Standard Bridges

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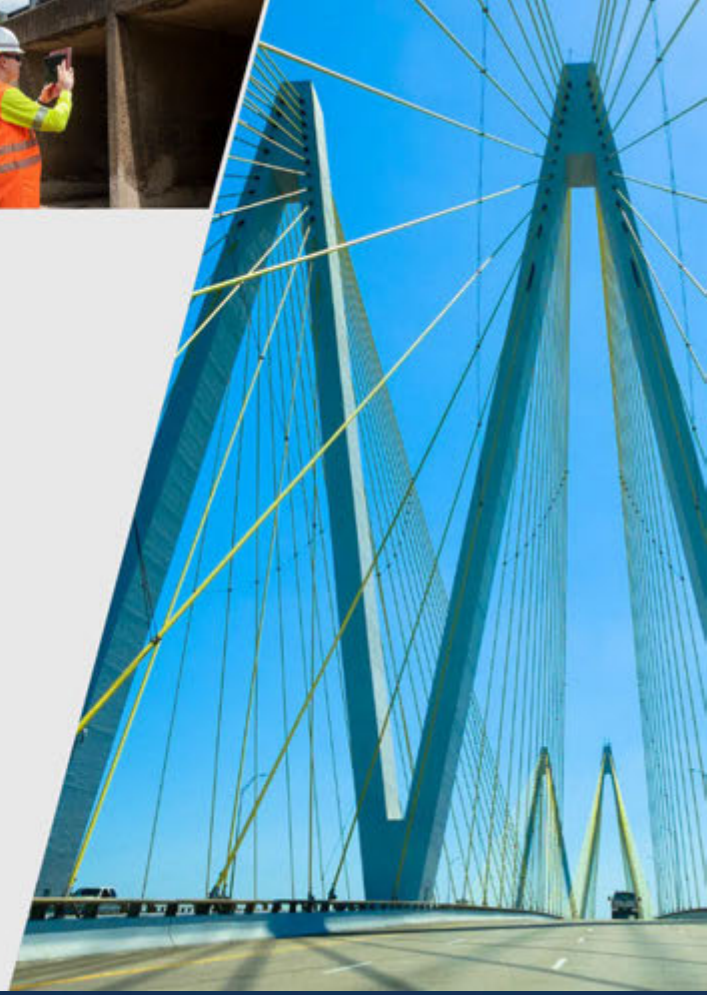
TxDOT – Bridge Division



January 25, 2024

Table of contents

What is a Standard Drawing

Per TxDOT PS&E manual, Section 2, Standard Drawing Reliability,

Plan sheets of TxDOT standard drawings are considered a product of the company which have evolved and been **developed by many people over a considerable number of years**, and the details shown on the drawings have **proven to be reliable** through their years of use.

- Two kinds of standard
  - **Statewide** Standard Drawings
  - **District** Standard Drawings
- There are working drawing now on the Standards Website for **bridge repairs**.
- TxDOT Bridge Division currently maintains:
  - **801 standards** (1268 sheets)

Standard Drawings

- Statewide Standard Drawing - Drawings are not considered to be an available standard until they are **issued via the TxDOT internet site**. The original version is kept on file in the Bridge Design Section of the Bridge Division. The electronic file of this original is available here on TxDOT's Internet web site. Any **reproducible** copies made from the electronic file may be **used in plan sets** and are **not required to be signed or sealed**.

- Modified Standard Drawing - **Any change, however minor**, to a standard drawing for use in a specific project, must be briefly described and dated in the revision block of the plan sheet. This sheet **must be signed and sealed** by the engineer of record. Additionally, the designation **"(MOD)"** must be placed after the standard name inside the **title block.**

- District Standard Drawing - Any drawings used regularly within a district that were developed by that district, or statewide standards that are revised to fit the individual needs of that district, may be considered a district standard. Each district must identify their standards by including the district name in the title block. **Only the issuing district** may use this drawing as a standard **without signing and sealing**.

Per the Bridge Detailing Guide: Chapter 2, Section 3 (https://ftp.txdot.gov/pub/txdot-info/brg/design/bridge-detailing-guide.pdf)

Bridge Division Standard Drawings

- **Designed for HL93 live load** in accordance with **AASHTO** LRFD Bridge Design Specifications
- Superstructure types
- Various beam sizes
- **Various Roadway widths** available (e.g., 24, 28, 30, 32, 34, 38, 40, and 44-ft)
- Various **skew** angle (e.g., 0, 15, 30, and 45-degree)
- **Span lengths** of 40 ft. through 135 ft. in 5 ft. increments (Not all girder types accommodate all span lengths)
- Roadway surface is a **cast-in-place** concrete **slab**
  - varies by superstructure type(e.g., 8 ½ -in. Tx-Girder)
- Most standard rail types

Types of Standard Bridges

SUPERSTRUCTURE	BEAM SIZE	SKEW	ROADWAY WIDTH
Prestressed I-Girders	Tx28, Tx34, Tx40, Tx46, Tx54, Tx62,	0˚, 15˚,30˚, or 45˚	24’, 28’, 30’, 32’, 34’, 38’, 40’, 44’
Prestressed Box Beams	4B20, 5B20, 4B28, 5B28, 4B34, 5B34, 4B40, 5B40	0˚	24’, 28’, 30’
Prestressed Slab Beams	4SB12, 4SB15, 5SB12, 5SB15,	0˚, 15˚, or 30˚	24’, 28’, 30’
Cast in Place Concrete Slab Span	Unit (25’), Unit(25’-25’), Unit(25.5’-25.5’), Unit(25’-25’-25’), Unit(25.5’-25.5’-25.5’), Unit(25’-30-25’), Unit(25.5’-30.5’-25.5’)	0˚, 15˚, or 30˚	24’, 28’, 30’, 38’, 44’
Concrete Slab and Girder (Pan Form)	CG-30’4”-24', CG-40'-24'	0˚, 14˚2’,26˚34’, 36˚52’, or 45˚	24’
Prestressed Decked Slab Beams	6DS20, 7DS20, 8DS20, 6DS23, 7DS23, 8DS23	0˚, 15˚, or 30˚	24’, 28’, 30’
Prestressed X-Beams	5XB20, 5XB28, 5XB34, 5XB40	0˚, 15˚, or 30˚	32’, 38’, 40’, 44’
Steel Beams	Varies (W18x130 thru W40x149)	0˚, 15˚, or 30˚	24’, 28’, 30’

Bridge Division Standard Drawings

- **Details** are provided to construct **2 or 3 span units** with slabs continuous over interior bents
  - **reducing** the number of **expansion joints**
- Details for Abutment **header slopes** of **2:1 and 3:1**
- Drawings support these **foundation** options:
  - Drilled shafts (36-and 42-in)
  - Multi-pile footings
  - Prestressed concrete piling (18-,20-,24-in)
  - Steel H-piling (HP 14x117 and HP 18x135)

Restrictions – BRG Standard Drawings

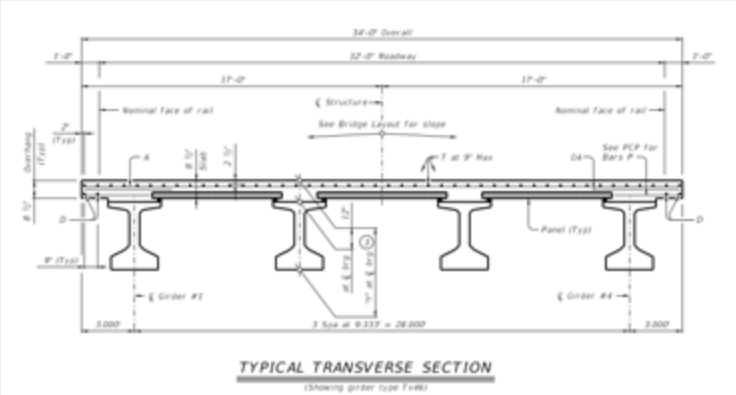
- Do not **change girder type within a bridge**
  - (for example, Tx28 to Tx40)
- **Do not change skew angle** within a bridge
- **Maximum allowed column height**, allowed exposed pile height, and maximum allowed pile loads are **listed on bent details**
- **Do not use rail:** T66, T80HT, T80SS, C412, C66, or T224
  - Their **width or weight precludes** their use on standard **roadway width** spans

Restrictions – BRG Standard Drawings

- The maximum number of **spans per unit is three**, and the **maximum unit length** cannot exceed the limits shown on standard drawing IGCS
  - based on applied unit length factor determined by roadway grade
- Some unit lengths are too great to use sealed or open armor joints and Type A joints
- Do not use single-sided crash cushions (see Design Division standard drawing SSCC-16) with abutment **wingwalls lengths less than 7 ft**
- Drawings do not accommodate raised sidewalks and medians or rails not on edge of slab If adding a raised sidewalk, median or rail, check standard drawing for additional loading

What is a Standard Bridge?

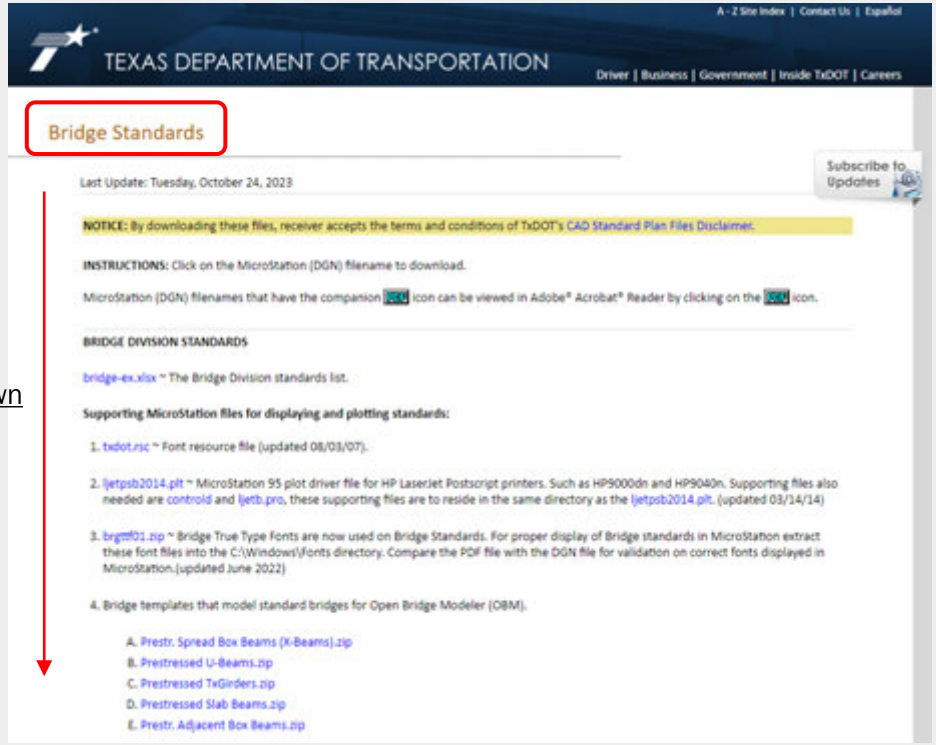
- A standard bridge is a bridge were **plan sheets** are comprised of **non-modified Bridge TxDOT standard drawings.** These Bridge TxDOT standards are selected by:
  - Superstructure Type
  - Roadway width
  - Girder size
  - Skew angle
- Bridge Layout
- Summary Estimated Quantities



- More info on Standard Bridge criteria in standard bridge guide per superstructure

https://ftp.dot.state.tx.us/pub/txdot-info/cmd/cserve/standard/bridge/guideste.pdf

Bridge Standards Website



Scroll-down

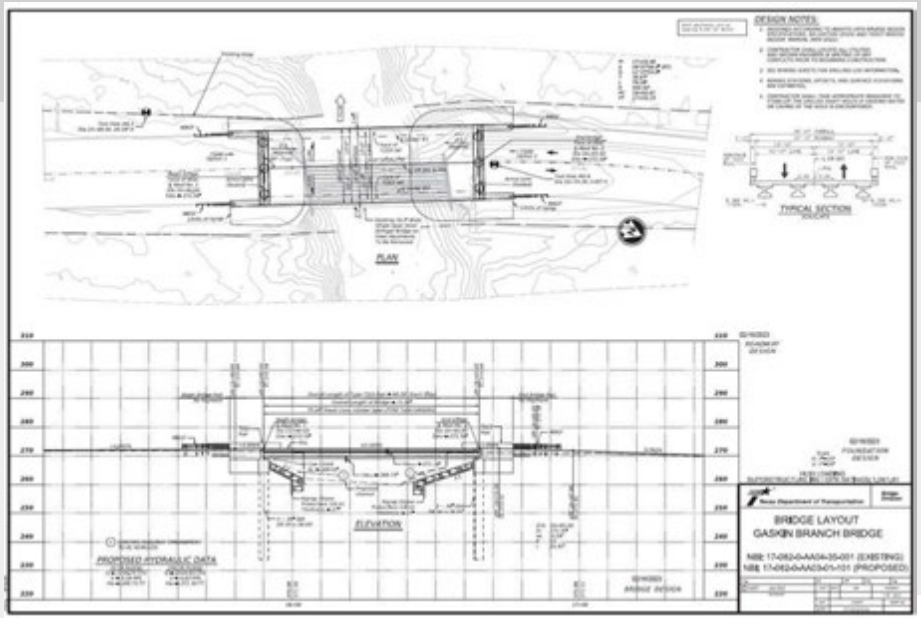
- Standard Drawing
- OBM Standard Templates
- Memorandums
- Guide to Bridge Standard Drawings
- Standard Bridge Spreadsheet

https://www.dot.state.tx.us/insdtdot/orgchart/cmd/cserve/standard/bridge-e.htm#PRESTRESSEDCONCRETEI-GIRDERS

Standards Spreadsheet

Information Needed:

- **Alignment** Info
  - Vertical
- **Cross slope**
  - Crown
  - Full Superelevation
  - Transitioning slope
- Preliminary **Bridge Layout**



954+59.000 R1	0.020	Normal Crown
955+40.000 R1	0.054	Full Super
980+31.000 R1	0.054	Full Super
981+13.000 R1	0.020	Normal Crown
1021+70.000 R1	0.020	Normal Crown
1023+45.000 R1	-0.053	Full Super
1063+30.000 R1	-0.053	Full Super
1065+06.000 R1	0.020	Normal Crown
1110+37.093 R1	0.020	Full Super
1110+48.613 R1	0.020	Normal Crown

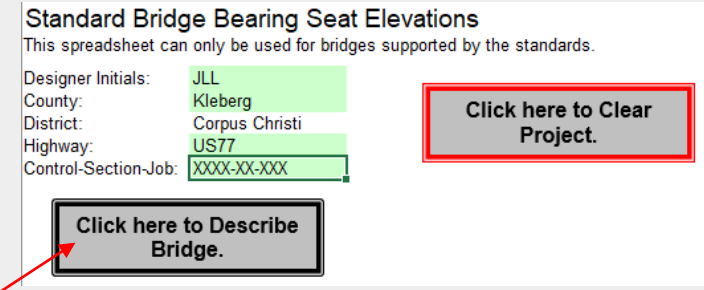
	STATION	ELEVATION
START	1123+00.0000 R1	39.0574
VPC	1125+28.2194 R1	39.8423
Tangent Grade:	0.0034	
Tangent Length:	228.2194	
VPC	1125+28.2194 R1	39.8423
VPI	1126+10.7194 R1	40.1261
VPT	1126+93.2194 R1	39.5898
VHP	1125+85.3167 R1	39.9405
Length:	165.0000	
Entrance Grade:	0.0034	
Exit Grade:	-0.0065	
K Value =:	166.0041	
Middle Ordinate (E):	-0.2050	

Standard Bridge Spreadsheet - 101

Steps:

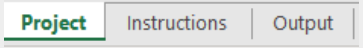
1. **Describe the project** being designed
   - Designer's Initials (up to 5 characters)
   - County
     - District: automatically found based on the County
   - Highway: (up to 10 characters)
   - C-S-J: typed input in the form “XXXX-XX-XXX“

2. Click on the "Click Here to **Describe Bridge**" Button



Note:

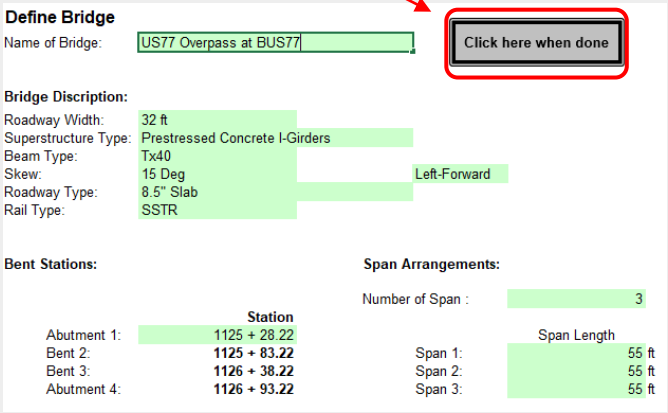
- Green cell require input
- Macros must be enabled on the spreadsheet
- Instructions found on spreadsheet



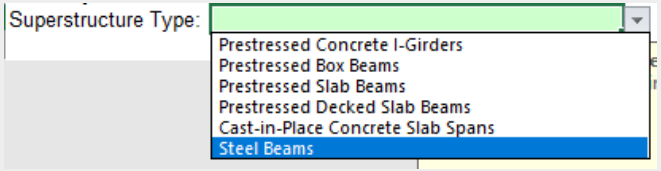
Standard Bridge Spreadsheet - 101

3. **Describe the bridge** being designed
   - Name of Bridge
   - Roadway Width (32’ roadway – prestressed concrete I-girders)
   - Superstructure Type Beam
   - Skew - Skew Direction
     - "Left-Forward" is a skew to the left end of a bent or abutment is up-station
     - "Right-Forward" is a skew to the right end of a bent or abutment is up-station
   - Roadway Type (TYP 8.5” slab thickness)
   - Rail Type
   - Number of Spans/Units
   - Stationing
     - Input only the station of Abutment 1 bents will be calculated based on the span lengths

Step 4. Click here when completed

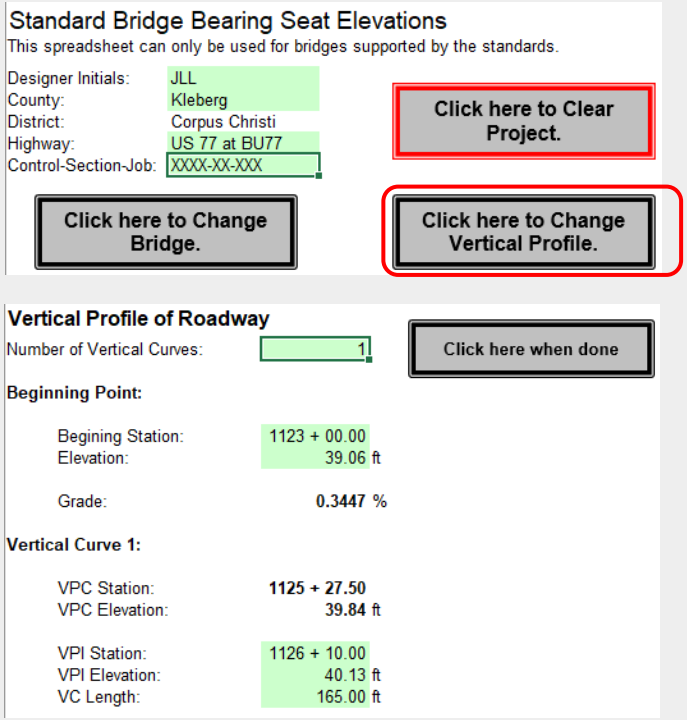


(Sample Input data for demonstration purposes only)



Standard Bridge Spreadsheet - 101

6. Describe the vertical profile of the roadway (input):
   - **Number of Vertical Curves:** (value can only be changed if the standards allow a vertical curve with the selected superstructure type)
   - **Beginning station:** The station down-station of the first abutment of the bridge. It must be before the beginning of the first vertical curve (VPC), if a vertical curve is defined
   - **Ending Station:** The station up-station of the last abutment of the bridge. It must be after the end of the last vertical curve (VPT)
   - **Elevations** (elevation of the Profile Grade Line (PGL) at the Station given
   - **VPI Station**
   - **VPI Elevations:** This is the elevation of the VPI at the PGL



(Sample Input data for demonstration purposes only)

Standard Bridge Spreadsheet - 101

6. Auto-populates:
   - **VPC/VPT Station**: the station at the Point of Tangency at the beginning of the VC (VPC) or ending of the VC (VPT)
   - **VPC/VPT Elevation**: Elevation of the PGL at the VPC or VPT
   - VC Length: Vertical **curve length** (only supports the use of symmetric parabolic vertical curves)

Step 7. Click here when completed

Vertical Profile of Roadway

Number of Vertical Curves: 1

Click here when done

Beginning Point:

Begining Station:	1123 + 00.00
Elevation:	39.06 ft
Grade:	0.3447 %

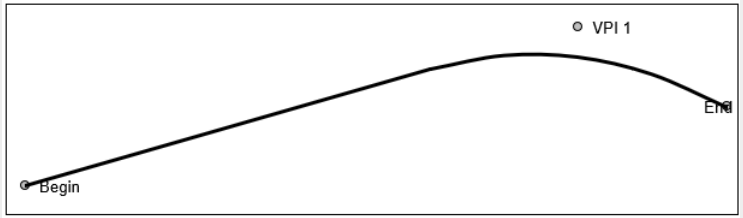
Vertical Curve 1:

VPC Station:	1125 + 27.50
VPC Elevation:	39.84 ft
VPI Station:	1126 + 10.00
VPI Elevation:	40.13 ft
VC Length:	165.00 ft
Ext:	-0.2040 ft
K:	167
VPT Station:	1126 + 92.50
VPT Elevation:	39.59 ft
Grade:	-0.6444 %

Ending Point:

Ending Station:	1126 + 93.22
Elevation:	39.59 ft

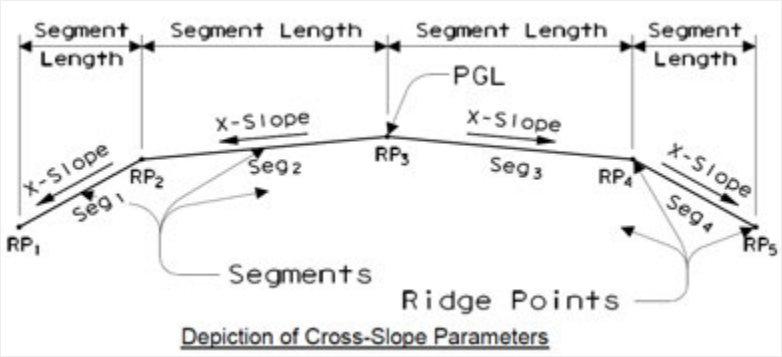
(Sample Input data for demonstration purposes only)



Note: Station input can be either numerically (1234.56) or station format (12+34.56)

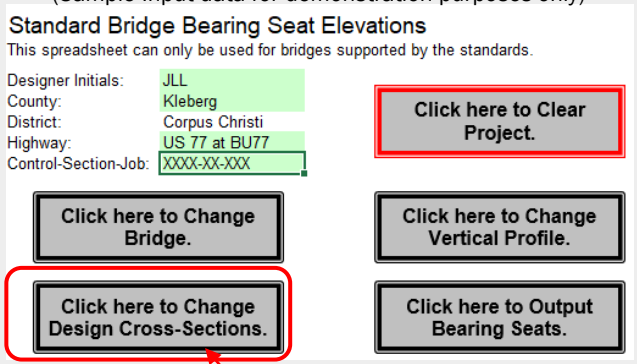
Standard Bridge Spreadsheet - 101

8. On the "Project" page, click on the "Click here to Describe Design Cross-Sections" Button
9. Describe the roadway template on the "X-Section" page
   - Number of Typical Sections : cross-slope transition allowed with certain superstructure types
   - View Cross-Section Number : picture at the top right of the page shows the corresponding cross-section



Depiction of Cross-Slope Parameters

(Sample Input data for demonstration purposes only)



Step 8. Click here when completed

Standard Bridge Spreadsheet - 101

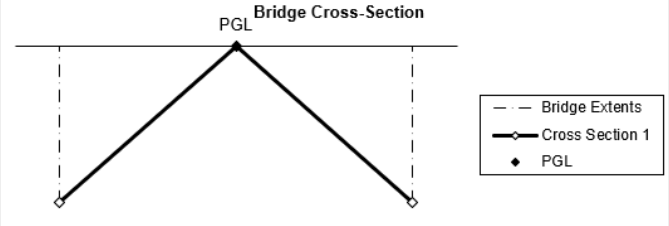
- Number of Segments : (there must be at least one segment on either side of the PGL)
- Ridge Point at PGL : designation of the point at PGL, point numbers increase from left to right. Point 1 is the point on the left side of the segment on the far left of the cross-section
- **Distance from PGL to CL Bridge:** measured transversely from the PGL, **CL positive to the right and negative to the left of the PGL (feet)**
- Length of Each Segment: in feet, measured in plan-view in the transverse direction
  - The length of the segments on either side of the PGL must extends to or beyond the left and right edges of the bridge
- Cross-Slope : in percent, **down away from the PGL are positive, and up away from the PGL are negative**

Design Cross-Sections of Roadway

Number of Typical Sections	1	
View Cross-Section Number:	1	
Describe Cross-Section Template:		
Number of Segments:	2	
Ridge point at PGL:	2	
Distance from PGL to CL Bridge:	0.00 ft	
Segment:	1	2
Length of each segment (ft):	17.00	17.00
Cross-Section 1:	Click here when done	
Segment:	1	2
Cross-Slope (%):	0.02	0.02

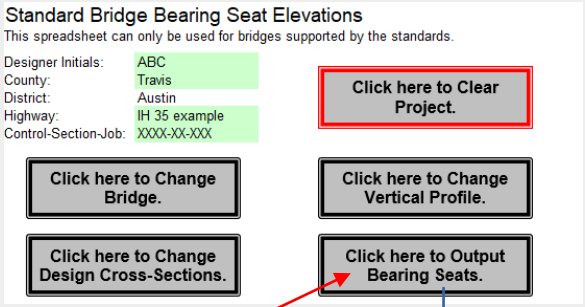
(Input data for demonstration purposes only)

Step 10. Click here when completed

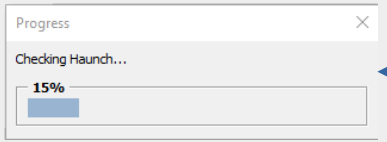


Standard Bridge Spreadsheet - 101

11. On the "Project" page, click on the "Click here to Output Bearing Seats" Button. Once the progress bar has disappeared, the program has finished running
12. Output as .txt file



Step 11. Click here for output



(Output file summary of input values)

```
                    TEXAS DEPARTMENT OF TRANSPORTATION                V 1.8
                       STANDARD BRIDGE SPREADSHEET                    April 2023

COUNTY - Kleberg          HIGHWAY - US 77 at B DESIGNER - JLL    1/10/2024 12:01 PM
CSJ - XXXX-XX-XXX         BRIDGE - US77 Overpass at BUS77
BrngSeat.txt


                          BRIDGE DESCRIPTION

     ROADWAY WIDTH:        32 FT
     SUPERSTRUCTURE TYPE:  Prestressed Concrete I-Girders
     BEAM TYPE:            Tx40
     SKEW:                 L 15 DEG F
     ROADWAY TYPE:         8.5" Slab
     RAIL TYPE:            SSTR

     NUMBER OF SPANS:      3

     BENT 1 STA: 1125+28.22       SPAN 1 LENGTH: 55 FT
     BENT 2 STA: 1125+83.22       SPAN 2 LENGTH: 55 FT
     BENT 3 STA: 1126+38.22       SPAN 3 LENGTH: 55 FT
     BENT 4 STA: 1126+93.22


                          ROADWAY PROFILE

     NUMBER OF VERTICAL CURVES = 1

     BEGINING POINT:
     STA. =       1123+00.00
     EL =         39.06 FT

     Grade =      0.3447%

     Vertical Curve 1:
     VPI STA. =   1126+10.00
     EL =         40.13 FT
     ex =         -0.20 FT
     K =          167
     L =          165.00 FT

     Grade =      -0.6444%

     ENDING POINT:
     STA. =       1126+93.22
     EL =         39.59 FT
```

```
                       ROADWAY CROSS-SECTIONS

  NUMBER OF TYPICAL SECTIONS =      1
  NUMBER OF SEGMENTS =              2
  RIDGE POINT AT PGL =              2
  DISTANCE FROM PGL TO CL BRIDGE = 0.00 FT

  Cross-Section 1:
  SEGMENT 1:   LENGTH = 17.00 FT @ SLOPE = 0.02% UR*
  PGL is at the junction of SEGMENT 1 and SEGMENT 2
  SEGMENT 2:   LENGTH = 17.00 FT @ SLOPE = 0.02% DR**

  *  UR: Up to the right
  ** DR: Down to the right


                          BRIDGE WIDTHS

  BRIDGE WIDTH =                          34.00 FT
  ROADWAY WIDTH =                         32.00 FT
  DISTANCE FROM PGL TO LEFT BRIDGE EDGE =  17.00 FT LEFT
  DISTANCE FROM PGL TO RIGHT BRIDGE EDGE = 17.00 FT RIGHT


                   BEGIN AND END BRIDGE ELEVATIONS

  BEGIN BRIDGE   STATION 1125+28.22     ELEVATION    39.84 FT
    END BRIDGE   STATION 1126+93.22     ELEVATION    39.59 FT


                          SECTION DEPTHS

 NOTE:

 NO CHANGE HAS BEEN MADE TO THE STANDARD SECTION DEPTHS.  THIS TABLE IS
 NOT REQUIRED IN THE PLAN SHEETS.

                    "X" at CL Brng      "Y" at CL Brng
                  (Top of Slab to      (Top of Slab to
                    Top of Beam)        Bottom of Beam)
  SPAN 1              1' - 0"              4' - 4"
  SPAN 2              1' - 0"              4' - 4"
  SPAN 3              1' - 0"              4' - 4"
```

Standard Bridge Spreadsheet - 101

Output file:

Verify:

- Input values
- Bearing Seat Elevations

(BrngSeat file direct import to Microstation for use on the plan sheets)

- Beam Slopes
- List of Standards
  - Bridge type details
  - Miscellaneous detail sheets

BEARING SEAT ELEVATIONS (FT)

	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
ABUT 1 (FWD)	35.294	35.288	35.280	35.270
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
BENT 2 (BK)	35.375	35.377	35.377	35.374
(FWD)	35.375	35.377	35.377	35.375
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
BENT 3 (BK)	35.282	35.292	35.300	35.305
(FWD)	35.275	35.285	35.293	35.299
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
ABUT 4 (BK)	35.007	35.025	35.041	35.055

BEAM SLOPES (FT/FT)

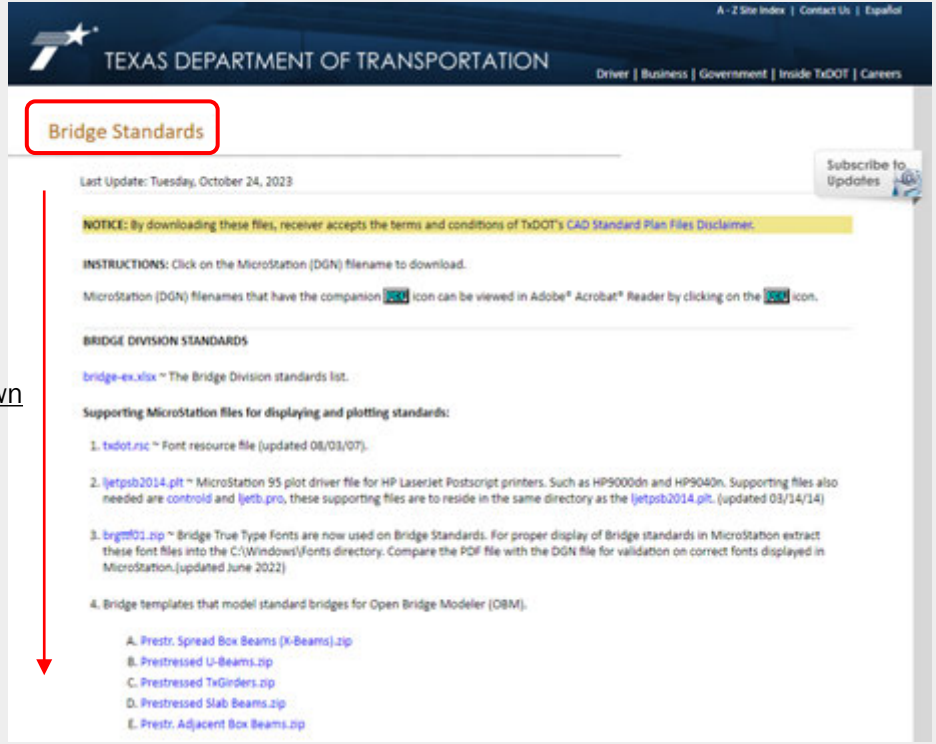
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
SPAN 1	0.0015	0.0017	0.0018	0.0020
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
SPAN 2	-0.0018	-0.0016	-0.0015	-0.0013
	GIRDER 1	GIRDER 2	GIRDER 3	GIRDER 4
SPAN 3	-0.0051	-0.0049	-0.0048	-0.0046

STANDARDS LIST

```
*************************************************************************
* The following list may not be entirely relevant nor all inclusive.    *
* Determine which other standards are needed and which standards        *
* included here are not required for your project.                      *
*************************************************************************

     AIG-32-15
     BIG-32-15      *Verify applicability
     BTIG-32-15     *Verify applicability
     SIG-32-15
     IGSD-32
     IGCS
     IGD
     IGEB
     IGFRP     *Verify applicability
     IGMS
     IGSK      *Verify applicability
     IGTS
     AJ        *Verify applicability
     BAS-A     *Verify applicability
     BAS-C     *Verify applicability
     BMCS      *Verify applicability
     CP        *Verify applicability
     CRR       *Verify applicability
     CSAB      *Verify applicability
     FD
     MEBR(C)
     NBIS
     PBC-P     *Verify applicability
     PPBC-RC   *Verify applicability
     PBC-RC    *Verify applicability
     SD-EBR
     PCP
     PCP-FAB
     PMDF
     SEJ-B     *Verify applicability
     SEJ-M     *Verify applicability
     SRR       *Verify applicability
     SSTR
```

Bridge Standards Spreadsheet



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```
                    BRIDGE DESCRIPTION

ROADWAY WIDTH:          32 FT
SUPERSTRUCTURE TYPE:    Prestressed Concrete I-Girders
BEAM TYPE:              Tx40
SKEW:                   L 15 DEG F
ROADWAY TYPE:           8.5" Slab
RAIL TYPE:              SSTR

NUMBER OF SPANS:        3

BENT 1 STA:  1125+28.22        SPAN 1 LENGTH:  55 FT
BENT 2 STA:  1125+83.22        SPAN 2 LENGTH:  55 FT
BENT 3 STA:  1126+38.22        SPAN 3 LENGTH:  55 FT
BENT 4 STA:  1126+93.22
```

Miscellaneous Standards | Bridge Railing Standards | Retaining Walls | Culvert And Drainage

Prestressed Concrete X-Beams | Cast-In-Place Concrete Slab Spans | Prestressed U-Beam Details | Prestressed Concrete I-Girders

Steel Beams | Prestressed Slab Beams | Prestressed Box Beams | Prestressed Decked Slab Beams

Concrete Slab & Girder (Pan Form) | Working Drawings

PRESTRESSED CONCRETE I-GIRDER 40' ROADWAY DETAILS

Rev Date	Std Name	Description	File Name
01-21	IGSD-40	Std Designs,Ty Tx28 Thru Tx62 Girders,40' Rdwy	IG-IGSD40-21.dgn
08-17	AIG-40	Abut,Ty Tx28 Thru Tx54 Girders,40' Rdwy	IG-AIG4000-17.dgn
08-17	AIG-62-40	Abut,Ty Tx62 Girders,40' Rdwy	IG-AIG624000-17.dgn
08-17	AIG-40-15	Abut,Ty Tx28 Thru Tx54 Girders,40' Rdwy,15 Deg	IG-AIG4015-17.dgn
08-17	AIG-62-40-15	Abut,Ty Tx62 Girders,40' Rdwy,15 Deg	IG-AIG624015-17.dgn
08-17	AIG-40-30	Abut,Ty Tx28 Thru Tx54 Girders,40' Rdwy,30 Deg	IG-AIG4030-17.dgn
08-17	AIG-62-40-30	Abut,Ty Tx62 Girders,40' Rdwy,30 Deg	IG-AIG624030-17.dgn
10-23	AIG-40-45	Abut,Ty Tx28 Thru Tx54 Girders,40' Rdwy,45 Deg	IG-AIG4045-23.dgn
08-17	AIG-62-40-45	Abut,Ty Tx62 Girders,40' Rdwy,45 Deg	IG-AIG624045-17.dgn
08-17	BIG-40	Bent,Ty Tx28 Thru Tx54 Girders,40' Rdwy	IG-BIG4000-17.dgn

STANDARDS LIST

```
**************************************************************************
* The following list may not be entirely relevant nor all inclusive.    *
* Determine which other standards are needed and which standards        *
* included here are not required for your project.                       *
**************************************************************************

      AIG-32-15
      BIG-32-15     *Verify applicability
      BTIG-32-15    *Verify applicability
      SIG-32-15
      IGSD-32
      IGCS
      IGD
      IGEB
      IGFRP     *Verify applicability
      IGMS
      IGSK      *Verify applicability
      IGTS
      AJ        *Verify applicability
      BAS-A     *Verify applicability
      BAS-C     *Verify applicability
      BMCS      *Verify applicability
      CP        *Verify applicability
      CRR       *Verify applicability
      CSAB      *Verify applicability
      FD
      MEBR(C)
      NBIS
      PBC-P     *Verify applicability
      PPBC-RC   *Verify applicability
      PBC-RC    *Verify applicability
      SD-EBR
      PCP
      PCP-FAB
      PMDF
      SEJ-B     *Verify applicability
      SEJ-M     *Verify applicability
      SRR       *Verify applicability
      SSTR
```

Superstructure: Beams

- IGSD-32
- Prestressed Concrete Girder
- 32’ Roadway
- **55’ Span Girder Design**

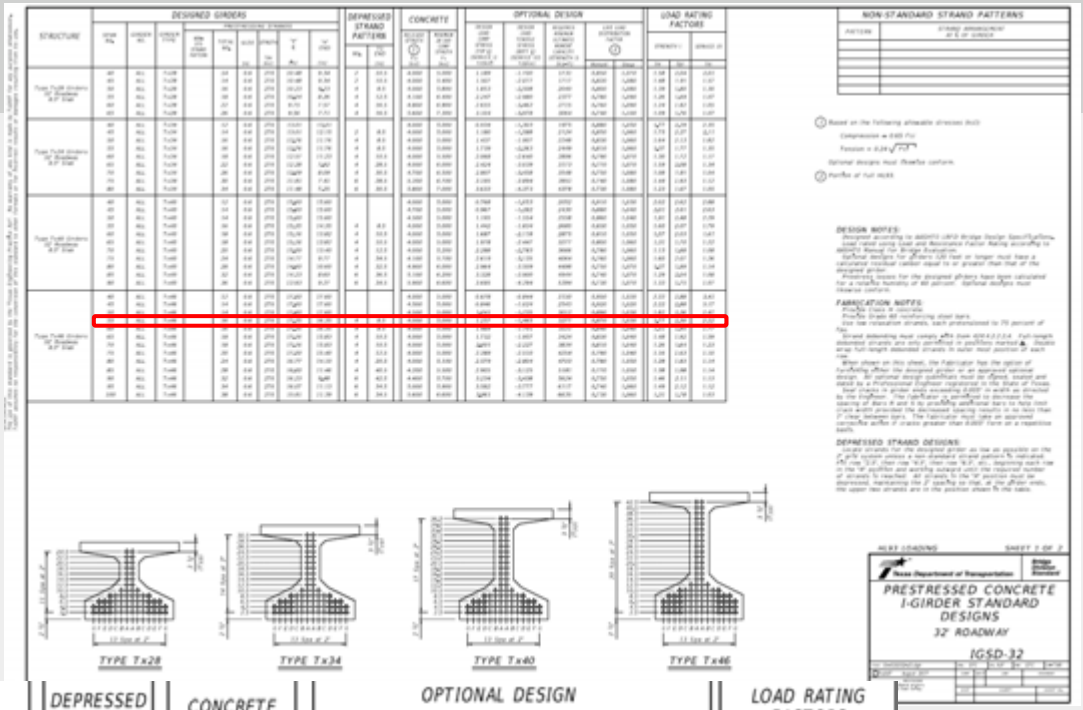
(1) *Based on the following allowable stresses (ksi):*

Compression = 0.65 f'ci

Tension = 0.24 $\sqrt{f'ci}$

Optional designs must likewise conform.

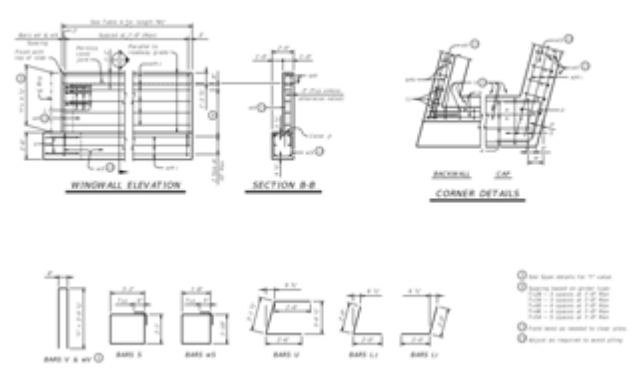
(2) *Portion of full HL93.*

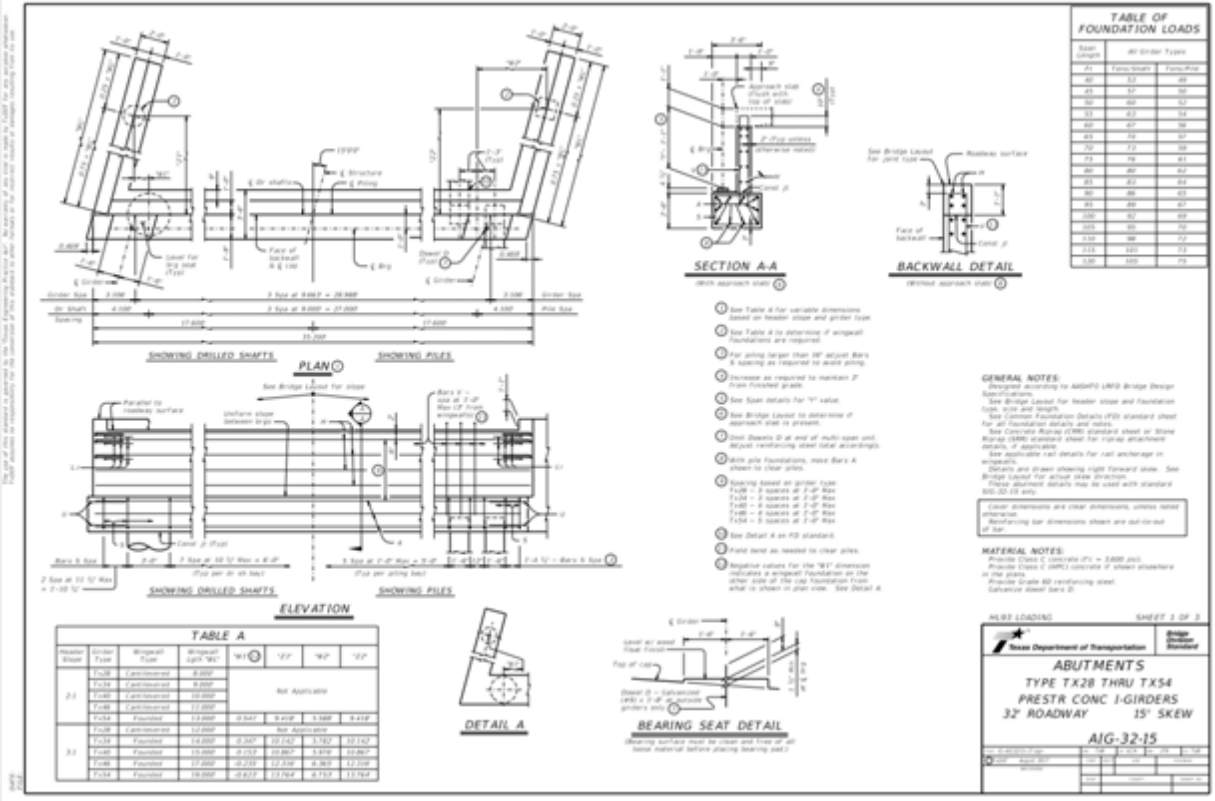


STRUCTURE	SPAN NO.	GIRDER NO.	GIRDER TYPE	DESIGNED GIRDERS: PRESTRESSING STRANDS: NON-STD STRAND PATTERN	TOTAL NO.	SIZE (in)	STRGTH fpu (ksi)	"e" @ ℄ (in)	"e" END (in)	DEPRESSED STRAND PATTERN: NO.	TO END (in)	CONCRETE: RELEASE STRGTH (1) f'ci (ksi)	MINIMUM 28 DAY COMP STRGTH f'c (ksi)	OPTIONAL DESIGN: DESIGN LOAD COMP STRESS (TOP ℄) (SERVICE I) fc(ksi)	DESIGN LOAD TENSILE STRESS (BOTT ℄) (SERVICE III) fc(ksi)	REQUIRED MINIMUM ULTIMATE MOMENT CAPACITY (STRENGTH I) (kip-ft)	LIVE LOAD DISTRIBUTION FACTOR (2): Moment	Shear	LOAD RATING FACTORS: STRENGTH I Inv	Opr	SERVICE III Inv
Type Tx40 Girders 32' Roadway 8.5" Slab	40	ALL	Tx40		12	0.6	270	15.60	15.60			4.000	5.000	0.768	-1.053	2052	0.910	1.030	2.02	2.62	2.88
	45	ALL	Tx40		14	0.6	270	15.60	15.60			4.700	5.000	0.967	-1.282	2430	0.880	1.040	2.01	2.61	2.63
	50	ALL	Tx40		14	0.6	270	15.60	15.60			4.500	5.000	1.195	-1.554	2558	0.860	1.040	1.91	2.48	2.29
	55	ALL	Tx40		16	0.6	270	15.35	14.35	4	8.5	4.000	5.000	1.442	-1.834	2685	0.830	1.050	1.60	2.07	1.79
	60	ALL	Tx40		18	0.6	270	15.16	13.82	4	10.5	4.000	5.000	1.687	-2.118	2875	0.810	1.050	1.57	2.03	1.61
	65	ALL	Tx40		18	0.6	270	15.16	13.82	4	10.5	4.000	5.000	1.978	-2.447	3277	0.800	1.060	1.31	1.70	1.22
	70	ALL	Tx40		20	0.6	270	15.00	13.40	4	12.5	4.000	5.200	2.288	-2.783	3666	0.780	1.060	1.13	1.68	1.08
	75	ALL	Tx40		24	0.6	270	14.77	9.77	4	34.5	4.100	5.700	2.619	-3.135	4064	0.760	1.060	1.60	2.07	1.26
	80	ALL	Tx40		28	0.6	270	14.60	10.60	4	32.5	4.900	6.000	2.964	-3.509	4498	0.750	1.070	1.27	1.99	1.14
	85	ALL	Tx40		32	0.6	270	14.23	8.60	6	36.5	5.100	6.200	3.328	-3.900	4944	0.740	1.070	1.29	2.04	1.08
	90	ALL	Tx40		36	0.6	270	13.93	9.27	6	34.5	5.900	6.600	3.695	-4.294	5394	0.730	1.070	1.33	1.75	1.07

Abutments: AIG-32-15

- Abutments Prestressed Girder
- 32’ Roadway
- 15-degree skew
- 2:1 header slope
  - **Breakback** details (included in applicable skew)
  - Header slope dependent





Abutments: AIG-32-15 (cont.)

2:1 Header Slope

TYPE Tx40 Girders				
Bar	No.	Size	Length	Weight
A	10	#11	34'-3"	1,820
D (7)	2	#9	1'-8"	11
H	10	#6	34'-10"	523
L1	9	#6	4'-0"	54
L2	9	#6	4'-0"	54
S	30	#5	11'-6"	360
U	4	#6	8'-2"	49
V	34	#5	13'-4"	473
wH1	14	#6	11'-5"	240
wH2	24	#6	9'-8"	348
wS	22	#4	7'-10"	115
wV	22	#5	13'-4"	306
Reinforcing Steel			Lb	4,353
Class "C" Concrete			CY	22.3

Notes (Tx40)

(5) See Span details for "Y" value.

(9) Spacing based on girder type:
Tx28 ~ 3 spaces at 1'-0" Max
Tx34 ~ 3 spaces at 1'-0" Max
Tx40 ~ 4 spaces at 1'-0" Max
Tx46 ~ 4 spaces at 1'-0" Max
Tx54 ~ 5 spaces at 1'-0" Max

(11) Field bend as needed to clear piles.

(13) Adjust as required to avoid piling.

TABLE A							
Header Slope	Girder Type	Wingwall Type	Wingwall Lgth "WL"	"W1" (12)	"Z1"	"W2"	"Z2"
2:1	Tx28	Cantilevered	8.000'	Not Applicable			
	Tx34	Cantilevered	9.000'				
	Tx40	Cantilevered	10.000'				
	Tx46	Cantilevered	11.000'				
	Tx54	Founded	13.000'	0.541'	9.418'	5.588'	9.418'
3:1	Tx28	Cantilevered	12.000'	Not Applicable			
	Tx34	Founded	14.000'	0.347'	10.142'	5.782'	10.142'
	Tx40	Founded	15.000'	0.153'	10.867'	5.976'	10.867'
	Tx46	Founded	17.000'	-0.235'	12.316'	6.365'	12.316'
	Tx54	Founded	19.000'	-0.623'	13.764'	6.753'	13.764'

Foundation Loads (55' Span)

TABLE OF FOUNDATION LOADS		
Span Length	All Girder Types	
Ft	Tons/Shaft	Tons/Pile
40	53	49
45	57	50
50	60	52
55	63	54
60	67	56
65	70	57
70	73	59
75	76	61
80	80	62
85	83	64
90	86	65
95	89	67
100	92	69
105	95	70
110	98	72
115	101	73
120	105	75

Interior Bents: BIG-32-15

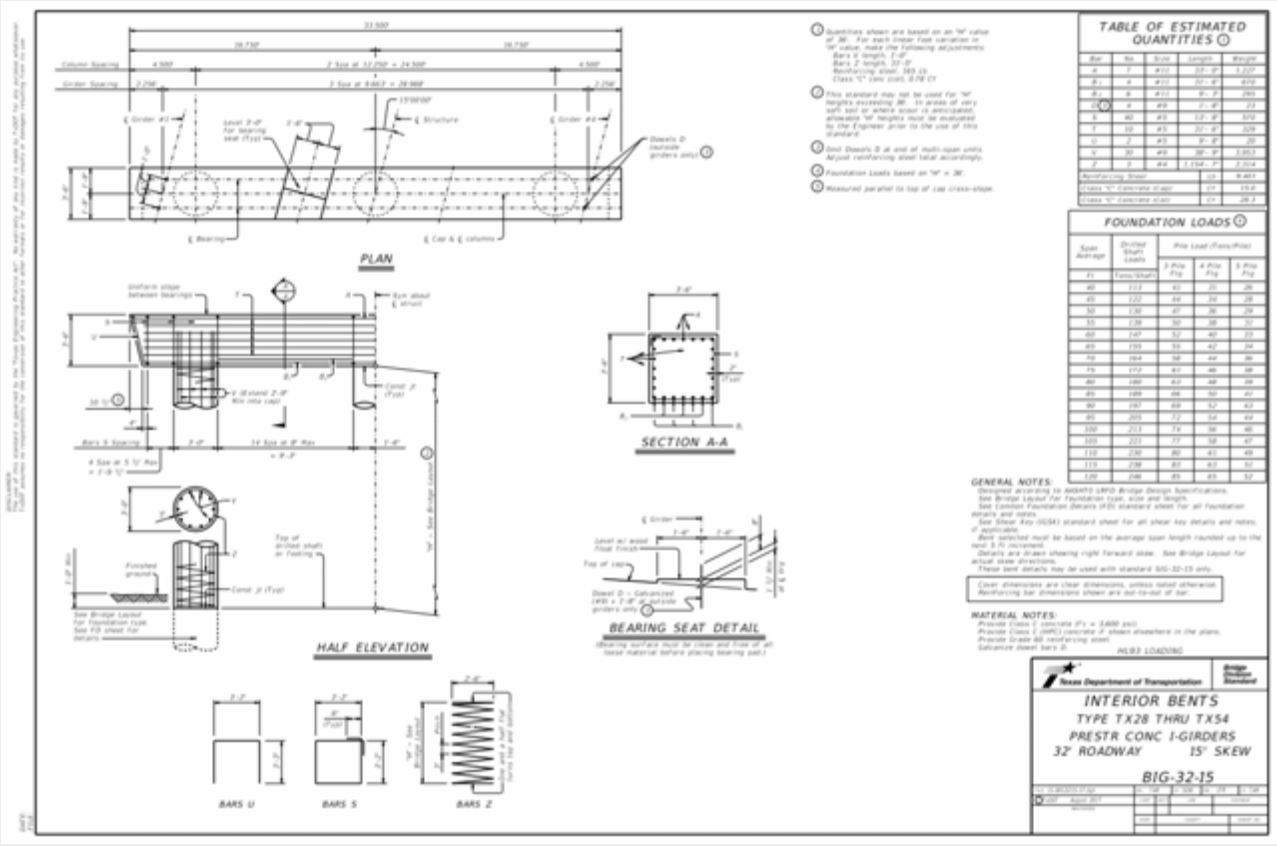
- TYP Multiple Column Bent
- Standard Design for cap and columns
  - Dimensioning
  - Bar layout
  - Bar detailing

Notes:

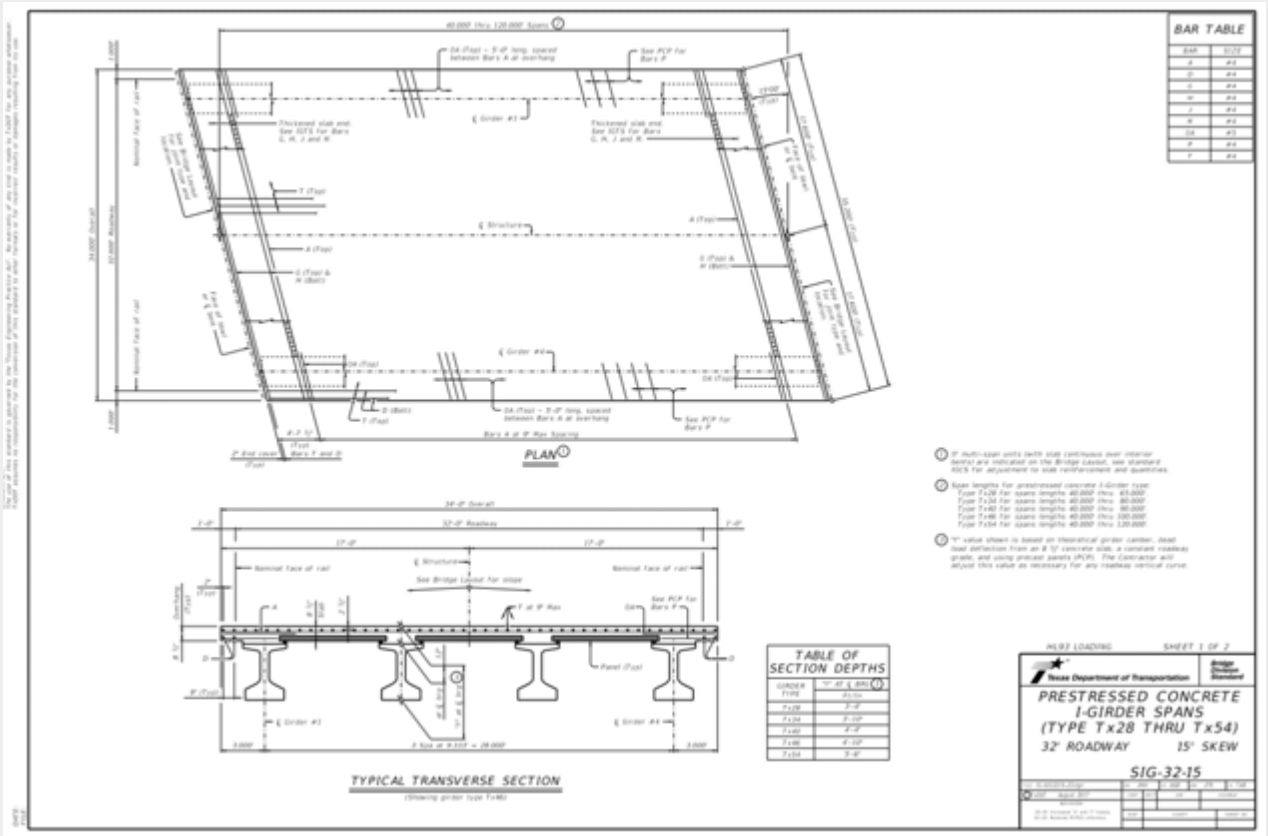
- **Foundation Loads** based on column height:

  H = 36 ft

- **Estimated Quantities**



Spans: SIG-32-15



(1) If multi-span units (with slab continuous over interior bents) are indicated on the Bridge Layout, see standard IGCS for adjustment to slab reinforcement and quantities.

(2) Span lengths for prestressed concrete I-Girder type:
Type Tx28 for spans lengths 40.000' thru 65.000'.
Type Tx34 for spans lengths 40.000' thru 80.000'.
Type Tx40 for spans lengths 40.000' thru 90.000'.
Type Tx46 for spans lengths 40.000' thru 100.000'.
Type Tx54 for spans lengths 40.000' thru 120.000'.

(3) "Y" value shown is based on theoretical girder camber, dead load deflection from an 8 ½" concrete slab, a constant roadway grade, and using precast panels (PCP). The Contractor will adjust this value as necessary for any roadway vertical curve.

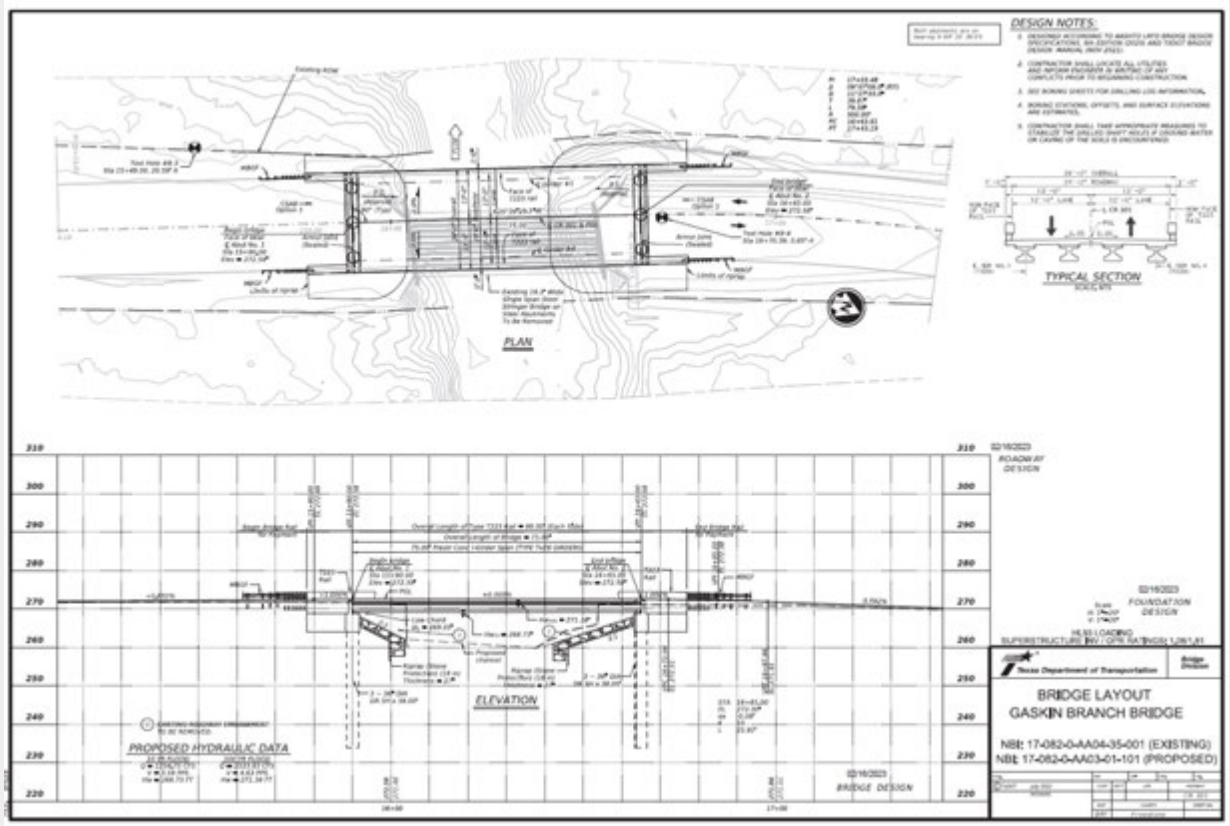
TABLE OF ESTIMATED QUANTITIES

SPAN LENGTH	REINF CONCRETE SLAB	Prestressed Concrete Girders: ABUT TO INT BT (4)	INT BT TO INT BT (4)	ABUT TO ABUT (4)	TOTAL REINF STEEL (5)
Ft	SF	LF	LF	LF	Lb
40	1,360	158.00	158.00	158.00	3,128
45	1,530	178.00	178.00	178.00	3,519
50	1,700	198.00	198.00	198.00	3,910
55	1,870	218.00	218.00	218.00	4,301
60	2,040	238.00	238.00	238.00	4,692
65	2,210	258.00	258.00	258.00	5,083
70	2,380	278.00	278.00	278.00	5,474
75	2,550	298.00	298.00	298.00	5,865
80	2,720	318.00	318.00	318.00	6,256
85	2,890	338.00	338.00	338.00	6,647
90	3,060	358.00	358.00	358.00	7,038
95	3,230	378.00	378.00	378.00	7,429
100	3,400	398.00	398.00	398.00	7,820
105	3,570	418.00	418.00	418.00	8,211
110	3,740	438.00	438.00	438.00	8,602
115	3,910	458.00	458.00	458.00	8,993
120	4,080	478.00	478.00	478.00	9,384

(4) Fabricator will adjust lengths for girder slopes as required.

(5) Reinforcing steel weight is calculated using an approximate factor of 2.3 lbs/SF.

Bridge Layout – Applicable Standards



- **Shear Key:** IGSK (Stream Crossing Bridge)
- Bridge Mounted **Clearance Sign** (BMCS)
- **Joints:**
  - Sealed expansion joint (Type B): SEJ-B
  - Sealed expansion joint (Type M): SEJ-M
  - Armored Joint with/without seal: AJ
- **Riprap:**
  - Stone: SRR or Concrete: CRR
- **Columns:**
  - Precast option(PBC-RC) vs Prestressed, precast option (PPBC-RC)
- **Approach slab:**
  - ACP or Concrete
- Cement stabilized **abutment backfill** (CSAB)
- GRFP Slab Top Mat Reinforcement: IGFRP
- Prestressed concrete piling

Estimated Quantities

- Generate **Summary Table** for Estimated Quantities
  - Most found in standard or bridge layout
- **Bid Item** – bridge detailing guide for tolerances

Table 9-1: Bid Tolerances

Bid Item #	Common Item	Show to Nearest
400	Structural Excavation	1 CY
400	Cement Stabilized Backfill	1 CY
402	Trench Excavation Protection	1 LF
409	Prestressed Concrete Piling	1 LF
416	Drilled Shaft Foundations	1 LF
420	Concrete	0.1 CY
422	Reinforced Concrete Slab	1 SF
425	Prestressed Concrete Beams	0.01 LF
432	Riprap	1 CY
434	Elastomeric Bearings	EA
442	Structural Steel	See Estimated Quantities in Appendix E
450	Railing	0.1 LF
454	Expansion Joint	1 LF
514	Permanent Concrete Traffic Barrier	0.1 LF
786	Carbon Fiber Reinforced Polymer	0.1 SF

① Indudes 0.3 CY of shear key concrete per abutment

② Includes 0.6 CY of shear key concrete.

SUMMARY OF ESTIMATED QUANTITIES

BRIDGE ELEMENT / BID ITEM DESCRIPTION	0416 6004 DRILL SHAFT (36 IN)	0420 6013 CL C CONC (ABUT)	0420 6029 CL C CONC (CAP)	0420 6037 CL C CONC (COLUMN)	0422 6001 REINF CONC SLAB	0425 6037 PRESTR CONC GIRDER (TX40)	0432 6026 RIPRAP (STONE COMMON) (DRY) (18 IN)	0450 6006 RAIL (TY223)	0454 6004 ARMOR JOINT (SEALED)	0496 6010 REMOV STR (BRIDGE 100-499 FT LENGTH)
	LF	CY	CY	CY	SF	LF	CY	LF	LF	EA
2 - ABUTMENTS	332	44.0 ①						40.0	54	
1 - INTERIOR BENT	126		13.7 ②	7.9						
1 - 130' PRESTRESSED CONC. I-GIRDER UNIT					3900	515.92		260.0		
OVERALL TOTALS:	458	44.0 ①	13.7 ②	7.9	3900	515.92	144	300.0	54	1

Take Aways

- Appropriate use of standards sheet
  - Applicability and restrictions
- Standard Bridge Spreadsheet
  - Location, use, compilation of standards
- Signing and sealing set plan
  - Bridge Layout
  - Sheet including bearing seat elevations or any other sheet including elevations
  - MOD standard sheets

Contact Information for Standards

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Questions???