FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.	SHEET NO.
-		1

STATE	DIST.	COUNTY
TEXAS	SAT	BEXAR

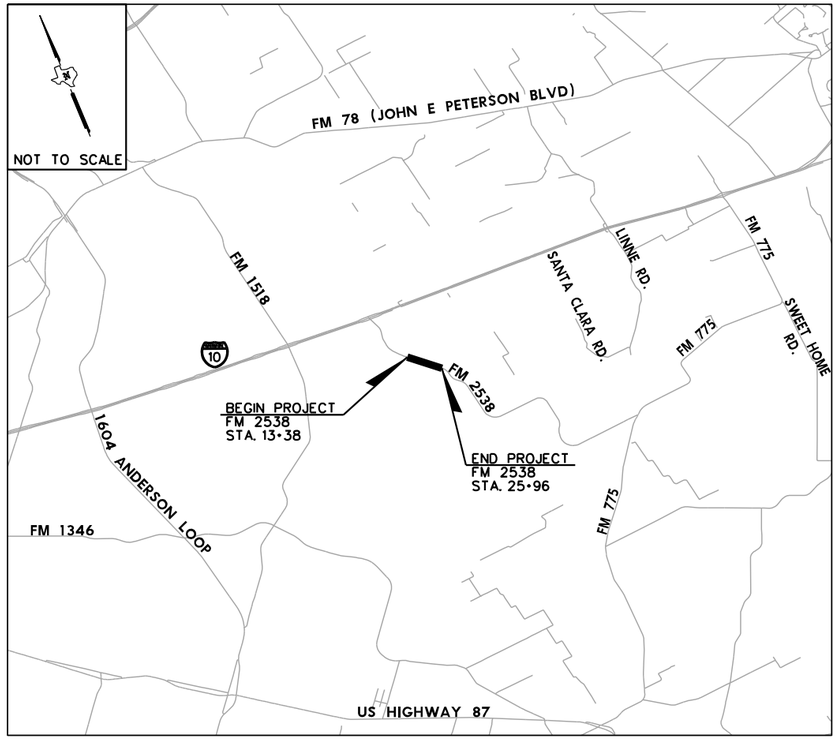
CONT.	SECT.	JOB	HIGHWAY NO.
-	-	-	FM 2538

INDEX DATA
SHEET ON PAGE 2

PLANS OF PROPOSED
ROADWAY IMPROVEMENT
FM 2538

PROJECT LENGTH: 1258 FT.= 0.238 MI.
LOCATIONS: 1.5 MILES SOUTH OF INTERSTATE 10

WIDENING AND OVERLAY OF A NON-FREEWAY FACILITY
CONSISTING OF GRADING, FLEXIBLE BASE,
ASPHALTIC CONCRETE PAVEMENT, SIGNING, DELINEATION, AND PAVEMENT MARKINGS.



FM 2538 PROJECT DATA

DESIGN SPEED:
FM 2538: 55 mph
(TRAINER HALE RD)

FUNCTIONAL CLASS:
FM 2538: MAJOR COLLECTOR

EXCEPTIONS:
NONE

BRIDGE
NONE

RAILROAD CROSSINGS:
NONE

EQUATIONS:
NONE

REGISTERED ACCESSIBILITY SPECIALIST (RAS) INSPECTION NOT REQUIRED

SPECIFICATIONS ADOPTED BY THE TEXAS DEPARTMENT OF TRANSPORTATION ON NOVEMBER 1, 2014 AND SPECIFICATION ITEMS LISTED AND DATED AS FOLLOWS, SHALL GOVERN ON THIS PROJECT.

LEGACY
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Legacy Engineering Group, PLLC
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FM 2538

COUNTY BEXAR PROJ. NO.
HWY. NO. FM 2538 LETTING DATE
DATE ACCEPTED

9/20/2021

P:\Clients\Firms\Legacy\Clearwater Creek\Design\01 GENERAL\01 Title Sheet\Title_Sht.dgn

STANDARD SHEETS 28-54 HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

STATE OF TEXAS
ERIC HERNANDEZ
114309
LICENSED PROFESSIONAL ENGINEER
09-23-2021

{S} - DENOTES STATE STANDARD
{D} - DENOTES SAN ANTONIO DISTRICT STANDARD

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FM 2538
INDEX OF SHEETS

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TR:								
CK TR:								

“TxDOT CONSTRUCTION GENERAL NOTES”

1. "The design and construction will provide for preserving all existing features in or near the State Right Of Way being affected by the widening. This includes but is not limited to, existing driveway gate set-backs, relocation of electronic private property gates, mailbox turnouts, mail boxes and supports, cattle guards, roadway signing, existing rip-rap or other permanent erosion control features, diversionary berms, swales, ditches, amount and configuration of driveway flares and driveway centerline profile, metal beam guard fence and end treatments, etc. Existing driveway culverts and safety end treatments if effected by roadway widening will be reconstructed to preserve existing front slope rates. The coordination of items that effect existing private property access, mail delivery, etc. is the responsibility of the developer. The written concurrence of any effected property owners for construction effecting their driveways or mailbox turnouts must be obtained and provided TxDOT prior to TxDOT driveway permits being issued."

2. "For work in State Right Of Way, the developer is responsible for coordination of, obtaining permits for, and complying with any and all state and federal regulatory agencies and all applicable laws, rules and regulations pertaining to the regulation of drainage, preservation of cultural resources, natural resources and the environment. The developer is responsible for determining if the project is in an environmentally sensitive area such as within the recharge or contributing zone of protected aquifers, and act in accordance with all resource agency regulations.”

If TxDOT has a CZP or WPAP on file with TCEQ, the developer is responsible for amending TxDOT’s permit, obtaining TCEQ approval and providing TxDOT with the approved amended permit. The amended permit will address the relocation of any TxDOT permanent BMP’s including vegetative filter strips that may be impacted by work done within TxDOT ROW. “

If TxDOT does not have a CZP or WPAP on file with TCEQ, any permanent BMP’s including vegetative filter strips, that may be required in order to treat additional impervious cover placed in TxDOT ROW will be located in private property and the developer will provide TxDOT with evidence of TCEQ approval of the additional impervious cover.”

The developer may not operate under resource agency environmental clearance of a previous or ongoing TxDOT project, but will be required to obtain separate resource/environmental agency clearance."

3. "If waste areas or material source areas result from this project, the Contractor is reminded to follow the requirements of the Texas Aggregate Quarry and Pit Safety Act. In addition, it is requested that these areas not be visible from any highway on the State system."

3.5. “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. Properly dispose unsalvageable materials in accordance with local, state, and federal regulations. Deface traffic signs so that they will not reappear in public as signs.”

4. "Any trees existing within State Right Of Way are the natural resources of the State and will be protected. In the event that trees must be removed, TxDOT written permission will be received in advance and will identify the specific trees by species, diameter and location to be removed. The developer will be fined for any unpermitted removal of trees."

4.5. “In the event that there are areas of public ROW dedication resulting from the platting process, the area within the public ROW dedication does not pass into TxDOT ownership as a result of platting. However, the developer will remove any old fencing, gates and unsightly vegetation within the area of the ROW dedication, leaving it in an aesthetically pleasing condition. The Area of ROW dedication will not be mowed or otherwise maintained by TxDOT. Prior to removal of trees in the area of ROW dedication, the trees will first be evaluated in accordance with the requirements of local tree protection ordinances and the written concurrence of the local jurisdiction will be provided to TxDOT.”

5. "The developer will maintain at the project site, and make available upon request, copies of all approved environmental plans and permits relating to work in State Right Of Way."

6. “Prior to beginning grading activity the contractor will set and maintain roadway stationing, control points, marks, stakes to establish lines, slopes, grades and centerlines.”

7. "Any slopes in State Right Of Way which become steeper than 3:1 as a result of the work will be treated with 4" thick reinforced concrete riprap and be treated with metal beam guard fence. This may entail additional rip-rap beyond that shown in the plans."

7.5. “Unless otherwise shown on the plans, where existing concrete rip-rap is removed, modified or extended, the portion to be removed will be neatly saw-cut prior to removal and the new rip-rap will be formed to match the existing lines and grades of the existing rip-rap and will be doweled into the existing rip-rap with #3 bars on 12” centers. The dowel bars will be epoxied in place with epoxy meeting TxDOT requirements. The minimum embedment length is 9 inches. This applies to any type of concrete rip-rap including metal beam guard fence or cable barrier mow strips. ”

8. "Duane Hofferichter (830) 609-0707 New Braunfels, Travis Young (830) 303-0130 Seguin, Chad Lux (830) 816-2430 Boerne, Mark Andrews (830) 393-3144 Floresville, TxDOT Maintenance office will be contacted by the contractor 48 hours prior to work occurring in State Right Of Way."

9. "State Right Of Way will not be used as an area for contractor parking or for staging the receipt of materials or equipment."

10. "Traffic control and construction barricades will meet the requirements of the Texas MUTCD."

11. “The contractor will provide advance notification to the engineer of impending/upcoming lane closures for all temporary and/or permanent lane, ramp, connector, frontage, shoulder, median crossover, etc. closures or detours.”

12. “Access to adjoining property must be maintained at all times.”

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FM 2538
GENERAL NOTES

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		-	TEXAS					FM 2538
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REVIEW:								
CK:								

13. “Unless otherwise noted in the plans and/or as directed by the area engineer or maintenance supervisor, daily lane closures shall be limited according to the following restrictions:

Nighttime: Maintenance Supervisor and/or Area engineer approval required. (with uniformed off duty law enforcement officers).

Weekend Closures: Maintenance Supervisor and/or Area engineer approval required.”

14. “No lane closures or roadway closures will be permitted for the following key dates and/or special events:

Between December 15 and January 1.
Wednesday before Thanksgiving thru the Sunday after Thanksgiving.
Saturday and Sunday before Memorial Day and Labor Day.
Saturday or Sunday when July 4 falls on a Friday or Monday.”

15. "At no time will the roadway travel way be blocked"

16. "Lane closures will only be permitted with 48 hour prior approval of the TxDOT Maintenance Supervisor. Lane closures will be permitted only between 9:00 a.m. and 4:00 p.m. Monday through Friday."

16.5. “For lane closures on two-lane two-way roadways, including during pilot car operations, flaggers will be placed at the beginning and end of the work zone as well as at each individual driveway and side road intersection within the limits of the work zone and extending for a minimum of the beginning of advanced warning signs either end of the work zone to control, warn and direct side road and driveway traffic of the change in traffic operations. Whenever one way traffic control is accomplished by traffic signals work zone flaggers will be similarly stationed at each individual driveway and side road intersection within the limits of the work zone and extending for a minimum of the beginning of the advanced warning signs either end of the work zone. All flaggers will be in constant radio contact.”

17. "A minimum 3:1 (H:V) temporary safety slope of stable compacted material will be required adjacent to the State highway edge of pavement at all times during non working hours."

18. “Only one side of the roadway will be open to construction at a time. Work will be completed and pavement edges backfilled on one side of the road before work will begin on the opposite side of the roadway.

19. “All milling, paving and seal coat operations shall proceed in the direction of traffic.”

20. “Any pavement edge drop-offs between 1 and 2 inches in height will have CW 8-11 warning signs. Any pavement edge drop-off 2 inches or greater will have a 3:1 compacted safety slope and CW 8-9a or CW 8-11 signs plus channelizing devices. Pavement edges will be shouldered up with compacted embankment material and 4 inches of topsoil as soon as possible after paving is completed on the side of the road being widened.”

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.”

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FM 2538
GENERAL NOTES

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
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CK:		SAT	BEXAR	-	-	-		3B
REVIEW:								
CK:								

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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 place 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. His 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 permitee 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.”

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FM 2538
GENERAL NOTES

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REVIEW:								
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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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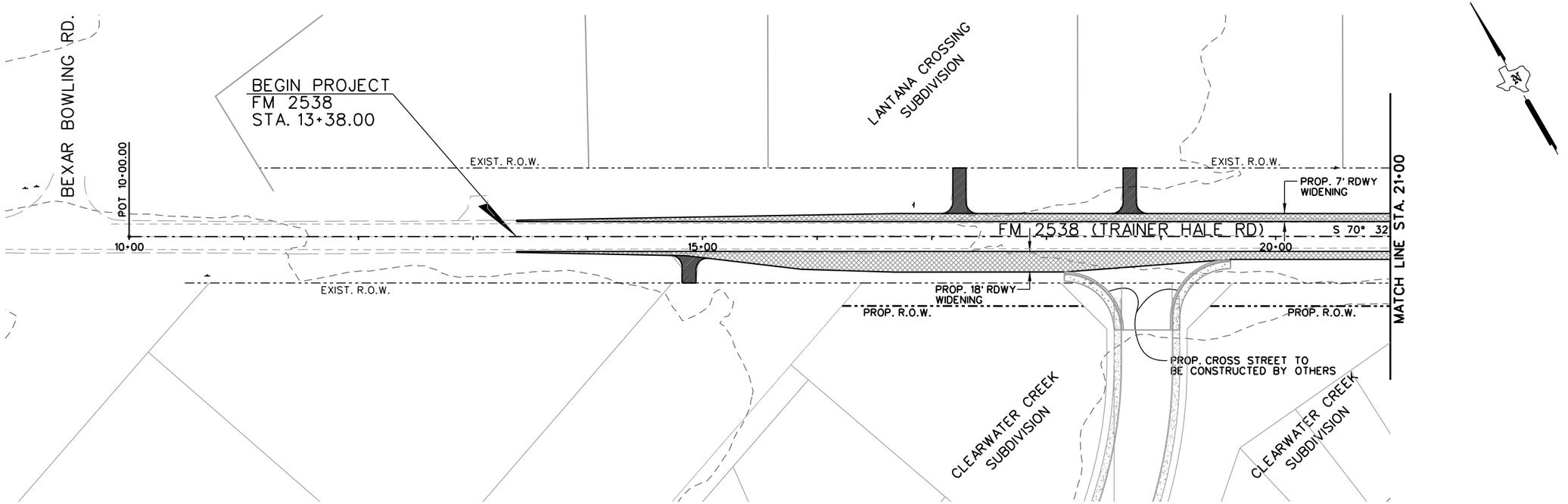

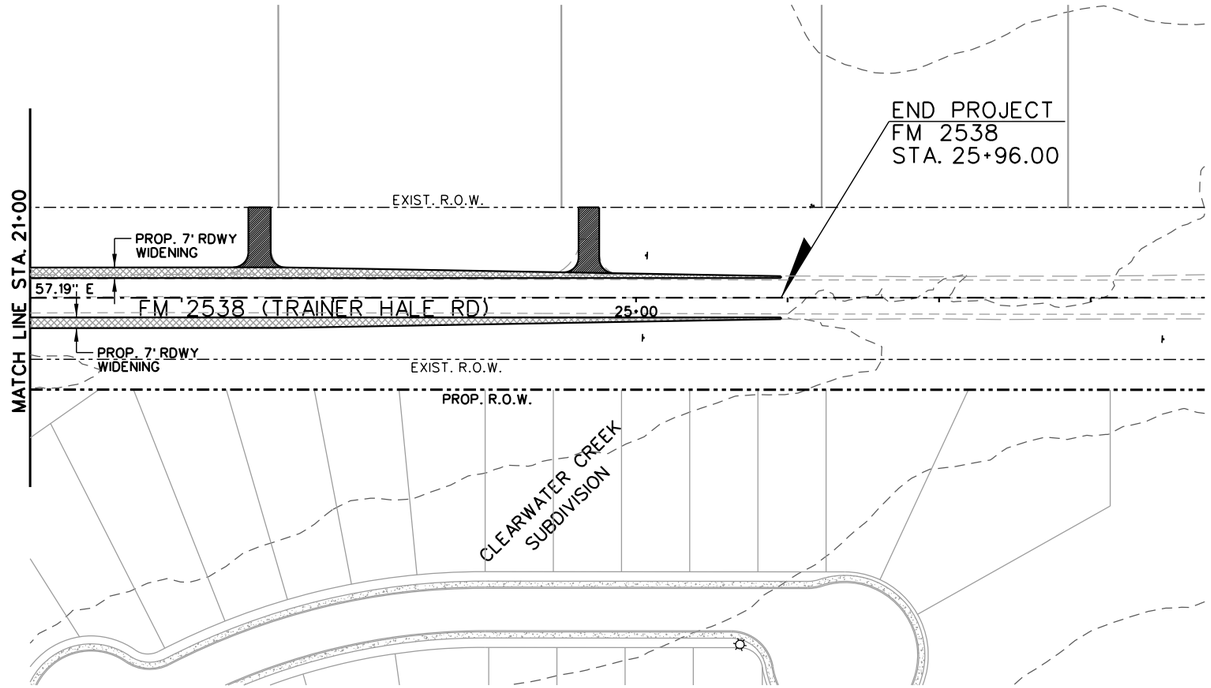

STATE OF TEXAS
ERIC HERNANDEZ
114309
LICENSED PROFESSIONAL ENGINEER
09-23-2021

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210.660.1960/TBPE Firm Registration No. 20623

FM 2538
PROJECT LAYOUT

SC: 1"=100' SHEET 1 OF 1

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CK:								

FM 2538 (TRAINER HALE RD)
ROAD ALIGNMENT

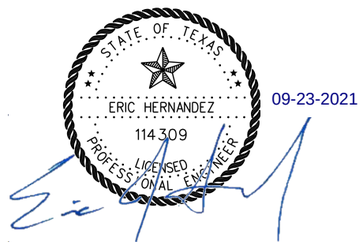
Beginning chain PROPCL description

Point 102 X 2,230,571.5130 Y 13,726,228.3400 Sta 10+00.00

Course from 102 to 103 S 70° 32' 57.19" E Dist 2,192.3023

Point 103 X 2,232,638.6960 Y 13,725,498.3100 Sta 31+92.30

Ending chain PROPCL description



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FM 2538
HORIZONTAL ALIGNMENT
DATA

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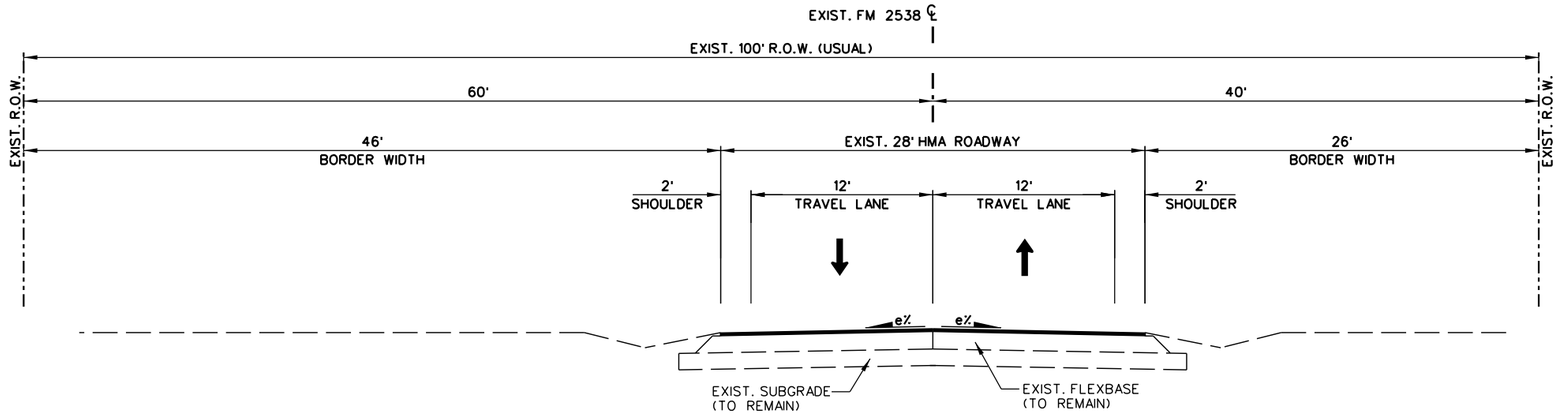
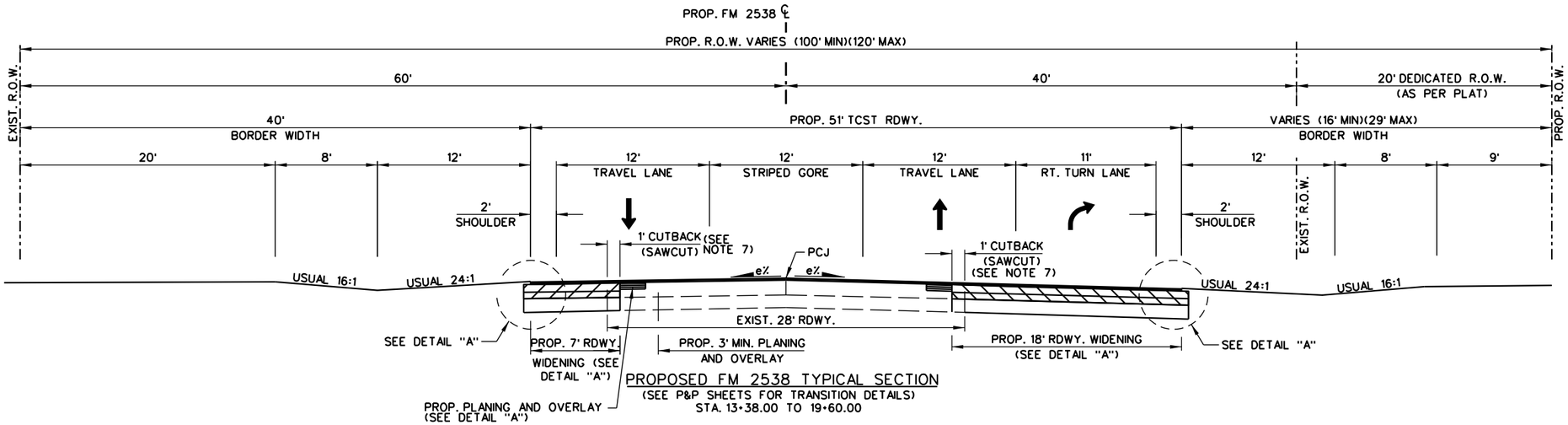
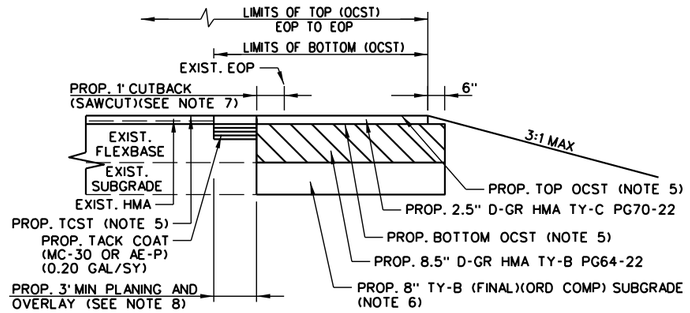


EXISTING FM 2538 TYPICAL SECTION
STA. 13+38.00 TO 25+96.00



PROPOSED FM 2538 TYPICAL SECTION
(SEE P&P SHEETS FOR TRANSITION DETAILS)
STA. 13+38.00 TO 19+60.00



PROPOSED PAVEMENT SECTION DETAIL "A"

GENERAL NOTES:

1. WHERE REQUIRED BY FIXTURES OR UNUSUAL CONDITIONS, THE GOVERING SLOPES MAY BE VARIED WHEN SPECIFICALLY DIRECTED BY THE ENGINEER.
2. WHERE POSSIBLE AND UNLESS OTHERWISE DIRECTED BY THE ENGINEER, PERMISSIBLE CONSTR. JOINTS SHALL FALL ON STRIPING LINES AS SHOWN ON THE STRIPING DETAILS.
3. ALL GRADING SHALL BE WITHIN THE R.O.W. LIMITS OR DEDICATIONS OF R.O.W.
4. PCJ - DENOTES SHALL BE WITHIN CONSTRUCTION JOINTS.
5. TOP ONE COURSE SURFACE TREATMENT (TOCST) FOR FINAL SURFACE SHALL BE APPLIED FROM EOP TO EOP FOR ENTIRE PROJECT LIMITS. GRADE 4 AGGR TY PB SAC-B @ 110SY/CY W/ ASPH(AC-15P,AC-20-5TR,AC-20XP, AC10-2TR) GAL @ 0.30 GAL/SY

   BOTTOM ONE COURSE TREATEMENT (BOCST) SHALL BE APPLIED ALONG WIDTH OF PROP. WIDENINGS AND PLANING / OVERLAY SECTION. GRADE 3 AGGR TY PB SAC-B @ 110SY/CY W/ ASPH(AC-15P,AC-20-5TR,AC-20XP, AC10-2TR) GAL @ 0.30 GAL/SY
6. SUBGRADE EMBARKMENT MATERIAL TO BE CONSTRUCTED AS PER TxDOT SPECIFICATION ITEM 132, INCLUDING MOISTURE CONDITIONED AND DEPTH FOR MOISTURE CONDITIONING. COMPACTION TO BE ORDINARY COMPACTION WITH PROOF ROLLING WITNESSED BY TxDOT INSPECTOR.
7. PROP. 1' CUTBACK (SAWCUT) TO NOT BE PAID DIRECTLY BUT SHALL BE CONSIDERED SUBSIDIARY TO PERTINENT ITEMS.
8. THE EXISTING RDWY PAVEMENT STRUCTURE SHALL BE PLANED AND OVERLAYED A MIN. OF 3' BEYOND THE PROP. WIDENING CUTBACK. PLANING AND OVERLAY OPERATIONS SHALL BE LIMITED TO DAILY TRAFFIC LANE CLOSURES AND REOPENING LIMITS. TOP 4" OF THE PAVEMENT STRUCTURE SHALL BE PLANED AND OVERLAYED WITH D-GR HMA TY-C PG 70-22.

STATE OF TEXAS
ERIC HERNANDEZ
114309
LICENSED
PROFESSIONAL ENGINEER
09-23-2021

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FM 2538
EXIST./PROP. TYPICAL SECTIONS

SHEET 1 OF 2

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CK:								

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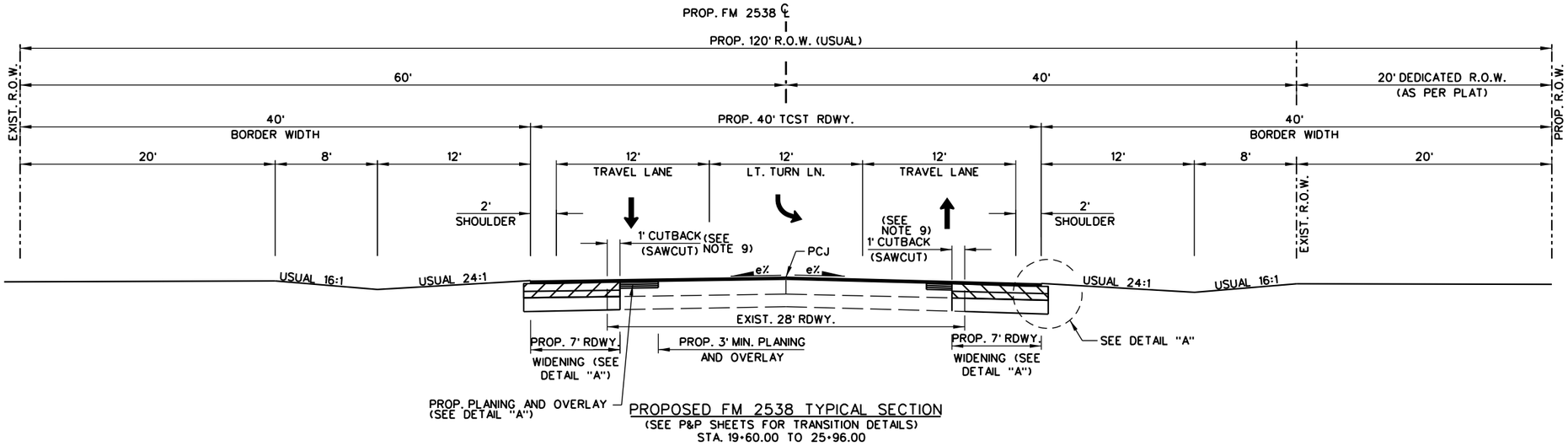
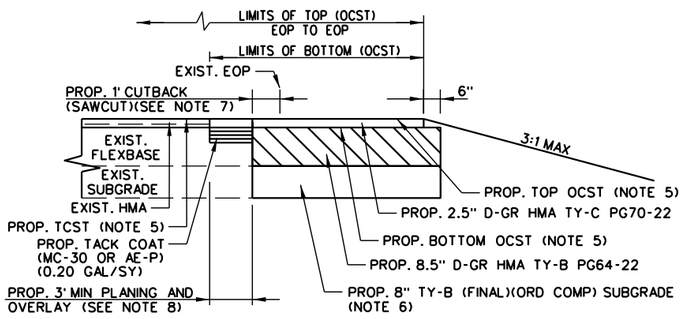


PROPOSED FM 2538 TYPICAL SECTION
(SEE P&P SHEETS FOR TRANSITION DETAILS)
STA. 19+60.00 TO 25+96.00



PROPOSED PAVEMENT SECTION DETAIL "A"

GENERAL NOTES:

1. WHERE REQUIRED BY FIXTURES OR UNUSUAL CONDITIONS, THE GOVERING SLOPES MAY BE VARIED WHEN SPECIFICALLY DIRECTED BY THE ENGINEER.
2. WHERE POSSIBLE AND UNLESS OTHERWISE DIRECTED BY THE ENGINEER, PERMISSIBLE CONSTR. JOINTS SHALL FALL ON STRIPING LINES AS SHOWN ON THE STRIPING DETAILS.
3. ALL GRADING SHALL BE WITHIN THE R.O.W. LIMITS OR DEDICATIONS OF R.O.W.
4. PCJ - DENOTES SHALL BE WITHIN CONSTRUCTION JOINTS.
5. TOP ONE COURSE SURFACE TREATMENT (TOCST) FOR FINAL SURFACE SHALL BE APPLIED FROM EOP TO EOP FOR ENTIRE PROJECT LIMITS. GRADE 4 AGGR TY PB SAC-B @ 110SY/CY W/ ASPH(AC-15P,AC-20-5TR,AC-20XP, AC10-2TR) GAL @ 0.30 GAL/SY

   BOTTOM ONE COURSE TREATEMENT (BOCST) SHALL BE APPLIED ALONG WIDTH OF PROP. WIDENINGS AND PLANING / OVERLAY SECTION. GRADE 3 AGGR TY PB SAC-B @ 110SY/CY W/ ASPH(AC-15P,AC-20-5TR,AC-20XP, AC10-2TR) GAL @ 0.30 GAL/SY
6. SUBGRADE EMBARKMENT MATERIAL TO BE CONSTRUCTED AS PER TxDOT SPECIFICATION ITEM 132, INCLUDING MOISTURE CONDITIONED AND DEPTH FOR MOISTURE CONDITIONING. COMPACTION TO BE ORDINARY COMPACTION WITH PROOF ROLLING WITNESSED BY TxDOT INSPECTOR.
7. PROP. 1' CUTBACK (SAWCUT) TO NOT BE PAID DIRECTLY BUT SHALL BE CONSIDERED SUBSIDIARY TO PERTINENT ITEMS.
8. THE EXISTING RDWY PAVEMENT STRUCTURE SHALL BE PLANED AND OVERLAYED A MIN. OF 3' BEYOND THE PROP. WIDENING CUTBACK. PLANING AND OVERLAY OPERATIONS SHALL BE LIMITED TO DAILY TRAFFIC LANE CLOSURES AND REOPENING LIMITS. TOP 4" OF THE PAVEMENT STRUCTURE SHALL BE PLANED AND OVERLAYED WITH D-GR HMA TY-C PG 70-22.

STATE OF TEXAS
ERIC HERNANDEZ
114309
LICENSED PROFESSIONAL ENGINEER
09-23-2021

LEGACY ENGINEERING GROUP
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FM 2538
EXIST./PROP. TYPICAL SECTIONS

SHEET 2 OF 2

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		15	TEXAS					FM 2538
ENGINEER:		DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		SAT	BEXAR	-	-	-		7
REVIEW:								
CK:								

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ITEM NO.	DESCRIPTION	UNIT	QUANTITY
100 6002	PREPARING ROW	STA	12.58
110 6001	EXCAVATION (ROADWAY)	CY	1342.0
132 6003	EMBANKMENT (FINAL)(ORD COMP)(TY B)	CY	493.0
160 6006	FURNISHING AND PLACING TOPSOIL (3")	SY	10067.0
164 6036	DRILL SEEDING (PERM) (RURAL) (CLAY)	AC	2.08
166 6002	FERTILIZER	TON	0.5
168 6001	VEGETATIVE WATERING	MG	317.0
310 6027	PRIME COAT(MC-30 OR AE-P)	GAL	417.0
316 6222	AGGR(TY-PB GR-3 SAC-B)	CY	27.0
316 6224	AGGR(TY-PB GR-4 SAC-B)	CY	51.0
316 6410	ASPH (AC-15P, AC-20-5TR,AC-20XP,AC10-2TR)	GAL	2552.0
340 6011	D-GR HMA(SQ) TY-B PG64-22	TON	1011.0
340 6050	D-GR HMA(SQ) TY-C PG70-22	TON	489.0
347 6008	TACK COAT	GAL	168.0
354 6057	PLANE ASPH CONC PAV (4")	SY	839.0
502 6001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	3.0
506 6038	TEMP SEDMT CONT FENCE (INSTALL)	LF	75.0
506 6039	TEMP SEDMT CONT FENCE (REMOVE)	LF	75.0
506 6020	CONSTRUCTION EXITS (INSTALL) (TY 1)	SY	312.0
506 6024	CONSTRUCTION EXITS (REMOVE)	SY	312.0
530 6005	DRIVEWAYS (ACP)	SY	288.0
644 6027	IN SM RD SN SUP&AM TYS80(1)SA(P)	EA	3.0
644 6070	RELOCATE SM RD SN SUP&AM TY S80	EA	1.0
662 6063	WK ZN PAV MRK REMOV (W)4"(SLD)	LF	5612.0
662 6095	WK ZN PAV MRK REMOV (Y)4"(SLD)	LF	5612.0
662 6109	WK ZN PAV MRK SHT TERM (TAB)TY W	EA	44.0
662 6111	WK ZN PAV MRK SHT TERM (TAB)TY Y-2	EA	222.0
666 6036	REFL PAV MRK TY I (W)8"(SLD)(100MIL)	LF	435.0
666 6048	REFL PAV MRK TY I (W)24"(SLD)(100MIL)	LF	38.0
666 6054	REFL PAV MRK TY I (W)(ARROW)(100MIL)	EA	4.0
666 6078	REFL PAV MRK TY I (W)(WORD)(100MIL)	EA	3.0
666 6178	REFL PAV MRK TY II (W) 8" (SLD)	LF	435.0
666 6182	REFL PAV MRK TY II (W) 24" (SLD)	LF	38.0
666 6184	REFL PAV MRK TY II (W) (ARROW)	EA	4.0
666 6192	REFL PAV MRK TY II (W) (WORD)	EA	3.0
666 6303	RE PM W/RET REQ TY I (W)4"(SLD)(100MIL)	LF	2500.0
666 6312	RE PM W/RET REQ TY I (Y)4"(BRK)(100MIL)	LF	75.0
666 6315	RE PM W/RET REQ TY I (Y)4"(SLD)(100MIL)	LF	4152.0
6048 6010	RE PM W/RET REQ TY II (W)4"(SLD)	LF	2500.0
6048 6013	RE PM W/RET REQ TY II (Y)4"(BRK)	LF	75.0
6048 6014	RE PM W/RET REQ TY II (Y)4"(SLD)	LF	4152.0
672 6007	REFL PAV MRKR TY I-C	EA	24.0
672 6009	REFL PAV MRKR TY II-A-A	EA	270.0
677 6001	ELIM EXT PAV MRK & MRKS (4")	LF	8688.0

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LEGACY ENGINEERING GROUP
Legacy Engineering Group, PLLC
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FM 2538
ESTIMATED QUANTITIES

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		-	TEXAS					FM 2538
ENGINEER:		DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		SAT	BEXAR	-	-	-		8
REVIEW:								
CK:								

MATERIAL		Excavation				FILL			
	Mass	Mult	End	Volume	Adjusted	Mult	End	Volume	Adjusted
	Ordinate	Factor	Area	Cu. Yd	Cu. Yd	Factor	Area	Cu. Yd	Cu. Yd
13+38.0000 R1	0	1	5	0	0	1	1	0	0
14+00.0000 R1	19.2	1	13	20.8	20.8	1	0	1.5	1.5
14+88.0000 R1	73.5	1	20	54.3	54.3	1	0	0	0
15+00.0000 R1	83.3	1	24	9.8	9.8	1	0	0	0
16+00.0000 R1	197.7	1	38	114.4	114.4	1	0	0	0
17+00.0000 R1	359.7	1	49	162	162	1	0	0	0
17+24.0000 R1	408.2	1	60	48.6	48.6	1	0	0	0
18+00.0000 R1	548.8	1	40	140.7	140.7	1	0	0.2	0.2
18+73.0000 R1	643.5	1	30	95.2	95.2	1	0	0.5	0.5
19+00.0000 R1	667.2	1	21	25.8	25.8	1	4	2	2
20+00.0000 R1	741.5	1	24	83.1	83.1	1	1	8.8	8.8
21+00.0000 R1	831.5	1	27	94	94	1	1	4.1	4.1
22+00.0000 R1	926.8	1	27	99.2	99.2	1	1	3.9	3.9
22+51.0000 R1	973.3	1	28	51.3	51.3	1	4	4.7	4.7
23+00.0000 R1	1021.7	1	30	52	52	1	0	3.6	3.6
24+00.0000 R1	1136.5	1	32	114.8	114.8	1	0	0	0
24+69.0000 R1	1231	1	42	94.5	94.5	1	0	0	0
25+00.0000 R1	1265.4	1	18	34.4	34.4	1	0	0	0
25+95.0000 R1	1311.9	1	8	46.9	46.9	1	0	0.4	0.4
Grand Total:			Excavation	1341.7 CY	1341.7 CY		Fill	29.8 CY	29.8 CY

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9/20/2021

LEGACY ENGINEERING GROUP
Legacy Engineering Group, PLLC
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FM 2538
SUMMARY SHEET OF EARTHWORK QUANTITIES

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		-	TEXAS					FM 2538
ENGINEER:		DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:								
REVIEW:		SAT	BEXAR	-	-	-		9
CK:								

TRAFFIC NOTES AND SPECIAL CONDITIONS

1.) IT IS CONTRACTOR'S SOLE RESPONSIBILITY TO SEE THAT ALL TRAFFIC CONTROL DEVICES ARE PROPERTY INSTALLED AND MAINTENED AT THE JOB SITE IN ACCORDANCE WITH THE PLANS, SPECIFICATIONS AND RELATED INDUSTRY STANDARDS AND REGULATIONS. THESE NOTES DO NOT, IN OF THEMSELVES, CONSTITUTE A TRAFFIC CONTROL PLAN. IN THE EVENT THAT THESES PLANS DO NOT INCLUDE TRAFFIC CONTROL, OR THAT THE CONTRACTOR WISHES TO VARY FROM TRAFFIC CONTROL INCLUDED WITH THESE PLANS, HE SHALL SUBMIT FOR REVIEW A TRAFFIC CONTROL PLAN SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF TEXAS. INCLUDING A SIGN AND BARRICADE PLAN CONFORMING TO THE REQUIREMENS OF THE TEXAS MANUAL ON UNIFORM TARFFIC CONTROL DEVICES (MUTCD). THE CITY, COUNTY OR STATE'S CONSTRUCTION OBSERVER/INSPECTOR (COI) AND THE TRAFFIC ENGINEERING REPRESENTATIVE WILL ONLY BE RESPONISBLE TO INSPECT THE TRAFFIC CONTROL DEVICES BEING DEPLOYED. IF, IN THE OPINION OF THE TRAFFIC ENGINEERING REPRESENTATIVE AND THE COI, THE TRAFFIC CONTROL DEVICES DO NOT CONFORM TO ESTABLISHED STANDARDS OR ARE INCORRECTLY PLACED OR ARE INSUFFICIENT IN QUANTITY TO PROTECT THE GENERAL PUBLIC, THE COI SHALL HAVE THE OPTION TO STOP CONSTRUCITON OPERATIONS AT NO EXPENSE TO THE CITY, COUNTY OR STATE UNTIL SUCH TIMES AS THE CONDITIONS ARE CORRECTED BY THE CONTRACTOR.

2.) PRIOR TO STARTING CONSTRUCITON, THE CONTRACTOR SHALL CONTACT THE TEXAS DEPARTMENT OF TRANSPORTATION (TXDOT) TRAFFIC OPERATIONS SECTION FOR A TRAFFIC SIGNAL INVENTORY AT (210) 527-7135. PRIOR TO COMPLETION OF THE CONTRACT AND REMOVAL OF THE BARRICADES, THE CONTRACTOR SHALL AGAIN CONTACT THE TRAFFIC OPERATIONS SECTION FOR FINAL INSPECTION. THE BARRICADES SHAL NOT BE REMOVED UNTIL ALL APPLICABLE PERMANENT TRAFFIC SIGNS AND SIGNALS ARE IN PLACE.

3.) IT IS THE CONTRACTOR'S RESPONISBILITY TO OBTAIN AND MAINTAIN TEMPORARY SIGNS AND ALL OTHER TRAFFIC CONTROL DEVICES REQUIRED TO PROTECT THE GENERAL PUBLIC. ALL PERMANENT SIGNS OR TRAFFIC CONTROL DEVICES MISSING OR DAMAGED UPON COMPLETION OF CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTOR'S EXPENSE.

4.) THE CONTRACTOR MUST CONTACT THE CITY OR COUNTY'S COI 48 HOURS IN ADVANCE (NOT INCLUDING WEEKENDS) OF ANY MINOR STREET CLOSURES. IT WILL BE THE CONTRACTOR'S REPONSIBLITY TO ADVISE THE COI 10 DAYS IN ADVANCE OF A TOTAL STREET CLOSURE. THIS MUCH TIME IS NECESSARY TO INSTALL ADVISORY SIGNS AND GIVE THE MOTORIST A MINIMUM OF 7 DAYS NOTICE OF THE STREET CLOSURE. THE COI AFTER BEING NOTIFIED WILL CONTRACT THE TRAFFIC ENGINEERING OFFICE TO MAKE THE NECESSARY ARRANGEMENTS. THERE WILL NOT BE ANY STREET CLOSURES ALLOWED ON THE STATE HIGHWAY SYSTEM.

5.) AS WORK PROGRESSES, LOCATION OF TEMPORARY TRAFFIC CONTROL DEVICES WILL BE ADJUSTED AND MODIFIED, AS NECESSARY BY THE CONTRACTOR AT CONTRACTOR'S EXPENSE.

6.) IF THE NEED ARISES, ADDITIONAL TEMPORARY TRAFFIC CONTROL DEVICES, SPECIAL DIRECTIONAL DEVICES, AND/OR BUSINESS NAME SIGNS MAY BE ORDERED BY THE TRAFFIC ENGINEERING REPRESENTATIVE AT THE CONTRACTOR'S EXPENSE.

7.) TEMPORARY TRAFFIC CONTROL DEVICES SHALL CONFORM TO TXDOT'S STANDARD SHEETS AND THE MUTCD.

8.) THE CONTRACTOR MUST MAINTAIN ALL STREETS WITHIN PROJECT LIMITS OPEN TO THROUGH TRAFFIC BY REPAIRING TRENCHES, POTHOLES, LEVELING UP WITH ASPHALT, ETC. AT NO DIRECT PAYMENT, WITH THE COST TO BE INCLUDED UNDER OTHER ITEMS.

9.) THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING SUITABLE ACCESS ACCOMMODATIONS FOR SCHOOL CHILDREN AND PEDESTRIANS ALONG THE CONSTRUCTION LIMITS.

10.) THE CONTRACTOR SHALL PROVIDE ACCESS FOR DELIVERY OF MAIL BY THE U.S. POSTAL SERVICE.

11.) WHEN CONSTRUCTION WORK NECESSITATES THE UTILIZATION OF VEHICLE PATHS OTHER THAN THE LANES NORMALLY USED, TRAFFIC CONTROL MARKINGS NO LONGER APPLICABLE SHALL BE REMOVED AND APPROVED TEMPORARY PAVEMENT MARKINGS AND SIGNS INSTALLED IN ACCORDANCE WITH PART 6 OF THE TEXAS MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES.

AFTER CONSTRUCTION IS COMPLETED AND TRAFFIC IS REROUTED BACK TO THE ORIGINAL LANES, THE TRAFFIC CONTROL MARKINGS AND/OR RAISED BUTTONS THAT WERE ORIGINALLY REMOVED FROM THE EXISTING PAVEMENT MUST BE REPLACED. IN ADDITION, TEMPORARY MARKINGS MUST BE REMOVED. ALL OF THIS IS TO BE DONE AT NO DIRECT PAYMENT; COST SHOULD BE INCLUDED IN OTHER ITEMS.

12.) PERMANENT PAVEMENT MARKINGS SHALL BE APPLIED PRIOR TO THE OPENING OF THE COMPLETED STREET TO TRAFFIC. PRIOR TO THE APPLICATION OF PERMANENT MARKINGS, EITHER TEMPORARY ADDITIONAL SHORT-TERM EXPENDABLE PAVEMENT MARKINGS, OR RAISED PAVEMENT MARKINGS MAY BE PROVIDED TO DELINEATE CONTINUITY UNTIL SUCH TIME AS STANDARD PAVEMENT MARKINGS CAN BE. TEMPORARY MARKINGS SHALL BE PLACED AT NO DIRECT PAYMENT.

13.) ALL TEMPORARY TRAFFIC CONTROL DEVICES, ETC. SHALL BE PROVIDED BY THE CONTRACTOR WITHOUT DIRECT PAYMENT, UNLESS OTHERWISE NOTED OR STATED.

14.) THE COI WILL MONITOR THE CONTRACTOR 'S TRAFFIC CONTROL DEVICES AND WILL BE RESPONSIBLE TO FURNISH ALL RESIDENTS AND BUSINESSES WITH AN INFORMATION FLYER ON ALL WORK PHASES DURING CONSTRUCTION.

15.) ANY DAMAGE TO PERMANENT TRAFFIC SIGNALS, THE CONTROLLER BOX, LOOPS OR CONDUITS DURING OR UPON COMPLETION OF THE PROJECT SHALL BE REPAIRED OR REPLACED AT THE CONTRACTOR'S EXPENSE. THE DECISION TO REPAIR, AS OPPOSED TO REPLACE, THE DAMAGED EQUIPMENT SHALL BE MADE BY THE TXDOT TRAFFIC ENGINEER OR REPRESENTATIVE.

16.) THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ALL STREETS OUTSIDE OF THE PROJECT LIMITS WHICH ARE DAMAGED DUE TO CONSTRUCTION ACTIVITIES. THE REPLACED SECTION MUST BE APPROVED BY THE CITY, COUNTY OR STATE'S TRAFFIC ENGINEER OR REPRESENTATIVE. THERE WILL BE NO DIRECT PAYMENT FOR THIS WORK. THE COST IS TO BE INCLUDED IN OTHER ITEMS.

17.) OFF-DUTY POLICE OFFICERS WILL BE REQUIRED AS DIRECTED BY THE TRAFFIC ENGINEER AT NO DIRECT PAYMENT, COST TO BE INCLUDED IN OTHER BID ITEMS. THIS WILL BE A REQUIREMENT WHERE TWO-WAY TRAFFIC IS TO BE MAINTAINED.

18.) THE CONTRACTOR SHALL PROVIDE THE CITY, COUNTY AND STATE AN EMERGENCY TELEPHONE NUMBER FOR EVENINGS, WEEKENDS, AND HOLIDAYS BY THE FIRST WORKING DAY OF THE PROJECT. THIS TELEPHONE NUMBER MUST BE A COMMERCIAL ANSWERING SERVICE. THE ANSWERING SERVICE MUST BE ABLE TO CONTACT THE CONTRACTOR AND HAVE THE CONTRACTOR RESPOND TO THE CITY, COUNTY OF STATE STAFF WITHIN TWO HOURS OF THE INITIAL CONTACT.

19.) THE CONTRACTOR SHALL MAINTAIN CONTINUOUS ACCESS TO ALL INTERSECTING STREETS UNLESS OTHERWISE SHOWN ON THESE PLANS. WHEN CONTINUOUS ACCESS IS SCHEDULED TO BE BLOCKED, THE CONTRACTOR SHALL CONTACT THE FIRE DEPARTMENT, EMS AND THE POLICE DEPARTMENT TO APPRISE THEM OF THE PENDING STREET CLOSURE AT LEAST FORTY-EIGHT HOURS IN ADVANCE. IF THE CLOSURE FALLS ALONG A BUS ROUTE, THE CONTRACTOR SHALL ALSO CONTACT BUS PROVIDER TO APPRISE THEM OF THE PENDING STREET CLOSURE AT LEAST FORTY-EIGHT HOURS IN ADVANCE.

20.) THE CONTRACTOR SHALL MAINTAIN EITHER THE EXISTING OR TEMPORARY STREET NAME SIGNS AT EACH INTERSECTION ONSITE THROUGHOUT CONSTRUCTION. IF THE EXISTING STREET NAME SIGNS ARE USED, THEY MUST
BE MAINTAINED IN THE CONDITION ENCOUNTERED PRIOR TO THE BEGINNING OF CONSTRUCTION, AND THEN BE TURNED IN TO THE CITY, COUNTY OR STATE INSPECTOR AT THE END OF THE PROJECT. IF TEMPORARY SIGNS ARE USED DURING CONSTRUCTION, THEY SHALL HAVE A MINIMUM OF 4-INCH LETTERS, AND MAY BE FABRICATED WITH CONSTRUCTION ZONE MATERIAL (BLACK LEGEND ON ORANGE BACKGROUND, USING PLYWOOD SUBSTRATE, ETC.) ACCORDING TO TMUTCD GUIDELINES.

STATE OF TEXAS
ERIC HERNANDEZ
114309
LICENSED PROFESSIONAL ENGINEER
09-23-2021

LEGACY ENGINEERING GROUP
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FM 2538
TRAFFIC CONTROL
GENERAL NOTES

SHEET 1 OF 2

DN:		FED. RD. DIV. NO.	STATE	PROJECT NO.				SHEET NO.
CK DN:		6	TEXAS					10
DW:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		HIGHWAY NO.
CK DW:		15	BEXAR					FM 2538
TR:								
CK TR:								

PHASING AND STAGING NOTES STREET AND DRAINAGE CONSTRUCTION

1.) ANY QUESTIONS REGARDING PHASING OR STAGING WILL BE STRICTLY HANDLED BY THE BEXAR COUNTY, WILSON COUNTY OR TEXAS DEPARTMENT OF TRANSPORTATION WHICH HAS COMPLETE AUTHORITY TO MAKE FINAL DECISIONS ON ANY CHANGES OR MODIFICATIONS. THERE WILL NOT BE ANY STREET CLOSURES ALLOWED ON THE STATE HIGHWAY SYSTEM. IT IS NECESSARY TO INSTALL ADVISORY SIGNS AND GIVE THE MOTORISTS A MINIMUM OF SEVEN (7) DAYS NOTICE BEFORE LANE CLOSURES AS PER TRAFFIC CONTROL PLAN. THE CONSTRUCTION INSPECTOR, AFTER HAVING BEEN NOTIFIED,
WILL CONTACT THE ENGINEERING OFFICE IMMEDIATELY TO MAKE THE NECESSARY ARRANGEMENTS. THE TEMPORARY BARRICADES AND WARNING SIGNS SHALL BE LOCATED SO AS TO AFFORD THE MAXIMUM PROTECTION TO THE PUBLIC AS WELL AS CONSTRUCTION PERSONNEL AND EQUIPMENT AND TO FACILITATE AN EXPEDITIOUS FLOW OF TRAFFIC AT ALL TIMES DURING CONSTRUCTION.

2.) IF THERE ARE TWO (2) OR MORE PHASES IN THE PROJECT, NO MORE THAN TWO (2) PHASES OF CONSTRUCTION MAY BE WORKED AT ONE TIME, UNLESS OTHERWISE INDICATED IN THE PLANS. PARTIAL CONSTRUCTION AT DIFFERENT SCATTERED LOCATIONS WITHIN THE PROJECT WILL NOT BE ALLOWED. WORK WILL NO T BE ENGAGED ON OPPOSITE SIDES OF THE ROAD AT THE SAME TIME. ALL REMAINING STREETS WITHIN THE PROJECT OR SEPARATE AREA SHALL REMAIN OPEN AT ALL TIMES.

3.) CONSTRUCT ONE PHASE AT A TIME AS SHOWN ON THE TCP TYPICAL SECTIONS AND SEQUENCE OF CONSTRUCTION. THE CONTRACTOR SHALL NOT CONSTRUCT MULTIPLE PHASES CONCURRENTLY. LANE CLOSURES NOT INCLUDED IN TRAFFIC CONTROL PLANS ARE RESTRICTED TO DAYTIME WORKING HOURS, MUST BE APPROVED BY TxDOT AND REOPENED TO FULL TWO WAY TRAFFIC DURING NON-WORKING HOURS.

4.) THE PLANS ARE PHASED FOR STREET AND STORM DRAINAGE CONSTRUCTION. NO STORM SEWER CONSTRUCTION WILL TAKE PLACE OUTSIDE OF THE PHASING LIMITS UNDER CONSTRUCTION, UNLESS SPECIFICALLY NOTED ON THE PLANS OR AUTHORIZED IN WRITING BY THE TRAFFIC DIVISION.

5.) ALL STORM DRAINAGE PIPES ARE NOT CONSIDERED UTILITIES, REGARDLESS OF SIZE. IF APPLICABLE TO PROJECT. THIS WORK SHALL BE PART OF THE PHASE.

6.) UNLESS OTHERWISE INDICATED IN THE PLANS, INTERSECTING STREETS SHALL BE CONSTRUCTED IN STAGES SO AS TO MAINTAIN ACCESS. INTERSECTION WORK SHALL BE DONE DURING WEEKEND HOURS OR AS DIRECTED BY THE ENGINEER. NO TWO ADJACENT INTERSECTIONS MAY BE CONSTRUCTED SIMULTANEOUSLY. WITH APPROVAL FROM THE ENGINEER, THE CONTRACTOR MAY CLOSE AN ENTIRE INTERSECTION. THE CONTRACTOR WILL BE REQUIRED TO PROVIDE A DETOUR PLAN FOR SUCH A CLOSURE TO THE ENGINEER FOR APPROVAL.

$FILE$

$DATE$

LEGACY ENGINEERING GROUP
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FM 2538
TRAFFIC CONTROL GENERAL NOTES

DN:		FED. RD. DIV. NO.	STATE	PROJECT NO.			SHEET NO.
CK DN:		6	TEXAS				11
DW:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
CK DW:							
TR:		15	BEXAR				FM 2538
CK TR:							

SEQUENCE OF CONSTRUCTION

GENERAL DESCRIPTION: THESE CONTRUCTION INPROVEMENTS WILL BE CONSTRUCTED IN TWO (2) SEPERATE PHASES. PHASE 1 WILL INCLUDE CONSTRUCTING ROADWAY WIDENING FOR THE RIGHT SIDE ALONG FM 2538 APPROACHING AND LEAVING THE PROP. SUDDIVISION. PHASE 2 CONSTRUCTION WILL INCLUDE CONSTRUCTING ROADWAY WIDENING FOR THE LEFT SIDE ALONG FM 2538.

PHASE I CONSTRUCTION

1. INSTALL PROJECT LIMIT AND ADVANCE WARNING SIGNS AND INSTALL BARRICADES, AS SHOWN ON THE TRAFFIC CONTROL LAYOUTS AND STANDARDS, IN ACCORDANCE WITH THE LATEST (TxMUTCD) AND/OR AS DIRECTED BY THE ENGINEER. INCLUDE ALL APPROPRIATE TEMPORARY EROSION CONTROL PROTECTION.

2. COORDINATE WITH LOCAL RESIDENTS AND LOCAL TRAFFIC, BEFORE ANY ROADWAY CONSTRUCTION, FOR CONTINUING ACCESS DURING CONSTRUCTION.

3. UTILIZE TCP STANDARDS (2-2)-18, (3-1)-13, AND (3-3)-14 TO GOVERN TEMPORARY LANE CLOSURES AND STRIPE EXISTING FM 2538, FOR TEMPORARY TWO 11' LANES OF BI-DIRECTIONAL TRAFFIC FROM STA. 12+83.00 TO STA. 26+51.00 AS SHOWN ON THE PHASE 1 TCP TYPICAL SECTIONS AND LAYOUTS.

4. CONSTRUCT RIGHT SIDE WIDENING OF FM 2538 FROM STA.13+38.00 TO STA.25+96.00 AS SHOWN ON THE TCP TYPICAL SECTIONS UP TO THE PROP. 2 1/2" ACP LIFT INCLUDING ALL APPROPRIATE EROSION CONTROL PROTECTION.

5. ROADWAY ACCESS TO ALL INTERSECTING ROADWAYS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.

PHASE II CONSTRUCTION

1. INSTALL PROJECT LIMIT AND ADVANCE WARNING SIGNS AND INSTALL BARRICADES, AS SHOWN ON THE TRAFFIC CONTROL LAYOUTS AND STANDARDS, IN ACCORDANCE WITH THE LATEST (TxMUTCD) AND/OR AS DIRECTED BY THE ENGINEER. INCLUDE ALL APPROPRIATE TEMPORARY EROSION CONTROL PROTECTION.

2. COORDINATE WITH LOCAL RESIDENTS AND LOCAL TRAFFIC, BEFORE ANY ROADWAY CONSTRUCTION, FOR CONTINUING ACCESS DURING CONSTRUCTION.

3. UTILIZE TCP STANDARDS (2-2)-18, (3-1)-13, AND (3-3)-14 TO GOVERN TEMPORARY LANE CLOSURES AND STRIPE EXISTING FM 2538, FOR TEMPORARY TWO 12' LANES OF BI-DIRECTIONAL TRAFFIC FROM STA. 12+53.00 TO STA. 26+81.00 AS SHOWN ON THE PHASE 1 TCP TYPICAL SECTIONS AND LAYOUTS.

4. CONSTRUCT LEFT SIDE WIDENING OF FM 2538 FROM STA.13+38.00 TO STA.25+96.00 AS SHOWN ON THE TCP TYPICAL SECTIONS UP TO THE PROP. 2 1/2" ACP LIFT INCLUDING ALL APPROPRIATE EROSION CONTROL PROTECTION.

5. ROADWAY ACCESS TO ALL INTERSECTING ROADWAYS AND DRIVEWAYS SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION.

PHASE III CONSTRUCTION

1. SWITCH, INSTALL, AND REMOVE ANY NECESSARY SIGNS, BARRICADES, CHANNELIZING DEVICES AND WORK ZONE PAVEMENT MARKINGS AS SHOWN FOR THIS PHASE OF THE TCP.

2. INSTALL CHIP SEAL MARKERS AND THE FINAL TOP ONE COURSE SURFACE TREATMENT ON THE PROPOSED PROJECT ROADWAY SECTIONS AS SHOWN ON THE PROJECT TYPICAL SECTIONS AND IN ACCORDANCE WITH THE PLANS AND SPECIFICATIONS. TCP STANDARD (2-2)-18, (3-1)-13, AND (3-3)-14 SHALL GOVERN INSTALLING THE CHIP SEAL MARKERS AND FINAL ONE COURSE SURFACE TREATMENT.

3. INSTALL FINAL STRIPING, AND SIGNING. IN ACCORDANCE WITH THE LATEST TxMUTCD, PLANS, AND SPECIFICATIONS. STANDARDS TCP (3-1)-13, (3-3)-14, AND WZ(STPM)-13 SHALL GOVERN MOBILE CONSTRUCTION OPERATIONS.

4. OPEN ROADWAYS TO FULL TRAFFIC AND REMOVE ALL TCP BARRICADES, SIGNS, CHANNELIZING DEVICES, PAVEMENT MARKINGS AND EROSION/ SEDIMENTATION CONTROL DEVICES AFTER APPROVAL AND ACCEPTANCE OF THE PROJECT BY TXDOT.

STATE OF TEXAS
ERIC HERNANDEZ
114309
LICENSED PROFESSIONAL ENGINEER

09-23-2021

LEGACY ENGINEERING GROUP
Legacy Engineering Group, PLLC
7800 W. Interstate 10, Ste 830, San Antonio, Texas 78230,
210.660.1960/TBPE Firm Registration No. 20623

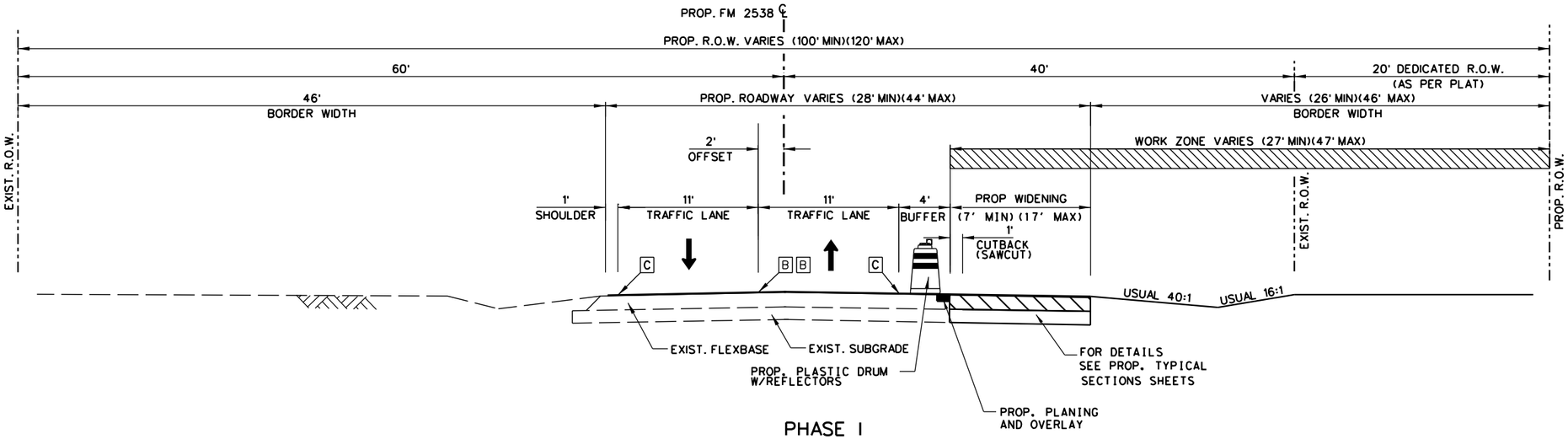
FM 2538
TRAFFIC CONTROL PLAN
SEQUENCE OF CONSTRUCTION

SHEET 1 OF 1

DN:		FED. RD. DIV. NO.	STATE	PROJECT NO.				SHEET NO.
CK DN:		6	TEXAS					12
DW:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		HIGHWAY NO.
CK DW:		15	BEXAR					FM 2538
TR:								
CK TR:								

LEGEND:

- [C] 4" SOLID WHITE STRIPE (REMOV)
- [B B] 4" DOUBLE SOLID YELLOW STRIPE (REMOV) W/ TY II-A-A MARKERS @ 40' C-C
- CONSTRUCTION WORK ZONE AREA
- ✧ SUBSIDIARY TO PERTINENT ITEMS
- (1) WZPM SHORT TERM TABS TY W 1 @ EVERY 20' (SEE NOTE NO.4)
- (2) WZPM SHORT TERM TABS TY Y-2 2 @ EVERY 20' (SEE NOTE NO.4)
- (3) WZPM SHORT TERM TABS TY W 2 @ EVERY 20' (SEE NOTE NO.4)



PHASE I

PROP TRAFFIC CONTROL PLAN. FM 2538 TYPICAL SECTION

STA. 13+38.00 TO STA.25+96.00

(SEE TCP PLAN LAYOUTS FOR TRANSITION DETAILS)

NOTES:

1. UTILIZE TCP STANDARDS (2-2)-18 AND (3-1)-13 TO GOVERN REMOVAL OF EXISTING STRIPPING OPERATIONS.
2. EXIST. STRIPING TO BE REMOVED BY USING WATER BLAST METHOD OR OTHER APPLICABLE METHOD (ITEM 677)
3. THE CONTRACTOR SHALL MAINTAIN TEMPORARY SHORT TERM TABS THROUGHOUT THE DURATION OF PHASE III. FINAL STRIPING OPERATIONS SHALL COMMENCE WITHIN 7 WORKING DAYS OF THE FINAL ONE COURSE SURFACE APPLICATION TREATMENT.
4. SHORT TERM WORZONE TABS SHALL BE TEMPORARY RAISED PAVEMENT MARKER (TPRM) CHIP SEAL MARKERS. APPLY CHIP SEAL MARKERS PRIOR TO APPLICATION OF FINAL TOP ONE COURSE SURFACE TREATMENT.

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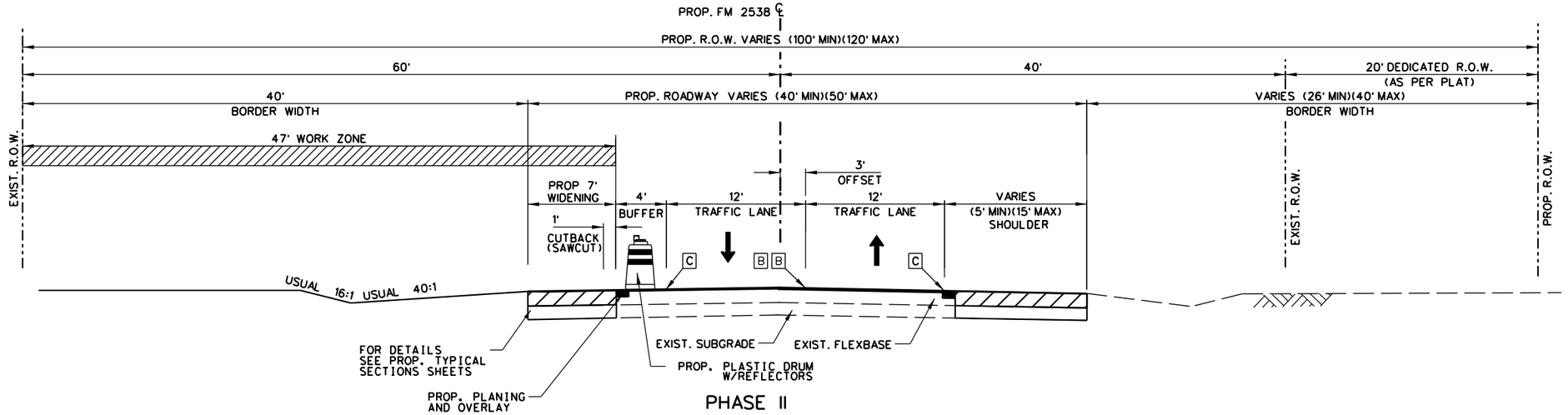
FM 2538
TRAFFIC CONTROL PLAN
TYPICAL SECTIONS

DN:		FED. RD. DIV. NO.	STATE	PROJECT NO.				SHEET NO.
CK DN:		6	TEXAS					13
DW:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		HIGHWAY NO.
CK DW:		15	BEXAR					FM 2538
TR:								
CK TR:								

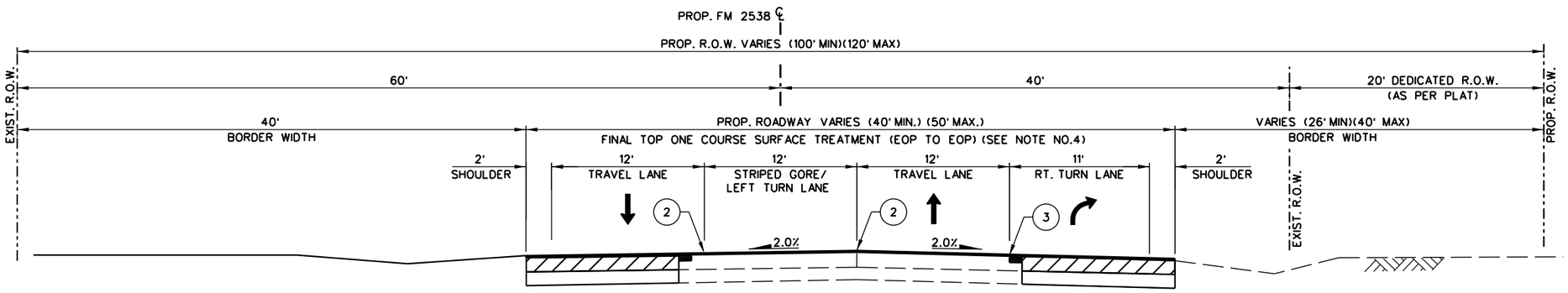


PHASE II

PROP TRAFFIC CONTROL PLAN. FM 2538 TYPICAL SECTION

STA. 13+38.00 TO STA. 25+96.00

(SEE TCP PLAN LAYOUTS FOR TRANSITION DETAILS)



PHASE III

PROP TRAFFIC CONTROL PLAN. FM 2538 TYPICAL SECTION

STA. 13+38.00 TO STA. 25+96.00 (SEE STRIPING LAYOUTS FOR TEMPERARY TABS CONFIGURATION)

LEGEND:

- C — 4" SOLID WHITE STRIPE (REMOV)
- B B — 4" DOUBLE SOLID YELLOW STRIPE (REMOV) W/ TY II-A-A MARKERS @ 40' C-C
- CONSTRUCTION WORK ZONE AREA
- SUBSIDIARY TO PERTINENT ITEMS
- (1) WZPM SHORT TERM TABS TY W 1 @ EVERY 20' (SEE NOTE NO.4)
- (2) WZPM SHORT TERM TABS TY Y-2 2 @ EVERY 20' (SEE NOTE NO.4)
- (3) WZPM SHORT TERM TABS TY W 2 @ EVERY 20' (SEE NOTE NO.4)

NOTES:

1. UTILIZE TCP STANDARDS (2-2)-18 AND (3-1)-13 TO GOVERN REMOVAL OF EXISTING STRIPPING OPERATIONS.
2. EXIST. STRIPING TO BE REMOVED BY USING WATER BLAST METHOD OR OTHER APPLICABLE METHOD (ITEM 677)
3. THE CONTRACTOR SHALL MAINTAIN TEMPORARY SHORT TERM TABS THROUGHOUT THE DURATION OF PHASE III. FINAL STRIPING OPERATIONS SHALL COMMENCE WITHIN 7 WORKING DAYS OF THE FINAL ONE COURSE SURFACE APPLICATION TREATMENT.
4. SHORT TERM WORZONE TABS SHALL BE TEMPORARY RAISED PAVEMENT MARKER (TPRM) CHIP SEAL MARKERS. APPLY CHIP SEAL MARKERS PRIOR TO APPLICATION OF FINAL TOP ONE COURSE SURFACE TREATMENT.

STATE OF TEXAS
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09-23-2021

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FM 2538
TRAFFIC CONTROL PLAN
TYPICAL SECTION

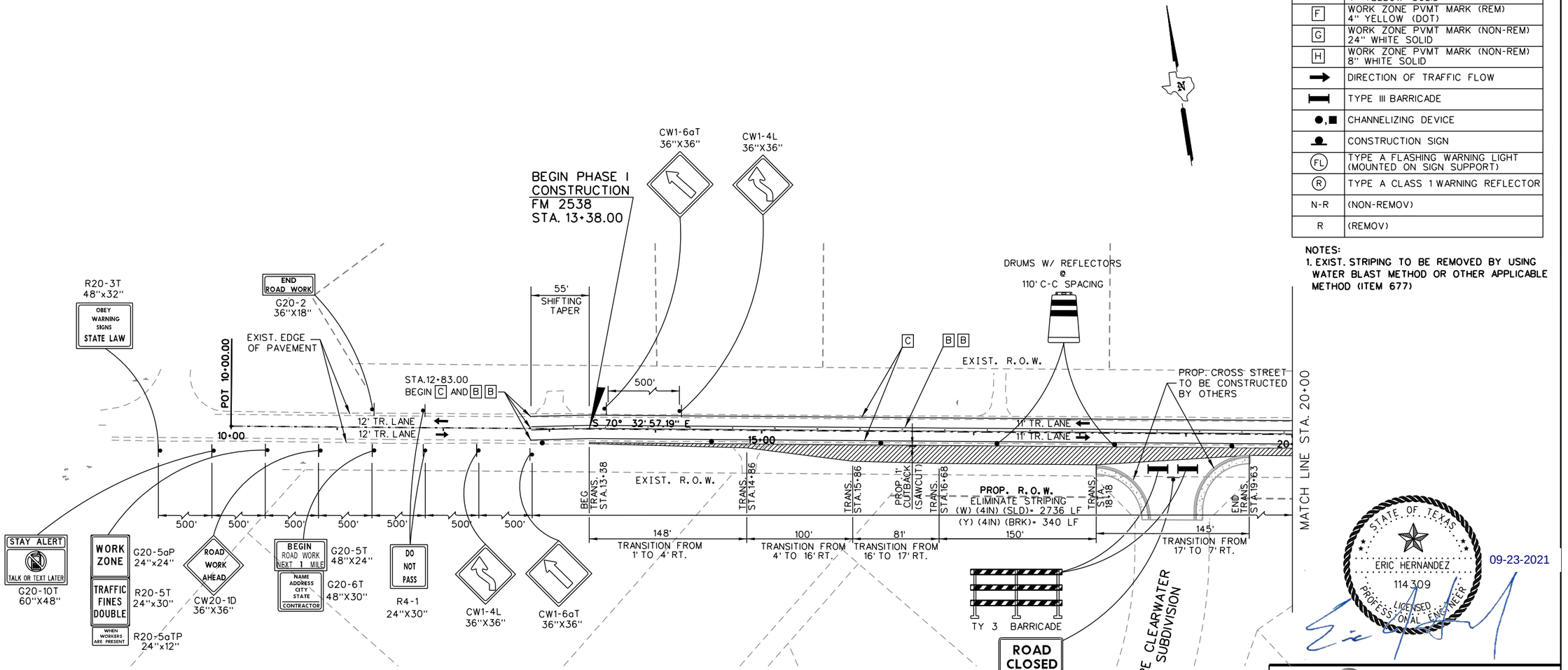
DN:		FED. RD. DIV. NO.	STATE	PROJECT NO.				SHEET NO.
CK DN:		6	TEXAS					14
DW:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		HIGHWAY NO.
CK DW:		15	BEXAR					FM 2538
TR:								
CK TR:								

SHEET SUMMARY

STATION LIMITS	ITEM 508	PAVEMENT MARKINGS (ITEM 662)															ITEM 677						ITEM 104
	CONSTRUCTING DETOURS (SY)	REFLECTORS		SHORT TERM (TAB)		NON-REMOVABLE							REMOVABLE				ELIMINATING EXISTING PAVEMENT MARKINGS						REMOVING EXIST. CURB & GUTTER (LF)
		TY I-C (EA)	TY II-A-A (EA)	TY W (EA)	TY Y-2 (EA)	4"WHITE SOLID (LF)	8"WHITE SOLID (LF)	24"WHITE SOLID (LF)	WORD (EA)	ARROW (EA)	4"YELLOW SOLID (LF)	4"YELLOW BROKEN (LF)	4"WHITE (DOT) (LF)	4"WHITE SOLID (LF)	4"YELLOW (DOT) (LF)	4"YELLOW SOLID (LF)	4"PAV'MT MARKINGS (LF)	8"PAV'MT MARKINGS (LF)	12"PAV'MT MARKINGS (LF)	24"PAV'MT MARKINGS (LF)	WORD (EA)	ARROW (EA)	
10+00-26+51			34											2736		2736	3076						
TOTAL			34											2736		2736	3076						

LEGEND	
	CONSTRUCTION PHASE
	TEMPORARY CONST. DETOUR
A	WORK ZONE PVMT MARK (NON-REM) 4" WHITE SOLID
B	WORK ZONE PVMT MARK (NON-REM) 4" YELLOW SOLID
B B	WORK ZONE PVMT MARK (REM) 4" DOUBLE YELLOW SOLID
C	WORK ZONE PVMT MARK (REM) 4" WHITE SOLID
D	WORK ZONE PVMT MARK (REM) WHITE 4" (DOT)
E	WORK ZONE PVMT MARK (REM) 4" YELLOW SOLID
F	WORK ZONE PVMT MARK (REM) 4" YELLOW (DOT)
G	WORK ZONE PVMT MARK (NON-REM) 24" WHITE SOLID
H	WORK ZONE PVMT MARK (NON-REM) 8" WHITE SOLID
→	DIRECTION OF TRAFFIC FLOW
	TYPE III BARRICADE
●, ■	CHANNELIZING DEVICE
	CONSTRUCTION SIGN
FL	TYPE A FLASHING WARNING LIGHT (MOUNTED ON SIGN SUPPORT)
R	TYPE A CLASS 1 WARNING REFLECTOR
N-R	(NON-REMOV)
R	(REMOV)

NOTES:
1. EXIST. STRIPING TO BE REMOVED BY USING WATER BLAST METHOD OR OTHER APPLICABLE METHOD (ITEM 677)



STATE OF TEXAS
ERIC HERNANDEZ
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09-23-2021

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FM 2538
TRAFFIC CONTROL PLAN
PHASE I

SCALE 1" = 100' SHEET 1 OF 2

DN:		FED. RD. DIV. NO.	STATE	PROJECT NO.				SHEET NO.
CK DN:		6	TEXAS					15
DW:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		HIGHWAY NO.
CK DW:		15	BEXAR					FM 2538
TR:								
CK TR:								

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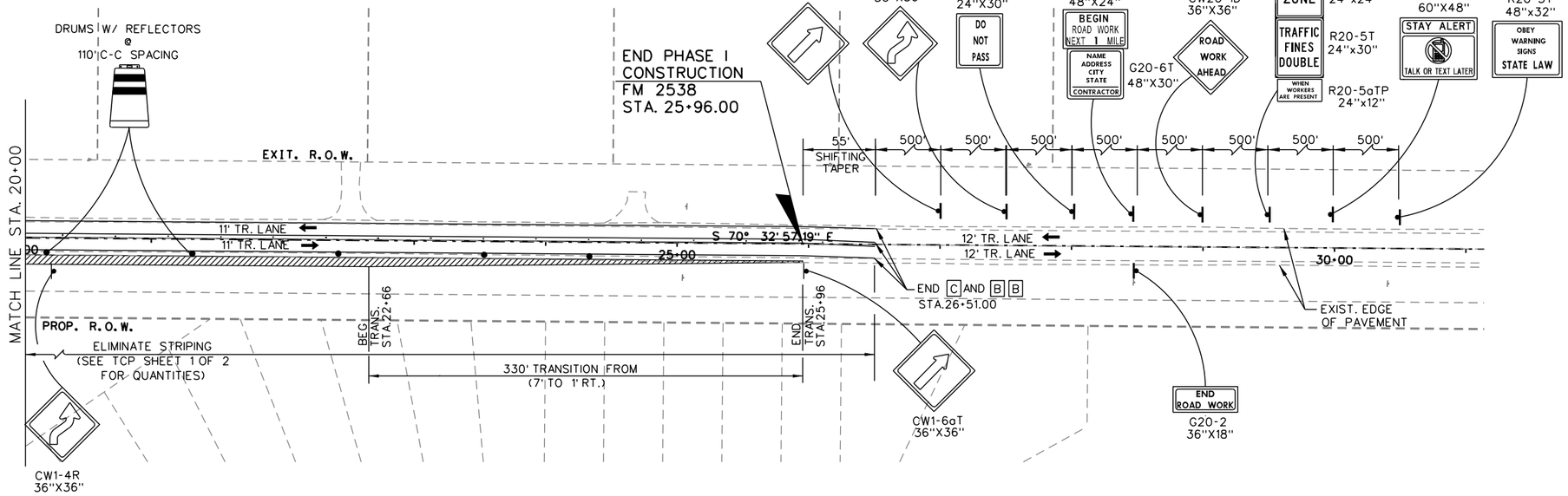
SHEET SUMMARY

STATION LIMITS	ITEM 508					PAVEMENT MARKINGS (ITEM 662)											ITEM 677						ITEM 104
	CONSTRUCTING DETOURS (SY)	REFLECTORS		SHORT TERM (TAB)		NON-REMOVABLE							REMOVABLE				ELIMINATING EXISTING PAVEMENT MARKINGS						REMOVING EXIST. CURB & GUTTER (LF)
		TY I-C (EA)	TY II-A-A (EA)	TY W (EA)	TY Y-2 (EA)	4"WHITE SOLID (LF)	8"WHITE SOLID (LF)	24"WHITE SOLID (LF)	WORD (EA)	ARROW (EA)	4"YELLOW SOLID (LF)	4"YELLOW BROKEN (LF)	4"WHITE (DOT) (LF)	4"WHITE SOLID (LF)	4"YELLOW (DOT) (LF)	4"YELLOW SOLID (LF)	4"PAV'MT MARKINGS (LF)	8"PAV'MT MARKINGS (LF)	12"PAV'MT MARKINGS (LF)	24"PAV'MT MARKINGS (LF)	WORD (EA)	ARROW (EA)	
-																							
TOTAL																							

*SEE TCP SHEET 1 OF 2 FOR QUANTITIES

LEGEND	
	CONSTRUCTION PHASE
	TEMPORARY CONST. DETOUR
A	WORK ZONE PVMT MARK (NON-REM) 4" WHITE SOLID
B	WORK ZONE PVMT MARK (NON-REM) 4" YELLOW SOLID
B B	WORK ZONE PVMT MARK (REM) 4" DOUBLE YELLOW SOLID
C	WORK ZONE PVMT MARK (REM) 4" WHITE SOLID
D	WORK ZONE PVMT MARK (REM) WHITE 4" (DOT)
E	WORK ZONE PVMT MARK (REM) 4" YELLOW SOLID
F	WORK ZONE PVMT MARK (REM) 4" YELLOW (DOT)
G	WORK ZONE PVMT MARK (NON-REM) 24" WHITE SOLID
H	WORK ZONE PVMT MARK (NON-REM) 8" WHITE SOLID
→	DIRECTION OF TRAFFIC FLOW
	TYPE III BARRICADE
●, ■	CHANNELIZING DEVICE
	CONSTRUCTION SIGN
FL	TYPE A FLASHING WARNING LIGHT (MOUNTED ON SIGN SUPPORT)
R	TYPE A CLASS 1 WARNING REFLECTOR
N-R	(NON-REMOV)
R	(REMOV)



NOTES:
1. EXIST. STRIPING TO BE REMOVED BY USING WATER BLAST METHOD OR OTHER APPLICABLE METHOD (ITEM 677)

STATE OF TEXAS
ERIC HERNANDEZ
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FM 2538
TRAFFIC CONTROL PLAN
PHASE I

SCALE 1" = 100' SHEET 2 OF 2

DN:		FED. RD. DIV. NO.	STATE	PROJECT NO.				SHEET NO.
CK DN:		6	TEXAS					16
DW:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		HIGHWAY NO.
CK DW:		15	BEXAR					FM2538
TR:								
CK TR:								

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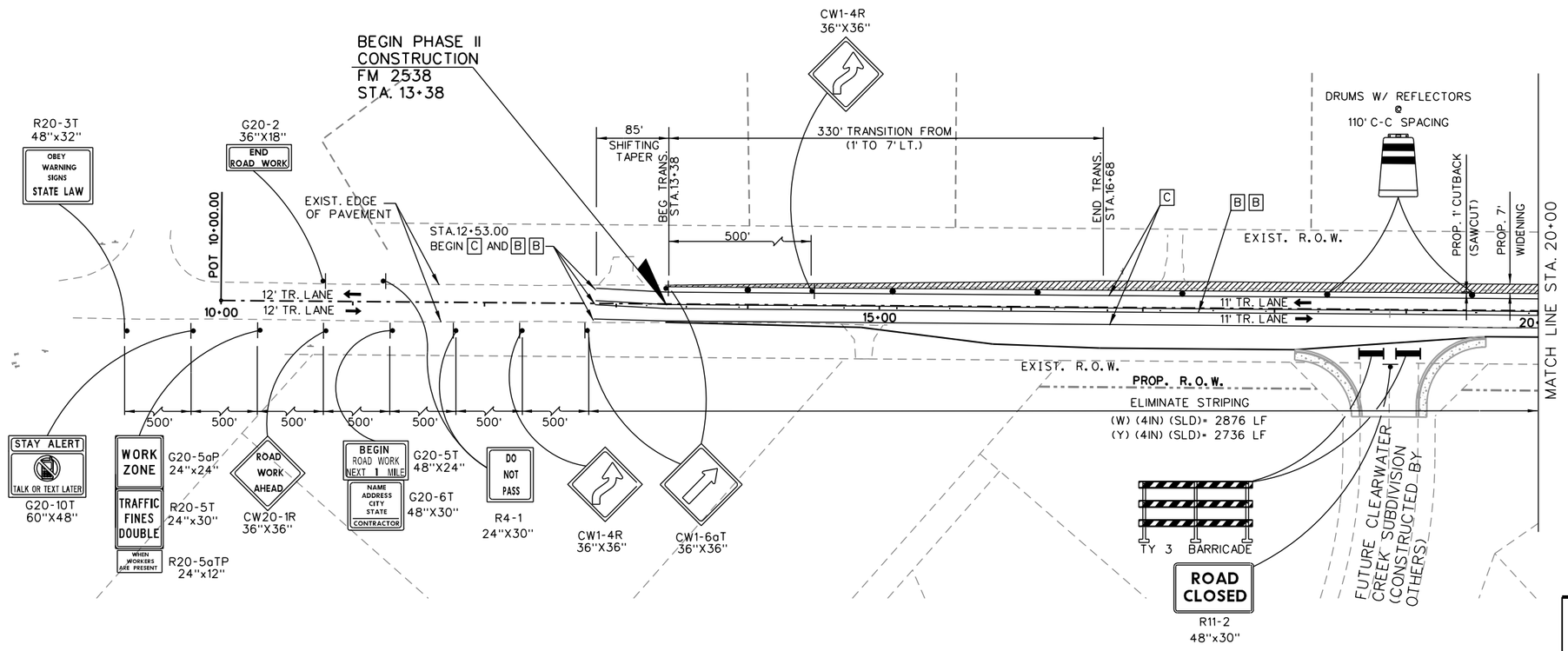
SHEET SUMMARY

STATION LIMITS	ITEM 508					PAVEMENT MARKINGS (ITEM 662)											ITEM 677						ITEM 104
	CONSTRUCTING DETOURS (SY)	REFLECTORS		SHORT TERM (TAB)		NON-REMOVABLE							REMOVABLE				ELIMINATING EXISTING PAVEMENT MARKINGS						REMOVING EXIST. CURB & GUTTER (LF)
		TY I-C (EA)	TY II-A-A (EA)	TY W (EA)	TY Y-2 (EA)	4"WHITE SOLID (LF)	8"WHITE SOLID (LF)	24"WHITE SOLID (LF)	WORD (EA)	ARROW (EA)	4"YELLOW SOLID (LF)	4"YELLOW BROKEN (LF)	4"WHITE (DOT) (LF)	4"WHITE SOLID (LF)	4"YELLOW (DOT) (LF)	4"YELLOW SOLID (LF)	4"PAV'MT MARKINGS (LF)	8"PAV'MT MARKINGS (LF)	12"PAV'MT MARKINGS (LF)	24"PAV'MT MARKINGS (LF)	WORD (EA)	ARROW (EA)	
10+00-26+81			36											2876		2876	5612						
TOTAL			36											2876		2876	5612						

LEGEND	
	CONSTRUCTION PHASE
	TEMPORARY CONST. DETOUR
A	WORK ZONE PVMT MARK (NON-REM) 4" WHITE SOLID
B	WORK ZONE PVMT MARK (NON-REM) 4" YELLOW SOLID
B B	WORK ZONE PVMT MARK (REM) 4" DOUBLE YELLOW SOLID
C	WORK ZONE PVMT MARK (REM) 4" WHITE SOLID
D	WORK ZONE PVMT MARK (REM) WHITE 4" (DOT)
E	WORK ZONE PVMT MARK (REM) 4" YELLOW SOLID
F	WORK ZONE PVMT MARK (REM) 4" YELLOW (DOT)
G	WORK ZONE PVMT MARK (NON-REM) 24" WHITE SOLID
H	WORK ZONE PVMT MARK (NON-REM) 8" WHITE SOLID
→	DIRECTION OF TRAFFIC FLOW
	TYPE III BARRICADE
●, ■	CHANNELIZING DEVICE
	CONSTRUCTION SIGN
FL	TYPE A FLASHING WARNING LIGHT (MOUNTED ON SIGN SUPPORT)
R	TYPE A CLASS 1 WARNING REFLECTOR
N-R	(NON-REMOV)
R	(REMOV)

NOTES:
1. EXIST. STRIPING TO BE REMOVED BY USING WATER BLAST METHOD OR OTHER APPLICABLE METHOD (ITEM 677).



STATE OF TEXAS
ERIC HERNANDEZ
114309
LICENSED PROFESSIONAL ENGINEER
09-23-2021

LEGACY ENGINEERING GROUP
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7800 W. Interstate 10, Ste 830 San Antonio, Texas 78230,
210.660.1960/TBPE Firm Registration No. 20623

FM 2538
TRAFFIC CONTROL PLAN
PHASE II

SCALE 1" = 100' SHEET 1 OF 2

DN:		FED. RD. DIV. NO.	STATE	PROJECT NO.				SHEET NO.
CK DN:		6	TEXAS					17
DW:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		HIGHWAY NO.
CK DW:		15	BEXAR					FM 2538
TR:								
CK TR:								

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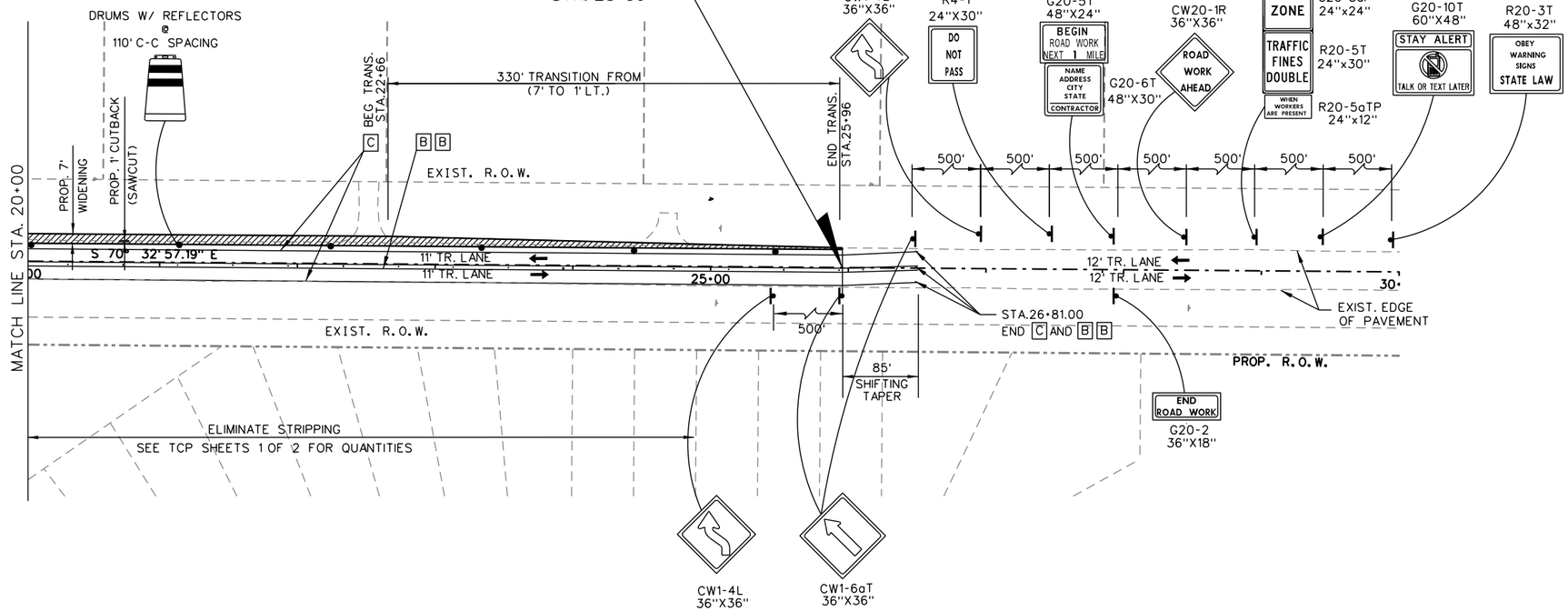
SHEET SUMMARY

STATION LIMITS	ITEM 508					PAVEMENT MARKINGS (ITEM 662)											ITEM 677						ITEM 104
	CONSTRUCTING DETOURS (SY)	REFLECTORS		SHORT TERM (TAB)		NON-REMOVABLE							REMOVABLE				ELIMINATING EXISTING PAVEMENT MARKINGS						REMOVING EXIST. CURB & GUTTER (LF)
		TY I-C (EA)	TY II-A-A (EA)	TY W (EA)	TY Y-2 (EA)	4"WHITE SOLID (LF)	8"WHITE SOLID (LF)	24"WHITE SOLID (LF)	WORD (EA)	ARROW (EA)	4"YELLOW SOLID (LF)	4"YELLOW BROKEN (LF)	4"WHITE (DOT) (LF)	4"WHITE SOLID (LF)	4"YELLOW (DOT) (LF)	4"YELLOW SOLID (LF)	4"PAV'MT MARKINGS (LF)	8"PAV'MT MARKINGS (LF)	12"PAV'MT MARKINGS (LF)	24"PAV'MT MARKINGS (LF)	WORD (EA)	ARROW (EA)	
-																							
TOTAL																							

*SEE TCP SHEET 1 OF 2 FOR QUANTITIES

LEGEND	
	CONSTRUCTION PHASE
	TEMPORARY CONST. DETOUR
A	WORK ZONE PVMT MARK (NON-REM) 4" WHITE SOLID
B	WORK ZONE PVMT MARK (NON-REM) 4" YELLOW SOLID
B B	WORK ZONE PVMT MARK (REM) 4" DOUBLE YELLOW SOLID
C	WORK ZONE PVMT MARK (REM) 4" WHITE SOLID
D	WORK ZONE PVMT MARK (REM) WHITE 4" (DOT)
E	WORK ZONE PVMT MARK (REM) 4" YELLOW SOLID
F	WORK ZONE PVMT MARK (REM) 4" YELLOW (DOT)
G	WORK ZONE PVMT MARK (NON-REM) 24" WHITE SOLID
H	WORK ZONE PVMT MARK (NON-REM) 8" WHITE SOLID
→	DIRECTION OF TRAFFIC FLOW
	TYPE III BARRICADE
●, ■	CHANNELIZING DEVICE
	CONSTRUCTION SIGN
FL	TYPE A FLASHING WARNING LIGHT (MOUNTED ON SIGN SUPPORT)
R	TYPE A CLASS 1 WARNING REFLECTOR
N-R	(NON-REMOV)
R	(REMOV)

NOTES:
1. EXIST. STRIPING TO BE REMOVED BY USING WATER BLAST METHOD OR OTHER APPLICABLE METHOD (ITEM 677).



STATE OF TEXAS
ERIC HERNANDEZ
114309
LICENSED PROFESSIONAL ENGINEER
09-23-2021

LEGACY ENGINEERING GROUP

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FM 2538
TRAFFIC CONTROL PLAN
PHASE II

SCALE 1" = 100' SHEET 2 OF 2

DN:		FED. RD. DIV. NO.	STATE	PROJECT NO.				SHEET NO.
CK DN:		6	TEXAS					18
DW:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		HIGHWAY NO.
CK DW:		15	BEXAR					FM 2538
TR:								
CK TR:								

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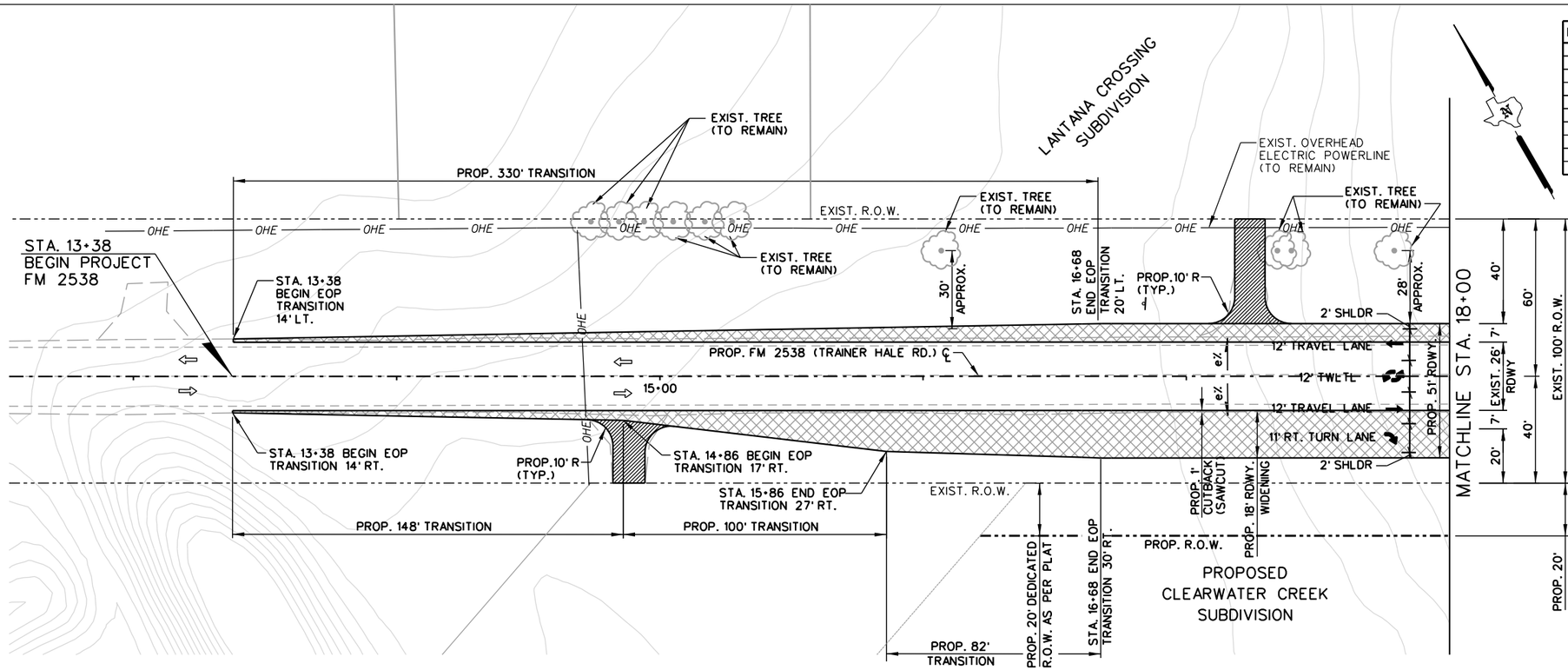

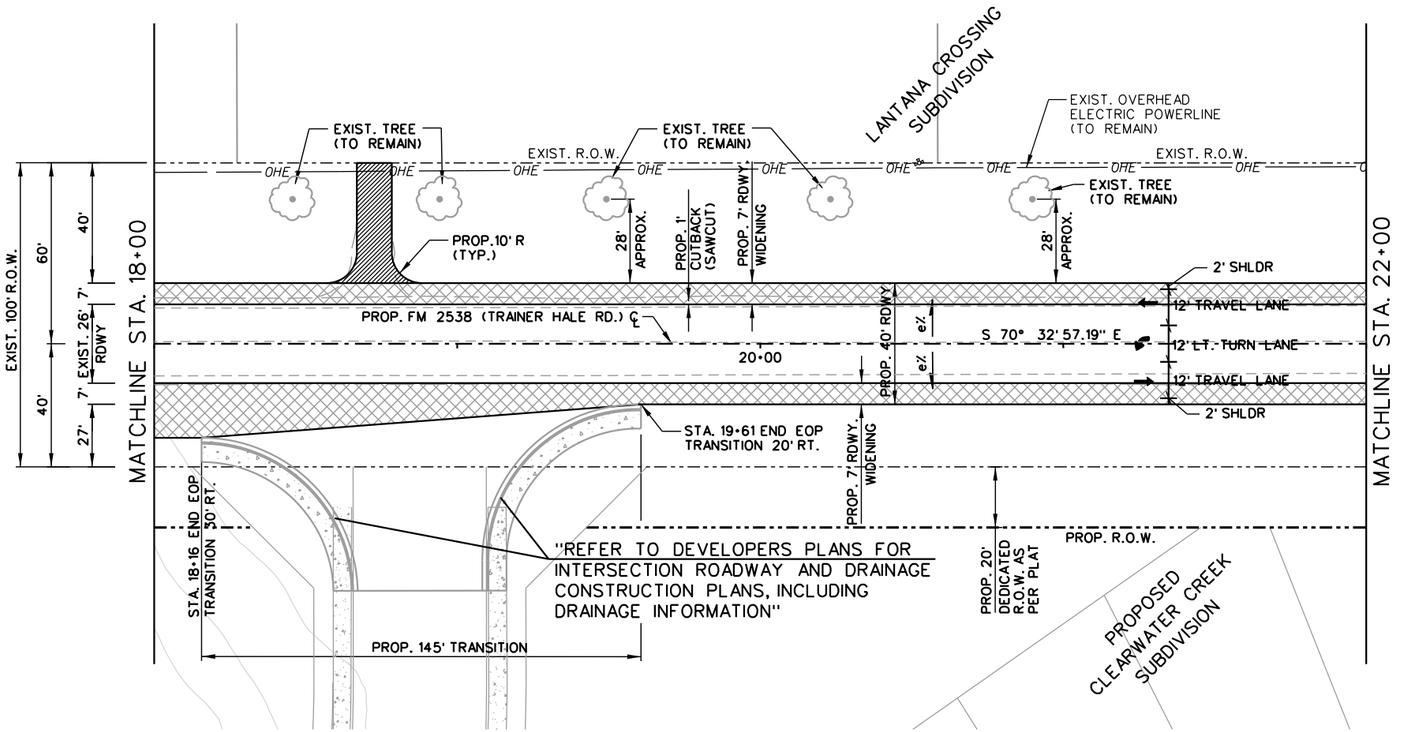

SHEET SUMMARY

ITEM	DESCRIPTION	UNIT	QUANTITY

LEGEND:

- PROPOSED PRIVATE DRIVEWAY OR PUBLIC INTERSECTION
- PROPOSED ROADWAY WIDENING
- ★ TO BE REMOVED UNDER ITEM 496 INCLUDES PAYMENT FOR REMOVAL OF ALL APPURTENANCES
- ★ TO BE REMOVED UNDER ITEM 100 "PREP. ROW"
- ⊛ NON-PAY, SUBSIDIARY TO PERTINENT BID ITEMS

NOTE:

SEE ALIGNMENT DATA SHEET FOR PROP. CENTERLINE DATA.

VERIFY ALL UTILITY LOCATIONS AND ELEVATIONS PRIOR TO ALL SCARIFYING OR EXCAVATING OPERATIONS.

STATE OF TEXAS
ERIC HERNANDEZ
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LICENSED PROFESSIONAL ENGINEER
09-23-2021

LEGACY ENGINEERING GROUP
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FM 2538
PLAN LAYOUT

SCALE 1"= 50' SHEET 1 OF 2

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		15	TEXAS					FM 2538
ENGINEER:		DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		SAT	BEXAR	-	-	-		19
REVIEW:								
CK:								

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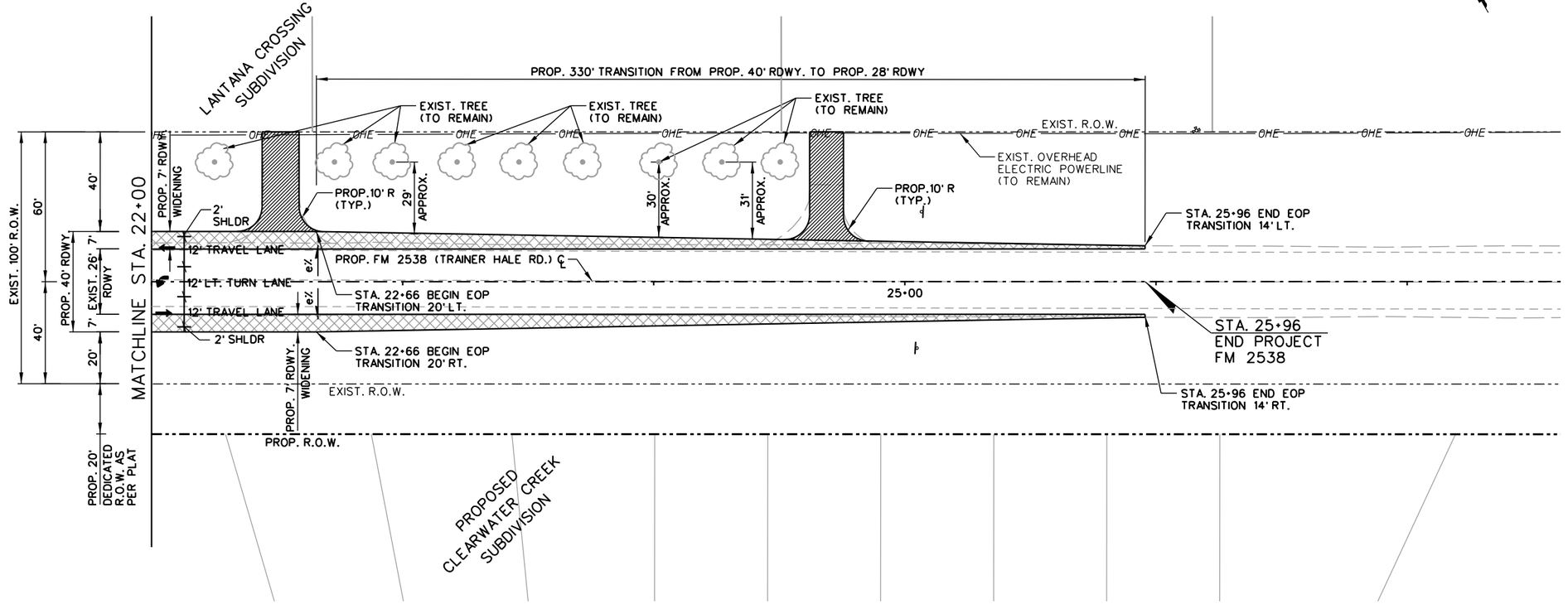
9/20/2021



SHEET SUMMARY

ITEM	DESCRIPTION	UNIT	QUANTITY

LEGEND:

- PROPOSED PRIVATE DRIVEWAY OR PUBLIC INTERSECTION
- PROPOSED ROADWAY WIDENING
- ⍟ TO BE REMOVED UNDER ITEM 496 INCLUDES PAYMENT FOR REMOVAL OF ALL APPURTENANCES
- ★ TO BE REMOVED UNDER ITEM 100 "PREP. ROW"
- ⊛ NON-PAY, SUBSIDIARY TO PERTINENT BID ITEMS

NOTE:

SEE ALIGNMENT DATA SHEET FOR PROP. CENTERLINE DATA.

VERIFY ALL UTILITY LOCATIONS AND ELEVATIONS PRIOR TO ALL SCARIFYING OR EXCAVATING OPERATIONS.

STATE OF TEXAS
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09-23-2021

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FM 2538
PLAN LAYOUT

SCALE 1"= 50'

SHEET 2 OF 2

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:								
ENGINEER:		15	TEXAS					FM 2538
CK:		DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
REVIEW:		SAT	BEXAR	-	-	-		198
CK:								

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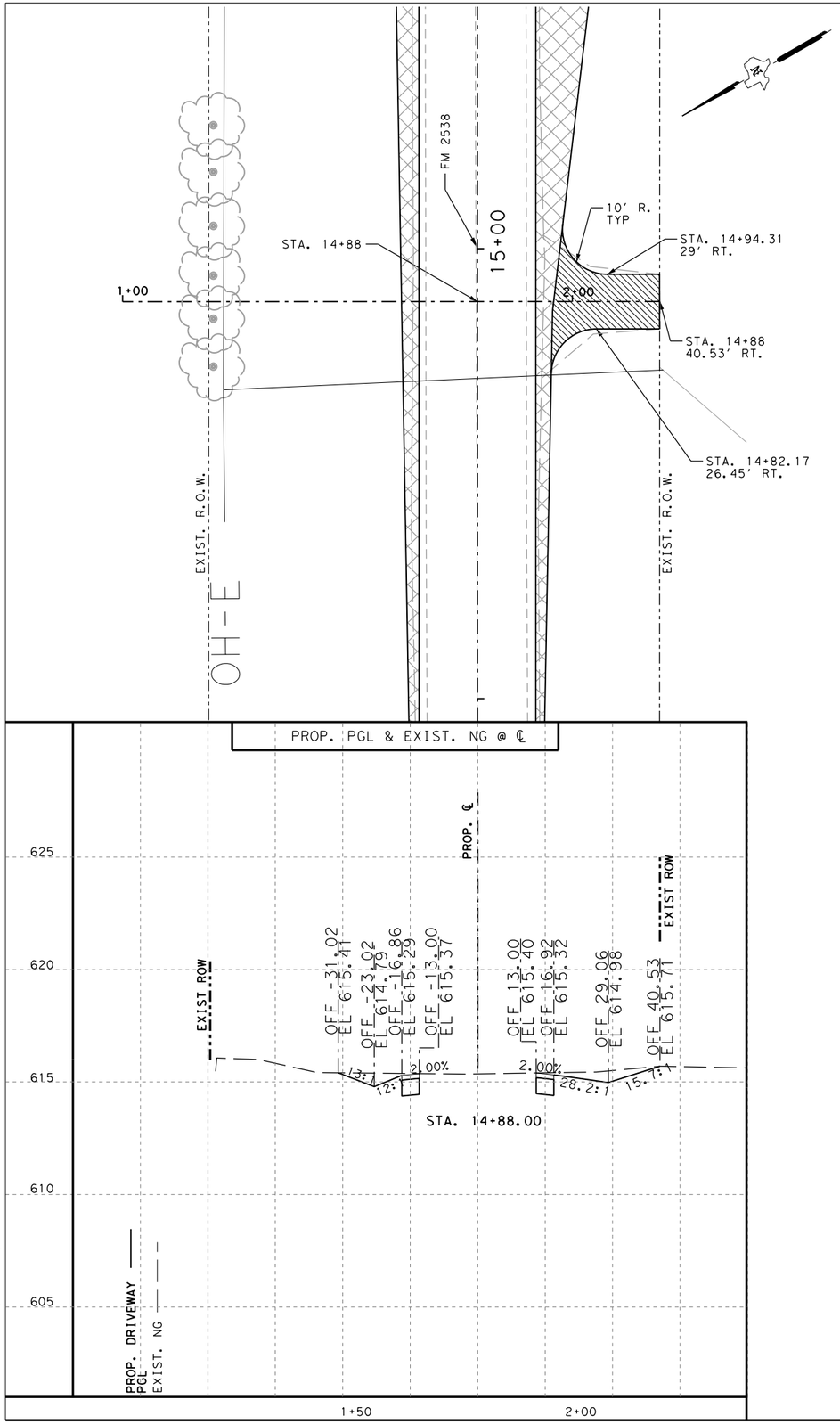
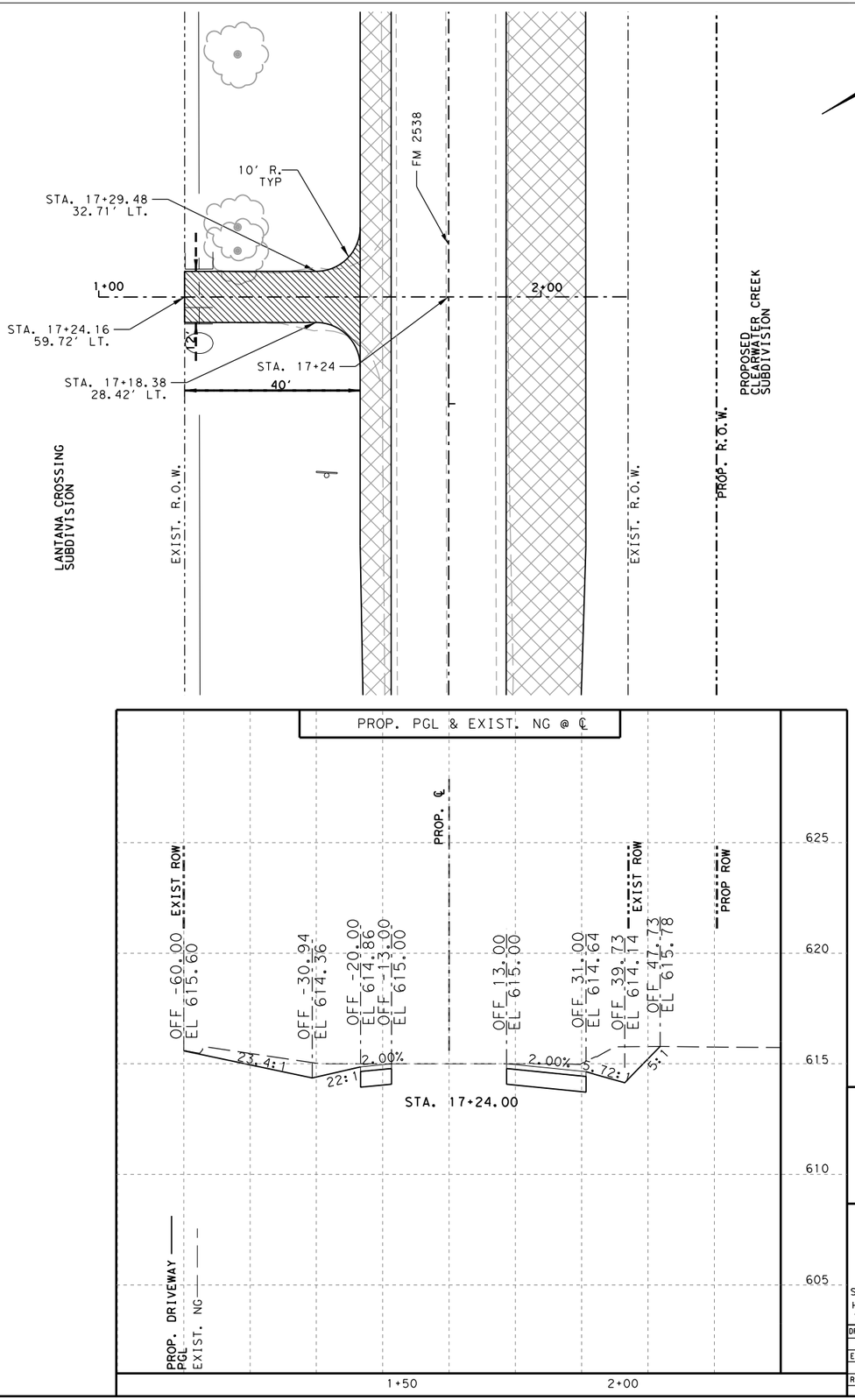
9/20/2021





STATE OF TEXAS
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FM 2538
DRIVEWAY DETAILS

SCALE:
HOR: 1"= 50'
VER: 1"= 10'

SHEET 1 OF 2

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:		15	TEXAS				FM 2538
ENGINEER:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		SAT	BEXAR	-	-	-	20
REVIEW:							
CK:							

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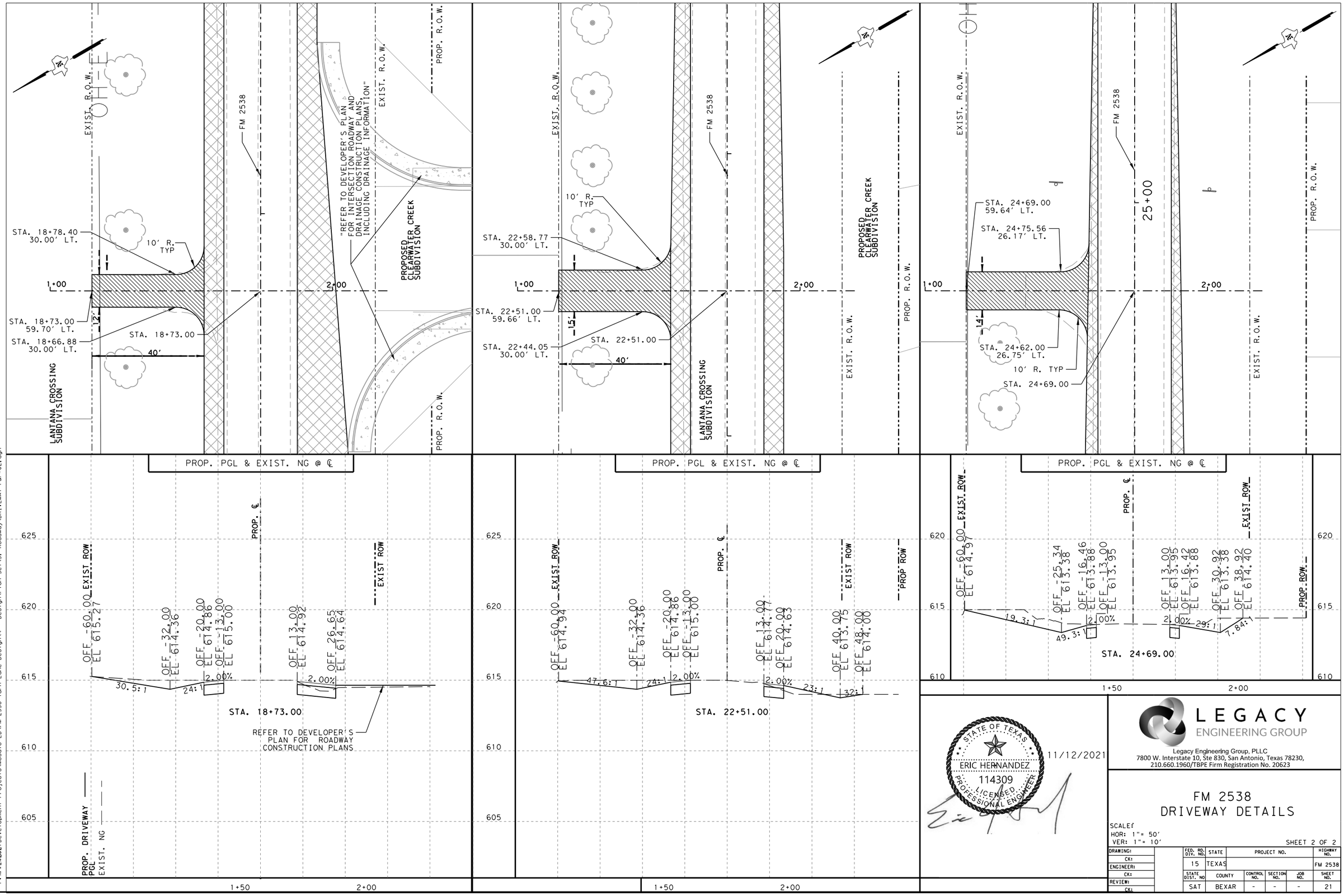

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DRIVEWAY DETAILS

SCALE:
HOR: 1"= 50'
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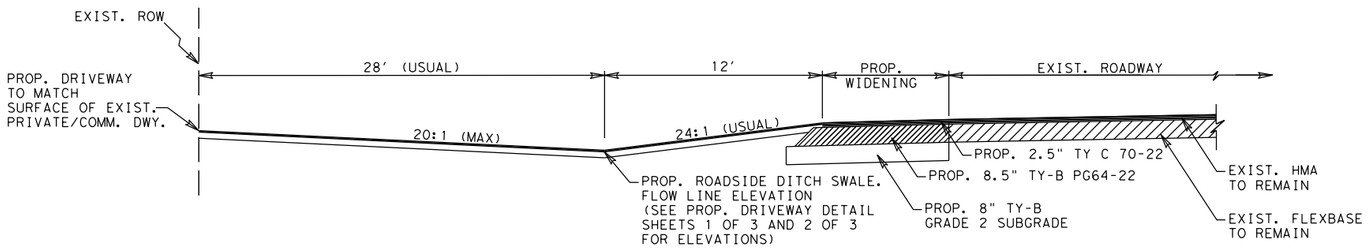
SHEET 2 OF 2

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		15	TEXAS					FM 2538
ENGINEER:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		SAT	BEXAR	-	-	-		21
REVIEW:								
CK:								

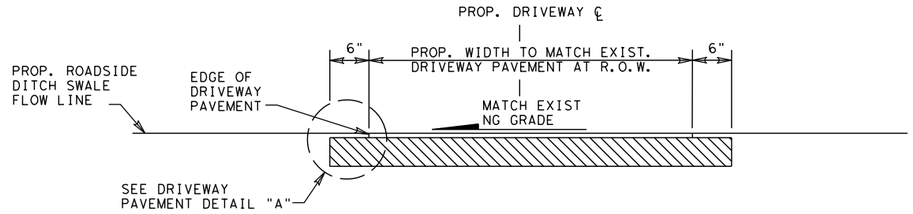


TYPICAL DRIVEWAY PROFILE VIEW (NTS)

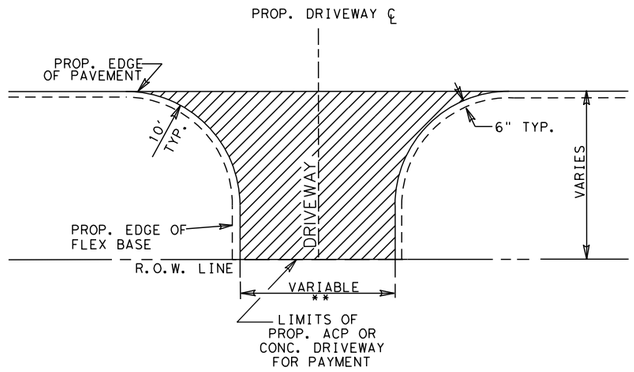
(TO BE USED WHERE NO PIPE IS PROPOSED.)

PROPOSED DRIVEWAY SLOPE TABLE
COMMERCIAL DRIVEWAYS @ 20:1 MAX.
RESIDENTIAL DRIVEWAYS @ 20:1 MAX.

PROPOSED DRIVEWAY CHANGE IN SLOPE (A)
COMMERCIAL DRIVEWAYS: A = 8% MAX.
RESIDENTIAL DRIVEWAYS: A = 8% MAX.
A = GRADE #2 - GRADE #1

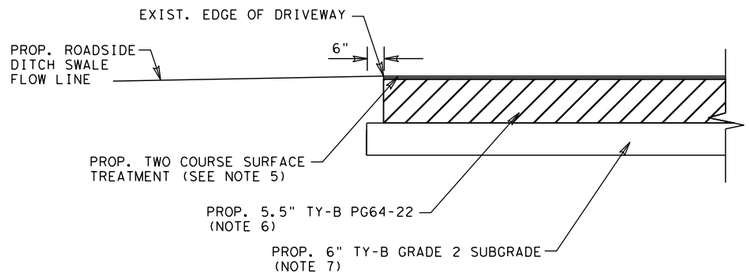


TYPICAL DRIVEWAY FRONT VIEW (NTS)



PLAN OF PRIVATE AND COMMERCIAL DRIVES

** FOR PRIVATE RESIDENTIAL DRIVES, TRY TO MATCH EXISTING WITH A MINIMUM WIDTH OF 12 FT. AND A MAXIMUM WIDTH OF 24 FT. WITH 10 FT. USUAL RADIUS.



PROPOSED DRIVEWAY PAVEMENT DETAIL "A" (NTS)

NOTES:

1. ALL ENTRANCES CONSTRUCTED ON THIS PROJECT ARE SUBJECT TO CONCURRENCE WITH EXISTING GOVERNING REGULATIONS AS SET OUT BY THE STATE - TEXAS TRANSPORTATION COMMISSION.
2. ENTRANCE'S BASE AND SURFACING MAY BE EXTENDED BEYOND R.O.W. LINE AS REQUIRED TO MEET EXISTING DRIVEWAY GRADE IN A SATISFACTORY MANNER OF WHICH NO STEEPER THAN 20:1 DRIVEWAY SLOPE WILL BE CONSTRUCTED. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING RIGHT OF WAY ENTRY AND ADJUSTING FENCES AND GATES TO MAINTAIN EXISTING GATE SET BACK. PRIOR TO DRIVEWAY RECONSTRUCTION IF NEEDED. DEVELOPER IS RESPONSIBLE FOR COST INCURRED AS A RESULT OF THESE OPERATIONS.
3. EXACT LOCATIONS, DIMENSIONS, AND TYPE TO BE ESTABLISHED DURING CONSTRUCTION BY THE ENGINEER.
4. PROP. WIDTH OF DRIVEWAYS TO MATCH EXISTING WIDTH AT R.O.W. LINE.
5. TWO (2) COURSE SURFACE TREATMENT (TCST) - ASPH(AC-15P,AC-5TR,AC-XP,AC-TR)(@0.30 GAL/SY) W/AGGR TY-B GR-4 SAC-B)(@110 SY/CY)
6. HMA COURSE- GRADE 3 AGGR TY PB SAC-B W/@ 110SY/CY W/ASPH(AC-15P,AC-20-5TR,AC-20XP, AC10-2TR)GAL @0.30 GAL/SY
7. SUBGRADE EMBARKMENT MATERIAL TO BE CONSTRUCTED AS PER TxDOT SPECIFICATION ITEM 132, INCLUDING MOISTURE CONDITIONED AND DEPTH FOR MOISTURE CONDITIONING. COMPACTION TO BE ORDINARY COMPACTION WITH PROOF ROLLING WITNESSED BY TxDOT INSPECTOR.

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FM 2538
DRIVEWAY DETAILS

SHEET 3 OF 3

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		15	TEXAS					FM 2538
ENGINEER:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		SAT	BEXAR	-	-	-		22
REVIEW:								
CK:								

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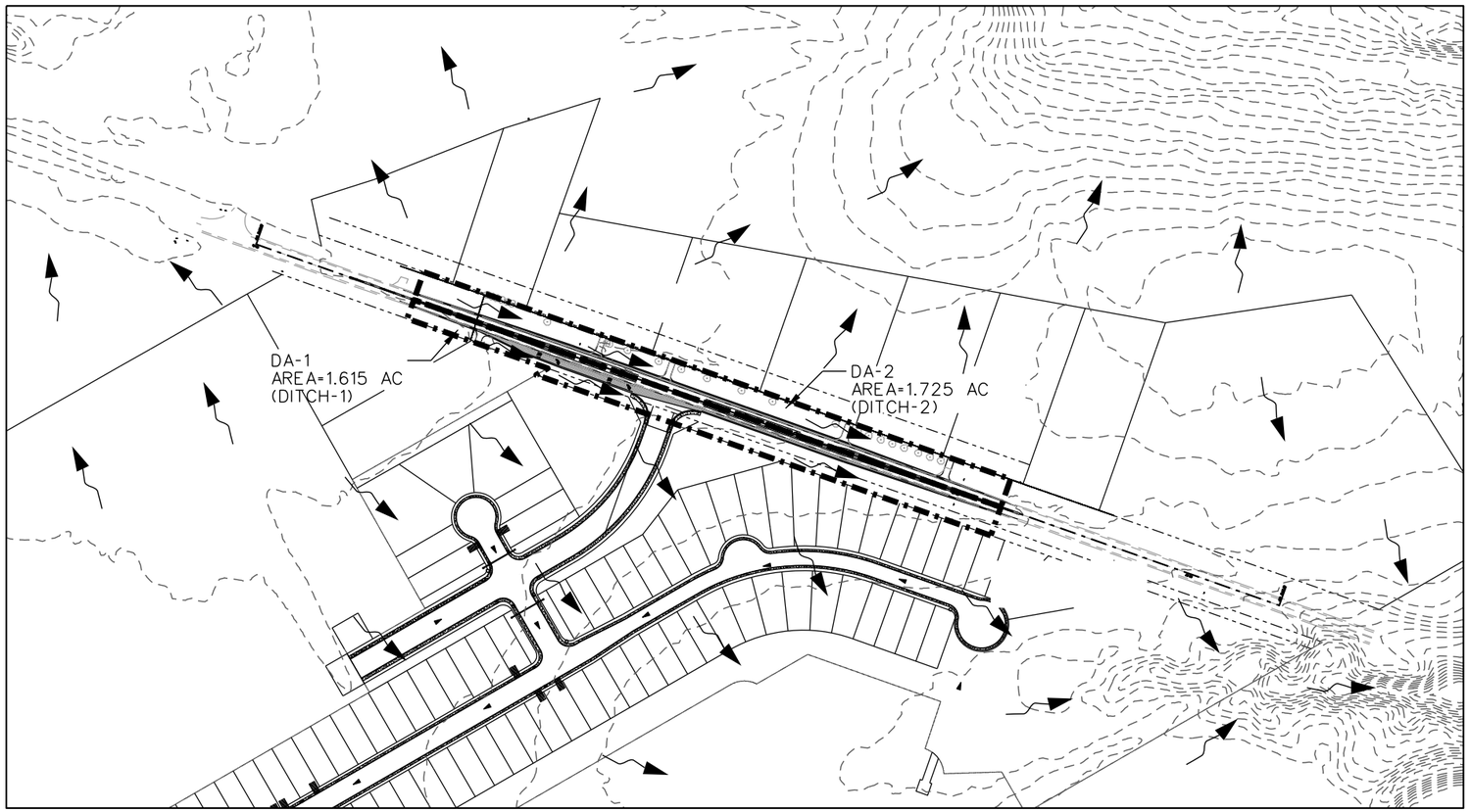

ROADSIDE DITCH CAPACITY ANALYSIS DRAINAGE AREAS

RATIONAL METHOD

$Q = C \times I \times A$

$I = \frac{b}{(tc+d)^e}$

Q = MAXIMUM RATE OF RUNOFF (CFS)
C = RUNOFF COEFF.
I = AVERAGE RAINFALL INTENSITY (IN/HR)
A = DRANAGE AREA (AC)

I = AVERAGE RAINFALL INTENSITY (IN/HR)
tc = DRAINAGE AREA TIME OF CONCENTRATION (HR)
e,b,d = COEFFICIENTS BASED ON RAINFALL IDF DATA

DRAINAGE RUNOFF (CFS)								
DRAIN AREA I.D.	TOTAL AREA (A) (AC)	TOTAL "C" VALUE	tc (HR)	e	b (IN)	d (MIN)	I (5 YR) (IN/HR)	Q (5 YR) (CFS)
DA-1	1.615	0.43	0.167	0.821	73.54	9.56	1.47	1.02
DA-2	1.725	0.33	0.167	0.821	73.54	9.56	1.47	0.84

MINIMUM TIME OF CONCENTRATION OF 10 MIN. (0.167 HR) USED FOR RATIONAL METHOD IN THE EVENT ACTUAL TIME OF CONCENTRATIONS ARE LESS THAN 10 MIN. (CHAPTER 4 SECTION 12)

ROADSIDE DITCH CAPACITY ANALYSIS

DITCH	DITCH DEPTH (FT)	FORESLOPE (L:1)	BACKSLOPE (L:1)	TOP WIDTH (FT)	BOTTOM WIDTH (FT)	CHANNEL SURFACE MATERIAL	ALIGN	STATION	OFFSET (FT)	FLOWLINE ELEV. (FT)	STATION	OFFSET (FT)	FLOWLINE ELEV. (FT)	LENGTH (FT)	SLOPE (%)	ROUGH-NESS COEFF. (N)	DITCH AREA (SQFT)	WETTED PERIMETER (FT)	DRAIN AREA I.D.	AREA PEAK FLOW 5 YR (CFS)	DITCH CAPACITY (CFS)
DITCH-1	0.50	15.00	5.00	20.00	0.00	GRASS	PROPCL	13+38.00	26.00	615.45	18+15.00	40.00	614.15	477.00	0.273	0.030	2.50	10.07	DA-1	1.020	3.08
DITCH-1	0.50	40.00	17.00	24.00	0.00	GRASS	PROPCL	19+60.00	40.00	613.75	25+95.00	26.00	613.53	635.00	0.035	0.030	7.13	28.52	DA-1	1.020	2.62
DITCH-2	0.50	9.00	15.00	16.00	0.00	GRASS	PROPCL	13+38.00	18.00	615.48	17+00.00	30.00	614.36	362.00	0.309	0.030	3.00	12.04	DA-2	0.840	3.27
DITCH-2	0.50	24.00	12.00	20.00	0.00	GRASS	PROPCL	17+00.00	32.00	614.36	22+00.00	32.00	613.99	500.00	0.074	0.030	4.50	18.03	DA-2	0.840	2.40
DITCH-2	0.50	18.00	8.00	13.50	0.00	GRASS	PROPCL	22+00.00	32.00	613.99	25+95.00	21.00	613.42	395.00	0.144	0.030	3.25	13.05	DA-2	0.840	2.42

GENERAL NOTES:

1. 5 YR DESIGN FREQUENCY USED TO PERFORM ROADSIDE DITCH CAPACITY ANALYSIS
2. TxDOT HYDRAULIC DESIGN MANUAL USED FOR TABLES & COEFFICEINTS
3. RATIONAL METHOD USED TO ANALYZE DRAINAGE AREAS.
4. RAINFALL IDF COEFFICIENT DATA (e,b,d) WAS COLLECTED FROM NOAA'S ATLAS 14 VOLUME 11 AS DESCRIBED IN TXDOT'S HYDRAULIC MANUAL CHAPTER 4 SECTION 12.
5. MANNINGS EQUATION UTILIZED TO DETERMINE THE PROPOSED ROADSIDE DITCH OPEN FLOW RATE CAPCITY.

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FM 2538
ROADSIDE DITCH
CAPACITY ANALYSIS

SHEET 1 OF 1

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		6	TEXAS					
ENGINEER:		STATE DIST. NO	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.	
CK:		PHR	HIDALGO	-	-	-	23	
REVIEW:								
CK:								

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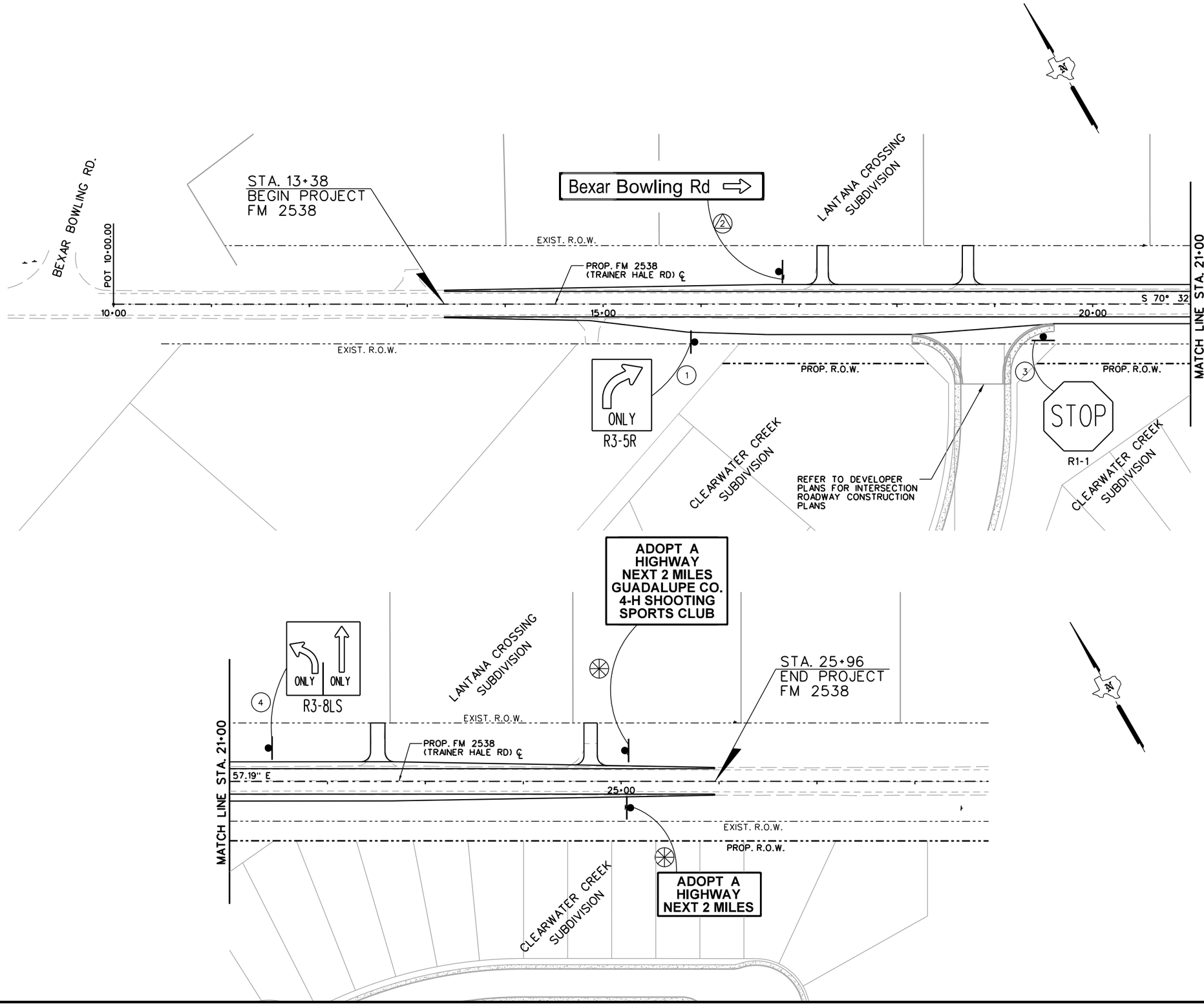

LEGEND:

- SIGNS TO REMAIN IN PLACE
- SIGNS TO BE REMOVED (ITEM 644)
- SIGNS TO BE RELOCATED (ITEM 644)
- SIGNS TO BE INSTALLED (ITEM 644)
- SIGN/RDSD FLASHERS TO BE INSTALLED (ITEM 685)
- SIGN/RDSD FLASHERS TO BE RELOCATED (ITEM 685)
- SIGNS SYMBOL

GENERAL NOTES

1. ALL SIGNS IN WORKING AREAS DESIGNATED TO BE RELOCATED SHALL BE REMOVED AND STORED WITHIN THE PROJECT LIMITS. THE CONTRACTOR SHALL MAKE THE PRECAUTIONARY MEASURES TO PREVENT DAMAGE DURING CONSTRUCTION. COORDINATE WITH THE PROJECT ENGINEER FOR STORAGE APPROVAL.
2. CONTRACTOR IS RESPONSIBLE FOR ALL SIGNS DAMAGED DURING CONSTRUCTION. THESE DAMAGED SIGNS WILL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE.
3. CONTRACTOR SHALL COORDINATE WITH UTILITY COMPANIES TO MAKE ANY ADJUSTMENTS, DUE TO CONFLICTS ON ANY SIGNS THAT ARE TO BE RELOCATED.

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FM 2538
SIGNING LAYOUT

SC: 1"=100'

SHEET 1 OF 1

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		-	TEXAS					FM 2538
ENGINEER:		DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		SAT	BEXAR	-	-	-		24
REVIEW:								
CK:								

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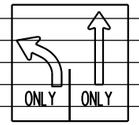
9/22/2021

SUMMARY OF SMALL SIGNS

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

PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)
										PREFABRICATED	1EXT or 2EXT = # of Ext	TY - TYPE
1 OF 1							FRP = Fiberglass TWT = Thin-Wall 10BWG = 10 BWG S80 = Sch 80	1,2or3	UA=Universal Conc UB=Universal Bolt SA=Slipbase-Conc SB=Slipbase-Bolt WS=Wedge Steel WP=Wedge Plastic	P = "Plain" T = "T" U = "U"	BM = Extruded Wind Beam WC = 1.12 #/ft Wing Channel EXAL= Extruded Alum Sign Panels	TY N TY S
	1	R3-5R		30X36	✓		S80	1	SA	P		
	3	R1-1		36X36	✓		S80	1	SA	P		
	4	R3-8LS		36X36	✓		S80	1	SA	P		

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

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

http://www.txdot.gov/

NOTE:

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

Texas Department of Transportation

Traffic Operations Division Standard

SUMMARY OF SMALL SIGNS

SOSS

SHEET 1 OF 1

FILE: sums16.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
©TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS	-	-	-	FM 2538
4-16	DIST	COUNTY		SHEET NO.
8-16	SAT	BEXAR		25A

18

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SUMMARY OF SMALL SIGNS

PLAN SHT. NO.	SIGN NO.	SIGN TYPE	SIGN TEXT	SIGN DIMENS.	644 2060 REMOVE SMALL RD SIGN SUP. & ASSM.	644 2058 RELOCATE SMALL RD SIGN SUP. & ASSM. TY S80
				INCHES	EA.	EA.
FM 2538						
	3	D21-1	BEXAR BOWLING RD ⇨	-		1
				SUB-TOTAL		1

TABULATION OF
SIGNS TO BE REMOVED
OR RELOCATED
UNDER ITEM 644
(WITHOUT REMOVABLE COPY)

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FM 2538
SUMMARY OF SMALL SIGNS
TO BE REMOVED

SHEET 1 OF 1

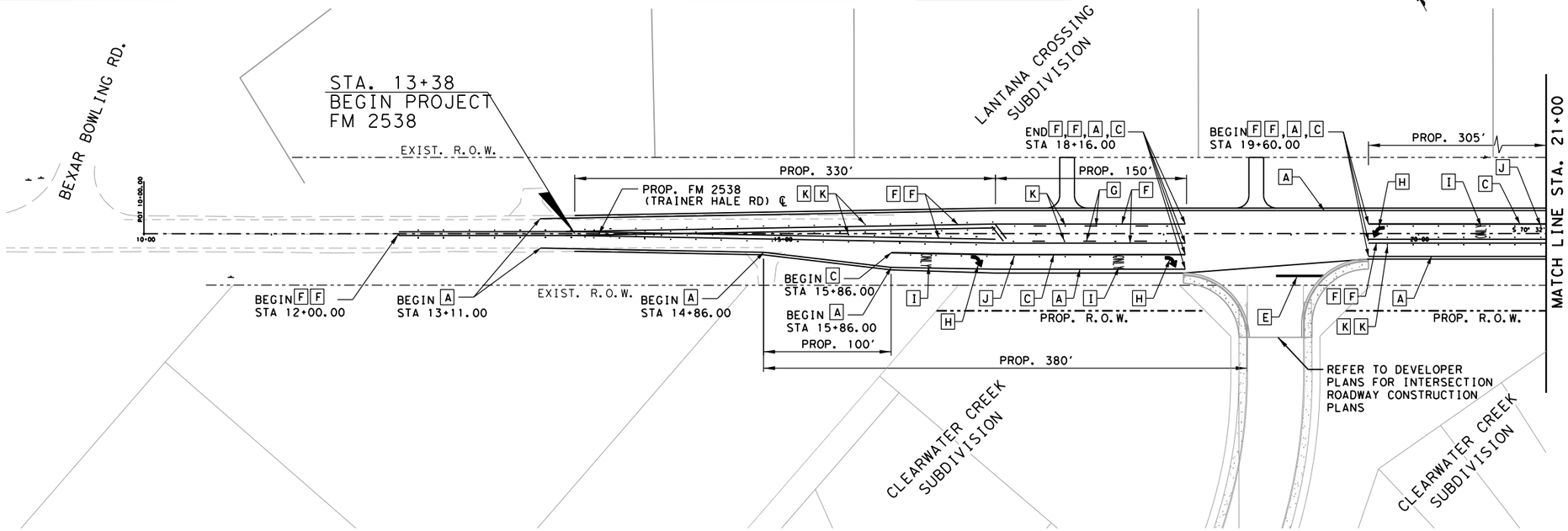
DN:		FED. RD. DIV. NO.	STATE	PROJECT NO.				SHEET NO.
CK DN:		15	TEXAS					258
DW:		DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		HIGHWAY NO.
CK DW:		SAT	BEXAR	-	-	-		FM 2538
TR:								
CK TR:								

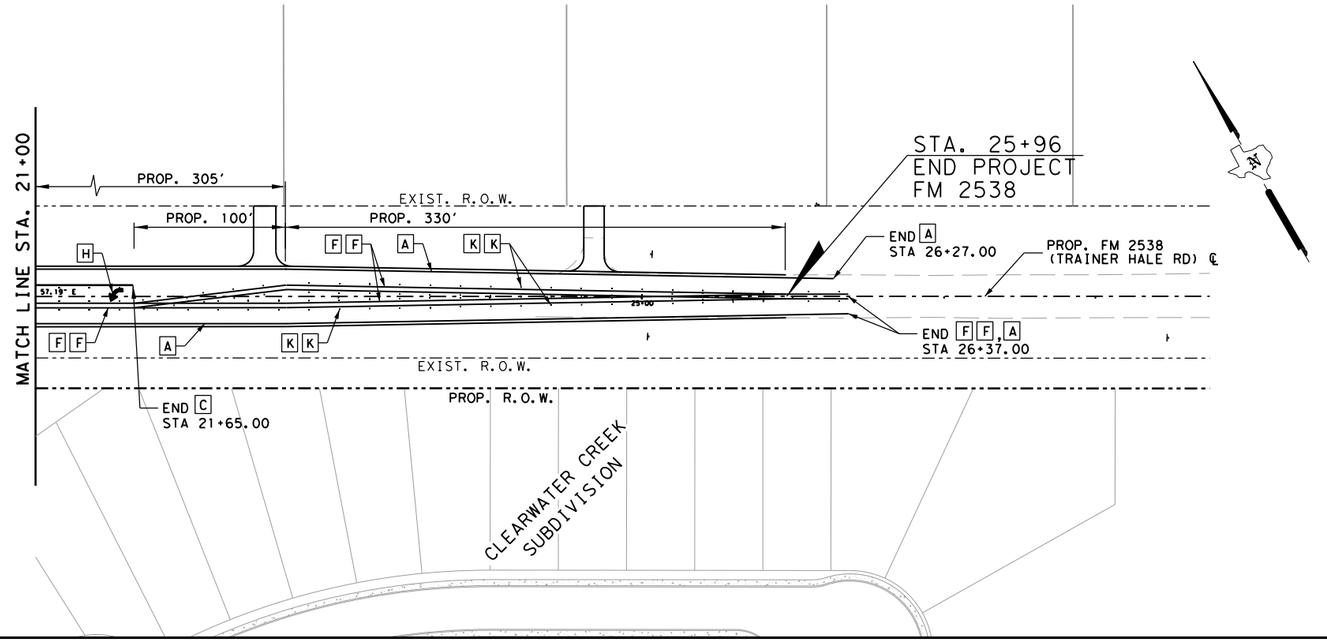
9/22/2021 P:\Clients\Firms\Legacy\Clearwater Creek\Design\07 TRAFFIC\03 Signing\SignsRemoval.dgn

SHEET SUMMARY

STATION LIMITS	REFLECTORIZED PAVEMENT MARKINGS ITEM 666								PREFAB PAV MRKS ITEM 666		RAISED PAV MRKS ITEM 672	
	TY I (W) 4" (BRK) (100 MIL)	TY I (W) 4" (SLD) (100 MIL)	TY I (W) 8" (SLD) (100 MIL)	TY I (W) 12" (SLD) (100 MIL)	TY I (W) 24" (SLD) (100 MIL)	TY I (Y) 4" (BRK) (100 MIL)	TY I (Y) 4" (SLD) (100 MIL)	TY I (Y) 12" (SLD) (100 MIL)	TY B (W) (ARROW)	TY B (W) (WORD)	REFL PAV MRK TY I-C	REFL PAV MRK TY II-A-A
	(LF)	(LF)	(LF)	(LF)	(LF)	(LF)	(LF)	(LF)	(EA)	(EA)	(EA)	(EA)
12+00 TO 26+37		2500	435		38	75	4152		4	3	24	200
SHEET TOTAL		2500	435		38	75	4152		4	3	24	200

WK ZN PAV MRK ITEM 662	
SHORT TERM TABS (TY W)	SHORT TERM TABS (TY Y)
(EA)	(EA)
44	221





PAVEMENT MARKINGS LEGEND:

TYPE I -THERMOPLASTIC W/ RETROREFLECTIVITY REQUIREMENTS (ITEM 666)

- A 4" WHITE SOLID
- B 4" WHITE BROKEN
- F 4" YELLOW SOLID
- G 4" YELLOW BROKEN

TYPE I -THERMOPLASTIC (ITEM 666)

- C 8" WHITE SOLID
- D 12" WHITE SOLID
- E 24" WHITE SOLID
- L 24" YELLOW SOLID
- H SINGLE ARROW WHITE
- I WORD "ONLY" WHITE
- M DOUBLE ARROW WHITE

REFLECTIVE PAVEMENT MARKERS (ITEM 672)

- J TYPE I-C REFLECTIVE CL B
- K TYPE II-AA REFLECTIVE CL B
- ⇦ TRAFFIC FLOW
- N TYPE II-CR REFLECTIVE CL B

NOTES:

1. THE PAVEMENT SURFACE SHALL BE FREE OF DELETERIOUS MATERIAL BEFORE APPLICATION OF PERMANENT STRIPING AND PAVEMENT MARKERS. IF THE SURFACE NEEDS TO BE CLEANED, AS DETERMINED BY THE ENGINEER, THE CONTRACTOR SHALL PREPARE SURFACE IN ACCORDANCE WITH ITEM 678, "PAVEMENT SURFACE PREPARATION FOR MARKINGS", EXCEPT FOR "MEASUREMENT" AND "PAYMENT". THE PREPARATION OF PAVEMENT SURFACE SHALL BE SUBSIDIARY TO ITEM 666, 668 AND 672.
2. ALL PERMANENT PAVEMENT MARKINGS SHALL BE THERMOPLASTIC 100 MIL.
3. APPLY TYPE II MARKINGS BEFORE PLACING ALL PROPOSED TYPE I MARKINGS.

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FM 2538
PAVEMENT MARKINGS

SC: 1"=100'

SHEET 1 OF 1

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.			HIGHWAY NO.
CK:		-	TEXAS				FM 2538
ENGINEER:		DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	SHEET NO.
CK:		SAT	BEXAR	-	-	-	26
REVIEW:							
CK:							

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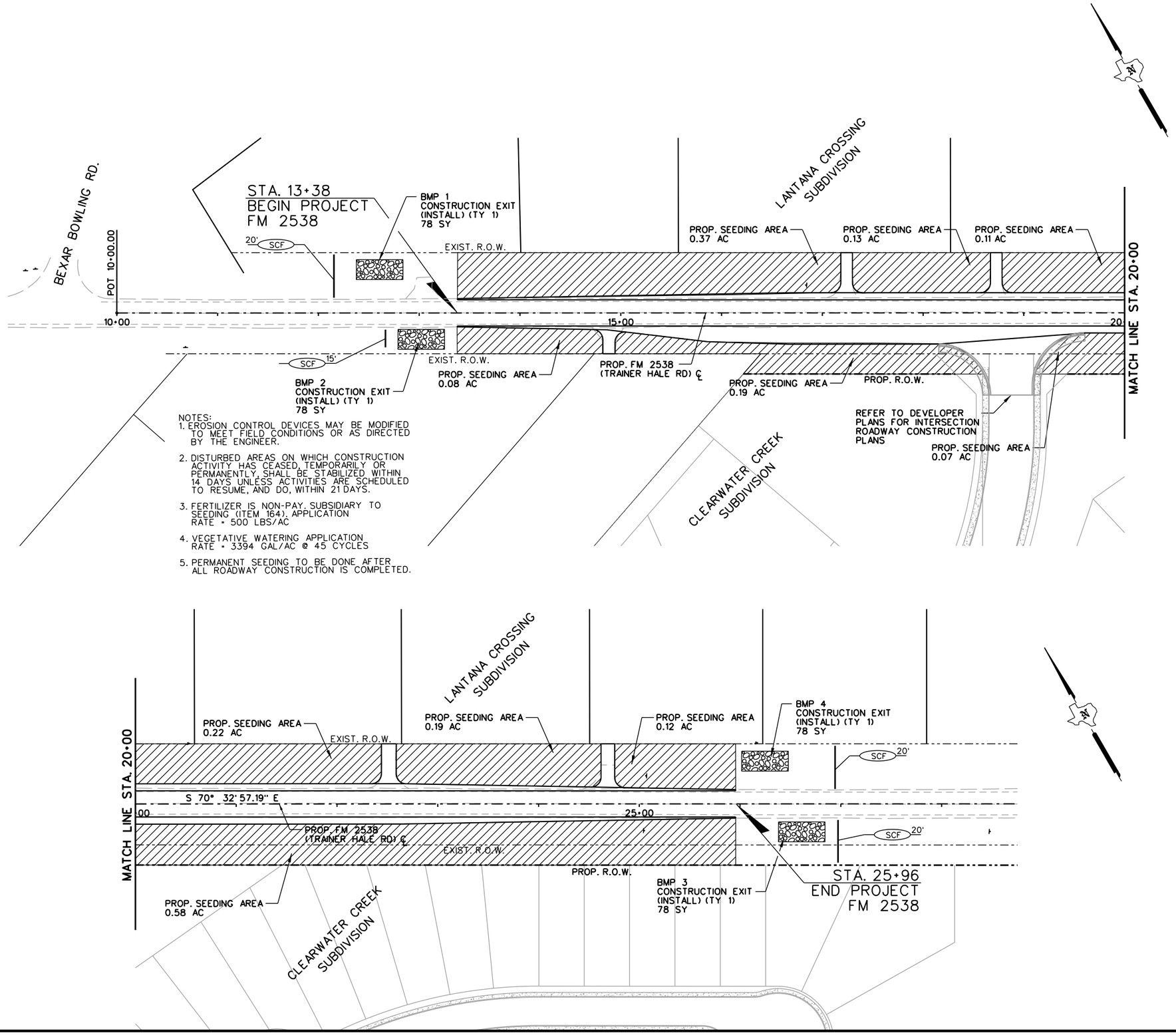

SHEET SUMMARY

ITEM	DESCRIPTION	UNIT	QUANTITY
160	FURNISHING AND PLACING TOPSOIL (3")	SY	10067
164	DRILL SEEDING (TEMP)(WARM)	AC	
164	DRILL SEEDING (PERM)(RURAL)(CLAY)	AC	2.08
166	FERTILIZER •••NON-PAY•••	TON	0.52
168	VEGETATIVE WATERING	MG	317
169	SOIL RETENTION BLANKETS (CL2)(TYF)	SY	
506	SEDMT CONT FEN (INSTALL)	LF	75
506	SEDMT CONT FEN (REMOVE)	LF	75
506	CONSTRUCTION EXITS (INSTALL)(TY 1)	SY	312
506	CONSTRUCTION EXITS (REMOVE)	SY	312
506	FRNT END LOADER WRK (ERSN & SEDM CONT)	HR	
506	BIOGRD EROSN CONT LOGS (12" DIA) INSTALL	LF	
506	BIOGRD EROSN CONT LOGS REMOVE	LF	

LEGEND

- PROP. SEEDING AREA
- PROP. SOIL RETENTION BLANKET (CL2)(TYF)
- PROP. CONSTRUCTION EXIT (TY 1)
- CI-ST XX' — PROP. CURB INLET SEDIMENT TRAP AND LENGTH
- SCF XX' — PROP. SEDIMENT CONTROL FENCE AND LENGTH (LF)
- DL-ST XX' — PROP. DITCH LINE SEDIMENT TRAP (LOG) AND LENGTH (LF)
- RFD1 XX' — PROP. ROCK FILTER DAM (TYPE 1)

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210.660.1960/TBPE Firm Registration No. 20623

FM 2538
SW3P LAYOUT

SC: 1"=100' SHEET 1 OF 1

DRAWING:		FED. RD. DIV. NO.	STATE	PROJECT NO.				HIGHWAY NO.
CK:		-	TEXAS					FM 2538
ENGINEER:		DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.		SHEET NO.
CK:		SAT	BEXAR	-	-	-		27
REVIEW:								
CK:								

9/20/2021 P:\Clients\Firms\Legacy\Clearwater Creek\Design\08 ENVIRONMENTAL\03 SW3P Layouts\SW3P_01.dgn

DATE:
FILE:

BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

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

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

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

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

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

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

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

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

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

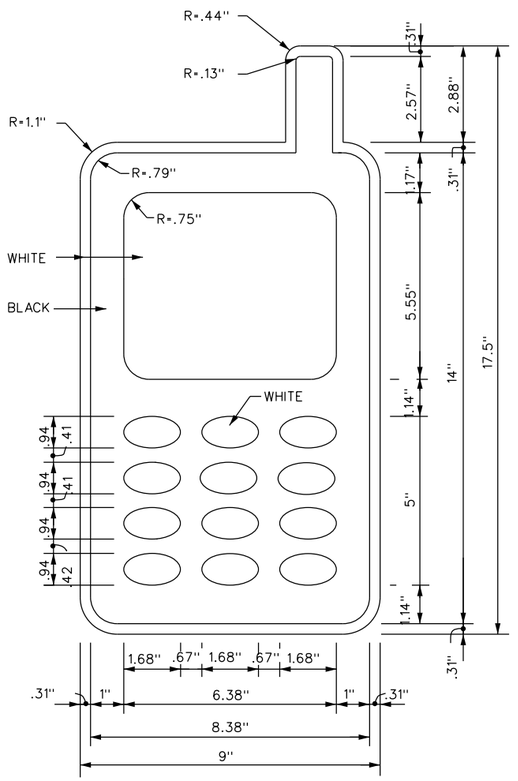
11. Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.

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

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

WORKER SAFETY APPAREL NOTES:

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



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

SIGN DETAIL (G20-10T)

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

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

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

Texas Department of Transportation | Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS

BC(1)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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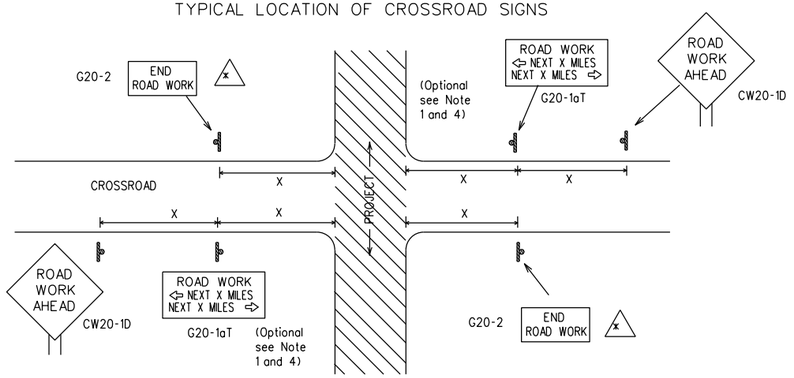
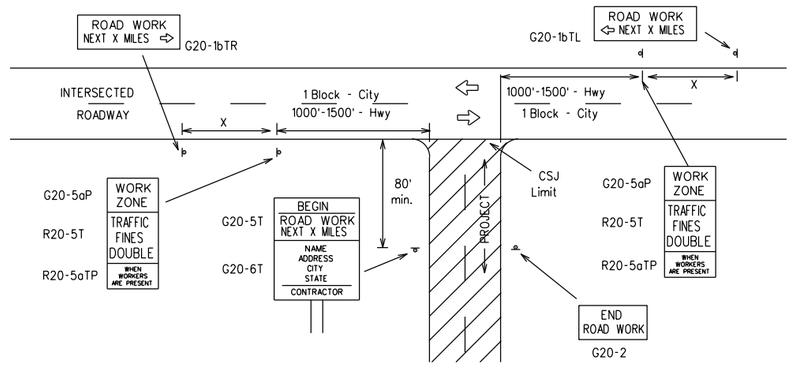
TYPICAL LOCATION OF CROSSROAD SIGNS



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

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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

TYPICAL CONSTRUCTION WARNING SIGN SIZE AND SPACING

1,5,6

SIZE

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

SPACING

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

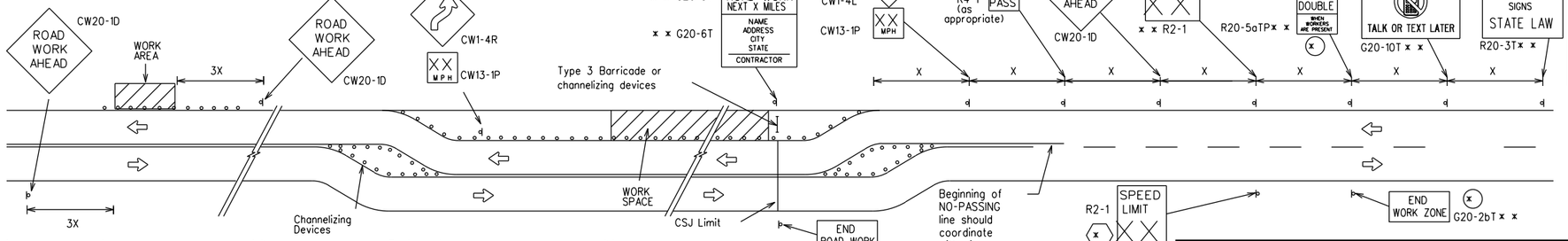
⚹ For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

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

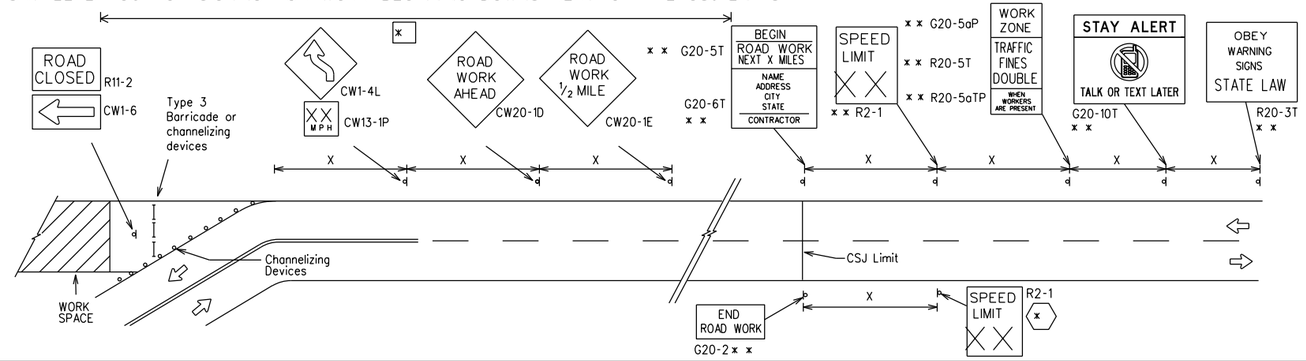
WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS



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

SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS

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



NOTES

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

(x) 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.

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

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

(x) Contractor will install a regulatory speed limit sign at the end of the work zone.

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

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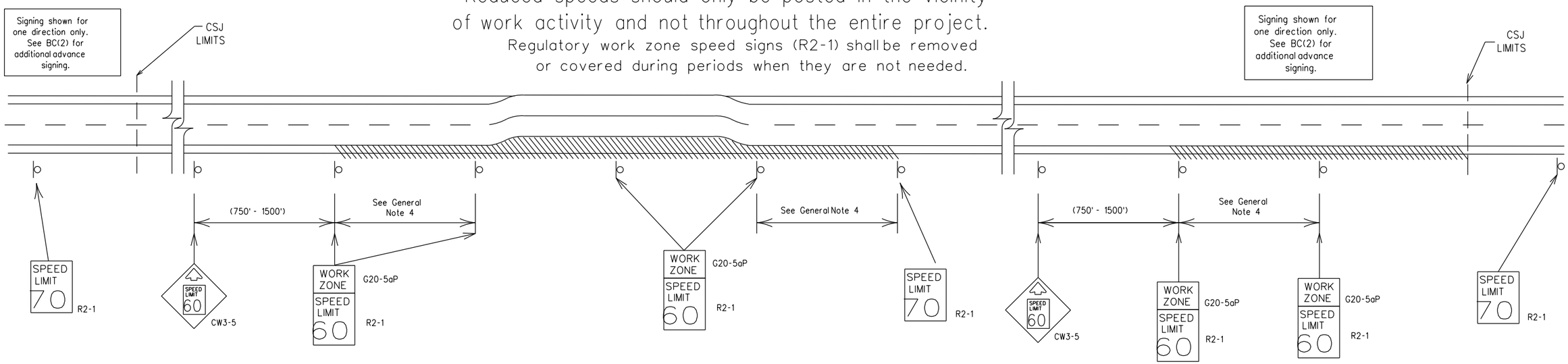
TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

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

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



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC(3)-14

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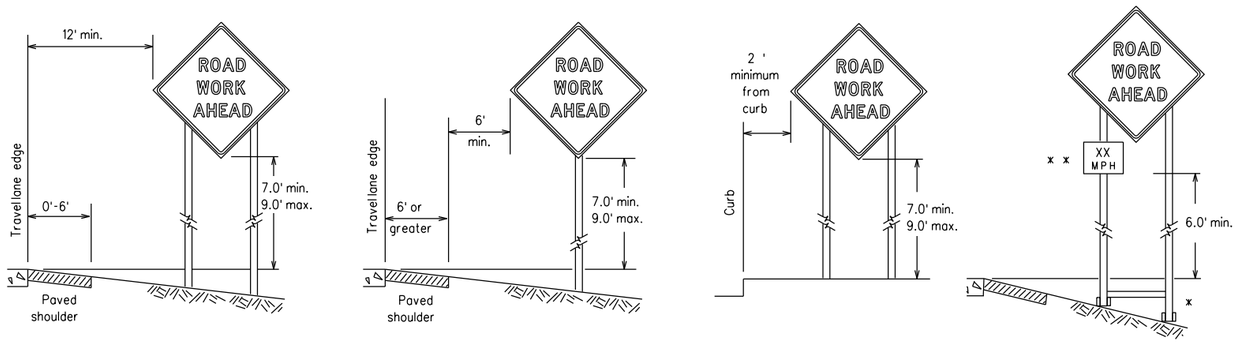
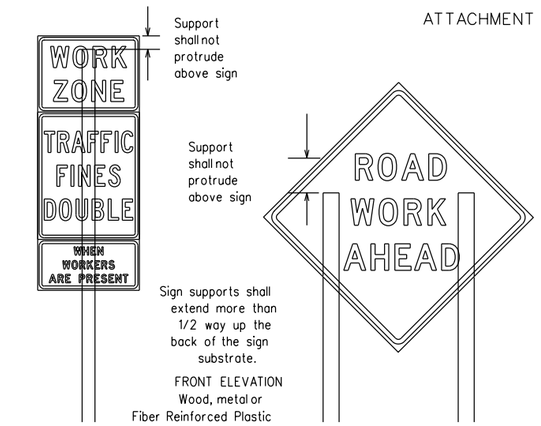
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



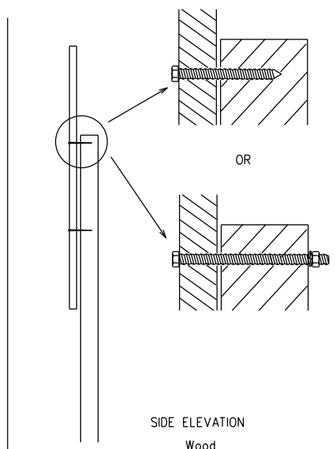
x When placing skid supports on unlevel ground, the leg post lengths must be adjusted so the sign appears straight and plumb. Objects shall NOT be placed under skids as a means of leveling.

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

ATTACHMENT FOR SIGN SUPPORTS



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

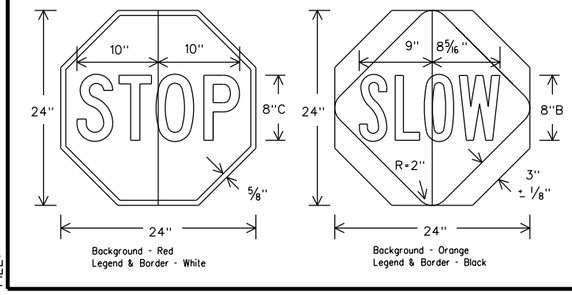


Attachment to wooden supports will be by bolts and nuts or screws. Use TxDOT's or manufacturer's recommended procedures for attaching sign substrates to other types of sign supports

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

STOP/SLOW PADDLES

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



CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

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

FLAGS ON SIGNS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC(4)-14

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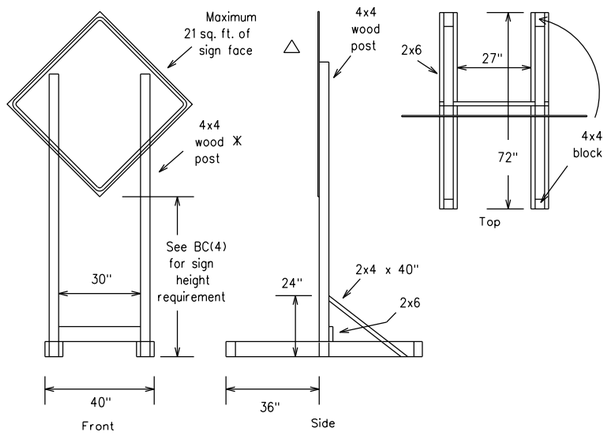
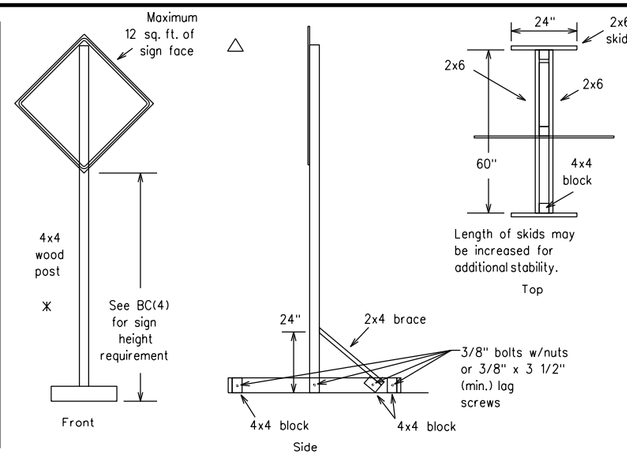
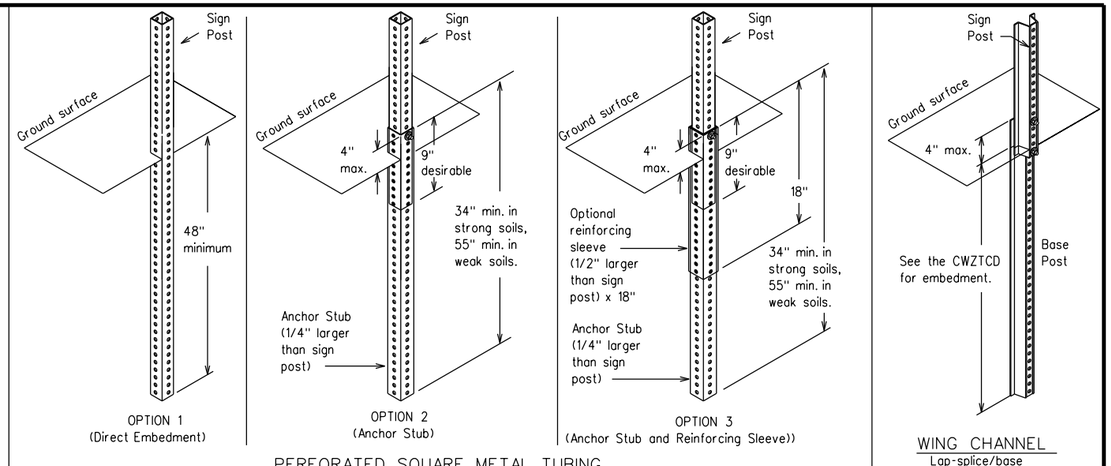




SKID MOUNTED WOOD SIGN SUPPORTS

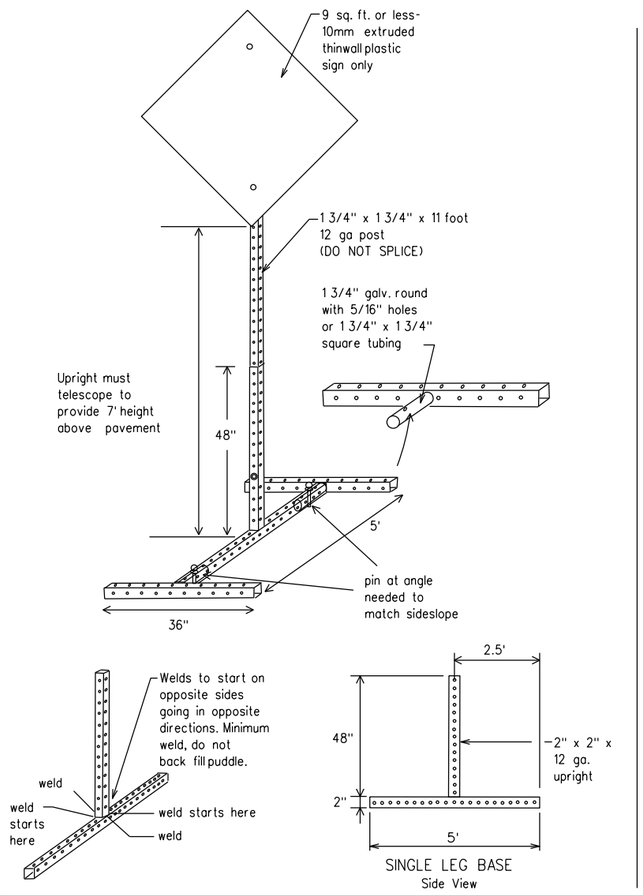
LONG/INTERMEDIATE TERM STATIONARY - PORTABLE SKID MOUNTED SIGN SUPPORTS □

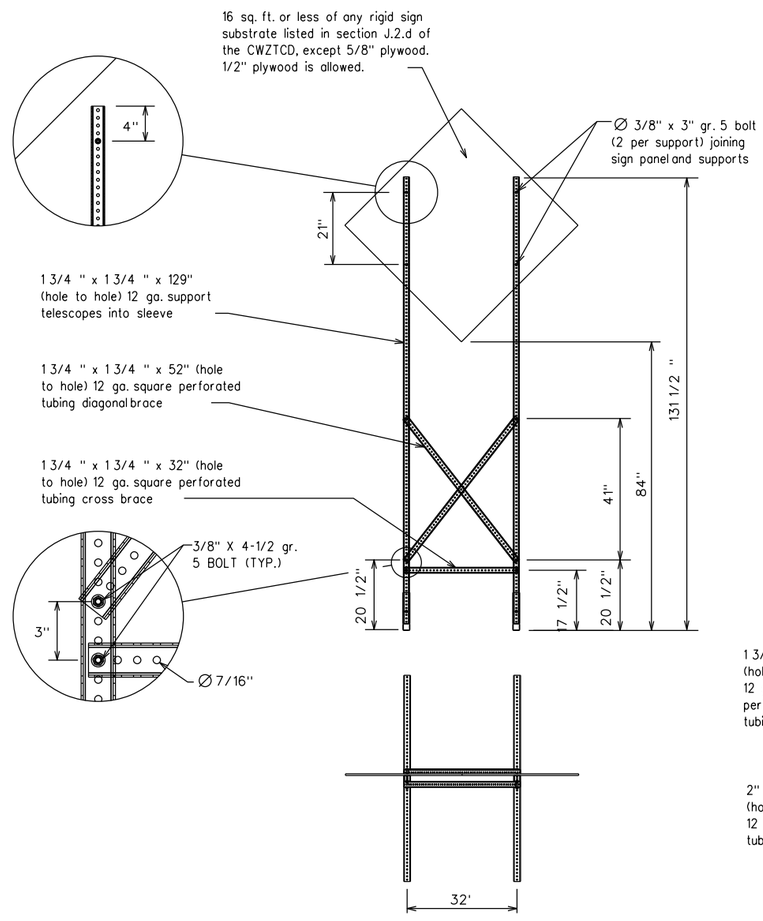


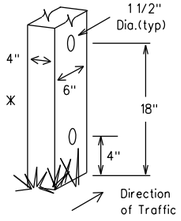
PERFORATED SQUARE METAL TUBING

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.

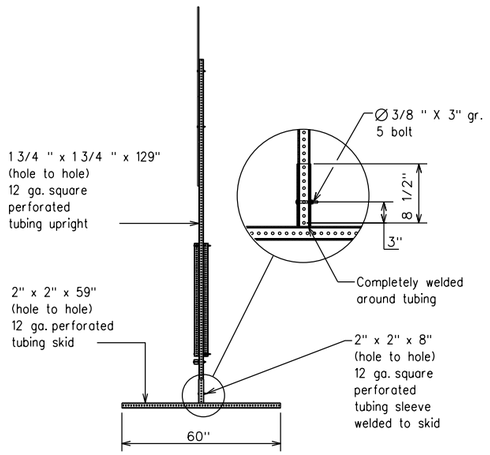






Nominal Post Size	Number of Posts	Maximum Sq. feet of Sign Face	Minimum Soil Embedment	Drilled Hole(s) Required
4 x 4	1	12	36"	NO
4 x 4	2	21	36"	NO
4 x 6	1	21	36"	YES
4 x 6	2	36	36"	YES

WOOD POST SYSTEM FOR GROUND MOUNTED SIGN SUPPORTS



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.

SKID MOUNTED PERFORATED SQUARE STEEL TUBING SIGN SUPPORTS

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BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

Phase 1: Condition Lists

Road/Lane/Ramp Closure List

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

Other Condition List

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

Phase 2: Possible Component Lists

Action to Take/Effect on Travel List		Location List	Warning List	** Advance Notice List
MERGE RIGHT	FORM X LINES RIGHT	AT FM XXXX	SPEED LIMIT XX MPH	TUE-FRI XX AM- X PM
DETOUR NEXT X EXITS	USE XXXXX RD EXIT	BEFORE RAILROAD CROSSING	MAXIMUM SPEED XX MPH	APR XX-XX X PM-X AM
USE EXIT XXX	USE EXIT I-XX NORTH	NEXT X MILES	MINIMUM SPEED XX MPH	BEGINS MONDAY
STAY ON US XXX SOUTH	USE I-XX E TO I-XX N	PAST US XXX EXIT	ADVISORY SPEED XX MPH	BEGINS MAY XX
TRUCKS USE US XXX N	WATCH FOR TRUCKS	XXXXXXX TO XXXXXXX	RIGHT LANE EXIT	MAY X-X XX PM - XX AM
WATCH FOR TRUCKS	EXPECT DELAYS	US XXX TO FM XXXX	USE CAUTION	NEXT FRI-SUN
EXPECT DELAYS	PREPARE TO STOP		DRIVE SAFELY	XX AM TO XX PM
REDUCE SPEED XXX FT	END SHOULDER USE		DRIVE WITH CARE	NEXT TUE AUG XX
USE OTHER ROUTES	WATCH FOR WORKERS			TONIGHT XX PM- XX AM
STAY IN LANE *				

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

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BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)

BC(6)-14

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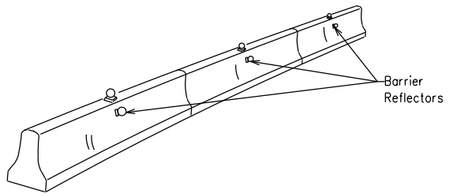
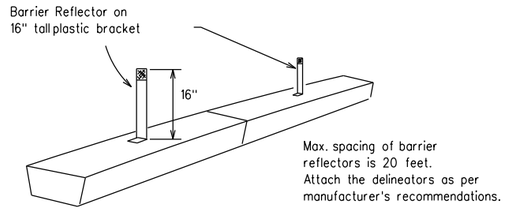
1. Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
2. Color of Barrier Reflectors shall be as specified in the TMUTCD. The cost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

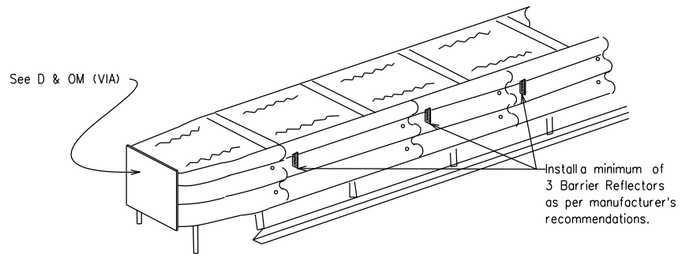


CONCRETE TRAFFIC BARRIER (CTB)

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



LOW PROFILE CONCRETE BARRIER (LPCB)

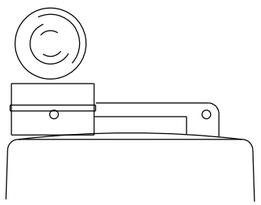


DELINEATION OF END TREATMENTS

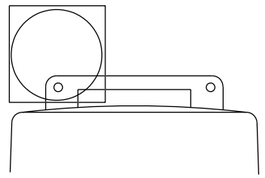
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS



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



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

WARNING LIGHTS

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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

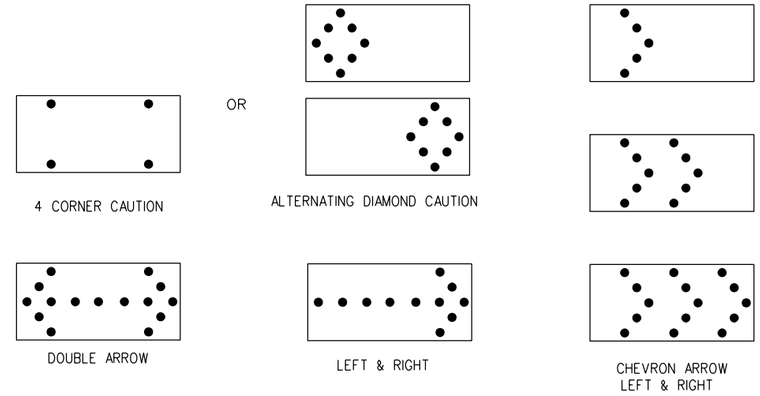
1. Type A flashing warning lights are intended to warn drivers that they are approaching or are in a potentially hazardous area.
2. Type A random flashing warning lights are not intended for delineation and shall not be used in a series.
3. A series of sequential flashing warning lights placed on channelizing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

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

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

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

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



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

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

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

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

FLASHING ARROW BOARDS

TRUCK-MOUNTED ATTENUATORS

1. Truck-mounted attenuators (TMA) used on TxDOT facilities must meet the requirements outlined in the National Cooperative Highway Research Report No. 350 (NCHRP 350) or the Manual for Assessing Safety Hardware (MASH).
2. Refer to the CWZTCD for the requirements of Level 2 or Level 3 TMAs.
3. Refer to the CWZTCD for a list of approved TMAs.
4. TMAs are required on freeways unless otherwise noted in the plans.
5. A TMA should be used anytime that it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the work performance.
6. The only reason a TMA should not be required is when a work area is spread down the roadway and the work crew is an extended distance from the TMA.

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Traffic Operations Division Standard

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

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

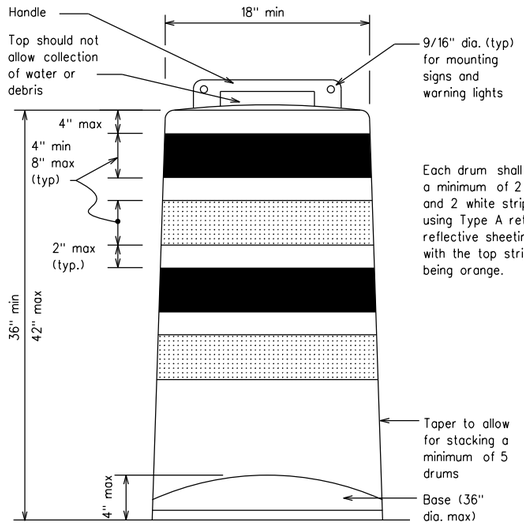
1. Plastic drums shall be a two-piece design: the "body" of the drum shall be the top portion and the "base" shall be the bottom.
2. The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

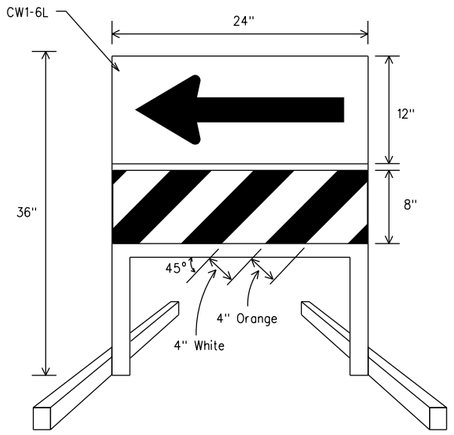
RETROREFLECTIVE SHEETING

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

BALLAST

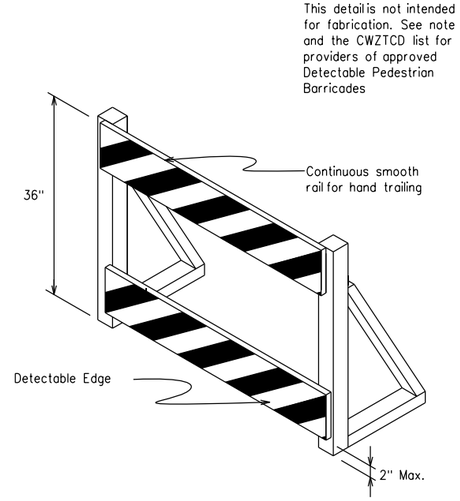
1. Unballasted bases shall be large enough to hold up to 50 lbs. of sand. This base, when filled with the ballast material, should weigh between 35 lbs (minimum) and 50 lbs (maximum). The ballast may be sand in one to three sandbags separate from the base, sand in a sand-filled plastic base, or other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





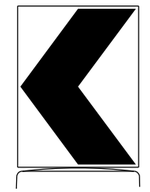
DIRECTION INDICATOR BARRICADE

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

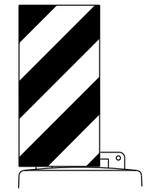


DETECTABLE PEDESTRIAN BARRICADES

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



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



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

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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(8)-14

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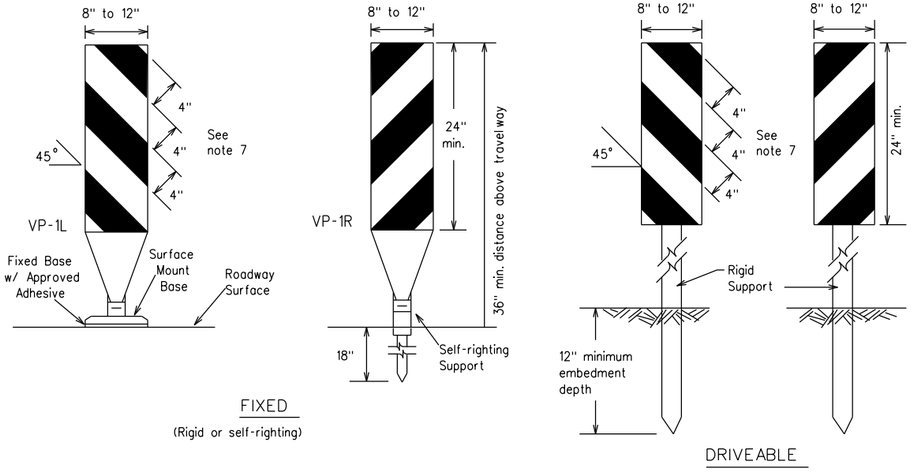
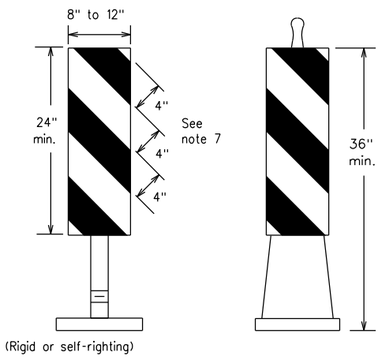


FIXED

(Rigid or self-righting)

DRIVEABLE

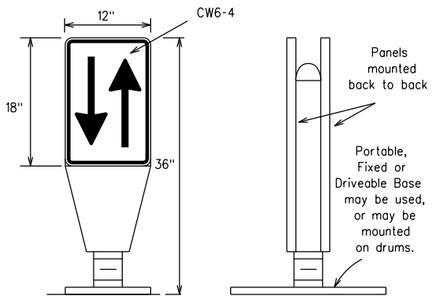


(Rigid or self-righting)

PORTABLE

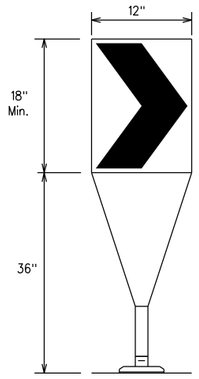
1. Vertical Panels (VP's) are normally used to channelize traffic or divide opposing lanes of traffic.
2. VP's may be used in daytime or nighttime situations. They may be used at the edge of shoulder drop-offs and other areas such as lane transitions where positive daytime and nighttime delineation is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

VERTICAL PANELS (VPs)



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

OPPOSING TRAFFIC LANE DIVIDERS (OTLD)



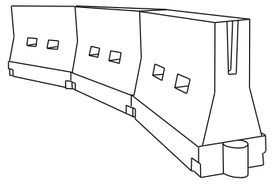
Fixed Base w/ Approved Adhesive (Driveable Base, or Flexible Support can be used)

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

CHEVRONS

GENERAL NOTES

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



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

1. Water ballasted systems used as barriers shall not be used solely to channelize road users, but also to protect the work space per the appropriate NCHRP 350 crashworthiness requirements based on roadway speed and barrier application.
2. Water ballasted systems used to channelize vehicular traffic shall be supplemented with retroreflective delineation or channelizing devices to improve daytime/nighttime visibility. They may also be supplemented with pavement markings.
3. Water ballasted systems used as barriers shall be placed in accordance to application and installation requirements specific to the device, and used only when shown on the CWZTCD list.
4. Water ballasted systems used as barriers should not be used for a merging taper except in low speed (less than 45 MPH) urban areas. When used on a taper in a low speed urban area, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.
5. When water ballasted systems used as barriers have blunt ends exposed to traffic, they should be attenuated as per manufacturer recommendations or flared to a point outside the clear zone.

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

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(9)-14

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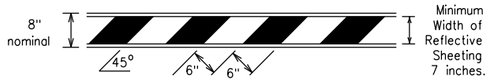
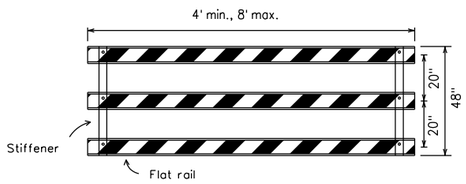
TYPE 3 BARRICADES

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

Barricades shall NOT be used as a sign support.



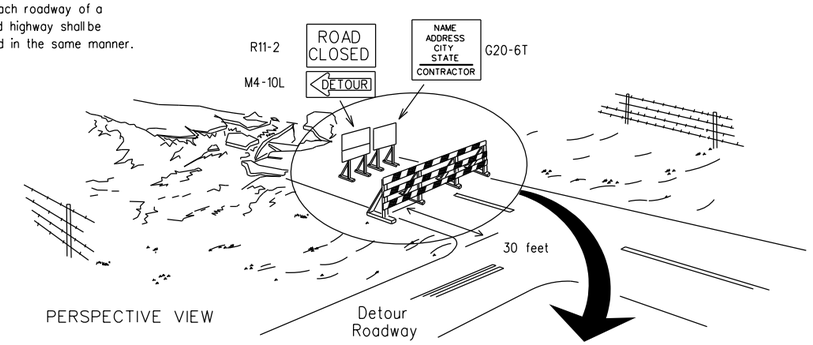
TYPICAL STRIPING DETAIL FOR BARRICADE RAIL



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

TYPICAL PANEL DETAIL FOR SKID OR POST TYPE BARRICADES

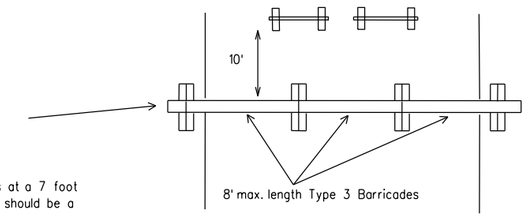
Each roadway of a divided highway shall be barricaded in the same manner.



PERSPECTIVE VIEW

The three rails on Type 3 barricades shall be reflectorized orange and reflective white stripes on one side facing one-way traffic and both sides for two-way traffic.

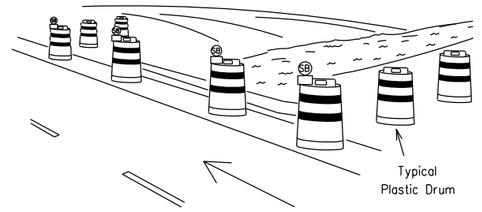
Barricade striping should slant downward in the direction of detour.



PLAN VIEW

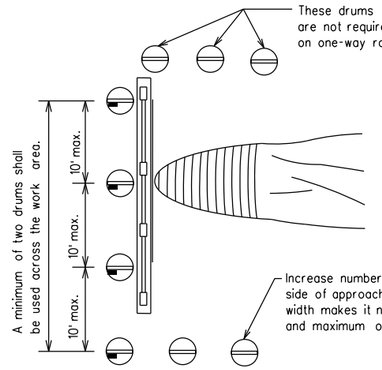
1. Signs should be mounted on independent supports at a 7 foot mounting height in center of roadway. The signs should be a minimum of 10 feet behind Type 3 Barricades.
2. Advance signing shall be as specified elsewhere in the plans.

TYPE 3 BARRICADE (POST AND SKID) TYPICAL APPLICATION



PERSPECTIVE VIEW

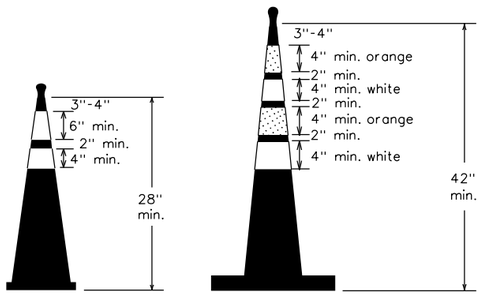
1. Where positive redirectional capability is provided, drums may be omitted.
2. Plastic construction fencing may be used with drums for safety as required in the plans.
3. Vertical Panels on flexible support may be substituted for drums when the shoulder width is less than 4 feet.
4. When the shoulder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



PLAN VIEW

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

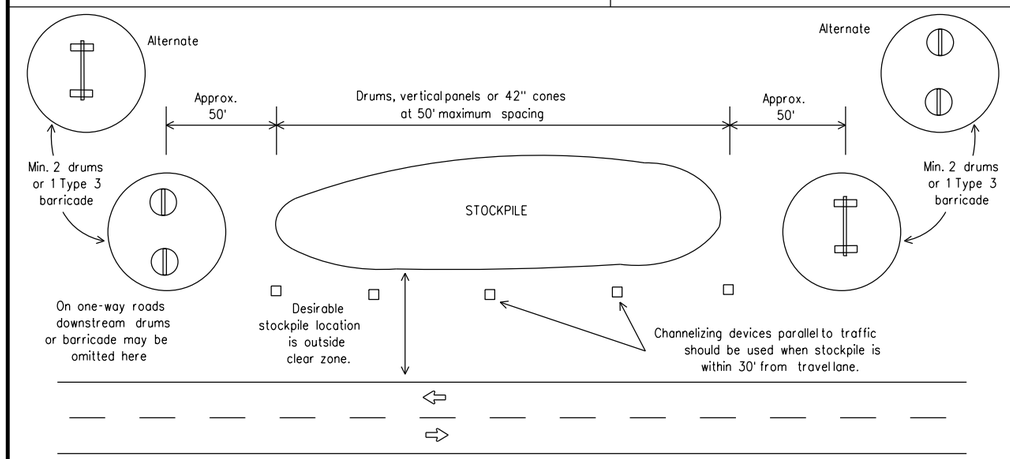
CULVERT WIDENING OR OTHER ISOLATED WORK WITHIN THE PROJECT LIMITS



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

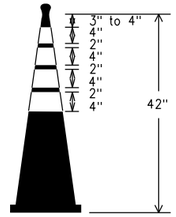
42" 2-piece cones shall have a minimum weight of 30 lbs. including base.

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



TRAFFIC CONTROL FOR MATERIAL STOCKPILES

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



EDGELINE CHANNELIZER

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC(10)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS				FM 2538
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FILE:

WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

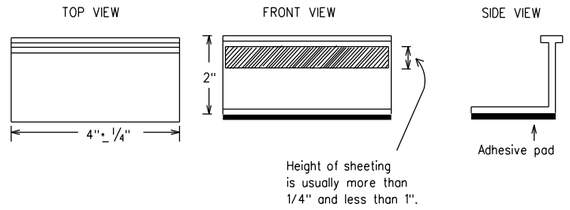
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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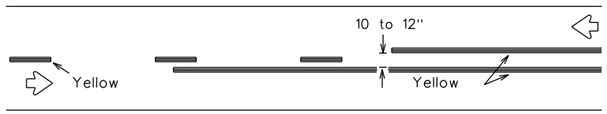
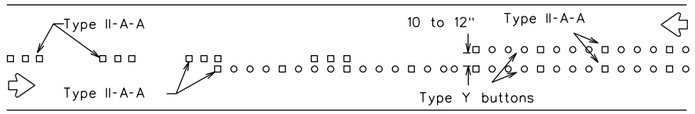
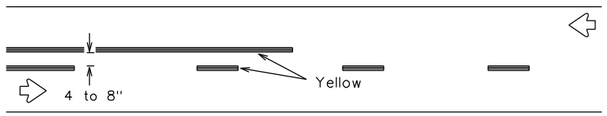
PAVEMENT MARKING PATTERNS



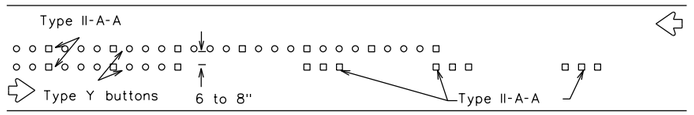
REFLECTORIZED PAVEMENT MARKINGS - PATTERN A



RAISED PAVEMENT MARKERS - PATTERN A



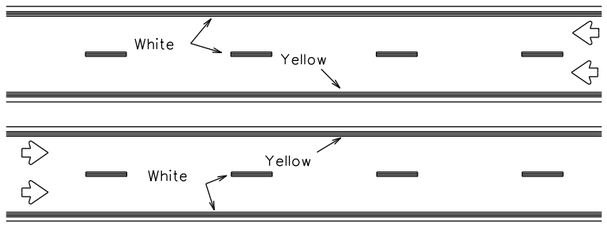
REFLECTORIZED PAVEMENT MARKINGS - PATTERN B



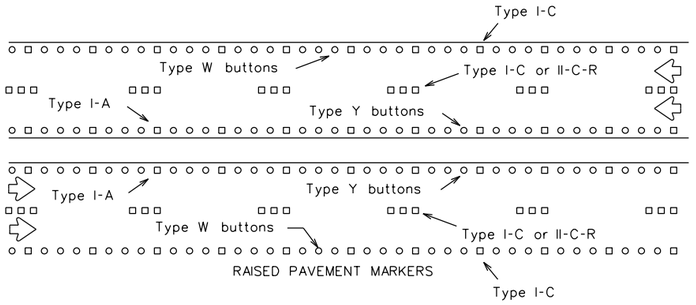
RAISED PAVEMENT MARKERS - PATTERN B

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

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



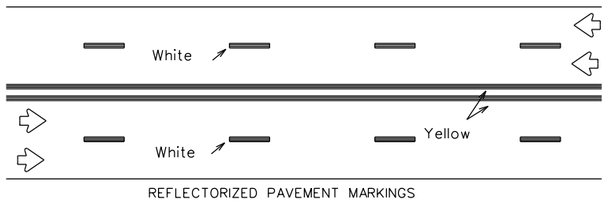
REFLECTORIZED PAVEMENT MARKINGS



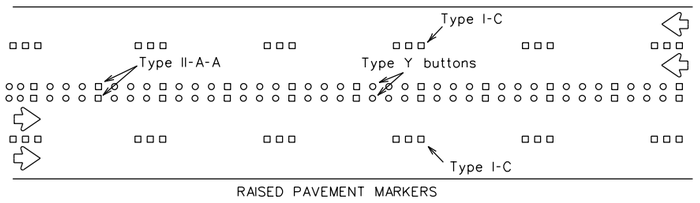
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

EDGE & LANE LINES FOR DIVIDED HIGHWAY



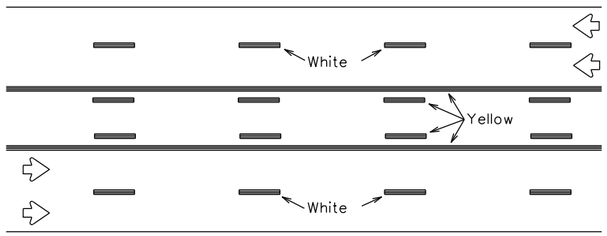
REFLECTORIZED PAVEMENT MARKINGS



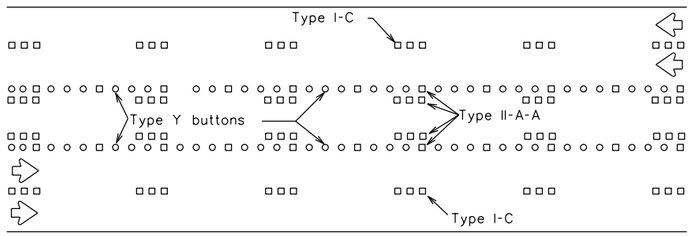
RAISED PAVEMENT MARKERS

Prefabricated markings may be substituted for reflectorized pavement markings.

LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



REFLECTORIZED PAVEMENT MARKINGS



RAISED PAVEMENT MARKERS

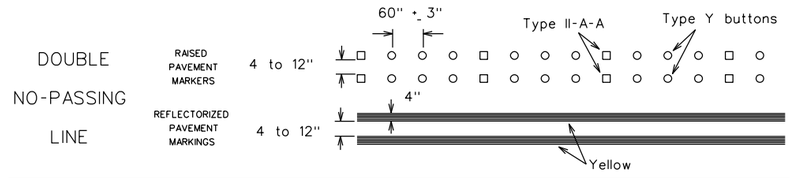
Prefabricated markings may be substituted for reflectorized pavement markings.

TWO-WAY LEFT TURN LANE

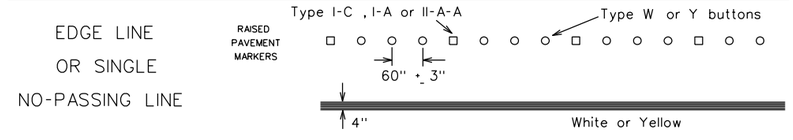
STANDARD WORK ZONE PAVEMENT MARKINGS DETAILS

SOLID LINES

DOUBLE NO-PASSING LINE

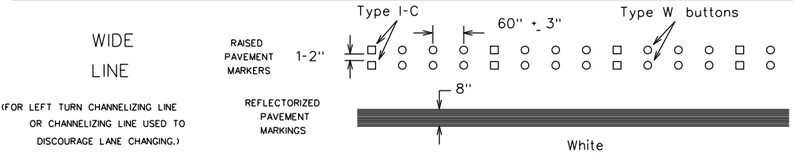


EDGE LINE OR SINGLE NO-PASSING LINE



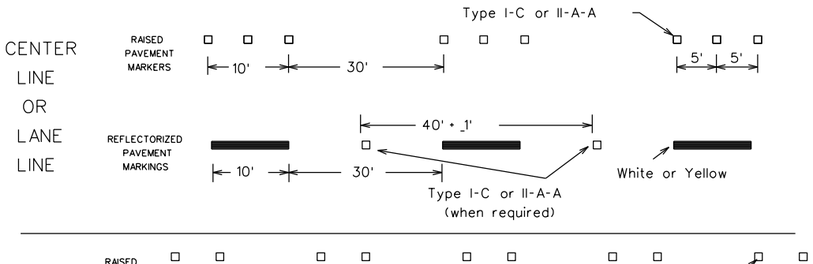
WIDE LINE

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

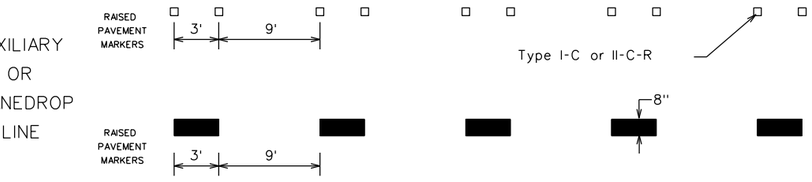


BROKEN LINES

CENTER LINE OR LANE LINE

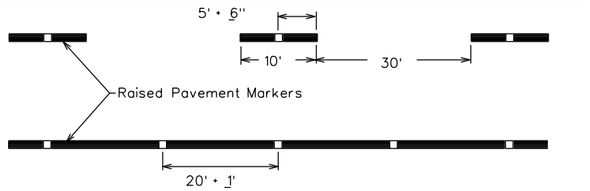


AUXILIARY OR LANEDROP LINE



REMOVABLE MARKINGS WITH RAISED PAVEMENT MARKERS

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



Centerline only - not to be used on edge lines

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

Texas Department of Transportation

Traffic Operations Division Standard

BARRICADE AND CONSTRUCTION PAVEMENT MARKING PATTERNS

BC(12)-14

FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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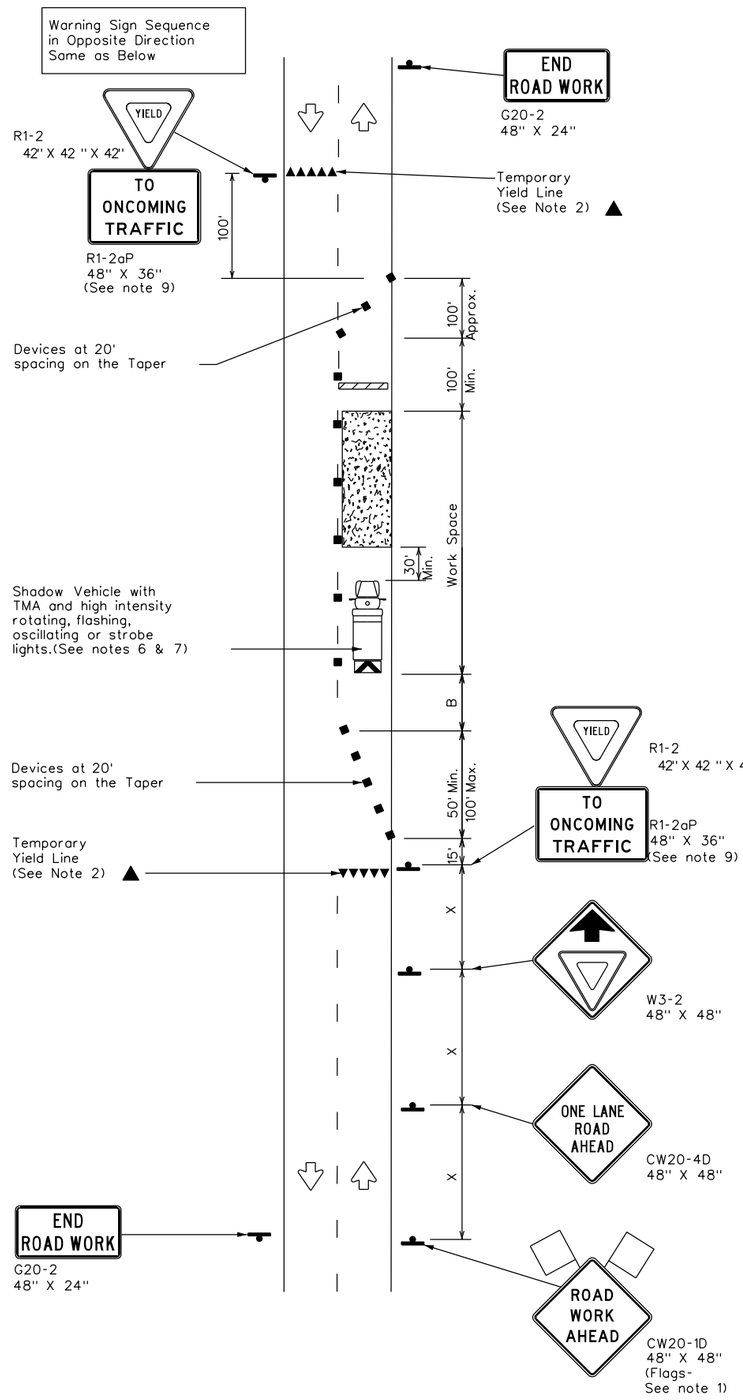
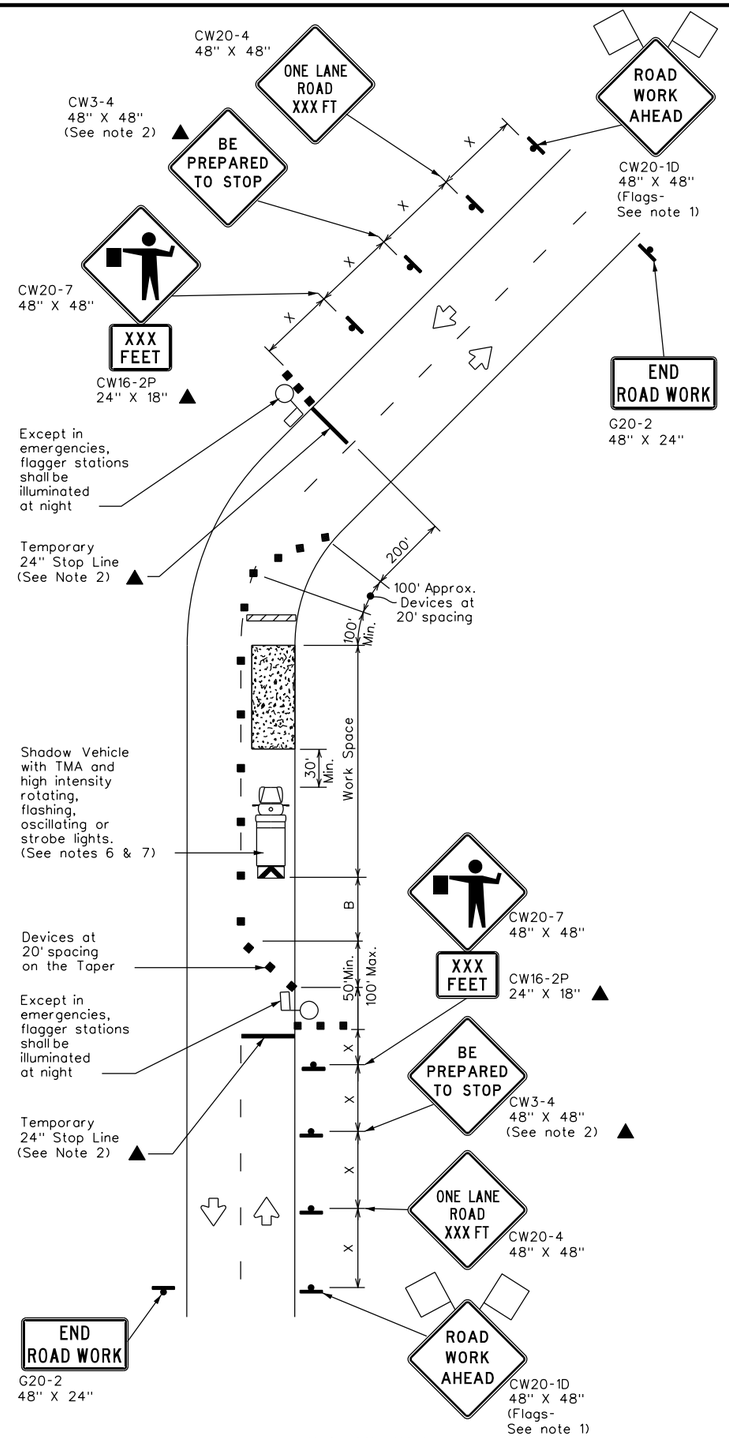


TCP (2-2a)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH YIELD SIGNS
(Less than 2000 ADT - See Note 9)



TCP (2-2b)
2-LANE ROADWAY WITHOUT PAVED SHOULDERS
ONE LANE TWO-WAY
CONTROL WITH FLAGGERS

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

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

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

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

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4 "ONE LANE ROAD XXX FT" sign, but proper sign spacing shall be maintained.
4. Flaggers should use two-way radios or other methods of communication to control traffic.
5. Length of work space should be based on the ability of flaggers to communicate.
6. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted for the Shadow Vehicle and TMA.
7. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-2a)

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

TCP (2-2b)

10. Channelizing devices on the center line may be omitted when a pilot car is leading traffic and approved by the Engineer.
11. If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain stopping sight distance to the flagger and a queue of stopped vehicles. (See table above).
12. Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situtations.

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN ONE-LANE TWO-WAY TRAFFIC CONTROL

TCP(2-2)-18

FILE: tcp2-2-18.dgn	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
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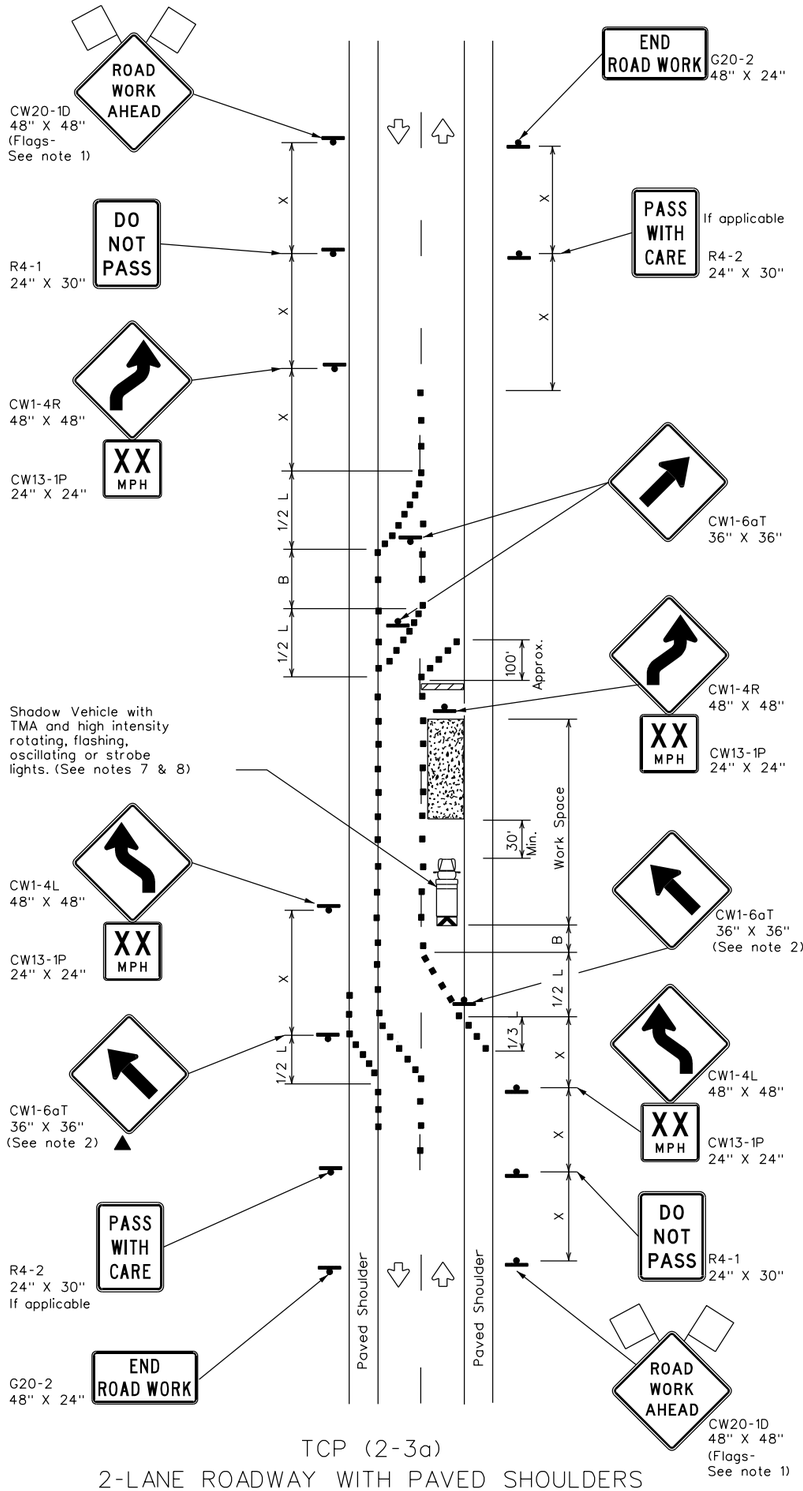
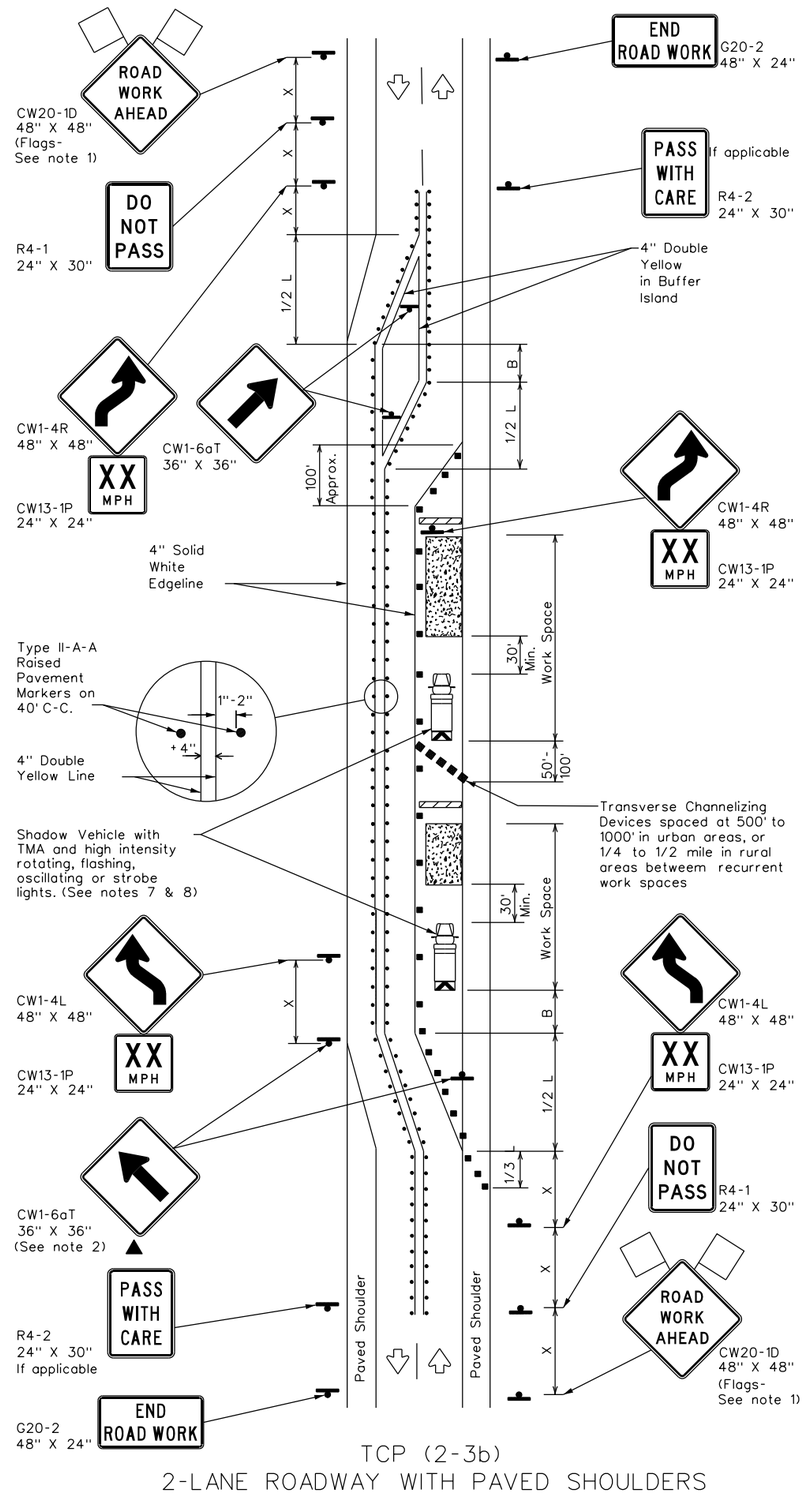
REVISIONS				FM 2538
8-95 3-03	DIST	COUNTY		SHEET NO.
1-97 2-12	15	BEXAR		40
4-98 2-18				

DATE:
FILE:



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

ONE LANE CLOSED
ADEQUATE FIELD OF VIEW



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

ONE LANE CLOSED
INADEQUATE FIELD OF VIEW

LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Raised Pavement Markers Ty II-AA
	Sign		Traffic Flow
	Flag		Flagger

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

* Conventional Roads Only

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

TYPICAL USAGE				
MOBILE	SHORT DURATION	SHORT TERM STATIONARY	INTERMEDIATE TERM STATIONARY	LONG TERM STATIONARY
				TCP(2-3b)ONLY
			✓	✓

GENERAL NOTES

1. Flags attached to signs where shown, are REQUIRED.
2. All traffic control devices illustrated are REQUIRED, except those denoted with the triangle symbol may be omitted when stated elsewhere in the plans, or for routine maintenance work, when approved by the Engineer.
3. When work space will be in place less than three days existing pavement markings may remain in place. Channelizing devices shall be used to separate traffic.
4. Flagger control should NOT be used unless roadway conditions or heavy traffic volume require additional emphasis to safely control traffic. Flagger should be positioned at end of traffic queue.
5. The R4-1 "DO NOT PASS," R4-2 " PASS WITH CARE" and construction regulatory speed zone signs may be installed within CW20-1D "ROAD WORK AHEAD" signs. Proper spacing of signs shall be maintained.
6. Conflicting pavement marking shall be removed for long term projects.
7. A Shadow Vehicle with a TMA should be used anytime it can be positioned 30 to 100 feet in advance of the area of crew exposure without adversely affecting the performance or quality of the work. If workers are no longer present but road or work conditions require the traffic control to remain in place, Type 3 Barricades or other channelizing devices may be substituted.
8. Additional Shadow Vehicles with TMAs may be positioned off the paved surface, next to those shown in order to protect a wider work space.

TCP (2-3a)

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

Texas Department of Transportation

Traffic Operations Division Standard

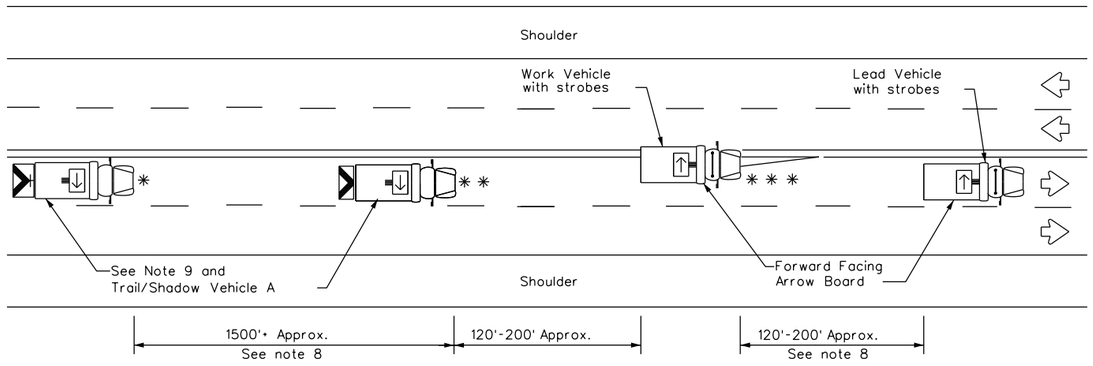
TRAFFIC CONTROL PLAN TRAFFIC SHIFTS ON TWO-LANE ROADS

TCP(2-3)-18

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

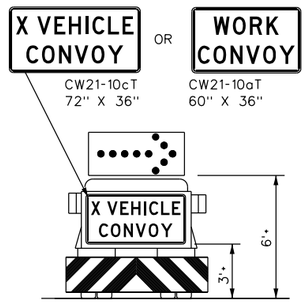
REVISIONS	CONT	SECT	JOB	HIGHWAY
8-95 2-12				FM 2538
1-97	DIST	COUNTY		SHEET NO.
4-98	15	BEXAR		41
3-03				

DATE:
FILE:



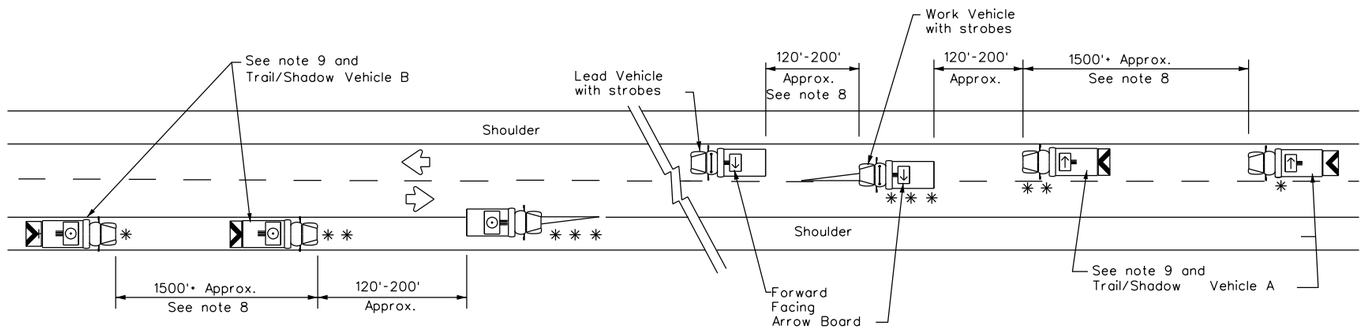
TCP (3-1a)

UNDIVIDED MULTILANE ROADWAY



TRAIL/SHADOW VEHICLE A

with RIGHT Directional display Flashing Arrow Board

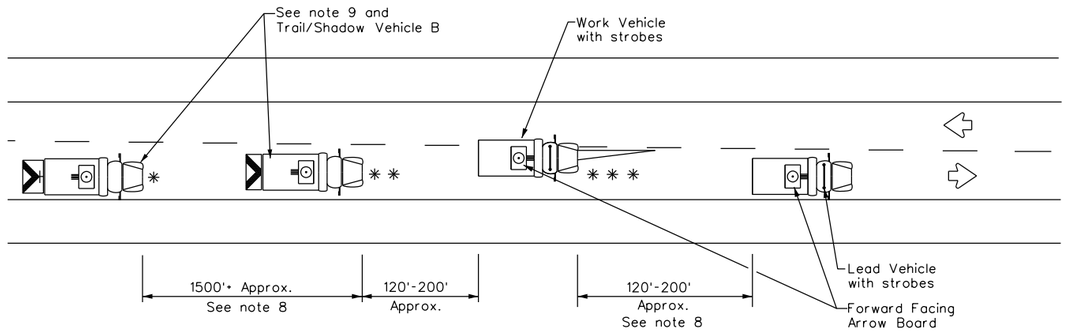


WORK ON SHOULDER

WORK ON TRAVEL LANE

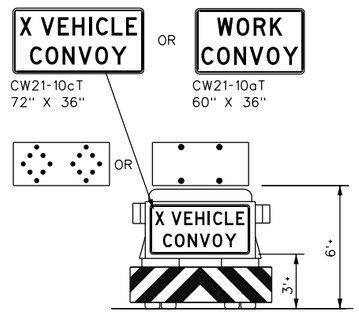
TCP (3-1b)

TWO-WAY ROADWAY WITH PAVED SHOULDERS



TCP (3-1c)

TWO-WAY ROADWAY WITHOUT PAVED SHOULDERS



TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board in CAUTION display

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

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

GENERAL NOTES

1. TRAIL, SHADOW, and LEAD vehicles shall be equipped with arrow boards as illustrated. When a LEAD vehicle is not used the WORK vehicle must be equipped with an arrow board. The Engineer will determine if the LEAD VEHICLE and/or TRAIL VEHICLE are required based on prevailing roadway conditions, traffic volume, and sight distance restrictions.

2. The use of amber high intensity rotating, flashing, oscillating, or strobe lights on vehicles are required. Blue high intensity rotating, flashing, oscillating or strobe lights when mounted on the driver's side of the vehicle may be operated simultaneously with the amber beacons or strobe lights.

3. The use of truck mounted attenuators (TMA) on the SHADOW VEHICLE and TRAIL VEHICLE are required.

4. Reflective sheeting on the rear of the TMA shall meet or exceed the reflectivity and color requirements of DEPARTMENTAL MATERIAL SPECIFICATION DMS 8300, Type A.

5. Flashing arrow boards shall be Type B or Type C as per the Barricade and Construction (BC) standards. The board shall be controlled from inside the vehicle.

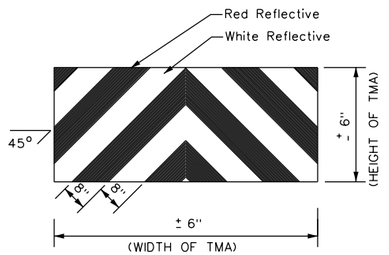
6. Each vehicle shall have two-way radio communication capability.

7. When work convoys must change lanes, the TRAIL VEHICLE should change lanes first to shadow the other convoy vehicles.

8. Vehicle spacing between the TRAIL VEHICLE and the SHADOW VEHICLE will vary depending on sight distance restrictions. Motorists approaching the work convoy should be able to see the TRAIL VEHICLE in time to slow down and/or change lanes as they approach the TRAIL VEHICLE. Vehicle spacing between the WORK VEHICLE and SHADOW VEHICLE and vehicle spacing between WORK VEHICLE and LEAD VEHICLE may vary according to terrain, work activity and other factors.

9. "X VEHICLE CONVOY" (CW21-10cT) or "WORK CONVOY" (CW21-10aT) signs shall be used on TRAIL VEHICLES and SHADOW VEHICLES as shown. As an option 48" X 48" diamond shaped "WORK CONVOY"(CW21-10T) or "X VEHICLE CONVOY" (CW21-10bT) signs may be used where adequate mounting space exists. When used, the X VEHICLE CONVOY sign shall have the number of the convoy vehicles displayed on the sign in the number designation "X" location. The "X VEHICLE CONVOY" sign shall not be used on the SHADOW VEHICLE if a TRAIL VEHICLE is used.

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



STRIPING FOR TMA

Texas Department of Transportation

Traffic Operations Division Standard

TRAFFIC CONTROL PLAN MOBILE OPERATIONS UNDIVIDED HIGHWAYS

TCP(3-1)-13

FILE: tcp3-1.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
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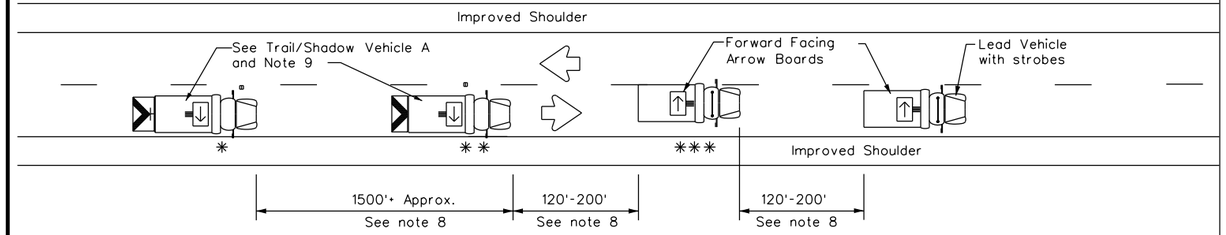
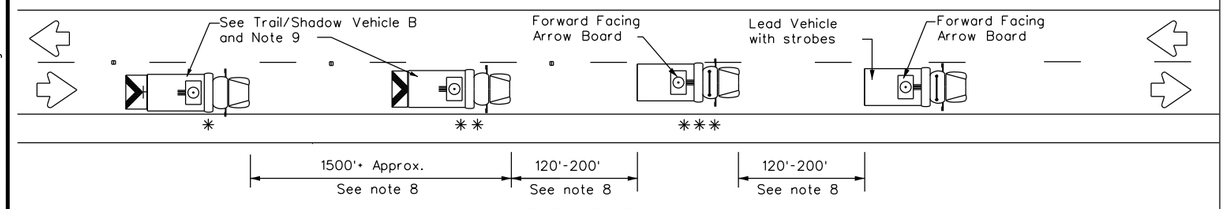
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	15	BEXAR		42
1-97				

DATE:
FILE:



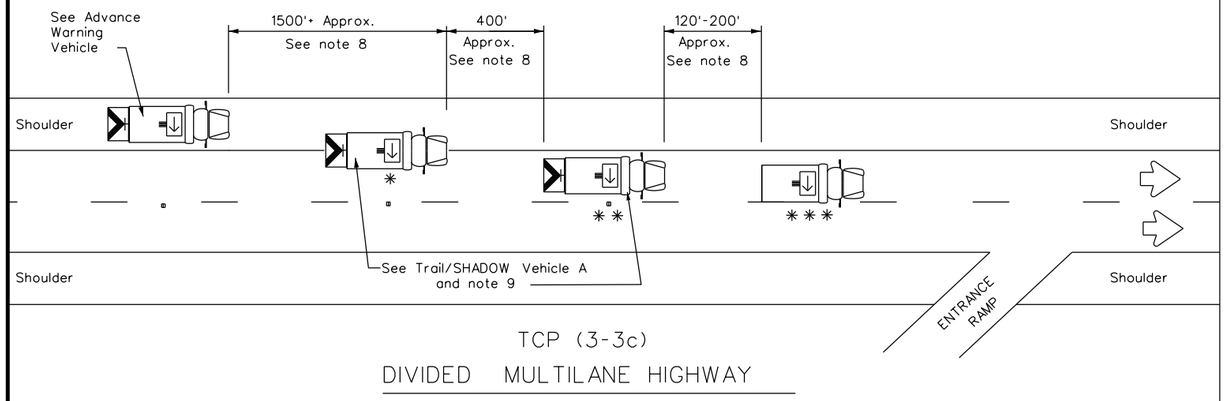
TCP (3-3a)

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



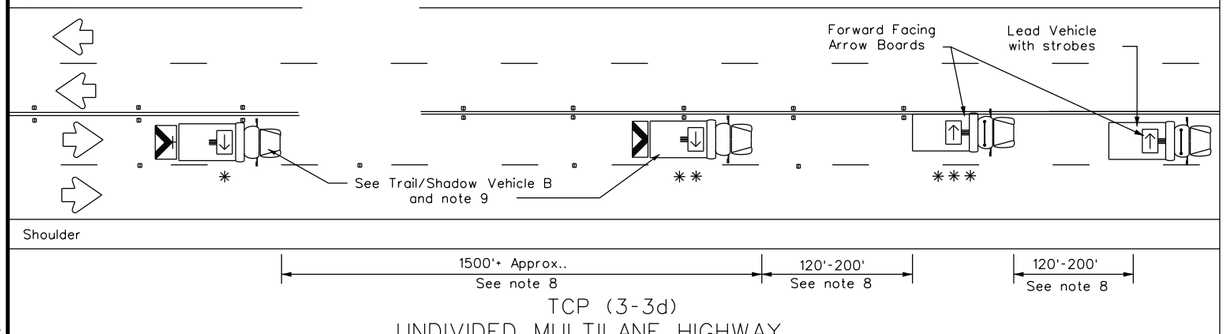
TCP (3-3b)

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



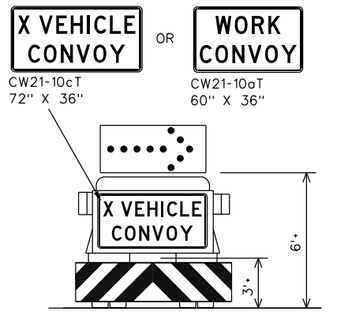
TCP (3-3c)

DIVIDED MULTILANE HIGHWAY



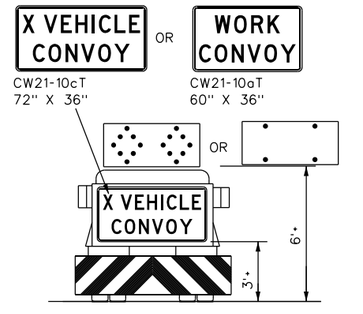
TCP (3-3d)

UNDIVIDED MULTILANE HIGHWAY



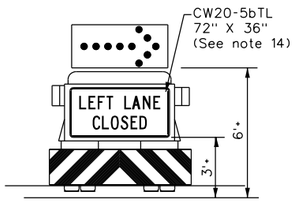
TRAIL/SHADOW VEHICLE A

with RIGHT Directional display
Flashing Arrow Board

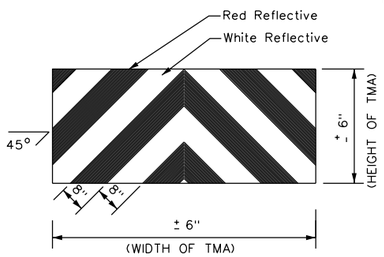


TRAIL/SHADOW VEHICLE B

with Flashing Arrow Board
in Caution Mode



ADVANCE WARNING VEHICLE



STRIPING FOR TMA

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

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

GENERAL NOTES

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

Texas Department of Transportation

Traffic Operations Division Standard

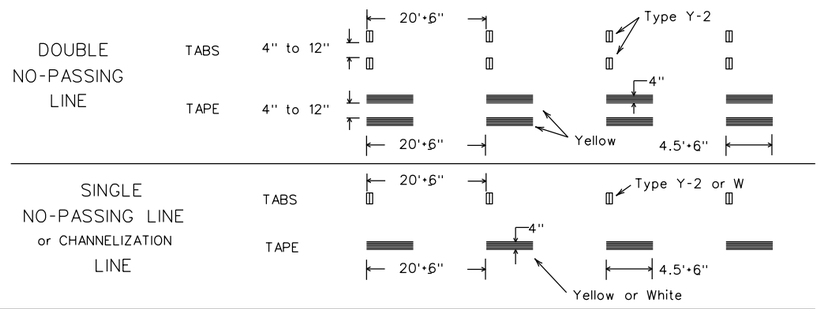
TRAFFIC CONTROL PLAN MOBILE OPERATIONS RAISED PAVEMENT MARKER INSTALLATION/ REMOVAL TCP(3-3)-14

FILE: tcp3-3.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT September 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 2538
2-94 4-98	DIST	COUNTY		SHEET NO.
8-95 7-13	15	BEXAR		43
1-97 7-14				

177

DATE:
FILE:

WORK ZONE SHORT TERM PAVEMENT MARKINGS DETAILS



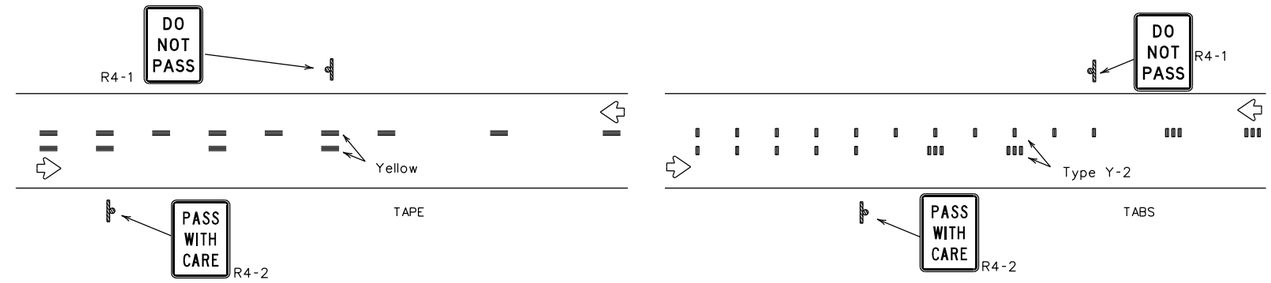
NOTES:

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

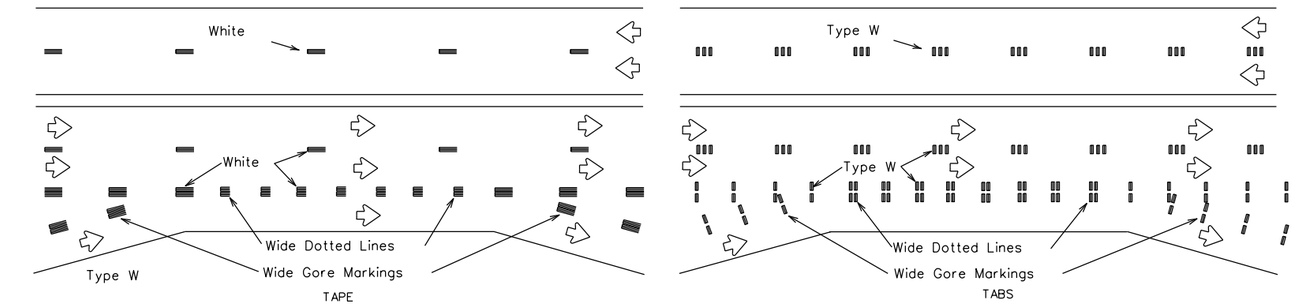
TEMPORARY FLEXIBLE, REFLECTIVE ROADWAY MARKER TABS (TABS)

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

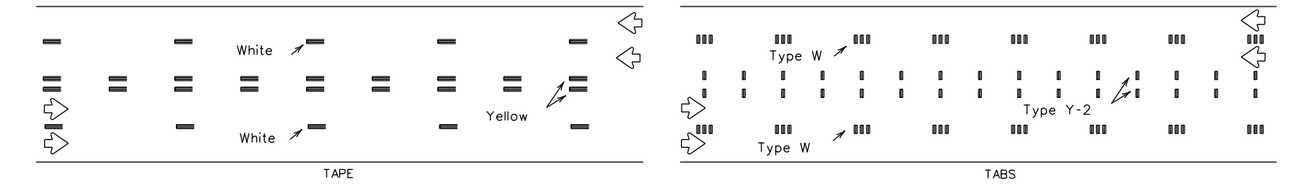
WORK ZONE SHORT TERM PAVEMENT MARKINGS PATTERNS



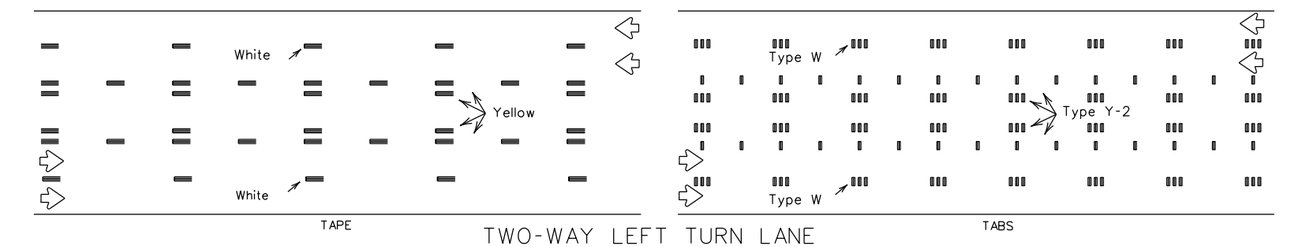
CENTER LINE & NO-PASSING ZONE BARRIER LINES FOR TWO LANE TWO-WAY HIGHWAYS



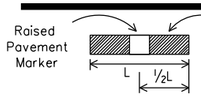
LANE LINES FOR DIVIDED HIGHWAY



LANE & CENTER LINES FOR MULTILANE UNDIVIDED HIGHWAYS



TWO-WAY LEFT TURN LANE



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

PREFABRICATED PAVEMENT MARKINGS

1. Temporary Removable Prefabricated Pavement Markings shall meet the requirements of DMS-8241.
2. Non-removable Prefabricated Pavement Markings shall meet the requirements of either DMS-8240 "Permanent Prefabricated Pavement Markings" or DMS-8243 "Temporary Costruction-Grade Prefabricated Pavement Markings."

RAISED PAVEMENT MARKERS

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

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

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

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

Texas Department of Transportation

Traffic Operations Division Standard

WORK ZONE SHORT TERM PAVEMENT MARKINGS

WZ(STPM)-13

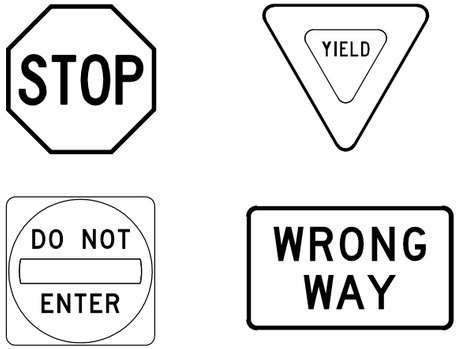
FILE: wzstpm-13.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 2538
1-97	DIST	COUNTY		SHEET NO.
3-03	15	BEXAR		44
7-13				

111

9/20/2021
P:\Clients\Firms\Legacy\Clearwater Creek\Design\10 STANDARDS\07 SIGNING\tsr4-13.dgn

REQUIREMENTS FOR RED BACKGROUND REGULATORY SIGNS

(STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)



REQUIREMENTS FOR FOUR SPECIFIC SIGNS ONLY

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	RED	TYPE B OR C SHEETING
BACKGROUND	WHITE	TYPE B OR C SHEETING
LEGEND & BORDERS	WHITE	TYPE B OR C SHEETING
LEGEND	RED	TYPE B OR C SHEETING

REQUIREMENTS FOR WHITE BACKGROUND REGULATORY SIGNS

(EXCLUDING STOP, YIELD, DO NOT ENTER AND WRONG WAY SIGNS)

TYPICAL EXAMPLES

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

GENERAL NOTES

1. Signs to be furnished shall be as detailed elsewhere in the plans and/or as shown on sign tabulation sheet. Standard sign designs and arrow dimensions can be found in the "Standard Highway Sign Designs for Texas" (SHSD).
2. Sign legend shall use the Federal Highway Administration (FHWA) Standard Highway Alphabets (B, C, D, E, Emod or F).
3. Lateral spacing between letters and numerals shall conform with the SHSD, and any approved changes thereto. Lateral spacing of legend shall provide a balanced appearance when spacing is not shown.
4. Black legend and borders shall be applied by screening process or cut-out acrylic non-reflective black film to background sheeting, or combination thereof.
5. White legend and borders shall be applied by screening process with transparent colored ink, transparent colored overlay film to white background sheeting or cut-out white sheeting to colored background sheeting, or combination thereof.
6. Colored legend shall be applied by screening process with transparent colored ink, transparent colored overlay film or colored sheeting to background sheeting, or combination thereof.
7. Sign substrate shall be any material that meets the Departmental Material Specification requirements of DMS-7110 or approved alternative.
8. Mounting details for roadside mounted signs are shown in the "SMD series" Standard Plan Sheets.

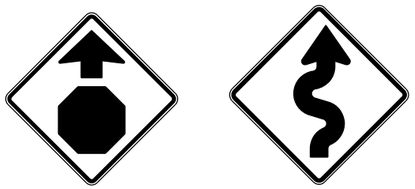
ALUMINUM SIGN BLANKS THICKNESS	
Square Feet	Minimum Thickness
Less than 7.5	0.080
7.5 to 15	0.100
Greater than 15	0.125

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

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

http://www.txdot.gov/

REQUIREMENTS FOR WARNING SIGNS



TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	FLOURESCENT YELLOW	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND & BORDERS	BLACK	ACRYLIC NON-REFLECTIVE FILM
LEGEND & SYMBOLS	ALL OTHER	TYPE B OR C SHEETING

REQUIREMENTS FOR SCHOOL SIGNS

TYPICAL EXAMPLES

SHEETING REQUIREMENTS		
USAGE	COLOR	SIGN FACE MATERIAL
BACKGROUND	WHITE	TYPE A SHEETING
BACKGROUND	FLOURESCENT YELLOW GREEN	TYPE B_{FL} OR C_{FL} SHEETING
LEGEND,BORDERS AND SYMBOLS	BLACK	ACRYLIC NON-REFLECTIVE FILM
SYMBOLS	RED	TYPE B OR C SHEETING

Texas Department of Transportation

Traffic Operations Division Standard

TYPICAL SIGN REQUIREMENTS

TSR(4)-13

FILE: tsr4-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT October 2003	CONT	SECT	JOB	HIGHWAY
REVISIONS	-	-	-	FM 2538
12-03 7-13	DIST	COUNTY		SHEET NO.
9-08	SAT	BEXAR		45

SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

Post Type

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

Number of Posts (1 or 2)

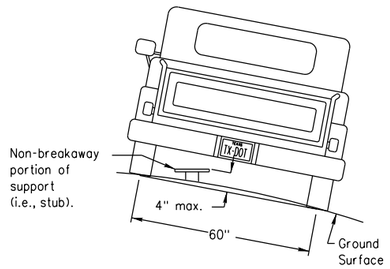
Anchor Type

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

Sign Mounting Designation

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

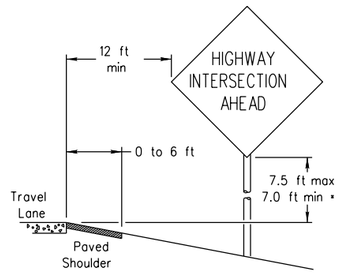
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

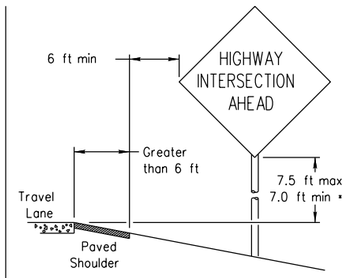
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

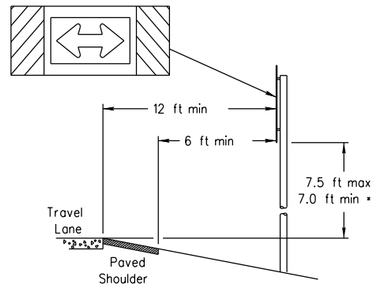
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



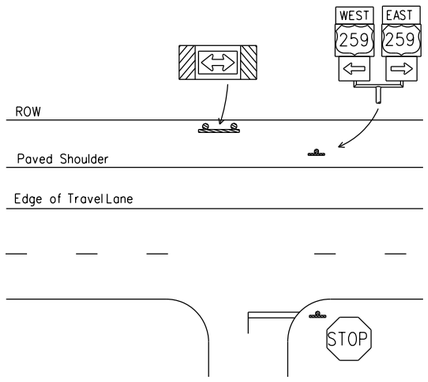
GREATER THAN 6 FT. WIDE

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

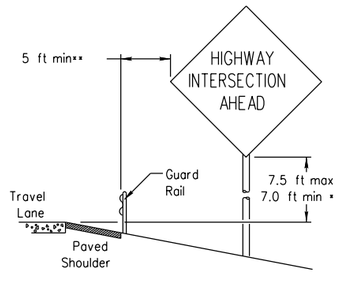
T-INTERSECTION



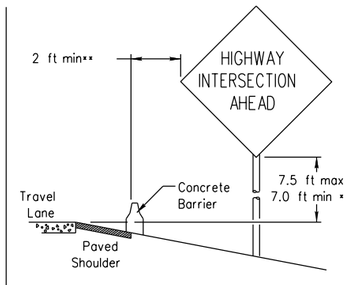
When this sign is needed at the end of a two-lane, two way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.



BEHIND BARRIER



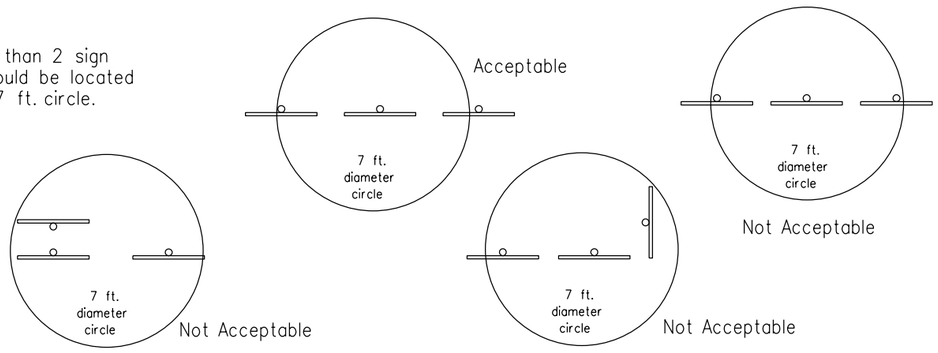
BEHIND GUARDRAIL



BEHIND CONCRETE BARRIER

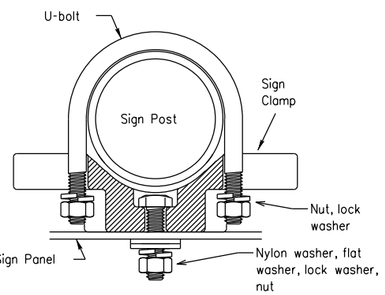
**Sign clearance based on distance required for proper guard rail or concrete barrier performance.

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



TYPICAL SIGN ATTACHMENT DETAIL

Single Signs

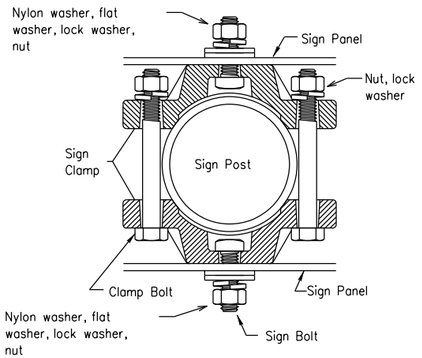


Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

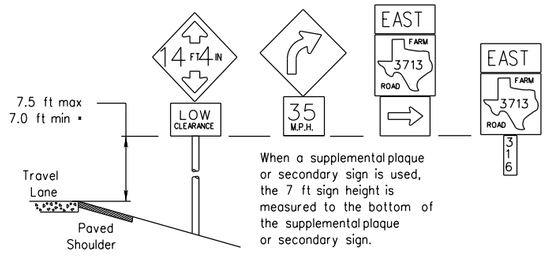
Sign clamps may be either the specific size clamp or the universal clamp.

Back-to-Back Signs



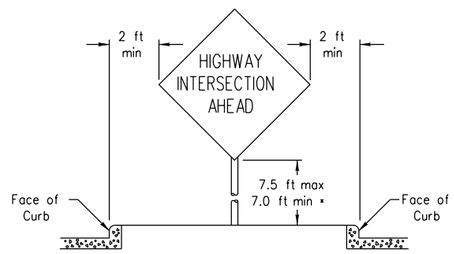
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES



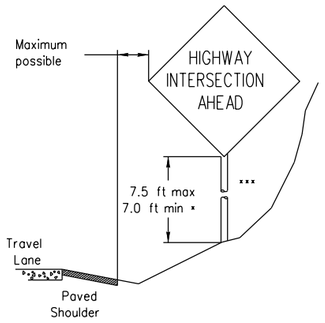
When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



RESTRICTED RIGHT-OF-WAY

(When 6 ft min. is not possible.)



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

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

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

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

(1) a minimum of 7 to a maximum of 7.5 feet above the edge of the travel lane or

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

The maximum values may be increased when directed by the Engineer.

See the Traffic Operations Division website for detailed drawings of sign clamps, Triangular Slipbase System components and Wedge Anchor System components.

The website address is:
http://www.txdot.gov/publications/traffic.htm

Texas Department of Transportation
Traffic Operations Division

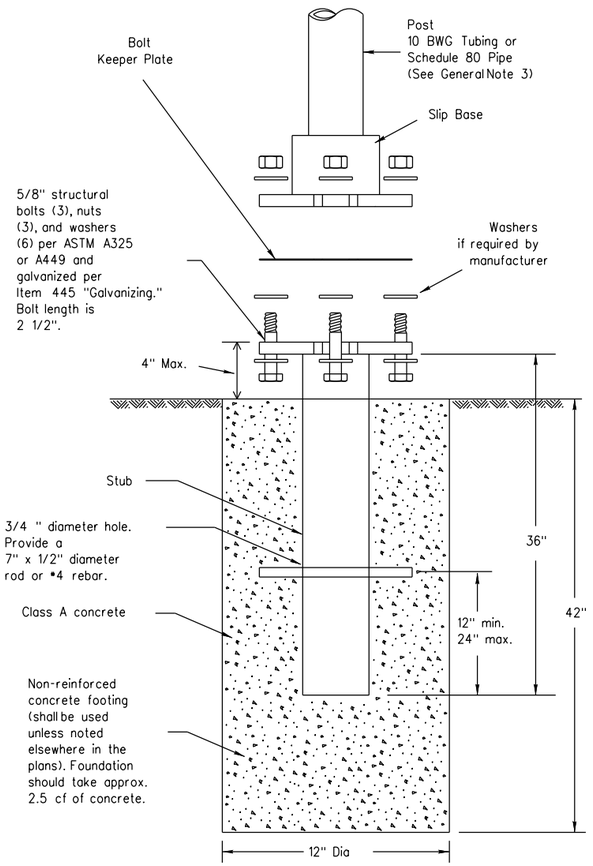
SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS GENERAL NOTES & DETAILS

SMD(GEN)-08

©TxDOT July 2002			DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS 9-08	STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT			SHEET
	SAT	-				46
	COUNTY		CONTROL	SECTION	JOB	HIGHWAY
	BEXAR		-	-	-	FM 2538

26A

TRIANGULAR SLIPBASE INSTALLATION GENERAL REQUIREMENTS



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

NOTE

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

GENERAL NOTES:

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

ASSEMBLY PROCEDURE

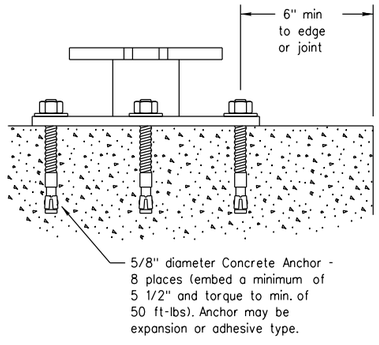
Foundation

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

Support

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

CONCRETE ANCHOR



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

Concrete anchor consists of 5/8" diameter stud bolt with UNC series bolt threads on the upper end. Heavy hex nut per ASTM A563, and hardened washer per ASTM F436. The stud bolt shall have a minimum yield and ultimate tensile strength of 50 and 75 KSI, respectively. Nuts, bolts and washers shall be galvanized per Item 445, "Galvanizing." Adhesive type anchors shall have stud bolts installed with Type III epoxy per DMS-6100, "Epoxies and Adhesives." Adhesive anchors may be loaded after adequate epoxy cure time per the manufacturer's recommendations. Top of bolt shall extend at least flush with top of the nut when installed. The anchor, when installed in 4000 psi normal-weight concrete with a 5 1/2" minimum embedment, shall have a minimum allowable tension and shear of 3900 and 3100 psi, respectively.

Texas Department of Transportation
Traffic Operations Division

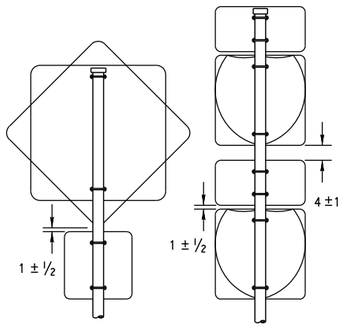
SIGN MOUNTING DETAILS
SMALL ROADSIDE SIGNS
TRIANGULAR SLIPBASE SYSTEM

SMD(SLIP-1)-08

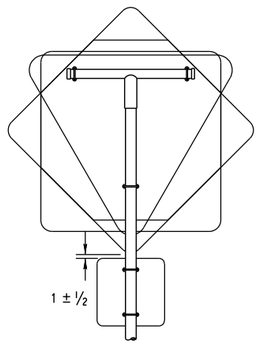
DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT

REVISIONS	CONT	SECT	JOB	HIGHWAY
9-08	-	-	-	FM 2538
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		47

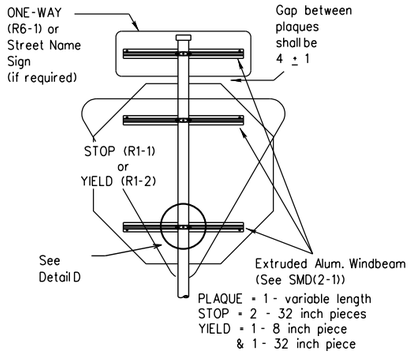
26B



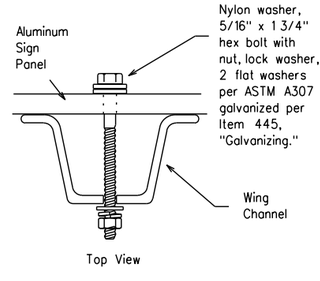
SM RD SGN ASSM TY XXXXX(1)XX(P)



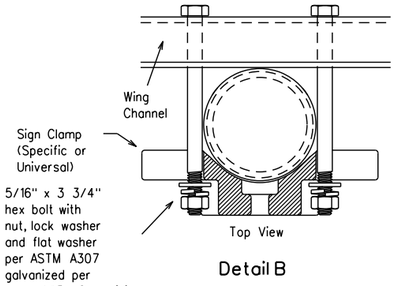
SM RD SGN ASSM TY XXXXX(1)XX(T)



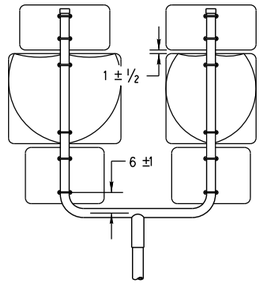
SM RD SGN ASSM TY XXXXX(1)XX(P-BM)



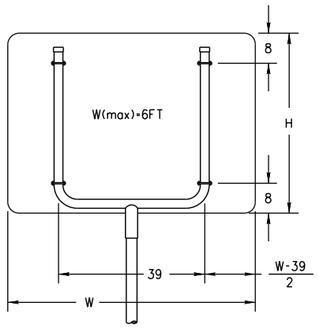
Detail A



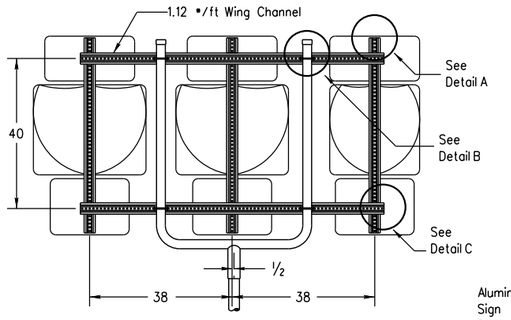
Detail B



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



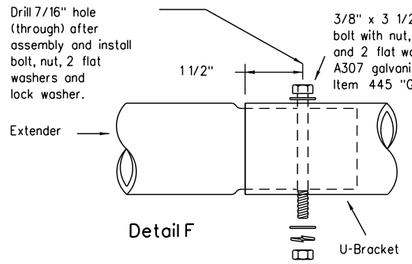
SM RD SGN ASSM TY XXXXX(1)XX(U)



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

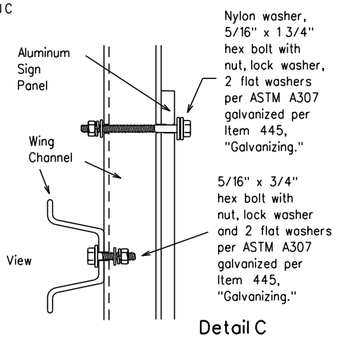
Drill 7/16" hole (through) after assembly and install bolt, nut, 2 flat washers and lock washer.

3/8" x 3 1/2" heavy hex bolt with nut, lock washer and 2 flat washers per ASTM A307 galvanized per Item 445 "Galvanizing."

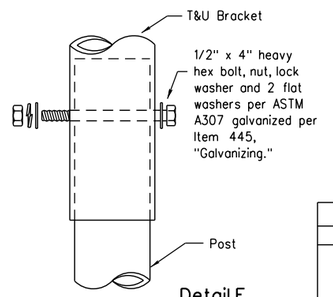


Detail F

Splices shall only be allowed behind the sign substrate.



Detail C



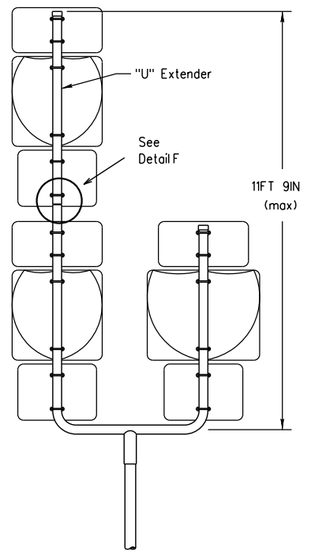
Detail E

GENERAL NOTES:

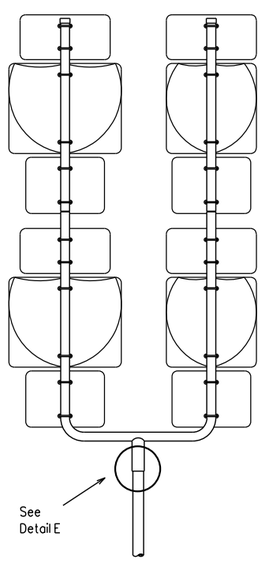
1.

SIGN SUPPORT	OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

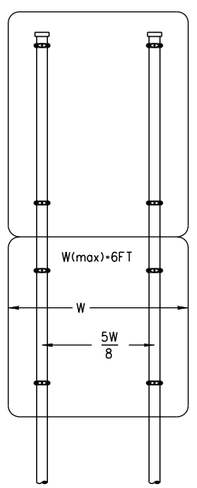
2. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
3. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
4. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
5. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
6. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
7. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
8. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
9. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
10. Additional route markers may be added vertically, provided the total sign area does not exceed the maximum allowable amount per Note 1.
11. Additional sign clamp required on the "T-bracket" post for 24 inch height signs. Place the clamp 3 inches above bottom of sign when possible.
12. Post open ends shall be fitted with Friction Caps.
13. Sign blanks shall be the sizes and shapes shown on the plans.



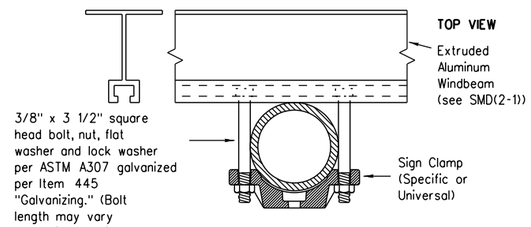
SM RD SGN ASSM TY S80(1)XX(U-1EXT)



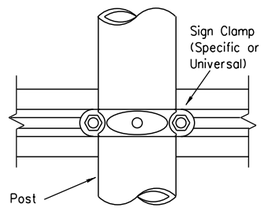
SM RD SGN ASSM TY S80(1)XX(U-2EXT)



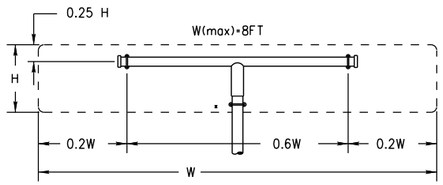
SM RD SGN ASSYM TY XXXXX(2)XX(P)



Detail D



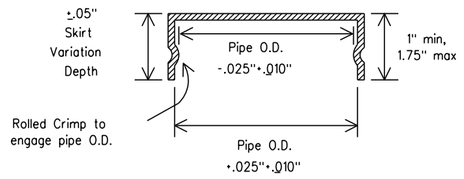
REQUIRED SUPPORT		
	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)



All dimensions are in english unless detailed otherwise.

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

FRICTION CAP DETAIL



Friction caps may be manufactured from hot rolled or cold rolled steel sheets. The minimum sheet metal thickness shall be 24 gauge for all cap sizes.

The rim edges shall be reasonably straight and smooth. Caps shall be sized and formed in such a manner as to produce a drive-on friction fit and have no tendency to rock when seated on the pipe. The depth shall be sufficient to give positive protection against entrance of rainwater. They shall be free of sharp creases or indentations and show no evidence of metal fracture.

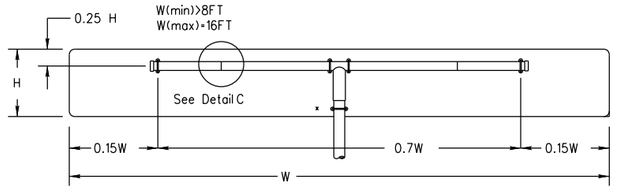
Caps shall have an electrodeposited coating of zinc in accordance with the requirements of ASTM B633 Class FE/ZN 8.

Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

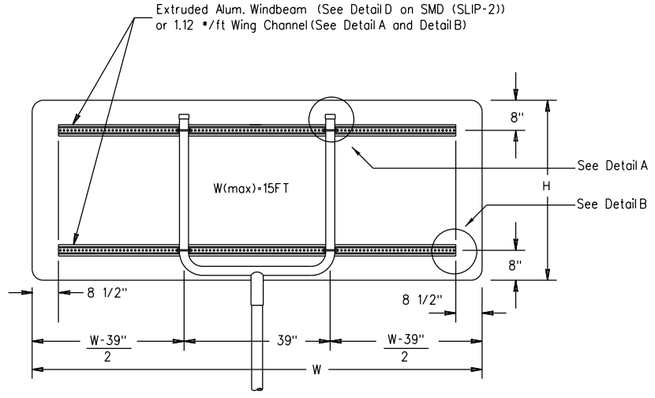
SMD(SLIP-2)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	-	-	-	FM 2538
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		48



SM RD SGN ASSM TY XXXXX(1)XX(T-2EXT)

(* - See Note 12)



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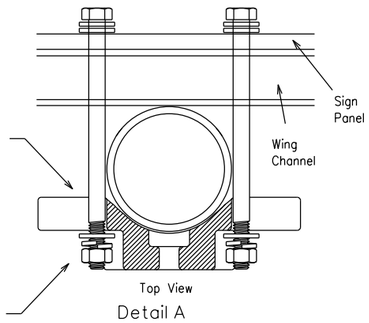
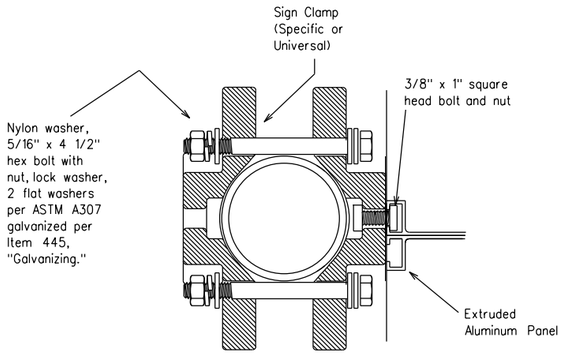
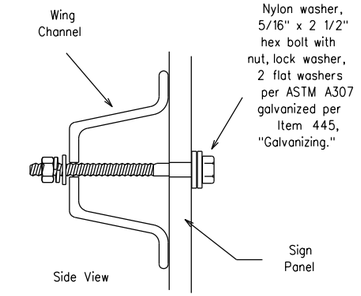


Detail A

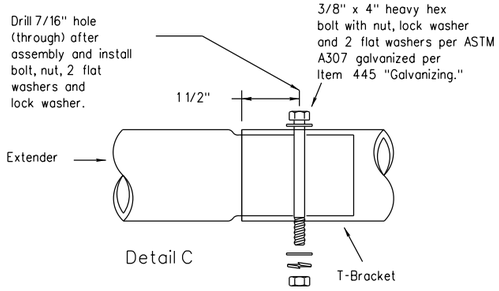


Detail D

EXTRUDED ALUMINUM SIGN WITH T BRACKET

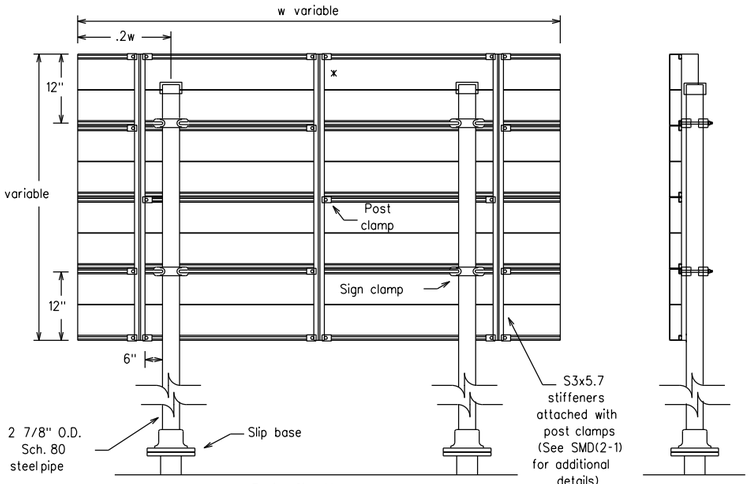


Detail B



Detail C

Splices shall only be allowed behind the sign substrate.

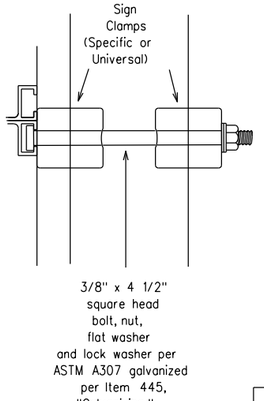


Typical Sign Mount

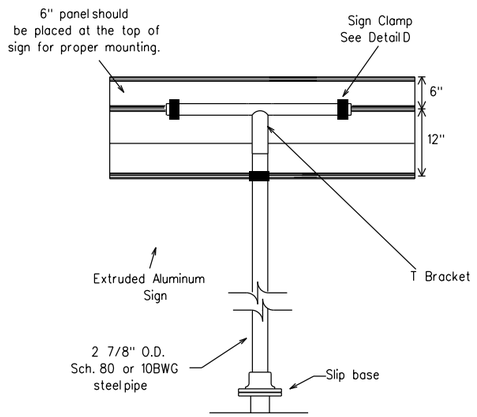
SM RD SGN ASSM TY S80(2)XX(P-EXAL)

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

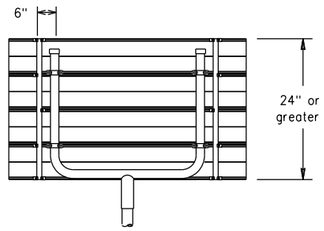
See Detail E
for clamp installation



Detail E



Extruded Aluminum Sign
With T Bracket



Use Extruded Alum. Windbeam as stiffeners
See SMD (2-1) for additional details

See Detail E
for clamp installation

GENERAL NOTES:

SIGN SUPPORT	# OF POSTS	MAX. SIGN AREA
10 BWG	1	16 SF
10 BWG	2	32 SF
Sch 80	1	32 SF
Sch 80	2	64 SF

1. The Engineer may require that a Schedule 80 post be used in place of a 10 BWG where a sign height is abnormally high due to a fill slope.
2. Sign supports shall not be spliced except where shown. Sign support posts shall not be spliced.
3. Aluminum sign blanks shall conform to Departmental Material Specifications DMS-7110 and shall have the following minimum thicknesses: 0.080 for signs less than 7.5 sq. ft., 0.100 for signs 7.5 to 15 sq. ft., and 0.125 for signs greater than 15 sq. ft.
4. Signs that require specific supports due to reasons in addition to windloading are indicated on the "REQUIRED SUPPORT" table on this sheet.
5. For horizontal rectangular signs fabricated from flat aluminum, T-brackets are used for signs 24 inches or less in height. U-brackets are used for signs of greater height.
6. When two triangular slipbase supports are used to support a single sign, they shall not be "rigidly" connected to each other except through the sign panel. This will allow each support to act independently when impacted by an errant vehicle.
7. Wing channel shall meet ASTM A 1011 SS Gr 50 and be galvanized per ASTM A 123.
8. Excess pipe, wing channel, or windbeam shall be cut off so that it does not extend beyond the sign panel (i.e., excess support shall not be visible when the sign is viewed from the front.) Repair galvanized coating at cut support ends per Item 445, "Galvanizing."
9. Sign blanks shall be the sizes and shapes shown on the plans.
10. Additional sign clamp required on the "T-bracket" post for 24 inch high signs. Place the clamp 3 inches above bottom of sign when possible.
11. Post open ends shall be fitted with Friction Caps.

REQUIRED SUPPORT

	SIGN DESCRIPTION	SUPPORT
Regulatory	48-inch STOP sign (R1-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	60-inch YIELD sign (R1-2)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	48x16-inch ONE-WAY sign (R6-1)	TY 10BWG(1)XX(T) TY 10BWG(1)XX(P-BM)
	36x48, 48x36, and 48x48-inch signs	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
Warning	48x48-inch signs (diamond or square)	TY 10BWG(1)XX(T)
	48x60-inch signs	TY S80(1)XX(T)
	48-inch Advance School X-ing sign (S1-1)	TY 10BWG(1)XX(T)
	48-inch School X-ing sign (S2-1)	TY 10BWG(1)XX(T)
	Large Arrow sign (W1-6 & W1-7)	TY 10BWG(1)XX(T)

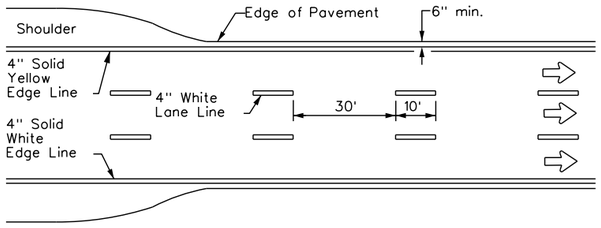
Texas Department of Transportation
Traffic Operations Division

SIGN MOUNTING DETAILS SMALL ROADSIDE SIGNS TRIANGULAR SLIPBASE SYSTEM

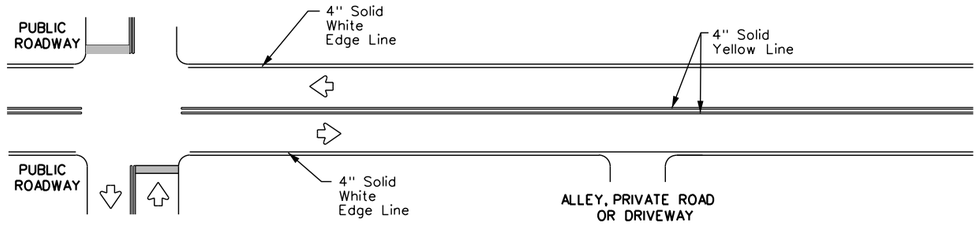
SMD(SLIP-3)-08

REVISIONS	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
9-08	CONT	SECT	JOB	HIGHWAY
	-	-	-	FM 2538
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		49

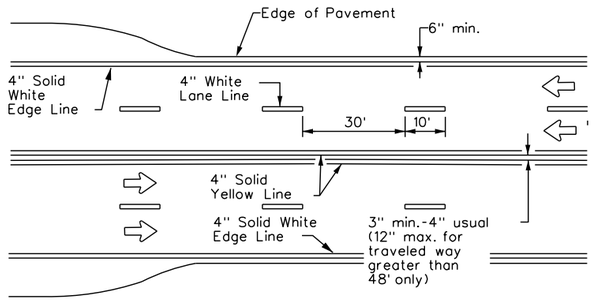
26D



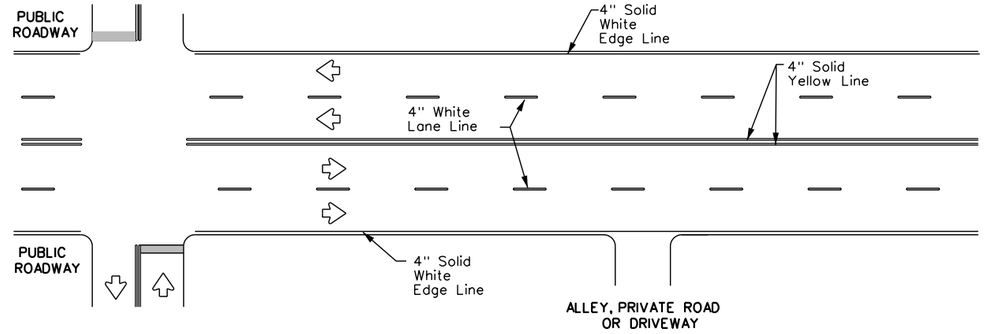
EDGE LINE AND LANE LINES ONE-WAY ROADWAY WITH OR WITHOUT SHOULDERS



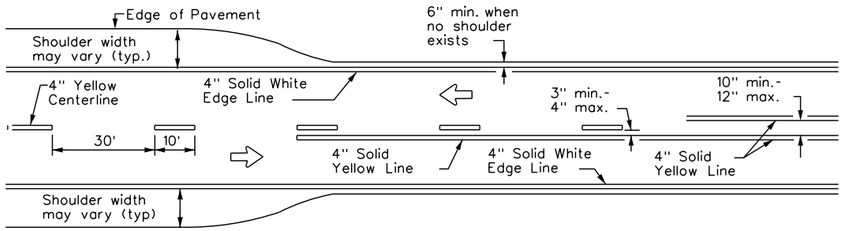
TYPICAL TWO-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



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

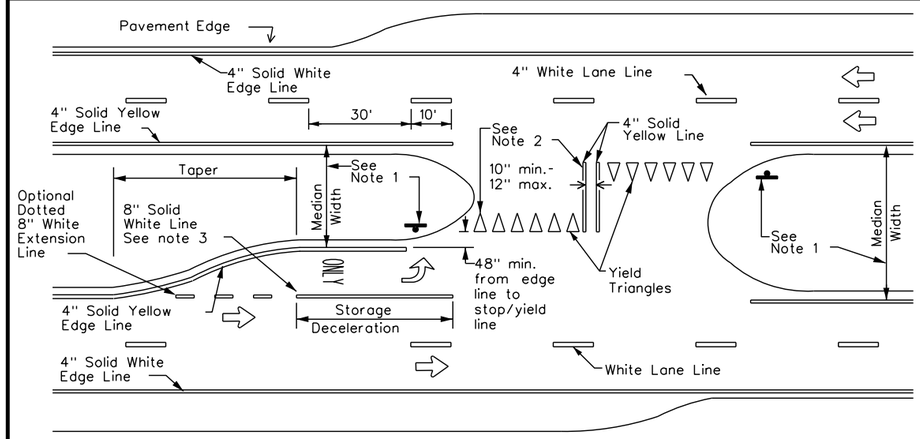


TYPICAL MULTI-LANE, TWO-WAY PAVEMENT MARKINGS THROUGH INTERSECTIONS



TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS

YIELD LINES



FOUR LANE DIVIDED ROADWAY CROSSOVERS

NOTES

1. Where divided highways are separated by median widths at the median opening itself of 30 feet or more, median openings shall be signed as two separate intersections. Each median opening has two width measurements, with one measurement for each approach. The narrow median width will be the controlling width to determine if signs are required. Yield signs are the typical intersection control. Stop signs are optional as determined by the Engineer.

2. Install median striping (double yellow centerlines and stop bars/yield triangles) when a 50' or greater median centerline can be placed. Stop bars shall only be used with stop signs. Yield traingles shall only be used with yield signs.

3. Length of turn bays, including taper, deceleration, and storage lengths shall be as shown on the plans or as directed by the Engineer.

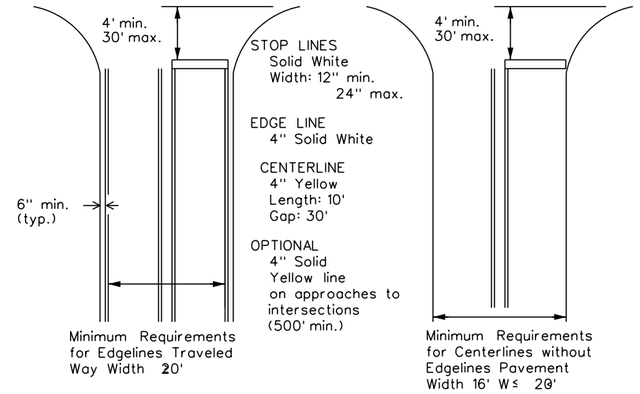
GENERAL NOTES

1. Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should not be placed less less than 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.

2. The traveled way includes only that portion of the roadway used for vehicular travel. It does not include the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to the inside of edgeline of a two lane roadway.

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

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



GUIDE FOR PLACEMENT OF STOP LINES, EDGE LINE & CENTERLINE

Based on Traveled Way and Pavement Widths for Undivided Highways

Texas Department of Transportation

Traffic Safety Division Standard

TYPICAL STANDARD PAVEMENT MARKINGS

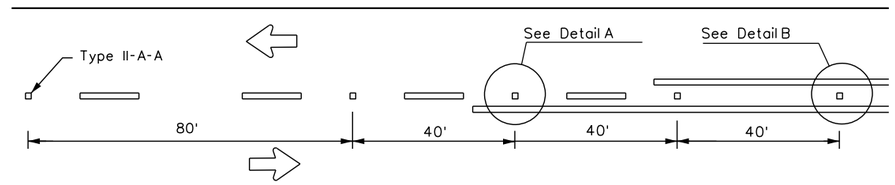
PM(1)-20

FILE: pm1-20.dgn	DN:	CK:	DW:	CK:
©TxDOT November 1978	CONT	SECT	JOB	HIGHWAY
REVISIONS 8-95 3-03	-	-	-	FM 2538
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	SAT	BEXAR		50

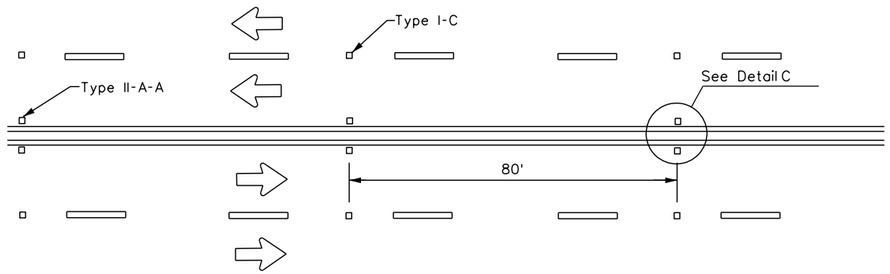
22B

DATE:
FILE:

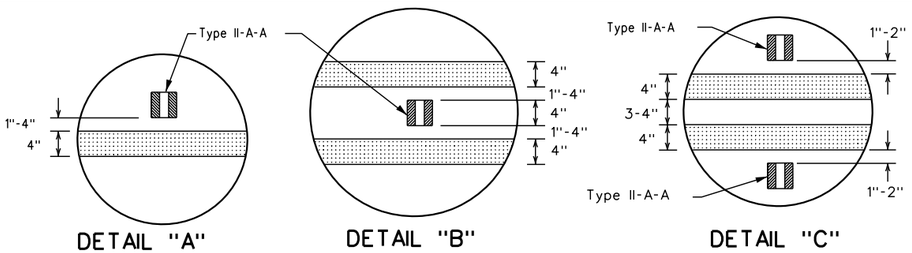
REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE



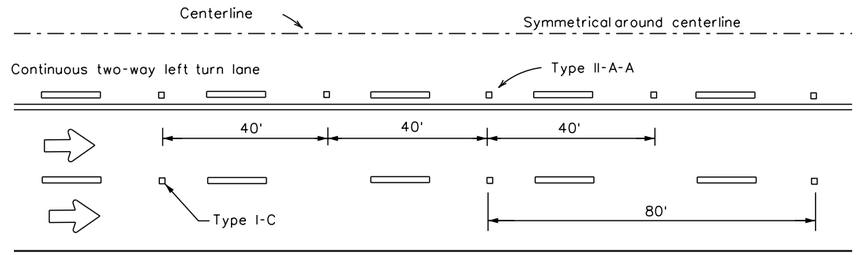
CENTERLINE FOR ALL TWO LANE ROADWAYS



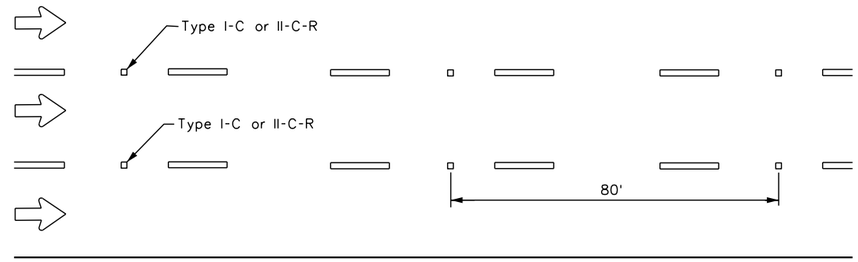
CENTERLINE & LANE LINES FOR FOUR LANE TWO-WAY HIGHWAYS



DETAIL "A" DETAIL "B" DETAIL "C"



CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE

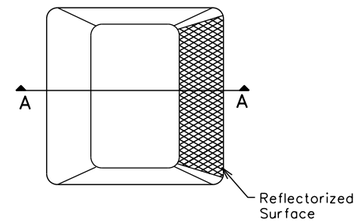


LANE LINES FOR ONE-WAY ROADWAY (NON-FREEWAY FACILITIES)

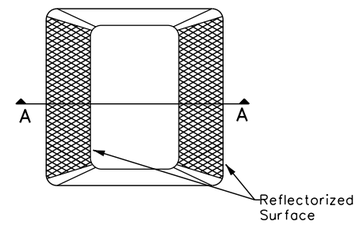
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.

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

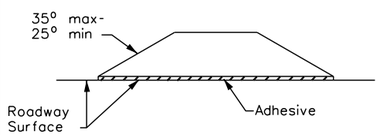
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)

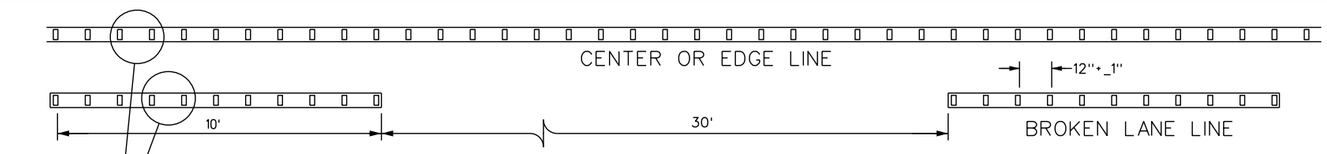


Type II (Top View)



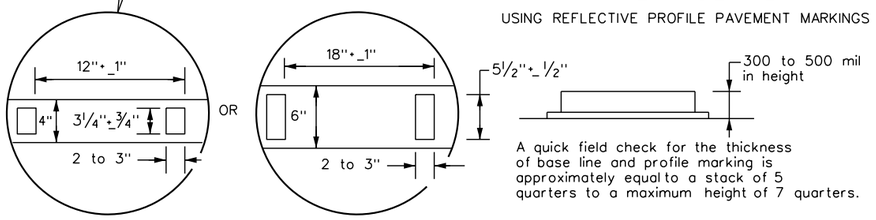
SECTION A

RAISED PAVEMENT MARKERS



REFLECTORIZED PROFILE PATTERN DETAIL

USING REFLECTIVE PROFILE PAVEMENT MARKINGS



4" EDGE LINE, CENTER LINE OR LANE LINE

OPTIONAL 6" EDGE LINE, CENTER LINE OR LANE LINE

A quick field check for the thickness of base line and profile marking is approximately equal to a stack of 5 quarters to a maximum height of 7 quarters.

NOTE

Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

Texas Department of Transportation

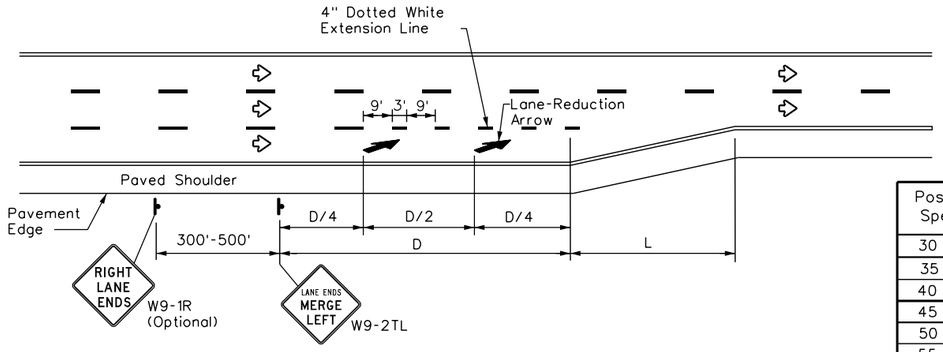
Traffic Safety Division Standard

POSITION GUIDANCE USING RAISED MARKERS RELECTORIZED PROFILE MARKINGS PM(2)-20

FILE: pm2-20.dgn	DN:	CK:	DW:	CK:
©TxDOT April 1977	CONT	SECT	JOB	HIGHWAY
REVISIONS 4-92 2-10	-	-	-	FM 2538
5-00 2-12	DIST	COUNTY		SHEET NO.
8-00 6-20	SAT	BEXAR		51

22B

DATE:
FILE:

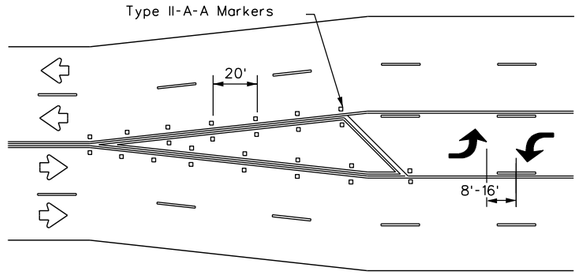


LANE REDUCTION

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

NOTES

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



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

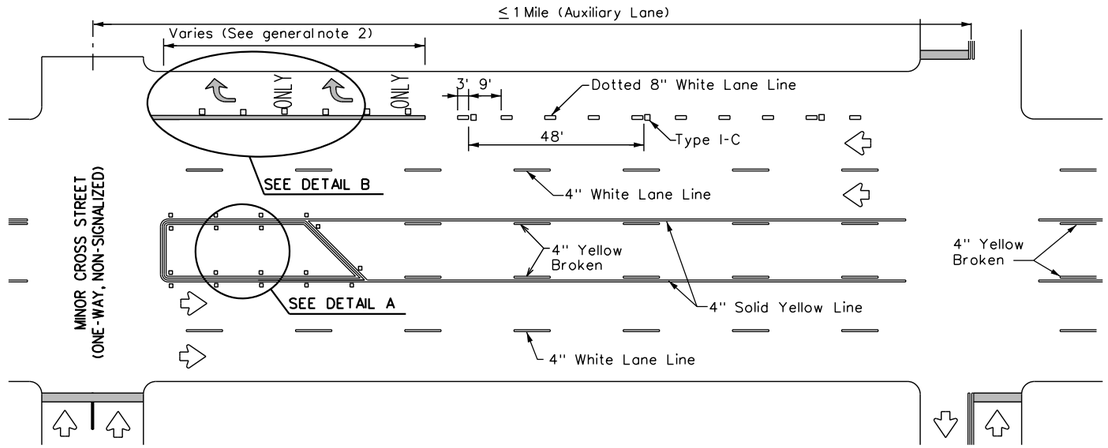
TYPICAL TRANSITION FOR TWLTL AND DIVIDED HIGHWAY

GENERAL NOTES

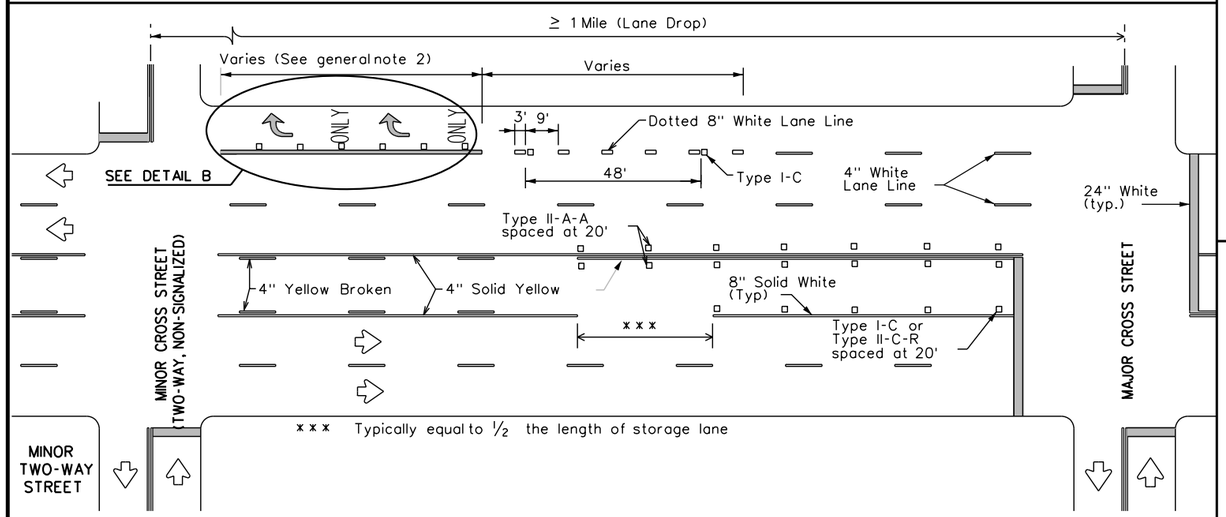
1. Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn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

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

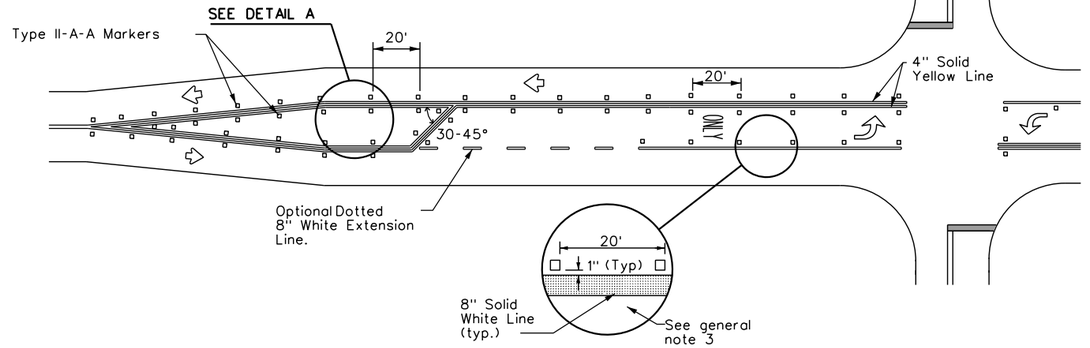
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



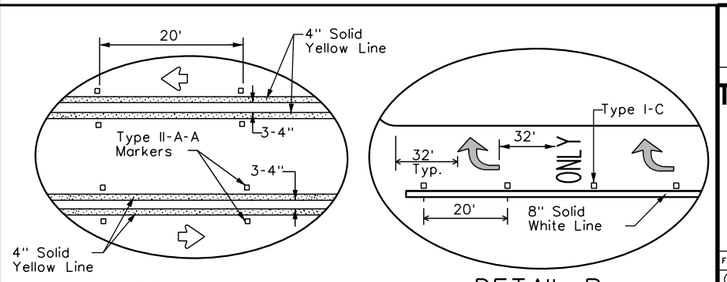
TYPICAL TWLTL AT ONE-WAY STREET AND RIGHT TURN AUXILIARY LANE



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



TYPICAL TWO-LANE HIGHWAY INTERSECTION WITH LEFT TURN BAYS



DETAIL A

DETAIL B

Texas Department of Transportation

Traffic Safety Division Standard

TWO-WAY LEFT TURN LANES, RURAL LEFT TURN BAYS, AND LANE REDUCTION PAVEMENT MARKINGS PM(3)-20

FILE: pm3-20.dgn	DN:	CK:	DW:	CK:
© TxDOT April 1998	CONT	SECT	JOB	HIGHWAY
REVISIONS	-	-	-	FM 2538
5-00 2-10	DIST	COUNTY		SHEET NO.
8-00 2-12	SAT	BEXAR		52
3-03 6-20				

22D

DATE:
FILE:

REVISED ON: 5-18 | CHECKED BY: G.G./OMC | REVISED BY: JCO3 | DRAWN BY: TED
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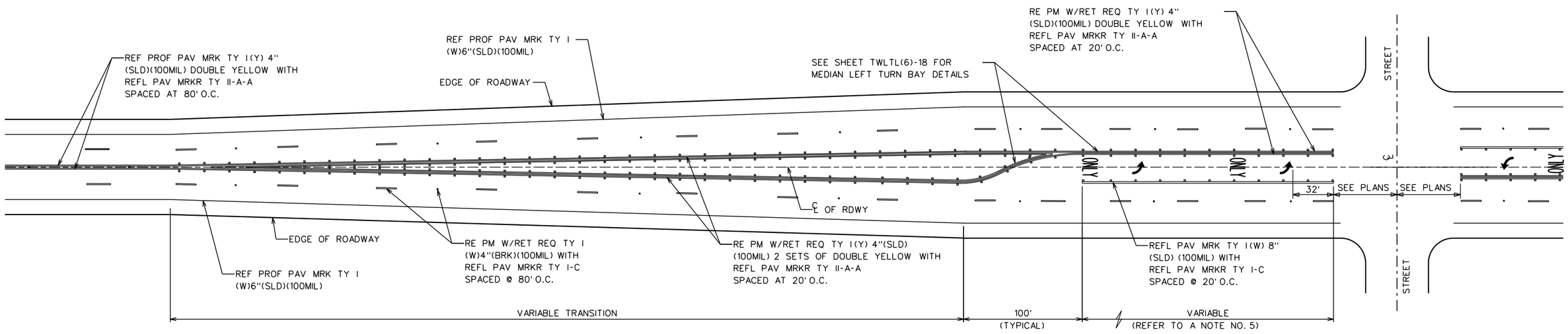
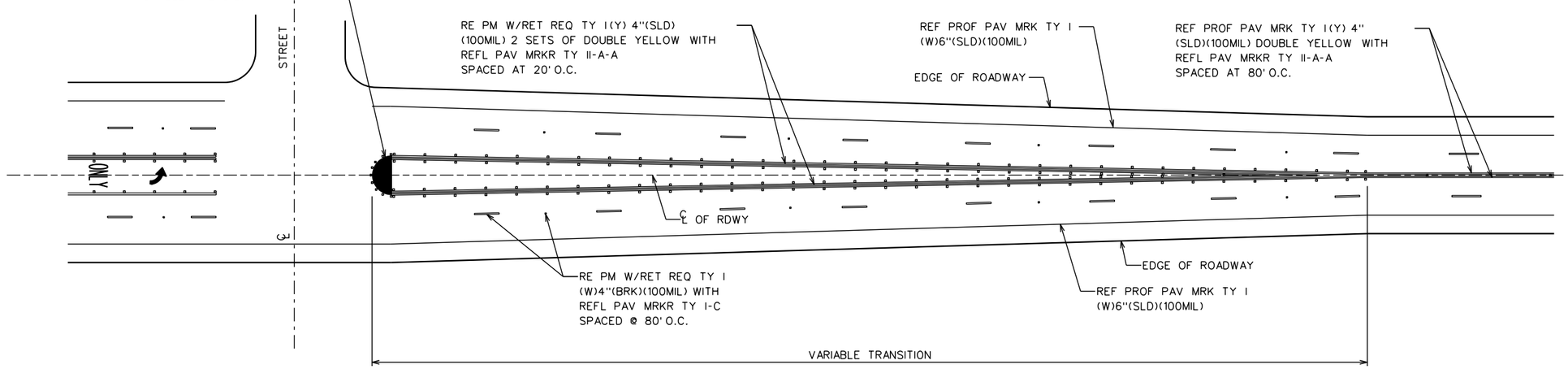


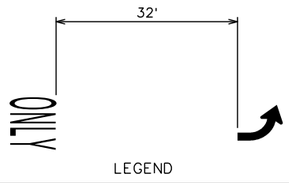
TYPICAL MEDIAN LEFT TURN BAY (FOR USE ON RURAL ROADS)

SIGNALIZED AND NON-SIGNALIZED CROSS STREETS
WITH LEFT TURN BAY



TYPICAL TRANSITION

LEFT TURN BAY END CONDITION AND ROADWAY TRANSITION



LEGEND

TYPICAL DETAIL
(PLACE LEGENDS IN ACCORDANCE TO STATE STANDARD PM(3)-12)

NOTES:

1. PAVEMENT MARKERS SHOULD BE IN ACCORDANCE WITH STATE STANDARDS PM(2)-12 (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 215 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)-12) FOR MORE TURN LANE DETAILS.
5. REFER TO TXDOT ROADWAY DESIGN MANUAL FOR DECELERATION AND STORAGE LENGTH.

LEGEND

☐ REFLECTIVE MARKER

San Antonio District Standard

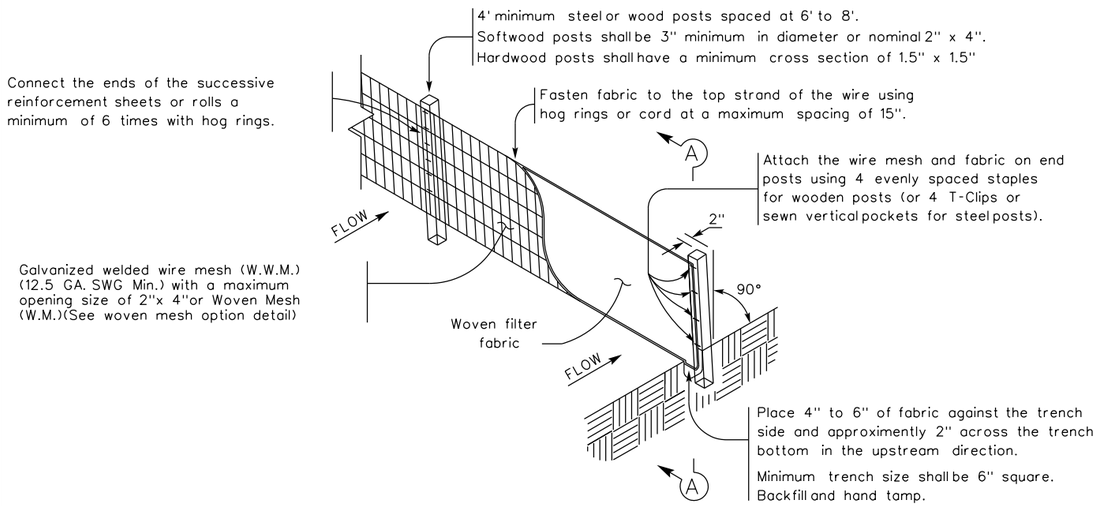
TWO WAY LEFT TURN LANE AND LEFT TURN BAYS - RURAL ROADS

SCALE: NS

TWLTL(1)-21

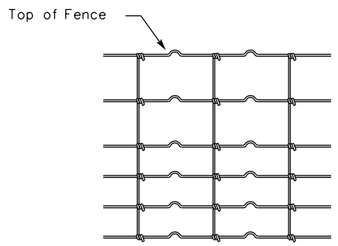
REVISIONS	FED.RD. DIV.NO.	FEDERAL AID PROJECT NO.		SHEET NO.
AUG 2002				53
APRIL 2003	STATE	DIST.	COUNTY	
NOV 2007		SAT	BEXAR	
SEPT 2008				
MARCH 2010	CONT.	SECT.	JOB	HIGHWAY NO.
MAY 2010				FM 2538
MAY 2018				

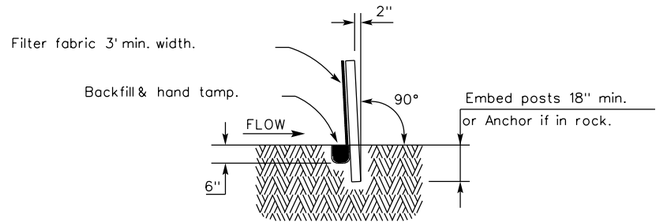
DATE
FILE



TEMPORARY SEDIMENT CONTROL FENCE

SCF





SECTION A-A

HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

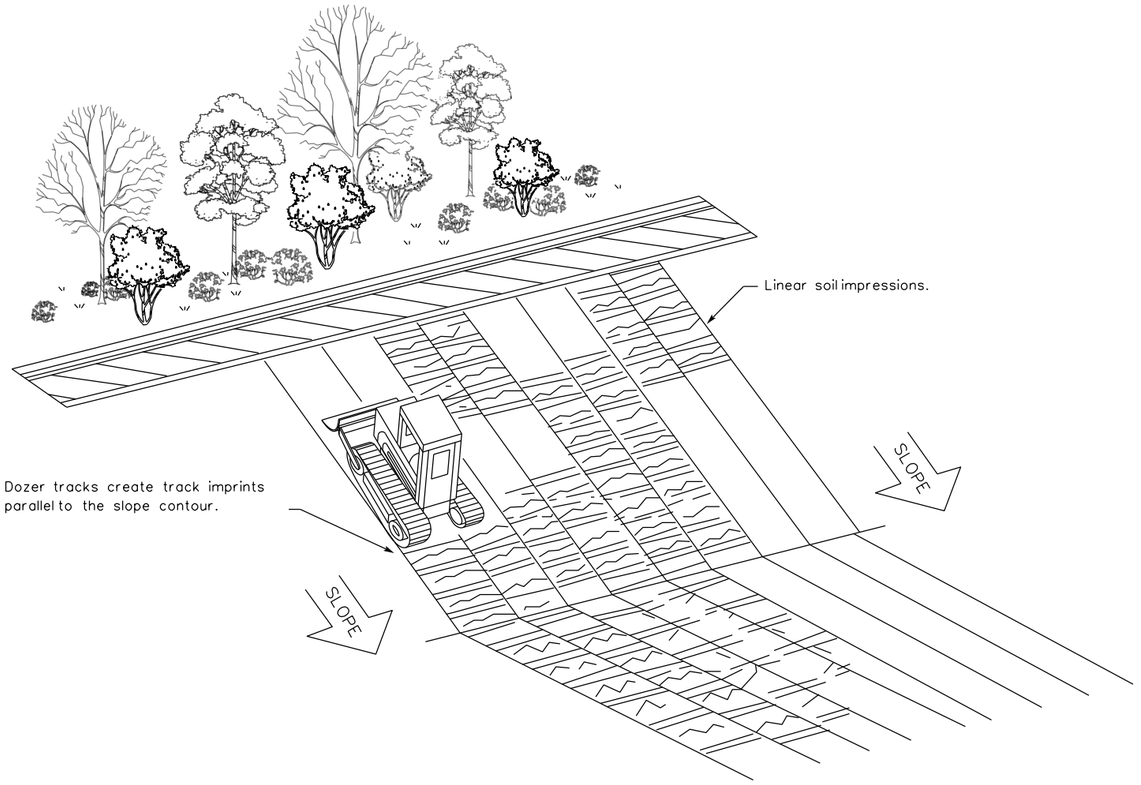
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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



VERTICAL TRACKING

Texas Department of Transportation

Design Division Standard

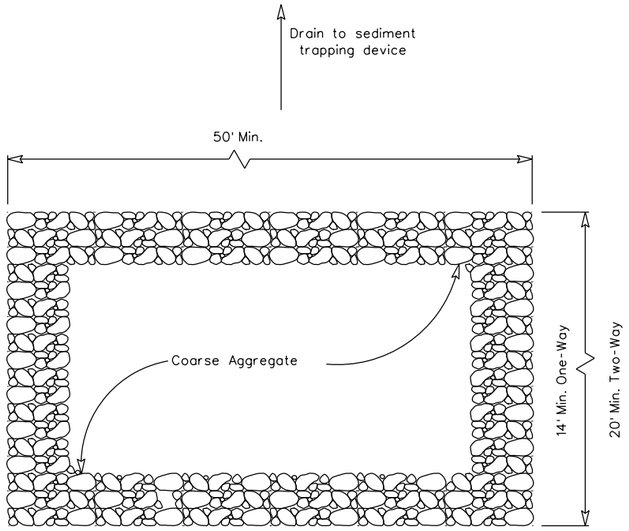
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

FENCE & VERTICAL TRACKING

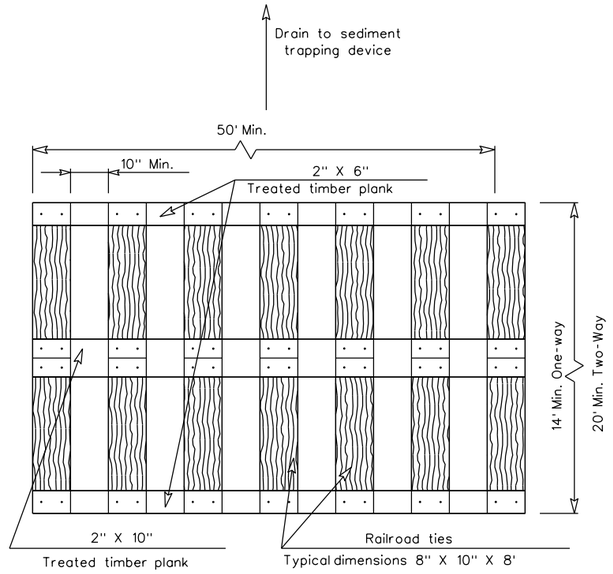
EC(1)-16

FILE: ec116	DN: TXDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY
REVISIONS	-	-	-	FM 2538
	DIST	COUNTY		SHEET NO.
	SAT	BEXAR		54A

DATE:
FILE:



PLAN VIEW



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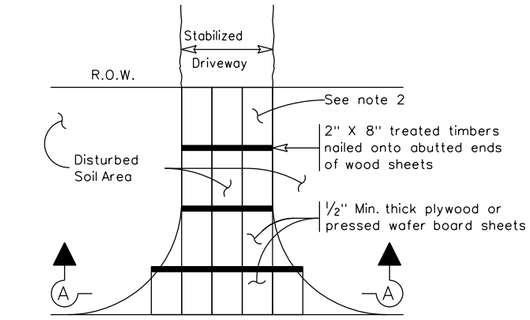
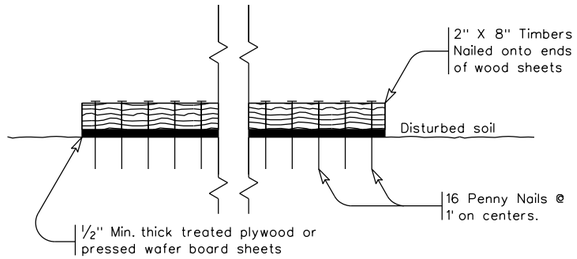


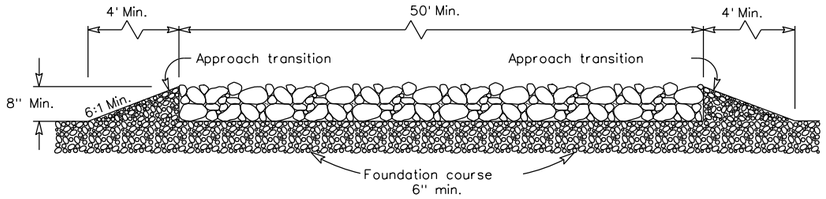
PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)

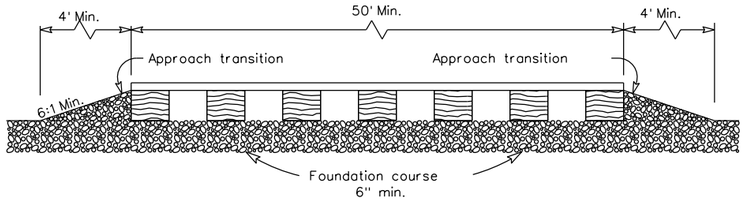
SHORT TERM



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 1)

ROCK CONSTRUCTION (LONG TERM)



ELEVATION VIEW

CONSTRUCTION EXIT (TYPE 2)

TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

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

GENERAL NOTES (TYPE 2)

1. The length of the type 2 construction exit shall be as indicated on the plans, but not less than 50'.
2. The treated timber planks shall be attached to the railroad ties with ½"x 6" min. lag bolts. Other fasteners may be used as approved by the Engineer.
3. The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
4. The approach transitions shall be no steeper than 6:1 and constructed as directed by the Engineer.
5. The construction exit foundation course shall be flexible base, bituminous concrete, portland cement concrete or other material as approved by the Engineer.
6. The construction exit should be graded to allow drainage to a sediment trapping device.
7. The guidelines shown hereon are suggestions only and may be modified by the Engineer.
8. Construct exits with a width of at least 14 ft. for one-way and 20 ft. for two-way traffic for the full width of the exit, or as directed by the engineer.

GENERAL NOTES (TYPE 3)

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

Texas Department of Transportation

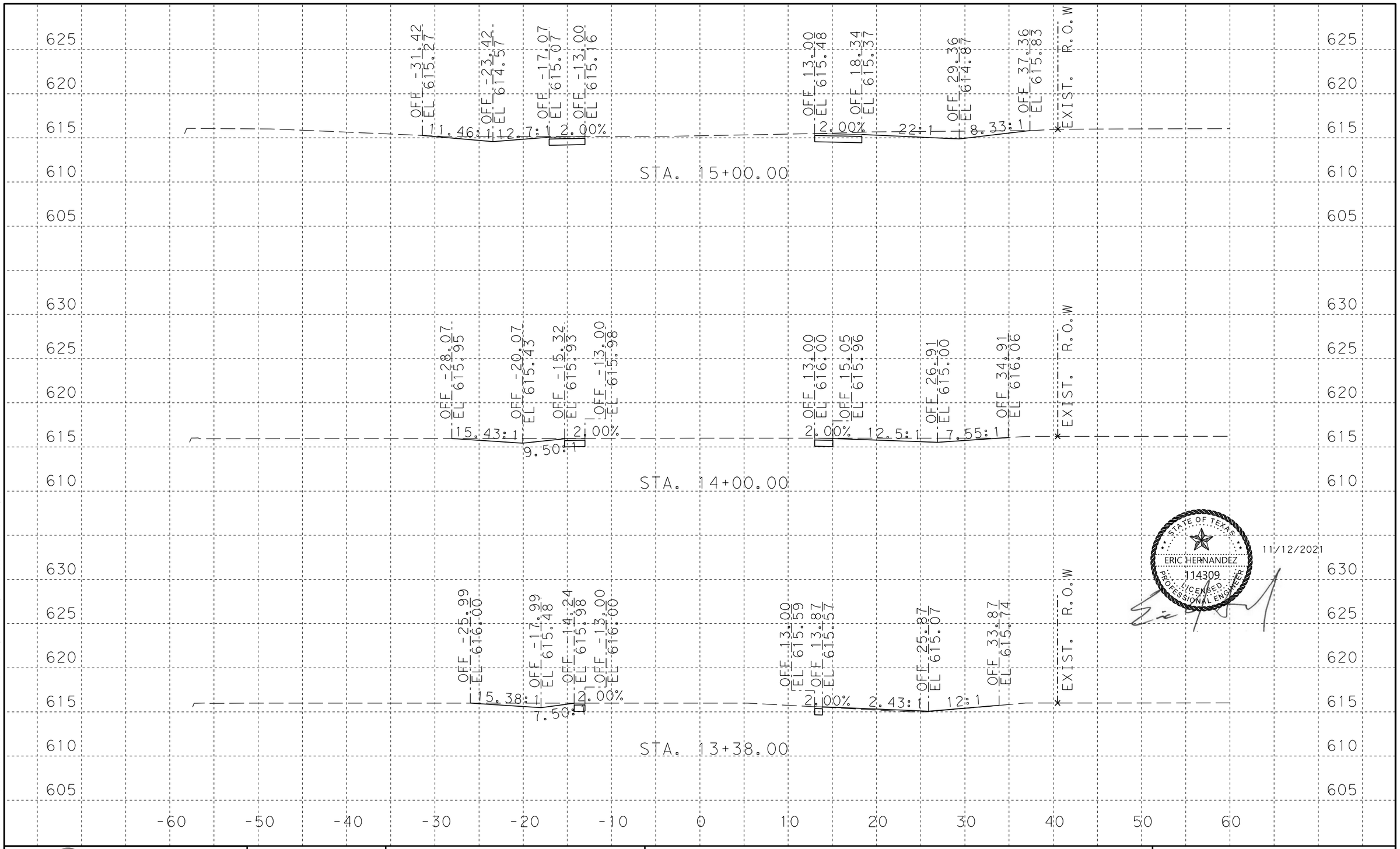
Design Division Standard

TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES

CONSTRUCTION EXITS

EC(3)-16

FILE: ec316	DN: TxDOT	CK: TXDOT	DW: TXDOT	CK: TXDOT	
©TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS	-	-	-	FM 2538	
	DIST	COUNTY		SHEET NO.	
	SAT	BEXAR		54B	



11/12/2021

11/12/2021 Private Development Projects\Mosaic LD\FM 2538 Turn Lane Design\4 - Design\OpenRoads\XSECT SHTS.dgn

LEGACY
ENGINEERING GROUP
Legacy Engineering Group, PLLC
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210.660.1960/TBPE Firm Registration No. 20623

FM 2538
CROSS SECTIONS

DESIGN CROSS SECTIONS

SCALE: 1" = 10'

DN:		FED. RD. DIV. NO.	STATE	PROJECT NO.				SHEET NO.
CK DN:		-	TEXAS					
DW:		DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.	
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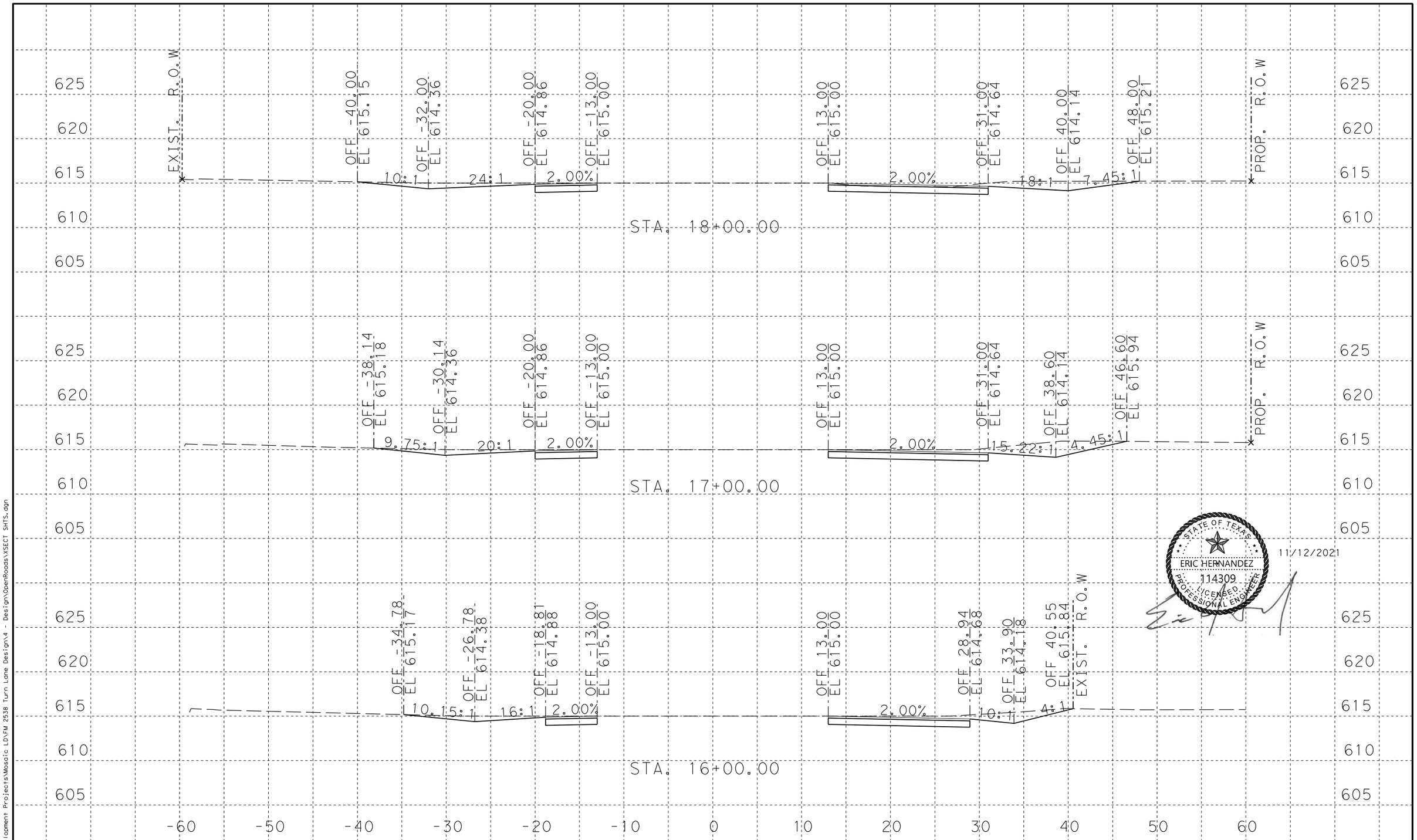

STATE OF TEXAS
ERIC HERNANDEZ
114309
LICENSED PROFESSIONAL ENGINEER
11/12/2021

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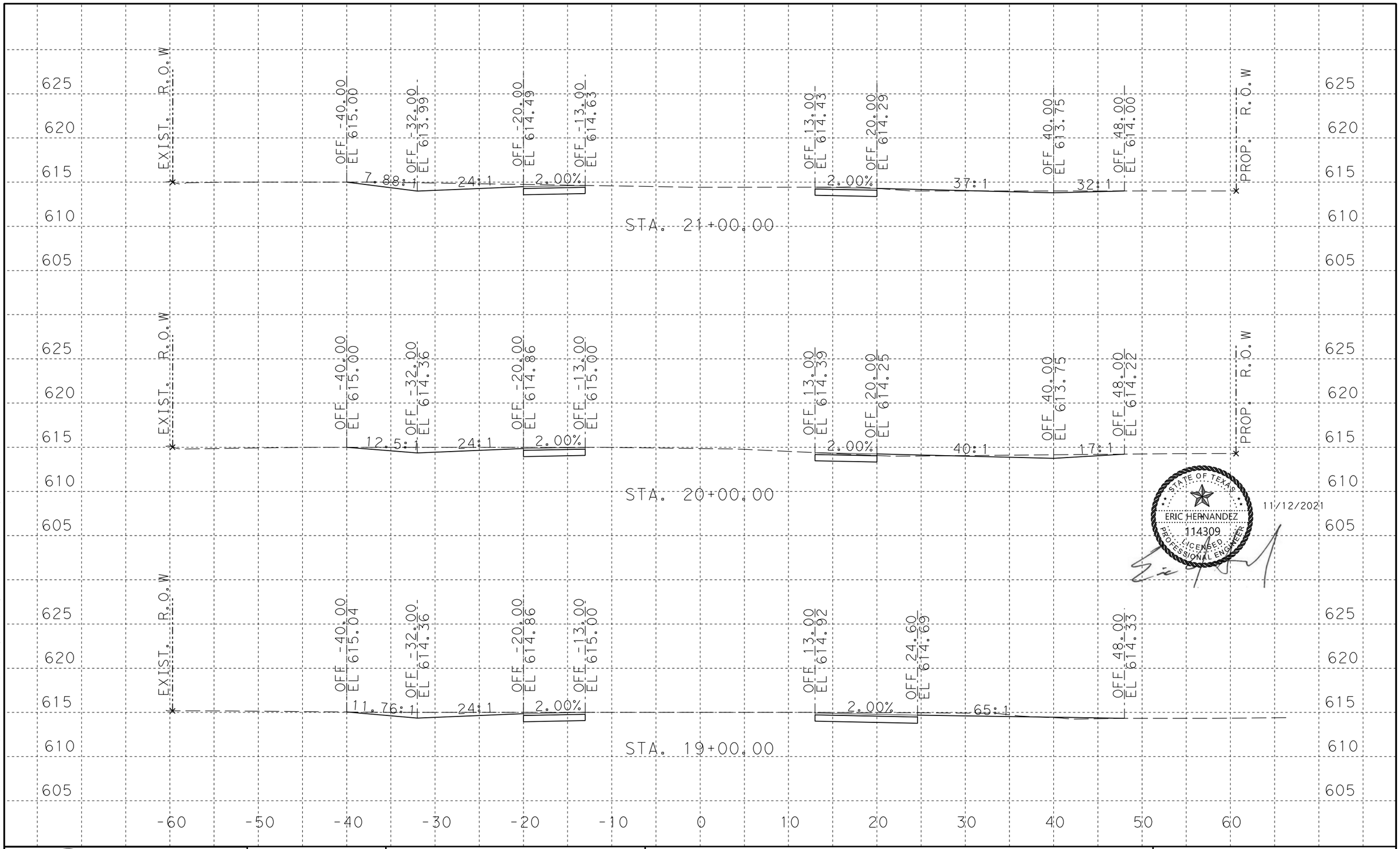

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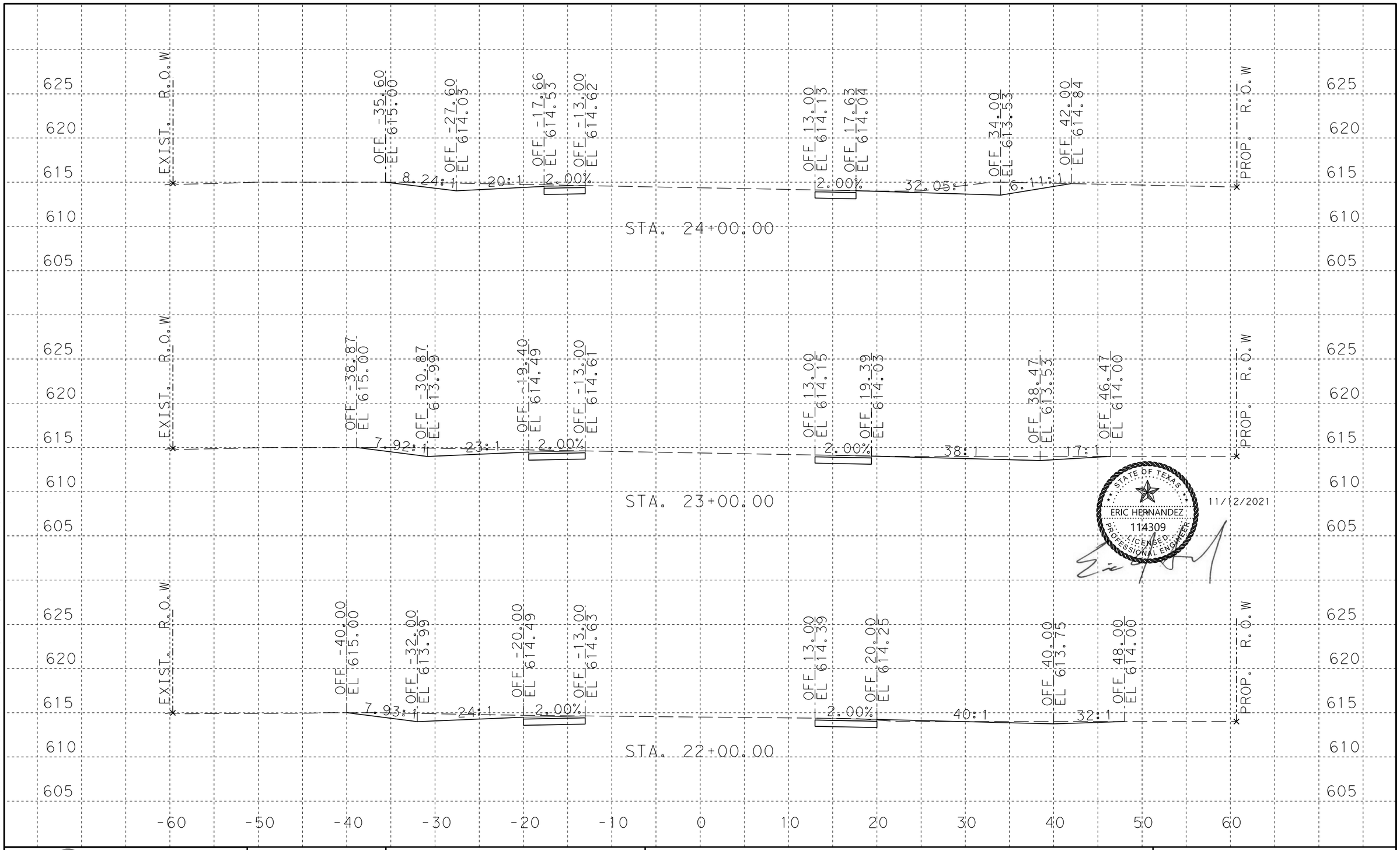

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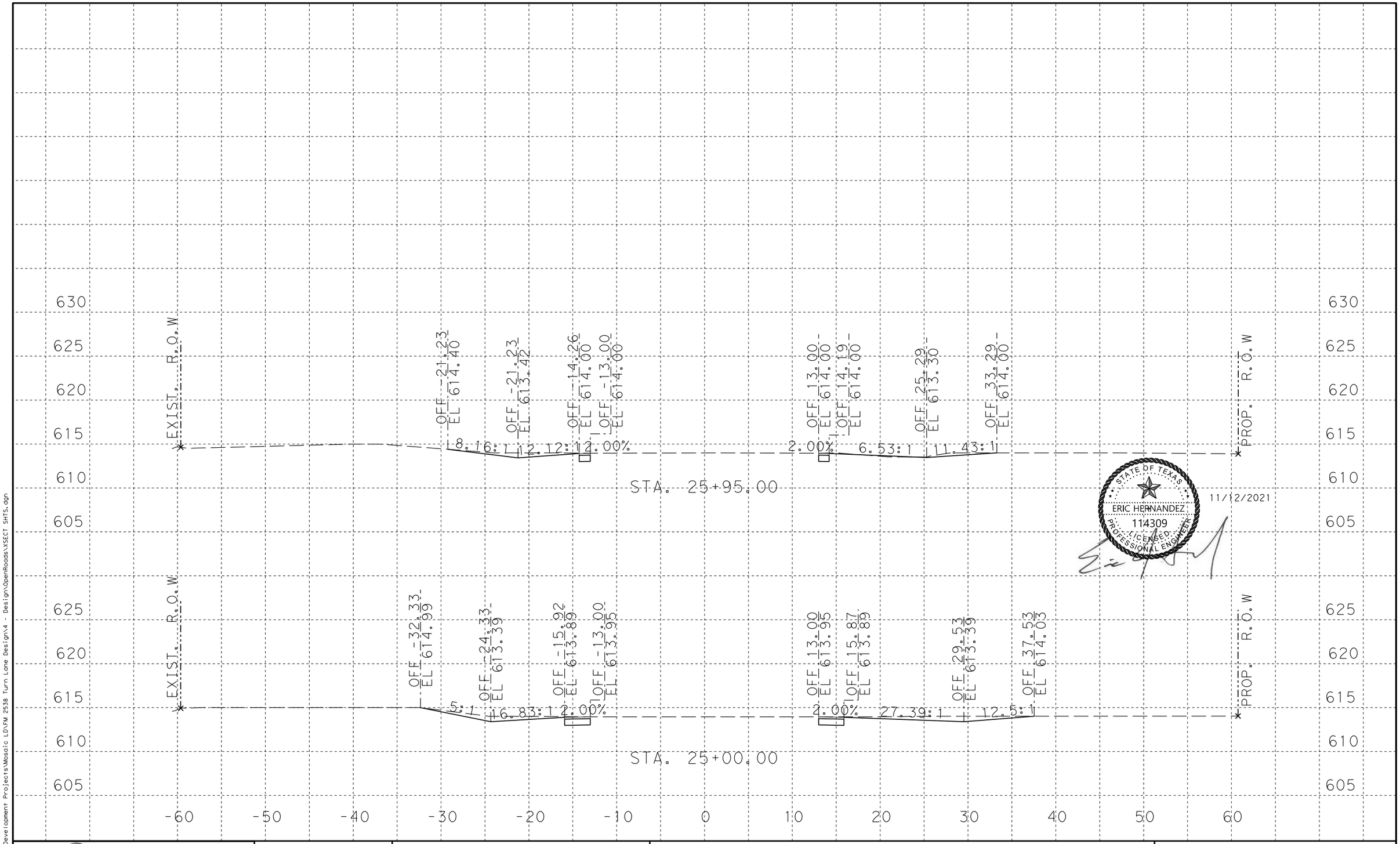

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-	TEXAS		

DIST.	COUNTY	CONTROL NO.	SECTION NO.	JOB NO.	HIGHWAY NO.
SAT	BEXAR				FM 2538