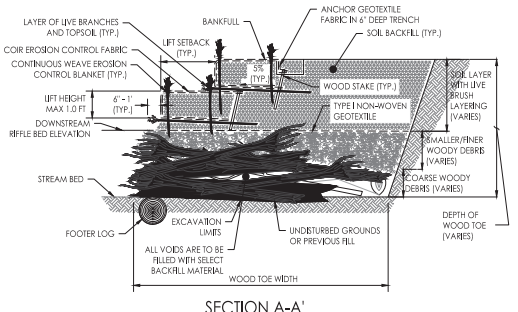
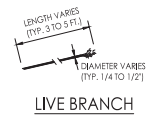
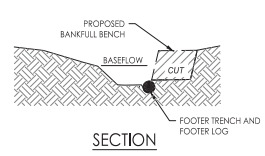


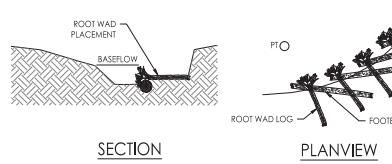
PLAN - SYMBOL



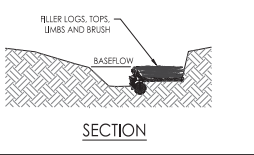
STEP 1. EXCAVATE LOW BENCH FOR TOE WOOD. EXCAVATE FOOTER TRENCH IN LOWER BENCH AND PLACE FOOTER LOGS.



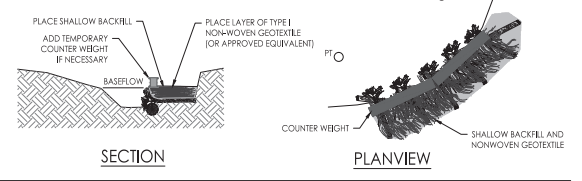
STEP 2. PLACE ROOT WAD LOGS CANTILEVERED OVER FOOTING LOGS.



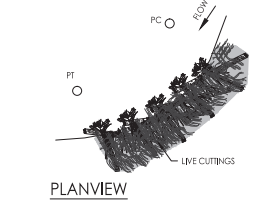
STEP 3. PLACE FILLER MATERIAL (SMALL LOGS, LIMBS, TREE TOPS AND BRUSH) BETWEEN AND ON TOP OF THE ROOT WADS.



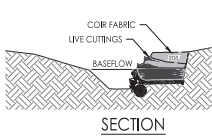
STEP 4. ADD TEMPORARY COUNTER WEIGHT TO SUBMERGE THE LOGS. PLACE SHALLOW BACKFILL BEHIND THE COUNTER WEIGHT.



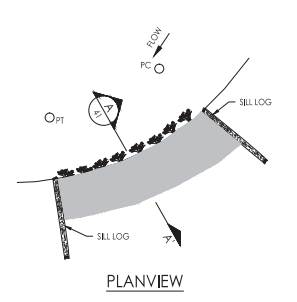
STEP 5. REMOVE TEMPORARY COUNTER WEIGHT AND PLACE LIVE CUTTINGS.



STEP 6. INSTALL WRAPPED SOIL LIFTS AND LAYERS OF CUTTINGS BETWEEN SOIL LIFTS UP TO BANKFULL STAGE.



STEP 7. SOIL LOGS ARE BURIED FLUSH WITH THE TOP OF THE BANKFULL BENCH. PLACE THE SOIL LOGS AT THE BEGINNING AND END OF THE TOE WOOD STRUCTURE, PERPENDICULAR TO THE FLOW.



NOTES:

- REFER TO STRUCTURE TABLE FOR DIMENSIONS.
- COARSE WOODY DEBRIS SHALL CONSIST OF LOGS, ROOTWADS, AND LARGE BRANCHES NOT SUITABLE FOR CONSTRUCTION OF LOG STRUCTURES. ALL MATERIALS ARE TO BE APPROVED BY ENGINEER.
- COARSE WOODY DEBRIS SHALL BE CONSTRUCTED WITH THE LARGEST MATERIAL PLACED FIRST. NO LOGS SHALL BE PLACED PARALLEL TO THE FLOW OF WATER. LIMES DIRECTED BY ENGINEER. LOGS SHALL BE PLACED IN A CROSSING PATTERN OR WEAVE SUCH THAT EACH LOG BE ANCHORED BY ANOTHER LOG.
- SMALLER/FINER WOODY DEBRIS SHALL CONSIST OF MEDIUM TO SMALL LIMBS AND CAN BE BRANCHES, BUSHES, AND/OR LOGS. INVASIVE SPECIES SHALL NOT BE USED.
- SMALLER/FINER WOODY DEBRIS SHALL BE PLACED ABOVE THE COARSE WOODY DEBRIS WITH THE LARGEST MATERIAL BEING PLACED FIRST AND THE SMALLEST MATERIAL PLACED LAST.
- ALL WOODY DEBRIS SHALL BE COMPACTED WITH THE EXCAVATOR BUCKET IN ORDER TO REDUCE THE PRESENCE OF VOIDS IN THE SMALLER/FINER WOODY DEBRIS LAYER.
- THE HORIZONTAL LOCATIONS OF ALL WOODY DEBRIS ARE LOCATED ON THE PLAN/PROFILE SHEETS AND STRUCTURE TABLES AND WILL BE PROVIDED TO THE CONTRACTOR DURING STAKEOUT. NO LOCATIONS OF WOODY DEBRIS SHALL VARY FROM THE PLAN LOCATIONS WITHOUT DIRECTION FROM THE STAMPING ENGINEER.
- NON-WOVEN GEOTEXTILE SHALL BE INSTALLED ABOVE THE HIGHEST ELEVATION OF THE WOODY DEBRIS BEFORE THE SOIL LIFTS ARE INSTALLED. GEOTEXTILE FABRIC IS INCIDENTAL TO CONSTRUCTION.
- THE SOIL BACKFILL USED FOR LIFTS AND TOPSOIL USED FOR LAYERING WITH THE LIVE BRANCHES SHALL BE FREE OF ANY LARGE ROOTS OR WOODY DEBRIS AND SHALL GENERALLY BE FREE FROM ANY COBBLE MATERIAL.
- SOIL BACKFILL SHALL BE COMPACTED SUCH THAT FUTURE SETTLING WILL BE KEPT TO A MINIMUM; YET, NOT SUCH THAT THE UNDERLYING BRUSH IS DISPLACED OR DAMAGED.
- TOP OF WOOD SHALL BE NO HIGHER THAN 6" ABOVE THE ELEVATION OF THE NEXT DOWNSTREAM RIFFLE.
- THE TOP OF THE BACKFILL FOR THE FIRST LIFT SHALL BE SLOPED AT APPROXIMATELY 3% AWAY FROM THE STREAM.
- PLACE A LAYER OF TOPSOIL AND LIVE BRANCHES ON TOP OF EACH SOIL LIFT SUCH THAT APPROXIMATELY 4 INCHES TO 1 FOOT OF EACH LIVE BRANCH WILL BE EXPOSED AND THE REMAINDER (2 TO 4 FT OF EACH LIVE BRANCH) WILL BE COVERED BY THE NEXT SOIL LIFT.
- LIVE BRANCHES SHALL BE OF THE SPECIES SPECIFIED FOR LIVE STAKES OR APPROVED BY ON SITE DNR REPRESENTATIVE.
- PLACE A LAYER OF 9.5 FEET WIDE GEOCOIR (OR 700 WOVEN EROSION CONTROL BLANKET, OR EQUIVALENT) ON TOP OF THE TOPSOIL AND LIVE BRANCHES SUCH THAT 2.5 FEET OF THE BLANKET WILL BE BURIED BELOW THE NEXT SOIL LIFT. ALLOW THE REMAINING 4.5 FEET OF BLANKET TO HANG OVER THE PRECEDING SOIL LIFT OR COIR FIBER LOGS.
- PLACE A LAYER OF 9.5 FEET WIDE NON-WOVEN COIR MATTING OVER THE EROSION CONTROL BLANKET TO THE SAME LIMBS.
- SOIL CAN BE COMPACTED BY STAKING A PIECE OF 2" X 4" OR 2" X 12" SAWN LUMBER EDGWAYS UP TO THE LIFT HEIGHT SPECIFIED IN THE STRUCTURE TABLE AND SECURING WITH WOODEN STAKES TO PROVIDE A RIGID BACKSTOP FOR COMPACTING SOIL LIFT.
- PLACE SOIL BACKFILL UP TO THE LIFT HEIGHT SPECIFIED OF NO GREATER THAN 1.0 FT BEING CAREFUL NOT TO PUSH/PULL OR TEAR THE FABRIC PREVIOUSLY PLACED.
- THE TOP OF THE SOIL BACKFILL SHALL BE FLAT WITHIN THE LIFT SETBACK DISTANCE SPECIFIED IN THE STRUCTURE TABLE. BEYOND THE LIFT SETBACK DISTANCE THE SOIL BACKFILL SHALL BE SLOPED AT AN APPROXIMATE 2% SLOPE AWAY FROM THE STREAM.
- TOP CROSS THE SOIL LIFT WITH TOPSOIL FROM THE FACE OF THE SOIL LIFT BACK INTO THE FLOODPLAIN AT LEAST 4FT.
- SPRINKLE SEED MIX ON SOIL WHERE IT WILL BE EXPOSED.
- REMOVE THE SAWN LUMBER AND WOODEN STAKES FROM THE FACE OF THE SOIL LIFT AND WRAP THE FACE AND TOP OF THE SOIL LIFT USING THE WOVEN AND NON-WOVEN COIR MATTING HANGING OVER THE PREVIOUS LIFT/COIR FIBER LOGS.
- THE EROSION CONTROL FABRIC SHALL BE PULLED AS TIGHT AS POSSIBLE WITHOUT TEARING OR EXCESSIVELY DISTORTING THE FABRIC.
- SECURE THE EROSION CONTROL AND NON-WOVEN MATTING IN PLACE BY STAKING THE END OF THE EROSION CONTROL FABRIC WITH WOODEN STAKES ON 14-FOOT CENTERS.
- BEGIN CONSTRUCTION OF THE NEXT SOIL LIFT BY REPEATING THE PREVIOUS NOTES STARTING WITH NOTE 11.
- THE OVERALL SLOPE CREATED BY THE LIVE BRUSH LAYERING SHALL MATCH THE PROPOSED CROSS SECTION SHAPE FOR THE OUTER BANK OF THE TYPICAL POOL CROSS-SECTION FOR EACH REACH.
- THE COIR BLANKETS USED FOR THE UPPER MOST SOIL LIFT WILL BE SECURED WITHIN A 4 INCH DEEP TRENCH AS SHOWN IN DETAIL.
- THE SURFACE OF THIS STRUCTURE SHALL BE FINISHED TO A SMOOTH AND COMPACT SURFACE IN ACCORDANCE WITH THE LIMES, GRADES, AND CROSS-SECTIONS OR ELEVATIONS SHOWN ON THE DRAWINGS. THE DEGREE OF FINISH FOR ELEVATIONS SHALL BE WITHIN 0.1 FT OF THE GRADES AND ELEVATIONS INDICATED.
- RE-DRESSING OF CHANNEL AND BANKFULL BENCH/FOODPLAIN WILL LIKELY BE REQUIRED FOLLOWING INSTALLATION OF IN-STREAM STRUCTURES AND SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION.
- SOD MAT MAY BE USED INSTEAD OF THE COIR IF IT IS ABOVE THE WOOD TOE IF IT IS AVAILABLE AND APPROVED BY ENGINEER.
- LENGTH SHOWN IN STRUCTURE TABLE REFLECTS LENGTH OF TOE WOOD ALONG THE BANK, NOT THE CENTERLINE.
- LIVE STAKES SHALL BE PLACED AT THE CHANNEL EDGE AS DESCRIBED IN THE PLANTING PLAN.
- LIVE STAKES ARE INSTALLED ONCE LIFTS AND/OR SOD MATS HAVE BEEN CONSTRUCTED.

Revision	By	App'd	YR/MO/DA	ISSUED

Client/Project
MINNESOTA DEPARTMENT OF NATURAL RESOURCES
KNOWLTON CREEK STREAM RESTORATION PROJECT FINAL DESIGN PLANS
DULUTH, MINNESOTA

Permit-Sect

11/18
DETAILS (4)



Project Number: 175654030

File Name: SK0004DETAILS.dwg

Drawing No. DETAILS-4
Revision Sheet



1
41 **WOOD TOE WITH COIR WRAPPED SOIL LIFTS**
NOT TO SCALE

Figure 8. Diagram of Wood Toe with COIR Wrapped Soil