

VICINITY MAP  
N.T.S.

**LEGEND**

- CMP CORRUGATED METAL PIPE
- INV INVERT
- SD STORM DRAIN
- TREE LINE
- UTILITY POLE
- GUY WIRE
- GRAVEL ROAD
- CHAIN LINK FENCE
- EDGE OF WOODS/BRUSH
- SOIL TYPE BOUNDARY
- WATERSHED BOUNDARY

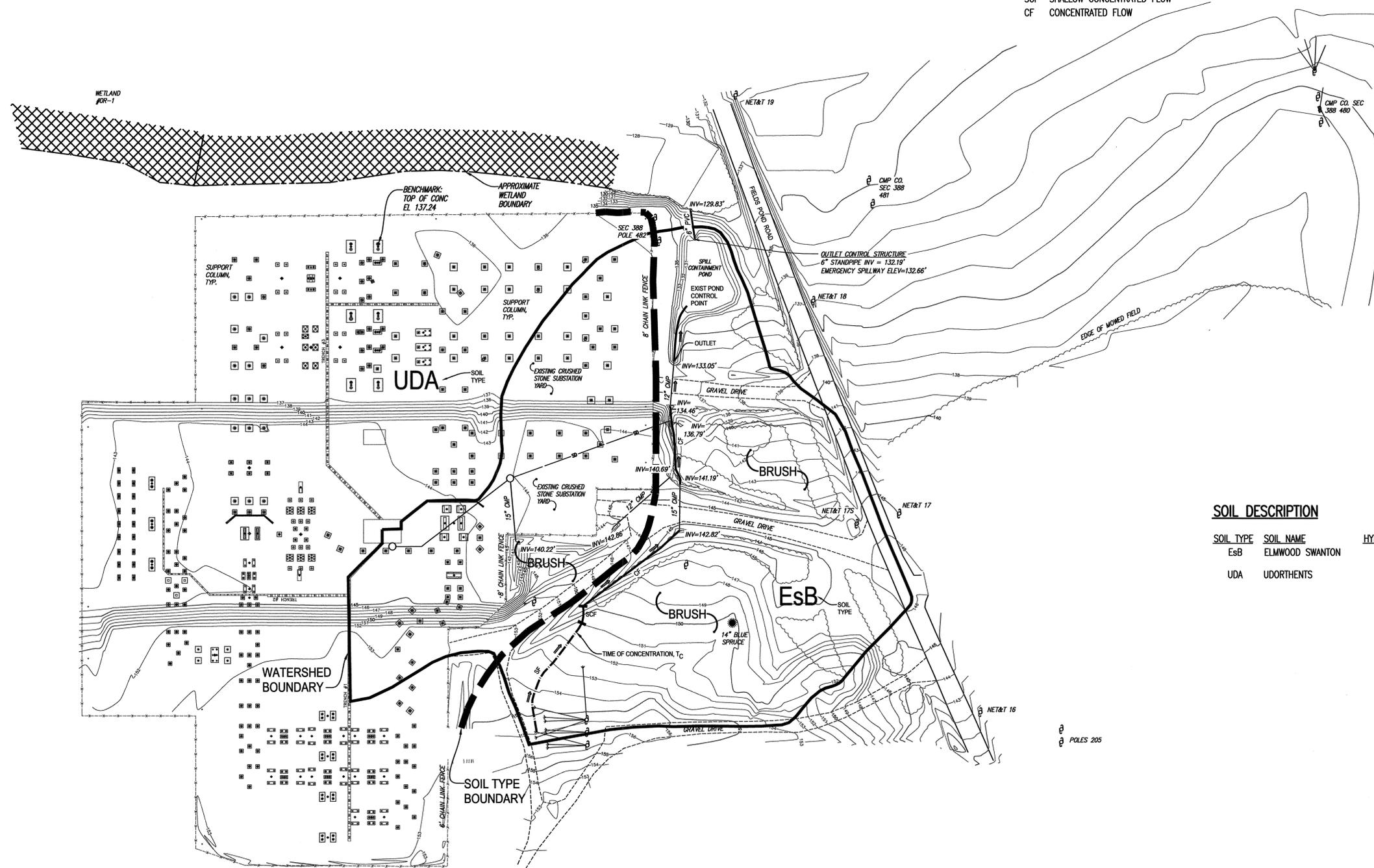


**ABBREVIATIONS**

- SF SHEET FLOW
- SCF SHALLOW CONCENTRATED FLOW
- CF CONCENTRATED FLOW

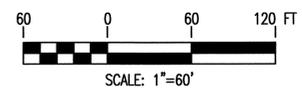
**NOTES:**

1. TOPOGRAPHIC AND PLANIMETRIC INFORMATION AS SHOWN HEREIN IS THE RESULT OF AN ON-THE-GROUND FIELD SURVEY PERFORMED BY SGC ENGINEERING, LLC BETWEEN NOVEMBER 15, 2004 AND NOVEMBER 17, 2004.
2. NORTH AS SHOWN HEREIN REFERENCED TO NAD83 MAINE STATE COORDINATE SYSTEM, EAST ZONE.
3. VERTICAL INFORMATION AS SHOWN HEREIN IS REFERENCED TO NAVD 88.
4. THE LOCATIONS OF FOOTINGS AND STRUCTURES WITHIN THE FENCED SUBSTATION AREA HAVE BEEN COMPILED BASED ON DESIGN INFORMATION PROVIDED BY BANGOR HYDRO-ELECTRIC COMPANY.
5. WETLANDS AS SHOWN HAVE BEEN DELINEATED BY DEVINE TARBELL & ASSOCIATES
6. WATERSHED BOUNDARIES WERE DELINEATED USING TOPOGRAPHIC INFORMATION PROVIDED BY SGC ENGINEERING, LLC AND A SITE VISIT. DUE TO SNOW COVER AT THE TIME OF THE SURVEY SOME FEATURES ARE SHOWN APPROXIMATE. OTHER FEATURES SUCH AS SUBTLE DRAINAGE DITCHES AND STRUCTURES MAY EXIST BUT WERE NOT FOUND DURING THIS SURVEY.



**SOIL DESCRIPTION**

SOIL TYPE	SOIL NAME	HYDROLOGIC SOIL GROUP
EsB	ELMWOOD SWANTON	"C"
UDA	UDORTHERTS	"C"



**PRE-DEVELOPMENT DRAINAGE PLAN**  
SCALE: 1"=60'

NO.	REVISION	DATE	BY	CK	P.E. STAMPED	P.E. No.
A	ISSUED FOR CLIENT REVIEW	1-28-05	EVD	DTB		
B	ISSUED FOR CLIENT REVIEW	2-14-05	EVD	DTB		
C	ISSUED FOR PERMIT	4-28-05	EVD	DTB		



CLIENT APPROVAL	DTB DESIGNED
	EVD DRAWN
APPROVED BY	DTB CHECKED
COMPANY	TRC APPROVED
DATE	

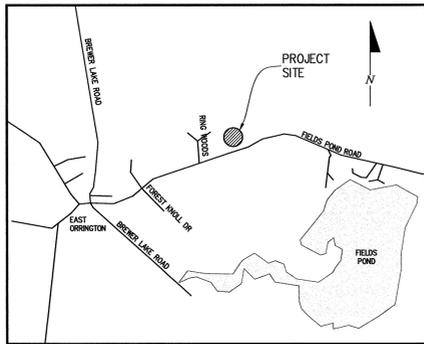
**BANGOR HYDRO-ELECTRIC**  
NORTHEAST RELIABILITY INTERCONNECT  
PRE-DEVELOPMENT DRAINAGE PLAN  
ORRINGTON SUBSTATION ORRINGTON, MAINE

REV. C

DP-1

SCALE AS NOTED DATE 1-28-05

TRC 249 Western Ave, Augusta, Maine 04330  
PROJECT NO: 10545 CONTRACT DWG NO: 10545-CB  
FILENAME: 10545-CB.DWG



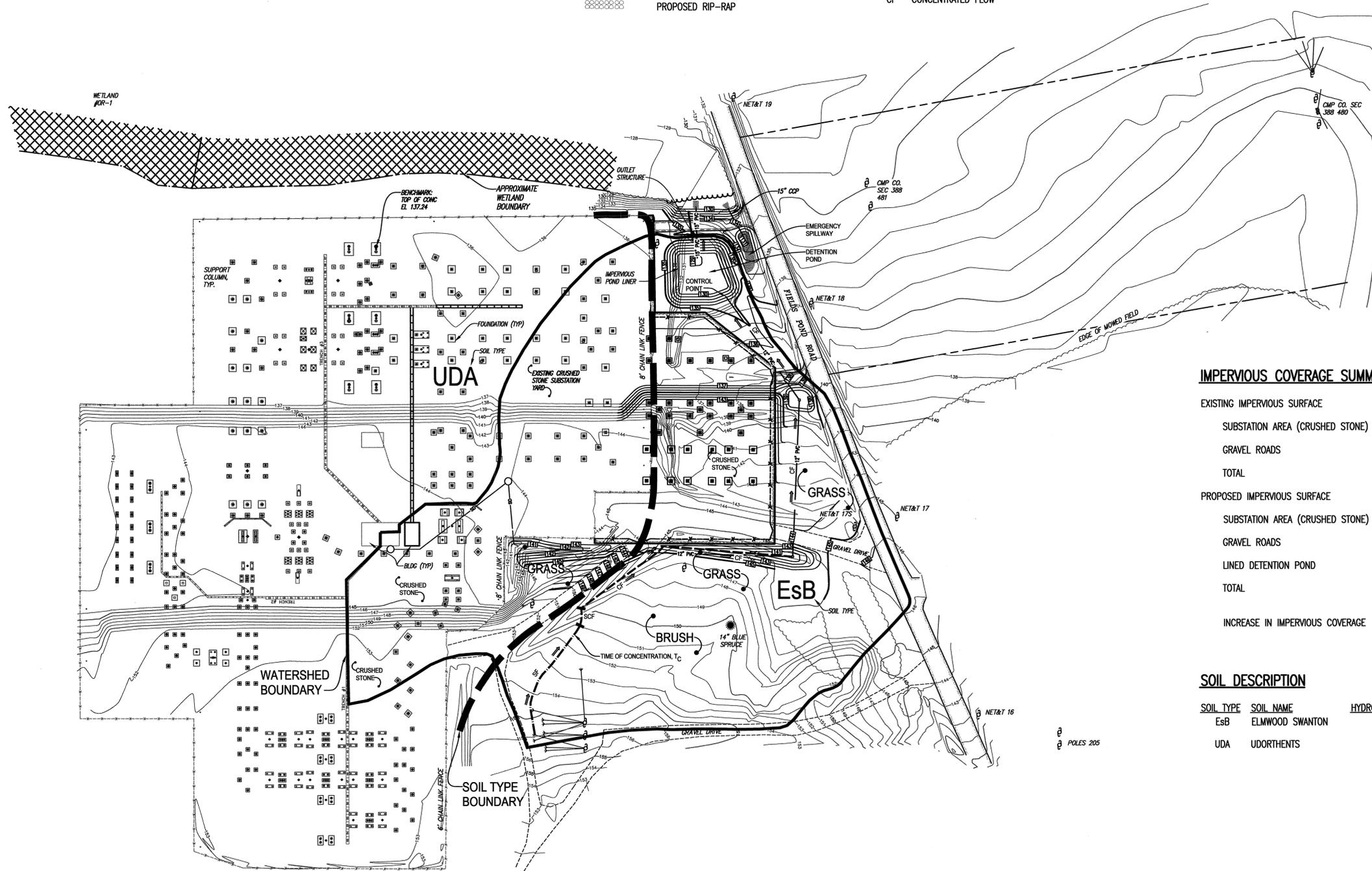
VICINITY MAP  
N.T.S.



- LEGEND**
- X-X- EXISTING CHAIN LINK FENCE
  - X-X- NEW CHAIN LINK FENCE
  - 129- EXISTING CONTOUR LINE
  - 130- PROPOSED CONTOUR LINE
  - SD- EXISTING STORM DRAIN LINE
  - SD- EXISTING EDGE OF GRAVEL
  - SD- NEW EDGE OF GRAVEL
  - SD- NEW SUBSTATION CRUSHED STONE APRON
  - 12" PVC- PROPOSED STORM DRAIN LINE
  - PROPOSED CATCH BASIN
  - ⊙ PROPOSED DRAIN MANHOLE
  - ⊗ PROPOSED RIP-RAP
- 433.54 EXISTING SPOT GRADE
  - 435.00 NEW SPOT GRADE
  - ⊕ EXISTING UTILITY POLE
  - ← EXISTING GUY WIRE
  - ~ EXISTING TREE LINE
  - ~ NEW TREE LINE
  - ▨ WETLANDS
  - ▨ SOIL TYPE BOUNDARY
  - ▨ WATERSHED BOUNDARY
- ABBREVIATIONS**
- SF SHEET FLOW
  - CF SHALLOW CONCENTRATED FLOW
  - CF CONCENTRATED FLOW

**NOTES:**

- TOPOGRAPHIC AND PLANIMETRIC INFORMATION AS SHOWN HEREIN IS THE RESULT OF AN ON-THE-GROUND FIELD SURVEY PERFORMED BY SGC ENGINEERING, LLC BETWEEN NOVEMBER 15, 2004 AND NOVEMBER 17, 2004.
- NORTH AS SHOWN HEREIN REFERENCED TO NAD83 MAINE STATE COORDINATE SYSTEM, EAST ZONE.
- VERTICAL INFORMATION AS SHOWN HEREIN IS REFERENCED TO NAVD 88.
- THE LOCATIONS OF FOOTINGS AND STRUCTURES WITHIN THE FENCED SUBSTATION AREA HAVE BEEN COMPILED BASED ON DESIGN INFORMATION PROVIDED BY BANGOR HYDRO-ELECTRIC COMPANY.
- WETLANDS AS SHOWN HAVE BEEN DELINEATED BY DEVINE TARBELL & ASSOCIATES
- WATERSHED BOUNDARIES WERE DELINEATED USING TOPOGRAPHIC INFORMATION PROVIDED BY SGC ENGINEERING, INC AND A SITE VISIT. DUE TO SNOW COVER AT THE TIME OF THE SURVEY SOME FEATURES ARE SHOWN APPROXIMATE. OTHER FEATURES SUCH AS SUBTLE DRAINAGE DITCHES AND STRUCTURES MAY EXIST BUT WERE NOT FOUND DURING THIS SURVEY.

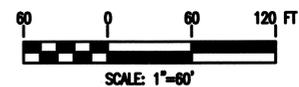


**IMPERVIOUS COVERAGE SUMMARY:**

EXISTING IMPERVIOUS SURFACE			
SUBSTATION AREA (CRUSHED STONE)	319,357	SQ-FT	7.33 AC
GRAVEL ROADS	22,566	SQ-FT	0.52 AC
<b>TOTAL</b>	<b>341,923</b>	<b>SQ-FT</b>	<b>7.85 AC</b>
PROPOSED IMPERVIOUS SURFACE			
SUBSTATION AREA (CRUSHED STONE)	354,512	SQ-FT	8.14 AC
GRAVEL ROADS	17,912	SQ-FT	0.41 AC
LINED DETENTION POND	4,317	SQ-FT	0.10 AC
<b>TOTAL</b>	<b>372,424</b>	<b>SQ-FT</b>	<b>8.65 AC</b>
<b>INCREASE IN IMPERVIOUS COVERAGE</b>	<b>34,818</b>	<b>SQ-FT</b>	<b>0.80 AC</b>

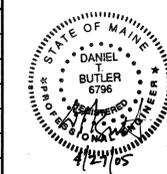
**SOIL DESCRIPTION**

SOIL TYPE	SOIL NAME	HYDROLOGIC SOIL GROUP
EsB	ELMWOOD SWANTON	"C"
UDA	UDORTHENTS	"C"



**POST-DEVELOPMENT DRAINAGE PLAN**  
SCALE: 1"=60'

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
A	ISSUED FOR CLIENT REVIEW	1-28-05	EVD	DTB		
B	ISSUED FOR CLIENT REVIEW	2-14-05	EVD	DTB		
C	ISSUED FOR PERMIT	4-28-05	EVD	DTB		

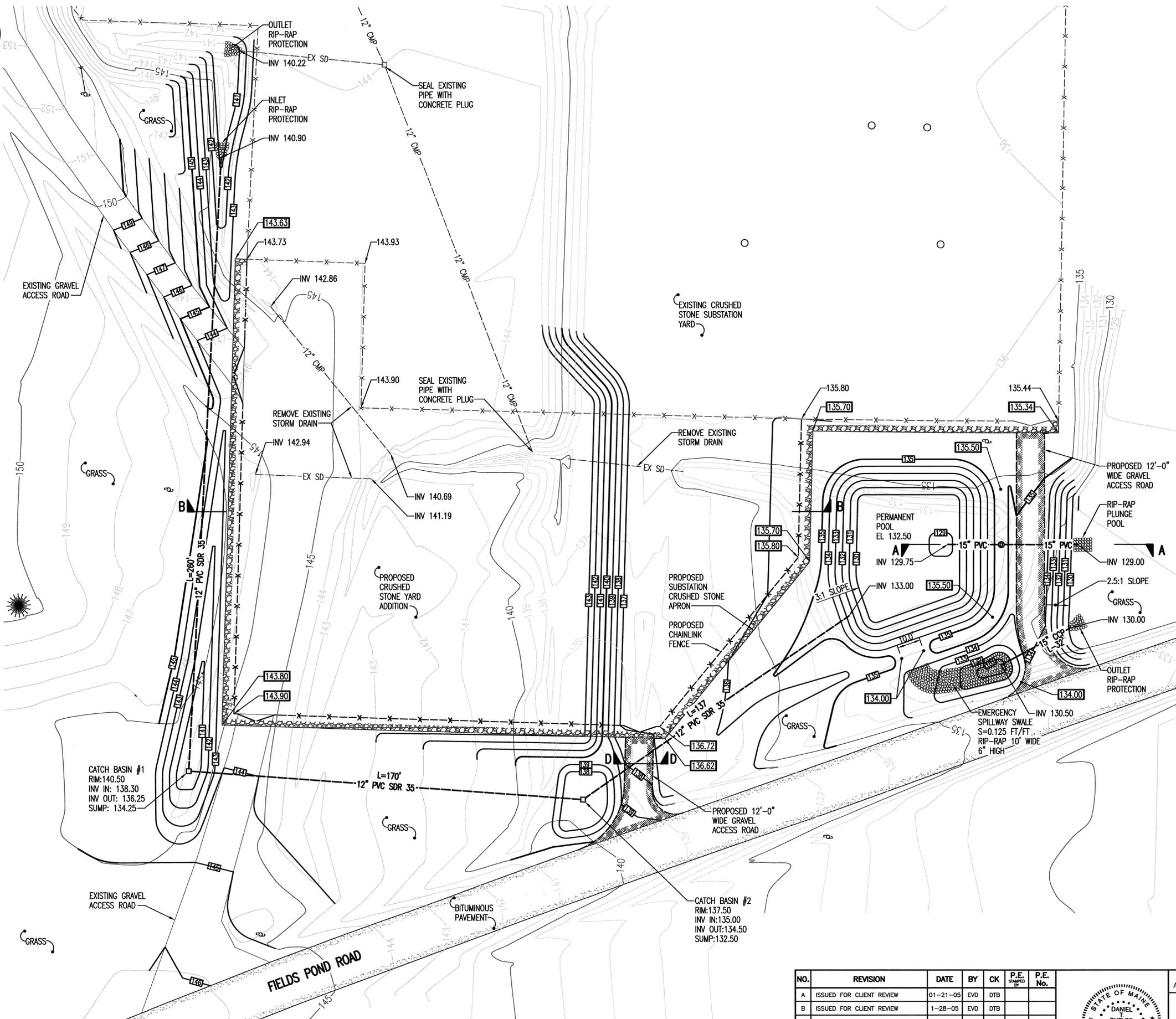


CLIENT APPROVAL	DTB DESIGNED
APPROVED BY	EVD DRAWN
COMPANY	DTB CHECKED
DATE	DTB APPROVED

**BANGOR HYDRO-ELECTRIC**  
NORTHEAST RELIABILITY INTERCONNECT  
POST-DEVELOPMENT DRAINAGE PLAN  
ORRINGTON SUBSTATION ORRINGTON, MAINE

**TRC** 249 Western Avenue  
Augusta, Maine 04330  
SCALE: AS NOTED DATE: 1-28-05

DP-2 REV. C



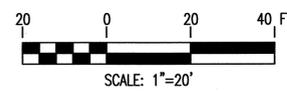
- NOTES:**
1. TOPOGRAPHIC AND PLANIMETRIC INFORMATION AS SHOWN HEREIN IS THE RESULT OF AN ON-THE-GROUND FIELD SURVEY PERFORMED BY SGC ENGINEERING, LLC BETWEEN NOVEMBER 15, 2004 AND NOVEMBER 17, 2004 AND ON DECEMBER 28, 2004.
  2. NORTH AS SHOWN HEREIN REFERENCED TO NAD83 MAINE STATE COORDINATE SYSTEM, EAST ZONE.
  3. VERTICAL INFORMATION AS SHOWN HEREIN IS REFERENCED TO NAVD 88.
  4. PRIOR TO WORK, THE CONTRACTOR SHALL, AT A MINIMUM, CONTACT "DIG SAFE" TO IDENTIFY OR VERIFY SIZE, DEPTH, AND LOCATIONS OF ALL UNDERGROUND UTILITIES WITHIN THE VICINITY OF THE WORK AREA. CONTRACTOR SHALL PROTECT UTILITIES FROM DAMAGE AND SHALL NOT DISTURB UNDERGROUND UTILITIES TO REMAIN. IN THE EVENT A UTILITY IS DAMAGED AS A RESULT OF THE CONTRACTOR'S WORK, THE DAMAGED UTILITY SHALL BE REPAIRED BY THE CONTRACTOR TO ITS PRE-CONSTRUCTION CONDITION AT NO ADDITIONAL COST TO THE OWNER.
  5. THE LOCATIONS OF FOOTINGS AND STRUCTURES WITHIN THE FENCED SUBSTATION AREA HAVE BEEN COMPILED BASED ON DESIGN INFORMATION PROVIDED BY BANGOR HYDRO-ELECTRIC COMPANY.
  6. WETLANDS AS SHOWN HAVE BEEN DELINEATED BY DEVINE TARBELL & ASSOCIATES
  7. WATERSHED BOUNDARIES WERE DELINEATED USING TOPOGRAPHIC INFORMATION PROVIDED BY SGC ENGINEERING, LLC AND A SITE VISIT. DUE TO SNOW COVER AT THE TIME OF THE SURVEY SOME FEATURES ARE SHOWN APPROXIMATE. OTHER FEATURES SUCH AS SUBTLE DRAINAGE DITCHES AND STRUCTURES MAY EXIST BUT WERE NOT FOUND DURING THIS SURVEY.

**LEGEND**

- X-X- EXISTING CHAIN LINK FENCE
- X-X- NEW CHAIN LINK FENCE
- 101- EXISTING CONTOUR LINE
- 102- PROPOSED CONTOUR LINE
- - - - EXISTING EDGE OF PAVEMENT
- - - - EXISTING EDGE OF GRAVEL
- - - - NEW EDGE OF GRAVEL
- - - - NEW SUBSTATION GRAVEL APRON
- - - - EXISTING STORM DRAIN LINE
- - - - PROPOSED STORM DRAIN LINE
- PROPOSED CATCH BASIN
- ⊙ PROPOSED DRAIN MANHOLE
- 433.54 EXISTING SPOT GRADE
- 435.00 NEW SPOT GRADE
- ⊕ EXISTING UTILITY POLE
- - - - EXISTING GUY WIRE

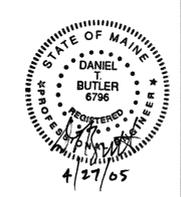
**ABBREVIATION LIST**

- BMP BEST MANAGEMENT PRACTICES
- CONC CONCRETE
- CPP CORRUGATED PLASTIC PIPE
- DIA DIAMETER
- EL ELEVATION
- INV INVERT
- L LENGTH
- LB POUND
- MAX MAXIMUM
- MDEP MAINE DEPARTMENT OF ENVIRONMENTAL PROTECTION
- MIN MINIMUM
- OC ON CENTER
- PVC POLYVINYL CHLORIDE
- SF SQUARE FEET
- T/ TOP
- TYP TYPICAL
- W/ WITH



**SITE PLAN**  
SCALE: 1"=20'

NO.	REVISION	DATE	BY	CK	P.E. STAMPED BY	P.E. No.
A	ISSUED FOR CLIENT REVIEW	01-21-05	EVD	DTB		
B	ISSUED FOR CLIENT REVIEW	1-28-05	EVD	DTB		
C	ISSUED FOR CLIENT REVIEW	2-14-05	EVD	DTB		
D	ISSUED FOR PERMIT	4-28-05	EVD	DTB		



CLIENT APPROVAL	DTB DESIGNED
APPROVED BY	EVD DRAWN
COMPANY	DTB CHECKED
DATE	DTB APPROVED

**BANGOR HYDRO-ELECTRIC**  
**NORTHEAST RELIABILITY INTERCONNECT**  
**SITE CONSTRUCTION DETAILS 1**

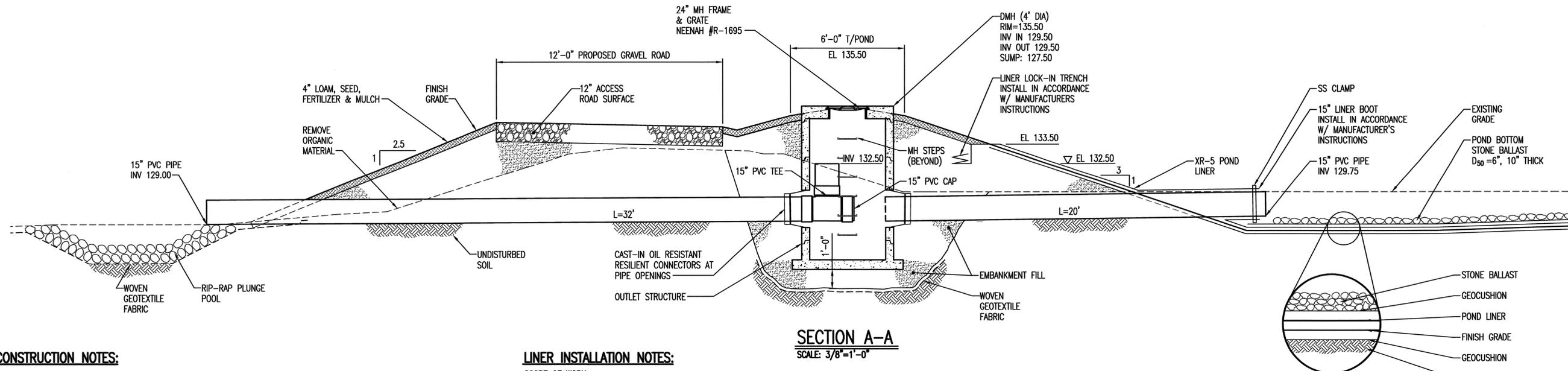
ORRINGTON SUBSTATION ORRINGTON, MAINE

**TRC** 249 Western Avenue  
Augusta, Maine 04330

10545-C1 REV. D

SCALE AS NOTED DATE 1-17-04

**TRC** 249 Western Ave, Augusta, Maine 04330  
PROJECT NO: 10545 CONTRACT DWG NO: 10545-C1  
FILENAME: 10545-C1.DWG



**SECTION A-A**  
SCALE: 3/8"=1'-0"

**POND CONSTRUCTION NOTES:**

- ALL EXCAVATIONS, SHORING, AND BRACING SHALL CONFORM TO OSHA REQUIREMENTS (29 CFR 1926).
- UNDERGROUND UTILITIES ARE SHOWN IN THEIR APPROXIMATE LOCATIONS. PRIOR TO WORK, THE CONTRACTOR SHALL, AT A MINIMUM, CONTACT "DIG SAFE" AT 1-888-344-7233 TO IDENTIFY OR VERIFY SIZE, DEPTH, AND LOCATIONS OF ALL UNDERGROUND UTILITIES WITHIN THE VICINITY OF THE WORK AREA. CONTRACTOR SHALL PROTECT UTILITIES FROM DAMAGE AND SHALL NOT DISTURB UNDERGROUND UTILITIES TO REMAIN. IN THE EVENT A UTILITY IS DAMAGED AS A RESULT OF THE CONTRACTOR'S WORK, THE DAMAGED UTILITY SHALL BE REPAIRED BY THE CONTRACTOR TO ITS PRE-CONSTRUCTION CONDITION AT NO ADDITIONAL COST TO THE OWNER.
- SOIL MATERIAL SHALL BE FREE OF COMBUSTIBLE, ORGANIC, DEBRIS, FROZEN MATERIALS, ROOTS, TOPSOIL, LOAM, TRASH, SNOW, ICE, WOOD, AND OTHER OBJECTIONABLE MATERIALS.
  - RE-USE OF EXCAVATED SOIL MATERIAL IS PERMISSIBLE IF MATERIAL MEETS SPECIFICATION OF PROPOSED MATERIAL.
  - EMBANKMENT FILL: MAINE DOT SPECIFICATION 703.19. COMPACT TO 95% OF ASTM D1557 MAXIMUM DENSITY.
  - ACCESS ROAD SURFACE: PROVIDE A 12 INCH THICK LAYER OF CRUSHED STONE MATERIAL MEETING MAINE DOT 703.12. COMPACT TO 95% OF ASTM D1557 MAXIMUM DENSITY.
  - 3/4" CRUSHED STONE: ASTM C33, STONE SIZE NO. 67.
  - RIP-RAP: D50=6" DIAMETER; TO DEPTH AS INDICATED. INSTALL ON WOVEN GEOTEXTILE FABRIC AND TAMP IN-PLACE.
  - LOAM: RE-USE EXISTING. IF EXISTING SUPPLY IS EXHAUSTED, PROVIDE LOAM MEETING MAINE DOT SPECIFICATION 615.02.
  - POND LINER: XR-5 8130, AS MANUFACTURED BY SEAMAN CORPORATION (TEL: 800-927-8578; WEBSITE: WWW.XR-5.COM). INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS AND AS SPECIFIED HEREIN.

- GEOCUSHION: MIRAFI 170N (8 OZ. NONWOVEN POLYPROPYLENE) OR EQUAL. INSTALL UNDER LINER IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- WOVEN GEOTEXTILE: MIRAFI HP370 OR PROPEX 2016. INSTALL UNDER EMBANKMENT FILL AND WHERE INDICATED. INSTALL IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- PVC PIPE AND FITTINGS: SDR 35.
- CPP PIPE: HANCOR OR EQUAL.

QUALITY CONTROL  
LABORATORY TESTS

- TEST EMBANKMENT FILL AND ACCESS ROAD MATERIAL USING ASTM C136 FOR CONFORMANCE TO THESE SPECIFICATIONS. IF A CERTIFICATE OF CONFORMANCE TO STATE DOT SPECIFICATIONS IS AVAILABLE FOR THE ABOVE MATERIALS, THE CONTRACTOR MAY SUBMIT THE CERTIFICATE IN LIEU OF THE ABOVE TESTING.
- TEST EMBANKMENT FILL, EMBANKMENT SUBGRADE MATERIAL, AND ACCESS ROAD MATERIAL FOR MOISTURE DENSITY RELATIONS USING ASTM D1557.
- PROVIDE TEST RESULTS TO ENGINEER WITHIN 7 DAYS OF STARTING CONSTRUCTION.

FIELD TESTS

- PERFORM IN-PLACE DENSITY AND MOISTURE TESTS IN RANDOMLY SELECTED LOCATIONS USING ASTM D2922 AS FOLLOWS:
 

EMBANKMENT FILL	2 TESTS PER LIFT OR FRACTION THEREOF
ACCESS ROAD MATERIAL	2 TESTS TOTAL
EMBANKMENT SUBGRADE	1 TEST PER 1000 SF.

**LINER INSTALLATION NOTES:**

- SCOPE OF WORK**
- FURNISH AND INSTALL FLEXIBLE MEMBRANE LINING IN THE AREAS SHOWN ON THE DRAWINGS. ALL WORK SHALL BE DONE IN STRICT ACCORDANCE WITH THE PROJECT DRAWINGS, THESE SPECIFICATIONS AND MEMBRANE LINING FABRICATOR'S APPROVED SHOP DRAWINGS.
  - GEOMEMBRANE PANELS WILL BE SUPPLIED SUFFICIENT TO COVER ALL AREAS, INCLUDING APPURTENANCES, AS REQUIRED IN THE PROJECT, AND SHOWN ON THE DRAWINGS. THE FABRICATOR/INSTALLER OF THE LINER SHALL ALLOW FOR SHRINKAGE AND WRINKLING OF THE FIELD PANELS.

- LINER SUBMITTALS**
- THE FABRICATOR OF PANELS USED IN THIS WORK SHALL PREPARE SHOP DRAWINGS WITH A PROPOSED PANEL LAYOUT TO COVER THE LINER AREA SHOWN IN THE PROJECT PLANS. SHOP DRAWINGS SHALL INDICATE THE DIRECTION OF FACTORY SEAMS AND SHALL SHOW PANEL SIZES CONSISTENT WITH THE MATERIAL QUANTITY REQUIREMENTS OF THE PROJECT.
  - DETAILS SHALL BE INCLUDED TO SHOW THE TERMINATION OF THE PANELS AT THE PERIMETER OF LINED AREAS, THE METHODS OF SEALING AROUND PENETRATIONS, AND METHODS OF ANCHORING.
  - PLACEMENT OF THE LINING SHALL NOT COMMENCE UNTIL THE SHOP DRAWINGS AND DETAILS HAVE BEEN APPROVED BY THE OWNER, OR HIS REPRESENTATIVE.

- FACTORY FABRICATION**
- THE INDIVIDUAL XR-5 LINER WIDTHS SHALL BE FACTORY FABRICATED INTO LARGE SHEETS CUSTOM DESIGNED FOR THIS PROJECT SO AS TO MINIMIZE FIELD SEAMING. THE NUMBER OF FACTORY SEAMS MUST EXCEED THE NUMBER OF FIELD SEAMS BY A FACTOR OF AT LEAST 10.
  - A TWO-INCH OVERLAP SEAM DONE BY HEAT OR RF WELDING IS RECOMMENDED. THE SURFACE OF THE WELDED AREAS MUST BE DRY AND CLEAN. PRESSURE MUST BE APPLIED TO THE FULL WIDTH OF THE SEAM ON THE TOP AND BOTTOM SURFACE WHILE THE WELDED AREA IS STILL IN A MELT-TYPE CONDITION. THE BOTTOM WELDING SURFACE MUST BE FLAT TO INSURE THAT THE ENTIRE SEAM IS WELDED PROPERLY. ENOUGH HEAT SHALL BE APPLIED IN THE WELDING PROCESS THAT A VISIBLE BEAD IS EXTRUDED FROM BOTH EDGES BEING WELDED. THE BEAD INSURES THAT THE MATERIAL IS IN A MELT CONDITION AND A SUCCESSFUL CHEMICAL BOND BETWEEN THE TWO SURFACES IS ACCOMPLISHED.
  - 2" SEAMS MUST WITHSTAND A MINIMUM OF 210 POUNDS PER INCH WIDTH DEAD LOAD AT 70°F. AND 105 POUNDS PER INCH AT 160°F. AS OUTLINED IN ASTM D 751. ALL SEAMS MUST EXCEED 550 LBS. BONDED SEAM STRENGTH PER ASTM D 751 BONDED SEAM STRENGTH GRAB TEST METHOD, PROCEDURE A.

- INSPECTION AND TESTING OF FACTORY SEAMS**
- THE FABRICATOR SHALL MONITOR EACH LINEAR FOOT OF SEAM AS IT IS PRODUCED. UPON DISCOVERY OF ANY DEFECTIVE SEAM, THE FABRICATOR SHALL STOP PRODUCTION OF PANELS USED IN THIS WORK AND SHALL REPAIR THE SEAM, AND DETERMINE AND RECTIFY THE CAUSE OF THE DEFECT PRIOR TO CONTINUATION OF THE SEAMING PROCESS.
  - THE FABRICATOR MUST PROVIDE A QUALITY CONTROL PROCEDURE TO THE OWNER OR HIS REPRESENTATIVE WHICH DETAILS HIS METHOD OF VISUAL INSPECTION AND PERIODIC SYSTEM CHECKS TO ENSURE LEAK-PROOF FACTORY FABRICATION.

- CERTIFICATION AND TEST REPORTS**
- PRIOR TO INSTALLATION OF THE PANELS, THE FABRICATOR SHALL PROVIDE THE OWNER, OR HIS REPRESENTATIVE, WITH WRITTEN CERTIFICATION THAT THE FACTORY SEAMS WERE INSPECTED IN ACCORDANCE WITH INSPECTION AND TESTING OF FACTORY SEAMS REQUIREMENTS.
- PANEL PACKAGING AND STORAGE**
- FACTORY FABRICATED PANELS SHALL BE ACCORDION-FOLDED, OR ROLLED, ONTO A STURDY WOODEN PALLET DESIGNED TO BE MOVED BY A FORKLIFT OR SIMILAR EQUIPMENT. EACH FACTORY FABRICATED PANEL SHALL BE PROMINENTLY AND INDELIBLY MARKED WITH THE PANEL SIZE.
  - PANELS SHALL BE PROTECTED AS NECESSARY TO PREVENT DAMAGE TO THE PANEL DURING SHIPMENT. PANELS WHICH HAVE BEEN DELIVERED TO THE PROJECT SITE SHALL BE STORED IN A DRY AREA.

- QUALIFICATIONS OF INSTALLER**
- THE INSTALLER OF THE LINING SHALL BE EXPERIENCED IN THE INSTALLATION OF FLEXIBLE MEMBRANE LINING, AND SHALL PROVIDE THE OWNER OR HIS REPRESENTATIVE WITH A LIST OF NOT LESS THAN FIVE (5) PROJECTS AND NOT LESS THAN 100,000 SQUARE FEET OF SUCCESSFULLY INSTALLED XR-5 SYNTHETIC LINING. THE PROJECT LIST SHALL SHOW THE NAME, ADDRESS, AND TELEPHONE NUMBER OF AN APPROPRIATE PARTY TO CONTACT IN EACH CASE.
- SUBGRADE PREPARATION**
- LINING INSTALLATION SHALL NOT BEGIN UNTIL A PROPER BASE HAS BEEN PREPARED TO ACCEPT THE MEMBRANE LINING. BASE MATERIAL SHALL BE FREE FROM ANGULAR ROCKS, ROOTS, GRASS AND VEGETATION. FOREIGN MATERIALS AND PROTRUSIONS SHALL BE REMOVED, AND ALL CRACKS AND VOIDS SHALL BE FILLED AND THE SURFACE MADE LEVEL, OR UNIFORMLY SLOPING AS INDICATED ON THE DRAWINGS. THE PREPARED SURFACE SHALL BE FREE FROM LOOSE EARTH, ROCKS, RUBBLE AND OTHER FOREIGN MATTER.

- GENERALLY, NO ROCK OR OTHER OBJECT LARGER THAN USCS SAND (SP) SHOULD REMAIN ON THE SUBGRADE IN ORDER TO PROVIDE AN ADEQUATE SAFETY FACTOR AGAINST PUNCTURE. GEOTEXTILES MAY BE USED TO COMPENSATE FOR IRREGULAR SUBGRADES. THE SUBGRADE SHALL BE UNIFORMLY COMPACTED TO ENSURE AGAINST SETTLEMENT. THE SURFACE ON WHICH THE LINING IS TO BE PLACED SHALL BE MAINTAINED IN A FIRM, CLEAN, DRY AND SMOOTH CONDITION DURING LINING INSTALLATION.

**LINING INSTALLATION**

- PRIOR TO PLACEMENT OF THE LINER, THE INSTALLER WILL INDICATE IN WRITING TO THE OWNER OR HIS REPRESENTATIVE THAT HE BELIEVES THE SUBGRADE TO BE ADEQUATELY PREPARED FOR THE LINER PLACEMENT.

- THE LINING SHALL BE PLACED OVER THE PREPARED SURFACE IN SUCH A MANNER AS TO ASSURE MINIMUM HANDLING. THE SHEETS SHALL BE OF SUCH LENGTHS AND WIDTHS AND SHALL BE PLACED IN SUCH A MANNER AS TO MINIMIZE FIELD SEAMING.

- IN AREAS WHERE WIND IS PREVALENT, LINING INSTALLATION SHOULD BE STARTED AT THE UPWIND SIDE OF THE PROJECT AND PROCEED DOWNWIND. THE LEADING EDGE OF THE LINER SHALL BE SECURED AT ALL TIMES WITH SANDBAGS OR OTHER MEANS SUFFICIENT TO HOLD IT DOWN DURING HIGH WINDS.

- SANDBAGS OR RUBBER TIRES MAY BE USED AS REQUIRED TO HOLD DOWN THE LINING IN POSITION DURING INSTALLATION. MATERIALS, EQUIPMENT OR OTHER ITEMS SHALL NOT BE DRAGGED ACROSS THE SURFACE OF THE LINER, OR BE ALLOWED TO SLIDE DOWN SLOPES ON THE LINING. ALL PARTIES WALKING OR WORKING UPON THE LINING MATERIAL SHALL WEAR SOFT-SOLE SHOES.

- LINING SHEETS SHALL BE CLOSELY FIT AND SEALED AROUND INLETS, OUTLETS AND OTHER PROJECTIONS THROUGH THE LINING.

- LINING TO CONCRETE SEALS SHALL BE MADE WITH A MECHANICAL ANCHOR, OR AS SHOWN ON THE DRAWINGS. ALL PIPING, STRUCTURES AND OTHER PROJECTIONS THROUGH THE LINING SHALL BE SEALED WITH APPROVED SEALING METHODS.

- XR-5 FIELD SEAMING**
- ALL REQUIREMENTS OF SECTIONS FACTORY FABRICATION AND INSPECTION AND TESTING OF FACTORY SEAMS APPLY. A VISIBLE BEAD SHOULD BE EXTRUDED FROM THE HOT AIR WELDING PROCESS. FIELD FABRICATION OF LINING MATERIAL WILL NOT BE ALLOWED.

- INSPECTION**
- ALL FIELD SEAMS WILL BE TESTED USING THE AIR LANCE METHOD. A COMPRESSED AIR SOURCE WILL DELIVER 55 PSI MINIMUM TO A 3/16 INCH NOZZLE. THE NOZZLE WILL BE DIRECTED TO THE LIP OF THE FIELD SEAM IN A NEAR PERPENDICULAR DIRECTION TO THE LENGTH OF THE FIELD SEAM. THE NOZZLE WILL BE HELD 4 INCHES MAXIMUM FROM THE SEAM AND TRAVEL AT A RATE NOT TO EXCEED 40 FEET PER MINUTE. ANY LOOSE FLAPS OF 1/8" OR GREATER WILL REQUIRE A REPAIR.

- ALTERNATIVELY ALL FIELD SEAMS SHOULD ALSO BE INSPECTED UTILIZING THE VACUUM BOX TECHNIQUE AS DESCRIBED IN STANDARD PRACTICE FOR GEOMEMBRANE SEAM EVALUATION BY VACUUM CHAMBER (ASTM D 5641-94 E1), USING A 3 TO 5 PSI VACUUM PRESSURE. ALL LEAKS SHALL BE REPAIRED AND TESTED.

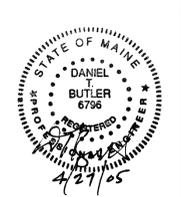
- ALL JOINTS, ON COMPLETION OF WORK, SHALL BE TIGHTLY BONDED. ANY LINING SURFACE SHOWING INJURY DUE TO SCUFFING, PENETRATION BY FOREIGN OBJECTS, OR DISTRESS FROM ROUGH SUBGRADE, SHALL AS DIRECTED BY THE OWNER OR HIS REPRESENTATIVE BE REPLACED OR COVERED, AND SEALED WITH AN ADDITIONAL LAYER OF LINING OF THE PROPER SIZE, IN ACCORDANCE WITH THE PATCHING PROCEDURE.

- PATCHING**
- ANY REPAIRS TO THE LINING SHALL BE PATCHED WITH THE LINING MATERIAL. THE PATCH MATERIAL SHALL HAVE ROUNDED CORNERS AND SHALL EXTEND A MINIMUM OF FOUR INCHES (4") IN EACH DIRECTION FROM THE DAMAGED AREA.

- SEAM REPAIRS OR SEAMS WHICH ARE QUESTIONABLE SHOULD BE CAP STRIPPED WITH A 1" WIDE (MIN.) STRIP OF THE LINER MATERIAL. THE REQUIREMENTS OF SECTION XR-5 FIELD SEAMING APPLY TO THIS CAP STRIPPING.

- WARRANTY**
- THE LINING MATERIAL SHALL BE WARRANTED ON A PRO-RATED BASIS FOR 10 YEARS AGAINST BOTH WEATHERING AND CHEMICAL COMPATIBILITY IN ACCORDANCE WITH SEAMAN CORPORATION WARRANTY FOR XR-5 STYLE 8130. WORKMANSHIP OF INSTALLATION SHALL BE WARRANTED FOR ONE YEAR ON A 100% BASIS.

NO.	REVISION	DATE	BY	CK	P.E. STAMPED	P.E. No.
A	ISSUED FOR CLIENT REVIEW	01-21-05	EVD	DTB		
B	ISSUED FOR CLIENT REVIEW	1-28-05	EVD	DTB		
C	ISSUED FOR CLIENT REVIEW	2-14-05	EVD	DTB		
D	ISSUED FOR PERMIT	4-28-05	EVD	DTB		



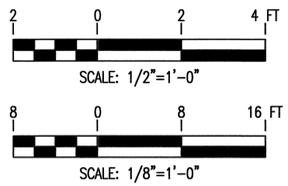
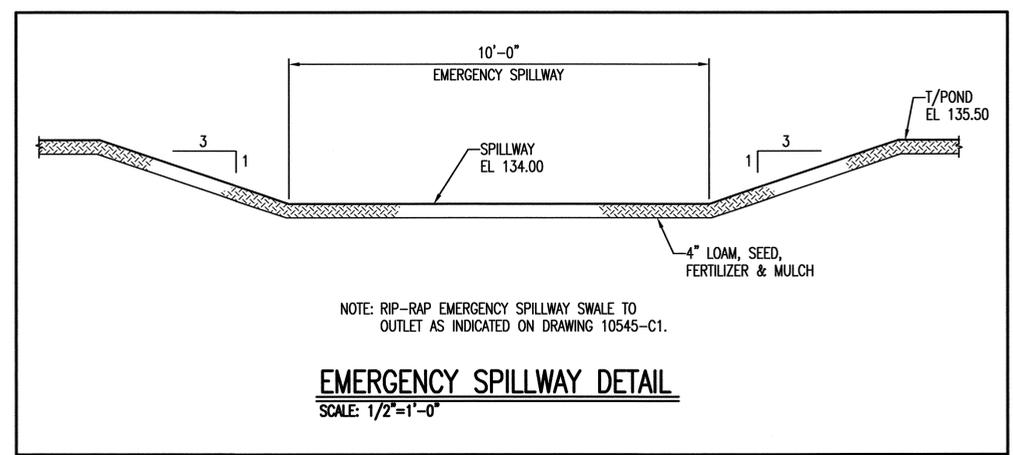
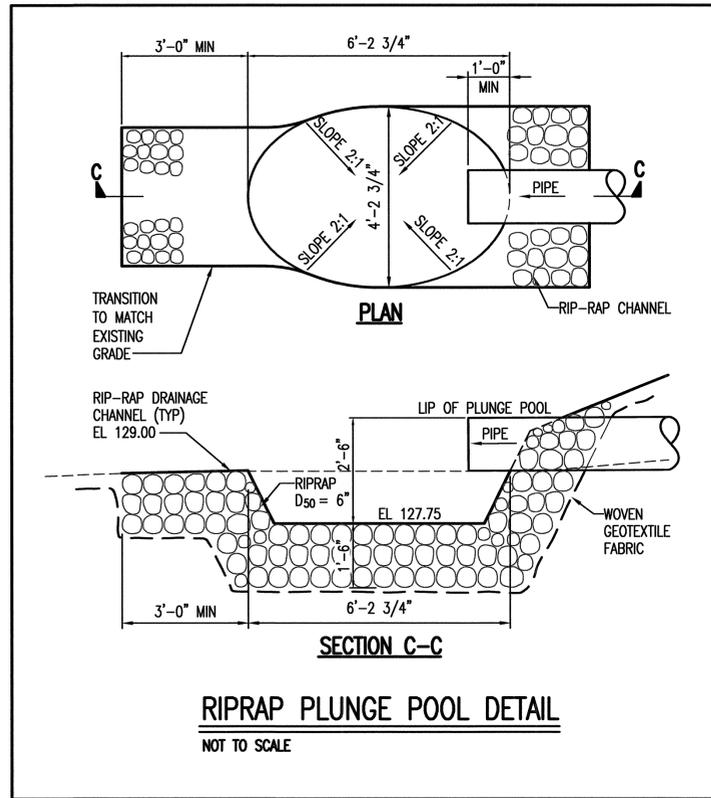
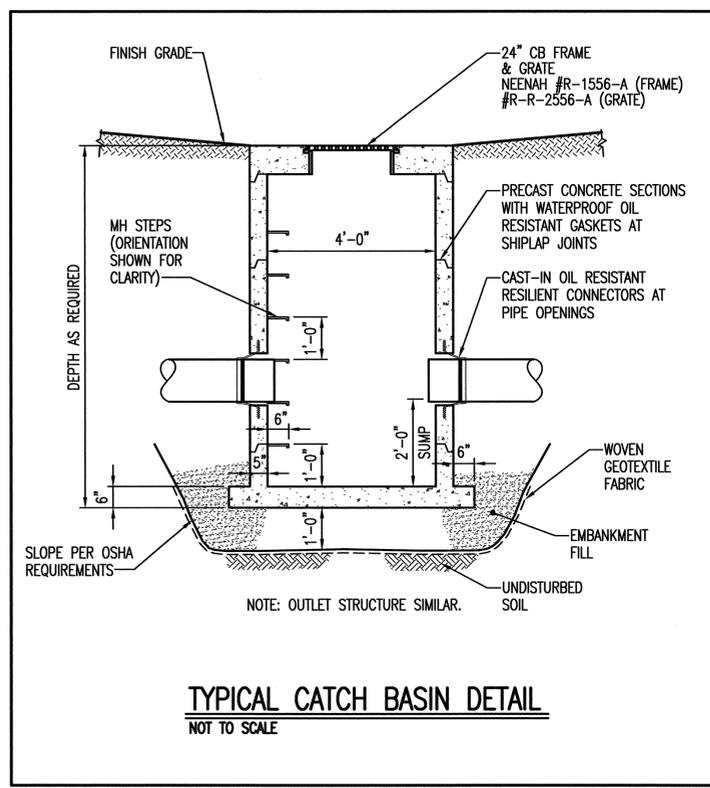
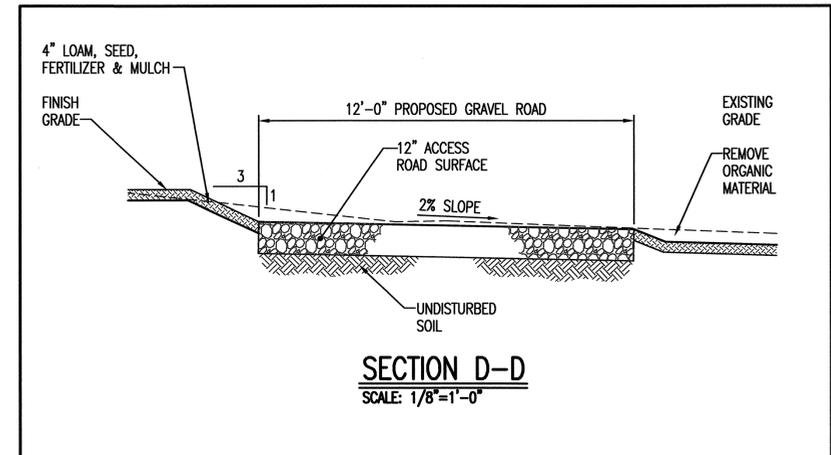
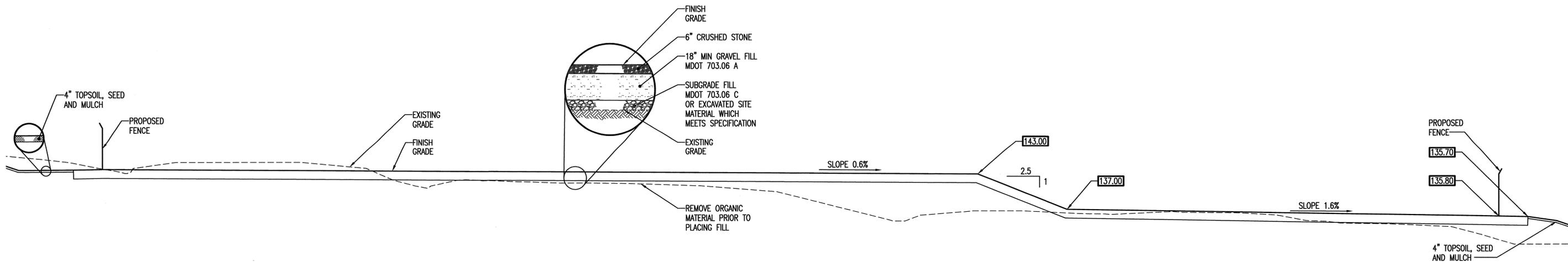
CLIENT APPROVAL	DTB DESIGNED
APPROVED BY	EVD DRAWN
COMPANY	DTB CHECKED
DATE	DTB APPROVED
	REVIEWED

**BANGOR HYDRO-ELECTRIC**  
**NORTHEAST RELIABILITY INTERCONNECT**  
**SITE CONSTRUCTION DETAILS 2**  
ORRINGTON SUBSTATION ORRINGTON, MAINE

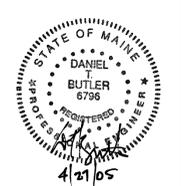
REV. D

10545-C2

TRC 249 Western Avenue  
Augusta, Maine 04330  
SCALE AS NOTED DATE 1-17-04



NO.	REVISION	DATE	BY	CK	P.E. STAMPED	P.E. No.
A	ISSUED FOR CLIENT REVIEW	01-21-05	EVD	DTB		
B	ISSUED FOR CLIENT REVIEW	1-28-05	EVD	DTB		
C	ISSUED FOR CLIENT REVIEW	2-14-05	EVD	DTB		
D	ISSUED FOR PERMIT	4-28-05	EVD	DTB		



CLIENT APPROVAL	DTB DESIGNED
APPROVED BY	EVD DRAWN
COMPANY	DTB CHECKED
DATE	JTB APPROVED
	REVIEWED

**BANGOR HYDRO-ELECTRIC**  
**NORTHEAST RELIABILITY INTERCONNECT**  
**SITE CONSTRUCTION DETAILS 3**  
**ORRINGTON SUBSTATION**      **ORRINGTON, MAINE**

**TRC** 249 Western Avenue  
Augusta, Maine 04330

SCALE AS NOTED      DATE 1-17-04

10545-C3      REV. D

TRC 249 Western Ave, Augusta, Maine 04330  
 PROJECT NO: 10545 CONTRACT DWG NO: 10545-C3  
 FILENAME: 10545-C3.DWG