

**APPENDIX 2.2**

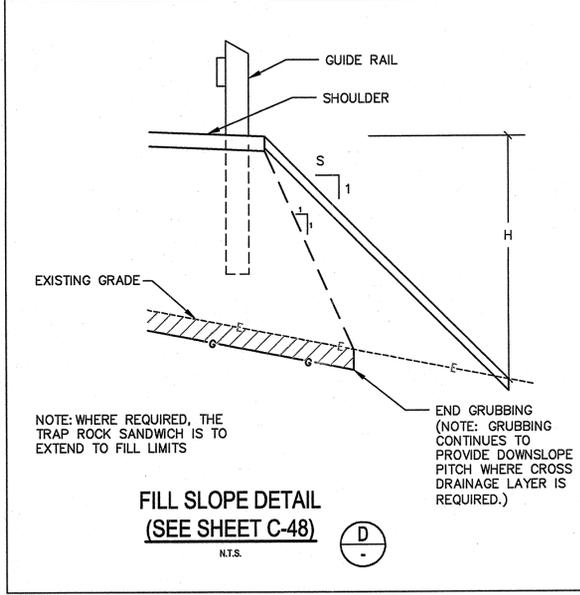
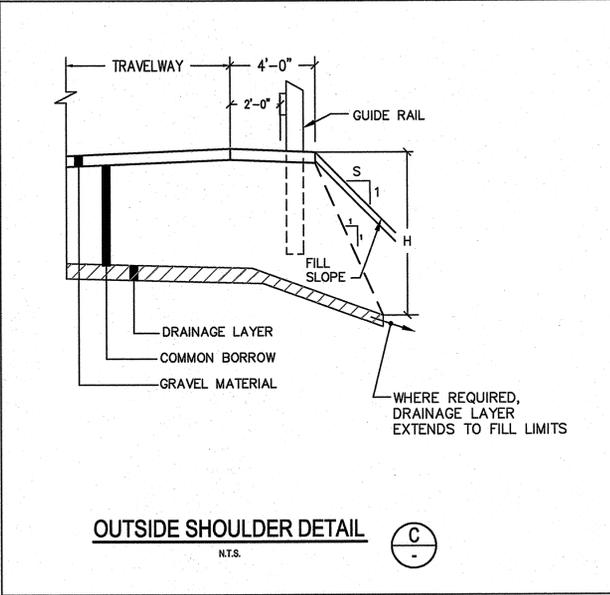
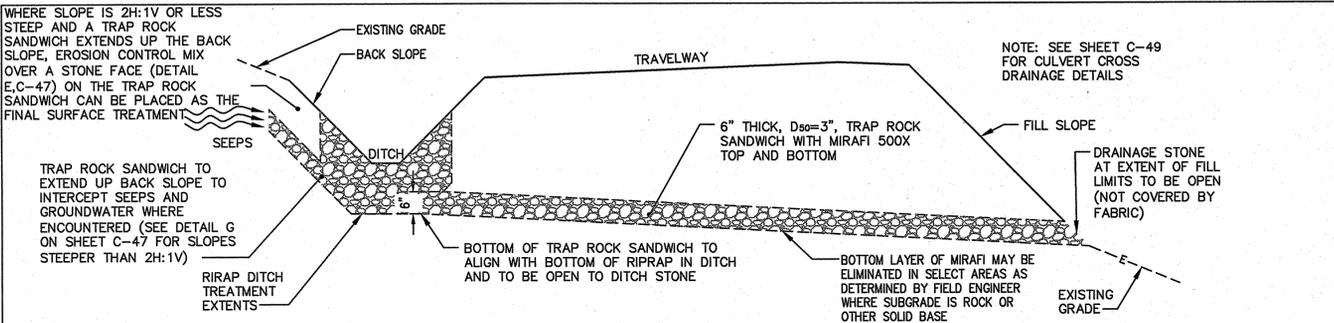
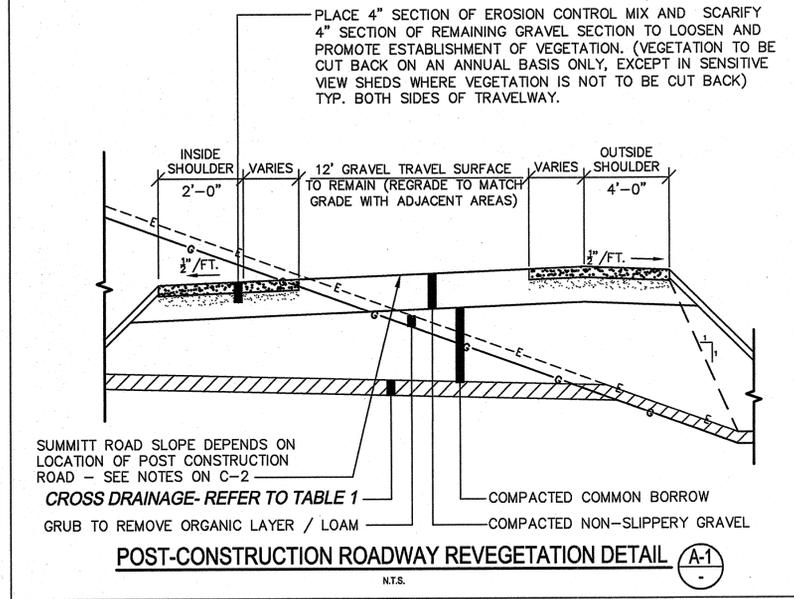
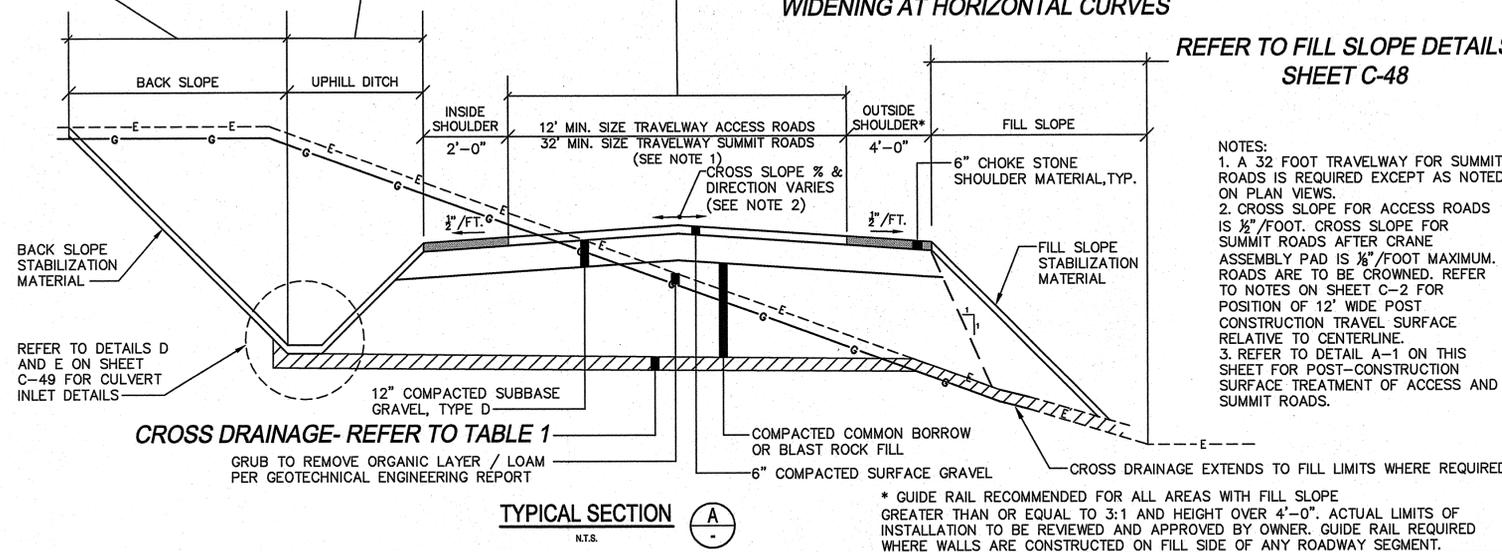
**Toolbox of road section designs (C-46 – C-55)**

REFER TO BACK SLOPE  
DETAILS SHEET C-47

REFER TO DITCH  
DETAILS SHEET C-49

REFER TO DETAIL AT THE BOTTOM OF THIS SHEET  
FOR REQUIRED TRAVELWAY  
WIDENING AT HORIZONTAL CURVES

REFER TO FILL SLOPE DETAILS  
SHEET C-48



**TABLE 1  
CROSS DRAINAGE OPTIONS**

CONDITION	DRAINAGE LAYER	6" CROSS PIPING	CULVERTS
1 DRY SUBSOIL, NO SEEPS OR WATER TABLE AND SMALL WATERSHED ABOVE ROAD	NOT REQUIRED	NOT REQUIRED	REQUIRED FOR CONDITIONS 1 AND 2
2 SEEPS OR WATER TABLE ENCOUNTERED OR SIGNIFICANT WATERSHED SIZE ABOVE ROAD	6" THICK, D <sub>50</sub> =3", TRAP ROCK SANDWICH AS SHOWN ON PLANS*	AS SHOWN ON PLANS (AT MORE SIGNIFICANT SEEPS - SPACING TO BE DETERMINED BY FIELD ENGINEER)*	
3 ROAD CONSTRUCTED ON DRAINAGE DIVIDE, NO WATER TABLE (NO CROSS DRAINAGE REQUIRED)	NOT REQUIRED	NOT REQUIRED	NOT REQUIRED

\*ADDITIONAL AREAS REQUIRING THE ROCK SANDWICH OR CROSS PIPING MAY BE ENCOUNTERED ONCE CONSTRUCTION COMMENCES AND WILL BE DETERMINED BY THE FIELD ENGINEER.

**CURVE TRAVELWAY WIDENING TABLE**

OUTSIDE CURVE RADIUS (ft)	MINIMUM TRAVELWAY WIDTH (ft)
115	20
154	VARIES*
200-300	VARIES*
300+	VARIES*

\* DEPENDING UPON CURVE LENGTH - SEE LAYOUT PLANS

NOTES:  
TRAVELWAY WIDENING DIMENSIONS REVIEW BY VESTAS AND THE PROJECT'S TRANSPORTATION COMPANY IS REQUIRED PRIOR TO CONSTRUCTION AS THE ROAD DESIGN IS BASED UPON A "NARROW ROAD SPECIFICATION".

ADDITIONAL CLEARING AND GRADING ASSOCIATED WITH BLADE OVERHANG IS SHOWN ON THE PROJECT GRADING PLANS.

REQUIRED TRAVELWAY WIDENING AT HORIZONTAL CURVES

ROADWAY DETAILS

BLACK NUBBLE WIND FARM PROJECT  
MAINE MOUNTAIN POWER LLC

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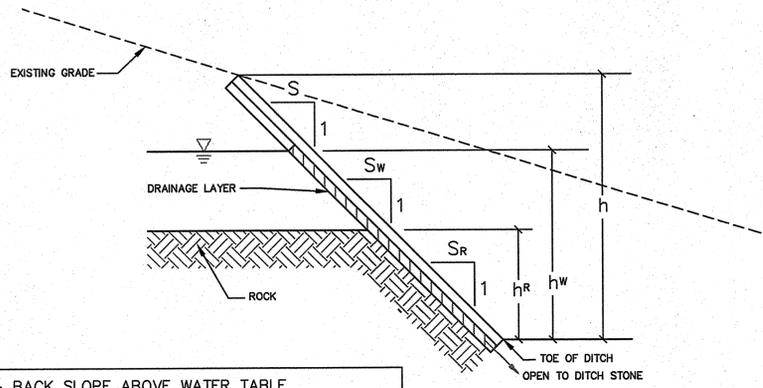
**MORTENSON**  
M.A. Mortenson Company  
700 Meadow Lane North  
Minneapolis, MN 55440

SCALE: AS NOTED  
JOB NO. 1708.08  
DRAWN: CMW  
DESIGNED: DDA  
FILE NAME: 1708.08-DET

NO.	DATE	REVISIONS
3	06.22.07	REVISED FOR BLACK NUBBLE ONLY PROJECT
2	12.06.06	DESIGN SUBMISSION TO CLIENT
1	10.31.06	DRAFT SUBMISSION FOR CLIENT REVIEW - PARTIAL SET

SHEET

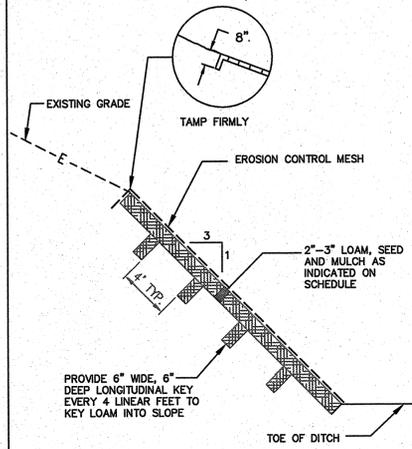
C-46



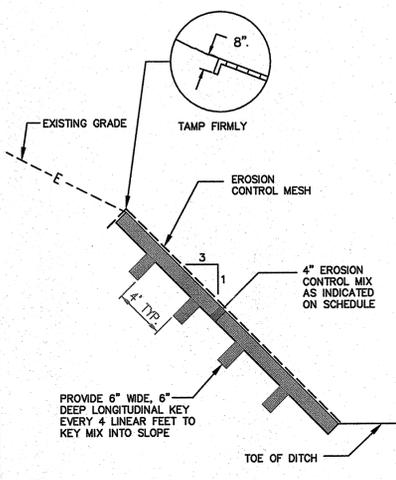
S - BACK SLOPE ABOVE WATER TABLE  
 Sw - BACK SLOPE BELOW WATER TABLE  
 Sr - BACK SLOPE IN ROCK  
 hw - HEIGHT FROM TOE OF DITCH TO WATER TABLE  
 hr - HEIGHT FROM TOE OF DITCH TO ROCK  
 h - SLOPE HEIGHT

**GENERIC CUT SLOPE DETAIL** (A) C-47  
 N.T.S.

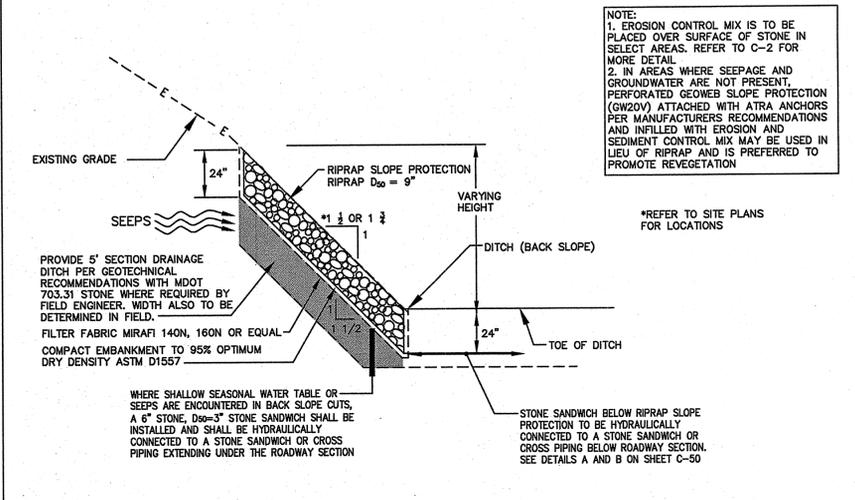
**NOTE: LOAM & SEED IS NOT TO BE USED ABOVE ELEV. 2,700**



**LOAM, SEED AND MULCH SLOPE** (C) C-47  
 N.T.S.



**EROSION CONTROL MIX SLOPE** (D) C-47  
 N.T.S.



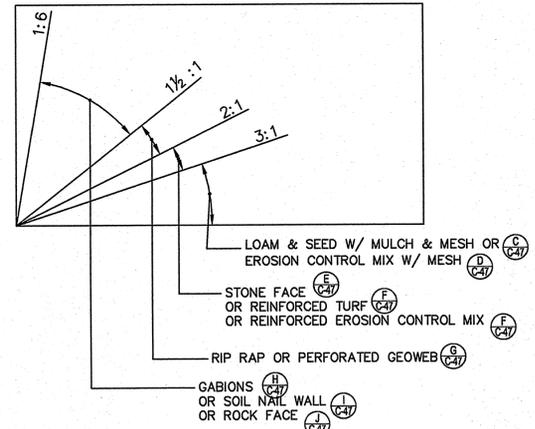
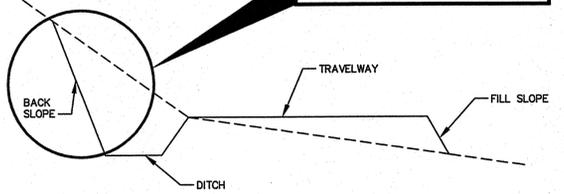
**RIPRAP SLOPE DETAIL** (G) C-47  
 N.T.S.

CONDITION	Sr	Sw	S	LOAM SEED AND MULCH	EROSION CONTROL MIX AND MESH	STONE FACE	REINFORCED TURF OR EROSION CONTROL MIX	RIPRAP	GABIONS	EXPOSED ROCK	SOIL NAIL WALL
ABOVE WATER TABLE AND ABOVE ROCK	N/A	N/A	1:6								X
ABOVE WATER TABLE W/ ROCK	N/A	N/A	2:1			X					X
BELOW WATER TABLE ABOVE ROCK (DRAINAGE LAYER OR PIPING REQUIRED)	N/A	N/A	3:1	X	X	X					X
BELOW WATER TABLE WITH ROCK	N/A	N/A	>:1	X	X	X					X
BELOW WATER TABLE WITH ROCK	N/A	N/A	1:6					X	X		X
BELOW WATER TABLE WITH ROCK	N/A	N/A	1.5 to 1.75:1								X
BELOW WATER TABLE WITH ROCK	N/A	N/A	2:1								X
BELOW WATER TABLE WITH ROCK	N/A	N/A	3:1								X
BELOW WATER TABLE WITH ROCK	N/A	N/A	>:1								X
BELOW WATER TABLE WITH ROCK	N/A	N/A	1:6								X
BELOW WATER TABLE WITH ROCK	N/A	N/A	1.5 to 1.75:1								X
BELOW WATER TABLE WITH ROCK	N/A	N/A	2:1								X
BELOW WATER TABLE WITH ROCK	N/A	N/A	3:1								X
BELOW WATER TABLE WITH ROCK	N/A	N/A	>:1								X

**NOTE:**  
 1. ACCEPTABLE BACK SLOPE MATERIALS FOR SPECIFIC CONDITIONS ARE DESIGNATED BY AN "X".  
 2. PREFERENCE IS TO BE GIVEN TO SELECTING SLOPE TREATMENTS WHICH WILL MOST EASILY REVEGETATE OVER TIME. REFER TO SHEET C-2 FOR REVEGETATION REQUIREMENTS FOR THE PROJECT.  
 3. NET DISTURBED AREA IS NOT TO BE INCREASED EXCEPT AS NOTED ON SHEET C-2.

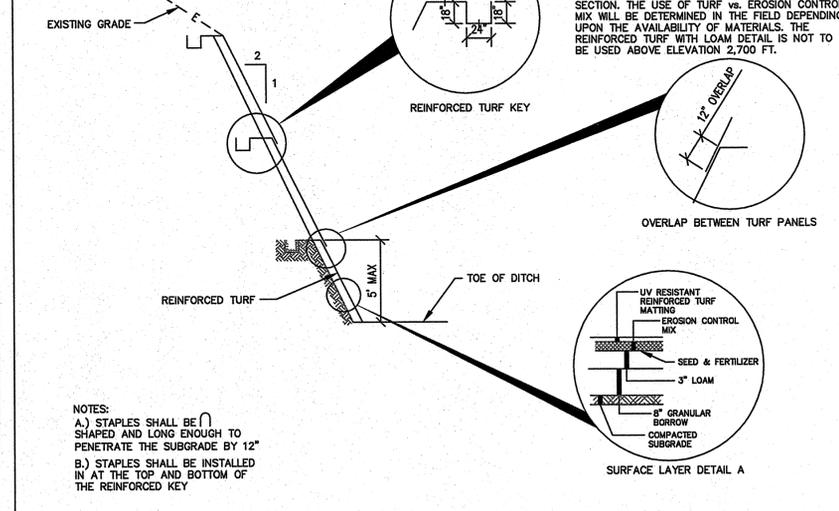
**NOT TO BE USED ABOVE ELEVATION 2,700**

**DETAILS SHOWN ON THIS SHEET**

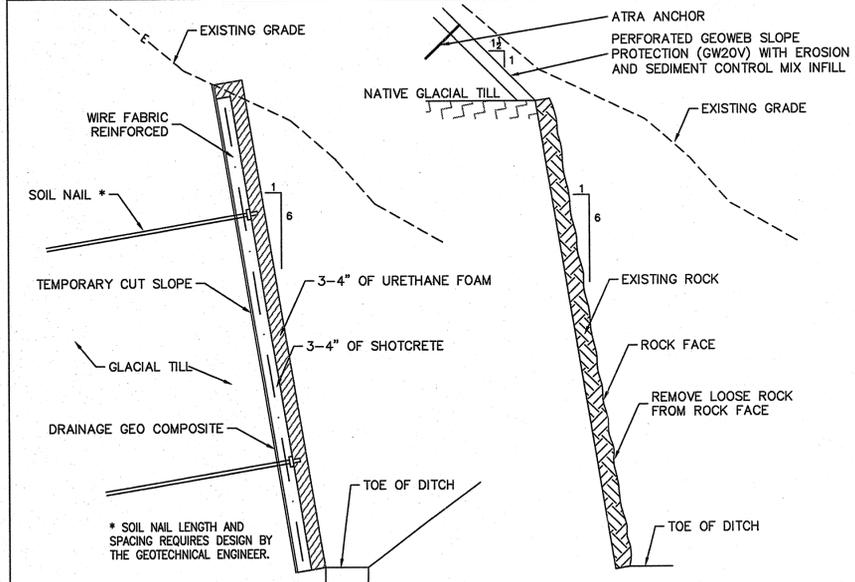


**PERMISSIBLE BACK SLOPE MATERIALS** (B) C-47  
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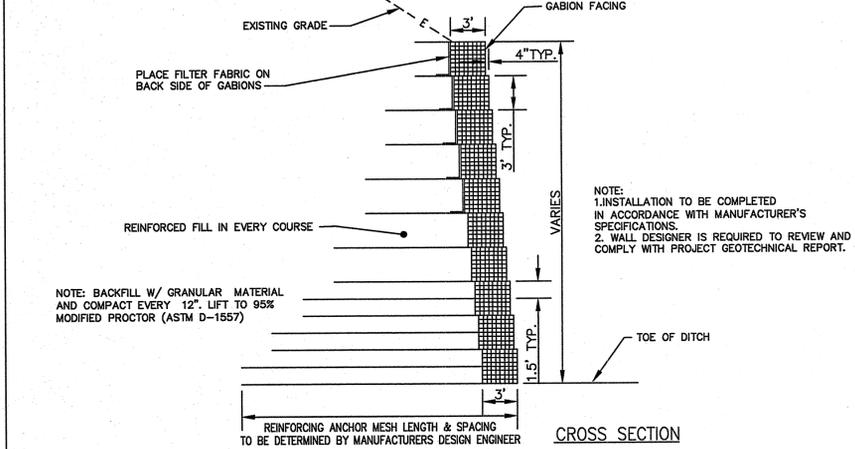
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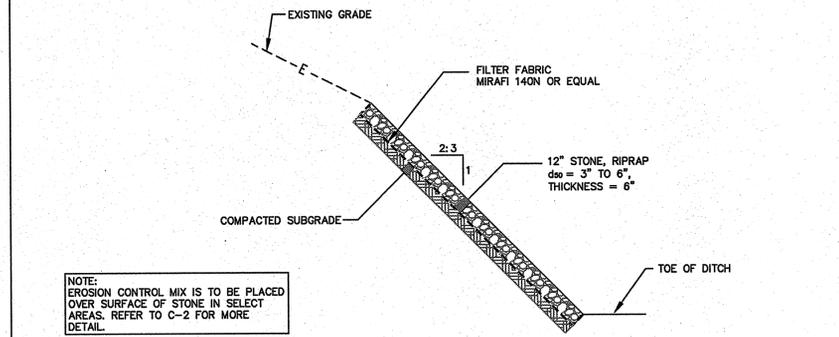
**REINFORCED TURF AND REINFORCED EROSION CONTROL MIX DETAILS** (F) C-47  
 N.T.S.



**SOIL NAIL WALL DETAIL** (I) C-47  
**ROCK FACE DETAIL** (J) C-47  
 N.T.S.



**GABION WALL DETAIL** (H) C-47  
 N.T.S.

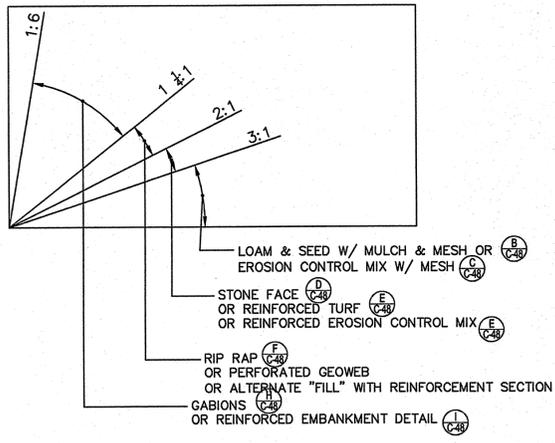


**STONE FACE DETAIL** (E) C-47  
 N.T.S.

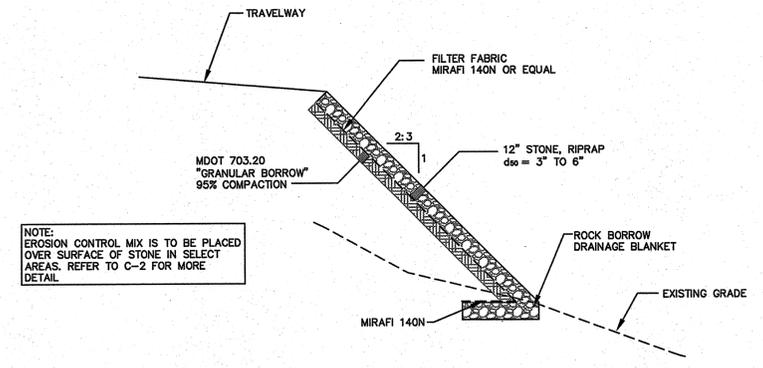
**BACK SLOPE DETAILS**

**BLACK NUBBLE WIND FARM PROJECT**  
**MAINE MOUNTAIN POWER LLC**

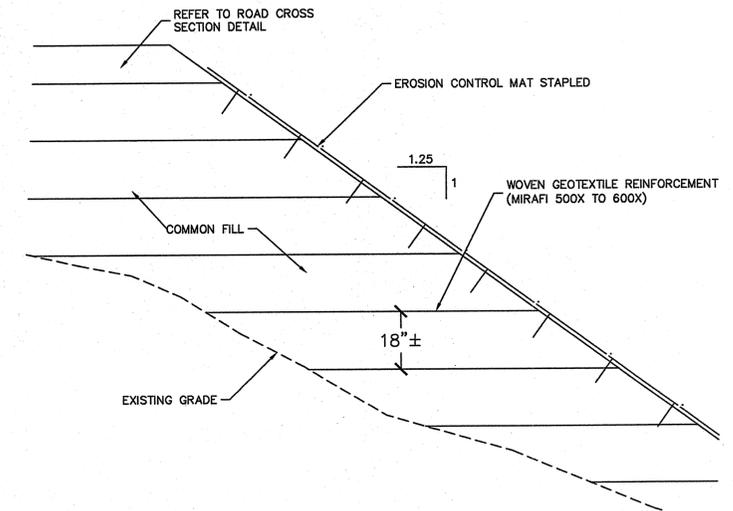
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 DESIGNED: DDA  
 FILE NAME: 1708.09-DET  
 SCALE: AS NOTED  
 JOB NO. 1708.09  
 REVISED FOR BLACK NUBBLE ONLY PROJECT  
 DESIGN SUBMISSION TO CLIENT  
 DRAFT SUBMISSION FOR CLIENT REVIEW - PARTIAL SET  
 NO. DATE REVISIONS  
 3 06.22.07  
 2 12.06.06  
 1 10.31.06  
**MORTENSON**  
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**DH**  
**C-47**  
 SHEET



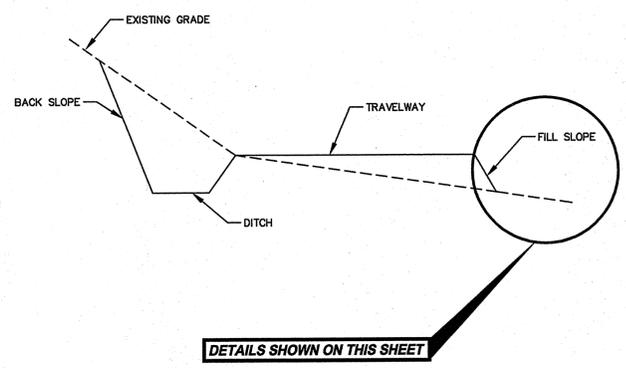
**PERMISSIBLE FILL SLOPE MATERIALS**  
N.T.S. (A) C-48



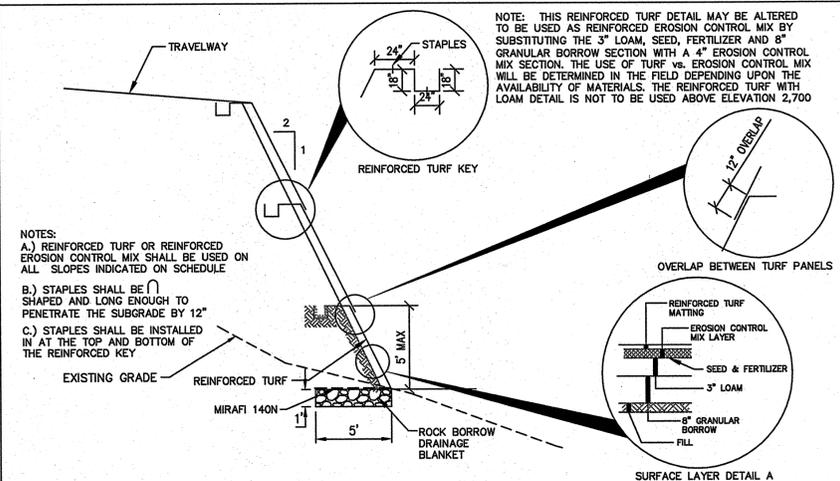
**STONE FACE DETAIL**  
N.T.S. (D) C-48



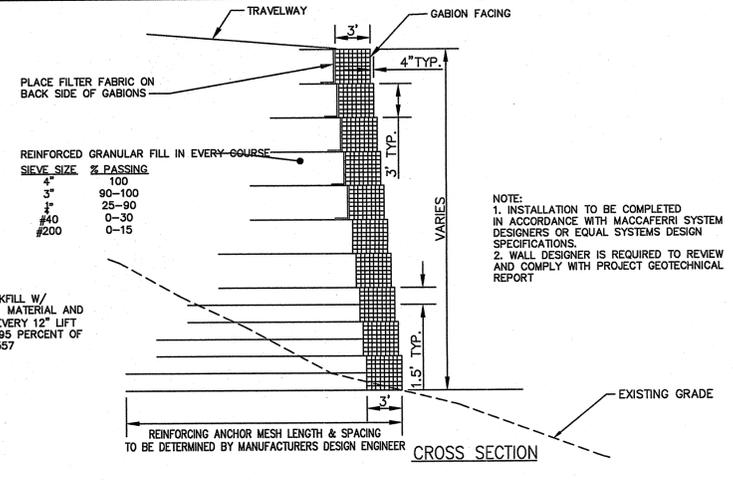
**ALTERNATE "FILL" WITH REINFORCEMENT SECTION**  
N.T.S. (G) C-48



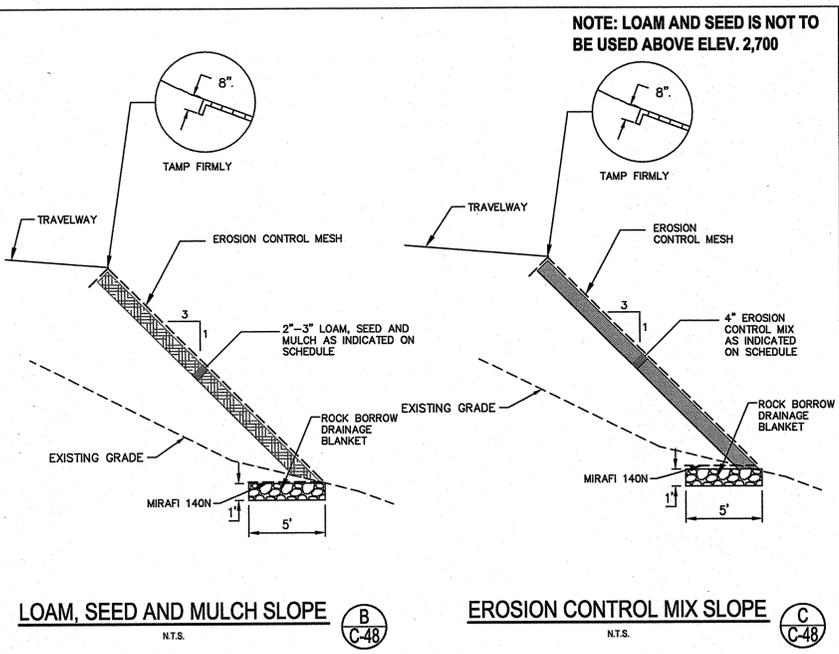
**DETAILS SHOWN ON THIS SHEET**



**REINFORCED TURF AND REINFORCED EROSION CONTROL MIX DETAILS**  
N.T.S. (E) C-48

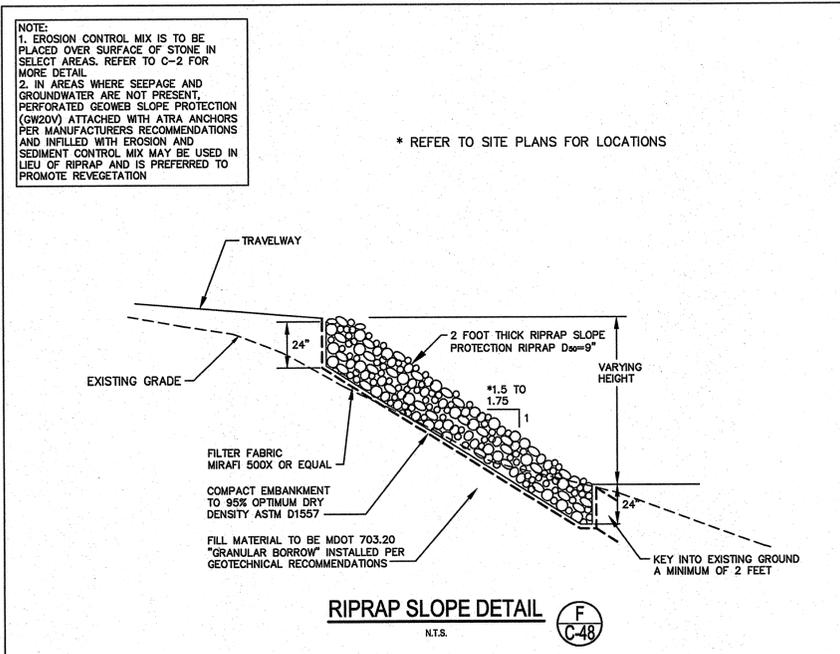


**GABION WALL DETAIL**  
N.T.S. (H) C-48

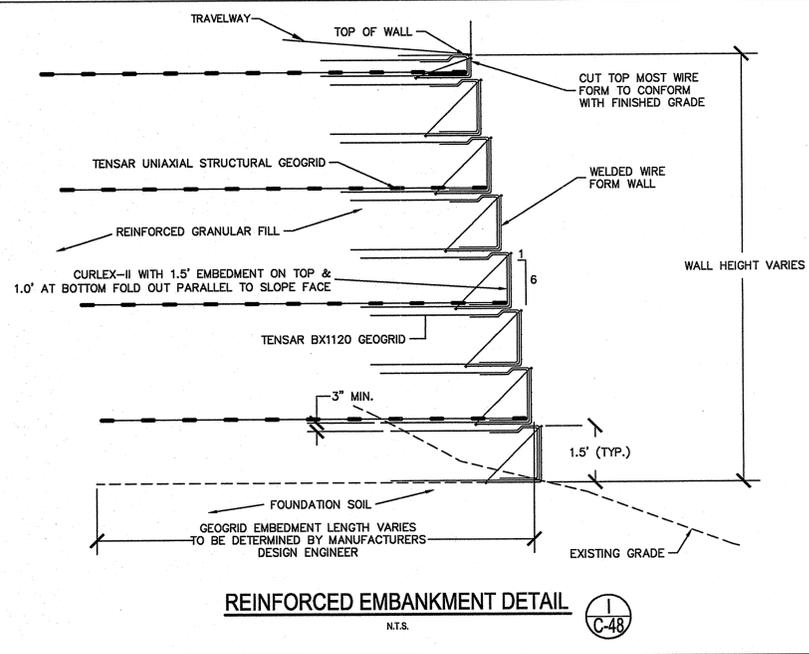


**LOAM, SEED AND MULCH SLOPE**  
N.T.S. (B) C-48

**EROSION CONTROL MIX SLOPE**  
N.T.S. (C) C-48



**RIPRAP SLOPE DETAIL**  
N.T.S. (F) C-48



**REINFORCED EMBANKMENT DETAIL**  
N.T.S. (I) C-48

**BLACK NUBBLE WIND FARM PROJECT**  
**MAINE MOUNTAIN POWER LLC**

**MORTENSON**  
M.A. Mortenson Company  
700 Meadow Lane North  
Minneapolis, MN 55440

**FILL SLOPE DETAILS**

NO.	DATE	REVISIONS
3	06.22.07	REVISED FOR BLACK NUBBLE ONLY PROJECT
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DRAWN: CMW SCALE: AS NOTED  
DESIGNED: DDA JOB NO. 1708.09  
FILE NAME: 1708.09-DET

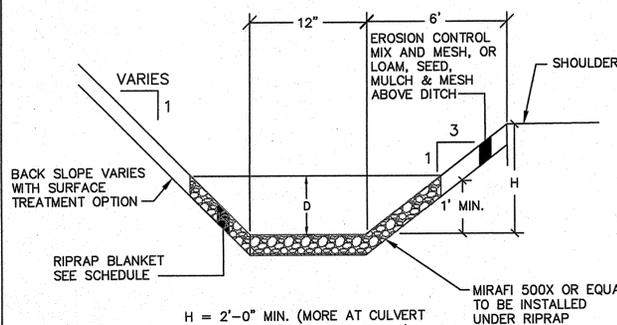
STATE OF MAINE  
REGISTERED PROFESSIONAL ENGINEER  
LICENSE NO. 10275  
EXPIRES 12/31/2010

DeLuca-Hoffman Associates, Inc.  
778 MAIN STREET, SUITE 8  
SOUTH PORTLAND, ME 04106  
207.775.1121  
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**DH**

SHEET **C-48**

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**DITCH DETAIL**

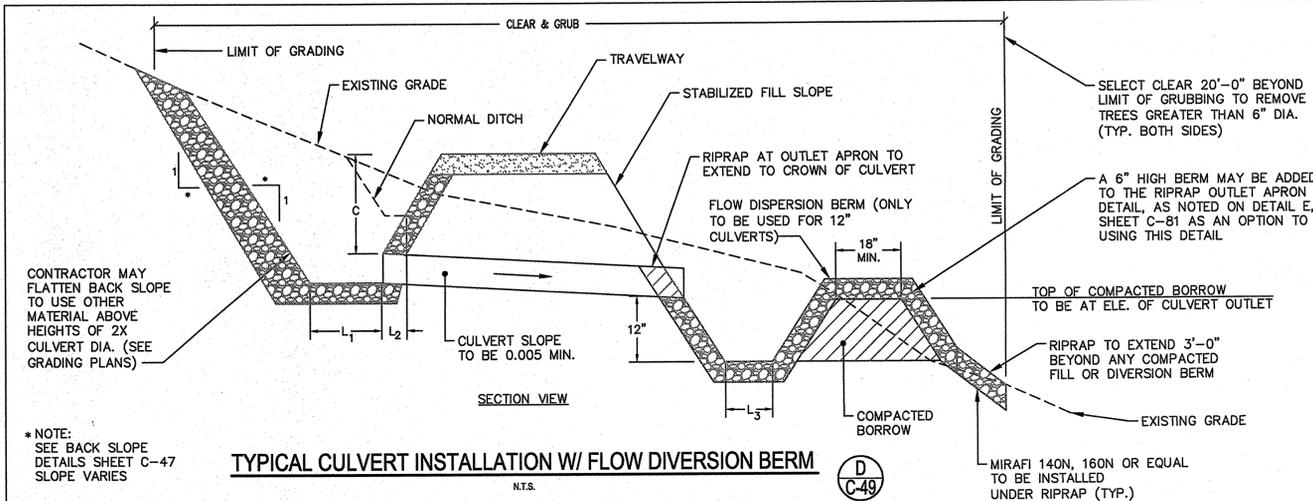
(A)  
C-49

**TABLE 2**  
ACCEPTABLE DITCH LINING RIPRAP MATERIAL SIZE, DEPTH & THICKNESS

CULVERT SIZE BELOW DITCH	D	DITCH GRADIENT 0-5%		DITCH GRADIENT 5-10%		DITCH GRADIENT 10-15%	
		RIPRAP SIZE	RIPRAP THICKNESS	RIPRAP SIZE	RIPRAP THICKNESS	RIPRAP SIZE	RIPRAP THICKNESS
12"	11"	3"	7"	3"	7"	6"	14"
18"	15"	3"	7"	6"	14"	6"	14"
24"	19"	6"	14"	6"	14"	9"	21"
30"	24"	6"	14"	9"	21"	9"	21"
36"	24"	6"	14"	9"	21"	12"	27"

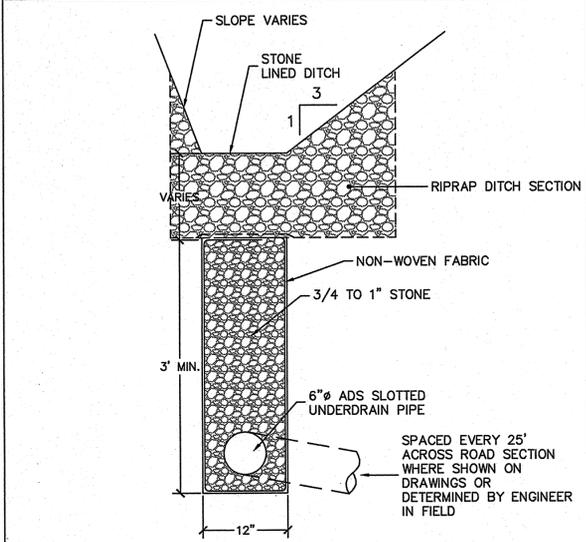
NOTE: WHERE 15" CULVERTS ARE USED THEY ARE TO MATCH RIPRAP REQUIREMENTS FOR THE 18" CULVERTS

**DITCH TREATMENT OPTIONS**



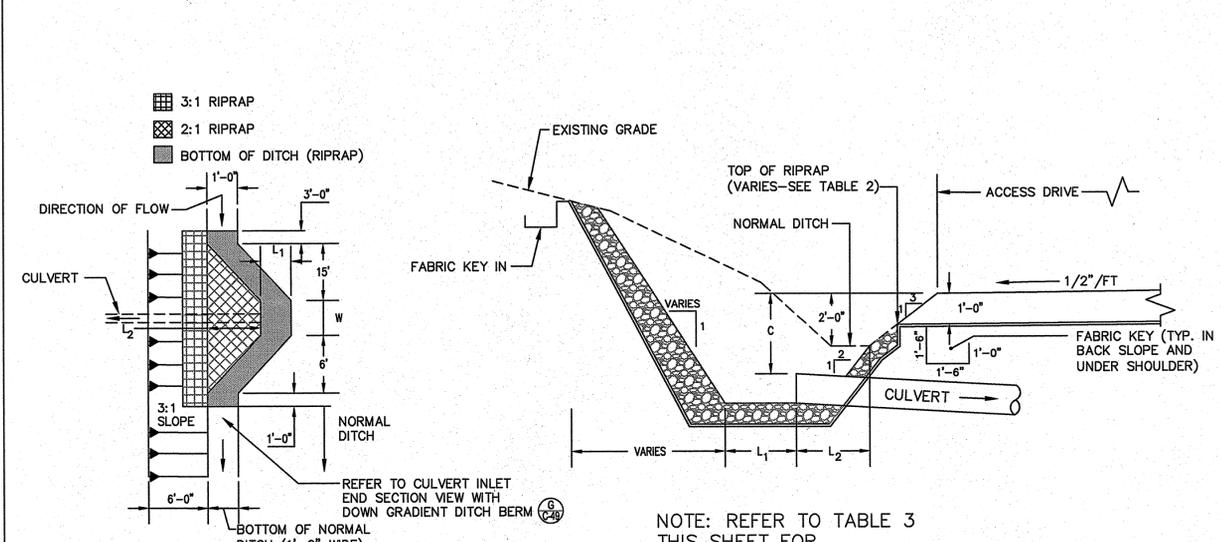
**TYPICAL CULVERT INSTALLATION W/ FLOW DIVERSION BERM**

(D)  
C-49



**DITCH WITH 6" DIA. UNDERDRAIN**

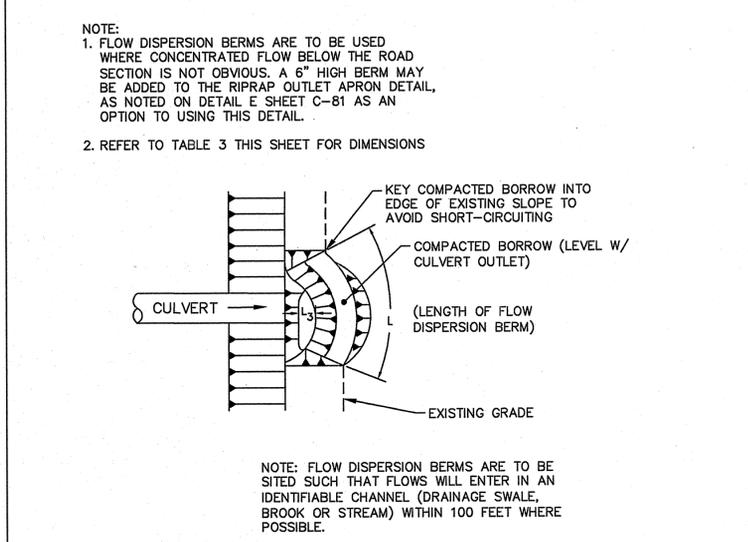
(B)  
C-49



NOTE: REFER TO TABLE 3 THIS SHEET FOR DIMENSIONS

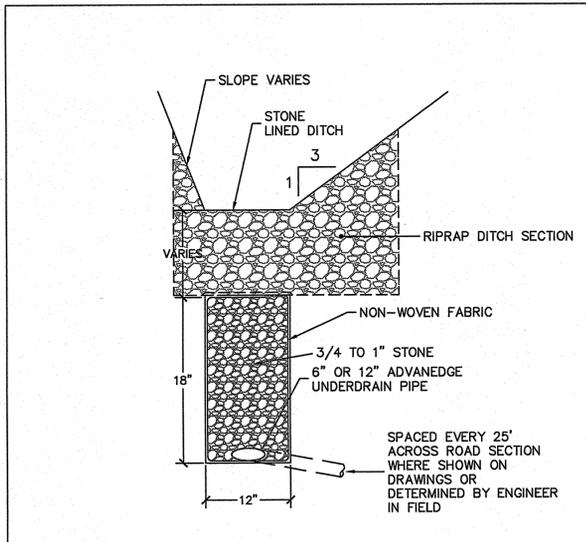
**CULVERT INLET SECTION VIEW**

(E)  
C-49



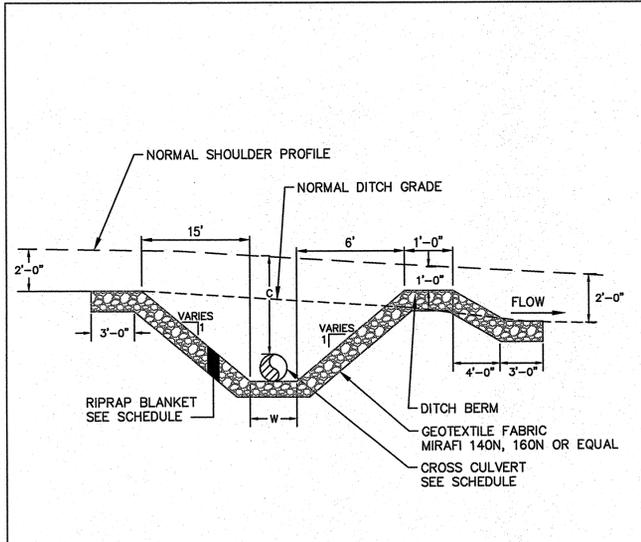
**FLOW DISPERSION BERM PLAN VIEW**

(F)  
C-49



**DITCH WITH 6" ADVANEDGE UNDERDRAIN**

(C)  
C-49



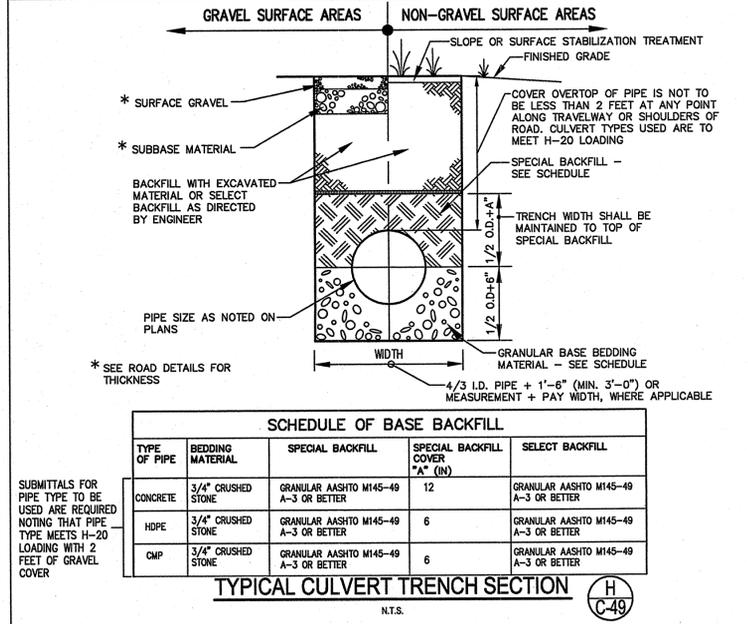
**CULVERT INLET END SECTION VIEW W/ DOWN GRADIENT DITCH BERM**

(G)  
C-49

**TABLE 3**  
DIMENSIONAL SCHEDULE FOR CULVERT INLETS AND FLOW DISPERSION BERMS

CULVERT DIAMETER	RIPRAP BLANKET		W	C	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L
	d <sub>50</sub>	THICKNESS						
12"	6"	14"	2'	36"	2'	4'	8'	8'
18"	6"	14"	4'	30"	4'	4'	*	*
24"	6"	14"	6'	24"	6'	4'	*	*
30"	12"	27"	8'	24"	8'	5'	*	*
36"	12"	27"	8'	24"	8'	6'	*	*

NOTE: WHERE 15" CULVERTS ARE USED THEY ARE TO MATCH RIPRAP REQUIREMENTS FOR THE 18" CULVERTS  
\*FLOW DISPERSION BERMS ARE NOT TO BE USED FOR CULVERTS LARGER THAN 12 INCHES.



**SCHEDULE OF BASE BACKFILL**

TYPE OF PIPE	BEDDING MATERIAL	SPECIAL BACKFILL	SPECIAL BACKFILL COVER "A" (ft)	SELECT BACKFILL
CONCRETE	3/4" CRUSHED STONE	GRANULAR AASHTO M145-49 A-3 OR BETTER	12	GRANULAR AASHTO M145-49 A-3 OR BETTER
HDPE	3/4" CRUSHED STONE	GRANULAR AASHTO M145-49 A-3 OR BETTER	6	GRANULAR AASHTO M145-49 A-3 OR BETTER
CMP	3/4" CRUSHED STONE	GRANULAR AASHTO M145-49 A-3 OR BETTER	6	GRANULAR AASHTO M145-49 A-3 OR BETTER

SUBMITTALS FOR PIPE TYPE TO BE USED ARE REQUIRED NOTING THAT PIPE TYPE MEETS H-20 LOADING WITH 2 FEET OF GRAVEL COVER

**TYPICAL CULVERT TRENCH SECTION**

(H)  
C-49

**BLACK NUBBLE WIND FARM PROJECT**  
**MAINE MOUNTAIN POWER LLC**

**DITCH AND CULVERT DETAILS**

DESIGNED: DDA  
FILE NAME: 1708.09-DET

SCALE: AS NOTED  
JOB NO.: 1708.09

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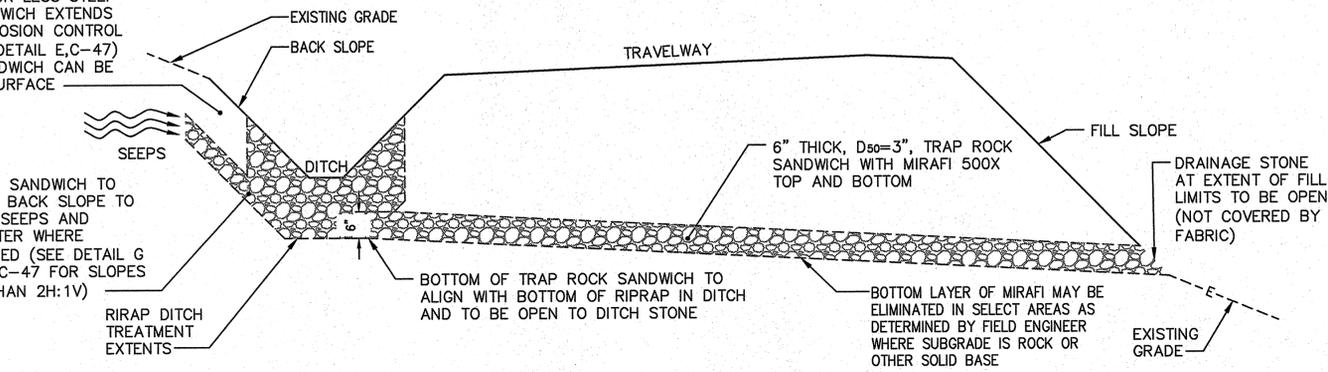
**DH**

**C-49**

SHEET

WHERE SLOPE IS 2H:1V OR LESS STEEP AND A TRAP ROCK SANDWICH EXTENDS UP THE BACK SLOPE, EROSION CONTROL MIX OVER STONE FACE (DETAIL E,C-47) ON THE TRAP ROCK SANDWICH CAN BE PLACED AS THE FINAL SURFACE TREATMENT

TRAP ROCK SANDWICH TO EXTEND UP BACK SLOPE TO INTERCEPT SEEPS AND GROUNDWATER WHERE ENCOUNTERED (SEE DETAIL G ON SHEET C-47 FOR SLOPES STEEPER THAN 2H:1V)

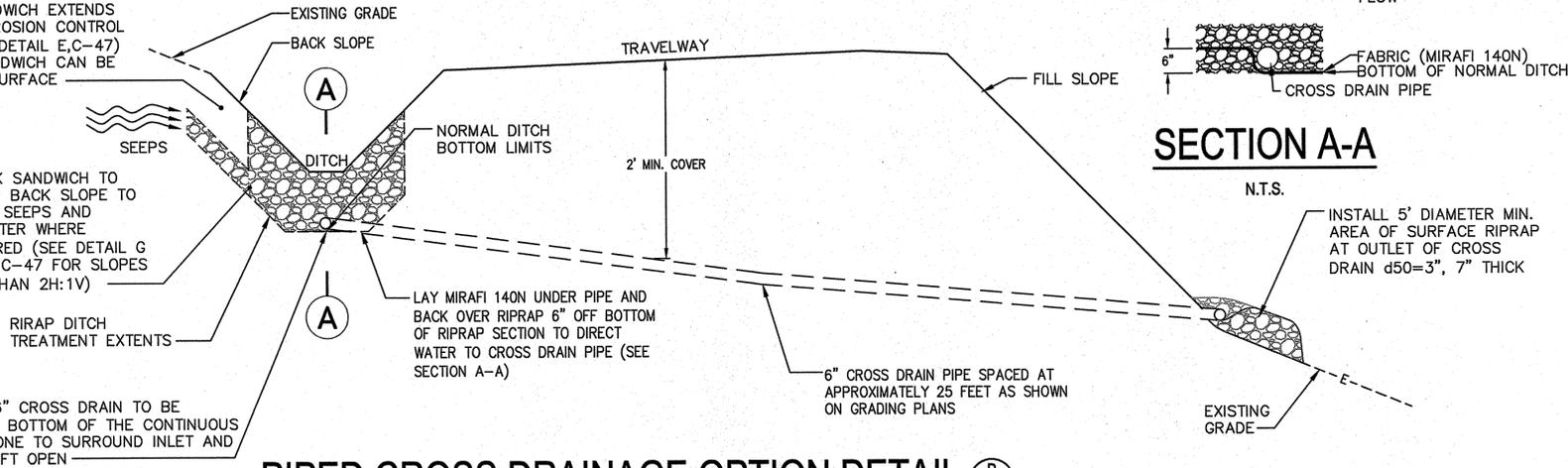


**TRAP ROCK SANDWICH CROSS DRAINAGE DETAIL** (A) (C-50)

N.T.S.

WHERE SLOPE IS 2H:1V OR LESS STEEP AND A TRAP ROCK SANDWICH EXTENDS UP THE BACK SLOPE, EROSION CONTROL MIX OVER STONE FACE (DETAIL E,C-47) ON THE TRAP ROCK SANDWICH CAN BE PLACED AS THE FINAL SURFACE TREATMENT

TRAP ROCK SANDWICH TO EXTEND UP BACK SLOPE TO INTERCEPT SEEPS AND GROUNDWATER WHERE ENCOUNTERED (SEE DETAIL G ON SHEET C-47 FOR SLOPES STEEPER THAN 2H:1V)

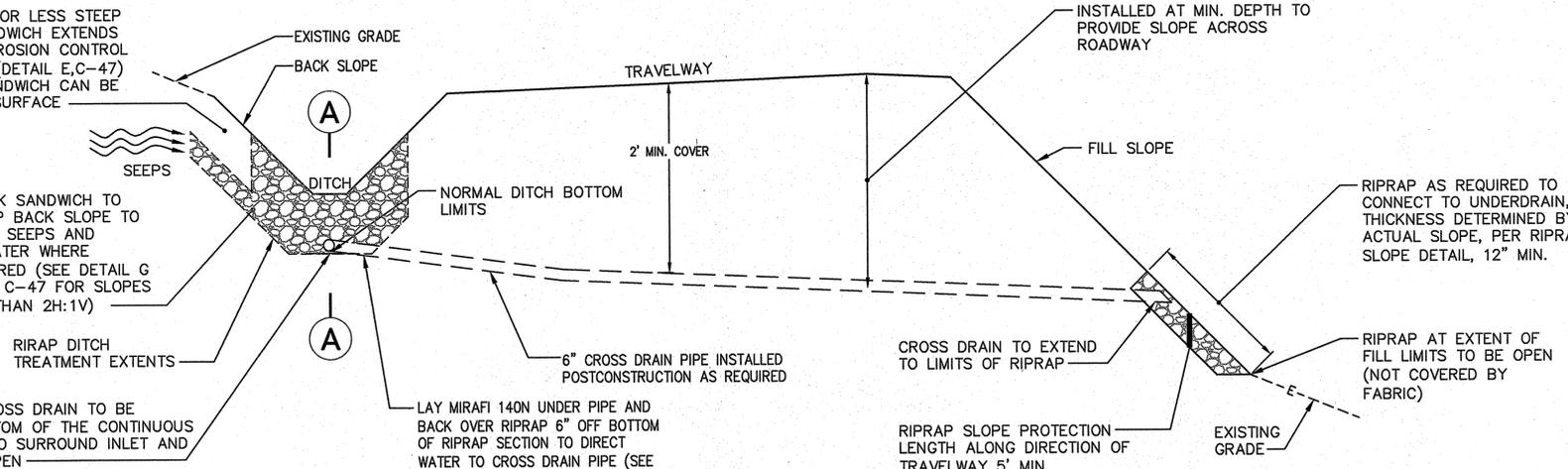


**PIPED CROSS DRAINAGE OPTION DETAIL** (B) (C-50)

N.T.S.

WHERE SLOPE IS 2H:1V OR LESS STEEP AND A TRAP ROCK SANDWICH EXTENDS UP THE BACK SLOPE, EROSION CONTROL MIX OVER STONE FACE (DETAIL E,C-47) ON THE TRAP ROCK SANDWICH CAN BE PLACED AS THE FINAL SURFACE TREATMENT

TRAP ROCK SANDWICH TO EXTEND UP BACK SLOPE TO INTERCEPT SEEPS AND GROUNDWATER WHERE ENCOUNTERED (SEE DETAIL G ON SHEET C-47 FOR SLOPES STEEPER THAN 2H:1V)



**POST CONSTRUCTION PIPED CROSS DRAINAGE DETAIL** (C) (C-50)

N.T.S.

**NOTES:**

1. THE PRIMARY OBJECTIVE OF THESE CROSS DRAINAGE DETAILS IS TO KEEP EXISTING HYDROLOGY INTACT TO THE EXTENT POSSIBLE BY MAINTAINING SEEP AND SHALLOW PERCHED GROUND WATER FLOW.
2. THESE CROSS DRAINAGE DETAILS DO NOT REPLACE REQUIRED CULVERTING FOR STORMWATER CONVEYANCE. SEE OTHER DETAILS FOR STORMWATER FLOW CONTROL VIA DITCH AND CULVERTING.
3. THE POST CONSTRUCTION CROSS DRAINAGE DETAIL WILL BE OBSERVED AFTER CONSTRUCTION OF THE ROADWAYS AND DETAIL A OR B WAS NOT PROVIDED.

SOIL HYDROLOGY PRESERVATION DETAILS

REDINGTON WIND FARM PROJECT  
MAINE MOUNTAIN POWER LLC



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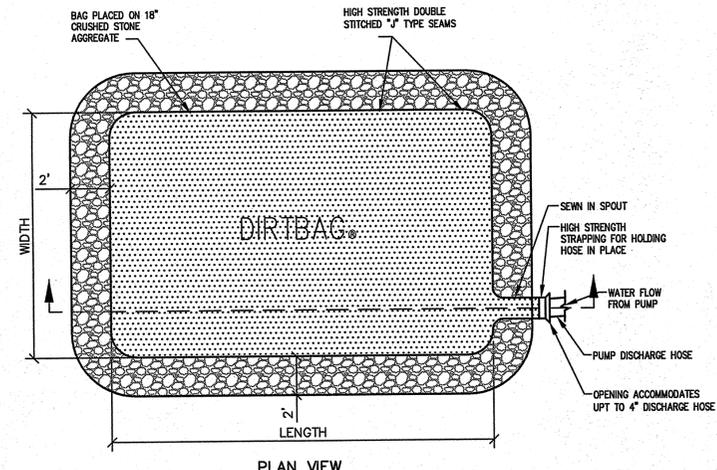


SHEET

**C-50**

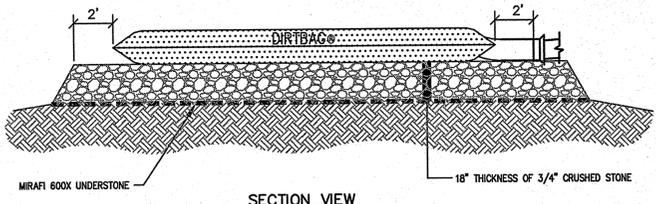
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Minneapolis, MN 55440

NO.	DATE	REVISIONS
1	10.31.06	DRAFT SUBMISSION FOR CLIENT REVIEW - PARTIAL SET
2	12.06.06	DESIGN SUBMISSION TO CLIENT
3	12.15.06	FINAL PERMIT DRAWING SET



DIRTBAG DETAIL  
N.T.S.

(A)  
C-51

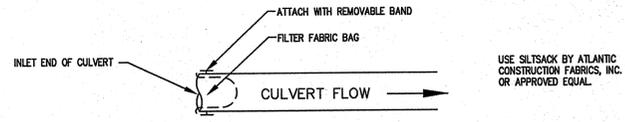


SECTION VIEW

NOTE: LOCATION OF DIRTBAGS TO BE SELECTED BY THE CONTRACTOR BUT SHALL NOT BE SITED IN WETLAND AREAS.

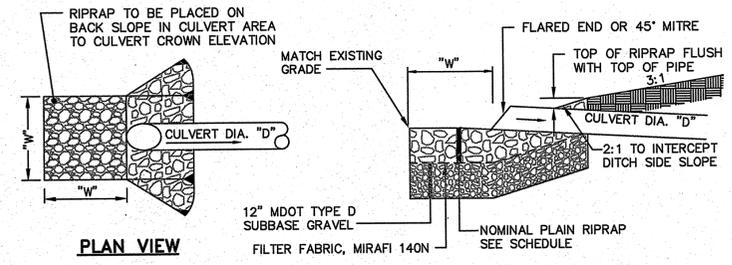
DIRTBAG DETAIL  
N.T.S.

(A)  
C-51



SILT SACK DETAIL  
N.T.S.

(B)  
C-51



PLAN VIEW

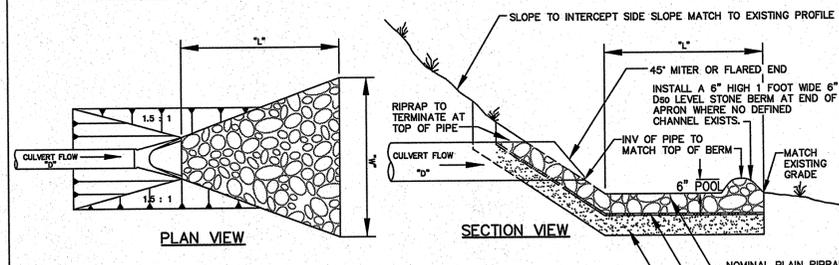
SECTION VIEW

NOTE: RIPRAP GRADATION AND PLACEMENT - THE RIPRAP GRADATION SHALL BE A WELL-GRADED MIX FROM ABOUT 1.5 TIMES THE D SIZE TO ABOUT 25 PERCENT OF THE D SIZE. THE RIPRAP STONES SHALL BE CAREFULLY PLACED WORKING FROM THE TOE OF THE SLOPE UPWARD. THE STONES SHOULD BE LOWERED TO THE SLOPE AND NOT BE ALLOWED TO DROP MORE THAN 12 INCHES ONTO THE GEOTEXTILE. THE FINISHED SURFACE SHALL BE A RELATIVELY SMOOTH UNIFORMLY SLOPED SURFACE.

CULVERT DIAMETER (D)	WIDTH (W)	STONE $d_{50}$	RIPRAP THICKNESS
12"	2'	6"	14"
18"	4'	6"	14"
24"	6'	6"	14"
30"	8'	12"	27"
36"	8'	12"	27"

PIPE/CULVERT INLET APRON IN FILL AREAS  
N.T.S.

(D)  
C-51



PLAN VIEW

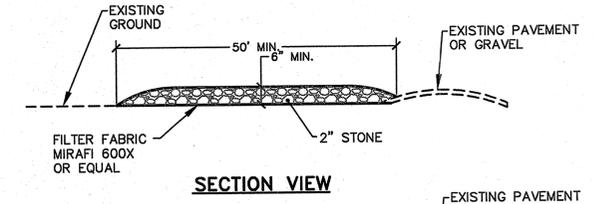
SECTION VIEW

NOTE: 1. RIPRAP GRADATION AND PLACEMENT - THE RIPRAP GRADATION SHALL BE A WELL-GRADED MIX FROM ABOUT 1.5 TIMES THE D SIZE TO ABOUT 25 PERCENT OF THE D SIZE. THE RIPRAP STONES SHALL BE CAREFULLY PLACED WORKING FROM THE TOE OF THE SLOPE UPWARD. THE STONES SHOULD BE LOWERED TO THE SLOPE AND NOT BE ALLOWED TO DROP MORE THAN 12 INCHES ONTO THE GEOTEXTILE. THE FINISHED SURFACE SHALL BE A RELATIVELY SMOOTH UNIFORMLY SLOPED SURFACE. 2. THIS DETAIL WITHOUT THE STONE BERM AT THE END IS TO BE USED WHERE CONCENTRATED FLOW BELOW THE ROADWAY SECTION IS OBVIOUS. A FLOW DISPERSION BERM IS TO BE ADDED AT 12" CULVERTS AS DETERMINED BY THE FIELD ENGINEER WHERE CONCENTRATED FLOWS ARE NOT OBVIOUS. 3. WHERE EXISTING SLOPE GRADES AT CULVERT OUTLETS EXCEED 30%, THE 6" POOL IS NOT REQUIRED. 4. WHERE EXISTING GRADES AT CULVERT OUTLETS EXCEED 30%,  $d_{50}=12"$ , 27" THICK IS TO BE USED FOR ALL PIPE SIZES.

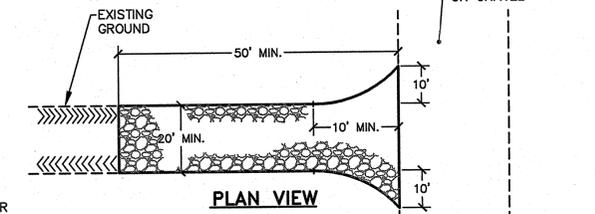
CULVERT DIAMETER (D)	LENGTH* (L)	WIDTH (W)	STONE $d_{50}$	RIPRAP THICKNESS
12"	8'	12'	6"	14"
18"	10'	12'	6"	14"
24"	12'	14'	6"	14"
30"	16'	20'	12"	27"
36"	20'	23'	12"	27"

PIPE/CULVERT OUTLET APRON  
N.T.S.

(E)  
C-51



SECTION VIEW

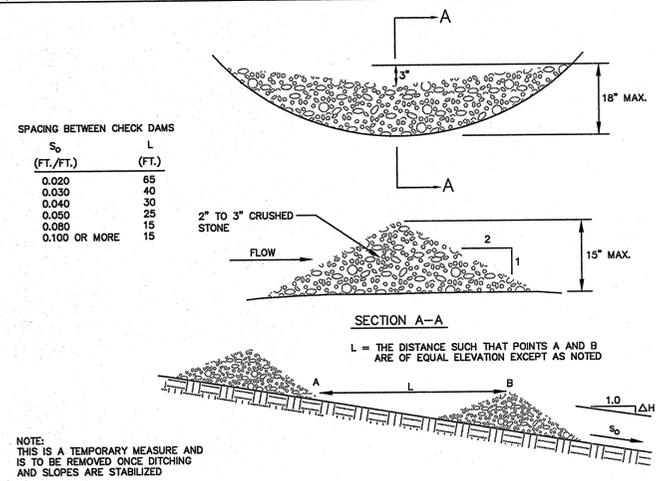


PLAN VIEW

NOTE: CONTRACTOR SHALL ADD STONE TO ENTRANCE AS MUD/SILT MATERIAL ACCUMULATES

STABILIZED CONSTRUCTION ENTRANCE  
N.T.S.

(G)  
C-51

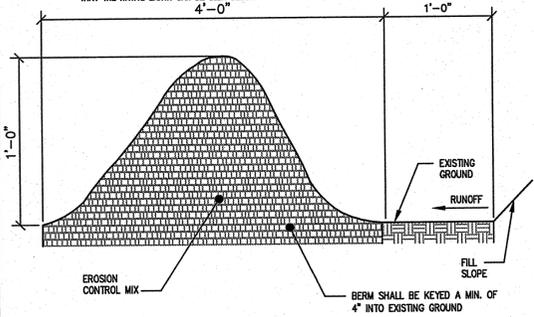


S <sub>0</sub> (FT./FT.)	L (FT.)
0.020	65
0.030	40
0.040	30
0.050	25
0.080	15
0.100 OR MORE	15

STONE CHECK DAM  
N.T.S.

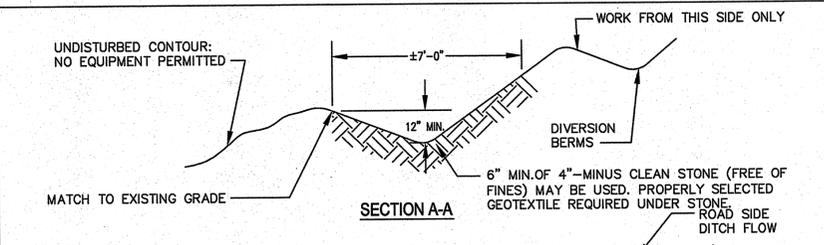
(H)  
C-51

NOTES:  
1. THE EROSION CONTROL MIX SHALL CONFORM TO THE FOLLOWING STANDARDS:  
A. THE ORGANIC MATTER CONTENT IS BETWEEN 80 AND 100% DRY WEIGHT BASIS.  
B. PARTICLE SIZE BY WEIGHT IS 100% PASSING A 6" SCREEN AND A MINIMUM OF 70% MAXIMUM OF 85% PASSING A 0.75" SCREEN.  
C. THE ORGANIC PORTION NEEDS TO BE FIBROUS AND ELONGATED.  
D. LARGE PORTIONS OF SILT CLAYS OR FINE SANDS ARE NOT ACCEPTABLE IN THE MIX.  
E. SOLUBLE SALTS CONTENT IS LESS THAN 4.0 MMS/CM.  
F. THE pH SHOULD FALL BETWEEN 5.0 AND 8.0.  
G. ON SLOPES LESS THAN 6% OR AT THE BOTTOM OF STEEPER SLOPES (<2:1) UP TO 20 FEET LONG, THE BARRIER SHOULD BE A MINIMUM OF 12" HIGH, AS MEASURED ON THE UPHILL SIDE OF THE BARRIER, AND A MINIMUM OF TWO FEET WIDE. ON LONGER OR STEEPER SLOPES, THE BARRIER SHOULD BE WIDER TO ACCOMMODATE THE ADDITIONAL FLOW.  
H. THE BARRIER MUST BE PLACED ALONG A RELATIVELY LEVEL CONTOUR. IT MAY BE NECESSARY TO CUT TALL GRASSES OR WOODY VEGETATION TO AVOID CREATING VOIDS AND BRIDGES THAT WOULD ENABLE FINES TO WASH UNDER THE BARRIER THROUGH THE GRASS BLADES OR PLANT STEMS.  
I. GOOD LOCATIONS FOR STAND-ALONE USE WITHOUT REINFORCEMENT BY OTHER BMPs ARE:  
- AT TOE OF SHALLOW SLOPES.  
- ON FROZEN GROUND, OUTCROPS OF BEDROCK AND VERY ROOTED FORESTED AREAS, AND  
- AT THE EDGE OF GRAVEL PARKING AREAS AND AREAS UNDER CONSTRUCTION.  
J. LOCATIONS WHERE OTHER BMPs SHOULD BE USED:  
- AT LOW POINTS OF CONCENTRATED RUNOFF.  
- BELOW CULVERT OUTLET APRONS.  
- WHERE A PREVIOUS STAND-ALONE EROSION CONTROL MIX APPLICATION HAS FAILED.  
- AT THE BOTTOM OF STEEP PERIMETER SLOPES THAT ARE MORE THAN 50 FEET FROM TOP TO BOTTOM (I.E., A LARGE UP-GRADE CONTRIBUTING WATERSHED), AND  
- AROUND CATCHBASINS AND CLOSED STORM SYSTEMS.  
2. BERMS SHALL REMAIN IN PLACE UNTIL UPSTREAM AREA IS COMPLETED OR 70% CATCH OF VEGETATION IS ATTAINED. BERMS SHALL BE REMOVED BY SPREADING SUCH THAT THE NATIVE EARTH CAN BE SEEN BELOW.



EROSION CONTROL MIX FILTER BERM DETAIL  
N.T.S.

(C)  
C-51

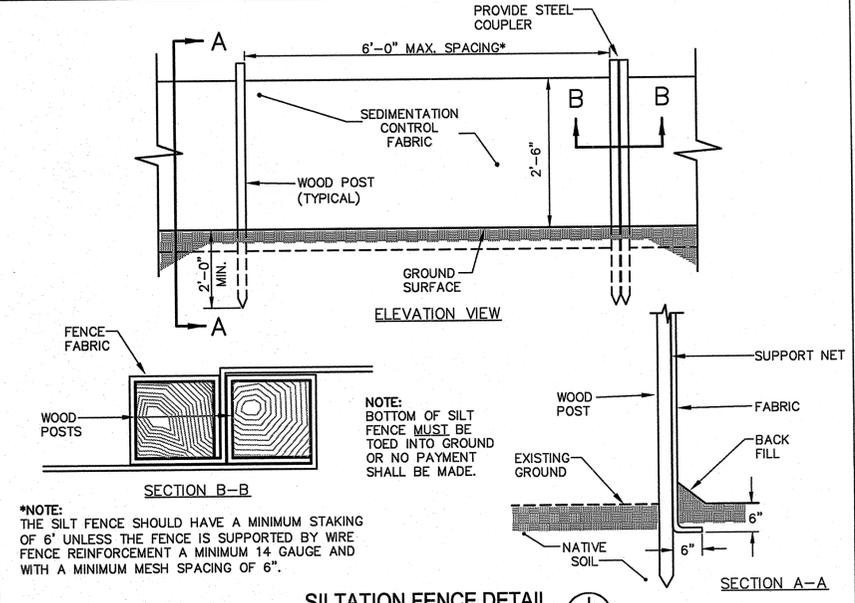


TURNOUT BERM AND TRENCH SPACING:  
SPACING SHALL BE BASED ON THE ROAD GRADE AS SHOWN BELOW:

ROAD GRADE	SPACING BETWEEN TURNOUTS
1-2%	200 FT.
3-10%	150 FT.
>10%	100 FT.

ROAD DITCH TURN OUT LEVEL SPREADER  
N.T.S.

(F)  
C-51



SILTATION FENCE DETAIL  
N.T.S.

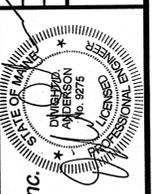
(I)  
C-51

EROSION CONTROL DETAILS

BLACK NUBBLE WIND FARM PROJECT  
MAINE MOUNTAIN POWER LLC

NO.	DATE	REVISIONS
3	06.22.07	REVISED FOR BLACK NUBBLE ONLY PROJECT
2	12.06.06	DESIGN SUBMISSION TO CLIENT
1	10.31.06	DRAFT SUBMISSION FOR CLIENT REVIEW - PARTIAL SET

DRAWN: CMW  
DESIGNED: DDA  
FILE NAME: 1708.09-DET  
SCALE: AS NOTED  
JOB NO. 1708.09  
M.A. Mortenson Company  
700 Meadow Lane North  
Minneapolis, MN 55440

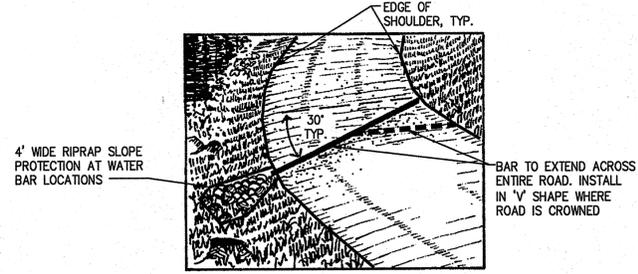
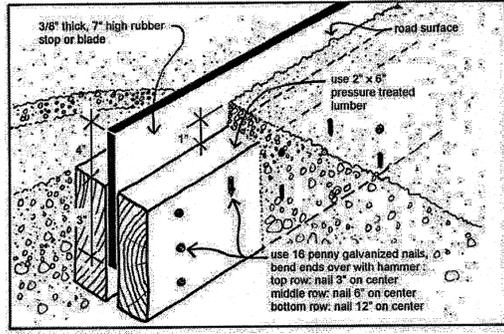


Deluca-Hoffman Associates, Inc.  
778 MAIN STREET, SUITE 8  
SOUTH PORTLAND, ME 04106  
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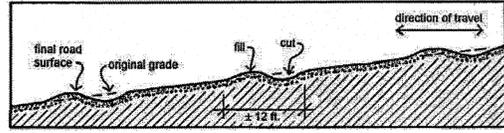


SHEET

C-51



**RUBBER WATER BAR DETAIL**  
N.T.S. A  
C-52



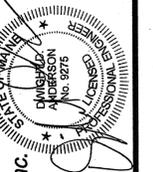
**GRAVEL WATER BAR DETAIL**  
N.T.S. B  
C-52

**EROSION CONTROL DETAILS**

DRAWN: CMW SCALE: AS NOTED  
DESIGNED: DDA JOB NO. 1708.09  
FILE NAME: 1708.09-DET

**MORTENSON**

M.A. Mortenson Company  
700 Meadow Lane North  
Minneapolis, MN 55440



**BLACK NUBBLE WIND FARM PROJECT  
MAINE MOUNTAIN POWER LLC**

DeLuca-Hoffman Associates, Inc.  
778 MAIN STREET, SUITE 8  
SOUTH PORTLAND, ME 04106  
207.775.1121  
www.delucahoffman.com



SHEET

**C-52**

NO.	DATE	REVISIONS
3	08.22.07	REVISED FOR BLACK NUBBLE ONLY PROJECT
2	12.06.06	DESIGN SUBMISSION TO CLIENT
1	10.31.06	DRAFT SUBMISSION FOR CLIENT REVIEW - PARTIAL SET

The control of erosion and sediment from the proposed construction of the access roads to serve the wind turbines has several requirements which will be necessary, irrespective of tools selected for construction:

- o A strict limitation on the amount of denuded (i.e. striped of stumps and grubbing) area exposed at any time;
- o The rapid establishment of drainage patterns to control runoff and divert it away from construction areas;
- o The proper selection and installation of the erosion control materials;
- o The use of native materials to the extent possible; and
- o The availability of the materials for construction without delay.
- o Use of winter conditions to limit and control the disturbance of soils that would be subject to erosion conditions at other times of the year.

These six principles that must be strictly adhered to and are essential for the erosion/sediment control plan to be successful. It is recommended that any contract include a specific statement requiring the contractor to certify the work will comply with the six requirements listed above.

These six limitations are expounded upon further in the following paragraphs:

#### 1.1 Limitation Upon Demanded Areas

There will undoubtedly be periods of adverse weather during the construction period for the roadways. Most construction areas are susceptible to erosion during adverse weather. By limiting the amount of denuded areas, the area exposed to erosion at any given time is reduced. Consequently, it becomes known that a major rain event will not cause significant erosion, because the open area which is susceptible to erosion will be small.

Achieving the objective will require the roadways be constructed and completed in segments as opposed to sequential step progression where one element (such as clearing and grubbing) is completed followed by the next construction element.

Limitation of the denuded area will require adherence to the construction sequence established by this report plan and designed to limit the size of any denuded area at a given time.

#### 1.2 Rapid Establishment of Drainage Patterns to Control Runoff and Avoidance of Erosion

This establishment includes the diversion of runoff from the construction site and the installation of the measures to collect and convey runoff across the roadway. These methods are described in the same sequence in which construction of these measures is recommended and will typically follow clearing operations.

##### 1.2.1 Wet or Seepage Areas

The first item will be to identify areas where wet conditions or seepage is observed. Field work by Al Frick has identified many of these areas as shown on the project drawings. Other areas may be encountered. The following sequence of measures to address these conditions is required:

- o Review the proposed profile and determine if an adjustment of the profile can be made to elevate the section of roadway over the wet seepage area. If so, the design profile should be readjusted, being cautious to remain within the basis of design parameters established for the established roadway.

- o Grub the wet area - The grubbing should attempt to remove the organics directly under the roadbed area only and in accordance with the geotechnical engineering report.

- o Place fabric and drainage stone as shown in the trap rock sandwich detail contained in the project drawings or place cross piping

- o Install cross culvert - In most areas at least a 12-inch culvert will be installed within or below the stone bedding. This may be done concurrently with the stone placement or as a subsequent step. However, if done later, the fabric will need to be cut and repaired.

- o Place and secure fabric over the stone (unless stipulated otherwise by the geotechnical representative).

- o Cover fabric with common borrow to provide at least 24 inches of cover over the top of the culvert.

- o Install the riprap culvert inlet and outlet aprons and channel including the flow dispersion lip for the culvert outlet.

##### 1.2.2 Install Cross Culverts Including Aprons And Outlet Flow Dispersion Lip

It is very important that culverts be carefully sited. The baseline data was obscured by dense ground cover in many areas, so field observation is required to finalize culvert locations. The final culvert locations should be at locations which appear to be stable and not eroded and at either natural low areas or areas where the flow dispersion lip can be eliminated. Culverts should be properly bedded and backfilled with cover material prior to crossing them with construction vehicles. Riprap aprons at the inlet and outlet should be installed at the same time that culverts are installed. Anticipated culvert locations are depicted on the project drawings.

##### 1.2.3 Divert Uphill Drainage

Runoff which must be handled during construction includes that emanating upslope of the work area. There is a series of implementation steps or tools to control runoff from the upgradient areas when necessary. These include:

- o A barrier positioned across the upslope area to divert the water. This method will be very effective when the barrier directs the runoff to an area where a culvert has been set to convey the water across the proposed access road.

The material of the diversion berm will vary. A suggested schedule of materials for the barrier, as well as suggested maintenance and removal, is provided in the table as follows:

#### Table 5 - Riprap Material Size for Diversion Berm

Flow Range (cfs)	Gradient (% Slope)			
	0-5	5-10	10-15	>15
0-2	450 = 2"	450 = 3"	450 = 3"	450 = 4"
2-4	450 = 2"	450 = 3"	450 = 4"	450 = 5"
4-6	450 = 3"	450 = 4"	450 = 5"	450 = 6"
6-10	450 = 3"	450 = 5"	450 = 7"	450 = 8"

- o An upgradient trench to divert the water: This alternative involves trenching in the upstream area to divert the runoff away from the slope. Instead of a berm, a ditch is constructed. The following table illustrates the treatment of the diversion ditch.

#### Table 6 - Diversion Ditch Size and Channel Treatment

Flow Range (cfs)	Gradient (% Slope)			
	0-5	5-10	10-15	>15
0-2	450 = 2"	450 = 3"	450 = 3"	450 = 4"
2-4	450 = 2"	450 = 3"	450 = 4"	450 = 5"
4-6	450 = 3"	450 = 4"	450 = 5"	450 = 6"
6-10	450 = 3"	450 = 5"	450 = 7"	450 = 8"

Generally, diversion berms will only be used in lower sections of the roadway where upstream drainage runoff is substantial due to the size of the catchment.

#### 1.2.4 Construct Backslope and Drainage Collector

The final step in the control of the drainage is to construct the ditch on the "cut" side of the roadway. This ditch is typically two feet deep with a 3:1 slope to the edge of shoulder and a backslope which matches the cut slope. The ditch should be protected with the final cover material within 24 hours of completing the final grading of any section of ditch. The ditch will lead to the riprap aprons of the cross culvert. In some cases, there may be a drainage collector up the backslope to intercept the runoff from the diversion berm. In areas where seepage is observed in the cut slope, a blanket drain or riprap slope will be installed.

#### 1.3 The Proper Selection and Installation of Erosion Control Materials

The erosion control material selection is contingent upon the slope, the tributary watershed and the season of construction. Winter provisions for erosion control are different than those used in the other periods of the year.

The installation of erosion control materials should be in strict accordance with the details, Maine DEP best management practices, and information provided by suppliers. There are numerous examples of past projects where silt fence has not been used in, erosion control fabrics have been installed in the wrong direction, and/or not secured in accordance with the requirements of the plans. The applicant will provide a training session for the contractor prior to the start of construction. Samples of all erosion control materials will be at the site of the training session in order that the selection and installation techniques can be reviewed. The bids and specifications for the contractor will have the plan attached.

#### 1.4 The Availability of the Materials for Construction

The contractor will not be allowed to substitute material or delay installation of erosion control measures. The contractor shall be given the responsibility to maintain an adequate supply of all erosion/sedimentation control materials. In the event that a material supply is depleted, additional areas for the roadway construction cannot be denuded until the materials have been received and are available for use on the project.

#### 2.0 Existing and Proposed Drainage Features for Roadways

The new roadways will traverse timberland with no formal drainage systems. The basis of design for the drainage system for the new roadways is detailed further in the Stormwater Management for Access Roadways and Basis of Design for the Roadways to Access Wind Turbines. The basic principles include:

- o Existing seeps and subsurface drainage channels will be retained to the extent possible. The tools to accommodate these are the fabric and crushed stone sandwich to be placed in locations where wet conditions are observed, the use of trap rock protected by fabric under the prepared subgrade, or cross piping. Details are shown on sheet C-30.

- o Especially in the higher elevations, the runoff is principally a mix of sheet flow, shallow concentrated flow, and subterranean flow. Culverts will be placed at frequent intervals to avoid flow concentration. When no downstream swale or runoff conveyance channel is observed, the flow will be re-dispersed at the outlet.

- o Intercepting groundwater where seeps or erosion of the cut slope are likely to occur.

The stormwater management report provides the basis for the size and placement of most culverts. However, placement will rely on field judgment and reconnaissance because the baseline data has been limited by thick vegetation. Most drainage channels have been located and are shown on the project drawings.

- o Placement of non-erodible material or geotextiles to re-disperse the flow.

- o Adding Culverts - For example, if a problem area was observed, and it appeared to be fed by 200 feet of runoff intercepted in the uphill ditch, a second culvert placed midway back of the ditch line would reduce the flow by 50%. Therefore, follow-up monitoring of the outlets will occur to verify discharge stability.

The existing roadways have existing culverts and bridges, which will be retained. If lengthening of culverts is required along existing roadways, the size will be matched. If culvert replacement were required, the replacement for small culverts would be increased by one size. (For example, a 15-inch culvert would be replaced with an 18-inch culvert.) Larger culverts would be checked for size before replacement using the procedures described in the stormwater management report for roadways.

#### 3.0 Critical Areas

The following four areas are considered "critical" areas:

##### 3.1 Areas Within the Designated Viewsheds

Stump disposal areas, borrow sources, and other features which result in additional clearing should not be located within the areas considered to be viewsheds. For identification of these areas, refer to the visual assessment portion of this application prepared by Terrace DeWan and Associates.

##### 3.2 Areas Near Natural Resources

Wetlands, streams, and other natural resources are considered critical areas. The critical areas include buffers as shown on the drawings. Only the specific work shown on the plans shall be permitted in these areas. No optional areas such as stockpiles, stump disposal areas, or borrow sources are located within these critical areas.

##### 3.3 Areas Above Elevation 2700

In areas above elevation 2,700, the period of exposure for denuded areas is reduced and the period where winter construction measures are required is longer than in the areas below this elevation. The contractor should take careful note of this differential.

##### 3.4 Areas With Slopes Over 25%

These areas are inherently unstable due to slope. Stump dumps and stockpiles are not located within these areas.

#### 4.0 Erosion/Sedimentation Control Measures

The Applicant should provide the contractor with this plan, since it defines the basis of the erosion/sedimentation control plan for the project. It is the responsibility of the contractor to properly install these devices to achieve the requirement for control of fugitive dust emissions, avoidance of turbid discharges, and avoiding significant sedimentation throughout construction. The proper installation of these devices, combined with the essential steps of implementation outlined in Sections 1.1 to 1.4, will be necessary for the contractor to meet these responsibilities. The devices described in this section are among the tools available to the contractor for construction of this project. These devices shall be installed as indicated on the plans or as described within this report plan. For further reference, see the Maine Erosion and Sediment Control Handbook for Construction: Best Management Practices, March 2003. Also see: State of Maine Department of Transportation (MDOT), Standard Specifications, Highways and Bridges, Revision of 1992; Erosion and Sediment Control Handbook for Maine Timber Harvesting Operations - Best Management Practices, June 1991; and Land Use Handbook - Section 6 - Erosion Control on Logging Jobs and Revision (Supplement), effective January 5, 1981. In addition, the contractor may add measures to meet the responsibility as defined by this narrative.

##### 4.1 Siltation Fence

Siltation fence shall be installed down slope of any disturbed areas to trap runoff-borne sediments until the site is revegetated. The silt fence shall be installed per the detail provided in the plan set and inspected immediately after each rainfall and at least daily during prolonged rainfall. The contractor shall make repairs immediately if there are any signs of erosion or sedimentation below the fence line. Proper placement of stakes and keying the bottom of the fabric into the ground is critical to the fence's effectiveness. If there are signs of undercutting at the center or the edges, or impounding of large volumes of water behind the fence, the barrier shall be replaced with a stone check dam.

Siltation fence on the downgradient side of the roadway should be installed after the profile and slope treatment for the applicable segment of roadway has been determined. (For additional information on the implementation steps refer to Section 1.1.7 of the basis of roadway design narrative.)

Silt fence is classified by three types depending upon the timing and intent as follows:

Table 10 - Schedule of Silt Fence Requirements		
Silt Fence	Type and Purpose	Time of Installation
Type 1	To trap sediment along the downgradient edge of the roadway with the silt fence; placed in segments to nearly parallel existing contours.	At initial site preparation and clearing, prior to other work. Also install around the perimeter of any stockpile which has erosion potential.
Type 2	To trap sediment from the work area; install in short sections parallel to existing contour; typically occurs where proposed and existing contours form a "V" shape.	During construction as the contour is shaped.
Type 3	To trap sediment along the base of proposed cut slopes; typically used in deepened cut areas.	During construction after new grade and backslope are shaped. Time between work in area and shaping new grade to allow silt fence to be installed shall be minimized. Typically not required if the cut slope height exceeds five feet. However, slopes which are found to be wet or have seepage may warrant the use of this silt fence for shallower heights.

##### 4.2 Mulch

Straw, bark or hay mulch, including hydroseeding, is intended to provide cover for denuded or seeded areas until revegetation is established. Mulch placed on slopes of less than 10 percent shall be anchored by applying water, mulch placed on slopes steeper than 10 percent shall be covered with fabric netting and anchored with staples in accordance with the manufacturer's recommendations. Proposed drainage channels and the ditch at the top of the "cut" slopes, (which are to be revegetated), shall receive Curlex blankets by American Excelsior or equal. Mulch application rates are provided in the seeding plans at the end of this narrative. Hay mulch shall be available on site at all times in order to provide immediate temporary stabilization when necessary. Where necessary, a temporary stone channel pipe sluice may be used to convey runoff down the slope as might be required from upstream diversion berms. For the cover material to be effective, it is necessary that it is applied uniformly at the rates indicated in this report plan and that proper anchorage be used to secure the material in place. Erosion Control Mix slope protection will be used as the primary soil stabilization measure to encourage natural woody vegetation to grow back.

##### 4.3 Erosion Control Mix

Erosion and sedimentation control material processed on site is intended to provide a cover material over bare slopes as an erosion control material. It may also be applied as a berm for erosion and sedimentation control in lieu of silt fence where appropriate.

##### 4.4 Riprap

Riprap slopes, ditch linings, stone check dams, hay bale barriers, and culvert outlet aprons are intended to reduce runoff velocities and protect denuded soil surfaces from concentrated flows. Installation details and stone sizes are provided in the construction details which accompany this plan.

##### 4.5 Diversion Berms

Flow dispersion berms at culvert outlets are intended to help re-disperse the flow. In areas where a defined area for concentrated flow is visible, the need for this will be less pronounced. In other areas, the redistribution of the water will be necessary. The field identification of appropriate discharge locations and treatment of culvert discharges is likely the most substantial element for the success of the implementation of the erosion control methods. During the course of construction, the flow pattern of the runoff discharge should be carefully observed. There will be instances where the outlet area is less stable than anticipated. In these areas it is recommended that a geotextile or stone be placed downgradient to a location where stable flow conditions are apparent.

##### 4.6 Construction Entrances

A construction entrance will be constructed between the terminus of the last completed segment of roadway and the next section scheduled for construction.

##### 4.7 Sediment Traps

Stone sediment traps or a premanufactured SiltSack™ will be installed ahead of culvert inlets. Installation details are provided in the plan set on the erosion control detail sheets.

##### 4.8 Reinforced Turf or Reinforced Erosion Control Mix

This treatment will be used on steep slopes where a vegetated fill slope steeper than 3:1 but equal to or shallower than 2:1 is constructed in areas designated on the drawings. Reinforced turf with loam is not to be used above elevation 2,700.

##### 4.9 Dirtbags™

Dirtbags™ will be required to be on site and available for construction dewatering. The contractor will be required to provide as many Dirtbags™ as necessary with one available for use in any new roadway segment. These will have particular benefit for dewatering of areas where wet subgrade has been encountered and filtering of turbid water is required.

##### 4.10 Loam and Seed

Loam and seed is intended to serve as a permanent revegetative measure for denuded areas not provided with other erosion control measures, such as riprap. However, to allow natural woody vegetation to grow back, erosion control mix slope protection is preferred over loam and seed and will be used as the primary soil stabilization measure. Application rates are provided at the end of this narrative for temporary and permanent seeding in non-wetland areas. Loam and seed is not to be used above elevation 2,700.

##### 4.11 Special Steep Slopes

Special slope protection devices to allow back and fill slopes to be constructed with near vertical slopes are designed to retain the slope without erosion. These include gabions, nail walls, Miraweb, and reinforced slopes illustrated on the detail drawings.

##### 4.12 Separation Fabric

Separation fabrics to place in wet crossing areas in conjunction with stone or trap rock are designed to reduce turbidity and avoid rutting of the subgrade, thereby reducing turbidity on the construction site.

#### 5.0 Temporary Erosion/Sedimentation Control Measures

The following are planned as temporary erosion/sedimentation control measures during construction:

- o A crushed-stone-stabilized construction entrance shall be placed at any construction access points from the terminus of established roadways. This location will shift as segments of the roadway are constructed.

- o Type 1 and 2 siltation fence shall be installed along the downgradient side of the proposed improvement areas. The siltation fence will remain in place and properly maintained until the site is acceptably revegetated.

- o Dirtbags™ shall be available for use and, where necessary, installed in accordance with the details in the plan set. The Dirtbags™ function on the project is to receive any water pumped from excavations during construction. When Dirtbags™ are observed to be at 50% capacity, they shall be cleaned or replaced. Stone under the Dirtbags™ shall be removed and replaced concurrently.

- o Temporary stockpiles of erodible materials should be protected as follows:

1. Temporary stockpiles shall not be located within critical areas and shall be surrounded by silt fence. In general, these stockpiles are expected to consist of the material which has been stripped from the surface.

2. Inactive stockpiles shall be stabilized within 5 days by either temporarily seeding the stockpile with a hydroseeded material containing an emulsified mulch tackifier or by covering the stockpile with mulch or erosion and sediment control mix. If necessary, mesh shall be installed to prevent wind from removing the mulch. Mulch containing any seed other than balsam fir is not to be used above elevation 2,700.

- o All back and fill slopes below elevation 2,700 which will be seeded should be rough graded then fine graded with loam or an organic soil mixture. The mulch and mesh should be applied as soon as possible. As noted, the goal during the drier construction periods of the year should be to construct the roadway in sections which can be constructed in a one week period.

- o All soils disturbed between November 1 and April 1 in areas below elevation 2,700 (and between September 1 and May 31 in areas above elevation 2,700) should be covered with mulch or erosion control mix within 5 days of disturbance, prior to any predicted storm event of the equivalent of 1/2" of equivalent rainfall in a 24-hour period, or prior to any work shutdown lasting more than 35 hours (including weekends and holidays). The mulch rate shall be double the normal rate.

For denuded work areas not being covered with stone or gravel that occur between November 1 and April 15 in areas below elevation 2,700 (and between September 1 and May 31 in areas above elevation 2,700), they should have a cover of mulch, applied at twice the normal application rate, or Erosion Control Mix. All mulched areas shall be covered with at least an anchored fabric netting. The time period for applying mulch in areas below elevation 2,700 shall be limited to 5 days for all areas or immediately in advance of a predicted rainfall event. In areas above elevation 2,700, the period will be 3 days.

- o The existing roadways shall be treated to control fugitive dust as necessary. In fall and spring, a water truck may be adequate, but it is likely that calcium chloride will be necessary during the months of higher evaporation. In addition to control of fugitive dust, the margin of safety for equipment and vehicle operations should be enhanced as a result of the better visibility.

- o Stone check dams or hay bale barriers or downstream stone or fabric should be installed at any event concentrated flow discharge points during construction and earthwork operations. The treatment should extend downgradient to a location where stable flow conditions exist.

- o Silt fencing with a maximum stake spacing of 6 feet should be used, unless the fence is supported by wire fence reinforcement of minimum 14 gauge and with a maximum mesh spacing of 6 inches, in which case stakes may be spaced a maximum of 10 feet apart. The bottom of the fence should be properly anchored a minimum of 6" per the plan detail and backfilled. Any silt fence identified by the applicant or reviewing agencies as not being properly installed during construction shall be immediately repaired in accordance with the installation details.

- o Culvert inlet protection shall be provided through the use of stone sediment barriers, check dams, or a premanufactured SiltSack™ as distributed by A. H. Harris Company, Portland, Maine. Stone sediment barrier installation details are provided in the plan set. The barriers or SiltSacks™ shall be inspected after each rainfall and repairs made as necessary, including the removal of sediment. Sediment shall be removed and the barrier or SiltSack™ restored to its original dimensions when the sediment has accumulated to 1/2 the design depth of the barrier. Sediment shall be removed from SiltSacks™ as necessary. Inlet protection shall be removed when the tributary drainage area has been stabilized.

- o All slopes over 4:1 shall receive erosion control mesh.

- o Slopes steeper than 3:1 shall receive reinforced turf or reinforced Erosion Control Mix.

- o Type 3 silt fences shall be installed as construction progresses.

- o Areas of visible erosion shall be stabilized with crushed stone. The size of the stone shall be determined based upon flow, slopes, and observed field conditions.

All temporary sedimentation and erosion control measures shall be removed after construction activity has ceased and a healthy vegetation has established itself or other appropriate permanent control measures have been implemented.

#### 6.0 Standards for Stabilizing Sites for the Winter

6.1 Standard For The Timely Stabilization Of Ditches And Channels  
The following additional measures apply to the colder seasons. The contractor shall construct and stabilize stone-lined ditches and channels along the roadway using the standard methods by November 15 (except in elevations above 2,700 where standard methods apply only until September 30). The contractor shall construct and stabilize all grass-lined ditches and channels along the roadway using the standard methods by September 15 (except in areas above elevation 2,700 where the standard methods apply only until August 21). If the contractor fails to stabilize a ditch or channel to be grass-lined by the specified date then the contractor shall take one of the following actions to stabilize the ditch for late fall and winter.

- q Install A Sod Lining In The Ditch - The contractor shall line the ditch with properly installed sod. Proper installation includes the applicant pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, watering the sod to promote root growth into the disturbed soil, and anchoring the sod with jute or plastic mesh to prevent the sod strips from sloughing during flow conditions.

- o Install A Stone Lining In The Ditch - The contractor shall line the ditch with stone riprap. The contractor shall hire a registered professional engineer to determine the stone size and lining thickness needed to withstand the anticipated flow velocities and flow depths within the ditch. If necessary, the contractor shall regrade the ditch prior to placing the stone lining so as to prevent the stone lining from reducing the ditch's cross-sectional area.

#### 6.2 Standard For The Timely Stabilization Of Disturbed Slopes

The contractor shall construct and stabilize stone-covered slopes using standard methods by November 15 (except in elevations above 2,700 where the standard methods apply until September 30). Permanent slope stabilization measures must be installed within 48 hours of completing the final grading for any section of slope. The contractor shall seed and mulch all slopes to be vegetated using standard methods by September 15, except in elevations above 2,700, where the standard methods will end on August 21. The department will consider any area having a grade greater than 15% (7H: 1V) to be a slope. If the contractor fails to stabilize any slope to be vegetated by the specified date, the contractor shall take one of the following actions to stabilize the slope for late fall and winter.

- o Stabilize The Soil With Temporary Vegetation And Erosion Control Mesh - By September 15 (except August 15 in areas above elevation 2,700) (mulch containing any other seed than balsam fir is not to be used above elevation 2,700) the contractor shall seed the disturbed slope with winter rye at a seeding rate of 3 pounds per 1,000 square feet and apply erosion control mats over the mulched slope. The contractor shall monitor growth of the rye over the next 45 days. If the rye fails to grow to at least three inches or fails to cover at least 75% of the disturbed slope by November 15, then the contractor shall cover the slope with a layer of Erosion Control Mix as described in this standard, or with stone riprap as described in this standard. Rye grass and any other specified grass seed is only to be used below elevation 2,700.

- o Stabilize The Slope With Sod - The contractor shall stabilize the disturbed slope with properly installed sod by October 1 (sod is not to be used above elevation 2,700). Proper installation includes the contractor pinning the sod onto the slope with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil. The contractor shall not use late-season sod installation to stabilize slopes having a grade greater than 33% (3H: 1V) or having groundwater seeps on the slope face.

- o Stabilize The Slope With Erosion and Sedimentation Control Mix - The contractor shall place a four-inch layer of erosion and sedimentation control mix on the slope by November 15 (October 1 in areas above elevation 2,700). Prior to placing the erosion and sedimentation control mix, the contractor shall remove any snow accumulation on the disturbed slope. The contractor shall not use erosion and sedimentation control mix to stabilize slopes having grades greater than 50% (2H: 1V) or having groundwater seeps on the slope face.

- o Stabilize The Slope With Stone Rip Rap - The contractor shall place a layer of stone riprap on the slope by November 15 (October 1 in areas above elevation 2,700). The contractor shall hire a registered professional engineer to determine the stone size needed for stability and to design a filter layer for underneath the riprap.

#### 6.3 Standard For The Timely Stabilization Of Disturbed Soil

By September 15 (August 1 in areas above elevation 2,700) the contractor shall seed and mulch all disturbed soils on areas having a slope less than 15%. If the contractor fails to stabilize these soils by this date, then the contractor shall take one of the following actions to stabilize the soil for late fall and winter. Mulch containing any other seed than balsam fir is not to be used above elevation 2,700.

- o Stabilize The Soil With Temporary Vegetation - By September 15, the contractor shall seed the disturbed soil with winter rye at a seeding rate of 3 pounds per 1,000 square feet, lightly mulch the seeded soil with hay or straw at 75 pounds per 1,000 square feet, and anchor the mulch with plastic netting. The contractor shall monitor the growth of the rye over the next 45 days. If the rye fails to grow to at least three inches or fails to cover at least 75% of the disturbed soil before November 15, then the contractor shall mulch the area for over-winter protection.

- o Stabilize The Soil With Sod - The contractor shall stabilize the disturbed soil with properly installed sod by October 1. Proper installation includes the contractor pinning the sod onto the soil with wire pins, rolling the sod to guarantee contact between the sod and underlying soil, and watering the sod to promote root growth into the disturbed soil.

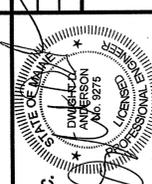
- o Stabilize The Soil With Mulch - By November 15, the contractor shall mulch the disturbed soil by spreading hay or straw at a rate of at least 150 pounds per 1,000 square feet on the area so that no soil is visible through the mulch. Prior to applying the mulch, the contractor shall remove any snow accumulation on the disturbed area. Immediately after applying the mulch, the contractor shall anchor the mulch with plastic netting to prevent wind from moving the mulch off the disturbed soil.

#### 7.0 Sedimentation Sumps

The use of shallow sediment sumps on the downgradient side of erodible stockpiles and in areas where excess borrow is removed from the "cut side" of the roadway is encouraged.

EROSION CONTROL NOTES

BLACK NUBBLE WIND FARM PROJECT  
MAINE MOUNTAIN POWER LLC



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SHEET

C-53

NO.	DATE	REVISIONS
3	06.22.07	REVISED FOR BLACK NUBBLE ONLY PROJECT
2	12.06.06	DESIGN SUBMISSION TO CLIENT
1	10.31.06	DRAFT SUBMISSION FOR CLIENT REVIEW - PARTIAL SET

8.0 Permanent Erosion Control Measures

The permanent erosion control measures for the roadways include:

- The culverts with proper inlet and outlet aprons and flow dispersion berms where necessary;
The ditch on the cut side of the roadway with riprap protection;
The properly designed and constructed measures for cut or fill slopes which exceed 2:1 including riprap, soil nail walls, gabions, geoweb, and similar steep slope construction measures;
Ditch turnouts;
Restored borrow pit areas;
Graded and revegetated stump disposal areas; and
Properly designed bridges where specified.

LURC standards require permanent soil stabilization to be completed within one week of inactivity or completion of construction and the following more stringent stabilization time requirements apply to this project:

- Permanent slope stabilization measures must be installed within 48 hours of completing the final grading for any section of slope.
Permanent ditch stabilization measures must be installed within 24 hours of completing the final grading for any section of ditch.

9.0 Timing and Sequence of Erosion/Sedimentation Control Measures

In defining the length of the segment of roadway to be constructed at a given time, the following guidance is offered:

- 1) A working road segment, defined as a denuded area of the roadway corridor (i.e. stumped and grubbed), should not exceed the length which can be constructed in a one-week period. A number of working road segments in various areas of the project are expected to be constructed simultaneously by multiple construction crews. During wet periods of saturated soils when runoff is higher, it is recommended that segment lengths be limited to the amount of roadway which can be constructed in two to three days. Above elevation 2,700, segment lengths should be reduced below the periods noted above as deemed necessary by the onsite field engineer.
2) Where possible, the terminus of a segment of roadway should end either where special pretreatment of the subgrade is necessary due to soft ground or seepage and high groundwater conditions, or at the cut/fill transition points.
When this is impracticable, a temporary crossing of the wet area should be made with a corduroy crossing or other temporary roadway measures.

A full time field engineer shall be onsite and will be required to log daily construction activities by stationing.

An engineer with expertise in storm water management will be present during construction to identify seepages and drainage swales not found during the field investigations, and to make adjustments to the road design during construction to maintain the slope hydrology.

The following sequence is recommended for each roadway segment. Where possible, roadway segments should end just beyond a cross culvert.

- 1. Mark the centerline.
2. Clear a 40-foot corridor centered on the proposed roadway centerline using temporary skidder roads with appropriate stabilized crossings over wet areas.
3. Stakeout the roadway at 50-foot sections and walkover by the project team to select final:
4. Cross section and slope treatment to be used along the segment;
5. Final clearing including select clearing of trees over 6-inch diameter 20 feet behind the grading limits.
6. Install type 1 and 2 silt fence and/or erosion control mix berm.
7. Stabilize wet or seepage areas.
8. Install cross culverts including inlet and outlet aprons with dispersion berm if necessary.
9. Install temporary erosion control measures ahead of culvert inlet.
10. Grub the roadway segment.
11. Prepare backslope (if blasting is required, it should be completed for the roadway segment concurrent with this step).
12. Install underdrain and cross hydrology piping if necessary.
13. Install ditch and prepare roadway subgrade.
14. Install type 3 silt fence.
15. Install erosion control and final restoration measures in the ditch including meshes and staples.
16. Dress backslope including placement of final surface cover with mesh and staples.
17. Install roadway gravels.
18. Remove construction entrance.
19. Dress and restore fill slope (certain fill slopes with structural reinforcement will need to be integrated with subgrade preparation) including surface restoration.
20. Final grading of roadway surface.
21. Guide rail can be installed subsequently in groups of several segments.
22. Periodically remove sediment from barriers and dress up any areas of minor erosion rills.
23. Remove temporary erosion control measures after site stabilization has been achieved (for vegetation, a 75% catch of healthy vegetation is required).

Any deviation from this sequence is subject to approval of the applicant and may require separate approval of the regulatory officials.

10.0 Contracting Procedure

The roadways for the project will be constructed by subcontractors of the applicant. The contract documents will require a schedule for the completion of the work which will satisfy the following criteria:

- 10.1 The Work Shall Be Constructed In Accordance With This Erosion Control Report/Plan Work must also be scheduled or phased to prevent the extent of the exposed areas as stipulated in this report/plan.
10.2 The Area of Denuded Non-Stabilized Construction Shall Be Limited To The Minimum Area Practicable.

An area shall be considered to be denuded until the surface gravel is installed on the roadway surface, the final surface treatment constructed, the areas have been loamed, seeded, and mulched or covered with erosion control mix.

Any deviations from the schedule or provisions contained in this report plan shall require the approval of the permittee. The permittee may elect to consult with LURC to secure their approval prior to approving any schedule changes.

The contractor must install any added measures which may be necessary to control erosion/sedimentation from the site, dependent upon the actual site and weather conditions occurring at the time of construction.

The applicant will retain an inspector. The contractor shall cooperate with the inspector and permit access to the site by the inspector at all times.

11.0 Provisions for Winter or Seasonal Shutdown Because the roadway construction is required to be completed in small segments, the ability to shut down the work for seasonal or other reasons should be relatively easy.

An inspection shall be made to identify any areas where additional erosion control work is needed. Such areas shall be repaired.

The new access roads shall be secured and barricaded to prevent illicit entry.

Subsequently, the new and reconstructed access roads shall be re-inspected after a significant rainfall. Any eroded areas shall be repaired.

12.0 Provisions for Maintenance of the Erosion/Sedimentation Control Features The roadway construction will be contracted by the applicant. The work will be subject to the requirements of a LURC Permit. The final provisions of this permit are anticipated to require the applicant and his contractors to prepare a list and designate by name, address and telephone number all individuals who will be responsible for implementation, inspection and maintenance of all erosion control measures identified within this section and as contained in the Erosion and Sedimentation Control Plan of the contract drawings.

- 1. Execution of the Contractor/Subcontractor Certification contained within this plan by any and all parties responsible for erosion control measures on the site.
2. Assuring and certifying the contractor's construction sequence is in conformance with the specified schedule of this report/plan.
3. In addition to the weekly certifications, the inspector(s) shall maintain written reports recording construction activities on site which include:
4. Inspection of this project work site on a weekly basis and after each significant rainfall event (0.5 inches or more within any consecutive 24-hour period) during construction until permanent erosion control measures have been properly installed and the site has been stabilized.

Once construction has been completed, long-term maintenance of the permanent erosion control measures and storm water systems will be the responsibility of the applicant.

All certifications, inspection forms, and written reports prepared by the inspector(s) should be filed with the applicant, and the MCGP Permit File contained on the project site.

The procedures for maintenance and inspections after construction are provided in the Basis of Stormwater Management for Access Roadways report.

13.0 Preconstruction Conference

Prior to any construction at the site, representatives of LURC, the roadway contractor, the geotechnical engineer, and the site design engineer should meet with the applicant to discuss the scheduling of the site construction and compliance with this plan.

14.0 Closure

This Erosion and Sedimentation Control Report Plan applies to turbine sites and the new roadways which will be constructed for access to the proposed wind turbines and improvements of existing roadways.

Seeding Plan

PERMANENT SEEDING PLAN AREAS ABOVE 2,700 FEET

Areas required to be seeded above elevation 2,700 feet are identified in the Vegetation Notes section on sheet C-2. These areas are to be seeded with balsam fir seeds only.

PERMANENT SEEDING PLAN NON-WETLAND AREAS BELOW 2,700 FEET

Project Black Nubble Mountain Wind Farm Site Location Roadway Construction X Permanent Seeding Temporary Seeding

- 1. Area to be seeded: not determined acre, OR M Sq. Ft.
2. Instructions on preparation of soil: Prepare a good seed bed for planting method used.
3. Apply lime as follows: #/acres, OR 138#/M Sq. Ft.
4. Fertilize with pounds of - - N-P-K/ac. OR 18.4 pounds of 10-20-20 N-P-K/M Sq. Ft.
5. Method of applying lime and fertilizer: Spread and work into the soil before seeding.
6. Seed with the following mixture: 50% Agrostis perennans (autumn bentgrass, upland bentgrass) 20% Deschampsia flexuosa (common hairgrass, wavy hairgrass), as available 15% Danthonia spicata (poverty oatgrass) 15% Danthonia compressa (wild oatgrass)
7. Mulching instructions: Apply at the rate of tons per acre. OR 115 pounds per M. Sq. Ft.

Table with 3 columns: Amount, Unit #, Tons, Etc. Rows include TOTAL LIME, TOTAL FERTILIZER, TOTAL SEED, TOTAL MULCH, and TOTAL other materials, seeds, etc.

- REMARKS
Recommended seeding dates: Varies with elevation; see narrative.
For areas with slopes >10%, waterways, areas within 100 feet of wetlands, and fall and winter erosion control areas, mulch netting shall be used per manufacturer's specifications.

Fertilizer requirements shall be subject to actual test results of the topsoil used for the project. The contractor shall be responsible for providing topsoil test results for pH and recommended fertilizer application rates to the permittee.

SEEDING PLAN WETLAND AREAS BELOW 2,700 FEET

- Project Black Nubble Mountain Wind Farm Site Location Roadway Construction X Permanent Seeding Temporary Seeding
1. Area to be seeded: Not Determined acre, OR M Sq. Ft.
2. Instructions on preparation of soil: Prepare a good seed bed for planting method used.
3. Apply lime as follows: #/acres, OR 138#/M Sq. Ft.
4. Fertilize with pounds of - - N-P-K/ac. OR 18.4 pounds of 10-20-20 N-P-K/M Sq. Ft.
5. Method of applying lime and fertilizer: Spread and work into the soil before seeding.
6. Seed with the following mixture: 75% Calamagrostis canadensis (Canada bluejoint) 25% Scirpus cyperinus (wool-grass)

When using small grain as nurse crop seed it at one-half the normal seeding rate.

- 7. Mulching instructions: Apply at the rate of tons per acre. OR 180 pounds per M. Sq. Ft.
8. TOTAL LIME.....138 #/1000 sq. ft.
9. TOTAL FERTILIZER.....18.4 #/1000 sq. ft.
10. TOTAL SEED.....5.0 #/1000 sq. ft.
11. TOTAL MULCH.....180 #/1000 sq. ft.
12. TOTAL other materials, seeds, etc.....

- REMARKS
The above seed mix is required in all temporarily disturbed wetland areas.

Fertilizer requirements shall be subject to actual test results of the topsoil used for the project. The contractor shall be responsible for providing topsoil test results for pH and recommended fertilizer application rates to the permittee.

TEMPORARY SEEDING PLAN NON-WETLAND AREAS BELOW 2,700 FEET

Project Black Nubble Mountain Wind Farm Site Location Roadway Construction X Permanent Seeding Temporary Seeding

- 1. Area to be seeded: not determined acre, OR M Sq. Ft.
2. Instructions on preparation of soil: Prepare a good seed bed for planting method used.
3. Apply lime as follows: #/acres, OR 138#/M Sq. Ft.
4. Fertilize with pounds of - - N-P-K/ac. OR 18.4 pounds of 10-20-20 N-P-K/M Sq. Ft.
5. Method of applying lime and fertilizer: Spread and work into the soil before seeding.
6. Seed with the following mixture: 100% Secale cereale (annual rye)

When using small grain as nurse crop seed it at one-half the normal seeding rate.

- 7. Mulching instructions: Apply at the rate of tons per acre. OR 230 pounds per M. Sq. Ft.
8. TOTAL LIME.....138 #/1000 sq. ft.
9. TOTAL FERTILIZER.....18.4 #/1000 sq. ft.
10. TOTAL SEED.....4.0 #/1000 sq. ft.
11. TOTAL MULCH.....115 #/1000 sq. ft.
12. TOTAL other materials, seeds, etc.....

- REMARKS
Spring seeding is recommended, however, late summer (prior to date specified in narrative) seeding can be made. Permanent seeding should be made prior to date specified in narrative or as a dormant seeding after the first killing frost and before the first snowfall.

Fertilizer requirements shall be subject to actual test results of the topsoil used for the project. The contractor shall be responsible for providing topsoil test results for pH and recommended fertilizer application rates to the permittee.

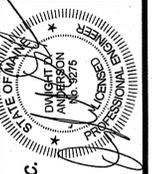
Fertilizer requirements shall be subject to actual test results of the topsoil used for the project. The contractor shall be responsible for providing topsoil test results for pH and recommended fertilizer application rates to the permittee.

EROSION CONTROL NOTES

BLACK NUBBLE WIND FARM PROJECT MAINE MOUNTAIN POWER LLC

Table with columns: NO., DATE, REVISIONS. Rows include 3, 06.22.07, 2, 12.06.06, 1, 10.31.06.

MORTENSON logo and contact information: M.A. Mortenson Company, 700 Meadow Lane North, Minneapolis, MN 55440.

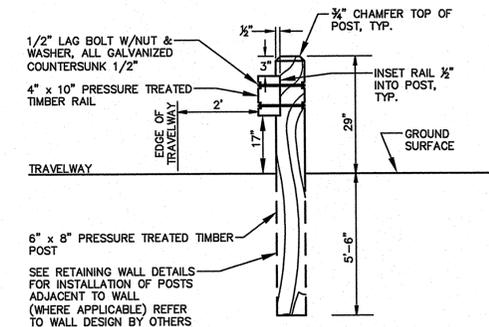
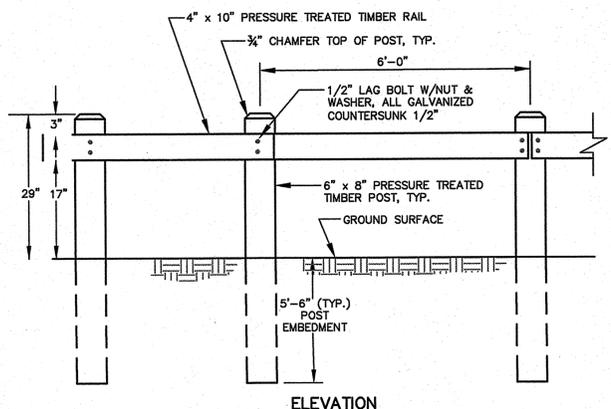
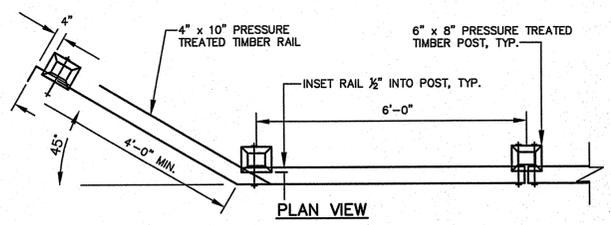


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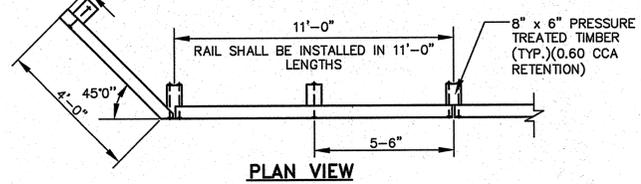
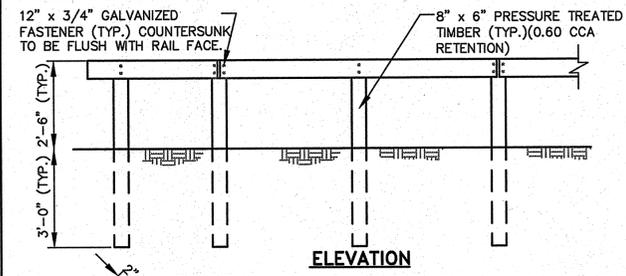


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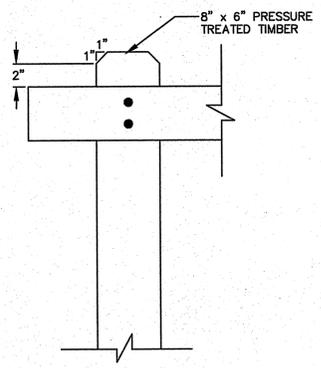
C-54



**(A) TIMBER GUIDERAIL DETAIL**  
N.T.S.



**(B) TIMBER GUIDERAIL DETAIL**  
N.T.S.



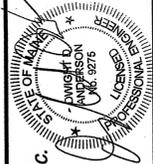
**(C) TIMBER CHAMFER DETAIL**  
N.T.S.

**SPECIAL CONSTRUCTION DETAILS**

DRAWN:	CMW	SCALE:	AS NOTED
DESIGNED:	DDA	JOB NO.:	1708.08
FILE NAME:	1708.09-JET		
<b>MORTENSON</b> M.A. Mortenson Company 700 Meadow Lane North Minneapolis, MN 55440			

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**C-55**

NO.	DATE	REVISIONS
1	06.22.07	REVISED FOR BLACK NUBBLE ONLY PROJECT