

CIVIL CONSTRUCTION PLANS

FOR

UHL ROAD

PAVING IMPROVEMENTS

UHL ROAD AND FM 664

CITY OF RED OAK, ELLIS COUNTY, TEXAS

CITY OF GLEN HEIGHTS, ELLIS COUNTY, TEXAS

SUBMITTAL LOG

DATE	DESCRIPTION
APRIL 2024	CITY REVIEW SUBMITTAL
JUNE 2024	CITY REVIEW SUBMITTAL
OCTOBER 2024	CITY REVIEW SUBMITTAL
APRIL 2025	BID DOCUMENTS



VICINITY MAP

N.T.S.

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CITY COUNCIL

MARK L. STANFILL, DVM, MAYOR
 WILLIAM L. DRAKE, MAYOR PRO TEM
 WILLIE G. FRANKLIN, JR.
 BEN GOODWYN
 TIM LIGHTFOOT
 JEFFREY SMITH

CITY MANAGER

TODD FULLER

DEPUTY CITY MANAGER

JONATHAN PHILLIPS

PUBLIC WORKS DIRECTOR

JARED BINFORD

ENGINEER



1719 ANGEL PKWY, SUITE 400-206
 ALLEN, TX 75002
 TBPE FIRM REG. #19101
 (214) 846-9397
 CONTACT: MICHAEL WESTFALL, P.E.

CITY COUNCIL

SONJA BROWN, MAYOR
 HARRY GARRETT, MAYOR PRO TEM
 SHERRON MOSLEY
 TRAVIS BURTON
 STEPHANNE HALE
 LAYMON LIGHTFOOT
 CORNEL BENFORD

CITY MANAGER

CLIFF BLACKWELL, CGFO, MPA

PUBLIC WORKS DIRECTOR

ANDREW WAITS



APRIL 2025

PAVING NOTES

1. CONCRETE FOR ALL STREETS SHALL BE IN ACCORDANCE WITH NCTCOG CLASS "A" CONCRETE (3,000 P.S.I. COMPRESSIVE STRENGTH @ 28 DAYS). CONCRETE FOR ALL ALLEYS SHALL BE IN ACCORDANCE WITH NCTCOG CLASS "C" CONCRETE (3,600 COMPRESSIVE STRENGTH @ 28 DAYS).
2. REINFORCING STEEL SHALL BE DEFORMED BARS NO. 3 ON 18 INCH CENTERS OR NO. 4 BARS ON 24 INCH CENTERS. REINFORCING SHALL BE IN BOTH DIRECTIONS ON CENTER. REINFORCING STEEL SHALL BE IN ACCORDANCE WITH ASTM 615, 616 AND 617.
3. ALL REINFORCING STEEL SHALL BE TIED (100%). REINFORCING STEEL SHALL BE SET ON PLASTIC CHAIRS. BAR LAPS BE MINIMUM 30 DIAMETERS.
4. EXPANSION JOINTS SHALL BE SPACED EVERY 200 FEET AND AT ALL INTERSECTIONS. ALLEYS SHALL HAVE A MINIMUM OF TWO EXPANSION JOINTS.
5. SAWED TRANSVERSE DUMMY JOINTS SHALL BE SPACED EVERY 20 FEET ON PAVING 8 INCHES OR THICKER AND EVERY 15 FEET FOR PAVING THICKNESS LESS THAN 8 INCHES. SAWING SHALL OCCUR WITHIN 5 TO 12 HOURS AFTER THE POUR INCLUDING SEALING. OTHERWISE THE SECTION SHALL BE REMOVED AND LONGITUDINAL BUTT JOINT CONSTRUCTED.
6. SUBGRADE UNDER PAVEMENTS SHALL BE A MINIMUM OF 6 INCHES OF LIME TREATED SUBGRADE. ONLY HYDRATED LIME SHALL BE UTILIZED. OPTIMUM LIME SHALL BE APPLIED. OPTIMUM LIME CONTENT SHALL BE DETERMINED DURING THE EXCAVATION BY THE USE OF A LIME SERIES TEST. LIME SERIES TEST SHALL BE TAKEN ALONG THE EXCAVATION AT ALL CHANGES IN SOIL AND A MINIMUM OF 300 FEET. LIME SERIES SHALL BE COMPLETED BY AN INDEPENDENT LABORATORY APPROVED BY THE CITY.
7. LIME TREATED SUBGRADE SHALL BE COMPACTED TO A DENSITY OF NOT LESS THAN 95 PERCENT OF THE MAXIMUM DENSITY AS DETERMINED BY ASTM D 698. MOISTURE CONTENT SHALL BE WITHIN -2 TO +4 OF OPTIMUM. DENSITY TEST RESULTS SHALL BE COMPLETED BY AN INDEPENDENT LABORATORY APPROVED BY THE CITY. ALL RESULTS SHALL BE PROVIDED TO THE CITY.
8. LIME TRIMMINGS ARE NOT ACCEPTABLE FOR ANY USE.
9. ALL FILL SHALL BE COMPACTED BY MECHANICAL METHODS. MAXIMUM LOOSE LIFT FOR COMPACTION SHALL BE 8 INCHES. ALL LIFTS SHALL BE TESTED FOR DENSITY BY AN INDEPENDENT LABORATORY APPROVED BY THE CITY. DENSITY REQUIREMENT SHALL BE AS SHOWN ON THE PLANS FOR THE TYPE OF MATERIAL CALLED FOR IN THE PLANS.
10. ALL DISTURBED AREAS OF ROADWAY WORK SHALL HAVE GRASS ESTABLISHED IMMEDIATELY. GRASS SHALL MEET THE REQUIREMENTS OF ITEM 3.8, 3.9, 3.10 & 3.11 OF NCTCOG.
11. ALL AREAS TO BE EXCAVATED OR FILLED SHALL HAVE EROSION CONTROL PLACED PRIOR TO COMMENCING EARTHWORK. EROSION CONTROL DEVICES SHALL BE MAINTAINED THROUGHOUT THE PROJECT IN ACCORDANCE WITH NCTCOG ITEM 3.12.
12. ALL SIDEWALKS SHALL INCLUDE BARRIER FREE RAMPS AT INTERSECTING STREETS, ALLEYS, DRIVEWAYS, ETC. BARRIER FREE RAMPS SHALL MEET CURRENT ADA REQUIREMENTS AND BE APPROVED BY THE TEXAS LICENSING BOARD.
13. SIDEWALKS SHALL BE DOWELED INTO PAVEMENT WHERE IT ABUTS DRIVEWAYS. EXPANSION JOINT MATERIAL SHALL BE USED AT THESE LOCATIONS.
14. NO VEHICLES SHALL BE PERMITTED ON CONCRETE PAVEMENT WITHOUT APPROVAL FROM THE CITY. THE CITY WILL MAKE DETERMINATION BASED ON CONCRETE BREAK REPORT.

LINED CHANNELS

1. CONSTRUCTION JOINT SHOWN IN DETAILS FOR CONVENIENCE ONLY, MONOLITHIC CONSTRUCTION MAY BE USED.
2. ALL VISIBLE SURFACES SHALL BE A TROWEL FINISH.
3. ALL REINFORCING STEEL SHALL BE 3/8" DIAMETER AND SPACED 12" CENTER TO CENTER BOTH WAYS UNLESS OTHERWISE SPECIFIED.
4. IF WOOD FORMS ARE USED WITH CONSTRUCTION JOINT, THEY SHALL BE TWO, 2'x4", AND SHALL NOT BE REMOVED UNTIL CONCRETE ON SLOPES IS READY TO BE PLACED.
5. ALL CONCRETE IN LINED CHANNEL SHALL BE NCTCOG CLASS "A" (MINIMUM 3,000 P.S.I.) CONCRETE.
6. FLAT BOTTOM TO BE CONSTRUCTED WHEN CHANNEL WIDTH IS LESS THAN 12 FOOT.
7. 1/2" CHAMFER ON ALL CONCRETE CORNERS.

PAVING NOTES - TXDOT R.O.W.

1. REINFORCED STEEL SHALL BE DEFORMED BARS NO. 3 ON 12" CENTERS OR NO 4 BARS ON 18" CENTERS. REINFORCED SHALL BE IN BOTH DIRECTIONS ON CENTER. REINFORCING STEEL SHALL BE IN ACCORDANCE WITH ASTM 615, 616, AND 617.
2. LIME TREATED SUBGRADE SHALL BE COMPACTED TO DENSITY OF NOT LESS THAN 98% OF MAXIMUM DENSITY AS DETERMINED BY ASTM D 698. MOISTURE CONTENT SHALL BE WITHIN -2 TO +4 OPTIMUM. DENSITY TEST RESULTS SHALL BE COMPLETED BY AN INDEPENDENT LABORATORY APPROVED BY TXDOT ALL RESULTS SHALL BE PROVIDED TO TXDOT.
3. ALL DISTURBED AREAS IN TXDOT R.O.W. SHALL HAVE VEGETATION RESTORED TO 75%.

STORM SEWER

1. THE FLOOR OF THE EXCAVATION FOR INLET BOX MUST PROVIDE A FIRM, LEVEL BED FOR THE BASE SECTION TO REST UPON.
2. A MINIMUM OF 6 INCHES OF 1" DIAMETER (MAXIMUM) ROCK OR GRAVEL SHALL BE USED TO PREPARE THE BEDDING TO FINAL GRADE OR IN LIEU OF THIS, AT LEAST 6 INCHES OF 2-SACK CEMENT STABILIZED SAND SHALL BE USED TO PREPARE THE BEDDING TO GRADE. CEMENT STABILIZED SAND SHALL BE ALLOWED TO SET BY KEEPING HOLE PUMPED DRY.
3. AFTER PIPE HAS BEEN LAID ON PROPER BEDDING, BACKFILLING TO COMMENCE WITH 8" MAXIMUM LOOSE LIFT MECHANICALLY COMPACTED TO 95% STANDARD PROCTOR UNDER ROADWAY OR 12" MAXIMUM LOOSE LIFT BEHIND CURB. MAXIMUM SIZE ROCK IN BACKFILL SHALL NOT EXCEED 4 INCHES IN DIAMETER.
4. PRECAST INLETS MUST BE APPROVED BY THE CITY.
5. CONCRETE TO BE MINIMUM 4,200 P.S.I.
6. LOCKING DEVICE IS REQUIRED ON ALL STORM SEWER LIDS.
7. "NO DUMPING" WARNING PLAQUE TO BE INSTALLED ON ALL STANDARD AND RECESSED INLETS.
8. CONCRETE CAST-IN-PLACE INLETS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4,200 P.S.I. @ 28 DAYS.
9. STORM DRAIN TILE SHALL BE PLACED IN THE CENTER OF THE INLET, 2 INCHES FROM THE EDGE OF OPENING AS SHOWN IN THE DRAWING. USE PL-200 CONSTRUCTION ADHESIVE FOR APPLICATION.
10. EXISTING STORM SEWER PIPE AND/OR LATERALS SHALL BE LOCATED PRIOR TO SETTING OF CONSTRUCTING INLET BOXES. IF ADJUSTMENT IN GRADE OF LATERAL IS REQUIRED, A REVISED DESIGN BY THE ENGINEER OF RECORD SHALL BE SUBMITTED TO THE CITY FOR APPROVAL.
11. REINFORCED CONCRETE PIPE CLASS III MINIMUM OR HIGH DENSITY POLYETHYLENE STORM SEWER PIPE IS APPROVED WITHIN THE CITY.

SANITARY SEWER

1. ALL SEWER LINES CROSSING POTABLE WATERLINES SHALL BE AS SHOWN IN THE PLANS AND MEET TCEQ REQUIREMENTS.
2. PIPES 6 INCHES THROUGH 15 INCHES SHALL BE IN ACCORDANCE WITH ASTM D3034 WITH A MINIMUM SDR OF 35 OR ASTM D3350 AND DE 345434 C.
3. PIPES LARGER THAN 12 INCHES THROUGH 48 INCHES SHALL BE IN ACCORDANCE WITH ASTM STANDARDS F679, F794, F949 AND D3350/ DE 345434 C.
4. MANHOLES SHALL BE CAST IN PLACE OR PRECAST. ALL MANHOLES SHALL BE WATER TIGHT. ALL RING AND COVERS SHALL INCLUDE AN INTERNAL CHIMNEY SEAL.
5. ALL PIPE OPENINGS IN MANHOLES SHALL INCLUDE COUPLINGS WITH "O" RING RUBBER GASKETS.
6. STUBOUTS OUT OF MANHOLES SHALL BE FITTED WITH A STOPPER AND CAP. STUBOUTS SHALL BE A MINIMUM OF 5 FEET FROM MANHOLE AND BE SUPPORTED BY A CONCRETE CRADLE.
7. ALL DROP MANHOLES SHALL BE OF THE INTERNAL TYPE.
8. MANHOLES SHALL HAVE A "NO-FLOW" COVER INSTALLED.
9. ALL SANITARY SEWER PIPE SHALL BE TESTED (NCTCOG ITEM 6.7.2) AFTER CONSTRUCTION. TESTING SHALL INCLUDE PRESSURE TESTING, MANDREL TEST (TCEQ REQUIRED) AND COLOR CCTV INSPECTION. COLOR CCTV INSPECTION SHALL BE COMPLETED IN PRESENCE OF CITY REPRESENTATIVE AND A DIGITAL COPY ON A FLASH DRIVE OR DVD SHALL BE GIVEN TO THE CITY AT THE COMPLETION OF THE INSPECTION.
10. MANHOLES SHALL BE VACUUM TESTED IN THE PRESENCE OF THE CITY REPRESENTATIVE.

DETAILS

SPECIAL DETAILS OR MODIFICATIONS TO THESE STANDARD DETAILS TO BE UTILIZED ON ANY GIVEN PROJECT SHALL BE SUBMITTED TO THE CITY FOR APPROVAL FOR USE.

WATER

1. ALL WATER LINE CROSSINGS OF SANITARY SEWER LINES SHALL BE AS SHOWN IN THE PLANS AND MEET TCEQ REQUIREMENTS.
2. PIPES 12 INCHES IN DIAMETER AND SMALLER SHALL BE POLYVINYL CHLORIDE (P.V.C.) MEETING THE REQUIREMENTS OF AWWA C900 DR 18 OR DUCTILE IRON PIPE (D.I.P.) MEETING THE REQUIREMENTS OF AWWA C 151 CLASS 50 PIPE. ALL D.I.P. SHALL BE WRAPPED WITH A POLYETHYLENE LINER.
3. FOR PIPES LARGER THAN 12 INCHES IN DIAMETER, THE PIPE SHALL BE REINFORCED CONCRETE CYLINDER PIPE (AWWA C301 OR AWWA C303), DUCTILE IRON PIPE (AWWA C 151 CLASS 50) OR POLYVINYL CHLORIDE PIPE UP TO 18 INCHES MEETING THE REQUIREMENTS OF AWWA C905 - 235 P.S.I. RATED PIPE.
4. ALL VALVES ON PIPES 12 INCHES AND SMALLER SHALL BE RESILIENT SEALED WEDGE VALVES (AWWA C509).
5. ALL VALVES ON PIPES LARGER THAN 12 INCHES BUT SMALLER THAN 30 INCHES SHALL BE BUTTERFLY VALVES (AWWA C504) OR WEDGE VALVES (AWWA C509).
6. ALL VALVES ON PIPES 30 INCHES AND LARGER SHALL BE BUTTERFLY VALVES (AWWA C504).
7. EMBEDMENT SHALL BE AS SHOWN IN THE PLANS. BACKFILL WITHIN THE LIMITS OF EXISTING AND PROPOSED PAVEMENT SHALL BE COMPACTED TO 95% STANDARD PROCTOR OUTSIDE PAVEMENT (EXISTING OR PROPOSED) SHALL BE COMPACTED TO MINIMUM OF 85% STANDARD PROCTOR. ALL COMPACTION SHALL BE BY MECHANICAL METHODS.
8. WATER LINES SHALL BE PRESSURE TESTED IN ACCORDANCE WITH NCTCOG ITEM 6.7.3.
9. ALL HORIZONTAL AND VERTICAL BENDS SHALL BE BLOCKED.

SCREENING WALLS

1. CONCRETE - MINIMUM COMPRESSIVE STRENGTH OF 3,000 P.S.I. @ 28 DAYS.
2. REINFORCEMENT - ASTM A-36.
3. MASONRY - COMPRESSIVE STRENGTH SHALL BE PRESCRIBED IN ITEM 2.3.6 SPECIAL PROVISIONS.
4. WIND LOAD FOR DESIGN - 20 P.S.F.
5. PIER BEARING STRESSES - SEE BRICK SCREENING WALL NOTES.
6. MORTAR - TYPE "S".
7. PROVIDE CONTROL JOINTS AT 50 FEET.
8. PROVIDE EXPANSION JOINTS AT 200 FEET CENTER MAXIMUM.
9. PROVIDE PIER WITH MINIMUM 9 FOOT W/ 24 INCH DIAMETER BELL IN CLAY OR OTHER MATERIAL EXCEPT BLUE SHALE, 6 FOOT MINIMUM WITH 3 FOOT MINIMUM INTO BLUE SHALE.
10. ALL EXPOSED CONCRETE SHALL BE CLASS 2 RUBBED FINISHED SURFACE.
11. SIDEWALKS ADJACENT TO WALLS MUST BE 5 FOOT MINIMUM WIDTH FROM ALL PORTIONS OF THE WALL (INCLUDING PILASTERS, COLUMNS, ETC.).
12. MAXIMUM PILASTER SPACING 40 FEET.
13. WALLS SHALL NOT BE PLACED IN THE VISIBILITY EASEMENT OR STREET RIGHT OF WAY.
14. THE WALL SHALL BE A MINIMUM OF EIGHT FEET IN HEIGHT AS MEASURED FROM THE NEAREST ALLEY EDGE OR SIDEWALK GRADE, WHICHEVER IS THE HIGHER. THE COLOR OF THE WALL SHALL BE LIMITED TO EARTH-TONE COLORS, EXCLUDING GRAY, GREEN AND WHITE. THE COLOR OF THE WALL SHALL BE UNIFORM ON EACH SIDE OF A THOROUGHFARE FOR THE ENTIRE LENGTH BETWEEN INTERSECTING THOROUGHFARES, UNLESS OTHERWISE APPROVED BY THE CITY'S PUBLIC WORKS DEPARTMENT. THE FINISH OF THE WALL SHALL BE CONSISTENT ON ALL SURFACES.
15. IF WROUGHT IRON FENCING IS TO BE UTILIZED ON REQUIRED SCREENING, ALL WROUGHT IRON MUST BE SOLID STOCK, NO TUBULAR STEEL WILL BE ALLOWED.

CITY OF RED OAK, TEXAS	
STANDARD CONSTRUCTION DETAILS	
GENERAL NOTES	
DATE:	2023
	SHEET STD-00

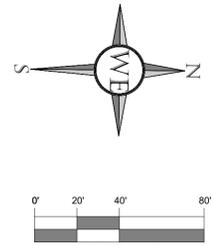


No.	DATE	
	DATE	
	DATE	04/01/2025
	PROJECT NO.	2301020
	SHEET NO.	C1.02

SF-00.DWG 11/17/99 EWH

POINT TABLE ABBREVIATIONS	
PI	POINT OF INTERSECTION
PC	POINT OF CURVE
PT	POINT OF TANGENCY
ME	MATCH EXISTING

POINT TABLE					
POINT NO.	DESCRIPTION	ALIGNMENT	STATION	OFFSET	ELEVATION
5	PT	UHL ROAD	9+48.44	31.34' L	644.04
6	PT	UHL ROAD	9+48.59	31.34' R	644.04
7	ME	UHL ROAD	10+32.44	60.52' R	646.76
8	ME	UHL ROAD	10+60.50	60.51' R	646.65
9	PC	UHL ROAD	12+34.49	24.66' L	649.14
10	PC	UHL ROAD	12+34.64	24.66' R	649.14
11	PT	UHL ROAD	12+48.48	24.50' L	649.32
12	PT	UHL ROAD	12+48.64	24.50' R	649.33
13	ME	UHL ROAD	13+41.63	54.54' L	651.30
14	ME	UHL ROAD	13+61.48	54.49' L	651.75
15	ME	UHL ROAD	13+81.48	54.45' L	651.70
16	ME	UHL ROAD	14+01.44	54.40' L	651.67



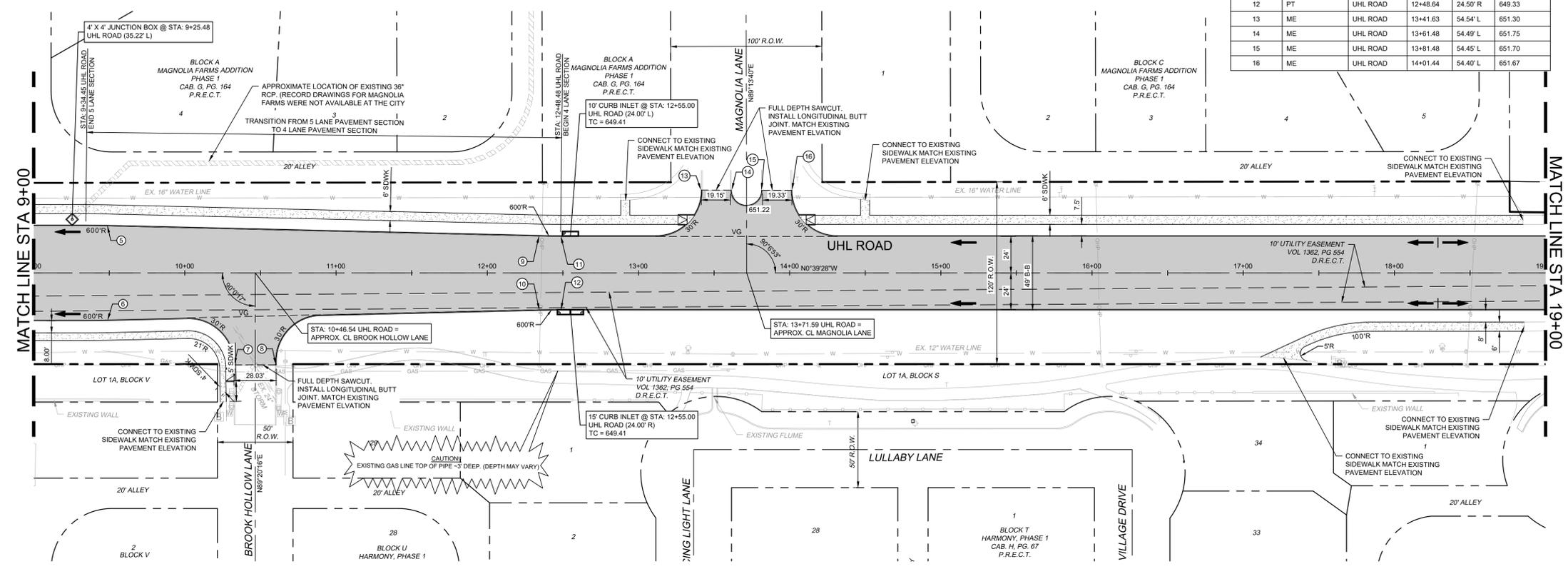
LEGEND

- PROPERTY / R.O.W. LINE
- EASEMENT
- EXISTING WATER LINE
- EXISTING ASPHALT PAVEMENT
- EXISTING STORM LINE
- EXISTING FIBER OPTIC LINE
- EXISTING UNDER GROUND TELECOMMUNICATION
- EXISTING GAS LINE
- PROPOSED 8" THICK 4,000 PSI CONCRETE PAVEMENT (REFER TO PAVEMENT SECTION ON SHEET C5.00)
- PROPOSED 4" THICK 3,000 PSI CONCRETE SIDEWALK (REFER CITY OF RED OAK STD-08)
- TxDOT TYPE 10 BARRIER FREE RAMP (BFR) (PED-18)
- PROPOSED SIDEWALK
- FINISH GRADE
- VALLEY GUTTER

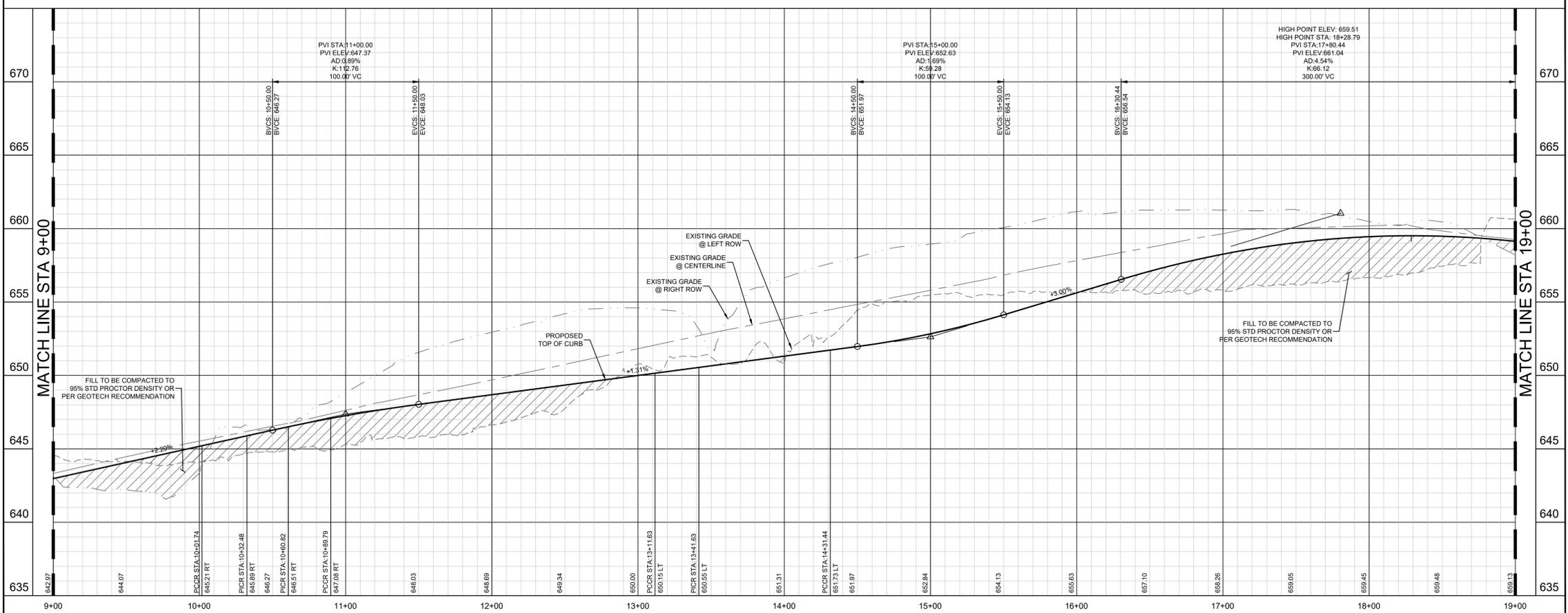
WESTFALL ENGINEERING
 1719 ANGEL PARKWAY
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 PHONE NO. (214) 846-9397
 TPBE FIRM REG. #19101



UHL ROAD PAVING IMPROVEMENTS
 UHL ROAD AND FM 664
 CITY OF RED OAK, TEXAS
 CITY OF GLEN HEIGHTS, TEXAS



UHL ROAD



PAVING NOTES

- ALL SPECIFICATIONS REGARDING PAVEMENT SECTION AND SUBGRADE PREPARATION ARE BASED ON CITY OF RED OAK MINIMUM REQUIREMENTS.

BENCHMARK

- CONTROL POINT NO. 11
 "X" CUT IN CONCRETE AT SOUTHEAST CORNER OF STORM SEWER MANHOLE LOCATED ±185 FEET NORTH OF HARMONY WAY ON THE EAST SIDE OF UHL ROAD.
 N: 6,582,905.80
 E: 2,480,031.77
 EL: 651.657
- CONTROL POINT NO. 12
 "X" CUT IN CONCRETE AT NORTHWEST CORNER OF CURB INLET LOCATED ±185 FEET NORTH OF HARMONY WAY ON THE WEST SIDE OF UHL ROAD.
 N: 6,582,930.04
 E: 2,480,084.41
 EL: 651.597



Know what's below.
 Call before you dig.

CAUTION!
 THE CONTRACTOR SHALL FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO START OF CONSTRUCTION AND SHALL NOTIFY THE CONSTRUCTION MANAGER AND ENGINEER OF ANY CONFLICTS DISCOVERED. CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING UTILITIES (SHOWN OR NOT SHOWN) WITHIN SCOPE OF CONSTRUCTION. IF ANY EXISTING UTILITIES ARE DAMAGED, THE CONTRACTOR SHALL REPLACE THEM AT HIS OWN EXPENSE. CALL 811 AT LEAST 72 HOURS PRIOR TO COMMENCING CONSTRUCTION IN VICINITY.

UHL ROAD PAVING PLAN & PROFILE

No.	DATE	REVISIONS

DATE: 04/01/2025
 PROJECT NO: 2301020
 SHEET NO: C5.02



No.	DATE

DATE
04/01/2025

PROJECT NO.
2301020

SHEET NO.
C7.00

LINE A																											
Pipe										Hydraulic Calculations																	
Station Down	Station Up	Length	Invert Down	Invert Up	Slope	Manning's 'n'	Str. Up	No. Barrels	Pipe Dia.	Box Size	100 Year Q _{max}	Total Flow	Pipe Flow	Pipe Capacity	S _s	Friction Loss	V ₁ Down	V ₂ Up	V ₁ ²	V ₂ ²	K _t	Str. Loss	HGL Down	HGL Up	HGL Str.	Surf. Bev.	Flow Regime
0+00.00	0+19.61	18.61	616.06	616.31	1.34%	0.013	WYE	1	5	3	5.50	101.60	101.60	190.12	0.004	0.07	6.8	6.4	0.7	0.6	1.00	0.10	619.06	--	--	--	Partial Flow
0+19.61	+23.92	105.31	616.31	617.72	1.34%	0.013	WYE	1	5	3	10.20	96.10	96.10	190.12	0.003	0.36	8.4	5.7	0.6	0.5	1.00	0.13	--	--	--	Partial Flow	
+23.92	+43.69	19.77	617.72	617.98	1.34%	0.013	None	1	5	3	0.00	85.90	85.90	190.12	0.003	0.05	5.7	5.7	0.5	0.5	0.00	0.00	--	--	--	Partial Flow	
+43.69	+51.69	8.00	617.98	618.08	1.30%	0.013	WYE	1	5	3	44.50	85.90	85.90	187.26	0.003	0.02	5.7	2.8	0.5	0.1	1.00	0.39	--	--	--	Partial Flow	
+51.69	+56.59	4.90	618.08	618.15	1.30%	0.013	FSC	1	5	3	0.00	41.40	41.40	187.26	0.001	0.00	2.8	8.4	0.1	1.1	0.00	0.12	--	--	--	Partial Flow	
+56.59	+59.69	3.10	618.15	618.69	1.30%	0.013	45Bend	1	30		0.00	41.40	41.40	46.77	0.010	0.03	8.4	8.4	1.1	1.1	0.35	0.39	--	--	--	Partial Flow	
+59.69	+78.20	18.51	618.69	618.93	1.30%	0.013	45Bend	1	30		0.00	41.40	41.40	46.77	0.010	0.19	8.4	8.4	1.1	1.1	0.35	0.39	--	--	--	Partial Flow	
+78.20	+87.95	9.75	618.93	619.08	1.50%	0.013	WYE	1	30		5.90	41.40	41.40	50.24	0.010	0.10	8.4	7.2	1.1	0.8	1.00	0.29	--	--	--	Partial Flow	
+87.95	+92.95	5.00	619.08	619.15	2.20%	0.013	FSC	1	30		0.00	35.50	35.50	60.84	0.007	0.04	7.2	11.3	0.8	2.0	0.00	0.81	--	--	--	Partial Flow	
+92.95	+27.28	234.33	619.15	624.81	2.20%	0.013	0M4	1	24		0.00	35.50	35.50	33.55	0.025	5.77	11.3	11.3	2.0	2.0	0.05	0.10	--	--	--	Partial Flow	
+27.28	+84.28	257.00	624.81	630.46	2.20%	0.013	WYE	1	24		8.00	35.50	35.50	33.55	0.025	6.33	11.3	8.6	2.0	1.2	1.00	0.79	--	--	--	Partial Flow	
+84.28	+68.81	284.53	630.46	636.72	2.20%	0.013	0M4	1	24		0.00	27.50	27.50	33.55	0.015	4.20	8.75	8.75	1.2	1.2	0.05	0.10	--	--	--	Partial Flow	
+68.81	+107.43	132.62	636.72	639.68	2.23%	0.013	WYE	1	24		8.10	27.50	27.50	33.78	0.015	1.96	8.75	6.18	1.2	0.6	1.00	0.60	--	--	--	Partial Flow	
+107.43	+130.75	205.82	639.68	644.28	2.23%	0.013	WYE	1	24		6.50	19.40	19.40	33.78	0.007	1.51	6.18	4.11	0.6	0.3	1.00	0.33	--	--	--	Partial Flow	
+130.75	+134.14	16.89	644.28	644.65	2.23%	0.013	45Bend	1	24		0.00	12.90	12.90	33.78	0.003	0.05	4.11	4.11	0.3	0.3	0.35	0.10	--	--	--	Partial Flow	
+134.14	+13+35.63	11.49	644.65	644.91	2.23%	0.013	Inlet	1	24		12.90	12.90	12.90	33.78	0.003	0.04	4.11	4.11	0.3	0.3	1.25	0.33	--	--	--	Partial Flow	

LAT A1																											
Pipe										Hydraulic Calculations																	
Station Down	Station Up	Length	Invert Down	Invert Up	Slope	Manning's 'n'	Str. Up	No. Barrels	Pipe Dia.	Box Size	100 Year Q _{max}	Total Flow	Pipe Flow	Pipe Capacity	S _s	Friction Loss	V ₁ Down	V ₂ Up	V ₁ ²	V ₂ ²	K _t	Str. Loss	HGL Down	HGL Up	HGL Str.	Surf. Bev.	Flow Regime
0+00.00	0+45.89	45.89	644.53	644.91	0.84%	0.013	Inlet	1	18		6.50	6.50	6.50	9.63	0.004	0.18	3.7	3.7	0.2	0.2	1.25	0.26	646.03	--	--	--	Partial Flow

LAT A2																											
Pipe										Hydraulic Calculations																	
Station Down	Station Up	Length	Invert Down	Invert Up	Slope	Manning's 'n'	Str. Up	No. Barrels	Pipe Dia.	Box Size	100 Year Q _{max}	Total Flow	Pipe Flow	Pipe Capacity	S _s	Friction Loss	V ₁ Down	V ₂ Up	V ₁ ²	V ₂ ²	K _t	Str. Loss	HGL Down	HGL Up	HGL Str.	Surf. Bev.	Flow Regime
0+00.00	0+16.73	16.73	639.68	641.30	9.69%	0.013	None	1	24		8.10	8.10	8.10	70.42	0.001	0.02	2.6	2.6	0.1	0.1	0.00	0.00	641.68	--	--	--	Partial Flow

LAT A3																											
Pipe										Hydraulic Calculations																	
Station Down	Station Up	Length	Invert Down	Invert Up	Slope	Manning's 'n'	Str. Up	No. Barrels	Pipe Dia.	Box Size	100 Year Q _{max}	Total Flow	Pipe Flow	Pipe Capacity	S _s	Friction Loss	V ₁ Down	V ₂ Up	V ₁ ²	V ₂ ²	K _t	Str. Loss	HGL Down	HGL Up	HGL Str.	Surf. Bev.	Flow Regime
0+00.00	0+14.14	14.14	630.71	632.39	11.88%	0.013	Inlet	1	18		7.30	7.30	7.30	36.21	0.005	0.07	4.1	4.1	0.3	0.3	1.25	0.33	632.21	--	--	--	Partial Flow

LAT A4																											
Pipe										Hydraulic Calculations																	
Station Down	Station Up	Length	Invert Down	Invert Up	Slope	Manning's 'n'	Str. Up	No. Barrels	Pipe Dia.	Box Size	100 Year Q _{max}	Total Flow	Pipe Flow	Pipe Capacity	S _s	Friction Loss	V ₁ Down	V ₂ Up	V ₁ ²	V ₂ ²	K _t	Str. Loss	HGL Down	HGL Up	HGL Str.	Surf. Bev.	Flow Regime
0+00.00	0+05.66	5.66	619.58	620.30	12.74%	0.013	45Bend	1	18		0.00	5.90	5.90	37.49	0.003	0.02	3.3	3.3	0.2	0.2	0.35	0.10	621.08	--	--	--	Partial Flow
0+05.66	0+11.66	6.00	620.30	621.06	12.74%	0.013	Inlet	1	18		5.90	5.90	5.90	37.49	0.003	0.02	3.3	3.3	0.2	0.2	1.25	0.22	--	--	--	Partial Flow	

LAT A5																											
Pipe										Hydraulic Calculations																	
Station Down	Station Up	Length	Invert Down	Invert Up	Slope	Manning's 'n'	Str. Up	No. Barrels	Pipe Dia.	Box Size	100 Year Q _{max}	Total Flow	Pipe Flow	Pipe Capacity	S _s	Friction Loss	V ₁ Down	V ₂ Up	V ₁ ²	V ₂ ²	K _t	Str. Loss	HGL Down	HGL Up	HGL Str.	Surf. Bev.	Flow Regime
0+00.00	0+46.61	46.61	618.31	620.25	4.39%	0.013	30Bend	1	30		0.00	44.50	44.50	85.94	0.012	0.55	9.1	9.1	1.3	1.3	0.20	0.26	620.81	--	--	--	Partial Flow
0+46.61	0+60.02	13.41	620.25	620.83	4.39%	0.013	30Bend	1	30		0.00	44.50	44.50	85.94	0.012	0.16	9.1	9.1	1.3	1.3	0.20	0.26	--	--	--	Partial Flow	
0+60.02	0+86.59	26.57	620.83	622.00	4.39%	0.013	Inlet	1	30		44.50	44.50	44.50	85.94	0.012	0.31	9.1	9.1	1.3	1.3	1.25	1.60	--	--	--	Partial Flow	

EXISTING TXDOT CULVERT 6																											
Pipe										Hydraulic Calculations																	
Station Down	Station Up	Length	Invert Down	Invert Up	Slope	Manning's 'n'	Str. Up	No. Barrels	Pipe Dia.	Box Size	100 Year Q _{max}	Total Flow	Pipe Flow	Pipe Capacity	S _s	Friction Loss	V ₁ Down	V ₂ Up	V ₁ ²	V ₂ ²	K _t	Str. Loss	HGL Down	HGL Up	HGL Str.	Surf. Bev.	Flow Regime
0+00.00	1+45.62	145.62	618.70	619.72	0.70%	0.013	0M4	2	4	2	120.70	120.70	60.35	116.78	0.002	0.27	7.5	7.5	0.9	0.9	0.05	0.10	620.70	--	--	--	Partial Flow

LINE B																											
Pipe										Hydraulic Calculations																	
Station Down	Station Up	Length	Invert Down	Invert Up	Slope	Manning's 'n'	Str. Up	No. Barrels	Pipe Dia.	Box Size	100 Year Q _{max}	Total Flow	Pipe Flow	Pipe Capacity	S _s	Friction Loss	V ₁ Down	V ₂ Up	V ₁ ²	V ₂ ²	K _t	Str. Loss	HGL Down	HGL Up	HGL Str.	Surf. Bev.	Flow Regime
0+00.00	0+10.03	10.03	619.68	619.76	1.00%	0.013	45Bend	1	36		0.00	74.70	74.70	66.70	0.013	0.13	10.6	10.6	1.7	1.7	0.35	0.61	622.66	622.79	623.39	--	Full Flow
0+10.03	0+17.62	7.59	619.76	619.84	1.00%	0.013	WYE	1	36		6.10	74.70	74.70	66.70	0.013	0.10	10.6	9.7	1.7	1.5	1.00	0.27	623.39	623.49	623.76	--	Full Flow
0+17.62	0+34.32	16.70	619.84	620.00	1.00%	0.013	45Bend	1	36		0.00	68.60	68.60	66.70	0.011	0.18	9.7	9.7	1.5	1.5	0.35	0.51	623.76	623.94	624.45	--	Full Flow
0+34.32	1+00.00	65.68	620.00	620.66	1.00%	0.013	None	1	36		0.00	68.60	68.60	66.70	0.011	0.69	9.7	9.7	1.5	1.5	0.00	0.00	624.45	625.14	625.14	--	Full Flow
1+00.00	2+84.29	184.29	620.66	624.71	2.20%	0.013	0M4	1	36		0.00	68.60	68.60	98.93	0.011	1.95	9.7	9.7	1.5	1.5	0.05	0.10	625.14	627.09	627.19	--	Full Flow
2+84.29	5+41.29	257.00	624.71	630.36	2.20%	0.013	WYE	1	36		7.40	68.60	68.60	98.93	0.011	2.72	9.7	8.7	1.5	1.2	1.00	0.30	--	--	--	Partial Flow	
5+41.29	8+61.98	320.69	630.36	637.10	2.20%	0.013	WYE	1	36		61.20	61.20	61.20	98.93	0.008												

25-YR CURB INLET CALCULATIONS

Inlet No.	INLET TYPE		INLET LOCATION		DRAINAGE AREA INFORMATION				Rainfall Intensity "I" (N/HR)	Storm Water Runoff "Q" (CFS)	Upstream Bypass Flow "Q _b " (CFS)	Crown Over-flow "Q _c " (CFS)	Total Gutter Flow "Q _t " (CFS)	SUMP INLET PERCENTAGE OF FLOW FROM:		SUMP INLET FLOW FROM:		ROADWAY INFORMATION										Conveyance	Gutter Flow Depth "y" (FT)	Ponding depth in Sump "y _s " (FT)	Flow Spread "T" (FT)	Width of Depres-sion "W" (FT)	Depth of Depre-ssion (FT)	Flow Ratio "E _r " (FT/FT)	Equiv-alent Cross Slope "S _e " (FT/FT)	Required Length "L _r " (FT)	Actual Length "L" (FT)	Inlet Effi-ciency	Intercepted Flow "Q _i " (CFS)	Bypa-ss Flow "Q _b " (CFS)	Bypass Destination
	On-Grade or Sump	Type	Station (FT)	Street	Area ID	Area "A" (AC)	Runoff Coeff. "C"	Time of Concen-tration "T _c " (MIN)						Lower Station	Higher Station	Lower Station	Higher Station	Roadway Classifi-cation	Mann-ings "n"	Pavement Crown/ Invert Height "H" (FT)	Curb Height (FT)	Pavement Width F-F "W" (FT)	Roadway Longitudinal Slope		Roadway Cross Slope "S _x " (FT/FT)																
														%	%	(CFS)	(CFS)	(CFS)	(CFS)	(FT/FT)	(FT/FT)	(FT/FT)	(FT/FT)	(FT/FT)	(FT/FT)																
CI-A1	ONGC	DEPC	12+50.00	Uhl Road	A-1	1.54	0.90	10	7.62	10.96	0.00	0.00	10.96	N/A	N/A	N/A	N/A	M4U	0.016	0.48	0.50	48.00	0.013	N/A	0.02000	92.27	0.33	N/A	16.59	2.50	0.33	0.35	0.06	28.43	15	0.74	7.82	2.74	CI-A2		
CI-B1	ONGC	DEPC	12+50.00	Uhl Road	B-1	0.77	0.90	10	7.62	5.28	0.00	0.00	5.28	N/A	N/A	N/A	N/A	M4U	0.016	0.48	0.50	48.00	0.013	N/A	0.02000	46.14	0.26	N/A	12.79	2.50	0.33	0.44	0.07	19.40	10	0.73	3.85	1.43	CI-B2		
CI-A2	ONGC	RECC	6+15.00	Uhl Road	A-3	0.87	0.90	10	7.62	6.61	2.74	0.00	9.35	N/A	N/A	N/A	N/A	M5U	0.016	0.62	0.50	62.00	0.022	N/A	0.02000	63.03	0.29	N/A	14.38	2.00	0.33	0.33	0.07	29.21	15	0.73	6.79	2.55	CI-A3		
CI-B2	ONGC	RECC	6+15.00	Uhl Road	B-3	0.88	0.90	10	7.62	6.04	1.43	0.00	7.47	N/A	N/A	N/A	N/A	M5U	0.016	0.62	0.50	62.00	0.022	N/A	0.02000	50.35	0.26	N/A	13.22	2.00	0.33	0.35	0.07	25.75	15	0.79	5.92	1.55	CI-B3		
CI-A3	ONGC	RECC	1+00.00	Uhl Road	A-4	0.71	0.90	10	7.62	4.87	2.55	0.00	7.42	N/A	N/A	N/A	N/A	M5U	0.016	0.62	0.50	62.00	0.022	N/A	0.02000	50.05	0.26	N/A	13.19	2.00	0.33	0.36	0.07	25.67	15	0.79	5.90	1.53			
CI-B3	ONGC	RECC	1+00.00	Uhl Road	B-4	0.73	0.90	10	7.62	5.01	1.55	0.00	6.56	N/A	N/A	N/A	N/A	M5U	0.016	0.62	0.50	62.00	0.022	N/A	0.02000	44.21	0.25	N/A	12.59	2.00	0.33	0.37	0.07	23.94	15	0.83	5.44	1.11			
CI-C	ONGC	DEPC	21+53.10	Uhl Road	C-2	0.35	0.55	15	6.57	1.26	0.00	0.00	1.26	N/A	N/A	N/A	N/A	M4U	0.016	0.48	0.50	48.00	0.015	N/A	0.02000	10.22	0.15	N/A	7.27	2.50	0.33	0.68	0.10	9.19	10	1.00	1.26	0.00			

100-YR CURB INLET CALCULATIONS

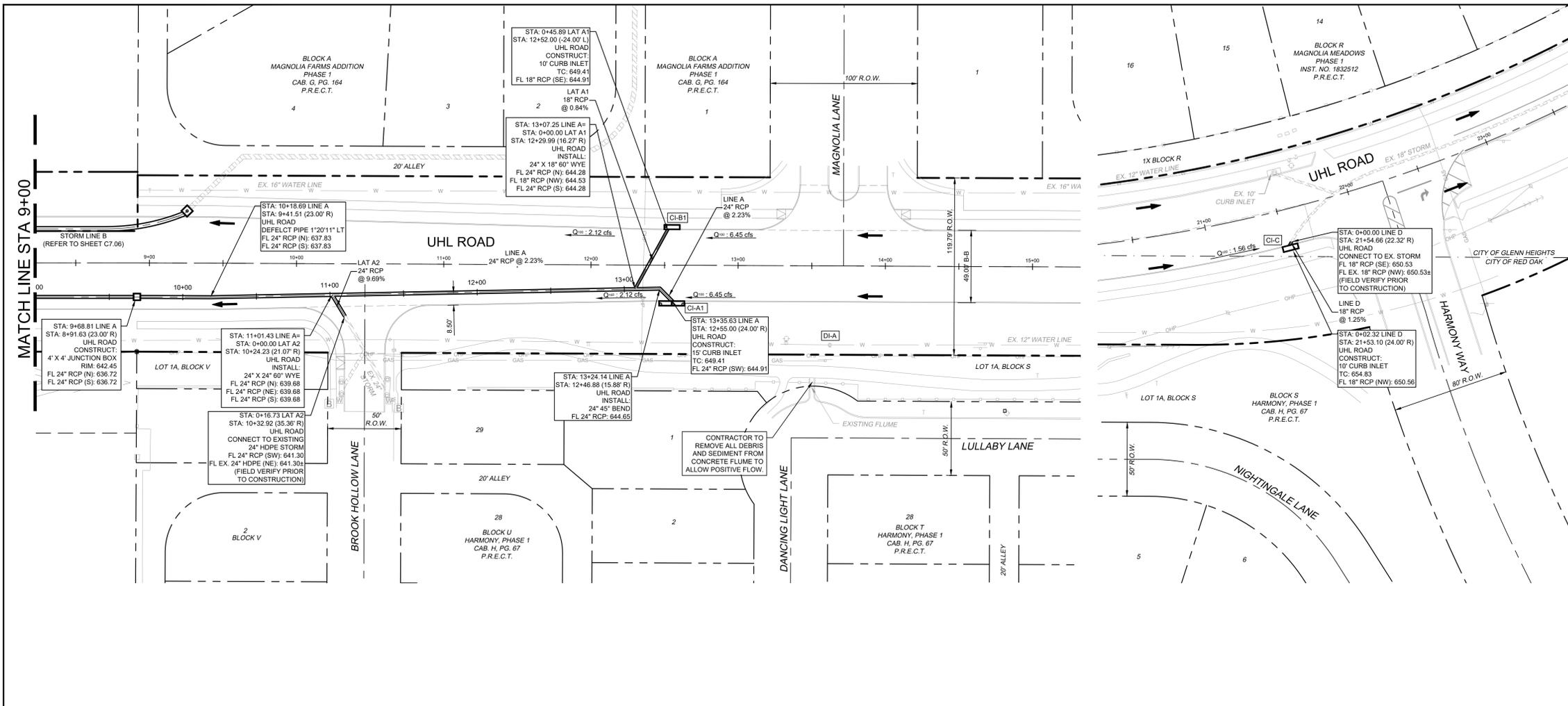
Inlet No.	INLET TYPE		INLET LOCATION		DRAINAGE AREA INFORMATION				Rainfall Intensity "I" (N/HR)	Storm Water Runoff "Q" (CFS)	Upstream Bypass Flow "Q _b " (CFS)	Crown Over-flow "Q _c " (CFS)	Total Gutter Flow "Q _t " (CFS)	SUMP INLET PERCENTAGE OF FLOW FROM:		SUMP INLET FLOW FROM:		ROADWAY INFORMATION										Conveyance	Gutter Flow Depth "y" (FT)	Ponding depth in Sump "y _s " (FT)	Flow Spread "T" (FT)	Width of Depres-sion "W" (FT)	Depth of Depre-ssion (FT)	Flow Ratio "E _r " (FT/FT)	Equiv-alent Cross Slope "S _e " (FT/FT)	Required Length "L _r " (FT)	Actual Length "L" (FT)	Inlet Effi-ciency	Intercepted Flow "Q _i " (CFS)	Bypa-ss Flow "Q _b " (CFS)	Bypass Destination
	On-Grade or Sump	Type	Station (FT)	Street	Area ID	Area "A" (AC)	Runoff Coeff. "C"	Time of Concen-tration "T _c " (MIN)						Lower Station	Higher Station	Lower Station	Higher Station	Roadway Classifi-cation	Mann-ings "n"	Pavement Crown/ Invert Height "H" (FT)	Curb Height (FT)	Pavement Width F-F "W" (FT)	Roadway Longitudinal Slope		Roadway Cross Slope "S _x " (FT/FT)																
														%	%	(CFS)	(CFS)	(CFS)	(CFS)	(FT/FT)	(FT/FT)	(FT/FT)	(FT/FT)	(FT/FT)	(FT/FT)																
CI-A1	ONGC	DEPC	12+50.00	Uhl Road	A-1	1.54	0.90	10	9.31	12.90	0.00	0.00	12.90	N/A	N/A	N/A	N/A	M4U	0.016	0.48	0.50	48.00	0.013	N/A	0.02000	112.74	0.36	N/A	17.88	2.50	0.33	0.33	0.06	31.74	15	0.68	8.82	4.08	CI-A2		
CI-B1	ONGC	DEPC	12+50.00	Uhl Road	B-1	0.77	0.90	10	9.31	6.45	0.00	0.00	6.45	N/A	N/A	N/A	N/A	M4U	0.016	0.48	0.50	48.00	0.013	N/A	0.02000	56.37	0.28	N/A	13.79	2.50	0.33	0.41	0.07	21.67	10	0.67	4.33	2.12	CI-B2		
CI-A2	ONGC	RECC	6+15.00	Uhl Road	A-3	0.87	0.90	10	9.31	7.99	4.08	0.00	12.07	N/A	N/A	N/A	N/A	M5U	0.016	0.62	0.50	62.00	0.022	N/A	0.02000	81.37	0.32	N/A	15.82	2.00	0.33	0.30	0.06	33.69	15	0.65	7.89	4.18	CI-A3		
CI-B2	ONGC	RECC	6+15.00	Uhl Road	B-3	0.88	0.90	10	9.31	7.37	2.12	0.00	9.49	N/A	N/A	N/A	N/A	M5U	0.016	0.62	0.50	62.00	0.022	N/A	0.02000	63.99	0.29	N/A	14.46	2.00	0.33	0.33	0.07	29.45	15	0.72	6.86	2.64	CI-B3		
CI-A3	ONGC	RECC	1+00.00	Uhl Road	A-4	0.71	0.90	10	9.31	5.95	4.18	0.00	10.13	N/A	N/A	N/A	N/A	M5U	0.016	0.62	0.50	62.00	0.022	N/A	0.02000	68.28	0.30	N/A	14.81	2.00	0.33	0.32	0.07	30.54	15	0.70	7.13	3.00			
CI-B3	ONGC	RECC	1+00.00	Uhl Road	B-4	0.73	0.90	10	9.31	6.12	2.64	0.00	8.75	N/A	N/A	N/A	N/A	M5U	0.016	0.62	0.50	62.00	0.022	N/A	0.02000	59.01	0.28	N/A	14.03	2.00	0.33	0.34	0.07	28.15	15	0.75	6.53	2.22			
CI-C	ONGC	DEPC	21+53.10	Uhl Road	C-2	0.35	0.55	15	8.09	1.56	0.00	0.00	1.56	N/A	N/A	N/A	N/A	M4U	0.016	0.48	0.50	48.00	0.015	N/A	0.02000	12.59	0.16	N/A	7.86	2.50	0.33	0.64	0.09	10.28	10	1.00	1.55	0.00			



UHL ROAD PAVING IMPROVEMENTS
 UHL ROAD AND FM 604
 CITY OF RED OAK, TEXAS
 CITY OF GLEN HEIGHTS, TEXAS

STORM INLET CALCULATIONS

No.	DATE	REVISIONS



LEGEND

- PROPERTY LINE
- PROPOSED STORM LINE
- EXISTING STORM LINE
- EXISTING OVERHEAD ELECTRIC
- EXISTING WATER LINE
- EXISTING GAS LINE
- EXISTING FIBER OPTIC CABLE LINE
- EXISTING UNDERGROUND TELEPHONE LINE

STORM DRAINAGE NOTES:

- THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES.
- CONTRACTOR SHALL FIELD VERIFY THE EXACT HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING UTILITIES IN FIELD PRIOR TO COMMENCING CONSTRUCTION. NOTIFY ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.
- STORM PIPE SHALL BE AS FOLLOWS UNLESS OTHERWISE NOTED:
A. RCP - ASTM C78 CLASS III
- ALL EXISTING AND PROPOSED PIPES AND STRUCTURES ARE TO BE CLEANED OUT AT THE COMPLETION OF CONSTRUCTION TO REMOVE ALL SILT AND DEBRIS.
- ALL STORM PIPE ENTERING STRUCTURES SHALL BE GROUTED TO ASSURE CONNECTION AT STRUCTURE IS WATERTIGHT.
- ALL STORM SEWER MANHOLES IN PAVED AREAS SHALL BE FLUSH WITH PAVEMENT, AND SHALL HAVE TRAFFIC BEARING RING & COVERS. MANHOLES IN UNPAVED AREAS SHALL BE 6" ABOVE FINISH GRADE. LIDS SHALL BE LABELED "STORM SEWER".
- ALL STORM STRUCTURES SHALL HAVE A SMOOTH UNIFORM POURED MORTAR INVERT FROM INVERT IN TO INVERT OUT.
- REFER TO SHEET ##### FOR STORM DRAINAGE LINE A LATERAL PROFILES.

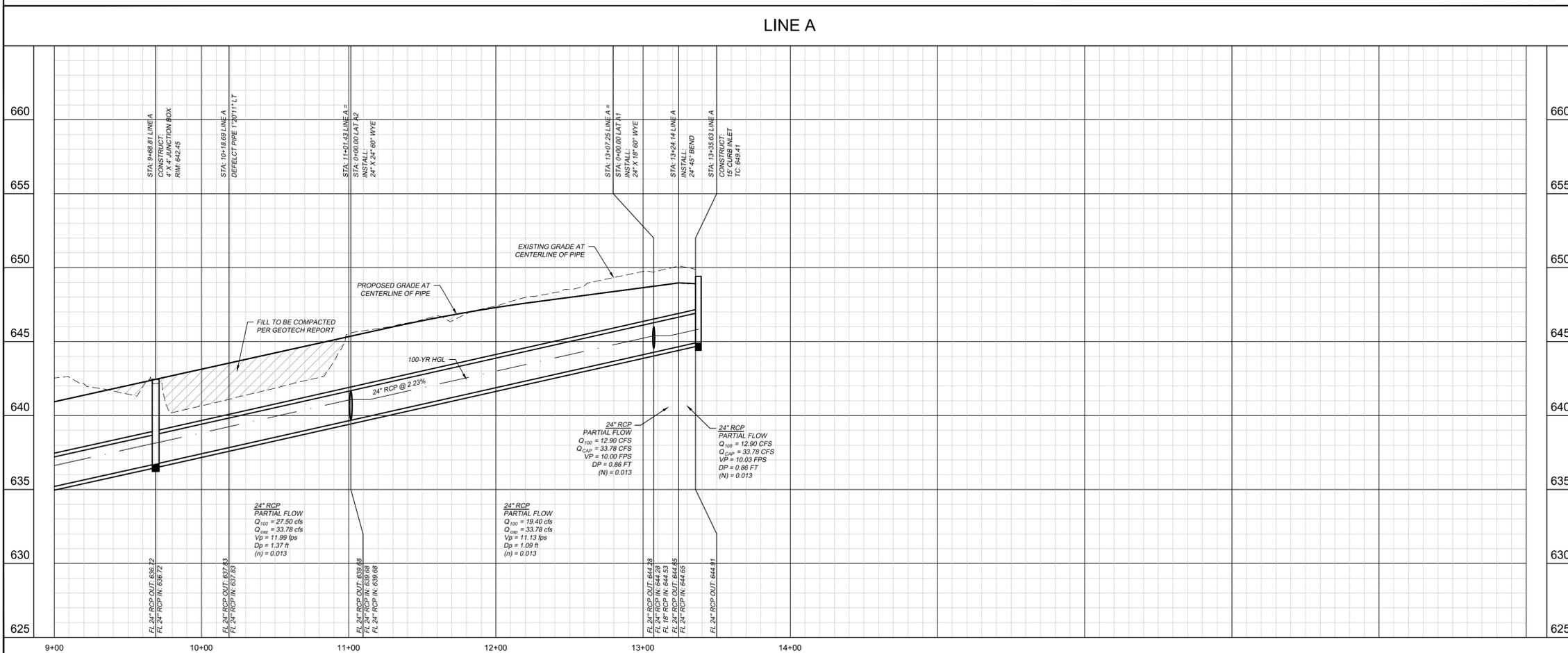
BENCHMARK

- CONTROL POINT NO. 11
"X" CUT IN CONCRETE AT SOUTHEAST CORNER OF STORM SEWER MANHOLE LOCATED ±185 FEET NORTH OF HARMONY WAY ON THE EAST SIDE OF UHL ROAD.
N: 6,882,905.80
E: 2,480,031.77
EL: 651.657
- CONTROL POINT NO. 12
"X" CUT IN CONCRETE AT NORTHWEST CORNER OF CURB INLET LOCATED ±185 FEET NORTH OF HARMONY WAY ON THE WEST SIDE OF UHL ROAD.
N: 6,882,930.04
E: 2,480,084.41
EL: 651.597

WESTFALL ENGINEERING
1719 ANGEL PARKWAY
STE 400-206 ALLEN, TX 75002
PHONE NO. (214) 846-9397
TPBE FIRM REG. #19101

UHL ROAD PAVING IMPROVEMENTS
UHL ROAD AND FM 664
CITY OF RED OAK, TEXAS
CITY OF GLEN HEIGHTS, TEXAS

STORM DRAINAGE LINE A AND LINE D PLAN AND PROFILE

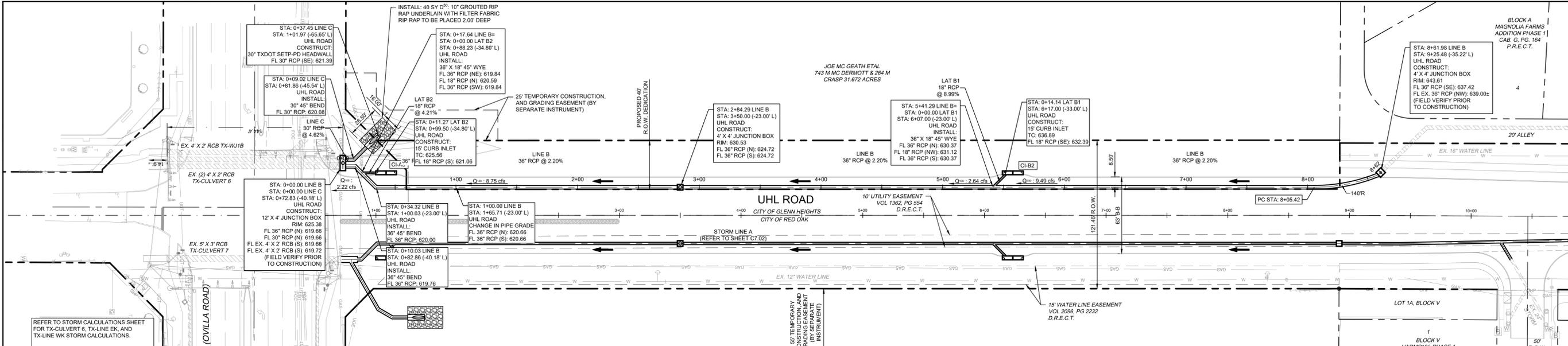


811
Know what's below.
Call before you dig.

CAUTION!
THE CONTRACTOR SHALL FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO START OF CONSTRUCTION AND SHALL NOTIFY THE CONSTRUCTION MANAGER AND ENGINEER OF ANY CONFLICTS DISCOVERED. CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING UTILITIES (SHOWN OR NOT SHOWN) WITHIN SCOPE OF CONSTRUCTION. IF ANY EXISTING UTILITIES ARE DAMAGED, THE CONTRACTOR SHALL REPLACE THEM AT HIS OWN EXPENSE. CALL 811 AT LEAST 72 HOURS PRIOR TO COMMENCING CONSTRUCTION IN VICINITY.

No.	DATE	REVISIONS

DATE: 04/01/2025
PROJECT NO.: 2301020
SHEET NO.: **C7.03**



REFER TO STORM CALCULATIONS SHEET FOR TX-CULVERT 6, TX-LINE EK, AND TX-LINE WK STORM CALCULATIONS. TX-CULVERT 7 IS BUILT INTO STORM LINE A CALCULATIONS.



CAUTION!!
 THE CONTRACTOR SHALL FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO START OF CONSTRUCTION AND SHALL NOTIFY THE CONSTRUCTION MANAGER AND ENGINEER OF ANY CONFLICTS DISCOVERED. CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING UTILITIES (SHOWN OR NOT SHOWN) WITHIN SCOPE OF CONSTRUCTION. IF ANY EXISTING UTILITIES ARE DAMAGED, THE CONTRACTOR SHALL REPLACE THEM AT HIS OWN EXPENSE. CALL 811 AT LEAST 72 HOURS PRIOR TO COMMENCING CONSTRUCTION IN VICINITY.

STORM DRAINAGE NOTES:

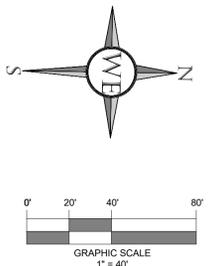
1. THE CONTRACTOR IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AS SHOWN ON THESE PLANS IS BASED ON RECORDS OF THE VARIOUS UTILITY COMPANIES, AND WHERE POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THE INFORMATION IS NOT TO BE RELIED ON AS BEING EXACT OR COMPLETE. THE CONTRACTOR MUST CALL THE APPROPRIATE UTILITY COMPANIES AT LEAST 72 HOURS BEFORE ANY EXCAVATION TO REQUEST EXACT FIELD LOCATION OF UTILITIES.
2. CONTRACTOR SHALL FIELD VERIFY THE EXACT HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING UTILITIES IN FIELD PRIOR TO COMMENCING CONSTRUCTION. NOTIFY ENGINEER IMMEDIATELY OF ANY DISCREPANCIES.
3. STORM PIPE SHALL BE AS FOLLOWS UNLESS OTHERWISE NOTED:
 A. RCP - ASTM C76 CLASS III
4. ALL EXISTING AND PROPOSED PIPES AND STRUCTURES ARE TO BE CLEANED OUT AT THE COMPLETION OF CONSTRUCTION TO REMOVE ALL SILT AND DEBRIS.
5. ALL STORM PIPE ENTERING STRUCTURES SHALL BE GROUTED TO ASSURE CONNECTION AT STRUCTURE IS WATERTIGHT.
6. ALL STORM SEWER MANHOLES IN PAVED AREAS SHALL BE FLUSH WITH PAVEMENT, AND SHALL HAVE TRAFFIC BEARING RING & COVERS. MANHOLES IN UNPAVED AREAS SHALL BE 6" ABOVE FINISH GRADE. LIDS SHALL BE LABELED "STORM SEWER".
7. ALL STORM STRUCTURES SHALL HAVE A SMOOTH UNIFORM POURED MORTAR INVERT FROM INVERT IN TO INVERT OUT.
8. REFER TO SHEET C7.06 FOR STORM DRAINAGE LINE B LATERAL AND STORM DRAINAGE LINE C PROFILES.

LEGEND

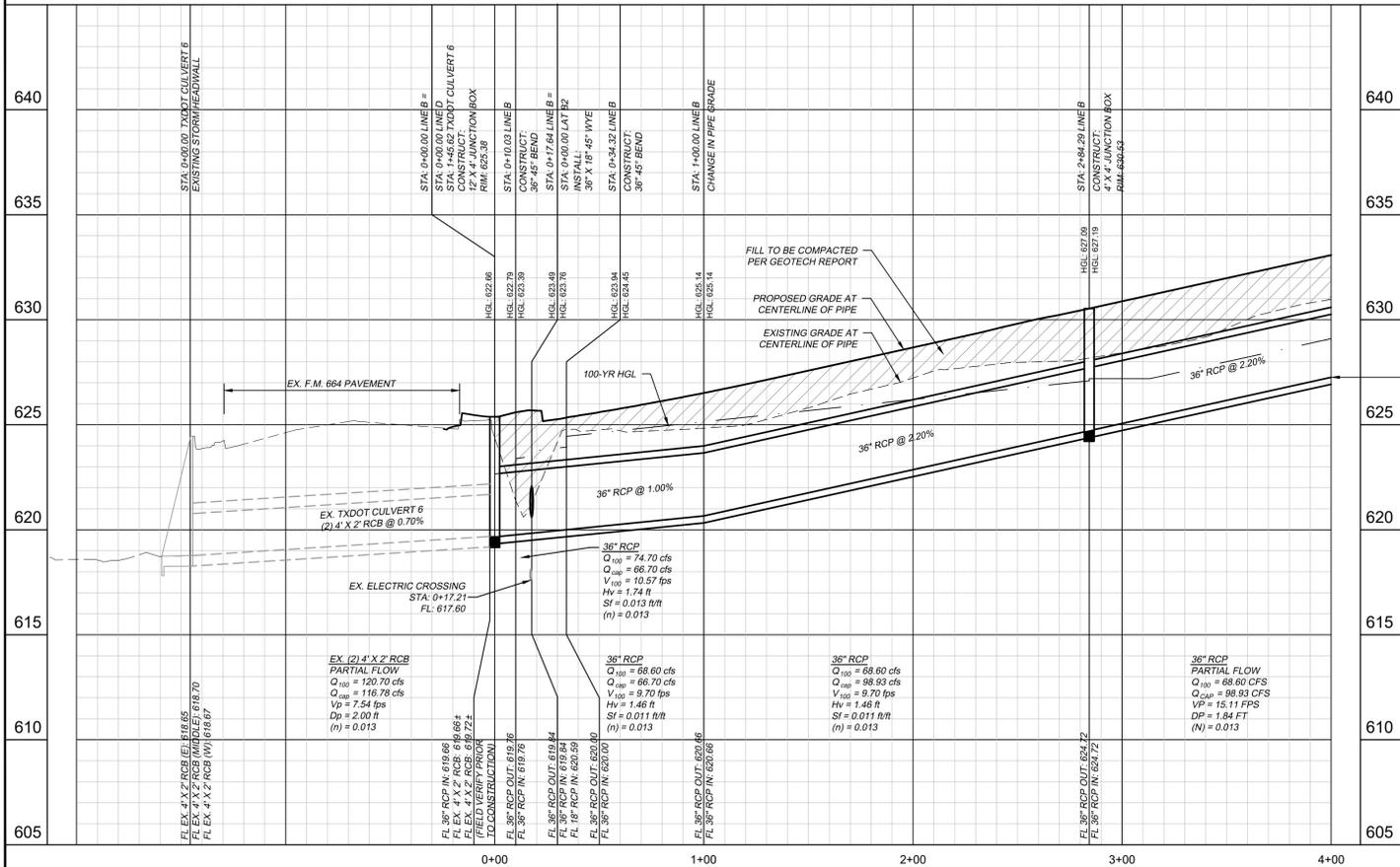
	PROPERTY LINE
	PROPOSED STORM LINE
	EXISTING STORM LINE
	EXISTING OVERHEAD ELECTRIC
	EXISTING WATER LINE
	EXISTING GAS LINE
	EXISTING FIBER OPTIC CABLE LINE
	EXISTING UNDERGROUND TELEPHONE LINE

BENCHMARK

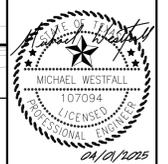
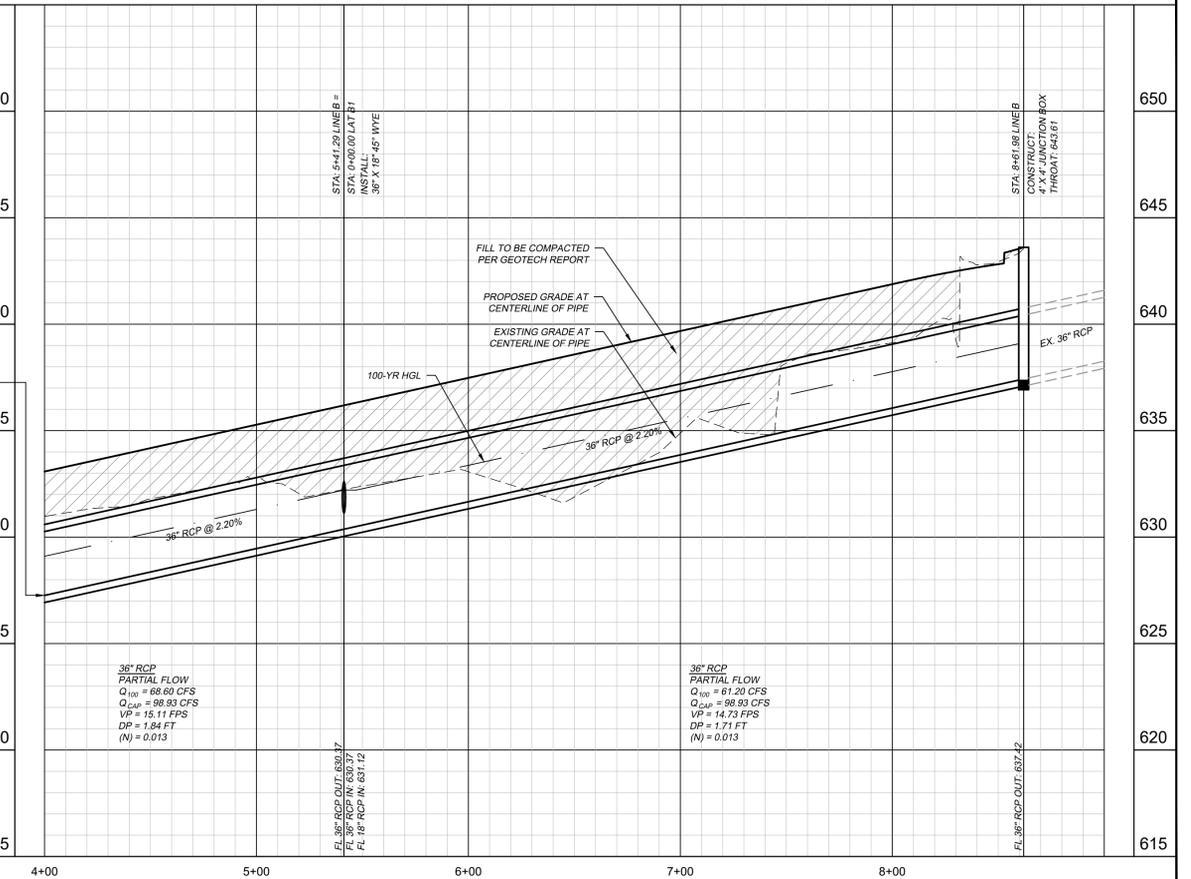
1. CONTROL POINT NO. 11
 "X" CUT IN CONCRETE AT SOUTHEAST CORNER OF STORM SEWER MANHOLE LOCATED ±185 FEET NORTH OF HARMONY WAY ON THE EAST SIDE OF UHL ROAD.
 N: 6,882,905.80
 E: 2,480,031.77
 EL: 651.657
2. CONTROL POINT NO. 12
 "X" CUT IN CONCRETE AT NORTHWEST CORNER OF CURB INLET LOCATED ±185 FEET NORTH OF HARMONY WAY ON THE WEST SIDE OF UHL ROAD.
 N: 6,882,930.04
 E: 2,480,064.41
 EL: 651.587



LINE B



LINE B



UHL ROAD PAVING IMPROVEMENTS
 UHL ROAD AND FM 664
 CITY OF RED OAK, TEXAS
 CITY OF GLEN HEIGHTS, TEXAS

STORM DRAINAGE LINE B AND LINE C PLAN AND PROFILE

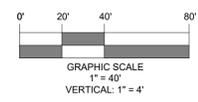
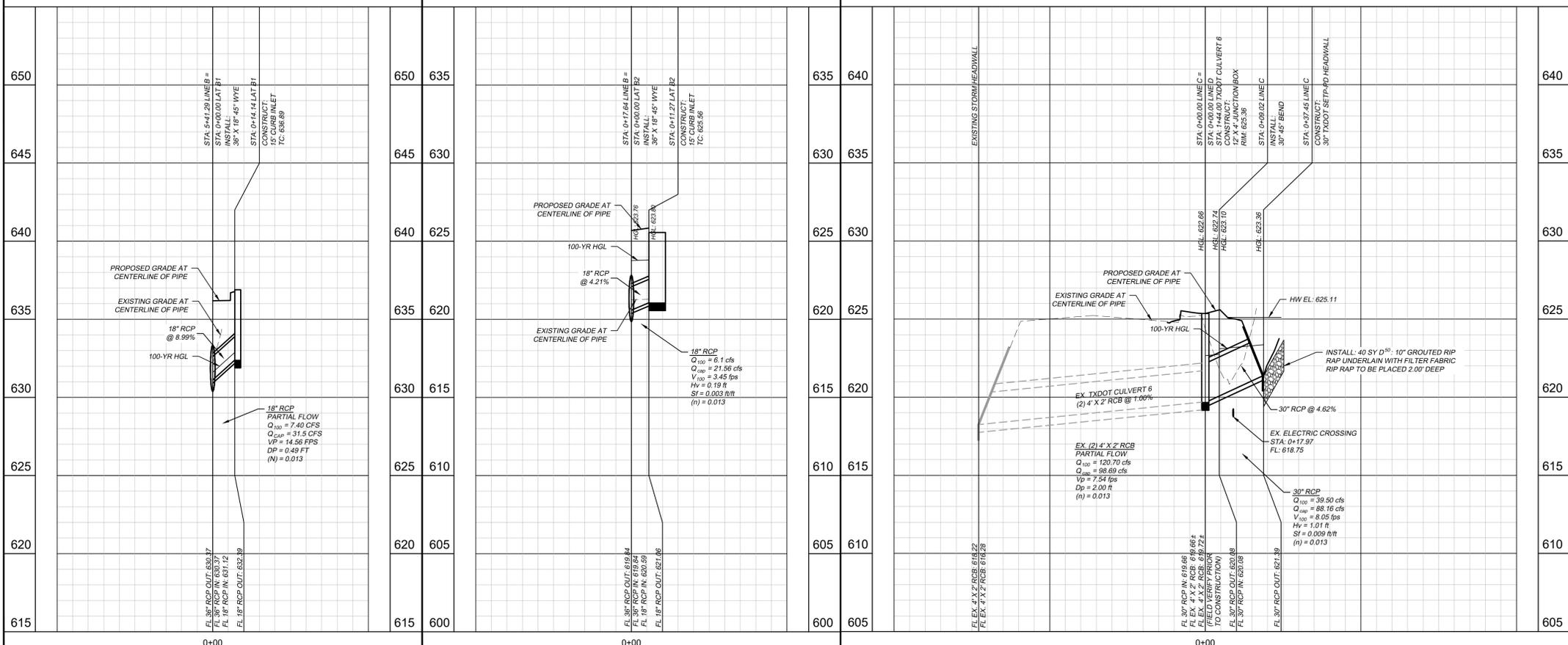
No.	DATE	REVISIONS

DATE: 04/01/2025
 PROJECT NO: 2301020
 SHEET NO: **C7.05**

LAT B1

LAT B2

LINE C



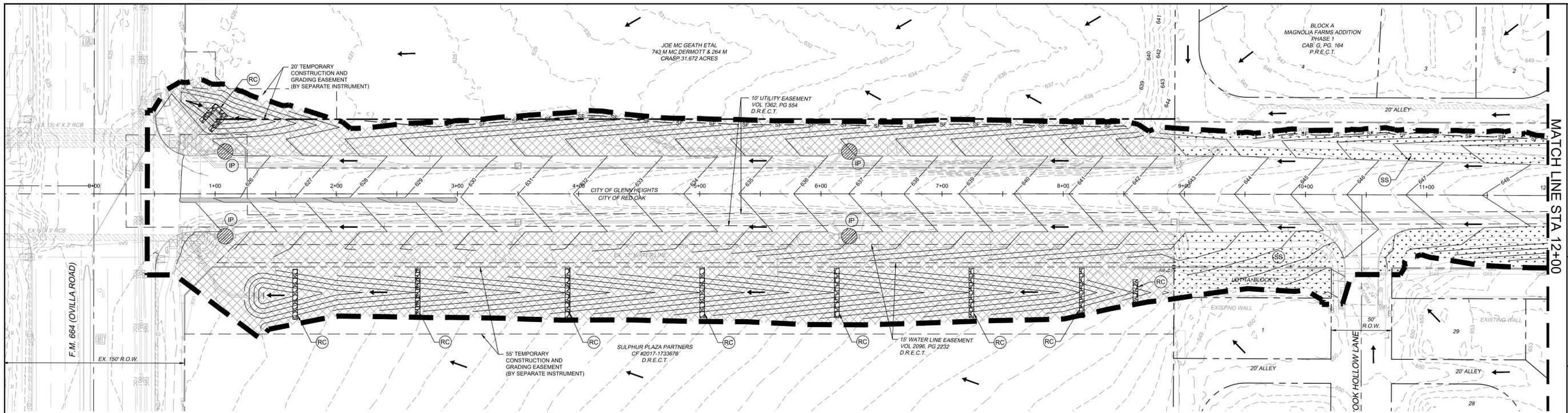
UHL ROAD PAVING IMPROVEMENTS
 UHL ROAD AND FM 664
 CITY OF RED OAK, TEXAS
 CITY OF GLEN HEIGHTS, TEXAS

STORM DRAINAGE LINE B LATERALS AND LINE C PROFILE

No.	DATE	REVISIONS

BENCHMARK

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 E: 2,480,084.41
 EL: 651.597



WESTFALL ENGINEERING
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 PHONE NO. (214) 846-9397
 TPBE FIRM REG. #19101



UHL ROAD PAVING IMPROVEMENTS
 UHL ROAD AND FM 664
 CITY OF RED OAK, TEXAS
 CITY OF GLEN HEIGHTS, TEXAS

LEGEND

	PROPERTY LINE
	PROPOSED CONTOUR
	EXISTING CONTOUR
	FLOW ARROW
	SILT FENCE
	LIMITS OF DISTURBANCE
	INLET PROTECTION
	ROCK CHECK DAM
	FURNISH AND INSTALL HYDROMULCH WITH BERMUDA SEED. CONTRACTOR SHALL WATER SOD UNTIL FULLY ESTABLISHED. LIMITS SHOWN ON PLAN ARE APPROXIMATE AND SHALL BE ADJUSTED TO COVER ALL DISTURBED AREAS.
	BERMUDA SOD

STANDARD EROSION CONTROL GENERAL NOTES

1. EROSION CONTROL DEVICES SHOWN ON THIS PLAN SHALL BE INSTALLED PRIOR TO THE START OF LAND DISTURBING ACTIVITIES ON THE PROJECT.
2. ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED IN ACCORDANCE WITH THE APPROVED PLANS AND SPECIFICATIONS FOR THIS PROJECT. CHANGES ARE TO BE APPROVED BEFORE CONSTRUCTION BY THE DESIGN ENGINEER AND THE CITY ENGINEERING DIVISION.
3. IF THE EROSION CONTROL PLAN AS APPROVED CANNOT CONTROL EROSION AND OFF-SITE SEDIMENTATION FROM THE PROJECT, THE EROSION CONTROL PLAN WILL BE REQUIRED TO BE REVISED AND/OR ADDITIONAL EROSION CONTROL DEVICES WILL BE REQUIRED ON SITE.
4. INSPECTIONS SHALL BE MADE WEEKLY AND AFTER RAIN STORM EVENTS TO INSURE THAT THE DEVICES ARE FUNCTIONING PROPERLY. WHEN SEDIMENT OR MUD HAS CLOGGED THE VOID SPACES BETWEEN STONES OR MUD IS BEING TRACKED ONTO A PUBLIC ROADWAY THE AGGREGATE PAD MUST BE WASHED DOWN OR REPLACED. RUNOFF FROM THE WASHDOWN OPERATION SHALL NOT BE ALLOWED TO DRAIN DIRECTLY OFF SITE WITHOUT FIRST FLOWING THROUGH ANOTHER BMP TO CONTROL OFF SITE SEDIMENTATION. PERIODIC RE-GRADING OR THE ADDITION OF NEW STONE MAY BE REQUIRED TO MAINTAIN THE EFFICIENCY OF THE INSTALLATION.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTAL OF N.O.I., N.O.T. AND ANY ADDITIONAL INFORMATION REQUIRED BY THE TCEQ CONTRACTOR SHALL COMPLY WITH ALL TCEQ STORMWATER POLLUTION PREVENTION REQUIREMENTS.

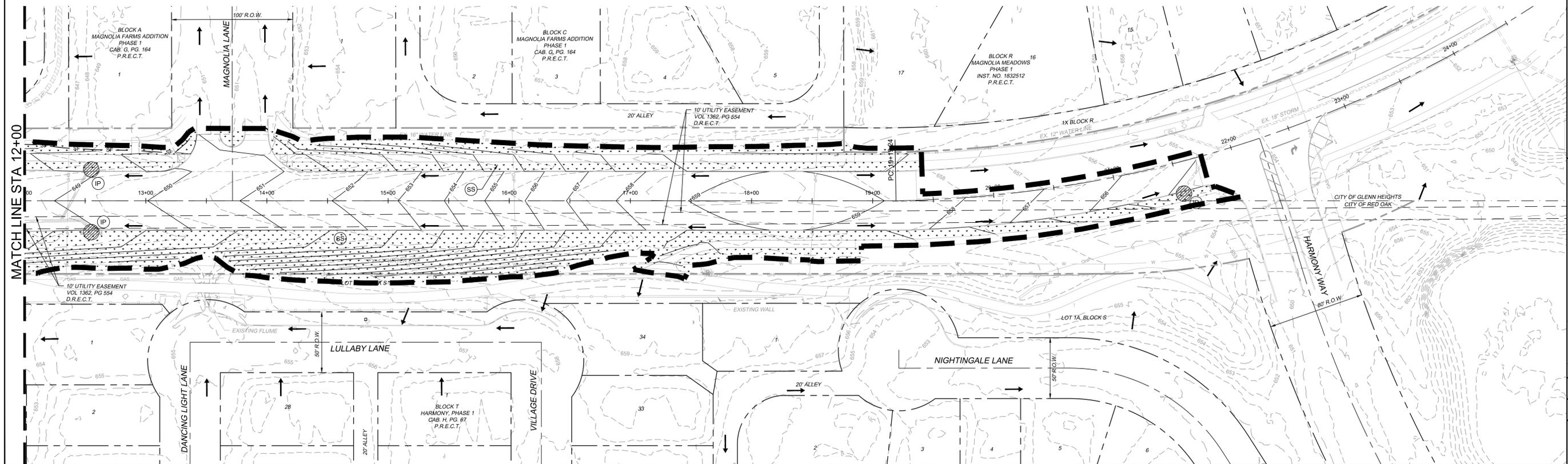
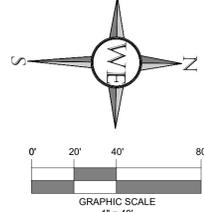


Know what's below.
Call before you dig.

CAUTION!
 THE CONTRACTOR SHALL FIELD VERIFY THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING UTILITIES PRIOR TO START OF CONSTRUCTION AND SHALL NOTIFY THE CONSTRUCTION MANAGER AND ENGINEER OF ANY CONFLICTS DISCOVERED. CONTRACTOR IS RESPONSIBLE FOR PROTECTING EXISTING UTILITIES (SHOWN OR NOT SHOWN) WITHIN SCOPE OF CONSTRUCTION. IF ANY EXISTING UTILITIES ARE DAMAGED, THE CONTRACTOR SHALL REPLACE THEM AT HIS OWN EXPENSE. CALL 811 AT LEAST 72 HOURS PRIOR TO COMMENCING CONSTRUCTION IN VICINITY.

BENCHMARK

1. CONTROL POINT NO. 11
 "X" CUT IN CONCRETE AT SOUTHEAST CORNER OF STORM SEWER MANHOLE LOCATED ±185 FEET NORTH OF HARMONY WAY ON THE EAST SIDE OF UHL ROAD.
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EROSION CONTROL PLAN

NO.	DATE	REVISIONS

DATE: 04/01/2025
 PROJECT NO.: 2301020
 SHEET NO.: C9.00

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DATE:
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

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

WORKER SAFETY NOTES:

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

COMPLIANT WORKZONE TRAFFIC CONTROL DEVICES

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

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

SHEET 1 OF 12

			
<p>BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS</p>			
<p>BC (1) - 21</p>			
FILE:	bc-21.dgn	DN:	TxDOT
CONT:	November 2002	ck:	TxDOT
SECT:		DW:	TxDOT
JOB:		ck:	TxDOT
HIGHWAY:			
<p>REVISIONS</p>			
4-03	7-13		
9-07	8-14		
5-10	5-21		
		DIST:	COUNTY:
			SHEET NO.

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**UHL ROAD
PAVING IMPROVEMENTS**
 UHL ROAD AND FM 664
 CITY OF RED OAK, TEXAS
 CITY OF GLEN HEIGHTS, TEXAS

TXDOT DETAILS BC(1) - 21

REVISIONS	
DATE	
NO.	

DATE
04/01/2025
 PROJECT NO.
2301020
 SHEET NO.
C10.00

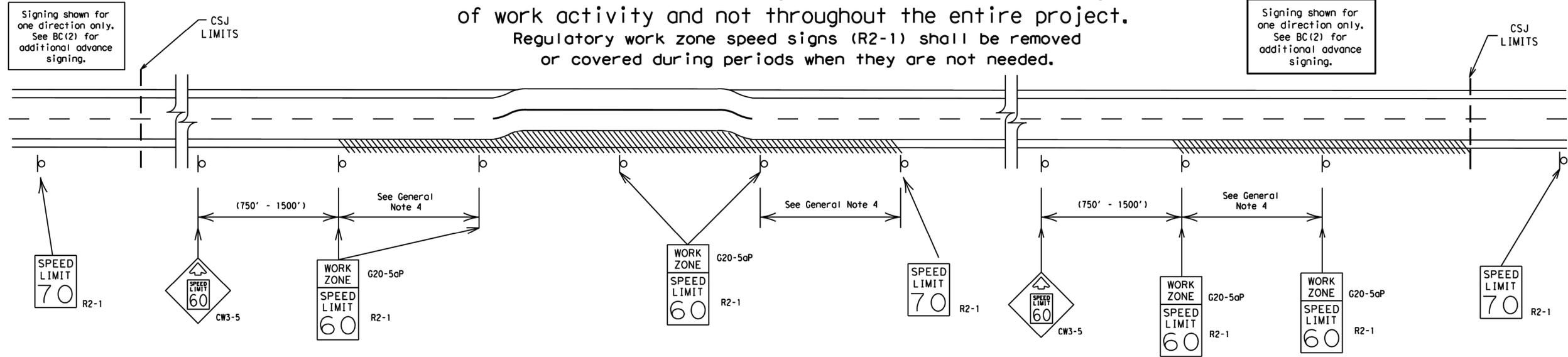
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DATE: FILE:

TYPICAL APPLICATION OF WORK ZONE SPEED LIMIT SIGNS

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

Reduced speeds should only be posted in the vicinity of work activity and not throughout the entire project. Regulatory work zone speed signs (R2-1) shall be removed or covered during periods when they are not needed.



GUIDANCE FOR USE:

LONG/INTERMEDIATE TERM WORK ZONE SPEED LIMITS

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

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

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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

SHEET 3 OF 12

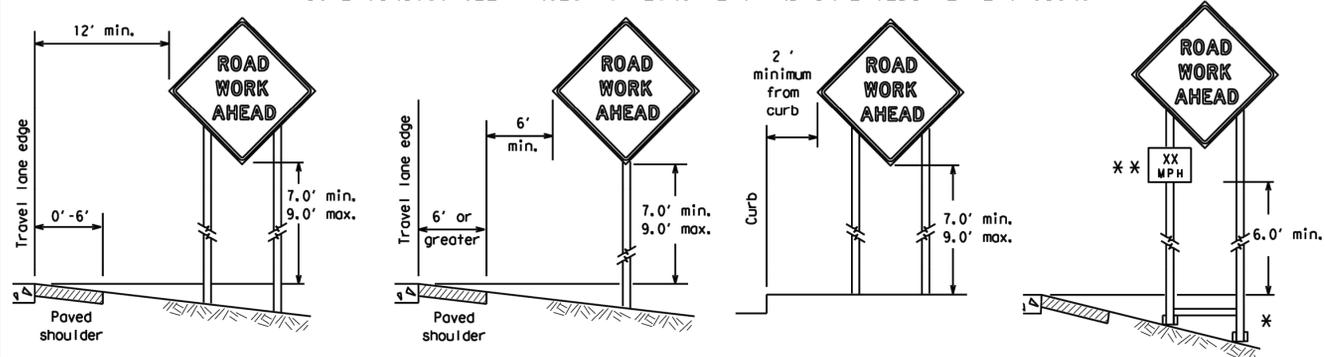
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT			
BC (3) - 21			
FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DR: TxDOT
© TxDOT November 2002	CONT	SECT	JOB
REVISIONS		HIGHWAY	
9-07	8-14	DIST	COUNTY
7-13	5-21	SHEET NO.	



REVISIONS	DATE

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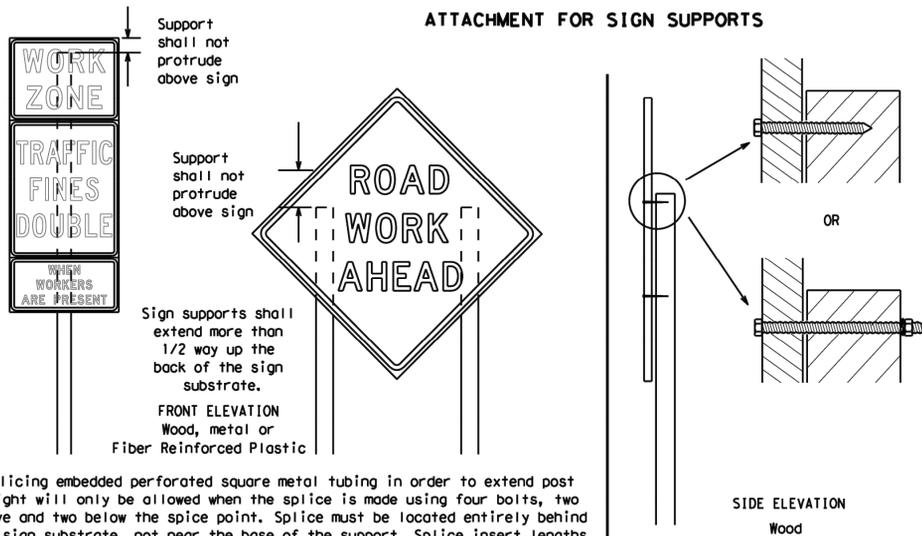
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



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

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

ATTACHMENT FOR SIGN SUPPORTS



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

GENERAL NOTES FOR WORK ZONE SIGNS

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

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

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

SIGN MOUNTING HEIGHT

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

SIZE OF SIGNS

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

SIGN SUBSTRATES

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

REFLECTIVE SHEETING

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

SIGN LETTERS

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

REMOVING OR COVERING

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

SIGN SUPPORT WEIGHTS

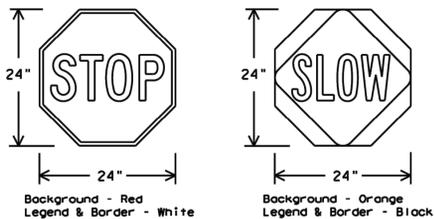
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not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

FLAGS ON SIGNS

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

STOP/SLOW PADDLES

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



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

CONTRACTOR REQUIREMENTS FOR MAINTAINING PERMANENT SIGNS WITHIN THE PROJECT LIMITS

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

SHEET 4 OF 12

Texas Department of Transportation Traffic Safety Division Standard

BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 21

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



REVISIONS

NO. DATE

DATE 04/01/2025

PROJECT NO. 2301020

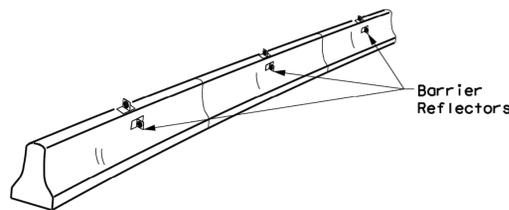
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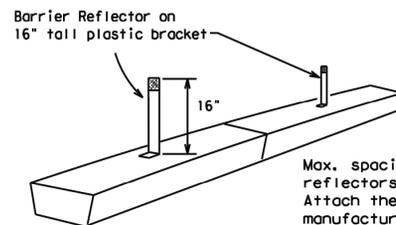
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- Barrier Reflectors shall be pre-qualified, and conform to the color and reflectivity requirements of DMS-8600. A list of prequalified Barrier Reflectors can be found at the Material Producer List web address shown on BC(1).
- Color of Barrier Reflectors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



CONCRETE TRAFFIC BARRIER (CTB)

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

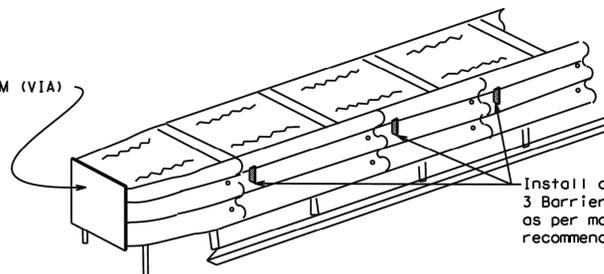


LOW PROFILE CONCRETE BARRIER (LPCB)

LOW PROFILE CONCRETE BARRIER (LPCB) USED IN WORK ZONES

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

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



DELINEATION OF END TREATMENTS

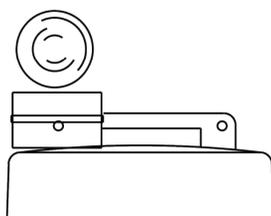
END TREATMENTS FOR CTB'S USED IN WORK ZONES

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

BARRIER REFLECTORS FOR CONCRETE TRAFFIC BARRIER AND ATTENUATORS

WARNING LIGHTS

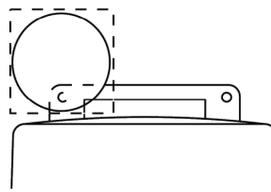
- Warning lights shall meet the requirements of the TMUTCD.
- Warning lights shall NOT be installed on barricades.
- Type A-Low Intensity Flashing Warning Lights are commonly used with drums. They are intended to warn of or mark a potentially hazardous area. Their use shall be as indicated on this sheet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



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

WARNING LIGHTS MOUNTED ON PLASTIC DRUMS

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



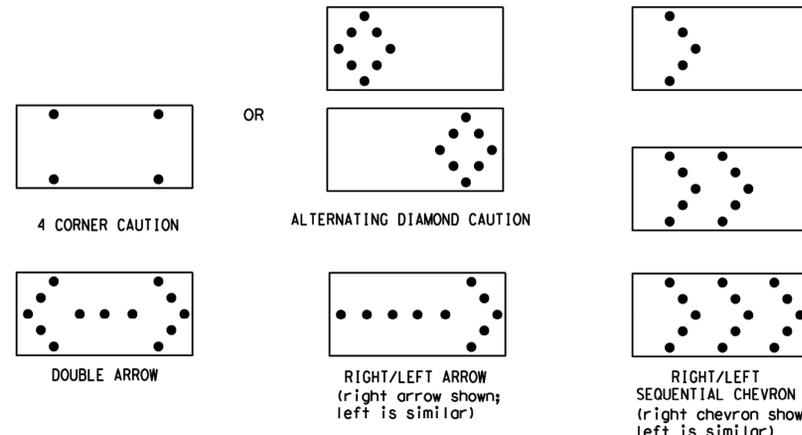
Warning reflector may be round or square. Must have a yellow reflective surface area of at least 30 square inches

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

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

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

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



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

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

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

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

FLASHING ARROW BOARDS

SHEET 7 OF 12

TRUCK-MOUNTED ATTENUATORS

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

Traffic Safety Division Standard

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

BC (7) - 21

FILE: bc-21.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT November 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
9-07	8-14			
7-13	5-21			
DIST		COUNTY		SHEET NO.

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GENERAL NOTES

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

GENERAL DESIGN REQUIREMENTS

Pre-qualified plastic drums shall meet the following requirements:

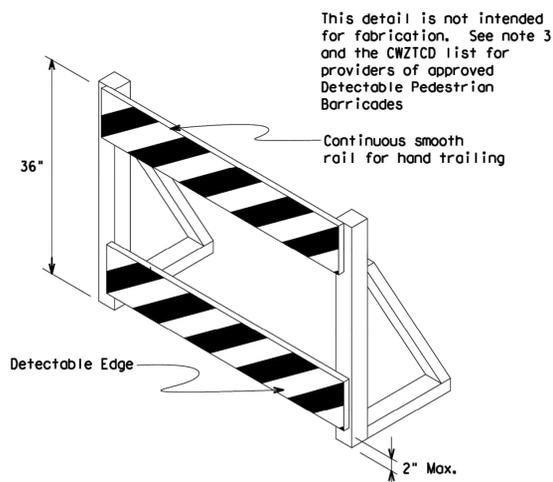
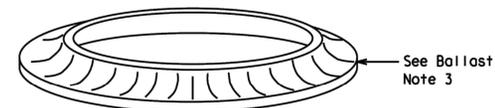
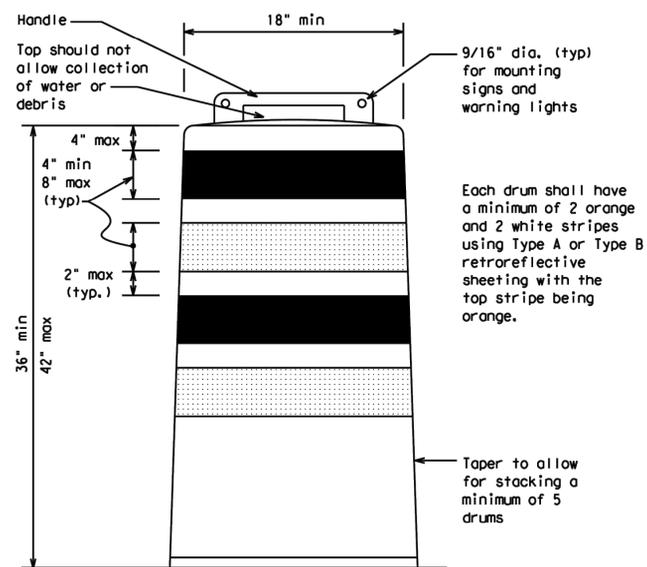
- Plastic drums shall be a two-piece design; the "body" of the drum shall be the top portion and the "base" shall be the bottom.
- The body and base shall lock together in such a manner that the body separates from the base when impacted by a vehicle traveling at a speed of 20 MPH or greater but prevents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

RETROREFLECTIVE SHEETING

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

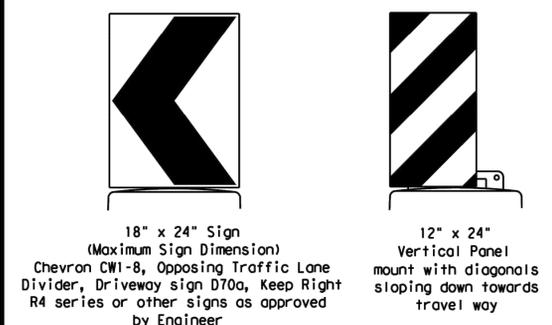
BALLAST

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



DETECTABLE PEDESTRIAN BARRICADES

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



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

SIGNS, CHEVRONS, AND VERTICAL PANELS MOUNTED ON PLASTIC DRUMS

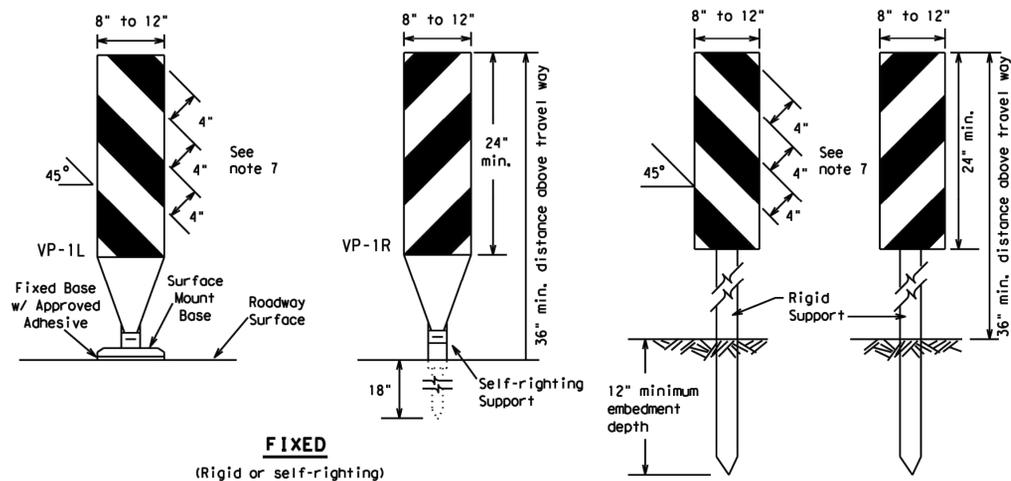
- Signs used on plastic drums shall be manufactured using substrates listed on the CWZTCD.
- Chevrons and other work zone signs with an orange background shall be manufactured with Type B_{FL} or Type C_{FL} Orange sheeting meeting the color and retroreflectivity requirements of DMS-8300, "Sign Face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

SHEET 8 OF 12

BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES			
BC (8) - 21			
FILE:	bc-21.dgn	DN:	TxDOT
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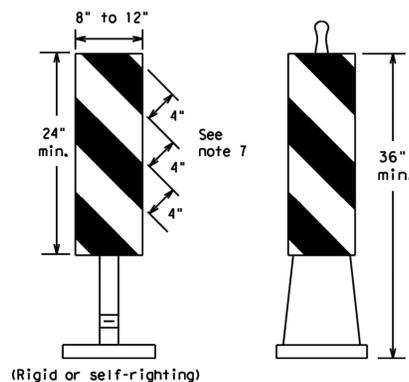
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FIXED
(Rigid or self-righting)

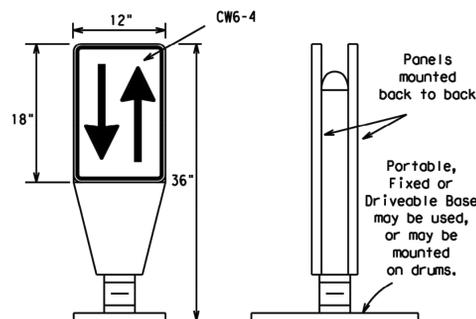
DRIVEABLE



PORTABLE

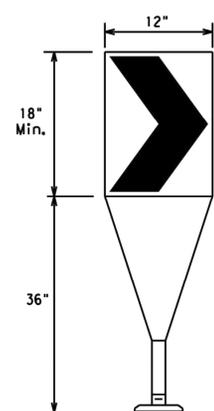
VERTICAL PANELS (VPs)

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



OPPOSING TRAFFIC LANE DIVIDERS (OTLD)

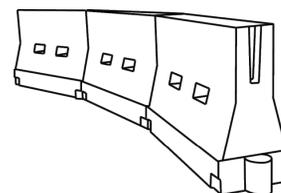
- Opposing Traffic Lane Dividers (OTLD) are delineation devices designed to convert a normal one-way roadway section to two-way operation. OTLD's are used on temporary centerlines. The upward and downward arrows on the sign's face indicate the direction of traffic on either side of the divider. The base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



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

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

CHEVRONS



LONGITUDINAL CHANNELIZING DEVICES (LCD)

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

WATER BALLASTED SYSTEMS USED AS BARRIERS

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

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

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

GENERAL NOTES

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

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

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

SUGGESTED MAXIMUM SPACING OF CHANNELIZING DEVICES AND MINIMUM DESIRABLE TAPER LENGTHS

SHEET 9 OF 12



BARRICADE AND CONSTRUCTION CHANNELIZING DEVICES

BC (9) - 21

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9-07	8-14			
7-13	5-21			
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NO. DATE

DATE 04/01/2025

PROJECT NO. 2301020

SHEET NO.

C10.08

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WORK ZONE PAVEMENT MARKINGS

GENERAL

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

RAISED PAVEMENT MARKERS

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

PREFABRICATED PAVEMENT MARKINGS

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

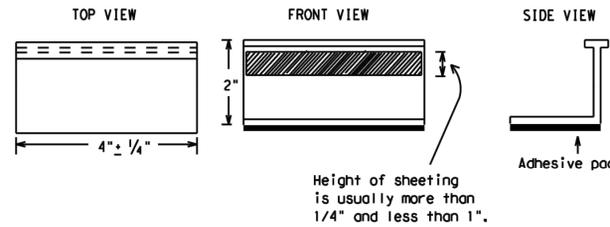
MAINTAINING WORK ZONE PAVEMENT MARKINGS

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

REMOVAL OF PAVEMENT MARKINGS

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

Temporary Flexible-Reflective Roadway Marker Tabs



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

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

RAISED PAVEMENT MARKERS USED AS GUIDEMARKS

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

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

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

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



SHEET 11 OF 12



BARRICADE AND CONSTRUCTION PAVEMENT MARKINGS

BC(11) - 21

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1-02	7-13			
11-02	8-14			
	DIST	COUNTY	SHEET NO.	

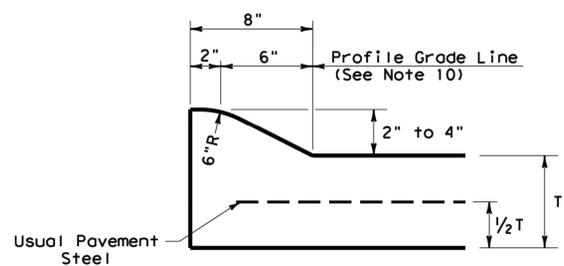
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 PROJECT NO.: 2301020
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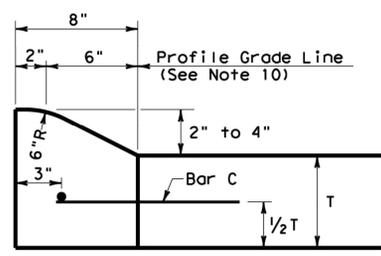
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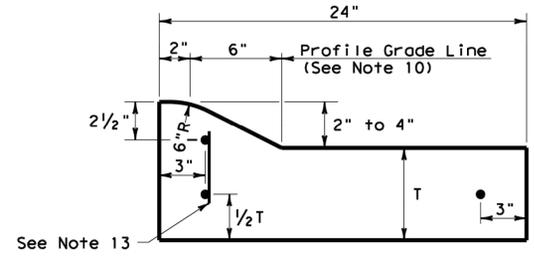
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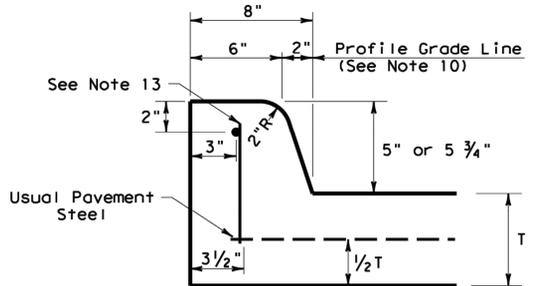
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



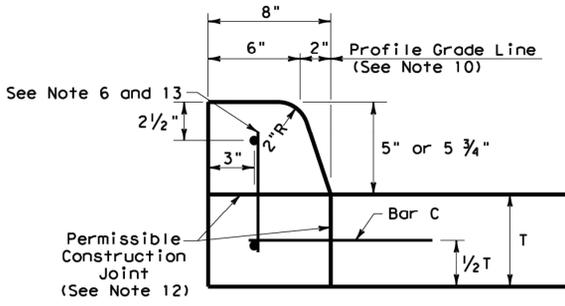
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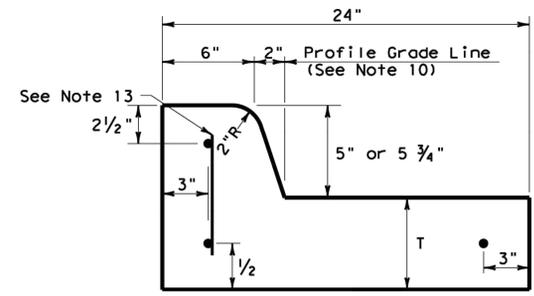
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



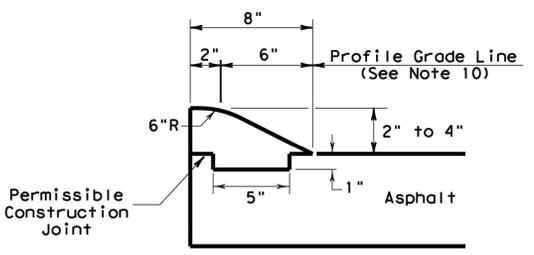
TYPE II CURB (MONOLITHIC)
5" - 5 3/4" HEIGHT



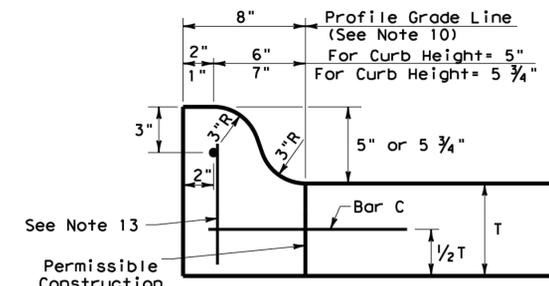
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5" - 5 3/4" HEIGHT



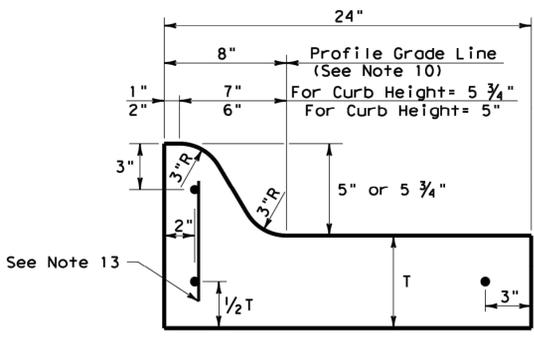
TYPE II CURB AND GUTTER
5" - 5 3/4" HEIGHT



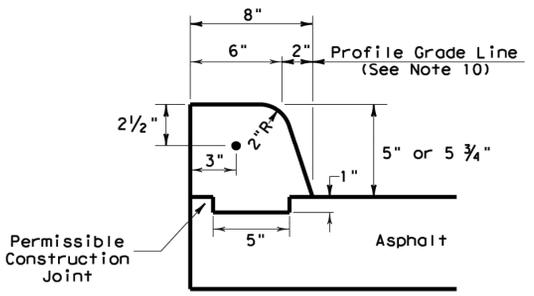
TYPE III CURB (KEYED)
2" - 4" HEIGHT



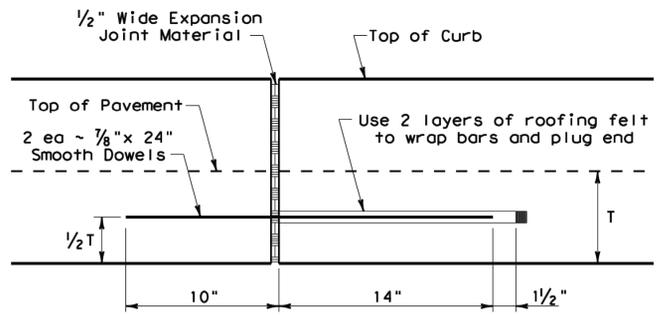
TYPE IIIa CURB
5" - 5 3/4" HEIGHT



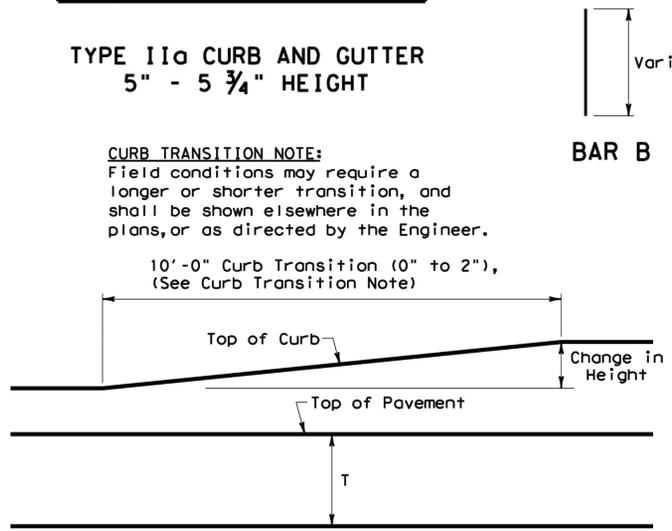
TYPE IIIa CURB AND GUTTER
5" - 5 3/4" HEIGHT



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



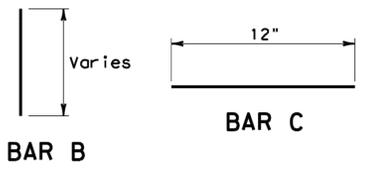
EXPANSION JOINT DETAIL



CURB TRANSITION
Note: To be paid for as Highest Curb

GENERAL NOTES

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



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

Texas Department of Transportation
Design Division Standard

CONCRETE CURB AND GUTTER

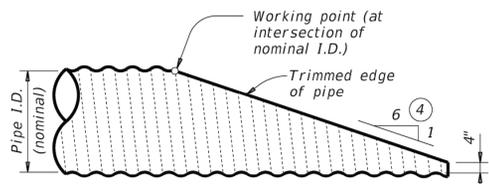
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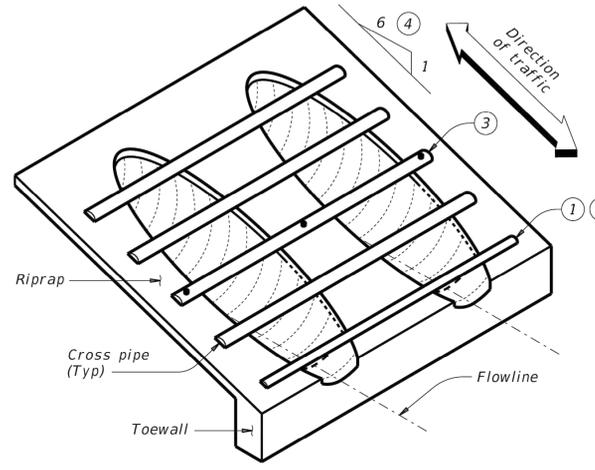
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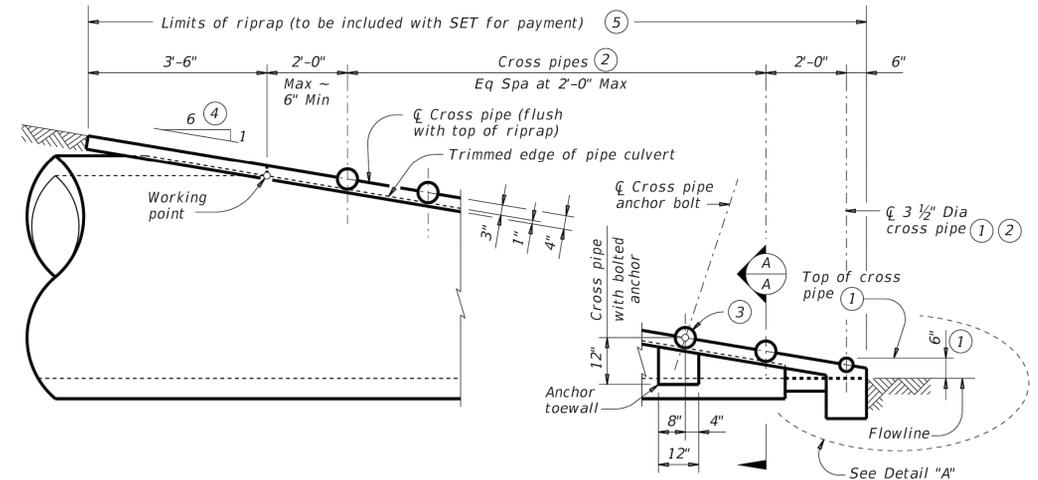
NOTE: All cross pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

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

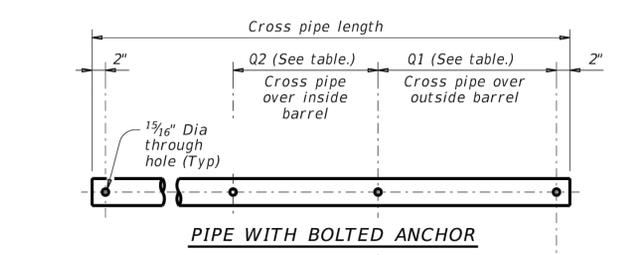


ISOMETRIC VIEW OF TYPICAL INSTALLATION

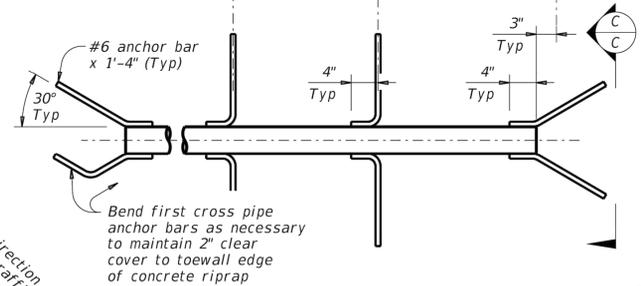


SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

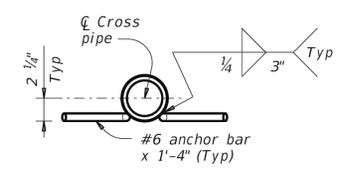
(Showing reinforced concrete pipe (RCP) culvert. Details at corrugated metal pipe (CMP) culvert are similar.)



PIPE WITH BOLTED ANCHOR

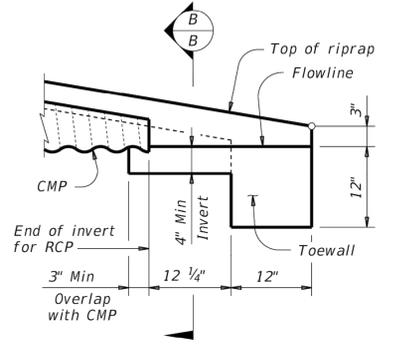


PIPE WITH ANCHOR BARS



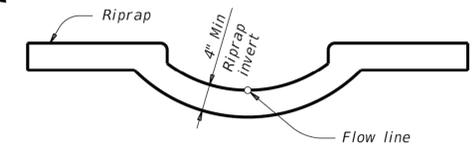
SECTION C-C

CROSS PIPE DETAILS



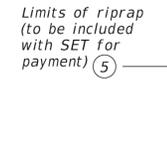
DETAIL "A"

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

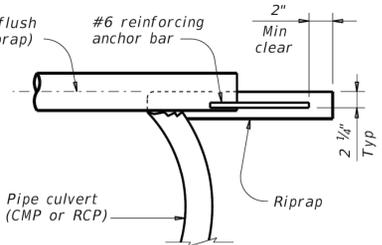


SECTION B-B

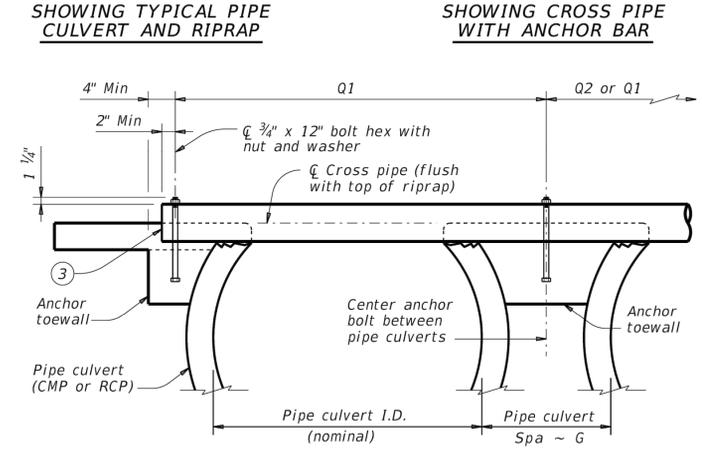
(Cross pipes not shown for clarity.)



SHOWING TYPICAL PIPE CULVERT AND RIPRAP



SHOWING CROSS PIPE WITH ANCHOR BAR



SECTION A-A

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, AND RIPRAP QUANTITIES

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

- The proper installation of the first cross pipe is critical for vehicle safety. Place the top of the first cross pipe no more than 6" above the flow line.
- Provide cross pipes, except the first bottom pipe, of the size shown in the table. Provide a 3 1/2" standard pipe (4" O.D.) for the first bottom pipe.
- Install the third cross pipe from the bottom of the culvert using a bolted connection. Ensure that riprap concrete does not flow into the cross pipe so as to permit disassembly of the bolted connection to allow cleanout access. At the Contractor's option, install all other cross pipes using the bolted connection details.
- Match cross slope as shown elsewhere in the plans. Cross slope of 6:1 or flatter is required for vehicle safety.
- Riprap placed beyond the limits shown will be paid for as concrete riprap in accordance with Item 432, "Riprap."
- Quantities shown are for one end of one reinforced concrete pipe (RCP) culvert. For multiple pipe culverts or for corrugated metal pipe (CMP) culverts, quantities will need to be adjusted. Riprap quantities are for contractor's information only.

MATERIAL NOTES:

Synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) may be used in lieu of steel reinforcing in riprap concrete unless noted otherwise. Provide cross pipes that meet the requirements of ASTM A53 (Type E or S, Gr B), ASTM A500 (Gr B), or API 5LX52. Provide ASTM A307 bolts and nuts. Galvanize all steel components, except concrete reinforcing, after fabrication. Repair galvanizing damaged during transport or construction in accordance with the specifications.

GENERAL NOTES:

Cross pipes are designed for a traversing load of 10,000 pounds at yield as recommended by Research Report 280-2F, "Safety Treatment of Roadside Parallel-Drainage Structures", Texas Transportation Institute, March 1981. Safety end treatments (SET) shown herein are intended for use in those installations where out of control vehicles are likely to traverse the openings approximately perpendicular to the cross pipes. Construct concrete riprap and all necessary inverts in accordance with the requirements of Item 432, "Riprap." Payment for riprap and toewall is included in the Price Bid for each Safety End Treatment.

Texas Department of Transportation Bridge Division Standard

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

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 REVISIONS DIST COUNTY SHEET NO.

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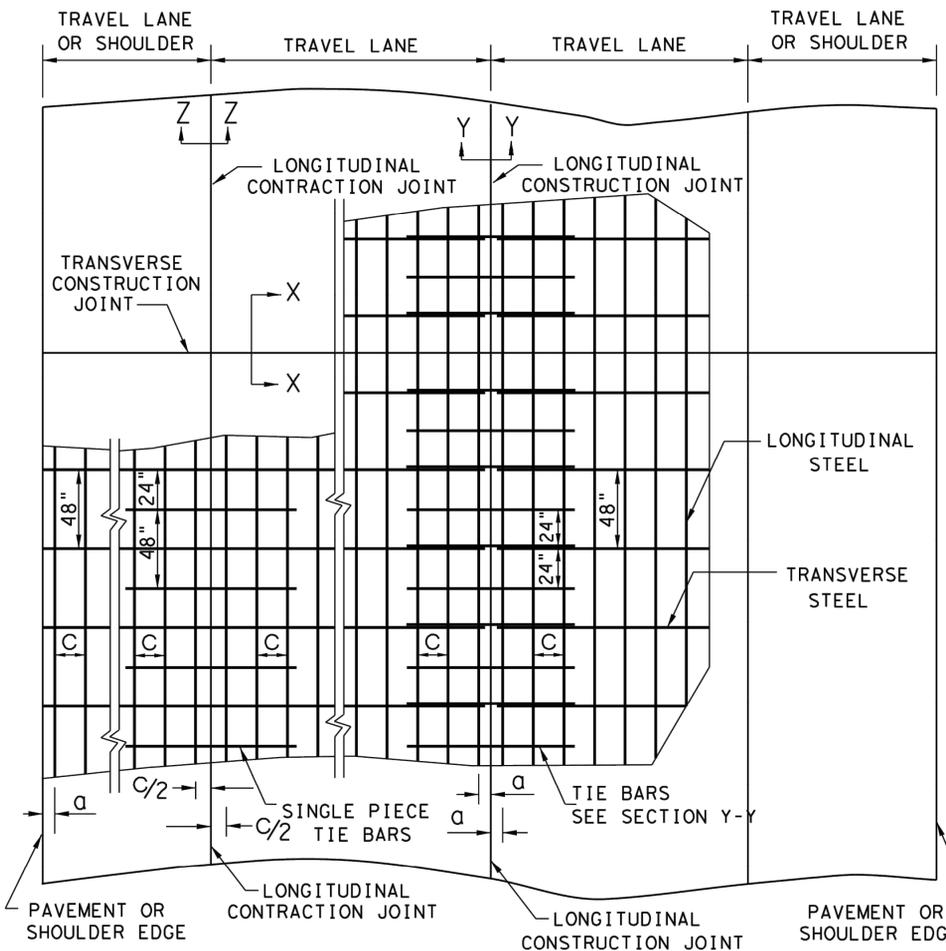
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TABLE NO. 1 LONGITUDINAL STEEL				
SLAB THICKNESS AND BAR SIZE		LONGITUDINAL STEEL BARS	FIRST SPACING AT EDGE OR JOINT	LONG. STEEL VERTICAL POSITION FROM BOTTOM OF PAVEMENT
T (IN.)	BAR SIZE	SPACING C (IN.)	SPACING ϕ (IN.)	T1 (IN.)
7.0	#5	6.5	3 TO 4	3.5
7.5	#5	6.0	3 TO 4	3.75
8.0	#6	9.0	3 TO 4	4.0
8.5	#6	8.5	3 TO 4	4.25
9.0	#6	8.0	3 TO 4	4.5
9.5	#6	7.5	3 TO 4	4.75
10.0	#6	7.0	3 TO 4	5.0
10.5	#6	6.75	3 TO 4	5.5
11.0	#6	6.5	3 TO 4	6.0
11.5	#6	6.25	3 TO 4	6.5
12.0	#6	6.0	3 TO 4	7.0
12.5	#6	5.75	3 TO 4	7.5
13.0	#6	5.5	3 TO 4	8.0

TABLE NO. 2 TRANSVERSE STEEL AND TIE BARS						
SLAB THICKNESS (IN.)	TRANSVERSE STEEL		TIE BARS AT LONGITUDINAL CONTRACTION JOINT (SECTION Z-Z)		TIE BARS AT LONGITUDINAL CONSTRUCTION JOINT (SECTION Y-Y)	
	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)	BAR SIZE	SPACING (IN.)
7.0 - 7.5	#5	48	#5	48	#5	24
8.0 - 13.0	#5	48	#6	48	#6	24

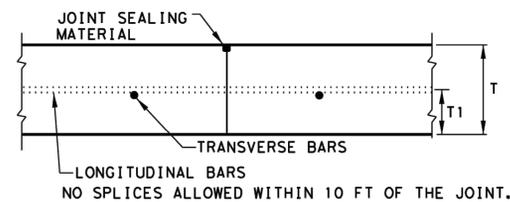
*CONTRACTOR MAY USE #6 REINFORCING STEEL INSTEAD OF #5 REINFORCING STEEL OR COMBINATION OF EACH SIZE



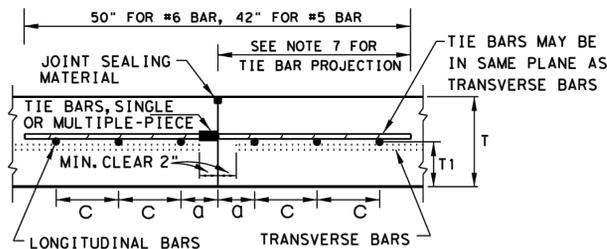
TYPICAL PAVEMENT LAYOUT
PLAN VIEW (NOT TO SCALE)

GENERAL NOTES

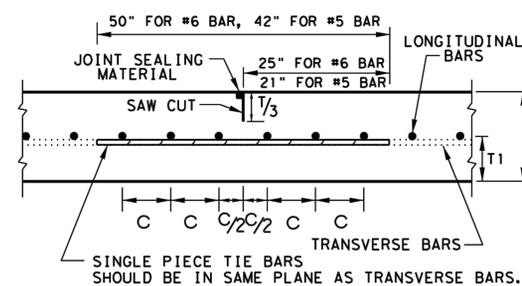
1. DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS AND THE CROWN CROSS-SLOPE SHALL BE SHOWN ELSEWHERE IN THE PLANS. FOR PAVEMENTS WIDER THAN 100 FT. WITHOUT A FREE LONGITUDINAL JOINT, ADDITIONAL DETAIL MAY BE SHOWN ELSEWHERE IN THE PLANS.
2. USE COARSE AGGREGATES WITH A RATED COEFFICIENT OF THERMAL EXPANSION (COTE) OF NOT MORE THAN 5.5×10^{-6} IN/IN/°F AS LISTED IN THE CONCRETE RATED SOURCE QUALITY CATALOG (CRSQC).
3. ALL THE REINFORCING STEEL AND TIE BARS SHALL BE DEFORMED STEEL BARS CONFORMING TO ASTM A 615 (GRADE 60) OR ASTM A 996 (GRADE 60) OR ABOVE. STEEL BAR SIZES AND SPACINGS SHALL CONFORM TO TABLE NO. 1 AND TABLE NO. 2.
4. STEEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1 IN. HORIZONTALLY AND +/- 0.5 IN. VERTICALLY. CALCULATED AVERAGE BAR SPACING (CONCRETE PLACEMENT WIDTH / NUMBER OF LONGITUDINAL BARS) SHALL CONFORM TO TABLE NO. 1.
5. ADJUST REINFORCING STEEL VERTICALLY USING SHIMS OR OTHER METHODS, AS APPROVED, TO MEET VERTICAL TOLERANCES PRIOR TO CONCRETE PLACEMENT.
6. PAVEMENT WIDTHS OF MORE THAN 15 FT. SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR SECTION Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6 IN. OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
7. THE MINIMUM PROJECTION OF TIE BARS INTO THE ADJACENT PLACEMENT IS 22.5 IN. FOR #6 BARS AND 18.5 IN. FOR #5 BARS.
8. SEE STANDARD SHEET "CONCRETE CURB AND CURB AND GUTTER," FOR DETAILS WHEN TYING CONCRETE CURB OR CURB GUTTER AT A LONGITUDINAL JOINT.
9. REPLACE MISSING OR DAMAGED TIE BARS WITHOUT ADDITIONAL COMPENSATION BY DRILLING MIN. 10 IN. DEEP AND GROUTING TIE BARS WITH TYPE III, CLASS C EPOXY. MEET THE PULL-OUT TEST REQUIREMENTS IN ITEM 361.
10. OMIT TIE BARS LOCATED WITHIN 18-IN. OF THE TRANSVERSE CONSTRUCTION JOINTS (SECTION X-X). USE HAND-OPERATED IMMERSION VIBRATORS TO CONSOLIDATE THE CONCRETE ADJACENT TO ALL FORMED JOINTS.
11. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR IS SHOWN ON STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



TRANSVERSE CONSTRUCTION JOINT
SECTION X - X



LONGITUDINAL CONSTRUCTION JOINT
SECTION Y - Y



LONGITUDINAL CONTRACTION JOINT
SECTION Z - Z

SHEET 1 OF 2

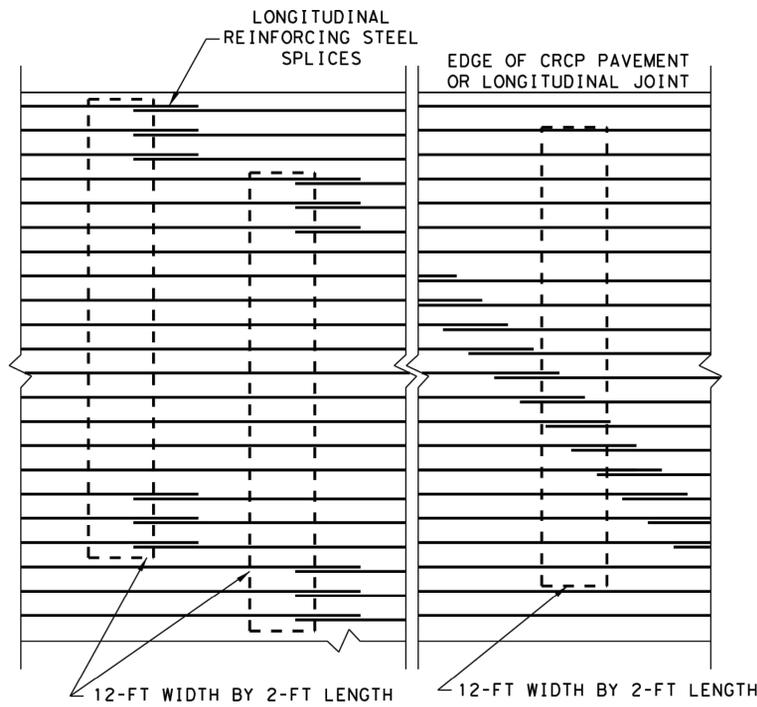
		Design Division Standard	
CONTINUOUSLY REINFORCED CONCRETE PAVEMENT			
ONE LAYER STEEL BAR PLACEMENT			
T - 7 TO 13 INCHES			
CRCP (1) - 23			
FILE: crcp123.dgn	DN: TxDOT	CK: KM	DW: CES
© TxDOT: APRIL 2023	CONT	SECT	JOB
REVISIONS			
APRIL 2023	REVISED LONG. STEEL VERTICAL LOCATION	DIST	COUNTY
APRIL 2023	REVISED LONG. STEEL VERTICAL LOCATION	SHEET NO.	



NO.	DATE	REVISIONS

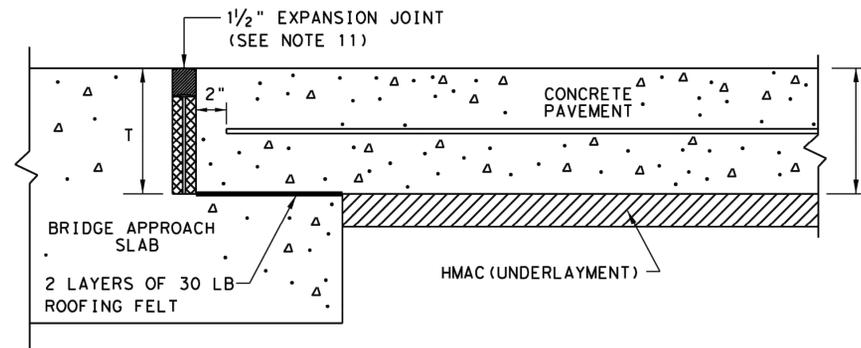
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DATE:
FILE:

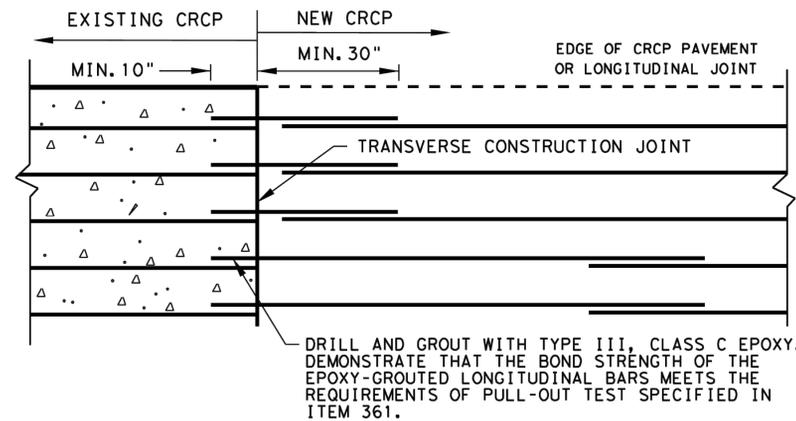


STAGGER THE LAP LOCATIONS SO THAT NO MORE THAN 1/3 OF THE LONGITUDINAL STEEL IS SPLICED IN ANY GIVEN 12-FT. WIDTH AND 2-FT. LENGTH OF THE PAVEMENT. ANY OTHER LAP CONFIGURATION MEETING THIS REQUIREMENT WILL BE ALLOWED.

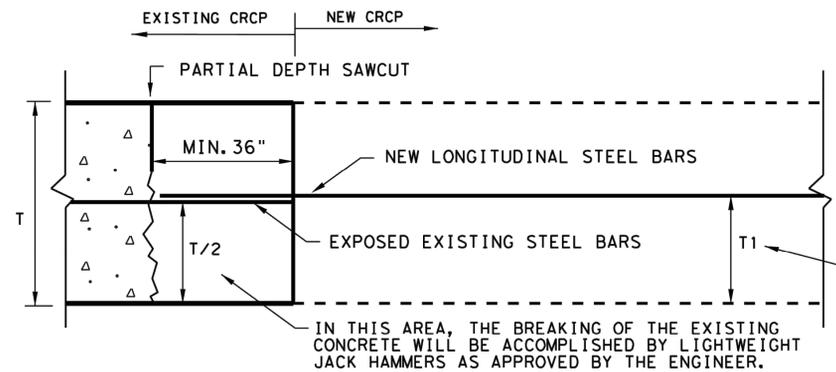
EXAMPLES OF LAP CONFIGURATION
PLAN VIEW (NOT TO SCALE)



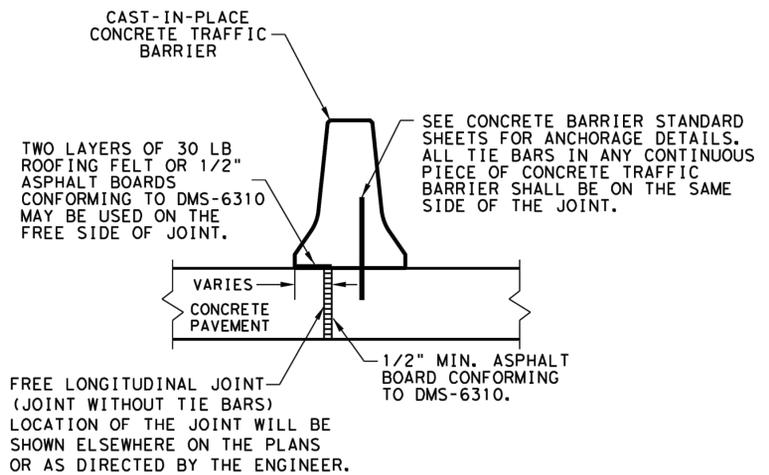
TRANSVERSE EXPANSION JOINT DETAIL
AT BRIDGE APPROACH



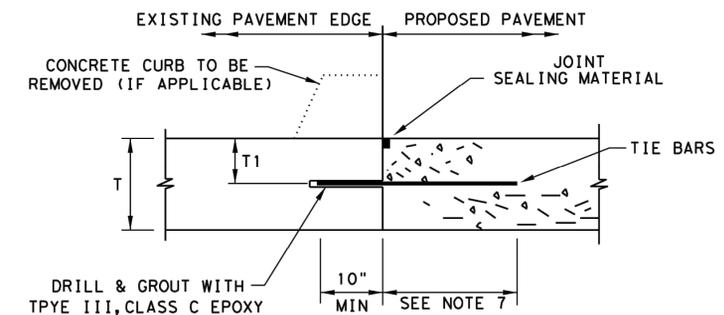
OPTION A: DRILL AND EPOXY
PLAN VIEW (NOT TO SCALE)



OPTION B: BREAKBACK AND LAP
TRANSVERSE TIE JOINT DETAIL
NEW CRCP TO EXISTING CRCP



CENTERLINE FREE LONGITUDINAL JOINT DETAIL



1. BEFORE CONCRETE PLACEMENT, PERFORM PULL-OUT TESTS ON EPOXY-GROUTED TIE BARS IN ACCORDANCE WITH ITEM 360.
2. SPACE TIE BARS AT 24" SPACING. USE #6 TIE BARS FOR 8" AND THICKER PAVEMENTS, USE #5 TIE BARS FOR LESS THAN 8" THICK PAVEMENTS.

LONGITUDINAL WIDENING JOINT DETAIL

SHEET 2 OF 2

Continuously Reinforced Concrete Pavement
ONE LAYER STEEL BAR PLACEMENT
T - 7 TO 13 INCHES
CRCP (1) - 23

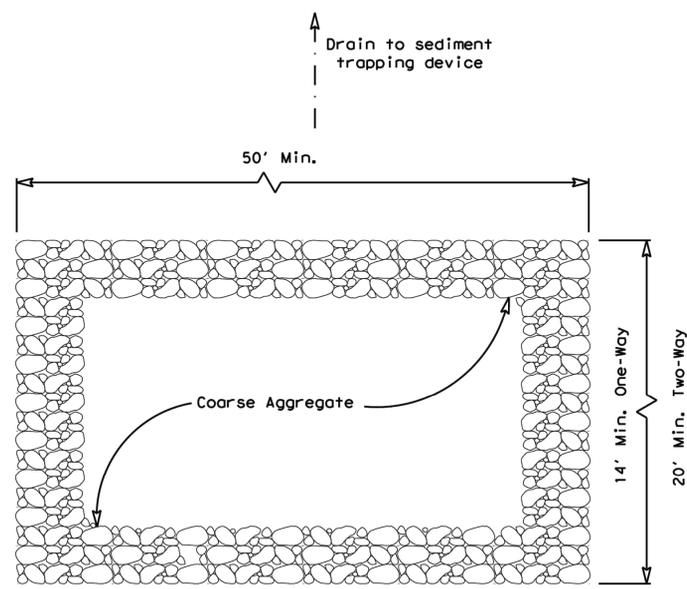
FILE: crcp123.dgn		DN: TxDOT	CK: KM	DN: CES	CK:
© TxDOT: APRIL 2023		CONT	SECT	JOB	HIGHWAY
REVISIONS					
APRIL 2023	REVISED EXPANSION JOINT DETAIL AT BRIDGE APPROACH	DIST	COUNTY	SHEET NO.	



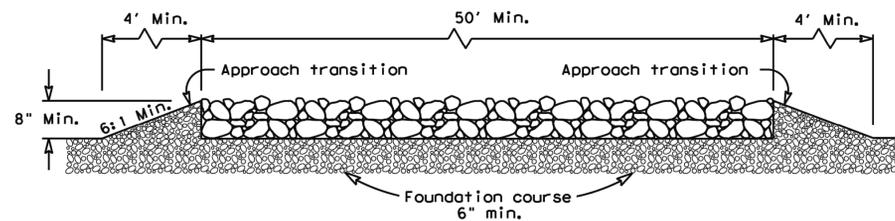
NO.	DATE	REVISIONS

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DATE: \$DATES\$
FILE: \$FILES\$



PLAN VIEW

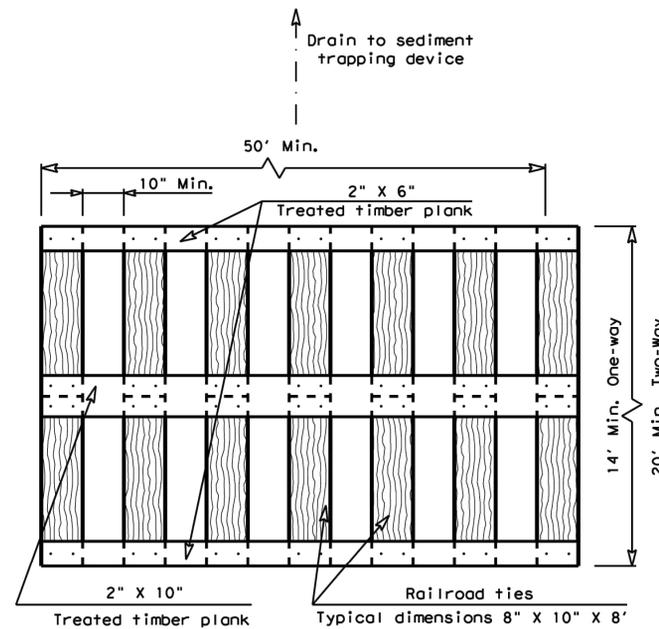


ELEVATION VIEW

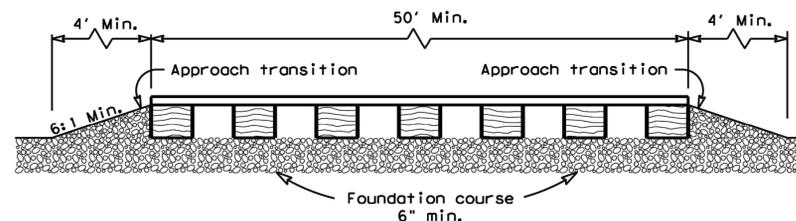
CONSTRUCTION EXIT (TYPE 1)
ROCK CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 1)

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



PLAN VIEW

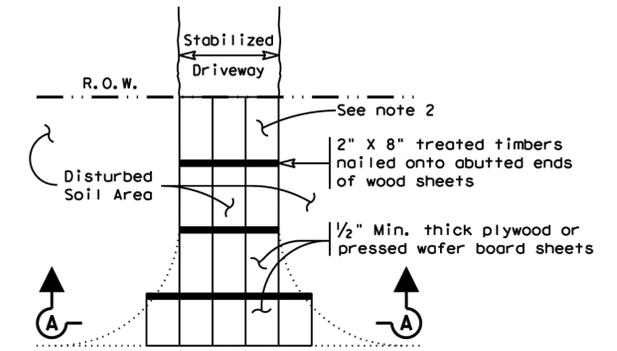


ELEVATION VIEW

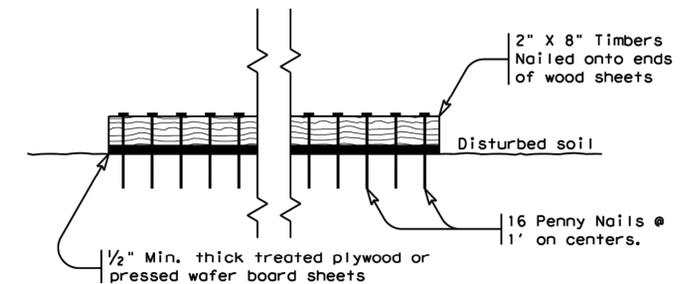
CONSTRUCTION EXIT (TYPE 2)
TIMBER CONSTRUCTION (LONG TERM)

GENERAL NOTES (TYPE 2)

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



PLAN VIEW



SECTION A-A

CONSTRUCTION EXIT (TYPE 3)
SHORT TERM

GENERAL NOTES (TYPE 3)

- The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
- 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.
- The treated timber planks shall be #2 grade min., and should be free from large and loose knots.
- The guidelines shown hereon are suggestions only and may be modified by the Engineer.

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES CONSTRUCTION EXITS EC (3) - 16			
FILE: ec316	DN: TxDOT	CK: M	DN/CK: LS
CONT: JULY 2016	SECT: HIGHWAY	JOB: HIGHWAY	DESIGNER: \$HWYS\$
REVISIONS		DIST: COUNTY	SHEET NO.
\$DST\$	\$CTYS\$	\$EC (3) - 16\$	\$6\$

WESTFALL ENGINEERING
1719 ANGEL PARKWAY
STE 400-206 ALLEN TX 75002
PHONE NO. (214) 846-9397
TPBE FIRM REG. #19101



UHL ROAD PAVING IMPROVEMENTS
UHL ROAD AND FM 664
CITY OF RED OAK, TEXAS
CITY OF GLEN HEIGHTS, TEXAS

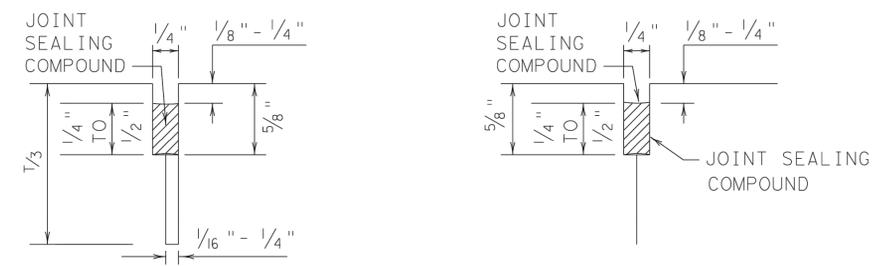
TXDOT DETAILS ESC(3) - 16

REVISIONS	DATE
No.	DATE
DATE	04/01/2025
PROJECT NO.	2301020
SHEET NO.	C10.16

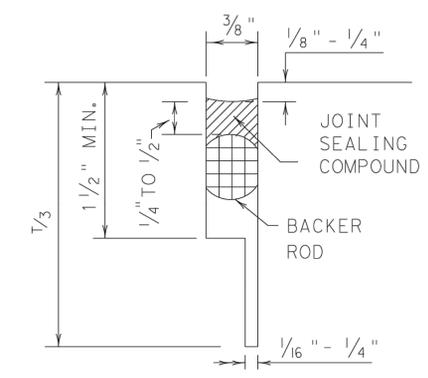
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DATE: FILE:

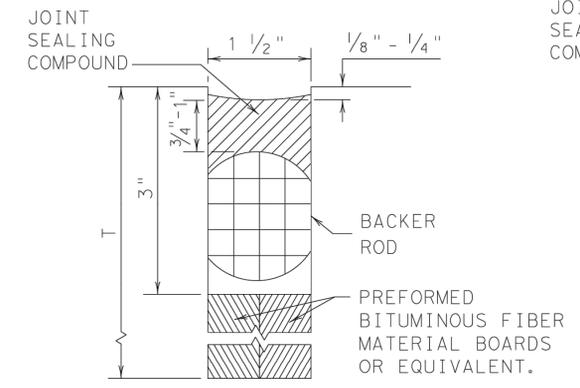
METHOD B: JOINT SEALING COMPOUND



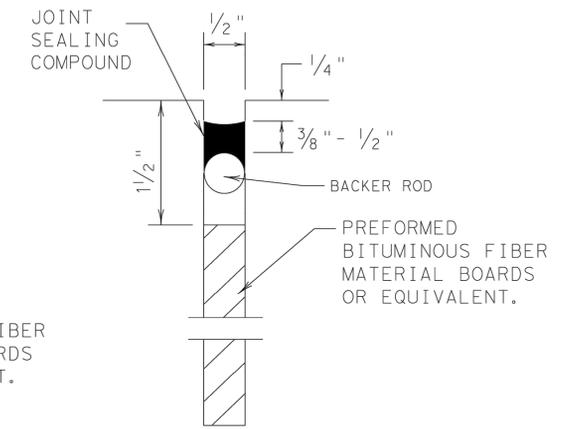
LONGITUDINAL SAWED CONTRACTION JOINT LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT

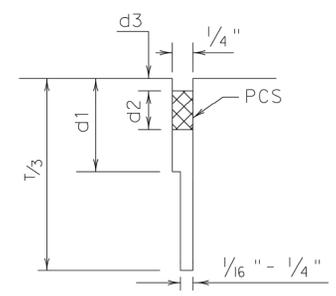


TRANSVERSE FORMED EXPANSION JOINT

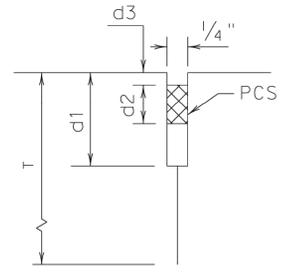


FORMED ISOLATION JOINT

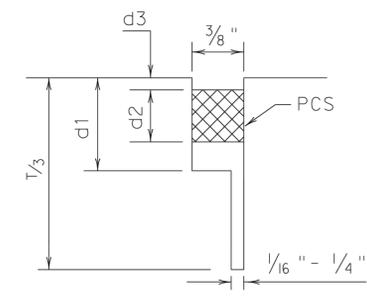
METHOD A: PREFORMED COMPRESSION SEALS (PCS) (DMS-6310 CLASS 6)



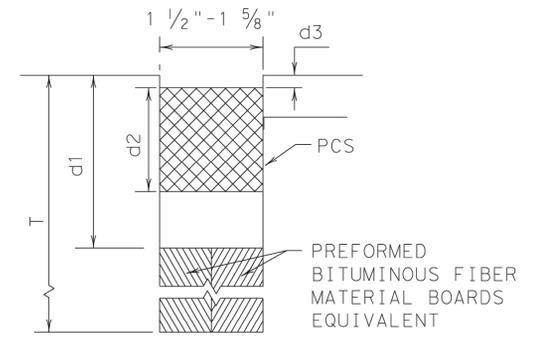
LONGITUDINAL SAWED CONTRACTION JOINT



LONGITUDINAL CONSTRUCTION JOINT



TRANSVERSE SAWED CONTRACTION JOINT



TRANSVERSE FORMED EXPANSION JOINT

GENERAL NOTES

- UNLESS OTHERWISE SHOWN IN THE PLANS, EITHER METHOD "A" OR METHOD "B" MAY BE USED.
- THE LOCATION OF JOINTS SHALL BE AS SHOWN ELSEWHERE IN THE PLANS.
- THE JOINT RESERVOIR FOR SEALANT OR PCS SHALL BE SAWED UNLESS OTHERWISE SHOWN ON THE PLANS FOR THE LONGITUDINAL AND TRANSVERSE CONSTRUCTION JOINTS AND THE SAWED JOINTS.
- DIMENSIONS d1, d2, AND d3 SHOWN IN METHOD A SHALL BE IN ACCORDANCE WITH THE PREFORMED COMPRESSION SEAL MANUFACTURER'S RECOMMENDATION.
- REFER TO DMS-6310 "JOINT SEALANTS AND FILLERS" FOR THE CLASSIFICATIONS.
- FOR SAWED LONGITUDINAL JOINT, LONGITUDINAL OR TRANSVERSE CONSTRUCTION JOINT, USE JOINT SEALANT CLASS 5 OR 8 UNLESS OTHERWISE SHOWN ON THE PLAN OR APPROVED.
- FOR TRANSVERSE SAWED CONTRACTION, TRANSVERSE FORMED EXPANSION JOINT, AND ISOLATION JOINT USE JOINT SEALANT CLASS 5 OR 8 AT NEW JOINTS. USE JOINT SEALANT CLASS 4,5,7, OR 8 FOR MAINTAINING EXISTING JOINTS.
- THE JOINTS SHALL BE CLEANED IN ACCORDANCE WITH THE ITEM 438 "CLEANING AND SEALING JOINTS" OR ITEM 713 "CLEANING AND SEALING JOINTS AND CRACKS (CONCRETE PAVEMENT)".
- ISOLATION JOINTS ACCOMMODATE HORIZONTAL AND VERTICAL MOVEMENTS THAT OCCUR BETWEEN A PAVEMENT AND A STRUCTURE. ISOLATION JOINTS MAY BE USED FOR BRIDGE ABUTMENTS, INTERSECTIONS, CURB AND GUTTER, OLD AND NEW PAVEMENTS, OR AROUND DRAINAGE INLETS, MANHOLES, FOOTINGS AND LIGHTING STRUCTURES.

		Design Division Standard	
CONCRETE PAVING DETAILS JOINT SEALS JS-14			
FILE: js14.dgn	DN: TxDOT	DN: HC	DN: AN
© TxDOT: DECEMBER 2014	CONT	SECT	HIGHWAY
REVISIONS	DIST	COUNTY	SHEET NO.

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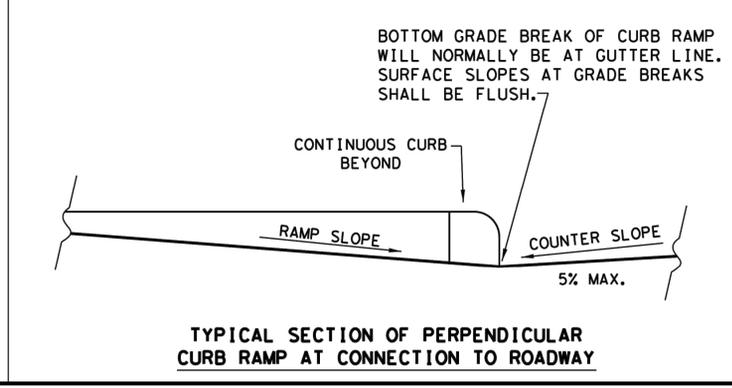
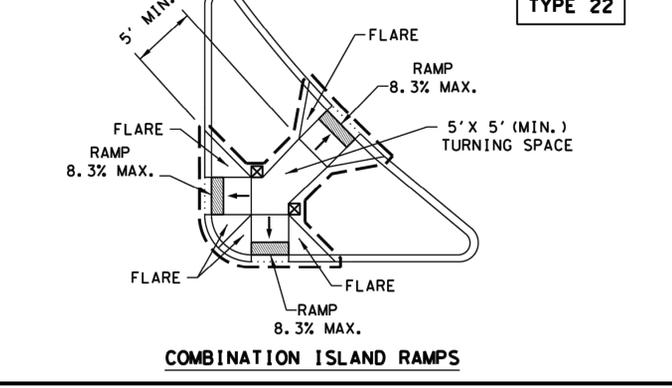
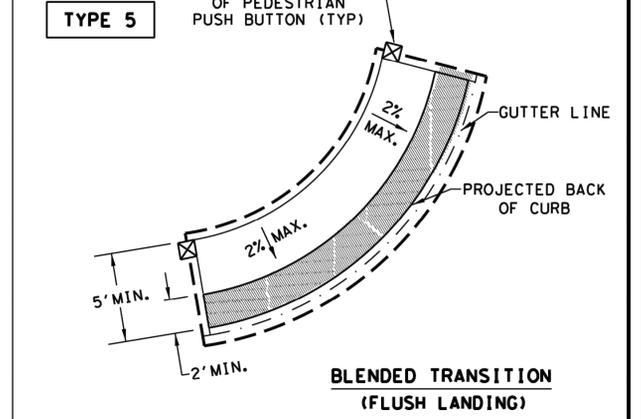
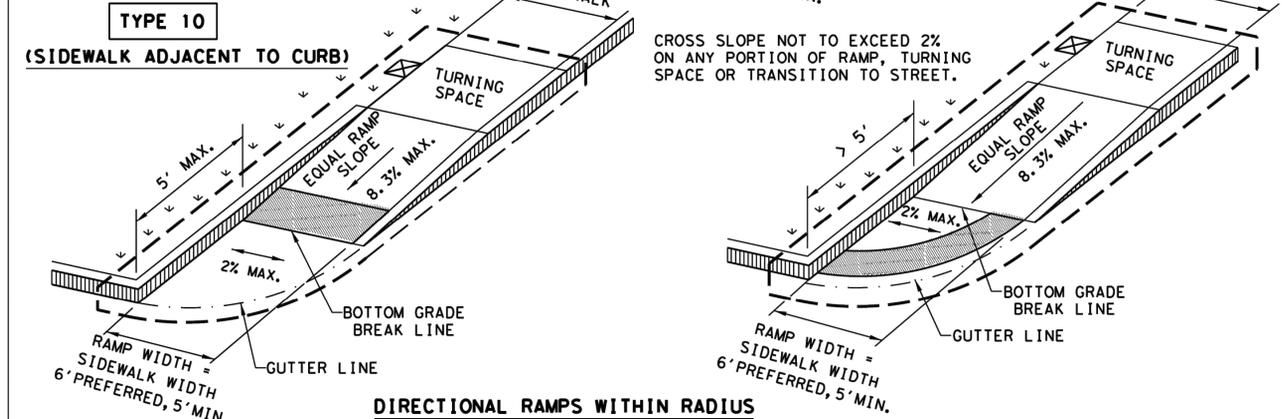
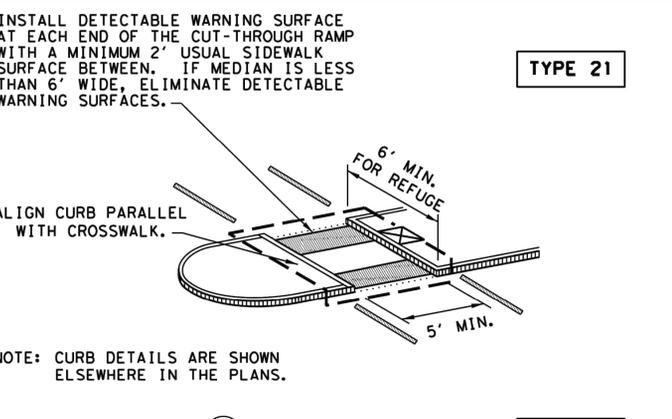
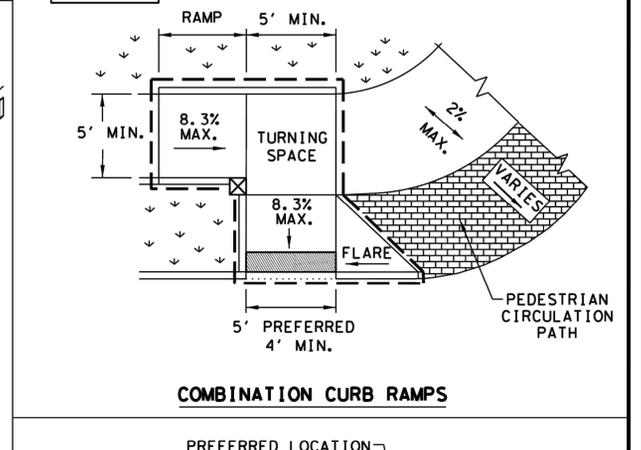
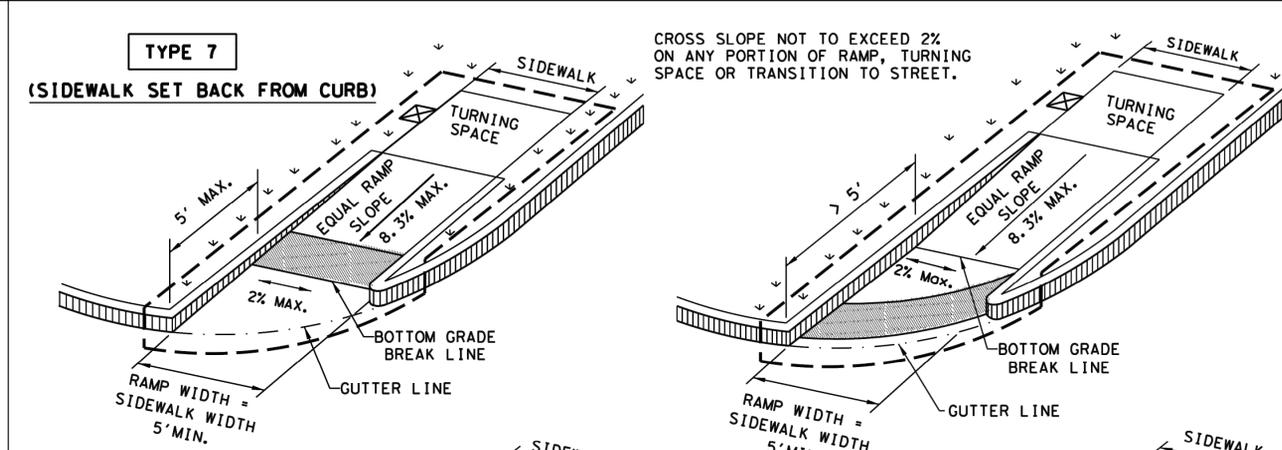
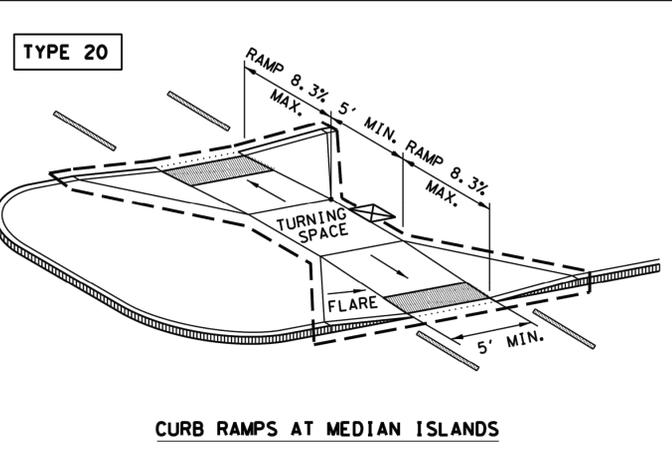
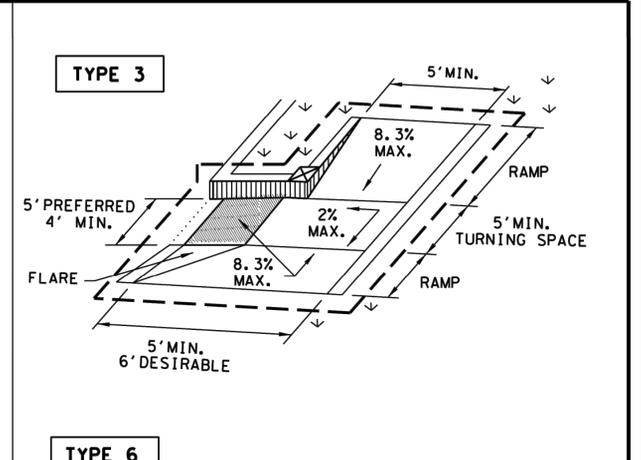
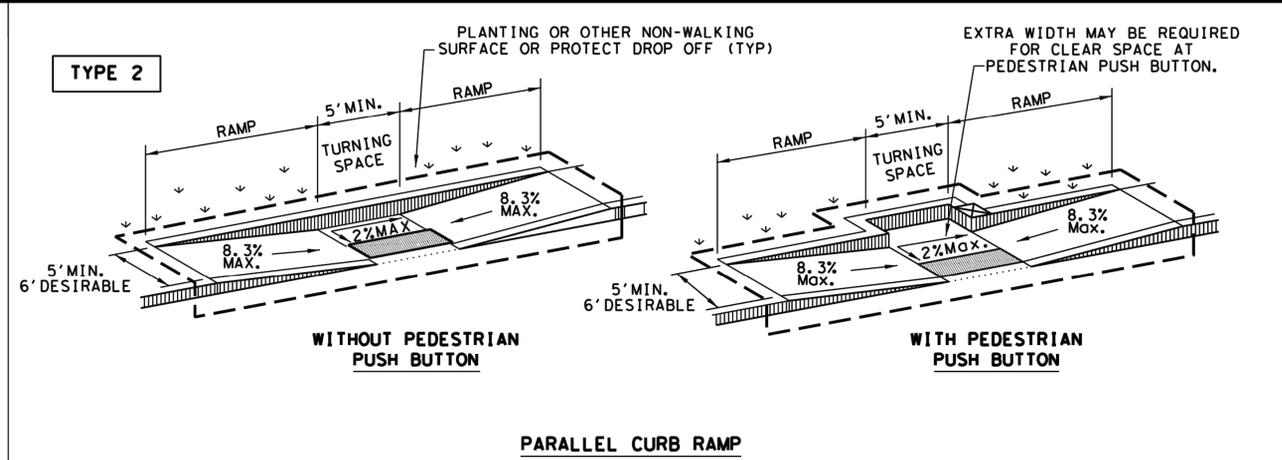
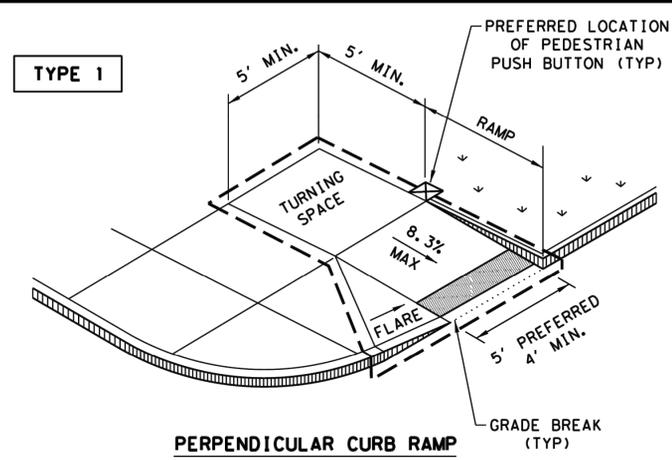
UHL ROAD PAVING IMPROVEMENTS
 UHL ROAD AND FM 664
 CITY OF RED OAK, TEXAS
 CITY OF GLEN HEIGHTS, TEXAS

TXDOT DETAILS JS - 14

REVISIONS	DATE

DATE: 04/01/2025
 PROJECT NO.: 2301020
 SHEET NO.: C10.17

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NOTES / LEGEND:

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

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

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

DETECTABLE WARNING SURFACE

GUTTER LINE

GRADE BREAK

RAMP LIMITS OF PAYMENT

SHEET 1 OF 4

Texas Department of Transportation

Design Division Standard

PEDESTRIAN FACILITIES

CURB RAMPS

PED-18

FILE: ped18	DN: TxDOT	DN: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISED 08, 2005	REVISIONS			
REVISED 06, 2012	DIST	COUNTY	SHEET NO.	
REVISED 01, 2018				

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GENERAL NOTES

CURB RAMPS

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

DETECTABLE WARNING MATERIAL

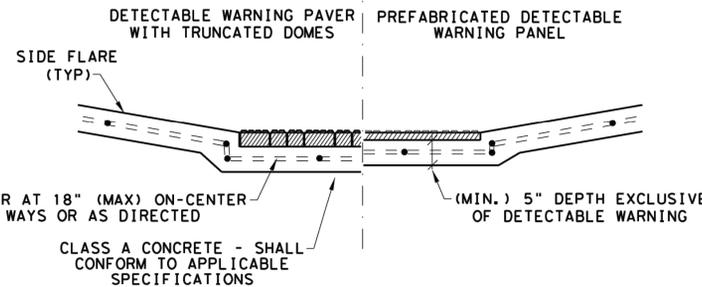
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material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

DETECTABLE WARNING PAVERS (IF USED)

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

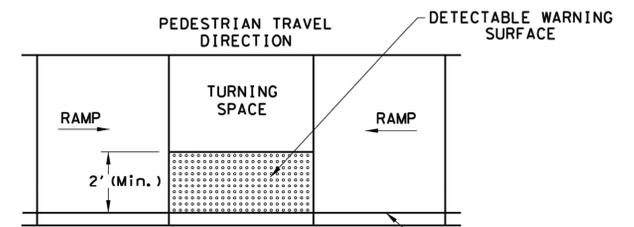
SIDEWALKS

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

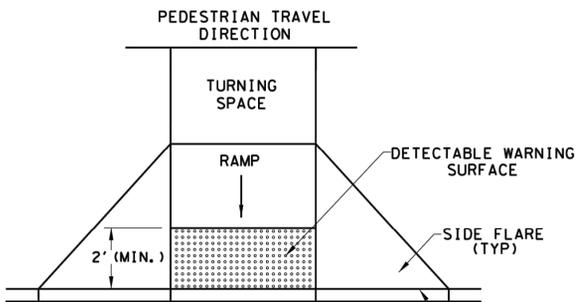


**SECTION VIEW DETAIL
CURB RAMP AT DETECTABLE WARNINGS**

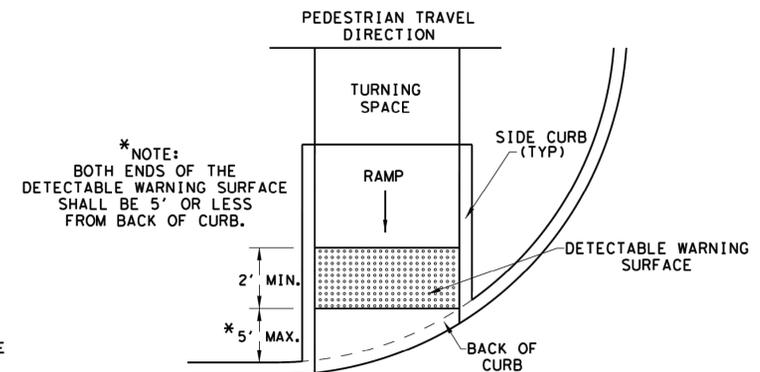
DETECTABLE WARNING SURFACE DETAILS



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



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



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

SHEET 2 OF 4

		Design Division Standard	
PEDESTRIAN FACILITIES CURB RAMPS			
PED-18			
FILE: ped18	DIST	COUNTY	SHEET NO.
© TxDOT: MARCH, 2002	CONT	SECT	HIGHWAY
REVISIONS REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018			

WESTFALL ENGINEERING
1710 ANGEL PARKWAY
STE 400-206 ALLEN TX 75002
PHONE NO. (214) 846-9397
TPPE FIRM REG. #19101



**UHL ROAD
PAVING IMPROVEMENTS**
UHL ROAD AND FM 664
CITY OF RED OAK, TEXAS
CITY OF GLEN HEIGHTS, TEXAS

TXDOT DETAILS PED - 18

REVISIONS	DATE

PROJECT NO. 2301020
SHEET NO. C10.19

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SIGN SUPPORT DESCRIPTIVE CODES

(Descriptive Codes correspond to project estimate and quantities sheets)

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

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

Number of Posts (1 or 2)

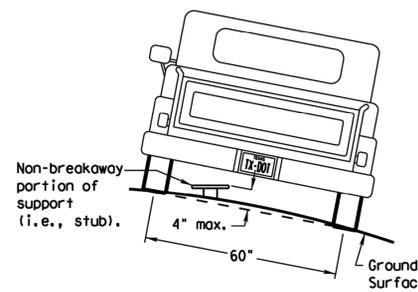
Anchor Type
 UA = Universal Anchor - Concreted (see SMD(FRP) and (TWT))
 UB = Universal Anchor - Bolted down (see SMD(FRP) and (TWT))
 WS = Wedge Anchor Steel - (see SMD(TWT))
 WP = Wedge Anchor Plastic (see SMD(TWT))
 SA = Slipbase - Concreted (see SMD(SLIP-1) to (SLIP-3))
 SB = Slipbase - Bolted Down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

Sign Mounting Designation

P = Prefab. "Plain" (see SMD(SLIP-1) to (SLIP-3), (TWT), (FRP))
 T = Prefab. "T" (see SMD(SLIP-1) to (SLIP-3), (TWT))
 U = Prefab. "U" (see SMD(SLIP-1) to (SLIP-3))

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

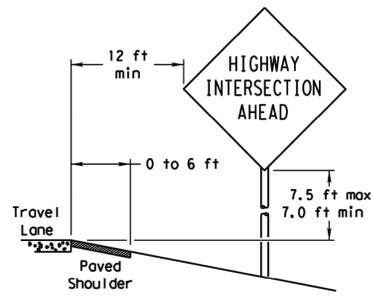
REQUIRED CLEARANCE FOR BREAKAWAY SUPPORT



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

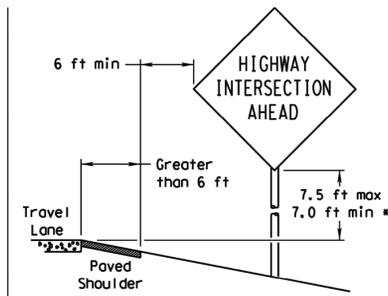
SIGN LOCATION

PAVED SHOULDERS



LESS THAN 6 FT. WIDE

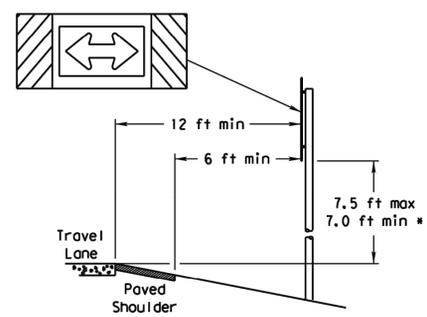
When the shoulder is 6 ft. or less in width, the sign must be placed at least 12 ft. from the edge of the travel lane.



GREATER THAN 6 FT. WIDE

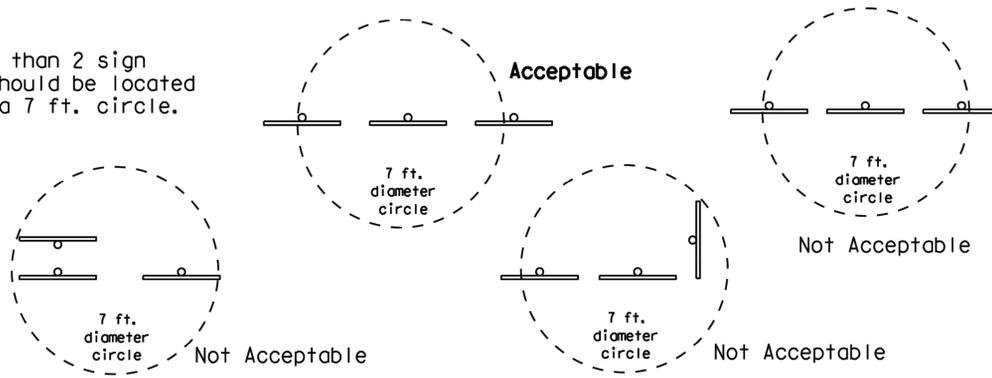
When the shoulder is greater than 6 ft in width, the sign must be placed at least 6 ft. from the edge of the shoulder.

T-INTERSECTION

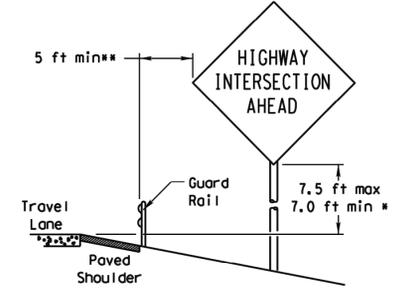


When this sign is needed at the end of a two-lane, two-way roadway, the right edge of the sign should be in line with the centerline of the roadway. Place as close to ROW as practical.

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

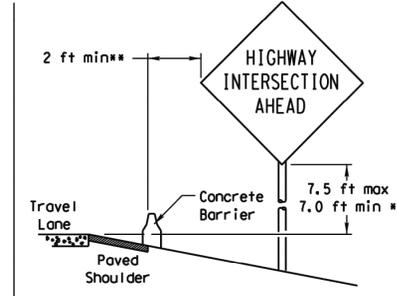


BEHIND BARRIER



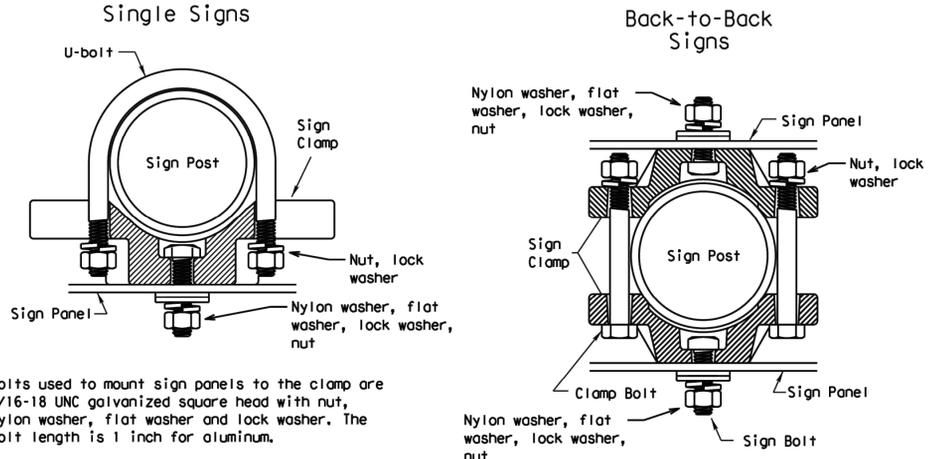
BEHIND GUARDRAIL

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



BEHIND CONCRETE BARRIER

TYPICAL SIGN ATTACHMENT DETAIL



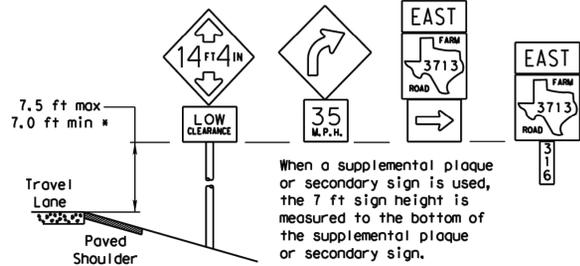
Bolts used to mount sign panels to the clamp are 5/16-18 UNC galvanized square head with nut, nylon washer, flat washer and lock washer. The bolt length is 1 inch for aluminum.

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

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

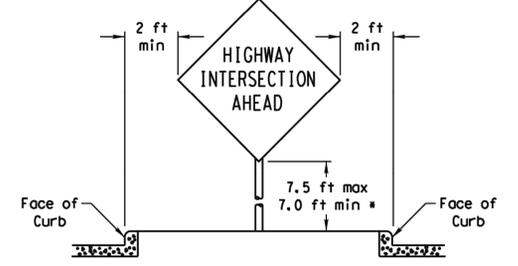
Pipe Diameter	Approximate Bolt Length	
	Specific Clamp	Universal Clamp
2" nominal	3"	3 or 3 1/2"
2 1/2" nominal	3 or 3 1/2"	3 1/2 or 4"
3" nominal	3 1/2 or 4"	4 1/2"

SIGNS WITH PLAQUES

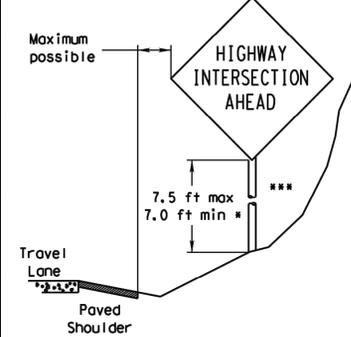


When a supplemental plaque or secondary sign is used, the 7 ft sign height is measured to the bottom of the supplemental plaque or secondary sign.

CURB & GUTTER OR RAISED ISLAND



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



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

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

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

* 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

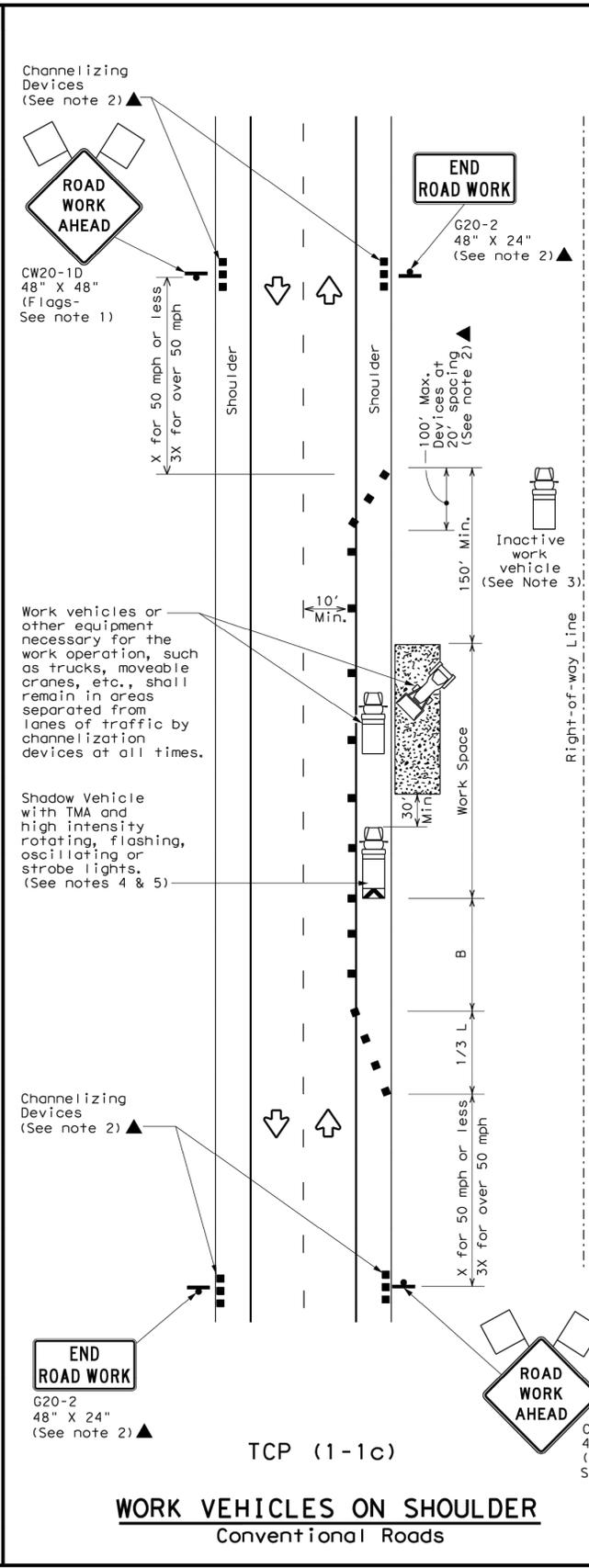
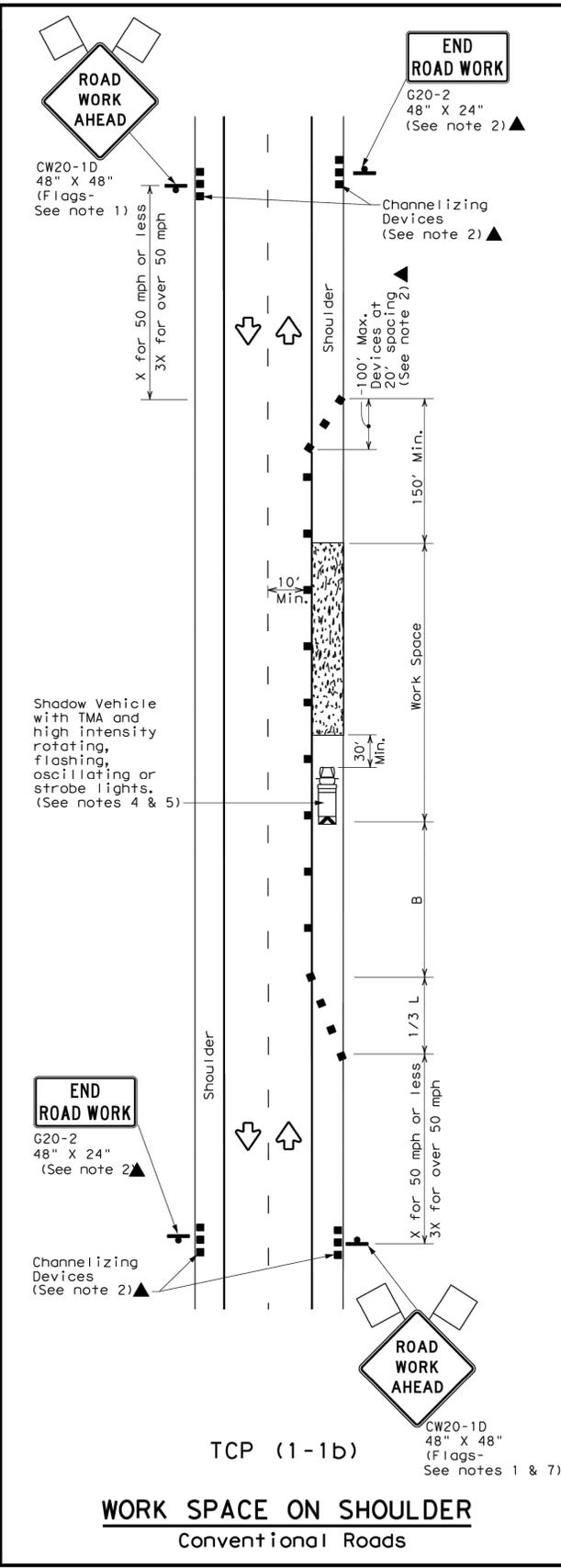
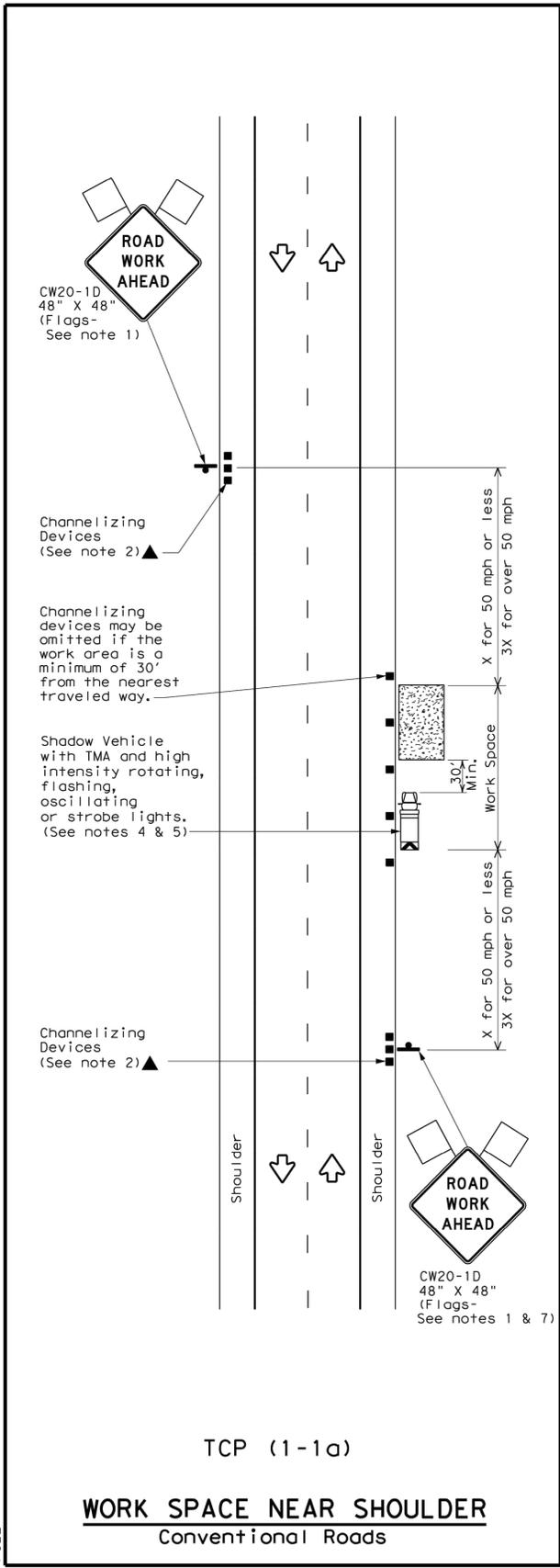
© TxDOT July 2002

9-08	REVISIONS	CONT	SECT	JOB	HIGHWAY

DATE: 04/01/2025
 PROJECT NO: 2301020
 SHEET NO: C10.23

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DATE: FILE:



LEGEND

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

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

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

TYPICAL USAGE

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

GENERAL NOTES

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

Texas Department of Transportation
Traffic Operations Division Standard

TRAFFIC CONTROL PLAN
CONVENTIONAL ROAD
SHOULDER WORK

TCP (1-1) - 18

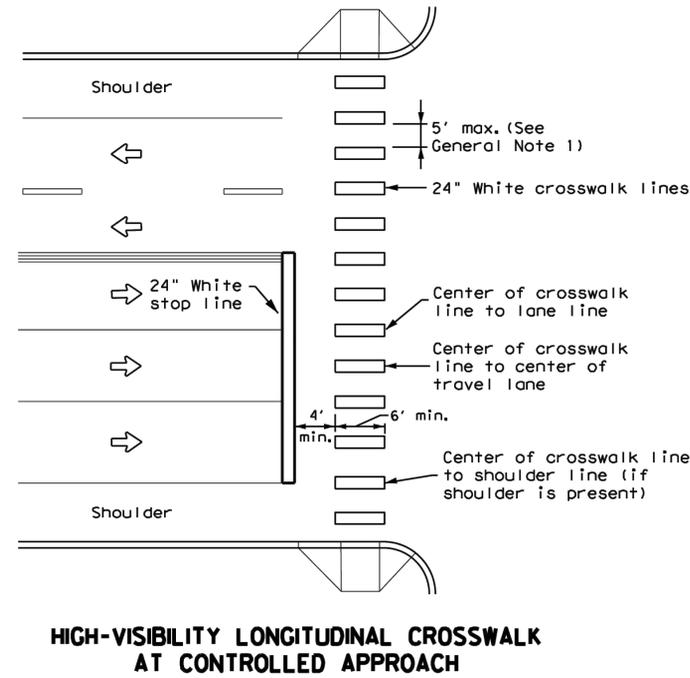
FILE: tcp1-1-18.dgn	DN:	CK:	DW:	CK:
© TxDOT December 1985	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY	SHEET NO.	
2-94 4-98				
8-95 2-12				
1-97 2-18				



NO.	DATE	REVISIONS

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DATE: FILE:



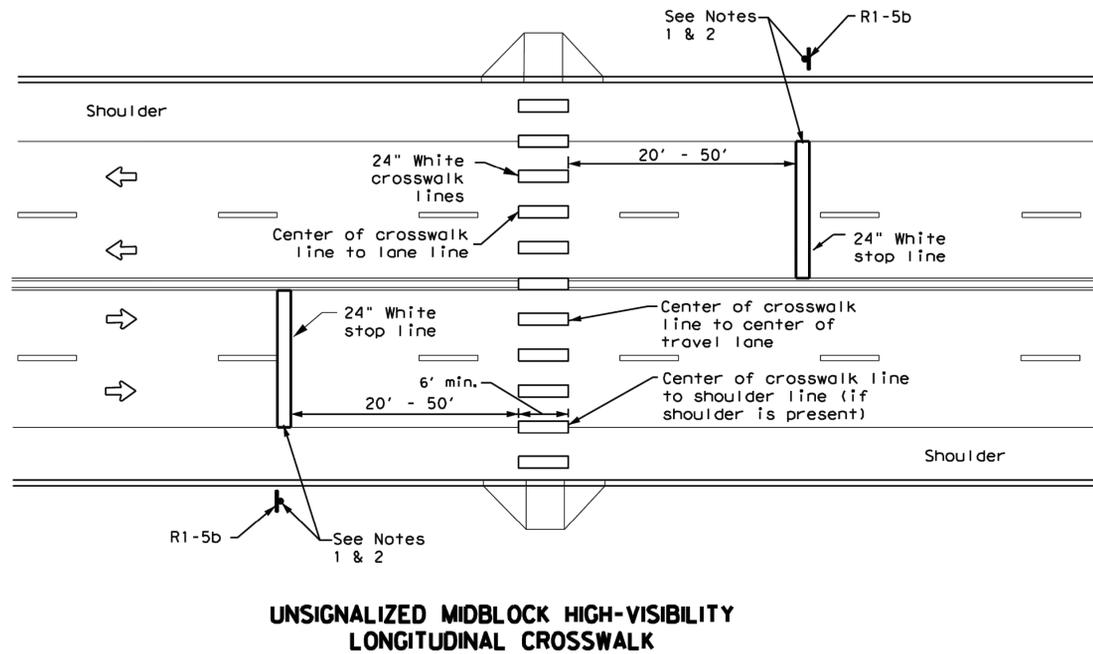
HIGH-VISIBILITY LONGITUDINAL CROSSWALK AT CONTROLLED APPROACH

GENERAL NOTES

1. Longitudinal crosswalk lines should not be placed in the wheel path of vehicles. Center the crosswalk lines on travel lanes, lane lines, and shoulder lines (if present).
2. A minimum 6" clear distance shall be provided to the curb face. If the last crosswalk line falls into this distance it must be omitted.
3. For divided roadways, adjustments in spacing of the crosswalk lines should be made in the median so that the crosswalk lines are maintained in their proper location across the travel portion of the roadway.
4. At skewed crosswalks, the crosswalk lines are to remain parallel to the lane lines.
5. Each crosswalk shall be a minimum of 6' wide.
6. The High-Visibility Longitudinal Crosswalk is the preferred crosswalk pattern on State Highways. Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used. All crosswalk designs and dimension shall comply with the "Texas Manual on Uniform Traffic Control Devices."
7. Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

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

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



UNSIGNALIZED MIDBLOCK HIGH-VISIBILITY LONGITUDINAL CROSSWALK

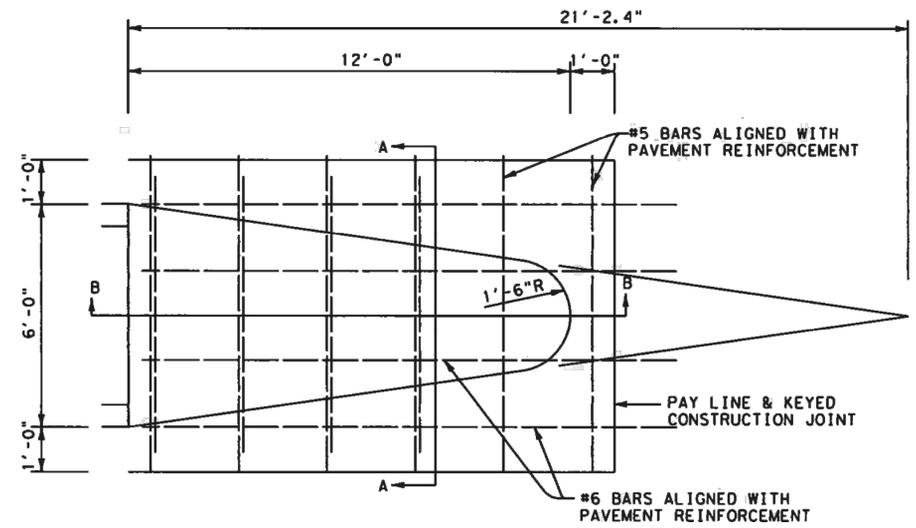
NOTES:

1. Use stop bars with Stop Here For Pedestrians (R1-5b) signs at unsignalized midblock crosswalks.
2. Use stop bars with STOP HERE ON RED (R10-6 or R10-6a) signs at mid block crosswalks controlled by traffic signals or pedestrian hybrid beacons.

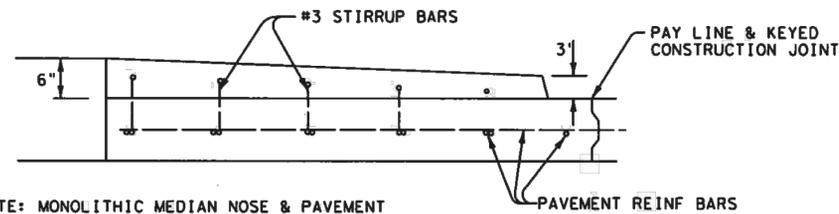
Texas Department of Transportation		Traffic Safety Division Standard	
CROSSWALK PAVEMENT MARKINGS			
PM(4)-22A			
FILE: pm4-22a.dgn	DN:	CK:	DW:
© TxDOT December 2022	CONT:	SECT:	JOB:
REVISIONS		HIGHWAY	
6-20			
6-22			
12-22			
220			
	DIST:	COUNTY:	SHEET NO.:



REVISIONS	
No.	DATE

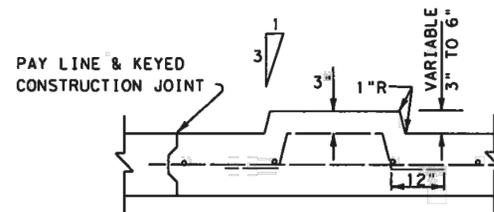


MONOLITHIC MEDIAN NOSE



NOTE: MONOLITHIC MEDIAN NOSE & PAVEMENT WITHIN PAY LINES SHALL BE PAID FOR AS CONCRETE PAVEMENT BY THE SQUARE YARD.

SECTION B-B



SECTION A-A



No.	DATE	REVISIONS

QUANTITY SUMMARY - FM 664 (OVILLA RD) AT UHL RD TRAFFIC SIGNAL MODIFICATION

TxDOT Item No.	TxDOT Desc. Code	Description	Unit	Traffic Signal Quantities
618	7036	CONDT (PVC) (SCHD 40) (3")	LF	110
618	7090	CONDUIT (PREPARE)	LF	620
620	7009	ELEC CONDR (NO. 6) BARE	LF	110
636	7001	ALUMINUM SIGNS (TY A)	SF	6.25
680	7001	INSTALL HWY TRAF SIG (UPGRADE)	EA	1
682	7001	VEH SIG SEC (12") LED (GRN)	EA	2
682	7002	VEH SIG SEC (12") LED (GRN ARW)	EA	2
682	7003	VEH SIG SEC (12") LED (YEL)	EA	2
682	7005	VEH SIG SEC (12") LED (RED)	EA	2
682	7018	PED SIG SEC (LED) (COUNTDOWN)	EA	8
682	7043	BACKPLATE W/REF BRDR(4 SEC) (VENT)ALUM	EA	2
684	7031	TRF SIG CBL (TY A) (14 AWG) (5 CONDR)	LF	285
684	7079	TRF SIG CBL (TY C) (12 AWG) (2 CONDR)	LF	1,435
687	7001	PEDESTAL POLE ASSEMBLY	EA	5
688	7001	PED DETECT PUSH BUTTON (APS)	EA	8
688	7003	PED DETECTOR CONTROLLER UNIT	EA	1
690	7024	REMOVAL OF SIGNAL HEAD ASSM	EA	2
6013	7006	GROUND BOX (PREPARE)	EA	6

Digitally signed by Christopher Pierce
 Date: 2024.10.02 07:12:12-0500

CHRISTOPHER J. PIERCE, P. E.
 LEE ENGINEERING, L.L.C., REGISTRATION NO. F-450



UHL ROAD PAVING IMPROVEMENTS
 UHL ROAD AND FM 664
 CITY OF RED OAK, TEXAS
 CITY OF GLEN HEIGHTS, TEXAS

PROPOSED TRAFFIC SIGNAL MODIFICATION QUANTITIES
 FM 664 (OVILLA RD) AT UHL RD

No.	DATE	REVISIONS

DATE
10/02/2024
 PROJECT NO.
2301020
 SHEET NO.
TS-1

CSJ: Sheet

County:

Highway: FM 664

GENERAL

The construction, operation and maintenance of the proposed project will be consistent with the state implementation plan as prepared by the Texas Commission on Environmental Quality.

The disturbed area for this project, as shown on the plans is 0.08 acres. However, the Total Disturbed Area (TDA) will establish the required authorization for storm water discharges. The TDA of this project will be determined by the sum of the disturbed area in all project locations in the contract, and all disturbed area on all Project-Specific Locations (PSL) located in the project limits and/or within 1 mile of the project limits. The department will obtain an authorization to discharge storm water from the Texas Commission on Environmental Quality (TCEQ) for the construction site as shown on the plans, according to the TDA of the project. The contractor will obtain any required authorization from the TCEQ for the discharge of storm water from any PSL for construction support activities on or off of the project row according to the TDA of the project. When the TDA for the project exceeds 1 acre, provide a copy of the appropriate application of permit (NOI, or Construction Site Notice) to the engineer, for any PSL located in the project limits or within 1 mile of the project limits. Follow the directives and adhere to all requirements set forth in the TCEQ, Texas Pollution Discharge Elimination System, Construction General Permit (TPDES, CGP).

Leave all right of way areas undisturbed until actual construction is to be performed in said areas.

Provide the Engineer with a copy of all DBE subcontractor agreements prior to commencing work.

Item 5:

Underground utilities owned by the Texas Department of Transportation may be present within the Right-Of-Way on this project. For signal, illumination, surveillance, and communications & control maintained by TxDOT, call the TxDOT Traffic Signal Office (214-320-6682) for locates a minimum of 48 hours in advance of excavation. For irrigation systems, call TxDOT Maintenance Landscape Office (214-320-6636) for locates a minimum of 48 hours in advance of excavation. If city or town owned irrigation facilities are present, call the appropriate department of the local city or town a minimum of 48 hours in advance of excavation. The Contractor is liable for all damages incurred to the above mentioned utilities when working without having the utilities located prior to excavation.

For the project to be deemed complete, permanently stabilize all unpaved disturbed areas of the project with a vegetative cover at a minimum of 70% density for the control of erosion.

General Notes Sheet A

CSJ: Sheet

County:

Highway: FM 664

Submit all shop drawings, working drawings, or other documents which require review sufficiently in advance of scheduled construction to allow no less than thirty (30) calendar days for review and response.

Locate all utilities, both underground and above ground, in the project area prior to beginning work so that conflicts are avoided.

Provide to the Engineer, in addition to any submittals required by the specifications and elsewhere in the general notes, a list of pre-qualified material to be used on the project.

Item 6:

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

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

The Buy America Material Classification Sheet is located at the below link. <https://www.txdot.gov/business/resources/materials/buy-america-material-classification-sheet.html> for clarification on material categorization.

****The above Buy America notes are required for all Federal Aid projects.****

Item 7:

Repair or replace any structures and utilities that might have been damaged by negligence or a failure to have utility locates performed.

Perform all electrical work in accordance with the National Electrical Code and Texas Department of Transportation Specifications.

Contractor will be responsible for all costs associated with locating and/or exposing existing utilities. This includes existing utilities that may have been mislabeled by the locator and/or utilities that are in the near vicinity of proposed construction. In addition, this includes all costs associated with pot-holing, mechanical vacuuming, hand-digging, etc. as needed to properly locate and protect all existing utilities.

Holiday restrictions – The Engineer may decide that no lane closures or construction operations shall be allowed during the restricted periods listed in the following holiday schedule. TxDOT has the right to lengthen, shorten, or otherwise modify these restricted periods as actual, or expected, traffic conditions may warrant. Working days will not be charged for these restricted periods. No additional compensation will be allowed for these closures (i.e., overhead, delays, stand-by, barricades or any other associated cost impacts).

General Notes Sheet B

Digitally signed by Christopher Pierce Date: 2024.10.02 07:14:57-05'00'

CHRISTOPHER J. PIERCE, P. E. LEE ENGINEERING, L.L.C., REGISTRATION NO. F-450



UHL ROAD PAVING IMPROVEMENTS UHL ROAD AND FM 664 CITY OF RED OAK, TEXAS CITY OF GLEN HEIGHTS, TEXAS

TRAFFIC SIGNAL GENERAL NOTES (1 OF 3) FM 664 (OVILLA RD) AT UHL RD

Table with 2 columns: No., DATE

DATE 10/02/2024 PROJECT NO. 2301020 SHEET NO.

TS-2

CSJ: Sheet

County:

Highway: FM 664

- New Year's Eve & Day (5 am on December 31 thru 10:00 pm January 1)
- Easter Holiday weekend (5 am on Friday thru 10:00 pm Sunday)
- Memorial Day weekend (5 am on Friday thru 10:00 pm Monday)
- Independence Day (5 am on July 3 thru 10:00 pm on July 5)
- Labor Day weekend (5 am on Friday thru 10:00 pm Monday)
- Thanksgiving Holiday (5 am on Wednesday thru 10:00 pm Sunday)
- Christmas Holiday (5 am on December 23 thru 10:00 pm December 26)

No significant traffic generator events identified.

Item 8:

This project will be a Standard Workweek in accordance with Article 8.3.1.4.

Item 416:

Drilled shafts shall be drilled and poured on the same day unless directed by the engineer.

Provide a formed smooth finish for all portions of drill shafts extending above proposed ground. Include cost for this work in the unit bid price for this item.

Traffic signal pole foundations will be paid for once regardless of extra work caused by obstructions.

Concrete removal required for installation of drilled shafts will be subsidiary to Item 416.

Item 421:

Furnish mix designs to the Engineer in a format compatible to the latest version of the Department's Construction Management System (SiteManager). Mix Design templates will be provided by the Engineer.

Provide sulfate resistant concrete for all drilled shafts.

Item 449:

Use Thomas & Betts Kopr-Shield, MG Chemicals #846, MG Chemicals #8463, NYOGEL #756G, Pro-Shield #7308, Cho-Lube #4220, or other approved electrically conducting lubricant compound.

Item 618:

The location of conduits and ground boxes are diagrammatic only and may be shifted to accommodate field conditions as directed.

Secure permission and approval from the proper authority prior to cutting into or removing any sidewalks or curbs for installation of this Item.

General Notes Sheet C

CSJ: Sheet

County:

Highway: FM 664

Place conduit under existing pavement by an approved boring method. Do not place boring pits closer than 2 feet from the edge of the pavement unless otherwise directed. Do not use water jetting. When conduits are bored, do not exceed 18 inches in the vertical and horizontal tolerances as measured from the intended target point.

Do not use a pneumatically driven device for punching holes beneath the pavement (commonly known as a "missile").

Furnish and install a flat, high tensile strength polyester fiber pull tape in conduit runs in excess of 50 feet or for future use and protected with standard weather-tight conduit caps, as approved. Acceptable products include Garvin # PT-1250-3K, ComStar PUL 1250P3K, Ideal Part No. 31-315 or equal as approved by the Engineer. This work will not be paid for directly, but is subsidiary to this Item.

Use a colored cleaner-primer on all PVC to PVC joints before application of PVC cement.

Seal all conduit ends with a permanently soft, non-toxic duct seal. Use a duct seal that does not adversely affect other plastic materials or corrode metals.

Existing conduit is proposed for reuse in this project. Conduit prep will be paid for under this item.

When using existing conduit, ensure that all conduits have bushings and are cleaned of mud and debris.

Where sidewalk is removed to install trenched conduit, replace sidewalk to match existing material. This work will be subsidiary to Item 618 except where shown otherwise in the plans.

Item 624:

Slack conductors required by Standard Sheet ED(3)-14 will be subsidiary to Item 624.

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

Item 656:

Form a 3/4-inch chamfer on the top edge of each pedestal pole foundation.

Probe for utilities and underground structures prior to drilling foundations. Foundations shall be paid for once regardless of extra work caused by obstructions.

Item 680:

Requirements for this Item include the following work, all of which are subsidiary to this Item:

General Notes Sheet D

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Christopher Pierce
CHRISTOPHER J. PIERCE, P. E.
LEE ENGINEERING, L.L.C., REGISTRATION NO. F-450



UHL ROAD
PAVING IMPROVEMENTS
UHL ROAD AND FM 664
CITY OF RED OAK, TEXAS
CITY OF GLEN HEIGHTS, TEXAS

TRAFFIC SIGNAL
GENERAL NOTES (2 OF 3)
FM 664 (OVILLA RD) AT UHL RD

No.	DATE	REVISIONS

DATE
10/02/2024
PROJECT NO.
2301020
SHEET NO.
TS-3

CSJ: Sheet

County:

Highway: FM 664

1. Notify the Traffic Projects Office at DAL_TPO@txdot.gov one week before beginning any work involving traffic signals. Supplement email correspondence with the District Signal Maintenance Office at (214)320-6682 and Construction Office at (214)319-6406.
2. Provide submittal literature for all traffic signal equipment before installation.
3. Connect all field wiring to the controller assembly.
4. Furnish and install all sign panels for mounting on signal poles, mast arms, and span wires. Fabricate the sign panels in accordance with Item 636, and mount with Astro-Sign Brac, Signfix aluminum channel, or equal as approved by the Engineer. Submit five (5) sets of shop drawings for street name signs.
5. Use qualified personnel to respond to and diagnose all trouble calls during the thirty-day test period. Repair any malfunction to Contractor-supplied signal equipment. Provide to the Engineer a local telephone number, not subject to frequent changes and available on a 24-hour basis, for reporting trouble calls. Response time to reported calls must be less than 2 hours. Make appropriate repairs within 24 hours. Place a logbook in the controller cabinet and keep a record of each trouble call reported. Notify the Engineer of each trouble call. Do not clear the error log in the conflict monitor or MMU during the thirty-day test period without approval.

Item 682:

Install signal head attachments so that the wiring to each signal head passes from the mast arm through the attachment hardware to the signal head. Do not leave cable or wiring exposed.

Provide signal head attachments that allow for adjustment about the horizontal and vertical axis.

Provide aluminum pedestrian and vehicle signal heads in the following color: Federal Yellow #13538 of Federal Standard 595. Provide non-painted aluminum tubing. Provide back plates, louvers, and the inside of visors with a flat black finish. Provide aluminum vented back plates for all traffic signal heads.

Mount signal heads level and plumb and aim as directed.

Item 684:

Provide stranded 14 AWG Type A signal cables for LED signal heads and stranded 12 AWG Type C cables for APS units.

Provide a separate multi-conductor signal cable (14 AWG) inside pedestal poles and signal poles from the terminal strip to each signal head as shown on the plans.

Identify each cable as shown on the plans (cable 1, etc.) with permanent marking labels (Panduit Type PLM standard single marker tie, Thomas&Betts Type 548M, or equal) at each ground box, pole base, and controller.

General Notes Sheet E

CSJ: Sheet

County:

Highway: FM 664

Item 687:

The bid price for this item is for a standard galvanized pedestal pole.

Item 688:

Verify the location of the APS units and the direction of the arrows on the signs prior to installation.

Contractor shall provide a digital copy of the APS messages to TxDOT for all new APS Units on the project.

APS Units shall operate with hardwired connections for the communications path between the APS Units and the APS controller.

Item 6013:

Existing ground boxes are proposed for reuse in this project. Ground box prep will be paid for under this item.

General Notes Sheet F

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LEE ENGINEERING, L.L.C., REGISTRATION NO. F-450



UHL ROAD
PAVING IMPROVEMENTS
UHL ROAD AND FM 664
CITY OF RED OAK, TEXAS
CITY OF GLEN HEIGHTS, TEXAS

TRAFFIC SIGNAL
GENERAL NOTES (3 OF 3)
FM 664 (OVILLA RD) AT UHL RD

No.	DATE	REVISIONS

DATE
10/02/2024

PROJECT NO.
2301020

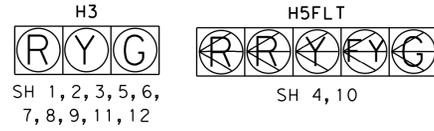
SHEET NO.
TS-4

NOTES:

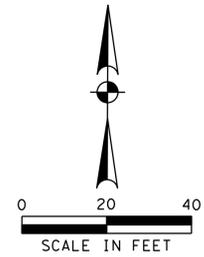
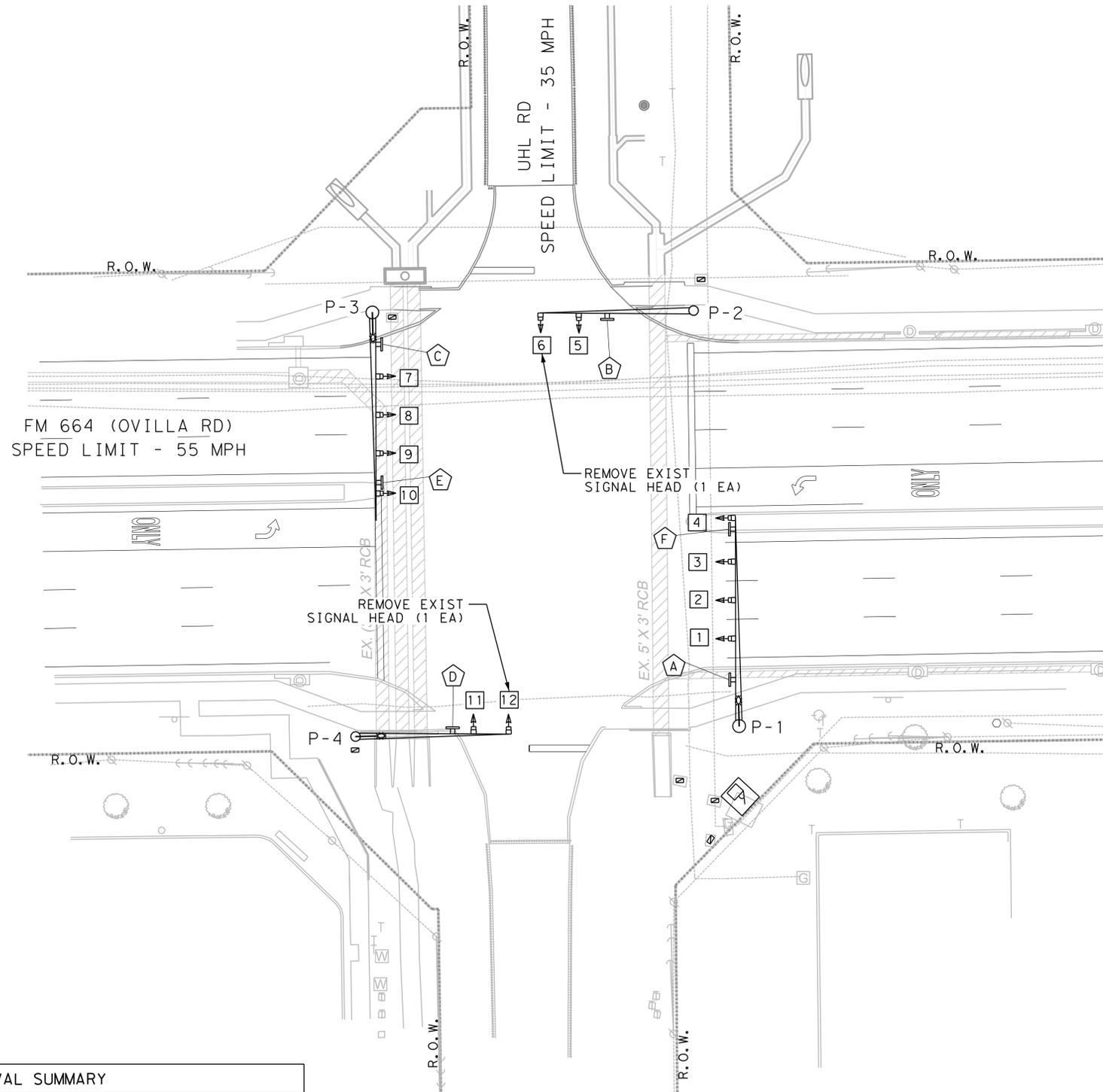
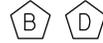
1. INFORMATION SHOWN ON THESE DRAWINGS CONCERNING EXISTING SIGNAL EQUIPMENT, PAVEMENT MARKINGS, SIGNING, RIGHT-OF-WAY, AND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL-INCLUSIVE. BEFORE CONSTRUCTION, CONTRACTOR SHALL DETERMINE THE TYPE AND LOCATION OF EXISTING UTILITIES TO AVOID DAMAGE THERETO.

2. EXISTING TRAFFIC SIGNAL EQUIPMENT SHALL REMAIN IN OPERATION UNTIL THE PROPOSED SIGNAL EQUIPMENT HAS BEEN ACTIVATED.

EXISTING SIGNAL HEADS



EXISTING SIGNS



LEGEND OF SYMBOLS

- SIGNAL POLE ASSEMBLY
- SIGNAL HEAD NUMBERS
- POLE NUMBERS
- GROUND MOUNTED CONTROLLER CABINET
- GROUND BOX
- TRAFFIC SIGNAL HEAD
- ELECTRICAL SERVICE METER
- LUMINAIRE
- MAST ARM MOUNTED SIGN
- SIGN DESIGNATION
- RIGHT OF WAY LINES

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Date: 2024.10.02 07:17:38-0500

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UHL ROAD PAVING IMPROVEMENTS
UHL ROAD AND FM 664
CITY OF RED OAK, TEXAS
CITY OF GLEN HEIGHTS, TEXAS

EXISTING TRAFFIC SIGNAL CONDITIONS & REMOVAL LAYOUT
FM 664 (OVILLA RD) AT UHL RD

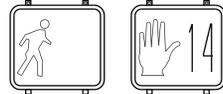
TRAFFIC SIGNAL REMOVAL SUMMARY				
TXDOT SPEC NO.	TXDOT DESC. CODE	DESCRIPTION	UNIT	QTY
690	6024	REMOVAL OF SIGNAL HEAD ASSM	EA	2

NO.	DATE	REVISIONS

DATE: 10/02/2024
PROJECT NO.: 2301020
SHEET NO.:

ITEM 682 - SIGNAL HEADS												
SIGNAL HEAD NO.	SIGNAL HEAD TYPE	12" SIGNAL INDICATION			VEHICLE SIGNAL SECTIONS						PEDESTRIAN SIGNAL SECTIONS	
		BACKPLATE			RED BALL	YELLOW BALL	GREEN BALL	RED ARROW	YELLOW ARROW	GREEN ARROW		
		3 SEC (EA)	4 SEC (EA)	5 SEC (EA)								
6, 12	H4LT		2		2	2	2				2	
13, 14, 15, 16, 17, 18, 19, 20	COUNTDOWN											8
1-5, 7-11	EXISTING											
	TOTAL	0	2	0	2	2	2	0	0	2		8

ALL NEW BACKPLATES SHALL INCLUDE A 2" RETROREFLECTIVE BORDER.



COUNTDOWN PEDESTRIAN SIGNAL HEAD

NOTES:

- ALL EQUIPMENT TO BE REPLACED SHALL BE NEW AND ON THE TXDOT PREQUALIFIED MATERIAL LIST.
- INFORMATION SHOWN ON THESE DRAWINGS CONCERNING SIGNAL EQUIPMENT, PAVEMENT MARKINGS, SIGNING, RIGHT-OF-WAY, AND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL-INCLUSIVE. BEFORE CONSTRUCTION, CONTRACTOR SHALL DETERMINE THE TYPE AND LOCATION OF EXISTING UTILITIES TO AVOID DAMAGE THERETO.
- CONTRACTOR SHALL CONTACT THE TXDOT DALLAS SIGNAL CONSTRUCTION OFFICE AT 214-319-6406 AND THE CITY OF GLENN HEIGHTS PUBLIC WORKS DEPARTMENT 972-223-1690 AT LEAST ONE WEEK IN ADVANCE TO COORDINATE WORK.
- THE LOCATIONS OF PROPOSED SIGNAL EQUIPMENT IS DIAGRAMMATIC ONLY AND MAY BE SHIFTED BY THE ENGINEER TO ACCOMMODATE FIELD CONDITIONS.
- THE INFORMATION SHOWN ON THESE DRAWINGS CONCERNING THE TYPE AND LOCATION OF OVERHEAD AND UNDERGROUND UTILITIES IS NOT GUARANTEED TO BE ACCURATE OR ALL INCLUSIVE. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING THE TYPE AND LOCATION OF EXISTING UTILITIES IN ORDER TO AVOID ANY DAMAGE.
- CONTRACTOR SHALL COORDINATE ALL PEDESTAL POLE ASSEMBLY FOUNDATION WORK WITH THE CURB RAMP AND SIDEWALK INSTALLATION. IF CURB RAMPS ARE CONSTRUCTED PRIOR TO DRILLING OF FOUNDATIONS, CONTRACTOR SHALL NOTIFY TXDOT, THE CITY, AND ENGINEER TO ARRANGE A FIELD MEETING TO DETERMINE IF THE FOUNDATIONS NEED TO BE SHIFTED TO BE ADJACENT TO THE LANDING AREAS. IF POLE FOUNDATIONS ARE POURED PRIOR TO INSTALLATION OF THE CURB RAMPS, THE CURB RAMPS AND SIDEWALKS SHALL BE ADJUSTED SO THAT THE CURB RAMP LANDING AREAS ARE ADJACENT TO THE PUSH BUTTONS AND THE SIDE REACH TO THE PUSH BUTTONS IS 10" OR LESS.
- PROPOSED APS UNITS SHALL BE PLACED ADJACENT TO A LEVEL LANDING AREA (2% MAX SLOPE IN ANY DIRECTION). IF THE DISTANCE FROM THE PUSH BUTTON TO THE EDGE OF THE ACCESSIBLE PATH EXCEEDS 10", THE CONTRACTOR SHALL FURNISH AND INSTALL A PUSH BUTTON EXTENDER TO MAKE THE REACH 10" OR LESS. PAYMENT FOR THE EXTENDER SHALL BE CONSIDERED SUBSIDIARY TO ITEM 680.
- PROPOSED CURB RAMP LANDINGS SHALL BE POURED UP TO THE SIGNAL FOUNDATIONS, LEAVING NO GAPS.
- LOCATION OF PEDESTAL POLE FOUNDATIONS SHALL BE STAKED BY THE CONTRACTOR. LOCATIONS SHALL BE APPROVED BY TXDOT AND THE CITY PRIOR TO FOUNDATIONS BEING DRILLED.
- ALL PEDESTAL POLES SHALL HAVE A GALVANIZED STEEL FINISH

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UHL ROAD
PAVING IMPROVEMENTS
UHL ROAD AND FM 664
CITY OF RED OAK, TEXAS
CITY OF GLEN HEIGHTS, TEXAS

PROPOSED TRAFFIC
SIGNAL MODIFICATION
TABLES (3 OF 6)
FM 664 (OVILLA RD) AT UHL RD

REVISIONS	No.	DATE

DATE
10/02/2024
PROJECT NO.
2301020
SHEET NO.

TS-9

ITEM 636 - SIGN SUMMARY

ID	TYPE	LEGEND	EXIST	REM	REL	REP	INST	HARDWARE & SUPPORT	LOCATION	QTY
A	ST NAME	UHL RD	1						P-1 MAST ARM	---
B	ST NAME	(FM 664) OVILLA RD	1						P-2 MAST ARM	---
C	ST NAME	UHL RD	1						P-3 MAST ARM	---
D	ST NAME	(FM 664) OVILLA RD	1						P-4 MAST ARM	---
E	R10-17T	LEFT TURN YIELD ON FLASHING YELLOW ARROW	1						P-3 MAST ARM	---
F	R10-17T	LEFT TURN YIELD ON FLASHING YELLOW ARROW	1						P-1 MAST ARM	---
G	R3-8L	LANE CONFIGURATION SIGN					1	1	P-4 MAST ARM	6.25 SF

EXIST = EXISTING, REM = REMOVE, REL = RELOCATE, REP = REPLACE, INST = INSTALL



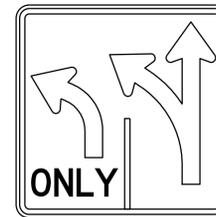
SIGNS A, C



SIGNS B, D



TMUTCD SIGN R10-17T
36"x42"
SIGNS E, F



TMUTCD SIGN R3-8L
30"x30"
SIGN G

ITEM 6008 - DETECTION INFORMATION

RADAR PRESENCE DETECTION (RPDD)	STATUS	PHASES	LOCATION	
R1	E	PH 1 & PH 6 PRESENCE	P-1 MAST ARM	
R2	E	PH 4 PRESENCE	P-2 SIGNAL POLE	
R3	E	PH 2 & PH 5 PRESENCE	P-3 SIGNAL POLE	
R4	E	PH 3 PRESENCE	P-4 MAST ARM	
RADAR ADVANCE DETECTION (RADD)	STATUS	PHASES	LOCATION	DETECTION ZONE LOCATIONS
R5	E	PH 6 ADVANCE	P-2 SIGNAL POLE	490' FROM STOPBAR
R6	E	PH 2 ADVANCE	P-4 SIGNAL POLE	490' FROM STOPBAR

I = INSTALL; E = EXISTING

ITEM 6013 - GROUND BOX SUMMARY

TYPE	EACH
EXISTING/PREPARE	6

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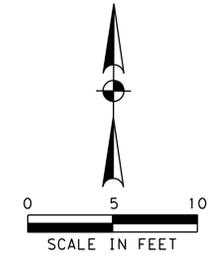
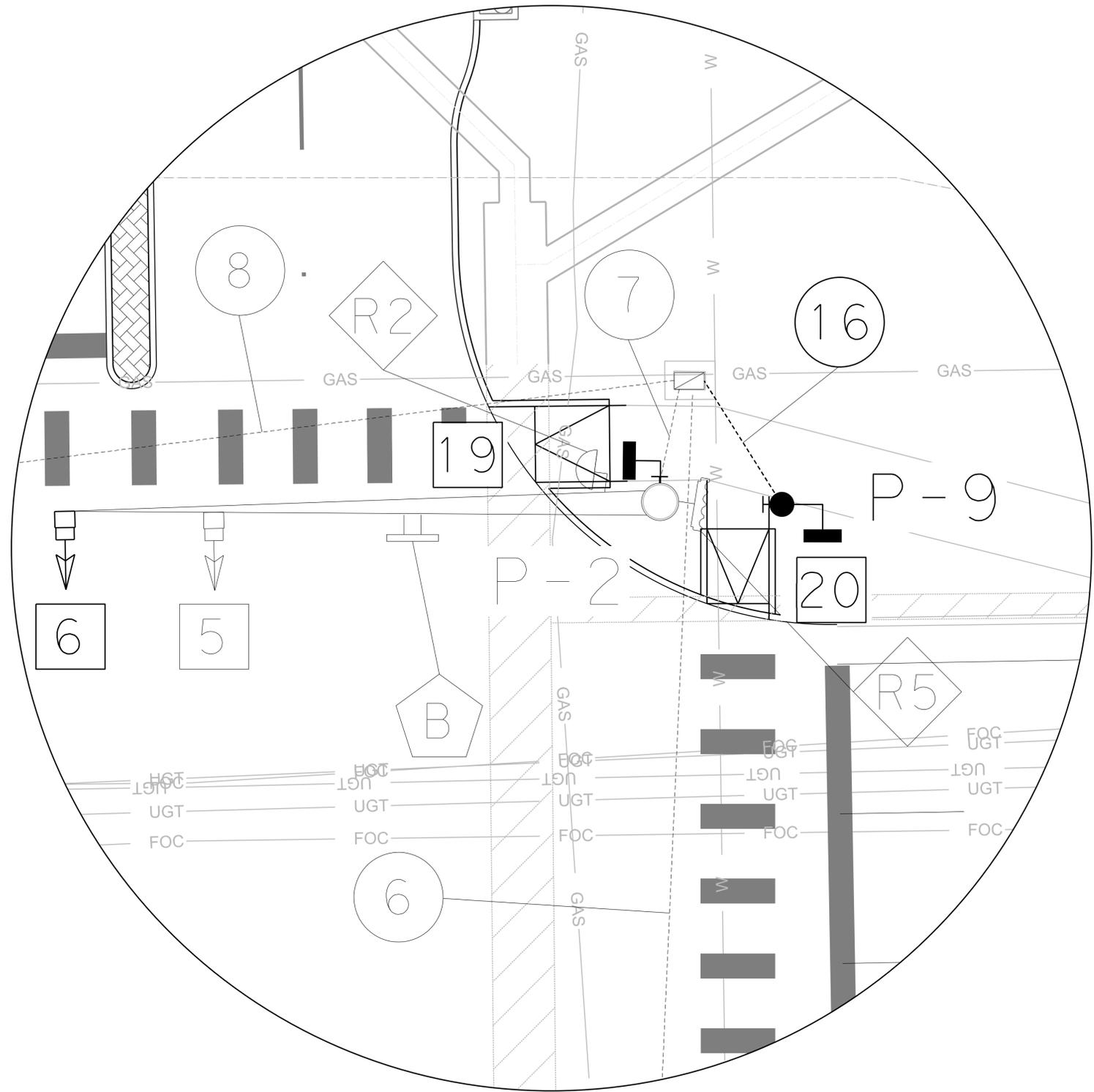


UHL ROAD
PAVING IMPROVEMENTS
UHL ROAD AND FM 664
CITY OF RED OAK, TEXAS
CITY OF GLEN HEIGHTS, TEXAS

PROPOSED TRAFFIC
SIGNAL MODIFICATION
TABLES (5 OF 6)
FM 664 (OVILLA RD) AT UHL RD

REVISIONS	No.	DATE

DATE
10/02/2024
PROJECT NO.
2301020
SHEET NO.
TS-11



LEGEND OF SYMBOLS

- EXIST. SIGNAL POLE ASSEMBLY
- EXIST. SIGNAL HEAD NUMBERS
- EXIST. POLE NUMBERS
- EXIST. GROUND MOUNTED CONTROLLER CABINET
- EXIST. GROUND BOX
- EXIST. TRAFFIC SIGNAL HEAD
- EXIST. ELECTRICAL SERVICE
- EXIST. LUMINAIRE
- EXIST. MAST ARM MOUNTED SIGN
- EXIST. SIGN DESIGNATION
- EXIST. CONDUIT RUN & NUMBERS
- EXIST. RADAR IDENTIFICATION
- EXIST. PRESENCE RADAR DETECTOR
- EXIST. ADVANCE RADAR DETECTOR
- EXIST. GPS OPTICOM DETECTOR
- R.O.W. RIGHT OF WAY LINES
- PHASE NUMBERS
- NEW TRAFFIC SIGNAL HEAD
- NEW SIGNAL HEAD NUMBERS
- NEW MAST ARM MOUNTED SIGN
- NEW SIGN DESIGNATION
- NEW PEDESTAL POLE ASSEMBLY
- NEW POLE NUMBERS

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07:25:26-0500

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**UHL ROAD
PAVING IMPROVEMENTS**
UHL ROAD AND FM 664
CITY OF RED OAK, TEXAS
CITY OF GLEN HEIGHTS, TEXAS

**PROPOSED NORTHEAST
CORNER SIGNAL LAYOUT**
FM 664 (OVILLA RD) AT UHL RD

No.	DATE	REVISIONS

DATE
10/02/2024
PROJECT NO.
2301020
SHEET NO.
TS-14

SUMMARY OF SMALL SIGNS

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PLAN SHEET NO.	SIGN NO.	SIGN NOMENCLATURE	SIGN	DIMENSIONS	FLAT ALUMINUM (TYPE A)	EXAL ALUMINUM (TYPE G)	SM RD SGN ASSM TY XXXXX (X) XX (X-XXXX)				BRIDGE MOUNT CLEARANCE SIGNS (See Note 2)	
							POST TYPE	POSTS	ANCHOR TYPE	MOUNTING DESIGNATION		
										PREFABRICATED		1EXT or 2EXT = # of Ext
			FM 664 AT UHL RD									
TS-5	A	D3-1G										
	C											
TS-5	B	D3-1G										
	D											
TS-5	E	R10-17T										
	F											
TS-5	G	R3-8L		30"x30"	X							

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

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

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



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SUMMARY OF SMALL SIGNS

SOSS

FILE: sums16.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT May 1987	CONT	SECT	JOB	HIGHWAY
REVISIONS				FM 664
4-16	DIST	COUNTY		SHEET NO.
8-16	DAL	DALLAS		TS-17

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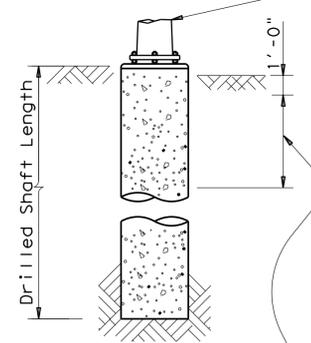
FOUNDATION DESIGN TABLE

FDN TYPE	DRILLED SHAFT DIA	REINFORCING STEEL		EMBEDDED DRILLED SHAFT LENGTH-ft (4), (5), (6)			ANCHOR BOLT DESIGN (1)				FOUNDATION DESIGN LOAD (2)		TYPICAL APPLICATION
		VERT BARS	SPIRAL & PITCH	TEXAS CONE PENETROMETER N Blows/ft			ANCHOR BOLT DIA	FY (ksi)	BOLT CIR DIA	ANCHOR TYPE	MOMENT K-ft	SHEAR Kips	
				10	15	40							
24-A	24"	4- #5	#2 at 12"	5.7	5.3	4.5	3/4"	36	12 3/4"	1	10	1	Pedestal pole, pedestal mounted controller.
30-A	30"	8- #9	#3 at 6"	11.3	10.3	8.0	1 1/2"	55	17"	2	87	3	Mast arm assembly. (see Selection Table)
36-A	36"	10- #9	#3 at 6"	13.2	12.0	9.4	1 3/4"	55	19"	2	131	5	Mast arm assembly. (see Selection Table) 30' strain pole with or without luminaire.
36-B	36"	12- #9	#3 at 6"	15.2	13.6	10.4	2"	55	21"	2	190	7	Mast arm assembly. (see Selection Table) Strain pole taller than 30' & strain pole with mast arm
42-A	42"	14- #9	#3 at 6"	17.4	15.6	11.9	2 1/4"	55	23"	2	271	9	Mast arm assembly. (see Selection Table)

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

80 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	FDN 30-A	FDN 36-A	FDN 36-B	FDN 42-A				
		MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'	28' X 28'	32' X 28'	32' X 32'	36' X 36'	40' X 36'	44' X 36'
100 MPH DESIGN WIND SPEED	MAX SINGLE ARM LENGTH	24' X 24'	28' X 28'	32' X 24'	32' X 32'	36' X 36'	40' X 24'	40' X 36'	44' X 36'
		MAXIMUM DOUBLE ARM LENGTH COMBINATIONS	24' X 24'	28' X 28'	32' X 24'	32' X 32'	36' X 36'	40' X 24'	40' X 36'

Traffic Signal Pole



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

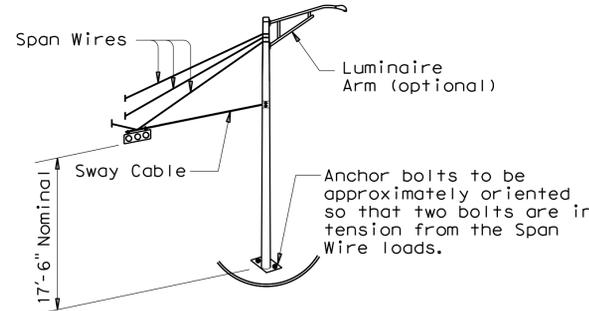
ANCHOR BOLT & TEMPLATE SIZES

BOLT DIA IN.	(7) BOLT LENGTH	TOP THREAD	BOTTOM THREAD	BOLT CIRCLE	R2	R1
3/4"	1'-6"	3"	—	12 3/4"	7 1/8"	5 5/8"
1 1/2"	3'-4"	6"	4"	17"	10"	7"
1 3/4"	3'-10"	7"	4 1/2"	19"	11 1/4"	7 3/4"
2"	4'-3"	8"	5"	21"	12 1/2"	8 1/2"
2 1/4"	4'-9"	9"	5 1/2"	23"	13 3/4"	9 1/4"

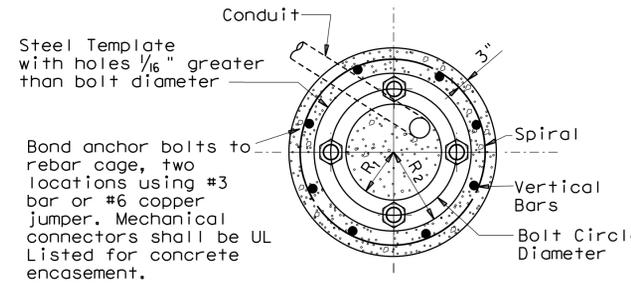
(7) Min dimensions given, longer bolts are acceptable.

EXAMPLE:

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



TYPICAL STRAIN POLE ASSEMBLY



TOP VIEW



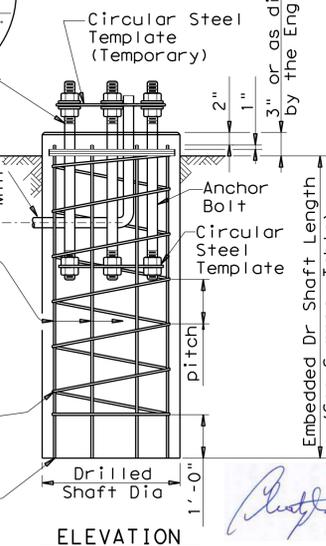
Conduit (See Layout Sheets for diameter. Orient as directed by the Engineer. 1 or 2 required)

Vertical Bars (See Design Table for size & number).

Spiral, 3 flat turns top & 1 flat turn bottom. (See Design Table for size & pitch)

Vertical bars may rest on bottom of drilled hole if material is firm enough to do so when concrete is placed.

FOUNDATION DETAILS



ELEVATION



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Date: 2024.10.02
07:30:47-05'00'

CHRISTOPHER J. PIERCE, P.E.
LEE ENGINEERING, L.L.C.
REGISTRATION NO. F-450

FOUNDATION SUMMARY TABLE (3)

LOCATION IDENTIFICATION	AVG. N BLOW /ft.	FDN TYPE	NO. EA	DRILLED SHAFT LENGTH (6) (FEET)				
				24-A	30-A	36-A	36-B	42-A
FM 664 (OVILLA RD) AT UHL RD								
POLE P-5	10	24-A	1	6				
POLE P-6	10	24-A	1	6				
POLE P-7	10	24-A	1	6				
POLE P-8	10	24-A	1	6				
POLE P-9	10	24-A	1	6				
TOTAL DRILLED SHAFT LENGTHS				30*				

* PAID FOR SUBSIDIARY TO ITEM 687.

THIS TABLE WAS COMPLETED UNDER MY RESPONSIBLE SUPERVISION

GENERAL NOTES:

Design conforms to 1994 AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals and interim revisions thereto.

Reinforcing steel shall conform to Item 440, "Reinforcing Steel".

Concrete shall be Class "C".

Threads for anchor bolts and nuts shall be rolled or cut threads of 8UN series up to 2" in diameter or UNC series for all sizes. Bolts and nuts shall have Class 2A and 2B fit tolerances. Galvanized nuts shall be tapped after galvanizing.

Anchor bolts that are larger than 1" in diameter shall conform to "alloy steel" or "medium-strength mild steel" per Item 449, "Anchor Bolts". Anchor bolts that are 1" in diameter or less shall conform to ASTM A36. Galvanize a minimum of the top end thread length plus 6" for all anchor bolts unless otherwise noted. Exposed washers and exposed nuts shall be galvanized. All galvanizing shall be in accordance with Item 445, "Galvanizing".

Templates and embedded nuts need not be galvanized. Lubricate and tighten anchor bolts when erecting the structure in accordance with Item 449, "Anchor Bolts".



TRAFFIC SIGNAL POLE FOUNDATION

TS-FD-12

REVISONS		DN: MS	CK: JSY	DW: MAO/MMF	CK: JSY/TEB
5-96					
11-99					
1-12					
DIST		COUNTY		SHEET NO.	
DAL		DALLAS		TS-18	

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DATE: FILE:

GENERAL NOTES FOR ALL ELECTRICAL WORK

- The location of all conduits, junction boxes, ground boxes, and electrical services is diagrammatic and may be shifted to accommodate field conditions.
- Provide new and unused materials. Ensure that all materials and installations comply with the applicable articles of the National Electrical Code (NEC), TxDOT standards and specifications, National Electrical Manufacturers Association (NEMA), and are listed by Underwriters Laboratories (UL) or a Nationally Recognized Testing Lab (NRTL). NRTLs such as Canadian Standard Association (CSA), Intertek Testing Services NA Inc., or FM Approvals LLC can be considered equivalent to UL. Where reference is made to NEMA listed devices, International Electrotechnical Commission (IEC) listed devices will not be considered an acceptable equal to a NEMA listed device. Acceptable devices may have both a NEMA and IEC listing. Faulty fabrication or poor workmanship in any material, equipment, or installation is justification for rejection. Replace or reinstall rejected material or equipment at no additional cost to the Department.
- Miscellaneous nuts, bolts and hardware, except for high strength bolts, may be stainless steel when plans specify galvanized, provided the bolt size is 1/2 in. or less in diameter.
- Provide the following test equipment as required by the Engineer to confirm compliance with the contract and the NEC: voltmeter, ammeter, megohm meter (1000 volt DC), ground resistance tester, torque wrenches, and torque screwdrivers. Ensure all equipment has been properly calibrated within the last year. Provide calibration certification to the Engineer upon request. Operate test equipment during inspection as requested by the Engineer.
- Install grounding as shown on the plans and in accordance with the NEC. Ensure all metallic conduits; metal poles; luminaires; and metal enclosures are bonded to the equipment grounding conductor. Provide stranded bare copper or green insulated grounding conductors. Ground rods, connectors, and bonding jumpers are subsidiary to the various bid items.
- When required by the Engineer, notify the Department in writing of materials from the Material Producers List (MPL) intended for use on each project. Prequalified materials are listed on the MPL on TxDOT's website under "Roadway Illumination and Electrical Supplies." No substitutions will be allowed for materials on this list.

CONDUIT

A. MATERIALS

- Provide conduit, junction boxes, fittings, and hardware as per TxDOT Departmental Material Specification (DMS) 11030 "Conduit" and Item 618 "Conduit" of TxDOT's "Standard Specifications For Construction And Maintenance Of Highways, Streets, And Bridges," latest edition. Provide conduits listed under Item 618 on the MPL under "Roadway Illumination and Electrical Supplies." Provide conduit types according to the descriptive code or as shown on the plans. Do not substitute other types of conduits for those shown. Provide liquidtight flexible metal conduit (LFMC) when flexible conduit is called for on galvanized steel rigid metallic conduit (RMC) systems. Provide liquidtight flexible nonmetallic conduit (LFNC) when flexible conduit is called for on polyvinyl chloride (PVC) systems.
- Provide galvanized steel RMC for all exposed conduits, unless otherwise shown on the plans. Properly bond all metal conduits.
- Unless otherwise shown on the plans, provide junction boxes with a minimum size as shown in the following table, which applies to the greatest number of conductors entering the box through one conduit with no more than four conduits per box. When a mixture of conductor sizes is present, count the conductors as if all are of the larger size. For situations not applicable to the table, size junction boxes in accordance with NEC.

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

- Junction boxes with an internal volume of less than 100 cu. in. and supported by entering raceways must have threaded entries or hubs identified for the intended purpose and supported by connection of two or more rigid metal conduits. Secure conduit within 3 ft. of the enclosure or within 18 in. of the enclosure if all conduit entries are on the same side. Mechanically secure all junction boxes with an internal volume greater than 100 cu. inches.
- Provide hot dipped galvanized cast iron or sand cast aluminum outlet boxes for junction boxes containing only 10 AWG or 12 AWG conductors. Do not use die cast aluminum boxes. Size outlet boxes according to the NEC.
- Do not use intermediate metal conduit (IMC) or electrical metallic tubing (EMT) unless specifically required by the plan sheets. When EMT is called for, provide junction boxes made from galvanized steel sheeting, listed and approved for outdoor use, unless otherwise noted on the plans. Size all galvanized steel junction boxes in accordance with the NEC. Provide junction boxes for IMC conduit systems that meet the same requirements for junction boxes used with RMC systems.
- Provide PVC junction boxes intended for outdoor use on PVC conduit systems, unless otherwise noted on the plans.

- Provide PVC elbows in PVC conduit systems, unless otherwise shown on the plans. Use only a flat, high tensile strength polyester fiber pull tape for pulling conductors through the PVC conduit system. When galvanized steel RMC elbows are specifically called for in the plans and any portion of the RMC elbow is buried less than 18 in., ground the RMC elbow by means of a grounding bushing on a rigid metal extension. Grounding of the rigid metal elbow is not required if the entire RMC elbow is encased in a minimum of 2 in. of concrete. PVC extensions are allowed on these concrete encased rigid metal elbows. RMC or PVC elbows are subsidiary to various bid items.
- When required, provide High-Density Polyethylene (HDPE) conduit with factory installed internal conductors according to Item 622 "Duct Cable." At the Contractor's request and with approval by the Engineer, substitute HDPE conduit with no conductors for bored schedule 40 or schedule 80 PVC conduit bid under Item 618. Ensure bored HDPE substituted for PVC is schedule 40 and of the same size PVC called for in the plans. Ensure the substituted HDPE meets the requirements of Item 622, except that the conduit is supplied without factory-installed conductors. Make the transition of the HDPE conduit to PVC (or RMC elbow when required) at the bore pit. Provide conduit of the size and schedule as shown on the plans. Do not extend substituted conduit into ground boxes or foundations. Provide PVC or galvanized steel RMC elbows as called for at all ground boxes and foundations.
- Use two-hole straps when supporting 2 in. and larger conduits. On electrical service poles, properly sized stainless steel or hot dipped galvanized one-hole standoff straps are allowed on the service riser conduit.

B. CONSTRUCTION METHODS

- Provide and install expansion joint conduit fittings on all structure-mounted conduits at the structure's expansion joints to allow for movement of the conduit. In addition, provide and install expansion joint fittings on all continuous runs of galvanized steel RMC conduit externally exposed on structures such as bridges at maximum intervals of 150 ft. When requested by the project Engineer, supply manufacturer's specification sheet for expansion joint conduit fittings. Repair or replace expansion joint fittings that do not allow for movement at no additional cost to the Department. Provide the method of determining the amount of expansion to the Engineer upon request. Do not use LFMC or LFNC as a substitute for the required expansion conduit fittings.
- Space all conduit supports at maximum intervals of 5 ft. Install conduit spacers when attaching metal conduit to surface of concrete structures. See "Conduit Mounting Options" on ED(2). Install conduit support within 3 ft. of all enclosures and conduit terminations.
- Do not attach conduit supports directly to pre-stressed concrete beams except as shown specifically in the plans or as approved by the Engineer.
- Unless otherwise shown on the plans, jack or bore conduit placed beneath existing roadways, driveways, sidewalks, or after the base or surfacing operation has begun. Backfill and compact the bore pits below the conduit per Item 476 "Jacking, Boring, or Tunneling Pipe or Box" prior to installing conduit or duct cable to prevent bending of the connections.
- When placing conduit in the sub-grade of new roadways, backfill all trenches with excavated material unless otherwise noted on the plans. When placing conduit in the sub-base of new roadways, backfill all trenches with cement-stabilized base as per requirements of Items 110 "Excavation", 400 "Excavation and Backfill for Structures", 401 "Flowable Backfill", 402 "Trench Excavation Protection", and 403 "Temporary Special Shoring."
- Provide and place warning tape approximately 10 in. above all trenched conduit as per Item 618.
- During construction, temporarily cap or plug open ends of all conduit and raceways immediately after installation to prevent entry of dirt, debris and animals. Temporary caps constructed of durable duct tape are allowed. Tightly fix the tape to the conduit opening. Clean out the conduit and prove it clear in accordance with Item 618 prior to installing any conductors.
- Ensure conduit entry into the top of any enclosure is waterproof by installing conduit sealing hubs or using boxes with threaded bosses. This includes surface mounted safety switches, meter cans, service enclosures, auxiliary enclosures and junction boxes. Grounding bushings on water tight sealing hubs are not required.
- Fit the ends of all PVC conduit terminations with bushings or bell end fittings. Provide and install a grounding type bushing on all metal conduit terminations.
- Install a bonding jumper from each grounding bushing to the nearest ground rod, grounding lug, or equipment grounding conductor. Ensure all bonding jumpers are the same size as the equipment grounding conductor. Bonding of conduit used as a casing under roadways for duct cable is not required, if the duct extends the full length through the casing.
- At all electrical services, install a 6 AWG solid copper grounding electrode conductor.
- Place conduits entering ground boxes so that the conduit openings are between 3 in. and 6 in. from the bottom of the box. See the ground box detail on sheet ED(4).
- Seal ends of all conduits with duct seal, expandable foam, or by other methods approved by the Engineer. Seal conduit immediately after completion of conductor installation and pull tests. Do not use duct tape as a permanent conduit sealant. Do not use silicone caulk as a conduit sealant.
- File smooth the cut ends of all mounting strut and conduit. Before installing, paint the field cut ends of all mounting strut and RMC (threaded or non-threaded) with zinc rich paint (94% or more zinc content) to alleviate overspray. Use zinc rich paint to touch up galvanized material as allowed under Item 445 "Galvanizing." Do not paint non-galvanized material with a zinc rich paint as an alternative for materials required to be galvanized.

 Texas Department of Transportation		Traffic Operations Division Standard	
<h1>ELECTRICAL DETAILS CONDUITS & NOTES</h1>			
<h2>ED(1)-14</h2>			
FILE: ed1-14.dgn	DN:	CK:	DW:
© TxDOT October 2014	CONT	SECT	JOB
REVISIONS			HIGHWAY
	DIST	COUNTY	SHEET NO.
	DAL	DALLAS	TS-19

ELECTRICAL CONDUCTORS

A. MATERIAL INFORMATION

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

B. CONSTRUCTION METHODS

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

12. Provide and install a separate stranded equipment grounding conductor (EGC) in all conduits that contain circuit wiring of 50 volts or more. Unless shown elsewhere, size the EGC to be the same size as the largest current carrying conductor contained in the conduit. Ensure all EGCs are bonded together at every accessible location. For traffic signal installations, provide a minimum size 8 AWG EGC. The EGC is paid for under Item 620.

C. TEMPORARY WIRING

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

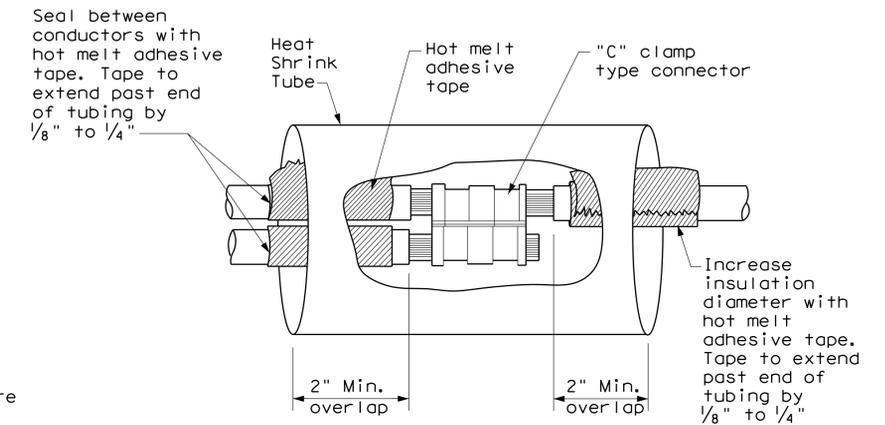
GROUND RODS & GROUNDING ELECTRODES

A. MATERIAL INFORMATION

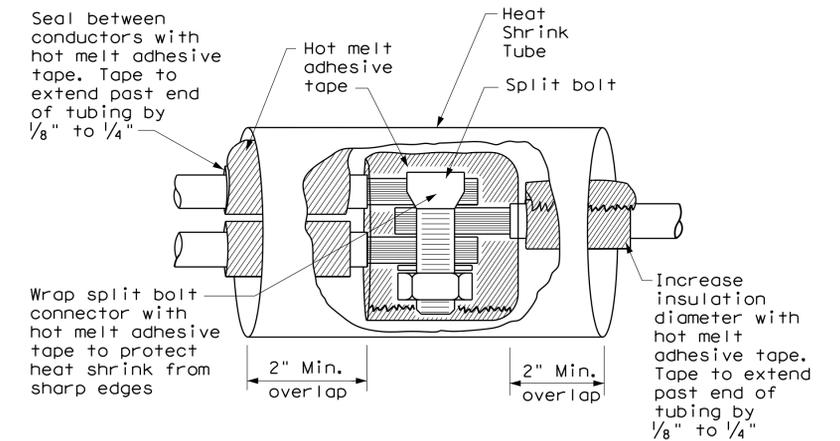
1. Provide and install a grounding electrode at electrical services. Provide ground rods according to DMS 11040 and the plans. Larger diameter or longer length rods may be called for in some specific locations, see the individual plans sheets. Concrete encased grounding electrodes may be called for in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

B. CONSTRUCTION METHODS

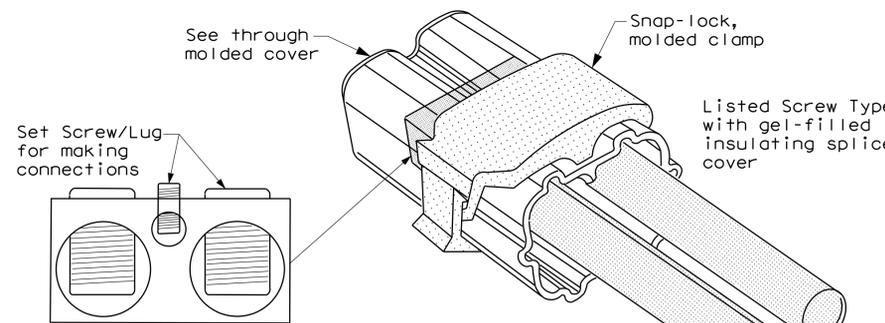
1. Furnish auxiliary ground rods for lightning protection and install in soil, concrete, or both, as called for in the plans. For ground rods installed in concrete, ensure the connection of the conductor to the ground rod is readily accessible for inspection or repairs. For ground rods installed in soil,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



SPLICE OPTION 1
Compression Type



SPLICE OPTION 2
Split Bolt Type



SPLICE OPTION 3
Listed Screw Type

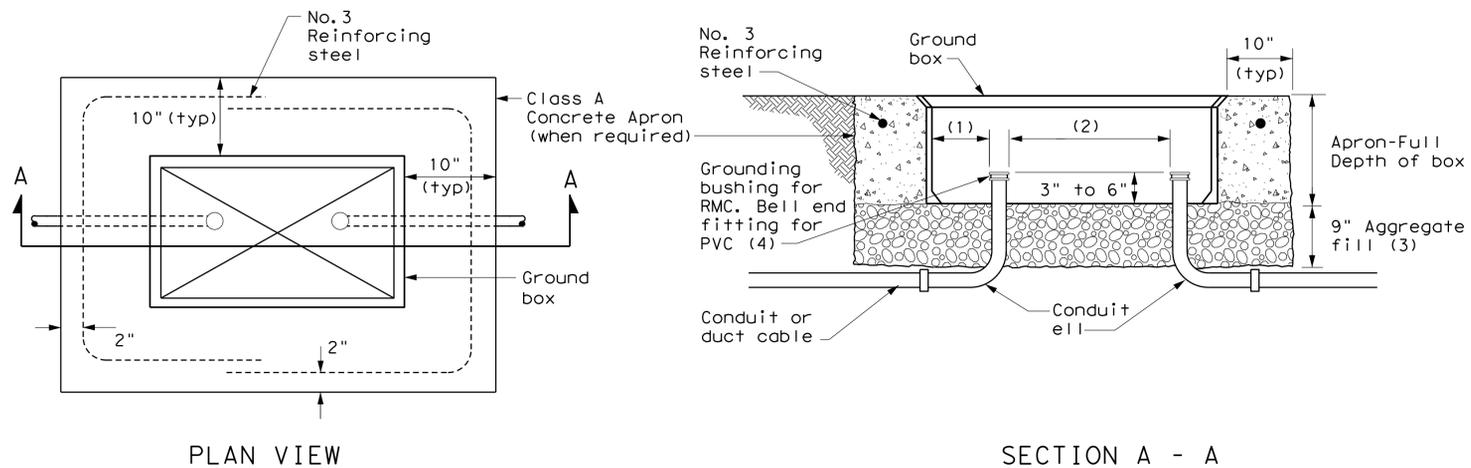
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DATE: FILE:

		Traffic Operations Division Standard	
<h2>ELECTRICAL DETAILS CONDUCTORS</h2> <h3>ED(3)-14</h3>			
FILE: ed3-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
© TxDOT October 2014	CONT	SECT	JOB
REVISIONS	HIGHWAY		FM 664
DIST	COUNTY	SHEET NO.	
DAL	DALLAS	TS-20	

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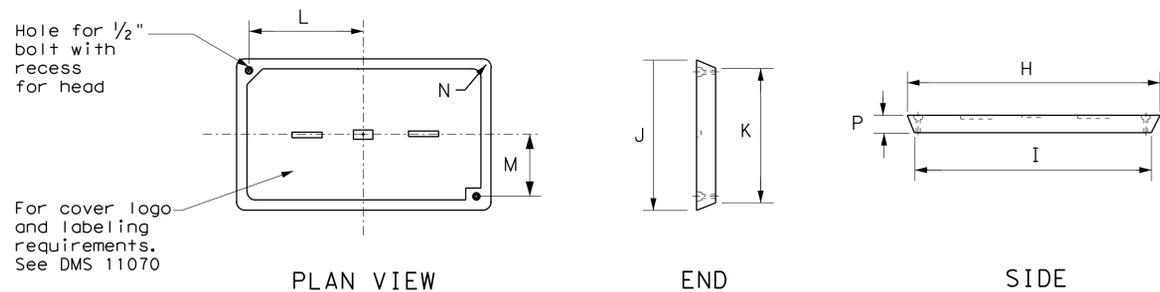


APRON FOR GROUND BOX

- (1) Uniformly space ends of conduits within the ground box. Position ends of conduits so that ground box walls do not interfere with the installation of grounding bushings or bell end fittings.
- (2) Maintain sufficient space between conduits to allow for proper installation of bushings.
- (3) Place aggregate under the box, not in the box. Aggregate should not encroach on the interior volume of the box.
- (4) Install a grounding bushing on the upper end of all RMC terminating in a ground box. Ground RMC elbows when any part of the elbow is less than 18 in. below the bottom of the ground box. Install a PVC bushing or bell end fitting on the upper end of all PVC conduits terminating in a ground box.

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

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



GROUND BOX COVER

GROUND BOXES

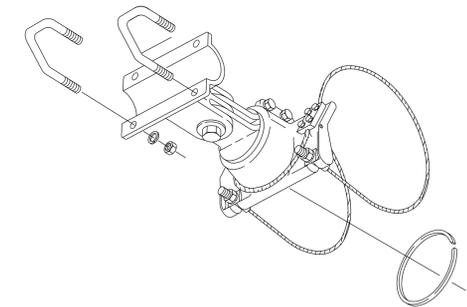
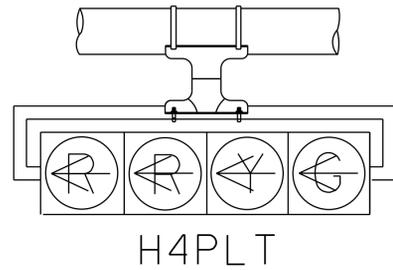
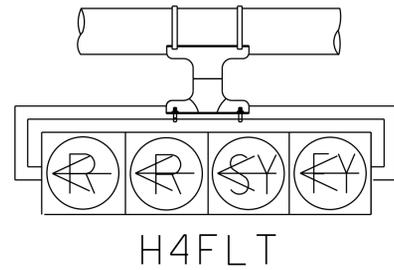
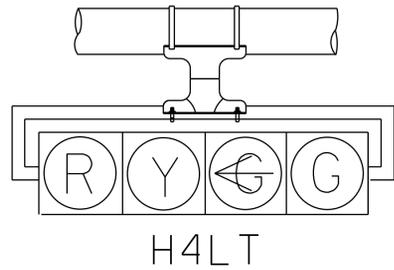
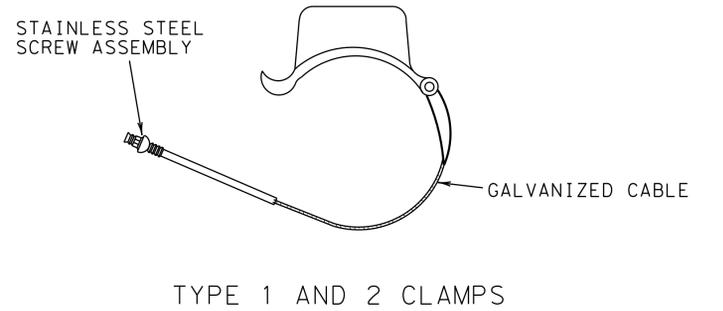
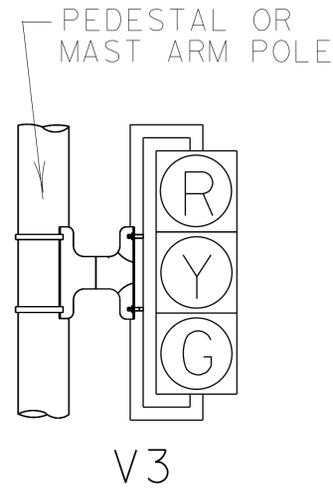
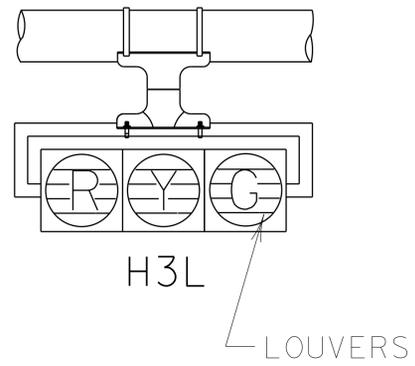
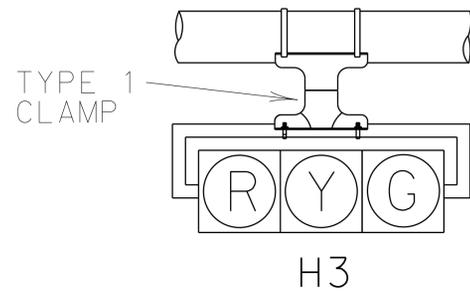
A. MATERIALS

1. Provide polymer concrete ground boxes measuring 16x30x24 in. (WxLxD) or smaller in accordance with Departmental Material Specification (DMS) 11070 "Ground Boxes" and Item 624 "Ground Boxes."
2. Provide Type A, B, C, D, and E ground boxes as shown in the plans, and as listed on the Material Producers List (MPL) on the Department web site under "Roadway Illumination and Electrical Supplies," Item 624.
3. Ensure ground box cover is correctly labeled in accordance with DMS 11070.
4. Provide larger ground boxes in accordance with Item 624 and as shown in the plans.

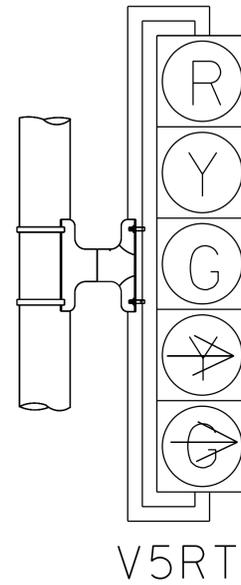
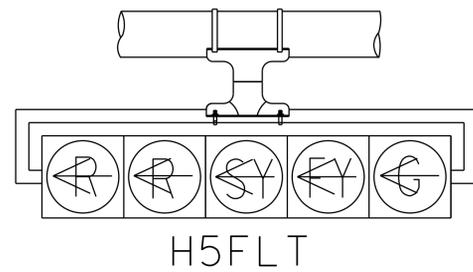
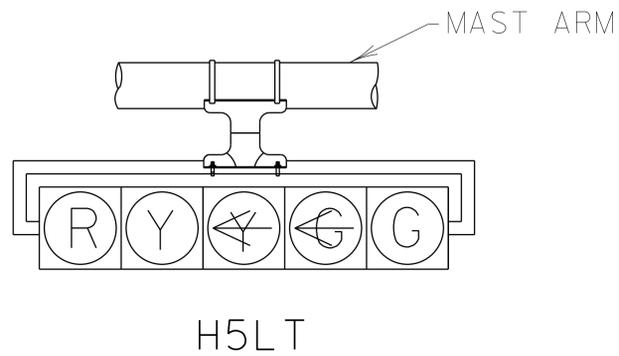
B. CONSTRUCTION METHODS

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

				Traffic Operations Division Standard	
ELECTRICAL DETAILS GROUND BOXES					
ED(4)-14					
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REVISIONS					
DIST	COUNTY		SHEET NO.		
DAL	DALLAS		TS-21		



SHALL BE INSTALLED WHEN ROTATION ABOUT THE HORIZONTAL AND VERTICAL AXES ARE NEEDED.



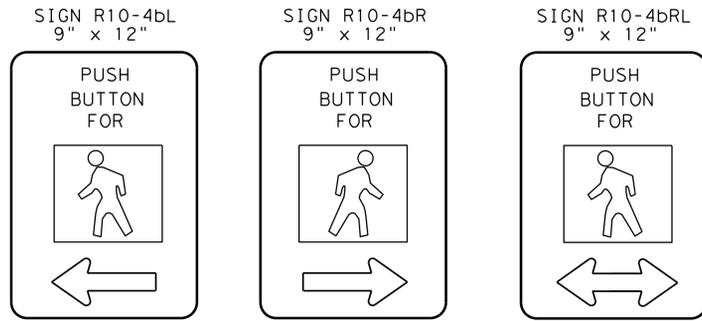
NOTES:

1. VEHICLE SIGNAL HEADS SHALL BE MOUNTED WITH TYPE 1 CLAMP AND APPROPRIATE TUBING.
2. ALL POLE MOUNTED VEHICLE HEADS SHALL BE INSTALLED ON THE AWAY-FROM-TRAFFIC SIDE OF THE PEDESTAL OR MAST ARM POLE.
3. THE SIGNAL HEADS SHOWN ARE NOT MEANT TO REFLECT ALL POSSIBLE SIGNAL HEADS, BUT ARE REPRESENTATIVE OF SIGNAL HEADS COMMONLY IN USE. SEE THE TRAFFIC SIGNAL LAYOUT FOR REQUIRED SIGNAL HEADS, AND THE NUMBER AND ORIENTATION OF LOUVERS.

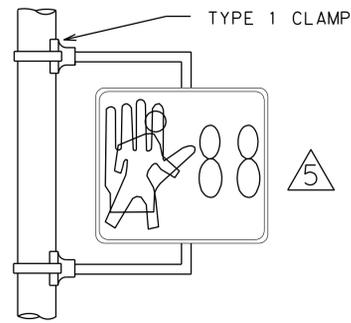
TRAFFIC SIGNAL HEAD DETAILS (DAL)

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DALLAS DISTRICT STANDARD

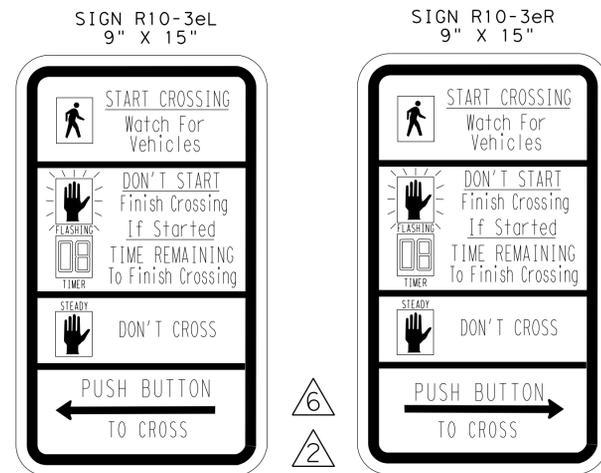
FED. RD. DIV. NO.	FEDERAL AID PROJECT NO.	SHEET NO.
6	(SEE TITLE SHEET)	TS-22
STATE	STATE DIST.	COUNTY
TEXAS	DALLAS	DALLAS
CONT.	SECT.	JOB HIGHWAY NO.
		FM 664



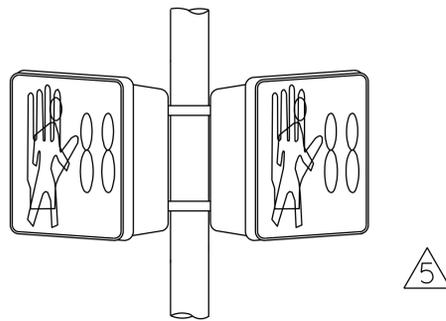
PEDESTRIAN PUSHBUTTON SIGN DETAILS



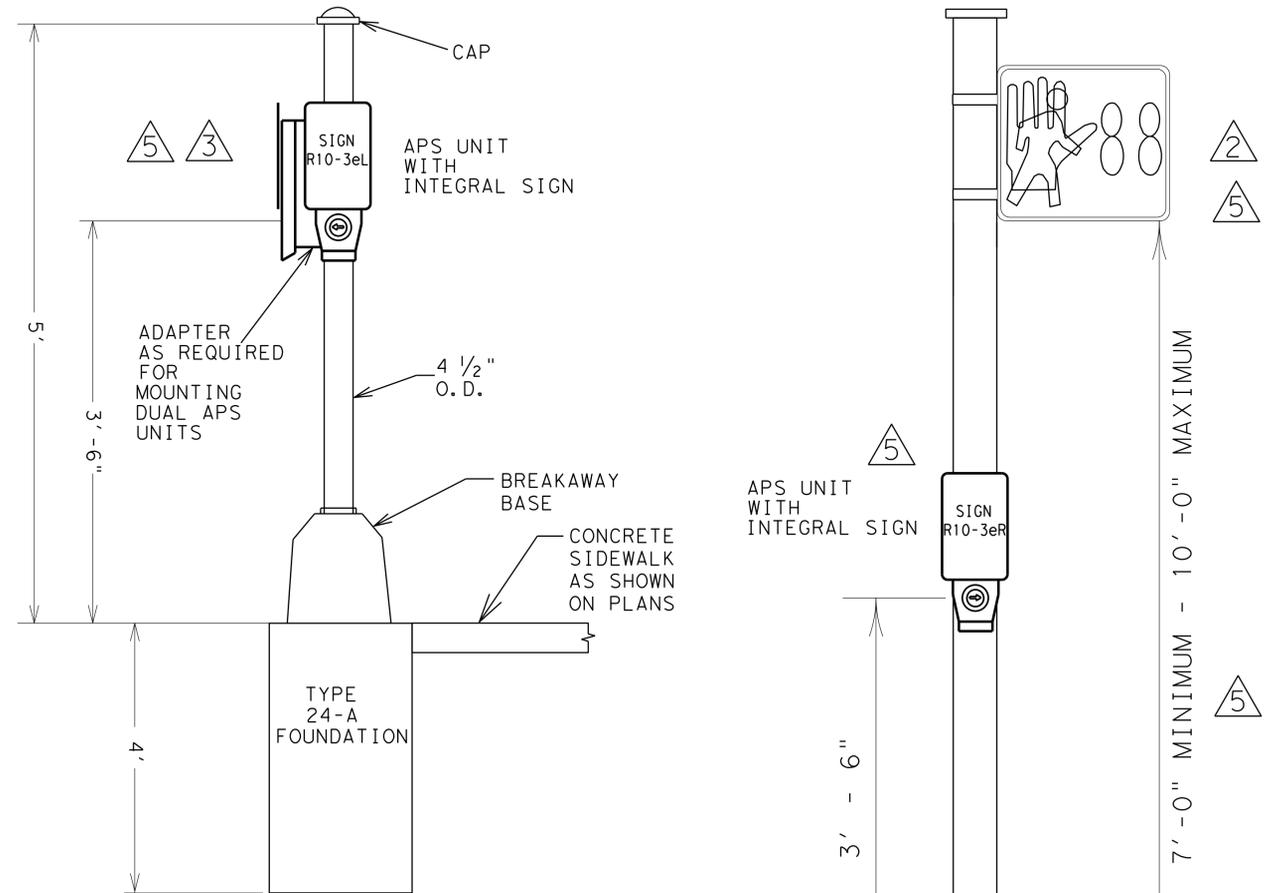
PEDESTRIAN SIGNAL HEAD MOUNTING FOR ONE PEDESTRIAN SIGNAL HEAD 152A



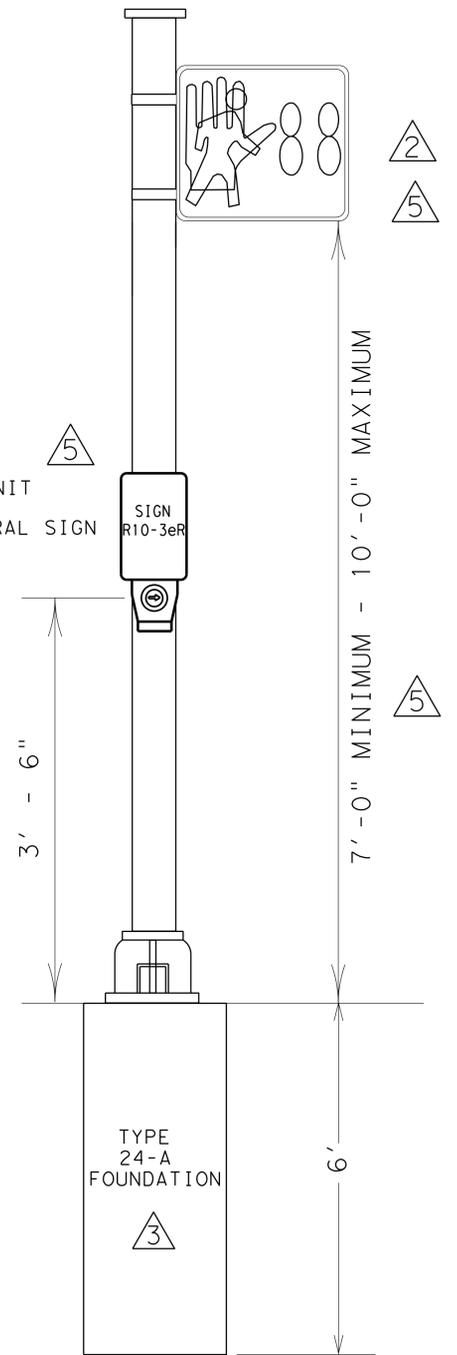
COUNTDOWN PEDESTRIAN PUSHBUTTON SIGN DETAILS



PEDESTRIAN SIGNAL HEAD MOUNTING FOR TWO PEDESTRIAN SIGNAL HEADS 143C

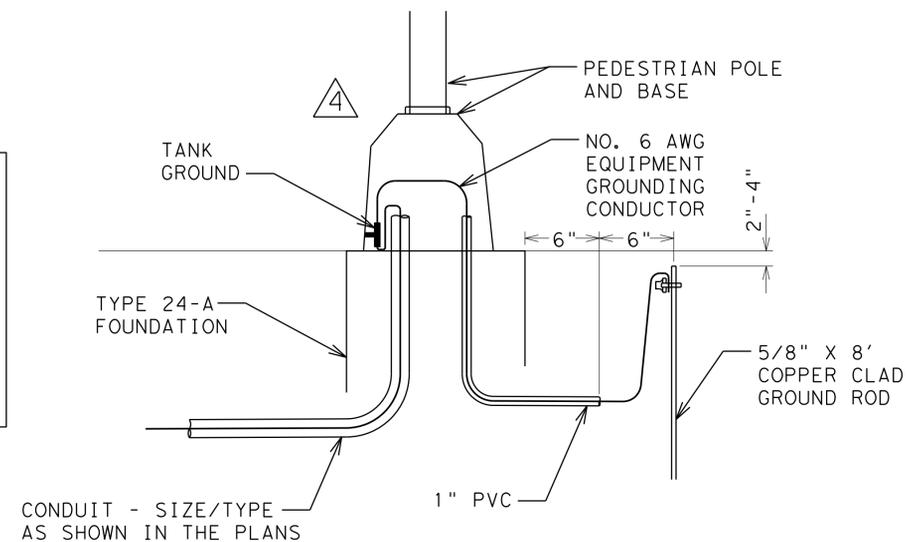
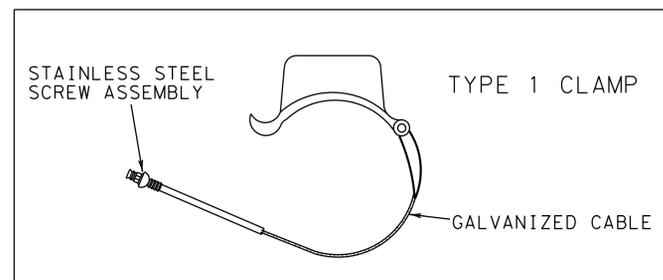


PEDESTRIAN PUSH BUTTON POLE



PEDESTAL POLE

NOTE: EITHER TYPE 1 CLAMPS OR CLAM SHELL MOUNTING HARDWARE MAY BE USED AS APPROVED BY THE ENGINEER. FOR CLAM SHELLS, USE ICC P/N 4805 OR MCCAIN QUICKMOUNT OR APPROVED EQUAL.



PEDESTRIAN PUSH BUTTON POLE GROUNDING DETAILS

NOTE: THE POLES ON THIS DRAWING ARE SHOWN AS AN EXAMPLE ONLY. POLES OF SIMILAR DESIGN FOR ANY CROSS SECTION WHICH MEET THE SPECIFICATIONS AND REQUIREMENTS SHOWN ON THESE DRAWINGS AND ARE APPROVED BY THE ENGINEER WILL BE DEEMED ACCEPTABLE.

- 1 ALTERNATIVE MOUNTING METHOD revised 12-92
- 2 ALTERNATIVE PEDESTRIAN SIGNAL HEAD AND SIGNING revised 10-08
- 3 PEDESTRIAN PUSH BUTTON POLE revised 01-11
- 4 PEDESTRIAN PUSH BUTTON POLE GROUNDING DETAILS revised 09-15
- 5 APS UNIT ADDED "SYMBOLS ONLY" PEDESTRIAN SIGNAL HEAD REMOVED MOUNTING HARDWARE NOTES REVISED MOUNTING HEIGHT REVISED revised 06-17
- 6 APS SIGN REVISED revised 11-20

- NOTES:
1. ALL PEDESTRIAN SIGNAL HEADS SHALL BE INSTALLED ON THE AWAY-FROM-TRAFFIC SIDE OF THE PEDESTAL OR MAST ARM POLE.
 2. ALL WIRING FOR PEDESTRIAN SIGNALS SHALL BE TOTALLY ENCLOSED WITHIN THE SIGNAL MOUNTING HARDWARE.
 3. ALL PEDESTRIAN SIGNAL HEADS AND PUSH BUTTON SIGNS SHALL DISPLAY THE SYMBOLIZED MESSAGES SHOWN ABOVE.

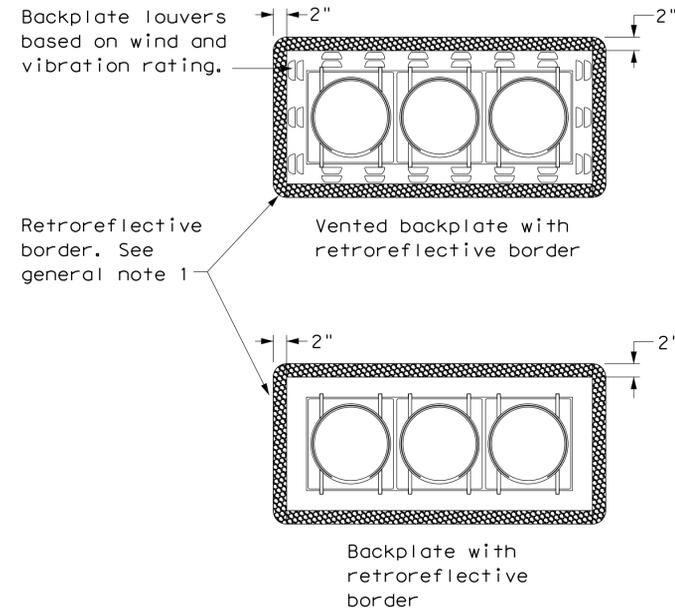
PEDESTRIAN SIGNAL HEAD DETAILS (DAL)

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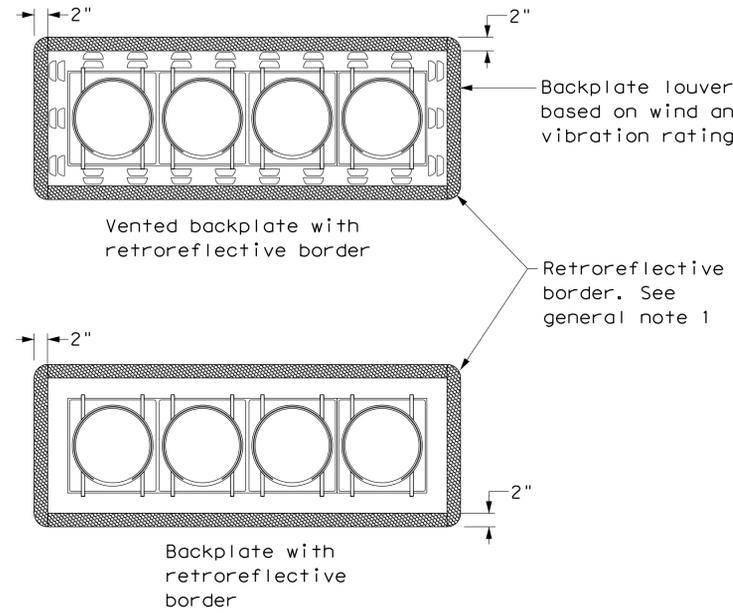
FED. RD. DIV. NO.	PROJECT NO.	SHEET NO.
6	(SEE TITLE SHEET)	TS-23
STATE	STATE DIST.	COUNTY
TEXAS	18	DALLAS
CONT.	SECT.	JOB HIGHWAY NO.
		FM 664

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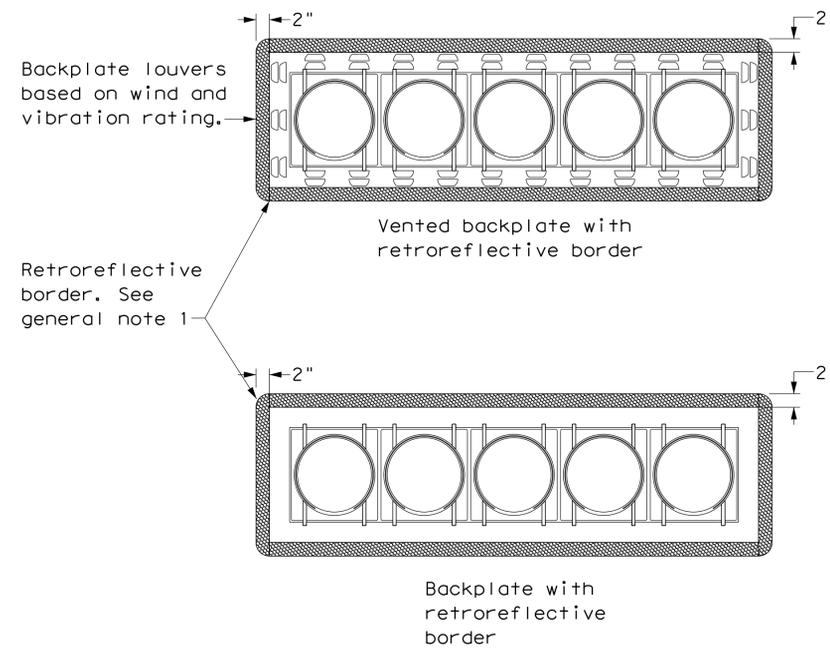
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FILE:



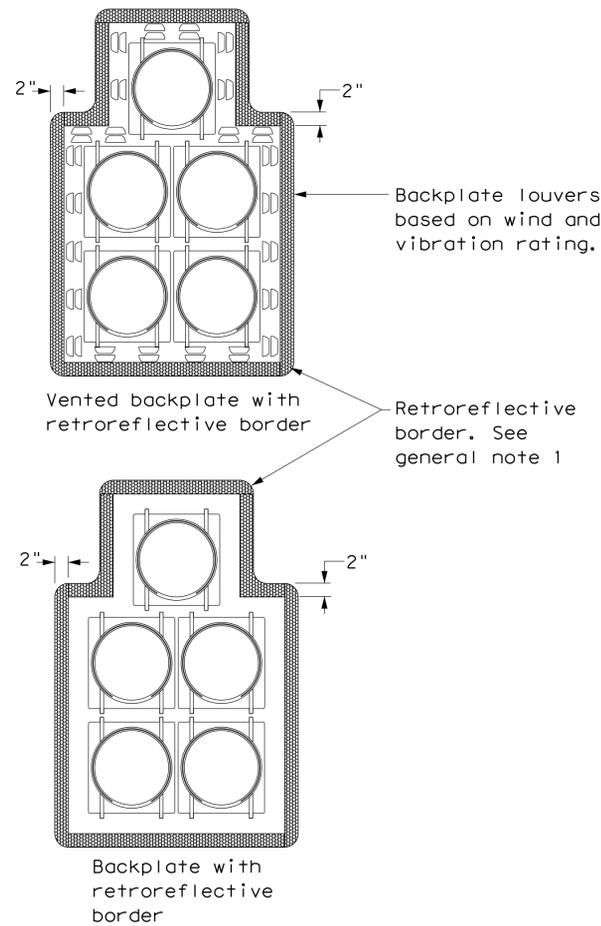
THREE-SECTION HEAD
HORIZONTAL OR VERTICAL



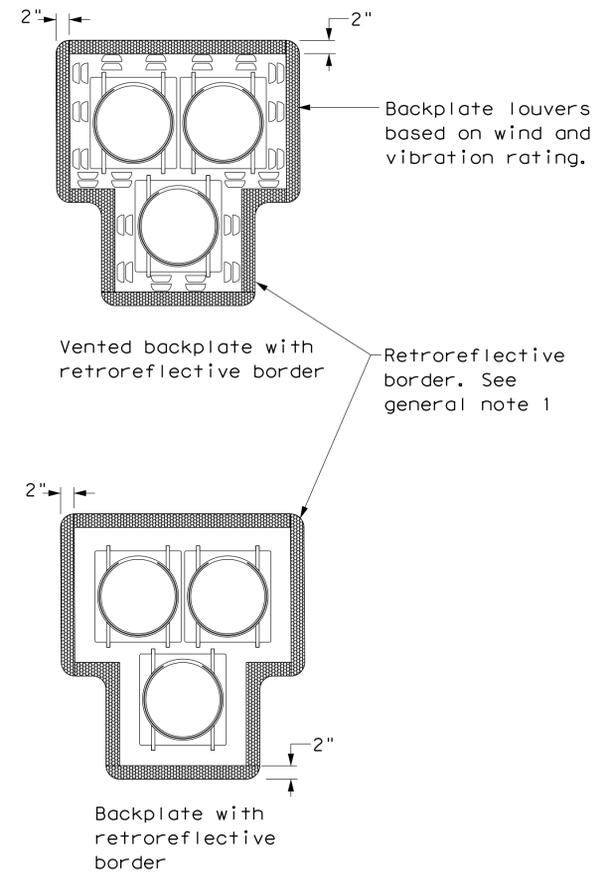
FOUR-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
HORIZONTAL OR VERTICAL



FIVE-SECTION HEAD
CLUSTER



PEDESTRIAN HYBRID
BEACON

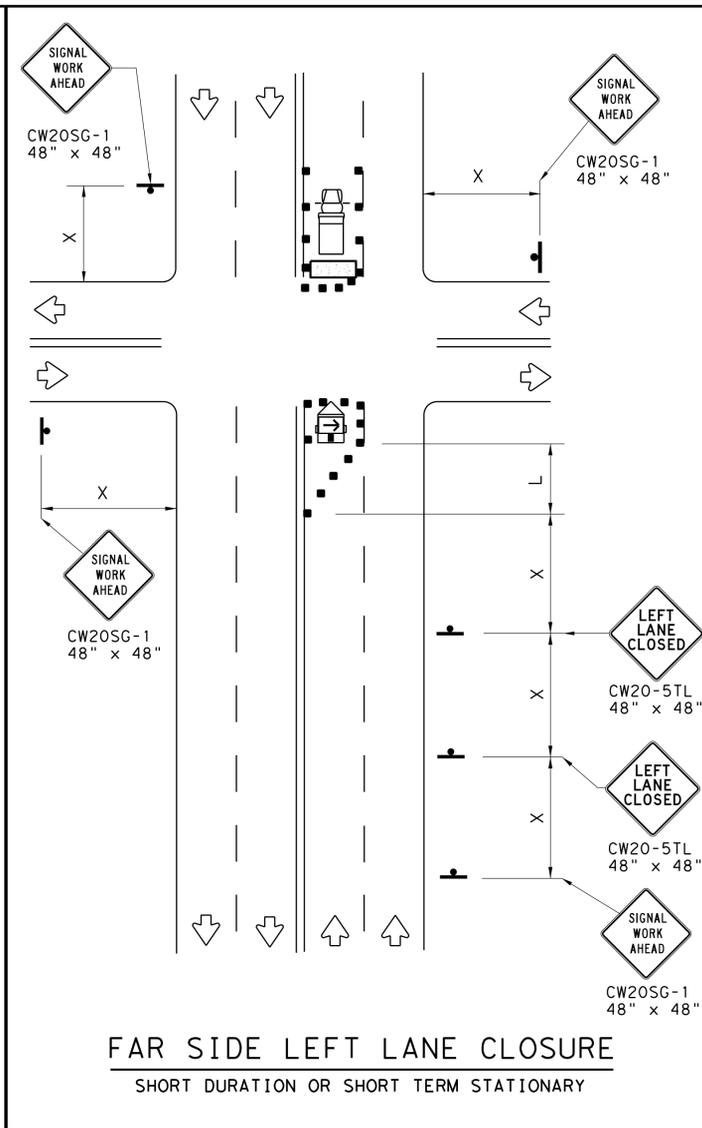
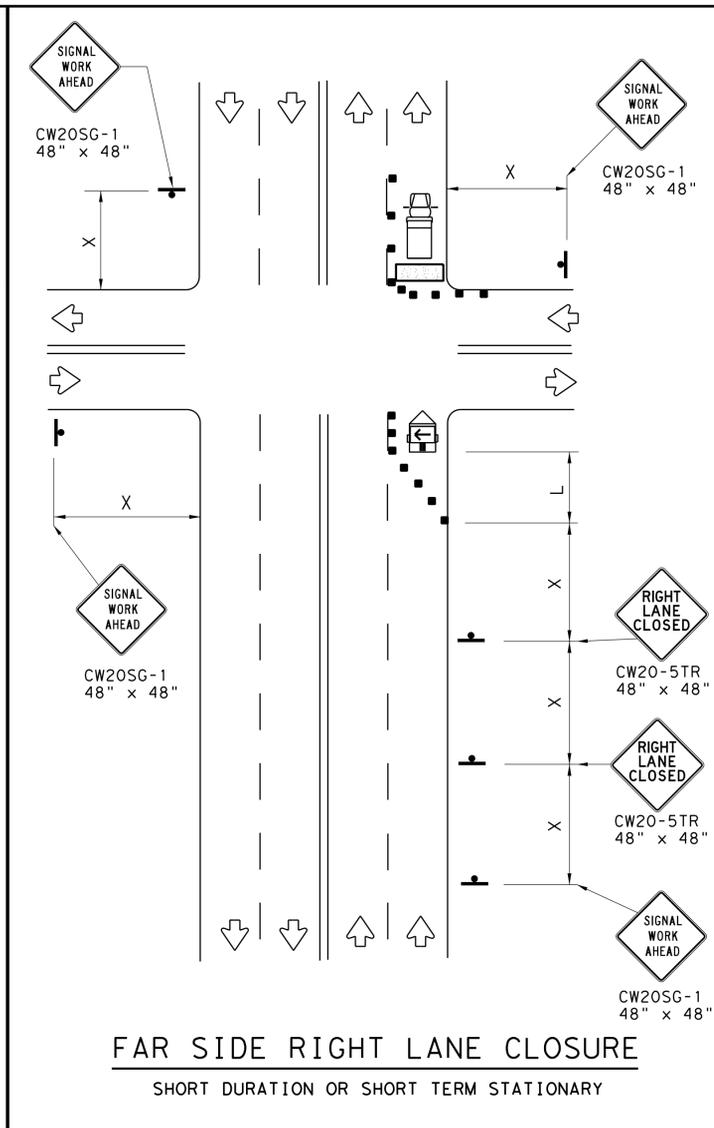
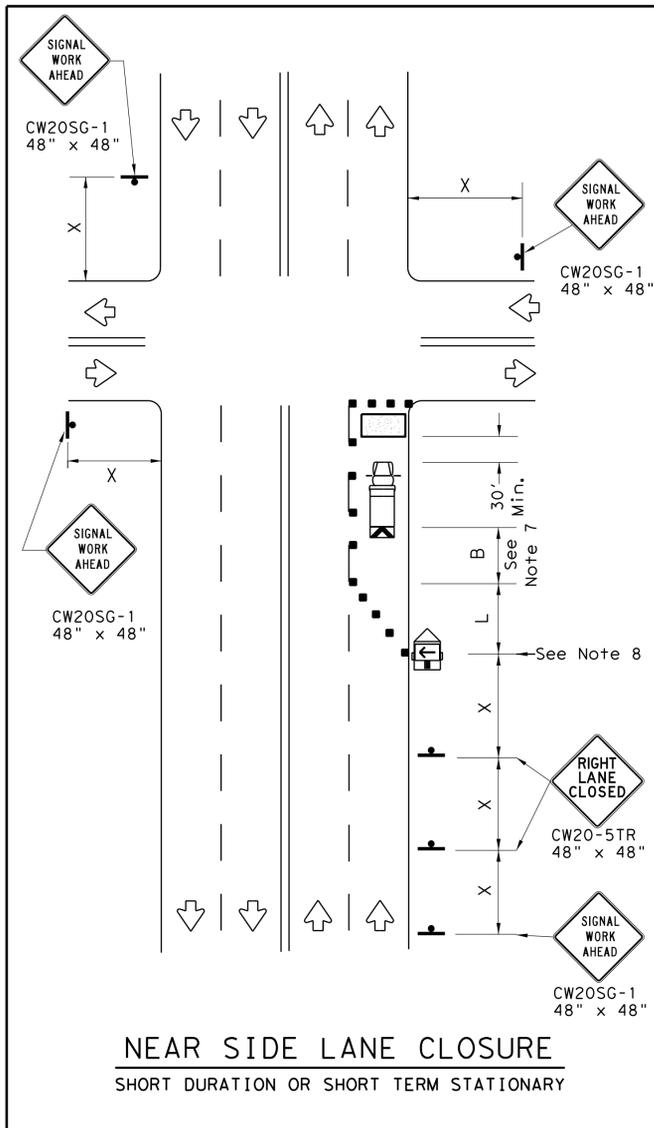
GENERAL NOTES:

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

		Texas Department of Transportation		Traffic Safety Division Standard	
TRAFFIC SIGNAL HEAD WITH BACKPLATE TS-BP-20					
FILE: ts-bp-20.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	
© TxDOT June 2020	CONT	SECT	JOB	HIGHWAY	FM 664
REVISIONS		DIST		COUNTY	SHEET NO.
		DAL		DALLAS	TS-24

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DATE: FILE:

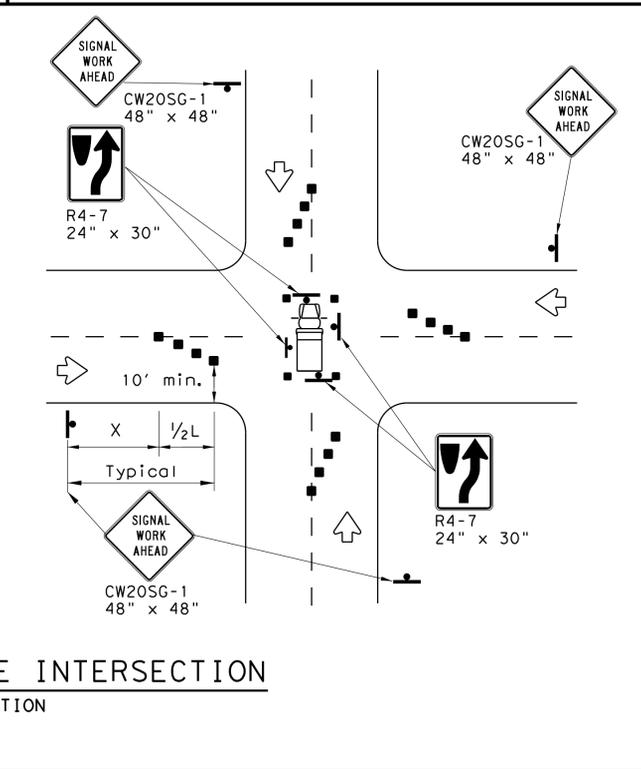
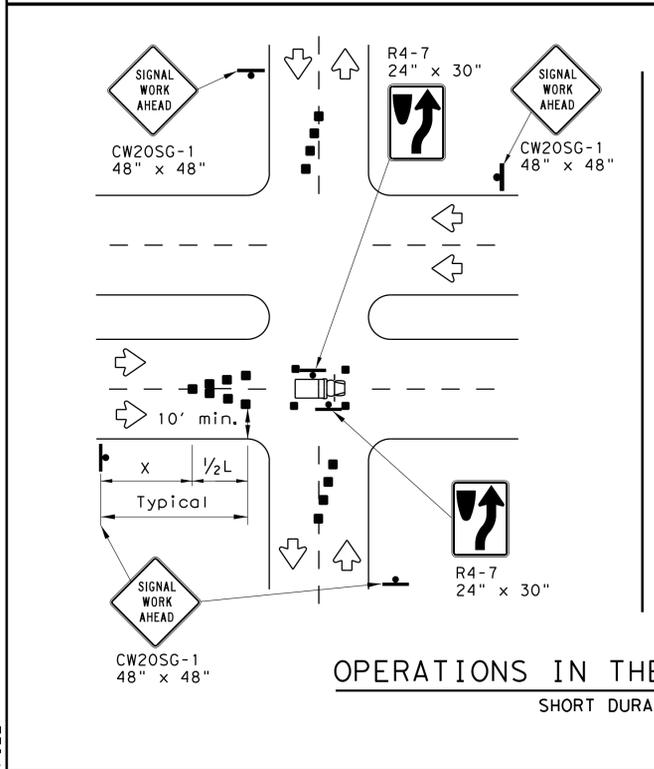


LEGEND			
	Type 3 Barricade		Channelizing Devices
	Heavy Work Vehicle		Truck Mounted Attenuator (TMA)
	Trailer Mounted Flashing Arrow Board		Portable Changeable Message Sign (PCMS)
	Sign		Traffic Flow
	Flag		Flagger

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

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

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



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

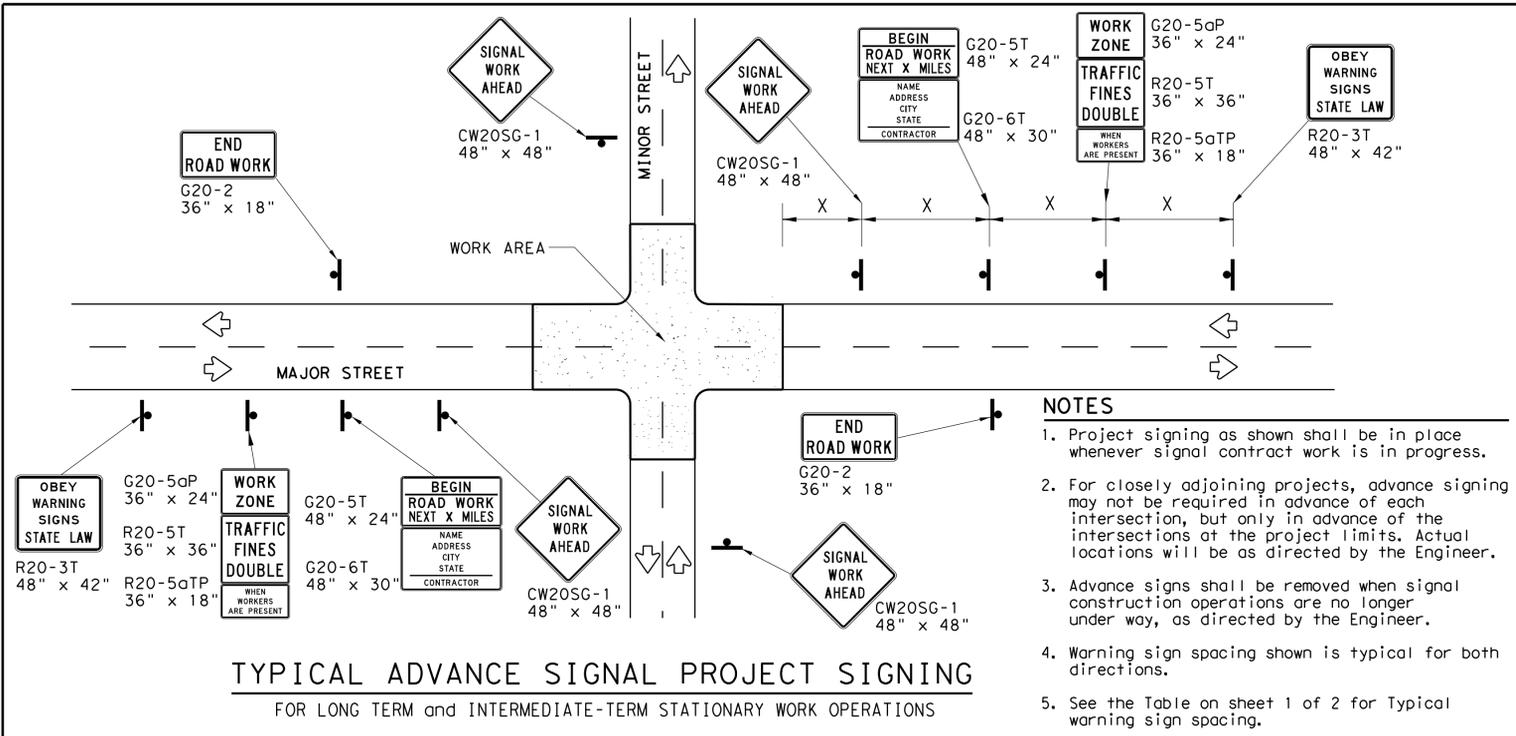


TRAFFIC SIGNAL WORK TYPICAL DETAILS

WZ (BTS-1) - 13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
© TxDOT April 1992	CONT	SECT	JOB	HIGHWAY
REVISIONS	FM 664			
2-98 10-99 7-13	DIST	COUNTY	SHEET NO.	
4-98 3-03	DAL	DALLAS	TS-25	

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

GENERAL NOTES FOR WORK ZONE SIGNS

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

DURATION OF WORK

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

SIGN MOUNTING HEIGHT

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

REMOVING OR COVERING

1. When sign messages may be confusing or do not apply, the signs shall be removed or completely covered, unless otherwise approved by the Engineer.
2. When signs are covered, the material used shall be opaque, such as heavy mil black plastic, or other materials which will cover the entire sign face and maintain their opaque properties under automobile headlights at night without damaging the sign sheeting. Burlap, or heavy materials such as plywood or aluminum shall not be used to cover signs.
3. Duct tape or other adhesive material shall NOT be affixed to a sign face.
4. Signs and anchor stubs shall be removed and holes backfilled upon completion of the work.

REFLECTIVE SHEETING

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

SIGN SUPPORT WEIGHTS

1. Weights used to keep signs from turning over should be sandbags filled with dry, cohesionless material.
2. The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
3. Rock, concrete, iron, steel or other solid objects will not be permitted for use as sign support weights.
4. Sandbags should weigh a minimum of 35 lbs and a maximum of 50 lbs.
5. Sandbags shall be made of a durable material that tears upon vehicular impact. Rubber, such as 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.

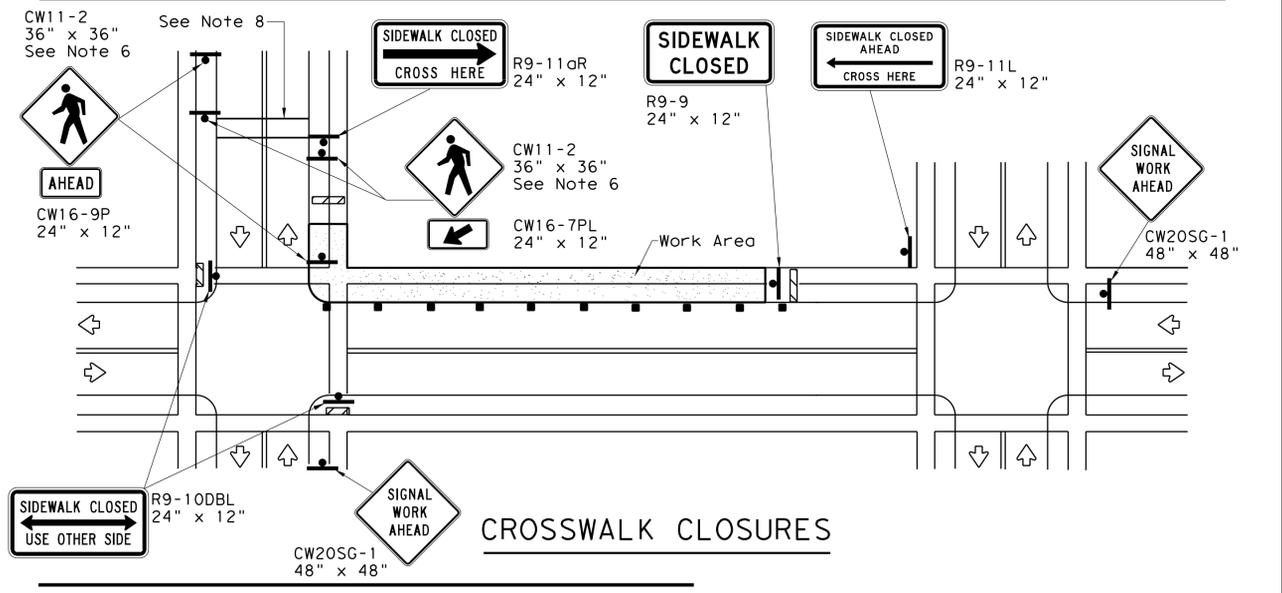
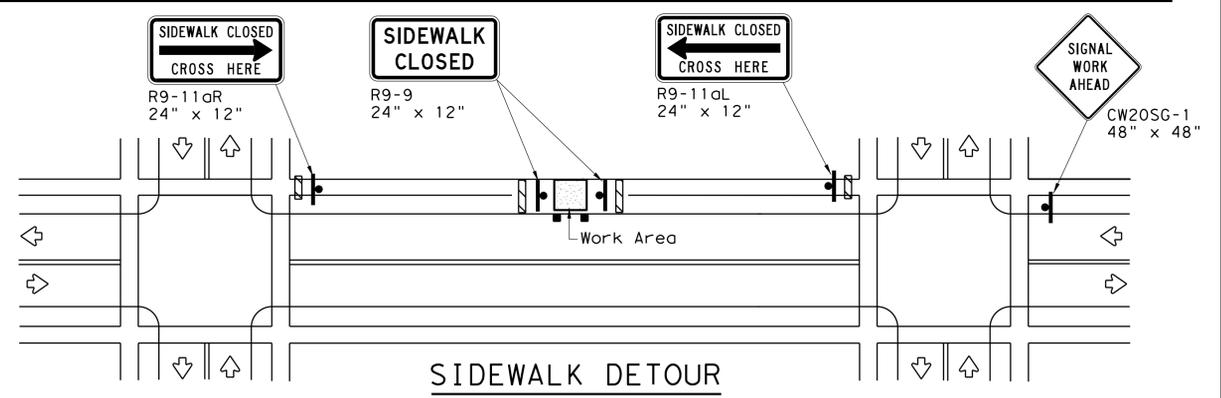
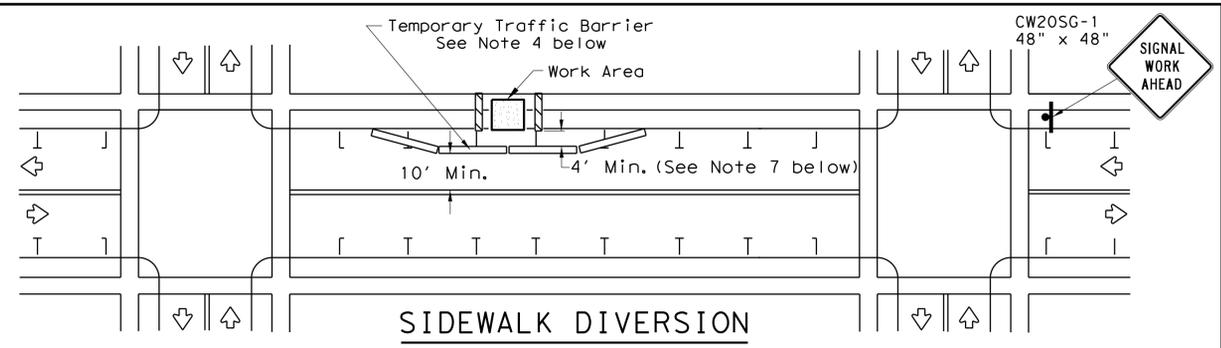
LEGEND	
	Sign
	Channelizing Devices
	Type 3 Barricade

DEPARTMENTAL MATERIAL SPECIFICATIONS

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

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

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



PEDESTRIAN CONTROL

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



TRAFFIC SIGNAL WORK BARRICADES AND SIGNS

WZ (BTS-2) - 13

FILE: wzbts-13.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	FM 664			
2-98 10-99 7-13	DIST	COUNTY	SHEET NO.	
4-98 3-03	DAL	DALLAS	TS-26	