



**REVIEW BY FORT BEND COUNTY  
COMMISSIONERS COURT**

**Fort Bend County  
Engineering Department**  
301 Jackson Suite 401  
Richmond, Texas 77469  
281.633.7500  
[Permits@fortbendcountytx.gov](mailto:Permits@fortbendcountytx.gov)

**Right of Way Permit**

**Commercial Driveway Permit**

Permit No: 2017-15271

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

**Job Location Site:** Oyster Creek at Highway 99, Richmond, TX 77407

**Bond No.**                      **Date of Bond:** 7/17/2017 **Amount:** \$264,300.65

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 inconsistent with Chapter 181, Vernon's Texas Statutes and Codes Annotated.

**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](http://MyGovernmentOnline.org) portal.
3. This permit expires one (1) year from date of permit if construction has not commenced.

On this 8th day of August, 2017, Upon Motion of Commissioner \_\_\_\_\_, seconded by Commissioner \_\_\_\_\_, 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**

Presented to Commissioners Court and approved.

By: *Charles O. Ay*

Date Recorded \_\_\_\_\_ Comm. Court No. \_\_\_\_\_

*for* County Engineer

Clerk of Commissioners Court

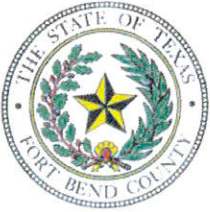
N/A

By: \_\_\_\_\_

By: \_\_\_\_\_

Drainage District Engineer/Manager

Deputy



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

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

- Right of Way Permit**  
 **Commercial Driveway Permit**

Permit No: 2017-15271

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:**

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

**(2) BOND:**

- County Attorney, approval when applicable.
- Perpetual bond currently posted.      Bond No: \_\_\_\_\_ Amount: \_\_\_\_\_
- Performance bond submitted.      Bond No: [REDACTED]      Amount: \$264,300.65
- Cashier's Check      Check No: \_\_\_\_\_ Amount: \_\_\_\_\_

**(3) DRAINAGE DISTRICT APPROVAL (WHEN APPLICABLE):**

\_\_\_\_\_  
Drainage District Approval

\_\_\_\_\_  
Date

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

*Charles O. Ay*

\_\_\_\_\_  
Permit Administrator

*8/1/17*  
\_\_\_\_\_  
Date

**PERFORMANCE BOND COVERING ALL CABLE, CONDUIT AND/OR POLE LINE  
ACTIVITY IN, UNDER, ACROSS OR ALONG FORT BEND COUNTY ROAD**

AUTHORIZED

BOND NO. [REDACTED]  
THE STATE OF TEXAS §  
COUNTY OF FORT BEND §

KNOW ALL MEN BY THESE PRESENTS:  
West Aliana Trace Bridge - APP 16810

THAT WE, Harris Construction Company, Ltd. whose  
address is 6602 Guhn Rd., Houston, TX 77040 Texas, hereinafter called the Principal,  
And Liberty Mutual Insurance Company, a Corporation existing under and by virtue of  
the laws of the state of Massachusetts and authorized to do an indemnifying business in the state of Texas, and whose  
principal office is located at 175 Berkeley St., Boston, MA 02117, whose officer residing  
in the State of Texas, authorized to accept service in all suits and actions brought whining said state is and Whose address is  
13201 NW Freeway, Ste. 810, Houston, TX 77040, hereinafter called the Surety, and held and  
firmly bound unto, Robert E. Hebert, County Judge of Fort Bend County, Texas, or his successors in office, in the full sum  
of Two Hundred Sixty Four Thousand Three Hundred & 65/100 Dollars (\$ 264,300.65 ) current, lawful money of the United States of  
America, to be paid to said Robert E. Hebert, County Judge of Fort Bend County, Texas, or his successors in office, to  
which payment well and truly to be made and done, we, the undersigned, bind ourselves and each of us, our heirs,  
executors, administrators, successors, assigns, and legal representatives, jointly and severally, by these presents.

THE CONDITION OF THIS BOND IS SUCH THAT, WHEREAS, the above bounden principal contemplates laying, constructing, maintaining and/or repairing one or more cables, conduits, and/or pole lines in, under, across and/or along roads, streets and highways, commercial driveway and median openings or modifications in the County of Fort Bend, and the State of Texas, under the jurisdiction of the Commissioners' Court of Fort Bend County, Texas, pursuant to the Commissioners' Court order adopted on the 1st day of December, A.D. 1980, recorded in Volume 13, of the Commissioners' Court Minutes of Fort Bend County, Texas, regulating same, which Commissioners' Court order is hereby referred to and made a part hereof for all purposes as though fully set out herein;

AND WHEREAS, the principal desires to provide Fort Bend County with a performance bond covering all such cable, conduit and/or pole line activity, commercial driveway and median openings or modifications;

NOW, THEREFORE, if the above bounden principal shall faithfully perform all its cable, conduit and/or pole line activity (including, but not limited to the laying, construction, maintenance and/or repair of cables, conduits and/or pole lines) in, under, across and/or along roads, streets and highways, commercial driveway and median openings or modifications in the County of Fort Bend and State of Texas, under the jurisdiction of the Commissioners Court of Fort Bend County, Texas, pursuant to and in accordance with minimum requirements and conditions of the above mentioned Commissioners' Court order set forth and specified to be by said principal done and performed, at the time and in the manner therein specified, and shall pay over and make good and reimburse Fort Bend County, all loss and damages which Fort Bend County may sustain by reason of any failure or default on the part of said principal, then this obligation shall be null and void, otherwise to remain in full force and effect.

This bond is payable at the County Courthouse in the County of Fort Bend and State of Texas.

It is understood that at any time Fort Bend County deems itself insecure under this bond, it may require further and/or additional bonds of the principal.

EXECUTED this 17th day of July, 2017.

Harris Construction Company, Ltd.  
PRINCIPAL Glenn S. Harris, President it's General Partner GHCC LLC

BY Glenn S. Harris, President  
Liberty Mutual Insurance Company  
SURETY

Michelle Utery  
Michelle Utery, Attorney in Fact

**THIS POWER OF ATTORNEY IS NOT VALID UNLESS IT IS PRINTED ON RED BACKGROUND.**

This Power of Attorney limits the acts of those named herein, and they have no authority to bind the Company except in the manner and to the extent herein stated.

Certificate No. 7222300

American Fire and Casualty Company  
The Ohio Casualty Insurance Company

Liberty Mutual Insurance Company  
West American Insurance Company

**POWER OF ATTORNEY**

KNOWN ALL PERSONS BY THESE PRESENTS: That American Fire & Casualty Company and The Ohio Casualty Insurance Company are corporations duly organized under the laws of the State of New Hampshire, that Liberty Mutual Insurance Company is a corporation duly organized under the laws of the State of Massachusetts, and West American Insurance Company is a corporation duly organized under the laws of the State of Indiana (herein collectively called the "Companies"), pursuant to and by authority herein set forth, does hereby name, constitute and appoint, C.A. McClure; Kelly J. Brooks; Kenneth L. Meyer; Michelle Ulery

all of the city of CYPRESS, state of TX each individually if there be more than one named, its true and lawful attorney-in-fact to make, execute, seal, acknowledge and deliver, for and on its behalf as surety and as its act and deed, any and all undertakings, bonds, recognizances and other surety obligations, in pursuance of these presents and shall be as binding upon the Companies as if they have been duly signed by the president and attested by the secretary of the Companies in their own proper persons.

IN WITNESS WHEREOF, this Power of Attorney has been subscribed by an authorized officer or official of the Companies and the corporate seals of the Companies have been affixed thereto this 5th day of January, 2016.



American Fire and Casualty Company  
The Ohio Casualty Insurance Company  
Liberty Mutual Insurance Company  
West American Insurance Company

By: David M. Carey  
David M. Carey, Assistant Secretary

STATE OF PENNSYLVANIA ss  
COUNTY OF MONTGOMERY

On this 5th day of January, 2016, before me personally appeared David M. Carey, who acknowledged himself to be the Assistant Secretary of American Fire and Casualty Company, Liberty Mutual Insurance Company, The Ohio Casualty Insurance Company, and West American Insurance Company, and that he, as such, being authorized so to do, execute the foregoing instrument for the purposes therein contained by signing on behalf of the corporations by himself as a duly authorized officer.

IN WITNESS WHEREOF, I have hereunto subscribed my name and affixed my notarial seal at Plymouth Meeting, Pennsylvania, on the day and year first above written.



COMMONWEALTH OF PENNSYLVANIA  
Notarial Seal  
Teresa Pastella, Notary Public  
Plymouth Twp., Montgomery County  
My Commission Expires March 28, 2017  
Member, Pennsylvania Association of Notaries

By: Teresa Pastella  
Teresa Pastella, Notary Public

This Power of Attorney is made and executed pursuant to and by authority of the following By-laws and Authorizations of American Fire and Casualty Company, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company which resolutions are now in full force and effect reading as follows:

**ARTICLE IV – OFFICERS** – Section 12. Power of Attorney. Any officer or other official of the Corporation authorized for that purpose in writing by the Chairman or the President, and subject to such limitation as the Chairman or the President may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Corporation to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact, subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Corporation by their signature and execution of any such instruments and to attach thereto the seal of the Corporation. When so executed, such instruments shall be as binding as if signed by the President and attested to by the Secretary. Any power or authority granted to any representative or attorney-in-fact under the provisions of this article may be revoked at any time by the Board, the Chairman, the President or by the officer or officers granting such power or authority.

**ARTICLE XIII – Execution of Contracts – SECTION 5. Surety Bonds and Undertakings.** Any officer of the Company authorized for that purpose in writing by the chairman or the president, and subject to such limitations as the chairman or the president may prescribe, shall appoint such attorneys-in-fact, as may be necessary to act in behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations. Such attorneys-in-fact subject to the limitations set forth in their respective powers of attorney, shall have full power to bind the Company by their signature and execution of any such instruments and to attach thereto the seal of the Company. When so executed such instruments shall be as binding as if signed by the president and attested by the secretary.

**Certificate of Designation** – The President of the Company, acting pursuant to the Bylaws of the Company, authorizes David M. Carey, Assistant Secretary to appoint such attorneys-in-fact as may be necessary to act on behalf of the Company to make, execute, seal, acknowledge and deliver as surety any and all undertakings, bonds, recognizances and other surety obligations.

**Authorization** – By unanimous consent of the Company's Board of Directors, the Company consents that facsimile or mechanically reproduced signature of any assistant secretary of the Company, wherever appearing upon a certified copy of any power of attorney issued by the Company in connection with surety bonds, shall be valid and binding upon the Company with the same force and effect as though manually affixed.

I, Gregory W. Davenport, the undersigned, Assistant Secretary, of American Fire and Casualty Company, The Ohio Casualty Insurance Company, Liberty Mutual Insurance Company, and West American Insurance Company do hereby certify that the original power of attorney of which the foregoing is a full, true and correct copy of the Power of Attorney executed by said Companies, is in full force and effect and has not been revoked.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the seals of said Companies this 17th day of July, 2017.



By: Gregory W. Davenport  
Gregory W. Davenport, Assistant Secretary

Not valid for mortgage, note, loan, letter of credit, currency rate, interest rate or residual value guarantees.

To confirm the validity of this Power of Attorney call 1-610-832-8240 between 9:00 am and 4:30 pm EST on any business day.



## TEXAS IMPORTANT NOTICE

To obtain information or make a complaint:

You may call toll-free for information or to make a complaint at  
1-877-751-2640

You may also write to:

2200 Renaissance Blvd., Ste. 400  
King of Prussia, PA 19406-2755

You may contact the Texas Department of Insurance to obtain information on companies, coverages, rights or complaints at  
1-800-252-3439

You may write the Texas Department of Insurance  
Consumer Protection (111-1A)  
P. O. Box 149091  
Austin, TX 78714-9091  
FAX: (512) 490-1007  
Web: <http://www.tdi.texas.gov>  
E-mail: [ConsumerProtection@tdi.texas.gov](mailto:ConsumerProtection@tdi.texas.gov)

### PREMIUM OR CLAIM DISPUTES:

Should you have a dispute concerning your premium or about a claim you should first contact the agent or call 1-800-843-6446. If the dispute is not resolved, you may contact the Texas Department of Insurance.

### ATTACH THIS NOTICE TO YOUR POLICY:

This notice is for information only and does not become a part or condition of the attached document.

## TEXAS AVISO IMPORTANTE

Para obtener informacion o para someter una queja:

Usted puede llamar al numero de telefono gratis para informacion o para someter una queja al  
1-877-751-2640

Usted tambien puede escribir a:

2200 Renaissance Blvd., Ste. 400  
King of Prussia, PA 19406-2755

Puede comunicarse con el Departamento de Seguros de Texas para obtener informacion acerca de companias, coberturas, derechos o quejas al  
1-800-252-3439

Puede escribir al Departamento de Seguros de Texas Consumer Protection (111-1A)  
P. O. Box 149091  
Austin, TX 78714-9091  
FAX # (512) 490-1007  
Web: <http://www.tdi.texas.gov>  
E-mail: [ConsumerProtection@tdi.texas.gov](mailto:ConsumerProtection@tdi.texas.gov)

### DISPUTAS SOBRE PRIMAS O RECLAMOS:

Si tiene una disputa concerniente a su prima o a un reclamo, debe comunicarse con el agente o primero. Si no se resuelve la disputa, puede entonces comunicarse con el departamento (TDI)

### UNA ESTE AVISO A SU POLIZA:

Este aviso es solo para proposito de informacion y no se convierte en parte o condicion del documento adjunto.











**REVISIONS**

NO.	DATE	DESCRIPTION
1	11/28/2017	ISSUED FOR PERMITS
2	12/14/2017	REVISED PER COMMENTS FROM PERMITS
3	1/11/2018	REVISED PER COMMENTS FROM PERMITS
4	2/27/2018	REVISED PER COMMENTS FROM PERMITS
5	3/21/2018	REVISED PER COMMENTS FROM PERMITS
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**RECORD DRAWING**

I CERTIFY THAT THIS DRAWING REFLECTS THE LOCATION AND GRADE AND THAT THE DESIGN INFORMATION WAS IN FULL COMPLIANCE WITH THE TEXAS PROFESSIONAL ENGINEERING ACT AND RULES.

DATE: 3/21/2018  
 BY: [Signature]  
 TITLE: [Signature]  
 FIRM: [Signature]

APPROVED: [Signature]  
 TITLE: [Signature]  
 FIRM: [Signature]

DATE: 3/21/2018  
 BY: [Signature]  
 TITLE: [Signature]  
 FIRM: [Signature]

WEST ALIANA TRACE DRIVE BRIDGE

BRIDGE LAYOUT

OYSTER CREEK BRIDGE

LJA Engineering, Inc.

11111 West Loop South, Suite 600  
 Houston, Texas 77042  
 Phone: 713.921.5200  
 Fax: 713.921.5208  
 Email: info@lja.com  
 Website: www.lja.com

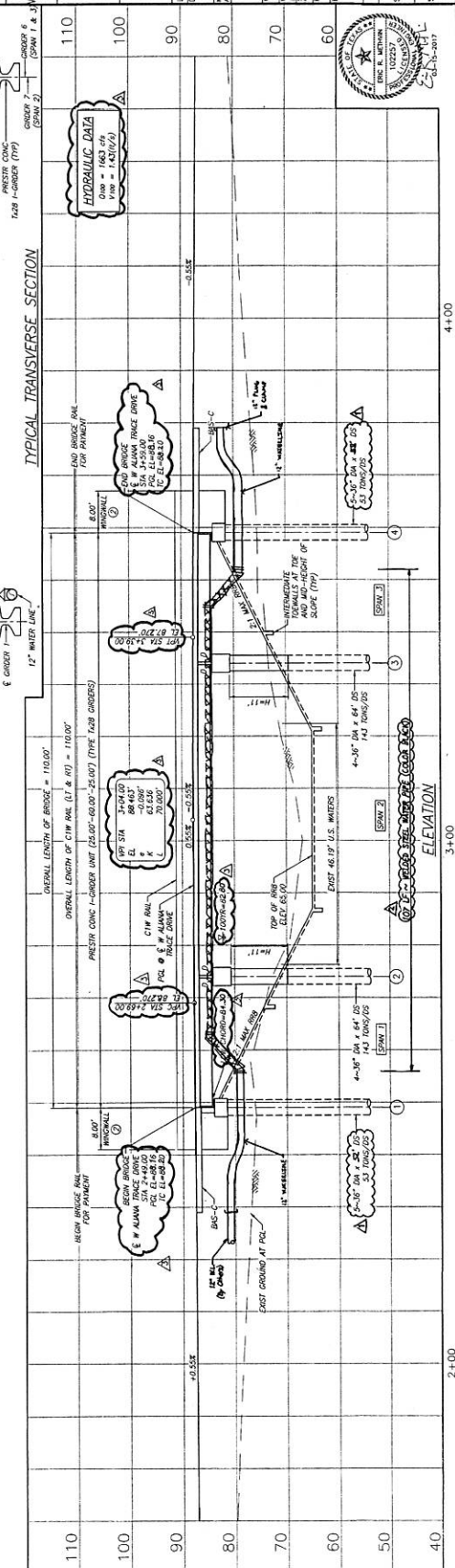
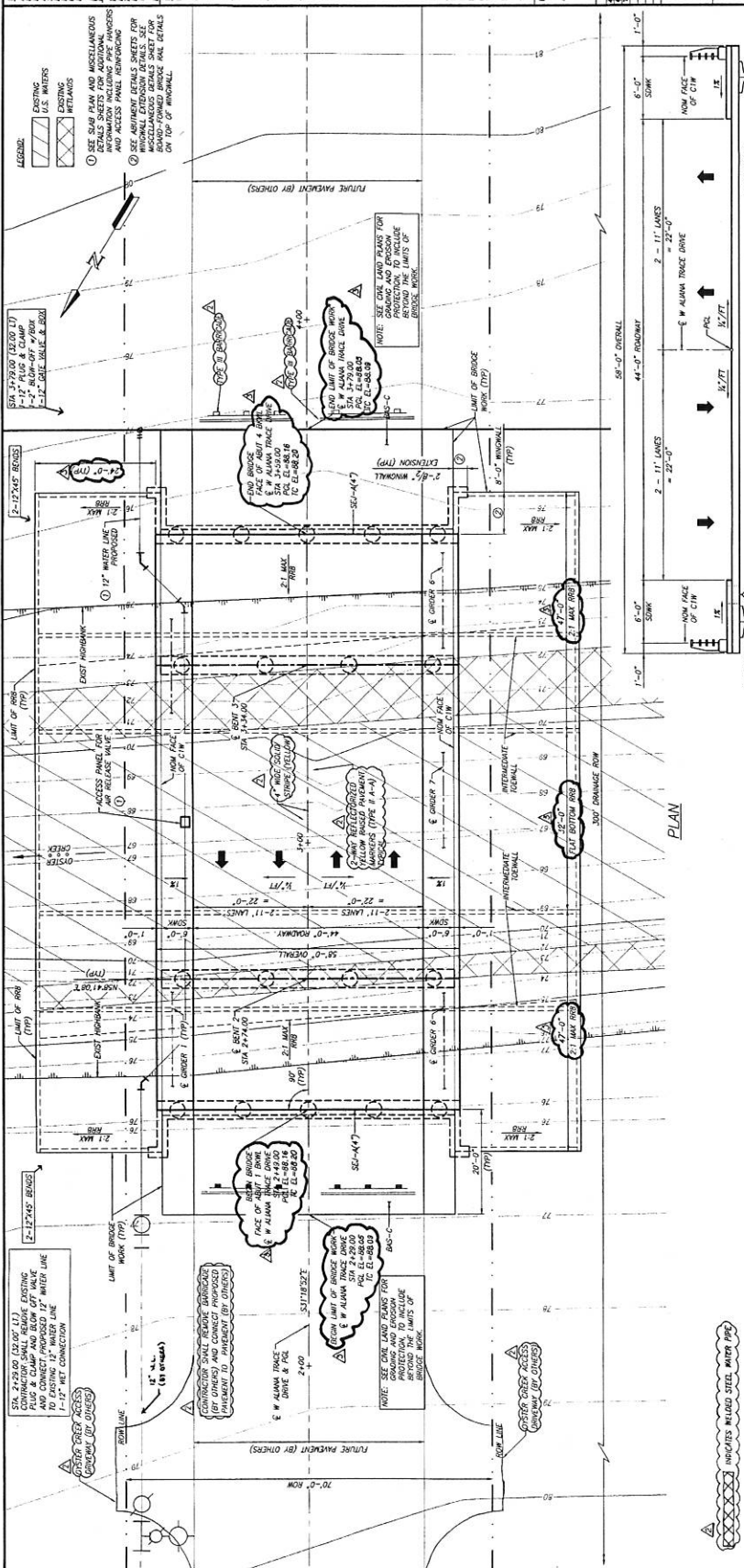
PROJECT NO.: 1988-1050  
 SHEET NO.: 6 OF 50

DESIGNED BY: [Signature]  
 CHECKED BY: [Signature]  
 DATE: MARCH 2017

CITY OF HOUSTON  
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING

DATE: 3/23/2017  
 TIME: 10:00 AM  
 DRAWN BY: [Signature]

FOR CITY OF HOUSTON USE ONLY







**BENCHMARKS:**  
 1. THE TOP OF THE CONCRETE ABUTMENT SHALL BE THE WEST END OF THE WEST ALIANA TRACE DRIVE BRIDGE. THE WEST END OF THE WEST ALIANA TRACE DRIVE BRIDGE SHALL BE THE WEST END OF THE WEST ALIANA TRACE DRIVE BRIDGE. THE WEST END OF THE WEST ALIANA TRACE DRIVE BRIDGE SHALL BE THE WEST END OF THE WEST ALIANA TRACE DRIVE BRIDGE. THE WEST END OF THE WEST ALIANA TRACE DRIVE BRIDGE SHALL BE THE WEST END OF THE WEST ALIANA TRACE DRIVE BRIDGE.

**REVISIONS:**  
 1. FOR GENERAL NOTES AND MATERIAL NOTES SEE SHEET 1 OF 2.

**SCALE:** 1/8" = 1'-0" (VERTICAL) 1/4" = 1'-0" (HORIZONTAL)

**DATE:** 3/23/17

**DESIGNER:** [Signature]

**APPROVED:** [Signature]

**DATE:** 3/23/17

**REVISION:**

**DATE:**

**BY:**

**DATE:**

**DATE:**

**DATE:**

**DATE:**

**DATE:**

**DATE:**

**DATE:**

**DATE:**

**WEST ALIANA TRACE DRIVE BRIDGE**

**ABUTMENT 1 & 4**

**OYSTER CREEK BRIDGE**

**LJA Engineering, Inc.**

**1948-1040**

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**WEST ALIANA TRACE DRIVE BRIDGE**

**ABUTMENT 1 & 4**

**OYSTER CREEK BRIDGE**

**LJA Engineering, Inc.**

**1948-1040**

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DESIGNER'S RESPONSIBILITY: THE DESIGNER SHALL BE RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION PROVIDED IN THIS DRAWING AND FOR THE DESIGN OF THE BRIDGE. THE DESIGNER SHALL BE RESPONSIBLE FOR THE DESIGN OF THE BRIDGE AND SHALL BE RESPONSIBLE FOR THE DESIGN OF THE BRIDGE AND SHALL BE RESPONSIBLE FOR THE DESIGN OF THE BRIDGE.

DATE: 7/24/17  
 APPROVED: DEVELOPMENT SUPERVISOR  
 FOR THE COUNTY ENGINEERING DEPARTMENT

PROJECT NAME:  
 WEST ALIANA TRACE DRIVE  
 C.P.C. LOG NO. 16-  
 ALIANA DEVELOPMENT  
 COMPANY

WEST ALIANA TRACE DRIVE BRIDGE  
 GIRDER LAYOUT  
 OYSTER CREEK BRIDGE

LJA Engineering, Inc.  
 11000 Katy Road, Suite 100  
 Houston, Texas 77058  
 LJA PROJECT NO.: 1916H-1050  
 DRAWN BY: [Signature]  
 DATE: MARCH 2017

CITY OF HOUSTON  
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING  
 PROJECT NO.: 1916H-1050  
 DRAWN BY: [Signature]  
 DATE: MARCH 2017

FILE NO.:  
 DRAWING SCALE:  
 SHEET NO. 12 of 50

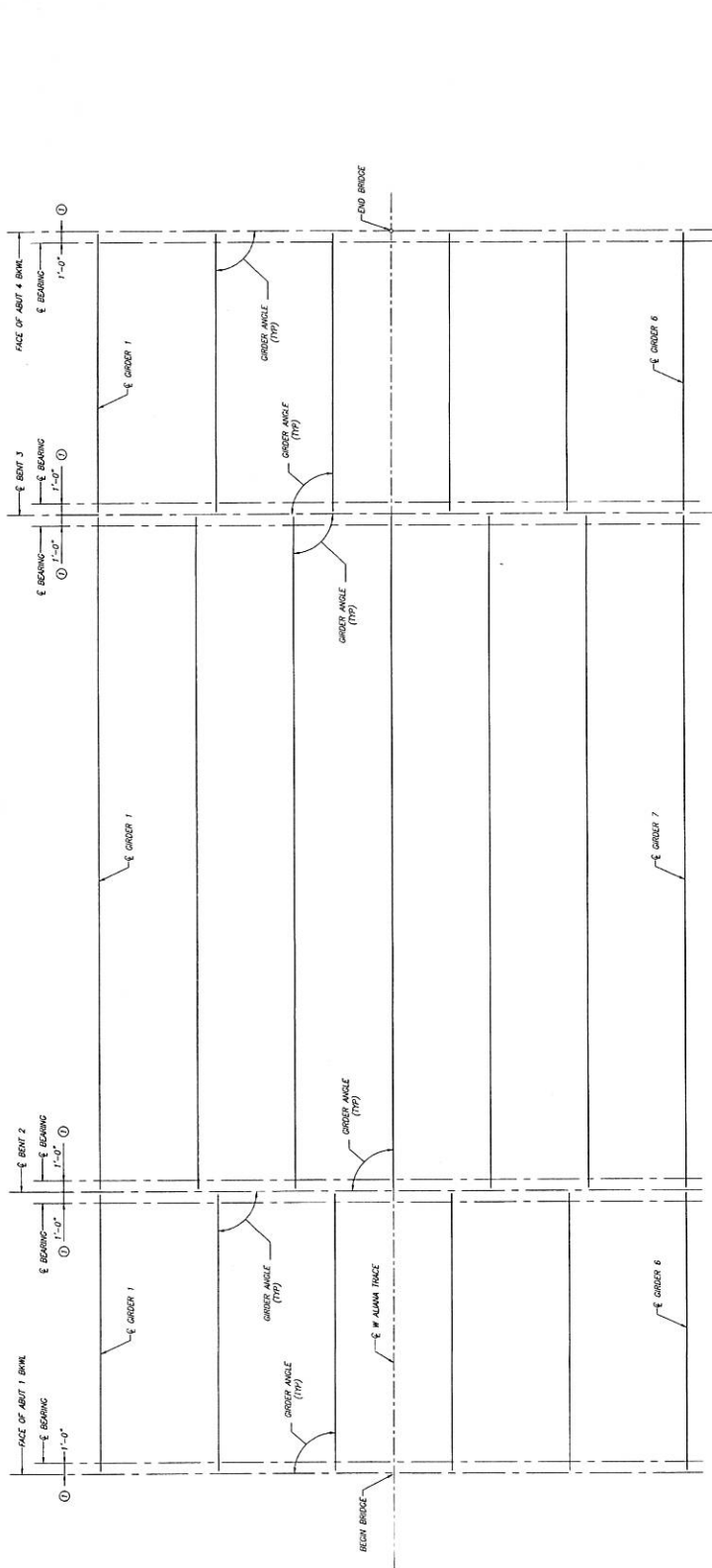
RECORD DRAWING  
 I CERTIFY THAT THIS DRAWING REFLECTS THE LOCATION AND GRADE AND THAT THE CONSTRUCTION WAS IN FULL COMPLIANCE WITH THE CONTRACT DOCUMENTS.  
 DATE: 7/24/17  
 APPROVED: DEVELOPMENT SUPERVISOR  
 FOR THE COUNTY ENGINEERING DEPARTMENT

WEST ALIANA TRACE DRIVE BRIDGE  
 GIRDER LAYOUT  
 OYSTER CREEK BRIDGE  
 LJA Engineering, Inc.  
 11000 Katy Road, Suite 100  
 Houston, Texas 77058  
 LJA PROJECT NO.: 1916H-1050  
 DRAWN BY: [Signature]  
 DATE: MARCH 2017

CITY OF HOUSTON  
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING  
 PROJECT NO.: 1916H-1050  
 DRAWN BY: [Signature]  
 DATE: MARCH 2017

FILE NO.:  
 DRAWING SCALE:  
 SHEET NO. 12 of 50

FOR CITY OF HOUSTON USE ONLY  
 DRAWING SCALE:  
 SHEET NO. 12 of 50



**PLAN**  
(7/24/17)

SEE ICB STANDARDS FOR ORDINARIETY OF DIMENSIONS  
 LENGTHS WITH DIMENSIONS SHALL BE GIVEN IN FEET

**GIRDER REPORT**

GIRDER REPORT SPAN 1		TRUE DISTANCE		GIRDER	
HORIZONTAL DISTANCE	VERTICAL DISTANCE	BOU	BM FLOO	BOU	BM FLOO
GIRDER 1	25.000	21.000	24.50	0.3445	
GIRDER 2	25.000	21.000	24.50	0.3445	
GIRDER 3	25.000	21.000	24.50	0.3445	
GIRDER 4	25.000	21.000	24.50	0.3445	
GIRDER 5	25.000	21.000	24.50	0.3445	
GIRDER 6	25.000	21.000	24.50	0.3445	
GIRDER 7	25.000	21.000	24.50	0.3445	

**BENT REPORT**

BENT NO. 1 (S 28 41 7.32 W)		GIRDER ANGLE		GIRDER ANGLE	
SPAN	GIRDER	BOU	BM FLOO	BOU	BM FLOO
SPAN 1	GIRDER 1	10.400	10.400	90	0
	GIRDER 2	10.400	10.400	90	0
	GIRDER 3	10.400	10.400	90	0
	GIRDER 4	10.400	10.400	90	0
	GIRDER 5	10.400	10.400	90	0
	GIRDER 6	10.400	10.400	90	0
	GIRDER 7	10.400	10.400	90	0
TOTAL		52.000	52.000	630	0



REVISIONS: SEE REVISED 1972 SET  
 A. ALL OF A CONTRACTOR'S WORK SHALL BE THE BEST  
 AVAILABLE MATERIALS AND METHODS OF CONSTRUCTION  
 WHICH MAY BE FOUND IN THE DIVISION OF PUBLIC  
 WORKS, CITY OF HOUSTON. THE CONTRACTOR SHALL  
 BE RESPONSIBLE FOR THE DESIGN AND CONSTRUCTION  
 OF THE BRIDGE AND SHALL BE RESPONSIBLE FOR  
 OBTAINING ALL NECESSARY PERMITS AND APPROVALS  
 FROM THE CITY OF HOUSTON. THE CONTRACTOR SHALL  
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 FROM THE CITY OF HOUSTON.

**TABLE OF ESTIMATED QUANTITIES**

SPAN	REFINEMENT	BRIDGE	PRECAST CONCRETE	10% IN REINFORCING	STEEL	LB
1	1.450	250	127.0	3.892		
2	3.430	840	416.0	9.248		
TOTAL	6.880	1,090	543.0	13.140		

\* FOR CONTRACTORS INFORMATION ONLY. REINFORCING STEEL QUANTITY IS CALCULATED USING APPROX. 2.3 LB/SY OF BRIDGE DECK AND 1.6 LB/SY OF SIDEWALK.

**BAR TABLE**

BAR	SIZE
A	#4
B	#4
C	#4
D	#4
E	#4
F	#4
G	#4
H	#4
I	#4
J	#4
K	#4
L	#4
M	#4
N	#4
O	#4
P	#4
Q	#4
R	#4
S	#4
T	#4
U	#4
V	#4
W	#4
X	#4
Y	#4
Z	#4
AA	#4
AB	#4
AC	#4
AD	#4
AE	#4
AF	#4
AG	#4
AH	#4
AI	#4
AJ	#4
AK	#4
AL	#4
AM	#4
AN	#4
AO	#4
AP	#4
AQ	#4
AR	#4
AS	#4
AT	#4
AU	#4
AV	#4
AW	#4
AX	#4
AY	#4
AZ	#4
BA	#4
BB	#4
BC	#4
BD	#4
BE	#4
BF	#4
BG	#4
BH	#4
BI	#4
BJ	#4
BK	#4
BL	#4
BM	#4
BN	#4
BO	#4
BP	#4
BQ	#4
BR	#4
BS	#4
BT	#4
BU	#4
BV	#4
BW	#4
BX	#4
BY	#4
BZ	#4
CA	#4
CB	#4
CC	#4
CD	#4
CE	#4
CF	#4
CG	#4
CH	#4
CI	#4
CJ	#4
CK	#4
CL	#4
CM	#4
CN	#4
CO	#4
CP	#4
CQ	#4
CR	#4
CS	#4
CT	#4
CU	#4
CV	#4
CW	#4
CX	#4
CY	#4
CZ	#4
DA	#4
DB	#4
DC	#4
DD	#4
DE	#4
DF	#4
DG	#4
DH	#4
DI	#4
DJ	#4
DK	#4
DL	#4
DM	#4
DN	#4
DO	#4
DP	#4
DQ	#4
DR	#4
DS	#4
DT	#4
DU	#4
DV	#4
DW	#4
DX	#4
DY	#4
DZ	#4
EA	#4
EB	#4
EC	#4
ED	#4
EE	#4
EF	#4
EG	#4
EH	#4
EI	#4
EJ	#4
EK	#4
EL	#4
EM	#4
EN	#4
EO	#4
EP	#4
EQ	#4
ER	#4
ES	#4
ET	#4
EU	#4
EV	#4
EW	#4
EX	#4
EY	#4
EZ	#4
FA	#4
FB	#4
FC	#4
FD	#4
FE	#4
FF	#4
FG	#4
FH	#4
FI	#4
FJ	#4
FK	#4
FL	#4
FM	#4
FN	#4
FO	#4
FP	#4
FQ	#4
FR	#4
FS	#4
FT	#4
FU	#4
FV	#4
FW	#4
FX	#4
FY	#4
FZ	#4
GA	#4
GB	#4
GC	#4
GD	#4
GE	#4
GF	#4
GG	#4
GH	#4
GI	#4
GJ	#4
GK	#4
GL	#4
GM	#4
GN	#4
GO	#4
GP	#4
GQ	#4
GR	#4
GS	#4
GT	#4
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IL	#4
IM	#4
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IS	#4
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JC	#4
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JE	#4
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JG	#4
JH	#4
JI	#4
JJ	#4
JK	#4
JL	#4
JM	#4
JN	#4
JO	#4
JP	#4
JQ	#4
JR	#4
JS	#4
JT	#4
JU	#4
JV	#4
JW	#4
JX	#4
JY	#4
JZ	#4
KA	#4
KB	#4
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KD	#4
KE	#4
KF	#4
KG	#4
KH	#4
KI	#4
KJ	#4
KK	#4
KL	#4
KM	#4
KN	#4
KO	#4
KP	#4
KQ	#4
KR	#4
KS	#4
KT	#4
KU	#4
KV	#4
KW	#4
KX	#4
KY	#4
KZ	#4
LA	#4
LB	#4
LC	#4
LD	#4
LE	#4
LF	#4
LG	#4
LH	#4
LI	#4
LJ	#4
LK	#4
LL	#4
LM	#4
LN	#4
LO	#4
LP	#4
LQ	#4
LR	#4
LS	#4
LT	#4
LU	#4
LV	#4
LW	#4
LX	#4
LY	#4
LZ	#4
MA	#4
MB	#4
MC	#4
MD	#4
ME	#4
MF	#4
MG	#4
MH	#4
MI	#4
MJ	#4
MK	#4
ML	#4
MM	#4
MN	#4
MO	#4
MP	#4
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MR	#4
MS	#4
MT	#4
MU	#4
MV	#4
MW	#4
MX	#4
MY	#4
MZ	#4
NA	#4
NB	#4
NC	#4
ND	#4
NE	#4
NF	#4
NG	#4
NH	#4
NI	#4
NJ	#4
NK	#4
NL	#4
NM	#4
NN	#4
NO	#4
NP	#4
NQ	#4
NR	#4
NS	#4
NT	#4
NU	#4
NV	#4
NW	#4
NX	#4
NY	#4
NZ	#4
OA	#4
OB	#4
OC	#4
OD	#4
OE	#4
OF	#4
OG	#4
OH	#4
OI	#4
OJ	#4
OK	#4
OL	#4
OM	#4
ON	#4
OO	#4
OP	#4
OQ	#4
OR	#4
OS	#4
OT	#4
OU	#4
OV	#4
OW	#4
OX	#4
OY	#4
OZ	#4
PA	#4
PB	#4
PC	#4
PD	#4
PE	#4
PF	#4
PG	#4
PH	#4
PI	#4
PJ	#4
PK	#4
PL	#4
PM	#4
PN	#4
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PQ	#4
PR	#4
PS	#4
PT	#4
PU	#4
PV	#4
PW	#4
PX	#4
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PZ	#4
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QD	#4
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QF	#4
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QH	#4
QI	#4
QJ	#4
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QL	#4
QM	#4
QN	#4
QO	#4
QP	#4
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QR	#4
QS	#4
QT	#4
QU	#4
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QW	#4
QX	#4
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RD	#4
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RG	#4
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RJ	#4
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RP	#4
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RZ	#4
SA	#4
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SD	#4
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TX	#4
TY	#4
TZ	#4
UA	#4
UB	#4
UC	#4
UD	#4
UE	#4

**RECORD DRAWING**  
 I CERTIFY THAT THIS DRAWING REFLECTS THE IMPROVEMENTS CONSTRUCTED AS TO SHEET NO. 14 OF 50. THE CONTRACTOR HAS BEEN ADVISED THAT THE CONSTRUCTION WAS IN FULL COMPLIANCE WITH THE CONTRACT DOCUMENTS.  
 DATE: 7/24/17  
 BY: [Signature]

**MISCELLANEOUS DETAILS**  
 OYSTER CREEK BRIDGE  
 LJA Engineering, Inc.  
 2620 Bissonnet Drive  
 Houston, Texas 77042  
 LJA PROJECT NO.: 1968-1050  
 DESIGNED BY: [Signature]  
 DRAWN BY: [Signature]  
 DATE: MARCH 2017

**CITY OF HOUSTON**  
 DEPARTMENT OF PUBLIC WORKS  
 PROJECT NO. 1968-1050  
 DRAWING NO. 1050-2-217  
 SHEET NO. 14 OF 50

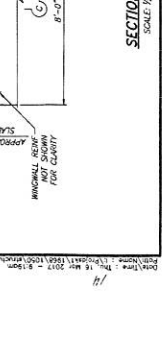
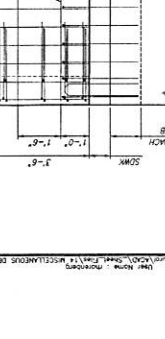
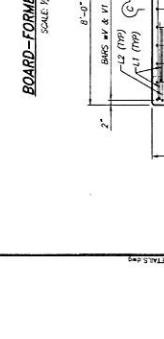
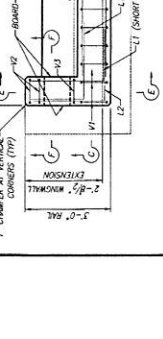
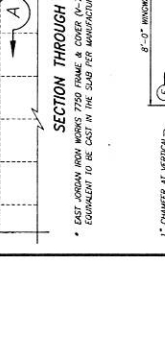
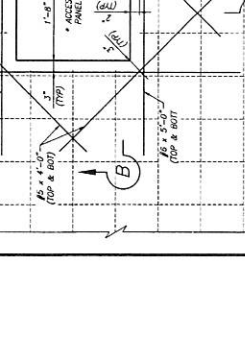
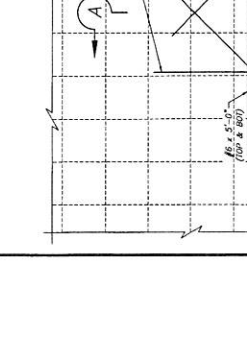
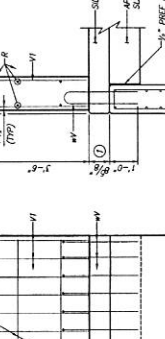
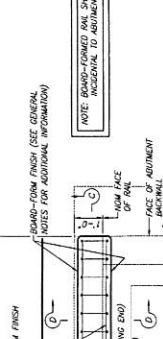
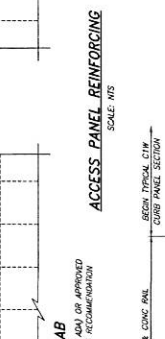
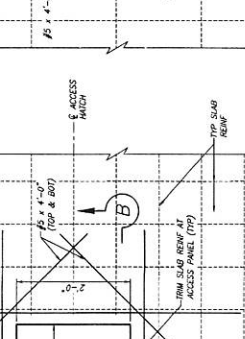
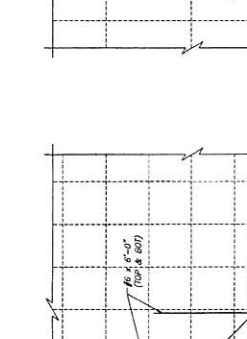
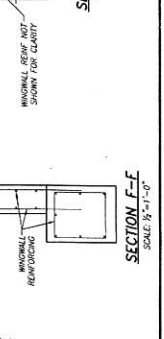
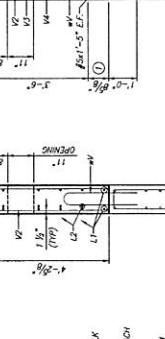
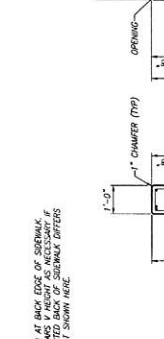
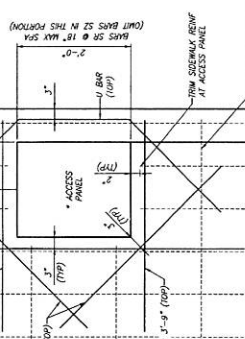
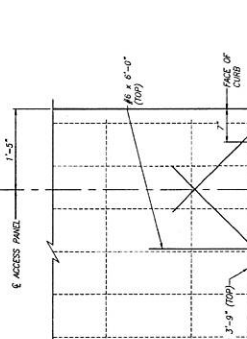
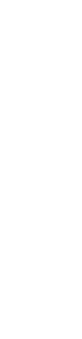
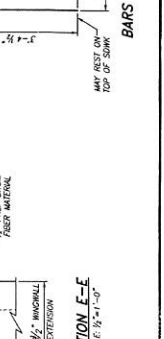
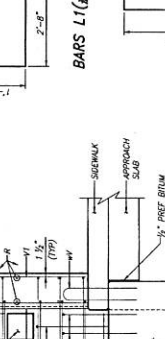
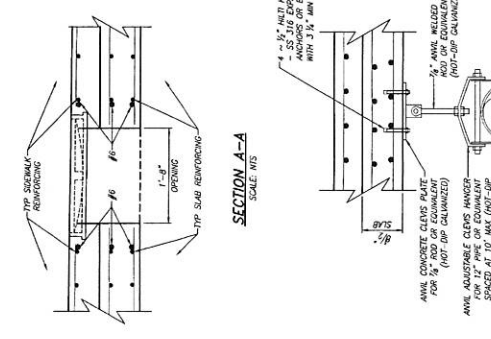
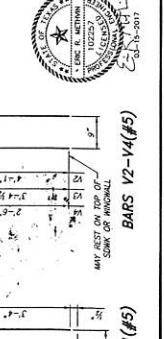
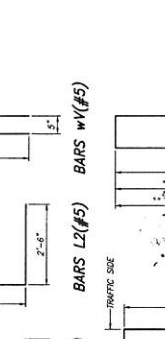
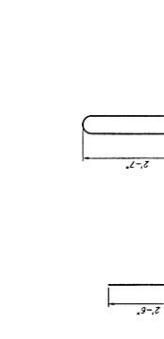
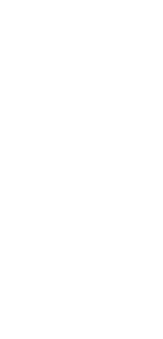
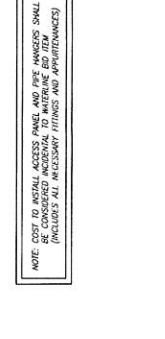
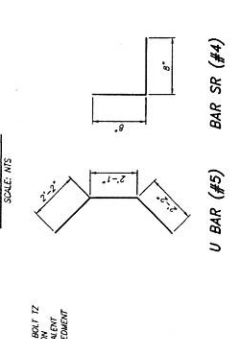
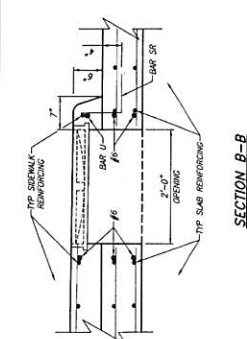
**WEST ALIANA TRACE DRIVE BRIDGE**  
 ALIANA DEVELOPMENT COMPANY  
 FORT BEND COUNTY ENGINEERING DEPARTMENT  
 APPROVED: [Signature]  
 DATE: 7/24/17

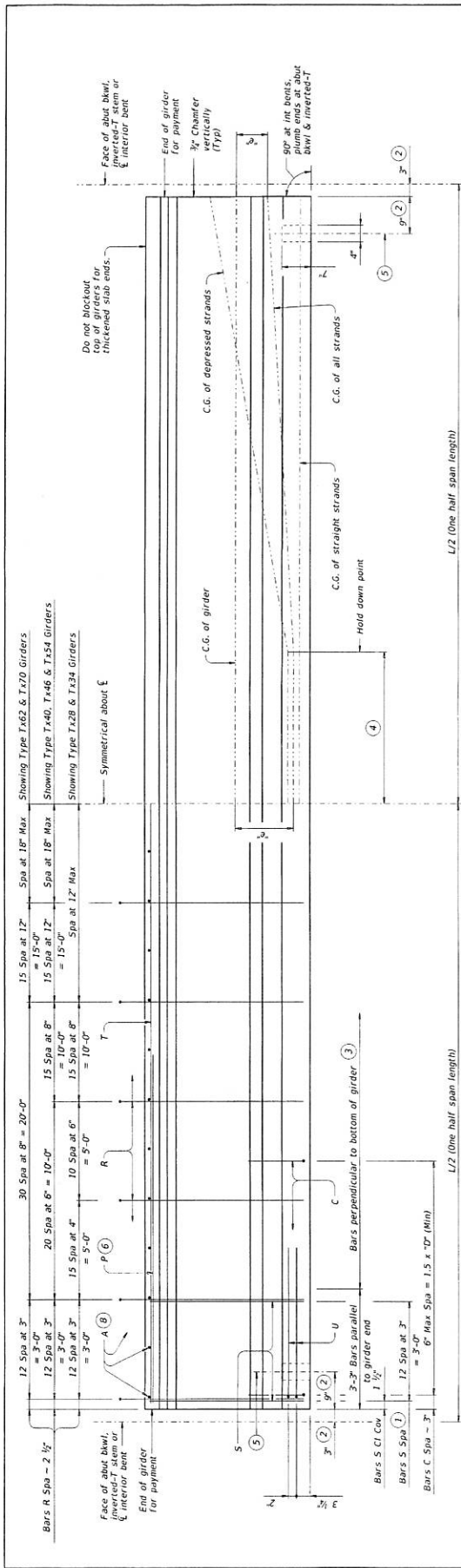
**RECORD DRAWING**  
 I CERTIFY THAT THIS DRAWING REFLECTS THE IMPROVEMENTS CONSTRUCTED AS TO SHEET NO. 14 OF 50. THE CONTRACTOR HAS BEEN ADVISED THAT THE CONSTRUCTION WAS IN FULL COMPLIANCE WITH THE CONTRACT DOCUMENTS.  
 DATE: 7/24/17  
 BY: [Signature]

**MISCELLANEOUS DETAILS**  
 OYSTER CREEK BRIDGE  
 LJA Engineering, Inc.  
 2620 Bissonnet Drive  
 Houston, Texas 77042  
 LJA PROJECT NO.: 1968-1050  
 DESIGNED BY: [Signature]  
 DRAWN BY: [Signature]  
 DATE: MARCH 2017

**CITY OF HOUSTON**  
 DEPARTMENT OF PUBLIC WORKS  
 PROJECT NO. 1968-1050  
 DRAWING NO. 1050-2-217  
 SHEET NO. 14 OF 50

**WEST ALIANA TRACE DRIVE BRIDGE**  
 ALIANA DEVELOPMENT COMPANY  
 FORT BEND COUNTY ENGINEERING DEPARTMENT  
 APPROVED: [Signature]  
 DATE: 7/24/17





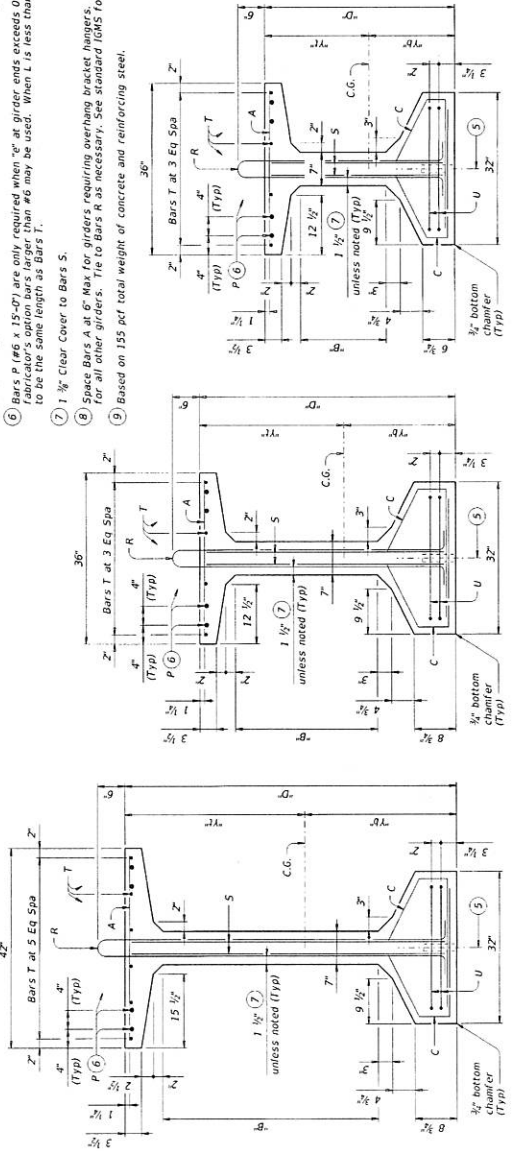
**GIRDER ELEVATION**

- ① Bundle with Bars R.
- ② Measured along  $\xi$  Girder at interior bents; perpendicular to abutment bwl or inverted-T stem.
- ③ The average of the top and bottom spacing of Bars R cannot exceed the required spacing.

**GIRDER DIMENSIONS AND SECTION PROPERTIES**

Girder Type	"D" (in.)	"B" (in.)	"T" (in.)	"T <sub>1</sub> " (in.)	"T <sub>2</sub> " (in.)	Area (in. <sup>2</sup> )	"I <sub>x</sub> " (in. <sup>4</sup> )	"I <sub>y</sub> " (in. <sup>4</sup> )	Weight (lb/ft)
Tx28	28	6	15.02	12.98	585	52,772	40,559	630	
Tx34	34	12	18.49	15.51	627	89,355	40,731	675	
Tx40	40	18	21.90	18.10	669	124,930	40,902	710	
Tx46	46	22	25.90	20.10	761	190,089	46,178	819	
Tx54	54	30	30.49	23.51	817	290,740	46,707	880	
Tx62	62	37 1/2	33.72	28.28	910	463,072	57,351	980	
Tx70	70	45 1/2	38.09	31.91	966	626,747	57,379	1,040	

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications.  
 Provide Class H concrete.  
 Provide Grade 60 reinforcing steel.  
 All reinforcement shall be placed in accordance with the drawings.  
 (ASTM A1064) may be substituted for Bars A, C, R or T unless otherwise noted.  
 The spacing for bars or strands to come in contact with materials used in forming anchor holes.  
 Cover dimensions are clear dimensions, unless noted otherwise.  
 Reinforcing bar dimensions shown are out-to-out of bar.



TYPE Tx28, Tx34 & Tx40

TYPE Tx46 & Tx54

TYPE Tx62 & Tx70

HL93 LOADING SHEET 1 OF 2

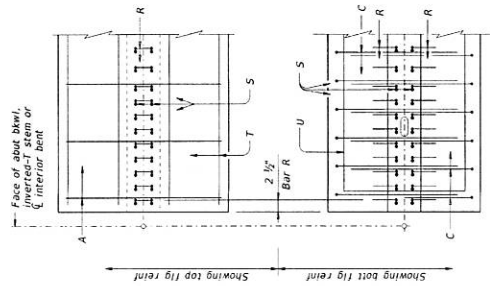
**Texas Department of Transportation**  
**PRESTRESSED CONCRETE**  
**T-GIRDER DETAILS**

IGD

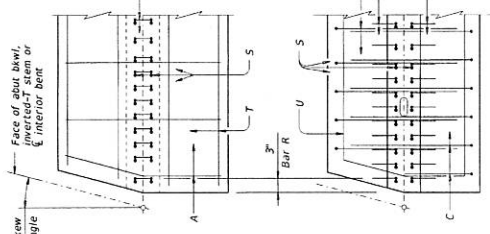
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 DRAWN BY: J. R. B. JR.  
 CHECKED BY: J. R. B. JR.  
 COUNTY: TARRANT  
 SHEET NO. 15



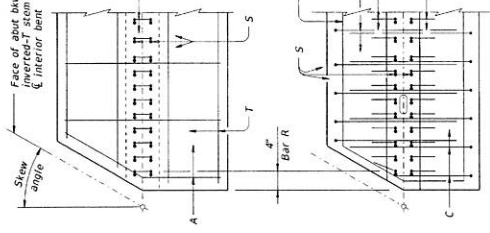
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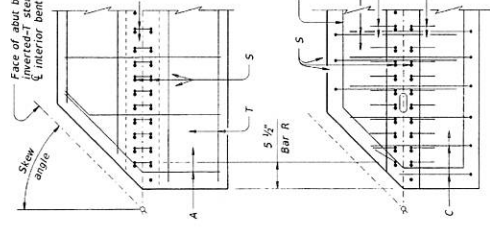
0° SKEW



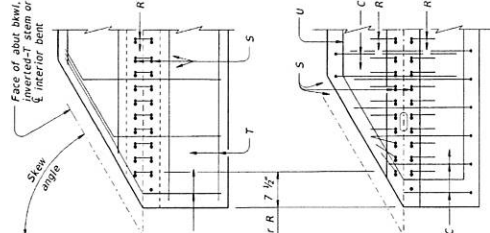
15° SKEW



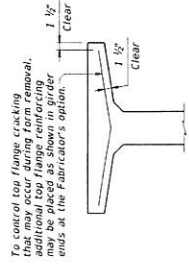
30° SKEW



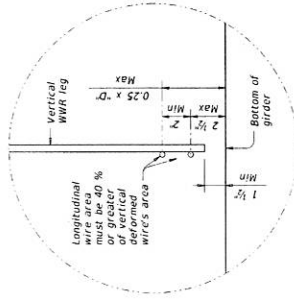
45° SKEW



60° SKEW

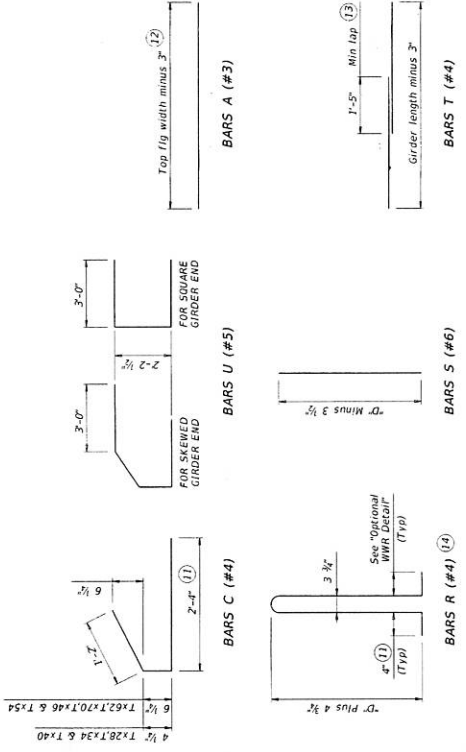


OPTIONAL TOP FLANGE REINFORCING DETAIL



OPTIONAL WELDED WIRE REINFORCEMENT (WWR) DETAIL

PLAN OF GIRDER ENDS (10)



- (10) Reinforcing patterns shown are provided as guides to determine reinforcement placement in skewed ends. Place Bars S as close to girder end as cover requirements permit, which may prevent them to be banded with Bar R.
- (11) Bars may be cut or bent at skewed end as required.
- (12) Increase as necessary for bars at skewed end.
- (13) No portion of bar less than 10 ft.
- (14) For Welded Wire Reinforcement (WWR) option, area of Bars R may be reduced in proportion to the increase in reinforcement yield strength over 60 ksi. Yield strength of WWR is limited to 75 ksi.

*L. E. G. D.*  
7/24/17

HL93 LOADING SHEET 2 OF 2

Texas Department of Transportation  
Bridge Division  
Standard

PRESTRESSED CONCRETE  
T-GIRDER DETAILS

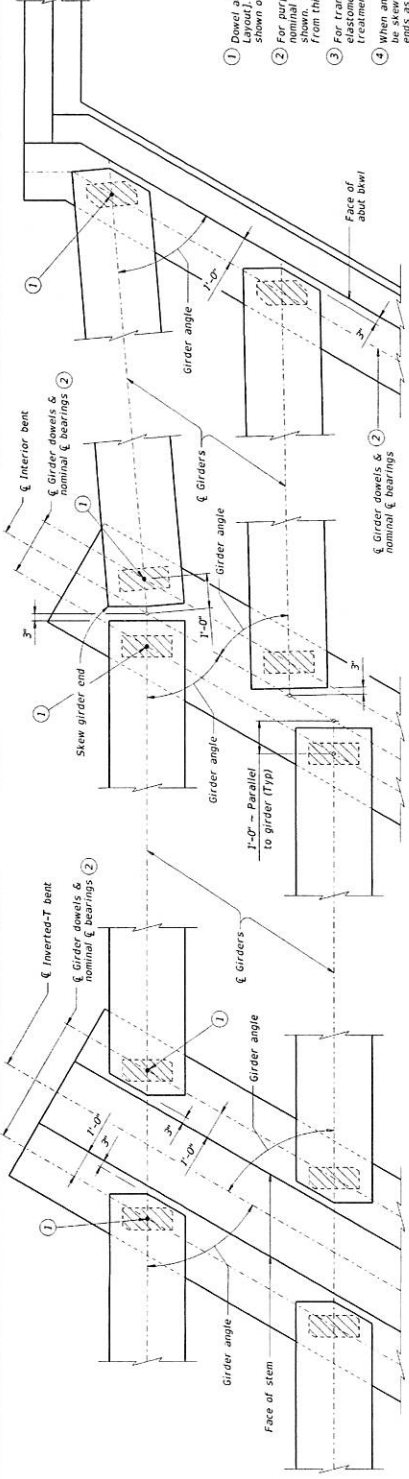
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FILE	PROJECT	LOC.	DATE	SCALE	SHEET NO.
	010007-2013				16



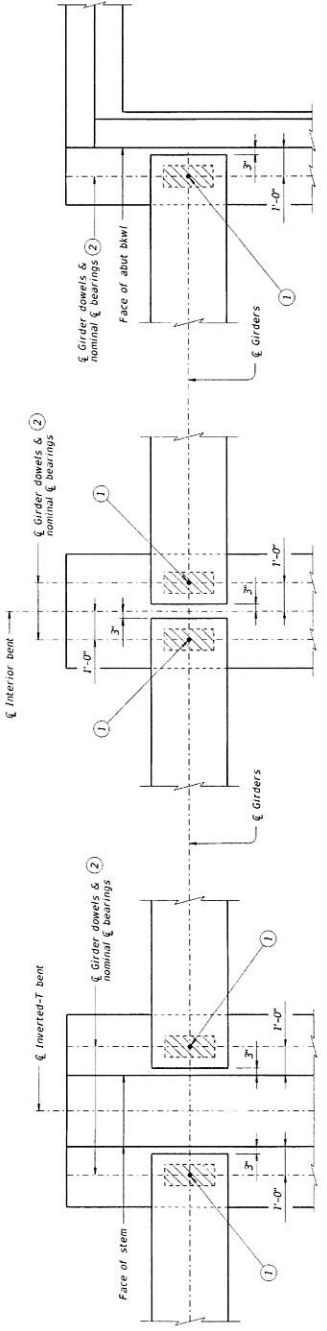
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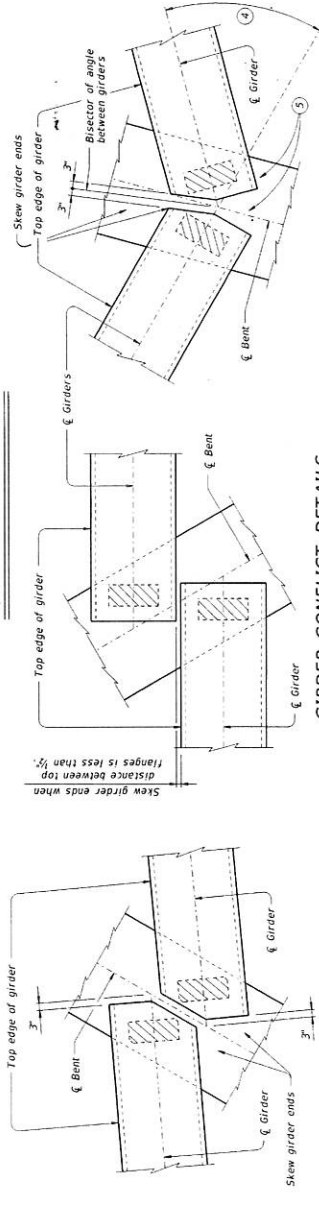


AT INVERTED-T BENT W/SKEW  
 AT CONVENTIONAL INTERIOR BENT W/SKEW  
 AT ABUTMENT W/SKEW

- 1 Dowel at doweled girder end (labeled (D) on Bridge Layout). Required for outside girder only or as shown on substructure section.
- 2 For purposes of computing bearing seat elevations, nominal bearing seat elevations are shown. The actual center of bearing pad may vary from this line.
- 3 For transition bents with backwall, girder and elastomeric bearings must receive the same treatment as shown for abutments.
- 4 When angle exceeds 0°, one or both girder ends must be skewed to maintain the clearance between girder ends as shown in view.
- 5 See Table of Bearing Pad Dimensions for bearing size. Girder end skew angles in Table not applicable for this type on radial bents only.



AT INVERTED-T BENT  
 AT CONVENTIONAL INTERIOR BENT  
 AT ABUTMENT



AT INVERTED-T BENT  
 AT CONVENTIONAL INTERIOR BENT  
 AT ABUTMENT

Skew girder ends when distance between top flanges is less than 1/2"

**GENERAL NOTES:**  
 These details accommodate skew angles up to 60°. Shop drawings for approval are required. A bearing layout which identifies location and orientation of each bearing is required. 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 fabricator. Cost of furnishing and installing elastomeric bearings, including beveled and embedded steel plates, must be included in unit price bid for "prestressed concrete girders".

*[Signature]*  
 7/20/14

HL93 LOADING SHEET 1 OF 3

Texas Department of Transportation  
 Bridge Division  
 Standard

**ELASTOMERIC BEARING AND GIRDER END DETAILS**  
**PRESTR. CONCRETE I-GIRDERS**

IGEB

DATE	REVISED	BY	APP	CHK	DES	SCALE	SHEET NO.
01/02/2015	01/02/2015	REVISIONS					17

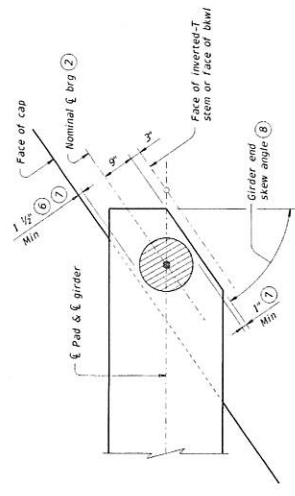
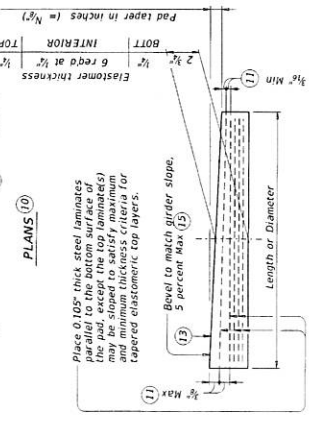


**TABLE OF MINIMUM SUBSTRUCTURE DIMENSIONS (1)**

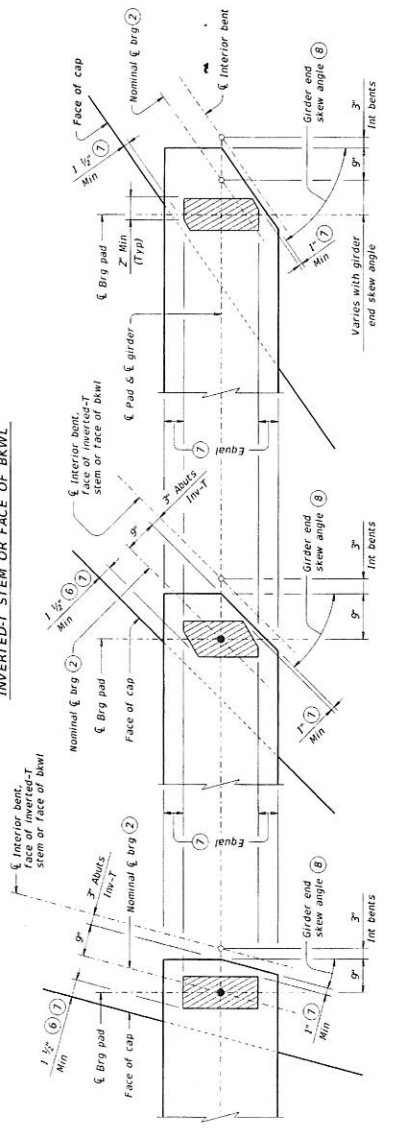
Girder Type	Abutments		Int Bents		In-T Bents	
	Face of Bawl to Face of Cap	Overall Cap Width	Overall Cap Width	Capribl Width	Capribl Width	Width
Tx28 thru Tx54	1'-0"	3'-0"	3'-0"	4'-0"	1'-10 1/2"	2'-1 1/2"
Tx62 & Tx70	2'-0"	4'-0"	4'-0"	4'-0"	1'-10 1/2"	2'-1 1/2"

**TABLE OF BEARING PAD DIMENSIONS**

Bent Type	Girder Type	Bearing Type (13)	Girder End Type Range	Pad Size Lgth x Width	Pad Clip Dimensions
ABUTMENTS, INVERTED-T AND TRANSITION BENTS WITH BACKWALLS	Tx28, Tx34, Tx40, Tx46 & Tx54	G-1-W*	0° thru 21°	8" x 21"	4"
		G-2-W*	21° thru 30°	8" x 21"	4 1/2"
		G-3-W*	30° thru 45°	8" x 21"	4 1/2"
	Tx62 & Tx70	G-4-W*	0° thru 21°	10" x 21"	4 1/2"
		G-5-W*	21° thru 30°	10" x 21"	4 1/2"
		G-6-W*	30° thru 45°	10" x 21"	4 1/2"
CONVENTIONAL INTERIOR BENTS	Tx28, Tx34, Tx40, Tx46 & Tx54	G-1-W*	0° thru 60°	8" x 21"	4"
		G-2-W*	60° thru 90°	8" x 21"	4 1/2"
		G-3-W*	90° thru 180°	8" x 21"	4 1/2"
	Tx62 & Tx70	G-4-W*	0° thru 60°	10" x 21"	4 1/2"
		G-5-W*	60° thru 90°	10" x 21"	4 1/2"
		G-6-W*	90° thru 180°	10" x 21"	4 1/2"
CONVENTIONAL INTERIOR BENTS	Tx28, Tx34, Tx40, Tx46 & Tx54	G-1-W*	0° thru 60°	8" x 21"	4"
		G-2-W*	60° thru 90°	8" x 21"	4 1/2"
		G-3-W*	90° thru 180°	8" x 21"	4 1/2"
	Tx62 & Tx70	G-4-W*	0° thru 60°	10" x 21"	4 1/2"
		G-5-W*	60° thru 90°	10" x 21"	4 1/2"
		G-6-W*	90° thru 180°	10" x 21"	4 1/2"



**ROUND BEARINGS FOR SKEWED GIRDER ENDS AT FACE OF INVERTED-T STEM OR FACE OF BKWL**



**SKWED GIRDER ENDS AT INT BENTS, FACE OF INVERTED-T STEM OR FACE OF BKWL**  
**BEARING PAD PLACEMENT DIAGRAMS**

- For purposes of computing bearing seat elevations, nominal centerline of bearing must be defined as shown. The actual center of bearing pad may vary from this line.
- Place centerline pad as near nominal centerline bearing as possible between limits shown.
- Girder end skew angle is equal to 90° minus the girder angle except at some conflicting girders.
- Provide Z' dia hole only at locations required. See Substructure details for location.
- See Table of Bearing Pad Dimensions for dimensions.
- Maximum and minimum layer thicknesses shown are for elastomer only, on layered layers.
- Locate Permanent Mark here.
- Indicate BEARING TYPE on all pads. For tapered pads, locate BEARING TYPE on the high side. The Fabricator must include the value of "N" (amount of taper) on the drawing. Examples: N=1, (for 1/2" taper) N=2, (for 1/4" taper)
- Fabricate top surface slope must not vary from plan girder slope by more than (Length or Dia) / (M/A/N).
- Substructure dimensions must satisfy the minimums provided to accommodate the elastomeric bearings shown on this standard.
- See sheet 3 of 3 for beveled plate use when slopes exceed 5 percent.
- If girder end is skewed for a girder conflict at an interior bent and a bearing pad is required, the bearing pad must be located at the girder's location. Location of bearing centerline is to be set as for abutments in this case.

HL93 LOADING SHEET 2 OF 3

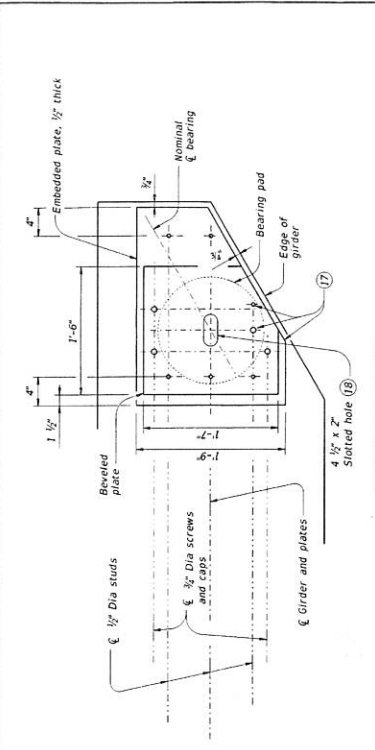
**Texas Department of Transportation**  
Bridge Standard

**ELASTOMERIC BEARING AND GIRDER END DETAILS**  
PRESTR CONCRETE I-GIRDERS

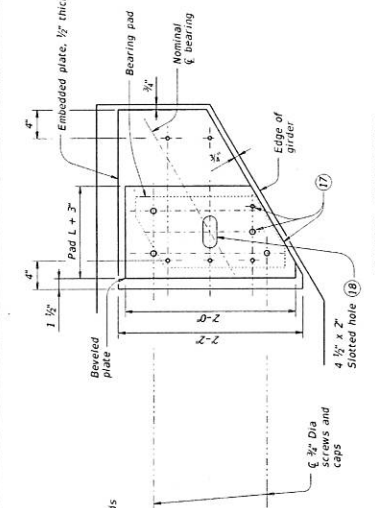
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REV: 10/11  
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DRAWN: [Signature]  
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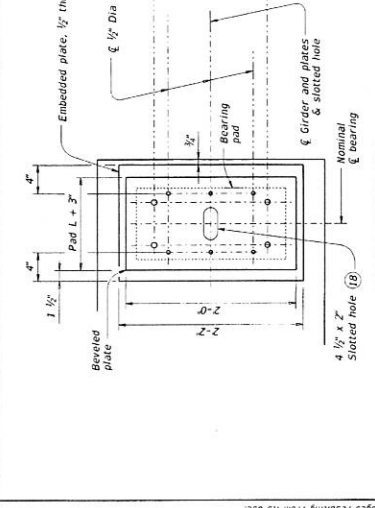
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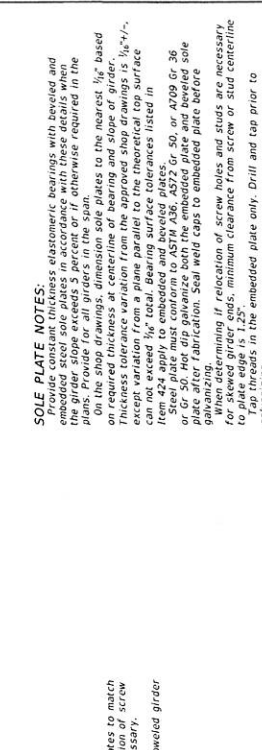
**NORMAL GIRDER END RECTANGULAR BEARING PAD**



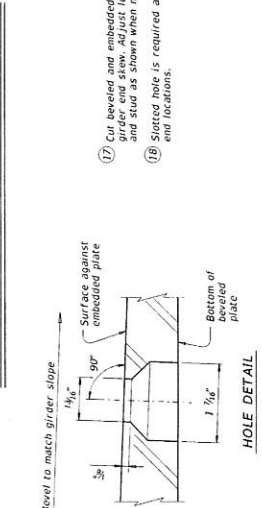
**SKewed GIRDER END CLIPPED RECTANGULAR BEARING PAD**



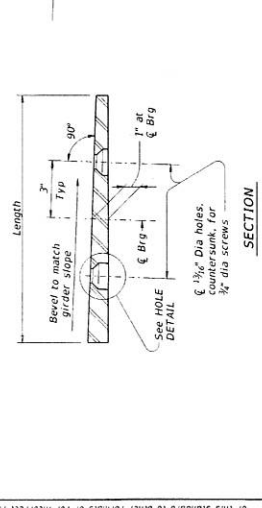
**SKewed GIRDER END 15° DIA BEARING PAD**



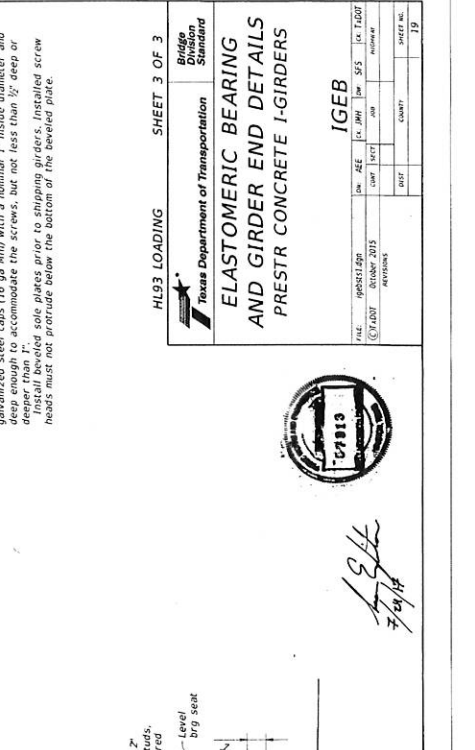
**BEVELED PLATE DETAILS**



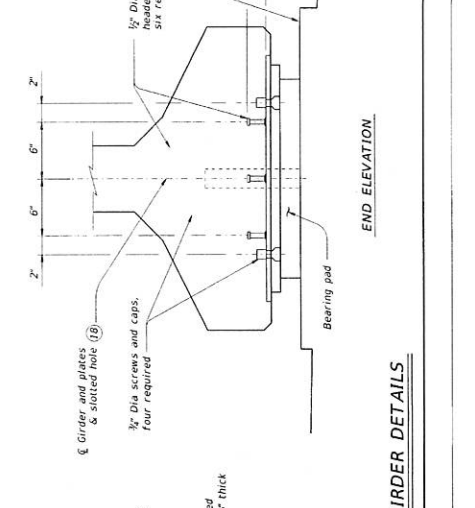
**HOLE DETAIL**



**PLAN VIEW OF SOLE PLATE DETAILS**



**END ELEVATION**



**SIDE ELEVATION**

**SOLE PLATE NOTES:**  
 Provide constant thickness elastomeric bearings with beveled and embedded steel sole plates in accordance with these details when plans. Provide for all girders in the span.  
 On the shop drawings, dimension sole plates to the nearest 1/8" based on required thickness at centerline of bearing and slope of girder. 1/4", 1/2", except variation from a plane parallel to the theoretical top surface can not exceed 1/8" total. Bearing surface tolerances listed in Item 424 apply to embedded and beveled plates.  
 For skewed girders, seal weld caps to embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate and beveled sole plate after fabrication. Seal weld caps to embedded plate and beveled sole plate after fabrication.  
 For skewed girder ends, minimum clearance from screw or stud centerline to plate edge is 1.25".  
 Stud ends in the embedded plate only. Drill and tap prior to galvanizing.  
 3/4" Dia screws must be electroplated, socket flat head countersunk cap screws conforming to ASTM F835. Electroplating must conform to ASTM B633, SC 2, Type 1. Provide screws long enough to maintain a 3/4" gap between the screw head and the plate. Provide galvanized steel caps (16 ga Min) with a nominal 1" inside diameter and deep enough to accommodate the screws, but not less than 1/2" deep or deeper than 1".  
 Foot sole plates prior to shipping girders. Installed screw heads must not protrude below the bottom of the beveled plate.

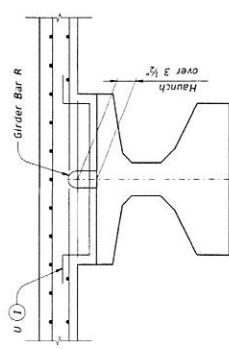
(17) Gir beveled and embedded plates to match gir slope and provide 1/2" dia screws and stud as shown when necessary.  
 (18) Slotted hole is required at doweled girder end locations.

HL93 LOADING SHEET 3 OF 3  
 Texas Department of Transportation  
 Bridge Division Standard  
**ELASTOMERIC BEARING AND GIRDER END DETAILS**  
 PRESTR CONCRETE I-GIRDERS  
 IGBB  
 DATE: 10/20/10  
 DRAWN BY: J. H. B. / J. H. B.  
 CHECKED BY: J. H. B. / J. H. B.  
 DESIGNED BY: J. H. B. / J. H. B.  
 SCALE: AS SHOWN  
 SHEET NO. 19

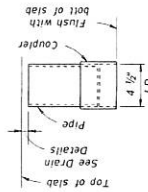
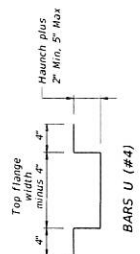


*J. H. B.*  
 7/24/10

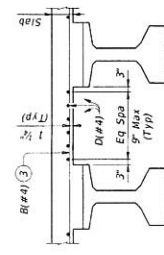
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**HAUNCH REINFORCING DETAIL**

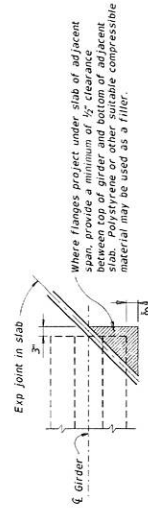


**C-I-P DRAIN DETAIL ②**

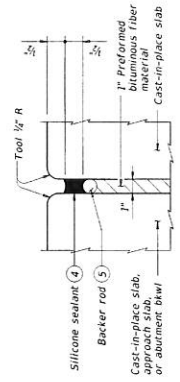


**TYPICAL PART TRANSVERSE SLAB SECTION WITHOUT PCP**

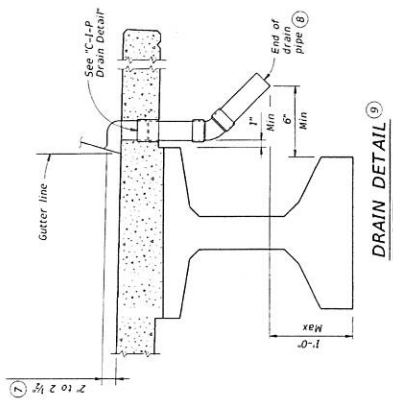
Top reinforcing steel not shown for clarity.



**TREATMENT AT GIRDER END FOR SKEWED SPANS**



**TYPE A JOINT DETAIL ⑥**



**DRAIN DETAIL ⑤**

**GENERAL NOTES:**  
Designed according to AASHTO LRFD Bridge Design Specifications, drains, joint formers, etc.) shown on this Sheet are subsidiary to other bid items.

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

**DECK FORMWORK NOTES:**  
Formwork shall be erected to a safe working load of 3,000 lbs. applied to and along the axis of a call out at 45 degrees from vertical, regardless of higher loads permitted by the manufacturer. The maximum span length shall not exceed 12' from girder end. Space hangers accordingly.

- ① Space Bars U with girder Bars R in all areas where measured haunch exceeds 3 1/2".
- ② Roughen outside of PVC with coarse rasp or equal to ensure bond with cast-in-place concrete.
- ③ Bars B(#4) spaced at 9" Max with 2" end cover. Overhang option. Contractors may end alternating bars B(#4) at centerline outside girder.
- ④ Class 7 silicone sealant that conforms to DMS-6310. Install when ambient temperature is between 55F and 85F and rising. Engineer to determine allowable hours for sealant application.
- ⑤ 1 1/2" 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.
- ⑥ The maximum distance between Type A expansion joints is 100'. See Bridge Layout for location of joints. Type A joints are subsidiary to Item 422, "Concrete Superstructures".
- ⑦ Drain entrance formed in rail or sidewalk.
- ⑧ Water may not be discharged onto girders.
- ⑨ All drain pipe and fittings to be 4" diameter (SCH 40) PVC. See Item 481 "Pipe for Drains" for details. The location of drains shall be as directed by the Engineer. Drains are not permitted over roadways or railroads or within 10'-0" of bent caps. Degrease outside of exposed PVC, apply acrylic water base primer, then coat with same surface finishing material as applied to outside grade face. Variations of the location of the pipe and the location of the sealant on the structure, may be installed with the approval and direction of the Engineer.



*[Signature]*  
7/28/13

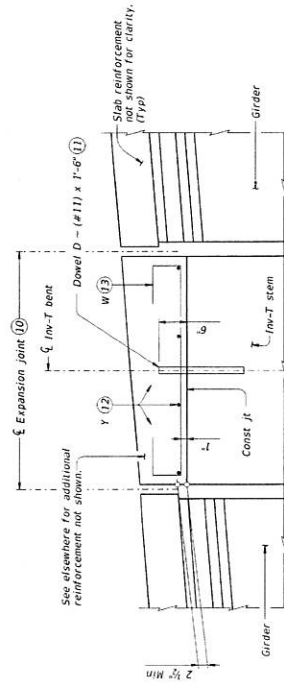
**Texas Department of Transportation**  
MISCELLANEOUS  
SLAB DETAILS  
PRESTR. CONCRETE I-GIRDERS

**IGMS**

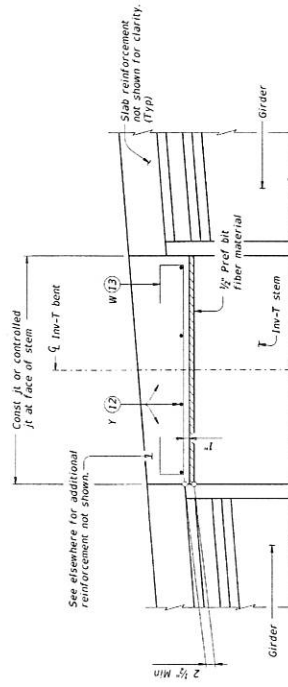
SHEET 1 OF 2

DATE: 09/04/13	REV: 1/2007	BY: JTR	IN: TxDOT	SHEET NO: 20
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PROJECT: 0000000000	DATE: 10/08/2013	DATE: 10/08/2013	DATE: 10/08/2013	DATE: 10/08/2013
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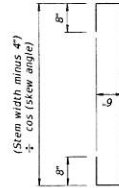
DISCLAIMER: This standard is governed by the Texas Engineering Practice Act. No warranty of any kind is made by TxDOT for any purpose whatsoever. TxDOT assumes no responsibility for the construction of this standard to other forms or for incorrect results or damages resulting from its use.



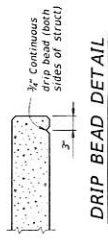
SHOWING EXPANSION JOINTS



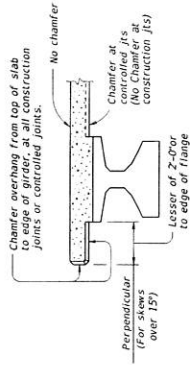
SHOWING CONST JTS OR CONTROLLED JTS REINFORCEMENT OVER INV-T BENTS



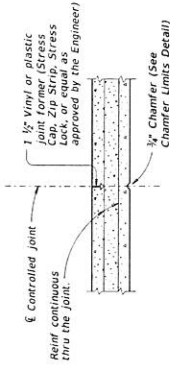
BARS W (#4)



DRIP BEAD DETAIL



CHAMFER LIMITS DETAIL (14)



CONTROLLED JOINT DETAIL

(Saw-cutting is not allowed)

- (10) See Layout for joint type.
- (11) Dowels D (#11) spaced at 5 Ft Max. See In-T bents for quantity and location.
- (12) Space Bars Y (#4) at 12" Max. Use 2" end cover. Number of Bars Y must satisfy spacing limits. Place parallel to bent.
- (13) Space Bars W at 12" Max (3" from end of cap). Tilt if necessary to maintain cover requirements. Place parallel to longitudinal slab reinforcement.
- (14) See Span details for type of joint and joint locations.

*[Handwritten signature]*  
7/24/14

SHEET 2 OF 2

Texas Department of Transportation  
Bridges Division Standard

MISCELLANEOUS  
SLAB DETAILS  
PRESTR. CONCRETE I-GIRDERS



IGMS

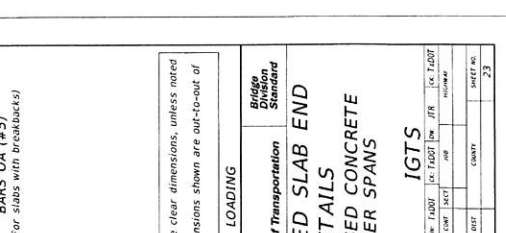
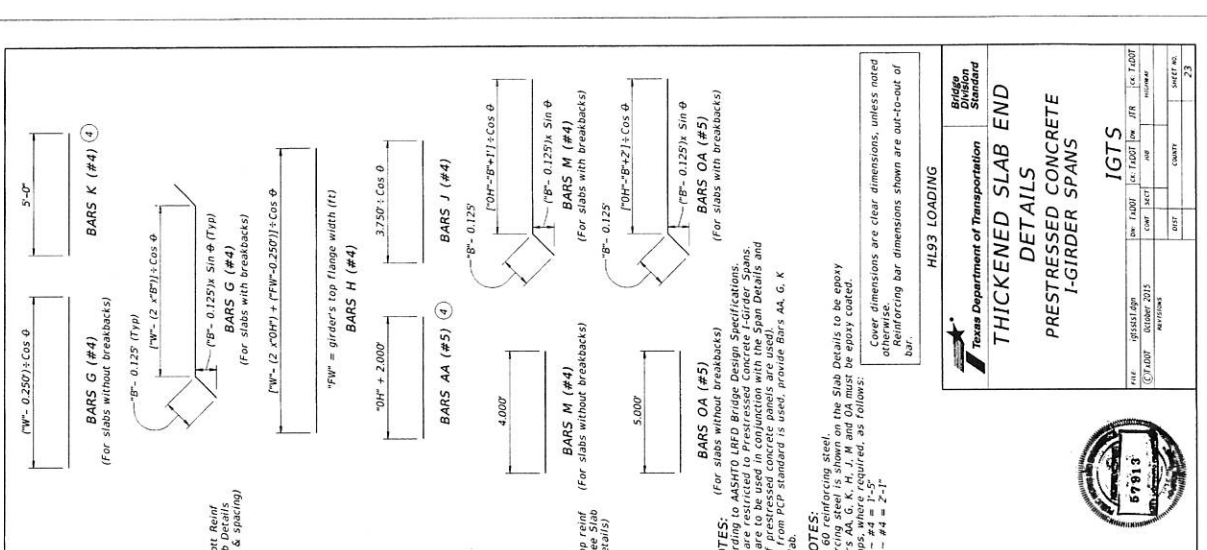
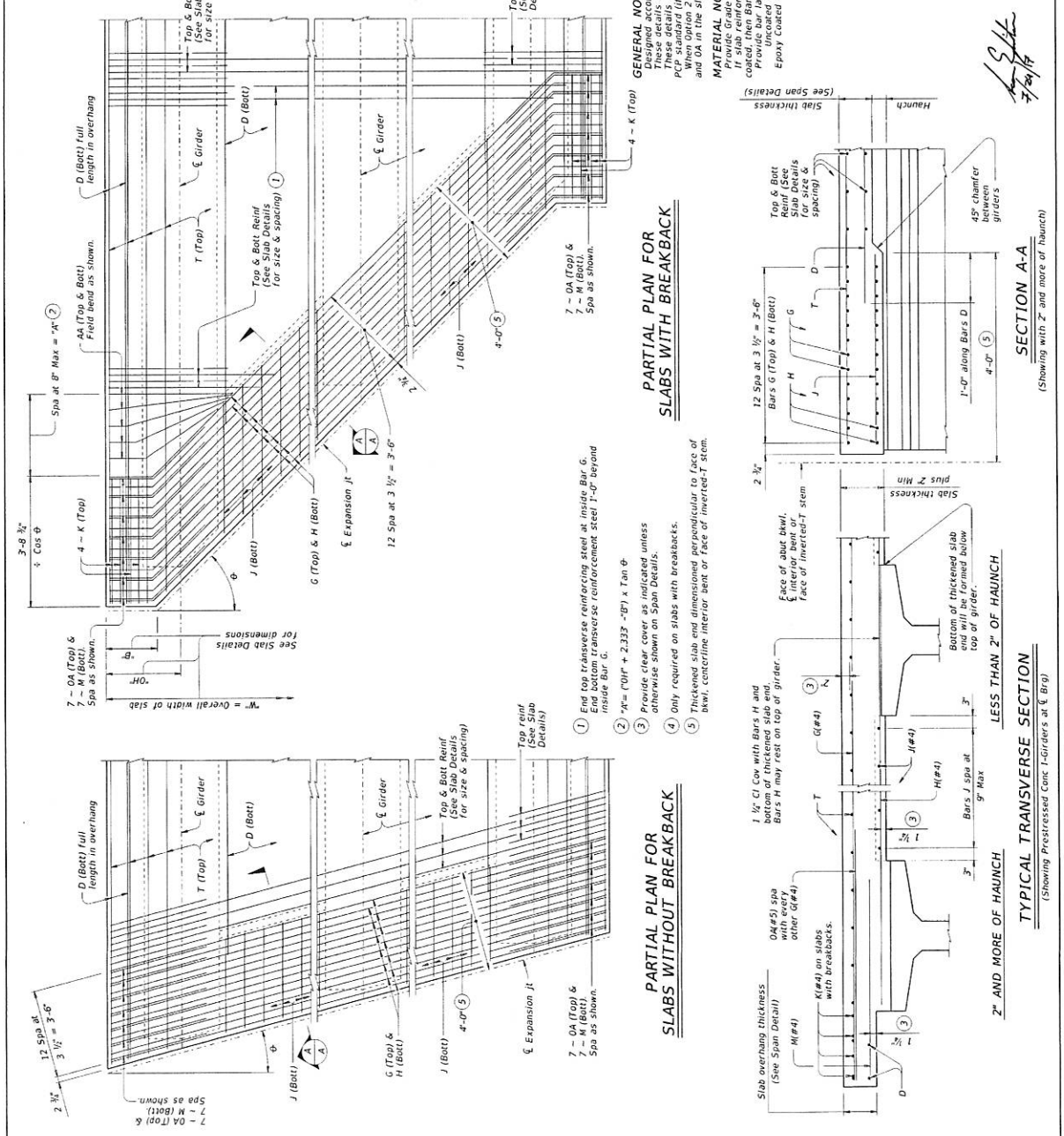
FILE NO.	PROJECT NO.	DATE	BY	CHKD.
57813	1000000000	7/24/14		
CONTRACT NO.	CONTRACT DIST.	CONTRACT DIV.	CONTRACT SHEET NO.	
			21	

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DATE: FILE:



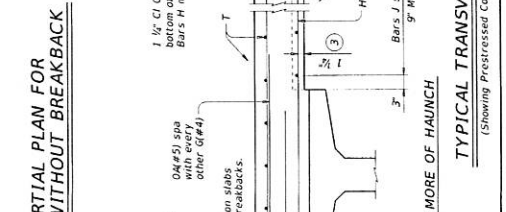
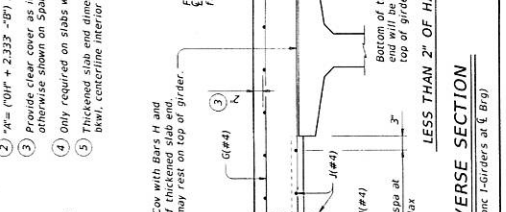
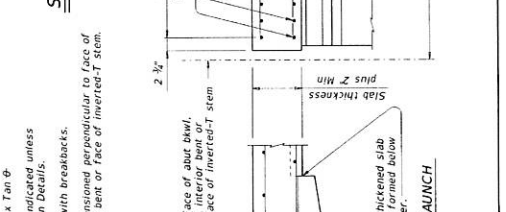
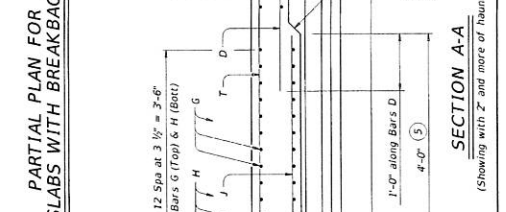
DISCLAIMER: The use of this standard is governed by the Texas Engineering Practice Act. No warranty of any kind is made by TxDOT for any specific measures. TxDOT assumes no responsibility for the construction of this structure or for incorrect results or damages resulting from its use.



**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Bridge Design Specifications. These details are to be used in conjunction with the Span Details and PCP standard (if prestressed concrete panels are used).  
**MATERIAL NOTES:**  
 Reinforcing steel shall be epoxy coated, then Bars AA, G, H, J, M and Oa must be epoxy coated. If slab reinforcing steel is shown on the Slab Details to be epoxy coated, then Bars AA, G, H, J, M and Oa must be epoxy coated. Otherwise, reinforcing bar dimensions shown are out-to-out of bar.

**HL93 LOADING**  
 Texas Department of Transportation  
 Bridge Division Standard  
**THICKENED SLAB END DETAILS**  
**PRESTRESSED CONCRETE I-GIRDER SPANS**

IGTS  
 DATE: 05/11/2015  
 DRAWN BY: JLR  
 CHECKED BY: JLR  
 PROJECT NO: 150302-2015  
 COUNTY: TARRANT  
 SHEET NO: 23



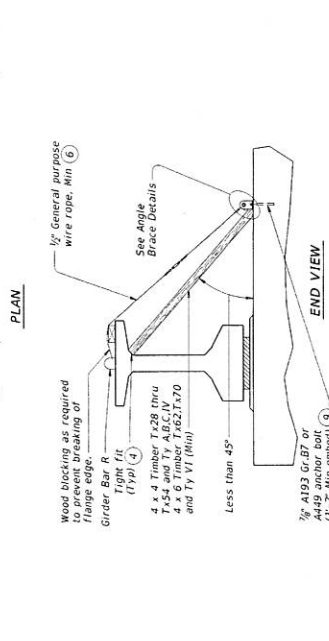
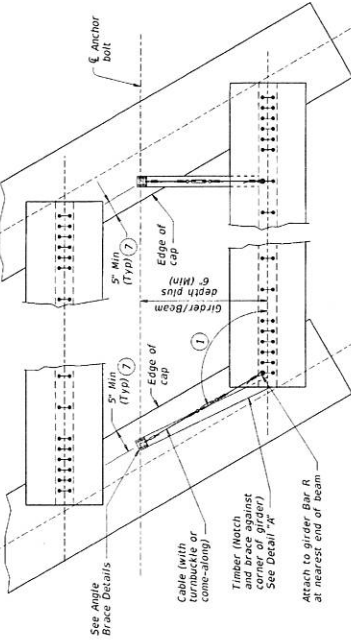
**2" AND MORE OF HAUNCH**  
 LESS THAN 2" OF HAUNCH  
 (Showing Prestressed Conc I-Girders at  $\xi$  Gird)

DATE: \_\_\_\_\_  
 FILE: \_\_\_\_\_

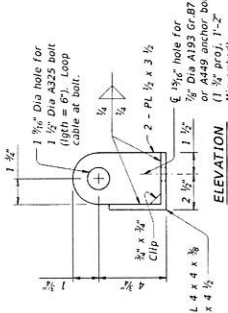
**HAULING & ERECTION:** Direct to the possible lateral instability of prestressed concrete girders and beams over 130' long, especially during hauling and erection. The use of the following methods to improve stability is encouraged. Locate lifting devices to provide a minimum of 10' between the ends; use external lateral stiffening devices during hauling and erection; lift with vertical lines using two machines; and take care in handling to minimize inertial and impact forces.

**ERECTION BRACING:** When the minimum for fulfilling the bracing requirements of Item 425. Required erection bracing must be placed immediately after erection of each girder and remain in place until additional bracing is provided. Erection bracing shall be designed and installed in all cases to meet requirements for Slab Placement Bracing.

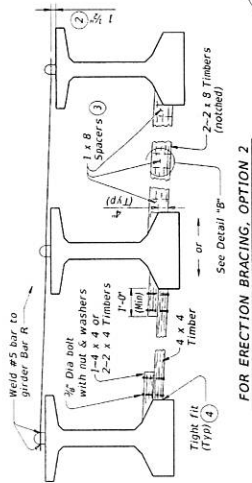
**PHASED CONSTRUCTION:** Phase erection and slab placement bracing for all girders in phases as shown in these details. For phases after first, also place erection and slab placement bracing between outer girder and inner girder. Erection bracing shall be provided on the phase construction joint is between girders, top bracing can be omitted.



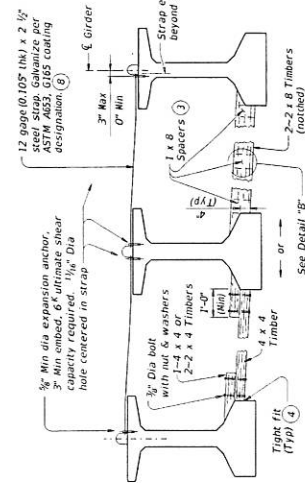
**DIAGONAL BRACING DETAILS 5**  
(To be used on both ends of the first girder/beam erected in the span in each phase.)



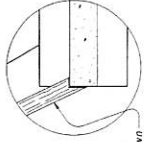
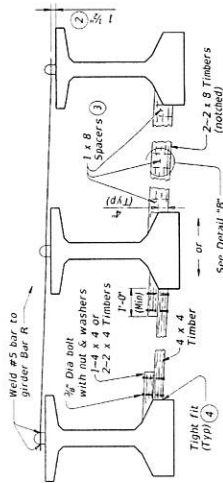
**HORIZONTAL BRACING DETAILS 5**



**FOR ERECTION BRACING, OPTION 1**  
(This option is not allowed when slab is formed with P/CR or plywood)



**FOR ERECTION BRACING, OPTION 2**



**DETAIL "A"**

- 1 If angle shown exceeds 120 degrees, move diagonal brace to other side of girder/beam and place square to girder/beam. This may prevent exterior girder from being erected first.
- 2 Place and weld #5 bars as shown during erection. If forming concrete, bars shall be removed, one at a time, during label erection. Re-install bar prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder bars R (See Sheet 2 of 2).
- 3 Clear distance between spacers must not exceed 3'. Nail together with 16d nails.
- 4 Use wedges as necessary to obtain tight fit. Nail wedges to timbers.
- 5 Pressure treated landscape timbers can not be used.
- 6 All hardware used with cable must be able to develop a minimum of 100% of the cable strength. Use of steel loops in cable. Install cable clamps with saddles bearing against the live end and U-bolts bearing against the dead end.
- 7 It is acceptable to tie anchor bolts to cap reinforcement.
- 8 Prior to installing, field bend strap to lay flush on both girders top flange and slope between flange tips.
- 9 Anchor bolt may be drilled and epoxied in place. Provide 25k minimum pullout. Core drill hole.

SHEET 1 OF 2

Texas Department of Transportation  
Bridge Division  
Standard

**MINIMUM REQUIREMENTS  
BRACING REQUIREMENTS  
PRESTRESSED CONCRETE  
I-GIRDERS AND I-BEAMS**



MEBR(C)  
REV. 01/2007 (Rev. 11/2007)  
DATE: 01/2007  
COUNT: 24  
SHEET NO. 24

ANGLE BRACE DETAILS

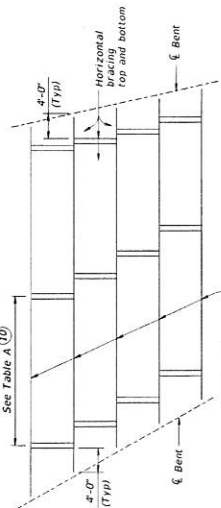
**DETAIL "B"**

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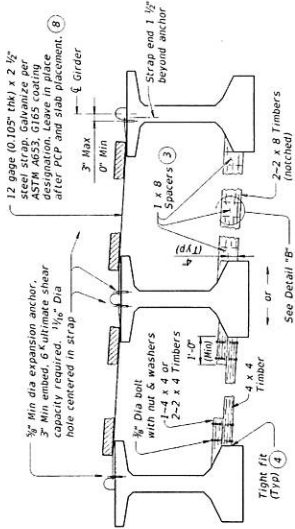
DATE: FILE:

TABLE A

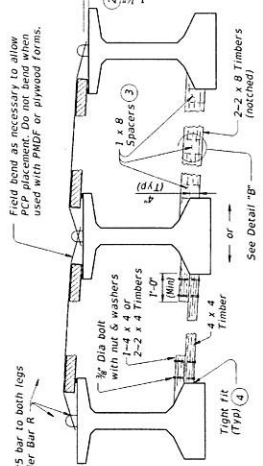
OPTION 1-RIGID BRACING (STEEL STRAP)		OPTION 2-FLEXIBLE BRACING (NO. 5 OVER PCP)	
Girder or Beam Type	Slab Overhang less than 4'-0" (1)	Girder or Beam Type	Slab Overhang 4'-0" and greater (1)
Tx28	1/2 points	Tx28	1/2 points
Tx34	1/2 points	Tx34	1/2 points
Tx40	1/2 points	Tx40	1/2 points
Tx46	1/2 points	Tx46	1/2 points
Tx54	1/2 points	Tx54	1/2 points
Tx62	1/2 points	Tx62	1/2 points
Tx70	1/2 points	Tx70	1/2 points
A	1/2 points	A	2.0 ft
B	1/2 points	B	3.0 ft
C	1/2 points	C	4.5 ft
IV	1/2 points	IV	1/2 points
VI	1/2 points	VI	4.0 ft



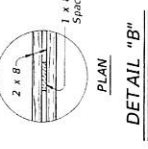
SLAB PLACEMENT BRACING



FOR SLAB PLACEMENT BRACING, OPTION 1 - RIGID  
(Showing slab formed with PCP. This option is not allowed when slab is formed with PMDF or plywood.)



FOR SLAB PLACEMENT BRACING, OPTION 2 - FLEXIBLE  
(Showing slab formed with PCP.)



PLAN  
DETAIL "B"

- (2) Place and weld #5 bars as shown during erection. If forming concrete in place, bars can be cast in place and removed, one at a time, starting panel erection. Re-install bars prior to additional panel erection. Bars can rest on panels and be bent down and welded to girder bars R.
- (3) Clear distance between spacers must not exceed 3'. Nail together with 16d nails.
- (4) Use wedges as necessary to obtain tight fit. Nail wedges to timbers.
- (5) Pressure treated landscape timbers can not be used.
- (6) Prior to installing, field bend strap to lay flush on both girders top flange and slope between flange tips.
- (10) Bracing spacing (1/2 and 1/2 points) measured between first and last typical brace location.
- (11) Measure slab overhang from centerline of girder or beam. When overhang varies in span, determine bracing spacing based on largest overhang.

**SLAB PLACEMENT BRACING:**  
Bracing details for spans longer than 150' are not provided. Bracing details for spans longer than 150' are not provided. Systems equal to or better than those shown may be used provided details or such systems are submitted to and approved by the Engineer. Use of these systems or details does not relieve the Contractor of the responsibility for the adequacy of the bracing and the removal of bracing for short periods of time to align girders and beams is permissible. All turn-buckles, come-alongs, anchors and other connections must be capable of developing the full strength of the cable shown. Furnish anchor bolts and nuts in accordance with Item 449, "Anchor Bolts".

SHEET 2 OF 2

**Texas Department of Transportation**  
**BRACING REQUIREMENTS**  
**PRESTRESSED CONCRETE**  
**I-GIRDERS AND I-BEAMS**

Bridge Division Standard  
MEBR(C)

FILE: MBR5313.B04  
REV: OCTOBER 2015  
DATE: 10/15/15  
COUNT: 001  
SHEET NO: 25

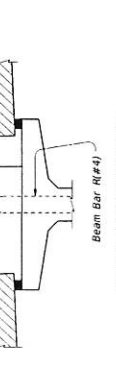
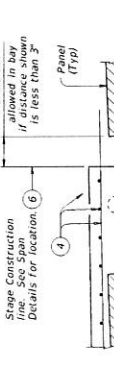
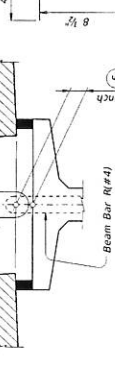
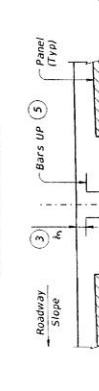
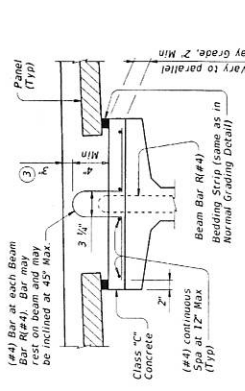
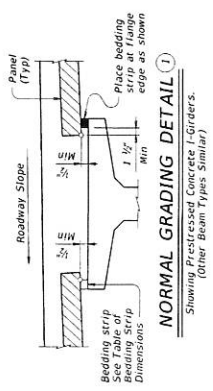
57913  
7/24/15

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**TABLE OF BEDDING STRIP DIMENSIONS**

WIDTH	HEIGHT (2)	
	Min	Max
1" (Min)	1/2"	2"
1 1/2"	1/2"	2 1/2"
1 3/4"	1/2"	3"
2" (Max)	1/2"	4"

- To reduce the quantity of cast-in-place concrete, bedding strip thickness may be increased in 1/2" increments. Bedding strips must be comprised of one layer. Bond bedding strips to the beams with an adhesive compatible with bedding strips. Bedding strips over 2.5" high may need to be bonded to the roadway slope. Bedding strips over 2.5" high may need to be bonded and the maximum change in thickness between adjacent panels is 1/2". Alternatively, bedding strips may be cut to grade. Panels may be supported by an alternate method, using a commercial product, if approved by the Bridge Division. See Special Grading Detail for Concrete Beams or submit an alternate method to the Bridge Division for approval.
- Height must not exceed twice the width.
- Provide clear cover as indicated unless otherwise shown on Span Details.
- See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels. If necessary to maintain clear cover.
- Space Bars UP(#4) with Beam Bars R(#4) in all areas where measured haunch exceeds 3" or 3/2" with Prestressed Concrete I-Girders. Epoxy coating for Bars UP is not required.
- Do not locate construction joints on top of a panel.
- Butt adjacent bedding strips together with adhesive. Cut v-notches, approx. 1/2" deep, in the top of the bedding strips at 8' o.c.



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DATE: \_\_\_\_\_  
FILE: \_\_\_\_\_

CONSTRUCTION NOTES:  
 1. Extended polyethylene placed along top flange edges of supporting the panels and extra reinforcing details between panels will be considered subsidiary to deck construction.  
 2. Bars U, shown on PCP-FAB, may be bent over or cut off if necessary.  
 3. Care must be taken to ensure proper cleaning of construction debris and consolidation of concrete mortar placed at edges of the panels. Bedding strips must be placed at edges of the panels to flow a minimum of 1/2" under the panels as the slab concrete is placed.  
 4. Bedding strips must be placed at edges of the panels to flow a minimum of 1/2" under the panels as the slab concrete is placed.  
 5. Roadway cross-slope reduces the opening available for entry of the mortar. Bedding strips varying in thickness across the beam are therefore required. For details on bedding strip thickness, see the Reinforced Concrete Slab Detail Sheets, UBMS.  
 MATERIAL NOTES:  
 1. Provide Class 60 reinforcing steel in the cast-in-place concrete.  
 2. Provide Class 60 Reinforcing Steel for size and spacing of reinforcement.  
 3. If the top and bottom layer of reinforcing steel is shown on the Span Details to be epoxy coated, then the epoxy coating must be applied to the bars.  
 4. Provide bar laps, where required, as follows:  
 Epoxy Coated - #4 = 1'-5"  
 Uncoated - #4 = 2'-1"  
 GENERAL NOTES:  
 1. Designed according to ASHPTO LRFD Specifications, except Option 1 must be used if the skew exceeds 45 degrees.  
 2. Prestressed Concrete Beams is not permitted for horizontally curved steel plate or tub girders.  
 3. See Span Details for other possible restrictions on the use of this standard.  
 4. This standard is to be used in conjunction with the Span Details, PCP-FAB and other applicable Standard drawings.  
 5. Additional reinforcement or concrete required on this standard is considered subsidiary to the bid item "Reinforced Concrete Slab".  
 Clear dimensions are clear dimensions, unless noted otherwise.  
 Reinforcing bar dimensions shown are out-to-out of bar.

HL93 LOADING SHEET 1 OF 4  
 Texas Department of Transportation  
 Bridge Division  
 Standard  
**PRESTRESSED CONCRETE PANELS DECK DETAILS**

PCP  
 REVISED 10/15/07  
 DATE 10/15/07  
 BY JRS  
 CHECKED BY JRS  
 DATE 10/15/07  
 COUNTY  
 SHEET NO. 26

97813

CLASH BUTT JOINT

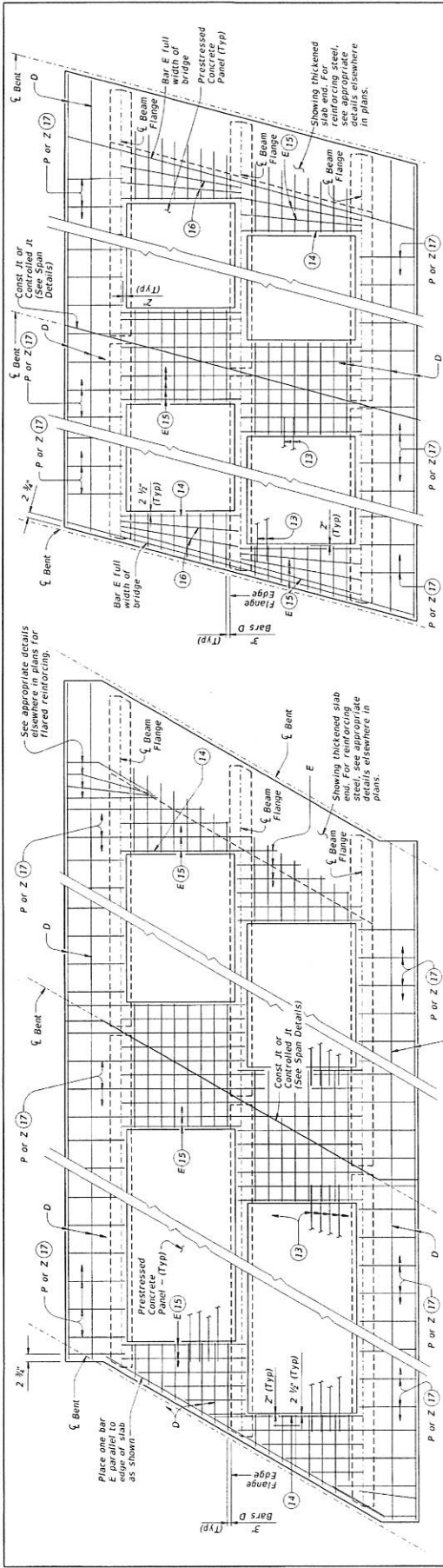
TYPICAL SECTION AT PANEL JOINT  
 (Panel reinforcing not shown for clarity.)  
 The gap cannot be considered as a panel fabrication tolerance.

BEDDING STRIP DETAIL (7)

STAGE CONSTRUCTION LIMITATIONS  
 (Other Beam Types Similar)

STAGE CONSTRUCTION LIMITATIONS  
 (Other Beam Types Similar)



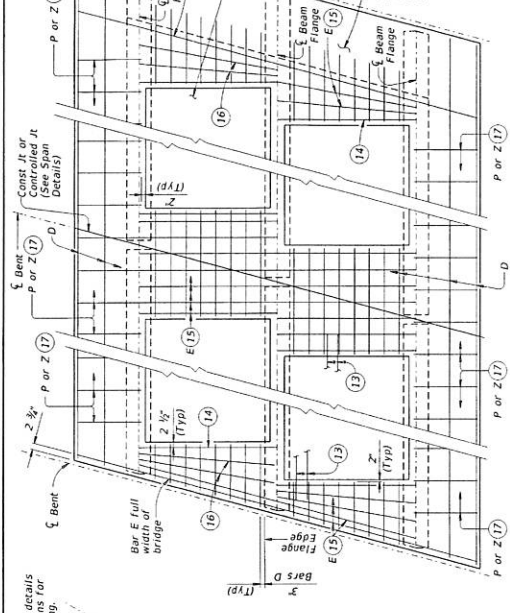


AT ALL SPAN ENDS UNLESS NOTED OTHERWISE

AT INTERIOR BENTS

AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH NORMAL REINFORCEMENT



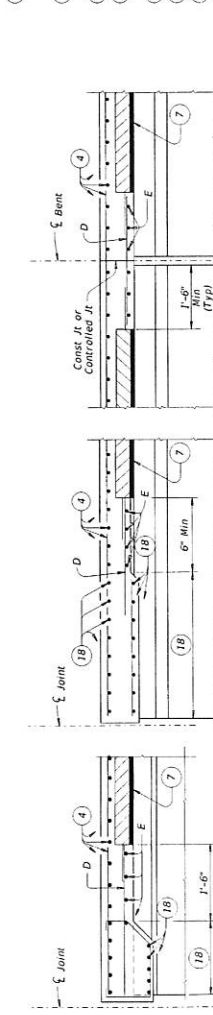
AT ALL SPAN ENDS UNLESS NOTED OTHERWISE

AT INTERIOR BENTS

AT THICKENED END SLABS

OPTION 1 ~ PLAN OF SLABS WITH SKEWED REINFORCEMENT

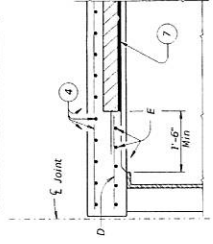
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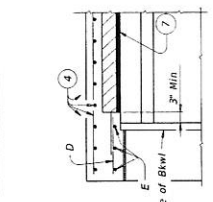
AT THICKENED SLAB ENDS FOR PRESTR CONC U-BMS

AT THICKENED SLAB ENDS FOR PRESTR CONC I-BMS AND STEEL BMS

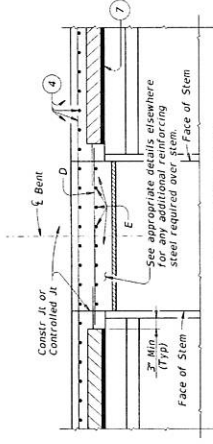
AT SLAB CONTINUOUS OVER INTERIOR BENTS FOR ALL SIMPLE SPAN BMS



AT CONVENTIONAL END DIAPHRAGMS FOR STEEL BMS



AT SLAB OVER ABUTMENT BACKWALL FOR ALL BMS



AT SLAB CONTINUOUS OVER INVERTED BENTS FOR ALL BMS

- (4) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover. Transverse top slab reinforcement may rest on top of prestressed concrete panels if necessary to maintain clear cover.
- (7) Butt adjacent bedding strips together with adhesive. Cut v-notches, approx 1/2" deep, in the top of the bedding strips at 8" o.c.
- (12) Max Spacing as listed unless otherwise shown.
- (13) At connection with cast-in-place slab, extend longitudinal panel reinforcement. See PCP-748 for details.
- (14) Maintain one Bar E(#4) parallel to panel ends (Typ).
- (15) Bars E(#4) not continuous over beam flanges must overlap beam flange 6" Min.
- (16) Add Flared Bars E(#4) (Min Spa = 6", Max Spa = 12") as required at panel ends.
- (17) Where possible, Bars E(#4) may be extended into overhangs to replace Bars P(#4). Bars Z(#4) are required for sloped overhangs with U-Beams.
- (18) See appropriate thickened slab end details for reinforcing and limits of thickened slab end.

**TABLE OF REINFORCING STEEL (2)**

BAR	SIZE	Max Spacing (in.)
D	#4	9
E	#4	9
P	#4	18
U	#4	-
Z	#4	18

HL93 LOADING SHEET 3 OF 4

Texas Department of Transportation  
**PRESTRESSED CONCRETE PANELS DECK DETAILS**

PCP

DATE: PREPARED BY: DATE: CHECKED BY: DATE: REVISIONS:

FILE: 57913

DATE: JANUARY 2015

PROJECT: 57913

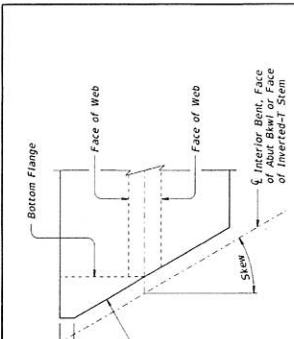
CONTRACT: 57913

SHEET NO. 28



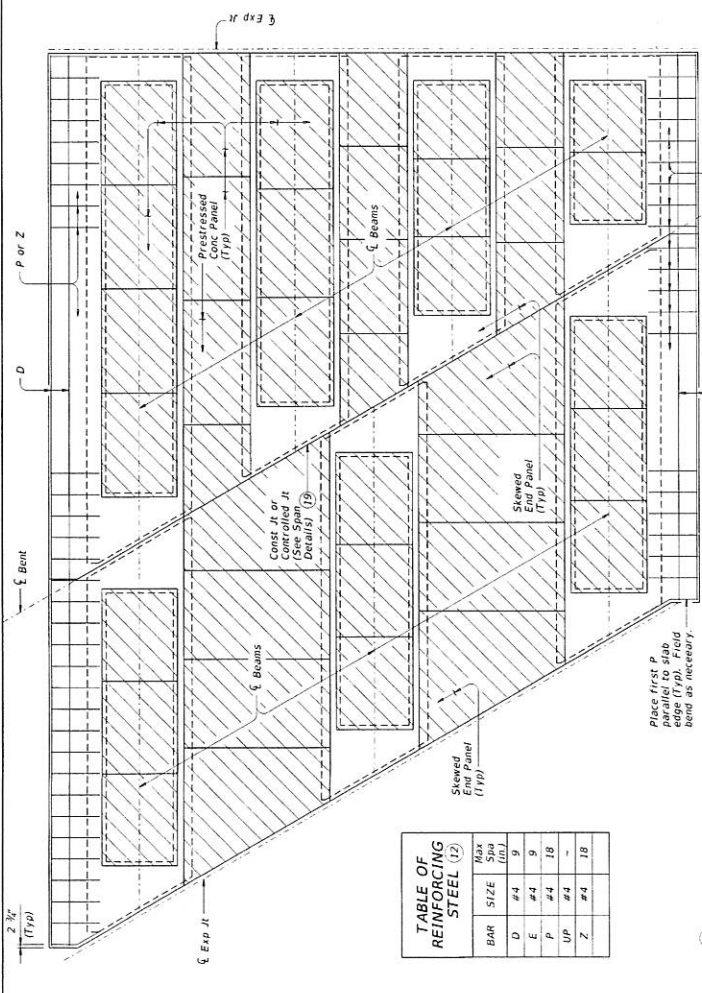
*Handwritten signature and date: 7/20/15*

DATE: FILE:



**OPTION 2 ~ SHOWING MODIFICATION TO BEAM/GIRDER TOP FLANGE FOR SKEWS OVER 5°**  
Showing I-Bent/Girder, U-Bms and Steel Bms similar.

Skew top flange of Bms/Girders as shown. Other beams to be skewed as shown in drawing. Do not skew a panel, not to be skewed on exterior side of fascia Bms/Girders.



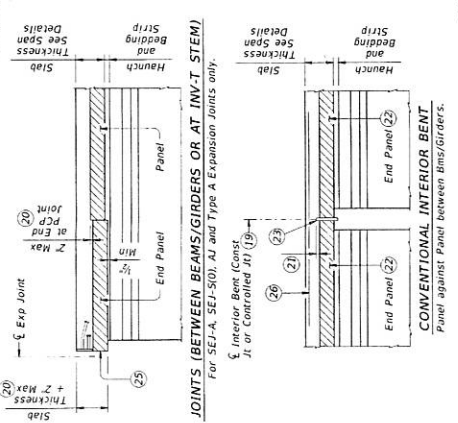
**TABLE OF REINFORCING STEEL (12)**

BAR	SIZE	Max Spacing (ft)
D	#4	9
E	#4	9
P	#4	18
UP	#4	-
Z	#4	18

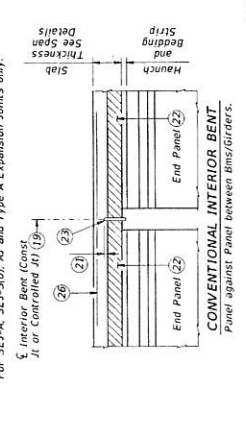
- (4) See Span Details and Thickened Slab End Details for top slab reinforcement and clear cover on top of prestressed concrete panels. If necessary to maintain clear cover.
- (12) Max Spacing as listed unless otherwise shown.
- (19) The Plastic Reinforcing of Controlled Joints (See Notes, Z-Strips, etc.) is not required with these Details.
- (20) End panel may be set up to Z lower to accommodate expansion joint hardware, provided bedding strip is not less than 1/2" thick.
- (21) 1" Min. 1 1/2" Max. support as necessary.
- (22) Place panel within 1/2" of 3/4" thick board.
- (23) 3/4" thick timber board, leave in place. Place straight, within 1/2" of concrete of Bent or Face of Inverted-T Stem. Do not extend into overhang. Do not extend into overhang.
- (24) Permanent galvanized steel sheet form. Removable formwork is acceptable.
- (25) Place one panel within 1/2" of expansion joint opening. End panel cannot encroach on required expansion joint opening.
- (26) Place additional #4 bar 5'-0" in length between every slab bars T. Center (#4) bar on joint.
- (27) Place additional #4 bar continuous Z or beyond each side of Inverted-T Stem between every slab bars T.

**SPECIAL OPTION 3 CONSTRUCTION NOTES:**  
Placing panels adjacent to expansion joints and notes concerning prior to completing interior panel placement is recommended by saw cutting panels to fit distance from a saw cut edge to a panel strand is 1 1/2". Do not extend the longitudinal panel reinforcement into the cast-in-place slab and girders on skewed bridges must be modified as shown on this drawing. The Contractor is responsible for coordinating this with the submitting shop drawings for approval.  
Fabricator may optionally skew the whole end. When fabricator to skew whole end, fabricator must be changed to use condition at abutment. Fabricator must coordinate change in bearing type, bearing centerline Contractor. Show appropriate changes on girder and bearing shop drawings.  
The location of expansion joints shown on standard AJ, SEJ-A and SEJ-S00 is permissible if necessary to clear top of end panels. The Contractor is responsible for coordinating modifications with the fabricator. Show appropriate changes on girder and bearing shop drawings. Expansion joint hardware are made. Bedding strips under skewed end panels must conform to the requirements of Item 428 except their minimum compressive strength must be 60 psi.  
Provide Bars AA, G, K, and OA from standard IGTSMOD in the slab.

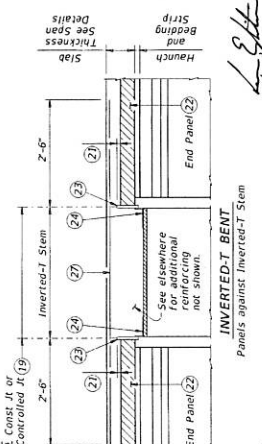
**OPTION 2 ~ PLAN OF SLAB**  
(Showing U-Beams; other beams similar)



**JOINTS BETWEEN BEAMS/GIRDERS OR AT INV-T STEM**  
For SEJ-A, SEJ-S00, AJ and Type A Expansion Joints only.



**OPTION 2 ~ ELEVATIONS AT BEAM ENDS**



Signature and Date: 7/24/19

Texas Department of Transportation  
**PRESTRESSED CONCRETE PANELS DECK DETAILS**  
Bridge Division Standard  
DATE: 01/01/2007  
REVISED: JANUARY 2015  
PROJECT: PCP  
SHEET NO: 229

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

Beam Type	Normal (In.)	Min (In.)	Max (In.)	TABLE A (4) (5)	TABLE B (4) (5)
A	3	2 1/2	3 1/2	17' to 12"	2 1/2
B	3	2 1/2	3 1/2	Over 12' to 15'	3 1/2
C	4	3	4 1/2	Over 15' to 18'	4
VI	6	4	7 1/2	Over 18'	5
U40 - 54	5 1/2	5	6 1/2		3 1/2
T-28-70	6	4	7 1/2		4 1/2
X820 - 40	4	3	4 1/2		4 1/2
XS212 - 151	4	3	4 1/2		4 1/2

**GENERAL NOTES:**  
 1. Minimum 28 day strength  $f'_c = 5000$  psi.  
 2. Do not use epoxy-coated reinforcing steel bar or strand in panels.  
 3. Minimum distance from top panel surface between a No. 6 and No. 9 concrete surface profile, inclusive, as specified by the International Concrete Repair Institute (ICRI).  
 4. For the fabrication of panels will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.  
 5. Layout which identifies location of each panel must be developed by the fabricator. Permanently mark each panel in accordance with the panel layout. A copy of the layout is to be provided to the Engineer.

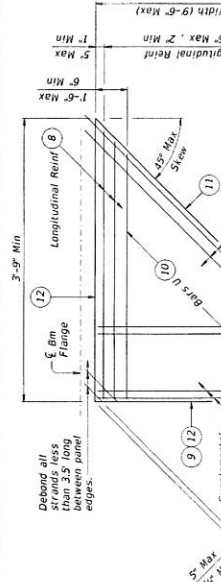
**TRANSVERSE PANEL REINFORCEMENT:**  
 For panel widths over 5', use 3/8" or 1/2" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.  
 For panel widths over 3'-6" up to and including 5', use 3/8" or 1/2" Dia (270k) prestressing strands with a tension of 14.4 kips per strand.  
 For panel widths up to 3'-6", use #4 Grade 60 reinforcing bars (prestressed strands alone are not allowed).  
 Place transverse panel reinforcement at panel centroid and space at 6" Max.

**LONGITUDINAL PANEL REINFORCEMENT:**  
 The following options may be used for longitudinal panel reinforcement:  
 1. #3 Grade 60 reinforcing steel at 6" Max Spacing. No splices allowed.  
 2. 3/8" Dia prestressing strands at 4 1/2" Max Spacing.  
 3. 1/2" Dia prestressing strands at 6" Max Spacing (unstressed).  
 4. Deformed Welded Wire Reinforcement (WWR) (ASTM A1064) providing longitudinal reinforcement for the entire length of the panel.  
 Provide transverse wires to ensure proper handling of reinforcement. One splice per panel is allowed. See WWR Splice Detail.  
 No combination of longitudinal reinforcement options in a panel is allowed.  
 Reinforcement must be placed above transverse panel reinforcement for skewed end panels with supplemental #4 reinforcement.

**HL93 LOADING**  
 Bridge Division Standard  
 Texas Department of Transportation  
**PRESTRESSED CONCRETE PANEL FABRICATION DETAILS**

FILE NO. 02/16/2010  
 REV. 10/07 10/1/2007  
 PROJECT NO. 0-4515  
 COUNTY  
 SHEET NO. 30

PCP-FAB  
 13  
 07913

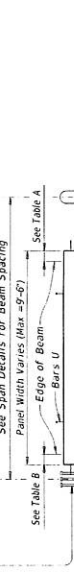


**TYPICAL NON-SKEWED PANEL PLAN**

- At connection with cast-in-place slab, extend longitudinal panel reinforcement past panel end. Alternatively, provide (#3) x 2'-0" dowels at panel ends and supplemental #4 reinforcement at panel ends.
- Four loops required per panel.
- Four loops required per panel. 3/8" or 1/2" strands may be used.
- Normal dimensions must be used on spans with parallel beams. Maximum spacing between supplemental #4 reinforcement apply only to spans with flared beams.
- See Normal Grading Detail on PCP standard for lap requirements and bedding strip dimensions. Maximum spacing between supplemental #4 reinforcement utilize all bedding strip widths.
- One Splice allowed per panel. No more than two sheets of WWR are allowed.
- Provide (#4) bars under transverse reinforcement. Omit for 5 degree (1:12) skew and smaller.
- End Cover 2 1/2" Max, 1" Min.
- Recess strands on indicated panel edge in accordance with Item 424.
- At the fabricator's option, Bars U may be placed parallel to transverse panel reinforcing with horizontal logs in plane of transverse panel reinforcing.
- Use length of indicated panel edge as panel width for purposes of determining type of transverse reinforcement.
- Timber form work permissible this edge.



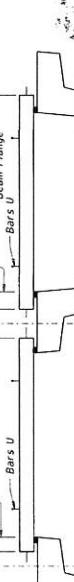
**WELDED WIRE REINFORCEMENT (WWR) SPLICE DETAIL**



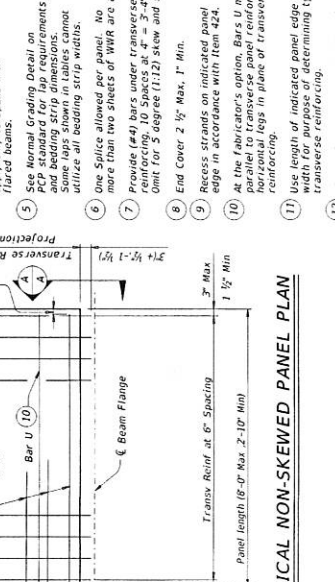
**SECTION A-A**  
 (Not Showing Supplemental #4 bars for Skewed End Panels.)



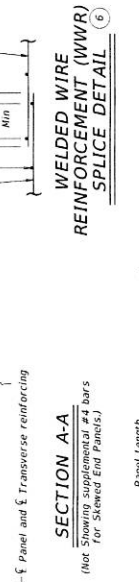
**BARS U (#3)**



**OPTIONAL STRAND FOR BARS U**



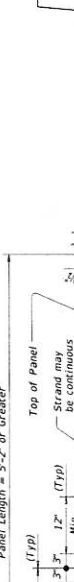
**TYPICAL SKEWED END PANEL PLAN**  
 (Only to be used with details shown elsewhere in the plans.)



**PRESTRESSED CONCRETE BEAMS OR GIRDERS**  
 Typ unless noted otherwise



**STEEL BEAMS**  
 Typ unless noted otherwise



**PRESTRESSED CONCRETE U-BEAMS**

**TYPICAL SECTIONS FOR DETERMINING PANEL WIDTH**

DATE: FILE:

**DESIGN NOTES:**

As a minimum, PMDF and support angles must be designed for a minimum yield stress of 50 ksi in reinforcement and concrete. Flexural stresses due to construction loads must not exceed 75 percent of the design yield stress for reinforcement. Maximum deflection under the weight of forms, reinforcement and concrete shall not exceed 1/100 of the form design span, but not more than 0.36" for design spans of 10' or less.

1/200 of the form design span, but not more than 0.25" for design spans greater than 10'.

The form design span must not be less than the clear distance between beam flanges, minus 2".

**CONSTRUCTION NOTES:**

Form sheets must not be permitted to rest on the ground. Form sheets must be supported on supports and must have a minimum bearing surface. All attachments must be placed in direct contact with beam flanges.

All attachments must be made by permissible S14C, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing steel. Span details except all bottom mat bars are to be #5.

Vertical loads, including the weight of the form, shall be applied uniformly across the entire width of the structure where the main reinforcing steel is located in the flange.

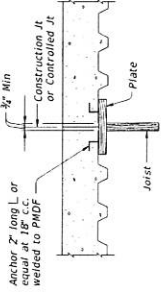
Field Welding, pertaining to fillet welds, shall be made by a qualified welder.

All permanently exposed form metal, where the galvanized coating has been damaged, must be treated with a zinc-rich primer in accordance with Item 425 "Galvanizing".

Minor heat discoloration in areas of welds need not be touched up, up uniformly across the entire width of the structure where the main reinforcing steel is located in the flange.

The location of all construction joints and forming details for any construction joint must be shown on the forming plans. Plans must be approved by the Engineer before removed after curing of the slab.

A sequence for uniform vibration of concrete must be provided on the forming plans to prevent damage to the forms, yet provide proper preparation to prevent voids or honeycomb in the finished concrete. Header's angle construction joints.

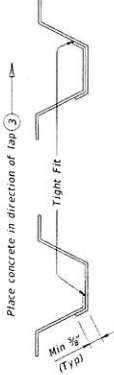


Note: In spans where PMDF forms are used, timber reinforcement must be made to provide adequate provision must be made to support edge of metal form and to provide adequate provision to slab concrete where joined to wood forms.

**SECTION THRU CONSTRUCTION JOINT**

**FOR PRESTR. CONC. U-BEAM BRIDGES:**

S14C, spacing, and orientation of bottom mat of slab reinforcement must match the top mat of reinforcing steel. Span details except all bottom mat bars are to be #5.



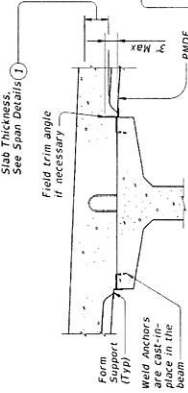
**SIDE LAP DETAILS**

- 1) Slab thickness minus 3/8" if corrugations match reinforcing bars.
- 2) Welding of form supports to tension flanges will not be permitted. Other methods of providing wind hold down will be considered. At least one layer of sheet metal must be provided between the flange and the weld joint.
- 3) The direction of concrete placement will be such that the upper layer of the form wrap is toward (1).
- 4) See Span details for cover requirements.

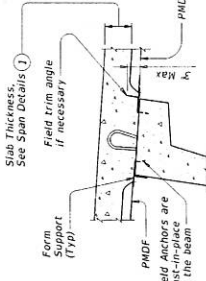
**GENERAL NOTES:**

Permanent Metal Deck Forms (PMDF) and support angles shall conform to ASTM A553, Structural Steel (SS), with coating designation G185. Steel must have a minimum yield strength of 50 ksi and a minimum tensile strength of 65 ksi and that of support angles and protective angles is 12 gauge.

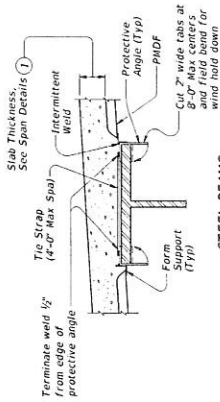
Submit two copies of forming plans for PMDF to the Engineer. These plans must show all essential details of proposed form conditions and size and location of welds. These plans must clearly show areas of tension flanges for steel beams and other details. The plans must show the location of all construction joints and the method of separating sheet metal or other positive method. These plans must be designed, signed, and approved by the Engineer before construction begins. The Contractor is responsible for the adequacy of these plans. All material, labor, tools and incidentals necessary to form as a guide in preparation of the forming plans. The Contractor shall be responsible for the adequacy of these plans. The Contractor shall be responsible for the adequacy of these plans. The Contractor shall be responsible for the adequacy of these plans.



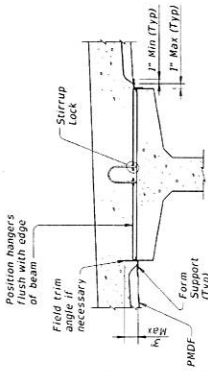
**PRESTR. CONC. I-BEAMS AND I-GIRDERS WITH WELD ANCHORS**



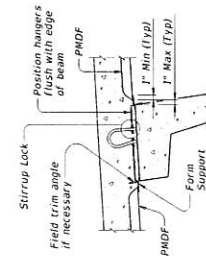
**U-BEAMS WITH WELD ANCHORS**



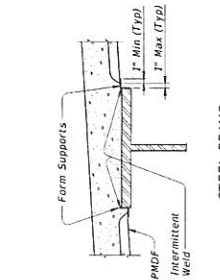
**STEEL BEAMS AT TENSION FLANGES**



**PRESTR. CONC. I-BEAMS AND I-GIRDERS WITH STIRRUP LOCKS**

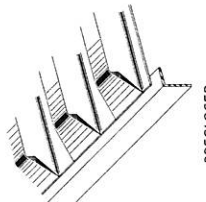
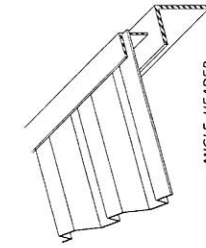


**U-BEAMS WITH STIRRUP LOCKS**



**STEEL BEAMS AT COMPRESSION FLANGES**

**TYPICAL TRANSVERSE SECTIONS**



**TYPES OF END CLOSURES**

Texas Department of Transportation  
 Division Standard  
**PERMANENT METAL DECK FORMS**

**SHEET 1 OF 2**

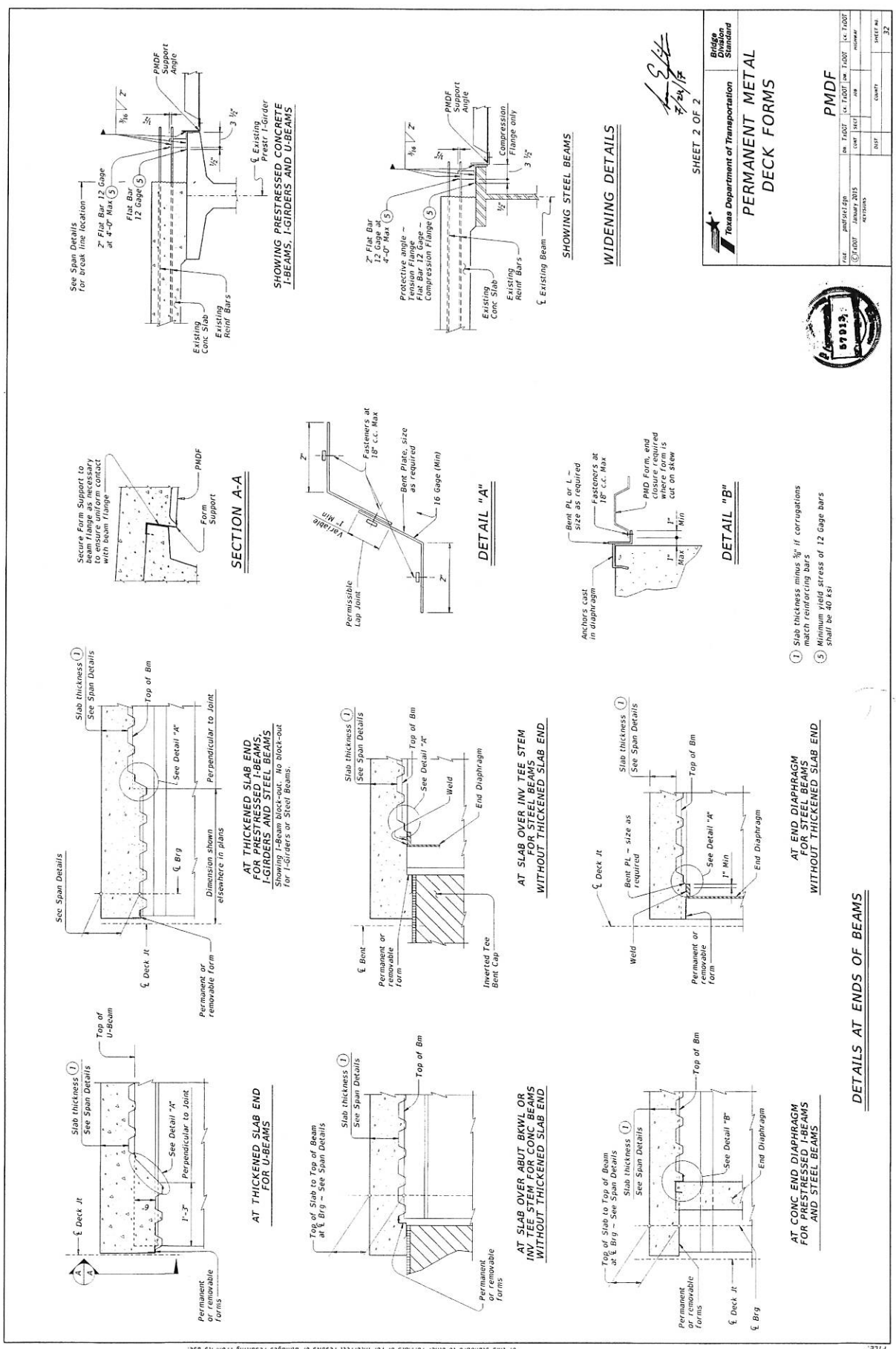
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PROJECT: [Blank]  
 SHEET NO: 31



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DATE: FILE: SHEET NO. 32

Texas Department of Transportation  
 Bridge Division  
 Standard  
**PERMANENT METAL DECK FORMS**  
 SHEET 2 OF 2

FILE: PMDF-012-010 DATE: JANUARY 2015  
 DRAWN: [ ] CHECKED: [ ] REVIEWED: [ ]  
 PROJECT: [ ] COUNTY: [ ] SHEET NO.: 32



- (1) Slab thickness minus 3/8" if corrugations match reinforcing bars
- (5) Minimum yield stress of 12 Gauge bars shall be 40 KSI

**DETAILS AT ENDS OF BEAMS**

# TABLE OF SEALED EXPANSION JOINT INFORMATION

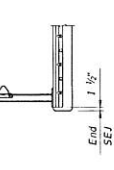
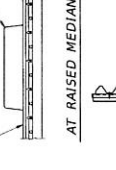
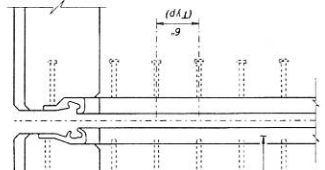
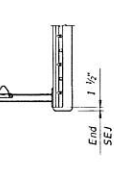
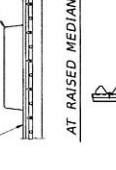
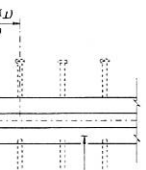
MANUFACTURER	STEEL SECTION (2)			STRIP SEAL		
	Seal Type	Joint Opening (3)	Seal Opening (3)	4" JOINT	5" JOINT	Joint Opening (3)
D.S. Brown	Type SSC02	1 1/2"	AZR-XTRA	2"	2"	2"
Watson Bowman Acme	Type R	1 1/2"	SE-500	2"	2"	2"
Watson Bowman Acme	As Shown	2"	N/A	2"	N/A	N/A
R.J. Watson	As Shown	2 1/2"	N/A	2"	N/A	N/A

**DESIGN NOTES:**  
 Provide a skew base reduced ability to accommodate longitudinal movement. Use table below to determine the correct joint size for skewed installations. Always use 25 degrees. Calculate reduced moment by multiplying joint size by cosine (skew).

SKEW (deg)	REDUCED LONGITUDINAL MOVEMENT RANGE		
	4"	5"	6"
0	4.0"	5.0"	6.0"
15	4.0"	5.0"	6.0"
30	3.5"	4.3"	5.1"
45	2.8"	3.5"	4.3"

**FABRICATION NOTES:**  
 temporary shop assemble corresponding seal and joint opening. Seal must be for fit, and match mark for shipment. Secure corresponding sections together for shipment. Seal and joint opening must be marked. The seal must be continuous and include in the price bid for Sealed Expansion Joint.  
 of 10° or less sections or convenient lengths for staged construction or widening. One shop splice is permitted in each shipping length. Sufficient studs are added to limit the stud to shop splice distance to 2' Min and 4' Max. Bolt weld all shop and field splices and grind smooth areas in contact with seal. Make all necessary field splice joint preparations in Paint portions of steel sections not in contact with concrete with the primer specified. Shop drawings for the fabrication of Sealed Expansion Joints will not require the Engineer's approval if fabrication is in accordance with the details shown on this standard.

**CONSTRUCTION NOTES:**  
 Secure the Sealed Expansion Joint in position and place to the proper grade and alignment by welding braces to adjacent reinforcing steel, cast in concrete diaphragms. Include cost of temporary bracing in the price bid for Sealed Expansion Joints.  
 Remove shipping angle immediately after each joint half is secured in place. Grind smooth, and clean and prepare seal cavity for seal installation as per the Manufacturer's installation procedures.  
**GENERAL NOTES:**  
 Provide Sealed Expansion Joints in the size and length specified. Minimum slab and overhang thickness required for the use of SEJ-A is 6 1/2".



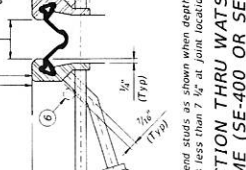
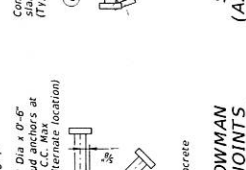
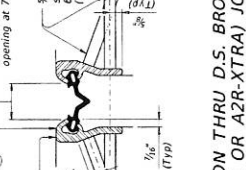
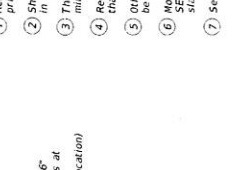
**DESIGNER'S NOTE:**  
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**Texas Department of Transportation**  
**Bridge Division Standard**  
**SEALED EXPANSION JOINT**  
**TYPE A**  
**WITHOUT OVERLAY**

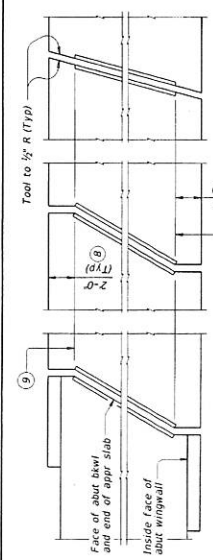
**SEJ-A**

DATE: 10/2010  
 REVISED: 10/2010  
 COUNTY: \_\_\_\_\_  
 SHEET NO.: 33

- Remove all burrs which will be in contact with seal prior to making splice.
- Shape of steel section shown is typical. Variations in sections must be approved by the Engineer.
- These openings are also the recommended minimum installation openings.
- Reduce for sidewalk or parapet heights less than 6".
- Other conditions affecting the joint profile should be noted elsewhere.
- Move transverse bars that are in conflict with SEJ studs, in either the bridge slab or approach slab, to rest at the junction of the studs.
- See span details for location of break point.

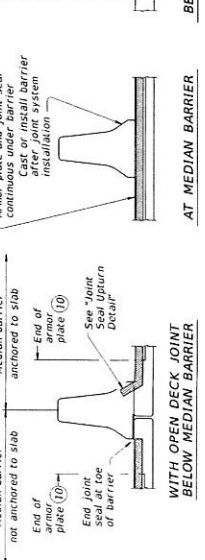


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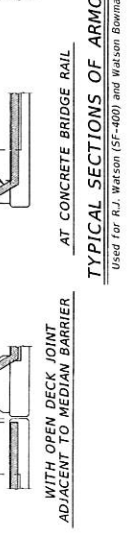
**JOINTS AT ABUTMENTS**  
**SKEMS OVER 15°**  
**SKEMS THRU 15°**

Used for R.J. Watson (SF-400) and Watson Bowman Acme (SPS-400) joint systems



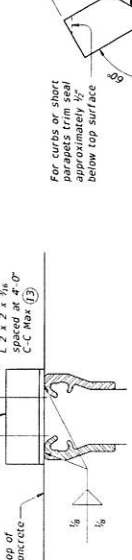
**PLANS OF ARMOR PLATES**  
**WITH OPEN DECK JOINT BELOW MEDIAN BARRIER**

Used for R.J. Watson (SF-400) and Watson Bowman Acme (SPS-400) joint systems



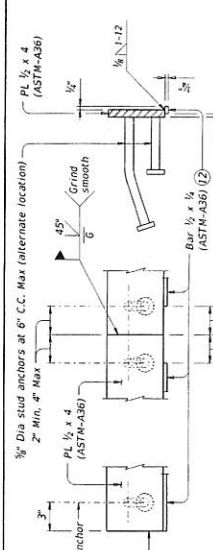
**TYPICAL SECTIONS OF ARMOR PLATES & SEALS**

Used for R.J. Watson (SF-400) and Watson Bowman Acme (SPS-400) joint systems



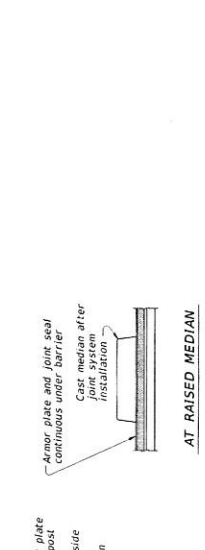
**WITH OPEN DECK JOINT ADJACENT TO MEDIAN BARRIER**

Used for R.J. Watson (SF-400) and Watson Bowman Acme (SPS-400) joint systems



**ELEVATION OF ARMOR PLATE**  
**FIELD SPLICE**

Used for R.J. Watson (SF-400) and Watson Bowman Acme (SPS-400) joint systems



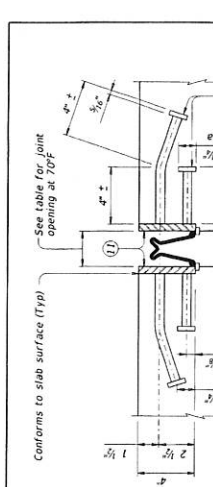
**AT SIDEWALK BEHIND BRIDGE RAIL**  
**AT MEDIAN BARRIER**

Used for R.J. Watson (SF-400) and Watson Bowman Acme (SPS-400) joint systems



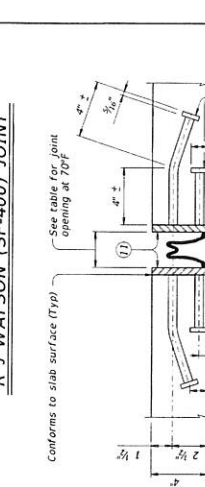
**AT STEEL POST BRIDGE RAIL**  
**AT CONCRETE BRIDGE RAIL**

Used for R.J. Watson (SF-400) and Watson Bowman Acme (SPS-400) joint systems



**SECTION THRU R J WATSON (SF-400) JOINT**

Used for R.J. Watson (SF-400) and Watson Bowman Acme (SPS-400) joint systems



**SECTION THRU BOWMAN ACME (SPS-400) JOINT**

Used for R.J. Watson (SF-400) and Watson Bowman Acme (SPS-400) joint systems

**CONSTRUCTION NOTE FOR R.J. WATSON (SF-400) AND WATSON BOWMAN ACME (SPS-400) JOINTS:**  
 1. The armor plates and joint seals shall be installed in the directions and with the adhesive provided by the manufacturer.  
 2. Splice in joint seal may be performed in the field.

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

**SHOWING D.S. BROWN (TY SSCM2)**  
 All joints similar

**JOINT SEAL UPTURN DETAIL**  
 Used for R.J. Watson (SF-400) and Watson Bowman Acme (SPS-400) joint systems. Upturn seal only. Terminate armor plates as shown in "Plans of Armor Plates and Typical Sections of Armor Plates & Seals."

**FOR CURBS OR SHORT SIDEWALKS:**  
 For curbs or short sidewalk, armor plate shall be approximately 1/2" below top surface of median barrier.

**FOR STEEL POST BRIDGE RAIL:**  
 Unless shown otherwise, terminate armor plate at slab break point if break is more than 2'-0" from slab edge.

**FOR CONCRETE BRIDGE RAIL:**  
 At fabricator's option, armor plates may extend up to 6" beyond this point for stems through 15".

**FOR MEDIAN BARRIER:**  
 See "Plans of Armor Plates."  
 Coat with Manufacturer's supplied epoxy primer above bar before installing sealant.

**FOR SIDEWALK BEHIND BRIDGE RAIL:**  
 In lieu of bar, use 1/2" 16 gauge stainless steel strap. Attach to armor plate with a fastener for attaching to steel base material, such as HiHi X-EGN or A-315.

**FOR STEEL POST BRIDGE RAIL:**  
 Align shipping angle perpendicular to joint.

**TEXAS DEPARTMENT OF TRANSPORTATION**  
**BRIDGE DIVISION**  
**STANDARD**

**SEALED EXPANSION JOINT**  
**TYPE A**  
**WITHOUT OVERLAY**

**SEJ-A**

REV.	DATE	BY	CHK'D	APP'D
01	10/01	10/01	10/01	10/01
02	10/01	10/01	10/01	10/01
03	10/01	10/01	10/01	10/01
04	10/01	10/01	10/01	10/01
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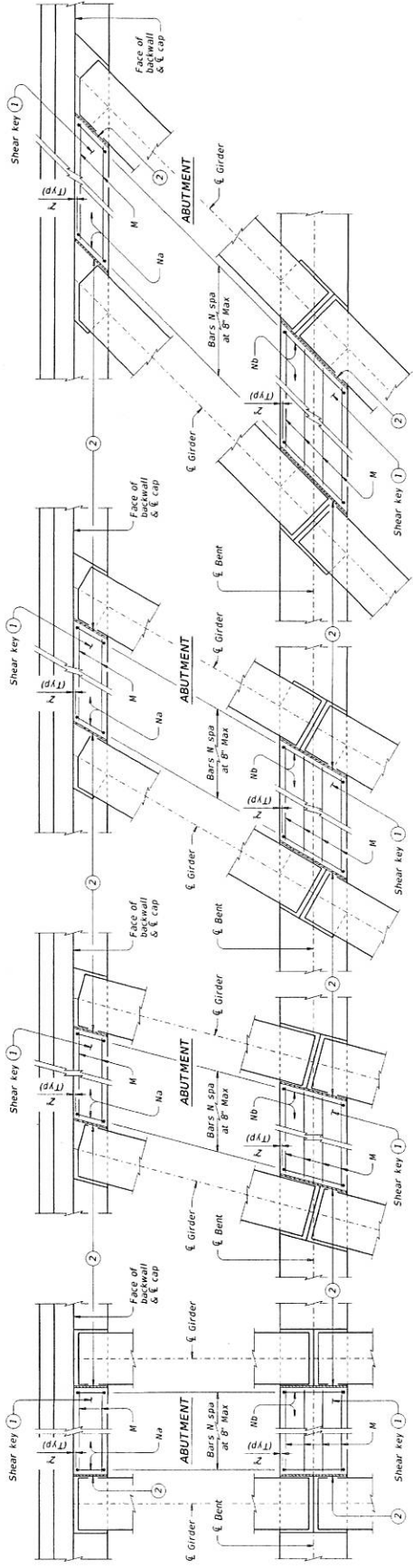
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 FILE: 10/01/01



*Handwritten signature and date: 10/01/01*

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**PARTIAL PLANS WITH NO SKEW**  
 Showing shear keys on 3'-6" wide caps. 4'-0" caps similar. INTERIOR BENT.

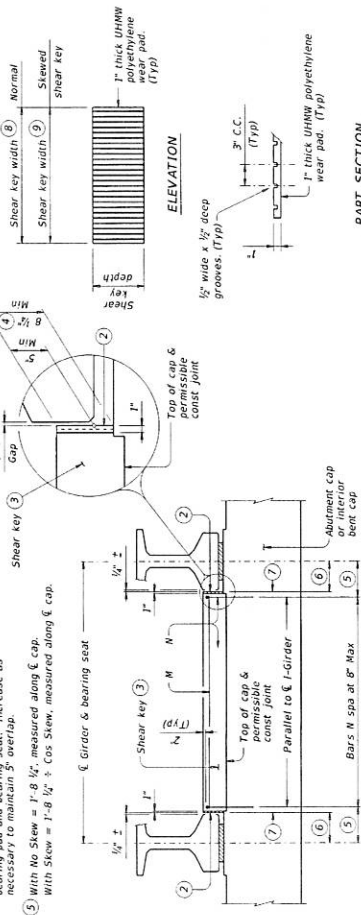
**PARTIAL PLANS WITH 15° SKEW**  
 Showing shear keys on 3'-6" wide caps. 4'-0" caps similar. INTERIOR BENT.

**PARTIAL PLANS WITH 30° SKEW**  
 Showing shear keys on 3'-6" wide caps. 4'-0" caps similar. INTERIOR BENT.

**PARTIAL PLANS WITH 45° SKEW**  
 Showing shear keys on 3'-6" wide caps. 4'-0" caps similar. INTERIOR BENT.

- 1 Place shear keys on the upstream side of structure between outside girder and next adjacent girder, unless shown otherwise on plans.
- 2 UHMW polyethylene wear pad. (Typ)
- 3 Leave a 1/2" gap plus or minus between girder and face of wear pad. If gap is not shown, the gap shall be 1/2" to 1/4" from the face of the girder. No keys in accordance with Item 420-4.9. Treatment and Finishing of Horizontal Surfaces.
- 4 Measure at higher bearing seat elevation forward or back. Dimension based on typical bearing seat elevation. Increase as necessary to maintain 5" overlap.
- 5 With No Skew = 1'-8 1/2" ± Cos Skew, measured along  $\xi$  cap. With Skew = 1'-8 1/2" ± Cos Skew, measured along  $\xi$  cap.
- 6 With No Skew = 1'-4 1/2" measured along  $\xi$  cap. With Skew = 1'-4 1/2" ± Cos Skew, measured along  $\xi$  cap.
- 7 Faces of UHMW polyethylene wear pad. Smooth side of pad facing girder.
- 8 Abutments = 1/2" Cap width. Interior bents = Cap width.
- 9 Abutments = 1/2" Cap width ± Cos Skew. Interior bents = Cap width ± Cos Skew.

Normal	Skewed Shear Key
Girder spa along $\xi$ cap - 3'-1 1/2"	
(Girder spa along $\xi$ cap - (3'-1 1/2" ± Cos Skew))	
<b>BARS M (#5)</b>	
1/2" Cap width - 4"	
(1/2" Cap width - 4") ± Cos Skew	
<b>BARS Na (#5)</b> (For abutments)	
Cap width - 4"	
(Cap width - 4") ± Cos Skew	
<b>BARS Nb (#5)</b> (For interior bents)	



**PARTIAL ELEVATION OF ABUTMENT OR INTERIOR BENT CAP**  
 Showing shear key with girder Type T-46. Other I-girder types similar.

**ULTRA HIGH MOLECULAR WEIGHT (UHMW) POLYETHYLENE WEAR PAD DETAILS**

**ELEVATION**  
 1" thick UHMW polyethylene wear pad. (Typ)

**PART SECTION**  
 1" thick UHMW polyethylene wear pad. (Typ)

CONSTRUCTION NOTES:  
 Provide Class "C" concrete ( $f'c = 3000$  psi). Provide Class "C" (HPC) concrete for abutment and bent cap.  
 Provide Grade 60 reinforcing steel.  
 Provide epoxy coated reinforcing steel for shear key if abutment or interior bent cap is exposed to deicing salts.  
 Provide Ultra High Molecular Weight (UHMW) polyethylene wear pads in accordance with ASTM D8872.

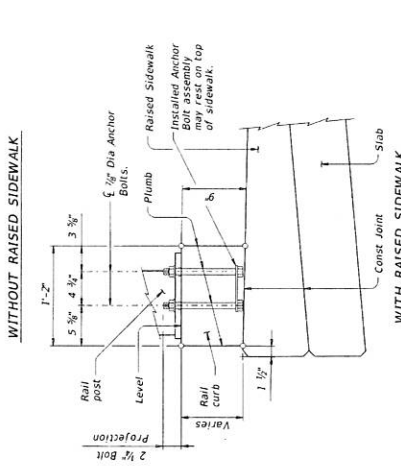
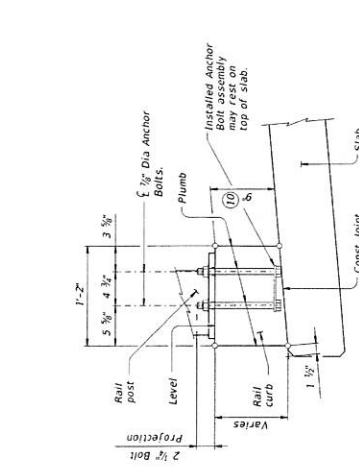
GENERAL NOTES:  
 Designed according to AASHTO LRFD Bridge Design Specifications. Details showing skew are drawn showing right forward skew. See bridge deck plan for skew angle.  
 These details are limited to bridges skewed 45 degrees and less. This standard is only applicable for I-girders.  
 Modify details for bearing conditions, and girder spacing not shown on plan. Details do not account for sole plate or pedestal bearing steel.  
 Include shear key concrete in abutment or bent concrete for UHMW polyethylene wear pads are subsidiary to Class "C" concrete.  
 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  
**SHEAR KEY DETAILS**  
 PRESTR. CONCRETE I-GIRDERS

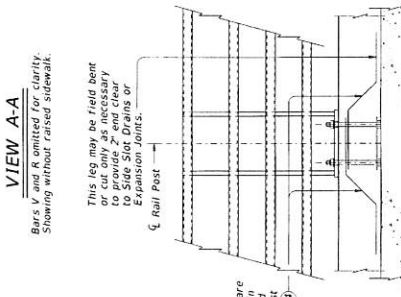
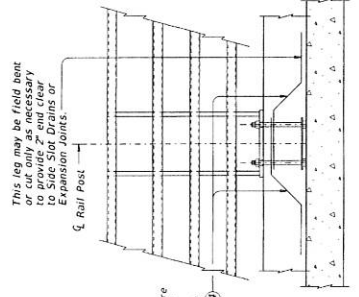
IGSK  
 FILE: BRIDGE/STP 16-1007 16-1007 (Rev. 10-45)  
 DATE: 01/2007 01/2007 01/2007  
 SHEET NO. 35







**RAIL CURB FORMING DETAIL**  
Reinforcing steel and rail curb chamfers not shown for clarity.

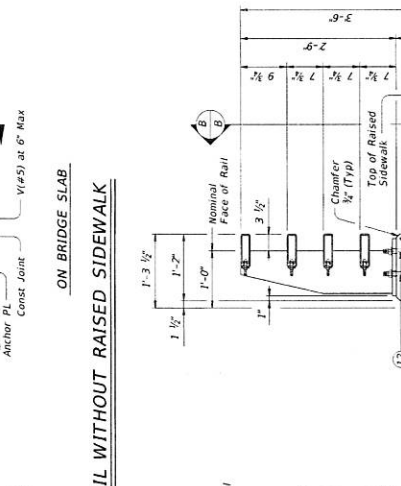
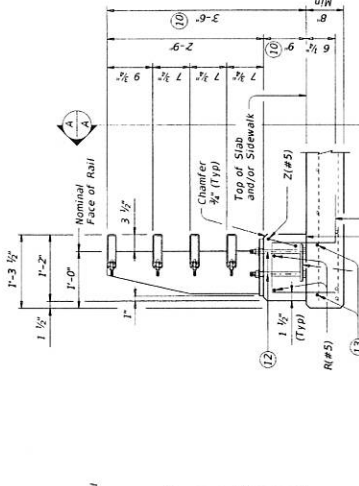


**VIEW A-A**  
Bars V and R omitted for clarity. Showing without raised sidewalk.

**VIEW B-B**  
Bars V and R omitted for clarity. Showing with raised sidewalk.

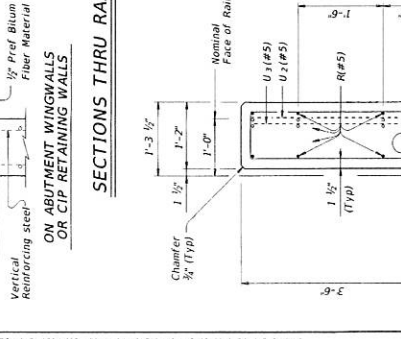
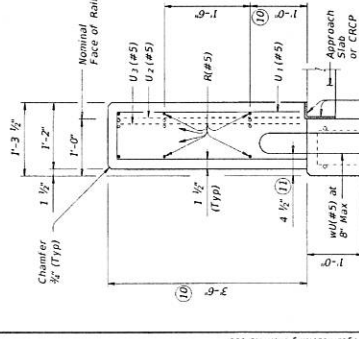
Z(#5) bars are lapped 9" Min and centered on every post as shown (12).  
This leg may be field bent or cut only as necessary to provide 2" and clear to expansion joints.

Z(#5) bars are lapped 9" Min and centered on every post as shown (14).  
This leg may be field bent or cut only as necessary to provide 2" and clear to side slot drains or expansion joints.



**ON BRIDGE SLAB**

**ON BRIDGE SLAB**



**ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS**

**ON ABUTMENT WINGWALLS OR CIP RETAINING WALLS**

- (10) Increase 2" for structures with Overlay.
- (11) 6 1/2" when vertical reinforcing has closer clear cover over horizontal reinforcing in abutment wingwalls or retaining walls on traffic side of wall.
- (12) 1/2" Dia Anchor Bolts. See "Anchor Bolt Assembly Details".
- (13) Top longitudinal slab bar may be adjusted laterally 2" plus or minus to tie reinforcing.
- (14) Adjust Bars Z(#5) as necessary to avoid Bars V(#5).
- (15) Raised Sidewalk.

Texas Department of Transportation  
Bridge Division Standard

**COMBINATION RAIL**

**TYPE CW**

FILE #	010412-001	REV	1-2007	REV	1-2007	DESIGNER	JFR	DATE	1-07-2007
PROJECT	104-1000	SECTION	104-1000	REV	1-2007	APPROVER	JFR	DATE	1-07-2007
DATE	01-07-2007	BY	JFR	REV	1-2007	CHECKED	JFR	DATE	1-07-2007
SCALE	AS SHOWN	PROJECT	104-1000	SECTION	104-1000	REV	1-2007	DATE	1-07-2007



*Handwritten signature and date: JFR 7/20/07*

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DATE: FILE:



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**CONSTRUCTION NOTES:** 1. Rail curb must be placed unless otherwise approved by the Engineer. Steel posts must be square to the top of curb. Use Type III epoxy for rail curb under post base plates if required. 2. Rail curb must be square to the top of curb. Use Type III epoxy for rail curb under post base plates if required. 3. Bend tubes to required radius for curved rails. Shop drawings for approval are required for curved rails. 4. One ship salice per rail member section is permitted with minimum 85 percent penetration. The weld may be square groove or single vee groove. Grind smooth. 5. Rail posts must be rounded or chamfered to approximately 1/2" by grinding. 6. Chamfer all exposed concrete corners.

**MATERIAL NOTES:** 1. Galvanize all steel components except reinforcing steel. 2. When plans require painted steel, follow the requirements for painting galvanized steel in Item 446, "Field Painting and Painting Steel." Do not paint sleeve anchor bolts for base plate. 3. Anchor bolts for base plate must be 1/2" Dia ASTM A325 or A449 bolts (or ASTM-A193 Gr B7 or F1554 Gr 105 threaded rods with one tack welded heavy hex nut each) nut. Nuts must conform to A503 requirements. 4. Epoxy resin must be Class "S" concrete. When Class "S" concrete is used, provide 3 gallons of calcium nitrate inorganic corrosion inhibitor per cubic yard of Class "S" concrete. 5. Provide Grade 60 reinforcing steel. 6. Provide 60 mil rail reinforcement if slab bars are epoxy coated. 7. Provide bar laps, where required, as follows: Epoxy coated - #5 = 1'-0" Epoxy coated - #5 = 2'-0"

**GENERAL NOTES:** 1. This rail has been evaluated and accepted to be of equal strength to railings with like geometry, which have been crash tested to meet NCHRP Report 350 TL-3 criteria. 2. When a TL-3 rated guard fence transition is used, when a TL-2 rated guard fence transition is used, this rail can only be used on bridges with expansion joints providing more than 5' movement. 3. Rail anchorage details shown on this standard may be modified. See appropriate details elsewhere in plans for these modifications. 4. See appropriate details elsewhere in plans for post spacing and anchor bolt settings to the Engineer for approval. 5. Average weight of railing with no overlay: total 131 pbf (Conc) 74 pbf (Steel).

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**

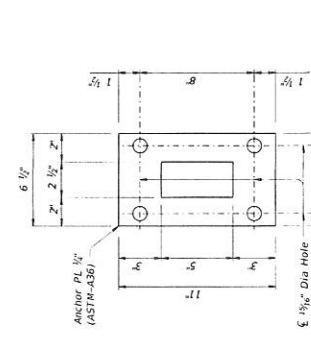
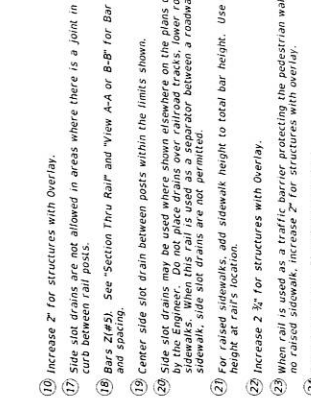
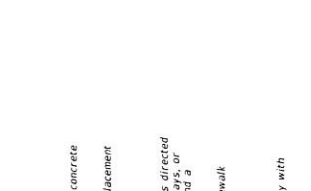
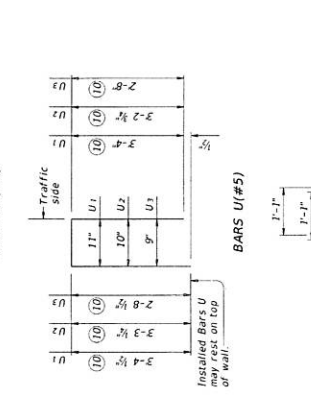
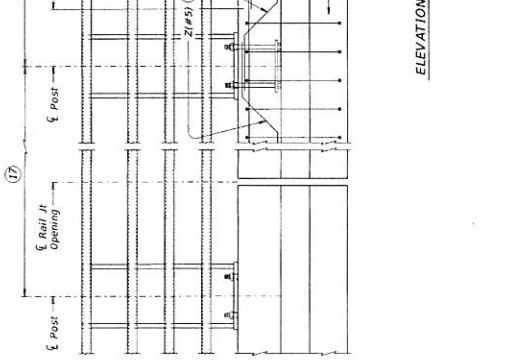
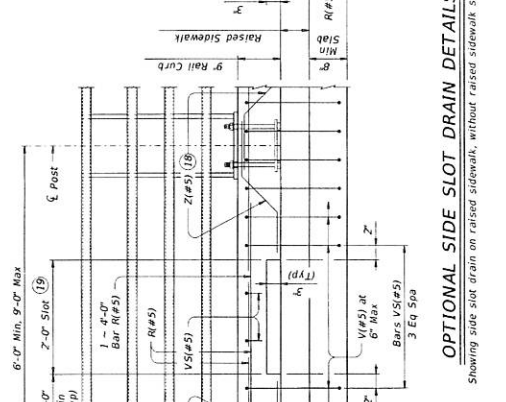
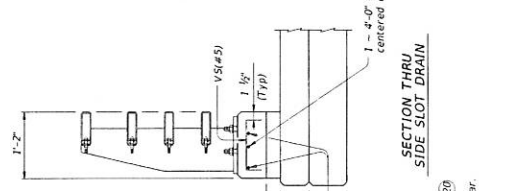
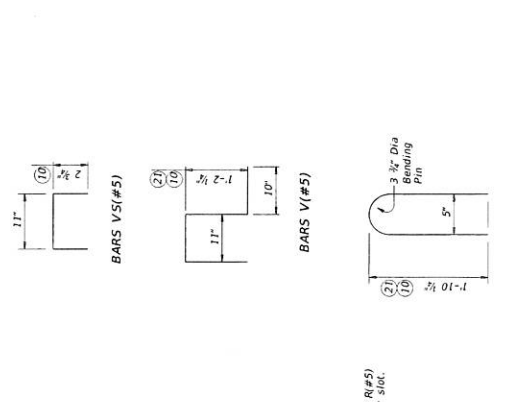
**COMBINATION RAIL**

**TYPE CW**

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 REVISED: 07/2014  
 BY: M. H. ...  
 CHECK BY: ...

FILE: 102817.00P  
 DATE: 05/20/2014  
 TIME: 10:07 AM  
 USER: ...

SHEET 4 OF 4



**ANCHOR BOLT ASSEMBLY DETAILS**

**ANCHOR BOLT OPTIONS**  
 (Showing Anchor Bolts for Base Plate)

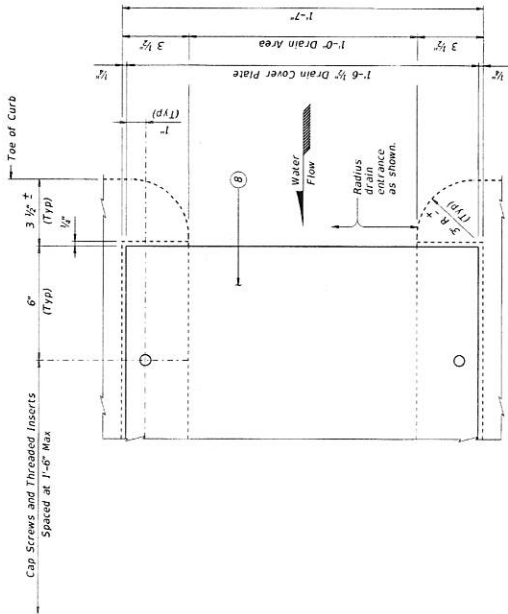
- (16) Increase 2" for structures with overlay.
- (17) Side slot drains are not allowed in areas where there is a joint in the concrete curb between rail posts.
- (18) Bars ZI(#5). See "Section Thru Rail" and "View A-A or B-B" for Bar Z placement and spacing.
- (19) Center side slot drain between posts within the limits shown.
- (20) Side slot drains may be used where shown elsewhere on the plans or as directed on sidewalks. When this rail is used as a separator between a roadway and a sidewalk, side slot drains are not permitted.
- (21) For raised sidewalks, add sidewalk height to total bar height. Use sidewalk height at rail's location.
- (22) Increase 2 3/4" for structures with overlay.
- (23) When rail is used as a traffic barrier protecting the pedestrian walkway with no raised sidewalk, increase 2" for structures with overlay.
- (24) Galvanizing Anchor Plate is not required.



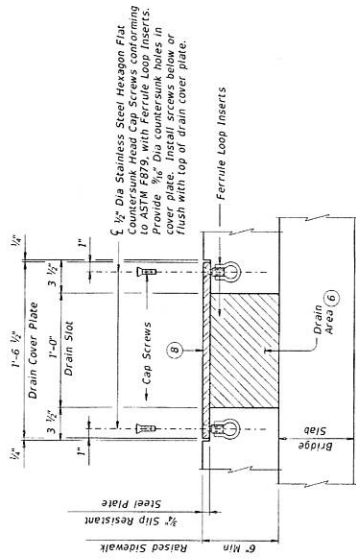
*M. H. ...*  
 7/24/14



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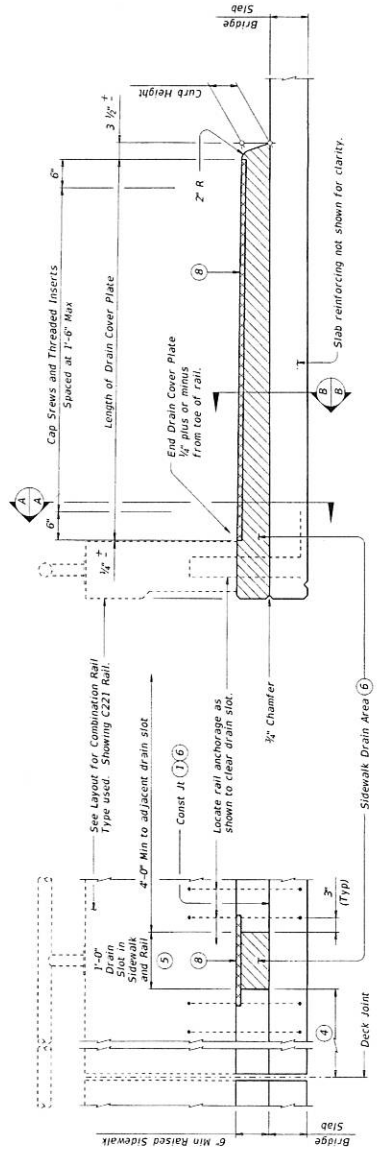


**PARTIAL PLAN CURB DRAIN**



**SECTION B-B**

Reinforcing not shown for clarity.



**SECTION A-A**

**OPTIONAL DRAIN DETAILS (7)**

Showing RAISED SIDEWALK WITH DRAIN SLOT  
Slab reinforcing not shown for clarity.

- 1) Provide broom finish to top of bridge slab where raised sidewalk or raised median area is defined.
- 2) 3-0" Min at Deck Expansion Joints, Deck Construction Joints or Controlled Joints, Rail Intermediate Wall Joints or from Face of Substructure.
- 3) For rail Type CIW, center drain slots between posts.
- 4) Steel trowel top surface of bridge deck in drain locations.
- 5) Provide sidewalk drains where shown elsewhere on the plans for use on bridge deck, sidewalks, or sidewalks of railroad tracks, lower roadways, or sidewalks. Place Drain and Cover Plate perpendicular to toe of rail.
- 6) Drain Cover Plate (PL 3/8" x 18 1/2" Slip Resistant Steel Plate). Install flush with top of sidewalk.

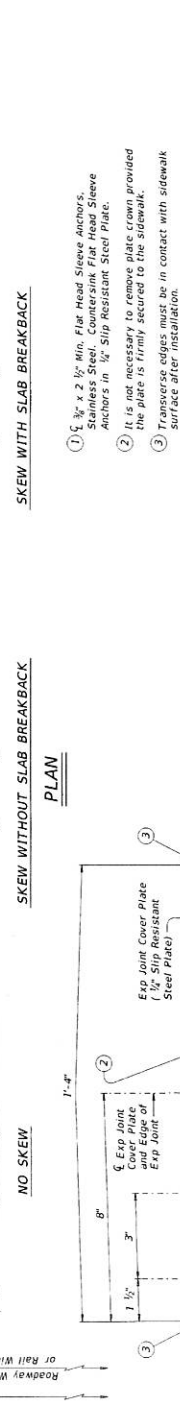
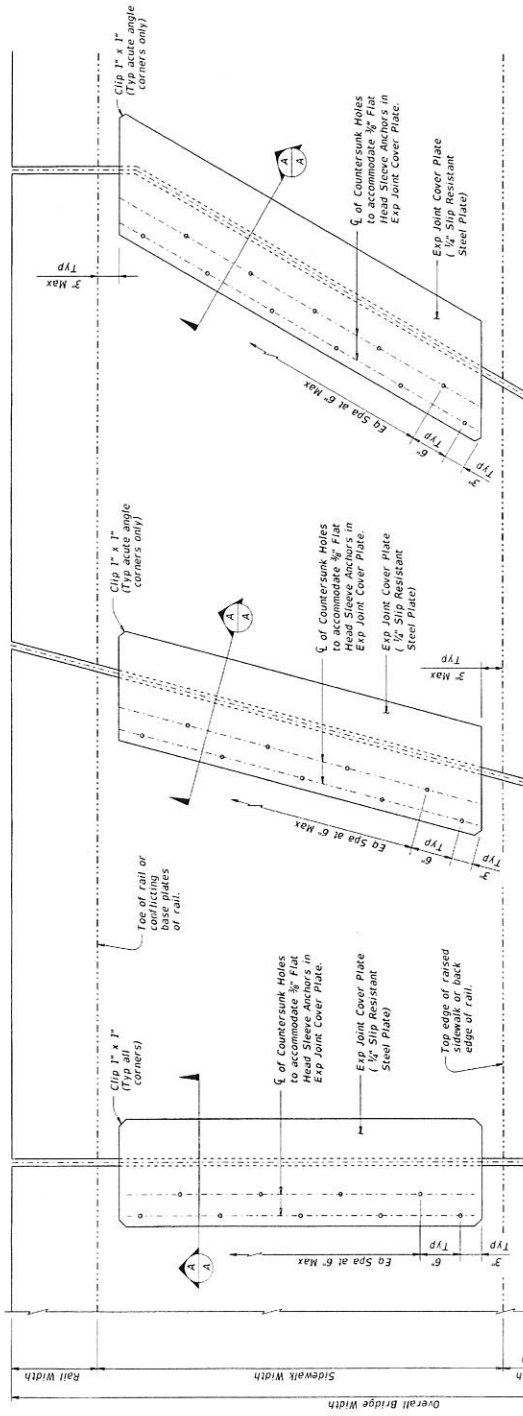
SHEET 2 OF 2

Texas Department of Transportation  
BRIDGE RAISED SIDEWALK AND MEDIAN DETAILS

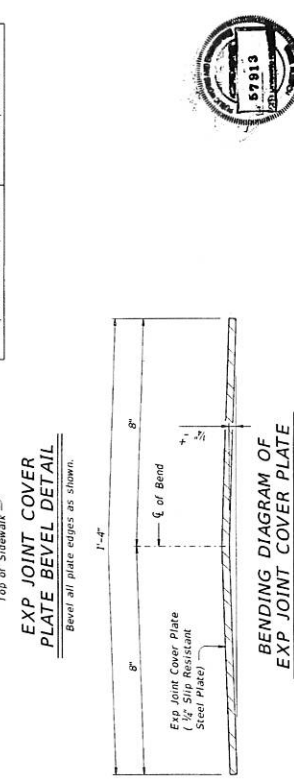
BRSM

FILE: BRSM201301	REV: 001	DATE: JAN 2013	BY: JER	CHK: JER	APP: JER	DATE: JAN 2013	SHEET NO: 41
PROJECT: BRSM201301				COUNTY: TARRANT		SHEET NO: 41	





APPROVED SLIP RESISTANT PLATE	
Product	Manufacturer Website
Metallic #3 Steel	<a href="http://www.barscoinc.com">www.barscoinc.com</a>
Aluminum Steel	<a href="http://www.alupro.com">www.alupro.com</a>
SlipA001 Grade 2 Steel	<a href="http://www.slipmat.com">www.slipmat.com</a>



**FABRICATION NOTES:**  
 1. Fabrication of Skew Expansion Joint Cover Plate will not require the Engineer's approval if fabrication is in accordance with the details shown on this drawing.  
 2. A Bridge Sidewalk Expansion Joint Cover Plate Layout which identifies location side of sleeve sections must be developed by the fabricator. Mark each steel section in accordance with the Bridge Sidewalk Expansion Joint Cover Plate Expansion Joint Cover Plate Layout to be provided to the Engineer.  
 3. Expansion joint cover plates must be not-dipped galvanized 1/2" slip resistant steel plate. Checker plate or diamond plate is not allowed nor are slip resistant tapes, films and Minimum required yield strength of steel plate is 36 ksi.  
 4. Expansion joint cover plates shall be after fabrication in accordance with Item 445, "Galvanizing".  
 5. Provide stainless steel flat head sleeve anchors in accordance with Item F 593, Group 1, Allow 304. Countersink holes in slip-resistant plate for sleeve anchors. Drill holes in the slip-resistant plate in accordance with manufacturer's recommendations. Initial sleeve anchors flush with, or slightly recessed below, top surface of sidewalk expansion joint cover plate.  
**GENERAL NOTES:**  
 1. Expansion joint cover plates can only accommodate up to a 1/2" maximum expansion joint. Details provided are applicable to concrete roadway surfaces only.  
 2. Expansion joint cover plates must be by the pound of "Structural Steel (Misc Non-Bridge)" as per Item 442, "Metal for Steel".  
 3. Estimated weight of one sidewalk expansion joint cover plate is 14 plf.

*[Signature]*  
 7/20/17

Texas Department of Transportation  
 Bridge Division  
 Standard

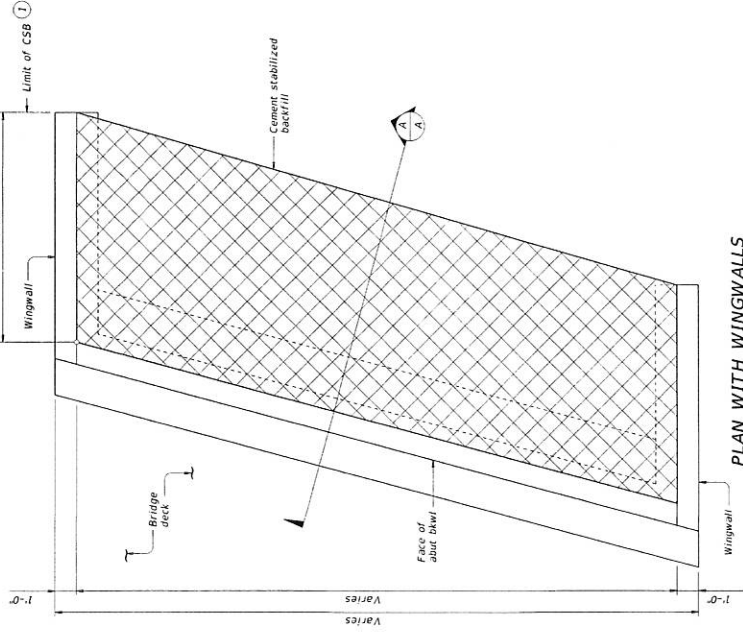
**BRIDGE SIDEWALK EXPANSION JOINT COVER PLATE (ALL SKEWS)**

BS-EJCP

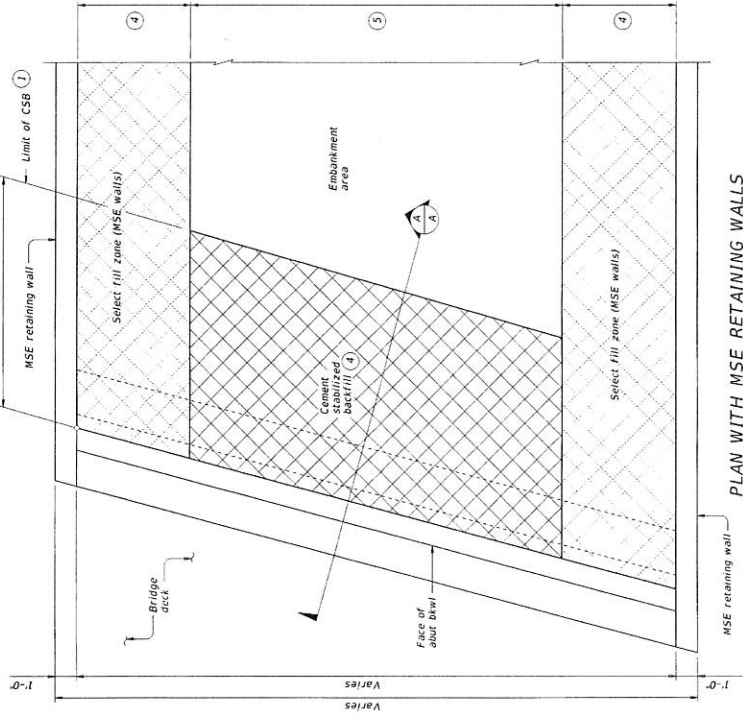
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 DESIGNED: JMM  
 PROJECT: 14007  
 SHEET NO: 42



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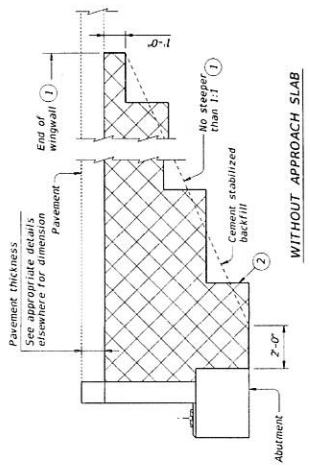
**PLAN WITH WINGWALLS**  
Cast-in-place retaining walls similar.



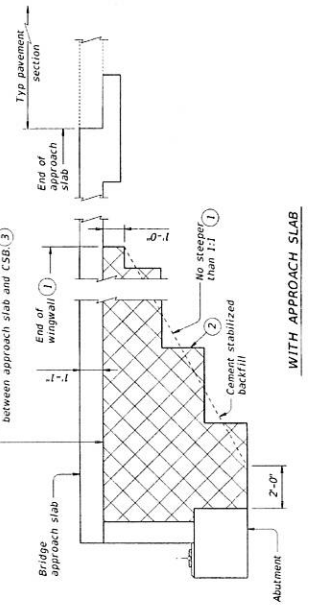
**PLAN WITH MSE RETAINING WALLS**

- 1) Usual limit of Cement Stabilized Backfill is at end of wingwall. Extend CSB limits steeper than 1:1 at bottom of backfill.
- 2) Bench backfill as shown with 12" (approximate) bench depths.
- 3) Other materials can be used as a bond breaker if permitted by the Engineer. Layers of 2" to 4" of roofing felt or 2 layers of 2" of polyethylene sheathing are examples.
- 4) Where MSE retaining walls are present, and just CSB limits to accommodate the select fill zone. See retaining wall details for additional information.
- 5) When distance between select fill zones is less than 5'-0". MSE select fill may be used with approval from the Engineer.

**GENERAL NOTES:**  
Provide Cement Stabilized Backfill (CSB) meeting the requirements of Item 400, "Excavation and Backfill for Structures", to the limits shown in Details. Details are drawn showing left forward skew. See Bridge Layout for actual skew direction. These details do not apply when Concrete Block Retaining walls are used in lieu of wingwalls.



**WITHOUT APPROACH SLAB**



**WITH APPROACH SLAB**



Texas Department of Transportation  
 Bridge Division  
 Standard

**CEMENT STABILIZED ABUTMENT BACKFILL BRIDGE ABUTMENT**

CSAB

FILE: CSABKLEBR	DATE: JANUARY 2015	BY: [Signature]	CHECK BY: [Signature]
PROJECT: [Blank]	CONTRACT: [Blank]	JOB: [Blank]	SECTION: [Blank]
COUNTY: [Blank]		SHEET NO.: 43	

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DATE: FILE:

### 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

### DRILLED SHAFT DETAILS

### DRILLED SHAFT SECTIONS

### ORIENTATION OF STEEL H-PILING

Pile Type	Embedment Depth (ft)
16" Sq Concrete 16" Sq Concrete HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP16 Steel	1'-6"

See standard CP for additional details on concrete pile embedment.

### VERTICAL PILING

### BATTERED PILING

### SECTION A-A

### SECTION B-B

### ELEVATION

### DETAIL "A"

(Showing Plan View of a 30° Skewed Abutment)

### SECTION THRU FLANGE OR WEB

### STEEL H-PILE SPICE DETAIL

### TABLE OF PILE EMBEDMENT

Pile Type	Embedment Depth (ft)
16" Sq Concrete 16" Sq Concrete HP16 Steel	1'-0"
20" Sq Concrete 24" Sq Concrete HP16 Steel	1'-6"

See standard CP for additional details on concrete pile embedment.

### DETAIL "A"

(Showing Plan View of a 30° Skewed Abutment)

### SECTION THRU FLANGE OR WEB

### STEEL H-PILE SPICE DETAIL

### DRILLED SHAFT DETAILS

### DRILLED SHAFT SECTIONS

### OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL

### DETAIL "A"

(Showing Plan View of a 30° Skewed Abutment)

### SECTION THRU FLANGE OR WEB

### STEEL H-PILE SPICE DETAIL

### DRILLED SHAFT DETAILS

### DRILLED SHAFT SECTIONS

### OPTIONAL INTERIOR BENT DRILLED SHAFT DETAIL

### DETAIL "A"

(Showing Plan View of a 30° Skewed Abutment)

### SECTION THRU FLANGE OR WEB

### STEEL H-PILE SPICE DETAIL

BRIDGE DIVISION  
Standard

## COMMON FOUNDATION DETAILS

FILE: 163000-0100  
DATE: JANUARY 2015  
REVISED: NONE

OK TBOI OK TBOI OK TBOI OK TBOI  
DATE: \_\_\_\_\_  
BY: \_\_\_\_\_  
CHECKED: \_\_\_\_\_  
DESIGNED: \_\_\_\_\_

FD  
SHEET NO. 44

7/24/17

SHEET 1 OF 2

**TABLE OF FOOTING QUANTITIES FOR 30" COLUMNS**

ONE 3 PILE FOOTING			
Bar No.	Size	Length	Weight
F1	#4	2'-2"	33
F2	#4	8'-2"	33
F3	#4	6'-11"	28
F4	#9	3'-2"	86
F5	#9	6'-11"	94
F6	#9	8'-2"	111
FC	#4	3'-6"	236
FD	#8	8'-6"	28
FD	#8	8'-6"	236
Reinforcing Steel			639
Class "C" Concrete			CY 4.8

ONE 4 PILE FOOTING			
Bar No.	Size	Length	Weight
F1	#4	7'-2"	96
F2	#8	7'-2"	306
FC	#4	3'-6"	37
FD	#8	8'-6"	236
Reinforcing Steel			675
Class "C" Concrete			CY 6.3

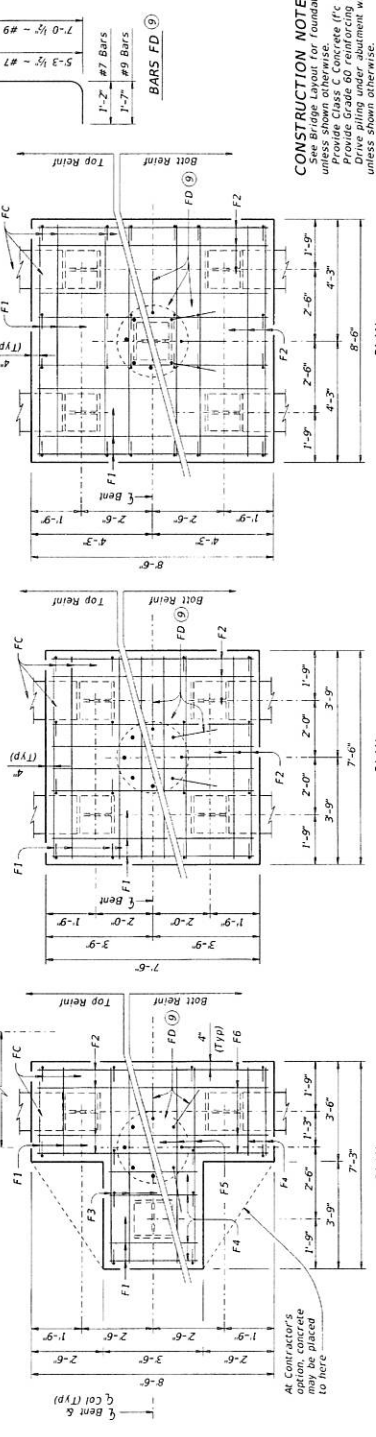
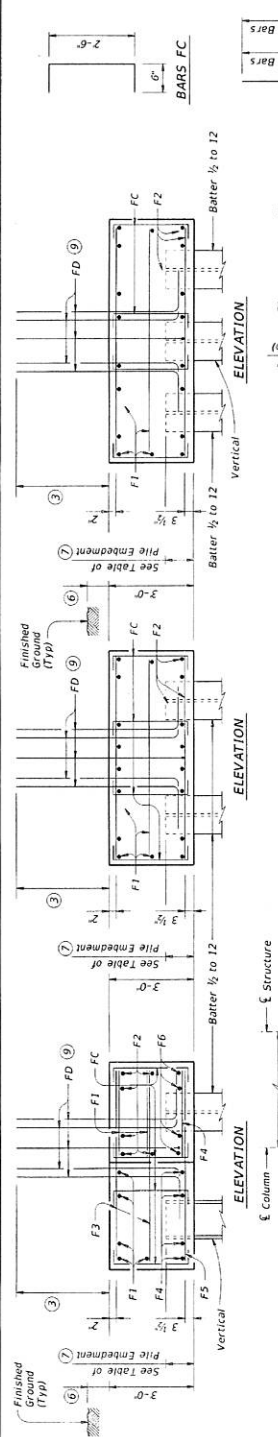
  

ONE 5 PILE FOOTING			
Bar No.	Size	Length	Weight
F1	#4	8'-2"	109
F2	#9	8'-2"	444
FC	#4	3'-6"	56
FD	#8	8'-6"	236
Reinforcing Steel			845
Class "C" Concrete			CY 8.0

**CONSTRUCTION NOTES:**  
 Use Bridge Layout for foundation type required. Use these foundation details unless otherwise noted.  
 Provide Class C Concrete (f'c = 3600 psi), unless shown otherwise.  
 Provide Grade 60 reinforcing steel.  
 Maximum allowable pile loads to a minimum resistance of 10 Tons/Pile unless shown otherwise.

**GENERAL NOTES:**  
 Designed according to AASHTO LRFD Specifications.  
 Clear dimensions are clear dimensions, unless noted otherwise.  
 Reinforcing bar dimensions shown are bar-to-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 Drilled Shaft details 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:  
 80 Tons/Pile with 30" Dia Columns  
 100 Tons/Pile with 36" Dia Columns  
 120 Tons/Pile with 42" Dia Columns



**THREE PILE FOOTING** (B)  
 For 36" Dia and smaller columns.

**FOUR PILE FOOTING** (B)  
 For 42" Dia and smaller columns.

**FIVE PILE FOOTING** (B)  
 For 42" Dia and smaller 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 number and size of the top of the bottom reinforcing mat.
- (10) For 36" 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 42" Columns, use #7 FD bars (6-6') in place of #9 bars and deduct 130 lbs.  
 For 42" Columns, add 2 FD bars (59 lbs).  
 (42" Columns disallowed on 3 Pile Footings)

SHEET 2 OF 2

Texas Department of Transportation  
 Bridge Division  
 Standard

**COMMON FOUNDATION DETAILS**

FD

FILE: 1604001.00  
 DATE: JANUARY 2013  
 REVISIONS:

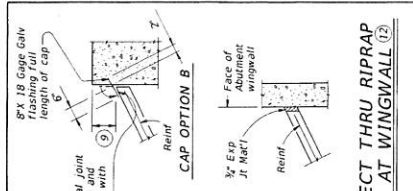
DATE: \_\_\_\_\_ FILE: \_\_\_\_\_ SHEET NO: 45



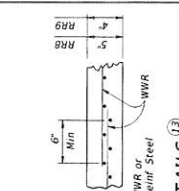
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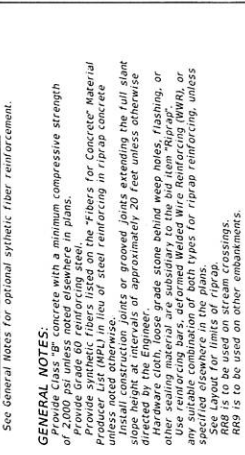


**SECT THRU RIPRAP AT WINGWALL (12)**



**SECTIONS THRU RIPRAP AT CAP (11)**

**REINFORCEMENT DETAILS (13)**

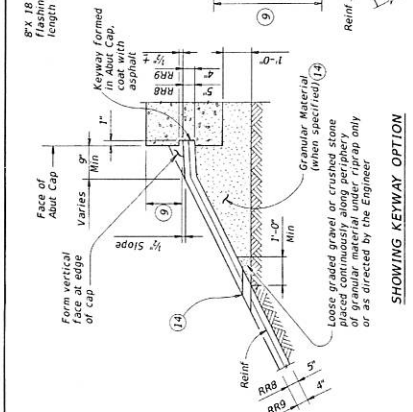


**GENERAL NOTES:**  
 Provide concrete with a minimum compressive strength of 2,000 psi unless noted elsewhere in plans.  
 Provide Grade 60 reinforcing steel.  
 Provide 1/2" Dia x 3/4" Galv. Anchor Screw at 12" c-c.  
 Use Producer List (PML) in lieu of steel reinforcing in riprap concrete unless noted otherwise.  
 Provide construction joints or grooved joints extending the full span of the riprap concrete.  
 Provide approximately 20 feet uncut concrete.  
 Provide a minimum 1/2" Dia x 3/4" Galv. Anchor Screw at 12" c-c.  
 Use reinforcement bars, deformed welded wire reinforcing (WWR), or any suitable combination of both types for riprap reinforcing, unless otherwise specified in plans.  
 See Contractor Limits of Plans.  
 RRR is to be used on stream crossings.  
 RR9 is to be used on other embankments.

**Texas Department of Transportation**  
**BRIDGE DIVISION**  
**STANDARD**

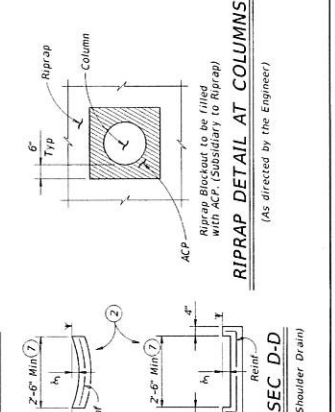
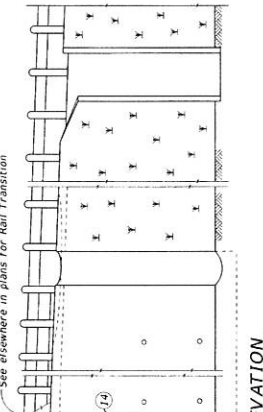
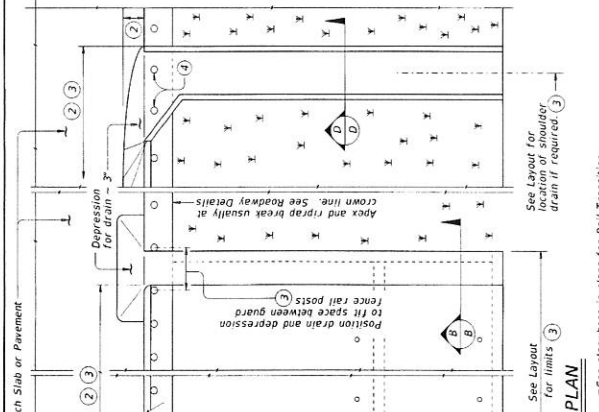
**CONCRETE RIPRAP AND SHOULDER DRAINS EMBANKMENTS AT BRIDGE ENDS (TYPES RR8 & RR9)**

FILE: CCR-030-010  
 DATE: JANUARY 2015  
 SHEET: 47



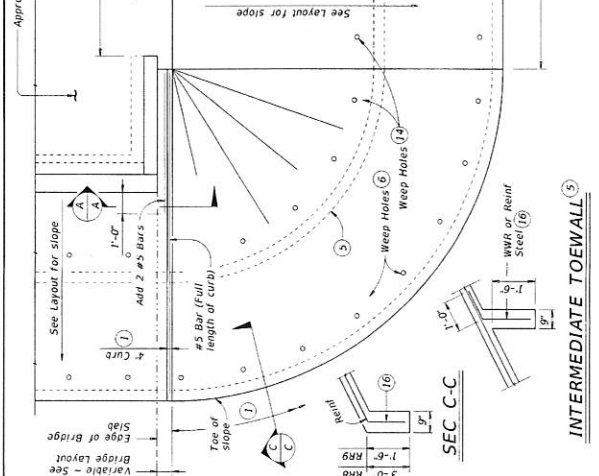
**SHOWING KEYWAY OPTION**

- When riprap is shown extending around header on layout, extend slab and toewall as shown and eliminate 4" curb.
- Limits and configuration of drains and depressions are as shown elsewhere in plans or as directed by the Engineer.
- 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.
- See details elsewhere in plans for installation of guard fence posts through concrete riprap.
- Provide intermediate toewall only when designated elsewhere in the plans or included in the specifications.
- Provide lower level of 2" Dia weep holes at 10' c-c backed by 1 LCF packet of gravel and galvanized hardware cloth at all locations unless directed by the Engineer to eliminate.
- Use water or other drain configurations if shown elsewhere in plans or if directed by the Engineer.
- Wall extension may be reduced or modified if approved by the Engineer. Increase wall extension to 1'-0" whenever the optional intermediate toewall is called for in the plans.
- Top of cap to top of riprap dimension varies as directed by the Engineer. Should be 5" Min for beam/slab type bridges and 1'-0" for slab span, box beam, or slab beam bridges.
- #5 bars shown are required even when synthetic fiber reinforcing option is selected.
- Provide sealing option for joint between the face of cap and riprap as designated by the Engineer or as shown elsewhere in plans.
- Flashing (shown in Cap Option A) may be used at wingwall in addition to Exp Jt. Malt if shown on plans or directed by the Engineer.
- Provide #3 reinforcing bars at 18" Spc c-c. Provide Welded Wire Reinforcing (WWR) in riprap concrete. Use lap splices of a minimum 6 inches, measured from the transverse wire of WWR, and the ends of reinforcing bars.
- If granular material is specified, provide upper level of 2" Dia weep holes at 10' c-c backed by galvanized hardware cloth.
- 8" x 18 Gage Galv Sheet Metal
- Provide WWR or #3 bars, with 1'-0" extension into slope.

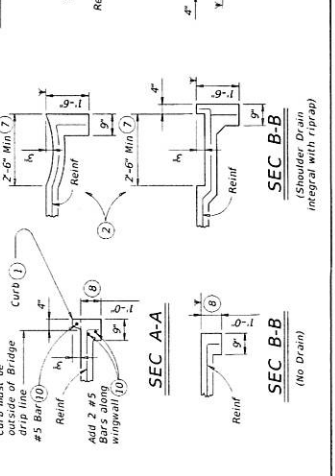
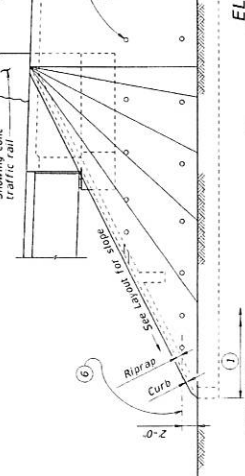


**RIPRAP DETAIL AT COLUMNS**

(As directed by the Engineer)



**INTERMEDIATE TOEWALL (5)**



**SEC D-D**

(Shoulder Drain)

**SEC B-B**

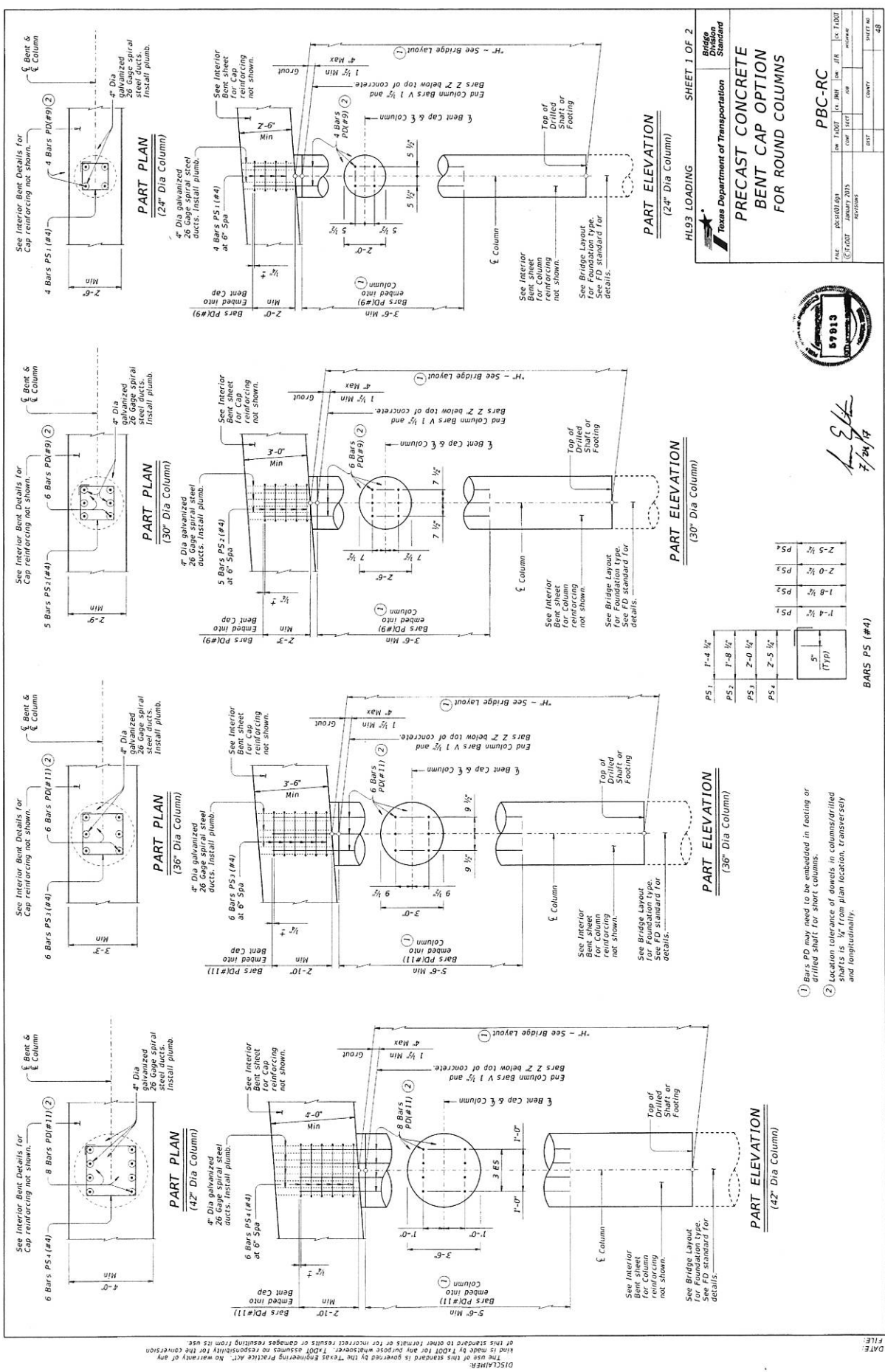
(Shoulder Drain integral with riprap)

**SEC A-A**

(No Drain)

DATE: \_\_\_\_\_ FILE: \_\_\_\_\_

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**Bridge Design Standard**  
**Texas Department of Transportation**

**PRECAST CONCRETE BENT CAP OPTION FOR ROUND COLUMNS**

**PBC-RC**

FILE: PBC-RC-0101 (Rev. 01/14) DATE: 01/14/14  
 PROJECT: COUNTY: DIST: SHEET NO: 48



**BARS PS (#4)**

PS1	1-4 1/2"
PS2	1-8 1/2"
PS3	2-0 1/2"
PS4	2-5 1/2"

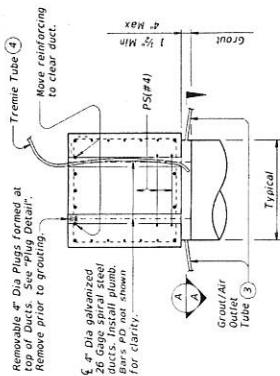
  

PS1	1-4 1/2"
PS2	2-0 1/2"
PS3	1-8 1/2"
PS4	2-5 1/2"

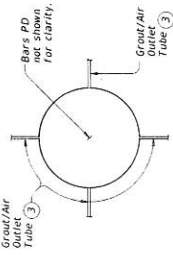
- 1) Bars PD may need to be embedded in footing or drilled shaft for short columns.
- 2) Location tolerance of dowels in columns/drilled shaft from plan location, transverse and longitudinally.

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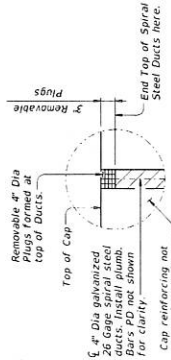
DATE: \_\_\_\_\_  
 FILE: \_\_\_\_\_



**TYPICAL SECTION THRU CAP**  
(Showing Example of Ducts and Cap Reinforcing)



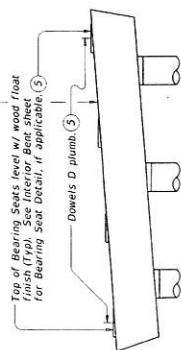
**SECTION A-A**



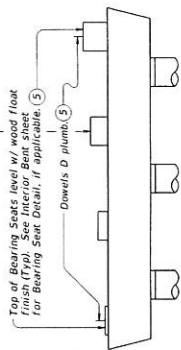
**PLUG DETAIL**

(To keep concrete out of ducts during concrete placement, remove prior to grouting)

Slope top of cap between bearing seats in accordance with Item 420.4.9 "Treatment and Finishing of Horizontal Surfaces", unless directed otherwise by the Engineer.



**EXAMPLES OF PRECAST BENTS WITH DOWELS D**



Provide bearing seats over 3" full and slope top of cap between bearing seats in accordance with Item 420.4.9 "Treatment and Finishing of Horizontal Surfaces", unless directed otherwise by the Engineer.

**CONSTRUCTION NOTES:**

Make a trial batch of grout using the same material, equipment and personnel to be used for actual grouting operations and grout a connection free of voids. Field test the trial batch grout to the presence of the Engineer. This mock-up test must demonstrate the reliability of the Contractor's grouting procedures to provide a connection free of voids. Field test the trial batch grout to the presence of the Engineer. This mock-up test must demonstrate the reliability of the Contractor's grouting procedures to provide a connection free of voids. Field test the trial batch grout to the presence of the Engineer. This mock-up test must demonstrate the reliability of the Contractor's grouting procedures to provide a connection free of voids.

**MATERIAL NOTES:**

Provide a pre-qualified grout from TXDOT's Material Producer List conforming to DMS-4675. Crimped, corrugated duct of galvanized, cold-rolled steel conforming to ASTM A 653. Corruptions must have a minimum amplitude of 0.094".

**GENERAL NOTES:**

Designed in accordance with ASHTO LRFD Bridge Design Specifications. The Contractor has the option to provide precast bent caps in the field. If the Contractor uses precast caps, perform sampling and testing of grout by trained personnel at the Contractor's expense and while witness by the Engineer. Grouted connections must be free of voids. Indicate lifting attachments and locations on the shop drawings and cure cap in accordance with Item 420. "Concrete Substructures". Secure ducts to prevent their movement during concrete placement. Location tolerance of ducts is 1/4" from plan location, transversely and longitudinally. Seal ducts to prevent intrusion of water. Seal ducts with the cap. Bearing seats over 3" in height must be reinforced as per Item 420.4.9. Do not locate lift points at the top of the cap. Do not locate lift points at the top of the cap. Do not locate lift points at the top of the cap. Do not locate lift points at the top of the cap. Do not locate lift points at the top of the cap.

HL93 LOADING SHEET 2 OF 2

Bridge Design Standard

Texas Department of Transportation

PRECAST CONCRETE BENT CAP OPTION FOR ROUND COLUMNS

PBC-RC

FILE NO.	PROJECT NO.	SECTION NO.	DATE
100-1000-100	100-1000-100	100-1000-100	100-1000-100



*Handwritten signature and date: 7/24/17*

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**REVISIONS:**  
 A-1212-1-1988-1050 STAMPED 4-17-12 1971 SET  
 BY: [Signature] FOR THE CITY OF HOUSTON  
 APPROVED: [Signature] FOR THE CITY OF HOUSTON  
 DATE: 7/24/78

**RECORD DRAWING**  
 A COPY OF THIS DRAWING REFLECTS THE  
 LOCATION AND GRADE AND THAT THE  
 CONTRACTOR SHALL COMPLY WITH  
 THE CONTRACT REQUIREMENTS.

**FOR THE CITY OF HOUSTON**  
 ENGINEERING DEPARTMENT  
 APPROVED: [Signature]  
 DATE: 7/24/78

**PLAT NAME:**  
 WEST ALIANA TRACE DRIVE  
**OPC 101 FILE NO.**  
 G.O.H. LOG NO. 19-  
**ALIANA DEVELOPMENT  
 COMPANY**

**WEST ALIANA TRACE DRIVE BRIDGE**  
**WATER MAIN CONSTRUCTION DETAILS**

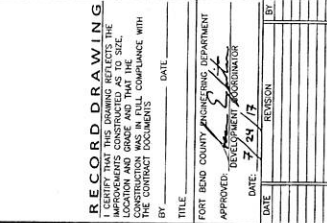
**FILE NO.**  
 (FOR CITY OF HOUSTON USE ONLY)

**DRAWING SCALE**  
 NONE

**SCALE**  
 NONE

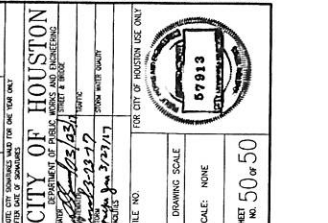
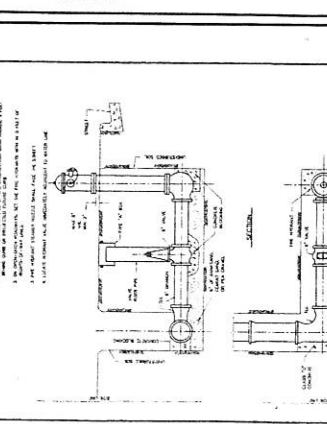
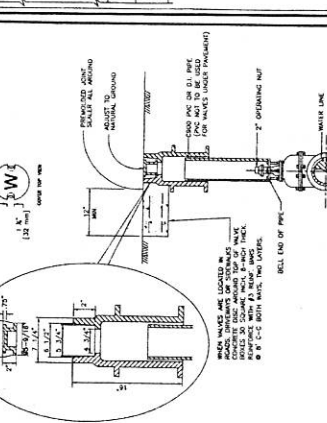
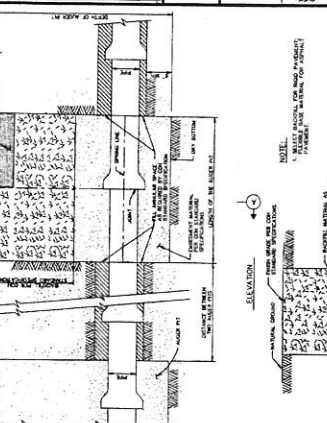
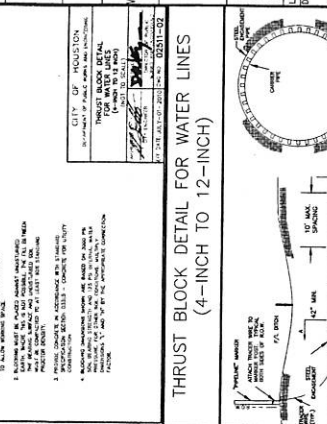
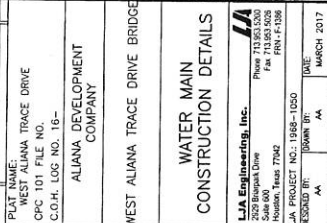
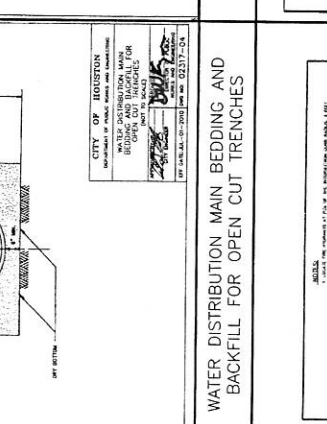
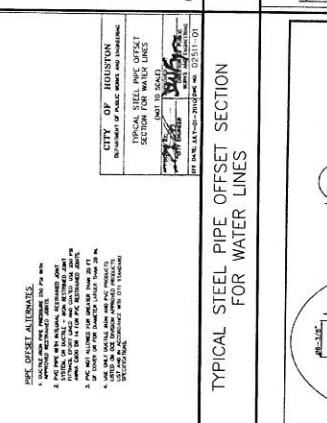
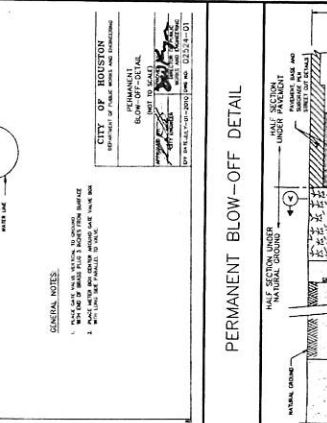
**SHEET NO.**  
 50 of 50

**DATE**  
 7/24/78



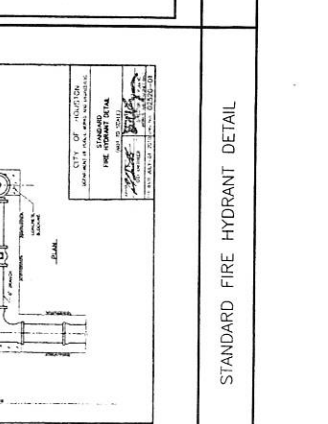
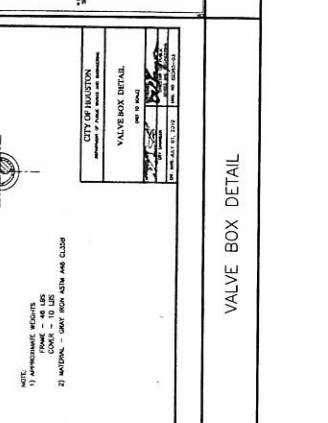
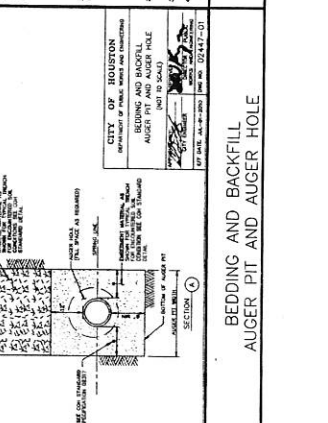
**MINIMUM BIDDING DIMENSIONS IN INCHES**

PIPE SIZE	NO. BANDS	AS BAND	1/2" GALV.	1/4" GALV.
4"	6	1/2"	1/2"	1/4"
6"	8	1/2"	1/2"	1/4"
8"	10	1/2"	1/2"	1/4"
10"	12	1/2"	1/2"	1/4"
12"	14	1/2"	1/2"	1/4"
14"	16	1/2"	1/2"	1/4"
16"	18	1/2"	1/2"	1/4"
18"	20	1/2"	1/2"	1/4"
20"	22	1/2"	1/2"	1/4"
24"	26	1/2"	1/2"	1/4"
30"	32	1/2"	1/2"	1/4"
36"	38	1/2"	1/2"	1/4"
42"	44	1/2"	1/2"	1/4"
48"	50	1/2"	1/2"	1/4"
54"	56	1/2"	1/2"	1/4"
60"	60	1/2"	1/2"	1/4"



**CONNECTION FACTORS**

SO. TYPE	STRENGTH	1" AND 1/4"	1/2"
SPR. CLAY	1500	1.5	1.5
SPR. CLAY	2000	2.0	2.0
SPR. CLAY	3000	3.0	3.0
SPR. CLAY	4000	4.0	4.0
SPR. CLAY	5000	5.0	5.0
MUD CLAY	5000	0.75	0.75
MUD CLAY	5000	0.58	0.58



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