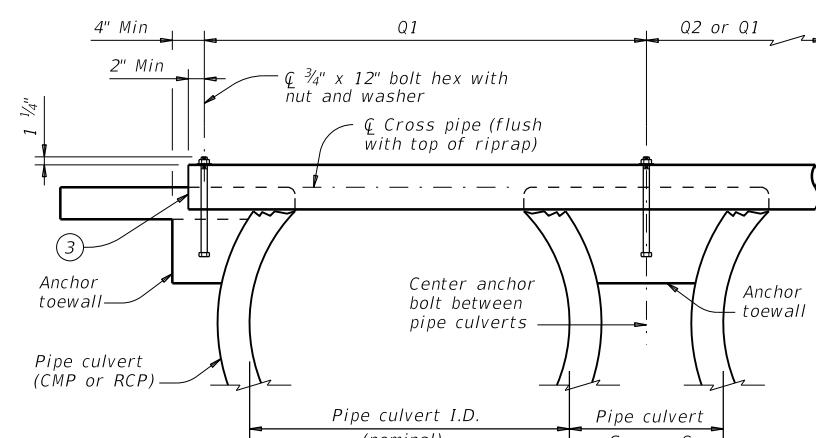
(Cross pipes not shown for clarity.)



SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

Nominal Culvert I.D.	Conc Riprap (CY) (6)	Pipe Culvert Spa ~ G	Single Barrel ~ Q1		Multi-Barrel ~ Q1	Q2	Conditions for Use of Cross Pipes	Cross Pipe Sizes
			3 or more pipe culverts	3" Std (3.500" O.D.)				
12"	0.6	0' - 9"	N/A	2' - 1"	1' - 9"			
15"	0.7	0' - 11"	N/A	2' - 5"	2' - 2"			
18"	0.8	1' - 2"	N/A	2' - 10"	2' - 8"			
21"	0.9	1' - 4"	N/A	3' - 2"	3' - 1"			
24"	0.9	1' - 7"	N/A	3' - 6"	3' - 7"			
27"	1.0	1' - 8"	N/A	3' - 10"	3' - 11"	3 or more pipe culverts		3 1/2" Std (4.000" O.D.)
30"	1.1	1' - 10"	N/A	4' - 2"	4' - 4"	2 or more pipe culverts		
33"	1.2	1' - 11"	4' - 2"	4' - 5"	4' - 8"	All pipe culverts		
36"	1.3	2' - 1"	4' - 5"	4' - 9"	5' - 1"	All pipe culverts		4" Std (4.500" O.D.)
42"	1.5	2' - 4"	4' - 11"	5' - 5"	5' - 10"			
48"	1.7	2' - 7"	5' - 5"	6' - 0"	6' - 7"			
54"	2.0	3' - 0"	5' - 11"	6' - 9"	7' - 6"			
60"	2.2	3' - 3"	6' - 5"	7' - 4"	8' - 3"			
66"	2.4	3' - 3"	6' - 11"	7' - 10"	8' - 9"			
72"	2.7	3' - 4"	7' - 5"	8' - 5"	9' - 4"			5" Std (5.563" O.D.)

① The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.

② Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1/2" standard pipe (4" O.D.) for the first bottom pipe.

③ Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.

④ Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.

⑤ Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."

⑥ Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise.

Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52.

Provide ASTM A307 bolts and nuts.

Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981.

Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes.

Construct concrete riprap and all necessary invert in accordance with the requirements of Item 432, "Riprap."

Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.



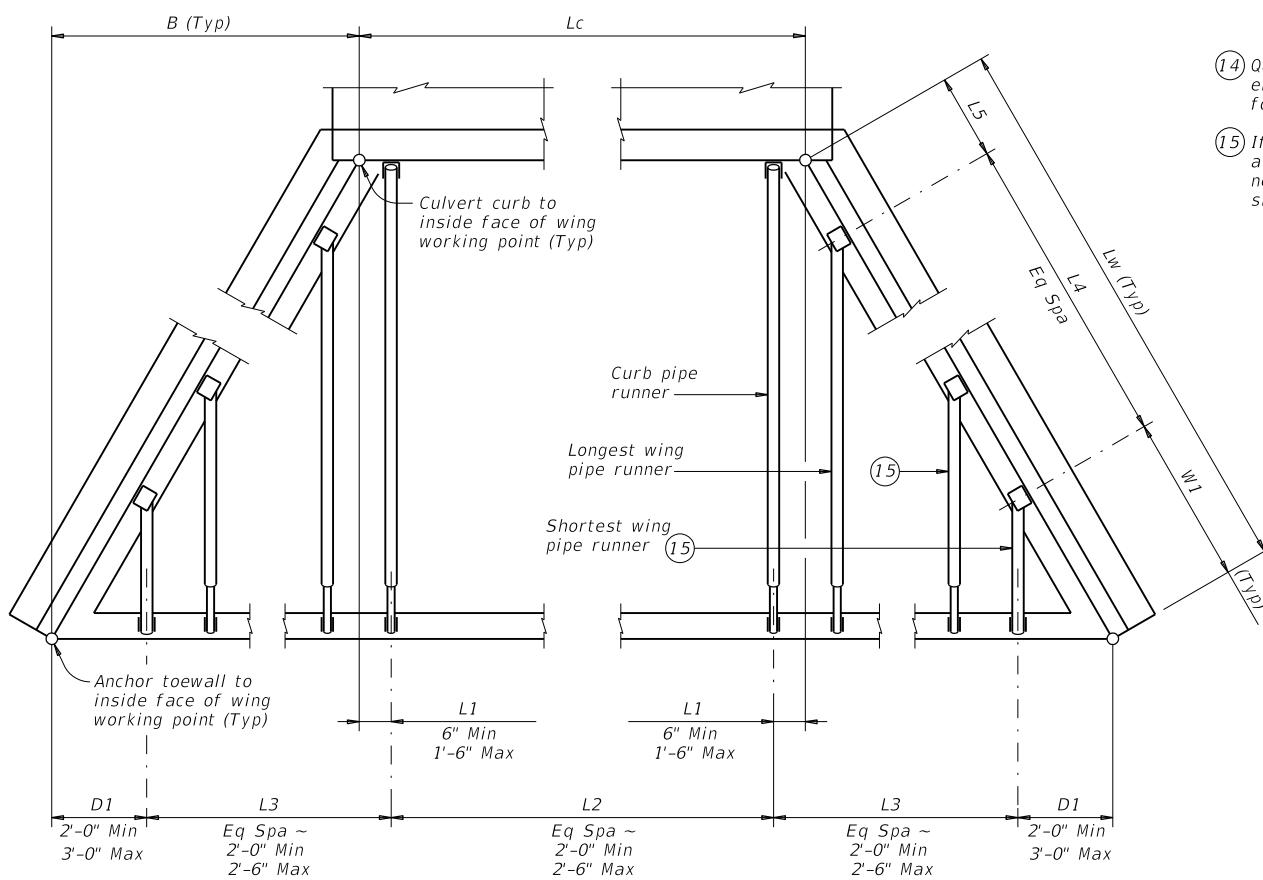
Texas Department of Transportation

Bridge Division Standard

SAFETY END TREATMENT FOR 12" DIA TO 72" DIA PIPE CULVERTS TYPE II ~ PARALLEL DRAINAGE

SETP-PD

FILE: CD-SETP-PD-20.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
① TxDOT	February 2020	CONT	SECT	JOB
REVISIONS				HIGHWAY
	3544 04	XXX		SH211
DIST	COUNTY			SHEET NO.
SAT	MEDINA			47



PIPE RUNNER LAYOUT

14 Quantities shown are for one structure end if Lt or Rt. Quantities shown are for two structure ends if Both.

15 If the outermost wing pipe runner is a non-sliding pipe runner, consider the next outermost wing pipe runner as the shortest.

SPECIAL NOTE:

This tabular sheet is to be filled out by the culvert specifier and provides information for the construction details and quantities of pipe runners.

An Excel 2010 spreadsheet to assist in completing this table can be downloaded from the Bridge Standards (English) web page on the TxDOT web site. The completed sheet must be signed, sealed, and dated by a licensed Professional Engineer.

Note that the tabular quantities are given for estimating purposes only. It is likely that these quantities will change due to field conditions. Therefore, all dimensions must be verified by the Contractor in the field prior to fabrication of the safety end treatment components.

SHEET 3 OF 3



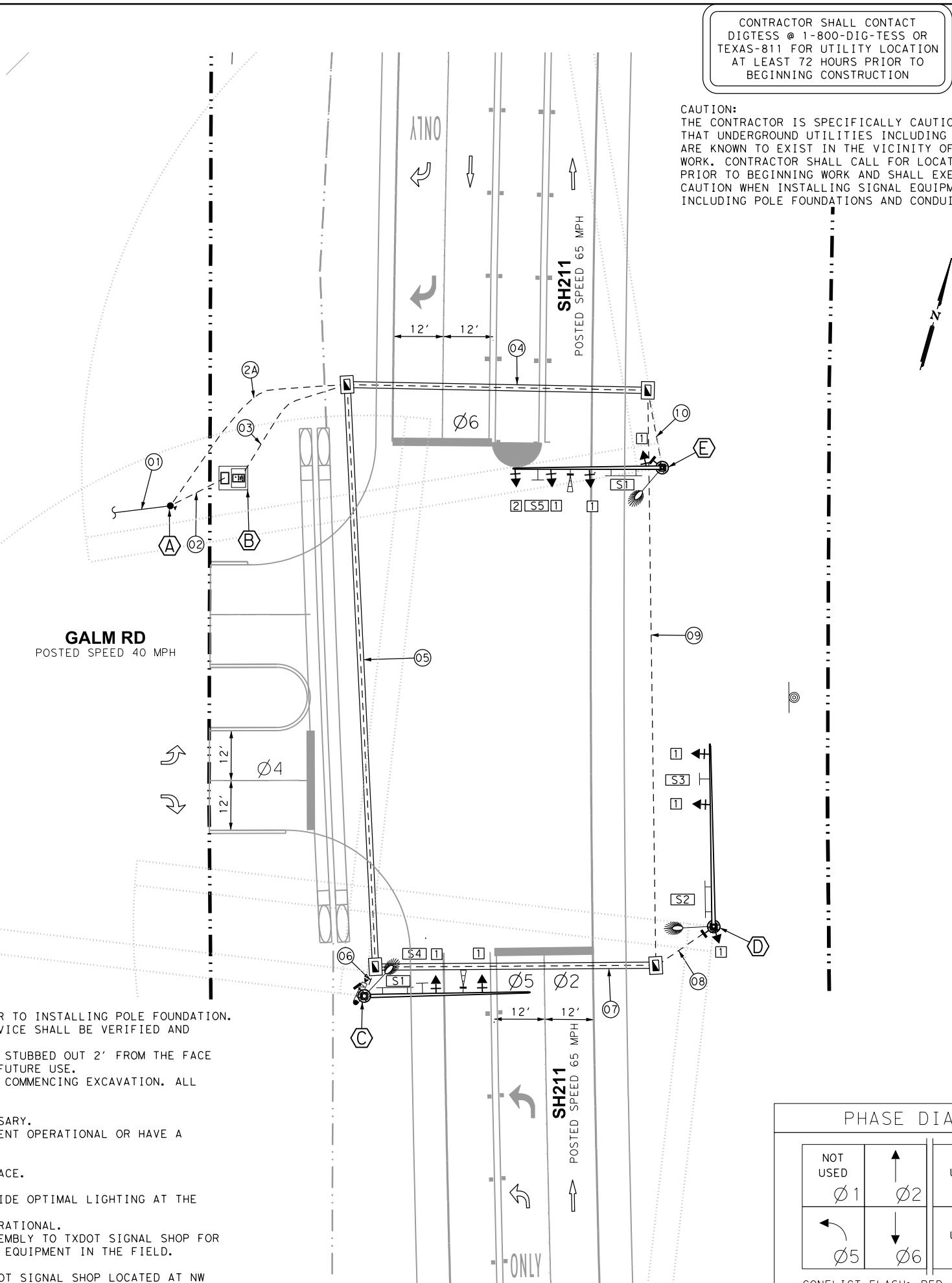
*SAFETY END TREATMENT
WITH FLARED WINGS
FOR 0° SKEW BOX CULVERTS
TYPE I ~ CROSS DRAINAGE*

SETB-FW-0

FILE: CD-SETB-FWD-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
① TxDOT February 2020	CONT	SECT	JOB	HIGHWAY
REVISIONS	3544	04	XXX	SH 211
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		50

TRAFFIC SIGNAL HEADS				
12" LED SIGNAL SECTIONS WITH VENTED ALUMINUM REFLECTIVE BACKPLATES				
SIGNAL FACES	KEY	TYPE	KEY	QTY
		SEE SIGNING DETAILS	S1	2
			S2	1
		R3-8LR (36" x 30")	S3	1
		R3-5R (30" x 36")	S4	1
		LEFT ON GREEN ARROW ONLY	S5	1
QTY	KEY			
8	1			

TRAFFIC SIGNS				
LEGEND	TYPE	KEY	QTY	SQFT
Galm Rd	SEE SIGNING DETAILS	S1	2	16.5
SH 211		S2	1	7.5
	R3-8LR (36" x 30")	S3	1	7.5
	R3-5R (30" x 36")	S4	1	7.5
	LEFT ON GREEN ARROW ONLY	S5	1	7.5



LEGEND	
(A)	EQUIPMENT ID
(01)	CABLE RUN ID
—	SIGNAL POLE
→	VEHICLE SIGNAL HEAD
—	MAST ARM SIGN
—	STREET NAME SIGN
—	RPDD
—	RADD
—	CCTV
—	LUMINAIRE
●	ELECTRIC SERVICE
—	CONDUIT (TRENCH)
—	CONDUIT (BORE)
—	GROUND BOX
—	TXDOT CONTROLLER



SCALE: 1" = 30'

REV. NO. DATE DESCRIPTION BY

**PAPE-DAWSON
ENGINEERS**
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #10028800

Texas Department of Transportation
SH 211 RIGHT-TURN LANE
TRAFFIC SIGNAL PROPOSED LAYOUT

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	51

PHASE DIAGRAM

NOT USED Ø1	Ø2	NOT USED Ø3	Ø4
Ø5	Ø6	NOT USED Ø7	NOT USED Ø8

CONFLICT FLASH: RED ALL PHASES
STARTUP FLASH: YELLOW 2+6, RED 4+5

Plotted on: 5/30/2025

CONDUIT AND CONDUCTOR SCHEDULE														
	RUN NUMBER	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩			
	CONDUIT SIZE IN INCHES	2	2	2	3	3	2	3	2	3	2	3	2	
	NUMBER OF CONDUITS	1	1	1	2	2	1	2	1	1	2	1	1	
	LENGTH OF RUN (FT)	25	45	25	80	80	120	120	10	10	70	70	20	
	TRENCH (T) / BORE (B) / RIGID OVERHEAD (O) METAL (R)	O	T	T	T	B	B	T	T	B	B	T	T	
CABLE	CIRCUIT	NUMBER OF CONDUCTORS												
#6 XHHW (SOLID)	120 POWER HOT	1												
	120 POWER COMMON	1												
#6 BARE (SOLID)	BARE BOND GROUND	1	1	2	2	1	2	1	1	1	2	1	1	
7 COND. #12 AWG TYPE "A", STRANDED	SIGNALS	6												
		2	1		1	1							1	
		4			1			1		1				
		2+5		3	2	1		1	1			2		
4 COND. #12 AWG TRAY CABLE	LUMINAIRE	C				1	1							
		D				1			1	1				
		E				1							1	
POWER & DATA CABLE	RPDD	C				1	1							
		D				1			1	1				
		E				1							1	
		RADD	C				1	1						
			E				1							1
ETHERNET CABLE	CCTV CAMERA	POLE	C			1	1							
PROPOSED ELECTRICAL SERVICE														
Electric Service ID	Electrical Service Description (see ED (5) - 14)	Service Conduit Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole / Amp	Two - Pole Contactor Amps	Panelbd/ Load center Amp Rating	Circuit No.	Branch Ckt. Bkr. Pole / Amps	Branch Circuit Amps	KVA Load			
TL-	ELEC. SERV. TYPE D (120/240) 070 (NS) AL (E) SP (O)	1-2"	3/#6	N/A	2P/70	30	100	A (Signal) B (Lum)	1P/50 1P/20	40 8	6.7			

POLE SCHEDULE											
POLE	POLE									⑥	⑦
POLE TYPE	SMA-80									⑥	⑦
POLE HEIGHT (FT)	30									⑥	⑦
MAST ARM LENGTH (FT)	40									⑥	⑦
LUMINAIRE (YES/NO)	YES									⑥	⑦
ILSN ARM LENGTH (FT)	N/A									⑥	⑦
FOUNDATION TYPE	36-A									⑥	⑦
FOUNDATION DEPTH (FT)	13									⑥	⑦
CABLE	CIRCUIT									⑥	⑦
#6 BARE (SOLID)	BARE BOND GROUND									⑥	⑦
7 COND. #12 AWG TYPE "A", STRANDED	SIGNALS									⑥	⑦
4 COND. #12 AWG TRAY CABLE	LUMINAIRE									⑥	⑦
POWER & DATA CABLE	RPDD									⑥	⑦
ETHERNET CABLE	RADD									⑥	⑦
	CCTV CAMERA									⑥	⑦

DESIGN



APPROVAL



APPROVAL

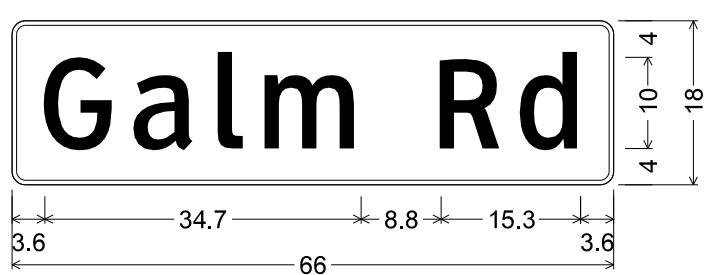
Design Filename: P:\30010\41431\ORD14-Design\Plan Sets\IS08-Traffic\IS8.1-Signals\IS000443_CCS01.dgn

SIGNS SHALL BE ATTACHED TO POLES AND MAST ARMS AS SHOWN ON PLANS.

POLE & EQUIPMENT INFORMATION

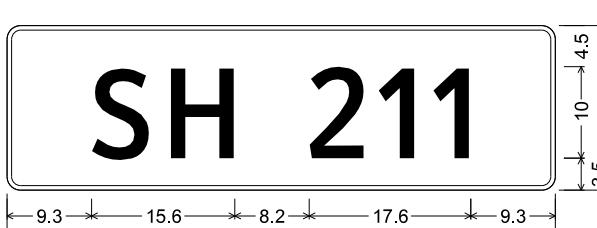
ID	DESCRIPTION/ATTACHMENTS	NORTHING	EASTING	FND. ELEV
Ⓐ	PROPOSED CPS ENERGY METER WITH TXDOT TYPE D SERVICE	N/A	N/A	N/A
Ⓑ	INSTALL TXDOT TRAFFIC SIGNAL CABINET ON CONCRETE FOUNDATION WITH COBALT ECONOLITE CONTROLLER AND TXDOT COMMUNICATION PACKAGE	N/A	N/A	N/A
Ⓒ	INSTALL 30 FT SMA-80, 40 FT MAST ARM ON 13 FT DRILLED SHAFT FND (36-A) WITH ONE LUMINAIRE, ONE RADD, ONE RPDD, ONE CCTV, ONE STREET NAME SIGN, ONE R3-5R SIGN, ONE DAMPING PLATE, AND TWO VEHICLE SIGNAL HEADS AS ILLUSTRATED	13716580.7	2030212	LEVEL W / CROWN OF ROAD
Ⓓ	INSTALL 30 FT SMA-80, 44 FT MAST ARM ON 13 FT DRILLED SHAFT FND (36-A) WITH ONE LUMINAIRE, ONE RPDD, ONE STREET NAME SIGN, ONE R3-8LR SIGN, ONE DAMPING PLATE, AND THREE VEHICLE SIGNAL HEADS AS ILLUSTRATED	13716619.1	2030288	LEVEL W / CROWN OF ROAD
Ⓔ	INSTALL 30 FT SMA-80, 36 FT MAST ARM ON 13 FT DRILLED SHAFT FND (36-A) WITH ONE LUMINAIRE, ONE RADD, ONE STREET NAME SIGN, ONE R10-5 SIGN, AND FOUR VEHICLE SIGNAL HEADS AS ILLUSTRATED	13716715.1	2030230	LEVEL W / CROWN OF ROAD

S1

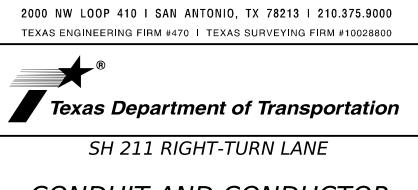
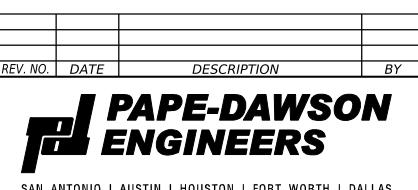


D3-1G(7) 10in;
1.5" Radius, 0.5" Border, White on Green;
"Galm Rd", ClearviewHwy-3-W;

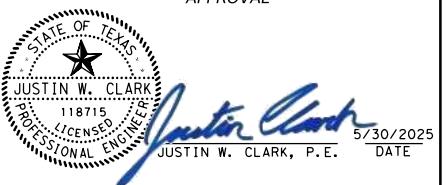
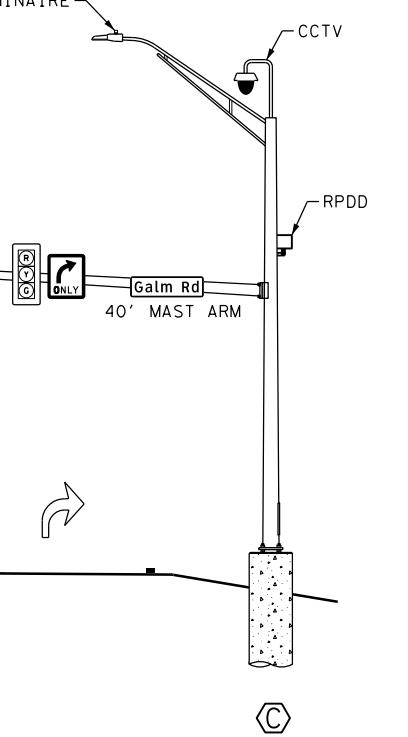
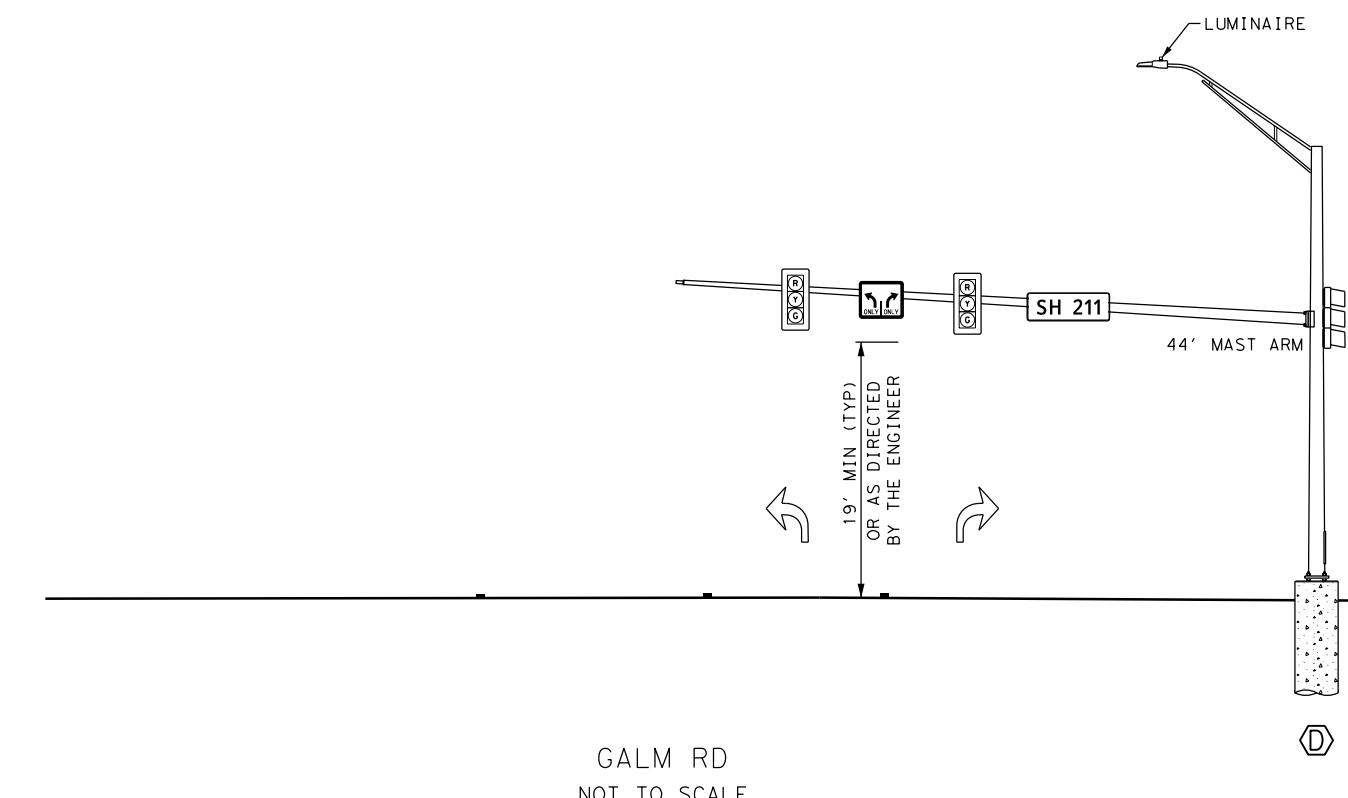
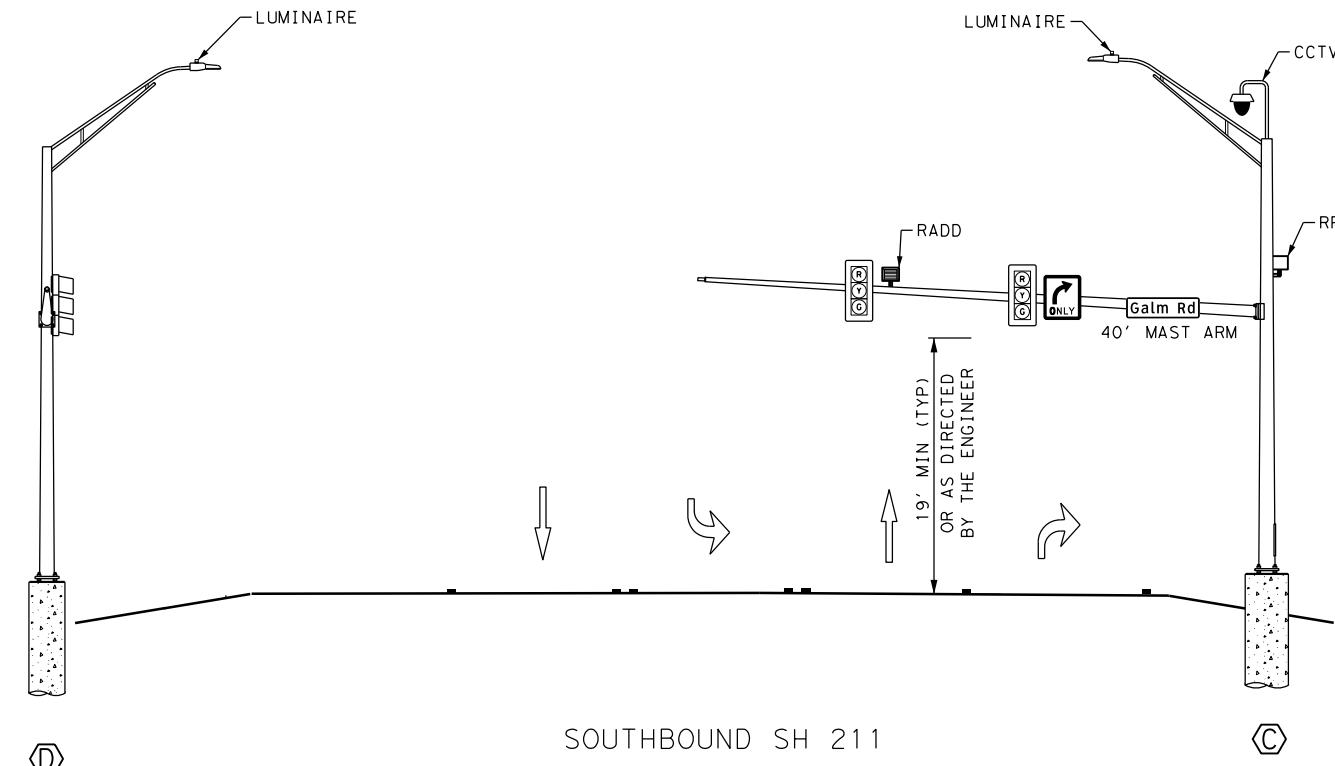
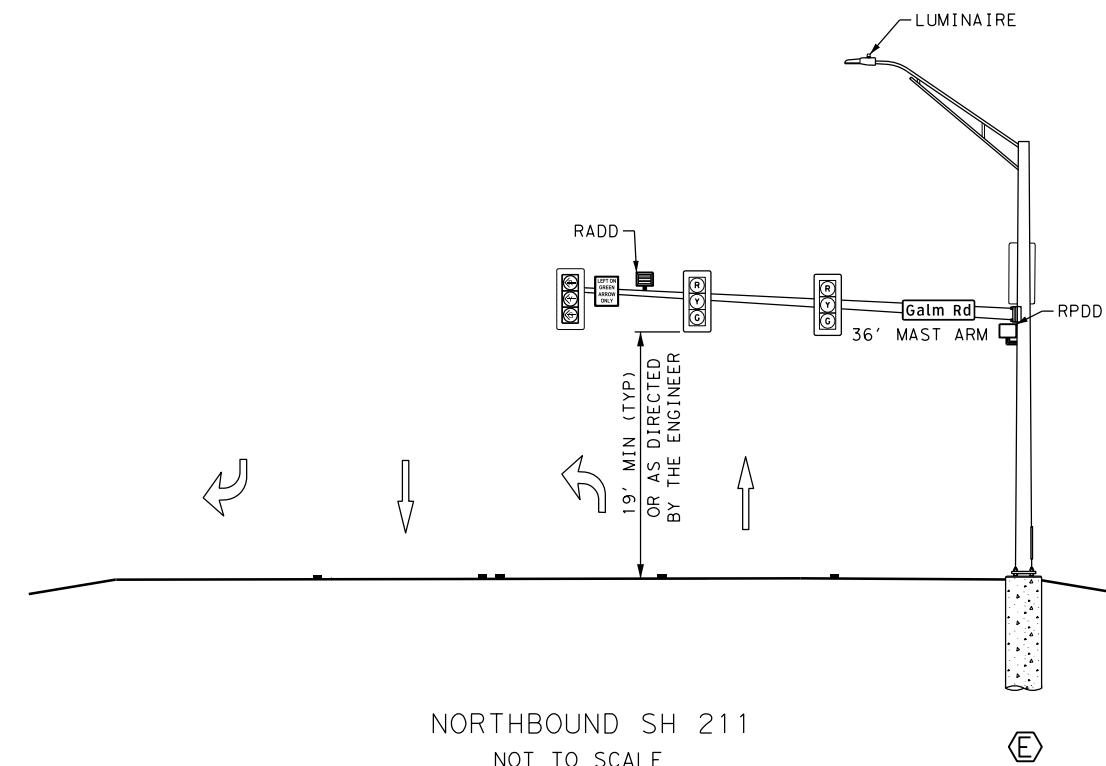
S2



D3-1G(7) 10in;
1.5" Radius, 0.5" Border, White on Green;
"SH 211", ClearviewHwy-3-W;



CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	52



REV. NO.	DATE	DESCRIPTION	BY
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**PAPE-DAWSON
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TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #1002880

Texas Department of Transportation

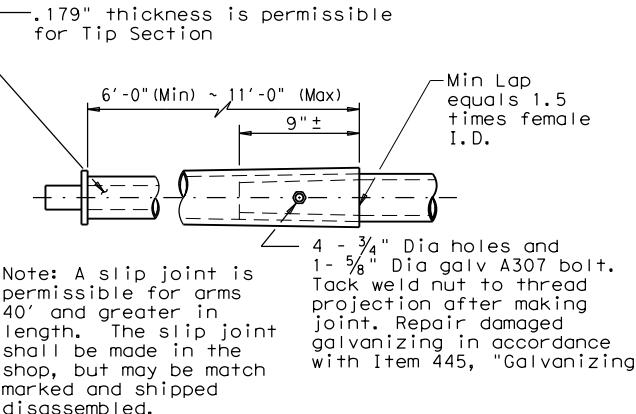
SH 211 RIGHT-TURN LANE

ELEVATION VIEWS

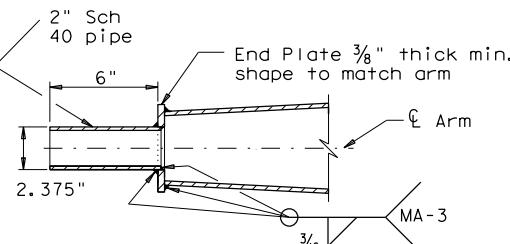
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	53

NOTES:

1. CONTRACTOR SHALL POTHOLE SIGNAL POLE LOCATIONS NEAR UNDERGROUND UTILITIES PRIOR TO INSTALLING POLE FOUNDATION.
2. MINIMUM CLEARANCE OF 10' RADIUS FROM NEUTRAL, PRIMARY, OR SECONDARY SHALL BE MAINTAINED BETWEEN PROPOSED TRAFFIC SIGNAL EQUIPMENT AND EXISTING OVERHEAD ELECTRICAL LINES.
3. ALL SIGNAL HEADS SHALL HAVE BACK PLATES.
4. SEE "SINGLE MAST ARM ASSEMBLY" (SMA-80), STANDARDS FOR SIGNAL POLE AND MAST ARM DETAILS.
5. SEE "TRAFFIC SIGNAL POLE FOUNDATION" (TS-FD) STANDARD FOR DRILLED SHAFT DETAILS.
6. SIGNAL HEADS SHALL HAVE A MINIMUM OF 19 FEET CLEARANCE ABOVE ROADWAY SURFACE.



SLIP JOINT DETAIL



TENON DETAIL

VIBRATION WARNING

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

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

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

The traffic signal mast arms shall be visually inspected in 5 to 20 mph wind conditions after installation of signal heads and any attachments, including any required 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).

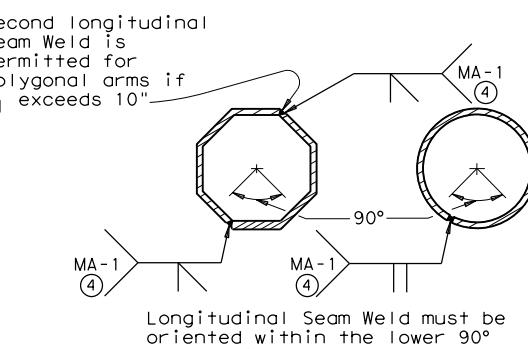
See Standard Sheet "MA-D" for pole details, "MA-C" for traffic signal arm connection details, "MA-C (ILSN)" for internally lighted street name sign arm connection details, "LUM-A" for luminaire arm and connection details, "SNS" for internally lighted street name sign details, and "TS-FD" for anchor bolt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

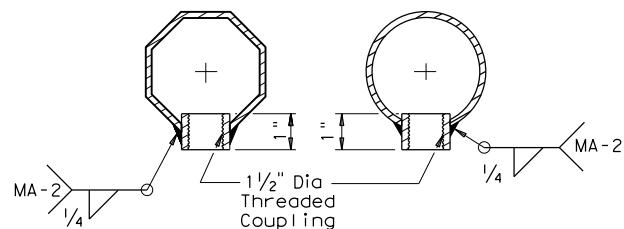
Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

SHEET 2 OF 2



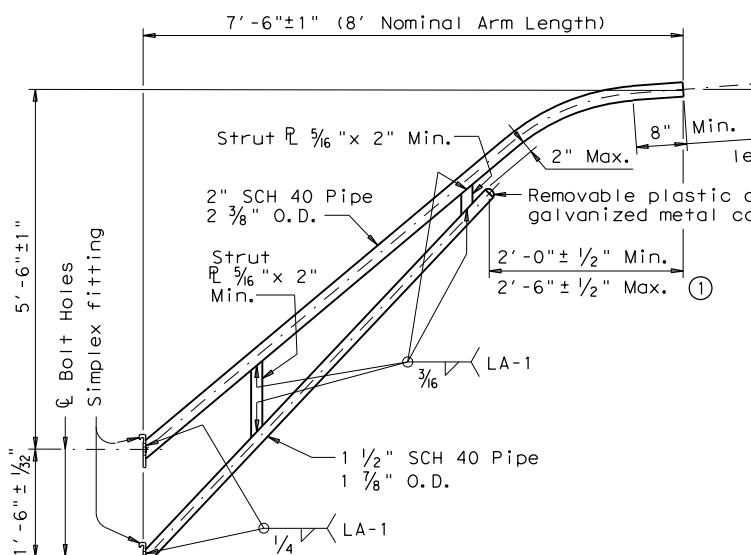
ARM WELD DETAIL

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

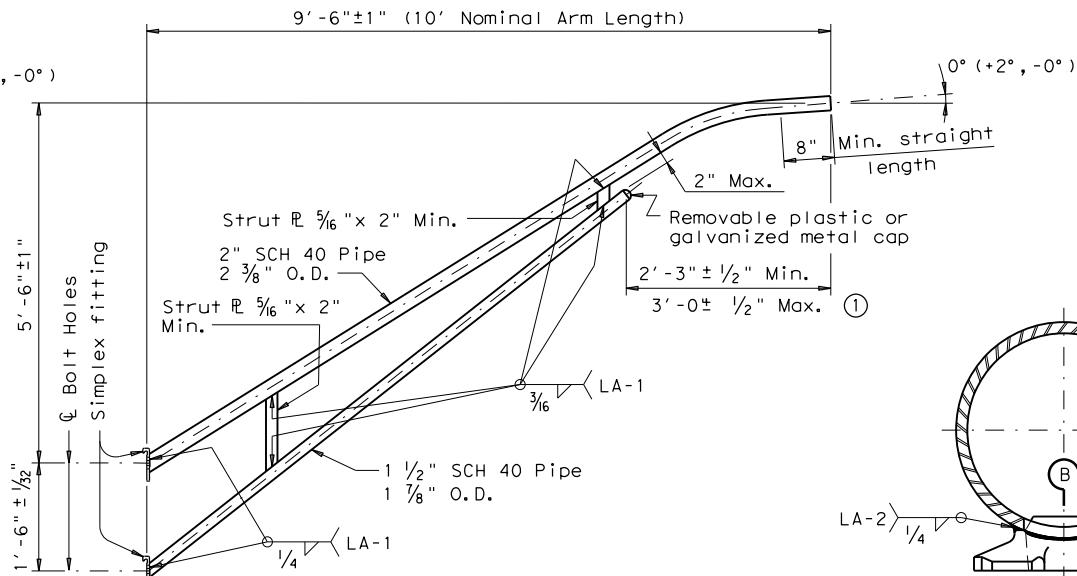


ARM COUPLING DETAILS

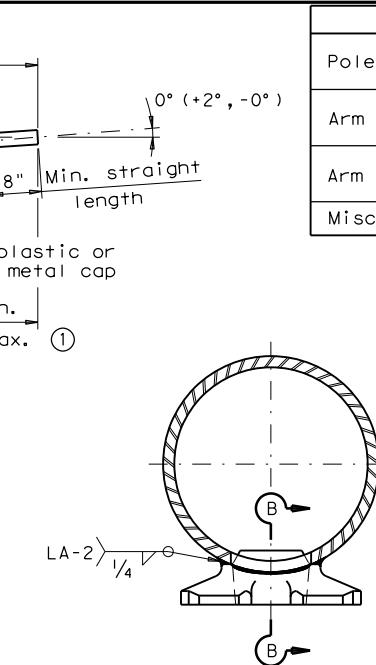
Texas Department of Transportation Traffic Operations Division				
TRAFFIC SIGNAL SUPPORT STRUCTURES SINGLE MAST ARM ASSEMBLY (80 MPH WIND ZONE)				
SMA-80(2)-12				
© TxDOT August 1995	DN: MS	CK: JSY	DW: MMF	CK: JSY
REVISIONS	CONT	SECT	JOB	HIGHWAY
5-96 1-12	3544 04	XXX	SH 211	
DIST	COUNTY		SHEET NO.	
SAT	MEDINA			56



8-FOOT LUMINAIRE ARM



10-FOOT LUMINAIRE ARM



DIRECT ATTACHMENT DETAIL

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

① Dimensional limits are given to show acceptable variation in design. All of a Fabricator's production of a particular arm length shall have the same dimensions within specified tolerances.

② Any of the materials listed for plates may be used where the drawings do not specify a particular ASTM designation.

③ A576 must be suitable for forging and also meet minimum tensile strength of 65 ksi, minimum yield of 35 ksi, and elongation in 2 inches of 22 percent.

④ ASTM A572, A1008 HSLAS-F, and A1011 HSLAS-F may have higher yield strengths but shall not have less elongation than the grade indicated.

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 100 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.

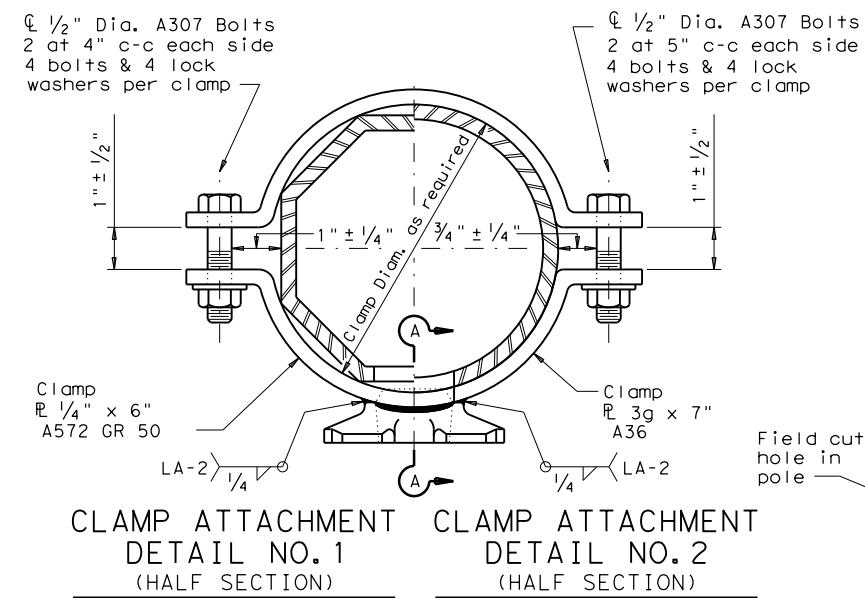
Materials and fabrication shall be in accordance with Item 686, "Traffic Signal Pole Assemblies (Steel)" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified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

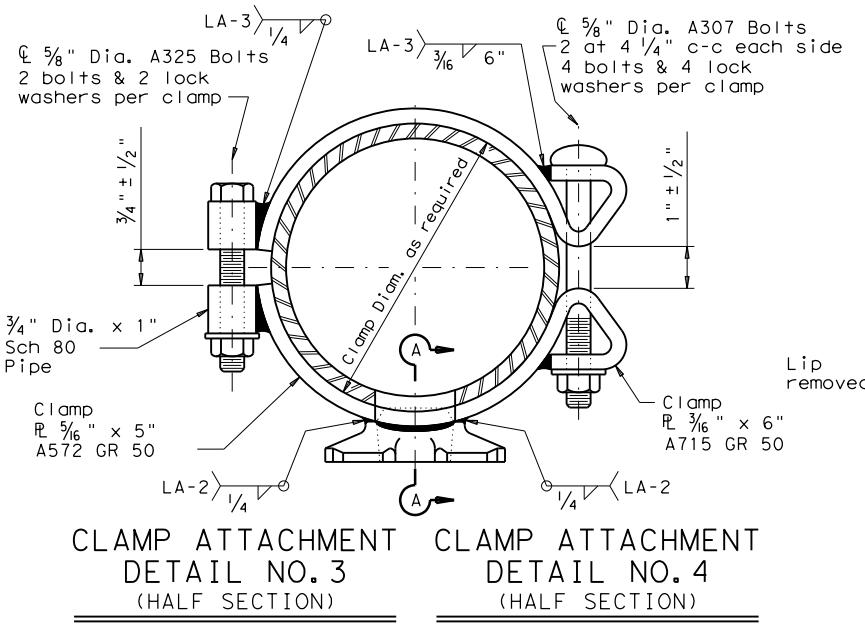
Deviation from the details and dimensions shown herein require submission of shop drawings in accordance with Item 441, "Steel Structures". Alternate designs are not acceptable.

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.

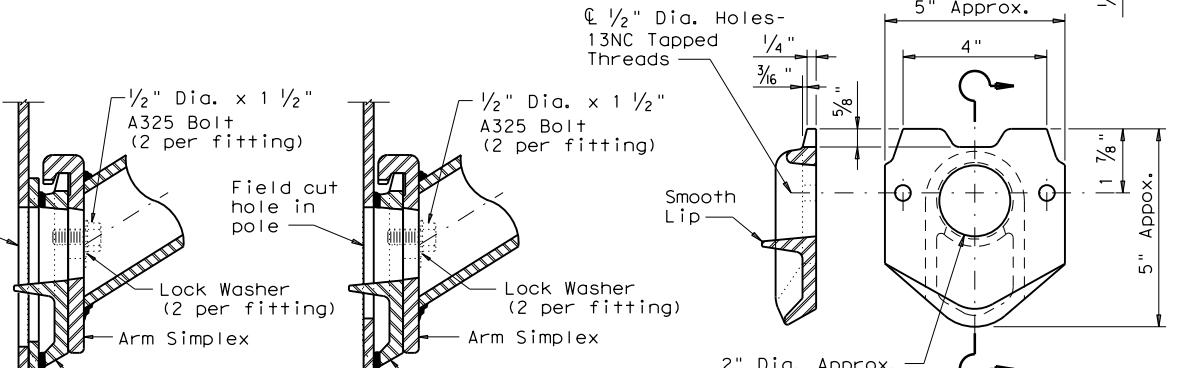
If clamp assemblies are ordered without poles, the Fabricator shall ship one upper and one lower clamp assembly together in a single package, including all nuts and washers required for the clamps and simplex fittings.



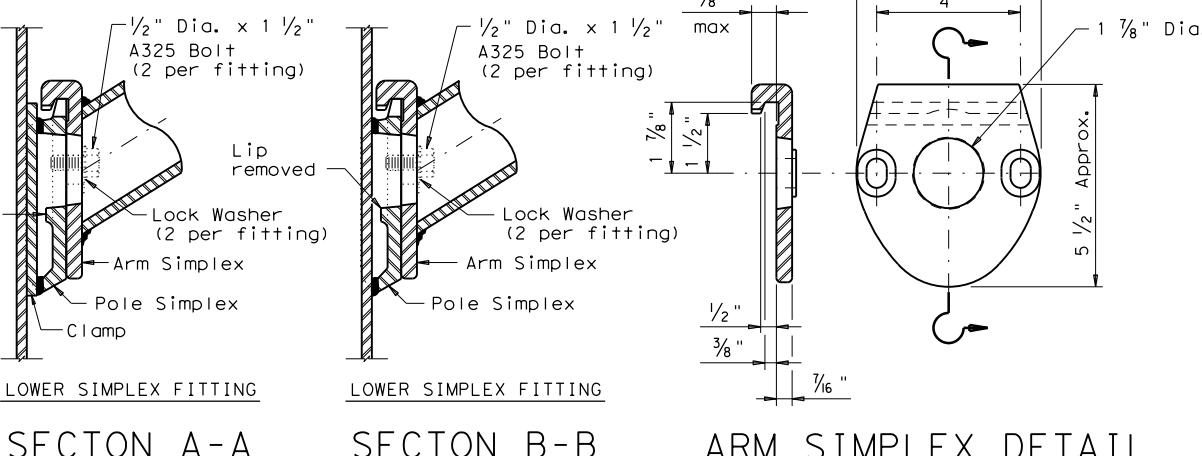
CLAMP ATTACHMENT DETAIL NO. 1
(HALF SECTION)



CLAMP ATTACHMENT DETAIL NO. 3
(HALF SECTION)



POLE SIMPLEX DETAIL



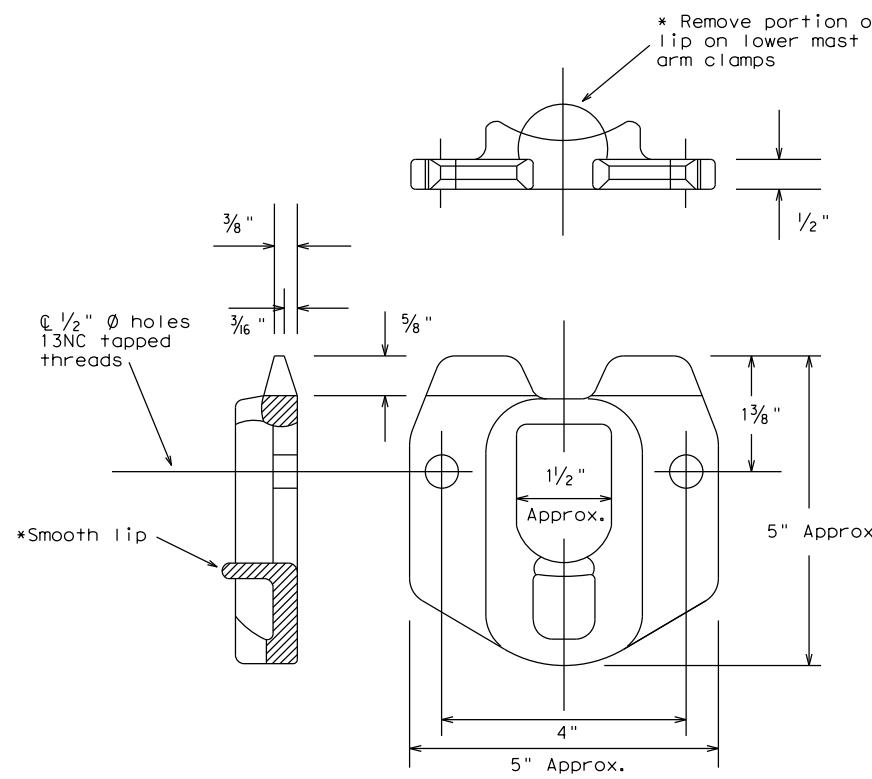
ARM SIMPLEX DETAIL

 Texas Department of Transportation
Traffic Operations Division
STANDARD ASSEMBLY DRAWINGS FOR LUMINAIRE SUPPORT STRUCTURES

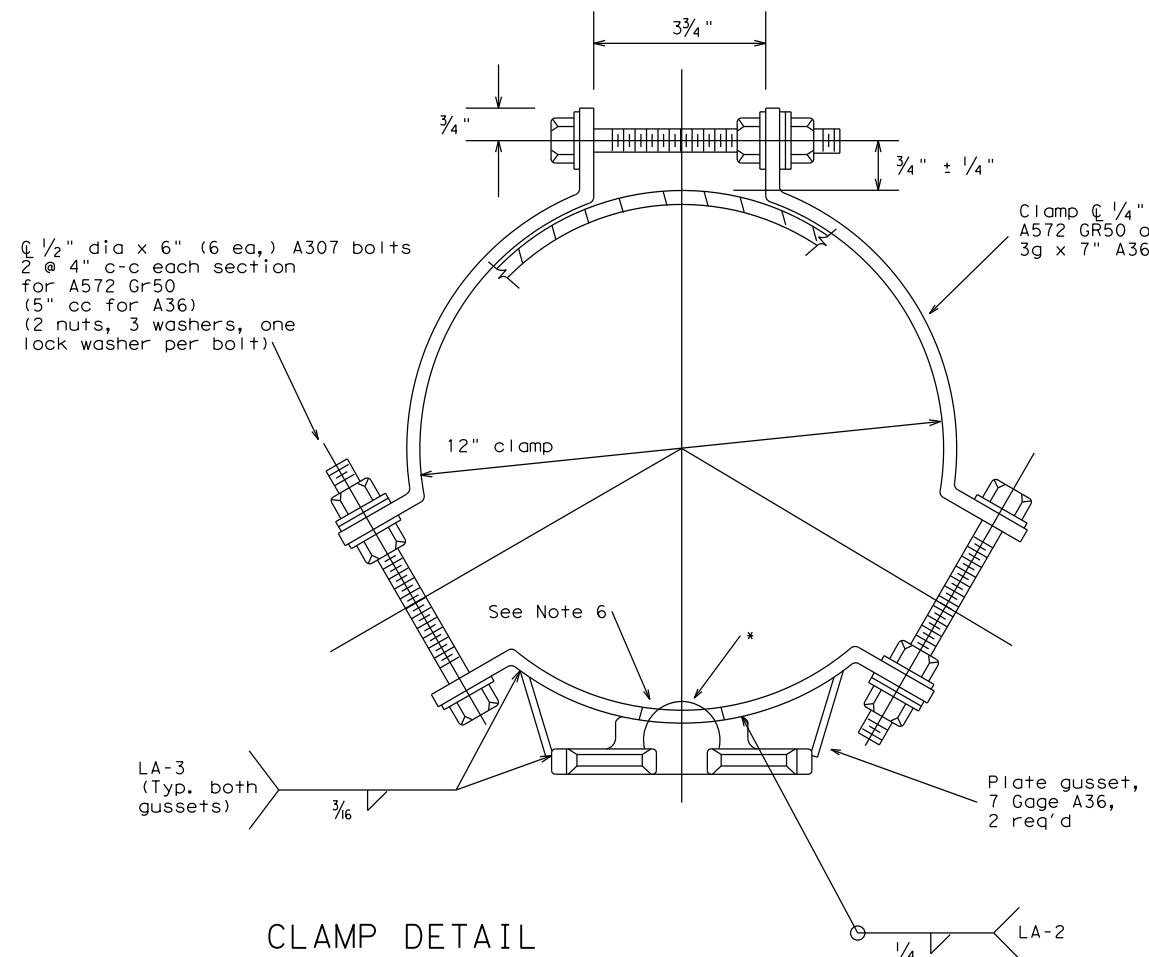
ARM DETAILS

LUM-A-12

© TxDOT August 1995	DN: LEH	CK: JSY	DW: LTT	CK: TEB
5-96	REVISIONS	CONT	SECT	HIGHWAY
1-99				
1-12				
3544 04	XXX			SH 211
DIST	COUNTY			SHEET NO.
SAT	MEDINA			57



POLE SIMPLEX DETAILS



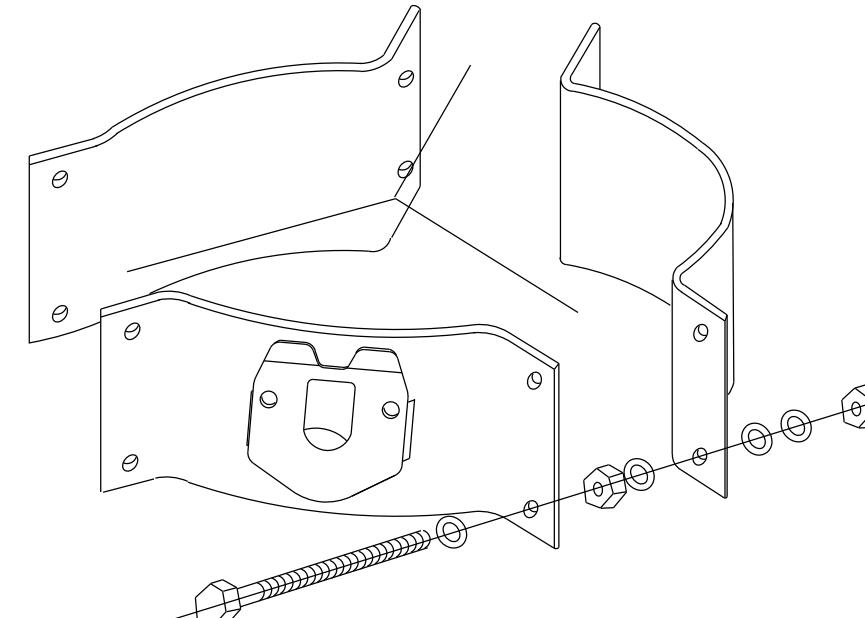
CLAMP DETAIL

OTHER MATERIALS:

1. Pole simplex shall be ASTM A27 GR65-35 or A148 GR80-50 or A576 GR1021. ASTM A576 must be suitable for forging and also meet minimum tensile of 65ksi, minimum yield of 35ksi, and a minimum elongation of 22 percent in 2 inches.
2. Welded tabs and backplates shall be ASTM A-36 steel or better.
3. Nylon insert locknuts shall conform to ASTM A563.

GENERAL NOTES:

1. Materials and fabrication shall be in accordance with Standard Sheet "MA-C" and with the details, dimensions, and weld procedures shown herein. Weld references call for preapproved weld procedures which the Fabricator must obtain prior to fabrication. In the absence of specified fabrication tolerances, dimensions shall be within the tolerances generally obtainable in normal fabrication practice.
2. All parts shall be galvanized after fabrication in accordance with Item 445, "Galvanizing". The throat of the Simplex shall be made free of all rough or sharp edges resulting from the galvanizing process.
3. Each simplex fitting shall be supplied with 2 ASTM A325 bolts, 1/2 in. x 1 1/2 in. and 2 lock washers. The bolts and lock washers shall be secured to the clamp with the other hardware items. The Fabricator shall ship clamp assembly together in a single package, including all bolts, nuts, and washers required for the clamp and simplex fitting.
4. Design conforms to 1994 AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals" and interim revisions thereto. Design Wind Speed equals 80 mph plus a 1.3 gust factor. Clamps are designed to support a 60 lb. luminaire having an effective projected area (actual area times drag coefficient) of 1.6 sq.ft., 12 ft. maximum arm length.
5. Each assembly shall consist of one upper piece simplex fitting having a smooth lip and one lower piece simplex fitting with the lip removed.
6. Approximately 2 in. diameter hole in upper mast arm clamp.



PROJECTION

For 8.9 - 12 inch diameter Signal Poles
(Two req'd for each mast arm)

Texas Department of Transportation
Traffic Operations Division

CLAMP ON
FITTING ASSEMBLY FOR
LUMINAIRE MAST ARM

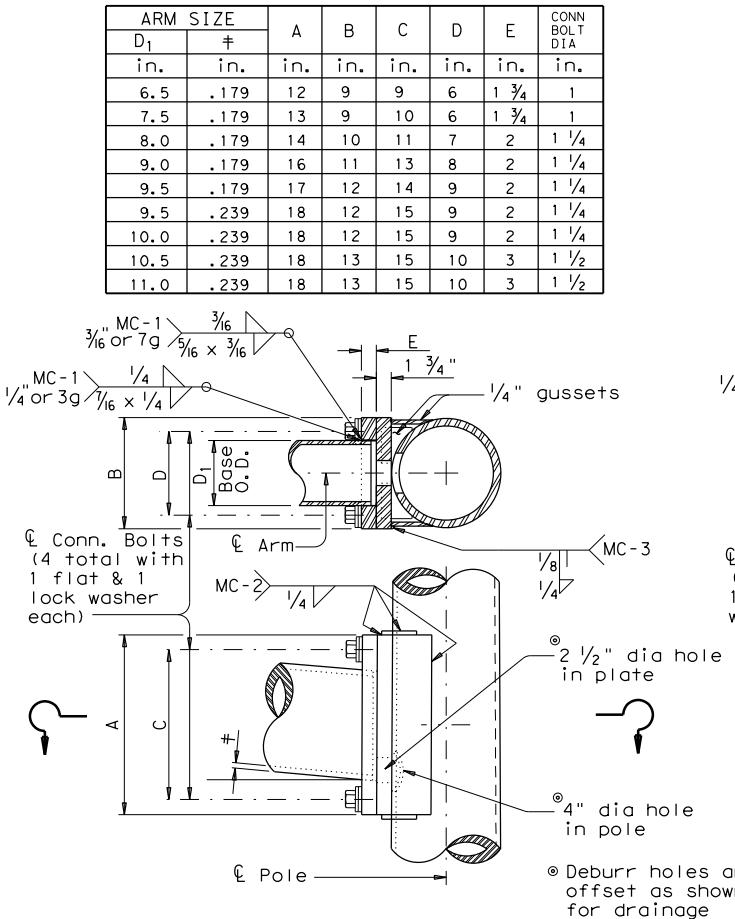
CFA-12

© TxDOT	DN: KAB	CK: RES	DW: FDN	CK: CAL
REVISIONS	CONT	SECT	JOB	HIGHWAY
11-99 1-12				
3544 04	XXX			SH 211
DIST	COUNTY			SHEET NO.
SAT	MEDINA			58

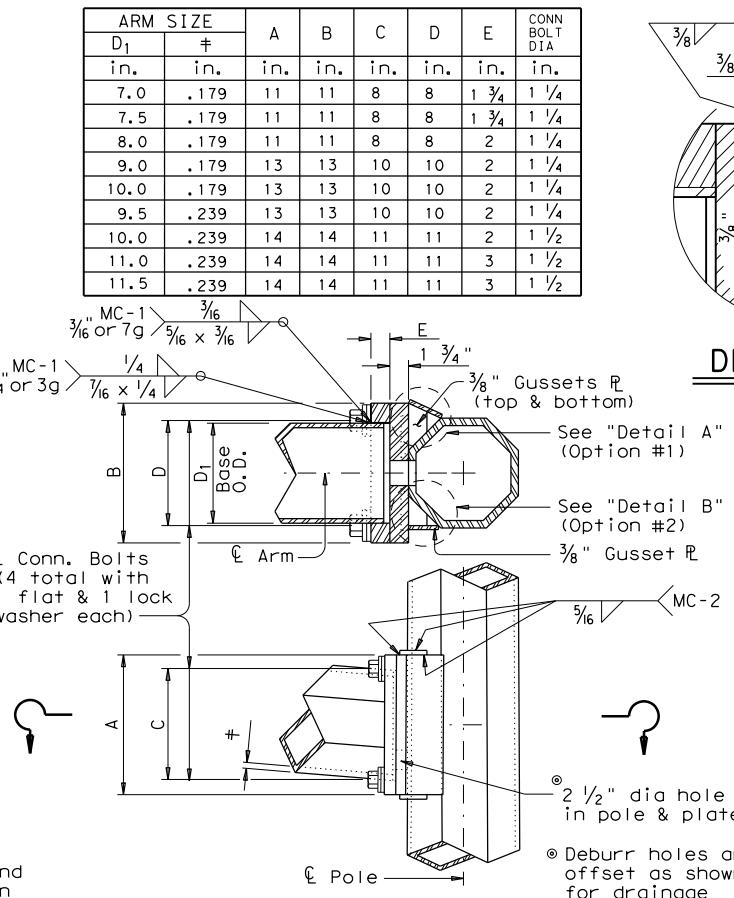
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DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty for the construction or use of any kind of this standard to other formats or for incorrect results or damages resulting from its use.

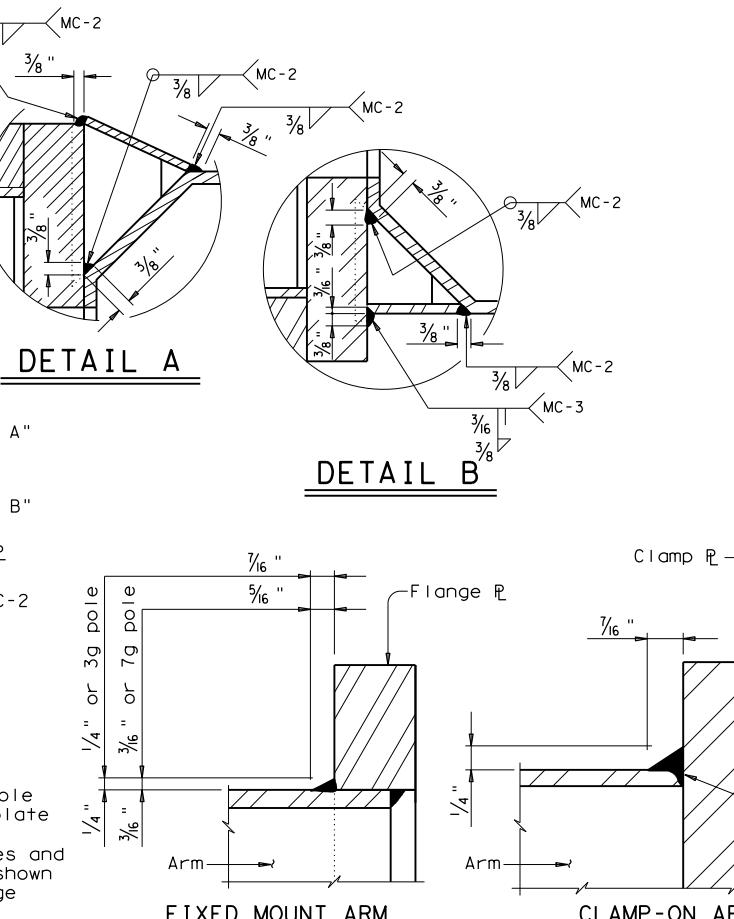
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FIXED MOUNT DETAIL 1



FIXED MOUNT DETAIL 2

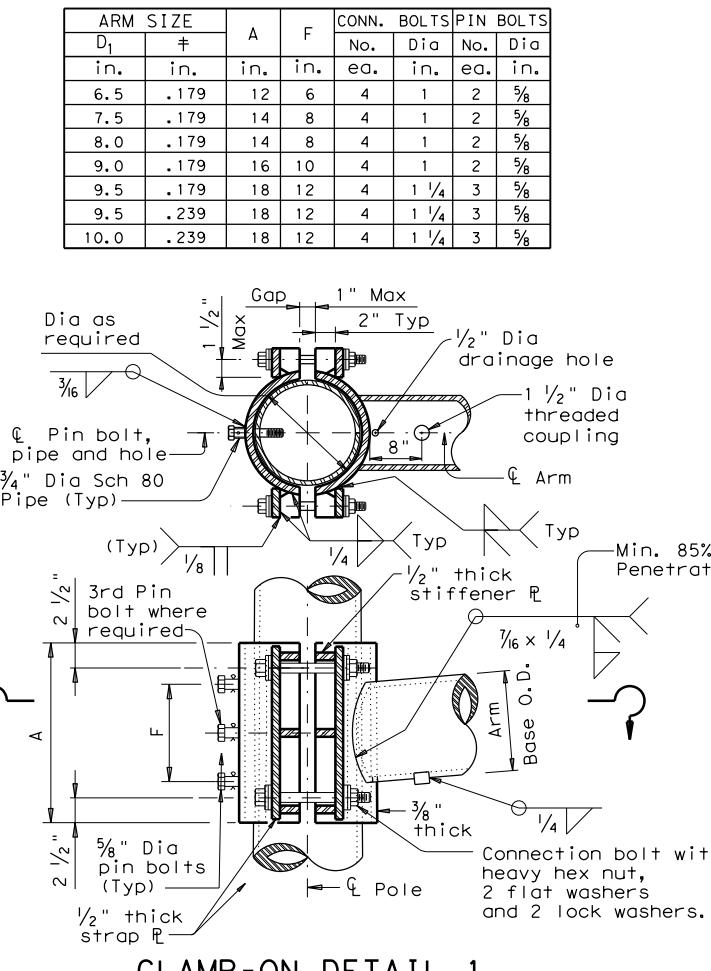


ARM BASE WELD DETAILS

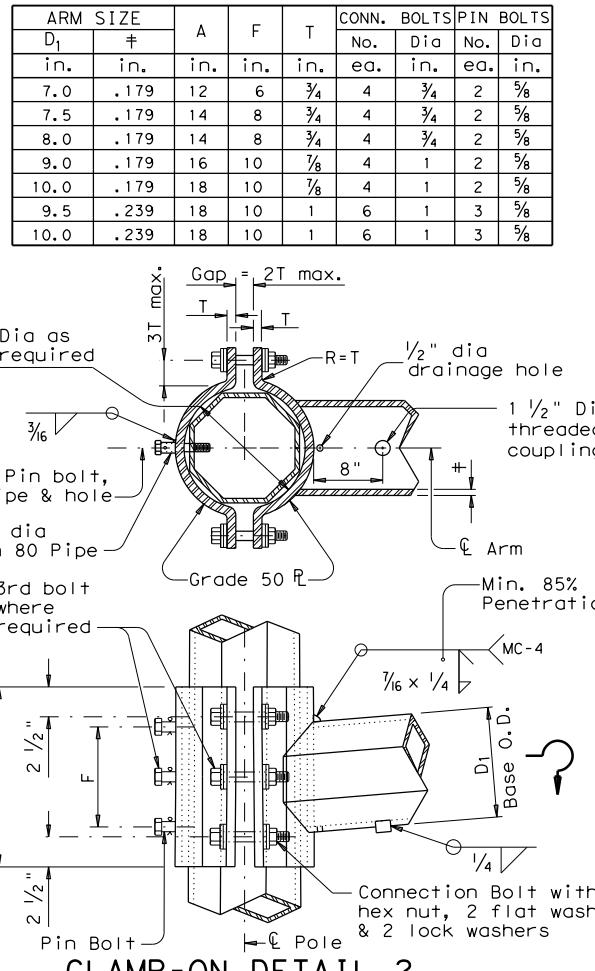
MATERIALS	
Round Shafts or Polygonal Shafts①	ASTM A595 Gr.A, A588, A1008 HSLAS Gr.50 Class 2, A1011 HSLAS Gr.50 Class 2, or A1011 SS Gr.50 ②
Plates ①	ASTM A36, A588, or A572 Gr.50
Connection Bolts	ASTM A325 or A449, except where noted
Pin Bolts	ASTM A325
Pipe ①	ASTM A53 Gr.B, A501, A1008 HSLAS-F Gr.50, 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.

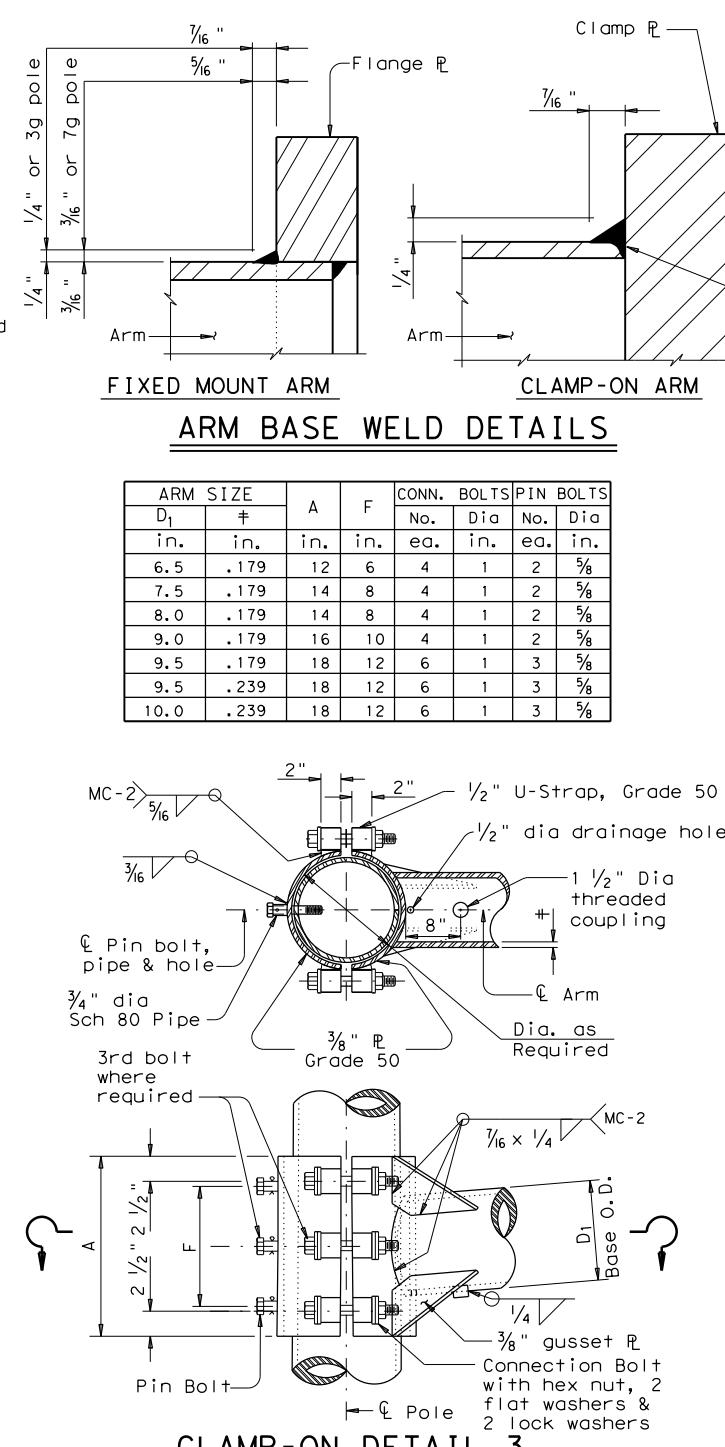
② ASTM A1011 SS Gr.50 material shall also have a minimum elongation of 18 percent in 8 inches or 23 percent in 2 inches. Material thickness in excess of those stipulated under A1011 SS will be acceptable providing the material meets all other A1011 SS requirements and the requirements of this item.



CLAMP-ON DETAIL 1



CLAMP-ON DETAIL 2



CLAMP-ON DETAIL 3

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".

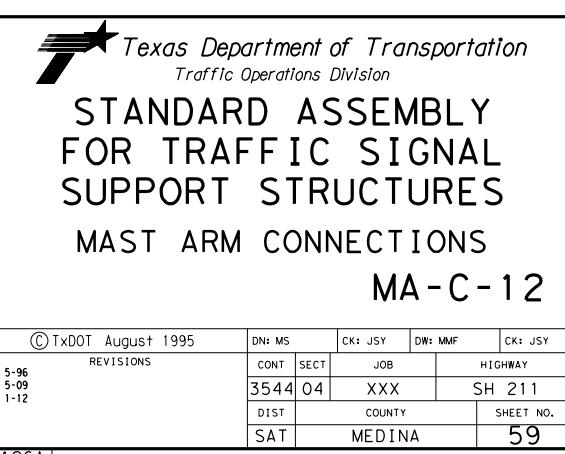
Fixed mount details are used for single mast arm assemblies and for the first arm on dual mast arm assemblies.

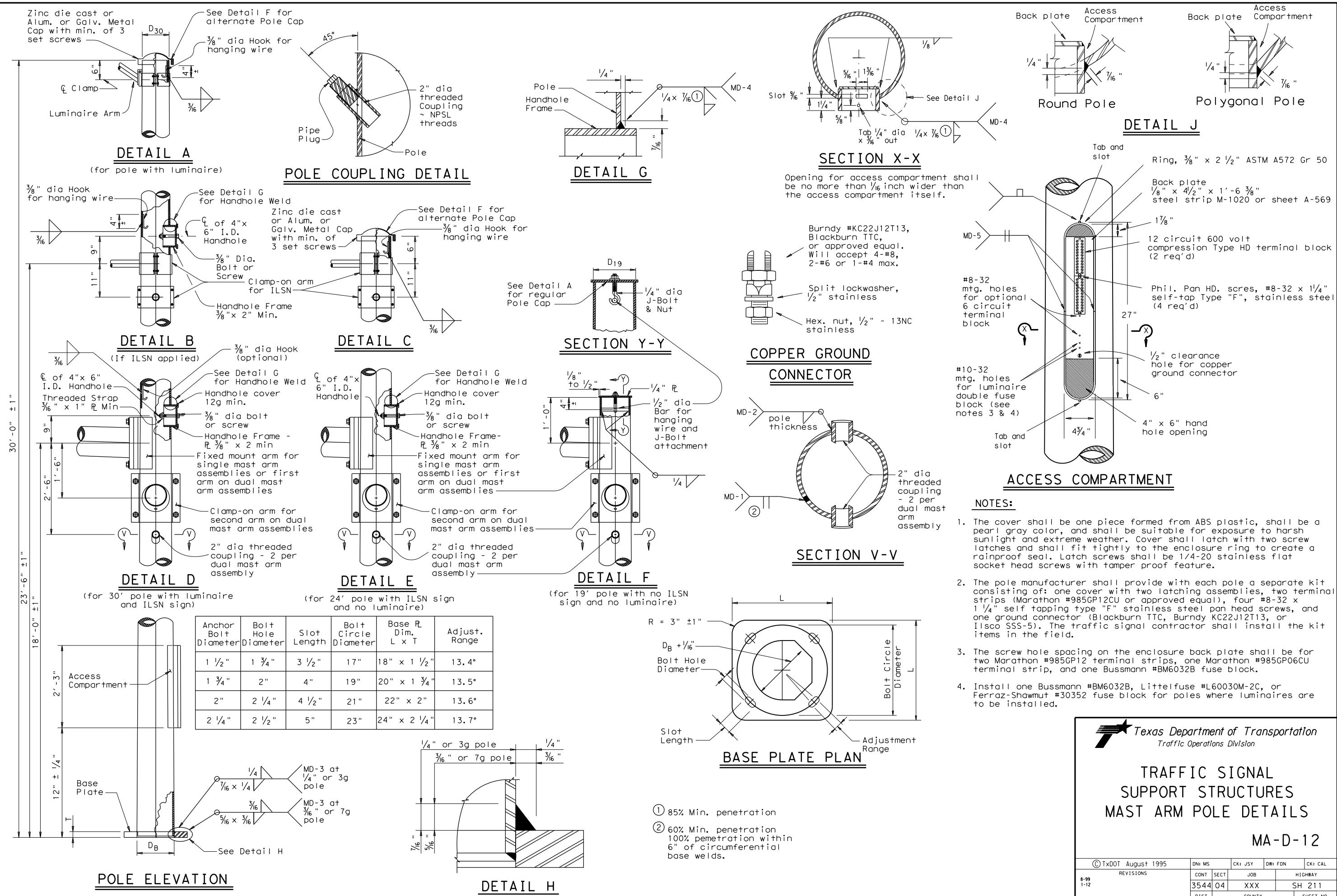
Where duplicate parts occur on a detail, welds shown for one part shall apply to all similar parts on the detail.

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 3/8" 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 1/8" dia hole for each pin bolt shall be field drilled through the pole after arm orientations have been approved by the Engineer.





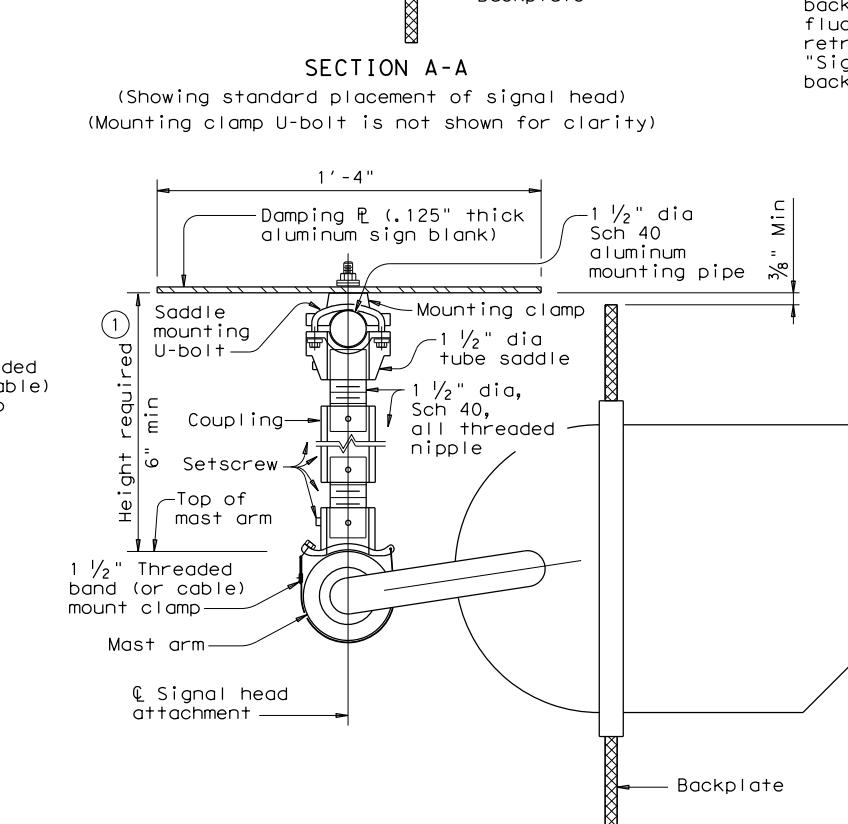
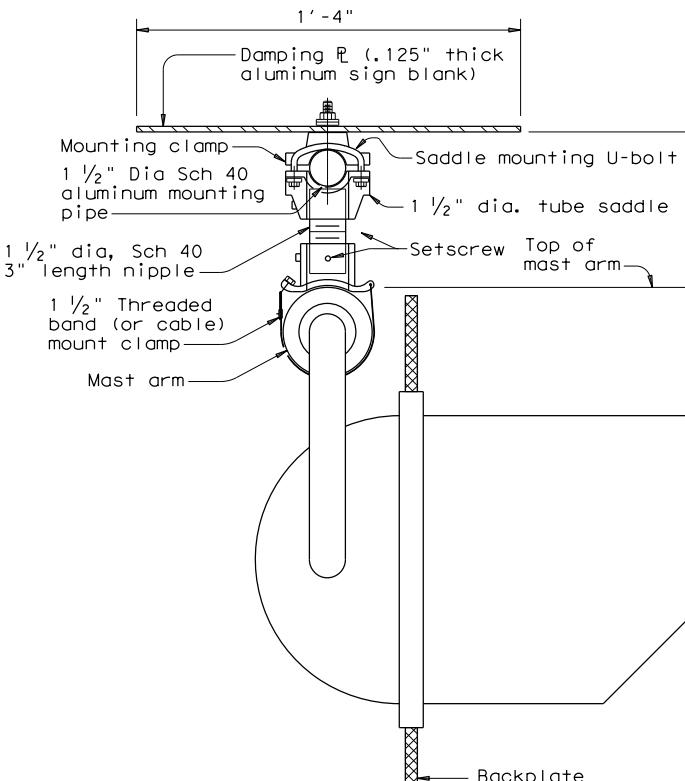
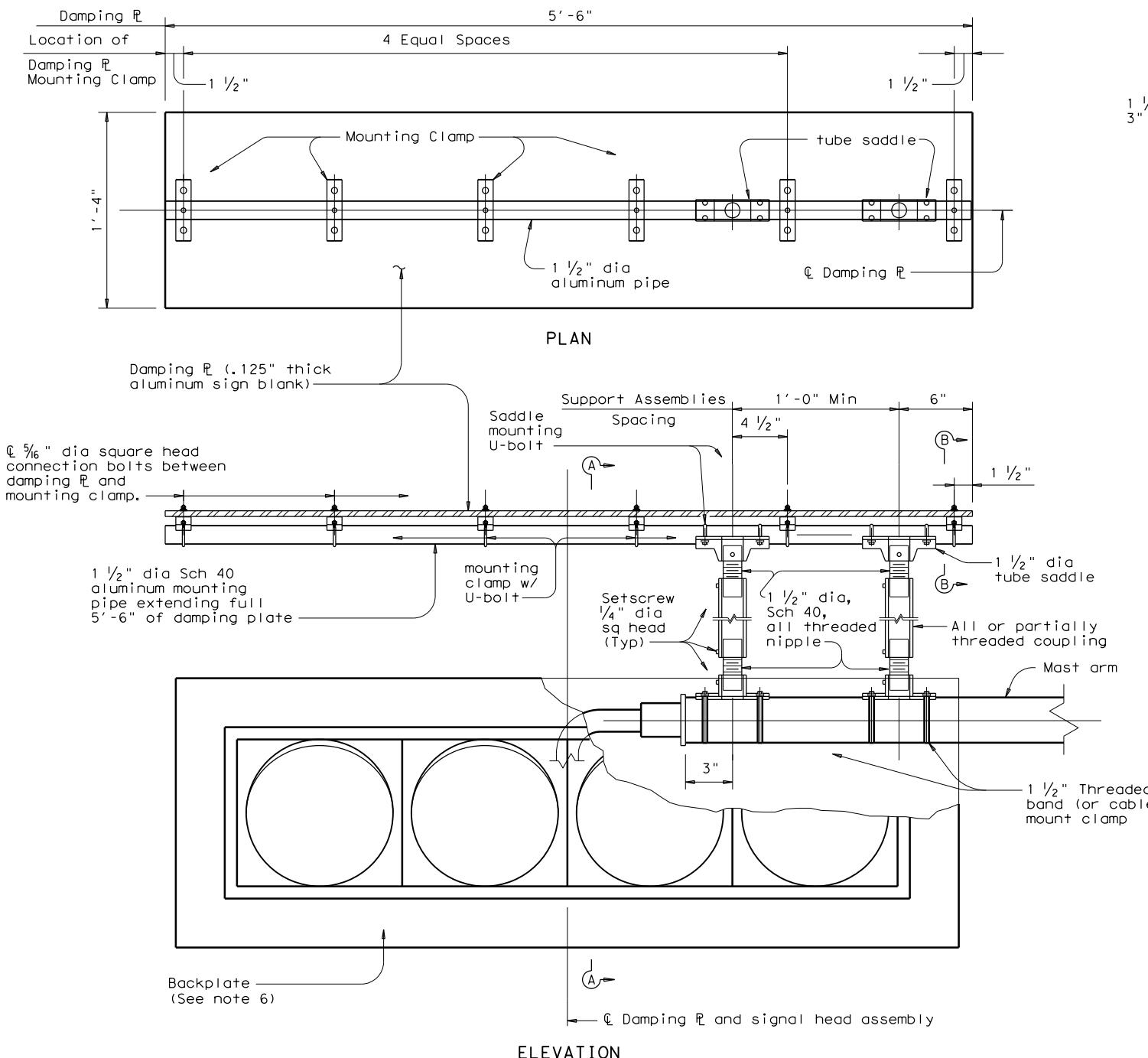
TRAFFIC SIGNAL SUPPORT STRUCTURES MAST ARM POLE DETAILS

MA-D-12

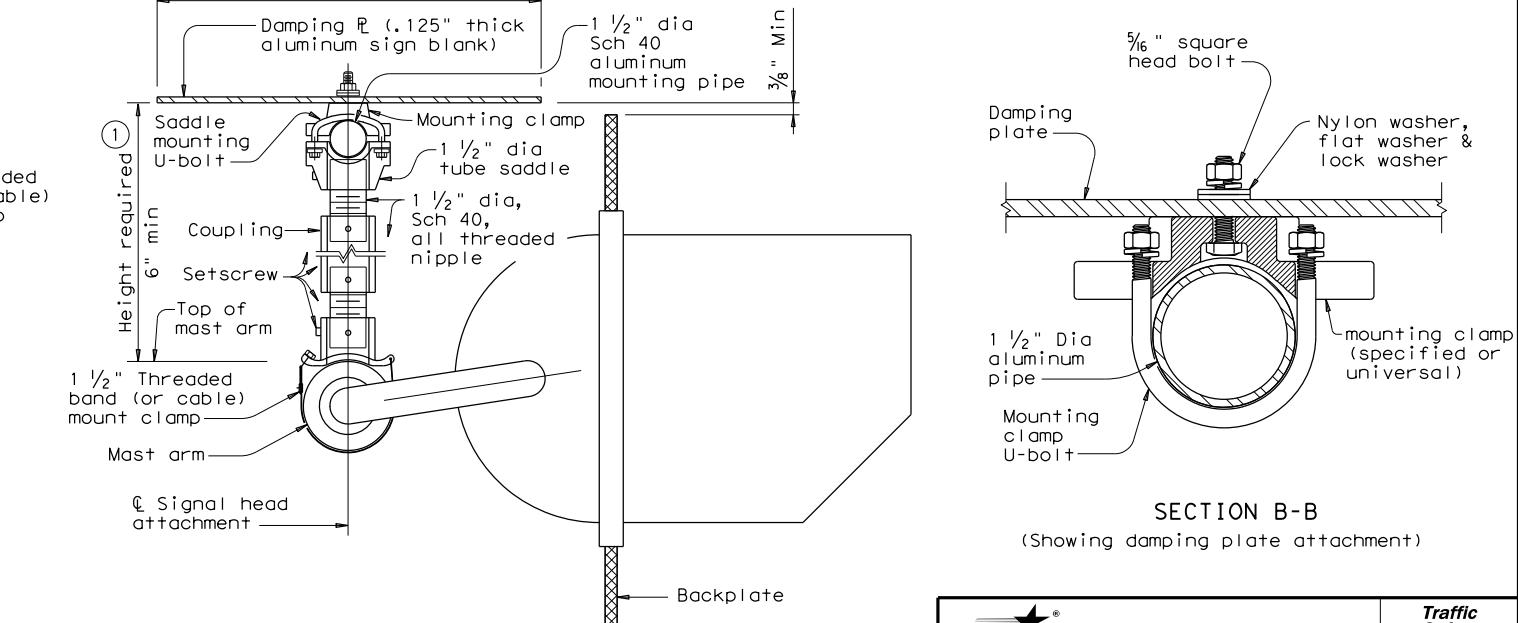
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REVISIONS		CONT		SECT		JOB		HIGHWAY	
		3544		04		XXX		SH 211	
		DIST				COUNTY		SHEET NO.	
		SAT				MEDINA		60	

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① Recommended supporting assemblies to achieve required height for horizontal section heads			
Height required	One nipple each length	Two nipples plus one coupling each length	One coupling each length
6" - 6 3/4"	3"	-	-
7" - 8 1/2"	4"	-	-
9" - 10 1/2"	6"	-	-
11" - 15 1/2"	-	4"	5"
16" - 24"	-	6"	10"



GENERAL NOTES:

- In accordance with the findings of TxDOT sponsored research, the installation of a damping plate in accordance with the details shown here at the end of signal mast arms of SMA and DMA standard structures reduces excessive harmonic vertical vibration, and thus fatigue damage. Any deviation from these details may reduce the effectiveness of this damping device.
- Aluminum sign blank for damping plate will conform to Departmental Material Specifications DMS-7110. Materials for mast arm mounting clamp and tube saddle will be aluminum castings or aluminum alloys as in accordance with manufacturers' stipulations. Mounting pipe, pipe nipple and coupling will be aluminum alloy 6061-T6 or 6063-T6. Damping plate mounting clamp and u-bolt assemblies will conform to Standard sheet SMD (GEN). U-bolts for saddle mounting will have a minimum yield strength of 36 ksi.
- Damping plate will be mounted horizontally. Position centerline of damping plate to align with centerline of mast arm or horizontal signal head assembly. Vertical clearance between signal head (with or without backing plate) and bottom of damping plate will be maintained as shown. The attachments shown here are examples only, other supporting details which meet both alignment and vertical clearance requirements are also acceptable.
- Unless stipulated by the manufacturers, all steel parts will be galvanized finish in accordance with Standard Specification Item 445, "Galvanizing".
- Contractor will verify applicable field dimensions before the installation.
- Backplates are optional for traffic signals. When backplates are used, backplates will have a 2-inch fluorescent yellow AASHTO Type B_{FL} or C_{FL} retroreflective border conforming to TxDOT DMS-8300 "Sign Face Materials." See Sheet TS-BP-20 for backplate details.

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6-20	REVISIONS	3544 04	XXX	SH 211
	DIST	COUNTY	SHEET NO.	
	SAT	MEDINA	61	

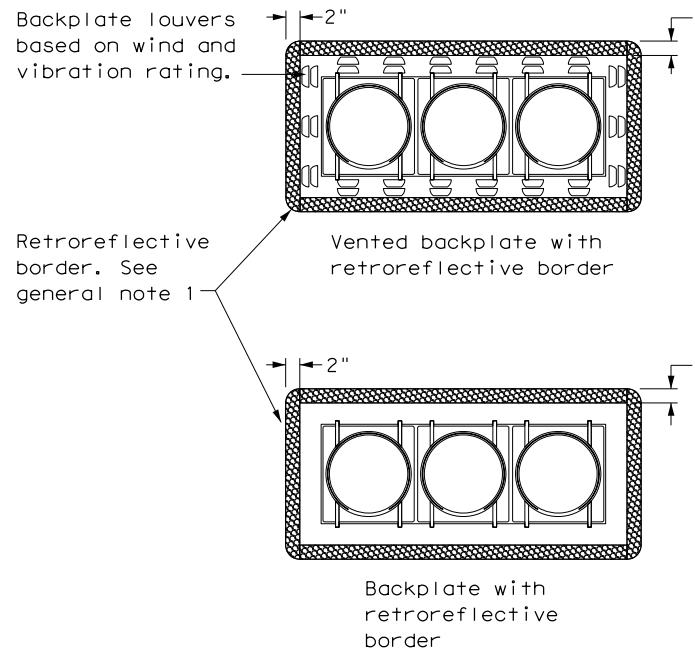
MA-DPD-20

MAST ARM DAMPING PLATE DETAILS

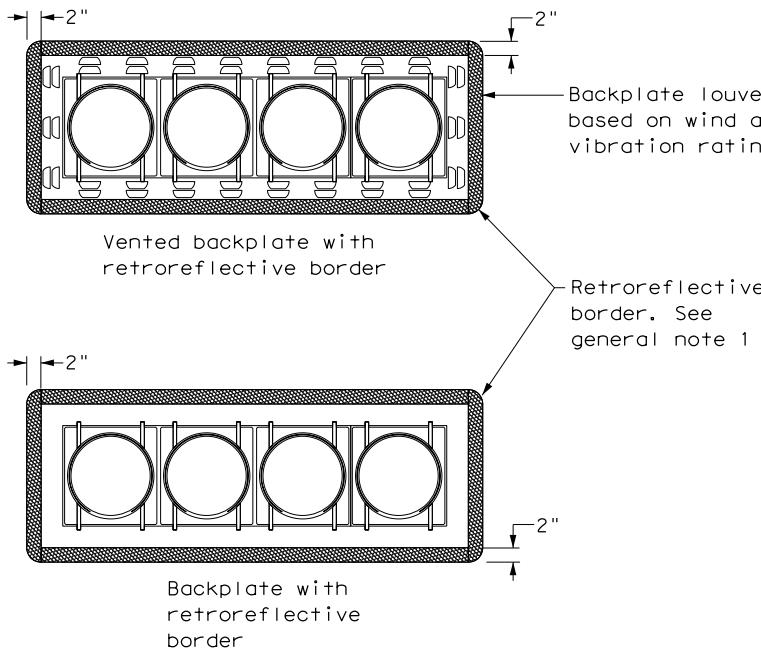
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	DIST	COUNTY	SHEET NO.	
	SAT	MEDINA	61	

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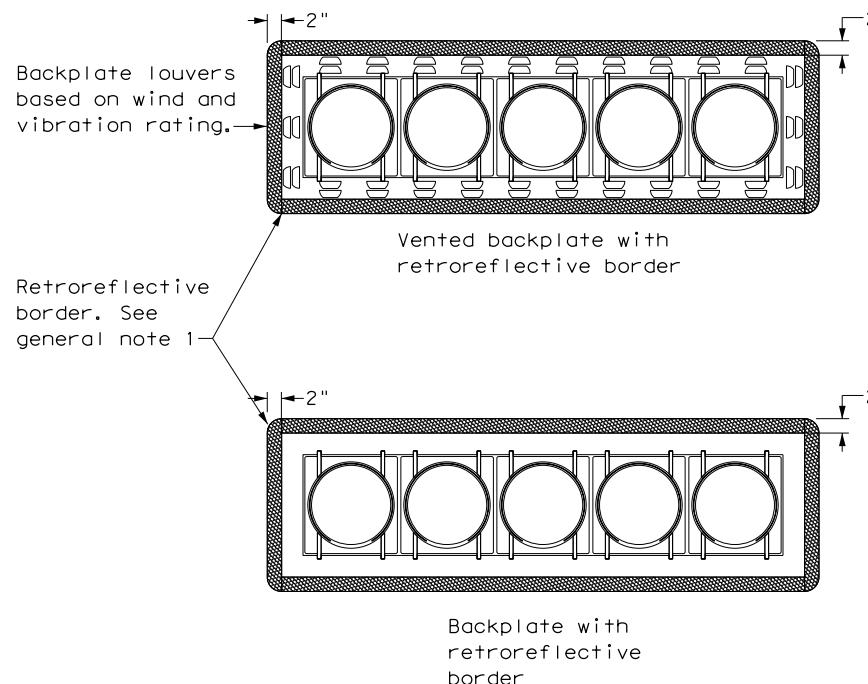
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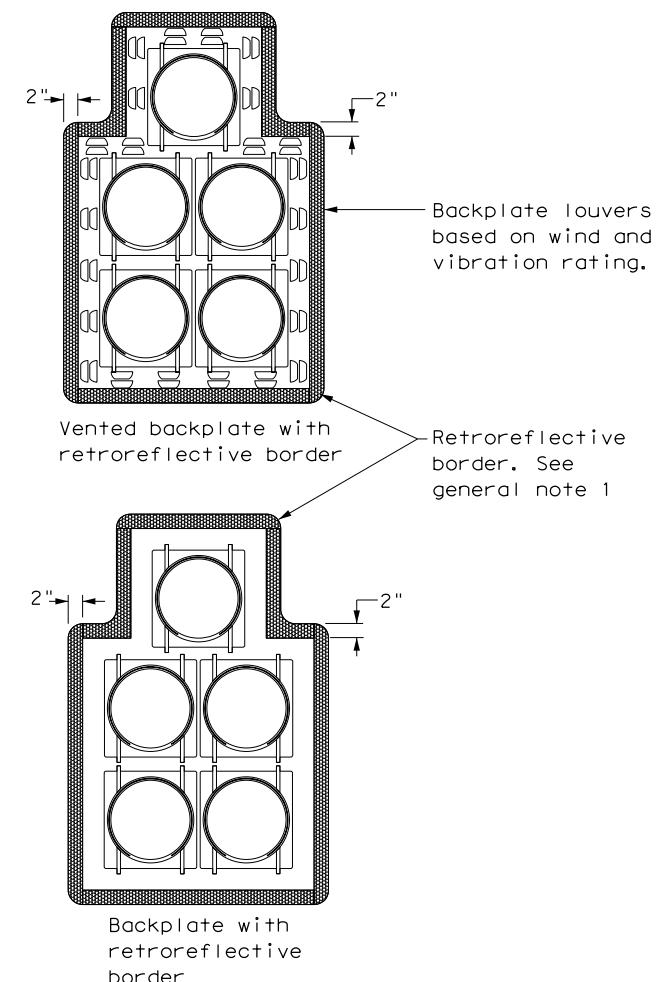
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



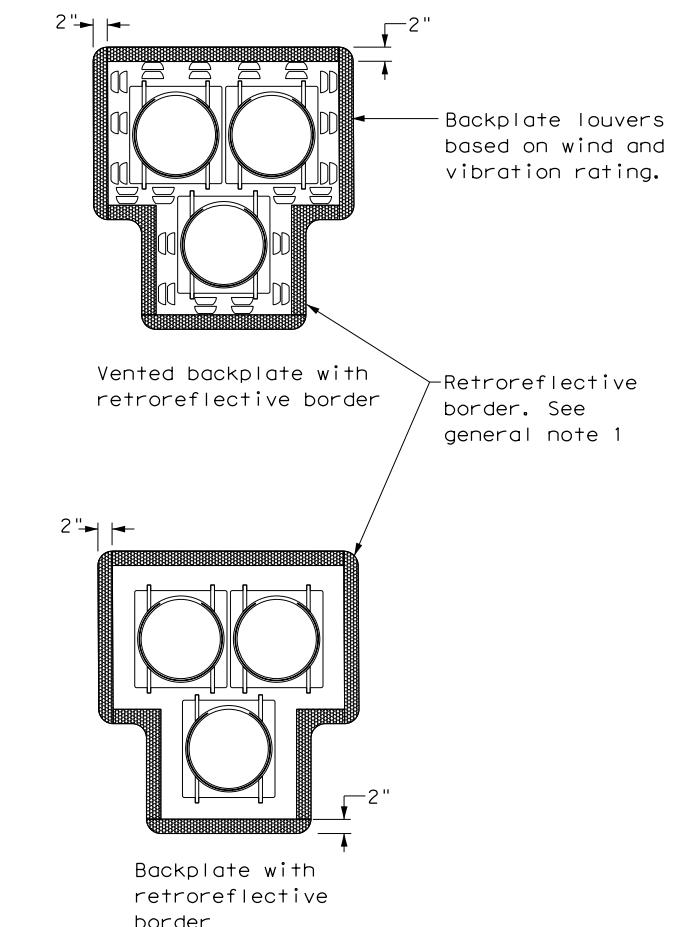
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



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

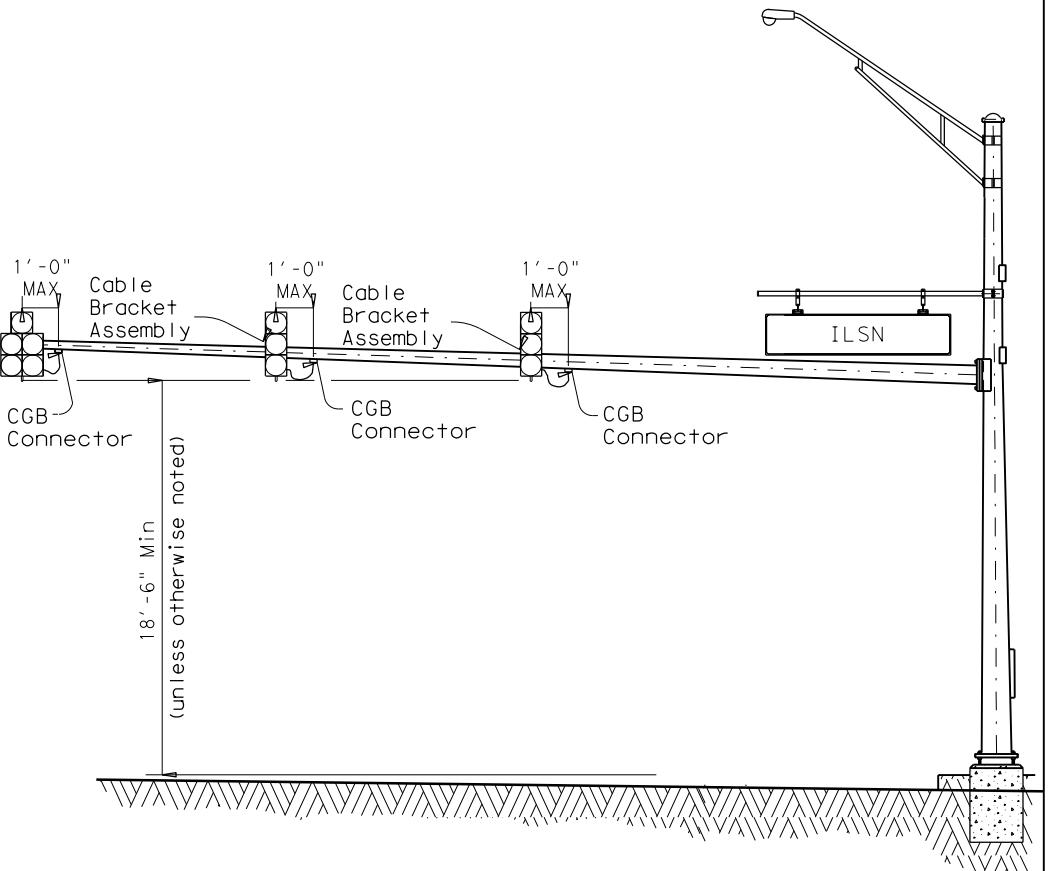
Traffic Safety Division Standard			
TRAFFIC SIGNAL HEAD WITH BACKPLATE			
FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT June 2020	CONT	SECT	JOB
REVISIONS	3544	04	SH 211
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	SAT	MEDINA	62

TS-BP-20

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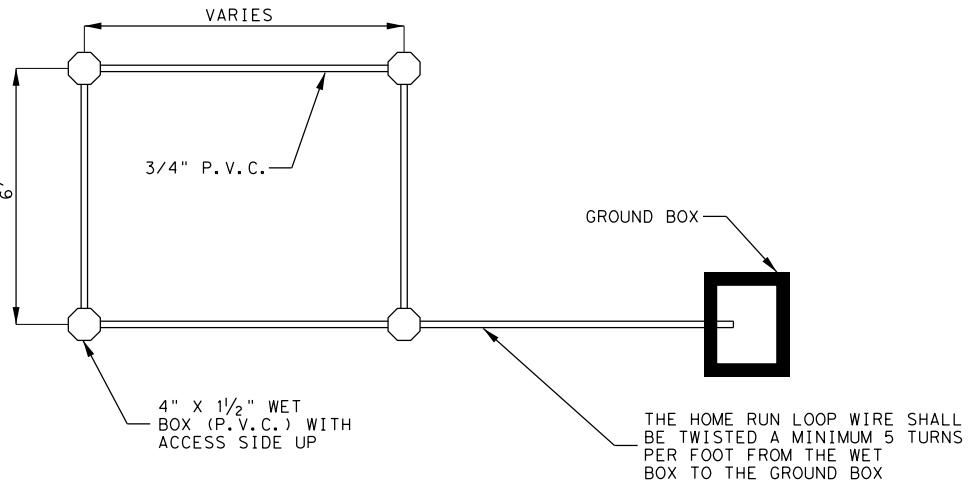
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
ACC:
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48
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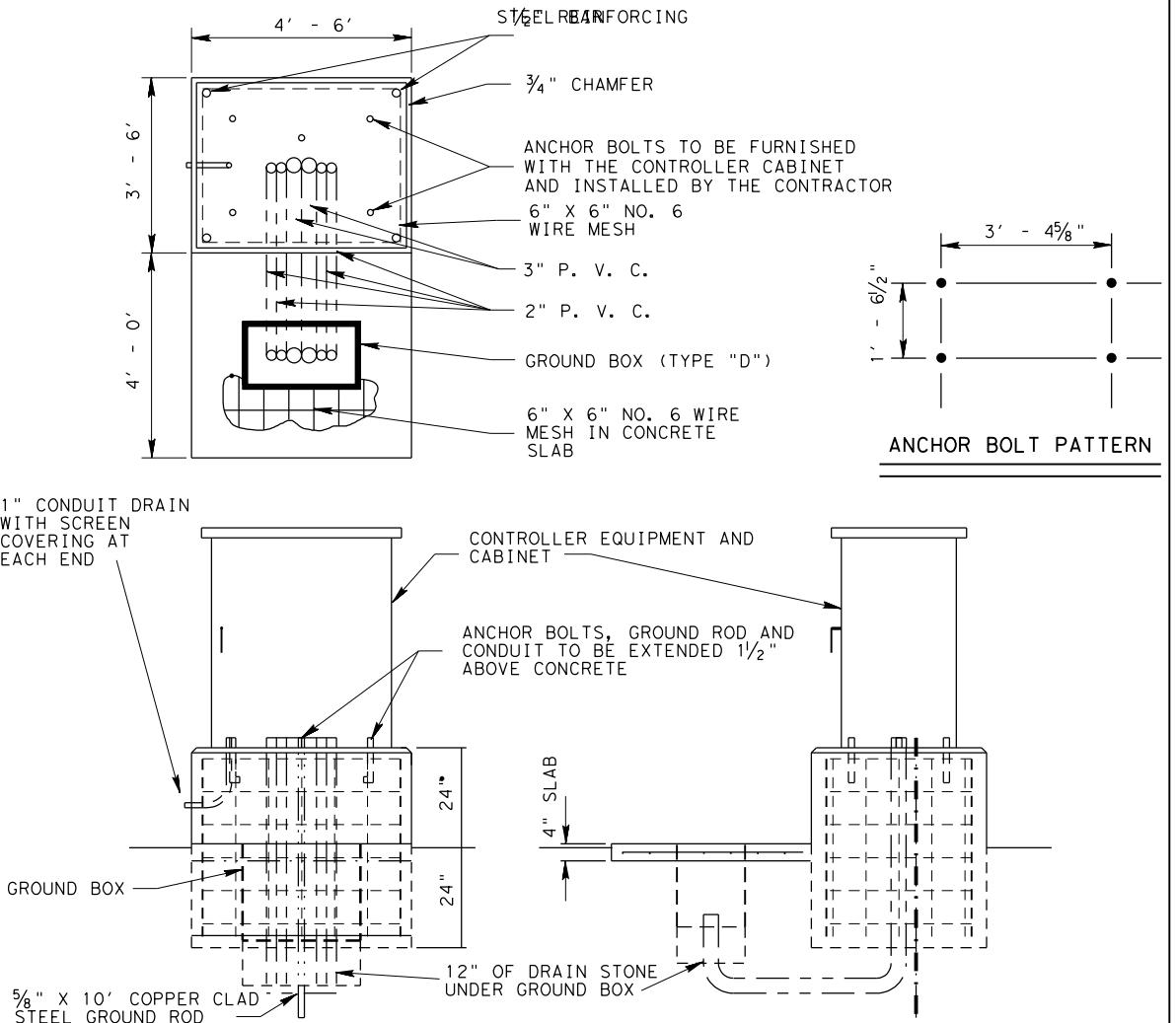
TYPICAL MAST ARM INSTALLATION

BACKPLATES ARE NOT SHOWN FOR CLARITY



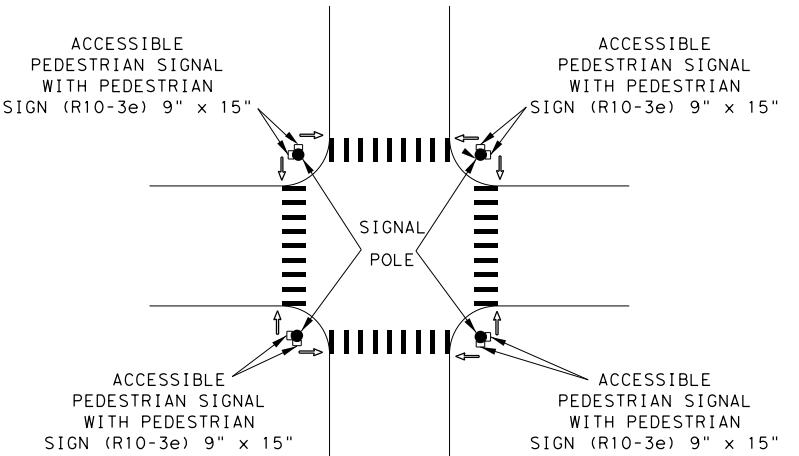
NOTES:
SHALL INSTALL CONDUIT ENCASED LOOPS AT THE LOCATIONS SHOWN ON THE PLANS USING 3/4" DIAMETER PVC SCHEDULE 40 OR AT NO ADDITIONAL COST 1" DIAMETER PVC SCHEDULE 80.
LOOP LOCATIONS MAY BE STAGGERED SLIGHTLY (6") TO ACCOMMODATE HOME RUN PLACEMENT.
INDIVIDUAL HOME RUN CONDUITS SHALL BE EXTENDED TO THE GROUND BOX SHOWN ON THE PLANS FOR EACH LOOP INSTALLED.
THE NUMBER OF LOOP WIRE TURNS SHALL BE AS SHOWN ON THE TYPICAL LOOP DETECTOR DETAILS.

CONDUIT ENCASED LOOPS



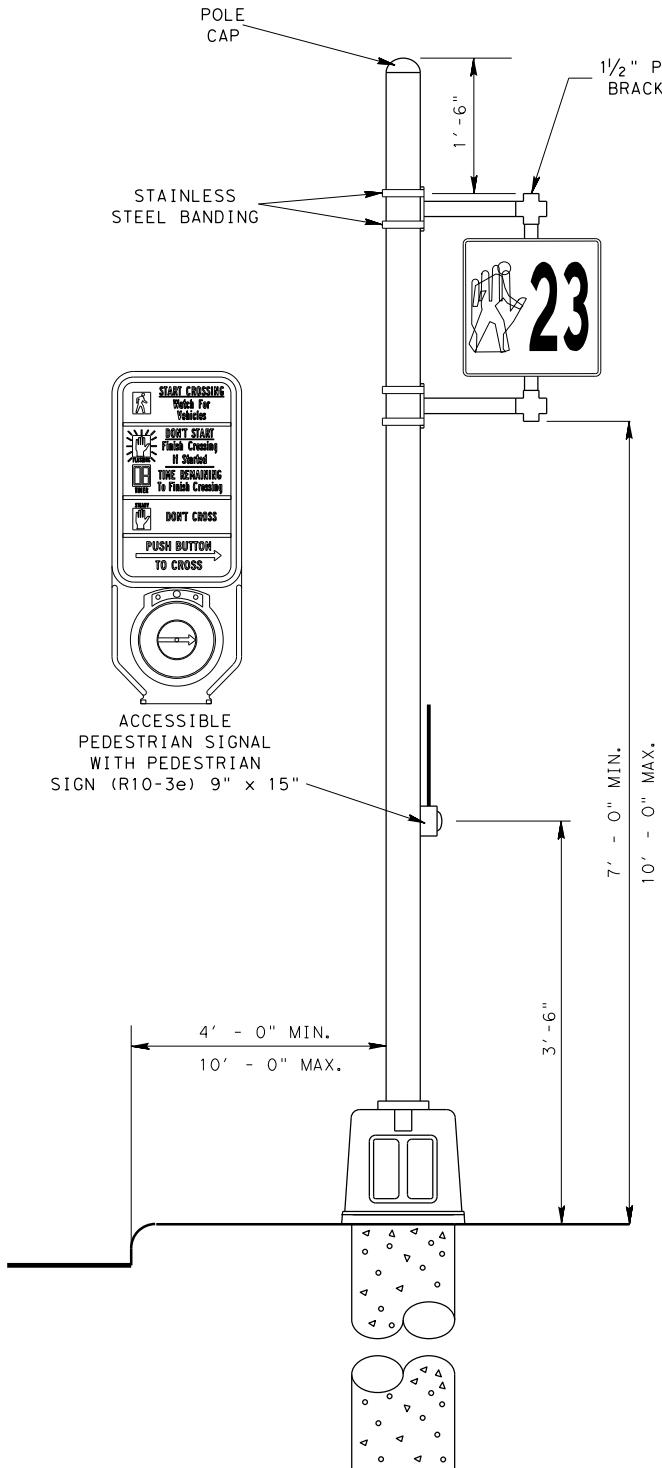
CONTROLLER MOUNT NOTES :
ALL WIRING TERMINATING IN THE CONTROLLER SHALL BE LABELED IN A MANNER THAT CAN BE IDENTIFIED WHEN THE CONTROLLER IS INSTALLED
THE CONTRACTOR SHALL CONNECT THE FIELD WIRING TO THE CONTROLLER
ONE 2" PVC SHALL REMAIN EMPTY FOR FUTURE USE
CONCRETE SHALL BE TESTED AS MISCELLANEOUS CONCRETE
ALL MATERIALS SHOWN AND LABOR TO INSTALL THE CONTROLLER FOUNDATION SHALL BE CONSIDERED SUBSIDIARY TO PERTINENT ITEMS
CONTROLLER FOUNDATION SHALL BE AS SHOWN ON THE PLANS, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

TYPICAL CONTROLLER MOUNT DETAILS



TYPICAL PED PUSH BUTTON LOCATION

THE ENGINEER SHALL VERIFY ALL PEDESTRIAN SIGNAL AND PEDESTRIAN PUSH BUTTON LOCATIONS PRIOR TO INSTALLATION.



TYPICAL PEDESTAL POLE ASSEMBLY

Texas Department of Transportation
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San Antonio District Standard MISCELLANEOUS TRAFFIC SIGNAL DETAILS

SCALE: NS		FED. RD. DIV. NO.		FEDERAL AID PROJECT NO.		SHEET NO.
REVISIONS	6					63
FEB 2006						
OCT 2007						
MAR 2017						
MAY 2018						
TEXAS	SAT					COUNTY
CONT.	SECT.	JOB				BEXAR
2452	02	130				HIGHWAY NO.
						LP1604

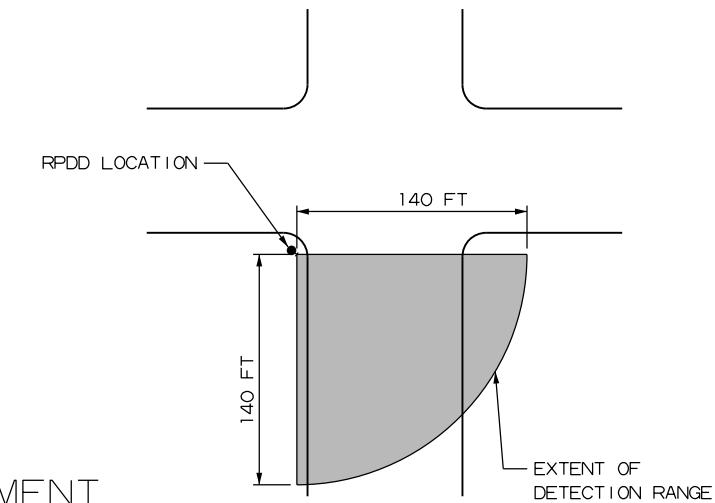
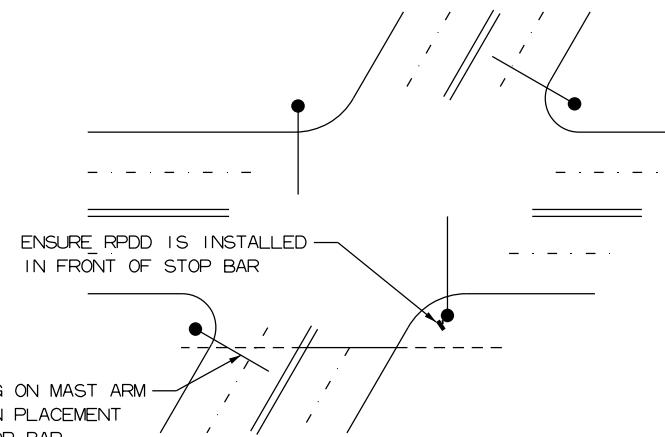
MOUNTING LOCATIONS

PRESENCE (RPDD)

- ① PREFERRED PLACEMENT FOR MAST ARMS, STRAIN POLES AND TIMBER POLES. ON MAST ARM POLES, MOUNT BELOW CONNECTION OF MAST ARM TO A MINIMUM OF 15 FT., MOUNT AS HIGH AS POSSIBLE TO A MAXIMUM OF 30 FT ON STRAIN AND TIMBER POLES.
- ② PREFERRED PLACEMENT FOR MAST ARMS. MOUNT ON AND BELOW MAST ARM ON NEAR SIDE OF ARM.
- ③ ALTERNATE PLACEMENT LOCATION. MOUNT AS HIGH AS POSSIBLE TO A MAXIMUM OF 30 FT TO PREVENT OCCLUSION OF THE LEFT TURN LANES. THIS PLACEMENT TO BE USED ONLY IF RPDD CANNOT BE MOUNTED IN THE PREFERRED PLACEMENT LOCATIONS.

ADVANCE (RADD)

- Ⓐ PREFERRED PLACEMENT FOR MAST ARMS. ALIGN RADD WITH CENTER OF TRAVEL LANES.
- Ⓑ ALTERNATE PLACEMENT FOR MAST ARMS. MOUNT ON BACK SIDE OF OPPOND MAST ARM.
- Ⓒ STRAIN OR TIMBER POLE PLACEMENT. MOUNT ON NEAR SIDE POLE.
- Ⓓ ALTERNATE STRAIN OR TIMBER POLE PLACEMENT. MOUNT LUMINAIRE ARM ON NEAR SIDE POLE WITH A MAXIMUM 40 FT MOUNTING HEIGHT.

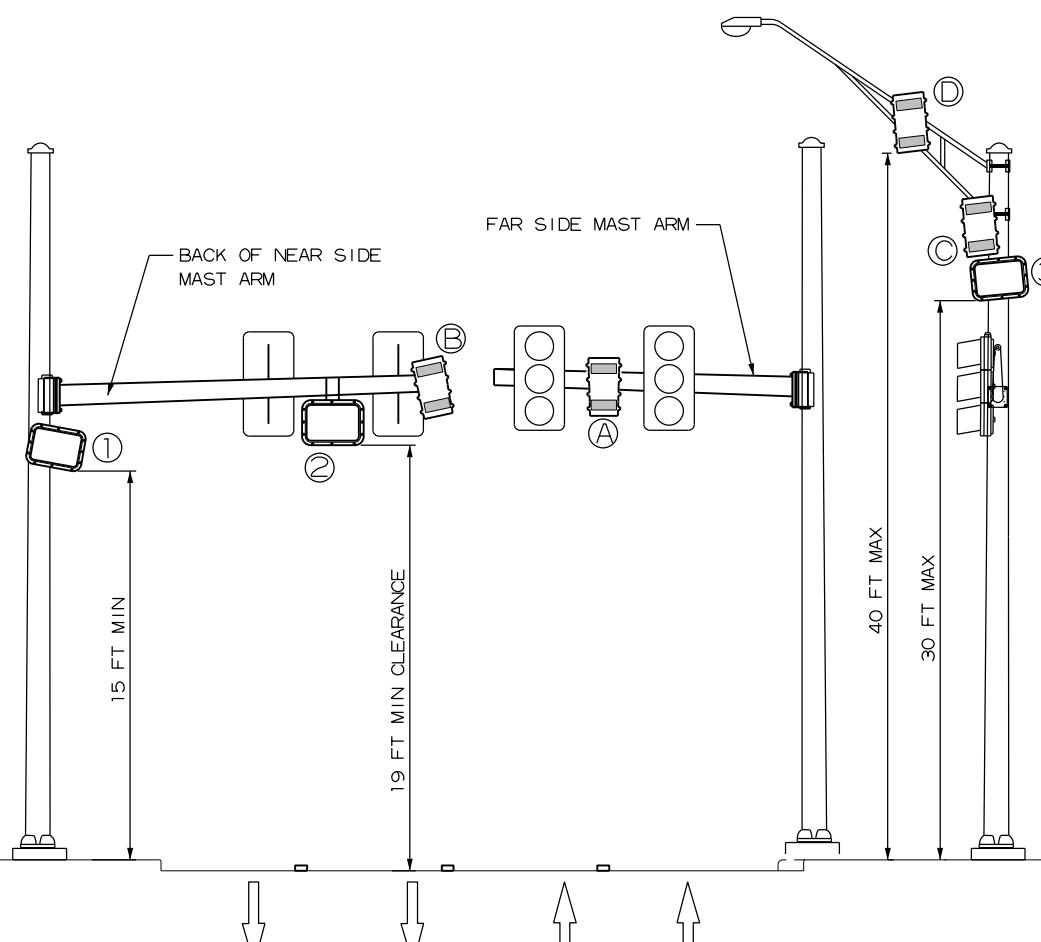


SKEWED INTERSECTION RPDD PLACEMENT

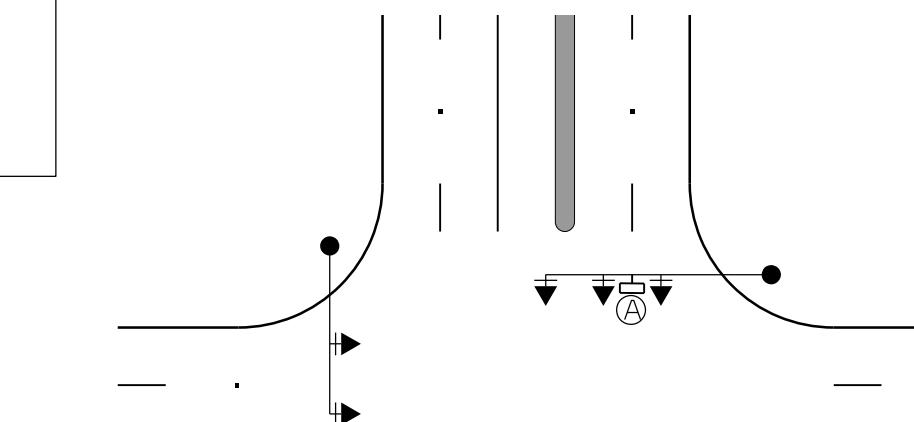
NTS

TYPICAL RPDD DETECTION RANGE

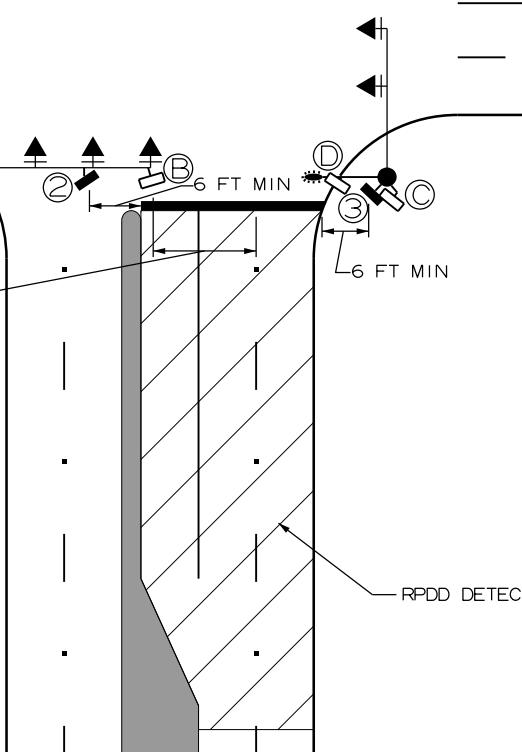
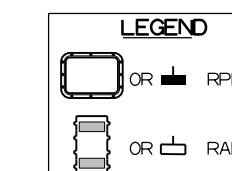
NTS



ELEVATION VIEW
NTS



RADD OFFSET DISTANCE
SEE TABLE 1



PLAN VIEW
NTS

NOTES:

- 1) A MINIMUM 6 FT HORIZONTAL OFFSET MUST BE MAINTAINED BETWEEN THE RPDD AND THE DETECTION ZONE
- 2) THE RPDD SHALL BE MOUNTED SUCH THAT AT LEAST 20 FT ALONG THE FARTHEST LANE TO BE MONITORED IS WITHIN THE FIELD OF VIEW OF THE RPDD
- 3) AIM RPDD AT THE CENTER OF THE LANES TO BE MONITORED, APPROXIMATELY 50 FT FROM THE RPDD UNIT
- 4) MOUNT RPDD SO THAT ITS FIELD OF VIEW IS NOT OCCLUDED BY POLES, SIGNS, OR OTHER STRUCTURES
- 5) RADD MOUNTING HEIGHT SHALL NOT BE LESS THAN 17 FT OR GREATER THAN 40 FT. RADD MOUNTING LOCATION SHALL HAVE A MAXIMUM 50 FT LATERAL OFFSET FROM CENTER OF TRAVEL LANES TO BE MONITORED

Texas Department of Transportation
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San Antonio District Standard RADAR PRESENCE DETECTOR (RPDD) RADAR ADVANCED DETECTION DEVICE (RADD) PLACEMENT

SCALE: NS		RPDD-RADD-20	
REVISIONS	FED. RD. DIV. NO.	PROJECT NO.	HEET NO.
MAR 2020	6		64
	STATE	DIST.	COUNTY
	TEXAS	SAT	MEDINA
	CONT.	SECT.	JOB
	3544	04	XXX
			SH 211

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 $\frac{1}{2}$ 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.

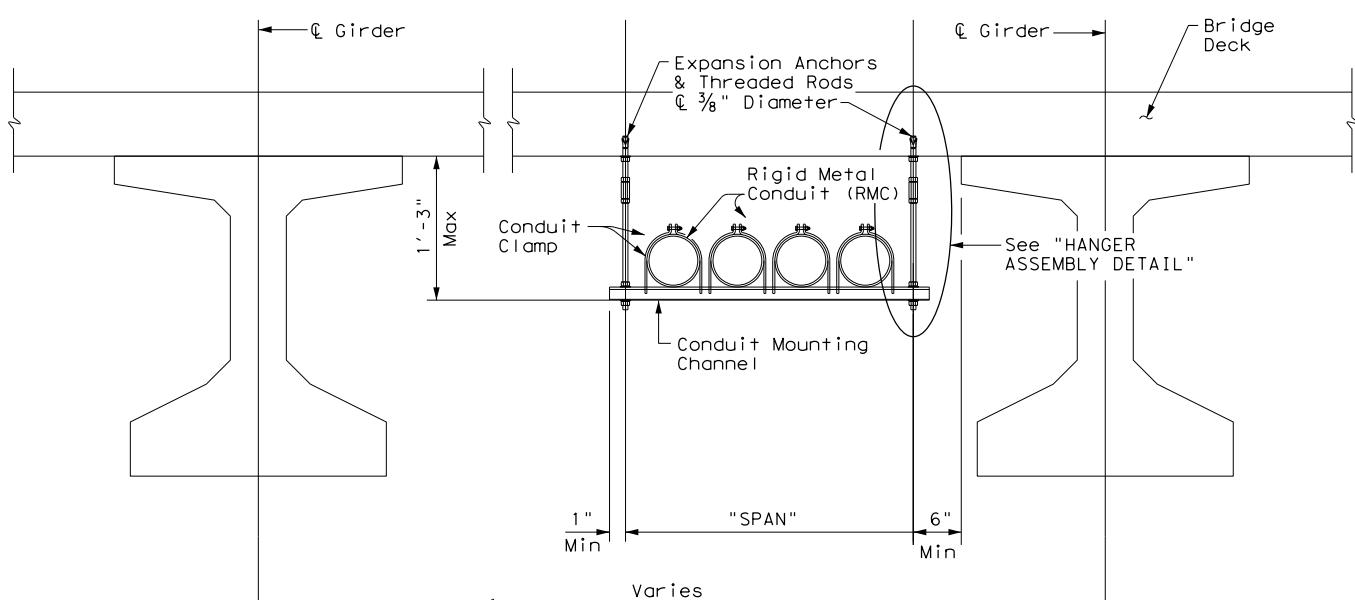
 Texas Department of Transportation		Traffic Operations Division Standard			
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© TxDOT October 2014 REVISIONS 3544 04 DIST SAT		CONT	SECT	JOB	HIGHWAY
		3544	04	XXX	SH 211
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		SAT	MEDINA	65	

**ELECTRICAL DETAILS
CONDUITS & NOTES**

ED(1) - 14

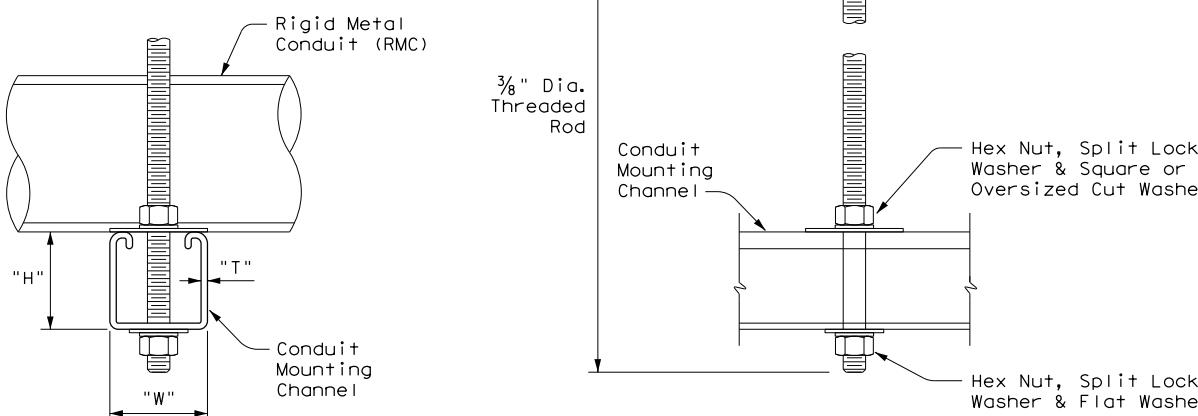
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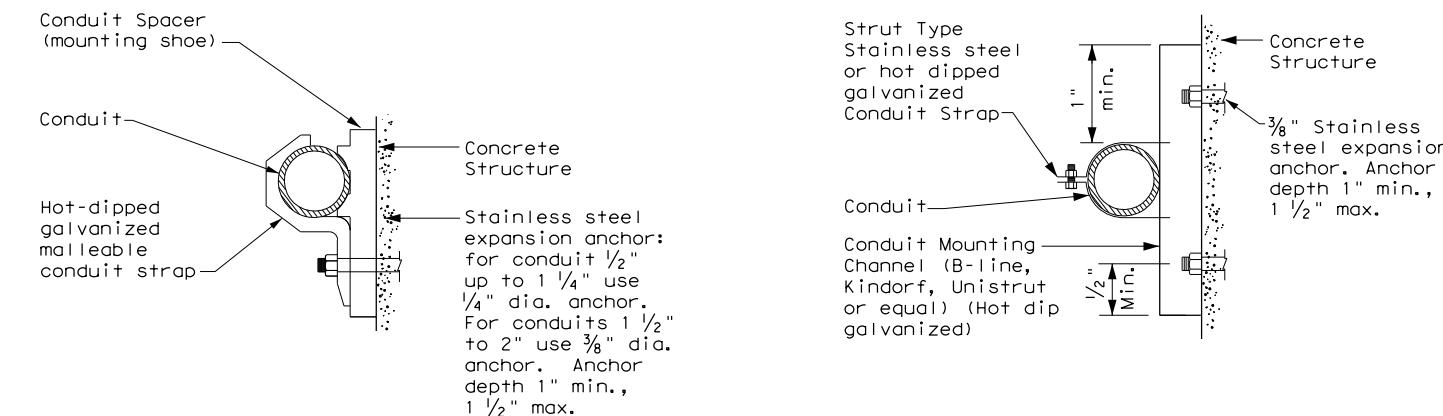
CONDUIT MOUNTING CHANNEL		
"SPAN"	"W" x "H"	"T"
less than 2'	1 $\frac{5}{8}$ " x 1 $\frac{3}{8}$ "	12 Ga.
2'-0" to 2'-6"	1 $\frac{5}{8}$ " x 1 $\frac{3}{8}$ "	12 Ga.
>2'-6" to 3'-0"	1 $\frac{5}{8}$ " x 2 $\frac{7}{16}$ "	12 Ga.

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



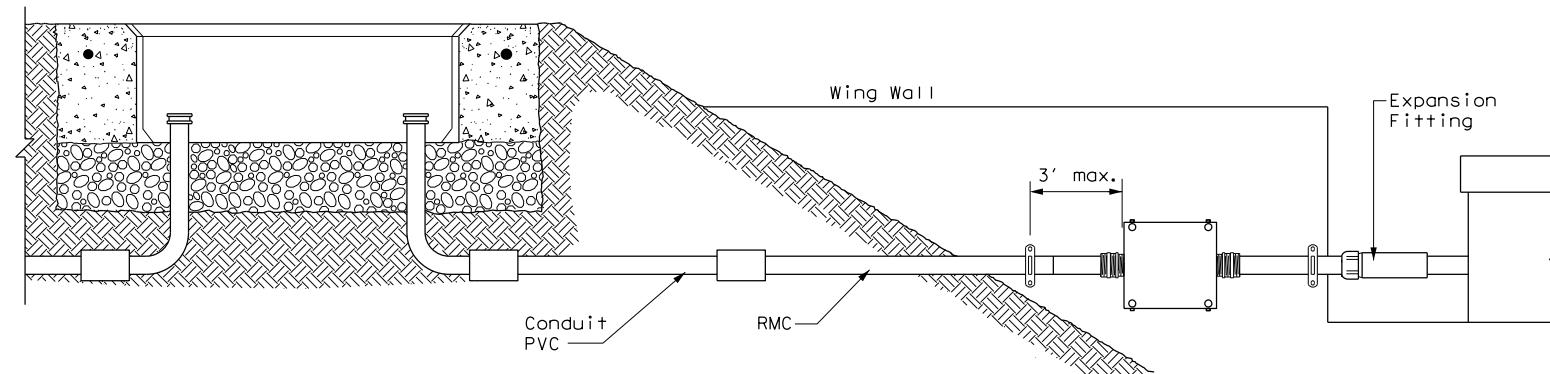
HANGER ASSEMBLY DETAIL

ELECTRIC CONDUIT TO BRIDGE DECK ATTACHMENT



CONDUIT MOUNTING OPTIONS

Attachment to concrete surfaces
See ED(1)B.2



TYPICAL CONDUIT ENTRY TO BRIDGE STRUCTURE DETAIL

EXPANSION ANCHOR NOTES FOR BRIDGE DECK ATTACHMENT

1. Use torque controlled mechanical expansion anchors that are approved for use in cracked concrete by the International Code Council, Evaluation Service (ICC-ES). The chosen anchor product shall have a designated ICC-ES Evaluation Report number, and its approval status shall be maintained on the ICC-ES website under Division 031600 for Concrete Anchors.
2. Unless otherwise approved by the Engineer: do not use adhesive anchors; do not use expansion anchors that are not included in the ICC-ES approval list; and do not use expansion anchors that are only approved for use in uncracked concrete.
3. Use anchors manufactured with stainless steel expansion wedges. Anchors manufactured with carbon steel expansion wedges are not allowed. Anchor bodies can be either zinc-plated carbon steel or stainless steel. For application in marine environment, both the anchor body and expansion wedge shall be stainless steel.
4. Install anchors as shown on the plans and in accordance with the anchor manufacturer's published installation instructions. Arrange a field demonstration test to evaluate the procedures and tools. The test shall be witnessed and approved by the Engineer prior to furnishing anchors on the structure.
5. Prior to hole drilling, use rebar locator to ensure clearing of existing deck strands or reinforcement. Install anchors to ensure a minimum effective embedment depth, (h_{ef}), as shown. Increase (h_{ef}) as needed to ensure sufficient thread length for proper torqueing and tightening of anchors.
6. Use anchors of minimum 1600 Lbs tensile capacity (minimum of steel, concrete breakout, and concrete pullout strengths as determined by ACI 318 Appendix D) at the required minimum embedment depth (h_{ef}). No lateral loads shall be introduced after conduit installation.

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ELECTRICAL DETAILS CONDUIT SUPPORTS				
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DIST	COUNTY		SHEET NO.	
SAT	MEDINA			66

ED(2) - 14

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

- 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.
- 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.
- 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.
- 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

- 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.
- 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.
- 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.
- Size and install gel-filled insulating splice covers according to manufacturer's specifications when used in place of heat shrink tubing.
- 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.
- Support conductors in illumination poles with a J-hook at the top of the pole.
- 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.
- Replace conductors and cables that are damaged beyond repair or that fail an insulation resistance test at no additional cost to the department.
- Do not repair damaged conductors with duct tape, electrical tape, or wire nuts. Use only approved splicing methods.
- 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.
- 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.

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- 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

- Install temporary conductors and electrical equipment in accordance with the NEC article "Temporary Installations" and Department standard sheets.
- 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.
- Use listed wire nuts with factory applied sealant for temporary wiring where approved.
- 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.
- Protect and when necessary repair any existing electrical conduits uncovered during the construction process in a timely manner and in conformance with the NEC.

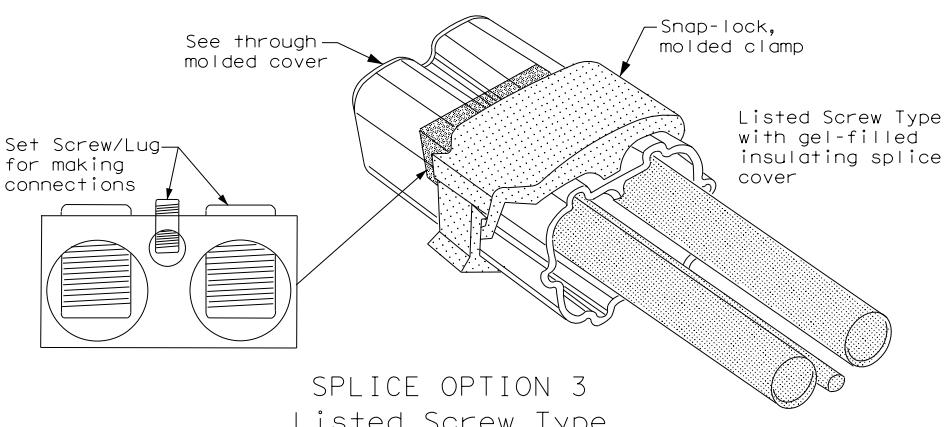
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

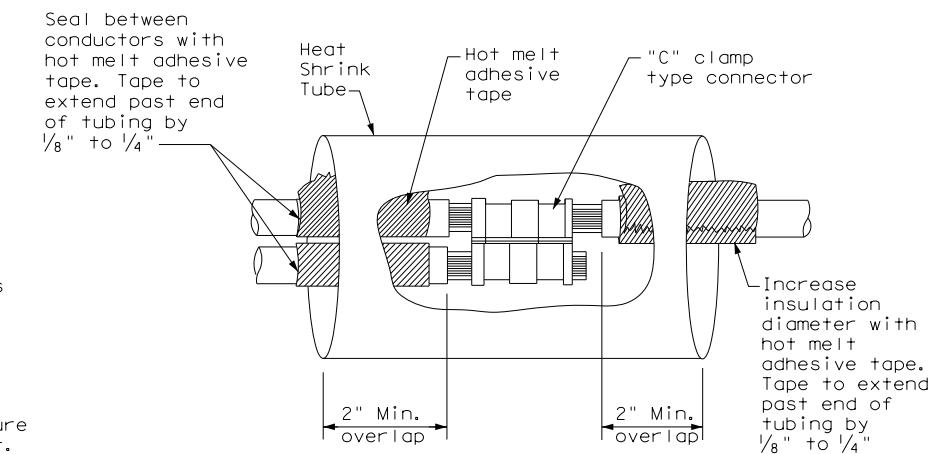
- Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in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

B. CONSTRUCTION METHODS

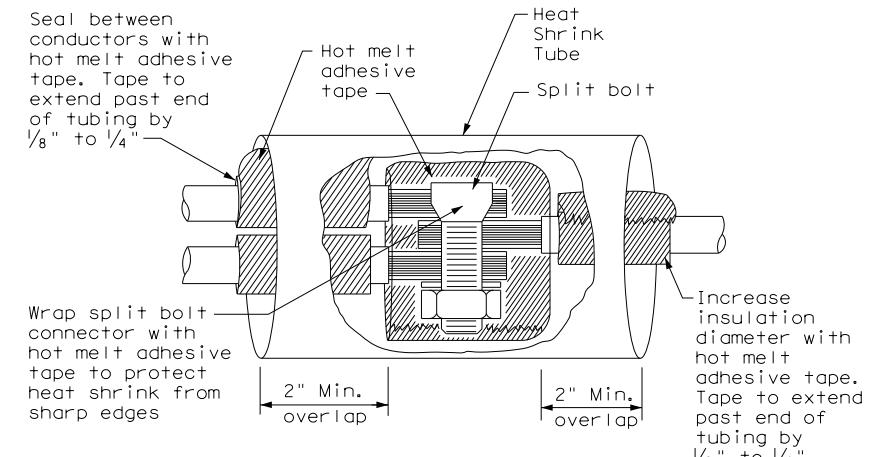
- Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil, ensure that the upper end is between 2 to 4 in. below finished grade.
- Do not place ground rods in the same drilled hole as a timber pole.
- Install ground rods so the imprinted part number is at the upper end of the rod.
- Remove all non-conductive coatings such as concrete splatter from the rod at the clamp location.
- 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.
- 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.
- Written authorization is required before installing a ground rod in a horizontal trench for rocky soil or a solid rock bottom.



SPLICE OPTION 3
Listed Screw Type



SPLICE OPTION 1
Compression Type



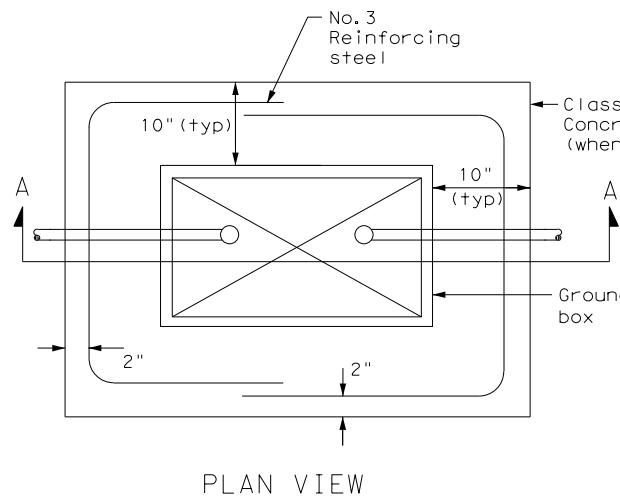
SPLICE OPTION 2
Split Bolt Type

ELECTRICAL DETAILS				Traffic Operations Division Standard	
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ELECTRICAL DETAILS CONDUCTORS

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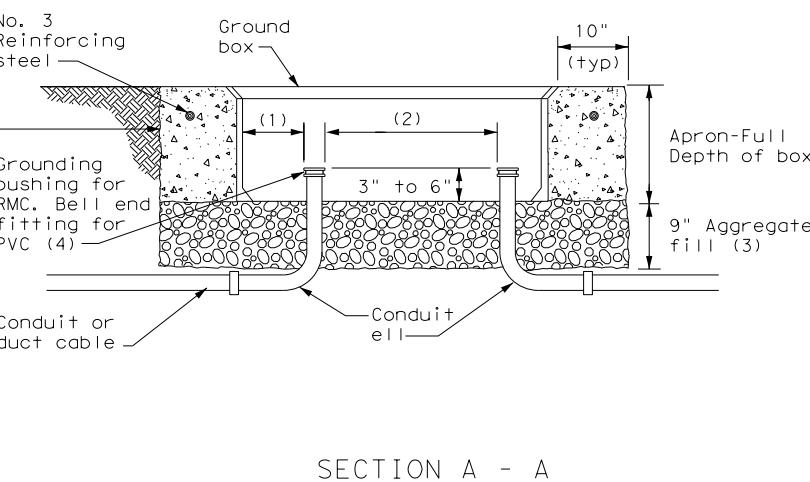
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PLAN VIEW

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.



SECTION A - A

GROUND BOXES

A. MATERIALS

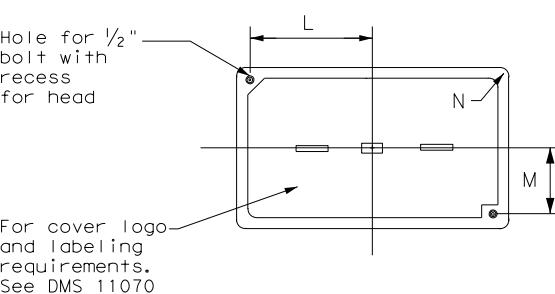
1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."
2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers 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

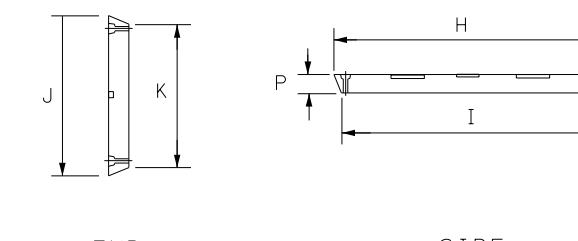
1. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure aggregate bed is in place and at least 9 inches deep, prior to setting the 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 ellipses in a neat and workmanlike manner. Uniformly space conduits so grounding bushings and bell end fittings can easily be installed.
5. Temporarily seal all conduits in the ground box until conductors are installed.
6. Permanently seal conduits immediately after the completion of conductor installation and pull tests. Permanently seal the ends of all conduits with duct seal, expandable foam, or other method as approved. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a sealant.
7. When a ground rod is present in a ground box, bond all equipment grounding conductors together and to the ground rod with listed connectors.
8. When a type B or D ground box is stacked to meet volume requirements, it is allowable to cut an appropriately sized hole for conduit entry in the side wall at least 18 inches below grade.
9. If an existing ground box in the contract has a metal cover, bond the cover to the equipment grounding conductor with a 3 ft. long stranded bonding jumper the same size as the grounding conductor. The bonding jumper is subsidiary to various bid items. Verify existing ground boxes with metal covers are shown on the plans, with notes fully describing the work required.
10. If other ground boxes with metal covers are within the project limits but are not part of the contract, the Engineer may direct the Contractor to bond the metal covers, identifying the specific boxes in writing. This work will be paid for separately.
11. Bond metal ground box covers to the grounding conductor with a tank ground type lug.

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

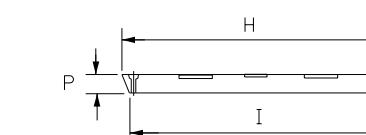
TYPE	DIMENSIONS (INCHES)							
	H	I	J	K	L	M	N	P
A, B & E	23 1/4	23	13 3/4	13 1/2	9 7/8	5 1/8	1 3/8	2
C & D	30 1/2	30 1/4	17 1/2	17 1/4	13 1/4	6 3/4	1 3/8	2



PLAN VIEW

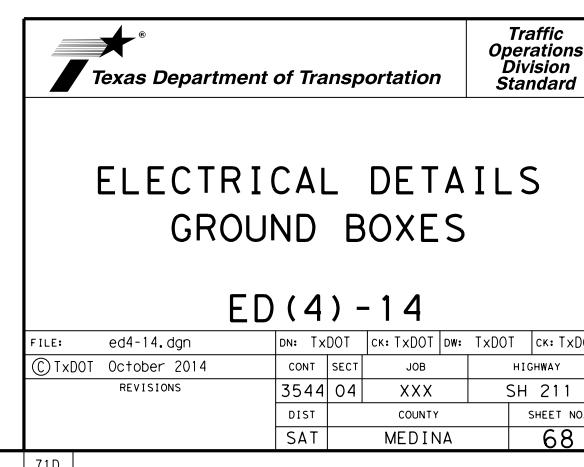


END



SIDE

GROUND BOX COVER



ELECTRICAL SERVICES NOTES

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- 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 $\frac{1}{2}$ 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 $\frac{1}{2}$ 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 $\frac{1}{2}$ 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 photocell 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 **Size	Service Conductors No./Size	Safety Switch Amps	Main Ckt. Bkr. Pole/Amps	Two-Pole Contractor Amps	Panelbd/Loadcenter Amp Rating	Branch Circuit ID	Branch Ckt. Bkr. Pole/Amps	Branch Circuit ID	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 $\frac{1}{4}$ "	3/#6	N/A	2P/60		100	Sig. Controller	1P/30	23	5.3
								30	Luminaires	2P/20	9	
									CCTV	1P/20	3	
2nd & Main	58	ELC SRV TY T 120/240 000(NS)GS(N)SP(O)	1 $\frac{1}{4}$ "	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

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

Schematic Type

Service Voltage V / V

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

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

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

Photocell Mounting Location

(E) = Inside Service/Enclosure Mounted

(T) = Top of pole

(L) = Luminaire mounted

(N) = None/No Photocell or
Lighting Contactor Required

Service Support Type

GC= Granite concrete

OC= Other concrete

TP= Timber pole

SP= Steel pole

SF= Steel frame

OT= Pole by others or paid
for separately

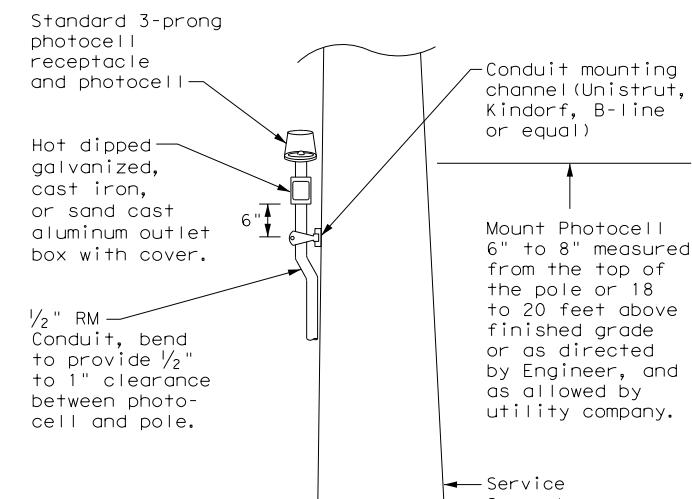
EX= Existing pole

TS= Service on traffic
signal pole

PS= Pedestal Service

O= Overhead Service Feed
from Utility

U= Underground Service Feed
from Utility



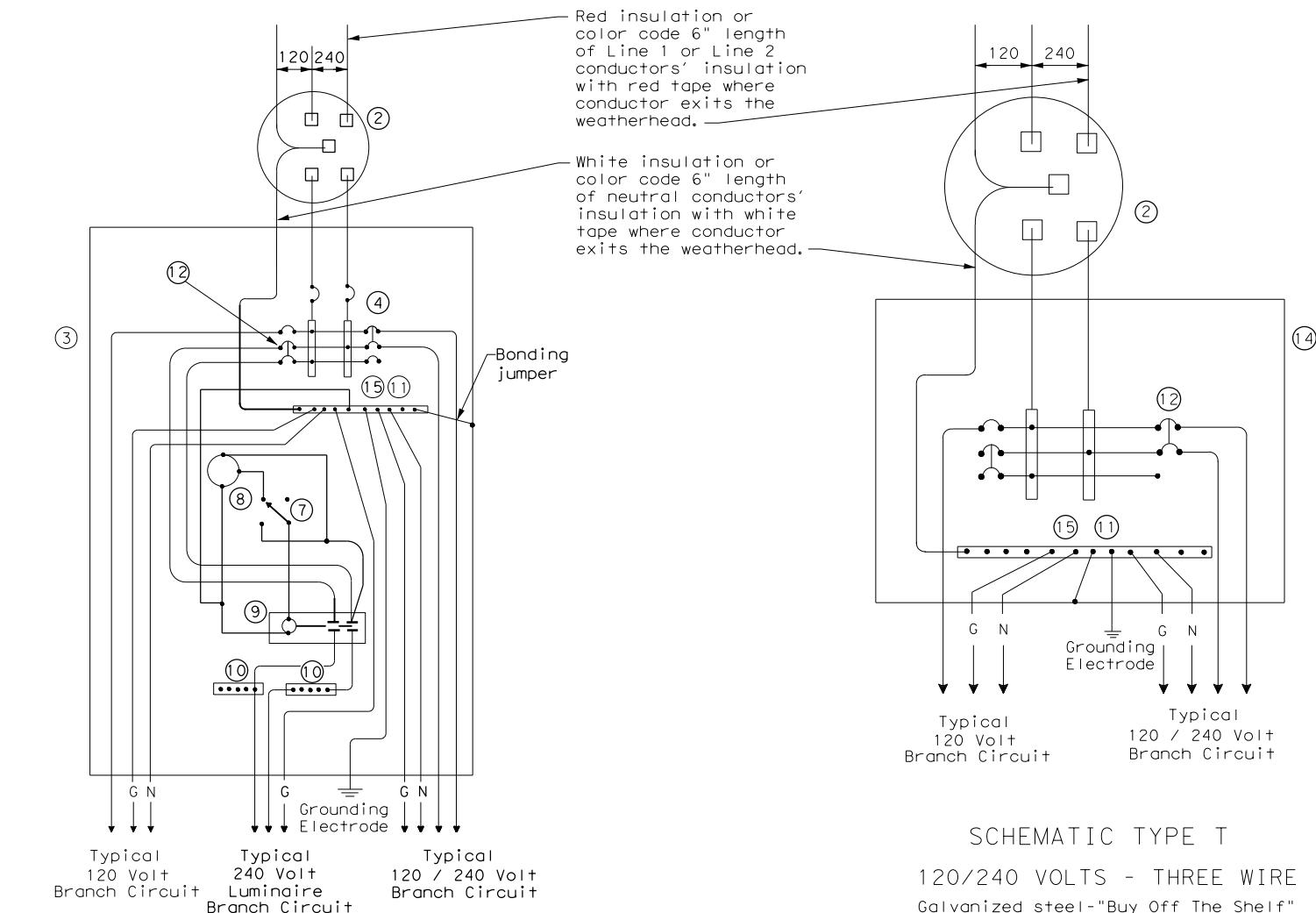
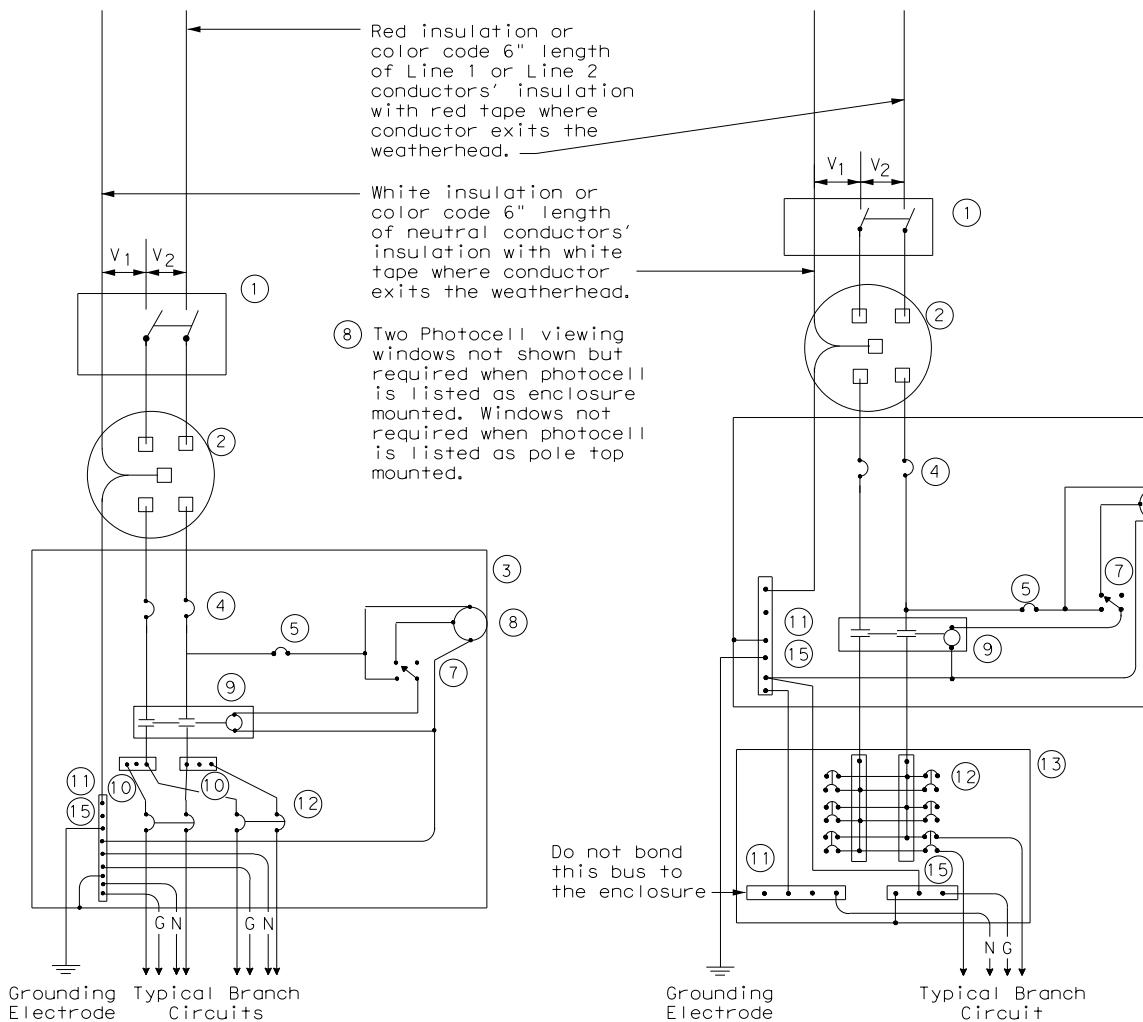
TOP MOUNTED PHOTOCELL

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

 Texas Department of Transportation			Traffic Operations Division Standard
ELECTRICAL DETAILS SERVICE NOTES & DATA			
ED (5) - 14			
FILE: ed5-14.dgn	DN: TxDOT	CK: TxDOT	ck: TxDOT
© TxDOT October 2014	CONT	SECT	JOB
REVISIONS	3544	04	HIGHWAY
		XXX	SH 211
DIST	COUNTY		SHEET NO.
SAT	MEDINA		69

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

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

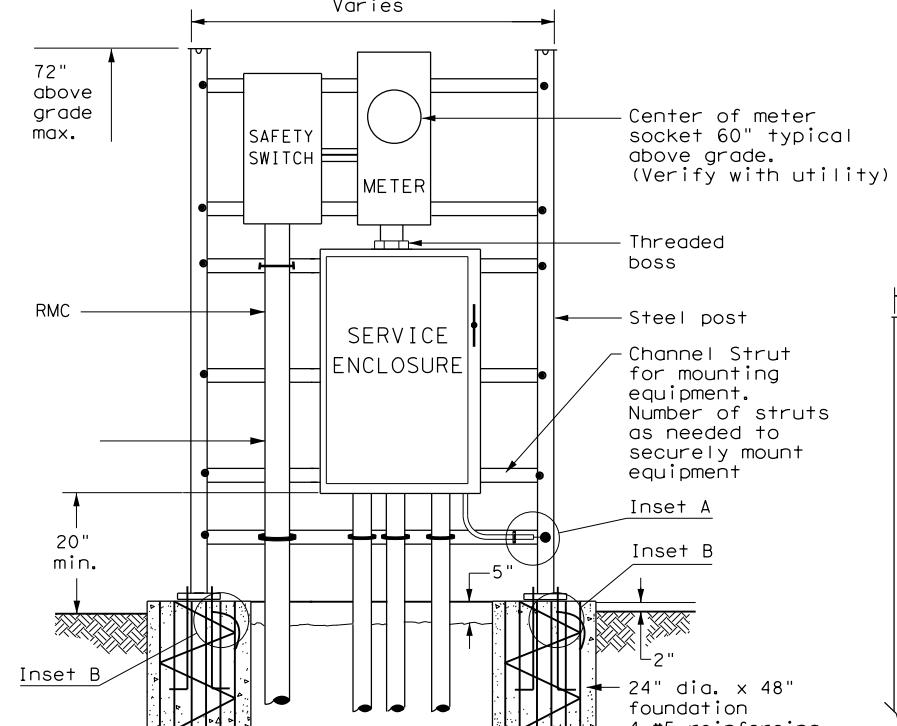
WIRING LEGEND	
—	Power Wiring
—	Control Wiring
—N—	Neutral Conductor
—G—	Equipment grounding conductor-always required

 Texas Department of Transportation		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	SECT
REVISIONS	JOB	HIGHWAY
3544 04	XXX	SH 211
DIST	COUNTY	SHEET NO.
SAT	MEDINA	70

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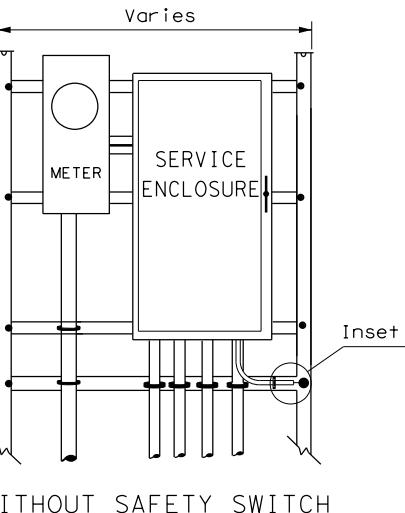
SUPPORT TYPE STEEL POLE (SP) AND STEEL FRAME (SF)

- 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 5/8 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.
- 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.
- 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.
- 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.
- Furnish and install rigid metallic ellips in all steel pole and steel frame foundations for all conduits entering the service from underground.
- Use class C concrete for foundations. Ensure reinforcing steel is Grade 60 with 3" of unobstructed concrete cover.
- 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.
- If Steel pole or frame is painted, bond each separate painted piece with a bonding jumper attached to a tapped hole.
- 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.
- Avoid contact of the service drop and service entrance conductors with the metal pole to prevent abrasion of the insulated conductors.
- Shop drawings are not required for service support structure unless specifically stated elsewhere or directed by the Engineer.

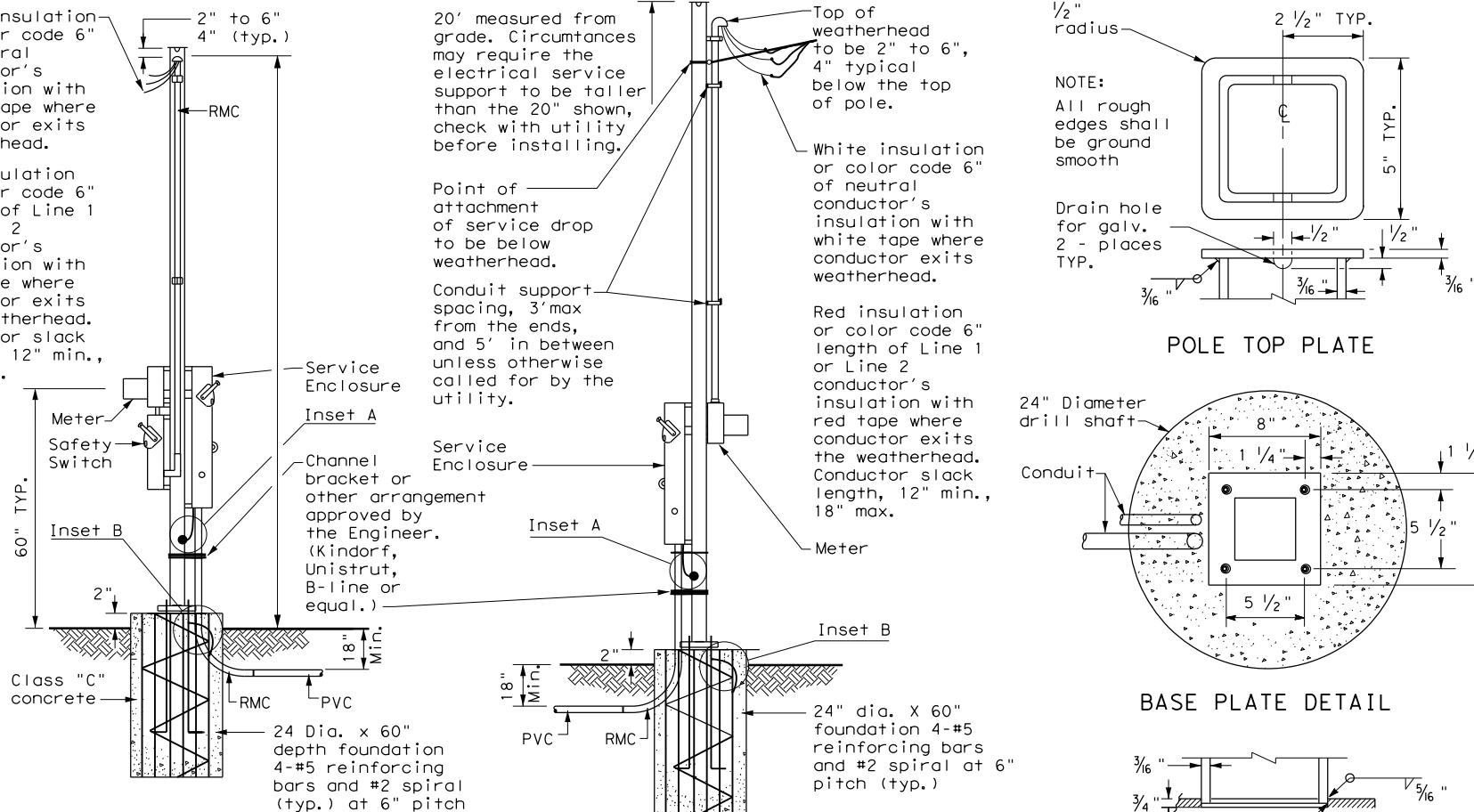


WITH SAFETY SWITCH
FRONT VIEW

SERVICE SUPPORT TYPE SF (U) - UNDERGROUND SERVICE



WITHOUT SAFETY SWITCH
FRONT VIEW

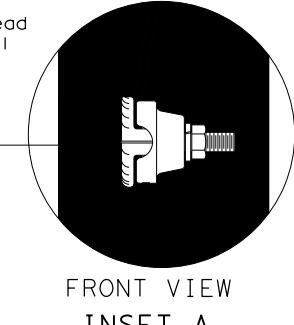


WITH SAFETY SWITCH

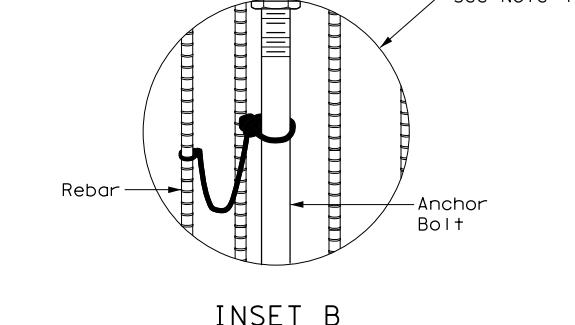
WITHOUT SAFETY SWITCH

SERVICE SUPPORT TYPE SP (O) - OVERHEAD SERVICE

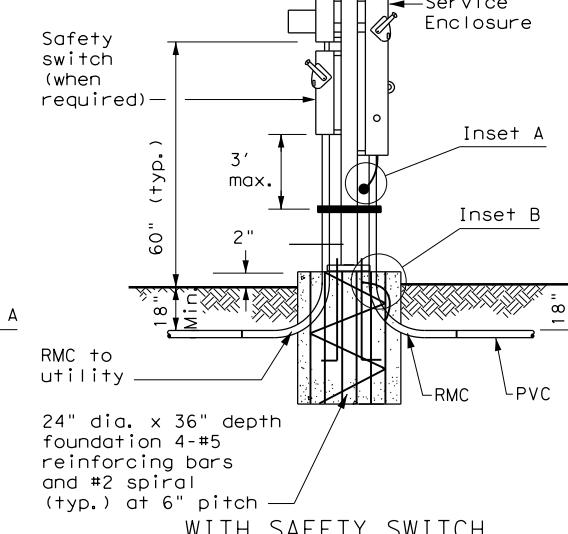
Drill, top, and thread 1/2" x 13 UNC. Install tank ground fitting, connect electrical service grounding electrode conductor. See Note 7.



FRONT VIEW
INSET A

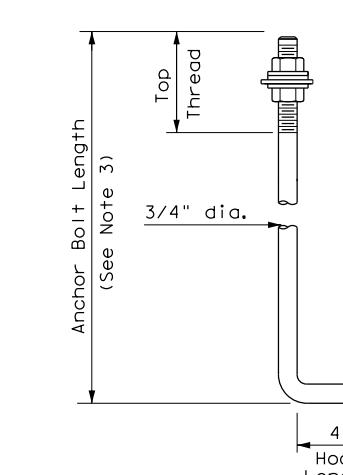


INSET B

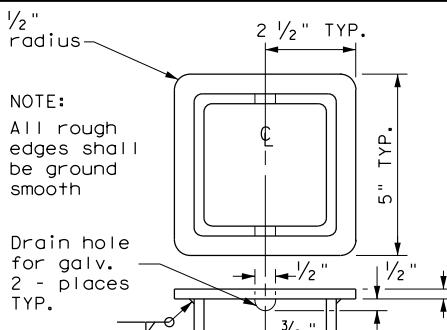


WITH SAFETY SWITCH
FRONT VIEW

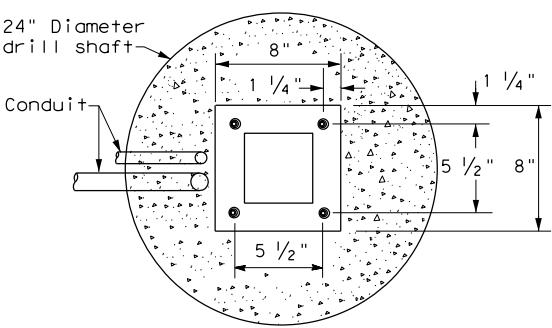
SERVICE SUPPORT TYPE SP (U) - UNDERGROUND SERVICE



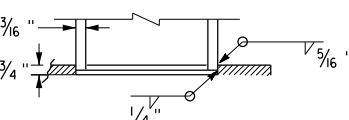
HOOKED ANCHOR DETAIL



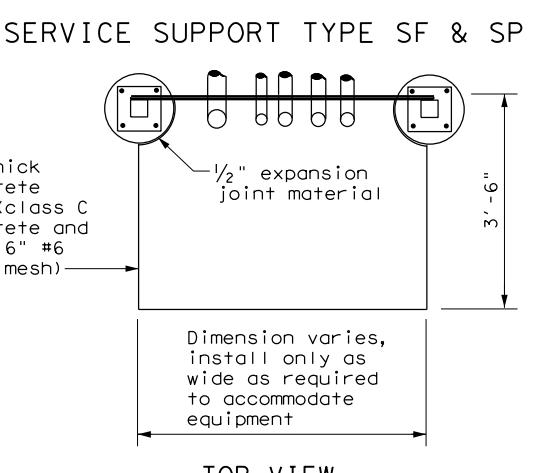
POLE TOP PLATE



BASE PLATE DETAIL

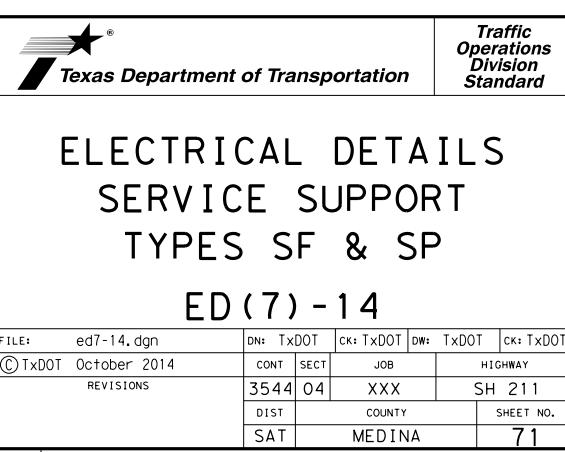


BOTTOM OF POLE



TOP VIEW

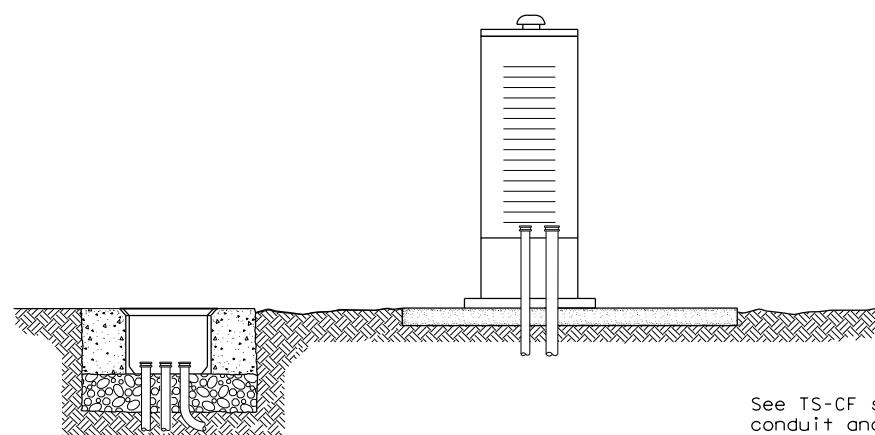
SERVICE SUPPORT TYPE SF (O) & SF (U)



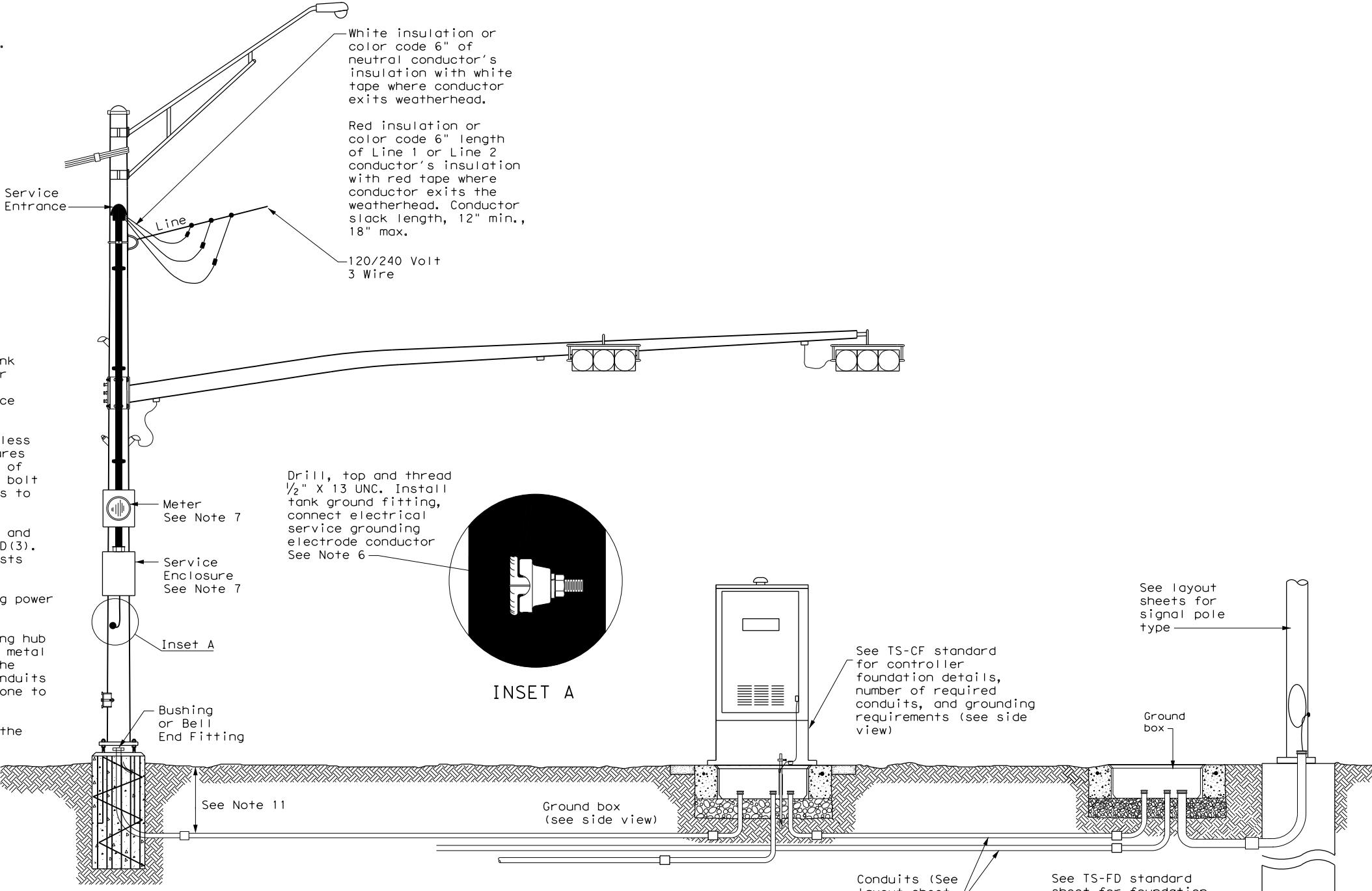
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TRAFFIC SIGNAL NOTES

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 $\frac{1}{2}$ 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 $\frac{3}{4}$ 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".



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



SIGNAL POLE WITH SERVICE

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

SIGNAL CONTROLLER FRONT VIEW

SIGNAL POLE

ELECTRICAL DETAILS				Traffic Operations Division Standard	
TYPICAL TRAFFIC SIGNAL SYSTEM DETAILS				ED(8)-14	
FILE: ed8-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
© TxDOT October 2014	CONT	SECT	JOB		HIGHWAY
REVISIONS	3544	04	XXX		SH 211
	DIST	COUNTY		SHEET NO.	
	SAT	MEDINA			72

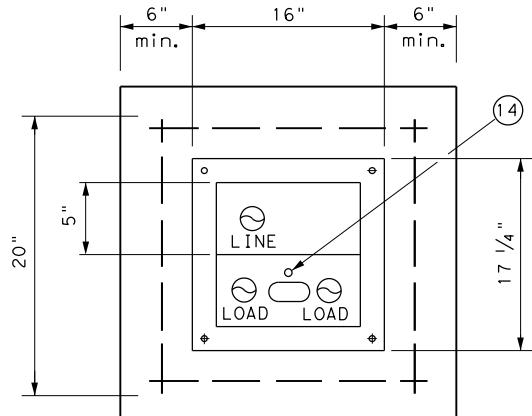
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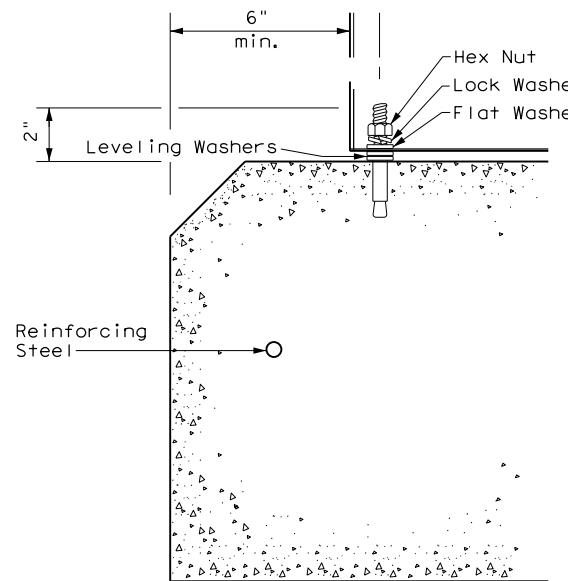
PEDESTAL SERVICE NOTES

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 $\frac{1}{2}$ in. x $2\frac{1}{16}$ 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 $\frac{1}{2}$ 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 $\frac{1}{8}$ in. gap at any corner. Do not exceed a maximum dip or rise in the foundation of $\frac{1}{8}$ in. per foot. When properly installed, ensure the top of the service enclosure is level front to back and side to side within $\frac{1}{4}$ 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.

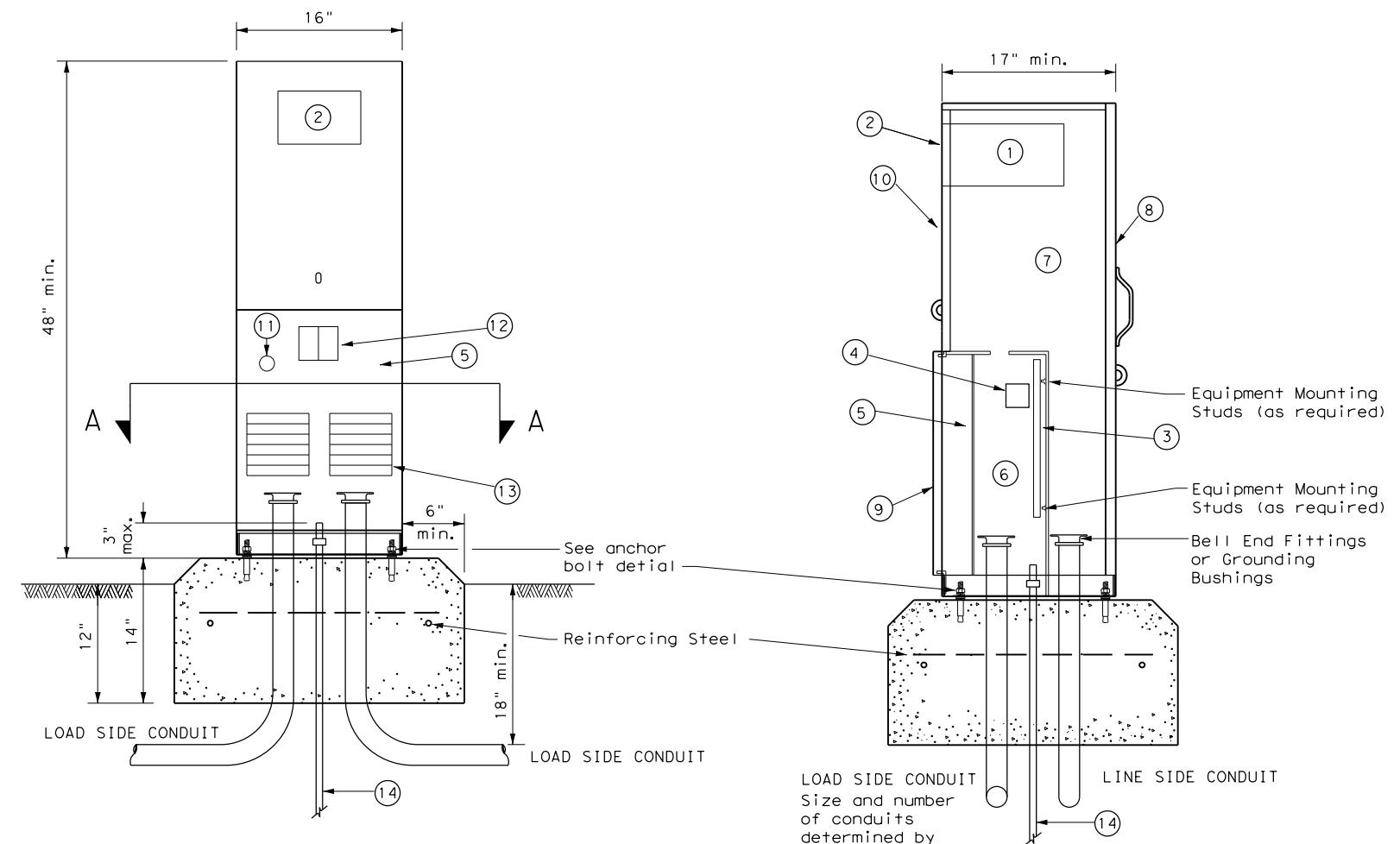
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SECTION A-A



ANCHOR BOLT DETAIL



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.

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

 Texas Department of Transportation		Traffic Operations Division Standard
ELECTRICAL DETAILS		
ELECTRICAL SERVICE SUPPORT		
PEDESTAL SERVICE TYPE PS		
ED(9)-14		
FILE: ed9-14.dgn	DN: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT
REVISIONS	JOB	HIGHWAY
3544 04	XXX	SH 211
DIST	COUNTY	SHEET NO.
SAT	MEDINA	73

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TIMBER POLE (TP) SERVICE SUPPORT NOTES

1. Ensure electrical service support is a class 5 treated timber pole as per Item 627 "Treated Timber Poles." Embed timber pole to depth required in Item 627.
2. Conduit and electrical conductors attached to the electrical service pole and underground within 12 in. of service pole are not paid for directly but are subsidiary to the electrical service.
3. Install pole-top mounted photocell (T) on north side of pole, or in service enclosure (E) as required. See Electrical Service Data chart in plan set.
4. Gain pole as required to provide flat surface for each channel. Gain timber pole to $\frac{5}{8}$ in. max. depth and $1\frac{1}{8}$ in. max. height. Gain pole in a neat and workmanlike manner.
5. Mount meter and service equipment on stainless steel or galvanized channel (Unistrut, Kindorf, or equal). Provide channel sized 1 in. to $3\frac{3}{4}$ in. maximum depth, and $1\frac{1}{2}$ in. to $1\frac{1}{8}$ in. maximum width. File smooth the cut ends of galvanized channel and paint with zinc rich paint before installing on pole. Secure each channel section to timber pole with two galvanized or SS lag bolts, $\frac{1}{4}$ in. minimum diameter by $1\frac{1}{2}$ in. minimum length. Use a galvanized or SS flat washer on each lag bolt. Do not stack channel.
6. When excess length must be trimmed from poles, trim from the top end only.

① Class 5 pole, height as required
② Service drop from utility company (attached below weatherhead)

③ Service conduit (RMC) and service entrance conductors - One Red, One Black, One White (See Electrical Service Data)

④ Safety switch (when required)

⑤ Meter (when required)

⑥ Service enclosure

⑦ 6 AWG bare grounding electrode conductor in $\frac{1}{2}$ in. PVC to ground rod - extend $\frac{1}{2}$ in. PVC 6 in. underground.

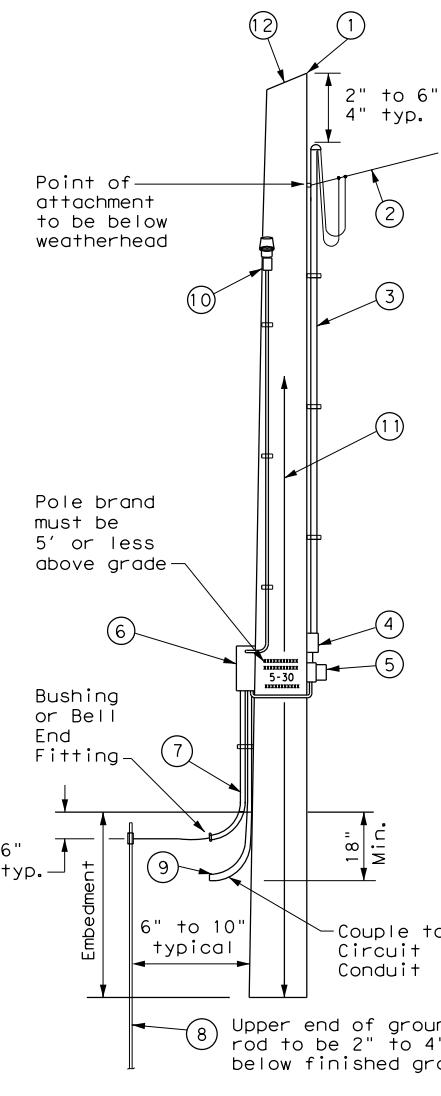
⑧ $\frac{5}{8}$ in. x 8 ft. Copper clad ground rod - drive ground rod to a depth of 2 in. to 4 in. below grade.

⑨ RMC same size as branch circuit conduit.

⑩ See pole-top mounted photocell detail on ED(5).

⑪ When required by the serving utility provide bare 6 AWG copper conductor. Run wire from pole top to butt wrap or copper butt plate. Protect conductor with non-conductive material to a height of 8 ft. above finished grade.

⑫ When required by utility, cut top of pole at an angle to enhance rain run off.



SERVICE SUPPORT TYPE TP (O)

GRANITE CONCRETE (GC) & OTHER CONCRETE (OC) NOTES

Ensure electrical service support structures bid as type Granite Concrete (GC) or Other Concrete (OC) meet the following requirements.

1. Provide GC and OC poles that meet the requirements of DMS 11080 "Electrical Services."
2. Provide prestressed concrete poles suitable for direct embedment into the ground without special foundations.
3. Verify poles are marked as required on DMS 11080. Location of marking should be approximately 4' above final grade. Use the two-point pickup locations when handling pole in horizontal position, and one-point pickup location for use in raising the pole to a vertical position. These marks are small but conspicuous.
4. Embed poles 42 in. or 10% of the length plus 2 ft., whichever is greater.
5. Ensure all installation details of services are in accordance with utility company specifications.
6. Install a one point rack or eye bolt bracket 6 inches to 12 inches below the weatherhead as an overhead service drop anchoring point for the electric utility.
7. Furnish and install galvanized or stainless steel channel strut 1 $\frac{1}{2}$ in. or 1 $\frac{1}{8}$ in. wide by 1 in. up to $3\frac{3}{4}$ in. deep (Unistrut, Kindorf, B-line or equal). Attach channel strut with stainless steel concrete anchors (max. 1" depth), square U-bolts or back to back channel strut with long bolts, or other secure mounting as approved by the Engineer. Ensure bolts are galvanized in accordance with ASTM A153. Do not stack channel struts.
8. Backfill the holes thoroughly by tamping in 6 in. lifts. After tamping to grade, place additional backfill material in a 6 inch high cone around the pole to allow for settling. Use material equal in composition and density to the surrounding area. Backfilling will not be paid for directly but is subsidiary to various bid items.

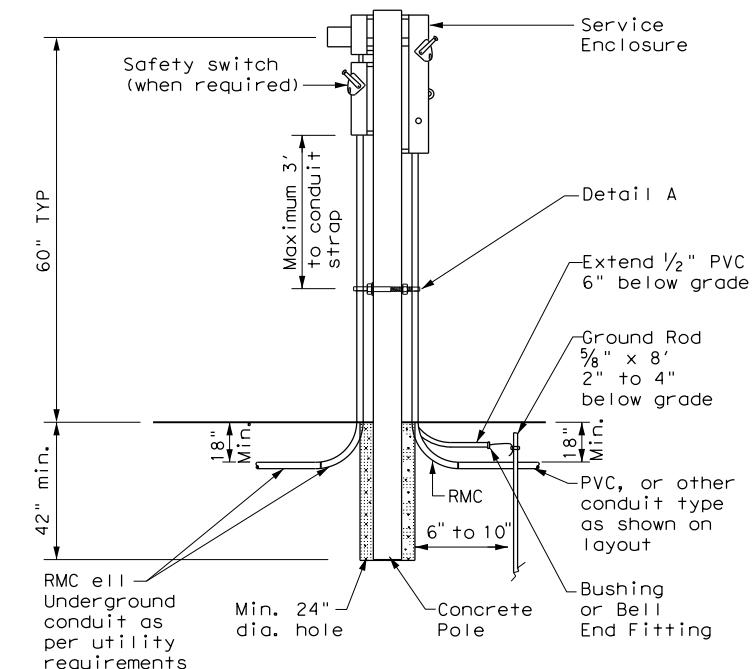
White insulation or color code 6" length neutral conductor's insulation with white tape where conductor exits the weatherhead. Red insulation or color code 6" length of Line 1 or Line 2 conductor's insulation with red tape where conductor exits the weatherhead. Conductor slack length, 12" min., 18" max.

25' measured from grade. Circumstances may require the electrical service support to be taller than the 25' shown, check with utility before installing

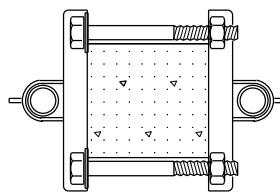
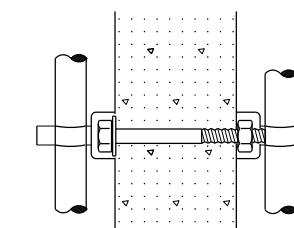
RMC
Service Enclosure
Safety Switch (when required)
Pole marking approx. 4' above ground line.

See Detail A
60" TYP
Minimum burial depth 10% of pole length plus 2', or 42" whichever is greater
Bushing or Bell End Fitting
PVC, or other conduit type as shown on layout
RMC
6" to 10"
Ground Rod $\frac{5}{8}$ " x 8' 2" to 4" below grade
Concrete Pole

CONCRETE SERVICE SUPPORT
Overhead(O)



CONCRETE SERVICE SUPPORT
Underground (U)



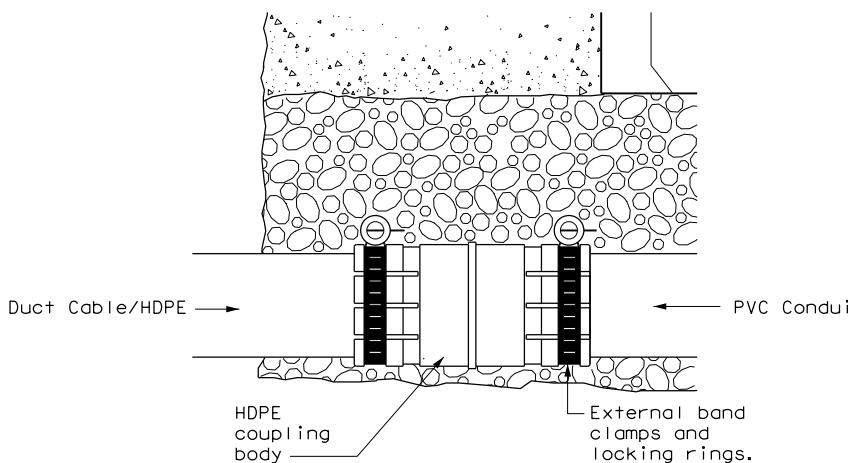
DETAIL A

See Note 7. Before installing channel that has been cut, file sharp edges and paint with zinc-rich paint. Ensure there is no paint splatter on the pole.

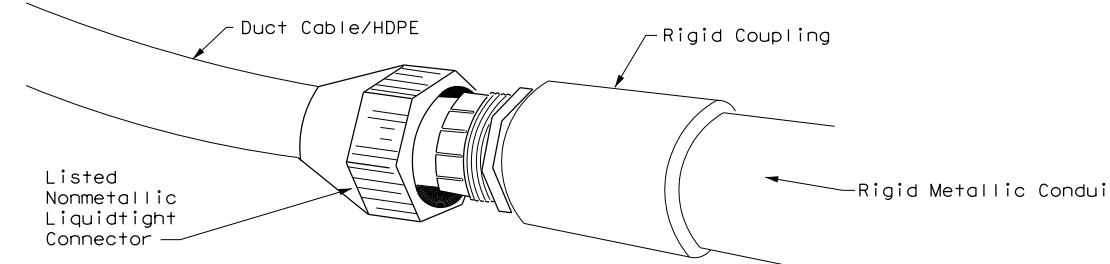
	Traffic Operations Division Standard			
ELECTRICAL DETAILS				
SERVICE SUPPORT TYPES GC, OC, & TP				
ED(10) - 14				
FILE: ed10-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	3544	04	XXX	SH 211
DIST	COUNTY			SHEET NO.
SAT	MEDINA			74

DUCT CABLE & HDPE CONDUIT NOTES

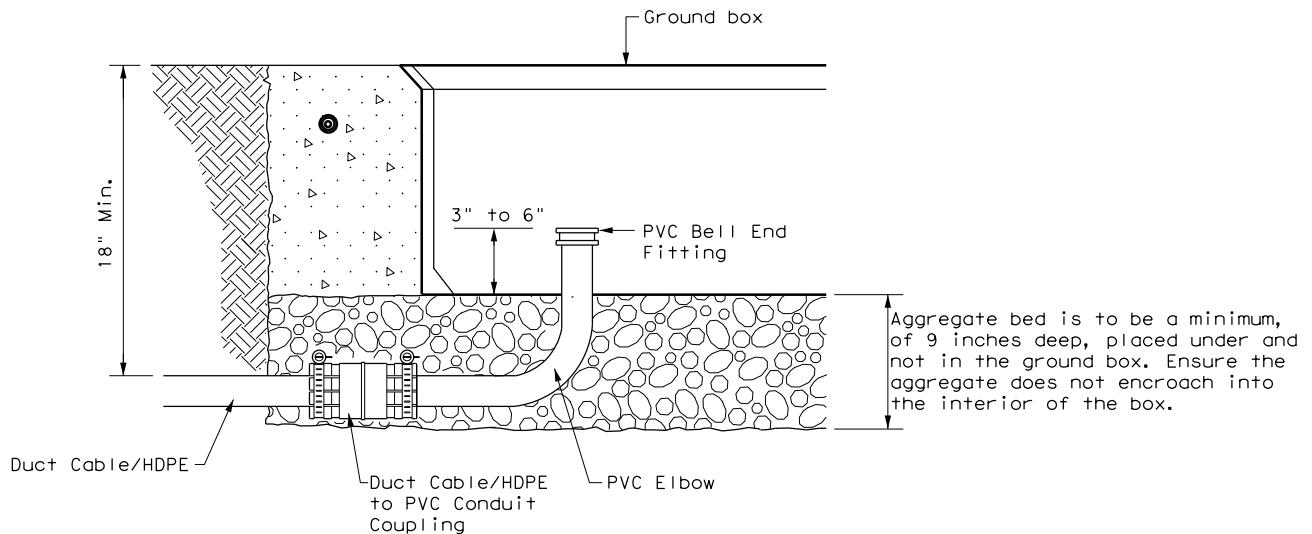
- Provide duct cable in accordance with Departmental Material Specification (DMS) 11060 "Duct Cable" and Item 622 "Duct Cable." Provide duct cable as listed on the Material Producer List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies" Item 622.
- Provide High-Density Polyethylene (HDPE) conduit in accordance with DMS 11060 and Item 618, "Conduit." Provide HDPE as listed on the MPL on the Department web site under "Roadway Illumination and Electrical Supplies," Item 618.
- Supply duct cable with a minimum 2 in. diameter, unless otherwise shown in the plans. Provide duct cable and HDPE conduit as shown by descriptive code or on the plans. Bend duct cable and HDPE conduit as recommended by the manufacturer, with a minimum bending radius of 26 in. for 2 in. duct. Follow manufacturers' recommendations when handling duct cable and HDPE conduit reels and during installation of duct cable and HDPE conduit.
- Do not splice conductors within duct cable or HDPE conduit. Couple duct cable and HDPE entering a ground box or foundation to a PVC elbow. When galvanized steel RMC elbows are called for in the plans and any portion of the RMC elbow is buried less than 18" from possible contact, ground the RMC elbow.
- Furnish and install duct cable with factory installed conductors, sized as shown in the plans and as required by the National Electrical Code (NEC). The NEC contains specific requirements for duct cable in Article, "Nonmetallic Underground Conduit with Conductors: Type NUCC."
- When conduit casing is called for in the plans, extend duct cable or HDPE conduit through the conduit casing in one continuous length without connection to the casing.
- Seal the ends of duct cable or HDPE conduit with duct seal, expandable foam, or other approved method after completing the pull tests required by Item 622.
- Provide minimum cover of 24 in. under roadways, 18 in. in other locations, or as shown on the plans.
- Furnish and install listed fittings to couple duct cable or HDPE conduit to other types of conduit. Duct cable and HDPE conduit may be field-threaded and spliced with PVC or RMC threaded couplings; connected with listed tie-wrap fittings; connected using listed coupling made of HDPE with stainless steel external banding clamps and locking rings; connected with approved electrofusion conduit couplings; or connected using an approved chemical fusion method using an epoxy or adhesive specifically designed for HDPE couplings and connectors all installed in accordance with their manufacturer's instructions. Do not use PVC glue on HDPE. Do not use water pipe fittings, or connect conduit with heat shrink tubing.



DUCT CABLE/HDPE TO PVC

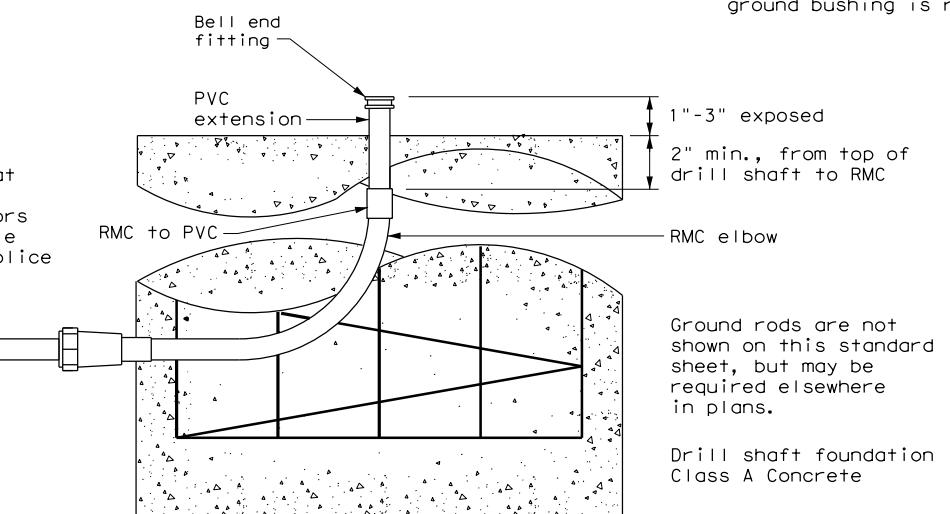


DUCT CABLE/HDPE TO RMC

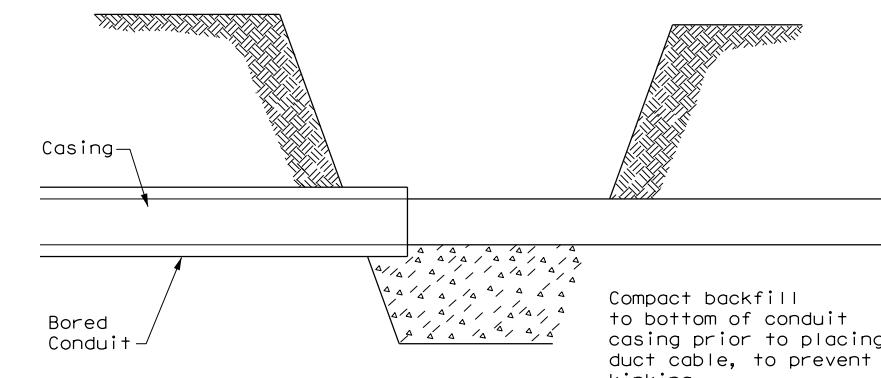


DUCT CABLE/HDPE AT GROUND BOX

When the upper end of an RMC ELL does not enter the ground box, it may be extended with a SCH-40 PVC conduit nipple and bell end, provided there is a minimum of 18" of cover over all parts of the elbow. If not, a rigid extension and ground bushing is required.



DUCT CABLE / HDPE AT FOUNDATION



BORE PIT DETAIL

ELECTRICAL DETAILS				Traffic Operations Division Standard
DUCT CABLE/ HDPE CONDUIT				ED (11) - 14
FILE: ed11-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT October 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS	3544	04	XXX	SH 211
DIST	COUNTY		SHEET NO.	
SAT	MEDINA			75

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BATTERY BOX GROUND BOXES NOTES

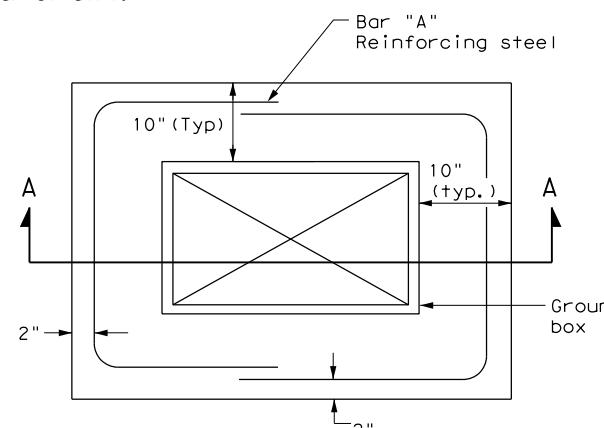
A. MATERIALS

1. Provide polymer concrete or fiberglass reinforced plastic (FRP) battery box ground box and cover in accordance with Departmental Material Specification (DMS) 11071 "Battery Box Ground Boxes." Battery box will accommodate up to 4 batteries, each measuring 8 in. x 13.5 in. x 10 in. (W x L x D). Label battery box ground box cover in accordance with DMS 11071.

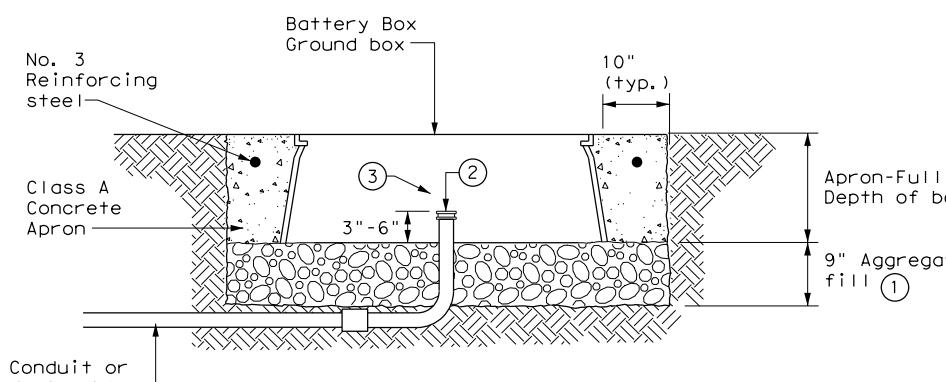
2. Supply a marine grade batteries with covers. Secure the marine grade batteries with covers to the stainless steel rack in the bottom of the ground box with tie down straps.

B. CONSTRUCTION METHODS

1. Ensure conduit entry will not interfere with placement of the batteries in the battery box ground box.
2. Remove all gravel and dirt from conduit. Cap all conduits prior to placing aggregate and setting battery box ground box. Provide Grade 3 or 4 coarse aggregate as shown on Table 2 of Item 302 "Aggregates for Surface Treatments." Ensure the aggregate bed is in place and is a minimum of 9 in. deep prior to setting the box. Install battery box ground box on top of aggregate.
3. Cast battery 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. Battery box ground box aprons, including concrete and reinforcing steel, are subsidiary to battery box ground boxes when called for by descriptive code.
4. Bolt covers down when not working in battery box ground boxes. Keep bolt holes in the box clear of dirt.

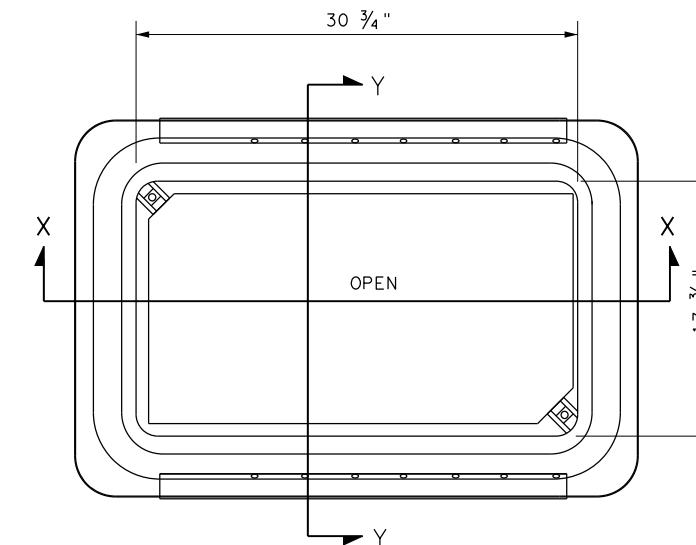


PLAN VIEW

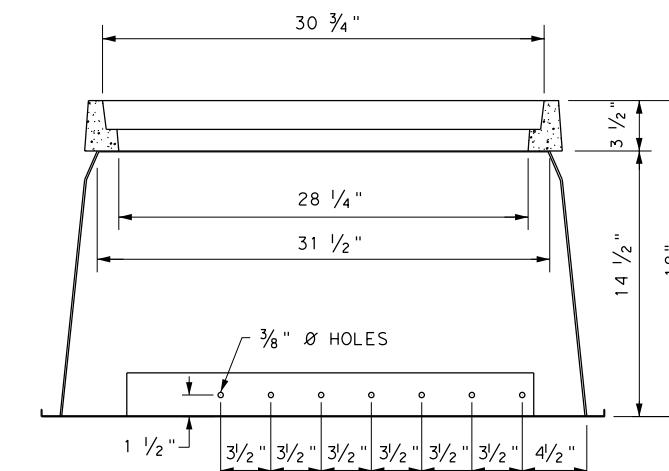


APRON FOR BATTERY BOX GROUND BOXES

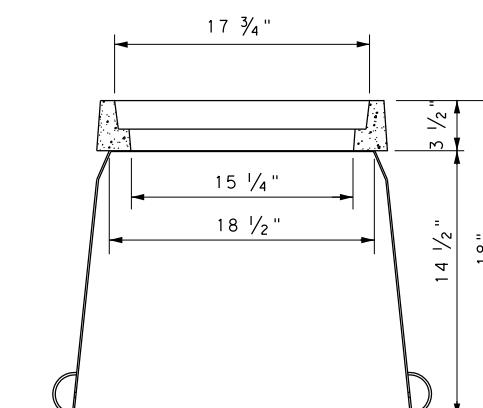
- 1 Place aggregate under the box and not in the box. Aggregate should not encroach on the interior volume of the box.
- 2 Install bushing or bell end fitting on the upper end of all ell's.
- 3 Install all conduits in a neat and workmanlike manner.



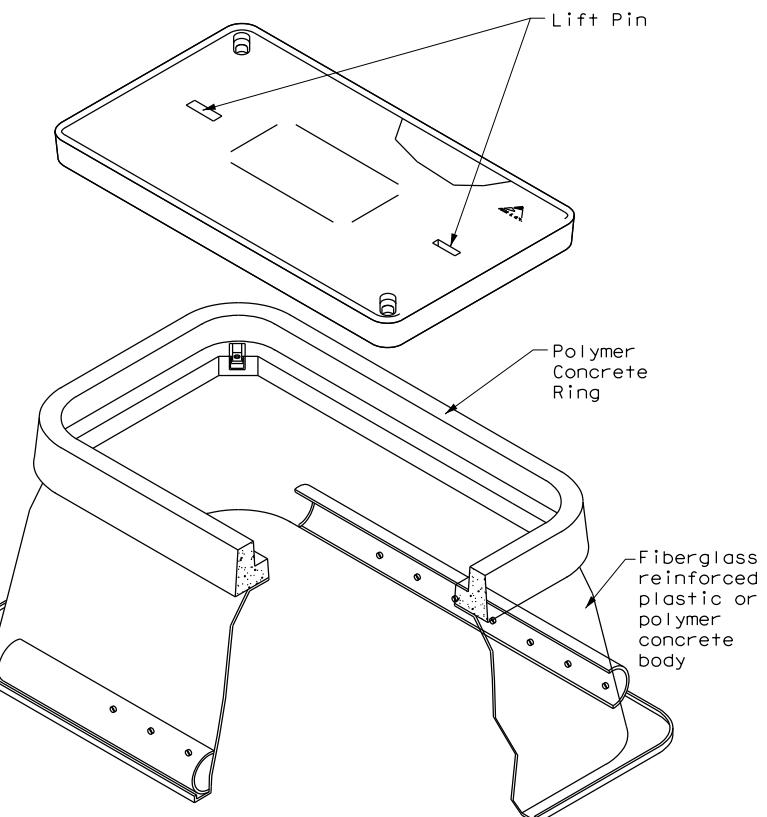
BATTERY BOX TOP VIEW



SECTION X-X



SECTION Y-Y

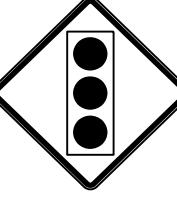
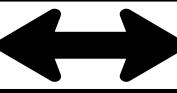
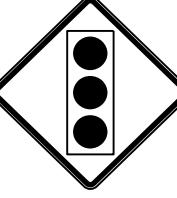


ELECTRICAL DETAILS			
BATTERY BOX GROUND BOXES			
ED (12) - 14			
FILE: ed12-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT October 2014	CONT	SECT	JOB
REVISIONS	3544	04	HIGHWAY
	COUNTY		SH 211
SAT		SHEET NO.	
	MEDINA		76

SUMMARY OF SMALL SIGNS

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DATE: 5/29/2025 4:52:08 PM
FILE: P:\300\04\43\ORD\4-DesignPlan Set\S08-Traffic\SS8.3-PM & Signing\81-Signage\81-Signage.dwg

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A) FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	EXAL ALUMINUM (TYPE G) UB=Universal Conc SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	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		
							1 or 2			PREFABRICATED	1EXT or 2EXT = # of Ext BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL = Extruded Alum Sign Panels	
78	1-1	*W3-3 LED SIGN		36x36	✓	10BWG	1	SA	P			
78	1-2	D3-2		60x30	✓	10BWG	2	SA	P			
79	2-1	W1-7		48x24	✓	10BWG	1	SA	T			
79	2-2	D3-2		60x30	✓	10BWG	2	SA	P			
79	2-3	*W3-3 LED SIGN		36x36	✓	10BWG	1	SA	P			
79												
79												

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

The Standard Highway Sign Designs for Texas (SHSD) can be found at the following website.
<http://www.txdot.gov/>

NOTE:

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

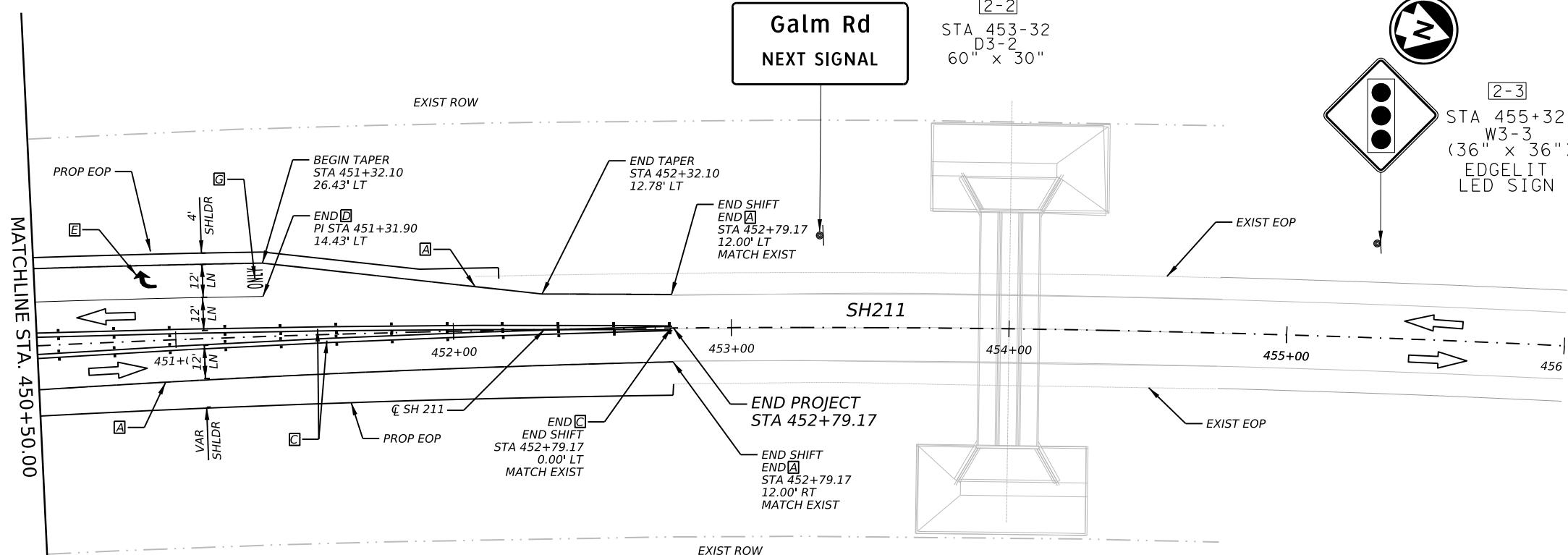
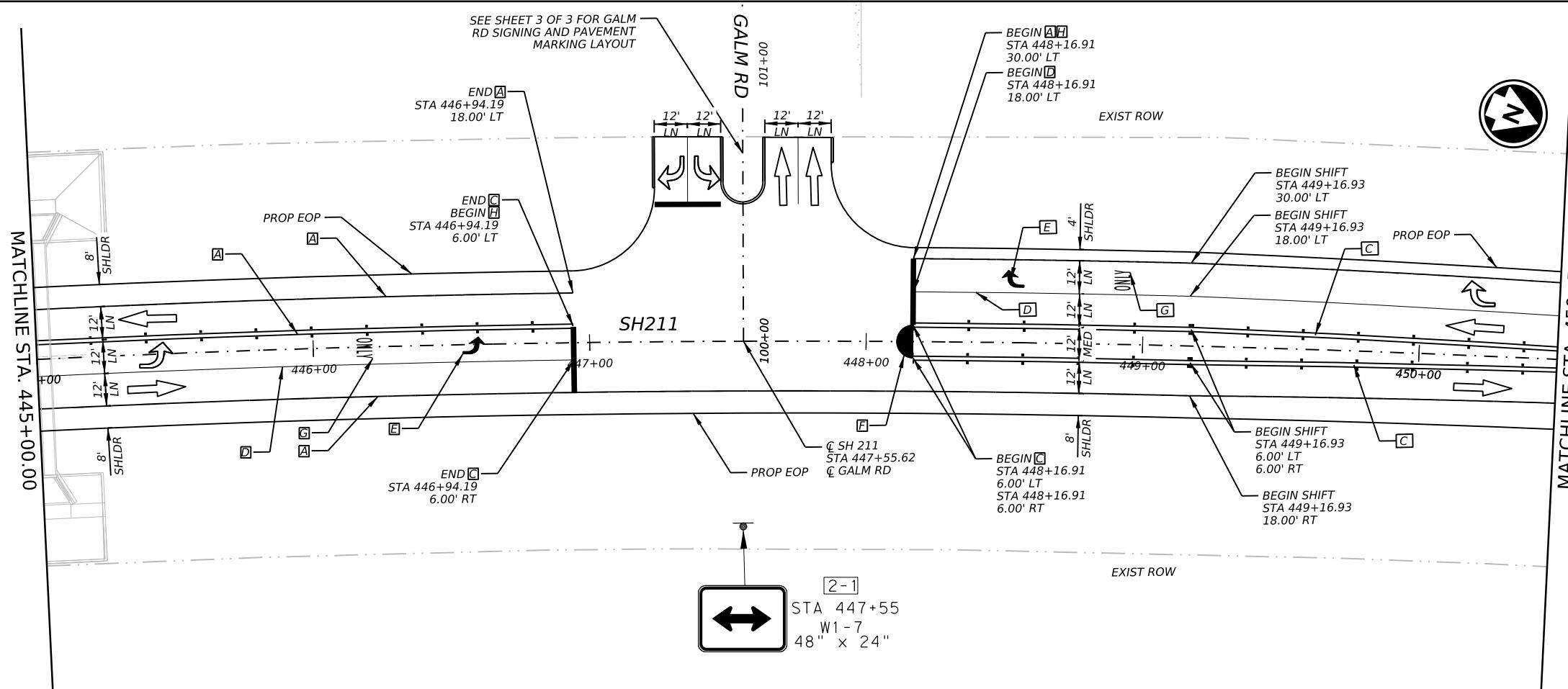


SUMMARY OF SMALL SIGNS

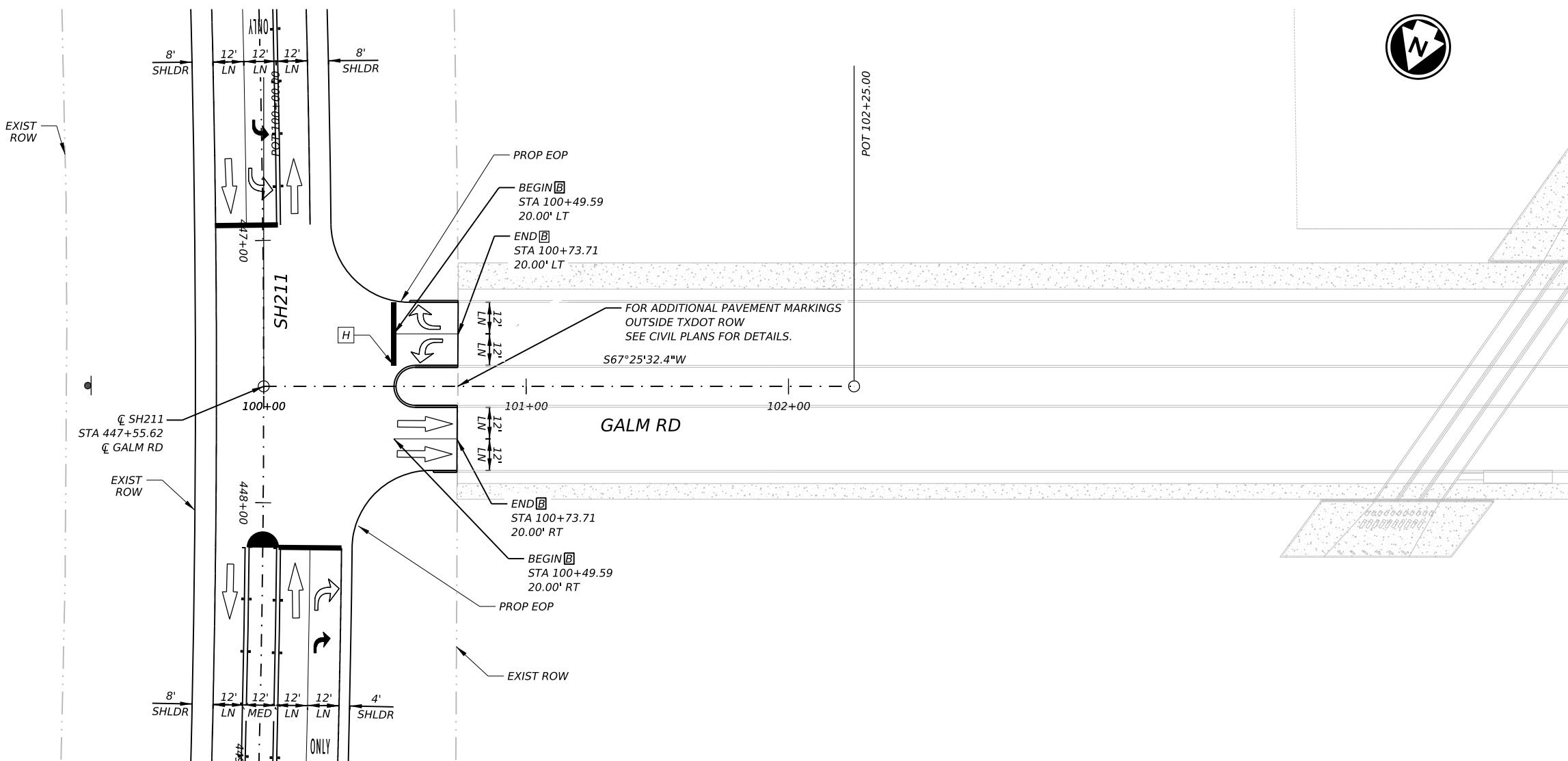
SOSS

SHEET 1 OF 1

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	3544	04	XXX	SH 211
4-16	DIST	COUNTY		SHEET NO.
8-16	SAT	MEDINA		77



PAPE-DAWSON ENGINEERS			
SAN ANTONIO AUSTIN HOUSTON FORT WORTH DALLAS			
2000 NW LOOP 410 SAN ANTONIO, TX 78213 210.375.9000			
TEXAS ENGINEERING FIRM #470 TEXAS SURVEYING FIRM #10028800			
 Texas Department of Transportation			
SH 211 TURN LANES AT GALM RD			
SIGNING AND PAVEMENT MARKING LAYOUT			
STA 445+00 TO END			
SHEET 2 OF 2			
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST	COUNTY		SHEET NO.
SAT	MEDINA		79



REV. NO.	DATE	DESCRIPTION	BY
PAPE-DAWSON ENGINEERS			
SAN ANTONIO AUSTIN HOUSTON FORT WORTH DALLAS 2000 NW LOOP 410 SAN ANTONIO, TX 78213 210.375.9000 TEXAS ENGINEERING FIRM #470 TEXAS SURVEYING FIRM #1002880			
Texas Department of Transportation			
SH 211 TURN LANES AT GALM RD			
SIGNING AND PAVEMENT MARKING LAYOUT			
SHEET 1 OF 1			
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	80

REQUIREMENTS FOR INDEPENDENT MOUNTED ROUTE SIGNS

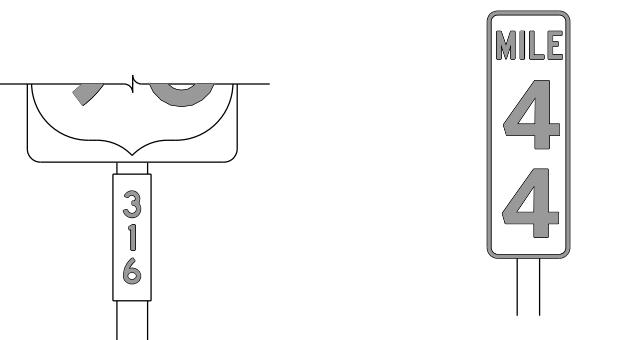
SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	ALL OTHERS	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE A SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & BORDERS	ALL OTHERS	TYPE B or C SHEETING



TYPICAL EXAMPLES

REQUIREMENTS FOR BLUE, BROWN & GREEN D AND I SERIES GUIDE SIGNS

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	ALL	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE D SHEETING
LEGEND, SYMBOLS & BORDERS	ALL OTHERS	TYPE B OR C SHEETING



TYPICAL EXAMPLES

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. White legend shall use the Clearview Alphabet. The following Clearview fonts shall be used to replace the existing white Federal Highway Administration (FHWA) Standard Highway Alphabets, when not specified in the SHSD, or in the plans.

B	CV-1W
C	CV-2W
D	CV-3W
E	CV-4W
Emod	CV-5WR
F	CV-6W
3. Route sign legend (ie. IH, US, SH and FM shields) shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets B, C, D, E, Emod or F.
4. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
5. Independent mounted route sign with white or colored legend and borders shall be applied by screening process with transparent color ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof. White legend, symbols and borders on all other signs shall be cut-out white sheeting applied to colored background sheeting.
6. Information regarding borders and radii for signs is found in the "Standard Highway Sign Designs for Texas". Dimensions shown and described for borders and corner radii on parent sign are nominal. Borders may vary in width as much as 1/2 inch. Corner radii above 3 inches may vary in width as much as 1 inch. Borders and corner radii within a parent sign must be of matching widths. The sign area outside the corner radius should be trimmed or rounded.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details of roadside signs are shown in the "SMD series" Standard Plan Sheets.

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

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

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

<http://www.txdot.gov/>



 Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

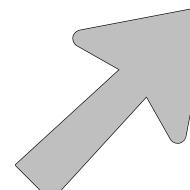
TSR (3) - 13

tsr3-13.dgn	DN:	TxDOT	ck:	TxDOT	dw:	TxDOT	ck:	TxDOT
October 2003	CONT	SECT		JOB		HIGHWAY		
REVISIONS	3544	04		XXX		SH 211		
7-13	DIST			COUNTY			SHEET NO.	
	SAT			MEDINA			81	

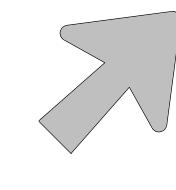
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of any standard or specification to another format or for incorrect results or damages resulting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

ARROW DETAILS

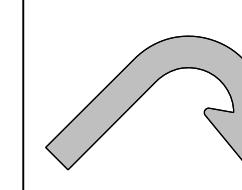
for Large Ground-Mounted and Overhead Guide Signs



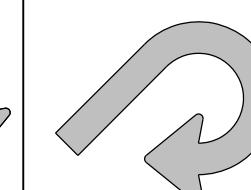
Type A



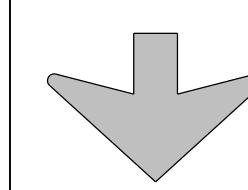
Type B



E-3



E-4



Down Arrow

TYPE	LETTER SIZE	USE
A-1	10.67" U/L and 10" Caps	Single Lane Exits
A-2	13.33" U/L and 12" Caps	
A-3	16" & 20" U/L	
B-1	10.67" U/L and 10" Caps	Multiple Lane Exits
B-2	13.33" U/L and 12" Caps	
B-3	16" & 20" U/L	

CODE	USED ON SIGN NO.
E-3	E5-1aT
E-4	E5-1bT

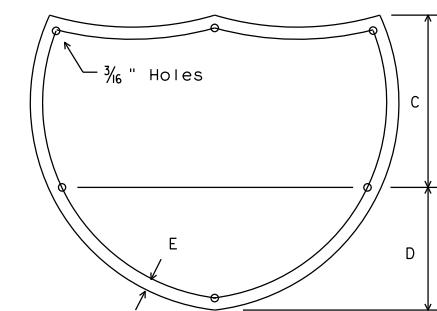
NOTE

Arrow dimensions are shown in the "Standard Highway Sign Designs for Texas" manual.

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

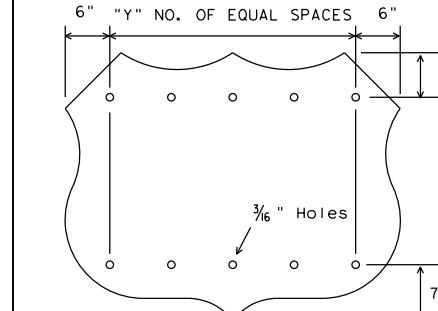
<http://www.txdot.gov/>

SIGN BLANK PUNCHING DETAILS FOR ATTACHMENTS WHEN SPECIFIED TO BE TYPE A ALUMINUM SIGNS (FOR MOUNTING TO GUIDE SIGN FACE)

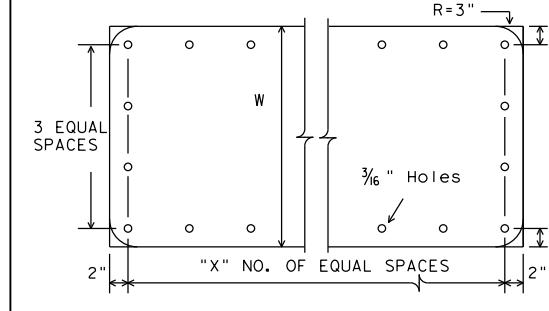


INTERSTATE ROUTE MARKERS

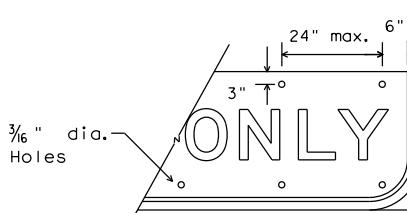
A	C	D	E
36	21	15	1 1/2
48	28	20	1 3/4



U.S. ROUTE MARKERS



STATE ROUTE MARKERS

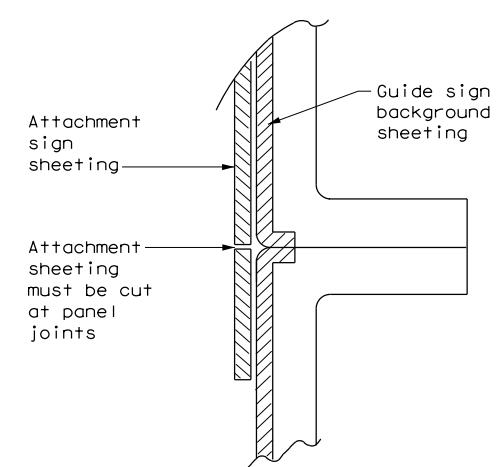


EXIT ONLY PANEL

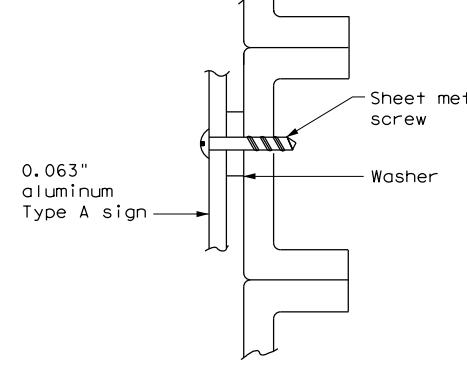
Sign Size	"Y"
24x24	2
30x24	3
36x36	3
45x36	4
48x48	4
60x48	5

No. of Digits	W	X
4	24	4
4	36	5
4	48	6
3	24	3
3	36	4
3	48	5

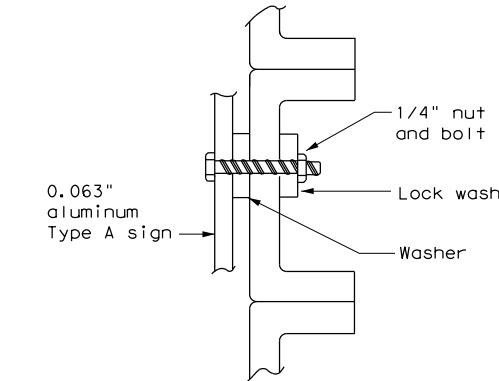
MOUNTING DETAILS OF ATTACHMENTS TO GUIDE SIGN FACE ("EXIT ONLY" AND "LEFT EXIT" PANELS, ROUTE MARKERS AND OTHER ATTACHMENTS)



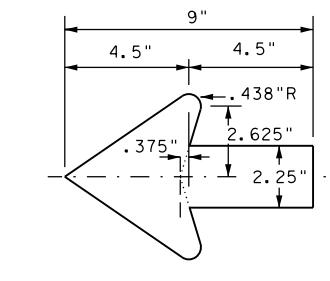
DIRECT APPLIED ATTACHMENT



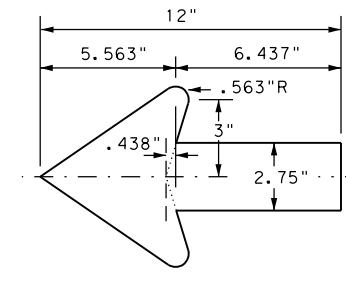
SCREW ATTACHMENT



NUT/BOLT ATTACHMENT



Standard arrow to be used with 6 inch letters.



Standard arrow to be used with 8 inch letters.

NOTE:

1. Sheeting for legend, symbols, and borders must be cut at panel joints.
2. Direct applied attachment signs will be subsidiary to "Aluminum Signs" or "Fiberglass Signs".

DATE: 5/29/2025 4:52:16 PM
FILE: P:\300\04\43\ORD\4-DesignPlan Set\S08-Traffic\81-Signing\81-5-29-2025.dwg

NOTE:

Furnish Type A aluminum sign attachments only when specified in the plans. These signs will be paid for under "Aluminum Signs".

TYPICAL SIGN REQUIREMENTS

TSR (5) - 13

FILE:	tsr5-13.dwg	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT
© TxDOT	October 2003	CONT	SECT	JOB		HIGHWAY			
		3544	04	XXX		SH 211			
12-03	7-13	DIST	COUNTY						
9-08		SAT	MEDINA						

DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty for the conformance of this standard to other formats or for incorrect results or damages resulting from its use.

DATE: FILE:

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))
10BWC = 10 BWG Tubing (see SMD(SLIP-1) to (SLIP-3))
S80 = Schedule 80 Pipe (see SMD(SLIP-1) to (SLIP-3))

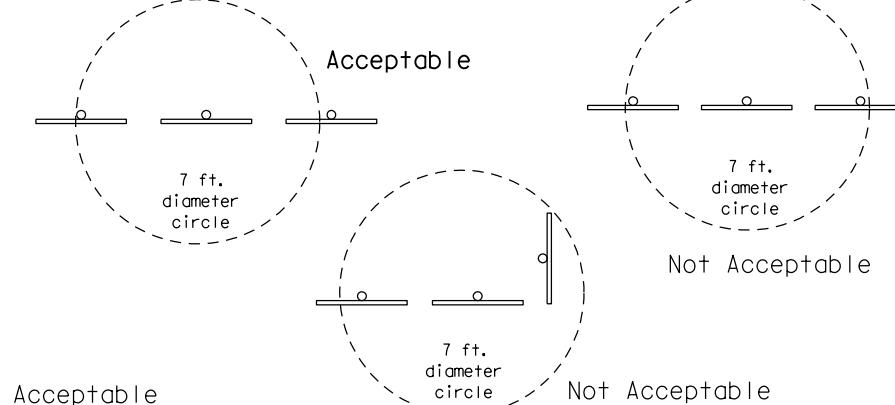
Number of Posts (1 or 2)

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))

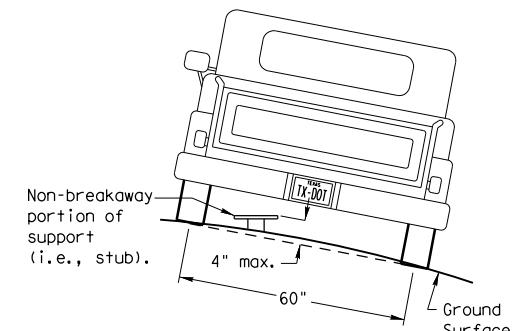
Sign Mounting Designation

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))

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



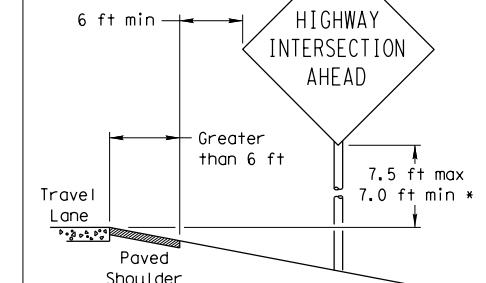
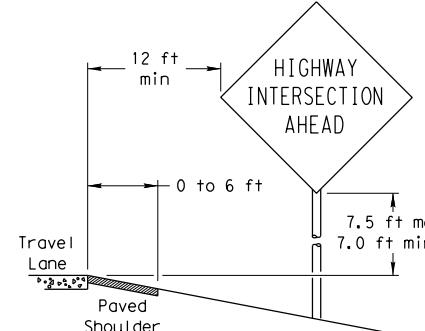
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

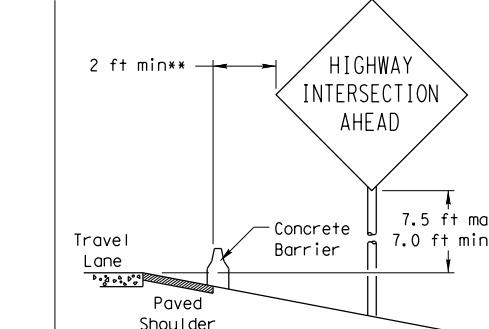
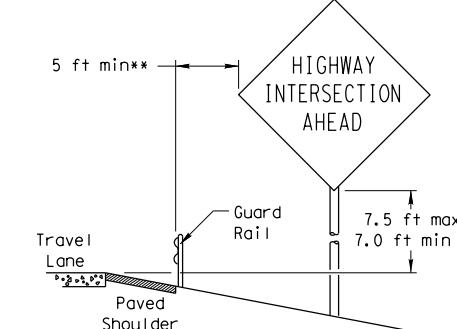
PAVED SHOULDERS



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.

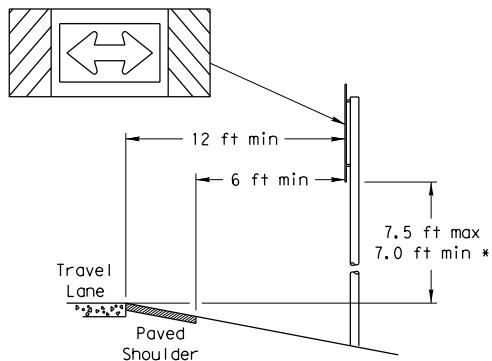
BEHIND BARRIER



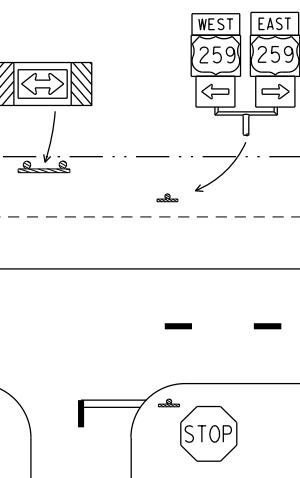
BEHIND GUARDRAIL

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

T-INTERSECTION

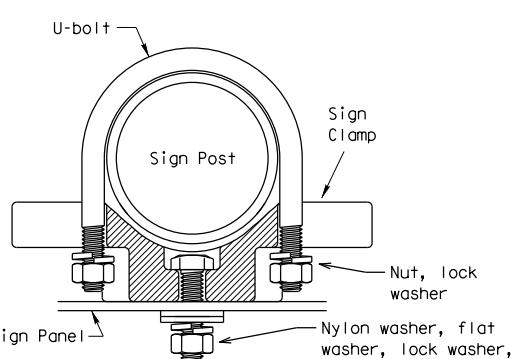


When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

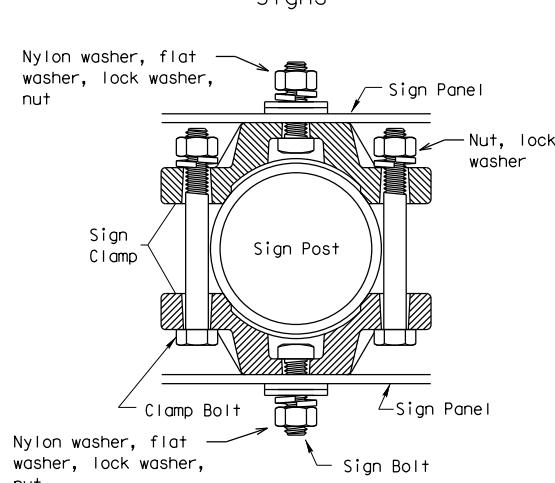


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

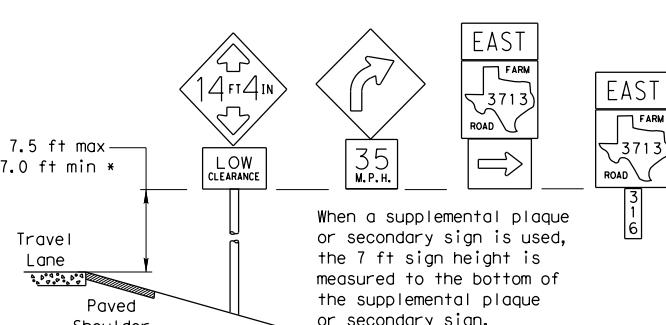
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



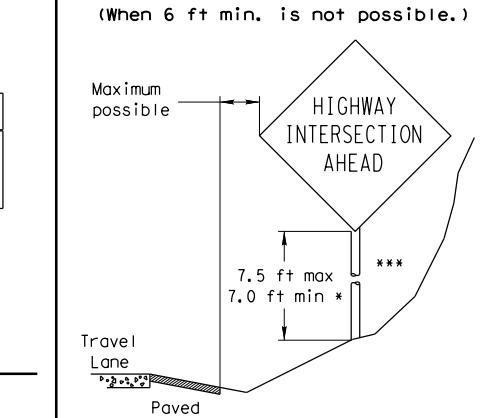
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES

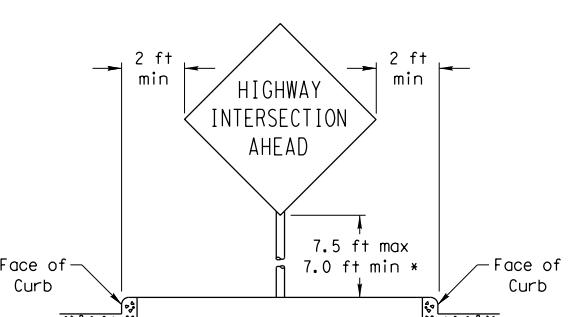


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

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



CURB & GUTTER OR RAISED ISLAND



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

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

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

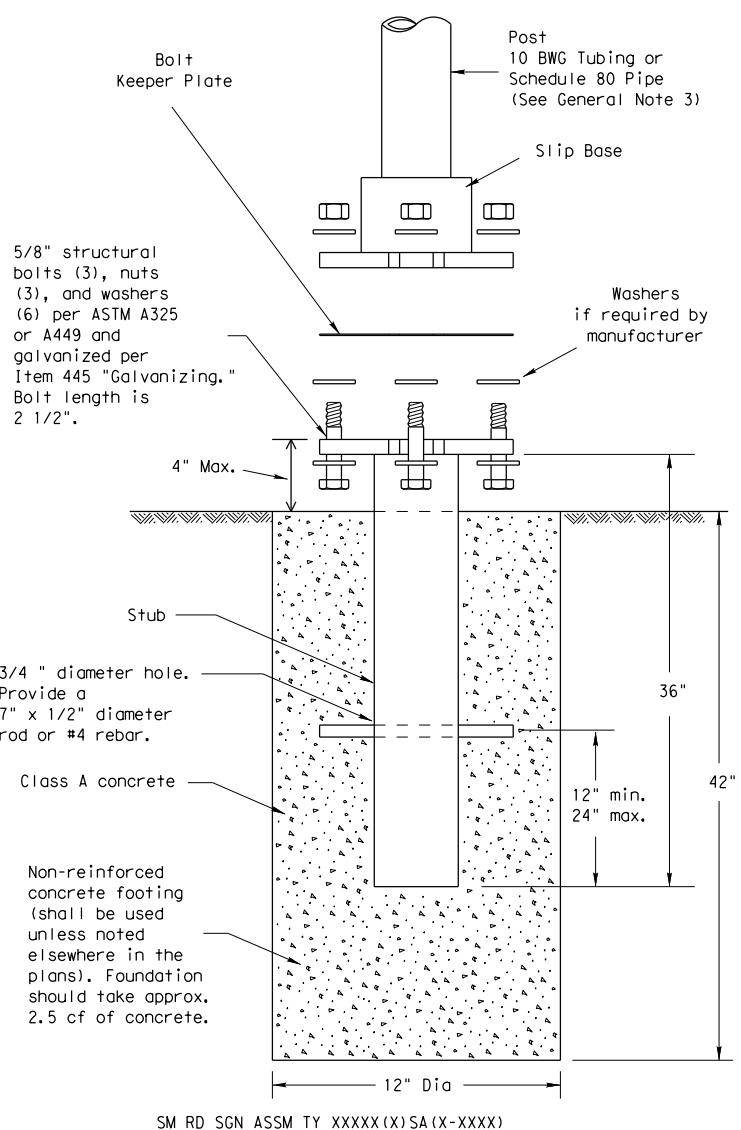
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

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9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
3544	04	XXX			SH 211
DIST	COUNTY				SHEET NO.
SAT	MEDINA				84

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:

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

ASSEMBLY PROCEDURE

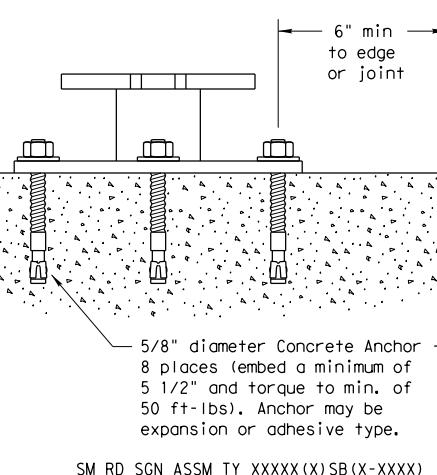
Foundation

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

Support

1. Cut support so that the bottom of the sign will be 7 to 7.5 feet above the edge of the travelway (i.e., edge of the closest lane) when slip plate is below the edge of pavement or 7 to 7.5 feet above slip plate when the slip plate is above the edge of the travelway. The cut shall be plumb and straight.
2. Attach sign to support using connections shown. When multiple signs are installed on the same support, ensure the minimum clearance between each sign is maintained. See SMD(SLIP-2) for clearances based on sign types.

CONCRETE ANCHOR



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, "Epoxy and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

 Texas Department of Transportation
Traffic Operations Division

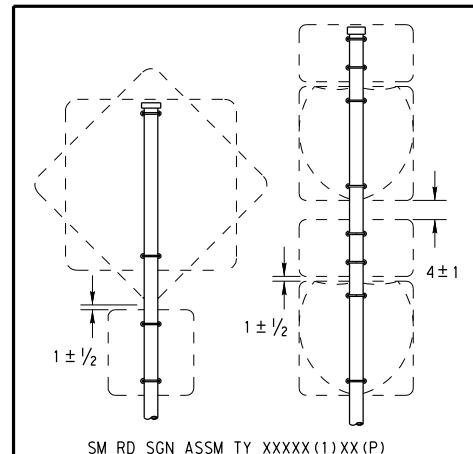
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

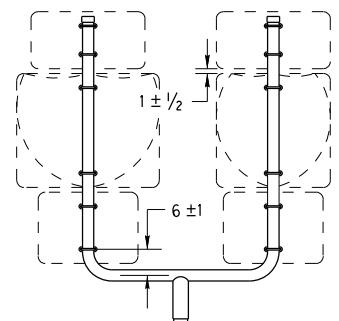
© TxDOT July 2002	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY
		3544	04	XXX	SH 211
		DIST	COUNTY		SHEET NO.
		SAT	MEDINA		85

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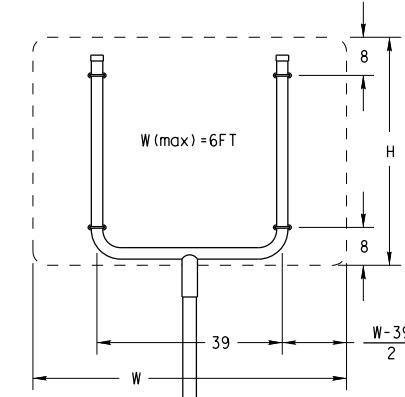
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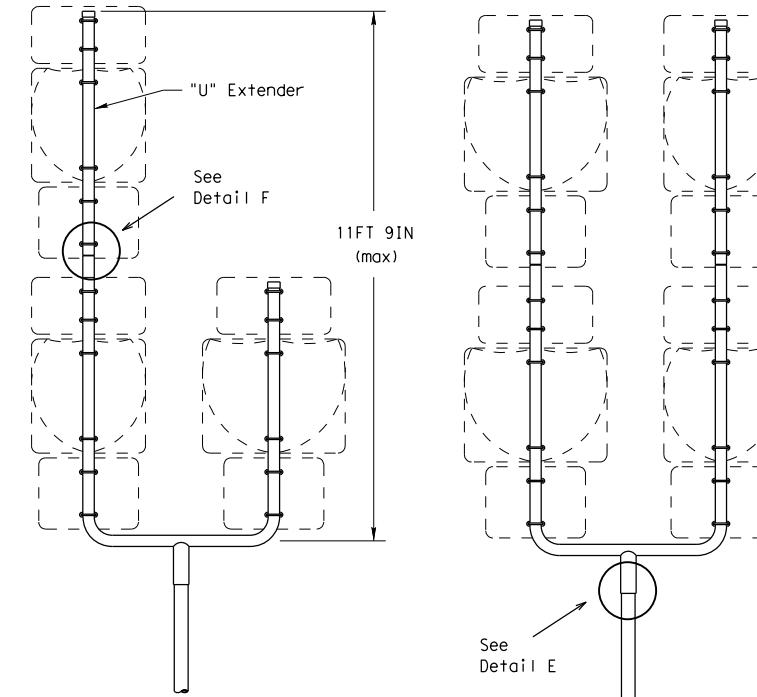
SM RD SGN ASSM TY XXXXX(1)XX(T)



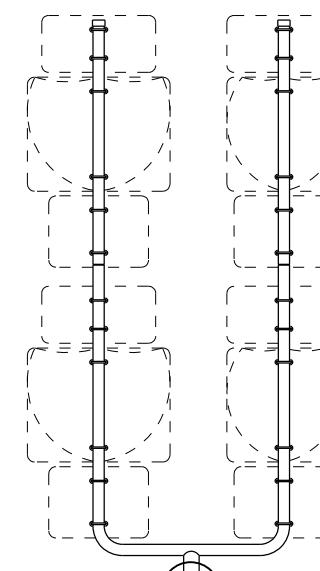
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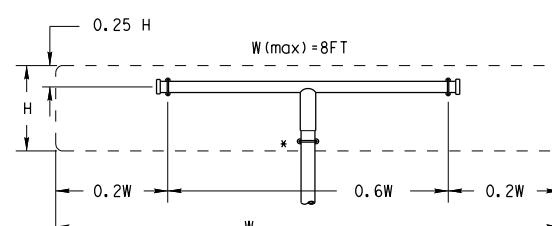
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SM RD SGN ASSM TY S80(1)XX(U-1EXT)

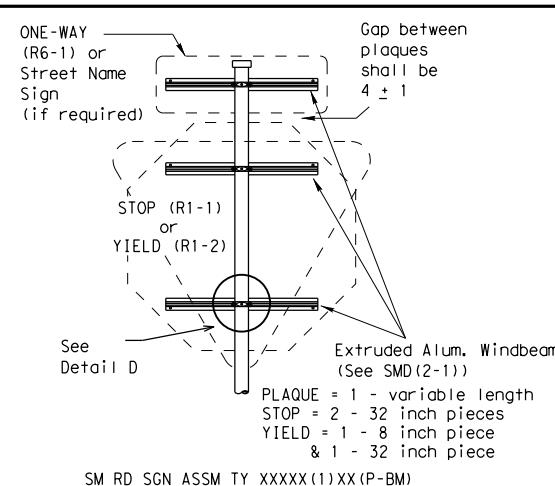


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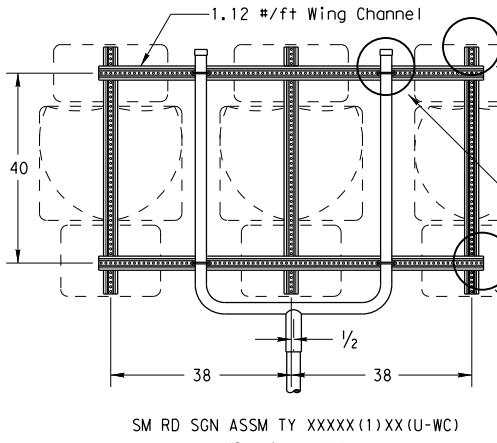


All dimensions are in English unless detailed otherwise.

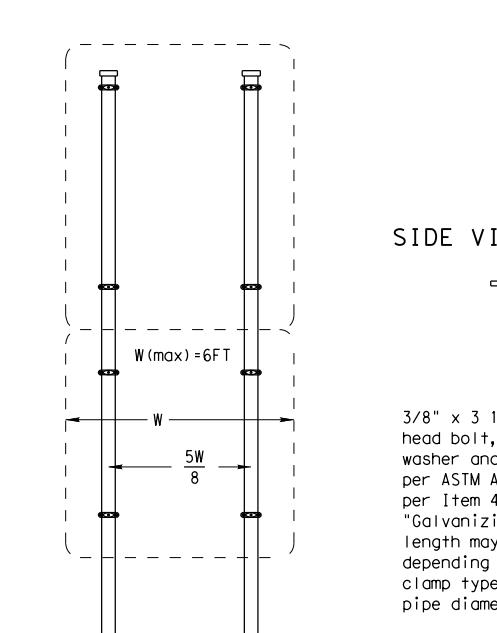
SM RD SGN ASSM TY XXXXX(1)XX(T)
(* - See Note 12)



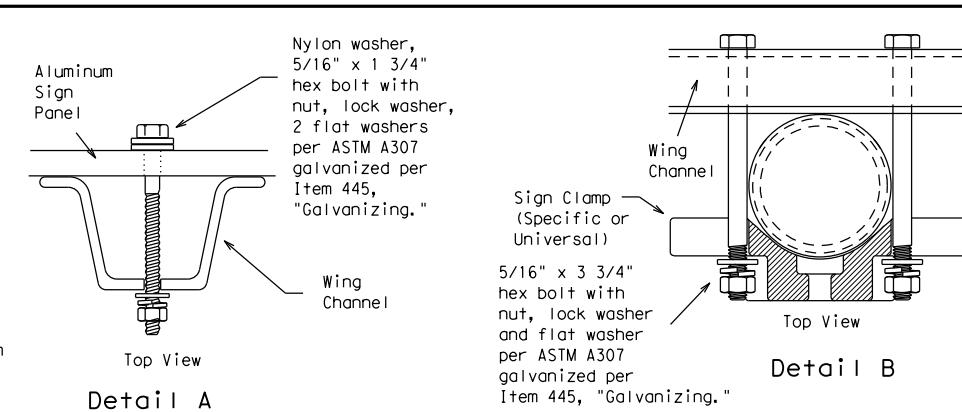
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



SM RD SGN ASSM TY XXXXX(1)XX(U-WC)
(See Note 11)

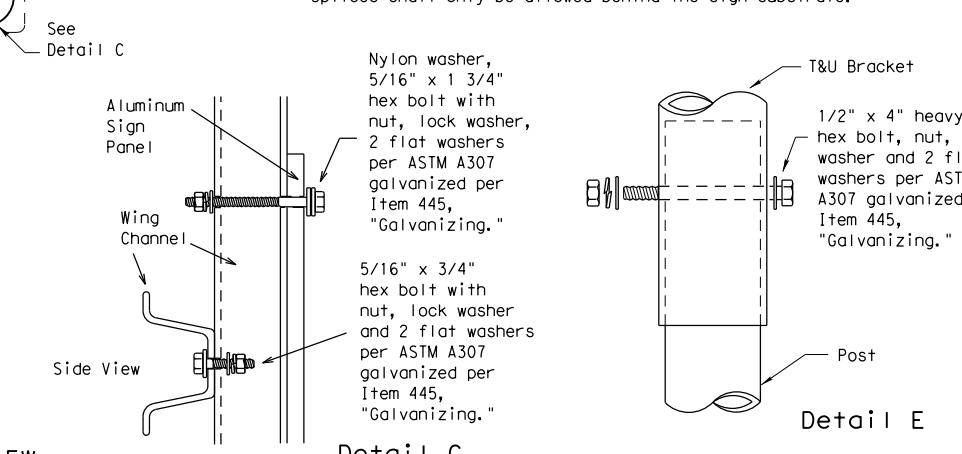
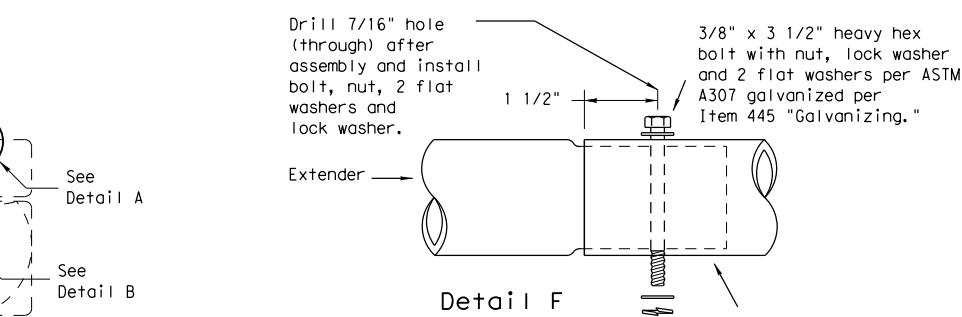


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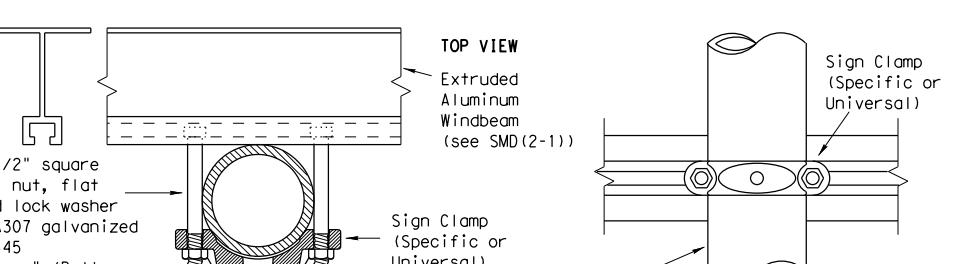


Detail A

Detail B



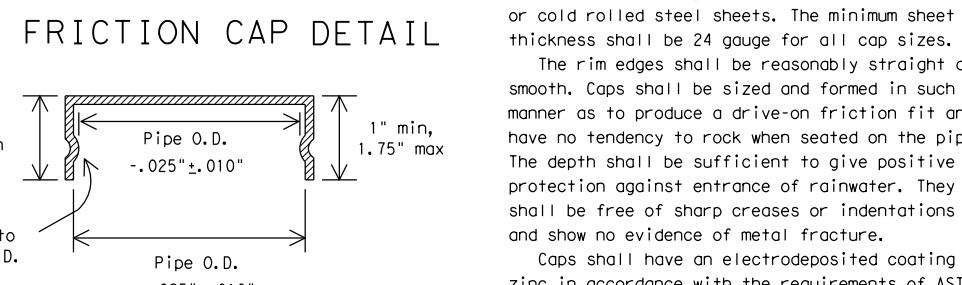
Detail C



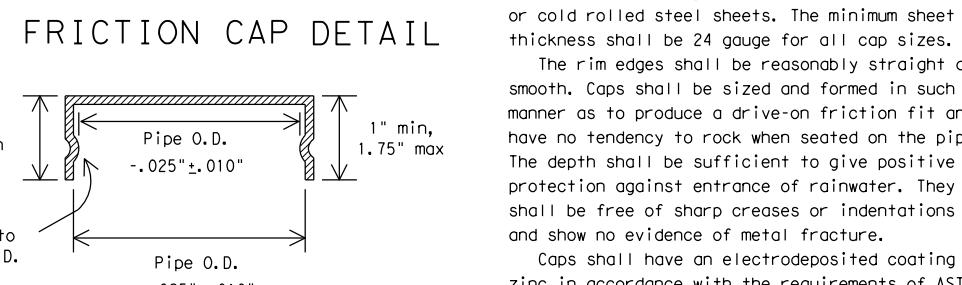
Detail E



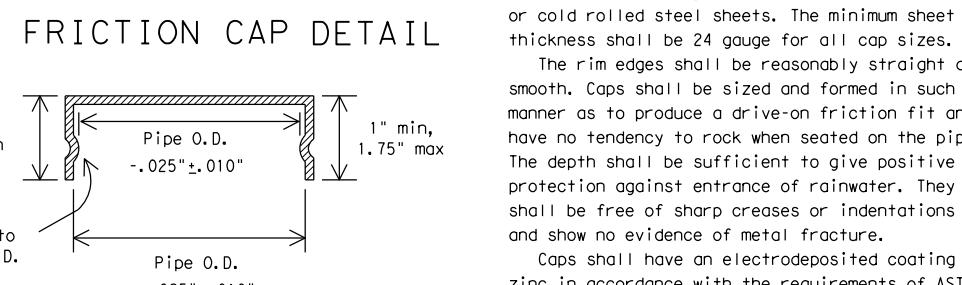
Detail F



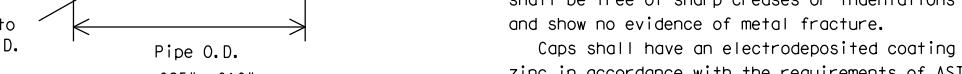
Detail G



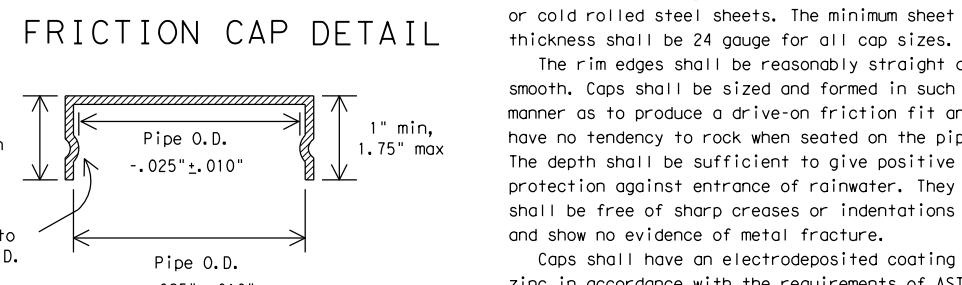
Detail H



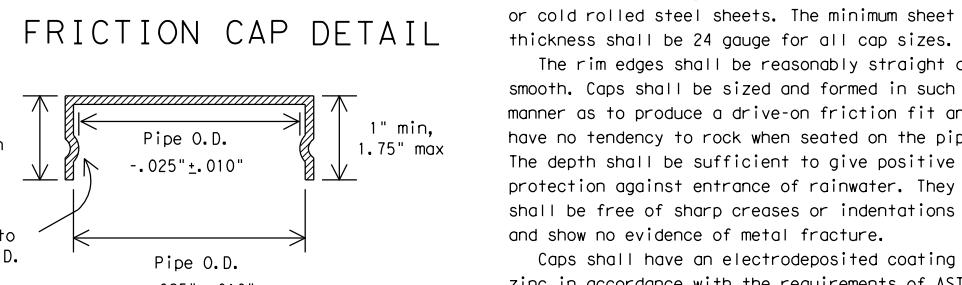
Detail I



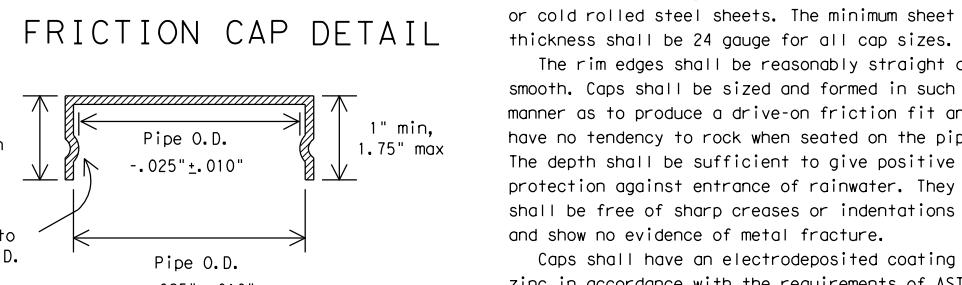
Detail J



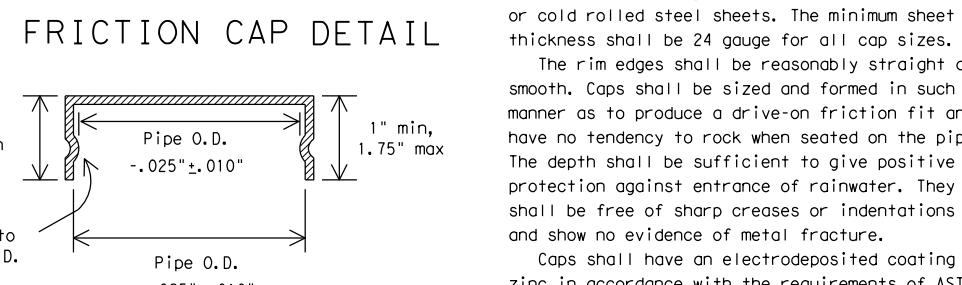
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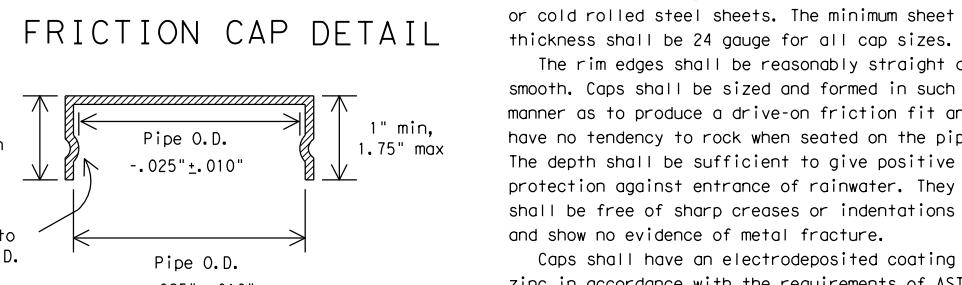
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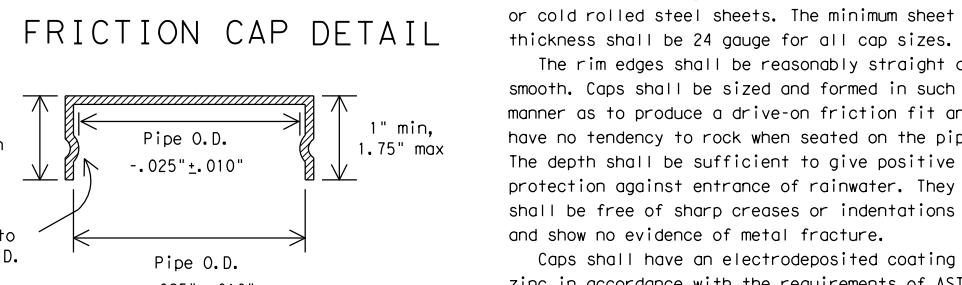
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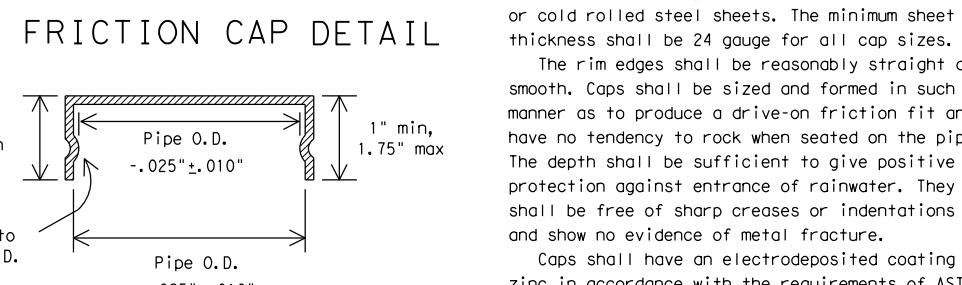
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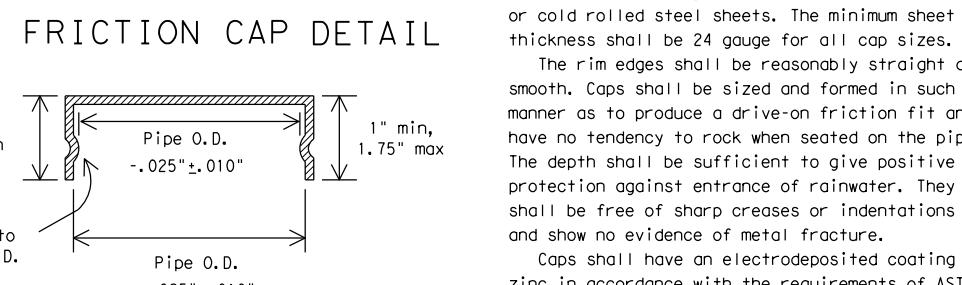
Detail O



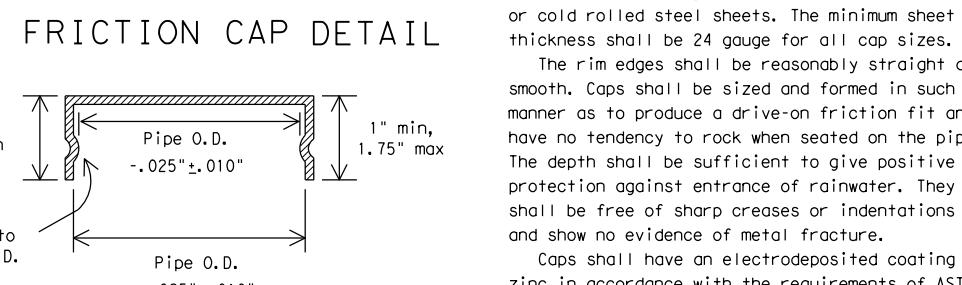
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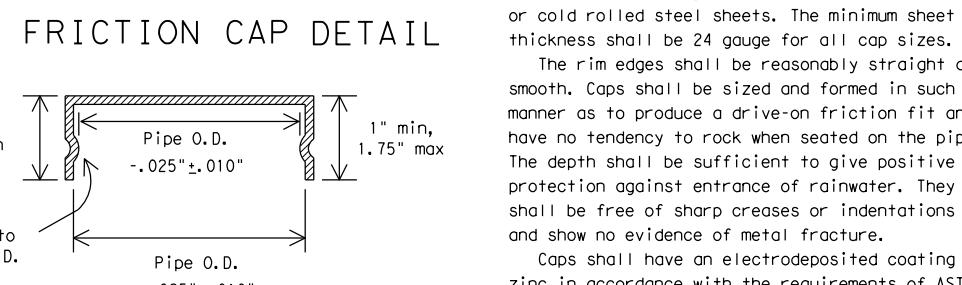
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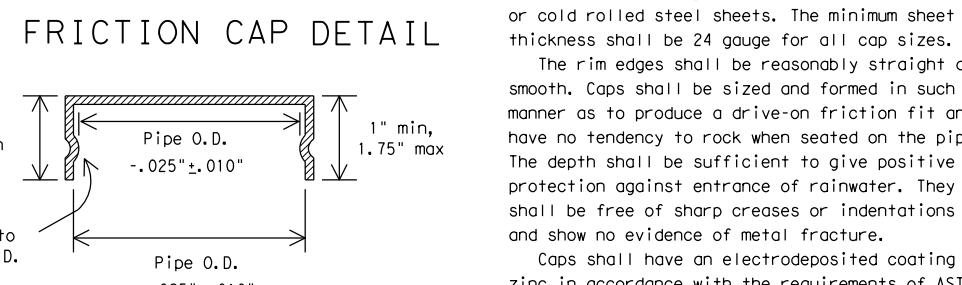
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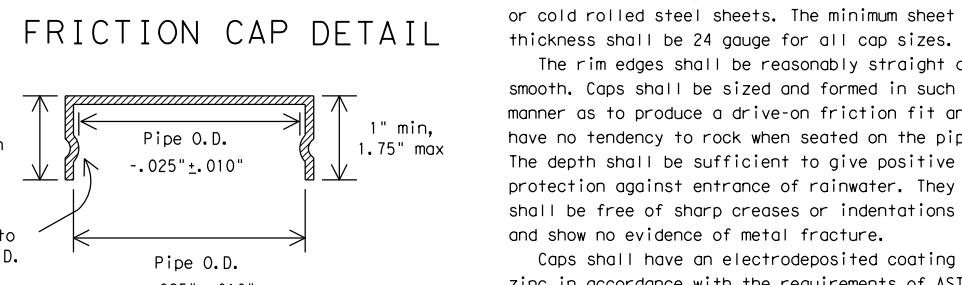
Detail S



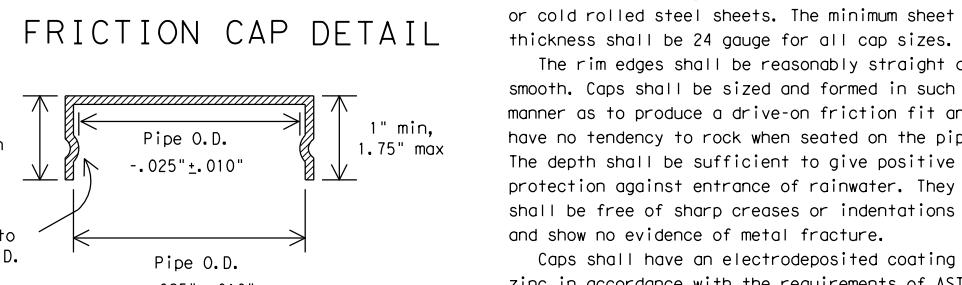
Detail T



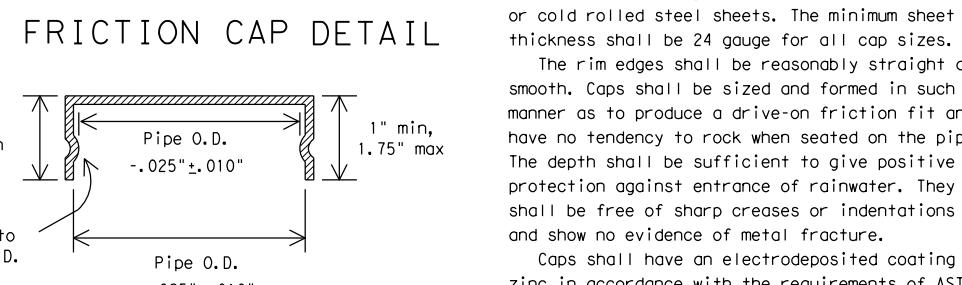
Detail U



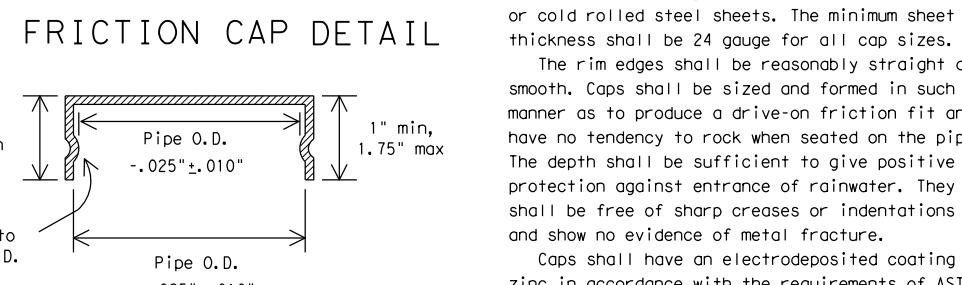
Detail V



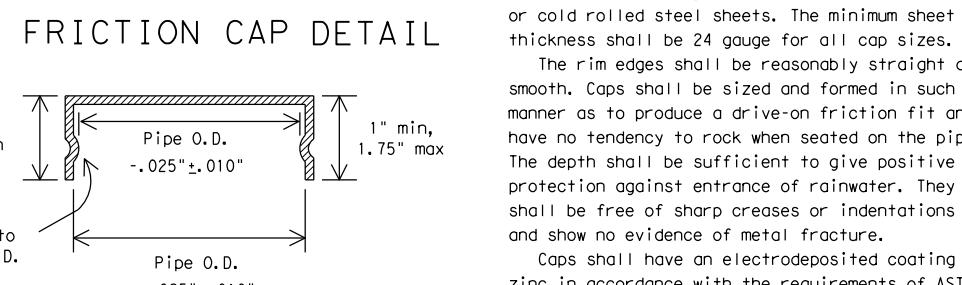
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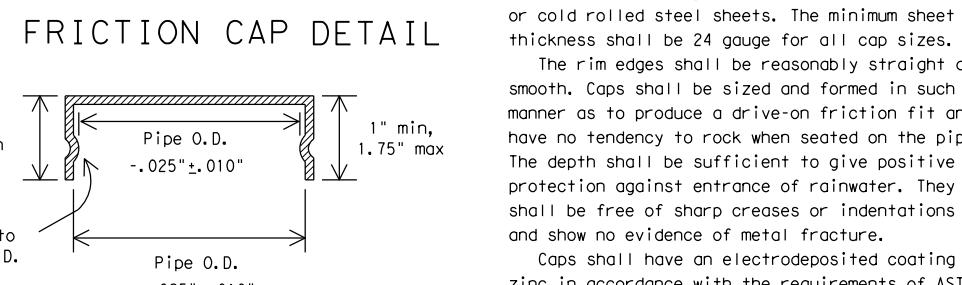
Detail X



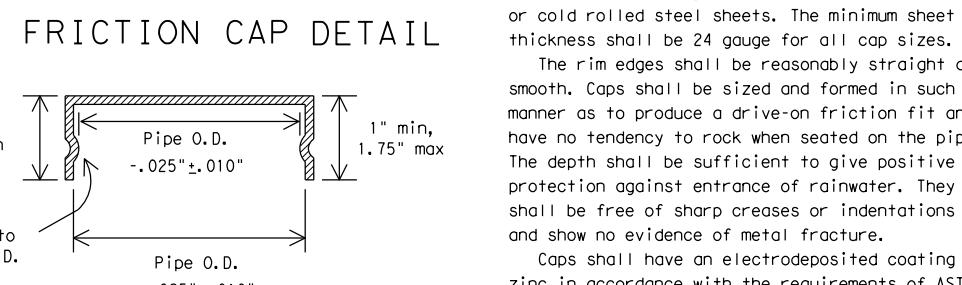
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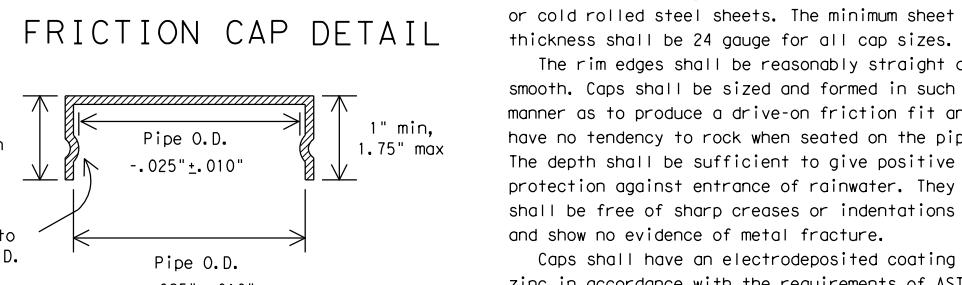
Detail Z



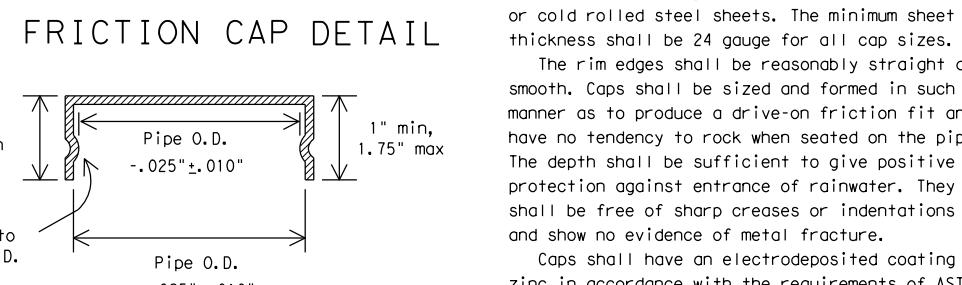
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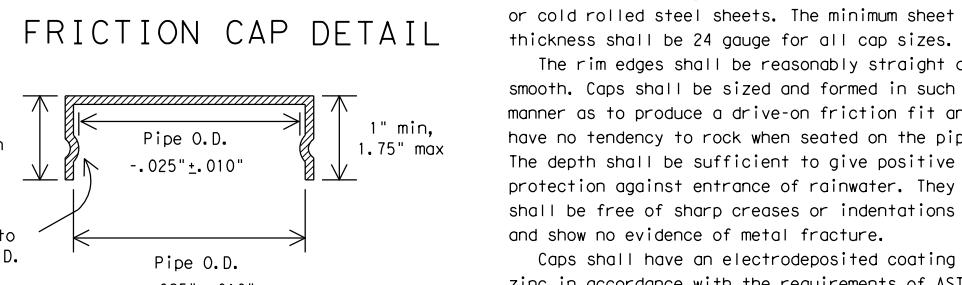
Detail BB



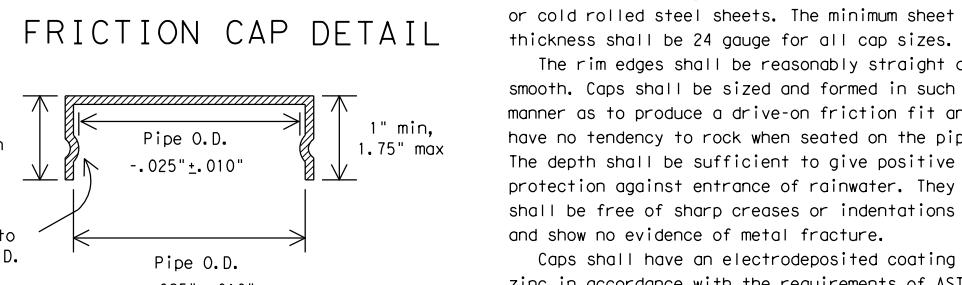
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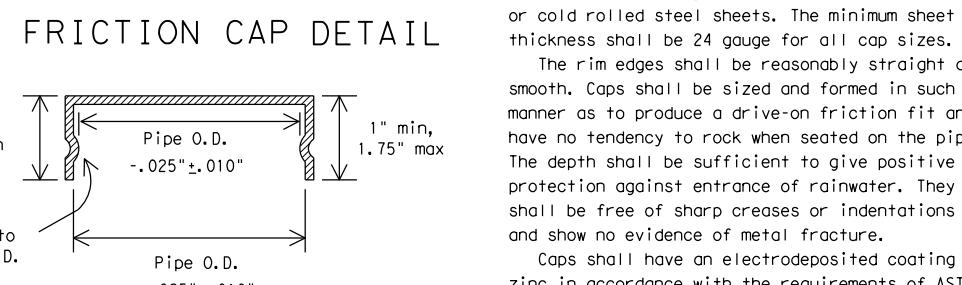
Detail DD



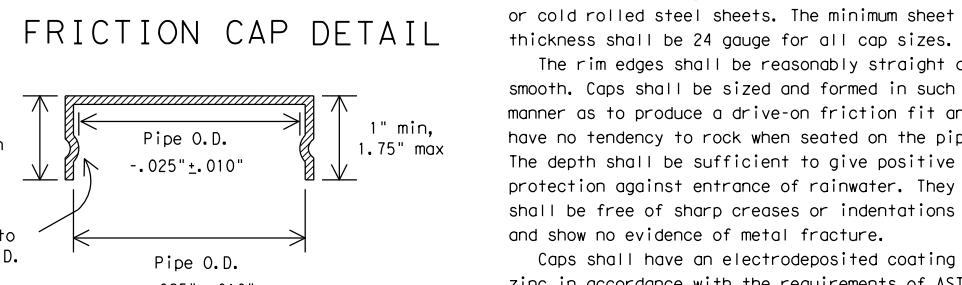
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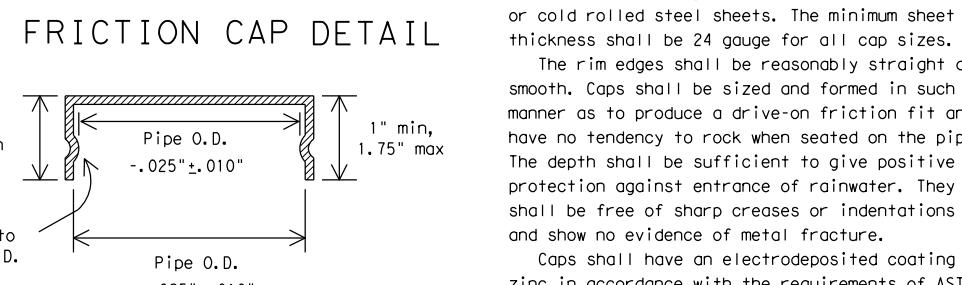
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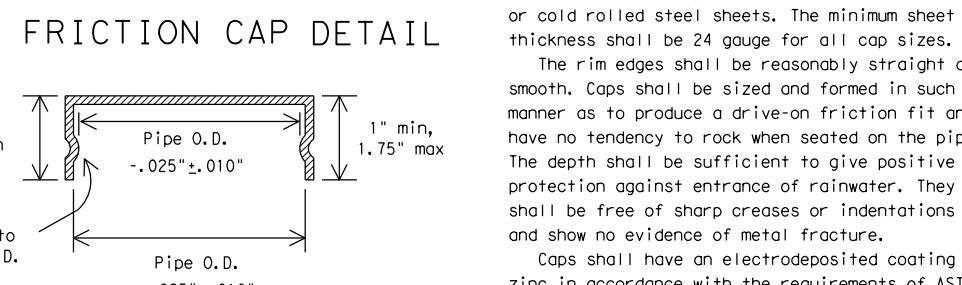
Detail GG



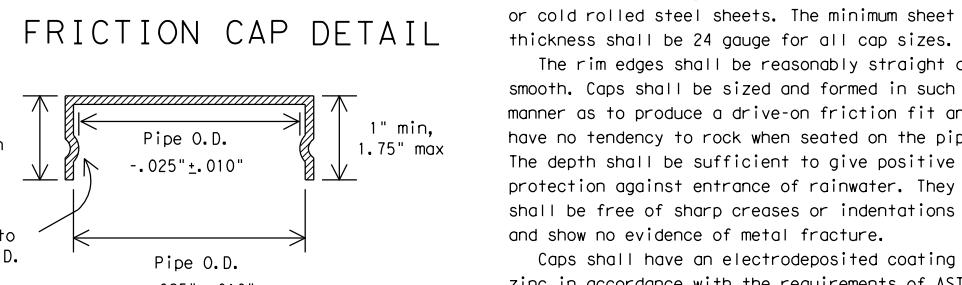
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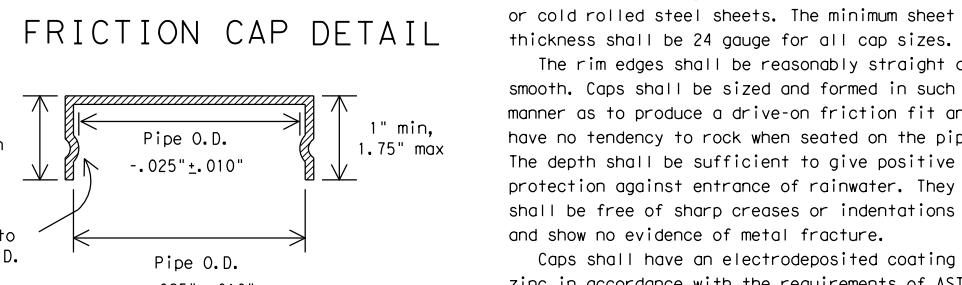
Detail II



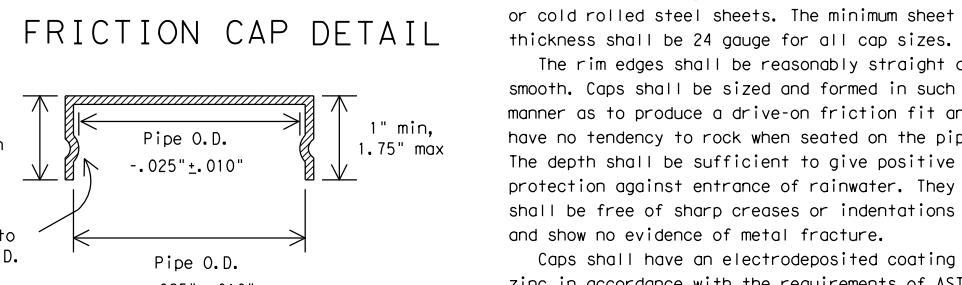
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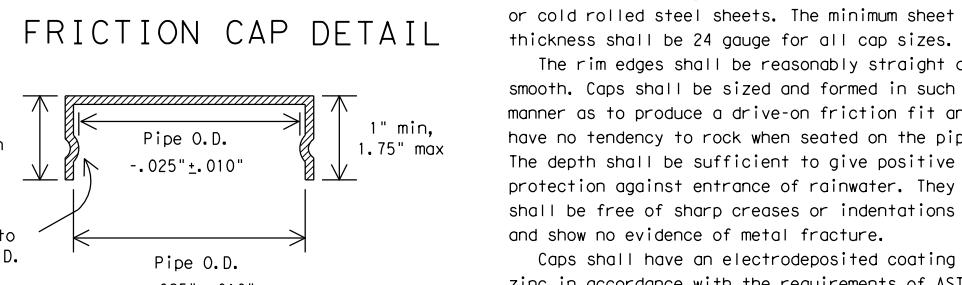
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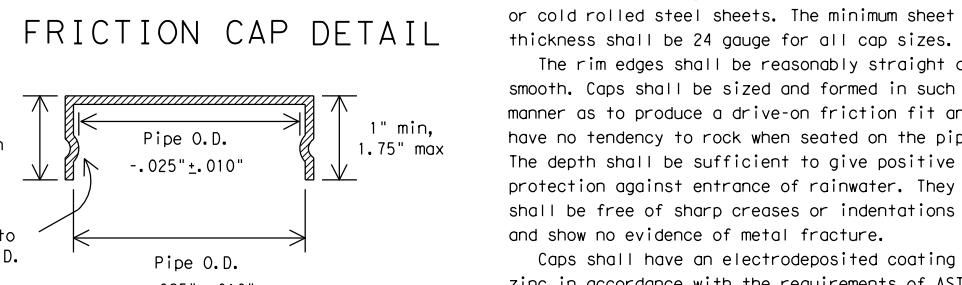
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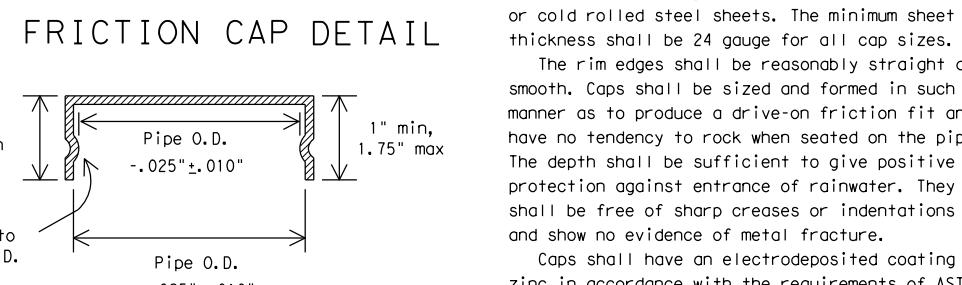
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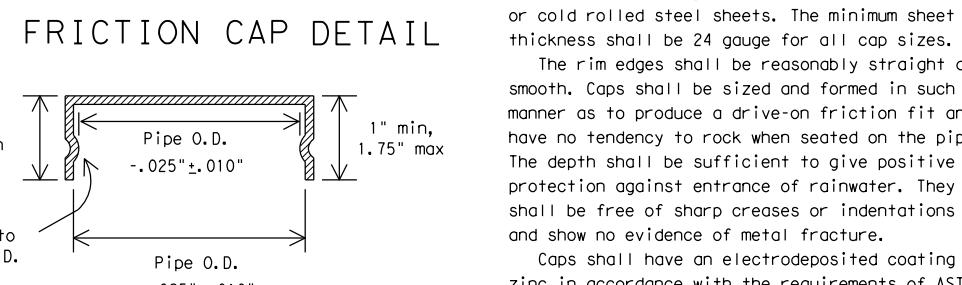
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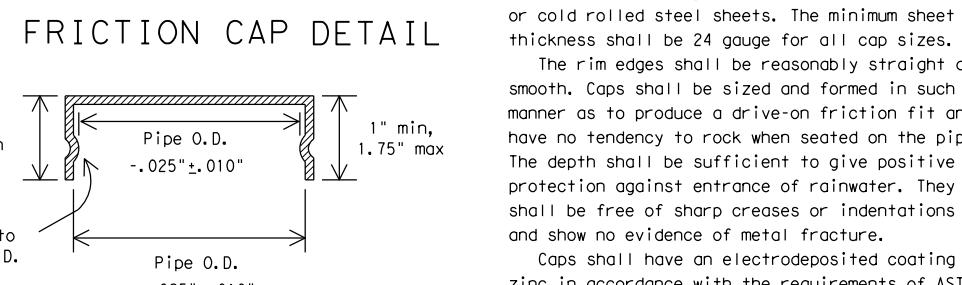
Detail OO



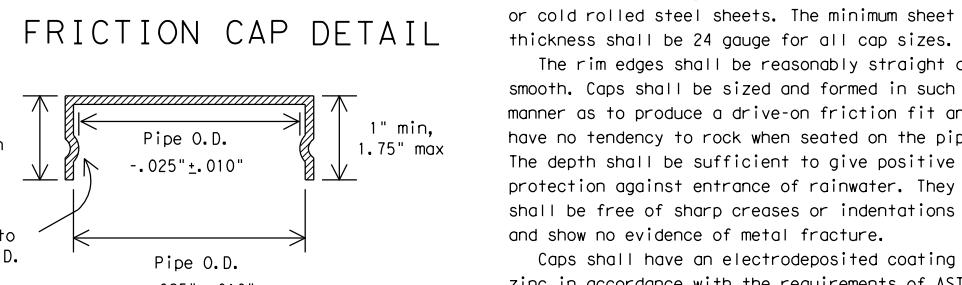
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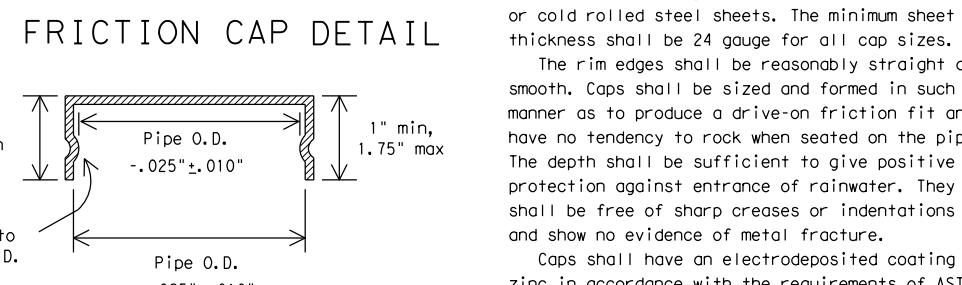
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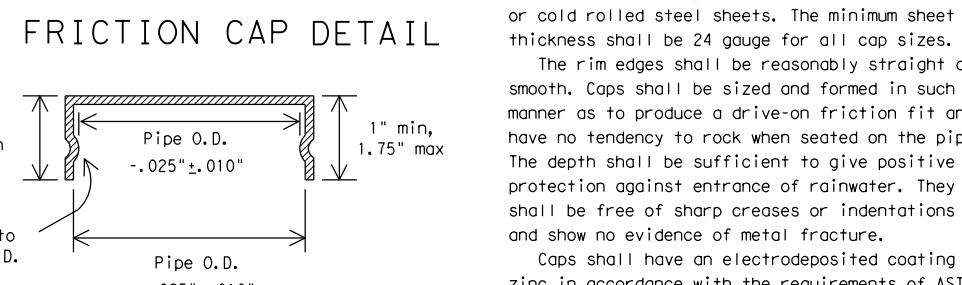
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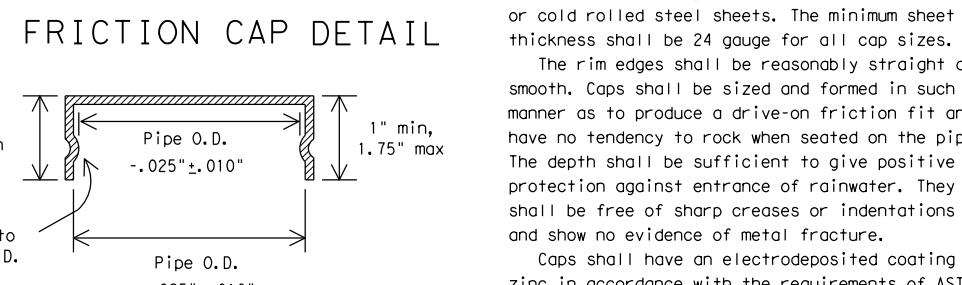
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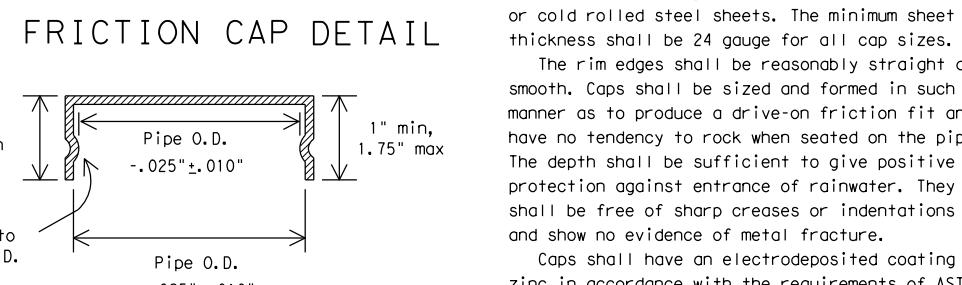
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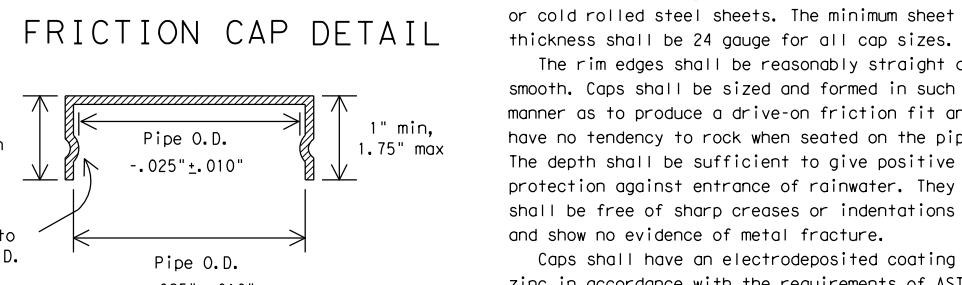
Detail UU



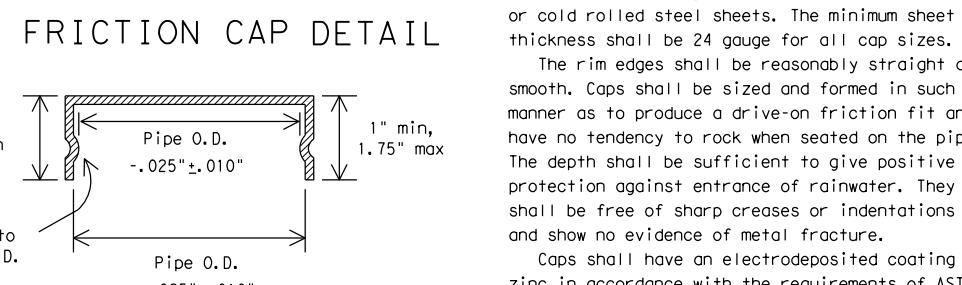
Detail VV



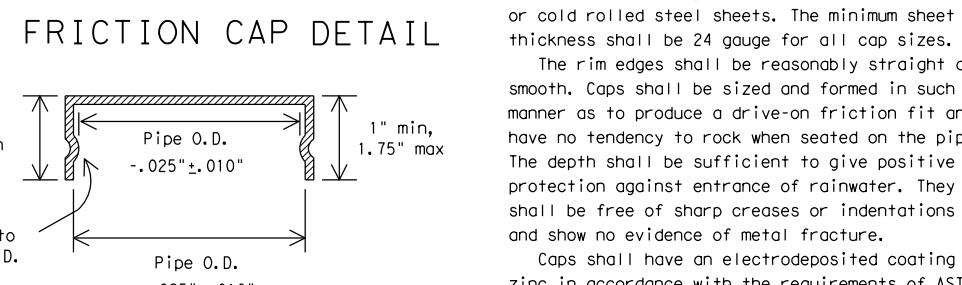
Detail WW

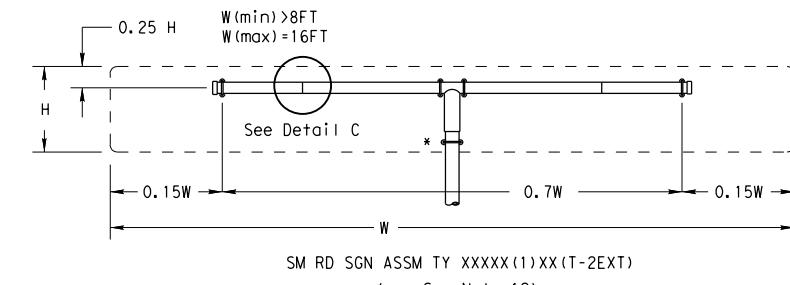


Detail XX

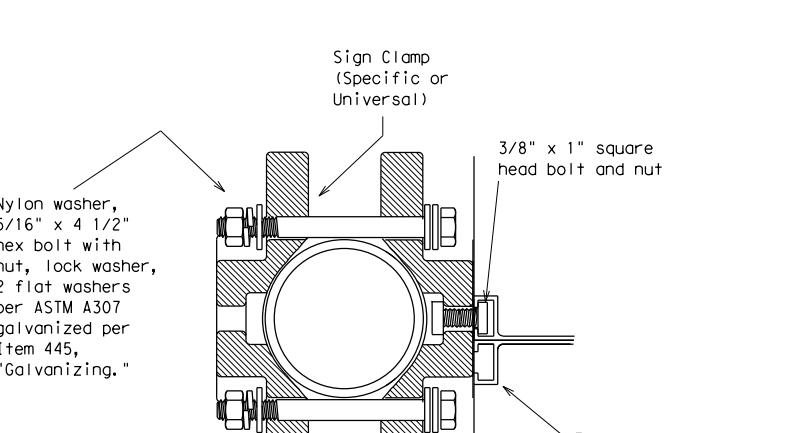
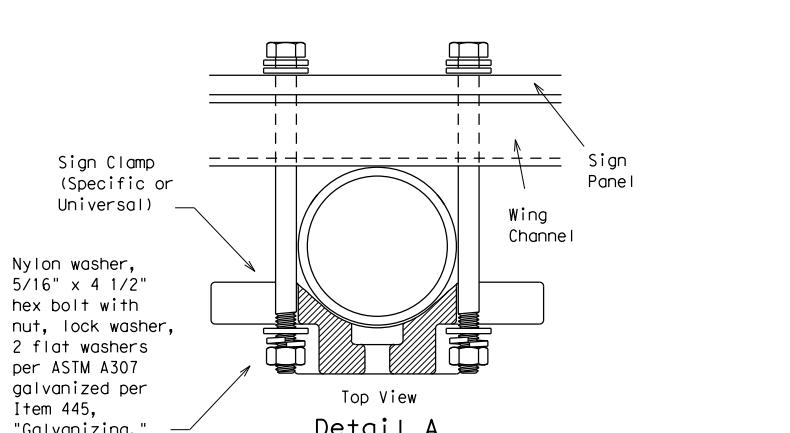
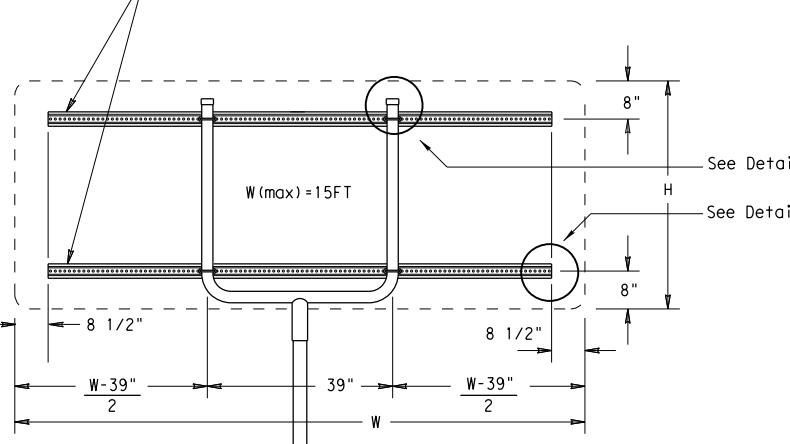


Detail YY

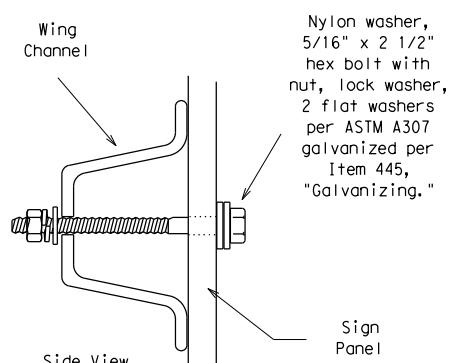




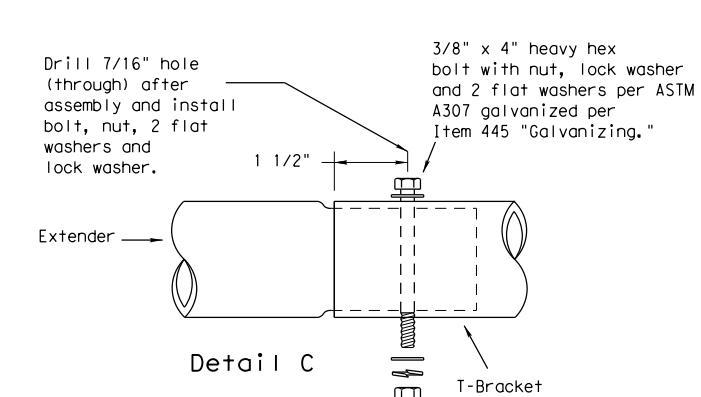
Extruded Alum. Windbeam (See Detail D on SMD (SLIP-2)) or 1.12 #/ft Wing Channel (See Detail A and Detail B)



EXTRUDED ALUMINUM SIGN WITH T BRACKET

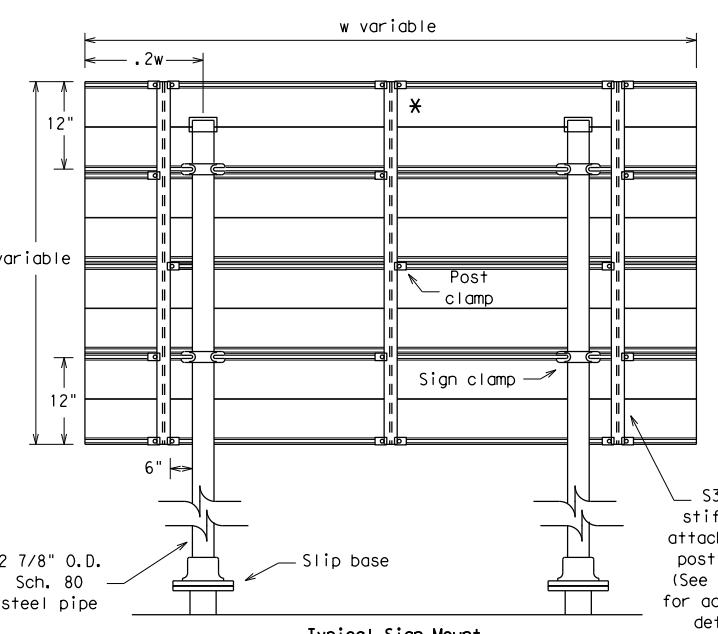


Detail B



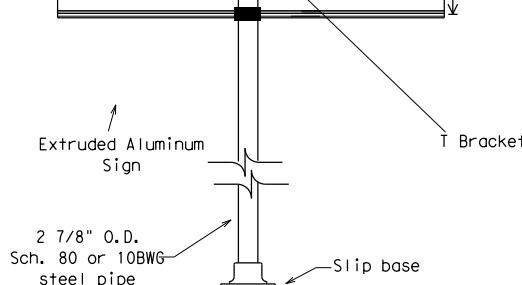
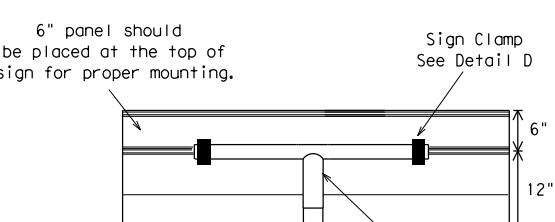
Detail C

Splices shall only be allowed behind the sign substrate.



Typical Sign Mount
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

* Additional stiffener placed at approximate center of signs when sign width is greater than 10'.



Extruded Aluminum Sign With T Bracket

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. Sign blanks shall be the sizes and shapes shown on the plans.
11. 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.
12. 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)	TY 10BWG(1)XX(T)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T)
	TY 10BWG(1)XX(P-BM)	TY 10BWG(1)XX(T)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T)
	TY 10BWG(1)XX(P-BM)	TY 10BWG(1)XX(T)
	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)
Warning	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

 Texas Department of Transportation
Traffic Operations Division

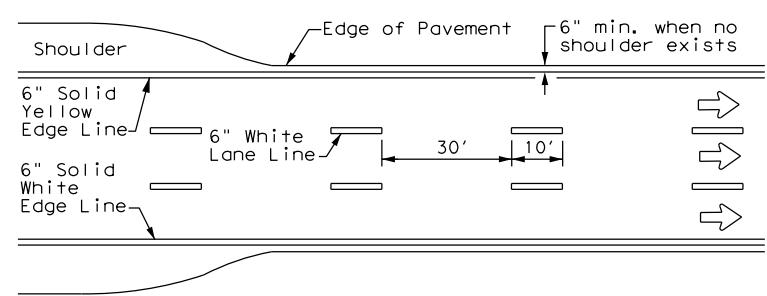
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD (SLIP-3) - 08

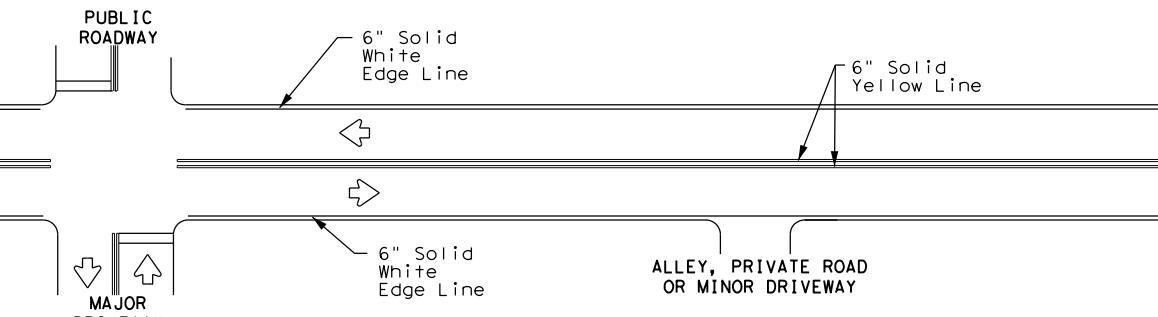
© TxDOT July 2002	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
9-08	REVISIONS	CONT	SECT	JOB
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		DIST	COUNTY	SH 211
		SAT	MEDINA	SHEET NO.
				87

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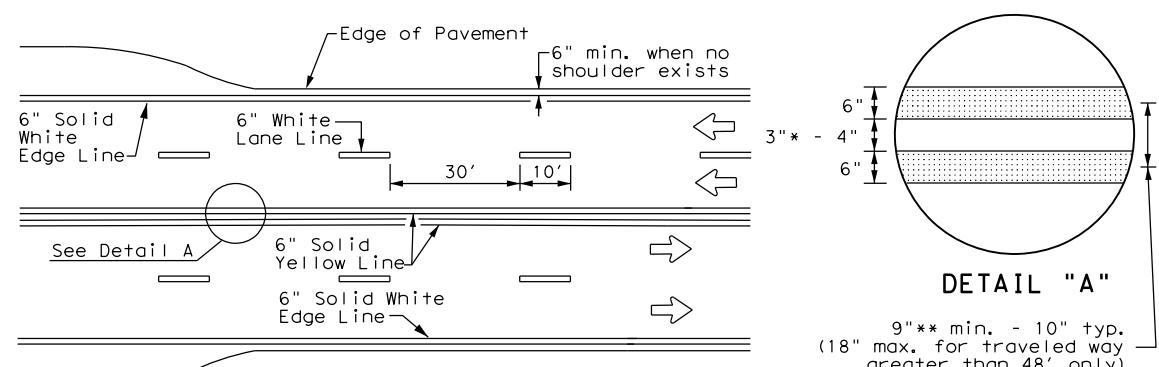
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EDGE LINE AND LANE LINES
ONE-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



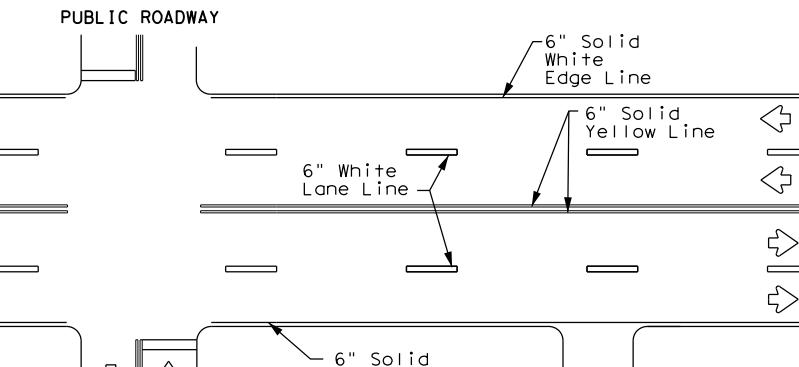
TYPICAL TWO-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS



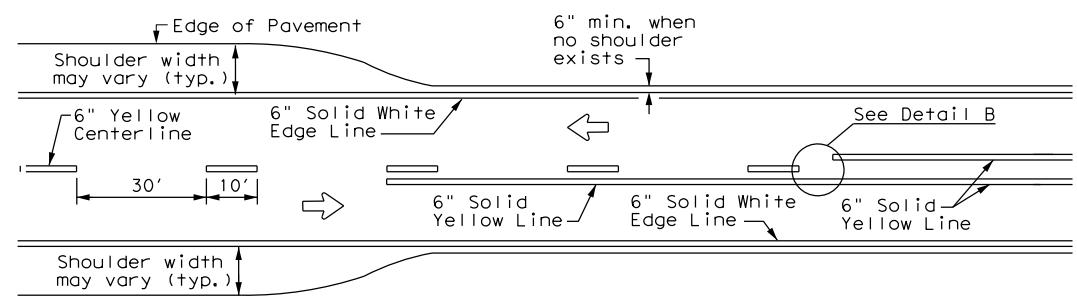
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

* 2" minimum for restripe projects when approved by the Engineer. ** 8" minimum for restripe projects when approved by the Engineer.

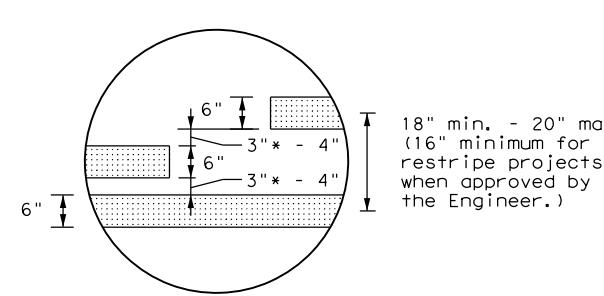
9"** min. - 10" typ.
(18" max. for traveled way greater than 48' only)



TYPICAL MULTI-LANE, TWO-WAY PAVEMENT
MARKINGS THROUGH INTERSECTIONS

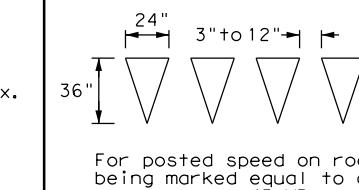


TWO LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS

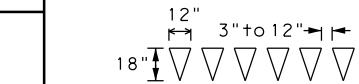


DETAIL "B"

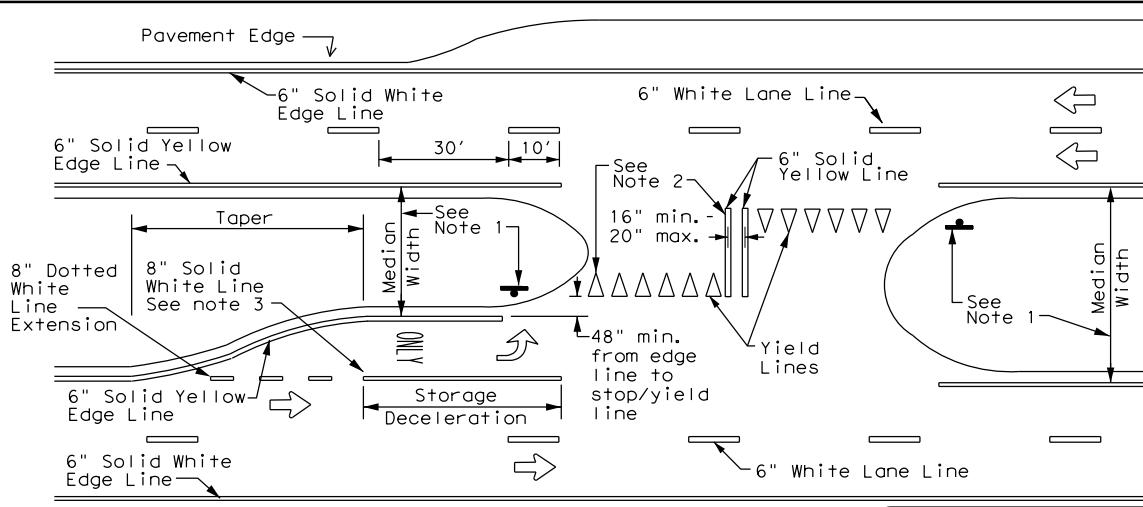
* 2" minimum for restripe projects when approved by the Engineer.



YIELD LINES



For posted speed on road being marked equal to or less than 40 MPH.



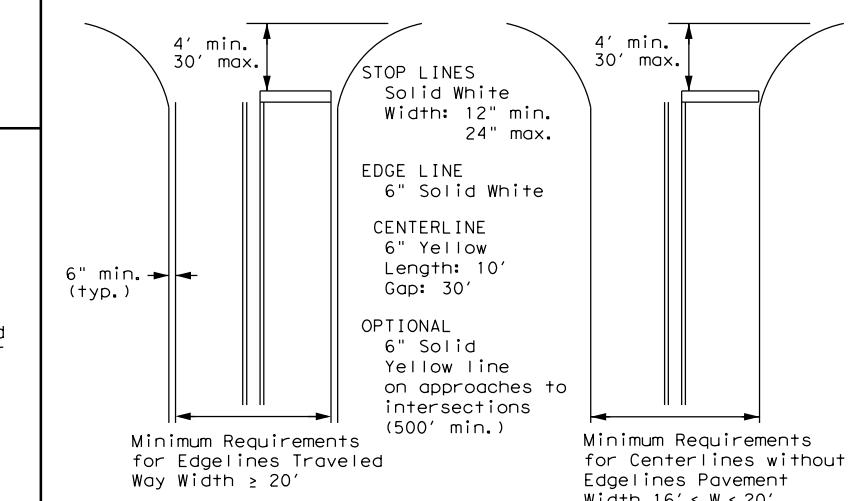
FOUR LANE DIVIDED ROADWAY CROSSOVERS

GENERAL NOTES

1. Edge line striping shall be as shown in the plans or as directed by the Engineer. The edge line should not be placed less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edge lines are not required in curb and gutter sections of roadways.
2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the center of edge line to the center of edge line of a two lane roadway.

MATERIAL SPECIFICATIONS	
PAVEMENT MARKERS (REFLECTORIZED)	DMS-4200
EPOXY AND ADHESIVES	DMS-6100
BITUMINOUS ADHESIVE FOR PAVEMENT MARKERS	DMS-6130
TRAFFIC PAINT	DMS-8200
HOT APPLIED THERMOPLASTIC	DMS-8220
PERMANENT PREFABRICATED PAVEMENT MARKINGS	DMS-8240

All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



NOTE: Traveled way is exclusive of shoulder widths. Refer to General Note 2 for additional details.

GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Roadways

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs and stop bars are optional as determined by the Engineer.
2. Install median striping (double yellow centerlines and stop lines/yield lines) when a 50' or greater median centerline can be placed. Stop lines shall only be used with stop signs. Yield lines shall only be used with yield signs.
3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.



TYPICAL STANDARD PAVEMENT MARKINGS

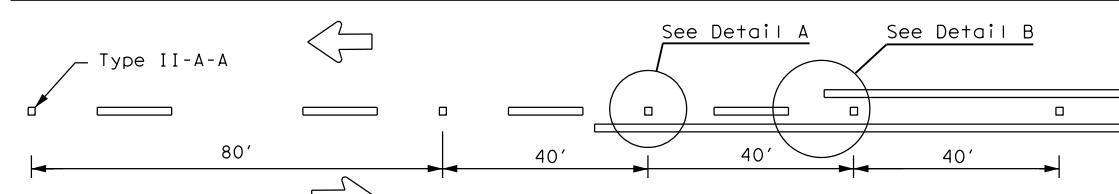
PM(1)-22

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© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
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5-00 2-12				

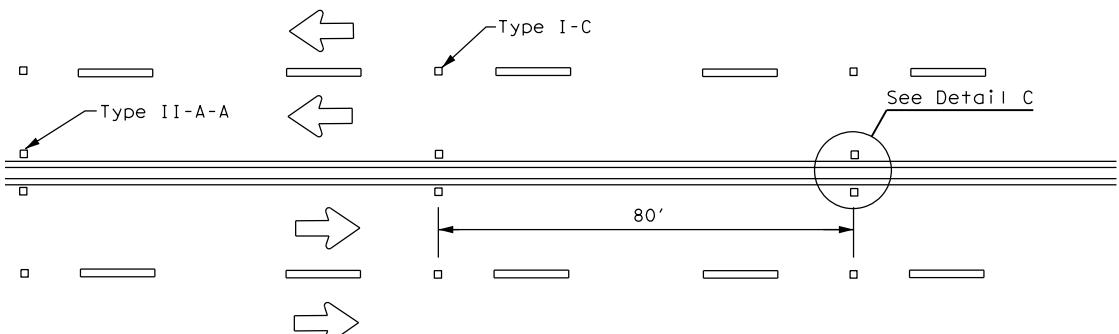
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

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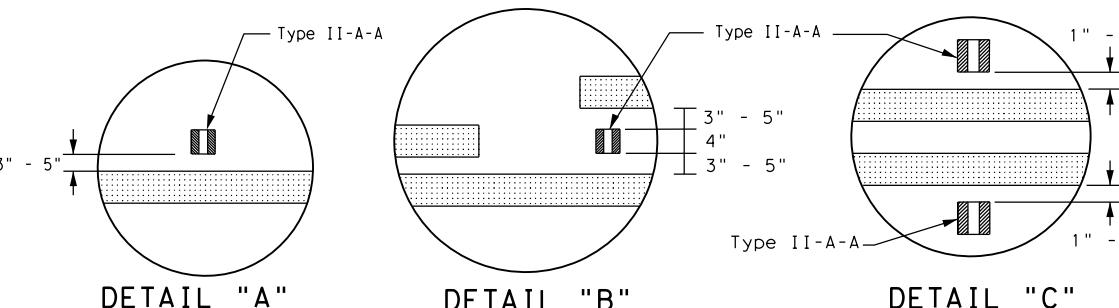
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CENTERLINE FOR ALL TWO LANE TWO-WAY ROADWAYS



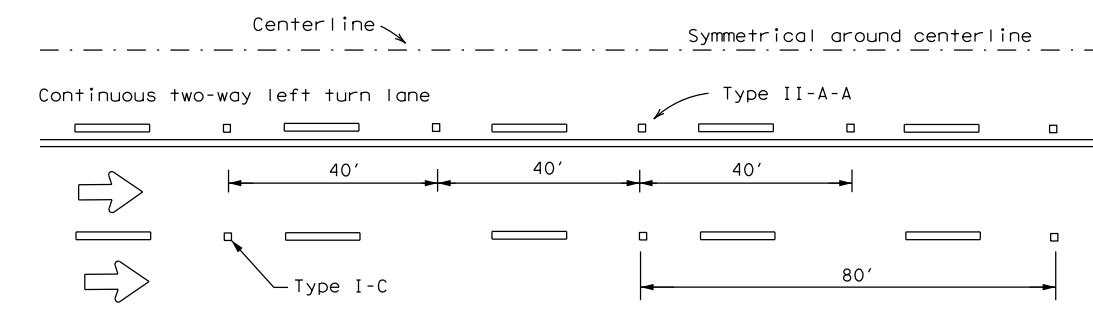
CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY ROADWAYS



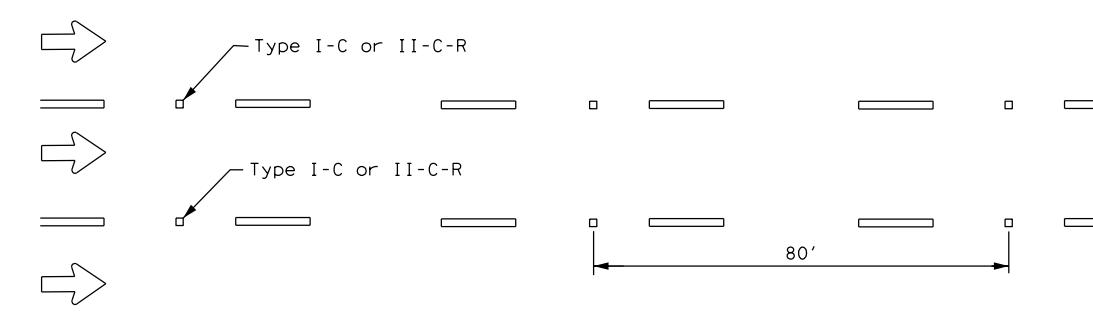
DETAIL "A"

DETAIL "B"

DETAIL "C"

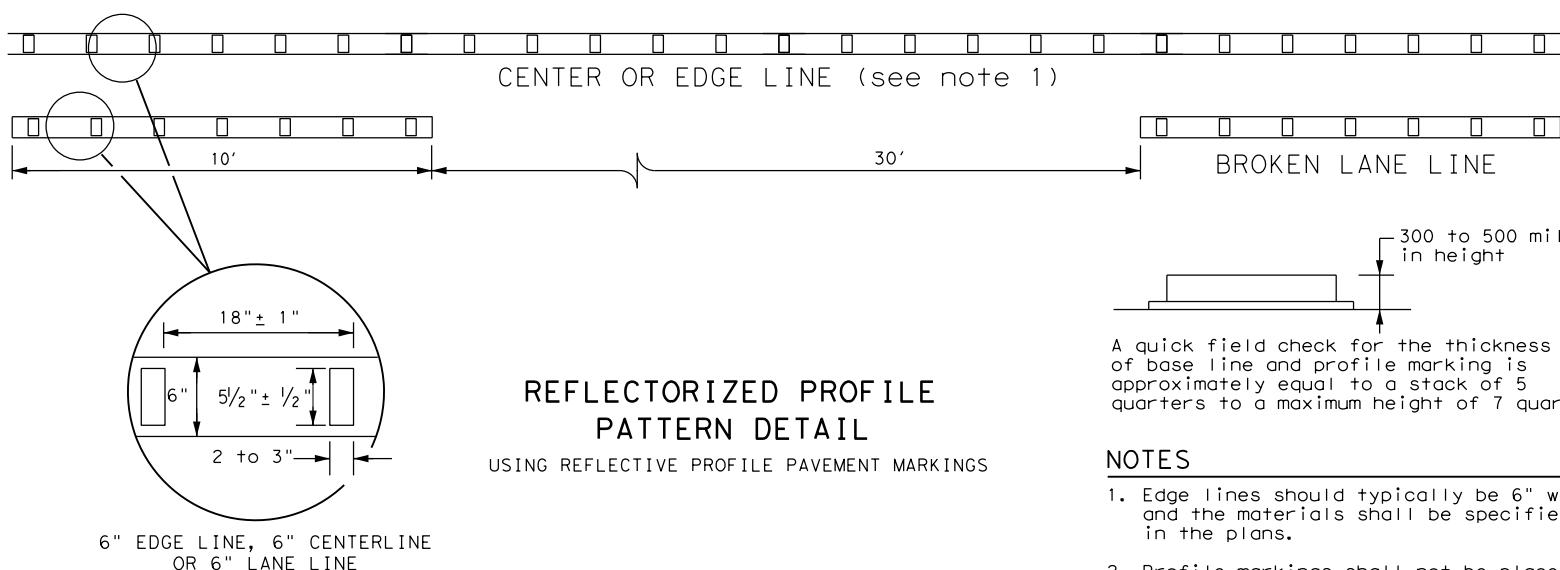


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

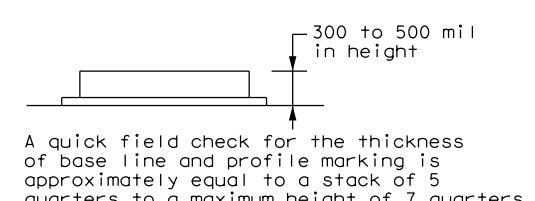
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.
See Note 3.



REFLECTORIZED PROFILE
PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

6" EDGE LINE, 6" CENTERLINE
OR 6" LANE LINE



NOTES

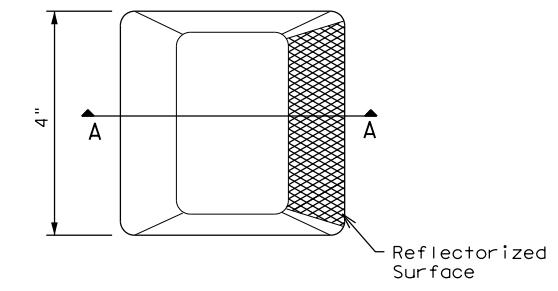
1. Edge lines should typically be 6" wide and the materials shall be specified in the plans.
2. Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

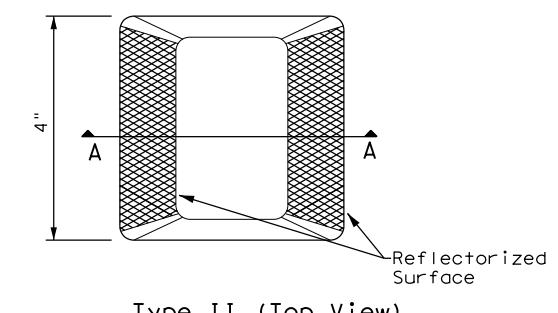
1. All raised pavement markers placed along broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements, the raised pavement markers should be placed to one side of the longitudinal joints.
3. Use raised pavement marker Type I-C with undivided roadways, flush medians, and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.

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

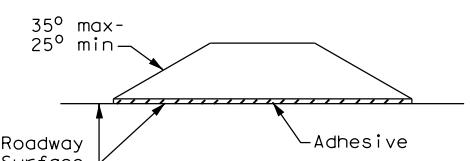
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

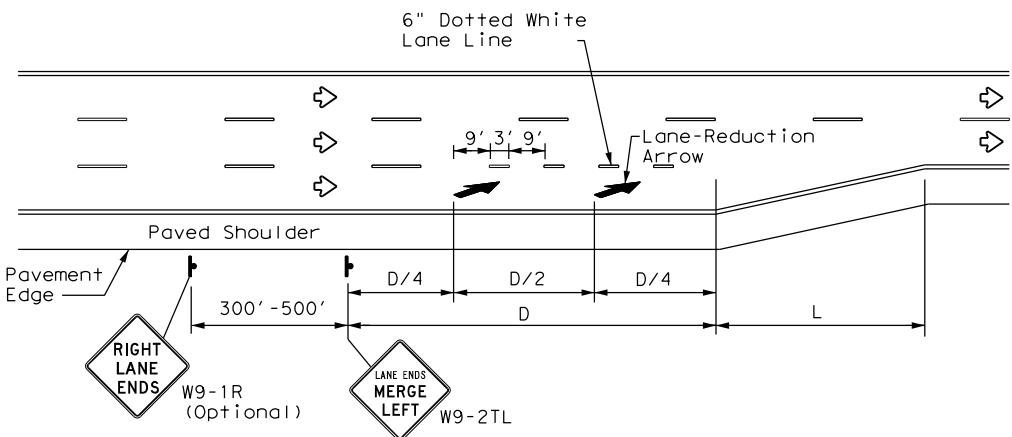


POSITION GUIDANCE USING RAISED MARKERS REFLECTORIZED PROFILE MARKINGS PM(2)-22

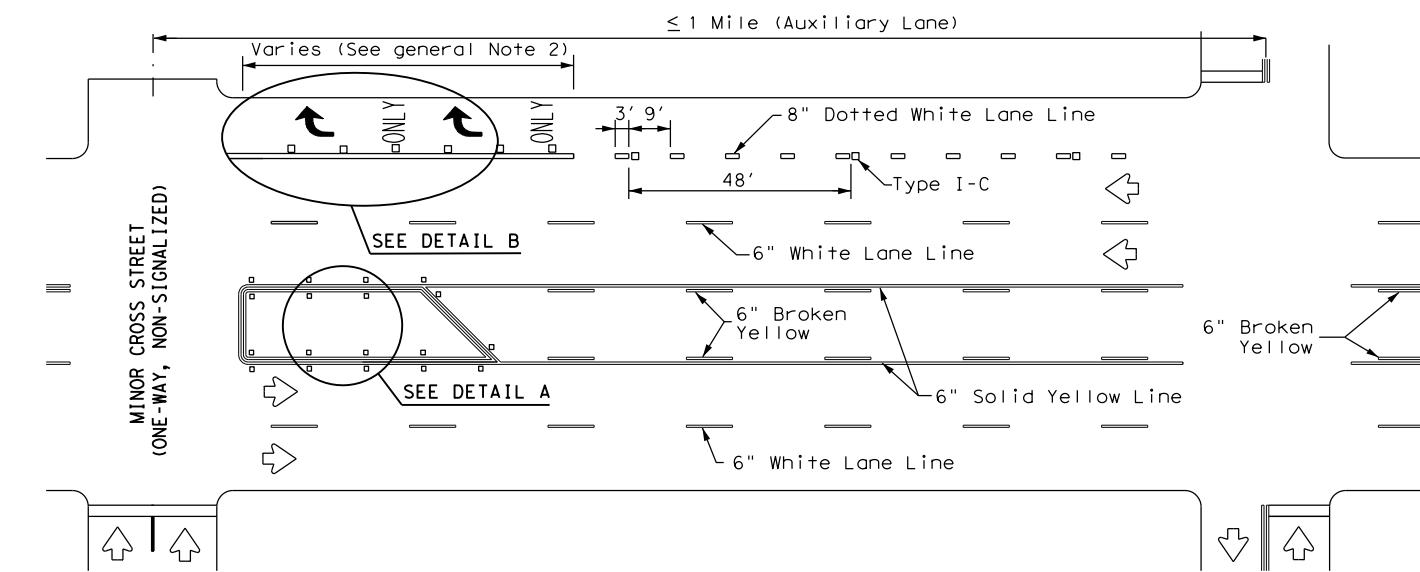
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© TxDOT December 2022	CONT	SECT	JOB	HIGHWAY
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REVISIONS				
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5-00 2-12	SAT	MEDINA		89

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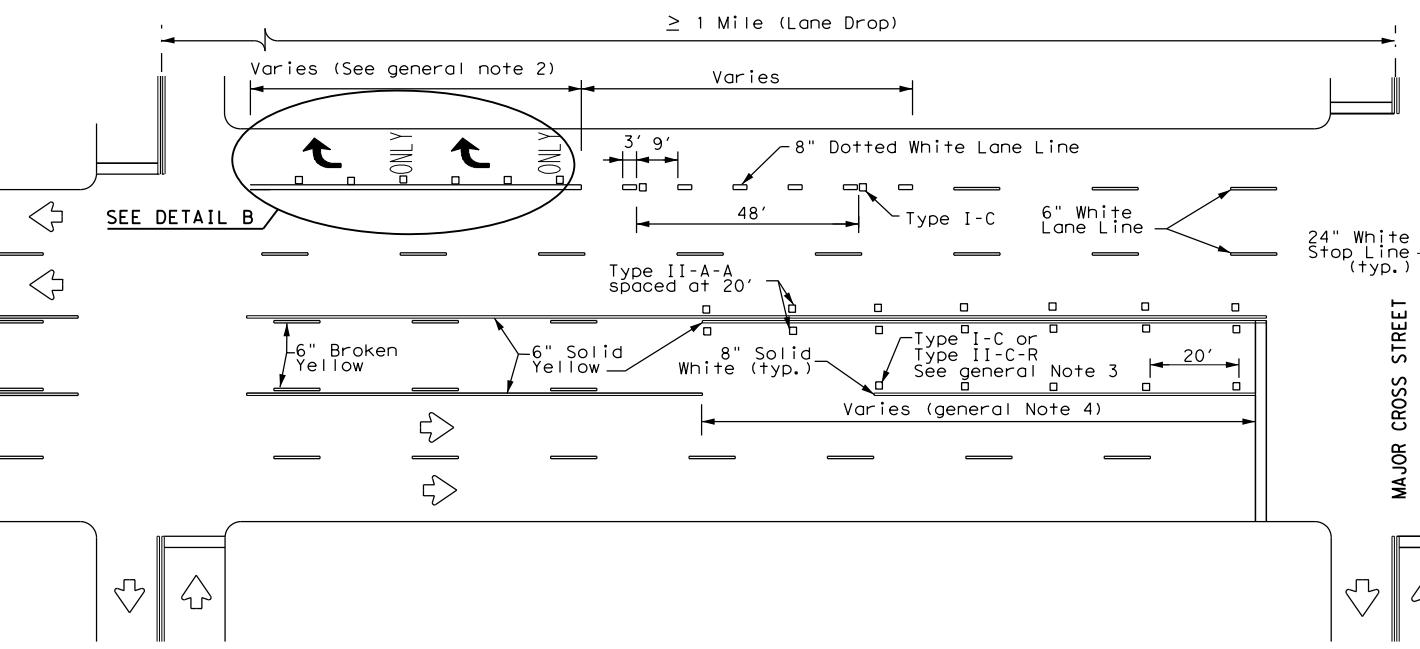
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LANE REDUCTION



TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



TYPICAL TWLTL AT TWO-WAY CROSS STREET AND RIGHT TURN LANE DROP

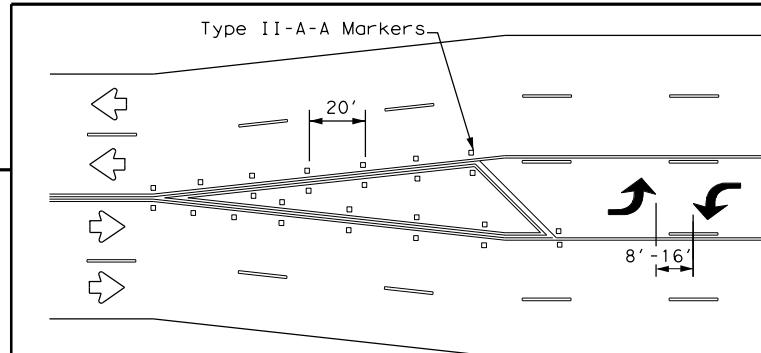
NOTES

1. Lane reduction pavement markings are used where the number of through lanes is reduced because of narrowing of the roadway or because of a section of on-street parking in what would otherwise be a through lane. For Texas Super 2 Passing Lanes, see TS2(PL) standard sheets.
2. On divided highways, an additional RIGHT LANE ENDS (W9-1R) sign may be installed in the median aligned with the W9-1R sign on the right side of the highway.
3. Lane reduction arrows are required for speeds of 45 mph or greater. An optional third lane reduction arrow may be added based on engineering judgement. If used, the optional third lane reduction arrow should be centered between the first and last lane reduction arrows.
4. For lane reductions on Freeways and Expressways, signing shall conform to the TxDOT Freeway Signing Handbook.

ADVANCED WARNING SIGN DISTANCE (D)		
Posted Speed	D (ft)	L (ft)
30 MPH	460	$L = \frac{WS^2}{60}$
35 MPH	565	
40 MPH	670	
45 MPH	775	
50 MPH	885	
55 MPH	990	
60 MPH	1,100	
65 MPH	1,200	
70 MPH	1,250	
75 MPH	1,350	

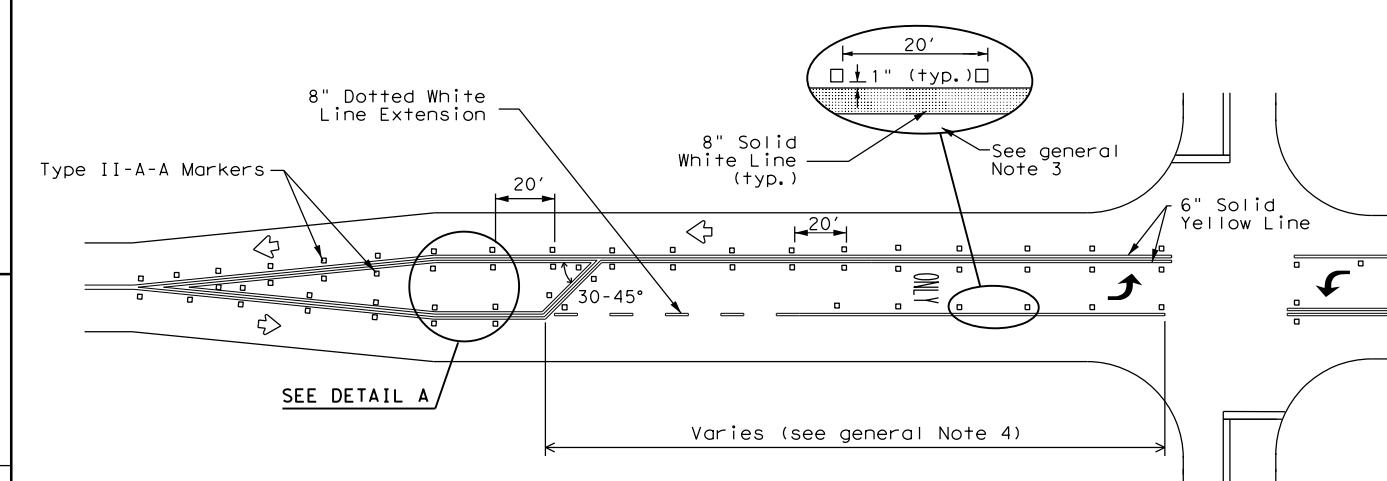
GENERAL NOTES

1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows are as shown in the Standard Highway Sign Designs for Texas.
2. When lane-use words and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
3. Use raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Use raised pavement marker Type II-C-R with divided highways and raised medians.
4. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer. See Chapter 3 of the Roadway Design Manual for additional information on turning lanes or storage lengths.

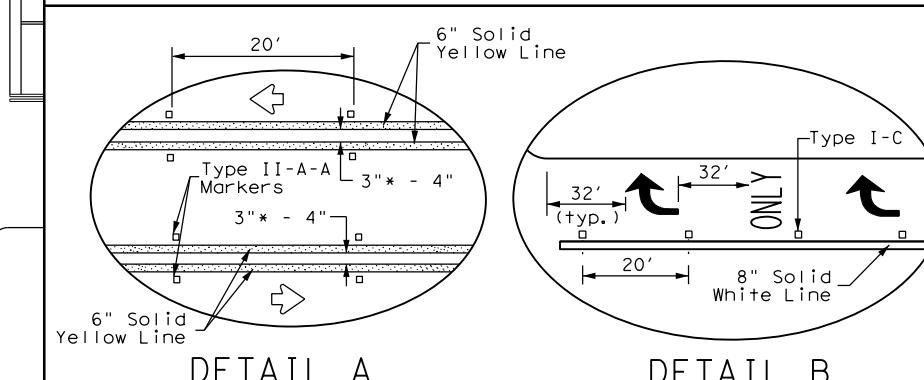


A two-way left-turn (TWLTL) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

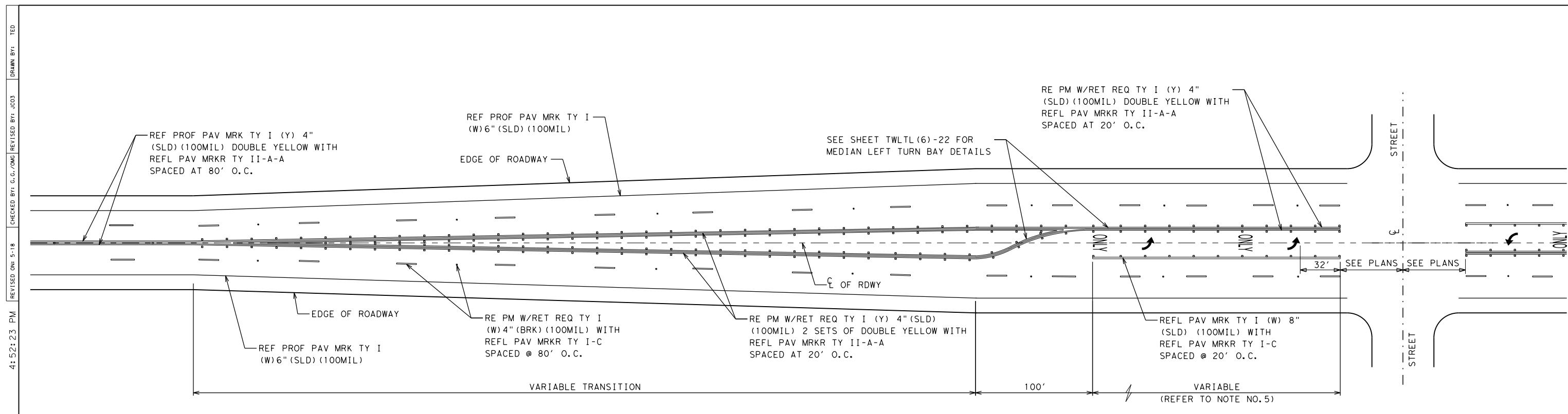


TYPICAL TWO-LANE ROADWAY INTERSECTION WITH LEFT TURN BAYS



* 2" minimum allowed for restripe projects when approved by the Engineer.

 Texas Department of Transportation		Traffic Safety Division Standard			
				FILE: pm3-22.dgn	DN:
© TxDOT December 2022		CONT	SECT	JOB	HIGHWAY
		3544	04	XXX	SH 211
		DIST	COUNTY		SHEET NO.
		SAT	MEDINA		90



TYPICAL MEDIAN LEFT TURN BAY (FOR USE ON RURAL ROADS)

SIGNALIZED AND NON-SIGNALIZED CROSS STREETS
WITH LEFT TURN BAY

5/29/2025
REFL PAV MRK TY I (Y)
(MED NOSE) (100MIL) WITH
REFL PAV MRKR TY II-A-A
SPACED @ 2' O.C.

RE PM W/RET REQ TY I (Y) 4" (SLD)
(100MIL) 2 SETS OF DOUBLE YELLOW WITH
REFL PAV MRKR TY II-A-A
SPACED AT 20' O.C.

REF PROF PAV MRK TY I (W) 6" (SLD) (100MIL)

REF PROF PAV MRK TY I (Y) 4"
(SLD) (100MIL) DOUBLE YELLOW WITH
REFL PAV MRKR TY II-A-A
SPACED AT 80' O.C.

RE PM W/RET REQ TY I
(W) 4" (BRK) (100MIL) WITH
REFL PAV MRKR TY I-C
SPACED @ 80' O.C.

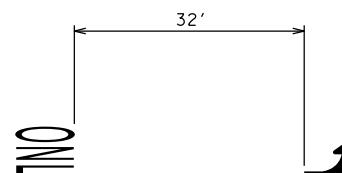
EDGE OF ROADWAY
REF PROF PAV MRK TY I (W) 6" (SLD) (100MIL)

VARIABLE TRANSITION

NOTES:

1. PAVEMENT MARKERS SHOULD BE IN ACCORDANCE WITH STATE STANDARDS PM(2)-20 (POSITIONING GUIDANCE).
2. PAVEMENT MARKING ARROWS SHALL COMPLY TO TEXAS MUTCD
3. LEFT TURN BAY LAYOUT, TWO SETS OF "WORDS" AND "ARROWS" SHALL BE USED IF THE LENGTH OF THE BAY IS EQUAL TO OR GREATER THAN 180 FEET. THE BOTTOM OF THE FIRST "ONLY" SHALL BE PLACED AT THE BEGINNING OF THE TURN BAY LANE LINE AS SHOWN ABOVE.
4. REFER TO TXDOT STANDARD PM(3)-20 FOR MORE TURN LANE DETAILS.
5. REFER TO TXDOT ROADWAY DESIGN MANUAL FOR DECELERATION AND STORAGE LENGTH.

TYPICAL TRANSITION
LEFT TURN BAY END CONDITION AND ROADWAY TRANSITION



LEGEND

TYPICAL DETAIL
(PLACE LEGENDS IN ACCORDANCE TO STATE STANDARD PM(3)-20)

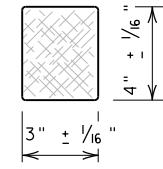
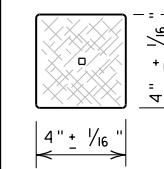
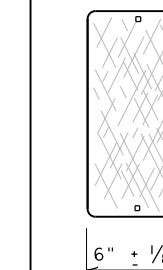
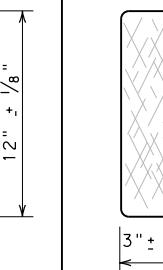
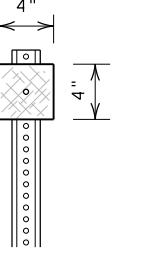
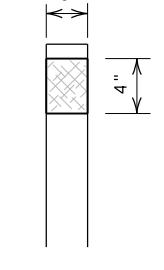
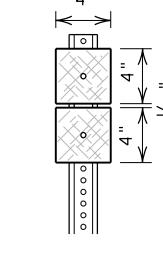
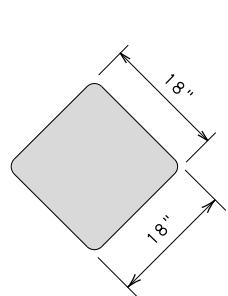
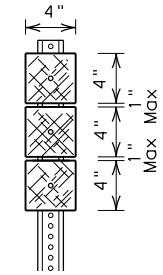
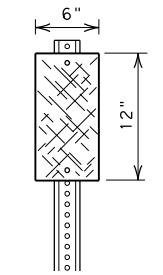
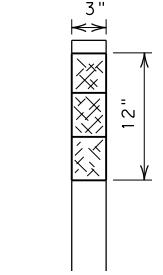
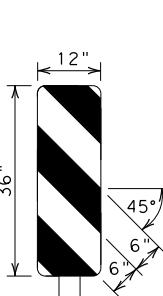
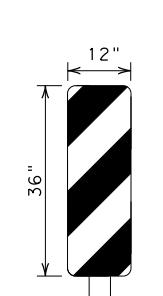
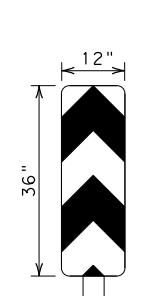
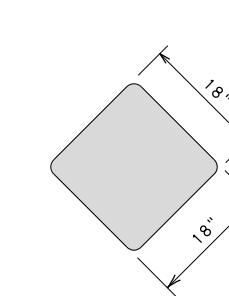
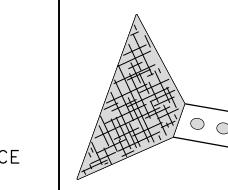
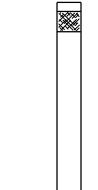
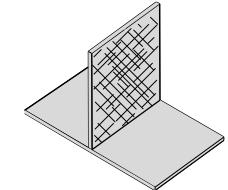
Texas Department of Transportation
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San Antonio District Standard

**TWO WAY LEFT TURN LANE
AND LEFT TURN BAYS - RURAL ROADS**

SCALE: NS			
REVISIONS	FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	
SHEET NO. 91			
MAY 2010			
MAY 2018	STATE	DIST.	COUNTY
MAY 2022		SAT	MEDINA
CONT.	SECT.	JOB	HIGHWAY NO.
3544	04	XXX	SH 211

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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)			
												
SHEETING	Yellow, White or Red Type B or C reflective sheeting					1-Size 2 reflector unit 1-Size 1 reflector unit 2-Size 2 reflector units 2-Size 1 reflector units						
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.					SHEETING Yellow, White or Red Type B or C Reflective Sheetng POST TYPE WC YFLX, WFLX WC YFLX, WFLX MOUNT TYPE GND GND, SRF GND GND, SRF						
OBJECT MARKERS												
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				
												
SHEETING	Yellow-Type B or C Sheetng	Yellow - Type B or C Sheetng			Alternating acrylic black and retroreflective yellow - Type B _{FL} or C _{FL} Sheetng			Red - Type B _{FL} or C _{FL} Sheetng				
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			DEPARTMENTAL MATERIAL SPECIFICATIONS			
DEVICE	GF1	GF2	CTB	DEVICE			DEVICE					
					W1-8	W1-8		W1-6				
	1. Barrier reflectors shall meet the requirements of DMS 8600.		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).		SIZE (W x L) 18" x 24" (Conventional) 24" x 30" (Conventional Oversize)		SIZE (W x L) 30" x 36" (Expressway) 36" x 48" (Freeway)	SIZE (W x L) 48" x 24" (Conventional) 60" x 30" (Expressway & Freeway)	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.			
	2. Approved Barrier Reflectors are listed on the "Barrier Reflectors" Material Producer List at: www.txdot.gov .		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).		MOUNTING HEIGHT 4'-0" or 7'-0"		MOUNTING HEIGHT 7'-0" Only	MOUNTING HEIGHT 7'-0"				
SHEETING	Yellow, White, Red		NOTE	1. Reflective sheeting shall have a minimum dimension of 3 inches and minimum surface area of 9 square inches.								
NOTE				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).								
FILE: dom1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	REVISIONS 3544 04 XXX SH 211 10-09 3-15 DIST COUNTY 4-10 7-20 SAT MEDINA							
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY								

NOTE:
Delineator and object marker substrates and sign substrates shall be 0.080" Aluminum sign blank to conform to ASTM B-209 Alloy 6061-T6 or approved alternative.

 **Texas Department of Transportation** *Traffic Safety Division Standard*

DELINATE & OBJECT MARKER MATERIAL DESCRIPTION

D & OM(1)-20

FILE: dom1-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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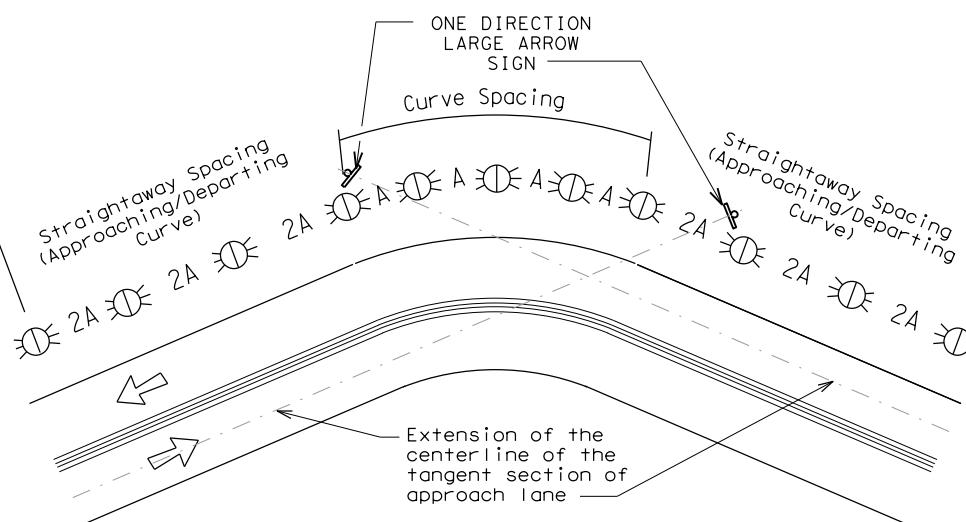
POST TYPE AND SUPPORT FOUNDATION DETAILS						TYPE OF BARRIER MOUNTS																										
WING CHANNEL (WC)	FLEXIBLE POSTS (YFLX, WFLX)		WEDGE ANCHOR SYSTEMS		GUARD FENCE ATTACHMENT																											
GND	GND	SRF	WAS	WAP	GF1	GF2																										
NOTES						CONCRETE TRAFFIC BARRIER (CTB)																										
<p>1. Embedded Wing Channel (WC) post option may be used for Type 2 Object Markers and Delineators only.</p> <p>2. 1.12 lbs/ft steel per ASTM A 1011 SS Gr. 50, or ASTM A499.</p>																																
NOTES		NOTES		NOTE		GENERAL NOTES																										
<p>1. See "Flexible Delineator and Object Marker Posts" Material Producer List for approved devices.</p> <p>2. Install per manufacturer's recommendations.</p> <p>3. Post length may vary to meet field conditions.</p> <p>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.</p>		<p>1. Install per manufacturer's recommendations.</p>		<p>1. Place delineators on a section of roadway at a consistent distance from the edge of pavement.</p> <p>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.</p> <p>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.</p> <p>4. Install all delineators, object markers and barrier reflectors in accordance with the manufacturer's recommendation.</p> <p>5. Barrier reflectors should be installed a minimum of 18 inches above the edge of the pavement surface.</p> <p>6. Diagonal stripes on Type 3 object markers shall slope down toward the intended travel lane.</p>																												
TYPES 1, 3, AND 4 OBJECT MARKERS AND CHEVRONS		CHEVRONS AND ONE DIRECTION LARGE ARROW SIGN		DELINEATORS AND TYPE 2 OBJECT MARKERS																												
<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>Approximately 4'-0"</p> <p>2'-0" to 8'-0" or in front of object being marked</p> <p>See general notes 1, 2 and 3.</p>		<p>Texas Department of Transportation</p> <p>Traffic Safety Division Standard</p> <p>DELINEATOR & OBJECT MARKER INSTALLATION</p> <p>D & OM(2)-20</p>																										
<p>DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for incorrect results or damages resulting from its use.</p>						<table border="1"> <tr> <td>FILE: dom2-20.dgn</td> <td>DN: TXDOT</td> <td>CK: TXDOT</td> <td>DW: TXDOT</td> <td>CK: TXDOT</td> </tr> <tr> <td>© TxDOT August 2004</td> <td>CONT</td> <td>SECT</td> <td>JOB</td> <td>HIGHWAY</td> </tr> <tr> <td>REVISIONS</td> <td>3544</td> <td>04</td> <td>XXX</td> <td>SH 211</td> </tr> <tr> <td>10-09 3-15</td> <td>DIST</td> <td>COUNTY</td> <td></td> <td>SHEET NO.</td> </tr> <tr> <td>4-10 7-20</td> <td>SAT</td> <td>MEDINA</td> <td></td> <td>93</td> </tr> </table>		FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT	© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY	REVISIONS	3544	04	XXX	SH 211	10-09 3-15	DIST	COUNTY		SHEET NO.	4-10 7-20	SAT	MEDINA		93
FILE: dom2-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT																												
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY																												
REVISIONS	3544	04	XXX	SH 211																												
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MINIMUM WARNING DEVICES AT CURVES WITH ADVISORY SPEEDS

Amount by which Advisory Speed is less than Posted Speed	Curve Advisory Speed	
	Turn (30 MPH or less)	Curve (35 MPH or more)
5 MPH & 10 MPH	• RPMs	• RPMs
15 MPH & 20 MPH	• RPMs and One Direction Large Arrow sign	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons.
25 MPH & more	• RPMs and Chevrons; or • RPMs and One Direction Large Arrow sign where geometric conditions or roadside obstacles prevent the installation of chevrons	• RPMs and Chevrons

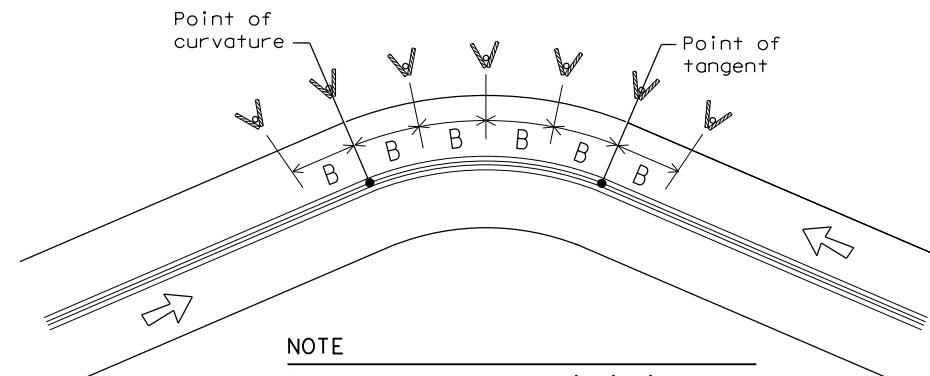
SUGGESTED SPACING FOR DELINEATORS ON HORIZONTAL CURVES



NOTE

ONE DIRECTION LARGE ARROW (W1-6) sign should be located at approximately and perpendicular to the extension of the centerline of the tangent section of approach lane.

SUGGESTED SPACING FOR CHEVRONS ON HORIZONTAL CURVES



NOTE

At least one chevron pair is installed beyond the point of tangent in tangent section.

DELINERATOR AND CHERON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS KNOWN

Degree of Curve	FEET			
	Radius of Curve	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
1	5730	225	450	—
2	2865	160	320	—
3	1910	130	260	200
4	1433	110	220	160
5	1146	100	200	160
6	955	90	180	160
7	819	85	170	160
8	716	75	150	160
9	637	75	150	120
10	573	70	140	120
11	521	65	130	120
12	478	60	120	120
13	441	60	120	120
14	409	55	110	80
15	382	55	110	80
16	358	55	110	80
19	302	50	100	80
23	249	40	80	80
29	198	35	70	40
38	151	30	60	40
57	101	20	40	40

Curve delineator approach and departure spacing should include 3 delineators spaced at 2A. This spacing should be used during design preparation or when the degree of curve is known.

DELINERATOR AND CHERON SPACING

WHEN DEGREE OF CURVE OR RADIUS IS NOT KNOWN

Advisory Speed (MPH)	Spacing in Curve	Spacing in Straightaway	Chevron Spacing in Curve
A	2xA	B	
65	130	260	200
60	110	220	160
55	100	200	160
50	85	170	160
45	75	150	120
40	70	140	120
35	60	120	120
30	55	110	80
25	50	100	80
20	40	80	80
15	35	70	40

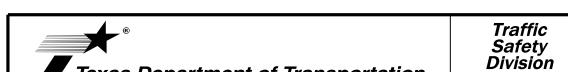
If the degree of curve is not known, delineator spacing may be determined based on the Advisory Speed of the curve. Use the delineator curve spacing for each Advisory Speed (MPH).

DELINERATOR AND OBJECT MARKER APPLICATION AND SPACING

CONDITION	REQUIRED TREATMENT	MINIMUM SPACING
Frwy./Exp. Tangent	RPMs	See PM-series and FPM-series standard sheets
Frwy./Exp. Curve	Single delineators on right side	See delineator spacing table
Frwy./Exp. Ramp	Single delineators on at least one side of ramp (should be on outside of curves) (see Detail 3 on D&OM(4))	100 feet on ramp tangents Use delineator spacing table for ramp curves ("straightaway spacing" does not apply to ramp curves)
Acceleration/Deceleration Lane	Double delineators (see Detail 3 on D&OM(4))	100 feet (See Detail 3 on D & OM (4))
Truck Escape Ramp	Single red delineators on both sides	50 feet
Bridge Rail (steel or concrete) and Metal Beam Guard Fence	Bi-Directional Delineators when undivided with one lane each direction Single Delineators when multiple lanes each direction	Equal spacing (100' max) but not less than 3 delineators
Concrete Traffic Barrier (CTB) or Steel Traffic Barrier	Barrier reflectors matching the color of the edge line	Equal spacing 100' max
Cable Barrier	Reflectors matching the color of the edge line	Every 5th cable barrier post (up to 100' max)
Guard Rail Terminus/Impact Head	Divided highway - Object marker on approach end Undivided 2-lane highways - Object marker on approach and departure end	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5) and D & OM (6)
Bridges with no Approach Rail	Type 3 Object Marker (OM-3) at end of rail and 3 single delineators approaching rail	See D & OM(5)
Reduced Width Approaches to Bridge Rail	Type 2 and Type 3 Object Markers (OM-3) and 3 single delineators approaching bridge	Requires reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end See D & OM (5)
Culverts without MBGF	Type 2 Object Markers	See Detail 2 on D & OM(4)
Crossovers	Double yellow delineators and RPMs	See Detail 1 on D & OM (4)
Pavement Narrowing (lane merge) on Freeways/Expressway	Single delineators adjacent to affected lane for full length of transition	100 feet

NOTES

1. Unless indicated otherwise, the delineator or barrier reflector color shall conform to the color of the pavement edge line on the side of the road where the delineators or barrier reflectors are placed.
2. Barrier reflectors may be used to replace required delineators.
3. Single red delineators may be mounted on the back side of delineator posts for wrong way driver applications



DELINERATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(3)-20

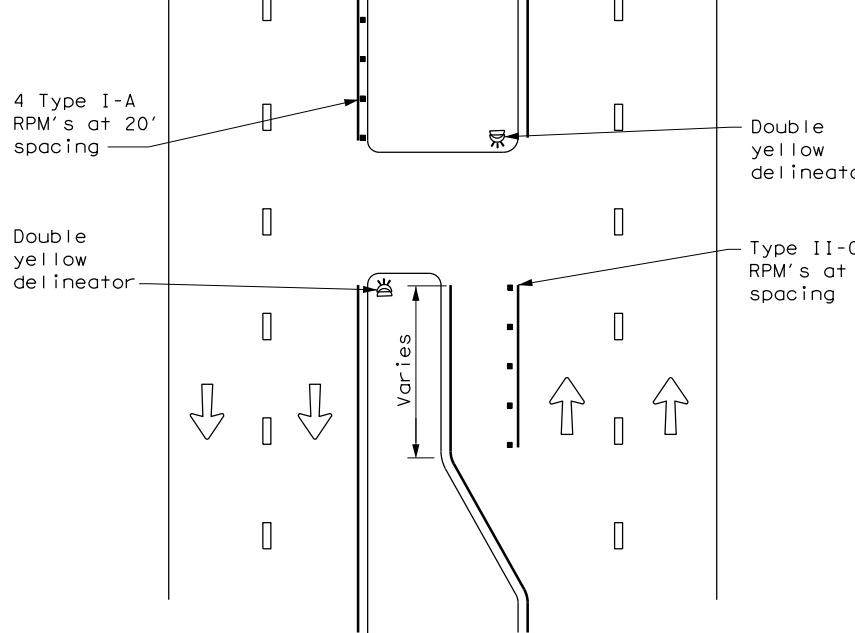
LEGEND	
	Bi-directional Delineator
	Delineator
	Sign

FILE: dom3-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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	3544	04	XXX	SH 211
REVISIONS				
3-15 8-15	DIST	COUNTY		SHEET NO.
8-15 7-20	SAT	MEDINA		94

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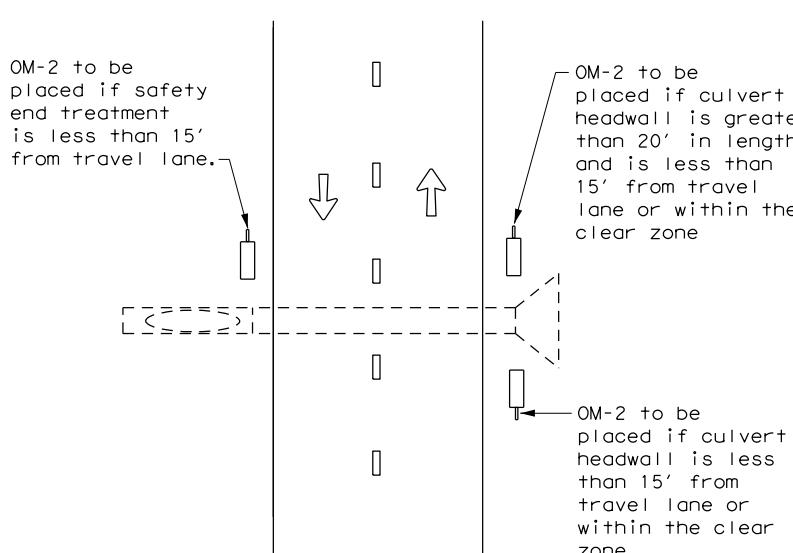
DATE:
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Crossovers



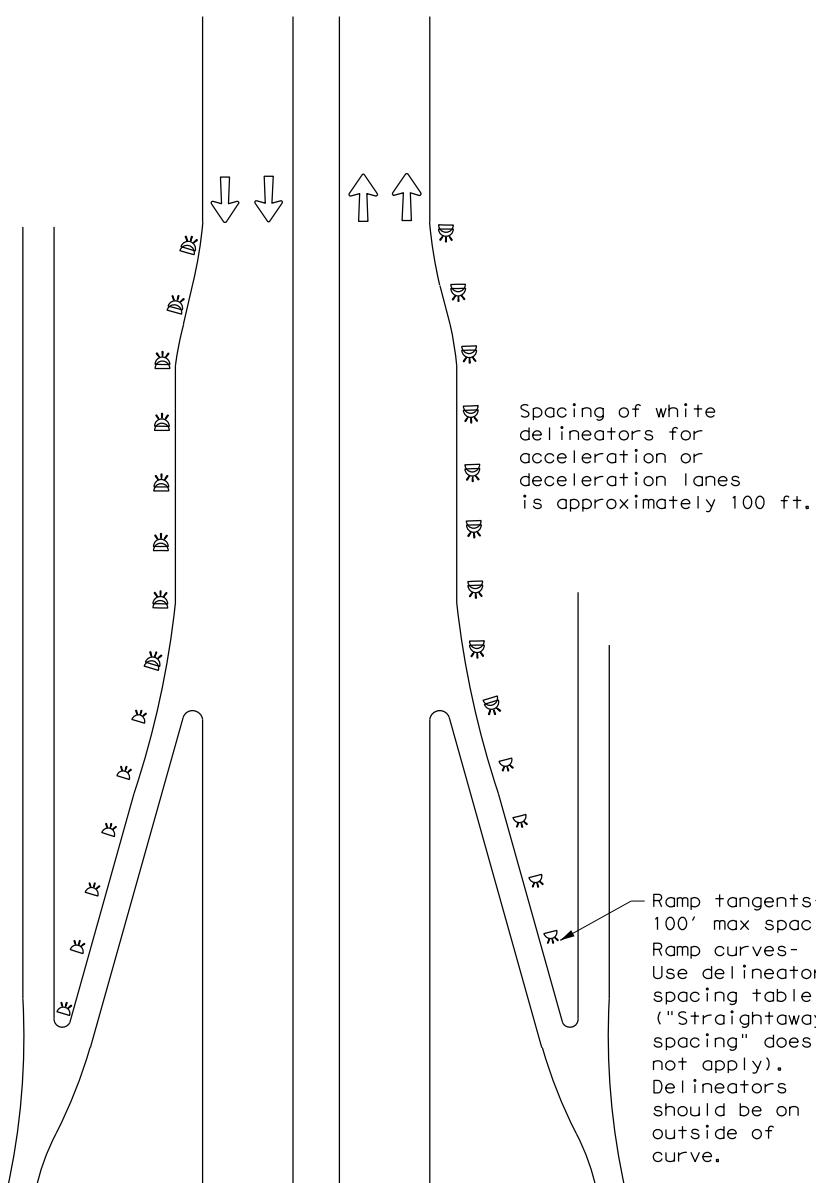
DETAIL 1

FOR CULVERTS WITHOUT MBGF



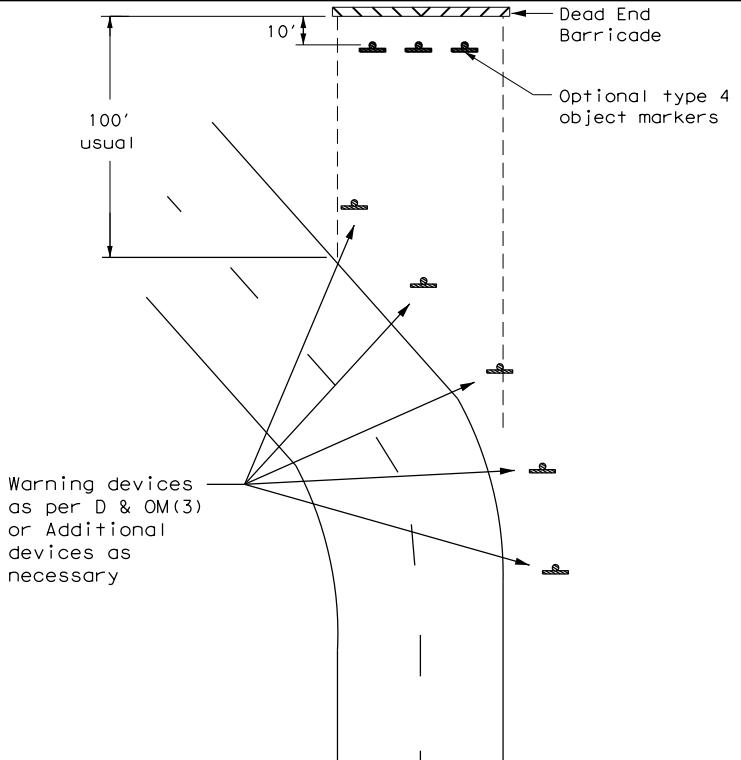
DETAIL 2

FREEWAY DELINEATION FOR RAMPS AND ACCELERATION/DECELERATION LANES



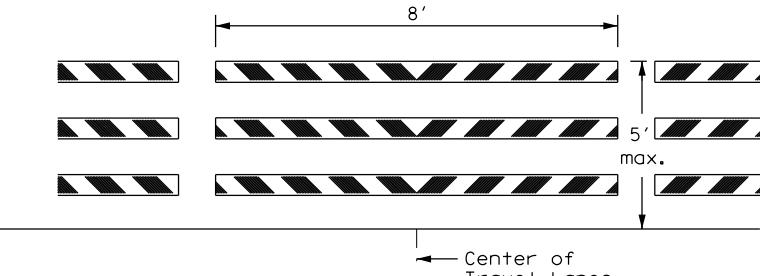
DETAIL 3

TYPICAL APPLICATION OF DEAD END BARRICADE



DETAIL 4

TYPICAL DEAD END BARRICADE INSTALLATION



NOTES

1. Barricade striping shall be red and white reflective sheeting for all permanent road closures.
2. Barricade striping is red and white sloping toward the center of the roadway.
3. Type 3 Barricade Supports should be anchored to soil or pavement as described in compliant Work Zone Traffic Control Devices List, section D.2.f and D.2.g.

DETAIL 5

LEGEND	
	Bidirectional Delineator
	Delineator
	OM-3
	Barricade
	Sign
	OM-2
	Double Delineator



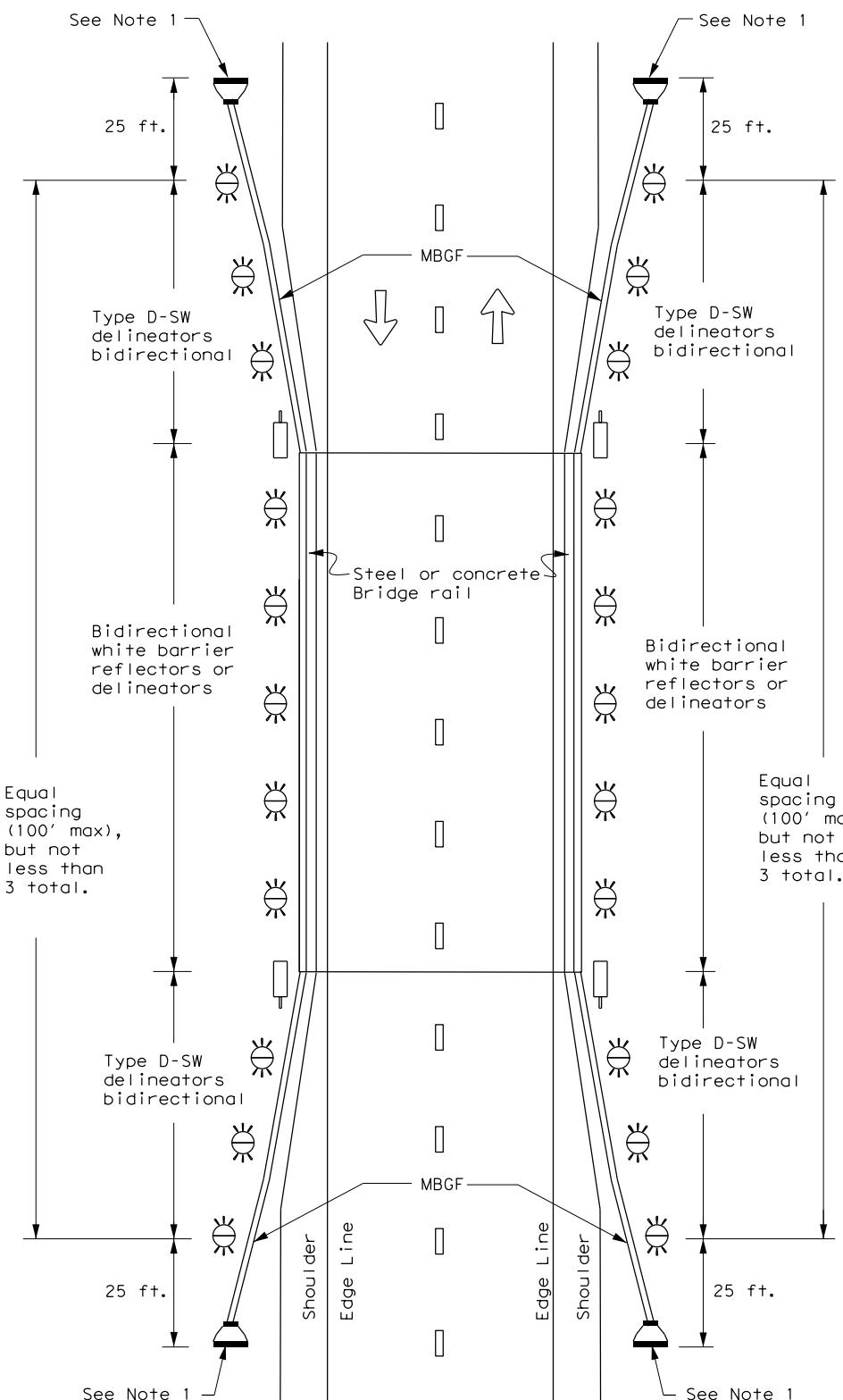
DELINERATOR & OBJECT MARKER PLACEMENT DETAILS

D & OM(4)-20

FILE: dom4-20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT August 2004	CONT	SECT	JOB	HIGHWAY
3544	04	XXX		SH 211
3-15 7-20	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		95

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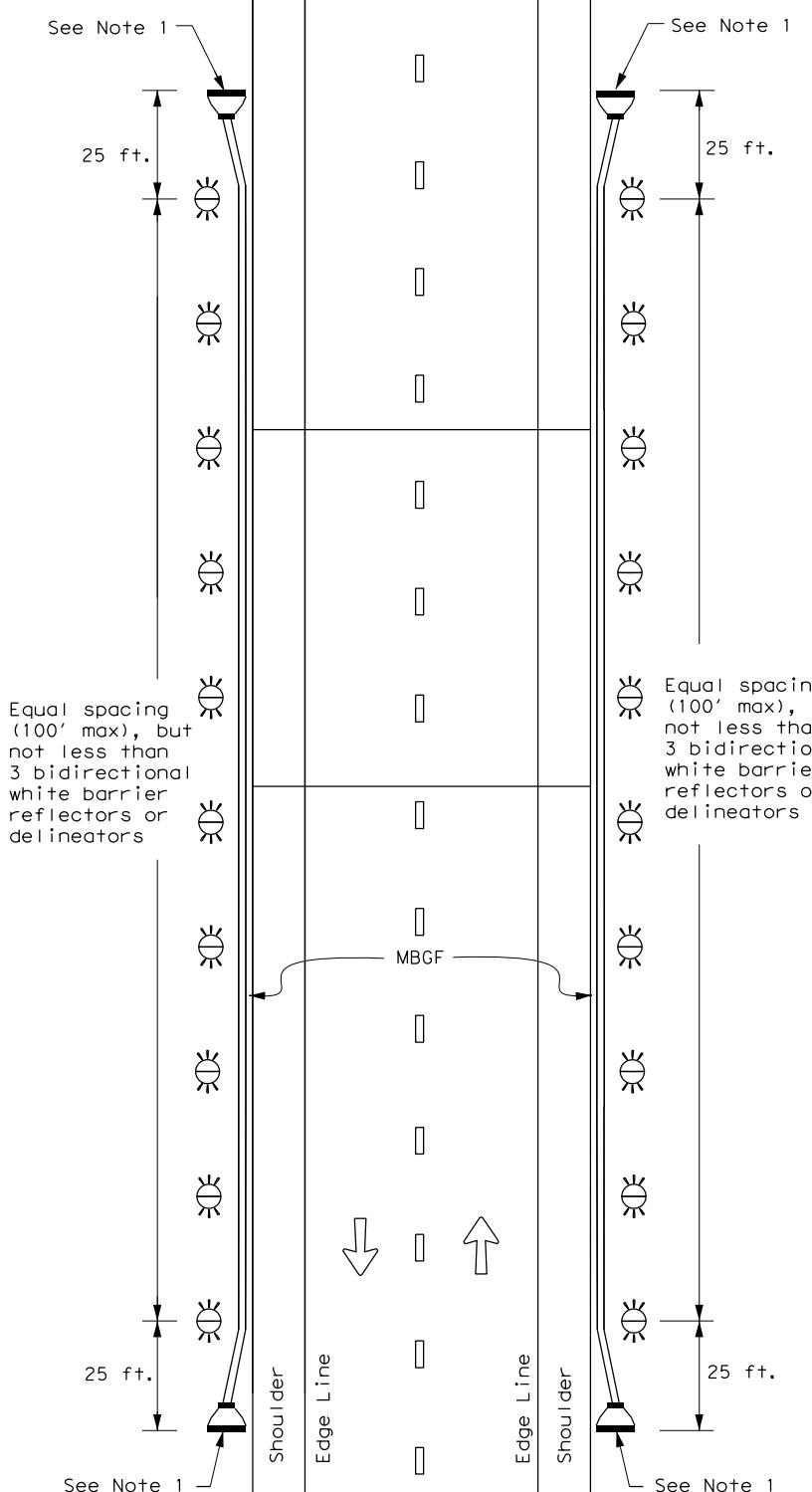
**TWO-WAY, TWO LANE ROADWAY
WITH REDUCED WIDTH APPROACH RAIL**



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

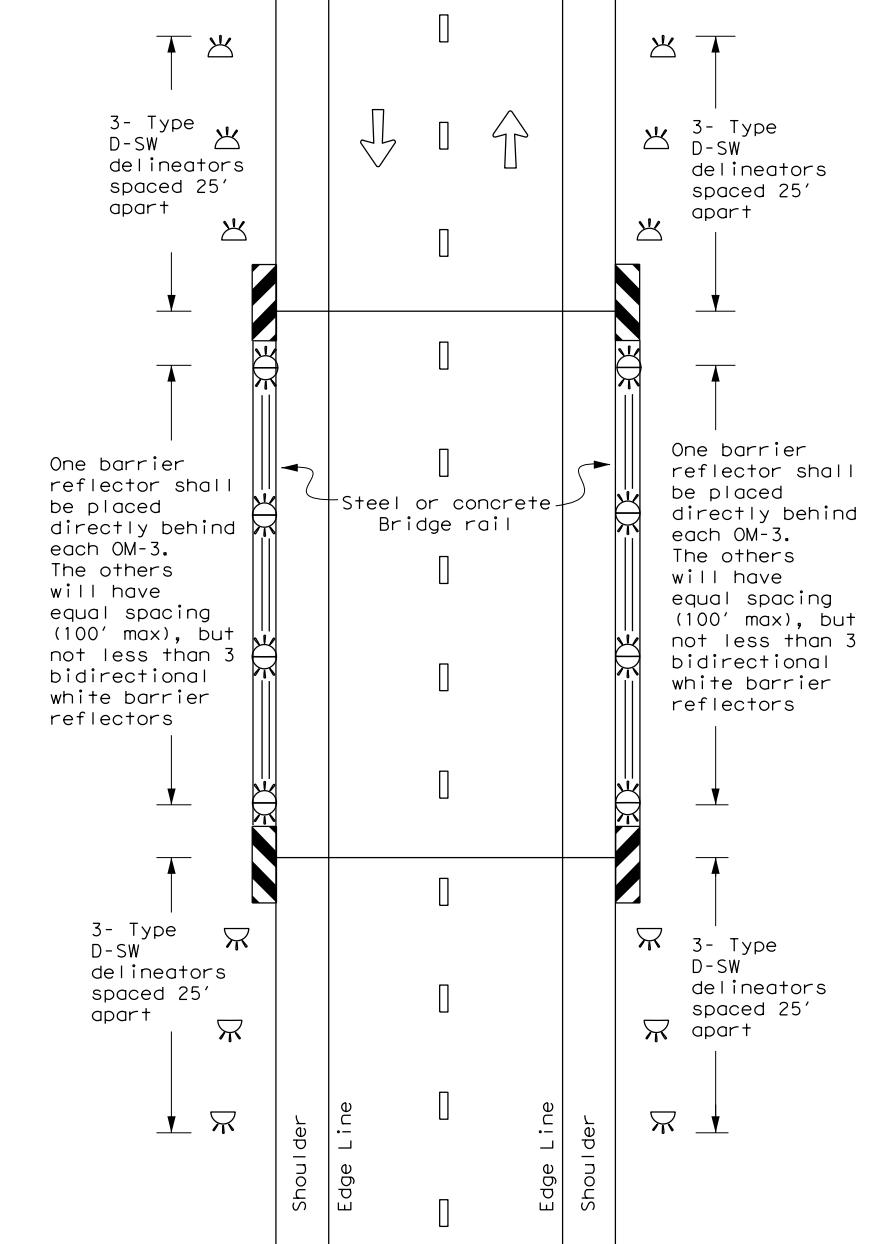
**TWO-WAY, TWO LANE ROADWAY
WITH METAL BEAM GUARD FENCE (MBGF)**



NOTE:

1. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

**TWO-WAY, TWO LANE ROADWAY
BRIDGE WITH NO APPROACH RAIL**



LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

**DELINERATOR &
OBJECT MARKER
PLACEMENT DETAILS**

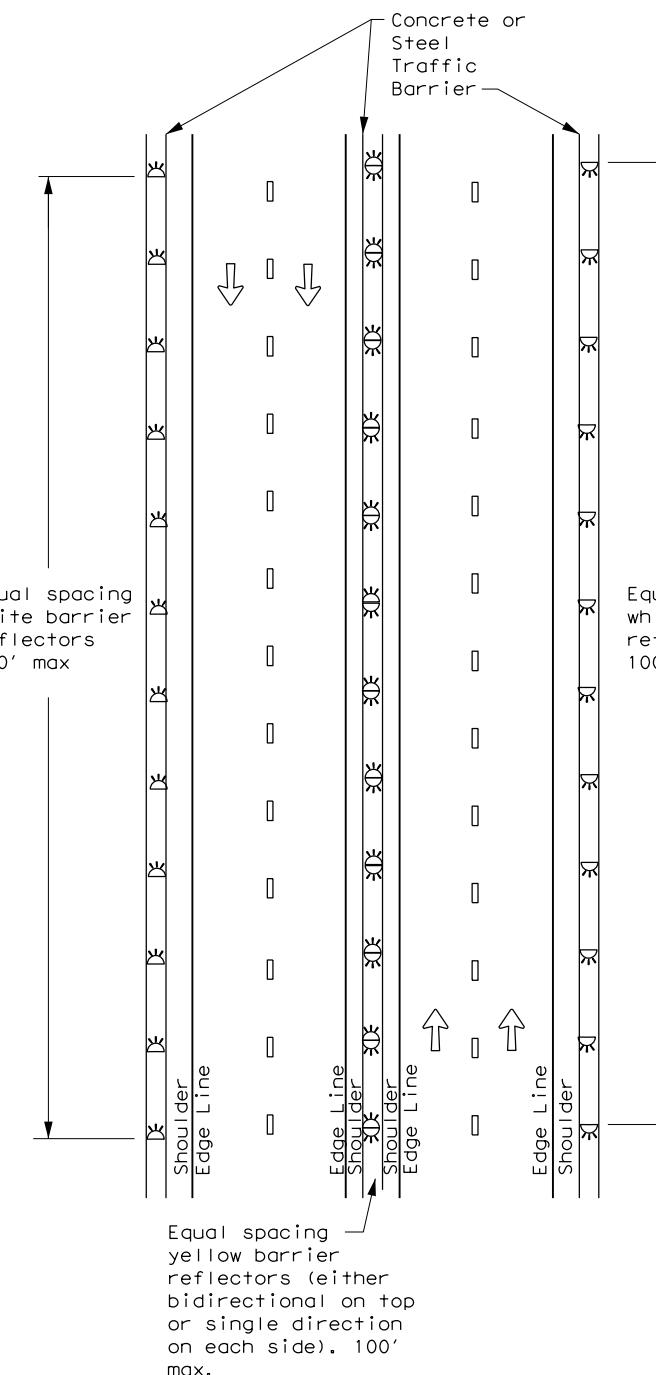
D & OM(5)-20

FILE: dom5-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	3544	04	XXX	SH 211
7-20	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		96

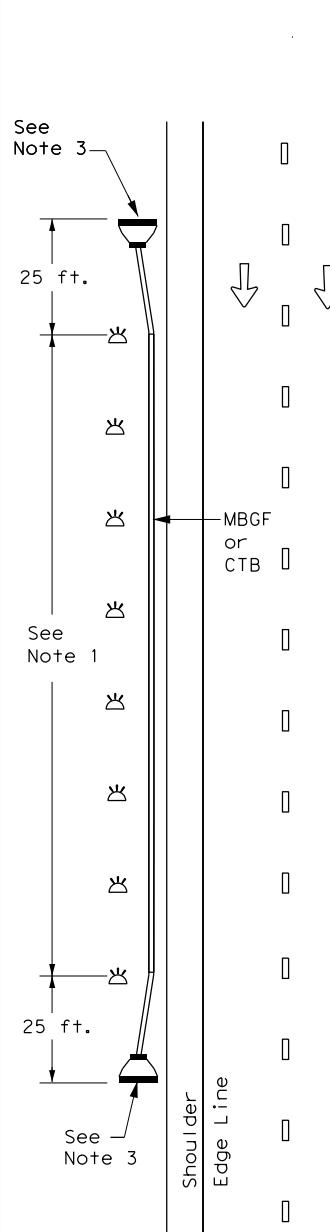
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DATE:
FILE:

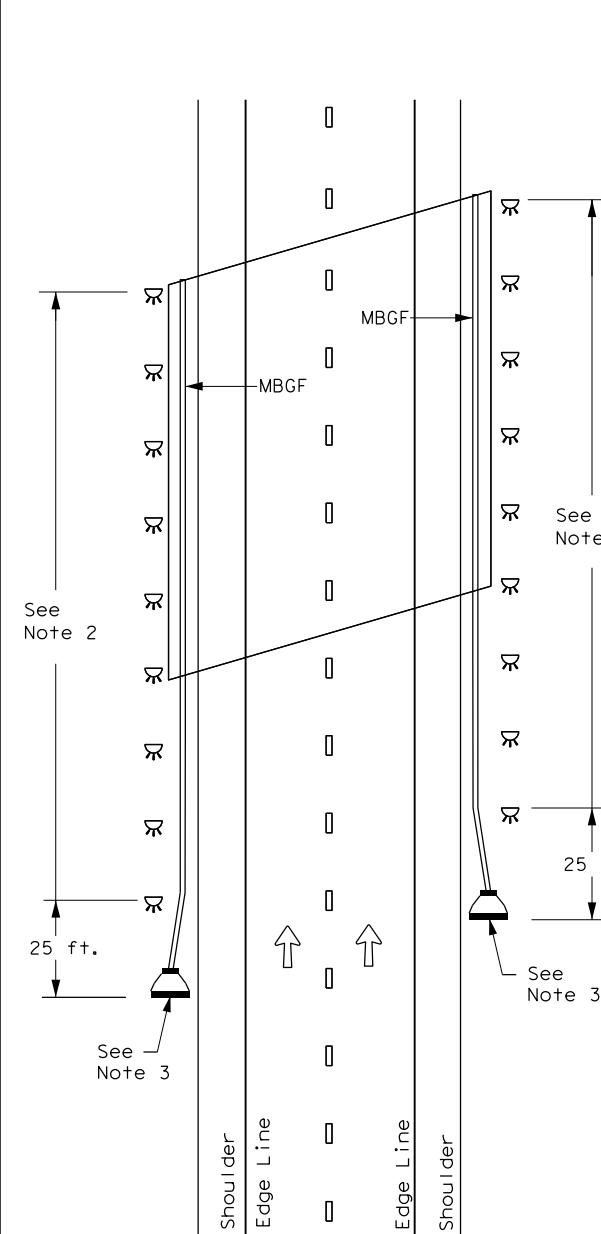
CONTINUOUS CONCRETE OR STEEL BARRIER



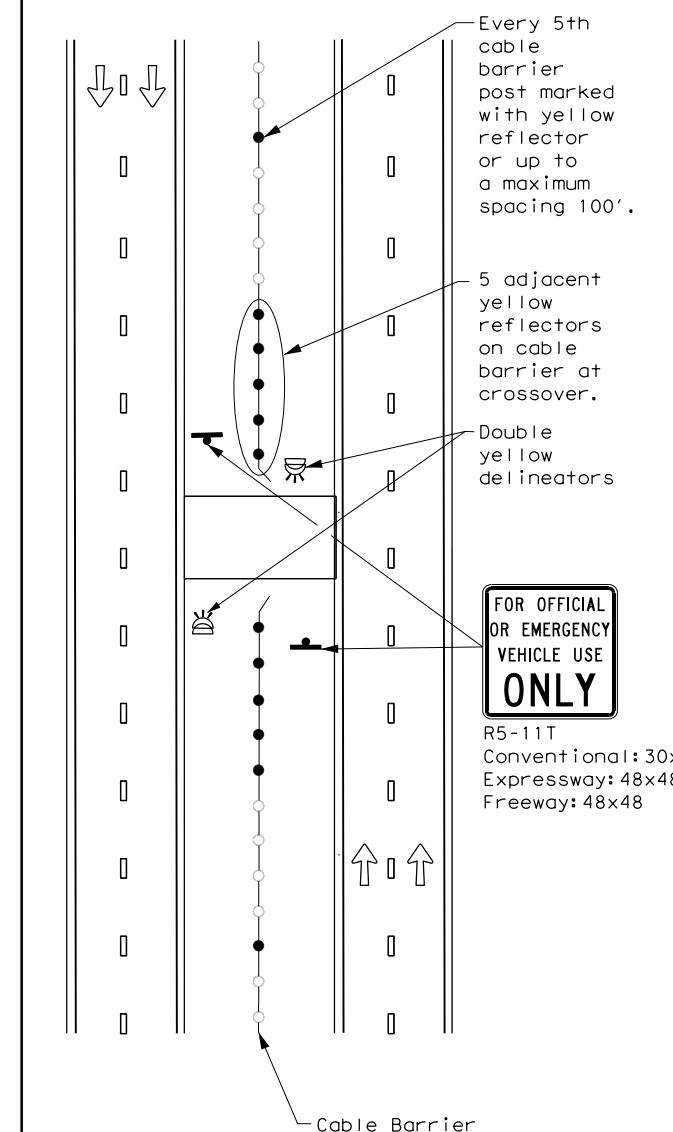
MULTI-LANE UNDIVIDED, TWO-WAY ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



DIVIDED ROADWAY WITH METAL BEAM GUARD FENCE (MBGF)



EMERGENCY CROSSOVER



NOTES

1. Equal spacing (100' max), but not less than 3 single directional white barrier reflectors or delineators. On Continuous Barrier, equal spacing (100' max.)
2. Equal spacing (100' max), but not less than 3 single directional yellow barrier reflectors or delineators.
3. Terminal ends require reflective sheeting provided by manufacturer per D & OM (VIA) or a Type 3 Object Marker (OM-3) in front of the terminal end.

LEGEND

	Bidirectional Delineator
	Delineator
	OM-3
	OM-2
	Terminal End
	Traffic Flow

FILE: dom6-20.dgn DN: TxDOT ck: TxDOT dw: TxDOT ck: TxDOT
 © TxDOT August 2015 CONT SECT JOB HIGHWAY
 7-20 REVISIONS 3544 04 XXX SH 211
 DIST COUNTY SHEET NO.
 SAT MEDINA 97

DELINERATOR & OBJECT MARKER PLACEMENT DETAILS

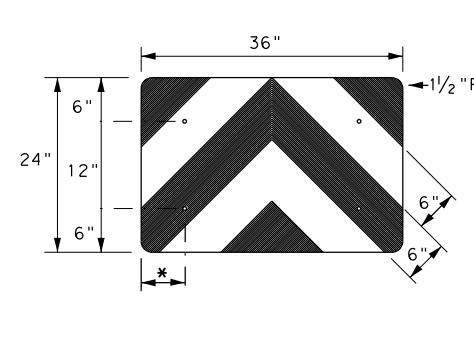
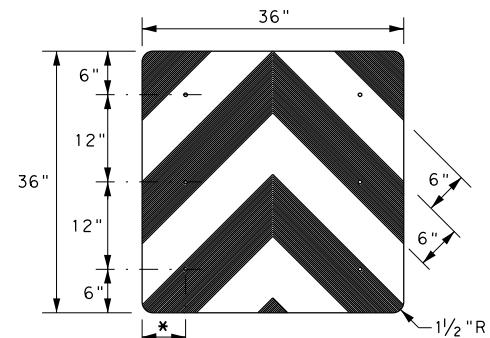
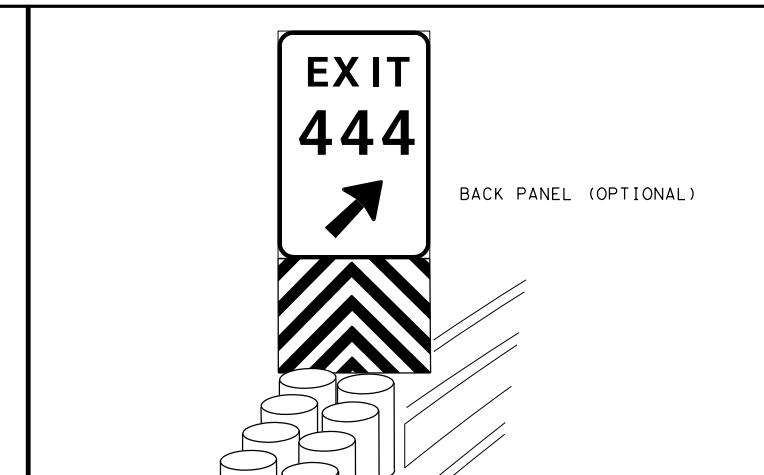
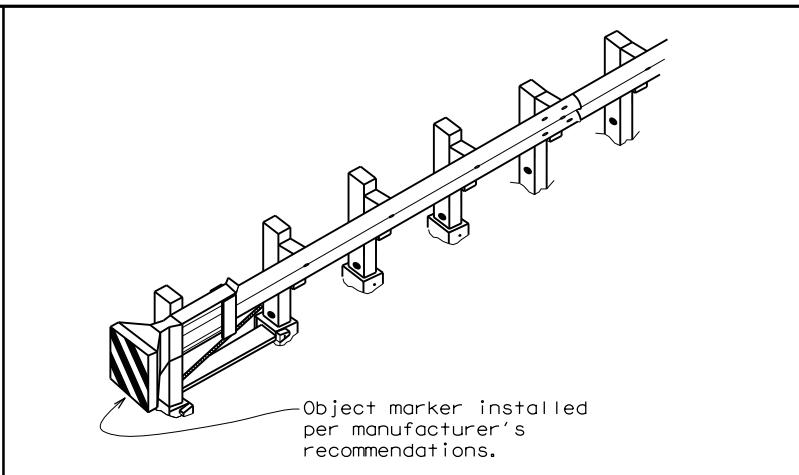
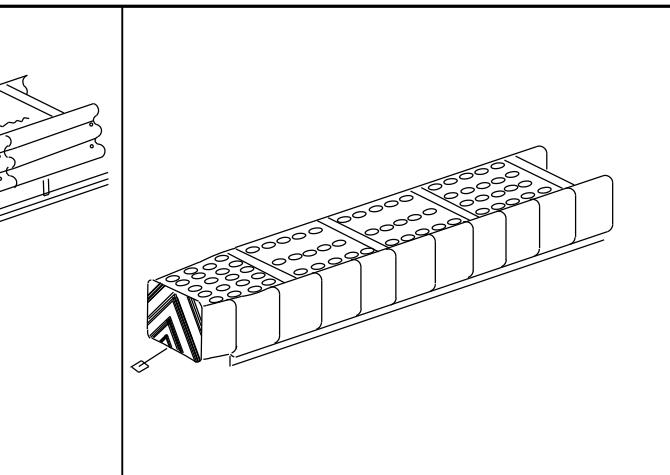
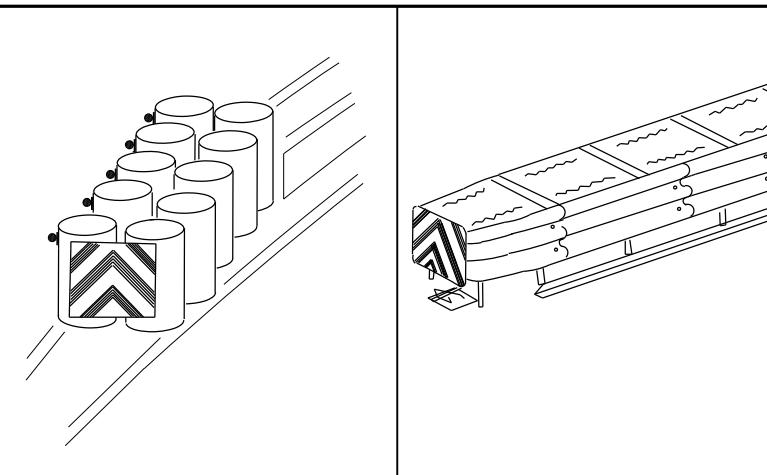
D & OM(6)-20

Texas Department of Transportation **Traffic Safety Division Standard**

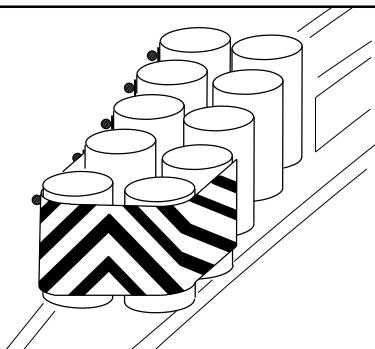
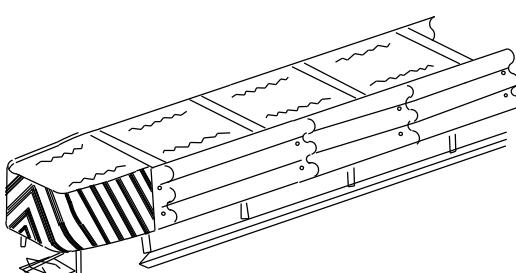
FILE: dom6-20.dgn	DN: TxDOT	ck: TxDOT	dw: TxDOT	ck: TxDOT
© TxDOT August 2015	CONT	SECT	JOB	HIGHWAY
7-20	REVISIONS	3544	04	XXX SH 211
DIST	COUNTY			
SAT	MEDINA			97

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DATE:
FILE:

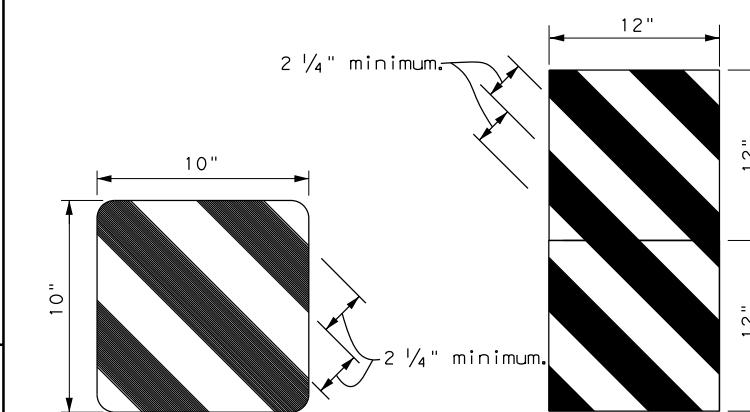
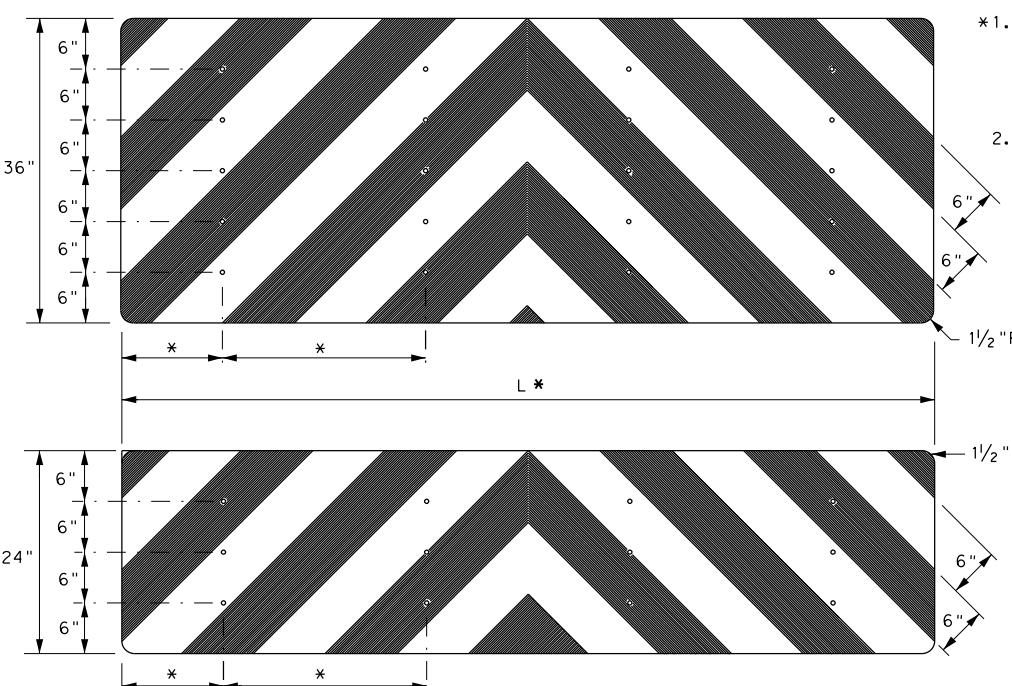


* Adjust to fit attenuator per manufacturer's recommendation, or as directed by the Engineer



NOTES

1. Spacing should be adjusted to attach through centerline of drum, per attenuator manufacturers recommendation, or as directed by the Engineer.
2. Mounting should be flush with top of attenuator. Minimum size 96" x 24".



OBJECT MARKERS SMALLER THAN 3 FT²

NOTES

1. Object Markers shall conform to the Texas MUTCD and meet the color and reflectivity requirement of Department Material Specification DMS 8300. Background shall be yellow reflective sheeting (Type B or C) and Chevron shall be black.
2. Object Markers may be fabricated from adhesive backed reflective sheeting applied directly to guardrail end treatment, or applied directly to an "end cap" as per the manufacturer's recommendation. Direct applied sheeting shall provide a smooth surface and have no wrinkles, air bubbles, cuts or tears. A radius at the corners is not required for direct applied sheeting.
3. Object Marker size may be reduced to fit smaller devices. Width of alternating black and yellow stripes are typically 6". Object Markers smaller than 3ft may have reduced width stripes of a minimum of 2 1/4".
4. Pop rivets, screws, or nuts and bolts may be used to attach object markers and reflectors. Holes, slots or other openings may be cut or drilled through object markers to allow cable or other attachments.
5. Object Marker at nose of attenuator is subsidiary to the attenuator.
6. See D & OM (1-4) for required barrier reflectors.

Texas Department of Transportation				Traffic Safety Division Standard
DELINATEATOR & OBJECT MARKER FOR VEHICLE IMPACT ATTENUATORS				
FILE: domvia20.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT December 1989	CONT	SECT	JOB	HIGHWAY
REVISIONS	3544	04	XXX	SH 211
4-92 8-04	DIST	COUNTY	SHEET NO.	
8-95 3-15	SAT	MEDINA		98
4-98 7-20				

I. STORMWATER POLLUTION PREVENTION-CLEAN WATER ACT SECTION 402

Texas Pollutant Discharge Elimination System (TPDES) TXR 150000: Stormwater Discharge Permit or Construction General Permit (CGP) required for projects with 1 or more acres disturbed soil. Projects with any disturbed soil must protect for erosion and sedimentation in accordance with Item 506.

No Action Required Required Action

Action No.

1. Prevent stormwater pollution by controlling erosion and sedimentation in accordance with TPDES Permit TXR 150000.
2. Comply with the Storm Water Pollution Prevention Plan (SW3P) and revise when necessary to control pollution or required by the Engineer.
3. Post Construction Site Notice (CSN) with SW3P information on or near the site, accessible to the public and Texas Commission on Environmental Quality (TCEQ), Environmental Protection Agency (EPA) or other inspectors.
4. When Contractor project specific locations (PSL's) increase disturbed soil area to 5 acres or more, Contractor shall submit Notice of Intent (NOI) to TCEQ and the Engineer.
5. NOI required: Yes No

Note: If amount of soil disturbance changes, permit requirements may change.

II. WORK IN OR NEAR STREAMS, WATERBODIES AND WETLANDS CLEAN WATER ACT SECTIONS 401 AND 404

US Army Corps of Engineers (USACE) Permit required for filling, dredging, excavating or other work in any potential USACE jurisdictional water, such as, rivers, creeks, streams, or wetlands.

The Contractor shall adhere to all of the terms and conditions associated with the following permit(s):

No Permit Required
 Nationwide Permit (NWP) 14 - Pre-construction Notice (PCN) not Required
 Nationwide Permit 14 - PCN Required
 Individual 404 Permit Required
 Other Nationwide Permit Required: NWP# _____

Required Actions: List waters of the US permit applies to, location in project and check Best Management Practices (BMPs) planned to control erosion, sedimentation and post-project total suspended solids (TSS).

- 1.
- 2.
- 3.
- 4.

401 Best Management Practices: (Not applicable if no USACE permit)

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 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 type="checkbox"/> Mulch Filter Berm and Socks	<input 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 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"/> Sedimentation Chambers
		<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

Action No.

1.

Required Action

2.

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

Hazardous Materials or Contamination Issues Specific to this Project:

No Action Required

Required Action

Action No.

1.

2.

3.

Does the project involve the demolition of a span bridge?

Yes No (No further action required)

If "Yes", a pre-demolition notification must be submitted to the Texas Department of State Health Services. The contractor shall contact TxDOT's Project Engineer 25 calendar days prior to the demolition of the bridge(s) on the project to assist with the notification.

VII. OTHER ENVIRONMENTAL ISSUES

(includes regional issues such as Edwards Aquifer District, etc.)

No Action Required

Required Action

Action No.

1. FOR SH 211 AT GALT RD: KARST ZONE 1 AND 3b: IF ANY SENSITIVE FEATURE (CAVES, SUBSURFACE VOIDS, ETC) IS DISCOVERED DURING CONSTRUCTION, ALL CONSTRUCTION ACTIVITIES NEAR THE SENSITIVE FEATURE MUST BE SUSPENDED IMMEDIATELY. THE CONSTRUCTION INSPECTOR SHALL BE IMMEDIATELY NOTIFIED OF ANY SENSITIVE FEATURES ENCOUNTERED DURING CONSTRUCTION. THE CONSTRUCTION ACTIVITIES NEAR THE SENSITIVE FEATURE MAY NOT PROCEED UNTIL A US FISH AND WILDLIFE SERVICE (USFWS) PERMITTED BIOLOGIST HAS ASSESSED THE SITE FOR EVIDENCE OF HABITAT OR LISTED ENDANGERED SPECIES. IF IT IS DETERMINED THAT ENDANGERED SPECIES OR THEIR HABITAT IS PRESENT WITHIN THE VOID SPACE, CONSULTATIONS WITH THE USFWS WILL COMMENCE AND WORK WITHIN THE IMMEDIATE VICINITY OF THE SENSITIVE FEATURE WILL NOT BE ALLOWED TO PROCEED UNTIL USFWS APPROVAL HAS BEEN RECEIVED.

 Texas Department of Transportation
San Antonio District Standard

ENVIRONMENTAL PERMITS, ISSUES AND COMMITMENTS

EPIC

FILE: epic_2015-10-09_SAT.dgn	DN: TxDOT	CK: TxDOT	DW: BW	CK: GAG
© TxDOT OCTOBER 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	3544	04	XXX	SH 211
	DIST	COUNTY		SHEET NO.
	SAT	MEDINA		99

STORMWATER POLLUTION PREVENTION PLAN (SWP3):

This SWP3 has been developed in accordance with the TPDES Construction General Permit TXR150000 (CGP). The Texas Department of Transportation (TxDOT) ensures that project specifications include adequate best management practices (BMPs) for this project.

For all projects with soil disturbing activity and for projects that have Environmental, Permits, Issues, and Commitments (EPICs) dependent on stormwater controls and water quality measures TxDOT will maintain a SWP3 with all pertinent records, correspondence, environmental documents, etc. at the project field office, Area Office, or electronically.

This SWP3 is consistent with requirements specified in applicable stormwater plans and the projects environmental permits, issues, and commitments (EPICs). A copy of the CGP is included in Attachment 2.12 of the SWP3 binder.

1.0 SITE/PROJECT DESCRIPTION**1.1 PROJECT CONTROL SECTION JOB (CSJ):**

3544-04-XXX

1.2 PROJECT LIMITS:

From: STA 438+19.54

To: STA 452+79.10

1.3 PROJECT COORDINATES:

BEGIN: (Lat) 29.456295, (Long) -98.805820

END: (Lat) 29.4599306, (Long) -98.8076833

1.4 TOTAL PROJECT AREA (Acres): 3.00**1.5 TOTAL AREA TO BE DISTURBED (Acres):** 1.65**1.6 NATURE OF CONSTRUCTION ACTIVITY:**

CONSTRUCTION OF TURN LANE CONSISTING OF
ROADWAY WIDENING, GRADING, DRAINAGE, SIGNING
AND PAVEMENT MARKINGS, AND TRAFFIC SIGNAL
INSTALLATION

1.7 MAJOR SOIL TYPES:

Soil Type	Description
San Antonio clay loam, 0 to 5 percent slopes	Sta 436+37.45 to Sta 452+79.10 Well drained; slow rate runoff

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 2.5.)

- X Mobilization
- X Install sediment and erosion controls
- Blade existing topsoil into windrows, prep ROW, clear and grub
- Remove existing pavement
- X Grading operations, excavation, and embankment
- X Excavate and prepare subgrade for proposed pavement widening
- Remove existing culverts, safety end treatments (SETs)
- Remove existing metal beam guard fence (MBGF), bridge rail
- X Install proposed pavement per plans
- Install culverts, culvert extensions, SETs
- Install mow strip, MBGF, bridge rail
- X Place flex base
- X Rework slopes, grade ditches
- X Blade windrowed material back across slopes
- X Revegetation of unpaved areas
- X Achieve site stabilization and remove sediment and erosion control measures
- Other: _____
- Other: _____
- Other: _____

1.10 POTENTIAL POLLUTANTS AND SOURCES:

- X Sediment laden stormwater from stormwater conveyance over disturbed area
- X Fuels, oils, and lubricants from construction vehicles, equipment, and storage
- X Solvents, paints, adhesives, etc. from various construction activities
- X Transported soils from offsite vehicle tracking
- X Construction debris and waste from various construction activities
- X Contaminated water from excavation or dewatering pump-out water
- X Sanitary waste from onsite restroom facilities
- X Trash from various construction activities/receptacles
- X Long-term stockpiles of material and waste
- X _____

- 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
LUCAS CREEK	MEDINA RIVER; NOT IMPARIED

* Add (*) for impaired waterbodies with pollutant in ().

1.12 ROLES AND RESPONSIBILITIES: TxDOT

- Development of plans and specifications
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Perform SWP3 inspections
- Maintain SWP3 records and update to reflect daily operations
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years
- Other: _____
- Other: _____
- Other: _____

1.13 ROLES AND RESPONSIBILITIES: CONTRACTOR

- Day To Day Operational Control
- Submit Notice of Intent (NOI) to TCEQ (≥5 acres)
- Post Construction Site Notice
- Submit NOI/CSN to local MS4
- Maintain schedule of major construction activities
- Install, maintain and modify BMPs
- Complete and submit Notice of Termination to TCEQ
- Maintain SWP3 records for 3 years

Other: _____

Other: _____

1.14 LOCAL MUNICIPAL SEPARATE STORM SEWER SYSTEM (MS4) OPERATOR COORDINATION:

MS4 Entity

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

©2023  July 2023 Sheet 1 of 2
Texas Department of Transportation

FED. RD. DIV. NO.	STATE DIST.	PROJECT NO.	SHEET NO.
			100
STATE	STATE DIST.	COUNTY	
TEXAS	SAT	MEDINA	
CONT.	SECT.	JOB	HIGHWAY NO.
3544	04	XXX	SH 211

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

Sediment control BMPs requiring design capacity calculations (See SWP3 Attachment 1.3.):

T / P

- Sediment Trap
 - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
 - 3,600 cubic feet of storage per acre drained
- Sedimentation Basin
 - Not required (<10 acres disturbed)
 - Required (>10 acres) and implemented.
 - Calculated volume runoff from 2-year, 24-hour storm for each acre of disturbed area
 - 3,600 cubic feet of storage per acre drained
 - Required (>10 acres), but not feasible due to:
 - Available area/Site geometry
 - Site slope/Drainage patterns
 - Site soils/Geotechnical factors
 - Public safety
 - Other: _____

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
- Daily street sweeping

Other: _____

Other: _____

Other: _____

Other: _____

2.5 POLLUTION PREVENTION MEASURES:

- Chemical Management
- Concrete and Materials Waste Management
- Debris and Trash Management
- Dust Control
- Sanitary Facilities
- 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 DEWATERING:

Dewatering discharges of accumulated stormwater, groundwater, and surface water including discharges from dewatering of trenches, excavations, foundations, vaults, and other points of accumulation are prohibited unless managed by appropriate controls to prevent and minimize the offsite discharge of sediment and other pollutants.

2.9 INSPECTIONS:

All disturbed areas and erosion and sediment control devices shall be inspected at least once every seven (7) days. Inspections shall be performed by TxDOT as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

When dewatering activities are present, a daily inspection will be conducted once per day during those activities and documented in accordance with CGP and TxDOT requirements.

2.10 MAINTENANCE:

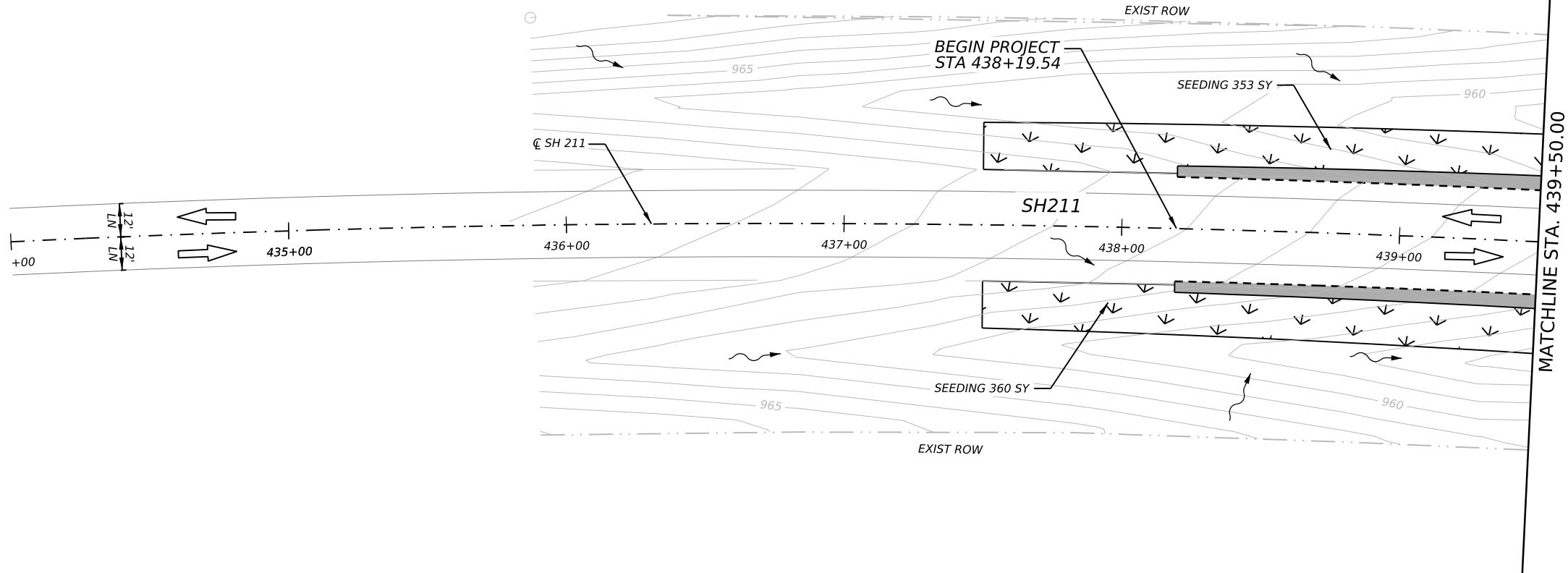
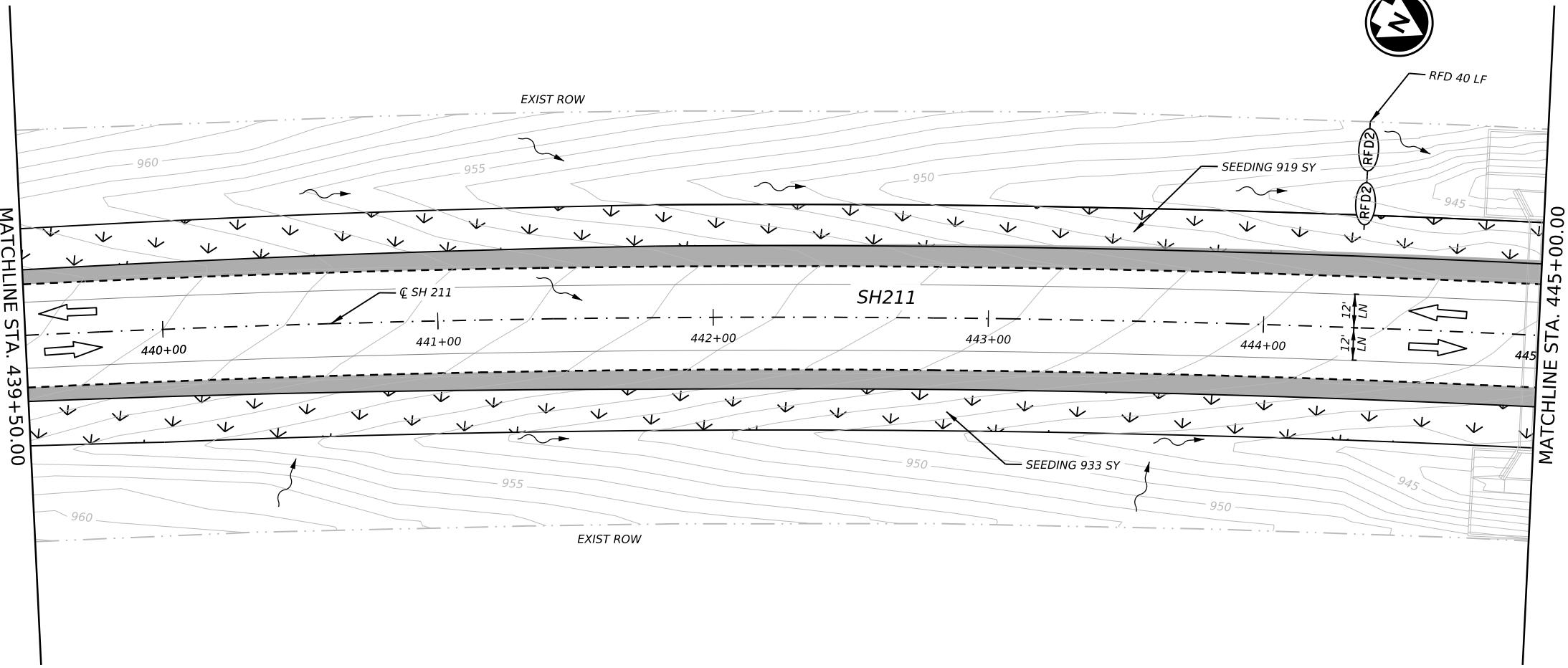
Control measures shall be properly installed according to specifications. If it is determined that a BMP or control measure is not operating effectively, maintenance must be accomplished as soon as possible and before the next anticipated rain event, but in no case later than 7 calendar days after being able to access the site. Maintenance shall be performed by the Contractor as indicated on the Field Inspection and Maintenance Report Form 2118 and retained in Attachment 2.5 of this SWP3.

STORMWATER POLLUTION PREVENTION PLAN (SWP3)

©2023 July 2023 Sheet 2 of 2

Texas Department of Transportation

FED. RD. DIV. NO.	PROJECT NO.		SHEET NO.
STATE	STATE DIST.	COUNTY	
TEXAS	SAT	MEDINA	101
CONT.	SECT.	JOB	HIGHWAY NO.
3544	04	XXX	SH 211



LEGEND

- (RFD2) ROCK FILTER DAM TY 2
- Flow direction
- Broadcast seed
- Direction of traffic
- 850 EXISTING CONTOUR

NOTES:

1. REFER TO TEMPORARY EROSION CONTROL MEASURE STANDARDS FOR ADDITIONAL INFORMATION.
2. CONSTRUCTION ENTRANCE/EXIT LOCATIONS TO BE DETERMINED IN THE FIELD.
3. SW3P CONTROL MEASURES INSTALLED DURING CONSTRUCTION ARE TO REMAIN IN PLACE UNTIL GRASS COVER IS ACHIEVED OR AS APPROVED BY THE ENGINEER.
4. SW3P CONTROLS MAY NEED TO BE MODIFIED IN THE FIELD TO ACCOMPLISH THE DESIRED AFFECT. ALL MODIFICATIONS ARE TO BE NOTED ON THIS SHEET AND SIGNED BY THE RESPONSIBLE PARTY.
5. ALL SW3P CONTROLS ARE TO BE MAINTAINED AND IN WORKING CONDITION AT ALL TIMES.

DESIGN

STATE OF TEXAS
ERNESTO GARZA JR.
14155
LICENSED PROFESSIONAL ENGINEER
ERNESTO GARZA JR., P.E. 6/16/2025 DATE

APPROVAL

STATE OF TEXAS
DAN THOMA
98622
LICENSED PROFESSIONAL ENGINEER
DAN THOMA, P.E. 6/16/2025 DATE

0 25 50 75

SCALE: 1" = 50'

REV. NO. DATE DESCRIPTION BY

**PAPE-DAWSON
ENGINEERS**

SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

Texas Department of Transportation

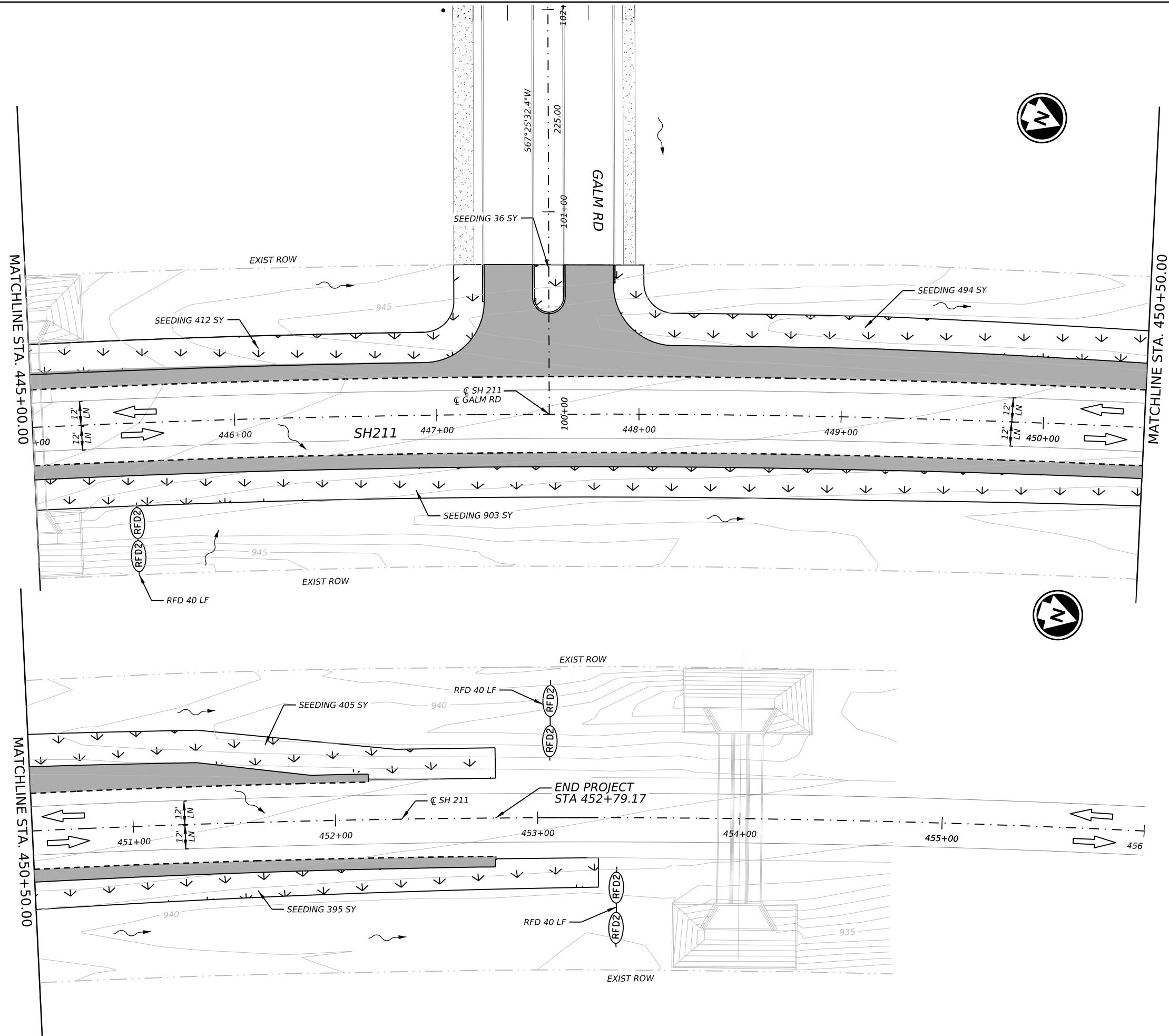
SH 211 TURN LANES AT GALT RD

SW3P LAYOUT

BEGIN TO STA 445+00

SHEET 1 OF 2

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	102



LEGEND

	ROCK FILTER DAM TY 2
	FLOW DIRECTION
	BROADCAST SEED
	DIRECTION OF TRAFFIC
	EXISTING CONTOUR

NOTES:

1. REFER TO TEMPORARY EROSION CONTROL MEASURE STANDARDS FOR ADDITIONAL INFORMATION.
2. CONSTRUCTION ENTRANCE/EXIT LOCATIONS TO BE DETERMINED IN THE FIELD.
3. SW3P CONTROL MEASURES INSTALLED DURING CONSTRUCTION ARE TO REMAIN IN PLACE UNTIL GRASS COVER IS ACHIEVED OR AS APPROVED BY THE ENGINEER.
4. SW3P CONTROLS MAY NEED TO BE MODIFIED IN THE FIELD TO ACCOMPLISH THE DESIRED AFFECT. ALL MODIFICATIONS ARE TO BE NOTED ON THIS SHEET AND SIGNED BY THE RESPONSIBLE PARTY.
5. ALL SW3P CONTROLS ARE TO BE MAINTAINED AND IN WORKING CONDITION AT ALL TIMES.

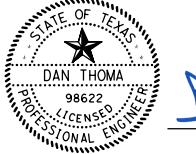
DESIGN



Ernesto Garza Jr., P.E.

5/29/2025

APPROVAL



Dan Thoma

5/29/2025

SCALE: 1" = 50'

REV. NO. DATE DESCRIPTION BY

**PAPE-DAWSON
ENGINEERS**
SAN ANTONIO | AUSTIN | HOUSTON | FORT WORTH | DALLAS
2000 NW LOOP 410 | SAN ANTONIO, TX 78213 | 210.375.9000
TEXAS ENGINEERING FIRM #470 | TEXAS SURVEYING FIRM #1002880

Texas Department of Transportation

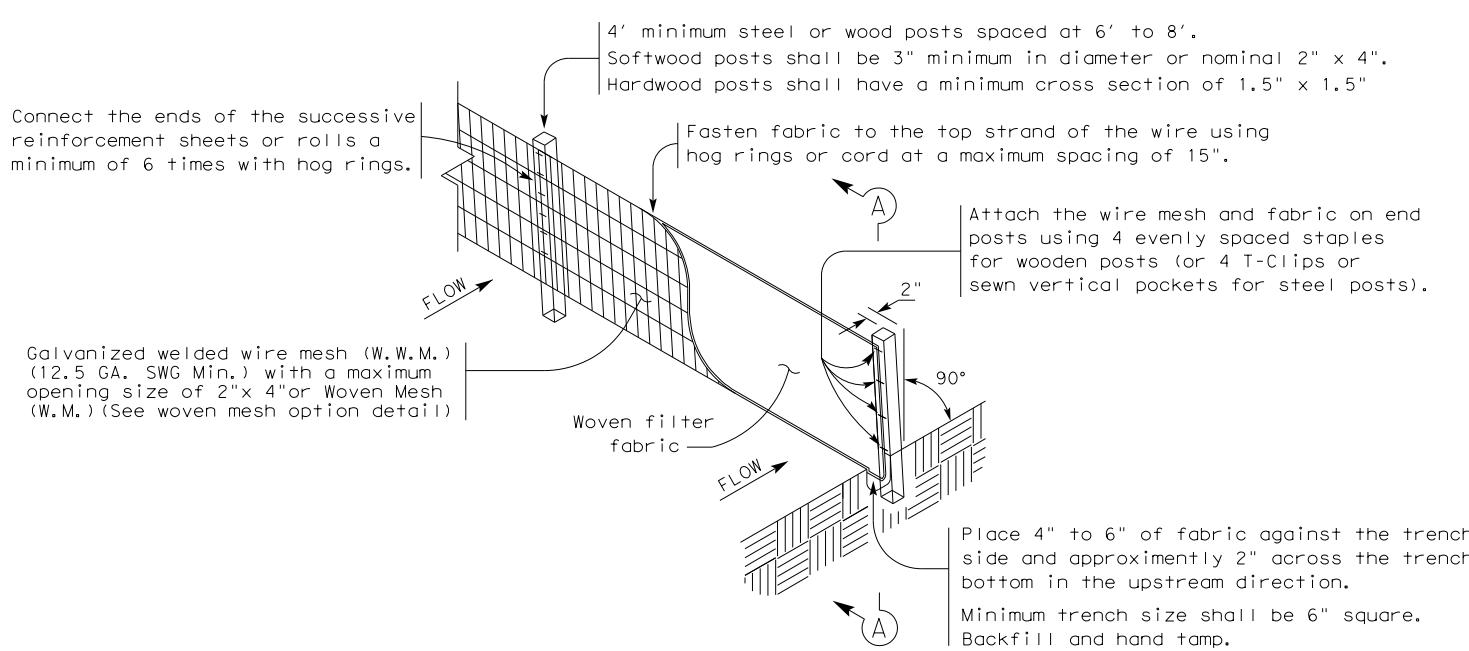
SH 211 TURN LANES AT GALM RD

SW3P LAYOUT

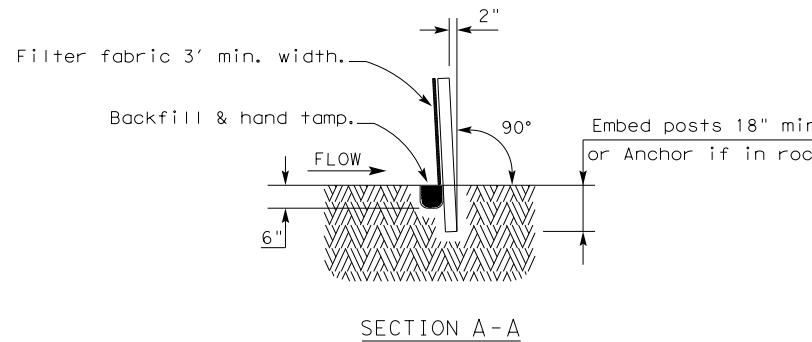
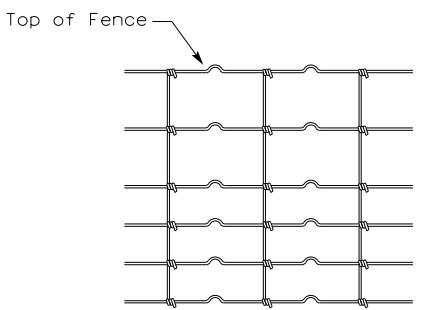
STA 445+00 TO END

SHEET 2 OF 2

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	103



TEMPORARY SEDIMENT CONTROL FENCE



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

Galvanized hinge joint knot woven mesh (12.5 GA.SWG Min.) requires a minimum of five horizontal wires spaced at a maximum of 12 inches apart and all vertical wires spaced at a maximum of 12 inches apart.

SEDIMENT CONTROL FENCE USAGE GUIDELINES

A sediment control fence may be constructed near the downstream perimeter of a disturbed area along a contour to intercept sediment from overland runoff. A 2 year storm frequency may be used to calculate the flow rate to be filtered.

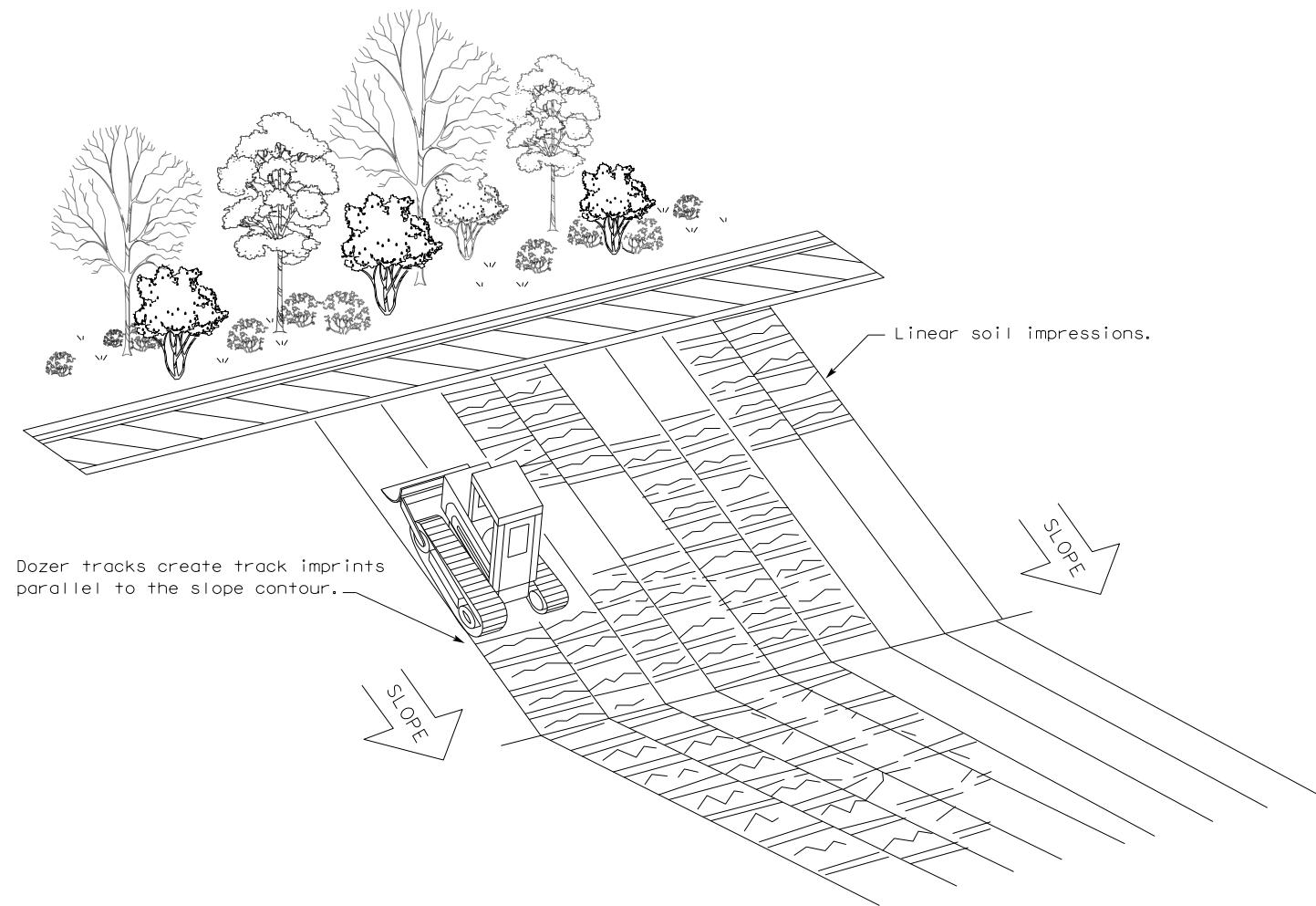
Sediment control fence should be sized to filter a maximum flow through rate of 100 GPM/FT². Sediment control fence is not recommended to control erosion from a drainage area larger than 2 acres.

LEGEND

Sediment Control Fence
SCF

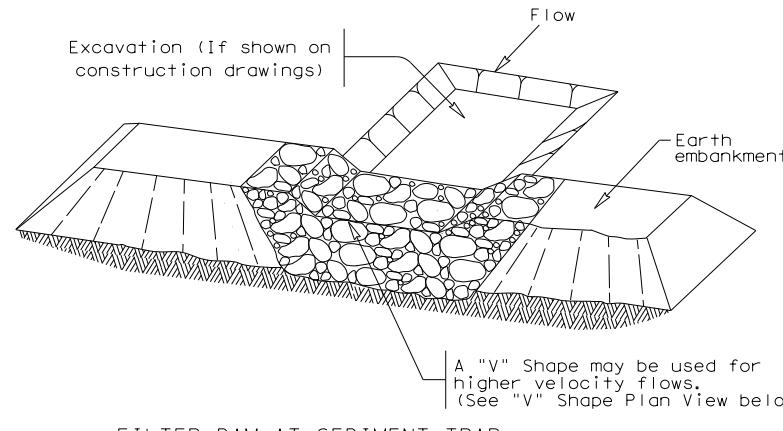
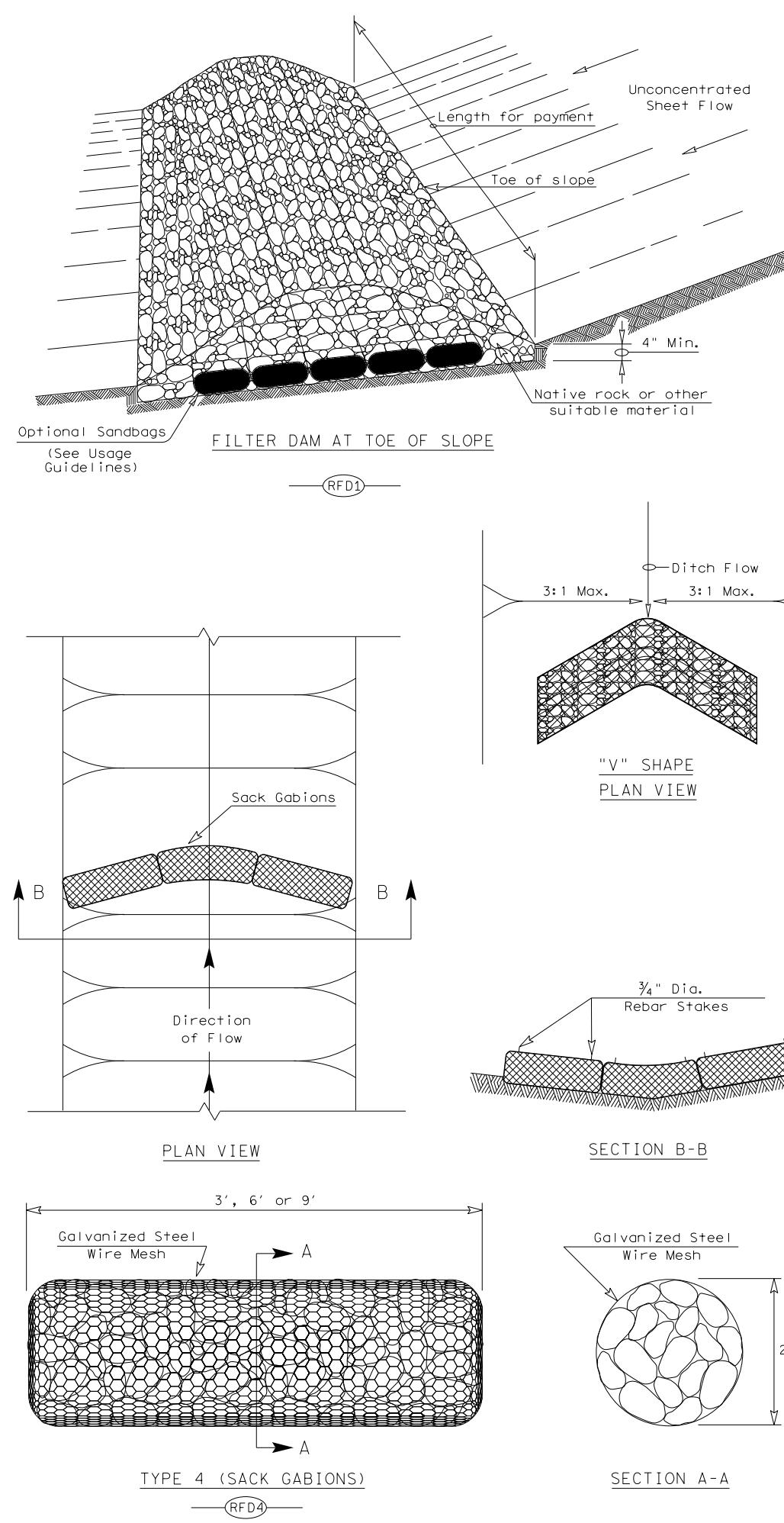
GENERAL NOTES

1. Vertical tracking is required on projects where soil distributing activities have occurred unless otherwise approved.
2. Perform vertical tracking on slopes to temporarily stabilize soil.
3. Provide equipment with a track undercarriage capable of producing linear soil impressions measuring a minimum of 12" in length by 2" to 4" in width by 1/2" to 2" in depth.
4. Do not exceed 12" between track impressions.
5. Install continuous linear track impressions where the minimum 12" length impressions are perpendicular to the slope or direction of water flow.



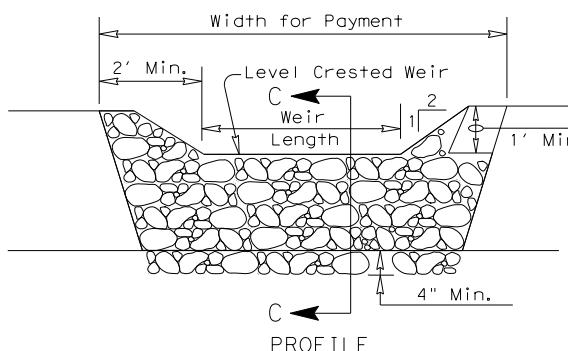
VERTICAL TRACKING

Texas Department of Transportation				Design Division Standard
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE & VERTICAL TRACKING				
EC (1)-16				
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	3544	04	XXX	SH 211
DIST	COUNTY		SHEET NO.	
SAT	MEDINA		104	

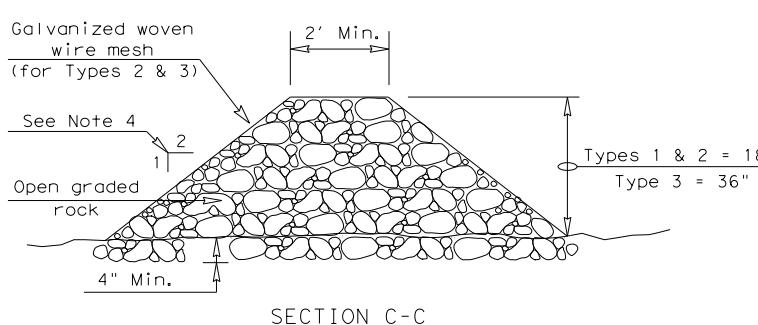


FILTER DAM AT SEDIMENT TRAP

(RFD1) OR (RFD2)



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

Rock Filter Dams should be constructed downstream from disturbed areas to intercept sediment from overland runoff and/or concentrated flow. The dams should be sized to filter a maximum flow through rate of 60 GPM/FT² of cross sectional area. A 2 year storm frequency may be used to calculate the flow rate.

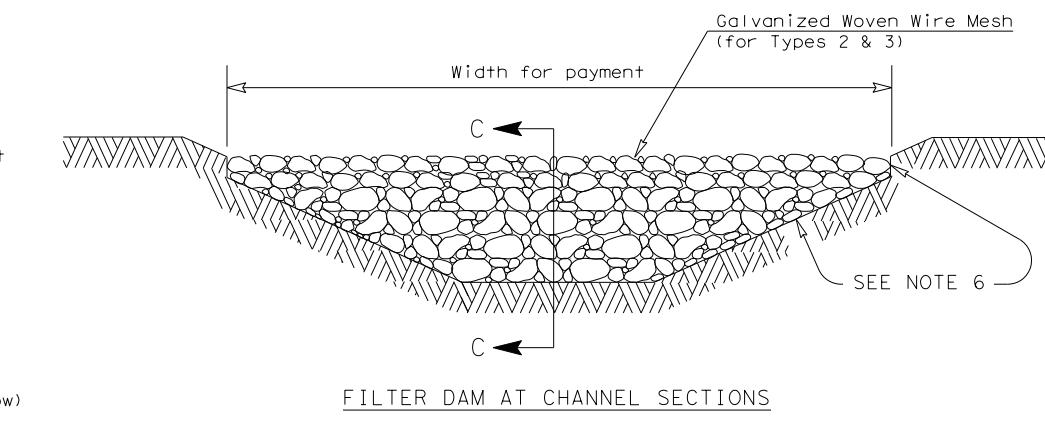
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity flows (approximately 8 Ft/Sec or more) in which aggregate wash out may occur. Sandbags may be used at the embedded foundation (4" deep min.) for better filtering efficiency of low flows if called for on the plans or directed by the Engineer.

Type 2 (18" high with wire mesh) (3" to 6" aggregate): Type 2 may be used in ditches and at dike or swale outlets.

Type 3 (36" high with wire mesh) (4" to 8" aggregate): Type 3 may be used in stream flow and should be secured to the stream bed.

Type 4 (Sack gabions) (3" to 6" aggregate): Type 4 May be used in ditches and smaller channels to form an erosion control dam.

Type 5: Provide rock filter dams as shown on plans.



FILTER DAM AT CHANNEL SECTIONS

(RFD1) OR (RFD2) OR (RFD3)

GENERAL NOTES

- If shown on the plans or directed by the Engineer, filter dams should be placed near the toe of slopes where erosion is anticipated, upstream and/or downstream at drainage structures, and in roadway ditches and channels to collect sediment.
- Materials (aggregate, wire mesh, sandbags, etc.) shall be as indicated by the specification for "Rock Filter Dams for Erosion and Sedimentation Control".
- The rock filter dam dimensions shall be as indicated on the SW3P plans.
- Side slopes should be 2:1 or flatter. Dams within the safety zone shall have sideslopes of 6:1 or flatter.
- Maintain a minimum of 1' between top of rock filter dam weir and top of embankment for filter dams at sediment traps.
- Filter dams should be embedded a minimum of 4" into existing ground.
- The sediment trap for ponding of sediment laden runoff shall be of the dimensions shown on the plans.
- Rock filter dam types 2 & 3 shall be secured with 20 gauge galvanized woven wire mesh with 1" diameter hexagonal openings. The aggregate shall be placed on the mesh to the height & slopes specified. The mesh shall be folded at the upstream side over the aggregate and tightly secured to itself on the downstream side using wire ties or hog rings. For in stream use, the mesh should be secured or staked to the stream bed prior to aggregate placement.
- Sack Gabions should be staked down with $\frac{3}{4}$ " dia. rebar stakes, and have a double-twisted hexagonal weave with a nominal mesh opening of $2\frac{1}{2}$ " x $3\frac{1}{4}$ ".
- Flow outlet should be onto a stabilized area (vegetation, rock, etc.).
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.

PLAN SHEET LEGEND

Type 1 Rock Filter Dam	(RFD1)
Type 2 Rock Filter Dam	(RFD2)
Type 3 Rock Filter Dam	(RFD3)
Type 4 Rock Filter Dam	(RFD4)



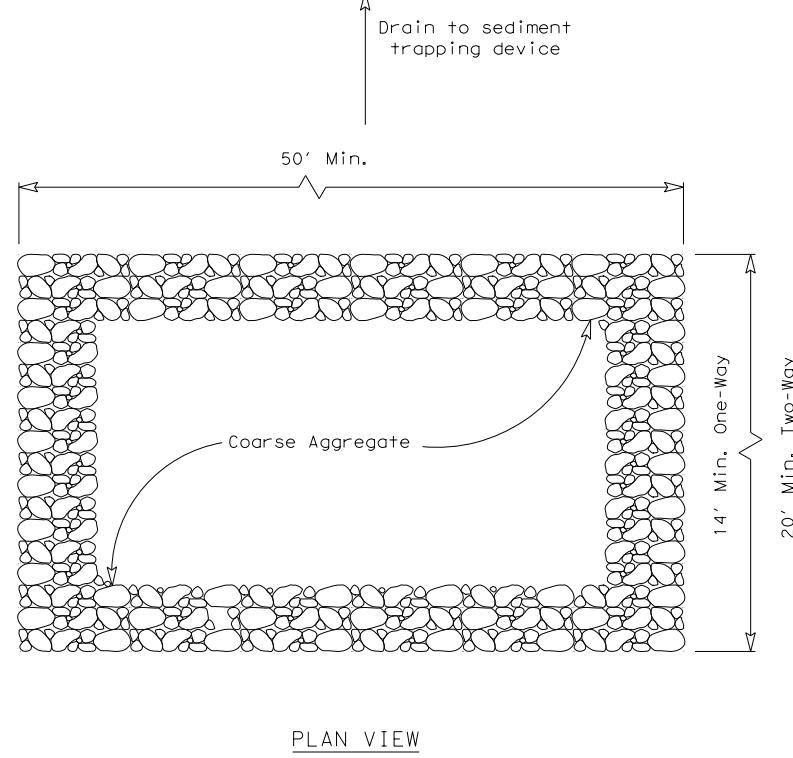
Texas Department of Transportation

Design
Division
Standard

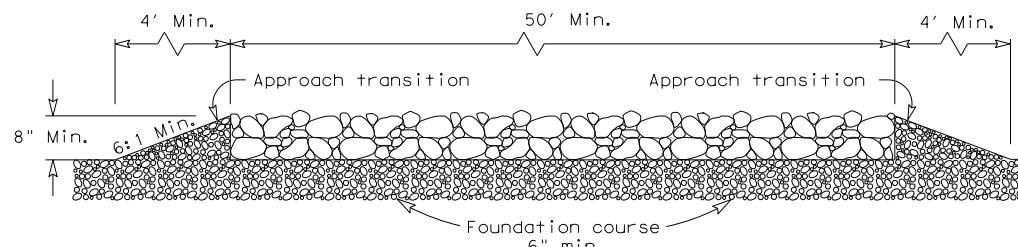
TEMPORARY EROSION,
SEDIMENT AND WATER
POLLUTION CONTROL MEASURES
ROCK FILTER DAMS

EC (2)-16

FILE: ec216	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	3544	04	XXX	SH 211
DIST	COUNTY			SHEET NO.
SAT	MEDINA			105



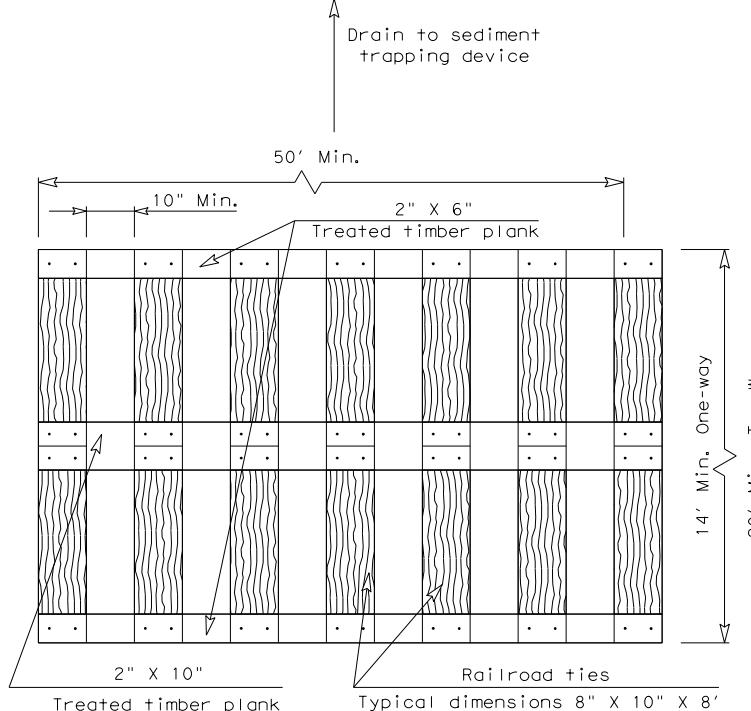
PLAN VIEW



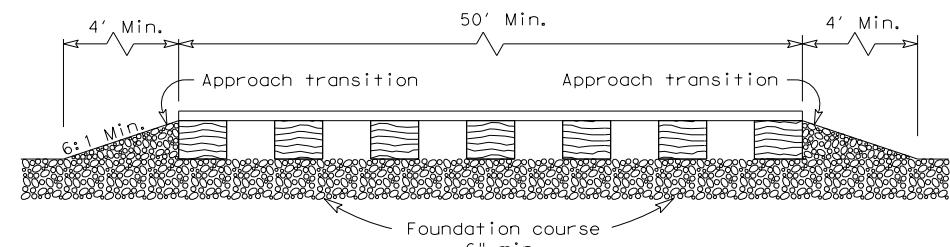
CONSTRUCTION EXIT (TYPE 1)
ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

1. The length of the type 1 construction exit shall be as indicated on the plans, but not less than 50'.
2. The coarse aggregate should be open graded with a size of 4" to 8".
3. The approach transitions should be no steeper than 6:1 and constructed as directed by the Engineer.
4. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other materials approved by the Engineer.
5. The construction exit shall be graded to allow drainage to a sediment trapping device.
6. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
7. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.



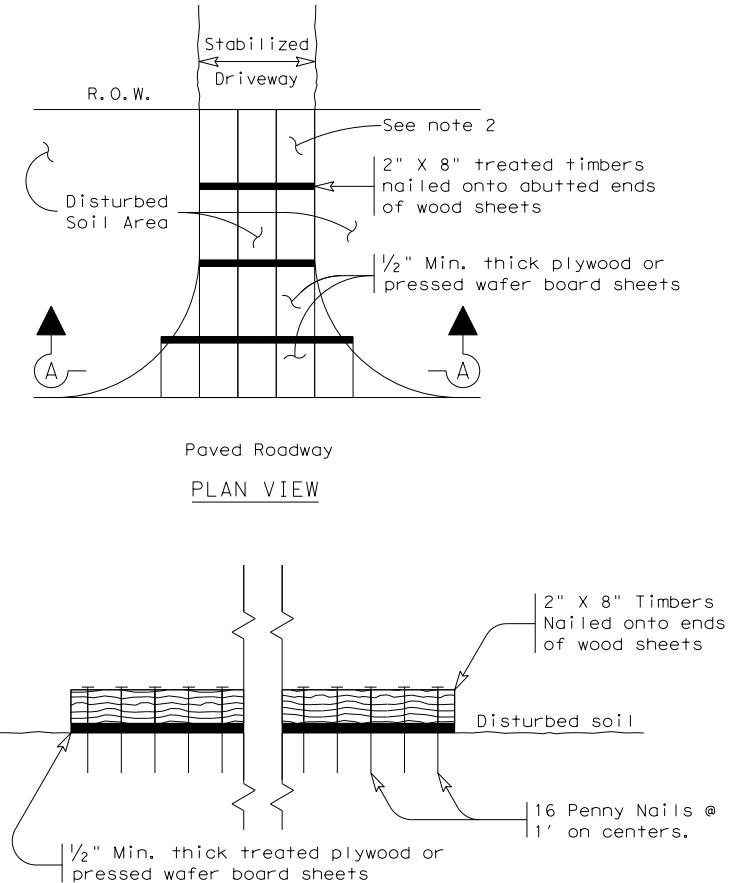
PLAN VIEW



CONSTRUCTION EXIT (TYPE 2)
TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with $\frac{1}{2}" \times 6"$ min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

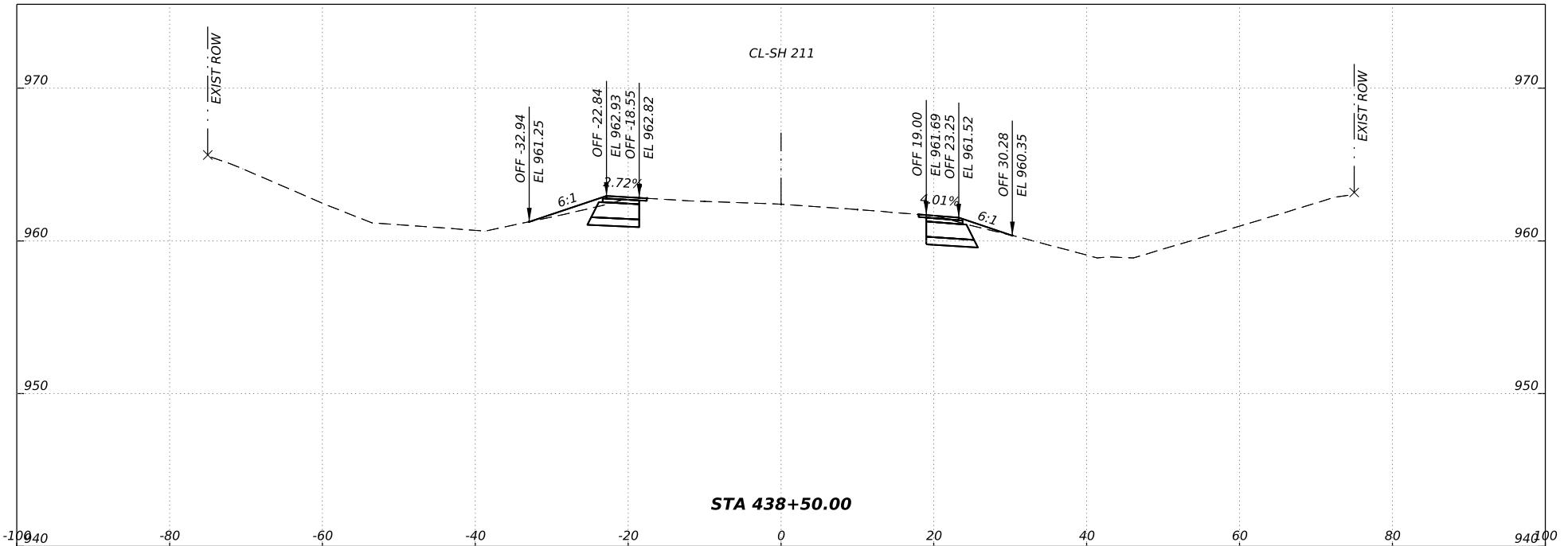


SECTION A-A
CONSTRUCTION EXIT (TYPE 3)
SHORT TERM

GENERAL NOTES (TYPE 3)

1. The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
2. The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The guidelines shown hereon are suggestions only and may be modified by the Engineer.

Design Division Standard			
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES CONSTRUCTION EXITS			
EC (3) - 16			
FILE: ec316	DN: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONT	SECT	HIGHWAY
REVISIONS	3544 04	XXX	SH 211
DIST	COUNTY	SHEET NO.	
SAT	MEDINA	106	



SCALE: PLAN 1"=20' PROFILE: 1"=10'

0 10 20

REV. NO. DATE DESCRIPTION BY

PAPE-DAWSON
ENGINEERS
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

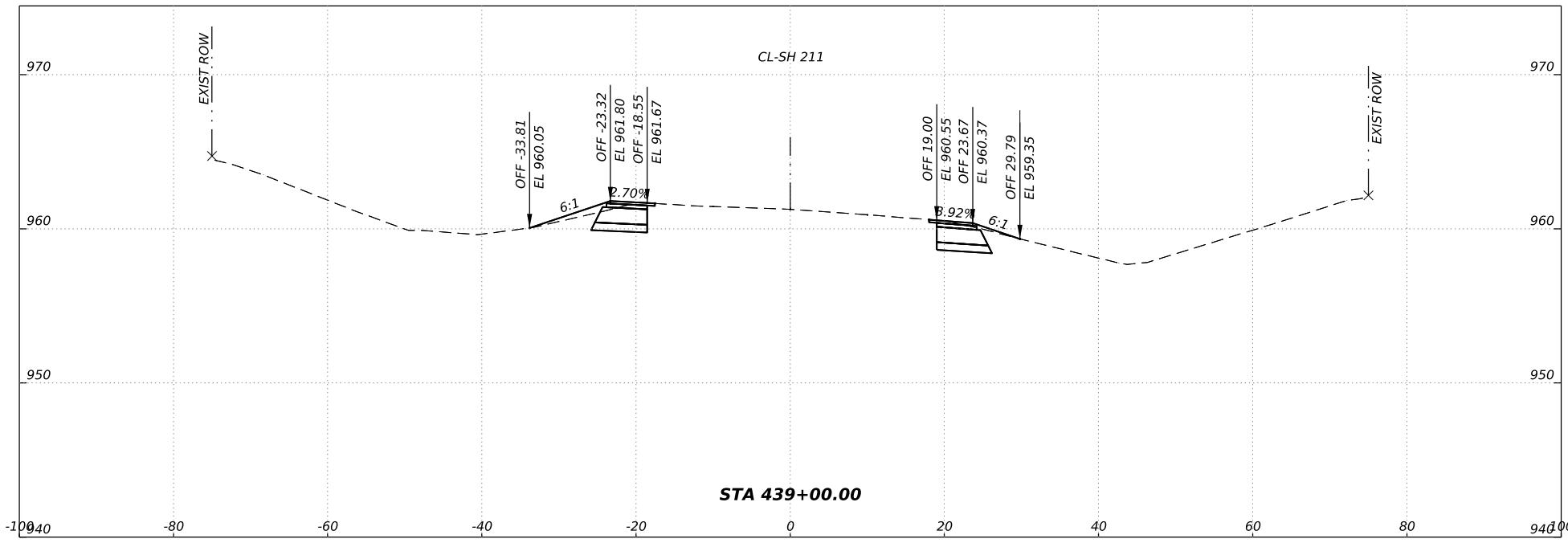
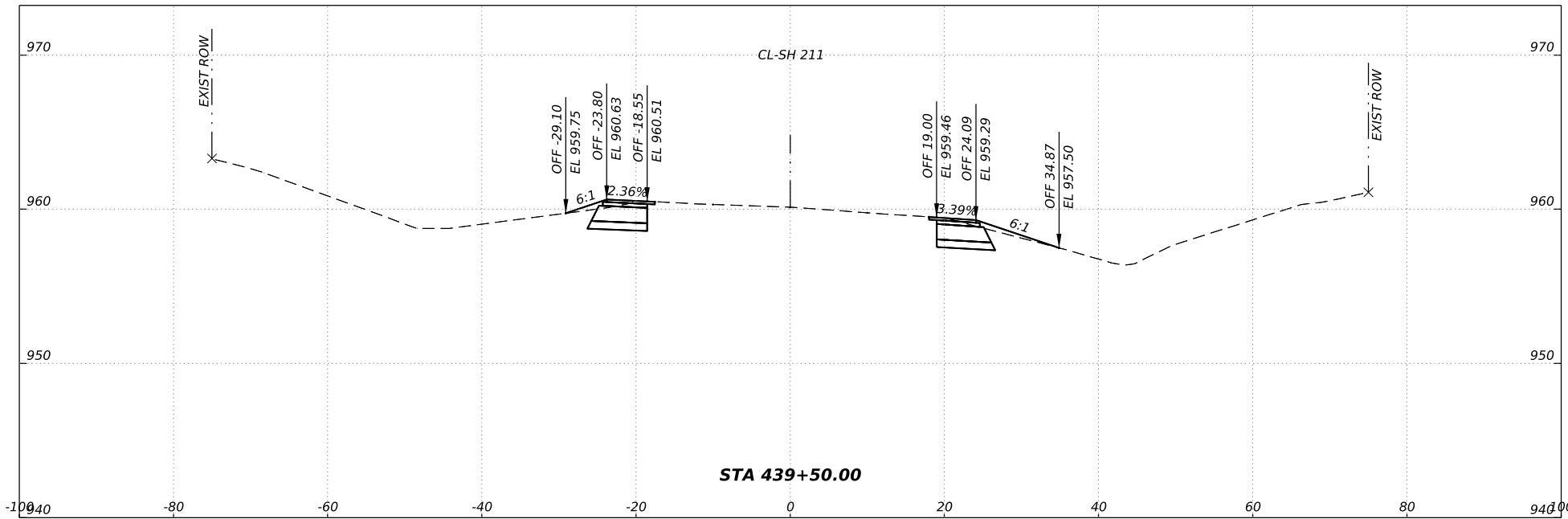
Texas Department of Transportation

SH 211 TURN LANES AT GALT RD

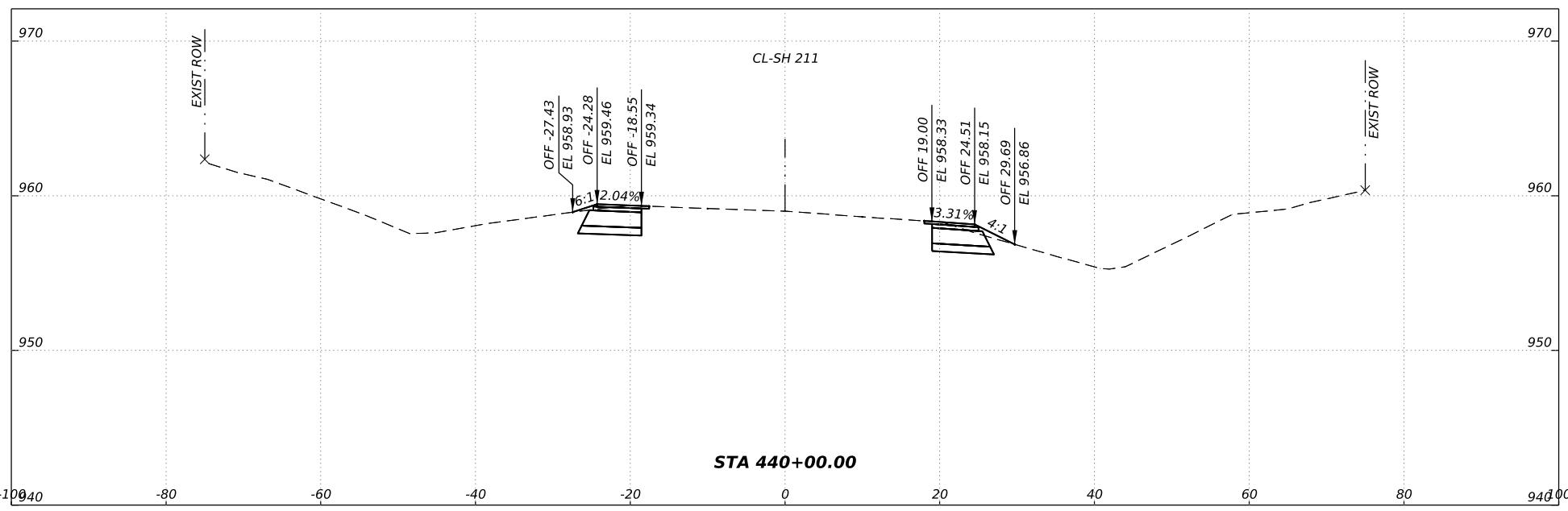
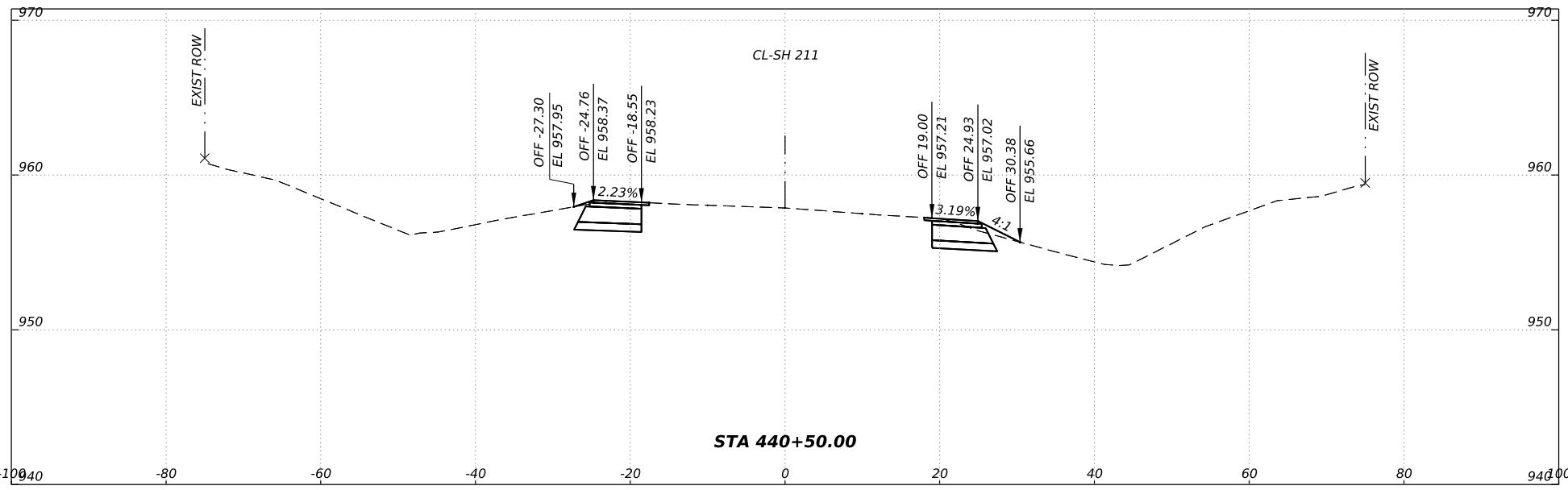
CROSS SECTIONS

SHEET 1 OF 13

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST	COUNTY		SHEET NO.
SAT	MEDINA		107



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SCALE: PLAN 1"=20'			PROFILE: 1"=10'	
REV. NO.		DATE	DESCRIPTION	
PL		PAPE-DAWSON ENGINEERS		
SAN ANTONIO AUSTIN HOUSTON FORT WORTH DALLAS				
2000 NW LOOP 410 SAN ANTONIO, TX 78213 210.375.9000				
TEXAS ENGINEERING FIRM #470 TEXAS SURVEYING FIRM #10028800				
				
Texas Department of Transportation				
SH 211 TURN LANES AT GALM RD				
CROSS SECTIONS				
SHEET 2 OF 13				
CONT	SECT	JOB	HIGHWAY	
3544	04	XXX	SH 211	
DIST	COUNTY			SHEET NO.
SAT	MEDINA			108



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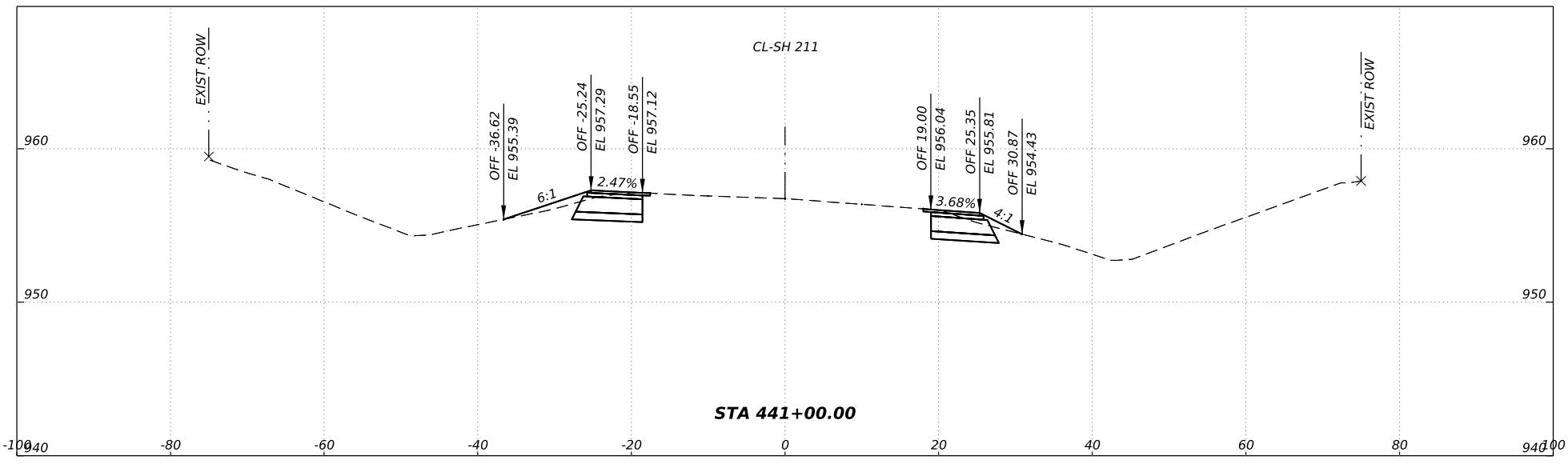
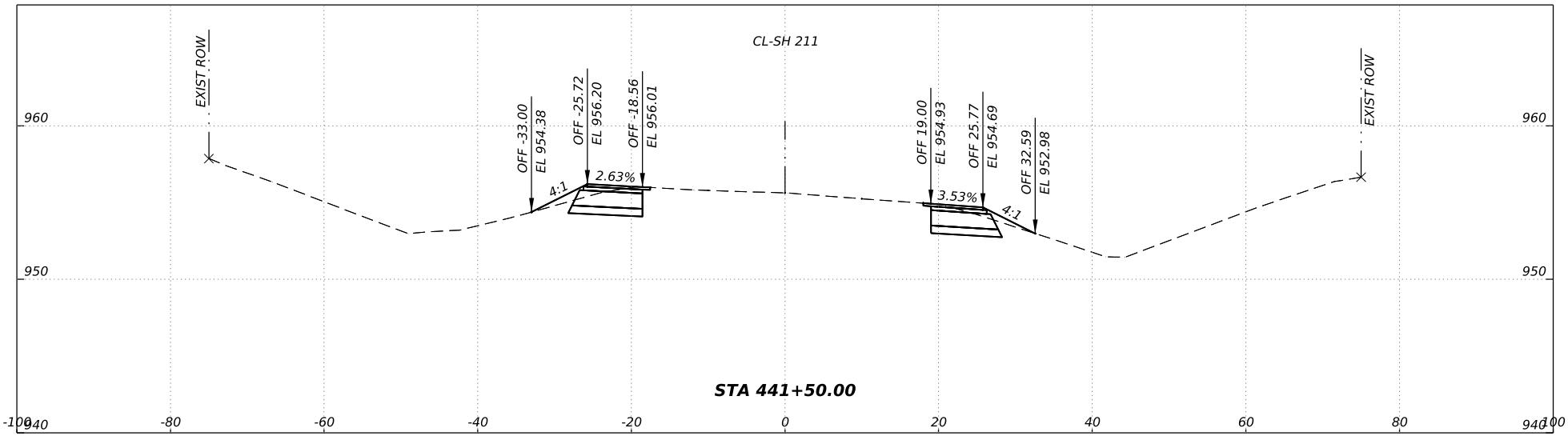
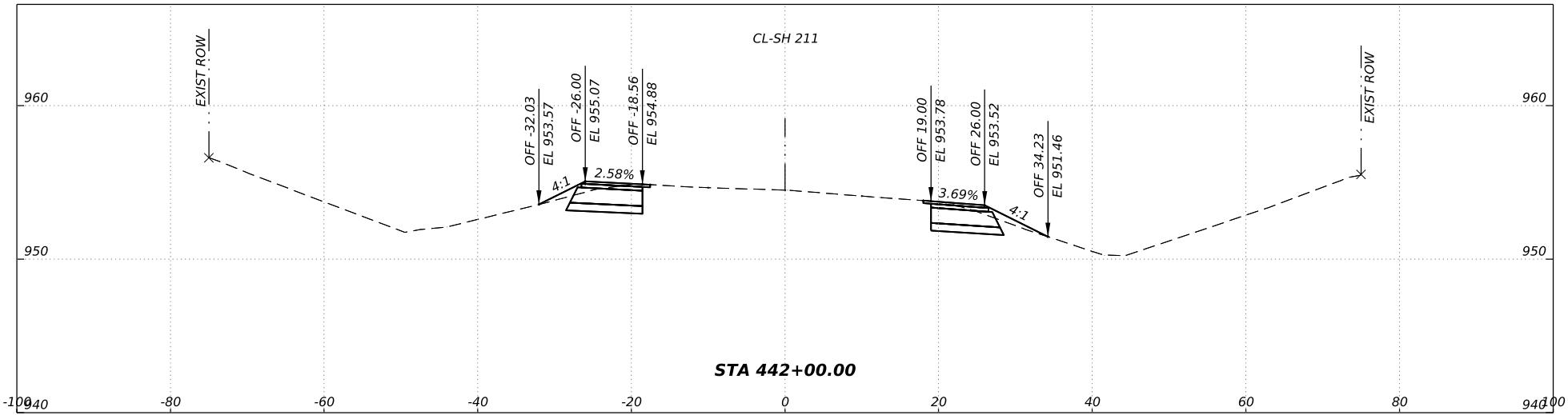
PAPE-DAWSON ENGINEERS
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2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

Texas Department of Transportation
SH 211 TURN LANES AT GALT RD

CROSS SECTIONS

SHEET 3 OF 13

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	109



SCALE: PLAN 1"=20' PROFILE: 1"=10'

REV. NO. DATE DESCRIPTION BY

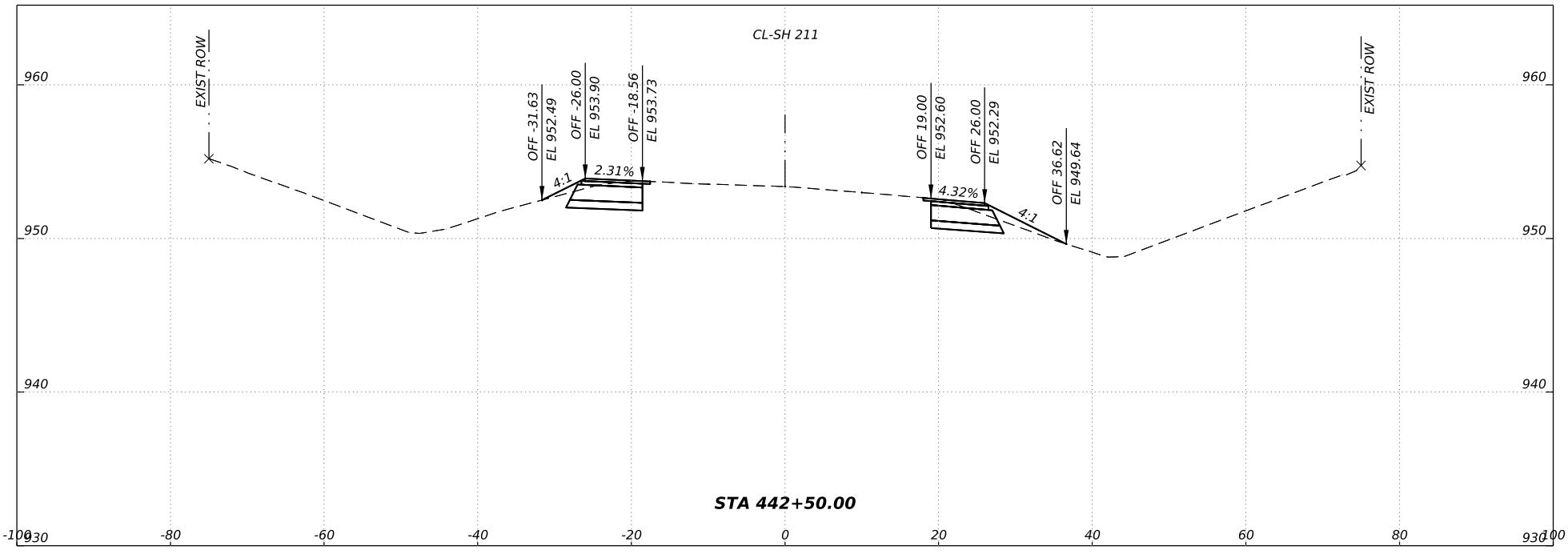
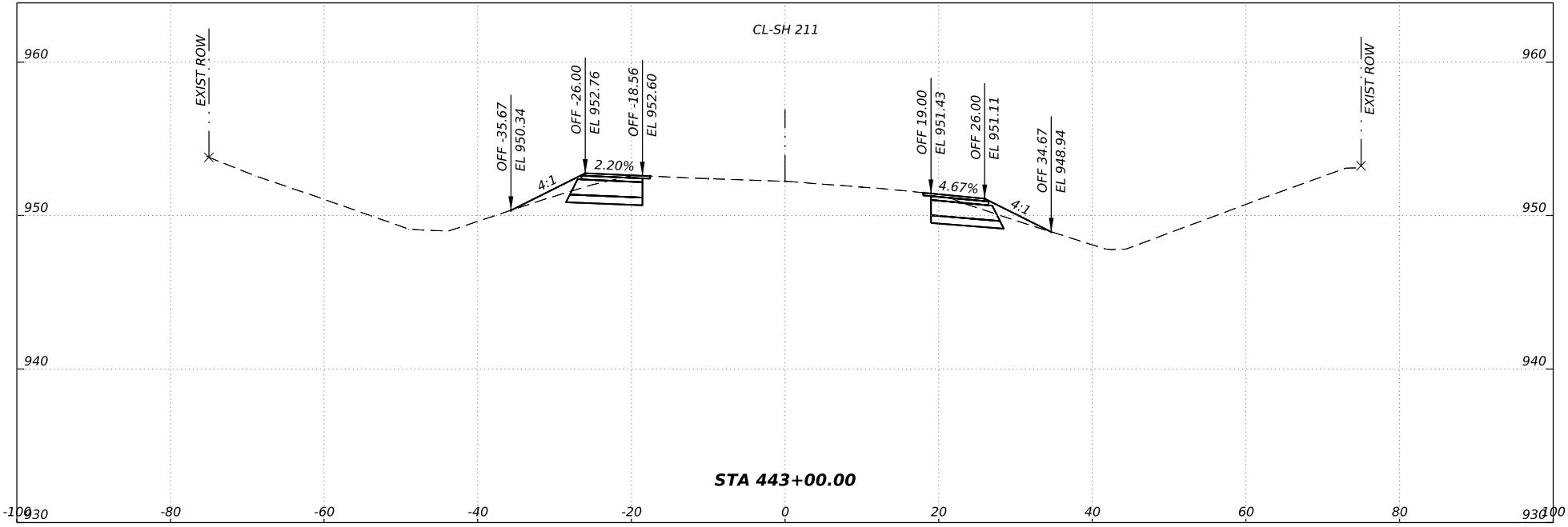
**PAPE-DAWSON
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2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

Texas Department of Transportation
SH 211 TURN LANES AT GALT RD

CROSS SECTIONS

SHEET 4 OF 13

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	110



SCALE: PLAN 1"=20'		PROFILE: 1"=10'	
REV. NO.	DATE	DESCRIPTION	BY

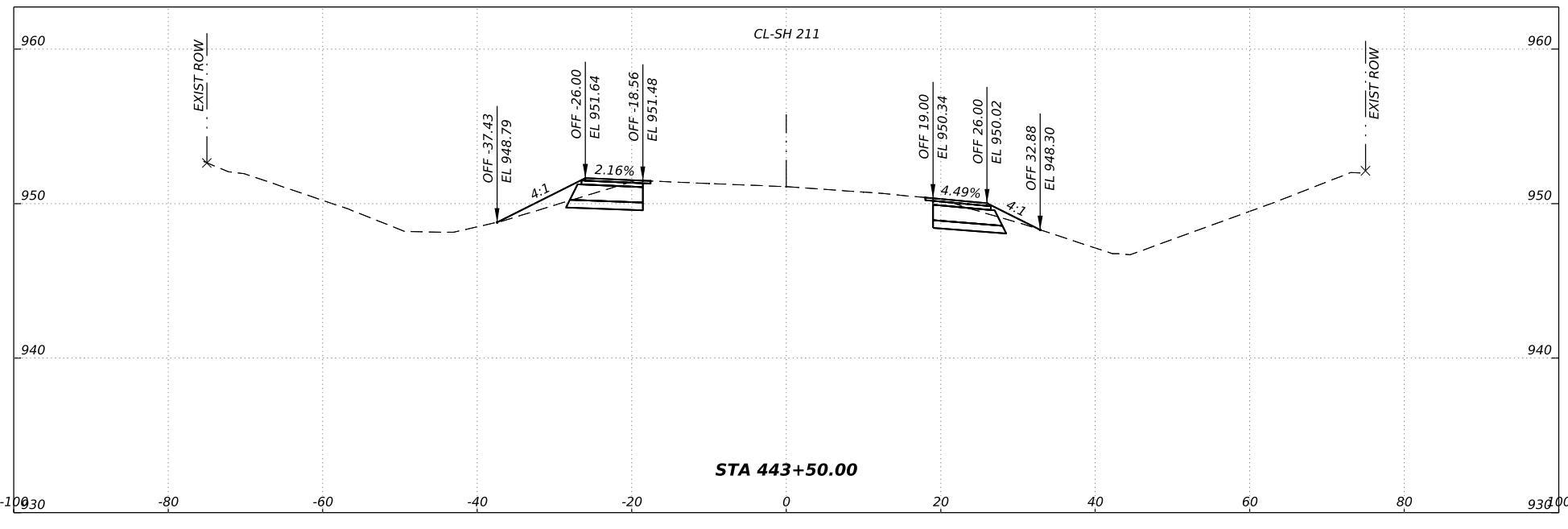
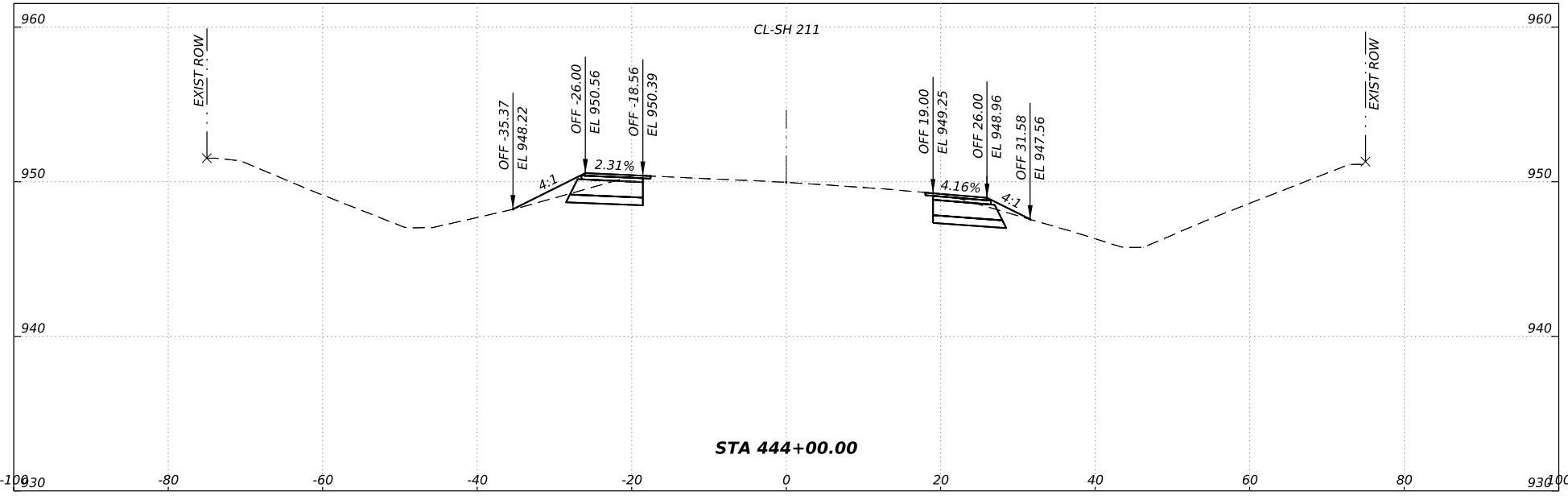
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TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #1002880

Texas Department of Transportation
SH 211 TURN LANES AT GALT RD

CROSS SECTIONS

SHEET 5 OF 13

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	111



SCALE: PLAN 1"=20' PROFILE: 1"=10'

REV. NO. DATE DESCRIPTION BY

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SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

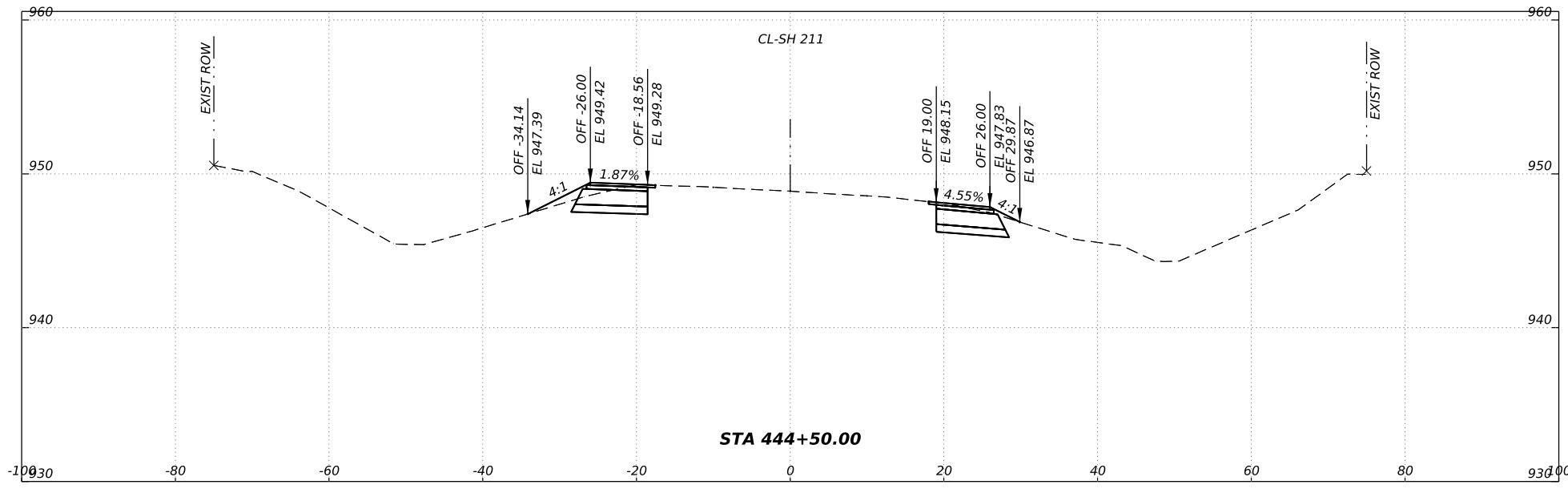
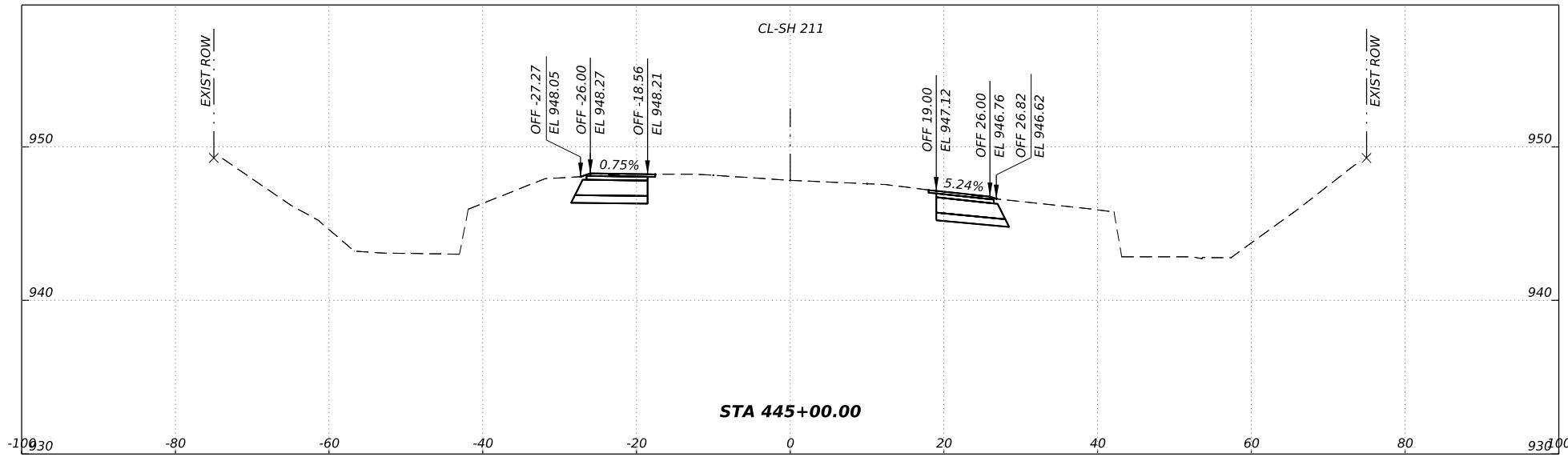
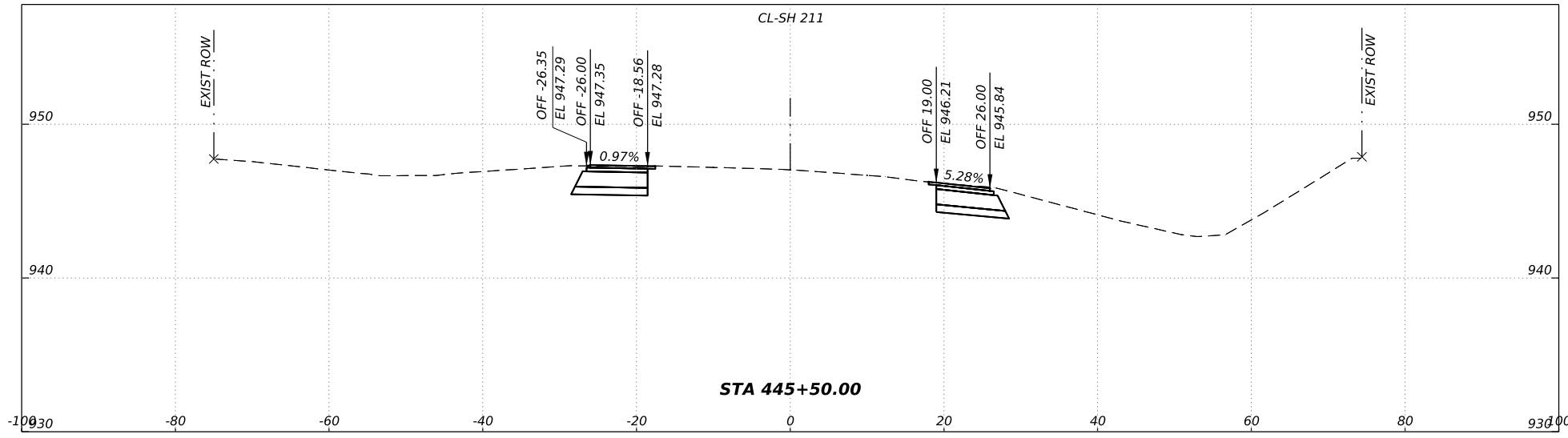
Texas Department of Transportation

SH 211 TURN LANES AT GALT RD

CROSS SECTIONS

SHEET 6 OF 13

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	112



SCALE: PLAN 1"=20' PROFILE: 1"=10'

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REV. NO. DATE DESCRIPTION BY

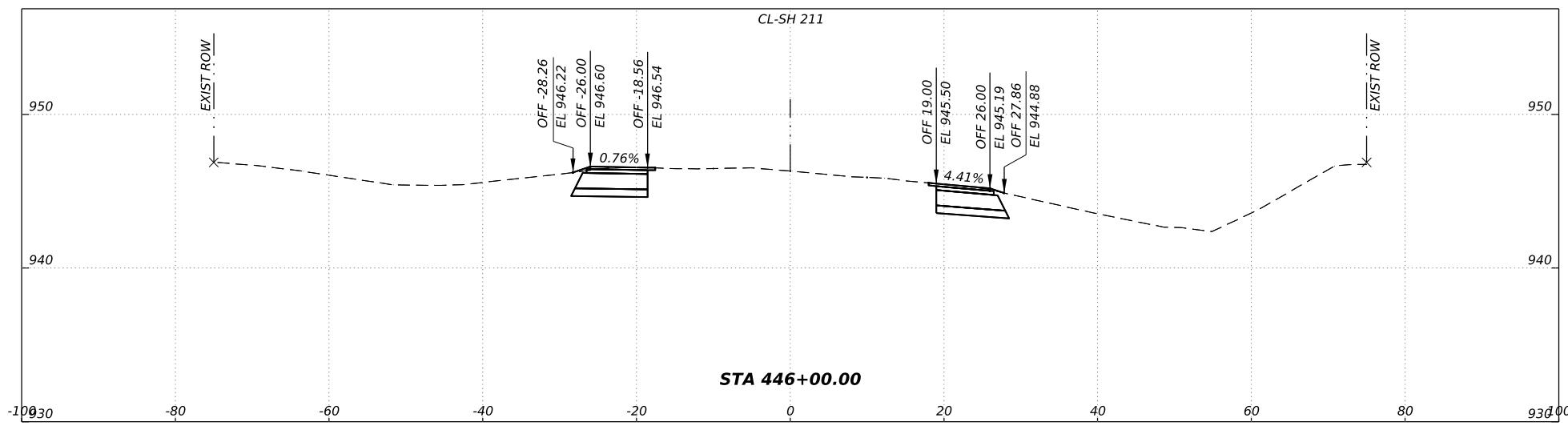
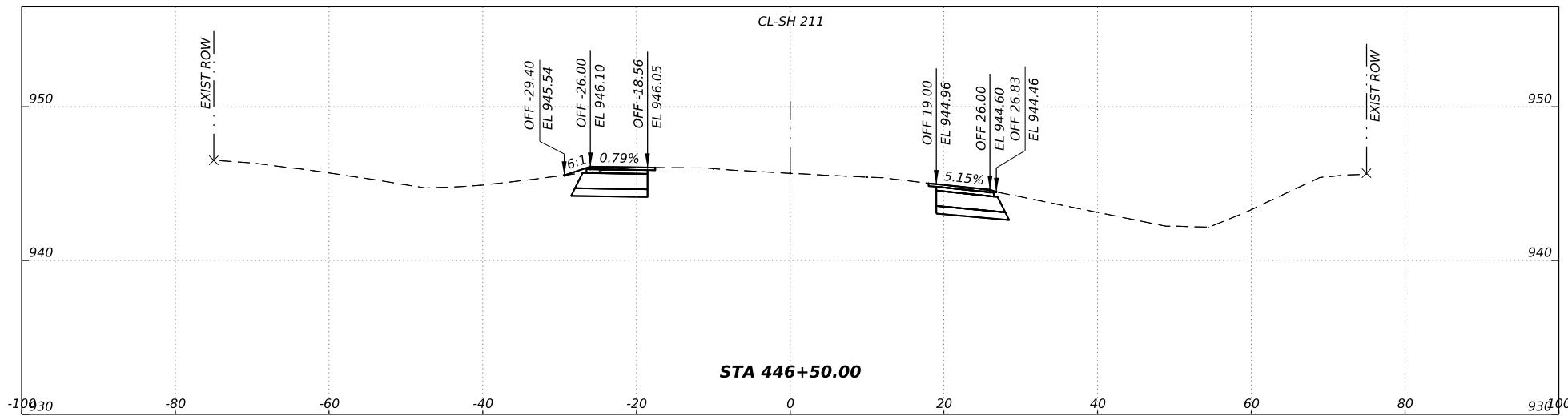
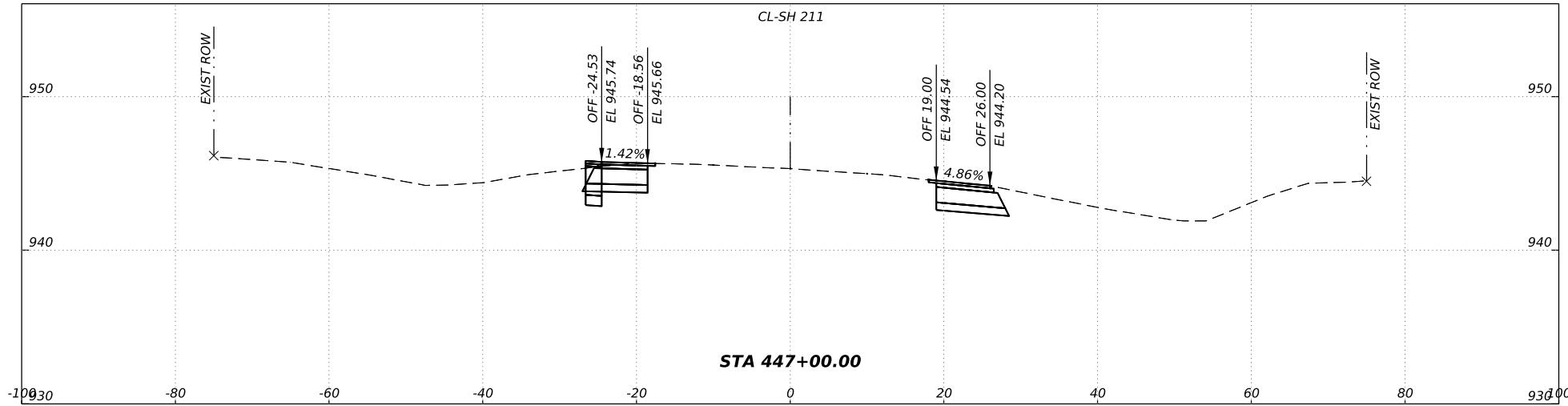
**PAPE-DAWSON
ENGINEERS**
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

Texas Department of Transportation
SH 211 TURN LANES AT GALT RD

CROSS SECTIONS

SHEET 7 OF 13

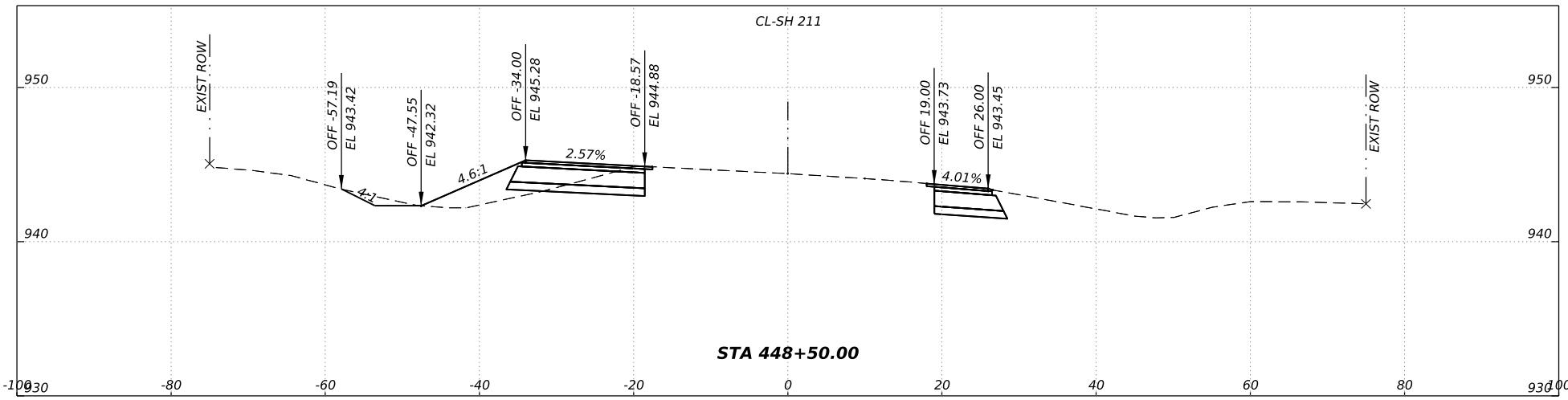
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3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	113

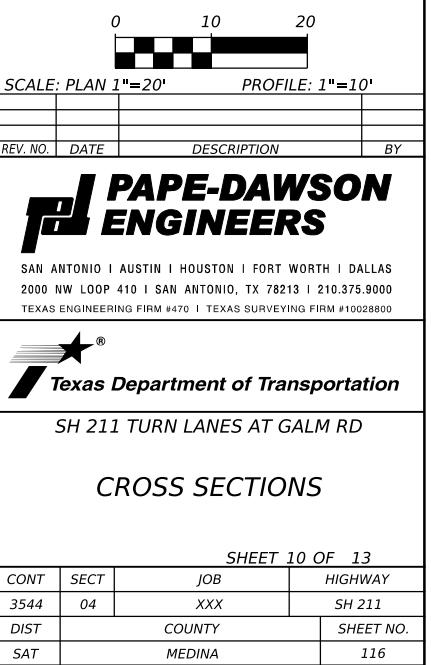
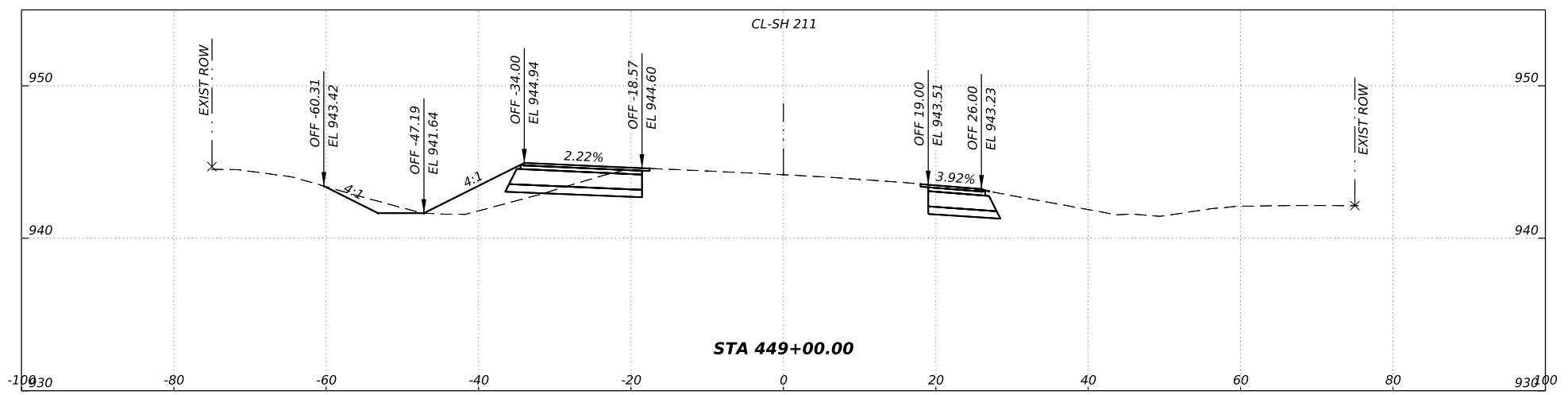
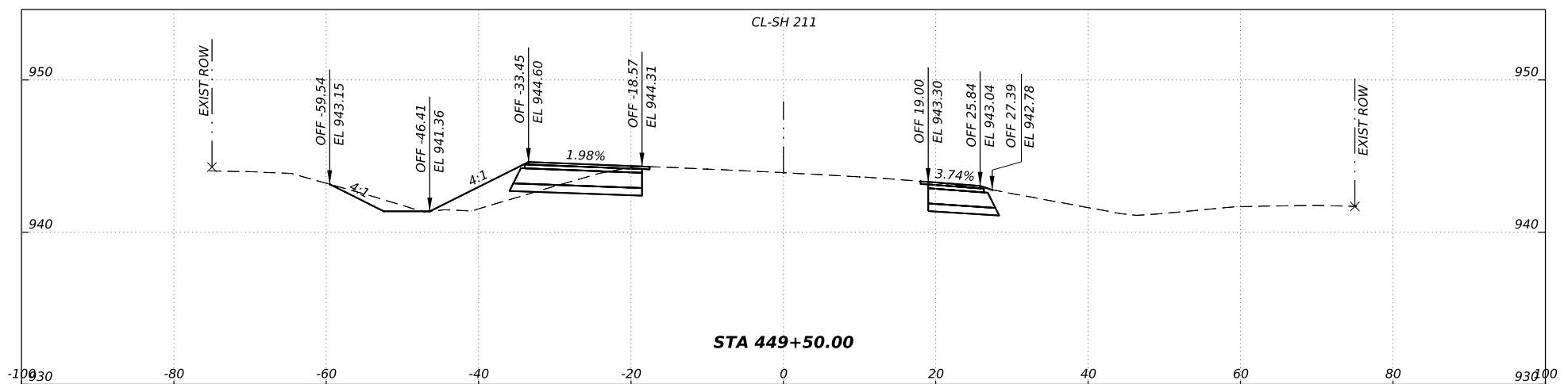
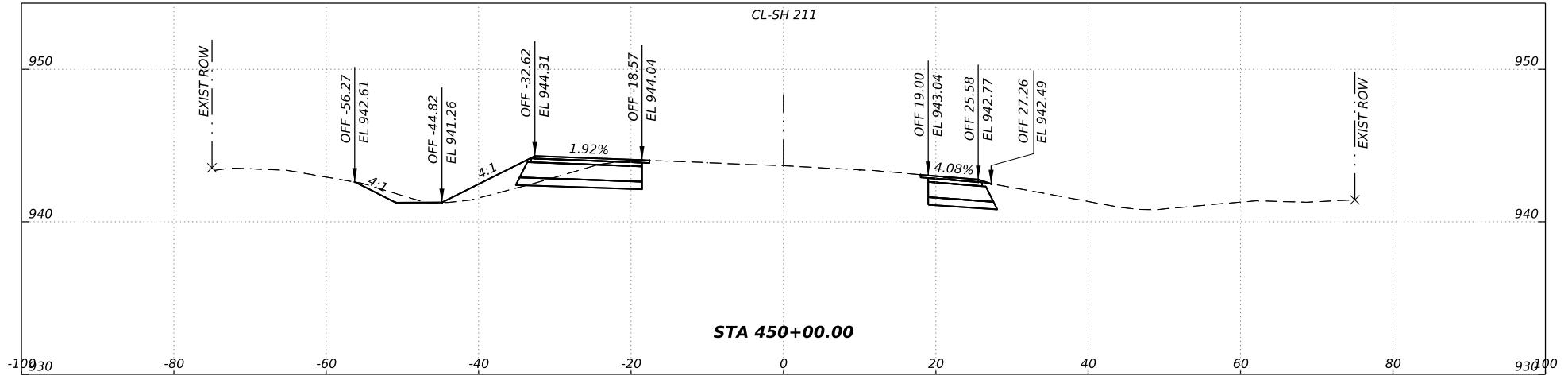


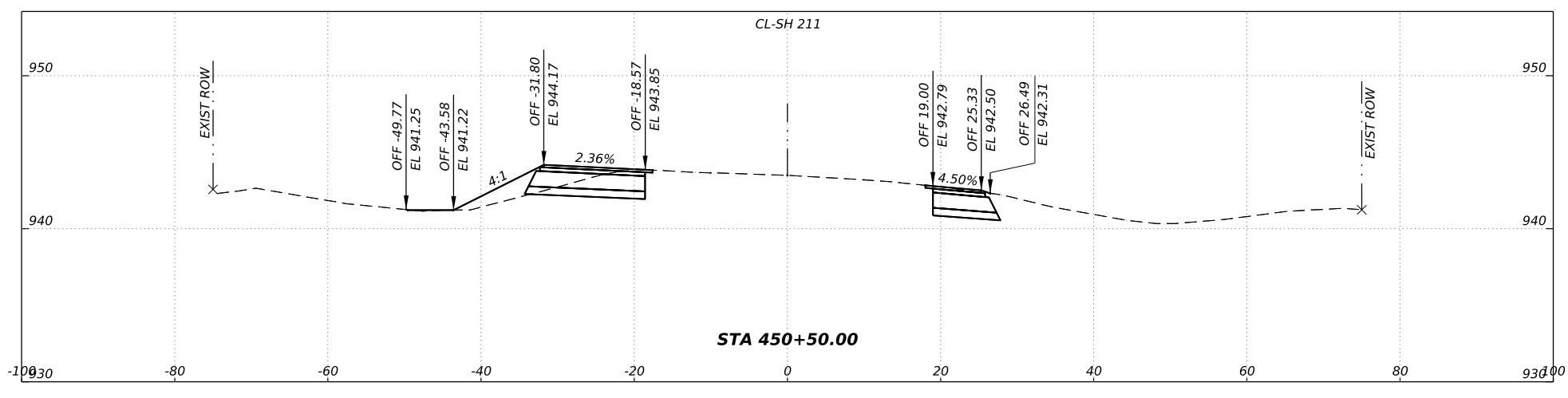
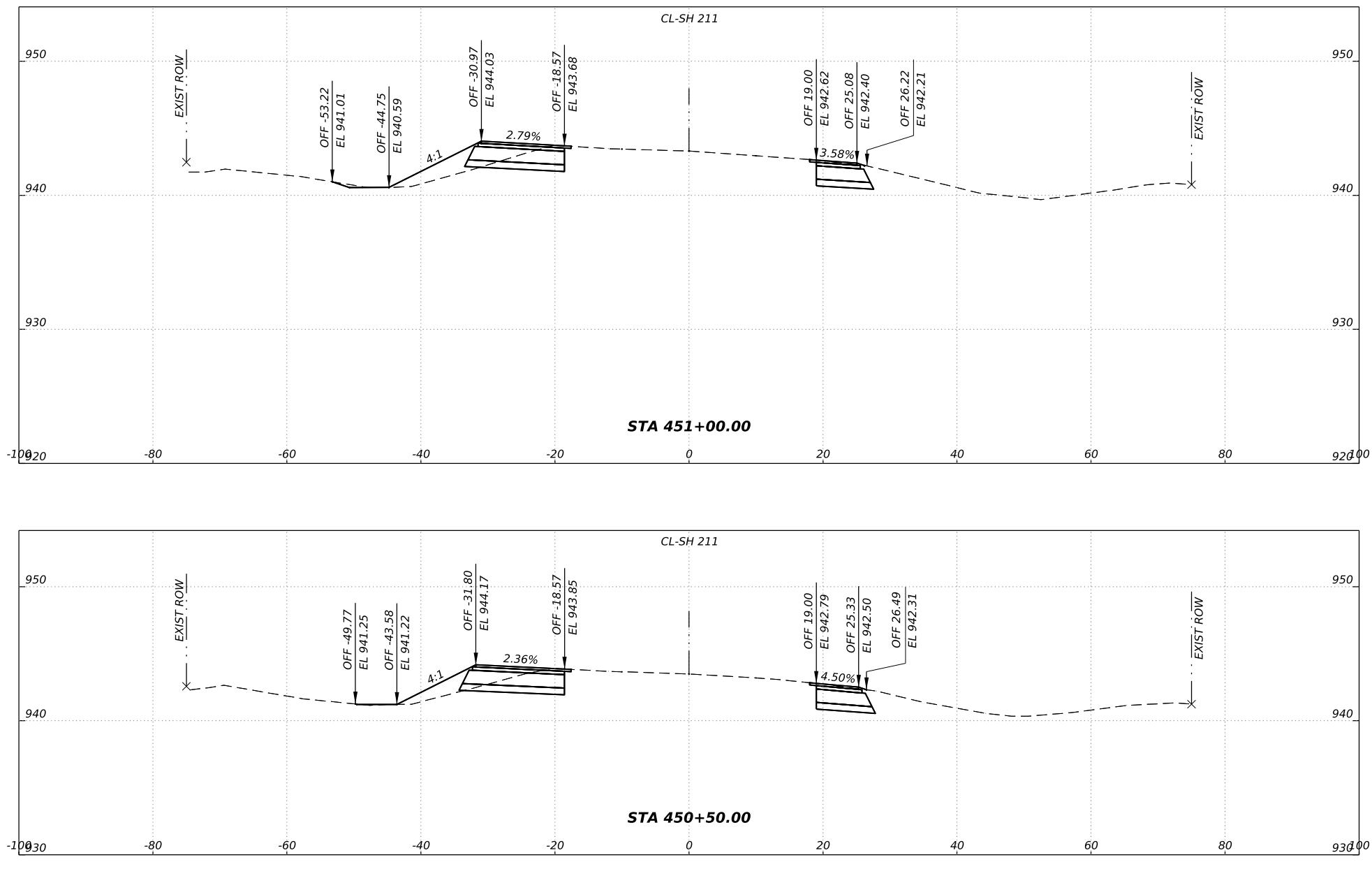
SCALE: PLAN 1"=20' PROFILE: 1"=10'

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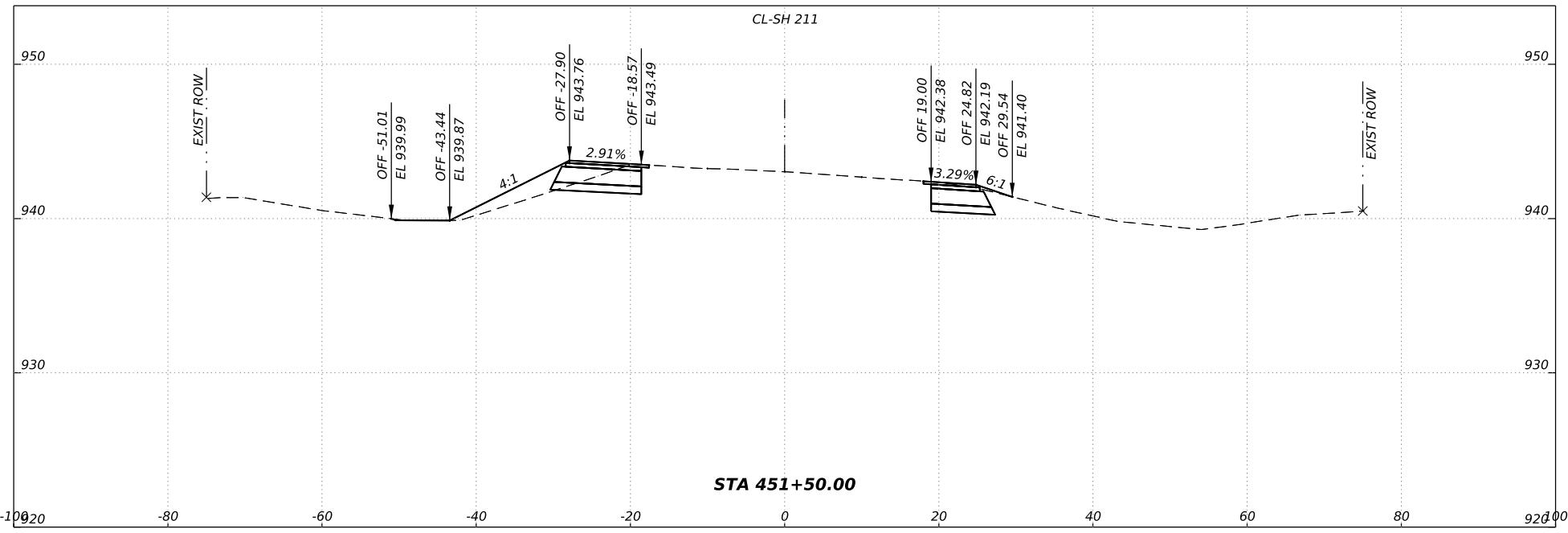
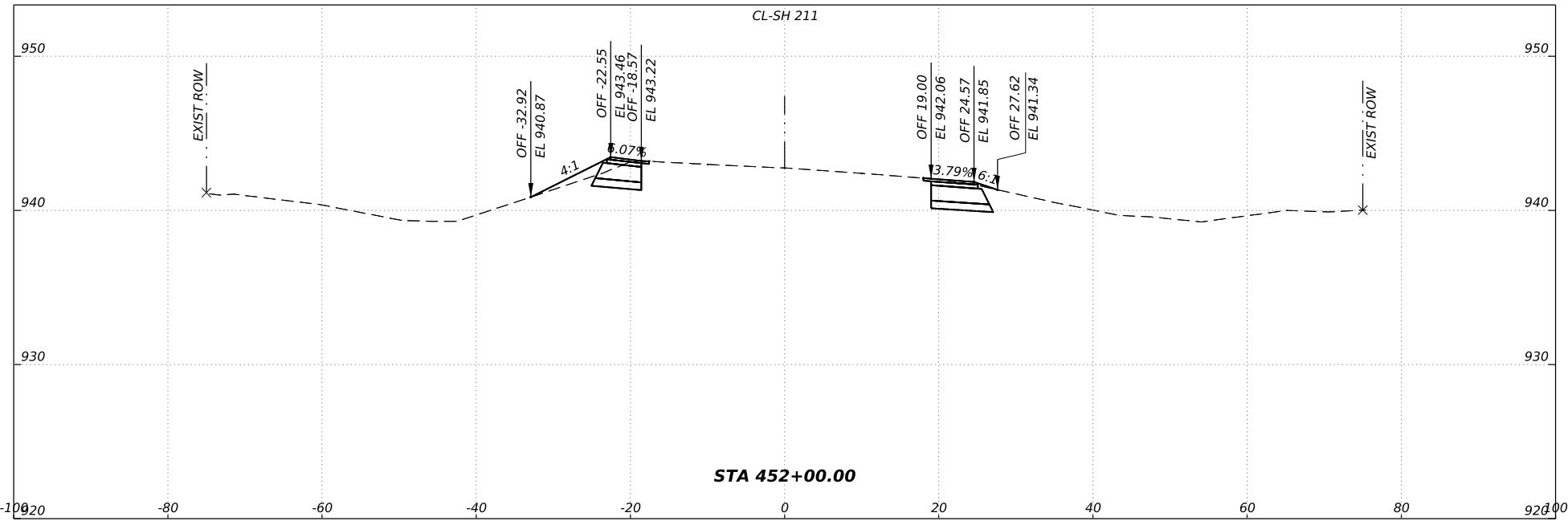
REV. NO.	DATE	DESCRIPTION	BY
PAPE-DAWSON ENGINEERS			
SAN ANTONIO AUSTIN HOUSTON FORT WORTH DALLAS 2000 NW LOOP 410 SAN ANTONIO, TX 78213 210.375.9000 TEXAS ENGINEERING FIRM #470 TEXAS SURVEYING FIRM #10028800			
 Texas Department of Transportation			
SH 211 TURN LANES AT GALT RD			
CROSS SECTIONS			
SHEET 8 OF 13			
CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST		COUNTY	SHEET NO.
SAT		MEDINA	114







0		10	20	
				
SCALE: PLAN 1"=20'			PROFILE: 1"=10'	
REV. NO.		DATE	DESCRIPTION	
PJ		PAPE-DAWSON ENGINEERS		
SAN ANTONIO AUSTIN HOUSTON FORT WORTH DALLAS				
2000 NW LOOP 410 SAN ANTONIO, TX 78213 210.375.9000				
TEXAS ENGINEERING FIRM #470 TEXAS SURVEYING FIRM #10028800				
 Texas Department of Transportation				
SH 211 TURN LANES AT GALM RD				
CROSS SECTIONS				
SHEET 11 OF 13				
CONT	SECT	JOB	HIGHWAY	
3544	04	XXX	SH 211	
DIST	COUNTY			SHEET NO.
SAT	MEDINA			117



SCALE: PLAN 1"=20' PROFILE: 1"=10'

0 10 20

REV. NO. DATE DESCRIPTION BY

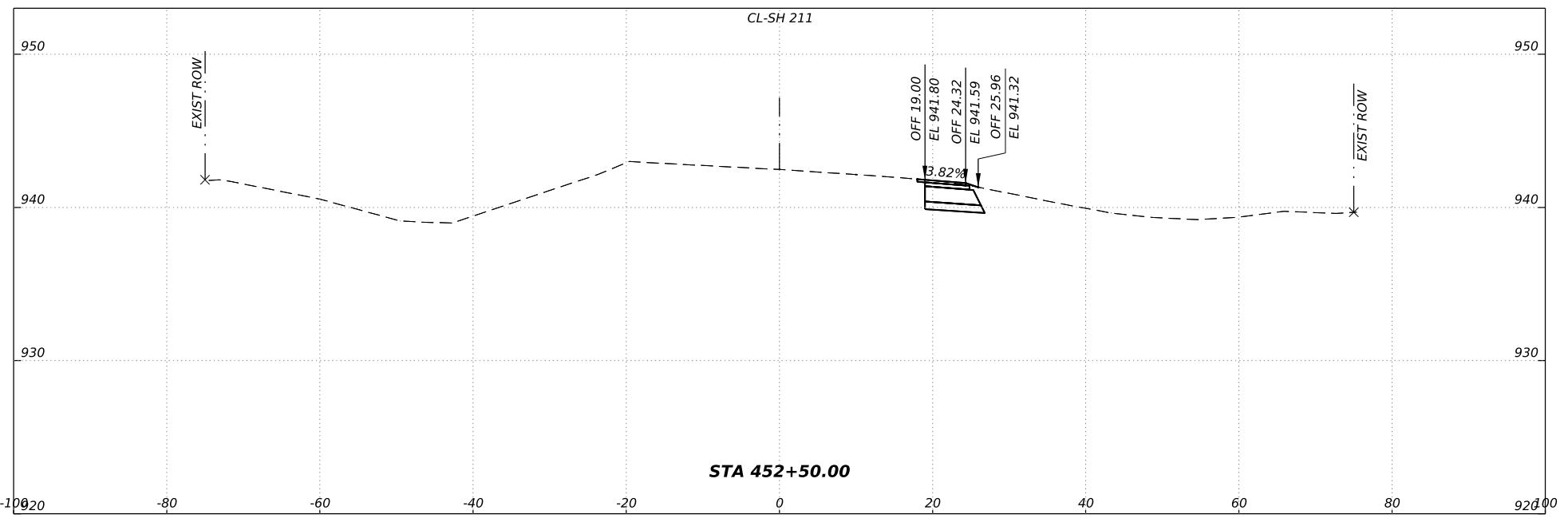
**PAPE-DAWSON
ENGINEERS**
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

Texas Department of Transportation
SH 211 TURN LANES AT GALT RD

CROSS SECTIONS

SHEET 12 OF 13

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST	COUNTY		SHEET NO.
SAT	MEDINA		118



SCALE: PLAN 1"=20' PROFILE: 1"=10'

REV. NO. DATE DESCRIPTION BY

PAPE-DAWSON ENGINEERS
SAN ANTONIO I AUSTIN I HOUSTON I FORT WORTH I DALLAS
2000 NW LOOP 410 I SAN ANTONIO, TX 78213 I 210.375.9000
TEXAS ENGINEERING FIRM #470 I TEXAS SURVEYING FIRM #10028800

Texas Department of Transportation
SH 211 TURN LANES AT GALT RD

CROSS SECTIONS

SHEET 13 OF 13

CONT	SECT	JOB	HIGHWAY
3544	04	XXX	SH 211
DIST	COUNTY		SHEET NO.
SAT	MEDINA		119