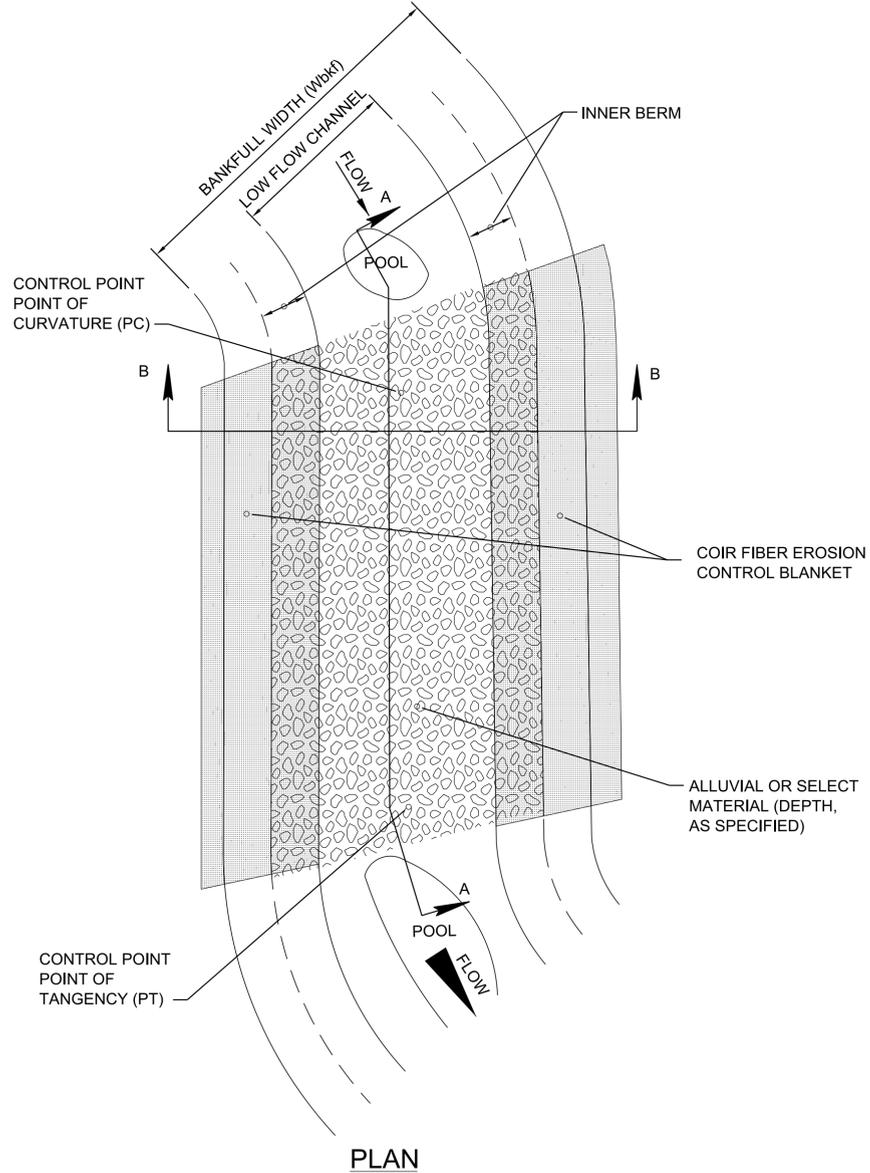
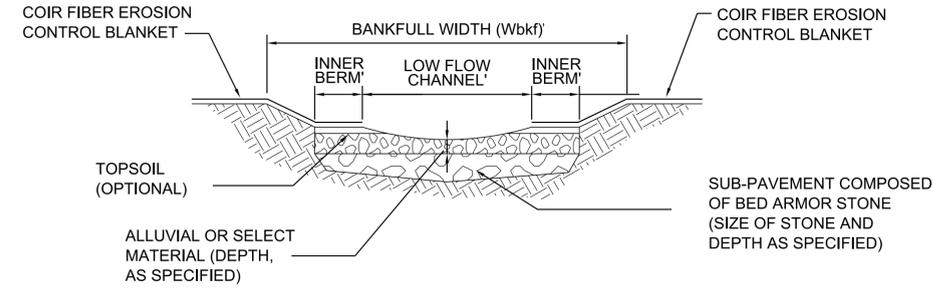


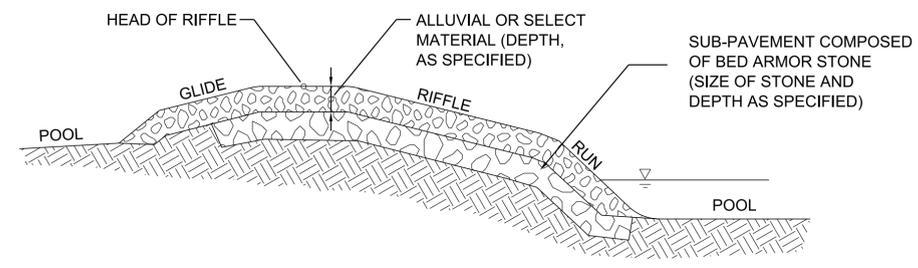
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PLAN



SECTION B-B



SECTION A-A

CONSTRUCTED ALLUVIAL RIFFLE NOTES

- (A) CONSTRUCTED ALLUVIAL RIFFLES ARE GRADE CONTROL AND HABITAT ENHANCEMENT MEASURES THAT ARE USED TO MAINTAIN GRADE OF UPSTREAM POOLS, OXYGENATE WATER, AND PROVIDE HABITAT FOR EPIFAUNA AND FISH. THESE STRUCTURES ARE TYPICALLY USED IN LOWER GRADIENT STREAMS WITH OVERALL SLOPES LESS THAN 2% THIS DETAIL CAN BE USED FOR CONSTRUCTING RIFFLES USING NATURAL ALLUVIUM CONSISTING OF BOULDERS, COBBLES, AND GRAVEL OR SPECIFIED SELECT MATERIAL.
- (B) CONSTRUCTED ALLUVIAL RIFFLES SHOULD BE PLACED AT THE STATIONS, OFFSETS, ELEVATIONS, AND GEOMORPHIC POSITIONS INDICATED ON THE STREAM MITIGATION DATA TABLE IN THE PROJECT PLANS, STREAM MITIGATION PLAN, OR AS DIRECTED BY THE ENGINEER. AT A MINIMUM, THE BANKFULL, INNER BERM, AND LOW-FLOW CHANNEL WIDTHS; INVERT ELEVATIONS AT HEAD AND BOTTOM OF RIFFLE; ESTIMATED ROCK THRESHOLD SIZE; AND ALLUVIUM OR SELECT MATERIAL CLASSIFICATION AND DEPTH SHOULD BE SPECIFIED IN THE STREAM MITIGATION DATA TABLE.
- (C) REFER TO D-NSD-37 "SPECIAL NOTES FOR STREAM DESIGN".
- (D) CONSTRUCTED ALLUVIAL RIFFLES ARE PLACED IN THE STRAIGHT SECTIONS OF THE CHANNEL BETWEEN MEANDER BENDS (I.E., BETWEEN UPSTREAM POINT OF TANGENCY AND DOWNSTREAM POINT OF CURVATURE), AS INDICATED ON THE STREAM MITIGATION PLANS.
- (E) ALLUVIUM OR SELECT MATERIAL FOR CONSTRUCTED RIFFLES SHALL CONSIST OF COARSE SUBSTRATE (GRAVEL, COBBLE, AND BOULDER). A MIXTURE OF SIZES OF ALLUVIUM OR SELECT MATERIALS, AS SPECIFIED ON THE STREAM MITIGATION PLAN SHEETS, SHOULD BE USED FOR SUBSTRATE IN RIFFLE AND RUN HABITATS. COARSE ALLUVIUM EXCAVATED FROM THE EXISTING STREAM BED, WHICH MEETS THE SPECIFIED SIZE CLASSIFICATION, IS THE PREFERRED MATERIAL TO USE FOR SUBSTRATE RESTORATION. REFER TO D-NSD-30 AND D-NSD-37 FOR ADDITIONAL SUBSTRATE RESTORATION INFORMATION.
- (F) CONSTRUCT ALLUVIAL RIFFLES BY:
 - (1) SHAPE THE CHANNEL AND FLOODPLAIN TO THE SPECIFIED GRADES AND DIMENSIONS.
 - (2) EXCAVATE ENOUGH BED MATERIAL TO PLACE SUBPAVEMENT ARMOR STONE, AND COARSE ALLUVIUM OR SELECT MATERIAL FOR THE RIFFLE TO ACHIEVE THE SPECIFIED INVERT ELEVATIONS. IF THE CHANNEL IS DESIGNED WITH AN INNER BERM, KEY THE COARSE ALLUVIUM OR SELECT MATERIAL INTO THE BANKS EXTENDING ENTIRELY UNDER THE INNER BERM. IF THE CHANNEL LACKS AN INNER BERM, KEY THE COARSE ALLUVIUM OR SELECT MATERIAL INTO THE BANKS EXTENDING TO HALF BANKFULL.
 - (3) PLACE THE COARSE ALLUVIUM OR SELECT MATERIAL IN SIX-INCH LIFTS AND COMPACT EACH LIFT WITH THE BUCKET OF THE EXCAVATOR.
 - (4) INSTALL THE ALLUVIAL RIFFLE AT THE INVERTS SPECIFIED IN THE PLANS AND THEN CHECK THE ELEVATIONS OF THE INVERTS WITH SURVEY EQUIPMENT.
 - (5) PLACE SOIL OVER THE TOP OF THE COARSE ALLUVIUM OR SELECT MATERIAL KEYED INTO THE INNER BERM OR STREAM BANK AND GRADE THE INNER BERM/BANKS TO THE SPECIFIED ELEVATIONS.
- (G) THE CONSTRUCTED ALLUVIAL RIFFLE MATERIAL SHALL BE FINISHED TO CREATE A SMOOTH PROFILE, WITHOUT AN ABRUPT JUMP/TRANSITION BETWEEN THE UPSTREAM POOL-GLIDE AND THE RIFFLE, OR AN ABRUPT DROP/TRANSITION BETWEEN THE RIFFLE AND THE DOWNSTREAM RUN-POOL. THE FINISHED CROSS SECTION OF THE RIFFLE MATERIAL SHALL GENERALLY MATCH THE SHAPE AND DIMENSIONS SHOWN ON THE RIFFLE TYPICAL SECTION WITH SOME VARIABILITY OF THE THALWEG LOCATION AS A RESULT OF PLACEMENT OF LARGER SUBSTRATE, SUCH AS BOULDERS.
- (H) THE END OF RIFFLE CONTROL POINT MAY TIE IN TO A DRAINAGE STRUCTURE OR OTHER IN-STREAM STRUCTURE (E.G. - J-HOOK VANE, LOG OR BOULDER SILL, ETC.).
- (I) RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FLOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.
- (J) COIR FIBER EROSION CONTROL BLANKET SHALL BE INSTALLED ABOVE THE INNER-BERM STAGE AND NOT IN THE LOW-FLOW CHANNEL OF THE RIFFLE. SEE TYPICAL CROSS-SECTION DATA IN STREAM MITIGATION PLANS FOR INNER BERM INFORMATION.
- (K) ALL MATERIALS ARE TO BE APPROVED BY ENGINEER OR ENGINEER'S ON-SITE CONSTRUCTION OBSERVER.
- (L) CONSTRUCTED ALLUVIAL RIFFLES SHALL BE PAID FOR UNDER THE FOLLOWING ITEM NUMBER:
 709-05.81 ROCK RIFFLES PER LUMP SUM
 PAYMENT SHALL INCLUDE ALL MATERIALS, EQUIPMENT, AND LABOR TO CONSTRUCT THE ALLUVIAL RIFFLE.

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.

NOT TO SCALE

STATE OF TENNESSEE
DEPARTMENT OF
TRANSPORTATION

CONSTRUCTED
ALLUVIAL
RIFFLE

11-01-16 D-NSD-29

STREAM MITIGATION PLAN LEGEND:



CONSTRUCTED ALLUVIAL RIFFLE