

**Vermont Department of Environmental Conservation**

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*Agency of Natural Resources*

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**AUTHORIZATION TO CONDUCT STREAM ALTERATION ACTIVITIES**

Pursuant to Section C.2.2.5 of the Vermont Stream Alteration General Permit

Project Number:	<b>SA-05-005-2016 Wardsboro Townshend Dam Rd culvert</b>	<b>FEMA PW 3034 Town Highway #20</b>
Applicant Name:	Wardsboro Highway Department	Contact: Gregg Donna
Mailing Address:	P.O. Box 48, 71 Main St, Wardsboro, VT 05355	Phone: 802-896-6542 or 802-896-6055
Project Location:	Townshend Dam Road over tributary to Fair Brook	Email: <a href="mailto:wardsborohighway@myfairpoint.net">wardsborohighway@myfairpoint.net</a>

The Secretary of the Vermont Agency of Natural Resources (VT ANR) has determined that:

1. This project authorizes replacement of a 3' x 3' stone box culvert damaged by T.S. Irene with a 95" x 67" corrugated metal arch culvert on Townshend Dam Road TH 20 over an unnamed tributary of Fair Brook.
2. The proposed activity is eligible for coverage under the VT ANR Stream Alteration General Permit.
3. The proposed activity will meet the terms and conditions of the General Permit provided:
  - a) The project will be completed and approved as shown on the attached plans dated 3/9/16, prepared by Bell Engineering, as approved by the VT ANR and attached herein.
  - b) The project will not adversely affect the public safety by increasing flood hazards.
  - c) The project will not significantly damage fish life or wildlife.
  - d) The project will not significantly damage the rights of riparian owners.
  - e) The project will not obstruct the movement of aquatic life indigenous to the waterbody beyond the actual duration of construction. The invert shall be filled with Type E1 Stone per Appendix M Stream Stone Bed Fill.
  - f) The project is conducted in a manner which minimizes or avoids any discharge of sediment or other pollutants to surface waters in violation of the VT Water Quality Standards.
  - g) The ANR River Management Engineer is notified by phone or email when construction begins and when the project is complete.
  - h) In-stream working dates for all GP activities are from July 1<sup>st</sup> through October 1<sup>st</sup>; any in-stream work outside these dates will require an Individual Stream Alteration Permit authorization by the River Management Engineer.
  - i) This authorization has been posted for three days public comment. This authorization constitutes final approval.

If there are any changes in the project plan or deviation in construction from the plan, the Permittee must notify the River Management Engineer immediately.

If the project is constructed as you have described, as shown on the above referenced approved plans and according to the above conditions, there is no reason to expect any violation of Vermont Water Quality Standards.

Signed this 28<sup>th</sup> day of March, 2016

This permit expires October 1, 2016.

Alyssa B. Schuren, Commissioner  
Department of Environmental Conservation



by: \_\_\_\_\_  
Todd Menees, P.E., P.H., River Management Engineer

### **Streambed Stone Fill Design Guidance**

<b>Type</b>	<b>Velocity Range (fps)*</b>	<b>Embeddedness (in)</b>
E1	$V \leq 9$	18
E2	$9 < V \leq 11$	24
E3	$11 < V \leq 13$	36
E4	$13 < V \leq 15$	48

\*Maximum velocity should be based on a minimum 50-year design flow rate and calculated at the structure outlet.

### **Item xxx.xxx CY Streambed Stone Fill Specification**

Type E1. The longest dimension of the stone shall be at least 18 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 12 inches, and at least 25 percent of the particles shall have a maximum dimension of 2 inches and be well graded material.

Type E2. The longest dimension of the stone shall be at least 24 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 18 inches, and at least 25 percent of the particles shall have a maximum dimension of 2 inches and be well graded material.

Type E3. The longest dimension of the stone shall be at least 36 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 24 inches, and at least 25 percent of the particles shall have a maximum dimension of 2 inches and be well graded material.

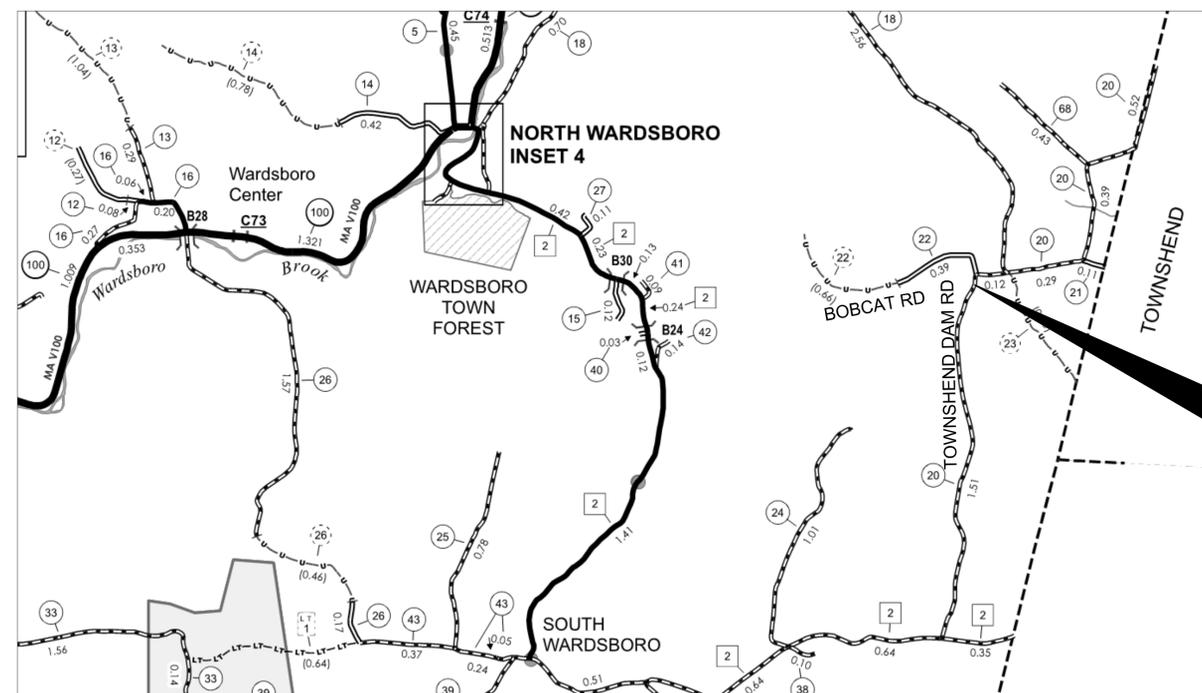
Type E4. The longest dimension of the stone shall be at least 48 inches, and at least 50 percent of the volume of the stone in place shall have a least dimension of 36 inches, and at least 25 percent of the particles shall have a maximum dimension of 2 inches and be well graded material.

### Notes

- The streambed stone fill shall be hard, blasted, angular rock other than serpentine rock containing the fibrous variety chrysotile (asbestos). Similar sized river sediment is an acceptable alternative as is a mixture of angular material and river sediment.
- Stone placed inside of a closed structure shall be placed such that the structure is not damaged.
- Care shall be taken to limit segregation of the materials.
- Add sand borrow item as needed to seal the bed and prevent subsurface flow.
- There shall be no subsurface flow upon final inspection.

# TOWN OF WARDBORO, VERMONT

## TH 20: TOWNSHEND DAM ROAD CULVERT REPLACEMENT PROJECT



**LOCATION**

PLAN DATE: FEBRUARY 5, 2016

**PLAN SHEETS:**

- C-1 FINISH PLAN
- C-2 DETAILS AND SPECIFICATIONS
- C-3 DETAILS AND SPECIFICATIONS
- C-4 EROSION CONTROL
- VTRANS STANDARD G-1
- VTRANS STANDARD G-1d

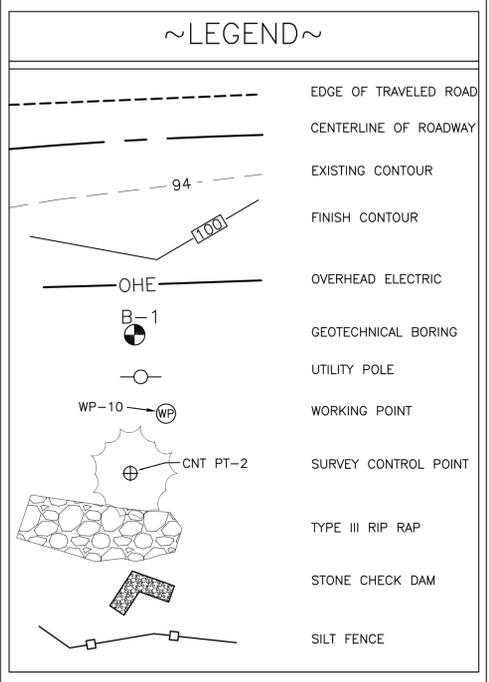
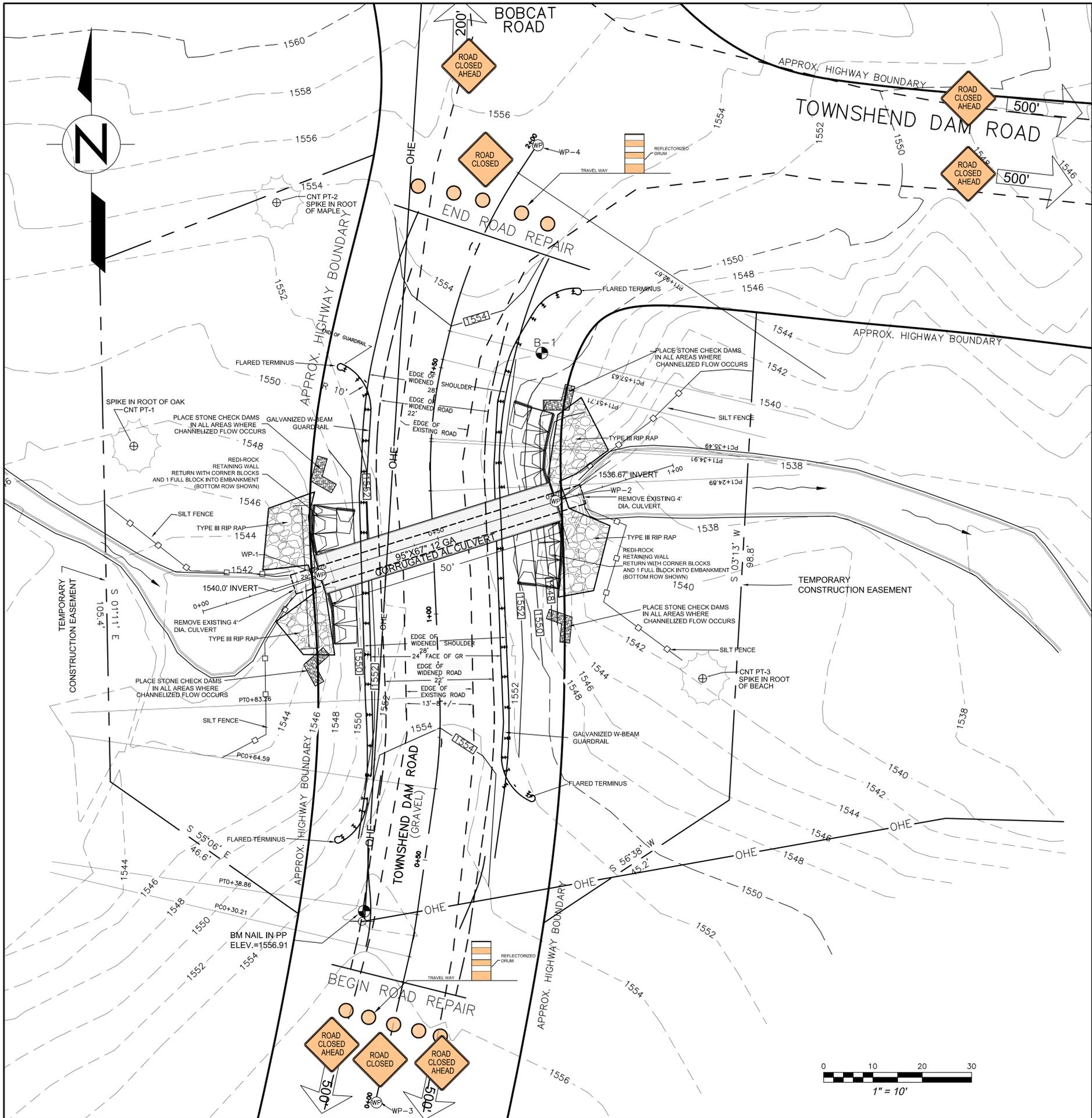


bellengineering@myfairpoint.net

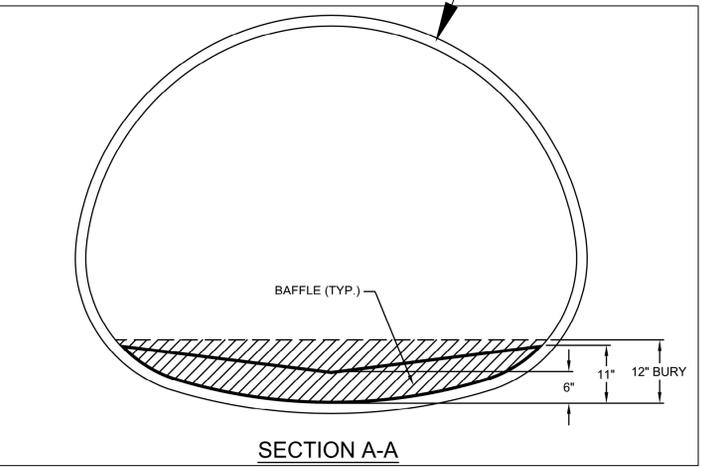


**PROJECT NOTES**

- 1) DESIGN LOAD IS HL-93
- 2) THIS PLAN INCLUDES INSTALLATION OF A 95"X67"X50' 12 GAUGE ALUMINUM CULVERT WITH 3"X1" CORRUGATIONS WITH REDIROCK HEADWALLS.
- 3) THE CONTRATOR SHALL PROVIDE THE ENGINEER AND TOWN OF WARDBORO SHOP DRAWINGS FROM THE COMPANY PROVIDING ALUMINUM CULVERT.
- 4) THE CONTRACT SHALL MEET WITH THE ENGINEER PRIOR TO CONSTRUCTION TO REVIEW THE PROJECT AND THESE PLANS.
- 5) THE CONTRACTOR SHALL REMOVE THE EXISTING CORRUGATED PLASTIC CULVERT AND DELIVER TO THE TOWN HIGHWAY GARAGE.



95'X67'X50' LONG 12 GAUGE ALUMINUM CULVERT  
 3"X1" CORUGATIONS WITH TAPERED BAFFLES  
 12" BURIAL BELOW STRAM BOTTOM



CONTROL POINTS

Point	Northing	Easting	Elevation
BM UTILITY POLE	3203532.46	323857.51	1556.91
CONTROL PNT 3	3203581.63	323926.74	1542.53
CONTROL PNT 2	3203677.91	323840.13	153.68
CONTROL PNT 1	3203628.64	323811.09	1548.68

WORKING POINTS

Point	Northing	Easting	Elevation	Description
WP-1	3203602.63	323849.10	1540.00	INVERT IN CULVERT
WP-2	3203617.43	323896.86	1536.67	INVERT OUT CULVERT
WP-3	3203495.97	323860.17	1557.25	STATION 0+00
WP-4	3203689.58	323893.12	1555.65	STATION 2+00

REVISIONS:

NO.	DATE	DESCRIPTION

PROJECT:  
**TOWN OF WARDSBORO, VT**  
**TOWNSHEND DAM RD**  
**CULVERT REPLACEMENT**

SHEET TITLE:  
**FINISHED CONDITIONS**

SCALE:  
 1" = 10'

DATE:  
 FEBRUARY 5, 2016

SHEET  
**C-1**



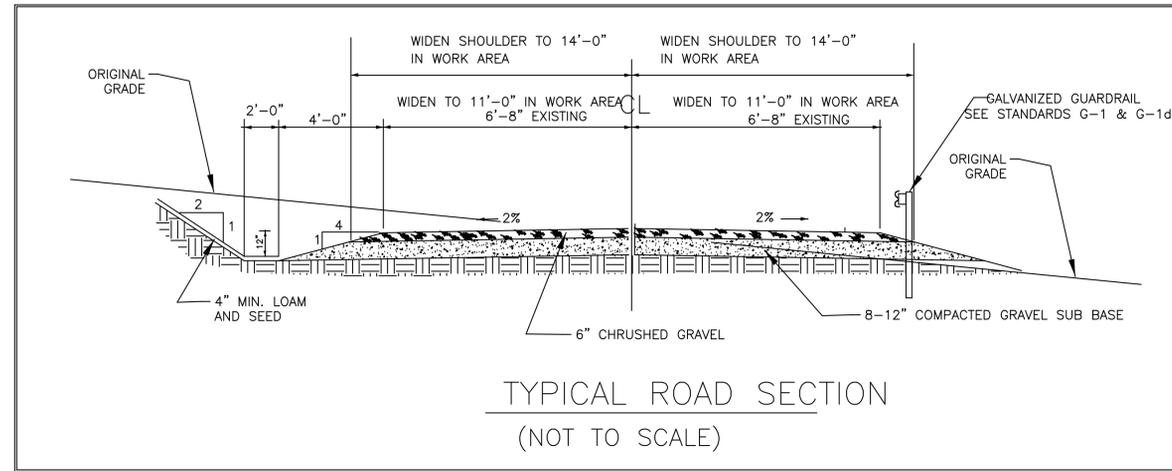
CONSTRUCTION NOTES

1. ALL SITE WORK SHALL BE IN CONFORMANCE WITH VERMONT AGENCY OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION", 2011 EDITION, EXCEPT AS MODIFIED IN THE DRAWINGS, SPECIFICATIONS AND NOTES.
2. SUBBASE FOR THE ROADWAY SHALL CONSIST OF 12" MIN. OF COARSE GRAVEL FOR THE SUBBASE (ITEM 703.04) WITH MAX. SIZE OF STONE OF 6 INCHES. SUBBASE MATERIALS TO BE COMPACTED TO ATTAIN AT LEAST 95% OF THE MAXIMUM DRY DENSITY (AASHTO T-99, METHOD C). SURFACE COURSE AND SHOULDERS SHALL CONSIST OF 6 INCHES OF AGGREGATE FOR SURFACE COURSE AND SHOULDERS (ITEM 704.12).
3. SITE PREPARATION AND ERATWORK SHALL BE AS FOLLOWS:
  - A. TOPSOIL AND ANY UNDERLYING SUBSOIL WHICH CONTAINS ORGANIC MATERIAL SHALL BE STRIPPED TO UNDISTURBED, FIRM, INORGANIC SUBGRADE. UNSUITABLE MATERIALS SHALL BE REMOVED FROM THE ROADWAY AND CULVERT AREAS, REGRADLESS OF IT'S THICKNESS.
  - B. GROUNDWATER CONTROL MEASURES SHALL BE PERFORMED SO THAT THE EXCAVATION ACTIVITIES CAN BE CONSTRUCTED IN-THE-DRY, THUS LIMITING THE POTENTIAL FOR THE DISTURBANCE OF SUBGRADE SOILS.
  - C. EXCAVATION SIDESLOPES SHOULD BE NO STEEPER THAN THOSE ALLOWED BY OSHA, UNLESS BRACING OR TRENCH BOXES ARE USED.
  - D. PROOFROLLING OF SUBGRADE SOILS SHALL BE CONDUCTED PRIOR TO PLACEMENT OF FILL. PROOFROLLING SHOULD NOT BE CONDUCTED WHEN DISTURBANCE OF THE SUBGRADE SOILS MAY OCCUR AS A RESULT OF PROOFROLLING, SUCH AS WHEN SUBGRADE SOILS ARE WET. LOOSE OR SOFT ZONES IDENTIFIED DURING PROOFROLLING SHOULD BE EXCAVATED AND REPLACED WITH COMPACTED COARSE GRAVEL FOR SUBBASE (ITEM 704.04).
  - E. FILL PLACED WITHIN CULVERT AREAS SHALL CONSIST OF GRANULAR BACKFILL FOR STRUCTURES (ITEM 704.08) OR APPROVED EQUAL.
  - F. SOIL MATERIALS SHALL BE PLACED IN LOOSE LIFTS NOT TO EXCEED 12 INCHES THICKNESS AND SHOULD BE COMPACTED TO THE FOLLOWING REQUIREMENTS (REFERENCE TO ASTM D-1557, METHOD D OR C):

AREA MINIMUM DEGREE OF COMPACTION

1. BELOW FOOTINGS	95
2. BASE COURSES	95
3. BELOW PAVEMENT SUBBASE AND BASE COURSES	95
4. BACKFILL OF FOOTINGS	95
5. WALLS AND CULVERT	90
6. ORDINARY FILL WITHING THE TOP 3 FEET OF GRADE IN GRASS AREAS	90

4. CONCRETE SHALL BE IN CONFORMANCE WITH SECTION 501, STRUCTURAL CONCRETE, AND SECTION 507, REINFORCING STEEL. CONCRETE SHALL BE CLASS B (3500 PSI) AND BAR REINFORCEMENT SHALL BE GRADE 60 UNLESS OTHERWISE NOTED.
5. RIP-RAP SHOWN ON PLAN SHALL BE PLACE IN CONFORMANCE WITH STONE FILL, RIP-RAP AND STONE PAVING, VTRANS SECTIN 613 AND STONE FILL TYPE III (SECTION 706.04) TO BE AS INDICATED ON PLANS.
6. THE CULVERT SHALL BE CONSTRUCTED IN ACCORDANCE WITH AASHTO LRFD DESIGN SPECIFICATIONS 2012.



ALUMINUM CULVERT INSTALLATION NOTES

**INSTALLATION:**  
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II OR ASTM A 798 AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE PROJECT ENGINEER.

FOUNDATION/BEDDING PREPARATION

PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER. ONCE THE FOUNDATION PREPARATION IS COMPLETE, THE 4 INCHES OF A WELL-GRADED GRANULAR MATERIAL SHALL BE PLACED AS THE BEDDING.

BACKFILL

THE BACKFILL SHALL MEET THE REQUIREMENTS OF VTRANS 2011 STANDARD SPECIFICATION FOR CONSTRUCTION 404.08 GRANULAR BACKFILL FOR STRUCTURES. GRANULAR BACKFILL FOR STRUCTURES SHALL BE OBTAINED FROM APPROVED SOURCES. IT SHALL CONSIST OF SATISFACTORILY GRADED, FREE DRAINING GRANULAR MATERIAL REASONABLY FREE FROM LOAM, SILT, CLAY AND ORGANIC MATERIAL.

THE MATERIAL SHALL BE PLACED IN 8-INCH LOOSE LIFTS AND COMPACTED TO 90% OF AASHTO T99 STANDARD PROCTOR DENSITY. WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE PIPE AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE. GRANULAR BACKFILL FOR STRUCTURES SHALL MEET THE GRADATION REQUIREMENTS OF THE FOLLOWING TABLE AS DETERMINED IN ACCORDANCE WITH AASHTO T 27 & 11.

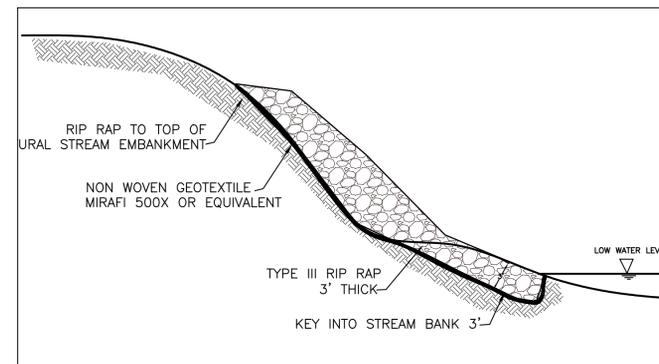
SIEVE DESIGNATION	PERCENTAGE BY MASS PASSING SQUARE MESH SIEVES
75 MM (3 INCH)	100
4.75 MM (NO. 4)	45 TO 75
150 UM (NO. 100)	0 TO 12
75 UM (NO. 200)	0 TO 6

MINIMUM COVER

BACKFILL SHALL BE PLACED TO THE PROPER ELEVATION OVER THE SYSTEM AS OUTLINED IN THE PLANS. MINIMUM COVER FOR CONSTRUCTION LOADING SHALL BE 3.0 FEET OVER THE TOP OF THE PIPE FOR 18-50 KIP AXLE LOADS. FOR GREATER LOADS CONSULT WITH THE ENGINEER FOR PROPER COVER REQUIREMENTS.

TESTING AND INSPECTION

- A. Contractor to employ and pay for a qualified independent geotechnical testing laboratory to perform soil testing and inspection service during earthwork operations.
- B. Test and analysis of fill material will be performed in accordance with ANSI/ASTM D 698 "Standard" Proctor Density.
- C. Frequency of test: One in-place nuclear density compaction test should be performed for each 1,000 square feet of fill placed, per lift, with a minimum of three tests per lift.
- D. Sub-grade shall be approved by testing lab before backfilling begins.



TYPICAL CROSS SECTION OF STREAM BANK RIP-RAP  
NTS

**EROSION CONTROL AND WATER DIVERSION**

1. ALL EROSION CONTROL MEASURES SHALL BE INSTALLED BY THE CONTRACTOR PRIOR TO THE ADVANCEMENT OF ANY WORK AT THE SITE. THE CONTRACTOR SHALL TAKE SPECIAL CARE TO ENSURE THAT NO SEDIMENTS ENTER THE STREAM DURING CONSTRUCTION.

2. THE CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL TEMPORARY EROSION CONTROL MEASURES AT THE COMPLETION OF THE PROJECT.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING AND MAINTAINING

TEMPORARY RIVER DIVERSION IN ORDER TO ACCOMPLISH THE INSTALLATION OF THE BRIDGE ABUTMENTS AND WING WALLS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SECURING ALL REQUIRED PERMITS PRIOR TO COMMENCING WORK. UPON COMPLETION OF THE WORK THE CONTRACTOR SHALL REMOVE ALL

MATERIALS USED FOR DIVERSION AND RETURN THE STREAM BED TO ITS ORIGINAL CONDITION.

**TEMPORARY EROSION AND SEDIMENT CONTROL**

1. THE SMALLEST PRACTICAL AREA OF LAND SHALL BE DISTURBED AT ANY GIVEN TIME DURING CONSTRUCTION. WHEN LAND IS DISTURBED, THE DISTURBANCE SHALL BE KEPT TO THE SHORTEST PRACTICABLE DURATION.

2. DUST SHALL BE CONTROLLED WITH WATER DISTRIBUTED VIA TRUCK MOUNTED SPRAY BAR.

3. SILT FENCE SHALL BE INSTALLED AS SHOWN ON THE EROSION CONTROL PLAN. SILT FENCE SHALL BE MIRAFI 100X OR EQUIVALENT AND SHALL BE KEYED INTO SOIL A MINIMUM OF 4 INCHES.

4. STOCKPILED SOIL MATERIALS (TOPSOIL, BORROW, ETC.) SHALL HAVE SILT FENCE CONSTRUCTED AROUND PERIMETER. THE STOCKPILE MATERIAL SHALL BE SEEDED AND MULCHED AS SOON AS PRACTICABLE AND BE LOCATED UPHILL OF DISTURBED AREAS WHERE POSSIBLE. DURING WINDY CONDITIONS, STOCKPILED MATERIAL SHALL BE COVERED OR WATERED APPROPRIATELY TO PREVENT WIND EROSION.

5. SLOPES GREATER THAN 3:1 SHALL HAVE EROSION CONTROL NETTING INSTALLED TO STABILIZE THE SLOPE AND REDUCE THE EROSION POTENTIAL. NETTING SHALL BE BIODEGRADABLE WITH 12 MONTH LONGEVITY (S150BN NORTH AMERICAN GREEN MULCH OR EQUIVALENT), PIN SETTING WITH WIRE STAPLES 3 FEET O.C. TO ENSURE FULL BONDING WITH THE SOIL SURFACE. SOIL SURFACE SHALL BE SLIGHTLY ROUGHENED AND NOT SMOOTH. IF LARGE AMOUNTS OF RUNOFF ARE ANTICIPATED OVER SLOPES, TEMPORARY DIVERSION SWALES SHALL BE INSTALLED UP SLOPE UNTIL SLOPE VEGETATION STABILIZES.

**PERMANENT EROSION CONTROL**

1. GRASS LINE SWALES SHALL BE LOAMED, SEEDED, FERTILIZED AND COVERED WITH BIODEGRADABLE EROSION MATTING. AREAS WHICH EXHIBIT SIGNS OF EROSION SHALL BE REPAIRED AND RE-SEEDED IMMEDIATELY AND MAINTAINED UNTIL PERMANENT VEGETATION HAS STABILIZED.

2. WHEN CONSTRUCTION IS COMPLETED IN AN AREA IT SHALL BE IMMEDIATELY LOAMED, SEEDED FERTILIZED AND MULCHED.

3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTINUED MAINTENANCE OF ALL DISTURBED AREAS, INCLUDING WATERING, UNTIL THE AREA IS INSPECTED BY THE OWNER OR ENGINEER AND FOUND TO BE STABILIZED.

4. AFTER THE SITE IS STABILIZED, REMOVE ALL TEMPORARY MEASURES AND INSTALL PERMANENT VEGETATION ON THE DISTURBED AREAS.

5. RE-SEEDING SHALL BE DONE UNTIL ALL AREAS ARE COMPLETELY COVERED WITH A MATURE STRAND OF GRASS. AREAS SHALL BE CONSIDERED COVERED WHEN THE ENTIRE SURFACE CONTAINS A FRESH GROWTH OF GRASS. AREAS THAT, IN THE OPINION OF THE ENGINEER OR OWNER, ARE PREDOMINANTLY WEEDS SHALL BE PLOWED UP, FINE GRADED, FERTILIZED AND RE-SEEDED IN THE MANNER SPECIFIED PREVIOUSLY, EXERCISING CAUTION NOT TO DAMAGE NEW OR EXISTING PLANT MATERIAL.

6. CUT AND FILL SLOPES SHALL BE MAXIMUM OF 2 HORIZONTAL TO 1 VERTICAL EXCEPT IN AREAS OF ROCK EXCAVATION OR AREAS DESIGNATED ON THE PLANS FOR SPECIAL CONSTRUCTION. ROCK MAY BE EXCAVATED TO A MAXIMUM OF 1 HORIZONTAL TO 4 VERTICAL. ALL PERMANENT SLOPES SHALL BE LOAMED, FERTILIZED, SEEDED AND MULCHED AFTER THE AREA IS GRADED AND WITHIN THREE (3) DAYS OF BEING STRIPPED OR EXPOSED.

7. SURFACE AND SEEPAGE WATER SHALL BE DRAINED OR DIVERTED FROM THE SITE. STONES LARGER THAN 4 INCHES AND TRASH THAT WILL INTERFERE WITH SEEDING AND FUTURE MAINTENANCE OF THE ARE SHALL BE REMOVED.

8. A MINIMUM OF 2 TONS OF LIME PER ACRE AND 1,000 POUNDS OF 5-10-10 FERTILIZER PER ACRE SHALL BE WORKED INTO THE TOP 3 TO 4 INCHES OF SOIL IN ORDER TO PREPARE A REASONABLE FIRM AND SMOOTH SEED BED. THE LAST TILLAGE OPERATION SHOULD BE PERFORMED ACROSS THE SLOPE WHENEVER PRACTICAL.

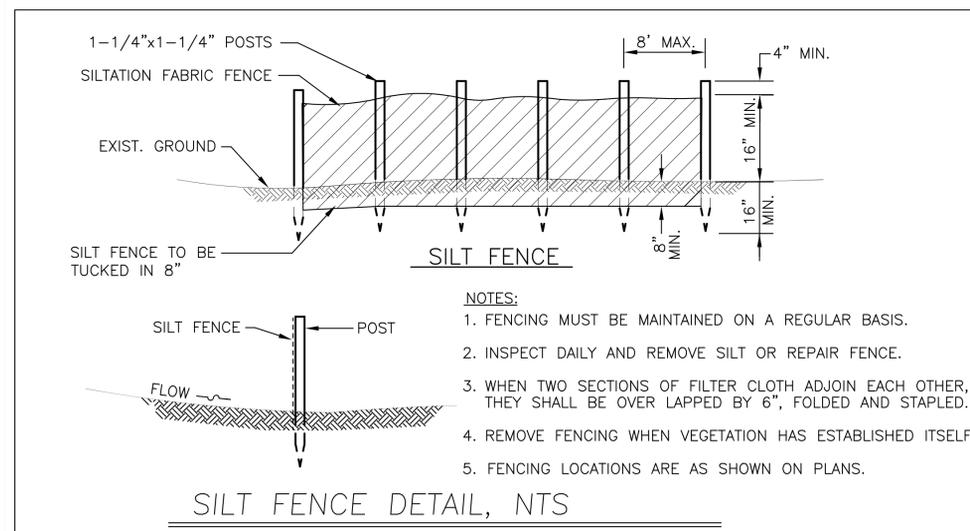
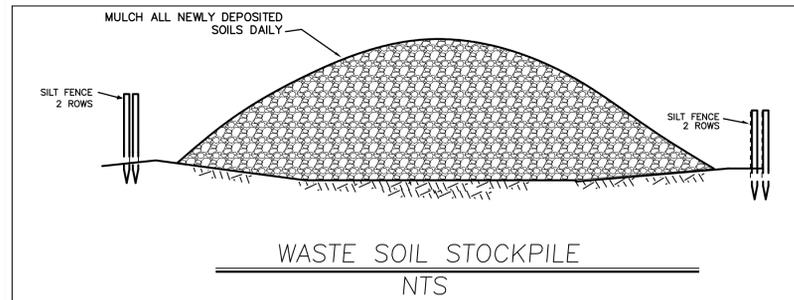
9. SEED SHOULD BE SPREAD UNIFORMLY BY THE METHOD MOST APPROPRIATE FOR THE SITE. METHODS INCLUDE BROADCASTING, DRILLING AND HYDROSEEDING. WHEN BROADCASTING IS USED, COVER SEED WITH 1/2 INCH OF SOIL OR LESS WITH CULTPACKING OR RAKING. REFER TO TABLE 1 FOR APPROPRIATE SEED MIXTURES AND TABLE 2 FOR RATES OF SEEDING. ALL LEGUMES (BIRD'S FOOT TREFLOIL) MUST BE INOCULATED WITH THEIR SPECIFIC INOCULANT.

10. WHERE POSSIBLE, CONSTRUCTION SHALL BE SCHEDULED SO THAT SEEDING CAN TAKE PLACE BETWEEN EARLY SPRING (MAY 1 AND SEPTEMBER 1) SO THAT ALL SEEDED AREAS HAVE A VISIBLE GROWTH BY OCTOBER 1.

11. ALL SEEDED AREAS SHALL BE MULCHED IMMEDIATELY FOLLOWING THE SEEDING OPERATION. FROM THE FOLLOWING MULCH MATERIAL SHALL BE SELECTED BY THE ENGINEER AND APPLIED TO BEST MEET THE NEEDS OF THE SITE.

MIXTURE	Lb/ACRE	Lb/1,000 SQ. FT.
C. TALL FESCUE	20	0.45
CREeping RED FESCUE	20	0.45
BIRD'S FOOT TREFLOIL	8	0.20
TOTAL	48	1.10
D. BIRD'S FOOT TREFLOIL	10	0.25
RED TOP	5	0.10
RED CANARY GRASS	15	0.35
TOTAL	30	0.70

MULCH MATERIALS AND RATES	REMARKS
HAY OR STRAW, 1 TO 1 1/2 TONS PER ACRE 70 TO 90 LBS/ 1,000 SQ. FT.	CAN BE SPREAD BY HAND OR BY MACHINE. MUST BE DRY AND FREE OF MOLD. MAY BE USED WITH PLANTINGS OR FOR EROSION CONTROL ALONE. SUBJECT TO BLOWING AND SLIPPING ON STEEP SLOPES UNLESS ANCHORED.
JUTE AND FIBROUS MATS	USED AS MULCH ESPECIALLY IN AREAS OF CONCENTRATED FLOW. MUST BE CAREFULLY INSTALLED AND ANCHORED. DURABLE. CAN BE USED FOR EROSION CONTROL WITHOUT OTHER MULCHING MATERIALS. THE WATERWAY CHANNEL OR AREA TO BE PROTECTED IS TO BE SHAPED TO REQUIRED SHAPE AND GRADED AND THOROUGHLY COMPACTED BEFORE SEEDED PREPARATION. ROCKS OR CLODS OVER 1 INCHES IN DIAMETER AND STICKS OR OTHER MATERIAL THAT WILL PREVENT CONTACT OF THE FIBER MATTING WITH THE SOIL SURFACE SHOULD BE REMOVED. AFTER SEEDING IS COMPLETED, MATTING SHOULD BE LAID IN DIRECTION OF FLOW AND APPLIED IN ACCORDANCE WITH INSTRUCTION IN EACH ROLL OF MATERIAL. AFTER MATTING IS INSTALLED A CULTPACKER OR SUITABLE IMPLEMENT SHOULD BE ROLLED AT RIGHT ANGLES OVER THE ENTIRE AREA SO AS TO THOROUGHLY FUSE THE MATTING WITH THE SOIL SURFACE.
CRUSHED STONE, 1/4 TO 1 1/2 INCHES IN DIAMETER, SPREAD MORE THAN 1/2 INCH THICK.	EFFECTIVE IN CONTROLLING WIND AND WATER EROSION.



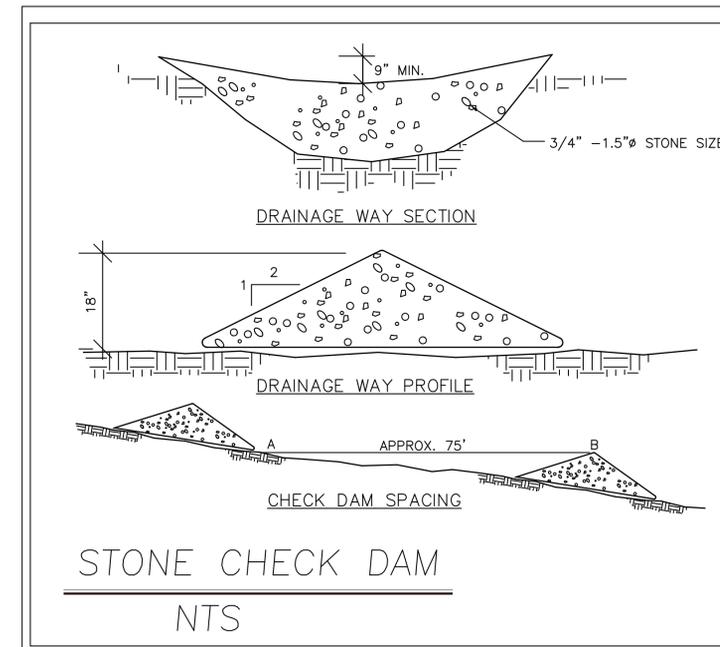
USE	SEEDING MIXTURE
STEEP CUTS AND FILLS	C
WATERWAYS & OTHER CHANNELS WITH FLOWING WATER	C,D

**SLOPE INSTALLATION**

**GENERAL NOTES:**

- PREPARE SOIL BEFORE INSTALLING BLANKETS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER, AND SEED.
- BEGIN AT THE TOP OF THE CHANNEL BY ANCHORING THE BLANKET IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH WITH APPROXIMATELY 12" (30cm) OF BLANKET EXTENDED BEYOND THE UP-SLOPE PORTION OF THE TRENCH. ANCHOR THE BLANKET WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN THE BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" (30cm) PORTION OF BLANKET OVER SEED AND COMPACTED SOIL. SECURE BLANKET OVER COMPACTED SOIL WITH A ROW OF STAPLES/STAKES SPACED APPROXIMATELY 12" (30cm) APART ACROSS THE WIDTH OF THE BLANKET.
- IN CHANNEL APPLICATIONS, ROLL CENTER BLANKET IN DIRECTION OF WATER FLOW IN BOTTOM OF CHANNEL. IN SLOPE APPLICATIONS, ROLL THE BLANKETS (A) DOWN OR (B) HORIZONTALLY ACROSS THE SLOPE. BLANKETS WILL UNROLL WITH APPROPRIATE SIDE AGAINST THE SOIL SURFACE. ALL BLANKETS MUST BE SECURELY FASTENED TO SOIL SURFACE BY PLACING STAPLES/STAKES IN APPROPRIATE LOCATIONS AS SHOWN IN THE STAPLE PATTERN GUIDE. WHEN USING OPTIONAL DOT SYSTEM, STAPLES/STAKES SHOULD BE PLACED THROUGH EACH OF THE COLORED DOTS CORRESPONDING TO THE APPROPRIATE STAPLE PATTERN.
- PLACE CONSECUTIVE BLANKETS END OVER END (SHINGLE STYLE) WITH A 4"-6" (10cm-15cm) OVERLAP. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10cm) APART AND 4" (10cm) ON CENTER TO SECURE BLANKETS.
- FULL LENGTH EDGE OF BLANKETS AT TOP OF SIDE SLOPES MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
- ADJACENT BLANKETS MUST BE OVERLAPPED APPROXIMATELY 2"-5" (5cm-12.5cm) (DEPENDING ON BLANKET TYPE) AND STAPLED. TO ENSURE PROPER SEAM ALIGNMENT, PLACE THE EDGE OF THE OVERLAPPING BLANKET (BLANKET BEING INSTALLED ON TOP) EVEN WITH THE COLORED SEAM STITCH ON THE BLANKET BEING OVERLAPPED.
- IN HIGH FLOW CHANNEL APPLICATIONS, A STAPLE CHECK SLOT IS RECOMMENDED AT 30' TO 40' (9m-12m) INTERVALS. USE A DOUBLE ROW OF STAPLES STAGGERED 4" (10cm) APART AND 4" (10cm) ON CENTER OVER ENTIRE WIDTH OF CHANNEL.
- THE TERMINAL END OF THE BLANKETS MUST BE ANCHORED WITH A ROW OF STAPLES/STAKES APPROXIMATELY 12" (30cm) APART IN A 6" (15cm) DEEP X 6" (15cm) WIDE TRENCH. BACKFILL AND COMPACT THE TRENCH AFTER STAPLING.
- IN LOOSE SOIL CONDITIONS, THE USE OF STAPLE OR STAKE LENGTHS GREATER THAN 6" (15cm) MAY BE NECESSARY TO PROPERLY SECURE THE BLANKETS.

**SOIL STABILIZATION BLANKET, NTS**  
(FOR SLOPES GREATER THAN 3:1)



REVISIONS:

PROJECT:

SHEET TITLE:

SCALE:

DATE:

SHEET

TOWN OF WARDSBORO, VT  
TOWNSHEND DAM RD  
CULVERT REPLACEMENT

EROSION CONTROL  
DETAILS

AS NOTED

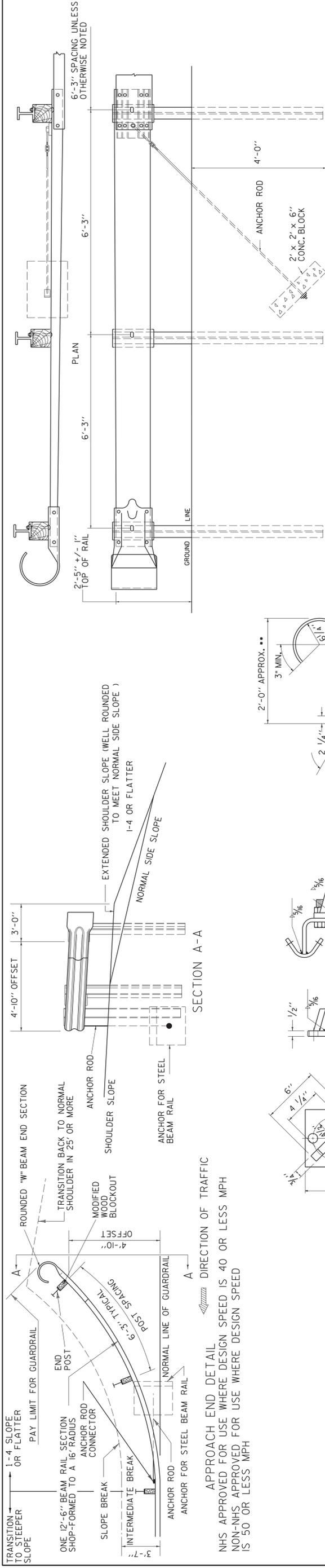
FEBRUARY 5, 2016

C-4



bellengineering@myfairpoint.net





ASSEMBLY ELEVATION

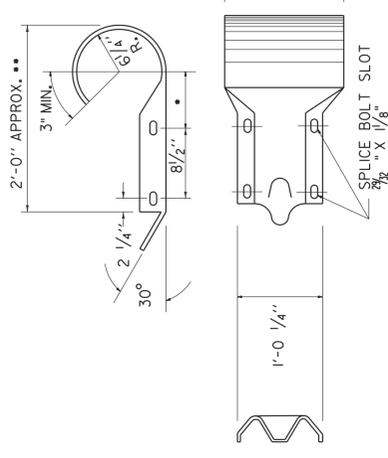
TRAILING END TERMINAL FOR USE ON ONE-WAY HIGHWAYS

GENERAL NOTES:

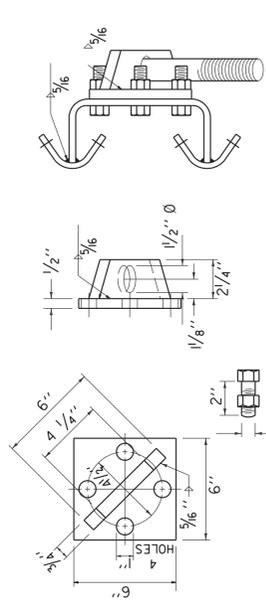
1. ALL METAL PARTS SHALL BE GALVANIZED
2. ALL WOOD POSTS SHALL BE GIVEN A PRESERVATIVE TREATMENT
3. DETAILS PERTINENT TO THE STANDARD INSTALLATION OF "W" BEAM SECTIONS WILL BE FOUND ON STANDARD DRAWING G-1.
4. FOR DESCRIPTION AND SPECIFICATIONS OF PARTS IDENTIFIED BY "PARTS" AND OTHER DETAILS OF POSTS, POST ACCESSORIES, FASTENERS AND RAIL ELEMENTS, SEE FASTENING AND JOINT TASK FORCE NO. 13, TITLED "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE", LATEST EDITION.
5. THE TRANSITION FROM THE APPROACH END TO THE STANDARD STEEL BEAM GUARDRAIL SHALL BE 25'-0" UNLESS OTHERWISE SPECIFIED.
6. WHEN STANDARD STEEL BEAM CONNECTS TO BRIDGE APPROACH RAIL OF A DIFFERENT HEIGHT THE LENGTH NEEDED TO TRANSITION THE HEIGHT OF STANDARD STEEL BEAM TO MATCH THE BRIDGE APPROACH RAIL SHALL BE 25'-0" UNLESS OTHERWISE SPECIFIED.
7. WHEN STANDARD STEEL BEAM CONNECTS TO A MANUFACTURED TERMINAL SECTION OF A DIFFERENT HEIGHT THE LENGTH NEEDED TO TRANSITION THE HEIGHT OF STANDARD STEEL BEAM TO MATCH THE MANUFACTURED TERMINAL SECTION SHALL BE 25'-0" UNLESS OTHERWISE SPECIFIED.

ROUNDED "W" BEAM END SECTION

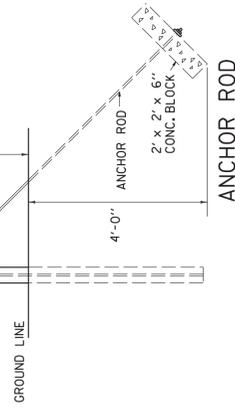
• THIS DIMENSION IS 7/16" IN RE-7-79. IF THE DIMENSION IS USED IN THIS PART, IT WILL GIVE AN ACCEPTABLE OVERALL LENGTH (\*\*) OF APPROXIMATELY 2'-11/2".



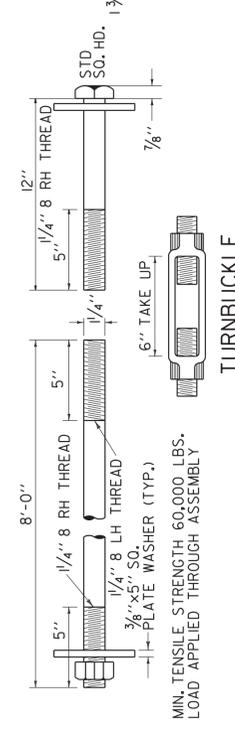
ANCHOR ROD CONNECTOR



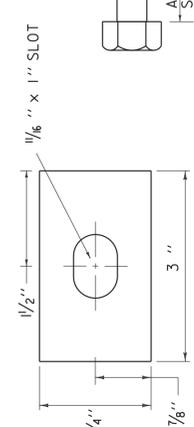
MOD. WOOD BLOCKOUT



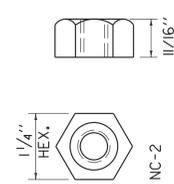
ANCHOR ROD



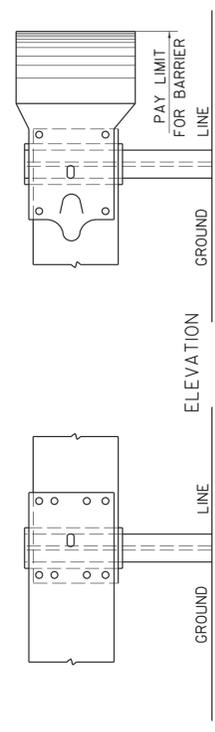
TURNBUCKLE



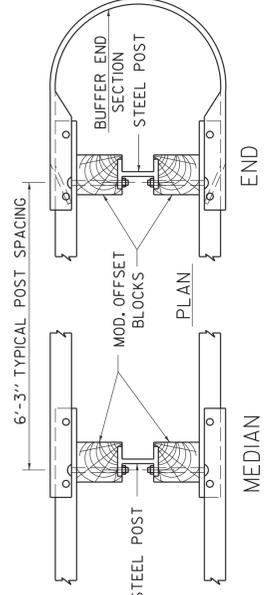
RECTANGULAR GUARDRAIL PLATE WASHER (ARTBA F-12-73)



5/8" HEX NUT AND BOLT "F" (ARTBA F-8-76)



ELEVATION



PLAN

END

MEDIAN

STEEL BEAM MEDIAN BARRIER

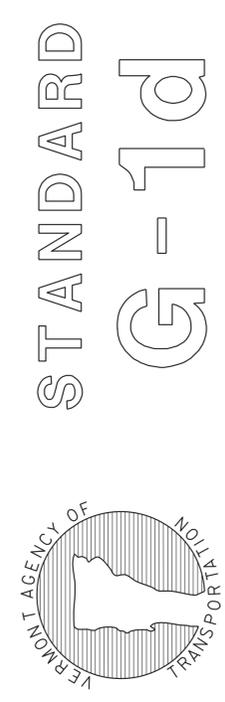
NOTE: TO BE USED OUTSIDE CLEAR ZONE ONLY.

FASTENER DETAILS

REVISIONS AND CORRECTIONS  
 JUNE 1, 1994 - REISSUED, WITHOUT CHANGE, UNDER NEW SIGNATURES.  
 JAN. 3, 2000 - UPDATED TO REFLECT METRIC STD. CHANGES  
 FEB. 10, 2014 - UPDATED TO REFLECT GUARDRAIL HEIGHT OF 29"; AS NOTED IN FHWA LETTER DATED MAY 17, 2010

APPROVED  
  
 HIGHWAY SAFETY & DESIGN ENGINEER  
  
 DIRECTOR OF PROGRAM DEVELOPMENT  
  
 FEDERAL HIGHWAY ADMINISTRATION

STEEL BEAM GUARDRAIL APPROACH END TERMINAL  
 STEEL BEAM GUARDRAIL TRAILING END TERMINAL  
 ANCHOR FOR STEEL BEAM GUARDRAIL  
 STEEL BEAM MEDIAN BARRIER



OTHER STANDARD REQUIRED: G-1