## IMPLEMENTATION

**GENERAL NOTES**

1. Use MOD-9P (Design Specification Except for UHPC) for all cables extending over 30 meters.
2. For UHPC, the vertical load at the ends of the beam shall be considered the effective vertical load.
3. USM-9P (Design Specification Except for UHPC) for all cables extending over 30 meters.
4. Use MOD-9P (Design Specification Except for UHPC) for all cables extending over 30 meters.
5. Use MOD-9P (Design Specification Except for UHPC) for all cables extending over 30 meters.
6. Use MOD-9P (Design Specification Except for UHPC) for all cables extending over 30 meters.
7. Use MOD-9P (Design Specification Except for UHPC) for all cables extending over 30 meters.

### MISC. DETAILS

**INDEX OF SHEETS**

- NEDBT-04: Beam Substructure Details
- NEDBT-05: Miscellaneous Details
- NEDBT-01: Recommended Usage and Notes
- NEDBT-02: Profile Accommodation Details
- NEDBT-03: Typical Beam Details

**GENERAL NOTES**

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**LIVE LOAD DISTRIBUTION FACTOR CALCULATIONS**

- Use MOD-9P (Design Specification Except for UHPC) for all cables extending over 30 meters.
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**DISCLAIMER**

- The details shown are guidelines and should not be considered standard. The information has been obtained from sources believed to be reliable. PCI Northwest or its membership shall not be responsible for any errors, omissions, or damages arising out of this information. PCI Northwest has published this work with the understanding that PCI Northwest is supplying information only. PCI Northwest is not rendering engineering or other professional services through this guideline. If such services are required, please seek a professional.
1. The details shown depict varying the thickness of the top flange (Option 1). Another option is to vary the thickness of the overlay (Option 2).

2. The engineer should detail the anticipated variable thickness of the top flange or overlay in the plans based on the estimated camber. The plans should include notes regarding survey of the beam after erection and then adjustment of the overlay thickness may be required. The same applies to the height of the curb or barrier.

3. The engineer should account for the estimated variable thickness overlap, including notes requiring survey of the beams after erection, and then adjustment of the overlay thickness may be required. The same applies to the height of the curb or barrier.

4. The estimated camber used for the variable noted above should be based on the estimated camber at erection.

5. For more information, see the PCI Northeast document entitled "Guidelines for Camber and Profile Management in Adjacent Beams" at www.pcine.org.

**NOTES**

1. The details shown depict varying the thickness of the top flange (Option 1). Another option is to vary the thickness of the overlay (Option 2).

2. The engineer should detail the anticipated variable thickness of the top flange or overlay in the plans based on the estimated camber. The plans should include notes regarding survey of the beam after erection and then adjustment of the overlay thickness may be required. The same applies to the height of the curb or barrier.

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4. The estimated camber used for the variable noted above should be based on the estimated camber at erection.

5. For more information, see the PCI Northeast document entitled "Guidelines for Camber and Profile Management in Adjacent Beams" at www.pcine.org.
### GENERAL NOTES

1. The top flange is intended to act as a structural deck.
2. Decks reinforced in this manner are installed to maximize the cross-section in the beam.
3. See NEDBT-1 for layout details.
4.iproper adjustment of the stiffness of the top longitudinal reinforcement is allowed to facilitate the installation of the stirrups.

### DESIGN NOTES

1. The reinforcing shown is schematic. Designers must design the reinforcing for each beam based on the loading and design specifications and their standards.
2. The strip method specified in AASHTO Article 4.6.2.1 is recommended for the design of the reinforcing in the top flange.
3. The interaction of the stresses in the beam depends on the stress levels at the beam ends as specified in the guide. The beam may be reinforced with the same control provisions as specified in Article 5.7.3.4. These provisions should also be followed for stirrups.
4. Additional reinforcing may be required for deck expansions and overhanging.

### STRAND LAYOUT NOTES

1. The columns of strand in the interior of the beam may be grouped.
2. Whenever possible the strand layout shown should be followed. This layout complies with the AASHTO LRFD Bridge Design Specifications and is recommended.
3. Debonding of strand is allowed. The restrictions outlined in the AASHTO LRFD Bridge Design Specifications should be followed.
4. It is recommended that approximately 15% of all strand be located in the 6" area of the beam in order to control cracking. Specific restrictions outlined in the AASHTO LRFD Bridge Design Specifications must be followed in each beam.
5. NEDBT Brand No. 6 strand is recommended for the design of the reinforcing in the top flange.
6. The pattern shown in the bottom flange reflects the recommended number of strands allowing for space for stirrup reinforcement. The recommended number of strands shown is limited to the cross section of the strands. Steel may be possible contact with strand reinforcement having smaller cross sections having the same control provisions as specified in Article 5.7.3.4. These provisions should also be followed for stirrups.
7. Almost all reinforcing systems should be lap spliced, unless otherwise specified. Lap spliced reinforcing should be designed to allow for the possibility of debonding.
8. The additional strands shown in the top flange are used to support the top flange reinforcing.

### STRAND LAYOUT TABLE

<table>
<thead>
<tr>
<th>Beam Designation</th>
<th>Beam Width</th>
<th>Beam Depth</th>
<th>Beam Weight</th>
<th>Reinforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEDBT44</td>
<td>44</td>
<td>44</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>NEDBT48</td>
<td>48</td>
<td>48</td>
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<td>48</td>
</tr>
<tr>
<td>NEDBT56</td>
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<tr>
<td>NEDBT72</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>NEDBT80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

### BEAM DIMENSION NOTES

1. The depth of the beam is limited to the size shown.
2. The dimensions shown are fixed.
3. The ends of the beams must be designed for loads specified. The vertical dimension of the flange should be limited to 4" in order to minimize deflections and minimize crack length.
4. The details on the vertical face of the deck of fascia beams may be modified to allow for alternate deck side finishes.

### NEDBT BEAM - SECTION PROPERTIES

<table>
<thead>
<tr>
<th>Beam Designation</th>
<th>Beam Width</th>
<th>Beam Depth</th>
<th>Beam Weight</th>
<th>Reinforcement</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEDBT44</td>
<td>44</td>
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<td>NEDBT48</td>
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<tr>
<td>NEDBT80</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

### AVAILABLE NEDBT BEAM SIZES

- NEDBT40
- NEDBT44
- NEDBT48
- NEDBT56
- NEDBT64
- NEDBT72
- NEDBT80

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**NOTES:**
- SEE SHEET NEDBT-02 FOR DETAILS OF VARIABLE THICKNESS TOP FLANGE.
- THE BEAMS SHOWN ARE GUIDELINES AND SHOULD NOT BE CONSIDERED STANDARDS. THE INFORMATION HAS BEEN OBTAINED FROM SOURCES BELIEVED TO BE RELIABLE. PCI NORTH EAST OR ITS MEMBERS SHALL NOT BE RESPONSIBLE FOR ANY ERRORS, OMISSIONS OR DAMAGES ARISING OUT OF THIS INFORMATION. PCI NORTH EAST HAS PUBLISHED THIS WORK WITH THE UNDERSTANDING THAT PCI NORTH EAST IS SUPPLYING INFORMATION ONLY. PCI NORTH EAST IS NOT ENGAGED IN ENGINEERING OR OTHER PROFESSIONAL SERVICES THROUGH THIS GUIDE. IF SUCH SERVICES ARE REQUIRED, PLEASE SEEK AN APPROPRIATE PROFESSIONAL.
1. **Example Bridge Section Notes**

   a. The bridge sections include various options for beam spacing involving connections. Please refer to the figure for detailed views. Notes shall be checked for compliance with the owner of the bridge. The dimensions in the figure shall be checked by the cost of the materials.

   b. Ensure that the bridge supports align with the beam supports accurately. The cost savings are accounted for in this section.

2. **Approximate Maximum Span Lengths**

<table>
<thead>
<tr>
<th>Beam Size</th>
<th>Approximate Maximum Span Length (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEDBT80</td>
<td>159</td>
</tr>
<tr>
<td>NEDBT72</td>
<td>151</td>
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<tr>
<td>NEDBT64</td>
<td>142</td>
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<tr>
<td>NEDBT56</td>
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<tr>
<td>NEDBT48</td>
<td>121</td>
</tr>
<tr>
<td>NEDBT40</td>
<td>105</td>
</tr>
</tbody>
</table>

Span table notes:

1. Cross section 1 shown above the list is assumed. Only with only 5 beams.
2. Cross section 2 will need longer maximum span lengths when compared to cross section 1.
3. Cross section 3 will have maximum span lengths approximately equal to those shown.
4. The values shown should be considered approximate. The actual maximum span lengths are affected by a number of assumptions. The span lengths shown are generally based on the following assumptions:
   - Design Specifications: AASHTO LRFD Bridge Design Specifications (2014)
   - Uniform maximum live load
   - Bearing forces: 2.5' max
   - F_c = 6000 psi
   - Final service limits state allowable tension at the bottom of the beam = 0.236f'c(ksi)
I. STRAIGHT BARS WITH UHPC

3" MIN.

II. HOOKED BARS WITH 4 KSI CONCRETE

2" MAXIMUM JOINT DIFFERENTIAL - WEARING SURFACE DETAIL

III. STRAIGHT BARS WITH UHPC

1. HOOKED BAR DETAIL SHOWN, OTHER JOINTS SIMILAR

L1 = AASHTO HOOK DEVELOPMENT LENGTH

W1 = SPECIFIED JOINT WIDTH, MINIMUM = L1 + T + 1.5, MAXIMUM = 24"

W2 = SPECIFIED JOINT WIDTH: MINIMUM = L2 + T + 1.5, MAXIMUM = 44"

T = RECOMMENDED TOLERANCE = 1"

NOTE:

1. USE THIS DETAIL FOR ALL SKEWED BEAMS.

2. OTHER REINFORCING BARS SUCH AS END ZONE REINFORCING NOT SHOWN FOR CLARITY.

3. THE BAR LAYOUT SHOWN IS APPROXIMATE. THE FABRICATOR SHALL LAY OUT BARS TO PROVIDE A MAXIMUM OF 6" SPACING BETWEEN ADJACENT TRANSVERSE DECK BARS.

4. CONCRETE CLOSURE POUR MATERIAL IN DETAIL 1 AND 2 TO BE A MIX WITH 6" SPACING.

5. EXPOSED AGGREGATE SURFACE OF THE FACES OF THE KEYS IS preferred in this detail. This detail can be considered equivalent to a closure pour joint. This detail can be considered equivalent to a closure pour joint. This detail can be considered equivalent to a closure pour joint. This detail can be considered equivalent to a closure pour joint.

6. THE DESIGNER SHOULD ALLOW THE FABRICATOR TO MAKE MINOR CHANGES TO THE DIMENSIONS OF THE SHEAR KEYS TO ACCOMMODATE VARIATIONS IN EXISTING FORMS.

7. THE DESIGNER SHOULD ALLOW THE FABRICATOR TO MAKE MINOR CHANGES TO THE DIMENSIONS OF THE SHEAR KEYS TO ACCOMMODATE VARIATIONS IN EXISTING FORMS.

8. THE CONNECTIONS HAVE BEEN DESIGNED TO MEET THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.

NOTES:

1. METHOD OF FORMING CLOSURE POUR TO BE DETERMINED BY THE FABRICATOR PER H4.3.4.3.2 JOB SPEC.

2. FOR SKEWED BRIDGES, PLACE CONNECTOR REINFORCING WITHIN THE FLANGE IN ACUTE CORNERS TO PRODUCE A SQUARE PERPENDICULAR TO BEAM EDGE. BEND CONNECTOR REINFORCING 20 DEGREES MAX. WITH MAIN DECK REINFORCING.

3. CONNECTION REINFORCING TO BE PLACED ALONG THE ENTIRE SPAN.

4. CONCRETE CLOSURE POUR TO BE SEPARATED FROM BEAM EDGE 1/2" HOOKED CONNECTOR REINFORCING IN ARC* SHOWN TO ENHANCE FLOW THROUGH THE PLANES IN ADJACENT CEMENT TO PRECISE A SQUARE.

5. WIDTH OF CLOSURE POUR TO BE DETERMINED BY THE FABRICATOR. THE FABRICATOR MIGHT USE 6" SPACE BETWEEN THE TWO BARS AS SHOWN.

6. CHANGES TO THE DIMENSIONS OF THE SHEAR KEYS TO ACCOMMODATE VARIATIONS IN EXISTING FORMS.

7. CONNECTIONS HAVE BEEN DESIGNED TO MEET THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS.
**DISCLAIMER:**

**DESCRIPTION**

**REVOLUTIONS**

**DATE**

**PRECAST/PRESTRESSED CONCRETE INSTITUTE NORTH E A S T**

**WWW.PCINORI.G.O.R**

**REINFORCING NOT SHOWN**

**REINFORCED DECK SLAB**

**CONNECTION TO BACKWALL**

**REINFORCING TO PROVIDE**

**EXTEND STRAND AND/OR**

**NOTE: ALL REINFORCEMENT NOT SHOWN**

**IN PLANT OR FIELD CAST.**

**SEMI-INTEGRAL BACKWALL. SECONDARY POUR**

**COMPRESSIBLE MATERIAL**

**CLOSED CELL FOAM OR OTHER**


1. THE DETAILS SHOWN ARE SCHEMATIC. REFER TO STATE STANDARDS FOR SPECIFIC DETAILS.

**NOTES:**

**SAMPLE END DIAPHRAGM DETAIL**

**CANTILEVER ABUTMENT**

**1.** THESE DETAILS ARE BASED ON MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARDS FOR TYPE 2 APPROACH SLABS. DETAILS FOR OTHER STATES WILL VARY.

**NOTES:**

1. THESE DETAILS ARE SIMILAR TO MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARDS FOR TYPE 1 APPROACH SLABS. DETAILS FOR OTHER STATES WILL VARY.

2. THESE DETAILS ARE BASED ON MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARDS FOR TYPE 2 APPROACH SLABS. DETAILS FOR OTHER STATES WILL VARY.

**SAMPLE PIER CONTINUITY DETAIL**

**NOTES:**

**SAMPLE INTEGRAL ABUTMENT SECTION**

**NOTES:**

**SAMPLE SEMI-INTEGRAL ABUTMENT SECTION**

**NOTES:**

**PIER CAP**

**ELASTOMERIC BEARING**

**MAY BE REQUIRED TO ADDRESS THIS CONDITION.**

**ABUTMENT STEM**

**ELASTOMERIC BEARING (TYP.)**

**PORE CAP**

**NOTE: ALL REINFORCEMENT NOT SHOWN**

**INTEGRAL ABUTMENT**

**SAMPLE INTEGRAL ABUTMENT SECTION**

**NOTES:**

1. THESE DETAILS ARE BASED ON MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARDS FOR TYPE 2 APPROACH SLABS. DETAILS FOR OTHER STATES WILL VARY.

2. A PRECAST PIECE SIMILAR TO THE BACKWALL PIECE CAN BE USED AT THE ENDS OF THE ABUTMENT ALSO.

**APPROACH SLABS. DETAILS FOR OTHER STATES WILL VARY.**

**1.** THESE DETAILS ARE BASED ON MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARDS FOR TYPE 2 APPROACH SLABS. DETAILS FOR OTHER STATES WILL VARY.

**PRECAST INTEGRAL ABUTMENT**

**PILE**

**APPROACH SLAB**

**APPROACH SLAB**

**APPROACH SLAB**

**APPROACH SLAB**
RELEASING THE BEAM FROM THE CRANE.

1. DETAILS FOR CROSS FRAMES AND DIAPHRAGMS SHALL BE CONSISTENT WITH DETAILS USED FOR THE NORTHEAST BULB TEE GIRDER.

2. CROSS FRAMES SHOULD BE USED TO MAINTAIN STABILITY OF THE BEAMS DURING ERECTION.

3. BRIDGE SEAT AND BEARING MAY BE SLOPED TO MATCH THE CROSS SLOPE OF THE ROADWAY ABOVE (2% MAX.).

4. ELASTOMERIC SHIMS MAY BE USED TO PROPERLY SEAT BEAMS AND ADJUST THE ELEVATION OF THE TOP BEARING.

5. KEEPER BLOCKS MAY BE USED BETWEEN THE STEMS FOR LATERAL RESISTANCE.

DIAPHRAGMS AND CROSS FRAME NOTES

1. DETAILS FOR CROSS FRAMES AND DIAPHRAGMS SHALL BE CONSISTENT WITH DETAILS USED FOR THE NORTHEAST BULB TEE GIRDER.

2. Details for cross frames and diaphragms shall be consistent with details used for the Northeast bulb tee girder.

3. THESE DETAILS MAY BE USED FOR FIXED BEARING DESIGNS. BEAM CONNECTION DETAILS WILL BE SIMILAR.

4. THESE DETAILS ARE ONLY REQUIRED FOR NON-INTEGRAL SUBSTRUCTURES WITHOUT ANCHOR BOLTS.

5. BRIDGE SEAT AND BEARING ASSEMBLY SHOULD BE SLOPED TO MATCH THE CROSS SLOPE OF THE ROADWAY ABOVE (2% MAX.).

6. KEEPER BLOCKS MAY BE USED BETWEEN THE STEMS FOR LATERAL RESISTANCE.