

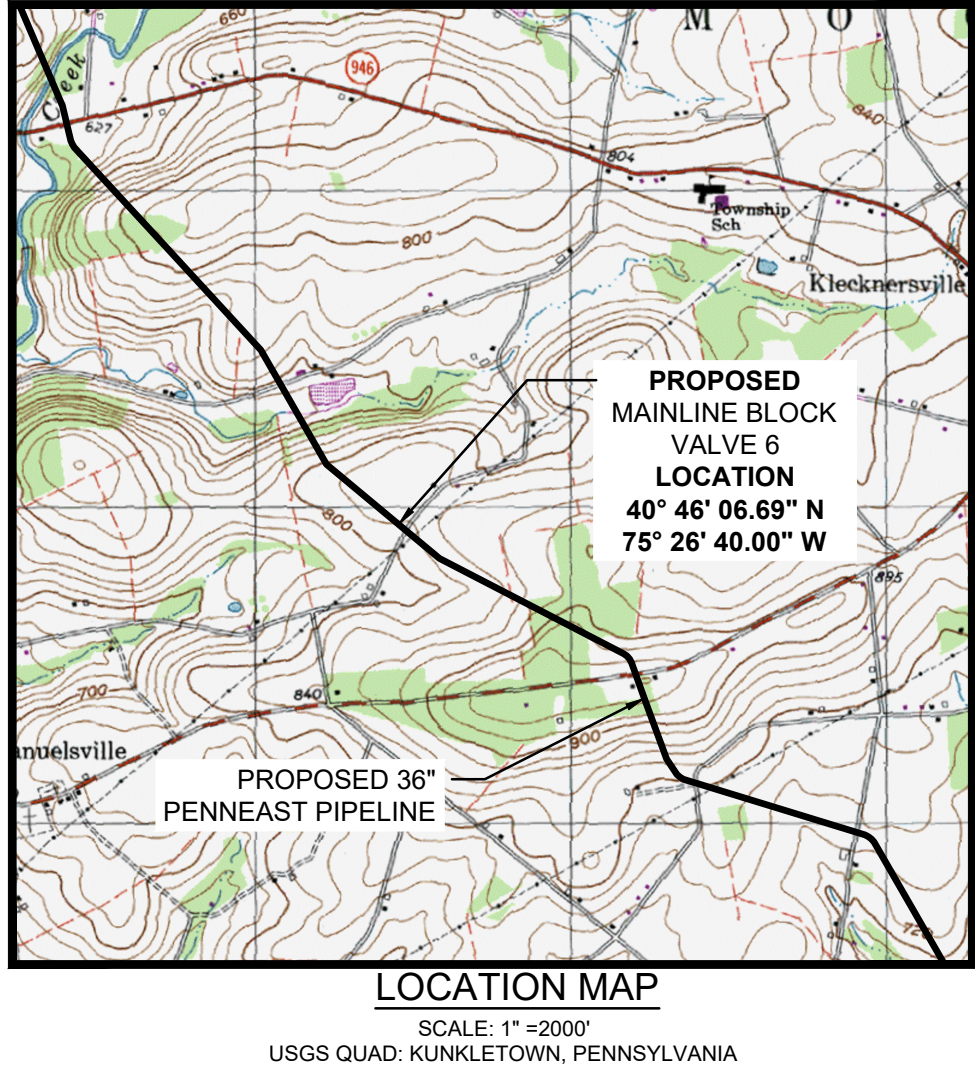
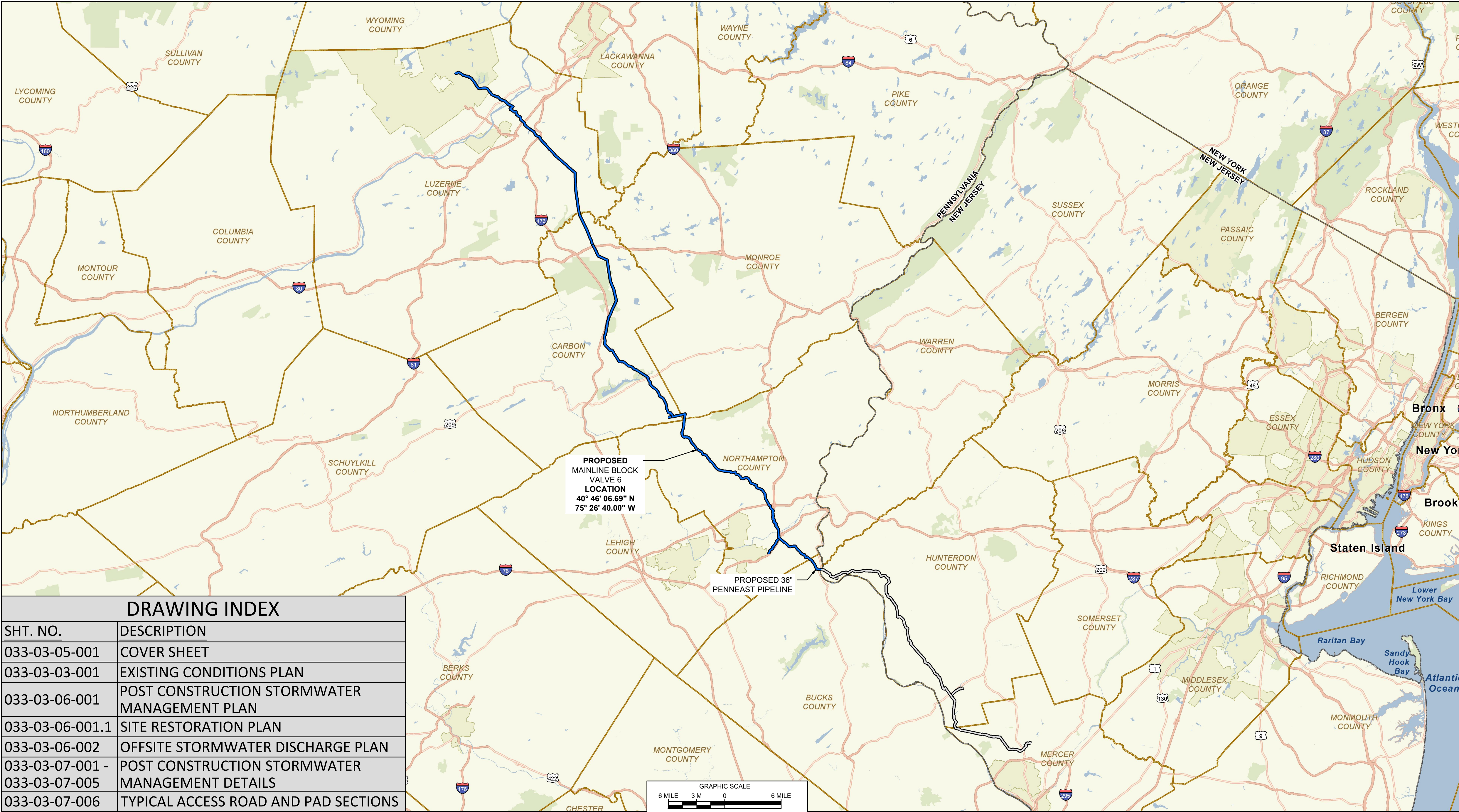
PENNEAST PIPELINE COMPANY, LLC

MAINLINE BLOCK VALVE 6

MOORE TOWNSHIP

NORTHAMPTON COUNTY, PENNSYLVANIA

POST CONSTRUCTION STORMWATER MANAGEMENT PLAN



| DRAWING INDEX | |
|-------------------------------|---|
| SHT. NO. | DESCRIPTION |
| 033-03-05-001 | COVER SHEET |
| 033-03-03-001 | EXISTING CONDITIONS PLAN |
| 033-03-06-001 | POST CONSTRUCTION STORMWATER MANAGEMENT PLAN |
| 033-03-06-001.1 | SITE RESTORATION PLAN |
| 033-03-06-002 | OFFSITE STORMWATER DISCHARGE PLAN |
| 033-03-07-001 - 033-03-07-005 | POST CONSTRUCTION STORMWATER MANAGEMENT DETAILS |
| 033-03-07-006 | TYPICAL ACCESS ROAD AND PAD SECTIONS |

- GENERAL NOTES:
- THIS PLAN SET CONTAINS ALL INFORMATION FOR THE POST CONSTRUCTION STORMWATER MANAGEMENT PLAN (PCSM PLAN) FOR THE PERMIT AS SPECIFIED ABOVE. THIS IS A PERMIT DOCUMENT ONLY. ADDITIONAL PLANS AND DOCUMENTATION ARE REQUIRED FOR CONSTRUCTION OF THE PROPOSED DEVELOPMENT.
 - FULL SIZE SHEETS OF THIS PLAN SET MAY BE PRINTED OUT ON 24"x36" SHEETS. REPRODUCTION AT DIFFERENT SIZES SHALL RESULT IN DIFFERENT SCALES.
- REFERENCE (ALL SHEETS):
- EXISTING CONTOURS SHOWN WERE SURVEYED BY MOTT MACDONALD DURING 2015 AND 2016. ADDITIONAL EXISTING CONTOURS WERE PROVIDED BY PICTOMETRY, 2015 AND SUPPLEMENTED FROM PASDA.
 - SITE TOPOGRAPHIC AND FEATURE SURVEY PERFORMED BY MOTT MACDONALD 2015 AND 2016.
 - PROPERTY INFORMATION ON THIS PLAN BASED ON GIS TAX MAP DATA AND RECTIFIED PROPERTY LINES AND ARE NOT THE RESULT OF A BOUNDARY SURVEY.
 - WATERBODY INFORMATION PROVIDED BY AECOM 2015 AND 2016.
 - HORIZONTAL DATUM IS UTM83-18F. VERTICAL DATUM IS NAVD1988.

PENNSYLVANIA ONE-CALL SERIAL NUMBERS

20181981135-000



811
Know what's below.
Call before you dig.
CALL BEFORE YOU DIG!
PENNSYLVANIA LAW REQUIRES
3 WORKING DAYS NOTICE FOR
CONSTRUCTION PHASE AND 10 WORKING DAYS IN
DESIGN STAGE - STOP CALL
PENNSYLVANIA ONE CALL SYSTEM INC.
1-800-242-1776

M M
MOTT
MACDONALD
111 WOOD AVENUE
SOUTH SELIN, NJ 08830
UNITED STATES
973-379-3400
INFO@MOTTMAC.COM

| REFERENCE DRAWINGS | | REVISIONS | | | | | |
|--------------------|-------|-----------|---------------------|------------|---------|---------|---------|
| DWG. NO. | TITLE | NO. | DESCRIPTION | DATE | DRAWN | CK | APPR |
| A | | 1 | ISSUED FOR PADEP | 10/15/2018 | CAF(MM) | WMC(MM) | MJD(MM) |
| B | | 2 | RE-ISSUED FOR PADEP | 10/2019 | MWF(MM) | DOW(MM) | WMC(MM) |
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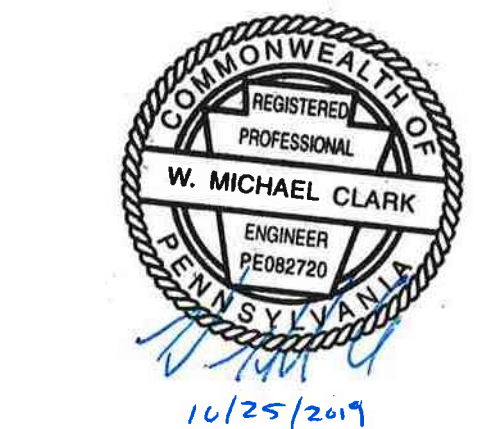
THIS DRAWING IS THE PROPERTY OF PENNEAST PIPELINE COMPANY, LLC ("P.E."). IT MAY CONTAIN INFORMATION DESCRIBING TECHNOLOGY OWNED BY P.E. AND DEEMED TO BE COMMERCIALY SENSITIVE. IT IS TO BE USED ONLY IN CONNECTION WITH WORK PERFORMED FOR P.E. REPRODUCTION IN WHOLE OR IN PART FOR ANY PURPOSE OTHER THAN WORK FOR P.E. IS EXPRESSLY FORBIDDEN EXCEPT BY EXPRESS WRITTEN PERMISSION OF P.E. IT IS TO BE SAFEGUARDED AGAINST BOTH DELIBERATE AND INADVERTENT DISCLOSURE TO ANY THIRD PARTY.

| PENNEAST PIPELINE PROJECT | | | |
|----------------------------------|---------------|-------------|------------|
| MAINLINE BLOCK VALVE 6 | | | |
| COVER SHEET | | | |
| NORTHAMPTON COUNTY, PENNSYLVANIA | | | |
| DRAWN BY | CAF | DATE ISSUED | 10/15/2018 |
| CHECKED BY | WMC | SCALE | AS SHOWN |
| APPROVED BY | JRD | APPROVED BY | |
| DWG. NO. | 033-03-05-001 | REV. NO. | B |

This topographic map of Kunkletown, Pennsylvania, displays a proposed 36-inch PennEast pipeline (PE-NO-043.003) running diagonally from the upper left to the lower right. A proposed permanent facility and an access road (AR-054AN) are also shown. The map features contour lines with spot elevations ranging from 816 to 836 feet. Various labels are present, including BKA, BKB, BfB, BkB, and BfB, which likely represent different types of land use or terrain. The map also shows existing overhead lines and a proposed 36-inch PennEast pipeline (PE-NO-051.000) running diagonally from the upper right to the lower left. A north arrow is located in the upper left corner.

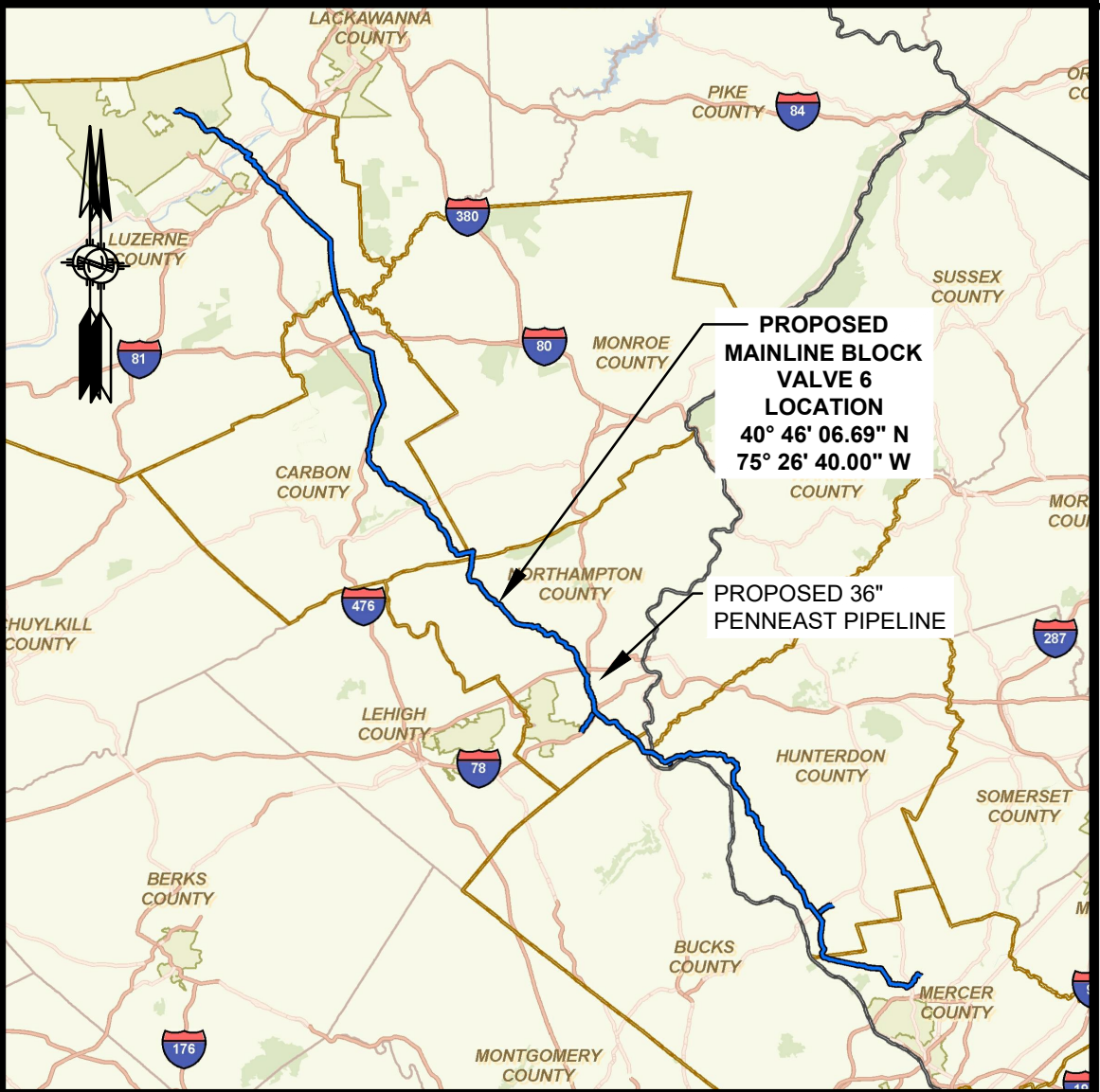
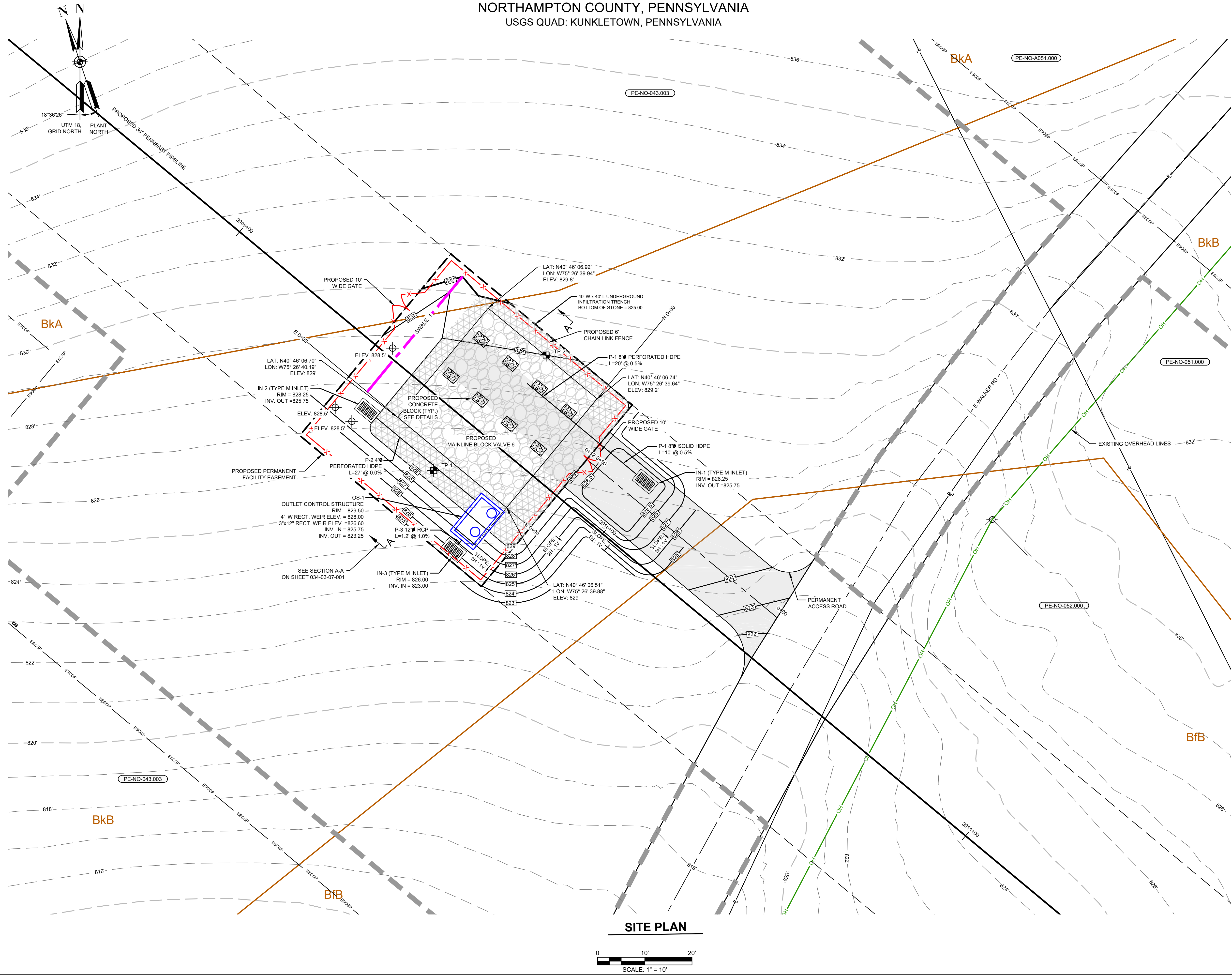
1. EXISTING CONTOURS SHOWN WERE SURVEYED BY MOTT MACDONALD DURING 2015 THRU 2019. ADDITIONAL EXISTING CONTOURS WERE PROVIDED BY PICTOMETRY, 2015 AND SUPPLEMENTED FROM USGS.
2. SITE TOPOGRAPHIC AND FEATURE SURVEY PERFORMED BY MOTT MACDONALD 2015 THRU 2019.
3. PROPERTY INFORMATION ON THIS PLAN BASED ON GIS TAX MAP DATA AND RECTIFIED PROPERTY LINES AND ARE NOT THE RESULT OF A BOUNDARY SURVEY.
4. WATERBODY INFORMATION PROVIDED BY AECOM 2015 THRU 2019.
5. HORIZONTAL DATUM IS UTM83-18F. VERTICAL DATUM IS NAVD1988.

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| CHECKED BY | WMC | SCALE | AS SHOWN |
| APPROVED BY | JRD | APPROVED BY | |
| DWG. NO. | 033-03-03-001 | REV. NO. | B |

NORTHAMPTON COUNTY, PENNSYLVANIA
USGS QUAD: KUNKLETOWN, PENNSYLVANIA

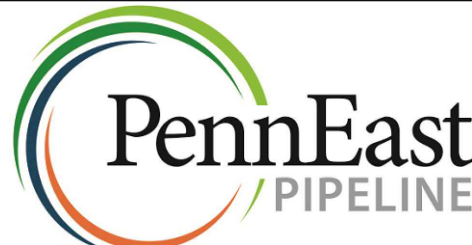


LOCATION MAP
SCALE: 1" = 15 MILES

- PROPOSED**
- PROPOSED 36" PIPELINE
 - PROPOSED PIPELINE PERMANENT EASEMENT
 - FACILITY PERMANENT EASEMENT
 - PROPOSED PIPELINE LIMITS OF DISTURBANCE (REFER TO MAINLINE EROSION & SEDIMENT CONTROL PLAN)
 - ESCCP BOUNDARY
 - IMPERVIOUS AREA
 - INFILTRATION TRENCH
 - IMPERVIOUS AREA OVER INFILTRATION TRENCH
 - VEGETATED AREA OVER INFILTRATION TRENCH
 - PROPOSED FENCE
 - PROPOSED SWALE
 - PROPOSED MAJOR CONTOUR
 - PROPOSED MINOR CONTOUR
 - TEST PITS
 - PROPOSED CONCRETE BLOCK
- EXISTING**
- PROPERTY LINE
 - EXISTING MAJOR CONTOUR
 - EXISTING MINOR CONTOUR
 - EXISTING OVERHEAD LINE
 - EXISTING UTILITY POLE
 - EXISTING FENCE
 - LINE LIST NUMBER
 - SOIL BOUNDARY
 - EXISTING ROAD CENTERLINE
 - SOIL TYPE ABBREVIATION

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| REFERENCE DRAWINGS | | REVISIONS | | | | | |
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| PENNEAST PIPELINE PROJECT MAINLINE BLOCK VALVE 6 POST CONSTRUCTION STORMWATER MANAGEMENT PLAN | | | |
|---|---------------|-------------|------------|
| NORTHAMPTON COUNTY, PENNSYLVANIA | | | |
| DRAWN BY | CAF | DATE ISSUED | 10/15/2018 |
| CHECKED BY | WMC | SCALE | AS SHOWN |
| APPROVED BY | JRD | APPROVED BY | |
| DWG. NO. | 033-03-06-001 | REV. NO. | B |

NORTHAMPTON COUNTY, PENNSYLVANIA
USGS QUAD: KUNKLETOWN, PENNSYLVANIA

THE SOIL AMENDMENT NOTES:

- SOIL AMENDMENT AND RESTORATION SHOULD NOT TAKE PLACE:
 - WITHIN THE DRIP LINE OF TREES OR TREE LINE.
 - OVER UTILITY INSTALLATIONS WITHIN 30 INCHES OF THE SURFACE.
 - WHERE TRENCHING/DRAINAGE LINES ARE INSTALLED.
 - WHERE COMPACTION OF THE SOILS BY DESIGN IS REQUIRED.
- METHODOLOGY SHOULD ONLY BE PERFORMED:
 - WHEN THE SOIL CONDITIONS ARE DRY.
 - USING A SOLID SHANK RIPPER, NOT A DISK OR PLOW DUE TO THEIR INEFFECTIVENESS.

SOIL AMENDMENT METHODOLOGY:

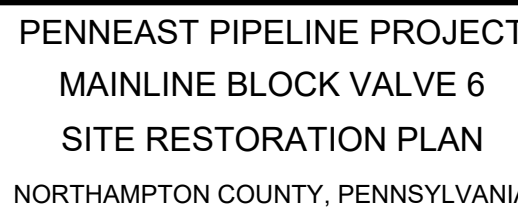
- TREATING COMPACTION BY SOIL RESTORATION:
 - SOIL AMENDMENT MEDIA USUALLY CONSISTS OF COMPOST, BUT CAN INCLUDE MULCH, MANURES, SAND, AND MANUFACTURED MICROBIAL SOLUTIONS.
 - COMPOST SHOULD BE ADDED AT A RATE OF 2:1 (SOIL: COMPOST), IF A PROPRIETARY PRODUCT IS USED, THE MANUFACTURER'S INSTRUCTIONS SHOULD BE FOLLOWED IN TERMS OF MIXING AND APPLICATION RATE.
 - SOIL RESTORATION SHOULD NOT BE USED ON SLOPES GREATER THAN 30%. IN THESE AREAS, DEEP-ROOTED VEGETATION CAN BE USED TO INCREASE STABILITY.
 - SOIL RESTORATION SHOULD NOT TAKE PLACE WITHIN THE DRIP LINE OF A TREE TO AVOID DAMAGING THE ROOT SYSTEM.
 - ON-SITE SOILS WITH AN ORGANIC CONTENT OF AT LEAST 5 PERCENT CAN BE PROPERLY STOCKPILED (TO MAINTAIN ORGANIC CONTENT) AND REUSED.
 - PROCEDURE: ROTOTILL, OR RIP THE SUBGRADE, REMOVE ROCKS, DISTRIBUTE THE COMPOST, SPREAD THE NUTRIENTS, ROTOTILL AGAIN.
 - ADD 6 INCHES COMPOST/AMENDMENT AND TILL UP TO 20 INCHES FOR MINOR COMPACTION.
 - ADD 10 INCHES COMPOST/AMENDMENT AND TILL UP TO 20 INCHES FOR MAJOR COMPACTION.
- TREATING COMPACTION BY RIPPING / SUBSOILING / TILLING / SCARIFICATION:
 - SUBSOILING IS ONLY EFFECTIVE WHEN PERFORMED ON DRY SOILS.
 - RIPPING, SUBSOILING, OR SCARIFICATION OF THE SUBSOIL SHOULD BE PERFORMED WHERE SUBSOIL HAS BECOME COMPACTED BY EQUIPMENT OPERATION, DRIED OUT AND CRUSTED, OR WHERE NECESSARY TO OBLITERATE EROSION RILLS.
 - RIPPING (SUBSOILING) SHOULD BE PERFORMED USING A SOLID-SHANK RIPPER AND TO A DEPTH OF 20 INCHES (8 INCHES FOR MINOR COMPACTION).
 - SHOULD BE PERFORMED BEFORE COMPOST IS PLACED AND AFTER ANY EXCAVATION IS COMPLETED.
 - SUBSOILING SHOULD NOT BE PERFORMED WITHIN THE DRIP LINE OF ANY EXISTING TREES, OVER UNDERGROUND UTILITY INSTALLATIONS WITH 30 INCHES OF THE SURFACE, WHERE TRENCHING/DRAINAGE LINES ARE INSTALLED, WHERE COMPACTION IS BY DESIGN.

LANDSCAPE RESTORATION:

- IN THE SEQUENCE OF CONSTRUCTION, THE SITE PREPARATION SHOULD OCCUR IN THE FALL PRIOR TO PLANTING IN ORDER TO ELIMINATE UNDESIRABLE SPECIES AND PREP SOIL.
- SHOULD THE LANDSCAPE RESTORATION AREAS BECOME DISTURBED AND/OR COMPACTED, SOILS AMENDMENT AND RESTORATION MAY BE REQUIRED.
- ALL BUFFER BOUNDARIES SHALL BE DELINEATED AND CLEARLY MARKED PRIOR TO ANY CONSTRUCTION ACTIVITY TAKING PLACE.
- WEED CONTROL METHODS SUCH AS ORGANIC MULCH, WEED CONTROL FABRICS, SHALLOW CULTIVATION, PRE-EMERGENT HERBICIDES, OR MOWING AS APPLICABLE IS ALLOWED.
- DEER CONTROL, TREE PROTECTION, STREAM BUFFER FENCING AND/OR OTHER TYPES OF VEGETATION PROTECTION AS APPLICABLE IS REQUIRED.
- MONITORING OF THE NEW LANDSCAPED RESTORATION AREAS SHALL BE DONE FOUR TIMES A YEAR FOR FOUR YEARS.
- THE USE OF SIGNIFICANT AMOUNTS OF CHEMICALS, FERTILIZERS, HERBICIDES AND PESTICIDES ON THE LANDSCAPE RESTORATION IS NOT ALLOWED.

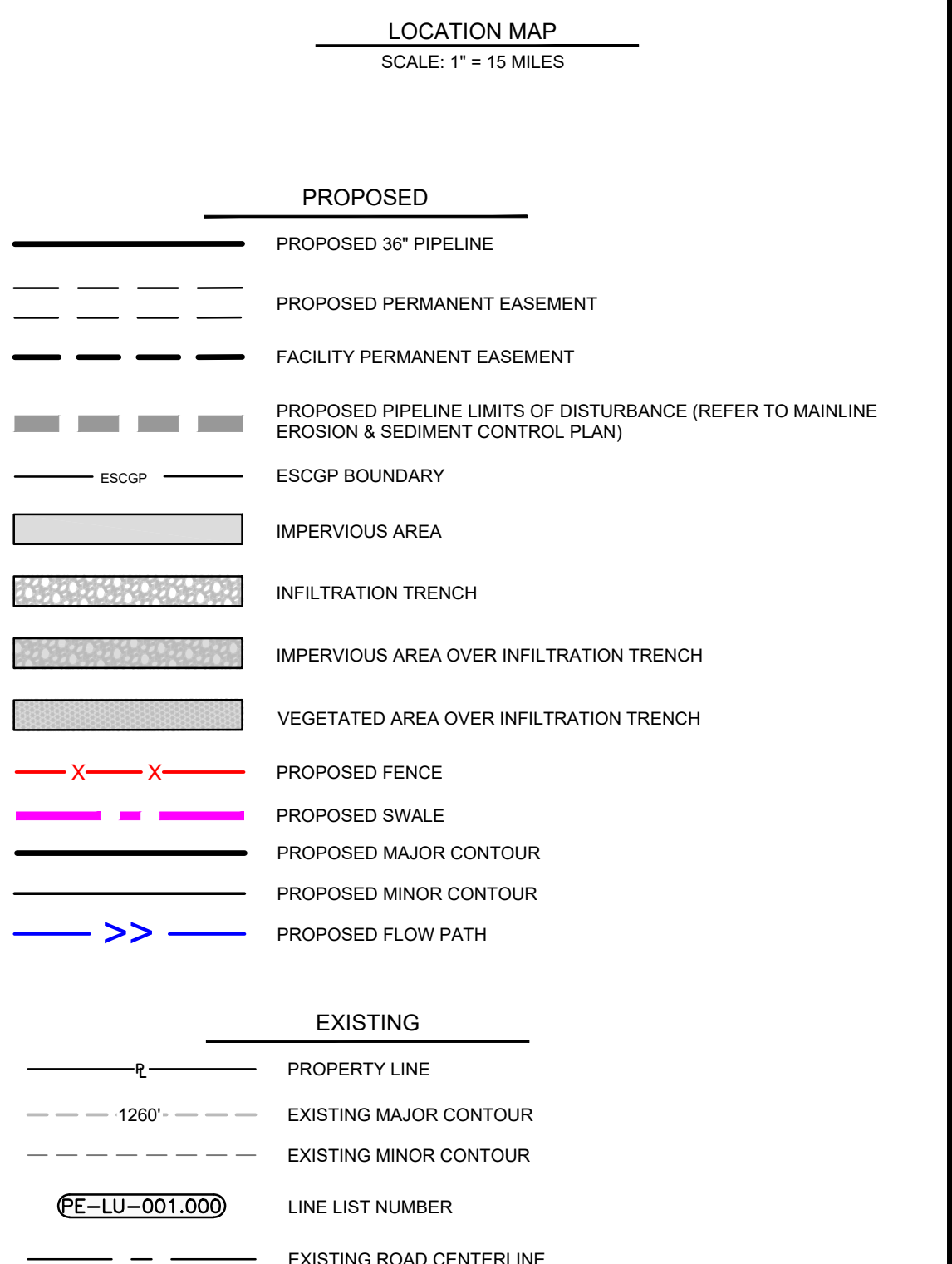
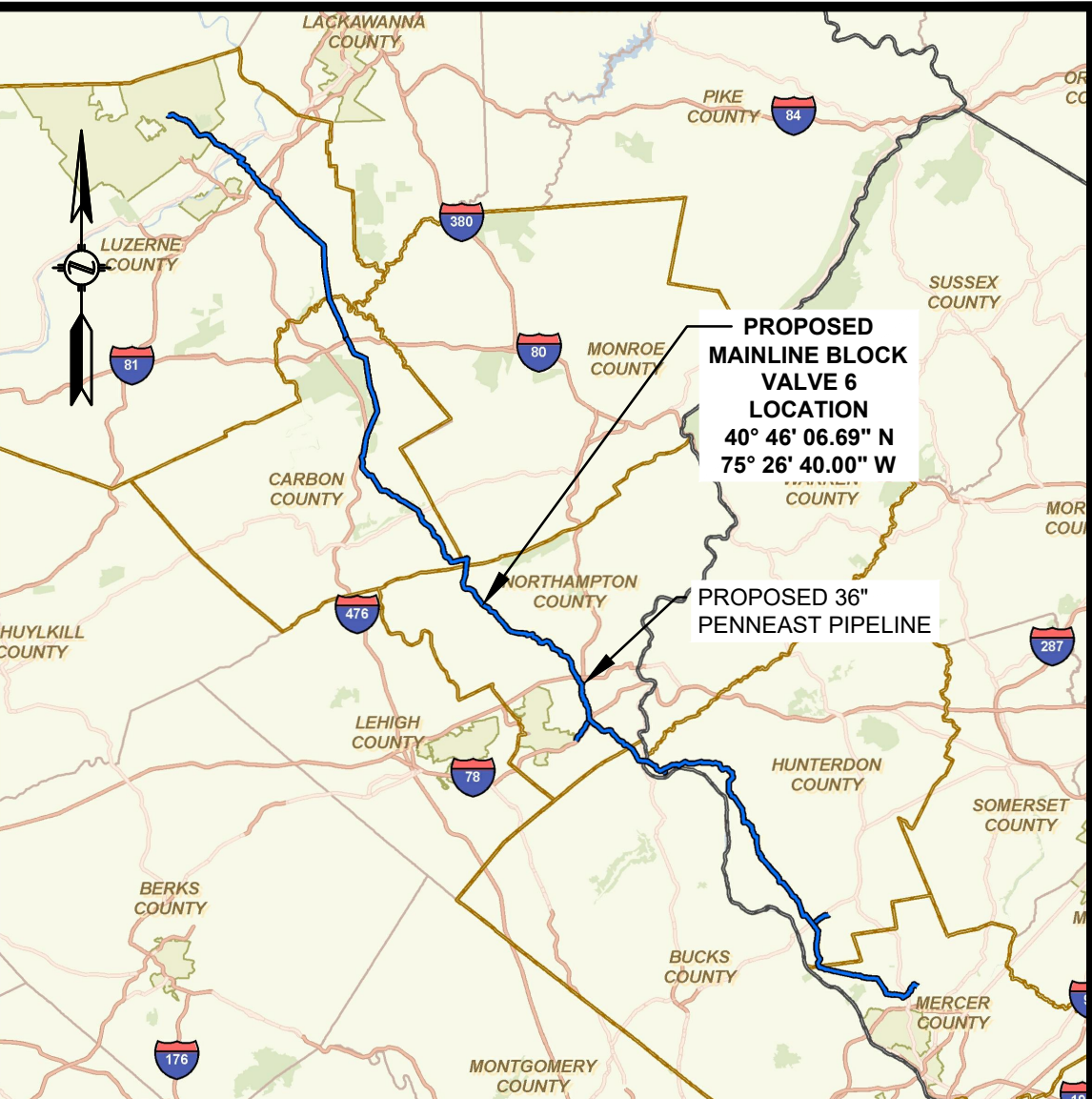
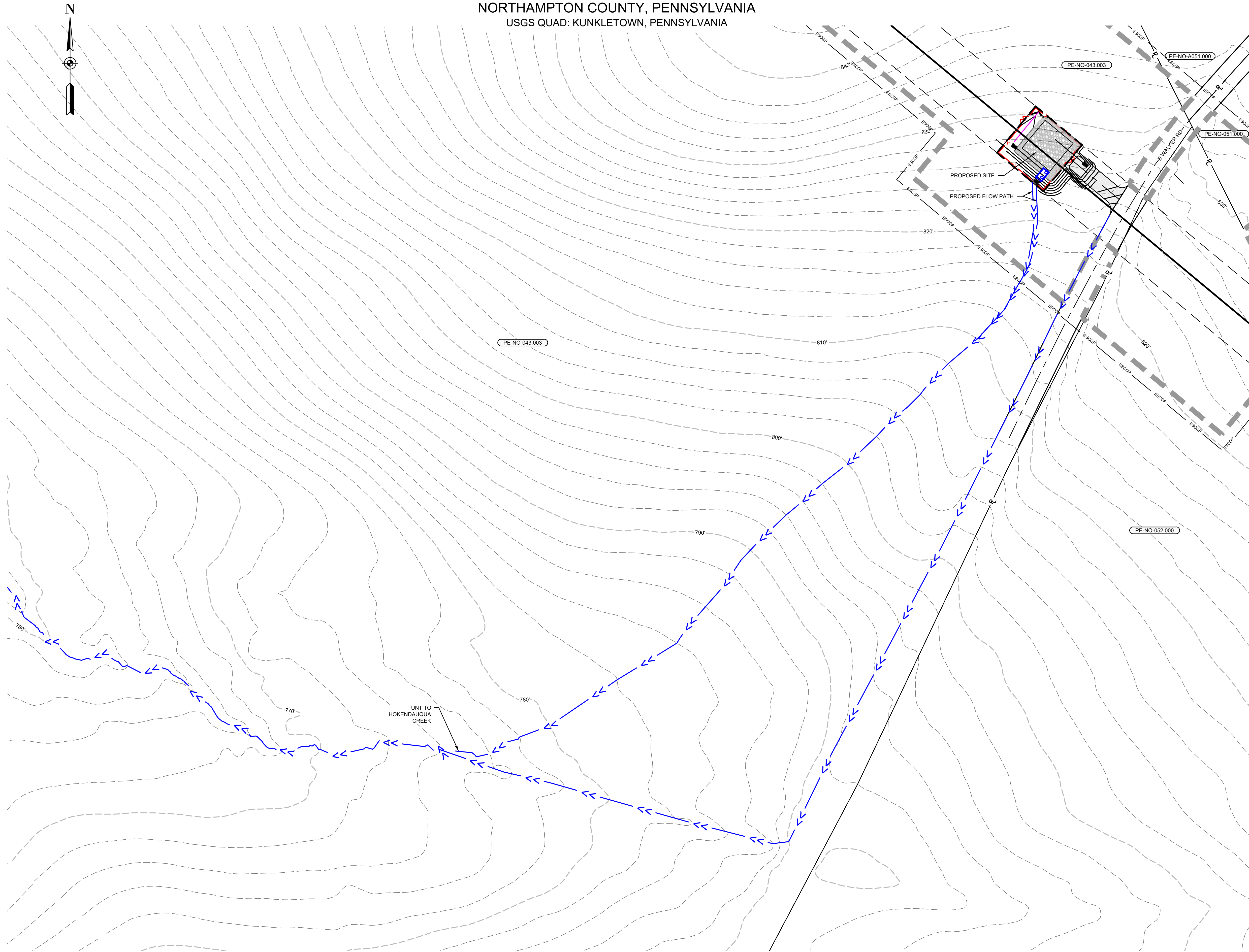
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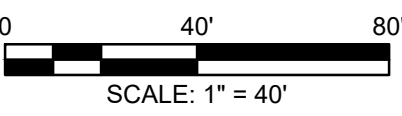


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| DRAWN BY | CAF | DATE ISSUED | 10/15/2018 |
| CHECKED BY | WMC | SCALE | AS SHOWN |
| APPROVED BY | JRD | APPROVED BY | |
| DWG. NO. | 033-03-06-001.1 | REV. NO. | B |

NORTHAMPTON COUNTY, PENNSYLVANIA
USGS QUAD: KUNKLETOWN, PENNSYLVANIA

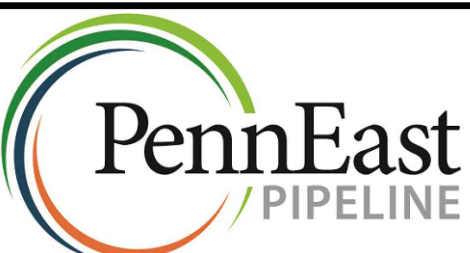


SITE PLAN



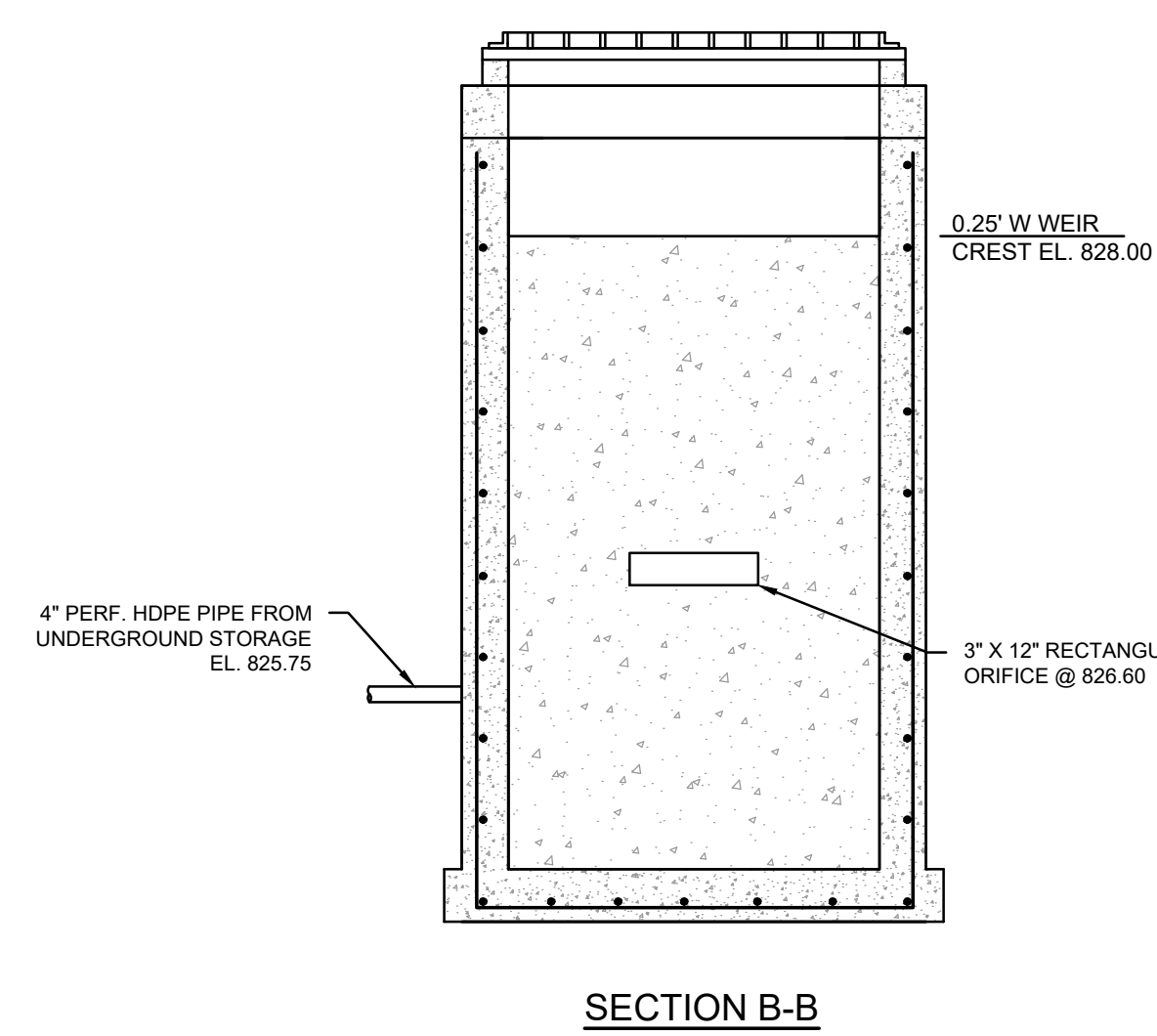
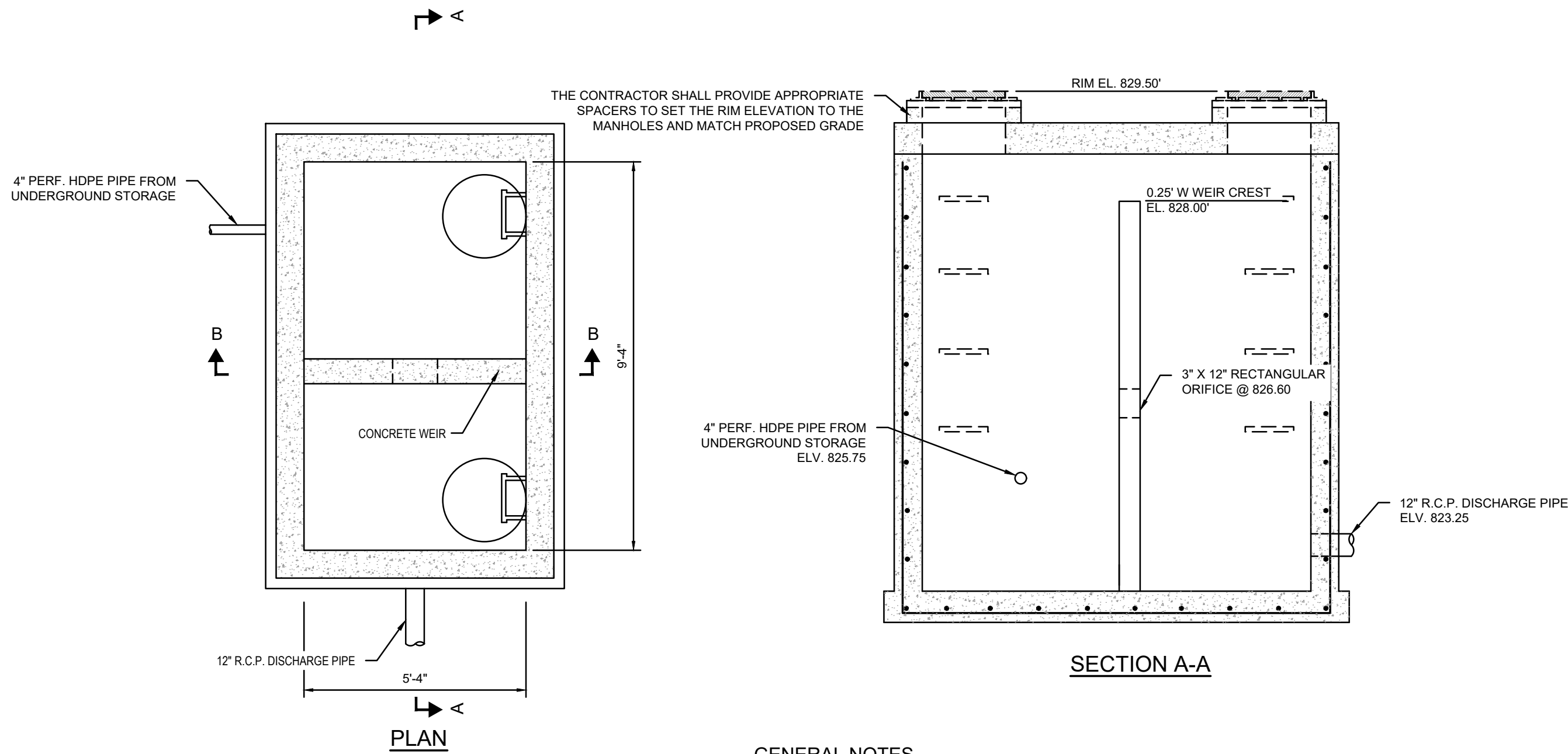
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 - WATERBODY INFORMATION PROVIDED BY AECOM 2016 THRU 2019.
 - HORIZONTAL DATUM IS UTM83-16F. VERTICAL DATUM IS NAVD1988.

| REFERENCE DRAWINGS | | | REVISIONS | | | | |
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| PENNEAST PIPELINE PROJECT | | | |
|-----------------------------------|---------------|-------------|------------|
| MAINLINE BLOCK VALVE 6 | | | |
| OFFSITE STORMWATER DISCHARGE PLAN | | | |
| NORTHAMPTON COUNTY, PENNSYLVANIA | | | |
| DRAWN BY | CAF | DATE ISSUED | 10/15/2018 |
| CHECKED BY | WMC | SCALE | AS SHOWN |
| APPROVED BY | JRD | APPROVED BY | |
| DWG. NO. | 033-03-06-002 | REV. NO. | B |

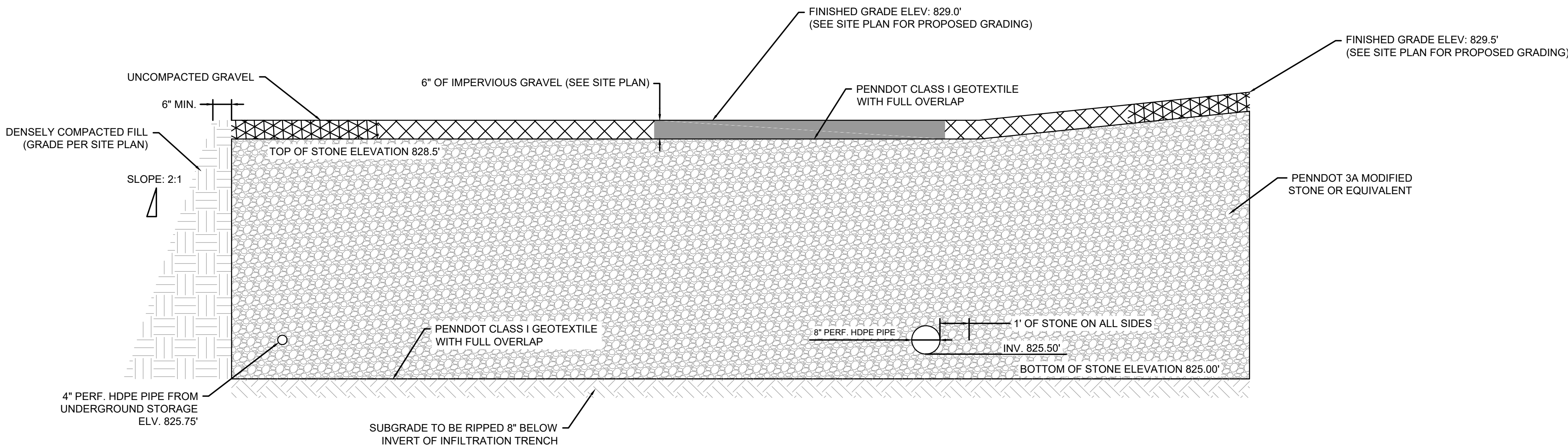


GENERAL NOTES

1. THE CONTRACTOR IS RESPONSIBLE FOR AND SHALL VERIFY AND COORDINATE ALL DIMENSIONS AND DETAILS CONCERNING HIS WORK BEFORE PROCEEDING WITH SAID WORK. ANY DISCREPANCIES SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ENGINEER.
2. THE CONTRACTOR SHALL VERIFY THE ELEVATIONS OF EXISTING STRUCTURES AND CLEARANCES TO THE NEW CONSTRUCTION.
3. ALL REINFORCED CAST-IN-PLACE CONCRETE CONSTRUCTION SHALL CONFORM TO "BUILDING CODE REQUIREMENTS FOR REINFORCED CONCRETE" (ACI STANDARD 318-99), AND "ACI DETAILING MANUAL- (ACI 66 (94)) EXCEPT AS SPECIFICALLY MODIFIED BY THE CONTRACT DRAWINGS AND THE SPECIFICATIONS.
4. ALL CONCRETE USED ON THE PROJECT SHALL HAVE A SPECIFIED 28-DAY COMPRESSIVE STRENGTH (FC) AS NOTED BELOW. SUCH STRENGTHS SHALL BE DETERMINED BY A TESTING LABORATORY.
A) FC = 5,000 PSI FOR ALL PRECAST STRUCTURES ALL REINFORCING STEEL SHALL HAVE A MINIMUM YIELD STRENGTH, FY = 60 KSI AND SHALL BE NEW DEFORMED BILLET-STEEL CONFORMING TO ASTM A615-96a, GRADE 60.
5. ALL COLUMN TIES AND BEAM STIRRUPS SHALL BE REINFORCING BARS CONFORMING TO ASTM A615-96a, GRADE 40.
6. ALL WELDED WIRE REINFORCING (WWR) SHALL CONFORM TO ASTM A185-01.
7. THE STRUCTURE IS DESIGNED TO MEET THE REQUIREMENTS OF ASTM C-478, "PRECAST REINFORCED CONCRETE MANHOLE SECTIONS." THE REINFORCED CONCRETE STRUCTURES ARE TO BE DESIGNED TO WITHSTAND AASHTO HS-20 LIVE LOAD CONDITIONS (DESIGN OF FRAME AND COVER BY OTHERS).
8. CONTRACTOR TO SUBMIT SHOP DRAWINGS SIGNED AND SEALED BY A LICENSED PROFESSIONAL ENGINEER PRIOR TO CONSTRUCTION SHOWING FABRICATION DETAILS AND DIMENSIONS.

SUB-SURFACE DETENTION OUTLET
CONTROL STRUCTURE

NO SCALE



SECTION A - A
UNDERGROUND STORMWATER DETENTION SYSTEM
NO SCALE


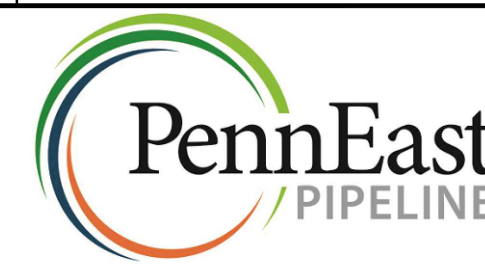
| Test Pit | Test #1 | Test #2 | Final Rate Used |
|-------------------------------------|--------------|--------------|---------------------------|
| TP-1 | 15.0 inch/hr | 13.5 inch/hr | 14.25 inch/hr |
| TP-2 | 9.0 inch/hr | 7.5 inch/hr | 8.25 inch/hr ¹ |
| Observed Overall Rate | | | 10.0 inch/hr ¹ |
| Design Rate (Factor of Safety of 2) | | | 5.0 inch/hr ² |

| Test Pit No. | Existing Grade Elevation (feet) | Proposed BMP Invert (feet) | Infiltration Test Elevation (feet) | Excavation Depth Elevation (feet) | Depth to High Groundwater (feet) |
|--------------|---------------------------------|----------------------------|------------------------------------|-----------------------------------|--|
| MLV6-TP-1 | 821.4 | N/A | 819.9 | 817.9 | No evidence of high groundwater observed |
| MLV6-TP-2 | 824.6 | N/A | 820.1 | 818.1 | No evidence of high groundwater observed |

NOTES:

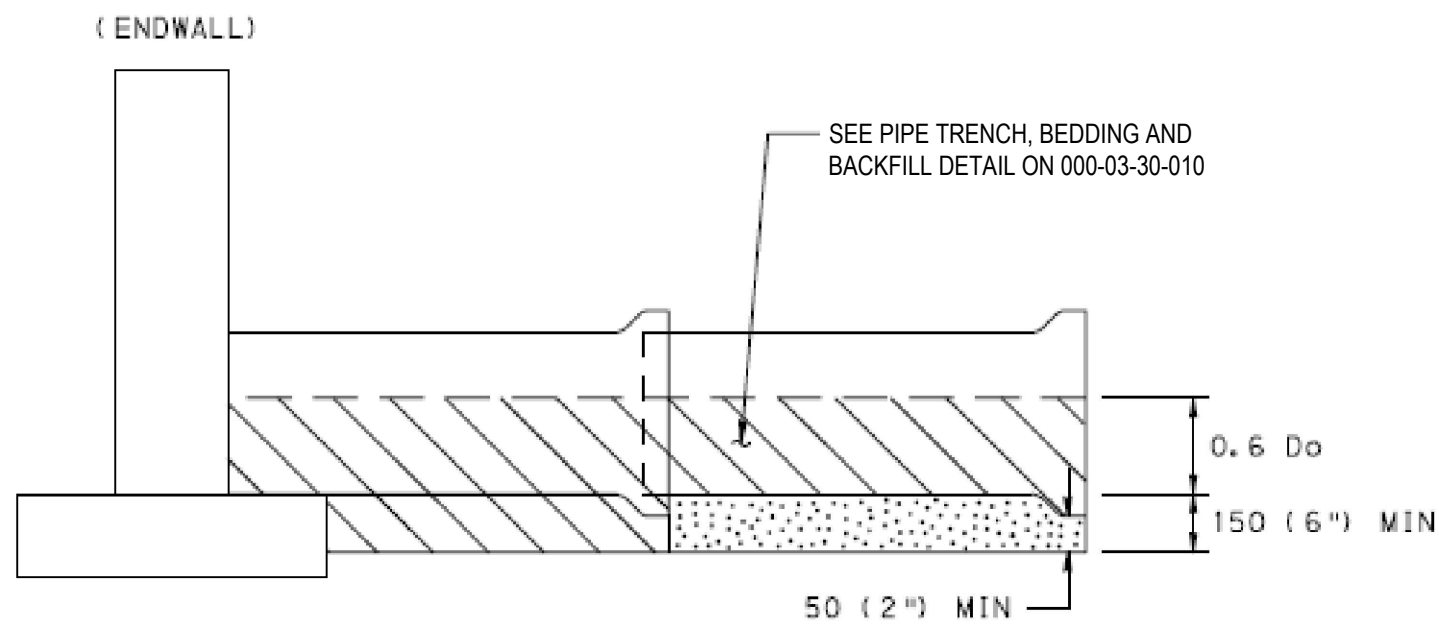
1. THE RATES FROM WTP-1 AND WTP-2 REPRESENT DESIGN RATES AS THE REQUIRED FACTOR OF SAFETY IS INCORPORATED INTO THE BASIN FLOOD TEST.
2. PROJECT DESIGN RATE FOR MLV-3 IS BASED ON WTP-1 WHICH IS WITHIN THE FOOTPRINT OF THE PROPOSED BMP, HOWEVER, THE DESIGN RATE IS CONSISTENT WITH THE OTHER TEST PIT LOCATION.



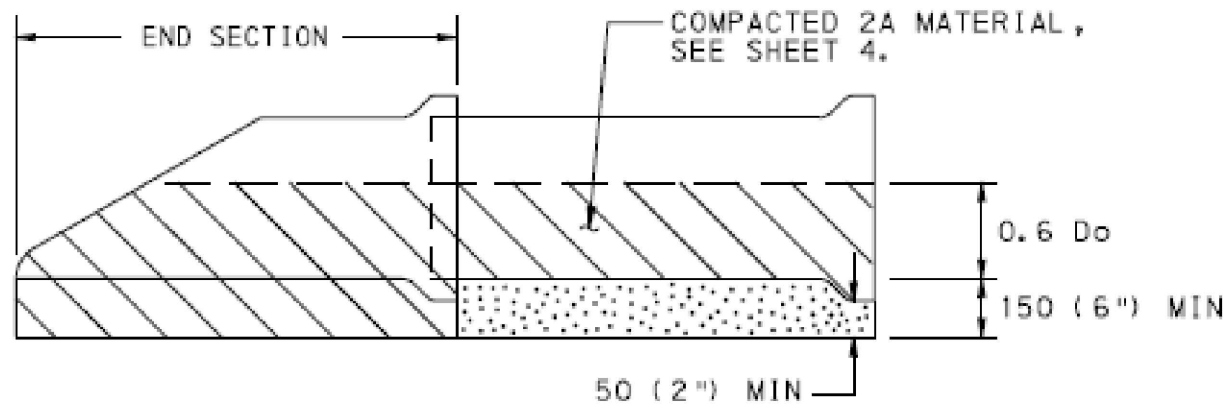
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|--|---------------------|---|---------|-------------|------------|---|
|  Know what's below. Call before you dig. | | CLIENT APPROVAL | | | | |
| | | DATE | | | | |
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|  | | PENNEAST PIPELINE PROJECT MAINLINE BLOCK VALVE 6 POST CONSTRUCTION STORMWATER MANAGEMENT DETAILS NORTHAMPTON COUNTY, PENNSYLVANIA | | | | |
| | | DRAWN BY | CAF | DATE ISSUED | 10/15/2018 | |
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| | | APPROVED BY | JRD | APPROVED BY | | |
| DWG. NO. | | 033-03-07-001 | | | REV. NO. | B |



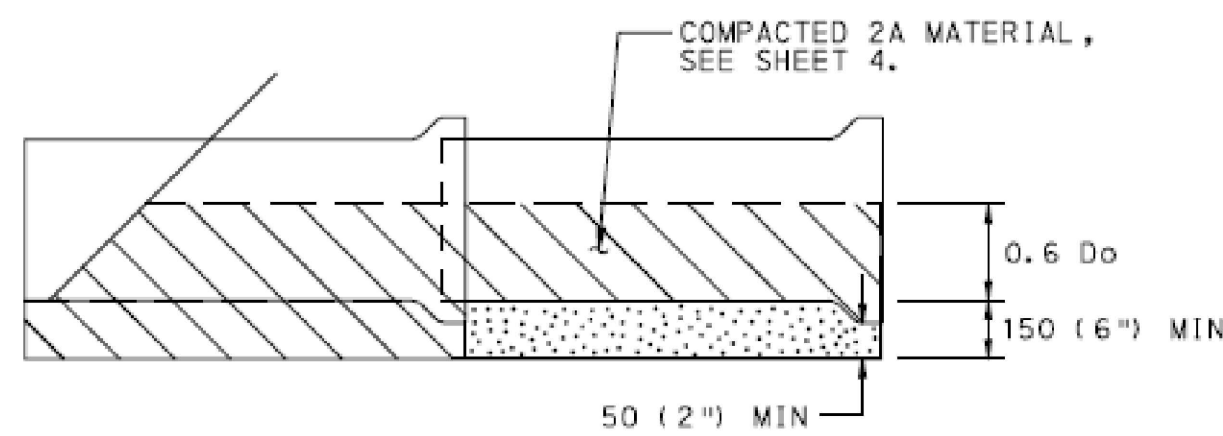
- (SEE GENERAL NOTE 15 ON SHEET 1)



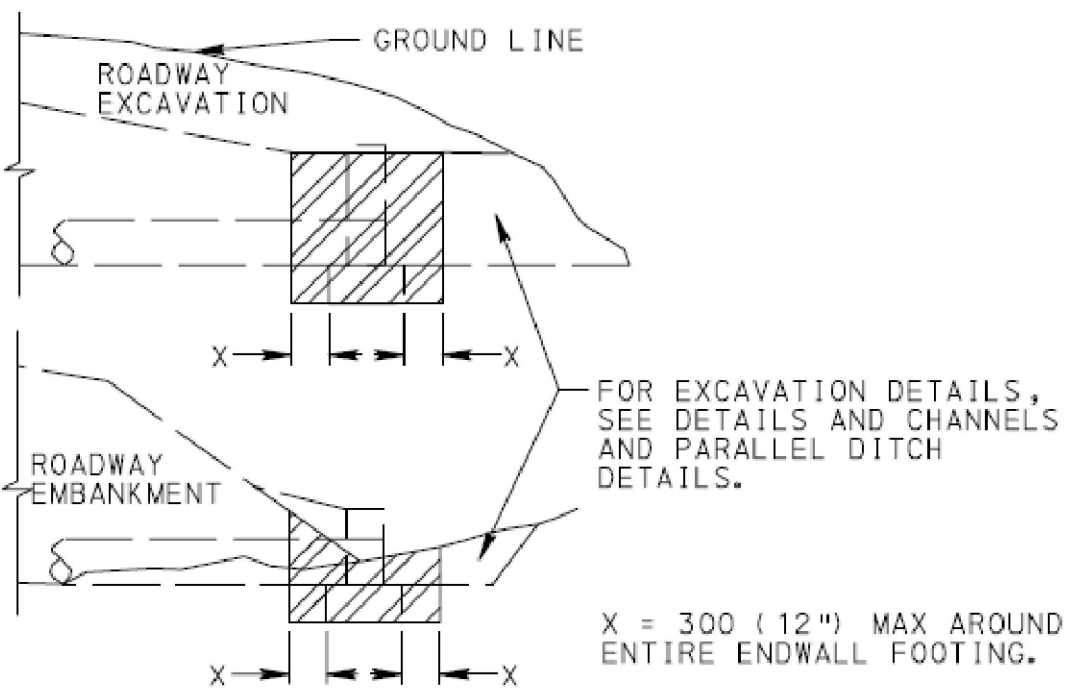
BACKFILL DETAIL AT ENDWALL
(FOR CONCRETE PIPE)



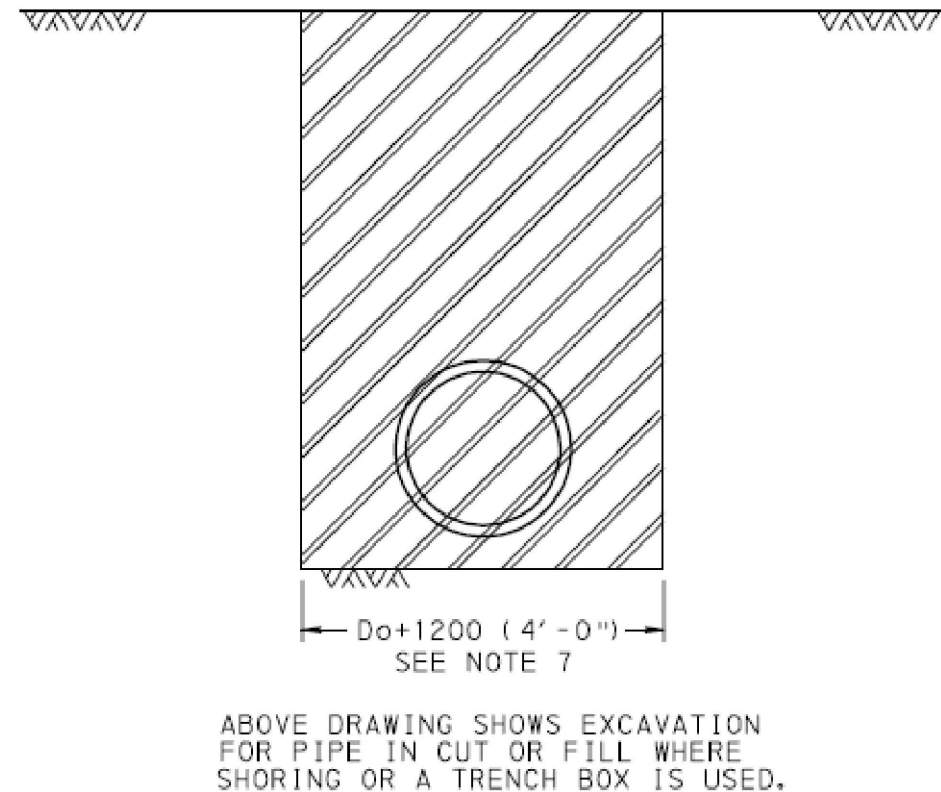
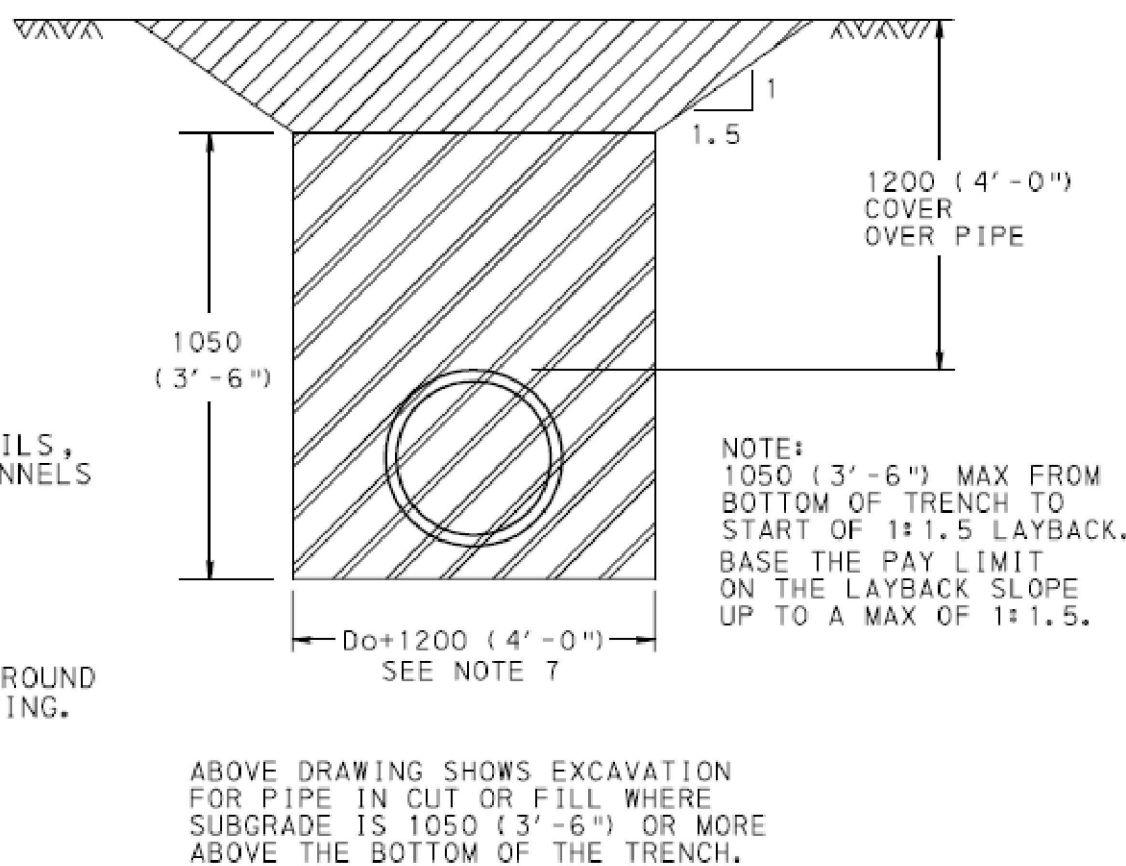
BACKFILL DETAIL AT END SECTION
(FOR CONCRETE PIPE)



BACKFILL DETAIL AT LAST SECTION OF PIPE
(FOR CONCRETE PIPE)



EXCAVATION FOR ENDWALLS



PAY LIMITS FOR PIPE EXCAVATION

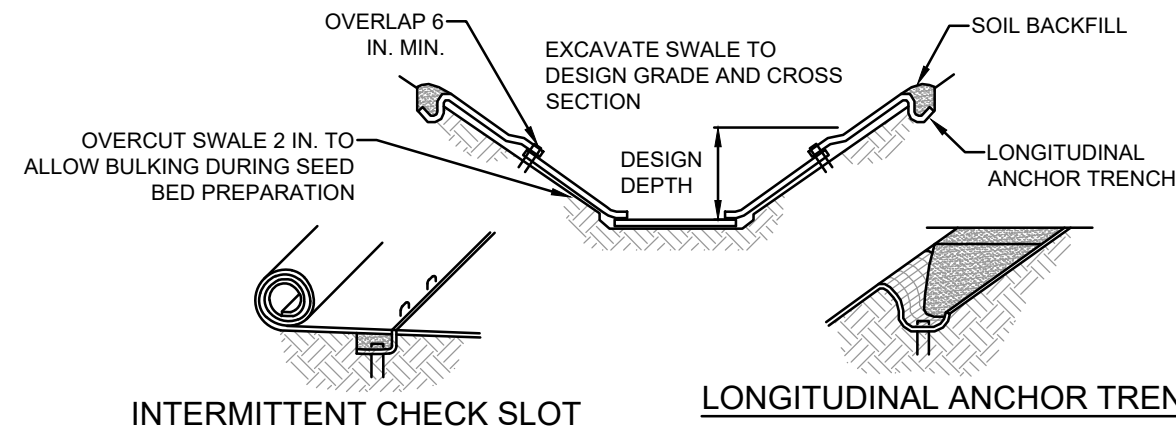
NOTES

1. PROVIDE MATERIALS AND CONSTRUCT AS SPECIFIED IN PUBLICATION 408, SECTION 601 FOR PIPE CULVERTS, SECTION 602 FOR CORRUGATED METAL PIPE-ARCH CULVERTS AND SECTION 603 FOR METAL PLATE CULVERTS.
2. SHORING OR TRENCH BOX INSTALLATION FOR FLEXIBLE PIPE IS NOT NORMALLY USED. IF SHORING OR TRENCH BOX INSTALLATION IS PERMITTED IN SPECIAL CIRCUMSTANCES, REFER TO PUBLICATION 408, SECTION 601.3(g).
3. IN ALL EXCAVATION AREAS FOLLOW OSHA SAFETY REQUIREMENTS.
4. DO NOT COMPACT NO. 8 MATERIAL USED FOR BEDDING UNDER CONCRETE PIPES.
5. ALLOW NO PAYMENT FOR EXCAVATION IN EXCESS OF SPECIFIED LIMITS AND FOR ADDITIONAL BACKFILL MATERIAL REQUIRED.
6. PAYMENT FOR THE BACKFILL ENVELOPE, INCLUDING BEDDING, COARSE AGGREGATE AND SUITABLE MATERIAL UP TO 300 (12") ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
7. FOR BOTTOM TRENCH WIDTHS ≥ 2.5 m (8'-0"), ALL EXCAVATION IS CLASS 1.
8. FOR INLET OR OUTLET PROTECTION SEE DETAIL A-1.
9. CONSTRUCT FLEXIBLE BASE REPLACEMENT IN ACCORDANCE WITH THE REQUIREMENTS OF PUBLICATION 408, SECTION 316.
10. PREPARE EXPOSED VERTICAL AND HORIZONTAL SURFACES AS PER PUBLICATION 408, SECTION 409.3(k).
11. FOR NON-OVERLAY APPLICATIONS, THE TOP 40 (1 1/2") OF BASE REPLACEMENT WILL BE SUPERPAVE WEARING COURSE.
12. FOR RESTORATION OF RIGID PAVEMENT, REFER TO PUBLICATION 408, SECTION 516 AND RC-26M.
13. FOR SUPERPAVE BASE REPLACEMENT, SAW CUTTING, EXCAVATION, HAULING AND DISPOSAL, BITUMINOUS TACK COAT, BITUMINOUS MATERIAL, AND SEALING OF THE JOINTS ARE CONSIDERED AS INCIDENTAL.
14. PERFORM AND COMPLETE PIPE RESTORATION WORK PRIOR TO THE FLEXIBLE SUPERPAVE BASE REPLACEMENT.

LEGEND

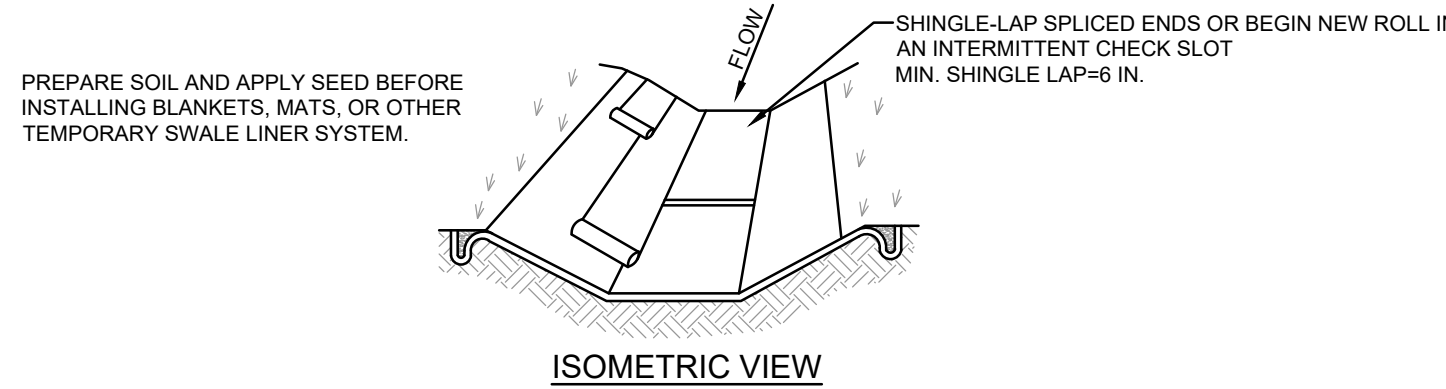
| | |
|--|--------------------------------------|
| | CLASS 4 EXCAVATION |
| | CLASS 1 EXCAVATION |
| | AGGREGATE FOR BEDDING (AASHTO NO. 8) |
| | COARSE AGGREGATE (2A) |

Do = OUTSIDE DIAMETER OF PIPE.

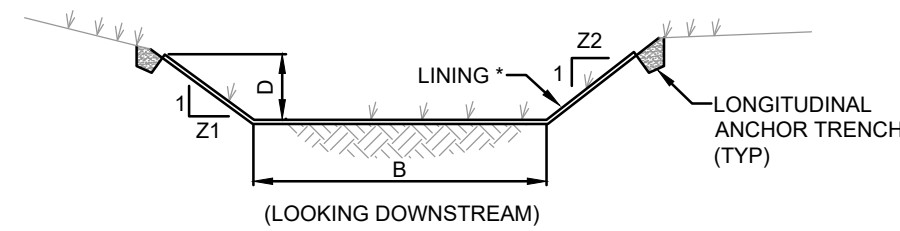


INTERMITTENT CHECK SLOT

LONGITUDINAL ANCHOR TRENCH



ISOMETRIC VIEW



SWALE CROSS-SECTION

* SEE MANUFACTURER'S LINING INSTALLATION DETAIL FOR STAPLE PATTERNS, VEGETATIVE STABILIZATION FOR SOIL AMENDMENTS, SEED MIXTURES AND MULCHING INFORMATION

NOTES

ANCHOR TRENCHES SHALL BE INSTALLED AT BEGINNING AND END OF SWALE IN THE SAME MANNER AS LONGITUDINAL ANCHOR TRENCHES.

SWALE DIMENSIONS SHALL BE CONSTANTLY MAINTAINED. SWALE SHALL BE CLEANED WHENEVER TOTAL SWALE DEPTH IS REDUCED BY 25% AT ANY LOCATION. SEDIMENT DEPOSITS SHALL BE REMOVED WITHIN 24 HOURS OF DISCOVERY OR AS SOON AS SOIL CONDITIONS PERMIT ACCESS TO SWALE WITHOUT FURTHER DAMAGE. DAMAGED LINING SHALL BE REPAIRED OR REPLACED WITHIN 48 HOURS OF DISCOVERY.

NO MORE THAN ONE THIRD OF THE SHOOT (GRASS LEAF) SHALL BE REMOVED IN ANY MOWING. GRASS HEIGHT SHALL BE MAINTAINED BETWEEN 2 AND 3 INCHES UNLESS OTHERWISE SPECIFIED. EXCESS VEGETATION SHALL BE REMOVED FROM PERMANENT SWALES TO ENSURE SUFFICIENT SWALE CAPACITY.

| SWALE NO. | BOTTOM WIDTH (FT) | LEFT SIDE SLOPE (H:V) | RIGHT SIDE SLOPE (H:V) | DEPTH (FT) | LINING MATERIAL |
|-----------|-------------------|-----------------------|------------------------|------------|--------------------------|
| SWALE1 | 0.0 | 4.0 | 4.0 | 0.75 | LANDLOK TRM-435 OR EQUAL |

VEGETATED SWALE DETAIL
(NOT TO SCALE)



NOTE:

THESE DETAILS HAVE BEEN ADAPTED FROM PENNDOT JUNE 2010 STANDARD DRAWINGS. ADDITIONAL INFORMATION FROM STANDARD PENNDOT DRAWINGS AND SPECIFICATIONS ARE INCORPORATED AS REFERENCED.

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| NO. | DESCRIPTION | DATE | DRAWN | CK | APPR |
| A | ISSUED FOR PADEP | 10/15/2018 | CAF(MM) | WMC(MM) | MJD(MM) |
| B | RE-ISSUED FOR PADEP | 10/2019 | MWF(MM) | DOW(MM) | WMC(MM) |
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| | | PENNEAST PIPELINE PROJECT MAINLINE BLOCK VALVE 6 POST CONSTRUCTION STORMWATER MANAGEMENT DETAILS NORTHAMPTON COUNTY, PENNSYLVANIA | | | |
| DRAWN BY CAF CHECKED BY WMC APPROVED BY JRD | | DATE ISSUED 10/15/2018 SCALE AS SHOWN APPROVED BY | | | |
| DWG. NO. 033-03-07-003 | | REV. NO. 8 | | | |

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DRAINAGE PIPE INSTALLATION PROCEDURE

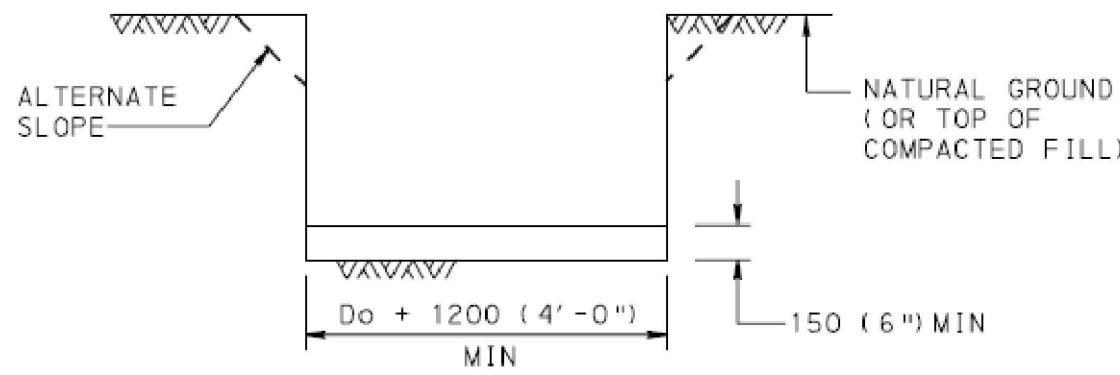
CONSTRUCTION DETAILS BELOW COVER THE FOLLOWING CONDITIONS:

- (A) PIPE LYING ON TOP OF THE NATURAL GROUND, ROCK OR COMPACTED (97% SPD) FILL.
- (B) THE EXISTING GROUND IS BETWEEN THE TOP AND THE BOTTOM OF THE PROPOSED PIPE AND THE PIPE IS TO BE COVERED WITH EARTH FILL.
- (C) THE TOP OF PIPE IS BELOW THE LEVEL OF THE NATURAL GROUND OR COMPACTED FILL (TO MINIMUM 97% SPD) AND TO BE COVERED WITH EARTH FILL TO HEIGHTS ABOVE THE NATURAL GROUND.

STEP 1 : REMOVE TOPSOIL (COMPRESSIBLE LAYER OF ORGANIC MATERIAL) TO A WIDTH EQUAL TO 5 OUTSIDE DIAMETERS OF THE PIPE IN ALL FILL CONDITIONS ABOVE (A), (B) & (C). ALSO IF SPECIFIED ON THE CONTRACT DRAWING, UNDERCUT FOR THE DEPTH BELOW THE BEDDING AS SHOWN BY DESIGN (MAKE MIN WIDTH 5 DIAMETERS OF PIPE). PAY AS CLASS 1 EXCAVATION.

STEP 2 : CONSTRUCT THE EMBANKMENT TO 1200 (4'-0") ABOVE THE TOP OF PIPE OR TO THE SUBGRADE ELEVATION, WHICHEVER IS LESS. FOR PIPES 1800 (72") OR GREATER SEE NOTE 1.

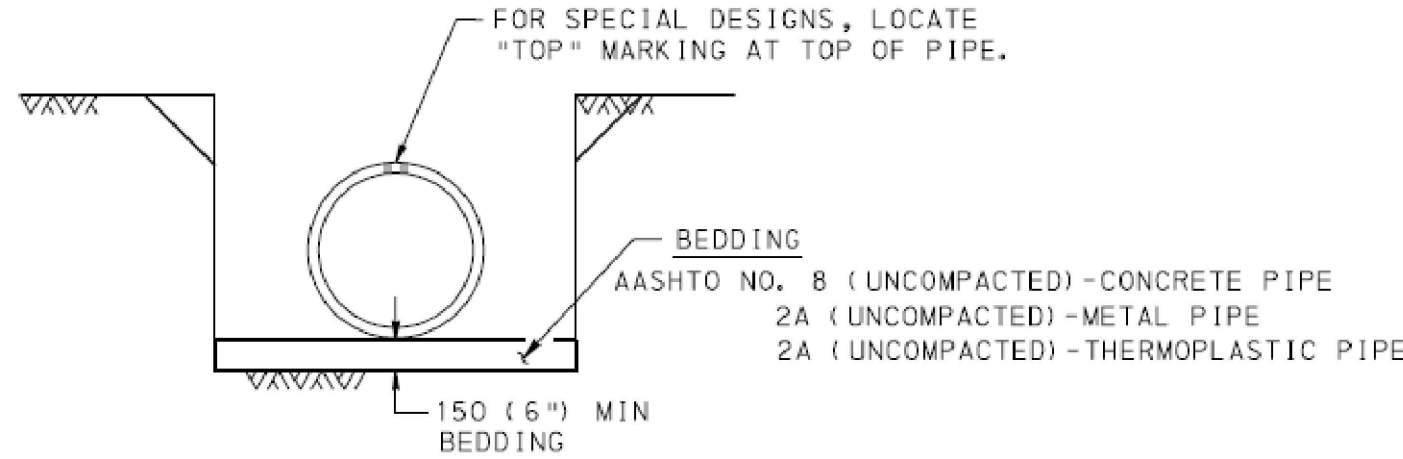
STEP 3 : EXCAVATE THE TRENCH TO THE WIDTH OF THE OUTSIDE DIAMETER OF THE PIPE BARREL PLUS 1200 (4'-0") AND CREATE AN APPROPRIATE BEDDING 150 (6") DEEP.



STEP 4 : FOR CONCRETE PIPE, IF THIS EXCAVATION IS THROUGH ROCK, OR HARD SHALE, OR IN AREAS OF UNDERCUT, PROVIDE 150+40 mm/m (6"+1/2" INCH/FT) OF Do+1200 (4'-0"), BELOW THE INTENDED BOTTOM ELEVATION OF THE PIPE, 400 (16") MAX.

NOTE: IF UNSUITABLE MATERIAL IS FOUND, UNDERCUT AS DIRECTED AND BACKFILL WITH SUITABLE MATERIAL TO BOTTOM OF BEDDING ELEVATION. (UNLESS OTHERWISE SPECIFIED.)

STEP 5 : LAY PIPE ON APPROPRIATE BEDDING. SEE STEP 6D FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH.



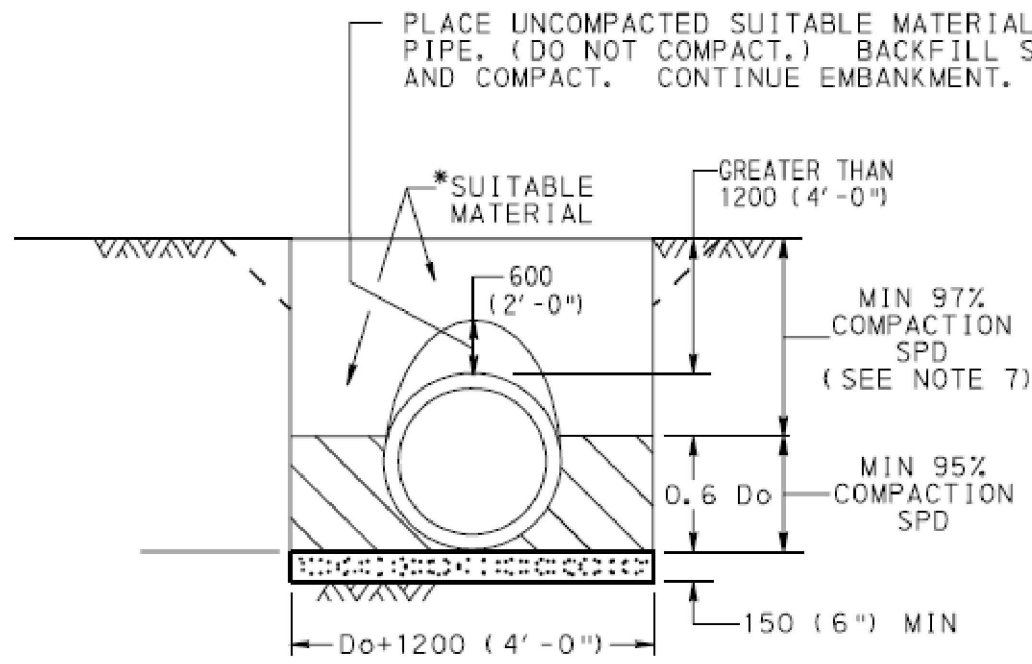
STEP 6 : FOR CONCRETE PIPE, SEE STEP 6A.
FOR METAL PIPE AND METAL PLATE PIPE, SEE STEP 6B.
FOR THERMOPLASTIC PIPE, SEE STEP 6C.
FOR METAL PIPE ARCH AND METAL PLATE PIPE ARCH, SEE STEP 6D.

NOTE:

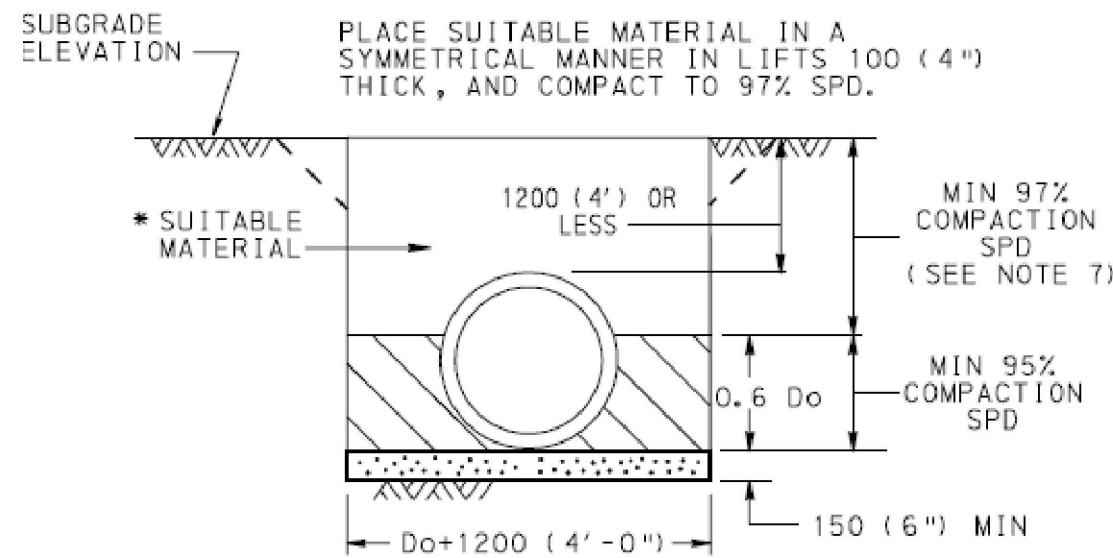
WHEN LAYING PIPE FOR INFILTRATION TRENCHES, LEVEL SPREADERS AND SUBSURFACE STORMWATER STORAGE FACILITIES CARE SHALL BE TAKEN TO AVOID COMPACTION OF SUBGRADE.

STEP 6A : CONCRETE PIPE

PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 0.6 Do. COMPACT TO 95% SPD. TEST THE SIDE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



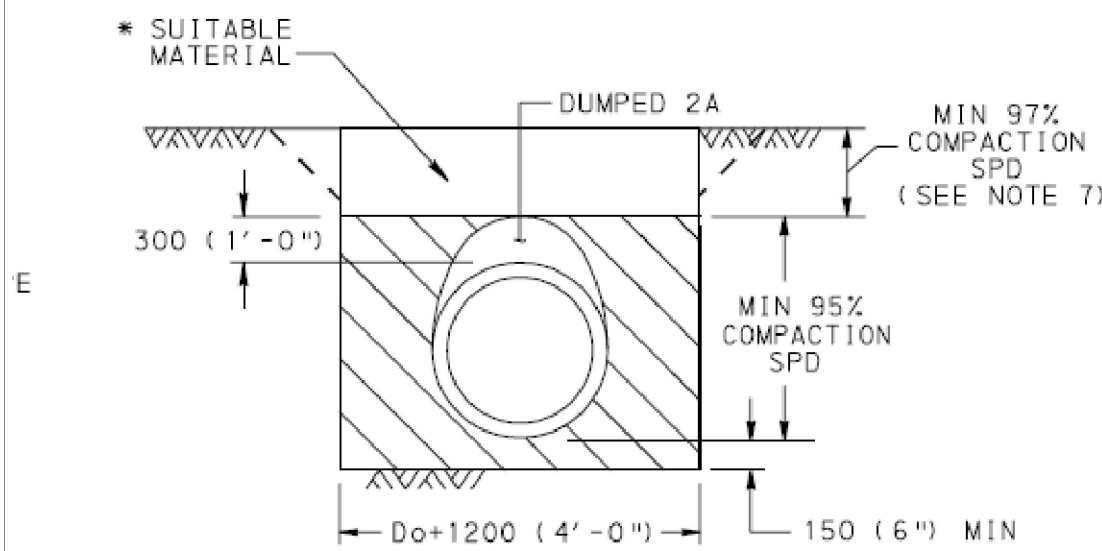
GREATER THAN 1.2 m (4') TO 14.6 m (48')
FOR FILLS OVER 14.6 m (48'), SEE NOTE 8.



SHALLOW FILLS 1200 (4'-0") AND LESS

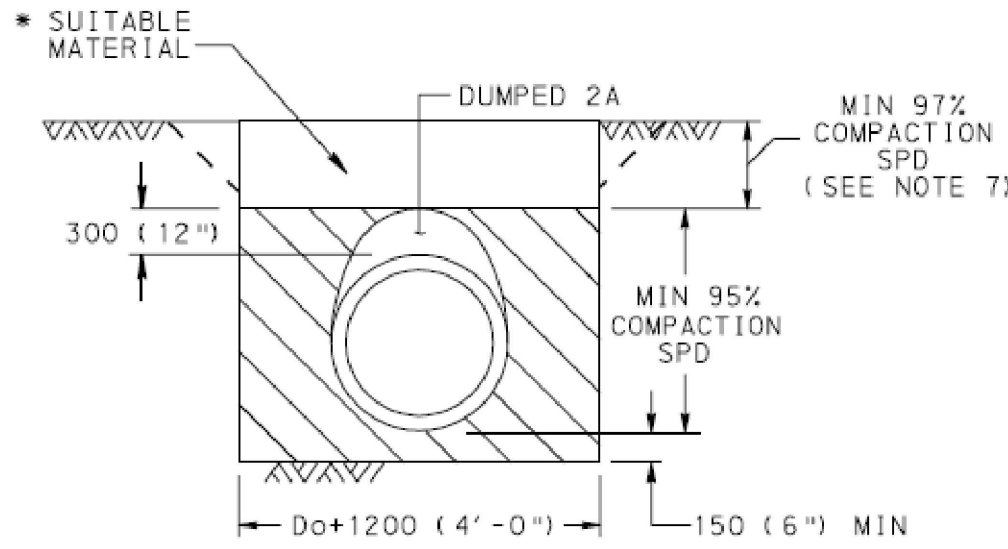
STEP 6B : METAL PIPE AND METAL PLATE PIPE

PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



STEP 6C: THERMOPLASTIC PIPE

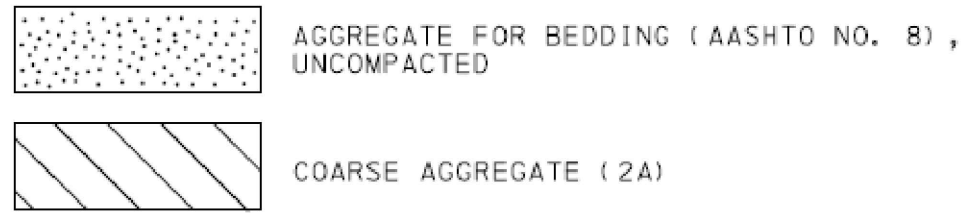
PLACE 2A COARSE AGGREGATE MATERIAL, IN LIFTS 100 (4") THICK, ADJACENT TO THE LOWER HAUNCHES TO A HEIGHT OF 300 (12") ABOVE TOP OF PIPE. COMPACT TO 95% SPD. TEST THE BACKFILL MATERIAL AND CONTINUE EMBANKMENT IN ACCORDANCE WITH PUBLICATION 408, SECTION 601.



NOTES

- THE INSTALLATION OF PIPES 1800 (72") OR GREATER INSIDE DIAMETER OR SPAN IS PERMITTED WITHOUT PLACING EMBANKMENT FIRST. MAKE THE BACKFILL ENVELOPE AS SHOWN ON THIS DRAWING EXCEPT PROVIDE 2A MATERIAL ON EACH SIDE OF THE PIPE EQUAL TO ONE OUTSIDE DIAMETER OR SPAN OF THE PIPE. FOR CONCRETE PIPE, THE WIDTH OF UNCOMPACTED AGGREGATE FOR BEDDING (AASHTO NO. 8) REMAINS AT Do + 1200 (4'-0"). PAYMENT FOR THE 2A MATERIAL IS AS PER NOTE 3.
- A HIGHER STRENGTH PIPE THAN SPECIFIED MAY BE SUPPLIED AT NO ADDITIONAL COST TO THE DEPARTMENT.
- PAYMENT FOR THE BACKFILL ENVELOPE INCLUDING BEDDING, COARSE AGGREGATE AND SUITABLE MATERIAL UP TO 300 (12") ABOVE THE PIPE IS INCIDENTAL TO THE PIPE.
- TO PRECLUDE POINT LOADING ON RELATIVELY RIGID CONCRETE PIPE, DO NOT COMPACT AASHTO NO. 8 BEDDING MATERIAL.
- FOR TRENCH BOX/SHORING INSTALLATION REQUIREMENTS REFER TO PUBLICATION 408, SECTION 601.
- PERMIT PLACEMENT OF BACKFILL MATERIAL IN LAYERS, LIFTS, 200 (8") THICK WHEN USING VIBRATORY COMPACTION EQUIPMENT.
- COMPACT TOP 1000 (3'-0") OF SUBGRADE TO 100% IN ACCORDANCE WITH PUBLICATION 408, SECTION 206.3.
- FOR REINFORCED CONCRETE PIPES INSTALLED WITH GREATER THAN 14.6 m (48') OF FILL, PROVIDE 300 (12") BEDDING MINIMUM AND 400 (16") WHEN ROCK IS PRESENT.

LEGEND



Do = OUTSIDE DIAMETER OF PIPE, MILLIMETERS (INCHES)

SPD = STANDARD PROCTOR DENSITY

ID = INSIDE DIAMETER


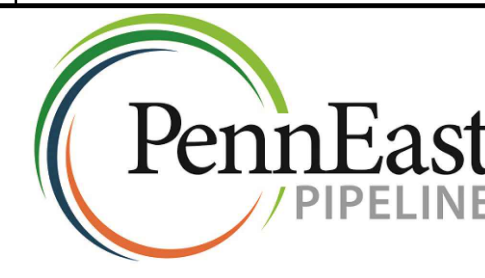
* SUITABLE = MATERIAL CONTAINING NO DEBRIS, ORGANIC MATTER, FROZEN MATERIAL OR LARGE STONES WITH A DIAMETER GREATER THAN ONE-HALF THE THICKNESS OF THE COMPACTED LAYERS BEING PLACED.

PIPE TRENCH, BEDDING AND BACKFILL DETAIL
(NOT TO SCALE)



NOTE:

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| NO. | DESCRIPTION | DATE | DRAWN | CK | APPR |
| A | ISSUED FOR PADEP | 10/15/2018 | CAF(MM) | WMC(MM) | MJD(MM) |
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| | | DRAWN BY | CAF | DATE ISSUED | 10/15/2018 |
| CHECKED BY | | WMC | SCALE | AS SHOWN | |
| APPROVED BY | | JRD | APPROVED BY | | |
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POST CONSTRUCTION STORM WATER BMP NOTES:

GENERAL:

1. DISTURBANCE TO VEGETATION AND EXISTING DRAINAGE FEATURES SHALL BE LIMITED TO THE GREATEST EXTENT PRACTICAL.
2. NO VEGETATION SHALL BE DISTURBED AND NO GROUND CLEARED FOR THE INSTALLATION OF THE STORMWATER SWALE AND STORMWATER TRENCH, EXCEPT FOR THE FOOTPRINT OF THE STORMWATER SWALE AND STORMWATER TRENCH THEMSELVES.
3. POST CONSTRUCTION STORMWATER MANAGEMENT (PCSM) BMPS SHALL BE INSTALLED AS LATE IN THE CONSTRUCTION PROCESS AS POSSIBLE.
4. AREAS TO BE OCCUPIED BY PCSM BMPS SHALL BE IDENTIFIED PRIOR TO CONSTRUCTION AND SURROUNDED WITH SNOW FENCE OR OTHER BARRIER, CARE SHALL BE TAKEN TO PREVENT COMPACTION OF SOIL IN UNDISTURBED AREAS AND THOSE AREAS OCCUPIED OR TO BE OCCUPIED TO PCSM BMPS.
5. ENTRY OF SEDIMENT LADEN WATER TO THE PCSM BMPS SHALL BE PREVENTED.
6. PCSM BMPS SHALL BE INSPECTED DURING CONSTRUCTION AS PER THE REQUIREMENTS OF THE PA BMP MANUAL AND AS SPECIFIED ELSEWHERE ON CONSTRUCTION DRAWINGS.
7. ALL PLANTINGS AND SEEDING SHALL BE NATIVE NON-INVASIVE SPECIES.

CONSTRUCTION SEQUENCE:

1. AT LEAST SEVEN (7) DAYS BEFORE STARTING ANY EARTH DISTURBANCE ACTIVITIES, THE OWNER AND/OR OPERATOR SHALL NOTIFY THE PADEP BY EITHER TELEPHONE OR CERTIFIED MAIL OF THE INTENT TO COMMENCE EARTH DISTURBANCE ACTIVITIES. ATTENDANCE AT A PRE-CONSTRUCTION CONFERENCE IS REQUIRED UPON REQUEST OF THE PADEP.
2. AT LEAST THREE (3) DAYS BEFORE STARTING ANY EARTH DISTURBANCE ACTIVITIES, ALL CONTRACTORS INVOLVED IN THOSE ACTIVITIES SHALL NOTIFY THE PENNSYLVANIA ONE CALL SYSTEM AT 1-800-242-1776 TO DETERMINE THE LOCATION OF EXISTING UNDERGROUND UTILITIES.
3. INSTALL THE ROCK CONSTRUCTION ENTRANCE.
4. CONFIRM COMPOST FILTER SOCK PLACEMENT DOWNSLOPE OF ANY PROPOSED DISTURBED/EXCAVATED AREA AND STOCKPILES. CONFIRM TEMPORARY WATERBAR INSTALLED DURING MAINLINE CONSTRUCTION. REPAIR AS NEEDED.
5. PERFORM CLEARING AND GRUBBING TO THOSE AREAS DESCRIBED IN EACH STAGE OF WORK. REMOVE ALL EXCESS TOPSOIL FROM THE LIMITS OF DISTURBANCE AND STOCKPILE OFF-SITE. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT ANY OFF-SITE WASTE AREAS HAVE AN E&SC PLAN APPROVED BY THE LOCAL CONSERVATION DISTRICT OR PADEP PRIOR TO BEING ACTIVATED. SNOW FENCING SHALL BE INSTALLED TO PREVENT COMPACTION OF INFILTRATION AREAS.
6. THE STONE BASE AND SUB-SURFACE INFILTRATION FACILITY SHALL BE INSTALLED. CARE SHALL BE TAKEN TO PREVENT SEDIMENT LADEN RUNOFF FROM ENTERING THE STONE INFILTRATION BASE. THE ENGINEER SHALL INSPECT THE SUB-SURFACE INFILTRATION FACILITY PRIOR TO BACKFILLING AROUND IT.
7. PERFORM GRADING ACTIVITIES DETAILED BY PROPOSED CONTOURS, NOTES, AND DETAILS SHOWN ON THE PLAN DRAWINGS. REMOVE TEMPORARY WATERBAR. PER PROJECT SPECIFICATIONS, ADDITIONAL TEMPORARY PLACEMENT OF COMPOST FILTER SOCK MAY BE NECESSARY AT THE CONTRACTOR'S DISCRETION. SHOULD ACCELERATED EROSION BE OBSERVED DURING GRADING ACTIVITIES. INSTALL SUBSURFACE STORMWATER INFILTRATION SYSTEM DURING BULK FILLING OPERATIONS.
8. CONSTRUCT PAD AND FACILITIES ACCORDING TO SPECIFICATIONS WITHIN THESE PLAN SHEETS INCLUDING ALL STABILIZATION MEASURES. GRADES WILL BE LEFT 1 FOOT BELOW CATCH BASIN INLET GRATE ELEVATIONS TO PREVENT SILT-LADEN STORMWATER RUNOFF FROM ENTERING THE SUBSURFACE PIPING. ONCE THE SITE HAS BEEN STABILIZED, GRADING SHALL BE BROUGHT TO FINAL ELEVATIONS.
9. ALL AREAS WITH MINOR SOIL COMPACTION SHALL BE RIPPED TO A DEPTH OF 8", AND AREAS OF MAJOR COMPACTION SHALL BE RIPPED TO A DEPTH OF 20". NO RIPPING SHALL TAKE PLACE IN THE VICINITY OF THE MAINLINE PIPING OR OTHER UNDERGROUND UTILITIES.
10. PLACE TOPSOIL IN ALL AREAS TO BE VEGETATED.
11. APPLY SEED AND MULCH TO DISTURBED AREAS AS SPECIFIED AND IN ACCORDANCE WITH THIS PLAN.
12. ANY TEMPORARY MEASURES (SUCH AS COMPOST FILTER SOCK, COLLECTION CHANNEL, RIPRAP APRONS, ETC.) INSTALLED BY CONTRACTOR DURING GRADING SHALL REMAIN IN PLACE UNTIL FINAL STABILIZATION HAS OCCURRED WITH A MINIMUM UNIFORM 70% PERENNIAL VEGETATIVE COVER OR OTHER PERMANENT NON-VEGETATIVE COVER, WITH A DENSITY SUFFICIENT TO RESIST ACCELERATED SURFACE EROSION AND SUBSURFACE CHARACTERISTICS SUFFICIENT TO RESIST SLIDING AND OTHER MOVEMENTS. THE ENGINEER SHALL INSPECT FINAL STABILIZATION PRIOR TO REMOVAL OF TEMPORARY MEASURES.
13. CLEAN WORK AREA OF ANY DEBRIS CREATED DURING THE CONSTRUCTION SEQUENCE.

SPECIFICATIONS:

- PCSM FACILITIES SHALL BE CONSTRUCTED PER PENNSYLVANIA STORMWATER BEST MANAGEMENT PRACTICES MANUAL
1. SITE PREPARATION
 - a. ALL EXCAVATION AREAS, EMBANKMENTS, AND WHERE STRUCTURES ARE TO BE INSTALLED SHALL BE CLEARED AND GRUBBED AS NECESSARY.
 - b. A MINIMUM 10-FOOT RADIUS AROUND THE INLET AND OUTLET STRUCTURES CAN BE CLEARED TO ALLOW CONSTRUCTION.
 - c. CARE SHOULD BE TAKEN TO PREVENT COMPACTION OF THE BOTTOM OF THE BASIN. IF COMPACTION SHOULD OCCUR, SOILS SHOULD BE RESTORED AND AMENDED TO A DEPTH OF 18" USING A MIXTURE OF 3 PARTS SAND TO 1 PART TOPSOIL.
 - d. THE OPERATOR WILL REMOVE, RECYCLE OR DISPOSE FROM THE SITE ALL EXCESS CONSTRUCTION MATERIALS AND WASTES IN ACCORDANCE WITH PENNSYLVANIA'S SOLID WASTE MANAGEMENT REGULATIONS AT 25 PA. CODE 260.1 ET SEQ., 271.1 ET SEQ. THE CONTRACTOR WILL NOT ILLEGALLY BURY, DUMP, OR DISCHARGE ANY BUILDING MATERIAL OR WASTES AT THE SITE.
 2. EARTH FILL MATERIAL & PLACEMENT
 - a. THE FILL MATERIAL SHOULD BE TAKEN FROM APPROVED DESIGNATED EXCAVATION AREAS. IT SHOULD BE FREE OF ROOTS, STUMPS, WOOD, RUBBISH, STONES GREATER THAN 6 INCHES, OR OTHER OBJECTIONABLE MATERIALS. MATERIALS ON THE OUTER SURFACE OF THE EMBANKMENT MUST HAVE THE CAPABILITY TO SUPPORT VEGETATION.
 - b. AREAS WHERE FILL IS TO BE PLACED SHOULD BE SCARIFIED PRIOR TO PLACEMENT.
 - c. THE MOVEMENT OF THE HAULING AND SPREADING EQUIPMENT OVER THE SITE SHOULD BE CONTROLLED. FOR THE EMBANKMENT, EACH LIFT SHOULD BE COMPACTED TO 95% OF THE STANDARD PROCTOR. FILL MATERIAL SHOULD CONTAIN SUFFICIENT MOISTURE SO THAT IF FORMED IN TO A BALL IT WILL NOT CRUMBLE. YET NOT BE SO WET THAT WATER CAN BE SQUEEZED OUT.
 3. STRUCTURE BACKFILL
 - a. BACKFILL ADJACENT TO PIPES AND STRUCTURES SHOULD BE OF THE TYPE AND QUALITY CONFORMING TO THAT SPECIFIED FOR THE ADJOINING FILL MATERIAL. THE FILL SHOULD BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED FOUR INCHES IN THICKNESS AND COMPACTED BY HAND TAMPERS OR OTHER MANUALLY DIRECTED COMPACTION EQUIPMENT. THE MATERIAL SHOULD FILL COMPLETELY ALL SPACES UNDER AND ADJACENT TO THE PIPE. AT NO TIME DURING THE BACKFILLING OPERATION SHOULD DRIVEN EQUIPMENT BE ALLOWED TO OPERATE CLOSER THAN FOUR FEET TO ANY PART OF THE STRUCTURE. EQUIPMENT SHOULD NOT BE DRIVEN OVER ANY PART OF A CONCRETE STRUCTURE OR PIPE, UNLESS THERE IS A COMPACTED FILL OF 24 INCHES OR GREATER OVER THE STRUCTURE OR PIPE.
 - b. STRUCTURE BACKFILL MAY BE FLOWABLE FILL MEETING THE REQUIREMENTS OF THE PADOT STANDARD SPECIFICATIONS FOR CONSTRUCTION. MATERIAL SHOULD BE PLACED SO THAT A MINIMUM OF 6 INCHES OF FLOWABLE FILL SHOULD BE UNDER (BEDDING), OVER AND, ON THE SIDES OF THE PIPE. IT ONLY NEEDS TO EXTEND UP TO THE SPRING LINE FOR RIGID CONDUITS. AVERAGE SLUMP OF THE FILL MATERIAL SHOULD BE 7 INCHES TO ASSURE FLOWABILITY OF THE MIXTURE. ADEQUATE MEASURES SHOULD BE TAKEN (SAND BAGS, ETC.) TO PREVENT FLOATING THE PIPE. WHEN USING FLOWABLE FILL ALL METAL PIPE SHOULD BE BITUMINOUS COATED. ADJOINING SOIL FILL SHOULD BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED 4 INCHES IN THICKNESS AND COMPACTED BY HAND TAMPERS OR OTHER MANUALLY DIRECTED COMPACTION EQUIPMENT.
 - c. REFER TO CHAPTER 220 OF PENNDOT PUB. 408 (2000).
 - d. STABILIZATION
 - a. ALL BORROW AREAS SHOULD BE GRADED TO PROVIDE PROPER DRAINAGE AND LEFT IN A SLIGHTLY CONDITION. ALL EXPOSED SURFACES OF THE EMBANKMENT, SPILLWAY, SPOIL AND BORROW AREAS, AND BERMS SHOULD BE STABILIZED BY SEEDING, PLANTING AND MULCHING.
 5. ALL DRAINAGE PIPING, FLARED END SECTIONS, PRECAST STRUCTURES AND CASTINGS SHALL BE CONSTRUCTED IN ACCORDANCE WITH PADOT FORM 408 AS AMENDED.
 6. ALL DRAINAGE PIPING SHALL HAVE WATER TIGHT JOINTS.

MAINTENANCE AND INSPECTION NOTES:

THESE REQUIREMENTS ARE INDEPENDENT OF THE EROSION AND SEDIMENT CONTROL REQUIREMENT DURING CONSTRUCTION. HOWEVER CERTAIN TASKS MAY OVERLAP.

1. SWALES:

MAINTENANCE ACTIVITIES TO BE DONE ANNUALLY AND WITHIN 48 HOURS AFTER EVERY MAJOR STORM EVENT (> 1 INCH RAINFALL DEPTH):

 - A.INSPECT AND CORRECT EROSION PROBLEMS, DAMAGE TO VEGETATION, AND SEDIMENT AND DEBRIS ACCUMULATION (ADDRESS WHEN > 3 INCHES AT ANY SPOT OR COVERING VEGETATION)
 - B.INSPECT VEGETATION ON SIDE SLOPES FOR EROSION AND FORMATION OF RILLS OR GULLIES, CORRECT AS NEEDED
 - C.INSPECT FOR POOLS OF STANDING WATER; DEWATER AND DISCHARGE TO AN APPROVED LOCATION AND RESTORE TO DESIGN GRADE
 - D.MOW AND TRIM VEGETATION TO ENSURE SAFETY, AESTHETICS, PROPER SWALE OPERATION, OR TO SUPPRESS WEEDS AND INVASIVE VEGETATION; DISPOSE OF CUTTINGS IN A LOCAL COMPOSTING FACILITY; MOW ONLY WHEN SWALE IS DRY TO AVOID RUTTING
 - E.INSPECT FOR LITTER; REMOVE PRIOR TO MOWING
 - F.INSPECT FOR UNIFORMITY IN CROSS-SECTION AND LONGITUDINAL SLOPE, CORRECT AS NEEDED
 - G.INSPECT SWALE INLET (CURB CUTS, PIPES, ETC.) AND OUTLET FOR SIGNS OF EROSION OR BLOCKAGE, CORRECT AS NEEDED

MAINTENANCE ACTIVITIES TO BE DONE AS NEEDED:

 - A.PLANT ALTERNATIVE GRASS SPECIES IN THE EVENT OF UNSUCCESSFUL ESTABLISHMENT
 - B. RESEED BARE AREAS; INSTALL APPROPRIATE EROSION CONTROL MEASURES WHEN NATIVE SOIL IS EXPOSED OR EROSION CHANNELS ARE FORMING
 - C. ROTOTILL AND REPLANT SWALE IF DRAW DOWN TIME IS MORE THAN 48 HOURS
 - D.INSPECT AND CORRECT CHECK DAMS WHEN SIGNS OF ALTERED WATER FLOW (CHANNELIZATION, OBSTRUCTIONS, EROSION, ETC.) ARE IDENTIFIED
 - E. WATER DURING DRY PERIODS, FERTILIZE, AND APPLY PESTICIDE ONLY WHEN ABSOLUTELY NECESSARY

MAINTENANCE UNDER WINTER CONDITIONS:

 - A.INSPECT SWALE IMMEDIATELY AFTER THE SPRING MELT. REMOVE RESIDUALS (E.G. SAND) AND REPLACE DAMAGED VEGETATION WITHOUT DISTURBING REMAINING VEGETATION.
 - B. IF ROADSIDE OR PARKING LOT RUNOFF IS DIRECTED TO THE SWALE, MULCHING AND/OR SOIL AERATION/MANIPULATION MAY BE REQUIRED IN THE SPRING TO RESTORE SOIL STRUCTURE AND MOISTURE CAPACITY AND TO REDUCE THE IMPACTS OF DEICING AGENTS.
 - C. USE NONTOXIC, ORGANIC DEICING AGENTS, APPLIED EITHER AS BLENDED, MAGNESIUM CHLORIDE-BASED LIQUID PRODUCTS OR AS PRETREATED SALT.
 - D. USE SALT-TOLERANT VEGETATION IN SWALES.
2. INFILTRATION TRENCH:
 - a. OUTLET CONTROL STRUCTURES WILL BE INSPECTED AND CLEANED AT LEAST TWO TIMES PER YEAR AND AFTER RUNOFF EVENTS.
 - b. VEHICLES WILL NOT BE PARKED OR DRIVEN ON THE BASIN.
 - c. THE TRENCH WILL BE INSPECTED AFTER RUNOFF EVENTS TO MAKE SURE THAT RUNOFF DRAINS DOWN WITHIN 72 HOURS. THE TRENCH WILL ALSO BE INSPECTED FOR ACCUMULATION OF SEDIMENT, DAMAGE TO OUTLET CONTROL STRUCTURES, EROSION CONTROL MEASURES, AND SIGNS OF WATER CONTAMINATION/SPILLS. ACCUMULATED SEDIMENT WILL BE REMOVED INSPECT AND CORRECT EROSION PROBLEMS, AND SEDIMENT AND DEBRIS ACCUMULATION (ADDRESS WHEN > 3 INCHES AT ANY SPOT).
 - d. INSPECT FOR LITTER, REMOVE FROM BASIN AS REQUIRED.
 - e. SEDIMENT WILL BE PROPERLY DISPOSED OF.

THE SOIL LIMITATIONS SHALL BE ADDRESSED AS FOLLOWS:

LIMITATIONS AND RESOLUTIONS:

LIMITATION: CUTBANKS CAVE, LOW STRENGTH - CUTBANKS HAVE POTENTIAL TO CAVE AND MANY SOILS ARE LOW STRENGTH.
RESOLUTION: CONTRACTOR SHALL BE AWARE OF POTENTIAL ISSUES AND FOLLOW OSHA GUIDELINES FOR OPEN TRENCHING. LOW SOIL STRENGTH IS NOT A CONCERN DUE TO THE NATURE OF THE PROPOSED PROJECT. UTILITY TRENCHING WILL NOT BE ADVERSELY EFFECTED BY POOR SOIL STRENGTH.

LIMITATION: CORROSIVE TO STEEL AND/OR CONCRETE
RESOLUTION: IF STEEL PIPE IS USED RUST PROTECTION BY COATINGS AND/OR USE OF CATHODIC PROTECTION IS RECOMMENDED. IF CONCRETE IS USED SOIL SHALL BE TESTED AND CONCRETE COATED AS RECOMMENDED BY MANUFACTURER.

LIMITATION: DROUGHTY - SOILS EXHIBITING A POOR MOISTURE-HOLDING CAPACITY, WHICH MAY LIMIT THE VEGETATIVE STABILIZATION ABILITY OF THE SOIL.
RESOLUTION: FOR DROUGHTY SOILS, CONTRACTOR TO REFER TO "TABLE 11-3: PLANT TOLERANCES OF SOIL LIMITATION FACTORS" TO SELECT APPROPRIATE VEGETATION. EROSION CONTROL BLANKETS SHOULD ALSO BE CONSIDERED IN SOIL CONDITIONS THAT MAKE REVEGETATION DIFFICULT (E.G. DROUGHTY). WHEN INSTALLED PROPERLY, EROSION CONTROL BLANKETS CAN HELP HOLD SOIL PARTICLES IN PLACE AND RETAIN SOIL MOISTURE, PROMOTING SEED GERMINATION.

LIMITATION: EASILY ERODIBLE
RESOLUTION: SPECIAL ATTENTION SHALL BE GIVEN TO MAINTAINING EXISTING VEGETATION IN EASILY ERODIBLE SOILS, TO THE EXTENT POSSIBLE. EASILY ERODIBLE SOILS WITHIN 50 FEET OF A SURFACE WATER SHOULD BE BLANKETED. WHEREVER ERODIBLE SOILS ARE PRESENT, OR WHERE THERE IS NOT A SUFFICIENT VEGETATIVE FILTER STRIP BETWEEN THE WATERBAR AND A RECEIVING SURFACE WATER, THE WATERBAR SHOULD BE PROVIDED WITH A TEMPORARY PROTECTIVE LINER.

LIMITATION: FLOODING - ANY SOIL SUBJECT TO INUNDATION DURING A 2-YEAR/24HR STORM EVENT.
RESOLUTION: (SEE WET SOILS)

LIMITATION: HIGH WATER TABLE, POTENTIALLY HYDRIC - HIGH WATER TABLE IS TO BE EXPECTED AND MANY OF THE SOILS ARE POTENTIALLY HYDRIC.
RESOLUTION: FOLLOW E&S PLAN WITH REGARD TO PUMPING AND DEWATERING. DISCHARGE OF SEDIMENT LADEN WATER IS PROHIBITED UNLESS WITHOUT FIRST PASSING THRU A "PUMPED WATER FILTER BAG" BMP.

LIMITATION: HYDRIC / HYDRIC INCLUSIONS - A SOIL THAT IS SATURATED, FLOODED, OR PONDED LONG ENOUGH DURING THE GROWING SEASON TO DEVELOP ANAEROBIC-CONDITIONS. WHEN SUCH A SOIL IS LOCATED IN AN AREA THAT HAS HYDROPHYTIC VEGETATION AND WETLAND HYDROLOGY, A WETLAND IS PRESENT.
RESOLUTION: HYDRIC SOILS THAT ARE DELINEATED WETLANDS, SHOULD BE AVOIDED TO THE EXTENT POSSIBLE. STAGING AREAS SHOULD BE LOCATED 50 FEET FROM THE EDGE OF WETLAND. MOVEMENT OF VEHICLES ACROSS WETLAND MUST BE MINIMIZED. WHERE VEHICLES NEED TO CROSS WETLANDS, THE USE OF TEMPORARY TIMBER MATS SHALL BE USED DUE TO THE POTENTIAL FOR RUTTING. TRENCH PLUGS SHALL BE INSTALLED TO PREVENT THE TRENCH FROM DRAINING THE WETLANDS OR CHANGING THE HYDROLOGY.

LIMITATION: LOW STRENGTH / LANDSLIDE PRONE - SOILS WITH LOW STRENGTH HAVE A LESSER ABILITY TO RESIST SLOPE FAILURE, SUCH AS SLUMPING, FLOWING, ETC. MATERIALS WITH LOW SHEAR STRENGTH ARE MORE SUSCEPTIBLE TO LANDSLIDES AND EMBANKMENT FAILURES.
RESOLUTION: PRECAUTIONS SHOULD BE TAKEN TO PREVENT SLOPE FAILURES DUE TO IMPROPER CONSTRUCTION PRACTICES SUCH AS OVER-STEEPENING AND OVERLOADING SLOPES, REMOVAL OF LATERAL SUPPORT, AND FAILURE TO PREVENT SATURATION OF SLOPES. SETBACKS SHOULD COMPLY WITH THE STANDARDS CONTAINED IN CHAPTER 16 OF THE, "PADEP - EROSION AND SEDIMENT CONTROL PROGRAM MANUAL," UNLESS IT CAN BE SHOWN THAT PROPOSED CUTS AND FILLS DO NOT POSE A HAZARD TO PUBLIC SAFETY OR SURFACE WATERS. ALSO, ROAD FILL MATERIAL WILL LIKELY NEED TO BE IMPORTED IN AREAS WHERE SOILS HAVE LOW STRENGTH.

LIMITATION: SLOW PERCOLATION - PERMEABILITY RATE LESS THAN OR EQUAL TO 0.2 INCHES/HR.
RESOLUTION: BMPS TO BE INSPECTED AFTER RUNOFF EVENTS, MAKE SURE THERE IS ADEQUATE AREA FOR PUMPED WATER DISCHARGE. PCSM FACILITIES DESIGN BASED ON SITE SPECIFIC TESTING.
LIMITATION: PIPING
RESOLUTION: PIPING POTENTIAL IN THE SOIL WILL BE MINIMIZED BY THE USE OF TRENCH PLUGS. FURTHERMORE, ANY PLANNED EMBANKMENTS OR PERMANENT IMPOUNDMENTS SUSCEPTIBLE TO PIPING SHALL UTILIZE ANTI-SEEP COLLARS OR FILTER DIAPHRAGMS ON OUTLET BARRELS.

LIMITATION: LIMITED AVAILABLE TOPSOIL
RESOLUTION: ANY EXCAVATED TOPSOIL WILL BE STOCKPILED AND REUSED. IF NECESSARY, ADDITIONAL TOPSOIL WILL BE BROUGHT ON-SITE.

LIMITATION: FROST ACTION - THE LIKELIHOOD OF UPWARD OR LATERAL EXPANSION OF THE SOIL CAUSED BY THE FORMATION OF SEGREGATED ICE LENSES, OR FROST HEAVE, AND THE SUBSEQUENT COLLAPSE OF THE SOIL AND LOSS OF STRENGTH ON THAWING, WHICH CAN DAMAGE ROADS, BUILDINGS, AND OTHER STRUCTURES AS WELL AS PLANT ROOTS.
RESOLUTION: PRECAUTIONS ARE NEEDED TO PREVENT DAMAGE TO ROADWAYS AND STRUCTURES.

LIMITATION: WET SOILS - SOME SOILS MAY EXHIBIT A HIGH WATER TABLE OR PONDING.
RESOLUTION: IF HIGH WATER TABLE IS ENCOUNTERED, TRENCH DEWATERING WILL BE EMPLOYED. LOCATE PCSM FACILITIES AWAY FROM WET SOILS.

LIMITATION: MIN. DEPTH TO BEDROCK - SOME SOILS HAVE A MIN DEPTH OF BEDROCK LESS THAN THE TYPICAL TRENCH DEPTH OF 7 FT (ASSUMES 3 FT OF COVER, PIPE DIAMETER, AND BEDDING DEPTH OF 1 FT).
RESOLUTION: CONTRACTOR TO PLAN FOR ROCK REMOVAL DURING TRENCHING OPERATIONS. FOR SEDIMENT BARRIERS REQUIRING STAKING (E.G. SILT FENCES, ETC.), DEPTH TO BEDROCK LESS THAN 2 FT CAN IMPACT ABILITY TO DRIVE STAKE AND/OR POLE (FOR SUPER SILT FENCE). IN THESE AREAS, COMPOST FILTER SOCK OR OTHER APPLICABLE BMP NOT REQUIRING STAKING MAY BE CONSIDERED.

LIMITATION: pH - SOME SOILS HAVE pH VALUES LESS THAN 5.5, WHICH MAY LIMIT THE VEGETATIVE STABILIZATION ABILITY OF THE SOIL.
RESOLUTION: AS IS TYPICAL FOR THESE TYPE OF SOILS, LIME WILL BE ADDED AS NEEDED TO PRODUCE VEGETATIVE STABILITY.


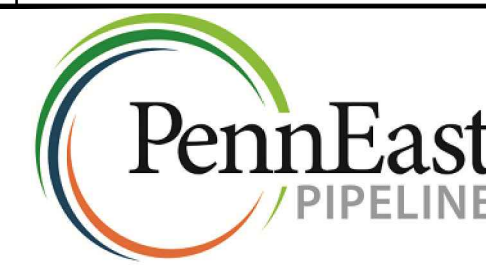
LIMITATION: LOW FERTILITY
RESOLUTION: IF NECESSARY TO PRODUCE VEGETATIVE STABILITY OF THE SOIL, FERTILIZER OR NUTRIENT SUPPLEMENTS WILL BE ADDED TO THE SOIL TO PRODUCE VEGETATIVE STABILITY. FOR LOW FERTILITY SOILS, CONTRACTOR TO REFER TO "TABLE 11-3: PLANT TOLERANCES OF SOIL LIMITATION FACTORS" TO SELECT APPROPRIATE VEGETATION. EROSION CONTROL BLANKETS SHOULD ALSO BE CONSIDERED IN SOIL CONDITIONS THAT MAKE REVEGETATION DIFFICULT (E.G. LOW FERTILITY). WHEN INSTALLED PROPERLY, EROSION CONTROL BLANKETS CAN HELP HOLD SOIL PARTICLES IN PLACE AND RETAIN SOIL MOISTURE, PROMOTING SEED GERMINATION.

TABLE E.1 LIMITATIONS OF PENNSYLVANIA SOILS
PERTAINING TO EARTH-MOVING PROJECTS
(ABSENCE OF AN X DOES NOT MEAN "NO POTENTIAL LIMITATION")

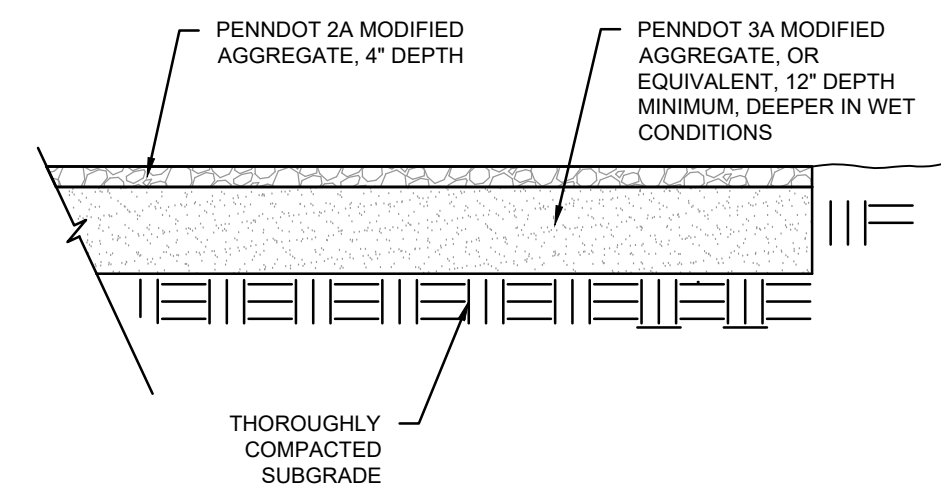
| LIMITING SOIL CHARACTERISTICS LEGEND | | | | | | | | | | | | | | | | | | | |
|--------------------------------------|--|---------------|------------------------------|----------|-----------------|----------|--|---------------------------|--------------------------------|------------------|--------|------------------------|--------------|----------------|--------------------|---------|---------|-----------------------|----|
| MAP SYMBOL | SOIL NAME | CUTBANKS CAVE | CORROSIVE TO CONCRETE/ STEEL | DROUGHTY | EASILY ERODIBLE | FLOODING | DEPTH TO SATURATED ZONE/ SEASONAL HIGH WATER TABLE | HYDRIC/ HYDRIC INCLUSIONS | LOW STRENGTH / LANDSLIDE PRONE | SLOW PERCOLATION | PIPING | POOR SOURCE OF TOPSOIL | FROST ACTION | SHRINK - SWELL | POTENTIAL SINKHOLE | PONDING | WETNESS | MIN. DEPTH TO BEDROCK | pH |
| BIB | BEDINGTON-BERKS COMPLEX, 3 TO 8 PERCENT SLOPES | X | C | X | X | | | X | | X | | X | X | | | | | X | X |
| BKA | BERKS-WEIKERT COMPLEX, 0 TO 3 PERCENT SLOPES | X | C | X | X | | | X | | X | X | X | | | | | | X | |
| BkB | BERKS-WEIKERT COMPLEX, 3 TO 8 PERCENT SLOPES | X | C | X | X | | | X | | X | X | X | | | | | | X | X |

SOURCE: AS TAKEN FROM TABLE E.1 OF THE THE PADEP E&SPCP MANUAL, MARCH 2012. HTTP://WWW.ELIBRARY.DEP.STATE.PA.US/DSWEB/GET/DOCUMENT-88925/363-2134-008.PDF

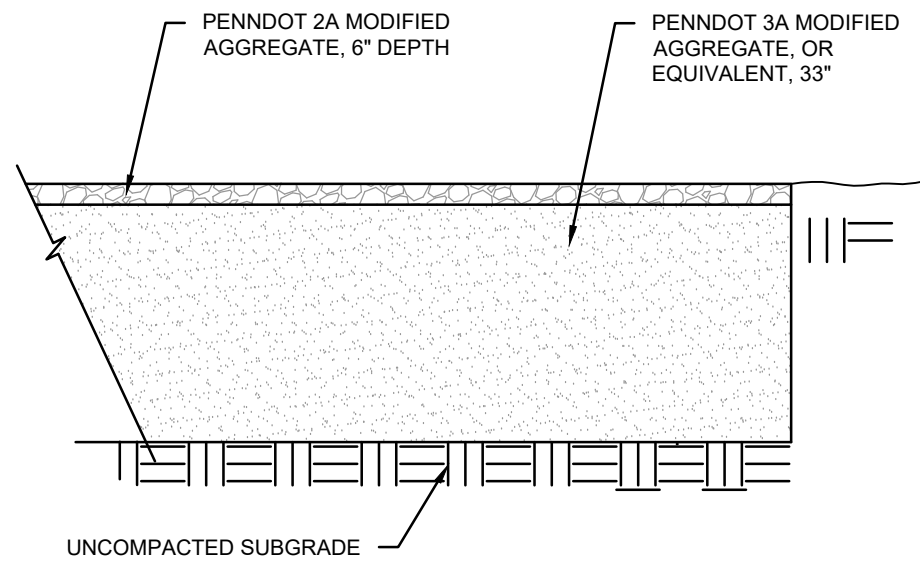


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| NO. | DESCRIPTION | DATE | DRAWN | CK | APPR |
| A | ISSUED FOR PADEP | 10/15/2018 | CAF(MM) | WMC(MM) | MJD(MM) |
| B | RE-ISSUED FOR PADEP | 10/2019 | MWF(MM) | DOW(MM) | WMC(MM) |
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|  | | PENNEAST PIPELINE PROJECT | | | |
| | | MAINLINE BLOCK VALVE 6 | | | |
| | | POST CONSTRUCTION STORMWATER MANAGEMENT DETAILS | | | |
| | | NORTHAMPTON COUNTY, PENNSYLVANIA | | | |
| DRAWN BY | | CAF | DATE ISSUED | 10/15/2018 | |
| CHECKED BY | | WMC | SCALE | AS SHOWN | |
| APPROVED BY | | JRD | APPROVED BY | | |
| DWG. NO. | | 033-03-07-005 | | REV. NO. | B |

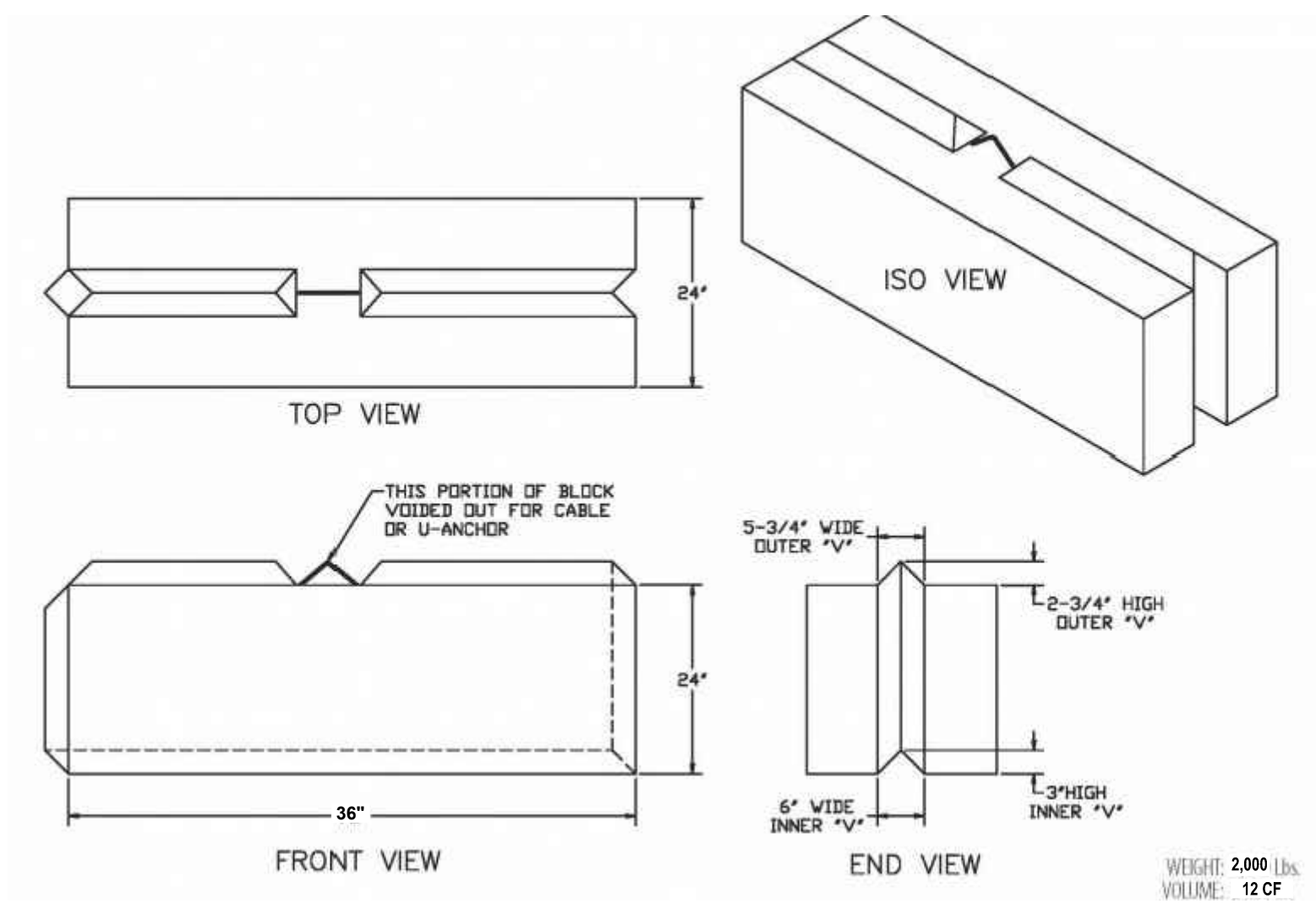
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TYPICAL ACCESS ROAD CROSS-SECTION DETAIL
(NOT TO SCALE)




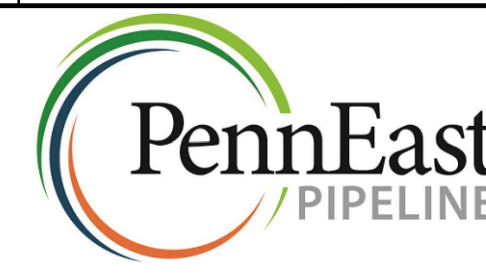
TYPICAL PAD
CROSS SECTION DETAIL
(NOT TO SCALE)



TYPICAL CONCRETE BLOCK DETAIL
(NOT TO SCALE)



NOTE:
THESE DETAILS HAVE BEEN ADAPTED FROM PENNDOT JUNE 2010 STANDARD DRAWINGS.
ADDITIONAL INFORMATION FROM STANDARD PENNDOT DRAWINGS AND SPECIFICATIONS ARE
INCORPORATED AS REFERENCED.

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|  | | PENNEAST PIPELINE PROJECT MAINLINE BLOCK VALVE 6 TYPICAL ACCESS ROAD AND PAD SECTIONS NORTHAMPTON COUNTY, PENNSYLVANIA | | | |
| | | DRAWN BY | CAF | DATE ISSUED | 10/15/2018 |
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| DWG. NO. | | 033-03-07-006 | | REV. NO. | B |