Vermont Department of Environmental Conservation *Agency of Natural Resources*
Watershed Management Division
Springfield Regional Office
100 Mineral Street, Suite 303 [phone] 802-885-8855
Springfield, VT 05156 [fax] 802-885-8890
www.watershedmanagement.vt.gov [cell] 802-345-3510

AUTHORIZATION TO CONDUCT NEXT FLOOD MEASURES

Pursuant to Section F Next Flood Protective Measure of the Vermont Stream Alteration General Permit

Project Number: **NFM-05-014-2016 Farrar Road Culvert**
Applicant Name: Chester Highway Department, Chester, Vermont
Mailing Address: P.O. Box 370, 556 Elm Street, Chester, Vermont 05143
Project Location: Farrar Road over Potash Brook to Williams River

Contact: Graham Kennedy
Phone: (802) 875-2173 or (802) 875-2737
Email: jhchester@vermontel.net

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

1. This project authorizes replacing a 7" dia CMP damaged by T.S. Irene with a 20' x 8'-3" arch plate culvert. The stream bed inside the culvert shall be stabilized with stone & sediments in Appendix M Stream Bed Stone Fill Type E1 stone.
2. The proposed activity is eligible for coverage under the VT ANR Stream Alteration General Permit – Next Flood Protective Measures.
3. The proposed activity will meet the terms and conditions of Section F of the General Permit provided:
   a) The project will be completed and approved as shown on the plans dated April 5, 2016, prepared by Dufresne Group, as approved by the Vermont Agency of Natural Resources as attached herein.
   b) The project is proportional to the threat and conditioned to cease when the threat to life or to improved property has ended.
   c) The project will not result in a threat to life, public health or safety.
   d) The project will meet the standards detailed in subsection C.2.2.4 of the General Permit.
   e) The project will meet Stream Alteration Standards to the greatest extent possible.
   f) A pre-construction meeting is held between the contractor, owner/applicant, and the ANR River Management Engineer.
   g) The 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 1st through October 1st; 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 public access and 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 28th day of June, 2016
Alyssa B. Schuren, Commissioner
Department of Environmental Conservation

This permit expires October 1, 2016.

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

Streambed Stone Fill Design Guidance

Type	Velocity Range (fps)*	Embeddedness (in)
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.

GENERAL NOTES:

1. SURVEY COMPLETED BY DUFRESNE GROUP IN MAY 2015. COORDINATE SYSTEM IS VERMONT STATE PLANE. VERTICAL DATUM IS NAVD88.

2. EXPLORATORY EXCAVATION IS REQUIRED TO LOCATE UNDERGROUND UTILITIES. CONTRACTOR SHALL USE EXTREME CAUTION TO PREVENT DAMAGE TO EXISTING UTILITIES. CONTRACTOR SHALL COORDINATE WITH DIG SAFE (1-888-DIG SAFE) A MINIMUM OF 72 HOURS PRIOR TO EXCAVATION.

4. ALL EXISTING UNDERGROUND UTILITIES WERE LOCATED USING THE BEST AVAILABLE INFORMATION. CONTRACTOR IS RESPONSIBLE FOR PROTECTION OF ALL UTILITIES WHETHER OR NOT THEY ARE SHOWN ON THE PLANS. ALL REPAIRS TO DAMAGED UTILITIES SHALL BE MADE BY THE CONTRACTOR USING MATERIALS APPROVED BY THE ENGINEER PRIOR TO INSTALLATION.

5. CONTRACTOR SHALL VERIFY LOCATION OF ALL OVERHEAD AND UNDERGROUND ELECTRIC, CABLE AND TELEPHONE LINES AND TAKE NECESSARY PRECAUTIONS IN STRICT ACCORDANCE WITH OSHA STANDARDS DURING CONSTRUCTION. CONTRACTOR SHALL CONTACT THE LOCAL POWER UTILITY AND TELEPHONE UTILITY REGARDING ANY NECESSARY SUPPORT OF ANY UTILITY POLES DURING CONSTRUCTION. LOCAL ELECTRIC UTILITY IS GREEN MOUNTAIN POWER. LOCAL PHONE UTILITY IS VERMONT TELEPHONE COMPANY.

7. GENERALLY HEAVY OR DARK LINE WORK OR NOTES REFER TO PROPOSED IMPROVEMENTS. LIGHT LINE WORK OR SCREENED GENERALLY DENOTES EXISTING FEATURES.

9. TECHNICAL SPECIFICATIONS PROVIDE NECESSARY INFORMATION AND ARE PART OF THE CONTRACT DOCUMENTS FOR THIS PROJECT.

8. ALL DISTURBED AREAS SHALL BE RESTORED TO CLASS A RESTORATION UNLESS OTHERWISE SHOWN.

9. THE CONTRACTOR SHALL BE REQUIRED TO STAKE OUT THE CULVERT AND MAINTAIN THE THREE DIMENSIONAL CONTROL OF THE SITE USING A COORDINATE SYSTEM AND ELEVATION THAT EXACTLY COINCIDES WITH THE DESIGN DRAWINGS.

10. THE CONTRACTOR SHALL CONSTRUCT A TEMPORARY STREAM CROSSING UPSTREAM OF THE EXISTING CULVERT AS SHOWN ON THE PLANS. FARRAR ROAD AND POTASH BROOK ROAD TO THE NORTH AND WEST OF THE PROJECT ARE DEAD END ROADS AND CLOSURE OF THE ROAD IS NOT ALLOWED. CONTRACTOR SHALL ERECT SAFETY BARRIERS AND INSTALL ADEQUATE EXCAVATION SUPPORT AS SPECIFIED AND LIMIT CONSTRUCTION ACTIVITIES TO THE CURRENT ACTIVE AREA TO ACCOMMODATE TRAFFIC IMMEDIATELY ADJACENT TO THE WORK AREA. CONTRACTOR SHALL SUBMIT DETOUR AND CONSTRUCTION SIGNAGE PLAN FOR APPROVAL PRIOR TO COMMENCING WORK.

11. CONTRACTOR TO USE EXTREME CAUTION WHEN EXCAVATING NEAR BUILDINGS AND OTHER STRUCTURES. ANY DAMAGE TO BUILDINGS AND STRUCTURES SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER AT NO ADDITIONAL COST TO THE OWNER.

12. THE CONTRACTOR'S EROSION PREVENTION AND SEDIMENT CONTROL MEASURES SHALL COMPLY WITH VERMONT STANDARDS AND SPECIFICATIONS FOR EROSION PREVENTION AND SEDIMENT CONTROL. THE CONTRACTOR SHALL SUBMIT PROPOSED MEASURES TO THE ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.

13. REFER TO CIVIL AND STRUCTURAL DETAILS FOR CONSTRUCTION DETAILS.

14. CONTRACTOR'S STAGING AREA SHALL BE LOCATED WITHIN THE CONSTRUCTION EASEMENT AREAS DESIGNATED ON THESE PLANS.

15. REFER TO SPECIFICATIONS FOR BORING LOGS.

16. ADEQUATE PROTECTION OF THE CULVERT DURING CONSTRUCTION SHALL BE THE SOLE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR SHALL FOLLOW AND COMPLY WITH ALL RECOMMENDATIONS AND REQUIREMENTS OF THE CULVERT MANUFACTURER INCLUDING, MAINTENANCE AND INSTALLING ADDITIONAL FILL OVER THE CULVERT TO PROTECT THE CULVERT FROM CONSTRUCTION LOADS.

17. ALL CONSTRUCTION ACTIVITIES SHALL BE CONFINED TO THE PUBLIC RIGHT-OF-WAY OR EASEMENT AREAS.

ABBREVIATION LIST

APPROX	APPROXIMATELY
BVCS	BEGINNING VERTICAL CURVE STATION
BVCE	BEGINNING VERTICAL CURVE ELEVATION
CL	CENTER LINE
CMP	CORRUGATED METAL PIPE
DIA	DIAMETER
ED	EDGE
ELEV	ELEVATION
EVCS	END VERTICAL CURVE STATION
EVCE	END VERTICAL CURVE ELEVATION
GND	GROUND
H	HORIZONTAL
INV	INVERT
OHW	OVERHEAD WIRE
PL	PROPERTY LINE
PT	POINT
PVI	POINT OF VERTICAL INTERSECITON
ROW	RIGHT-OF-WAY
STA	STATION
TBM	TEMPORARY BENCH MARK
TYP	TYPICAL
UG	UNDERGROUND
UP	UTILITY POLE
W	WATER LINE
V	VERTICAL
K	RATE OF VERTICAL CURVATURE

LEGEND

EXISTING:

500	MAJOR CONTOUR
499	MINOR CONTOUR
	RIGHT-OF-WAY
	EDGE OF GRAVEL ROAD/DRIVE
P-1	BORING LOCATION
	CENTERLINE OF ROAD
T	BURIED TELEPHONE
	STREAM FLOW DIRECTION
	EDGE OF STREAM
	WETLAND

PROPOSED:

	NEW REINFORCED CONCRETE WALL WITH FOOTING
	STONE FILL
	GROUT
	CONCRETE STEM WALL/FOOTING
	CRUSHED STONE
	GRAVEL
500	MAJOR CONTOUR
498	MINOR CONTOUR
SF	SILT FENCE
	PROJECT DELINEATION FENCE
	DIVERSION SWALE
	GUARDRAIL

BID DOCUMENTS

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STATE OF VERMONT
TIMOTHY P. KNAPP
NO. 50793
LICENSED PROFESSIONAL ENGINEER
4-4-16

REVISIONS

DATE	COMMENTS	BY

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FARRAR ROAD
CULVERT REPLACEMENT #1

GENERAL NOTES, LEGEND AND EXISTING CONDITIONS

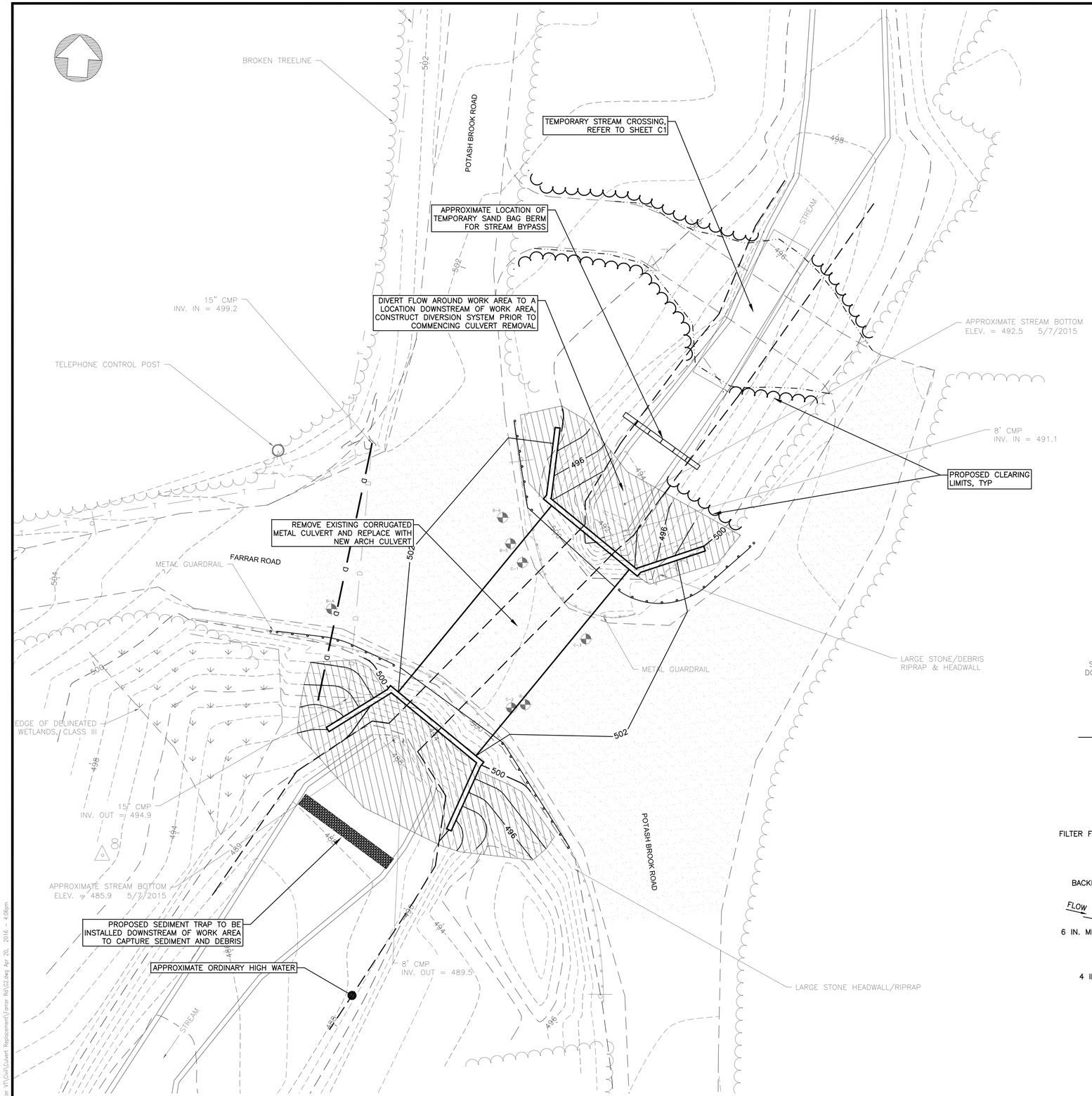
CHESTER, VERMONT

Project #	---
Project Mgr.	TPK
Design by	NRJ
Drawn by	TPK
Reviewed by	NRJ
Approved by	TPK
Date	APRIL 5, 2016
Scale	AS SHOWN

G1

SHEET 1 OF 9

FILE: W:\CADD Files\Chester VT\Civil\Culvert Replacement\Farrar Rd\G1.dwg Apr 20, 2016 - 3:40pm

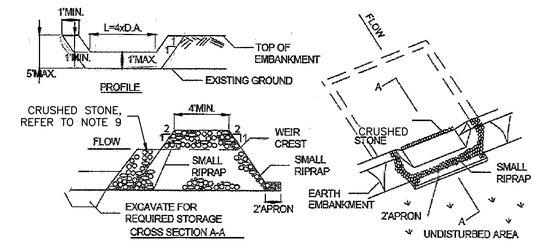


EROSION CONTROL AND SEDIMENT PREVENTION PLAN

SCALE: 1"=10'

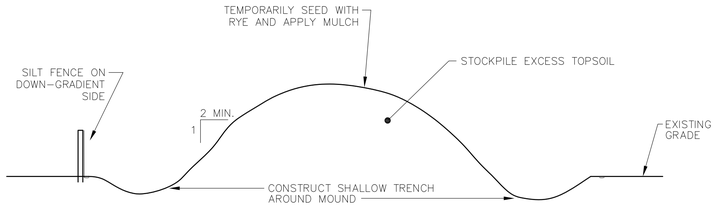
GENERAL NOTES:

1. ANY WATER FROM DEWATERING OR STREAM BYPASS SHALL BE TREATED WITH A SEDIMENT TRAP PRIOR TO ENTERING THE STREAM CHANNEL.
2. CONTRACTOR SHALL SUBMIT PLAN FOR STREAM DIVERSION AND TEMPORARY STREAM CROSSING TO ENGINEER FOR APPROVAL PRIOR TO CONDUCTING IN–STREAM WORK. IT IS ANTICIPATED THAT BYPASS PUMPING WILL BE USED DURING CONSTRUCTION OF THE NEW CULVERT.
3. ADDITIONAL EROSION CONTROL AND SEDIMENT PREVENTION MEASURES, SUCH AS SILT FENCE AND STABILIZATION MAY BE REQUIRED DURING CONSTRUCTION AND WILL BE PROVIDED BY THE CONTRACTOR. CONTRACTOR SHALL FOLLOW ALL REQUIREMENTS AND RECOMMENDATION LISTED IN THE VERMONT LOW RISH SITE HANDBOOK FOR EROSION PREVENTION AND SEDIMENT CONTROL.
4. REFER TO CIVIL SHEETS FOR ADDITIONAL CULVERT AND UTILITY DETAILS.
5. INSTALL SILT FENCE AROUND SOIL STOCK PILES AND ALONG CONTOURS AT BASE OF DISTURBED AREAS. ACTUAL LOCATIONS TO BE FIELD DETERMINED.



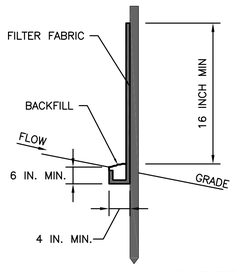
STONE OUTLET SEDIMENT TRAP CONSTRUCTION SPECIFICATIONS:

1. AREA UNDER EMBANKMENT SHALL BE CLEARED, GRUBBED, AND STRIPPED OF ANY VEGETATION AND ROOT MATERIAL. THE POOL AREA SHALL BE CLEARED.
2. THE FILL MATERIAL FOR THE EMBANKMENT SHALL BE FREE OF ROOTS AND OTHER WOODY VEGETATION AS WELL AS OVER–SIZED STONES, ROCKS, ORGANIC MATERIAL, OR OTHER OBJECTIONABLE MATERIAL. THE EMBANKMENT SHALL BE COMPACTED BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
3. ALL CUT AND FILL SLOPES SHALL BE 2:1 OR FLATTER.
4. THE STONE USED IN THE OUTLET SHALL BE SMALL RIP RAP (TYPE I STONE FILL) WITH A 1 FOOT THICKNESS OF 2" AGGREGATE (WASHED CRUSHED STONE) PLACED ON THE UP–GRADE SIDE ON THE SMALL RIP RAP OR EMBEDDED FILTER CLOTH IN THE RIP RAP.
5. SEDIMENT SHALL BE REMOVED AND TRAP RESTORED TO ITS ORIGINAL DIMENSIONS WHEN THE SEDIMENT HAS ACCUMULATED TO 1/2 THE DESIGN DEPTH OF THE TRAP. IT SHALL BE PLACED ON SITE AND STABILIZED.
6. THE STRUCTURE SHALL BE INSPECTED AFTER EACH RAIN AND AS REQUIRED BY THE ENGINEER.
7. CONSTRUCTION OPERATIONS SHALL BE CARRIED OUT IN SUCH A MANNER THAT EROSION AND SEDIMENT ARE CONTROLLED.
8. THE STRUCTURE SHALL BE REMOVED AND THE AREA STABILIZED WHEN THE DRAINAGE AREA HAS BEEN PROPERLY STABILIZED.
9. A ONE FOOT LAYER OF CRUSHED STONE MAY BE PLACED ON THE UPSTREAM SIDE OF THE RIP RAP IN PLACE OF THE EMBEDDED FILTER CLOTH.



TOPSOIL STOCKPILE MOUND

NOT TO SCALE



SLOPE STEEPNESS (H:V)	MAXIMUM SLOPE LENGTH BETWEEN SILT FENCE ROWS (FEET)
2:1	25
3:1	50
4:1	75
5:1 OR FLATTER	100

SILT FENCE INSTALLATION DETAIL

NOT TO SCALE

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4-4-16

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DATE	COMMENTS	BY

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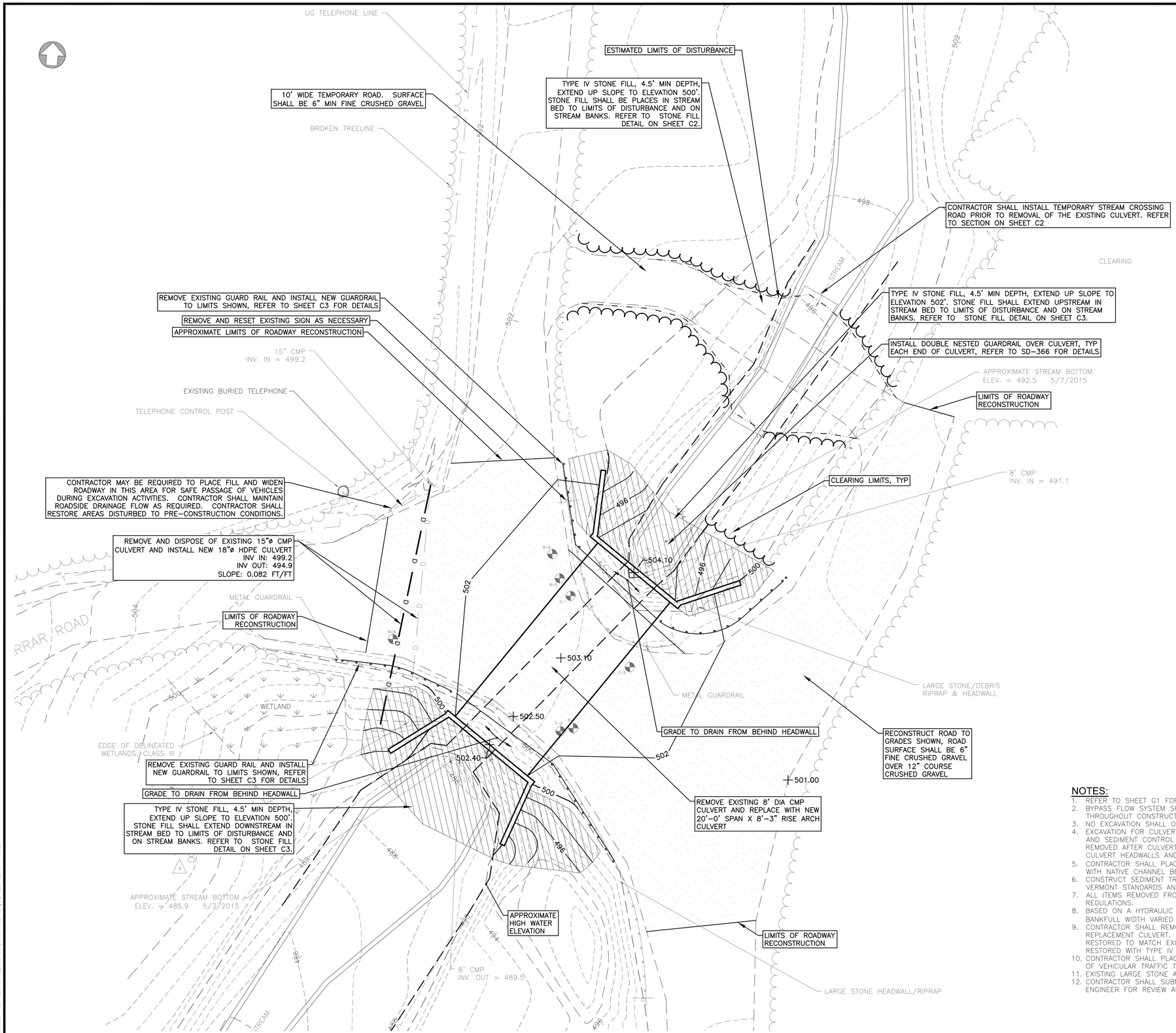
FARRAR ROAD CULVERT REPLACEMENT #1

EROSION CONTROL AND SEDIMENT PREVENTION PLAN

CHESTER, VERMONT

Project #	---
Project Mgr.	TPK
Design by	ADM
Drawn by	ADM
Reviewed by	NRJ
Approved by	TPK
Date	APRIL 5, 2016
Scale	AS SHOWN

G2



CULVERT PLAN

SCALE: 1"=10'

NOTES:

1. REFER TO SHEET G1 FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS.
2. BYPASS FLOW SYSTEM SHALL BE IN PLACE TO MAINTAIN FLOW TO DOWNSTREAM CHANNEL THROUGHOUT CONSTRUCTION. REFER TO SHEET G2.
3. NO EXCAVATION SHALL OCCUR IN FREE FLOWING WATER.
4. EXCAVATION FOR CULVERT REPLACEMENT WORK SHALL NOT COMMENCE UNTIL EROSION PREVENTION AND SEDIMENT CONTROL SYSTEMS AND BYPASS SYSTEMS ARE IN PLACE. BYPASS SYSTEM SHALL BE REMOVED AFTER CULVERT CONSTRUCTION. GRADE AREA FOR POSITIVE DRAINAGE AWAY FROM CULVERT HEADWALLS AND WINGWALLS.
5. CONTRACTOR SHALL PLACE A 4.5' DEEP LAYER INSIDE THE CULVERT OF TYPE IV STONE FILL MIXED WITH NATIVE CHANNEL BED MATERIAL.
6. CONSTRUCT SEDIMENT TRAP AT DOWNSTREAM END OF CONSTRUCTION AREA IN ACCORDANCE WITH VERMONT STANDARDS AND SPECIFICATIONS FOR EROSION PREVENTION AND SEDIMENT CONTROL.
7. ALL ITEMS REMOVED FROM THE PROJECT AREA SHALL BE DISPOSED OF IN ACCORDANCE WITH STATE REGULATIONS.
8. BASED ON A HYDRAULIC STUDY COMPLETED BY VTRANS DATED OCTOBER 23, 2014 MEASURED BANKFULL WIDTH VARIED BETWEEN 22' TO 25' UPSTREAM AND 25' DOWNSTREAM.
9. CONTRACTOR SHALL REMOVE TEMPORARY STREAM CROSSING AFTER COMPLETION OF THE PERMANENT REPLACEMENT CULVERT. THE AREAS DISTURBED FOR THE TEMPORARY CROSSING SHALL BE RESTORED TO MATCH EXISTING TOPOGRAPHY. DISTURBED STREAM BED AND SLOPES SHALL BE RESTORED WITH TYPE IV STONE FILL PER DETAIL ON SHEET C3.
10. CONTRACTOR SHALL PLACE ANY NECESSARY BARRIERS, FENCING, OR SIGNS FOR THE SAFE DETOUR OF VEHICULAR TRAFFIC THROUGH THE TEMPORARY ROAD.
11. EXISTING LARGE STONE AT INLET AND OUTLET HEADWALLS AND SLOPE NOT SHOWN FOR CLARITY.
12. CONTRACTOR SHALL SUBMIT TEMPORARY STREAM BYPASS AND STREAM CROSSING PLAN TO THE ENGINEER FOR REVIEW AND APPROVAL.

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4.4.16

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FARRAR ROAD
CULVERT REPLACEMENT #1

CULVERT SITE PLAN

CHESTER, VERMONT

Project #	---
Project Mgr.	TPK
Design by	NRJ
Drawn by	TPK
Reviewed by	NRJ
Approved by	NRJ
Date	APRIL 5, 2016
Scale	AS SHOWN

C1

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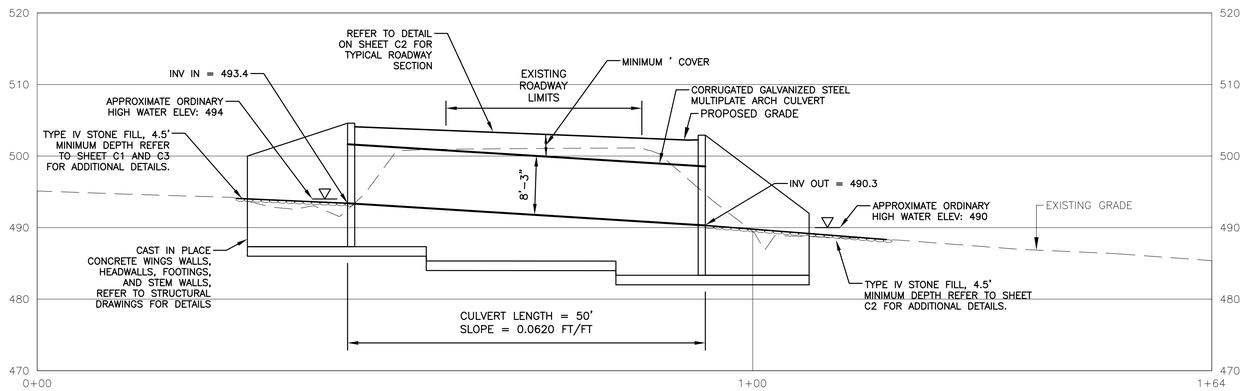
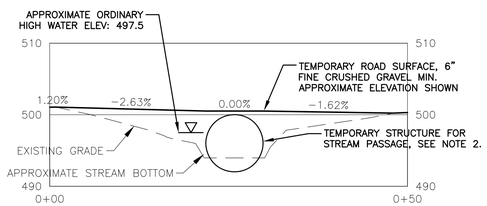


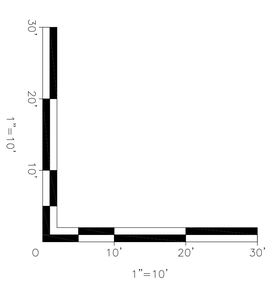
BOX CULVERT PROFILE

SCALE: 1"=10' H/V



TEMPORARY STREAM CROSSING SECTION

SCALE: 1"=10' H/V



NOTES:

1. REFER TO SHEET G1 FOR GENERAL NOTES, LEGEND, AND ABBREVIATIONS.
2. PROVIDE TEMPORARY STRUCTURE, WITH 8' MINIMUM SPAN LENGTH, SLOPE TO MATCH STREAM BOTTOM, LENGTH AS REQUIRED. AN 8' DIAMETER CULVERT SHOWN AS EXAMPLE. ADJUST COVER OVER STRUCTURE TO MEET MANUFACTURER MINIMUM.

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4.4.16

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FARRAR ROAD
CULVERT REPLACEMENT #1

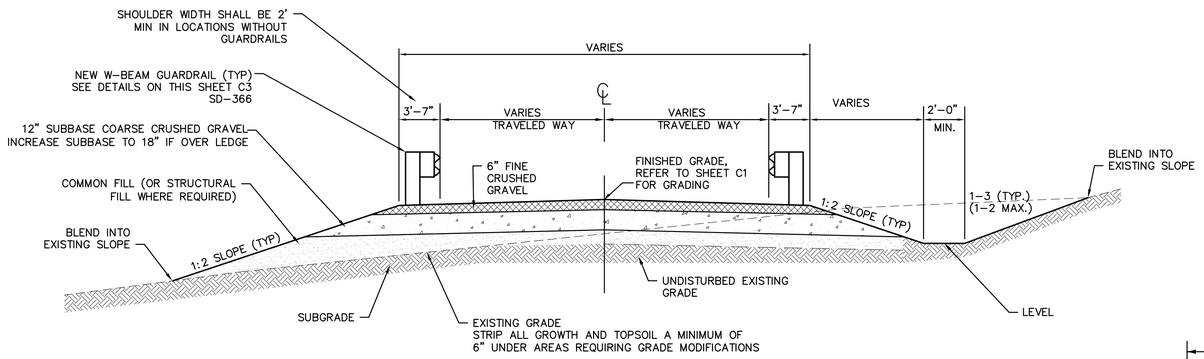
CULVERT PROFILE AND TEMPORARY STREAM CROSSING SECTION

CHESTER, VERMONT

Project #	---
Project Mgr.	TPK
Design by	NRJ
Drawn by	TPK
Reviewed by	NRJ
Approved by	NRJ
Date	APRIL 5, 2016
Scale	AS SHOWN

C2

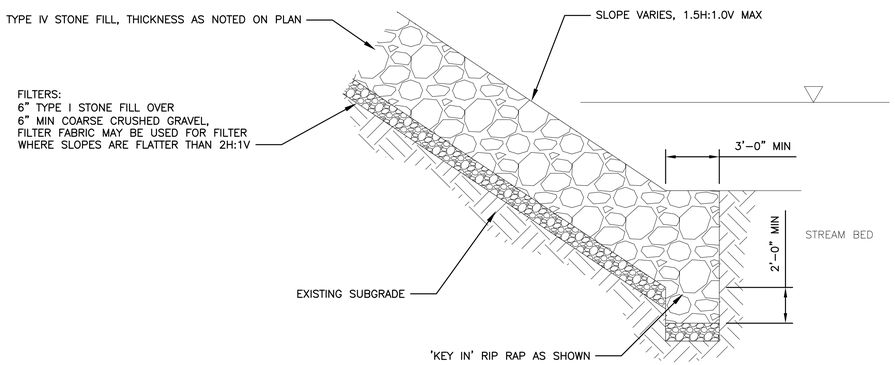
FILE: W:\CADD Files\Chester VT\Civil\Culvert Replacement\Farrar Rd\C1.dwg Apr 20, 2016 - 4:07pm



TYPICAL ROAD SECTION

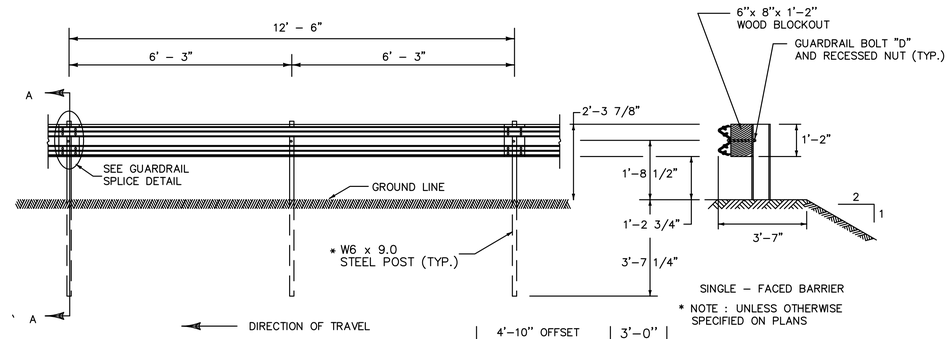
NOT TO SCALE

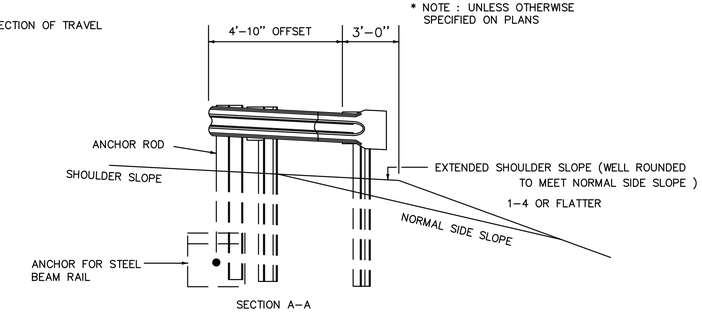
1. TYPICAL FOR TOWN ROAD WITHIN PROJECT SITE.
2. SHOULDER SHALL BE 6" FINE CRUSHED GRAVEL OVER, 12" COARSE CRUSHED GRAVEL.



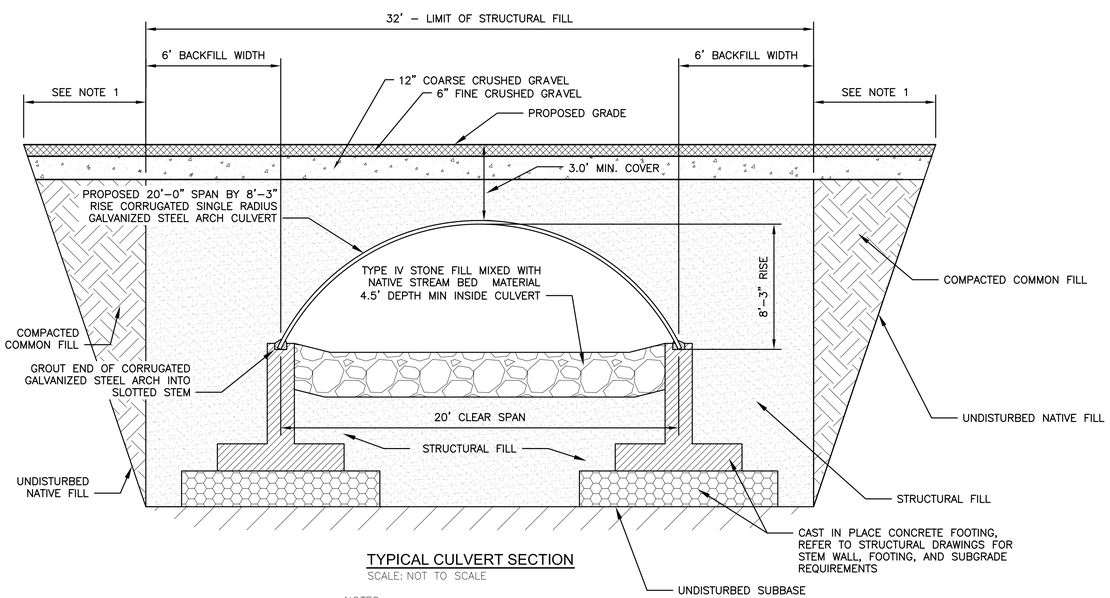
STONE FILL DETAIL

SCALE: NOT TO SCALE





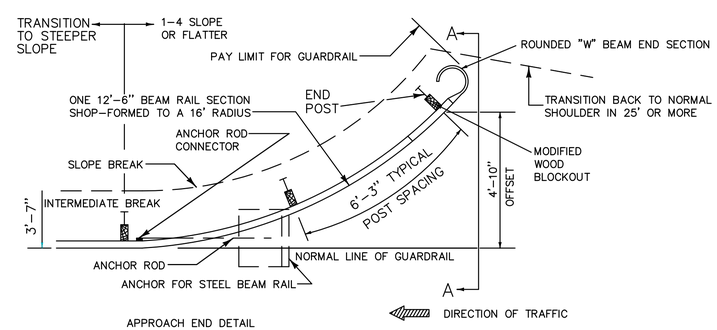
SECTION A-A



TYPICAL CULVERT SECTION

SCALE: NOT TO SCALE

NOTES:
1. WHERE BACKFILL WIDTH OF COMMON FILL IS NOT AGAINST UNDISTURBED NATIVE FILL, MINIMUM WIDTH OF COMPACTED COMMON FILL SHALL BE 5.25'



APPROACH END DETAIL

NHS APPROVED FOR USE WHERE DESIGN SPEED IS 40 OR LESS MPH

NON-NHS APPROVED FOR USE WHERE DESIGN SPEED IS 50 OR LESS MPH

STEEL W-BEAM GUARD RAIL

SCALE: NOT TO SCALE

1. PROVIDE DOUBLE NESTING OF W-BEAMS OVER CULVERT, PLACE WOOD POSTS AT 18'-9" O.C. MAXIMUM AND EXTEND NESTING 6'-3" BEYOND CENTER OF POST.

BID DOCUMENTS

DO NOT REVISE

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Dufresne Group is owned by Dufresne & Associates, PC

STATE OF VERMONT
TIMOTHY P. KNAPP
NO. 50793
LICENSED PROFESSIONAL ENGINEER
4.4.16

REVISIONS

DATE	COMMENTS	BY

THIS DRAWING SHALL NOT BE REUSED OR ALTERED IN ANY WAY WITHOUT THE WRITTEN APPROVAL AND AUTHORITY OF DUFRESNE GROUP. ANY REVISIONS SHALL BE MADE BY DUFRESNE GROUP.

FARRAR ROAD
CULVERT REPLACEMENT #1

TYPICAL DETAILS

CHESTER, VERMONT

Project #	---
Project Mgr.	TPK
Design by	ADM
Drawn by	ADM
Reviewed by	NRJ
Approved by	TPK
Date	APRIL 5, 2016
Scale	AS SHOWN

C3

FILE: W:\2400 Finch\Chester VT\Civil\Culvert Replacement\Farrar Rd\Details dwg Apr 20, 2016 - 3:41pm

1. GENERAL NOTES

1. IN THE CASE OF A CONFLICT BETWEEN THE DRAWINGS OR NOTES ON THE DRAWINGS, THE ENGINEER SHALL BE NOTIFIED TO RESOLVE THE DISCREPANCY.

2. IF DEVIATIONS OR CHANGES FROM TO THE DESIGN AND SHOP DRAWINGS ARE REQUIRED DUE TO INTERFERENCES, FABRICATION ERRORS, OR OTHER CAUSES, THE ENGINEER SHALL BE NOTIFIED. SUBMIT ANY PROPOSED CHANGES TO THE ENGINEER FOR REVIEW PRIOR TO MAKING CHANGES.

2. FOUNDATION RELATED EARTHWORK

EXCAVATION

1. EXCAVATE SUBSOIL TO ACCOMMODATE FOUNDATIONS. HAND TRIM EXCAVATIONS. REMOVE LOOSE MATERIAL.

2. NOTIFY ENGINEER A MINIMUM OF 24 HOURS PRIOR TO EXCAVATIONS TO SCHEDULE A REVIEW OF NATIVE SOIL OR LEDGE CONDITIONS. FOOTINGS HAVE BEEN DESIGNED FOR A MINIMUM NOMINAL BEARING RESISTANCE OF 5000 PSF, BASED ON PRESUMPTIVE BEARING VALUES (AASHTO TABLE C10.6.2.6.1-1).

3. COMPACT DISTURBED LOAD BEARING SOIL IN DIRECT CONTACT WITH FOUNDATIONS TO ORIGINAL BEARING CAPACITY. PLACE A MINIMUM OF 18 INCHES OF CRUSHED STONE BENEATH SPREAD FOOTINGS IF STANDING WATER OR CLAY SOILS ARE ENCOUNTERED IN EXCAVATIONS.

4. IF OVER-EXCAVATION OCCURS, REPLACE MATERIAL WITH SUITABLE WELL-DRAINED MATERIAL, IN 6 INCH LIFTS, APPROVED BY THE ENGINEER AND COMPACTED TO 95% OF MODIFIED PROCTOR.

5. PROTECT THE SITE AND ALL CONSTRUCTION, EXISTING AND PROPOSED, FROM THE EFFECTS OF FREEZING OR FROST ACTION.

SUBMITTALS FOR REVIEW:

1. SUBMIT SIEVE ANALYSIS AND STANDARD MOISTURE-DENSITY CURVE FOR EACH BACKFILL MATERIAL. RESUBMIT WHENEVER A NEW PIT OR SUBSTANTIALLY DIFFERENT MATERIAL IS USED.

BACKFILL AND COMPACTION

1. PLACE AND COMPACT BACKFILL IN EQUAL CONTINUOUS LAYERS NOT EXCEEDING 8" OF COMPACTED DEPTH FOR HAND HELD COMPACTION EQUIPMENT AND A MAXIMUM OF 12" INCHES COMPACTED DEPTH FOR VIBRATORY ROLLERS.

2. MAINTAIN OPTIMUM MOISTURE CONTENT OF BACKFILL MATERIALS TO ATTAIN COMPACTION DENSITY.

3. COMPACTION TESTING SHALL BE PERFORMED IN ACCORDANCE WITH ASTM D2922, TEST METHODS FOR SOIL BY NUCLEAR METHODS. MAXIMUM DENSITY SHALL BE DETERMINED BY THE MODIFIED PROCTOR METHOD, ASTM D1557.

BACKFILL REQUIREMENTS:

1. BACKFILL ALONG RETAINING WALLS:
a. MATERIAL: GRANULAR BACKFILL, SUITABLE NATIVE SOIL
b. COMPACTION: 95% MODIFIED PROCTOR

2. BELOW FOOTINGS:
a. MATERIAL: CRUSHED STONE, GRANULAR BACKFILL
b. COMPACTION: 95% MODIFIED PROCTOR
c. TESTING: EVERY 1000 SF

MATERIALS:

1. GRANULAR BACKFILL: SEE SPECIFICATIONS

2. CRUSHED STONE: SEE SPECIFICATIONS

3. SUITABLE NATIVE SOIL: ON SITE SAND OR GRAVEL REASONABLY FREE OF LOAM, SILT, CLAY, OR ORGANIC MATTER.

3. CAST-IN-PLACE CONCRETE

1. CODES AND STANDARDS: COMPLY WITH THE PROVISIONS OF THE LATEST EDITIONS OF:
a. ACI 318 "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE"
b. ACI 301 "SPECIFICATIONS FOR STRUCTURAL CONCRETE"
c. ACI 305 "HOT WEATHER CONCRETING"
d. ACI 306 "STANDARD SPECIFICATION FOR COLD WEATHER CONCRETING"
e. ACI 308 "STANDARD PRACTICE FOR CURING CONCRETE"
f. AASHTO 2010 LRFD "BRIDGE DESIGN SPECIFICATIONS, FIFTH EDITION"

2. PRIOR TO PLACEMENT OF CONCRETE, SUBMIT TO ENGINEER MIX DESIGN INCLUDING TECHNICAL DATA SHEETS ON ANY ADMIXTURES TO BE USED.

3. CONCRETE TESTING: THE CONTRACTOR SHALL PREPARE A SET OF 4 CYLINDERS/TEST SET TO BE TESTED AT AN INDEPENDENT LABORATORY. THE CYLINDERS SHALL BE TAKEN FROM ONE CONCRETE TRUCK AND LABELED WITH DATE, TRUCK NUMBER, AND LOCATION OF CONCRETE PLACEMENT. EACH SAMPLE SHALL ALSO BE TESTED FOR SLUMP, AIR CONTENT, AND TEMPERATURE. THE CYLINDERS SHALL BE TESTED AS FOLLOWS: 1 AT 7 DAYS; 2 AT 28 DAYS; AND A THIRD HELD FOR A 56 DAY BREAK IF REQUIRED. TEST CYLINDERS SHALL BE TAKEN AT LEAST ONCE PER PLACEMENT OR EVERY 50 CUBIC YARDS.

4. FIELD TESTING SHALL BE PERFORMED BY A GRADE I ACI FIELD TESTING TECHNICIAN.

5. FIELD TESTING TO BE PAID FOR BY OWNER.

6. SUBMIT MIX DESIGN AND EITHER TRIAL MIX DESIGNS OR HISTORIC FIELD DATA FOR APPROVAL IN ACCORDANCE WITH ACI 318, CHAPTER 5.

7. COMPRESSIVE STRENGTH AT 28 DAYS: 5,000 PSI

8. TRANSIT MIX SHALL CONFORM TO ASTM C94.

9. MAXIMUM AGGREGATE SIZE SHALL BE 3/4".

10. SLUMP: 3" TO 5".

11. AIR ENTRAINMENT OF 4 TO 6% BY VOLUME.

12. NO CHLORIDE OR OTHER UNAUTHORIZED ADMIXTURES SHALL BE USED.

13. PLACE NO CONCRETE WHEN AMBIENT TEMPERATURE IS BELOW 40 DEGREES FAHRENHEIT OR MORE THAN 90 DEGREES FAHRENHEIT.

14. COMPLY WITH ACI CODES AND PLACE CONCRETE IN A CONTINUOUS OPERATION WITHIN PLANNED JOINTS OR SECTIONS. DO NOT PERMIT COLD JOINTS TO OCCUR.

15. CURING: BEGIN INITIAL CURING AS SOON AS FREE WATER HAS DISAPPEARED FROM EXPOSED SURFACES. WHERE POSSIBLE, KEEP CONTINUOUSLY WET FOR 72 HOURS. CONTINUE CURING BY USE OF MOISTURE RETAINING COVER OR MEMBRANE-FORMING CURING COMPOUND.

3. CAST-IN-PLACE CONCRETE (CONTINUED)

16. GROUT: PRE-MIXED, NON-SHRINK GROUT, MEETING THE REQUIREMENTS OF VAOT 707.03.

17. NO CONCRETE SHALL BE DROPPED MORE THAN 4 FEET INSIDE A FORM.

18. CHAMFER ALL EXPOSED EDGES $\frac{3}{4}$".

19. COAT ALL EXPOSED SURFACES WITH SILANE 40 WATER REPELLANT.

CONCRETE FORMWORK

1. CONCRETE FORMS SHALL BE CLEAN AND FREE FROM DEBRIS. IF FORMS ARE COATED WITH A RELEASE AGENT, THE RELEASE AGENT SHALL BE COLORLESS MINERAL OIL WHICH SHALL NOT STAIN CONCRETE OR ABSORB MOISTURE OR IMPAIR NATURAL BONDING OF CONCRETE.

2. SOAK INSIDE SURFACE OF UNTREATED FORMWORK WITH WATER PRIOR TO USE.

3. DO NOT DAMAGE CONCRETE DURING FORM STRIPPING.

4. PROVIDE BRACING TO ENSURE STABILITY OF FORMWORK.

5. DO NOT REMOVE FORMS OR BRACING UNTIL CONCRETE HAS GAINED SUFFICIENT STRENGTH TO CARRY ITS OWN WEIGHT AND IMPOSED LOADS.

CONCRETE REINFORCING

1. SHOP DRAWINGS SHALL BE PROVIDED PRIOR TO START OF CONCRETE PLACING. INDICATE BAR SIZES, SPACING, LOCATION, LAPS, AND QUANTITIES.

2. REINFORCING STEEL SHALL BE ASTM A615, GRADE 60.

3. CHAIRS AND SPACERS SHALL BE PLACED TO ADEQUATELY SUPPORT REINFORCING DURING PLACEMENT. FOREIGN MATERIALS SUCH AS WOOD OR OTHER UNSUITABLE SUPPORTS SHALL NOT BE USED TO SUPPORT REINFORCING. SET WIRE TIES SO ENDS ARE DIRECTED INTO CONCRETE WHERE CONCRETE WILL BE EXPOSED.

4. CONCRETE CLEAR COVER FOR REINFORCEMENT (UNLESS SHOWN OTHERWISE):
a. TOP OF BRIDGE DECK, BOTTOM OF FOOTINGS: 3".
b. ALL OTHER LOCATIONS: 2".

4. STRUCTURAL STEEL PLATE CULVERT

1. SEE SPECIFICATION SECTION 02641.

5. DRAWING LEGEND

NOTE: NOT ALL SYMBOLS AND NOTATIONS USED

N	NORTH ARROW
	ELEVATION
[98'-0"]	TOP OF FOOTING ELEV.
1 / S2.1	SECTION NUMBER / DRAWING WHERE SHOWN
DECK SPAN	DECK SPAN DIRECTION OR GRATING DIRECTION
1/8" / FT	SLOPE DIRECTION, and MAGNITUDE
	CONCRETE
	GROUT or FINE CRUSHED GRAVEL
	LEDGE/ROCK
	CRUSHED STONE
	COMPACTED GRANULAR/NATIVE FILL
	UNDISTURBED SUBGRADE

STATE OF VERMONT
WILLIAM A. NOURSE
NO. 74452
Structural II
LICENSED
PROFESSIONAL ENGINEER
4/7/2016

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REVISIONS		
DATE	COMMENTS	BY

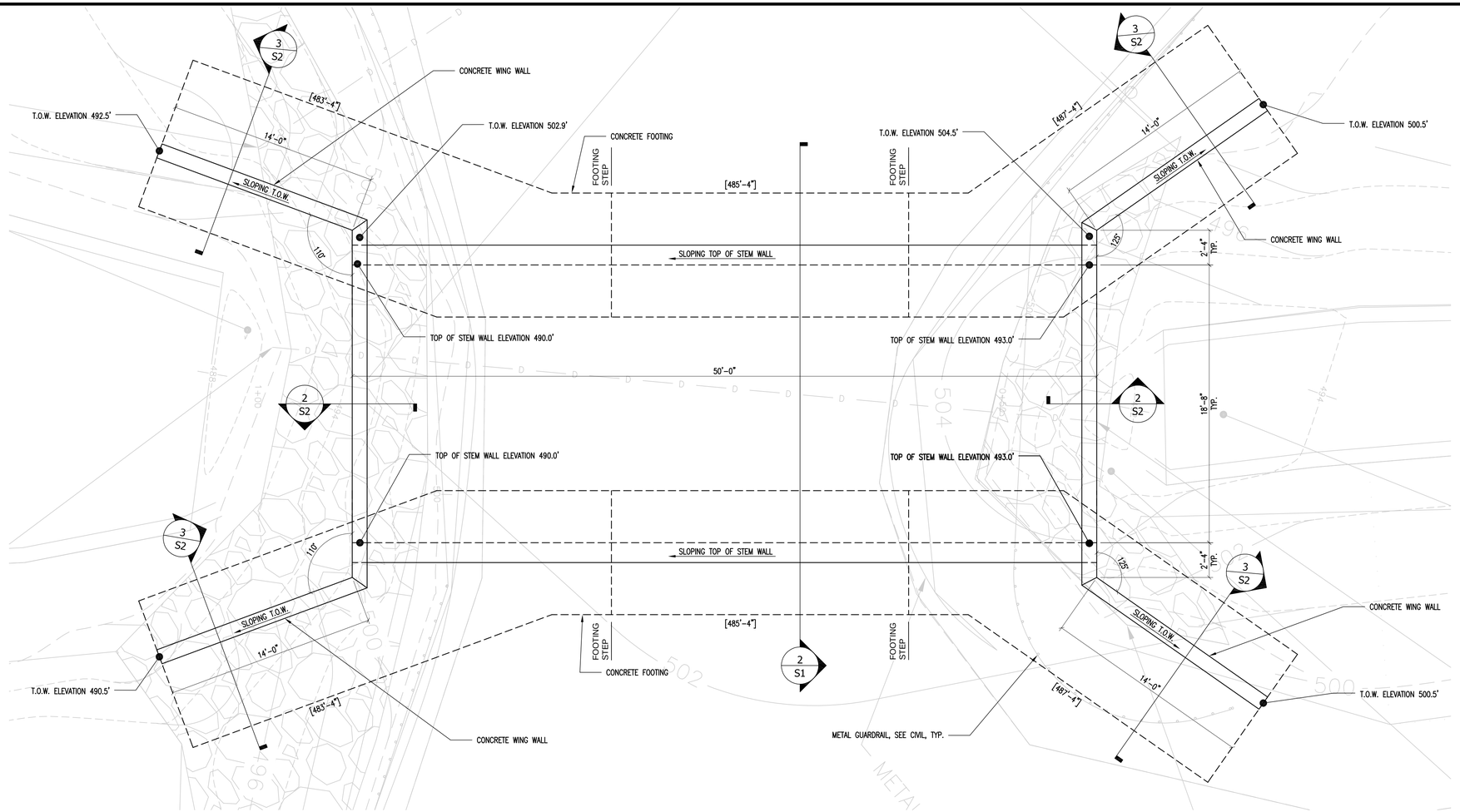
FARRAR ROAD CULVERT REPLACEMENT #1

GENERAL NOTES

CHESTER, VERMONT

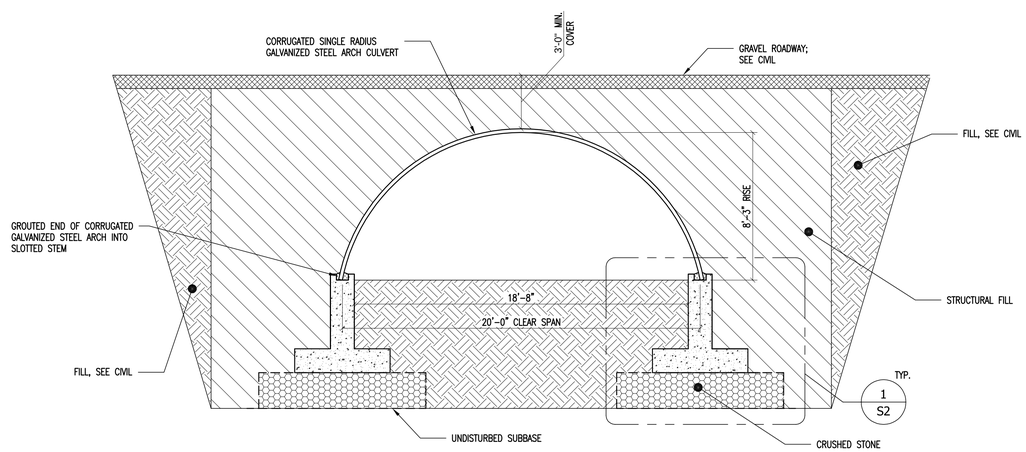
Project #	15546
Project Mgr.	OHG
Design by	OHG
Drawn by	DJQ
Reviewed by	BN
Approved by	BN
Date	4/8/2016
Scale	AS NOTED

S0



CULVERT PLAN

1/4" = 1'-0"



CORRUGATED STEEL ARCH BRIDGE SECTION

1/4"=1'-0'

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REVISIONS

DATE	COMMENTS	BY

FARRAR ROAD CULVERT REPLACEMENT #1

CULVERT PLAN AND SECTION

CHESTER, VERMONT

Project #	15546
Project Mgr.	OHG
Design by	OHG
Drawn by	DJQ
Reviewed by	BN
Approved by	BN
Date	4/8/2016
Scale	AS NOTED

S1

SHEET 7 OF 9