Fort Bend County
Engineering Department
301 Jackson Suite 401
Richmond, Texas 77469
281.633.7500
Permits@fortbendcountytx.gov

REVIEW BY FORT BEND COUNTY COMMISSIONERS COURT

[X] **Right of Way Permit**

[ ] **Commercial Driveway Permit**

Permit No: 2016-10848

Applicant: **Harris Construction Company, LTD.**

Job Location Site: **1380 Benton Road, Richmond, TX 77469**

Bond No. [redacted] **Date of Bond:** **1/29/2001** **Amount:** **$50,000.00**

The above applicant came to make use of certain Fort Bend County property subject to, "The Order Regulating the Laying, Construction, Maintenance, and Repair of Buried Cables, Conduits, and Pole Lines, In, Under, Across or Along Roads, Streets, Highways, and Drainage Ditches in Fort Bend County, Texas, Under the Jurisdiction of the Commissioners Court of Fort Bend County, Texas," as passed by the Commissioners Court of Fort Bend County, Texas, of the Minutes of the Commissioners Court of Fort Bend County, Texas, to the extent that such order is not inconsistant with Chapter 181, Vernon's Texas Statutes and Codes Annoted.

Notes:

1. Evidence of review by the Commissioners Court must be kept on the job site and failure to do so constitutes grounds for job shutdown.
2. Written notices are required:
   a. 48 hours in advance of construction start up, and
   b. When construction is completed and ready for final inspection, submit notification to Permit Administrator thru MyGovernmentOnline.org portal.
3. This permit expires one (1) year from date of permit if construction has not commenced.

On this 3rd day of January, 2017, Upon Motion of Commissioner Meyers, seconded by Commissioner Patterson, duly put and carried, it is ORDERED, ADJUDGED AND DECREED that said notice of said above purpose is hereby acknowledged by the Commissioners Court of Fort Bend County, Texas, and that said notice be placed on record according to the regulation order thereof.

Signature

By: Charles O. Dy
for County Engineer

By: Mark Vogler
Drainage District Engineer/Manager

Presented to Commissioners Court and approved.

Date Recorded 1-10-17 Comm. Court No. 18C

Clerk of Commissioners Court

By: Linda Wilkes
Deputy

Fort Bend County
Engineering Department
301 Jackson Suite 401
Richmond, Texas 77469
281.633.7500
Permits@fortbendcountytx.gov

PERMIT APPLICATION REVIEW FORM FOR CABLE, CONDUIT, AND POLE LINE ACTIVITY IN FORT BEND COUNTY

[X] **Right of Way Permit**

[ ] **Commercial Driveway Permit**

Permit No: 2016-10848

The following "Notice of Proposed Cable, Conduit, and/or Pole Line activity in Fort Bend County" and accompanying attachments have been reviewed and the notice conforms to appropriate regulations set by Commissioner's Court of Fort Bend County, Texas.

(1) COMPLETE APPLICATION FORM:

- [X] a. Name of road, street, and/or drainage ditch affected.
- [X] b. Vicinity map showing course of directions
- [X] c. Plans and specifications

(2) BOND:

- [ ] County Attorney, approval when applicable.
- [X] Perpetual bond currently posted. Bond No: [redacted] Amount: $50,000.00
- [ ] Performance bond submitted. Bond No: Amount:
- [ ] Cashier's Check Check No: Amount:

(3) DRAINAGE DISTRICT APPROVAL (WHEN APPLICABLE):

Mark Vogt
Drainage District Approval

11/3/17
Date

We have reviewed this project and agree it meets minimum requirements.

Charles O. Dy
Permit Administrator

12/22/16
Date

LENNAR HOMES OF TEXAS LAND AND CONSTRUCTION, LTD.

ON BEHALF OF

FORT BEND COUNTY MUNICIPAL UTILITY DISTRICT NO. 152

PLANS

FOR CONSTRUCTION OF

PAVING

TO SERVE

BENTON ROAD STREET DEDICATION AND RESERVE

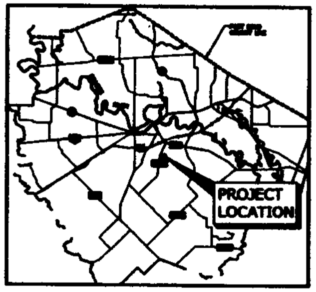
FORT BEND COUNTY, TEXAS

DESIGN JOB NO. 0371-157-00 CONTRACT NO. 1

RECEIVED NOV 17 2016 By KVT

APPROVED

ISSUED FOR CONSTRUCTION NOVEMBER 10, 2016



VICINITY MAP

SCALE: N.T.S.

LOCATION MAP

N.T.S.

[illegible]

[illegible]

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET WITH A "*" HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

J. C. K[illegible], P.E. 6/21/16

DATE

THE STANDARD SHEETS SPECIFICALLY IDENTIFIED ON THIS SHEET WITH A "**" HAVE BEEN SELECTED BY ME OR UNDER MY RESPONSIBLE SUPERVISION AS BEING APPLICABLE TO THIS PROJECT.

Jennifer T. Evans, P.E. 06/21/2016

JENNIFER T. EVANS, P.E.

DATE

FORT BEND COUNTY ENGINEER

ENGINEER: [illegible], P.E.

DATE: 11/9/16

THESE DRAWINGS ARE VOID IF CONSTRUCTION HAS NOT COMMENCED IN (1) YEAR FROM DATE OF APPROVAL.

APPROVED BY: [illegible]

DATE: 11/8/16

CONTRACTOR SHALL NOTIFY FORT BEND COUNTY AT [illegible]

CONTACTS:

CITY OF ROSENBERG UTILITY DEPARTMENT: [illegible]

CITY OF ROSENBERG ENGINEERING: [illegible]

FORT BEND COUNTY ENGINEERING: [illegible]

IDS Engineering Group

6/21/2016

SURVEYED BY: IDS SURVEYORS

CITY OF ROSENBERG

DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

JOHN MAESTAS, INTERIM CITY MANAGER 10/25/2016

CHARLES A. KALKOMEY, P.E., CITY ENGINEER

SHEET NO 1 OF 50 SHEETS

PAVING WALNUT CREEK BENTON RD. BRIDGE #1689

FORT BEND COUNTY ENGINEERING DEPARTMENT

APPROVED: DEVELOPMENT COORDINATOR

DATE: 11/8/16

BRIAN D. GEROULD

108804

6/23/2016

IDS Engineering Group

June 2016

T.S.B.

VERIFICATION OF PRIVATE UTILITY LINES

BENTON ROAD STREET DEDICATION AND RESERVE

CONSTRUCTION NOTES

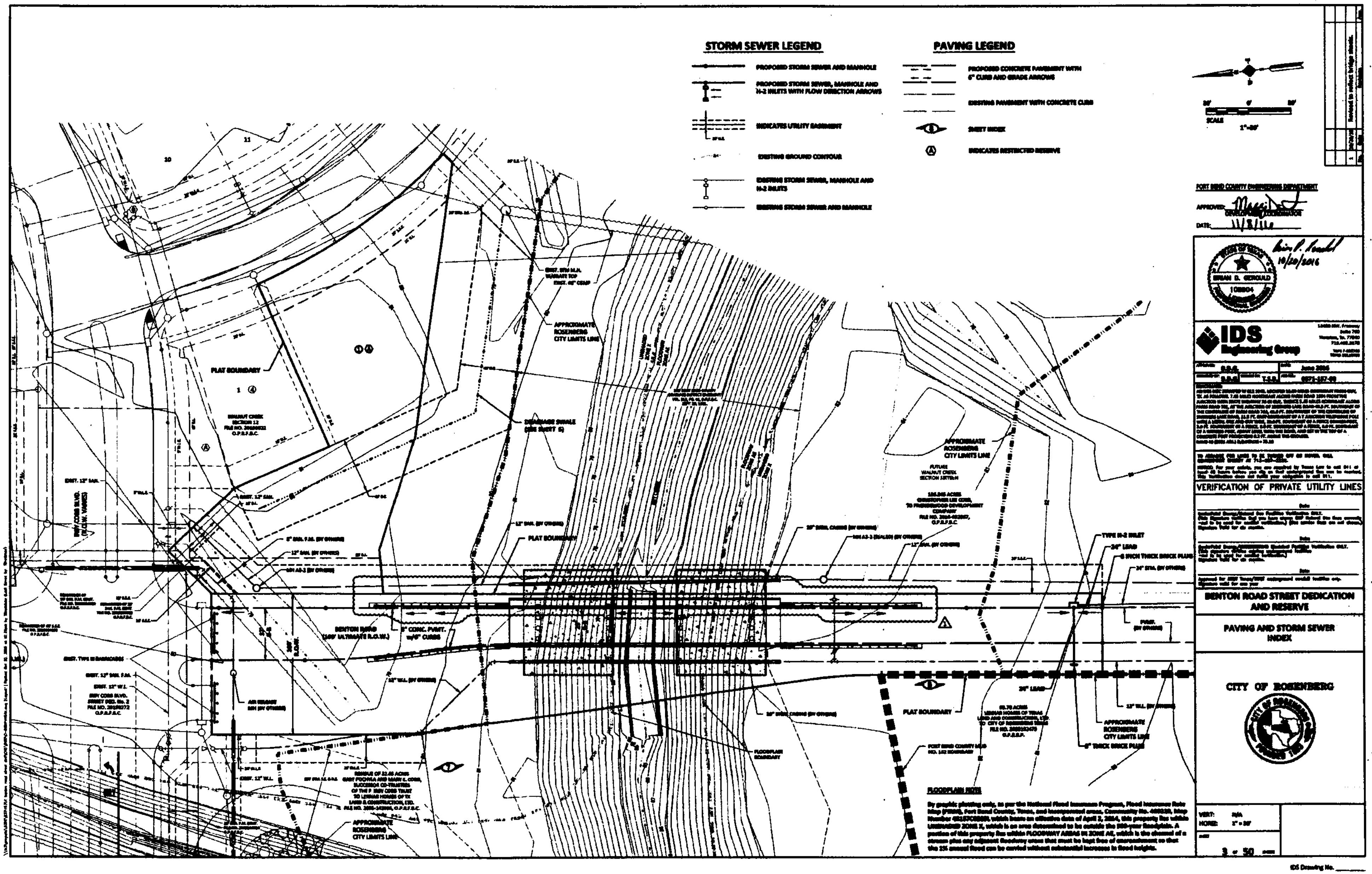
CITY OF ROSENBERG

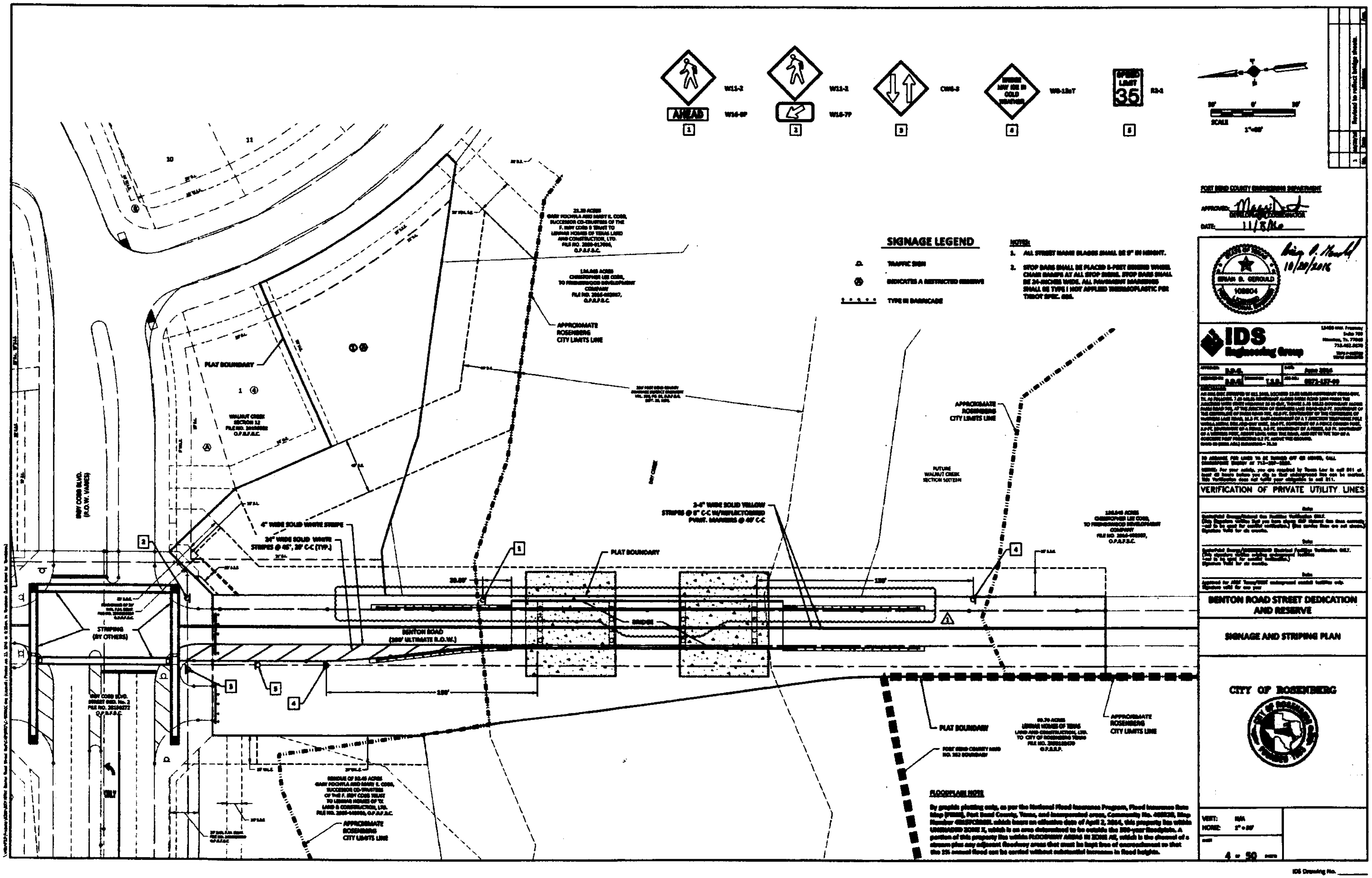
VERT: N/A

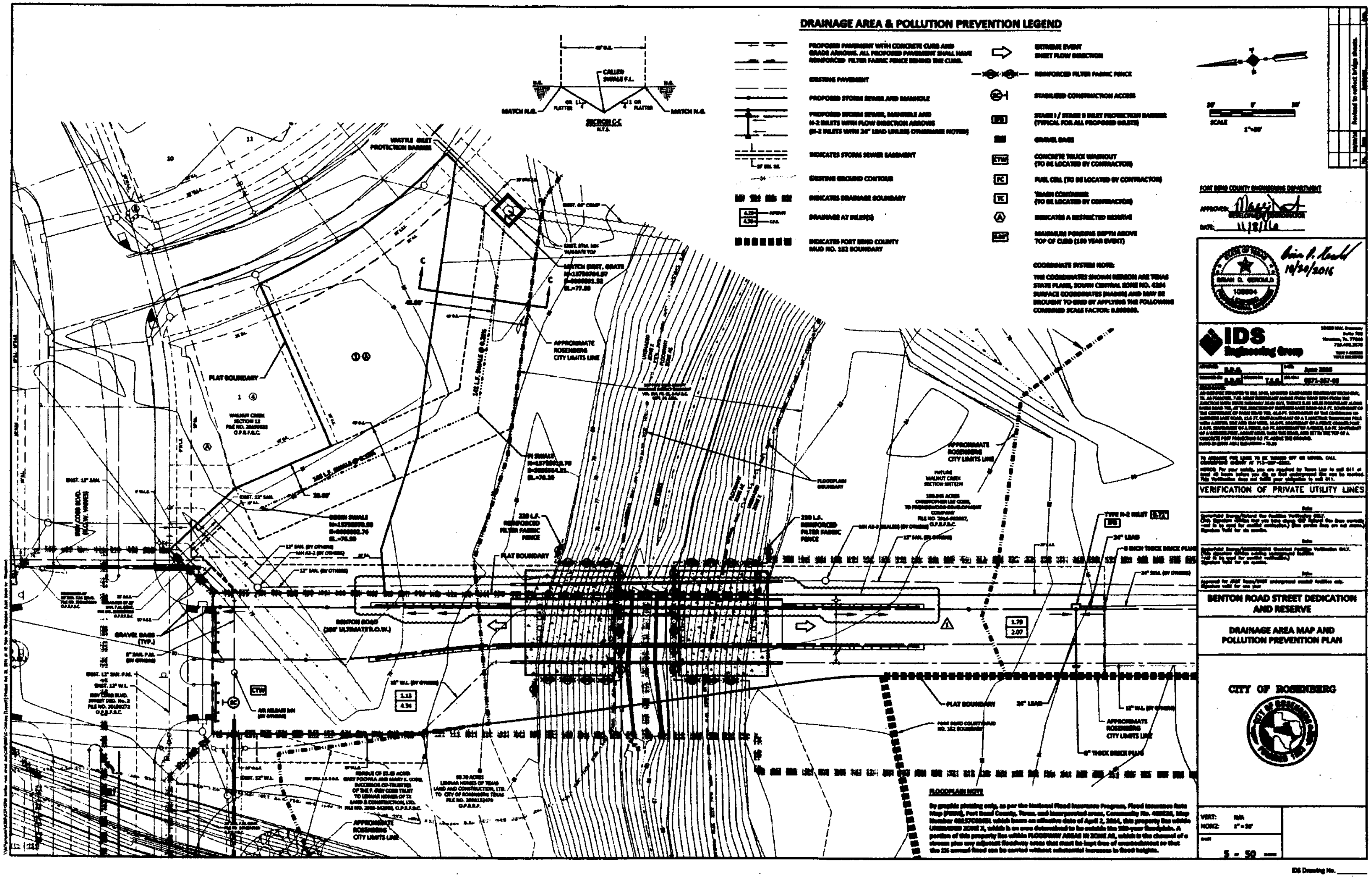
HORIZ:

2 of 50

IDS Drawing No. ________


STORM SEWER LEGEND
PROPOSED STORM SEWER AND MANHOLE
PROPOSED STORM SEWER, MANHOLE AND H-2 INLETS WITH FLOW DIRECTION ARROWS
INDICATES UTILITY EASEMENT
EXISTING GROUND CONTOUR
EXISTING STORM SEWER, MANHOLE AND H-2 INLETS
EXISTING STORM SEWER AND MANHOLE
PAVING LEGEND
PROPOSED CONCRETE PAVEMENT WITH 6" CURB AND GRADE ARROWS
EXISTING PAVEMENT WITH CONCRETE CURB
SHEET INDEX
INDICATES RESTRICTED RESERVE
SCALE 1"=30'
FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED:
DEVELOPMENT COORDINATOR
DATE: 11/8/16
BRIAN D. GEROULD
108904
10/20/2016
IDS Engineering Group
June 2016
VERIFICATION OF PRIVATE UTILITY LINES
BENTON ROAD STREET DEDICATION AND RESERVE
PAVING AND STORM SEWER INDEX
CITY OF ROSENBERG
VERT: N/A
HORIZ: 1" = 30'
3 of 50
IDS Drawing No.
PLAT BOUNDARY
WALNUT CREEK SECTION 12
APPROXIMATE ROSENBERG CITY LIMITS LINE
DRAINAGE SWALE
BENTON ROAD
6" CONC. PVMT. w/6" CURBS
TYPE H-2 INLET
24" LEAD
6 INCH THICK BRICK PLUG
FUTURE WALNUT CREEK SECTION SIXTEEN
FLOODPLAIN BOUNDARY
FLOODPLAIN NOTE


SIGNAGE LEGEND
TRAFFIC SIGN
INDICATES A RESTRICTED RESERVE
TYPE III BARRICADE
NOTES:
AHEAD
35
APPROXIMATE ROSENBERG CITY LIMITS LINE
PLAT BOUNDARY
STRIPING (BY OTHERS)
4" WIDE SOLID WHITE STRIPE
FUTURE WALNUT CREEK SECTION SIXTEEN
FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED:
DATE:
11/8/16
BRIAN B. GEROULD
108804
10/20/2016
IDS Engineering Group
VERIFICATION OF PRIVATE UTILITY LINES
BENTON ROAD STREET DEDICATION AND RESERVE
SIGNAGE AND STRIPING PLAN
CITY OF ROSENBERG
FLOODPLAIN NOTE
VERT: N/A
4 - 50
IDS Drawing No.


DRAINAGE AREA & POLLUTION PREVENTION LEGEND
EXISTING PAVEMENT
PROPOSED STORM SEWER AND MANHOLE
INDICATES STORM SEWER EASEMENT
EXISTING GROUND CONTOUR
INDICATES DRAINAGE BOUNDARY
DRAINAGE AT INLET(S)
EXTREME EVENT
SHEET FLOW DIRECTION
REINFORCED FILTER FABRIC FENCE
STABILIZED CONSTRUCTION ACCESS
GRAVEL BAGS
CONCRETE TRUCK WASHOUT
(TO BE LOCATED BY CONTRACTOR)
FUEL CELL (TO BE LOCATED BY CONTRACTOR)
INDICATES A RESTRICTED RESERVE
MAXIMUM PONDING DEPTH ABOVE
TOP OF CURB (100 YEAR EVENT)
COORDINATE SYSTEM NOTE:
SECTION C-C
N.T.S.
MATCH N.G.
WATTLE INLET PROTECTION BARRIER
PLAT BOUNDARY
WALNUT CREEK SECTION 12
APPROXIMATE ROSENBERG CITY LIMITS LINE
FLOODPLAIN BOUNDARY
220 L.F. REINFORCED FILTER FABRIC FENCE
BENTON ROAD
GRAVEL BAGS (TYP.)
CTW
1.13
4.34
1.79
2.07
24" LEAD
8 INCH THICK BRICK PLUG
FLOODPLAIN NOTE
FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED:
DATE: 11/18/16
BRIAN D. GEROULD
108804
10/20/2016
IDS Engineering Group
June 2008
VERIFICATION OF PRIVATE UTILITY LINES
BENTON ROAD STREET DEDICATION AND RESERVE
DRAINAGE AREA MAP AND POLLUTION PREVENTION PLAN
CITY OF ROSENBERG
VERT: N/A
5 - 50
IDS Drawing No.

STORM SEWER CALCULATIONS
IDS ENGINEERING GROUP

CLIENT: Lennar Homes of Texas Land and Construction
PROJECT: Benton Road Street Dedication and Reserve
IDS JOB NO: 1278-039-00
DATE ISSUED: 5/23/2016
DATE LAST MODIFIED: 4/19/2016 BY: BDG

STORM EVENT FREQUENCY: 2 YEAR
SELECT CURVE NUMBER: 4 CURVE NUMBER 4 - SINGLE-FAMILY RESIDENTIAL AREA
LAND USE SFR (< ½ ac. lots)
ENTER 25 YEAR WSEL: 75.40 FEET
STARTING TIME OF CONCENTRATION 10.00 MINUTES
DESIGN CURB HEIGHT 4.00 INCHES

WALNUT CREEK SECTION 16	I	plug	5	80	84	RCP	0.08%	34.00	1.00	34.08	22.8	34.12	2.15	40.17	3.08	0.030%	0.01	0.07	79.85	75.88	75.80	-0.75	66.15	66.14	3.44
WALNUT CREEK SECTION 16	I	5	4	70	72	RCP	0.04%		1.00	67.45	24.1	67.62	2.39	85.75	3.08	0.029%	0.02	0.05	79.80	75.80	75.73		67.39	67.36	3.07
WALNUT CREEK SECTION 16	I	4	3	100	72	RCP	0.04%	1.53	1.00	[illegible]	24.6	[illegible]	2.44	85.75	3.08	0.027%	0.04	0.05	79.50	75.73	75.64		67.36	67.29	3.54
WALNUT CREEK SECTION 16	I	3	2	135	72	RCP	0.04%		1.00	[illegible]	25.7	[illegible]	2.44	85.75	3.03	0.027%	0.04	0.05	80.00	75.64	75.58		67.29	67.24	4.00
WALNUT CREEK SECTION 16	I	2	1	145	72	RCP	0.04%	1.19	1.00	70.08	28.6	70.08	2.48	85.75	3.08	0.027%	0.04	0.05	78.00	75.55	75.47	-0.50	67.24	67.18	3.11
WALNUT CREEK SECTION 16	I	1	OF	150	84	CMP	0.12%		1.00	70.08	27.8	70.08	1.82	119.87	3.11	0.041%	0.08	[illegible]	79.00	75.47	75.40		[illegible]	[illegible]	3.30
WALNUT CREEK SECTION 16	I	inlets	5h	90	24	RCP	0.19%	2.58	1.15	2.58	10.0	2.96	0.95	9.60	3.08	0.017%	0.02	0.01	80.05	76.62	76.60	2.15	74.75	74.59	3.19
WALNUT CREEK SECTION 16	I	5h	5g	325	24	RCP	0.19%		1.13	2.58	11.6	2.96	0.95	9.60	3.06	0.017%	0.06	0.01	80.75	76.59	76.52		72.44	71.82	3.62
WALNUT CREEK SECTION 16	I	5g	5f	80	30	RCP	0.13%	2.52	1.06	5.10	17.3	5.30	1.10	14.79	3.01	0.017%	0.01	0.01	79.86	76.52	76.50		71.25	71.25	3.09
WALNUT CREEK SECTION 16	I	5f	5e	100	30	RCP	0.13%		1.06	5.10	18.5	5.30	1.10	14.79	3.01	0.017%	0.05	0.01	80.65	76.50	76.46		71.25	71.04	3.82
WALNUT CREEK SECTION 16	I	5e	5d	75	30	RCP	0.13%		[illegible]	10.89	20.9	11.07	2.28	14.79	3.01	0.073%	0.05	0.07	80.10	76.46	76.34		71.04	70.94	3.30
WALNUT CREEK SECTION 16	I	5d	5c	135	30	RCP	0.13%	1.89	1.02	12.40	21.5	12.66	2.50	14.79	3.01	[illegible]	0.13	0.08	79.85	76.34	76.15		70.94	70.77	3.28
WALNUT CREEK SECTION 16	I	5c	5b	55	42	RCP	0.09%		1.01	21.80	22.4	21.90	2.28	30.16	3.14	0.047%	0.08	0.08	80.25	76.15	76.09		69.77	69.72	3.77
WALNUT CREEK SECTION 16	I	5b	5a	100	42	RCP	0.09%	1.89	1.01	22.59	23.2	22.79	2.37	30.16	3.14	0.051%	0.05	0.05	79.85	76.09	75.99		69.72	69.63	3.43
WALNUT CREEK SECTION 16	I	5a	5	205	42	RCP	0.09%	0.46	1.00	23.46	23.9	23.56	2.45	30.16	3.14	[illegible]	0.14	0.05	79.86	75.99	75.80	-0.80	69.63	69.39	3.52
WALNUT CREEK SECTION 16	I	inlets	5e-3	380	24	RCP	0.19%	3.17	1.15	3.17	10.0	3.66	1.16	9.60	3.06	[illegible]	0.00	0.02	80.05	76.89	76.77	2.00	74.75	74.11	2.89
WALNUT CREEK SECTION 16	I	5e-3	5e-2	105	24	RCP	0.19%	2.58	1.08	5.70	15.2	6.18	1.96	9.60	3.08	0.074%	0.06	0.05	80.75	76.77	76.64		72.03	71.84	3.65
WALNUT CREEK SECTION 16	I	5e-2	5e-1	40	24	RCP	0.19%		1.07	5.70	16.0	6.18	1.96	9.60	3.08	0.074%	0.03	0.03	81.75	76.64	76.58		71.84	71.77	4.77
WALNUT CREEK SECTION 16	I	5e-1	5e	125	24	RCP	0.19%		1.06	5.70	16.9	6.18	1.96	9.60	3.06	0.074%	0.09	0.03	79.85	76.58	76.46		71.77	71.54	3.09
WALNUT CREEK SECTION 16	I	plug	5	50	36	RCP	0.11%	10.00	1.15	10.00	10.8	11.54	1.63	28.12	3.13	[illegible]	0.01	0.04	80.06	75.85	75.80		70.44	70.39	4.46
WALNUT CREEK SECTION 16	I	type E inlet	5c-6	30	24	RCP	0.19%	1.69	1.15	1.69	10.0	1.95	0.62	9.60	3.06	0.007%	0.00	0.01	80.36	76.44	76.43		72.59	72.53	3.60
WALNUT CREEK SECTION 16	I	5c-6	5c-5	85	24	RCP	0.19%	1.45	1.14	3.14	10.6	3.58	1.14	9.60	3.06	0.023%	0.02	0.02	79.96	76.43	76.39		72.03	71.87	3.18
WALNUT CREEK SECTION 16	I	5c-5	5c-4	26	24	RCP	0.19%		1.12	3.14	12.0	3.58	1.14	9.60	3.06	0.023%	0.01	0.01	80.36	76.39	76.38		71.87	71.80	3.62
WALNUT CREEK SECTION 16	I	5c-4	5c-3	15	24	RCP	0.19%		1.11	4.93	12.4	5.80	1.75	9.60	3.06	[illegible]	0.01	0.04	79.90	76.38	76.33		71.80	71.80	3.19
WALNUT CREEK SECTION 16	I	5c-3	5c-2	160	30	RCP	0.13%	0.70	1.11	5.63	12.6	6.26	1.28	14.79	3.01	0.023%	0.04	0.00	79.90	76.33	76.29		71.30	71.07	3.24
WALNUT CREEK SECTION 16	I	5c-2	5c-1	150	30	RCP	0.13%		1.06	5.63	14.9	6.28	1.28	14.79	3.01	0.023%	0.03	0.01	80.46	76.29	76.24		71.07	70.87	3.83
WALNUT CREEK SECTION 16	I	5c-1	5c	80	30	RCP	0.13%	3.58	1.06	9.18	16.9	9.76	1.99	14.79	3.01	0.057%	0.05	0.05	79.99	76.24	76.15		70.87	70.77	3.39
	I	inlets	5e-4	335	24	RCP	0.19%	1.79	1.15	1.79	10.0	2.07	0.66	9.60	3.06	0.009%	0.08	0.01	80.05	76.45	76.42	2.89	75.06	74.42	3.35

NOTES:
1. This spreadsheet has been developed using the Fort Bend County criteria outlined in the Drainage Criteria Manual for Fort Bend County, Texas. The Rational Method has been used to calculate flows, and Manning's Formula for pipes flowing full has been used to calculate velocities.
2. Minimum storm sewer grades as established in the City of Rosenberg design criteria have been used to establish the grades used in this system.
3. The minor loss calculation includes an entrance loss for the upstream inlet or a manhole in accordance with Fort Bend County criteria.
4. Where more than 2 storm sewer pipes connect to a manhole, additional minor loss calculations have been included for the change in velocity.
5. Design flow and velocity are based entirely on pipe grade and represent the condition when pipe is flowing full with the hydraulic grade line equal to the pipe grade, and are used to demonstrate that the pipe slopes used in the calculations conform to the City of Rosenberg minimum and maximum standards.

Pipe Material	Mannings "n" Value	Pipe Description
CLAY	0.012	Extra Strength Vitrified Clay Pipe
CMP	0.024	Corrugated Metal Pipe
CMPSI	0.013	CMP w/ Smooth Interior
HDPE	0.010	High Density Polyethylene Pipe
PVC	0.013	Polyvinyl Chloride Pipe
RCA	0.013	Reinforced Concrete Arch Pipe
RCB	0.015	Reinforced Concrete Box Culvert
RCE	0.013	Reinforced Concrete Elliptical Pipe
RCP	0.013	Reinforced Concrete Pipe

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: Macy D. [signature] DEVELOPMENT COORDINATOR
DATE: 11/8/16

STATE OF TEXAS — BRIAN D. GERULD — 105804 — LICENSED PROFESSIONAL ENGINEER
Brian D. Gerould 6/23/2016

IDS Engineering Group

June 2016
6871-157-00

VERIFICATION OF PRIVATE UTILITY LINES

BENTON ROAD STREET DEDICATION AND RESERVE

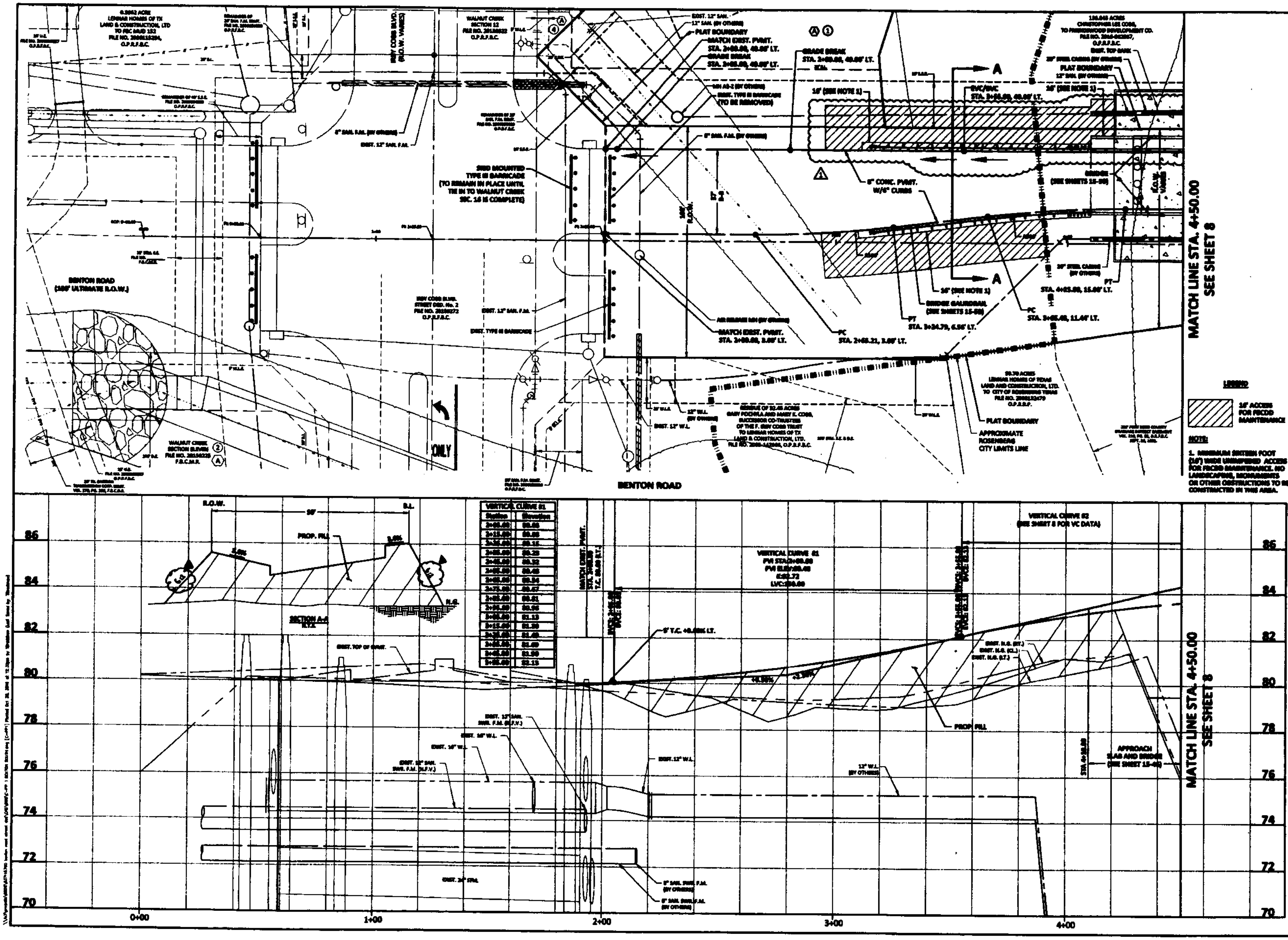
DRAINAGE CALCULATIONS

CITY OF ROSENBERG

VERT: N/A
HORIZ:

6 - 50

IDS Drawing No. ________


BENTON ROAD
(100' ULTIMATE R.O.W.)
MATCH LINE STA. 4+50.00
SEE SHEET 8
LEGEND
16' ACCESS FOR FBCDD MAINTENANCE
NOTE:
1. MINIMUM SIXTEEN FOOT (16') WIDE UNIMPEDED ACCESS FOR FBCDD MAINTENANCE. NO LANDSCAPING, MONUMENTS OR OTHER OBSTRUCTIONS TO BE CONSTRUCTED IN THIS AREA.
PLAT BOUNDARY
APPROXIMATE ROSENBERG CITY LIMITS LINE
SECTION A-A
PROP. FILL
VERTICAL CURVE #1
VERTICAL CURVE #2
(SEE SHEET 8 FOR VC DATA)
APPROACH SLAB AND BRIDGE
0+00
1+00
2+00
3+00
4+00
FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED:
DATE: 11/8/16
BRIAN D. GEROULD
108904
10/28/2016

IDS Engineering Group

DATE:	June 2016
DESIGNED BY: D.D.G.	T.S.D.
JOB NO.:	6971-157-00

VERIFICATION OF PRIVATE UTILITY LINES

BENTON ROAD STREET DEDICATION AND RESERVE

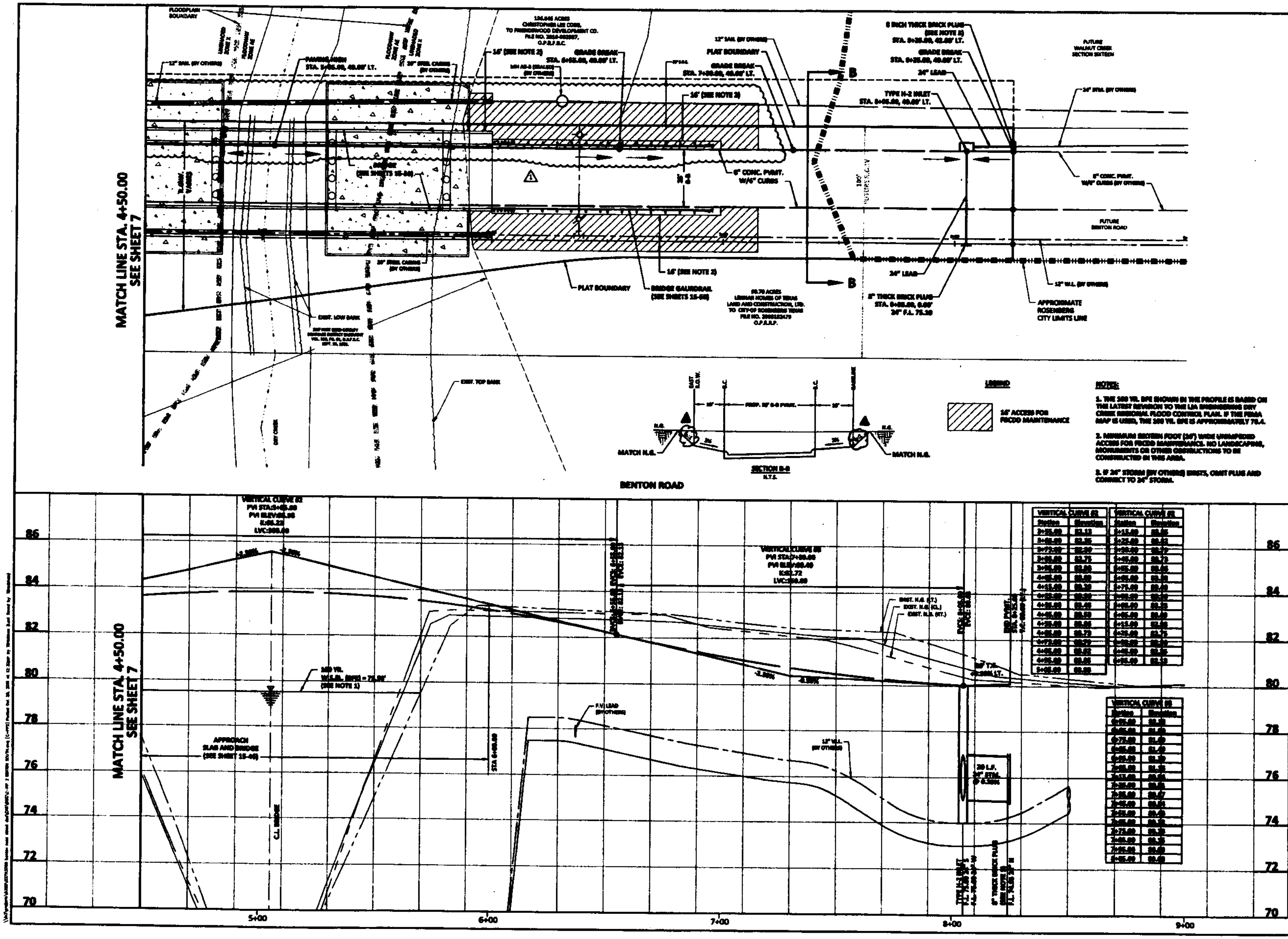
PLAN AND PROFILE - BENTON ROAD

CITY OF ROSENBERG

VERT: 1" = 2'
HORIZ: 1" = 20'

7 of 50

IDS Drawing No. ______



FORT BEND COUNTY ENGINEERING DEPARTMENT

APPROVED: DEVELOPMENT COORDINATOR

DATE: 11/8/16

BRIAN D. GEROULD
108804
10/20/2016

IDS Engineering Group

DATE: June 2016

T.S.B.

VERIFICATION OF PRIVATE UTILITY LINES

BENTON ROAD STREET DEDICATION AND RESERVE

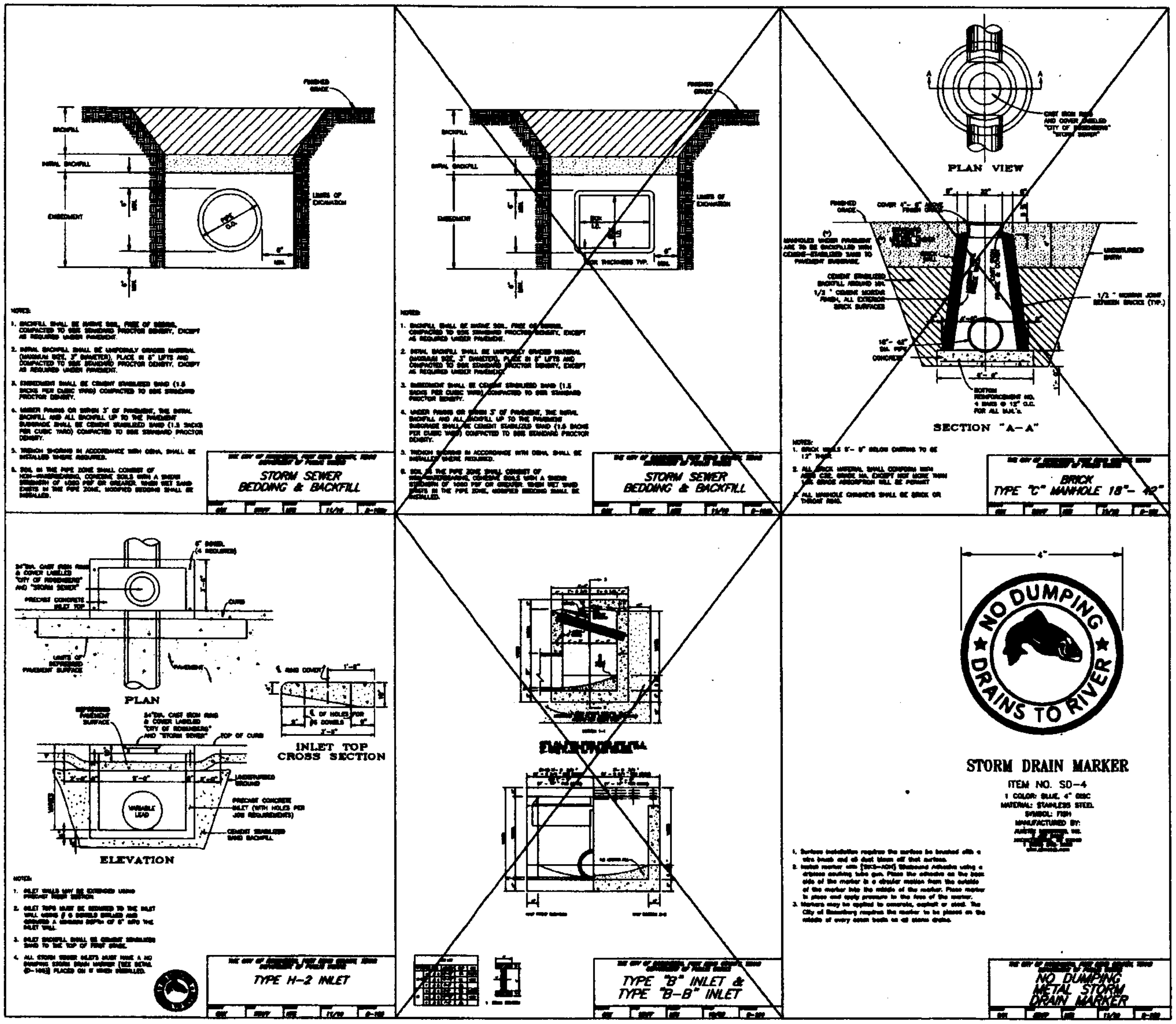
PLAN AND PROFILE - BENTON ROAD

CITY OF ROSENBERG

VERT: 1" = 2'
HORIZ: 1" = 20'

8 of 50

IDS Drawing No. ______



FORT BEND COUNTY ENGINEERING DEPARTMENT

APPROVED: DEVELOPMENT COORDINATOR

DATE: 11/9/16

BRIAN D. GEROULD 108804

6/23/2016

IDS Engineering Group

APPROVED: B.D.G.	DATE: June 2016
DESIGNED BY: B.D.G. DRAWN BY: T.S.B.	JOB NO.: 6871-157-00

VERIFICATION OF PRIVATE UTILITY LINES

BENTON ROAD STREET DEDICATION AND RESERVE

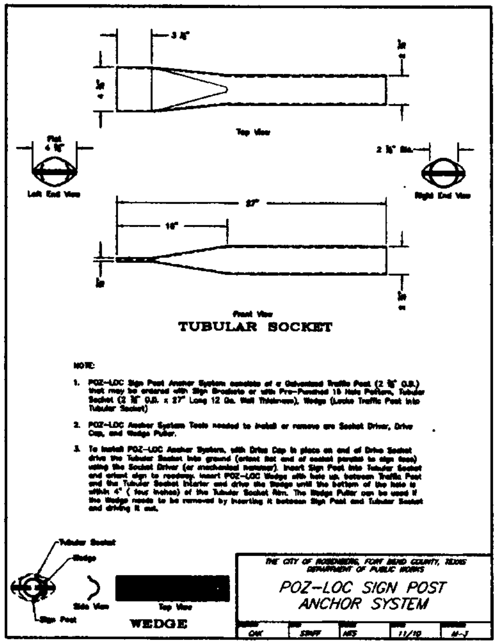
STORM SEWER DETAILS

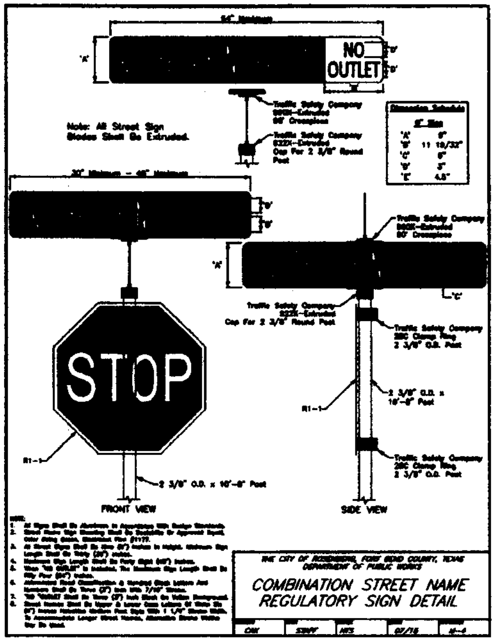
CITY OF ROSENBERG

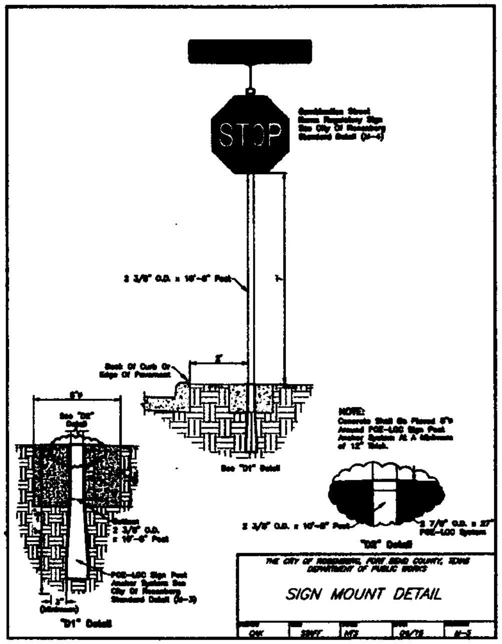
VERT: N/A
HORIZ:

SHEET 9 of 50

IDS Drawing No. ______







FORT BEND COUNTY ENGINEERING DEPARTMENT

APPROVED: DEVELOPMENT COORDINATOR

DATE: 11/8/16

BRIAN D. GEROULD
108604

6/27/2016

IDS Engineering Group

APPROVED: B.D.G. DATE: June 2016

VERIFICATION OF PRIVATE UTILITY LINES

BENTON ROAD STREET DEDICATION AND RESERVE

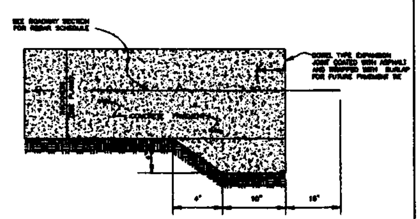
PAVING DETAILS

CITY OF ROSENBERG

VERT: N/A
HORIZ:

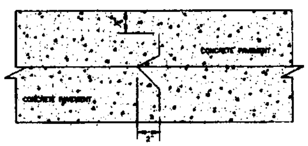
SHEET 10 of 50

IDS Drawing No. ______

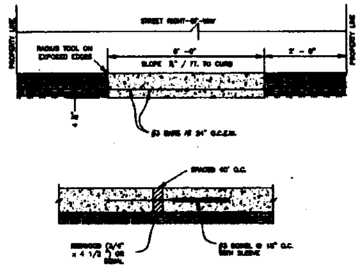


THE CITY OF ROSENBERG, FORT BEND COUNTY, TEXAS
DEPARTMENT OF PUBLIC WORKS

PAVEMENT HEADER

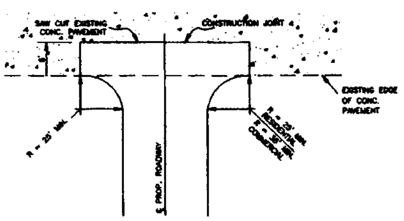


DEFORMED METAL STRIP



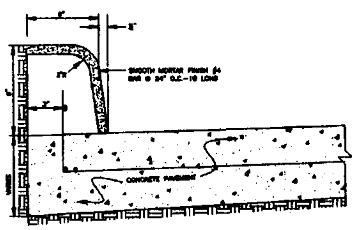
EXPANSION JOINT

CONCRETE SIDEWALK



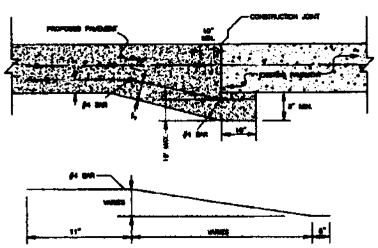
PROVIDE A MINIMUM OF 10" OF REINFORCING STEEL OVERLAP.

METROPOLITAN INTERSECTION



NOTES:

CONCRETE CURB



UNDERCUT BAR LAYOUT

PAVEMENT UNDERCUT

FORT BEND COUNTY ENGINEERING DEPARTMENT

APPROVED: [signature]

DATE: 11/8/16

BRIAN D. GEROULD
108804

6/23/2016

IDS Engineering Group

June 2016

VERIFICATION OF PRIVATE UTILITY LINES

BENTON ROAD STREET DEDICATION AND RESERVE

PAVING DETAILS

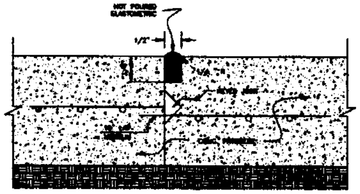
CITY OF ROSENBERG

VERT: N/A
HORIZ:

11 - 50

IDS Drawing No. ________

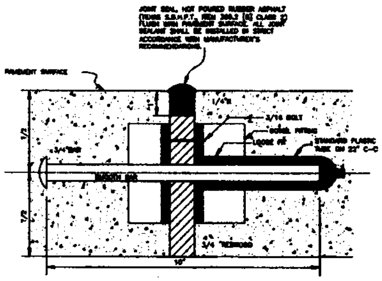
JOINT SEAL, HOT POURED RUBBER ASPHALT (TEXAS S.D.H.P.T., ITEM 369.2 (B) CLASS 2) FLUSH WITH PAVEMENT SURFACE. ALL JOINT SEALANT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.



THE CITY OF ROSENBERG, FORT BEND COUNTY, TEXAS
DEPARTMENT OF PUBLIC WORKS

CONSTRUCTION JOINT

JOINT SEAL, HOT POURED RUBBER ASPHALT (TEXAS S.D.H.P.T., ITEM 369.2 (B) CLASS 2) FLUSH WITH PAVEMENT SURFACE. ALL JOINT SEALANT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

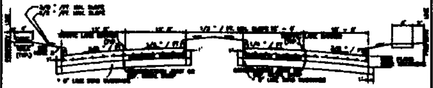


NOTES:

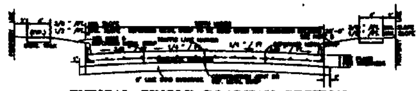
1. EXPANSION JOINT TO BE PLACED AT THE END OF EACH CURB RADIUS AND SPACED A MAXIMUM OF 60'-0" APART.
2. STAKES FOR TRANSVERSE JOINTS SHALL NOT BE PLACED CLOSER THAN 6" TO A LONGITUDINAL JOINT. THE TOP OF EACH STAKE SHALL NOT BE LESS THAN 1" BELOW THE FINISHED SURFACE.
3. ALTERNATIVE DOWEL IS A CANTILEVER TYPE, CAST MALLEABLE IRON LOAD TRANSMISSION UNIT, STAR-LUG, MODEL D-27, OR EQUAL, ON 22" C-C.

THE CITY OF ROSENBERG, FORT BEND COUNTY, TEXAS
DEPARTMENT OF PUBLIC WORKS

DOWEL TYPE EXPANSION JOINT



TYPICAL DOUBLE ROADWAY SECTION



TYPICAL SINGLE ROADWAY SECTION

MINIMUM REINFORCEMENT SCHEDULE

NOTES:

1. All reinforcing steel shall conform to ASTM A-615, current grade 40. Minimum lap at all splices shall be 16".
2. Concrete shall be a minimum of five (5 1/2) sacks of cement per cubic yard of concrete, compressive strength 3000 psi at 28 days.
3. The location of construction joints and deformed metal strips may be varied, with the approval of the Department of Community Services, to suit the proposed construction methods of the Contractor. The maximum width between longitudinal joints shall not exceed 14'-6".
4. 6" lime stabilized subgrade shall be a minimum of [illegible], unless specifically approved by the Department of Community Services.
5. The slope behind pavement may be increased, with approval of the Public Works.
6. Maximum expansion joint spacing shall not exceed 60'.

THE CITY OF ROSENBERG, FORT BEND COUNTY, TEXAS
DEPARTMENT OF PUBLIC WORKS

ROADWAY CROSS-SECTION

FORT BEND COUNTY ENGINEERING DEPARTMENT

APPROVED: [signature]
DEVELOPMENT COORDINATOR

DATE: 11/8/16

STATE OF TEXAS
BRIAN D. GEROULD
105804
LICENSED PROFESSIONAL ENGINEER

[signature] 6/23/2016

IDS Engineering Group

June 2016

VERIFICATION OF PRIVATE UTILITY LINES

BENTON ROAD STREET DEDICATION AND RESERVE

PAVING DETAILS

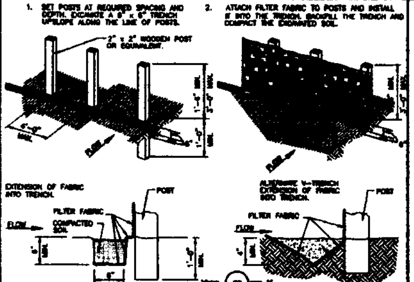
CITY OF ROSENBERG

VERT: N/A
HORIZ:

12 of 50 SHEETS

IDS Drawing No.______

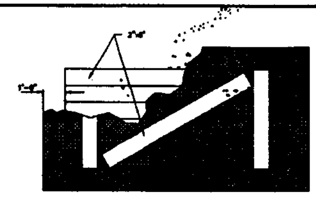
1. SET POSTS AT REQUIRED SPACING AND DEPTH. EXCAVATE A 6" x 6" TRENCH UPSLOPE ALONG THE LINE OF POSTS.
2. ATTACH FILTER FABRIC TO POSTS AND INSTALL IT INTO THE TRENCH. BACKFILL THE TRENCH AND COMPACT THE EXCAVATED SOIL.



GENERAL NOTES:

1. SET POSTS AT 4-FEET MAXIMUM SPACING. IF FACTORY PREASSEMBLED FENCE WITH SUPPORT NETTING IS USED, SPACING OF POST MAY BE INCREASED TO 8 FEET MAXIMUM.
2. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER, OVERLAP 6 INCHES AT THE POST, FOLD TOGETHER, AND ATTACH TO THE POSTS.
3. REMOVE SEDIMENT DEPOSITS WHEN SILT DEPTH REACHES ONE-THIRD OF THE HEIGHT OF THE FENCE.

1	FILTER FABRIC FENCE	Scale: N.T.S. File: SLFFNCFS

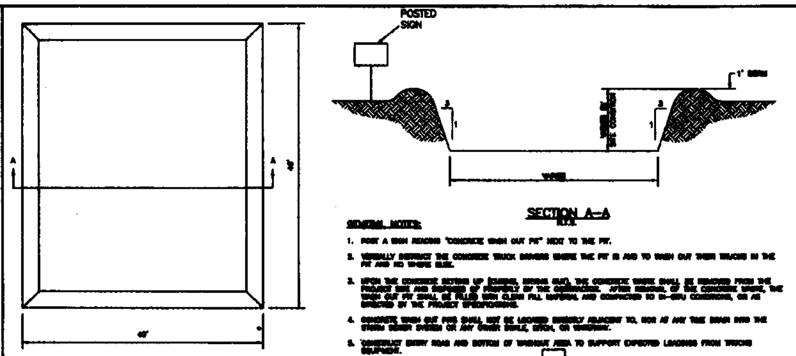


INSTALLATION NOTES:

1. PLACE 2"X6"X6' TREATED OAK OVER STAGE ONE INLETS. ALLOW 2" SPACING BETWEEN BOARDS.
2. COVER 2X6s WITH FILTER FABRIC EXTENDED 1'-0" BEYOND EDGE, ALL AROUND AND TACK.
3. PLACE 2X6s OVER FABRIC, ACROSS 2X6s AS SHOWN, NAIL TO SECURE.

PB
SYMBOL

3	PROTECTION BARRIER FOR STAGE I CURB INLETS	Scale: N.T.S. File:

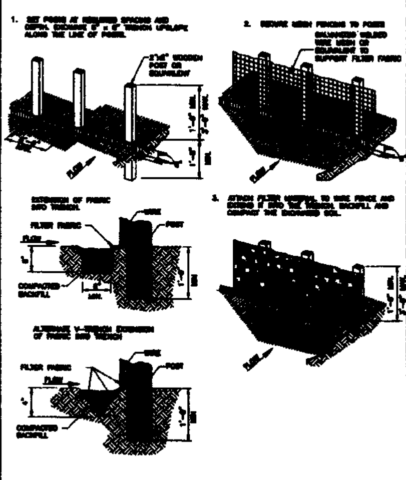


GENERAL NOTES:

1. POST A SIGN READING "CONCRETE WASH OUT PIT" NEXT TO THE PIT.
2. [illegible]
3. [illegible]
4. [illegible]
5. CONSTRUCT ENTRY ROAD AND BOTTOM OF WASHOUT AREA TO SUPPORT EXPECTED LOADINGS FROM TRUCKS EQUIPMENT.

CTW
SYMBOL

6	CONCRETE TRUCK WASHOUT AREA	Scale: N.T.S. File:



1. SET POSTS AT REQUIRED SPACING AND DEPTH. EXCAVATE 6" x 6" TRENCH UPSLOPE ALONG THE LINE OF POSTS.
2. SECURE MESH FENCING TO POSTS.
3. ATTACH FILTER MATERIAL TO WIRE FENCE AND EXTEND IT INTO THE TRENCH. BACKFILL AND COMPACT THE EXCAVATED SOIL.

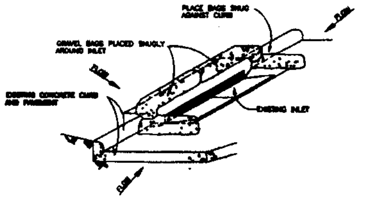
GENERAL NOTES:

1. SECURELY FASTEN MESH FENCING TO POSTS WITH STAPLES OR TIE WIRES.
2. SECURELY FASTEN FILTER FABRIC TO MESH FENCING.
3. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER, OVERLAP 6 INCHES AT A POST, FOLD TOGETHER, AND ATTACH TO A POST.
4. REMOVE SEDIMENT DEPOSITS WHEN SILT REACHES ONE-THIRD OF THE HEIGHT OF THE FENCE IN DEPTH.

REINFORCED FILTER FABRIC BARRIER

RFB
SYMBOL

2	REINFORCED FILTER FABRIC BARRIER	Scale: N.T.S. File: FLTFABFN



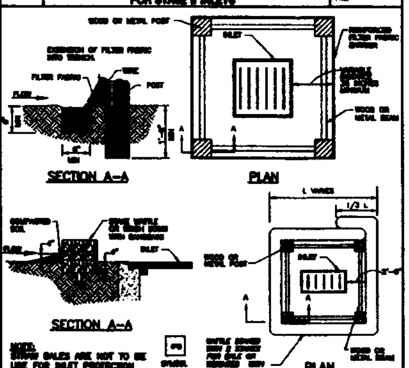
GENERAL NOTES:

1. BAGS OR WATTLES CAN BE USED FOR THIS APPLICATION.
2. PROVIDE WOVEN OR UNWOVEN GEOTEXTILE FILTER FABRIC FOR BAGS.
3. PROVIDE COARSE SAND AND AGGREGATE MIX FOR FILL MATERIAL FOR BAGS. USE ONLY PARTICLES CONSISTING OF CLEAN, HARD, DURABLE MATERIALS FREE FROM ADHERENT COATINGS, SALT, ALKALI, DIRT, CLAY, LOAM, SHALE, SOFT OR FLAKY MATERIALS, OR ORGANIC AND INJURIOUS MATTER.
4. REMOVE SEDIMENT DEPOSIT WHEN THE SEDIMENT HAS ACCUMULATED TO ONE-THIRD THE HEIGHT OF THE BARRIER.

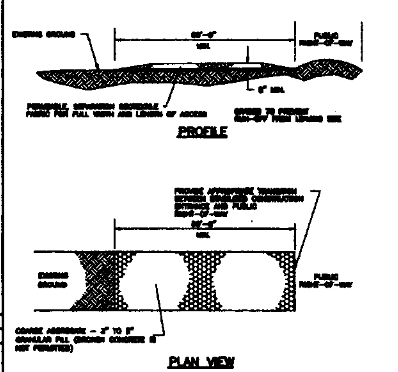
SEE CONSTRUCTION HANDBOOK: STORM WATER MANAGEMENT HANDBOOK FOR CONSTRUCTION ACTIVITIES, PREPARED BY CITY OF HOUSTON, HARRIS COUNTY, AND HARRIS COUNTY FLOOD CONTROL DISTRICT, FOR GRAVEL BAG DESIGN AND MAINTENANCE REQUIREMENTS.

IPB
SYMBOL

4	INLET PROTECTION BARRIERS FOR STAGE II INLETS	Scale: N.T.S. File:



5	REINFORCED FILTER FABRIC INLET PROTECTION BARRIER	Scale: N.T.S. File:



COARSE AGGREGATE - 3" TO 5" GRANULAR FILL (BROKEN CONCRETE IS NOT PERMITTED)

GENERAL NOTES:

1. [illegible]
2. [illegible]
3. [illegible]
4. [illegible]
5. [illegible]
6. PERIODICALLY TURN AGGREGATE TO EXPOSE A CLEAN BEARING SURFACE.
7. ALTERNATIVE METHODS OF CONSTRUCTION INCLUDE: [illegible]

SC
SYMBOL

7	STABILIZED CONSTRUCTION ACCESS	Scale: N.T.S. File: FLTFABFN

EROSION AND SEDIMENTATION CONTROL NOTES:

1. PROVISIONS SHALL BE MADE TO PROTECT DOWNSTREAM WATERCOURSES (I.E., STORM SEWER SYSTEMS, DITCHES, WETLANDS, ETC.) FROM SEDIMENT RUNOFF DEVELOPED FROM THE CONSTRUCTION PROCESS. PROVISIONS INCLUDE, BUT ARE NOT LIMITED TO, STRUCTURAL CONTROLS SUCH AS SILT FENCING, GEOTEXTILE FABRIC PROTECTION OF STORM SEWERS, HAY BALES, DIKES, AND SANDBAG BERMS; AND / OR VEGETATION CONTROLS SUCH AS SEEDING OR EXISTING VEGETATIVE BUFFER STRIPS (MINIMUM 25 FEET WIDE).
2. PRIOR TO START OF CONSTRUCTION, CONTRACTOR SHALL INSTALL EROSION AND SEDIMENTATION CONTROLS AT LOCATIONS SHOWN ON PLANS.
3. CONTRACTOR SHALL PERFORM DAILY STREET CLEANING ON ROADS AND STREETS ADJACENT TO THE PROJECT WHICH ARE USED AS ACCESS ROUTES FOR CONSTRUCTION TRAFFIC IF DIRT AND MUD IS NOT ADEQUATELY REMOVED FROM VEHICLES AT THE STABILIZED CONSTRUCTION ACCESS LOCATIONS.
4. LOCATE FUEL/MATERIAL STORAGE AREAS AWAY FROM STORMWATER CONVEYANCE SYSTEMS. USE A MINIMUM 60 MIL POLYETHYLENE LINER UNDER ABOVE GROUND STORAGE TANKS. USE 2 FOOT HIGH BERMS AROUND FUEL STORAGE AREAS.
5. CONTRACTOR WILL ADVISE OWNER IMMEDIATELY, VERBALLY, AND IN WRITING, OF ANY FUEL SPILLS ONTO THE PROJECT/CONSTRUCTION AREA AND THE ACTIONS TAKEN TO REMEDY THE PROBLEM.
6. CONTRACTOR IS RESPONSIBLE FOR COMPLYING WITH ALL ENVIRONMENTAL LAWS.
7. CONTRACTOR IS RESPONSIBLE FOR DISPOSING OF FUELS, MATERIALS, AND CONTAMINATED EXCAVATIONS IN A LEGALLY APPROVED MANNER.
8. CONTRACTOR SHALL INSPECT ALL STRUCTURAL CONTROLS WITHIN 24 HOURS AFTER ANY STORM EVENT THAT MEETS OR EXCEEDS 0.5 INCHES OF RAINFALL IN A 24 HOUR PERIOD. DURING PROLONGED RAINFALL EVENTS, CONTRACTOR SHALL INSPECT STRUCTURAL CONTROLS ON A DAILY BASIS. AT A MINIMUM, STRUCTURAL CONTROLS SHOULD BE INSPECTED ONCE EVERY 14 CALENDAR DAYS. A QUALIFIED REPRESENTATIVE OF THE CONTRACTOR, AS APPROVED BY THE OWNER, SHALL PROVIDE THESE INSPECTIONS. SHOULD CONTROLS BECOME INEFFECTIVE, NECESSARY REPAIRS SHALL BE PERFORMED TO RETURN THE INTEGRITY OF THE STRUCTURAL CONTROLS. REMOVE ALL SEDIMENT IF IT ACCUMULATES TO 1/3 THE HEIGHT OF THE SILT FENCE. MATERIAL MAY BE SPREAD ON ADJACENT PROPERTY.
9. CONTRACTOR SHALL MAINTAIN, REPAIR AND/OR REPLACE DAMAGED EROSION AN SEDIMENTATION CONTROL SYSTEMS THROUGHOUT THE DURATION OF THE CONTRACT.
10. CONTRACTOR WILL PROVIDE PROTECTED STORAGE AREAS FOR CHEMICALS, PAINTS, SOLVENTS, FERTILIZERS, AND OTHER POTENTIALLY TOXIC MATERIALS.
11. CONTRACTOR IS RESPONSIBLE FOR PROVIDING ADEQUATELY MAINTAINED SANITARY FACILITIES.
12. EQUIPMENT STAGING AREA TO BE DESIGNATED BY CONTRACTOR AND APPROVED BY OWNER PRIOR TO CONSTRUCTION.
13. AT COMPLETION OF THE CONTRACT, OWNER AND/OR OWNER'S REPRESENTATIVE WITH THE CONTRACTOR SHALL EXAMINE EROSION AND SEDIMENTATION CONTROL SYSTEMS BEFORE RELIEVING CONTRACTOR OF HIS MAINTENANCE RESPONSIBILITIES. PAVING CONTRACTOR SHALL BE RESPONSIBLE FOR REMOVAL AND DISPOSAL OF SEDIMENTATION CONTROL SYSTEMS AFTER THE PROJECT HAS BEEN ACCEPTED BY THE OWNER OR OWNER'S REPRESENTATIVE.
14. IF EROSION AND SEDIMENTATION CONTROL SYSTEMS ARE EXISTING FROM PRIOR CONTRACTS, OWNER AND/OR OWNER'S REPRESENTATIVE WITH THE CONTRACTOR SHALL EXAMINE THE EXISTING EROSION AND SEDIMENTATION CONTROL SYSTEMS FOR DAMAGE PRIOR TO CONTRACTOR STARTING CONSTRUCTION OF THE CONTRACT. ANY DAMAGE NOTED AT THIS TIME SHALL BE REPAIRED AT OWNER'S EXPENSE.
15. CONTRACTOR SHALL PROVIDE STAGE I INLET PROTECTION BARRIERS AT ALL PROPOSED INLETS AS PER DETAILS SHOWN ON THIS SHEET.
16. CONTRACTOR SHALL PROVIDE STAGE II INLET PROTECTION BARRIERS AT ALL PROPOSED INLETS AS PER DETAILS SHOWN ON THIS SHEET.
17. CONTRACTOR SHALL PROVIDE HYDROMULCH SEEDING FOR ALL DISTURBED AREAS BETWEEN CURB AND R.O.W.

FORT BEND COUNTY ENGINEERING DEPARTMENT

APPROVED: [signature] DEVELOPMENT COORDINATOR

DATE: 11/8/16

STATE OF TEXAS
BRIAN D. GEROULD
109804
LICENSED

[signature] 4/23/2016

IDS Engineering Group

APPROVED: B.D.G.	DATE: June 2015
DESIGNED BY: B.D.G. DRAWN BY: T.S.B.	JOB NO.: 0871-157-00

BENCHMARK: [illegible]

VERIFICATION OF PRIVATE UTILITY LINES

BENTON ROAD STREET DEDICATION AND RESERVE

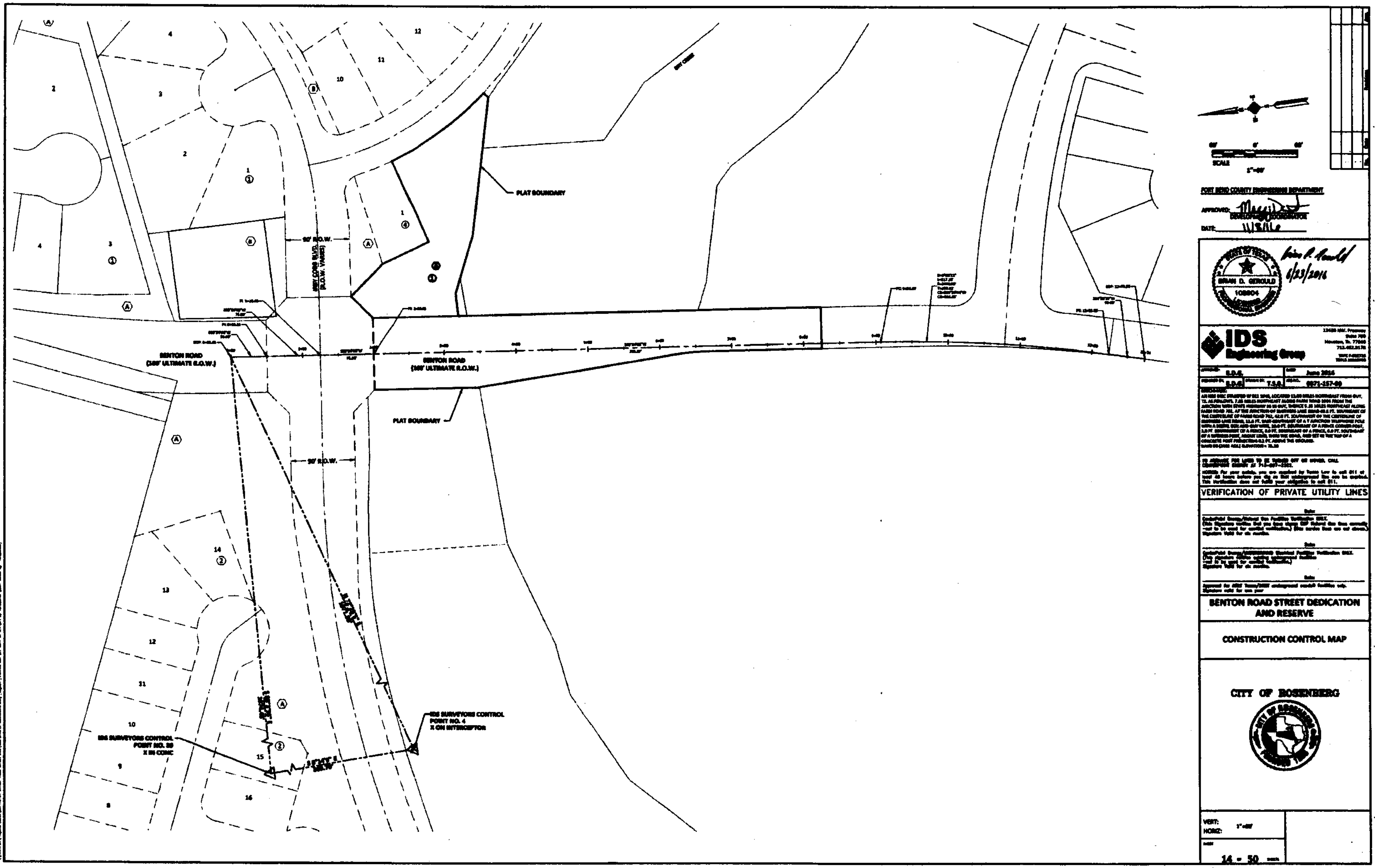
POLLUTION PREVENTION DETAILS AND NOTES

CITY OF ROSENBERG

VERT: N/A
HORIZ:

SHEET 13 OF 50

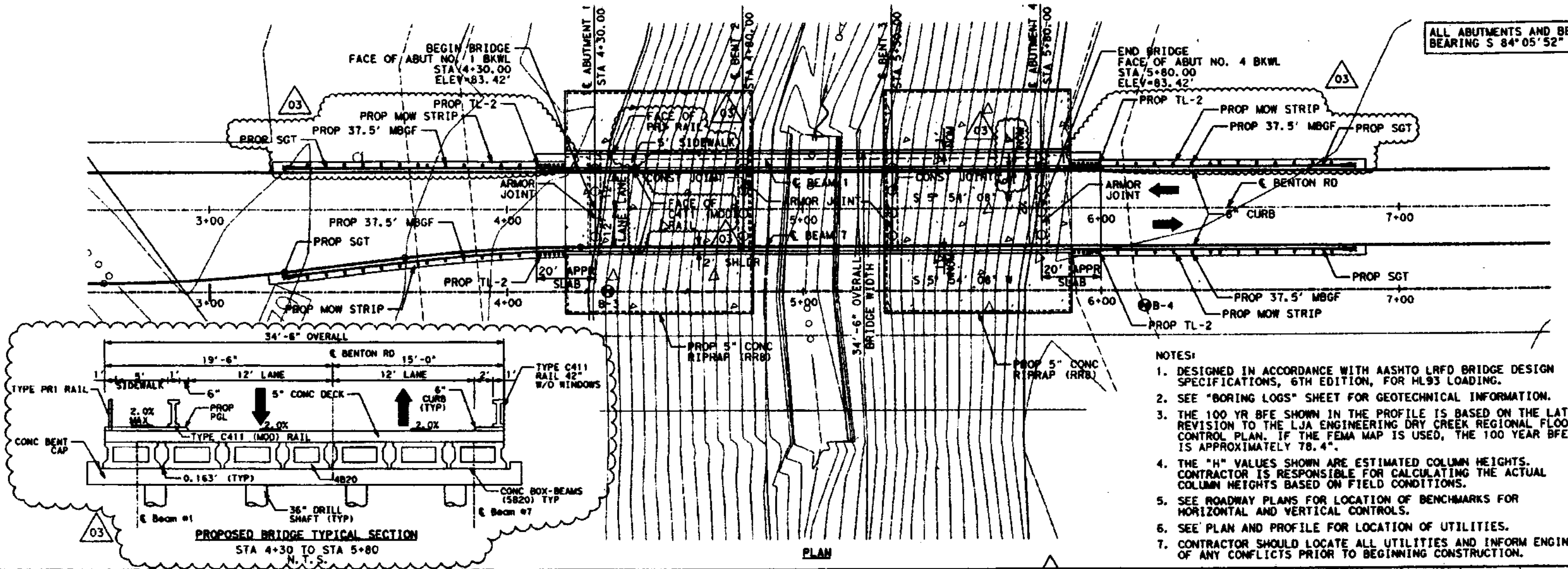
IDS Drawing No. ________



IDS Drawing No. ______

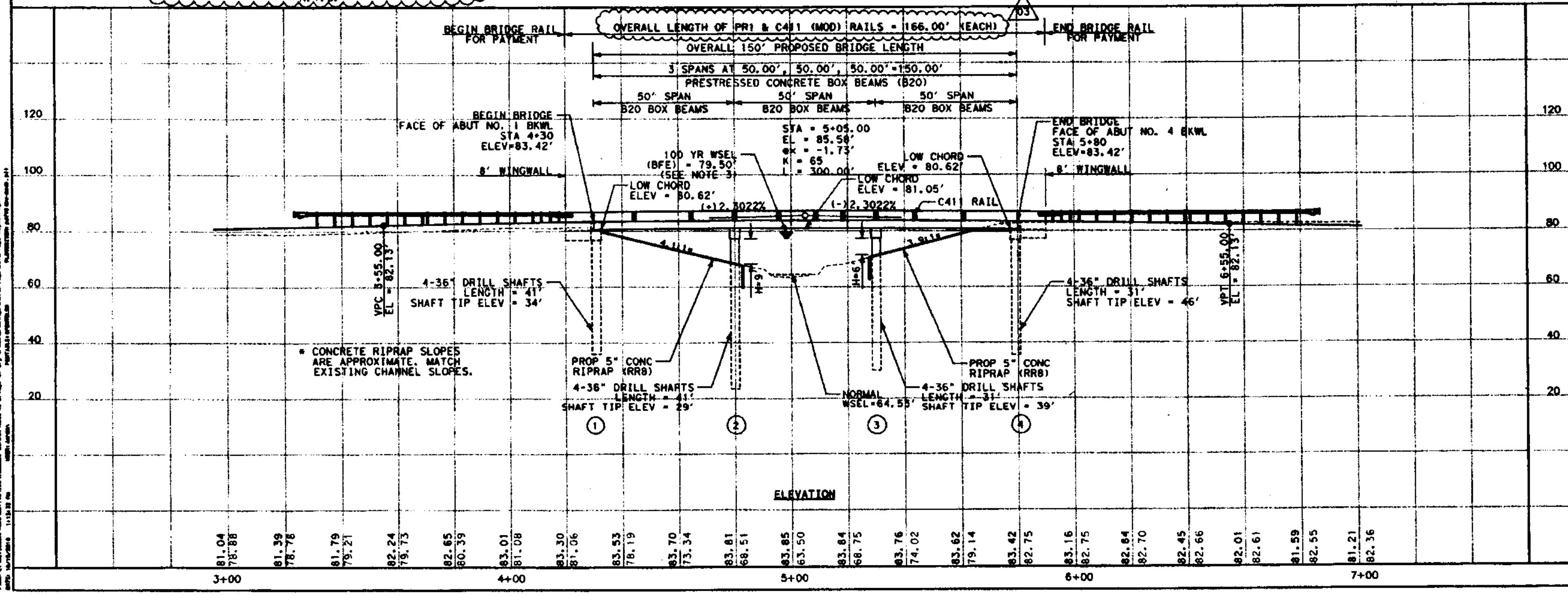
ALL ABUTMENTS AND BENTS ARE ON BEARING S 84°05'52" E

DESIGN SPEED = 45 MPH



NOTES:

1. DESIGNED IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 6TH EDITION, FOR HL93 LOADING.
2. SEE "BORING LOGS" SHEET FOR GEOTECHNICAL INFORMATION.
3. THE 100 YR BFE SHOWN IN THE PROFILE IS BASED ON THE LATEST REVISION TO THE LJA ENGINEERING DRY CREEK REGIONAL FLOOD CONTROL PLAN. IF THE FEMA MAP IS USED, THE 100 YEAR BFE IS APPROXIMATELY 78.4".
4. THE "H" VALUES SHOWN ARE ESTIMATED COLUMN HEIGHTS. CONTRACTOR IS RESPONSIBLE FOR CALCULATING THE ACTUAL COLUMN HEIGHTS BASED ON FIELD CONDITIONS.
5. SEE ROADWAY PLANS FOR LOCATION OF BENCHMARKS FOR HORIZONTAL AND VERTICAL CONTROLS.
6. SEE PLAN AND PROFILE FOR LOCATION OF UTILITIES.
7. CONTRACTOR SHOULD LOCATE ALL UTILITIES AND INFORM ENGINEER OF ANY CONFLICTS PRIOR TO BEGINNING CONSTRUCTION.



FORT BEND COUNTY ENGINEERING DEPARTMENT

APPROVED: [illegible]
DEVELOPMENT COORDINATOR

DATE: 11/8/16

HL93 LOADING

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 10283

STATE OF TEXAS
106672
LICENSED PROFESSIONAL ENGINEER

10/19/16

STATE OF TEXAS
JENNIFER T. EVANS
115641
LICENSED PROFESSIONAL ENGINEER

10/19/16

AIA ENGINEERS, LTD.
CONSULTANTS

CivilCorp
ENGINEERS • SURVEYORS

IDS
Engineering Group

BENTON ROAD STREET DEDICATION AND RESERVE

BENTON RD AT DRY CREEK
BRIDGE LAYOUT

SHEET 1 OF 1

CITY OF ROSENBERG

VERT: 1" = 20'
HORIZ: 1" = 20'

SHEET
15 - 50

SUMMARY OF BRIDGE ITEMS

BID ITEM	400 6005	416 6004	420 6013	420 6025	420 6037	422 6005	422 6013	422 6015	422 6023	425 6001	425 6002	432 6008	442 6007	450 6042	450 6066	454 6003
BID ITEM DESCRIPTION / BRIDGE ELEMENT	CEM STABIL BKFL	DRILL SHAFT (36 IN)	CL C CONC (ABUT)	CL C CONC (BENT)	CL C CONC (COLUMN)	REINF CONC SLAB (BOX BEAM)	BRIDGE SIDEWALK	APPROACH SLAB	CL S CONC (SHEAR KEY)	PRESTR CONC BOX BEAM (4B20)	PRESTR CONC BOX BEAM (5B20)	RIPRAP (CONC) (CL B) (RR8&RR9)	STR STEEL (MISC NON-BRIDGE)	RAIL (TY PR1)	RAIL (TY C411) (MOD)	ARMOR JOINT
	CY	LF	CY	CY	CY	SF	SF	CY	CY	LF	LF	CY	LB	LF	LF	LF
2 ~ ABUTMENTS	3370	288	69.6					62.2				145	336	16.00	32.00	61
2 ~ INTERIOR BENTS		288		26.9	15.7											61
3 ~ 50.00' PRESTR CONC BOX BEAM SPAN						5169	1575		25.3	150.00	900.00			150.00	300.00	
TOTALS	3370	576	69.6	26.9	15.7	5169	1575	62.2	25.3	150.00	900.00	145	336	166.00	332.00	122

FORT BEND COUNTY ENGINEERING DEPARTMENT

APPROVED: DEVELOPMENT COORDINATOR

DATE: 11/8/16

HL93 LOADING

JENNIFER T. EVANS 115641 LICENSED PROFESSIONAL ENGINEER

10/19/2016

AIA ENGINEERS, LTD.
CONSULTANTS

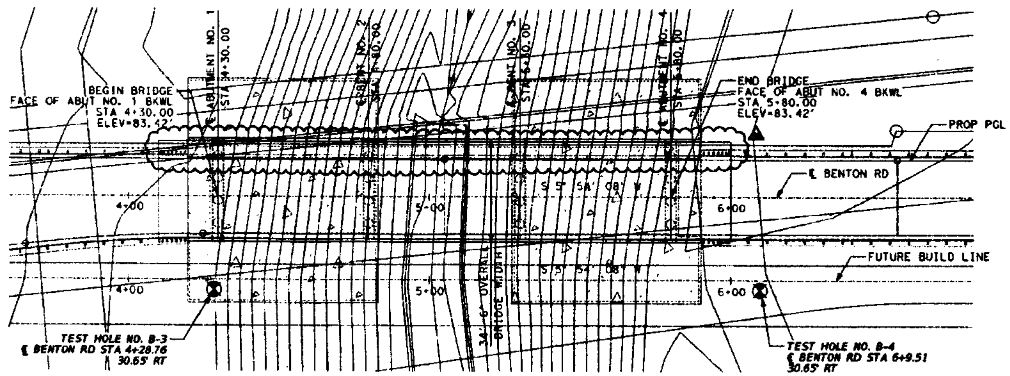
BENTON ROAD STREET DEDICATION AND RESERVE

ESTIMATED QUANTITIES

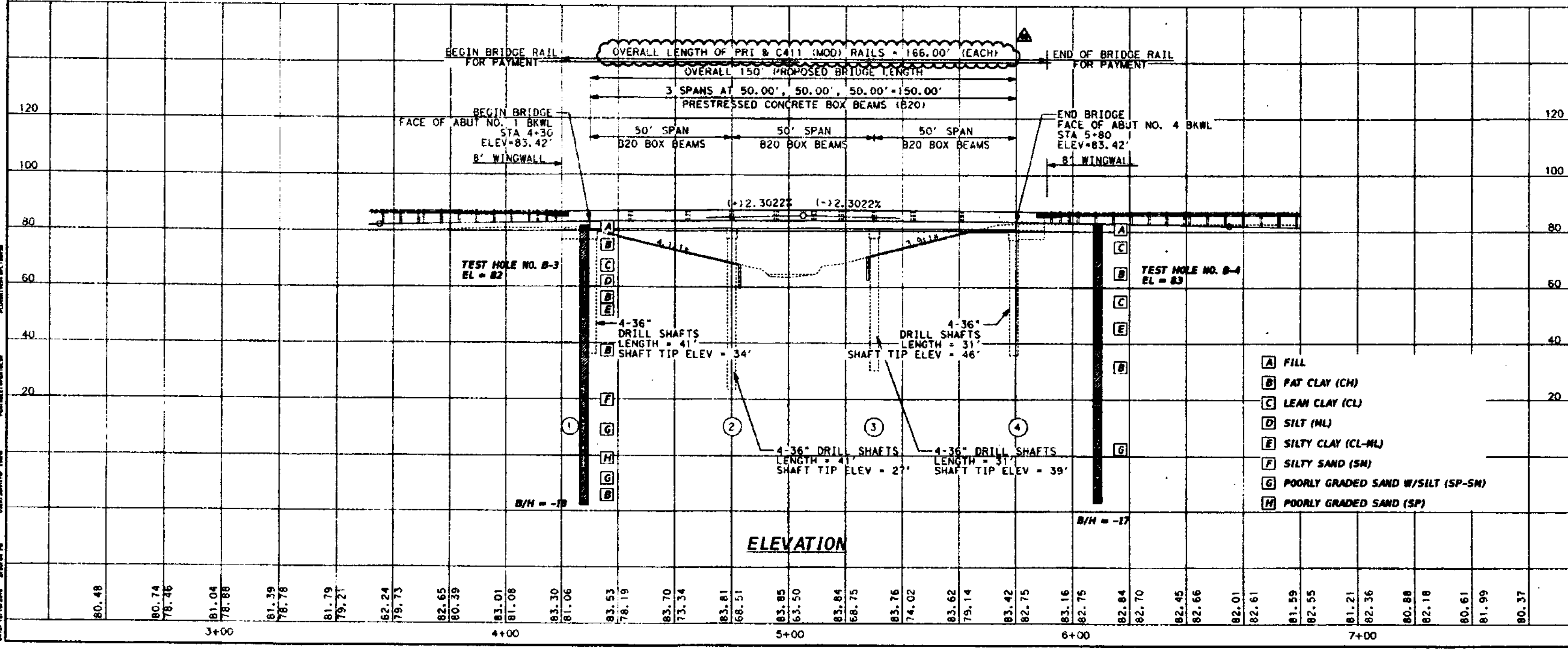
CITY OF ROSENBERG

VERT: N/A
HORIZ:

16 - 50


BEGIN BRIDGE
FACE OF ABUT NO. 1 BKWL
STA 4+30.00
ELEV=83.42'
END BRIDGE
FACE OF ABUT NO. 4 BKWL
STA 5+80.00
ELEV=83.42'
PROP PGL
℄ BENTON RD
FUTURE BUILD LINE
4+00
5+00
6+00
34'-6" OVERALL BRIDGE WIDTH
TEST HOLE NO. B-3
℄ BENTON RD STA 4+28.76
30.65' RT
TEST HOLE NO. B-4
℄ BENTON RD STA 6+9.51
30.65' RT

PLAN


BEGIN BRIDGE RAIL FOR PAYMENT
OVERALL LENGTH OF PR1 & C411 (MOD) RAILS = 166.00' (EACH)
END OF BRIDGE RAIL FOR PAYMENT
OVERALL 150' PROPOSED BRIDGE LENGTH
3 SPANS AT 50.00', 50.00', 50.00'=150.00'
PRESTRESSED CONCRETE BOX BEAMS (B20)
BEGIN BRIDGE
FACE OF ABUT NO. 1 BKWL
STA 4+30
ELEV=83.42'
8' WINGWALL
50' SPAN
B20 BOX BEAMS
END BRIDGE
FACE OF ABUT NO. 4 BKWL
STA 5+80
ELEV=83.42'
(+)2.3022%
(-)2.3022%
TEST HOLE NO. B-3
EL = 82
TEST HOLE NO. B-4
EL = 83
4-36" DRILL SHAFTS
LENGTH = 41'
SHAFT TIP ELEV = 34'
4-36" DRILL SHAFTS
LENGTH = 31'
SHAFT TIP ELEV = 46'
4-36" DRILL SHAFTS
LENGTH = 41'
SHAFT TIP ELEV = 27'
4-36" DRILL SHAFTS
LENGTH = 31'
SHAFT TIP ELEV = 39'
B/H = -19
B/H = -17
120
100
80
60
40
20
3+00
4+00
5+00
6+00
7+00
A FILL
B FAT CLAY (CH)
C LEAN CLAY (CL)
D SILT (ML)
E SILTY CLAY (CL-ML)
F SILTY SAND (SM)
G POORLY GRADED SAND W/SILT (SP-SM)
H POORLY GRADED SAND (SP)

ELEVATION

NOTES:
TEST HOLE DATA PROVIDED BY TOLUNAY-WONG ENGINEERS, INC.

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: ______ COORDINATOR
DATE: 11/8/16

HL93 LOADING

CIVILCORP, LLC
FIRM REGISTRATION NUMBER: 10283

STATE OF TEXAS
108672
LICENSED
10/19/16

STATE OF TEXAS
JENNIFER T EVANS
115641
LICENSED
10/19/2016

AIA ENGINEERS, LTD.
CONSULTANTS

CivilCorp

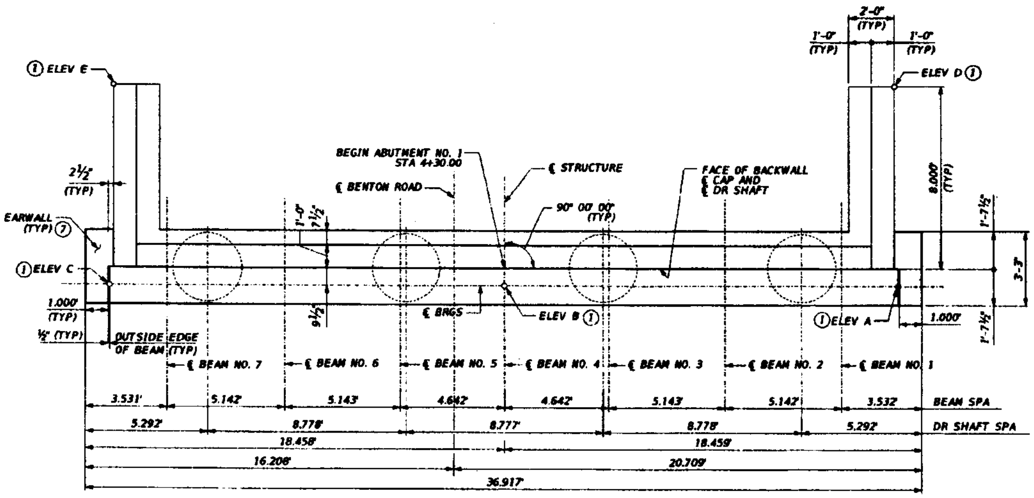
BENTON ROAD STREET DEDICATION AND RESERVE

BORING LOGS

CITY OF ROSENBERG

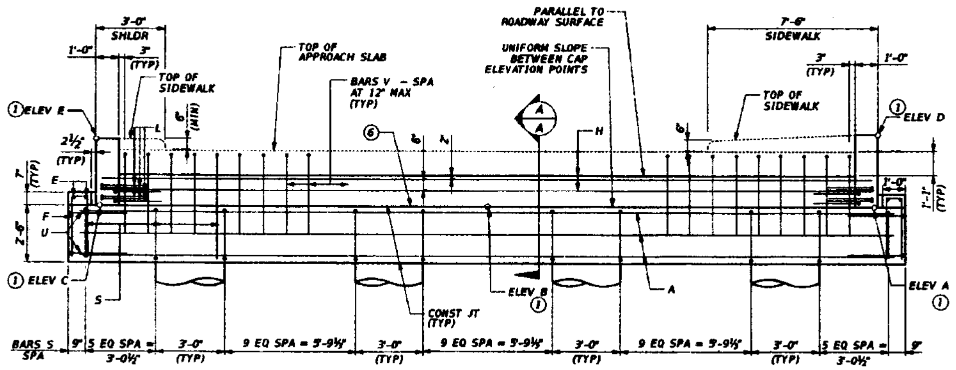
VERT: 1"=20'
HORIZ: 1"=20'

17 of 50



PLAN

SCALE: ⅜" = 1'-0"



ELEVATION

SCALE: ⅜" = 1'-0"

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS, 7TH EDITION (2014)

CONCRETE STRENGTH f'c = 3,600 PSI.

ALL REINFORCING MUST BE GRADE 60.

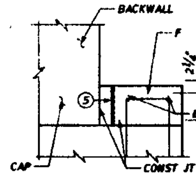
DESIGNED FOR NORMAL EMBANKMENT HEADER SLOPE OF 3:1 OR 2:1.

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.

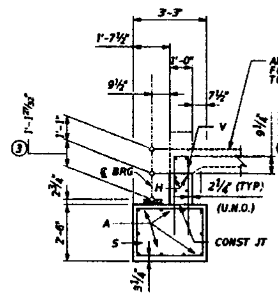
SEE STANDARD CRR FOR RIPRAP ATTACHMENT DETAILS , IF APPLICABLE.



EARWALL ELEVATION DETAIL

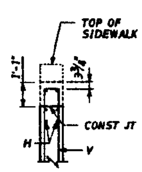
SCALE: ¾" = 1'-0"
(SLOPE TOP OF EARWALL AWAY FROM BEAMS) 7

1. TOP OF CAP ELEVATIONS ARE BASED ON SECTION DEPTHS SHOWN ON SPAN DETAILS.
2. SEE BRIDGE LAYOUT FOR JOINT TYPE .
3. SEE SPAN DETAILS FOR "Y" VALUE.
4. INCREASE AS REQUIRED TO MAINTAIN 3½" FROM FINISHED GRADE.
5. ½" 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.
6. 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.
7. DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.
8. CAP ELEVATION LINES OCCUR AT THE OUTSIDE EDGE OF EXTERIOR BEAMS AND AT THE CENTERLINE OF CAP.



SECTION A-A

SCALE: ⅜" = 1'-0"
(SHOWING APPROACH SLAB) 2



BACKWALL DETAIL

SCALE: ⅜" = 1'-0"
(WITHOUT APPROACH SLAB) 2

BAR SCHEDULE ~ 1 CAP, ONLY				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	35'-11"	1908
E	4	#5	2'-11"	12
F	12	#5	6'-1"	76
H	4	#6	34'-2"	205
L	12	#6	4'-0"	72
S	42	#4	10'-8"	299
U	4	#6	7'-10"	47
V	33	#5	5'-4"	181
wH₁	14	#6	9'-1"	190
wH₂	14	#6	7'-8"	161
wS	18	#4	7'-9"	93
wV	18	#5	5'-9"	107
REINF STEEL			LB	3352

TABLE OF ESTIMATED QUANTITIES ~ 1 CAP, ONLY		
ITEM	UNIT	QTY
DRILL SHAFT (36 IN)	LF	164
REINF STEEL	LB	3352
CL C CONC (ABUT)	CY	34.8
ARMOR JOINT	LF	30.5
RAIL (TYP C411) (MOD)	LF	16.0
BAS-C - BRIDGE APPROACH SLAB	CY	31.1

CAP ELEVATIONS 1 8					
ABUT NO.	ELEV A	ELEV B	ELEV C	ELEV D	ELEV E
1	80.298'	80.647'	80.558'	83.975'	84.365'

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: DEVELOPMENT COORDINATOR
DATE:

HL93 LOADING

STATE OF TEXAS
JENNIFER T. EVANS
115641
LICENSED

6/17/2016

AIA ENGINEERS, LTD.
CONSULTANTS

BENTON ROAD STREET DEDICATION AND RESERVE

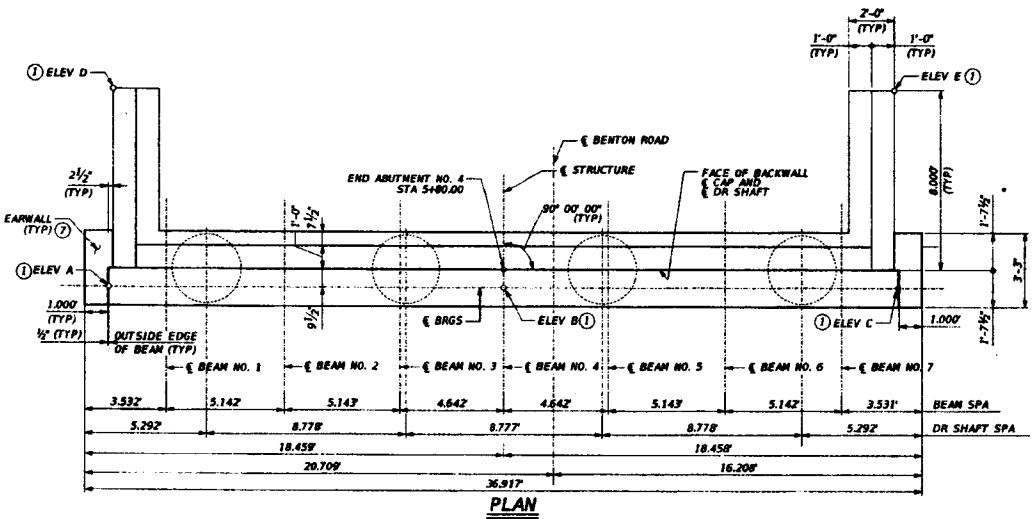
ABUTMENT NO. 1

SHEET 1 OF 3

CITY OF ROSENBERG

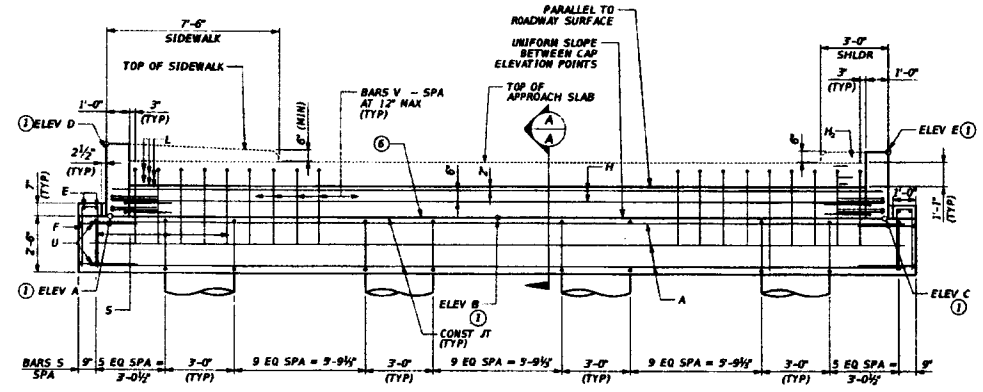
VERT: HORIZ: N/A

18 - 50



PLAN

SCALE: 3/16" = 1'-0"



ELEVATION

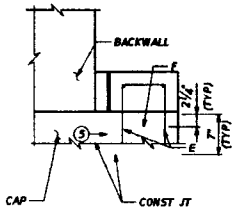
SCALE: 3/16" = 1'-0"

BAR SCHEDULE - 1 CAP ONLY				
BAR	NO.	SIZE	LENGTH	WEIGHT
A	10	#11	35'-11"	1908
E	4	#3	2'-11"	12
F	12	#5	6'-1"	76
H	4	#6	34'-2"	205
L	12	#6	4'-0"	72
S	42	#4	10'-8"	299
U	4	#6	7'-10"	47
V	33	#5	5'-6"	181
wH1	14	#6	9'-1"	190
wH2	14	#6	7'-8"	161
w3	18	#4	7'-9"	93
wV	18	#5	5'-9"	107
REINF STEEL			LB	3352

TABLE OF ESTIMATED QUANTITIES - 1 CAP ONLY		
ITEM	UNIT	QTY
DRILL SHAFT (36 IN)	LF	124
REINF STEEL	LB	3352
CL C CONC (ABUT)	CY	34.8
ARMOR JOINT	LF	30.5
RAIL (TYP C411) (MOD)	LF	16.0
BAS-C - BRIDGE APPROACH SLAB	CY	31.1

GENERAL NOTES:

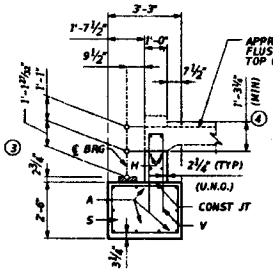
DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS, 7TH EDITION (2014)
CONCRETE STRENGTH f'c = 3,600 PSI.
ALL REINFORCING MUST BE GRADE 60.
DESIGNED FOR NORMAL EMBANKMENT HEADER SLOPE OF 3:1 OR 2:1.
SEE BRIDGE LAYOUT FOR BEAM TYPE AND FOUNDATION TYPE, SIZE AND LENGTH.
SEE STANDARD FD FOR ALL FOUNDATION DETAILS AND NOTES.
SEE APPLICABLE RAIL DETAILS FOR RAIL ANCHORAGE CAST IN WINGWALLS.
SEE STANDARD CRR FOR RIPRAP ATTACHMENT DETAILS, IF APPLICABLE.



EARWALL ELEVATION DETAIL

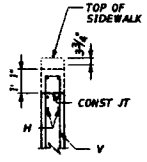
SCALE: 3/4" = 1'-0"
(SLOPE TOP OF EARWALL AWAY FROM BEAMS) (7)

(1) TOP OF CAP ELEVATIONS ARE BASED ON SECTION DEPTHS SHOWN ON SPAN DETAILS.
(2) SEE BRIDGE LAYOUT FOR JOINT TYPE.
(3) SEE SPAN DETAILS FOR "T" VALUE.
(4) INCREASE AS REQUIRED TO MAINTAIN 3'-6" FROM FINISHED GRADE.
(5) ½" 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.
(6) 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.
(7) DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.
(8) CAP ELEVATION LINES OCCUR AT THE OUTSIDE EDGE OF EXTERIOR BEAMS AND AT THE CENTERLINE OF CAP.



SECTION A-A

SCALE: 3/4" = 1'-0"
(SHOWING APPROACH SLAB) (2)



BACKWALL DETAIL

SCALE: 3/4" = 1'-0"
(WITHOUT APPROACH SLAB) (2)

CAP ELEVATIONS (1) (8)					
ABUT NO.	ELEV A	ELEV B	ELEV C	ELEV D	ELEV E
4	80.298'	80.647'	80.358'	83.975'	84.369'

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: DEVELOPMENT COORDINATOR
DATE: 11/8/16

HL93 LOADING

STATE OF TEXAS
JENNIFER T. EVANS
115641
LICENSED PROFESSIONAL ENGINEER
6/17/2016

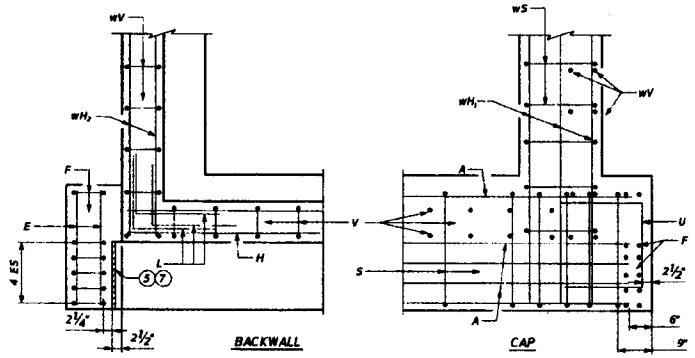
AIA ENGINEERS, LTD.
CONSULTANTS

BENTON ROAD STREET DEDICATION AND RESERVE

ABUTMENT NO. 4
SHEET 2 OF 3

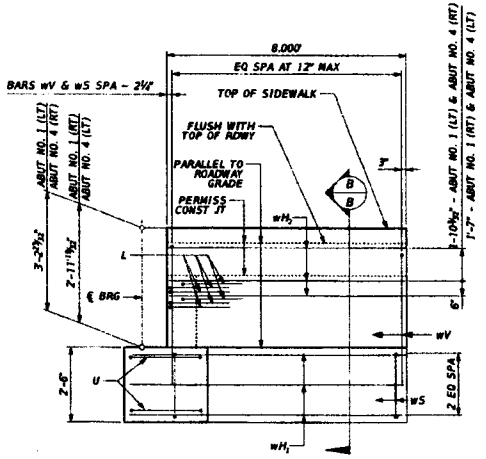
CITY OF ROSENBERG

VERT: N/A
HORIZ:
19 = 50



CORNER DETAILS

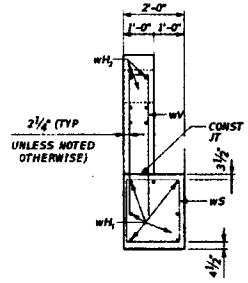
N.T.S.



WINGWALL ELEVATION

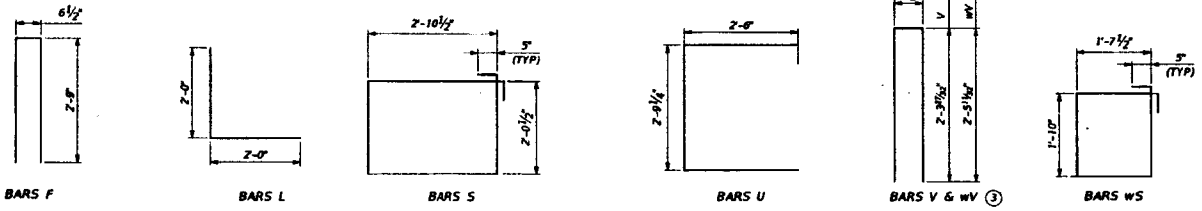
SCALE: ½"= 1'-0"

(EARWALL OMITTED FOR CLARITY)



SECTION B-B

SCALE: ½"= 1'-0"



③ SEE SPAN DETAILS FOR "Y" VALUE.

⑤ ½" 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.

⑦ DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

⑨ QUANTITIES SHOWN ARE FROM ONE ABUTMENT ONLY (WITH APPROACH SLAB).

FORT BEND COUNTY ENGINEERING DEPARTMENT

APPROVED: DEVELOPMENT COORDINATOR

DATE: 11/8/16

HL93 LOADING

STATE OF TEXAS
JENNIFER T. EVANS
115641
LICENSED PROFESSIONAL ENGINEER

6/17/2016

AIA ENGINEERS, LTD.
CONSULTANTS

BENTON ROAD STREET DEDICATION AND RESERVE

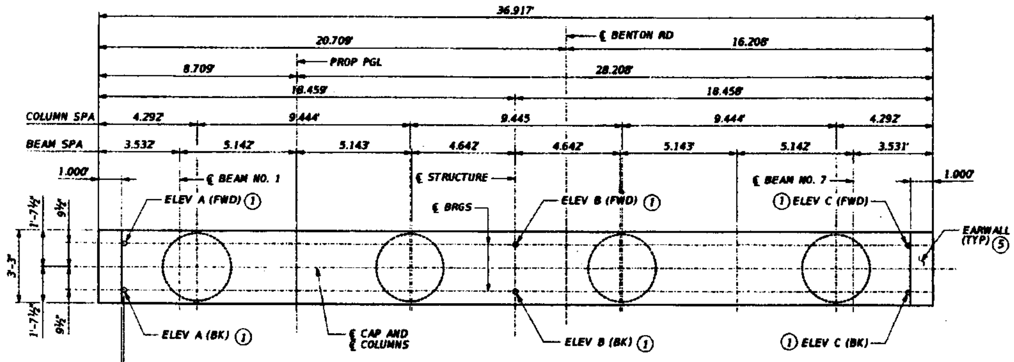
ABUTMENT DETAILS

SHEET 3 OF 3

CITY OF ROSENBERG

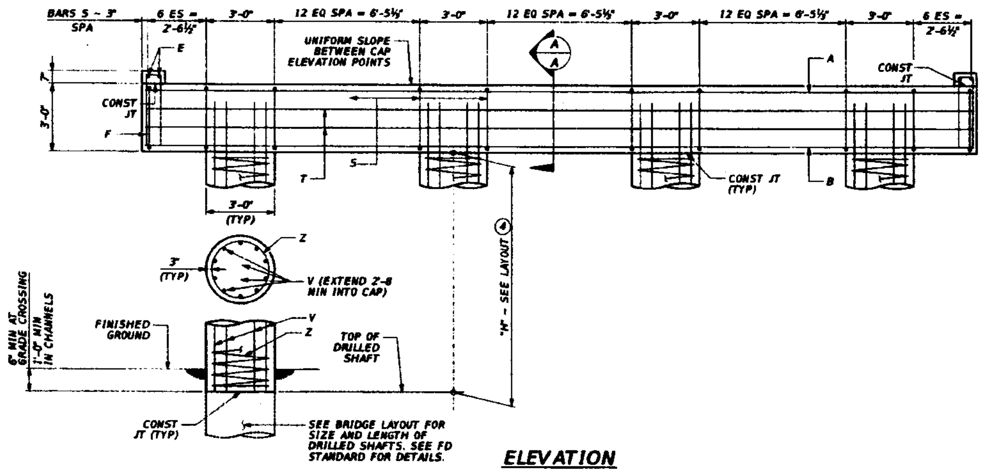
VERT: N/A
HORIZ:

20 = 50



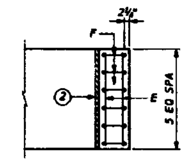
PLAN

SCALE: ⅜" = 1'-0"

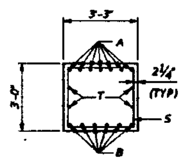


ELEVATION

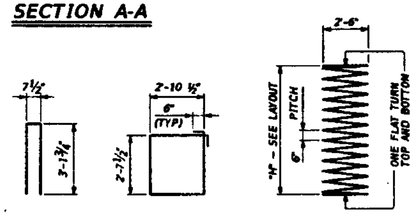
SCALE: ⅜" = 1'-0"



EARWALL PLAN ⑤



SECTION A-A



BARS F   BARS S   BARS Z

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD SPECIFICATIONS, 7TH EDITION (2014).
CONCRETE STRENGTH f'c = 3,600 PSI.
ALL CAP REINFORCING MUST BE GRADE 60.
COLUMN AND DRILLED SHAFT REINFORCING MAY BE GRADE 40.
SEE BRIDGE LAYOUT FOR FOUNDATION TYPE, SIZE, AND LENGTH.
SEE STANDARD FD FOR ALL FOUNDATION DETAILS AND NOTES.

① TOP OF CAP ELEVATIONS ARE BASED ON SECTION DEPTHS SHOWN ON SPAN DETAILS.

② ½" PREFORMED BITUMINOUS FIBER MATERIAL BETWEEN BOX BEAM AND EARWALL. BOND TO BEAM WITH AN APPROVED ADHESIVE. INSIDE FACE OF EARWALL TO BE CAST WITH VERTICAL SIDE OF BEAM.

③ FOR EACH LINEAR FOOT VARIATION IN "H" VALUE, MAKE THE FOLLOWING ADJUSTMENTS:

BARS V LENGTH................1.000'
BARS Z LENGTH................15.740'
REINFORCING STEEL........# LB
CL "C" CONC (COLUMN)......1.040 CY

④ IN AREAS OF VERY SOFT SOIL OR WHERE SCOUR IS ANTICIPATED, MAXIMUM ALLOWABLE "H" HEIGHTS MUST BE EVALUATED BY THE ENGINEER PROIR TO THE USE OF THIS DRAWING.

⑤ DO NOT CAST EARWALLS UNTIL BEAMS ARE ERECTED IN THEIR FINAL POSITION.

⑥ CAP ELEVATION LINES OCCUR AT THE OUTSIDE EDGE OF EXTERIOR BEAMS AND AT THE CENTERLINE OF CAP.

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: [signature]
DEVELOPMENT COORDINATOR
DATE: 11/18/16

HL93 LOADING

STATE OF TEXAS
JENNIFER T. EVANS
115641
LICENSED PROFESSIONAL ENGINEER
6/17/2016

AIA ENGINEERS, LTD.
CONSULTANTS

BENTON ROAD STREET DEDICATION AND RESERVE

INTERIOR BENTS NO. 2 & 3

CITY OF ROSENBERG

CAP ELEVATIONS ①⑥

BENT NO.	ELEV A	ELEV B	ELEV C
2 (BK)	80.670'	81.018'	81.367'
2 (FWD)	80.676'	81.024'	81.373'
3 (BK)	80.676'	81.024'	81.373'
3 (FWD)	80.670'	81.018'	81.367'

INTERIOR BENT NO. 2
TABLE OF ESTIMATED QUANTITIES

ITEM	UNIT	QTY
DRILL SHAFT (36 IN)	LF	164
REINF STEEL	LB	5425
CL C CONC (BENT)	CY	13.5
ARMOR JOINT	LF	30.5

INTERIOR BENT NO. 2
BAR SCHEDULE

BAR	NO.	SIZE	LENGTH	WEIGHT
A	7	#11	36'-7"	1361
B	6	#11	36'-7"	1166
E	4	#5	2'-11"	12
F	12	#5	6'-11"	87
S	53	#5	12'-0"	663
T	4	#5	36'-7"	153
V	40	#9	12'-8"	1723
Z	4	#3	173'-2"	260
REINF STEEL			LB	5425

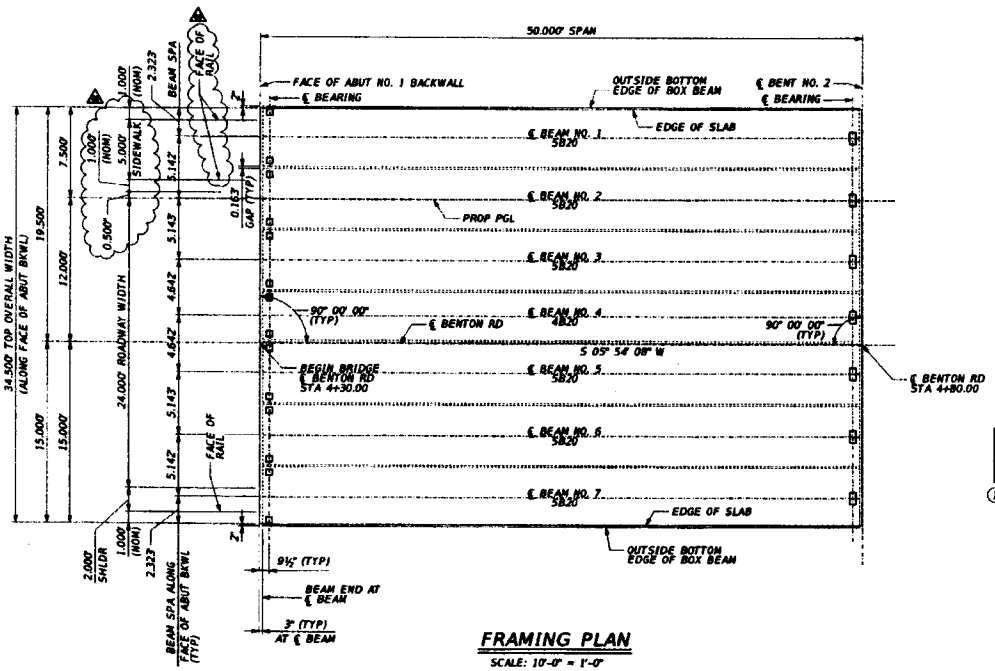
INTERIOR BENT NO. 3
TABLE OF ESTIMATED QUANTITIES

ITEM	UNIT	QTY
DRILL SHAFT (36 IN)	LF	124
REINF STEEL	LB	5105
CL C CONC (BENT)	CY	13.5
ARMOR JOINT	LF	30.5

INTERIOR BENT NO. 3
BAR SCHEDULE

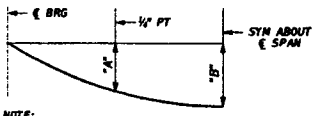
BAR	NO.	SIZE	LENGTH	WEIGHT
A	7	#11	36'-7"	1361
B	6	#11	36'-7"	1166
E	4	#5	2'-11"	12
F	12	#5	6'-11"	87
S	53	#5	12'-0"	663
T	4	#5	36'-7"	153
V	40	#9	10'-8"	1451
Z	4	#3	141'-8"	213
REINF STEEL			LB	5105

VERT: N/A
HORIZ:



FRAMING PLAN

SCALE: 10'-0" = 1'-0"



NOTE:
DEFLECTIONS SHOWN ARE DUE TO SHEAR KEY AND CONCRETE SLAB ONLY. (Ec = 5,000 KSI).
CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY BE LESS. DEFLECTIONS MAY BE ADJUSTED BASED ON FIELD OBSERVATIONS.

DEAD LOAD DEFLECTION DIAGRAM

SPAN NO.	BEAM NO.	POINT	DEAD LOAD DEFLECTIONS (FT) SHEAR KEY	SLAB	TOTAL
1	1 & 7	"A"	-0.002	-0.014	-0.016
		"B"	-0.003	-0.019	-0.022
	2 - 3 & 5 - 6	"A"	-0.005	-0.014	-0.019
		"B"	-0.007	-0.020	-0.027
	4	"A"	-0.006	-0.014	-0.020
		"B"	-0.008	-0.020	-0.028

SPAN NO.	BEAM NO.	BEAM REPORT HORIZONTAL DISTANCE C ABUT - C BEN	C - C BRG	TRUE DISTANCE BOTTOM BEAM (1)	BEAM SLOPE
1	ALL	50.000'	48.417'	49.561'	0.0077

(1) BEAM LENGTHS SHOWN ARE BOTTOM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7TH EDITION (2014).
IT IS RECOMMENDED TO ERECT BEAMS ON THE HIGH SIDE OF CROSS-SLOPE FIRST AND PROGRESS TO THE LOW SIDE.

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: DEVELOPMENT COORDINATOR
DATE: 11/8/16

HL93 LOADING

STATE OF TEXAS
JENNIFER T. EVANS
125641
LICENSED
PROFESSIONAL ENGINEER

10/19/2016

AIA ENGINEERS, LTD.
CONSULTANTS
6500 LBJ FREEWAY, 9TH FLR, DALLAS, TX 75240
PHONE: (972) 490-9000 TBPE # 3991

BENTON ROAD STREET DEDICATION AND RESERVE

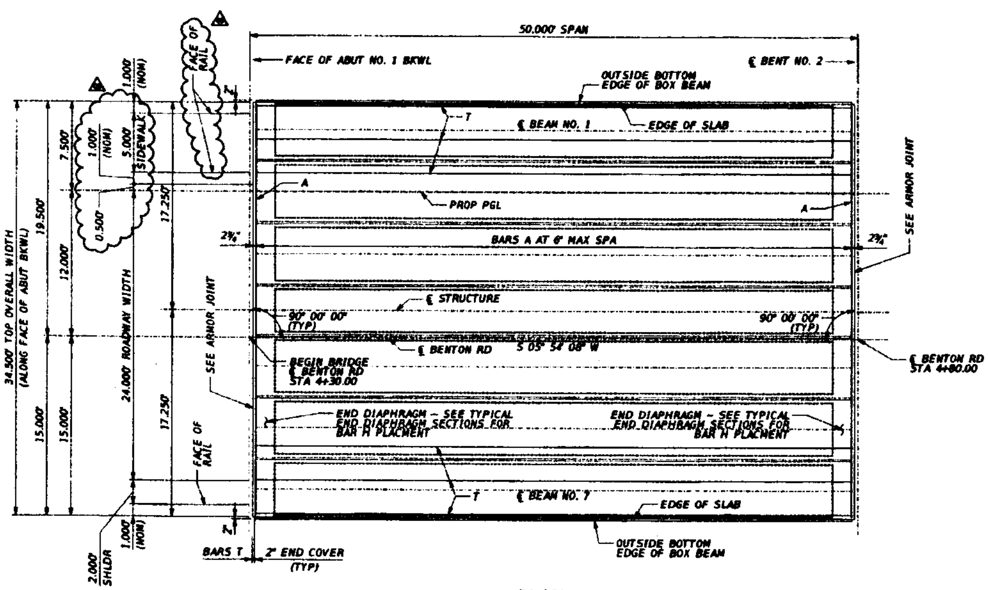
FRAMING PLAN (SPAN NO. 1)

SHEET 1 OF 2

CITY OF ROSENBERG

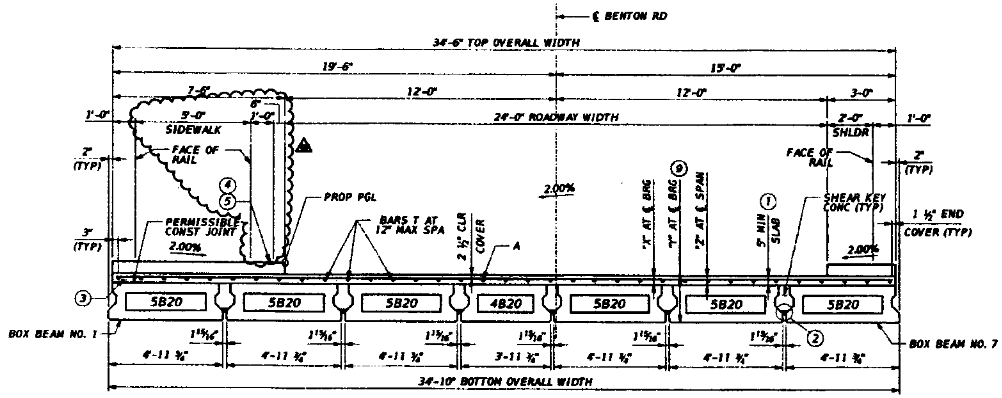
VERT: N/A
HORIZ:

22 - 50



PLAN

SCALE: 10'-0" = 1'-0"



TYPICAL TRANSVERSE SECTION

SCALE: 3/8" = 1'-0"

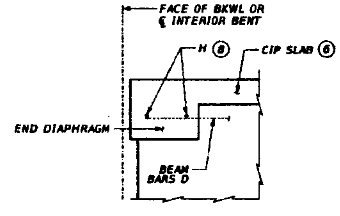
1. SLAB THICKNESS AT MIDSPAN OF BEAMS MAY NOT EXCEED 6.5 INCHES.
2. FORM BOTTOM OF SHEAR KEYS WITH FOAM BACKER ROD OR OTHER MATERIAL ACCEPTABLE TO THE ENGINEER.
3. SEE TYPE C411 (MOD) RAIL, TYPE PR1 RAIL, AND BBRAS FOR REQUIRED REINFORCING CONNECTION TO BRIDGE DECK.
4. SEE BRSN FOR BRIDGE RAISED SIDEWALK AND SHOULDER DETAILS.
5. SEE BS-EJDP FOR REQUIRED BRIDGE SIDEWALK EXPANSION PLATES.
6. SLAB REINFORCING OMITTED FOR CLARITY.
7. SEE BRIDGE LAYOUT FOR JOINT TYPE.
8. PROVIDE 1½" 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.
9. BASED ON THEORETICAL BEAM CAMBER, DEAD LOAD DEFLECTIONS OF 5" CAST-IN-PLACE SLAB, SHEAR KEY DEAD LOAD AND A CONSTANT GRADE. THE CONTRACTOR MUST ADJUST THESE VALUES FOR ANY VERTICAL CURVE.
10. FABRICATOR MUST ADJUST BEAM LENGTHS FOR BEAM SLOPES AS REQUIRED.
11. REINFORCING STEEL WEIGHT IS BASED ON AN APPROXIMATE FACTOR OF 2.0 LBS PER SQUARE FOOT OF SLAB.

BAR TABLE

BAR	SIZE
A	#4
H	#5
T	#4

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7TH EDITION (2014).
PROVIDE CLASS S CONCRETE (f'c = 4,000 PSI) FOR SLAB AND SHEAR KEY.
ALL REINFORCING STEEL SHALL BE GRADE 60.
BAR LAPS, WHERE REQUIRED, SHALL BE AS FOLLOWS:
#4 = 1'-5" (UNCOATED)
IT IS RECOMMENDED TO ERECT BEAMS ON THE HIGH SIDE OF CROSS-SLOPE FIRST AND PROGRESS TO THE LOW SIDE.
FOR FRAMING DETAILS NOT SHOWN, SEE FRAMING PLAN.
SEE RAILING DETAILS AND STANDARD BBRAS FOR RAIL ANCHORAGE.



ABUTMENT OR INTERIOR BENT
(WITH EXPANSION JOINT) (7)

TYPICAL END DIAPHRAGM SECTION

(ALONG CENTERLINE OF BOX BEAM)

SPAN NO.	BEAM NO.	SECTION DEPTHS "X" AT CL BRNG (9)	"Y" AT CL BRNG (9)	"Z" AT CL SPAN (9)
1	1 & 7	6 1/2"	2' - 2 1/2"	5 5/8"
	2 - 3 & 5 - 6	6 1/2"	2' - 2 1/2"	5 5/8"
	4	6 1/2"	2' - 2 1/2"	5 5/8"

SPAN NO. 1 TABLE OF ESTIMATED QUANTITIES

ITEM	UNIT	QTY
REINF CONC SLAB (BOX BEAM) (9)	SF	1723
BRIDGE SIDEWALK	SF	525
CL S CONC (SHEAR KEY)	CY	8.4
PRESTR CONC BOX BEAM (4B20) (10)	LF	50.00
PRESTR CONC BOX BEAM (5B20) (10)	LF	300.00
TOTAL REINF STEEL (10)	LB	3624

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: DEVELOPMENT COORDINATOR
DATE: 11/8/16

HL93 LOADING

STATE OF TEXAS
JENNIFER T. EVANS
115641
LICENSED PROFESSIONAL ENGINEER

10/19/2016

AIA ENGINEERS, LTD.
CONSULTANTS

BENTON ROAD STREET DEDICATION AND RESERVE

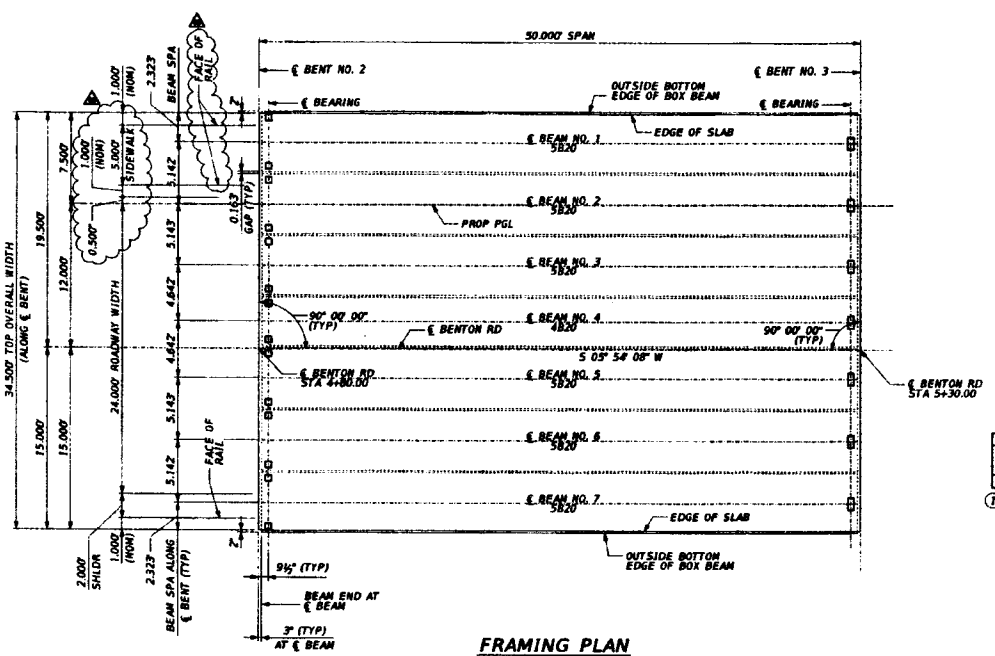
50.00' PRESTR CONC BOX BEAM (SPAN NO. 1)

SHEET 2 OF 2

CITY OF ROSENBERG

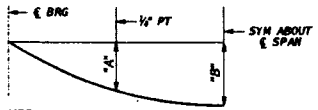
VERT: N/A
HORIZ:

23 of 50



FRAMING PLAN

SCALE: 10'-0" = 1'-0"



NOTE:
DEFLECTIONS SHOWN ARE DUE TO SHEAR KEY AND CONCRETE SLAB ONLY, (Ec = 5,000 KSI). CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY BE LESS. DEFLECTIONS MAY BE ADJUSTED BASED ON FIELD OBSERVATIONS.

DEAD LOAD DEFLECTION DIAGRAM

SPAN NO.	BEAM NO.	POINT	DEAD LOAD DEFLECTIONS (FT) SHEAR KEY	SLAB	TOTAL
2	1 & 7	"A"	-0.002	-0.014	-0.016
		"B"	-0.003	-0.019	-0.022
	2 - 3 & 5 - 6	"A"	-0.005	-0.014	-0.019
		"B"	-0.007	-0.020	-0.027
	4	"A"	-0.006	-0.014	-0.020
		"B"	-0.008	-0.020	-0.028

BEAM REPORT

SPAN NO.	BEAM NO.	HORIZONTAL DISTANCE C ABUT - C BEN	C - C BRG	TRUE DISTANCE BOTTOM BEAM (1)	BEAM SLOPE
2	ALL	50.000'	48.417'	49.500'	0.0000

(1) BEAM LENGTHS SHOWN ARE BOTTOM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7TH EDITION (2014).
IT IS RECOMMENDED TO ERECT BEAMS ON THE HIGH SIDE OF CROSS-SLOPE FIRST AND PROGRESS TO THE LOW SIDE.

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: DEVELOPMENT COORDINATION
DATE: 11/8/16

HL93 LOADING

STATE OF TEXAS
JENNIFER T. EVANS
115641
LICENSED
PROFESSIONAL ENGINEER

10/19/2016

AIA ENGINEERS LTD.
CONSULTANTS

BENTON ROAD STREET DEDICATION AND RESERVE

FRAMING PLAN (SPAN NO. 2)

SHEET 1 OF 2

CITY OF ROSENBERG

VERT: N/A
HORIZ: N/A

24 x 50

① SLAB THICKNESS AT MIDSPAN OF BEAMS MAY NOT EXCEED 6.5 INCHES.

② FORM BOTTOM OF SHEAR KEYS WITH FOAM BACKER ROD OR OTHER MATERIAL ACCEPTABLE TO THE ENGINEER.

③ SEE TYPE C411 (MOD) RAIL, TYPE PR1 RAIL, AND BBRAS FOR REQUIRED REINFORCING CONNECTION TO BRIDGE DECK.

④ SEE BRSM FOR BRIDGE RAISED SIDEWALK AND SHOULDER DETAILS.

⑤ SEE BS-EJDP FOR REQUIRED BRIDGE SIDEWALK EXPANSION PLATES.

⑥ SLAB REINFORCING OMITTED FOR CLARITY.

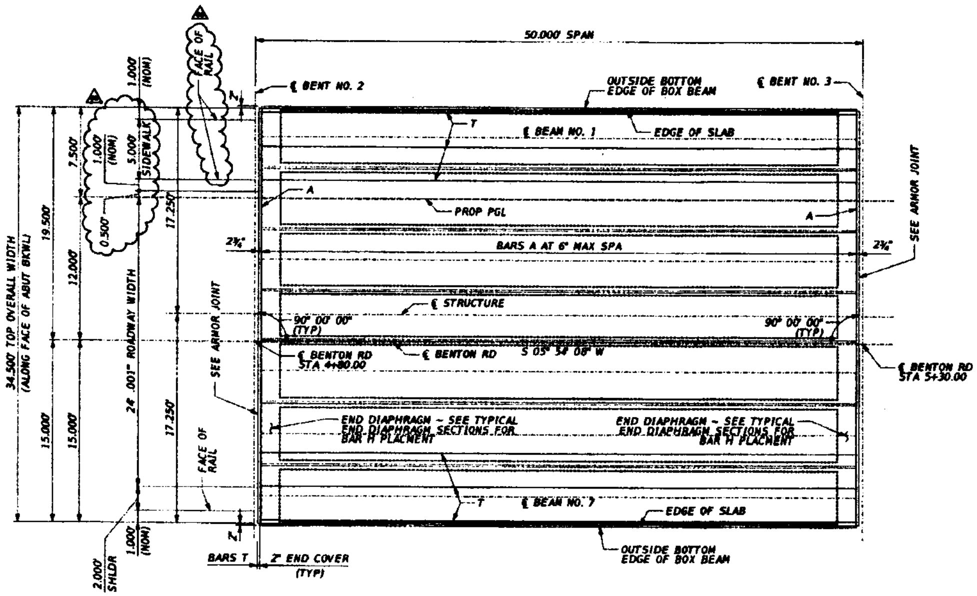
⑦ SEE BRIDGE LAYOUT FOR JOINT TYPE.

⑧ PROVIDE 1½" 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.

⑨ BASED ON THEORETICAL BEAM CAMBER, DEAD LOAD DEFLECTIONS OF 5" CAST-IN-PLACE SLAB, SHEAR KEY DEAD LOAD AND A CONSTANT GRADE. THE CONTRACTOR MUST ADJUST THESE VALUES FOR ANY VERTICAL CURVE.

⑩ FABRICATOR MUST ADJUST BEAM LENGTHS FOR BEAM SLOPES AS REQUIRED.

⑪ REINFORCING STEEL WEIGHT IS BASED ON AN APPROXIMATE FACTOR OF 2.0 LBS PER SQUARE FOOT OF SLAB.



PLAN

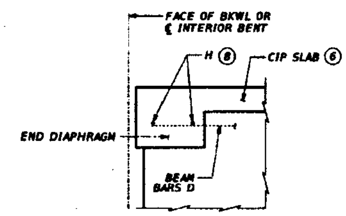
SCALE: 10'-0" = 1'-0"

BAR TABLE

BAR	SIZE
A	#4
H	#5
T	#4

GENERAL NOTES:

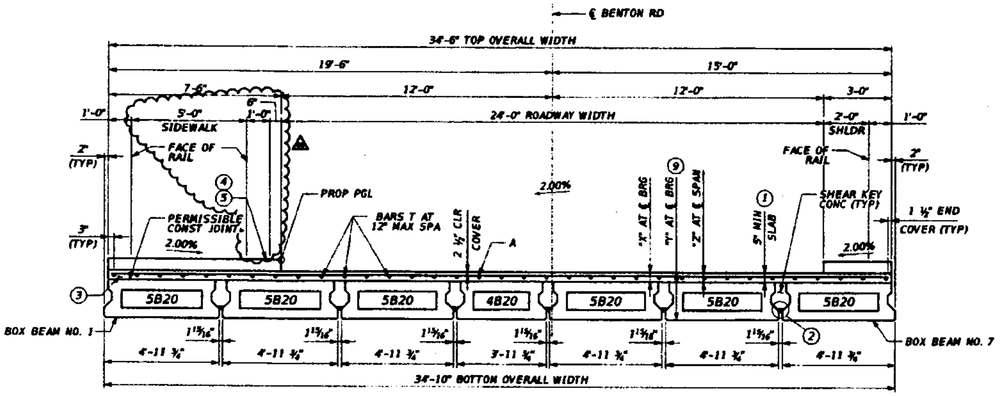
DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7TH EDITION (2014).
PROVIDE CLASS S CONCRETE (f'c = 4,000 PSI) FOR SLAB AND SHEAR KEY.
ALL REINFORCING STEEL SHALL BE GRADE 60.
BAR LAPS, WHERE REQUIRED, SHALL BE AS FOLLOWS:
#4 = 1'-5" (UNCOATED)
IT IS RECOMMENDED TO ERECT BEAMS ON THE HIGH SIDE OF CROSS-SLOPE FIRST AND PROGRESS TO THE LOW SIDE.
FOR FRAMING DETAILS NOT SHOWN, SEE FRAMING PLAN.
SEE RAILING DETAILS AND STANDARD BBRAS FOR RAIL ANCHORAGE.



ABUTMENT OR INTERIOR BENT
(WITH EXPANSION JOINT) ⑦

TYPICAL END DIAPHRAGM SECTION

(ALONG CENTERLINE OF BOX BEAM)



TYPICAL TRANSVERSE SECTION

SCALE: ⅜" = 1'-0"

SPAN NO.	BEAM NO.	SECTION DEPTHS "X" AT CL BRNG ⑨	"Y" AT CL BRNG ⑨	"Z" AT C' SPAN ⑨
2	1 & 7	6 1/2"	2' - 2 1/2"	5 5/8"
	2 - 3 & 5 - 6	6 1/2"	2' - 2 1/2"	5 5/8"
	4	6 1/2"	2' - 2 1/2"	5 5/8"

SPAN NO. 2
TABLE OF ESTIMATED QUANTITIES

ITEM	UNIT	QTY
REINF CONC SLAB (BOX BEAM) ⑨	SF	1723
BRIDGE SIDEWALK	SF	525
CL S CONC (SHEAR KEY)	CY	8
PRESTR CONC BOX BEAM (4B20) ⑩	LF	50
PRESTR CONC BOX BEAM (5B20) ⑩	LF	300
TOTAL REINF STEEL ⑪	LB	3624

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: [illegible]
DEVELOPMENT COORDINATOR
DATE: 11/15/16

HL93 LOADING

STATE OF TEXAS
JENNIFER T. EVANS
115641
LICENSED PROFESSIONAL ENGINEER

10/19/2016

AIA ENGINEERS, LTD.
CONSULTANTS

BENTON ROAD STREET DEDICATION AND RESERVE

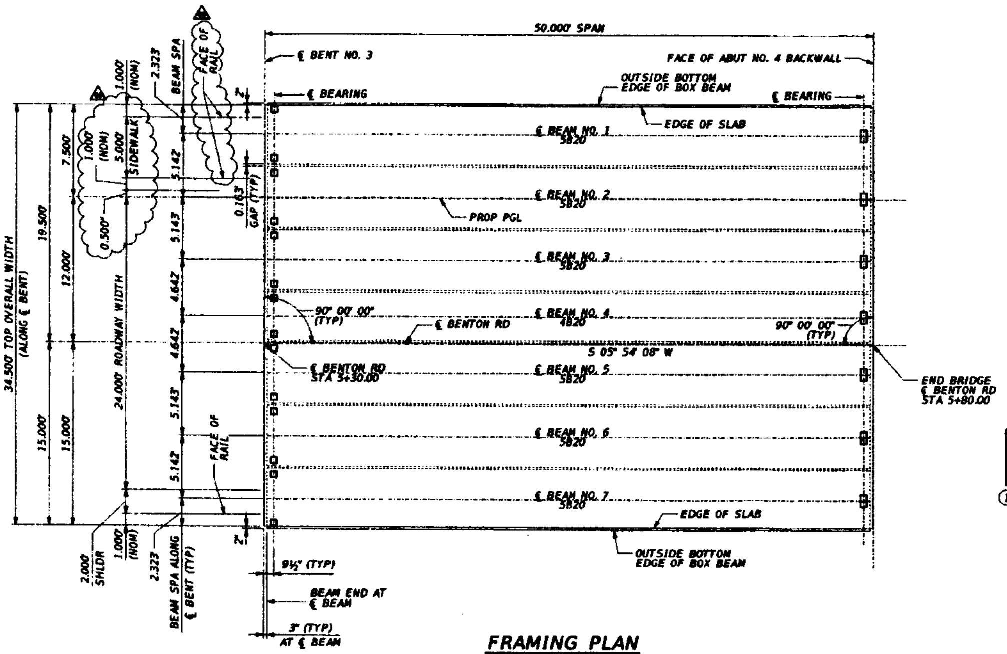
50.00' PRESTR CONC
BOX BEAM (SPAN NO. 2)

SHEET 2 OF 2

CITY OF ROSENBERG

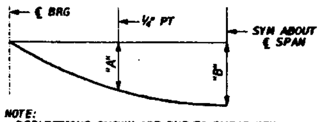
VERT: N/A
HORIZ:

25 - 50


50.000' SPAN
℄ BENT NO. 3
FACE OF ABUT NO. 4 BACKWALL
OUTSIDE BOTTOM EDGE OF BOX BEAM
℄ BEARING
℄ BEARING
EDGE OF SLAB
℄ BEAM NO. 1 5B20
℄ BEAM NO. 2 5B20
℄ BEAM NO. 3 5B20
℄ BEAM NO. 4 4B20
℄ BEAM NO. 5 5B20
℄ BEAM NO. 6 5B20
℄ BEAM NO. 7 5B20
PROP PGL
90° 00' 00" (TYP)
℄ BENTON RD
S 05° 54' 08" W
℄ BENTON RD STA 5+30.00
END BRIDGE ℄ BENTON RD STA 5+80.00
EDGE OF SLAB
OUTSIDE BOTTOM EDGE OF BOX BEAM
34.500' TOP OVERALL WIDTH (ALONG ℄ BENT)
24.000' ROADWAY WIDTH
19.500
15.000
15.000
12.000
7.500
SIDEWALK
FACE OF RAIL
FACE OF RAIL
BEAM SPA
2.323
5.142
5.143
4.642
4.642
5.143
5.142
0.163' GAP (TYP)
2.000 SHLDR
BEAM SPA ALONG ℄ BENT (TYP)
9½" (TYP)
BEAM END AT ℄ BEAM
3" (TYP) AT ℄ BEAM

FRAMING PLAN

SCALE: 10'-0" = 1'-0"



NOTE:
DEFLECTIONS SHOWN ARE DUE TO SHEAR KEY AND CONCRETE SLAB ONLY. (Ec = 5,000 KSI).
CALCULATED DEFLECTIONS SHOWN ARE THEORETICAL AND ACTUAL DIMENSIONS MAY BE LESS. DEFLECTIONS MAY BE ADJUSTED BASED ON FIELD OBSERVATIONS.

DEAD LOAD DEFLECTION DIAGRAM

SPAN NO.	BEAM NO.	POINT	DEAD LOAD DEFLECTIONS (FT)		
			SHEAR KEY	SLAB	TOTAL
3	1 & 7	"A"	-0.002	-0.014	-0.016
		"B"	-0.003	-0.019	-0.022
	2 - 3 & 5 - 6	"A"	-0.005	-0.014	-0.019
		"B"	-0.007	-0.020	-0.027
	4	"A"	-0.006	-0.014	-0.020
		"B"	-0.008	-0.020	-0.028

BEAM REPORT					
SPAN NO.	BEAM NO.	HORIZONTAL DISTANCE		TRUE DISTANCE	
		C ABUT - C BEN	C - C BRG	BOTTOM BEAM (1)	BEAM SLOPE
3	ALL	50.000	48.417'	49.501'	-0.0077

(1) BEAM LENGTHS SHOWN ARE BOTTOM LENGTHS WITH ADJUSTMENTS MADE FOR BEAM SLOPE.

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7TH EDITION (2014).
IT IS RECOMMENDED TO ERECT BEAMS ON THE HIGH SIDE OF CROSS-SLOPE FIRST AND PROGRESS TO THE LOW SIDE.

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: DEVELOPMENT COORDINATOR
DATE: 11/15/16

HL93 LOADING

STATE OF TEXAS
JENNIFER T. EVANS
115641
LICENSED PROFESSIONAL ENGINEER

10/19/2016

AIA ENGINEERS, LTD.
CONSULTANTS

BENTON ROAD STREET DEDICATION AND RESERVE

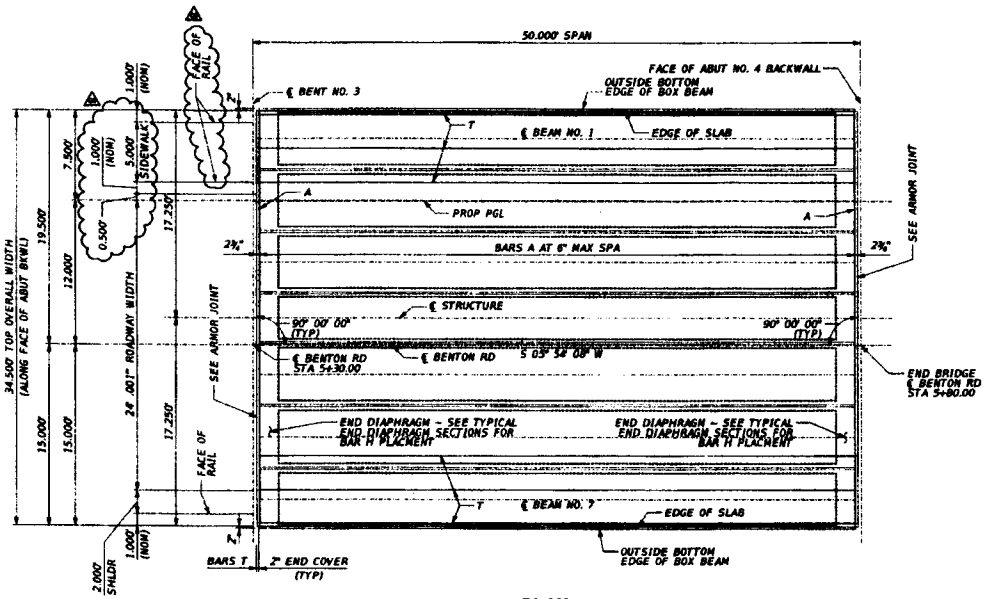
FRAMING PLAN
(SPAN NO. 3)

SHEET 1 OF 2

CITY OF ROSENBERG

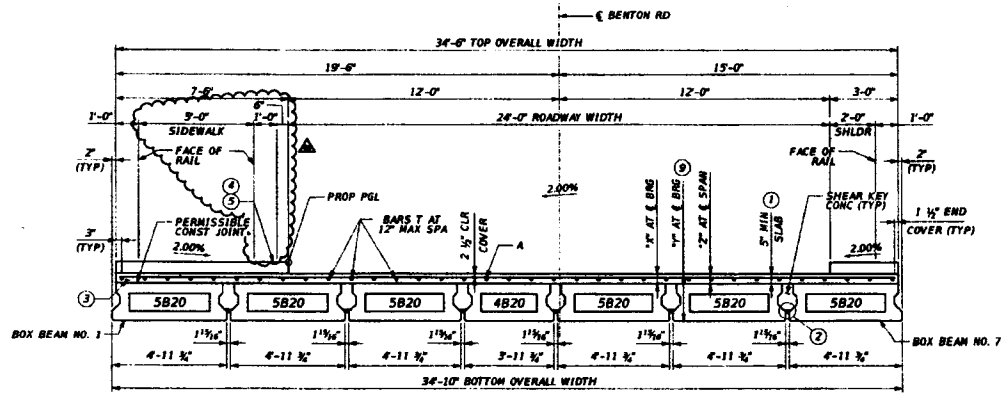
VERT:
HORIZ: N/A

26 - 50



PLAN

SCALE: 1'-0" = 1'-0"



TYPICAL TRANSVERSE SECTION

SCALE: ⅜" = 1'-0"

1. SLAB THICKNESS AT MIDSPAN OF BEAMS MAY NOT EXCEED 6.5 INCHES.
2. FORM BOTTOM OF SHEAR KEYS WITH FOAM BACKER ROD OR OTHER MATERIAL ACCEPTABLE TO THE ENGINEER.
3. SEE TYPE C411 (MOD) RAIL, TYPE PR1 RAIL, AND BBRAS FOR REQUIRED REINFORCING CONNECTION TO BRIDGE DECK.
4. SEE BRSW FOR BRIDGE RAISED SIDEWALK AND SHOULDER DETAILS.
5. SEE BS-EJDP FOR REQUIRED BRIDGE SIDEWALK EXPANSION PLATES.
6. SLAB REINFORCING OMITTED FOR CLARITY.
7. SEE BRIDGE LAYOUT FOR JOINT TYPE.
8. PROVIDE 1½" 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.
9. BASED ON THEORETICAL BEAM CAMBER, DEAD LOAD DEFLECTIONS OF 5" CAST-IN-PLACE SLAB, SHEAR KEY DEAD LOAD AND A CONSTANT GRADE. THE CONTRACTOR MUST ADJUST THESE VALUES FOR ANY VERTICAL CURVE.
10. FABRICATOR MUST ADJUST BEAM LENGTHS FOR BEAM SLOPES AS REQUIRED.
11. REINFORCING STEEL WEIGHT IS BASED ON AN APPROXIMATE FACTOR OF 2.0 LBS PER SQUARE FOOT OF SLAB.

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

GENERAL NOTES:

DESIGNED ACCORDING TO AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7TH EDITION (2014).
PROVIDE CLASS S CONCRETE (f'c = 4,000 PSI) FOR SLAB AND SHEAR KEY.
ALL REINFORCING STEEL SHALL BE GRADE 60.
BAR LAPS, WHERE REQUIRED, SHALL BE AS FOLLOWS:
#4 = 1'-5" (UNCOATED)
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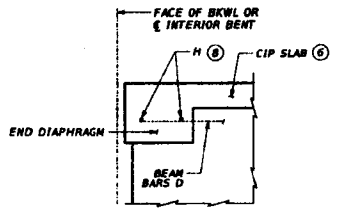
FOR FRAMING DETAILS NOT SHOWN, SEE FRAMING PLAN.
SEE RAILING DETAILS AND STANDARD BBRAS FOR RAIL ANCHORAGE.



ABUTMENT OR INTERIOR BENT (WITH EXPANSION JOINT) (7)

TYPICAL END DIAPHRAGM SECTION

(ALONG CENTERLINE OF BOX BEAM)

SPAN NO.	BEAM NO.	SECTION DEPTHS "X" AT CL BRNG (9)	"Y" AT CL BRNG (9)	"Z" AT CL SPAN (9)
3	1 & 7	6 1/2"	2' - 2 1/2"	5 5/8"
	2 - 3 & 5 - 6	6 1/2"	2' - 2 1/2"	5 5/8"
	4	6 1/2"	2' - 2 1/2"	5 5/8"

SPAN NO. 3
TABLE OF ESTIMATED QUANTITIES

ITEM	UNIT	QTY
REINF CONC SLAB (BOX BEAM) (9)	SF	1723
BRIDGE SIDEWALK	SF	525
CL S CONC (SHEAR KEY)	CY	8
PRESTR CONC BOX BEAM (4B20) (10)	LF	50
PRESTR CONC BOX BEAM (5B20) (10)	LF	300
TOTAL REINF STEEL (11)	LB	3624

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: DEVELOPMENT COORDINATION
DATE: 11/8/16

HL93 LOADING

STATE OF TEXAS
JENNIFER T. EVANS
115641
LICENSED PROFESSIONAL ENGINEER
10/19/2016

AIA ENGINEERS LTD.
CONSULTANTS

BENTON ROAD STREET DEDICATION AND RESERVE

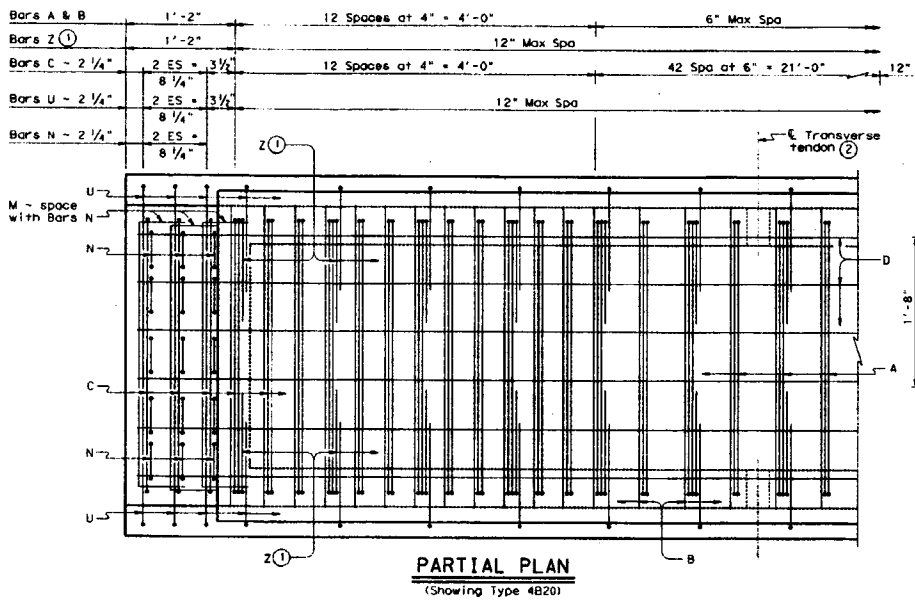
50.00' PRESTR CONC BOX BEAM (SPAN NO. 3)

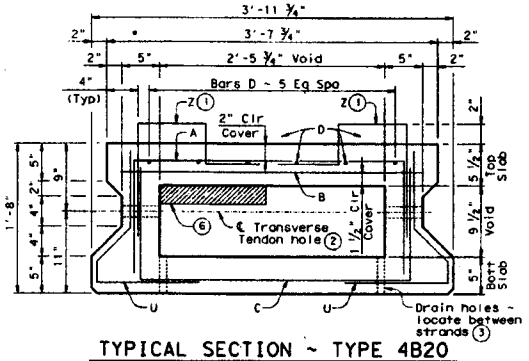
SHEET 2 OF 2

CITY OF ROSENBERG

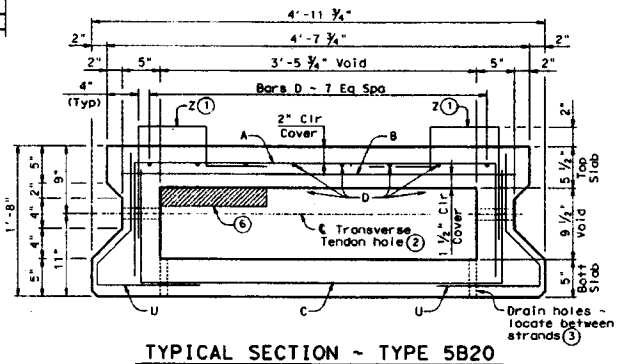
VERT: N/A
HORIZ: N/A
27 - 50

Maggie 11/8/16

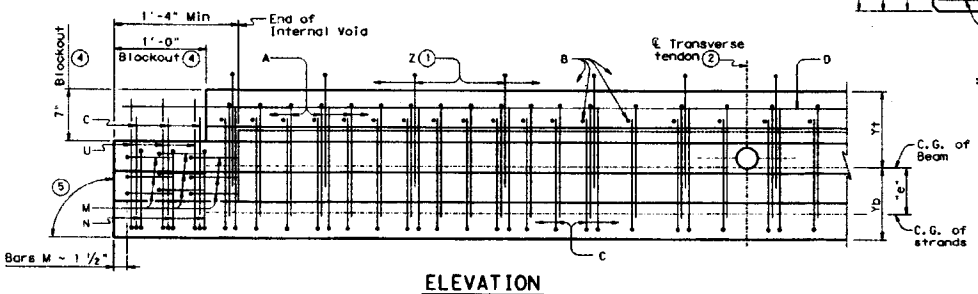




TYPICAL SECTION ~ TYPE 4B20



TYPICAL SECTION ~ TYPE 5B20



BEAM PROPERTIES			
		Type 4B20	Type 5B20
Area	in^2	591.8	717.8
Y top	in	10.19	10.12
Y bott	in	9.81	9.88
I	in^4	28,086	35,234
Weight (7)	lb/ft	616	748

(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 1/2" 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

Bridge Division Standard

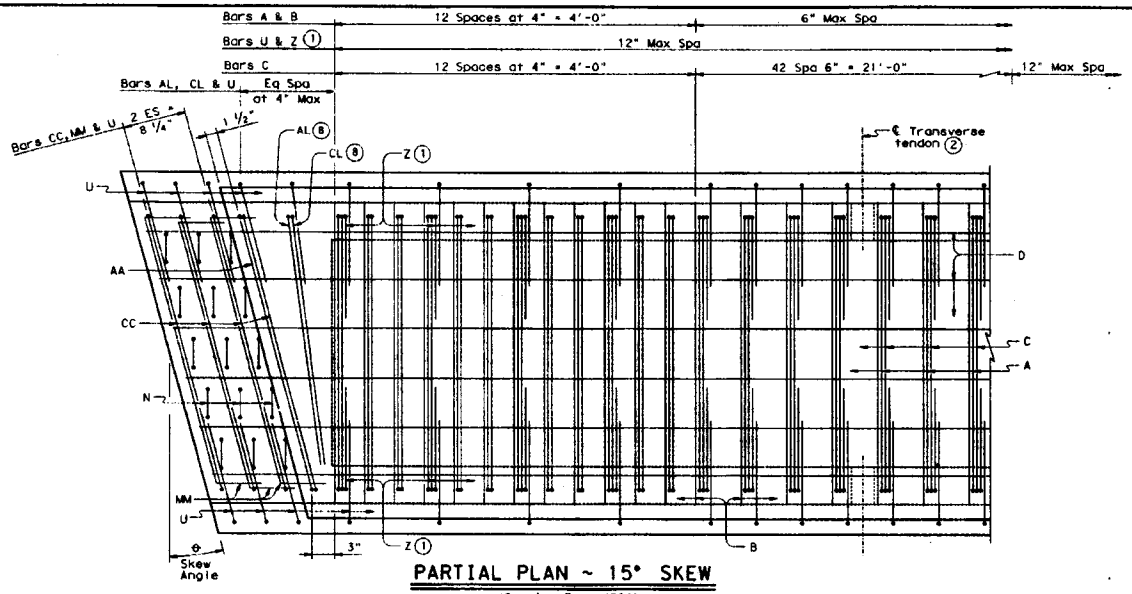
PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

FILE: bbstd01.dgn	dn: TxDOT	ck: TxDOT	dw: TxDOT	ck: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-12: Bars Z.	DIST	COUNTY		SHEET NO. 28

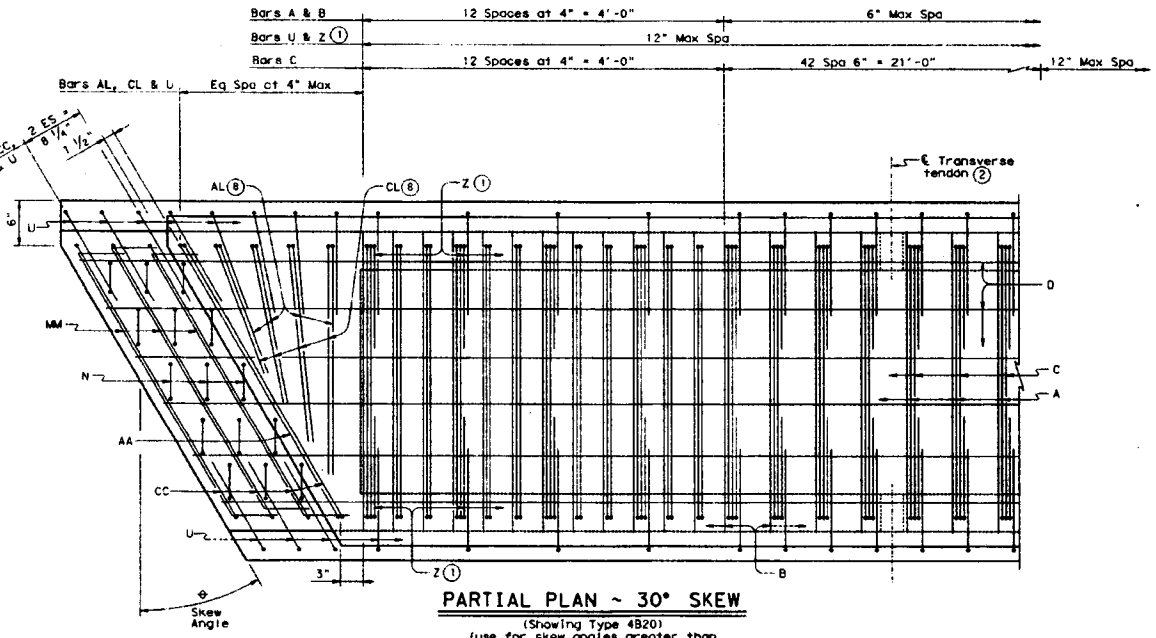
11/8/16

DATE: 6/7/2016 9:19:59 AM
FILE: F:\TXPROJ\TX2449-00\Dwg\DGN\Standards\Bridge\bbstd01.dgn



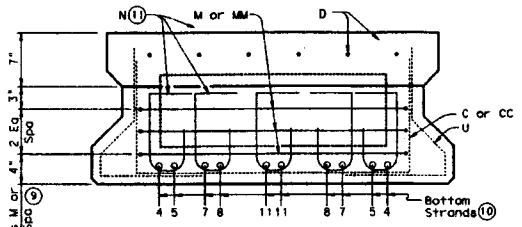
PARTIAL PLAN ~ 15° SKEW

(Showing Type 4B20)
(use for skew angles of 15° or less)



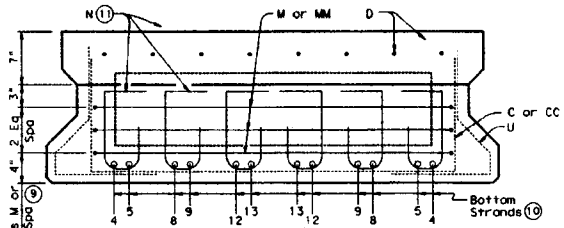
PARTIAL PLAN ~ 30° SKEW

(Showing Type 4B20)
(use for skew angles greater than 15° and less than or equal to 30°)



SECTION THRU BLOCKOUT ~ TYPE 4B20

(Showing End Mat Reinforcing)



SECTION THRU BLOCKOUT ~ TYPE 5B20

(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 hole 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 4B20 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 5B20 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.

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HL93 LOADING

Texas Department of Transportation

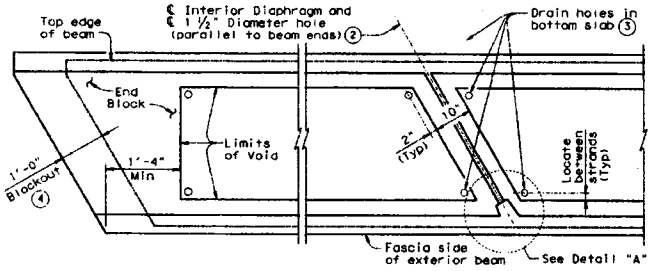
Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

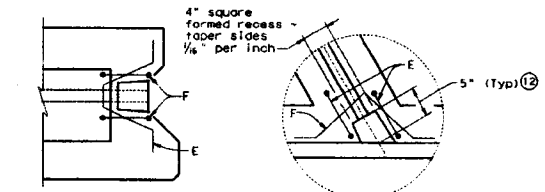
FILE: bbstds01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-12: Bars Z.	DIST	COUNTY		SHEET NO. 29

11/8/16



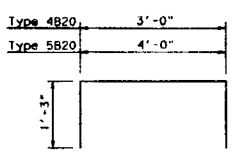
BLOCKOUT, INTERIOR DIAPHRAGM AND DRAIN DETAILS

(Showing 30° skew)

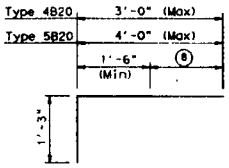


POST-TENSION ANCHORAGE DETAIL

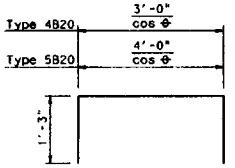
DETAIL A



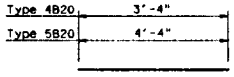
BARS A & C (#4)



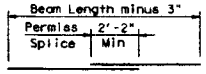
BARS AL & CL (#4)



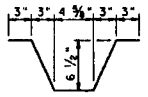
BARS AA & CC (#4)



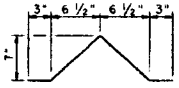
BARS B (#4)



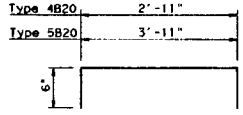
BARS D (#5)
Permissible splices to be placed in middle third of span



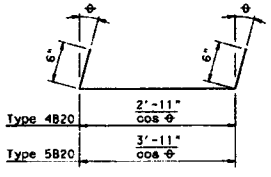
BARS E (#4)



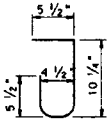
BARS F (#4)



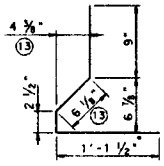
BARS M (#4)



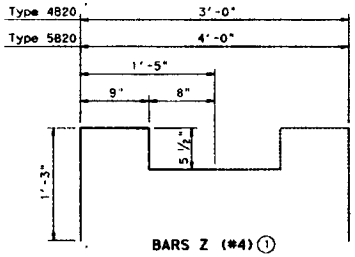
BARS MM (#4)



BARS N (#4)



BARS U (#4)



BARS Z (#4) (1)

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.

(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.

HL93 LOADING

SHEET 3 OF 3

Texas Department of Transportation

Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DETAILS (TYPE B20)

BB-B20

FILE: bbtd01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT December, 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 01-12: Bars Z.	DIST	COUNTY		SHEET NO. 30

11/8/16

DATE: 6/1/2016 9:20:36 AM
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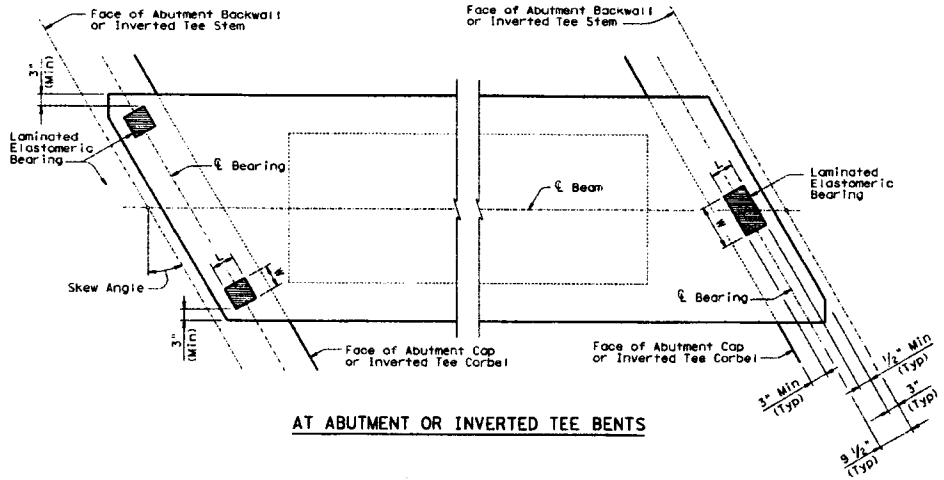
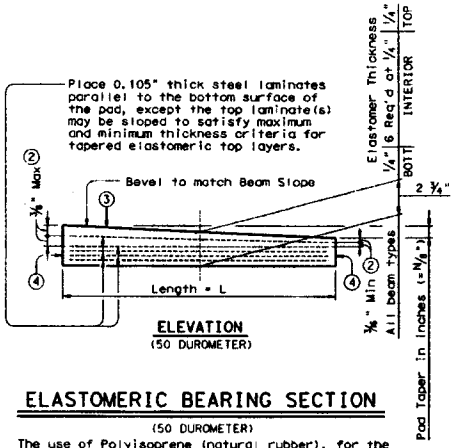


AT ABUTMENT OR INVERTED TEE BENTS



ELEVATION
(50 DUROMETER)

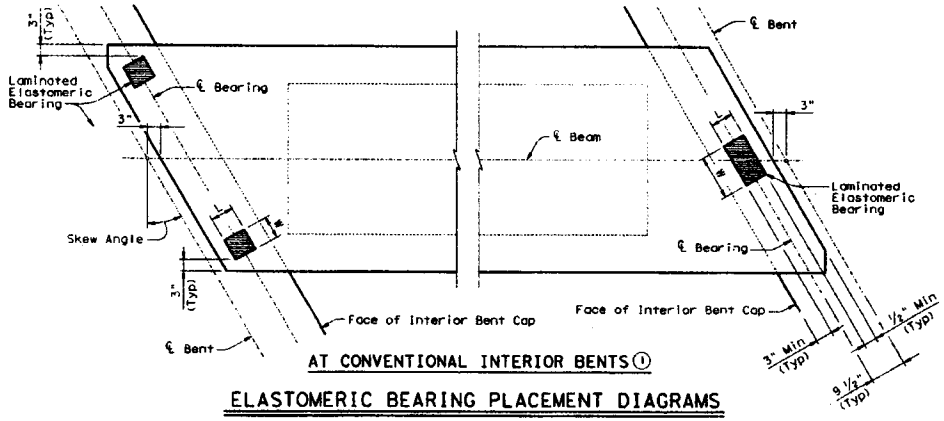
ELASTOMERIC BEARING SECTION

(50 DUROMETER)

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

ELASTOMETRIC BEARING DIMENSIONS

BEARING TYPE	BEAM TYPE	ONE BEARING L	ONE BEARING W	TWO BEARINGS L	TWO BEARINGS 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"



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.

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 ⅛" increments) in this mark.
Examples: N=0, (for 0" taper)
N=1, (for ⅛" taper)
N=2, (for ¼" taper)
(etc.)
Fabricated pad top surface slope must not vary from plan beam slope by more than $\left(\frac{0.0625"}{\text{Length}}\right)$ IN/IN.

④ Locate Permanent Mark here.

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

FILE: bbeb08.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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REVISIONS	DIST	COUNTY		SHEET NO. 31

11/8/16

DATE: 6/7/2016 5:13:20 AM
FILE: F:\TXPROJ\TX2449-00\Dwg\DGN\Standards\Bridge\bbsta08.dgn

STRUCTURE	SPAN NO.	BEAM NO.	BEAM TYPE	NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" ℄ (in)	"e" END (in)	TOT NO. DEB	DIST FROM BOTTOM (in)	NO OF STRANDS: TOTAL	NO OF STRANDS: DE-BONDED	DEBONDED TO (ft from end): 3	6	9	12	15	RELEASE STRGTH ① f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fct(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fcb(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (ft-kips)	LIVE LOAD DISTRIBUTION FACTOR ②: Moment	Shear
BENTON RD 24' ROADWAY 5" SLAB	1	1-3 & 5-7	5B20		18	0.6	270	7.38	7.38	0	2.50	18	0	0	0	0	0	0	4.000	5.000	2.320	-2.571	1357	0.388	0.653
	1	4	4B20		12	0.6	270	7.31	7.31	0	2.50	12	0	0	0	0	0	0	4.000	5.000	2.092	-2.236	991	0.328	0.473
	2	1-3 & 5-7	5B20		18	0.6	270	7.38	7.38	0	2.50	18	0	0	0	0	0	0	4.000	5.000	2.320	-2.571	1357	0.388	0.653
	2	4	4B20		12	0.6	270	7.31	7.31	0	2.50	12	0	0	0	0	0	0	4.000	5.000	2.092	-2.236	991	0.328	0.473
	3	1-3 & 5-7	5B20		18	0.6	270	7.38	7.38	0	2.50	18	0	0	0	0	0	0	4.000	5.000	2.320	-2.571	1357	0.388	0.653
	3	4	4B20		12	0.6	270	7.31	7.31	0	2.50	12	0	0	0	0	0	0	4.000	5.000	2.092	-2.236	991	0.328	0.473

DESIGNED BEAMS (STRAIGHT STRANDS) — OPTIONAL DESIGN

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 75% 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 fpu.

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 424.4.2.2.2.4.

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.

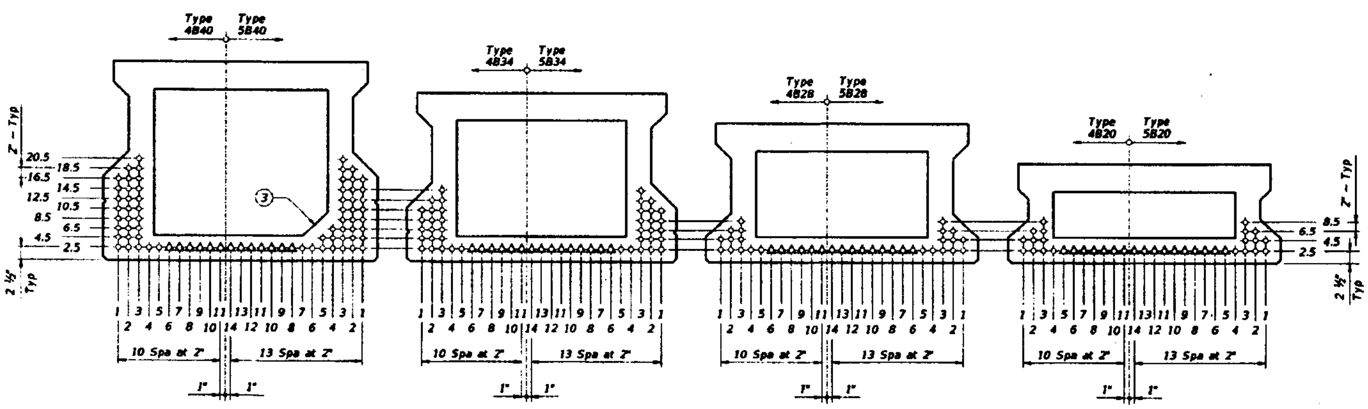
Full-length debonded strands are only permitted in positions marked Δ.

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: [signature] DEVELOPMENT COORDINATOR
DATE: 11/8/16

HL93 LOADING

STATE OF TEXAS — JENNIFER T EVANS — 115641 — LICENSED PROFESSIONAL ENGINEER
10/19/2016

AIA ENGINEERS, LTD. CONSULTANTS



TxDOT B40 BOX BEAMS   TxDOT B34 BOX BEAMS   TxDOT B28 BOX BEAMS   TxDOT B20 BOX BEAMS

Texas Department of Transportation — Bridge Division Standard

PRESTRESSED CONCRETE BOX BEAM DESIGNS (NON-STANDARD SPANS)

BBND

FILE: bbstde07.dgn	DN: TxDOT	CK: TxDOT	DW: SFS	CK: SDB
©TxDOT December 2006	CONT	SECT	JOB	HIGHWAY
REVISIONS 04-11: ... 03-16: ...	DIST	COUNTY		SHEET NO. 32

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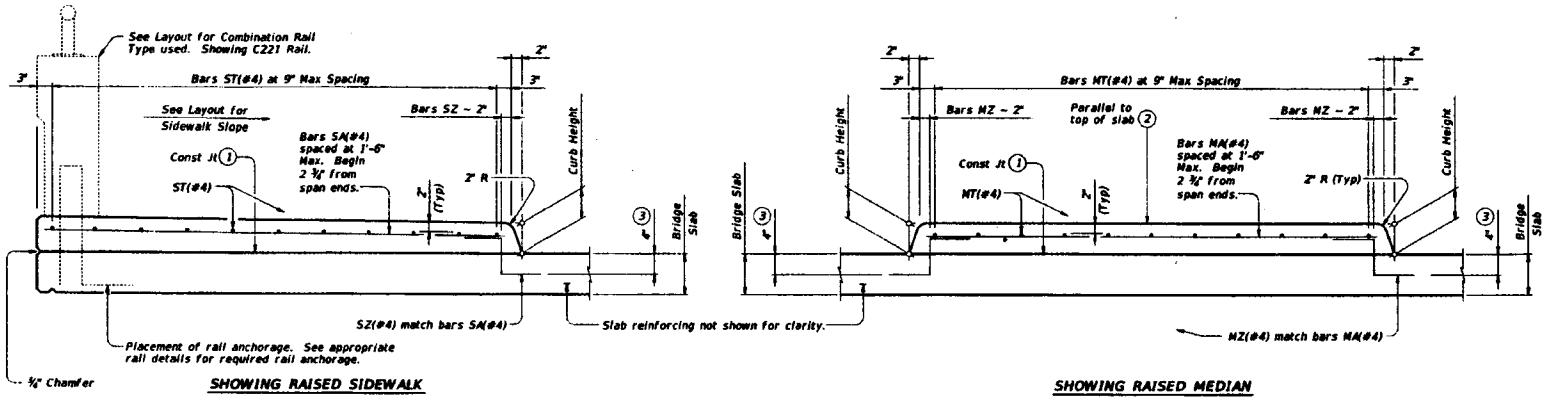


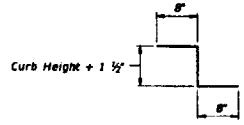
TYPICAL TRANSVERSE SECTIONS

See Span Details for dimensions not shown.

(1) Provide broom finish to top of bridge slab where raised sidewalk or raised median area is defined.

(2) Unless noted otherwise on the span details.

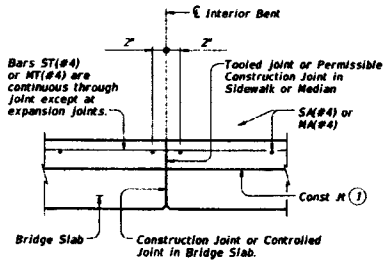
(3) Bars may rest on top of PCPs.



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

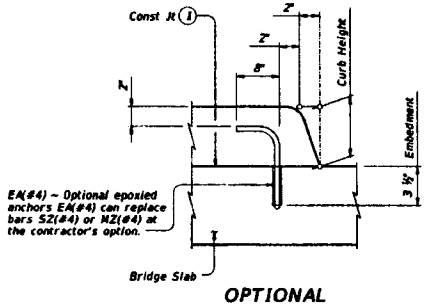
APPROVED SLIP RESISTANT PLATE	
Product	Manufacturer Website
Nebac® #3, Steel	www.harscoltg.com
Algrip™, Steel	www.algrip.com
SlipNOT® Grade 2, Steel	www.slipnot.com

Drain cover plates must be fabricated with a product from this list. No exceptions are permitted.



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) epoxy meeting the requirements of DMS-6100, "Epoxies and Adhesives". Follow manufacturer's directions for installing the epoxied anchor bars.

MATERIAL NOTES:

Provide the same concrete required for the bridge deck, Class S or Class S (HPC).

Provide Grade 60 reinforcement. Welded wire reinforcement (WWR) meeting ASTM A1064 of equivalent size and spacing may be substituted for bars SA, ST, MA, and MT.

Epoxy coat reinforcement if bridge deck reinforcement is required to be epoxy coated.

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 Specifications.

Provide the following bar or wire lap lengths when required:
Uncoated, 1'-5" Min
Coated, 2'-1" 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.

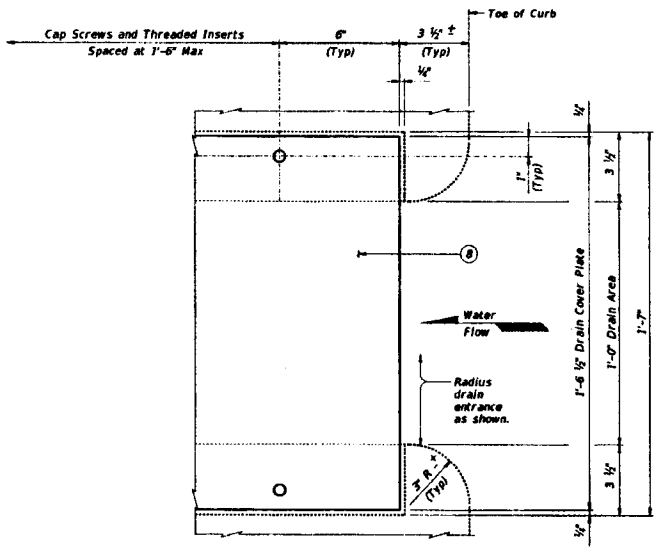
Texas Department of Transportation — Bridge Division Standard

BRIDGE RAISED SIDEWALK AND MEDIAN DETAILS

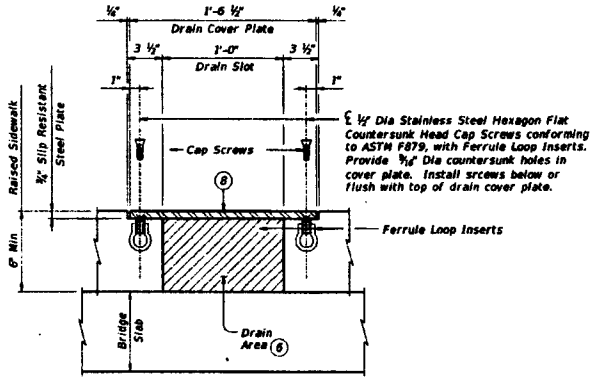
BRSM

FILE: brsmste1.dgn	DN: JRH	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT January 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO. 33

11/9/16



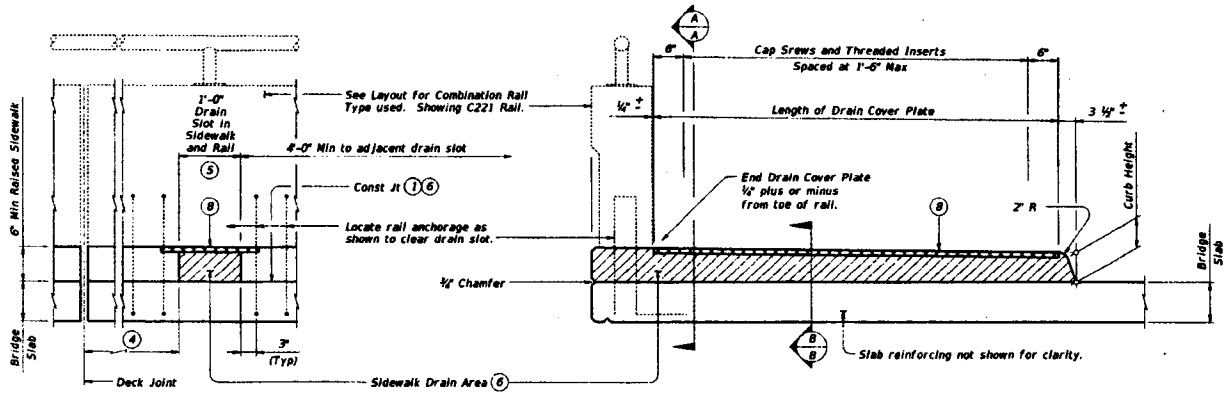
PARTIAL PLAN CURB DRAIN



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 defined.
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 ¾ x 18 ½ 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

BRSM

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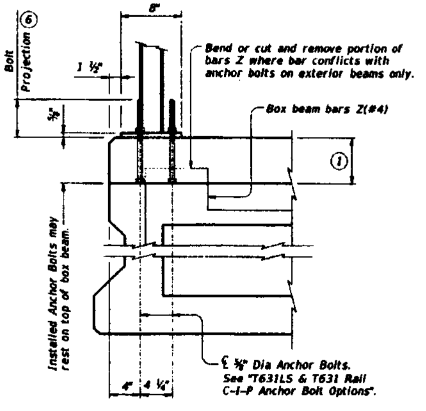
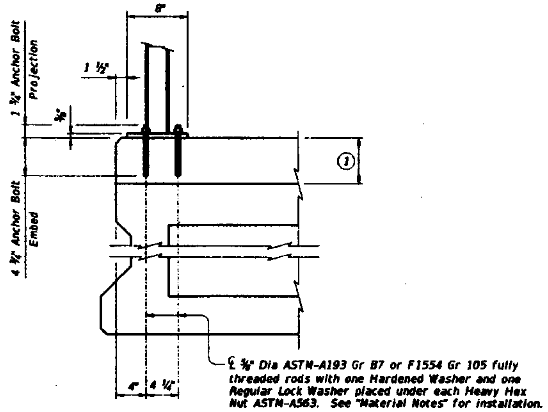
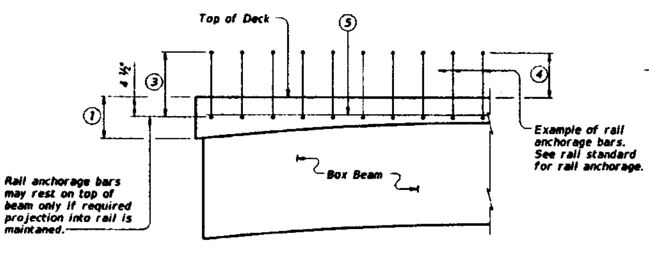


CAST-IN-PLACE ANCHORAGE OPTION

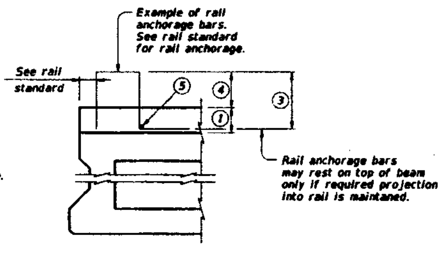


EPOXY ADHESIVE ANCHORAGE OPTION

T631LS & T631 RAIL ANCHORAGE PLACEMENT ②⑦



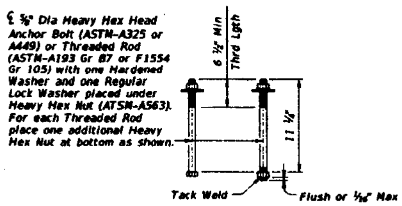
PART SPAN ELEVATION



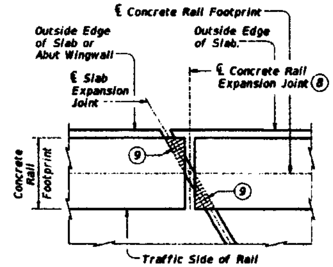
SECTION

TYPICAL CONCRETE RAIL ANCHORAGE

(Showing typical concrete rail anchorage)



T631LS & T631 RAIL C-I-P ANCHOR BOLT OPTIONS



PLAN OF CONCRETE RAILS AT EXPANSION JOINTS

① Cast-in-place slab thickness varies due to beam camber (5" minimum).

② Replace cast-in-place anchor bolts shown on T631 Rail standard with an epoxy system or cast-in-place anchor bolts shown on this sheet.

③ Bar length shown on rail standard, minus 1 ½". 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 ½" 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 ℄ Slab Expansion Joint, ℄ Rail Footprint and perpendicular to slab outside edge.

⑨ Cross-hatched area must have ½" Preformed Bitumuminous 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.

MATERIAL NOTES:

Galvanize all steel components except reinforcing steel unless noted otherwise.

Provide Grade 60 reinforcing.

Epoxy adhesive anchor bolts for T631 Rail must be ⅝" Dia ASTM-A193 Gr B7 or F1554 Gr 105 fully threaded rods with one Hardened Washer and one Regular Lock Washer placed under each Heavy Hex Nut ASTM-A563. Embed threaded rods 4 ½" Min into slab and/or abutment wingwall using a Type III, Class C epoxy adhesive anchorage system capable of obtaining an ultimate load, per threaded rod, of 8 kips in tension. Submit evidence of the proposed epoxy adhesive anchorage system'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 the manufacturer's instructions.

Cast-in-place anchorage system must be ⅝" Dia Heavy Hex Head Anchor Bolts (ASTM-A325 or A449) or Threaded Rods (ASTM-A193 Gr B7 or F1554 Gr 105) with one Hardened Washer and one Regular Lock Washer placed under Heavy Hex Nut (ATSM-A563). For each Threaded Rod place one additional Heavy Hex Nut at bottom as shown and tack weld. Embed anchor bolts 4 ½" minimum.

Epoxy coat reinforcement shown on this standard if rail reinforcement is epoxy coated.

GENERAL NOTES:

Designed in accordance with AASHTO LRFD 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 T80HT, T80SS, C412, PR1, PR2 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.

Texas Department of Transportation — Bridge Division Standard

RAIL ANCHORAGE DETAILS

PRESTR CONC BOX BEAMS (WITH SLAB)

BBRAS

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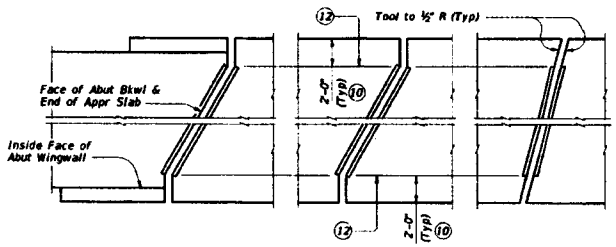
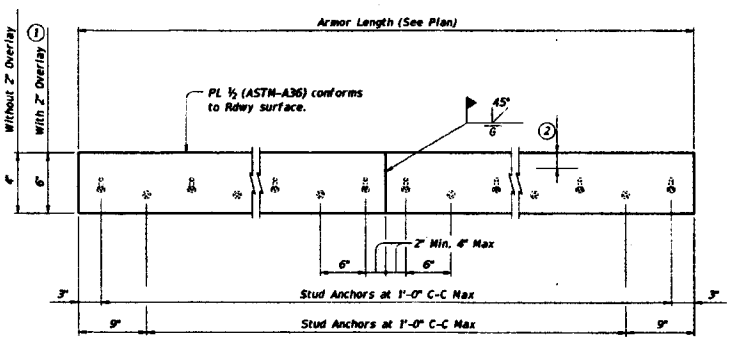


JOINTS AT ABUTMENTS | SKEWS OVER 15° | SKEWS THRU 15°

PLANS OF ARMOR PLATES



ELEVATION OF BASIC ARMOR PLATE

(1) Adjust 6" plate height for overlay thicknesses other than the 2" shown. Adjust values by 1.70 Lbs for each ½" variation in thickness.

(2) Do not paint top 1 ½" of plate if using sealed armor joint.

(3) Set top of backer rod 1" below top of armor plate. Backer rod must be compatible with joint sealant. Use of multiple pieces to create a backer rod cross section is not permitted. Top of backer rod must be convex as shown.

(4) Blast clean entire contact area between sealant and plate (SSPC-SP10) before installing sealant. Light brush blast and thoroughly clean all dust and debris from concrete surfaces in contact with joint sealant before application of silicone seal.

(5) Use Class 7 joint sealant that conforms to DMS-6310.

(6) Place sealant while ambient temperature is between 55°F and 80°F and is rising.

(7) Armor Joint does not include joint sealant or backer rod.

(8) Armor Joint (Sealed) includes Class 7 joint sealant and backer rod.

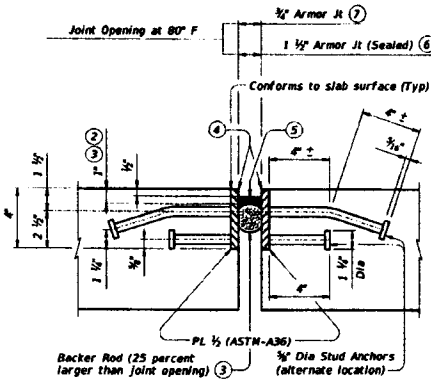
(9) Form vertical leg of seal as per the Manufacturer's recommendations. Use Class 4 joint sealant if Class 7 cannot be installed correctly. Install according to Manufacturer's recommendations.

(10) Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.

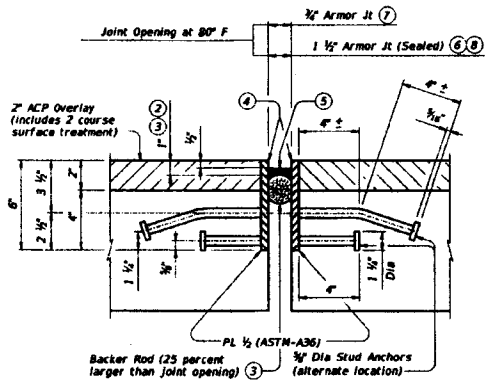
(11) See "Plans of Armor Plates".

(12) At Fabricator's option, armor plate may extend up to 6" beyond this point for skews through 15°.

(13) Align shipping angle perpendicular to joint.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION



SHOWN WITH 2" OVERLAY AT JOINT LOCATION (1)

ARMOR JOINT SECTIONS

Showing Armor Joint (Sealed)

FABRICATION NOTES:

Match mark corresponding plate sections and secure together for shipment with shipping angle. Do not use erection bolts.
Ship armor joints in convenient lengths of 10'-0" Min and 24'-0" Max unless necessary for stage construction or widenings. One shop splice is permitted in each shipping length provided no piece is less than 2'-0" long and sufficient studs are added to limit the stud to shop splice distance to 2" Min and 4" Max.
Weld studs in accordance with AWS D1.1.
Use groove welds for all shop and field butt splices. Grind smooth areas in contact with seal. Make all necessary field splice joint preparations in the shop.
Paint portions of plate not in contact with concrete with the primer specified for System II paint.
Shop drawings for the fabrication of armor joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

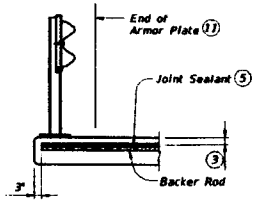
CONSTRUCTION NOTES:

Secure armor joints in position and place to proper grade and alignment by welding braces to adjacent reinforcing steel, to prestressed beam stirrups, or to anchors cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Armor Joint.
Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and touch up with organic zinc-rich paint.

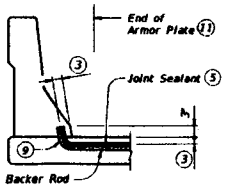
GENERAL NOTES:

Provide armor joints at locations shown on the plans. Provide the seal when "Armor Joint (Sealed)" is noted on the plans.
These joint details accommodate a joint movement range of 1 ⅜" (¾" opening movement and ⅜" closure movement).
Payment for armor joint, with or without seal, is based on length of armor plate.

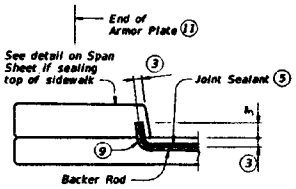
WEIGHTS P.L.F. FOR ONE ARMOR JOINT (2 PLATES)	
WITHOUT OVERLAY	16.10 Lb
WITH 2" OVERLAY (1)	22.90 Lb



AT STEEL POST BRIDGE RAIL



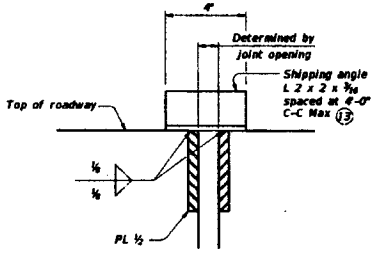
AT CONCRETE BRIDGE RAIL



AT SIDEWALK

JOINT SEALANT TERMINATION DETAILS

Armor Joint (Sealed) only. Armor Plate is not shown for clarity.



SHOWN WITHOUT 2" OVERLAY AT JOINT LOCATION
With overlay similar

SHIPPING ANGLE

An alternate method of securing joint sections may be used if approved by the Bridge Division. Erection bolts are not allowed.

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ARMOR JOINT DETAILS

AJ

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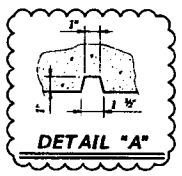
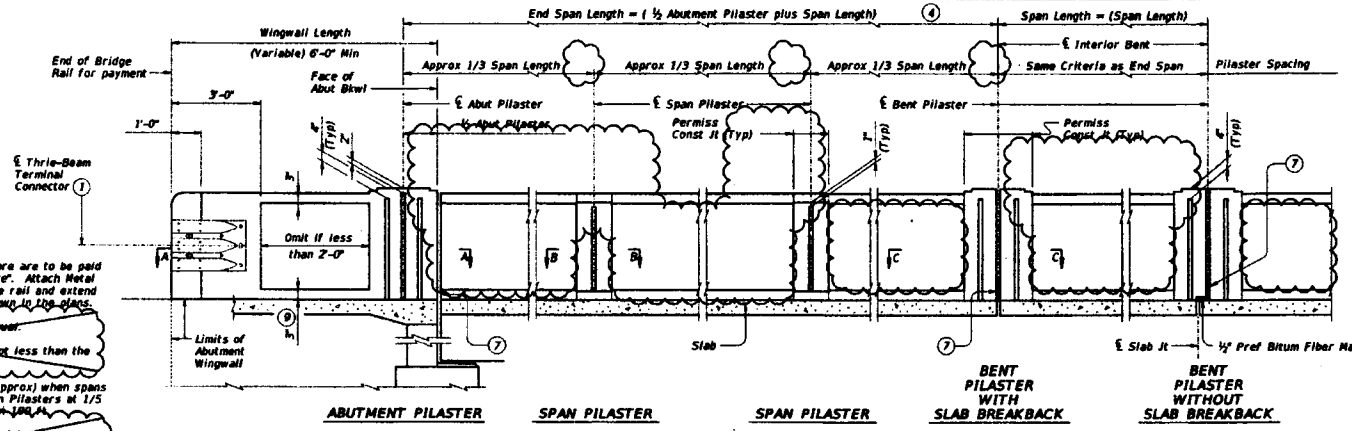


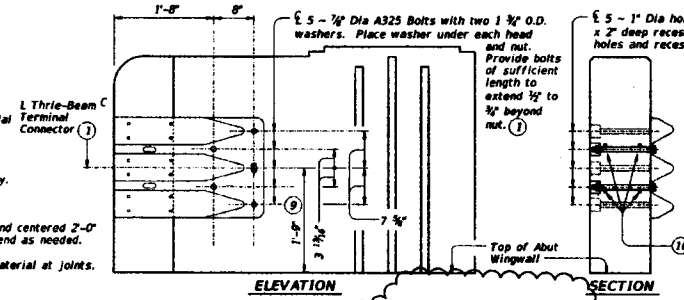
DETAIL "A"



ROADWAY ELEVATION OF RAIL

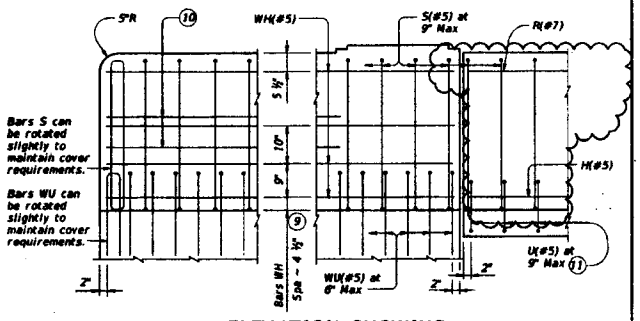
(Showing without raised sidewalk)

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. Number of windows in exterior bays are equal.
3. Number of windows in interior bay(s) are not less than the amount in exterior bays (Note 2).
4. Space Span Pilasters at 1/3 span length (Approx) when spans are 100 ft and less, as shown. Space Span Pilasters at 1/5 span length (Approx) for spans greater than 100 ft.
5. Dimension is the same for all posts adjacent to Span Pilasters in a span. Dimension may vary from span to span, Min = 3", Max = 7 ½".
6. Min = 6", Max = 1'-3".
7. Provide rail joints at ends of all spans the same width as Slab joint opening, except that Rail Joints over construction joints must be ½" Min to ¾" Max in width. Joints must be open if slab joint opening is not sealed. Joints over construction joints and over sealed deck joints must be plugged. Forming material used in joints may be left in place if it is light in color and compressible, such as the following materials: polystyrene, molded cork granules, sponge rubber sheet, etc. If forming material is not left in place, plug the bottom 6" with slab joint sealing compound to prevent drainage and staining.
8. Place Preformed Bituminous Fiber Material between slab and rail when rail extends over expansion joint. Shift Bars U as necessary.
9. Increase 2" for structures with overlay.
10. Place 4 additional Bars WH(#5) 3'-8" in length inside Bars S(#5) and centered 2'-0" from end of rail when Terminal Connections are required. Field bend as needed.
11. Shift U Bars from region below ½" Preformed Bituminous Fiber Material at joints.



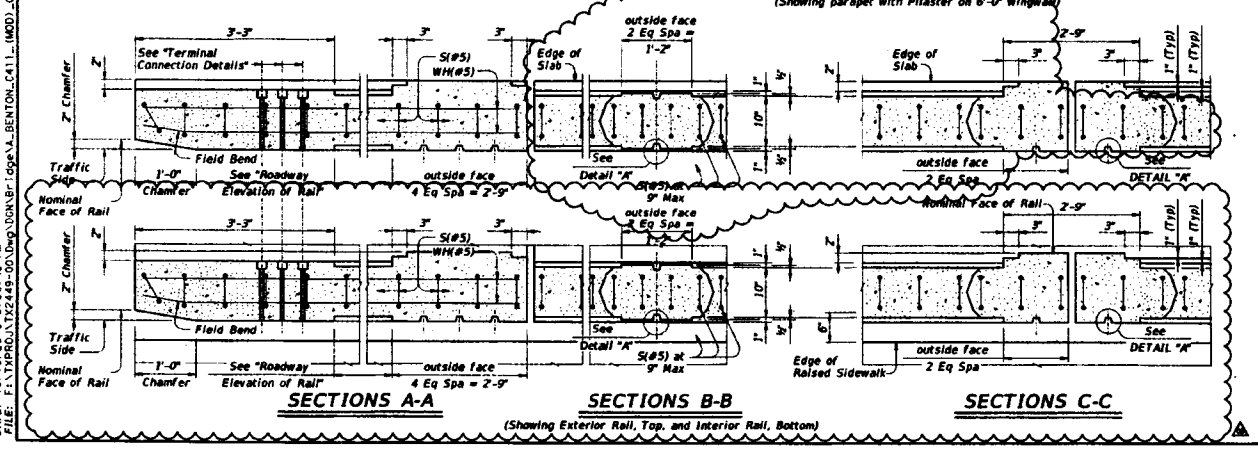
TERMINAL CONNECTION DETAILS

(Showing parapet with Pilaster on 6'-0" Wingwall)



ELEVATION SHOWING TYPICAL REINFORCING PLACEMENT

(Showing without raised sidewalk)



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The use of this railing is restricted to speeds of 45 mph or less

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: [signature] DEVELOPMENT COORDINATOR
DATE: 11/8/16

HL93 LOADING

SHEET 1 OF 4

Texas Department of Transportation

Bridge Division Standard

COMBINATION RAIL TEXAS CLASSIC

TYPE C411 (MOD)

STATE OF TEXAS
JENNIFER T EVANS
115641
LICENSED
PROFESSIONAL ENGINEER

10/19/2016

AIA ENGINEERS, LTD.
CONSULTANTS
8000 LBJ FREEWAY, STE 100, DALLAS, TX 75240
PHONE: (972) 490-9410
TBPE # 3891

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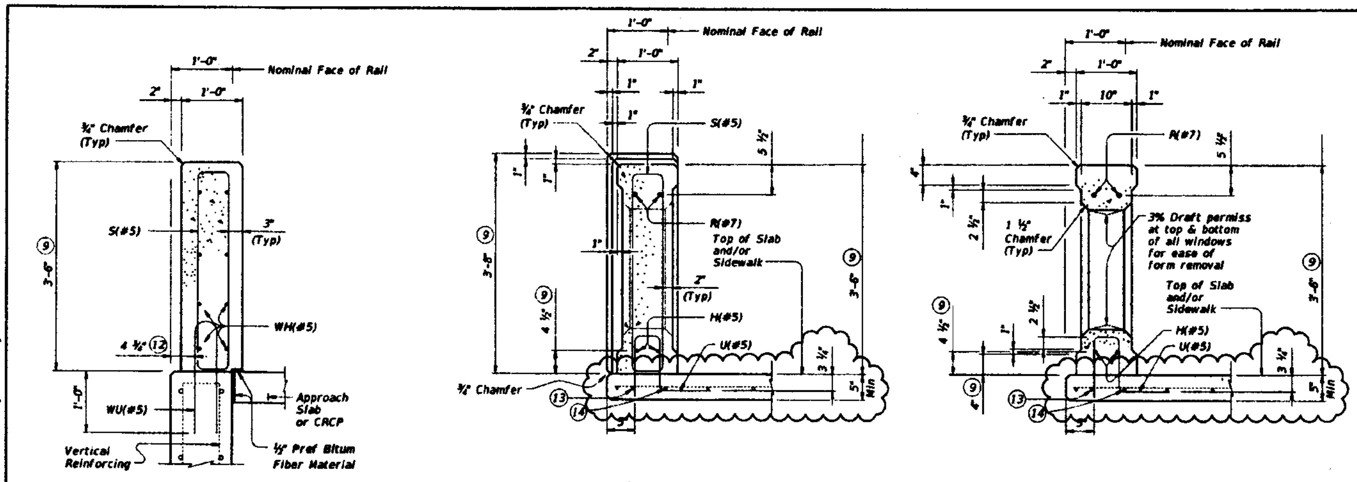


ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS

SECTION THRU POST ON BRIDGE SLAB
(Showing Pilaster)

SECTION THRU WINDOW ON BRIDGE SLAB

SECTIONS THRU RAIL WITHOUT RAISED SIDEWALK

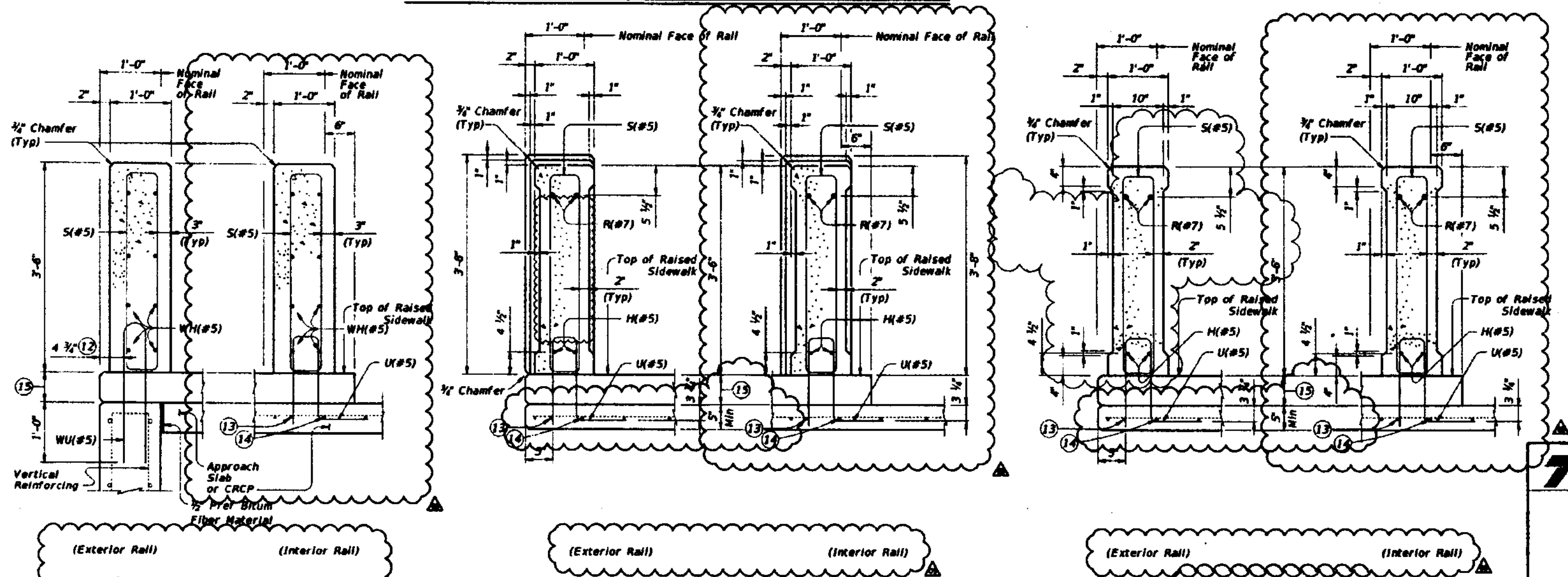
(9) Increase 2" for structures with overlay.

(12) 5 1/4" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.

(13) As an aid in supporting reinforcement, additional longitudinal bars may be used in the slab with the approval of the Engineer. Such bars must be furnished at the Contractor's expense.

(14) Top longitudinal slab bar may be adjusted laterally 3" plus or minus to tie reinforcing.

(15) Raised Sidewalk



(Exterior Rail) (Interior Rail)

ON ABUTMENT WINGWALLS, BACKWALL, OR CIP RETAINING WALLS

(Exterior Rail) (Interior Rail)

SECTION THRU POST ON BRIDGE SLAB
(Showing Pilaster)

(Exterior Rail) (Interior Rail)

SECTION THRU RAIL ON BRIDGE SLAB

SECTIONS THRU RAIL WITH RAISED SIDEWALK

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: DEVELOPMENT COORDINATOR
DATE: 11/8/16

HL93 LOADING SHEET 2 OF 4

STATE OF TEXAS
JENNIFER T EVANS
115641
LICENSED PROFESSIONAL ENGINEER
10/19/2016

AIA ENGINEERS, LTD.
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Texas Department of Transportation
Bridge Division Standard

COMBINATION RAIL TEXAS CLASSIC

TYPE C411 (MOD)

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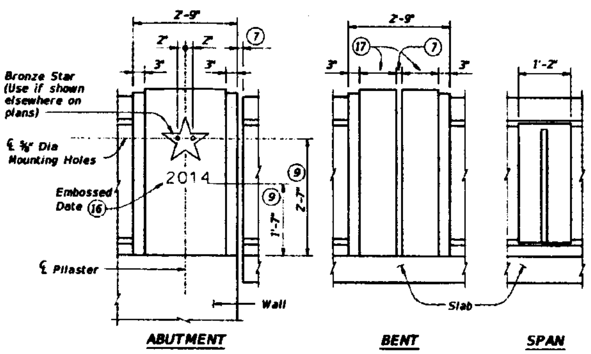
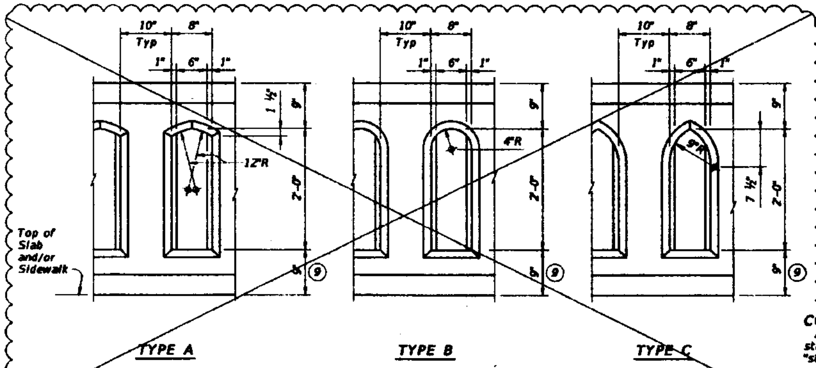
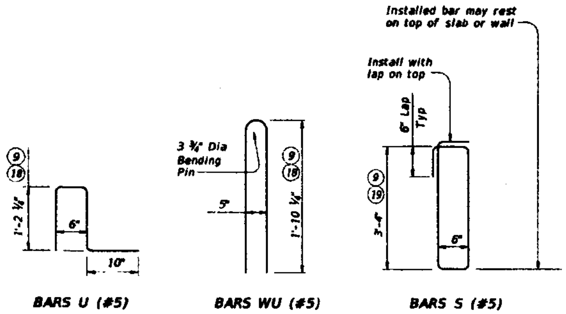


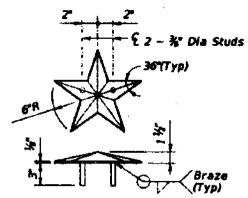
EXTERIOR PILASTER ELEVATIONS

(Showing without raised sidewalk)



WINDOW TYPES





BRONZE STAR·DETAIL ⑳

Two known manufacturers are:
1. Kassons Castings
   Austin, Texas
2. Southwell Company
   San Antonio, Texas

⑦ Provide rail joints at ends of all spans the same width as Slab joint opening, except that Rail Joints over construction joints must be ¼" Min to ¾" Max in width. Joints must be open if slab joint opening is not sealed. Joints over construction joints and over sealed deck joints must be plugged. Forming material used in joints may be left in place if it is light in color and compressible, such as the following materials: polystyrene, molded cork granules, sponge rubber sheet, etc. If forming material is not left in place, plug the bottom 6" with slab joint sealing compound to prevent drainage and staining.

⑨ Increase 2" for structures with overlay.

⑯ Construction year (use if shown elsewhere on plans) 3" High "Plantin Bold" Typeface with ¼" recess. Placed at one Abutment only or as directed by the Engineer.

⑰ Dimensions must be the same on each side of joint.

⑱ For raised sidewalks, add sidewalk height to total bar height. Use sidewalk height at rail's location.

⑲ Reduce by 2" or field bend over Preformed Bituminous Fiber Material to gain cover.

⑳ Bronze Star dimensions of the final product can be slightly smaller due to shrinkage after casting.

CONSTRUCTION NOTES:

Attach Bronze Star with a Type III Class C epoxy. Clamp star until epoxy achieves set. Remove any visible epoxy "squeeze out" from under star.

Face of rail and pilasters, parapet must be plumb unless otherwise approved.

Apply a one rub finish to all railing surfaces unless otherwise shown elsewhere on the plans.

MATERIAL NOTES:

Provide Class "C" concrete for railing. Provide Class "C" (HPC) concrete if shown elsewhere in the plans.

Provide Grade 60 reinforcing steel.

Epoxy coat all rail reinforcement if slab bars are epoxy coated.

Bronze Star must be cast of architectural bronze having the following composition: Copper 85 %, Tin 5 %, Lead 5 %, Zinc 5 %.

Provide bar laps, where required, as follows:

Uncoated ~ #5 = 1'-9"
Uncoated ~ #7 = 2-9"
Epoxy coated ~ #5 = 2'-7"
Epoxy coated ~ #7 = 4'-1"

GENERAL NOTES:

~~This rail was evaluated based on the results of previous crash tests and approved for a NCHRP Report 350 TL-2 rating. This rail is only approved for low speed use, 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 will not be required for this rail.~~

See Bridge Layout or other plan sheets for the following: dimensions with the number of span pilasters, ~~dimensions with the number of windows, window type,~~ inclusion of bronze stars, inclusion of construction year with abutment identity.

Submit erection drawings showing span number, span pilaster locations, ~~number of windows between pilasters and spacing to first window (see Note 6)~~ to the Engineer for approval.

Average weight of railing with no overlay increase and no pilasters is 525 plf.

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

FORT BEND COUNTY ENGINEERING DEPARTMENT
APPROVED: [illegible]
DEVELOPMENT COORDINATOR
DATE: 11/8/16

STATE OF TEXAS
JENNIFER T EVANS
115641
LICENSED
PROFESSIONAL ENGINEER
[illegible]

6/17/2016

AIA ENGINEERS, LTD.
CONSULTANTS
PHONE: (972) 488-0000 TBPE F 2001

HL93 LOADING SHEET 3 OF 4

Texas Department of Transportation — Bridge Division Standard

COMBINATION RAIL TEXAS CLASSIC

TYPE C411 (MOD)

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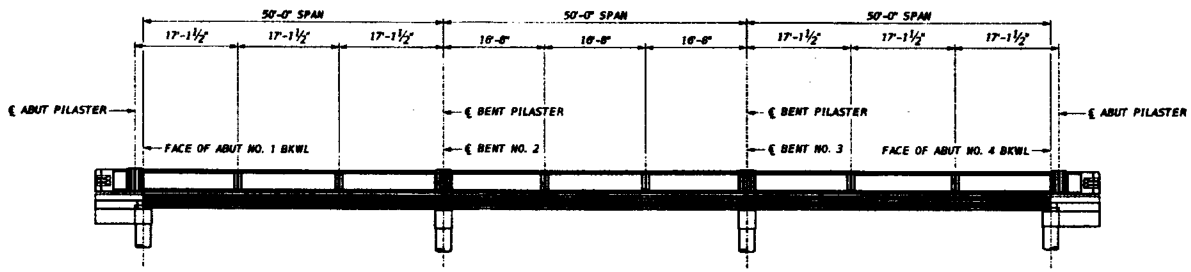


RAIL ELEVATION

SCALE: 10'-0" = 1'-0"

FORT BEND COUNTY ENGINEERING DEPARTMENT

APPROVED: DEVELOPMENT COORDINATOR

DATE:

HL93 LOADING

STATE OF TEXAS
JENNIFER T. EVANS
115641
LICENSED

6/17/2016

AIA ENGINEERS, LTD.
CONSULTANTS

BENTON ROAD STREET DEDICATION AND RESERVE

TYPE C411 (MOD)
BRIDGE RAIL ELEVATION

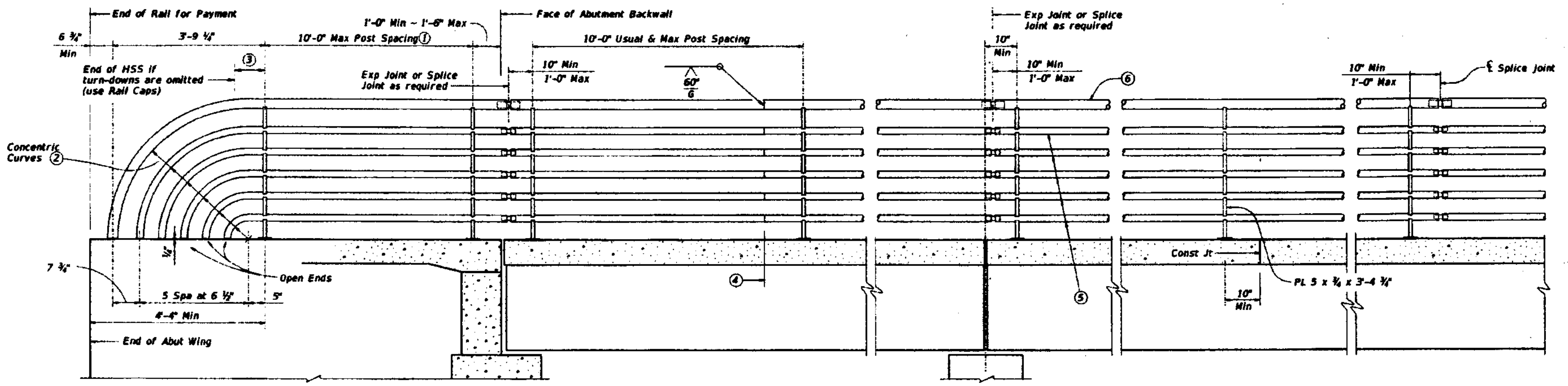
SHEET 4 OF 4

CITY OF ROSENBERG

VERT:
HORIZ: N/A

40 - 50

11/8/16



AT ABUTMENTS

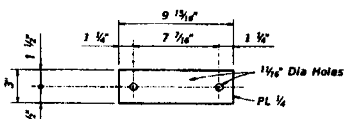
AT SHOP SPLICE

AT ENDS OF UNIT

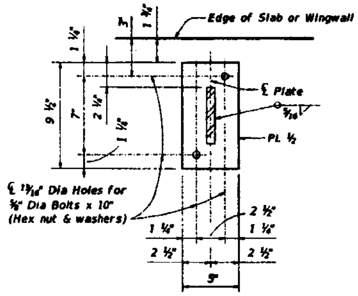
AT SLAB CONST JOINT

AT SPLICE JOINT

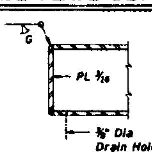
ROADWAY ELEVATION OF RAIL



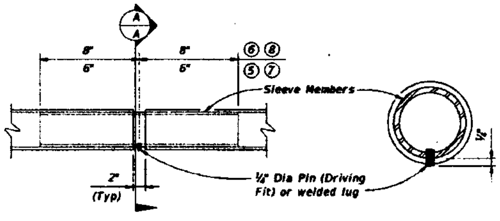
BOTTOM PLATE DETAIL



BASE PLATE DETAIL



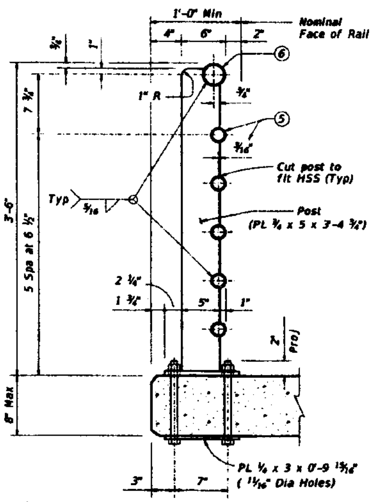
RAIL CAP DETAIL



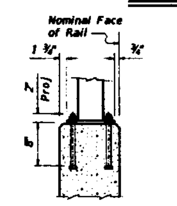
AT SPLICE OR EXP JTS

SECTION A-A

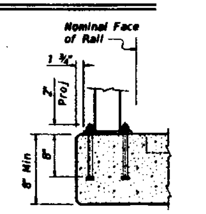
HSS SPLICE DETAIL



BASIC CONDITION



ON ABUT WING OR CIP RETAINING WALL



ON CULVERTS OR SLABS OVER 8" THICK

POST MOUNTING DETAILS

① Min of 2 posts required on wingwall

② Portion of railing with turn-downs to be used or omitted as indicated on Bridge Layout.

③ 10" Min ~ 1'-6" Max if turn-downs are omitted.

④ One shop splice per panel is permitted (with minimum 85 percent penetration). The weld may be square groove or single vee groove. Grind smooth.

⑤ HSS 2.375 x 0.154

⑥ HSS 3.500 x 0.216

⑦ HSS 1.900 x 0.145

⑧ HSS 2.875 x 0.203

CONSTRUCTION NOTES:

Panel lengths of railing must be attached to a minimum of three posts except at abutment wingwalls.

Face of rail and posts must be vertical transversely unless otherwise approved. Posts must be perpendicular to adjacent roadway grade. Use Type VIII epoxy mortar under post base plates if gaps larger than 1/16" exist.

For curved railing applications, fabricate the HSS rails to the radius when the radius is 600' or less. Submit shop drawings for approval when tubes are required to be fabricated to a radius. Shop drawings must be submitted to the Engineer for approval.

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

MATERIAL NOTES:

Provide ASTM-A500 Grade B, A1085 or A53 Grade B for all HSS.

Provide ASTM-A36 for posts and plates.

Galvanize all steel components unless otherwise shown.

Anchor bolts must be ⅝" Dia ASTM A307 Grade A bolts (or A36 threaded rods with one tack welded hex nut each) with one hex nut and one hardened steel washer at each bolt. Threaded rods may be 0.557" minimum diameter with rolled threads. Nuts must conform to A563 requirements.

GENERAL NOTES:

Designed according to AASHTO LRFD Specifications.

Rail anchorage details shown on this standard may require modification for select structure types. See appropriate details elsewhere in plans for these modifications.

Do not use this railing on bridges with expansion joints providing more than 5" movement.

For all rails, submit erection drawings showing section lengths, splice locations, rail post spacing and anchor bolt setting for approval.

Average weight of railing is 30 plf.

Texas Department of Transportation | Bridge Division Standard

PEDESTRIAN RAIL

TYPE PR1

FILE: rlstd028.dgn		DN: TxDOT	CK: TxDOT	DW: JTR	CK: TxDOT
©TxDOT	July 2014	CONT	SECT	JOB	HIGHWAY
	REVISIONS				
		DIST	COUNTY		SHEET NO
					40A

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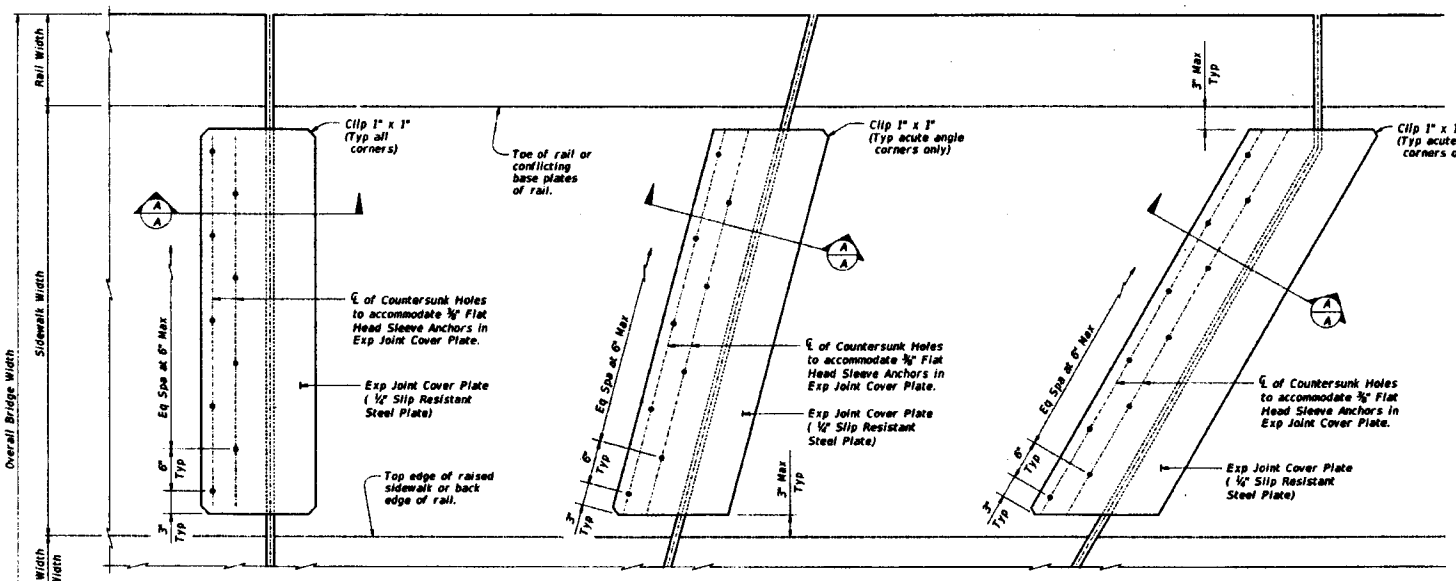
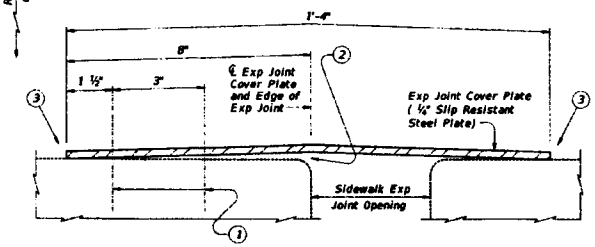
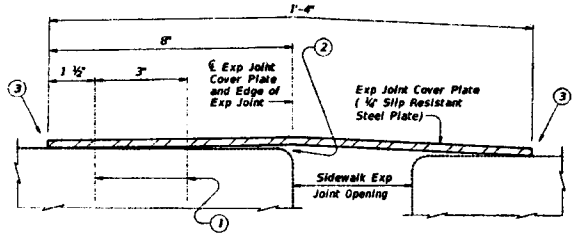


NO SKEW | SKEW WITHOUT SLAB BREAKBACK | SKEW WITH SLAB BREAKBACK

PLAN



SHOWING LEVEL EXP JOINT

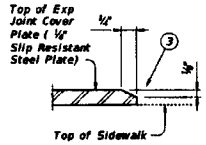


SHOWING UNLEVEL EXP JOINT

(Install Sleeve Anchors on high side of Exp Joint)

SECTION A-A

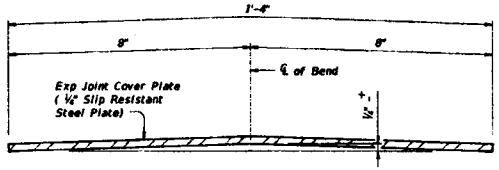
1. ℄ ⅜" x 2 ½" Min, Flat Head Sleeve Anchors, Stainless Steel. Countersink Flat Head Sleeve Anchors in ½" Slip Resistant Steel Plate.
2. It is not necessary to remove plate crown provided the plate is firmly secured to the sidewalk.
3. Transverse edges must be in contact with sidewalk surface after installation.



EXP JOINT COVER PLATE BEVEL DETAIL

Bevel all plate edges as shown.

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



BENDING DIAGRAM OF EXP JOINT COVER PLATE

FABRICATION NOTES:

Shop drawings for the fabrication of 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 ½" slip resistant steel plate. Checker plate or diamond plate is not allowed nor are slip resistant tapes, films 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 flat head sleeve anchors meeting the requirements of ASTM F 593, Group I, 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.

Details provided are applicable to concrete walkway surfaces only.

Payment for sidewalk expansion joint cover plates must be 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.

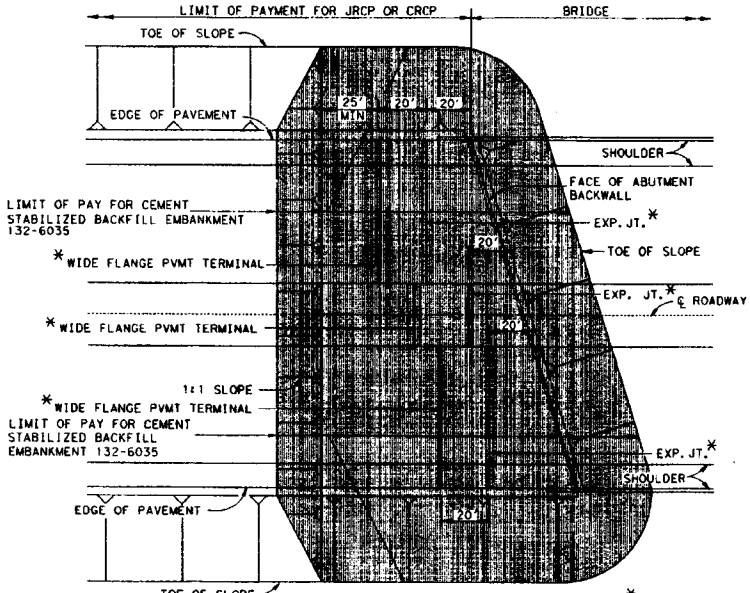
Texas Department of Transportation | Bridge Division Standard

BRIDGE SIDEWALK EXPANSION JOINT COVER PLATE (ALL SKEWS)

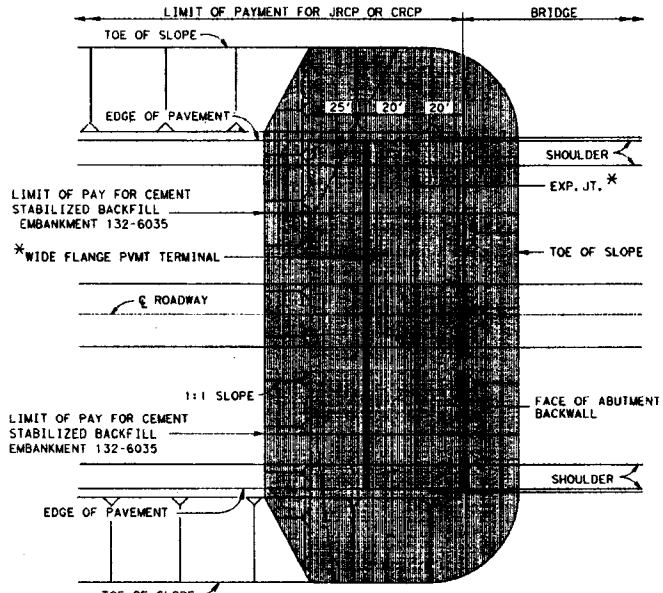
BS-EJCP

FILE: bsejstel.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
©TxDOT January 2015	CONT	SECT	JOB	HIGHWAY
REVISIONS	DIST	COUNTY		SHEET NO. 41

11/8/16



TYPICAL ROADWAY LAYOUT
CONCRETE MEDIAN AND SHOULDERS
(AT SKEWED BRIDGES)



TYPICAL ROADWAY LAYOUT
CONCRETE MEDIAN AND SHOULDERS
(AT NON-SKEWED BRIDGES)

* THIS APPLIES ONLY WHEN WIDE FLANGE TERMINALS ARE USED ON THE APPROACHES TO BRIDGES. IF NOT USING THIS SYSTEM, SEE APPROACH SLAB DETAILS ELSEWHERE IN THE PLANS.

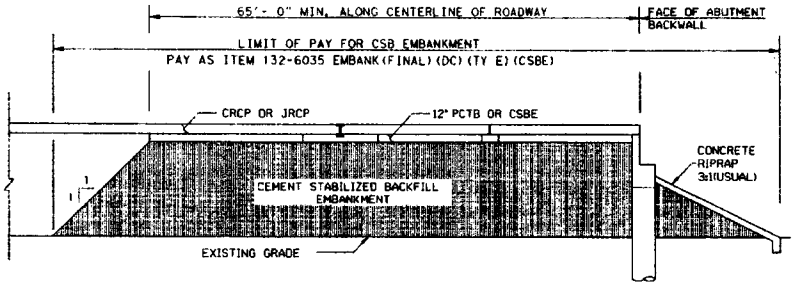
NOTES

1. PROVIDE CEMENT STABILIZED BACKFILL EMBANKMENT IN ACCORDANCE WITH ITEM 132 AND HOUSTON DISTRICT SP (132-001).
2. FOR ADDITIONAL DETAILS ON WIDE FLANGE PAVEMENT TERMINALS SEE "WIDE FLANGE PAVEMENT TERMINALS" STANDARD SHEET.

ASB - ASPHALT STABILIZED BASE
CRCP - CONTINUOUSLY REINFORCED CONCRETE PAVEMENT
CSBE - CEMENT STABILIZED BACKFILL EMBANKMENT
EXP JT - EXPANSION JOINT
JRCP - JOINTED REINFORCED CONCRETE PAVEMENT
LTS - LIME TREATED SUBGRADE
PCTB - PORTLAND CEMENT TREATED BASE

LIMITS OF CEMENT STABILIZED BACKFILL EMBANKMENT. THIS QUANTITY IS PAID UNDER ITEM 132-6035, EMBANKMENT (FINAL) (DENSITY CONTROL) (TY E) (CSBE)

LEGEND



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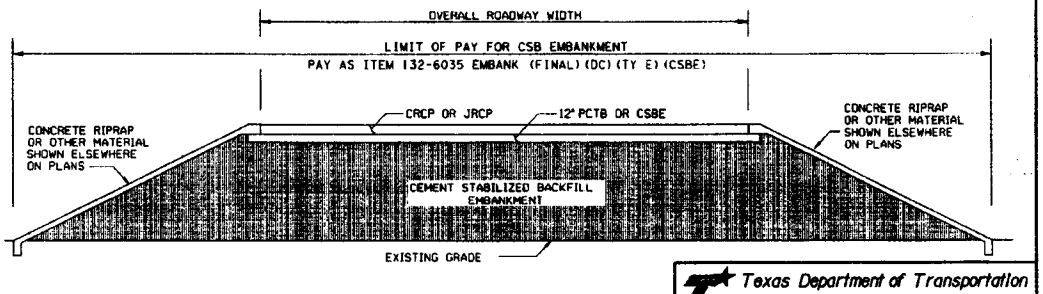

TRANSVERSE SECTION

Texas Department of Transportation
Houston District

CEMENT STABILIZED BACKFILL EMBANKMENT

(FOR USE WITHOUT RETAINING WALLS AT BRIDGE ABUTMENTS)

CSBE

SHEET 1 OF 1

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©TxDOT 2014	DIST	FED REG	PROJECT NO.	SHEET
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Maggie Dodd 11/8/16

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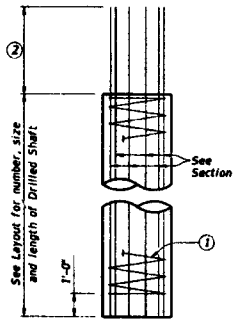
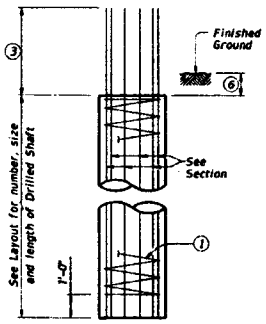
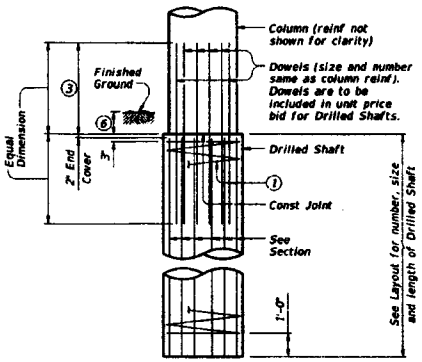


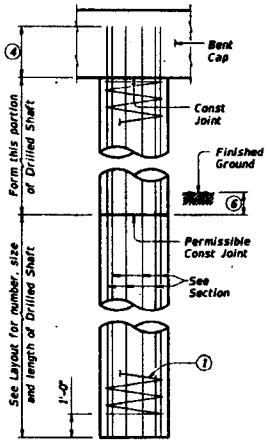
ABUTMENTS, WINGWALLS AND MULTI-DRILLED SHAFT FOOTINGS



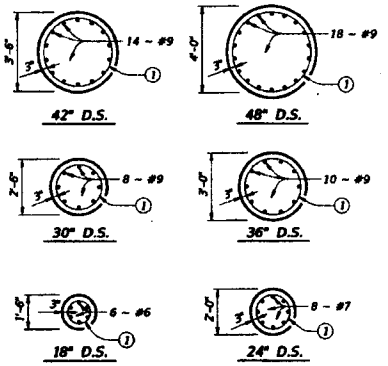
INTERIOR BENTS DRILLED SHAFT DIA EQUAL TO COLUMN DIA



INTERIOR BENTS DRILLED SHAFT DIA GREATER THAN COLUMN DIA



OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL (5)

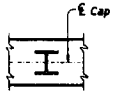


DRILLED SHAFT SECTIONS

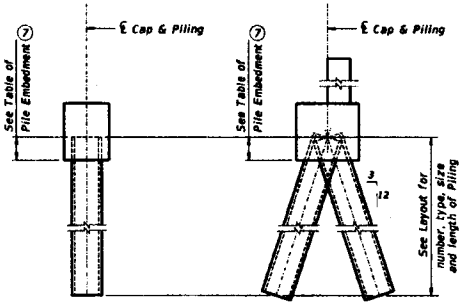
DRILLED SHAFT DETAILS

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 standard CP for additional details on concrete pile embedment.

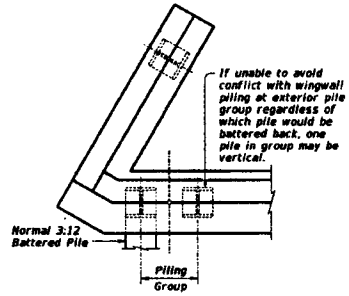


ORIENTATION OF STEEL H-PILING



VERTICAL PILE BATTERED PILE

PILING DETAILS
(Concrete or Steel H)



DETAIL "A"
(Showing Plan View of a 30° Skewed Abutment)

(1) #3 Spiral at 6" pitch (One and a half flat turns top & bottom).

(2) Min extension into supported element:
#6 Bars = 1'-6"
#7 Bars = 1'-8"
#9 Bars = 2'-3"

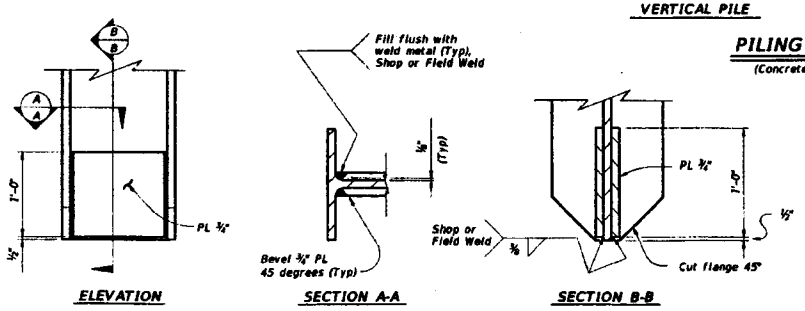
(3) Min lap with Column reinf:
#7 Bars = 2'-9"
#9 Bars = 4'-6"

(4) Min extension into supported element:
#6 Bars = 1'-0"
#7 Bars = 1'-6"
#9 Bars = 2'-0"

(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.

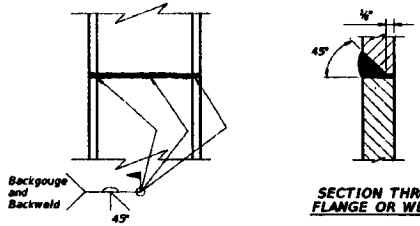
(6) 1'-0" Min

(7) Or as shown on plans.



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.

SECTION THRU FLANGE OR WEB

SHEET 1 OF 2

Texas Department of Transportation — Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

File: fdstd01.dgn	DN: TxDOT	CK: TxDOT	DW: TxDOT	CK: TxDOT
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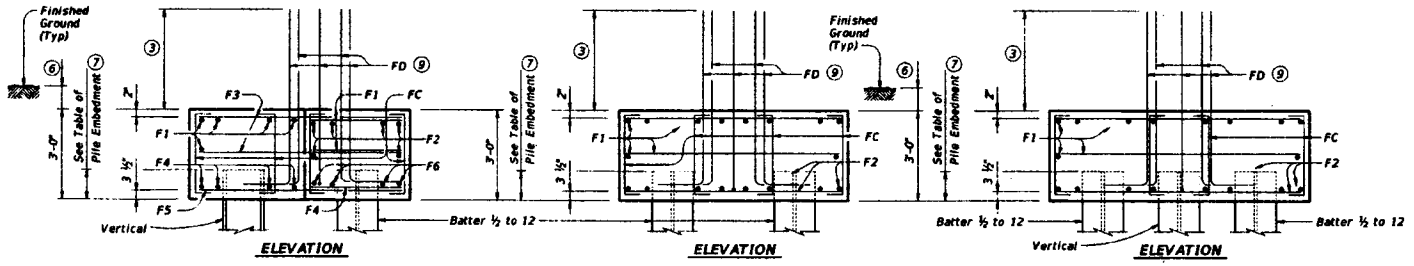
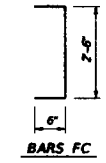
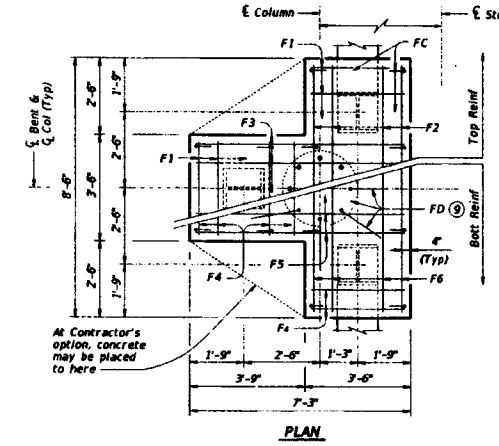
REVISIONS	DIST	COUNTY		SHEET NO. 43

11/8/16

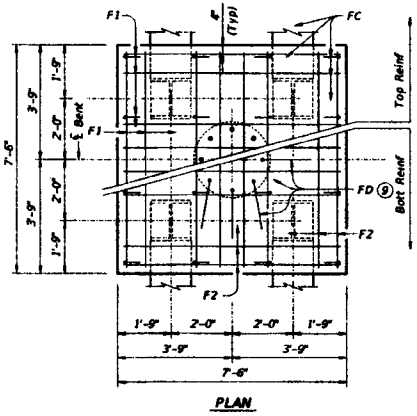






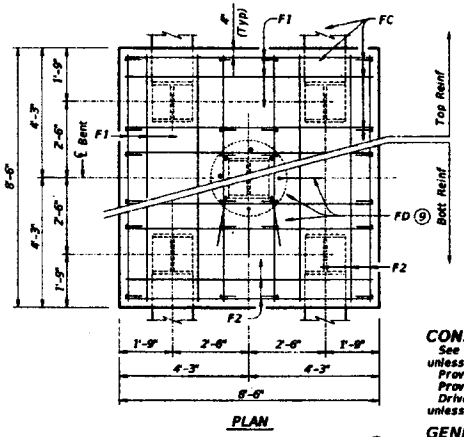
THREE PILE FOOTING ⑧

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.

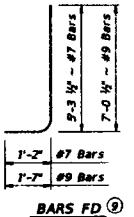


TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS

Bar	No.	Size	Length	Weight
ONE 3 PILE FOOTING				
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"	236
Reinforcing Steel			Lb	639
Class "C" Concrete			CY	4.8
ONE 4 PILE FOOTING				
F1	20	#4	7'- 2"	96
F2	16	#8	7'- 2"	306
FC	16	#4	3'- 6"	37
FD ⑪	8	#9	8'- 8"	236
Reinforcing Steel			Lb	675
Class "C" Concrete			CY	6.3
ONE 5 PILE FOOTING				
F1	20	#4	8'- 2"	109
F2	16	#9	8'- 2"	444
FC	24	#4	3'- 6"	56
FD ⑪	8	#9	8'- 8"	236
Reinforcing Steel			Lb	845
Class "C" Concrete			CY	8.0

CONSTRUCTION NOTES:

See Bridge Layout for foundation type required. Use these foundation details unless shown otherwise.
Provide Class C Concrete (f'_c = 3600 psi), unless shown otherwise.
Provide Grade 60 reinforcing steel.
Drive piling under abutment wingwalls to a minimum resistance of 10 Tons/Pile unless shown otherwise.

GENERAL NOTES:

Designed according to AASHTO LRFD 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'-9"
#9 Bars = 4'-6"

⑥ 1'-0" Min

⑦ Or as shown on plans.

⑧ See 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 (6'-6") in place of #9 bars and deduct 130 lbs. For 36" Columns, add 2 FD bars (59 lbs).

⑪ For 24" Columns, use #7 FD bars (6'-6") in place of #9 bars and deduct 130 lbs. For 36" Columns, add 2 FD bars (59 lbs). For 42" Columns, add 6 FD bars (177 lbs) (42" Columns disallowed on 3 Pile Footings)

SHEET 2 OF 2

Texas Department of Transportation — Bridge Division Standard

COMMON FOUNDATION DETAILS

FD

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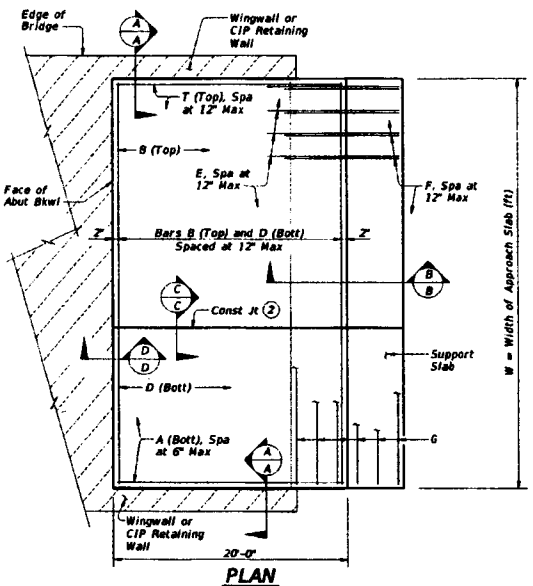
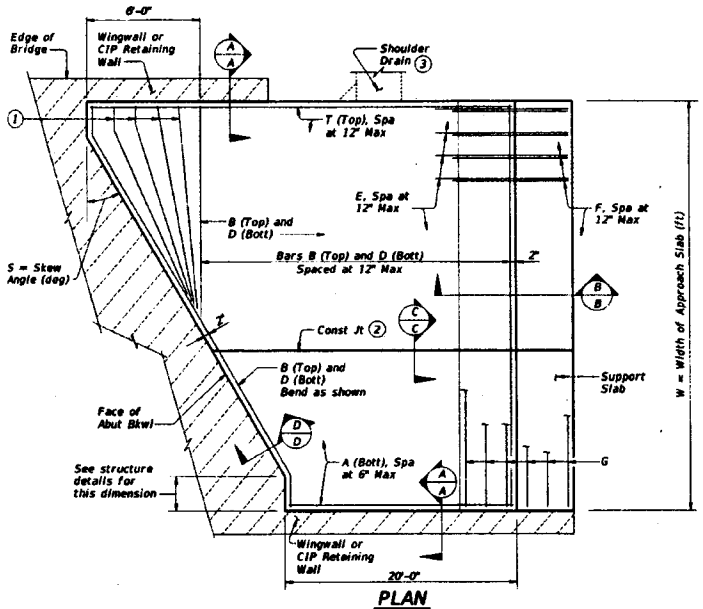


PLAN

(Showing Non-Skewed Approach Slab)



PLAN

(Showing Skewed Approach Slab)

BAR TABLE	
BAR	SIZE
A	#8
B	#5
D	#5
E	#5
F	#5
G	#5
T	#5

APPROXIMATE QUANTITIES (4)

Reinf steel weight = 8.5 Lbs/SF of Approach Slab
= 18.4 Lbs/LF of Support Slab

Vol of Appr Slab Conc (CY) = 1.052W - 0.093W x T + 0.02W² Tan S
(Includes Support Slab)

W = Width of Approach Slab (ft)

T = Conc Pavement Thickness (in)

S = Skew Angle (deg)

(1) Flare Bars B and D in this region (1'-6" Max Spa, 3" Min Spa). Minimum flared 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.

(5) On portion of support slab that supports the concrete pavement, adjust top surface elevation, if required, to accommodate concrete pavement thickness. Smooth trowel finish. Oil top of support slab with 60 grade oil and apply heavy coat of powdered graphite. Press down one layer of 30# roofing felt.

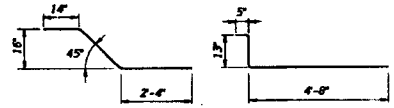
(6) Multiple piece tie bars are acceptable at longitudinal construction joints provided minimum laps shown are achieved.

(7) See details elsewhere in plans for required cross-slope.

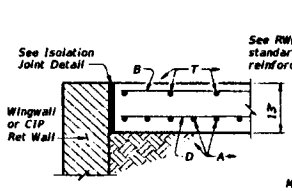
(8) Place in accordance with Item 438.

(9) Backer rod shall be 25% larger than joint opening and shall be compatible with the sealant.

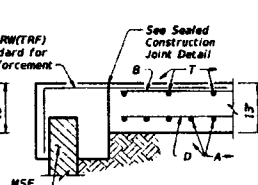
(10) Place ½" Preformed Bituminous Fiber Material between concrete railing and top of approach slab as shown when concrete railing projects over the approach slab.



BARS E (#5) **BARS F (#5)**

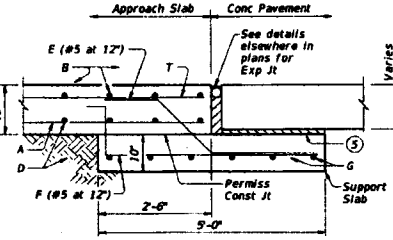


SHOWING WINGWALL OR CIP RETAINING WALL

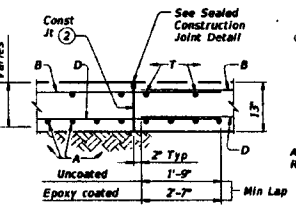


SHOWING MSE WALL

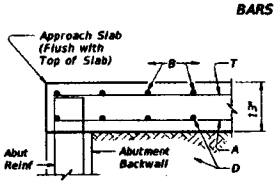
SECTION A-A



SECTION B-B



SECTION C-C (6)



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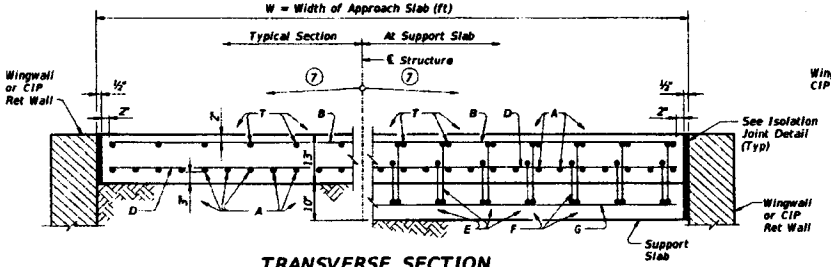
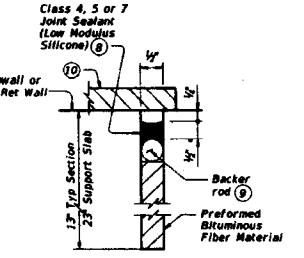
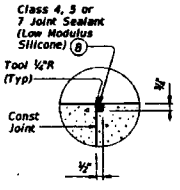


TRANSVERSE SECTION



ISOLATION JOINT DETAIL



SEALED CONSTRUCTION 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.

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

Compact and finish 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.

Sealant, backer rod and preformed bituminous fiber material are subsidiary to approach slab concrete.

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

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

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BRIDGE APPROACH SLAB
CONCRETE PAVEMENT

BAS-C

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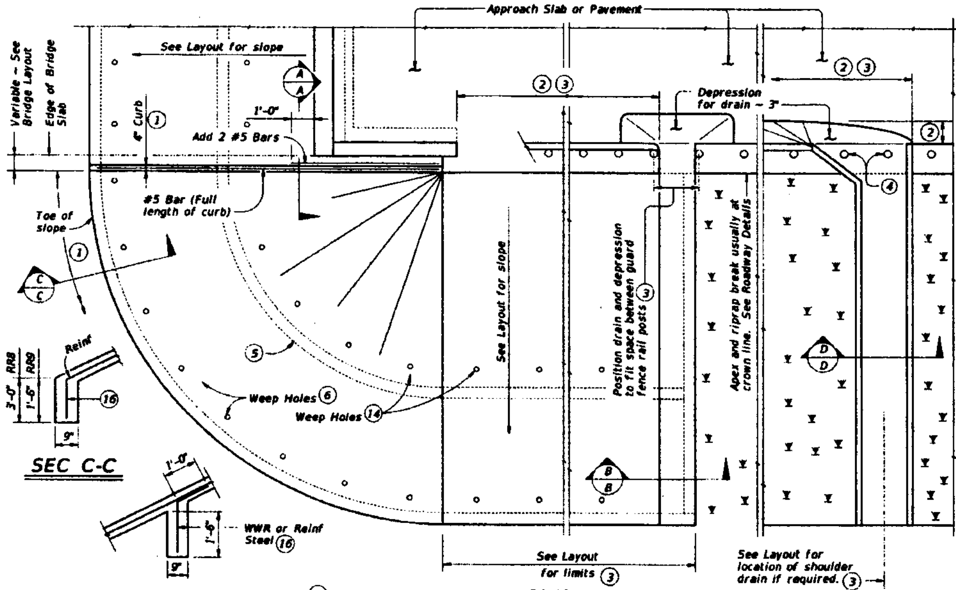
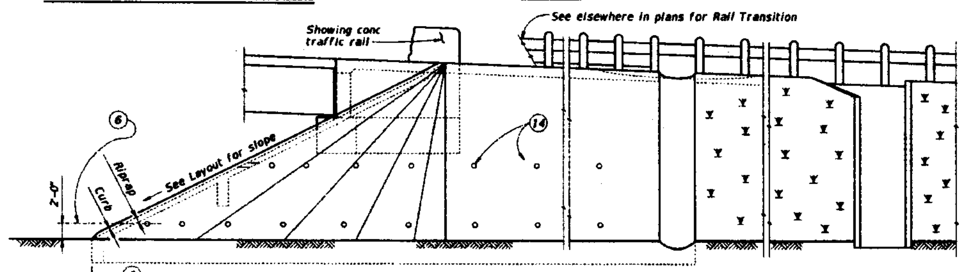
Mary Dell 11/8/16

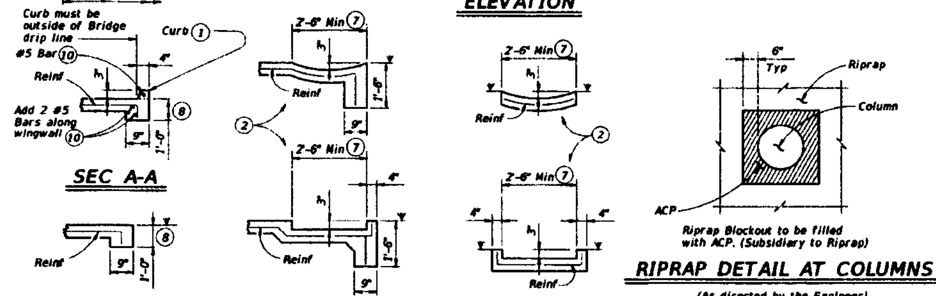


INTERMEDIATE TOEWALL (5)

PLAN

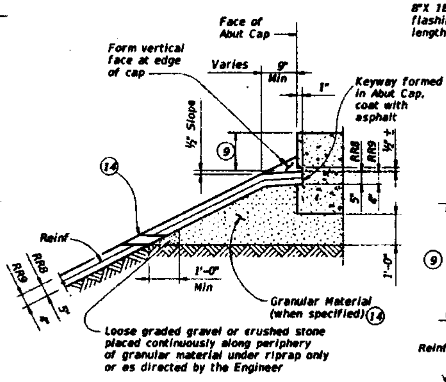


ELEVATION

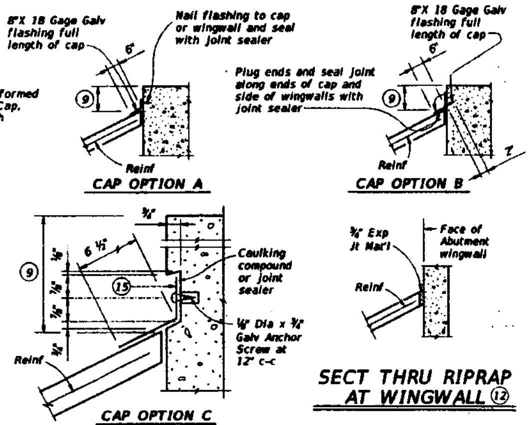


RIPRAP DETAIL AT COLUMNS

(As directed by the Engineer)

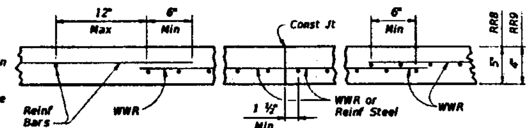


SHOWING KEYWAY OPTION



SECT THRU RIPRAP AT WINGWALL (12)

SECTIONS THRU RIPRAP AT CAP (11)



REINFORCEMENT DETAILS (13)

See General Notes for optional sythetic fiber reinforcement.

(1) When riprap is shown extended around header on layout, extend slab and toewall as shown and eliminate 4" curb.

(2) Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.

(3) Location of shoulder drain must consider limitations imposed by rail transition. Do not locate shoulder drains at expansion joints between approach slab and concrete pavement.

(4) See details elsewhere in plans for installation of guard fence posts through concrete riprap.

(5) Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.

(6) Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 CF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.

(7) Use wider or other drain configurations if shown elsewhere in plans or if directed by the Engineer.

(8) Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-6" whenever the optional intermediate toewall is called for in the plans.

(9) Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 9" Min for beam/slab type bridges and 1'-6" for slab span, box beam, or slab beam bridges.

(10) #5 bars shown are required even when synthetic fiber reinforcing option is selected.

(11) Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere on plans.

(12) Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt Mat'l if shown on plans or directed by the Engineer.

(13) Provide #3 reinforcing bars at 18" Spa c-c. Provide Welded Wire Reinforcement (WWR) as 6x6-D3xD3. Combinations of WWR and reinforcing bars may be used if both are permitted. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.

(14) If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.

(15) 8" x 18 Gage Galv Sheet Metal

(16) Provide WWR or #3 bars, with 1'-0" extension into slope.

GENERAL NOTES:

Provide Class "B" concrete with a minimum compressive strength of 2,000 psi unless noted elsewhere in plans.
Provide Grade 60 reinforcing steel.
Provide synthetic fibers listed on the "Fibers for Concrete" Material Producer List (MPL) in lieu of steel reinforcing in riprap concrete unless noted otherwise.
Install construction joints or grooved joints extending the full slant slope height at intervals of approximately 20 feet unless otherwise directed by the Engineer.
Hardware cloth, loose grade stone behind weep holes, flashing, or other sealing material are subsidiary to the bid item "Riprap".
Use reinforcing bars, deformed Welded Wire Reinforcing (WWR), or any suitable combination of both types for riprap reinforcing, unless specified elsewhere in the plans.
See Layout for limits of riprap.
RR8 is to be used on stream crossings.
RR9 is to be used on other embankments.

FOR CONTRACTOR'S INFORMATION ONLY:
5" of RR8 = 0.015 CY/SF
4" of RR9 = 0.012 CY/SF
#3 Reinf at 18" c-c = 0.501 Lbs/SF
6x6-D3xD3 = 0.408 Lbs/SF

Texas Department of Transportation

Bridge Division Standard

CONCRETE RIPRAP AND SHOULDER DRAINS
EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)

CRR

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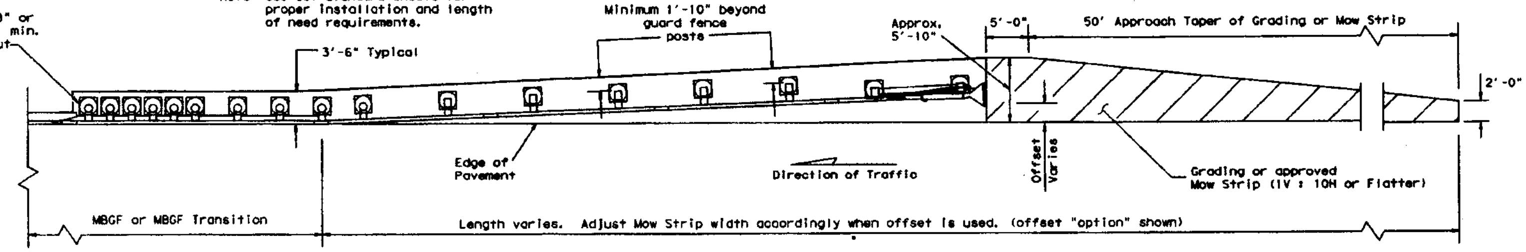
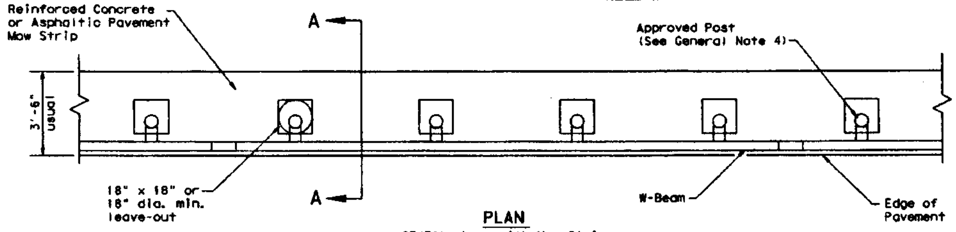
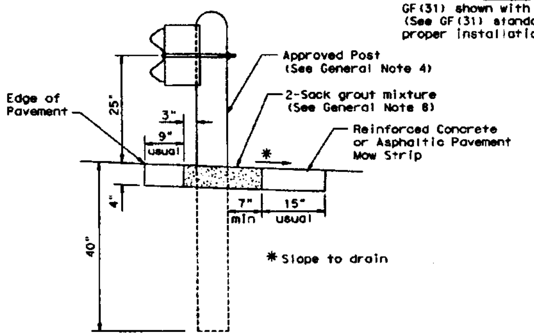

Note: See SGT standard sheets for proper installation and length of need requirements.
18" x 18" or 18" dia. min. leave-out
3'-6" Typical
Minimum 1'-10" beyond guard fence posts
Approx. 5'-10"
5'-0"
50' Approach Taper of Grading or Mow Strip
2'-0"
Edge of Pavement
Direction of Traffic
Offset Varies
Grading or approved Mow Strip (1V : 10H or Flatter)
MBGF or MBGF Transition
Length varies. Adjust Mow Strip width accordingly when offset is used. (offset "option" shown)

GRADING AND MOW STRIP AT GUARDRAIL END TREATMENTS



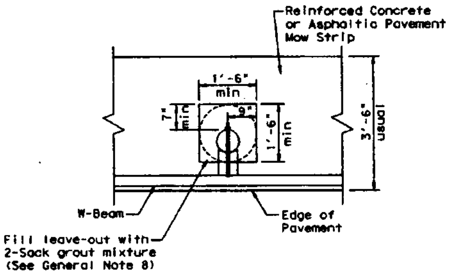
PLAN

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



SECTION A-A

Typical



MOW STRIP DETAIL

Reinforced Concrete or Asphaltic Pavement Mow Strip with 18" x 18" or 18" dia. minimum leave-out.

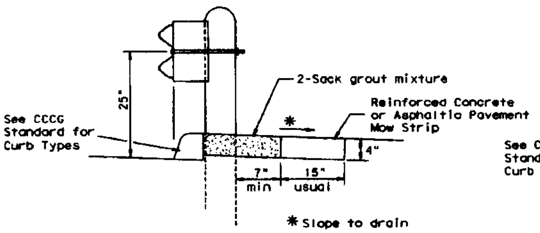
Note: Site Condition(s)

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.

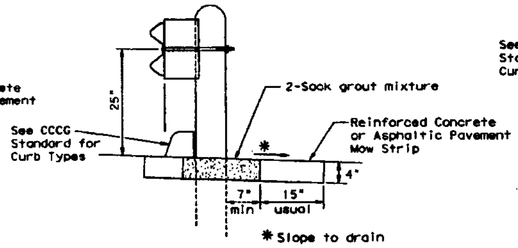
GENERAL NOTES

1. This mow strip design is for use with metal beam guard fence, guard fence transitions, and guard fence end treatments (See SGT standards for proper SGT installation).
2. Mow strips shall be asphaltic pavement or reinforced concrete (wire mesh or synthetic fiber), as shown on the plans and will be paid for under the pertinent bid item. Asphaltic pavement shall meet the requirements of the item, and be placed in accordance with the pertinent bid item as shown in the plans. 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. The type of approved post will be as shown in the plans. See the applicable standard sheets for additional details and information.
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 asphaltic pavement or reinforced concrete will include leave-outs for the posts.
8. The leave-outs shall be filled with no more than a 2-sack grout mixture and placed in accordance with Section 421.2.F, "Mortar and Grout." Payment for furnishing and placing the grout mixture will be subsidiary to the pay item of asphaltic pavement or reinforced concrete.



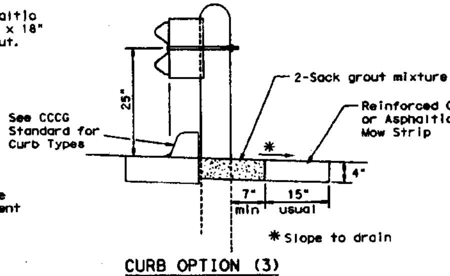
CURB OPTION (1)

This option will increase the post embedment through out the system.



CURB OPTION (2)

Curb shown on top of mow strip



CURB OPTION (3)

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METAL BEAM GUARD FENCE (MOW STRIP)

GF(31)MS-11

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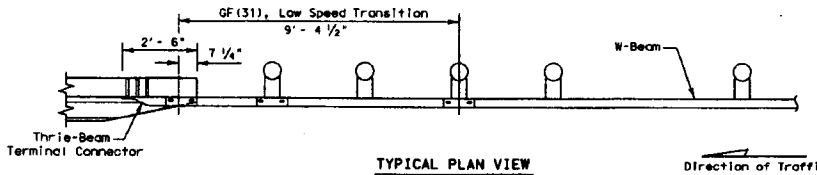
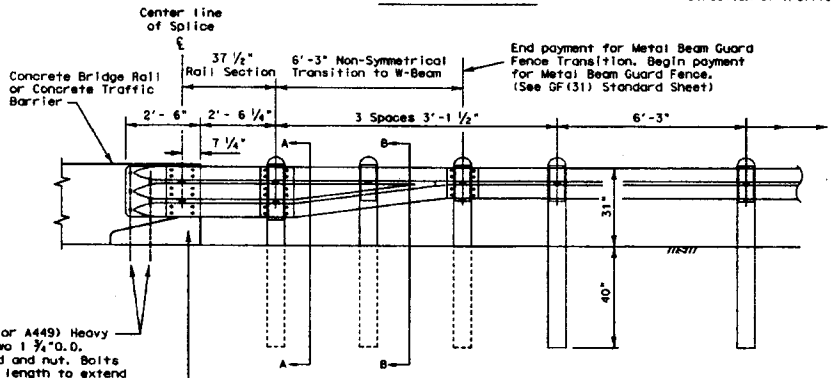


TYPICAL PLAN VIEW

Direction of Traffic



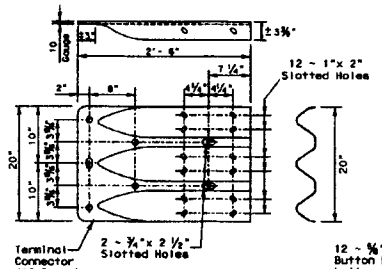
TYPICAL ELEVATION VIEW

5 ~ ⅞" Dia. (ASTM A325 or A449) Heavy Hex Head Bolts, with two 1 ¾"O.D. washers under each head and nut. Bolts shall be of sufficient length to extend through the full thickness of the rail, washer, and nut. Install with bolt heads on traffic face.

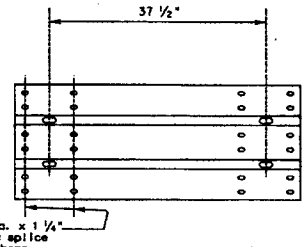
Chamfer required on concrete rails that extend beyond the face of the guardrail transition.

TERMINAL CONNECTION NOTE

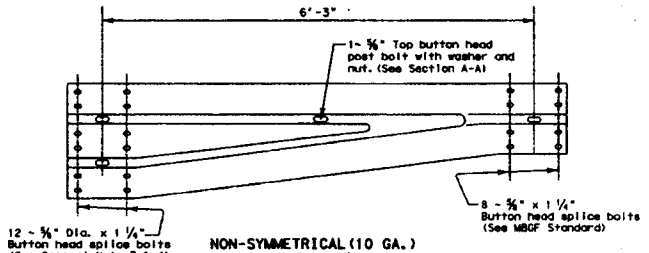
To ensure a stable connection. (12) Rectangular Rosners (FWR03) are required under the recessed nuts at the Terminal Connection splice.



THRIE-BEAM TERMINAL CONNECTION
(See Terminal Connection Note)



THRIE-BEAM (3'- 1 ½") (10 GA.) ELEMENT SECTION

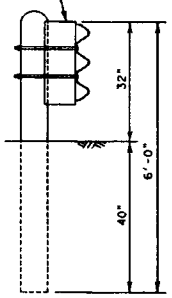


NON-SYMMETRICAL (10 GA.) TRANSITION SECTION

GENERAL NOTES

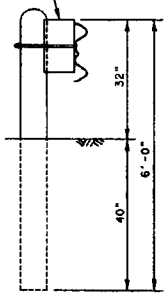
1. The type of post (round wood post, rectangular wood post, or steel post) will be as shown in the plans. The exact position of transitions shall be as shown in the plans or as directed by the Engineer.
2. Rail element shall meet the requirements of Item 540, "Metal Beam Guard Fence" except as modified in the plans.
3. Button head "post" bolts (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut and Type A 1 ¾" O.D. washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are ⅝" x 1 ¼" with ⅝" double recessed nuts (ASTM A563).
4. 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.
5. Crown will be widened to accommodate transitions.
6. If solid rock is encountered. See the GF(31) standard sheet for the proper installation guidance.
7. Posts shall not be set in concrete, of any depth.
8. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or 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 posts and/or blocks.
9. Refer to GF(31) standard sheet for additional details.

This post location requires a Thrie-Beam Block (6"x 8"x 22" Nom).

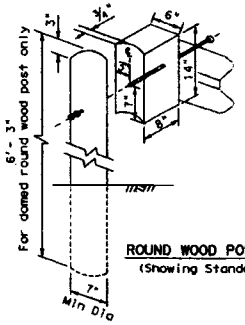


SECTION A-A

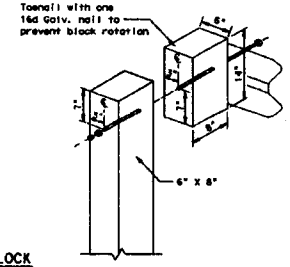
Standard Block (6"x 8"x 14" Nom)



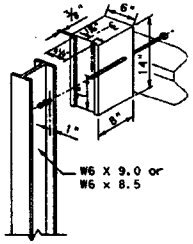
SECTION B-B



ROUND WOOD POST & BLOCK
(Showing Standard Block)



WOOD BLOCK TO RECTANGULAR WOOD POST



STEEL POST & BLOCK
(Showing Standard Block)

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METAL BEAM GUARD FENCE TRANSITION (TL-2) (Low Speed Transition) GF(31)TL2-11

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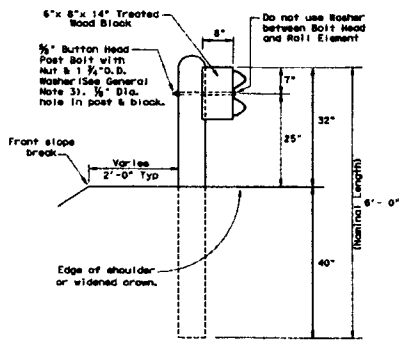
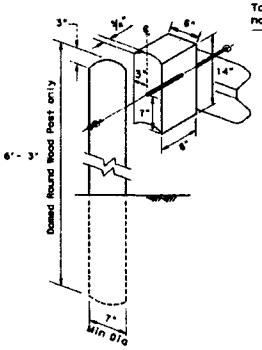
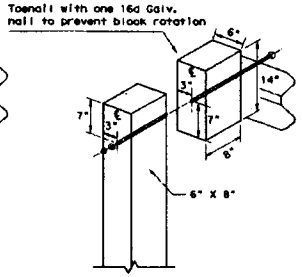


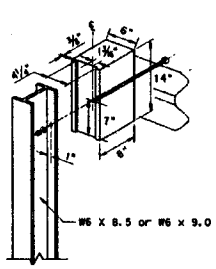
TYPICAL POST



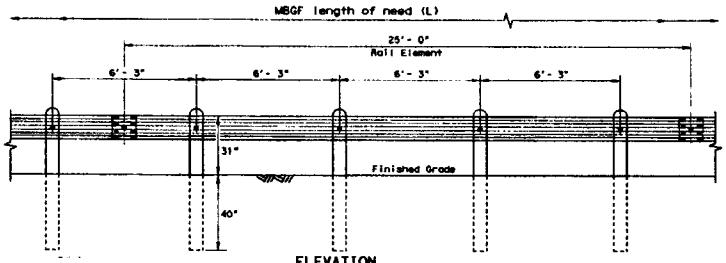
WOOD BLOCK TO ROUND WOOD POST



WOOD BLOCK TO RECTANGULAR WOOD POST



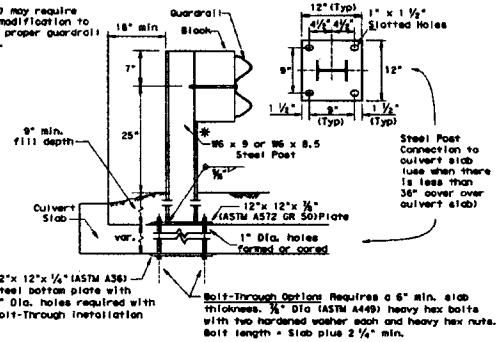
WOOD BLOCK TO STEEL POST



ELEVATION
MID-SPAN RAIL SPLICE

Showing a 25'- 0" section of W-Beam rail, 12'- 6" rail sections may also be supplied (See General Note 2)

Direction of Traffic

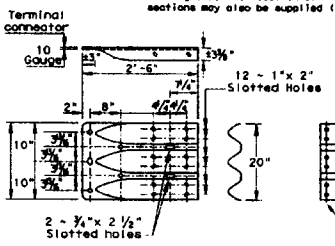


Bolt-Through Option: Requires a 6" min. slab thickness. 5/8" Dia (ASTM A449) heavy hex bolts with two hardened washer each and heavy hex nuts. Bolt length = Slab plus 2 1/4" min.

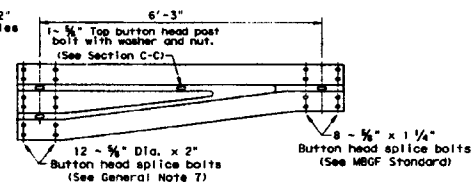
LOW FILL CULVERT POST

Culverts of 25 ft. or less, see GF(31)LS standard for "Long Span" option.

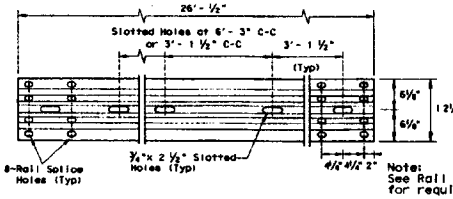
Epoxy Notes:
Epoxy Anchor Option: This option may only be used if the culvert slab is 8" min. thick. Threaded anchor rods must be 5/8" Dia. ASTM A449 or A193 Grade B7 with heavy hex nut, and one hardened washer each. Embed anchor rods 6" with Hilti HIT RE 500 epoxy adhesive. Other Type III Class C epoxy 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 1/2" min. beyond nut.



THRIE-BEAM TERMINAL CONNECTION
(SEE GENERAL NOTES 6 & 7 FOR REQUIRED HARDWARE)

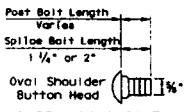


NON-SYMMETRICAL TRANSITION
TO W-BEAM (10 Gauge)

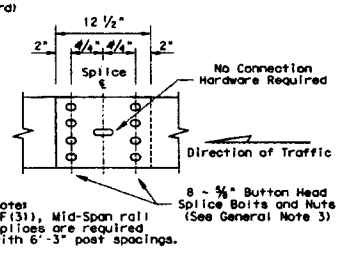


Note:
See Rail Splice Detail for required hardware.

ELEVATION 25'- 0" (NOM.) W-BEAM SECTION
12'- 6" RAIL SECTIONS MAY ALSO BE SUPPLIED (SEE GENERAL NOTE 2)

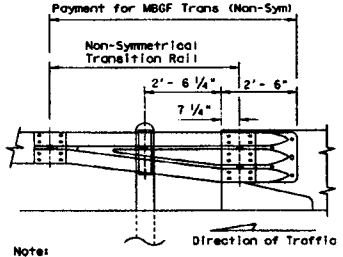


BUTTON HEAD BOLT
Post and Splice Bolts (See General Note 3)



Notes:
GF(31), Mid-Span rail splices are required with 6'-3" post spacings.

MID-SPAN
RAIL SPLICE DETAIL



Note:
All rail elements shall be lapped in the direction of adjacent traffic.

DOWNSTREAM RAIL ATTACHMENT

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 element 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'-1½" 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 (ASTM A307) shall be of sufficient length to extend through the full thickness of the nut (ASTM A563) and Type A (1 ¾" O.D.) washer and not more than 1" beyond it. Button head "splice" bolts (ASTM A307) are ⅝" x 1 ¼" (or 2" long at triple rail splices) with a ⅝" double recessed nut (ASTM A563). Thrie beam "connection" ⅞" dia. (ASTM A325) hex bolts shall be of sufficient length to extend through the full thickness of the rail, washers, and nuts.
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. If solid rock is encountered within 0 to 18" of the finished grade, drill a 22" dia. hole, or drill two 12" dia. front to back overlapping holes, 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 a cohesionless material.
10. Posts shall not be set in concrete, of any depth.
11. Special fabrication will be required at installations having a curvature of less than 150 ft. radius.
12. Unless otherwise shown in the plans, a composite material post and/or block that meets the requirements of DMS-7210, "Composite Material Posts and Blocks for Metal Beam Guard Fence" may be substituted for posts and/or 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 posts and/or blocks.
13. For posts located partially or wholly between precast box culvert units, the use of a cast-in-place concrete closure between boxes is required. See Detail "A" on Bridge Standard SCP-MD.

Texas Department of Transportation | Design Division Standard

METAL BEAM GUARD FENCE

GF(31)-14

FILE: gf3114.dgn	DN: TxDOT	CK: AM	DW: VP	CK: CGL
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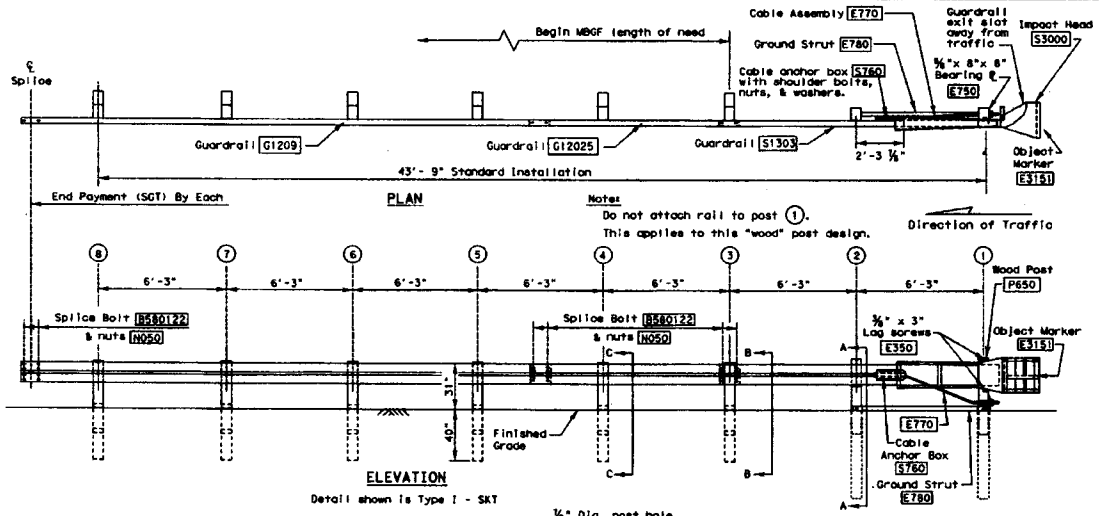

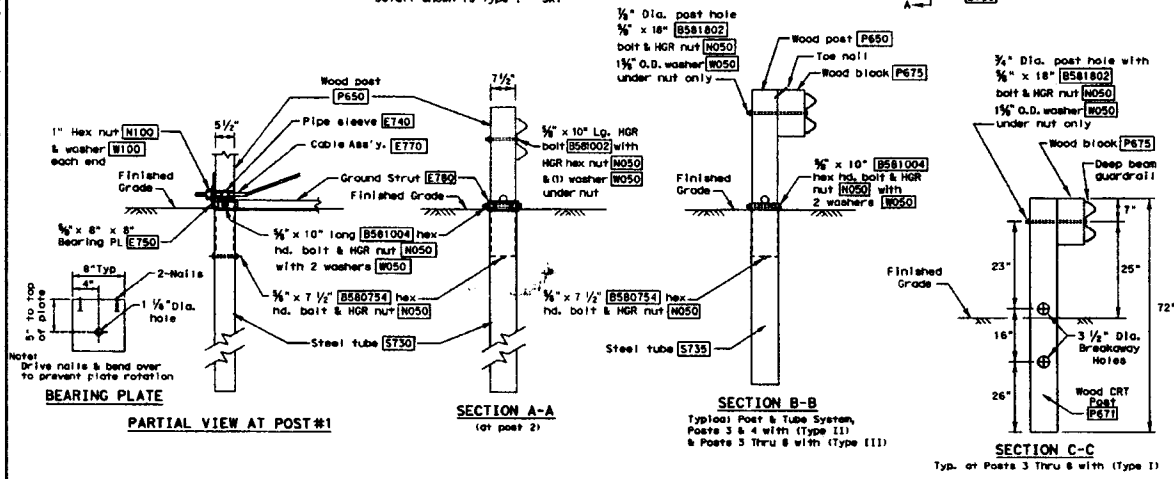

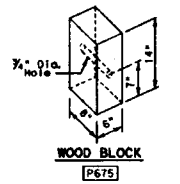

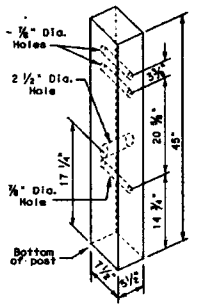

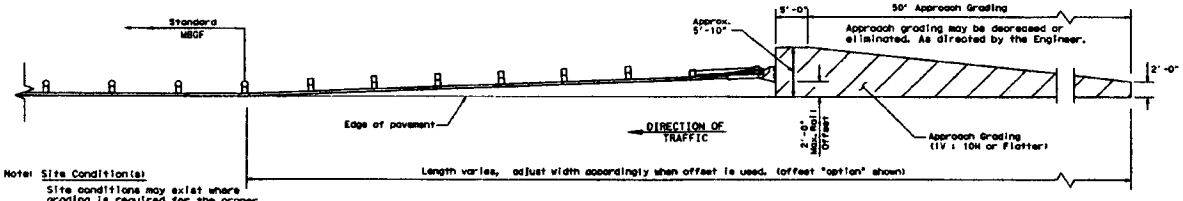

GENERAL NOTES

1. For additional information contact: Interstate Steel Inc. (432) 263-3725
2. The Type of SGT unit will be specified elsewhere in the plans. The numbers in the circles indicate post position. The Type of SGT unit chosen is a maintenance consideration and does not affect the systems performance.

Post & Tube Options		Post Only	
Type I	Posts (1) thru (2)	Posts (3) thru (8)	
Type II	Posts (1) thru (4)	Posts (5) thru (8)	
Type III	Posts (1) thru (8)	None	

3. SGT's placed within the "minimum" 150 ft. radius, shall be installed straight. Standard rail elements may be installed within the radius, without special fabrication.
4. All bolts, nuts cable assemblies, cable anchors, steel tubes & bearing plates shall be galvanized.
5. A flare rate of 25:1 may be used over the first 50 ft. of the system to prevent the terminal head from encroaching the shoulder. The flare may be decreased or eliminated for specific installations, if directed by the Engineer.
6. The steel tubes shall not protrude more than 4 inches above ground. Site grading may be necessary to meet this requirement.
7. The steel tubes may be driven with an approved driving head. They shall not be driven with the wood post in the tube. If the steel tubes are placed in drilled holes, the backfill material must be satisfactorily compacted to prevent tube settlement.
8. If solid rock is encountered. See the Manufacturer's installation manual for the proper installation guidance.
9. The breakaway cable assembly must be taut. A locking device, (vice grips or channel lock pliers) should be used to prevent the cable from twisting when tightening the nuts.
10. The wood blocks shall be "toe nailed" to the rectangular wood posts to prevent them from turning when the wood shrinks. The bearing plate on the front post shall also be "toe nailed" to prevent rotation.
11. For curb installations, the soil tubes and posts shall be installed at the proper ground elevation behind the curb. The posts will then require field drilling new holes to accommodate the rail to post connection bolt to maintain the proper height of the rail above the gutter pan. The excess post length above the rail will be removed if directed by the Engineer.
12. An object marker shall be installed on the front of the impact head as detailed on D&OM(VIA).

BILL OF MATERIAL

Item #	POST & TUBE OPTIONS Type I	Type II	Type III	DESCRIPTION
S1303	1	1	1	Guardrail (12 Ga.) 12'- 6" SKT
G12025	1	1	1	Guardrail (12 Ga.) 9'- 4 ½"
G1209	1	1	1	Guardrail (12 Ga.) 25'- 0"
S730	2	2	2	Steel Tube - 6" x 8" x 72" x ⅛" min. or ⅜"
S735	0	2	6	Steel Tube - 6" x 8" x 54" x ⅛" min. or ⅜"
P650	2	4	8	Wood Posts - 5 ½" x 7 ½" x 45"
P671	6	4	0	Wood CRT Posts - 6" x 8" x 72"
P675	6	6	6	Wood Block - 6" x 8" x 14"
E740	1	1	1	Pipe Sleeve - 2" Std. Pipe x 5½"
E750	1	1	1	Bearing Plate - ⅝" x 8" x 8"
S760	1	1	1	Cable Anchor Box
E770	1	1	1	Cable Assembly
E780	1	1	1	Ground Strut
S3000	1	1	1	Impact Head
				HARDWARE
B580754	2	4	8	⅝" x 7 ½" Hex Hd. Bolt
B581004	2	4	8	⅝" x 10" Hex Hd. Bolt (Top of Tubes)
W050	11	15	23	⅝" Washers
B581002	1	1	1	⅝" x 10" HGR Post Bolt (Post 2)
B580122	16	16	16	⅝" x 1 ⅛" HGR Splice Bolt
B581802	6	6	6	⅝" x 18" HGR Post Bolt (Posts (3) thru (8))
N050	35	39	47	⅝" HGR Nut 124-Spl, Varies-Posts, 2-Strut)
E350	2	2	2	⅜" x 3" Lag Screw
N100	2	2	2	1" Hex Nut (Anchor Cable)
W100	2	2	2	1" Washer (Anchor Cable)
SB12A	8	8	8	Cable Anchor Box Shoulder Bolts
N012A	8	8	8	½" Structural Nut
W012A	8	8	8	½" Structural Washer
E315I	1	1	1	Object Marker - (18" x 18")

POST & TUBE OPTIONS	
Type I	post (1) thru (2)
Type II	post (1) thru (4)
Type III	post (1) thru (8)

Texas Department of Transportation — Design Division Standard

SINGLE GUARDRAIL TERMINAL
(SKT-31)
(WOOD POST)
SGT(8)31-14

FILE:	sgt83114.dgn	DN: TxDOT	CK: AM	DW: BD/VP	CK: VP
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