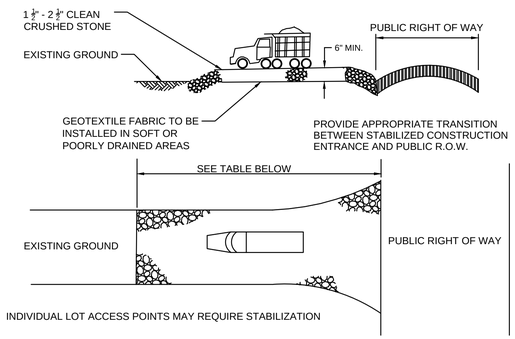

STABILIZED CONSTRUCTION ENTRANCE DETAIL

NOT TO SCALE

PERCENT SLOPE OF ROADWAY	LENGTH OF STONE REQUIRED
0 TO 2%	100 FT.
>2%	200 FT.

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STABILIZED CONSTRUCTION ENTRANCE DETAIL

FIGURE 1

ROAD GRADE (PERCENT)	APPROX DISTANCE BETWEEN DIVERSIONS (FT)	ROAD GRADE (PERCENT)	APPROX DISTANCE BETWEEN DIVERSIONS (FT)
1	400	15	60
2	245	20	50
5	125	25	40
10	80	30	35

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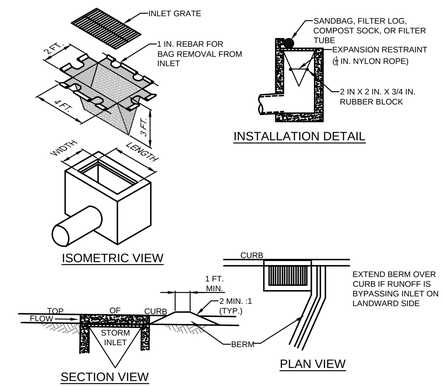
ROADBED DIVERSIONS

FIGURE 2



NOTES:

MAXIMUM DRAINAGE AREA = 1/2 ACRE.

INLET PROTECTION SHALL NOT BE REQUIRED FOR INLET TRIBUTARY TO SEDIMENT BASIN OR TRAP. BERMS SHALL BE REQUIRED FOR ALL INSTALLATIONS.

ROLLED EARTHEN BERM SHALL BE MAINTAINED UNTIL ROADWAY IS STONED. ROAD SUBBASE BERM SHALL BE MAINTAINED UNTIL ROADWAY IS PAVED. SIX INCH MINIMUM HEIGHT ASPHALT BERM SHALL BE MAINTAINED UNTIL ROADWAY SURFACE RECEIVES FINAL COAT.

AT A MINIMUM, THE FABRIC SHALL HAVE A MINIMUM GRAB TENSILE STRENGTH OF 120 LBS, A MINIMUM BURST STRENGTH OF 200 PSI, AND A MINIMUM TRAPEZOIDAL TEAR STRENGTH OF 50 LBS. FILTER BAGS SHALL BE CAPABLE OF TRAPPING ALL PARTICLES NOT PASSING A NO. 40 SIEVE.

INLET FILTER BAGS SHALL BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT. BAGS SHALL BE EMPTIED AND RINSED OR REPLACED WHEN HALF FULL OR WHEN FLOW CAPACITY HAS BEEN REDUCED SO AS TO CAUSE FLOODING OR BYPASSING OF THE INLET. DAMAGED OR CLOGGED BAGS SHALL BE REPLACED. A SUPPLY SHALL BE MAINTAINED ON SITE FOR REPLACEMENT OF BAGS. ALL NEEDED REPAIRS SHALL BE INITIATED IMMEDIATELY AFTER THE INSPECTION. DISPOSE OF ACCUMULATED SEDIMENT AS WELL AS ALL USED BAGS ACCORDING TO THE PLAN NOTES.

DO NOT USE ON MAJOR PAVED ROADWAYS WHERE PONDING MAY CAUSE TRAFFIC HAZARDS.

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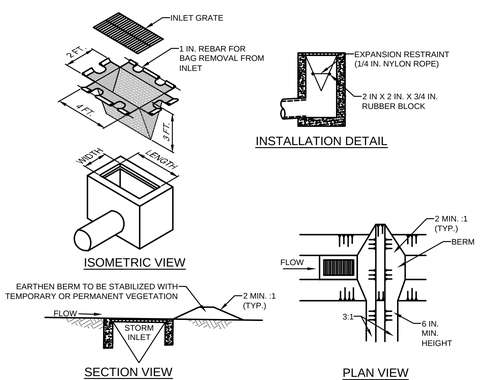
PENNEAST PIPELINE PROJECT

FILTER BAG INLET PROTECTION TYPE C INLET

FIGURE 3



NOTES:

MAXIMUM DRAINAGE AREA = 1/2 ACRE.

INLET PROTECTION SHALL NOT BE REQUIRED FOR INLET TRIBUTARY TO SEDIMENT BASIN OR TRAP. BERMS SHALL BE REQUIRED FOR ALL INSTALLATIONS.

ROLLED EARTHEN BERM IN ROADWAY SHALL BE MAINTAINED UNTIL ROADWAY IS STONED. ROAD SUBBASE BERM ON ROADWAY SHALL BE MAINTAINED UNTIL ROADWAY IS PAVED. EARTHEN BERM IN CHANNEL SHALL BE MAINTAINED UNTIL PERMANENT STABILIZATION IS COMPLETED OR REMAIN PERMANENTLY.

AT A MINIMUM, THE FABRIC SHALL HAVE A MINIMUM GRAB TENSILE STRENGTH OF 120 LBS., A MINIMUM BURST STRENGTH OF 200 PSI, AND A MINIMUM TRAPEZOIDAL TEAR STRENGTH OF 50 LBS. FILTER BAGS SHALL BE CAPABLE OF TRAPPING ALL PARTICLES NOT PASSING A NO. 40 SIEVE.

INLET FILTER BAGS SHALL BE INSPECTED ON A WEEKLY BASIS AND AFTER EACH RUNOFF EVENT. BAGS SHALL BE EMPTIED AND RINSED OR REPLACED WHEN HALF FULL OR WHEN FLOW CAPACITY HAS BEEN REDUCED SO AS TO CAUSE FLOODING OR BYPASSING OF THE INLET. DAMAGED OR CLOGGED BAGS SHALL BE REPLACED. A SUPPLY SHALL BE MAINTAINED ON SITE FOR REPLACEMENT OF BAGS. ALL NEEDED REPAIRS SHALL BE INITIATED IMMEDIATELY AFTER THE INSPECTION. DISPOSE ACCUMULATED SEDIMENT AS WELL AS ALL USED BAGS ACCORDING TO THE PLAN NOTES.

DO NOT USE ON MAJOR PAVED ROADWAYS WHERE PONDING MAY CAUSE TRAFFIC HAZARDS.

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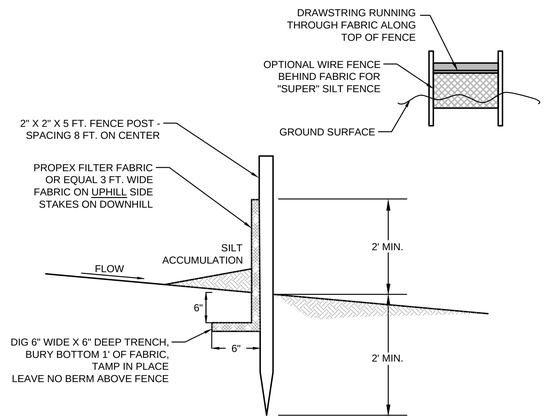
PennEast PIPELINE

PENNEAST PIPELINE PROJECT

FILTER BAG INLET PROTECTION TYPE M INLET

FIGURE 4



SILT FENCE DETAIL

NOT TO SCALE

NOTES:

AS MUCH AS POSSIBLE, INSTALL SILT FENCE ALONG CONTOUR

SILT FENCE MUST BE REINFORCED WHEREVER IT WILL RECEIVE CONCENTRATED RUNOFF (USUALLY AT LOW POINTS)
-USE STAKED HAYBALES OR BERM OF CLEAN STONE (1.5" - 2.5" PILED TO MINIMUM HEIGHT OF 2 FEET)

INSPECT AFTER EVERY STORM

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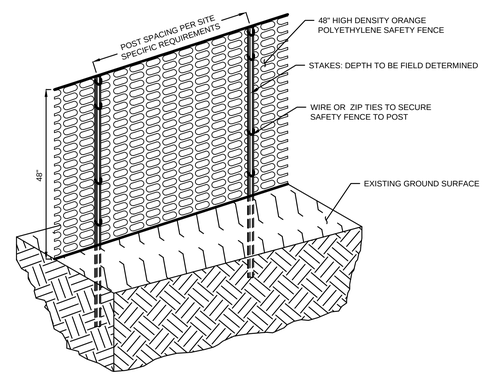
PENNEAST PIPELINE PROJECT

SILT FENCE DETAIL

FIGURE 5



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SAFETY FENCE

FIGURE 6

MICHAEL J. DENICHILO
PROFESSIONAL ENGINEER
N.J. LIC. NO. 24GE05078700

SIGNATURE — DATE 08/01/2019

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CHECKED BY	DATE
MWF (MM)	07/2019
ENG. APPROVAL	DATE
MJD (MM)	07/2019
P.M. APPROVAL	DATE

PREPARED FOR PennEast PIPELINE

PREPARED BY MOTT MACDONALD
111 WOOD AVENUE SOUTH, ISELIN, NJ, 08830
CERTIFICATE NO. 24GA28016600

PENNEAST PIPELINE PROJECT

SOIL EROSION AND SEDIMENT CONTROL PLAN
TYPICAL E&S DETAILS

HUNTERDON COUNTY

SCALE	DRAWING NO.	REVISION
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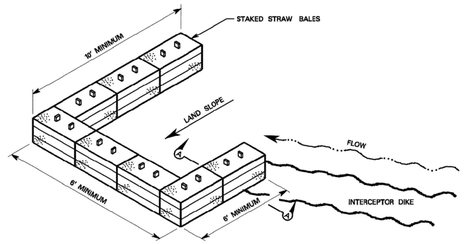
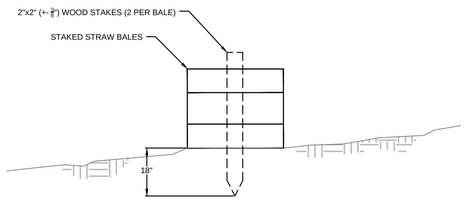


PLAN VIEW



INSTALLATION REQUIRMENTS:

WHEN USING STRAW BALES PLACE THEM WITH THEIR ENDS TIGHTLY ABUTTING.

PLACE WITH BALING STRING/WIRE ON THE SIDE (NOT IN CONTACT WITH THE GROUND).

STANDARD 12" COMPOST FILTER SOCK MAY BE SUBSTITUTED FOR STRAW BALES.

MAINTENANCE REQUIREMENTS:

REMOVE ACCUMULATED SEDIMENTS TO AN UPLAND AREA WHEN SEDIMENT REACHES 1/3 THE HEIGHT OF STRAW BALES OR 1/2 THE HEIGHT OF 12" COMPOST FILTER SOCK.

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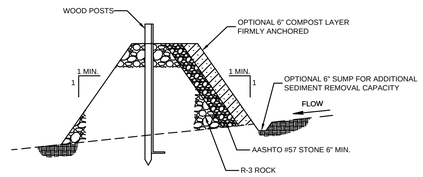
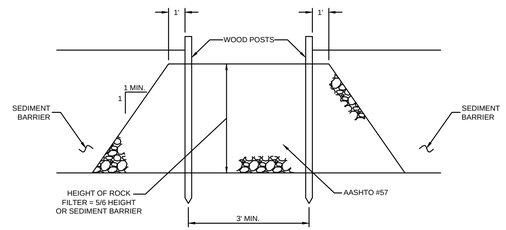
PENNEAST PIPELINE PROJECT

J-HOOK SEDIMENT BARRIER

FIGURE 7



OUTLET CROSS-SECTION



UP-SLOPE FACE

NOTES:

A ROCK FILTER OUTLET SHALL BE INSTALLED WHERE FAILURE OF A SEDIMENT BARRIER HAS OCCURRED DUE TO CONCENTRATED FLOW. ANCHORED COMPOST LAYER SHALL BE USED ON UP SLOPE FACE IN "HQ AND EV WATERSHEDS."

INSPECT WEEKLY AND AFTER EACH RUNOFF EVENT. SEDIMENT MUST BE REMOVED WHEN ACCUMULATIONS REACH 1/3 THE HEIGHT OF THE OUTLET.

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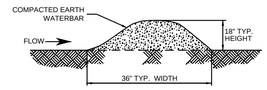
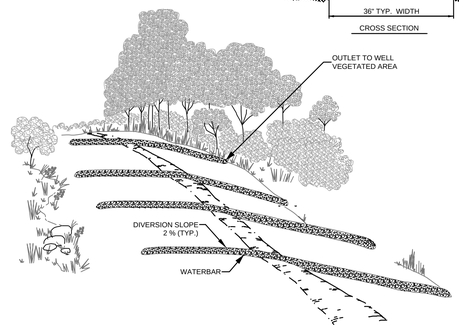
PENNEAST PIPELINE PROJECT

ROCK FILTER OUTLET
STANDARD CONSTRUCTION DETAIL #4-6

FIGURE 8



CROSS SECTION



INSTALLATION REQUIREMENTS:

- PERMANENT WATERBARS ARE REQUIRED AT ALL STREAM, RIVER AND OTHER WATERBODY CROSSINGS AS WELL AS UPSLOPE FROM ROADWAY AND RAILROAD CUT SLOPES
- INSTALL PERMANENT WATERBARS IN ALL AREAS EXCEPT RESIDENTIAL OR AGRICULTURAL AS NECESSARY TO AVOID EXCESSIVE EROSION

MAXIMUM SPACING FOR PERMANENT WATERBAR	
SLOPE (%)	SPACING (FT.)
<5	250
5 - 15	150
>15 - 30	100
>30	50

- INSTALL A PROTECTIVE LINER, WHEREVER ERODIBLE SOILS ARE PRESENT, OR WHERE THERE IS NOT SUFFICIENT VEGETATIVE GROWTH.
- INSTALL WITH A 2% (TYP.) OUTFALL ANGLE.
- POSITION OUTFALL TO PREVENT SEDIMENT DISCHARGE INTO WETLANDS, WATERBODIES, OR OTHER SENSITIVE RESOURCES.
- ON SLOPES GREATER THAN 30 PERCENT, INSTALL WATERBARS WITH EROSION CONTROL BLANKET ON THE SWALE SIDE.
- FILTER RUN-OFF WATER BY CONSTRUCTING THE DISCHARGE END IN A WELL VEGETATED STABLE AREA, OR BY USING AN ENERGY DISSIPATING DEVICE (SHOWN ABOVE) AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

MAINTENANCE REQUIREMENTS:

- INSPECT WATERBARS DURING AND FOLLOWING CONSTRUCTION AND MAKE REPAIRS AS NEEDED.
- KEEP THE CHANNEL FREE OF DEBRIS AND OBSTRUCTIONS.
- SEED AND MULCH PERMANENT WATERBARS FOLLOWING CONSTRUCTION.

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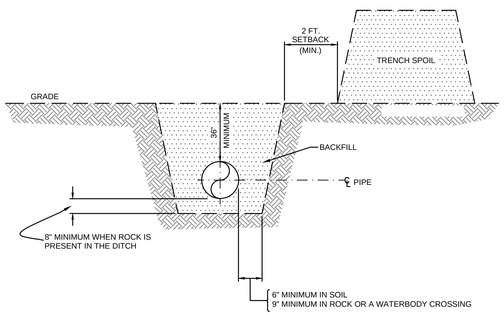
PENNEAST PIPELINE PROJECT

WATERBAR
INSTALLATION AND MAINTENANCE

FIGURE 9



CROSS-SECTION VIEW OF TYPICAL TRENCH

NOTES:

ALL ORIGINAL CONTOURS WILL BE RE-ESTABLISHED UPON COMPLETION OF PIPE INSTALLATION, EXCEPT IN WETLANDS, A CROWN MAY BE LEFT TO ACCOUNT FOR DITCH SETTLING, AS DIRECTED BY THE ENVIRONMENTAL INSPECTOR.

IN COLD WATER FISHERY STREAMS, THE TOP 12" OF THE TRENCH WILL BE BACKFILLED WITH CLEAN GRAVEL OR NATIVE COBBLES.

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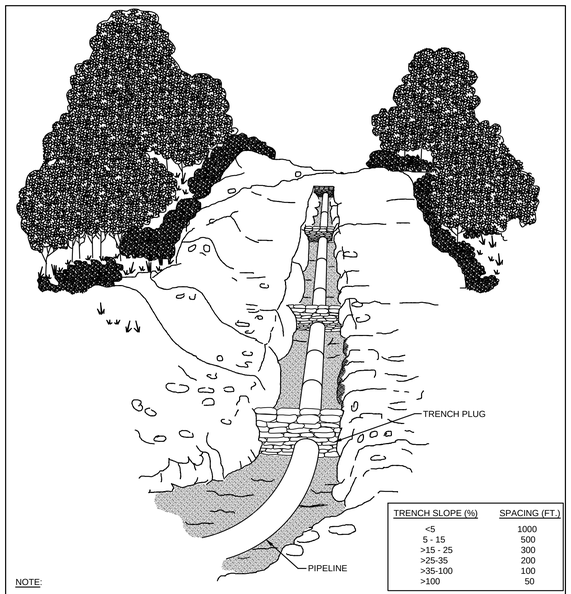
PENNEAST PIPELINE PROJECT

TYPICAL TRENCH DETAIL

FIGURE 10



TRENCH SLOPE (%)	SPACING (FT.)
<5	1000
5 - 15	500
>15 - 25	300
>25-35	200
>35-100	100
>100	50

NOTE:

PLUG MATERIAL SHALL CONSIST OF CLAY, BENTONITE, SYNTHETIC FOAM, SAND OR CONCRETE FILLED SACKS, EXCEPT WHERE TRENCH SLOPE IS GREATER THAN 100%, CEMENT FILLED BAGS SHALL BE USED.

TOPSOIL SHALL NOT BE USED TO FILL SACKS.

PERMANENT IMPERVIOUS TRENCH PLUGS ARE REQUIRED FOR ALL WATERBODY AND WETLAND CROSSINGS, AS WELL AS UP SLOPE FROM ROADWAY AND RAILROAD CUT SLOPES.

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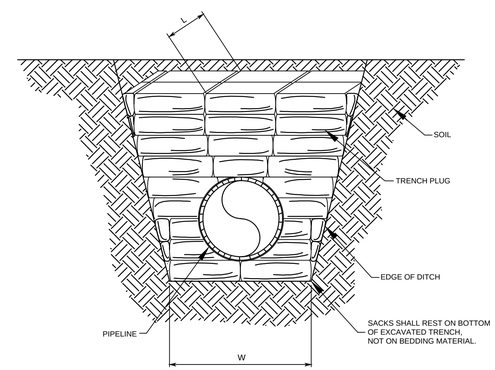
PENNEAST PIPELINE PROJECT

TRENCH PLUGS
FOLLOWING PIPELINE INSTALLATION

FIGURE 11



W = TRENCH WIDTH
L = 24" MINIMUM

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PENNEAST PIPELINE PROJECT

TRENCH PLUG DETAIL

FIGURE 12

MICHAEL J. DENICHILO
PROFESSIONAL ENGINEER
N.J. LIC. NO. 24GE05078700

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MWF (MM)	07/2019
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MJD (MM)	07/2019
P.M. APPROVAL	DATE

PREPARED FOR

PENNEAST PIPELINE

PREPARED BY

MOTT MACDONALD
111 WOOD AVENUE SOUTH, ISELIN, NJ, 08830
CERTIFICATE NO. 24GA28016600

PENNEAST PIPELINE PROJECT

SOIL EROSION AND SEDIMENT CONTROL PLAN
TYPICAL E&S DETAILS
HUNTERDON COUNTY

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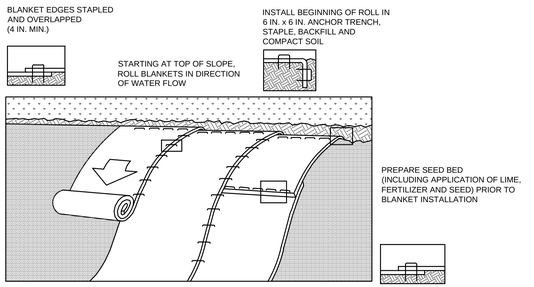

NOTES:

INSTALL EROSION CONTROL BLANKET ON ALL SLOPES 3H:1V OR STEEPER AND WITHIN 50 FEET OF SURFACE WATERS. SEED AND SOIL AMENDMENTS SHALL BE APPLIED ACCORDING TO THE RATES IN THE PLAN DRAWINGS PRIOR TO INSTALLING THE BLANKET.

PROVIDE ANCHOR TRENCH AT TOE OF SLOPE IN SIMILAR FASHION AS AT TOP OF SLOPE.

SLOPE SURFACE SHALL BE FREE OF ROCKS, CLODS, STICKS, AND GRASS.

BLANKET SHALL HAVE GOOD CONTINUOUS CONTACT WITH UNDERLYING SOIL THROUGHOUT ENTIRE LENGTH. LAY BLANKET LOOSELY AND STAKE OR STAPLE TO MAINTAIN DIRECT CONTACT WITH SOIL. DO NOT STRETCH BLANKET.

THE BLANKET SHALL BE STAPLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

BLANKETED AREAS SHALL BE INSPECTED WEEKLY AND AFTER EACH RUNOFF EVENT UNTIL PERENNIAL VEGETATION IS ESTABLISHED TO A MINIMUM UNIFORM 70% COVERAGE THROUGHOUT THE BLANKETED AREA. DAMAGED OR DISPLACED BLANKETS SHALL BE RESTORED OR REPLACED WITHIN 4 CALENDAR DAYS.

AGRICULTURAL LAND NOTE:
EROSION CONTROL BLANKET IS A TRIPPING HAZARD WHEN USED IN HOOVED ANIMAL PASTURES AND IS NOT COMPATIBLE WITH MOST CROP LAND MANAGEMENT. IN SUCH CASES, HAY, STRAW, OR HYDRAULICALLY-APPLIED MULCH SHOULD BE APPLIED UNLESS THE LAND IS PLOWED AND REPLANTED FOR CROP GROWTH WITHIN 4 DAYS. MULCH IN ANIMAL PASTURES SHOULD BE LIMITED TO HAY OR STRAW.

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PENNEAST PIPELINE PROJECT
EROSION CONTROL BLANKET INSTALLATION

FIGURE 13

HYDRAULICALLY APPLIED BLANKETS

Hydraulically applied blankets should not be used in areas of concentrated flow (e.g. channels).

A **Bonded Fiber Matrix (BFM)** can be an effective method of stabilizing steep slopes when used properly. BFMs make use of a cross-linked hydrocolloid tackifier to bond thermally processed wood fibers. Application rates vary according to site conditions. For slopes up to 3H:1V the BFM should be applied at a rate of 3,000 lb/acre. Steeper slopes may need as much as 4,000 lb/acre. In any case, manufa

BFMs should only be used when no rain is forecast for at least 48 hours following the application. This is to allow the tackifier sufficient time to cure properly. Once properly applied, a BFM is typically 90% effective in preventing accelerated erosion. **Bonded Fiber Matrix should not be applied between September 30 and April 1.**

Other fiber matrices that have been shown to be effective in preventing erosion on disturbed surfaces may be used in accordance with manufacturer's recommendations if sufficient supporting documentation is provided.

A **Flexible Growth Medium (FGM)** has the added component of ½ inch long, crimped organic or manmade fibers which add a mechanical bond to the chemical bond provided by BFMs. This increases the blanket's resistance to both raindrop impact and erosion due to runoff. Unlike BFMs, a flexible growth medium typically does not require a curing time to be effective. Properly applied, an FGM may be as much as 99% effective.

A **Polymer Stabilized Fiber Matrix (PSFM)** can also be an effective method of stabilizing steep slopes when used properly. PSFMs make use of a linear soil stabilizing tackifier that works directly on soil to maintain soil structure, maintain pore space capacity and flocculate dislodged sediment that will significantly reduce runoff turbidity. Properly applied, a PSFM may be as much as 99% effective.

PSFMs can be used in re-vegetation applications and for site winterization and/or dormant seeding — fall planting for spring germination — applications. Application rates vary according to site conditions

and the following application rates are suggested. In any case, manufacturer's recommendations should be followed. The following are typical application rates:

TABLE 11.7
Typical Polymer Stabilized Fiber Matrix Application Rates

Maximum Rainfall of ≤ 20" SLOPE	6:1	5:1	4:1	3:1	2:1	1.5:1	1:1
Soil Stabilizer (gals/acre)	4	5	6	7	8	9	10
Fiber (lb/acre)	1,500	1,500	1,500	1,800	2,000	2,500	3,000

Maximum Rainfall of > 20" and for Site Winterization SLOPE	≤5:1	4:1	≥3:1
Soil Stabilizer (gals/acre)	6	8	10
Fiber (lb/acre)	2,000	2,500	3,000

Unlike rolled blankets, there is no need to smooth the slope prior to application of hydraulically applied blankets. In fact some roughening of the surface, either natural or mechanically induced, is preferable. However, large rocks, those ≥ 9 inches, and existing rills should be removed prior to application. Tracking or grooving of slopes should be considered to slow water flows during a storm event. Slope interruption devices such as stair step grading or benching should be applied prior to the application. Mixing and application rates should follow manufacturer's recommendations.

Hydraulically applied blankets are typically applied in two stages. Unless specifically recommended to be applied in one application by the manufacturer, the seed mixture and soil amendments should be applied first. If the seed is applied at the same time as the hydraulically applied blanket, the bonded fibers may keep the seed from making sufficient contact with the soil to germinate. After the seed mixture is applied, the BFM, FGM, or PSFM should be sprayed over the area at the required application rate.

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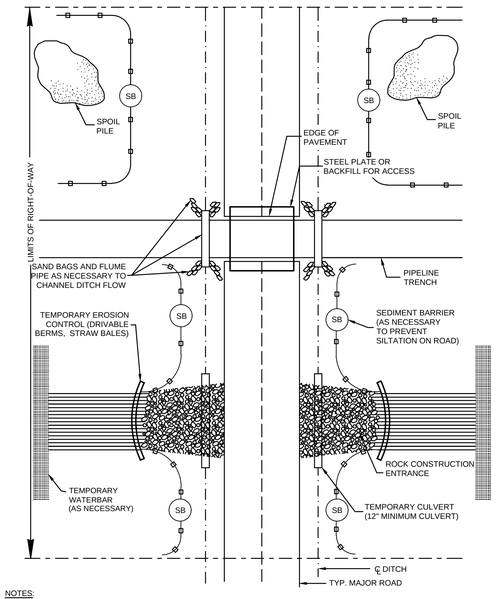
PennEast PIPELINE

PENNEAST PIPELINE PROJECT
HYDRAULICALLY APPLIED BLANKETS

FIGURE 14



NOTES:
SB TEMPORARY SEDIMENT BARRIER

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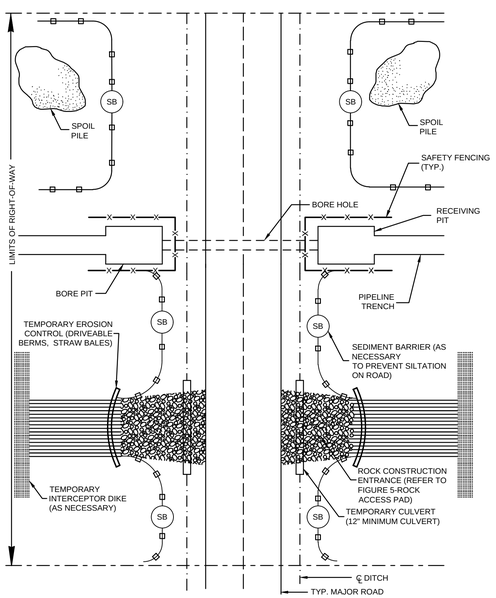
PennEast PIPELINE

PENNEAST PIPELINE PROJECT
TYPICAL PAVED ROAD CROSSING CONTROL MEASURES (OPEN CUT)

FIGURE 15



NOTES:
SB TEMPORARY SEDIMENT BARRIER

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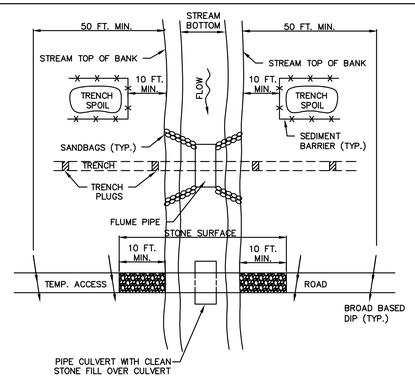
PennEast PIPELINE

PENNEAST PIPELINE PROJECT
TYPICAL PAVED ROAD CROSSING CONTROL MEASURES (BORED CROSSING)

FIGURE 16



NOT TO SCALE

NOTES:

GRUBBING SHALL NOT TAKE PLACE WITHIN 50 FEET OF TOP-OF-BANK UNTIL ALL MATERIALS REQUIRED TO COMPLETE CROSSING ARE ON SITE AND PIPE IS READY FOR INSTALLATION.

PIPE CULVERT FOR ACCESS ROAD AND FLUME PIPE MAY BE ONE CONTINUOUS PIPE.

TRENCH PLUGS SHALL BE INSTALLED WITHIN THE TRENCH ON BOTH SIDES OF THE STREAM CHANNEL.

WATER ACCUMULATING WITHIN THE WORK AREA SHALL BE PUMPED TO A PUMPED WATER FILTER BAG OR SEDIMENT TRAP PRIOR TO DISCHARGING INTO ANY SURFACE WATER.

HAZARDOUS OR POLLUTANT MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM THE TOP OF STREAMBANK.

ALL EXCESS EXCAVATED MATERIAL SHALL BE IMMEDIATELY REMOVED FROM THE STREAM CROSSING AREA.

ALL DISTURBED AREAS WITHIN 50 FEET OF TOP-OF-BANK SHALL BE BLANKETED OR MATTED WITHIN 24 HOURS OF INITIAL DISTURBANCE FOR MINOR STREAMS OR 48 HOURS OF INITIAL DISTURBANCE FOR MAJOR STREAMS UNLESS OTHERWISE AUTHORIZED. APPROPRIATE STREAMBANK PROTECTION SHALL BE PROVIDED WITHIN THE CHANNEL.

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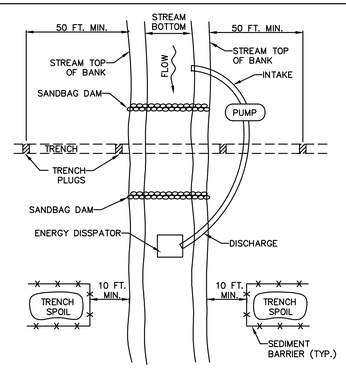
PennEast PIPELINE

PENNEAST PIPELINE PROJECT
TYPICAL FLUMED STREAM CROSSING WITH OPTIONAL ACCESS ROAD

FIGURE 17



NOT TO SCALE

NOTES:

GRUBBING SHALL NOT TAKE PLACE WITHIN 50 FEET OF TOP-OF-BANK UNTIL ALL MATERIALS REQUIRED TO COMPLETE CROSSING ARE ON SITE AND PIPE IS READY FOR INSTALLATION.

BYPASS PUMP INTAKE SHALL BE MAINTAINED A SUFFICIENT DISTANCE FROM THE BOTTOM TO PREVENT PUMPING OF CHANNEL BOTTOM MATERIALS.

TRENCH PLUGS SHALL BE INSTALLED WITHIN THE TRENCH ON BOTH SIDES OF THE STREAM CHANNEL.

WATER ACCUMULATING WITHIN THE WORK AREA SHALL BE PUMPED TO A PUMPED WATER FILTER BAG OR SEDIMENT TRAP PRIOR TO DISCHARGING INTO ANY SURFACE WATER.

HAZARDOUS OR POLLUTANT MATERIAL STORAGE AREAS SHALL BE LOCATED AT LEAST 100 FEET BACK FROM THE TOP OF STREAMBANK.

ALL EXCESS EXCAVATED MATERIAL SHALL BE IMMEDIATELY REMOVED FROM THE STREAM CROSSING AREA.

ALL DISTURBED AREAS WITHIN 50 FEET OF TOP-OF-BANK SHALL BE BLANKETED OR MATTED WITHIN 24 HOURS OF INITIAL DISTURBANCE FOR MINOR STREAMS OR 48 HOURS OF INITIAL DISTURBANCE FOR MAJOR STREAMS UNLESS OTHERWISE AUTHORIZED.

APPROPRIATE STREAMBANK PROTECTION SHALL BE PROVIDED WITHIN THE CHANNEL.

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TYPICAL STREAM CROSSING WITH PUMP BYPASS

FIGURE 18

MICHAEL J. DENICHILO
PROFESSIONAL ENGINEER
N.J. LIC. NO. 24GE05078700

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PennEast PIPELINE

PREPARED BY
MOTT MACDONALD
111 WOOD AVENUE SOUTH, ISELIN, NJ, 08830
CERTIFICATE NO. 24GA28016600

PENNEAST PIPELINE PROJECT

SOIL EROSION AND SEDIMENT CONTROL PLAN
TYPICAL E&S DETAILS

HUNTERDON COUNTY

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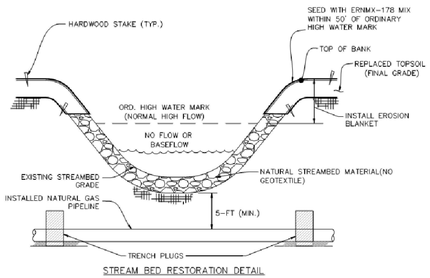

STREAM BED RESTORATION DETAIL

NOTES:
1. REMOVE EXISTING STREAMBED MATERIAL AND STOCKPILE SEPARATELY.
2. ONCE PIPELINE IS INSTALLED, REPLACE SUBSTRATE BACK IN STREAMBED AND RESTORE TO EXISTING CONDITION.
3. SEE RECOMMENDED SEED MIXTURES TABLES FOR SEED MIXES.

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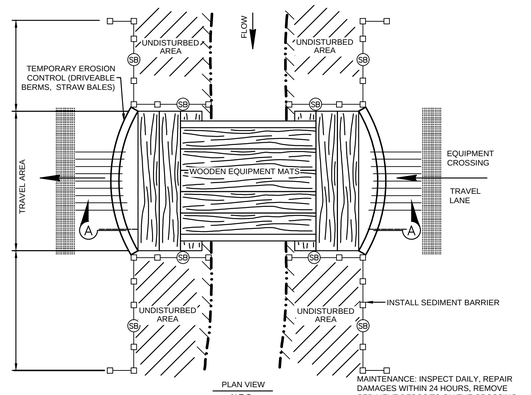
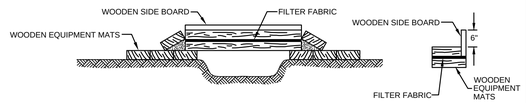
PENNEAST PIPELINE PROJECT

STREAM BANK STABILIZATION WITH REINFORCEMENT BLANKET

FIGURE 19



PLAN VIEW
N.T.S.



N.T.S.

NOTES:

SB TEMPORARY SEDIMENT BARRIER OF COMPOST FILTER SOCK (ABACT) TO BE USED.

WOODEN SIDE BOARDS AND FILTER FABRIC WILL BE USED TO KEEP SEDIMENT FROM FALLING INTO CREEK.

EQUIPMENT MATS TYPICALLY CONSTRUCTED OF HARDWOOD OR OTHER SUITABLE MATERIAL TO ACCOMMODATE THE HEAVIEST EQUIPMENT USED.

TEMPORARY WATERBAR TO DISCHARGE TO SEDIMENT REMOVAL DEVICE.

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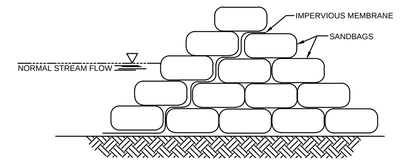
PENNEAST PIPELINE PROJECT

TEMPORARY EQUIPMENT BRIDGE (EQUIPMENT MATS)

FIGURE 20

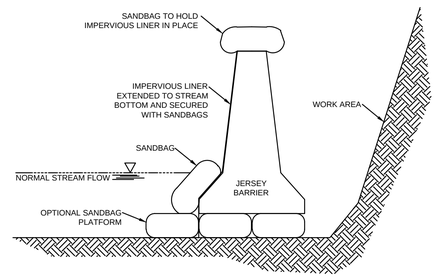
SANDBAG DIVERSION DAM OR COFFERDAM



NOTE:

2 BAG MIN. HEIGHT ABOVE NORMAL BASE FLOW

JERSEY BARRIER COFFERDAM - END VIEW



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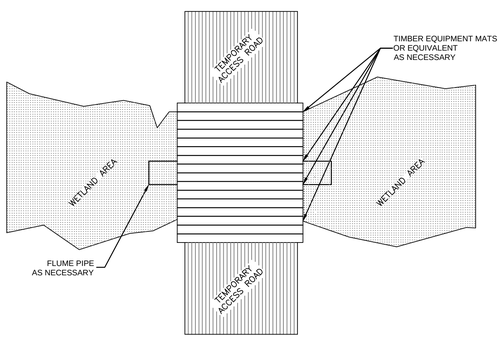
SANDBAG DIVERSION DAM OR COFFERDAM / JERSEY BARRIER COFFERDAM

FIGURE 21



PLAN VIEW
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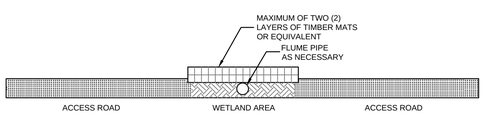

CROSS SECTION
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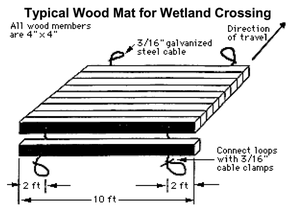
PENNEAST PIPELINE PROJECT

TYPICAL TEMPORARY ACCESS ROAD THROUGH WETLANDS

FIGURE 22

Typical Wood Mat for Wetland Crossing



University of Minnesota FS 07009

A geotextile underlayment shall be used under the wood mat.

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PENNEAST PIPELINE PROJECT

TIMBER MAT DETAIL

FIGURE 23

WETLAND CROSSING GENERAL PROCEDURES

Clearing and Grading

1. Limit construction activity and ground disturbance in wetland areas to a construction ROW width of 75 feet or as shown on the construction plans. With written approval from the FERC for site-specific conditions, construction ROW width within the boundaries of federally delineated wetlands may be expanded beyond 75 feet.
2. Wetland boundaries and buffers must be clearly marked in the field with signs and/or highly visible flagging until construction-related ground disturbing activities are complete.
3. Restrict extra work areas (such as staging areas and additional spoil storage areas) to those shown only on the construction plans. All extra work areas must be located at least 50 feet away from wetland boundaries, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land. If site-specific conditions do not permit a 50-foot setback, the Company can receive written approval from the FERC to locate these extra work areas closer than 50 feet from the wetland.
4. Above ground facilities shall not be located in any wetland, except as permitted or where the location of such facilities outside of wetlands would prohibit compliance with DOT regulations.
5. Use timber riprap, prefabricated equipment mats or terra mats on the working side of the ROW during clearing operations. Do not use more than two layers of timber riprap to stabilize the ROW.
6. Cut vegetation just above ground level and grind stumps to ground level, leaving existing root systems in place. Immediately remove all cut trees, chips from grinding and branches from the wetland and stockpile in an upland area on ROW for disposal.
7. Limit pulling of tree stumps and grading activities to directly over trench line. Do not grade or remove stumps or root systems from the rest of the ROW in wetlands unless the Chief Inspector and EI determine that safety-related construction constraints require removal of tree stumps from under the working side of the ROW.
8. Do not cut trees outside of the construction ROW to obtain timber for riprap or equipment mats.
9. Cleared materials (slash, logs, brush, wood chips) shall not be permanently placed within wetland areas.

Temporary Erosion and Sediment Control

1. Install sediment barriers immediately after clearing and prior to ground disturbance at the following locations:
   A. Within the ROW at the edge of the boundary between wetland and upland;
   B. Across the entire ROW immediately upslope of the wetland boundary to prevent sediment flow into the wetland;
   C. Along the edge of the ROW, where the ROW slopes toward the wetland, to protect adjacent off ROW wetland; and
   D. Along the edge of the ROW as necessary to contain spoil and sediment within the ROW through wetlands.
2. Maintain all sediment barriers throughout construction and reinstall as necessary (such as after backfilling of the trench) until replaced by permanent erosion controls or restoration of adjacent upland areas is complete.
3. Depth of topsoil segregation should be 12 inches, if present, unless otherwise indicated by the landowner if relating to agricultural land.

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WETLAND PIPELINE CONSTRUCTION REQUIREMENTS

FIGURE 24

MICHAEL J. DENICHILO
PROFESSIONAL ENGINEER
N.J. LIC. NO. 24GE05078700

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PREPARED BY

MOTT MACDONALD
111 WOOD AVENUE SOUTH, ISELIN, NJ, 08830
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PENNEAST PIPELINE PROJECT

SOIL EROSION AND SEDIMENT CONTROL PLAN
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Crossing Procedure

1. Minimize the length of time that topsoil is segregated and the trench is open.
2. Do not use rock / soil imported from outside the wetland, tree stumps, or brush riprap to stabilize the ROW.
3. Perform topsoil segregation and trench dewatering.
4. Assemble the pipeline in an upland area unless the wetland is dry enough to adequately support skids and pipe.
5. Use "push-off" or "float" techniques to place the pipe in the trench where water and other site conditions allow.
6. Install trench plugs and/or seal the trench bottom as necessary to maintain the original wetland hydrology at locations where the pipeline trench may drain a wetland.
7. Install a permanent interceptor dike and a trench plug at the base of slopes near the boundary between the wetland and adjacent upland areas. In addition, install sediment barriers. Permanent interceptor dikes shall not be installed in agricultural areas.
8. Restore segregated topsoil to its original position after backfilling is complete. When required, additional material imported from off the ROW must be approved by the EI. The original wetland contours and flow regimes will be restored to the extent practical.

Cleanup and Restoration

1. Revegetate the ROW with annual ryegrass at 45 lbs / acre Pure Live Seed or with the recommended wetland seed mix, unless standing water is present.
2. **Do not use lime or fertilizer in wetland areas.**
3. Mulch the disturbed ROW. No mulch may be applied in wetlands.
4. In the event that final seeding and mulching is deferred more than 20 days after the trench is backfilled, all slopes adjacent to wetlands shall be mulched with 3 tons / acre of straw for a minimum of 100 feet on each side of the crossing.
5. Remove all equipment mats upon completion of construction.
6. Develop specific procedures in coordination with the appropriate land management or state agency, where necessary, to prevent the invasion or spread of undesirable exotic vegetation (such as purple loose strife and phragmites). Additionally, install matting at exceptional value wetland crossing.
7. Ensure that all disturbed areas permanently revegetate.
8. Remove temporary sediment barriers located at the boundary between wetland and adjacent upland areas after upland revegetation and stabilization of adjacent upland areas are successful.

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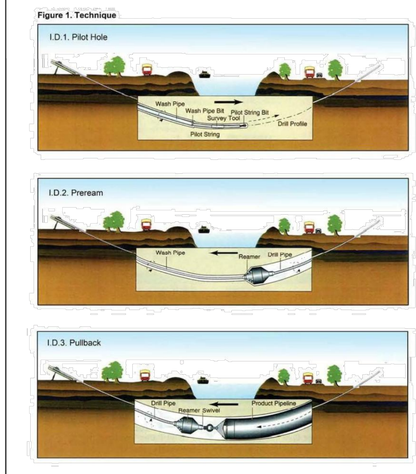
WETLAND PIPELINE CONSTRUCTION REQUIREMENTS

FIGURE 25



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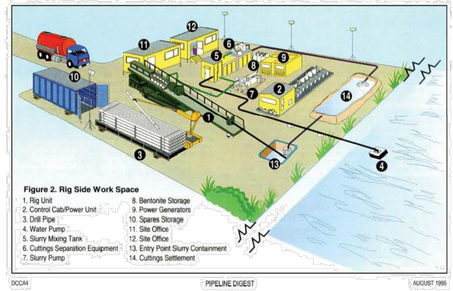
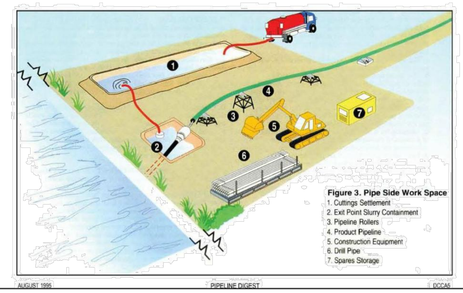
HORIZONTAL DIRECTION DRILL

FIGURE 26





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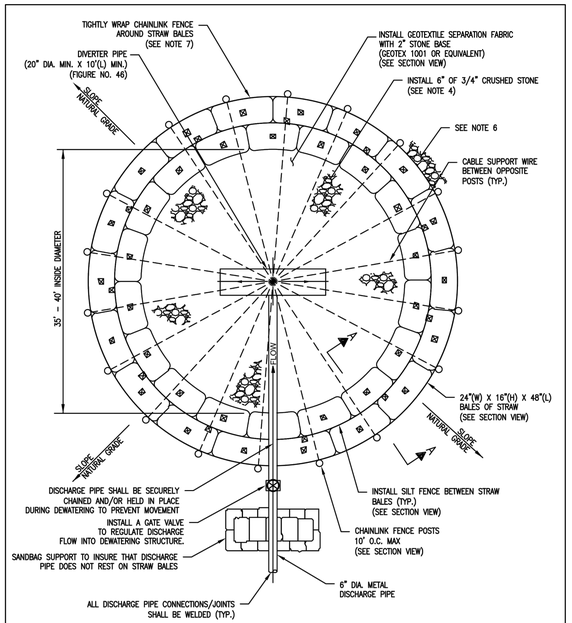
PENNEAST PIPELINE PROJECT

HORIZONTAL DIRECTION DRILL

FIGURE 27



PLAN VIEW

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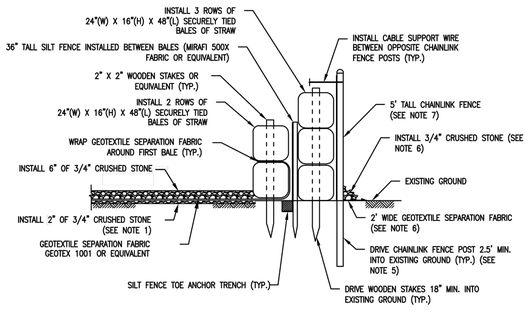
HYDROSTATIC DEWATERING STRUCTURE

FIGURE 28



SECTION A–A

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NOTES:

1. STRUCTURE SHALL BE PLACED ON A LEVEL WELL VEGETATED SITE SUCH THAT WATER WILL FLOW AWAY FROM STRUCTURE AND WORK AREAS AND MINIMIZE EROSION OF THE SURROUNDING AREA TO THE EXTENT PRACTICABLE.
2. AT THE DISCRETION OF THE ENVIRONMENTAL INSPECTOR, ADDITIONAL EROSION AND SEDIMENTATION CONTROL DEVICES (E.G. RIPRAP CHECK DAMS, COMPOST FILTER SOCKS, ETC.) MAY BE REQUIRED TO BE INSTALLED DOWNSTREAM OF THE STRUCTURE IF EROSION BECOMES APPARENT DURING DEWATERING.
3. FLOW RATES AND VOLUMES THROUGH DISCHARGE AND DIVERTER PIPES SHALL BE SUCH THAT THE STRUCTURE WILL NOT OVERFLOW OR CAUSE EROSION. A MINIMUM FREEBOARD OF 3" MEASURED FROM THE TOP OF THE THIRD ROW OF STRAW BALES TO THE WATER SURFACE ELEVATION SHALL BE MAINTAINED AT ALL TIMES. ADDITIONAL DEWATERING STRUCTURES WILL BE ADDED AS NECESSARY TO FACILITATE DEWATERING OF THE PIPELINE AT THE APPROVED RATES.
4. THE 3/4" CRUSHED STONE INSTALLED WITHIN THE BASIN SHALL BE WASHED TO REMOVE ALL DIRT/FINE PARTICLES PRIOR TO INSTALLATION.
5. THE CHAINLINK FENCE POSTS SHALL BE DRIVEN A MINIMUM OF 2.5 FT. INTO STABLE, EXISTING GROUND. THE CONTRACTOR MAY BE REQUIRED TO INSTALL THE POLES DEEPER IF STABLE SUBSOILS ARE NOT ACHIEVED WITHIN 2.5 FT.
6. AT THE DISCRETION OF THE ENVIRONMENTAL INSPECTOR, ADDITIONAL GEOTEXTILE SEPARATION FABRIC AND 3/4" CRUSHED STONE MAY BE REQUIRED TO BE INSTALLED AROUND THE OUTSIDE EDGE OF THE DEWATERING STRUCTURE.
7. CHAINLINK FENCE SHALL INSTALLED TIGHTLY AGAINST THE STRAW BALES AND SECURELY FASTENED TOGETHER AT ALL JOINTS WITH CABLE TENSION WIRE AND STRETCHER BARS.
8. THE ENVIRONMENTAL INSPECTOR SHALL HAVE THE AUTHORITY TO MODIFY THE DESIGN AS REQUIRED TO PREVENT EROSION AND SEDIMENTATION DOWNSTREAM OF THE STRUCTURE.
9. STRAW BALES SHALL BE STACKED SUCH THAT THE JOINTS ARE STAGGERED.

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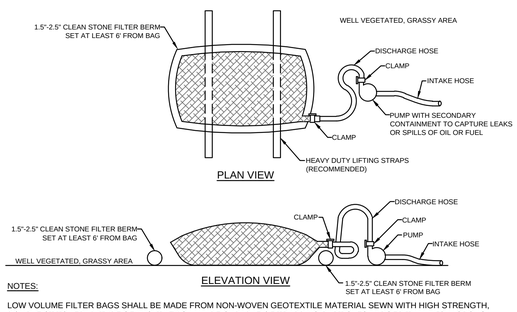
HYDROSTATIC DEWATERING STRUCTURE

FIGURE 29



NOTES:

LOW VOLUME FILTER BAGS SHALL BE MADE FROM NON-WOVEN GEOTEXTILE MATERIAL SEWN WITH HIGH STRENGTH, DOUBLE STITCHED "J" TYPE SEAMS. THEY SHALL BE CAPABLE OF TRAPPING PARTICLES LARGER THAN 150 MICRONS. HIGH VOLUME FILTER BAGS SHALL BE MADE FROM WOVEN GEOTEXTILES THAT MEET THE FOLLOWING STANDARDS:

PROPERTY	TEST METHOD	MINIMUM STANDARD
AVG. WIDE WIDTH STRENGTH	ASTM D-4884	60 LB/IN
GRAB TENSILE	ASTM D-4632	205 LB
PUNCTURE	ASTM D-4833	110 LB
MULLEN BURST	ASTM D-3786	350 PSI
UV RESISTANCE	ASTM D-4355	70%
AOS % RETAINED	ASTM D-4751	80 SIEVE

A SUITABLE MEANS OF ACCESSING THE BAG WITH MACHINERY REQUIRED FOR DISPOSAL PURPOSES SHALL BE PROVIDED. FILTER BAGS SHALL BE REPLACED WHEN THEY BECOME 1/2 FULL OF SEDIMENT. SPARE BAGS SHALL BE KEPT AVAILABLE FOR REPLACEMENT OF THOSE THAT HAVE FAILED OR ARE FILLED. BAGS SHALL BE PLACED ON STRAPS TO FACILITATE REMOVAL UNLESS BAGS COME WITH LIFTING STRAPS ALREADY ATTACHED.

BAGS SHALL BE LOCATED IN WELL-VEGETATED (GRASSY) AREA, AND DISCHARGE ONTO STABLE, EROSION RESISTANT AREAS. WHERE THIS IS NOT POSSIBLE, A GEOTEXTILE UNDERLAYMENT AND FLOW PATH SHALL BE PROVIDED. BAGS MAY BE PLACED ON FILTER STONE TO INCREASE DISCHARGE CAPACITY. BAGS SHALL NOT BE PLACED ON SLOPES GREATER THAN 5%. FOR SLOPES EXCEEDING 5%, CLEAN ROCK OR OTHER NON-ERODIBLE AND NON-POLLUTING MATERIAL MAY BE PLACED UNDER THE BAG TO REDUCE SLOPE STEEPNESS.

NO DOWNSLOPE SEDIMENT BARRIER IS REQUIRED FOR MOST INSTALLATIONS. 1.5"-2.5" CLEAN STONE FILTER BERM SET AT LEAST 6' FROM BAG SHALL BE INSTALLED BELOW BAGS LOCATED, WITHIN 50 FEET OF ANY RECEIVING SURFACE WATER OR WHERE GRASSY AREA IS NOT AVAILABLE.

THE PUMP DISCHARGE HOSE SHALL BE INSERTED INTO THE BAGS IN THE MANNER SPECIFIED BY THE MANUFACTURER AND SECURELY CLAMPED. A PIECE OF PVC PIPE IS RECOMMENDED FOR THIS PURPOSE.

THE PUMPING RATE SHALL BE NO GREATER THAN 750 GPM OR 1/2 THE MAXIMUM SPECIFIED BY THE MANUFACTURER, WHICHEVER IS LESS. PUMP INTAKES SHALL BE FLOATING AND SCREENED.

FILTER BAGS SHALL BE INSPECTED DAILY. IF ANY PROBLEM IS DETECTED, PUMPING SHALL CEASE IMMEDIATELY AND NOT RESUME UNTIL THE PROBLEM IS CORRECTED.

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PUMPED WATER FILTER BAG

FIGURE 30

MICHAEL J. DENICHILO

PROFESSIONAL ENGINEER

N.J. LIC. NO. 24GE05078700

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PREPARED FOR

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PREPARED BY

MOTT MACDONALD

111 WOOD AVENUE SOUTH, ISELIN, NJ, 08830

CERTIFICATE NO. 24GA28016600

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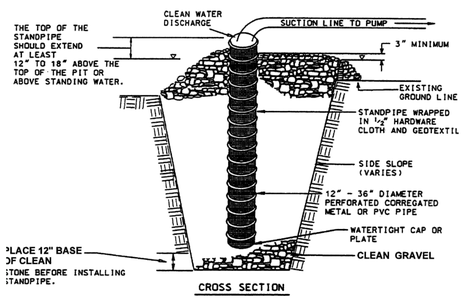

CROSS SECTION

Construction Specifications

1. Pit dimensions are variable. with the minimum diameter being 2 times the standpipe diameter.

2. The standpipe should be constructed by perforating a 12" to 24" diameter corrugated or PVC pipe. Then wrapping with ½" hardware cloth and Geotextile fabric. The perforations shall be ½" x 6" slits or 1" diameter holes.

3. A base of filter material consisting of clean gravel or ASTM C 33 stone should be placed in the pit to a depth of 12". After installing the standpipe, the pit surrounding the standpipe should then be backfilled with the same filter material.

4. The standpipe should extend 12" to 18" above the lip of the pit or the riser crest elevation (basin dewatering only) and the filter material should extend 3" minimum above the anticipated standing water elevation.

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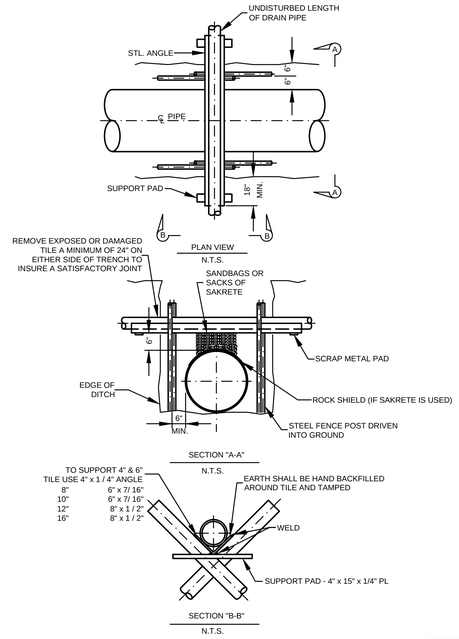
PENNEAST PIPELINE PROJECT

SUMP PIT DETAIL

FIGURE 31



NOTE:

USE OF SAKRETE SHALL REQUIRE PRIOR COMPANY APPROVAL.

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PENNEAST PIPELINE PROJECT

DRAIN TILE REPAIR PROCEDURE

FIGURE 32

MICHAEL J. DENICHILO
PROFESSIONAL ENGINEER
N.J. LIC. NO. 24GE05078700

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