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PREFACE

The Common Bridge Details and Notes Guide is intended to be the primary source of information on current detailing practices of the Montana Department of Transportation's (MDT) Bridge Bureau. The guide provides helpful hints, expected details, and updated processes in assembling bridge plans for MDT and consultant personnel preparing contract plans for MDT projects. For uniformity and consistency of the final plan set, the methods and practices shown or stated in this guide should be followed when practicable.

The use of this guide does not relieve the designer or engineer of their responsibility to consider the applicability of the detail or notes to their situation, nor should it act as a restriction or inhibitor to new ideas. Although Bridge Bureau policy and detailing practice is presented here for numerous situations, content of the guide is not intended to be exhaustive. Therefore, use of this guide must be tempered with sound engineering judgment.

REVISIONS

The electronic release of this new guide is March, 2017. Portions of the guide may periodically be revised to incorporate changes in detailing or design methods. These changes may be based on construction practice, AASHTO code revisions or materials. When changes are made, the watermark date stamp will reflect the change date and a description of the change will be annotated in the revision section of the guide. It is incumbent on the user to verify that they are referencing the most current version of the guide.
GETTING STARTED

STRUCTURES MANUAL CHANGES

DETAILING HELPFUL TIPS
GETTING STARTED

STRUCTURES MANUAL CHANGES

1. Rescind 5.4.1.3.2. Place the pay items in the quantities table in the sequential order of the bid item numbers. Show the bridge length in the first column.
GETTING STARTED

DETAILING HELPFUL TIPS

1. Footnotes shown on the Sample Drawings and Common Notes and Details are for reference only. These should not be placed on the plan sheets.
2. When placing cells from the rebar shapes cell library, these should be placed at a scale of 0.09:1 when placed in a border drawn at a 1:1 Scale.
3. When placing rebar charts from the rebar charts cell library, these should be placed in the border at a scale of 1:10.
4. When placing “dots” representing reinforcing steel in a section view place them at 1/16” diameter for a 1:1 scale.
5. When placing rebar detail all bars with the correct bend radius as defined on the “Standard Rebar Bends and Hooks” sheet.
6. To place a “Check Mark” in an excel table.
   a. Set the font to “Wingdings” in the cell which requires the check mark.
   b. Use key combination: ALT + 0252
   c. Set the font size for the desired check mark size.
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OVERLAY TREATMENT AT DECK DRAINS
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GUARD ANGLE REMOVAL DETAIL
**Kalani**

**SINGLE V-GROOVE WELD**

- **AWS D1.4 figure 3.2(A)**

**HOOP RESISTANCE BUTT JOINT DETAIL**

- **AWS D1.4 figure 3.2(B)**

**ANCHOR BOLT DETAIL**

- **No Scale**

**SPIRAL LAP DETAIL**

- **No Scale**

**TIE BAR DETAIL**

- **No Scale**

**HOOP MANUAL DIRECT BUTT JOINT DETAILS**

- **No Scale**

**EXPANSION CAP DIMENSIONS**

<table>
<thead>
<tr>
<th>HOOP</th>
<th>SPAN (FT)</th>
<th>SMOOTH BAR DIAMETER</th>
<th>SMOOTH BAR LENGTH</th>
<th>EXPANSION CAP DIAMETER</th>
<th>EXPANSION CAP LENGTH</th>
<th>OVERALL LENGTH</th>
<th>LENGTH TO PIN STOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type A, IV-M.75</td>
<td>0 - 40 ft</td>
<td>1&quot;</td>
<td>2-7</td>
<td>1.5&quot;</td>
<td>4.0</td>
<td>4.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Type A, IV-M.75</td>
<td>&gt; 40 - 80 ft</td>
<td>1.5&quot;</td>
<td>2-4</td>
<td>1.5&quot;</td>
<td>4.0</td>
<td>4.0</td>
<td>2.7</td>
</tr>
<tr>
<td>Type A, IV-M.75</td>
<td>&gt; 80 ft</td>
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<td>1.5&quot;</td>
<td>4.0</td>
<td>4.0</td>
<td>2.7</td>
</tr>
</tbody>
</table>

**Metal Expansion Cap Detail**

- **No Scale**

**Waterstop Detail**

- **No Scale**

**Spiral Lap Detail**

- **No Scale**

**Expansion Cap Dimensions**

**Aplicable Footnotes**

- **Use a certified welder to weld according to AWS D1.4.**

**Tie Bar Detail**

- **No Scale**

**Anchor Bolt Detail**

- **No Scale**

**Nose Angle Detail**

- **No Scale**

**Note:** Use nose angle and anchor bars meeting the requirements of AASHTO M270 Grade 36 and paint in accordance with the Standard Specifications.

**Note:** Use a certified welder to weld according to AWS D1.4.
**STRUCTURAL STEEL GIRDER SHEET NOTES**

**NOTES**

Use W3x54 and W3x66 for the requirements of AASHTO M270 Grade 50W and 70W materials.

- Steel plates shall be fabricated in accordance with AASHTO M270 Grade 50W or 70W.
- Steel plates shall be fabricated in accordance with AASHTO M270 Grade 50W or 70W.
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- Steel plates shall be fabricated in accordance with AASHTO M270 Grade 50W or 70W.

**DIAPHRAGM NOTES**

- Paint steel diaphragms in accordance with the Standard Specifications.
- Install diaphragms immediately after setting the beams in place. Tighten the bolts in accordance with the Turn-of-Nut Tightening Standard Specification, Sec. 556.03.9, to half of the value specified in Table 556-6.
- Tighten the bolts in accordance with the Turn-of-Nut Tightening Standard Specification, Sec. 556.03.9, to half of the value specified in Table 556-6.
- Tighten the bolts in accordance with the Turn-of-Nut Tightening Standard Specification, Sec. 556.03.9, to half of the value specified in Table 556-6.

**BULB-TEE DIAPHRAGM SHEET NOTES**

- Paint steel diaphragms in accordance with the Standard Specifications.
- Include all costs associated with furnishing and installing steel diaphragms, channels, plates, angles and bolts incidental to the diaphragms in the lump sum bid for Structural Steel.
- Include all costs associated with furnishing and installing steel diaphragms, channels, plates, angles and bolts incidental to the diaphragms in the lump sum bid for Structural Steel.
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- Include all costs associated with furnishing and installing steel diaphragms, channels, plates, angles and bolts incidental to the diaphragms in the lump sum bid for Structural Steel.

**BULB-TEE ERECTION PLAN SHEET NOTES**

- Include an interior bay is located under the crown of the roadway. Use the results of this check if 
  
<---}

**SLAB & BEARING SHEET NOTES**

- Use the results of this check if 
  
<---}

**CELL: SLAB BEARING NOTES**

**REVISED: 5/17**
**REHAB SHEET NOTES**

**GENERAL NOTES**

- **LIVE LOAD:** Standard HS25-44 loading or alternate loading.
- **FUNCTIONAL LOAD:** Standard HS25-44 loading or alternate loading.
- **NOTE:** Old Bridge Work Summary for necessary investment at a specific location.
- **MILITARY LOADING (INTERSTATE):** Standard HS25-44 loading or alternate loading.
- **OVERLAY TREATMENT:** Use Concrete Class Overlay on bridge decks requiring thick overlays. See Special Provisions.
- **REPAIRS:** Use new deformed type reinforcing steel meeting the requirements of AASHTO M 31 Grade 60 for Reinforcing Steel.
- **EPOXY RESIN BONDING AGENT:** Thoroughly coat all existing concrete in contact with new concrete with a bonding agent AASHTO M 276 Type-VI to provide a new reinforcing in the same bar size and long enough to meet the minimum lap indicated on this sheet, and provide a cover to the new bar size. Include all costs associated with furnishing and installing the necessary additional reinforcing in the unit price bid for Reinforcing Steel - epoxy coated.
- **OVERLAY DECK MILLING:** Use Hydrodemolition to reach final milling depth in the unit price bid for Reinforcing Steel.
- **NOTE:** Use Hydrodemolition to remove existing reinforcing steel in other bars of work.
- **OVERLAY TREATMENT:** Use Concrete Class Overlay on bridge decks requiring thick overlays. See Special Provisions.
- **REINFORCING STEEL:** Use new deformed type reinforcing steel meeting the requirements of AASHTO M 31 Grade 60.
- **REPLACE EXISTING REINFORCING STEEL:** Replace existing reinforcing steel damaged during construction that is called out to remain in place at no additional cost to the State.
- **GENERAL NOTES:** Use new deformed type reinforcing steel meeting the requirements of AASHTO M 31 Grade 60.
- **EPOXY BONDING AGENT:** Use new deformed type reinforcing steel meeting the requirements of AASHTO M 31 Grade 60 or ASTM Specification A 706 Grade 60 for Reinforcing Steel.
- **GENERAL NOTES:** Use new deformed type reinforcing steel meeting the requirements of AASHTO M 31 Grade 60 or ASTM Specification A 706 Grade 60 for Reinforcing Steel.
- **OVERLAY DECK MILLING:** Use Hydrodemolition to reach final milling depth in the unit price bid for Reinforcing Steel.
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- **NOTE:** Use Hydrodemolition to remove existing reinforcing steel in other bars of work.
STANDARD DRAWINGS

PRESTRESSED CONCRETE BEAMS

COMMON PRESTRESSED CONCRETE GIRDER TYPE, SIZE & SPAN – SHEET 1 (FORTERRA)
COMMON PRESTRESSED CONCRETE GIRDER TYPE, SIZE & SPAN – SHEET 2 (OLDCASTLE)

TYPE 1
TYPE MT-28
TYPE A
TYPE 4
TYPE M-72
TYPE MTS
TYPE BULB-TEE
TYPE TRI-DECK
TYPE VOIED SLAB

SLABS

SL-5
SL-6
SL-7
SL-8

RAILS

T101
W740
W830
W740 & W830 TERMINATION DETAILS

BARRIER
PEDESTRIAN RAIL
HAND RAIL
DRILLED FOUNDATION ANCHOR POST
TIMBER BRIDGE RAIL REVISION
OTHER
STATIC LOAD TEST FRAME FIELD SETUP
PILE SPLICE DETAILS & TIPS
### FORTEarra Pre-Stressed Concrete Girder Shapes

<table>
<thead>
<tr>
<th>Girder Type</th>
<th>Max Span Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTS - 36</td>
<td>105 FT</td>
</tr>
<tr>
<td>MTS - 45</td>
<td>122 FT</td>
</tr>
<tr>
<td>MTS - 54</td>
<td>139 FT</td>
</tr>
<tr>
<td>MTS - 63</td>
<td>148 FT</td>
</tr>
<tr>
<td>MTS - 72</td>
<td>160 FT</td>
</tr>
<tr>
<td>MTS - 81</td>
<td>174 FT</td>
</tr>
<tr>
<td>MTS - 96</td>
<td>184 FT</td>
</tr>
<tr>
<td>MTS - 28</td>
<td>55 FT</td>
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<tr>
<td>MTS - 35</td>
<td>65 FT</td>
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<tr>
<td>MTS - 44</td>
<td>75 FT</td>
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<tr>
<td>MTS - 56</td>
<td>85 FT</td>
</tr>
<tr>
<td>MTS - 63</td>
<td>95 FT</td>
</tr>
<tr>
<td>MTS - 72</td>
<td>105 FT</td>
</tr>
<tr>
<td>MTS - 81</td>
<td>115 FT</td>
</tr>
<tr>
<td>MTS - 96</td>
<td>125 FT</td>
</tr>
</tbody>
</table>

### Notes

Maximum span lengths shown are based on available literature from manufacturer.
### OLDCASTLE - SPOKANE PRE-STRESSED CONCRETE GIRDER SHAPES

<table>
<thead>
<tr>
<th>GIRDER SHAPE</th>
<th>MAX SPAN LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>WF36G</td>
<td>105 FT</td>
</tr>
<tr>
<td>WF42G</td>
<td>119 FT</td>
</tr>
<tr>
<td>WF50G</td>
<td>133 FT</td>
</tr>
<tr>
<td>WF58G</td>
<td>149 FT</td>
</tr>
<tr>
<td>WF66G</td>
<td>165 FT</td>
</tr>
<tr>
<td>WF74G</td>
<td>175 FT</td>
</tr>
<tr>
<td>WF83G</td>
<td>195 FT</td>
</tr>
<tr>
<td>W42G</td>
<td>115 FT</td>
</tr>
<tr>
<td>W50G</td>
<td>130 FT</td>
</tr>
<tr>
<td>W58G</td>
<td>130 FT</td>
</tr>
<tr>
<td>W66G</td>
<td>150 FT</td>
</tr>
<tr>
<td>W74G</td>
<td>175 FT</td>
</tr>
<tr>
<td>W83G</td>
<td>195 FT</td>
</tr>
<tr>
<td>TYPE III</td>
<td>XXX FT</td>
</tr>
<tr>
<td>BULB - TEE 35</td>
<td>100 FT</td>
</tr>
<tr>
<td>BULB - TEE 41</td>
<td>100 FT</td>
</tr>
<tr>
<td>BULB - TEE 53</td>
<td>135 FT</td>
</tr>
<tr>
<td>BULB - TEE 65</td>
<td>135 FT</td>
</tr>
<tr>
<td>TRI - DECK 27</td>
<td>75 FT</td>
</tr>
<tr>
<td>VOIED SLAB 18</td>
<td>45 FT</td>
</tr>
<tr>
<td>VOIED SLAB 26</td>
<td>65 FT</td>
</tr>
</tbody>
</table>

**NOTES**

Maximum span lengths shown are based on available literature from manufacturer.
For spans greater than 40 feet, S for spans greater than 40 feet

4" notch at end bent (Typ.)

2" open hole (intermediate beam), threaded insert for 1/2" red or exterior beams, inclusive (Typ. at intermediate diaphragm)

2" Ø threaded insert in 2" Ø open hole

5"

2" Ø threaded insert in 2" Ø open hole

B3A~#4 (Typ.)

1" C l.

1" Ø Threaded insert

B3~#4 (24 required per beam)

1" Ø x 4

2-B4~#4 (Typ.)

5" 8" 7"

2-2 5-15

45°

2 spaces at 1-0 centers

2-B1~#5 stirrups

Hole for anchor bolts (Diameter for 1" Ø rod (exterior beams, inside face) 2" Ø open hole (interior beams), threaded insert

NOTE: Use the following equation to determine the number of B1~#5 stirrups required per beam:

N = (S - 15) / 2 + 21

NOTE: The number of B2A~#5 stirrups required per beam varies due to varying skew.

NOTE:  Length of A and B stirrups required per beam

NOTE:  The number of B2A~#5 stirrups required per beam

B3A~#4

B3~#4

B1~#5

For spans 40 feet or less, S = Length of Span (ft)

NOTE:  Use structural steel meeting the requirements of AASHTO M 220. Use headed shears meeting the requirements of AASHTO M 324 for Type 1 beams.

END VIEW

VIEW D

NOTE:  Include all costs to furnish and install intermediate diaphragms, intermediate diaphragms are not required.

For spans 40 feet or less, intermediate diaphragms are not required.

NOTE:  Use structural steel meeting the requirements of AASHTO M 314 Grade 36 for anchor bolts. Galvanize anchor bolts in accordance with AASHTO code specified on the General layout.

NOTE:  The number of B2A~#5 stirrups required per beam

B4~#4

1" Ø threaded insert for bent ~ all beams.

2-B4~#4

1" Ø threaded insert for bent ~ interior beams.

For Prestressed Beams ~ Type 1.

HARDWARE: Threaded metric, hold down devices, lifting devices and

FOR PRE-TENSIONING SYSTEM

BEAM LENGTH: Increase the overall length of the beam 0.0075 inches per foot of length to allow for elastic shortening, shrinkage and creep.

HARDWARE: Threaded metric, hold down devices, lifting devices and

REINFORCING STEEL: See General Layout.

NOTE:  Increase the overall length of the beam 0.0075 inches per foot of length to allow for elastic shortening, shrinkage and creep.

ENGINEERING STEEL: See General Layout.

REINFORCING STEEL: See General Layout.

NOTE:  The number of B2A~#5 stirrups required per beam

B3A~#4

B3~#4

B1~#5

NOTE:  The number of B2A~#5 stirrups required per beam

B4~#4

1" Ø threaded insert for bent ~ all beams.

2-B4~#4

1" Ø threaded insert for bent ~ interior beams.

For Prestressed Beams ~ Type 1.

HARDWARE: Threaded metric, hold down devices, lifting devices and

FOR PRE-TENSIONING SYSTEM

BEAM LENGTH: Increase the overall length of the beam 0.0075 inches per foot of length to allow for elastic shortening, shrinkage and creep.

HARDWARE: Threaded metric, hold down devices, lifting devices and

REINFORCING STEEL: See General Layout.

NOTE:  The number of B2A~#5 stirrups required per beam

B3A~#4

B3~#4

B1~#5

NOTE:  The number of B2A~#5 stirrups required per beam

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HARDWARE: Threaded metric, hold down devices, lifting devices and

REINFORCING STEEL: See General Layout.

NOTE:  The number of B2A~#5 stirrups required per beam

B3A~#4

B3~#4

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NOTE:  The number of B2A~#5 stirrups required per beam

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1" Ø threaded insert for bent ~ interior beams.

For Prestressed Beams ~ Type 1.

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FOR PRE-TENSIONING SYSTEM

BEAM LENGTH: Increase the overall length of the beam 0.0075 inches per foot of length to allow for elastic shortening, shrinkage and creep.

HARDWARE: Threaded metric, hold down devices, lifting devices and

REINFORCING STEEL: See General Layout.

NOTE:  The number of B2A~#5 stirrups required per beam

B3A~#4

B3~#4

B1~#5

NOTE:  The number of B2A~#5 stirrups required per beam

B4~#4

1" Ø threaded insert for bent ~ all beams.

2-B4~#4

1" Ø threaded insert for bent ~ interior beams.

For Prestressed Beams ~ Type 1.
SQUARE BRIDGE

Beam is symmetrical about axis of span as noted.

For spans 40 ft or less, intermediate diaphragms are not required.

2-Ø open hole at end of beam (interior beams), threaded insert for 1-Ø nut (exterior beam) (Typ. for intermediate diaphragms).

NOTE:

For spans greater than 40 ft, intermediate diaphragms are required.

2-Ø open hole at end of beam (interior beams), threaded insert for 1-Ø nut (exterior beam) (Typ. for intermediate diaphragms).

NOTE:

For spans 40 ft or less, intermediate diaphragms are not required.

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NOTE:

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2-Ø open hole at end of beam (interior beams), threaded insert for 1-Ø nut (exterior beam) (Typ. for intermediate diaphragms).

NOTE:

For spans 40 ft or less, intermediate diaphragms are not required.
**BEAM END DETAILS**

Use standard reinforcement meeting the requirements of AASHTO M 169 Grades 1010 through 1020. Use headed shear studs meeting the requirements of AASHTO M 169. Include all reinforcing bars (2 hex nuts per bolt).

**BEAM LENGTH**
Increase the overall length of the beam 0.75% for spans 40 feet or less.

**SHEAR REINFORCING**
The shear and end reinforcement shown on this drawing is the Department's minimum. Increase reinforcing if needed to meet the requirements of the AASTHO code specified on the General Method.

**REINFORCING STEEL**
See General Layout.

**SOLVENTS**
The shear and end reinforcement shown on this drawing is the Department's minimum. Increase reinforcing if needed to meet the requirements of the AASTHO code specified on the General Method.

**END VIEW**
For the number of B1~#5 stirrups required per beam, see the following equation:
1.6 / 0.0075 x 0.2 x 0.34

**SECTION A**
2.5~#4 (12 required per beam)

**SECTION B**
2.0~#4 (8 required per beam)

**FIXED SHOE DETAILS**
Adjust shear stud spacing as necessary to avoid prestressing steels.

**NOTES**
- Beam is symmetrical about the midpoint of the span.
  - Intermediate diaphragms are not required.
- Lift at ends only when B4~#4 bars have no design stress.
- Use headed shear studs meeting the requirements of AASHTO M 169. Include all reinforcing bars (2 hex nuts per bolt).
- For the number of B1~#5 stirrups required per beam, see the following equation:
  1.6 / 0.0075 x 0.2 x 0.34
- If the result of the equation is an odd number, round to the next largest even number.
NOTES
Use details shown on this sheet only as they apply to the project. See the General Layout or Other Sheets for beam spacing, slab thickness, size and spacing of S200 bars, number and spacing of S300 and S200-W bars, deck joint arrangement, barrier height, bill of reinforcing steel and roadway width.

When adjoining spans have a different number of longitudinal slab bars, make the longitudinal bars of the shorter span continuous over the bent and extend them 0.10 into the longer span.

If the bridge is skewed, place the transverse slab reinforcing steel as shown on Other Sheets. Do not place concrete barrier for at least 72 hours after concrete in slab has taken initial set.

See Standard Bridge Rail Type Barrier drawing for barrier details.

Dimensions vary due to skew. Dimensions at 1/10 points vary, see Erection Plan.

Beam Deflection Table and Camber Diagram. See note for theoretical camber and deflection of beam and may vary from theoretical calculated D.L. deflection.

NOTE:  For Dimension D, see slab Transverse Section. (Varies at tenth points) See Dead Load.

NOTE:  For Dimension D at Beam (See Other Sheets for size and spacing).

NOTE:  See Erection plan for theoretical D.L. Deflection Table.

Use details shown on this sheet only as they apply to the project. See the General Layout or Other Sheets for beam spacing, slab thickness, size and spacing of S200 bars, number and spacing of S300 and S200-W bars, deck joint arrangement, barrier height, bill of reinforcing steel and roadway width.

When adjoining spans have a different number of longitudinal slab bars, make the longitudinal bars of the shorter span continuous over the bent and extend them 0.10 into the longer span.

If the bridge is skewed, place the transverse slab reinforcing steel as shown on Other Sheets. Do not place concrete barrier for at least 72 hours after concrete in slab has taken initial set.

See Standard Bridge Rail Type Barrier drawing for barrier details.

Dimensions vary due to skew. Dimensions at 1/10 points vary, see Erection Plan.

Beam Deflection Table and Camber Diagram. See note for theoretical camber and deflection of beam and may vary from theoretical calculated D.L. deflection.

NOTE:  For Dimension D, see slab Transverse Section. (Varies at tenth points) See Dead Load.

NOTE:  For Dimension D at Beam (See Other Sheets for size and spacing).

NOTE:  See Erection plan for theoretical D.L. Deflection Table.
Concrete Class - Deck

Type MT-28 Beam
6" Beam
6"

**NOTES**

Use details shown on the standard plans aside as they apply to the project. See the General Layout or Other Sheets for beam, slab thickness, rise and spacing of D10 bars, number and spacing of D300 and C300 deck longitudinal bars, and embedment of reinforcing. Minimum embedment of reinforcing is 2000 pounds. Include the cost of the inserts in the unit price bid for Prestressed Concrete Beams.

NOTE: For dimension of D, see slab transverse section. (Variable both horizontal and vertical) See shear load definition table and detail.

**DEFINITIONS**

1. **HD**: Horizontal distance from the top of the deck to the top of the bridge.
2. **V**: Vertical distance from the top of the deck to the top of the bridge.
3. **R**: Radial distance from the center of the bridge to the point of measurement.

**STANDARD SLAB AND DIAPHRAGM**

**LONGITUDINAL SECTION**

- 3.0" Drip groove
- 1-8 Construction joint

**TRANSVERSE SECTION NEAR INTERMEDIATE DIAPHRAGM AT LOW SIDE**

**CURB REINFORCING DETAIL**

**TRANSVERSE SECTION AT INTERMEDIATE BENT AT HIGH SIDE**

**CAMBER DIAGRAM**

- Haunch Depth: Variable due to D.L. Deflection
- D.L. Deflection as shown in table

**DEFINITIONS**

- Deflection: Movement of the bridge deck from its original position.
- Camber: Tilt or slope of the bridge deck.

**NOTE:**

- Camber is noted as the distance from the working line to the top of the deck after D.L. Deflection is thoroughly calculated D.L. Deflection.

**DIMENSIONS**

- Dimensions vary due to skew
- Dimensions vary due to skew

**ATTACHMENTS**

- See Erection Plan for details
- See Erection Plan for details

**OTHER SHEETS**

- See Other Sheets for size and spacing
- See Other Sheets for size and spacing

**REFERENCES**

- Standard Bridge Rail Type W740 or W830
- Standard Bridge Rail Type W740 or W830

**REMARKS**

- Do not place concrete curb for at least 72 hours after concrete in slab has taken initial set.
- Do not place concrete curb for at least 72 hours after concrete in slab has taken initial set.

**APPENDIX**

- See Standard Bridge Rail Type W740 or W830
- See Standard Bridge Rail Type W740 or W830
NOTE: Place anchorage between top and (Typ. top and bottom)

NOTE: Rail posts as shown in details, perpendicular to adjacent roadway, and vertical in relation to roadway cross slopes.

NOTE: Rail posts as shown in details, parallel to adjacent roadway grades and vertical in relation to roadway cross slopes.

NOTE: Fabricate sleeves using channels, angles, plates, or bent plates. Weld and grind seams as required. Fabricate sleeves using more than four welds. Fabricate sleeves with a minimum wall thickness of 3/8".

NOTE: Rail bolts may be face welded to anchorage prior to field.

NOTE: Anchor bolts may be face welded to anchorage (anchor bolts not shown).

NOTE: Anchor bolts may be face welded to anchorage (anchor bolts not shown).
W740 TERMINATION DETAILS

ELEVATION AT TERMINAL TYPE BOX BEAM

(W-beam guardrail connection, terminals end departure end only)

ELEVATION AT TERMINAL TYPE W-BEAM

(W-beam guardrail connection or no guardrail connection)

W830 TERMINATION DETAILS

ELEVATION AT TERMINAL TYPE BOX BEAM

(Box Beam guardrail connection, intermediate end departure end only)

ELEVATION AT TERMINAL TYPE W-BEAM

(Box Beam guardrail connection or no guardrail connection)

NOTES

Either the top or bottom rail in terminal section may be the longer rail.

Railing that is part of terminal is continuous if either the top or bottom rail in the terminal is continuous over a minimum of two posts.

A brace bar is required and shall be placed 2-0 from the splice end of the shorter tube.

The Fabricator shall prepare a sample of the indicated joint and macroetch it to demonstrate that the required effective throat is achieved.

See Dwg. No. SBR-W740 for additional rail details.

NOTES

Either the top or bottom rail in terminal section may be the longer rail.

Railing that is part of terminal is continuous if either the top or bottom rail in the terminal is continuous over a minimum of two posts.

A brace bar is required and shall be placed 2-0 from the splice end of the shorter tube.

The Fabricator shall prepare a sample of the indicated joint and macroetch it to demonstrate that the required effective throat is achieved.

See Dwg. No. SBR-W830 for additional rail details.
**NOTES**

**PLACEMENT:** Do not place concrete barrier for at least 72 hours after barrier cast.

**REFLECTORS:** Place a white reflector on top of concrete barrier at 10'-0" spacing between beams of barrier. See OR Dep. No. 609-93 for reflector detail. Include the cost of reflectors in the unit price bid for Barrier Rail - Cast in Place - Br. - See Specifications.

**PAYMENT:** Include all costs associated with reinforcing steel in the unit price of the Item 75A unit price bid for Railing Steel - epoxy coated. Include all costs associated with the barrier in the unit price bid for Barrier Rail - Cast in Place - Br. - See Specifications.

**EXCEPTIONS:** Use listing shown on this drawing only as they apply to this project. Any other details may vary. Refer to other drawings for variations in these details.

**RAIL DESIGN CAPACITY:**

**-** = Use reinforcing steel conforming to AASHTO M 270, Grade 60 for rebar being welded to loops.

**-** = Use connecting pins conforming to AASHTO M 270, Grade 36.

**-** = Use reinforcing steel conforming to ASTM A 653 or AASHTO M 111. Galvanize expansion bolts, conduit, and washers in accordance with AASHTO M 111.

**-** = Connect reinforcing steel in accordance with AWS D1.4. Do not place the welded assembly in the unit price bid for Reinforcing Steel - Epoxy Coated. Do not tack weld the pieces together prior to welding. Use a set of pins and washer in accordance with the current edition of AWS D1.4. Do not use any fasteners or clamping assembly in the form until it has been inspected.

**-** = AASHTO M 111. Galvanize plates in accordance with the current edition of AWS D1.4.

**LOCATIONS:** Use connecting plate conforming to AASHTO M 270, Grade 36.

**CONNECTING PIN DETAIL:**

**NOTE:** Use connecting plate conforming to AASHTO M 270, Grade 36.

**DETAIL AT FIXED END BENT:**

**NOTE:** Weld reinforcing bar to loop using 1/4" E8018 rod. Do not tack weld the pieces together prior to welding. Use a set of pins and washer in accordance with the current edition of AWS D1.4. Do not use any fasteners or clamping assembly in the form until it has been inspected.

**DETAIL AT INTERMEDIATE BENT:**

**NOTE:** Use reinforcing steel conforming to AASHTO M 270, Grade 60 for rebar being welded to loops.

**DETAIL AT FIXED END BENT:**

**NOTE:** Cold bend the loops by using a jig that will produce smooth round bars conforming to AASHTO M 270, Grade 60 for rebar being welded to loops.

**DETAIL AT FIXED END BENT:**

**NOTE:** Weld reinforcing bar to loop using 1/4" E8018 rod. Do not tack weld the pieces together prior to welding. Use a set of pins and washer in accordance with the current edition of AWS D1.4. Do not use any fasteners or clamping assembly in the form until it has been inspected.

**DETAIL AT FIXED END BENT:**

**NOTE:** Use reinforcing steel conforming to AASHTO M 270, Grade 60 for rebar being welded to loops.

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**DETAIL AT FIXED END BENT:**

**NOTE:** Use reinforcing steel conforming to AASHTO M 270, Grade 60 for rebar being welded to loops.
**NOTES**

**FABRICATION:** Consider this rail system an ancillary item for the purposes of payment. Use details shown on this drawing only as they apply to the project. Anchor details may vary. Refer to other drawings for variations in these details.

**PAINTING:** Paint all posts, structural tubing and plates (except as noted) meeting the requirements of subsection 711.16 of the Standard Specifications. Paint all exposed corners as noted. Paint the top of the barrier under each rail post to a minimum wall thickness of 1/8".

**CONCRETE BARRIER:** Do not provide a tube splice in the first panel unless it crosses an expansion joint. Bush hammering is acceptable only to remove high spots.

**EROSION:** Set the rail parallel to the top of barrier. Adjust the rail to the project right-of-way using micrometer shims.

**PLACING:** Finish the top of the barrier under each rail post to a minimum wall thickness of 1/8" in these details.

**CONCRETE BARRIER:** Do not provide a tube splice in the first panel unless it crosses an expansion joint. Bush hammering is acceptable only to remove high spots.

**EROSION:** Set the rail parallel to the top of barrier. Adjust the rail to the project right-of-way using micrometer shims.

**PLACING:** Finish the top of the barrier under each rail post to a minimum wall thickness of 1/8".

**CONCRETE BARRIER:** Do not provide a tube splice in the first panel unless it crosses an expansion joint. Bush hammering is acceptable only to remove high spots.

**EROSION:** Set the rail parallel to the top of barrier. Adjust the rail to the project right-of-way using micrometer shims.

**PLACING:** Finish the top of the barrier under each rail post to a minimum wall thickness of 1/8".

**CONCRETE BARRIER:** Do not provide a tube splice in the first panel unless it crosses an expansion joint. Bush hammering is acceptable only to remove high spots.
Drilled foundation

Anchor bolt assembly

Drilled hole in post flange

Penetrated next to post

Place the first surface (drill or punch)

<table>
<thead>
<tr>
<th>Slotted hole in post flange</th>
</tr>
</thead>
</table>
| 11
| 16
| " Ø x 2'-0" galvanized high tensile strength stud bolts (ASTM A 449) 4 per post (2" thread both ends)

T101 post anchor bolt location

Bill of reinforcing steel

FOR ONE ANCHOR POST ONLY

(TALL DIMENSIONS ARE OUT TO OUT)

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>No.</th>
<th>Length</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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</thead>
<tbody>
<tr>
<td>1271</td>
<td>9/16</td>
<td>2</td>
<td>STR 6-10</td>
<td>6.10</td>
<td>3.28</td>
<td>0.03</td>
<td>0.06</td>
<td>0.06</td>
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</tbody>
</table>

Notes

(1) Anchor bolt is paid for in the unit price bid which is full compensation for all resources necessary to complete the item.

(2) Use Class DD-Bridge Concrete. Estimated volume per foundation = 1.9 cubic yards for all resources necessary to complete the item.

(3) Use new deformed type reinforcing steel meeting the requirements of ASTM A 615 Grade 60. Estimated weight per foundation = 1.3 tons. Construct the portion of the approach fills, where the drilled foundation is constructed, of select material meeting the specified requirements for embankments. See Std. Dwg. No. MDR-T101 for additional notes and details.

(4) Finish the top of the foundation under each rail post to a smooth and uniform surface to assure a proper alignment of the post and a tight fit between the fiber reinforced pad and concrete. Bush hammering is acceptable only to remove high spots.

(5) Set rail posts perpendicular to roadway grade and set rail parallel to roadway grades. Adjust to proper rail height using vertical sides in the old posts or new post boxes.

(6) The top of the foundation under each rail post is to be smooth and uniform in thickness and a tight fit between the fiber reinforced pad and concrete. Bush hammering is acceptable only to remove high spots.
Classification for solid bridging is Beams and Stringers. Use treated timber meeting the requirements for numerical stress values shown on the table below for Dense No. 1 timber Douglas Fir, Western Larch or Pacific Coast Douglas Fir conforming to AASHTO M 168 meeting the Standard Specifications. Galvanizing the posts, structural tubing and plates in accordance with using vertical slots in rail posts.

Revise Timber Bridge Rail - T101 for payment is the distance between centerlines of the drilled foundation anchor posts as shown on this sheet (See Summary Table below). Use posts and plates conforming to AASHTO M 270 Grade 36T3. Use metal guardrail conforming to AASHTO M 180 to stringer to hold in position)

Dimensions shown on this drawing apply to both sides for the entire length of the structure.

Remove existing rails, rail posts, curb and hardware as shown on this drawing. All removed items remain the property of the State. Fasteners for State rail are included in the unit price bid for Revise Timber Bridge Rail - T101.

Replace any timber which is to be incorporated in the rehabilitated structure that is damaged during construction at no additional cost to the State.

Removal costs are included in the unit price bid for Revise Timber Bridge Rail - T101.

Remove existing rail, rail posts, curb and hardware as shown on this drawing. All removed items remain the property of the State. Fasteners for State rail are included in the unit price bid for Revise Timber Bridge Rail - T101.

Request length of tube members continuously in a minimum of three places.

For the purpose of fabrication, this rail system is considered an ancillary item. The requirements of subsection 1.5.5 of AASHTO/AWS D1.5 apply.
This Load Cell, Hemispherical Bearing, Jack, Base Plate, Dial Indicators and their support systems, and Timber Block furnished by the contractor. Include all notes associated with furnishing and installing these items in the unit price bid for Static Load Test.

Estimated weight of Static Load Test Frame for handling:

Steel Pile Assembly = 7.0 Tons

Girder Only = 6.0 Tons

Details shown for steel pipe piles. The details for H-Piles are similar except as noted.

Handle Static Load Test Frame by crane only.

NOTES

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<tr>
<td>550</td>
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<tr>
<td>650</td>
<td>18&quot;</td>
</tr>
<tr>
<td>750</td>
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</tr>
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</table>
PILE EXTENSION AFTER DRIVING

45°

PILE EXTENSION BEFORE DRIVING

45°

WEB & FLANGE DETAIL

BEVEL TOP MEMBER ONLY

CLEAN ROOT OF WELD BY GRINDING OR AIR-ARC GOUGING. REMOVE TO SOUND METAL BEFORE WELDING THIS SIDE.

WEB & FLANGE DETAIL

BEVEL TOP MEMBER ONLY

CLEAN ROOT OF WELD BY GRINDING OR AIR-ARC GOUGING. REMOVE TO SOUND METAL BEFORE WELDING THIS SIDE.

WEB & FLANGE DETAIL

BEVEL TOP MEMBER ONLY

CLEAN ROOT OF WELD BY GRINDING OR AIR-ARC GOUGING. REMOVE TO SOUND METAL BEFORE WELDING THIS SIDE.

FIELD CRIMPING DETAIL FOR CUT-OFF EXTENSIONS

FIRST STEP:
Burn cut slits in valleys.

SECOND STEP:
Crimp with four or six stingers.

THIRD STEP:
Insert field crimped end into pile to be extended. Fit snug and weld.

FACTORY CRIMPED EXTENSION

FIELD CRIMPED EXTENSION

WELDED SPLICES FOR STEEL FLUTED PILES

PIPE WALL DETAIL

SUBSEQUENT PASS:
3/8" thick (maximum)

ROOT PASS:
3/8" thick (maximum)

WEB & FLANGE DETAIL

BEVEL UPPER MEMBER ONLY

CLEAN ROOT OF WELD BY GRINDING OR AIR-ARC GOUGING. REMOVE TO SOUND METAL BEFORE WELDING THIS SIDE.

WEB & FLANGE DETAIL

BEVEL UPPER MEMBER ONLY

CLEAN ROOT OF WELD BY GRINDING OR AIR-ARC GOUGING. REMOVE TO SOUND METAL BEFORE WELDING THIS SIDE.

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FACTORY CRIMPED EXTENSION

FIELD CRIMPED EXTENSION

WELDED SPLICES FOR STEEL FLUTED PILES

PIPE WALL DETAIL

SUBSEQUENT PASS:
3/8" thick (maximum)

ROOT PASS:
3/8" thick (maximum)

WEB & FLANGE DETAIL

BEVEL LOWER MEMBER ONLY

CLEAN ROOT OF WELD BY GRINDING OR AIR-ARC GOUGING. REMOVE TO SOUND METAL BEFORE WELDING THIS SIDE.

WEB & FLANGE DETAIL

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FIELD CRIMPING DETAIL FOR CUT-OFF EXTENSIONS

FIRST STEP:
Burn cut slits in valleys.

SECOND STEP:
Crimp with four or six stingers.

THIRD STEP:
Insert field crimped end into pile to be extended. Fit snug and weld.

FACTORY CRIMPED EXTENSION

FIELD CRIMPED EXTENSION

WELDED SPLICES FOR STEEL FLUTED PILES

PIPE WALL DETAIL

SUBSEQUENT PASS:
3/8" thick (maximum)

ROOT PASS:
3/8" thick (maximum)

WEB & FLANGE DETAIL

BEVEL LOWER MEMBER ONLY

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3/8" thick (maximum)

ROOT PASS:
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FIELD CRIMPED EXTENSION

WELDED SPLICES FOR STEEL FLUTED PILES

PIPE WALL DETAIL

SUBSEQUENT PASS:
3/8" thick (maximum)

ROOT PASS:
3/8" thick (maximum)
BRIDGE TABLES

SHEET – 1
QUANTITIES TABLE NEW
QUANTITIES TABLE REHAB MAJOR
QUANTITIES TABLE REHAB MINOR

SHEET – 2
HYDRAULIC BASE FLOOD
HYDRAULIC CANAL
HYDRAULIC DESIGN FLOOD
BULB – TEE DIMENSIONS
COORDINATE TABLE FOOTING
COORDINATE TABLE GRADING
CURVE DATA
DEAD LOAD DEFLECTION 1
DEAD LOAD DEFLECTION 2
DESIGN PARAMETERS PRESTRESS
DESIGN PILE INFORMATION
DESIGN DS INFORMATION
EXPANSION GAPS
EXPANSION GAPS WITH ADJUSTMENT
SHOE FIXED ADJUSTMENTS
SHOE MOVEMENTS
SHOE MOVEMENTS WITH ADJUSTMENT
TABLE OF ELEVATIONS

SHEET – 3
BEARING DESIGN
CAMBER TABLE
DESIGN INFO STEEL
FIELD SPLICE PLATES
GIRDER DATA
GIRDER THROW
STRINGLINE SLOPE
SHEET – 4
ABBREVIATIONS
BAR MARKS LOCATION
BARRIER LENGTHS
DECK CONDITIONS SURVEY SUMMARY
POST TENSION TENDONS
REBAR LAP LENGTHS
REMOVAL & OVERLAY DEPTHS
WORK SUMMARY
### ESTIMATED BRIDGE PLAN QUANTITIES

**FORM: QUANTITIES_TABLE_REHAB_MAJOR**  
**REVISED: 5/1/17**

<table>
<thead>
<tr>
<th>MDT STRUCTURE ID</th>
<th>FEATURE CROSSED</th>
<th>ROUTE</th>
<th>REFERENCE</th>
<th>LOCATION</th>
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<tbody>
<tr>
<td>BENT NO. 1</td>
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<tr>
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**TOTAL**

<table>
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<tr>
<th>LENGTH (FT)</th>
<th>CONCRETE CLASS - STRUCTURE (yd³)</th>
<th>CONCRETE CLASS - DECK (yd³)</th>
<th>TRANSVERSE DECK GROOVING (yd³)</th>
<th>PRESTRESSED BEAMS TYPE XXX (FT)</th>
<th>REINFORCING STEEL</th>
<th>BRIDGE RAIL T/F (FT)</th>
<th>RE-DRIVE TEST PILE (EACH)</th>
<th>STATIC LOAD TEST (EACH)</th>
<th>DYNAMIC LOAD TEST (EACH)</th>
<th>16&quot;X 1/2&quot; WALL THICKNESS STEEL TYPE PILES</th>
<th>CONCRETE WIND DRIVING POINT (EACH)</th>
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<tbody>
<tr>
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### ESTIMATED BRIDGE PLAN QUANTITIES

**FORM: QUANTITIES_TABLE_REHAB_MINOR**  
**REVISED: 5/1/17**

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<th>GENERAL LAYOUT DRAWING NO.</th>
<th>TRANSVERSE DECK GROOVING (yd³)</th>
<th>JOINT SEALS POLYURETHANE (IN FT)</th>
<th>BRIDGE DECK MILLING (yd³)</th>
<th>CLASS A BRIDGE DECK REPAIR (yd³)</th>
<th>CLASS B BRIDGE DECK REPAIR (yd³)</th>
<th>POLYMER OVERLAY (yd³)</th>
<th>POLYMER OVERLAY (yd³)</th>
<th>CONCRETE DECK PREPARE (yd³)</th>
<th>REVERSE BRIDGE RAIL - CONCRETE BARRIER (IN FT)</th>
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<tbody>
<tr>
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</table>

**TOTAL**

| PROJECT TOTAL | 0               | 0               | 0               | 0               | 0               | 0               | 0                 | 0               | 0               | 0               | 0               | 0               | 0               |

**NOTE:** Concrete - Class Overlay quantities are based on the minimum overlay thickness specified on Sheet No. 32. Hydrodemolition may result in increased removal limits and increased overlay quantities.

### ESTIMATED BRIDGE PLAN QUANTITIES

**FORM: QUANTITIES_TABLE_NEW**  
**REVISED: 5/1/17**

<table>
<thead>
<tr>
<th>MDT STRUCTURE ID</th>
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<th>REFERENCE</th>
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<tr>
<td>BENT NO. 2</td>
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<tr>
<td>SUPERSTRUCTURE</td>
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**TOTAL**

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<th>REMOVE DECK (yd³)</th>
<th>CONCRETE CLASS DECK (yd³)</th>
<th>TRANSVERSE DECK GROOVING (yd³)</th>
<th>BRIDGE DECK HYDRODEMOLITION (yd³)</th>
<th>REINFORCING STEEL</th>
<th>CLASS A REPAIR (yd³)</th>
<th>CLASS B REPAIR (yd³)</th>
<th>CONCRETE LATEX MODIFIED (yd³)</th>
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<td>0</td>
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<tr>
<td>SUBTOTAL</td>
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**TOTAL**

| BENT NO. 1       |                 |       |           |          |
| BENT NO. 2       |                 |       |           |          |
| SUPERSTRUCTURE    |                 |       |           |          |

**SUBTOTAL**

| PROJECT TOTAL | 0               | 0               | 0               | 0               | 0               | 0               | 0                             |

MDT CADD Memos and Guidance | Design Guidance | Common Bridge Details & Notes Guide | Released 05/01/2017
### HYDRAULIC DATA

<table>
<thead>
<tr>
<th>Drv</th>
<th>Ax</th>
<th>Low Scour Elevation (Q100)</th>
<th>E. Ax</th>
<th>Q100 Elev. (Route)</th>
<th>Q100 Elev.</th>
<th>Actual Low Beam Elev.</th>
<th>Allowable Low Beam Elev.</th>
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### COORD TABLE GRADING

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<thead>
<tr>
<th>POINT NUMBER</th>
<th>X</th>
<th>Y</th>
<th>DESCRIPTION</th>
</tr>
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<tr>
<td></td>
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### COORD TABLE FOOTING

<table>
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<th>X</th>
<th>Y</th>
<th>DESCRIPTION</th>
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<tbody>
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### CURVE DATA

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<tr>
<th>PI</th>
<th>R</th>
<th>T</th>
<th>E</th>
<th>X</th>
<th>L</th>
<th>S</th>
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<th>T2</th>
<th>T3</th>
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</tbody>
</table>

### TABLE OF EXPANSION SHOE MOVEMENTS

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>TEMPERATURE (°F)</th>
<th>Adjustment for 1/8&quot; Movement (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-40 -20 0 20 30 60 90 115</td>
<td></td>
</tr>
<tr>
<td>BENT NO. 1</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>BENT NO. 4</td>
<td>A</td>
<td>B</td>
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</tbody>
</table>

### EXPANSION GAPS

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>TEMPERATURE (°F)</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-40 -20 0 20 30 60 90 115</td>
<td></td>
</tr>
<tr>
<td>BENT NO. 1</td>
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<td>B</td>
</tr>
<tr>
<td>BENT NO. 4</td>
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<td>B</td>
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### EXPANSION GAPS_W_ADJUSTMENT

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>TEMPERATURE (°F)</th>
<th>adjustment for 1/8&quot; Movement (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>-40 -20 0 20 30 60 90 115</td>
<td></td>
</tr>
<tr>
<td>BENT NO. 1</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>BENT NO. 4</td>
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<td>B</td>
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</tbody>
</table>

### TABLE OF FIXED SHOE ADJUSTMENTS

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<th>MARK</th>
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<td>A</td>
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<td>B</td>
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</table>

### DNB - TEE DIMENSIONS

<table>
<thead>
<tr>
<th>ELEVATION</th>
<th>BENT NO. 1</th>
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<tr>
<td>A</td>
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<td>C</td>
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<tr>
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### TABLE OF ELEVATIONS

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>INTERIOR BEAM</th>
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<tr>
<td>A</td>
<td>B</td>
<td>C</td>
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<tr>
<td>B</td>
<td>D</td>
<td>E</td>
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### DEAD LOAD DEFLECTION TABLE

<table>
<thead>
<tr>
<th>TYPE XXX PRESTRESSED CONCRETE BEAM</th>
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<tbody>
<tr>
<td>SPAN LENGTH</td>
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<tr>
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<td></td>
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### PRESTRESSED BEAM DESIGN PARAMETERS

- AASHTO Specifications: LRFD 7th edition with 2014 Interims
- Structure Type: Single Span
- Deck Concrete Strength: 4000 psi
- Deck Concrete Density: 150 lb/ft³
- Prestressing Strand: 270 ksi Low Relaxation (0.500" or 0.600" diameter)
- Shear Reinforcement: AASHTO M31 Grade 60
- Alternate Shear Reinforcement: Welded Wire Reinforcement - AASHTO M35, M321, or M54
- Section Property Calculations: Gross Section
- Prestress Loss Method: Approximate Losses per LRFD 5.0.5 and 5.0.3.3
- Shear Calculation Method: Sectional Model per LRFD 5.8.3
- Beam / Slab Interface: Tensionally Routed to 1/4" amplitude
- Load Rating Requirements: AASHTO/LRFD Design Load

### PILE INFORMATION

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>FLEET</th>
<th>MAXIMUM FLEET OF ELAVATION (Ft)</th>
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<th>MAXIMUM PILE REACTION UNDER SERVICE I</th>
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### FORM: DESIGN PILE INFORMATION

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<th>LOCATION</th>
<th>MAXIMUM PILE END ELEVATION (Ft)</th>
<th>MAXIMUM PILE END ELEVATION (Ft)</th>
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### FORM: DRILLED SHAFT INFORMATION

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### FORM: FORMS TABLES SHEET - 2

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### FORM: HYDRAULIC_BASE_FLOOD

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<tr>
<td>A</td>
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<td>XXX °F</td>
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### FORM: HYDRAULIC_CANAL

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<td>A</td>
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<tr>
<td>B</td>
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### FORM: HYDRAULIC_DESIGN_FLOOD

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</tr>
<tr>
<td>A</td>
<td>XXX °F</td>
</tr>
<tr>
<td>B</td>
<td>XXX °F</td>
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### FORM: COORD TABLE GRADING

<table>
<thead>
<tr>
<th>POINT NUMBER</th>
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<th>Y</th>
<th>DESCRIPTION</th>
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### FORM: HYDRAULIC_Bdivide FLOOD

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<tr>
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<tr>
<td>B</td>
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### FORM: HYDRAULIC_CANAL

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### FORM: CURVE DATA

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<td>XXX °F</td>
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### TABLE OF EXPANSION SHOE MOVEMENTS

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<td></td>
</tr>
<tr>
<td>BENT NO. 1</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>BENT NO. 4</td>
<td>A</td>
<td>B</td>
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### EXPANSION GAPS

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<tr>
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<td>B</td>
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<tr>
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### DNB - TEE DIMENSIONS

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<td>B</td>
<td>C</td>
</tr>
<tr>
<td>B</td>
<td>D</td>
<td>E</td>
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### TABLE OF ELEVATIONS

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<th>EXTERIOR BEAM</th>
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<tr>
<td>B</td>
<td>D</td>
<td>E</td>
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### DEAD LOAD DEFLECTION TABLE

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<td>SPAN LENGTH</td>
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### PRESTRESSED BEAM LOAD TABLE

- Load Rating Requirements: AASHTO/LRFD Design Load
### TABLE OF CAMBER INFORMATION

<table>
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<th>SPAN 1</th>
<th>SPAN 2</th>
<th>SPAN 3</th>
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<tbody>
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### TABLE OF DESIGN INFORMATION

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<td>ORDER 01 &amp; 02</td>
<td>ORDER 01 &amp; 03</td>
<td>ORDER 01 &amp; 03</td>
<td>ORDER 01 &amp; 03</td>
<td>ORDER 01 &amp; 03</td>
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### FIELD SPlice PLATE INFORMATION

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<th>FIELD SPlice 1</th>
<th>FIELD SPlice 2</th>
<th>FIELD SPlice 3</th>
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<tr>
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<td>SECTION A</td>
<td>SECTION A</td>
<td>SECTION A</td>
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<tr>
<td>TOP FLANGE TOP PLATE</td>
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</tr>
<tr>
<td>TOP FLANGE FILLER PLATE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOP FLANGE</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>TOP FLANGE BOTTOM PLATE</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>BOTTOM FLANGE TOP PLATE</td>
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<td>BOTTOM FLANGE</td>
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<td>BOTTOM FLANGE FILLER PLATE</td>
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<td>BOTTOM FLANGE BOTTOM PLATE</td>
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### BEARING DESIGN TABLE (SERVICE | LIMIT STATE)

<table>
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<tr>
<th>AASHTO Design Method</th>
<th>Elaboration Grade</th>
<th>Elaboration Part Unladen Height</th>
<th>Total Bearing Assembly Unladen Height</th>
<th>Shear Modulus at 75°F</th>
<th>Dead Load Reaction</th>
<th>Live Load Reaction (without regard)</th>
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</thead>
</table>
### Bridge Work Summary

<table>
<thead>
<tr>
<th>CLASS A DECK REPAIR</th>
<th>CLASS B DECK REPAIR</th>
<th>THICK CONCRETE OVERLAY</th>
<th>TRANSVERSE DECK GROOVING</th>
<th>THIN POLYMER OVERLAY</th>
<th>BRIDGE DECK CRACK SEAL</th>
<th>REVISE BRIDGE RAIL</th>
<th>JOINT SEAL POLYURETHANE</th>
<th>REPLACE EXPANSION JOINT</th>
<th>REMOVE GUARD ANGEL</th>
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</thead>
</table>

### Deck Condition Survey Summary

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th>DELAMINATED AREA (SQ.YD)</th>
<th>AVERAGE COMRESSIVE STRENGTH (PSI)</th>
<th>DATE OF SURVEY</th>
</tr>
</thead>
</table>

A bridge deck condition survey was performed on the structure. The complete set of field investigation and test results is considered too voluminous to include in the listing package. This information is available for review upon request. Contact the inspection/operations supervisor at [phone number] XXX-XXXX to review the full listing information. Bridge deck condition surveys are not warranted to be representative of the actual conditions encountered.

### Table of Removal and Overlay Depths

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th>DECK TREATMENT</th>
<th>REMOVAL DEPTH (IN)</th>
<th>OVERLAY THICKNESS (IN)</th>
<th>TOTAL GRADING RISE (IN)</th>
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</thead>
</table>

### Barrier Lengths

<table>
<thead>
<tr>
<th>BARRIER LENGTHS</th>
<th>RIGHT SIDE</th>
<th>LEFT SIDE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Right Side</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>Right Side</td>
<td>Left Side</td>
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</tbody>
</table>

The suffix E denotes epoxy coated reinforcing.

### Table of Post Tension Tendons

<table>
<thead>
<tr>
<th>NUMBER &amp; SIZE</th>
<th>STRESSING FORCE (PSI)</th>
<th>TENDON LENGTH (FT)</th>
<th>WEIGHT / TENDON (LB)</th>
<th>NUMBER OF TENDONS</th>
<th>TOTAL WEIGHT (LB)</th>
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</thead>
</table>

### Transverse Voided Slab Tendons

<table>
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<tr>
<th>NUMBER &amp; SIZE</th>
<th>STRESSING FORCE (PSI)</th>
<th>TENDON LENGTH (FT)</th>
<th>WEIGHT / TENDON (LB)</th>
<th>NUMBER OF TENDONS</th>
<th>TOTAL WEIGHT (LB)</th>
</tr>
</thead>
</table>

### ABBREVIATIONS

- P.F. - Prestress
- F.P. - Field Protect
- N.F. - Near Face
- E.F. - East Face
- B.C. - Bottom of Cap
- B.F. - Bottom of Footing
- T.C. - Top of Cap
- T.F. - Top of Footing

The suffix E denotes epoxy coated reinforcing.

### Rebar Lap Lengths

<table>
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<tr>
<td>#3 OR #3W</td>
<td>2-2</td>
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<tr>
<td>#6 OR #6W</td>
<td>2-7</td>
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<tr>
<td>#7 OR #7W</td>
<td>3-3</td>
</tr>
<tr>
<td>#8 OR #8W</td>
<td>4-3</td>
</tr>
<tr>
<td>#9 OR #9W</td>
<td>5-4</td>
</tr>
<tr>
<td>#10 OR #10W</td>
<td>6-9</td>
</tr>
<tr>
<td>#11 OR #11W</td>
<td>7-11</td>
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<td>#12 OR #12W</td>
<td>8-4</td>
</tr>
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<td>#13 OR #13W</td>
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<table>
<thead>
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<th>LOCATION</th>
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<tbody>
<tr>
<td>C</td>
<td>CAP</td>
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<tr>
<td>B</td>
<td>BARRIER</td>
</tr>
<tr>
<td>BS</td>
<td>BEAM SEATS</td>
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<tr>
<td>BW</td>
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<td>DRILLED SHAFT</td>
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<td>PIER</td>
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<td>R</td>
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</tr>
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<td>T</td>
<td>TIES</td>
</tr>
<tr>
<td>WW</td>
<td>WINGWALL</td>
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The suffix E denotes epoxy coated reinforcing.

### Rebar Bar Marks Locations

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<td>2-1</td>
</tr>
<tr>
<td>#7</td>
<td>3-3</td>
</tr>
<tr>
<td>#8</td>
<td>3-10</td>
</tr>
<tr>
<td>#9</td>
<td>4-6</td>
</tr>
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<td>#10</td>
<td>5-4</td>
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<tr>
<td>#11</td>
<td>6-9</td>
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<td>7-11</td>
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<tr>
<td>#14</td>
<td>8-7</td>
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The suffix E denotes epoxy coated reinforcing.
MISCELLANEOUS DETAILS

STANDARD REBAR BENDS AND HOOKS
STANDARD REBAR SHAPE CELLS - SHEET 1
STANDARD REBAR SHAPE CELLS - SHEET 2
OLD STANDARD BRIDGE RAILS
STANDARD BRIDGE BORDER - QSHEET
STANDARD BRIDGE BORDER - QSHEET CNST
STANDARD BRIDGE BORDER
### RECOMMENDED END HOOKS

<table>
<thead>
<tr>
<th>BAR SIZE</th>
<th>D</th>
<th>180° HOOKS</th>
<th>90° HOOKS</th>
<th>OUTSIDE RADIUS</th>
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</thead>
<tbody>
<tr>
<td># 3</td>
<td>2A</td>
<td>6&quot;  4A  6°</td>
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<td></td>
</tr>
<tr>
<td># 4</td>
<td>3A</td>
<td>8&quot;  4A  6°</td>
<td>0°  1\frac{1}{2}&quot;</td>
<td></td>
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<tr>
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<td>10&quot; 10A 10°</td>
<td>0°  1\frac{1}{2}&quot;</td>
<td></td>
</tr>
<tr>
<td># 6</td>
<td>12A</td>
<td>12&quot; 12A 12°</td>
<td>0°  1\frac{1}{2}&quot;</td>
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<tr>
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### STIRRUP / TIE HOOK

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<th>135° HOOKS</th>
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</thead>
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<td># 4</td>
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<td>8&quot;  4A  6°</td>
<td>0°  1\frac{1}{2}&quot;</td>
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<tr>
<td># 5</td>
<td>10A</td>
<td>10&quot; 10A 10°</td>
<td>0°  1\frac{1}{2}&quot;</td>
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<tr>
<td># 6</td>
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<td>12&quot; 12A 12°</td>
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### 135° SEISMIC STIRRUP / TIE HOOK

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<th>OUTSIDE RADIUS</th>
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<tr>
<td># 4</td>
<td>3A</td>
<td>8&quot;  4A  6°</td>
<td>0°  1\frac{1}{2}&quot;</td>
</tr>
<tr>
<td># 5</td>
<td>10A</td>
<td>10&quot; 10A 10°</td>
<td>0°  1\frac{1}{2}&quot;</td>
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<td># 6</td>
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<td>12&quot; 12A 12°</td>
<td>0°  1\frac{1}{2}&quot;</td>
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</tbody>
</table>

**135° HOOK**

*Hook Detailing Dimension: 6d, 3" Minimum*

**90° HOOK**

*Hook Detailing Dimension: 6d, 3" Minimum*

**180° HOOK**

*Hook Detailing Dimension: 6d, 3" Minimum*
# MONTANA DEPARTMENT OF TRANSPORTATION

## BRIDGE PLANS AND QUANTITIES

### FEDERAL AID PROJECT XXXXXX

### XXXX PROJECT

### XXXX COUNTY

### LIST OF DRAWINGS

<table>
<thead>
<tr>
<th>SHEET NO.</th>
<th>DWG. NO.</th>
<th>TITLE</th>
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<tbody>
<tr>
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<td>LIST OF DRAWINGS AND ESTIMATED BRIDGE PLAN QUANTITIES</td>
</tr>
<tr>
<td>B2</td>
<td>XXXXX</td>
<td>GENERAL LAYOUT AT STA. XXXXXX</td>
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<tr>
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<td>XXXXX</td>
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<tr>
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<th>TITLE</th>
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<tbody>
<tr>
<td>MTS [REVISED 5-20-16]</td>
<td>STANDARD PRESTRESSED CONCRETE BEAM TYPE MTS</td>
</tr>
<tr>
<td>SL-8 [REVISED 5-20-16]</td>
<td>STANDARD SLAB AND DIAPHRAGM DETAILS</td>
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# LIST OF DRAWINGS

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<tr>
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<th>DWG. NO.</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
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<td>B1</td>
<td>XXXX</td>
<td>LIST OF DRAWINGS AND ESTIMATED BRIDGE PLAN QUANTITIES</td>
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<tr>
<td>B2</td>
<td>XXXX</td>
<td>GENERAL LAYOUT AT STA. XX+XX00</td>
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<tr>
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<td>XXXXXX</td>
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<th>TITLE</th>
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<tr>
<td>SL-8 [REVISED 5-20-14]</td>
<td>STANDARD SLAB AND DIAPHRAGM DETAILS</td>
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SAMPLE DRAWINGS

Q – SHEET
GENERAL LAYOUT
FOOTING PLAN
END BENT
END BENT DETAILS
INTERMEDIATE BENT
ERECTION PLAN
SLAB DETAILS
## Estimated Bridge Plan Quantities

<table>
<thead>
<tr>
<th>Bridge ID. Number</th>
<th>Location</th>
<th>Length (ft)</th>
<th>Prestressed Slabs Type MTS-54 (ft)</th>
<th>Transverse Deck Grooving (yd²)</th>
<th>Concrete Class - Deck, YD (yd³)</th>
<th>Concrete Class - Structure (yd³)</th>
<th>Rebar (lb)</th>
<th>EFCDY (lb)</th>
<th>Furnish (ft)</th>
<th>Drive (ft)</th>
<th>Conical Driving Point (Each)</th>
<th>Dynamic Load Test (Each)</th>
<th>Bridge Rail (W/300-ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>06381</td>
<td>Bent No. 1</td>
<td>37.6</td>
<td>2098</td>
<td>17.3</td>
<td>229.9</td>
<td>229.9</td>
<td>179.6</td>
<td>171.3</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pier No. 2</td>
<td>37.6</td>
<td>2098</td>
<td>17.3</td>
<td>229.9</td>
<td>229.9</td>
<td>179.6</td>
<td>171.3</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bent No. 3</td>
<td>37.6</td>
<td>2098</td>
<td>17.3</td>
<td>229.9</td>
<td>229.9</td>
<td>179.6</td>
<td>171.3</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superstructure</td>
<td>247.50</td>
<td>1230.0</td>
<td>1047</td>
<td>545.1</td>
<td>62279</td>
<td>5834</td>
<td>483.4</td>
<td>15</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td>504.88</td>
</tr>
<tr>
<td>Total</td>
<td>247.50</td>
<td>1230.0</td>
<td>1047</td>
<td>545.1</td>
<td>62279</td>
<td>5834</td>
<td>483.4</td>
<td>15</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td>504.88</td>
</tr>
</tbody>
</table>
PRESTRESSED BEAM DESIGN PARAMETERS

AASHTO Specifications
LFRD 19 edition with 2014 updates

Structure Type
Simply Supported

Deck Concrete Strength
4000 psi

Deck Concrete Density
150 lb/ft³

Posttensioning Strand
270 ksi Low Relaxation - 0.500" or 0.600" diameters

Shear Reinforcing
AASHTO M-31 Grade 60

Alternate Shear Reinforcing
Wrapped Wire Reinforcement - AASHTO M18, M21 or M24

Section Property Calculations
Gross Section

Posttensioning Load Method
Approximate Loads per LFRD 5.95 and 5.9.5.3

Shear Computation Method
Sectional Model per LFRD 5.8.3

Beam / Slab Interface
Intentionally Roughened to 1/16” amplitude

Load Rating Requirements
AASHTO LRFD Design 2017

PRESTRESSED BEAM LOAD TABLE

<table>
<thead>
<tr>
<th>LOAD TYPE</th>
<th>LOADS</th>
<th>APPLICATION METHOD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barrier Load</td>
<td>0.113 kip/ft rail per</td>
<td>Equality to all beams</td>
</tr>
<tr>
<td>Future Wearing Surface</td>
<td>10 kip/ft² applied between</td>
<td>Equality to all beams</td>
</tr>
<tr>
<td>Interior Grating</td>
<td>3,253 kip/ft² per</td>
<td>All point load</td>
</tr>
<tr>
<td>Exterior Grating</td>
<td>1,406 kip/ft² per</td>
<td>All point load</td>
</tr>
<tr>
<td>Additional Dead Load</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Live Load</td>
<td>LFRD – HL-90</td>
<td>per AASHTO LRFD</td>
</tr>
</tbody>
</table>

DEAD LOAD DEFLECTION TABLE

<table>
<thead>
<tr>
<th>TYPE MTS-04 PRESTRESSED CONCRETE BEAM</th>
<th>SPAN LENGTH</th>
<th>TENTH POINT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.1</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>0”</td>
<td>1”</td>
</tr>
<tr>
<td>123” - 0”</td>
<td>INT. 1”</td>
<td>1.5”</td>
</tr>
<tr>
<td></td>
<td>0.3</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>1”</td>
<td>1.1”</td>
</tr>
</tbody>
</table>

Note: Unconnected symmetrical section U.S. units and do not include dead load.
10. Spaces at about 6" centers = 8-9

SCALE: 1" = 15'-0"

NOTE: C6 #6E hoops spaced at about 8' centers (371 Lines)

S100~#5E Top Transverse bars spaced at about 9" centers (456 Lines)

TYPE T1

See Std. Dwg. No. SL-8 for additional slab, rail and threaded insert details.

Appl. Footnotes

BALFORD BEATTY

FEDERAL AID PROJECT NO.
STPG 209.1(9)4

SHEET NO. 8

REVISED

DATE

DESIGNED

DRAWN

CHECKED

REVISED

FILE ABBR.

MONTEANO DEPARTMENT OF TRANSPORTATION

BRIDGE OVER SWAN RIVER

FLATHEAD & LAKE COUNTIES

REVISED

Pianview

Preliminary

REVISED

BILL OF REINFORCING STEEL

(ALL DIMENSIONS ARE OUT TO OUT)

Mark
Size
No.
Type
Length
A
B
C
D
E
F
G
H

STANDARD - 3/17

STANDARD - 3/17

Lap #4E longitudinal bars 2-0 minimum, 2-4 lap provided.

4" additional per lap splice has been provided for construction tolerances.

Apply #4E longitudinal bars at 1-0 minimum, 3-0 ap provided.
3D PDF

TYPICAL STUB ABUTMENT

TYPICAL PILE SUPPORTED INTERMEDIATE BENT
FOOTNOTES

COMMON NOTES & DETAILS

SAMPLE DRAWINGS
COMMON NOTES & DETAILS

1. Choose the appropriate values from the table to fill in the values in the detail.
2. Use this detail on bridge barrier projects requiring bridge barrier to attach to median rail as shown on Det. Dwg. No. 605-00. This detail requires the details from STD Dwg. No. SL-5 to be part of the plans package. Where there is no conduit in the barrier, remove the conduit and the associated dimensions and the callouts for the Side View.
3. Use these dimensions for all barrier and curb bars.
4. Place these details on the abutment sheets for a Bulb Tee Bridge. Provide similar details for a Tri Deck Bridge.
5. 2” x 3/8” Strap is only necessary when total girder depth exceeds 5’-0.
6. Permissible shop splice locations based on MDT Structures Manual Page 18.7(8) Figure 18.7F.
7. Use the “Base Flood” Hydraulic Data for bridges designed to Q100, for bridges designed for water elevations other than Q100 use the “Design Flood” Hydraulic Data.
SAMPLE DRAWINGS

1. Left and Right profiles cut at faces of outermost rails on each side of CL Roadway rounded to the nearest foot.
2. Do not dimension the cap or the pile locations in relation to the cap. Only dimension the piles and their location with respect to the CL Roadway.
3. Do not show these dimension or callouts on the plans.
4. These are the standard lengths of these bars on Standard Stub Abutments, Piers and Slabs.
5. At abutments always use a 5'-0” seat width at interior beams or 2'-6” from CL Beam toward adjacent beam at exterior beam seats.
6. Bar layout shown is for Std. Stub Abutment, adjust dimensions accordingly.
7. Show bearings and anchor bolts in all views at abutments and intermediate bents.
8. For different drawings for each abutment or a single intermediate bent the table may be omitted and elevations may be placed directly in the Plan View.
9. Reinforcing shown around and over piles is for Seismic Zone A & Minimum lateral loads. Investigate reinforcing for other conditions.
GUIDES

BRIDGE BORING LOG DRAFTING PROCEDURE

BRIDGE REFERENCE POINT LOCATION PROCEDURE

INSERT BRIDGE COMMON DETAILS

DETAIL BRIDGE PLANS IN SINGLE FILE
This Procedure is only for borings that can be generated in microstation format from Geotech.

**NOTE:** All borings will be drafted to have a scale of 1” = 15'-0".

**NOTE:** All borings will be drafted completely in the border in the sheet model.

**NOTE:** Place the SUMMARY OF LOG OF BORINGS below the Footing Plan.

Use only one method of placing borings in the plan sheets. Ex. Hand Drafted or Geotech Produced, if some borings can’t be produced by Geotech, this will require hand drafting of all borings.

### BRIDGE SUMMARY OF LOG OF BORINGS

1) Place borings received from Geotech on DMS.
   a. The borings will need to be requested by email from Geotech. Only request the borings that are relevant to the bridge job. The bridge detailer will receive a microstation file of each boring requested. Name the files as outlined below.
      i. Filename: XXXXXXXBRGBLXXX.DGN
         1. The three digit number at the end of the filename should be the number of the boring ex. (001, 052, 103)
2) Place the Elevation Scale (Cell: OB_AN_Scale) at a scale of 0.0055555 directly in to the border in the sheet model and modify as necessary.
   a. When placing this cell verify that “Scale Annotations” is not checked.
   b. Fill in the scale text using the “Auto Fill In Enter Data Fields”
3) Draw the tracer lines for the scale and borings as required directly in the border in the sheet model.
4) Add a title to the detail (SUMMARY OF LOG OF BORINGS)
5) Reference in the boring directly into the sheet model using the following settings. (Also See Figure 1)
   a. Model = Default
   b. Orientation = Coincident – World
   c. Detail Scale = Full Size 1” = 1”
6) After placing the borings, in the reference dialog box disable the annotation scaling for the borings
7) Move the references to the correct location in the border. (The borings will be referenced in to the sheet model at a location that is well beyond the border limits)
   a. To locate the borings at the correct vertical elevation, place the top of boring at a known elevation and adjust the location vertically by taking the difference in the known elevations (placement elevation and top of boring elevation) divided by 180. This is the distance to move the boring vertically (This value will be in feet) to place at the correct elevation
8) Draw the lines connecting the borings with their respective targets in the Footing Plan. This will also get drawn directly in the border.

The boring files submitted for Geotech may need some standard drafting clean up only to prevent lines from crossing over text. This is the only item that should be changed in the borings.
This Procedure is for locating the reference point that is to be placed on the plan sheets.

**NOTE:** If the coordinates of the new structure are located at a location that is not on a current alignment the system will not return a reference point.

**BRIDGE REFERENCE POINT LOCATION**

1) Open the following link: http://app.mdt.mt.gov/routeidtool/
2) Click the button for “Get location from coordinate” located in the upper right hand corner of the screen.
   a. 
3) Choose the tab “State Plane Feet”
4) Enter the coordinates for the CL Roadway at CL Bridge
   a. These are the coordinates for the station that is displayed in the bridge border.
5) Click “Get Location”
   a. 
6) The map will then zoom to the location of the coordinates.
   a. If the coordinates are not located on an existing route a message will be displayed under the location in which the coordinates were entered stating
   i. No result for Reference Marker Offset returned
7) Click the icon button for “Locate mileage along a Route”

MDT CADD Memos and Guidance | Design Guidance | Common Bridge Details & Notes Guide | Released 05/01/2017
8) Set the "Search Radius" to a distance greater than the distance from the coordinates to the existing route.

9) Click the button "Select Points".

10) In the map view zoom in some on the marker displayed from the coordinate location and click as near to the center point of the circle as possible.
    a. The size of the marker will not change as you zoom in.

11) Click the "Execute" button.

12) The program will automatically switch to the output tab at the top of the box and display the results.

13) You will need the information displayed in the "Reference Marker and Offset" Section of the dialog.
    a. Route_RM Column.
i. The last digits beyond the underscore are the reference marker

b. RM Offset Column

i. This is the reference point in relation to the reference post

14) For the bridge plans the above example will be displayed as the following in the reference point block in the border

a. 142+0.087

i. The reference point requires the following
   1. The plus sign between the reference marker and the reference point
   2. The reference point displayed at 3 decimal places

**BRIDGE ROUTE NUMBER IDENTIFICATION**

1) The Route displayed in the border will be the Department Route Number


2) These can be found in the dialog that will pop up when a route is clicked in the map view

3) The letter at the end of the department route number indicates the roadway direction.

   a. Typically on non-interstate highways this will display as an “N” for north/south highways or “E” for east/west highways
   b. On interstate route this will change depending on the direction of travel on the interstate route.

**FINISHED SHEET BORDER AREA**

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>REFERENCE POINT</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-1E</td>
<td>142+0.087</td>
</tr>
</tbody>
</table>
This procedure is for inserting the common bridge details as models into the plan sheets.

**IMPORT COMMON BRIDGE DETAIL MODEL**

1) Open the Bridge Models Dialog

![Bridge Models Dialog](image1)

2) Click Import Model

![Import Model](image2)

3) Browse to W:\\WORKGROUP\\BRSTD\\CELL

4) Select the file containing the models
   a. BridgeDetailModels.dgn

5) Choose the model which you want to import and click OK.
   a. Model names match the detail names shown in the Common Bridge Details and Notes Guide

![Select Models](image3)
6) After selecting OK the new model will automatically open in the current microstation file
   a. This detail may now be edited directly if need in this location
   b. This detail now has the annotation scaling correctly set for the specific detail that
      which will be the scale it is inserted into the plans at

REFERENCE ABOVE DETAIL INTO PLANS
1) In the Bridge Models dialog switch to the sheet model in which the detail will be referenced
2) Select the new model that is to be placed in the sheet border and drag it out of the bridge
   models dialog and to the sheet itself. (Click and Drag)
3) Once the mouse button is released a dialog box will appear informing you that you are
   about to reference a file.
   a. Select Ok in this dialog box
4) An outline of the applicable model view will be visible. This is the extents of the detail that
   is going to be placed in the sheet.
   a. Locate the detail in the appropriate location and right click to accept.
5) A microstation drawing title will appear with the detail, this needs to be removed.
   a. Delete this drawing title
   b. After selecting delete the following dialog will appear asking about deleting the
      reference or just the drawing title
   c. Click “No” in this dialog box

The detail is now referenced into the microstation sheet
SINGLE FILE BRIDGE PLANS FLOW CHART

This guide will layout the process for detailing the bridge in one single design file.

This guide is written using the 1000-unit workspace. The procedure is the same for the 10,000-unit workspace.

FILE SETUP

1) Create a new design file
   a. Filename: XXXXXXBRMAP001.DGN where XXXXXX is the project UPN Number
   b. Seed File: BR_GP_SEED_SINGLE
      i. The new file will contain the following models
         1. Design
            a. Drafting of the bridge objects will take place in this model
         2. Profiles
            a. The existing ground profiles and finished grade profile
         3. Drawing Seed
            a. This is the seed file for all new drawing models in the design
         4. Sheet Seed
            a. This is the seed file for all new sheets in the design
         5. Sheet Project Info
            a. Contains all the project specific border information

2) Open the “Sheet Project Info” Model
   a. Revise the text that is common to all sheets for that bridge in the border
      i. This is the blue text

3) Detail all bridge plans in the “Design” Model, except for the general layout profiles
   a. Do not dimension or annotate anything in the “Design” model. All this will be done in the “Drawing Model

4) Place the general layout profiles in the “Profiles” model and reference these into the “Design” model.
DRAWING MODEL CREATION

1) Create a saved view of the detail

2) In the create saved view Dialog box set the following settings
   a. Name: Use MDT Standard file class and the title of the detail. Ex. GEN_Plan
   b. Method: From View
   c. View Type: Saved View
   d. Create Drawing: Verify that this is checked on

3) Click to accept the current view

4) In the create Drawing Dialog box set the following settings
   a. Create Drawing: Checked On
   b. Seed Model: Microstation should default to the file that is shown above
   c. Annotation Scale: This is the scale that the drawing will be placed on the sheet at
   d. Create Sheet Model: Do NOT check this box
      i. Sheets need to be created by the method above
   e. Open Model: Check this box on

5) Select OK
a. Microstation will take you to the new drawing model that was just created
b. In this new model dimension and annotate the detail

**SHEET MODEL CREATION**

1) Open the Microstation Models Dialog Box
2) Choose create new model

![Image of Microstation Models Dialog Box]

3) In the create model Dialog box set the following settings
   a. Type: Sheet from seed
   b. Seed Model: “Sheet Seed” from the current file models list of the XXXXXXXBRMAP001 file you are working in.
   c. Name: Use MDT Standard file class and Series Number. Ex. GEN001.
   d. Description: The sheet name that will appear in the border of the sheet
      i. The file will use this to fill in the title in the border.
   e. Sheet Name: The sheet number of the sheet in the plan set
      i. The file will use this to fill in the sheet number in the border
      ii. Sheet Number: Use 0 for preliminary sheets until drawing numbers are assigned.
         1. The file will use this to fill in the drawing number in the border.
            a. Letters are not allowed in this field
   f. Ensure the following items are set and match the image below
      i. Annotation Scale 1” = 1”
      ii. Propagate Annotation Scale checked on

![Image of create model Dialog box with settings]
iii. Update Fields Automatically checked on
iv. Display Sheet Boundary check on
   1. Verify the size and origin match what is shown above
4) Select Ok
   a. Microstation will take you to the new sheet model that was just created
   i. All border information will be filled in except:
      1. Drawing Scale
      2. Design, Drawn, & Checked Fields

**PLAN SHEET CREATION**

1) Drag and drop the newly created drawing models in the appropriate sheets
   a. See Insert Bridge Common Details Guide for procedure.
2) Create a saved view of each sheet with the proper levels turned on or off.
   a. Name: DWG_XX
      i. Where “XX” is the sheet number
3) Fill in the following items in the border
   a. Drawing Scale
   b. Design, Drawn, & Checked Fields
      i. Drawn By will be auto populated by the “Sheet Project Info” model text.

**PLAN SHEET CREATION FOR CPB**

*NOTE:* Docuplot requires a separate file for each plan sheet for it to process a Contract Plans Book (CPB)

1) Create a new blank file using the correct seed file and name per the standard naming convention
   c. Seed: BR_GP_SEED
2) Reference the appropriate sheet file from the file XXXXXXBRMAP001.DGN into the sheet file in the newly
   created appropriately name file
   a. Coincident World
   b. Live Nesting = 3
   c. Map reference file correctly  ex. MTBR:
3) Verify the correct levels are on in the reference files in these new individual files.

*NOTE:* If any sheet has been renamed after creating the corresponding sheet for the CPB, the corresponding
CPB sheet will need to be opened and the reference file changed to the new sheet name.
REVISIONS

ISSUED 5-1-17
The following lists the changes and revisions to MDT’s detailing and engineering practices from the Structures Manual and previous versions of the Standard Bridge Notes and Details book, which have been incorporated into the new Common Bridge Details & Notes Guide Issued May 1, 2017.

NOTES:

- Added a new note denoting the suffix “E” & “W” & “CR”
  - These will now be placed with the standard notes on the general layout.
- Remove the “Utilities” note from the general layout notes
  - This information is found in the Standard Specifications
- Moved the pile notes from the end bent and intermediate bent sections to the footing plan
- Combined the end bent and intermediate bent sections together
  - The same notes were typically used for both
- Changed the erection plan section to “Slab & Bearings”
- Added some additional rehab notes that have been used lately on several rehab jobs
- Added Standard Structural Steel Notes
- Added a note to the End & Int. Bent notes about reinforcing in conflict with anchor bolts.
- Separated out the notes and details into separate sections
- Added a note denoting the suffix “CR” for corrosion resistant reinforcing
- Remove most of the bulb tee notes and details
  - These will be incorporated into the new bulb tee standard drawing
- Updated the Beam Design Information Table
  - New material specs
- Revised standard rebar lap lengths
  - Now meet the requirements of the 7th edition 2016 interims
- Added a new Reinforcing Steel Cover Note
  - No longer need to show the cover on every detail, only where and exception to the note is required.
- Removed the “Joint Sealant” notes
  - These are covered under the standard special provisions
- Removed the pile note about “not driving service piles before test pile analysis”
- Revised the pile re-drive note to clarify that the time frame is for a test pile

DETAILS:

- Revised the “spiral lap detail” to include a table for weld size
- Revise the “metal expansion cap detail” to just a single detail
  - Detailer will fill in the appropriate values based on the table
- Added a hoop butt weld detail
- Added Standard Barrier and Curb Reinforcing dimensions
- Revised the drain details
  - Support strap now required when girder depth exceeds 5’-0” steel and prestressed concrete girders
- Removed several like details
  - Composed the like details into a single detail that the detailer can revise to meet their conditions.
- Removed the deck grid from the rehab section
• This detail is not used any more
• Added Standard Structural Steel Details
• Added Footnotes to the details and sample drawings
• Revised the L-Bar in backwall that laps with Top Longitudinal bars to extend farther into slab
• Added additional stirrups and u-bars around and over piles
  o Required for minimum lateral loads
• Added additional bar in bottom of caps between piles
  o Required to meet temperature and shrinkage requirements
• Added additional rebar at ends of caps
  o Need to place U-Bars both directions to lap with cap bars
• Revised the beam seat reinforcing
• Footing Plan will now be placed above the borings to match format of other sheets (Plan above Elevation)
• Remove all but the “Joint Sealant” details except for the detail at concrete faces
  o The other details are no longer required due to the specifications of the sealant
• Modified the Bridge Deck Repair and Thick Overlay Definition detail
• Added a detail for Bridge Deck Repair and Thin Overlay
• Added details for Guard Angle Removal

STANDARD DRAWINGS:

• Updated SL-5, SL-6, SL-7, & SL-8
  o 2 ½” cover on slab
  o Top Longitudinal bars spaced at 1’-0” centers
  o S6 bar omitted and S5 bar now alternates with S200 bars
  o S5 bar now extends 10’-0” from centerline (20’-0” Total Length)
  o Revised references to “Erection Plan” to “Other sheets”.
• Updated SBR-W740 & SBR-W830 standard drawing for placing posts after curb is placed
• Updated SBR-BRR, SBR-T101, SBR-W830, SBR-W740, SBR-PED, SBR-HND, Drilled Foundation Anchor Post for new material specifications
• Revised the Drilled Foundation Anchor Post Standard Drawing
  o It is now applicable to a new bridge and a timber bridge rail revision
  o This is a Draft version
• Made the Timber Bridge Rail Revision sheet a standard drawing.
  o Detailer only to show the rail spacing on the bridge sheets for a timber rail revision
    ▪ Will need to include SBR-T101 and Drilled Anchor Post Standard Drawings
  o This is a Draft version

NEW ITEMS:

• New bulb tee standard drawing
• New tri deck standard drawing
• New voided slab standard drawing
• New standard prestressed concrete girder shapes drawing
• Added a sheet showing the old standard rail drawings
• Added a sheet showing the standard bar bends and hooks
• Added “Sample” Bridge Drawings
COMMON BRIDGE DETAILS & NOTES GUIDE

Issued May 1, 2017

- Added footnotes to the Common Notes and Details as well as the new sample drawings

OTHER ITEMS:

- List the items in the quantities table in sequential order matching the item number of the respective items
- Use the actual bid item names for the quantities shown in the quantities table