Notes to Designer:

These standards give most of the information necessary to build these bridges. However, the following additional information is required to be part of the contract plans:

1. Title sheet with Engineer(s) seal
2. Estimated quantities totals including bid item "Class 20 Excavation" for bridge
3. Situation plan layout of bridge
4. Top of slab elevations layout
5. Bottom of abutment footing elevations
6. Elevations at top of wing (e.g. Elev. "A" and "B")
7. Piling design information
8. Slope protection layout (if needed)
9. Guardrail design
10. Approach details (if needed)

These standards have been developed utilizing epoxy-coated reinforcing. Non-coated or stainless steel bars may be substituted without modification of development or lap lengths. The Designer shall specify the appropriate bid item for the selected reinforcing.

The abutments for these standards have been designed for the use of both friction and point bearing piles. The pile length shall be determined by the Designer using Iowa DOT Bridge Design Manual (BDM) Article 6.2 based on site conditions.

Two options are provided for abutments to be used with these standards:

1. Integral abutments: HP10x42 piles at Bridge Design Manual (BDM) Article 6.2.6.1 Structural Resistance Level-1 (SRL-1). Water and ice loading not included.
2. High Abutments (0 and 15 degree skew only): HP10x42 piles at SRL-1 with PZ27 steel sheet pile backwall and wings. Maximum height from grade to top of berm/streambed of 14'-0". Water and ice loading not included.

The Bridge Designer shall obtain adequate soil borings to evaluate depth to rock and ability to achieve pile embedment as described in the General Notes, and perform the pile design.

Additionally, the Designer shall verify the soil properties obtained from the soil borings for the actual bridge site will not increase the embedment lengths required for the steel sheet piling, if applicable.

The following soil conditions were assumed in the design of the steel sheet piling:

Backfill Material

- Shall consist of well drained granular material with less than 8% fines.
- Material shall consist of gradation as noted on Abutment Backfill Details Sheet.
- Backfill shall be placed as noted on Abutment Backfill Details Sheet.
- Unit weight of granular backfill assumed to be 130 pcf.
- ϕ', internal friction angle = 34 degrees.
- Subdrain to be of type specified on Subdrain Details Sheet.

Foundation Soils

- Consists of either alluvium, loess or glacial till, all of which will be comprised of clay soils.
- Unit weight of 125 pcf.
- Strength was conservatively modeled assuming a long term effective strength ϕ', equal to 21 degrees.
- The strength and unit weight are considered conservative and applicable if loose alluvial sand comprises the soils.
- Berm slope shall not be steeper than 2:1.

Designer will need to determine the pile construction control method, contract length, and target driving resistance and include in the plan notes and estimated quantities. Bridge Design Manual CADD notes E818, and E819 are appropriate for that purpose. The notes, as well as design examples and spreadsheets, are available on the Bridges and Structures Bureau website.

Examples of Bridge Elevation Calculations:

The Designer shall show on the plans the three bottom of footing elevations required for each abutment. The Designer shall also show on the plans the required top of wing elevations as shown in the plans at each corner of the bridge.

The boxed details in the following examples show how the abutment elevations should be indicated on the plans.

Example No. 1

Bridge located on a constant grade. For this example, the grade is -3.00% with the P.I. station of 199+00.00 and a P.I. elevation of 600.00. The bridge length is 50'-0" ℄ to ℄ of abutment bearings with 30° right hand ahead skew.

Stations

℄ Bridge Station	= 200+25.00
℄ Abut. No. 1 Brg.	= 200+00.00
℄ Abut. No. 2 Brg.	= 200+50.00

Elevations Along Profile Grade

℄ Abut. No. 1 Brg. = 600.00 + (20000.00 - 19900.00)(-0.0300)
= 597.00

℄ Abut. No. 2 Brg. = 600.00 + (20050.00 - 19900.00)(-0.0300)
= 595.50

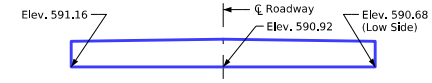
Skew angle correction

(Offset to end of abut.) (tan skew angle) (Grade)
= (13.58')(tan 30°)(0.0300)
= 0.24'

Abutment No. 1

Location	Left End	℄ Roadway	Right End
PGL Elevation	597.00	597.00	597.00
Skew Angle Corr.	+ 0.24	0.00	- 0.24
-"X" ▲	- 6.08	- 6.08	- 6.08
Bottom of Abut. Elev.	591.16	590.92	590.68

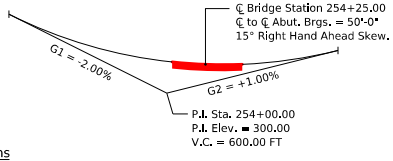
Note: X dimension is shown for integral abutment for example purposes.



Abutment No. 1 Bottom of Footing Elevations Diagram
Looking Up Stationing

Example No. 2

Bridge located on a parabolic vertical curve. For this example, the vertical curve is as shown below.



Stations

℄ Bridge Station	= 254+25.00
℄ Abut. No. 1 Brg.	= 254+00.00
℄ Abut. No. 2 Brg.	= 254+50.00

Elevations along Profile Grade

℄ Abut. No. 1 Brg. = 302.25
℄ Abut. No. 2 Brg. = 302.06

Bridge Grade

Grade = $\frac{(302.06-302.25)(100)}{50.00}$ = -0.38%

(Establish grade along ℄ Roadway and use this grade for bridge geometrics.)

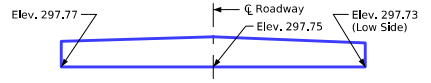
Skew Angle Correction

(Offset to end of abut.) (tan skew angle) (Grade)
= (17.5')(tan 15°)(0.0038)
= 0.02'

Abutment No. 1

Location	Left End	℄ Roadway	Right End
PGL Elevation	302.25	302.25	302.25
Skew Angle Corr.	+ 0.02	0.00	- 0.02
-"X" ▲	- 4.50	- 4.50	- 4.50
Bottom of Abut. Elev.	297.77	297.75	297.73

Note: X dimension is shown for sheet pile abutment for example purposes.



Abutment No. 1 Bottom of Footing Elevations Diagram
Looking Up Stationing

▲ Slab depth plus diaphragm and cap height.
See Abutment Details Sheets for "X" dimensions.

Latest Revision Date

Approved by Bridge Engineer

IOWA DOT

Standard Design - 24'-0" Roadway, Single Span Bridge

Single Span Concrete Slab Bridges

July, 2025

Designer Information

J24S-02-25