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|--------|-------------|------|-----------|--------------|
| STATE | PROJECT NO. | YEAR | SHEET NO. | TOTAL SHEETS |
| KANSAS | 472-84915 | 2013 | 40 | 83 |

GENERAL NOTES

(All items on this sheet are subsidiary)

PRECAST BOX CULVERTS: If precast boxes are specified, construct them at the locations shown in the plans and according to the requirement shown on this sheet. When approved by the Engineer, precast box culverts may be used in lieu of cast-in-place box culverts. If the Contractor chooses the precast option, use the cast-in-place quantities as the cost basis. This cost includes all labor equipment, material and incidentals necessary to complete the installation.

Unless otherwise approved by the Engineer, use cast-in-place collars at horizontal and vertical changes in RCB alignment. Use cast-in-place end sections and wingwalls except as noted on this sheet. The Engineer may require cast-in-place sections at junctions of drainage structures.

Cast-in-place concrete work shall conform to the requirements of the KDOT Specifications and KDOT's "Guidelines for Structural Design and Detail of Reinforced Concrete Box Culverts". Use Grade 4.0 concrete and Grade 60 reinforcing steel conforming to ASTM A615 for cast-in-place construction.

Cast-in-place box sections shall have member thicknesses and reinforcement not less than the RCB Standard from the original design. Connections between the cast-in-place and precast members shall be drilled and grouted according to details shown on this sheet. When the wall thicknesses differ between the cast-in-place and precast, transition at a 4:1 without reducing the box opening size. See KDOT Specifications for further requirements.

SPECIFICATIONS: Single-cell Precast Concrete Box Culverts shall conform to the requirements of the following specifications except as noted in the KDOT Specifications. Design multiple-cell precast boxes in accordance with the criteria used to develop the single-cell precast boxes. (See Appendix of ASTM Specification C 1577-08, Table 2 and the latest AASHTO LRFD Specifications.)

DISTRIBUTION SLAB: Fill heights less than 2 feet require a distribution slab. Construct the distribution slab over the width of the exterior walls of the barrel to the outside edges of the roadway shoulders. Terminate the slab a minimum of 2 feet from the edge of a barrel segment.

If the fill height is less than or equal to one foot then:

A distribution slab shall be a minimum of 6 inches thick, reinforced with #4 bars spaced at 18 inches, placed perpendicular to centerline of the box and with #5 bars spaced at 12 inches, placed parallel to centerline of the box. Substitution of an equivalent welded wire fabric is acceptable. Place a min. of 3" of granular material between the box and slab.

If the fill height is greater than one foot then:

(Use one of the following options)

- 1) Use the cast-in-place criteria above.
- 2) Use precast distribution slabs with same criteria as the cast-in-place above. Center the joints in slabs over the box segments. Provide a minimum of 3 inches of granular material between the box and the slabs.
- 3) Reinforced concrete pavement (min. 6 inches thick) will meet the requirements of a distribution slab. Reinforce as noted above. Provide a minimum of 3 inches of granular material between the concrete pavement and the precast boxes.
- 4) Asphalt pavement (min. 6 inches thick) will meet the requirements of a distribution slab. Provide a minimum of 6 inches of granular material between the asphalt and the precast boxes. Also provide a geogrid on top of the granular material.

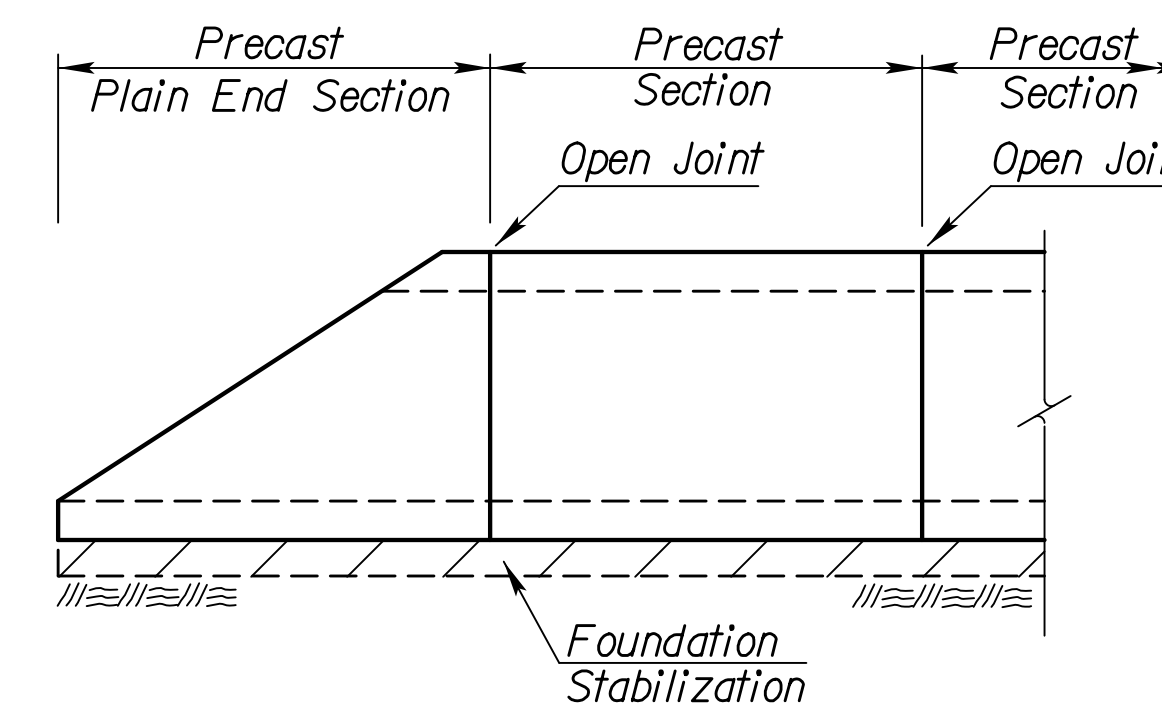
A special design will be required when the above options are not geometrically possible.

| NO. | DATE | REVISIONS | BY | APP'D |
|-----|----------|----------------------------------|-----|-------|
| 5 | 07-28-11 | Added Bridge Backwall Protection | JPJ | TLF |
| 4 | 03-10-10 | Clarification of Extension | JPJ | KFH |
| 3 | 12-03-09 | Revised ASTM / Added Note | JPJ | KFH |
| 2 | 4-07-09 | Clarified Distribution Slab | JPJ | LRR |
| 1 | 07-31-01 | Revised Notes | RAM | KFH |

KANSAS DEPARTMENT OF TRANSPORTATION

PRECAST CONCRETE BOX CULVERT DETAILS

| | | | | |
|------------|------------|----------------|----------|------------------|
| BRO31 | | 9-20-11 APP'D | | KENNETH F. HURST |
| DESIGNED | DETAILED | PFI QUANTITIES | CADD | |
| DESIGN CK. | DETAIL CK. | RAM QUAN. CK. | CADD CK. | |



ELEVATION AT PRECAST END SECTION

(Precast End Sections are permitted where straight wings are shown in the plans or at the downstream end for single cell RCB with a rise of six feet or less.)

NOTE: See "Bridge Excavation" sheet, (Std. No. BR100), for excavation details and basis of payment.

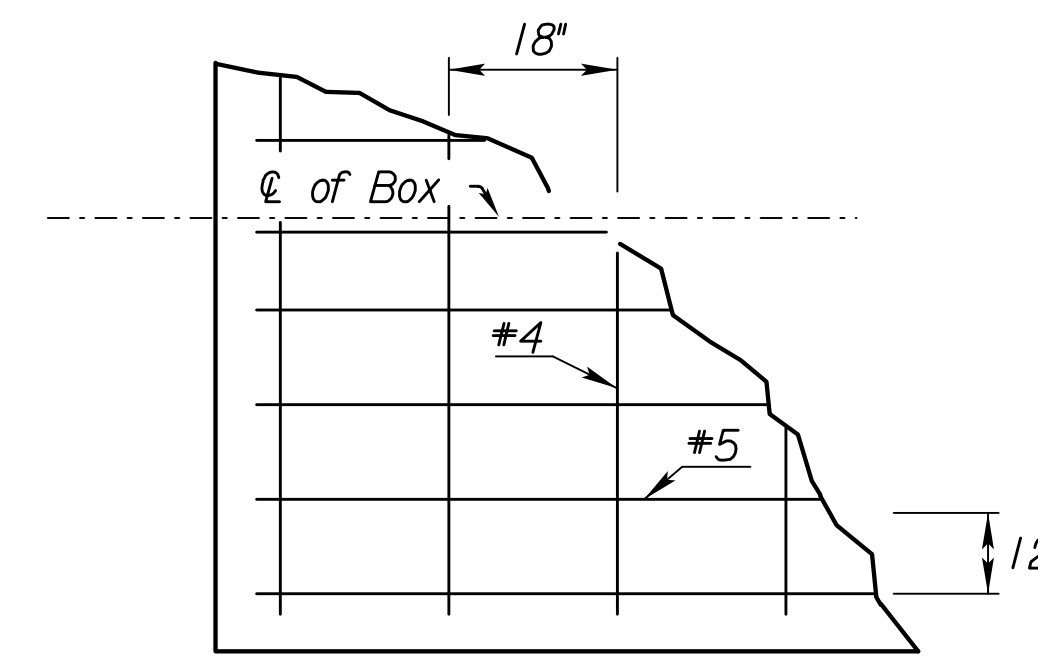
NOTE: Minimum length of precast section shall be 4'-0".

NOTE: A single cell box of equivalent area may be substituted for a double cell box with cell spans less than or equal to 6'-0". Any revision in the cell height from that shown on the plans will not be permitted, unless approved by the Engineer. Two single cell boxes may be substituted for a double cell box, when approved by the Engineer.

NOTE: See respective RCB Standard Sheets for cast-in-place details.

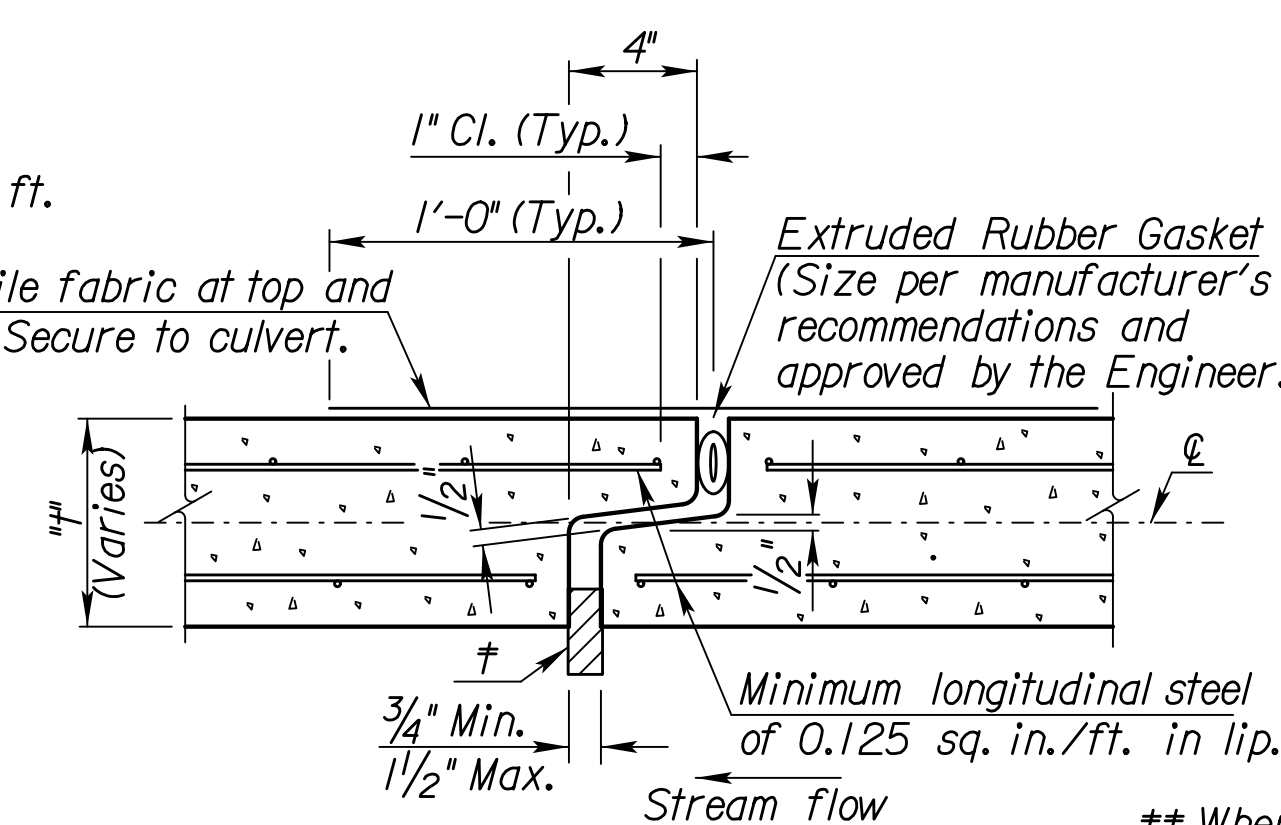
NOTE: When the fill height is 2'-0" or less "Bridge Backwall Protection" is required.

Bridge Backwall Protection not shown for clarity



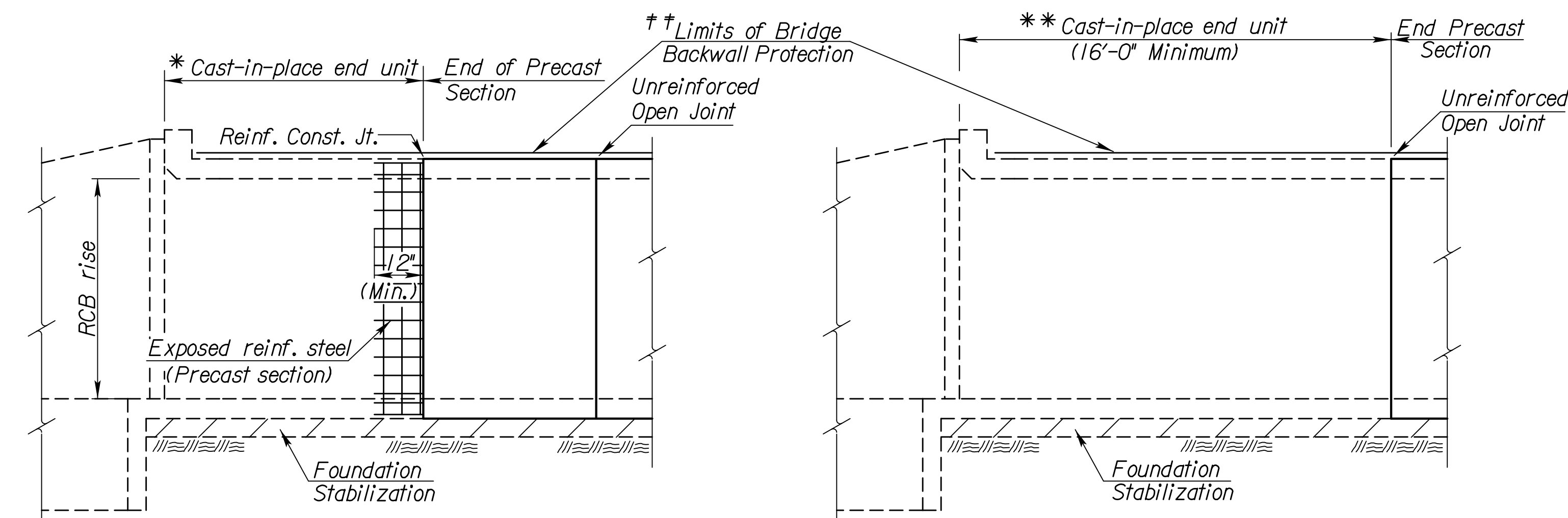
CAST IN PLACE DISTRIBUTION SLAB

(Partial plan of reinforcement)



† Insert temporary, 3/4"-1" wide, hardwood wedges to prevent over-compressing gasket.

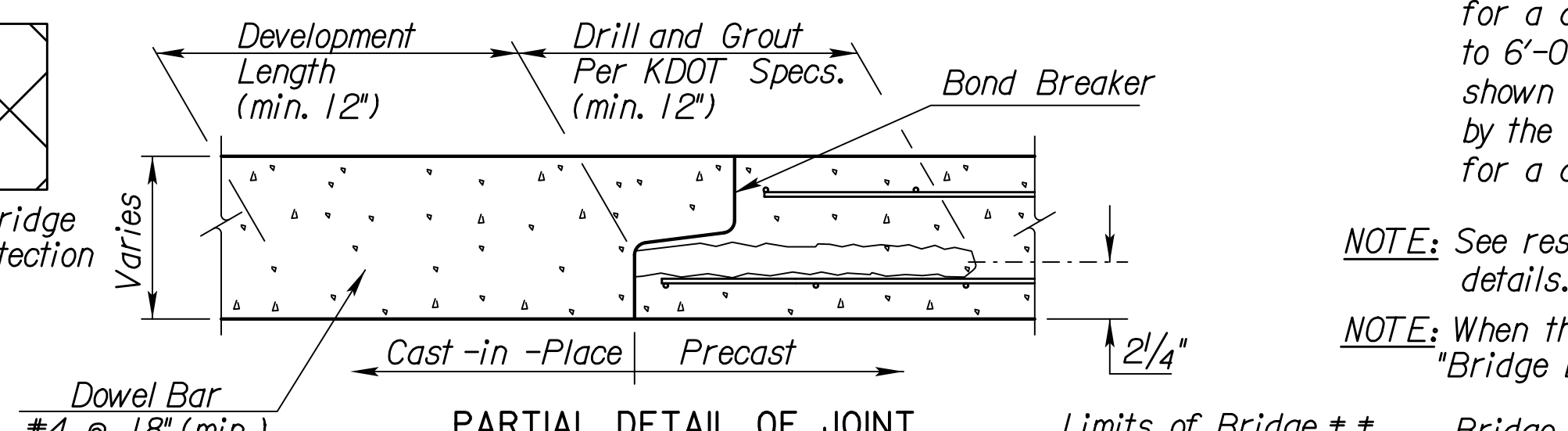
†† When shown on the shop details use a Bridge Backwall Protection conforming to Section 1700 of the KDOT Specifications.



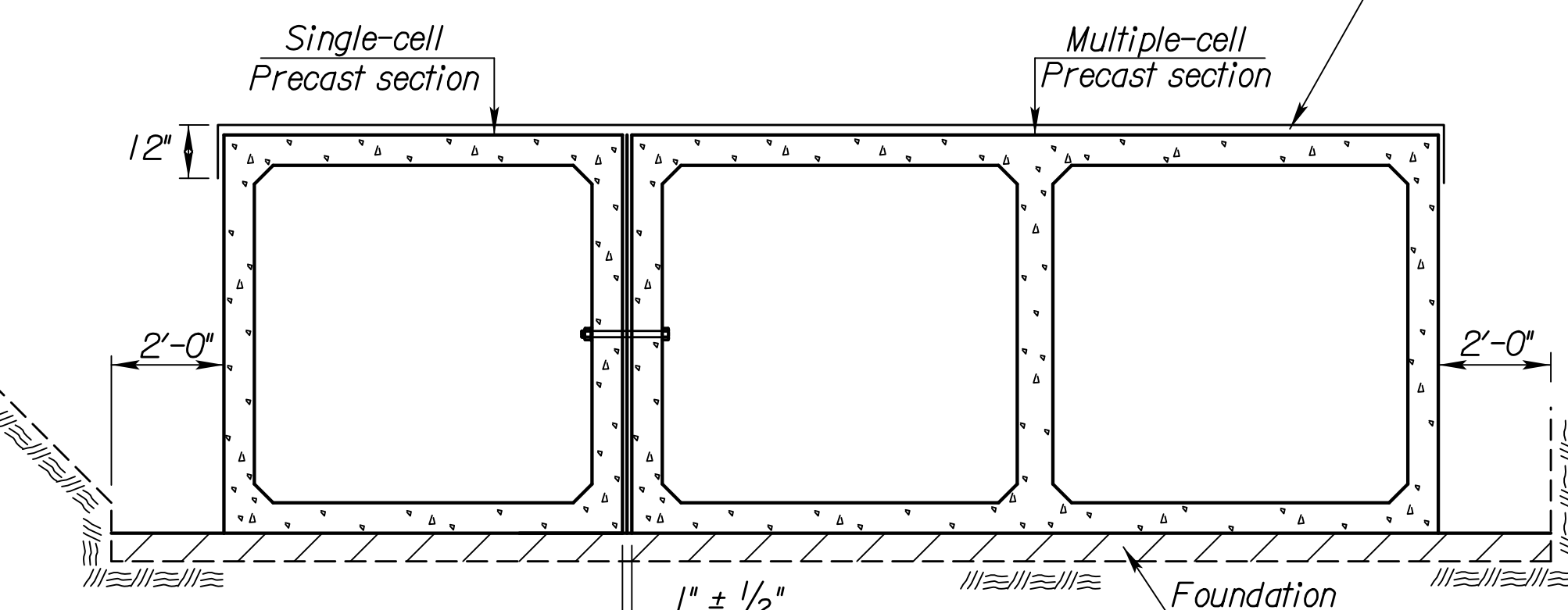
ELEVATION AT HEADWALL

* Minimum barrel length of cast-in-place end unit shall equal the RCB rise or 8'-0", whichever is less. This length can be used when the joint between the cast-in-place end unit and the precast section is reinforced as shown.

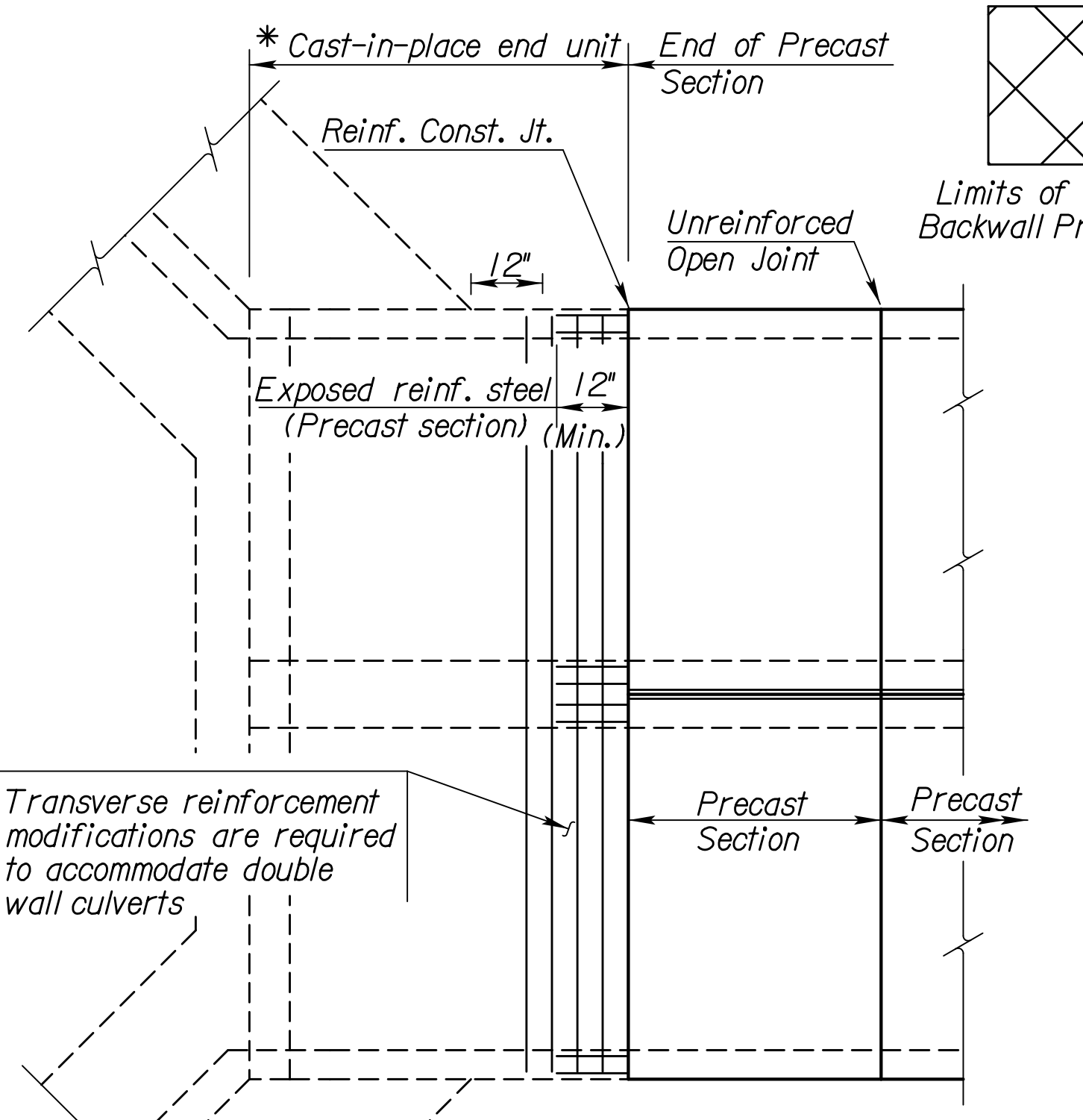
** Minimum barrel length of cast-in-place end unit shall be 16'-0" when using an unreinforced open joint at the end of the precast section.



PARTIAL DETAIL OF JOINT



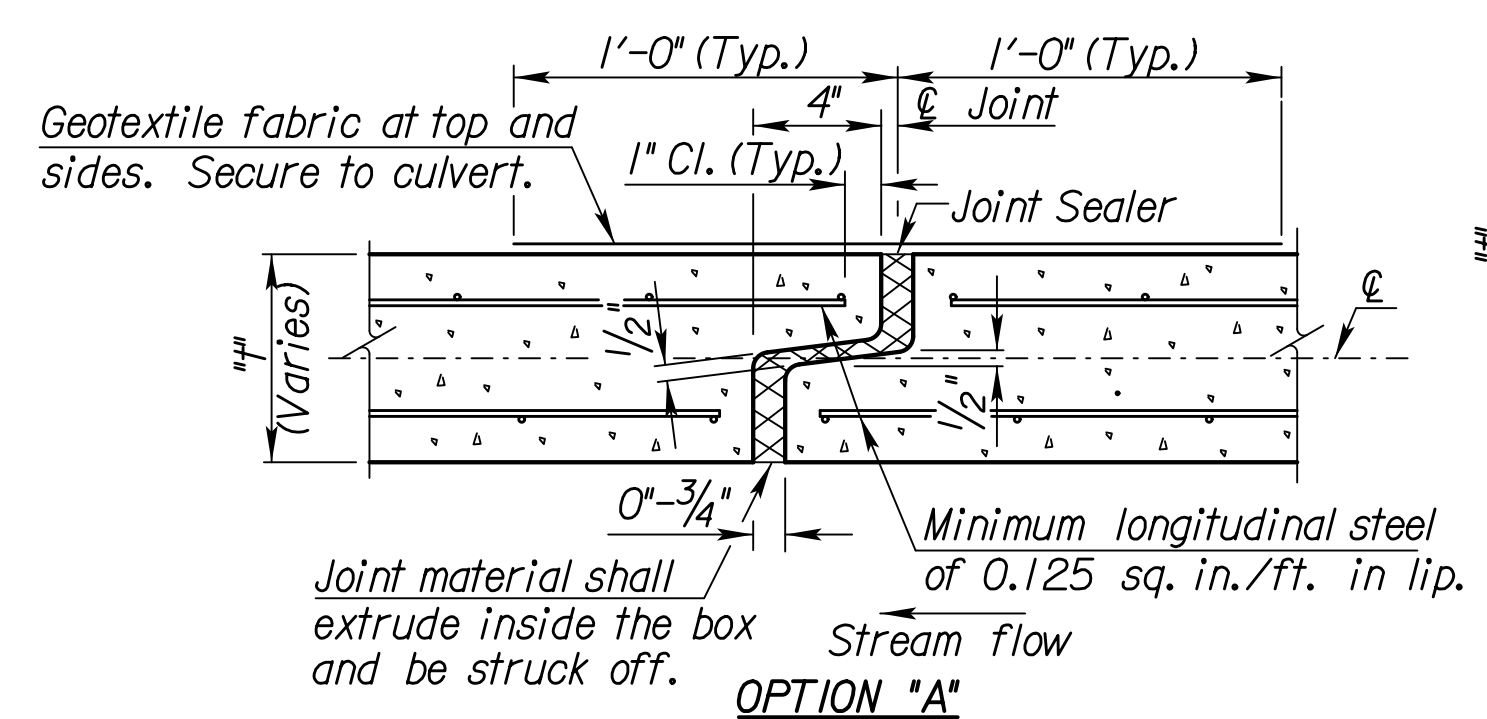
TYPICAL INSTALLATION DETAILS



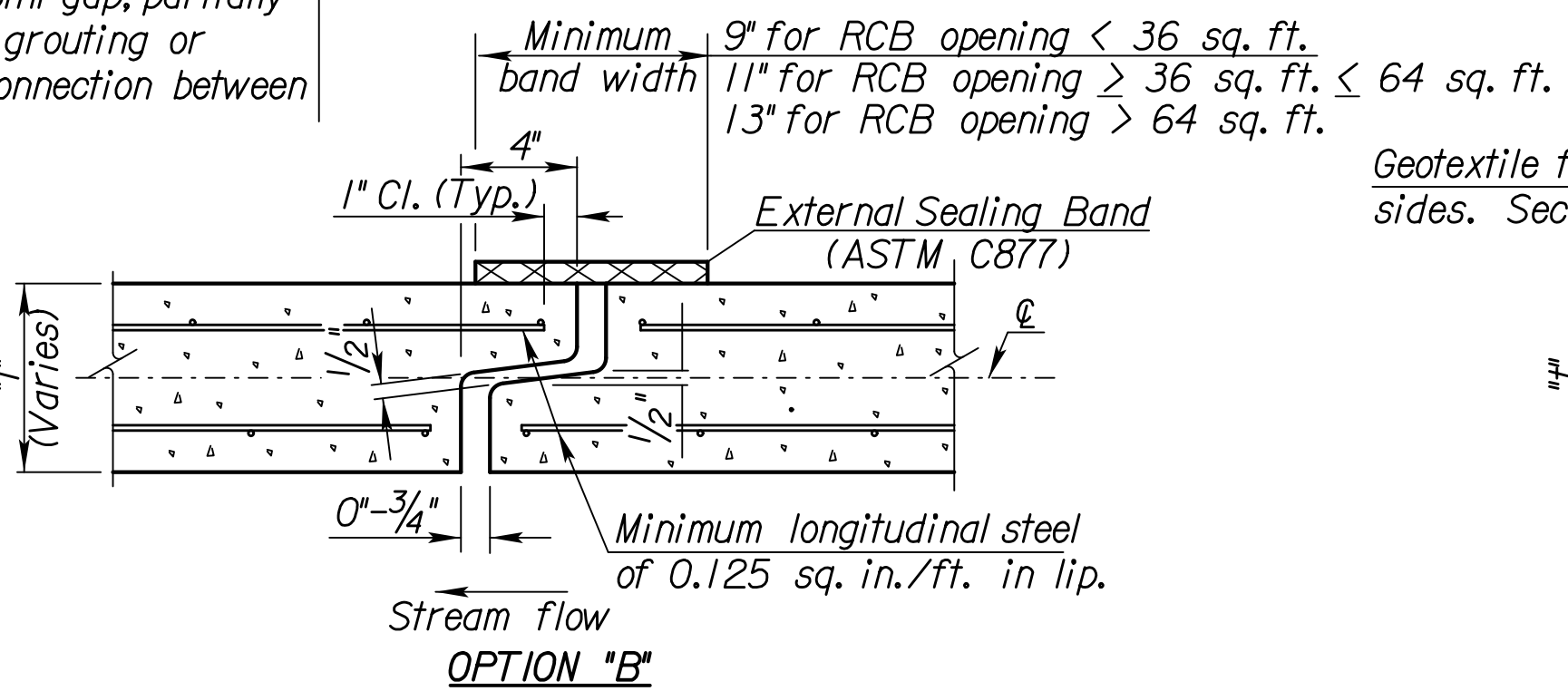
PLAN AT HEADWALL

(Double culvert installation shown)

Fill space between boxes with grout. (To maintain proper joint gap, partially backfill boxes prior to grouting or provide a mechanical connection between boxes.)



OPTION "A"



OPTION "B"

OPEN JOINT DETAIL

Std. Base File: br031.dgn
 Plotted By: srb
 File: I:\2010\0281\Bridge\0281-br031.dgn
 Plot Date: 2/5/2013