SPECIFICATIONS:


CONSTRUCTION: IOWA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGE CONSTRUCTION SERIES 100, PLUS APPLICABLE GENERAL SUPPLEMENTAL SPECIFICATIONS, DESIGNER SPECIFICATIONS, MATERIALS SPECIFICATIONS, AND SPECIAL PROVISIONS SHALL APPLY TO CONSTRUCTION WORK ON THIS PROJECT.

DESIGN STRESSES:

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE IN ACCORDANCE WITH THE AS5011-1980 FIBRCHEMICAL ENHANCED CONCRETE SPECIFICATIONS, 6TH EDITION OF 2005:

- Reinforcing Steel in accordance with the American Institute of Steel Construction, Standard Specification for Reinforcing Steel, AISC-416-05.
- Concrete in accordance with the American Concrete Institute, Standard Specification for Concrete, ACI 318-11.
- Prestressed Concrete in accordance with the American Concrete Institute, Standard Specification for Prestressed Concrete, ACI 318-11.
- Precast Concrete in accordance with the American Concrete Institute, Standard Specification for Precast Concrete, ACI 350-11.

NOTES TO DESIGNER:

These standards contain options for:

1) BOX BEAM BRIDGES WITH CAST-IN-PLACE CONCRETE ABUTMENTS (SHEET PILING WINGS (0° SKEW ONLY) OR CONCRETE WINGS (0°, 15°, 30° SKEWS))
2) BOX BEAM BRIDGES WITH PRECAST CONCRETE ABUTMENTS (SHEET PILING WINGS (0° SKEW ONLY) OR CONCRETE WINGS (0°, 15°, 30° SKEWS))
3) PREPRINTED AND NON-PREPRINTED CONCRETE BOX BEAMS

REFER TO QUANTITY SUMMARY SHEETS B30-28-16 TO B30-31-16 FOR APPROPRIATE BID ITEMS TO USE IN PLAN DEVELOPMENT.
PRECAST CONCRETE ELEMENT NOTES:

A. DESCRIPTION:
   - Furnish and install precast concrete substructure and superstructure elements, including bridge approach fillings, bridge abutment foundations, bridge approach fillings, bridge abutment foundations, and bridge approach fillings, as required for the project.

B. GENERAL PROCEDURES FOR INSTALLATION OF PRECAST SUBSTRUCTURE ELEMENTS:
   - Laying down the substructure and superstructure elements shall be in accordance with the plans and specifications.
   - Ensure that the precast elements are properly aligned and positioned before installation.

C. QUALITY ASSURANCE:
   - Section 4141 of the Standard Specifications and Materials I.M. 441 shall be followed.
   - Concrete shall be in accordance with Article 1105.03 of the Standard Specifications.
   - Provide submittals to the Engineer as required on Sheet B30-02-16.

D. CONCRETE:
   - High early strength self-consolidating concrete mix designs shall be used as noted in the plans, with minimum 7-day compressive strength of 4000 psi, and minimum 6-hour compressive strength of 2500 psi.

E. MATERIALS:
   - Hardened concrete must be of such quality as to meet the requirements of the plans and specifications.
   - No more than 3% expansion in the high early strength concrete of no shrinkage-compensating additive shall produce such that there will be no separation of pile pocket fill concrete from the adjacent precast element.

F. FRAGMENTS:
   - Attachments and connections shall be of sufficient strength and quality to meet the requirements of the plans and specifications.
   - The substructure stability during construction shall be the responsibility of the Contractor.

G. INSTALLATION:
   - Lifting attachments shall be designed and constructed in accordance with the plans and specifications.
   - Set box beams in the designated bearing locations following completion of the precast elements.

H. INSTALLATION TOLERANCES:
   - Tolerances shall be in accordance with the plans and specifications.
   - The Contractor shall be responsible for the installation of the precast elements.

I. GENERAL:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

J. CONSTRUCTION:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

K. FINISHING:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

L. CLEANING:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

M. TEMPORARY BRACING:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

N. MACHINERY:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

O. ELECTRICAL:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

P. MECHANICAL:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

Q. PLUMBING:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

R. GENERAL NOTES:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

S. CONCRETE BOX BEAM BRIDGES:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

T. INTEGRITY, DURABILITY, AND AESTHETICS:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

U. SUPERSTRUCTURE:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

V. TEMPORARY SUPPORT:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

W. SHIPMENT:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

X. SUPPORT:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

Y. BEARING SURFACES:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.

Z. SUPPORT:
   - The Contractor shall be responsible for the installation of the precast elements.
   - The installation shall be in accordance with the plans and specifications.
PRECAST CONCRETE ELEMENT NOTES (CONT):

7. All closure pour surfaces shall be re-erected to saturated surface dry conditions prior to casting the UHPC. Joint surfacing preparation shall be in accordance with the design plans.

8. Do not apply superimposed dead loads or construction live loads to, or perform grouting operations on the assembled superstructure until the compressive strength test results for the longitudinal UHPC closure pour have reached a minimum compressive strength of at least 8000 psi or as otherwise recommended by the UHPC manufacturer. Precast/Prestressed is subject to.

9. After removal of lifting loops, concrete shall be patched as directed by the Engineer.

METHOD OF MEASUREMENT:

A. Precast Box Beams:

The quantity by count of precast concrete bridge abutment backwalls will be the plan quantity.

B. Backfill:

The quantity by count of precast concrete bridge abutment backwalls will be the plan quantity.

C. Precast Box Beams:

The quantity by count of precast concrete box beams will be the plan quantity.

D. Precast/Prestressed Box Beams:

The quantity by plan value of precast/prestressed concrete box beams will be the plan quantity.

BASIS OF PAYMENT:

A. Precast Box Beams:

Payment will be full compensation for the manufacturing, furnishing and placement of each precast concrete bridge abutment backwall, including structural concrete, epoxy coated reinforcing steel, corrugated tubes and gussets.

B. Precast Bridge Backwalls:

Payment will be full compensation for the manufacturing, furnishing and placement of each precast concrete bridge abutment backwall, including structural concrete, epoxy coated reinforcing steel, corrugated tubes and gussets.

C. Precast Beams:

Payment will be full compensation for the manufacturing, furnishing and placement of each precast concrete box beam, including mechanical splice assemblies, galvanized corrugated metal pipe, lifting devices, porous backfill, removable backfill (includes welded for flooding, corrugated backfill, removable forms for anchor backfill, and assembling forms used to fill the precast drain pipes and precast abutment units, these forms are excluded to be included in a bid item for diametrical concrete precast beams.

D. Precast/Prestressed Box Beams:

Payment will be full compensation for the manufacturing, furnishing and placement of each precast concrete box beam, including structural concrete, epoxy coated reinforcing steel, corrugated tubes and gussets.

ALTERNATE SITE CASTING NOTES:

The contractor may elect to fabricate non-prestressed precast concrete components at an alternate site determined by the contractor, in lieu of fabricating these components at a prequalified fabrication plant. Alternate site casting shall comply with the following:

A. Alternate site casting:

Concrete shall be provided by an off-site ready mix producer, section 2407.03, D, 1 to the curing of precast concrete components. Article 2407.03, D, 1, a-d; 2407.03, D, 3, f; and Article 2407.03, D, 3, and 2407.03, D, 4 shall be applied to the production, fabrication and construction of precast concrete elements, Article 2407.03, D, 1, shall not apply.

1. Ready mix concrete shall be supplied by an approved ready mix concrete plant.

2. Casting beds shall be rigidly constructed and supported so that under the weight of concrete and forms, there shall be no vertical deformation of the bed.

3. The producer of the precast elements shall provide technical personnel, experienced and skilled in the application of precast systems, supplemented with a sufficient staff of skilled labor to construct forms, place and the reinforcing steel and anchor, consolidate and finish the concrete. The producer shall utilize a technician with a valid Iowa DOT Level I PCC Certification or an ACI Level I Certification when casting operations require physical testing such as an expansion, slump testing, etc.

4. A minimum of 30 days prior to beginning precast concrete operations, the producer shall submit a plan to the Engineer indicating the quality control procedures to be used in the manufacture of the precast components, including:

   a. Seamless reinforcing steel fabrication and placement
   b. Concrete mix design and proportioning
   c. Concrete placement and consolidation
   d. Precast finished surfaces
   e. Frequency and procedures for physical testing of concrete, including air entrainment testing, slump testing, and concrete cylinder production / testing.

   f. Apply Articles 2407.03, D, 1; 2407.03, D, 2; 2407.03, D, 3, a-d; 2407.03, D, 3, f, and 2407.03, D, 4 to the curing of precast concrete they using accelerated heat curing.

   g. Finish all surfaces which will be exposed in the finished structure as provided in Article 2407.03, D, 4, and as noted in these plans, and ensure that they are free of items or surface defects. Quality structural repair procedures to be approved by the Engineer.

PILE TOLERANCE NOTE:

The contractor shall note that tighter pile location tolerances shall be required for use with the precast abutment footing option. The gap pile pocket size noted in the plans is based on maximum pile deviation of 27 from plan value, measured at 15 feet above the abutment top. Use of a pile driving template is strongly suggested. The contractor shall be permitted to make minor adjustments to position the top of pile by jacking or other approved means to facilitate proper alignment. Accelerated setting methods that damage or permanently deform the pile shall not be permitted.

**NOTE:**

*FOR ABUTMENTS USING SHEETPILE WINGS AND PRECAST ABUTMENT UNITS, THE CONTRACTOR MAY ELECT TO FABRICATE NON-PRESTRESSED PRECAST CONCRETE BOX BEAMS AND CONVERT THE CONTRACTOR TO A PREQUALIFIED FABRICATION PLANT. ALTERNATE SITE CASTING IS SUBJECT TO THE CONTRACTOR'S APPROVAL.**
EXAMPLES OF BRIDGE ELEVATION CALCULATIONS:

EXAMPLE NO. 1

Bridge located on a constant grade, for this example, the grade is -3.00% with the fill elevation of 594.06 and a fill elevation of 600.00. The bridge length is 70'-0 and the required top of wing elevations as shown in the plan at each corner of the bridge.

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

EXAMPLE NO. 2

Bridge located on a constant grade. The bridge length is 70'-0 and the required top of wing elevations as shown in the plan at each corner of the bridge.

EXAMPLE NO. 3

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

EXAMPLE NO. 4

Bridge located on a constant grade. The bridge length is 70'-0 and the required top of wing elevations as shown in the plan at each corner of the bridge.

EXAMPLE NO. 5

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

EXAMPLE NO. 6

Bridge located on a constant grade. The bridge length is 70'-0 and the required top of wing elevations as shown in the plan at each corner of the bridge.

NOTES TO DESIGNER:

The bridge designer shall obtain soil borings at each abutment to evaluate whether the required steel sheet pile embedment can be obtained, and to assess the construction considerations for the project. Additionally, the designer shall verify the soil properties obtained from the soil borings for the actual bridge site.

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

- Backfill material:
  - Small consist of well drained granular material with less than 5% fines.
  - Material shall consist of gradation as noted on backfill details sheet.
  - Backfill shall be placed as noted on backfill details sheet.
  - Unit weight of granular backfill assumed to be 120pcf.
  - Backfill shall be of type specified on backfill details sheet.

Foundation soils:

- Consists of either alluvium, loess or glacial till, all of which shall be comprised of clay soils.
- Unit weight of 120pcf.
- Strength was conservatively modeled assuming a long term effective strength of equal to 29 degrees.
- Strength and unit weight are considered conservative and applicable if loose alluvial sand comprises the soils.
- New grade shall not be eroded than 0%. 

CONCRETE BOX BEAM BRIDGES

GENERAL INFORMATION

DECEMBER, 2016

Highway Division

A P P R O V E D  B Y  B R ID G E  E N G IN E E R

IOWA DOT

STANDARD DESIGN - 30'-0 ROADWAY, SINGLE SPAN

LATEST REVISION DATE
**CONCRETE BOX BEAM BRIDGES**

**STANDARD DESIGN - 30'-0" ROADWAY, SINGLE SPAN**

**DECEMBER, 2016**

**B30-06-16**

**Typical Section**

**RETTAINER ANGLE NOTES:**

Anchor bolts, nuts and washers shall meet the requirements of IM 453.08 and shall be grade 36 and galvanized. Anchor bolts shall be set in accordance with Article 2405.03, H, 2 of the Standard Specifications. Retainer Angle assemblies shall be galvanized. All welding shall be completed prior to galvanizing. Galvanizing shall be in accordance with ASTM A123 and Article 4100.07, E of the Standard Specifications. All costs for furnishing and installing the Retainer Angles and Anchor Bolts shall be included in the Bid Price for "Structural Steel".

Weight for Four Retainer Angle Assemblies = 72 Lbs.

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**SECTION NEAR ABUTMENT WITH SHEET PILE WINGS**

**SECTION NEAR ABUTMENT WITH CONCRETE WINGS**

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**PLAN**

(SHOWING SHEETED CASE AT ACUTE CORNER)

**PLAN**

(SHOWING 0° SHEET CASE)

**PLAN**

(SHOWING SHEETED CASE AT OBTUSE CORNER)

---

**ELEVATION**

Retainer Angle Detail

Anchor Bolt Swedge Detail
STEEL SHEET PILING DETAILS

STEEL SHEET PILING PLAN VIEW

COVER PLATES NOT SHOWN FOR CLARITY

STEEL SHEET PILING NOTES:

AS A MINIMUM, ALL STEEL SHEET PILINGS SHALL BE PZ27 AND SHALL CONFORM TO ASTM A325 STEEL, AND SHALL MEET THE FOLLOWING REQUIREMENTS:

SECTION LENGTH

SEE TYPICAL SECTION, SHEET B30-08-16

MAXIMUM SECTION DEPTH

6 IN

MINIMUM SECTION THICKNESS

0.275 IN

ELASTIC SECTION MODULUS

360 KNI/FT

THE CONTRACTOR SHALL SUBMIT FOR REVIEW A SHOP PLAN OF THE SHEET PILE LAYERS, INCLUDING THE SIZES AND DETAILS, SHOWING ALL PERMISSIBLE DIMENSIONS, DETAILS, AND SECTION PROPERTIES. THE CONTRACTOR SHALL NOT PROCEED WITH INSTALLATION OF STEEL SHEET PILING AND STEEL BEARING PILING PRIOR TO APPROVAL OF THE SUBMITTED SHOP DRAWINGS.

THE PAY QUANTITY WILL BE BASED ON THE SHEET PILE WALL DIMENSIONS SHOWN.

THE RODS SHALL BE POSITIONED AND DETAILED TO AVOID CONFLICTS WITH THE GUARDRAIL POSTS.

THE RODS SHALL BE ASTM A307 GRADE 75 AND BOLTED AND OR SLEEVED IN ACCORDANCE WITH ASTM A325.

LOCK NUTS AND WASHERS SHALL BE BOLTED AND OR SLEEVED AND PROVIDED BY THE TIE ROD MANUFACTURER.

STEEL CHANNELS, BEARING PLATES AND OTHER MISCELLANEOUS PLATES SHALL CONFORM TO ASTM A992 GRADE 50.

FIELD WELDING SHALL MEET THE REQUIREMENTS OF MATERIALS I.2.A.2.B.

THE STEEL WALTERS SHALL BEAR UNIFORMLY AGAINST THE SHEET PILES PRIOR TO INSTALLATION, THE TIE ROD NUTS, 6" x 6" SHIM PLATES SHALL BE USED TO PROVIDE UNIFORM BEARING.

THE COST OF FURNISHING AND INSTALLING THE WALTERS, TIE RODS, BEARING PLATES, LOCK NUTS, WASHERS, STIFFENER PLATES, COVER PLATES AND SHIM PLATES SHALL BE INCLUDED IN THE PRICE BID FOR "PILES STEEL SHEET".

GUARDRAIL POSTS.

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THE COST OF FURNISHING AND INSTALLING THE WALTERS, TIE RODS, BEARING PLATES, LOCK NUTS, WASHERS, STIFFENER PLATES, COVER PLATES AND SHIM PLATES SHALL BE INCLUDED IN THE PRICE BID FOR "PILES STEEL SHEET."
CONCRETE BOX BEAM BRIDGES
STANDARD DESIGN - 30'-0 ROADWAY, SINGLE SPAN
DECEMBER, 2016

SECTION A-A

SECTION C-C

PARTIAL PLAN VIEW AT END OF ABUTMENT

VIEW B-B

FOR DETAIL B, SEE SHEET B30-08-16.

TOP OF SHEET PILING AT WINGS TO MATCH TOP OF BACKWALL ELEVATION.
### Reinforced Concrete Box Beams

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### Pretensioned Prestressed Concrete Box Beams

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### Bent Bar Details

- **5g1**: Backwall, Vertical
- **33.2**: Footing End, Vertical
- **33.2**: Footing End, Horizontal
- **5c1 & 5c2**: Footing, Longitudinal
- **D=2"**: Pin Diameter

### Epoxy Coated Reinforcing Bar List, Cast-In-Place Abutment (Two Abutments)

#### Reinforced Concrete Box Beams

- **Epoxy Coating Not Required**

#### Prestressed Concrete Box Beams

- **Backwall, Vertical**
- **33.2**: Footing End, Vertical
- **33.2**: Footing End, Horizontal
- **5c1 & 5c2**: Footing, Longitudinal

### Concrete Placement Quantities (Two Abutments)

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### Standard Design - 30'-0 Roadway, Single Span

- **Concrete Box Beam Bridges**

**B30-11-16**

**Concrete Box Beam Bridges**

**IOWA DOT**

**Highway Division**

**November 2016**

**ABUTMENT DETAILS (CAST-IN-PLACE)**

- **Sheet Pile Wings**
- **5° Skew**

**Sheet 2 of 2**
**ABUTMENT NOTES:**

Maximum clear distance from face of concrete to rear reinforcing bar is to be 3" unless otherwise noted on drawings. Abutment piles shall be driven to values shown in the design plans.

Reinforcing Steel:

- The top of each beam shall be formed with 2" bar, 1" bar spaced 12" on center.
- The backwall shall be placed after the UHPC joints.
- The beam shall be formed with 2" clear of UHPC joint.
- The backwall shall be placed after the UHPC joints.
- The backwall shall be formed with 1" reinforcing bar, 1" bar spaced 12" on center.
- The top of each beam shall be formed with 2" bar, 1" bar spaced 12" on center.

**ABUTMENT PILE PLAN**

- Abutment piles shall be driven to values shown in the design plans.
- The top of each beam shall be formed with 2" bar, 1" bar spaced 12" on center.
- The backwall shall be placed after the UHPC joints.
- The beam shall be formed with 2" clear of UHPC joint.
- The backwall shall be placed after the UHPC joints.
- The backwall shall be formed with 1" reinforcing bar, 1" bar spaced 12" on center.
- The top of each beam shall be formed with 2" bar, 1" bar spaced 12" on center.

**REAR ELEVATION AT ABUTMENT**

- Abutment piles shall be driven to values shown in the design plans.
- The top of each beam shall be formed with 2" bar, 1" bar spaced 12" on center.
- The backwall shall be placed after the UHPC joints.
- The beam shall be formed with 2" clear of UHPC joint.
- The backwall shall be placed after the UHPC joints.
- The backwall shall be formed with 1" reinforcing bar, 1" bar spaced 12" on center.
- The top of each beam shall be formed with 2" bar, 1" bar spaced 12" on center.

**PART PLAN VIEW**

- Abutment piles shall be driven to values shown in the design plans.
- The top of each beam shall be formed with 2" bar, 1" bar spaced 12" on center.
- The backwall shall be placed after the UHPC joints.
- The beam shall be formed with 2" clear of UHPC joint.
- The backwall shall be placed after the UHPC joints.
- The backwall shall be formed with 1" reinforcing bar, 1" bar spaced 12" on center.
- The top of each beam shall be formed with 2" bar, 1" bar spaced 12" on center.

**PART SECTION THROUGH BACKWALL**

- Abutment piles shall be driven to values shown in the design plans.
- The top of each beam shall be formed with 2" bar, 1" bar spaced 12" on center.
- The backwall shall be placed after the UHPC joints.
- The beam shall be formed with 2" clear of UHPC joint.
- The backwall shall be placed after the UHPC joints.
- The backwall shall be formed with 1" reinforcing bar, 1" bar spaced 12" on center.
- The top of each beam shall be formed with 2" bar, 1" bar spaced 12" on center.
### Epoxy Coated Reinforcing Bar List, Cast-In-Place Abutment (Two Abutments)

#### Reinforced Concrete Box Beams

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#### Prestressed Concrete Box Beams

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### Bending Bar Details

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### Concrete Placement Quantities (Two Abutments)

#### Reinforced Concrete Box Beams

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<td>450</td>
</tr>
<tr>
<td>6g1</td>
<td>30'-0</td>
<td>38'-6</td>
<td>549</td>
<td>707</td>
</tr>
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</table>

#### Prestressed Concrete Box Beams

<table>
<thead>
<tr>
<th>Location</th>
<th>Span</th>
<th>Height</th>
<th>Length</th>
<th>Weight</th>
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<tbody>
<tr>
<td>BENT</td>
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<td>11'-8</td>
<td>288</td>
<td>450</td>
</tr>
<tr>
<td>6g3</td>
<td>30'-0</td>
<td>38'-6</td>
<td>549</td>
<td>707</td>
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</tbody>
</table>

---

### Epoxy Coating Not Required

- To OUT, ≥ 3/16" for diameters.
## EPOXY COATED REINFORCING BAR List, Cast-In-Place Abutment (Two Abutments)

### Reinforced Concrete Box Beams

<table>
<thead>
<tr>
<th>Location</th>
<th>Span</th>
<th>Pre-Tensioned</th>
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<td>Box Beams</td>
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<tr>
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<td>10'-0</td>
<td>5'-0</td>
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<tr>
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<td>70'-0</td>
<td>20'-0</td>
<td>15'-0</td>
<td>10'-0</td>
<td>5'-0</td>
</tr>
</tbody>
</table>

### Pre-Tensioned/Prestressed Concrete Box Beams

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<thead>
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<td>10'-0</td>
<td>5'-0</td>
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<tr>
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<td>20'-0</td>
<td>15'-0</td>
<td>10'-0</td>
<td>5'-0</td>
</tr>
</tbody>
</table>

### Notes:
- The additional concrete value is based on the road grade at the abutment.
- Additional concrete should be added for the purpose of the abutment.
- Additional concrete values should be excluded for scenarios that have a slope.
- Values may be interpreted for grades between the values shown in the table.

### BENT BAR DETAILS

![Bent Bar Details Diagram]

### CONCRETE PLACEMENT QUANTITIES (Two Abutments)

<table>
<thead>
<tr>
<th>Location</th>
<th>Span</th>
<th>Reinforced Concrete</th>
<th>Pre-Tensioned Concrete</th>
<th>Prestressed Concrete</th>
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</thead>
<tbody>
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<td>40'-0</td>
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<tr>
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<td>50'-0</td>
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<td>Box Beams</td>
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<tr>
<td></td>
<td>60'-0</td>
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<td>Box Beams</td>
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### ADDITIONAL CONCRETE

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<thead>
<tr>
<th>Roadway Grade</th>
<th>Reinforced Concrete</th>
<th>Pre-Tensioned Concrete</th>
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</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

### Standard Design - 30' Roadway, Single Span

**Concrete Box Beam Bridges**

- B30-15-16

**ABUTMENT DETAILS**

**Concrete Wings Quantities**

**10° Skew**
### EPOXY COATED REINFORCING BAR LIST, CAST-IN-PLACE ABUTMENT (TWO ABUTMENTS)

<table>
<thead>
<tr>
<th>No.</th>
<th>Location</th>
<th>BAR</th>
<th>Dia.</th>
<th>Spacing</th>
<th>Length</th>
<th>Area</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>FOOTING, VERTICAL</td>
<td>5c1</td>
<td>24</td>
<td>13</td>
<td>0.375</td>
<td>6.84</td>
<td>0.000</td>
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<tr>
<td>2</td>
<td>FOOTING, VERTICAL</td>
<td>5c2</td>
<td>24</td>
<td>13</td>
<td>0.375</td>
<td>6.84</td>
<td>0.000</td>
</tr>
<tr>
<td>3</td>
<td>FOOTING, HORIZONTAL</td>
<td>5d1</td>
<td>12</td>
<td>10</td>
<td>0.375</td>
<td>6.84</td>
<td>0.000</td>
</tr>
<tr>
<td>4</td>
<td>FOOTING, HORIZONTAL</td>
<td>5d2</td>
<td>12</td>
<td>10</td>
<td>0.375</td>
<td>6.84</td>
<td>0.000</td>
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<tr>
<td>5</td>
<td>FOOTING, VERTICAL</td>
<td>5d3</td>
<td>12</td>
<td>10</td>
<td>0.375</td>
<td>6.84</td>
<td>0.000</td>
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### CONCRETE PLACEMENT QUANTITIES (TWO ABUTMENTS)

<table>
<thead>
<tr>
<th>Location</th>
<th>SPANS</th>
<th>10'-0</th>
<th>20'-0</th>
<th>30'-0</th>
<th>40'-0</th>
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<th>60'-0</th>
<th>70'-0</th>
<th>80'-0</th>
<th>90'-0</th>
<th>100'-0</th>
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<tbody>
<tr>
<td>BENT GAUGE</td>
<td>5c1</td>
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<td>0.375</td>
<td>0.375</td>
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<td>0.375</td>
<td>0.375</td>
<td>0.375</td>
<td>0.375</td>
<td>0.375</td>
</tr>
<tr>
<td>BENT GAUGE</td>
<td>5c2</td>
<td>0.375</td>
<td>0.375</td>
<td>0.375</td>
<td>0.375</td>
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<td>0.375</td>
<td>0.375</td>
<td>0.375</td>
<td>0.375</td>
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<tr>
<td>BENT GAUGE</td>
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<td>0.375</td>
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<td>0.375</td>
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<td>0.375</td>
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<td>0.375</td>
<td>0.375</td>
<td>0.375</td>
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<td>0.375</td>
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<td>0.375</td>
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<tr>
<td>BENT GAUGE</td>
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<td>0.375</td>
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<td>0.375</td>
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<td>0.375</td>
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### ADDITIONAL CONCRETE

<table>
<thead>
<tr>
<th>ROADWAY GRADE AT ABUTMENT</th>
<th>0%</th>
<th>2%</th>
<th>3%</th>
<th>5%</th>
<th>7%</th>
<th>9%</th>
<th>11%</th>
<th>13%</th>
<th>15%</th>
<th>17%</th>
<th>19%</th>
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</thead>
<tbody>
<tr>
<td>QUANTITY</td>
<td>4.06</td>
<td>4.86</td>
<td>5.86</td>
<td>7.06</td>
<td>8.56</td>
<td>10.16</td>
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<td>14.06</td>
<td>16.40</td>
<td>19.06</td>
<td>22.00</td>
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</tbody>
</table>

### NOTES:

- Additional concrete values shown in the table are based on the roadway grade at each abutment. Additional concrete should be added to the plans for each abutment footprint that has a roadway grade greater than 0%. Additional concrete values should be excluded for scenarios that have less than 0.5 cu. yds. of additional concrete per abutment. Values may be interpolated for grades between the values shown in the table.
ABUTMENT DATA

<table>
<thead>
<tr>
<th>SPAN</th>
<th>30'-0</th>
<th>40'-0</th>
<th>50'-0</th>
<th>60'-0</th>
<th>70'-0</th>
<th>80'-0</th>
<th>90'-0</th>
<th>100'-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>REINFORCED CONCRETE BOX BEAM</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
</tr>
<tr>
<td>PRETENSENED PRESTRESSED BOX BEAM</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
<td>10'-1</td>
</tr>
</tbody>
</table>

- **NOTES:**
  - 2' 1/2" x 1" THICK POLYSTYRENE PLUG ON TOP OF DOWEL. FILL REMAINDER OF HOLE ABOVE PLUG WITH NON-SHRINK GROUT.
  - FOR CAST-IN-PLACE ABUTMENT BACKWALLS, CAST BACKWALL CONCRETE DIRECTLY AGAINST ENDS OF CONCRETE BOXES.
  - IN LIEU OF MECHANICAL COUPLERS, 6d1 AND 6d2 MAY BE COMBINED INTO ONE BAR EXTENDING FROM THE FOOTING INTO THE BACKWALL.
  - 1' 1/2 SMOOTH DOWELS (A36). DRILL A 1 1/2" HOLE 12" DEEP INTO ABUTMENT AFTER BEAMS ARE IN PLACE. USE CONCRETE ROTARY DRILL PRIOR TO SETTING DOWEL. FILL HOLE TO A DEPTH OF A WITH A POLYSTYRENE PLUG AND POLYSTYRENE PLUGS ON TOP OF DOWEL. FILL REMAINDER OF HOLE ABOVE PLUG WITH NON-SHRINK GROUT.

CONSTRUCTION MAY BE NECESSARY TO ACCOMMODATE BEAM CAMBER AND LATERAL MOVEMENT.

- 1/2" SMOOTH DOWELS (A36), DRILL A 1 1/2" HOLE DEEP INTO ABUTMENT AFTER BEAMS ARE IN PLACE. USE CONCRETE ROTARY DRILL PRIOR TO SETTING DOWEL. FILL HOLE TO A DEPTH OF A WITH A POLYSTYRENE PLUG AND POLYSTYRENE PLUGS ON TOP OF DOWEL. FILL REMAINDER OF HOLE ABOVE PLUG WITH NON-SHRINK GROUT.

- IN LIEU OF MECHANICAL COUPLERS, 6d1 AND 6d2 MAY BE COMBINED INTO ONE BAR EXTENDING FROM THE FOOTING INTO THE BACKWALL.

- 1/2" SMOOTH DOWELS (A36). DRILL A 1 1/2" HOLE 12" DEEP INTO ABUTMENT AFTER BEAMS ARE IN PLACE. USE CONCRETE ROTARY DRILL PRIOR TO SETTING DOWEL. FILL HOLE TO A DEPTH OF A WITH A POLYSTYRENE PLUG AND POLYSTYRENE PLUGS ON TOP OF DOWEL. FILL REMAINDER OF HOLE ABOVE PLUG WITH NON-SHRINK GROUT.

- FOR CAST-IN-PLACE ABUTMENT BACKWALLS, CAST BACKWALL CONCRETE DIRECTLY AGAINST ENDS OF CONCRETE BOXES.

- IN LIEU OF MECHANICAL COUPLERS, 6d1 AND 6d2 MAY BE COMBINED INTO ONE BAR EXTENDING FROM THE FOOTING INTO THE BACKWALL.
EPOXY COATED REINFORCING BAR LIST

CAST-IN-PLACE ABUTMENT BACKWALL (TWO ABUTMENTS)

REINFORCED CONCRETE BOX BEAMS

<table>
<thead>
<tr>
<th>BAR</th>
<th>LOCATION</th>
<th>SHAPE</th>
<th>SPAN</th>
<th>LENGTH</th>
<th>HEIG</th>
<th>NO.</th>
<th>LENGTH</th>
<th>HEIG</th>
<th>NO.</th>
<th>LENGTH</th>
<th>HEIG</th>
<th>NO.</th>
<th>LENGTH</th>
<th>HEIG</th>
<th>NO.</th>
<th>LENGTH</th>
<th>HEIG</th>
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<tbody>
<tr>
<td>B01</td>
<td>BENT WALL</td>
<td>VERTICAL</td>
<td>20'</td>
<td>40'-0</td>
<td>2.0</td>
<td>310</td>
<td>40'-0</td>
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</tr>
<tr>
<td>B02</td>
<td>BENT WALL</td>
<td>HORIZONTAL</td>
<td>20'</td>
<td>40'-0</td>
<td>2.0</td>
<td>310</td>
<td>40'-0</td>
<td>2.0</td>
<td>310</td>
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PRECAST ABUTMENT FOOTING (ONE FOOTING)

REINFORCED CONCRETE BOX BEAMS

<table>
<thead>
<tr>
<th>BAR</th>
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<th>SHAPE</th>
<th>SPAN</th>
<th>LENGTH</th>
<th>HEIG</th>
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<th>LENGTH</th>
<th>HEIG</th>
<th>NO.</th>
<th>LENGTH</th>
<th>HEIG</th>
<th>NO.</th>
<th>LENGTH</th>
<th>HEIG</th>
<th>NO.</th>
<th>LENGTH</th>
<th>HEIG</th>
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</thead>
<tbody>
<tr>
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<td>FOOTING, LONGITUDINAL</td>
<td>5'-0</td>
<td>10'</td>
<td>50'-0</td>
<td>10.0</td>
<td>350</td>
<td>50'-0</td>
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<td>10'</td>
<td>50'-0</td>
<td>10.0</td>
<td>350</td>
<td>50'-0</td>
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<tr>
<td>B103</td>
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<td>10'</td>
<td>50'-0</td>
<td>10.0</td>
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<td>50'-0</td>
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<td></td>
</tr>
</tbody>
</table>

ABUTMENT NOTES:
- Use high early strength self-consolidating concrete.
- Footing piles shall consist of galvanized steel aggregates.
- Cast-in-place concrete shall be placed ACCORDING TO THE PRECAST CONCRETE ELEMENTS.

PRECAST CONCRETE PLACEMENT QUANTITIES (ONE FOOTING)

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>BOX BEAMS</th>
<th>SPAN</th>
<th>30'-0</th>
<th>36'-0</th>
<th>40'-0</th>
<th>45'-0</th>
<th>50'-0</th>
<th>55'-0</th>
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<td>0.62</td>
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<td></td>
<td></td>
<td></td>
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</table>

** NOTE: ALL DIMENSIONS ARE OUT TO OUT. D = PIN DIAMETER.

** INCLUDES MECHANICAL COUPLERS, SEE BENT BAR DETAILS.

CAST-IN-PLACE CONCRETE PLACEMENT QUANTITIES (TWO ABUTMENTS)

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>BOX BEAMS</th>
<th>SPAN</th>
<th>30'-0</th>
<th>36'-0</th>
<th>40'-0</th>
<th>45'-0</th>
<th>50'-0</th>
<th>55'-0</th>
<th>60'-0</th>
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<tbody>
<tr>
<td>BACKWALLS</td>
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<td>0.62</td>
</tr>
</tbody>
</table>

** INCLUDES MECHANICAL COUPLERS, SEE BENT BAR DETAILS.

ABUTMENT DETAILS (PRECAST)
- Sheet pile wings

** NOTE: ALL DIMENSIONS ARE OUT TO OUT. D = PIN DIAMETER.

** HIGH EARLY STRENGTH SELF-CONSOLIDATING CONCRETE.

CMP POLE POCKET NOTE:
- Pole pockets shall consist of galvanized steel aggregates.
- Cast-in-place concrete shall be placed ACCORDING TO THE PRECAST CONCRETE ELEMENTS.

HIGHWAY DIVISION

DECEMBER, 2016

IOWA DOT

B30-18-16
**ABUTMENT NOTES:**

- **PRECAST CONCRETE BOX BEAM BRIDGES**
- **NOTES:**
  - The additional concrete table lists the additional concrete volume required in each precast concrete footing based on the roadway grade at each abutment. This additional concrete is included in each item for precast footing concrete wing wall. The quantities shown in the precast concrete quantities three are based on CO. 
  - The additional concrete notes, following all manufacturers’ recommendations for installation.

### EPOXY COATED REINFORCING BAR LIST, PRECAST ABUTMENT BACKWALL (ONE UNIT)

<table>
<thead>
<tr>
<th>Bar No.</th>
<th>Location</th>
<th>Bar</th>
<th>3'D - 0&quot;</th>
<th>5'9&quot; - 0&quot;</th>
<th>8'6&quot; - 0&quot;</th>
<th>10'9&quot; - 0&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>402</td>
<td>403</td>
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<td>405</td>
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</tr>
</tbody>
</table>

### Footing Bending Bar Details

- **THREAD BAR END**
  - Length
  - Bending bar details
  - Bending bar details
  - Bending bar details

### Additional Concrete

- **NOTES:**
  - The additional concrete volume required in each precast concrete footing based on the roadway grade at each abutment. This additional concrete is included in each item for precast footing concrete wing wall. The quantities shown in the precast concrete quantities three are based on CO.

### Backwall Setting Notes

- The additional concrete volume required in each precast concrete footing based on the roadway grade at each abutment. This additional concrete is included in each item for precast footing concrete wing wall. The quantities shown in the precast concrete quantities three are based on CO.
### EPOXY COATED REINFORCING BAR LIST, PRECAST ABUTMENT BACKWALL (ONE UNIT)

<table>
<thead>
<tr>
<th>Bar</th>
<th>Location</th>
<th>30°</th>
<th>60°</th>
<th>90°</th>
<th>Material</th>
<th>Length</th>
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<tbody>
<tr>
<td>1</td>
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<td>31</td>
<td>8</td>
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<tr>
<td>2</td>
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<td>3</td>
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<td>6</td>
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<td>7</td>
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<td>8</td>
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<tr>
<td>9</td>
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<td>10</td>
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<tr>
<td>11</td>
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<td>20</td>
<td>27</td>
<td>139</td>
<td>27</td>
<td>27</td>
</tr>
</tbody>
</table>

**NOTES:**
- *INCLUDES THE COST OF FURNISHING AND PLACING ALL PREPARED EXPANSION JOINT FILLER.
- **PRECAST CONCRETE QUANTITIES TABLE ARE BASED ON 0% CONCRETE WINGS)
- **PRECAST CONCRETE QUANTITIES ARE BASED ON 0% CONCRETE WINGS)
ABUTMENT FOOTING LIFTING LOOP DETAILS

ABUTMENT BACKWALL LIFTING LOOP DETAILS

NOTES:
- Alternate lifting devices and/or attachment points shall be submitted for approval.
- Lifting operations shall be performed in a manner that lifting loops carry loads equally.
- Lifting devices shall be removed after installation and recesses shall be filled with grout.
- All costs associated with lifting devices and filling recesses shall be incidental to the price bid for the precast component.

PRECAST ABUTMENT LIFTING LOOP DETAILS

B30-24-16
TABLE 1: TRIANGULAR LOAD DEAD WEIGHT "A" ALONG JOINT (PLF)

<table>
<thead>
<tr>
<th>GRADE</th>
<th>20'-0</th>
<th>30'-0</th>
<th>40'-0</th>
<th>50'-0</th>
<th>60'-0</th>
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<tr>
<td>2%</td>
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<tr>
<td>1%</td>
<td>16</td>
<td>16</td>
<td>16</td>
<td>16</td>
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<td>16</td>
</tr>
</tbody>
</table>

(Foam strips shown uncompressed for clarity)

Calendar:
- 0°`SKEW
- 15°`SKEW

**UHPC JOINT NOTES:***
- Longitudinal joints between beams shall be constructed of Ultra High Performance Concrete (UHPC). The contractor shall be required to meet all UHPC material specifications and the Ultra High Performance Concrete Notes on Sheets B30-26-16.

**UHPC FORMWORK NOTES:***
- Material properties of UHPC vary considerably from conventional concrete, even during the plastic state and at the hardened state. The foam strips shall be placed in the joint to provide an additional formwork effort. Effort shall be required to ensure the formwork is properly sealed and is capable of resisting the anticipated form pressures.

The contractor shall note that the UHPC placement on grade typically requires top forms for containment of the material within the designated placement area. The form pressures must be considered proportionally depending on their location along the span. The total form pressure shall be applied along the length of the joint. The form pressures are shown in Table 1. Foam strips are required for all joint blockouts. At the low end of the span and point loads "B" at other blockouts along the concrete box span shall be considered proportionally depending on their location along the span. Foam strips for joints are computed assuming a maximum height of 16" FC. Dead loads shall be applied to all joints concurrently and shall not be removed until the UHPC joints have attained a minimum required strength of 10 KSI.

**UHPC JOINT QUANTITY TABLE**

<table>
<thead>
<tr>
<th>SPAN (FT)</th>
<th>TOTAL (LF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>289</td>
</tr>
<tr>
<td>40</td>
<td>428</td>
</tr>
<tr>
<td>50</td>
<td>359</td>
</tr>
<tr>
<td>60</td>
<td>299</td>
</tr>
</tbody>
</table>

Specialized grinding equipment may be required to grind the UHPC. Additional formwork will be required to ensure the concrete is properly sealed and is capable of resisting the anticipated form pressures. The contractor shall add equipment in the formwork for grinding. The cost for grinding shall be included in price bid for UHPC joint.

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ULTRA HIGH PERFORMANCE CONCRETE JOINT FOR CONCRETE BOX BEAM BRIDGE NOTES:

1. Selection of materials, tools, and labor necessary for the performance of all work connected with the construction, operation, and maintenance of Ultra High Performance Concrete (UHPC) for Long-Term Performance Concrete Joint (LTPC) required for planning and Ultra High Performance Concrete Joint (LTPC) required for planning and

2. UHPC JOINT DETAILS:
   - Provide submittals to the engineer in electronic format, in accordance with instructions for submittals. The submittals shall include:
     - METHODS OF JOINT SURFACE PREPARATION TO ACHIEVE THE REQUIRED PERFORMANCE CONCRETE JOINTS.
     - PERFORMANCE CONCRETE (UHPC) WHERE REQUIRED PER PLAN FOR ULTRA HIGH PERFORMANCE CONCRETE JOINTS.

3. QUALITY CONTROL:
   - The quality control procedures for Ultra High Performance Concrete Joint shall be in accordance with ASTM C1202, LONG-TERM SHRINKAGE (ASTM C157; INITIAL READING AFTER SET), and shall be performed for Ultra High Performance Concrete Joint Strength Requirements at 28 days, unless noted otherwise.

4. MATERI AL S:
   - UHPC JOINT FOR CONCRETE BOX BEAM BRIDGES:
     - BASIS OF PAYMENT:
       - COMPENSATION FOR ALL LABOR, EQUIPMENT, FORMS, MATERIAL AND TESTING TO COMPLETE CONTRACT PRICE FOR UHPC JOINT FOR CONCRETE BOX BEAM BRIDGE AND SHALL BE FULLY MEASURED TO THE ENGINEER.

5. MATERIAL TESTING:
   - FOUR SETS OF COMPRESSIVE TEST CYLINDERS FOR EACH DAY OF UHPC PLACEMENT, EACH CYLINDER CONSISTS OF THREE PIECES, ALL SETS SHALL BE CURED IN AN ENVIRONMENT SIMILAR TO THE MATERIAL I TEM BEGIN.

6. MEASUREMENT:
   - QUALITY ASSURANCE:
     - RECORD THE SLUMP FLOW FOR EACH BATCH IN THE QA/QC LOG. PROTECT A COPY OF THE LOG TO THE ENGINEER.

7. PRE-POUR MEETING:
   - THE WORK FOR ULTRA HIGH PERFORMANCE CONCRETE JOINTS, AS DESCRIBED IN THE PLANS AND THESE NOTICES.

8. FORMING, BATCHING, PLACEMENT, AND CURING:
   - WORK TOGETHER WITH UHPC MANUFACTURER TO ENSURE APPROPRIATE INITIAL STRENGTH GAINS DURING THE PLACEMENT OF ALL UHPC, INCLUSIVE OF ALL LONGITUDINAL BEAM CONNECTIONS. THE DESIGN AND FABRICATION OF FORMS SHALL FOLLOW APPROVED INSTALLATION DRAWINGS AND SUBMITTED TO AND ACCEPTED BY THE ENGINEER.

9. STORAGE:
   - THE UHPC REPRODUCED FOR HYDROSTATIC PRESSURE TESTING SHALL BE STORED IN A VACUUM TANK AT 200 MAX.
   - 5.0 - 8.5
   - RDM > 96%
UHPC WATER INTEGRITY TEST NOTES:

DESCRIPTION:
A. Furnish all materials, tools and labor necessary for the performance of all work to water integrity test the UHPC joint.

B. Submit:
- Provide submittals to the Engineer in electronic format, in accordance with Article 1105.03, F of the Standard Specifications.
- The submittals requiring written approval from the Engineer are as follows:
  2.甲
  3.甲

MATERIALS:

<table>
<thead>
<tr>
<th>Property</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Viscosity</td>
<td>Less than 20 cP when measured according to ASTM D2849</td>
</tr>
<tr>
<td>2. Density</td>
<td>Greater than 80 kg/m³</td>
</tr>
<tr>
<td>3. TG (DSC)</td>
<td>Greater than 136°F (ASTM D323)</td>
</tr>
<tr>
<td>4. Vapor Pressure</td>
<td>Less than 0.2 in Hg at 77°F (ASTM D547)</td>
</tr>
<tr>
<td>5. Damp Time</td>
<td>Greater than 40 minutes for 100 gram mass</td>
</tr>
<tr>
<td>6. Per cent Solids</td>
<td>Greater than 90% by weight</td>
</tr>
<tr>
<td>7. Bond Strength</td>
<td>Greater than 152°F for 120 minutes</td>
</tr>
</tbody>
</table>

INTEGRITY TEST:

A. Water Integrity Testing:

1. The procedure for water integrity testing shall be as follows:
   - Test the designated UHPC joint by blocking out and covering the joint with water. Apply water to the joint with a water pressure of at least 3 psi for at least 5 minutes. The Contractor may conduct a single test of the entire joint or may conduct separate tests of overlapping lengths of the joint.
   - During the test and for 5 minutes after the supply of water has stopped, the Inspector will examine the integrity of the joint for leakage. The Contractor shall be responsible for providing the Inspector with access to the undersides of the deck. The joint shall be conducted with a minimum test water depth of 1 inch, for at least 15 minutes. The Contractor may conduct a single test of the entire joint or may conduct separate tests of overlapping lengths of the joint.

2. If leakage occurs in any joint, the joint shall be repaired in accordance with the procedures as follows:
   - Abrasive blast cleaning of the joint area to be repaired, removing all contaminants from the surface. Clean adjacent surfaces of the UHPC joint using compressed air free of oil and moisture.
   - Do not apply resin if rain is expected within 12 hours of completion. Apply resin to clean, dry surfaces where surface temperature is at least 70°F and if near 70°F, temperature shall be rising. Mix and apply resin according to the manufacturer’s instructions and no more than 5 gallons at a time, pour resin over joints.
   - When methacrylate surfaces will be used as a driving surface, apply resin and then provide a protective layer of approximately 2 pounds per square yard, completely covering the resin. The protective layer must be tack-free before construction traffic is permitted to resume.
### ESTIMATED QUANTITIES (WITH CAST-IN-PLACE ABUTMENTS)

<table>
<thead>
<tr>
<th>SPAN</th>
<th>REINFORCED CONCRETE BOX BEAMS</th>
<th>PRETENSIONED PRESTRESSED CONCRETE BOX BEAMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>30'-0</td>
<td>288</td>
<td>288</td>
</tr>
<tr>
<td>40'-0</td>
<td>308</td>
<td>308</td>
</tr>
<tr>
<td>50'-0</td>
<td>328</td>
<td>328</td>
</tr>
</tbody>
</table>

#### Notes:
- Includes two abutment footings and two abutment backwalls.
- Includes four retained angle assemblies and bridge rail posts.
- For required steel sheet pile quantity, see sheet B30-08-16. Pay item "Piles Steel Sheet-Concrete Box Beam Bridge".
- * Includes two abutment backwalls.
- ** Includes high early strength self-consolidating concrete for CMP pockets. See sheet B30-18-16 for volume of high early strength self-consolidating concrete required for each box beam type and span length.
- *** Includes high early strength self-consolidating concrete for CMP pockets. See sheet B30-18-16 for volume of high early strength self-consolidating concrete required for each box beam type and span length.

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<th>SPAN</th>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Structural Steel</td>
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<tr>
<td>Precast Concrete Box Beam</td>
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Notes:
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<tbody>
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<td>B30-16</td>
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<tr>
<td>60'-0</td>
<td>RCB</td>
<td>B30-16</td>
</tr>
<tr>
<td>70'-0</td>
<td>RCB</td>
<td>B30-16</td>
</tr>
</tbody>
</table>

**NOTES:**
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- *** INCLUDES HIGH EARLY STRENGTH SELF-CONSOLIDATING CONCRETE FOR CMP POCKETS. SEE SHEET B30-22-16 FOR VOLUME OF HIGH EARLY STRENGTH SELF-CONSOLIDATING CONCRETE REQUIRED FOR EACH BOX BEAM TYPE AND SPAN LENGTH.
- ** INCLUDES FOUR RETAINER ANGLE ASSEMBLIES AND BRIDGE RAIL POSTS.
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### Estimated Quantities (With Cast-In-Place Abutments)

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<th>Span</th>
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<tbody>
<tr>
<td>30'-0</td>
<td>305</td>
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<td>50'-0</td>
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Notes:
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- ** Includes four retained angle assemblies and bridge rail posts.
- *** Includes high early strength self-consolidating concrete for CMP pockets. See Sheet B30-23-16 for volume of high early strength self-consolidating concrete required for each box beam type and span length.

### Notes
- Quantities shown only include quantities covered by these standards. Other quantities as required may also need to be calculated by the use of these standards such as UHPC joint, water integrity test, excavation class 20 or 21, removal of structure, bridge wing armor, etc.
KEYWAY JOINT PREPARATION NOTES:

Keyed joint surfaces of concrete box beams for longitudinal joint connections shall receive a textured finish consisting of micro-texture and macro-texture. Joint surfaces shall be textured to “Concrete Surface Profile 6” or rougher, as established by the International Concrete Repair Institute (ICRI), joint texture may be achieved by one or more of the following means:

- Medial blasting
- Use of a textured formliner
- Use of a form textured at the joint surface, followed by pressure washing after initial set to provide an exposed aggregate finish
- Other means, subject to Engineer's approval.

In addition to the above joint preparation requirements, the requirements of Section 2403.20.11 of the Standard Specifications shall apply (includes sandblasting and air blast cleaning of joint surfaces). Keyway surfaces shall be keyed to a saturated concrete or joint condition prior to casting the UHPC joint.

All work for preparation and texturing of keyed joint surfaces for longitudinal beam connections shall be included in the price bid for the beams.
CONCRETE BOX BEAM BRIDGES

STANDARD DESIGN - 30'-0" ROADWAY, SINGLE SPAN

DECEMBER, 2016

B30-33-16

BEAM CHAMFER DETAILS

NOTE:
FOR REVELED KEYWAY DETAILS, SEE BEAM DETAILS SHEETS.
**Specifications:**

**Design:**
- Concrete Box Beam Design Specifications, TR-BR-6, Series of 2014, except as noted in 'Live Load Distribution Factor Notes'.

**Construction:**

**Live Load Distribution Factor Notes:**
- Live Load Distribution Factors used for the flexural design of the beams are based on past studies conducted by the Iowa Department of Transportation, including shear effects used for determining the live load distribution factor for beams. The controlling live load distribution factors are based on past studies conducted by IADOT. However, AASHTO equations including shear effects were used as noted in the 'Live Load Distribution Factor Notes'.

**Design Stresses:**
- Design stresses for the following materials are to be in accordance with AASHTO LRFD Bridge Design Specifications, 7th Ed., Series of 2014:
  - Prestressing steel in accordance with Section 5, Grade 270.
  - Concrete in accordance with Section 5, Grade 270.
  - Steel in accordance with Section 5, Grade 60.

**Notes:**
- These beams are designed for highway loading with an allowance of 50 lb. per square foot of roadway for skew and future bearing surface.
- The prestressing strands are to be tensioned in accordance with AASHTO LRFD Bridge Design Specifications, 7th Ed., Series of 2014.
- All prestressing strands are to be tensioned in accordance with AASHTO LRFD Bridge Design Specifications, 7th Ed., Series of 2014.
- All beams are to be placed in a manner that lifting loops carry loads equally.

**Load Losses:**
- These beams are designed for highway loading with an allowance of 50 lb. per square foot of roadway for skew and future bearing surface.
- The prestressing strands are to be tensioned in accordance with AASHTO LRFD Bridge Design Specifications, 7th Ed., Series of 2014.
- All prestressing strands are to be tensioned in accordance with AASHTO LRFD Bridge Design Specifications, 7th Ed., Series of 2014.
- All beams are to be placed in a manner that lifting loops carry loads equally.

**Beam Section Properties:**

**Lifting Loop Plan:**
- Alternate types of lifting loops may be substituted for approval.
- Lifting loops shall be placed in a manner that lifting loops carry loads equally.

**Lifting Loop Details:**
- Mechanical couplers (typ.)
- HDPE sleeves
- Top of beam
- Top of beam
- 1½' extra strong steel pipe
CONCRETE BOX BEAM BRIDGES

STANDARD DESIGN - 30'-0" ROADWAY, SINGLE SPAN

DECEMBER, 2016

B30-35-16

TABLE OF DIMENSION DATA

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<thead>
<tr>
<th>BEAM LINE</th>
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<th>&quot;B&quot; SPACES</th>
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NOTES:

1. For beam line designations, see sheet B30-06-16.
2. For beam shape details, see sheet B30-33-16.
3. For view B-B, see sheet B30-34-16.

NOTE:

Keyway block-out, for details, see sheet B30-22-16.

For 90° and 45° skew beam shapes, see sheet B30-33-16.

For 0° skew beam shapes, see sheet B30-35-16.

FOR VIEW 0°, SEE SHEET B30-35-16.

FOR VIEW 45°, SEE SHEET B30-36-16.

FOR VIEW 90°, SEE SHEET B30-37-16.

FOR VIEW 45°, SEE SHEET B30-38-16.
### EPOXY COATED REINFORCING BAR LIST

**21" x 48" x 30'-0 PPCBB, 0° SKEW**

<table>
<thead>
<tr>
<th>Beam Line</th>
<th>Length</th>
<th>Weight</th>
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<tr>
<td>A</td>
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<tr>
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**Bent Bar Details**

The lengths shown do not include an allowance for the threaded end. The weight of the threaded end is not included in the quantity shown.

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### EPOXY COATED REINFORCING BAR LIST

**21" x 48" x 30'-0 PPCBB, 15° SKEW**

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**Bent Bar Details**

The lengths shown do not include an allowance for the threaded end. The cost of the threaded portion of these bars is to be included in the price bid for the beam. The weight of the threaded end is not included in the quantity shown.

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### EPOXY COATED REINFORCING BAR LIST

**21" x 48" x 30'-0 PPCBB, 30° SKEW**

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**Bent Bar Details**

The lengths shown do not include an allowance for the threaded end. The weight of the threaded end is not included in the quantity shown.
**EPOXY COATED REINFORCING BAR LIST**

**21" x 48" x 40'-0" PPCBB, 0° SKEW**

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**NOTE:** ALL DIMENSIONS ARE OUT TO OUT. D= PIN DIAMETER.

---

**BENT BAR DETAILS**

**4c1:** INCLUDES MECHANICAL COUPLER; SEE BENT BAR DETAILS.

**4c2, 4c3:** SEE BENT BAR DETAILS. THE LENGTH SHOWN DO NOT INCLUDE AN ALLOWANCE FOR THE THREADED END. BAR LENGTHS MAY NEED TO INCREASE DEPENDING ON THE MECHANICAL COUPLER ASSEMBLY USED. THE COST OF THE THREADED PORTION OF THESE BARS IS TO BE INCLUDED IN THE PRICE BID FOR THE BARS. THE WEIGHT OF THE THREADED END IS NOT INCLUDED IN THE QUANTITY SHOWN.

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**EPOXY COATED REINFORCING BAR LIST**

**21" x 48" x 40'-0" PPCBB, 15° SKEW**

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**EPOXY COATED REINFORCING BAR LIST**

**21" x 48" x 40'-0" PPCBB, 30° SKEW**

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**IOWA DOT**

Highway Division

**Standard Design - 30'-0" Roadway, Single Span**

**Concrete Box Beam Bridges**

**December, 2016**

**CONCRETE BOX BEAM BRIDGES**

**21" x 48" x 40'-0" PPCBB Details**

**Reinforcing Bar List**

**B30-40-16**
27" x 48" PRETENSIONED Prestressed Concrete Box Beam Data

**BEAM SECTION PROPERTIES**

- **INTERIOR BEAM CROSS SECTION**
- **EXTERIOR BEAM CROSS SECTION**

**LIFTING LOOP PLAN**

- **LIFTING LOOP DETAIL**

**SPECIFICATIONS**

**DESIGN**
- Accurately locate keyways, see Sheet B30-32-16.
- For keyway details, see Sheet B30-33-16.

**CONSTRUCTION**
- Standard specifications of the Iowa Department of Transportation, current series, with current applicable special provisions and supplemental specifications.

**LIVE LOAD DISTRIBUTION FACTOR NOTES**

- Live load distribution factors used for the preliminary design of the beams was based on worst cases conducted by Coast Highway Authority Equations. Including shear effects are used for determining the live load distribution factors for beams.

**DESIGN STRESSES**

- Design stresses for the following materials are to be in accordance with AASHTO LPS-29 bridge design specifications, 7th ed., Series of 2014:
  - Prestressing steel in accordance with Section 5, Grade 270.
  - Reinforcing steel in accordance with Section 5, Grade 60.

**NOTES**

- These beams are designed for H2-93 loading with an allowance of 50 lb. per square foot of roadway for gravel or future wearing surface.
- Prestressing strands shall conform to AASHTO 270.2.2.6.6 of the standard specifications.
- Beams shall be at least 28 days old before the future wearing surface.
- Beam ends are to be struck off level and longitudinally tined in accordance with Article 2301.03, H, 3 of the Standard Specifications.
- All prestressing strands shall carry to a beam end.
- All beams are to be increased in length to compensate for elastic shortening, creep, and shrinkage.
- Concrete must be at least 28 days old before the future wearing surface.

**BEAMS ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FUTURE WEARING SURFACE.**

**BEARINGS**

- All beams are to be provided with grout after loop is removed.

**CONCRETE BOX BEAM BRIDGES**

**DESIGN**

- Standard design - 30'-0 roadways, single span

- Concrete Box Beam Bridges

**SPECIFICATIONS**

**DESIGN**
- Accurately locate keyways, see Sheet B30-32-16.
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**CONCRETE BOX BEAM BRIDGES**

**DESIGN**

- Standard design - 30'-0 roadways, single span

- Concrete Box Beam Bridges

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**CONCRETE BOX BEAM BRIDGES**

**DESIGN**

- Standard design - 30'-0 roadways, single span

- Concrete Box Beam Bridges

**SPECIFICATIONS**

**DESIGN**
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- Standard specifications of the Iowa Department of Transportation, current series, with current applicable special provisions and supplemental specifications.

**LIVE LOAD DISTRIBUTION FACTOR NOTES**

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<td>48'-8&quot;</td>
<td>75</td>
<td>4'-22&quot;</td>
</tr>
<tr>
<td>Beam Line D</td>
<td>1</td>
<td>48'-8&quot;</td>
<td>75</td>
<td>4'-22&quot;</td>
</tr>
<tr>
<td>Beam Line E</td>
<td>1</td>
<td>48'-8&quot;</td>
<td>75</td>
<td>4'-22&quot;</td>
</tr>
<tr>
<td>Beam Line F</td>
<td>1</td>
<td>48'-8&quot;</td>
<td>75</td>
<td>4'-22&quot;</td>
</tr>
<tr>
<td>Beam Line G</td>
<td>1</td>
<td>48'-8&quot;</td>
<td>75</td>
<td>4'-22&quot;</td>
</tr>
</tbody>
</table>

**Total Length:** 948"

**Notes:**
- All dimensions are out to out, x pin diameter.
- Includes mechanical coupler, see bent bar details.
- See bent bar details. The lengths shown do not include an allowance for the threaded end. Bar lengths may need to increase depending on the mechanical coupler assembly. The cost of the threaded portion of these bars is to be included in the price bid for the beams. The weight of the threaded end is not included in the quantity shown.

---

**BENT BAR DETAILS**

**Threaded End**

4c1, 4d2

4b1, 4b2

---

### BENT BAR DETAILS

**Threaded Mechanical Coupler, Unit from one end for beam lines A and E.**

4c1 x

4d1, 4d2

**Threaded Mechanical Coupler, Unit from one end for beam lines A and E.**

4c1 x

4d1, 4d2

---

### BENT BAR DETAILS

**Threaded End**

4c1 x

4d1, 4d2

**Threaded Mechanical Coupler, Unit on exterior face for beam lines A and E.**

4c1 x

4d1, 4d2

---

**NOTES:**
- Includes mechanical coupler, see bent bar details.
- See bent bar details. The lengths shown do not include an allowance for the threaded end. Bar lengths may need to increase depending on the mechanical coupler assembly. The cost of the threaded portion of these bars is to be included in the price bid for the beams. The weight of the threaded end is not included in the quantity shown.
NOTE: ALL DIMENSIONS ARE OUT TO OUT. D= PIN DIAMETER.

INCLUDED IN THE PRICE BID FOR THE BEAMS. THE WEIGHT OF THE THREADED END IS NOT INCLUDED IN THE QUANTITY SHOWN.

TO INCREASE DEPENDING ON THE MECHANICAL COUPLER ASSEMBLY USED. THE COST OF THE THREADED PORTION OF THESE BARS IS TO BE

* INCLUDES MECHANICAL COUPLER(S). SEE BENT BAR DETAILS.

** SEE BENT BAR DETAILS. THE LENGTH SHOWN DO NOT INCLUDE AN ALLOWANCE FOR THE THREADED END. BAR LENGTHS MAY NEED
LINES "A" AND "H".

EXTERIOR FACE FOR COUPLER. OMIT ON THREADED MECHANICAL COUPLER (TYP.). OMIT ON THREADED MECHANICAL COUPLER (TYP.).

FROM ONE END FOR BEAM COUPLER LINES "A" AND "H".

BEAM LINES "A" AND "H".

NOTE: ALL DIMENSIONS ARE OUT TO OUT. D= PIN DIAMETER.
**EPOXY COATED REINFORCING BAR LIST**

**33" x 48" x 70'-0 PPCBB, 0° SKEW**

<table>
<thead>
<tr>
<th>BEAM LINE NO.</th>
<th>BAR SIZE</th>
<th>LENGTH</th>
<th>WEIGHT</th>
</tr>
</thead>
<tbody>
<tr>
<td>4c1</td>
<td>8 33&quot;</td>
<td>2 '</td>
<td>4c1</td>
</tr>
<tr>
<td>4c2</td>
<td>4 33&quot;</td>
<td>2 '</td>
<td>4c2</td>
</tr>
<tr>
<td>4c3</td>
<td>4 33&quot;</td>
<td>2 '</td>
<td>4c3</td>
</tr>
<tr>
<td>4c4</td>
<td>4 33&quot;</td>
<td>2 '</td>
<td>4c4</td>
</tr>
<tr>
<td>4c5</td>
<td>4 33&quot;</td>
<td>2 '</td>
<td>4c5</td>
</tr>
<tr>
<td>4c6</td>
<td>4 33&quot;</td>
<td>2 '</td>
<td>4c6</td>
</tr>
</tbody>
</table>

**BENT BAR DETAILS**

- Threading End "D" (4c2)
- Threaded Mechanical Coupling Type "D" from one end for beam lines "A" and "B".

**NOTES:**
- All dimensions are out to out, in pin diameter.
- Includes mechanical couplings.
- See bent bar details.
- The lengths shown do not include an allowance for the threaded end. Bar lengths may need to increase depending on the mechanical coupler assembly used. The cost of the threaded portion of these bars is to be included in the price bid for the beams. The weight of the threaded end is not included in the quantity shown.
27" x 48" REINFORCED CONCRETE BOX BEAM DATA

<table>
<thead>
<tr>
<th>BEAM</th>
<th>SPAN LENGTH</th>
<th>OVERALL LENGTH</th>
<th>P.C.</th>
<th>CONCRETE TYPE</th>
<th>STEEL TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>270B</td>
<td>270'-0</td>
<td>270'-0</td>
<td>4.0</td>
<td>600 psi</td>
<td>370 SS</td>
</tr>
</tbody>
</table>

NOTES:
- DESIGN STRESSES:
  - CONCRETE IN ACCORDANCE WITH SECTION 5.
  - REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60.

SPECIFICATIONS:
- DESIGN:
  - AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7TH ED. SERIES OF 2014:
  - CONSTRUCTION:
    - STANDARD SPECIFICATIONS OF THE IOWA DEPARTMENT OF TRANSPORTATION, CURRENT SERIES WITH CURRENT APPROPRIATE SPECIAL PROVISIONS AND SUPPLEMENTAL SPECIFICATIONS.

LIVE LOAD DISTRIBUTION FACTOR NOTES:
- ASSUMED EQUATIONS WERE USED FOR DETERMINING THE LIVE LOAD DISTRIBUTION FACTORS FOR THE DESIGN OF THE BEAMS. SKEW EFFECTS WERE INCLUDED IN THE LIVE LOAD DISTRIBUTION FACTOR FOR SHEAR AND CONSERVATIVELY IGNORED FOR THE LIVE LOAD DISTRIBUTION FACTOR FOR MOMENT. CONTROLLING LIVE LOAD DISTRIBUTION FACTORS ARE:
  - 30'-0 SPAN:
    - MOMENT = 2 OUT LANES / BEAM
    - SHEAR = 4 OUT LANES / BEAM
  - 40'-0 SPAN:
    - MOMENT = 2 OUT LANES / BEAM
    - SHEAR = 4 OUT LANES / BEAM

DESIGN STRESSES FOR THE FOLLOWING MATERIALS ARE TO BE IN ACCORDANCE WITH AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 7TH ED. SERIES OF 2014:
- STEEL:
  - REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60.

CONSTRUCTION:
- CONCRETE IN ACCORDANCE WITH SECTION 5.
- REINFORCING STEEL IN ACCORDANCE WITH SECTION 5, GRADE 60.

REINFORCEMENT:
- 3-3/4" GRADE 270 STRANDS

SKEW:
- 2" 1/2 HDPE DRAIN AT CORNERS OF EACH END OF VOID, LOCATE TO CLEAR REINFORCING (TYP.)
- 2 x 10 x 2'-6 BEVELED KEWAY
- 2 x 10 x 2'-6 BEVELED KEWAY

NOTES:
- THESE BEAMS ARE DESIGNED FOR WIND LOADS WITH AN ALLOWANCE OF 50.0 lb. PER SQUARE FOOT OF ROOF FOR GRAY OR FUTURE WEARING SURFACE.
- TOPS OF BEAMS ARE TO BE STRUCK OFF LEVEL AND LONGITUDINALLY TINED IN ACCORDANCE WITH ARTICLE 2301.03, H, 3 OF THE STANDARD SPECIFICATIONS.
- BEAMS SHALL BE AT LEAST 28 DAYS OLD BEFORE THE FUTURE WEARING SURFACE, IF BEAMS ARE TO BE AT LEAST 28 DAYS OLD BEFORE THE FUTURE WEARING SURFACE, IF LOADING PLACED UNTIL A MINIMUM CURING TIME IS APPROVED BY THE BRIDGE ENGINEER.
- LIFTING OPERATIONS SHALL BE PERFORMED IN A MANNER THAT LIFTING LOOPS CARRY LOADS EQUALLY.

FOR KEYWAY DETAILS, SEE SHEET B30-33-16.
FOR VIEW B-B LOCATION, SEE SHEETS B30-53-16 & B30-54-16.
FOR KEYWAY DETAILS, SEE SHEET B30-33-16.
FOR VIEW B-B LOCATION, SEE SHEETS B30-53-16 & B30-54-16.
CONCRETE BOX BEAM BRIDGES
STANDARD DESIGN - 30'-0 ROADWAY, SINGLE SPAN
DECEMBER, 2016

TABLE OF DIMENSION DATA

<table>
<thead>
<tr>
<th>CREST LINE</th>
<th>(INCHES)</th>
<th>SPACES</th>
<th>SPACES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4</td>
<td>45</td>
<td>44</td>
</tr>
<tr>
<td>B</td>
<td>4</td>
<td>45</td>
<td>44</td>
</tr>
<tr>
<td>C</td>
<td>4</td>
<td>45</td>
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<tr>
<td>D</td>
<td>4</td>
<td>45</td>
<td>44</td>
</tr>
<tr>
<td>E</td>
<td>4</td>
<td>45</td>
<td>44</td>
</tr>
<tr>
<td>F</td>
<td>4</td>
<td>45</td>
<td>44</td>
</tr>
</tbody>
</table>

NOTES:

- FOR VIEW A-A, SEE SHEET B30-52-16.
- FOR BEAM CHAMFER DETAILS, SEE SHEET B30-33-16.
- FOR VIEW B-B, SEE SHEET B30-52-16.
- FOR VIEW 6-5, SEE SHEET B30-32-16.
- FOR BEAM CHAMFER DETAILS, SEE SHEET B30-33-16.

FOR BEAM LINE DESIGNATIONS, SEE SHEET B30-06-16.
Concrete Box Beam Bridges

**TABLE OF DIMENSION DATA**

<table>
<thead>
<tr>
<th>Beam Line</th>
<th>Spaces</th>
<th>Spacing</th>
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<tbody>
<tr>
<td>4a1</td>
<td>2</td>
<td>1 1/2</td>
</tr>
<tr>
<td>4a2</td>
<td>2</td>
<td>1 1/2</td>
</tr>
<tr>
<td>4b1</td>
<td>4</td>
<td>2</td>
</tr>
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</table>

**Notes:**
- For beam line designation, see Sheet B30-06-16.
- For beam chamfer details, see Sheet B30-33-16.
**INTERIOR BEAM CROSS SECTION**

**EXTerior BEAM CROSS SECTION**

**LIFTING LOOP DETAIL**

**LIFTING LOOP PLAN**

**NOTES:**

- These beams are designed for HLL loading with an allowance of 50 lb per square foot of roadway for gravel or future wearing surface.
- Tops of beams are to be struck off level and longitudinally tined in accordance with Article 2301.03, H, 3 of the Standard Specifications.
- Lifting operations shall be performed in a manner that lifting loops carry loads equally.
- These beams have been designed for HL-93 loading with an allowance of 50 lb per square foot of roadway for gravel or future wearing surface.
Concrete Box Beam Bridges

**ELEVATION**

KEYWAY NOT SHOWN FOR CLARITY

**PLAN**

INTERIOR BEAM SHOWS EXTERIOR BEAM SIMILAR

**SECTION A-A**

NOTES:
- KEYWAY, MECHANICAL COUPLERS, AND 4c2 BARS ON EXTERIOR FACE OF EXTERIOR BEAMS
- 10a BARS IN BOTTOM SLAB AND 4c2 BARS NOT SHOWN FOR CLARITY

**TABLE OF DIMENSION DATA**

<table>
<thead>
<tr>
<th>LINE</th>
<th>(INCHES)</th>
<th>SPACES</th>
<th>SPACES</th>
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</thead>
<tbody>
<tr>
<td>A</td>
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<td>74</td>
</tr>
<tr>
<td>B</td>
<td>1</td>
<td>75</td>
<td>74</td>
</tr>
<tr>
<td>C</td>
<td>1</td>
<td>75</td>
<td>74</td>
</tr>
<tr>
<td>D</td>
<td>1</td>
<td>75</td>
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<td>E</td>
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<td>75</td>
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<tr>
<td>F</td>
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<td>75</td>
<td>74</td>
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</table>

NOTES:
- FOR ITEMS SEE SHEET B30-06-16
- FOR BEAM LINE DESIGNATIONS, SEE SHEET B30-06-16
- FOR BEAM CHAMFER DETAILS, SEE SHEET B30-33-16
- FOR VIEW B-B, SEE SHEET B30-59-16

**FOR DETAILS, SEE SHEET 850-33-16.**

**IOWA DOT**

Highway Division

**STANDARD DESIGN: 30'-0 ROADWAY, SINGLE SPAN**

**CONCRETE BOX BEAM BRIDGES**

DECEMBER, 2016

**B30-60-16**
**EPOXY COATED REINFORCING BAR LIST**

<table>
<thead>
<tr>
<th>Beam Line</th>
<th>No.</th>
<th>D=3</th>
<th>Shape</th>
<th>Length</th>
<th>Weight</th>
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</thead>
<tbody>
<tr>
<td>BEAM LINES “B” THRU “G”</td>
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<td></td>
</tr>
<tr>
<td>NO.</td>
<td>LENGTH</td>
<td>WEIGHT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>9'-1</td>
<td>168</td>
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<td>10</td>
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<td>160</td>
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</tr>
<tr>
<td>11</td>
<td>9'-5</td>
<td>1750</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>9'-1</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>9'-1</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL (LBS.)**

3264

**NOTES:**

- * Includes Mechanical Coupler. See Bent Bar Details.
- ** Includes Bent Bar Details. The lengths shown do not include an allowance for the threaded end. Bar lengths may need to increase depending on the mechanical coupler assembly. The cost of the threaded portion of these bars is to be included in the price bid for the beam. The weight of the threaded end is not included in the quantity shown.

---

**CONCRETE BOX BEAM BRIDGES**

**DECEMBER, 2016**

**EPOXY COATED REINFORCING BAR LIST**

<table>
<thead>
<tr>
<th>Beam Line</th>
<th>No.</th>
<th>D=3</th>
<th>Shape</th>
<th>Length</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEAM LINES “B” THRU “G”</td>
<td></td>
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</tr>
<tr>
<td>NO.</td>
<td>LENGTH</td>
<td>WEIGHT</td>
<td></td>
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</tr>
<tr>
<td>8</td>
<td>9'-1</td>
<td>168</td>
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<td>10</td>
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<td>9'-5</td>
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</tr>
<tr>
<td>12</td>
<td>9'-1</td>
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<tr>
<td>14</td>
<td>9'-1</td>
<td>19</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**TOTAL (LBS.)**

3264

**NOTES:**

- * Includes Mechanical Coupler. See Bent Bar Details.
- ** Includes Bent Bar Details. The lengths shown do not include an allowance for the threaded end. Bar lengths may need to increase depending on the mechanical coupler assembly. The cost of the threaded portion of these bars is to be included in the price bid for the beam. The weight of the threaded end is not included in the quantity shown.
BEARING PAD PLAN - 0° SKEW

BEARING PAD PLAN - 15° SKEW

BEARING PAD PLAN - 30° SKEW

SECTION THROUGH BEARING PAD

BEARING TAPER TABLE

SLOPE CALCULATION FORMULA

BEARING NOTES:

MATERIAL FOR NEOPRENE PADS TO BE OF 70 DUROMETER NEOPRENE.
THE NEOPRENE BEARING PADS SHALL BE TAPERED AS SHOWN IN THE 
"BEARING TAPER TABLE".
IF NECESSARY, BEARING SEAT SURFACES SHALL BE ADJUSTED BY SHIMMING
TO ASSURE FIRM AND EVEN BEARING OF THE BOX BEAMS. TWO "E" NEOPRENE
ADJUSTING SHIMS WITH THE DIMENSIONS OF THE BEARING PAD SHALL BE
PROVIDED FOR ADJUSTING EACH BEARING.
THE NEOPRENE BEARING PADS SHALL BE TAPERED AS SHOWN IN THE
"BEARING TAPER TABLE".
MATERIAL FOR NEOPRENE PADS TO BE OF 70 DUROMETER NEOPRENE.
THE NEOPRENE BEARING PADS SHALL BE TAPERED AS SHOWN IN THE
"BEARING TAPER TABLE".
BEARING SEAT SURFACES SHALL BE ADJUSTED TO ASSURE FIRM AND EVEN 
BEARING OF THE BOX BEAMS. TWO "E" ADJUSTING SHIMS WITH THE 
DIMENSIONS OF THE BEARING PAD SHALL BE PROVIDED FOR ADJUSTING EACH 
BEARING. THE NEOPRENE BEARING PADS SHALL BE TAPERED AS SHOWN IN THE 
"BEARING TAPER TABLE".
BRIDGE RAIL POST SPACING DATA TABLE

<table>
<thead>
<tr>
<th>SPAN</th>
<th>&quot;A&quot; DIMENSION</th>
<th>&quot;H&quot; POST SPACE AT &quot;A&quot;</th>
<th>&quot;C&quot;</th>
<th>TOTAL NUMBER OF POSTS ON BRIDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>10'-0</td>
<td>1'-6&quot;</td>
<td>3'-1&quot;</td>
<td>13</td>
<td>28</td>
</tr>
<tr>
<td>20'-0</td>
<td>1'-10&quot;</td>
<td>3'-2&quot;</td>
<td>15</td>
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<tr>
<td>30'-0</td>
<td>2'-1&quot;</td>
<td>3'-3&quot;</td>
<td>18</td>
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<tr>
<td>35'-0</td>
<td>2'-2&quot;</td>
<td>3'-4&quot;</td>
<td>20</td>
<td>68</td>
</tr>
</tbody>
</table>

BRIDGE RAIL POST NOTES:
- All material, including bolts, nuts and washers shall be galvanized.
- All structural steel shall conform to ASTM A606 Grade 50, unless otherwise noted or shown.
- Post sockets shall conform to ASTM A500 Grade B.
- All nuts, including coupling nuts shall be ASTM A563, Grade DH, unless otherwise noted or shown.
- All threaded studs shall be ASTM A449.
- All threaded studs and nuts shall be ASTM A449, Grade DH, unless otherwise noted or shown.
- All washers shall be ASTM A563, Grade DH, unless otherwise noted or shown.
- Post sockets shall conform to ASTM A500 Grade B.
- Exterior Box Beam Elevations (Showing Post Spacing)
TYPICAL SECTION OF SUBDRAIN OUTLET

OUTLET DETAILS

SUBDRAIN DETAILS

SITUATION PLAN

REFER TO SITUATION PLAN FOR NORTH ANGEL

NOTES:

1. USE AN INSIDE FIT REDUCER COUPLER FOR WING ARMORING DETAILS, SEE SHEET B30-68-16.

2. INSERT 1'-0 OF THE 4½" SUBDRAIN INTO THE 6½" METAL OUTLET PIPE, THEN FULLY SEAL THE ENTIRE OPENING WITH GROUT.

NOTE:

SEE BRIDGE WING ARMORING SHEET AND ARMOR BACKFILL DETAILS SHEET FOR DETAILS NOT SHOWN ON THIS SHEET WHICH ARE PERTINENT TO THIS STRUCTURE.

THE SUBDRAIN OUTLET SHAL CONSIST OF A 6'-0 LENGTH OF PIPE WITH A REMOVABLE RODENT GUARD AS DETAILED ON THIS SHEET.

FOR WING ARMORING DETAILS, SEE SHEET B30-68-16.
OUTLET DETAILS

SUBDRAIN OUTLET

TYPICAL SECTION OF SUBDRAIN OUTLET

OUTLET DETAILS

6'-0 CORRUGATED METAL PIPE OUTLET, OR 4½" CORRUGATED DOUBLE-WALLED PE OR PVC PIPE OUTLET WITH AN APPROPRIATE COUPLER. IF METAL PIPE IS USED, THE PIPE SHOULD BE COUPLERED IN ONE OF THE TWO FOLLOWING WAYS:

1. USE AN INSIDE FIT REDUCER COUPLER. THE SUBDRAIN IS inserted INTO THE METAL OUTLET PIPE, THEN FULLY SEAL THE ENTIRE OPENING WITH GROUT.

2. INSERT 1'-0 OF THE 4½" SUBDRAIN INTO THE METAL OUTLET PIPE, THEN FULLY SEAL THE ENTIRE OPENING WITH GROUT.

THE 6½ METAL OUTLET PIPE, THEN FULLY SEAL THE ENTIRE OPENING WITH GROUT.

NOTES:

- SEE BRIDGE WING ARMORING SHEET AND ABUTMENT BACKFILL DETAILS SHEET FOR DETAILS NOT SHOWN ON THIS SHEET WHICH ARE PERTINENT TO THIS STRUCTURE.
- THE SUBDRAIN OUTLET SHALL CONSIST OF A 6'-0 LENGTH OF PIPE WITH A STRUCTURE.
- FOR DETAILS NOT SHOWN ON THIS SHEET WHICH ARE PERTINENT TO THIS STRUCTURE, SEE SHEET B30-68-16.
ABUTMENTS WITH CONCRETE WINGS

PROFILE VIEW OF WING ARMORING

ABUTMENTS WITH SHEET PILE WINGS

SECTION A-A

EROSION STONE WING ARMORING NOTES:

- Erosion stone shall be placed along the sides of the wings as shown. This is typical at each corner of the bridge unless otherwise noted in the plans. The erosion stone at these locations shall be undercut with engineering fabric in accordance with Article 4143.2.1 of the Standard Specifications. The erosion stone shall consist of a 6"-0 length of pipe with a removable rodent guard.

- Erosion stones shall be placed along the sides of the wings as shown. This is typical at each corner of the bridge unless otherwise noted in the plans. The erosion stone at these locations shall be undercut with engineering fabric in accordance with Article 4143.2.1 of the Standard Specifications. The erosion stone shall consist of a 6"-0 length of pipe with a removable rodent guard.

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- Erosion stones shall be placed along the sides of the wings as shown. This is typical at each corner of the bridge unless otherwise noted in the plans. The erosion stone at these locations shall be undercut with engineering fabric in accordance with Article 4143.2.1 of the Standard Specifications. The erosion stone shall consist of a 6"-0 length of pipe with a removable rodent guard.
ABUTMENT BACKFILL NOTES:

THE GRANULAR BACKFILL SHALL CONSIST OF IOWA DOT GRADATION NO. 1 FINE AGGREGATE.

PLACE BACKFILL BETWEEN BOTH ABUTMENTS SIMULTANEOUSLY SO THAT THE TWO FILLS ARE KEPT AT APPROXIMATELY THE SAME DEPTH AT ALL TIMES.

THE COST OF FURNISHING AND PLACING SUBDRAINS INCLUDING EXCAVATION, SUBDRAIN OUTLETS, AND ENGINEERING FABRIC SHALL BE INCLUDED IN THE CONTRACT UNIT PRICE BID FOR GRANULAR BACKFILL. NO EXTRA PAYMENT WILL BE MADE.

NOTES:

* OR FLATTER AS REQUIRED FOR STABILITY.

THE SUBDRAIN SHALL SLOPE DOWNWARD 2% FROM APPROACH ROADWAY.

NOTE:
SUBDRAIN SHALL SLOPE DOWNWARD 2% FROM APPROACH ROADWAY, & OR FLATTER AS REQUIRED FOR STABILITY.

THE ENGINEERING FABRIC IS TO BE PLACED FULL WIDTH OF SHEET PILING AND EXTEND 2'-0 MINIMUM PAST VERTICAL COVER PLATES.

THE ENGINEERING FABRIC SHALL BE IN ACCORDANCE WITH ARTICLE 4196.01.B OF THE STANDARD SPECIFICATIONS. IF THE ENGINEERING FABRIC IS LAPPED, THE LAPS SHALL BE A MINIMUM OF ONE FOOT IN LENGTH, SINGLE FABRIC AND STAPLED FOR CONTINUITY.

THE INTENDED PURPOSE OF THE ENGINEERING FABRIC IS TO PREVENT THE BACKFILL FROM SPILLING BETWEEN SHEET PILING AND ABUTMENT. THE CONTRACTOR SHALL ENSURE ALL GAPS ARE SEALLED TO RETAIN THE BACKFILL TO THE SATISFACTION OF THE ENGINEER.

NOTE:
ENGINEERING FABRIC IS TO BE PLACED FULL WIDTH OF SHEET PILING AND EXTEND 2'-0 MINIMUM PAST VERTICAL COVER PLATES.

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THE INTENDED PURPOSE OF THE ENGINEERING FABRIC IS TO PREVENT THE BACKFILL FROM SPILLING BETWEEN SHEET PILING AND ABUTMENT. THE CONTRACTOR SHALL ENSURE ALL GAPS ARE SEALLED TO RETAIN THE BACKFILL TO THE SATISFACTION OF THE ENGINEER.

NOTE:
SEE SUBDRAIN DETAILS SHEET FOR DETAILS NOT SHOWN ON THIS SHEET WHICH ARE PERTINENT TO THIS STRUCTURE.
ABUTMENT BACKFILL PROCESS:
The base of the excavation subsurface behind the abutment is to be graded with a 4% slope away from the abutment footing and a 2% cross slope in the direction of the abutment. This excavation shaping is to be done prior to beginning installation of the geotextile and backfill material.

After the subsurface has been shaped, the geotextile fabric shall be installed in accordance with the details shown. The fabric is intended to be installed in the base of the excavation and placed vertically at the abutment backfill. The fabric is placed on the excavation face to a height that will be approximately 1 to 2 feet higher than the height of the proposed subdrain placement as shown in the backfill details on this sheet. The fabric placement shall overlap approximately 1 foot and shall be pinned in place. The fabric shall be attached to the abutment by using latEquipped in the fabric and secured to the concrete with 4-inch wire. The fabric placed against the excavation face shall be pinned.

When the fabric is in place, the subdrain shall be installed directly on the fabric at the toe of the rear excavation slope. A slot will need to be cut in the fabric at the point where the subdrain exits the fabric near the backwall wing wall.

Periodic subdrain is then placed and levels. No compaction is required.

The remaining work involves backfilling with flexible backfill, surface flooding, and vibratory compaction. The flexible backfill material shall be in accordance with the standard specifications. The flexible backfill shall be placed in individual lifts, surface flooded, and compacted with vibratory compaction as one continuous layer. Limit the loose lifts to no more than 2 feet of thickness.

Start surface flooding for each flexible backfill lift at the high point of the subdrain placement and proceed down the length of the subdrain. Use the subdrain to flood the fabric to eliminate any difference in the subdrain flooding. Surface flooding, water running fall in a 2-inch targeted note should be spread in successive 1-foot to 2-foot increments for 30 minutes within each increment.

Flexible backfill lift placement, flooding, and compaction shall progress until the required fill thickness of the abutment backfill has been completed.

Water required for flooding subdrains, porous backfill, and geotextile fabric shall be included in the contract unit price. A slope lift is shown on this sheet which is pertinent to this structure.

NOTE: Subdrain shall slope downward 2% from each approach when outfilling both sides of the abutment, subdrain shall slope downward 2% from high end when outfilling at the end of the abutment.

The geotextile fabric shall be in accordance with the details shown. The engineered fabric is placed in the subdrain lift shall be a minimum of one foot in length. A single fascia width of slope lift edge on top and backfill for continuity.

SKewed ABUTMENT PLAN
(Skewed right shows skew left and vice versa)

NOTE: See Subdrain details sheet for details not shown on this sheet which are pertinent to this structure.