



THE COUNTY OF GALVESTON

RUFUS G. CROWDER, CPPO, CPPB
PURCHASING AGENT

GWEN MCLAREN, CPPB
ASST. PURCHASING AGENT

COUNTY COURTHOUSE
722 Moody (21st Street)
Fifth (5th) Floor
GALVESTON, TEXAS 77550

April 28, 2020

PROJECT NAME: Birch Road Bridge Replacement

SOLICITATION NO: B201030

RE: ADDENDUM #1

To All Prospective Bidders:

The following information is being provided to aid in preparation of your bid submittal(s):

Revised Timeline:

- **Question Deadline:** Friday, May 8, 2020, by 5:00 p.m. CST
- **Bid Opening:** Tuesday, May 19, 2020 at 2:00 p.m. CST

Question #1: *It is requested that the bid due date be postponed for two weeks from May 5 to May 19. Additionally it is requested the question deadline be moved to May 8 due to COVID-19.*

Response: Please refer to the revised timeline above.

Question #2: *After reviewing the Stainless Steel Gabions and Gabion Mattresses Special Specifications, it is not clear whether Welded Wire Gabions, ASTM A974 are being specified or Twisted Wire Gabions, ASTM A975 are being specified. It does say "furnish welded wire gabions and gabion mattresses in accordance with ASTM A974, but then in the next paragraph, it refers to the mesh and wire characteristics of ASTM A975. Please clarify if both types of mesh are acceptable.*

Response: Stainless Steel, Welded Wire, or Twisted Wire Gabions meeting Project Specifications will be acceptable.

Question #3: *Will the county be providing the 3rd party testing lab? Or will the testing scope fall under the contractor's umbrella?*

Response: The County will provide a third-party testing lab.

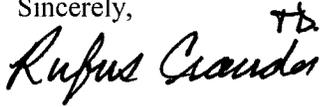
As a reminder, all questions regarding this bid must be submitted in writing to:

Rufus G. Crowder, CPPO CPPB
Galveston County Purchasing Agent
722 Moody, Fifth (5th) Floor
Galveston, Texas 77550
E-mail: purchasing.bids@co.galveston.tx.us

If you have any further questions regarding this bid, please address them to Rufus Crowder, CPPO CPPB, Purchasing Agent, via e-mail at purchasing.bids@co.galveston.tx.us, or contact the Purchasing Department at (409) 770-5371.

Please excuse us for any inconvenience that this may have caused.

Sincerely,

 ^{tb}
Rufus Crowder

Rufus G. Crowder, CPPO CPPB
Purchasing Agent
Galveston County



THE COUNTY OF GALVESTON

RUFUS G. CROWDER, CPPO, CPPB
PURCHASING AGENT

GWEN MCLAREN, CPPB
ASST. PURCHASING AGENT

COUNTY COURTHOUSE
722 Moody (21st Street)
Fifth (5th) Floor
GALVESTON, TEXAS 77550

May 12, 2020

PROJECT NAME: Birch Road Bridge Replacement

SOLICITATION NO: B201030

RE: ADDENDUM #2

To All Prospective Bidders:

The following information is being provided to aid in preparation of your bid submittal(s):

Question #1: *The as-built drawings do not detail support column size (if columns exist). Please clarify.*

Response: No as-built drawings are provided.

Question #2: *If support columns do exist. Please clarify at what height will support columns be cut-off?*

Response: The existing bridge has interior bents with timber piles. See Sheet 73 for note regarding where the piles should be cut.

Question #3: *What is the thickness of the bridge concrete slab?*

Response: See Sheets 74 and 80 for thickness of the bridge slab.

Question #4: *How many bents support the bridge weight? What size are these bents?*

Response: There are no bents for the new bridge, only abutments. This is a single span bridge.

Question #5: *How many beams support the bridge weight? What size are these beams?*

Response: See Sheets 74, 80, 81 and 82 for number and type of beams.

Question #6: *What size is the existing railing?*

Response: Not sure the size of the existing railing is relevant. The whole existing bridge is going to be removed. For rail types on the new bridge, see Sheets 73, 74 and 80.

Question #7: *Where is the removal lay down area located?*

Response: Birch Road will be closed during the bridge construction so the lay down area may be at either end of the bridge.

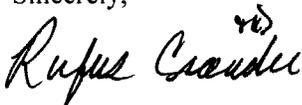
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Sincerely,



Rufus G. Crowder, CPPO CPPB
Purchasing Agent
Galveston County

INDEX OF SHEETS
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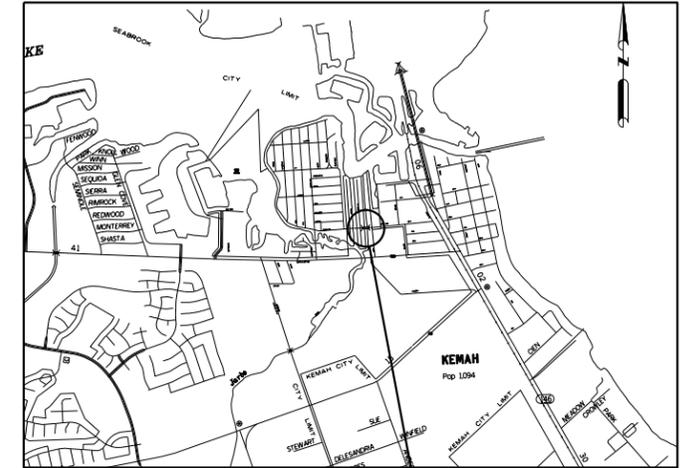
GALVESTON COUNTY
 GALVESTON COUNTY ENGINEERING DEPARTMENT

PLANS OF PROPOSED
 COUNTY IMPROVEMENTS



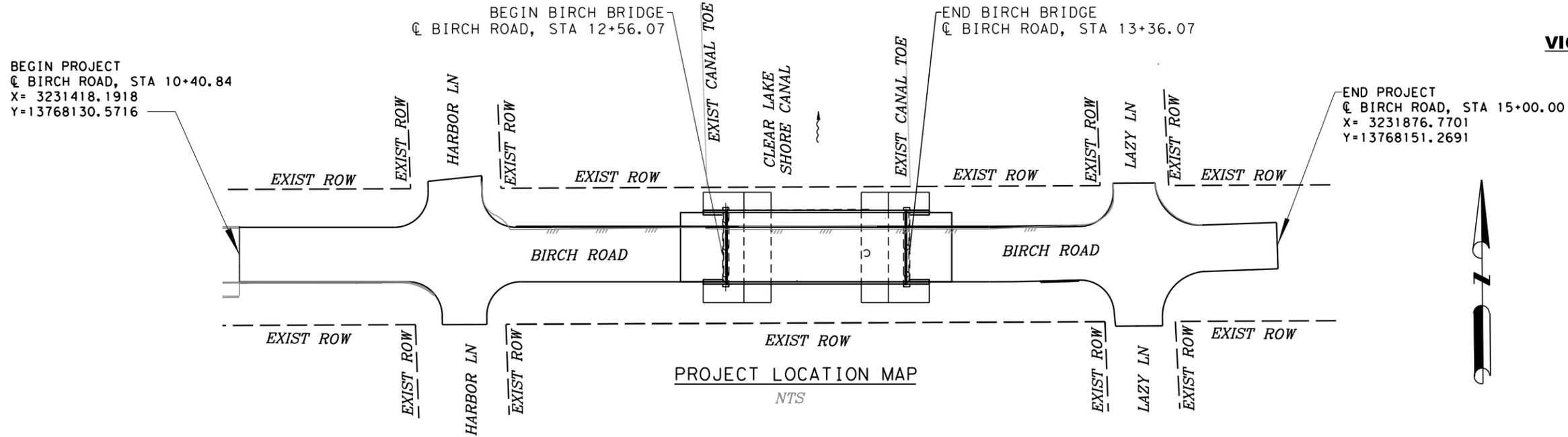
BIRCH ROAD BRIDGE REPLACEMENT

FROM WEST OF HARBOR LANE TO EAST OF LAZY LANE
 FOR THE CONSTRUCTION OF THE REPLACEMENTS OF EXISTING BRIDGE FACILITIES
 CONSISTING OF STRUCTURES, CONCRETE PAVEMENT, LIME-TREATED SUBGRADE, STORM SEWER,
 METAL BEAM GUARD FENCE, PAVEMENT MARKINGS, ETC.



PROJECT LOCATION

VICINITY MAP
 (NTS)



OFFICIALS

MARK HENRY
 DARRELL APFFEL
 JOE GIUSTI
 STEPHEN HOLMES
 KENNETH CLARK
 MICHAEL SHANNON, PE

COUNTY JUDGE
 COMMISSIONER PRECINCT No. 1
 COMMISSIONER PRECINCT No. 2
 COMMISSIONER PRECINCT No. 3
 COMMISSIONER PRECINCT No. 4
 COUNTY ENGINEER



APPROVED BY:

MICHAEL SHANNON, PE
 COUNTY ENGINEER

DATE _____

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SHEET NO.

DESCRIPTION

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REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT

INDEX OF SHEETS

SHEET 1 OF 1

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GENERAL CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL COORDINATE HIS CONSTRUCTION SCHEDULE WITH THE OWNER PRIOR TO COMMENCING WORK.
2. THE CONTRACTOR SHALL ADEQUATELY PROTECT EXISTING STRUCTURES, UTILITIES, TREES, SHRUBS AND OTHER PERMANENT OBJECTS INDICATED ON PLANS.
3. THE CONTRACTOR SHALL CONDUCT HIS OPERATIONS IN A MANNER SUCH THAT TRUCKS AND OTHER VEHICLES DO NOT CREATE A DIRT NUISANCE OR SAFETY HAZARD ON ANY STREETS, PUBLIC OR PRIVATE. CLEAN UP OF STREETS SHALL BE DONE DAILY.
4. ANY AREA OF GRASS THAT ARE DISTURBED OR DUG UP DURING THE CONSTRUCTION SHALL BE REPLACED WITH BLOCK SOD UNLESS OTHERWISE INSTRUCTED BY THE OWNER OR ENGINEER.
5. THE CONTRACTOR SHALL PLACE BACKFILL AS PROMPTLY AS PRACTICAL AFTER COMPLETION OF EACH STRUCTURE OR PORTION OF A STRUCTURE AT THE SPECIFIED COMPACTION RATE. DO NOT PLACE BACKFILL AGAINST CONCRETE WALLS OR SIMILAR STRUCTURES UNTIL CONCRETE HAS CURED AT LEAST SEVEN (7) DAYS.
6. NO EXCAVATIONS SHALL BE LEFT OPEN OVERNIGHT. ALL EXCAVATIONS THAT CANNOT BE BACKFILLED OVERNIGHT FOR THE INSTALLATION OF MANHOLES AND OTHER UTILITIES SHALL BE COVERED WITH STEEL PLATES IN PAVED AREAS, USE SAFETY BARRIERS AS PER STANDARD DETAILS. 3/4" PLYWOOD, WOOD PLANKING OR SOME OTHER MATERIAL APPROVED BY THE ENGINEER IN OTHER AREAS.
7. EXISTING PAVEMENTS, CURBS, SIDEWALKS, DRIVEWAYS AND LANDSCAPING THAT ARE NOT INTENDED TO BE REMOVED DURING PLANNED CONSTRUCTION AND ARE DAMAGED BY THE CONTRACTOR SHALL BE REPLACED BY THE CONTRACTOR AT HIS EXPENSE.
8. ALL DIMENSIONS SHOWN ARE APPROXIMATE AND SHALL NEED TO BE FIELD VERIFIED BY THE CONTRACTOR PRIOR TO BEGINNING CONSTRUCTION ACTIVITIES. HORIZONTAL AND VERTICAL ALIGNMENT CHANGES ARE TO BE APPROVED BY THE ENGINEER OF RECORD. ANY DISCREPANCY BETWEEN FIELD CONDITIONS AND/OR ELEVATIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO ANY CONSTRUCTION IN AREAS OF DISCREPANCY.
9. THE LOCATIONS SHOWN OF AT&T TEXAS/SWB1, CENTERPOINT ENERGY AND OTHER UTILITIES ARE AS APPROXIMATE. THE CONTRACTOR SHALL REQUEST THE EXACT LOCATION OF THESE FACILITIES BY CALLING THE UTILITY COORDINATING COMMITTEE AT PHONE NUMBER 800-545-6005 OR 811 A MINIMUM OF 48 HOURS BEFORE COMMENCING WORK. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ALL DAMAGES WHICH OCCUR DUE TO HIS FAILURE TO REQUEST THE LOCATION AND PRESERVATION OF THESE UNDERGROUND FACILITIES.
10. THE CONTRACTOR SHALL COMPLY WITH OSHA REGULATIONS AND STATE OF TEXAS LAW CONCERNING EXCAVATION, TRENCHING AND SHORING AS DETAILED IN THE SPECIFICATIONS.
11. PROJECT SITE DRAINAGE SHALL BE MAINTAINED AT ALL TIMES DURING CONSTRUCTION AND ANY EXISTING DRAINAGE DITCH OR STRUCTURE DISTURBED DURING CONSTRUCTION AND NOT TO BE REPLACED SHALL BE RESTORED TO ITS ORIGINAL CONDITION TO THE SATISFACTION OF

GALVESTON COUNTY. THE CONTRACTOR IS RESPONSIBLE FOR IMPLEMENTING AND ADHERING TO THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) PREPARED FOR THIS PROJECT. THE CONTRACTOR SHALL PREPARE ALL NOTICE OF INTENT FORMS FOR THE PROPOSED WORK AND OBTAIN THE NECESSARY CERTIFICATES AND SIGNATURES FROM THE OWNER, APPLICABLE SUBCONTRACTORS AND OTHERS AS REQUIRED.

12. THE CONTRACTOR SHALL MAINTAIN ACCESS TO ALL PROPERTIES AFFECTED BY THIS CONSTRUCTION. THE MATERIALS USED MUST ALLOW FOR SAFE ACCESS UNDER ALL WEATHER CONDITIONS.
13. THE CONTRACTOR SHALL COORDINATE WITH PROPERTY OWNERS ON TEMPORARY DRIVEWAY CLOSURES AND REQUIRED DEMOLITION OF VARIOUS TYPES OF FENCES, SUCH AS CHAINLINK AND DECORATIVE, INCLUDING IMPACTS TO LANDSCAPING AND TREES.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED CONSTRUCTION PERMITS.
15. THE CONTRACTOR SHALL REMOVE ALL TRASH, EXCESS MATERIAL, DEBRIS, ETC. FROM THE SITE UPON SUBSTANTIAL COMPLETION OF THE PROJECT PRIOR TO THE FINAL INSPECTION AND APPROVAL BY GALVESTON COUNTY.
16. THE CONTRACTOR IS RESPONSIBLE FOR HIS OWN HORIZONTAL AND VERTICAL CONTROL. REFERENCE POINTS AND CONSTRUCTION STAKING IS INCIDENTAL TO THE PROJECT.
17. INSTALL AND MAINTAIN TEMPORARY CONSTRUCTION FENCING DURING CONSTRUCTION.
18. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING AND UPDATING A REDLINED "AS-BUILT" SET OF CONSTRUCTION DRAWINGS ON SITE FOR INSPECTION BY THE OWNER. THE CONTRACTOR SHALL SUBMIT THE "AS-BUILT" PRINTS TO THE OWNER ELECTRONICALLY AT THE END OF THE PROJECT.
19. THE CONTRACTOR SHALL REPLACE SURVEY CONTROL MARKERS AND PROPERTY IRON RODS DISTURBED BY CONSTRUCTION ACTIVITIES AND SHALL BE REPLACED BY A REGISTERED PUBLIC LAND SURVEYOR AT NO ADDITIONAL COST TO THE OWNER.

DESIGN CRITERIA:

DESIGN SPEED: BIRCH ROAD = 30 MPH
 DESIGN SPEED: HARBOR LN = 20 MPH
 DESIGN SPEED: LAZY LN = 20 MPH

STORM WATER POLLUTION PREVENTION NOTES:

1. THE CONTRACTOR SHALL ENSURE THAT THE STORM WATER POLLUTION PREVENTION PLAN (SWPPP) MEETS APPLICABLE TEXAS POLLUTANT DISCHARGE ELIMINATION SYSTEM (TPDES) STANDARDS AND REGULATIONS.



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM

ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT

GENERAL NOTES

SHEET 1 OF 2

Job No.:	Scales:	NO. 3
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2. THE CONTRACTOR SHALL ENSURE ALL CONTROL MEASURES ARE PROPERLY INSTALLED AND MAINTAINED ACCORDING TO THE PROJECT SWPPP, APPLICABLE PROJECT SPECIFICATIONS, AND PERMITS.
3. THE CONTRACTOR SHALL MINIMIZE OFF-SITE VEHICLE TRACKING OF SEDIMENTS AND THE GENERATION OF DUST.
4. ALL PROTECTIVE MEASURES IDENTIFIED IN THE SWPPP MUST BE MAINTAINED IN EFFECTIVE OPERATING CONDITION. IF, THROUGH INSPECTIONS OR OTHER MEANS, THE PERMITTEE DETERMINES THAT BMP'S (EROSION AND SEDIMENT CONTROLS) ARE NOT OPERATING EFFECTIVELY, THEN PRIOR TO THE NEXT RAIN EVENT, THE PERMITTEE SHALL PERFORM NECESSARY MAINTENANCE AS NECESSARY TO MAINTAIN THE EFFECTIVENESS OF THE CONTROLS. IF MAINTENANCE PRIOR TO THE NEXT ANTICIPATED RAIN EVENT IS IMPRACTICABLE, THE REASON SHALL BE DOCUMENTED, GALVESTON COUNTY NOTIFIED, AND MAINTENANCE SCHEDULED AND ACCOMPLISHED AS SOON AS POSSIBLE. REPLACE ALL BMP'S THAT ARE DISABLED OR INOPERABLE IMMEDIATELY.
5. REMOVE SEDIMENT FROM SEDIMENT TRAPS AND/OR SEDIMENTATION PONDS AT THE 50% DESIGN CAPACITY. FOR PERIMETER CONTROLS SUCH AS SILT FENCE, BERMS, ETC., REMOVE THE TRAPPED SEDIMENT BEFORE IT REACHES 50% OF THE ABOVE-GROUND HEIGHT.

SURVEY NOTES:

1. ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE (4204) NORTH AMERICAN DATUM OF 1983 (2011 ADJ.) 2010 EPOCH. COORDINATES SHOWN HEREON ARE GRID VALUE AND MAY BE CONVERTED TO SURFACE VALUES BY DIVING BY THE COMBINED ADJUSTMENT FACTOR OF 0.99987364.

SURFACE COORDINATE=GRID COORDINATE/CSF
2. ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) GEOID 12B BASED ON A 2-HOUR STATIC OBSERVATION OF CONTROL POINT 10 COLLECTED ON JANUARY 18, 2019.

UTILITY NOTES

CENTERPOINT NOTES:

CAUTION: UNDERGROUND GAS FACILITIES

THE CONTRACTOR SHALL CONTACT THE UTILITY COORDINATING COMMITTEE AT 1-800-545-6005 OR 811 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION TO HAVE MAIN AND SERVICE LINES FIELD LOCATED.

- WHEN CENTERPOINT ENERGY PIPE LINE MARKINGS ARE NOT VISIBLE, CALL (713) 207-5463 OR (713) 945-8037 (7:00 A.M. TO 4:30 P.M.) FOR STATUS OF LINE LOCATION REQUEST BEFORE EXCAVATION BEGINS.

- WHEN EXCAVATING WITHIN EIGHTEEN INCHES (18") OF THE INDICATED LOCATION OF CENTERPOINT ENERGY FACILITIES, ALL EXCAVATION MUST BE ACCOMPLISHED USING NON-MECHANIZED EXCAVATION PROCEDURES.
- WHEN CENTERPOINT ENERGY FACILITIES ARE EXPOSED, SUFFICIENT SUPPORT MUST BE PROVIDED TO THE FACILITIES TO PREVENT EXCESSIVE STRESS ON THE PIPING.
- FOR EMERGENCIES REGARDING GAS LINES CALL (713) 659-3552 OR (713) 207-4200.

THE CONTRACTOR IS FULLY RESPONSIBLE FOR ANY DAMAGES CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE THESE UNDERGROUND FACILITIES.

WARNING: OVERHEAD ELECTRICAL LINES

OVERHEAD LINES MAY EXIST ON THE PROPERTY. THE LOCATION OF OVERHEAD LINES HAS NOT BEEN SHOWN ON THESE DRAWINGS AS THE LINES ARE CLEARLY VISIBLE, BUT YOU SHOULD LOCATE THEM PRIOR TO BEGINNING ANY CONSTRUCTION. TEXAS LAW, SECTION 752, HEALTH & SAFETY CODE FORBIDS ACTIVITIES THAT OCCUR IN CLOSE PROXIMITY TO HIGH VOLTAGE LINES, SPECIFICALLY:

- ANY ACTIVITY WHERE PERSON OR THINGS MAY COME WITHIN SIX(6) FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES; AND
- OPERATING A CRANE, DERRICK, POWER SHOVEL, DRILLING RIG, PILE DRIVER, HOISTING EQUIPMENT, OR SIMILAR APPARATUS WITHIN 10 FEET OF LIVE OVERHEAD HIGH VOLTAGE LINES.

PARTIES RESPONSIBLE FOR THE WORK, INCLUDING CONTRACTORS ARE LEGALLY RESPONSIBLE FOR THE SAFETY OF CONSTRUCTION WORKERS UNDER THIS LAW. THIS LAW CARRIES BOTH CRIMINAL AND CIVIL LIABILITY. TO ARRANGE FOR LINES TO BE TURNED OFF OR REMOVED CALL CENTERPOINT ENERGY AT (713) 207-2222.

FRONTIER COMMUNICATIONS NOTES:

THE CONTRACTOR IS REQUIRED TO PROVIDE FRONTIER COMMUNICATIONS AT LEAST 2 WEEKS ADVANCED NOTICE WHEN WORKING NEAR FRONTIER'S FACILITIES INCLUDING THEIR HANDHOLE AND UNDERGROUND COMMUNICATION LINE. THE HANDHOLE AT STATION 13+97.30, 21.20' LT WILL REQUIRE ADJUSTMENT AND FRONTIER WILL ADJUST ONCE THE ELEVATIONS ARE KNOWN FOR FINAL GRADING. THERE IS ALSO A COMMUNICATIONS LINE BENEATH THE CANAL. CALL: (281) 338-2221.

PAVING NOTES:

1. THE CONTRACTOR SHALL SAWCUT FULL DEPTH OF EXISTING PAVEMENT TO PRODUCE A CLEAN EDGE AT PAVEMENT JUNCTURES BETWEEN EXISTING AND PROPOSED PAVEMENTS.
2. SIDEWALKS AND WHEELCHAIR RAMPS SHALL COMPLY WITH CURRENT ADA/TDLR REQUIREMENTS.
1. WHEN ANY STREET OR ANY SECTION OF A STREET IS CLOSED, THE CONTRACTOR SHALL FURNISH AND MAINTAIN BARRICADES IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS AND STANDARDS.
2. PROVIDE TEMPORARY STREET SIGNAGE AT EACH INTERSECTION THROUGHOUT CONSTRUCTION. THIS WORK IS INCIDENTAL TO ITEM 502, BARRICADES, SIGNS AND TRAFFIC HANDLING.
3. THE CONTRACTOR SHALL CAREFULLY REMOVE IN ONE PIECE THE DECORATIVE BRICK PEDESTALS AT THE CORNERS OF LAZY AND HARBOR LANES AND BIRCH STREET, STORE THEM IN A SAFE AND STABLE LOCATION, THEN REINSTALL TO MATCH EXISTING (INCLUDING THE CONCRETE PAD THE PEDESTAL RESTS ON), ONCE CONSTRUCTION ACTIVITIES IN THE AREA OF THE PEDESTAL LOCATIONS ARE COMPLETE. THIS WORK IS INCIDENTAL TO ITEM 500, MOBILIZATION.



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM

ENGINEERING CORPORATION - HOUSTON, LLC
T.B.P.E. FIRM REGISTRATION #392
3100 WEST ALABAMA, HOUSTON, TEXAS 77098 (713) 520-8570

GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT

GENERAL NOTES

SHEET 2 OF 2

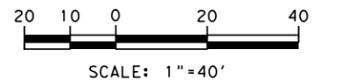
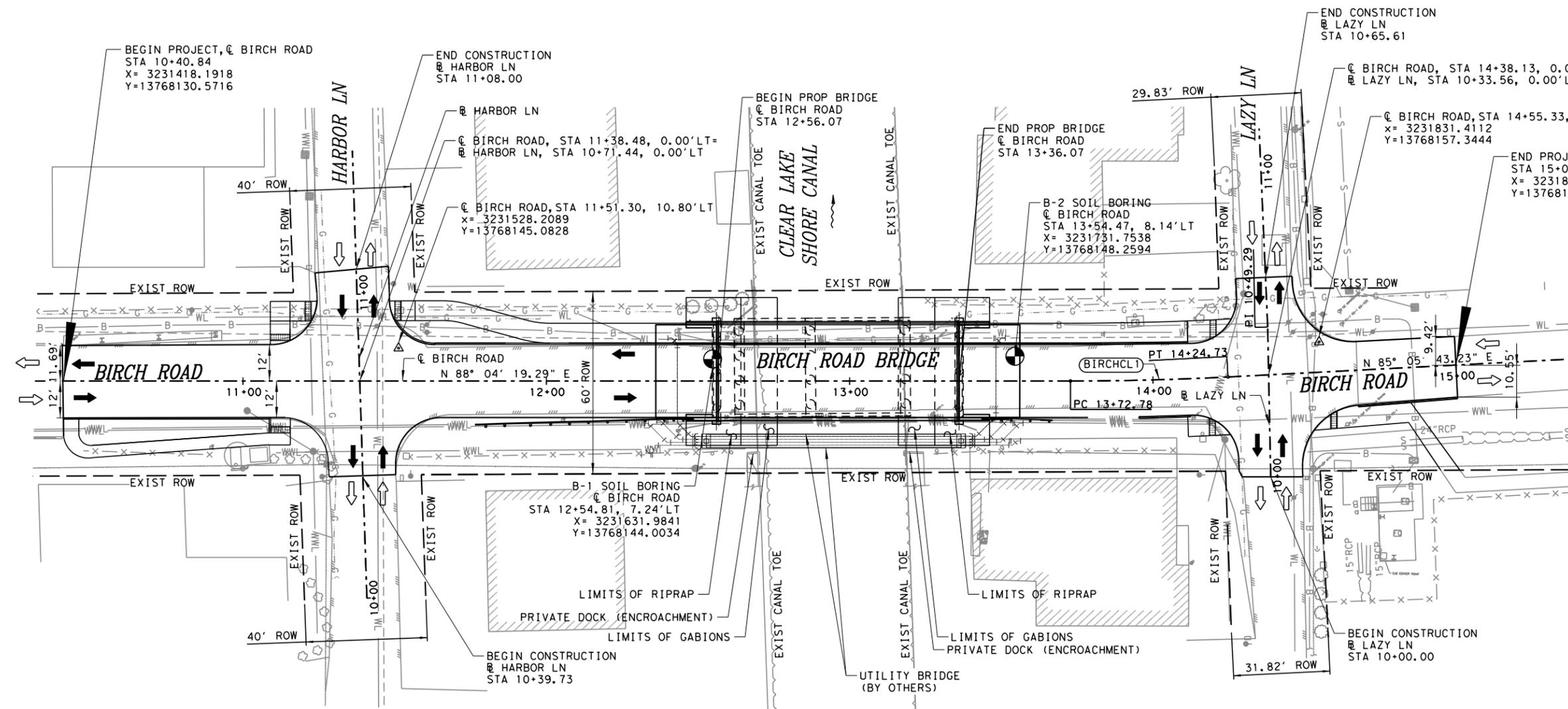
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Date: February, 2020	HORZ:	
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- LEGEND:
- (XX-XXX) CURVE NUMBER
 - △ BENCHMARKS
 - ⊗ SOIL BORING

- NOTES:
1. FOR HORIZONTAL ALIGNMENT DATA AND COORDINATES SEE HORIZONTAL ALIGNMENT DATA SHEET.



REV. NO.	DATE	DESCRIPTION	BY



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GALVESTON COUNTY, TEXAS

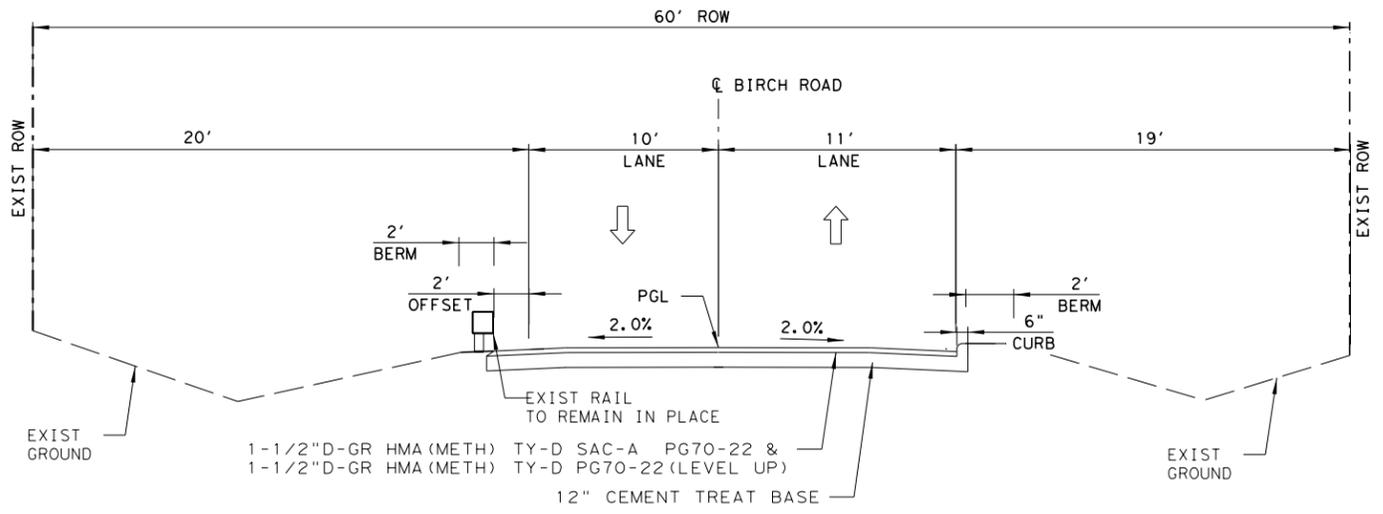
**BIRCH ROAD BRIDGE REPLACEMENT
 PROJECT LAYOUT**

STA 10+40.84 TO STA 15+00.00

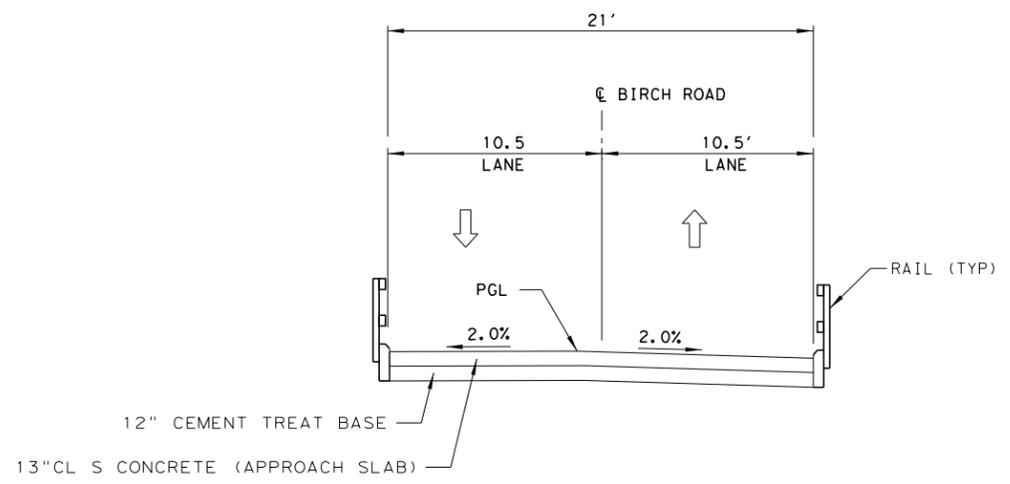
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Date: February, 2020	HORZ:	
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Chk By: ic		

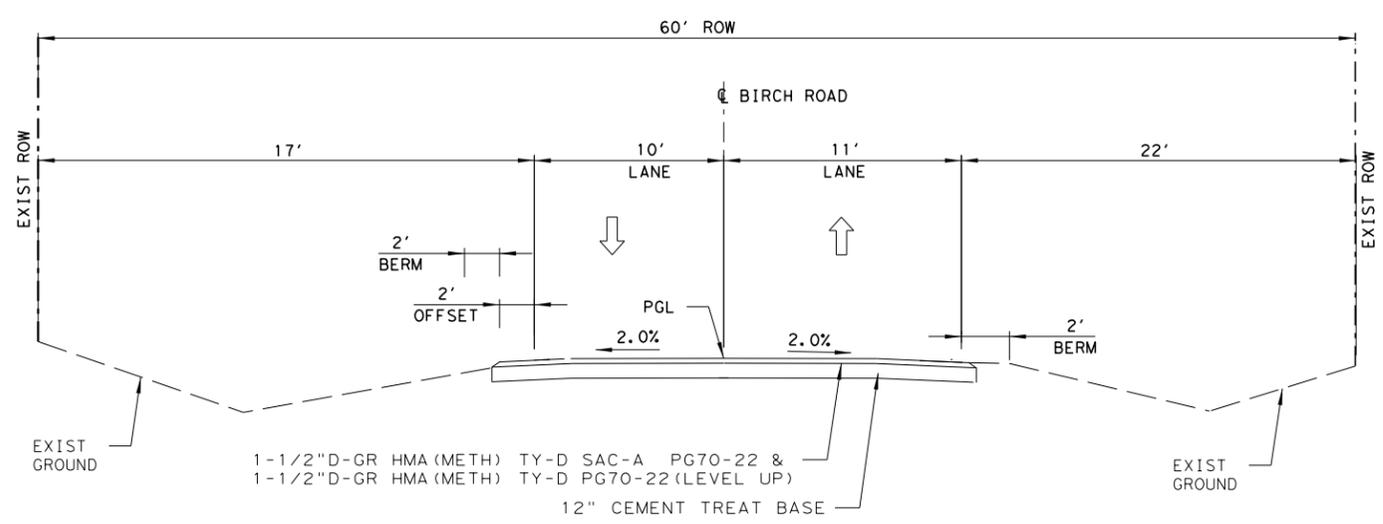
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EXISTING TYPICAL SECTION
 STA 10+00.00 TO STA 11+24.00



EXISTING BRIDGE TYPICAL SECTION
 STA 12+56.07 TO STA 13+36.07



EXISTING TYPICAL SECTION
 STA 11+24.00 TO STA 12+56.07
 STA 13+36.07 TO STA 15+00.00

NOT TO SCALE

09/06/2020

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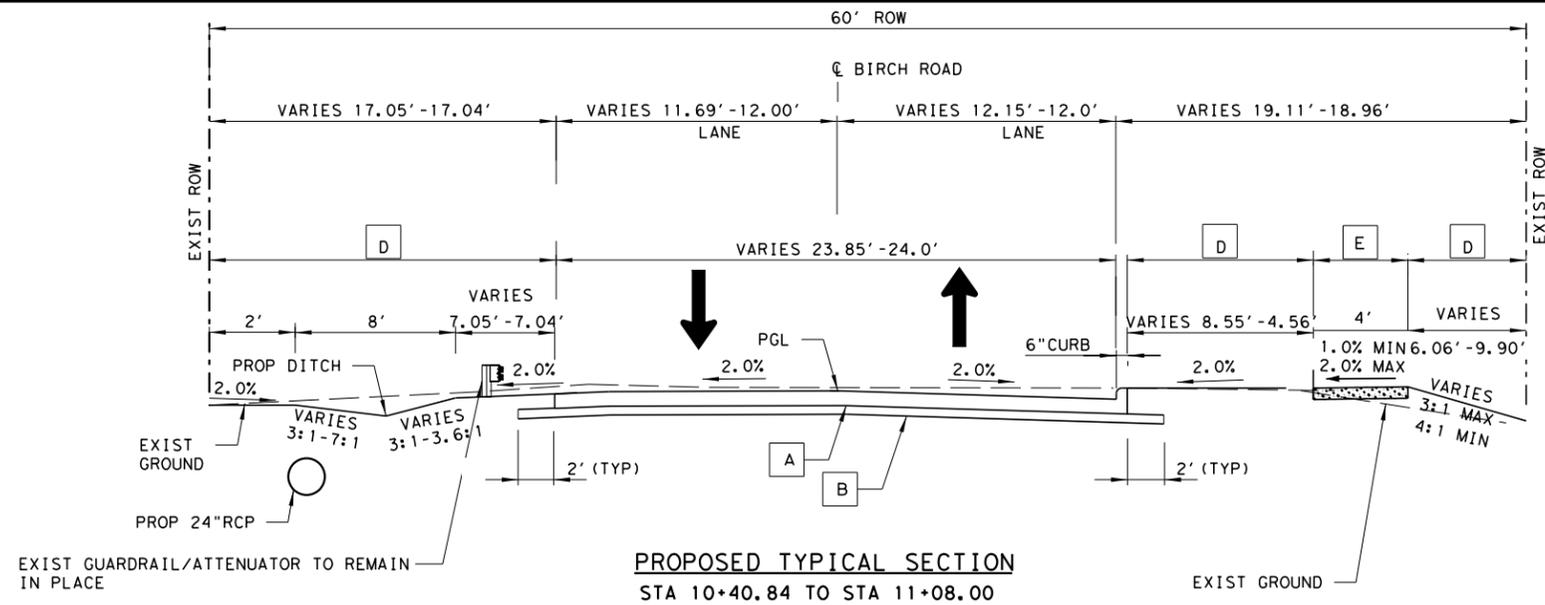
GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 EXISTING TYPICAL SECTIONS

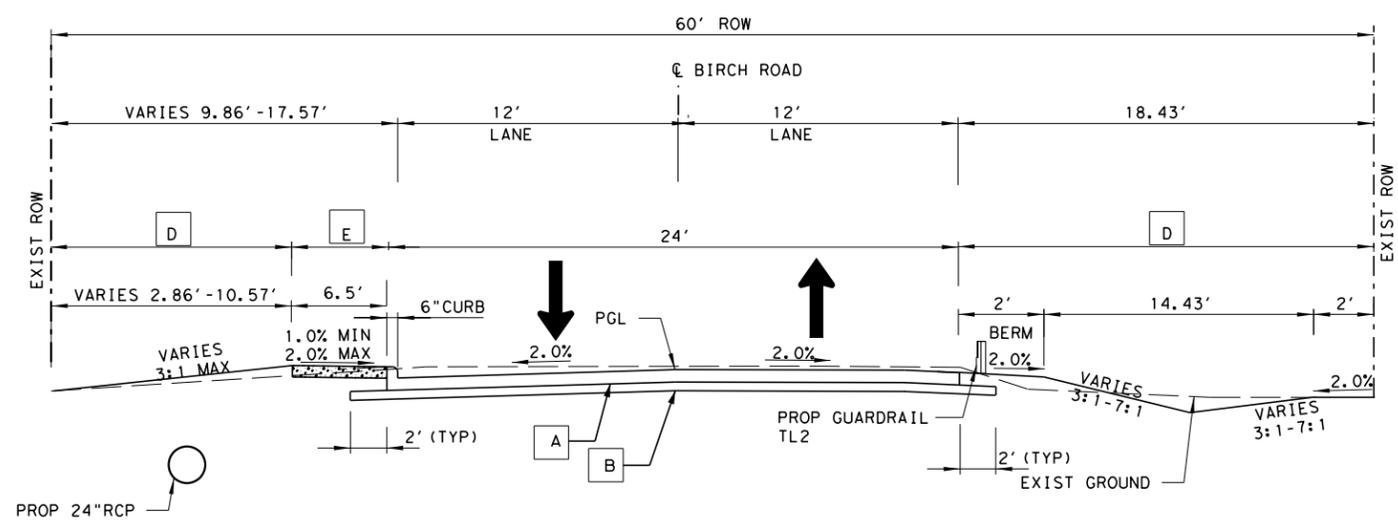
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Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	NO.
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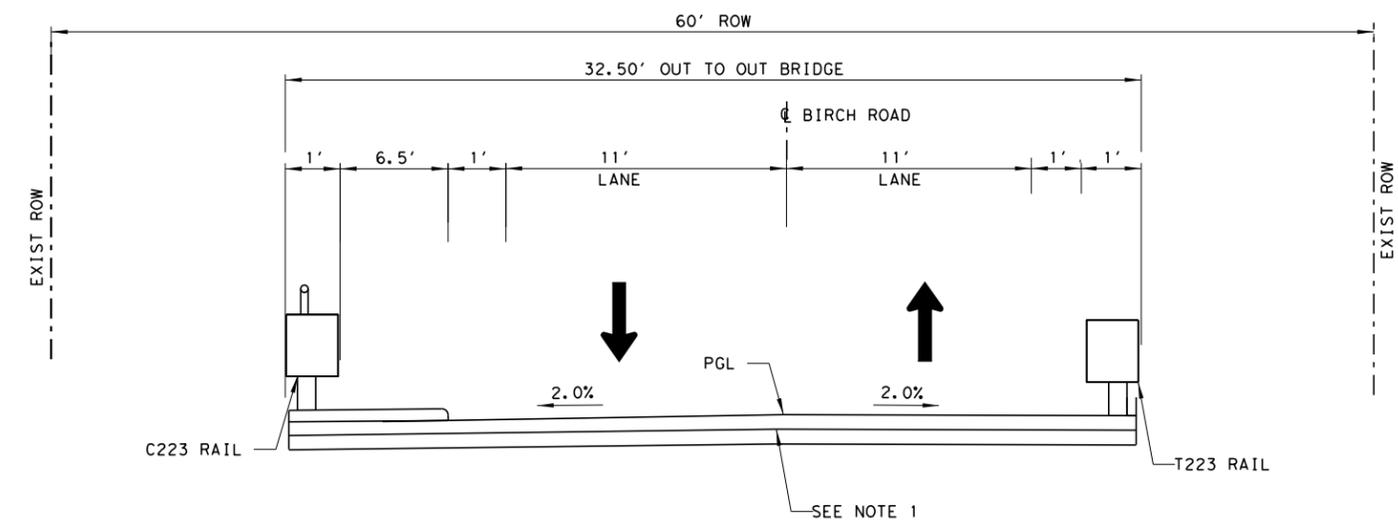
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PROPOSED TYPICAL SECTION
 STA 10+40.84 TO STA 11+08.00



PROPOSED TYPICAL SECTION
 STA 11+66.00 TO STA 12+56.07



PROPOSED BRIDGE TYPICAL SECTION
 STA 12+56.07 TO STA 13+36.07

- LEGEND**
- A 10" CONC PAVEMENT (JRCP)
 - B 6" LIME TREATED SUBGRADE
 - D BLOCK SODDING (4" TOPSOIL)
 - E 4" CONCRETE SIDEWALK

- NOTES:**
1. FROM STA 12+56.07 TO STA 13+36.07 SEE BRIDGE TYPICAL SECTION
 2. PROPOSED SIDE SLOPE STEEPER THAN 3:1 WILL HAVE CONCRETE RIPRAP AS SHOWN ON THE ROADWAY PLAN AND PROFILE SHEETS
 3. SEE HARBOR LN PLAN & PROFILE FROM STA 11+08.00 TO STA 11+66.00
 4. SEE LAZY LN PLAN & PROFILE FROM STA 14+11.92 TO STA 14+67.21

NOT TO SCALE

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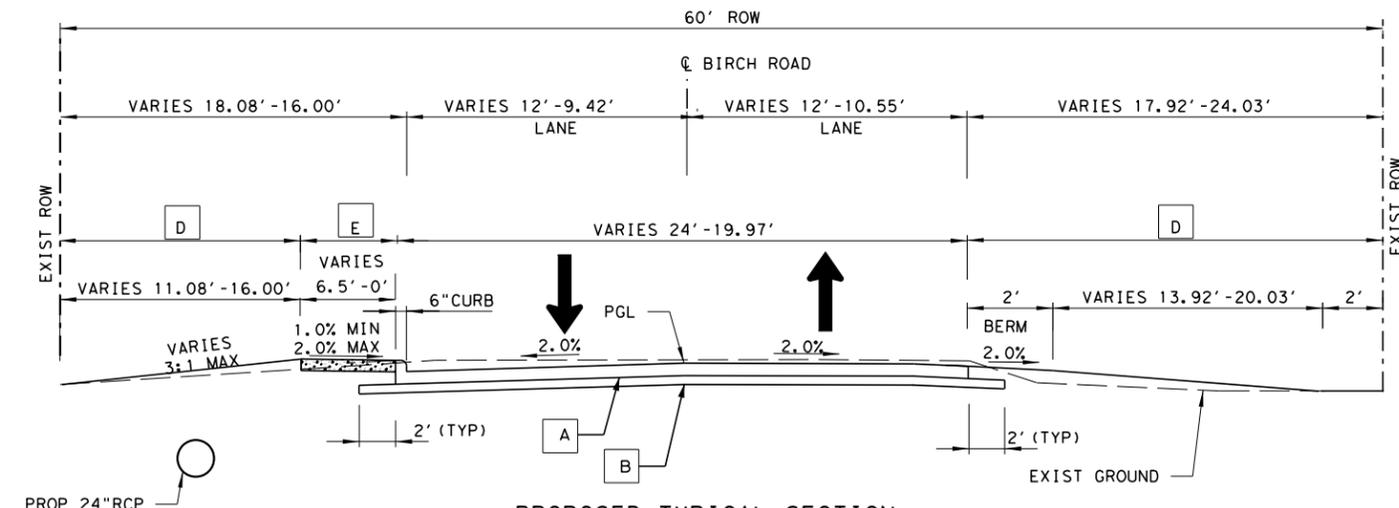
GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 PROPOSED TYPICAL SECTIONS

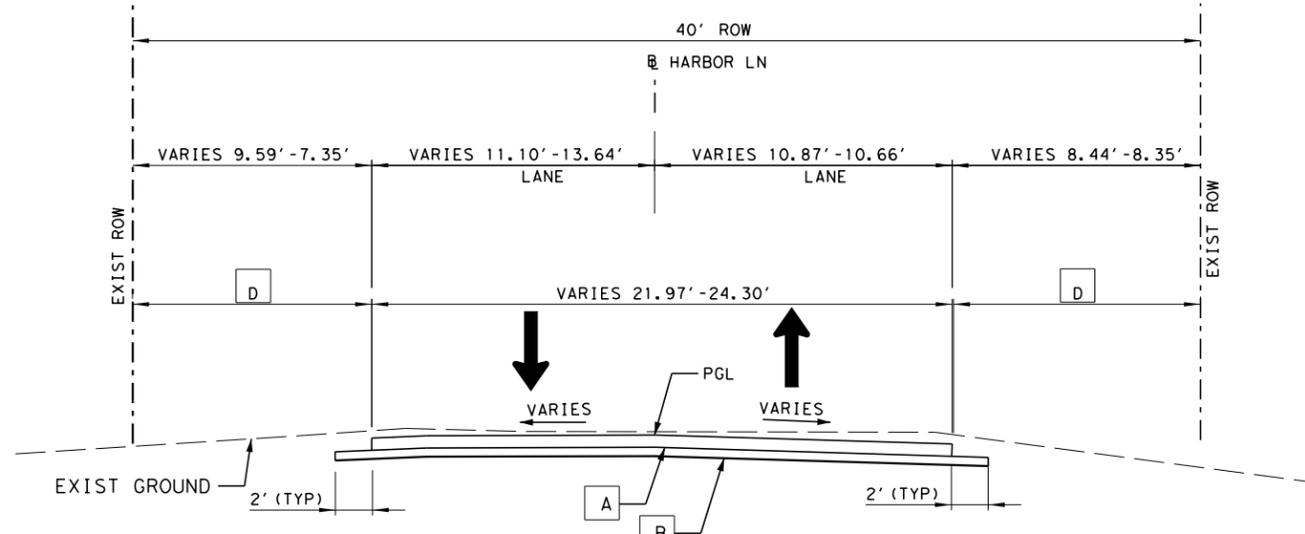
SHEET 2 OF 3

Job No.:	Scale:	SHEET NO.
Date: February, 2020	HORZ:	
Drn By: ic	VERT:	NO. 7
Chk By: ic		

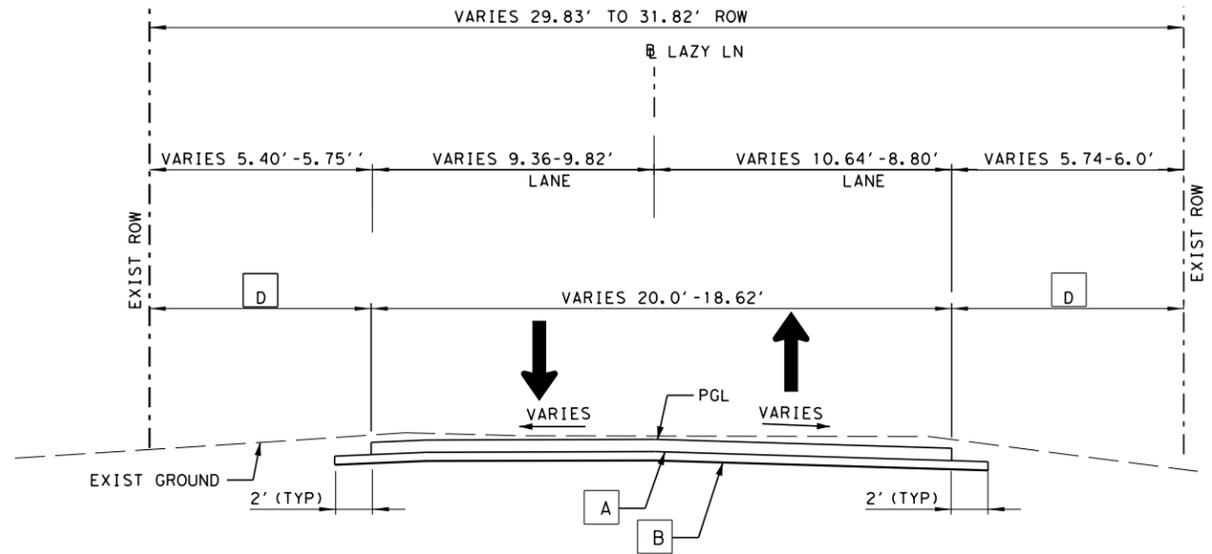
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PROPOSED TYPICAL SECTION
 STA 13+36.07 TO STA 14+11.92
 STA 14+67.21 TO STA 15+00.00



PROPOSED TYPICAL SECTION HARBOR LN
 STA 10+39.73 TO STA 11+08.00



PROPOSED TYPICAL SECTION LAZY LN
 STA 10+00.00 TO STA 10+65.61

LEGEND

- A 10" CONC PAVEMENT (JRCP)
- B 6" LIME TREATED SUBGRADE
- D BLOCK SODDING (4" TOPOSOIL)
- E 4" CONCRETE SIDEWALK

NOTES:

1. FROM STA 12+56.07 TO STA 13+36.07 SEE BRIDGE TYPICAL SECTION
2. PROPOSED SIDE SLOPE STEEPER THAN 3:1 WILL HAVE CONCRETE RIPRAP AS SHOWN ON THE ROADWAY PLAN AND PROFILE SHEETS
3. SEE HARBOR LN PLAN & PROFILE FROM STA 11+08.00 TO STA 11+66.00
4. SEE LAZY LN PLAN & PROFILE FROM STA 14+11.92 TO STA 14+67.21

NOT TO SCALE



REV. NO.	DATE	DESCRIPTION	BY



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GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 PROPOSED TYPICAL SECTIONS

SHEET 3 OF 3

Job No.:	Scales:	SHEET NO.
Date: February, 2020	HORZ:	
Drn By: ic	VERT:	NO. 8
Chk By: ic		

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SUMMARY OF ROADWAY QUANTITIES

SHEET	BEGIN STATION	END STATION	110-6001 EXCAVATION (ROADWAY) (CY)	132-6006 EMBANKMENT (FINAL) (DENS CONT) (TY C) (CY)	260-6006 LIME TRT (EXST MATL) (6") (SY)	260-6012 LIME (HYD, COM OR QK) (SLRY) OR QK (DRY) TON	360-6020 CONC PVMT (JOINTED- CPCD) (10") (SY)	422-6015 APPROACH SLAB (CY)	432-6002 RIPRAP (CONC) (5 IN) (CY)	432-6045 RIPRAP (MOW STRIP) (4 IN) (CY)	529-6005 CONC CURB (MONO) (TY II) (LF)	531-6001 CONC SIDEWALKS (4") (SY)	531-6004 CURB RAMPS TY 1 (EA)	531-6010 CURB RAMPS TY 7 (EA)	540-6001 MTL W-BEAM GD FEN (TIM POST) (LF)	540-6007 MTL BEAM GD FEN TRANS (TL2) (EA)	540-6016 DOWNSTREAM ANCHOR TERMINAL SECTION (EA)	544-6001 GUARDRAIL END TREATMENT (INSTALL) (TL2) (EA)
ROADWAY PLAN & PROFILE 1 OF 1	10+40.84	15+00.00	376.00	138.00	1,032.00	14.00	881.00	49.00	27.00	8.00	310.00	186.00	2.00	5.00	31.25	2	1	1
INTERSECTION PLAN & PROFILE																		
HARBOR LN (1 OF 1)	10+39.73	11+08.00	77.00	6.00	136.00	2.00	134.00											
LAZY LN (1 OF 1)	10+00.00	10+65.61	44.00	2.00	127.00	2.00	124.00											
TOTAL			497.00	146.00	1,295.00	18.00	1,139.00	49.00	27.00	8.00	310.00	186.00	2.00	5.00	31.25	2	1	1

SUMMARY OF DEMOLITION QUANTITIES

	105-6069	496-6009	550-6003	542-6001	644-6076
DESCRIPTION	REMOVING STAB BASE & ASPH PAV (4"-6")	REMOV STR (BRIDGE 0-99FT LENGTH)	CHAIN LINK FENCE (REMOVE)	REMOVE METAL BEAM GUARD FENCE	REMOVE SM RD SN SUP&AM
UNIT	SY	EA	LF	LF	EA
SHEET 1	1,297	1	511	72	8
TOTALS	1,297	1	511	72	8

SUMMARY OF PREP ROW

SHEET	100-6002 PREPARING ROW (STA)
ROADWAY PLAN & PROFILE	
BIRCH ROAD SHEET 1 OF 1	5.00
TOTAL	5.00

SUMMARY OF EARTHWORK QUANTITIES

STA	AREA CUT (SF)	CUT VOLUME (CY)	AREA FILL (SF)	FILL VOLUME (CY)
BIRCH ROAD				
10+40.84	0.00	0.00	0.00	0.00
10+80.00	27.57	20.00	4.97	3.60
11+20.00	22.36	36.99	0.36	3.95
11+60.00	39.70	45.97	2.96	2.46
12+00.00	43.06	61.30	0.07	2.24
12+40.00	1.57	33.06	52.10	38.64
12+56.07	1.57	0.93	52.10	31.01
13+36.07	16.59	0.00	25.85	0.00
13+60.00	16.59	14.70	25.85	22.91
14+00.00	29.68	34.27	3.10	21.45
14+40.00	51.27	59.96	4.65	5.75
14+80.00	27.65	58.46	2.45	5.26
15+00.00	0.00	10.24	0.00	0.91
SUBTOTAL		375.88		138.17
HARBOR LANE				
10+40.84	12.89	0.00	0.86	0.00
10+80.00	14.44	20.24	0.53	1.03
11+20.00	14.44	10.16	0.53	0.37
11+60.00	19.31	0.00	2.10	0.00
12+00.00	19.31	26.46	2.10	2.88
12+40.00	19.78	19.72	0.34	1.23
SUBTOTAL		76.58		5.51
LAZY LANE				
10+40.84	26.68	0.00	0.75	0.00
10+80.00	26.68	21.74	0.75	0.61
11+20.00	12.74	0.00	0.59	0.00
11+60.00	12.74	14.15	0.59	0.65
12+00.00	0.00	8.16	0.00	0.38
SUBTOTAL		44.05		1.64
TOTAL		496.51		145.33



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GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 SUMMARY OF ROADWAY, PREP ROW,
 DEMOLITION & EARTHWORK QUANTITIES

SHEET 1 OF 1

Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	
Drn By: ic	VERT:	
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SUMMARY OF STORM SEWER QUANTITIES													
DRAINAGE P&P SHEET # 'S	ALIGNMENT NAME	STATION	PIPE RUN		400-6001	400-6005	400-6009	402-6001	464-6005	465-6167	465-6173	465-6176	467-6389
			FROM	TO	*	CEM	CEMENT	TRENCH	RC PIPE	INLET	MANH	INLET	SET
			(CY)	(CY)	STRUCT EXCAV	STABIL BKFL	STAB BACKFILL (INLET OR MH)	EXCAV PROTECTION	(CL III) (24 IN)	(COMPL) (TY AD)	(COMPL) (TY A)	(COMPL) (TY C1)	(TY II) (24IN) (RCP) (3:1) (P)
					(CY)	(CY)	(CY)	(LF)	(LF)	(EA)	(EA)	(EA)	(EA)
MAINLANE P & P (SHT 1-1)													
1 OF 1	BIRCH RD	10+99.83	BRB-N2	BRB-N4	68	30	8.25	68	63	1			
1 OF 1	BIRCH RD	11+63.90	BRB-N4	OUT_N1	90	37	8.25	91	78			1	1
1 OF 1	BIRCH RD	13+98.00	MH4	OUT_N2	92	32	8.25	70	66		1		
1 OF 1	BIRCH RD	14+75.09	BRB-S8	BRB-S6	55	34	5.75	0	71			1	
LATERAL #													
1	HARBOR LN	11+05.63 - 11+04.60	HB2	HB4	29	13	8.25	35	28	1			
2	BIRCH RD	10+96.00 - 11+00.00	BRB-S2	BRB-N2	29	15	8.25	36	32			1	
3	BIRCH RD	11+01.60 - 11+66.00	HB4	BRB-N4	19	11	8.25	20	22	1			
4	BIRCH RD	11+66.00 - 11+66.00	BRB-S4	BRB-N4	31	16	8.25	37	33	1			
5	BIRCH RD	13+98.70 - 13+98.73	BRB-S6	BRB-N6	22	10	5.75	26	21			1	
5	BIRCH RD	13+98.73 - 13+98.00	BRB-N6	MH4	9	2	5.75	7	4			1	
TOTALS					444	200	75	390	418	4	1	5	1

* FOR CONTRACTOR'S INFORMATION ONLY

SUMMARY OF STORM WATER POLLUTION & PREVENTION (SW3P) QUANTITIES																	
SHEET	162-6002 BLOCK SODDING (SY)	162-6003 STRAW OR HAY MULCH (SY)	164-6051 DRILL SEED (TEMP) (WARM) OR COOL) SY	166-6001 FERTILIZER (* (AC)	168-6001 VEGETATIVE WATERING (MG)	506-6001 ROCK FILTER DAMS (INSTALL) (LF)	506-6011 ROCK FILTER DAMS (REMOVE) (LF)	506-6020 CONSTRUCTION EXIT (INSTALL) (TY1) (SY)	506-6024 CONSTRUCTION EXIT (REMOVE) (SY)	506-6038 TEMP SEDMT CONT FENCE INSTALL (LF)	506-6039 TEMP SEDMT CONT FENCE REMOVE (LF)	506-6040 BIODEG EROSN CONT LOGS (8" DIA) INSTALL (LF)	506-6041 BIODEG EROSN CONT LOGS (12" DIA) INSTALL (LF)	506-6043 BIODEG EROSN CONT LOGS (REMOVE) (LF)	1004-6001 TREE PROTECTION (EA)	4500 GABIONS (3' X 3') (STAINLESS STEEL) (CY)	
SW3P LAYOUTS																	
1 OF 1	1,006.00	1,006.00	1,006.00	0.42	50.00	31.00	31.00	49.00	49.00	744.00	744.00	50.00	192.00	242.00	16.00	146.00	
TOTAL	1,006.00	1,006.00	1,006.00	0.42	50.00	31.00	31.00	49.00	49.00	744.00	744.00	50.00	192.00	242.00	16.00	146.00	



REV. NO.	DATE	DESCRIPTION	BY



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ENGINEERING CORPORATION - HOUSTON, LLC
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GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 SUMMARY OF STORM SEWER &
 STORM WATER POLLUTION & PREVENTION
 PLAN QUANTITIES

SHEET 1 OF 1

Job No.:	Scale:	NO. 10
Date: February, 2020	HORZ:	
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SUMMARY OF PAVEMENT MARKINGS										
	666-6042	666-6048	666-6126	666-6224	666-6228	666-6230	672-6009	678-6001	678-6006	678-6008
DESCRIPTION	REFL PAV MRK TY I (W) 12" (SLD) (100MIL)	REFL PAV MRK TY I (W) 24" (SLD) (100MIL)	REFL PAV MRK TY I (Y) 4" (SLD) (100MIL)	PAVEMENT SEALER 4"	PAVEMENT SEALER 12"	PAVEMENT SEALER 24"	REFL PAV MRKR TY II-A-A	PAV SURF PREP FOR MRK (4")	PAV SURF PREP FOR MRK (12")	PAV SURF PREP FOR MRK (24")
	LF	LF	LF	LF	LF	LF	EA	LF	LF	LF
SHEET 1	205	84	698	698	205	84	10	698	205	84
TOTALS	205	84	698	698	205	84	10	698	205	84



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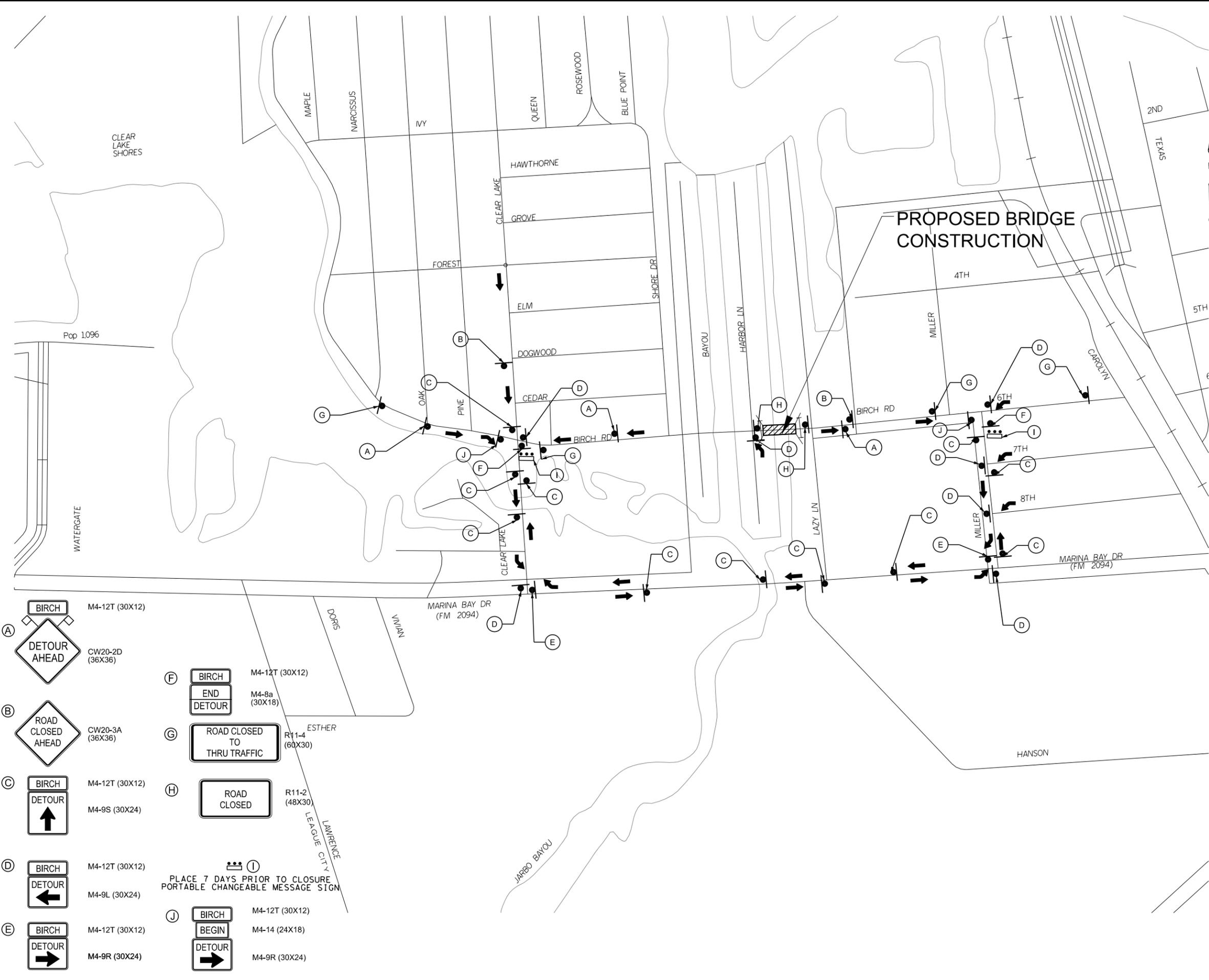
GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 SUMMARY OF PAVEMENT
 MARKING QUANTITIES

SHEET 1 OF 1

Job No.:	Scales:	SHEET
Date: February, 2020	HORZ:	NO.
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LEGEND

- PROPOSED CONSTRUCTION
- PORTABLE CHANGEABLE MESSAGE SIGN
- TY III BARRICADE
- SIGN

NOTE:
 SEE TxDOT STANDARD BC(2)-14 FOR WARNING SIGN SPACING.



REV. NO.	DATE	DESCRIPTION	BY



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GALVESTON COUNTY, TEXAS

**BIRCH ROAD BRIDGE REPLACEMENT
 TRAFFIC CONTROL PLAN
 DETOUR LAYOUT**

SHEET 1 OF 4

Job No.:	Scale:	Date: February, 2020	HORIZ:	NO.
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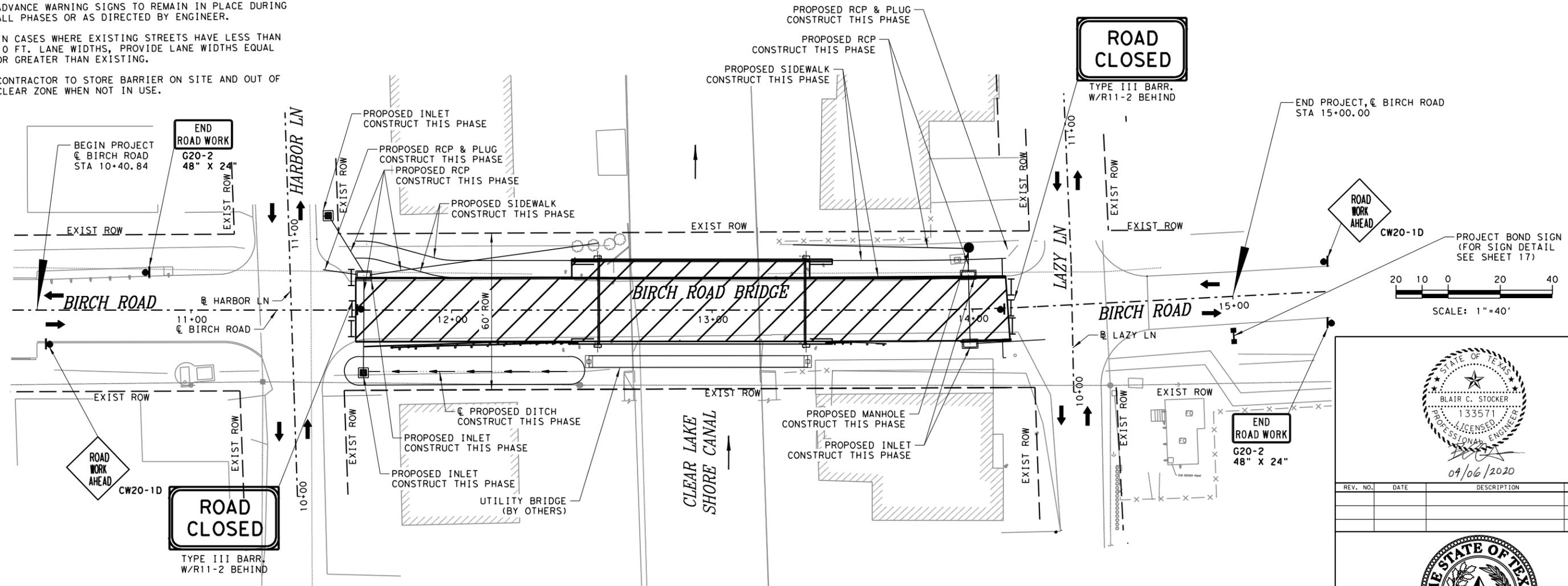
- GENERAL NOTES:**
1. CONTRACTOR TO MAINTAIN ACCESS TO ALL STREETS AND DRIVEWAYS AT ALL TIMES UNLESS OTHERWISE APPROVED.
 2. MAINTAIN POSITIVE DRAINAGE AT ALL TIMES DURING CONSTRUCTION. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
 3. SEE DRAINAGE PLAN & PROFILE FOR FURTHER DETAILS.
 4. FLAGGERS SHOULD USE TWO-WAY RADIOS OR OTHER METHODS OF COMMUNICATION TO CONTROL TRAFFIC.
 5. FLAGGERS SHOULD BE PRESENT TO DIRECT TRAFFIC WHILE CONSTRUCTION ACTIVITIES ARE ON GOING.
 6. LENGTH OF WORK SPACE SHOULD BE BASED ON THE ABILITY OF FLAGGERS TO COMMUNICATE IN ORDER TO PROTECT A WIDER WORK SPACE.
 7. ADVANCE WARNING SIGNS TO REMAIN IN PLACE DURING ALL PHASES OR AS DIRECTED BY ENGINEER.
 8. IN CASES WHERE EXISTING STREETS HAVE LESS THAN 10 FT. LANE WIDTHS, PROVIDE LANE WIDTHS EQUAL OR GREATER THAN EXISTING.
 9. CONTRACTOR TO STORE BARRIER ON SITE AND OUT OF CLEAR ZONE WHEN NOT IN USE.

- NARRATIVE**
- PHASE 1**
- TRAFFIC OPERATIONS:**
1. PRIOR TO PLACEMENT OF ADVANCED WARNING SIGNS, CONTRACTOR TO PLACE ADVANCED PROJECT BOND SIGN AT THE END OF THE PROJECT LIMITS.
 2. PLACE ADVANCED WARNING SIGNS IN ACCORDANCE WITH TXDOT BARRICADE AND CONSTRUCTION STANDARDS BC(1)-14 THRU BC(12)-14 AND AS SHOWN IN THE TCP PLANS
 3. PLACE CHANNELIZING DEVICES, BARRICADES AND SIGN AS SHOWN IN THE PLANS.
 4. IMPLEMENT DETOUR, SEE TRAFFIC CONTROL PLAN, SHEET 1 OF 4.

- CONSTRUCTION:**
1. COMPLETE ALL ROW PREPARATION.
 2. PLACE EROSION CONTROL DEVICES FOR THE PROJECT AS SHOWN ON THE STORM WATER POLLUTION & PREVENTION PLAN LAYOUT.
 3. CONSTRUCT ALL PROPOSED DRAINAGE STRUCTURES AS SHOWN IN THIS PHASE. GRADE TO DRAIN UNTIL DITCH LOCATIONS ARE FINALIZED.
 4. CONSTRUCT BRIDGE, GABIONS, SIDEWALKS AND PERMANENT PAVEMENT AS SHOWN IN PLANS.

LEGEND:

- ROADWAY CONSTRUCTION THIS PHASE
- COMPLETED CONSTRUCTION
- TCP DEVICE (DRUMS/VERTICAL PANELS)
- TYPE III BARRICADES
- GROUND MOUNTED SIGN



STATE OF TEXAS
 BLAIR C. STOCKER
 133571
 LICENSED PROFESSIONAL ENGINEER
 09/06/2020

REV. NO.	DATE	DESCRIPTION	BY



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 ENGINEERING CORPORATION - HOUSTON, LLC
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 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

**BIRCH ROAD BRIDGE REPLACEMENT
 TRAFFIC CONTROL PLAN
 PHASE 1
 STA 10+40.84 TO STA 15+00.00**

SHEET 2 OF 4

Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	
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GENERAL NOTES:

1. CONTRACTOR TO MAINTAIN ACCESS TO ALL STREETS AND DRIVEWAYS AT ALL TIMES UNLESS OTHERWISE APPROVED.
2. MAINTAIN POSITIVE DRAINAGE AT ALL TIMES DURING CONSTRUCTION. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
3. SEE DRAINAGE PLAN & PROFILE FOR FURTHER DETAILS.
4. FLAGGERS SHOULD USE TWO-WAY RADIOS OR OTHER METHODS OF COMMUNICATION TO CONTROL TRAFFIC.
5. FLAGGERS SHOULD BE PRESENT TO DIRECT TRAFFIC WHILE CONSTRUCTION ACTIVITIES ARE ON GOING.
6. LENGTH OF WORK SPACE SHOULD BE BASED ON THE ABILITY OF FLAGGERS TO COMMUNICATE IN ORDER TO PROTECT A WIDER WORK SPACE.
7. ADVANCE WARNING SIGNS TO REMAIN IN PLACE DURING ALL PHASES OR AS DIRECTED BY ENGINEER.
8. IN CASES WHERE EXISTING STREETS HAVE LESS THAN 10 FT. LANE WIDTHS, PROVIDE LANE WIDTHS EQUAL OR GREATER THAN EXISTING.
9. CONTRACTOR TO STORE BARRIER ON SITE AND OUT OF CLEAR ZONE WHEN NOT IN USE.

NARRATIVE

**PHASE 2
TRAFFIC OPERATIONS:**

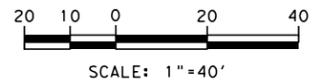
1. PLACE ADVANCED WARNING SIGNS IN ACCORDANCE WITH TXDOT BARRICADE AND CONSTRUCTION STANDARDS BC(1)-14 THRU BC(12)-14 AND AS SHOWN IN THE TCP PLANS
2. PLACE CHANNELIZING DEVICES, BARRICADES AND SIGN AS SHOWN IN THE PLANS.
3. MAINTAIN DETOUR AS SHOWN IN TRAFFIC CONTROL PLAN, SHEET 1 OF 4.

CONSTRUCTION:

1. PLACE EROSION CONTROL DEVICES FOR THE PROJECT AS SHOWN ON THE STORM WATER POLLUTION & PREVENTION PLAN LAYOUT.
2. CONSTRUCT EAST HALF OF HARBOR LANE AND WEST HALF OF LAZY LANE WHILE MAINTAINING DETOUR.

LEGEND:

- ROADWAY CONSTRUCTION THIS PHASE
- COMPLETED CONSTRUCTION
- TCP DEVICE (DRUMS/VERTICAL PANELS)
- TYPE III BARRICADES
- GROUND MOUNTED SIGN



REV. NO.	DATE	DESCRIPTION	BY



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T.B.P.E. FIRM REGISTRATION #392
3100 WEST ALABAMA, HOUSTON, TEXAS 77098 (713) 520-9570

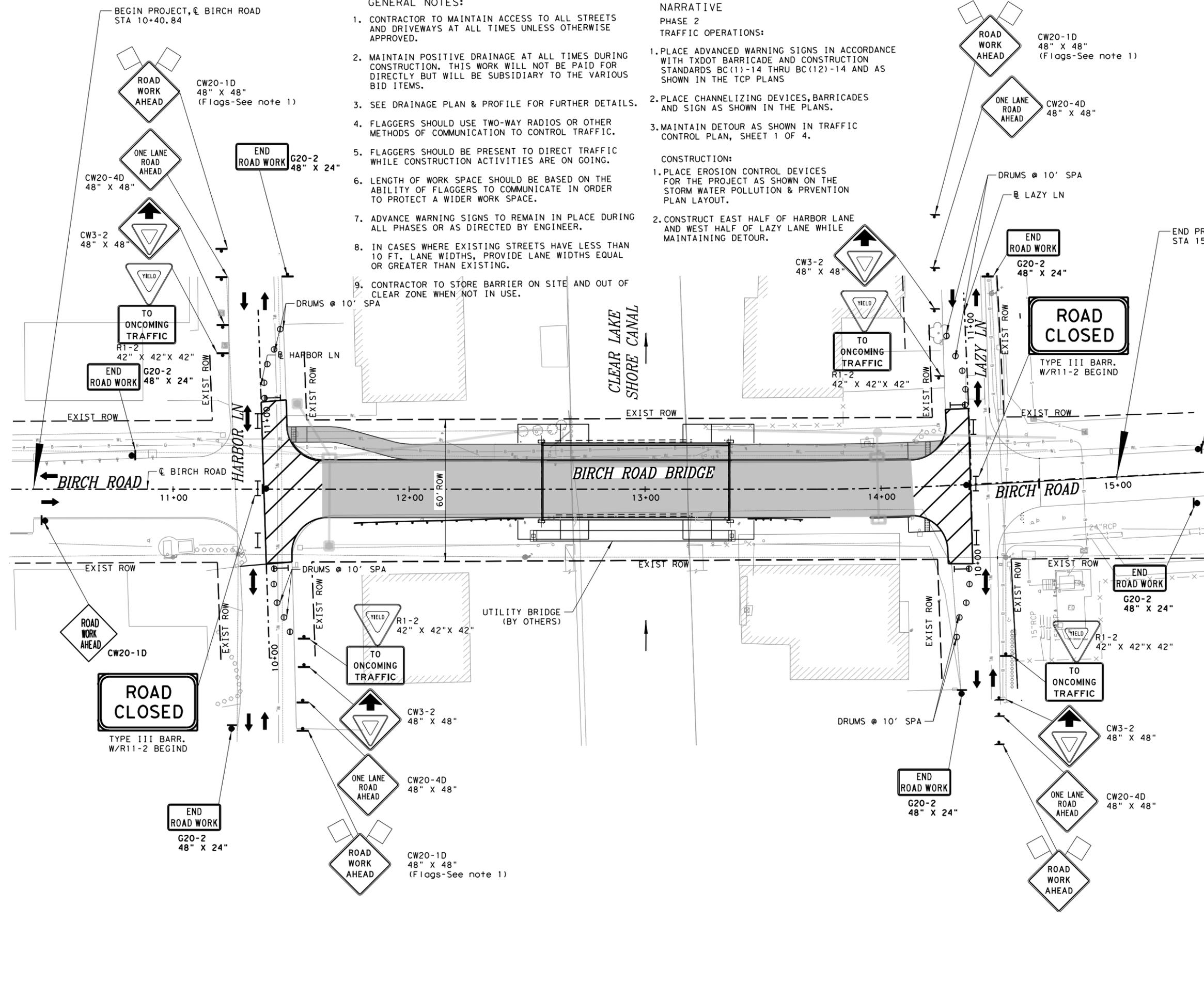
GALVESTON COUNTY, TEXAS

**BIRCH ROAD BRIDGE REPLACEMENT
TRAFFIC CONTROL PLAN
PHASE 2
STA 10+40.84 TO STA 15+00.00**

SHEET 3 OF 4

Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	
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Chk By: ic		No. 15

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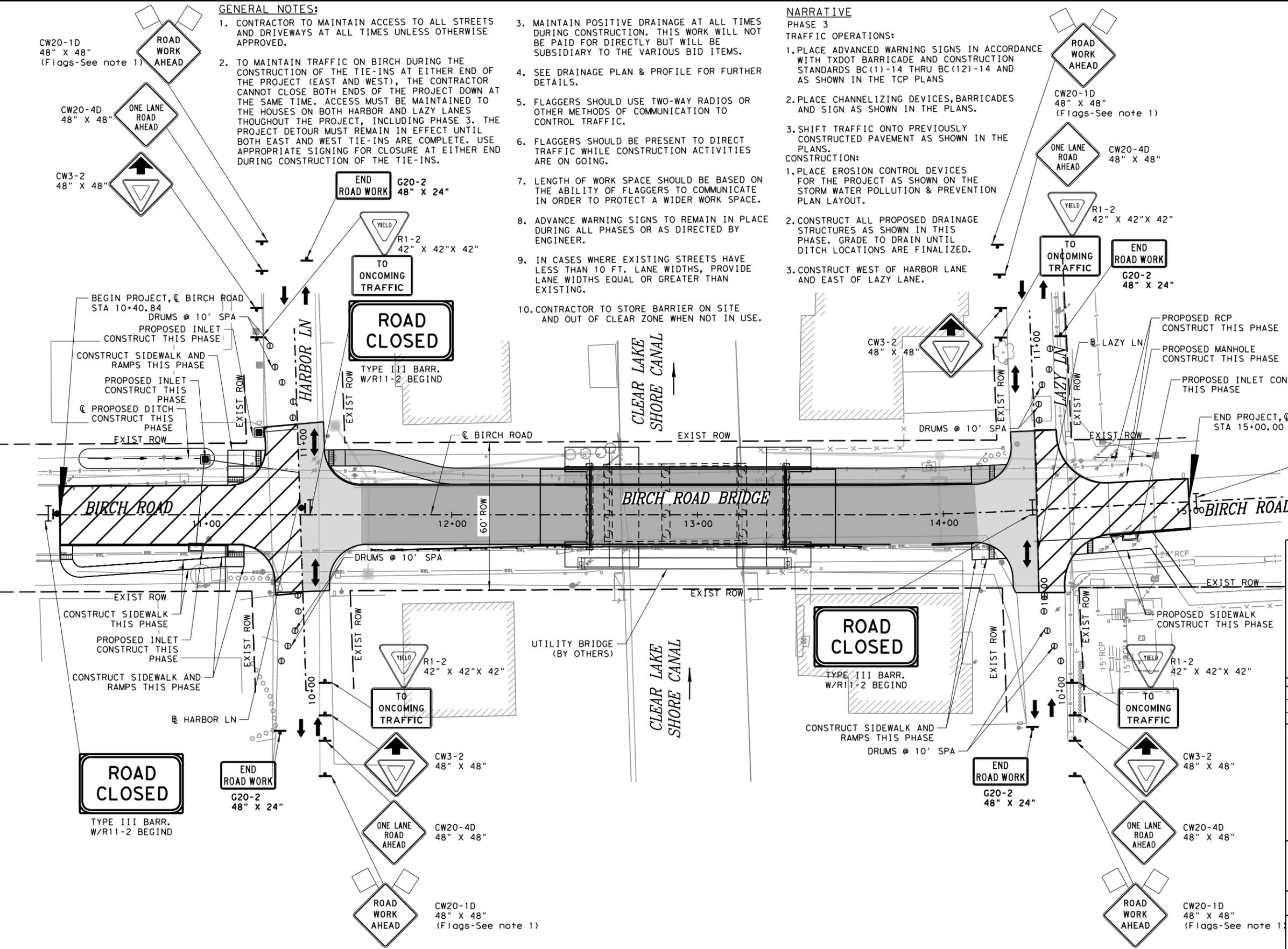
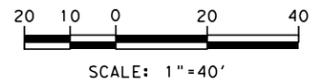
GENERAL NOTES:

- CONTRACTOR TO MAINTAIN ACCESS TO ALL STREETS AND DRIVEWAYS AT ALL TIMES UNLESS OTHERWISE APPROVED.
- TO MAINTAIN TRAFFIC ON BIRCH DURING THE CONSTRUCTION OF THE TIE-INS AT EITHER END OF THE PROJECT (EAST AND WEST), THE CONTRACTOR CANNOT CLOSE BOTH ENDS OF THE PROJECT DOWN AT THE SAME TIME. ACCESS MUST BE MAINTAINED TO THE HOUSES ON BOTH HARBOR AND LAZY LANES THROUGHOUT THE PROJECT, INCLUDING PHASE 3. THE PROJECT DETOUR MUST REMAIN IN EFFECT UNTIL BOTH EAST AND WEST TIE-INS ARE COMPLETE. USE APPROPRIATE SIGNING FOR CLOSURE AT EITHER END DURING CONSTRUCTION OF THE TIE-INS.
- MAINTAIN POSITIVE DRAINAGE AT ALL TIMES DURING CONSTRUCTION. THIS WORK WILL NOT BE PAID FOR DIRECTLY BUT WILL BE SUBSIDIARY TO THE VARIOUS BID ITEMS.
- SEE DRAINAGE PLAN & PROFILE FOR FURTHER DETAILS.
- FLAGGERS SHOULD USE TWO-WAY RADIOS OR OTHER METHODS OF COMMUNICATION TO CONTROL TRAFFIC.
- FLAGGERS SHOULD BE PRESENT TO DIRECT TRAFFIC WHILE CONSTRUCTION ACTIVITIES ARE ON GOING.
- LENGTH OF WORK SPACE SHOULD BE BASED ON THE ABILITY OF FLAGGERS TO COMMUNICATE IN ORDER TO PROTECT A WIDER WORK SPACE.
- ADVANCE WARNING SIGNS TO REMAIN IN PLACE DURING ALL PHASES OR AS DIRECTED BY ENGINEER.
- IN CASES WHERE EXISTING STREETS HAVE LESS THAN 10 FT. LANE WIDTHS, PROVIDE LANE WIDTHS EQUAL OR GREATER THAN EXISTING.
- CONTRACTOR TO STORE BARRIER ON SITE AND OUT OF CLEAR ZONE WHEN NOT IN USE.

NARRATIVE

- PHASE 3**
TRAFFIC OPERATIONS:
- PLACE ADVANCED WARNING SIGNS IN ACCORDANCE WITH TxDOT BARRICADE AND CONSTRUCTION STANDARDS BC(1)-14 THRU BC(12)-14 AND AS SHOWN IN THE TCP PLANS
 - PLACE CHANNELIZING DEVICES, BARRICADES AND SIGN AS SHOWN IN THE PLANS.
 - SHIFT TRAFFIC ONTO PREVIOUSLY CONSTRUCTED PAVEMENT AS SHOWN IN THE PLANS.
- CONSTRUCTION:**
- PLACE EROSION CONTROL DEVICES FOR THE PROJECT AS SHOWN ON THE STORM WATER POLLUTION & PREVENTION PLAN LAYOUT.
 - CONSTRUCT ALL PROPOSED DRAINAGE STRUCTURES AS SHOWN IN THIS PHASE. GRADE TO DRAIN UNTIL DITCH LOCATIONS ARE FINALIZED.
 - CONSTRUCT WEST OF HARBOR LANE AND EAST OF LAZY LANE.

- LEGEND:**
- ROADWAY CONSTRUCTION THIS PHASE
 - COMPLETED CONSTRUCTION
 - TCP DEVICE (DRUMS/VERTICAL PANELS)
 - TYPE III BARRICADES
 - GROUND MOUNTED SIGN



ROAD CLOSED
 TYPE III BARR.
 W/R11-2 BEGIND



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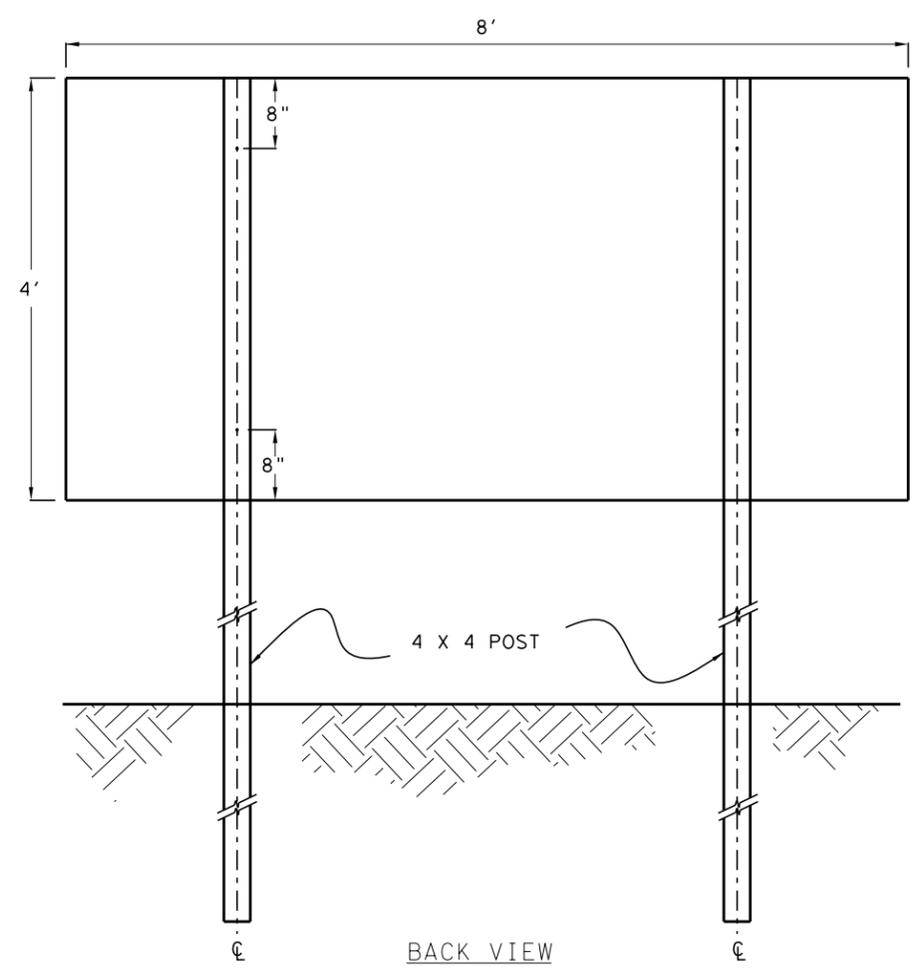
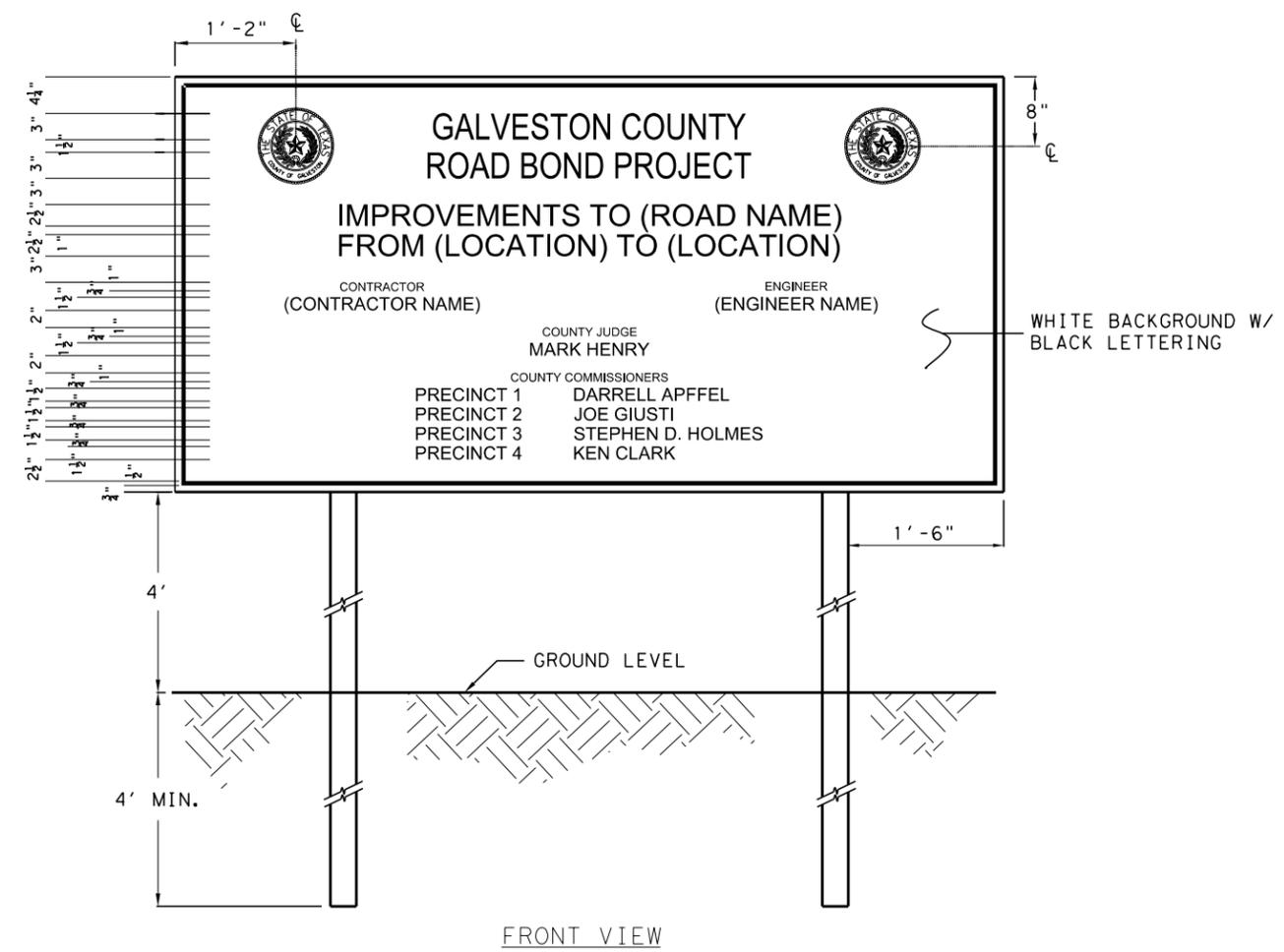
GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
TRAFFIC CONTROL PLAN
PHASE 3
 STA 10+40.84 TO STA 15+00.00

SHEET 4 OF 4

Job No.:	Scale:	Date: February, 2020	HORIZ:	No. 16
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Chk By: ic				

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GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 TRAFFIC CONTROL PLAN
 PROJECT SIGN DETAIL

SHEET 1 OF 1

Job No.:	Scales:	NO. 17
Date: February, 2020	HORZ:	
Drn By: ic	VERT:	
Chk By: ic		

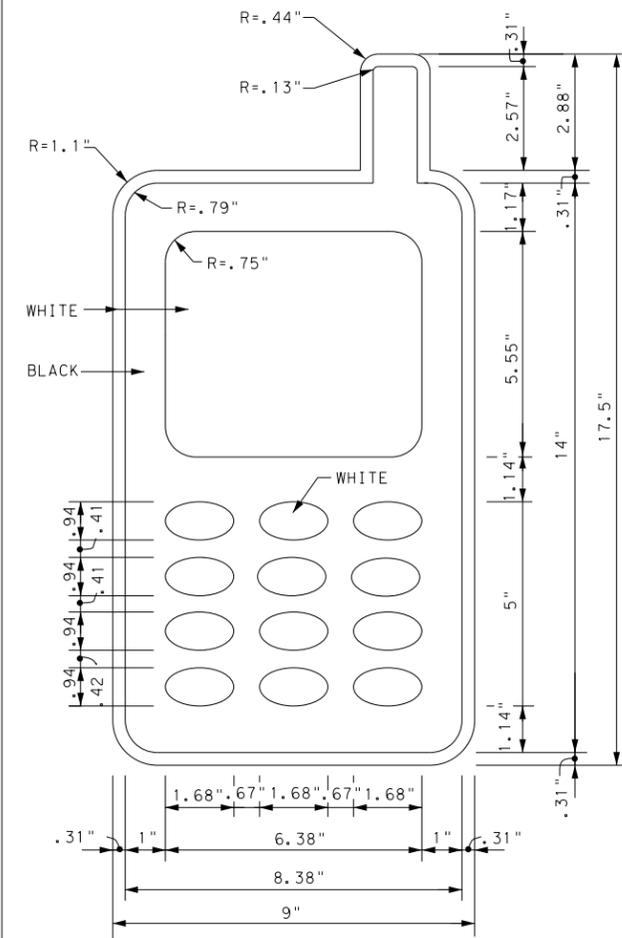
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BARRICADE AND CONSTRUCTION (BC) STANDARD SHEETS GENERAL NOTES:

- The Barricade and Construction Standard Sheets (BC sheets) are intended to show typical examples for placement of temporary traffic control devices, construction pavement markings, and typical work zone signs. The information contained in these sheets meet or exceed the requirements shown in the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD).
- The development and design of the Traffic Control Plan (TCP) is the responsibility of the Engineer.
- The Contractor may propose changes to the TCP that are signed and sealed by a licensed professional engineer for approval. The Engineer may develop, sign and seal Contractor proposed changes.
- The Contractor is responsible for installing and maintaining the traffic control devices as shown in the plans. The Contractor may not move or change the approximate location of any device without the approval of the Engineer.
- Geometric design of lane shifts and detours should, when possible, meet the applicable design criteria contained in manuals such as the American Association of State Highway and Transportation Officials (AASHTO), "A Policy on Geometric Design of Highways and Streets," the TxDOT "Roadway Design Manual" or engineering judgment.
- When projects abut, the Engineer(s) may omit the END ROAD WORK, TRAFFIC FINES DOUBLE, and other advance warning signs if the signing would be redundant and the work areas appear continuous to the motorists. If the adjacent project is completed first, the Contractor shall erect the necessary warning signs as shown on these sheets, the TCP sheets or as directed by the Engineer. The BEGIN ROAD WORK NEXT X MILES sign shall be revised to show appropriate work zone distance.
- The Engineer may require duplicate warning signs on the median side of divided highways where median width will permit and traffic volumes justify the signing.
- All signs shall be constructed in accordance with the details found in the "Standard Highway Sign Designs for Texas," latest edition. Sign details not shown in this manual shall be shown in the plans or the Engineer shall provide a detail to the Contractor before the sign is manufactured.
- The temporary traffic control devices shown in the illustrations of the BC sheets are examples. As necessary, the Engineer will determine the most appropriate traffic control devices to be used.
- As shown on BC(2), the OBEY WARNING SIGNS STATE LAW sign, STAY ALERT TALK OR TEXT LATER (see Sign Detail G20-10T) and the WORK ZONE TRAFFIC FINES DOUBLE sign with plaque shall be erected in advance of the CSJ limits. However, the TRAFFIC FINES DOUBLE sign will not be required on projects consisting solely of mobile operation work, such as striping or milling edgeline rumble strips. The BEGIN ROAD WORK NEXT X MILES, CONTRACTOR and END ROAD WORK signs shall be erected at or near the CSJ limits.
- Except for devices required by Note 10, traffic control devices should be in place only while work is actually in progress or a definite need exists.
- The Engineer has the final decision on the location of all traffic control devices.
- Inactive equipment and work vehicles, including workers' private vehicles must be parked away from travel lanes. They should be as close to the right-of-way line as possible, or located behind a barrier or guardrail, or as approved by the Engineer.

WORKER SAFETY APPAREL NOTES:

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



SIGN DETAIL (G20-10T)



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

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

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

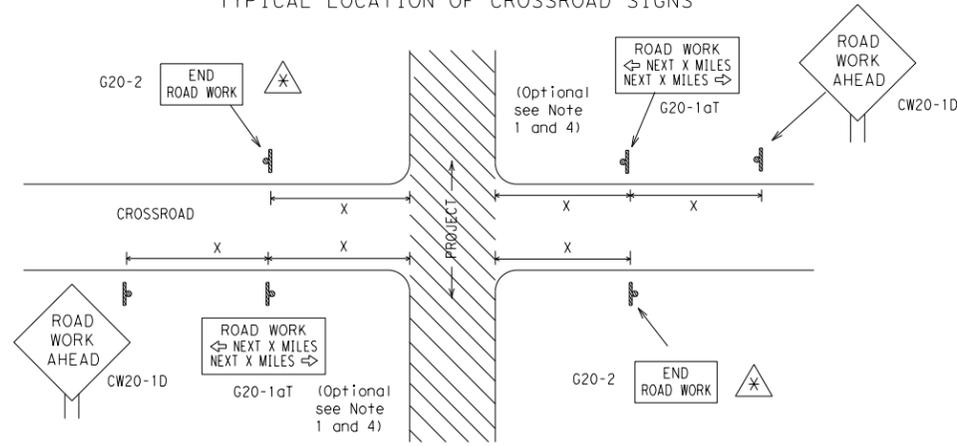
SHEET 1 OF 12

BARRICADE AND CONSTRUCTION GENERAL NOTES AND REQUIREMENTS			
BC (1) - 14			
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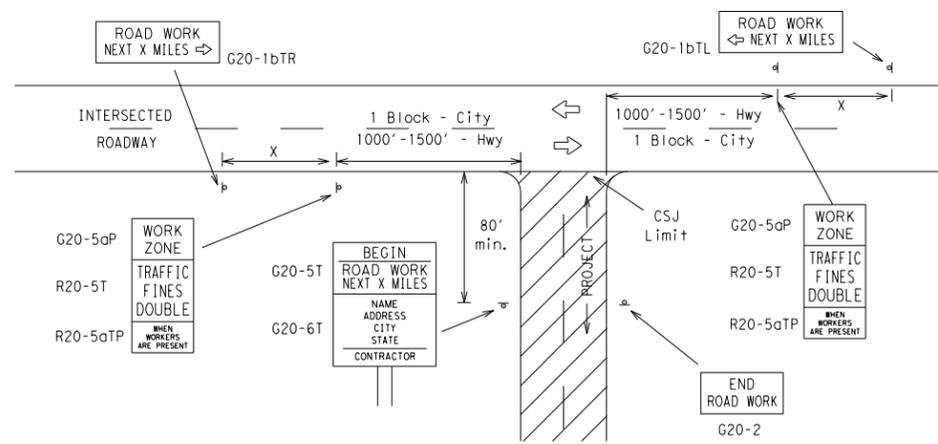
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TYPICAL LOCATION OF CROSSROAD SIGNS



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

T-INTERSECTION



CSJ LIMITS AT T-INTERSECTION

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

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

Sign Number or Series	SIZE		SPACING	
	Conventional Road	Expressway/Freeway	Posted Speed MPH	Sign Spacing "X" Feet (Apprx.)
CW20 ⁴	48" x 48"	48" x 48"	30	120
CW21			35	160
CW22			40	240
CW23			45	320
CW25			50	400
CW1, CW2, CW7, CW8, CW9, CW11, CW14	36" x 36"	48" x 48"	55	500 ²
CW3, CW4, CW5, CW6, CW8-3, CW10, CW12	48" x 48"	48" x 48"	60	600 ²
			65	700 ²
			70	800 ²
			75	900 ²
			80	1000 ²
			*	* ³

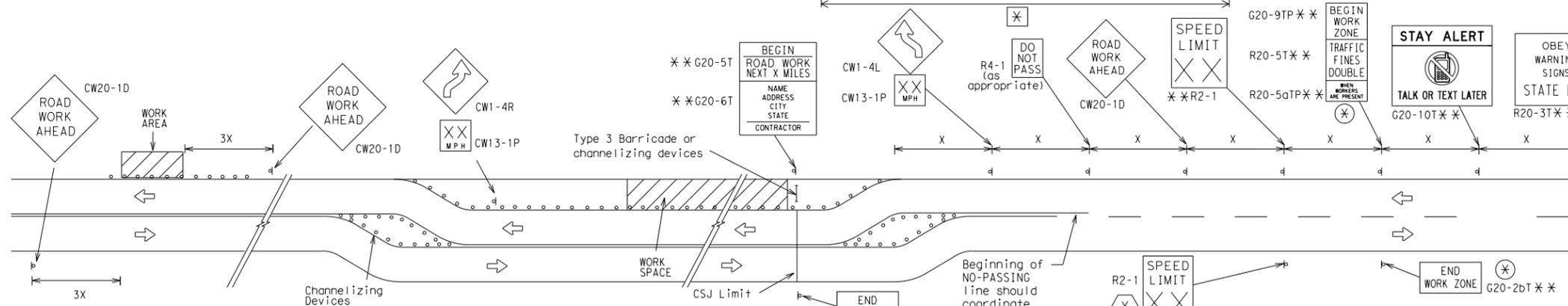
* For typical sign spacings on divided highways, expressways and freeways, see Part 6 of the "Texas Manual on Uniform Traffic Control Devices" (TMUTCD) typical application diagrams or TCP Standard Sheets.

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

GENERAL NOTES

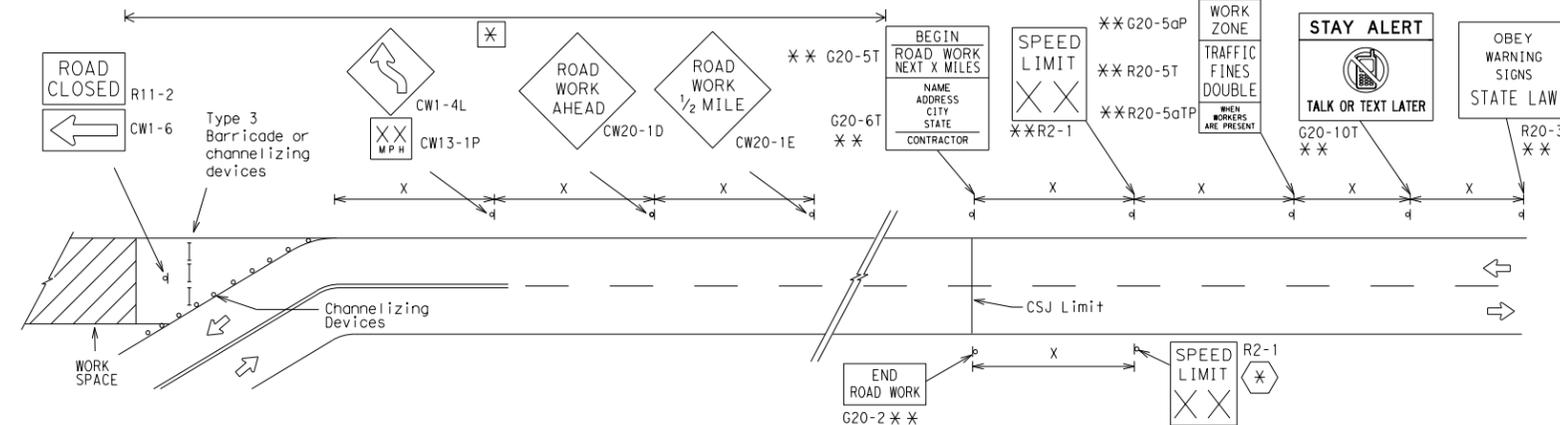
- Special or larger size signs may be used as necessary.
- Distance between signs should be increased as required to have 1500 feet advance warning.
- Distance between signs should be increased as required to have 1/2 mile or more advance warning.
- 36" x 36" "ROAD WORK AHEAD" (CW20-1D) signs may be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

WORK AREAS IN MULTIPLE LOCATIONS WITHIN CSJ LIMITS

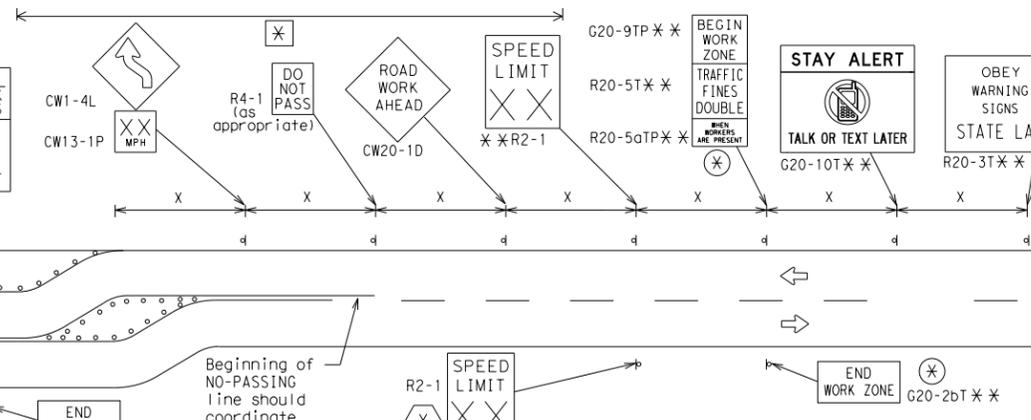


When extended distances occur between minimal work spaces, the Engineer/Inspector should ensure additional "ROAD WORK AHEAD" (CW20-1D) signs are placed in advance of these work areas to remind drivers they are still within the project limits. See the applicable TCP sheets for exact location and spacing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

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



SAMPLE LAYOUT OF SIGNING FOR WORK BEGINNING AT THE CSJ LIMITS



NOTES

- The Contractor shall determine the appropriate distance to be placed on the G20-1 series signs and "BEGIN ROAD WORK NEXT X MILES" (G20-5T) sign for each specific project. This distance shall replace the "X" and shall be rounded to the nearest whole mile with the approval of the Engineer. No decimals shall be used.
- ⊗ The "BEGIN WORK ZONE" (G20-9TP) and "END WORK ZONE" (G20-2bT) shall be used as shown on the sample layout when advance signs are required outside the CSJ Limits. They inform the motorist of entering or leaving a part of the work zone lying outside the CSJ Limits where traffic fines may double if workers are present.
- ** Required CSJ Limit signing. See Note 10 on BC(1). TRAFFIC FINES DOUBLE signs will not be required on projects consisting solely of mobile operations work.
- ⊗ Area for placement of "ROAD WORK AHEAD" (CW20-1D) sign and other signs or devices as called for on the Traffic Control Plan.
- ⊗ Contractor will install a regulatory speed limit sign at the end of the work zone.

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

SHEET 2 OF 12



BARRICADE AND CONSTRUCTION PROJECT LIMIT

BC(2)-14

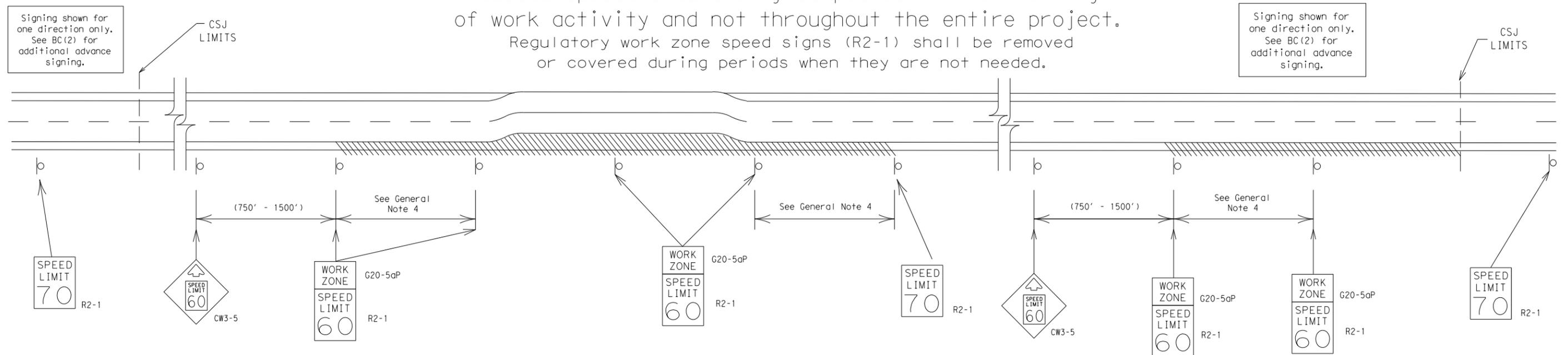
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DATE: FILE:

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:

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

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

SHORT TERM WORK ZONE SPEED LIMITS

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

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

GENERAL NOTES

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

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

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SHEET 3 OF 12



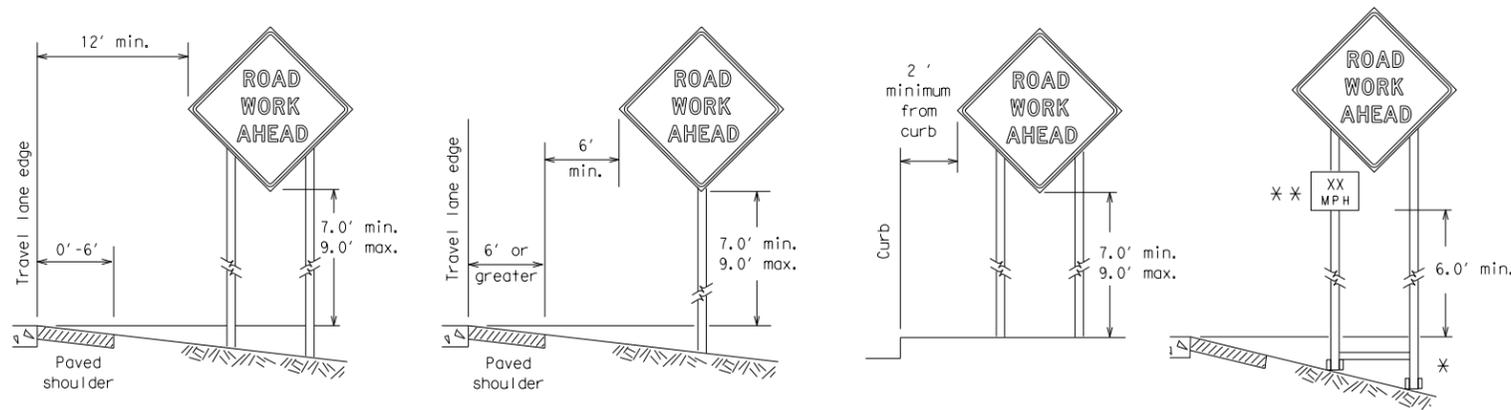
BARRICADE AND CONSTRUCTION WORK ZONE SPEED LIMIT

BC (3) - 14

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7-13		DIST	COUNTY	SHEET NO.	
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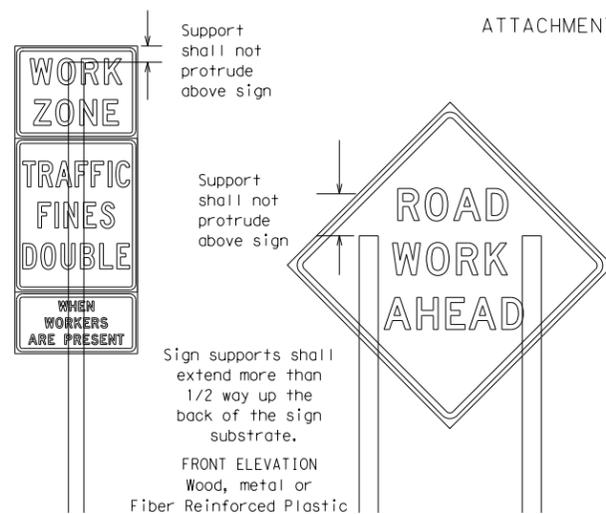
TYPICAL MINIMUM CLEARANCES FOR LONG TERM AND INTERMEDIATE TERM SIGNS



* 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.

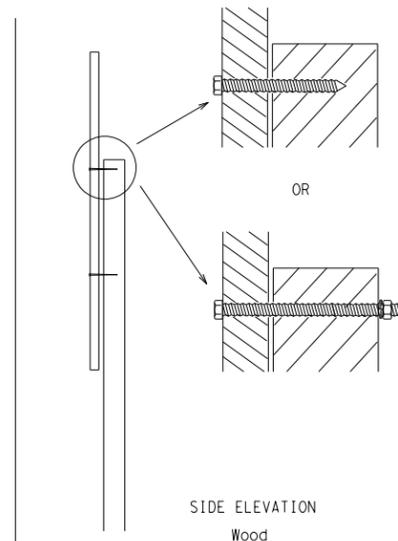
** When plaques are placed on dual-leg supports, they should be attached to the upright nearest the travel lane. Supplemental plaques (advisory or distance) should not cover the surface of the parent sign.

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.

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



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

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). 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

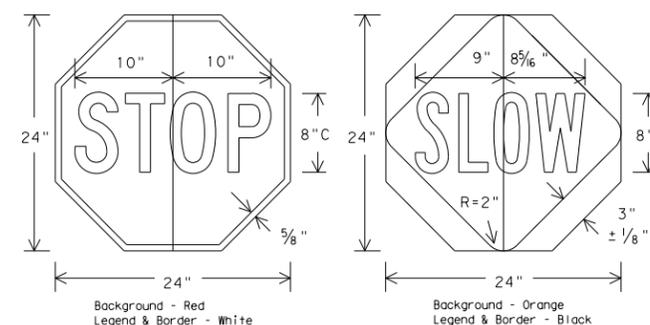
- Where sign supports require the use of weights to keep from turning over, the use of sandbags with dry, cohesionless sand should be used.
- The sandbags will be tied shut to keep the sand from spilling and to maintain a constant weight.
- Rock, concrete, iron, steel or other solid objects shall not 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" as detailed below.
- When used at night, the STOP/SLOW paddle shall be retroreflectORIZED.
- 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.



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, 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.
- 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 sheets or the CWZTCD. The signs shall meet the required mounting heights shown on the BC Sheets or the SMD Standards during construction. This work should be paid for under the appropriate pay item for relocating existing signs.
- 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.

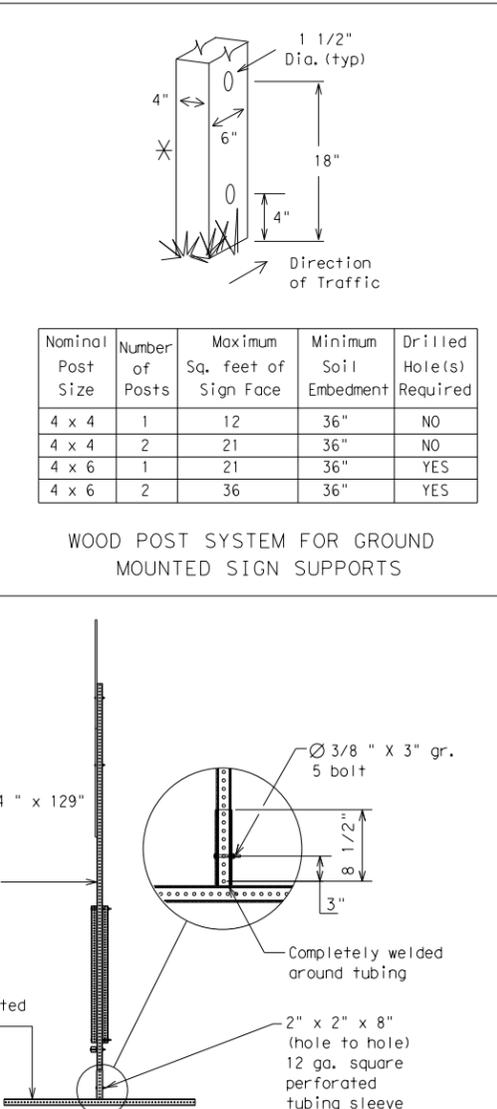
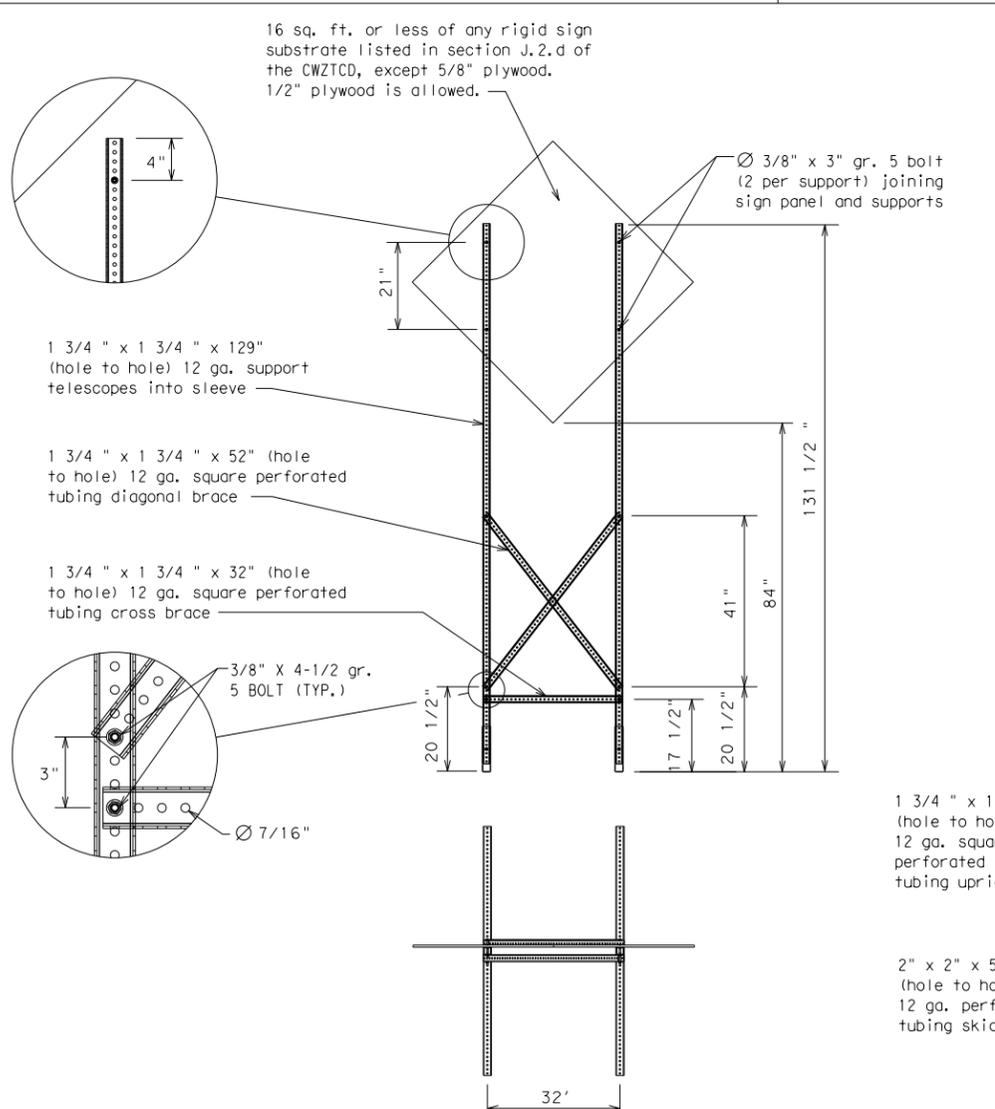
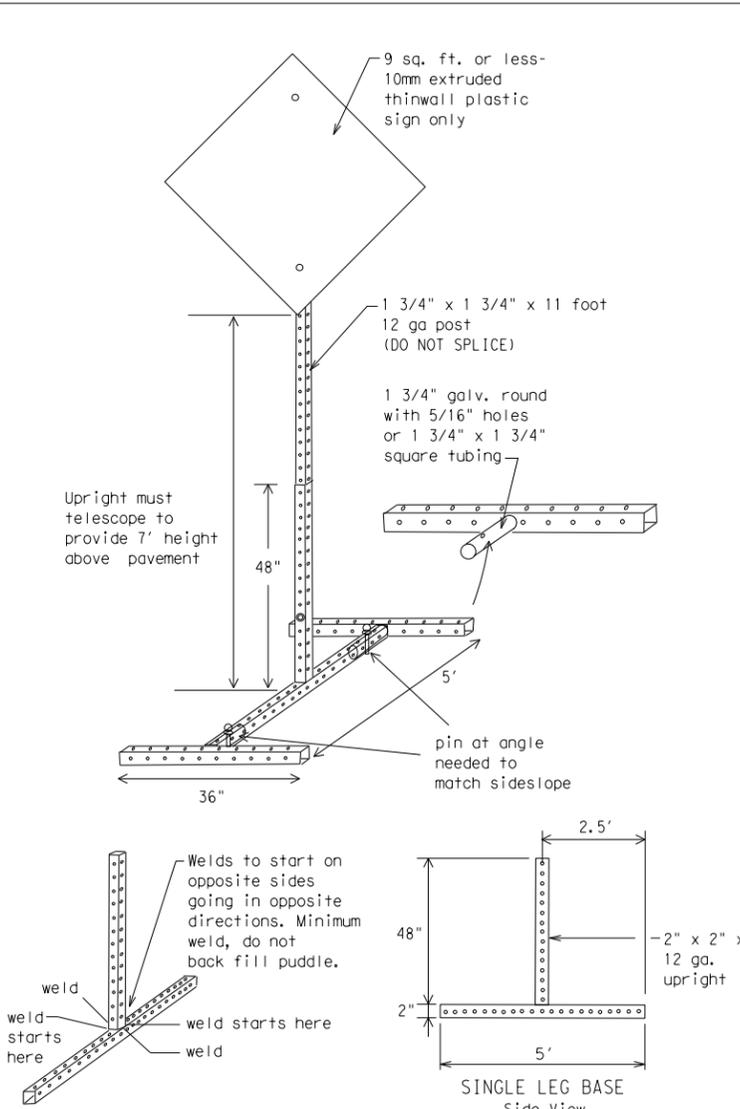
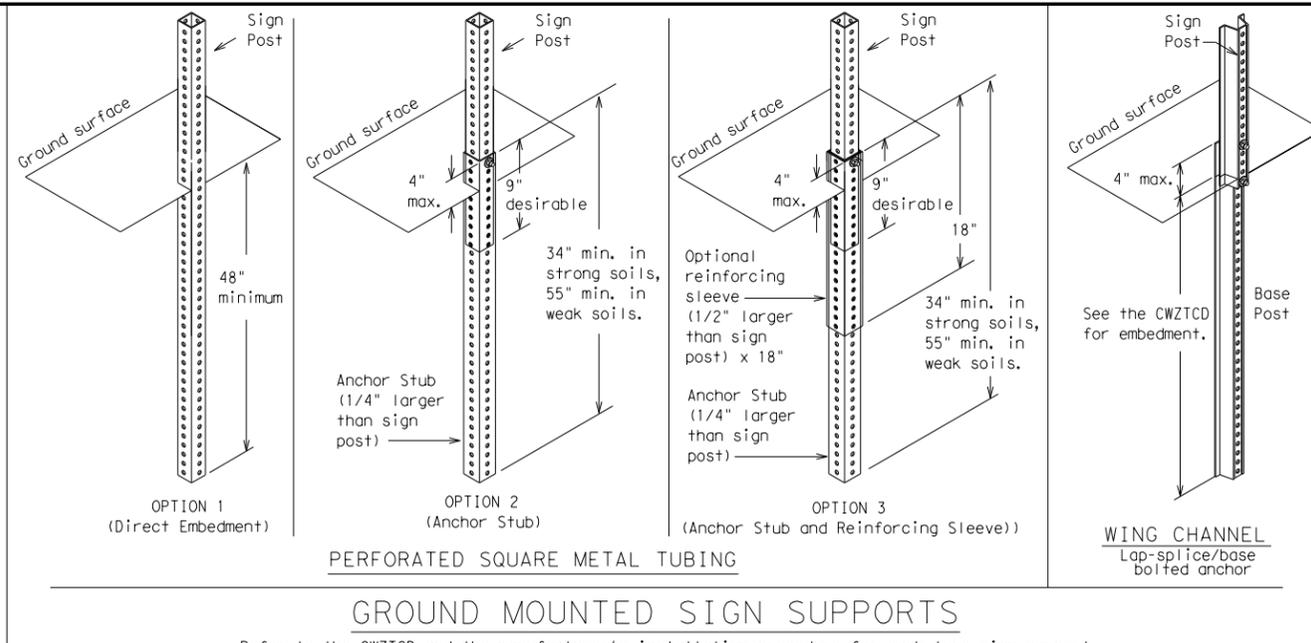
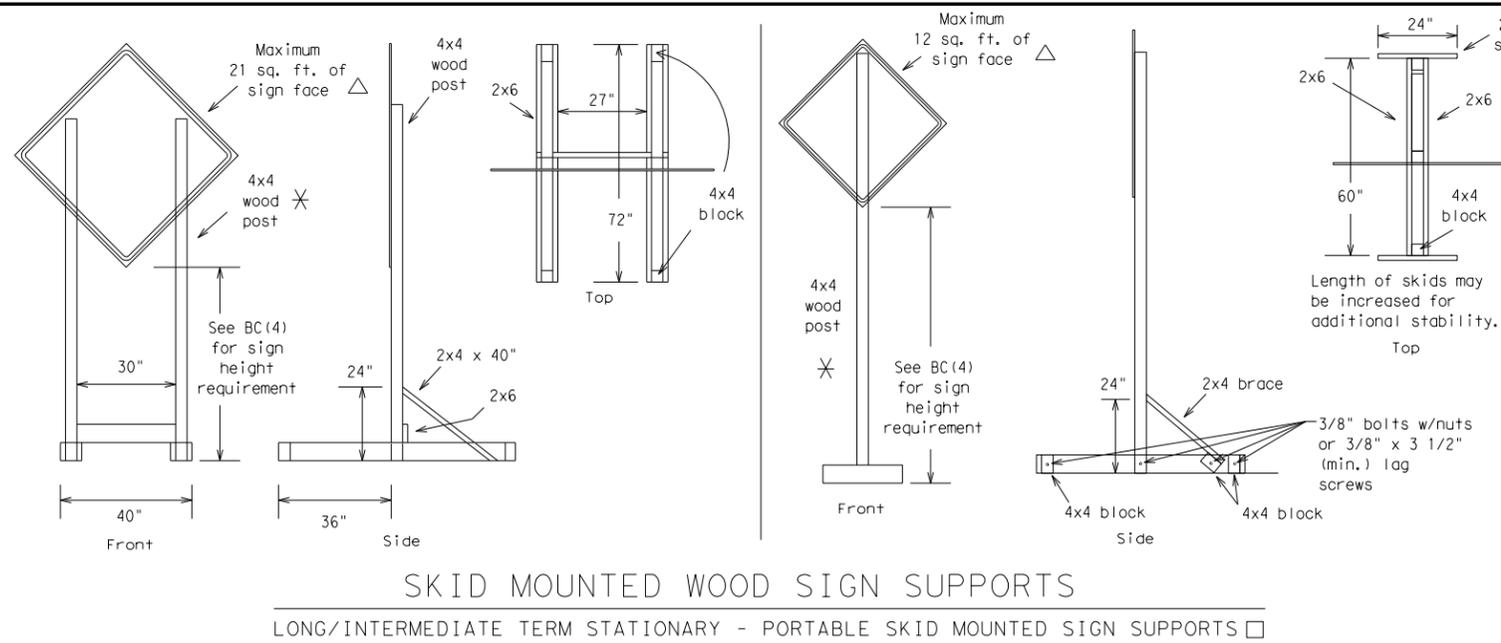


BARRICADE AND CONSTRUCTION TEMPORARY SIGN NOTES

BC (4) - 14

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

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

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

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

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

- See BC(4) for definition of "Work Duration."
- Wood sign posts MUST be one piece. Splicing will NOT be allowed. Posts shall be painted white.
- See the CWZTCD for the type of sign substrate that can be used for each approved sign support.

BARRICADE AND CONSTRUCTION TYPICAL SIGN SUPPORT

BC(5) - 14

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9-07	8-14			BR
7-13		DIST	COUNTY	SHEET NO.
		HOU	GALVESTON	22

DATE: FILE:

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

RECOMMENDED PHASES AND FORMATS FOR PCMS MESSAGES DURING ROADWORK ACTIVITIES

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

PORTABLE CHANGEABLE MESSAGE SIGNS

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

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

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

Phase 1: Condition Lists

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

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

Phase 2: Possible Component Lists

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

** See Application Guidelines Note 6.

APPLICATION GUIDELINES

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

WORDING ALTERNATIVES

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

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

FULL MATRIX PCMS SIGNS

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

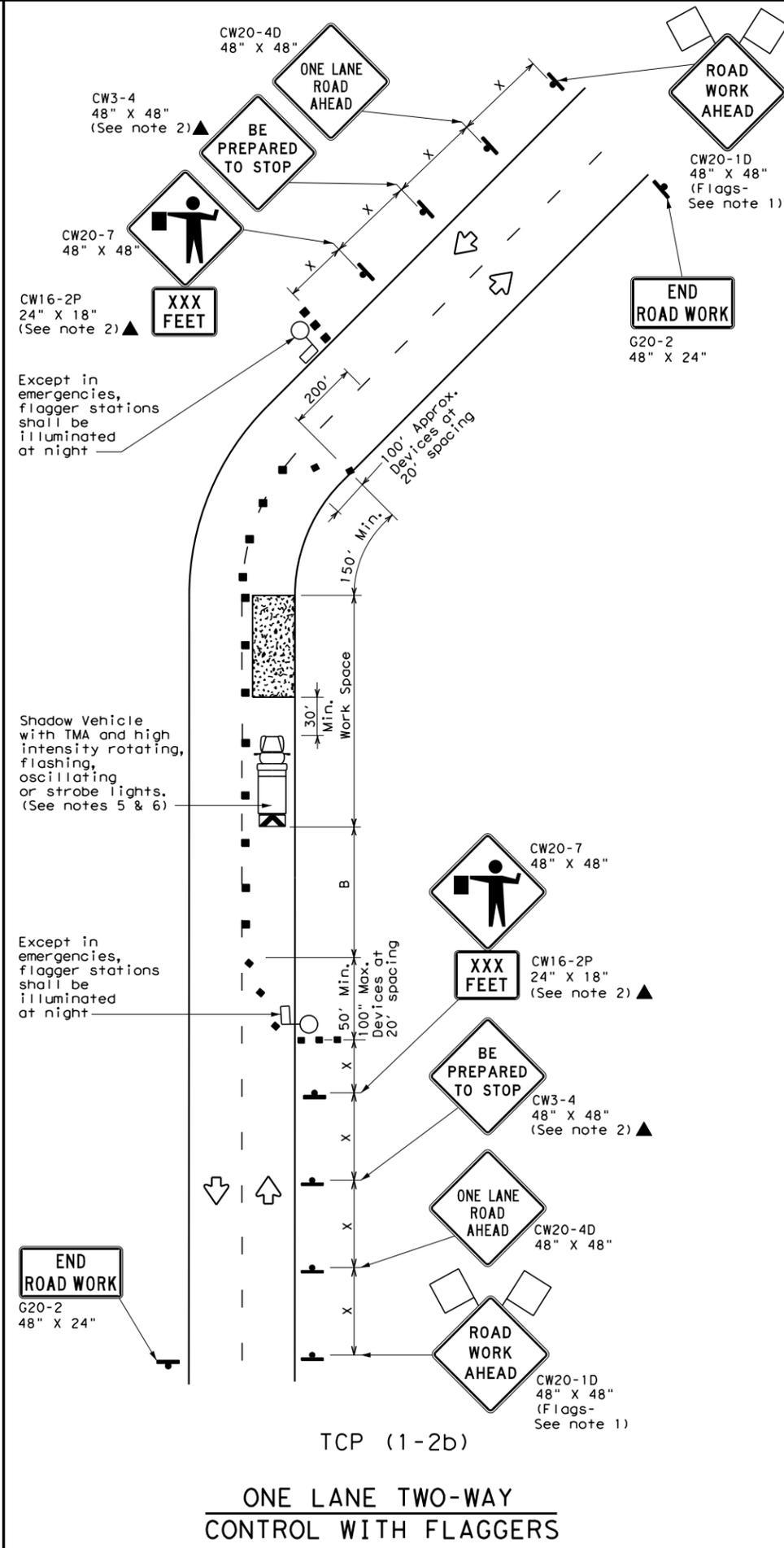
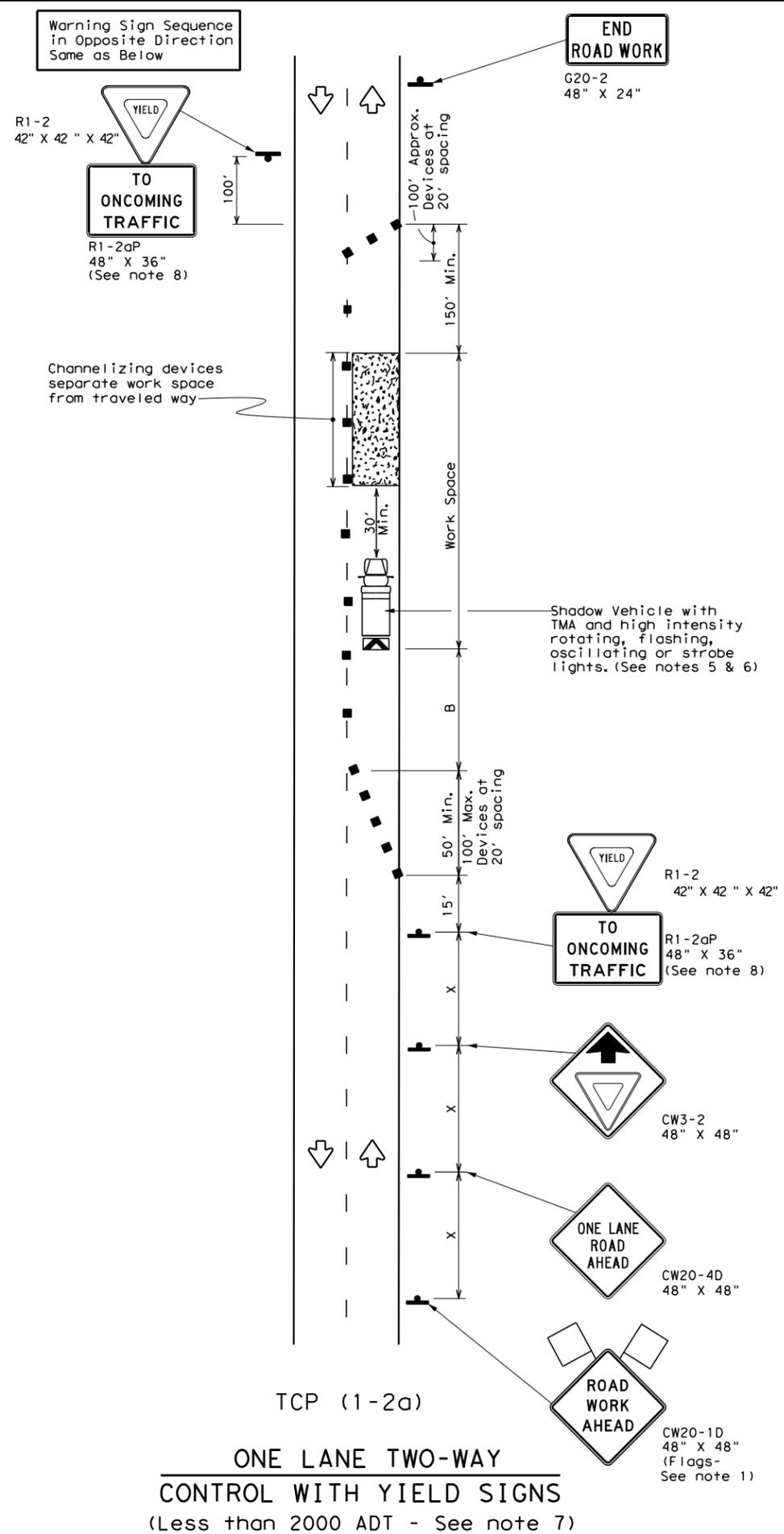
SHEET 6 OF 12

Texas Department of Transportation		Traffic Operations Division Standard	
BARRICADE AND CONSTRUCTION PORTABLE CHANGEABLE MESSAGE SIGN (PCMS)			
BC (6) - 14			
FILE: bc-14.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
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REVISIONS			
9-07	8-14	HIGHWAY	
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DATE:
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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 * X	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"	Stopping Sight Distance
		10' Offset	11' Offset	12' Offset	On a Taper	On a Tangent			
30	L = WS ² / 60	150'	165'	180'	30'	60'	120'	90'	200'
35		205'	225'	245'	35'	70'	160'	120'	250'
40		265'	295'	320'	40'	80'	240'	155'	305'
45		450'	495'	540'	45'	90'	320'	195'	360'
50		500'	550'	600'	50'	100'	400'	240'	425'
55		550'	605'	660'	55'	110'	500'	295'	495'
60		600'	660'	720'	60'	120'	600'	350'	570'
65		650'	715'	780'	65'	130'	700'	410'	645'
70		700'	770'	840'	70'	140'	800'	475'	730'
75		750'	825'	900'	75'	150'	900'	540'	820'

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

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

GENERAL NOTES

- 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.
- The CW3-4 "BE PREPARED TO STOP" sign may be installed after the CW20-4D "ONE LANE ROAD AHEAD" sign, but proper sign spacing shall be maintained.
- Sign spacing may be increased or an additional CW20-1D "ROAD WORK AHEAD" sign may be used if advance warning ahead of the flagger or R1-2 "YIELD" sign is less than 1500 feet.
- 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.

TCP (1-2a)

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

TCP (1-2b)

- Flaggers should use two-way radios or other methods of communication to control traffic.
- Length of work space should be based on the ability of flaggers to communicate.
- If the work space is located near a horizontal or vertical curve, the buffer distances should be increased in order to maintain adequate stopping sight distance to the flagger and a queue of stopped vehicles (see table above).
- Channelizing devices on the center-line may be omitted when a pilot car is leading traffic and approved by the Engineer.
- Flaggers should use 24" STOP/SLOW paddles to control traffic. Flags should be limited to emergency situations.

For construction or maintenance contract work, specific project requirements for shadow vehicles can be found in the project GENERAL NOTES for Item 502, Barricades, Signs and Traffic Handling.

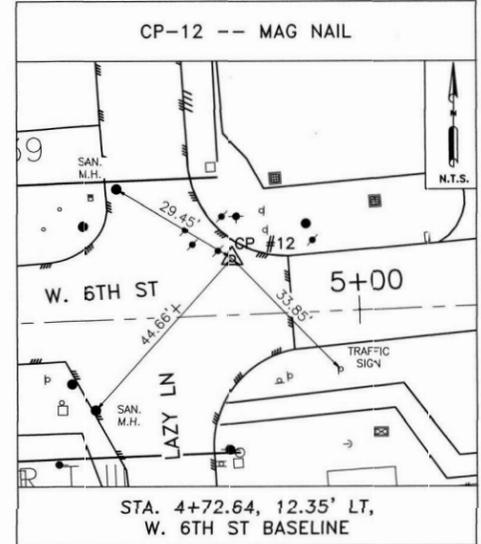
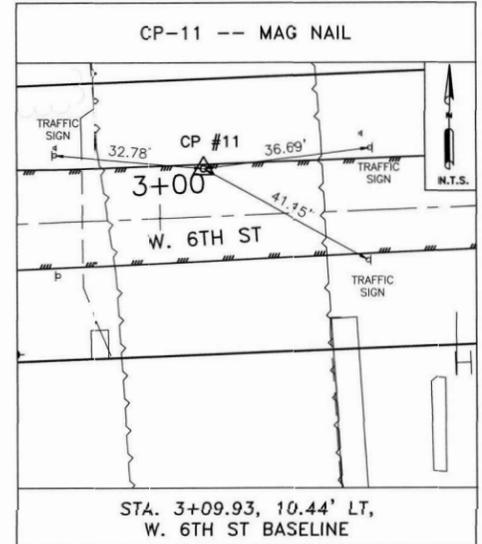
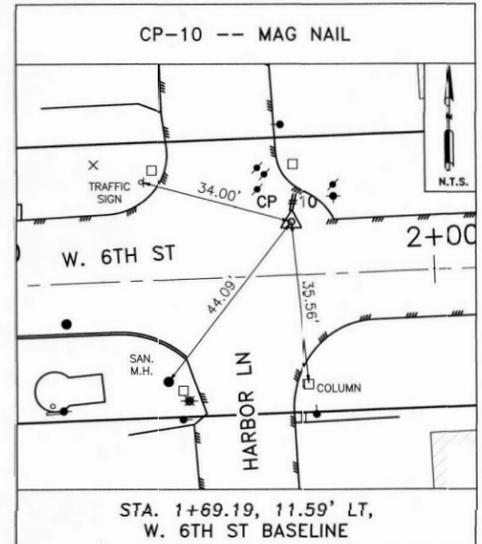
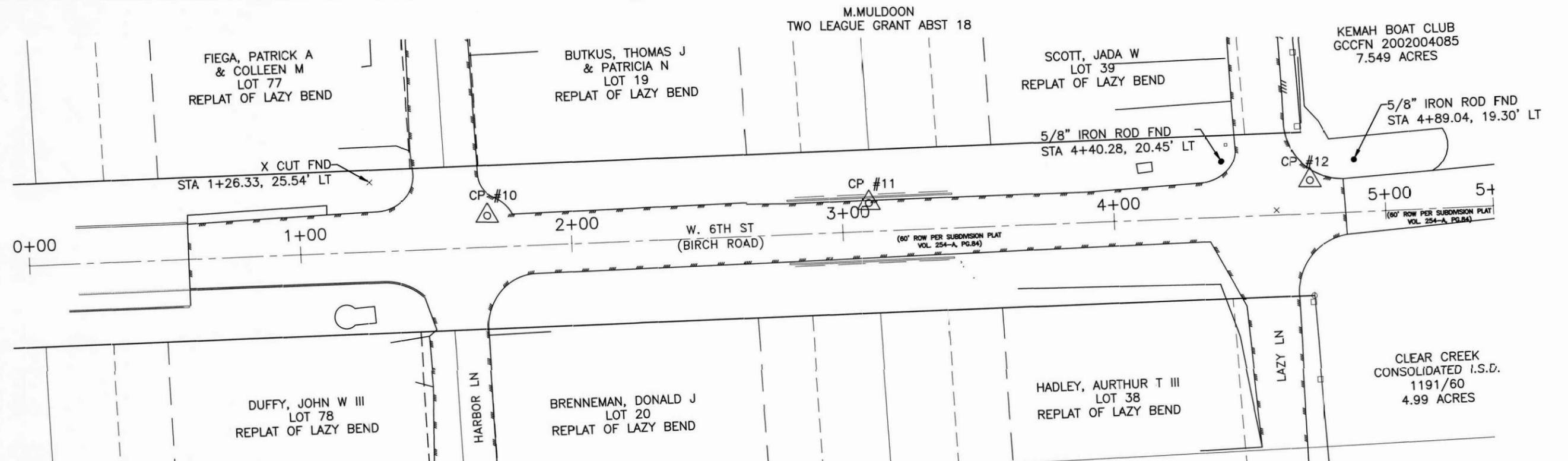


**TRAFFIC CONTROL PLAN
ONE-LANE TWO-WAY
TRAFFIC CONTROL**

TCP (1-2) - 12

© TxDOT December 1985		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
4-90	2-12				BR
2-94					
1-97					
4-98		DIST	COUNTY		SHEET NO.
		HOU	GALVESTON		24

P:\Cadd\2019\190002 - Dannebaum_BirchRoadBridge\CAD_DWG\Survey Control Map.dwg Apr. 26, 2019 3:15pm



CONTROL POINT	(GRID) Northing	(GRID) Easting	Elevation	Description	Station	Remarks
10	13,766,405.34	3,231,119.87	8.62	MAG-NAIL IN ASPH	STA. 1+69.19, 11.59' LT	W. 6TH ST BASELINE
11	13,766,409.53	3,231,260.54	9.19	MAG-NAIL IN ASPH	STA. 3+09.93, 10.44' LT	W. 6TH ST BASELINE
12	13,766,417.60	3,231,423.04	7.73	MAG-NAIL IN ASPH	STA. 4+72.64, 12.35' LT	W. 6TH ST BASELINE

SURVEY NOTE

- ALL BEARINGS AND COORDINATES ARE BASED ON THE TEXAS COORDINATE SYSTEM, SOUTH CENTRAL ZONE (4204) NORTH AMERICAN DATUM OF 1983 (2011 ADJ.) 2010 EPOCH. COORDINATES SHOWN HEREON ARE GRID VALUE AND MAY BE CONVERTED TO SURFACE VALUES BY DIVIDING BY THE COMBINED ADJUSTMENT FACTOR OF 0.99987364.
- ALL ELEVATIONS SHOWN HEREON ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88) GEOID 12B BASED ON A 2-HOUR STATIC OBSERVATION OF CONTROL POINT 10 COLLECTED ON JANUARY 18, 2019.

SURFACE COORDINATE=GRID COORDINATE/CSF

AMANI ENGINEERING, INC.
3000 SHILOH CREEK DRIVE, SUITE 200, HOUSTON, TX 77057
 (713) 290-5700 Fax (713) 271-3480
 REG. REG. NO. 7-0028, REG. REG. NO. 100282-00

SURVEYED BY: AMANI
 FB NO.

GALVESTON COUNTY

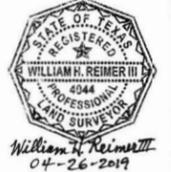
BIRCH BRIDGE REPLACEMENT

SURVEY CONTROL MAP AND SWINGTIES

WBS NO.

DRAWING SCALE
 1"=20'

SHEET NO. 25 OF



BIRCH RD HORIZONTAL ALIGNMENT

Beginning chain BIRCHCL description

Point 30006 N 13,768,129.1969 E 3,231,377.3549 Sta 10+00.0000

Course from 30006 to PC BIRCHCL1 N 88° 04' 19.29" E Dist 372.7814

Curve Data

Curve BIRCHCL1
P.I. Station 13+98.7637 N 13,768,142.6126 E 3,231,775.8929
Delta = 2° 58' 36.06" (LT)
Degree = 5° 43' 46.48"
Tangent = 25.9823
Length = 51.9529
Radius = 1,000.0000
External = 0.3375
Long Chord = 51.9471
Mid. Ord. = 0.3374
P.C. Station 13+72.7814 N 13,768,141.7385 E 3,231,749.9253
P.T. Station 14+24.7343 N 13,768,144.8340 E 3,231,801.7800
C.C. N 13,769,141.1724 E 3,231,716.2821
Back = N 88° 04' 19.29" E
Ahead = N 85° 05' 43.23" E
Chord Bear = N 86° 35' 01.26" E

Course from PT BIRCHCL1 to 30007 N 85° 05' 43.23" E Dist 122.6166

Point 30007 N 13,768,155.3175 E 3,231,923.9477 Sta 15+47.3509

Ending chain BIRCHCL description

HARBOR LN HORIZONTAL ALIGNMENT

Beginning chain HARBOR_LN description

Point 13 N 13,768,062.5714 E 3,231,520.4979 Sta 10+00.0000

Course from 13 to 14 N 3° 50' 03.23" W Dist 40.5850

Point 14 N 13,768,103.0656 E 3,231,517.7839 Sta 10+40.5850

Course from 14 to 15 N 3° 46' 06.41" W Dist 60.0233

Point 15 N 13,768,162.9591 E 3,231,513.8389 Sta 11+00.6083

Course from 15 to 16 N 3° 45' 53.90" W Dist 46.6340

Point 16 N 13,768,209.4925 E 3,231,510.7768 Sta 11+47.2423

Ending chain HARBOR_LN description

LAZY LN HORIZONTAL ALIGNMENT

Beginning chain LAZY_LN description
Feature: Geom_CenterLine

Point 9 N 13,768,112.4659 E 3,231,816.9380 Sta 10+00.0000

Course from 9 to 10 N 3° 05' 07.69" W Dist 49.2922

Point 10 N 13,768,161.6867 E 3,231,814.2848 Sta 10+49.2922

Course from 10 to 11 N 4° 23' 25.25" W Dist 20.3416

Point 11 N 13,768,181.9685 E 3,231,812.7276 Sta 10+69.6338

Course from 11 to 12 N 4° 23' 25.25" W Dist 44.9528

Point 12 N 13,768,226.7894 E 3,231,809.2865 Sta 11+14.5866

Ending chain LAZY_LN description

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4/3/2020
pwt:\us-hou-pw01.dannenbaum.local:Dannenbaum\Documents\Transportation\5166-01\Design\03 ROADWAY\E. ALIGNMENT DATA\5166_BIRCH_HAD.dgn



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM

ENGINEERING CORPORATION - HOUSTON, LLC
T.B.P.E. FIRM REGISTRATION #392
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
BIRCH ROAD
HORIZONTAL ALIGNMENT DATA

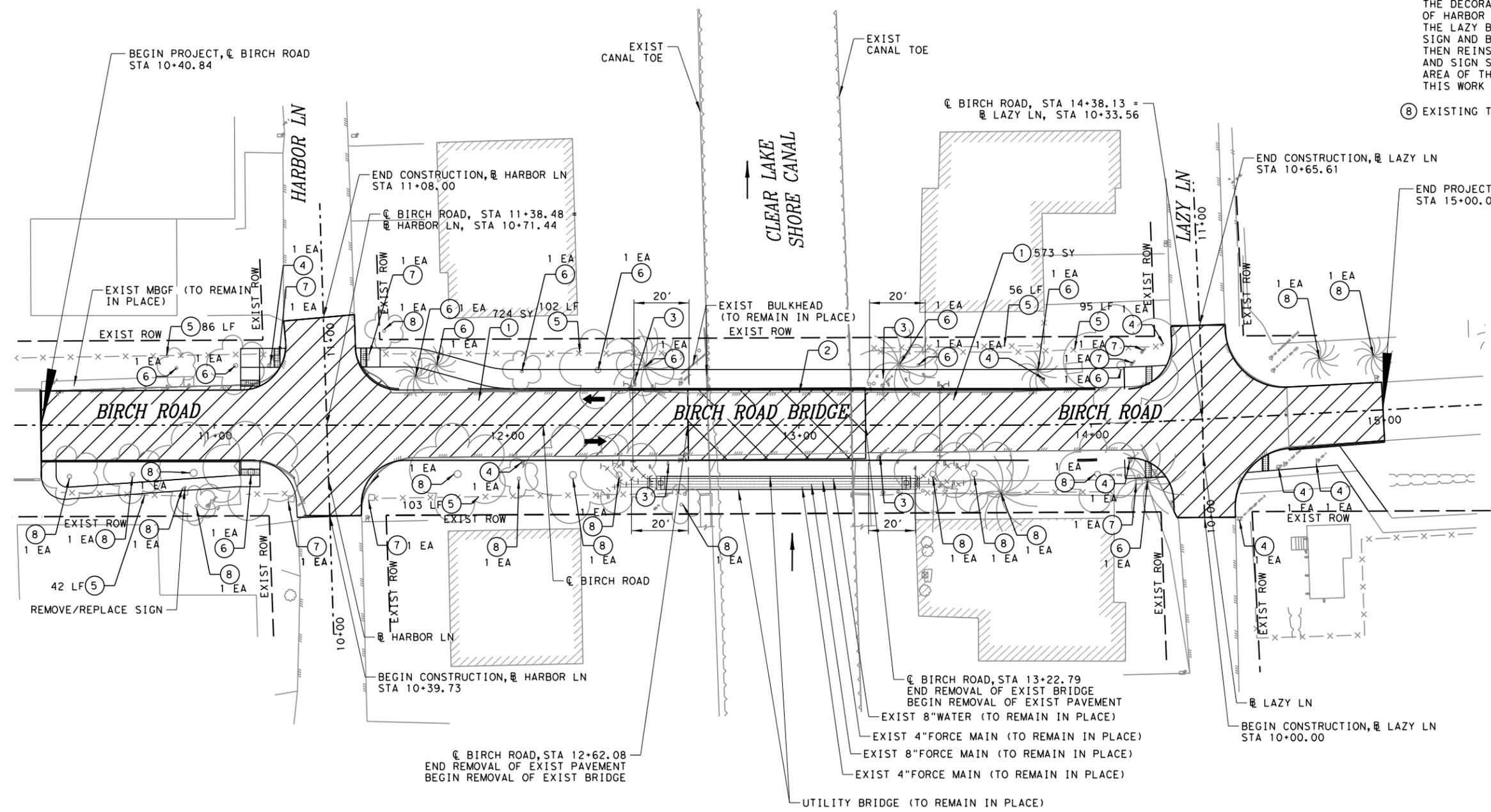
SHEET 1 OF 1

Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	NO.
Drn By: ic	VERT:	
Ckd By: ic		26

USER: 10:37:49 AM
 4/3/2020
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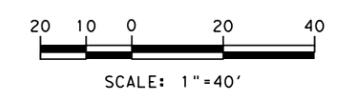
LEGEND

- ① REMOVE STAB BASE AND/OR ASPH PAV 4"-6"
- ② REMOVE STR (BRIDGE)
- ③ REMOVE MBGF
- ④ REMOVE SM RD SN SUP&AM
- ⑤ REMOVE CHAIN LINK FENCE
- ⑥ REMOVE TREE
- ⑦ THE CONTRACTOR SHALL CAREFULLY REMOVE IN ONE PIECE THE DECORATIVE BRICK PEDESTALS AT THE CORNERS OF HARBOR AND LAZY LANES AT BIRCH ROAD AND THE LAZY BEND GRAND CANAL COMMUNITY SIGN. STORE EACH SIGN AND BRICK PEDESTALS IN A SAFE AND STABLE LOCATION, THEN REINSTALL TO MATCH EXISTING, (INCLUDING FOUNDATIONS AND SIGN SUPPORTS), ONCE CONSTRUCTION ACTIVITIES IN THE AREA OF THE PEDESTAL LOCATIONS ARE COMPLETE. THIS WORK IS INCIDENTAL TO ITEM 502-6001
- ⑧ EXISTING TREES (TO REMAIN IN PLACE)



NOTES

1. EXISTING DOCKS SOUTH OF THE BRIDGE TO REMAIN IN PLACE. BULKHEADS NORTH OF THE BRIDGE TO REMAIN IN PLACE. SEE GABION DETAILS.
2. CONTRACTOR TO CONTACT ADJACENT PROPERTY OWNER PRIOR TO REMOVING DECORATIVE CHAIN LINK FENCE.



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM

ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

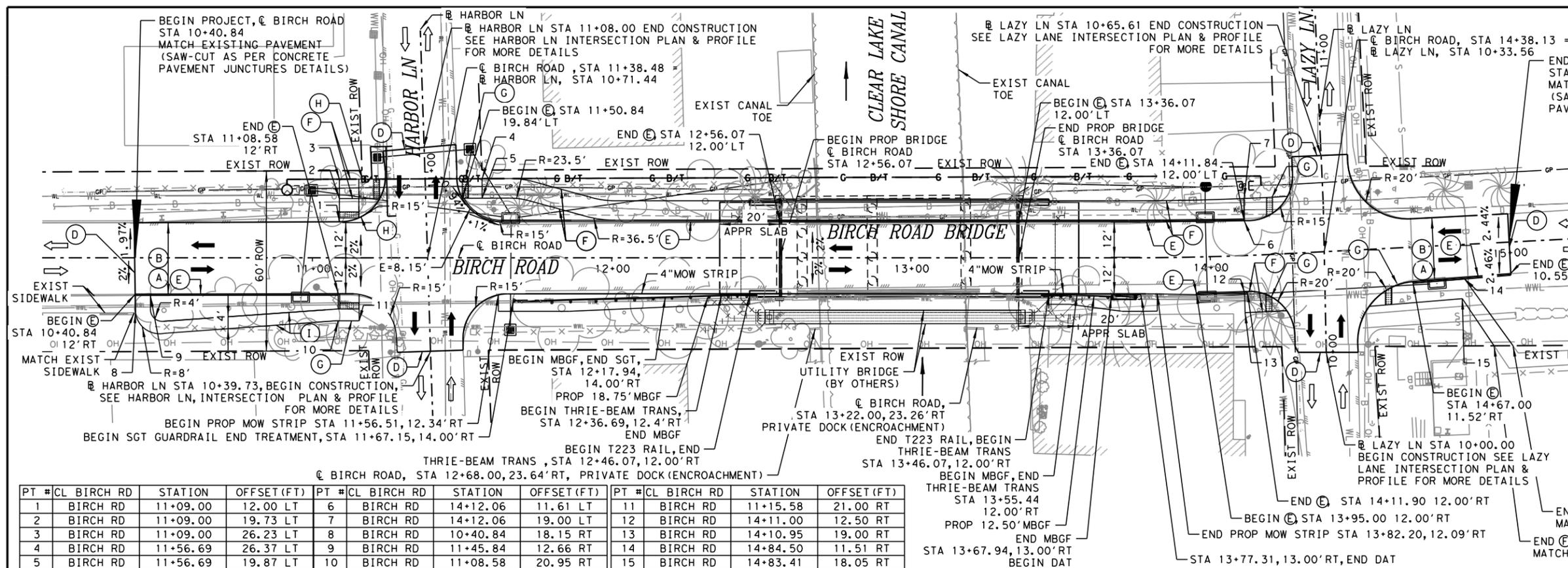
BIRCH ROAD BRIDGE REPLACEMENT

DEMOLITION LAYOUT
 STA 10+40.84 TO STA 15+00.00

SHEET 1 OF 1

Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	
Drn By: ic	VERT:	NO. 27
Ckd By: ic		

USER: 10/31/2020 10:37:56 AM
 4/3/2020
 D:\us-hou-pw01\dannenbaum\Documents\Transportation\5166-01\Des\ign\03 ROADWAY.VA. PLAN & PROFILE\5166_PP01.dgn



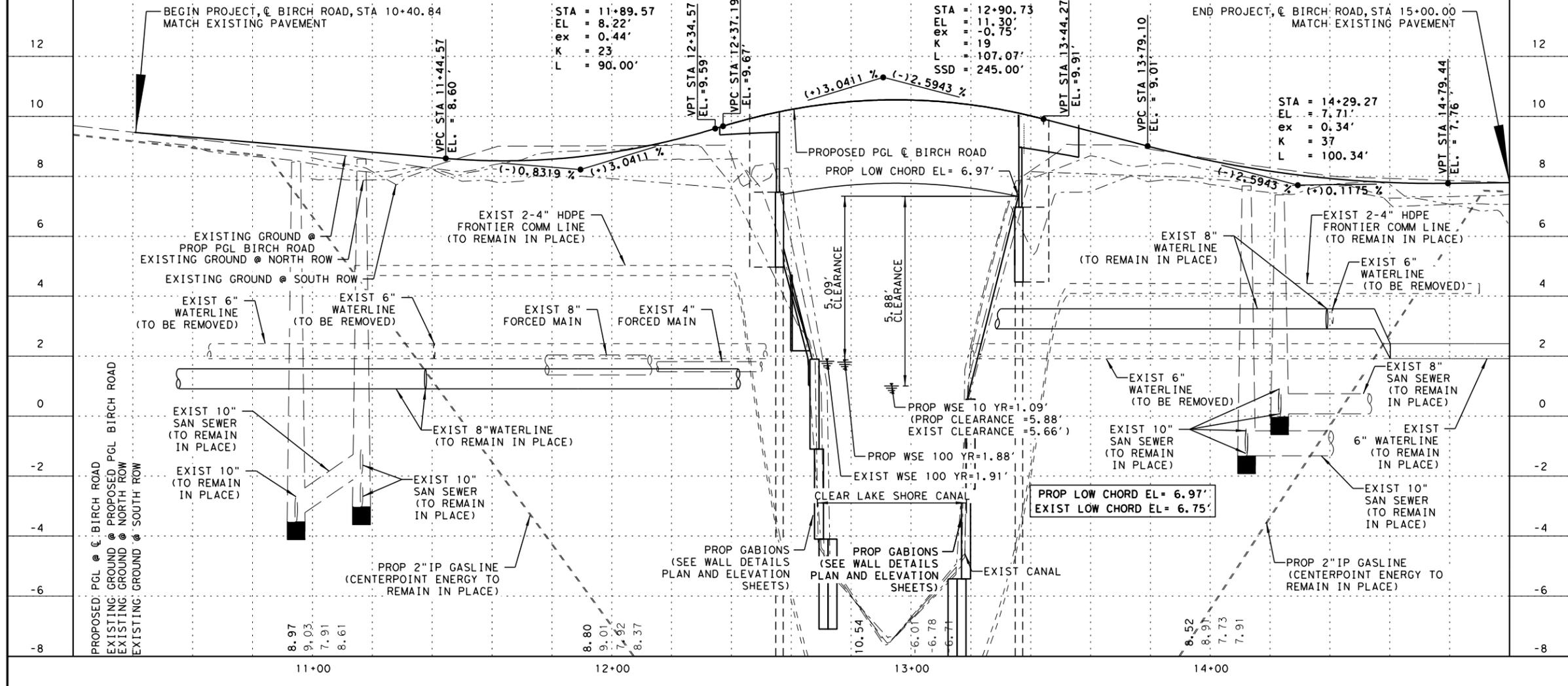
LEGEND

- (A) 10" CONC PAVEMENT (JRCP)
- (B) 6" LIME TREATED SUBGRADE
- (D) SAW CUT ALL DEPTHS
- (E) PROP 6" MONO CURB
- (F) 6.5' CONC SIDEWALK
- (G) PROP RAMP TY 7
- (H) PROP RAMP TY 1
- (I) 4' CONC SIDEWALK

NOTES:

- FOR BENCHMARK LOCATIONS AND DESCRIPTIONS SEE SURVEY CONTROL MAP AND SWINGTIES.
- SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ADDITIONAL ALIGNMENT INFORMATION.
- SEE "HARBOR LN" & "LAZY LN" PLAN & PROFILE SHEETS FOR INTERSECTION DETAILS.
- SEE "UTILITY PLAN & PROFILE" SHEETS FOR UTILITY INFORMATION.
- SEE "DRAINAGE PLAN & PROFILE" FOR STORM SEWER DETAILS.
- FOR CONCRETE RIPRAP AND GABIONS NOT SHOWN, SEE GABION DETAILS.

PT #	CL BIRCH RD	STATION	OFFSET (FT)	PT #	CL BIRCH RD	STATION	OFFSET (FT)	PT #	CL BIRCH RD	STATION	OFFSET (FT)
1	BIRCH RD	11+09.00	12.00 LT	6	BIRCH RD	14+12.06	11.61 LT	11	BIRCH RD	11+15.58	21.00 RT
2	BIRCH RD	11+09.00	19.73 LT	7	BIRCH RD	14+12.06	19.00 LT	12	BIRCH RD	14+11.00	12.50 RT
3	BIRCH RD	11+09.00	26.23 LT	8	BIRCH RD	10+40.84	18.15 RT	13	BIRCH RD	14+10.95	19.00 RT
4	BIRCH RD	11+56.69	26.37 LT	9	BIRCH RD	11+45.84	12.66 RT	14	BIRCH RD	14+84.50	11.51 RT
5	BIRCH RD	11+56.69	19.87 LT	10	BIRCH RD	11+08.58	20.95 RT	15	BIRCH RD	14+83.41	18.05 RT



SCALE: 1"=40' H
 SCALE: 1"=4' V

STA = 11+89.57
 EL = 8.22'
 ex = 0.44'
 K = 23
 L = 90.00'

STA = 12+90.73
 EL = 11.30'
 ex = -0.75'
 K = 19
 L = 107.07'
 SSD = 245.00'

STA = 14+29.27
 EL = 7.71'
 ex = 0.34'
 K = 37
 L = 100.34'

STA = 11+44.57
 EL = 8.60'

STA = 12+34.57
 EL = 9.59'

STA = 13+79.10
 EL = 9.01'

STA = 14+79.44
 EL = 7.76'

PROPOSED PGL @ BIRCH ROAD
 PROP LOW CHORD EL = 6.97'

EXIST 2-4" HDPE FRONTIER COMM LINE (TO REMAIN IN PLACE)

EXIST 8" WATERLINE (TO REMAIN IN PLACE)

EXIST 6" WATERLINE (TO BE REMOVED)

EXIST 8" SAN SEWER (TO REMAIN IN PLACE)

EXIST 10" SAN SEWER (TO REMAIN IN PLACE)

EXIST 2" IP GASLINE (CENTERPOINT ENERGY TO REMAIN IN PLACE)

PROP WSE 10 YR = 1.09' (PROP CLEARANCE = 5.88', EXIST CLEARANCE = 5.66')

PROP WSE 100 YR = 1.88'

EXIST WSE 100 YR = 1.91'

PROP GABIONS (SEE WALL DETAILS PLAN AND ELEVATION SHEETS)

EXIST CANAL

PROP 2" IP GASLINE (CENTERPOINT ENERGY TO REMAIN IN PLACE)

REV. NO. | DATE | DESCRIPTION | BY

THE STATE OF TEXAS
 COUNTY OF GALVESTON
 BLAIR C. STOCKER
 133571
 LICENSED PROFESSIONAL ENGINEER
 09/06/2020

DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA, HOUSTON, TEXAS 77098 (713) 520-9570

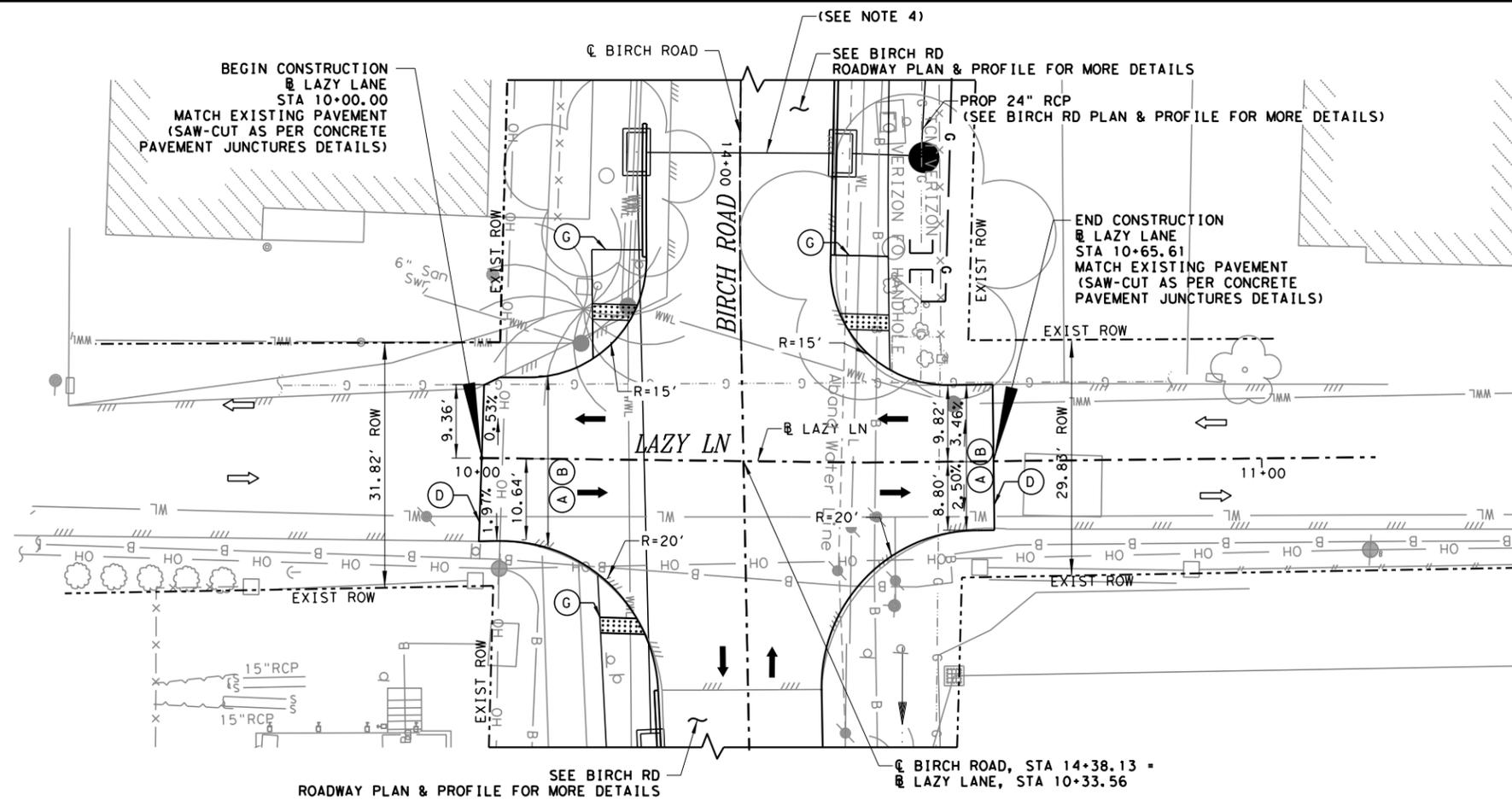
BIRCH ROAD BRIDGE REPLACEMENT
ROADWAY PLAN & PROFILE
 STA 10+40.84 TO STA 15+00.00
 SHEET 1 OF 1

Job No.:
 Date: February, 2020
 Drn By: ic
 Ckd By: ic

Scale:
 HORZ:
 VERT:

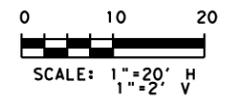
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- LEGEND**
- (A) 10" CONC PAVEMENT (JRCP)
 - (B) 6" LIME TREATED SUBGRADE
 - (D) SAW CUT ALL DEPTHS
 - (E) PROP 6" MONO CURB
 - (F) 6.5' CONC SIDEWALK
 - (G) PROP RAMP TY 7

- NOTES:**
1. FOR BENCHMARK LOCATIONS AND DESCRIPTIONS SEE SURVEY CONTROL MAP AND SWINGTIES.
 2. SEE "HORIZONTAL ALIGNMENT DATA" SHEET FOR ADDITIONAL ALIGNMENT INFORMATION.
 3. SEE "UTILITY PLAN & PROFILE" SHEET FOR UTILITY INFORMATION.
 4. SEE LATERAL SHEETS FOR DETAILS.



REV. NO.	DATE	DESCRIPTION	BY



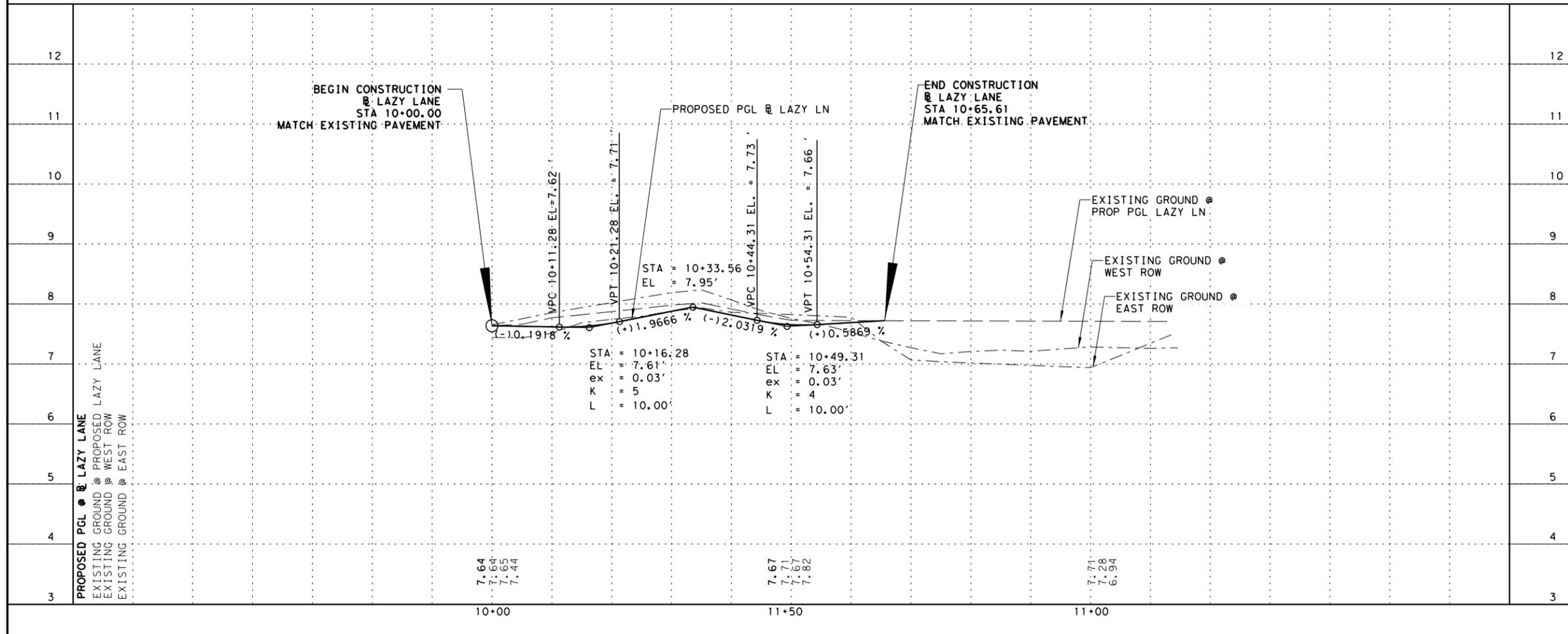
DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

**BIRCH ROAD BRIDGE REPLACEMENT
 INTERSECTION LAZY LN
 PLAN & PROFILE**

STA 10+00.00 TO STA 10+65.61
 SHEET 1 OF 1

Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	
Drn By: ic	VERT:	
Ckd By: ic		No. 30



PROPOSED PGL @ LAZY LANE
 EXISTING GROUND @ PROPOSED LAZY LANE
 EXISTING GROUND @ WEST ROW
 EXISTING GROUND @ EAST ROW

7.64
 7.64
 7.65
 7.44

7.67
 7.71
 7.67
 7.82

7.71
 7.28
 6.94

10+00

11+50

11+00

DRILLING LOG

1 of 2

WinCore Version 3.0 County GALVESTON Hole B-01 District HOUSTON
 Highway CSJ Structure BRIDGE Date 01/21/19
 Station 9.22 ft Grnd. Elev. 9.22 ft
 Offset N/A GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
			CLAY, fat, soft, brown (CH)							-FILL 0 to 7 ft, with gravel fragments, 0 to 5 ft
5		5 (6) 4 (6)								Depth=1-3', 3-5', 6-8', 8-10' Sampler Type=Shelby Tube
										HP: 2; with calcareous nodules, 6.5 to 8 ft
1.2			CLAY, sandy lean, soft, brown (CL)	0	22.4	21			126.9	HP: 2; -200: 66%; with calcareous nodules, 8 to 15 ft Sampler Type=Shelby Tube Depth=11-13'
										HP: 4
10		10 (6) 10 (6)								HP: 2.5 Sampler Type=Shelby Tube Depth=13-15'
15		7 (6) 6 (6)								
			CLAY, lean, stiff, brown (CL)							HP: 0.5; -200: 88%; with silt seams, 18 to 20 ft Sampler Type=Shelby Tube Depth=18-20'
-8.8										
20		16 (6) 18 (6)								HP: 1; with silt seams, 23 to 25 ft Sampler Type=Shelby Tube Depth=23-25'
25		8 (6) 19 (6)								HP: 2.5; -200: 95%; gray, 33 to 38 ft Sampler Type=Shelby Tube Depth=33-35'
-18.8			CLAY, fat, stiff, reddish brown (CH)							HP: 4; with calcareous nodules, 38 to 40 ft Sampler Type=Shelby Tube Depth=38-40'
30		12 (6) 12 (6)								HP: 4.5 Sampler Type=Shelby Tube Depth=43-45'
35		12 (6) 14 (6)								
40		16 (6) 20 (6)								
45		16 (6) 18 (6)								
-38.8			CLAY, sandy fat, stiff, brown (CH)	26	19.9	19	51	38	127.4	HP: 4.5; -200: 59% Sampler Type=Shelby Tube Depth=48-50'
50		11 (6) 14 (6)								

Remarks: WATER ENCOUNTERED DURING DRILLING AT DEPTH OF ABOUT 14 FEET.
 NORTHING: 13,766,404.26, EASTING: 3,231,223.64

Driller: DENNIS Logger: OSCAR Organization: PSI

p:\286 reports\2019 reports\286-1952 birch rd. bridge replacement\logs\1952.gpj

PLATE 2

DRILLING LOG

2 of 2

WinCore Version 3.0 County GALVESTON Hole B-01 District HOUSTON
 Highway CSJ Structure BRIDGE Date 01/21/19
 Station 9.22 ft Grnd. Elev. 9.22 ft
 Offset N/A GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
-40.8			CLAY, fat, stiff, brown (CH)							
55		11 (6) 14 (6)								HP: 4; gray, 53 to 55 ft Sampler Type=Shelby Tube Depth=53-55'
-48.8			SAND, silty, compact to very dense, gray (SC)	30	60.6	19			132.7	HP: 3; -200: 21%; with organics, 58 to 60 ft, with clay seams, 58 to 63 ft Sampler Type=Shelby Tube Depth=58-60'
60		30 (6) 34 (6)								N:60 Sampler Type=Split Spoon Depth=63-65'
65		28 (6) 50 (4.5)								
-59.8			SAND, poorly graded with silt, compact, gray (SP-SM)							N:43 Sampler Type=Split Spoon Depth=68-70'
70		18 (6) 25 (6)								N:40; -200: 10% Sampler Type=Split Spoon Depth=73-75'
75		33 (6) 36 (6)								N:42; clayey at 78 to 80 ft Sampler Type=Split Spoon Depth=78-80'
-70.8										
80										
85										
90										
95										
100										

Remarks: WATER ENCOUNTERED DURING DRILLING AT DEPTH OF ABOUT 14 FEET.
 NORTHING: 13,766,404.26, EASTING: 3,231,223.64

Driller: DENNIS Logger: OSCAR Organization: PSI

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PLATE 2



DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT

DRILLING LOGS

SHEET 1 OF 2

Job No.:	Scales:	SHEET
Date: February, 2020	HORZ:	
Drn By: ic	VERT:	NO. 31
Ckd By: ic		

USER: 10138; 11 AM 4/3/2020
 p:\286 reports\2019 reports\286-1952 birch rd. bridge replacement\logs\1952.gpj

DRILLING LOG

1 of 2

WinCore Version 3.0
 County GALVESTON
 Highway CSJ
 Hole B-02
 Structure BRIDGE
 Station
 Offset
 District HOUSTON
 Date 01/18/19
 Grnd. Elev. 9.20 ft
 GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
5		5 (6) 7 (6)	CLAY, lean, soft, brown (CL)			9				-FILL 0 to 6.5 ft, with gravel fragments, 0 to 2 ft -gray, 3 to 6.5 ft, with ferrous nodules, 3 to 6.5 ft; -200: 95% HP: 1.5; -200: 90%
2.7			CLAY, fat, stiff, gray (CH)	0	25.4	22	46	32	126.9	-with calcareous nodules, 6.5 to 10 ft HP: 1; brown, 8 to 10 ft Sampler Type=Shelby Tube 1-3',3-5',6-8',8-10',13-15'
10		13 (6) 20 (6)	CLAY, lean, stiff, brown (CL)			18				-with silt seams, 11.5 to 18 ft HP: 1; -200: 100% Sampler type =Split Spoon Depth=11-13'
-2.3			CLAY, lean, stiff, brown (CL)	0	25.3	24	42	27	124.5	HP: 0.5; with silt seams, 18 to 20 ft Sampler Type= Shelby Tube Depth=18-20'
15		10 (6) 11 (6)	CLAY, fat, soft, brown (CH)			23				HP: 1; with silt seams, 23 to 28 ft Sampler Type=Shelby Tube Depth=23-25'
-8.8		8 (6) 11 (6)	CLAY, lean, stiff, brown (CL)			25	39	23		HP: 1; -200: 99%; with silt seams, 28 to 33 ft Sampler Type=Shelby Tube Depth=28-30'
20		6 (6) 9 (6)	CLAY, fat, stiff, brown (CH)			27				HP: 3 Sampler Type=Shelby Tube Depth=33-35'
25		11 (6) 12 (6)	CLAY, lean, stiff, brown (CL)			25				HP: 3; brown, 38 to 40 ft; with calcareous nodules, 38 to 40 ft Sampler Type=Shelby Tube Depth=38-40'
-18.8			CLAY, lean, stiff, brown (CL)	24	37.0	28	62	44	122.9	HP: 2.5; -200: 100% Sampler Type=Shelby Tube Depth=43-45'
30		12 (6) 14 (6)	CLAY, fat, stiff, brown (CH)			21				HP: 2.5 Sampler Type=Shelby Tube Depth=48-50'
-23.8		14 (6) 15 (6)	CLAY, lean, stiff, gray (CL)							
35		15 (6) 16 (6)								
40		15 (6) 15 (6)								
45										
-38.8										
50										

Remarks: WATER ENCOUNTERED DURING DRILLING AT DEPTH OF ABOUT 15 FEET.
 NORTHING: 13,766,408.52, EASTING: 3,231,223.39

Driller: DENNIS Logger: OSCAR Organization: PSI

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PLATE 3

DRILLING LOG

2 of 2

WinCore Version 3.0
 County GALVESTON
 Highway CSJ
 Hole B-02
 Structure BRIDGE
 Station
 Offset
 District HOUSTON
 Date 01/18/19
 Grnd. Elev. 9.20 ft
 GW Elev. N/A

Elev. (ft)	LOG	Texas Cone Penetrometer	Strata Description	Triaxial Test		Properties				Additional Remarks
				Lateral Press. (psi)	Deviator Stress (psi)	MC	LL	PI	Wet Den. (pcf)	
-40.8			CLAY, lean, stiff, gray (CL)			18				HP: 1.75 Sampler Type=Shelby Tube Depth=53-55'
55		16 (6) 18 (6)								
-48.8			SAND, clayey, compact, gray (SC)	30	66.7	17	34	20	132.7	-200: 30% Sampler Type=Shelby Tube Depth=58-60'
-50.8		23 (6) 25 (6)	SAND, silty, compact to very dense, gray (SM)			24				Sampler Type=Shelby Tube Depth=63-65'
60		50 (5.5) 50 (4.5)								N= 32; brown, 68 to 80 feet Sampler Type=Split Spoon Depth=68-70'
65										
70		16 (6) 27 (6)								N=44 Sampler Type=Split Spoon Depth=73-75'
-64.8			SILT, sandy, compact, gray (ML)			29				N= 39; -200: 66% Sampler Type=Split Spoon Depth=78-80'
75		25 (6) 50 (6)								
80										
85										
90										
95										
100										

Remarks: WATER ENCOUNTERED DURING DRILLING AT DEPTH OF ABOUT 15 FEET.
 NORTHING: 13,766,408.52, EASTING: 3,231,223.39

Driller: DENNIS Logger: OSCAR Organization: PSI

p:\286 reports\2019 reports\286-1952 birch rd. bridge replacement\logs\1952.gpj

PLATE 3



DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

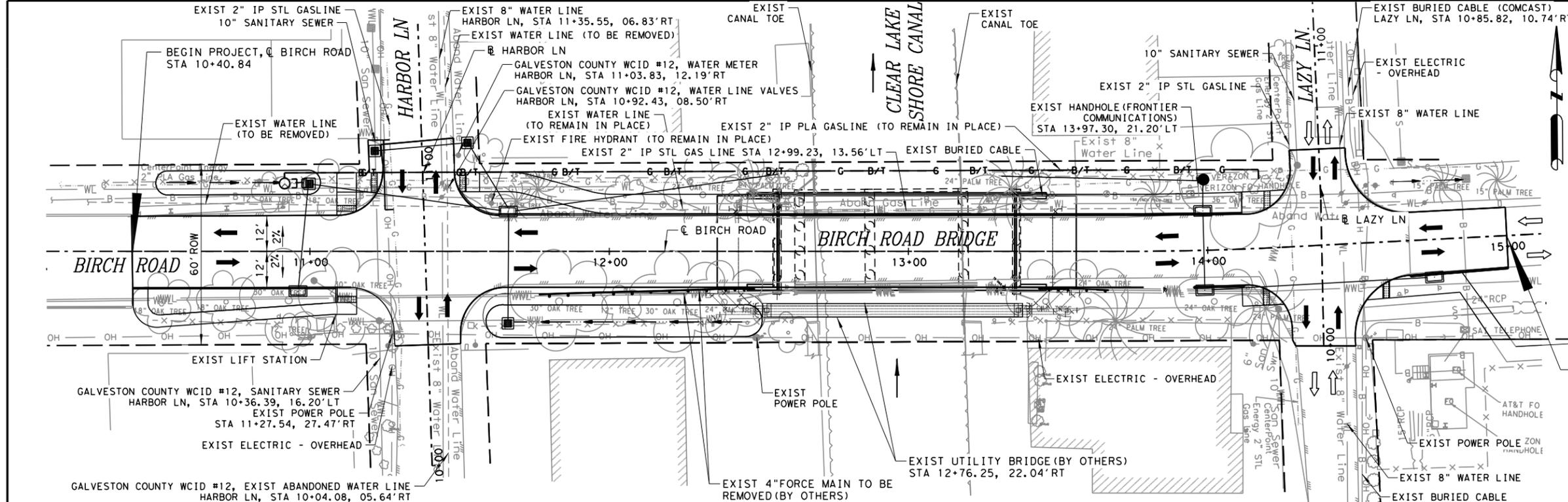
BIRCH ROAD BRIDGE REPLACEMENT

DRILLING LOGS

SHEET 2 OF 2

Job No.:	Scales:	SHEET
Date: February, 2020	HORZ:	
Drn By: iC	VERT:	
Chk By: iC		NO. 32

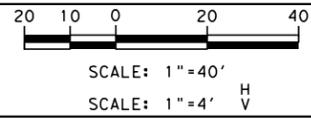
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- LEGEND**
- OH — EXIST ELECTRIC - OVERHEAD (CENTER POINT)
 - - - G - - - EXIST GAS LINE (CENTERPOINT)
 - G — PROPOSED GAS LINE (CENTERPOINT)
 - WL — EXIST WATER LINE
 - WWL — EXIST SANITARY SEWER UNDERGROUND
 - S — EXIST STORM SEWER UNDERGROUND
 - B — EXIST BURIED CABLE (COMCAST & FRONTIER)
 - ➔ PROP DIRECTION OF TRAFFIC
 - ➔ EXIST DIRECTION OF TRAFFIC

EXISTING SANITARY SEWER LINES, GAS LINE, WATER LINES, TELECOMMUNICATION LINES, AND POWER LINES IN THE PROJECT AREA. CONTRACTOR SHALL BE RESPONSIBLE TO FIELD VERIFY ALL OVERHEAD AND UNDERGROUND UTILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION.

EXISTING UTILITIES PROFILES ELEVATIONS AND LOCATIONS ARE APPROXIMATE. CONTRACTOR TO FIELD VERIFY PRIOR TO ANY CONSTRUCTION ACTIVITY. CONTRACTOR TO PROTECT EXISTING UTILITIES.



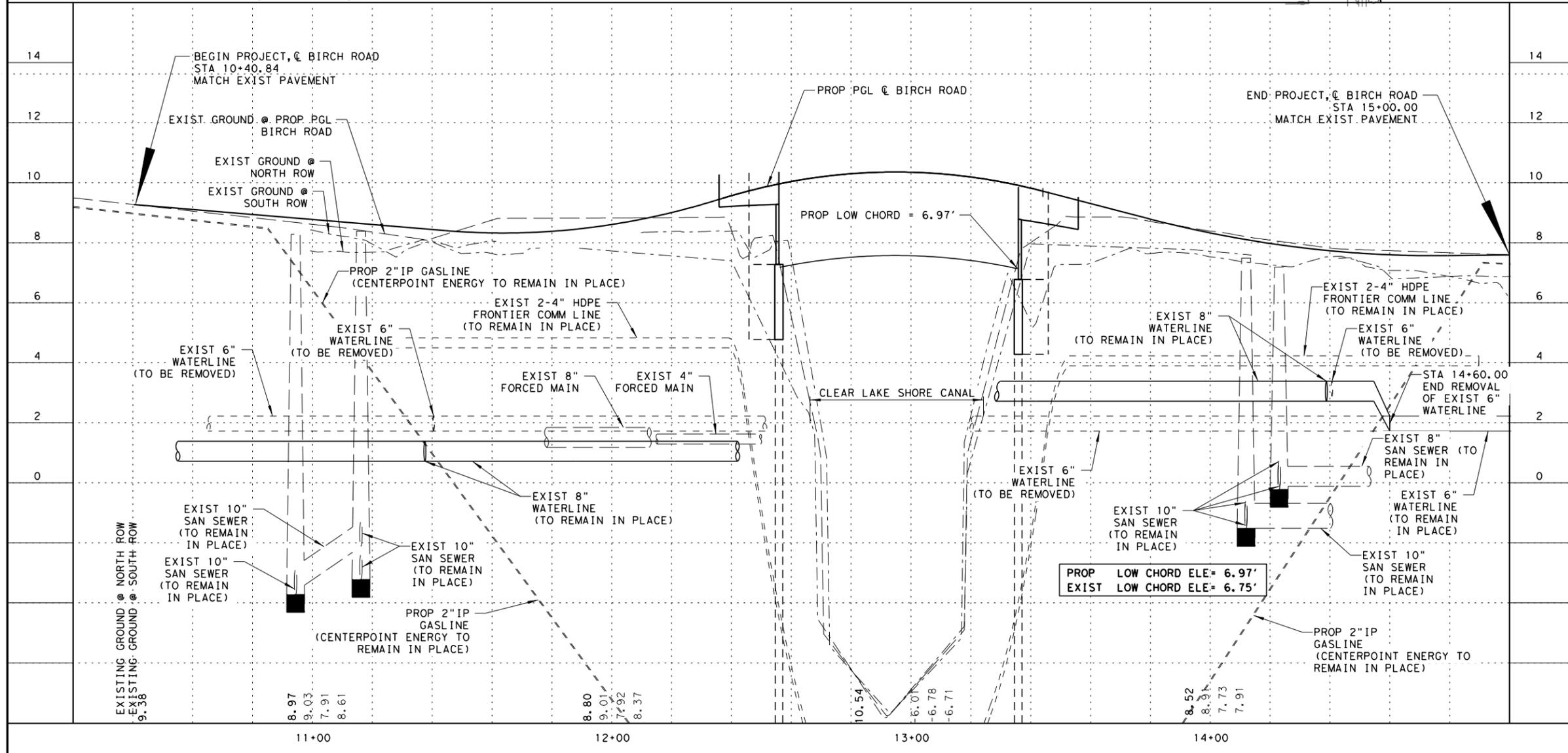
REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM
ENGINEERING CORPORATION - HOUSTON, LLC
T.B.P.E. FIRM REGISTRATION #392
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

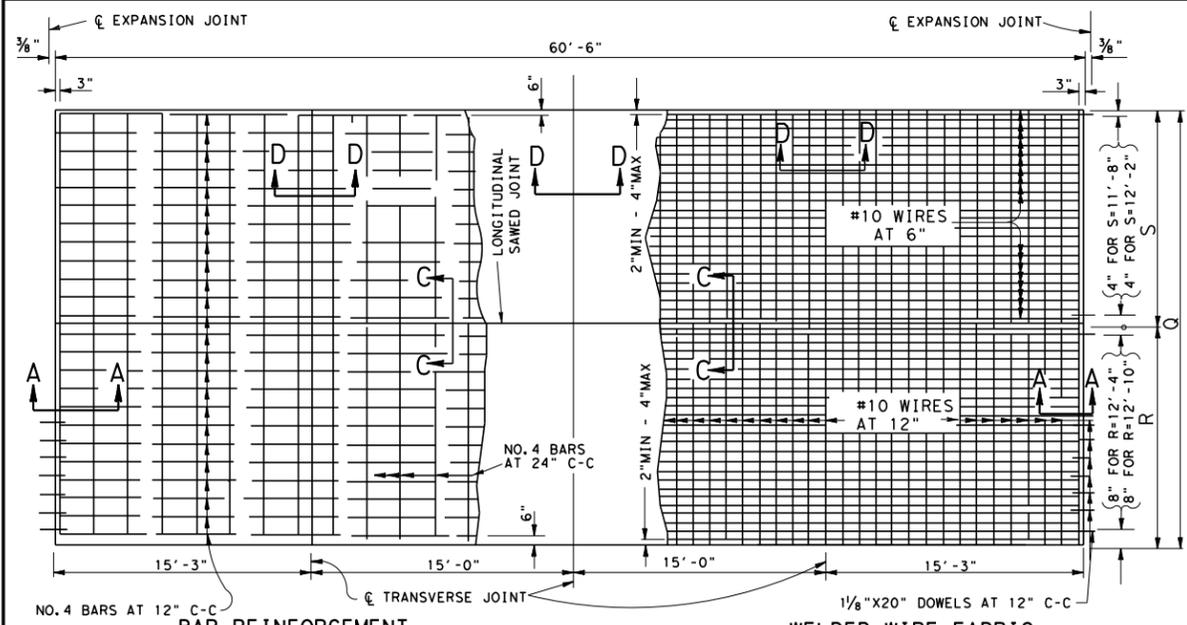
GALVESTON COUNTY, TEXAS

**BIRCH ROAD BRIDGE REPLACEMENT
UTILITY PLAN & PROFILE**
STA 10+40.84 TO STA 15+00.00



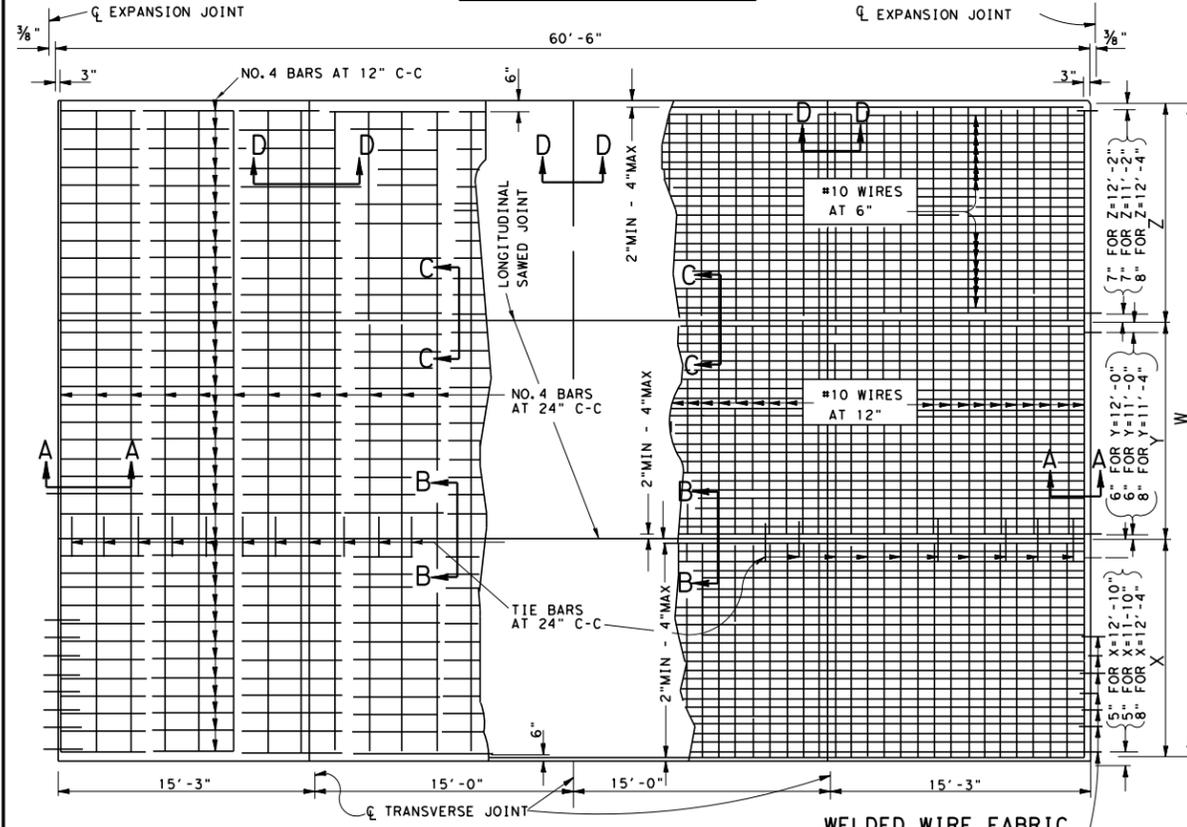
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Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	
Drn By: ic	VERT:	
Ckd By: ic		NO. 33



TWO LANE PAVEMENT PLAN

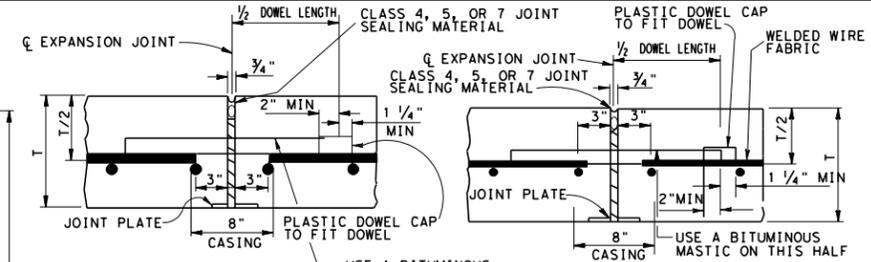
	WIDTH - Q		
	24'-0"	24'-6"	25'-0"
R	12'-4"	12'-4"	12'-10"
S	11'-8"	12'-2"	12'-2"



THREE LANE PAVEMENT PLAN

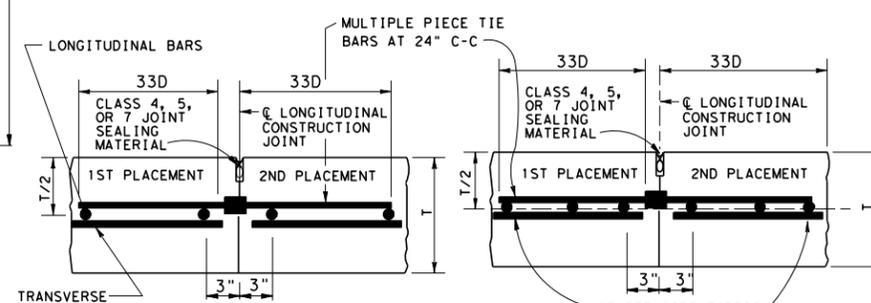
	WIDTH - W		
	37'-0"	36'-0"	34'-0"
X	12'-10"	12'-4"	11'-10"
Y	12'-0"	11'-4"	11'-0"
Z	12'-2"	12'-4"	11'-2"

D = DIAMETER
R = RADIUS
T = THICKNESS

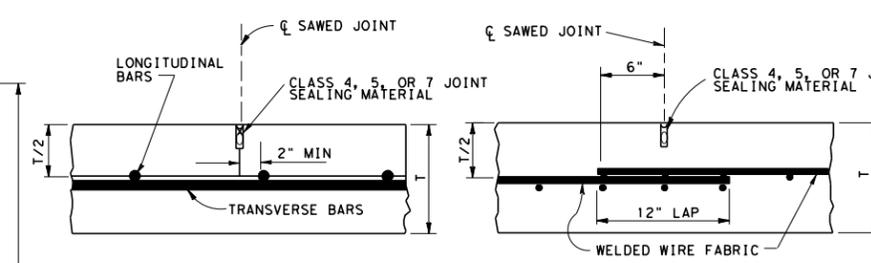


TRANSVERSE EXPANSION JOINTS

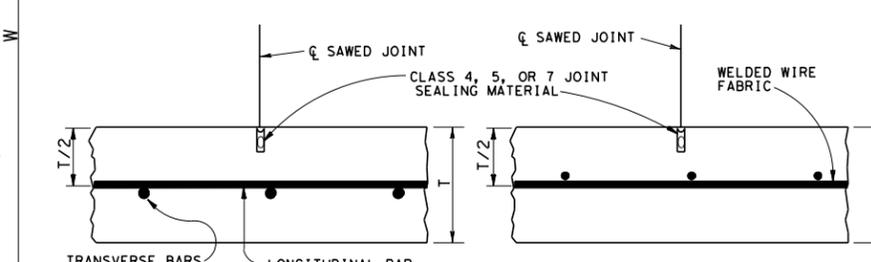
NOTE: DOWEL BARS CONFORMING TO ASTM A615 OR A616 GRADE 60 ARE ACCEPTABLE



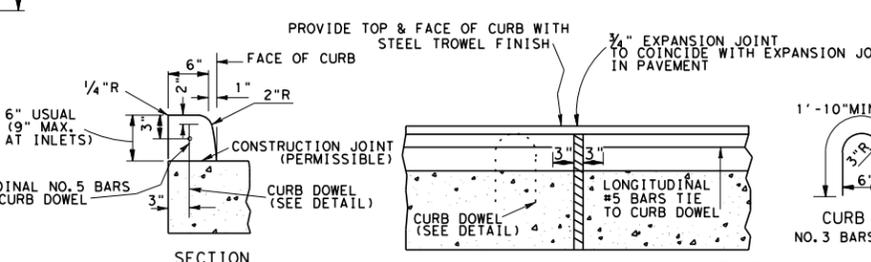
LONGITUDINAL CONSTRUCTION JOINTS



LONGITUDINAL SAWED JOINTS



TRANSVERSE SAWED JOINTS



TYPICAL 6" CURB (DETAIL)

- GENERAL NOTES**
- MULTIPLE PIECE TIE BARS ARE REQUIRED AT LONGITUDINAL CONSTRUCTION JOINTS. USE MULTIPLE PIECE TIE BAR ASSEMBLIES WITH STOP TYPE COUPLINGS AND WITH THREADS ON THE BARS. ENSURE THE MULTIPLE PIECE TIE BAR ASSEMBLIES DEVELOP A MINIMUM ULTIMATE TENSILE STRENGTH EQUAL TO 1.25 TIMES THE YIELD STRENGTH OF THE TRANSVERSE BARS BEING JOINED. USE DEFORMED REINFORCING BARS FOR TIE BARS. TIE BAR ASSEMBLIES MADE FROM STEELS OTHER THAN ASTM GRADE 60 AND WITH DEFORMATIONS OTHER THAN ASTM STANDARD MAY BE USED IF IT CAN BE PROVEN TO THE ENGINEER THAT THEY ARE IN EVERY RESPECT THE EQUAL OF THE ASSEMBLIES SPECIFIED. LABORATORY TESTING OF THE PROPOSED ASSEMBLIES, AT THE CONTRACTOR'S EXPENSE, MAY BE REQUIRED.
 - FORM CONSTRUCTION JOINTS WITH METAL OR WOOD FORMS EQUAL IN DEPTH TO THE NOMINAL DEPTH OF THE PAVEMENT OR BY OTHER MEANS APPROVED PRIOR TO THEIR USE.
 - SAW LONGITUDINAL AND TRANSVERSE JOINTS AS SOON AS SAWING CAN BE ACCOMPLISHED WITHOUT DAMAGE TO THE PAVEMENT AND BEFORE 24 HOURS AFTER PLACING THE CONCRETE, THE EXACT TIME WILL BE APPROVED BY THE ENGINEER. PREFORMED JOINT WITH ASPHALT STRIP IS NOT ACCEPTABLE.
 - LONGITUDINAL JOINTS ARE SHOWN OFFSET FOUR INCHES FROM THE THEORETICAL LANE LINE AND MAY BE OFFSET TO EITHER SIDE IF THE WIDTH OF THE WIRE FABRIC IS PROPERLY ADJUSTED.
 - ONE OF THE LONGITUDINAL JOINTS OF PAVEMENT SLABS WIDER THAN TWO LANES MAY BE A CONSTRUCTION JOINT. FOR PAVEMENT SLABS WIDER THAN 15 FT. PROVIDE A LOGITUDINAL SAWED JOINT UNLESS OTHERWISE DIRECTED.
 - FORM THE JOINT SEAL SPACE AT TRANSVERSE EXPANSION JOINTS BY USING A STRAIGHT FORM PLACED BEHIND THE LONGITUDINAL FLOAT. LOOSEN THE FORM AS SOON AS THE CONCRETE WILL RETAIN ITS SHAPE AND EDGE WITH AN APPROVED EDGING TOOL. TOOL BOTH EDGES OF LONGITUDINAL CONSTRUCTION JOINTS TO A 1/8 IN. RADIUS AT THE PAVEMENT SURFACE.
 - DO NOT DISCHARGE CONCRETE FROM THE MIXER DIRECTLY ON TOP OF OR ON THE SIDES OF THE EXPANSION JOINT ASSEMBLIES.
 - LAP TRANSVERSE EDGES OF SHEETS OF WELDED WIRE FABRIC 12 INCHES EXCEPT AT TRANSVERSE EXPANSION JOINTS. LAP LONGITUDINAL EDGES 6 INCHES EXCEPT AT LONGITUDINAL CONSTRUCTION JOINTS.
 - DOWEL BARS MAY BE COATED WITH STAINLESS STEEL, MONEL METAL, OR IN ACCORDANCE WITH THE ITEM "REINFORCING STEEL" SECTION ON EPOXY COATING; WITH A WELDED DOWEL ASSEMBLY SUPPORT, AS APPROVED. ENSURE THE CASING CONFORMS TO THE REQUIREMENTS OF ONE OF THE GRADES OF ASTM A167-70 OR A176-71 AND IS NOT LESS THAN 0.010 INCH THICK. PROVIDE A CASING AT LEAST 8 INCHES LONG AND THAT COVERS THE MIDDLE 8 INCHES OF THE DOWEL.
 - SECURE DOWELS PARALLEL TO THE PAVEMENT SURFACE AND PERPENDICULAR TO THE JOINT WITH THE AID OF APPROVED WELDED WIRE BASKET ARRANGEMENTS. ENSURE WELDED WIRE BASKET ARRANGEMENTS DO NOT CROSS THE EXPANSION JOINT. UNIFORMLY COAT DOWELS WITH A BITUMINOUS MASTIC ON THE END WITH THE DOWEL CAP.
 - DO NOT BEND TIE BARS AND DOWEL BARS. TO PREVENT DISPLACEMENT OF WIRE FABRIC BY CONCRETE PLACEMENT, TIE THE FABRIC PANEL TOGETHER AND TIE THE INITIAL FABRIC PANELS OF EACH SLAB TO THE DOWEL BASKET OR AS DIRECTED.
 - TOOL PAVEMENT EDGES TO A RADIUS OF 1/8 IN. WITH AN APPROVED EDGING TOOL.
 - DETAILS FOR PAVEMENT WIDTH, PAVEMENT THICKNESS, AND CROWN-SLOPE ARE ELSEWHERE SHOWN ON THE PLANS.
 - THE CONTRACTOR HAS THE OPTION OF USING WELDED WIRE FABRIC OR BAR REINFORCEMENT. LOCATE THE LONGITUDINAL STEEL AT THE CENTER OF THE SLAB. TAKE NECESSARY PRECAUTIONS TO INSURE THAT THE FINAL POSITION OF STEEL IS WITHIN 1/2 IN. OF THE SLAB CENTER. ENSURE THE LONGITUDINAL AND TRANSVERSE STEEL SPACING DOES NOT VARY MORE THAN ONE-TWELFTH OF SPACING SHOWN.
 - LONGITUDINAL STEEL MAY BE SPLICED WITH 33 TIMES BAR DIAMETER LAPS.
 - FOR LANE WIDTHS NOT SHOWN OR FOR VARIABLE PANEL LENGTHS AND WIDTHS, SPACE REINFORCING STEEL AND DOWELS AS DIRECTED.
 - USE APPROVED BAR MAT CHAIRS. DO NOT EXCEED CHAIR SPACING OF 30 IN. C-C (TRANSVERSE) AND 48 IN. C-C (LONGITUDINAL). GALVANIZING THE CHAIRS IS NOT REQUIRED.
 - OBTAIN BOARDS FOR EXPANSION JOINT FILLER FROM REDWOOD TIMBER.
 - PROVIDE AND CONSTRUCT THE JOINT PLATE AS APPROVED.
 - WHEN CURB IS PLACED SEPARATELY FROM THE CONCRETE PAVEMENT, PROVIDE THE REINFORCING STEEL AS SHOWN IN THE CURB DETAIL. THE CURB REINFORCING STEEL MAY BE OMITTED WHEN THE CURB IS PLACED MONOLITHICALLY.

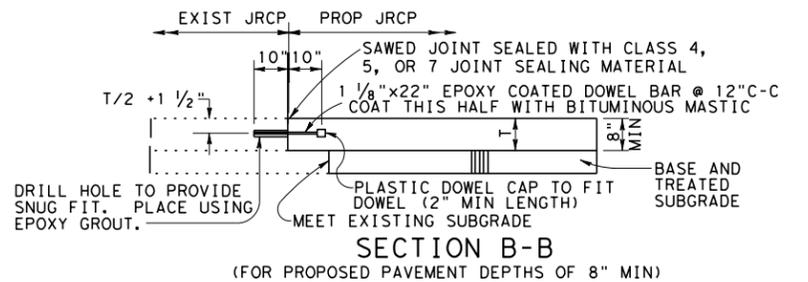
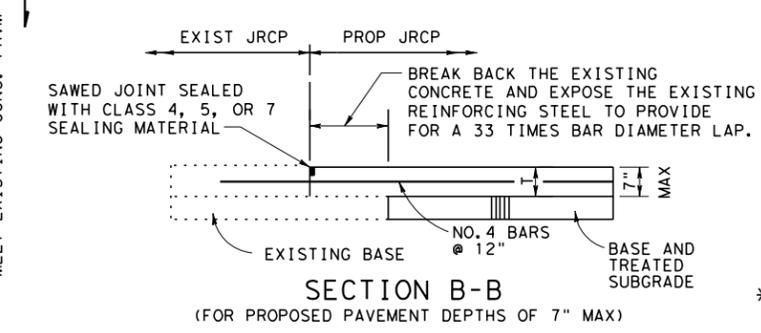
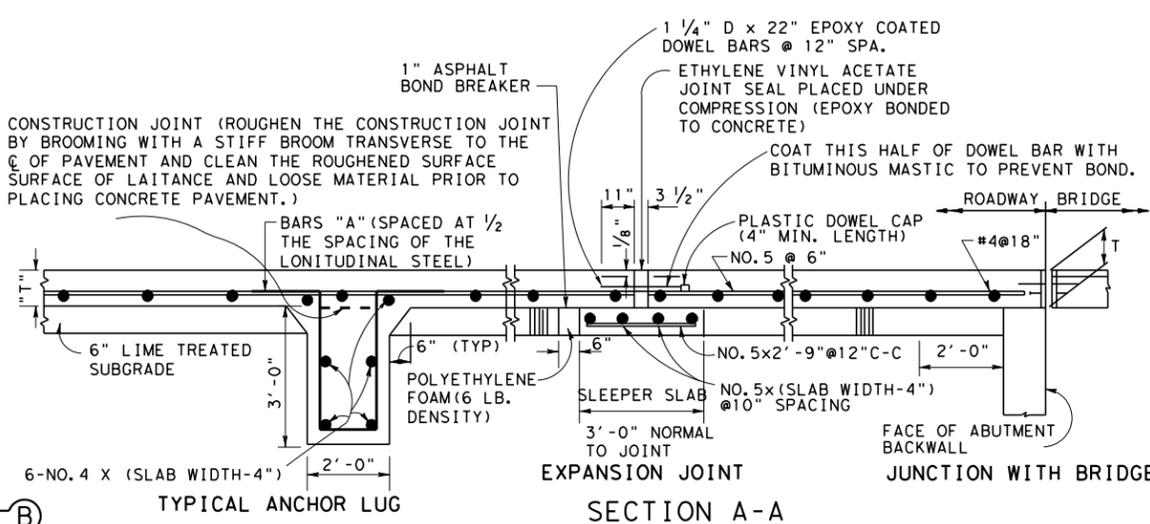
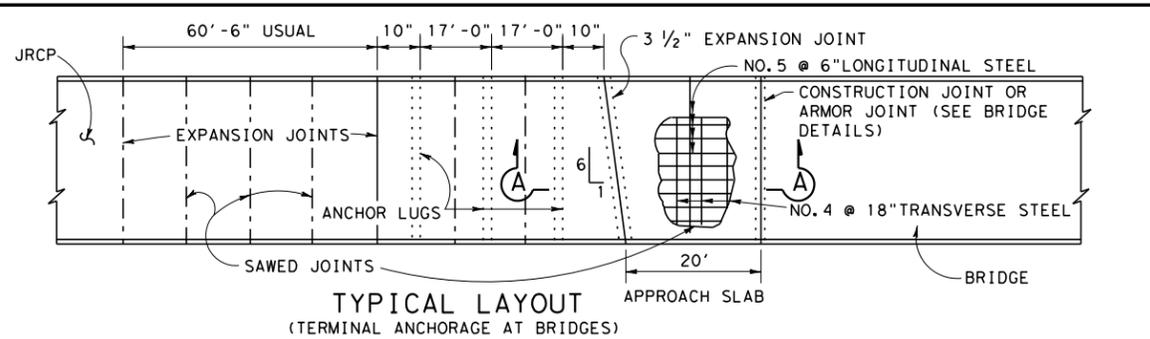
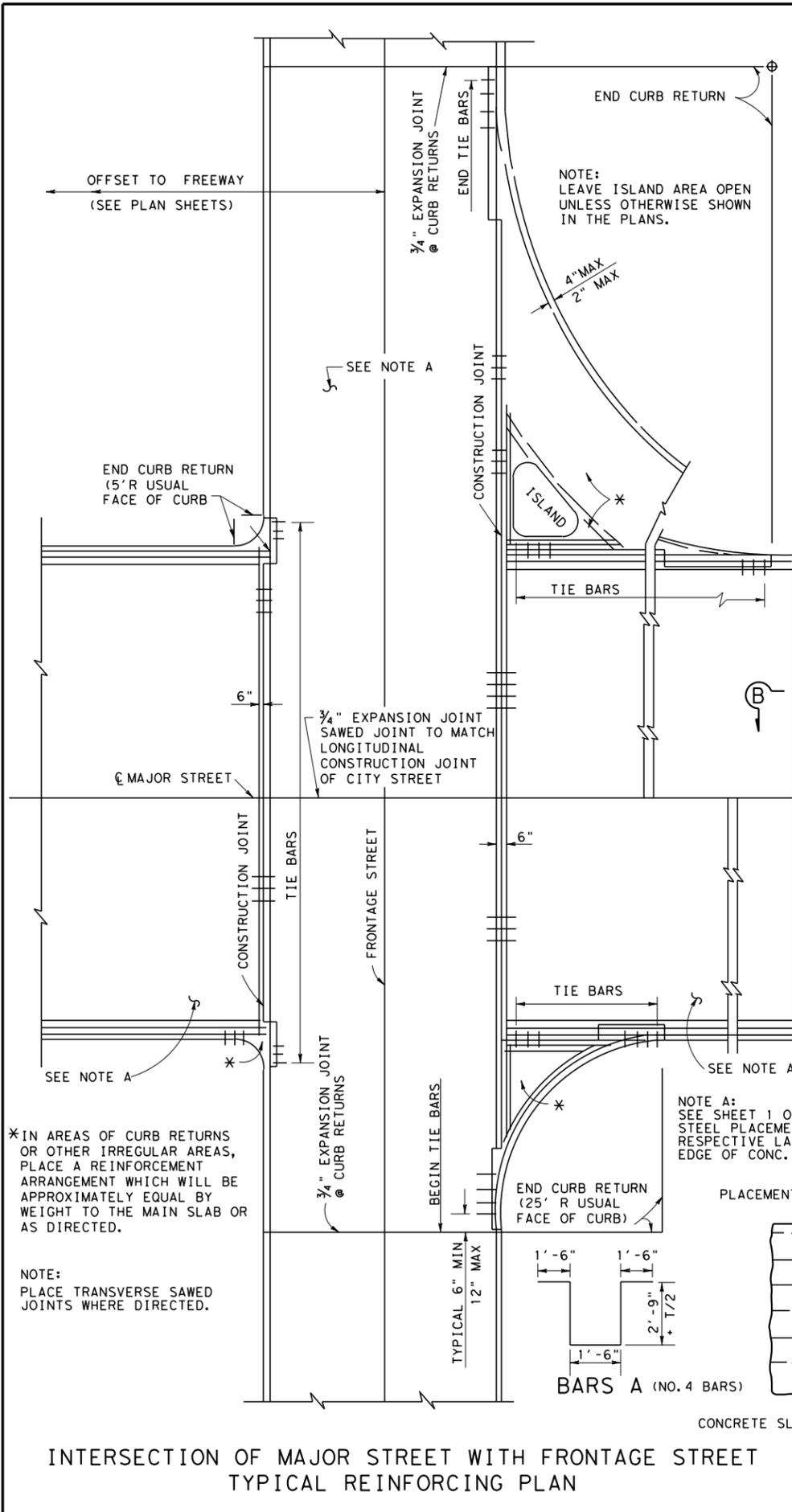
(GENERAL NOTES CONTINUED ON SHEET 2 OF 2)

Texas Department of Transportation
Houston District

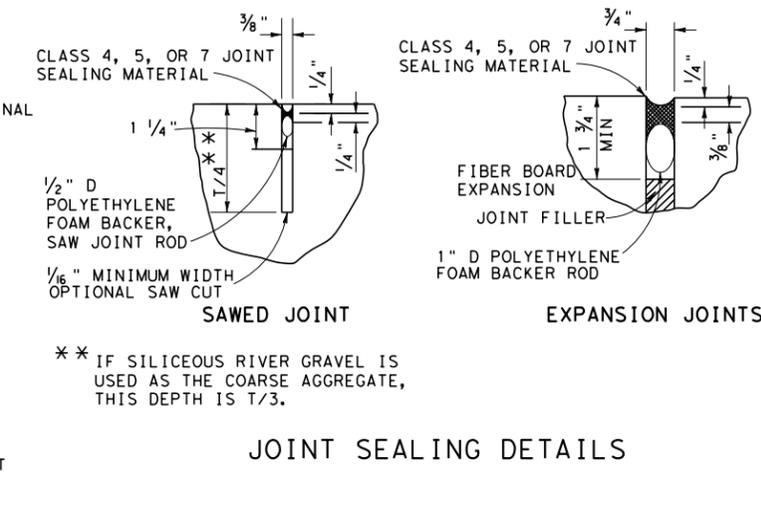
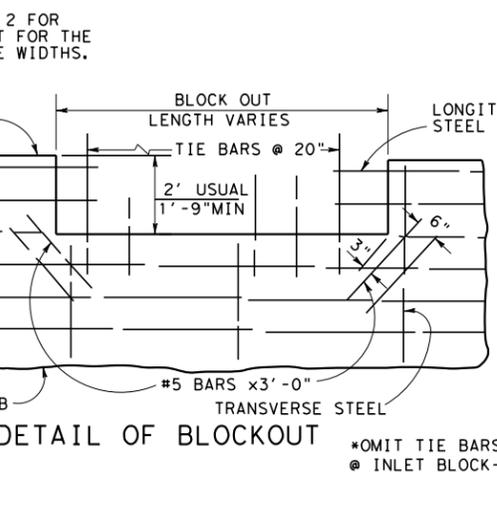
JOINTED REINFORCED CONCRETE PAVEMENT DETAILS
(FOR PAVEMENT THICKNESS 10 INCHES OR LESS)

JRPC SHEET 1 OF 2

FILE: STDB-2.dgn	DN:	CK:	DW:	CK:
© TxDOT MAR. 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU			34
5/05 2004 SPECS	COUNTY	CONTROL	SECT	JOB
7/2010 ADDED NOTE	GALVESTON			HIGHWAY
8/2015 MODIFIED NOTES				BR



REPLACE ANY BENT LONGITUDINAL REINFORCING. IF THERE IS NOT SUFFICIENT EXPOSED REINFORCING TO PROVIDE A MINIMUM OF A 33 TIMES BAR DIAMETER LAP, REMOVE THE EXISTING PAVEMENT AND SUFFICIENTLY EXPOSE THE EXISTING REINFORCING TO PROVIDE A 33 TIMES BAR DIAMETER LAP. REPLACE ANY SHEAR BARS THAT ARE DISTURBED, BY DRILLING AND GROUTING AS REQUIRED BY NOTE #29. PERFORM THIS CORRECTIVE ACTION AT NO EXPENSE TO THE DEPARTMENT.



- GENERAL NOTES (CONTINUED FROM SHEET 1 OF 2)
- CONSTRUCT ANCHOR LUGS, EXPANSION JOINTS, AND SLEEPER SLABS AS DETAILED IN SECTION A-A. THESE WILL BE PAID FOR IN ACCORDANCE WITH ITEM, "CONCRETE PAVEMENT TERMINALS."
 - REINFORCING STEEL FOR TERMINAL ANCHOR SYSTEMS MAY BE GRADE 40 OR GRADE 60.
 - PLACE CONCRETE FOR ANCHOR LUGS AS SOON AS POSSIBLE AFTER COMPLETING EXCAVATION, TO PRESERVE THE INHERENT SOIL CHARACTERISTICS. EXCAVATING FOR AND PLACING CONCRETE FOR ANCHOR SYSTEM MAY BE IN PREFORMED SECTIONS CORRESPONDING TO THE WIDTH OF PAVING PLACEMENT.
 - APPLY A STEEL TROWEL FINISH TO SLEEPER SLABS AND COAT WITH AN ASPHALT BOND BREAKER.
 - THE DETAILS FOR ANCHORS, LUGS, EXPANSION JOINTS, AND SLEEPER SLABS ARE NOT APPLICABLE UNLESS SHOWN ELSEWHERE IN THE PLANS.
 - APPROACH SLAB WILL BE PAID FOR IN ACCORDANCE WITH THE ITEM "CONCRETE STRUCTURES."
 - WITHIN 5 MINUTES OF SAWING, COMPLETELY REMOVE THE RESULTING SLURRY FROM THE JOINT BY FLUSHING WITH HIGH PRESSURE WATER. THEN ALLOW THE JOINT TO DRY FOR A MINIMUM OF 48 HOURS BEFORE SANDBLASTING THE JOINT.
 - DO NOT SHEAR CUT DOWEL BARS.
 - SIZE ADDITIONAL SHEAR BARS AS LONGITUDINAL BARS AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE LEAVE-OUT.
 - IF THE CONCRETE DESIGN REQUIRES GREATER THAN 5.5 SACKS OF CEMENTITIOUS MATERIAL PER CUBIC YARD, WRITTEN APPROVAL BY THE AREA ENGINEER WILL BE REQUIRED. ENSURE CONCRETE PAVEMENT MIXES PLACED FROM APRIL 1 TO OCTOBER 31 CONTAIN A MINIMUM OF 25 PERCENT BY WEIGHT OF CLASS "F" FLY ASH.
 - IN LOCATIONS WHERE THE PLANS CALL FOR FAST TRACK CONCRETE PAVEMENT IN LIEU OF JRCP (LAID ON COMPACTED OR STABILIZED SUBGRADE), USE DETAILS IN THIS STANDARD IN CONJUNCTION WITH THE APPROPRIATE FAST TRACK CONCRETE SPECIFICATION. IF THE JRCP IS LAID UPON A BASE STRUCTURE, ADD 3" TO THE FAST TRACK PAVEMENT THICKNESS TO COMPENSATE FOR THE BASE.

INTERSECTION OF MAJOR STREET WITH FRONTAGE STREET
TYPICAL REINFORCING PLAN

DETAIL OF BLOCKOUT

JOINT SEALING DETAILS

Texas Department of Transportation
Houston District

JOINTED REINFORCED CONCRETE PAVEMENT DETAILS

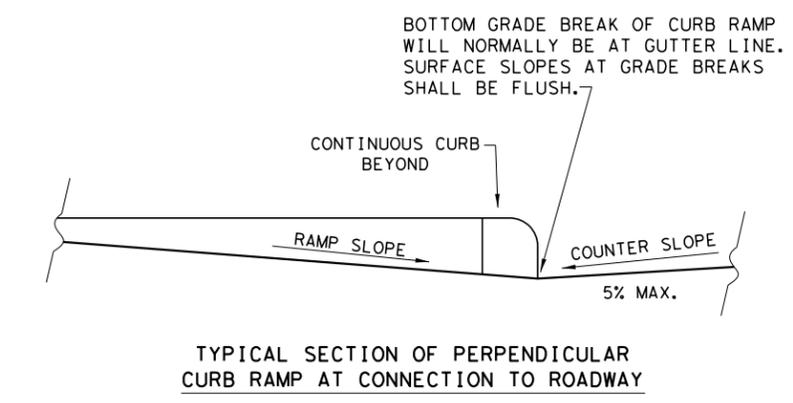
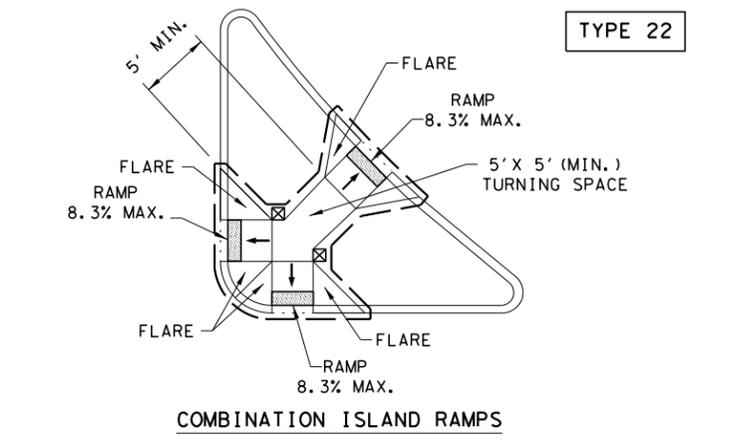
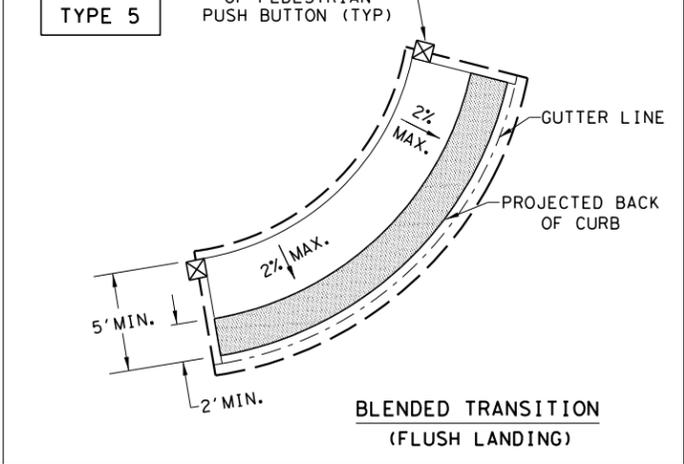
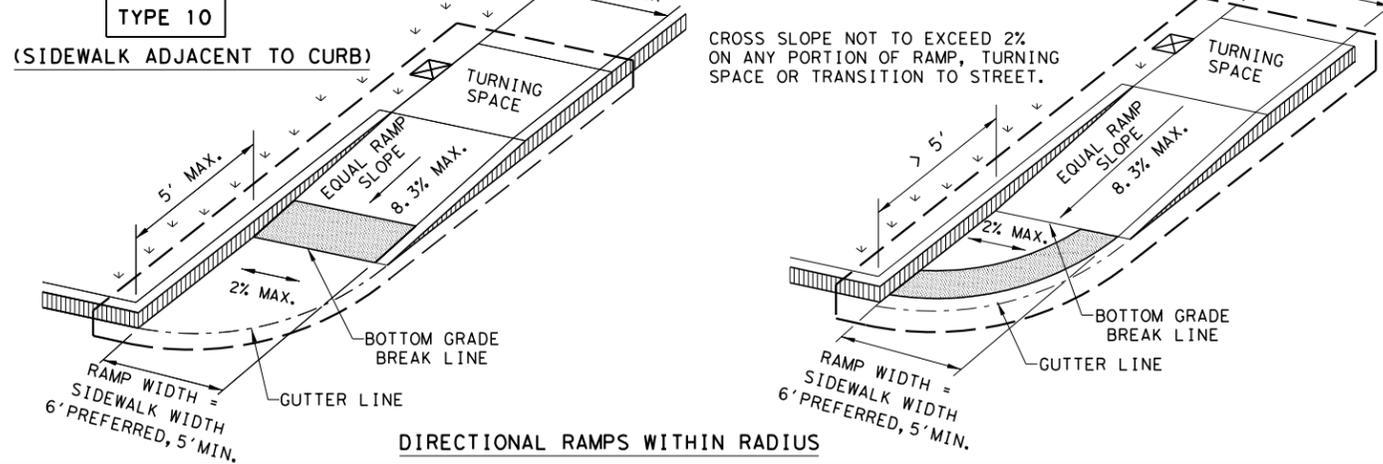
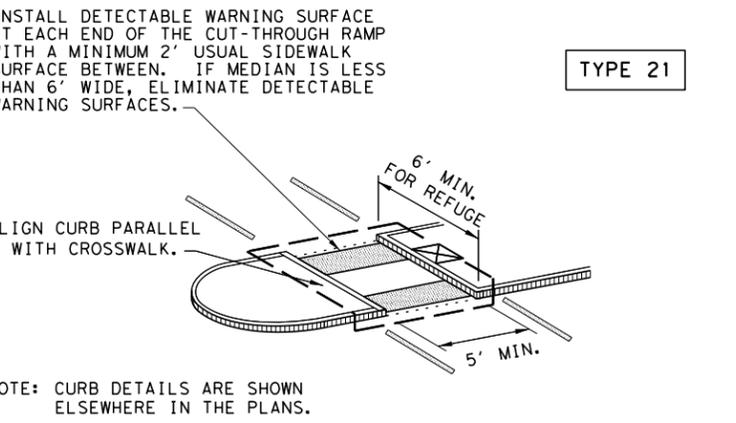
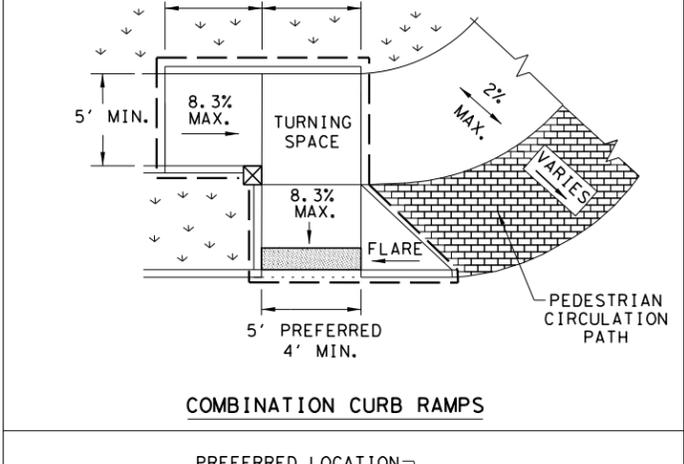
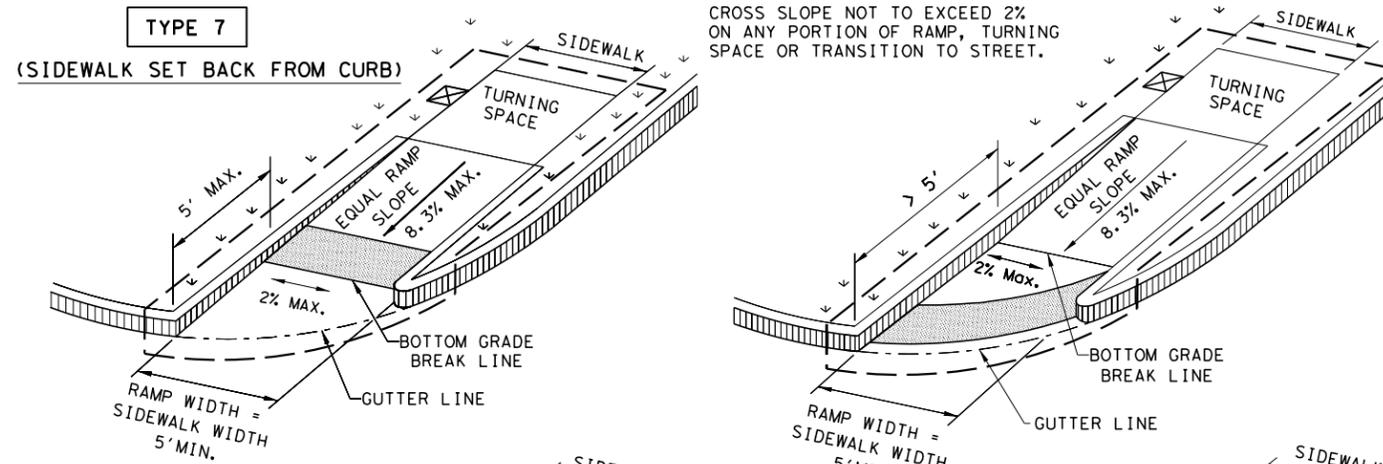
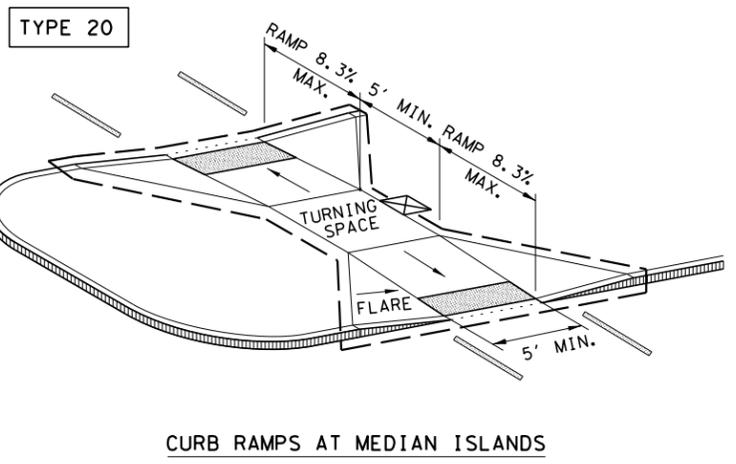
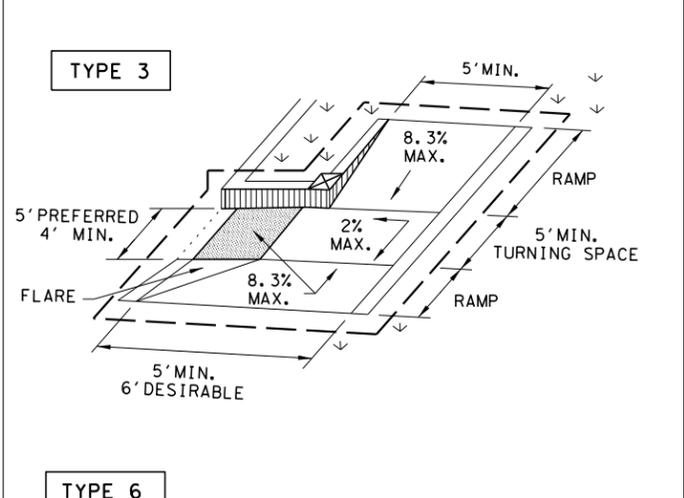
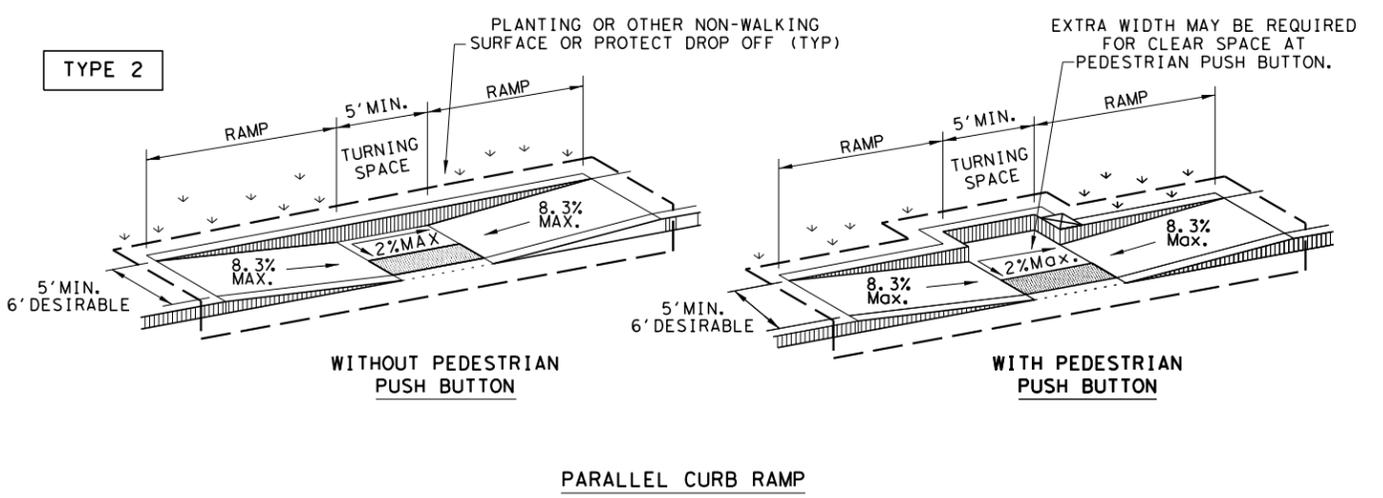
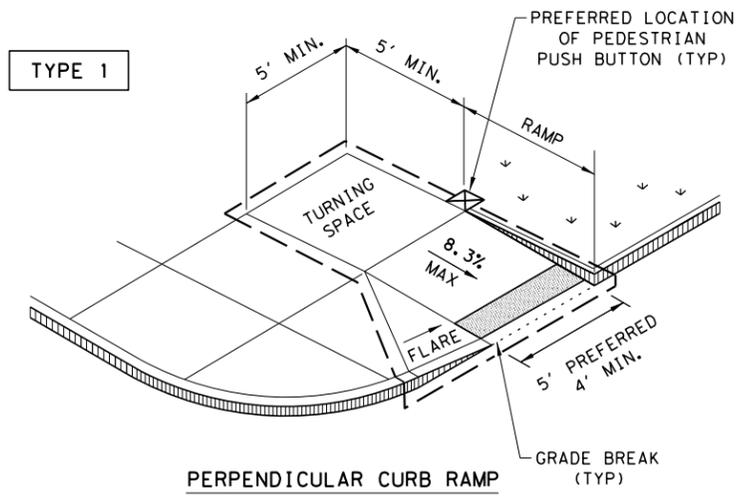
EXPANSION JOINT DESIGN
(FOR PAVEMENT THICKNESS 10 INCHES OR LESS)

JRCP SHEET 2 OF 2

FILE: STDB-2.dgn	DN:	CK:	DW:	CK:
© TxDOT MAR. 2004	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU			35
5/05 2004 SPECS				
7/2010 ADDED NOTE	COUNTY	CONTROL	SECT	JOB
9/2013 ADDED NOTE	GALVESTON			BR
8/2015 MODIFIED NOTES				

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DATE: FILE:



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

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

DENOTES PREFERRED LOCATION OF PEDESTRIAN PUSH BUTTON IF APPLICABLE.

Detectable Warning Surface: [Symbol]

Gutter Line: [Symbol]

Grade Break: [Symbol]

Ramp Limits of Payment: [Symbol]

SHEET 1 OF 4

Texas Department of Transportation
Design Division Standard

**PEDESTRIAN FACILITIES
CURB RAMPS
PED-18**

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				BR
REVISED 08, 2009	DIST	COUNTY		SHEET NO.
REVISED 06, 2012	HOU	GALVESTON		36
REVISED 01, 2018				

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GENERAL NOTES

CURB RAMP

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

DETECTABLE WARNING MATERIAL

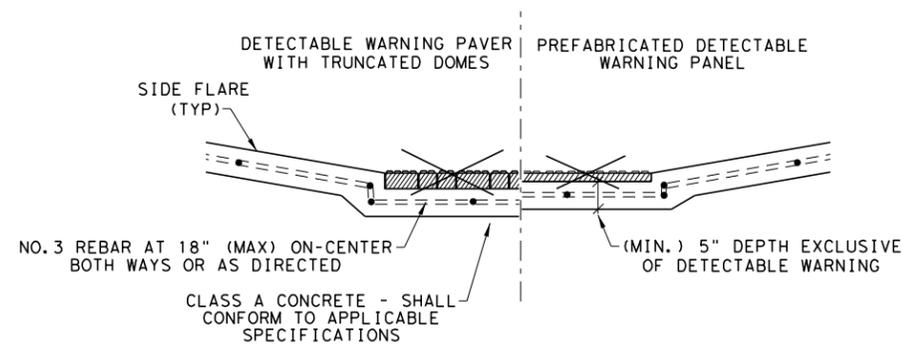
19. Curb ramps must contain a detectable warning surface that consists of raised truncated domes complying with PROWAG. The surface must contrast visually with adjoining surfaces, including side flares. Furnish and install an approved cast-in-place dark brown or dark red detectable warning surface material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

DETECTABLE WARNING PAVERS (IF USED)

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

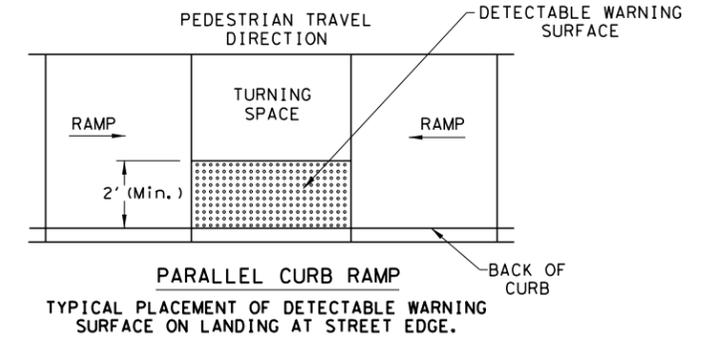
SIDEWALKS

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

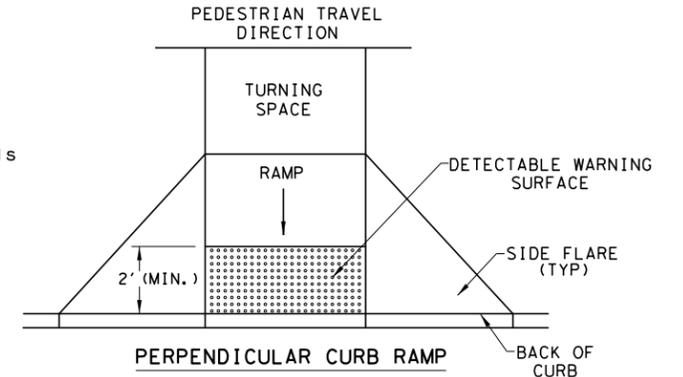


**SECTION VIEW DETAIL
CURB RAMP AT DETECTIBLE WARNINGS**

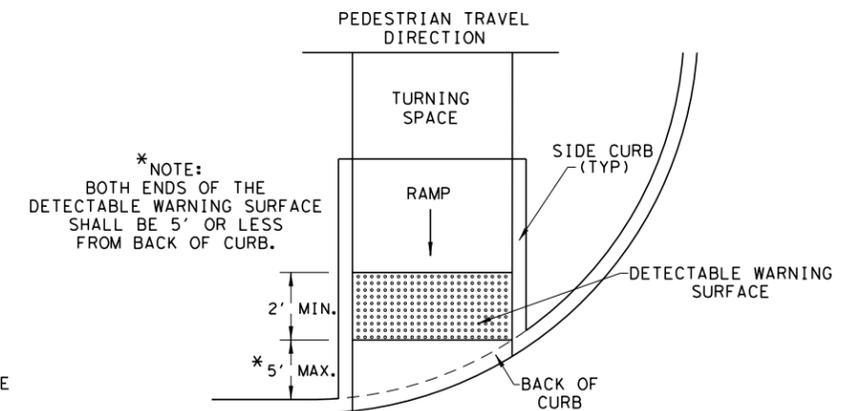
DETECTABLE WARNING SURFACE DETAILS



**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.**

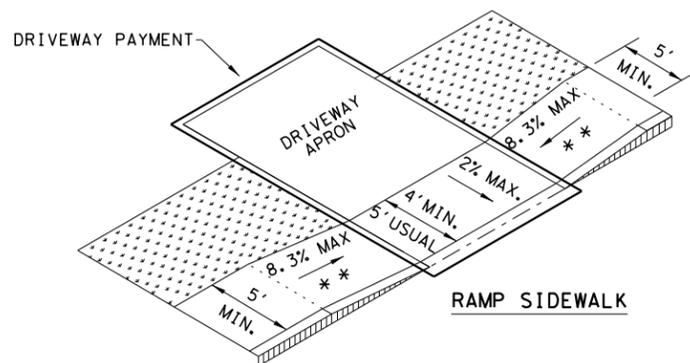
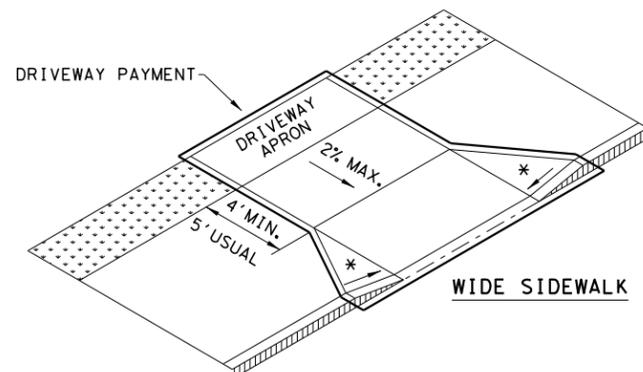
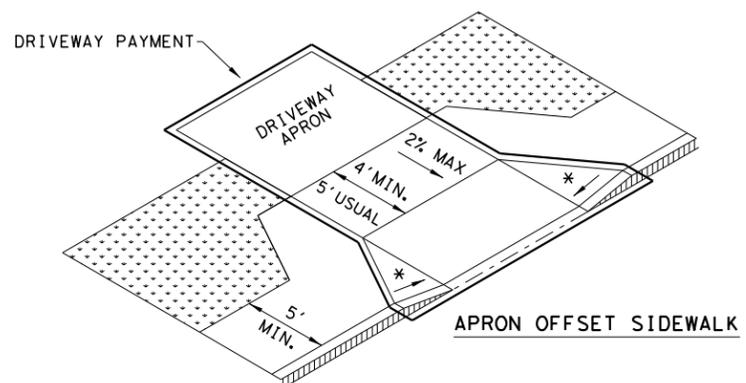
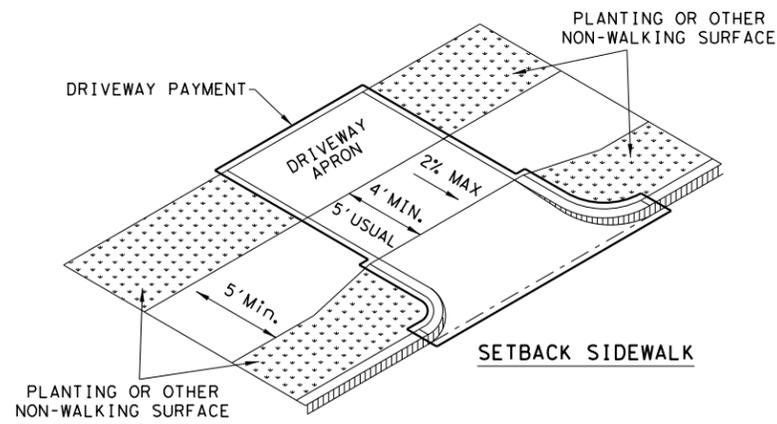
SHEET 2 OF 4

		Design Division Standard	
<h1>PEDESTRIAN FACILITIES</h1> <h2>CURB RAMPS</h2> <h3>PED-18</h3>			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT	SECT	JOB
REVISIONS	REVISIONS REVISED 08, 2009 REVISED 06, 2012 REVISED 01, 2018		HIGHWAY BR SHEET NO.
DIST	COUNTY	SHEET NO.	
HOU	GALVESTON	37	

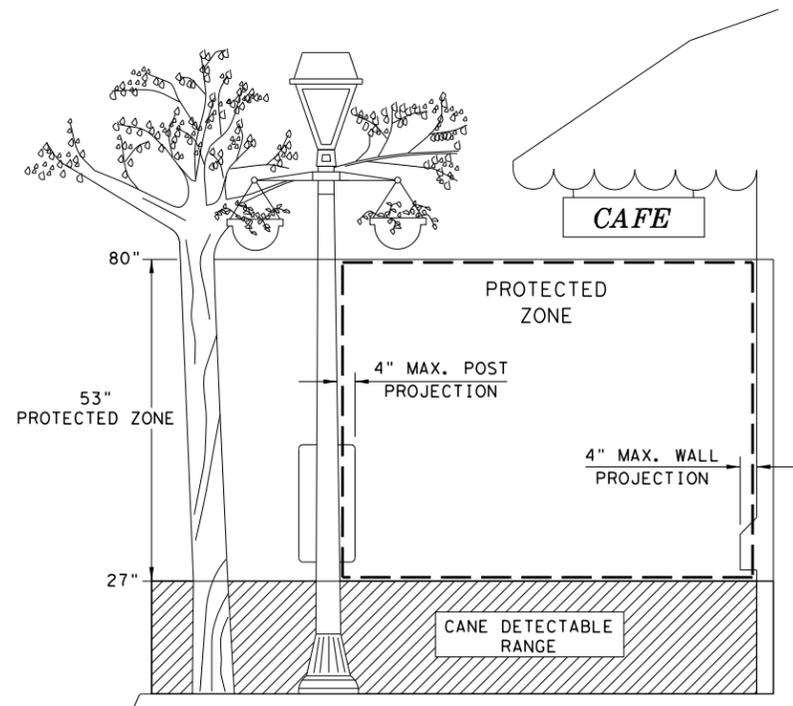
DATE:
FILE:

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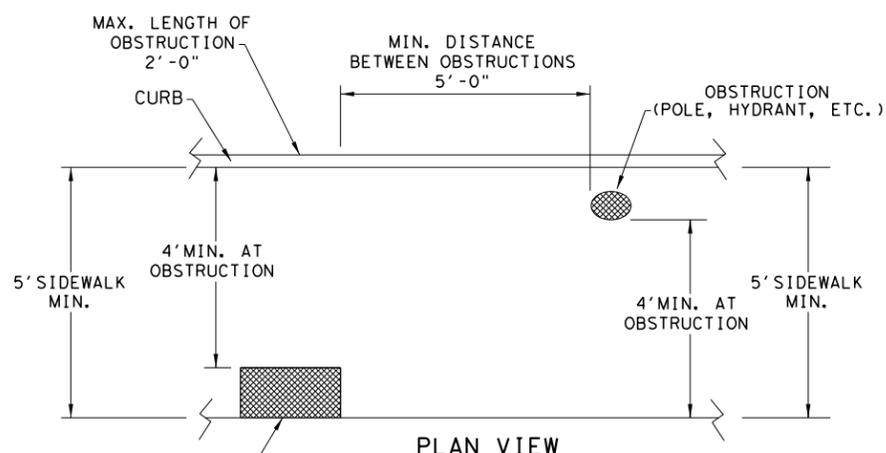
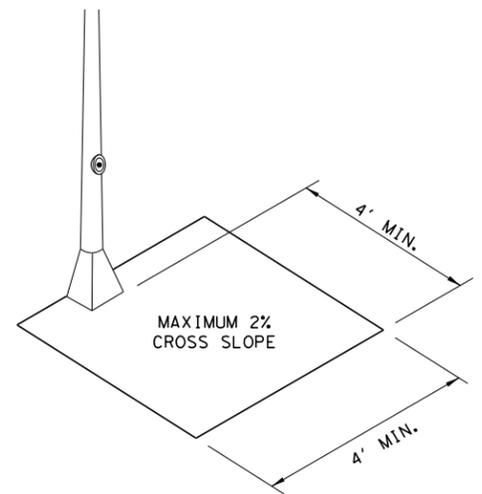
SIDEWALK TREATMENT AT DRIVEWAYS



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

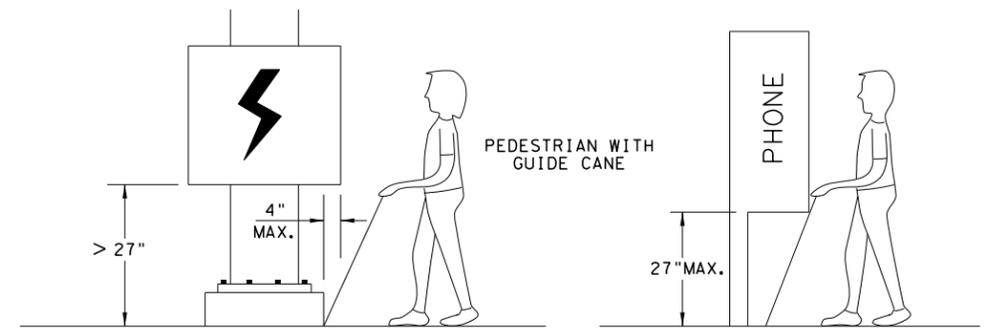


NOTE: IN PEDESTRIAN CIRCULATION AREA, MAXIMUM 4" PROJECTION FOR POST OR WALL MOUNTED OBJECTS BETWEEN 27" AND 80" ABOVE THE SURFACE.



PLAN VIEW
PLACEMENT OF STREET FIXTURES

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



WHEN AN OBSTRUCTION OF A HEIGHT GREATER THAN 27" FROM THE SURFACE WOULD CREATE A PROTRUSION OF MORE THAN 4" INTO THE PEDESTRIAN CIRCULATION AREA, CONSTRUCT ADDITIONAL CURB OR FOUNDATION AT THE BOTTOM TO PROVIDE A MAXIMUM 4" OVERHANG.
 PROTRUDING OBJECTS OF A HEIGHT ≤ 27" ARE DETECTABLE BY CANE AND DO NOT REQUIRE ADDITIONAL TREATMENT.

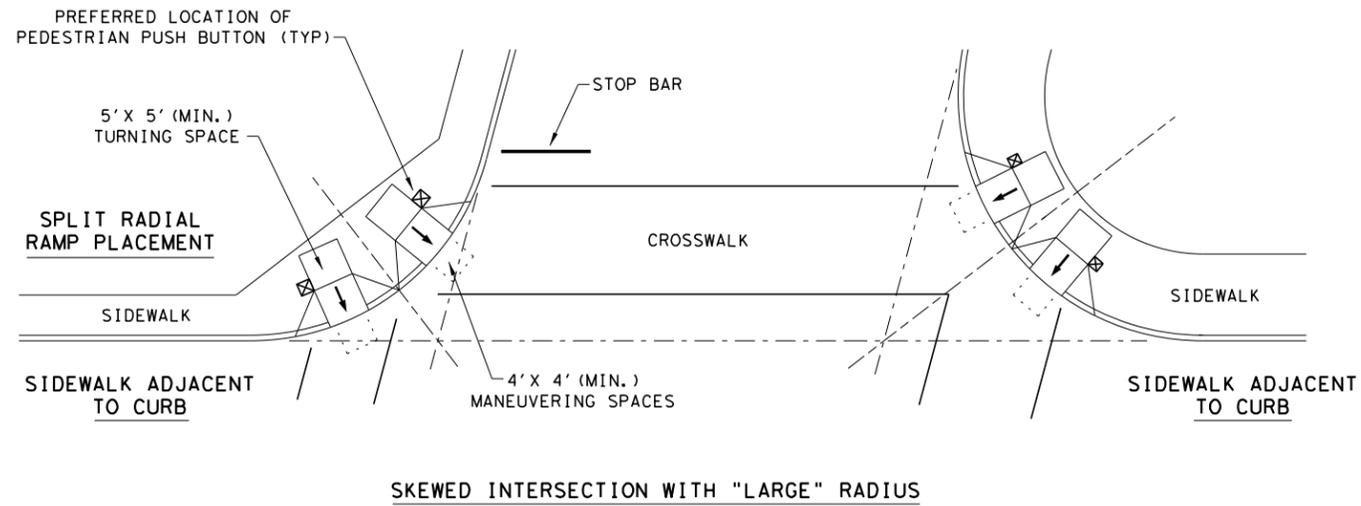
DETECTION BARRIER FOR VERTICAL CLEARANCE < 80"

		Design Division Standard	
PEDESTRIAN FACILITIES CURB RAMPS PED-18			
FILE: ped18	DN: TxDOT	DW: VP	CK: KM
© TxDOT: MARCH, 2002	CONT	SECT	JOB
REVISIONS REVISED 08, 2005 REVISED 06, 2012 REVISED 01, 2018		HIGHWAY BR SHEET NO. 38	
DIST	COUNTY	SHEET NO.	
HOU	GALVESTON	38	

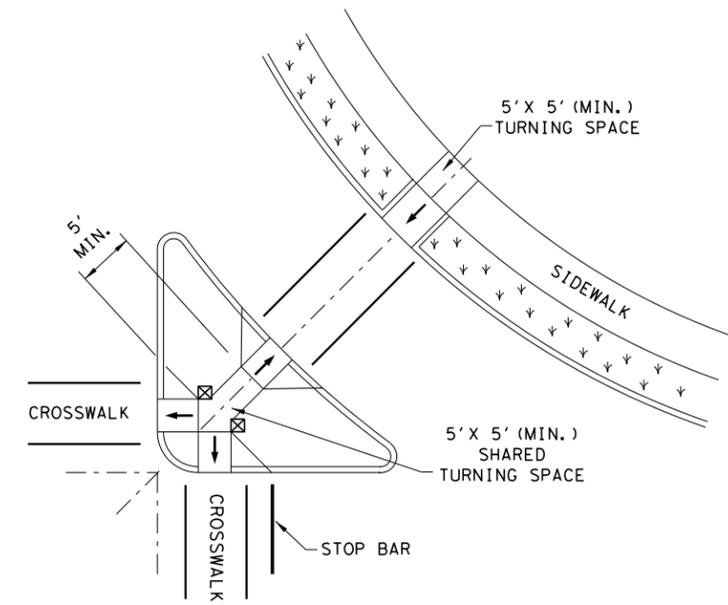
DATE:
 FILE:

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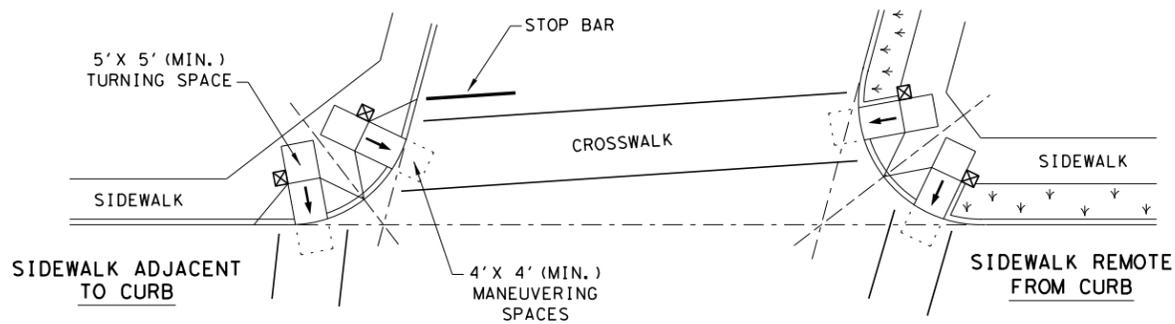
TYPICAL CROSSING LAYOUTS
SEE SHEET 1 OF 4 FOR DETAILS AND DIMENSIONS



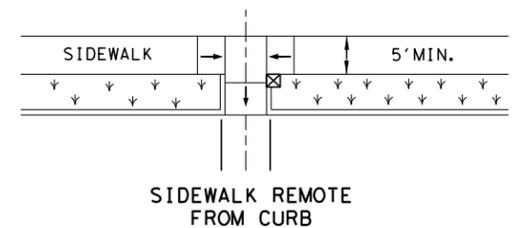
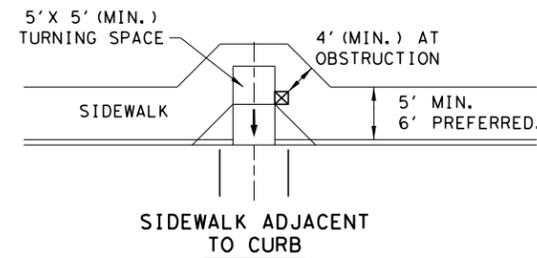
SKewed INTERSECTION WITH "LARGE" RADIUS



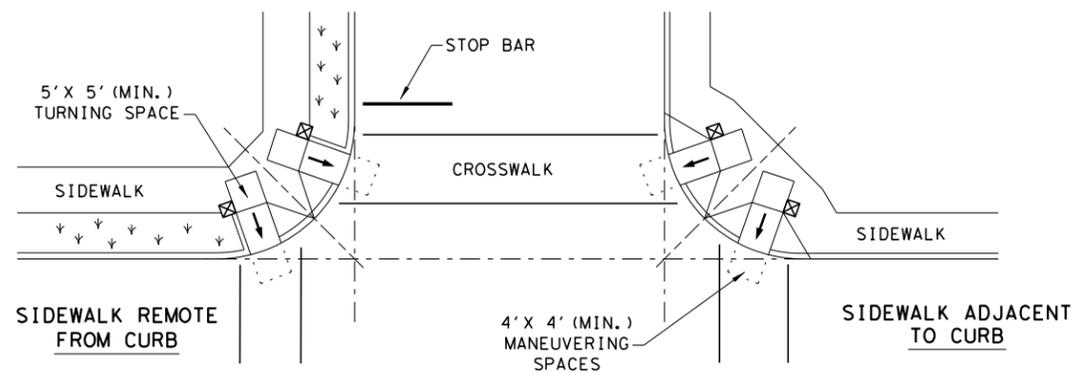
AT INTERSECTION W/FREE RIGHT TURN & ISLAND



SKewed INTERSECTION WITH "SMALL" RADIUS



MID-BLOCK PLACEMENT PERPENDICULAR RAMPS



NORMAL INTERSECTION WITH "SMALL" RADIUS

LEGEND:

SHOWS DOWNWARD SLOPE. →

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

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

SHEET 4 OF 4



PEDESTRIAN FACILITIES
CURB RAMPS
PED-18

FILE: ped18	DN: TxDOT	DW: VP	CK: KM	CK: PK & JG
© TxDOT: MARCH, 2002	CONT	SECT	JOB	HIGHWAY
REVISIONS				
REVISED 08, 2005				BR
REVISED 06, 2012				
REVISED 01, 2018				
DIST	COUNTY		SHEET NO.	
HOU	GALVESTON		39	

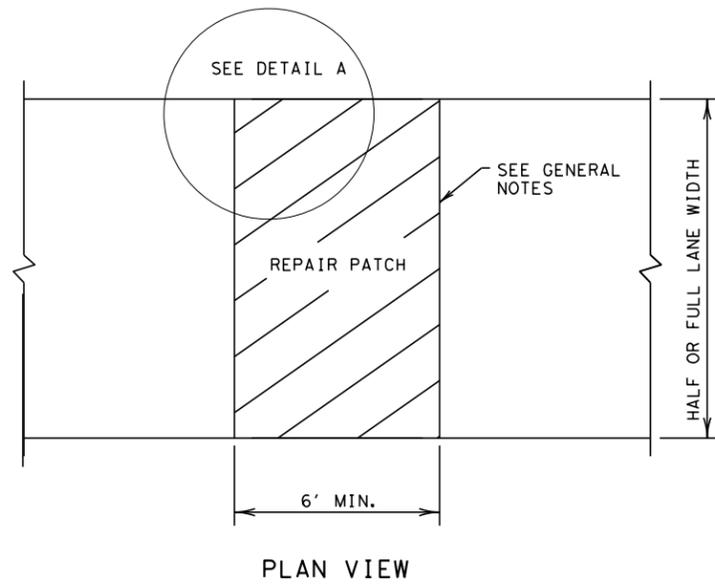
DATE:
FILE:

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DATE: FILE:

TABLE NO.1 STEEL BAR SIZE AND SPACING						
TYPE PAVEMENT	SLAB THICKNESS AND BAR SIZE		LONGITUDINAL*		TRANSVERSE*	
			REGULAR BARS	TIEBARS	BARS	TIEBARS
	T (IN.)	BAR SIZE	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)	SPACING (IN.)
CRCP	6.0	#5	7.5	7.5	24	24
	6.5		7.0	7.0		
	7.0		6.5	6.5		
	7.5		6.0	6.0		
	8.0	#6	9.0	9.0	24	24
	8.5		8.5	8.5		
	9.0		8.0	8.0		
	9.5		7.5	7.5		
	10.0		7.0	7.0		
	10.5		6.75	6.75		
11.0	6.5	6.5				
11.5	6.25	6.25				
≥12.0	6.0	6.0				
JRCP	<8.0	#5	24.0	12.0	24	24
	≥8.0	#6	24.0	12.0	24	24
CPCD	<8.0	#5	NONE	12.0	NONE	24
	≥8.0	#6	NONE	12.0	NONE	24

* USE 12" SPACING AS FIRST AND LAST SPACING AT END OR SIDE FOR ALL BARS.

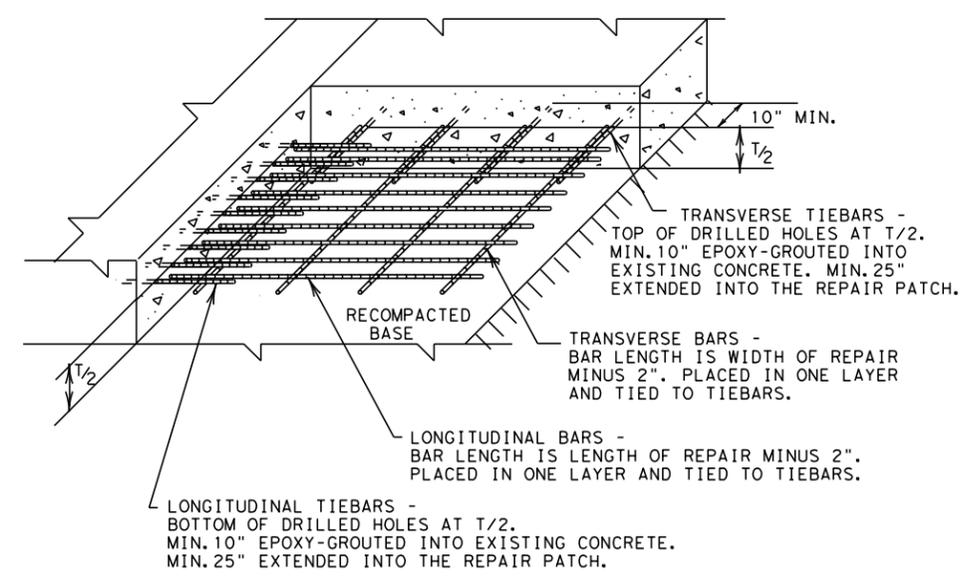


PLAN VIEW

FULL-DEPTH REPAIR OF CRCP, JRCP, AND CPCD

GENERAL NOTES

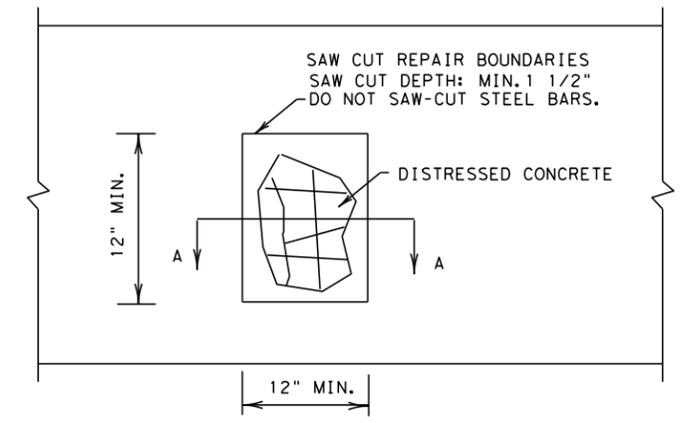
- ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
- MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
- FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
- AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
- ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
- THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
- EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



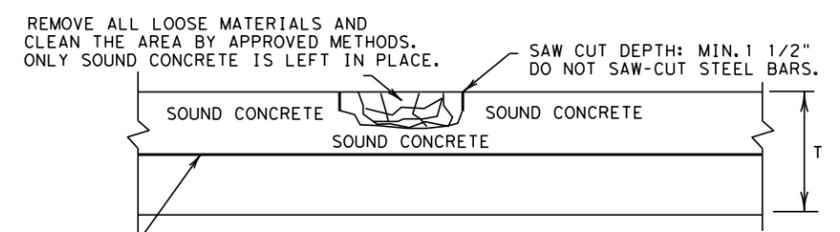
DETAIL A
GROUTED TIEBARS & REINFORCEMENT

GENERAL NOTES

- ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
- THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
- EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."



PLAN VIEW



LONGITUDINAL STEEL BARS:
 *REPAIR AREAS MAY BE ADJUSTED AFTER REMOVING DISTRESSED CONCRETE. SWITCH THE HALF-DEPTH REPAIR TO FULL-DEPTH REPAIR IF EXPOSED EXISTING LONGITUDINAL BARS ARE DEFICIENT, AS APPROVED. COMPENSATION WILL BE MADE FOR UNEXPECTED VOLUMES OF REPAIR AREAS OR CHANGES IN SCOPE OF WORK.
 *INCREASE THE REPAIR AREA AND PERFORM A FULL-DEPTH REPAIR AS DIRECTED IF LONGITUDINAL STEEL BARS WERE DAMAGED BY THE REMOVAL OPERATIONS. NO ADDITIONAL COMPENSATION WILL BE MADE.

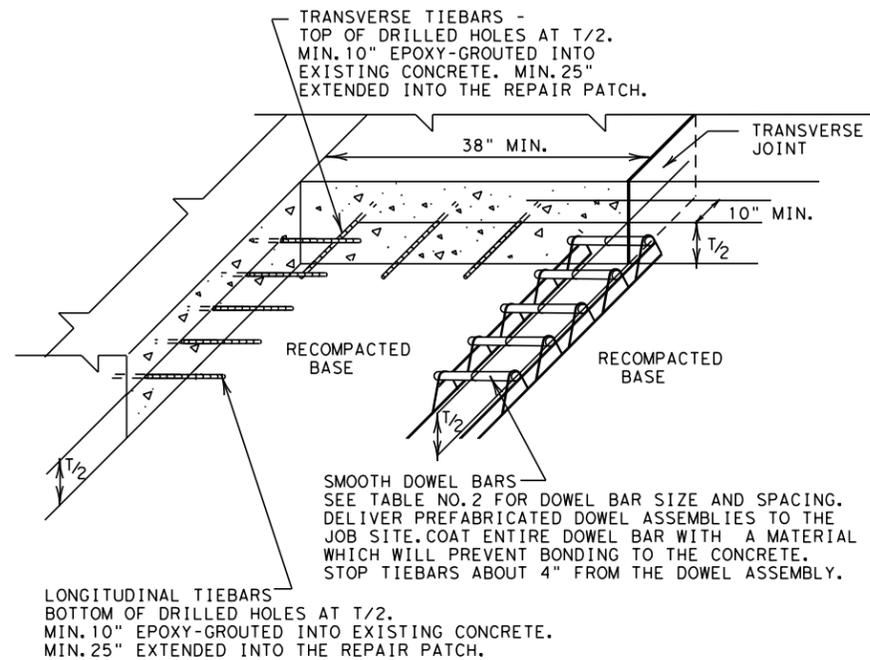
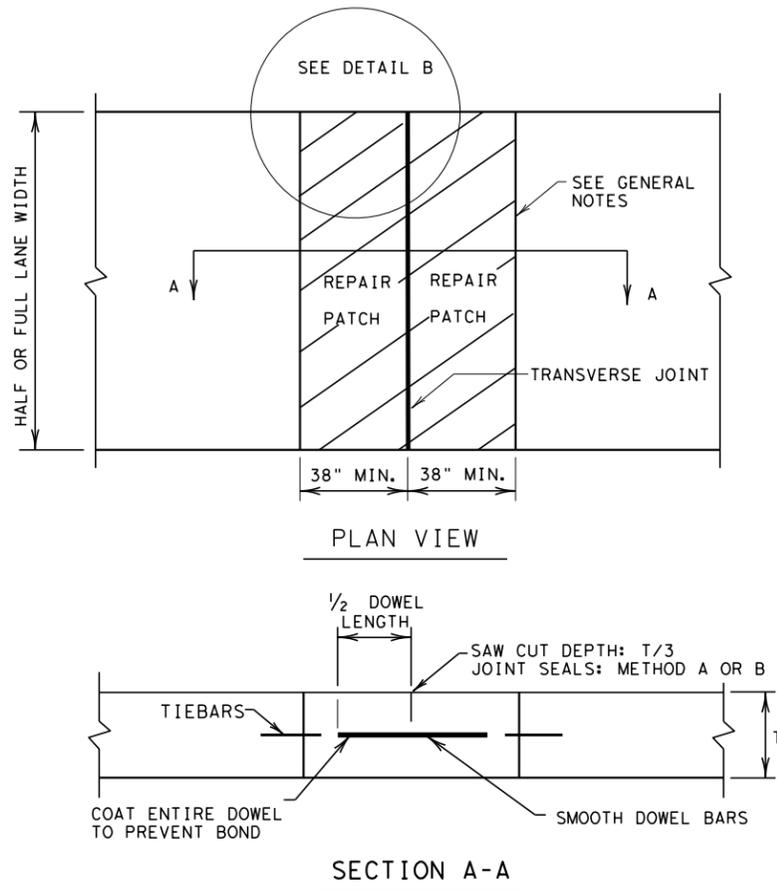
SECTION A-A
HALF-DEPTH REPAIR

SHEET 1 OF 2

				Design Division Standard	
<h2>REPAIR OF CONCRETE PAVEMENT</h2> <h3>REPCP-14</h3>					
FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN	
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY	
REVISIONS					
	DIST	COUNTY	SHEET NO.		
	HOU	GALVESTON			40

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DATE:
FILE:



DETAIL B
GROUTED TIEBARS & DOWELS

GENERAL NOTES

1. ITEM 361, "REPAIR OF CONCRETE PAVEMENT" SHALL GOVERN FOR THIS WORK.
2. MULTIPLE PIECE TIEBARS SHALL BE USED WHEN THE REPAIR AREA MUST BE PLACED IN TWO STAGES DUE TO SEQUENCE OF CONSTRUCTION.
3. FULL DEPTH SAW CUTS SHALL BE MADE AROUND THE PERIMETER OF THE AREA TO BE REPAIRED. THE CUT SHALL BE MADE AT A RIGHT ANGLE TO THE PAVEMENT EDGE AND TO THE CENTER LINE OF THE PAVEMENT.
4. AT LEAST ONE LONGITUDINAL FULL DEPTH SAW CUT SHALL BE AT AN EXISTING LONGITUDINAL JOINT.
5. ADDITIONAL SAW CUTS MAY BE REQUIRED WITHIN THE AREA OF THE REPAIR TO FACILITATE REMOVAL OF THE CONCRETE OR TO ALLEVIATE BINDING OF THE FULL DEPTH SAW CUT AT THE REPAIR EDGE.
6. THE SAW CUTS WHICH EXTEND OUTSIDE THE AREA OF THE REPAIR WILL BE CLEANED AND FILLED WITH A CEMENTITIOUS GROUT APPROVED BY THE ENGINEER.
7. EXISTING LONGITUDINAL AND TRANSVERSE JOINTS REMOVED DUE TO REPAIR OPERATION SHOULD BE RESTORED IN ACCORDANCE WITH STANDARD SHEET "CONCRETE PAVING DETAILS, JOINT SEALS."
8. DOWEL BAR PLACEMENT TOLERANCE SHALL BE +/- 1/4 IN. HORIZONTALLY AND VERTICALLY UNLESS OTHERWISE SPECIFIED. WHERE DOWEL BAR BASKETS ARE USED, REMOVE THE SHIPPING WIRES.

TABLE NO. 2 DOWELS (SMOOTH BARS)			
PAVEMENT THICKNESS (INCHES)	SIZE AND DIA.	LENGTH (IN.)	SPACING (IN.)
<10	#8 (1 IN.)	18.0	12.0
≥10	#10 (1 1/4 IN.)		

REPAIR OF TRANSVERSE JOINT OF CPCD

SHEET 2 OF 2



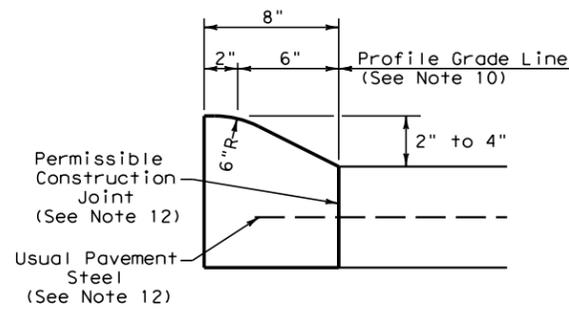
REPAIR OF CONCRETE PAVEMENT

REPCP-14

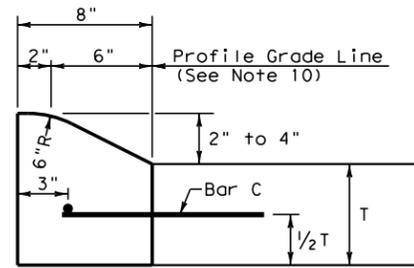
FILE: repcp14.dgn	DN: TxDOT	DN: HC	DW: HC	CK: AN
© TxDOT: DECEMBER 2014	CONT	SECT	JOB	HIGHWAY
REVISIONS				BR
DIST	COUNTY		SHEET NO.	
HOU	GALVESTON		41	

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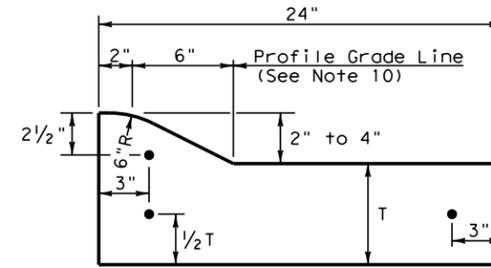
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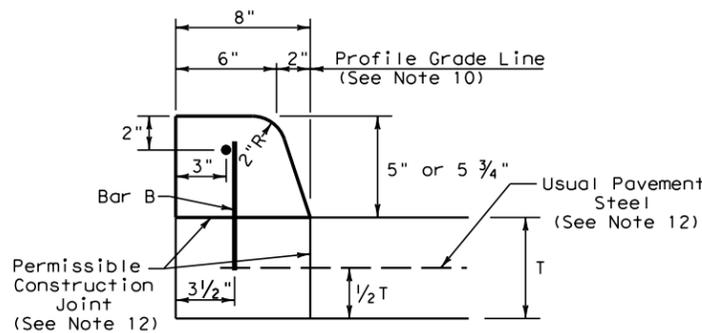
TYPE I CURB (MONOLITHIC)
2" - 4" HEIGHT



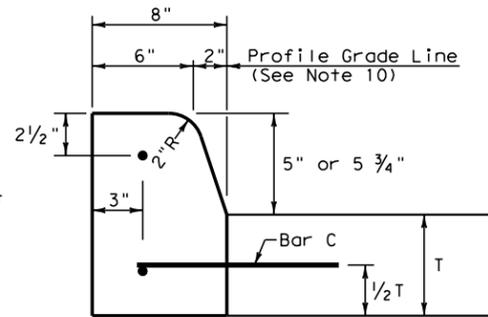
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



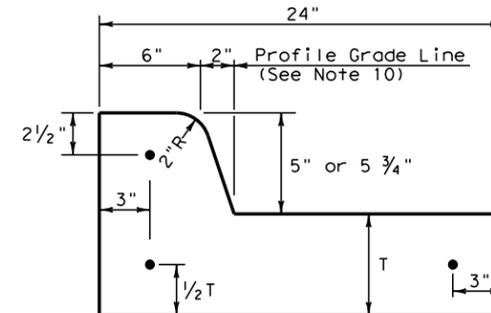
TYPE I CURB AND GUTTER
2" - 4" HEIGHT



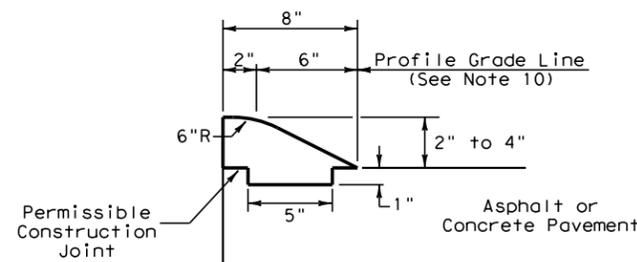
TYPE II CURB (MONOLITHIC)
5" - 5 3/4" HEIGHT



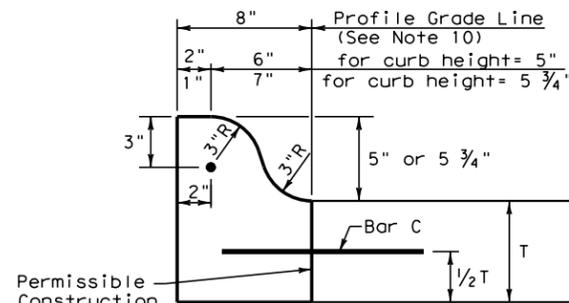
TYPE II CURB AND GUTTER
5" - 5 3/4" HEIGHT



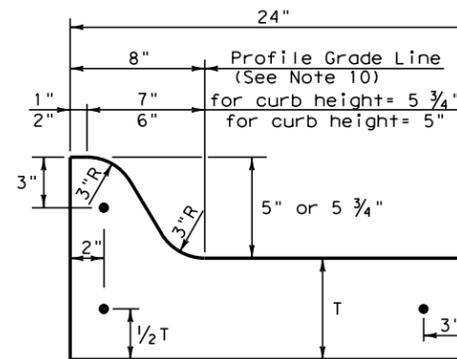
TYPE II CURB AND GUTTER
5" - 5 3/4" HEIGHT



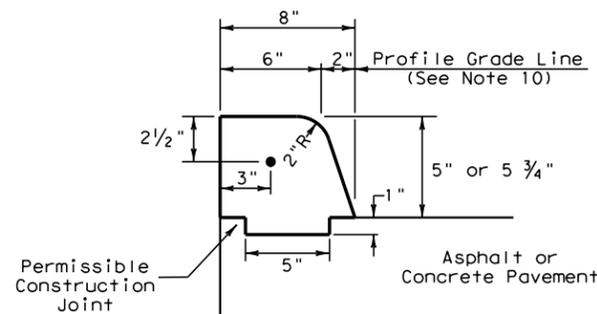
TYPE III CURB (KEYED)
2" - 4" HEIGHT



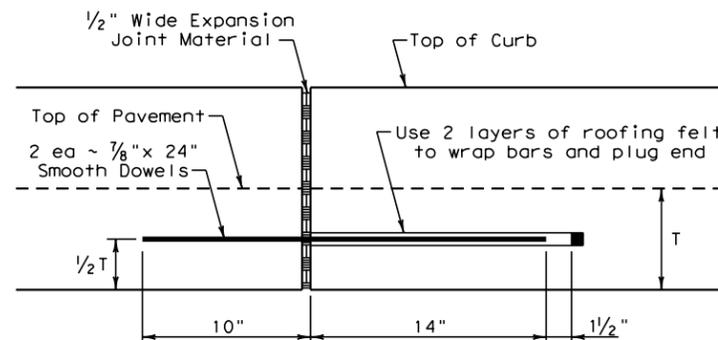
TYPE IIa CURB
5" - 5 3/4" HEIGHT



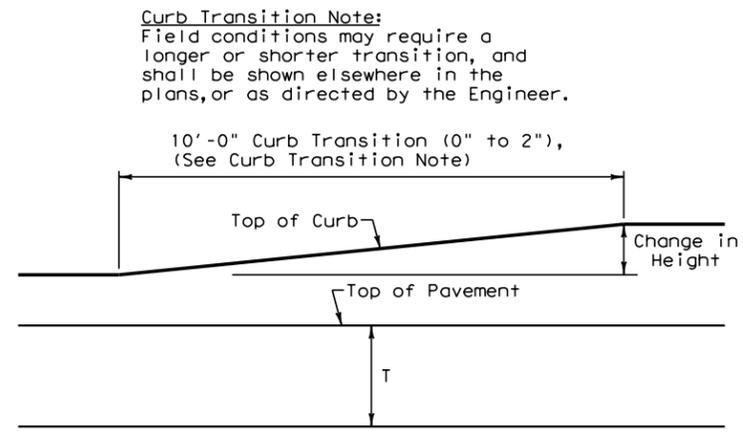
TYPE IIa CURB AND GUTTER
5" - 5 3/4" HEIGHT



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



EXPANSION JOINT DETAIL

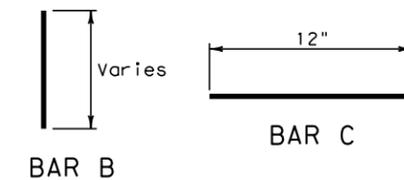


CURB TRANSITION

Note: To be paid for as Highest Curb

General Notes

- All materials and construction shall be in accordance with Item 529, "Concrete Curb, Gutter, and Combined Curb and Gutter."
- Concrete shall be Class A.
- When reinforcing bars are used, they shall be No.4 unless otherwise shown. The use of synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Producer List (MPL), maintained by TxDOT, Construction Division.
- 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 placed on existing concrete pavement, the pavement shall be drilled and the reinforcing bars grouted in place.
- Expansion and contraction joints shall be constructed to match pavement joints in all curbs and curb and gutter adjacent to jointed concrete pavement. Where placement of curb or curb and gutter is not adjacent to concrete pavement, expansion joints shall be provided at structures, curb returns at streets, and at locations directed by The Engineer.
- Vertical and horizontal dowel bars and transverse reinforcing bars shall be placed at 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 vertical permissible construction joints are used, resulting in a longitudinal construction joint in the pavement, the longitudinal pavement steel shall be placed in accordance with pavement details shown elsewhere in the plans for longitudinal construction joints. Reinforcing steel for curb section shall then conform to that required for concrete curb.

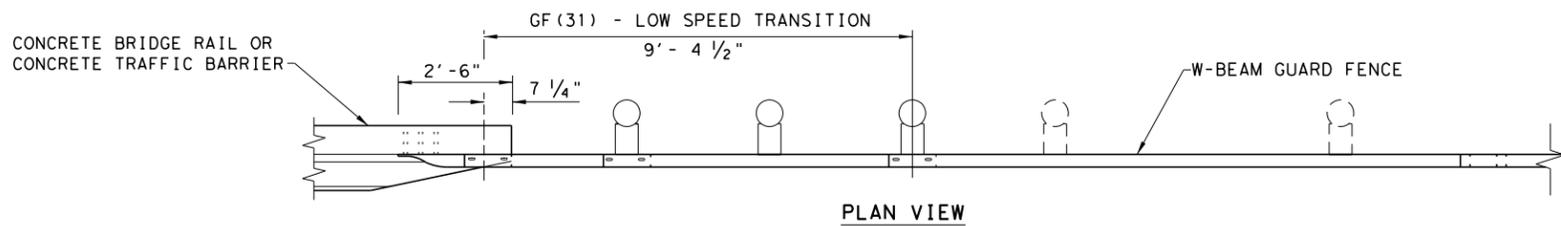


Curb Transition Note:
Field conditions may require a longer or shorter transition, and shall be shown elsewhere in the plans, or as directed by the Engineer.

		Design Division Standard	
<h2>CONCRETE CURB AND GUTTER</h2> <h3>CCCG-12</h3>			
FILE: ccg12.dgn	DN: TxDOT	CK: AM	DW: VP
© TxDOT: 1995	CONT	SECT	JOB
UPDATED 2012 - VP	REVISIONS		BR
DIST	COUNTY	SHEET NO.	
HOU	GALVESTON	42	

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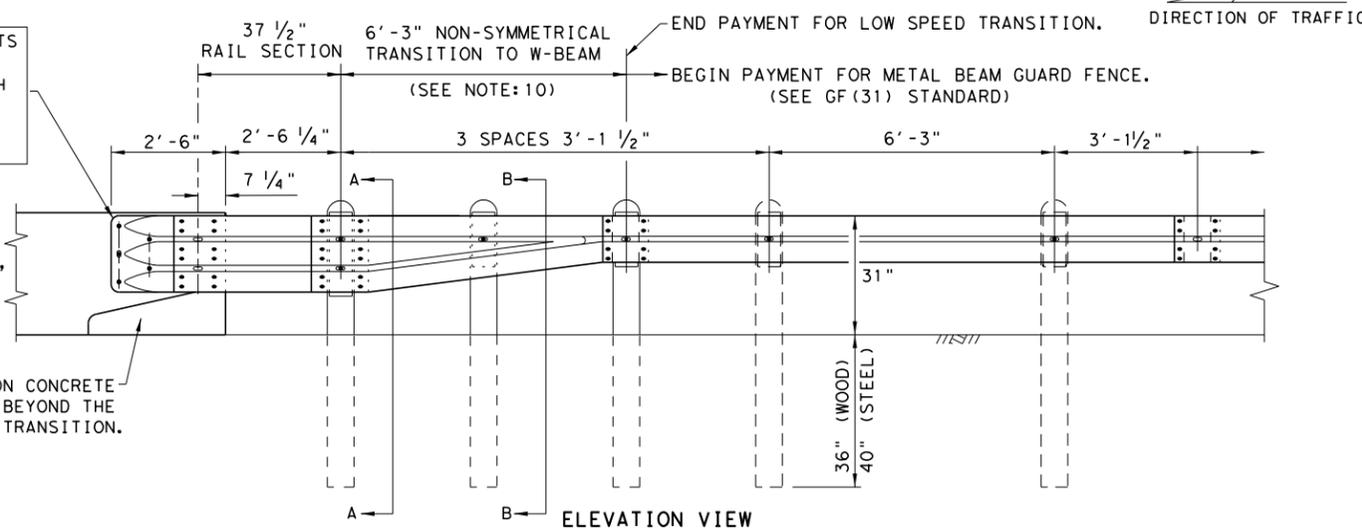
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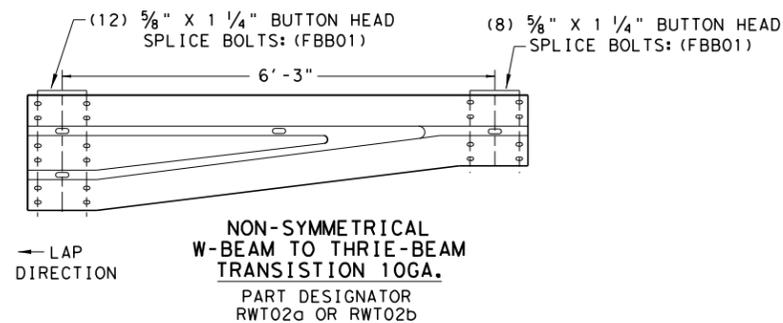
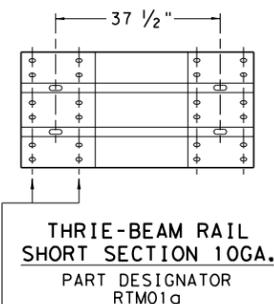
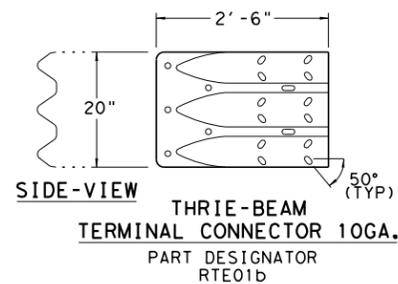
- (5) 7/8" DIA. HEAVY HEX HEAD BOLTS (ASTM A325 OR A449)
- (10) 1 3/4" O.D. WASHER UNDER EACH HEX BOLT HEAD AND NUT.
- (5) 7/8" DIA. HEAVY HEX NUTS (ASTM A194 OR A563)

NOTE: HEAVY HEX BOLT LENGTH WILL VARY DEPENDING ON WIDTH CONCRETE RAIL, LEAVE 1" OF BOLT LENGTH PAST THE 7/8" HEX NUT. TRIM AS REQUIRED.

NOTE: CHAMFER REQUIRED ON CONCRETE RAILS THAT EXTEND BEYOND THE FACE OF GUARDRAIL TRANSITION.



- GENERAL NOTES**
- THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF TRANSITIONS SHALL BE AS SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. REFER TO GF(31) STANDARD SHEET.
 - RAIL ELEMENT SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS.
 - FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM REQUIRING CONSTRUCTION OF THE TRANSITION.
 - BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC160) AND NOT MORE THAN 1" BEYOND IT. TRIM BOLT LENGTH TO MEET REQUIRED LENGTH.
 - POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
 - CROWN SHALL BE WIDENED TO ACCOMMODATE TRANSITIONS.
 - WHERE SOLID ROCK IS ENCOUNTERED, CONTACT THE DESIGN DIVISION FOR ADDITIONAL GUIDANCE. (512) 416-2678
 - UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TxDOT, MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210. ONLY PRODUCERS ON THE MPL CAN FURNISH COMPOSITE MATERIAL BLOCKS.
 - REFER TO GF(31) STANDARD SHEET & BRIDGE RAILING DETAILS FOR ADDITIONAL DETAILS.
 - FOR ROUND WOOD POSTS SYSTEMS, ALL ROUND WOOD POSTS SHALL BE 7 1/2" DIA. MINIMUM THROUGHOUT THE TRANSITION.

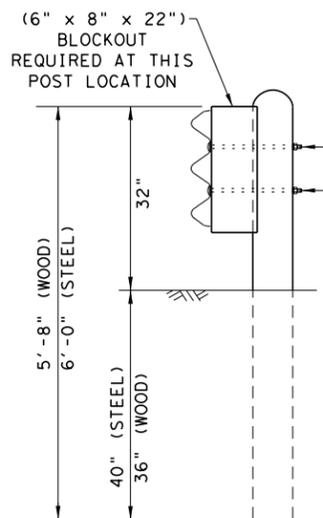


- (2) 5/8" BUTTON HEAD POST BOLTS & NUTS: (FBB04)
- (1) 5/8" FLAT WASHER: (FWC140) UNDER EACH NUT

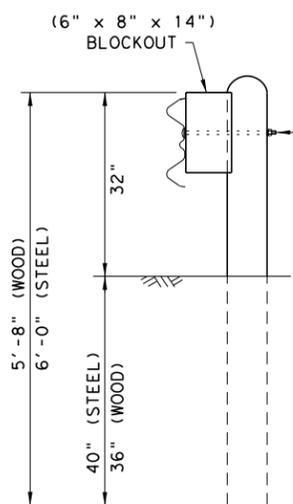
- (1) 5/8" BUTTON HEAD POST BOLT & NUT: (FBB04)
- (1) 5/8" FLAT WASHER: (FWC140) UNDER EACH NUT

PLATE WASHER INSTRUCTIONS

BRIDGE APPROACH - UPSTREAM: THE SHORT RAIL LAPS OVER THE TERMINAL CONNECTOR. PLATE WASHERS ARE INSTALLED UNDER THE SPLICE NUTS AGAINST INSIDE OF CONNECTOR.
BRIDGE EXIT - DOWNSTREAM: THE TERMINAL CONNECTOR LAPS OVER THE NESTED RAIL. PLATE WASHERS ARE INSTALLED UNDER THE BOLT HEAD AGAINST OUTSIDE OF CONNECTOR.

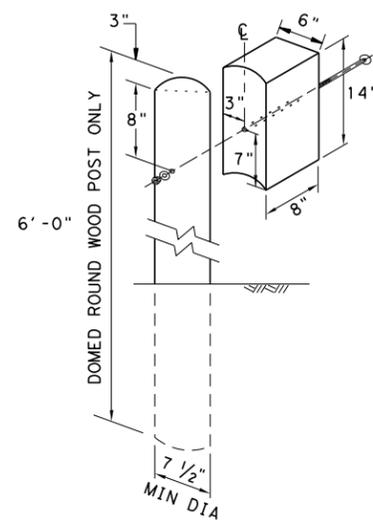


SECTION A-A



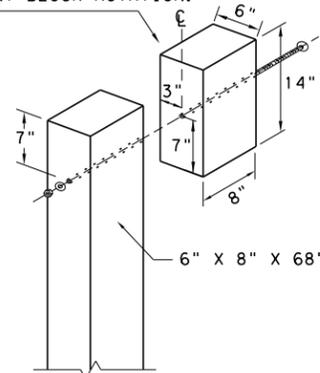
SECTION B-B

NOTE: * "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.

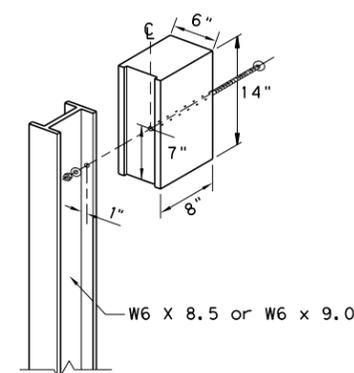


WOOD BLOCK TO ROUND WOOD POST

NOTE: TOENAIL WITH ONE 16D GALV. NAIL TO PREVENT BLOCK ROTATION.



WOOD BLOCK TO RECTANGULAR WOOD POST

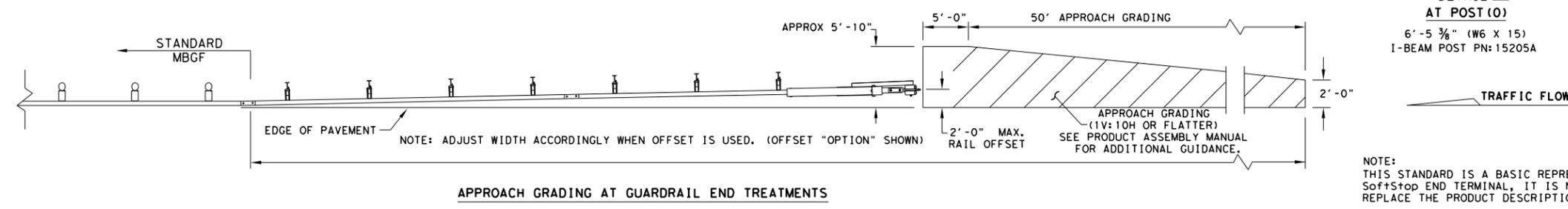
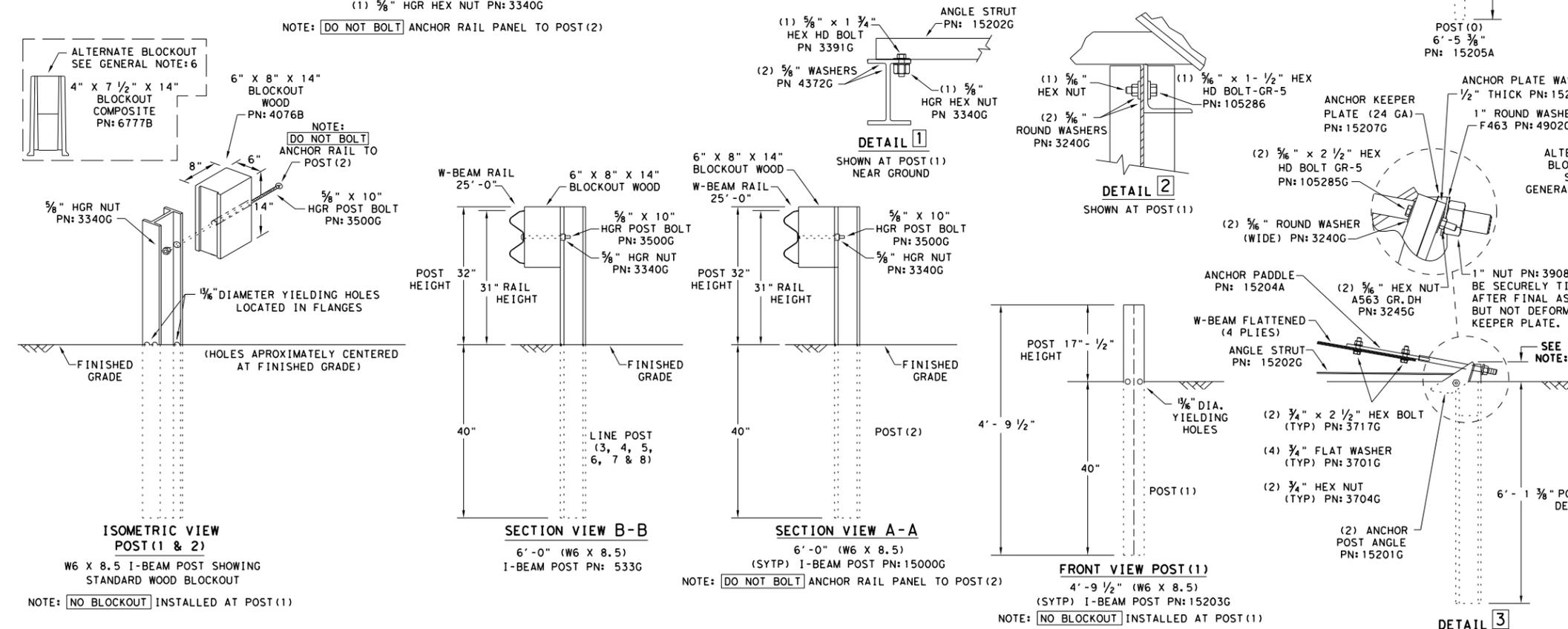
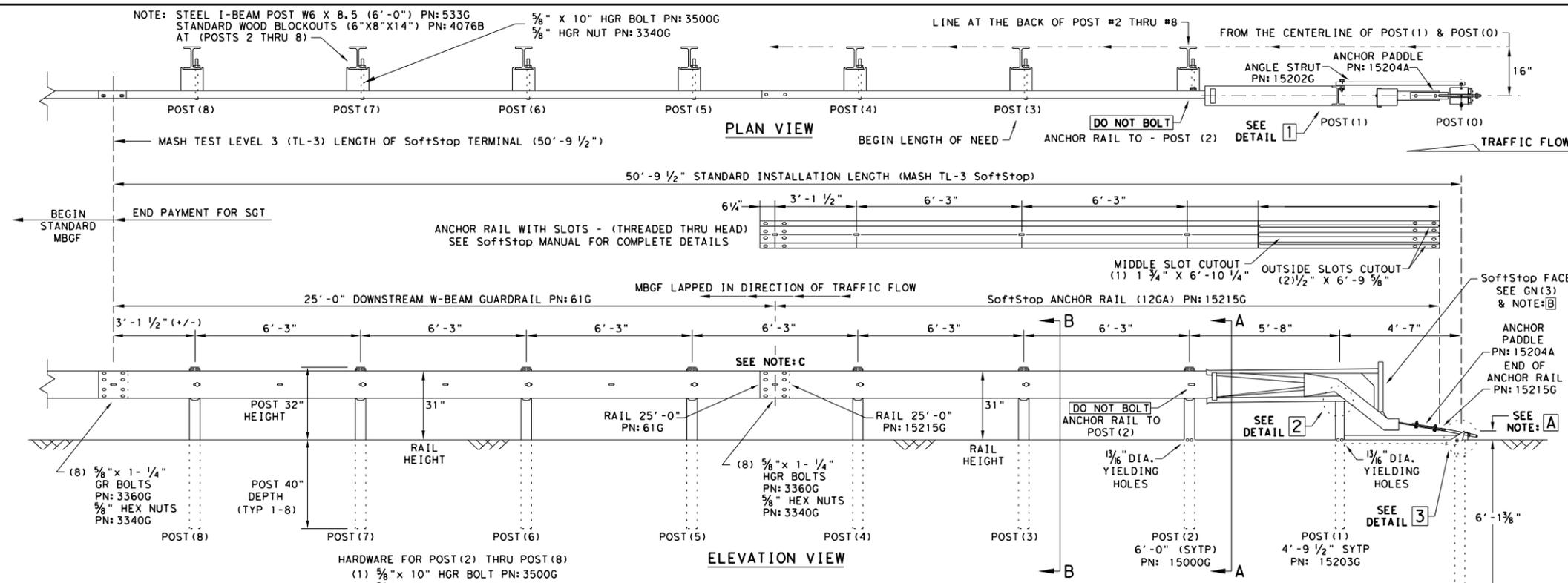


ROUTED WOOD BLOCK TO I-BEAM STEEL POST

LOW-SPEED TRANSITION

				<i>Design Division Standard</i>
METAL BEAM GUARD FENCE THRIE-BEAM TRANSITION TL-2 MASH COMPLIANT				
GF(31) TR TL2-19				
FILE: gf31tr+1219.dgn	DN: TxDOT	CK: KM	DW: VP	CK: CGL/AG
© TxDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS				BR
	DIST	COUNTY	SHEET NO.	
	HOU	GALVESTON	43	

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



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

NOTE: A THE INSTALLATION HEIGHT OF FULLY ASSEMBLED ANCHOR POST WILL VARY FROM 3-3/4" MIN. TO 4" MAX. ABOVE FINISHED GRADE.

NOTE: B PART PN:5852B RIGHT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING) PART PN:5851B LEFT-SIDE (HIGH INTENSITY REFLECTIVE SHEETING)

NOTE: C W-BEAM SPLICE LOCATED BETWEEN LINE POST(4) AND LINE POST(5) GUARDRAIL PANEL 25'-0" PN:61G ANCHOR RAIL 25'-0" PN:15215G LAP GUARDRAIL IN DIRECTION OF TRAFFIC FLOW.

PART	QTY	MAIN SYSTEM COMPONENTS
620237B	1	PRODUCT DESCRIPTION ASSEMBLY MANUAL (LATEST REV.)
15208A	1	SoftStop HEAD (SEE MANUAL FOR RIGHT-LEFT APPROACH)
15215G	1	SoftStop ANCHOR RAIL (12GA) WITH CUTOUT SLOTS
61G	1	SoftStop DOWNSTREAM W-BEAM RAIL (12GA) (25'-0")
15205A	1	POST #0 - ANCHOR POST (6'-5 3/8")
15203G	1	POST #1 - (SYTP) (4'-9 1/2")
15000G	1	POST #2 - (SYTP) (6'-0")
533G	6	POST #3 THRU #8 - I-BEAM (W6 X 8.5) (6'-0")
4076B	7	BLOCKOUT - WOOD (ROUTED) (6" X 8" X 14")
6777B	7	BLOCKOUT - COMPOSITE (4" X 7 1/2" X 14")
15204A	1	ANCHOR PADDLE
15207G	1	ANCHOR KEEPER PLATE (24 GA)
15206G	1	ANCHOR PLATE WASHER (1/2" THICK)
15201G	2	ANCHOR POST ANGLE (10" LONG)
15202G	1	ANGLE STRUT

HARDWARE		
4902G	1	1" ROUND WASHER F436
3908G	1	1" HEAVY HEX NUT A563 GR.DH
3717G	2	3/4" X 2 1/2" HEX BOLT A325
3701G	4	3/4" ROUND WASHER F436
3704G	2	3/4" HEAVY HEX NUT A563 GR.DH
3360G	16	5/8" X 1 1/4" W-BEAM RAIL SPLICE BOLTS HGR
3340G	25	5/8" W-BEAM RAIL SPLICE NUTS HGR
3500G	7	5/8" X 10" HGR POST BOLT A307
3391G	1	5/8" X 1 3/4" HEX HD BOLT A325
4489G	1	5/8" X 9" HEX HD BOLT A325
4372G	4	5/8" WASHER F436
105285G	2	5/8" X 2 1/2" HEX HD BOLT GR-5
105286G	1	5/8" X 1 1/2" HEX HD BOLT GR-5
3240G	6	5/8" ROUND WASHER (WIDE)
3245G	3	5/8" HEX NUT A563 GR.DH
5852B	1	HIGH INTENSITY REFLECTIVE SHEETING - SEE NOTE: B

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

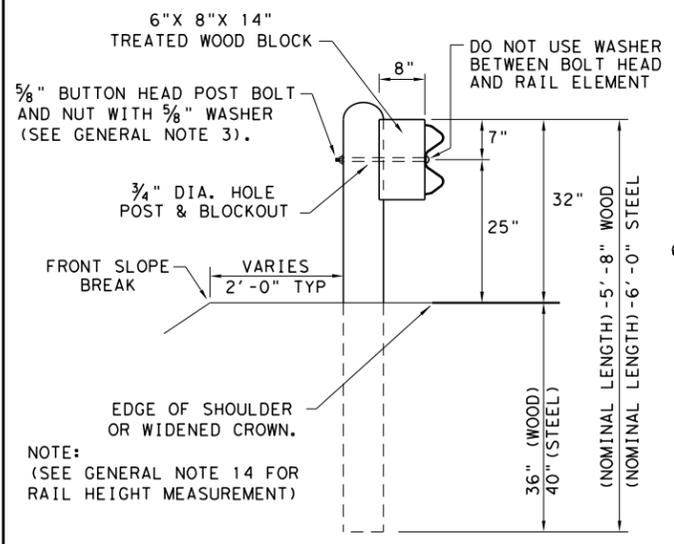
FILE: sgt10s3116 DNE: TxDOT CK: KM DW: VP CK: MB/VP
 © TxDOT: JULY 2016 CONT: SECT: JOB: HIGHWAY: BR:
 REVISIONS
 DIST: COUNTY: SHEET NO.:
 HOU GALVESTON 44

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

DATE: FILE:

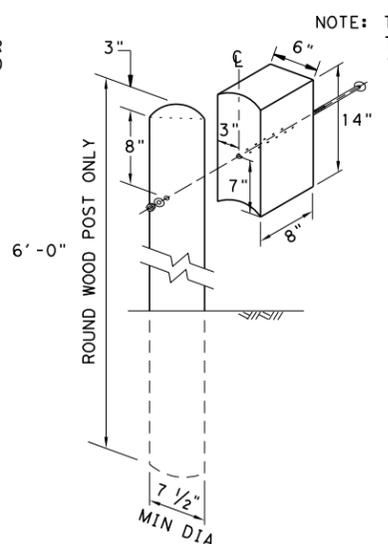
DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: FILE:

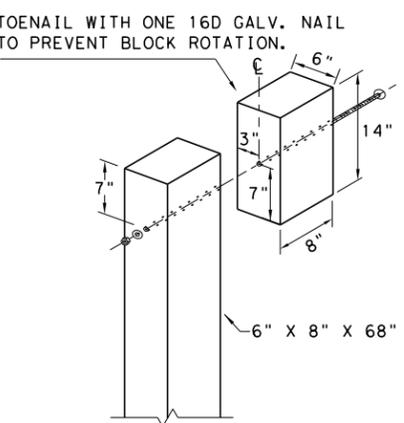


TYPICAL POST PLACEMENT

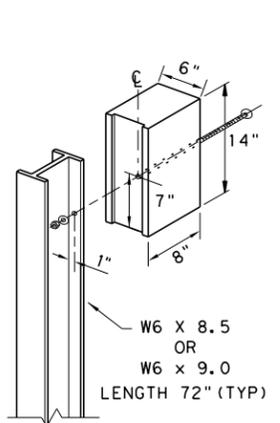
NOTE: (SEE GENERAL NOTE 14 FOR RAIL HEIGHT MEASUREMENT)



WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST

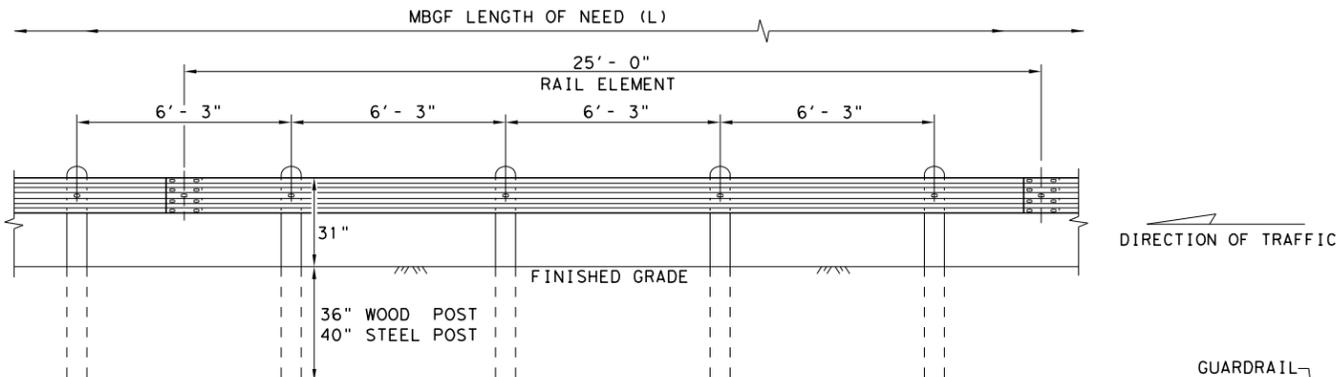


ROUTED WOOD BLOCK TO I-BEAM STEEL POST

GENERAL NOTES

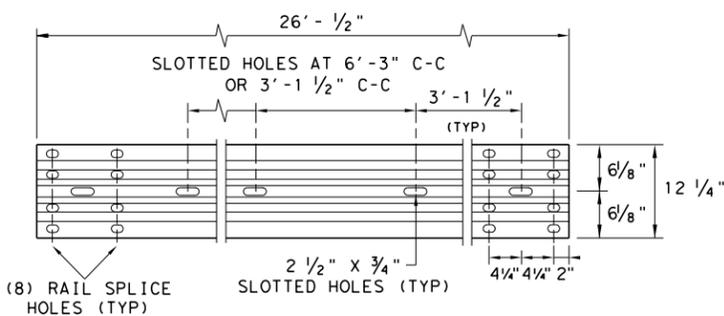
1. THE TYPE OF POST (ROUND WOOD POST, RECTANGULAR WOOD POST, OR STEEL POST) WILL BE AS SHOWN IN THE PLANS. THE EXACT POSITION OF MBGF SHALL BE SHOWN IN THE PLANS OR AS DIRECTED BY THE ENGINEER. STEEL POSTS TO BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING."
2. RAIL ELEMENTS SHALL MEET THE REQUIREMENTS OF ITEM 540, "METAL BEAM GUARD FENCE" EXCEPT AS MODIFIED IN THE PLANS. THE CONTRACTOR MAY FURNISH RAIL ELEMENTS OF 25'-0", OR 12'-6" (NOM.) LENGTHS. RAIL ELEMENTS MAY HAVE SLOTTED HOLES AT 3'-1 1/2" C-C OR 6'-3" C-C. A SPECIAL LENGTH OF RAIL MAY BE MANUFACTURED TO ACCOMMODATE THE DOWNSTREAM ANCHOR TERMINAL (DAT) AND THE TRANSITION SECTIONS OF GUARDRAIL.
3. BUTTON HEAD "POST BOLTS & NUTS" SHALL MEET THE REQUIREMENTS OF (ASTM A307), AND SHALL BE OF SUFFICIENT LENGTH TO EXTEND THROUGH THE FULL THICKNESS OF THE NUT AND 5/8" WASHER (FWC160) AND NOT MORE THAN 1" BEYOND IT. TRIM REMAINING BOLT LENGTH TO MEET REQUIRED LENGTH.
4. FITTINGS (BOLTS, NUTS, AND WASHERS) SHALL BE GALVANIZED IN ACCORDANCE WITH ITEM 445, "GALVANIZING." FITTINGS SHALL BE SUBSIDIARY TO THE BID ITEM.
5. CROWN SHALL BE WIDENED TO ACCOMMODATE THE METAL BEAM GUARD FENCE.
6. THE LATERAL APPROACH TO THE GUARD FENCE, SHALL HAVE A MAXIMUM SLOPE OF 1V:10H.
7. IF SHOWN ELSEWHERE IN THE PLANS OR AS DIRECTED BY THE ENGINEER, THE GUARD FENCE MAY BE FLARED AT A RATE OF 25:1 OR FLATTER.
8. UNLESS OTHERWISE SHOWN IN THE PLANS, GUARD FENCE PLACED IN THE VICINITY OF CURBS SHALL BE POSITIONED SO THAT THE FACE OF CURB IS LOCATED DIRECTLY BELOW OR BEHIND THE FACE OF THE RAIL. RAIL PLACED OVER CURBS SHALL BE INSTALLED SO THAT THE POST BOLT IS LOCATED APPROXIMATELY 25 INCHES ABOVE THE GUTTER PAN OR EDGE OF SHOULDER.
9. APPLICATIONS IN SOLID ROCK ARE ONLY ALLOWED WITH STEEL POSTS. IF SOLID ROCK IS ENCOUNTERED WITHIN 0 TO 18" OF THE FINISHED GRADE, DRILL A 24" DIA. HOLE, 24" INTO THE ROCK. IF SOLID ROCK IS ENCOUNTERED BELOW 18", DRILL A 12" DIA. HOLE, 12" INTO THE ROCK OR TO THE STANDARD EMBEDMENT DEPTH, WHICHEVER MAYBE LESS. ANY EXCESS POST LENGTH, AFTER MEETING THESE DEPTHS, MAY BE FIELD CUT TO ENSURE PROPER GUARDRAIL MOUNTING HEIGHT. BACKFILL WITH COARSE AGGREGATE MATERIAL.
10. POSTS SHALL NOT BE SET IN CONCRETE, OF ANY DEPTH.
11. SPECIAL FABRICATION WILL BE REQUIRED AT INSTALLATION LOCATIONS HAVING A CURVATURE OF LESS THAN 150 FT. RADIUS.
12. UNLESS OTHERWISE SHOWN IN THE PLANS, A COMPOSITE MATERIAL BLOCK THAT MEETS THE REQUIREMENTS OF DMS-7210, "COMPOSITE MATERIAL POSTS AND BLOCKS FOR METAL BEAM GUARD FENCE" MAY BE SUBSTITUTED FOR BLOCKS OF SIMILAR DIMENSIONS. THE CONSTRUCTION DIVISION, TXDOT MAINTAINS A MATERIAL PRODUCER LIST (MPL) FOR PRODUCERS OF MATERIALS CONFORMING TO DMS-7210 ONLY PRODUCERS ON THE MPL MAY FURNISH COMPOSITE MATERIAL BLOCKS.
- 13.

NOTE: ** "WOOD" INDICATES DIMENSIONS FOR BOTH ROUND AND RECTANGULAR WOOD POST SYSTEMS.



ELEVATION MID-SPAN RAIL SPLICE

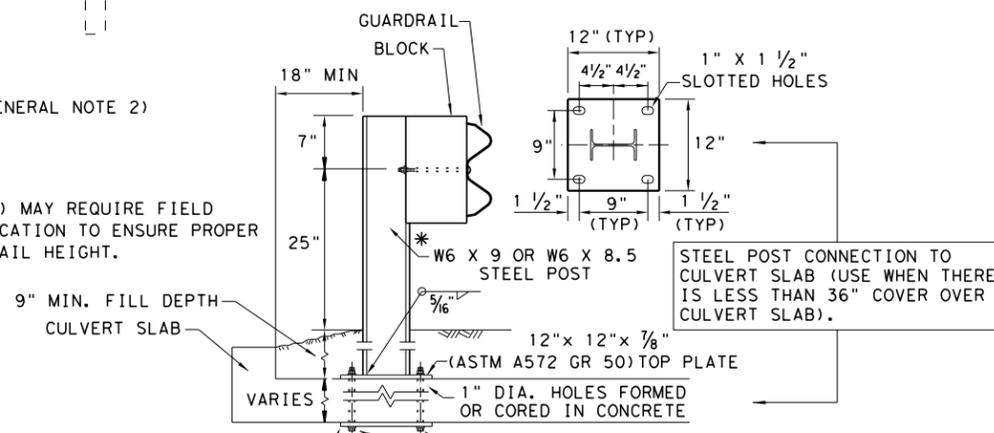
SHOWING A 25'-0" SECTION OF W-BEAM RAIL. (SEE GENERAL NOTE 2)



ELEVATION 25'-0" (NOM.) W-BEAM SECTION

NOTES: SEE GENERAL NOTE 2 FOR ALLOWABLE RAIL TYPES. SEE RAIL SPLICE DETAIL FOR REQUIRED HARDWARE.

* POST(S) MAY REQUIRE FIELD MODIFICATION TO ENSURE PROPER GUARDRAIL HEIGHT.

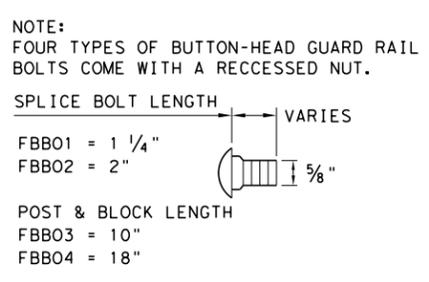


LOW FILL CULVERT POST

- NOTE: TWO INSTALLATION OPTIONS.
1. **BOLT-THROUGH OPTION:** REQUIRES A 6" MIN. SLAB THICKNESS. 7/8" DIA (ASTM A449) HEAVY HEX BOLTS WITH TWO HARDENED WASHER EACH AND HEAVY HEX NUTS. NOTE: BOLT LENGTH = SLAB PLUS 2 1/4" MIN.
 2. **EPOXY ANCHOR OPTION:** THIS OPTION MAY ONLY BE USED IF THE CULVERT SLAB IS 9" MIN. THICK. THREADED ANCHOR RODS MUST BE 7/8" DIA. ASTM A449 OR A193 GRADE B7 WITH HEAVY HEX NUT, AND ONE HARDENED WASHER EACH. EMBED ANCHOR RODS 6" WITH HILTI HIT RE 500 EPOXY ADHESIVE. OTHER TYPE III CLASS C EPOXY ADHESIVES MEETING THE REQUIREMENTS OF DMS-6100, "EPOXIES AND ADHESIVES", MAY BE USED IF IT CAN BE DEMONSTRATED THAT THEY MEET OR EXCEED THE STRENGTH OF HILTI HIT RE 500 WITH THE SAME EMBEDMENT DEPTH AND THREADED ROD DIA. FOLLOW THE MANUFACTURER'S REQUIREMENTS FOR INSTALLING EPOXIED THREADED RODS. EXTEND RODS 1/4" MIN. BEYOND NUT.

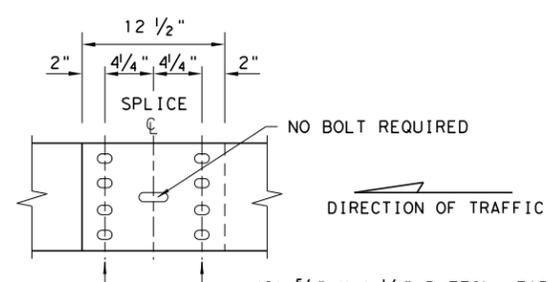
NOTE: TRANSITIONS TO BRIDGE RAILS OR TRAFFIC BARRIERS. SEE GF(31)TL3 TR STANDARD FOR HIGH-SPEED TL-3 TRANSITIONS. SEE GF(31)TL2 TR STANDARD FOR LOW-SPEED TL-2 TRANSITIONS.

NOTE: CULVERTS OF 25 FT. OR LESS, SEE GF(31)LS STANDARD FOR "LONG SPAN" OPTION.



BUTTON HEAD BOLT

NOTE: SEE GENERAL NOTE 3 FOR SPLICE & POST BOLT DETAILS.

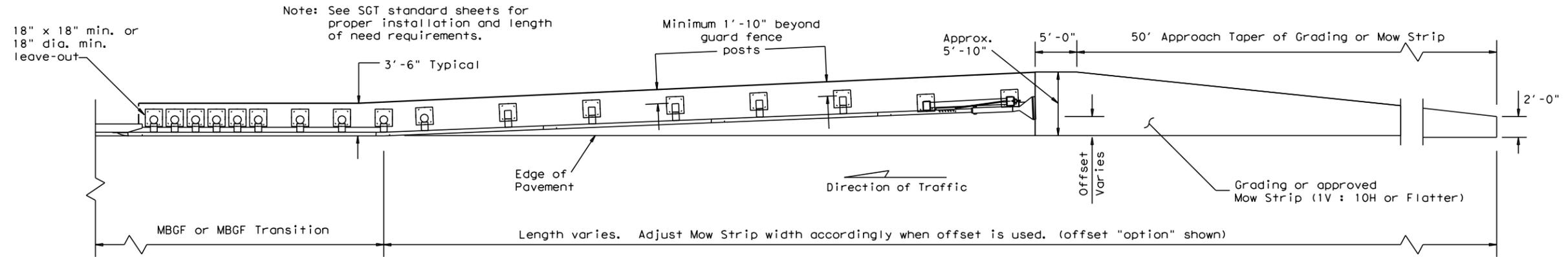


MID-SPAN RAIL SPLICE DETAIL

NOTE: GF(31), MID-SPAN RAIL SPLICES ARE REQUIRED WITH 6'-3" POST SPACINGS.

				Design Division Standard
METAL BEAM GUARD FENCE TL-3 MASH COMPLIANT GF(31)-19				
FILE: gf3119.dgn	DN: TXDOT	CK: KM	DW: VP	CK: CGL/AG
© TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS				
DIST	COUNTY	SHEET NO.		BR
HOU	GALVESTON	45		

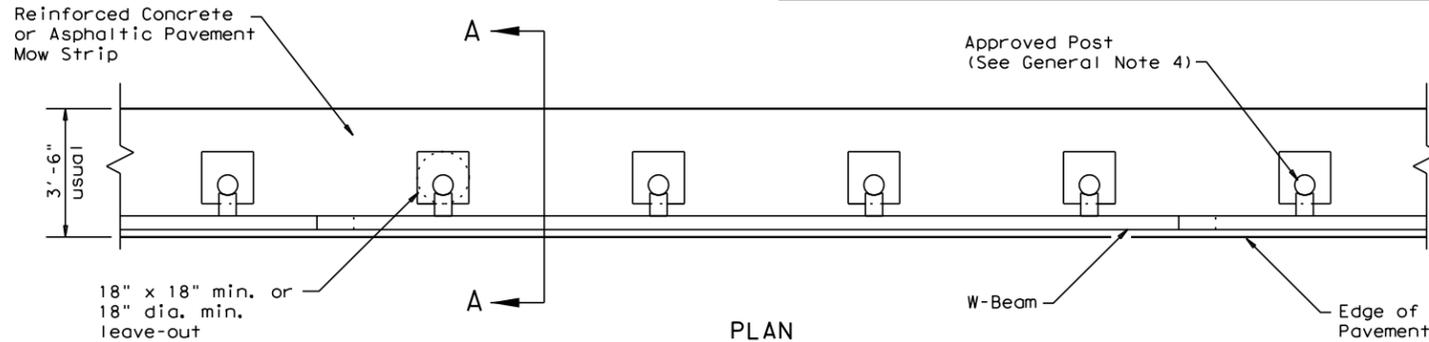
DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.



Note: See SGT standard sheets for proper installation and length of need requirements.

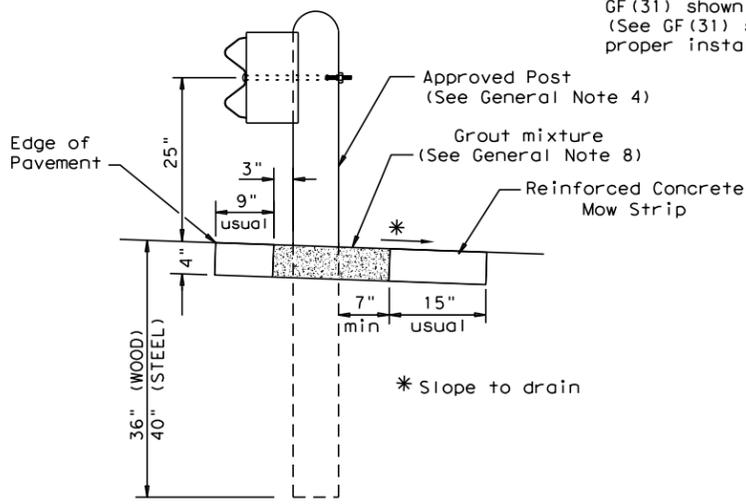
GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS

Note: Site Condition(s)
 Site conditions may exist where grading is required for the proper installation of metal guard fence and end treatments.
 Approach grading or mow strip may be decreased or eliminated, as directed by the Engineer.



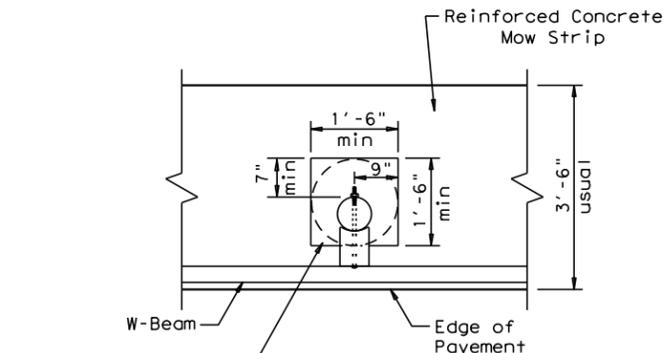
PLAN

GF(31) shown with Mow Strip
 (See GF(31) standard sheet for proper installation)



SECTION A-A

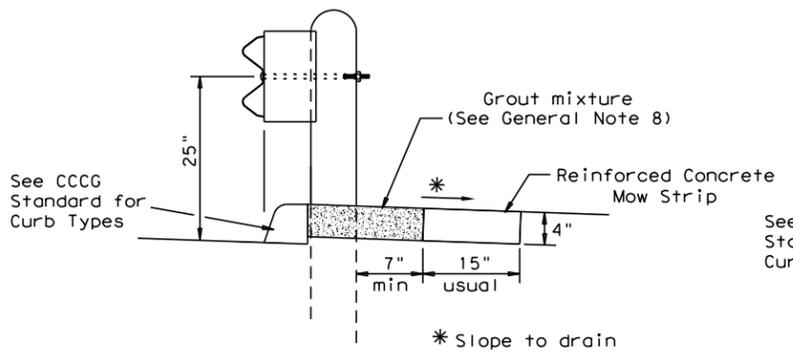
Typical



MOW STRIP DETAIL

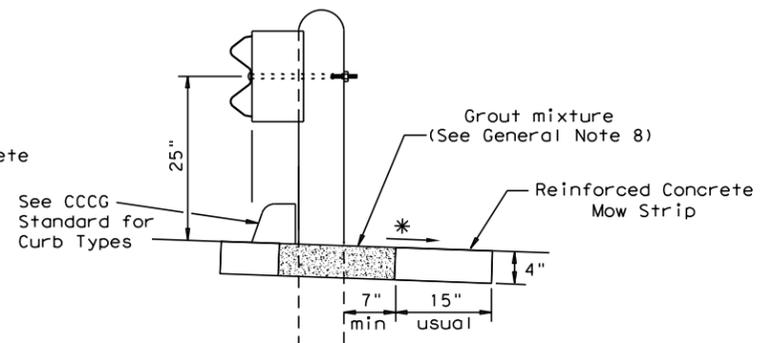
Reinforced Concrete Mow Strip with 18\"/>

- GENERAL NOTES**
1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments. See applicable GF(31) MBGF or GF(31) Transition Standard sheet for additional information.
 2. Mow strips shall be reinforced concrete with (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Reinforced concrete shall be placed in accordance with Item 432, "Riprap." The use of the synthetic fiber in lieu of steel reinforcing is acceptable, provided the fiber producer is on the Department Material Producer List (MPL), maintained by TxDOT, Construction Division.
 3. The leave-out behind the post shall be a minimum of 7".
 4. Only steel (W6 x 8.5 or W6 x 9.0), or 7 1/2" Dia. round wood posts are acceptable for use in the mow strip. See GF(31) Standard for additional details.
 5. Other curb placement options may be used. Curbs are not considered part of the mow strip and will be paid for under other pertinent bid item.
 6. Thickness of the mow strip will be 4".
 7. The limits of payment for reinforced concrete will include leave-outs for the posts.
 8. The leave-outs shall be filled with a Grout mixture consisting of: 2719 pounds sand, 188 pounds Type 1 or II cement, and 550 pounds of water per cubic yard, with a 28-day compressive strength of approximately 230 psi or less. Provide grout with a consistency that will flow into and completely fill all voids. Due to auger size, larger leave-out dimensions are acceptable from both an impact performance and maintenance repair standpoint (Suggested Maximum leave-out of 20"). Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of riprap mow strip.



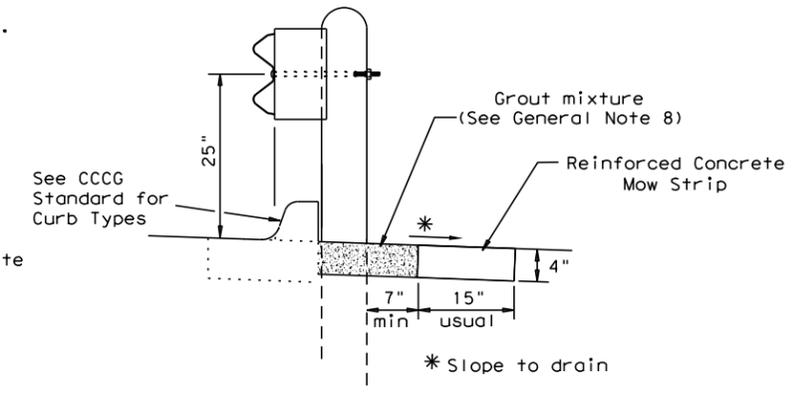
CURB OPTION (1)

This option will increase the post embedment throughout the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)



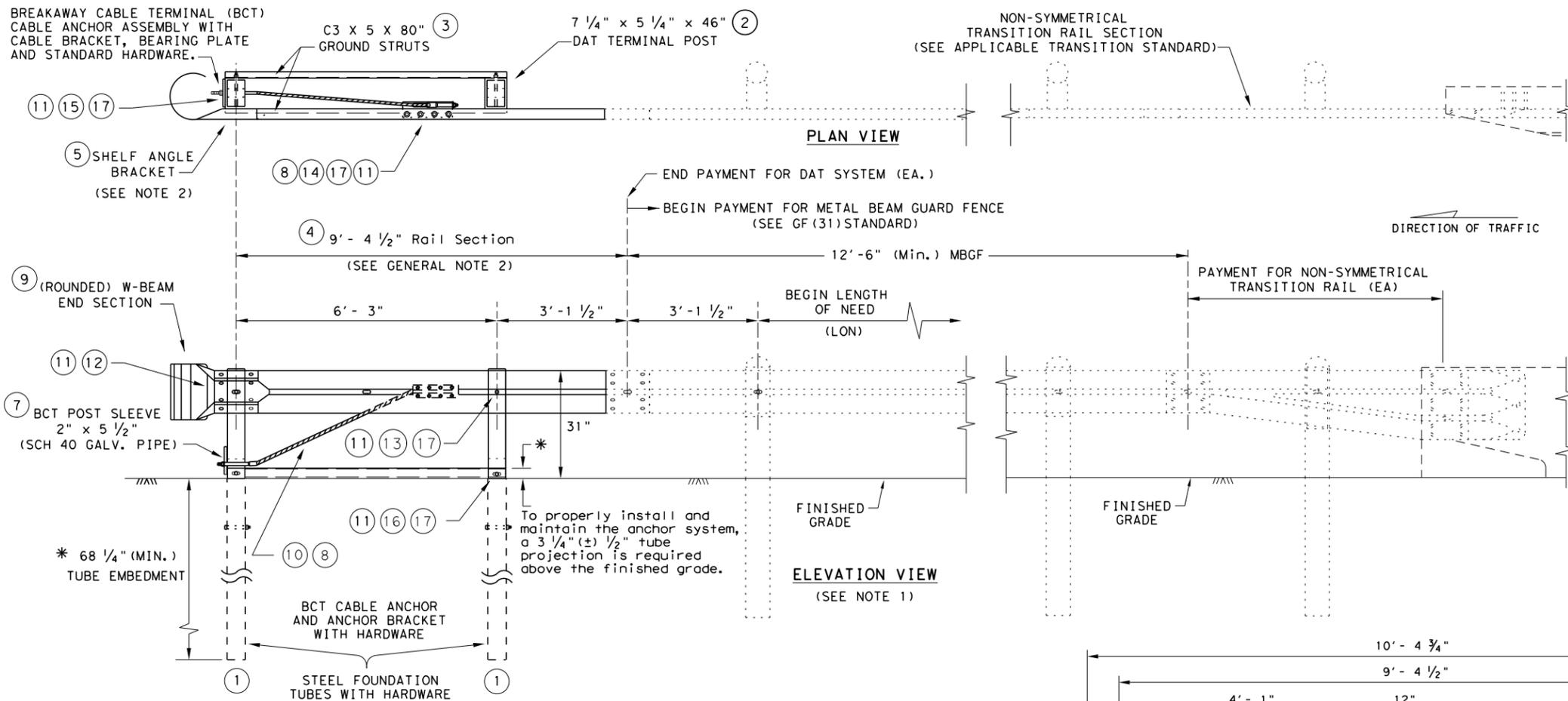
METAL BEAM GUARD FENCE (MOW STRIP)
TL-3 MASH COMPLIANT
GF(31)MS-19

FILE: gf31ms19.dgn	DN:TxDOT	CK: KM	DW: VP	CK:CGL/AG
©TXDOT: NOVEMBER 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS				BR
DIST	COUNTY		SHEET NO.	
HOU	GALVESTON		46	

DATE:
FILE:

DISCLAIMER: THE USE OF THIS STANDARD IS GOVERNED BY THE "TEXAS ENGINEERING PRACTICE ACT". NO WARRANTY OF ANY KIND IS MADE BY TXDOT FOR ANY PURPOSE WHATSOEVER. TXDOT ASSUMES NO RESPONSIBILITY FOR THE CONVERSION OF THIS STANDARD TO OTHER FORMATS OR FOR INCORRECT RESULTS OR DAMAGES RESULTING FROM ITS USE.

DATE: FILE:



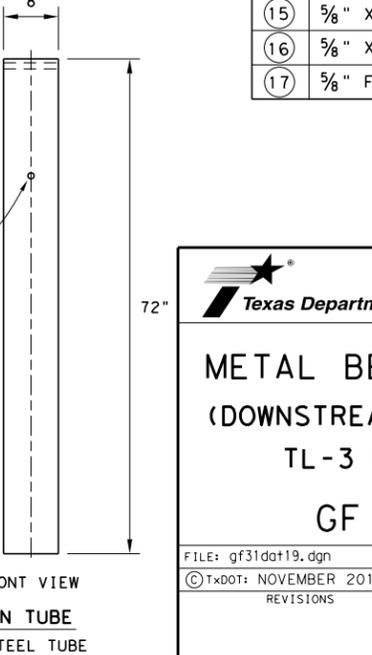
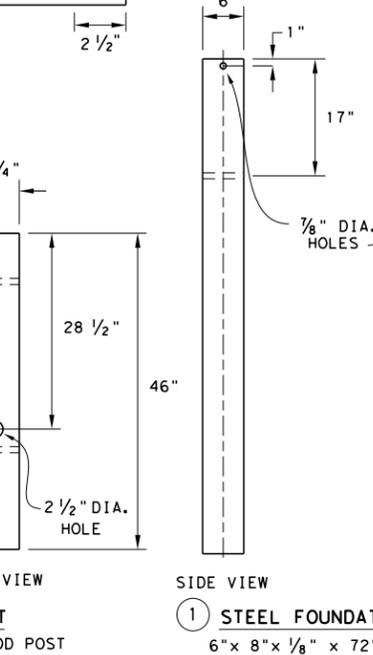
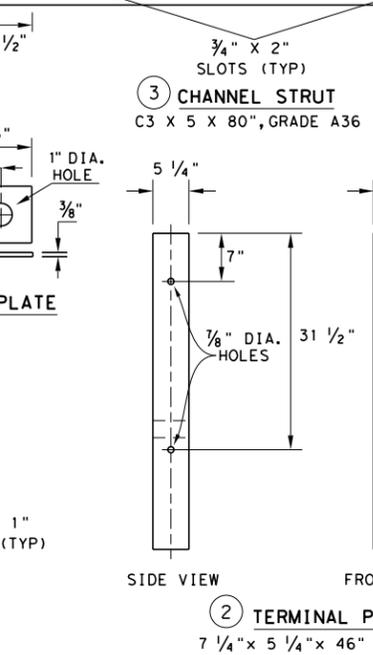
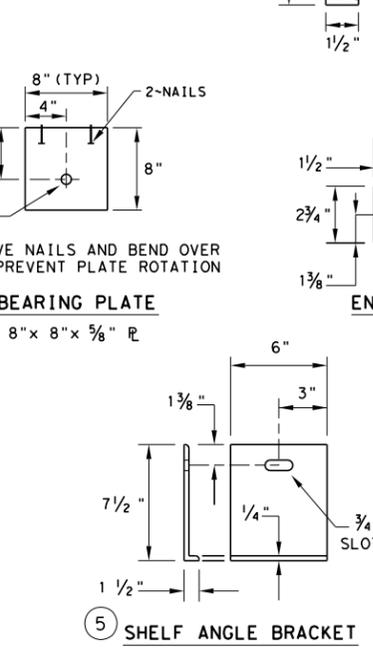
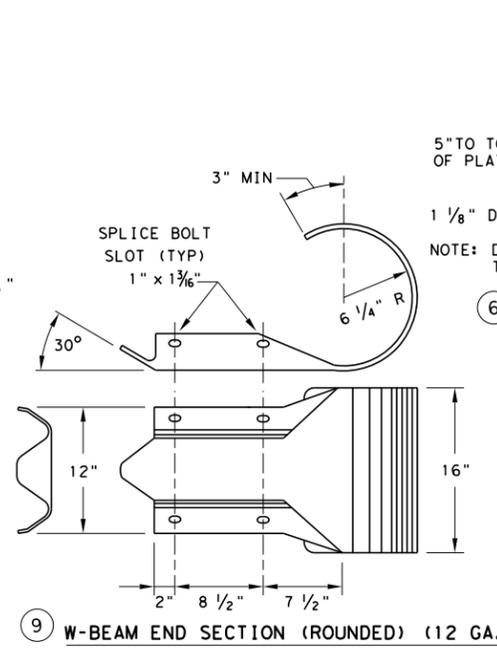
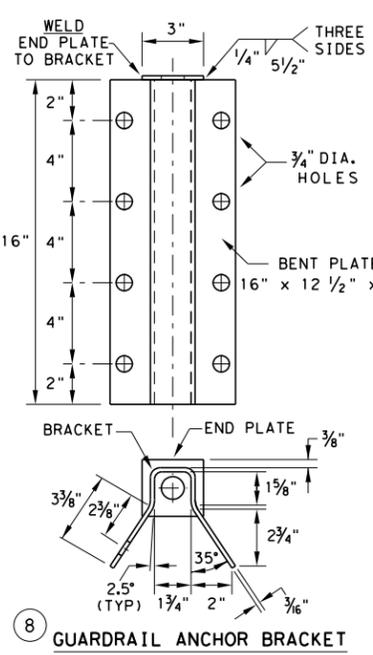
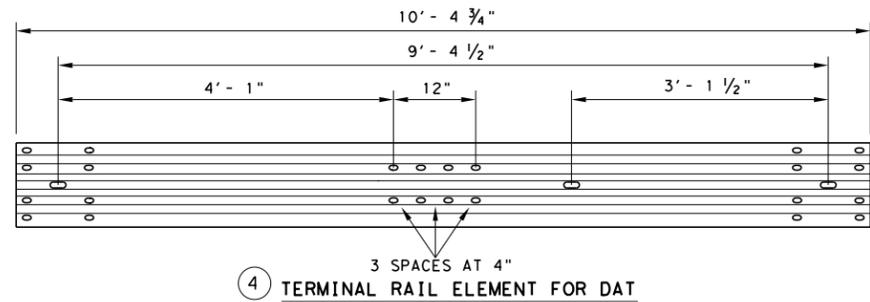
DOWNSTREAM ANCHOR TERMINAL (DAT)

NOTE: ONLY FOR DOWNSTREAM USE, WHEN LOCATED OUTSIDE THE HORIZONTAL CLEARANCE AREA OF OPPOSING TRAFFIC.

- GENERAL NOTES**
1. THE DETAIL SHOWN IS THE MINIMUM LENGTH OF NEED (LON) FOR A DOWNSTREAM ANCHOR TERMINAL (DAT) CONNECTED TO A CONCRETE RAIL.
 2. THE RAIL SECTION AT THE END POST IS SUPPORTED BY THE SHELF ANGLE BRACKET. THE RAIL ELEMENT IS NOT ATTACHED TO THE END POST.
 3. THE FOUNDATION TUBES SHALL NOT PROJECT MORE THAN 3 3/4" ABOVE THE FINISHED GRADE.
 4. ALL HARDWARE FOR DAT SHALL BE ASTM A307 UNLESS OTHERWISE SHOWN.
 5. REFER TO GF (31) SHEET FOR TERMINAL CONNECTION DETAILS.

MOW STRIP INSTALLATION
 IF A MOW STRIP IS REQUIRED WITH THE DAT INSTALLATION THE LEAVE-OUT AREA AROUND THE STEEL FOUNDATION TUBES AND THE TWO CHANNEL STRUTS MAY BE OMITTED. THIS WILL REQUIRE A FULL POUR AT THE FOUNDATION TUBES.

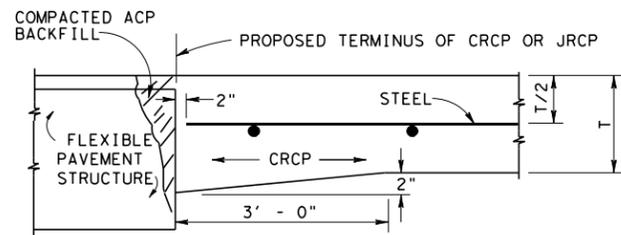
#	(DAT) PARTS LIST	QTY
1	STEEL FOUNDATION TUBE	2
2	DAT TERMINAL POST	2
3	CHANNEL STRUT	2
4	TERMINAL RAIL ELEMENT	1
5	SHELF ANGLE BRACKET	1
6	BCT BEARING PLATE	1
7	BCT POST SLEEVE	1
8	GUARDRAIL ANCHOR BRACKET	1
9	(ROUNDED) W-BEAM END SECTION	1
10	BCT CABLE ANCHOR	1
11	RECESSED NUT, GUARDRAIL	20
12	1 1/4" BUTTON HEAD BOLT	4
13	10" BUTTON HEAD BOLT	2
14	5/8" X 2" HEX HEAD BOLT	8
15	5/8" X 8" HEX HEAD BOLT	4
16	5/8" X 10" HEX HEAD BOLT	2
17	5/8" FLAT WASHER	18



Design Division Standard
METAL BEAM GUARD FENCE (DOWNSTREAM ANCHOR TERMINAL) TL-3 MASH COMPLIANT GF (31) DAT-19
 FILE: gf31dat19.dgn DN: TXDOT CK: KM DW: VP CK: CGL/AG
 © TXDOT: NOVEMBER 2019 CONT SECT JOB HIGHWAY
 REVISIONS BR
 DIST COUNTY SHEET NO.
 HOU GALVESTON 47

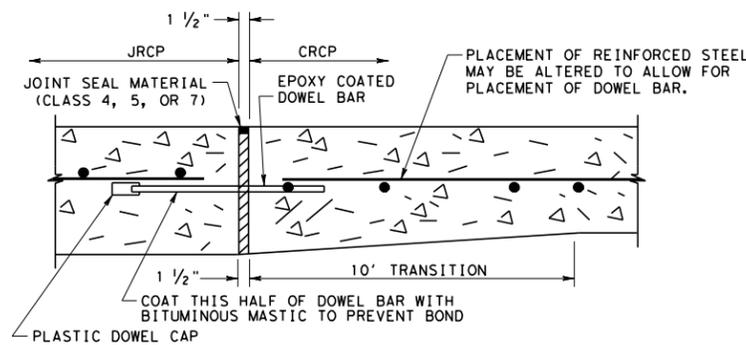
GENERAL NOTES

- FOR FURTHER INFORMATION REGARDING PLACING CONCRETE AND REINFORCEMENT, REFER TO THE GOVERNING SPECIFICATION FOR CONCRETE PAVEMENT.
- THE DESIGN REQUIREMENTS FOR THE PAVEMENT STRUCTURE, I.E. BAR SPACING, BAR SIZE LAP REQUIREMENTS, ETC., ARE SHOWN ON THE APPROPRIATE PAVEMENT DESIGN DETAIL.
- SLEEPER SLAB AND ADDITIONAL REINFORCING REQUIRED ON THIS DRAWING ARE INCIDENTAL TO THE VARIOUS BID ITEMS.
- USE THE SIZE, SPACING, AND LENGTH OF DOWEL BARS SHOWN IN TABLE "A".
- WHERE THERE WILL BE A JUNCTURE AND ADDITIONAL JRCP PAVING WILL BE PLACED AT A FUTURE DATE, MULTIPLE PIECE DOWEL BARS WILL BE PERMITTED AT THE JUNCTURE. PROVIDE MULTIPLE PIECE DOWEL BAR ASSEMBLIES WITH A MINIMUM ULTIMATE TENSILE STRENGTH OF 60.0 KIPS AND THAT HAVE SMOOTH EPOXY COATED BARS. ENSURE THE MULTIPLE PIECE DOWEL BAR ASSEMBLIES HAVE STOP TYPE COUPLINGS AND HAVE ROLLED THREADS ON THE BARS. DISMANTLE THE BAR AND FIT THE COUPLING PORTION USED IN CONSTRUCTION, WITH A PLASTIC CAP. FURNISH THE REMAINING PORTION OF THE BAR TO THE ENGINEER.
- WHERE THE PAVING IS CRCP AND A RAMP COMPOSED OF A FLEXIBLE PAVEMENT WILL BE USED AT THE JUNCTURE UNTIL FUTURE PAVING IS CONSTRUCTED, MULTIPLE PIECE TIE BARS MAY BE USED IF PERMITTED BY THE ENGINEER. IF USED, ENSURE THE MULTIPLE PIECE TIE BAR ASSEMBLIES HAVE STOP TYPE COUPLINGS AND ROLLED THREADS ON THE BARS. FURNISH MULTIPLE PIECE TIE BAR ASSEMBLIES THAT DEVELOP A MINIMUM ULTIMATE TENSILE STRENGTH EQUAL TO 1.25 TIMES THE YIELD STRENGTH OF THE TRANSVERSE BARS BEING JOINED. FOR TIE BARS, USE DEFORMED REINFORCING BARS. TIE BAR ASSEMBLIES MADE FROM STEELS OTHER THAN ASTM GRADE 60 AND WITH DEFORMATIONS OTHER THAN ASTM STD. MAY BE USED PROVIDED THEY PROVE SATISFACTORY TO THE ENGINEER AND ARE IN EVERY RESPECT THE EQUAL TO THE ASSEMBLIES SPECIFIED. LABORATORY TESTING OF THE PROPOSED ASSEMBLIES, AT THE CONTRACTOR'S EXPENSE, MAY BE REQUIRED. LAP AND WELD ONE PORTION OF THE TIE BAR ASSEMBLY TO EACH LONGITUDINAL BAR IN ACCORDANCE WITH THE ITEM "STRUCTURAL FIELD WELDING" AND THE OTHER PORTION INTO THE COUPLING PRIOR TO PAVING. ENSURE MULTIPLE PIECE TIE BAR LENGTHS CONFORM TO THE TIE BAR LENGTHS SHOWN ELSEWHERE IN THE PLANS. ADDITIONAL "SHEAR STEEL" WILL ALSO BE REQUIRED AND MAY BE USED WITH MULTIPLE PIECE ASSEMBLIES AS PREVIOUSLY DESCRIBED. USE ADDITIONAL STEEL BARS OF EQUAL DIAMETER AT A SPACING DOUBLE THAT OF THE LONGITUDINAL STEEL AND ENSURE THE LENGTH IS 66 TIMES THE TIE BAR DIAMETER.
- DO NOT SHEAR CUT DOWEL BARS.
- ENSURE DOWEL BAR EPOXY COATING CONFORMS TO ARTICLE 440.2.7., "EPOXY COATING".
- REPLACE ANY BENT LONGITUDINAL REINFORCING. IF THERE IS NOT SUFFICIENT EXPOSED REINFORCING TO PROVIDE A MINIMUM OF A 33 TIMES BAR DIAMETER LAP, REMOVE THE EXISTING PAVEMENT AND SUFFICIENTLY EXPOSE THE EXISTING REINFORCING TO PROVIDE A 33 TIMES BAR DIAMETER LAP. REPLACE ANY SHEAR BARS THAT ARE DISTURBED, BY DRILLING AND GROUTING AS REQUIRED BY NOTE 12 BELOW. PERFORM THIS CORRECTIVE ACTION AT NO EXPENSE TO THE DEPARTMENT.
- TIE BARS AND DOWEL BARS OMITTED, LOST, OR DAMAGED SHALL BE REPAIRED BY DRILLING AND EPOXY GROUTING AT NO EXPENSE TO THE DEPARTMENT.
- JUNCTURES A & B ARE ONLY SUITABLE FOR MINOR STREETS WITH LOW TRAFFIC VOLUMES.
- FURNISH ADDITIONAL SHEAR BARS (DIAMETER "D") OF THE SAME SIZE AS LONGITUDINAL BARS AND SPACE THEM MIDWAY BETWEEN ALTERNATE LONGITUDINAL BARS ALONG THE TRANSVERSE CONSTRUCTION JOINT FORMED AT THE LEAVE-OUT.



NOTE:
 ADDITIONAL CONCRETE FOR THICKENED EDGE IS SUBSIDIARY TO VARIOUS BID ITEMS. BACKFILL DISTURBED MATERIAL IN THE FLEXIBLE PAVEMENT WITH ACP. THIS ACP IS SUBSIDIARY TO VARIOUS BID ITEMS.

JUNCTURE A & B - CRCP OR JRCP WITH FLEXIBLE TYPE PAVEMENT STRUCTURE

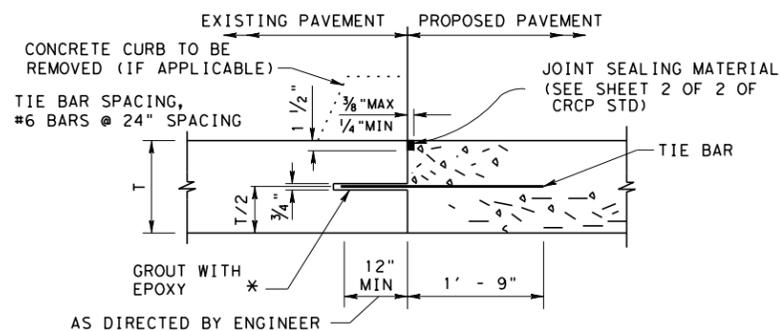


FOR DETAILS NOT SHOWN, SEE TRANSVERSE EXPANSION JOINT DETAILS ELSEWHERE IN PLANS.

DETAIL "B" - DOWEL ASSEMBLY AT EXPANSION JOINT

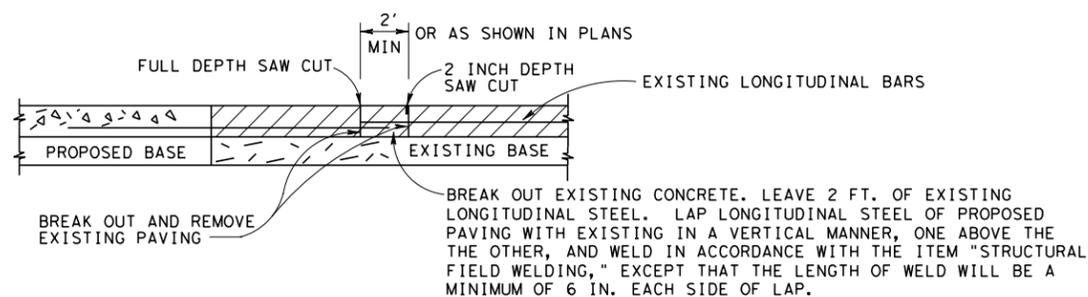
DOWEL BAR DATA			
SLAB THICKNESS (T)	6"-7.5"	8"-10"	10.5"-15"
DOWEL SIZE	1"	1 1/4"	1 1/2"
DOWEL LENGTH	18"	20"	22"
DOWEL BAR SPACING	12"	12"	12"

TABLE A - DOWEL BAR DATA



JUNCTURE D - TYPICAL CONNECTION TO EXISTING CONCRETE

*FOR EPOXY TYPE SEE ITEM 361.



JUNCTURE F - "BREAK BACK" CONCRETE CRCP WITH CRCP OR JRCP WITH JRCP

LEGEND

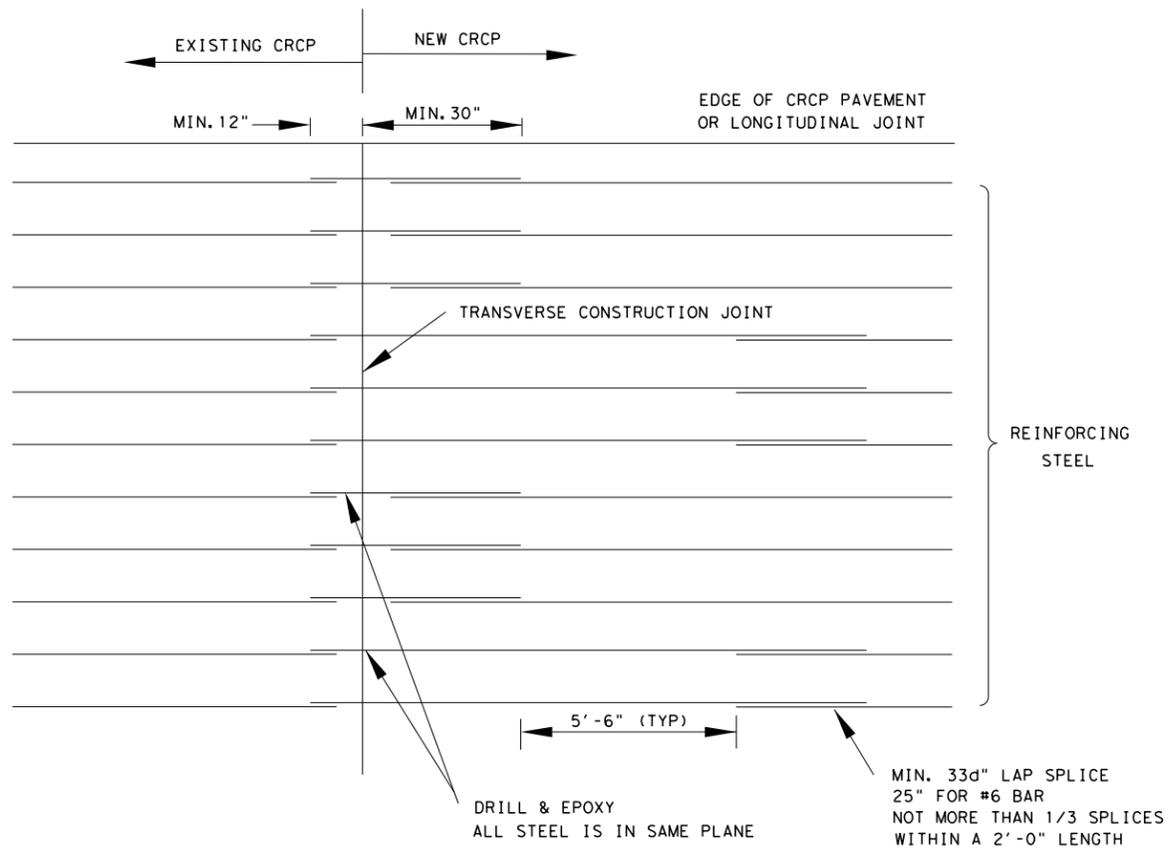
- ACP - ASPHALT CONCRETE PAVEMENT
- CRCP - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
- JRCP - JOINTED REINFORCED CONCRETE PAVEMENT
- T - THICKNESS

Texas Department of Transportation
Houston District

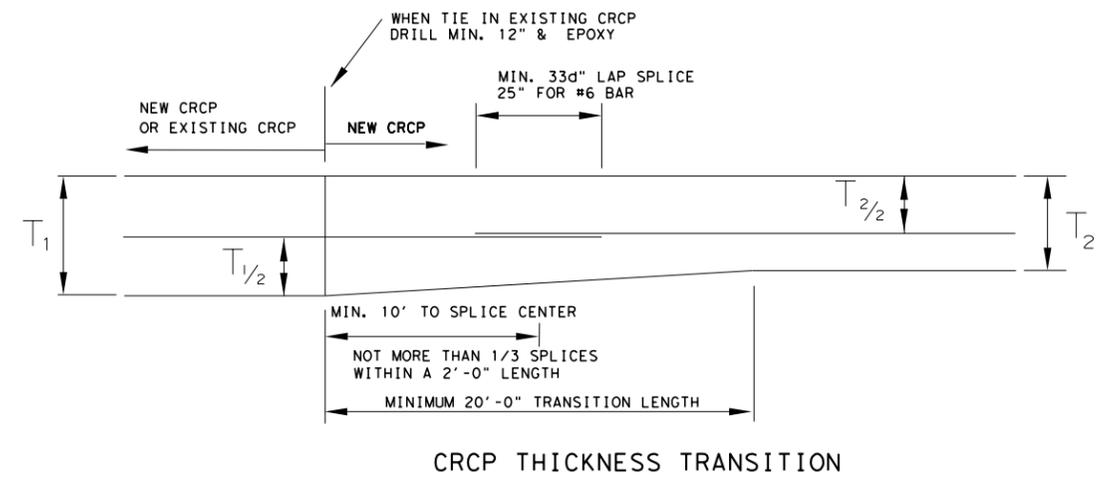
CONCRETE PAVEMENT JUNCTURES

CPJ

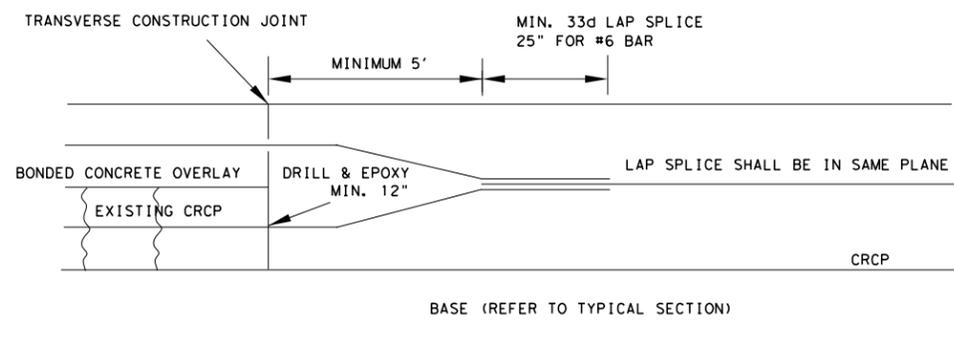
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REVISIONS	HOU		48	
5/05 2004 SPECS	COUNTY	CONTROL	SECT	JOB
REVISED 4/2008	GALVESTON			HIGHWAY
2/15 2014 SPECS				BR



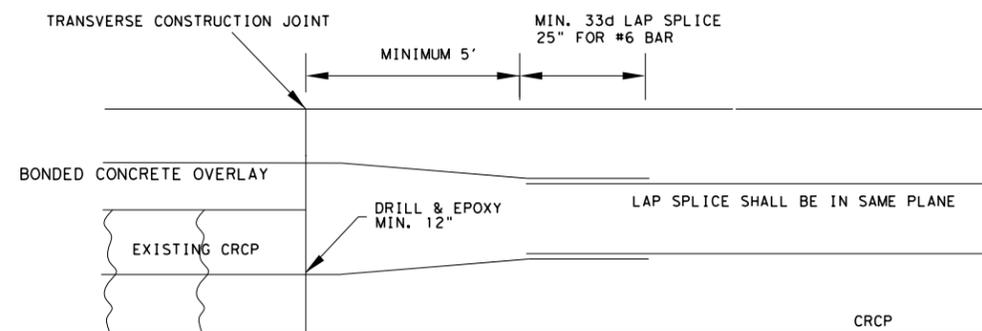
EXISTING CRCP TO NEW CRCP



CRCP THICKNESS TRANSITION



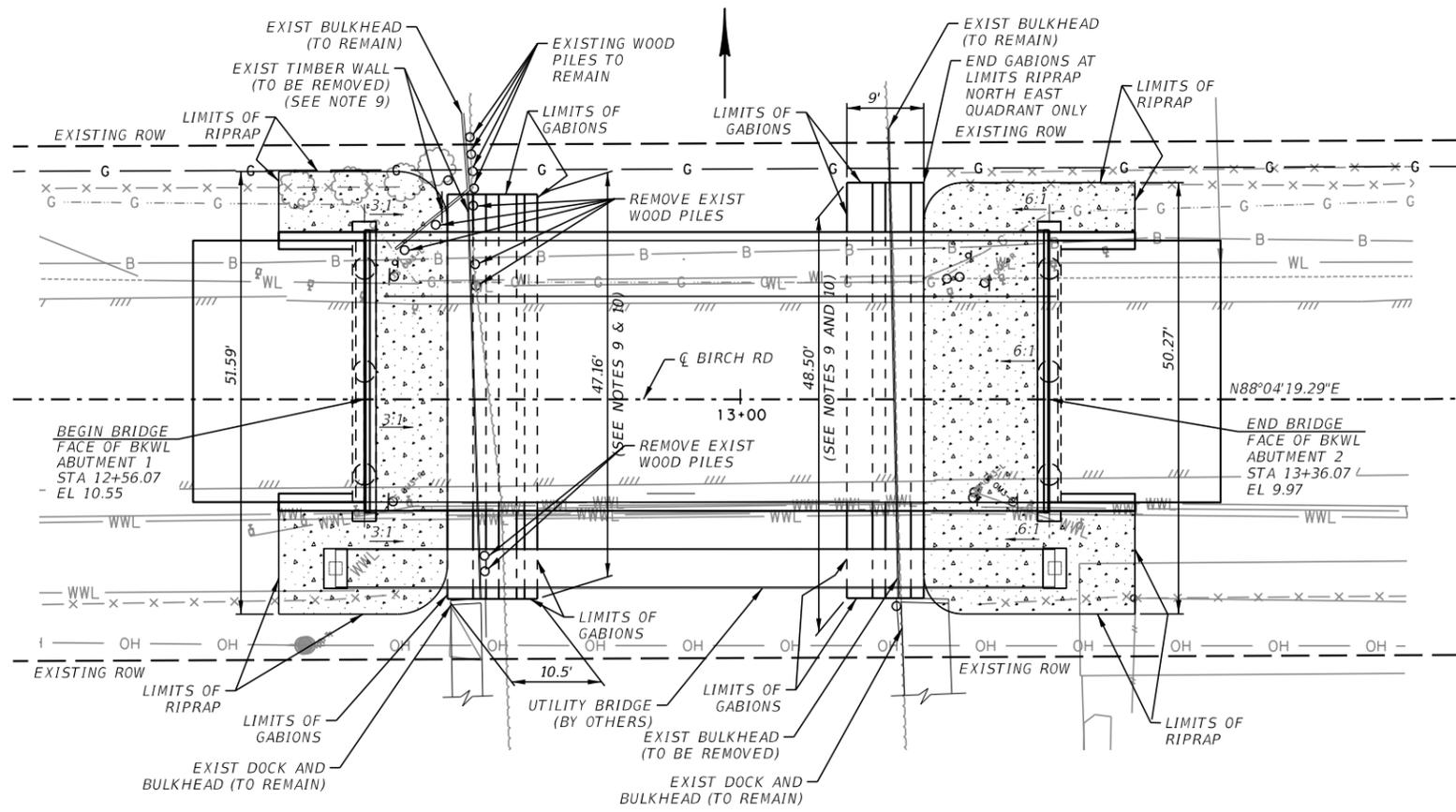
CRCP BONDED OVERLAY TO CRCP TRANSITION
(ONE LAYER STEEL)



CRCP BONDED OVERLAY TO CRCP TRANSITION
(TWO LAYER STEEL)


**CONCRETE PAVEMENT
JUNCTURES**
 CPJ

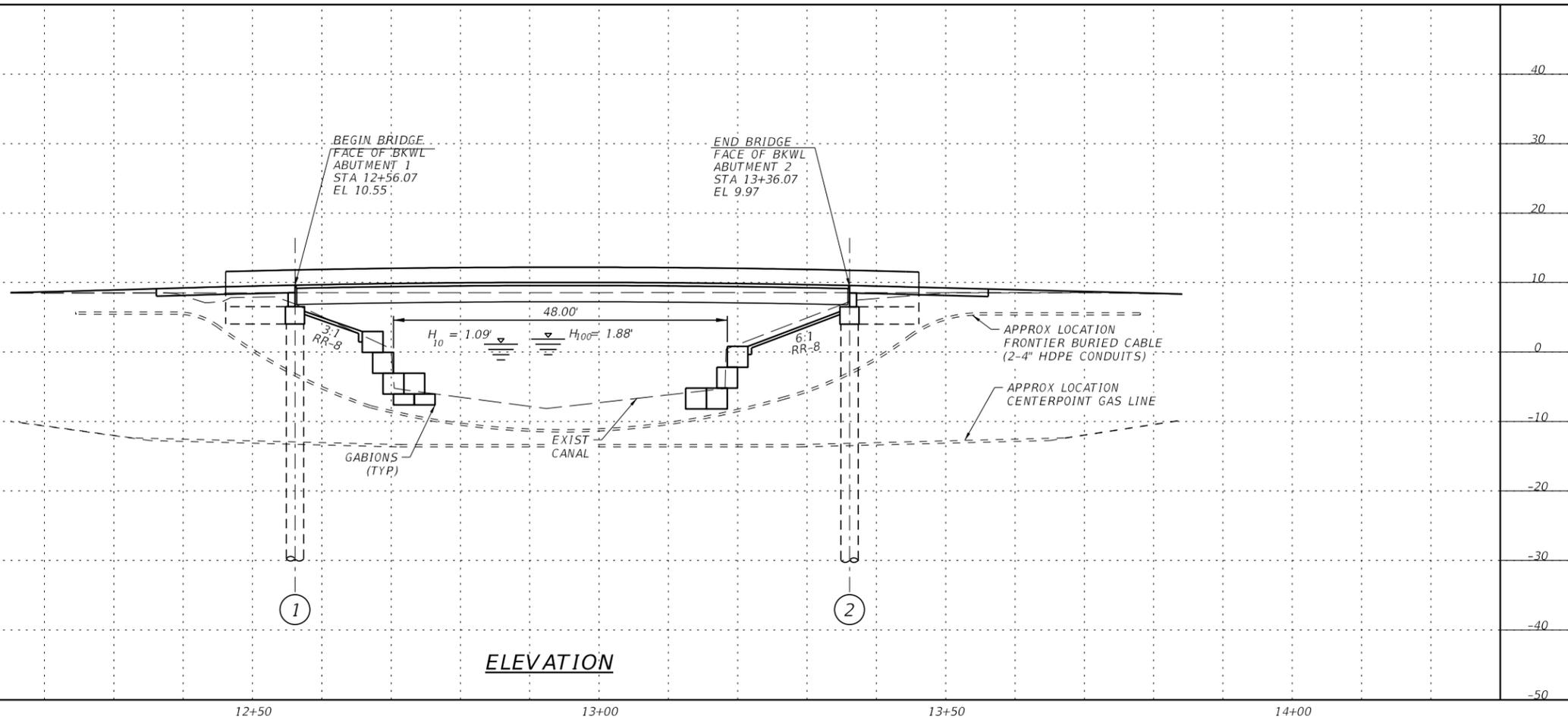
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© TXDOT DEC. 2009	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS 5/05 2004 SPECS REVISED 4/2008 2/15 2014 SPECS	HOU			49
	COUNTY	CONTROL	SECT	JOB
	GALVESTON			BR



PLAN

GENERAL NOTES:

1. BURY GABION INTO CANAL BOTTOM BY AT LEAST 1/2 HEIGHT (H).
2. BACKFILL BEHIND GABIONS WITH SUITABLE MATERIAL TO SUPPLY SOLID SUPPORT FOR THE GABIONS IN THE NEXT ROW ABOVE.
3. INSTALL THE TOP GABION BASKET FLUSH WITH TOP TOP OF CONC RIPRAP CUTOFF WALL USING THE WALL AS A BUTRESS FOR THE TOP GABION ROW.
4. BATTER GABIONS 1/2"/FT TOWARDS EXISTING CANAL SLOPE.
5. EACH SUCCESSIVE GABION TO OVERLAP THE LOWER GABION 1/2 WIDTH (1.5').
6. ONLY EXCAVATE ENOUGH OF EXISTING CANAL SLOPE TO INSTALL GABIONS. OVEREXCAVATION IS AT CONTRACTOR'S EXPENSE.
7. TIE GABIONS TOGETHER AS PER MANUFACTURER'S RECOMMENDATIONS.
8. PLACE GABIONS FLUSH WITH DOCKS ON SOUTH SIDE OF BRIDGE AT BOTH EAST AND WEST QUADRANTS.
9. REMOVE TIMBER/PILEWALL TO PRIVATE BULKHEAD. AND INSTALL GABIONS TO BULKHEAD AS DIMENSIONED.
10. REMOVE ALL EXISTING WOODEN BULKHEAD PILES AND IMPEDIMENTS AT THE LOCATIONS WITHIN THE DIMENSIONS AS NOTED ON PLANS TO ALLOW GABION INSTALLATION.
11. REMOVE EXISTING PIER TO A DEPTH TO ALLOW CONSTRUCTION OF GABIONS TO THE LINES AND GRADES SHOWN ON THE PLANS.
12. INSTALL GABIONS TO ABUT AGAINST EITHER THE BULKHEAD PILE IN THE NORTHWEST QUADRANT (AS NOTED ON THE PLAN VIEW) OR THE DOCKS IN THE SOUTH EAST AND WEST QUADRANTS. FOR THE NORTHEAST QUADRANT, LINE THE GABIONS UP WITH THE EDGE OF THE CONCRETE RIPRAP, ENSURING ALL WOOD PILES AND MISCELLANEOUS IMPEDIMENTS ARE REMOVED WITHIN THE DIMENSIONS SHOWN. WOOD PILES AND OTHER IMPEDIMENTS OUTSIDE OF THOSE DIMENSIONS MAY REMAIN. DO NOT DISTURB THE CANAL BANKS OR EXISTING BULKHEADS OUTSIDE OF THE EXISTING ROW.
13. ALL WORK MUST BE COORDINATED WITH THE LAZY BEND HOMEOWNERS ASSOCIATION.
14. THE EXISTING DOCK ENCROACHMENTS IN THE SOUTH EAST AND WEST QUADRANTS ARE TO REMAIN. THE CONTRACTOR MUST MAINTAIN THE INTEGRITY OF THESE DOCKS USING TEMPORARY SUPPORTS AS NECESSARY. ANY DAMAGE TO THESE DOCKS MADE BY THE CONTRACTOR WILL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
15. PROVIDE DUMPED ROCK AS NEEDED TO PROVIDE TRANSITION TO EXISTING BANKS FROM GABIONS, INCIDENTAL TO STAINLESS STEEL GABIONS, ITEM - 04500.



ELEVATION



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM
ENGINEERING CORPORATION - HOUSTON, LLC
T.B.P.E. FIRM REGISTRATION #392
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

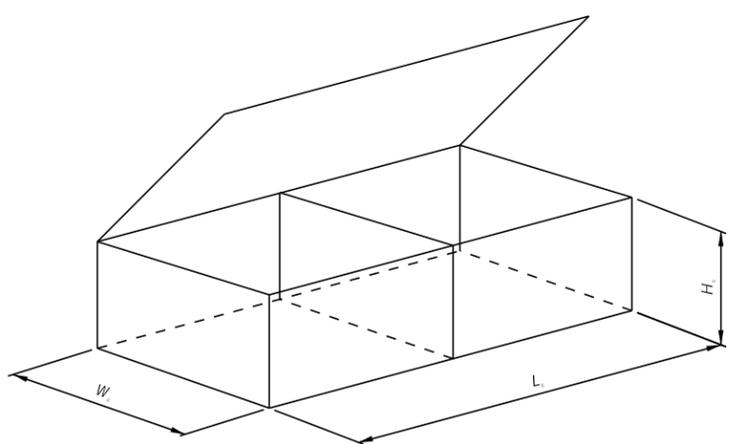
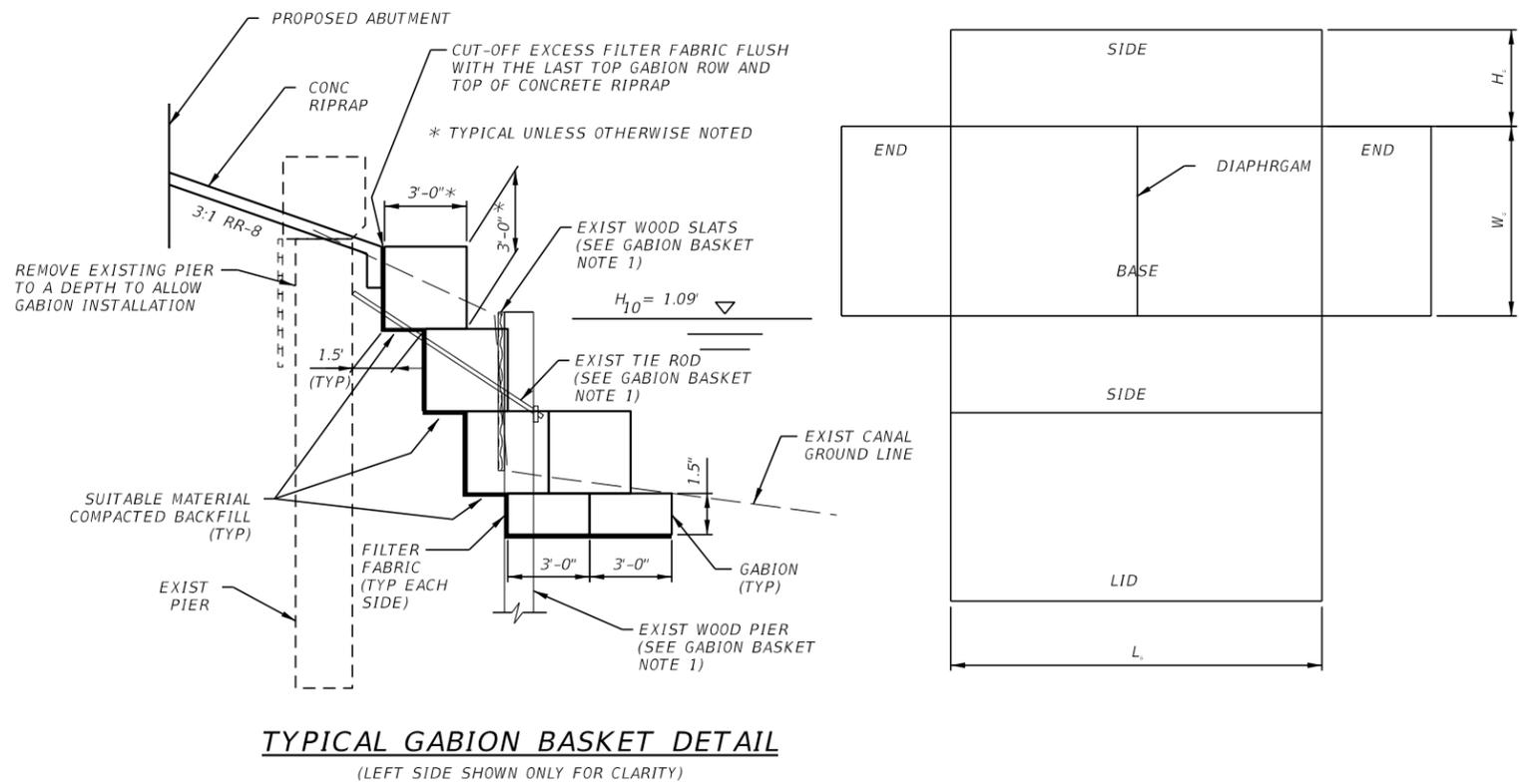
BIRCH ROAD BRIDGE REPLACEMENT
GABION WALL DETAILS
PLAN AND ELEVATION

SHEET 1 OF 2

Job No.:	Scale:	SHEET
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Ckd By: ic		

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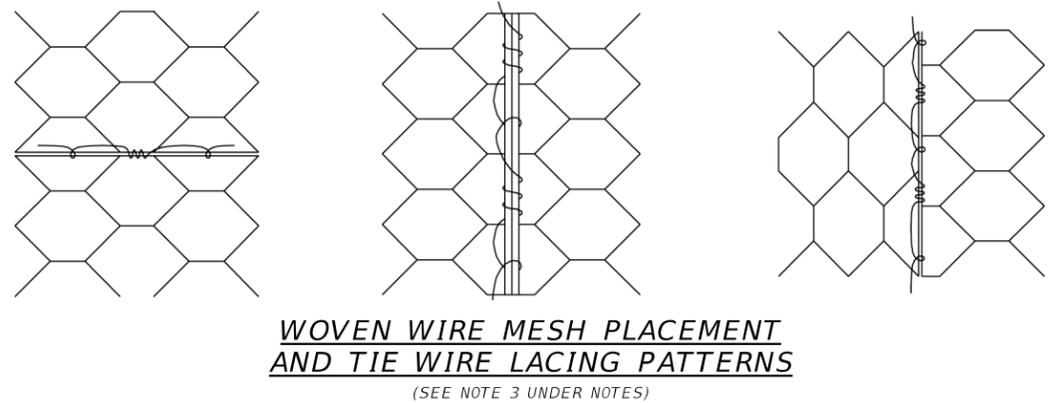
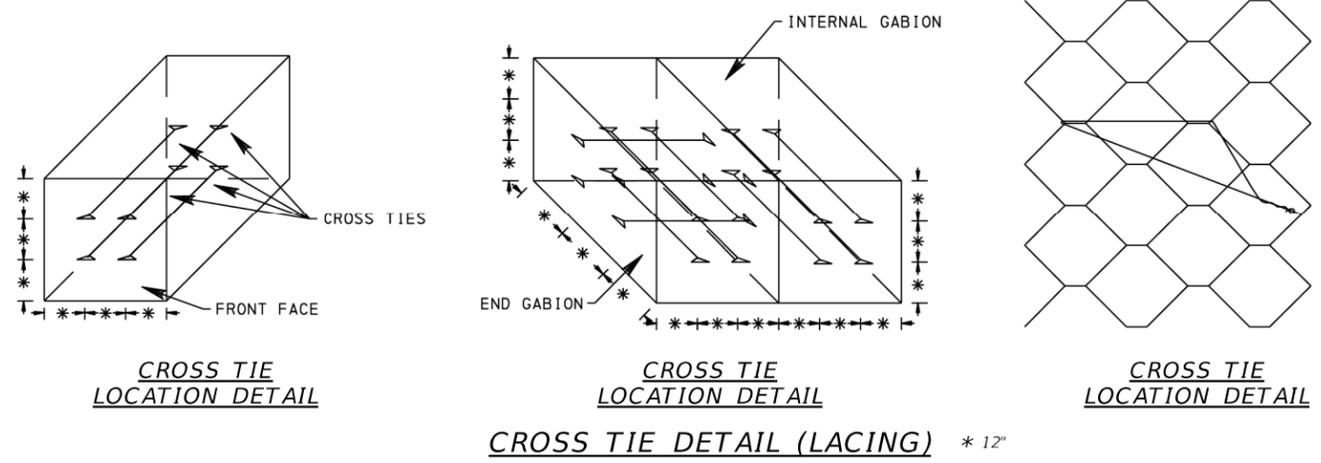
STANDARD		
W_b	L_b	H_b
3'-0"	6'-0"	1'-0"
3'-0"	12'-0"	1'-0"
3'-0"	9'-0"	1'-6"
3'-0"	6'-0"	3'-0"
3'-0"	9'-0"	3'-0"
3'-0"	12'-0"	3'-0"

ADDITIONAL SIZES MAY BE AVAILABLE ON A SPECIAL ORDER BASIS.

- NOTES:**
- ON ANY GIVEN LEVEL, BASKETS WITH EXPOSED FACES MUST BE FILLED PRIOR TO FILLING BASKETS WITH NO EXPOSED FACE.
 - BASE OF GABION TO BE CONSTRUCTED BELOW SCOUR DEPTH.
 - TIE WIRE LACING AS SHOWN IS FOR CLARITY PURPOSES ONLY. FOLLOW MANUFACTURER'S RECOMMENDATIONS FOR ACTUAL TIE WIRE LACING DETAILS.

- GABION BASKET DETAIL NOTES:**
- REMOVE ALL IMPEDIMENTS PRIOR TO CONSTRUCTION OF GABIONS INCLUDING WOOD PIERS, BULKHEADS, WOOD-SLATS, TIE ROADS AND ANY OTHER MISCELLANEOUS DEBRIS.
 - CONSTRUCT GABIONS IN ACCORDANCE TO ITEM 045000 GABIONS & GABION MATTRESSES.
 - OVERLAP GABION ON ROW ABOVE BY 1/2 GABION (1.5').
 - WHEN INSTALLING ROW ABOVE, ENSURE GABION ABOVE IS SUPPORTED BY COMPACTED SUITABLE MATERIAL NEXT TO GABION BELOW.
 - INSTALLATION OF GABIONS MUST BE PERFORMED BY PERSONNEL EXPERIENCES IN PERFORMING THIS WORK. CONTRACTOR TO PROVIDE AT LEAST 3 PROJECTS WHERE GABIONS WERE SUCCESSFULLY INSTALLED.
 - PROVIDE TYPE 2 FILTER FABRIC AS SPECIFIED IN ITEM NO. 4500, INCIDENTAL TO SAID ITEM.

WIRE MESH BASKETS



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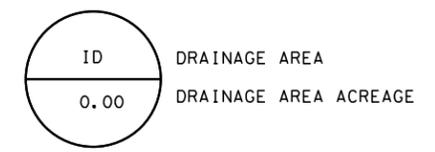
GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 GABION WALL DETAILS

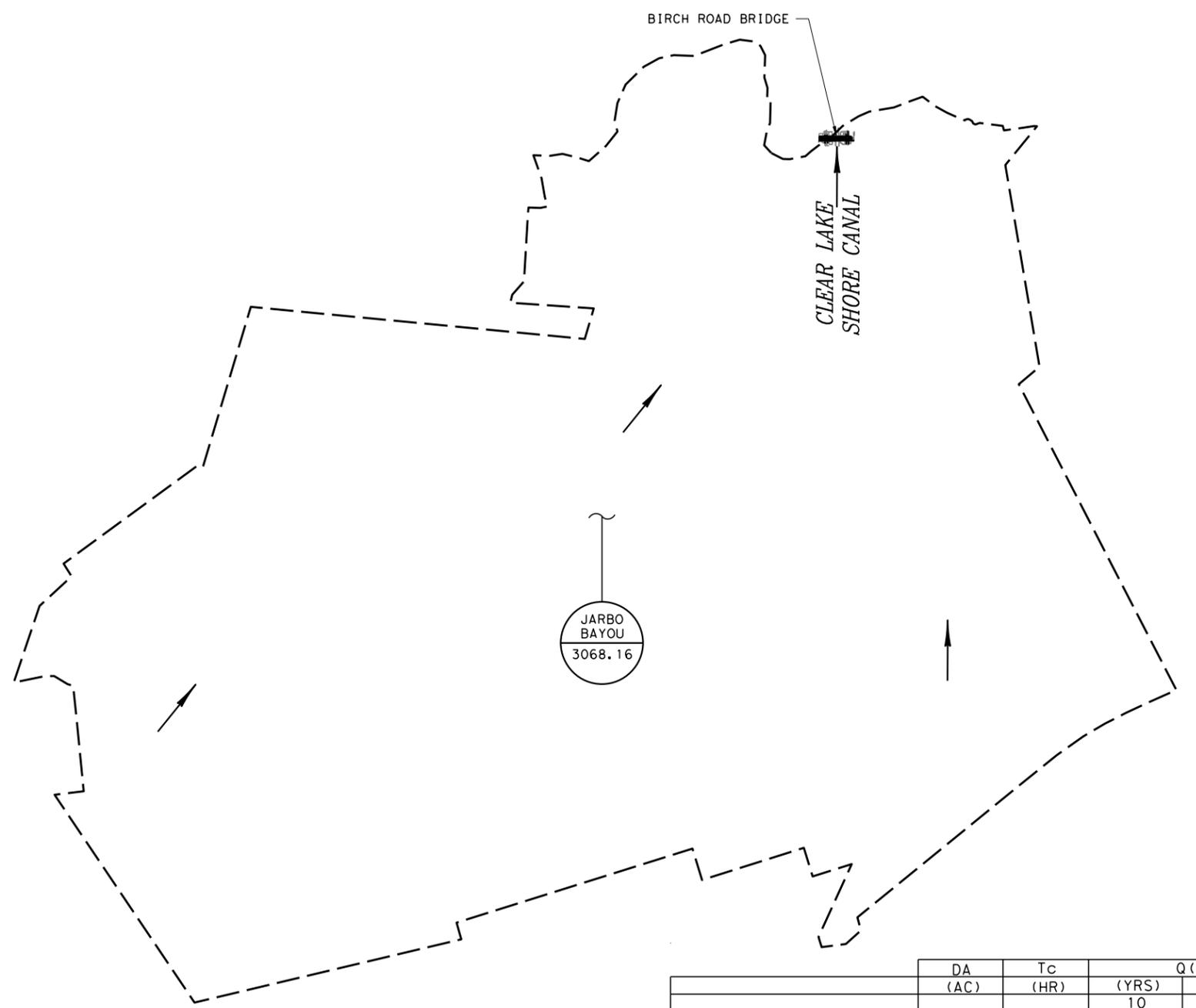
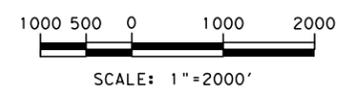
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NOTES:
 DRAINAGE AREA CONFORM TO AREA DELINEATED IN BIRCH ROAD BRIDGE HYDRAULIC STUDY REPORT BY DANNENBAUM ENGINEERING CORPORATION DATED JUNE 2019.



	DA (AC)	Tc (HR)	Q (CFS)	
			(YRS)	(YRS)
JARBO BAYOU	3,068.16	1.60	2,321.00	3,985.00
CLEAR LAKE SHORES CANAL	--	--	773.67	1,328.33

NOTE: NEAR THE DOWNSTREAM END, BEFORE OUTFALLING INTO CLEAR LAKE, JARBO BAYOU SPLITS INTO TWO OTHER CHANNELS. ONE OF THEM IS THE CLEAR LAKE SHORES CANAL, WHICH IS BEING ANALYZED IN THIS STUDY. JARBO BAYOU DRAINS APPROXIMATELY 3068 ACRES OF DRAINAGE AREA. THE FLOWS FROM THE DRAINAGE AREA HAVE BEEN OBTAINED FROM THE FEMA APPROVED EFFECTIVE HEC-HMS MODEL FOR CLEAR CREEK FOR HARRIS COUNTY. THE FEMA EFFECTIVE HEC-HMS MODEL HAS A SUB-BASIN REPRESENTING JARBO BAYOU DRAINAGE AREA IDENTIFIED AS JB100A. THE 100-YEAR FLOW FROM THE JARBO BAYOU SUB-BASIN AS PER THE EFFECTIVE MODEL IS 3895 CFS. AT THE DOWNSTREAM END, THE FLOW IS SPLIT BETWEEN THE JARBO BAYOU, CLEAR LAKE SHORES CANAL, AND ANOTHER CANAL. FOR THE PURPOSES OF THIS STUDY, IT WAS DETERMINED THAT IT WOULD BE REASONABLY CONSERVATIVE TO ASSUME THAT THE FLOW SPLITS EQUALLY BETWEEN THE THREE CHANNELS, RESULTING IN A THIRD OF THE FLOW (1328 CFS) ALONG CLEAR LAKE SHORES CANAL. SIMILAR APPROACH WAS USED FOR THE 10-YEAR STORM EVENT FREQUENCY AS WELL.



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
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 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

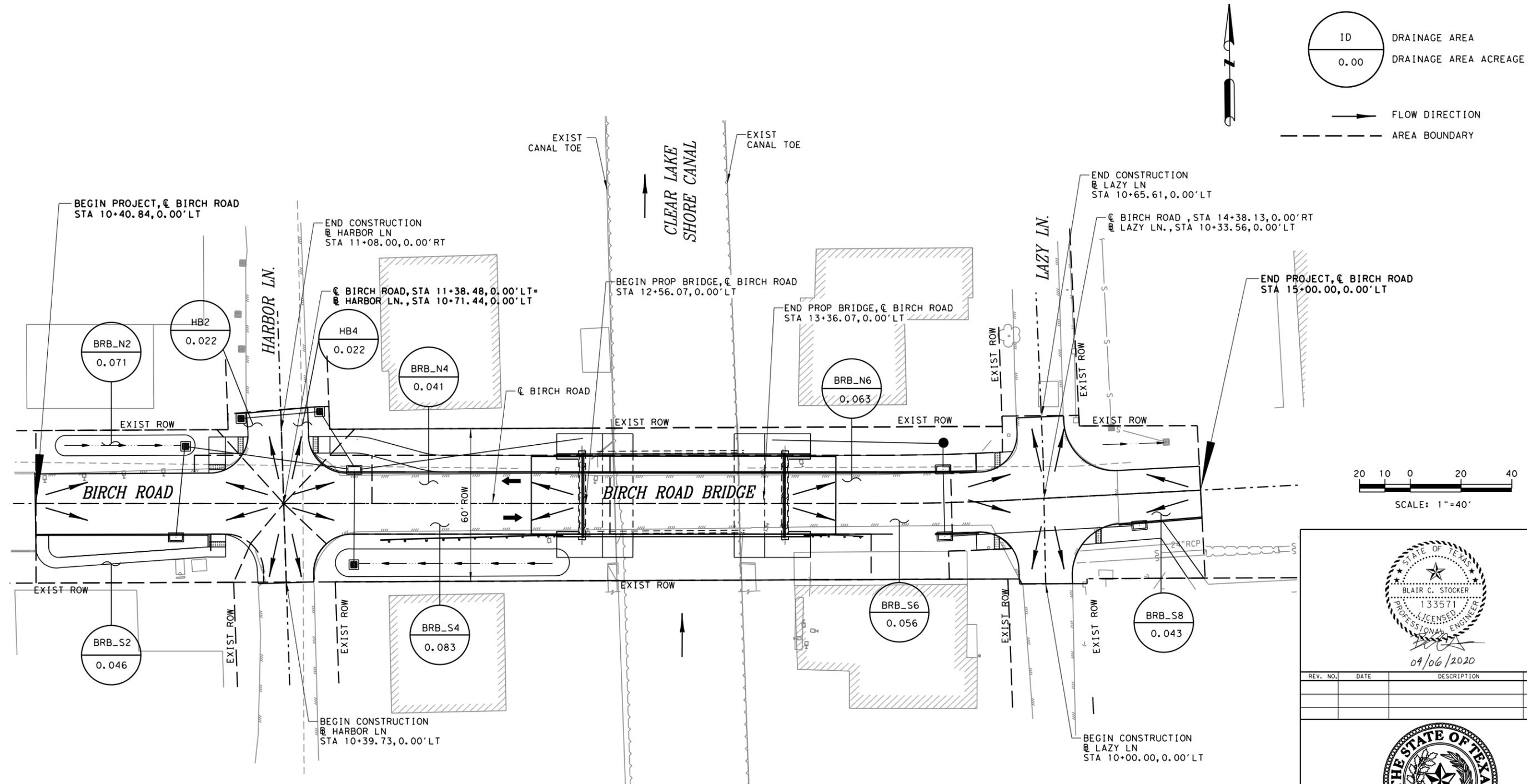
GALVESTON COUNTY, TEXAS

**BIRCH ROAD BRIDGE REPLACEMENT
 OVERALL DRAINAGE AREA MAP**

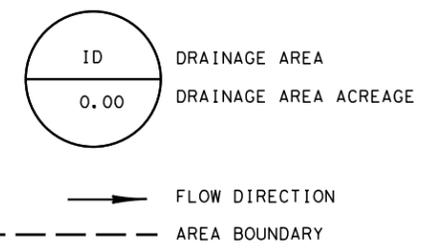
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RUNOFF COMPUTATIONS											
INLET ID	DRAINAGE AREA SYSTEM ID	TOTAL ACRES (AC)	COMPOSITE AREA, (AC)		WEIGHTED C	C*A	Tc (ACTUAL)	Tc (MIN)	FREQ (YR)	INTENSITY I (IN/HR)	DISCHARGE Q (CFS)
			PAVEMENT (C=0.90)	GRASS (C=0.35)							
BRB-N2	BIRCH ROAD BRIDGE	0.071	0.033	0.038	0.606	0.043	2.890	10.000	5	6.516	0.280
BRB-N4	BIRCH ROAD BRIDGE	0.041	0.041		0.900	0.037	0.580	10.000	5	6.516	0.240
BRB-N6	BIRCH ROAD BRIDGE	0.063	0.063		0.900	0.057	0.730	10.000	5	6.516	0.369
BRB-S2	BIRCH ROAD BRIDGE	0.046	0.038	0.008	0.804	0.037	0.510	10.000	5	6.516	0.241
BRB-S4	BIRCH ROAD BRIDGE	0.083	0.035	0.048	0.582	0.048	3.090	10.000	5	6.516	0.315
BRB-S6	BIRCH ROAD BRIDGE	0.056	0.044	0.012	0.782	0.044	0.730	10.000	5	6.516	0.285
HB2	BIRCH ROAD BRIDGE	0.022	0.008	0.014	0.550	0.012	0.180	10.000	5	6.516	0.079
HB4	BIRCH ROAD BRIDGE	0.022	0.008	0.014	0.550	0.012	0.180	10.000	5	6.516	0.079
BRB-S8	BIRCH ROAD BRIDGE	0.043	0.038	0.005	0.836	0.036	0.440	10.000	5	6.516	0.234



REV. NO.	DATE	DESCRIPTION	BY

DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT

DRAINAGE AREA MAP
 STA 10+40.84 TO STA 15+00.00

SHEET 1 OF 1

Job No.:	Scale:	Date: February, 2020	HORIZ:	NO. 53
Drn By: ic	Scale:			
Chk By: ic				

JOB DESCRIPTION: BIRCH ROAD
 ANALYSIS FREQUENCY: 100 YEARS
 MEASUREMENT UNITS: ENGLISH
 OUTPUT FOR DESIGN FREQUENCY OF: 5 YEARS

Runoff Computation for Design Frequency

ID	Total Area	Pavment	Grass	Cumm. Tc(Used)	Tc Intensity	Freq Supply Q	Total Q
	(acres)	C=0.90	C=0.35	C Value	(min)	(min)	(in/hr)
BRB-N2	0.071	0.033	0.038	0.606	2.890	10.000	6.516
BRB-N4	0.041	0.041		0.900	0.580	10.000	6.516
BRB-N6	0.063	0.063		0.900	0.730	10.000	6.516
BRB-S2	0.046	0.038	0.008	0.804	0.510	10.000	6.516
BRB-S4	0.083	0.035	0.048	0.582	3.090	10.000	6.516
BRB-S6	0.056	0.044	0.012	0.782	0.730	10.000	6.516
HB2	0.022	0.008	0.014	0.550	0.180	10.000	6.516
HB4	0.022	0.008	0.014	0.550	0.180	10.000	6.516
BRB-S8	0.043	0.038	0.005	0.836	0.440	10.000	6.516

SAG INLETS CONFIGURATION DATA

Inlet ID	Inlet Type	Curb Length	Perimeter	Grate Area	Left-Slope Long	Left-Slope Trans	Right-Slope Long	Right-Slope Trans	Gutter n	Depth Allowed	Critic Elev
		(ft)	(ft)	(sf)	(%)	(%)	(%)	(%)		(ft)	(ft)
BRB-N2	Grate	n/a	9.92	4.14	0.10	2.90	0.10	25.00	0.03	n/a	7.79
BRB-N4	Curb	5	n/a	n/a	0.83	2.00	3.04	2.00	0.015	0.25	7.97
BRB-S4	Grate	n/a	9.92	4.14	0.56	11.41	0.56	17.20	0.03	n/a	8.20
HB2	Grate	n/a	9.92	4.14	0.10	33.33	0.10	8.69	0.03	n/a	7.75
HB4	Grate	n/a	9.92	4.14	0.10	14.28	0.10	33.33	0.03	n/a	7.68
BRB-S8	Curb	5	n/a	n/a	2.59	2.00	0.12	2.00	0.015	0.25	7.52

SAG INLETS COMPUTATION DATA

Inlet ID	Inlet Type	Curb Length	Perim	Grate Area	Total Q	Inlet Capacity	Total Head	Ponded Width Allowed	Total Ponded Width	Ponded Left	Ponded Right
		(ft)	(ft)	(sf)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)
BRB-N2	Grate	n/a	9.92	4.14	0.280	6.689	0.06	12	0.21	0.98	1.66
BRB-N4	Curb	5	n/a	n/a	0.240	6.260	0.06	12	2.84	2.34	3.09
BRB-S4	Grate	n/a	9.92	4.14	0.315	6.689	0.06	12	2.86	3.86	6.47
HB2	Grate	n/a	9.92	4.14	0.022	6.689	0.05	12	2.84	2.34	3.08
HB4	Grate	n/a	9.92	4.14	0.022	6.689	0.05	12	2.84	2.34	3.08
BRB-S8	Curb	5	n/a	n/a	0.234	6.260	0.06	12	2.81	3.16	3.36

On Grade Inlets Configuration Data

Inlet ID	Inlet Type	Inlet Length	Grate Inlet	Slope Long	Slope Trans	Gutter n	Gutter Depr.	Grate Width	Grate Type	Ponded Width Allowed	Critic Elev.
		(ft)		(%)	(%)		(ft)	(ft)		(ft)	(ft)
BRB-S2	Curb	5	n/a	0.832	2	0.015	0.25	n/a	n/a	12.00	8.76
BRB-S6	Curb	5	n/a	2.065	2	0.015	0.25	n/a	n/a	12.00	8.31
BRB-N6	Curb	5	n/a	2.065	2	0.015	0.25	n/a	n/a	12.00	8.31

On Grade Inlets Computation Data

Inlet I	Inlet	Q Runoff	Intercept Capacity	Q Bypass Allow	Q Bypass Actual	Q Total	To Inlet	Required Length	Actual Length
		(cfs)	(cfs)	(cfs)	(cfs)	(cfs)		(ft)	(ft)
BRB-S2	Curb	0.214	0.241	0.250	0.000	0.214		3.260	5
BRB-S6	Curb	0.285	0.285	0.250	0.000	0.285		4.240	5
BRB-N6	Curb	0.369	0.369	0.250	0.000	0.369		5.000	5

CONVEYANCE CONFIGURATION DATA

Link ID	Node ID	Upstream	Downstream	Flowline Elevation		Shape	# Barrels	Span	Rise	Length	Slope	n Value
				Upstream	Downstream							
				(ft)	(ft)			(ft)	(ft)	(ft)	(%)	
P2	BRB-N4	OUT_N1		2.34	2.18	Circular	1	n/a	2.00	80.90	0.20	0.015
P6	BRB-S4	BRB-N4		2.41	2.34	Circular	1	n/a	2.00	37.26	0.20	0.015
P5	HB4	BRB-N4		2.39	2.34	Circular	1	n/a	2.00	26.60	0.20	0.015
P10	BRB-N2	BRB-N4		2.47	2.34	Circular	1	n/a	2.00	67.00	0.20	0.015
P4	HB2	HB4		3.26	3.20	Circular	1	n/a	2.00	31.14	0.20	0.015
P12	BRB-S2	BRB-N2		2.54	2.47	Circular	1	n/a	2.00	35.95	0.20	0.015
P18	MH4	OUT_N2		0.60	0.46	Circular	1	n/a	2.00	67.70	0.20	0.015
P16	BRB-N6	MH4		0.62	0.60	Circular	1	n/a	2.00	10.44	0.20	0.015
P14	BRB-S6	BRB-N6		3.54	3.49	Circular	1	n/a	2.00	26.40	0.20	0.015
P22	BRB-S8	BRB-S6		3.69	3.54	Circular	1	n/a	2.00	76.39	0.20	0.015

CONVEYANCE HYDRAULIC COMPUTATION DATA

Tailwater: Out N1=4.97', Out N2=5.82'

Link ID	Hydraulic	Gradeline	Friction Slope	Depth		Velocity		Discharge	Capacity	Junction Loss
	Upstream Elevation	Downstream Elevation		Uniform	Actual	Uniform	Actual			
	(ft)	(ft)	(%)	(ft)	(ft)	(ft/s)	(ft/s)	(cfs)	(cfs)	(ft)
P2	3.78	3.33	0.00	0.51	0.38	1.94	2.92	1.23	9.43	0.00
P5	3.78	3.78	0.00	0.19	0.63	1.06	0.19	0.16	9.43	0.00
P6	3.79	3.78	0.00	0.26	0.51	1.34	0.50	0.31	9.43	0.00
P10	3.81	3.78	0.00	0.33	0.63	1.54	0.62	0.52	9.43	0.00
P4	3.78	3.78	0.00	0.14	0.58	0.85	0.11	0.08	9.43	0.00
P12	3.83	3.81	0.00	0.23	0.35	1.22	0.66	0.24	9.43	0.00
P18	4.59	4.21	0.00	0.51	0.39	1.98	2.94	1.26	9.43	0.00
P16	4.59	4.59	0.00	0.37	0.64	1.66	0.76	0.65	9.43	0.00
P20	4.59	4.59	0.00	0.23	0.64	1.20	0.27	0.24	9.43	0.00
P14	4.60	4.59	0.00	0.25	0.62	1.26	0.34	0.29	9.43	0.00
P22	4.60	4.59	0.00	0.23	0.48	1.20	0.40	0.24	9.43	0.00

USER: 101.39; 39 AM
 4/3/2020
 pwt: \\us-hou-pw01.dannennaum.com\Transportation\5166-01\Design\04 DRAINAGE COMPUTATIONS.dgn



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

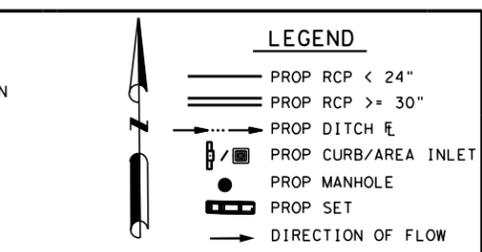
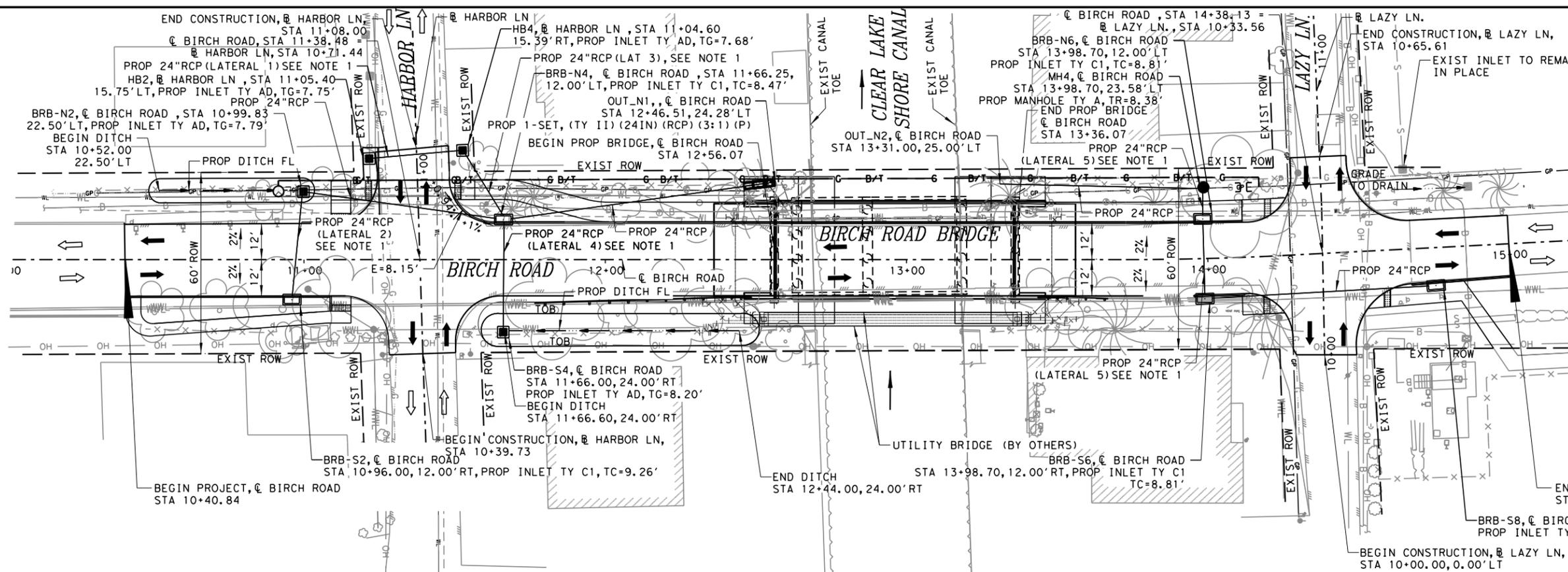
GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 BIRCH ROAD
 HYDRAULIC COMPUTATIONS

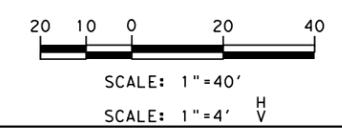
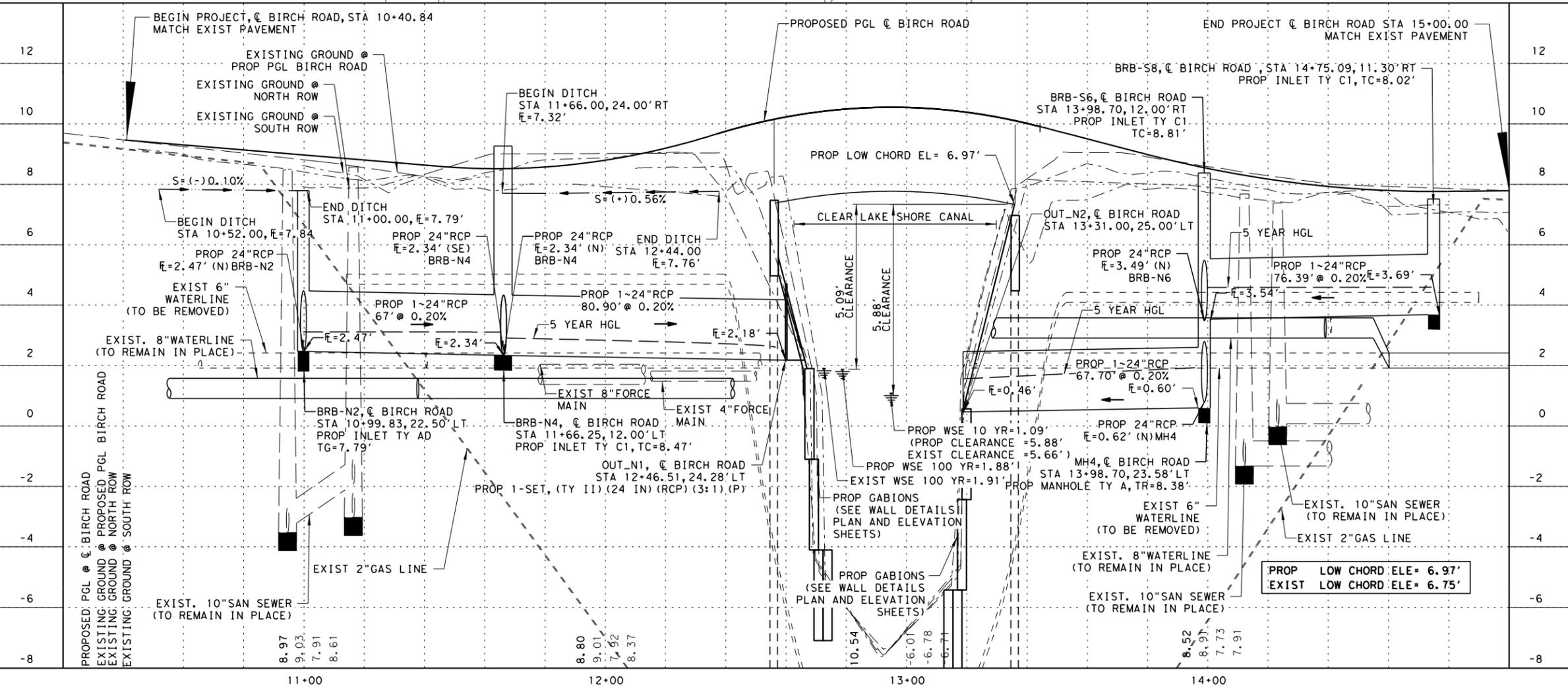
SHEET 1 OF 1

Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	
Drn By: ic	VERT:	
Chk By: ic		NO. 54

USER: 101.391.46 AM
 4/3/2020
 pwt:\us-hou-pw01.dannenbaum.local\damnenbaum\Documents\Transportation\5166-01\Design\04 DRAINAGE.B. PLAN & PROFILE\5166_PP01.dgn



- NOTES:
1. SEE LATERAL SHEETS FOR DETAILS.
 2. STORM SEWER LENGTH SHOWN IS CENTERLINE TO CENTERLINE OF DRAINAGE STRUCTURES WHICH DIFFERS FROM PAY LENGTH IN QUANTITY SHEET.
 3. CURB INLET OFFSETS ARE TO FACE OF CURB.
 4. ALL DIMENSIONS FOR GRATE INLETS ARE TO CENTER OF GRATE.
 5. ALL DITCHES ARE V-SHAPE UNLESS OTHERWISE NOTED.
 6. WATER SURFACE ELEVATIONS COMPUTED USING HEC-RAS HYDRAULIC MODELING SOFTWARE. REFER TO BIRCH ROAD BRIDGE HYDRAULIC STUDY REPORT BY DANNENBAUM ENGINEERING CORPORATION DATED JUNE 2019.
 7. UTILITY LOCATIONS SHOWN ARE APPROXIMATE. CONTRACTOR SHALL VERIFY LOCATION OF EXISTING UTILITIES PRIOR TO PLACING PROPOSED STORM SEWER.



REV. NO.	DATE	DESCRIPTION	BY



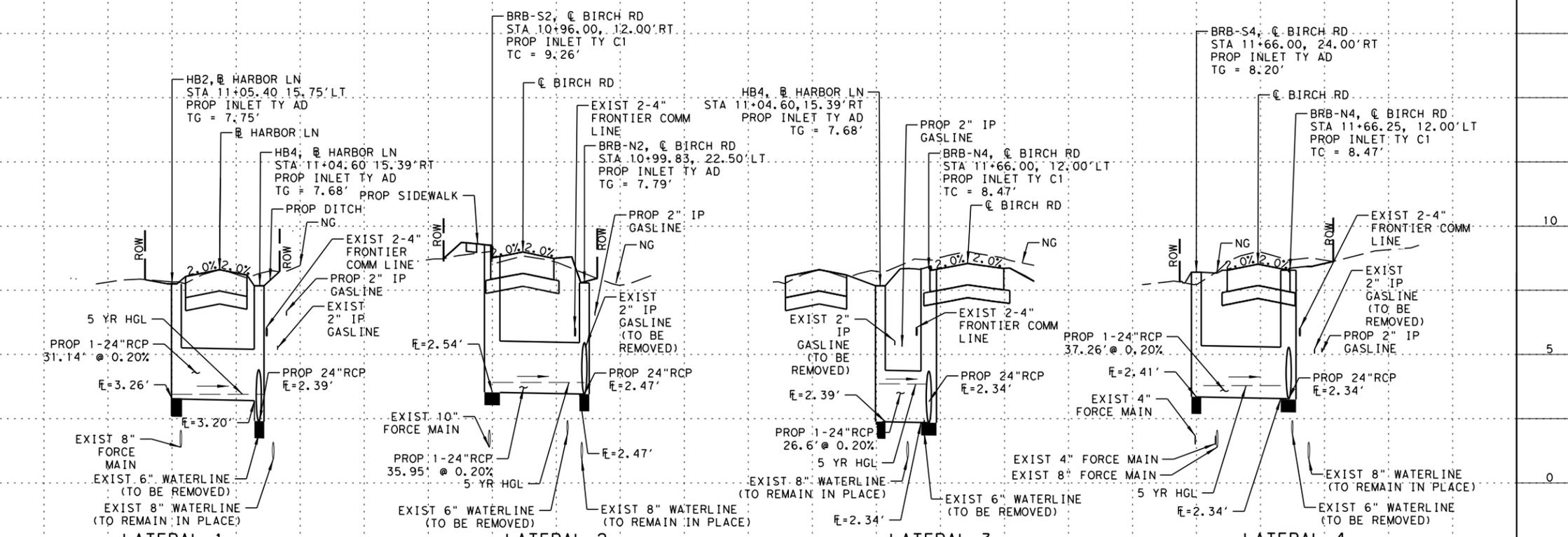
DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

**BIRCH ROAD BRIDGE REPLACEMENT
 DRAINAGE PLAN & PROFILE
 STA 10+40.84 TO STA 15+00.00**

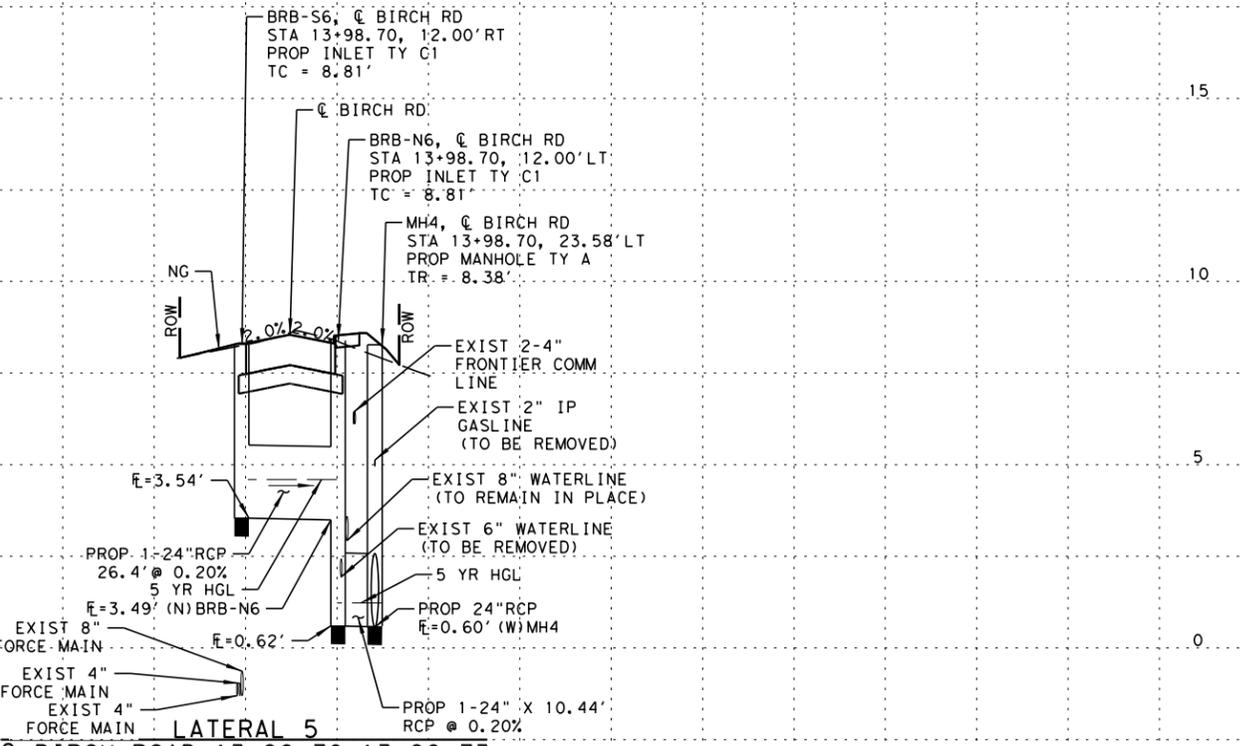
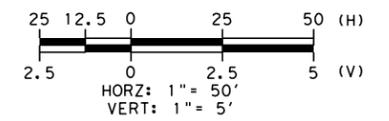
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Date: February, 2020	HORZ:	
Drn By: ic	VERT:	NO. 55
Chk By: ic		

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 4/3/2020
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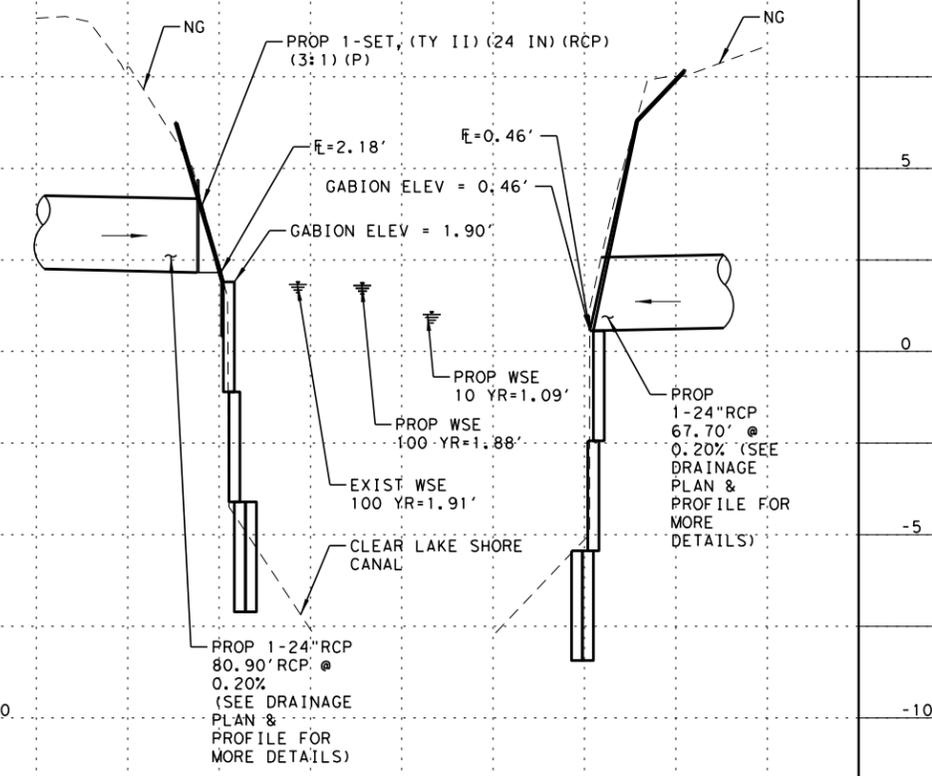
- NOTES:
1. STORM SEWER LENGTH SHOWN IS CENTERLINE TO CENTERLINE OF DRAINAGE STRUCTURE WHICH DIFFERS FROM PAY LENGTH IN QUANTITY SHEET.
 2. CURB INLET OFFSETS ARE TO FACE OF CURB.
 3. ALL DIMENSIONS FOR GRATE INLETS ARE TO CENTER OF GRATE.



LATERAL 1 HARBOR LANE 11+05.40-11+04.60 FROM HB2 TO HB4
LATERAL 2 BIRCH ROAD 10+96.00-10+99.83 FROM BRB-S2 TO BRB-N2
LATERAL 3 BIRCH ROAD 11+04.60-11+66.00 FROM HB4 TO BRB-N4
LATERAL 4 BIRCH ROAD 11+66.00-11+66.00 FROM BRB-S4 TO BRB-N4



LATERAL 5 BIRCH ROAD 13+98.70-13+98.73 FROM BRB-S6 TO BRB-N6
 BIRCH ROAD 13+98.70-13+98.73 FROM BRB-N6 TO MH4



OUTFALL N1 BIRCH RD 12+56.64 OUTFALL OUT_N1
OUTFALL N2 BIRCH RD 13+31.00 OUTFALL OUT_N2



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

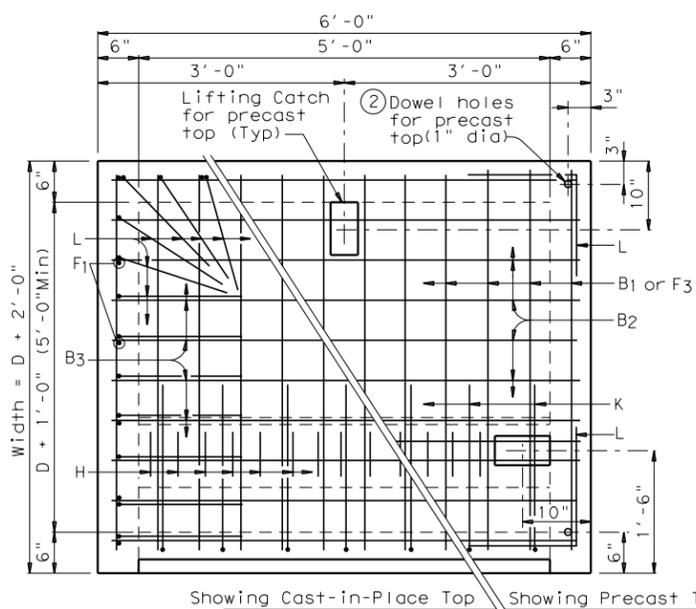
BIRCH ROAD BRIDGE REPLACEMENT
 LATERALS

Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	1 OF 1
Drn By: ic	VERT:	NO.
Chk By: ic		56

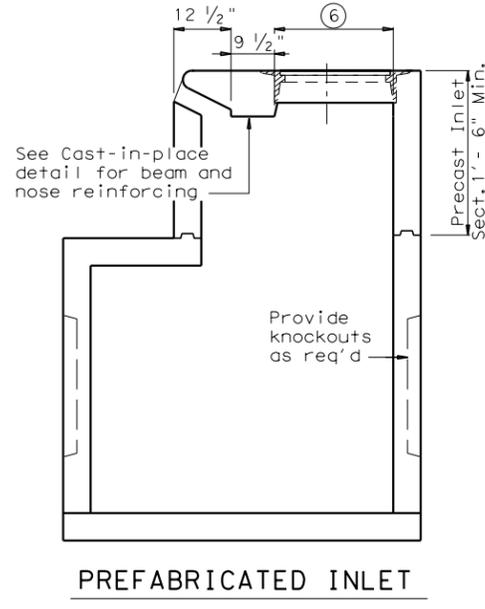
REINF STEEL

Bar	Size	Spacing
B1	#4	6"
B2	#5	6"
B3	#4	6"
C1-2	#4	12"
C3-4	#4	9"
C5	#6	9"
C6	#4	9"
D	#4	9"
E	#4	12"
F1-5	#4	12"
G	#4	6"
H	#3	4"
K	#4	9"
L	#4	6"

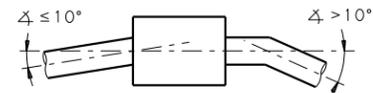
⑨ As shown



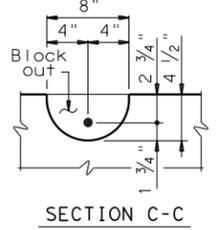
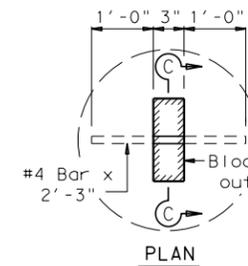
PLAN



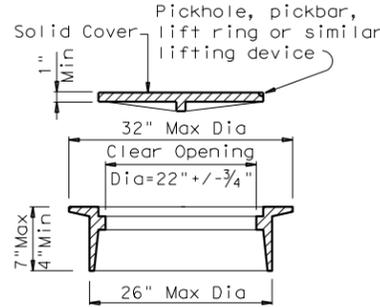
PREFABRICATED INLET



PIPE CONNECTION DETAIL
Connecting pipes should enter within 10° of normal to inlet wall. If necessary, pipe elbow or curved approach alignment should be used to stay within this limit.

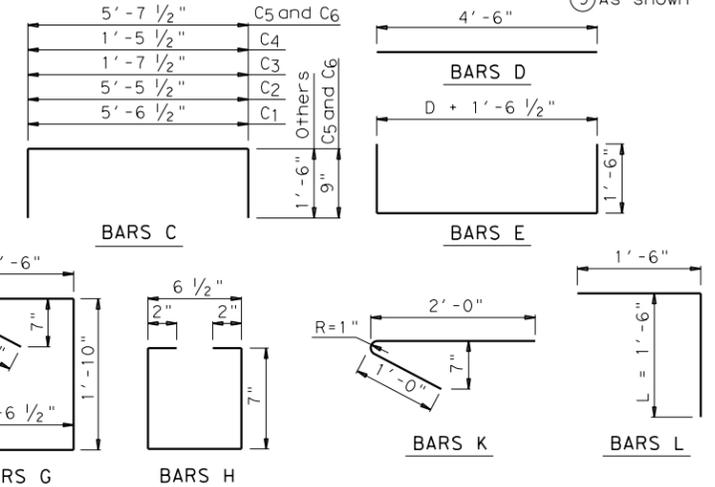


LIFTING CATCH



RING AND COVER DETAILS

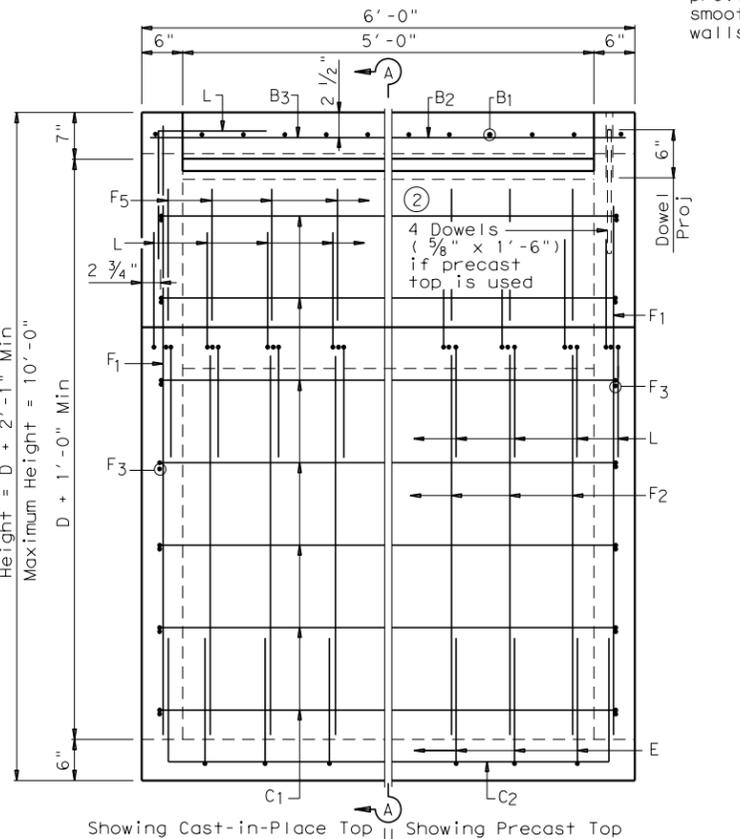
EJIW No V-1814 or Neenah No R5900 FTX



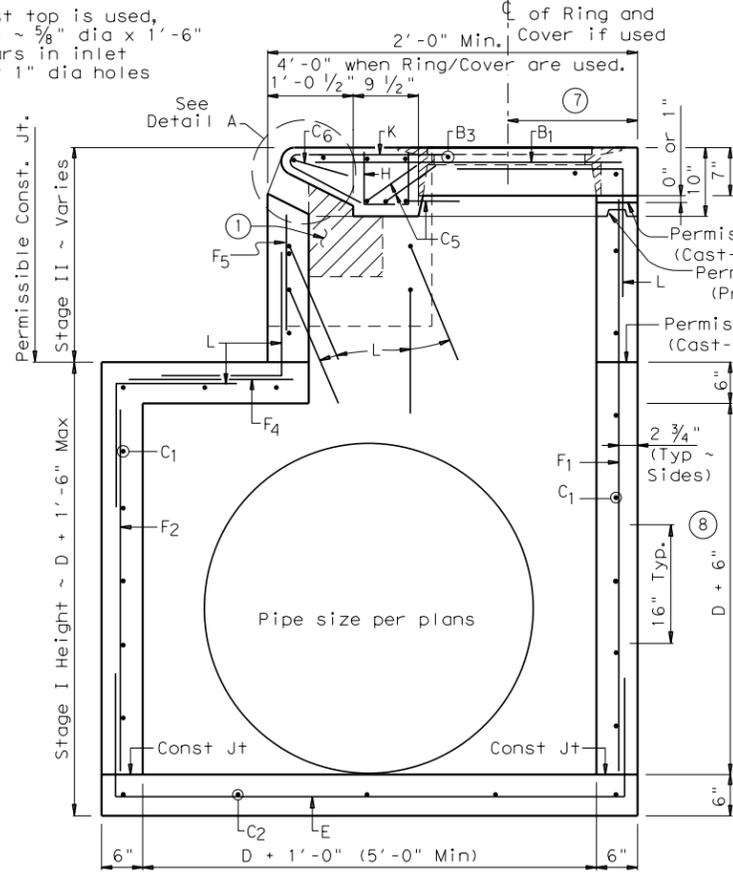
② If precast top is used, provide 4 ~ 5/8" dia x 1'-6" smooth bars in inlet walls for 1" dia holes

⑥ For reinforcing steel and dimensions not shown, see fabricator's shop drawings. Structure shall be of the size required to accommodate size of pipe shown elsewhere in the plans. Length of inlet = 5'-0"

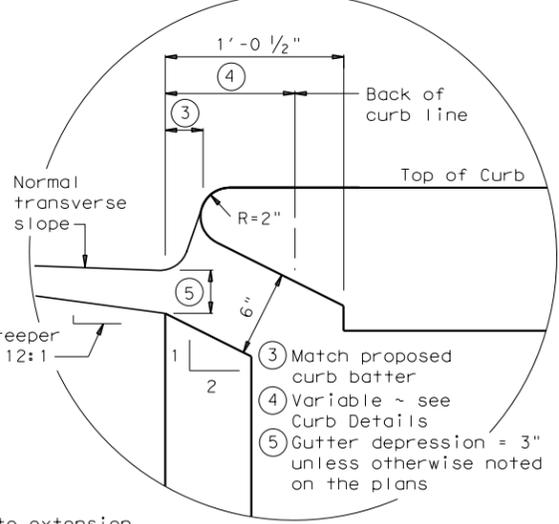
⑦ 1'-7" Usual, Adjust placement of Ring and Cover as necessary to avoid conflict with Bars H.



ELEVATION

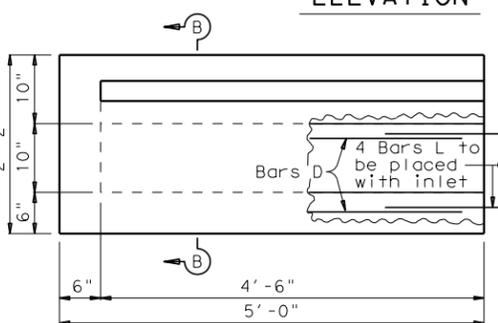


SECTION A-A

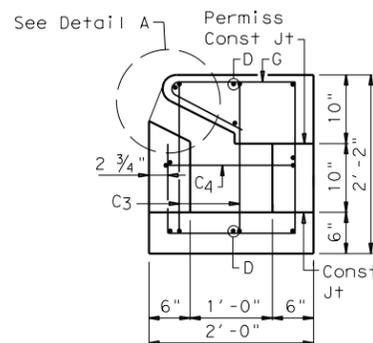


DETAIL A

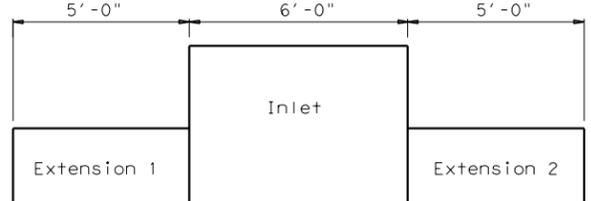
GENERAL NOTES:
No alternate designs nor alternate details shall be permitted for precast or cast in place inlets.
Quantities shown herein are for Contractor's information only. Unless otherwise shown in the plans, payment will be made for each inlet of the type specified and for each extension. Each five foot curb opening of extension is considered "one extension" regardless of whether placed monolithically or precast. Extension length shall be in multiples of 5 feet.
Engineer has the option of specifying cast-in-place top with ring and cover or removable precast top as specified elsewhere in plans. Shop drawings will be required for precast construction of inlets.
In areas of conflict between reinforcing steel, blockouts, pipes, anchor bolts or other reinforcing steel, the reinforcement shall be bent or adjusted to clear as directed by the Engineer.
Ring and cover shall conform to the requirements of AASHTO M306, "Standard Specification for Drainage Structure Castings". Materials shall conform to ASTM A48, Class 35B for gray iron castings or ASTM A536, Grade 65-45-12 for ductile iron castings. Aluminum alloy castings shall not be permitted.



EXTENSION ELEVATION



SECTION B-B



EXTENSION PLACEMENT

Note: If more than one extension is required, they should be located as indicated above. No slope is required in flowline of extension.

INSTALL A 3 FT. (HORIZ.) x 6 IN. (VERT.) OPENING ON THE BACK OF THE INLET WHEN SPECIFIED ELSEWHERE ON THE PLANS. MOVE STEPS AS NEEDED. NO REINFORCING ON OPENING/ON 2 IN. ADJACENT TO OPENING.
DESIGNERS: CLARIFY FLOWLINE OF OPENING AND INCLUDE OPENING IN HYDRAULIC CALCULATIONS.

D = Diameter
R = Radius

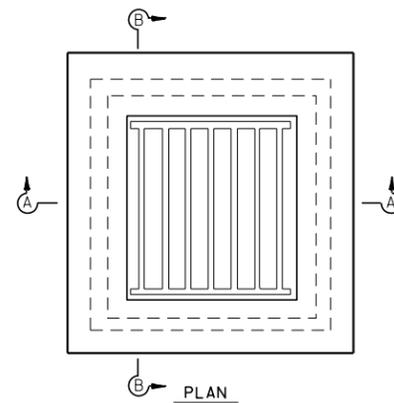
Texas Department of Transportation
Houston District

CURB INLET TYPE C1 (WITH OR WITHOUT EXTENSION)

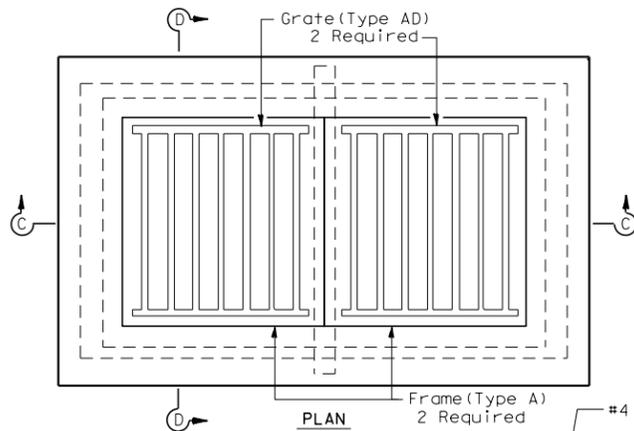
HIL-C1

FILE: STDD2.DGN	DW: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	STD:
© TxDOT Feb 2010	DIST	FED REG	PROJECT NO.	SHEET	
2/2010 Note for alternate design and opening on the back of inlet.	HOU			57	
10/2016 Removed ladder rung and wordings.	COUNTY	CONTROL	SECT	JOB	HIGHWAY
	GALVESTON				BR

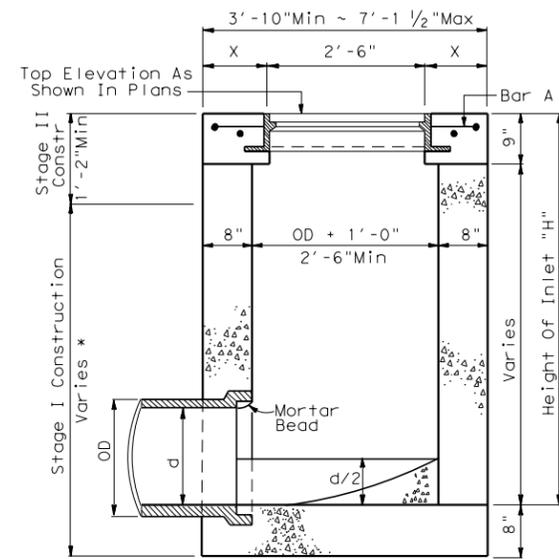
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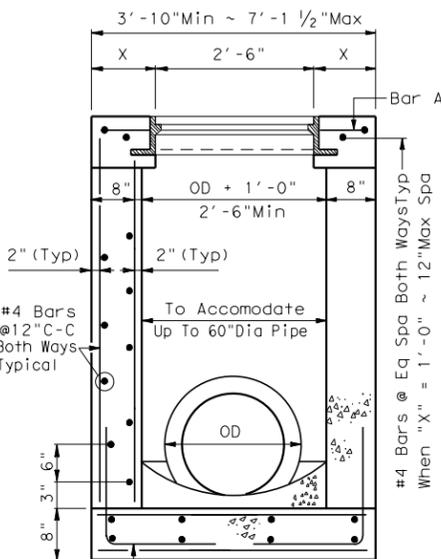
* But Not Less Than Six Inches Over Highest Entering Pipe.
X = 8" Min to 3'-9" Max



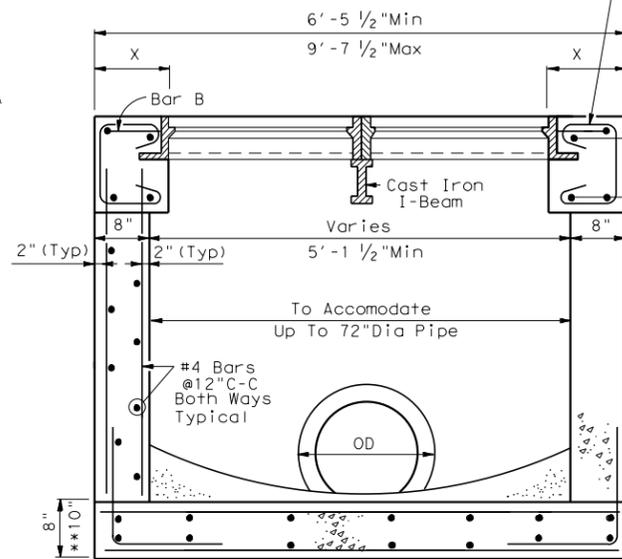
* But Not Less Than Six Inches Over Highest Entering Pipe.
** For Pipe Diameters 66" And Greater



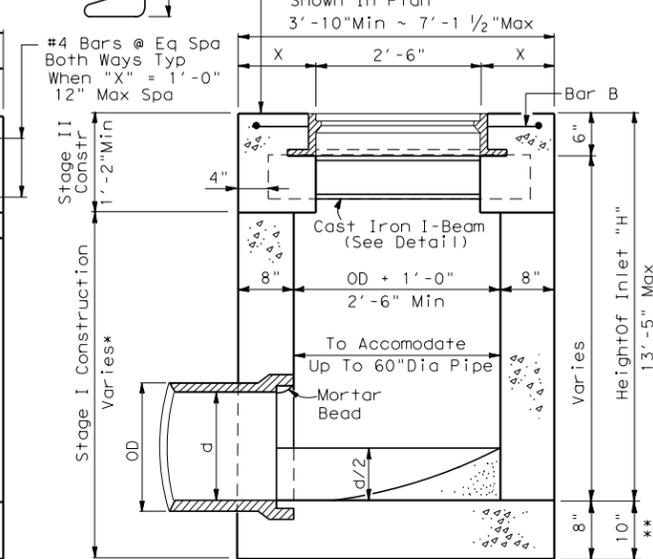
SECTION A-A



SECTION B-B



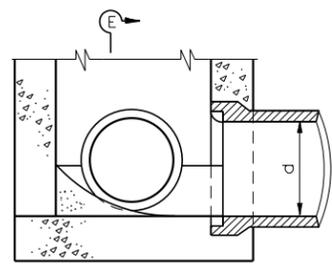
SECTION C-C



SECTION D-D

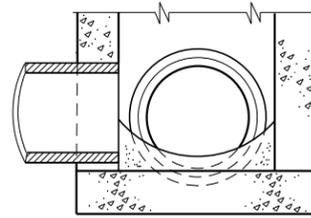
INLET TYPE AD

INLET TYPE AAD

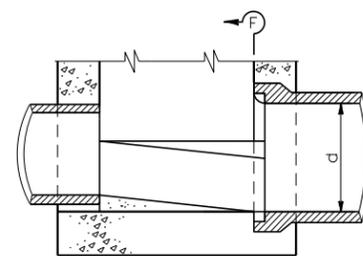


PART SECTION AT INVERT

Showing Shaping Of Invert, Pipe Entering From Adjacent Sides

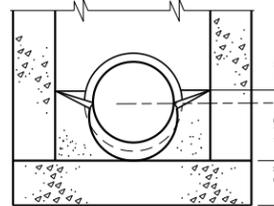


SECTION E-E

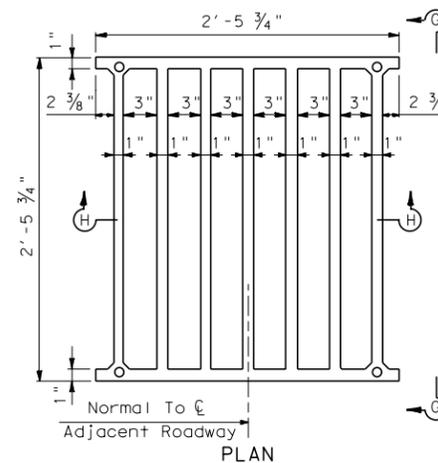


PART SECTION AT INVERT

Showing Shaping Of Invert, Pipe Entering From Opposite Sides



SECTION F-F

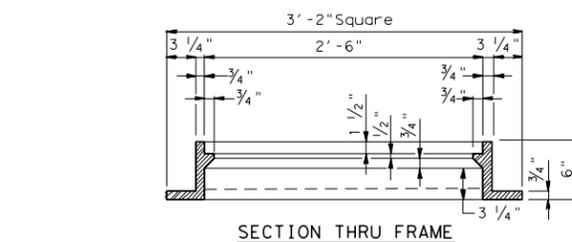


PLAN

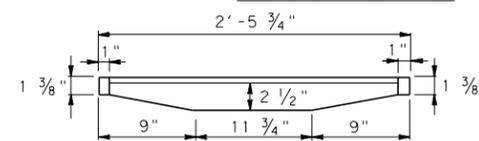
Provide 4 ~ Stainless Steel Hex Head Bolts per Grate

FRAME AND GRATE

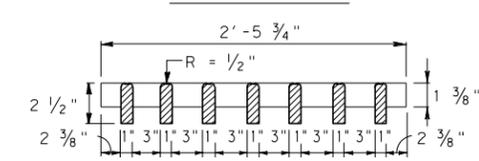
Type AD ~ Neenah No. 3418 or EJIW No. V-4880-2
Type AAD ~ Neenah No. 3418-2 or EJIW No. V-4881-2



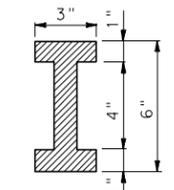
SECTION THRU FRAME



ELEVATION G-G



SECTION H-H



SECTION OF CAST IRON I-BEAM

d = Diameter
R = Radius

GENERAL NOTES:

Type AD Inlet contains a single frame with grate. Type AAD Inlet contains a double frame and double grate with an I-beam.

Frame and Grates may be gray cast iron.

The Furnishing And Installation Of Cast Iron I-Beams Shall Be Considered Incidental To Inlet (Compl) (Ty AAD) Or Inlet (Stage II) (Ty AAD) As The Case May Be.

Where Size Of Pipes Passing Thru Inlet Exceeds 30", Increase Inside Width To Diameter Of Pipe Plus 1'-0" (OD + 1'-0")

Cast Iron Manhole Steps (See Manhole Details) Spaced At 16" Centers And Located On Wall Specified By The Engineer Shall Be Provided And Installed Where "D" Exceeds 5'-0".

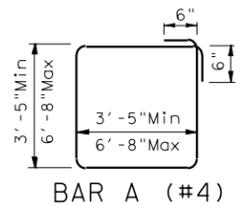
See Standard or Detail Sheet For Excavation and Backfill Diagrams.

Type AD & AAD Inlets Shall Be Built To Stage I And Finished After All Grading Operations Are Substantially Completed.

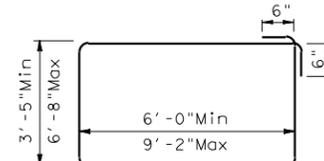
Shop Drawings Will Be Required For Precast Construction Of Inlets.

Upon installation of the grates the threads of the bolts shall be coated with thread lock type adhesive (Lockite or equal). Reapply thread lock adhesive each time grates are removed.

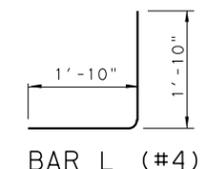
Bolted grates and frames are a matched set, do not unbolt without "Match Marking" so that grates and frames are re-installed as originally built.



BAR A (#4)



BAR B (#4)



BAR L (#4)

NOT FOR TRAFFIC LOADS

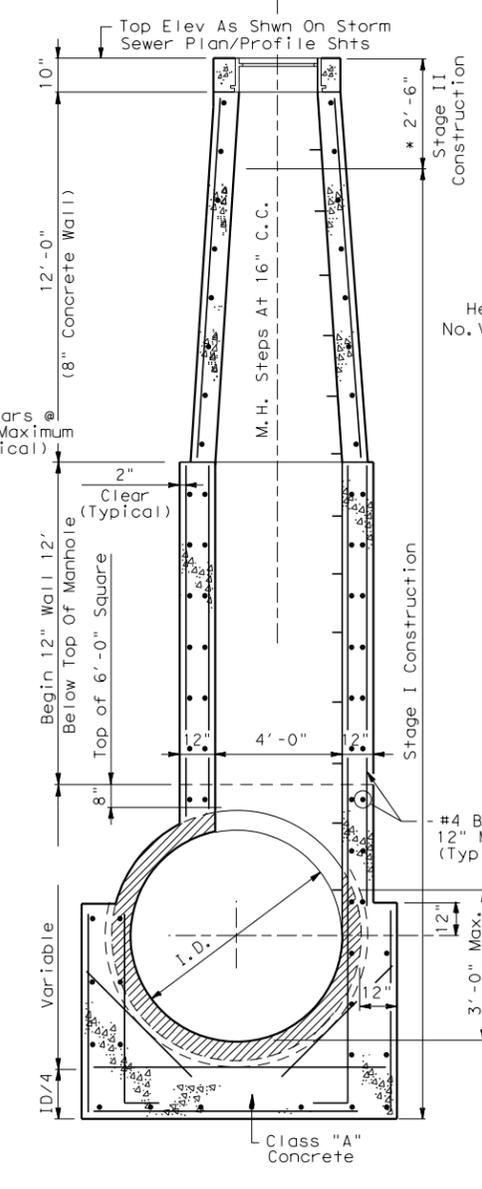
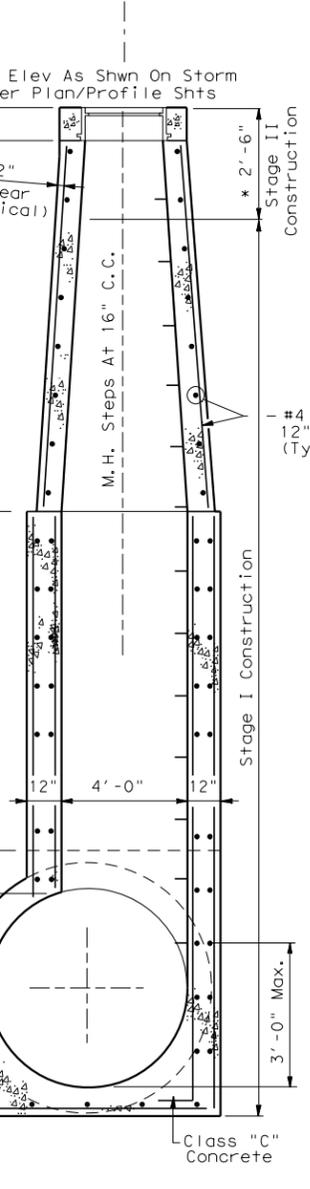
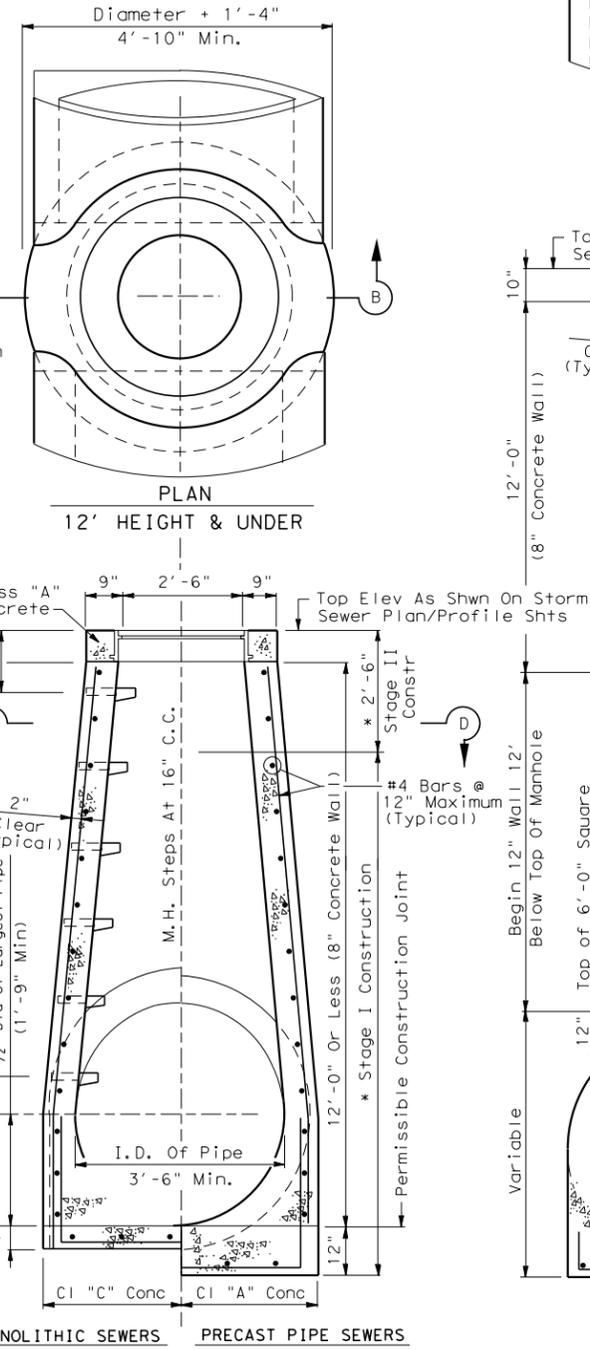
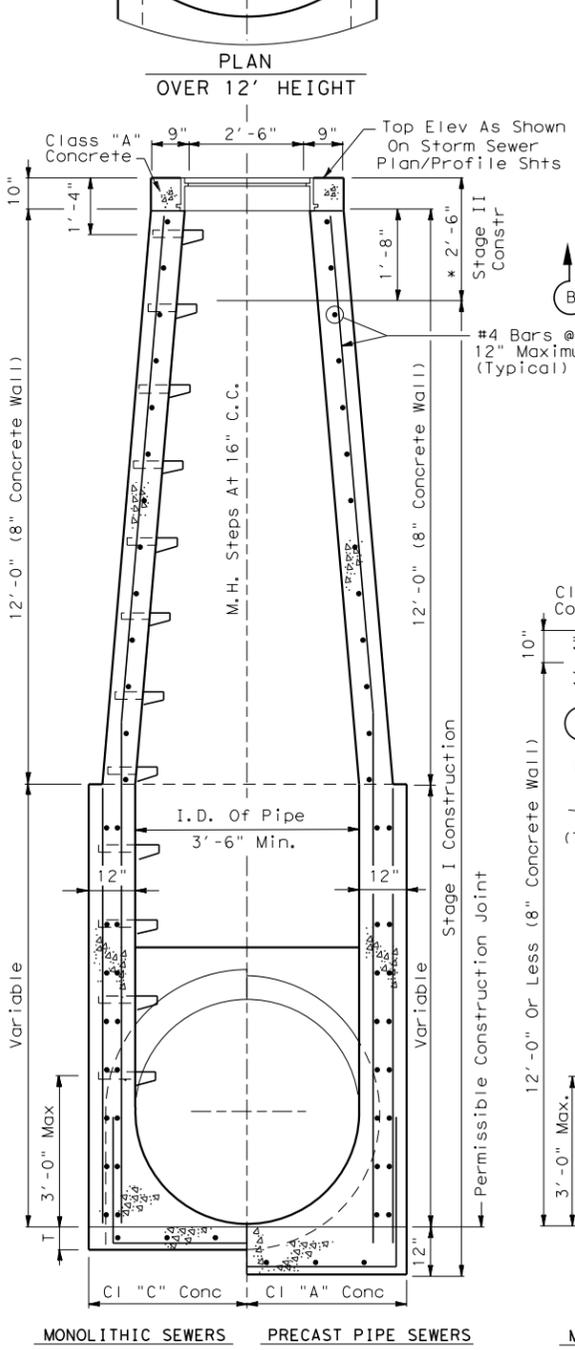
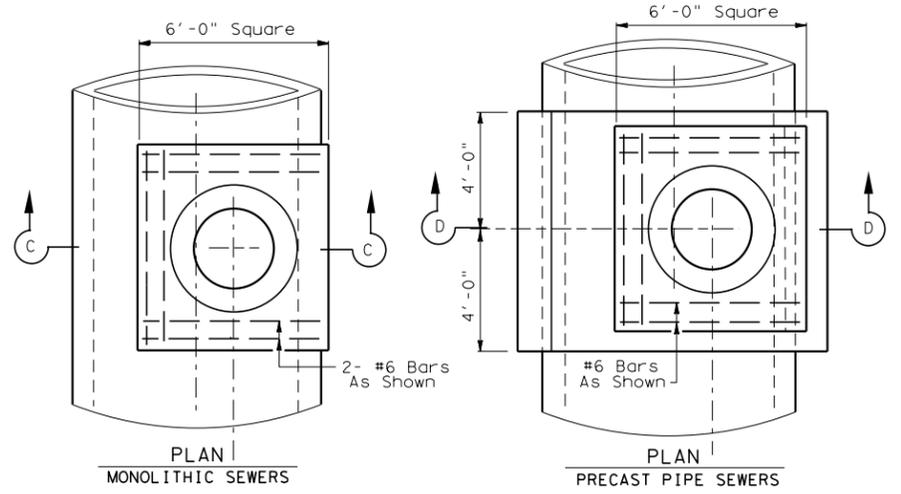
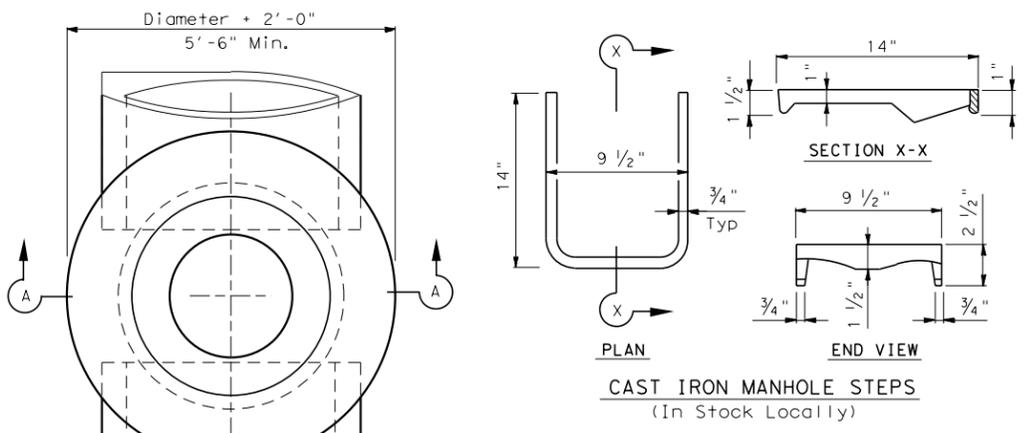


INLETS TYPE AD & AAD

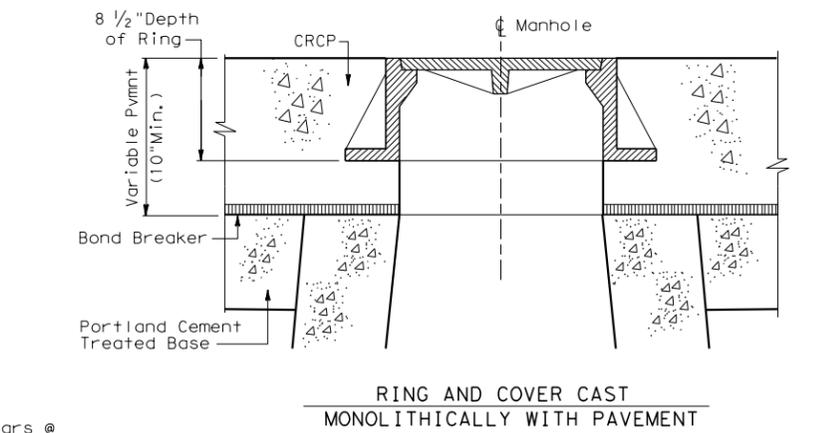
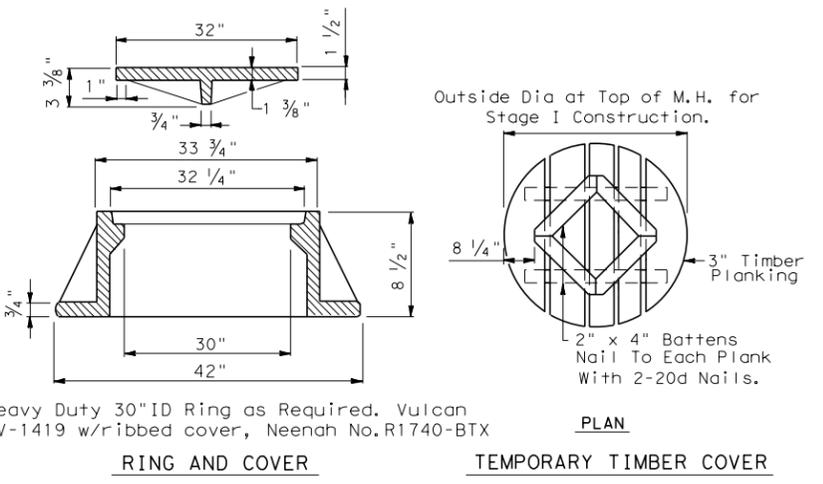
HIL-AD/AAD

FILE:	STDD5.DGN	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT	STD:	
© TxDOT	2014	DIST	FED REG	PROJECT NO.		SHEET		58			
REVISIONS		HOU	COUNTY		CONTROL	SECT	JOB	HIGHWAY		BR	
			GALVESTON								

p:\us-hou-pw01.dannenbaum.local:Dannenbaum\Documents\Transportation\5166-01\Design\04 DRAINAGE\E. STANDARDS\std10.dgn



GENERAL NOTES:
See Standard or Detail Sheet For Excavation And Backfill Diagrams.
All Manholes In Graded Areas Shall Be Built To Stage I And Finished After All Grading Operations Are Substantially Completed.
* But Not Less Than 6 Inches Above Highest Pipe.
"T" Thickness Of Shell Equals That Of Larger Diameter Pipe.
Optional Monolithic Or Precast Designs Permitted. Optional Designs Shall Be Signed & Sealed By A Registered Professional Engineer.



FOR DIRECT TRAFFIC

Texas Department of Transportation
Houston District

MANHOLES
TYPE A & B

MH-A/B

FILE: STDD10.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT	STD:
© TxDOT December 2006	DIST	FED REG	PROJECT NO.	SHEET	
REVISIONS	HOU			59	
3/15 MINOR CORRECTIONS			COUNTY	CONTROL	SECT
			GALVESTON		BR

d = Diameter
R = Radius

STD-D10

REINFORCED CONCRETE PIPE

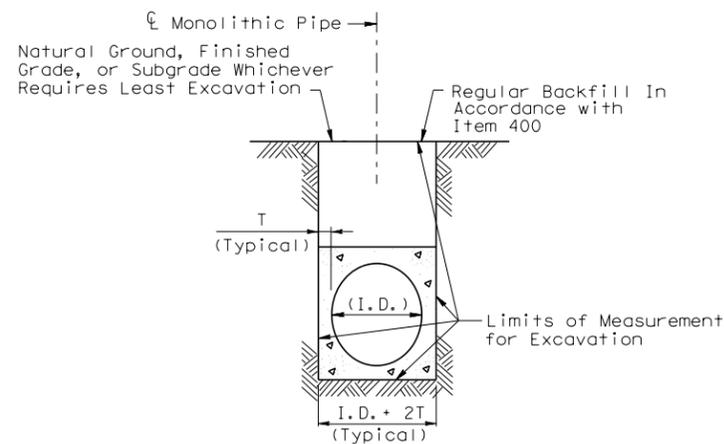
EXCAVATION AND BACKFILL QUANTITIES

PIPE DIA. IN.	T FT.	CULVERT OR SEWER EXCAVATION IN A PAVED OR GRADED AREA	CEMENT STABILIZED BACKFILL IN A PAVED OR GRADED AREA
		C.Y. PER L.F. PER FT. OF DEPTH	C.Y. PER L.F. OF PIPE
18	0.19	0.144	0.383
24	0.23	0.165	0.478
30	0.29	0.188	0.586
36	0.33	0.210	0.692
42	0.38	0.231	0.808
48	0.42	0.327	1.394
54	0.46	0.349	1.560
60	0.50	0.370	1.731
66	0.54	0.392	1.907
72	0.58	0.414	2.088
78	0.62	0.435	2.275
84	0.67	0.457	2.474

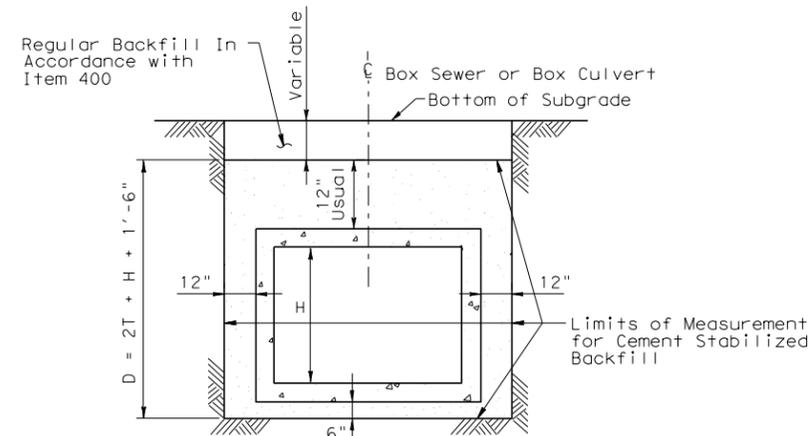
MONOLITHIC PIPE

EXCAVATION QUANTITIES

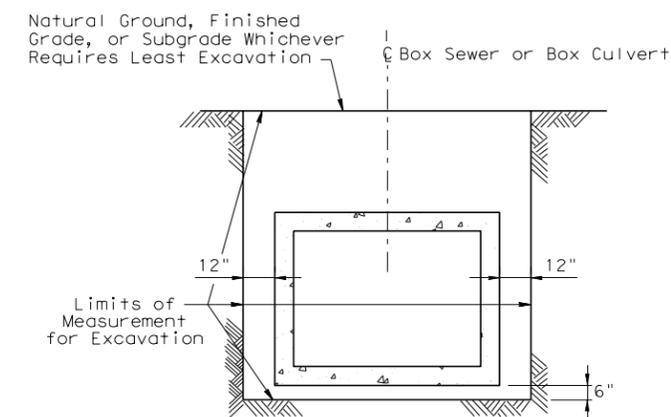
PIPE DIA. IN.	T FT.	EXCAVATION
		C.Y. PER L.F. PER FT. OF DEPTH
36	0.417	0.142
42	0.458	0.164
48	0.458	0.182
54	0.500	0.204
60	0.583	0.228
66	0.583	0.247
72	0.625	0.269
78	0.625	0.287
84	0.625	0.306



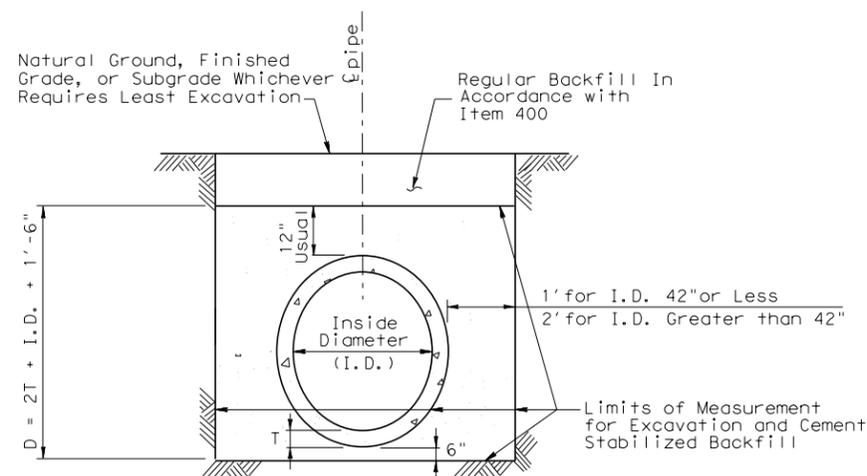
EXCAVATION DETAIL
MONOLITHIC PIPE
IN A PAVED OR GRADED AREA



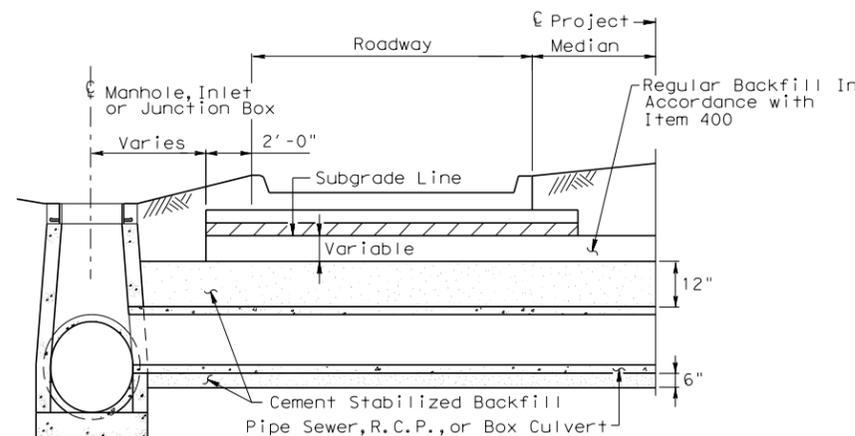
BACKFILL DETAIL
BOX CULVERTS
IN A GRADED OR PAVED AREA
INCLUDING DETOURS *



EXCAVATION DETAIL
BOX CULVERTS
IN A GRADED AREA



EXCAVATION & BACKFILL DETAIL
REINFORCED CONCRETE PIPE
IN A GRADED OR PAVED AREA
INCLUDING DETOURS



BACKFILL DETAIL
AT MANHOLE, INLET OR JUNCTION BOX

NOTE:

Cement stabilized backfill may be omitted in private driveways as indicated elsewhere in the plans.

Rubber gaskets shall be required for all joints on proposed cross drainage, pipe culverts and proposed storm sewer systems, unless otherwise shown in the plans.

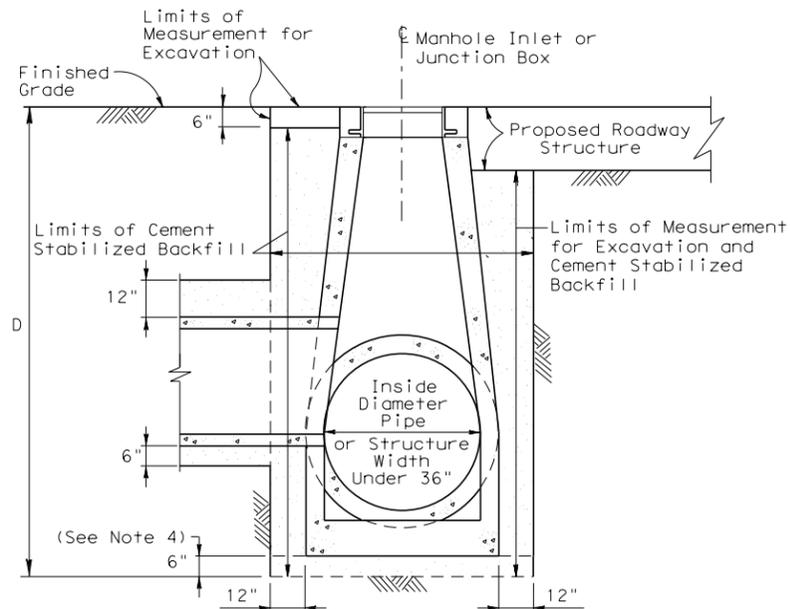
* Backfill with cement stabilized material will be required for all structures under detours unless noted otherwise in the General Notes.

EXCAVATION AND BACKFILL DIAGRAMS

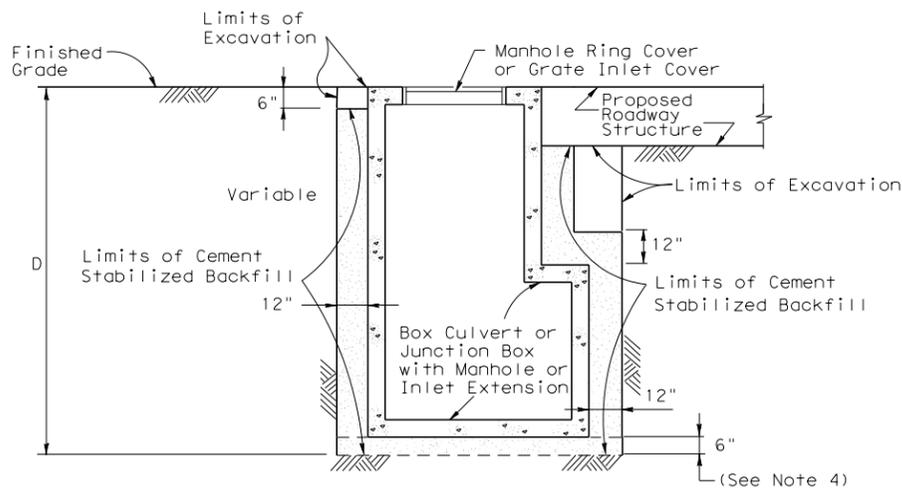
E&BD

D = Depth
H = Height
T = Thickness
R = Radius
Dia = Diameter

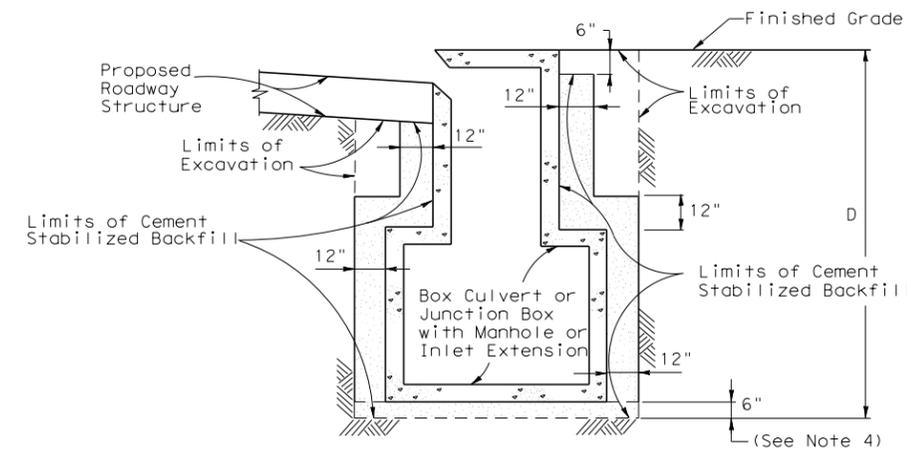
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© TxDOT FEB 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISIONS	HOU			60
REVISD 11/09				
REVISD 2/2010 Added note to Table 1, Sht 2 of 2.				
REVISD 6/12	COUNTY	CONTROL	SECT	JOB
REVISD 9/14	GALVESTON			BR



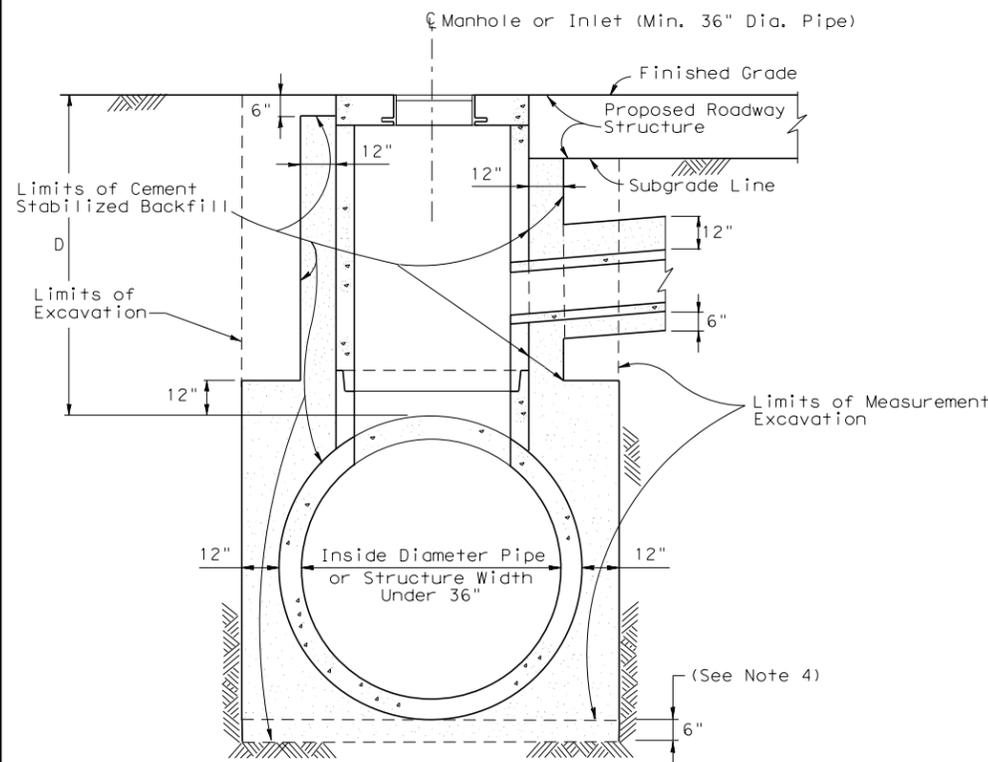
EXCAVATION AND BACKFILL DETAIL
MANHOLES SMALLER THAN 36 IN.
IN A PAVED OR GRADED AREAS
 N. T. S.



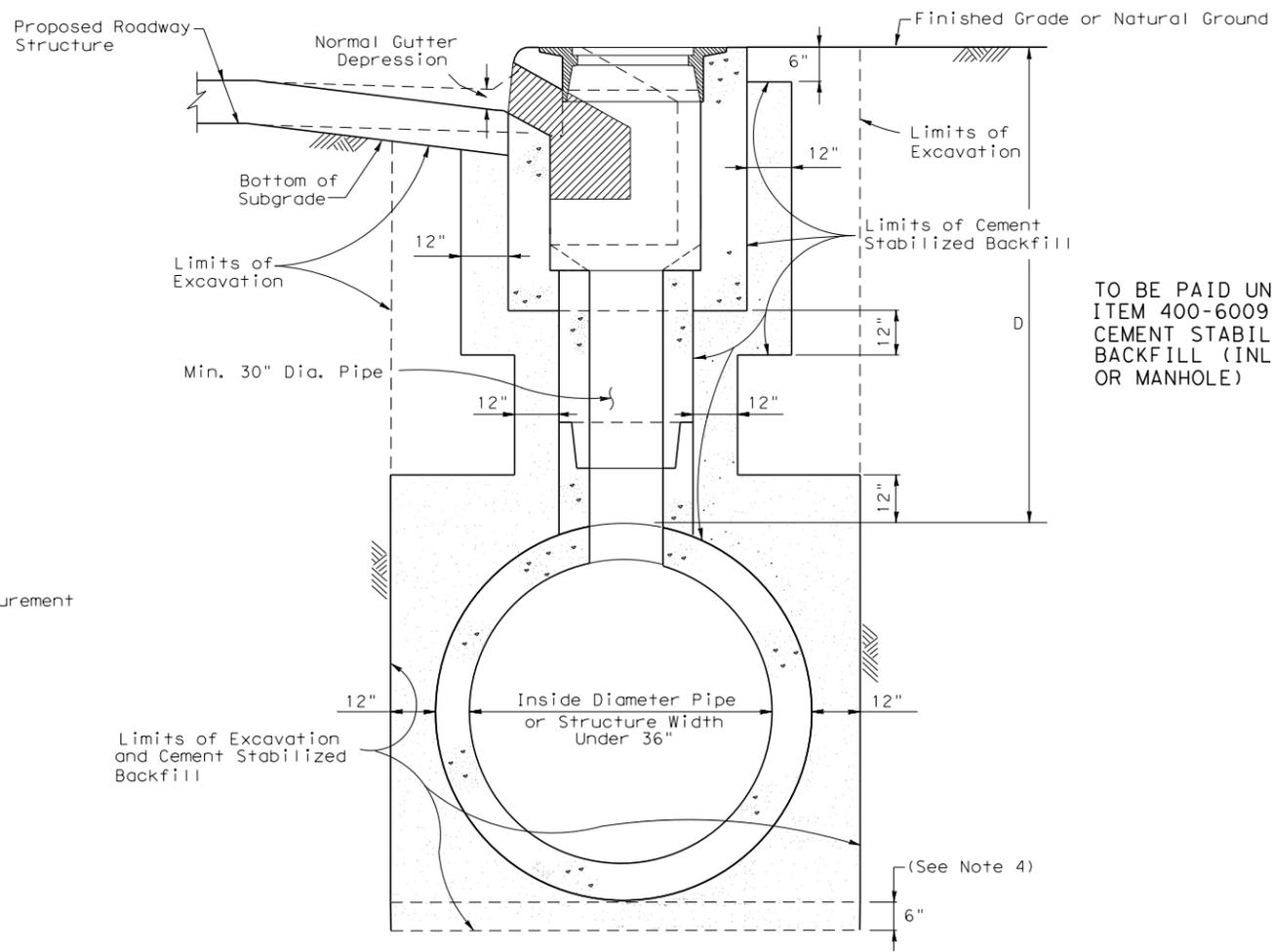
EXCAVATION AND BACKFILL DETAIL
JUNCTION BOXES IN A
PAVED OR GRADED AREA
 N. T. S.



EXCAVATION AND BACKFILL DETAIL
INLET EXTENSIONS ON A BOX CULVERT
IN A PAVED OR GRADED AREA
 N. T. S.



EXCAVATION AND BACKFILL DETAIL
MANHOLES 36 IN. AND GREATER
IN A PAVED OR GRADED AREA
 N. T. S.



EXCAVATION AND BACKFILL DETAIL
CURB INLETS IN A PAVED OR GRADED AREA
 N. T. S.

TO BE PAID UNDER
 ITEM 400-6009
 CEMENT STABILIZED
 BACKFILL (INLET
 OR MANHOLE)

TABLE I	
SCHEDULE FOR PAY QUANTITIES OF CEMENT STABILIZED BACKFILL (SEE NOTE 1)	
MANHOLE OR INLET DEPTH (D) IN FEET	CEMENT STABILIZED BACKFILL IN CUBIC YARDS
0 through 5	5.75
> 5 through 10	8.25
greater than 10	12.75

- NOTES:
1. The Contractor is paid a fixed estimated amount for cement stabilized backfill based on depth (D) and Table 1.
 2. Proposed roadway structure includes pavement, base and any subgrade.
 3. For backfill of intersecting pipes and box culverts, see "Excavation and Backfill Diagram for Pipes and Box Culverts."
 4. 6" cement stabilized backfill will be required only for precast units.

SHEET 2 OF 2



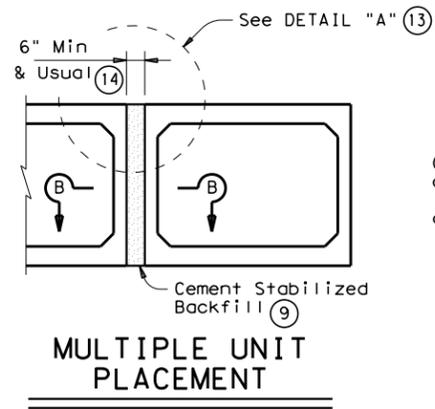
**EXCAVATION AND BACKFILL
 DIAGRAMS**

E&BD

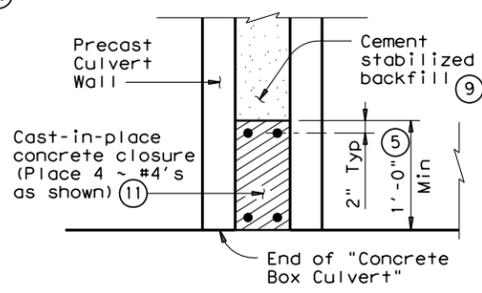
D = Depth
 H = Height
 T = Thickness
 R = Radius
 Dia = Diameter

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© TxDOT FEB 2010	DIST	FED REG	PROJECT NO.	SHEET
REVISED 2/2010 Added note to Table 1.	HOU			61
REVISED 6/12	COUNTY	CONTROL	SECT	JOB
REVISED 3/15	GALVESTON			BR

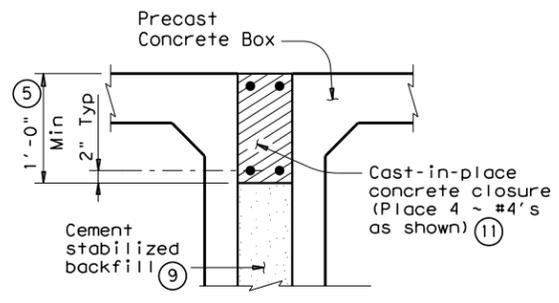
DISCLAIMER: The use of this standard is governed by the "Texas Engineering Practice Act". No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the conversion of this standard to other formats or for incorrect results or damages resulting from its use.



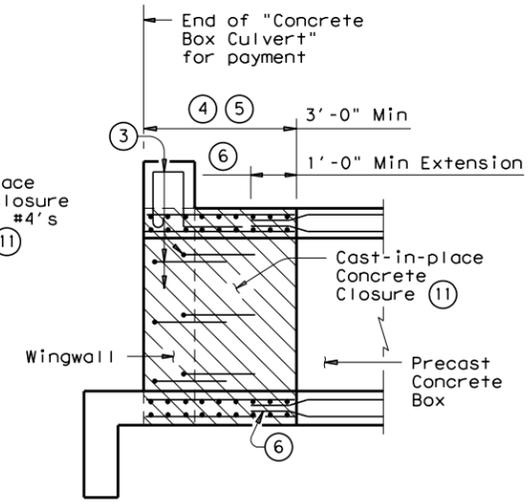
MULTIPLE UNIT PLACEMENT



SECTION B-B

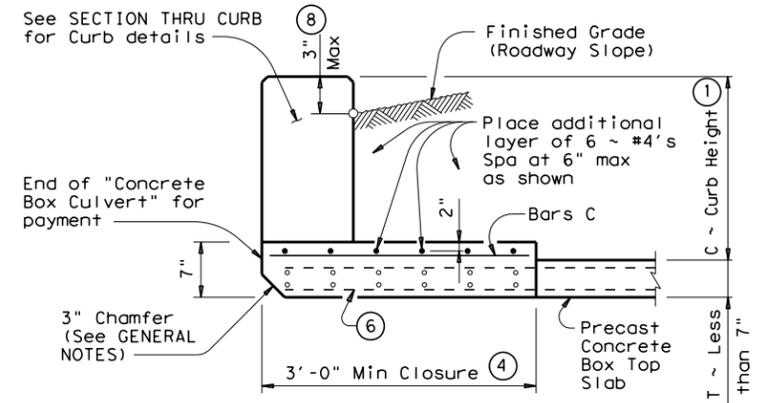


DETAIL "A"

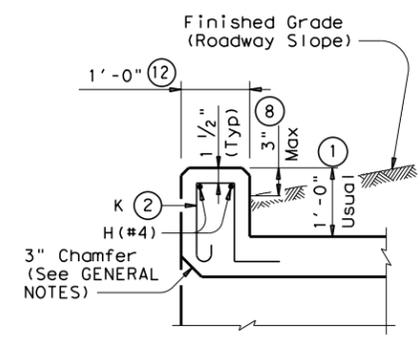


WINGWALL CONNECTION

(Also applies to Safety End Treatment)

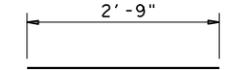


SECTION THRU TOP SLABS LESS THAN 7"

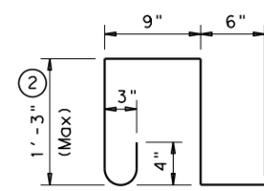


SECTION THRU CURB

(10) QUANTITIES PER FOOT OF CURB	
Reinforcing Steel	4.18 Lb
Concrete	0.037 CY



BARS C ~ #4
(Spa = 1'-0" Max)

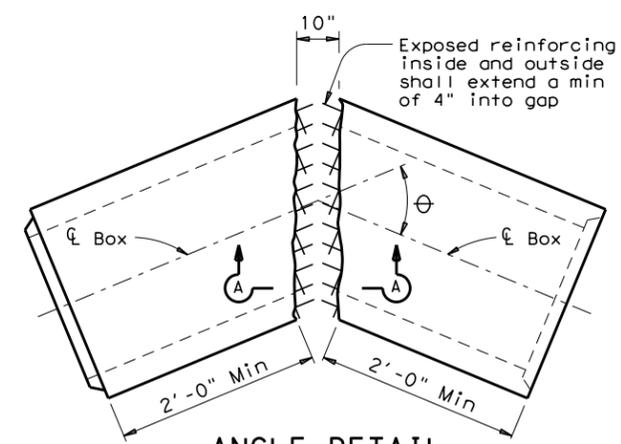


BARS K ~ #4
(Spa = 1'-0" Max)
(Length = 4'-3")

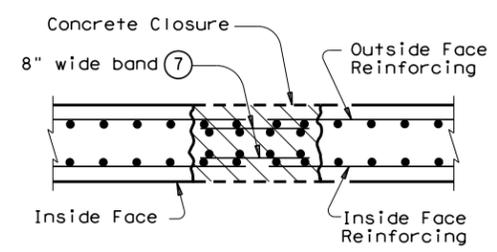
- 1 0" min to 5'-0" max. Estimated curb heights are shown elsewhere in the plans. For structures with pedestrian rail, bicycle rail or curbs taller than 1'-0", refer to ECD standard. For structures with T6 traffic rail, refer to T6-CM standard. For structures with traffic rail, other than T6, refer to RAC standard.
- 2 For curbs less than 1'-0" high, tilt Bars K or reduce bar height as necessary to maintain cover. For curbs less than 3" high, Bars K may be omitted.
- 3 Curb, Wingwall or Safety End Treatment reinforcing shall extend into concrete closure. Any reinforcing that does not fit into the closure shall be bent or trimmed as necessary.
- 4 Cast-in-place concrete closure shall be 3'-0" min. Boxes shall be cast short or broken back in the field. All reinforcing in the closure shall be the same size and spacing as in the precast box section. Except where shown otherwise, the cast-in-place closure shall be flush with the inside and outside faces of the precast box section.
- 5 For multiple unit placements the length of the closure for the interior walls may be adjusted as necessary. The length of the top slab, bottom slab, and exterior wall closure shall not be less than 3'-0". See Section B-B detail when interior walls are cast full length.
- 6 Precast box reinforcing shall extend a minimum of 1'-0" into concrete closure (Typ).
- 7 Bands of reinforcing matching the inside and outside face reinforcing shall be placed in the gaps of the top and bottom slabs. A band matching the outside face reinforcing of the wall shall be placed in the gaps of the walls (placed in the outside face only). The bands shall be tack welded to the exposed reinforcing at each point of contact.
- 8 For vehicle safety, the following requirements must be met:
 - For structures without bridge rail, curbs shall project no more than 3" above finished grade.
 - For structures with bridge rail, curbs shall be flush with finished grade.
 Curb heights shall be reduced, if necessary, to meet the above requirements. No changes will be made in quantities and no additional compensation will be allowed for this work.
- 9 Cement Stabilized Backfill between boxes is considered part of the Box Culvert for payment.
- 10 All curb concrete and reinforcing is considered part of the Box Culvert for payment.
- 11 Any additional concrete and reinforcing required for the closures shall be considered as subsidiary to the Concrete Box Culvert.
- 12 1'-0" typical. 2'-0" when RAC standard is referred to elsewhere in the plans.
- 13 For multiple unit placement with overlay, with 1 to 2 course surface treatment, or with the top slab as the final riding surface, provide wall closure as shown in DETAIL "A".
- 14 This dimension may be increased with approval of the Engineer to allow the precast boxes to be tunneled or jacked in accordance with Item 476, "Jacking, Boring, or Tunneling Pipe or Box". No payment will be made for any additional material in the gap between adjacent boxes.

GENERAL NOTES:

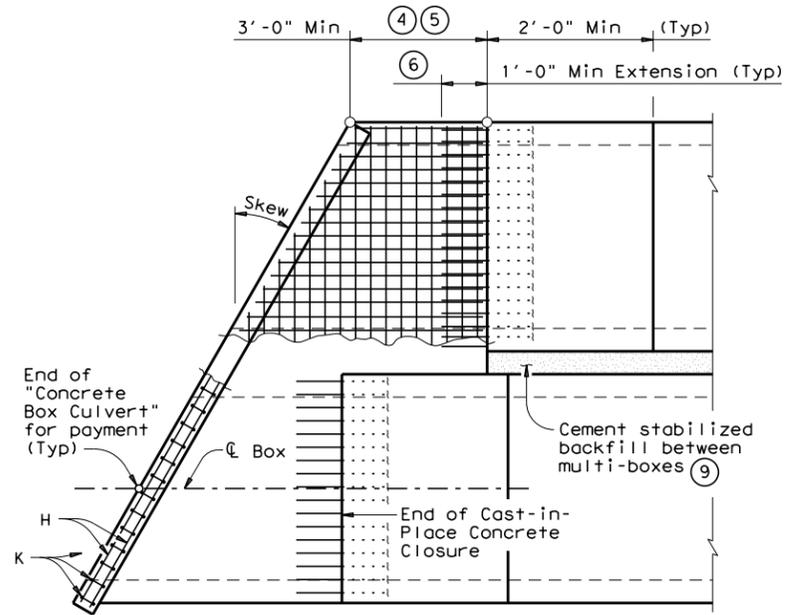
Designed according to AASHTO LRFD Specifications.
 All closure concrete shall be Class "C" with a minimum compressive strength of 3600 psi and shall be placed according to the Item, "Concrete Substructures".
 Any additional concrete required for the closures shall be considered as subsidiary to the Concrete Box Culvert.
 Refer to the Single Box Culverts Precast standard for details not shown.
 The bottom edge of the top slab closure shall be chamfered 3 inches at the entrance.



ANGLE DETAIL



SECTION A-A



PLAN OF SKEWED ENDS

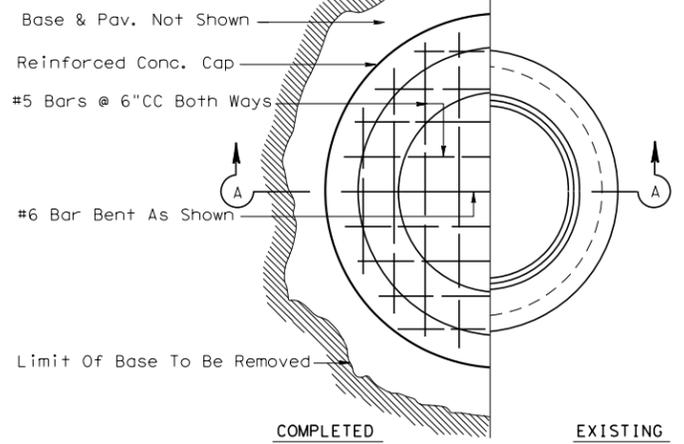
(Showing multi-box placement)

HL93 LOADING

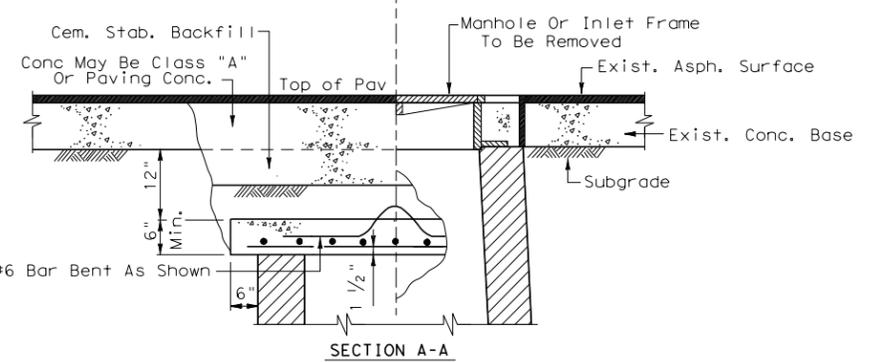
		Bridge Division Standard	
BOX CULVERTS PRECAST MISCELLANEOUS DETAILS			
SCP-MD			
FILE: scpmdsts.dgn	DN: GAF	CK: LMW	DW: BWH/TxDOT
©TxDOT February 2010	CONT	SECT	JOB
REVISIONS			HIGHWAY
			BR
DIST	COUNTY	SHEET NO.	
HOU	GALVESTON	62	

DATE: FILE:

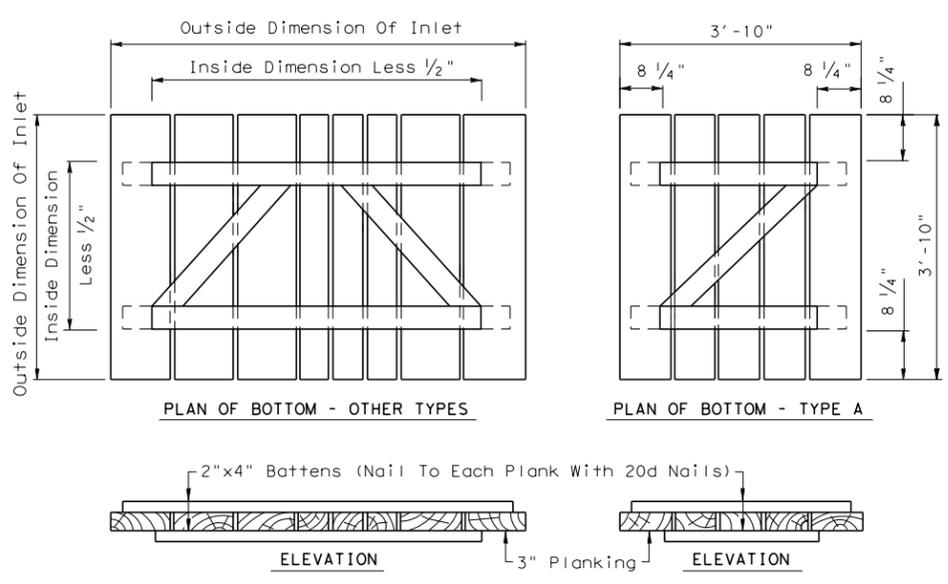
Note: No Conc Or Cem Stab Bkfl Required In Graded Areas.



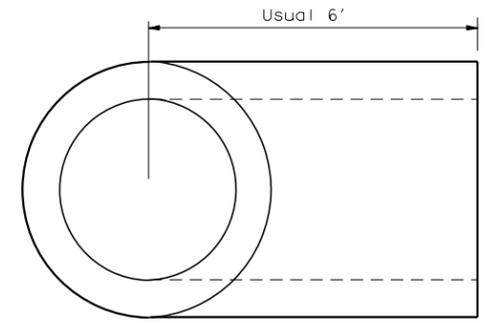
Note: Reinforced Conc. Cap Shall Be Precasted & Properly Cured Before Placing in Position.



DETAIL SHOWING METHOD OF CAPPING ABANDONED MANHOLES OR INLETS (GRADED OR PAVED AREAS)

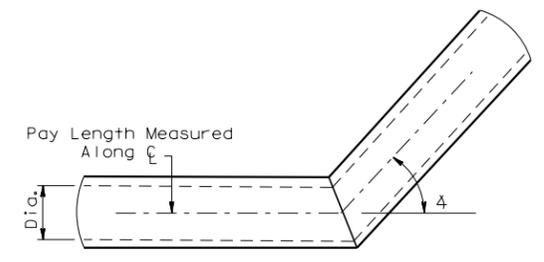


TEMPORARY COVERS FOR ALL TYPES OF INLETS



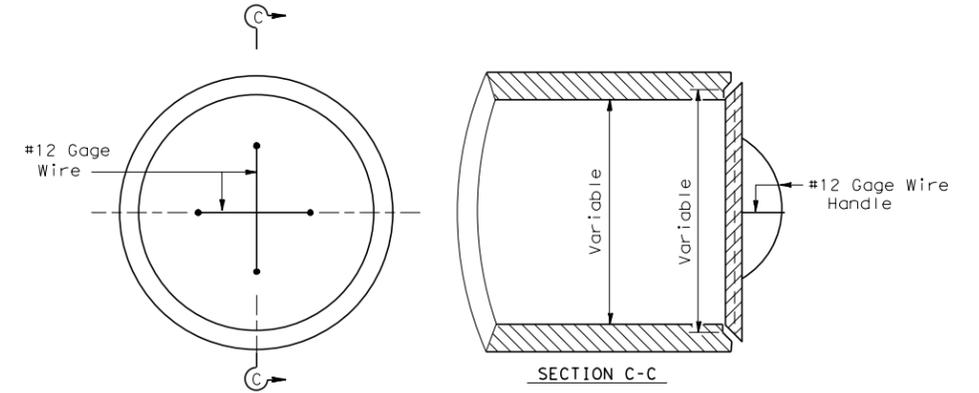
Note: Jointing Material Shall Conform To Requirements Of Item "Reinforced Concrete Pipe." Material For Tees Shall Conform To Requirements Of Item "Reinforced Concrete Tee." Payment For Tee To Be In Accordance With Item "Reinforced Concrete Pipe."

PRECAST STORM SEWER TEE



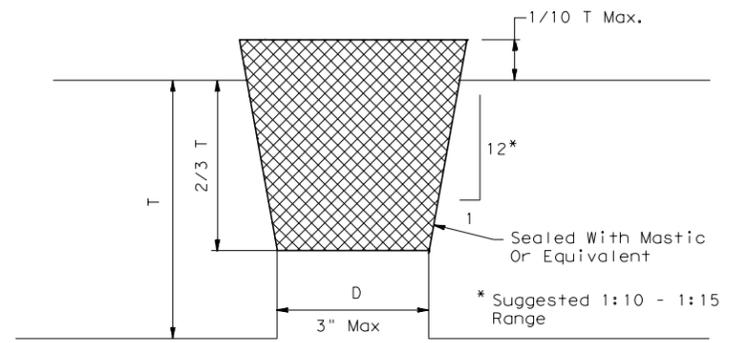
BENDING DETAIL

Note: Bending Of Proposed Pipe Sewer Or RCP In A Vertical & /Or Horizontal Plane Shall Be Accomplished By The Use Of A "Pipe Collar" Or A "Precast Elbow", As Approved By The Engineer. Price Of "Pipe Collar" Or, "Precast Elbow" Shall Be Subsidiary To The Unit Prices Bid For Item Reinforced Concrete Pipe. Pay Length Measurement To Be Along Horizontal C & Horizontal Plane Of Pipes.



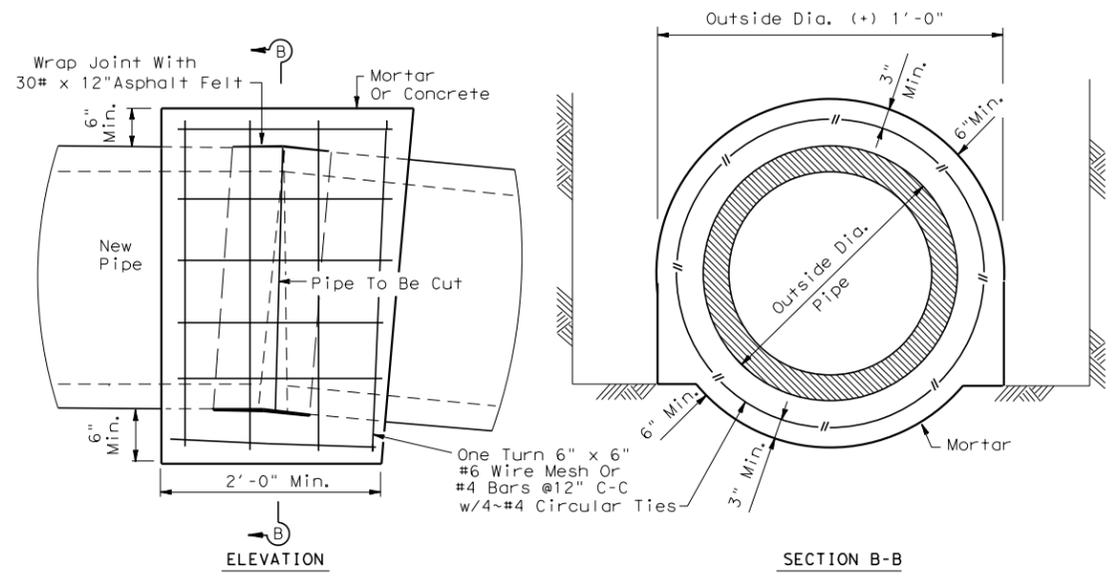
Note: The Price Of Plug Shall Be Subsidiary To The Unit Bid Price For Pipe Sewer Or RCP. Mortar Joints To Be Used As Directed By The Engineer. Removal Of The Existing Plugs For Storm Sewer Or RCP Conns. Shall Be Considered Incidental To Item "Excavation And Backfill For Structures."

Concrete Plug For End Of Pipe Culvert Or Sewer
CONCRETE PLUG FOR PIPE



T = Wall Thickness On Top Of Box Or Pipe
D = Diameter Of Lifting Hole
Minimum Length Of Plug Is 2/3 T +/-
Minimum Diameter At Bottom Of Plug = D - 1/8"
Maximum 1/10 T Of Plug Not Seated In Lifting Hole
Note: The Plug Shall Be Cast With The Same Taper As The Lifting Hole.

DETAIL OF PLUG FOR LIFTING HOLES IN RCB AND RCP



PIPE COLLAR DETAIL
For Horizontal Or Vertical Placement

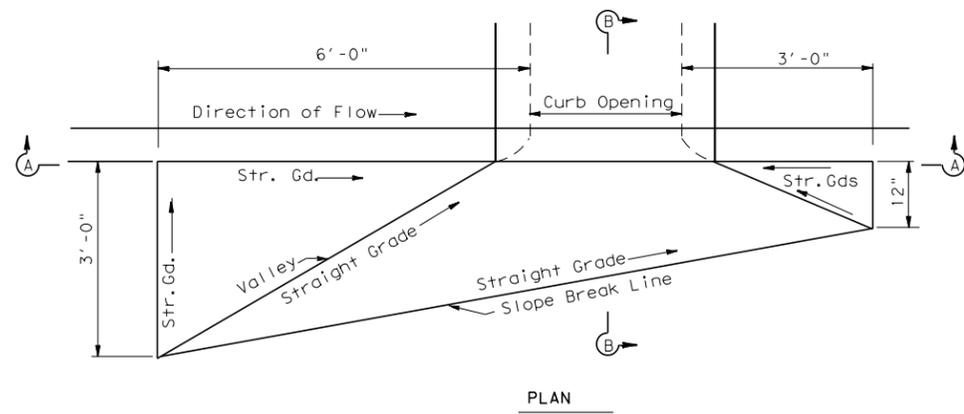
d = Diameter
R = Radius

MISCELLANEOUS SEWER DETAILS

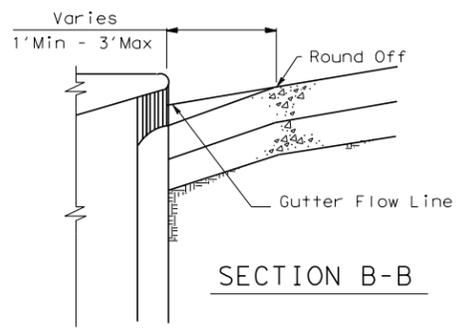
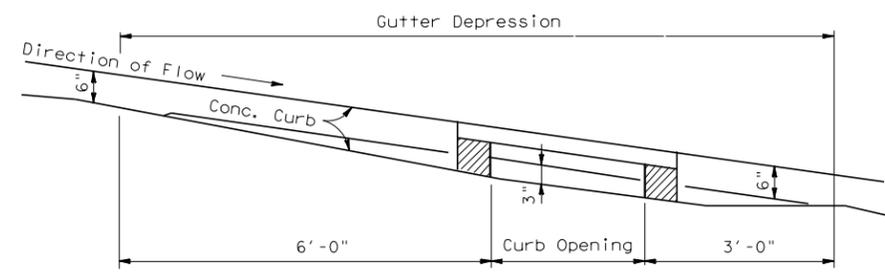
MSD

FILE: STDD11.DGN	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK:
© TxDOT Mar 2004	DISTRICT: HOU	FED REG:	PROJECT NO.:	SHEET: 63
REVISIONS: 3/2015 2014 Specs	COUNTY: GALVESTON	CONTROL:	SECT:	JOB: HIGHWAY
				BR

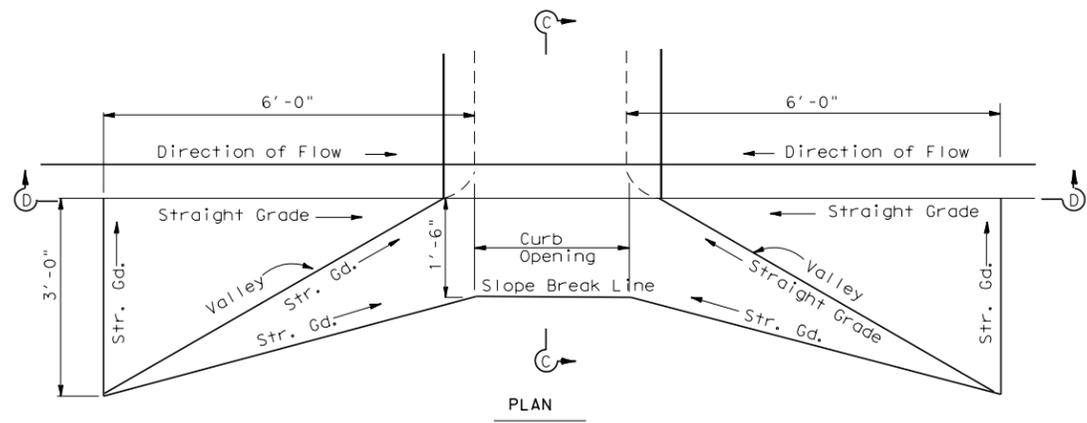
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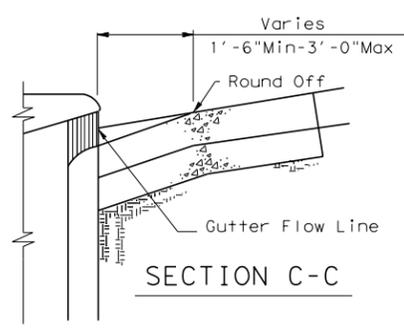
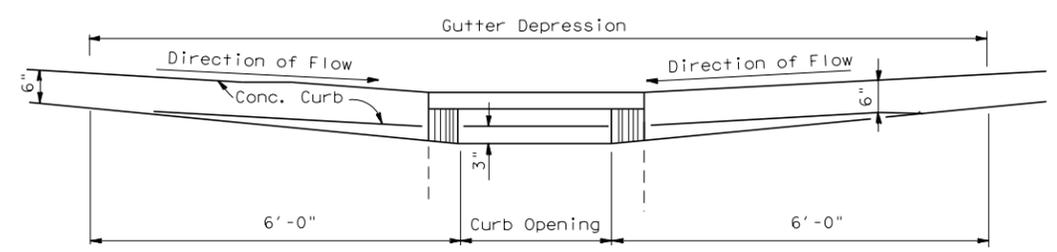
PLAN
SECTION A-A
CURB INLET ON GRADE



SECTION B-B



PLAN
SECTION D-D
CURB INLET AT SAG



SECTION C-C

GENERAL NOTES:
Base Course under Concrete Pavement shall be full depth and shall conform to surface depression details.



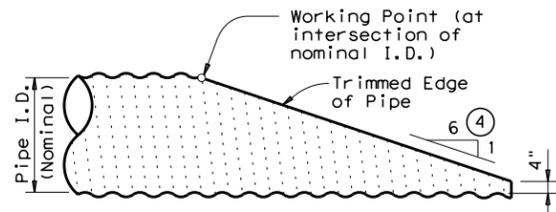
GUTTER DEPRESSION DETAILS FOR CURB INLETS

GD

FILE:	STDD12.DGN	DN:	TxDOT	CK:	TxDOT	DW:	TxDOT	CK:	TxDOT	STD:	
REVISIONS	© TxDOT Mar 2004	DIST	HOU	FED REG	PROJECT NO.					SHEET	64
		COUNTY	GALVESTON	CONTROL	SECT	JOB		HIGHWAY		BR	

STDD12.DGN

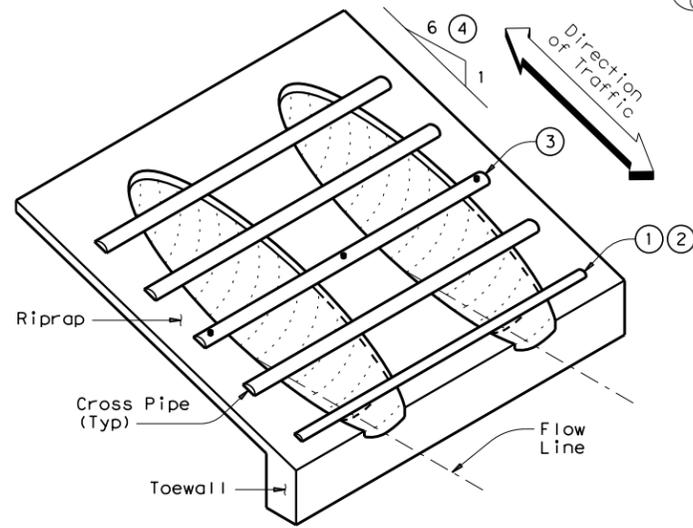
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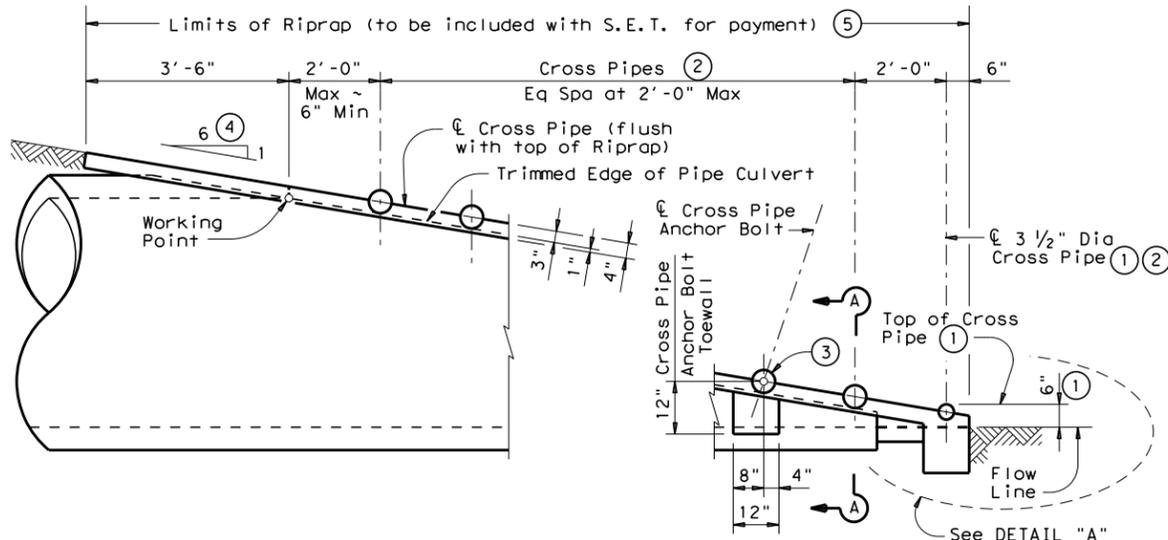
NOTE: All Cross Pipes, calculations, and dimensions are based on the pipe culverts mitered as shown in this detail. Alternate styles of mitered ends will require that appropriate adjustments be made to the values presented on this standard.

SIDE ELEVATION OF TYPICAL PIPE CULVERT MITER

(Showing Corrugated Metal Pipe Culvert.)
(Details at Concrete Pipe Culvert are similar.)

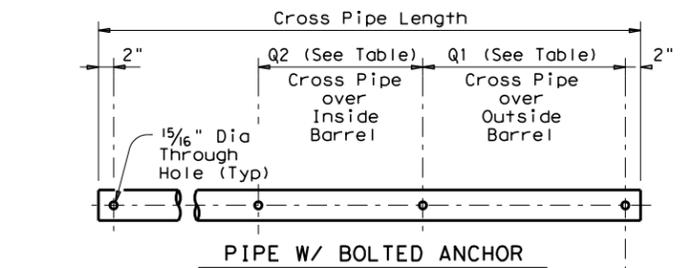


ISOMETRIC VIEW OF TYPICAL INSTALLATION

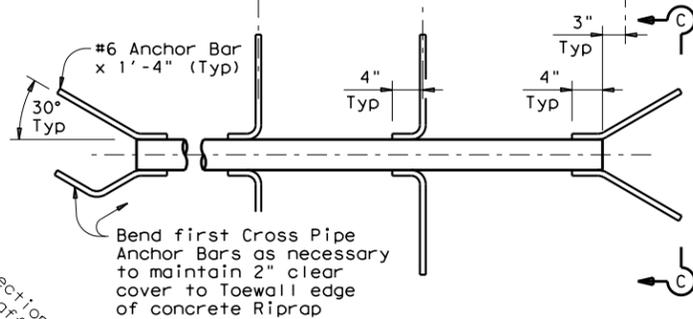


SIDE ELEVATION OF CAST-IN-PLACE CONCRETE

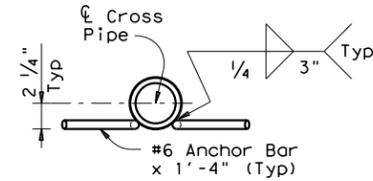
(Showing Concrete Pipe Culvert.)
(Details at Corrugated Metal Pipe Culvert are similar.)



PIPE W/ BOLTED ANCHOR

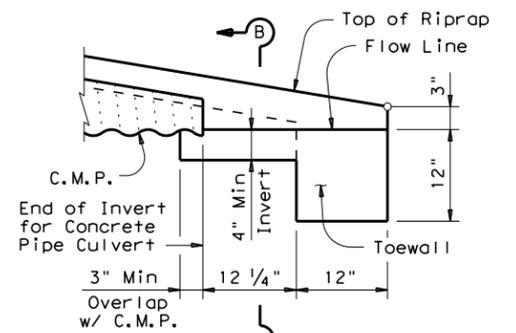


PIPE W/ ANCHOR BARS



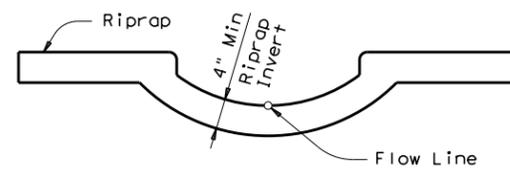
SECTION C-C

CROSS PIPE DETAILS



DETAIL "A"

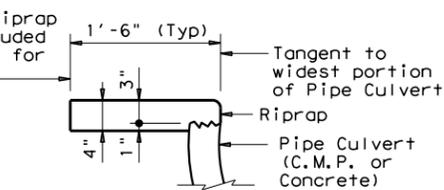
(Showing Invert with Corrugated Metal Pipe Culvert. Concrete Pipe Culvert details are similar. Cross Pipes not shown for clarity.)



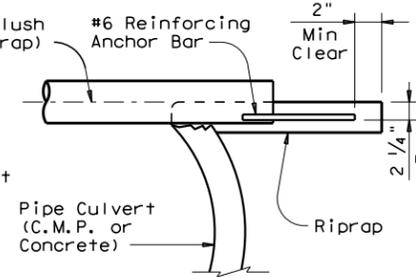
SECTION B-B

(Cross Pipes not shown for clarity.)

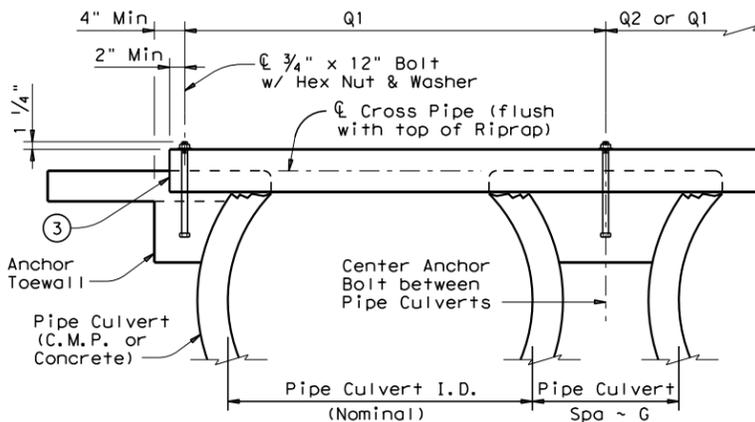
Limits of Riprap (to be included with S.E.T. for payment) ⑤



SHOWING TYPICAL PIPE CULVERT & RIPRAP



SHOWING CROSS PIPE WITH ANCHOR BAR



SHOWING CROSS PIPE WITH BOLTED ANCHOR

SECTION A-A

CROSS PIPE LENGTHS, REQUIRED PIPE SIZES, & RIPRAP QUANTITIES ②

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 Size
12"	0.6	9"	N/A	2'-1"	1'-9"	3 or more Pipe Culverts	3" Std (3.500" O.D.)
15"	0.7	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"	3 or more Pipe Culverts	3 1/2" Std (4.000" O.D.)
27"	1.0	1'-8"	N/A	3'-10"	3'-11"		
30"	1.1	1'-10"	N/A	4'-2"	4'-4"	2 or more Pipe Culverts	3 1/2" Std (4.000" O.D.)
33"	1.2	1'-11"	4'-2"	4'-5"	4'-8"	All Pipe Culverts	
36"	1.3	2'-1"	4'-5"	4'-9"	5'-1"	All Pipe Culverts	4" Std (4.500" O.D.)
42"	1.5	2'-4"	4'-11"	5'-5"	5'-10"		
48"	1.7	2'-7"	5'-5"	6'-0"	6'-7"	All Pipe Culverts	5" Std (5.563" O.D.)
54"	2.0	3'-0"	5'-11"	6'-9"	7'-6"		
60"	2.2	3'-3"	6'-5"	7'-4"	8'-3"		
66"	2.4	3'-3"	6'-11"	7'-10"	8'-9"		
72"	2.7	3'-4"	7'-5"	8'-5"	9'-4"		

- ① The proper installation of the first Cross Pipe is critical for vehicle safety. The top of the first Cross Pipe must be placed at no more than 6" above the flow line.
- ② Size of Cross Pipes, except the first bottom pipe, shall be as shown in the PIPE SIZE table. The first bottom pipe shall be 3 1/2" Standard Pipe (4" O.D.).
- ③ The third Cross Pipe from the bottom of the Culvert shall always be installed using a bolted connection. Care shall be taken to 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, all other Cross Pipes may also be installed using the bolted connection details.
- ④ Match Cross Slope as shown elsewhere in the plans. Cross Slope of 6:1 or flatter is required for vehicle safety.
- ⑤ Riprap placed beyond the limits shown will be paid as Concrete Riprap in accordance with Item 432, "Riprap".
- ⑥ Quantities shown are for one end of one reinforced Concrete Pipe Culvert. For multiple pipe culverts or for Corrugated Metal Pipe Culverts, quantities will need to be adjusted. Riprap quantities are for Contractor's information only.

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 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.

Riprap and all necessary inverts shall be Concrete Riprap conforming to the requirements of Item 432, "Riprap". 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.

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

Cross Pipes shall conform to the requirements of ASTM A53 (Type E or S, Grade B), ASTM A500 (Grade B), or API 5LX52. Bolts and nuts shall conform to ASTM A307.

All steel components, except concrete reinforcing, shall be galvanized after fabrication. Galvanizing damaged during transport or construction shall be repaired in accordance with the specifications.

Texas Department of Transportation
Bridge Division Standard

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

SETP-PD

FILE: setppdse.dgn	DN: GAF	CK: CAT	DW: JRP	CK: GAF
©TxDOT February 2010	CONT	SECT	JOB	HIGHWAY
REVISIONS				
BR				
11-10: Add note for synthetic fibers.		DIST		SHEET NO.
HOU		COUNTY		GALVESTON
				65

DATE: FILE:

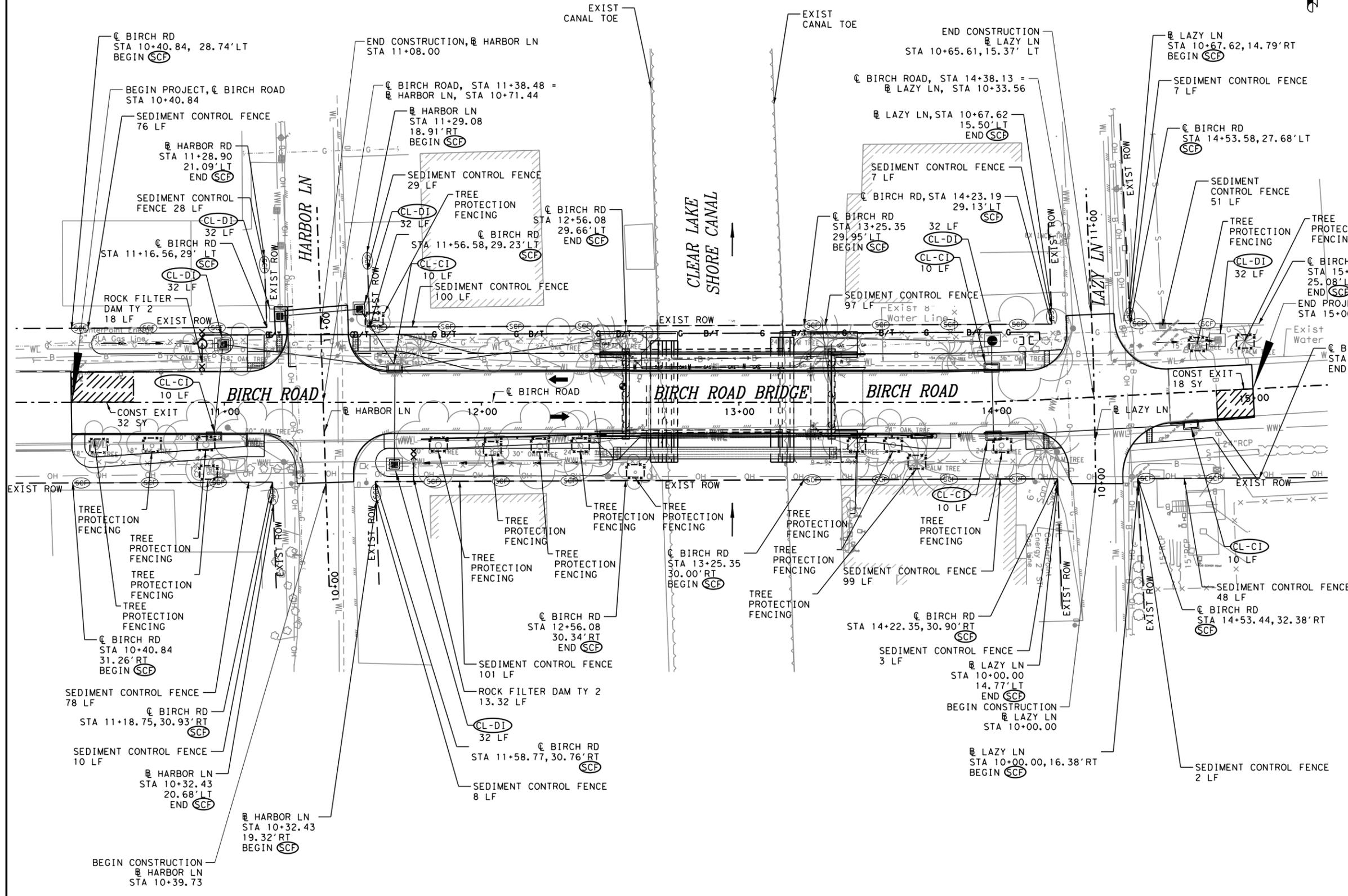
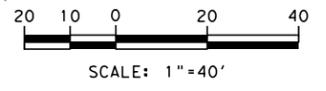
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LEGEND

- SEDIMENT CONTROL FENCE
- ROCK FILTER DAM TYPE 2
- 12" EROSION CONTROL LOG DROP INLET
- 8" EROSION CONTROL LOG
- CONSTRUCTION EXIT TYPE 1
- TREE PROTECTION FENCING

NOTES:

1. CONSTRUCTION ACCESS TO BE PLACED AT LOCATIONS APPROVED BY THE ENGINEER.
2. SEDIMENT CONTROL FENCE TO REMAIN IN PLACE UNTIL PROPOSED MANHOLE CONSTRUCTION IS COMPLETE.
3. CONTRACTOR TO PLACE SOD & SEED AFTER CONSTRUCTION ACTIVITIES ARE COMPLETED.
4. TREE PROTECTION FENCING MUST BE MAINTAINED FOR DURATION OF CONSTRUCTION ACTIVITIES IN THE AREA.



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM

ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

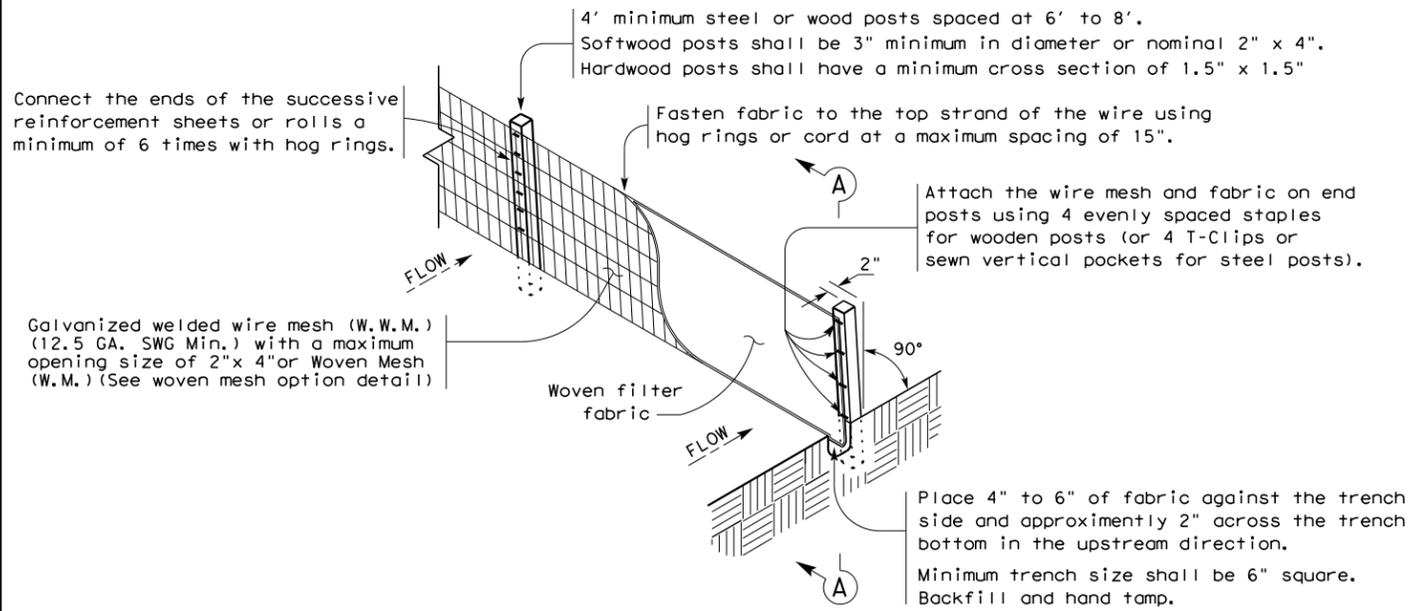
GALVESTON COUNTY, TEXAS

**BIRCH ROAD BRIDGE REPLACEMENT
 STORM WATER POLLUTION &
 PREVENTION PLAN LAYOUT**
 STA 10+40.84 TO STA 15+00.00

Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	
Drn By: ic	VERT:	NO.
Ckd By: ic		

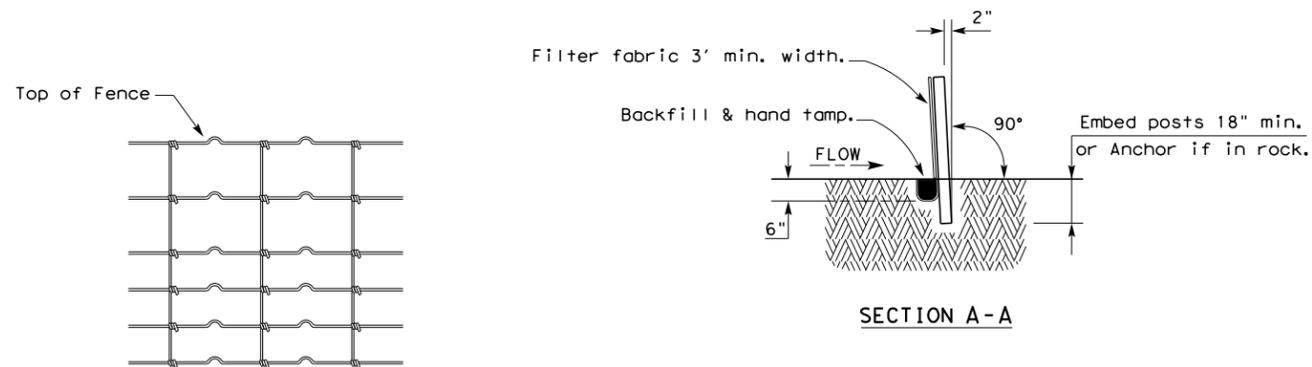
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DATE
FILE



TEMPORARY SEDIMENT CONTROL FENCE

SCF



HINGE JOINT KNOT WOVEN MESH (OPTION) DETAIL

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

SEDIMENT CONTROL FENCE USAGE GUIDELINES

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

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

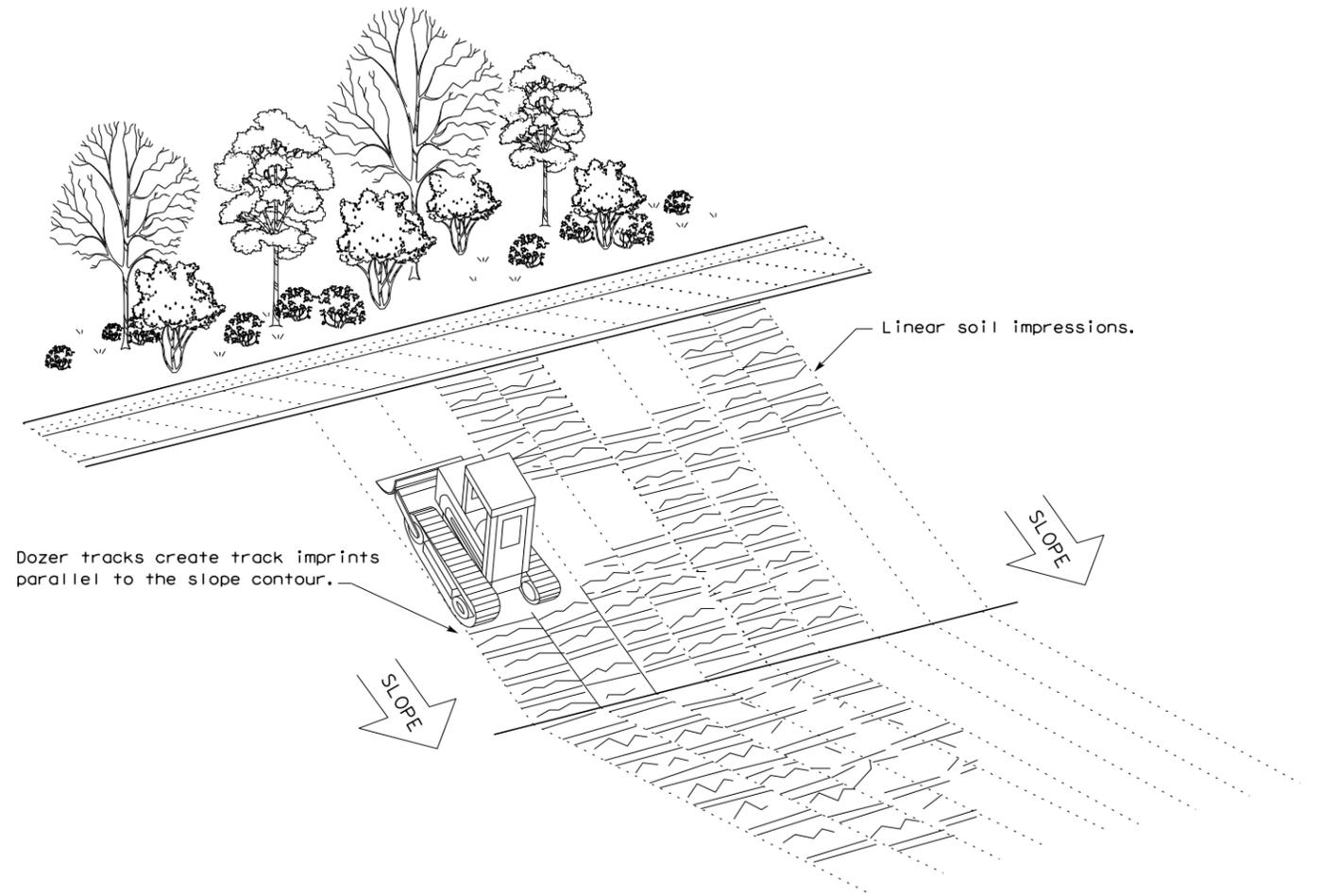
LEGEND

Sediment Control Fence

SCF

GENERAL NOTES

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

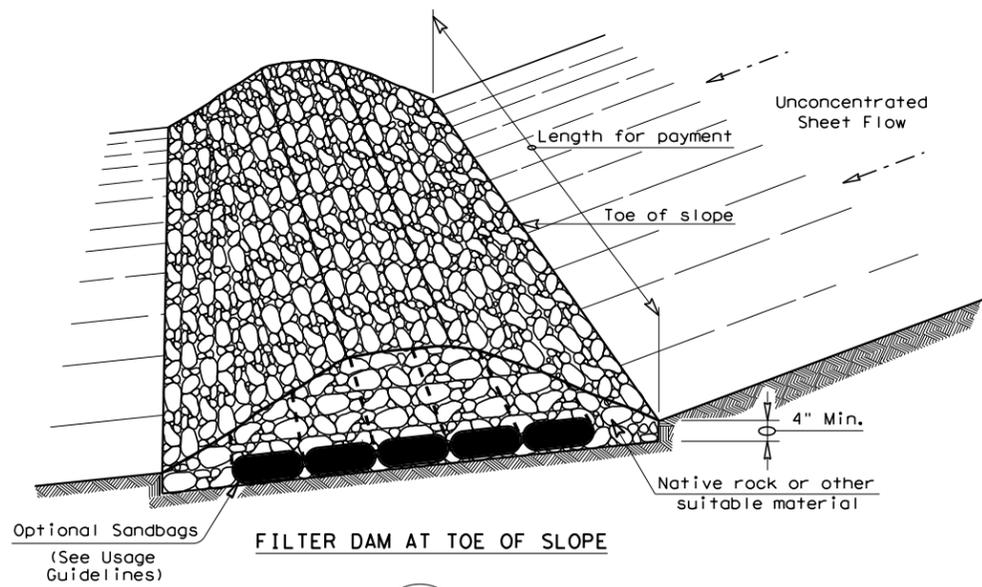


VERTICAL TRACKING

				Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES FENCE & VERTICAL TRACKING EC(1) - 16					
FILE: ec116	DN: TxDOT	CK: KM	DW: VP	DN/CK: LS	
© TxDOT: JULY 2016	CONT	SECT	JOB	HIGHWAY	
REVISIONS				BR	
DIST	COUNTY		SHEET NO.		
HOU	GALVESTON		67		

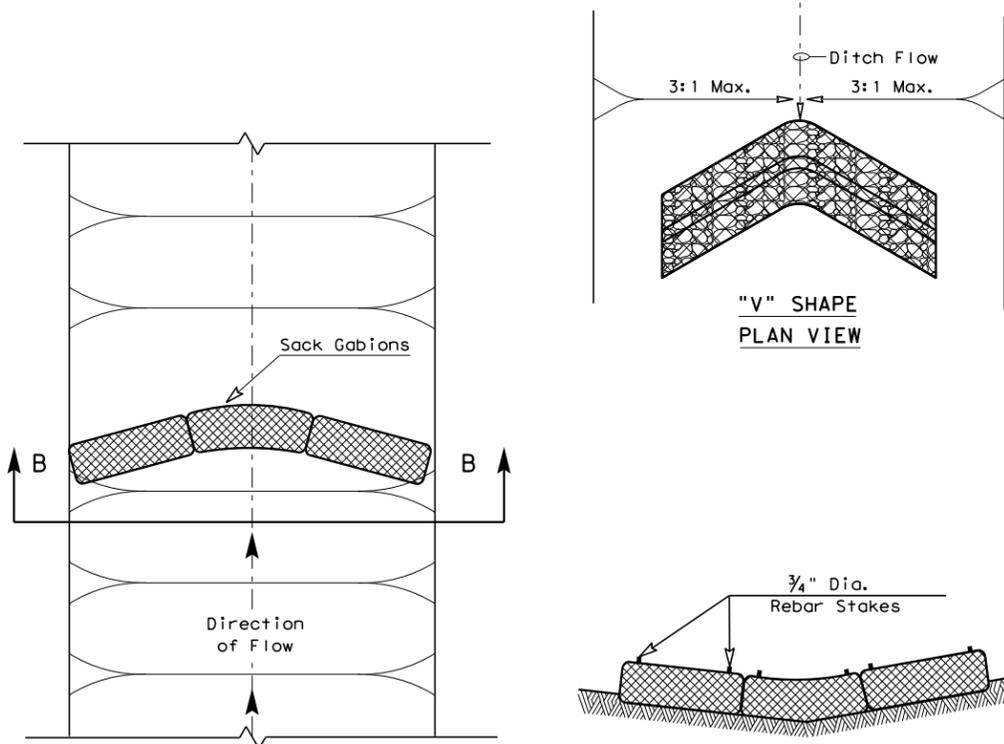
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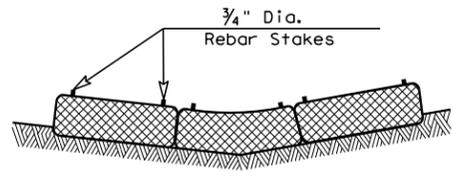
FILTER DAM AT TOE OF SLOPE

(RFD1)

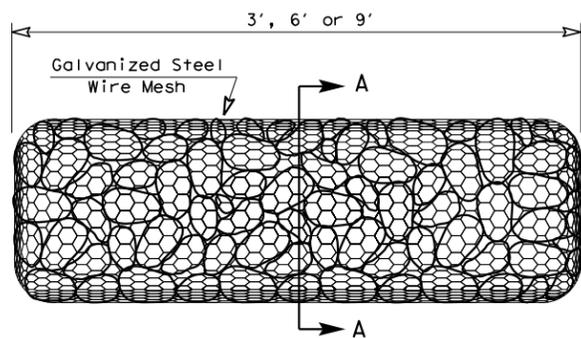


"V" SHAPE PLAN VIEW

PLAN VIEW

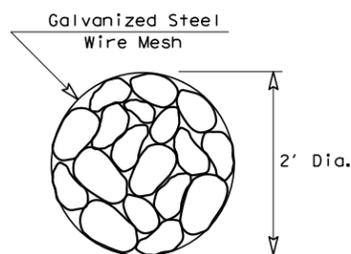


SECTION B-B

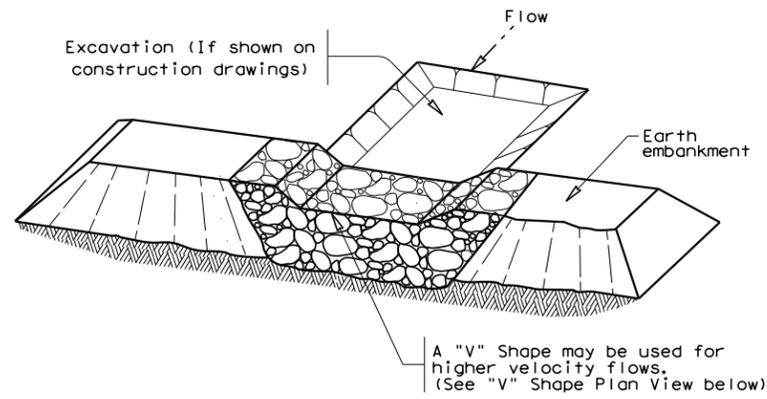


TYPE 4 (SACK GABIONS)

(RFD4)

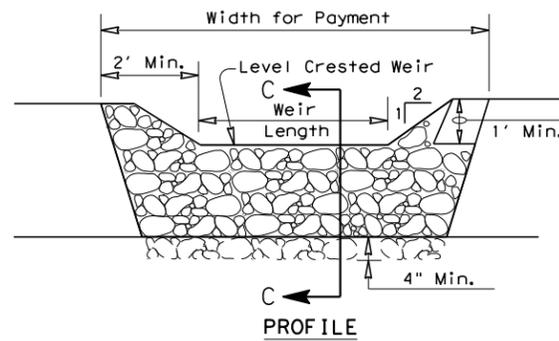


SECTION A-A

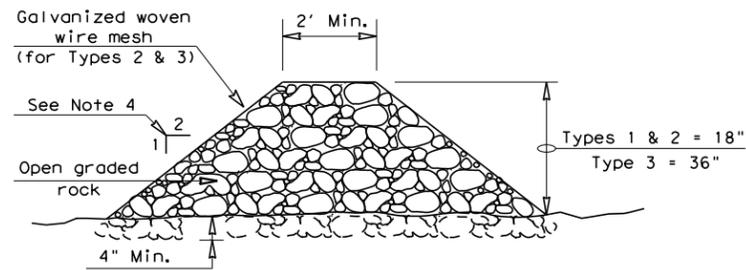


FILTER DAM AT SEDIMENT TRAP

(RFD1) OR (RFD2)



PROFILE



SECTION C-C

ROCK FILTER DAM USAGE GUIDELINES

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

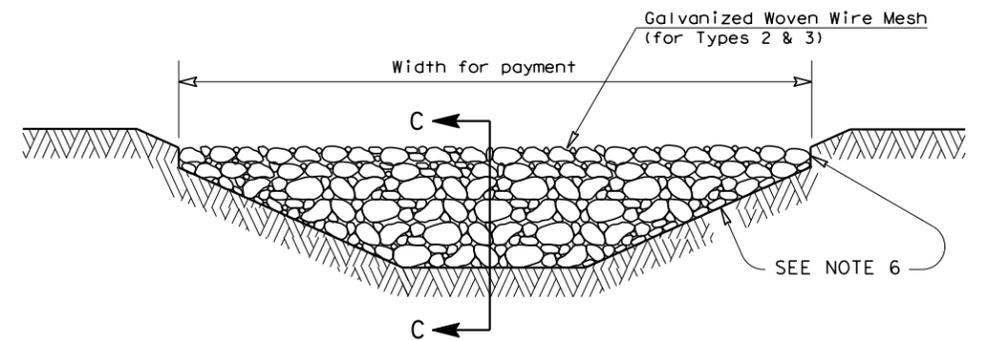
Type 1 (18" high with no wire mesh) (3" to 6" aggregate): Type 1 may be used at the toe of slopes, around inlets, in small ditches, and at dike or swale outlets. This type of dam is recommended to control erosion from a drainage area of 5 acres or less. Type 1 may not be used in concentrated high velocity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

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

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

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

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



FILTER DAM AT CHANNEL SECTIONS

(RFD1) OR (RFD2) OR (RFD3)

GENERAL NOTES

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

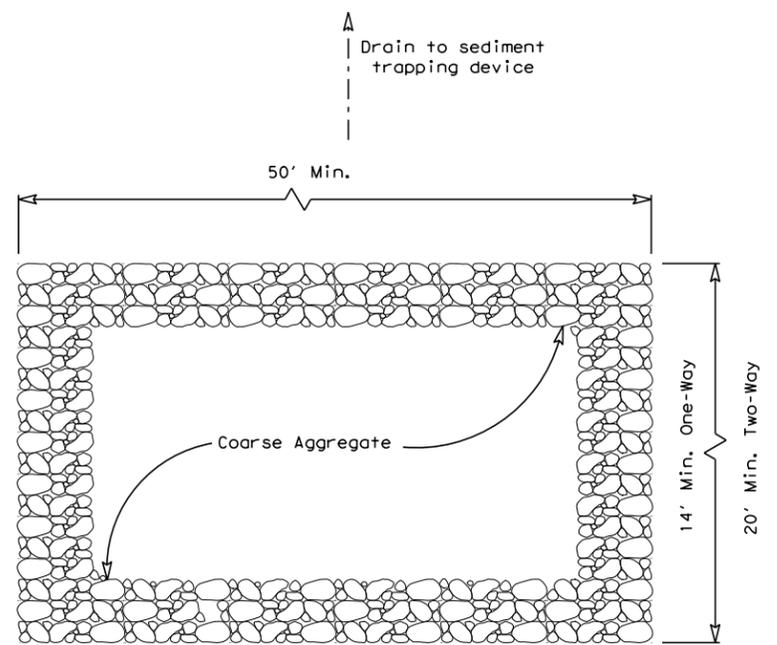
PLAN SHEET LEGEND

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

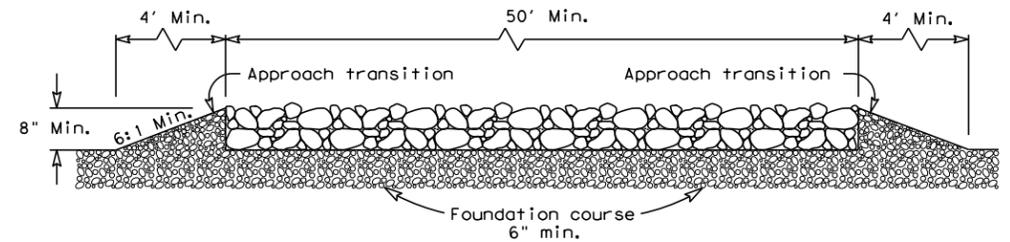
		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES ROCK FILTER DAMS EC (2) - 16			
FILE: ec216	DN: TxDOT	CK: KM	DW: VP
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS		HIGHWAY	
DIST	COUNTY	SHEET NO.	
HOU	GALVESTON	68	

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DATE: 4/3/2020
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PLAN VIEW

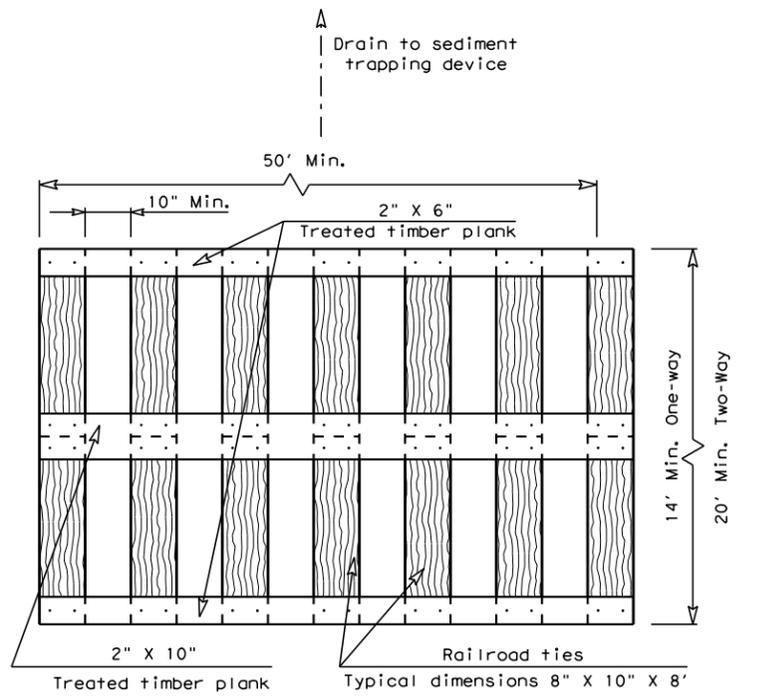


ELEVATION VIEW

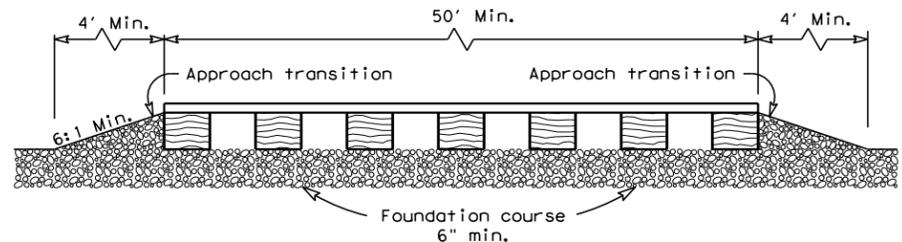
CONSTRUCTION EXIT (TYPE 1)
ROCK CONSTRUCTION (LONG TERM)

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

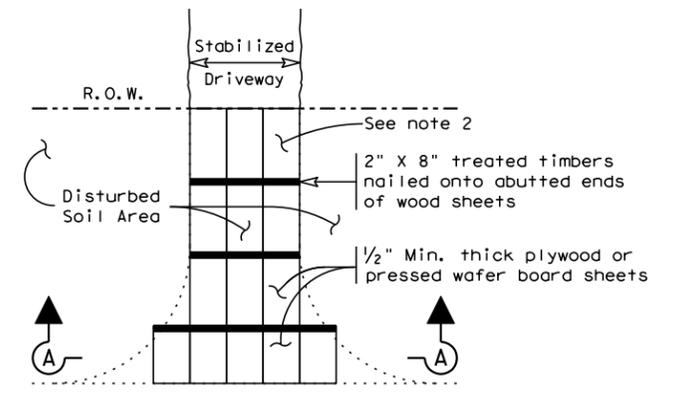


ELEVATION VIEW

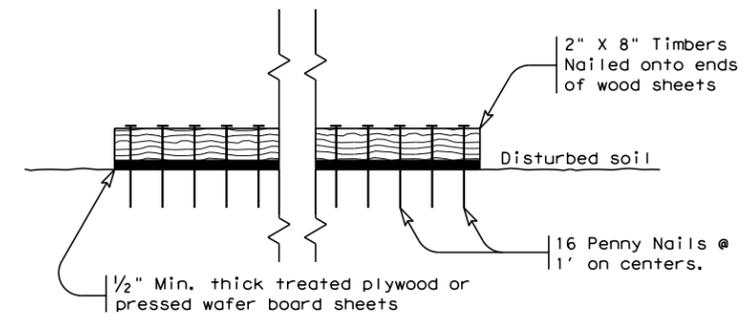
CONSTRUCTION EXIT (TYPE 2)
TIMBER CONSTRUCTION (LONG TERM)

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



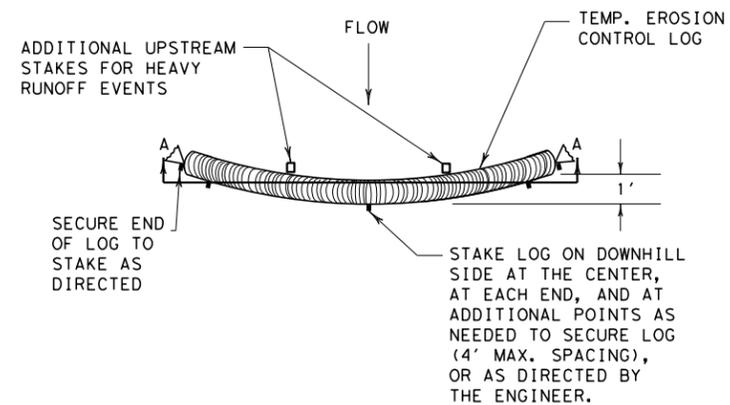
SECTION A-A
CONSTRUCTION EXIT (TYPE 3)
SHORT TERM

GENERAL NOTES (TYPE 3)

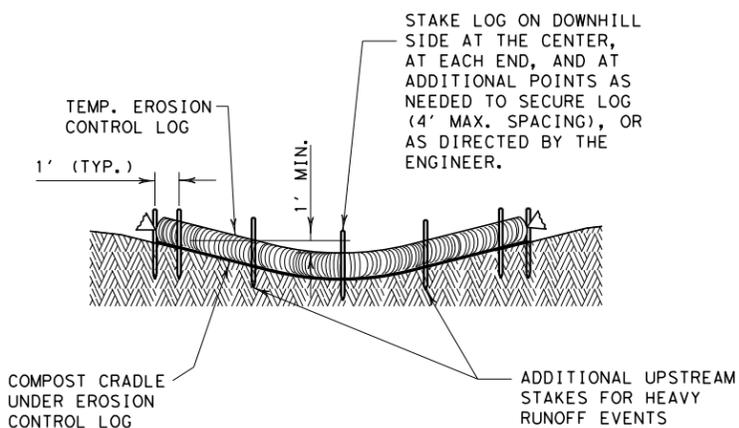
- The length of the type 3 construction exit shall be as shown on the plans, or as directed by the Engineer.
- The type 3 construction exit may be constructed from open graded crushed stone with a size of two to four inches spread a min. of 4" thick to the limits shown on the plans.
- The treated timber 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: KM	DW: VP
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS			HIGHWAY
			BR
DIST	COUNTY		SHEET NO.
HOU	GALVESTON		69

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PLAN VIEW



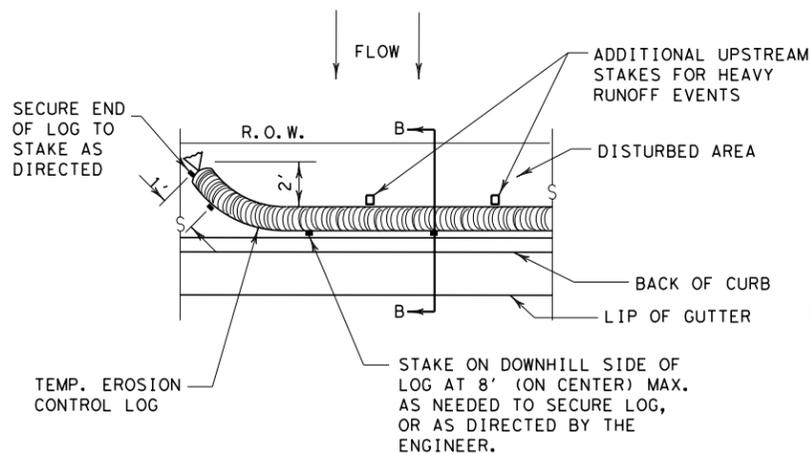
SECTION A-A

EROSION CONTROL LOG DAM

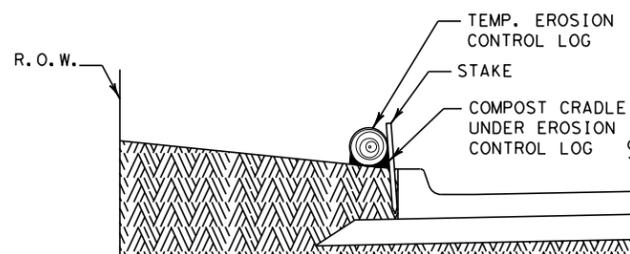
CL-D

LEGEND

- CL-D EROSION CONTROL LOG DAM
- CL-BOC EROSION CONTROL LOG AT BACK OF CURB
- CL-ROW EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY
- CL-SST EROSION CONTROL LOGS ON SLOPES STAKE AND TRENCHING ANCHORING
- CL-SSL EROSION CONTROL LOGS ON SLOPES STAKE AND LASHING ANCHORING
- CL-DI EROSION CONTROL LOG AT DROP INLET
- CL-CI EROSION CONTROL LOG AT CURB INLET
- CL-GI EROSION CONTROL LOG AT CURB & GRATE INLET



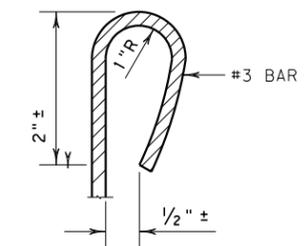
PLAN VIEW



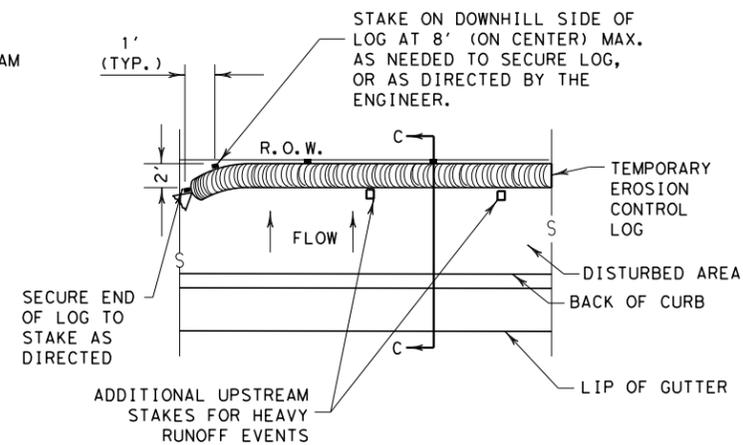
SECTION B-B

EROSION CONTROL LOG AT BACK OF CURB

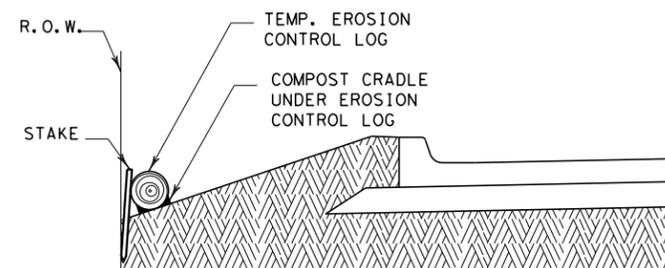
CL-BOC



REBAR STAKE DETAIL



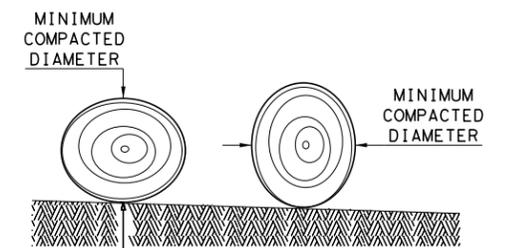
PLAN VIEW



SECTION C-C

EROSION CONTROL LOG AT EDGE OF RIGHT-OF-WAY

CL-ROW



DIAMETER MEASUREMENTS OF EROSION CONTROL LOGS SPECIFIED IN PLANS

SEDIMENT BASIN & TRAP USAGE GUIDELINES

An erosion control log sediment trap may be used to filter sediment out of runoff draining from an unstabilized area.

Log Traps: The drainage area for a sediment trap should not exceed 5 acres. The trap capacity should be 1800 CF/Acre (0.5" over the drainage area).

Control logs should be placed in the following locations:

1. Within drainage ditches spaced as needed or min. 500' on center
2. Immediately preceding ditch inlets or drain inlets
3. Just before the drainage enters a water course
4. Just before the drainage leaves the right of way
5. Just before the drainage leaves the construction limits where drainage flows away from the project.

The logs should be cleaned when the sediment has accumulated to a depth of 1/2 the log diameter.

Cleaning and removal of accumulated sediment deposits is incidental and will not be paid for separately.

GENERAL NOTES:

1. EROSION CONTROL LOGS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS DIRECTED BY THE ENGINEER.
2. LENGTHS OF EROSION CONTROL LOGS SHALL BE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS REQUIRED FOR THE PURPOSE INTENDED.
3. UNLESS OTHERWISE DIRECTED, USE BIODEGRADABLE OR PHOTODEGRADABLE CONTAINMENT MESH ONLY WHERE LOG WILL REMAIN IN PLACE AS PART OF A VEGETATIVE SYSTEM. FOR TEMPORARY INSTALLATIONS, USE RECYCLABLE CONTAINMENT MESH.
4. FILL LOGS WITH SUFFICIENT FILTER MATERIAL TO ACHIEVE THE MINIMUM COMPACTED DIAMETER SPECIFIED IN THE PLANS WITHOUT EXCESSIVE DEFORMATION.
5. STAKES SHALL BE 2" X 2" WOOD OR #3 REBAR, 2'-4' LONG, EMBEDDED SUCH THAT 2" PROTRUDES ABOVE LOG, OR AS DIRECTED BY THE ENGINEER.
6. DO NOT PLACE STAKES THROUGH CONTAINMENT MESH.
7. COMPOST CRADLE MATERIAL IS INCIDENTAL & WILL NOT BE PAID FOR SEPARATELY.
8. SANDBAGS USED AS ANCHORS SHALL BE PLACED ON TOP OF LOGS & SHALL BE OF SUFFICIENT SIZE TO HOLD LOGS IN PLACE.
9. TURN THE ENDS OF EACH ROW OF LOGS UPSLOPE TO PREVENT RUNOFF FROM FLOWING AROUND THE LOG.
10. FOR HEAVY RUNOFF EVENTS, ADDITIONAL UPSTREAM STAKES MAY BE NECESSARY TO KEEP LOG FROM FOLDING IN ON ITSELF.

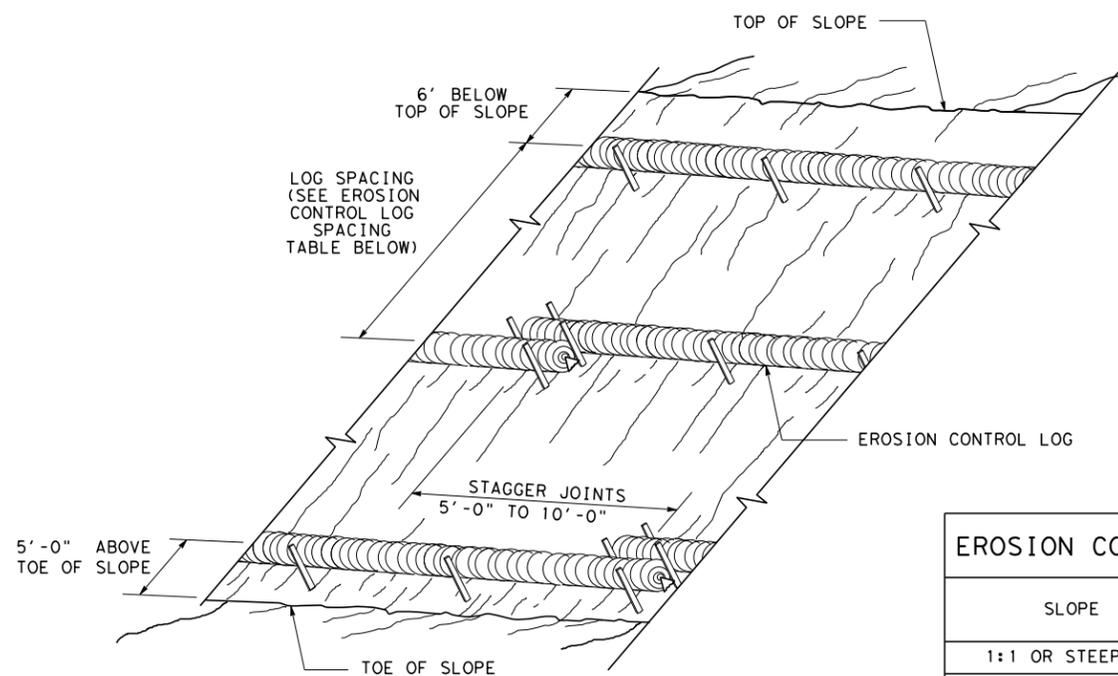
SHEET 1 OF 3

		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES			
EROSION CONTROL LOG			
EC(9) - 16			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS		HIGHWAY	
		BR	
DIST	COUNTY	SHEET NO.	
HOU	GALVESTON	70	

DATE: FILE:

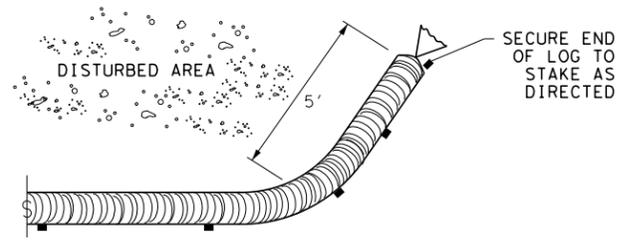
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DATE:
FILE:



EROSION CONTROL LOGS ON SLOPES
STAKE AND TRENCHING ANCHORING

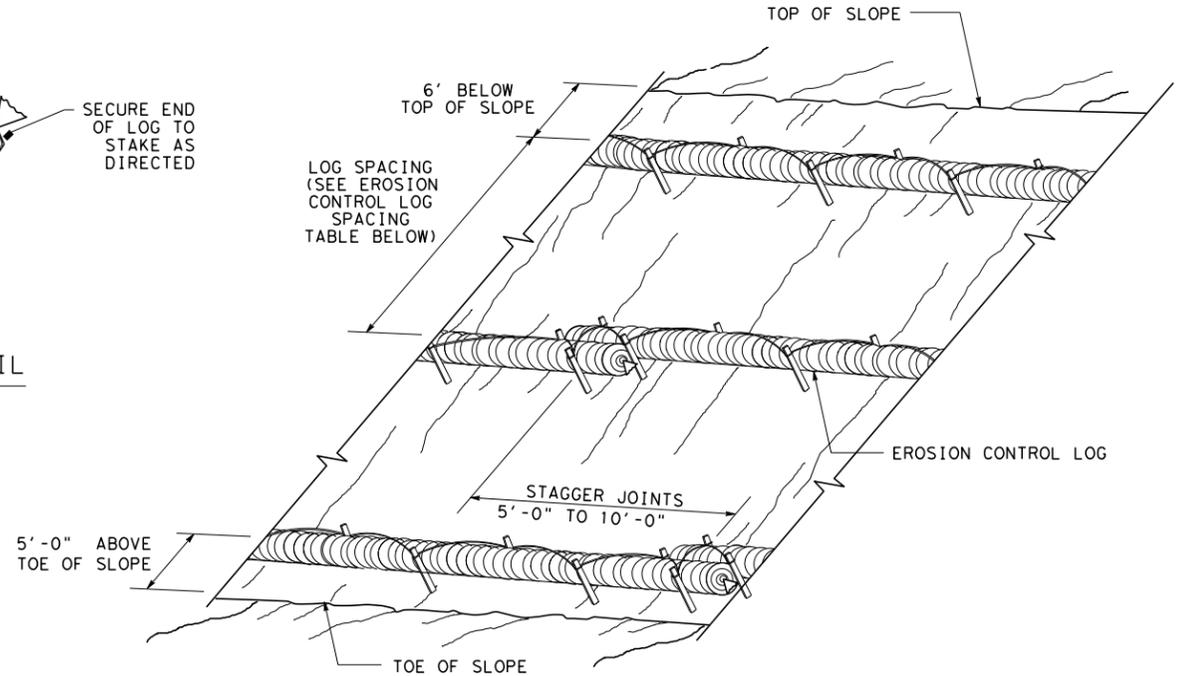
CL-SST



END SECTION RAP DETAIL

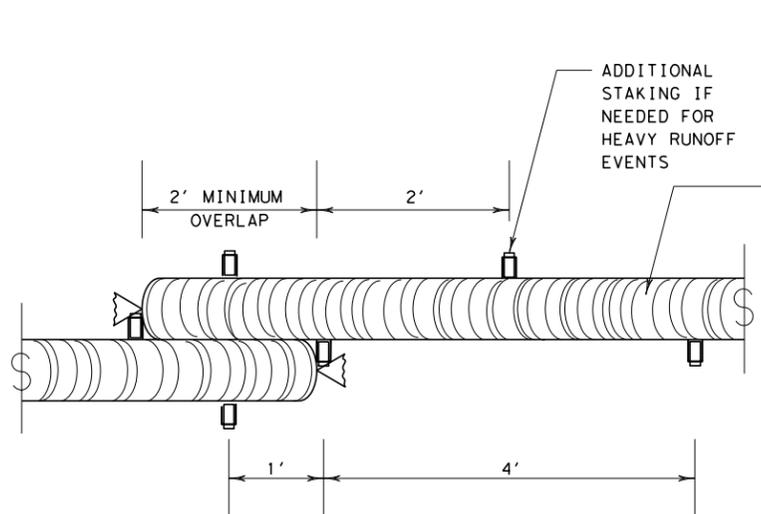
SLOPE	LOG DIAMETER			
	6"	8"	12"	18"
1:1 OR STEEPER	5'	10'	15'	20'
2:1	10'	20'	30'	40'
3:1	15'	30'	45'	60'
4:1 OR FLATTER	20'	40'	60'	80'

* ADJUSTMENTS CAN BE MADE FOR SOIL TYPE:
SOFT, LOAMY SOILS-ADJUST ROWS CLOSER TOGETHER;
HARD, ROCKY SOILS- ADJUST ROWS FARTHER APART



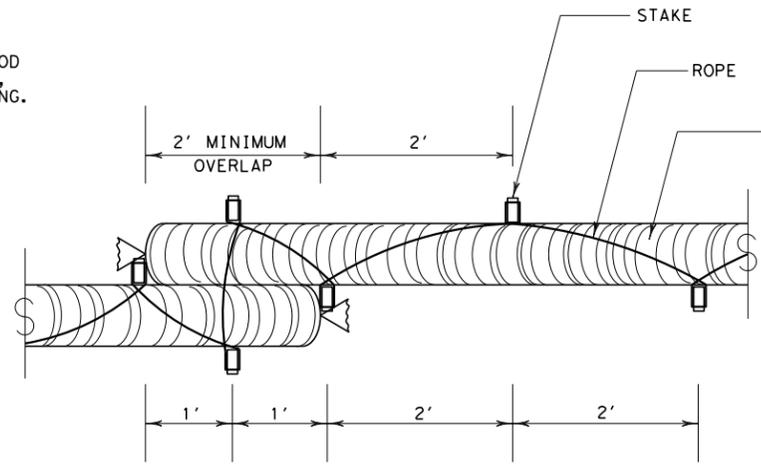
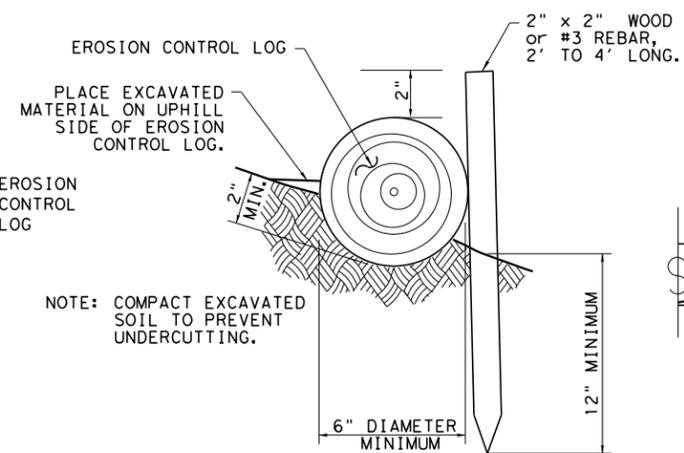
EROSION CONTROL LOGS ON SLOPES
STAKE AND LASHING ANCHORING

CL-SSL



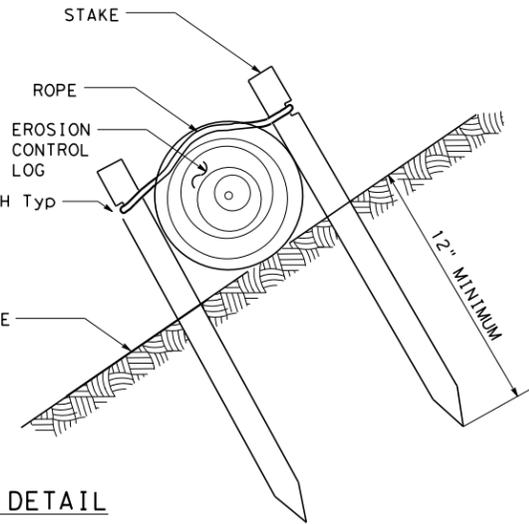
STAKE AND TRENCHING ANCHORING DETAIL

CL-SST



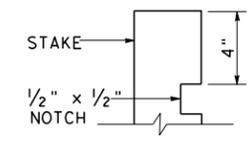
STAKE AND LASHING ANCHORING DETAIL

CL-SSL



SHEET 2 OF 3

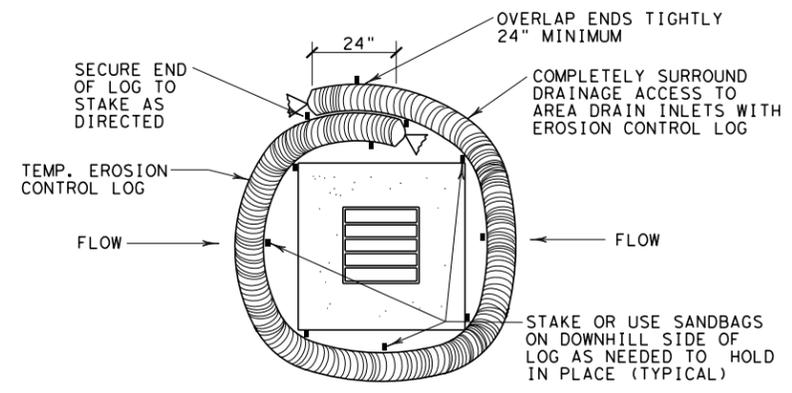
LOG DIAMETER	DEPTH
6"	2"
8"	3"
12"	4"
18"	5"



STAKE NOTCH DETAIL

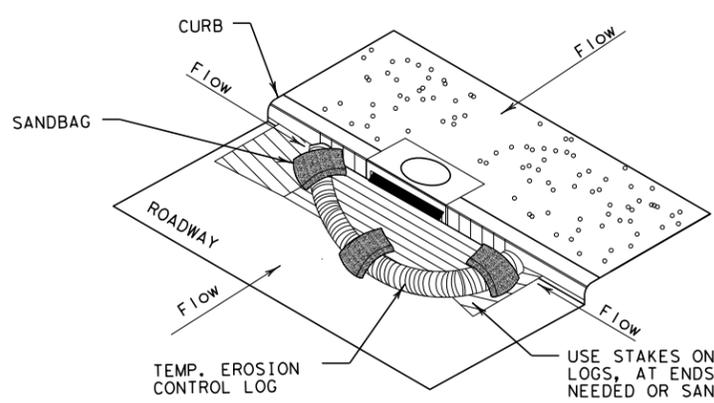
		Design Division Standard	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
FILE: ec116	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CON: SECT	JOB	HIGHWAY
REVISIONS		BR	
DIST	COUNTY	SHEET NO.	
HOU	GALVESTON	71	

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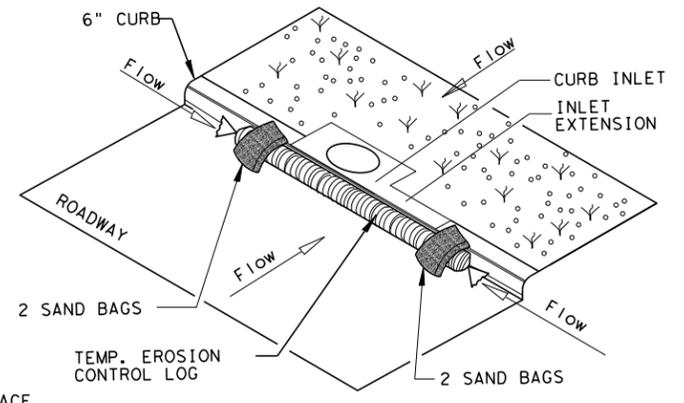
EROSION CONTROL LOG AT DROP INLET

CL-DI



EROSION CONTROL LOG AT CURB INLET

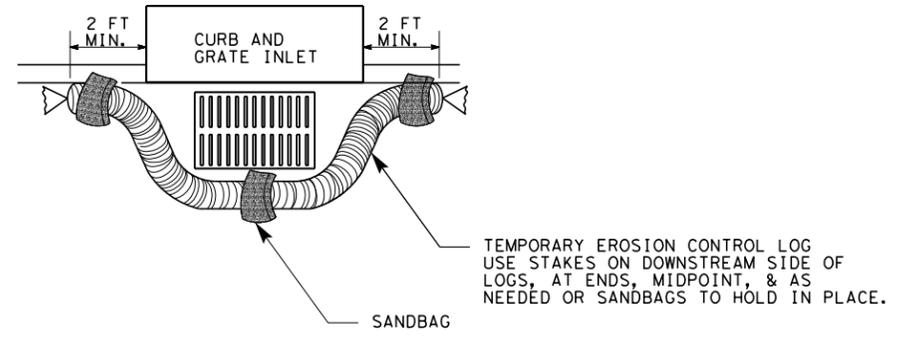
CL-CI



EROSION CONTROL LOG AT CURB INLET

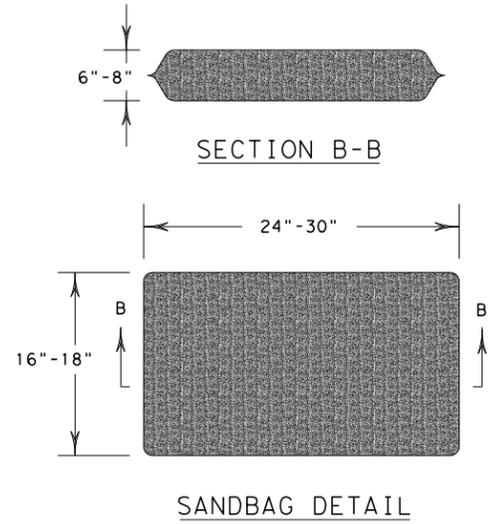
CL-CI

NOTE:
EROSION CONTROL LOGS USED AT CURB INLETS SHOULD ONLY BE USED IF THEY WILL NOT IMPEDE TRAFFIC OR FLOOD THE ROADWAY OR WHEN THE STORM SEWER SYSTEM IS NOT FULLY FUNCTIONAL.



EROSION CONTROL LOG AT CURB & GRADE INLET

CL-GI



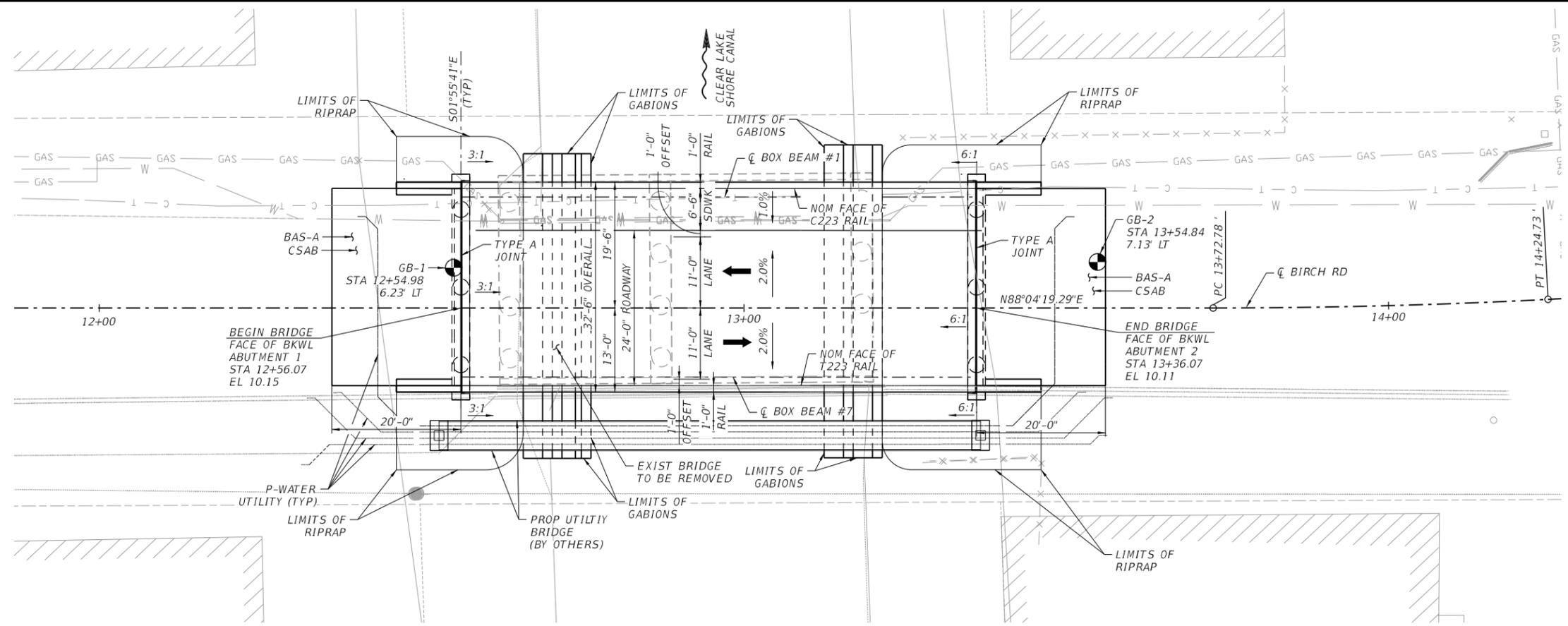
SANDBAG DETAIL

SHEET 3 OF 3

		<i>Design Division Standard</i>	
TEMPORARY EROSION, SEDIMENT AND WATER POLLUTION CONTROL MEASURES EROSION CONTROL LOG EC (9) - 16			
FILE: ec916	DN: TxDOT	CK: KM	DW: LS/PT
© TxDOT: JULY 2016	CONT	SECT	JOB
REVISIONS		HIGHWAY	
		BR	
DIST	COUNTY	SHEET NO.	
HOU	GALVESTON	72	

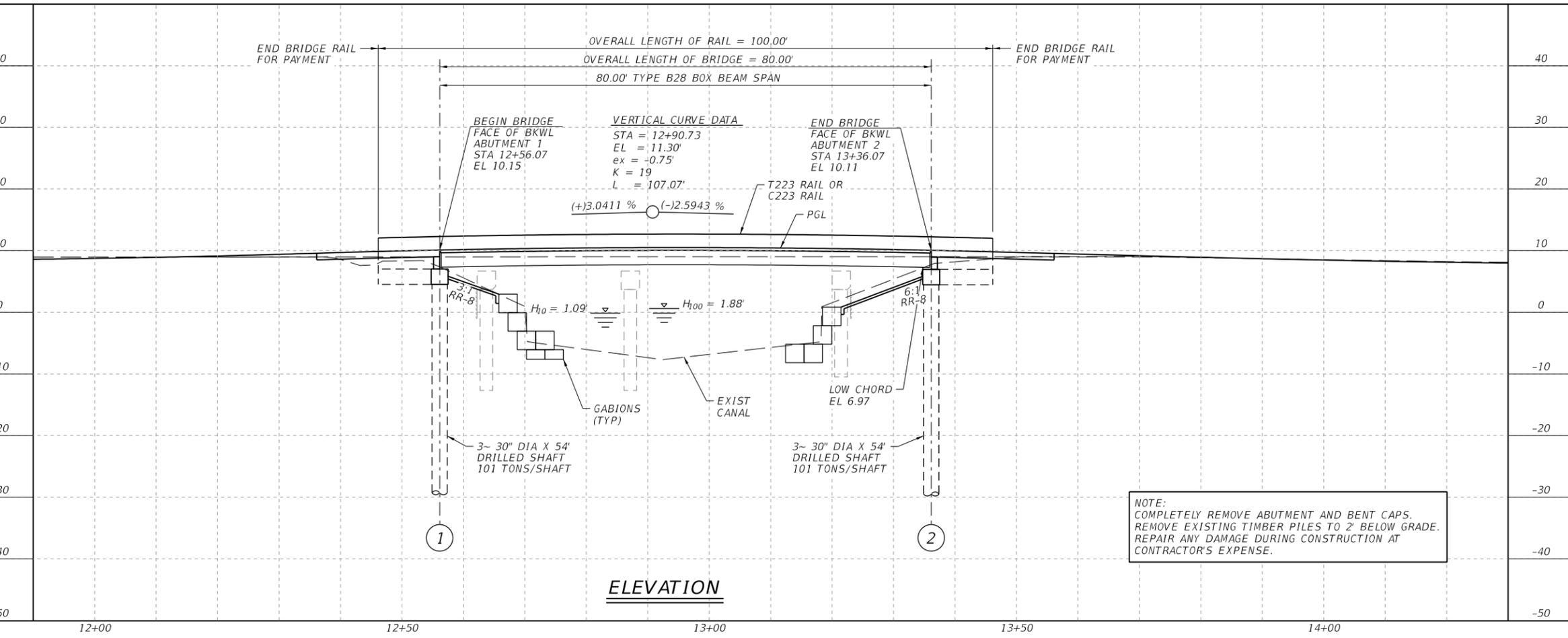
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PLAN

- GENERAL NOTES:**
- DESIGNED FOR HL-93 LOADING IN ACCORDANCE WITH AASHTO LRFD BRIDGE SPECIFICATIONS, 8TH EDITION, AS MODIFIED BY THE TXDOT BRIDGE DESIGN MANUAL - LRFD, JUL 2018 AND TXDOT BRIDGE DETAILING GUIDE AUG 2018.
 - SEE "BRIDGE TYPICAL SECTION" SHEET FOR TYPICAL SECTION.
 - CONTRACTOR SHALL VERIFY THE LOCATIONS AND DEPTHS OF ALL UTILITIES PRIOR TO CONSTRUCTION OR FABRICATION. SEE UTILITY PLANS FOR DISPOSITION OF ALL EXISTING UTILITIES.
 - ALL DIMENSIONS ARE EITHER HORIZONTAL OR VERTICAL AND MUST BE CORRECTED FOR GRADE, CROWN, AND/OR SUPERELEVATION.



ELEVATION

NOTE:
 COMPLETELY REMOVE ABUTMENT AND BENT CAPS.
 REMOVE EXISTING TIMBER PILES TO 2' BELOW GRADE.
 REPAIR ANY DAMAGE DURING CONSTRUCTION AT CONTRACTOR'S EXPENSE.

HL93 LOADING



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

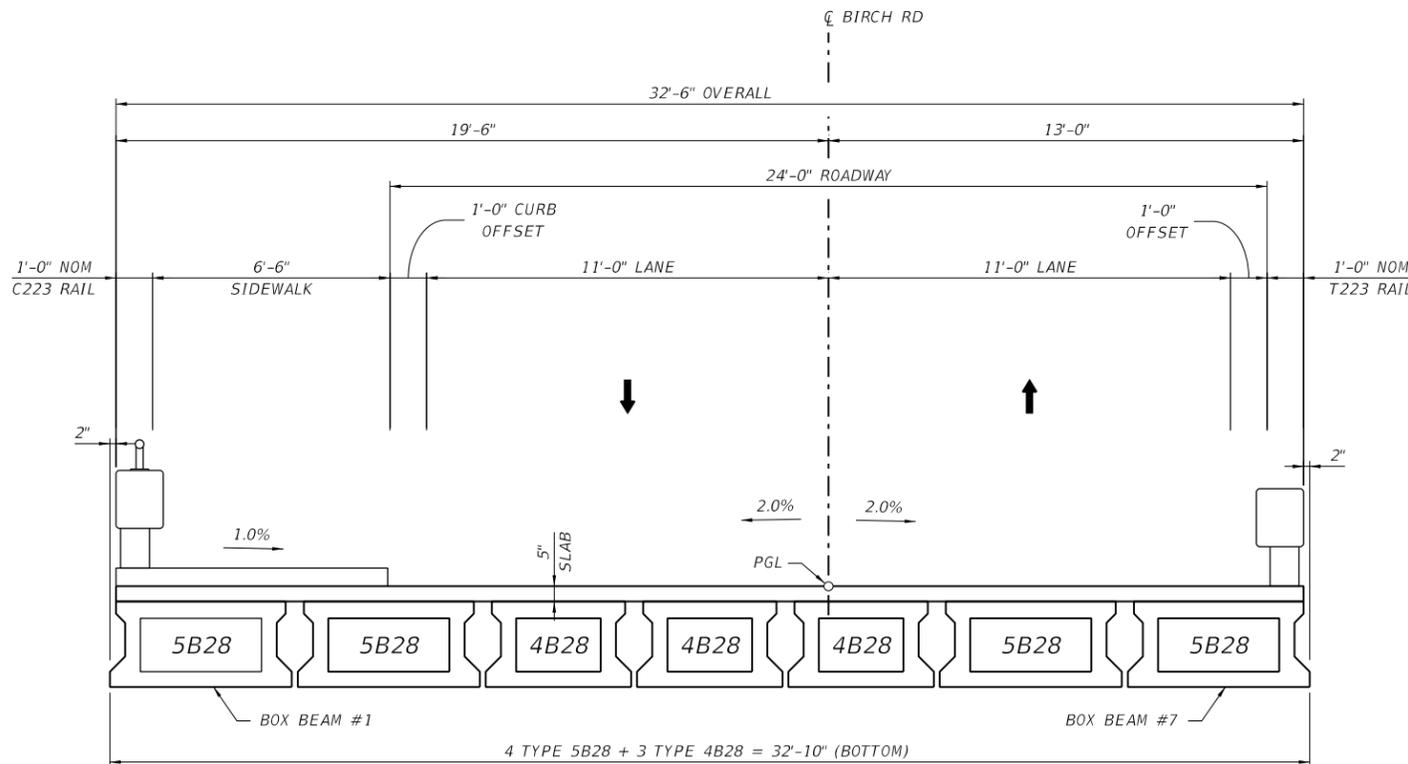
BIRCH ROAD BRIDGE REPLACEMENT

BRIDGE LAYOUT

SCALE: 1" = 20'	SHEET 1 OF 1
Job No.:	SHEET
Date: January, 2020	HORZ:
Drn By: WMR	VERT:
Ckd By: JFT	No. 73

SUMMARY OF ESTIMATED QUANTITIES

	416-6003	420-6013	422-6005	422-6013	425-6003	425-6004	442-6007	450-6006	450-6032
	DRILL SHAFT (30 IN)	CL C CONC (ABUT)	REINF CONC SLAB (BOX BEAM)	BRIDGE SIDEWALK	PRESTR CONC BOX BEAM (4B28)	PRESTR CONC BOX BEAM (5B28)	STR STEEL (MISC NON- BRIDGE)	RAIL (TY T223)	RAIL (TY C223)
	LF	CY	SF	SF	LF	LF	LB	LF	LF
2 - ABUTMENTS	324	33.6	-	-	-	-	168	20.0	20.0
1 - PRESTR CONC BOX BM SPAN	-	-	2600	600	238.50	318.00	-	80.0	80.0
TOTAL	324	33.6	2600	600	238.50	318.00	168	100.0	100.0



TYPICAL TRANSVERSE SECTION

HL93 LOADING



04/06/2020

REV. NO.	DATE	DESCRIPTION	BY



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T.B.P.E. FIRM REGISTRATION #392
3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

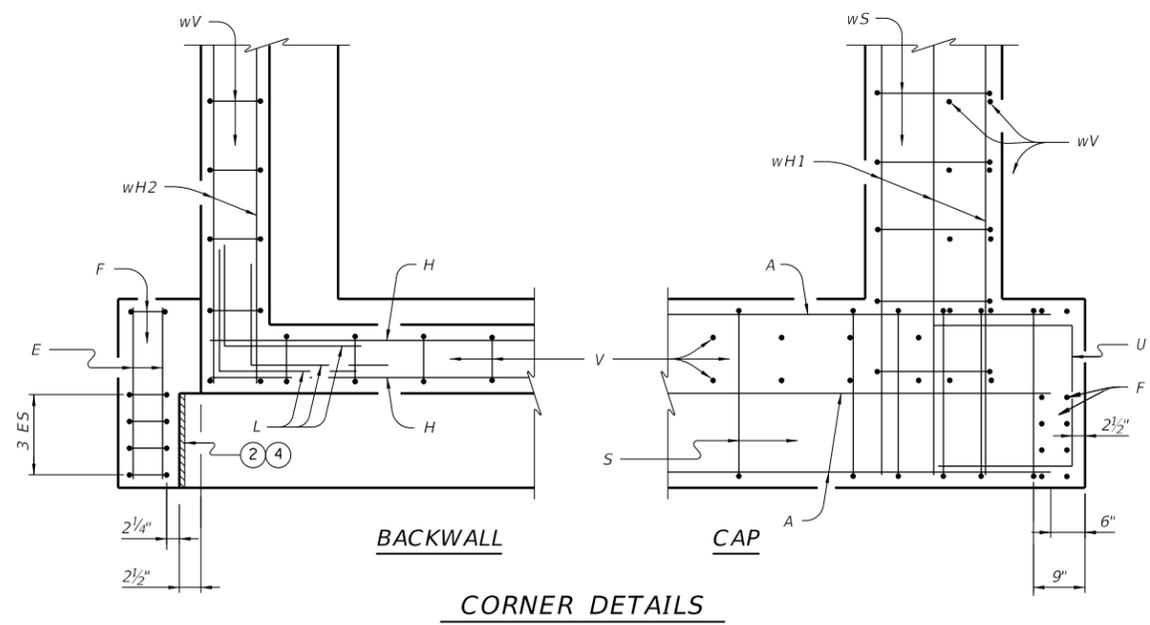
GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
**ESTIMATED QUANTITIES &
BRIDGE TYPICAL SECTION**

SHEET 1 OF 1

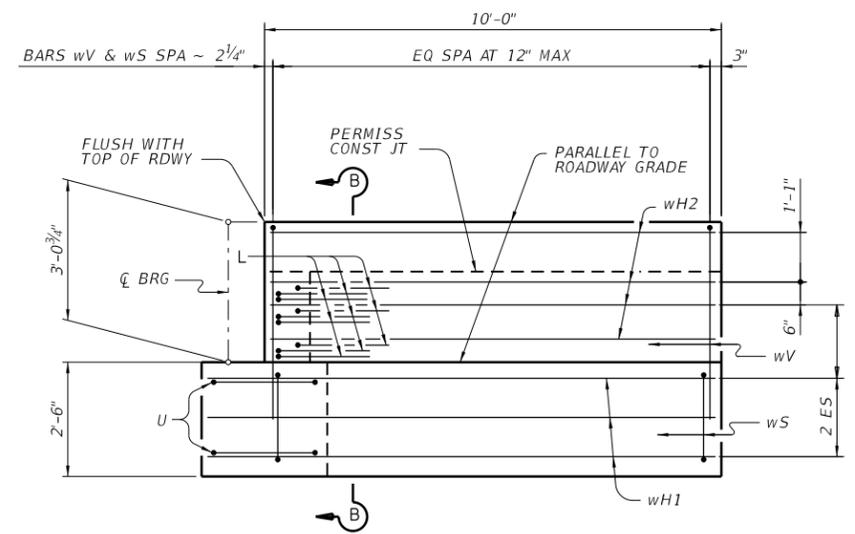
Job No.:	Scale:	SHEET
Date: January, 2020	HORZ:	NO.
Drn By: WMR	VERT:	74
Chk By: JFT		

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 4/2/2020
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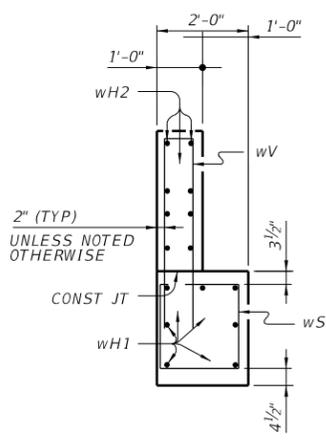


CORNER DETAILS

- ② 1/2" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM.
- ④ DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.



WINGWALL ELEVATION
(EARWALL OMITTED FOR CLARITY)



SECTION B-B

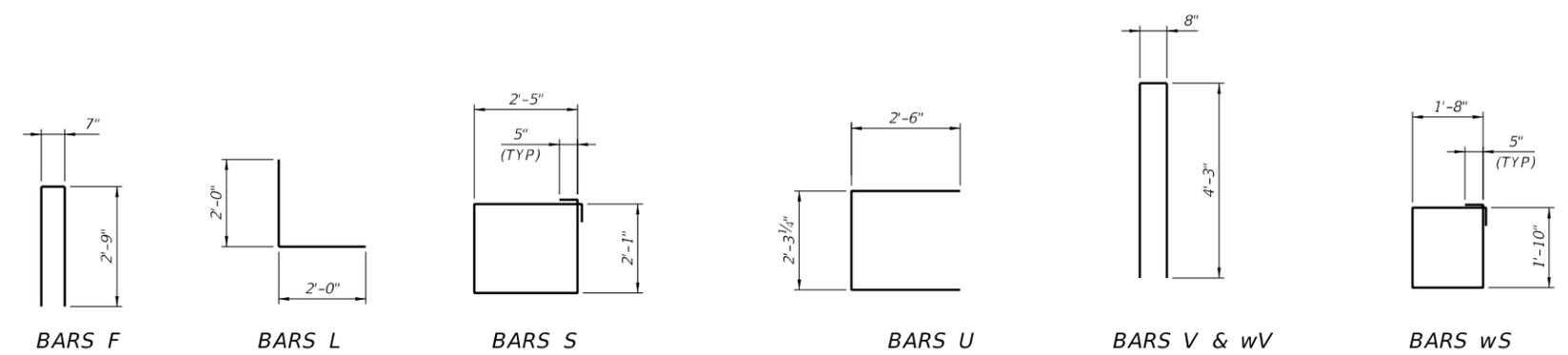


TABLE OF ESTIMATED QUANTITIES				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	8	#11	33'-11"	1,442
E	4	#5	2'-5"	10
F	10	#5	6'-1"	63
H	6	#6	32'-2"	290
L	18	#6	4'-0"	108
S	40	#4	9'-10"	263
U	4	#6	7'-3"	44
V	32	#5	9'-2"	306
wH1	14	#6	11'-0"	231
wH2	16	#6	9'-8"	232
wS	22	#4	7'-10"	115
wV	22	#5	9'-2"	210
Reinforcing Steel			Lb	3,314
Class "C" Concrete			CY	16.8

COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BARS.

HL93 LOADING



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM
ENGINEERING CORPORATION - HOUSTON, LLC
T.B.P.E. FIRM REGISTRATION #392
3100 WEST ALABAMA HOUSTON, TEXAS 77058 (713) 520-9570

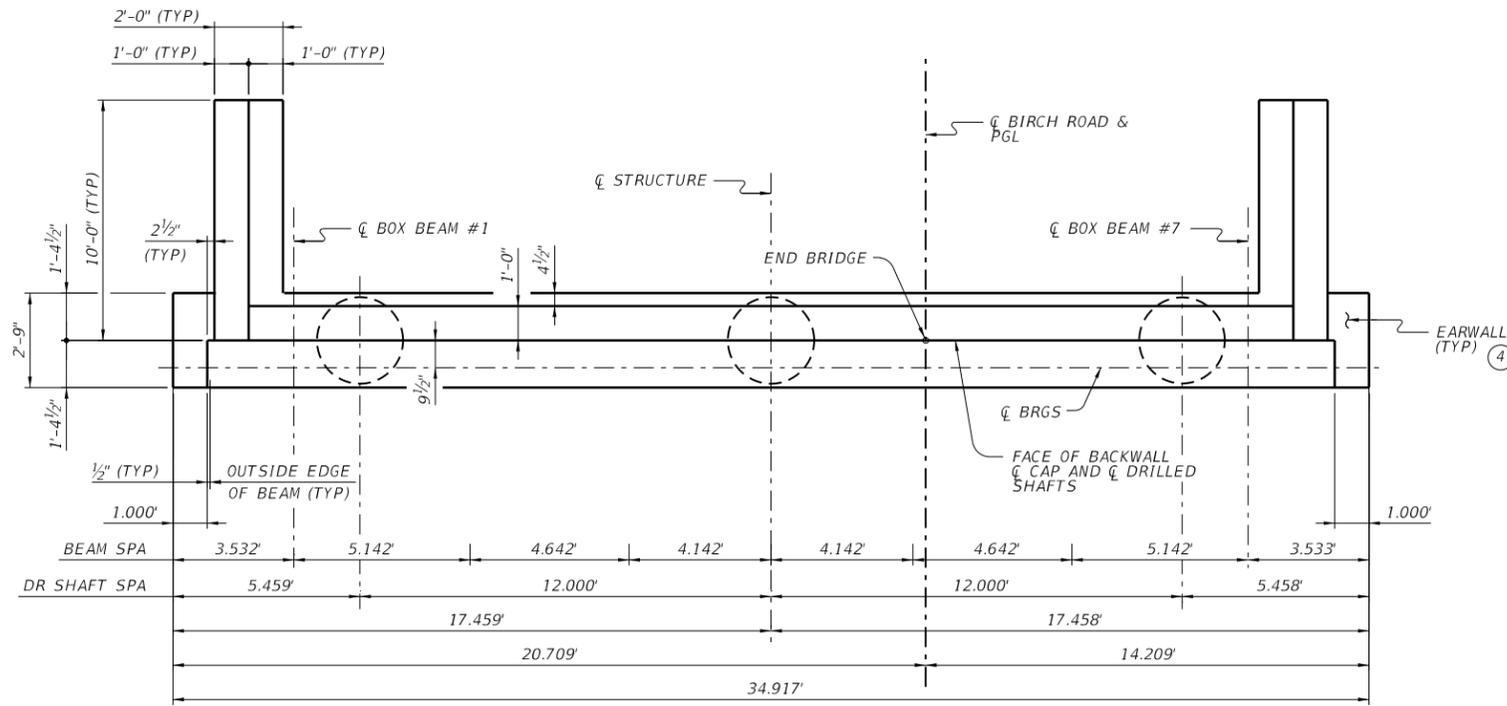
GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT

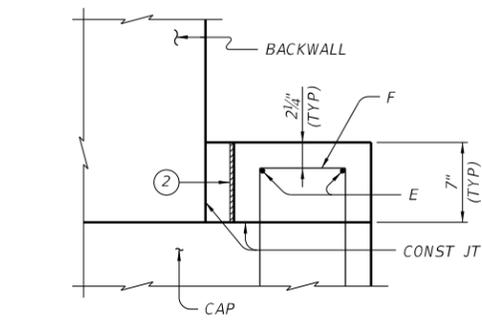
ABUTMENT NO. 1

Job No.:	Scale:	SHEET
Date: January, 2020	HORZ:	NO. 76
Drn By: WMR	VERT:	
Ckd By: JFT		

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 4/2/2020
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PLAN



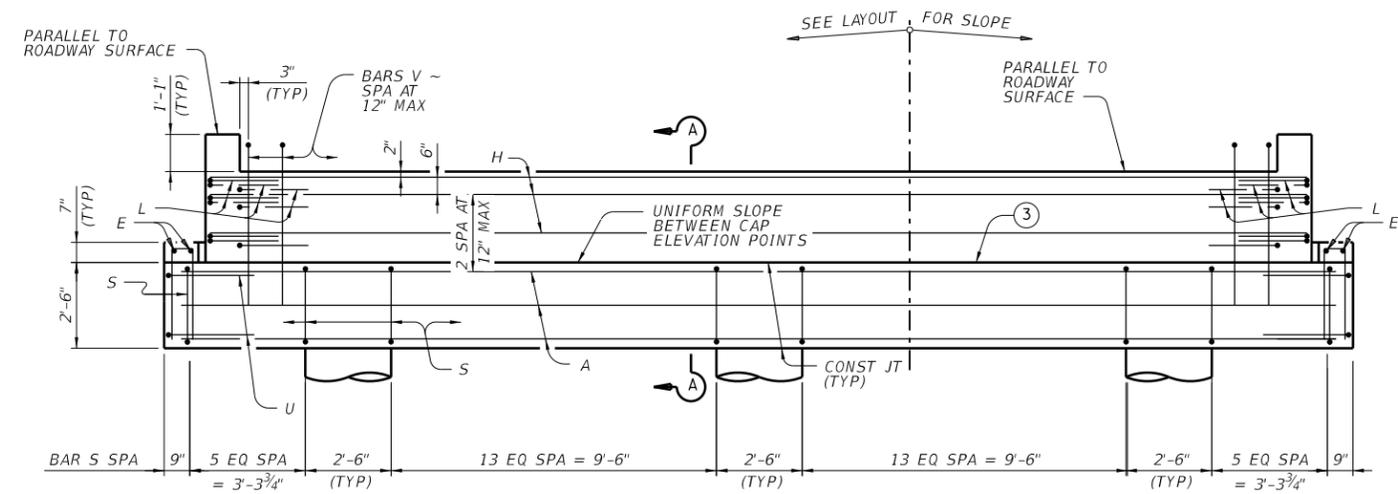
EARWALL ELEVATION DETAIL ④
 (SLOPE TOP OF EARWALL AWAY FROM BEAMS)

GENERAL NOTES:
 DESIGNED FOR HL-93 LOADING IN ACCORDANCE WITH AASHTO LRFD BRIDGE SPECIFICATIONS, 8TH EDITION, AS MODIFIED BY THE TXDOT BRIDGE DESIGN MANUAL - LRFD, JUL 2018 AND TXDOT BRIDGE DETAILING GUIDE AUG 2018.
 CONCRETE STRENGTH $f'c = 3,600$ PSI.
 ALL REINFORCING MUST BE GRADE 60.
 SEE BRIDGE LAYOUT FOR BEAM TYPE AND FOUNDATION TYPE, SIZE AND LENGTH.
 SEE STANDARD FD FOR ALL FOUNDATION DETAILS AND NOTES.
 SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE CAST IN WINGWALLS.
 SEE STANDARD CRR FOR RIPRAP ATTACHMENT DETAILS, IF APPLICABLE.
 SEE BRIDGE LAYOUT FOR JOINT TYPE.

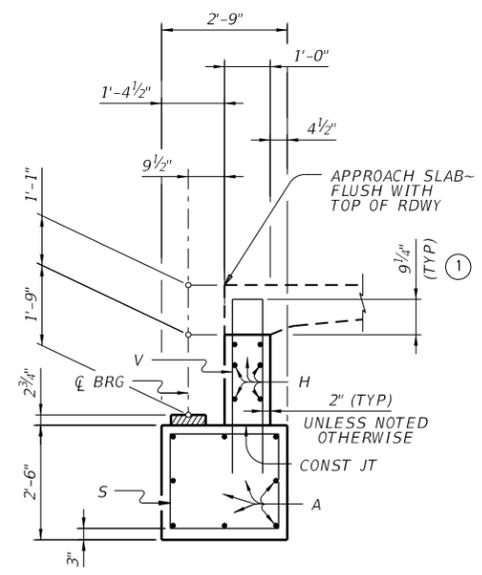
- ① INCREASE AS REQUIRED TO MAINTAIN 3" FROM FINISHED GRADE.
- ② 1/2" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM.
- ③ SURFACE FINISH FOR THE TOP OF CAP WILL BE A TEXTURED WOOD FLOAT FINISH. THE SURFACE MUST BE LEVEL IN THE DIRECTION OF THE CENTERLINE OF BEAMS.
- ④ DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE. REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BARS.

- MATERIAL NOTES:**
- 1. PROVIDE GRADE 60 REINFORCING STEEL.
 - 2. PROVIDE CLASS C CONCRETE ($f'c = 3,600$ PSI).



ELEVATION



SECTION A-A

HL93 LOADING

04/06/2020

REV. NO.	DATE	DESCRIPTION	BY

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 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

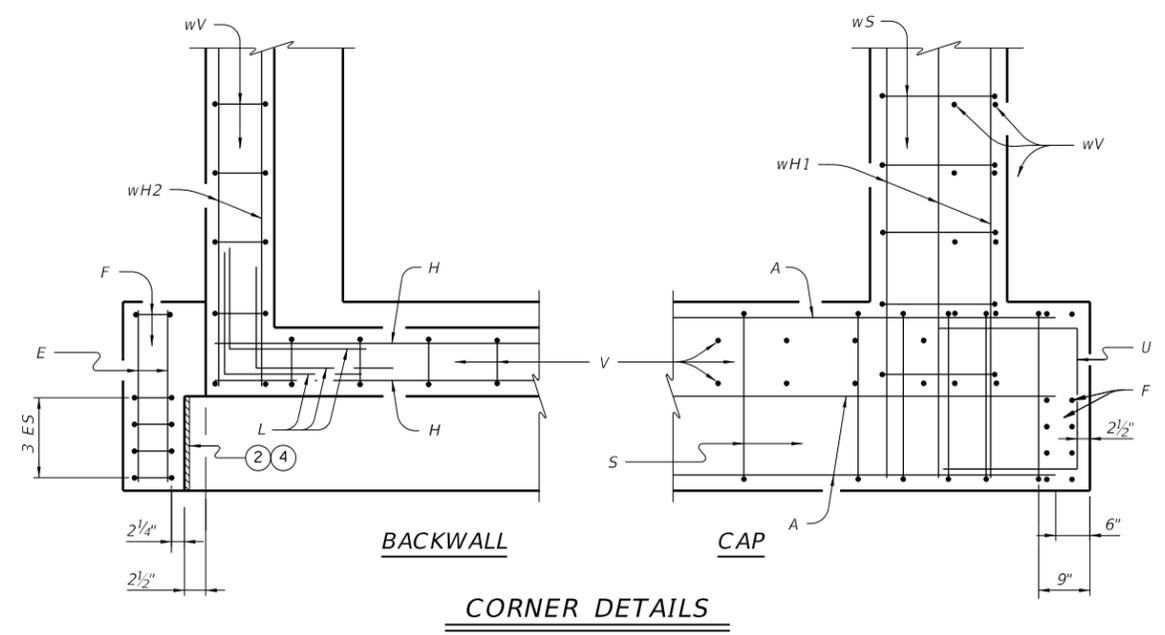
BIRCH ROAD BRIDGE REPLACEMENT

ABUTMENT NO. 2

Job No.:	Scale:	SHEET
Date: January, 2020	HORZ:	
Drn By: WMR	VERT:	NO. 77
Ckd By: JFT		

SHEET 1 OF 2

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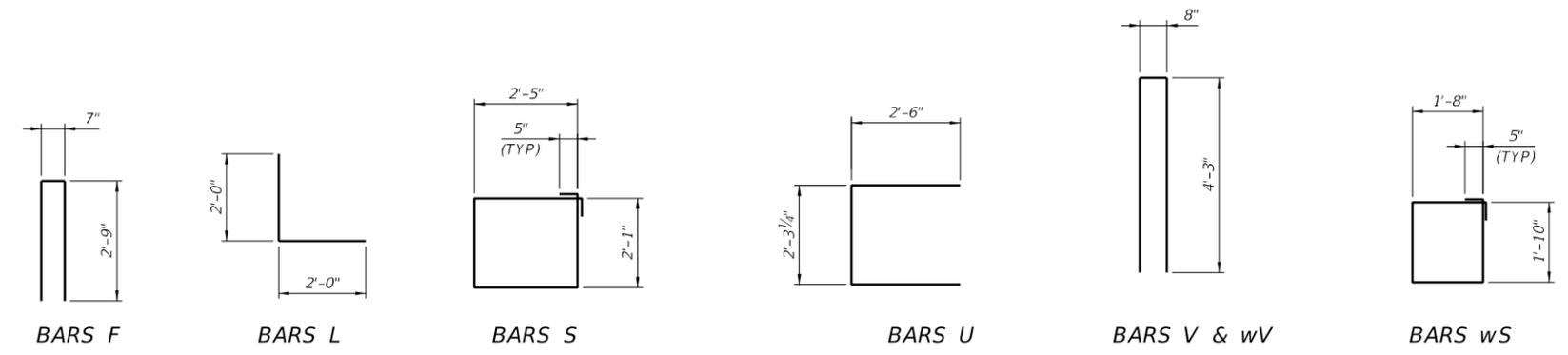
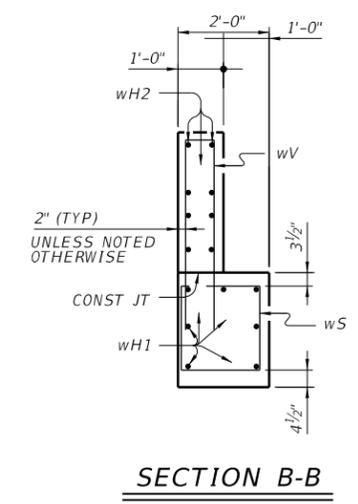
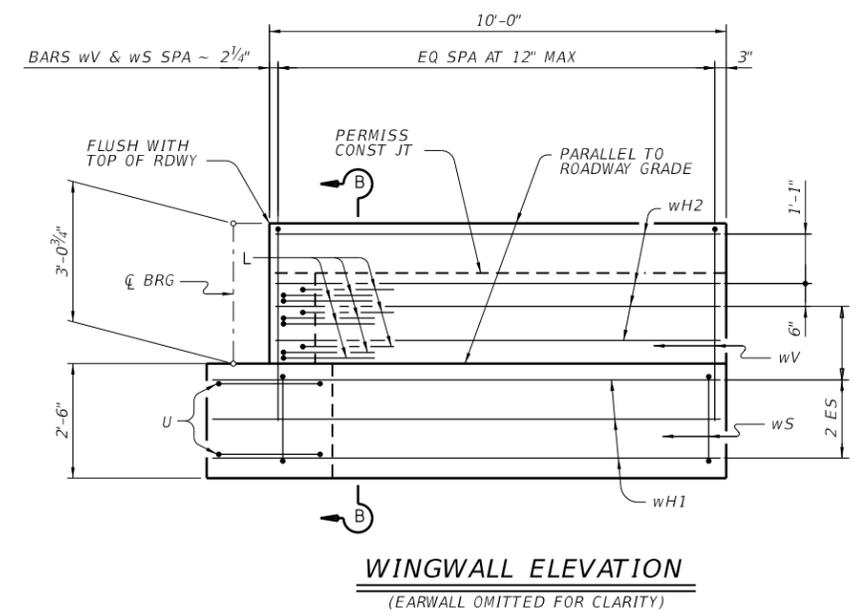


- ② 1/2" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM.
- ④ DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

TABLE OF ESTIMATED QUANTITIES

BAR	NO.	SIZE	LENGTH	WEIGHT	
A	8	#11	33'-11"	1,442	
E	4	#5	2'-5"	10	
F	10	#5	6'-1"	63	
H	6	#6	32'-2"	290	
L	18	#6	4'-0"	108	
S	40	#4	9'-10"	263	
U	4	#6	7'-3"	44	
V	32	#5	9'-2"	306	
wH1	14	#6	11'-0"	231	
wH2	16	#6	9'-8"	232	
wS	22	#4	7'-10"	115	
wV	22	#5	9'-2"	210	
Reinforcing Steel				Lb	3,314
Class "C" Concrete				CY	16.8

COVER DIMENSIONS ARE CLEAR DIMENSIONS UNLESS NOTED OTHERWISE.
 REINFORCING BAR DIMENSIONS SHOWN ARE OUT-TO-OUT OF BARS.



HL93 LOADING



REV. NO.	DATE	DESCRIPTION	BY



DANNENBAUM

ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77058 (713) 520-9570

GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT

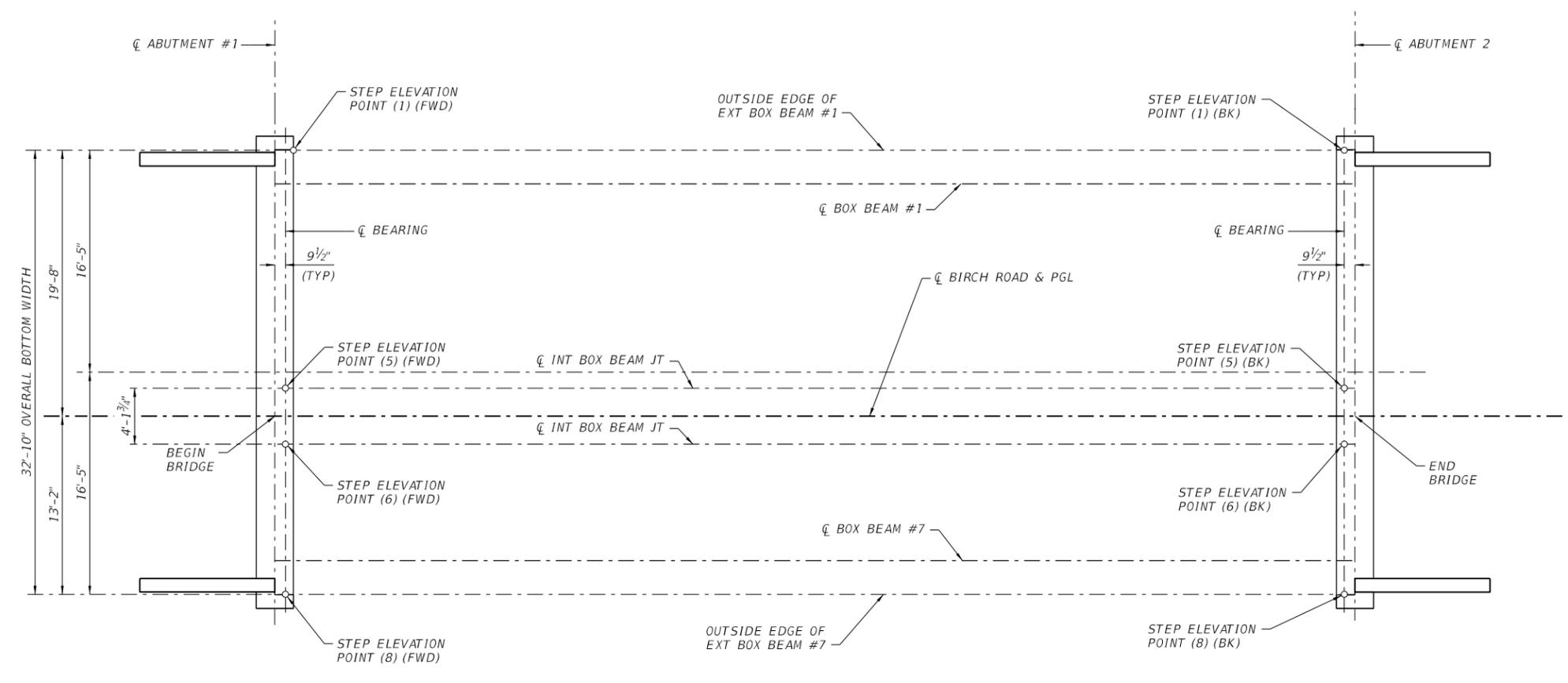
ABUTMENT NO. 2

SHEET 2 OF 2

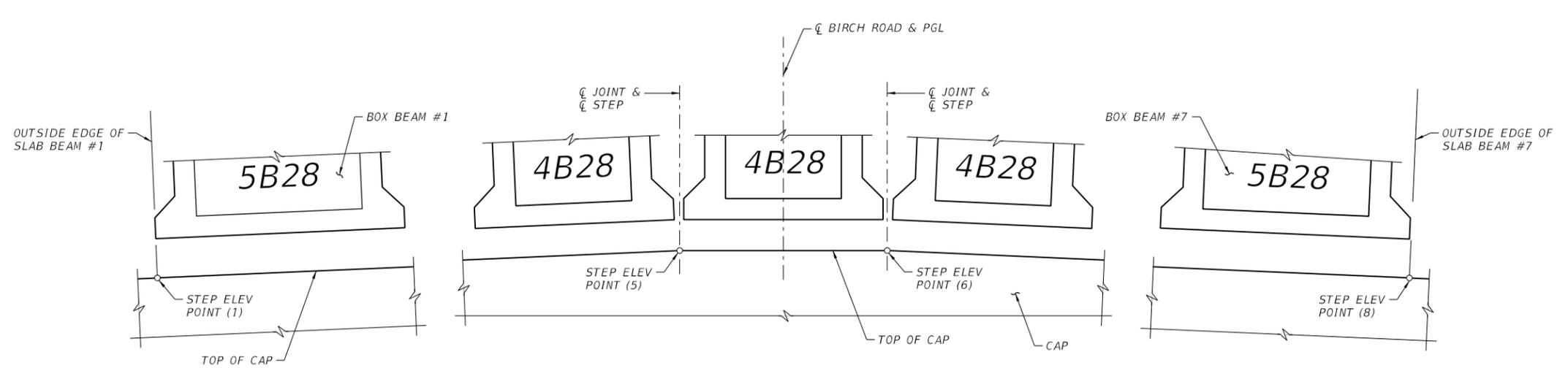
Job No.:	Scale:	SHEET
Date: January, 2020	HORZ:	NO.
Drn By: WMR	VERT:	78
Ckd By: JFT		

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BOX BEAM STEP ELEVATIONS						
BENT	STEP 1	STEP 5		STEP 6		STEP 8
	RT. SIDE	LT. SIDE	RT. SIDE	LT. SIDE	RT. SIDE	LT. SIDE
# 1 (FWD)	6.713	7.083	7.083	7.047	7.047	6.843
# 2 (BK)	6.665	7.035	7.035	6.999	6.999	6.795



PLAN OF STEP ELEVATIONS



TRANSVERSE SECTIONS AT CAP ELEVATIONS

LEFT SIDE AND RIGHT SIDE ARE REFERENCED FROM THE ELEVATION LINE LOOKING UPSTATION.

HL93 LOADING



REV. NO.	DATE	DESCRIPTION	BY



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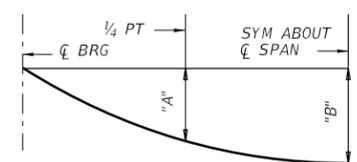
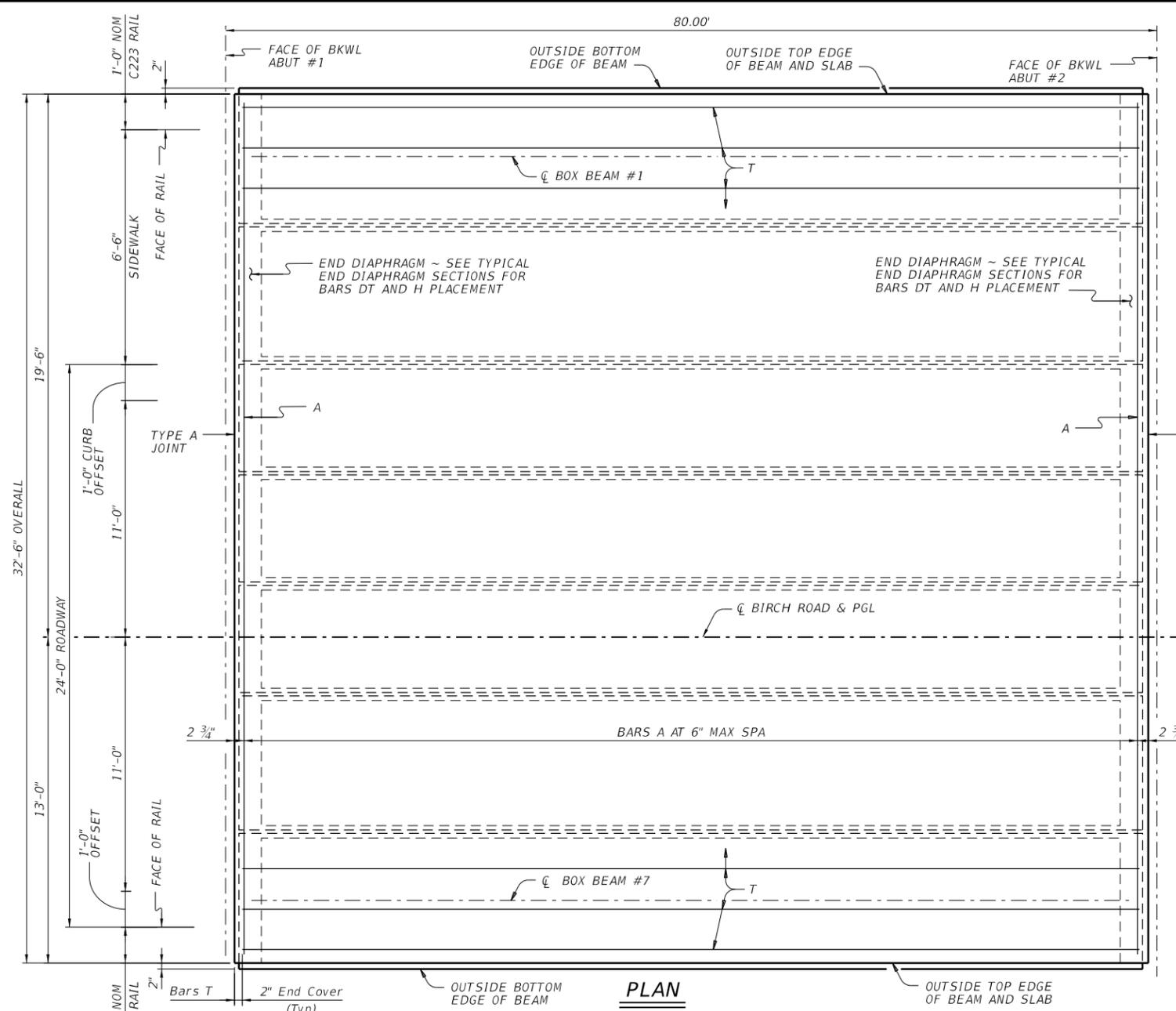
GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
CAP ELEVATION DETAILS

SHEET 1 OF 1

Job No.:	Scale:	SHEET
Date: January, 2020	HORZ:	NO.
Drn By: WMR	VERT:	
Chd By: JFT		79

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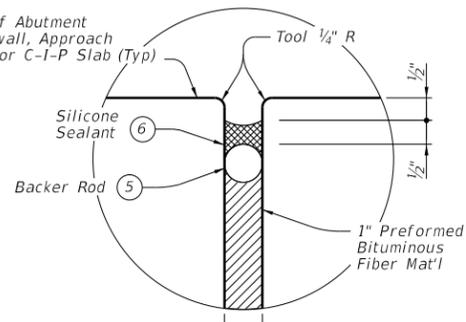


NOTE: DEFLECTIONS SHOWN ARE DUE TO SHEAR KEY AND CONCRETE SLAB ONLY, ($E_c = 5 \times 10^3$ KSI). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSION MAY BE LESS. DEFLECTIONS MAY BE ADJUSTED BASED ON FIELD OBSERVATION.

BAR TABLE	
BAR	SIZE
A	#4
DT	#4
H	#5
T	#4

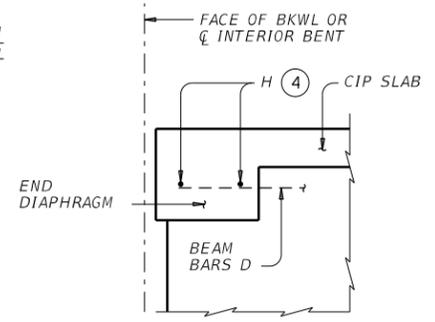
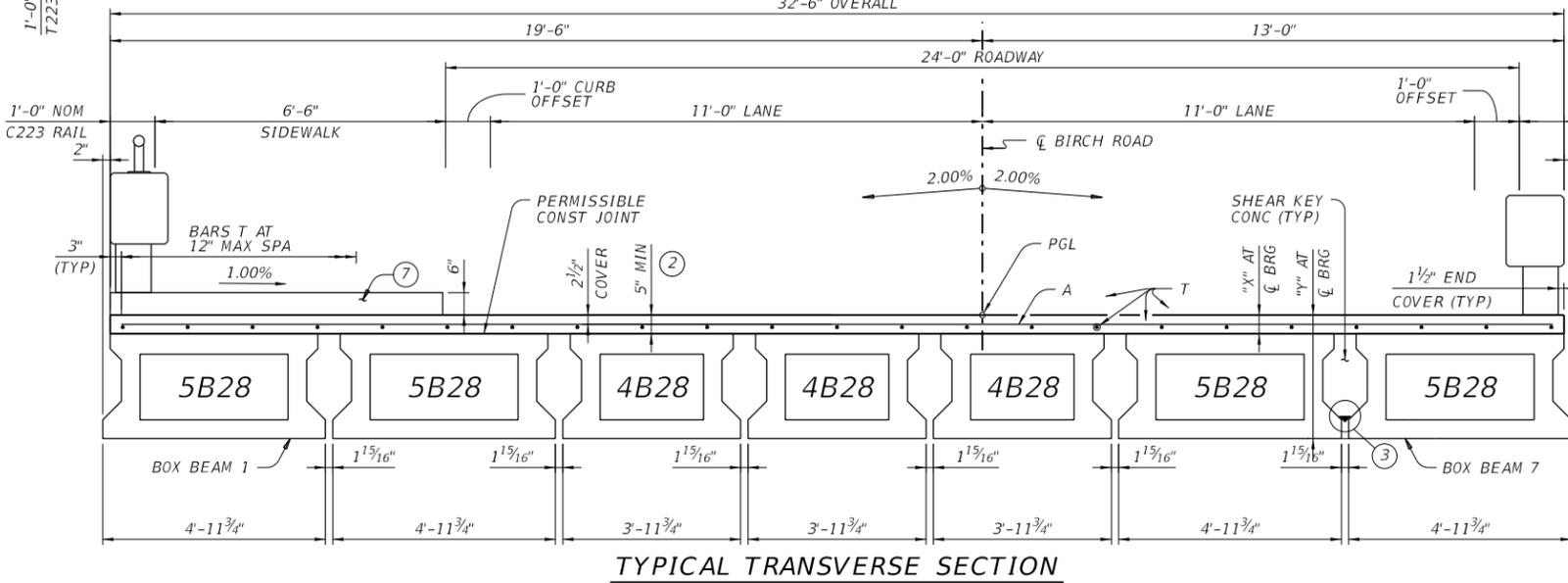
TABLE OF DEFLECTIONS AND SECTION DEPTHS						
BEAM NO.	POINT	DEAD LOAD DEFLECTIONS (FT)			SECTION DEPTHS	
		SHEAR KEY	SLAB	TOTAL	"X" AT CL BRG	"Y" AT CL BRG
ALL	"A"	0.016	0.021	0.037	6"	2'-10"
	"B"	0.022	0.030	0.052		

TABLE OF ESTIMATED QUANTITIES					
SPAN	SHEAR KEY	REINF CONC SLAB (BOX BEAM)	PRESTR CONCRETE BOX BEAMS (TY 4B28)	PRESTR CONCRETE BOX BEAMS (TY 5B28)	TOTAL REINF STEEL (1)
	CY	SF	LF	LF	Lb
1	27.8	2,600	238.50	318.00	5,200
TOTAL	27.8	2,600	238.50	318.00	5,200



(1) REINFORCING STEEL WEIGHT IS BASED ON AN APPROXIMATE FACTOR OF 2.0 psf.
GENERAL NOTES:
 DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS. PROVIDE CLASS 5 CONCRETE (FC = 4,000 PSI) FOR SLAB AND SHEAR KEY. PROVIDE CLASS 5 (HPC) CONCRETE IF SHOWN ELSEWHERE IN THE PLANS. ALL REINFORCING MUST BE GRADE 60. BAR LAPS, WHERE REQUIRED, WILL BE AS FOLLOWS:
 UNCOATED ~ #4 = 1'-5"
 EPOXY COATED ~ #4 = 2'-1"
 SEE RAILING DETAILS AND STANDARD BBRAS FOR RAIL ANCHORAGE.

- (2) SLAB THICKNESS AT MIDSPAN OF BEAMS MAY NOT EXCEED 7 INCHES.
- (3) FORM BOTTOM OF SHEAR KEYS WITH FOAM BACKER ROD OR OTHER MATERIAL ACCEPTABLE TO THE ENGINEER.
- (4) PROVIDE 1 1/2" END COVER TO BARS H. AFTER ALL BEAMS HAVE BEEN PLACED, WELD ONE BAR H TO TWO BARS D AT EACH END OF ALL BEAMS.
- (5) BACKER ROD MUST BE 25% LARGER THAN JOINT OPENING AND MUST BE COMPATIBLE WITH THE SEALANT.
- (6) USE CLASS 7 SILICONE SEALANT. PREPARE JOINT AND SEAL IN ACCORDANCE WITH ITEM 438 "CLEANING AND SEALING JOINTS".
- (7) SEE BRSM STANDARD FOR REINFORCING.



TYPICAL END DIAPHRAGM SECTION
 ALONG CENTERLINE OF BOX BEAM

HL93 LOADING



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GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
80.00' PRESTRESSED CONCRETE BOX BEAM SPAN

SHEET 1 OF 2

Job No.:	Scale:	SHEET
Date: January, 2020	HORZ:	
Drn By: WMR	VERT:	NO.
Chk By: JFT		80

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BENT REPORT

		ABUT NO. 1 (S 1 55 40.71 E)		
		DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 19.6667L		
		STEP SPAC.	BEAM ANGLE	
		(CL BENT)	D	M S
SPAN 1		0.0000	90	0 0.00
STEP 1				
BOX 1	LEFT CENTER RIGHT	5.0608	90	0 0.00
BOX 2	LEFT CENTER RIGHT	5.1424	90	0 0.00
BOX 3	LEFT CENTER RIGHT	4.1424	90	0 0.00
BOX 4	LEFT CENTER RIGHT	4.1424	90	0 0.00
STEP 5		4.1424	90	0 0.00
BOX 5	LEFT CENTER RIGHT	4.1422	90	0 0.00
STEP 6		4.1422	90	0 0.00
BOX 6	LEFT CENTER RIGHT	5.1424	90	0 0.00
BOX 7	LEFT CENTER RIGHT	5.0608	90	0 0.00
STEP 8		5.0608	90	0 0.00
	TOTAL	32.8335		

		ABUT NO. 2 (S 1 55 40.71 E)		
		DISTANCE BETWEEN STATION LINE AND STEP LINE 1, 19.6667L		
		STEP SPAC.	BEAM ANGLE	
		(CL BENT)	D	M S
SPAN 1		0.0000	90	0 0.00
STEP 1				
BOX 1	LEFT CENTER RIGHT	5.0608	90	0 0.00
BOX 2	LEFT CENTER RIGHT	5.1424	90	0 0.00
BOX 3	LEFT CENTER RIGHT	4.1424	90	0 0.00
BOX 4	LEFT CENTER RIGHT	4.1424	90	0 0.00
STEP 5		4.1424	90	0 0.00
BOX 5	LEFT CENTER RIGHT	4.1422	90	0 0.00
STEP 6		4.1422	90	0 0.00
BOX 6	LEFT CENTER RIGHT	5.1424	90	0 0.00
BOX 7	LEFT CENTER RIGHT	5.0608	90	0 0.00
STEP 8		5.0608	90	0 0.00
	TOTAL	32.8335		

BEAM REPORT

BEAM REPORT AT CENTER OF BOX BEAM				
	HORIZONTAL DISTANCE	TRUE DISTANCE		BEAM SLOPE
	C-C BENT	C-C BRG.	BOT. BEAM FLG.	
BEAM 1	80.0000	78.4167	79.5000	-0.00062
BEAM 2	80.0000	78.4167	79.5000	-0.00062
BEAM 3	80.0000	78.4167	79.5000	-0.00062
BEAM 4	80.0000	78.4167	79.5000	-0.00062
BEAM 5	80.0000	78.4167	79.5000	-0.00062
BEAM 6	80.0000	78.4167	79.5000	-0.00062
BEAM 7	80.0000	78.4167	79.5000	-0.00062

HL93 LOADING



04/06/2020

REV. NO.	DATE	DESCRIPTION	BY



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 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570

GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
**80.00' PRESTRESSED
 CONCRETE BOX BEAM SPAN**

SHEET 2 OF 2

Job No.:	Scale:	SHEET
Date: January, 2020	HORZ:	
Drn By: WMR	VERT:	
Chk By: JFT		NO. 81

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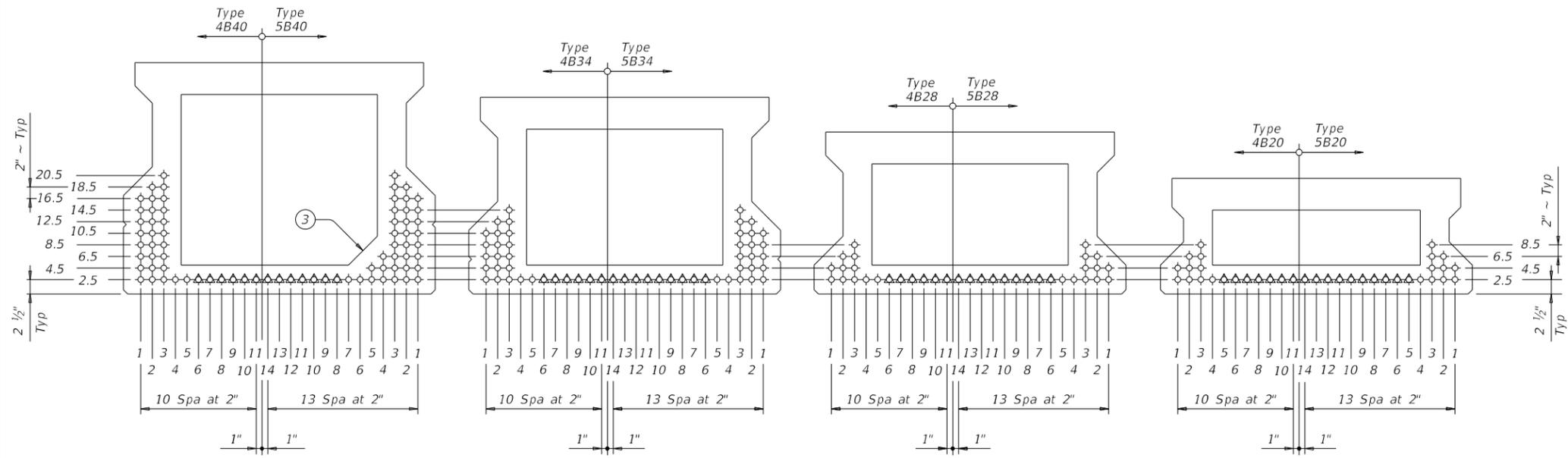
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STRUCTURE	DESIGNED BEAMS (STRAIGHT STRANDS)														OPTIONAL DESIGN										
	SPAN NO.	BEAM NO.	BEAM TYPE	PRESTRESSING STRANDS							DEBONDED STRAND PATTERN PER ROW							CONCRETE		DESIGN LOAD COMP STRESS (TOP ϵ) (SERVICE I)	DESIGN LOAD TENSILE STRESS (BOTTOM ϵ) (SERVICE III)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I)	LIVE LOAD DISTRIBUTION FACTOR		
				NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH (ksi)	"e" \bar{c} (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	NO. OF STRANDS		NUMBER OF STRANDS DEBONDED TO (ft from end)					RELEASE STRGTH f'_{ci} (ksi)				MINIMUM 28 DAY COMP STRGTH f'_c (ksi)	②	
												TOTAL	DE-BONDED	3	6	9	12	15						Moment	Shear
BIRCH RD BRIDGE	1	1	5B28		26	0.6	270	11.24	11.24	4	2.5	26	4	2	0	0	2	0	4.000	5.000	2.762	-3.139	2810	0.365	0.632
	1	2	5B28		28	0.6	270	11.24	11.24	6	2.5	28	6	2	0	2	0	2	4.000	5.000	2.926	-3.308	2911	0.359	0.631
	1	3	4B28		26	0.6	270	10.81	10.72	6	2.5	22	6	2	0	2	0	2	4.400	5.000	3.176	-3.524	2529	0.304	0.459
	1	4	4B28		22	0.6	270	11.12	11.12	4	2.5	22	4	2	0	0	2	0	4.000	5.000	2.947	-3.101	2235	0.304	0.459
	1	5	4B28		24	0.6	270	10.95	10.89	6	2.5	22	6	2	0	2	0	2	4.000	5.000	3.036	-3.266	2350	0.304	0.459
	1	6	5B28		26	0.6	270	11.24	11.24	4	2.5	26	4	2	0	0	2	0	4.000	5.000	2.815	-3.095	2732	0.359	0.631
	1	7	5B28		24	0.6	270	11.24	11.24	2	2.5	24	2	0	2	0	0	0	4.000	5.000	2.648	-2.926	2631	0.365	0.632

- ① Based on the following allowable stresses (ksi):
 Compression = 0.65 f'_{ci}
 Tension = 0.24 $\sqrt{f'_{ci}}$
 Optional designs must likewise conform.
- ② Portion of full HL93.
- ③ Bottom corner chamfer required for 4B40 and 5B40 boxes when beam lengths are greater than 100 ft.

DESIGN NOTES:
 Designed in accordance with AASHTO LRFD Bridge Design Specifications.
 Prestress losses for the designed beams have been calculated for a relative humidity of 60 percent. Optional designs must likewise conform.

FABRICATION NOTES:
 Provide Class H concrete.
 Provide Grade 60 reinforcing steel bars.
 Use low relaxation strands, each pretensioned to 75 percent of f_{pu} .
 When shown on this sheet, the Fabricator has the option of furnishing either the designed beam or an approved optional beam design. All optional design submittals and shop drawings must be signed, sealed and dated by a Professional Engineer registered in the State of Texas.
 Locate strands for the designed beam as low as possible on the 2" grid system unless a non-standard stand pattern is indicated. Fill row "2.5", then row "4.5", then row "6.5", etc. Place strands within a row as follows:
 1) Locate a strand in each "1" position.
 2) Place strand symmetrically about vertical centerline of box.
 3) Space strands as equally as possible across the entire width.
 Strand debonding must comply with Item 424.4.2.2.4.
 Do not debond strands in position "1". Distribute debonded strands equally about the vertical centerline. Decrease debonded lengths working inward, with debonding staggered in each row.
 Full-length debonded strands are only permitted in positions marked



TxDOT B40 BOX BEAMS

TxDOT B34 BOX BEAMS

TxDOT B28 BOX BEAMS

TxDOT B20 BOX BEAMS



HL93 LOADING

Texas Department of Transportation
 Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DESIGNS (NON-STANDARD SPANS)

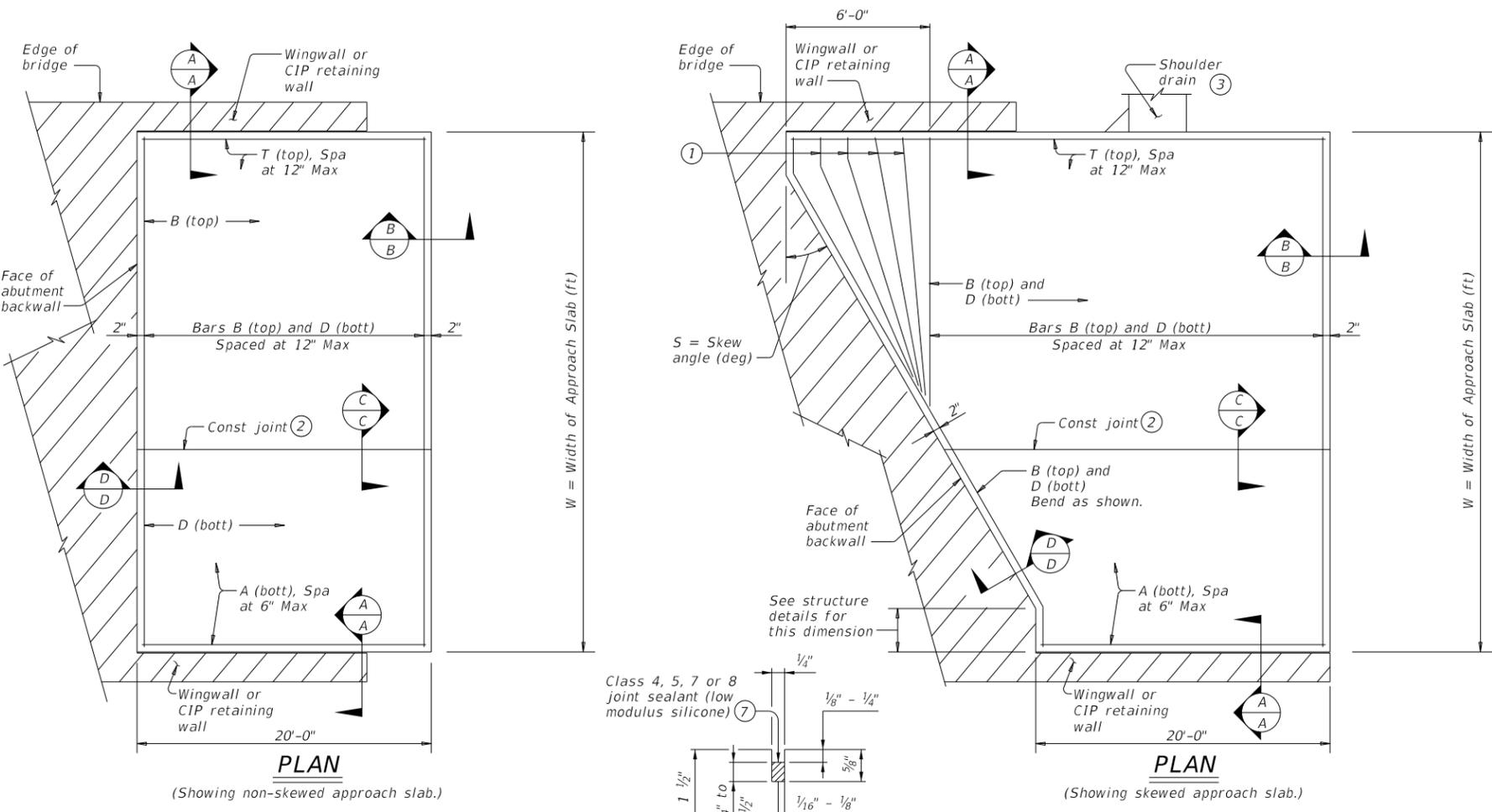
BBND

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©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS				
04-11: f'_{ci} and LLDf.	COUNTY		SHEET NO.	
01-16: Notes.	HOU	GALV	82	

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 ENGINEERING COMPANY - DALLAS, LLC
 T.B.P.E. FIRM REGISTRATION #8996
 3030 LBJ FREEWAY, SUITE 910 DALLAS, TX 75234 (972) 239-2002

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DATE: FILE:



BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
T	#5

APPROXIMATE QUANTITIES ④

Reinf steel weight = 8.5 Lbs/SF of Approach Slab

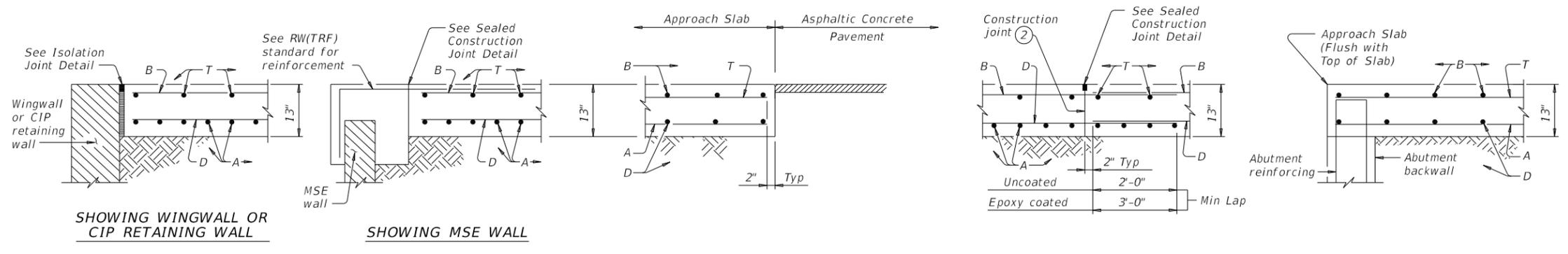
Volume of Appr Slab Conc (CY) = $0.802W + 0.02W^2 \tan S$

W = Width of Approach Slab (ft)

S = Skew Angle (deg)

- ① Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum arc bar length = 2'-6". Bend bars as necessary.
- ② Provide longitudinal construction joints that align with longitudinal construction joints in the bridge slab with bridges built in stages. Other longitudinal construction joints must receive approval of the Engineer.
- ③ See details elsewhere in plans for shoulder drain location and details.
- ④ For Contractor's information only. Quantities shown are for one approach slab.
- ⑤ Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.
- ⑥ See details elsewhere in plans for required cross-slope.
- ⑦ Place in accordance with Item 438.
- ⑧ Provide backer rod that is 25% larger than joint opening and compatible with the sealant.
- ⑨ If bridge rail is present at the wingwall or CIP retaining wall, place 1/2" rebonded recycled tire rubber between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.

LONGITUDINAL SAW CUT JOINT DETAIL



GENERAL NOTES:

Construct approach slab in accordance with Item 422.

Provide Class "S" concrete with a minimum compressive strength of 4,000 psi.

Provide Grade 60 reinforcing steel.

Provide longitudinal joints as shown on the Longitudinal Saw Cut Joint Detail at lane lines and shoulders when width between longitudinal construction joints or edges of approach slab exceeds 16 feet. Saw cut joints within 24 hours of concrete placement to a depth of 1 1/2" and seal in accordance with Item 438. Alternately, provide a controlled joint consisting of 1 1/2" vinyl or plastic joint former (Stress Cap, Zip Strip, Stress Lock, or equal as approved by the Engineer.)

Provide rebonded recycled tire rubber joint filler that meets the requirements of DMS-6310. "Joint Sealants and Fillers."

Construct the subgrade or subbase away from the bridge for a minimum distance of 100 feet prior to the approach slab, unless otherwise indicated on the plans.

Compact and nish the subgrade or foundation for the approach slab to the typical cross-section and to the lines and grades shown on the plans.

Cure for 4 days using water or membrane curing per Item 422.

Provide a 1" (asphaltic concrete pavement or asphalt stabilized base) stress relieving pad between the approach slab and cement stabilized backfill or cement treated base. Other stress relieving pads may be used if approved by the Engineer.

All details shown herein are subsidiary to bridge approach slab.

Cover dimensions are clear dimensions, unless noted otherwise.

Texas Department of Transportation Bridge Division Standard

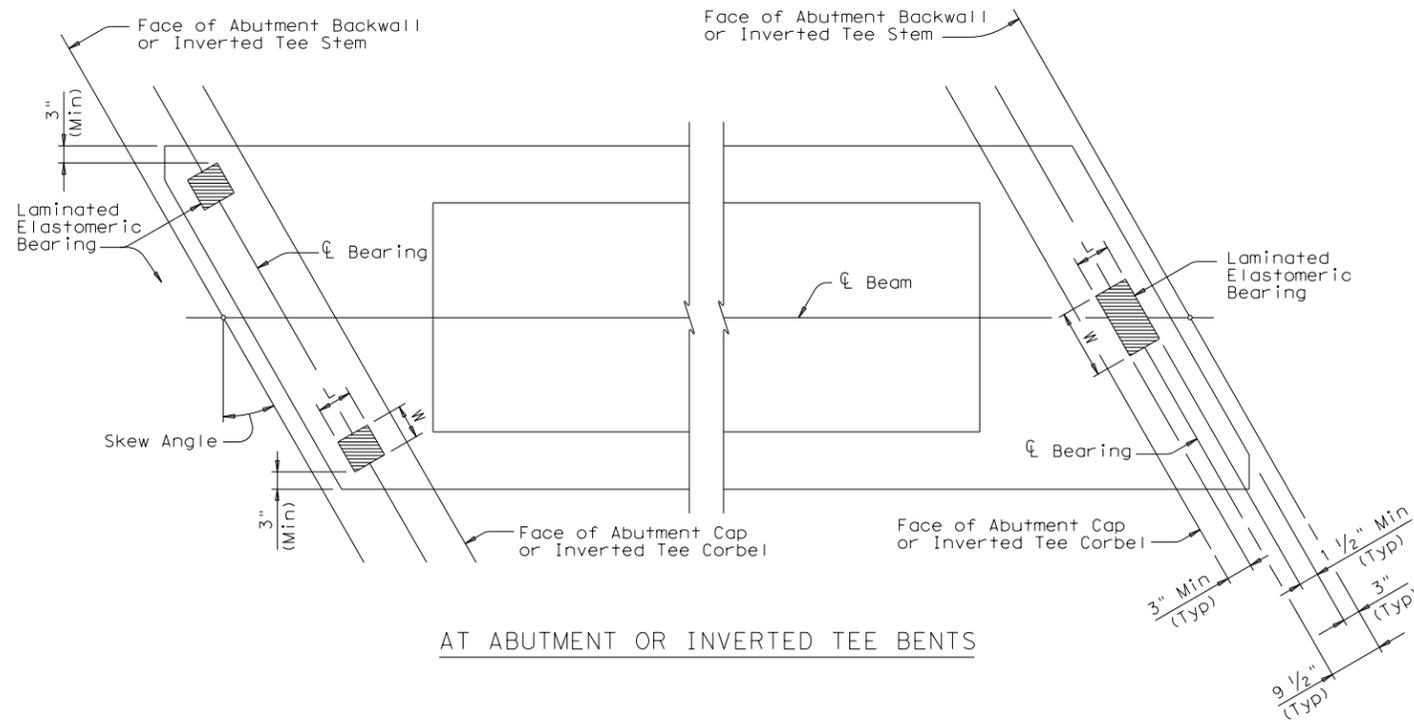
BRIDGE APPROACH SLAB ASPHALTIC CONCRETE PAVEMENT

BAS-A

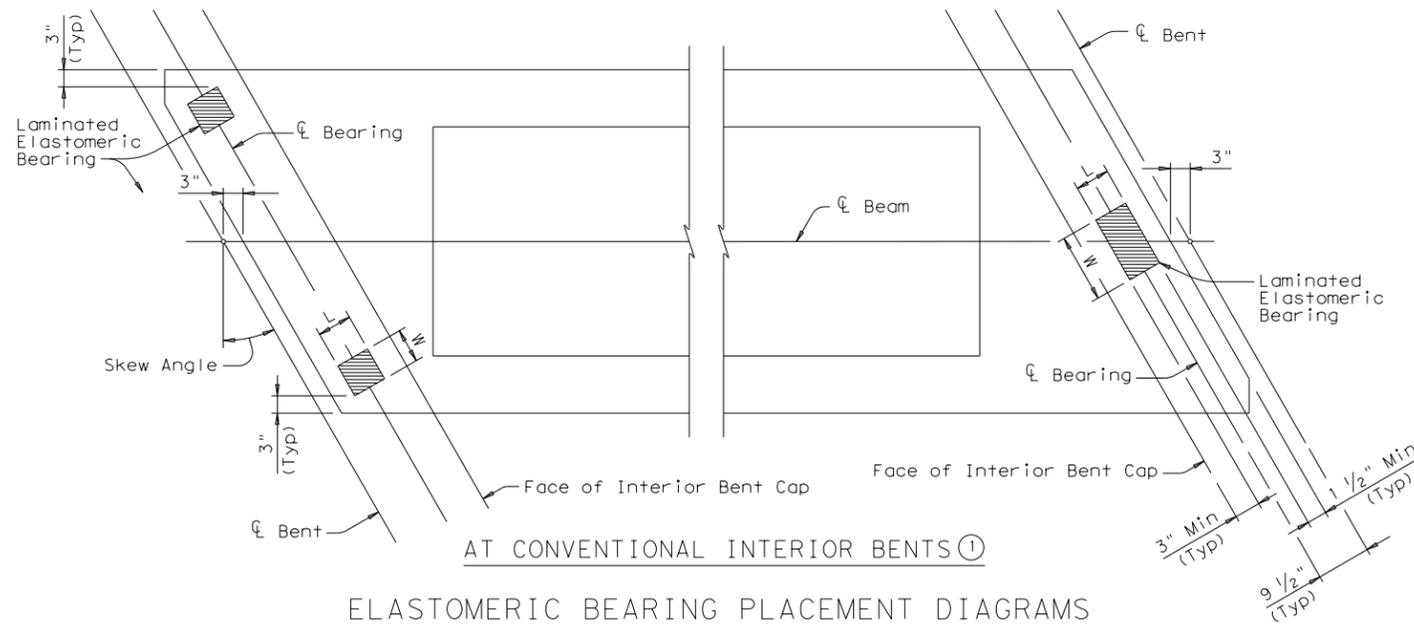
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	DIST	COUNTY		SHEET NO.
	HOU	GALVESTON		83

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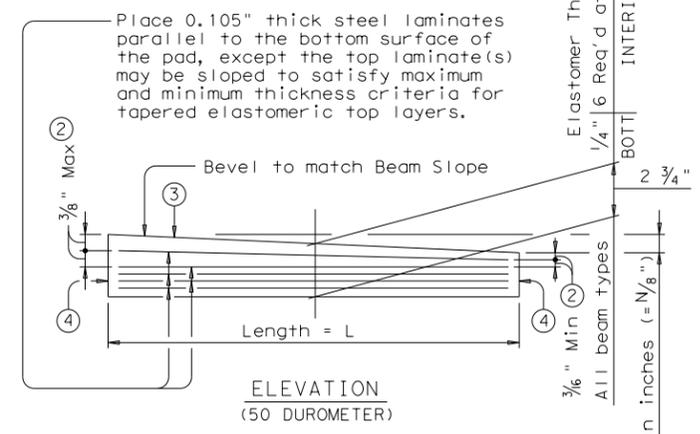
AT ABUTMENT OR INVERTED TEE BENTS



AT CONVENTIONAL INTERIOR BENTS ①

ELASTOMERIC BEARING PLACEMENT DIAGRAMS

The Forward Station Beam End will have one bearing and the Back Station Beam End will have two bearings.



ELASTOMERIC BEARING SECTION

(50 DUROMETER)
The use of Polyisoprene (natural rubber), for the manufacture of bearing pads, is not permitted.

- ① For Transition Bents with backwall, beams and elastomeric bearings will receive the same treatment as shown for Abutment Bents.
- ② Maximum and minimum layer thicknesses shown are for elastomer only, on tapered layers.
- ③ Indicate BEARING TYPE on all pads. For tapered pads, BEARING TYPE will be located on the high side. The Fabricator will include the value of "N" (amount of taper in 1/8" increments) in this mark. Examples: N=0, (for 0" taper)
N=1, (for 1/8" taper)
N=2, (for 1/4" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $(\frac{0.0625}{\text{Length}})$ IN/IN.
- ④ Locate Permanent Mark here.

ELASTOMERIC BEARING DIMENSIONS					
BEARING TYPE	BEAM TYPE	ONE BEARING		TWO BEARINGS	
		L	W	L	W
B20-"N"	4B20	6"	12"	6"	6"
	5B20	6"	12"	6"	6"
B28-"N"	4B28	6"	14"	6"	7"
	5B28	6"	14"	6"	7"
B34-"N"	4B34	6"	16"	6"	8"
	5B34	6"	16"	6"	8"
B40-"N"	4B40	6"	20"	6"	10"
	5B40	6"	20"	6"	10"

GENERAL NOTES:
Set beams on elastomeric bearings of the dimensions shown. Center bearings as near nominal bearing as possible within limits shown.
Constant thickness bearings may be used for moderate beam slopes up to 0.0113 ft/ft.
For skewed supports, Bearings beveled for beam slope may not provide uniform contact. However, predicted contact is considered within allowable tolerances.
Shop drawings for approval are required. A bearing layout which identifies location and orientation of all bearings will be developed by the bearing fabricator. Permanently mark each bearing in accordance with the bearing layout. A copy of the bearing layout is to be provided to the Engineer.
Cost of furnishing and installing elastomeric bearings is to be included in unit price bid for "Prestressed Concrete Box Beams".
Details are drawn showing right forward skew. See Bridge Layout for actual direction.
These details are applicable for skews up to 30 degrees only.

HL93 LOADING

Texas Department of Transportation Bridge Division Standard

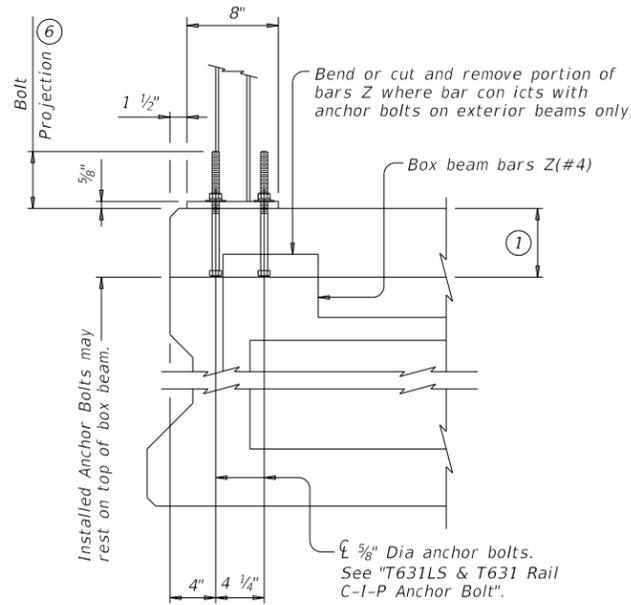
ELASTOMERIC BEARING DETAILS
PRESTR CONC BOX BEAMS

BBEB

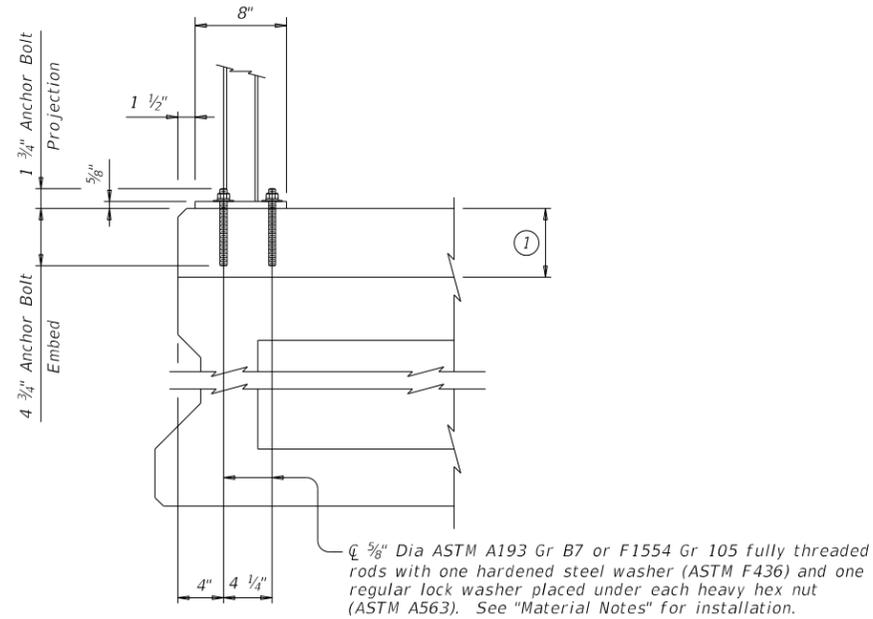
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©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS				BR
	DIST	COUNTY	SHEET NO.	
	HOU	GALVESTON	84	

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CAST-IN-PLACE ANCHORAGE OPTION



ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT (2)(7)

- ① Cast-in-place slab thickness varies due to beam camber (5" minimum).
- ② Replace cast-in-place anchor bolts shown on T631LS or T631 Rail standard with an adhesive anchor system or cast-in-place anchor bolts shown on this sheet.
- ③ Bar length shown on rail standard, minus 1 1/4". Adjust bar length for a raised sidewalk.
- ④ See Rail standard for projection from finished grade or top of sidewalk.
- ⑤ Place additional (#5) longitudinal bar.
- ⑥ Excess bolt length has been provided to accommodate a variable slab thickness due to beam camber. If slab thickness on span details exceed 10", bolt length must be increased accordingly. After posts have been set and bolts tightened, bolt projection above nuts of more than 1/2" must be cut off and painted with two coats of zinc-rich paint conforming to the Item 445 "Galvanizing".
- ⑦ Distance from end of top outside edge of slab to center of first bolt group can not be less than 9", except: 15° Skew: 1'-0" (acute corner only) 30° Skew: 1'-3" (acute corner only)
- ⑧ Location of Rail Expansion Joint must be at the intersection of Centerline of Slab Expansion Joint, Centerline of Rail Footprint and perpendicular to slab outside edge.
- ⑨ Cross-hatched area must have 1/2" Preformed Bituminous Fiber Material under concrete rail, as shown.

CONSTRUCTION NOTES:

Rail anchorage bars may be field bent as required to clear rail reinforcing or provide minimum cover shown on standard rail detail sheets. Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

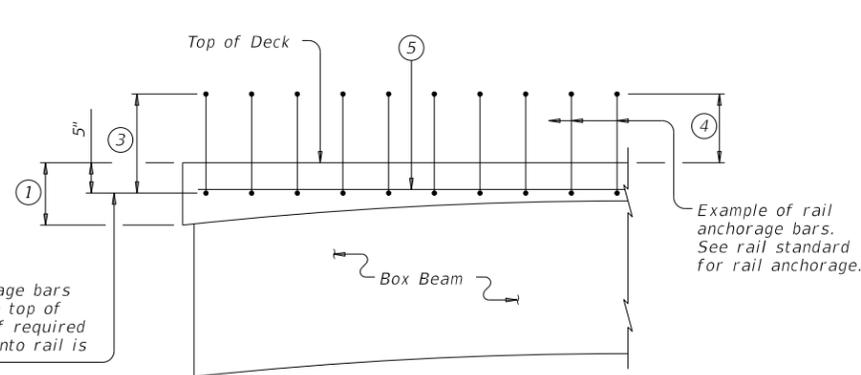
MATERIAL NOTES:

Galvanize all steel components of steel rail system. Provide Grade 60 reinforcing steel. Cast-in-place anchorage system for T631LS and T631 Rail must be 5/8" Dia heavy hex head anchor bolts (ASTM F3125 Gr 325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed anchor bolts 4 1/2" minimum. Adhesive anchors for T631LS and T631 Rail must be 5/8" Dia ASTM A193 Gr B7 or F1554 Gr 105 fully threaded rods with one hardened steel washer (ASTM F436) and one regular lock washer placed under each heavy hex nut. Nuts must conform to ASTM A563 requirements. Embed fully threaded rod into slab and/or abutment wingwall using a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 4 3/4". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 8 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing." Epoxy coat or galvanize reinforcing steel shown on this standard if rail reinforcement is epoxy coated or galvanized.

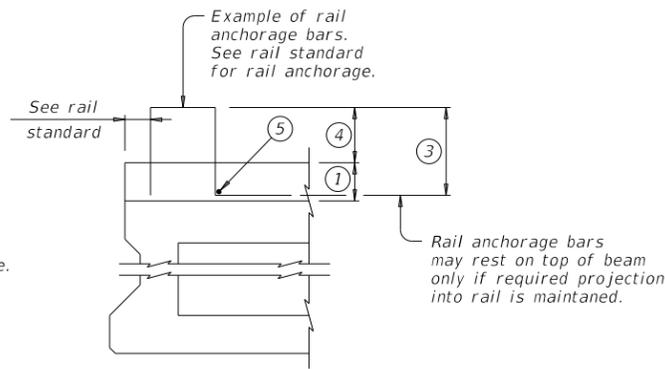
GENERAL NOTES:

Designed in accordance with AASHTO LRFD Bridge Design Specifications. This standard is for use with structures with a 5" minimum cast-in-place concrete slab. This standard may require modification for interior rails. This standard does not apply to median barriers. This standard does not provide details for Type T221P, T224, T80HT, T80SS, C412, PR11, PR22 and PR3 rails on box beam bridges. See rail standards for approved speed restrictions, notes and details not shown.

Cover dimensions are clear dimensions, unless noted otherwise.



PART SPAN ELEVATION

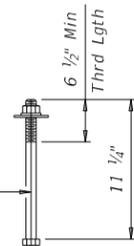


SECTION

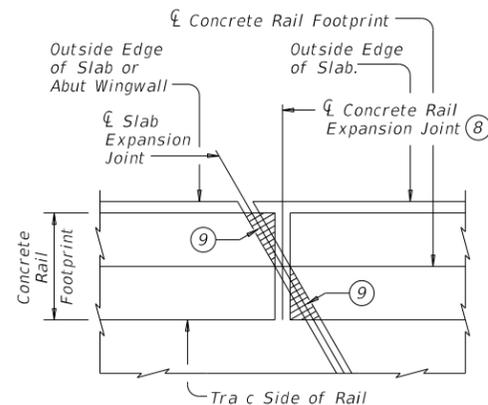
TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)

5/8" Dia heavy hex head anchor bolt (ASTM F3125 Gr A325 or A449) with one hardened steel washer (ASTM F436) and one regular lock washer placed under heavy hex nut (ASTM A563).



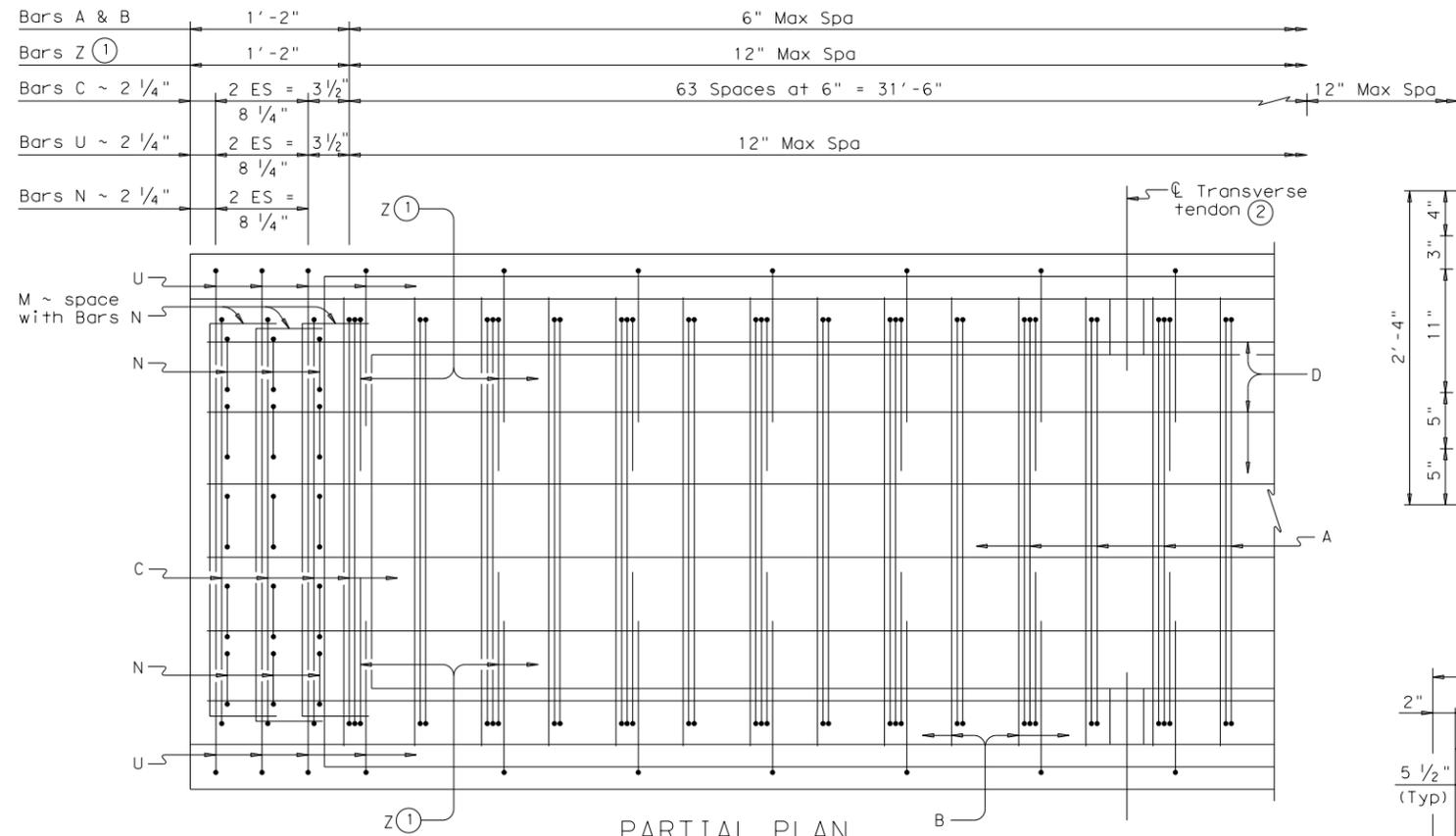
T631LS & T631 RAIL C-I-P ANCHOR BOLT



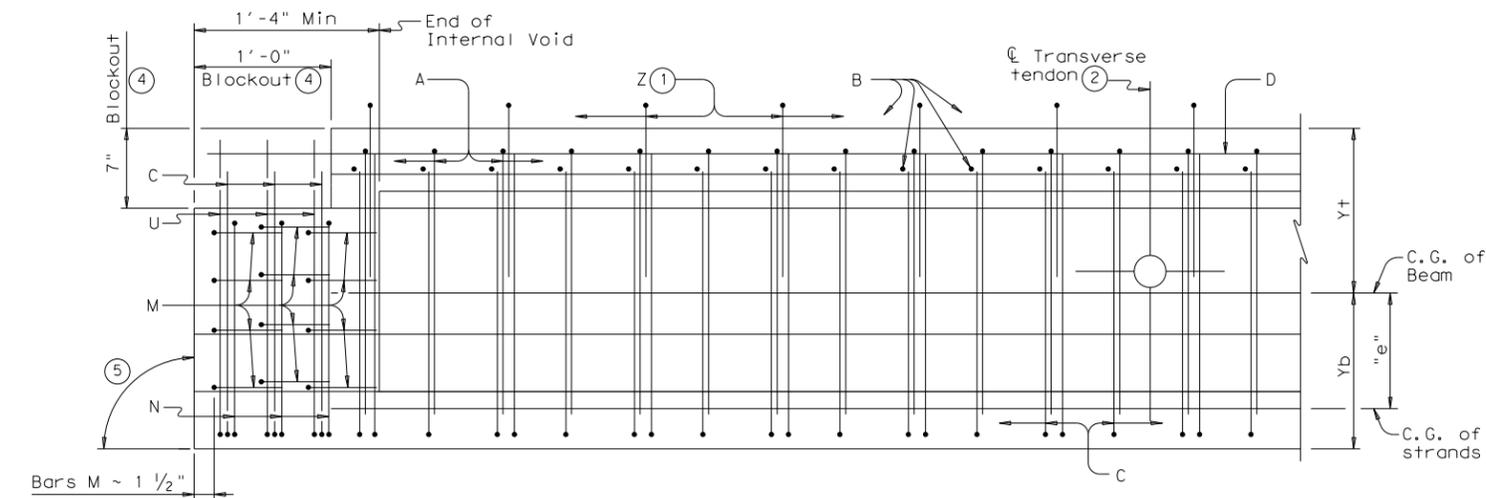
PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

				Bridge Division Standard	
RAIL ANCHORAGE DETAILS PRESTR CONC BOX BEAMS (WITH SLAB) BBRAS					
FILE: bbside09-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: JMH	
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY	
<small>REVISIONS</small> 04-90: Updated for new rails. 01-12: rails anchor bars. 07-14: Removed T101 & T16. Added T631. 03-16: Class D, E, or F epoxy in material notes. T221P & T224 in general notes. 03-18: Updated adhesive anchor notes.			DIST	COUNTY	SHEET NO.
			HOU	GALVESTON	85

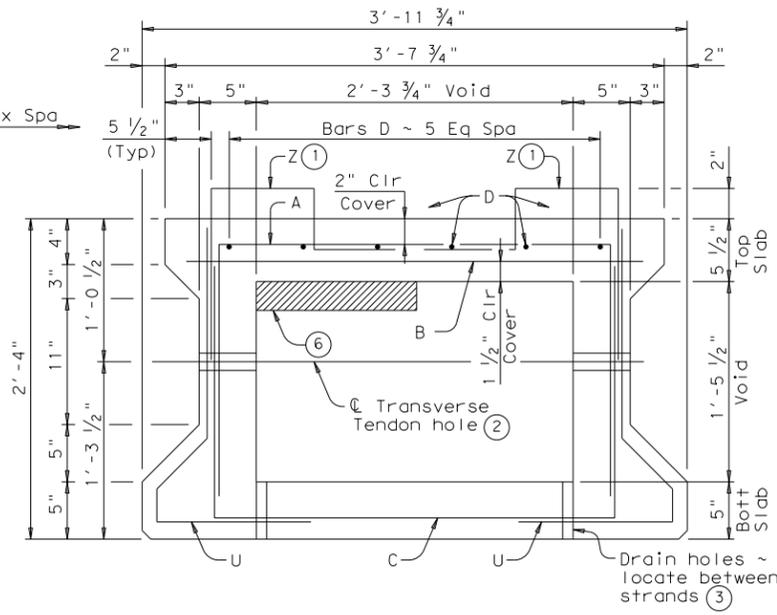
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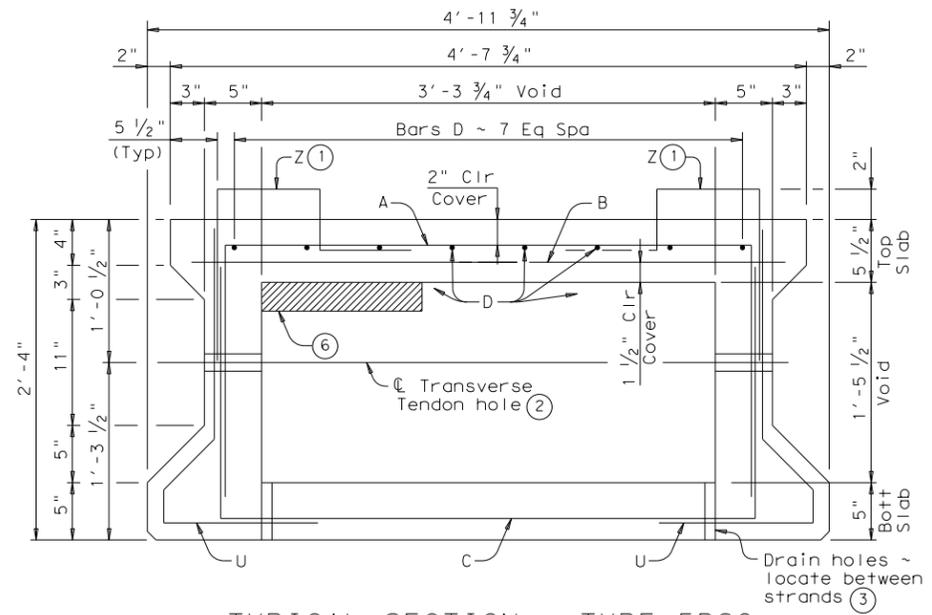
PARTIAL PLAN
(Showing Type 4B28)



ELEVATION



TYPICAL SECTION ~ TYPE 4B28



TYPICAL SECTION ~ TYPE 5B28

BEAM PROPERTIES			
		Type 4B28	Type 5B28
Area	in ²	678.8	804.8
Y top	in	14.38	14.26
Y bott	in	13.62	13.74
I	in ⁴	68,745	85,370
Weight ⑦	lb/ft	707	838

- ① Bars Z are required for beams topped with a cast-in-place concrete slab only.
- ② Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia holes in interior beams. See standard BBPT for details.
- ③ Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".
- ④ Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.
- ⑤ 90° at conventional Interior Bents. Ends of beams shall be vertical at Abutment backwall and Inverted Tee Bent Stems.
- ⑥ Showing void modification required in exterior beams not topped with a Min 5" cast-in-place concrete slab. See standard BBRAO for void modification dimensions.
- ⑦ Based on 150 pcf weight density of concrete. Weight of end blocks and interior diaphragms is not included.

GENERAL NOTES:
Designed according to AASHTO LRFD Specifications. Use Class H concrete. Use Class H (HPC) if required elsewhere in plans. All reinforcing steel must be Grade 60.
Two-stage monolithic casting is required. The concrete in the first stage cast (bottom beam flange) must remain plastic until the second stage cast (webs and top beam flange) is placed. Vibrate as required to ensure consolidation between the two casts.
1 1/4" clear cover to reinforcement is required unless noted otherwise.
See standard BBRAS or BBRAO for railing anchorage at bridge edges to be cast in beams.
An equal area of welded wire reinforcement (WWR) meeting the requirements of ASTM A1064 may be substituted for Bars A, B, C, and D.
These details are applicable for skews up to 30 degrees only.
Chamfer bottom beam corners 3/4" or round to a 3/4" radius.

HL93 LOADING SHEET 1 OF 3

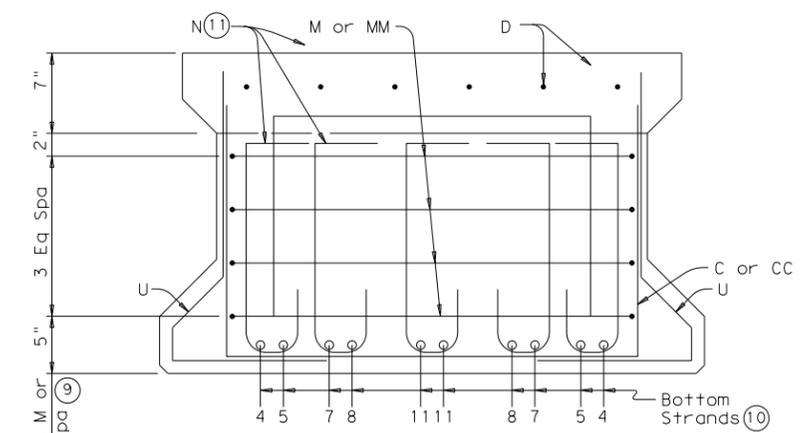
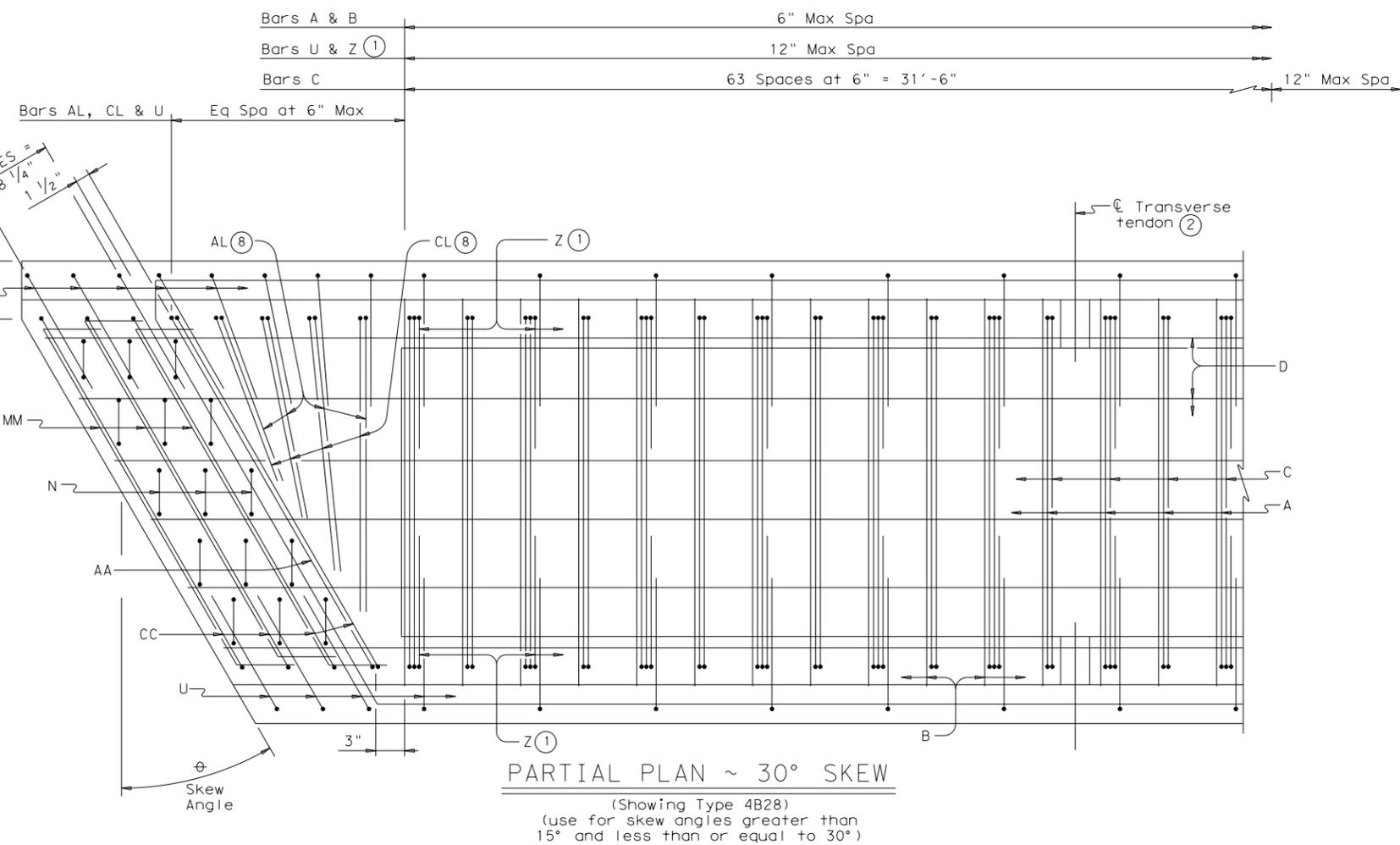
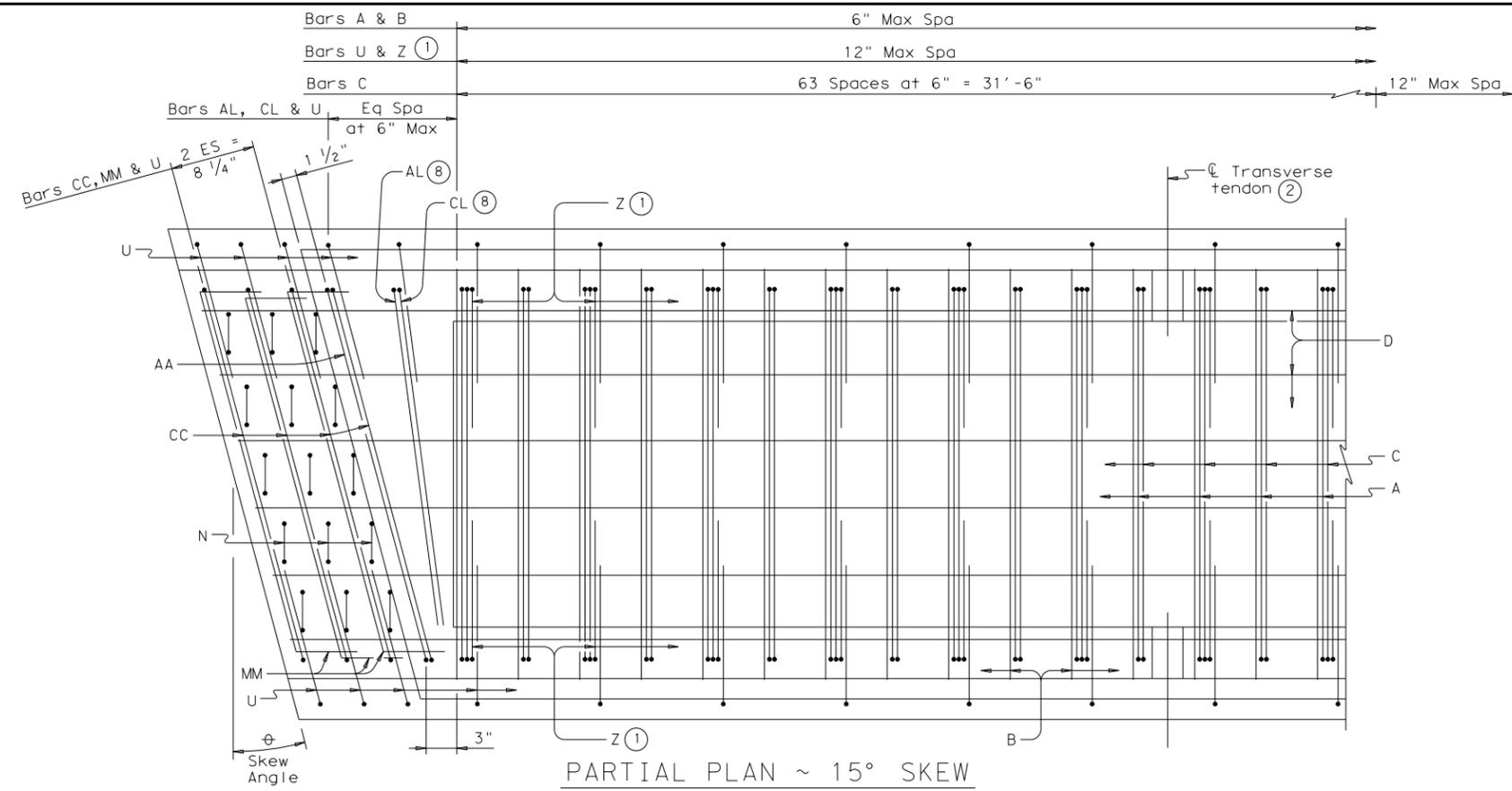
Texas Department of Transportation
PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B28)
BB-B28

FILE: bbstds02.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS	BR			
01-12: Bars Z.	DIST	COUNTY	SHEET NO.	
	HOU	GALVESTON	86	

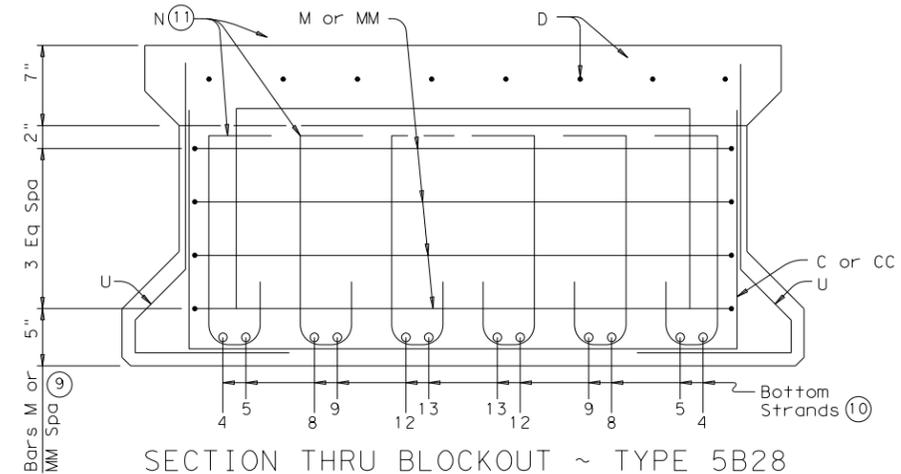
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DATE: FILE:



SECTION THRU BLOCKOUT ~ TYPE 4B28
(Showing End Mat Reinforcing)



SECTION THRU BLOCKOUT ~ TYPE 5B28
(Showing End Mat Reinforcing)

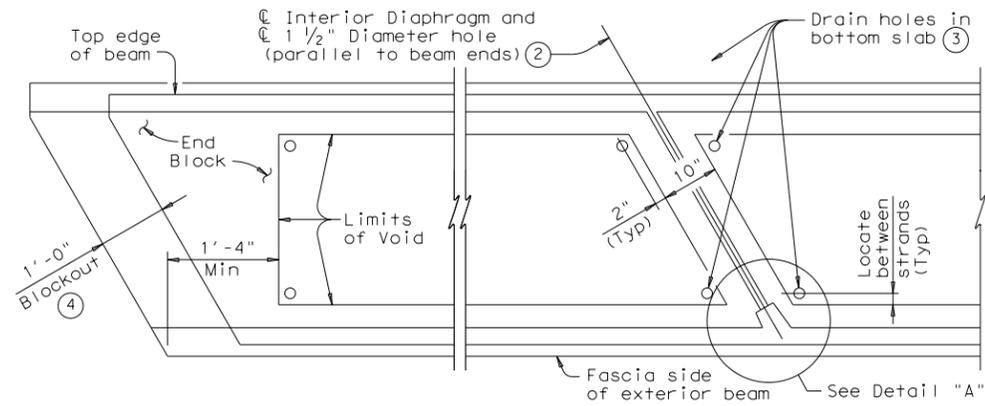
- ① Bars Z are required for beams topped with a cast-in-place concrete slab only.
- ② Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. See "Blockout, Interior Diaphragm, and Drain Details". Form 3" Dia holes in interior beams. See standard BBPT for details.
- ⑧ Cut as required to maintain one inch clear between bars.
- ⑨ Bars M may be adjusted vertically as required to avoid pretensioning strands in web.
- ⑩ See standard BBND or appropriate Prestressed Concrete Box Beam Standard Designs sheet for locations of pretensioning strands.
- ⑪ For Type 4B28 Box Beams: Bars N may be reduced to 4 bars per row when beam design contains fewer than 22 strands. In this case, place Bars N at the 5-6 and 8-9 strand locations.
For Type 5B28 Box Beams: Bars N may be reduced to 5 bars per row when beam design contains fewer than 28 strands. In this case, place Bars N at the 4-5, 9-10 and 14-14 strand locations.

HL93 LOADING SHEET 2 OF 3

		Bridge Division Standard	
PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B28)			
BB-B28			
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01-12: Bars Z.	COUNTY		SHEET NO.
HOU	GALVESTON		87

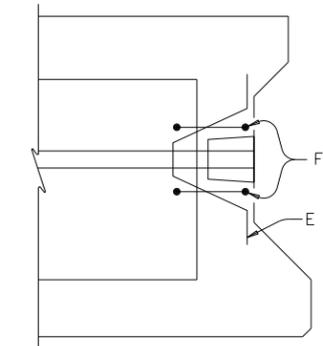
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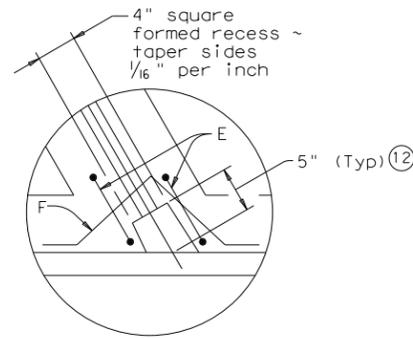


BLOCKOUT, INTERIOR DIAPHRAGM AND DRAIN DETAILS

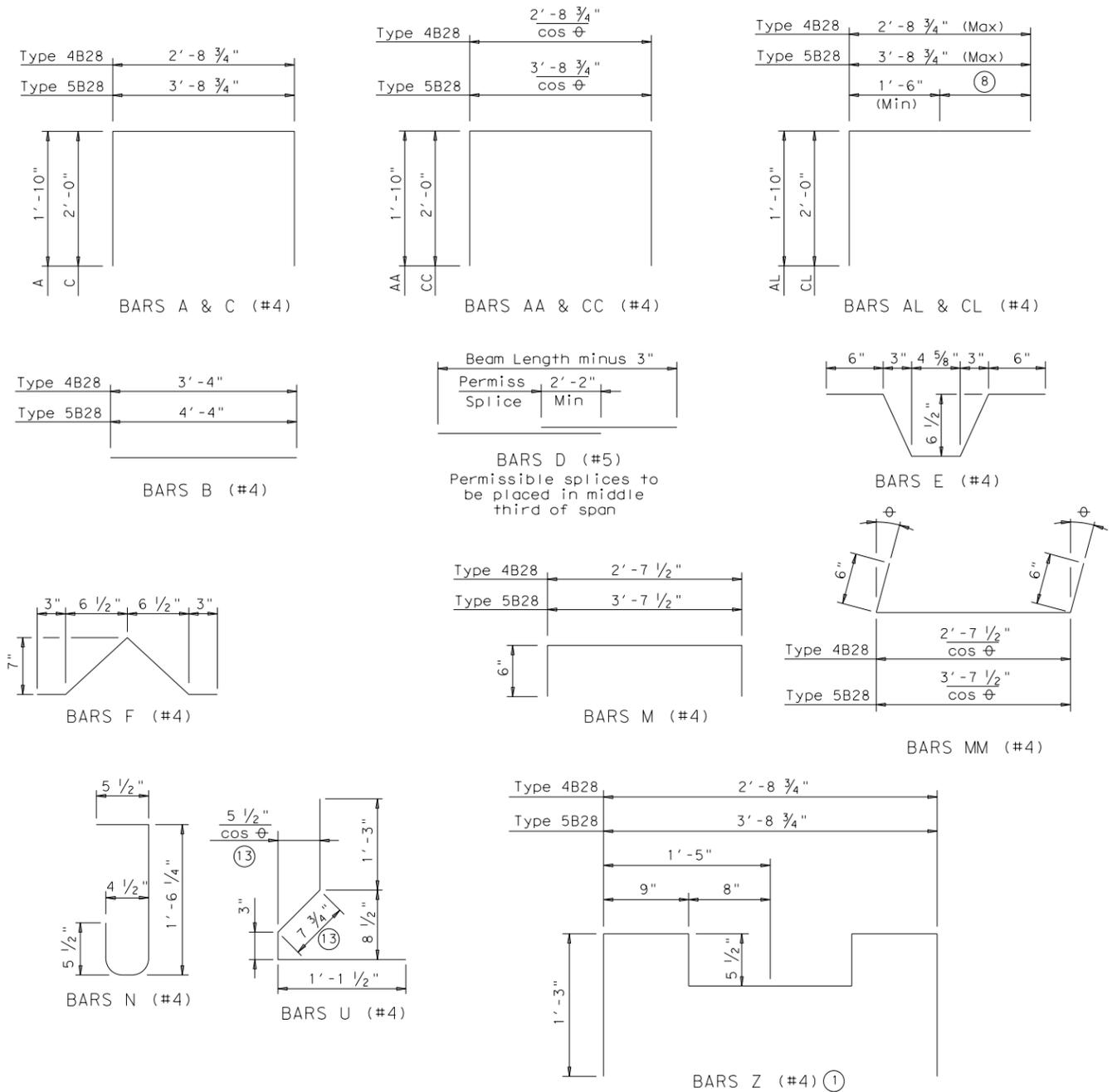
(Showing 30° skew)



POST-TENSION ANCHORAGE DETAIL



DETAIL A

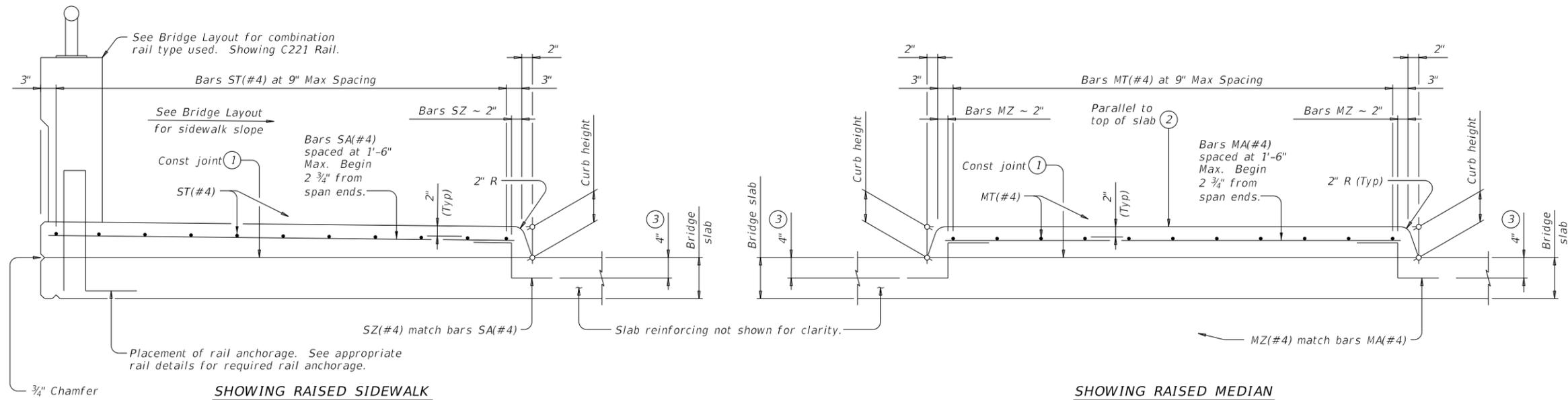


- ① Bars Z are required for beams topped with a cast-in-place concrete slab only.
- ② Post-tensioning tendons are required for beams not topped with a Min 5" cast-in-place concrete slab. See span details for number and spacing of transverse tendons. Cast interior diaphragms in exterior beams and beams that serve temporarily as exterior beams in staged constructed bridges. Form 3" Dia holes in interior beams. See "Blockout, Interior Diaphragm, and Drain Details". See standard BBPT for details.
- ③ Place drain holes (1" Dia PVC Sch 40 Pipe) as shown in all beam void corners including each side of interior diaphragms. See "Blockout, Interior Diaphragm, and Drain Details".
- ④ Blockouts required at ends of all beams. Extend beam reinforcement into blockouts.
- ⑧ Cut as required to maintain one inch clear between bars.
- ⑫ 5" (Typ) or sufficient depth to provide 1" Cover on cut-off tendon. See BBPT for details.
- ⑬ Dimension will vary slightly with skew. Adjust as necessary.

At fabricator's option, Bars Z pairs may be fabricated using one continuous bar. If this option is used, Bars B at Bar Z locations (only) may be omitted.

		Bridge Division Standard	
PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B28)			
BB-B28			
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©TxDOT December, 2006	CONT	SECT	JOB
REVISIONS		HIGHWAY	
01-12: Bars Z.	DIST	COUNTY	SHEET NO.
	HOU	GALVESTON	88

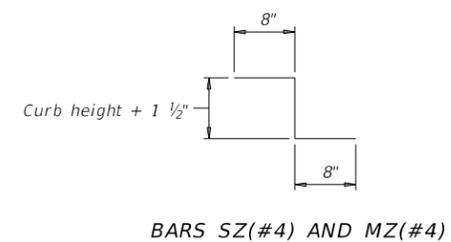
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TYPICAL TRANSVERSE SECTIONS

See Span Details for dimensions not shown.

- ① Provide broom nish to top of bridge slab where raised sidewalk or raised median area is de ned.
- ② Unless noted otherwise on the span details.
- ③ Bars may rest on top of PCPs.



BARS SZ(#4) AND MZ(#4)

APPROVED SLIP RESISTANT PLATE	
Product	Manufacturer Website
Algrip™, Steel	www.algrip.com
Mebac® #3, Steel	www.harscoikg.com
SlipNOT® Grade 2, Steel	www.slipnot.com

Provide drain cover plates fabricated with a product from this list. No exceptions are permitted.

MATERIAL NOTES:

- Provide the same concrete required for the bridge deck, Class S or Class S (HPC) concrete.
- Provide Grade 60 reinforcing steel. Deformed welded wire reinforcement (WWR) meeting ASTM A1064 of equivalent size and spacing may be substituted for bars SA, ST, MA, and MT.
- Provide epoxy coat or galvanize reinforcement if bridge deck reinforcement is required to be epoxy coated or galvanized.
- Provide hot-dip galvanize slip resistant steel plate after fabrication in accordance with Item 445, "Galvanizing". Chamfer or round edges approximately 1/16" prior to galvanizing.

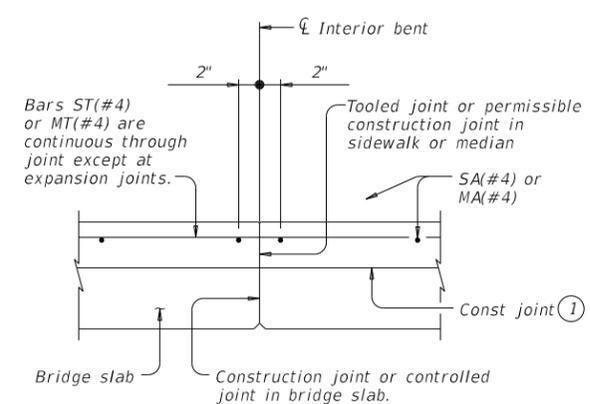
GENERAL NOTES:

- Designed according to AASHTO LRFD Bridge Design Specifications.
- Provide the following bar or wire lap lengths when required:
Uncoated, 1'-7" Min
Coated, 2'-5" Min
- Submittal and approval of drain cover plate shop drawings is not required if fabrication is accordance with these details.
- Raised sidewalks will be paid under Item 422 by the SF of Bridge Sidewalk or Bridge Sidewalk (HPC). Raised medians will be paid under Item 422 by the SF of Bridge Median or Bridge Median (HPC).
- Payment for drain cover plates will be by the pound of "Structural Steel (Misc Non-Bridge)" as per Item 442, "Metal for Structures". Weight of one drain cover plate is 48 plf.

DESIGNER NOTES:

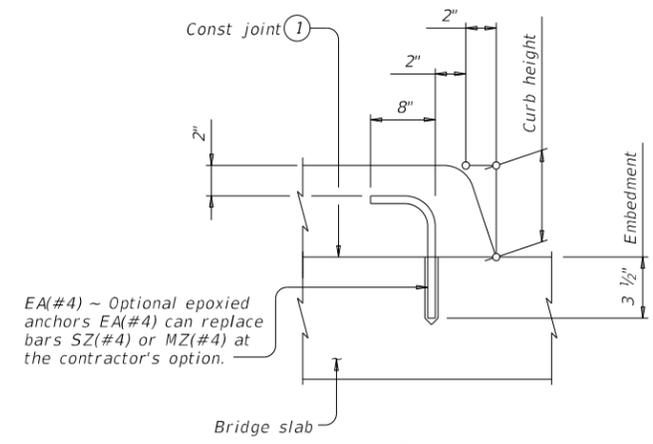
- These details do not apply for longitudinal grades exceeding 5 percent.

Cover dimensions are clear dimensions, unless noted otherwise.
Reinforcing bar dimensions shown are out-to-out of bar.



LONGITUDINAL SECTION AT INTERIOR BENT

At bents with expansion joints, provide an open joint in the sidewalk/median matching the deck's joint width.



OPTIONAL EPOXY ANCHORS

Embed EA(#4) bar into concrete with a Type III (Class C, D, E, or F) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Follow manufacturer's directions for installing the epoxied anchor bars.

Texas Department of Transportation Bridge Division Standard

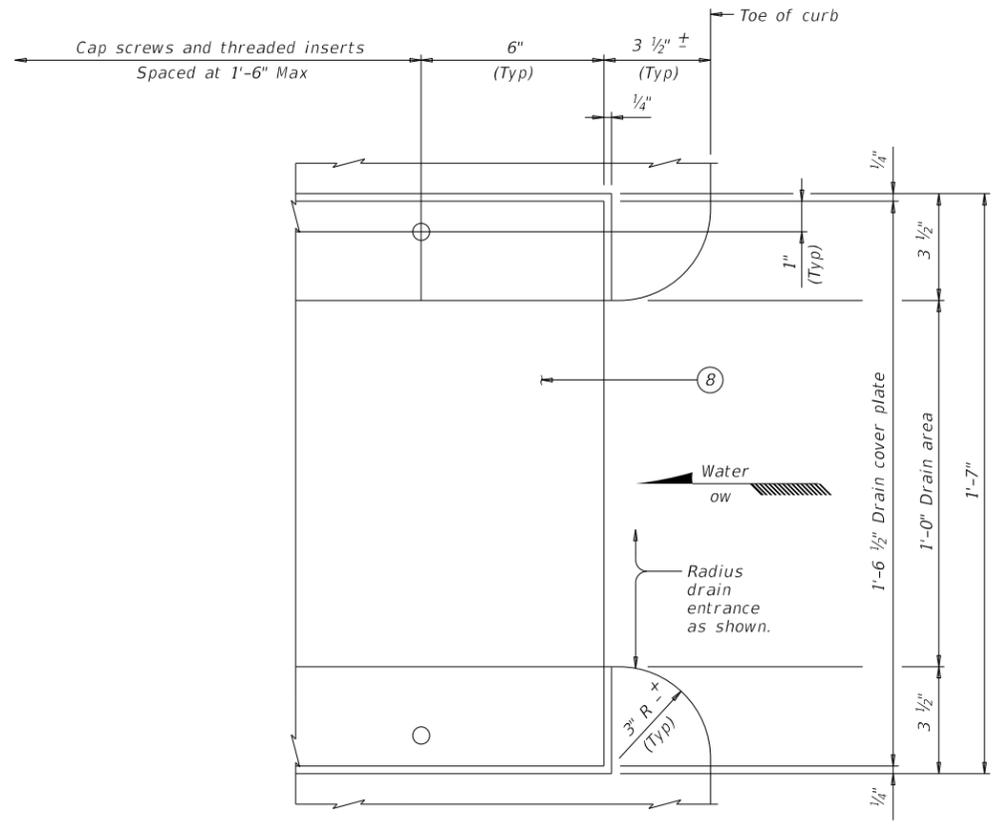
BRIDGE RAISED SIDEWALK AND MEDIAN DETAILS

BRSM

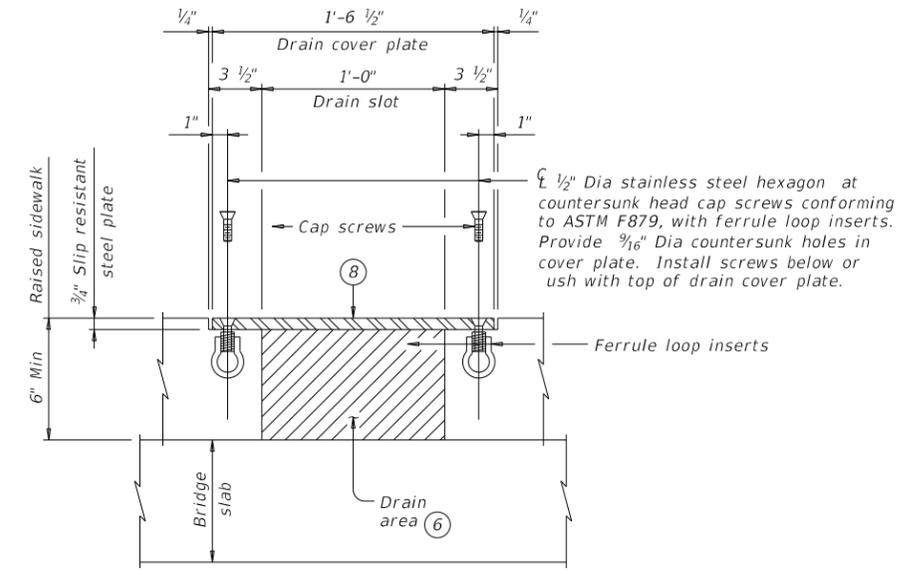
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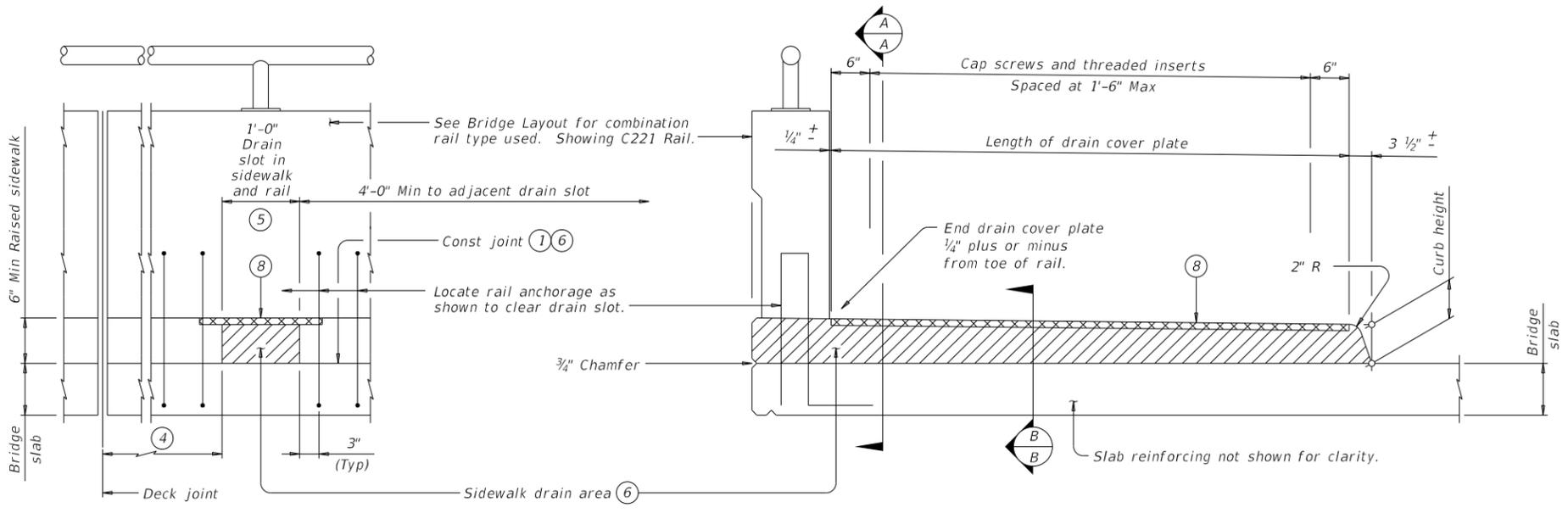
PARTIAL PLAN CURB DRAIN



SECTION B-B

Reinforcing not shown for clarity.

- ① Provide broom finish to top of bridge slab where raised sidewalk or raised median area is needed.
- ④ 3'-0" Min at deck expansion joints, deck construction joints or controlled joints, rail intermediate wall joints or from face of substructure.
- ⑤ For rail Type C1W, center drain slots between posts.
- ⑥ Steel trowel top surface of bridge deck in drain locations.
- ⑦ Provide sidewalk drains where shown elsewhere on the plans or as directed by the Engineer. Do not place drains over railroad tracks, lower roadways, or sidewalks. Place drain and cover plate perpendicular to toe of rail.
- ⑧ Drain cover plate (PL 3/4 x 18 1/2 slip resistant steel plate). Install flush with top of sidewalk.



SECTION A-A

SHOWING RAISED SIDEWALK WITH DRAIN SLOT

OPTIONAL DRAIN DETAILS ⑦

SHEET 2 OF 2

Texas Department of Transportation
 Bridge Division Standard

BRIDGE RAISED SIDEWALK AND MEDIAN DETAILS

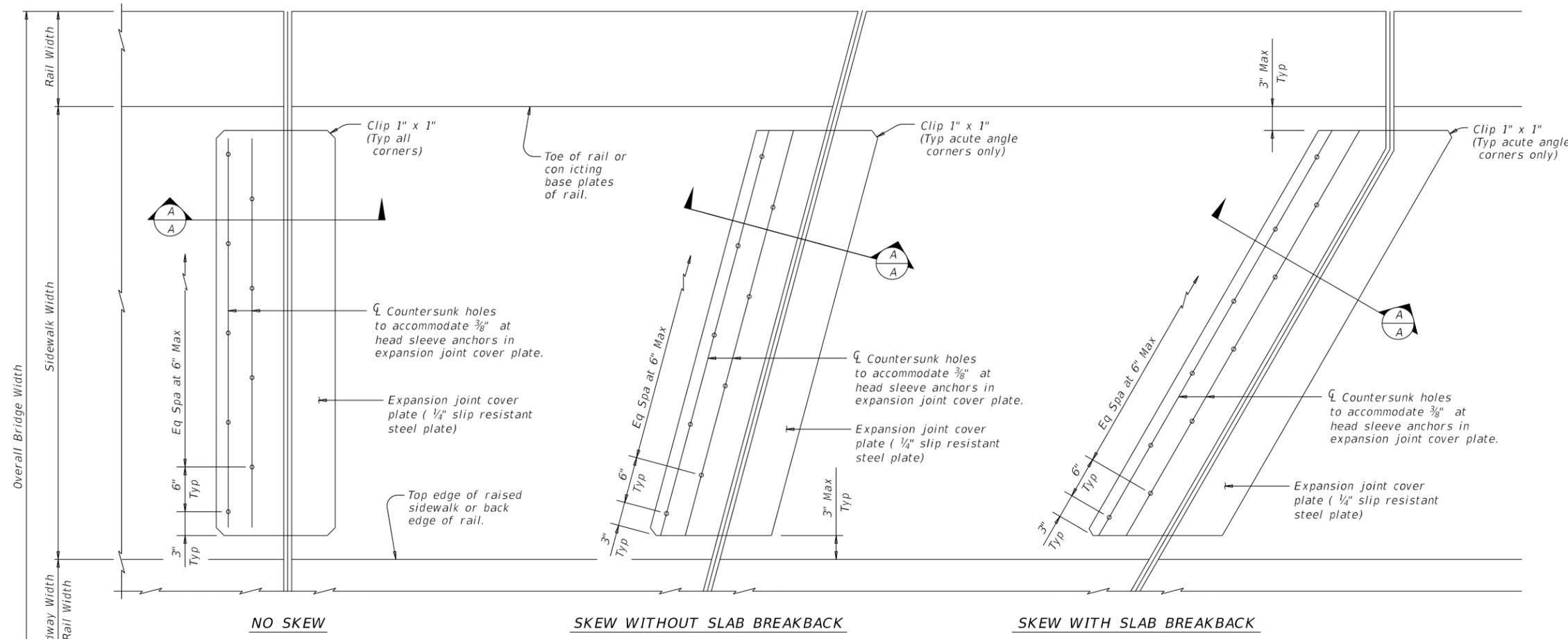
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DIST	COUNTY	SHEET NO.		
HOU	GALVESTON	90		

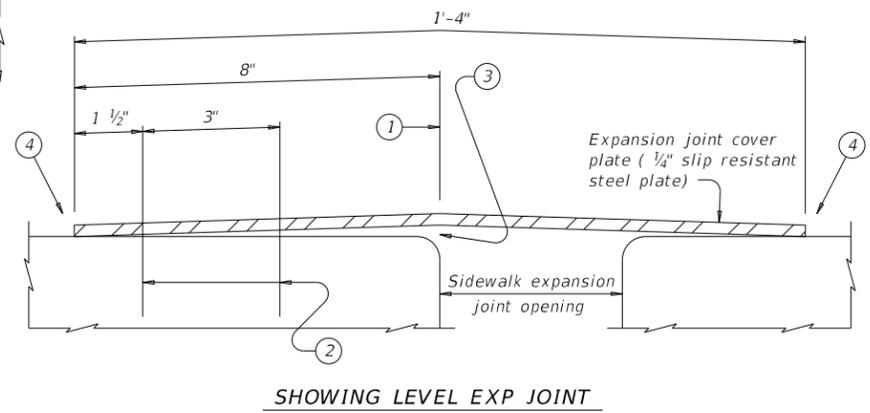
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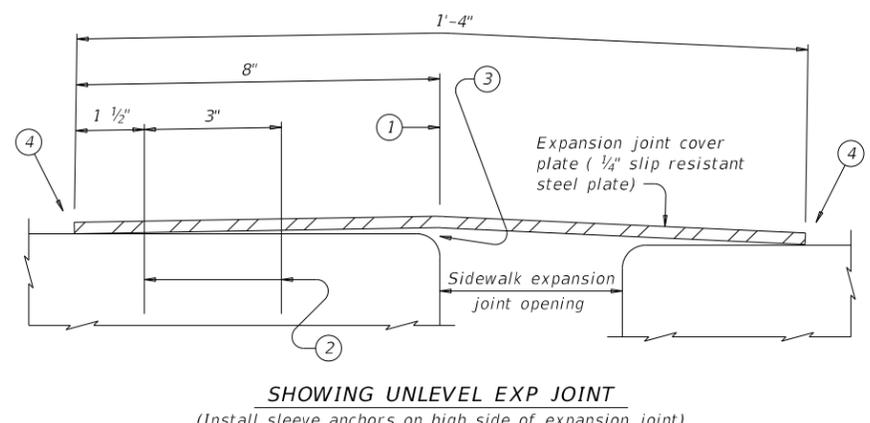
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PLAN

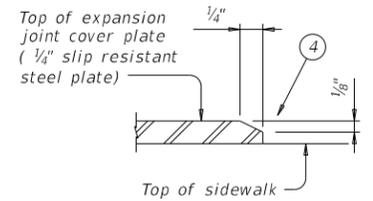


SHOWING LEVEL EXP JOINT



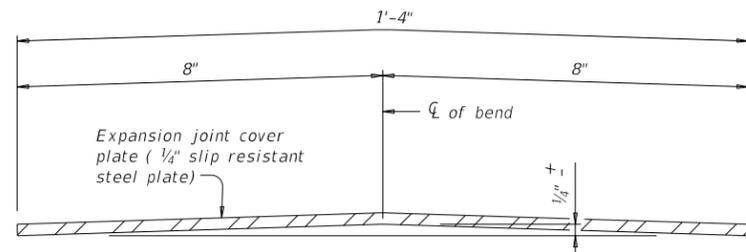
SHOWING UNLEVEL EXP JOINT
(Install sleeve anchors on high side of expansion joint)

SECTION A-A



EXP JOINT COVER PLATE BEVEL DETAIL

Bevel all plate edges as shown.



BENDING DIAGRAM OF EXP JOINT COVER PLATE

- ① Expansion joint cover plate and edge of expansion joint.
- ② 3/8" x 2 1/2" Min, Flat Head Sleeve Anchors, Stainless Steel. Countersink Flat Head Sleeve Anchors in 1/4" Slip Resistant Steel Plate.
- ③ It is not necessary to remove plate crown provided the plate is firmly secured to the sidewalk.
- ④ Transverse edges must be in contact with sidewalk surface after installation.

APPROVED SLIP RESISTANT PLATE	
Product	Manufacturer Website
Algrip™, Steel	www.algrip.com
Mebac® #3, Steel	www.harscoikg.com
SlipNOT® Grade 2, Steel	www.slipnot.com

Provide cover plates fabricated with a product from this list. No exceptions are permitted.

FABRICATION NOTES:
Shop drawings for the fabrication of Bridge Sidewalk Expansion Joint Cover Plate will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

A Bridge Sidewalk Expansion Joint Cover Plate Layout which identifies location side of sleeve anchors and orientation of all cover plate sections must be developed by the fabricator. Mark each steel section in accordance with the Bridge Sidewalk Expansion Joint Cover Plate Layout. A copy of the Bridge Sidewalk Expansion Joint Cover Plate Layout is to be provided to the Engineer.

Sidewalk expansion joint cover plates must be hot-dipped galvanized 1/4" slip resistant steel plate. Checker plate or diamond plate is not allowed nor are slip resistant tapes, lms and non-metallic coatings.

Minimum required yield strength of steel plate is 36 ksi.

Hot-dip galvanize slip resistant steel plate after fabrication in accordance with Item 445, "Galvanizing".

Provide stainless steel at head sleeve anchors meeting the requirements of ASTM F 593, Group 1, Alloy 304. Countersink holes in slip-resistant plate for sleeve anchors. Drill holes in sidewalk as per sleeve anchor manufacturer's recommendations. Install sleeve anchors flush with, or slightly recessed below, top surface of sidewalk expansion joint cover plate.

GENERAL NOTES:

Sidewalk expansion joint cover plates can only accommodate up to a 7" maximum expansion joint opening.

Details provided are applicable to concrete walkway surfaces only.

Payment for sidewalk expansion joint cover plates are by the pound of "Structural Steel (Misc Non-Bridge)" as per Item 442, "Metal for Structures".

Estimated weight of one sidewalk expansion joint cover plate is 14 plf.

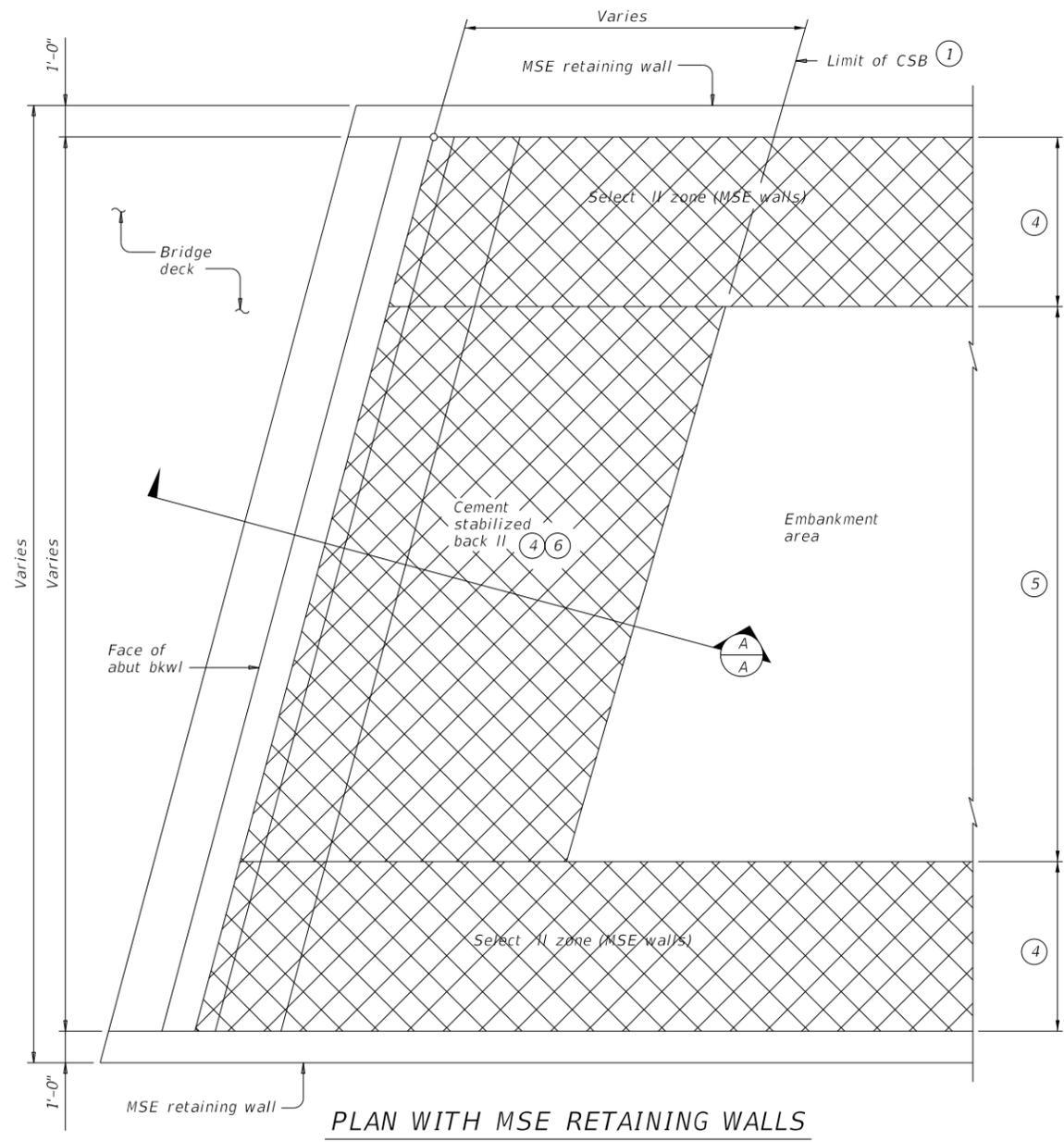
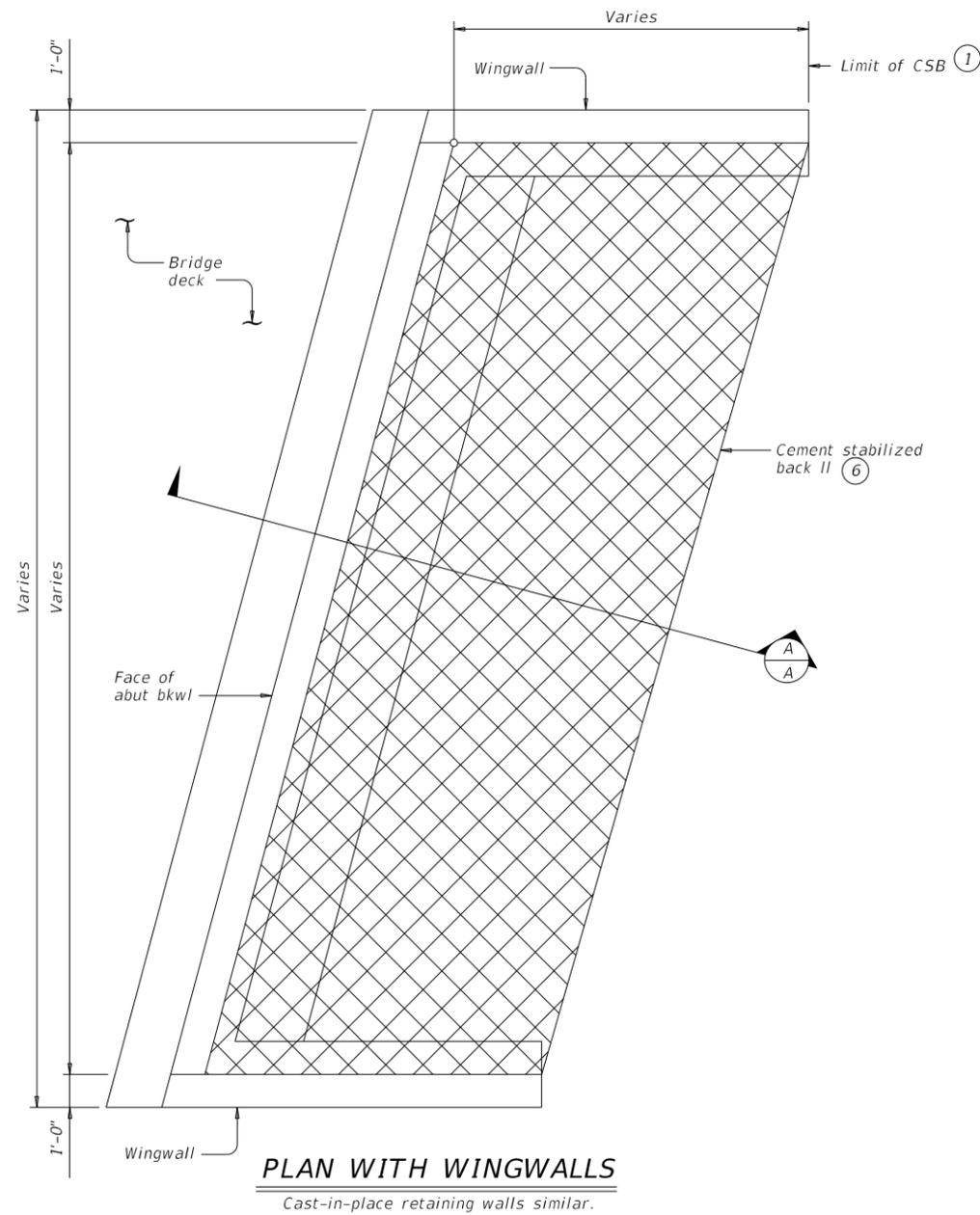
Texas Department of Transportation
Bridge Division Standard

BRIDGE SIDEWALK EXPANSION JOINT COVER PLATE (ALL SKEWS)

BS-EJCP

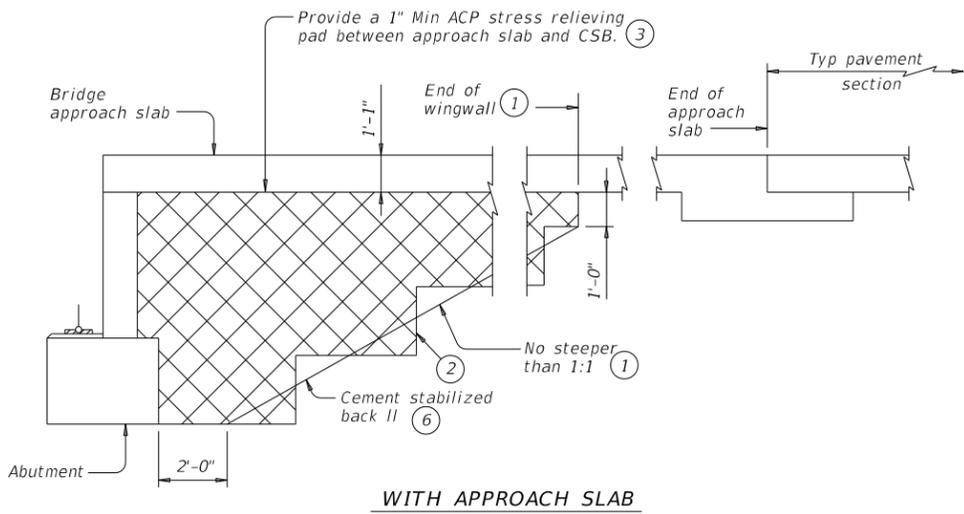
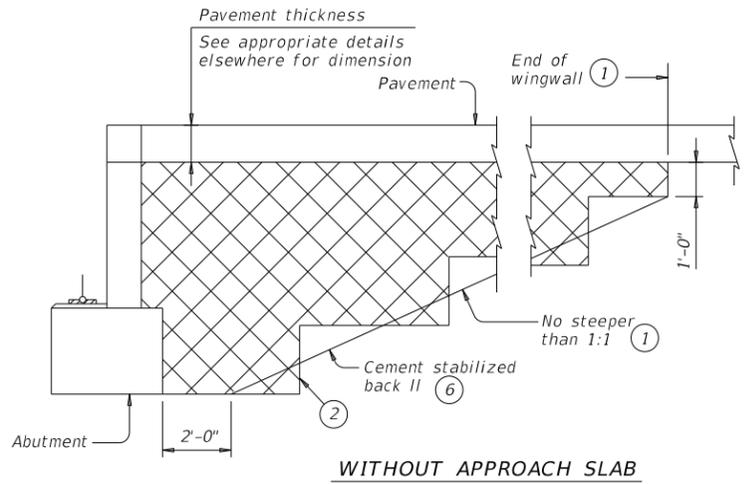
FILE: bsejste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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- ① Usual limit of Cement Stabilized Back II is at end of wingwall. Extend CSB limits as required to maintain a slope no steeper than 1:1 at bottom of back II.
- ② Bench back II as shown with 12" (approximate) bench depths.
- ③ Other material can be used as a stress relieving pad if approved by Engineer.
- ④ Where MSE retaining walls are present, adjust CSB limits to accommodate the select II zone. See retaining wall details for additional information.
- ⑤ When distance between select II zones is less than 5'-0", MSE select II may be substituted for cement stabilized back II with approval from the Engineer.
- ⑥ If shown in the plans flowable back II can be used as a substitute for cement stabilized back II with the following constraints:
 - a) If flowable back II is to be placed over MSE back II then a filter fabric will be placed over the MSE back II prior to placement of the flowable II; and
 - b) Place flowable II in lifts not exceeding 2 feet in height, place each successive lift when the previous lift has stiffened/hardened (i.e. has lost its flowability).

GENERAL NOTES:
Provide Cement Stabilized Back II (CSB) meeting the requirements of Item 400, "Excavation and Back II for Structures", to the limits shown at bridge abutments.
If required elsewhere in the plans, provide Flowable Back II meeting the requirements of Item 401, "Flowable Back II", the limits shown at bridge abutments.
Details are drawn showing left forward skew. See Bridge Layout for actual skew direction. These details do not apply when Concrete Block retaining walls are used in lieu of wingwalls.

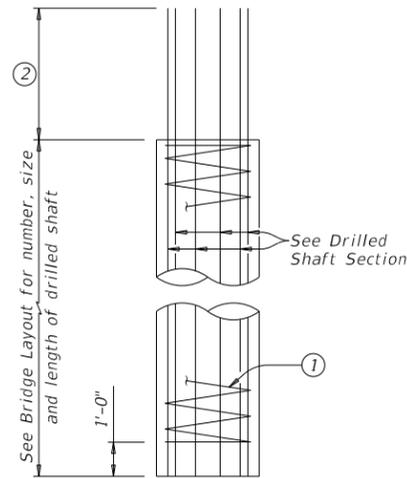


SECTION A-A

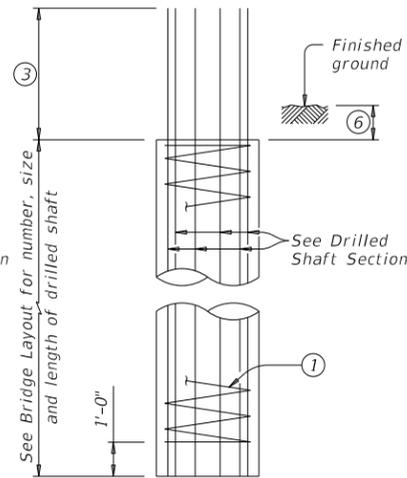
		Bridge Division Standard	
CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT			
CSAB			
FILE: csabste1-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CONT	SECT	JOB
REVISIONS		HIGHWAY	
		BR	
DIST	COUNTY	SHEET NO.	
HOU	GALVESTON	93	

DATE: FILE:

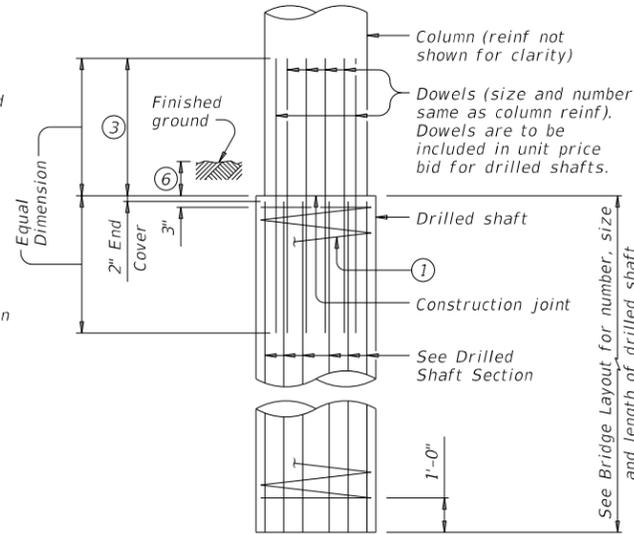
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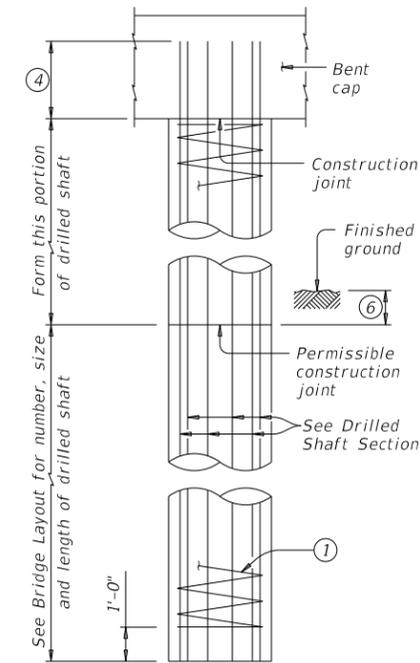
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



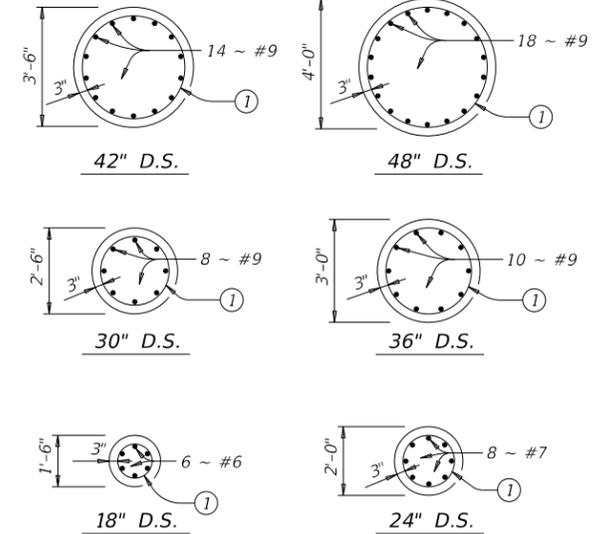
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL ⑤

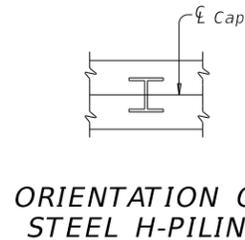


DRILLED SHAFT SECTIONS

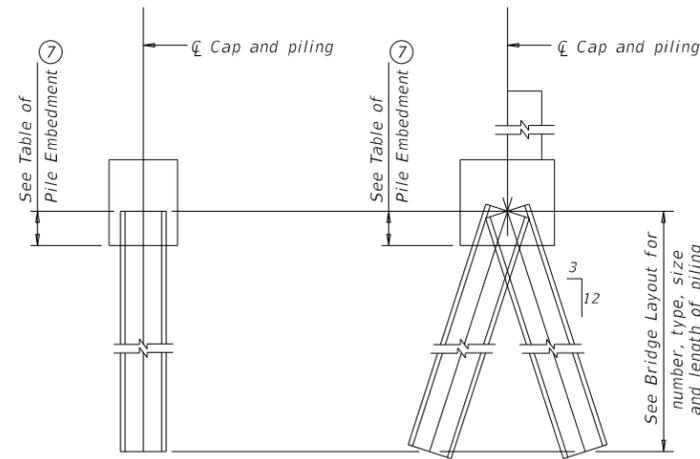
DRILLED SHAFT DETAILS

TABLE OF PILE EMBEDMENT	
Pile Type	Embedment Depth (Ft)
16" Sq Concrete 18" Sq Concrete HP14 Steel HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP18 Steel	1'-6"

See Prestressed Concrete Piling (CP) standard for additional details on concrete pile embedment.

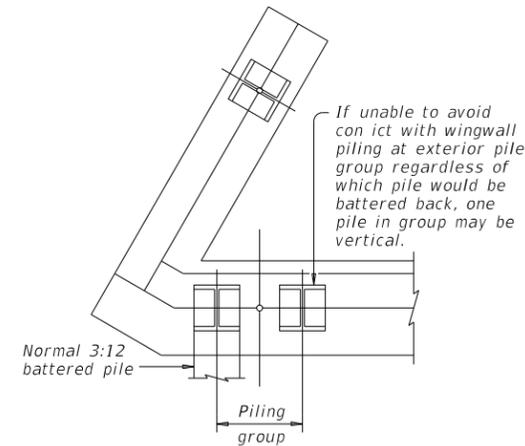


ORIENTATION OF STEEL H-PIILING



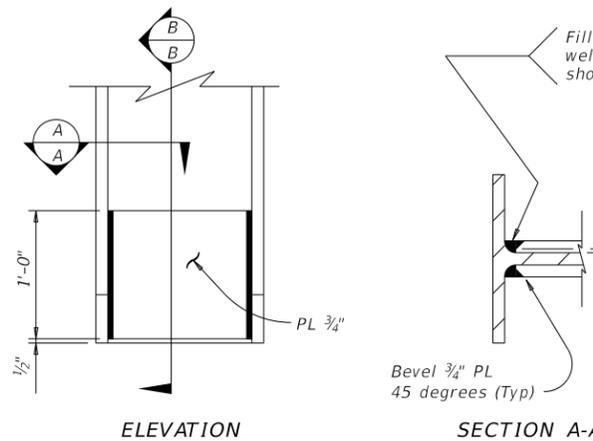
VERTICAL PILE BATTERED PILE

PIILING DETAILS (Concrete or steel H)



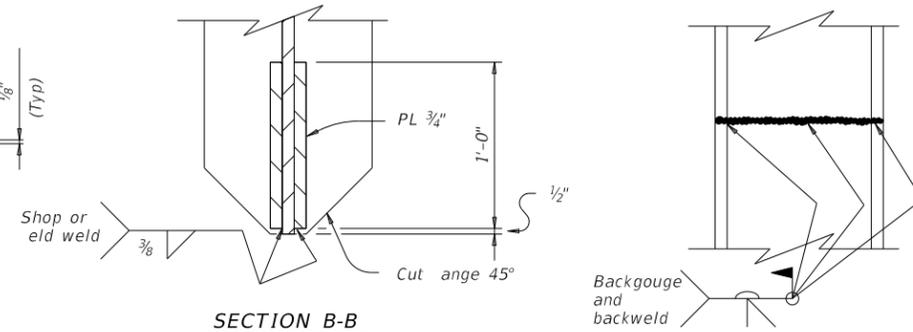
DETAIL "A"

(Showing plan view of a 30° skewed abutment)



STEEL H-PILE TIP REINFORCEMENT

See Item 407 "Steel Piling" to determine when tip reinforcement is required and for options to the details shown.



STEEL H-PILE SPLICE DETAIL

Use when required.

- ① #3 spiral at 6" pitch (one and a half at turns top and bottom).
- ② Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-0"
#9 Bars = 2'-3"
- ③ Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
- ④ Min extension into supported element:
#6 Bars = 1'-11"
#7 Bars = 2'-3"
#9 Bars = 2'-9"
- ⑤ Drilled shafts may extend to the bottom of bent caps for "H" heights of 6 ft and less (as shown on the Bridge Layout), if approved. This option can only be used when the drilled shaft diameter equals the column diameter. Obtain approval of the forming method above the ground line prior to construction. No adjustments in payment will be made if this option is used.
- ⑥ 1'-0" Min, unless shown otherwise on plans.
- ⑦ Or as shown on plans.

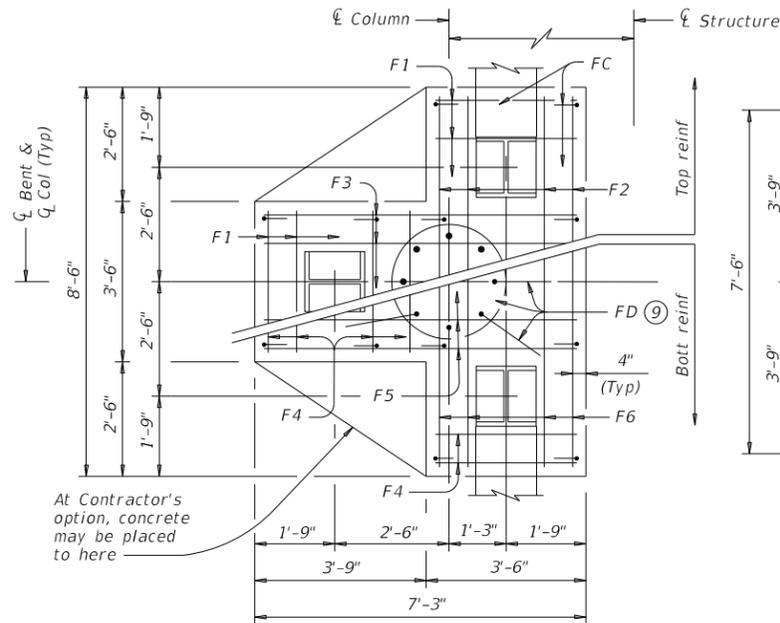
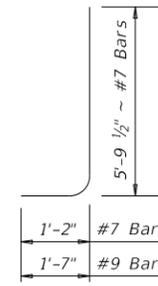
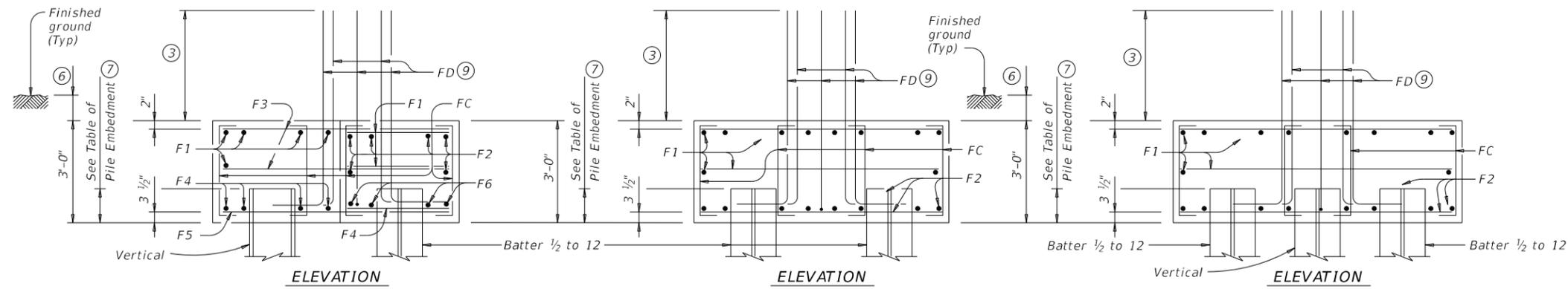
SHEET 1 OF 2

		Bridge Division Standard	
<h2>COMMON FOUNDATION DETAILS</h2>			
<h3>FD</h3>			
FILE: fdstde01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT
©TxDOT April 2019	CONT	SECT	JOB
REVISIONS			HIGHWAY
			BR
DIST	COUNTY	SHEET NO.	
HOU	GALVESTON	94	

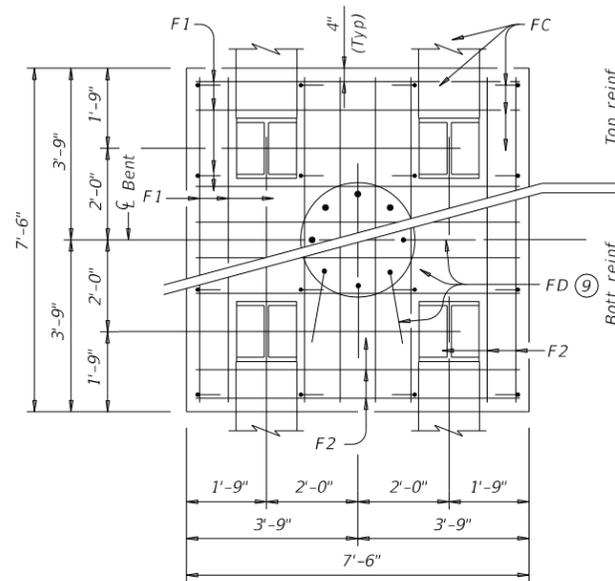
DATE: FILE:

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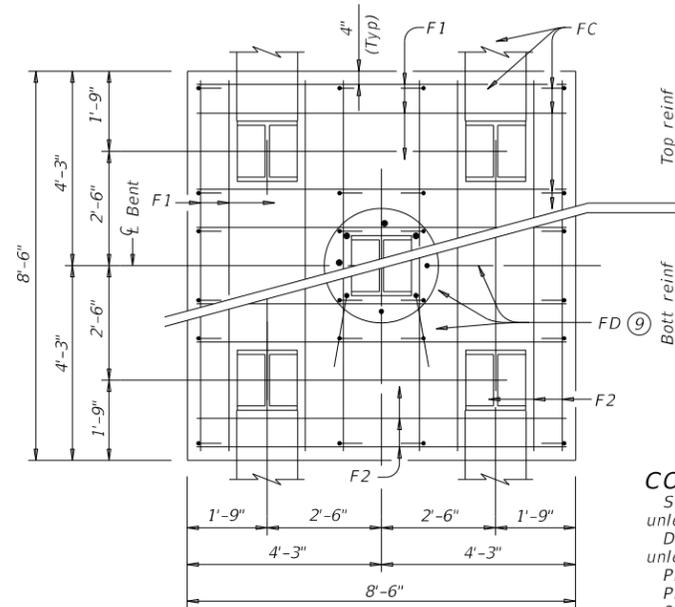
DATE: FILE:



THREE PILE FOOTING^⑧
For 36" Dia and smaller columns.



FOUR PILE FOOTING^⑧
For 42" Dia and smaller columns.



FIVE PILE FOOTING^⑧
For 42" Dia and smaller columns.

TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

ONE 3 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	11	#4	3'- 2"	23	
F2	6	#4	8'- 2"	33	
F3	6	#4	6'- 11"	28	
F4	8	#9	3'- 2"	86	
F5	4	#9	6'- 11"	94	
F6	4	#9	8'- 2"	111	
FC	12	#4	3'- 6"	28	
FD ^⑩	8	#9	8'- 8"	231	
Reinforcing Steel				Lb	606
Class "C" Concrete				CY	4.8
ONE 4 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	20	#4	7'- 2"	96	
F2	16	#8	7'- 2"	306	
FC	16	#4	3'- 6"	37	
FD ^⑪	8	#9	8'- 8"	231	
Reinforcing Steel				Lb	670
Class "C" Concrete				CY	6.3
ONE 5 PILE FOOTING					
Bar	No.	Size	Length	Weight	
F1	20	#4	8'- 2"	109	
F2	16	#9	8'- 2"	444	
FC	24	#4	3'- 6"	56	
FD ^⑪	8	#9	8'- 6"	231	
Reinforcing Steel				Lb	840
Class "C" Concrete				CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.
 Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.
 Provide Class C Concrete ($f'_c = 3,600$ psi), unless shown otherwise.
 Provide Grade 60 reinforcing steel.
 Galvanize reinforcing if shown elsewhere in the plans.
 Provide bar laps for drilled shaft reinforcing, where required, as follows:
 Uncoated or galvanized (#6) ~ 2'-6"
 Uncoated or galvanized (#7) ~ 2'-11"
 Uncoated or galvanized (#9) ~ 3'-9"

GENERAL NOTES:

Designed according to AASHTO LRFD Bridge Design Specifications.

Cover dimensions are clear dimensions, unless noted otherwise.
 Reinforcing bar dimensions shown are out-to-out of bar.

DESIGNER NOTES:

Do not use the drilled shaft details shown on this standard for retaining wall, noise wall, barrier, or sign foundations without structural evaluation.
 Do not use the footings shown on this standard in direct contact with salt water or exposed to salt water spray.
 Maximum allowable pile loads for the footings shown are :
 72 Tons/Pile with 24" Dia Columns
 80 Tons/Pile with 30" Dia Columns
 100 Tons/Pile with 36" Dia Columns
 120 Tons/Pile with 42" Dia Columns

- ③ Min lap with column reinf:
#7 Bars = 2'-11"
#9 Bars = 3'-9"
- ⑥ 1'-0" Min, unless shown otherwise on plans.
- ⑦ Or as shown on plans.
- ⑧ See Bridge Layout for type, size and length of piling.
- ⑨ Number and size of FD bars must match column reinforcing. Tie FD bars to the top of the bottom reinforcing mat.
- ⑩ For 24" columns, use #7 FD bars (7'-1") in place of #9 bars and deduct 116 lbs.
For 36" columns, add 2 FD bars (55 lbs).
- ⑪ For 24" columns, use #7 FD bars (7'-1") in place of #9 bars and deduct 116 lbs.
For 36" columns, add 2 FD bars (55 lbs).
For 42" columns, add 6 FD bars (172 lbs)
(42" columns disallowed on 3 Pile Footings)



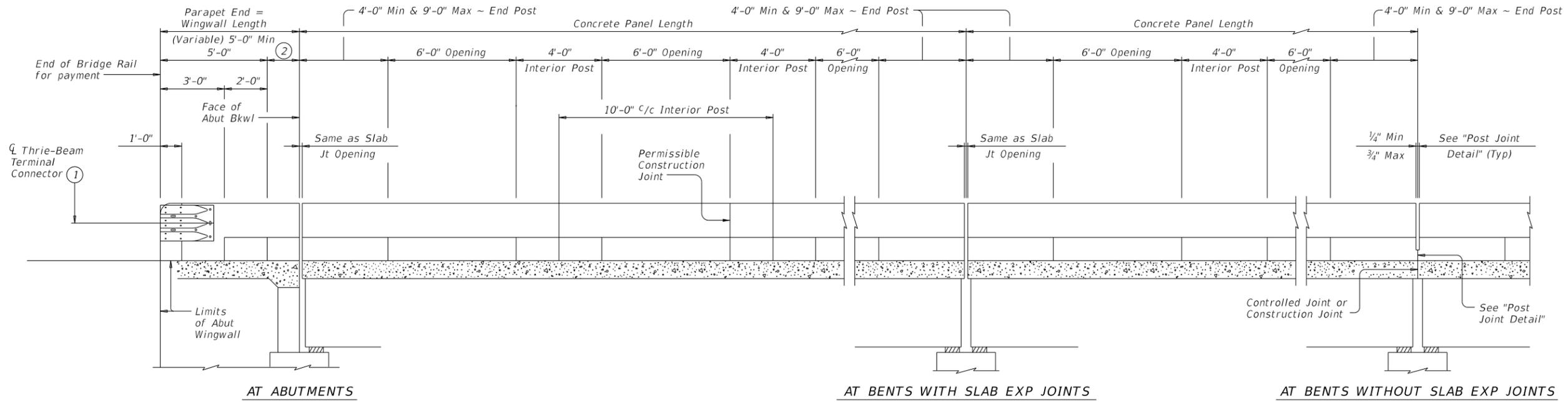
COMMON FOUNDATION DETAILS

FD

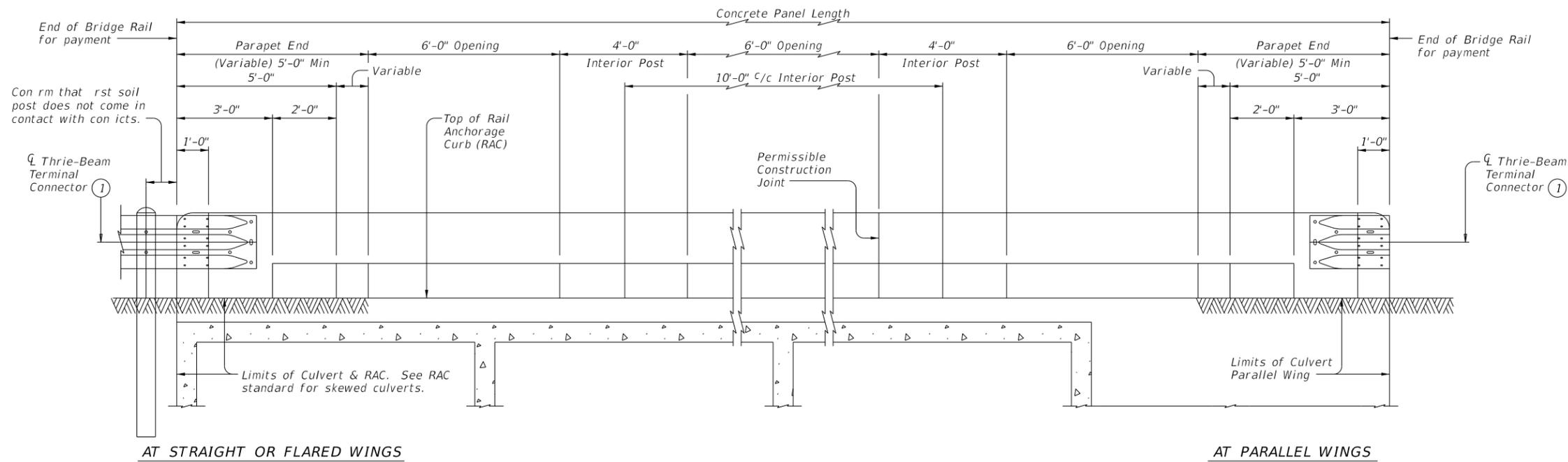
FILE: fstd01-19.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT April 2019	CONT	SECT	JOB	HIGHWAY
REVISIONS				BR
	DIST	COUNTY	SHEET NO.	
	HOU	GALVESTON	95	

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DATE:
FILE:



ROADWAY ELEVATION OF RAIL ON BRIDGE



ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)

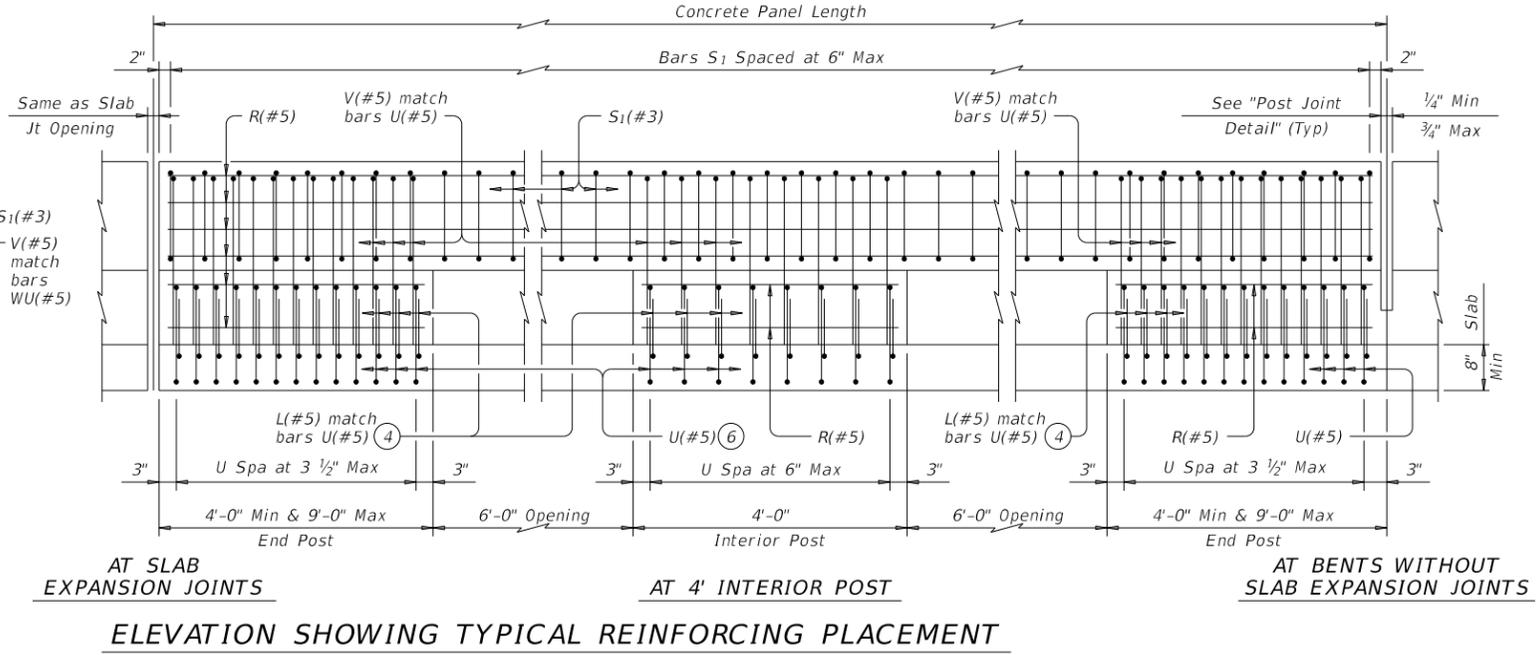
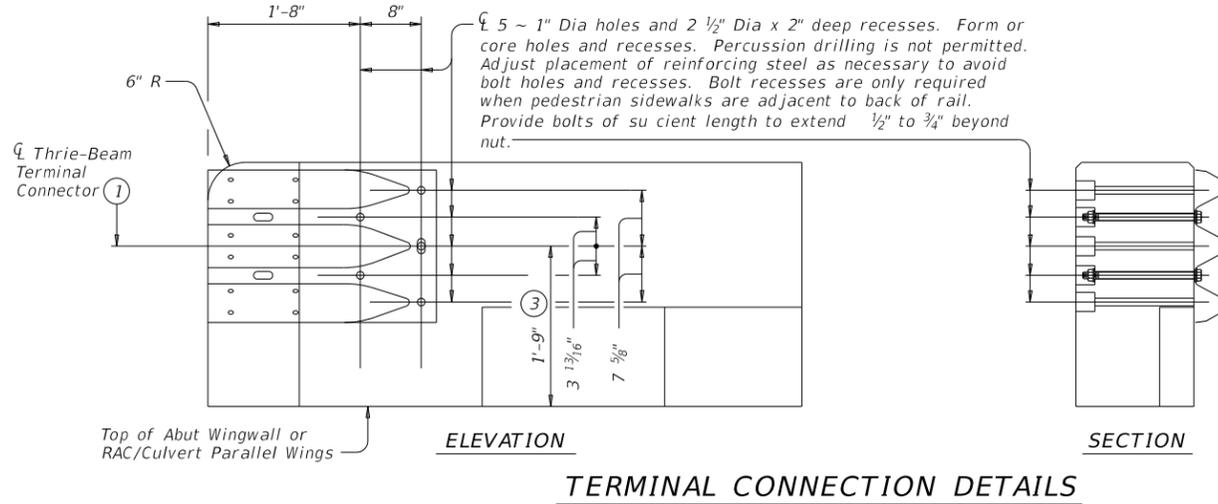
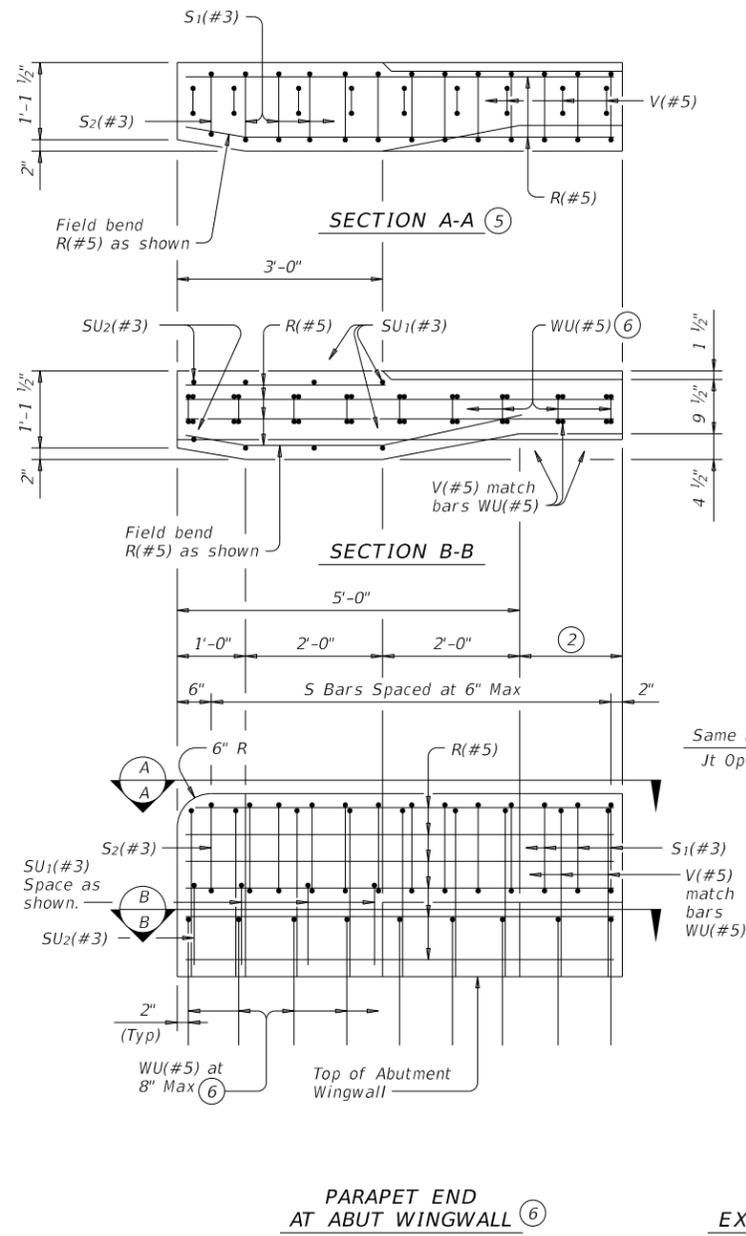
TRAFFIC RAIL

TYPE T223

FILE: r1std005-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT March 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS				BR
DIST	COUNTY			SHEET NO.
HOU	GALVESTON			96

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DATE: FILE:



- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)
- ③ Increase 2" for structures with overlay.
- ④ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑤ Bars SU₁(#3), SU₂(#3) and WU(#5) not shown for clarity.
- ⑥ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.

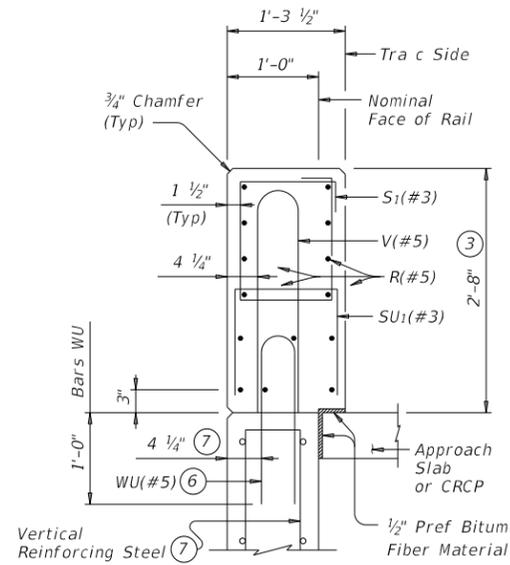


TRAFFIC RAIL

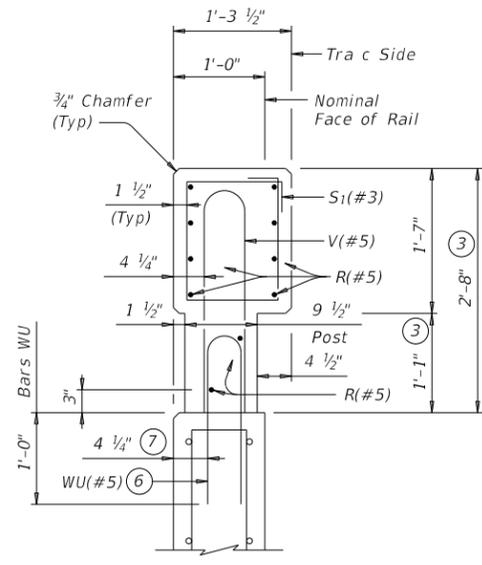
TYPE T223

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©TxDOT March 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS				BR
	DIST	COUNTY	SHEET NO.	
	HOU	GALVESTON	97	

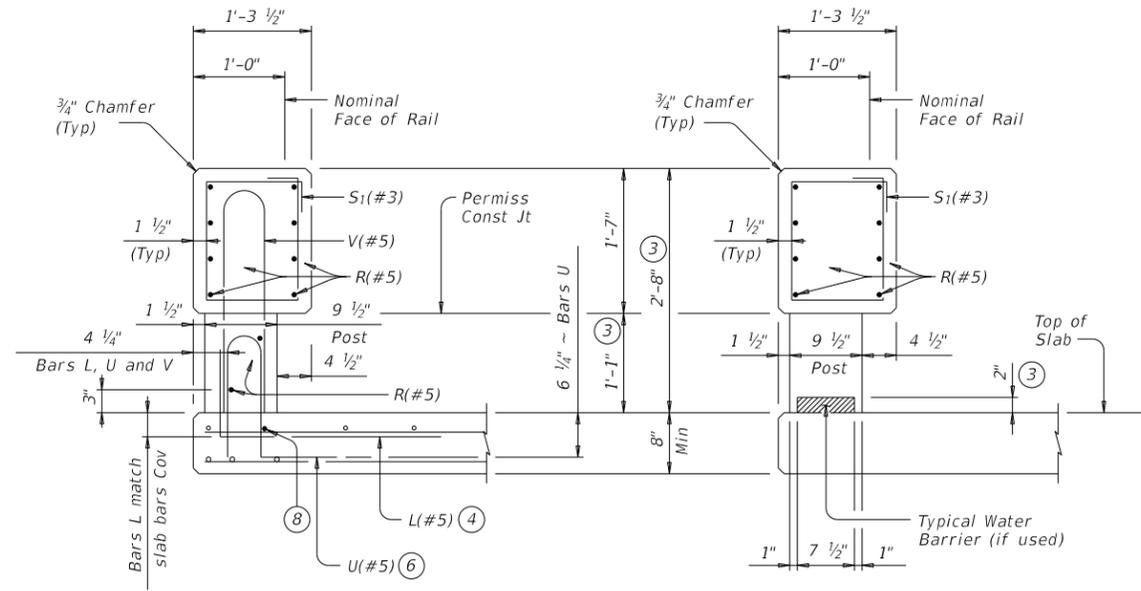
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SECTION C-C
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS

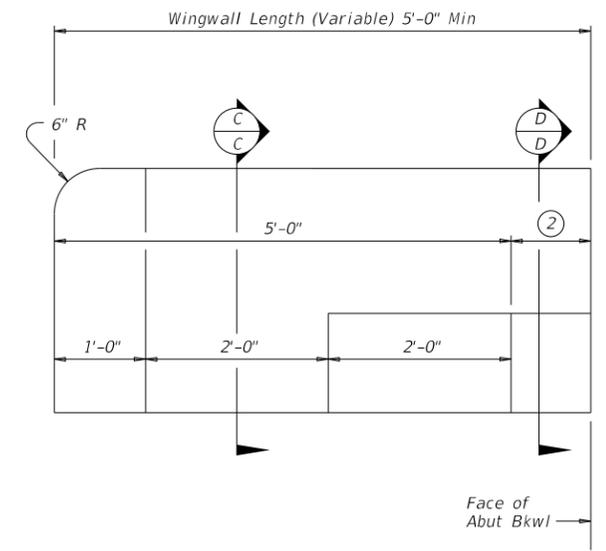


SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



AT POST
ON BRIDGE SLAB

AT OPENING
ON BRIDGE SLAB



ELEVATION AT
ABUTMENT WINGWALL

Box culvert parallel wings or rail anchorage curb similar.

SECTIONS THRU RAIL

Sections on box culverts similar.

- ② Wingwall Length minus 5'-0" (Varies)
- ③ Increase 2" for structures with overlay.
- ④ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑥ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.
- ⑦ When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on tra c side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars con t.
- ⑧ Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.
- ⑨ At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 1/4" above the roadway surface without overlay.

CONSTRUCTION NOTES:

Face of rail and parapet must be vertical transversely unless otherwise shown in the plans or approved by the Engineer.
Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.
Chamfer all exposed corners.

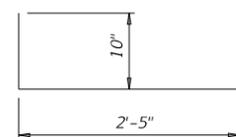
MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere.
Provide Grade 60 reinforcing steel.
Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized.
Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise. Provide the same laps as required for reinforcing bars.
Provide bar laps, where required, as follows:
Uncoated or galvanized ~ #5 = 2'-0"
Epoxy coated ~ #5 = 3'-0"

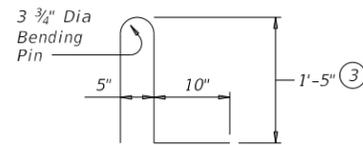
GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.
Do not use this railing on bridges with expansion joints providing more than 5" movement.
Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.
Shop drawings are not required for this rail.
Average weight of railing with no overlay is 358 p/f.

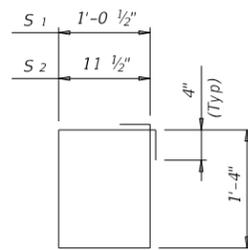
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.



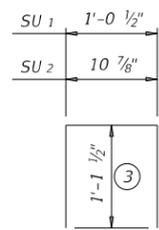
BARS L (#5)



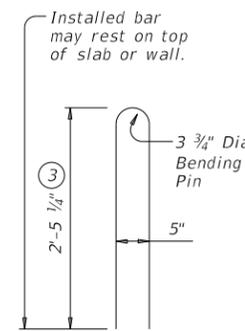
BARS U (#5) ⑨



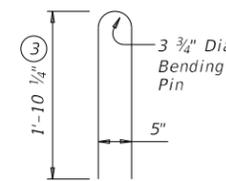
BARS S (#3)



BARS SU (#3)



BARS V (#5) ⑨



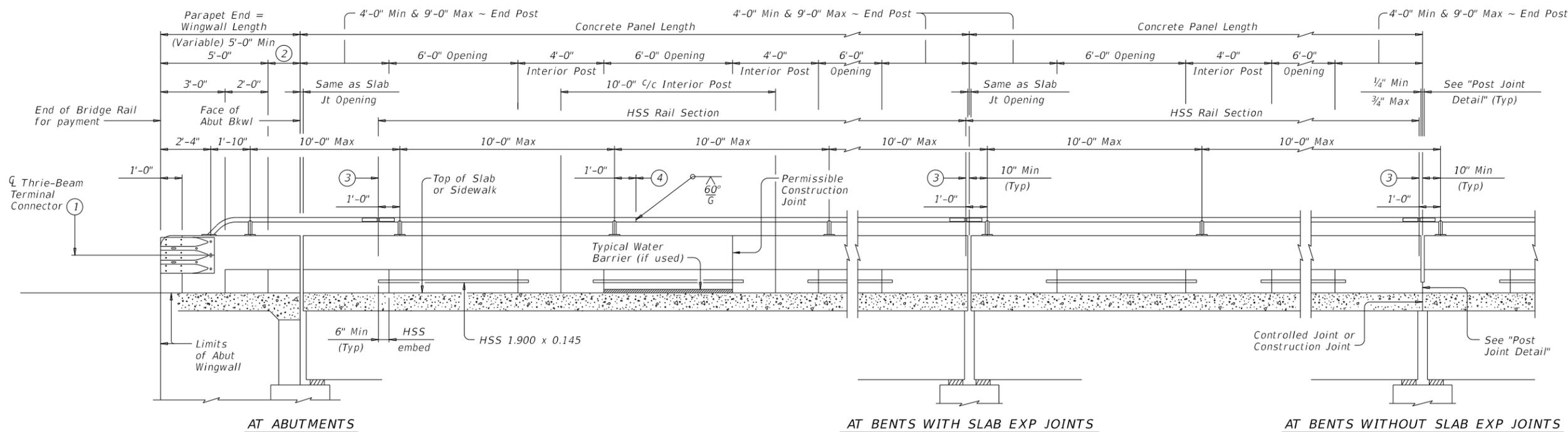
BARS WU (#5)

		Bridge Division Standard	
<h1>TRAFFIC RAIL</h1>			
<h2>TYPE T223</h2>			
FILE: r1std005-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
CON: TxDOT	SECT:	JOB:	HIGHWAY:
REVISIONS		BR	
DIST:	COUNTY:	SHEET NO.	
HOU	GALVESTON	98	

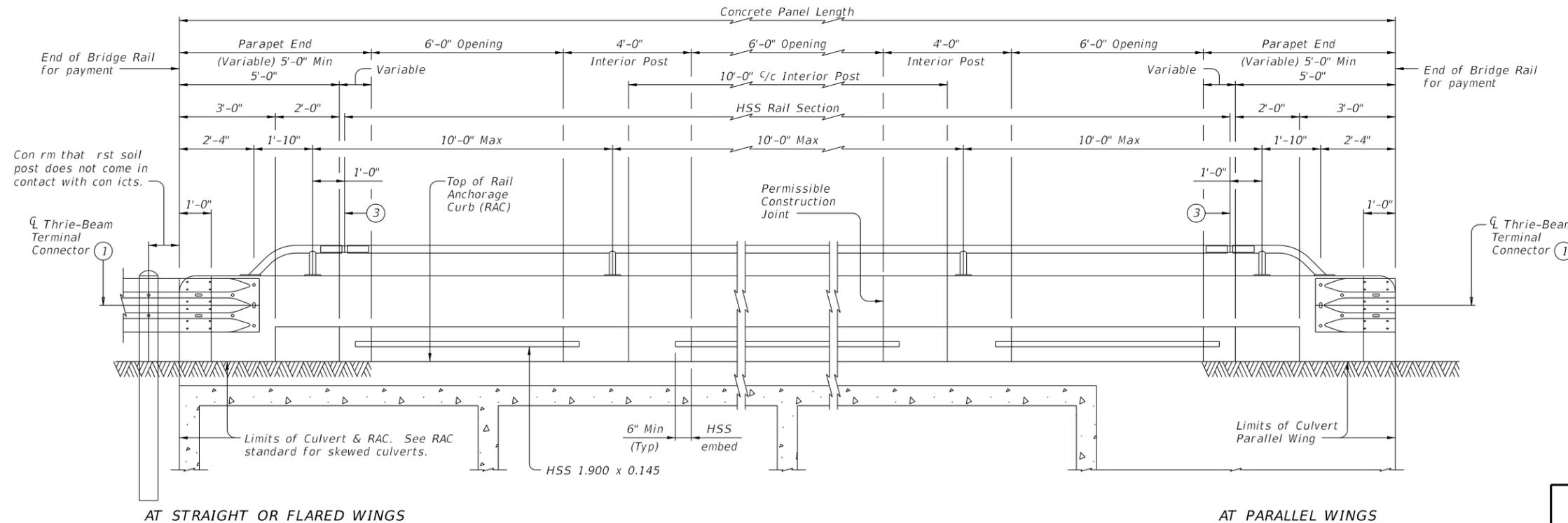
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ROADWAY ELEVATION OF RAIL ON BRIDGE
(Showing without raised sidewalk)



ROADWAY ELEVATION OF RAIL ON BOX CULVERTS

Showing 0° skew culvert. Skewed culverts similar. See RAC standard for details not shown. Vertical joints in concrete rail are not required, unless shown elsewhere.

- ① Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- ② Wingwall Length minus 5'-0" (Varies)
- ③ Splice Jt or Exp Jt
- ④ One shop splice per HSS rail section is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth.

SHEET 1 OF 4

Texas Department of Transportation
Bridge Division Standard

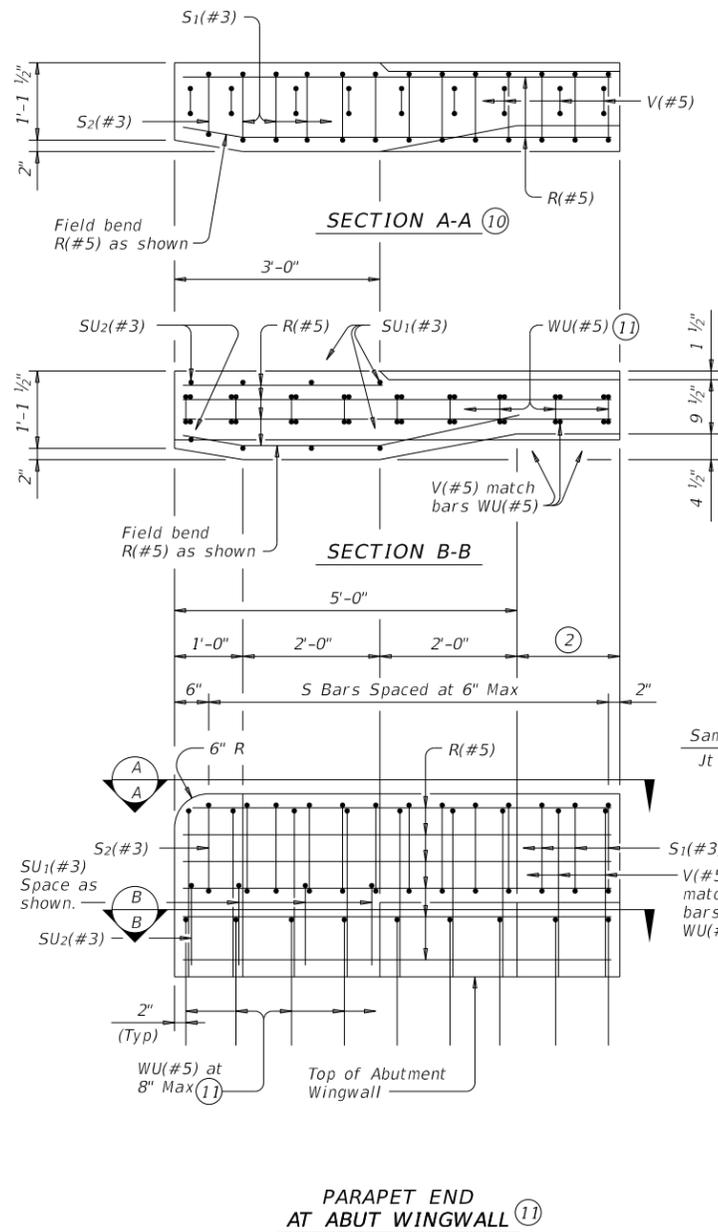
COMBINATION RAIL

TYPE C223

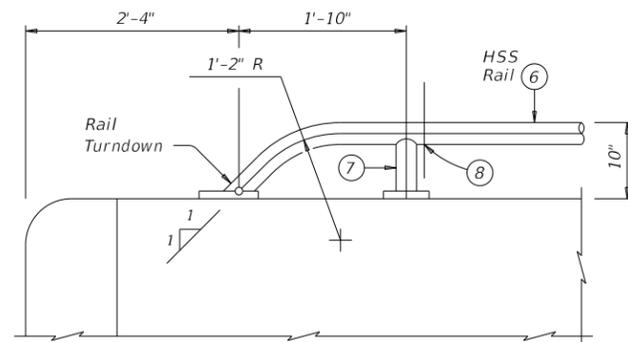
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©TxDOT March 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS				BR
DIST	COUNTY			SHEET NO.
HOU	GALVESTON			99

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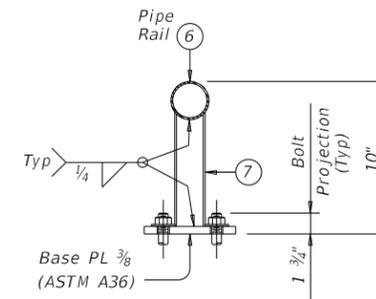


PARAPET END AT ABUT WINGWALL (1)

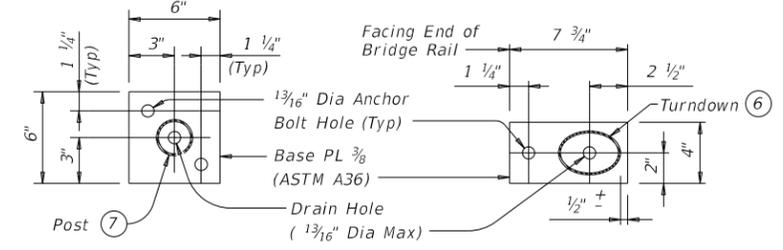


Note that at least two anchor points (as shown) are required for the Bridge Rail on the Abutment Wingwall. Longer Wingwalls may require more than two Rail anchorages.

HSS RAIL TERMINAL DETAIL



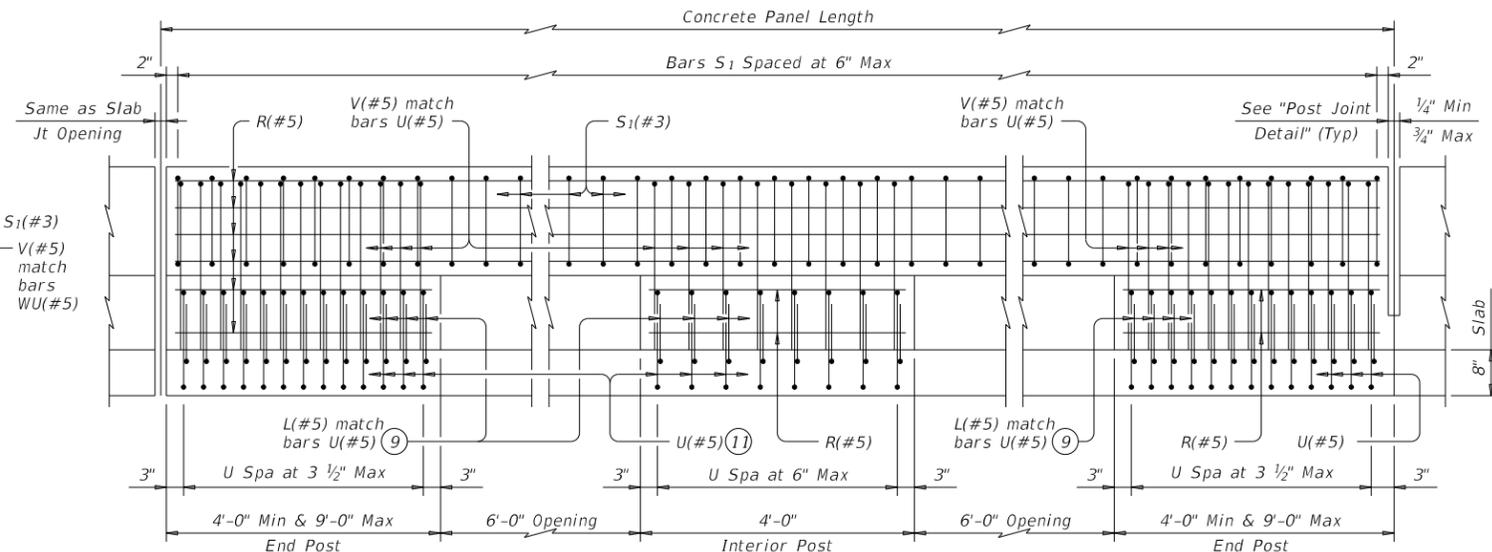
TRANSVERSE SECTION



POST BASE PLATE PLAN

RAIL TURNDOWN BASE PLATE PLAN

HSS RAIL DETAILS



AT BENTS WITH SLAB EXP JOINTS

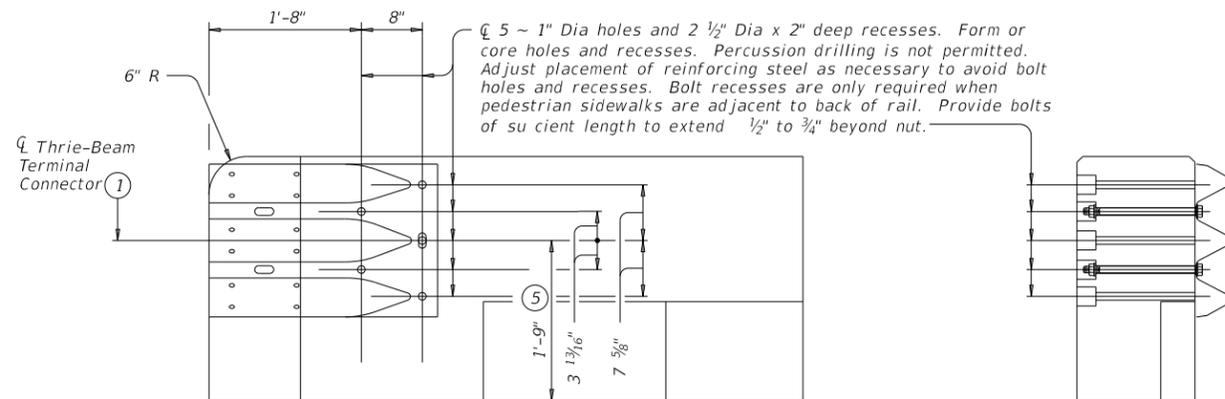
AT 4' INTERIOR POST

AT BENTS WITHOUT SLAB EXP JOINTS

ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

Showing rail on slab and without raised sidewalk. Rail on box culvert similar. HSS not shown for clarity.

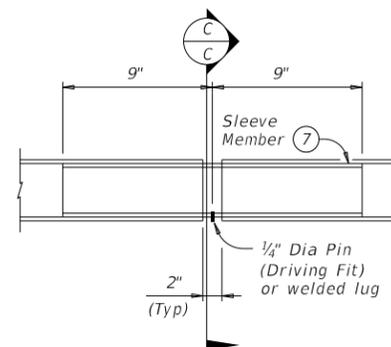
- (1) Terminal Connectors and associated hardware are to be paid for under the Item "Metal Beam Guard Fence". Attach Metal Beam Guard Fence Transitions to the bridge rail and extend along the embankment unless otherwise shown in the plans.
- (2) Wingwall Length minus 5'-0" (Varies)
- (5) Increase 2" for structures with overlay.
- (6) HSS 2.875 x 0.203
- (7) HSS 2.375 x 0.154
- (8) 3/8" Dia Hole in bottom of HSS rail (Minimum 1 hole between posts - Typ)
- (9) Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- (10) Bars SU1(#3), SU2(#3) and WU(#5) not shown for clarity.
- (11) Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.



ELEVATION

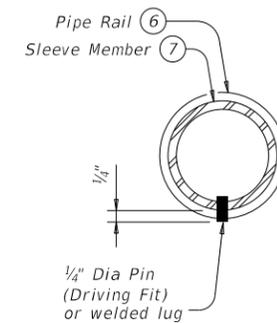
SECTION

TERMINAL CONNECTION DETAILS



AT SPLICE OR EXP JTS

PIPE SPLICE DETAILS



SECTION C-C

SHEET 2 OF 4



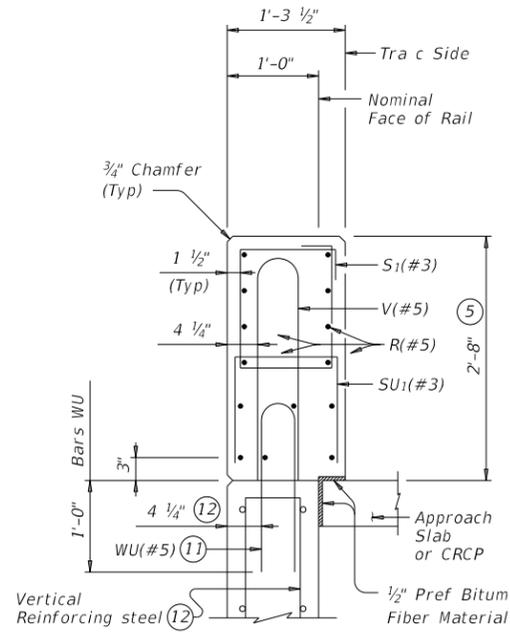
COMBINATION RAIL

TYPE C223

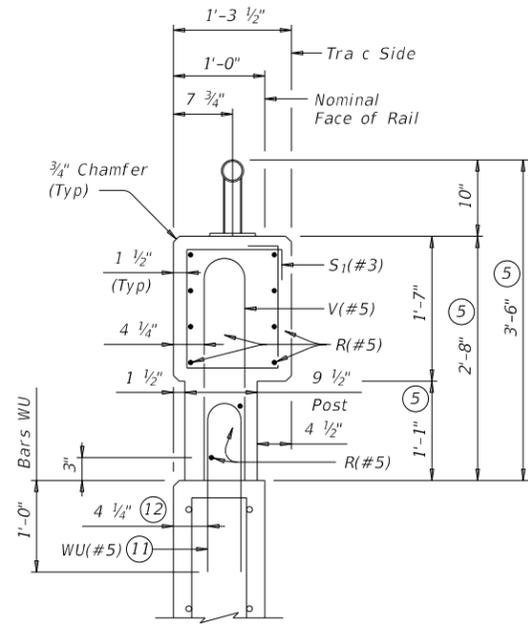
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©TxDOT March 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS				BR
	DIST	COUNTY	SHEET NO.	
	HOU	GALVESTON	100	

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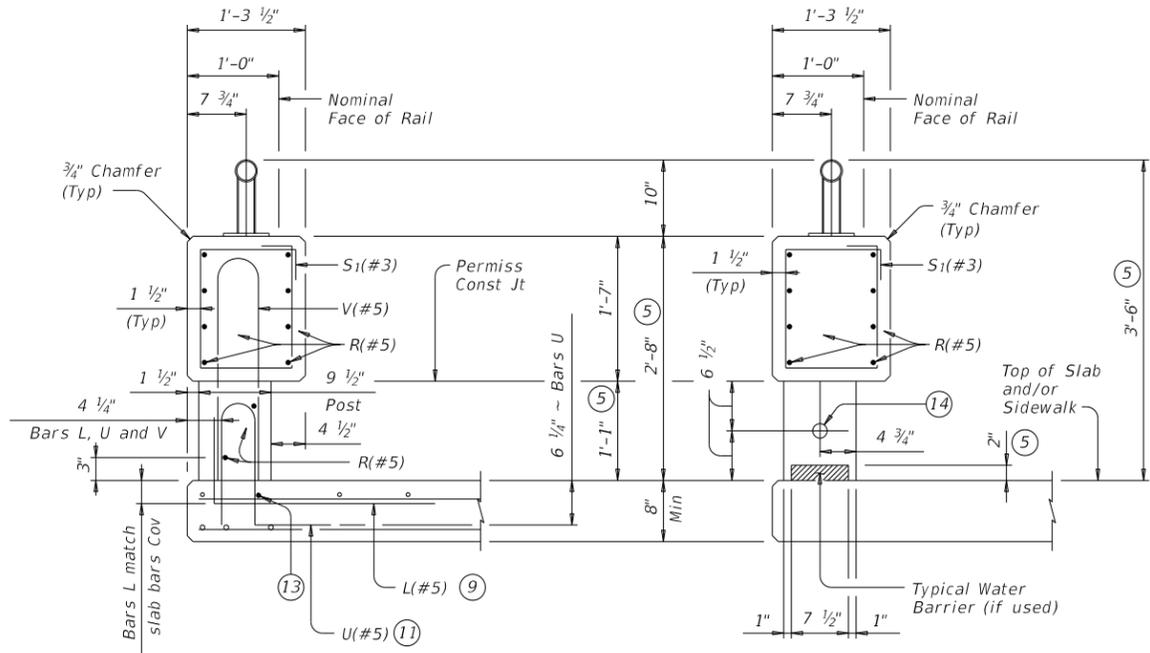
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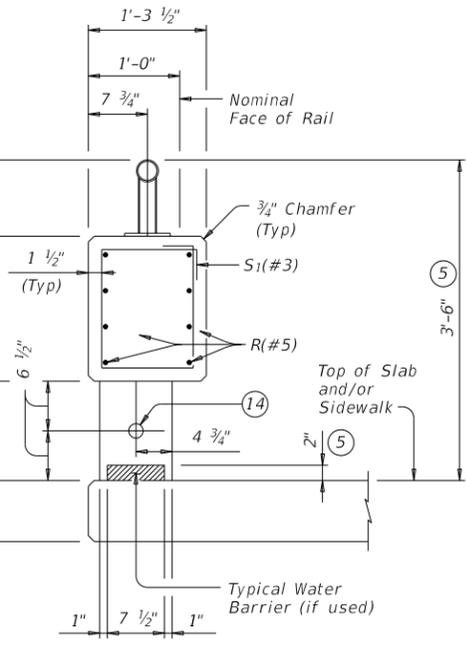
SECTION D-D
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



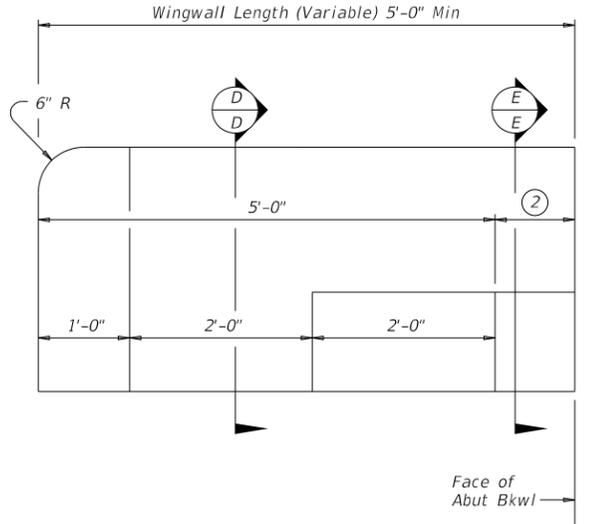
SECTION E-E
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



AT POST
ON BRIDGE SLAB



AT OPENING
ON BRIDGE SLAB

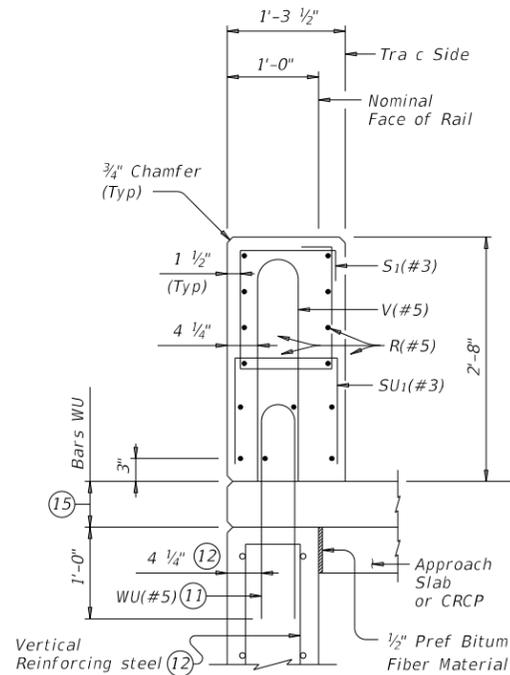


ELEVATION AT
ABUTMENT WINGWALL

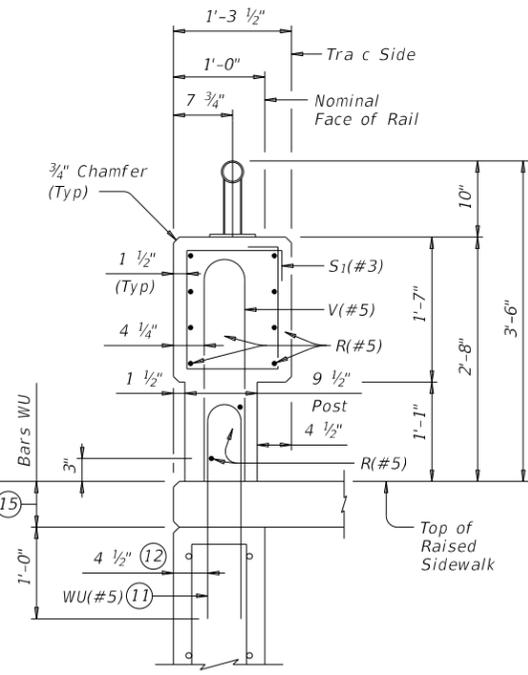
Box culvert parallel wings or rail anchorage curb similar. HSS rail not shown for clarity.

SECTIONS THRU RAIL WITHOUT RAISED SIDEWALK

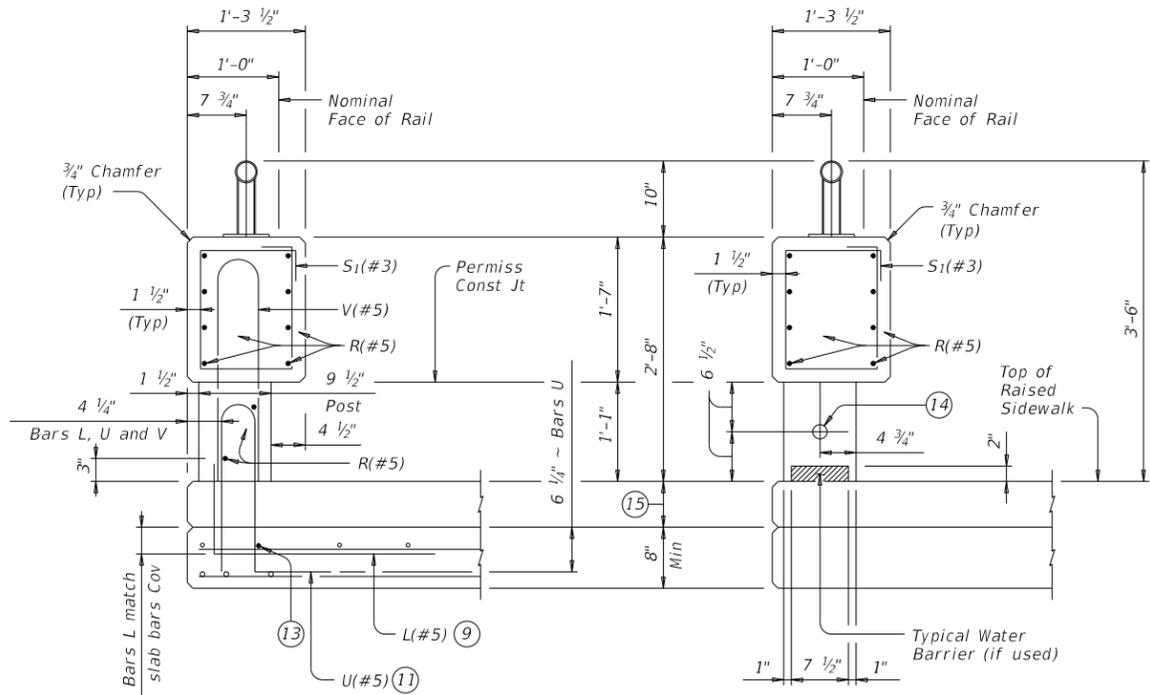
Sections on box culvert similar.



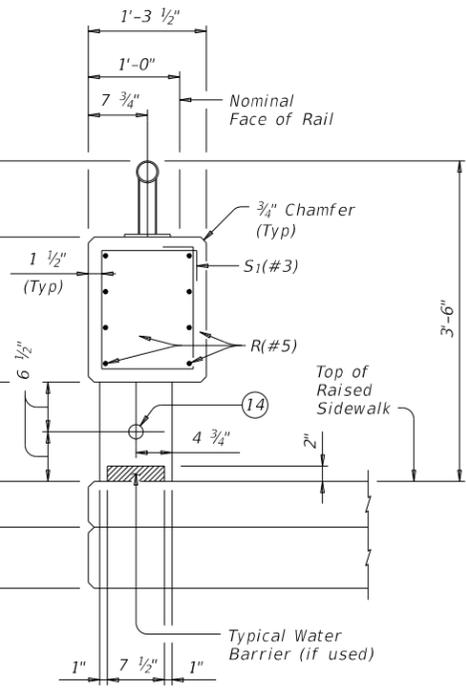
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OR CIP RETAINING WALLS



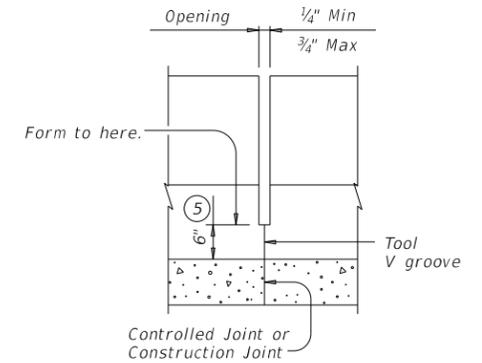
SECTION E-E
ON ABUTMENT WINGWALLS
OR CIP RETAINING WALLS



AT POST
ON BRIDGE SLAB



AT OPENING
ON BRIDGE SLAB



POST JOINT DETAIL

(Showing without raised sidewalk) Provide at all interior bents without slab expansion joints. Location independent of HSS rail splices.

SECTIONS THRU RAIL WITH RAISED SIDEWALK

Sections on box culvert similar.

- ② Wingwall Length minus 5'-0" (Varies)
- ⑤ Increase 2" for structures with overlay.
- ⑨ Bars L(#5) are part of rail reinforcing and are included in unit price bid for railing. Space with Bars U. Bars L match slab bar cover. Bars L may be bundled with top slab reinforcing if spacing is equivalent.
- ⑪ Substitute Bars U(#5) for Bars WU(#5) when parapet end is located on anchorage curb over culvert top slab. Use Bars WU(#5) in culvert parallel wings.
- ⑫ When vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls on tra c side of wall, move the horizontal wingwall/retaining wall reinforcing to the inside of Bars WU where bars con ict.
- ⑬ Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.
- ⑭ HSS 1.900 x 0.145
- ⑮ Raised Sidewalk.

SHEET 3 OF 4

Texas Department of Transportation
Bridge Division Standard

COMBINATION RAIL

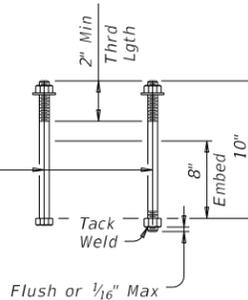
TYPE C223

FILE: r1std019-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR	CK: AES
©TxDOT March 2018	CONT	SECT	JOB	HIGHWAY
REVISIONS				BR
	DIST	COUNTY	SHEET NO.	
	HOU	GALVESTON	101	

RAIL DATA FOR HORIZONTAL CURVES

	RADIUS TO FACE OF RAIL	MAX CHORD LENGTH	CONSTRUCT OR FABRICATE
HSS Rail	Over 2800'	29'-0"	Straight rail sections
	Over 1400' thru 2800'	14'-6"	To required radius or to chords shown
	Over 700' thru 1400'	7'-3"	
	Thru 700'	Zero	To required radius

Use 5/8" Dia hex head anchor bolt or threaded rod (ASTM A307 Gr A) with one hardened steel washer (ASTM F436) placed under each hex nut (ASTM A563). One additional hex nut must be furnished and tack welded for each threaded rod.



CAST-IN-PLACE ANCHOR BOLT OPTIONS 16

- 5 Increase 2" for structures with overlay.
- 16 See "Material Notes" for anchor bolt information.
- 17 For raised sidewalks, add sidewalk height to total bar height. Use sidewalk height at rail's location.
- 18 At the Contractor's option, Bars V may be replaced by extending Bars U to 2'-5 1/4" above the roadway/sidewalk surface without overlay.

CONSTRUCTION NOTES:

Face of rail, posts and parapet must be vertical transversely unless otherwise approved by the Engineer. HSS rail posts and opening end faces must be perpendicular to top of adjacent concrete parapet grade. Use epoxy mortar under HSS rail post base plates if gaps larger than 1/16" exist.

Provide water barriers at openings draining onto undercrossing roadways and sidewalks. They may be cast-in-place or precast in convenient lengths and bonded to the bridge deck with an approved epoxy cement.

HSS rail sections must not include less than two posts, and no more than four (except at Abutments).

Round or chamfer exposed edges of HSS rail and HSS rail posts to approximately 1/16" by grinding.

Test adhesive anchors in accordance with Item 450.3.3, "Tests". Test 3 anchors per 100 anchors installed. Perform corrective measures to provide adequate capacity if any of the tests do not meet the required test load. Repair damage from testing as directed.

At the Contractor's option anchor bolts may be cast with the parapet. See "Material Notes". Chamfer all exposed corners.

MATERIAL NOTES:

Provide Class "C" concrete. Provide Class "C" (HPC) if required elsewhere. Provide Grade 60 reinforcing steel.

Epoxy coat or galvanize all reinforcing steel if slab bars are epoxy coated or galvanized. Provide ASTM A1085, A500 Gr B or A53 Gr B for all HSS.

Galvanize all metal components of steel rail system. Apply additional coatings when shown elsewhere on the plans. When plans require paint over galvanizing, follow the requirements for painting galvanized steel in Item 445, "Galvanizing" and when field painting, Item 446, "Field Cleaning and Painting Steel". Sleeve members and anchor bolts must receive galvanization prior to installation and only field paint after installation unless directed otherwise by Engineer.

Deformed Welded Wire Reinforcing (WWR) (ASTM A1064) of equal size and spacing may be substituted for Bars U, V, and WU unless noted otherwise.

Anchor bolts must be 5/8" Dia ASTM A307 Gr A fully threaded rods with one hex nut and one hardened steel washer (ASTM F436) each. Nuts must conform to ASTM A563 requirements. Embed fully threaded rods into parapet wall with a Type III, Class C, D, E, or F anchor adhesive. Minimum adhesive anchor embedment depth is 3". Anchor adhesive chosen must be able to achieve a nominal bond strength in tension of a single anchor, Na, of 5 kips (edge distance must be accounted for). Submit signed and sealed calculations or the manufacturer's published literature showing the proposed anchor adhesive's ability to develop this load to the Engineer for approval prior to use. Anchor installation, including hole size, drilling, and clean out, must be in accordance with Item 450, "Railing".

Optional cast-in-place anchor bolts must be 5/8" Dia ASTM A307 Gr A bolts (or threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer (ASTM F436) at each bolt. Nuts must conform to ASTM A563 requirements.

Provide bar laps, where required, as follows: Uncoated or galvanized ~ #5 = 2'-0" Epoxy coated ~ #5 = 3'-0"

GENERAL NOTES:

This rail has been evaluated by full-scale crash test to meet MASH TL-3 criteria. This rail can be used for speeds of 50 mph and greater when a TL-3 rated guard fence transition is used. When a TL-2 rated guard fence transition is used, this rail can only be used for speeds of 45 mph and less.

Do not use this railing on bridges with expansion joints providing more than 5" movement. Rail anchorage details shown on this standard may require modification for select structure types.

See appropriate details elsewhere in plans for these modifications.

Submit erection drawings showing panel lengths, HSS rail post spacing, and anchor bolt setting to the Engineer for approval.

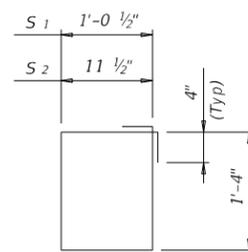
Average weight of railing with no overlay:

370 plf total
358 plf (Conc)
12 plf (Steel)

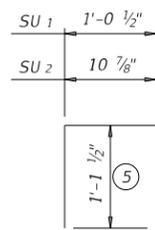
Cover dimensions are clear dimensions, unless noted otherwise. Reinforcing bar dimensions shown are out-to-out of bar.

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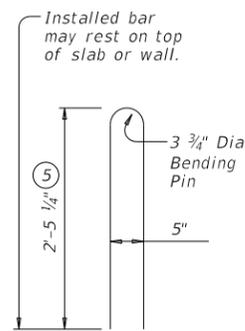
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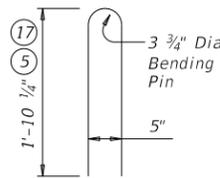
BARS S (#3)



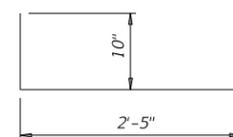
BARS SU (#3)



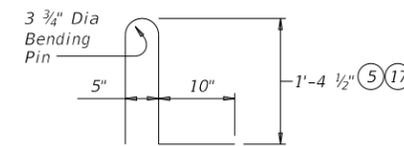
BARS V (#5) 18



BARS WU (#5)



BARS L (#5)



BARS U (#5) 18

		Bridge Division Standard	
<h2>COMBINATION RAIL</h2>			
<h3>TYPE C223</h3>			
FILE: r1std019-18.dgn	DN: TxDOT	CK: TxDOT	DW: JTR
CON: TxDOT	SECT: March 2018	JOB: HIGHWAY	CK: AES
REVISIONS		BR	
DIST: HOU	COUNTY: GALVESTON	SHEET NO. 102	

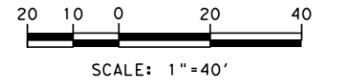
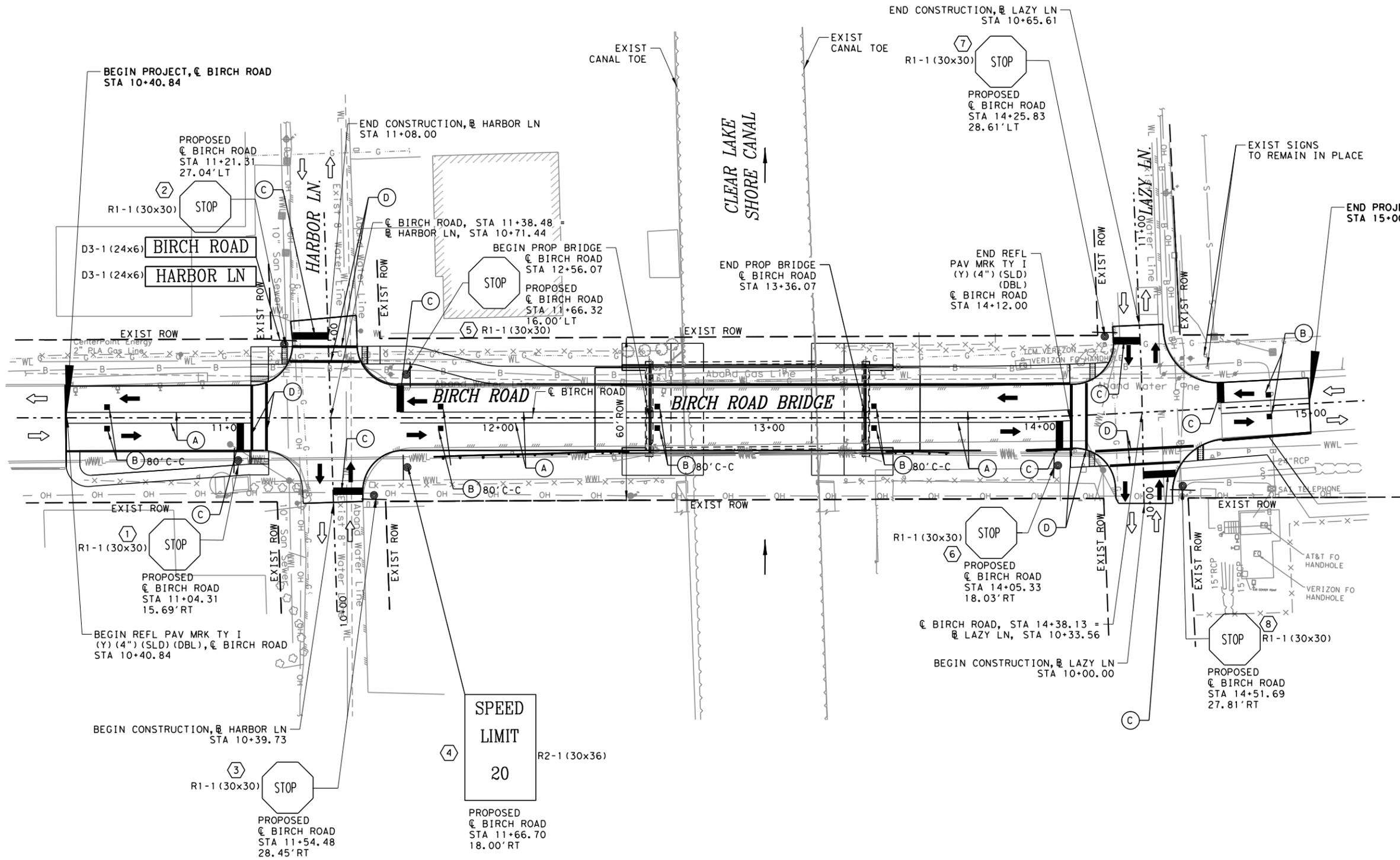
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LEGEND

- ⬇ (#) PROP SMALL SIGN
- ⬆ EXISTING SIGN
- ➡ PROP DIRECTION OF TRAFFIC
- ↔ EXIST DIRECTION OF TRAFFIC
- (A) REFL PAV MRK TY I (Y) (4") (SLD) (DBL)
- (B) REFL PAV MRK TY II A-A
- (C) REFL PAV MRK TY I (W) (24") (SLD)
- (D) REFL PAV MRK TY I (W) (12") (SLD)

NOTES

1. REMOVE ALL EXISTING SIGNS EXCEPT WHERE NOTED.
2. ALL PROPOSED SIGN LOCATIONS ARE APPROXIMATE AND MAY BE ADJUSTED, AS APPROVED BY THE ENGINEER.



REV. NO.	DATE	DESCRIPTION	BY

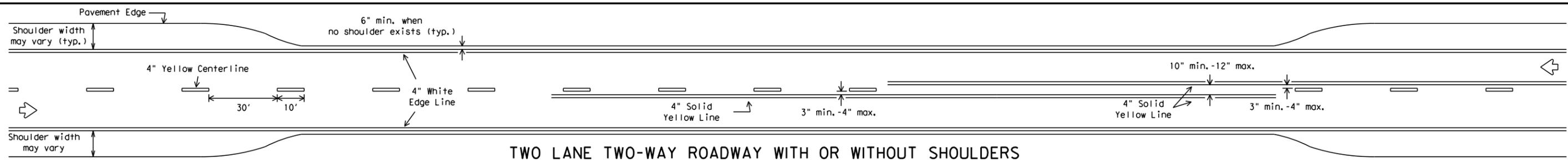


DANNENBAUM
 ENGINEERING CORPORATION - HOUSTON, LLC
 T.B.P.E. FIRM REGISTRATION #392
 3100 WEST ALABAMA HOUSTON, TEXAS 77098 (713) 520-9570
 GALVESTON COUNTY, TEXAS

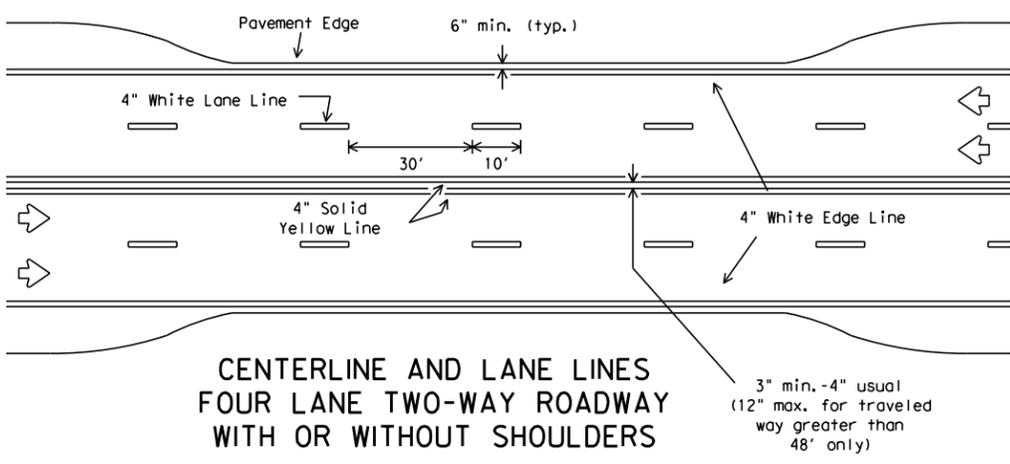
**BIRCH ROAD BRIDGE REPLACEMENT
 SIGNING & PAVEMENT
 MARKING LAYOUT**
 STA 10+20.00 TO STA 15+00.00
 SHEET 1 OF 1

Job No.:	Scale:	SHEET
Date: February, 2020	HORZ:	
Drn By: ic	VERT:	NO.
Chd By: ic		103

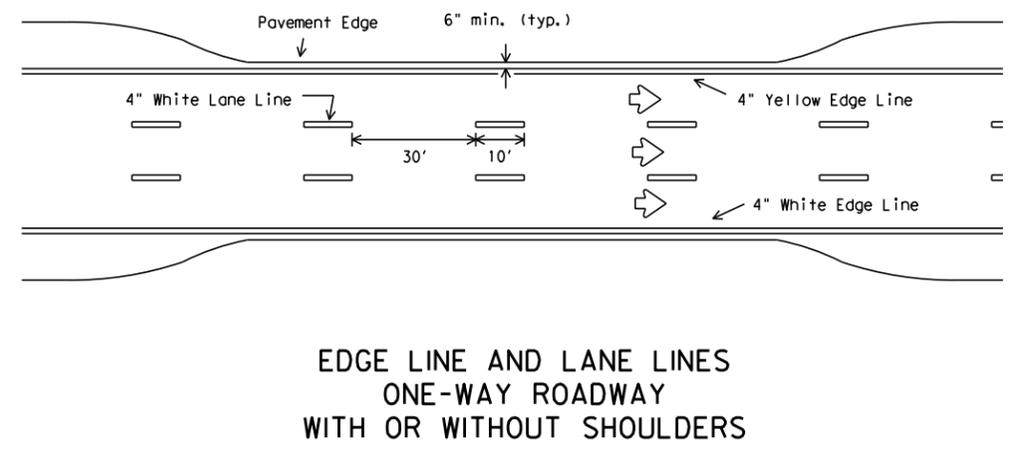
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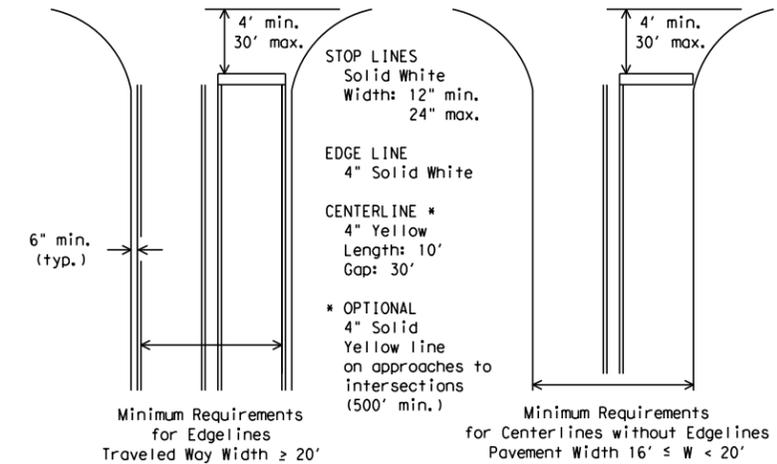
TWO LANE TWO-WAY ROADWAY WITH OR WITHOUT SHOULDERS



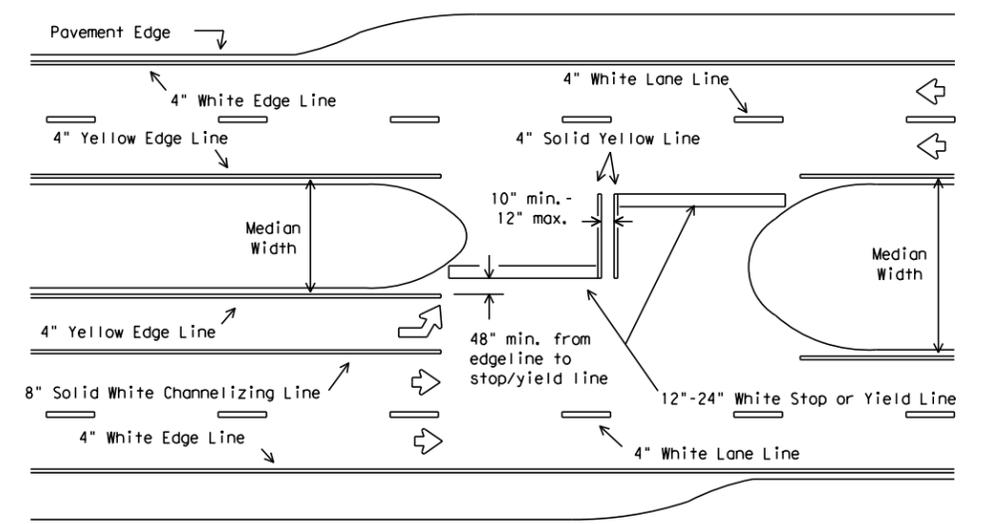
CENTERLINE AND LANE LINES
FOUR LANE TWO-WAY ROADWAY
WITH OR WITHOUT SHOULDERS



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

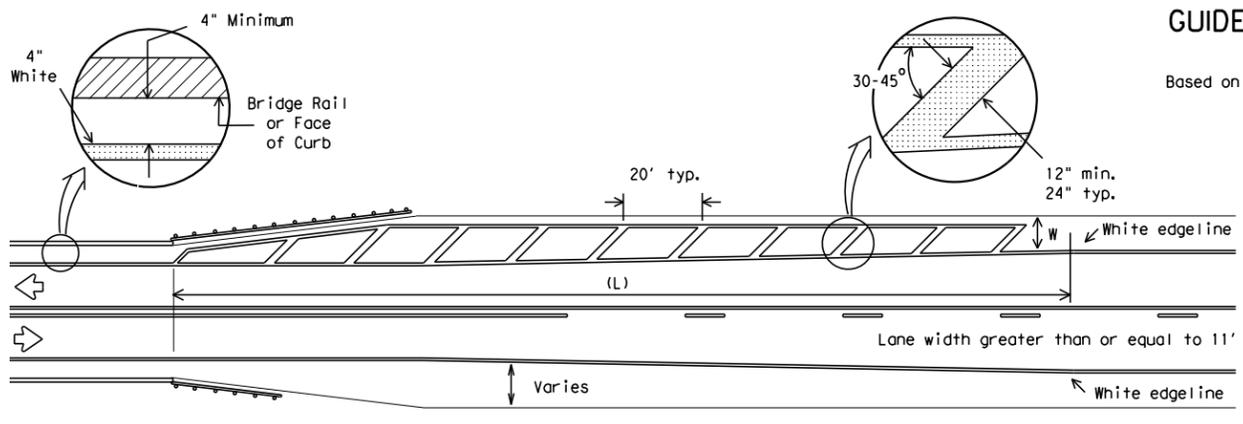


GUIDE FOR PLACEMENT OF STOP LINES,
EDGE LINE & CENTERLINE
Based on Traveled Way and Pavement Widths for Undivided Highways



All medians shall be field measured to determine the location of necessary striping. Stop/Yield bars and centerlines shall be placed when the median width is greater than 30 ft. The median width is defined as the area between two roadways of a divided highway measured from edge of traveled way to edge of traveled way. The median excludes turn lanes. The median width might be different between intersections, interchanges and of opposite approaches of the same intersection. The narrow median width will be the controlling width to determine if markings are required.

FOUR LANE DIVIDED ROADWAY INTERSECTIONS



- NOTES:
- No-passing zone on bridge approach is optional but if used, it shall be a minimum 500 feet long.
 - For crosshatching length (L) see Table 1.
 - The width of the offset (W) and the required crosshatching width is the full shoulder width in advance of the bridge.
 - The crosshatching is not required if delineators or barrier reflectors are used along the structure.
 - For guard fence details, refer elsewhere in the plans.

ROADWAYS WITH REDUCED SHOULDER
WIDTHS ACROSS BRIDGE OR CULVERT

TABLE 1 - TYPICAL LENGTH (L)

Posted Speed *	Formula
≤ 40	$L = \frac{WS^2}{60}$
≥ 45	$L = WS$

* 85th Percentile Speed may be used on roads where traffic speeds normally exceed the posted speed limit. Crosshatching length should be rounded up to nearest 5 foot increment.
L=Length of Crosshatching (FT.) W=Width of Offset (FT.) S=Posted Speed (MPH)

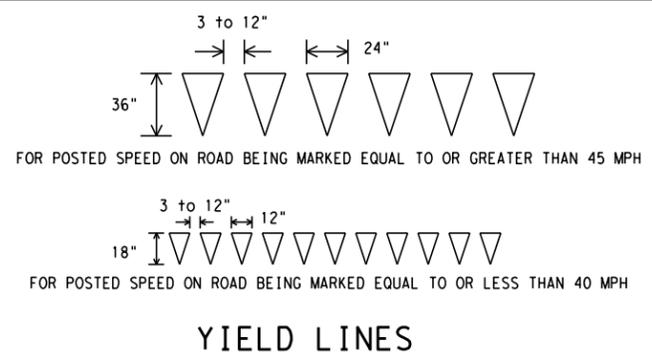
EXAMPLES:
An 8 foot shoulder in advance of a bridge reduces to 4 feet on a 70 MPH roadway. The length of the crosshatching should be:
 $L = 8 \times 70 = 560$ ft.
A 4 foot shoulder in advance of a bridge reduces to 2 feet on a 40 MPH roadway. The length of the crosshatching should be:
 $L = 4(40)^2 / 60 = 106.67$ ft. rounded to 110 ft.

GENERAL NOTES

- Edgeline striping shall be as shown in the plans or as directed by the Engineer. The edgeline should typically be placed a minimum of 6 inches from the edge of pavement. This distance may vary due to pavement raveling or other conditions. Edgelines are not required in curb and gutter sections of roadways.
- The traveled way includes only that portion of the roadway used for vehicular travel and not the parking lanes, sidewalks, berms and shoulders. The traveled ways shall be measured from the inside of edgeline to inside of edgeline of a two lane roadway.

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

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



YIELD LINES

Texas Department of Transportation
Traffic Operations Division

TYPICAL STANDARD
PAVEMENT MARKINGS

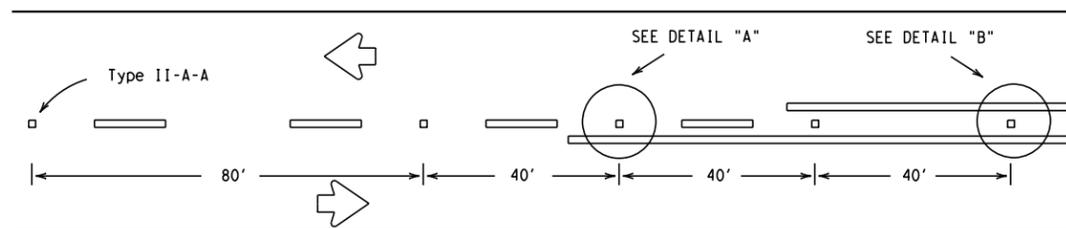
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5-00				
8-00	DIST	COUNTY		SHEET NO.
3-03	HOU	GALVESTON		104
22A				

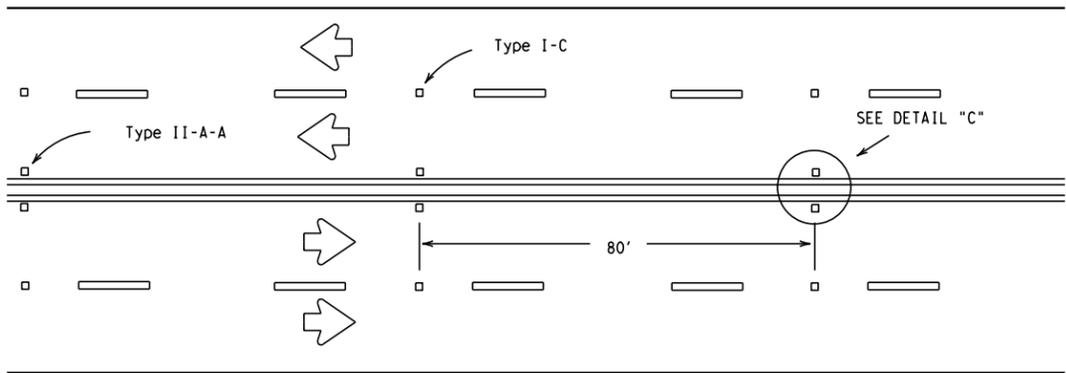
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FILE:

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REFLECTIVE RAISED PAVEMENT MARKERS FOR VEHICLE POSITIONING GUIDANCE

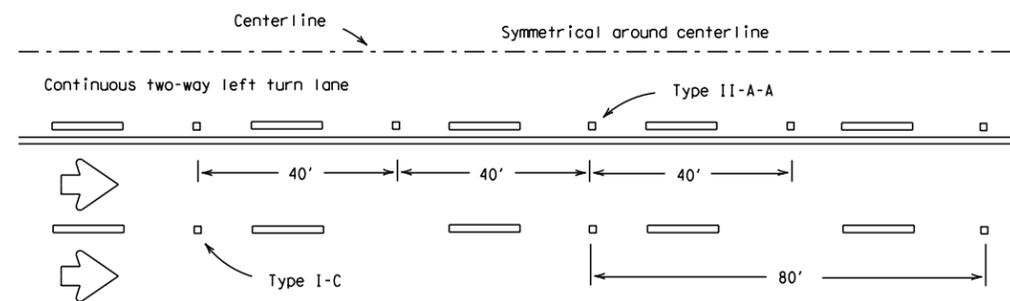


CENTERLINE FOR ALL TWO LANE ROADWAYS

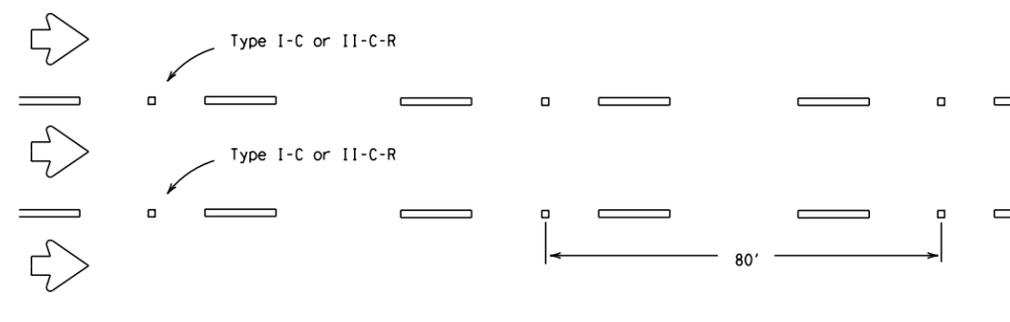


**CENTERLINE & LANE LINES
FOR FOUR LANE TWO-WAY HIGHWAYS**

Raised pavement marker Type I-C, clear face toward normal traffic, shall be placed on 80-foot centers.

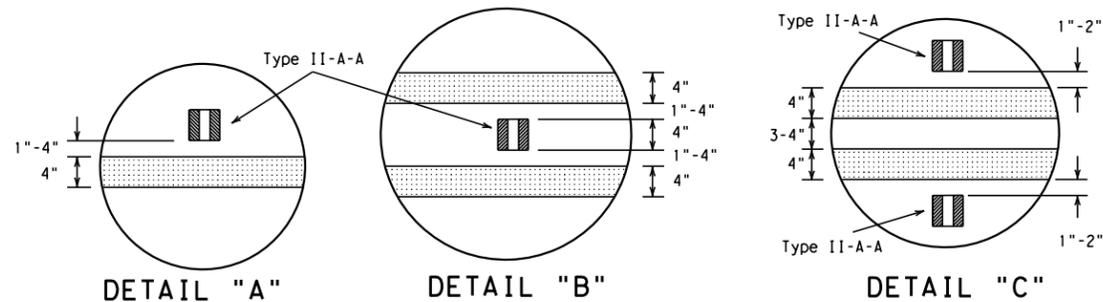


CENTERLINE AND LANE LINES FOR TWO-WAY LEFT TURN LANE



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

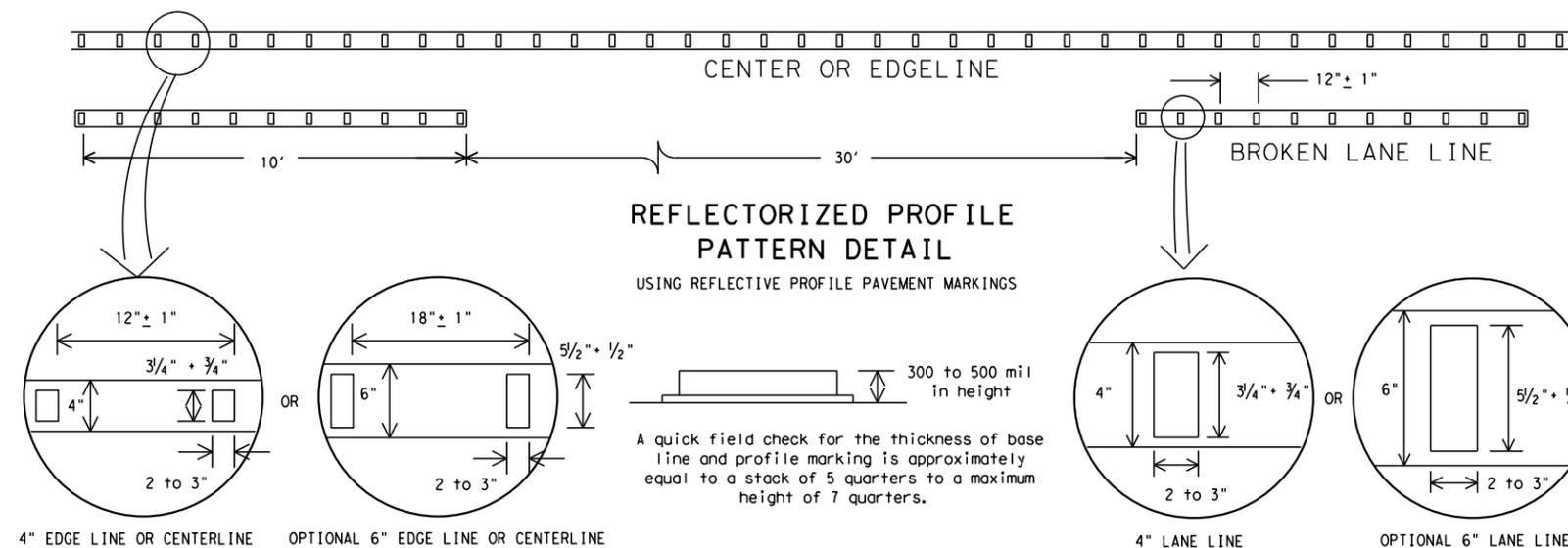
Raised pavement markers Type II-C-R shall have clear face toward normal traffic and red face toward wrong-way traffic.



DETAIL "A"

DETAIL "B"

DETAIL "C"



**REFLECTORIZED PROFILE
PATTERN DETAIL**

USING REFLECTIVE PROFILE PAVEMENT MARKINGS

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

NOTE:

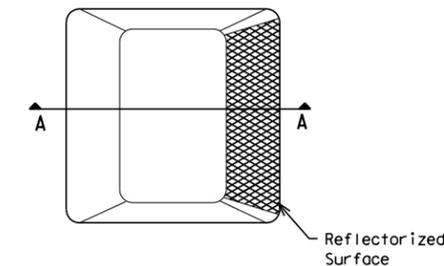
Profile markings shall not be placed on roadways with a posted speed limit of 45 MPH or less.

GENERAL NOTES

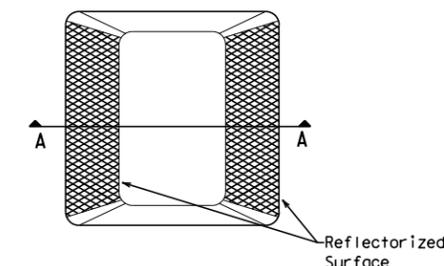
1. All raised pavement markers placed in broken lines shall be placed in line with and midway between the stripes.
2. On concrete pavements the raised pavement markers should be placed to one side of the longitudinal joints.

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

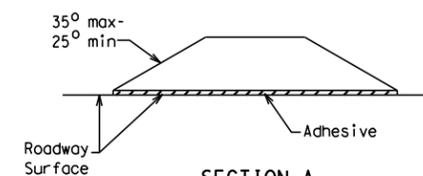
All pavement marking materials shall meet the required Departmental Material Specifications as specified by the plans.



Type I (Top View)



Type II (Top View)



SECTION A

RAISED PAVEMENT MARKERS

Texas Department of Transportation
Traffic Operations Division

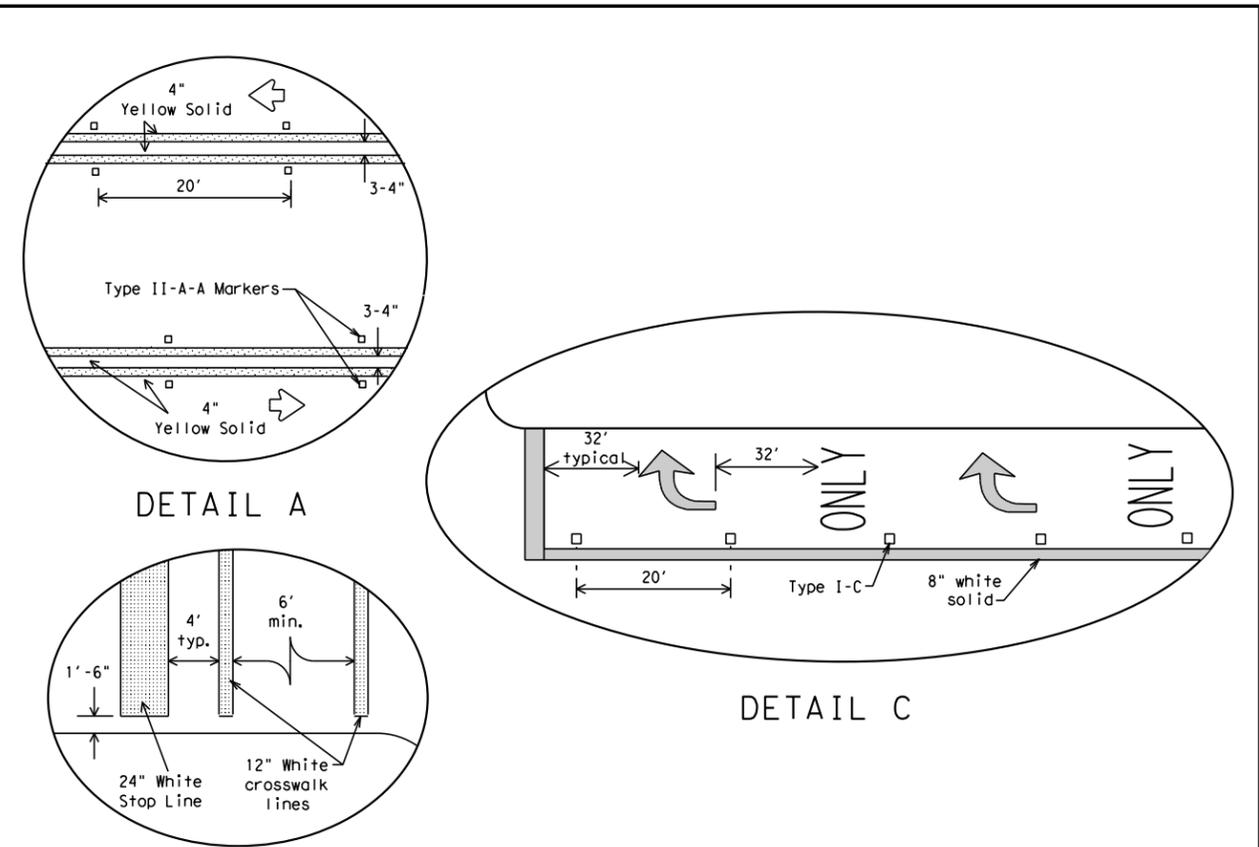
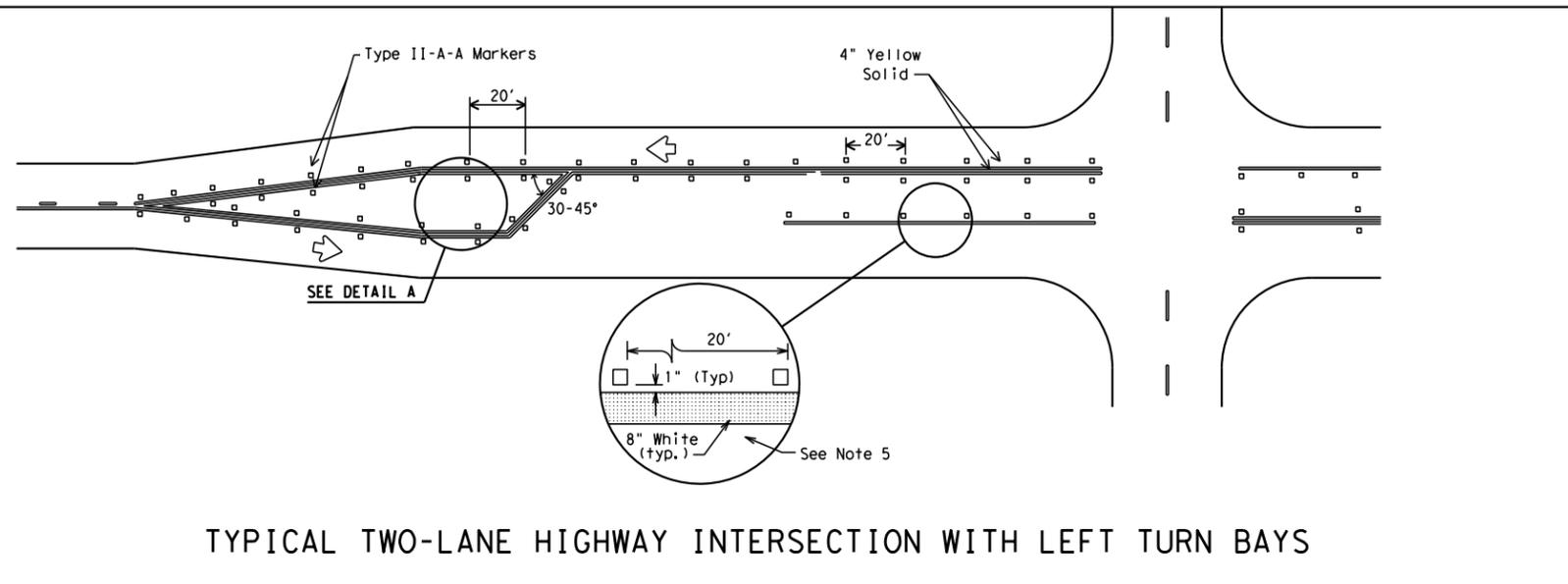
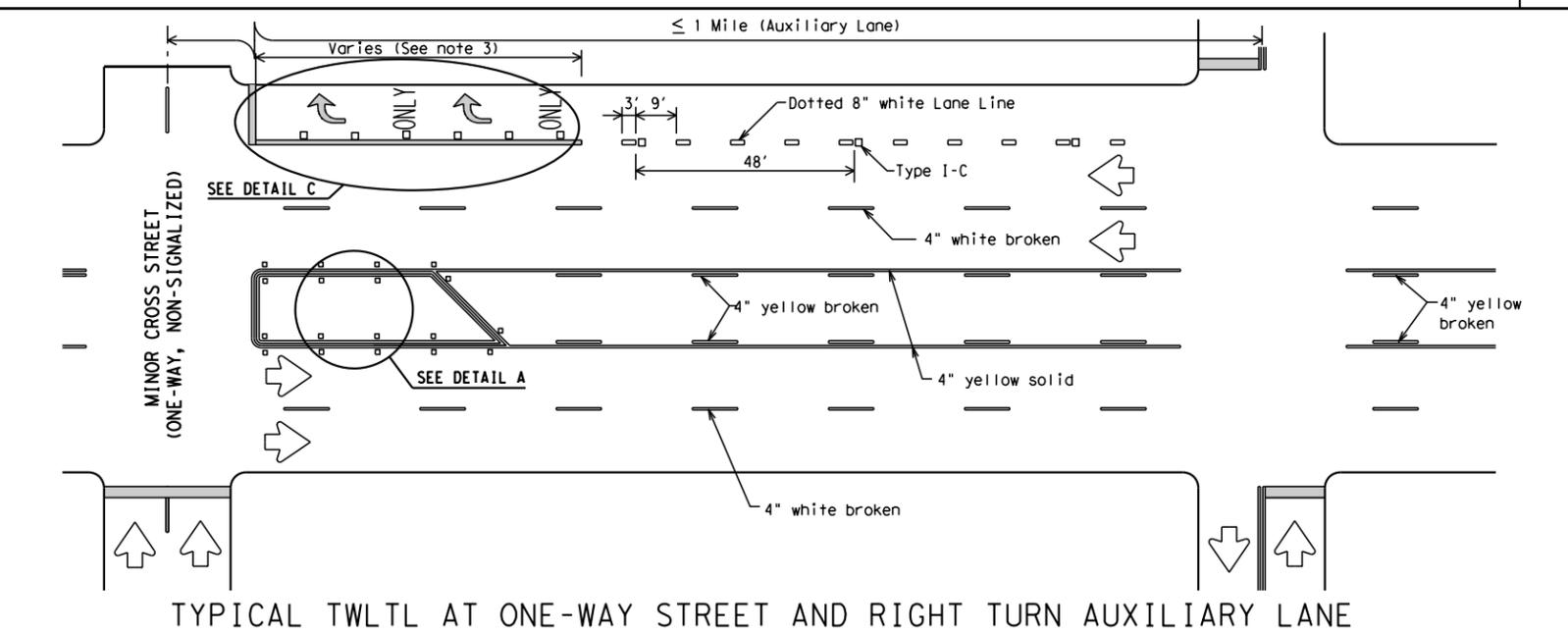
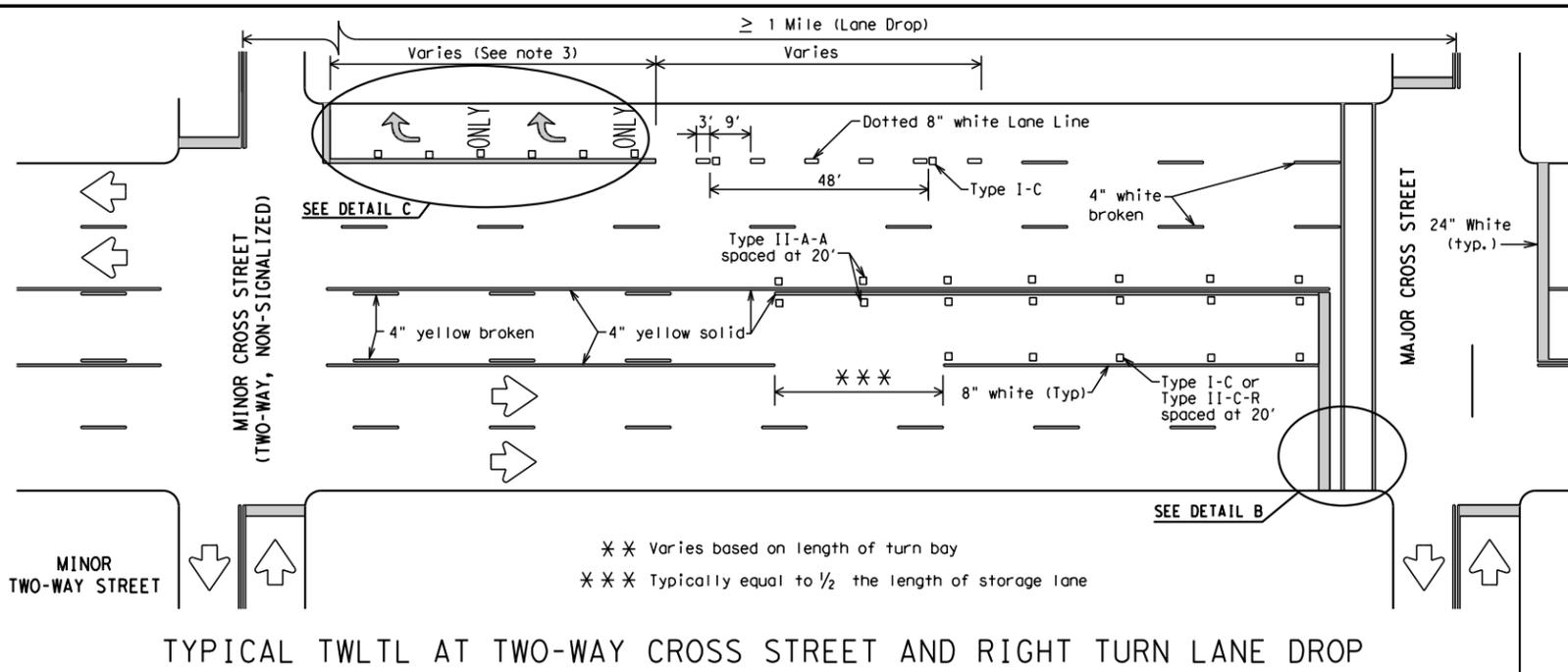
**POSITION GUIDANCE USING
RAISED MARKERS
REFLECTORIZED PROFILE
MARKINGS**

PM(2) - 12

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REVISIONS		CONT	SECT	JOB	HIGHWAY
4-92	2-10				BR
5-00	2-12				
8-00		DIST	COUNTY		SHEET NO.
2-08		HOU	GALVESTON		105

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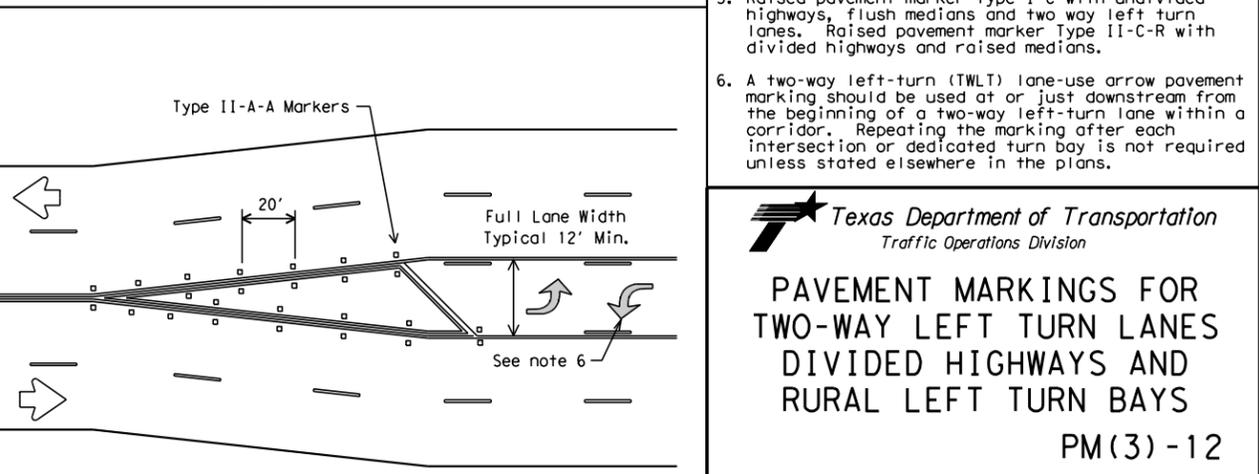


Final placement of Stop Bar and Crosswalk shall be approved by the Engineer in the field.

DETAIL B

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.



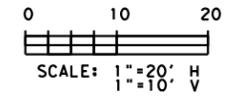
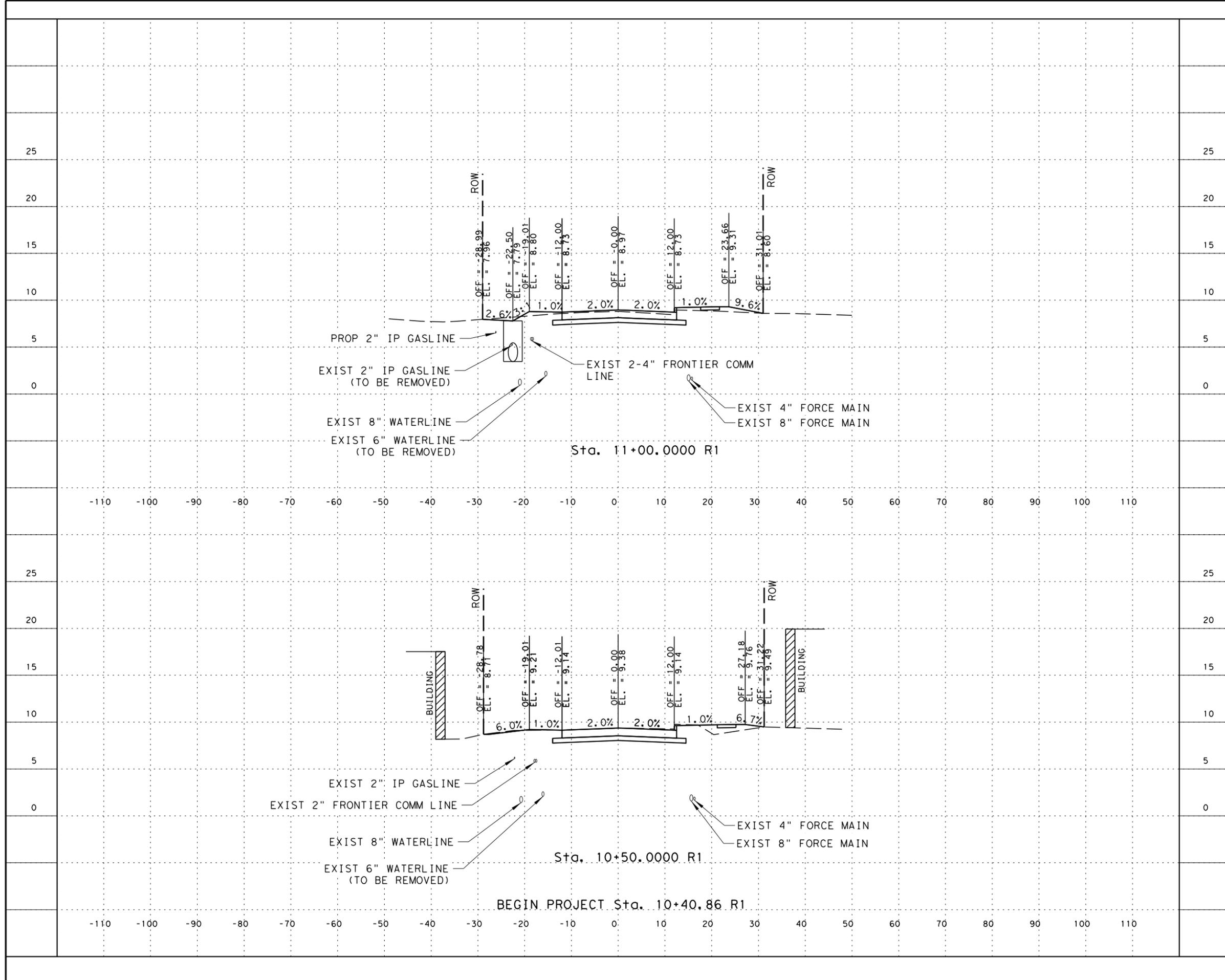
- GENERAL NOTES
- Refer elsewhere in plans for additional RPM placement and details.
 - Lane use word and arrow markings shall be used where through lanes approaching an intersection become mandatory turn lanes. Lane use word and arrow markings should be used in auxiliary lanes of substantial length. Lane use arrow markings or word and arrow markings may be used in other lanes and turn bays for emphasis. Details for words and arrows as shown in the Standard Highway Sign Designs for Texas.
 - When lane used word and arrow markings are used, two sets of arrows should be used if the length of the bay is greater than 180 feet. When a single lane use arrow or word and arrow marking is used for a short turn lane, it should be located at or near the upstream end of the full-width turn lane.
 - Other crosswalk patterns as shown in the "Texas Manual on Uniform Traffic Control Devices" may be used.
 - Raised pavement marker Type I-C with undivided highways, flush medians and two way left turn lanes. Raised pavement marker Type II-C-R with divided highways and raised medians.
 - A two-way left-turn (TWLTL) lane-use arrow pavement marking should be used at or just downstream from the beginning of a two-way left-turn lane within a corridor. Repeating the marking after each intersection or dedicated turn bay is not required unless stated elsewhere in the plans.

Texas Department of Transportation
Traffic Operations Division

PAVEMENT MARKINGS FOR
TWO-WAY LEFT TURN LANES
DIVIDED HIGHWAYS AND
RURAL LEFT TURN BAYS
PM(3)-12

© TxDOT April 1998		DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
REVISIONS		CONT	SECT	JOB	HIGHWAY
5-00	2-12				BR
8-00					
3-03					
2-10					
		DIST	COUNTY		SHEET NO.
		HOU	GALVESTON		106

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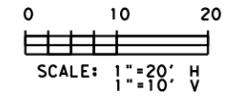
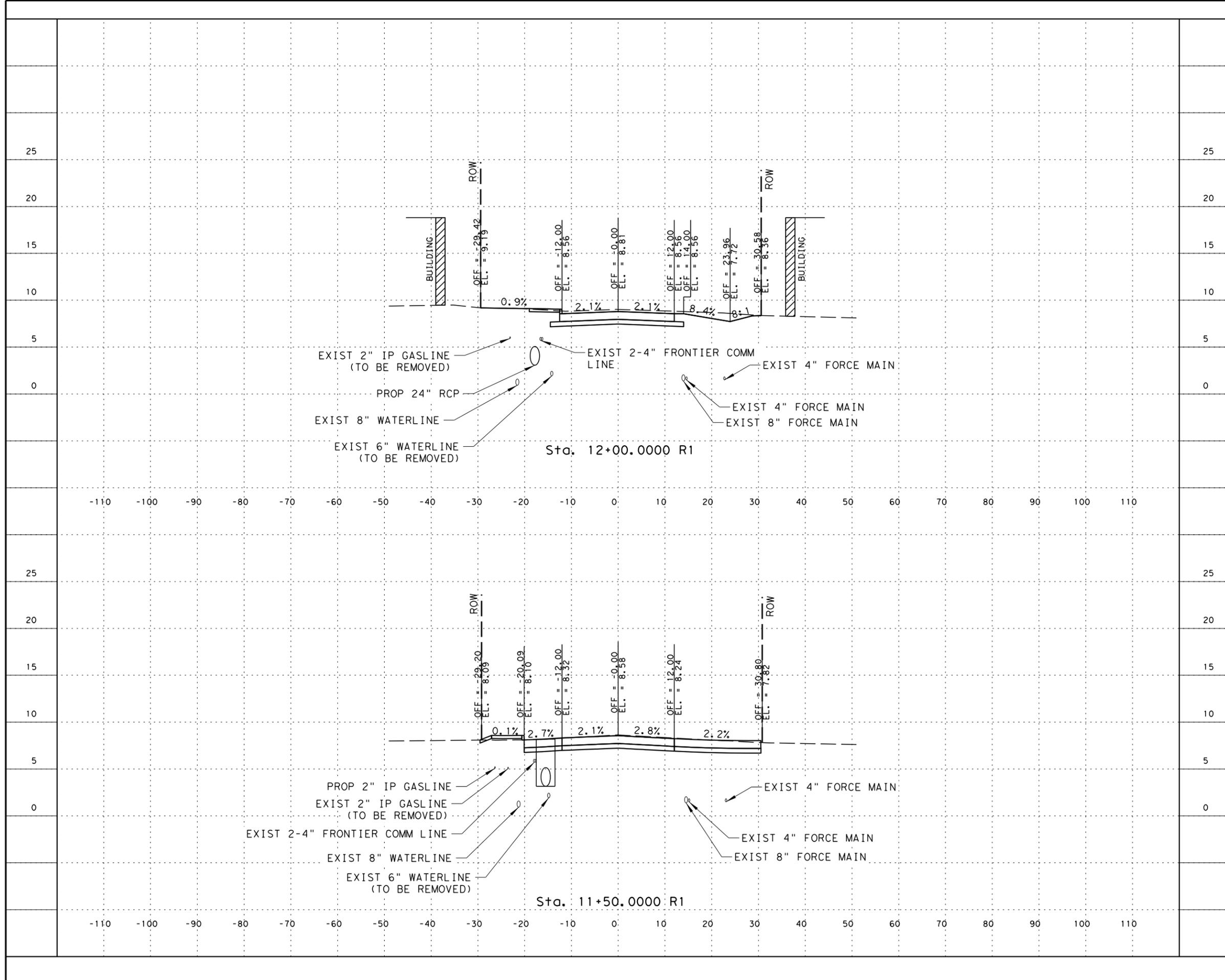
GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 PROPOSED CROSS SECTIONS
 BIRCH ROAD

SHEET 1 OF 5

Job No.:	Scale:	SHEET NO.
Date: January, 2020	HORZ:	
Drn By: ic	VERT:	NO. 107
Ckd By: ic		

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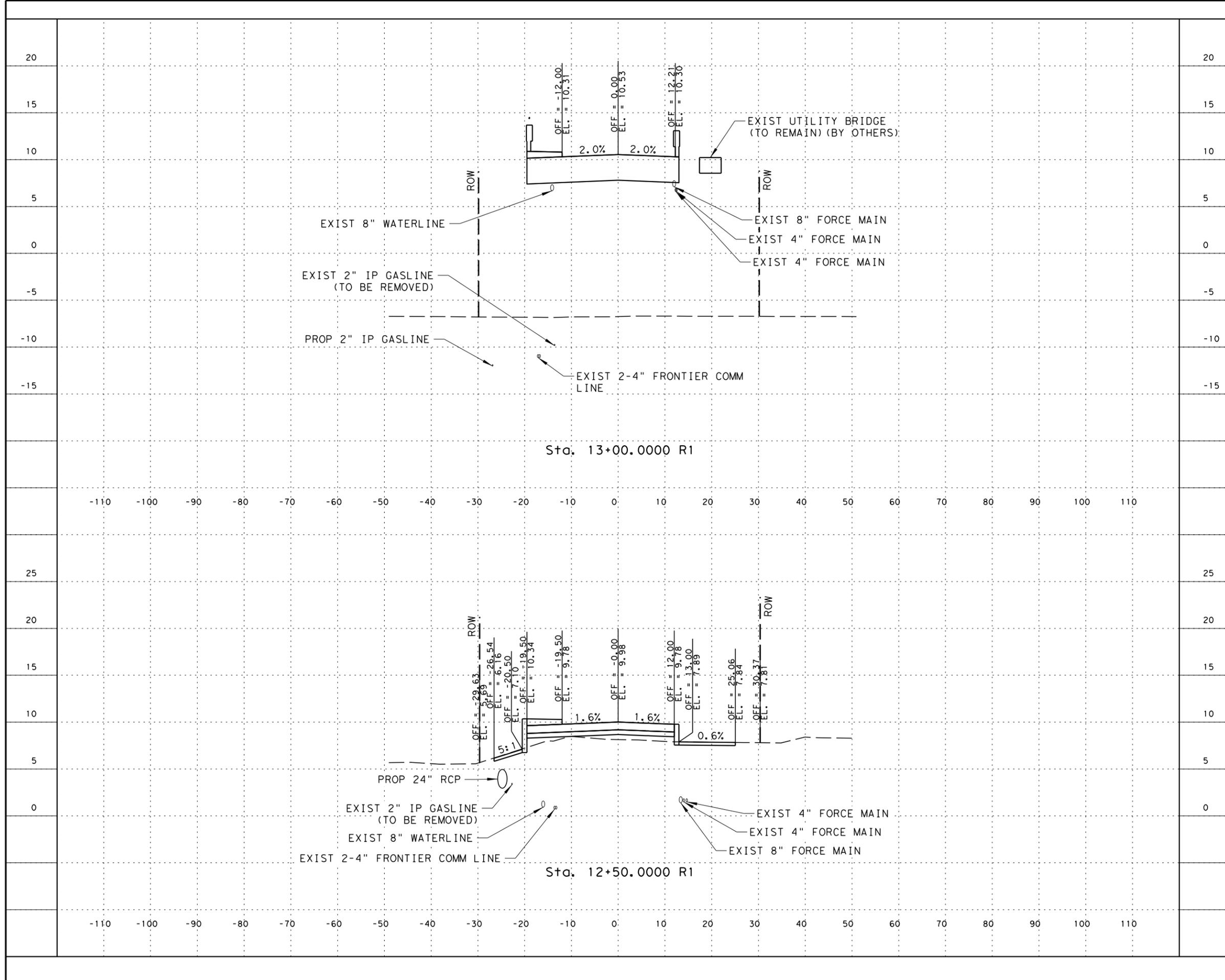
GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 PROPOSED CROSS SECTIONS
 BIRCH ROAD

SHEET 2 OF 5

Job No.:	Scale:	SHEET NO.
Date: January, 2020	HORZ:	
Drn By: ic	VERT:	NO. 108
Ckd By: ic		

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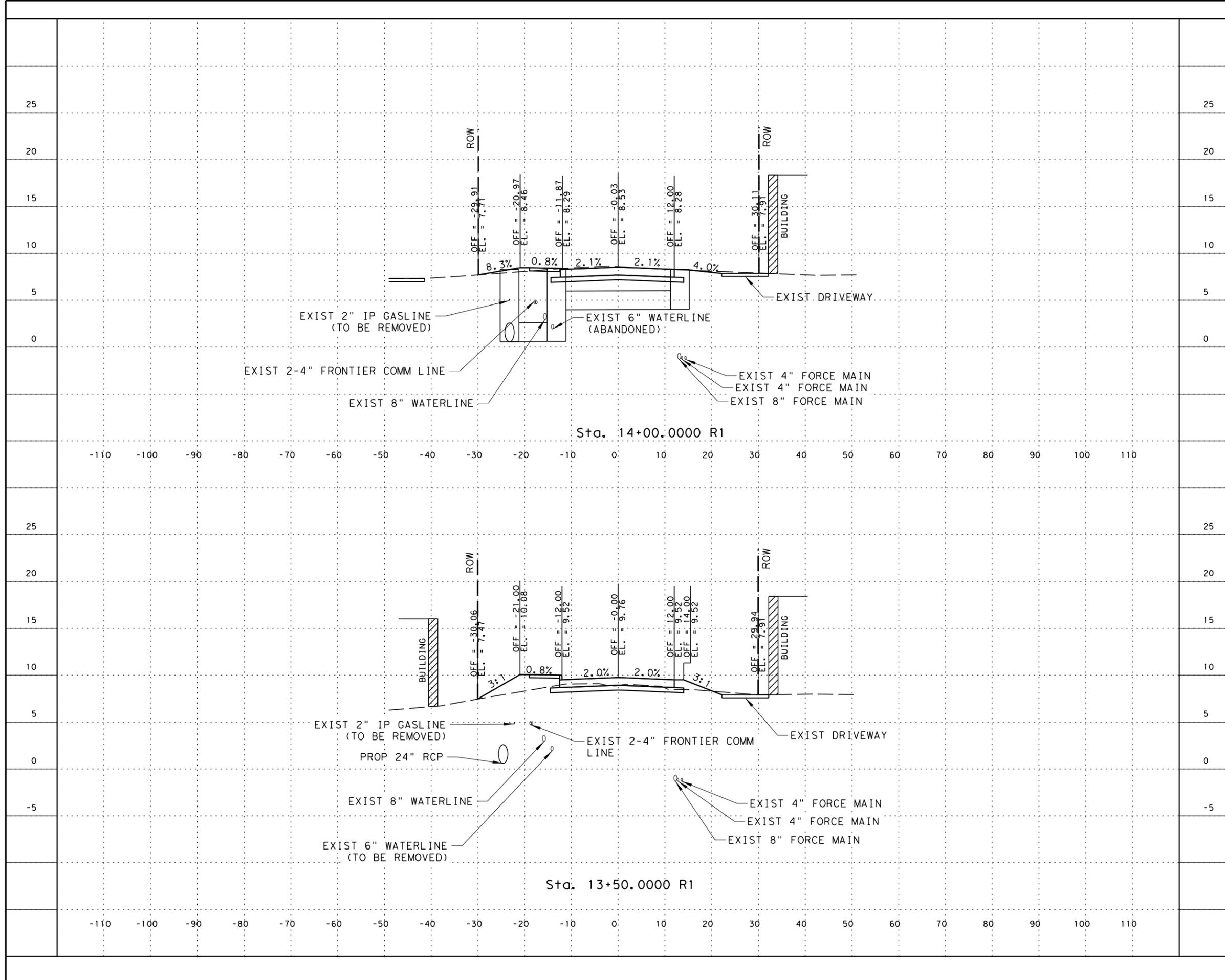
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BIRCH ROAD BRIDGE REPLACEMENT
 PROPOSED CROSS SECTIONS
 BIRCH ROAD

SHEET 3 OF 5

Job No.:	Scales:	SHEET NO.
Date: January, 2020	HORZ:	
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Ckd By: ic		

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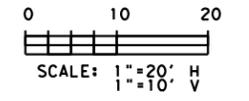
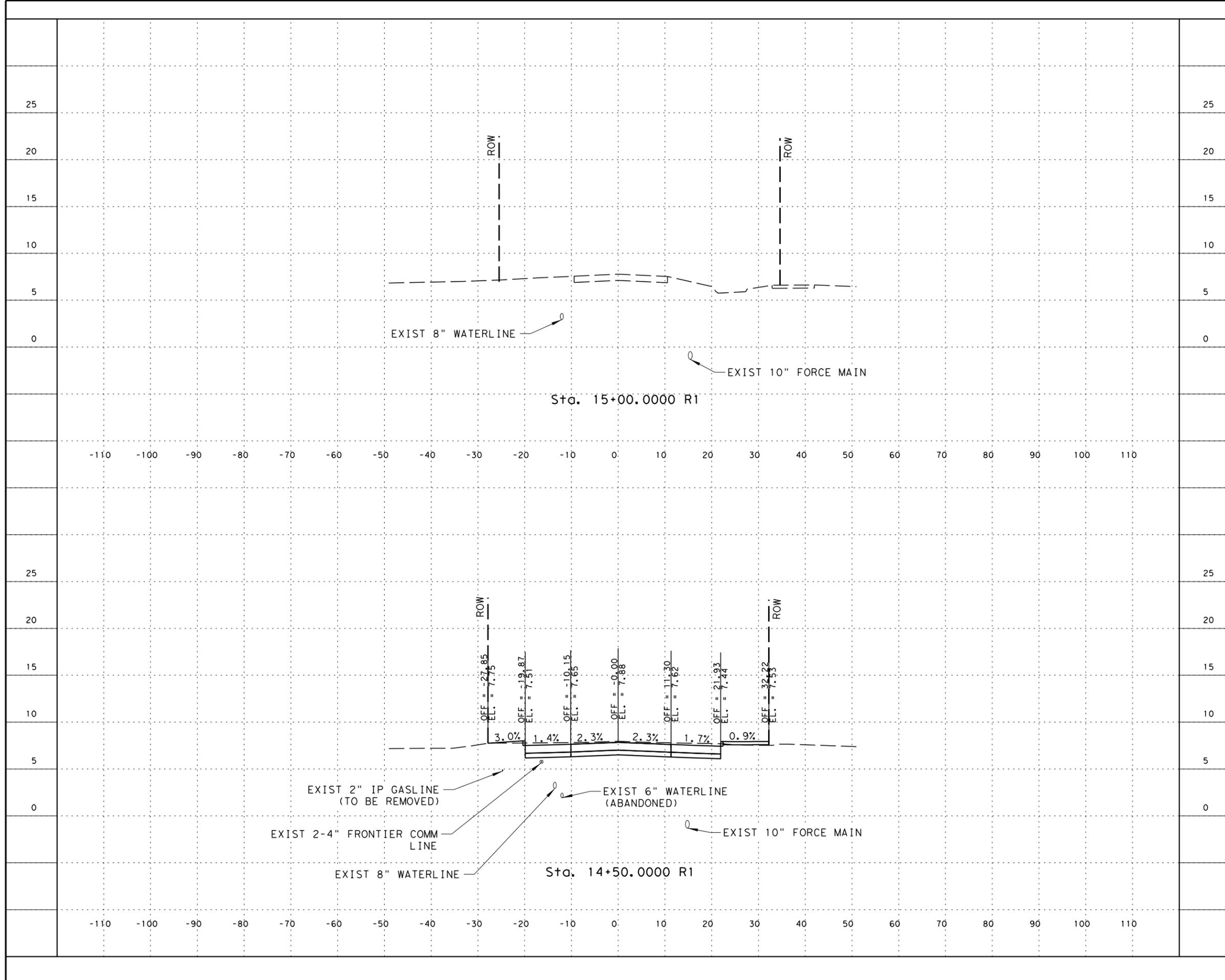
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GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
PROPOSED CROSS SECTIONS
BIRCH ROAD

Job No.:	Scale:	SHEET
Date: January, 2020	HORZ:	
Drn By: ic	VERT:	NO. 110
Ckd By: ic		

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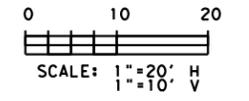
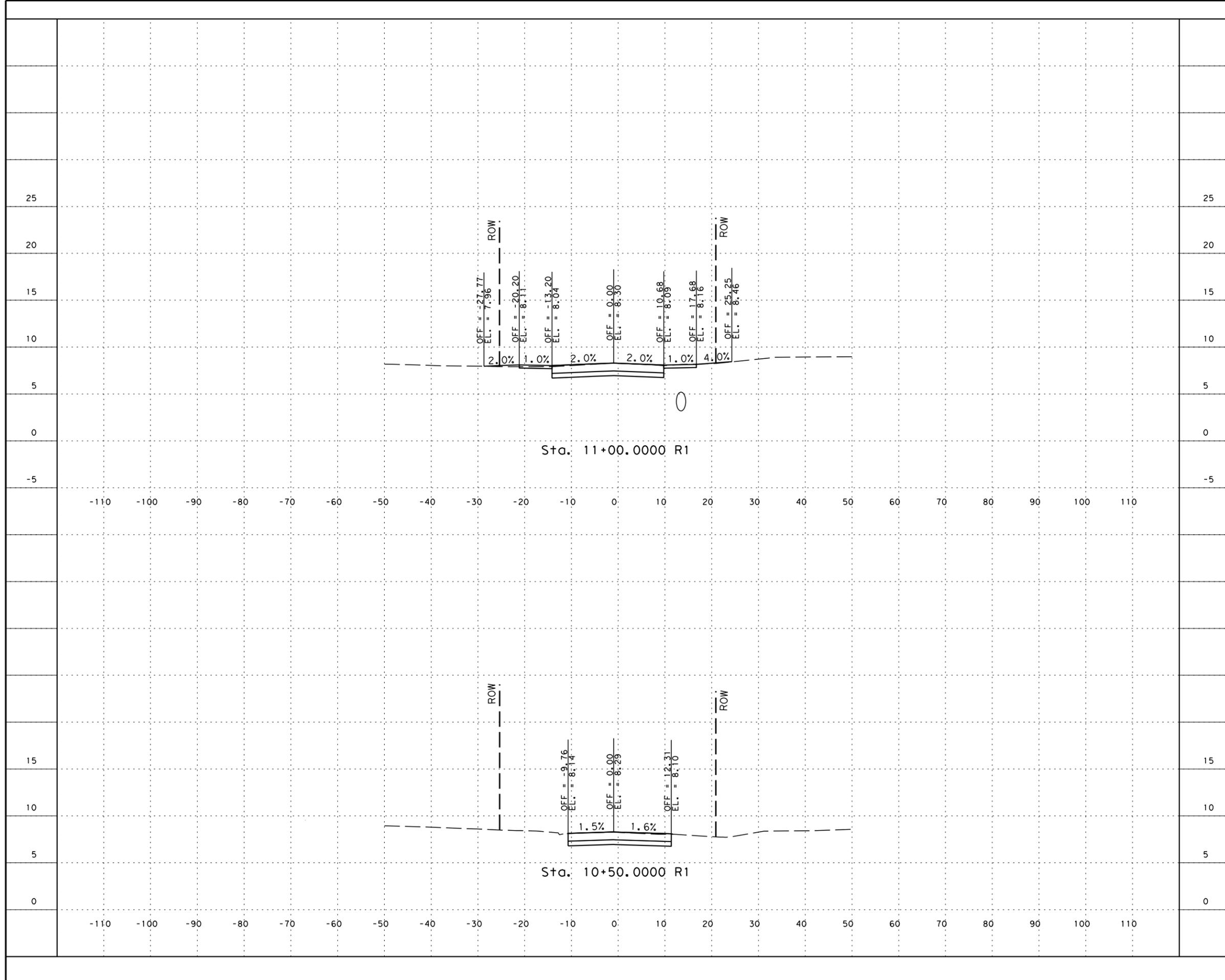
GALVESTON COUNTY, TEXAS

**BIRCH ROAD BRIDGE REPLACEMENT
 PROPOSED CROSS SECTIONS
 BIRCH ROAD**

SHEET 5 OF 5

Job No.:	Scale:	SHEET NO.
Date: January, 2020	HORZ:	
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Chk By: ic		

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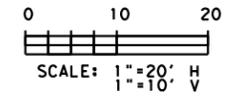
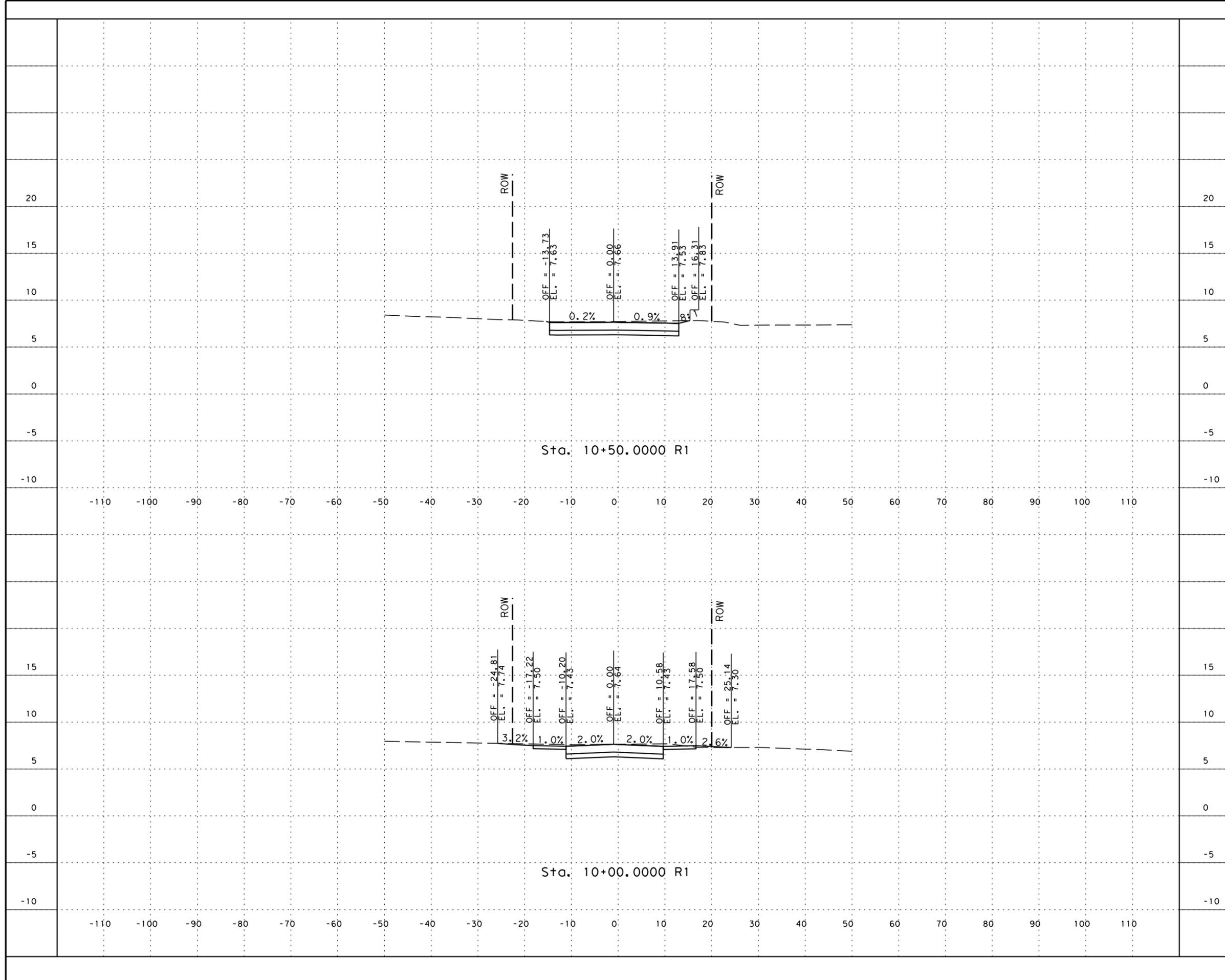


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 GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 PROPOSED CROSS SECTIONS
 HARBOR LANE
 SHEET 1 OF 1

Job No.:	Scale:	SHEET NO.
Date: January, 2020	HORZ:	
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Ckd By: ic		

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GALVESTON COUNTY, TEXAS

BIRCH ROAD BRIDGE REPLACEMENT
 PROPOSED CROSS SECTIONS
 LAZY LANE

SHEET 1 OF 1

Job No.:	Scale:	SHEET NO.
Date: January, 2020	HORZ:	
Drn By: ic	VERT:	NO. 113
Ckd By: ic		