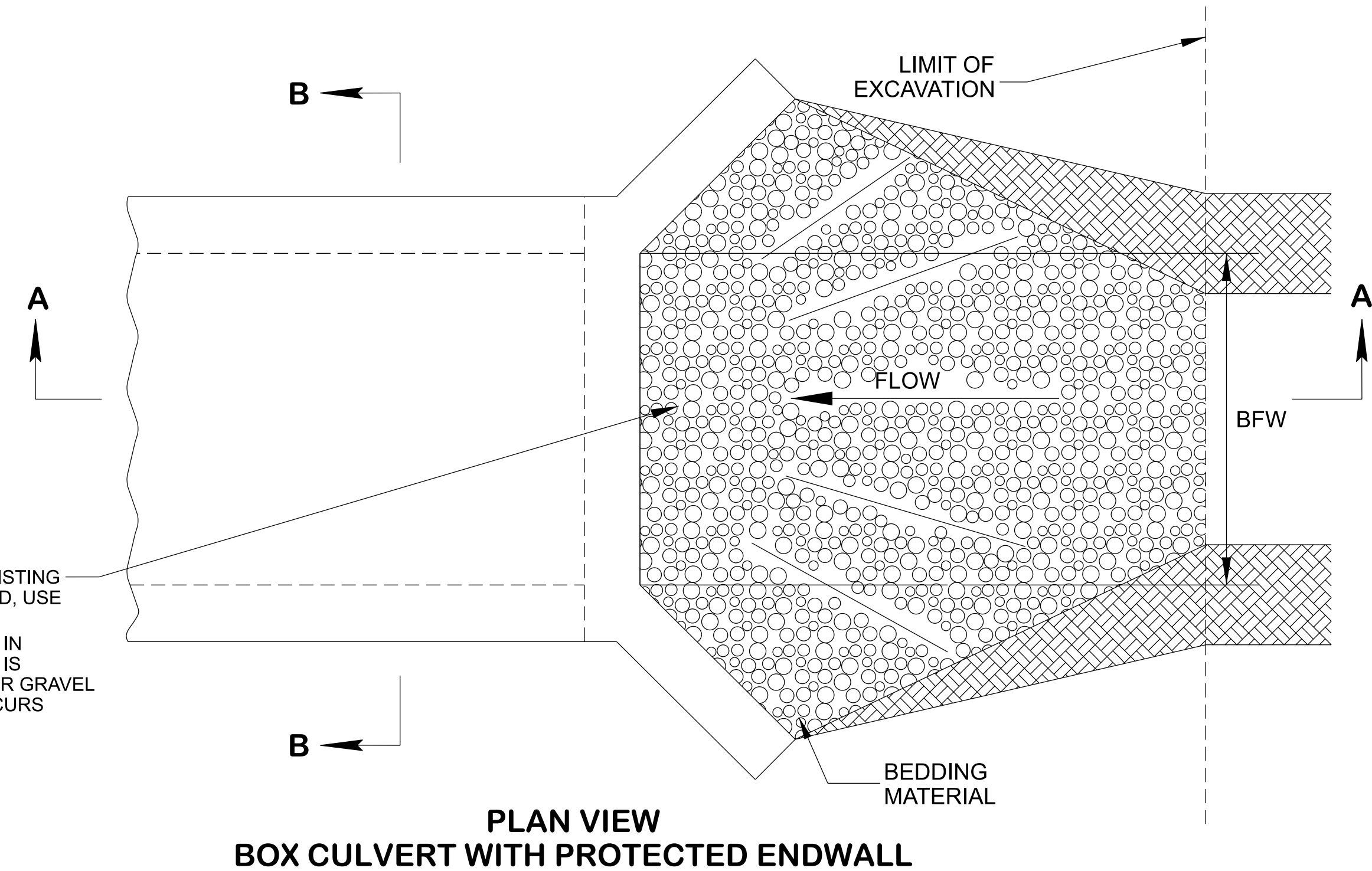
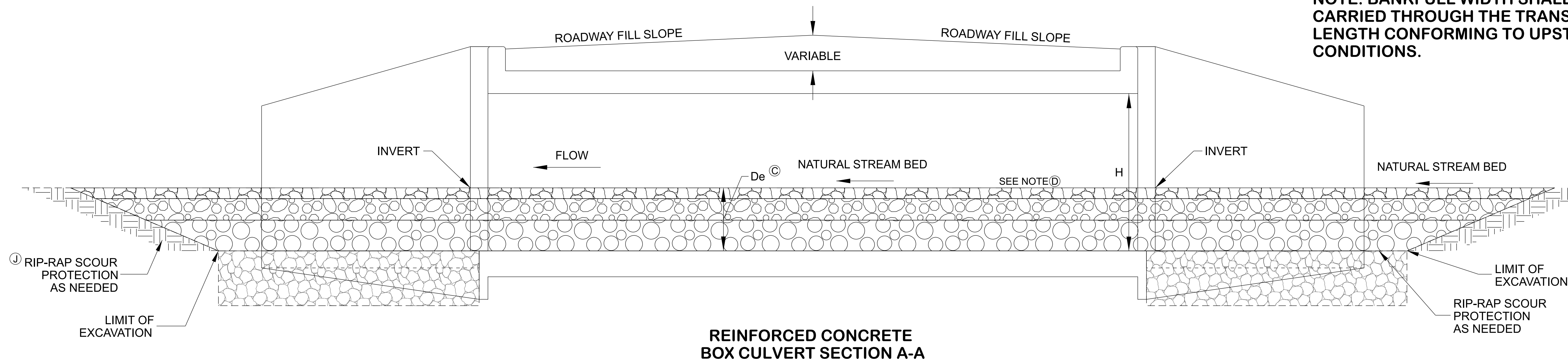


PLACE PREVIOUSLY REMOVED EXISTING STREAM BED MATERIAL. IF NEEDED, USE RESTORED SUBSTRATE.

SUBSTRATE RESORATION SHOWN IN LAYERS. PREMIXING RESORATION IS ACCEPTABLE AND PREFERRED FOR GRAVEL STREAM BED. INSURE MIXING OCCURS OUTSIDE OF BANK FULL WIDTH.



NOTE: BANKFULL WIDTH SHALL BE CARRIED THROUGH THE TRANSITION LENGTH CONFORMING TO UPSTREAM CONDITIONS.



#### Substrate Restoration

##### Range of nominal particle sizes based on Stream bed type

Stream Bed Type	Nominal particle size	Restoration aggregate type	Restoration aggregate size range
Sand/silt	< 0.08"	sand	< 0.08"
Small Gravel	0.08" – 1"	# 57 stone	1/2"- 1"
Large Gravel	1" – 2.5"	# 3 stone	1" - 2"
Small Cobble	2.5" – 6"	Class A-3 Rip-Rap	2"- 6"
Large Cobble	6" – 10"	Class A-1 Rip-Rap	2"- 14"

#### GENERAL NOTES

- (A) THIS DRAWING MAY BE USED FOR EMBEDDED BOX STRUCTURES WITH HEIGHTS GREATER THAN 5'. THE HEIGHT OF THE STRUCTURE SHALL NOT BE LARGER THAN THE WIDTH OF EACH CELL.
- (B) FOR ALL CAST-IN-PLACE STRUCTURES, NATURAL MATERIAL SHALL BE PLACED BY THE CONTRACTOR ON CULVERT BOTTOM AFTER INSTALLATION TO MATCH EXISTING STREAM CHANNEL BOTTOM AT INLET AND OUTLET.
- (C) THE DESIGNER MAY USE HY-8, OR EQUIVALENT TDOT APPROVED SOFTWARE, AND FOLLOW THE PROCEDURE IN TDOT DRAINAGE MANUAL CHAPTER 12 TO DETERMINE THE EMBEDMENT DEPTH (De) AND TABLE 12-2 FOR THE LAYER THICKNESS.
- (D) THE MATERIAL AND PLACEMENT OF NATURAL STREAM BED MATERIAL OR CHANNEL SUBSTRATE AND ALL INCIDENTALS INCLUDING THE PRACTICE OF LIMITING PERMEABILITY WILL BE PAID UNDER THE FOLLOWING ITEM NUMBERS,
- |            |   |      |
|------------|---|------|
| 203-20.01, | CHANNEL SUBSTRATE,                                      | C.Y. |
| 203-20.02, | NATURAL STREAMBED MATERIAL (REMOVAL-STORAGE-PLACEMENT), | C.Y. |
- (E) DESIGNER SHOULD PROVIDE ADDITIONAL HYDRAULIC DATA INCLUDING THE RECESSED OR EMBEDMENT DEPTH WITH THE PROPOSED PIPE INLET AND OUTLET INVERT ELEVATIONS, AOP DESIGN INFORMATION: BANK FULL WIDTH, AND VELOCITY. SEE DRAINAGE MANUAL SECTION 12.05 FOR DOCUMENTATION PROCEDURES.
- (F) IT IS DESIRED TO HAVE A 6" LAYER OF NATIVE STREAM BED MATERIAL. AT LOCATIONS WHERE USING NATIVE MATERIAL IS NOT POSSIBLE, REFER TO DRAINAGE MANUAL SECTION 12.04.
- (G) SEE STANDARD DRAWING D-NSD-30 FOR COMPLETE SUBSTRATE RESTORATION GENERAL NOTES.
- (H) CROSSING SHOULD BE ANALYZED AS AN EMBEDDED STRUCTURE FOR SHEAR STRESS REQUIREMENTS. THE APPROPRIATE RIP-RAP CLASS FOR THE SHEAR STRESS SHOULD BE USED AT THE INLET AND OUTLET OF THE STRUCTURE FOR SCOUR PROTECTION.

MATERIAL SHOWN ARE ONLY A GRAPHICAL REPRESENTATION AND DO NOT DEPICT THE ACTUAL DEPTH OR QUANTITY OF MATERIALS TO APPROPRIATELY CONSTRUCT OR STABILIZE THE CHANNEL.

STATE OF TENNESSEE  
STANDARD  
DRAWING  
DEPARTMENT OF TRANSPORTATION

AOP DESIGN  
EMBEDDED  
BOX CULVERTS

04-16-2025

D-AOP-3

NOT TO SCALE