PSC Box Beam and PSC Cored Slab Beam Bridges Common Item and Quantity Errors

These two bridge types are being used frequently on Low Impact Bridge Program (LIBP) projects and other bridge replacement projects. With both types the bridge deck and approach slabs are leveled and overlaid with recycled asphaltic concrete. These types are relatively new to Roadway Designers designing the projects and Roadway Designers providing QC and QA reviews of project deliverables. Similar errors are occurring in Construction Plan Sets and Cost Estimates. These errors have been undiscovered even with projects advertised for letting. A general schematic is provided below followed by a section with common errors. Additional pages have annotated bridge plan drawings.

**Common Errors:**
Both the Recycled Asphaltic Concrete Leveling and Surface Course for bridge deck and approach slabs are not accounted for in the Summary of Quantities/Cost Estimate.

Recycled Asphaltic Concrete quantity for bridge deck and approach slabs is incorrectly based on pavement being all Surface Course material.

Recycled Asphaltic Concrete Surface Course for bridge deck and approach slabs is accounted for in Summary of Quantities/Cost Estimate but the Leveling is not.

Approach slab specified is Standard 9017R which is not correct. 9017R is the type typically used when the roadway is asphalt and the bridge deck surface is concrete. 9017R is a reinforced concrete approach slab with a recycled asphaltic concrete inlay (3.5-inches on the standard) consisting of the surface course and the 2-inch thick layer below the surface course. With 9017R the first 1.5-feet of the approach slab at the beginning and end of the bridge is not inlaid with asphalt. Thus if this standard is used you end up with the 3.5-inch inlay on the standard plus the additional leveling and overlay to match that on the bridge deck. The other approach slab Standards which can be used are all concrete which will then be leveled and overlaid when used with these two bridge types. The correct Standard to use is the one that matches to your roadway design. For example 9017P (Typical Use: Where Shoulder is Adjacent to Roadway and/or Across Bridge).

Pavement Markings in the Summary of Quantities/Cost Estimate for the approach slabs and bridge deck are Preformed Plastic. They should not be preformed plastic since the surface is not concrete. They should be the same material (Thermoplastic or Paint) that is being used on the roadway.
Example 1 - PSC Box Beam Bridge

Bridge is on a tangent alignment.

...
The document contains a bridge design with detailed specifications and requirements. Key points include:

- **Bridge Consists Of**: PSC Box Beam Bridge Spans

- **General Notes - Continued**
  - **Wave Elevation**: Perform wave elevation analysis (WEA) in accordance with special provision sect. 4 for each bridge. Provide results of the wave to the departmental board.
  - **File Testing**: Perform file testing using the file testing analyzer (FTA) in accordance with special section sect. 4 for each bridge. Notify the departmental board.
  - **File Closure**: Use closure plates at File 2. File 1 elevation.

- **DRAINAGE DATA**
  - **Drainage Area**: 1,239.92 miles

- **TRAFFIC DATA**
  - **Traffic**: ADT = 500 (2019)

- **Utilities**
  - **Utilities**: 50 utilities on bridge

- **General Notes**
  - **Specifications**: Georgia standard specifications, 2013 edition, with 2016 amendments.

- **Design Data**

- **Summary of Quantities**

- **Bridge Quantities Do Not Include the Recycled Asphaltic Concrete or Track Coat for the Leveling and Overlay of the Bridge Deck**

- **Example 1 PSC Box Beam Bridge**

- **Here Are Clues That The Bridge Deck is Overlaid**
### Example 1 PSC Box Beam Bridge

#### SUPERSTRUCTURE QUANTITIES

<table>
<thead>
<tr>
<th>Beam</th>
<th>Span</th>
<th>Bar Length</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30'</td>
<td>1'-6&quot;</td>
<td>574</td>
</tr>
<tr>
<td>2</td>
<td>40'</td>
<td>1'-6&quot;</td>
<td>N/A</td>
</tr>
</tbody>
</table>

#### NOTES:
1. See Box Beam Details Sheets for locations of holes for 1" Dia. Plain Bar.
2. Cast Barrier after all keys have been filled with mortar for a minimum of 5 days.
3. Barrier expansion joints may be shifted slightly to avoid 574 bars cast in beam.

#### DEPARTMENT OF TRANSPORTATION

**ENGINEERING DIVISION - OFFICE OF BRIDGES AND STRUCTURES**

<table>
<thead>
<tr>
<th>Bridge No.</th>
<th>CR 29 (OLD WEST POINT RD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BID FOR <code>PSC BOX BEAMS</code></td>
<td></td>
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</table>

#### BARRIER DETAIL

- **Minimum Overlay Thickness at Gutter Line/Face of Barrier**

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**Last Updated:** March 30, 2017

**Design Group:** B/2

**Drawing No.:** 0015315

**Department:** Harris County

**BID:** 0015315

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**SCALE:** 1" = 1'-0"

**Note:**

- Place 3" x 6" rectangular deck drain on each side of barrier.
- Cast barrier after all keys have been filled with mortar for a minimum of 5 days.
- Barrier expansion joints may be shifted slightly to avoid 574 bars cast in beam.
- See Box Beam Details Sheets for locations of holes for 1" Dia. Plain Bar.
- Cast barrier after all keys have been filled with mortar for a minimum of 5 days.
- Barrier expansion joints may be shifted slightly to avoid 574 bars cast in beam.

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**SCALE: 1" = 1'-0"**

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**DECK PLAN - 29'-9" GUTTER TO GUTTER 30'-0" THRU 40'-0" SPANS**

**CR 29 (OLD WEST POINT RD)**

**HARRIS COUNTY**

**0015315**

**Bridge Sheet:** 1 of 13

**Last Updated:** March 30, 2017

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Example 1 PSC Box Beam Bridge

Review all the items outlined in red.

Notice that the cross slope for this tangent alignment bridge is 2.5%.

Since the bridge deck is leveled and overlaid the approach slabs are also leveled and overlaid. See the End Bent Joint Detail.

Roadway cross sections will have to account for cross slope transition to meet the bridge cross slope.

The Recycled Asphalitic Concrete Surface Course used on the bridge and approach slabs is the same as the roadway and should have the same spread rate. Typically this is either 135 lb/sq yd for 9.5 mm SP which is 1.25-inch thick or 165 lb/sq yd for 12.5 mm SP which is 1.5-inch thick. Leveling is used from the top surface of the Box Beams to the bottom of the surface course with the leveling creating the cross slope.

This project uses 9.5 mm SP thus the leveling thickness using the minimum overlay thicknesses specified this 0.25-inch thick at the gutter line and 0.75-inch thick at the CL.

NOTE: BEARING PADS NOT SHOWN.

10-18" 10" 15'-7"
1'-1"
4" 1'-1"
4" 15'-7"
9"
9"
1" PREFORMED JOINT FILLER BETWEEN EXTERIOR BOX BEAM AND KEEPER BLOCK, TYP.

ASPHALT OVERLAY, TYP. SEE ROADWAY PLANS FOR DETAILS AND PAYMENT.

FILL ALL KEYS FULL AND CONTINUOUS AS PER STANDARD SPECIFICATION 506, TYP. INCLUDE COST OF MATERIALS AND WORK IN PRICE BID FOR “PSC BOX BEAMS”.

NOTES:

ASPHALT OVERLAY, TYP. SEE ROADWAY PLANS FOR DETAILS AND PAYMENT.

FILL ALL KEYS FULL AND CONTINUOUS AS PER STANDARD SPECIFICATION 506, TYP. INCLUDE COST OF MATERIALS AND WORK IN PRICE BID FOR “PSC BOX BEAMS”.

1" PREFORMED JOINT FILLER BETWEEN EXTERIOR BOX BEAM AND KEEPER BLOCK, TYP.
Example 2 PSC Cored Slab Beam Bridge

Review all the items outlined in red.
Notice that the cross slope for this tangent alignment bridge is 2.5%.
Since the bridge deck is leveled and overlaid, the approach slabs are also leveled and overlaid. See the End Bent Joint Detail.
Roadway cross sections will have to account for cross slope transition to meet the bridge cross slope.
The Recycled Asphaltic Concrete Surface Course used on the bridge and approach slabs is the same as the roadway and should have the same spread rate. Typically this is either 135 lb/ys for 9.5 mm SP which is 1.25-inch thick or 165 lb/ys for 12.5 mm SP which is 1.5-inch thick. Leveling is used from the top surface of the Box Beams to the bottom of the surface course with the leveling creating the cross slope.
This project uses 9.5 mm SP thus the leveling thickness using the minimum overlay thicknesses specified 0.25-inch thick at the gutter line and 4.75-inch thick at the CL.