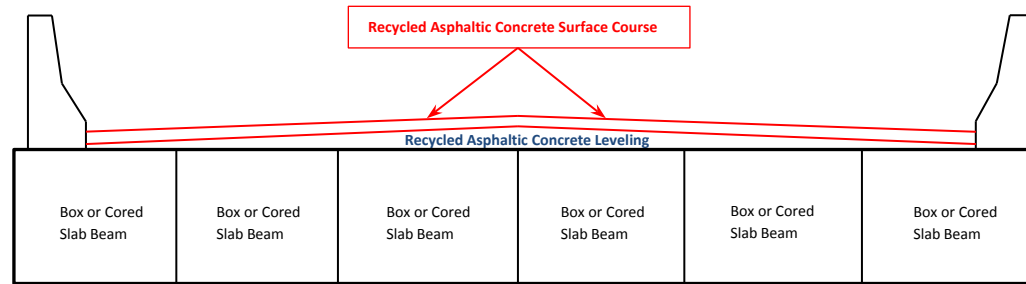


PSC Box Beam and PSC Cored Slab Beam Bridges Common Item and Quantity Errors

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:

Not To Scale

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.

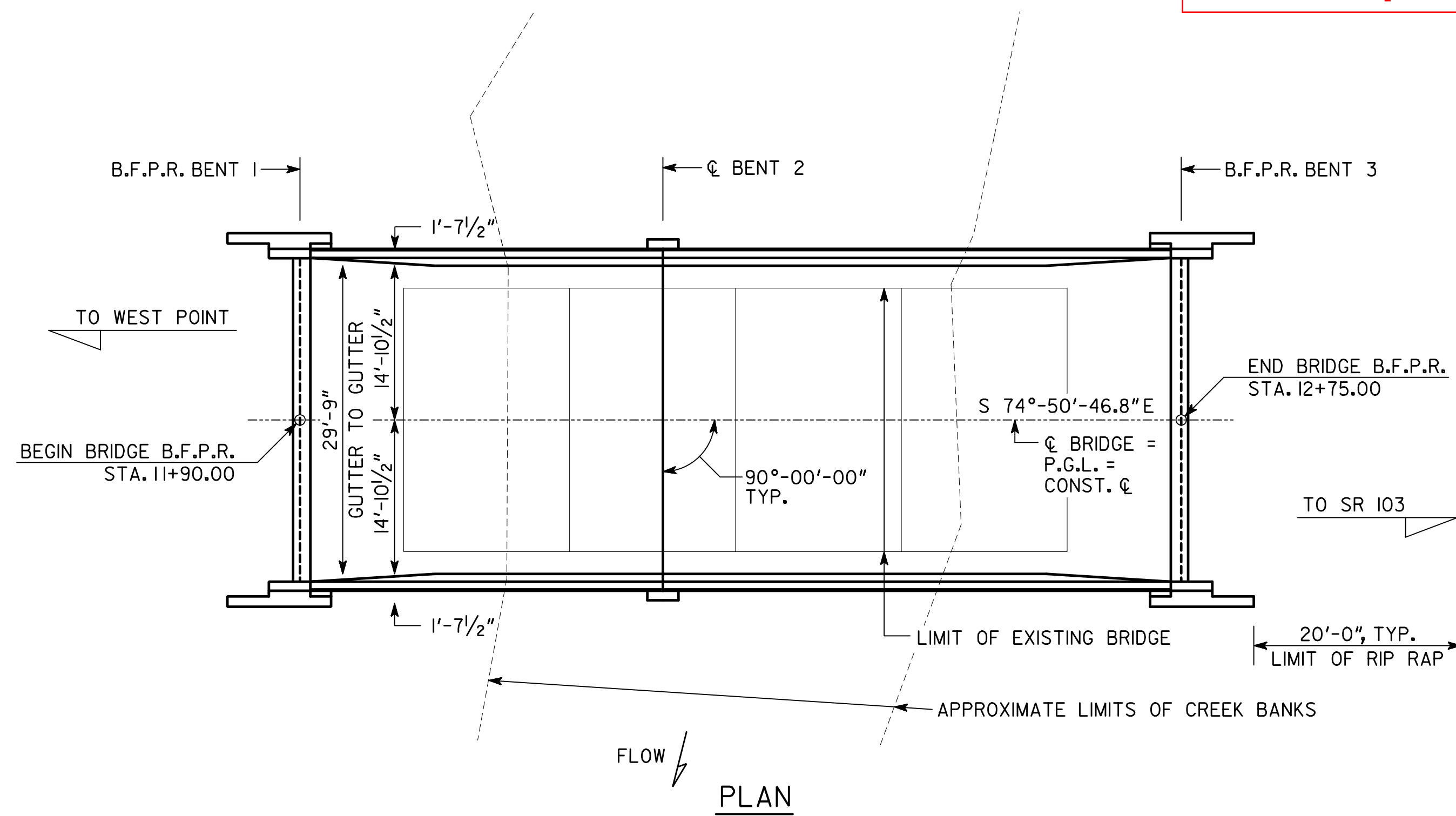
Recycled Asphaltic Concrete quantity for bridge deck and approach slabs is incorrectly based on pavement being all Surface Course material.

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.

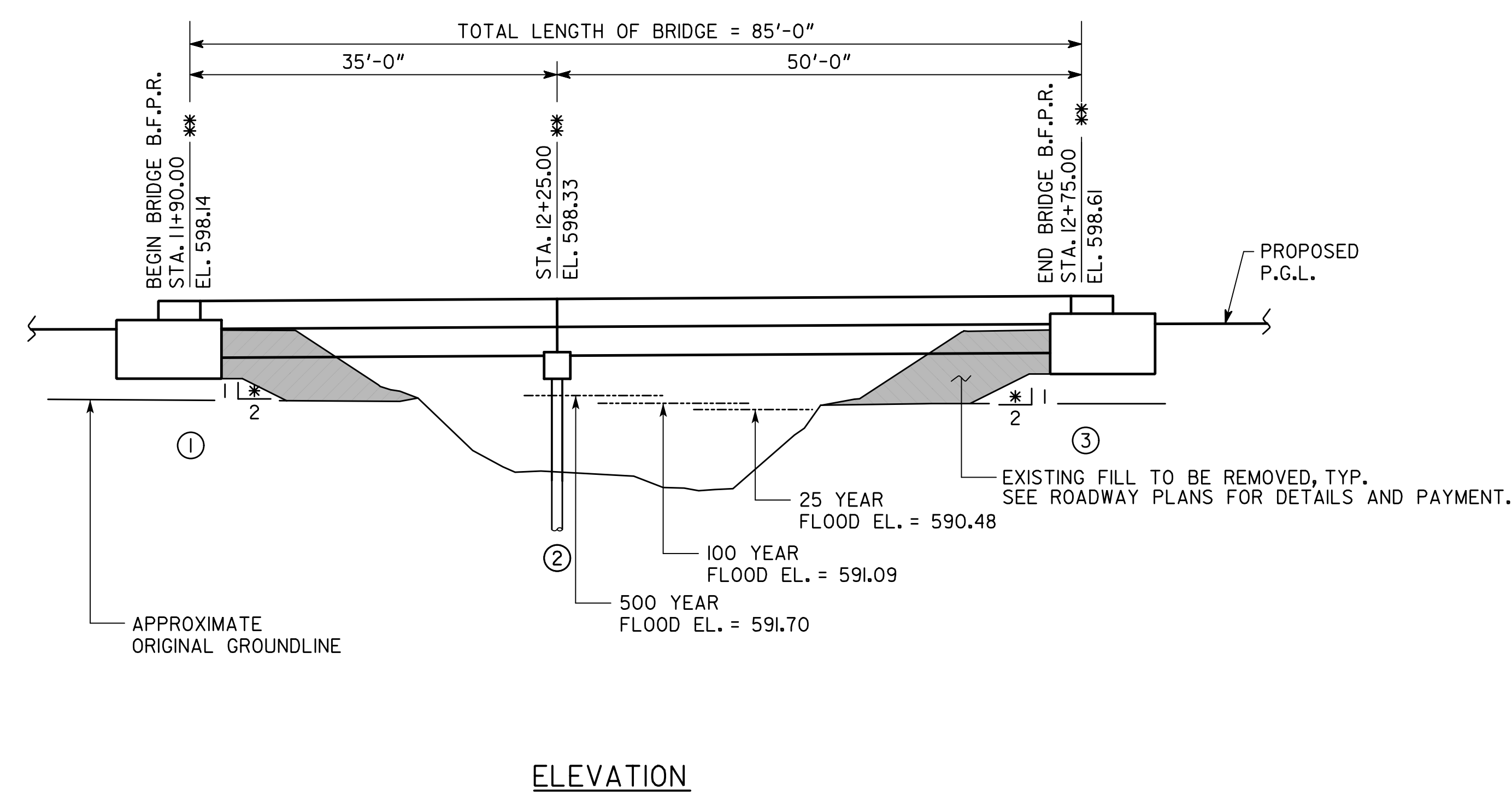
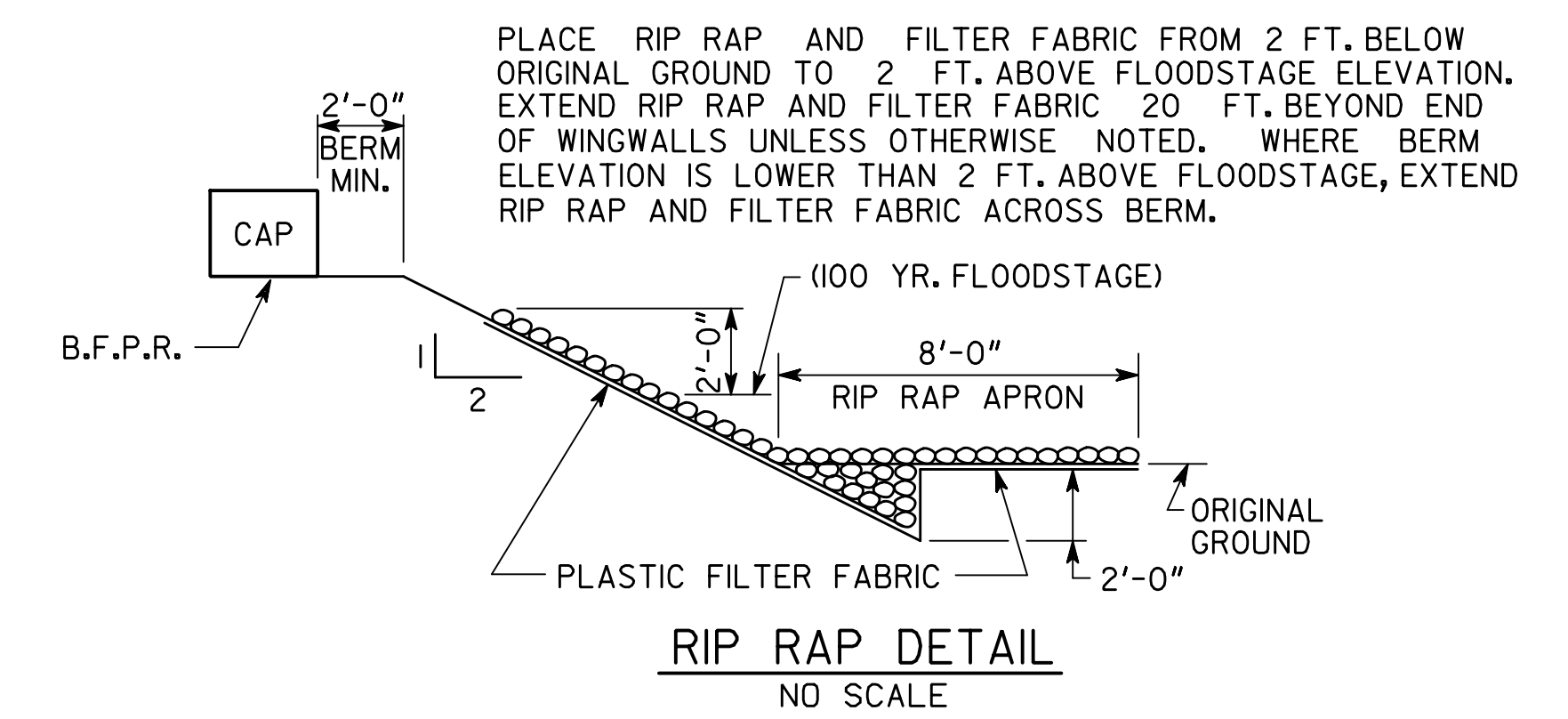
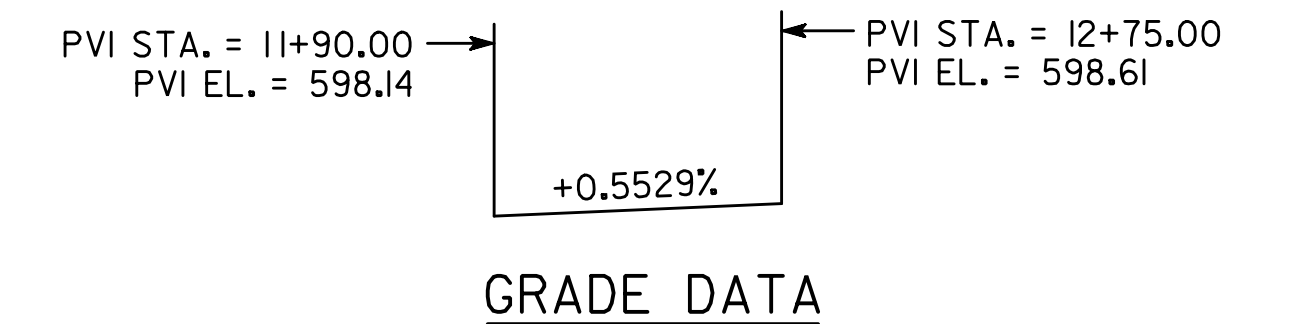
Approach slab specified is Standard 9017R which is not correct. 9017R is the type typically used when the roadway is asphalt and the bridge deck surface is concrete. 9017R is a reinforced concrete approach slab with a recycled asphaltic concrete inlay (3.5-inches on the standard) consisting of the surface 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



- NOTES**
1. ALL BENTS ARE PARALLEL.
 2. END BENT PILES NOT SHOWN.
 - * 3. SLOPE NORMAL TO END BENT
 - ** 4. STATIONS AND ELEVATIONS ARE ALONG PROFILE GRADE LINE AT THE INTERSECTION OF PROFILE GRADE LINE AND B.F.P.R. OR ϕ BENT.

BRIDGE SERIAL NO. 145-0052-0
 BRIDGE I.D. NO. 145-01427F-001.78E
 PROJECT P.J. NO. 0015315

BRIDGE NO. 1		GEORGIA	
DEPARTMENT OF TRANSPORTATION			
ENGINEERING DIVISION-OFFICE OF BRIDGES AND STRUCTURES			
PLAN AND ELEVATION			
CR 29 (OLD WEST POINT RD)			
OVER CHATTAHOOCHEE RIVER TRIBUTARY			
HARRIS COUNTY			0015315
SCALE: 1" = 10'-0" (UNLESS OTHERWISE NOTED)		JULY 2017	
DRAWING NO. 35-0001	DESIGNED <u>KNT</u>	CHECKED <u>VMW</u>	REVIEWED <u>DLC/SKG</u>
BRIDGE SHEET 1 OF 13	DRAWN <u>KNT</u>	DESIGN GROUP <u>EJC</u>	APPROVED <u>WMD</u>

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BRIDGE CONSISTS OF

PSC Box Beam Bridge Spans

GENERAL NOTES - CONTINUED

Example 1 PSC Box Beam Bridge

- 1 - 35'-0" 27" PSC BOX BEAM SPAN ----- SPECIAL DESIGN
- 1 - 50'-0" 27" PSC BOX BEAM SPAN ----- SPECIAL DESIGN
- 2 - METAL SHELL PILE END BENTS ----- SPECIAL DESIGN
- 1 - METAL SHELL INTERMEDIATE BENT ----- SPECIAL DESIGN
- 4 - END POST AND GUARDRAIL ATTACHMENT DETAIL ----- GA. STD. 3054 (9-30-02)
(L = 4'-0"; W = 1'-1"; H = 2'-9 1/2")
- BAR BENDING DETAILS ----- GA. STD. 3901 (8-69)
- TYPICAL FILL DETAIL AT END OF BRIDGE ----- GA. STD. 9037 (9-99)

DRAINAGE DATA

DRAINAGE AREA ----- 1.23 SQ MILES

FLOOD FREQUENCY	TOTAL DISCHARGE	MEAN VELOCITY	AREA OF OPENING UNDER FLOODSTAGE	BACKWATER
25 YEAR	609 CFS	3.01 FPS	202 SQ FT	0.01 FT
100 YEAR	878 CFS	3.67 FPS	239 SQ FT	0.02 FT
500 YEAR	1,210 CFS	4.14 FPS	292 SQ FT	0.03 FT

TRAFFIC DATA

TRAFFIC ----- ADT = 400 (2019)
ADT = 500 (2039)

DESIGN SPEED ----- 45 MPH

UTILITIES

NO UTILITIES ON BRIDGE

GENERAL NOTES

SPECIFICATIONS - GEORGIA STANDARD SPECIFICATIONS, 2013 EDITION, WITH 2016 SUPPLEMENTAL SPECIFICATIONS AS MODIFIED BY CONTRACT DOCUMENTS.

REINFORCING STEEL - PLACE AND TIE ALL REINFORCING STEEL IN ACCORDANCE WITH THE GEORGIA DOT SPECIFICATIONS. DO NOT WELD REINFORCING STEEL. MAINTAIN 2" CLEARANCE ON ALL REINFORCEMENT UNLESS OTHERWISE NOTED.

CHAMFER - CHAMFER ALL EXPOSED CONCRETE EDGES 3/4" UNLESS OTHERWISE NOTED.

TRAFFIC CONTROLS - ROAD TO BE CLOSED DURING BRIDGE CONSTRUCTION. SEE ROADWAY PLANS FOR DETOUR, TRAFFIC CONTROLS AND TRAFFIC CONTROL PAYMENT.

EXISTING BRIDGE PLANS - ORIGINAL BRIDGE PLANS ARE NOT AVAILABLE.

WAITING PERIOD - NONE REQUIRED.

PLAN DRIVING OBJECTIVE - SEE SUBSTRUCTURE DETAILS.

DRIVING RESISTANCE - DETERMINE DRIVING RESISTANCE FOR PILES USING DYNAMIC PILE TESTING IN ACCORDANCE WITH SPECIAL PROVISION 520. DYNAMIC PILE TESTING SHALL BE REQUIRED FOR ONE PILE AT EACH OF BENTS 2 AND 3.

DYNAMIC PILE TESTING - PERFORM PILE TESTING USING THE PILE DRIVING ANALYZER (PDA) IN ACCORDANCE WITH SPECIAL PROVISION SECTION 523. NOTIFY THE GEOTECHNICAL BUREAU OF THE GEORGIA DOT OFFICE OF MATERIALS AND TESTING AT 404-608-4720 TWO WEEKS PRIOR TO DRIVING PILES.

WAVE EQUATION - PERFORM WAVE EQUATION ANALYSIS (WEAP) IN ACCORDANCE WITH SPECIAL PROVISION 520. PROVIDE RESULTS OF THE WEAP TO THE GEOTECHNICAL BUREAU OF THE GEORGIA DOT OFFICE OF MATERIALS AND TESTING FOR REVIEW AND APPROVAL TWO WEEKS PRIOR TO DRIVING PILES.

PILE DRIVING - SHOULD PILES FAIL TO OBTAIN DRIVING RESISTANCE AFTER ACHIEVING THE PILE TIP ELEVATIONS SHOWN, ALLOW PILES TO FREEZE A MINIMUM OF 24 HOURS AND RESTRIKE WITH A WARM HAMMER.

BENT NUMBER	PILE TIP ELEVATION
1	565.00
2	560.00
3	550.00

METAL SHELL PILES - USE A MINIMUM SHELL THICKNESS OF 1/4" FOR PILES HAVING AN OUTSIDE DIAMETER OF 16" OR LESS, 5/16" FOR PILES HAVING AN OUTSIDE DIAMETER OF 18" THRU 20" AND 1/2" FOR PILES HAVING AN OUTSIDE DIAMETER OF 24". USE THESE SHELL THICKNESSES IN LIEU OF THOSE CALLED FOR IN SUB-SECTION 520.3.05.M AND SUB-SECTION 855.2.01.A.1 OF THE GEORGIA DOT SPECIFICATIONS.

PILE CLOSURE PLATE DETAIL - USE CLOSURE PLATE OPTION 2 AT THIS SITE IN ACCORDANCE WITH SUB-SECTION 520.3.05.M OF THE GEORGIA DOT SPECIFICATIONS.

SMOOTH DOWEL BARS - PLACE SMOOTH DOWEL BARS IN FORMED 3" DIAMETER X 12" DEEP HOLES AND GROUT IN PLACE SIMILAR TO ANCHOR BOLTS, SEE SUB-SECTION 501.3.05.B.3 OF THE GEORGIA DOT SPECIFICATIONS. STIRRUPS MAY BE SHIFTED SLIGHTLY TO CLEAR FORMED HOLES.

WELDING - ALL WELDING ON GEORGIA DOT PROJECTS SHALL BE PERFORMED BY CERTIFIED WELDERS THAT HAVE IN THEIR POSSESSION A CURRENT WELDING CERTIFICATION CARD ISSUED BY THE OFFICE OF MATERIALS AND TESTING. USE ONLY E70XX (EXCLUDING E7014 AND E7024) LOW HYDROGEN ELECTRODES FOR MANUAL SHIELDED METAL ARC WELDING.

SPECIAL PROTECTIVE COATING - CLEAN AND PAINT PILES WITH SPECIAL PROTECTIVE COATING NO. 2P IN ACCORDANCE WITH SECTIONS 520 AND 535 OF THE GEORGIA DOT SPECIFICATIONS.

BRIDGE REMOVAL - REMOVE EXISTING BRIDGE AS PER SUB-SECTION 540.3.05 OF THE GEORGIA DOT SPECIFICATIONS.

SALVAGE MATERIAL - NO MATERIAL REMOVED FROM THE EXISTING STRUCTURE SHALL BE SALVAGED FOR USE BY THE GEORGIA DOT.

INCIDENTAL ITEMS - INCLUDE THE COST INCIDENTAL TO THE WORK THAT IS NOT SPECIFICALLY COVERED BY THE GEORGIA STANDARD SPECIFICATIONS, SUPPLEMENTAL SPECIFICATIONS AND/OR SPECIAL PROVISIONS IN THE OVERALL BID SUBMITTED. THIS INCLUDES THE COST OF WATERPROOFING, JOINT FILLERS AND OTHER INCIDENTAL ITEMS NECESSARY TO COMPLETE THE WORK.

JOINTS IN OVERLAY - WITHIN 24 HOURS AFTER THE OVERLAY IS PLACED MAKE A 1/2 INCH WIDE BY 3/4 INCH DEEP SAW CUT OVER EACH EXPANSION JOINT LOCATION AND SEAL WITH RUBBERIZED ASPHALT IN ACCORDANCE WITH SECTION 407 OF THE GEORGIA DOT SPECIFICATIONS. INCLUDE COST OF RUBBERIZED ASPHALT IN THE OVERALL BID SUBMITTED.

WATERPROOFING MEMBRANE - INSTALL AN APPROVED BRIDGE DECK WATERPROOFING MEMBRANE IN ACCORDANCE WITH SECTION 533 OF THE GEORGIA DOT SPECIFICATIONS AND THE MANUFACTURER'S RECOMMENDATIONS. TURN MEMBRANE 3 INCHES UP AT FACE OF EACH BARRIER AND EXTEND MEMBRANE 18 INCHES PAST BEGIN AND END OF BRIDGE. SEE GPL-22 FOR APPROVED WATERPROOFING MATERIALS.

GROUT - FILL ALL SHEAR KEYS WITH 5,000 PSI 3 DAY STRENGTH GROUT AS PER SECTION 506 OF THE GEORGIA DOT SPECIFICATIONS. CURE GROUT A MINIMUM OF 5 DAYS BEFORE CASTING CONCRETE BARRIERS. INCLUDE COST OF GROUT IN THE PRICE BID FOR "PSC BOX BEAMS."

DESIGN DATA

SPECIFICATIONS ----- AASHTO LRFD 7TH EDITION, 2014
(DESIGNED FOR SEISMIC PERFORMANCE ZONE 1, SD1 = 0.112)

DESIGN VEHICLE LIVE LOAD ----- HL-93

FUTURE PAVING ALLOWANCE ----- 30 LBS PER SQ FT

CONCRETE: BARRIER ----- CLASS D, $f_c = 4,000$ PSI
PSC BEAMS ----- CLASS AAA, $f_c =$ SEE BEAM SHEETS
PSC BEAMS ALLOWABLE TENSION ----- SEE BEAM SHEETS
SUBSTRUCTURE ----- CLASS A, $f_c = 3,000$ PSI

REINFORCEMENT STEEL: ----- GRADE 60, $f_y = 60,000$ PSI

PRETENSIONING STRANDS: ----- $f_p = 270,000$ PSI

METAL SHELL PILES: ----- GRADE 3, $f_y = 45,000$ PSI

SUMMARY OF QUANTITIES

PAY ITEM NUMBER	QUANTITY	UNIT	PAY ITEM
500-2100	167	LF	CONCRETE BARRIER
500-3101	38	CY	CLASS A CONCRETE
507-0027	914	LF	PSC BOX BEAMS, 27 IN, BR NO - 1
511-1000	6316	LB	BAR REINF STEEL
511-3000	LUMP	LS	SUPERSTR REINF STEEL, BR NO - 1 (1911)
520-1316	470	LF	PILING IN PLACE, METAL SHELL, 16 IN OD
520-1318	220	LF	PILING IN PLACE, METAL SHELL, 18 IN OD
520-4316	1	EA	LOAD TEST, METAL SHELL, 16 IN OD (IF REQD)
520-4318	1	EA	LOAD TEST, METAL SHELL, 18 IN OD (IF REQD)
523-1100	2	EA	DYNAMIC PILE TEST
533-0010	302	SY	BRIDGE DECK WATERPROOFING MEMBRANE, METHOD A
540-1101	LUMP	LS	REMOVAL OF EXISTING BR, STA NO - 12+00
603-2024	339	SY	STN DUMPED RIP RAP, TP 1, 24 IN
603-7000	339	SY	PLASTIC FILTER FABRIC

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

Here Are Clues That The Bridge Deck is Overlaid

BRIDGE NO. 1

DATE		REVISIONS		BY		DESIGNED		CHECKED		REVIEWED	
						KNT		VMW		DLC/SKG	
						KNT		EJC		WMD	
DRAWING NO. 35-0002		BRIDGE SHEET 2 OF 13		NO SCALE		JULY 2017					

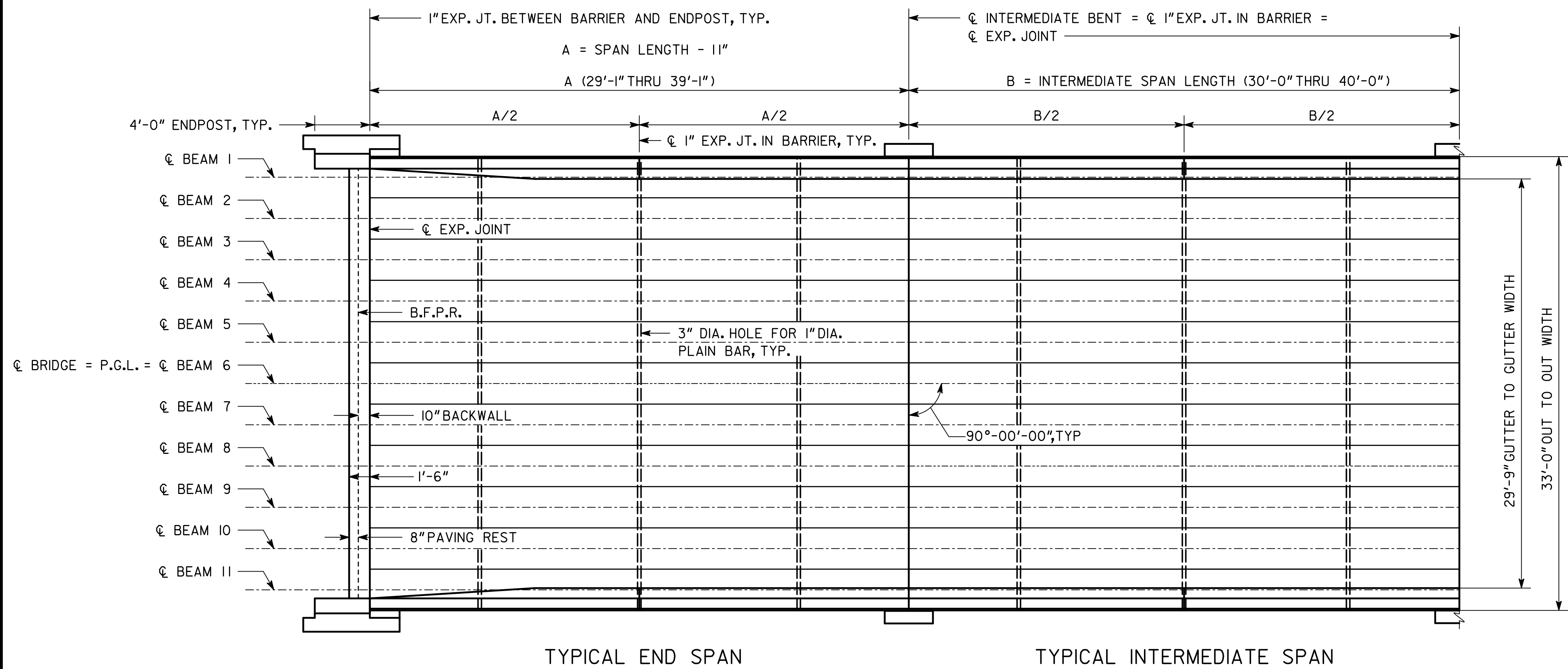
GEORGIA DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION-OFFICE OF BRIDGES AND STRUCTURES

GENERAL NOTES
CR 29 (OLD WEST POINT RD)
OVER CHATTAHOOCHEE RIVER TRIBUTARY
HARRIS COUNTY 0015315

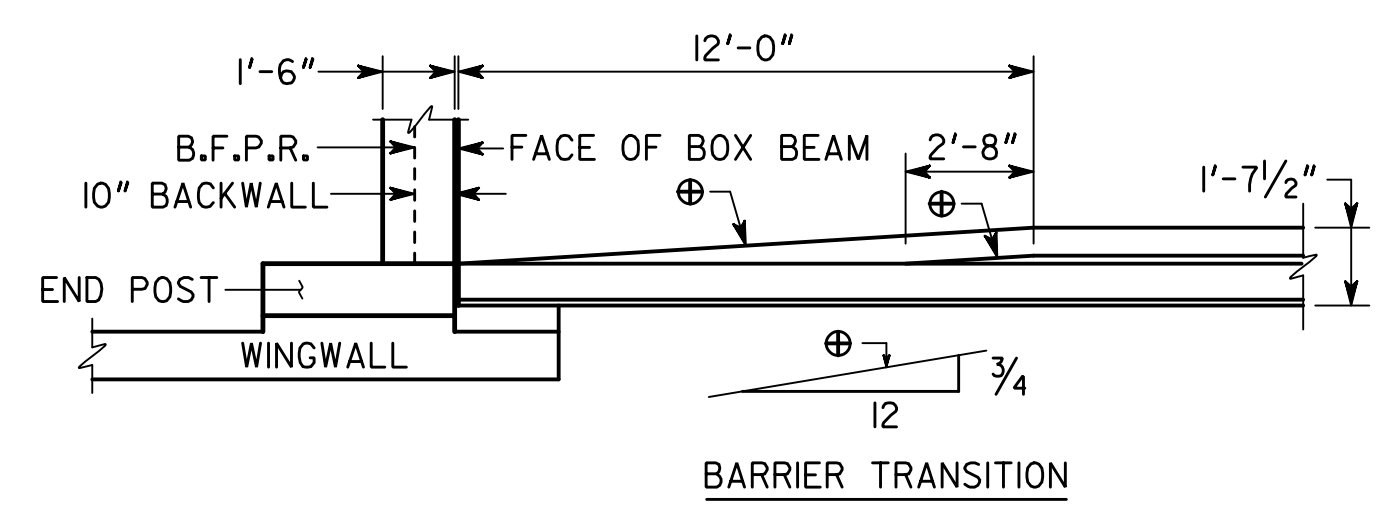
NO SCALE JULY 2017

DESIGNED KNT CHECKED VMW REVIEWED DLC/SKG
DRAWN KNT DESIGN GROUP EJC APPROVED WMD

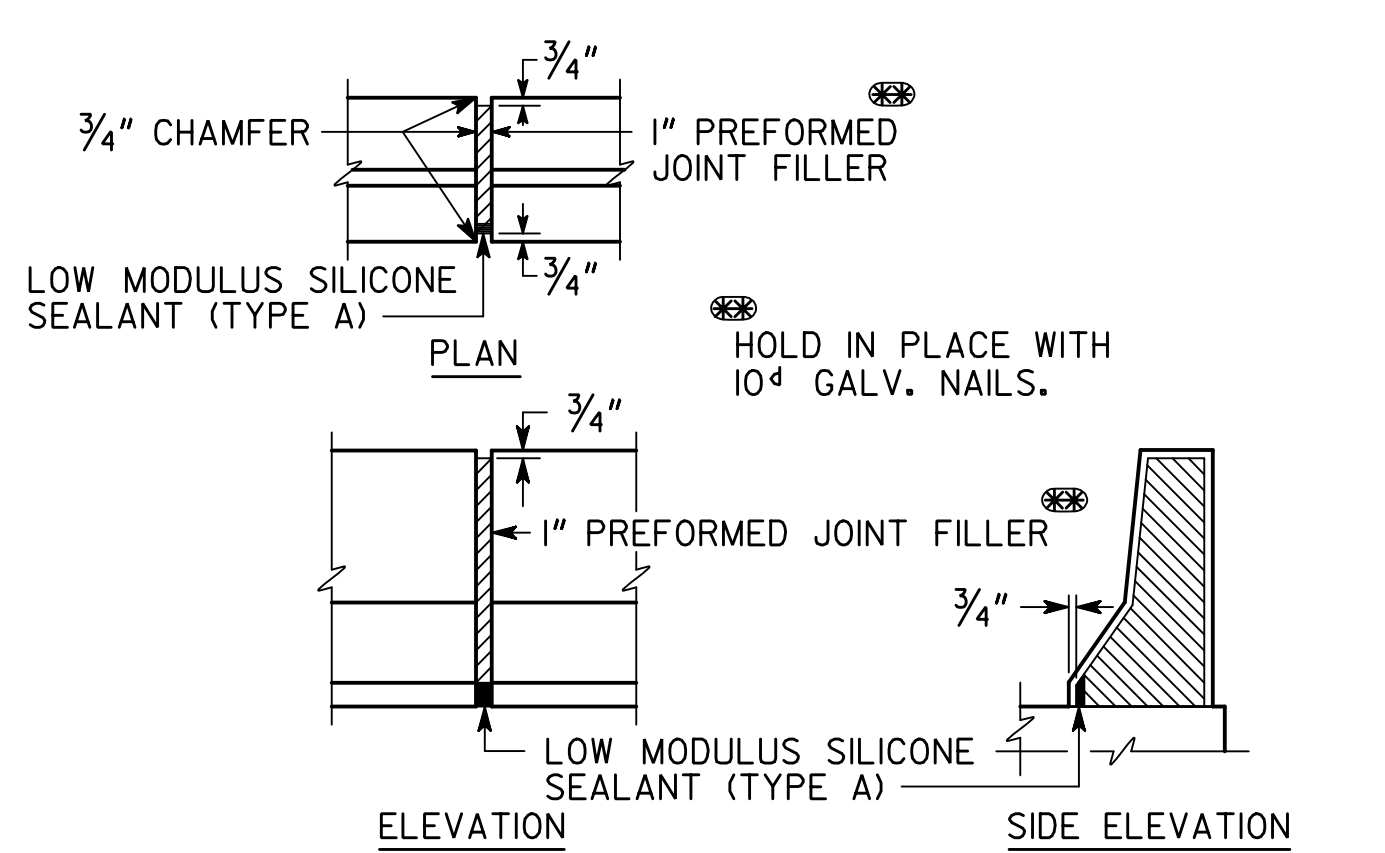
Example 1 PSC Box Beam Bridge



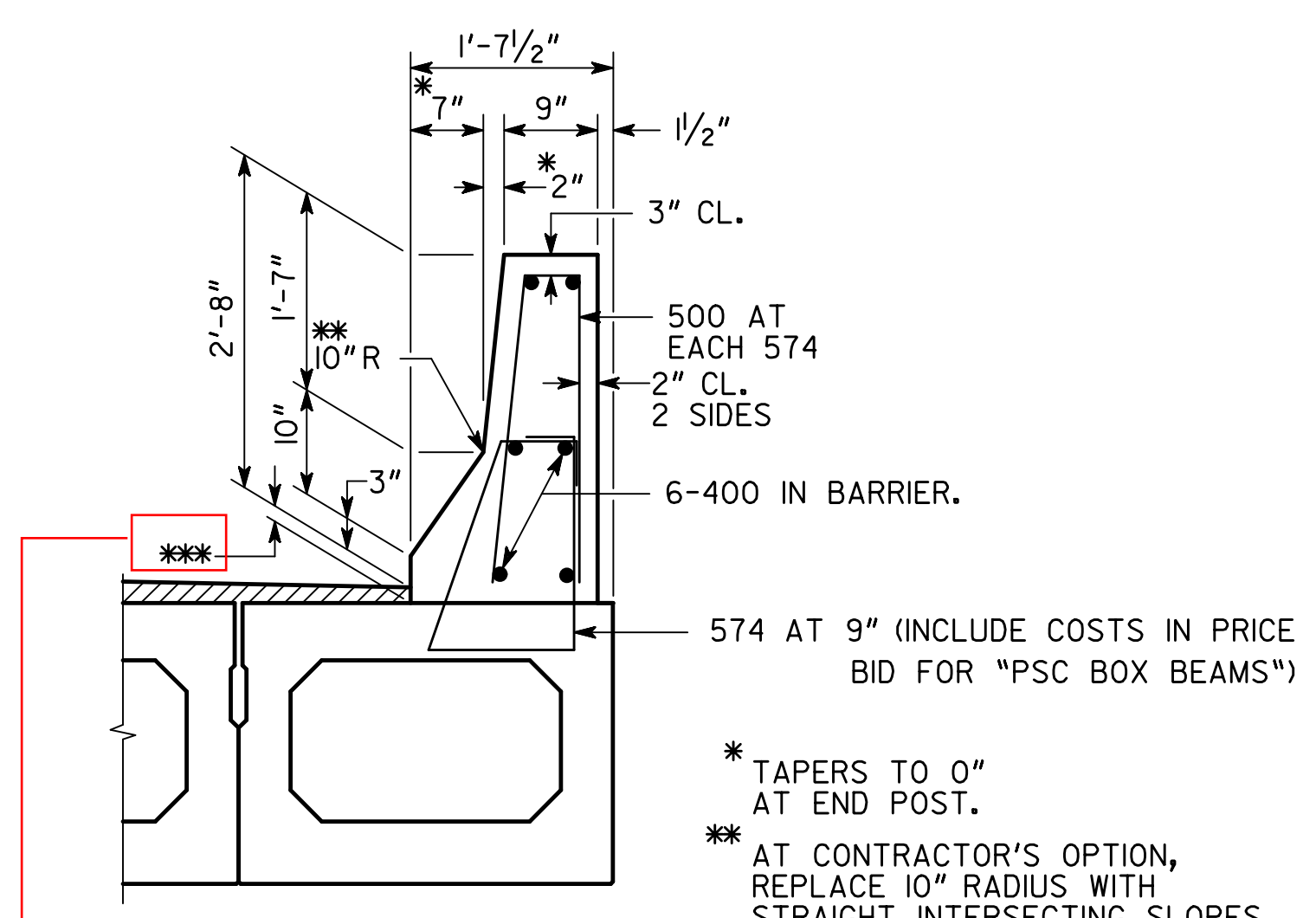
- NOTES:
1. SEE BOX BEAM DETAILS SHEETS FOR LOCATIONS OF HOLES FOR 1" DIA. PLAIN BAR.
 2. CAST BARRIER AFTER ALL KEYS HAVE BEEN FILLED WITH MORTAR FOR A MINIMUM OF 5 DAYS
 3. BARRIER EXPANSION JOINTS MAY BE SHIFTED SLIGHTLY TO AVOID 574 BARS CAST IN BEAMS.



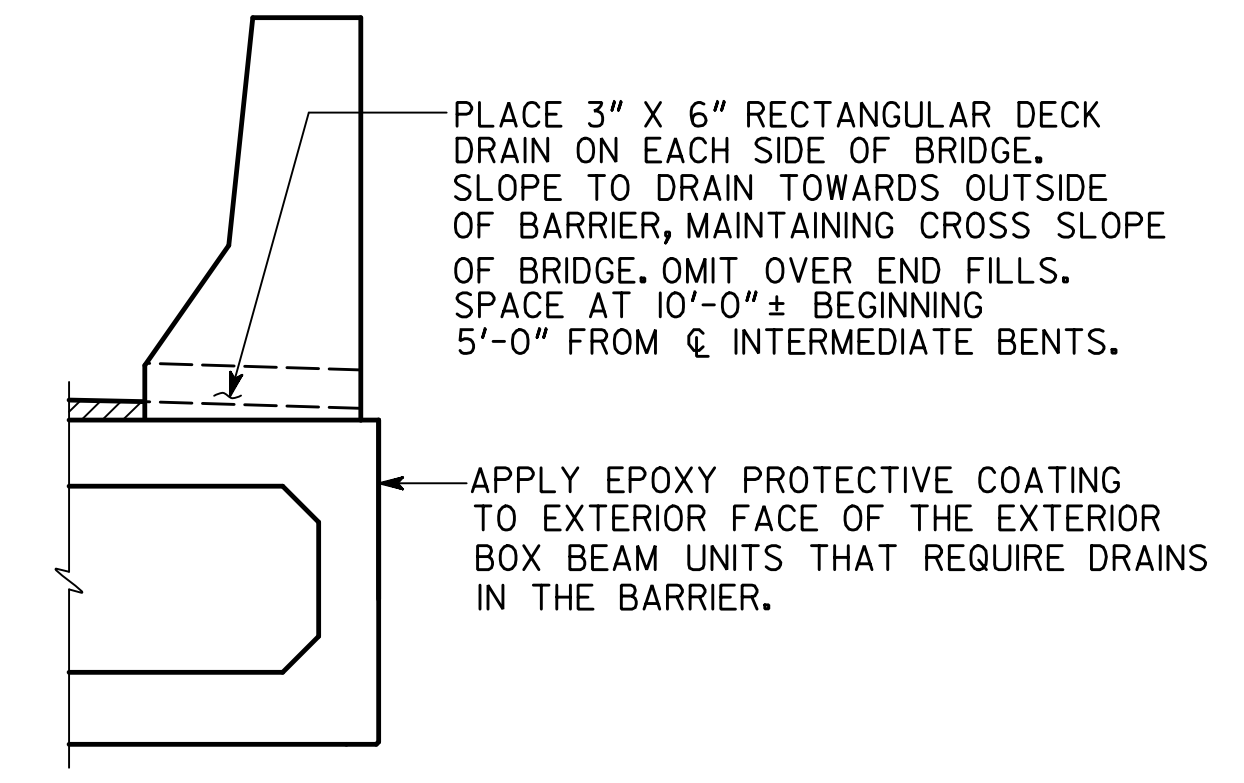
BARRIER TRANSITION DETAIL
SCALE: 1/4" = 1'-0"



DETAILS OF 1" EXPANSION JOINT IN BARRIER
SCALE: 1/2" = 1'-0"



BARRIER DETAIL
SCALE: 3/4" = 1'-0"



BARRIER DRAIN DETAIL
SCALE: 3/4" = 1'-0"

SUPERSTRUCTURE QUANTITIES			
ITEM	SPAN	SPAN LENGTH	
LUMP - SUPERSTR. REINF. STEEL, LBS.	END	785	N/A
	INTERMEDIATE	N/A	N/A

Minimum Overlay Thickness at Gutter Line/Face of Barrier

BRIDGE NO. 1

GEORGIA
DEPARTMENT OF TRANSPORTATION
ENGINEERING DIVISION-OFFICE OF BRIDGES AND STRUCTURES

DECK PLAN - 29'-9" GUTTER TO GUTTER
30'-0" THRU 40'-0" SPANS
CR 29 (OLD WEST POINT RD)

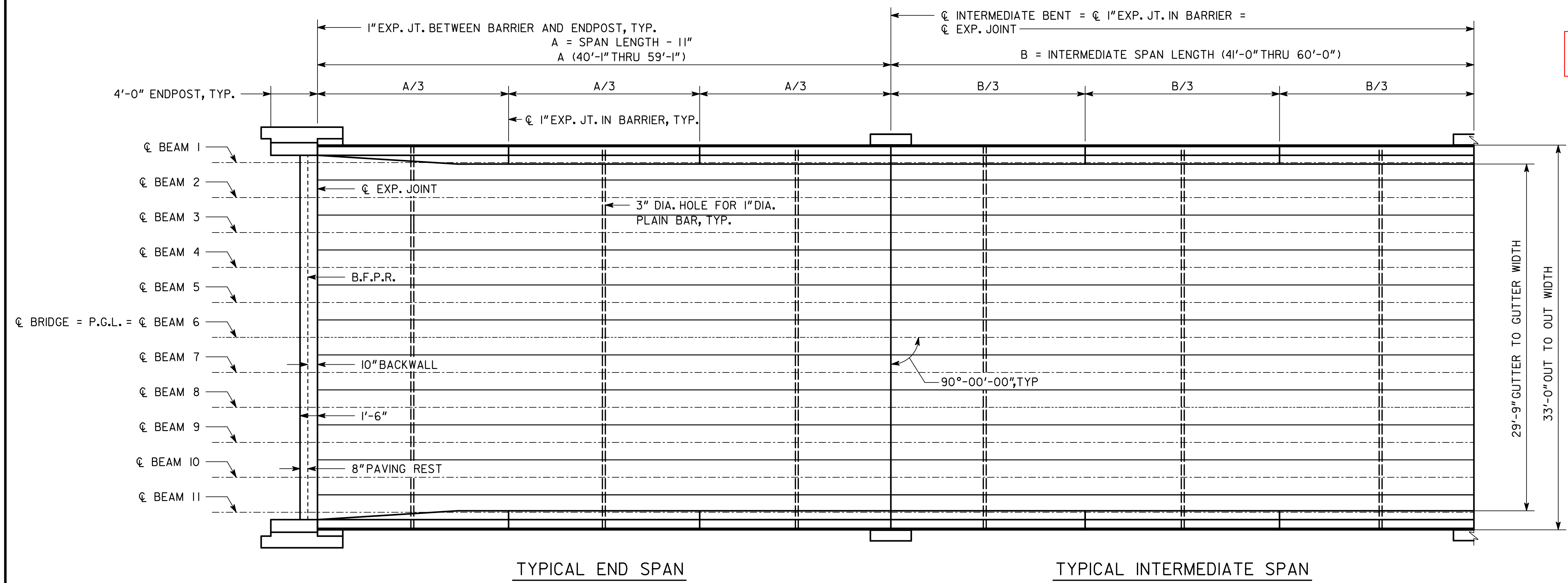
HARRIS COUNTY 0015315

NO SCALE, UNLESS OTHERWISE NOTED JULY 2017

DRAWING NO. 35-0003	CHECKED VMW	DESIGNED KNT	REVIEWED DLC/SKG
BRIDGE SHEET 3 OF 13	DESIGN GROUP EJC	DRAWN ASA	APPROVED WMD

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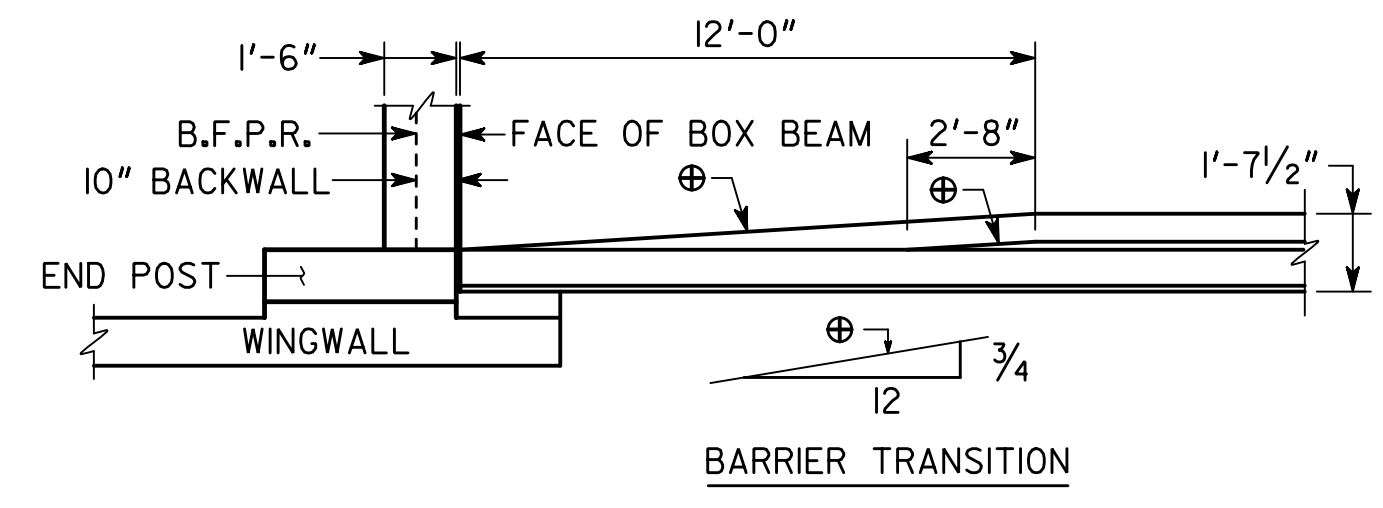
Example 1 PSC Box Beam Bridge



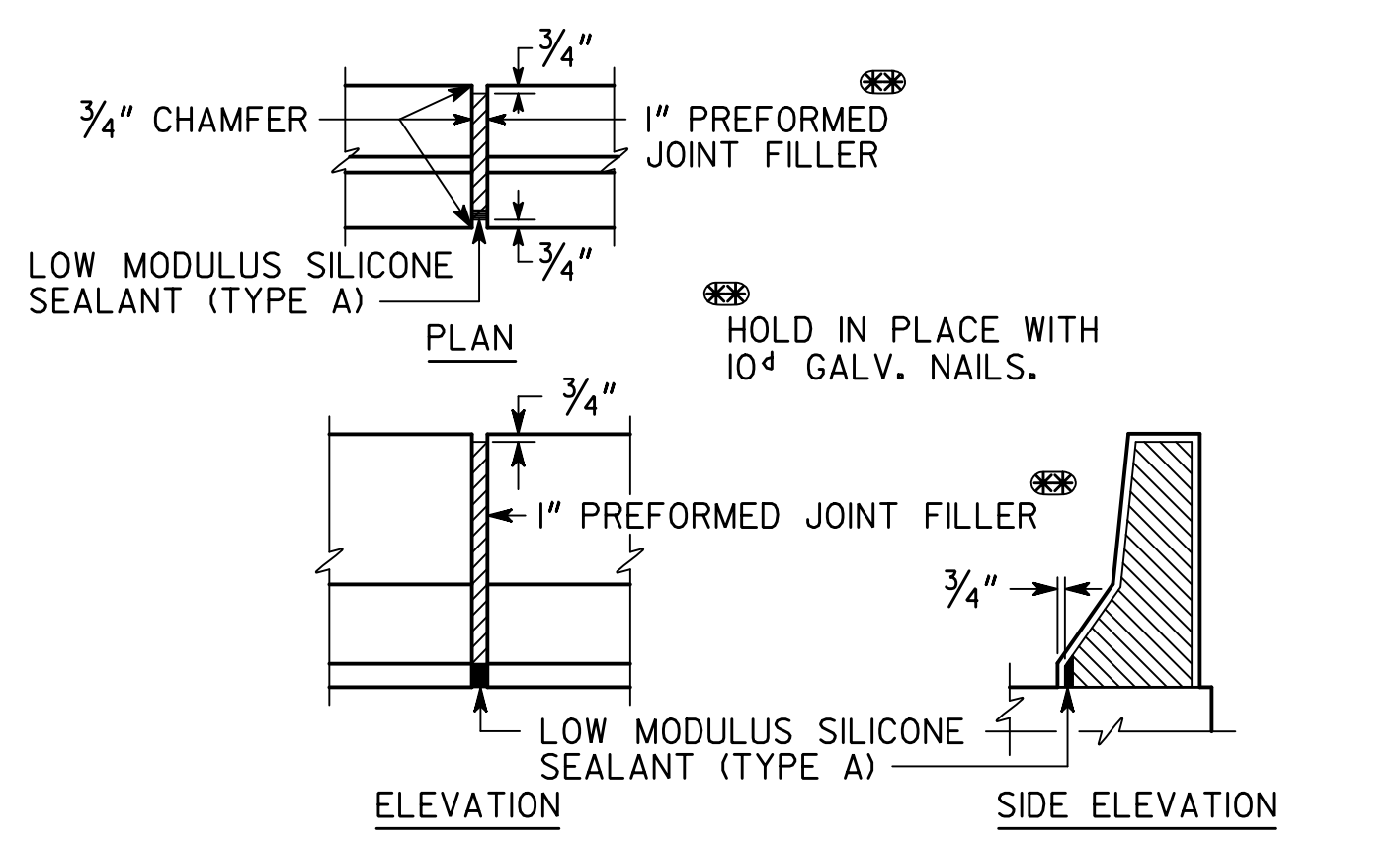
TYPICAL END SPAN

TYPICAL INTERMEDIATE SPAN

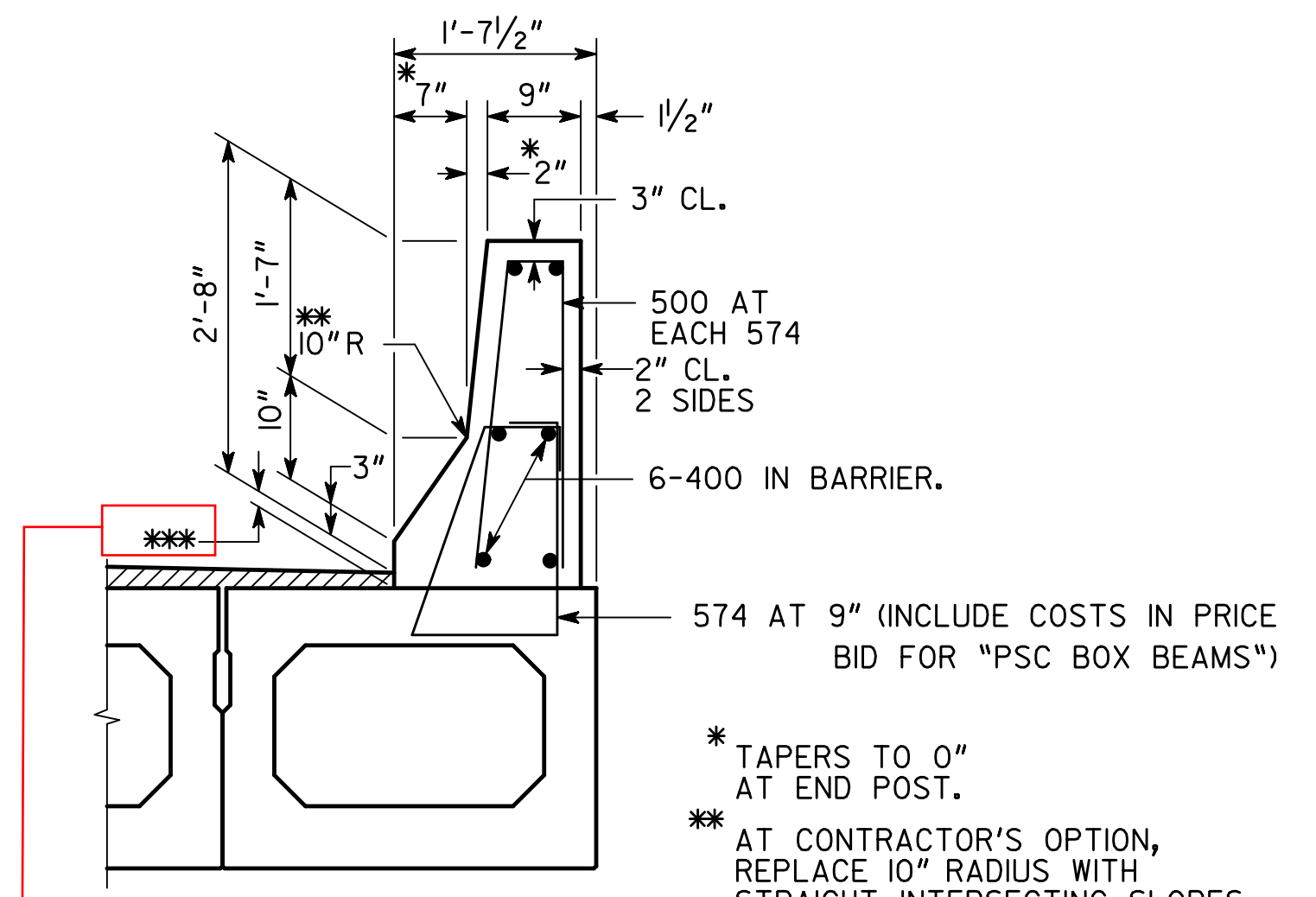
- NOTES:
1. MAINTAIN 2" MINIMUM CLEARANCE ON ALL REINFORCEMENT UNLESS OTHERWISE NOTED.
 2. SEE BOX BEAM DETAILS SHEETS FOR LOCATIONS OF HOLES FOR 1" DIA. PLAIN BAR.
 3. CAST BARRIER AFTER ALL KEYS HAVE BEEN FILLED WITH MORTAR FOR A MINIMUM OF 5 DAYS
 4. BARRIER EXPANSION JOINTS MAY BE SHIFTED SLIGHTLY TO AVOID 574 BARS CAST IN BEAMS.



BARRIER TRANSITION DETAIL
 SCALE: 1/4" = 1'-0"

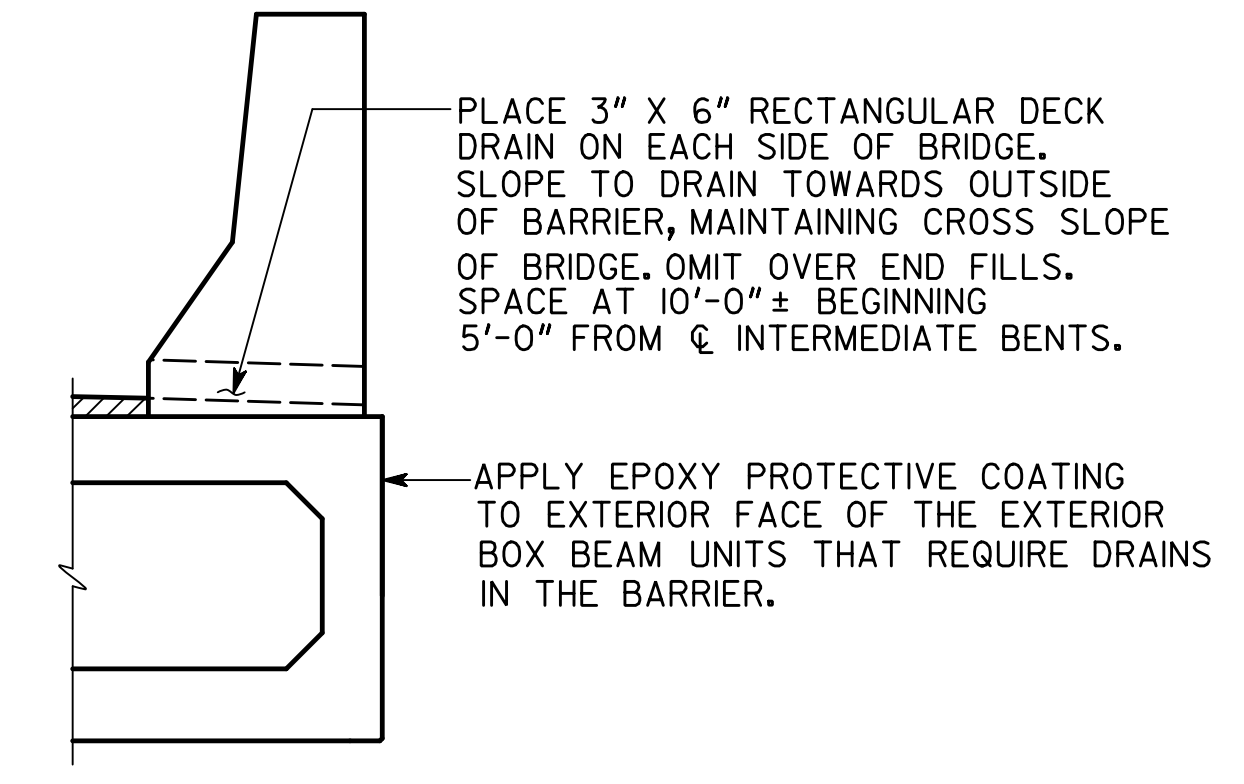


DETAILS OF 1" EXPANSION JOINT IN BARRIER
 SCALE: 1/2" = 1'-0"



BARRIER DETAIL
 SCALE: 3/4" = 1'-0"

- * TAPERS TO 0" AT END POST.
- ** AT CONTRACTOR'S OPTION, REPLACE 10" RADIUS WITH STRAIGHT INTERSECTING SLOPES.
- *** VARY DIMENSION TO ACCOUNT FOR BEAM CAMBER SO TOP OF BARRIER FOLLOWS ROADWAY PROFILE. 1/2" MIN. FOR ASPHALT OVERLAY.



BARRIER DRAIN DETAIL
 SCALE: 3/4" = 1'-0"

SUPERSTRUCTURE QUANTITIES			
ITEM	SPAN	SPAN LENGTH	
		50'-0"	XX'-0"
LUMP - SUPERSTR. REINF. STEEL, LBS.	END	1126	N/A
	INTERMEDIATE	N/A	N/A

BRIDGE NO. 1

GEORGIA
 DEPARTMENT OF TRANSPORTATION
 ENGINEERING DIVISION-OFFICE OF BRIDGES AND STRUCTURES

DECK PLAN - 29'-9" GUTTER TO GUTTER
 41'-0" THRU 60'-0" SPANS
 CR 29 (OLD WEST POINT RD)

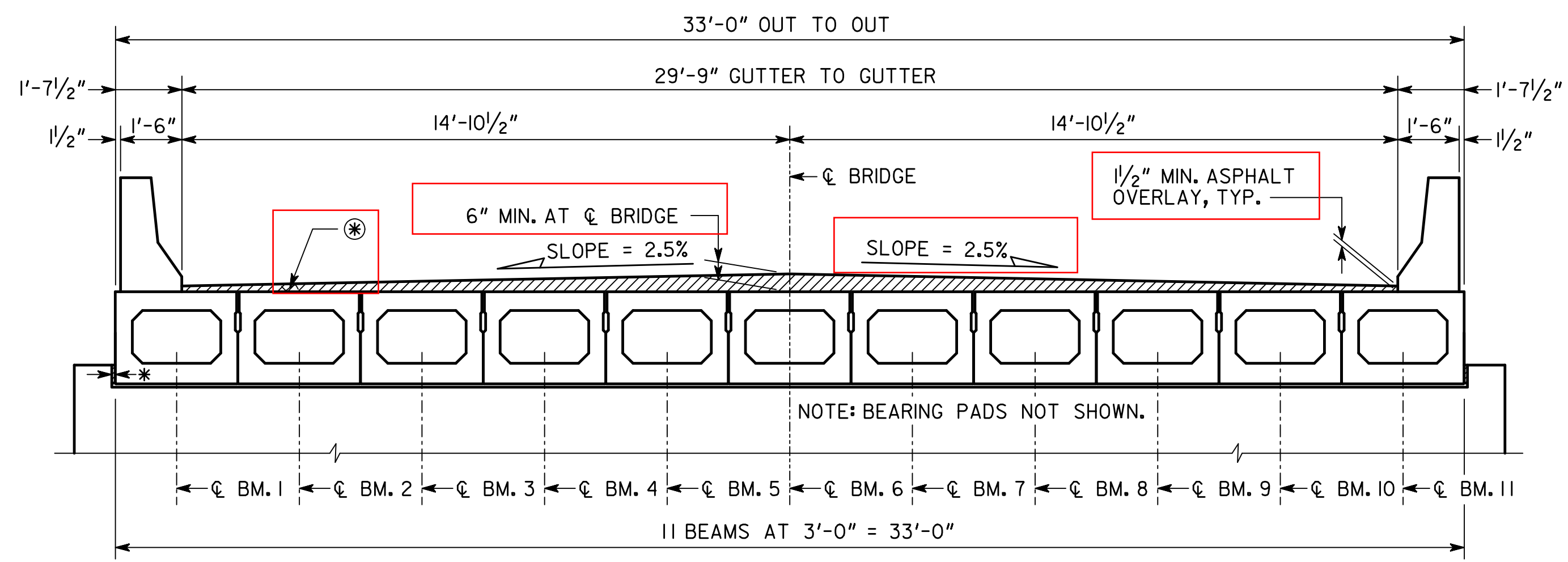
HARRIS COUNTY 0015315

NO SCALE, UNLESS OTHERWISE NOTED JULY 2017

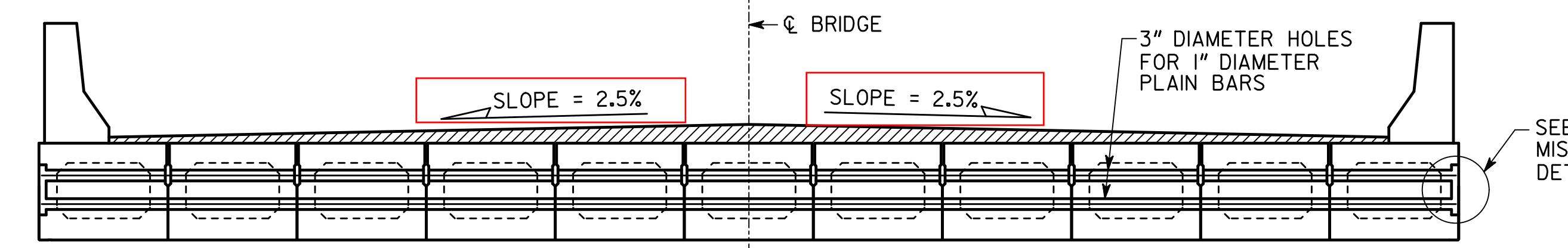
DESIGNED KNT	CHECKED VMW	REVIEWED DLC/SKG
DRAWN ASA	DESIGN GROUP EJC	APPROVED WMD

1 INCH WHEN PRINTED FULL SIZE

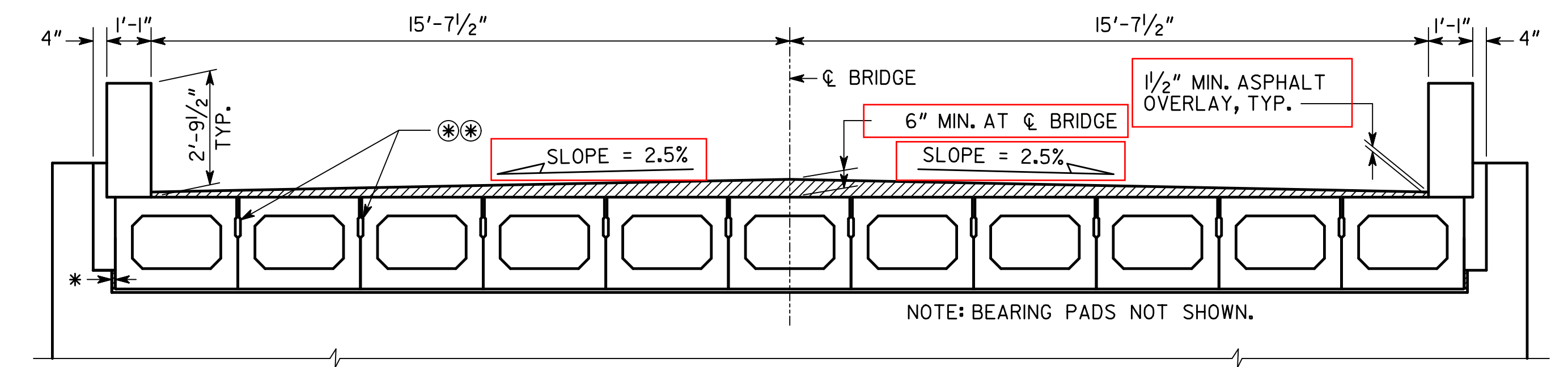
Example 1 PSC Box Beam Bridge



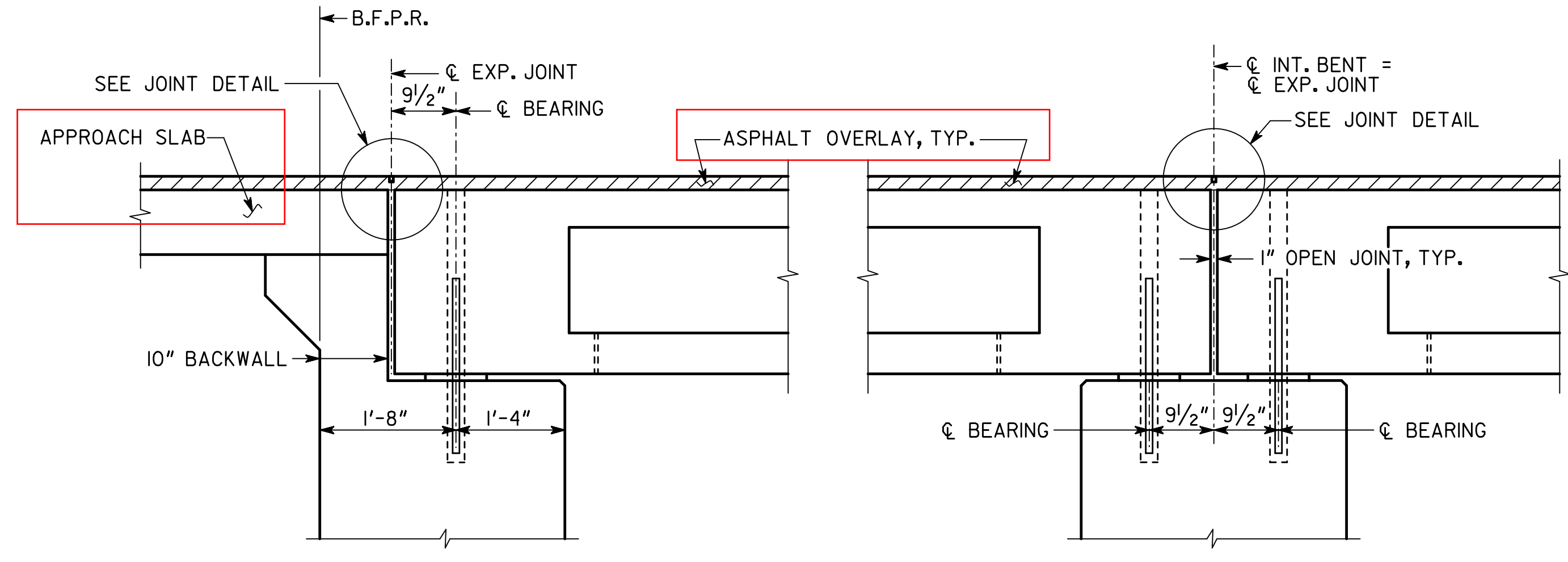
SECTION THRU DECK AT INTERMEDIATE BENT (LOOKING AHEAD)



SECTION THRU DECK AT DIAPHRAGM RODS (LOOKING AHEAD)

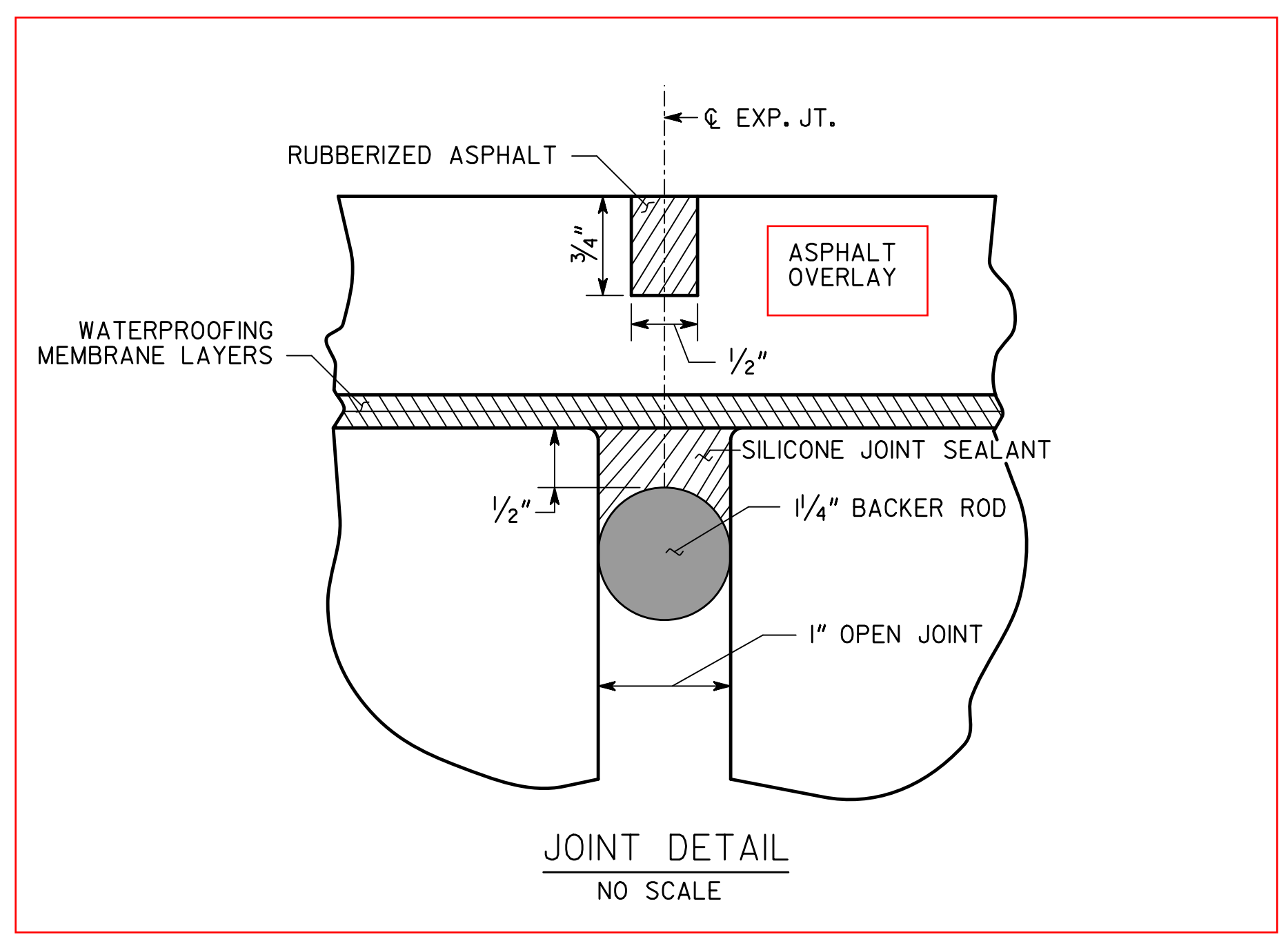


SECTION THRU DECK AT END BENT (LOOKING AHEAD)



SECTION AT END BENT SCALE: 3/4" = 1'-0"

SECTION AT INTERMEDIATE BENT SCALE: 3/4" = 1'-0"



JOINT DETAIL NO SCALE

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/sy for 9.5 mm SP which is 1.25-inch thick or 165 lb/sy 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 4.75-inch thick at the CL.

- ⊗ 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.

BRIDGE NO. 1		GEORGIA	
DEPARTMENT OF TRANSPORTATION			
ENGINEERING DIVISION-OFFICE OF BRIDGES AND STRUCTURES			
DECK SECTIONS - 29'-9" GUTTER TO GUTTER		CR 29 (OLD WEST POINT RD)	
OVER CHATTACHOOCHIEE RIVER TRIBUTARY		HARRIS COUNTY	
SCALE: 3/8" = 1'-0" (UNLESS OTHERWISE NOTED)		JULY 2017	
DRAWING NO. 35-0005	DESIGNED KNT	CHECKED VMW	REVIEWED DLC/SKG
BRIDGE SHEET 5 OF 13	DRAWN ASA/JAC	DESIGN GROUP EJC	APPROVED WMD

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