GEOTECHNICAL REPORT
FRYEBURG RAIL TRAIL
FRYEBURG, MAINE

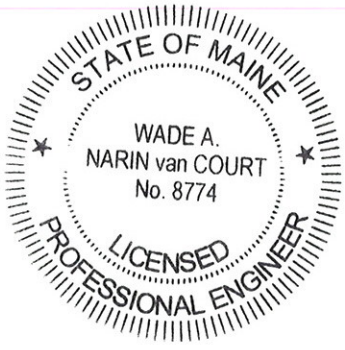
P.I.N. 16130.00

Prepared For:

Maine Department of Transportation
16 State House Station
Augusta, Maine 04333

Prepared By:

URS Corporation
115 Water Street, Suite 3
Hallowell, Maine 04347



February 2010

Wade A. Narin van Court, P.E.

Figures

Sheets

Appendices

This report presents the results of the geotechnical investigation performed for the Maine Department of Transportation (MaineDOT) for the Fryeburg Rail Trail. The MaineDOT Project Identification Number (PIN) is 16130.00. This recreational trail is to be constructed immediately south of the state-owned rail line east of Route 302 in Fryeburg, Maine. Preliminary plans show that from approximately Station 17+50 to Station 19+50, the proposed trail will be below existing grade

The objectives of this geotechnical investigation were to characterize the subsurface conditions between Station 17+00 and Station 20+00 and to determine if mechanical bedrock removal is necessary and, if so, is it practicable. To accomplish these objectives, URS performed a geotechnical investigation that included conducting subsurface explorations and evaluating rock removal by backhoe.

A total of four test pits spaced approximately 50 feet apart were excavated for the purposes of this investigation by URS Corporation (URS). The test pits were excavated perpendicular to the trail alignment. Along a portion of the proposed trail, from approximately Station 17+00 to Station 19+25, a man-made berm, roughly four feet high and 10 to 12 feet wide at the base, parallels the top of the slope. Between Station 17+00 and Station 20+00, up to approximately 4 feet of berm fill material (loose, fine sand with little silt) overlies an unstratified, fine eolian sandy deposit (loose, fine sand with little silt) that is approximately 3 to 6 feet thick. The site soils are underlain by light gray, fine-grained granite bedrock, which was encountered at depths of 6 feet or more below the ground surface. The bedrock is hard, slightly to moderately fractured, with horizontal and near vertical bedding planes and fractures, and the upper 6 inches to one foot of the bedrock may be weathered and highly to very highly fractured. The upper, weathered portion of the bedrock was moderately difficult to excavate, and excavation of intact bedrock in the test pits was not accomplished by the backhoe.

2.1 INTRODUCTION

A recreational trail is to be constructed immediately south of the state-owned rail line east of Route 302 in Fryeburg, Maine (rail trail). Preliminary plans show that from approximately Station 17+50 to Station 19+50, the proposed trail will be below existing grade. This section of the trail is expected to be shallow to bedrock and construction may possibly require bedrock excavation. Removal of bedrock, if required, would be by mechanical methods (i.e., by backhoe or excavator).

2.2 PROJECT OBJECTIVES

The objectives of the geotechnical investigation are to characterize the subsurface conditions between Station 17+00 and Station 20+00 to determine if mechanical bedrock removal is necessary and, if so, is it practicable. To accomplish these objectives, URS performed a geotechnical investigation which included conducting subsurface explorations and evaluating rock removal by backhoe. Findings from this investigation are summarized in this geotechnical design report.

2.3 SCOPE OF WORK

In accordance with the scope of services described in our proposal dated November 5, 2009, URS performed the following:

Visited the site and reviewed readily available information provided by MaineDOT, as well as topographic and geologic maps for the site and surrounding area;

Provide a geotechnical engineer to observe the test pit subsurface exploration program and evaluate soil/bedrock conditions at the site. The proposed exploration program consists of four field located test pits excavated to refusal (from approximately Station 17+00 to Station 20+00);

Conduct a joint URS/MDOT/SEA team briefing on the subsurface conditions that were observed and discuss the most appropriate rock removal methods, as necessary;

Prepare a final brief geotechnical design report that will include a summary of the subsurface exploration program, subsurface conditions and test logs indicating soil, bedrock, and groundwater conditions; and

Prepare a Microstation-based general location plan of subsurface explorations, subsurface Interpretative profile and test pit logs from the test pit information and site reconnaissance.

2.4 PROJECT BACKGROUND AND PROPOSED CONSTRUCTION

The Fryeburg Rail Trail is a recreation trail paralleling the state-owned railroad in Fryeburg, Maine. The trail, to be constructed on the south side of the track right of way, will go from Route 302 to Route 5/113. The trail will have a 10-foot wide paved surface place on a prepared subgrade.

3.1 SITE DESCRIPTION

The section of the proposed rail trail area evaluated for this report is located near the western terminus of the trail (approximately Station 17+00 to Station 20+00) at Route 302 (see Figure 1, Site Plan). The trail is uphill of a side-hill cut section of the railway line. Bedrock is exposed in the cut. Photographs of the track alignment are presented in Appendix A.

Site topography, based on aerial photograph, shows the trail area slopes relatively uniformly downward from south to north to the top of the cut slope on the south side of the rail bed. The elevations along the rail trail range from elevation 450 feet at about Station 17+00 and Station 20+00 to elevation 457 feet at Station 18+65.

On-site observations indicate a somewhat different topography than shown on Sheet 1. A man-made berm, roughly four feet high and 10 to 12 feet wide at the base, parallels the top of the cut slope on the south side of the rail bed from approximately station 17+00 to station 19+25. The berm can be seen on the site photographs.

The area investigated is covered with trees with trunks that are approximately 3 to 12 inches in diameter.

3.2 LOCAL GEOLOGY

Based upon the Bedrock Geologic Map of Maine[1], the site is underlain by bedrock mapped as Carboniferous era granites of the Sebago batholith.

The Fryeburg Quadrangle Surficial Geologic Map[2] indicates that subsurface soil deposits in the area of interest are a transitional deposit between late to postglacial lake bed silts and sands and

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[1] Osberg, P.H., Hussey II, A.M., and Boone, G.M. (1985) Bedrock Geologic Map of Maine, Maine Geological Survey, Department of Conservation.

windblown (eolian) sands associated with Glacial Lake Pigwacket. These deposits are relatively uniform, stratified to unstratified deposits of fine sand and silts.

3.3 SUBSURFACE INVESTIGATION PROGRAM

The subsurface investigation program consisted of four test pits. Test pits TP-1 through TP-4 were excavated under the direction of URS Corporation by Clyde Watson Excavation Inc. of Fryeburg, Maine on January 7, 2010 using a Caterpillar 315 track-mounted backhoe. Observation of site conditions, and locating and logging of the test pits was performed by a URS senior geotechnical engineer. The test pit locations are presented in Sheet 1; subsurface interpretative profile is shown on Sheet 2; and test pit logs from this investigation are presented in Appendix B and on Sheet 3.

3.3.1 Generalized Subsurface Profiles

The subsurface conditions from station 17+00 to station 20+00 are shown in the subsurface interpretative profile (Sheet 3) and are described from the ground surface to the limiting depth of the test pits as follows:

Fill Material

The berm fill material consists of loose, fine sand with little silt. The fill soil is classified as SP in the Unified Soil Classification System (USCS). The fill appears to be the same soil as the underlying, undisturbed sand deposit. The maximum thickness of this stratum is approximately 4 feet in the center of the berm. A boulder, that appears to be from the near-by rail road cut, was present in TP-1. The fill was easily excavated.

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[2] Fryeburg Quadrangle, Maine, Surficial Geologic Map of Maine, Maine Geological Survey, Open-File No. 99-7, 1999.

Eolian Deposit

An unstratified, fine eolian sandy deposit underlies the fill material. The soil is loose, fine sand with little silt classified as a USCS SP. The thickness of this layer was approximately of three to six feet. The deposit was dry and easily excavated.

Bedrock

Bedrock underlying the area investigated is light gray, fine-grained granite. The bedrock is hard, slightly to moderately fractured, with horizontal and near vertical bedding planes and fractures. The upper 6-inches to one feet of the bedrock may be weathered, as well as highly to very highly fractured based on the cobble and gravel layer encountered immediately above the bedrock surface. The upper, weathered portion of the bedrock was moderately difficult to excavate. Excavation of intact bedrock in the test pits was not accomplished by the backhoe.

3.4 GROUNDWATER CONDITIONS

At the time of the URS field investigation, there was no groundwater evident in the test pits. Visual evidence of groundwater, such as mottling, was also absent. Given the close proximity of the exposed rock cut slope, fractured bedrock and permeable soil, groundwater may be absent at this location.

3.5 EXCAVATION

Excavation of soil for construction of the trail subgrade will be readily done by backhoe. Excavation of the bedrock, if required, will not be practical using a typical backhoe bucket. Localized rock removal using a hydraulic ram may be feasible.

Disturbed subgrade, unsuitable soil, or deleterious material encountered at the elevation of bottom of excavations for the rail trail should be removed and replaced with granular or gravel borrow. Borrow material should be compacted to not less than 90 percent of the maximum dry density, as determined by AASHTO Standard Method of Test T-180, Methods C or D at optimum water content. Granular and gravel borrow should conform to the material specifications, Sections 703.19 and 703.20, respectively, in the MaineDOT (2002) Standard Specifications.

3.6 REUSE OF EXISTING SOILS

The existing soils are fine sand which appear adequate for reuse as common borrow. Excavated soils may be stockpiled and reused where appropriate after testing (e.g., gradation analysis and compaction testing) is performed on representative samples. Additionally, excavated soil may also meet the criteria for granular fill, but this needs to be confirmed by laboratory testing of represent samples prior to use.

3.7 EROSION AND SEDIMENTATION CONTROL

The erosion and sedimentation potential of soils along the alignment should be considered moderate due to the fines content, so exposed soils need to be protected during construction. Erosion control should be provided for disturbed areas in accordance with MaineDOT Standard Specifications Section 656 and the MaineDOT Best Management Practices Handbook[3].

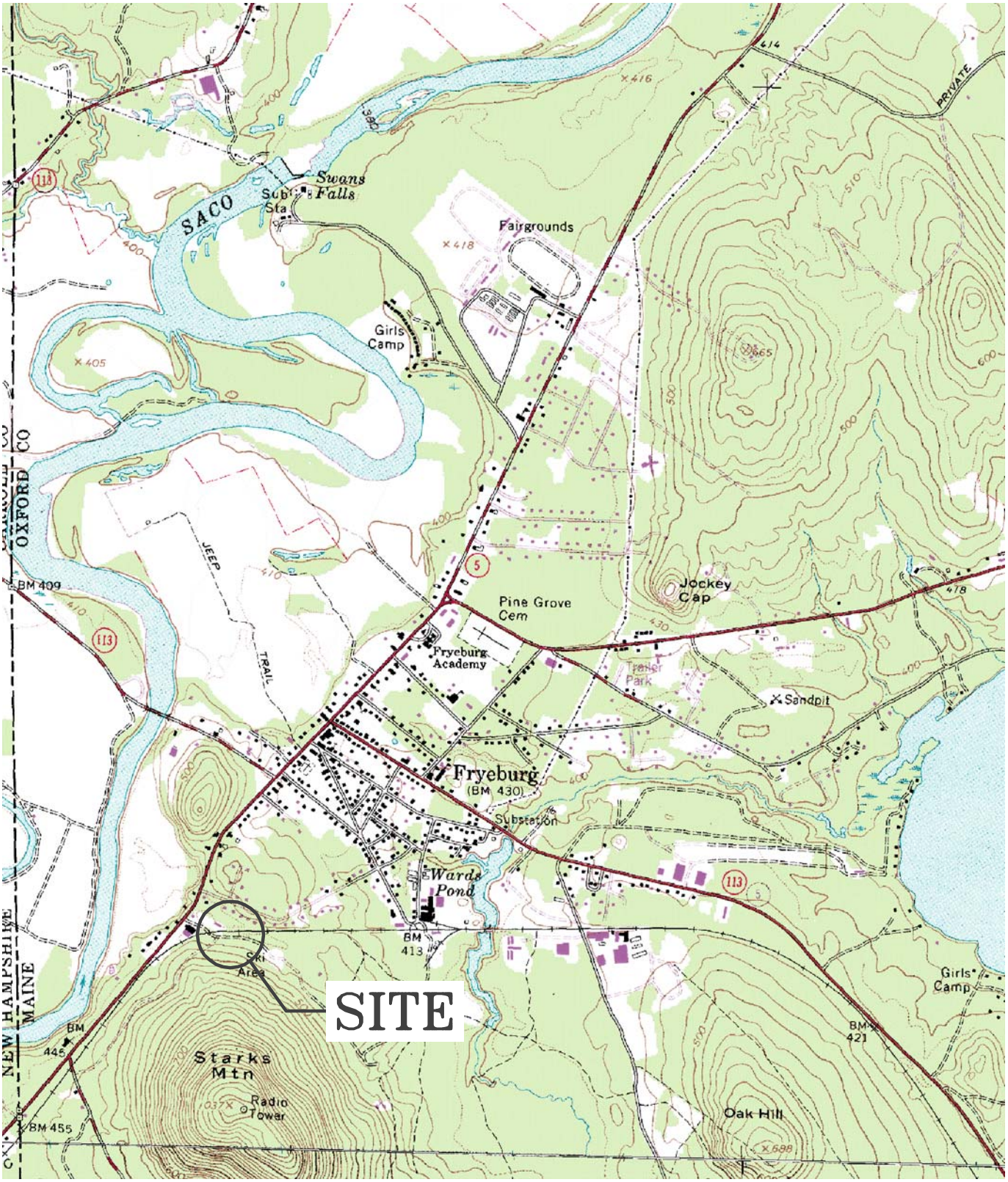
[3] MaineDOT. 2008. MaineDOT Best Management Practices for Erosion and Sedimentation Control. Maine Department of Transportation.

The results and recommendations presented in this report are largely based on subsurface information from a limited number of tests pits and our observations of site conditions. Subsurface conditions may vary from those presented in this report, and these variances may require a modification of the recommended foundation systems. If further investigation or construction activity reveals significant differences in the subsurface conditions, URS Corporation requests the opportunity to review and modify our recommendations, as appropriate. The recommendations presented in this report should not be extrapolated to other areas or used for other facilities without URS Corporation's prior review.

This report has been prepared by URS Corporation for the exclusive use of the Maine Department of Transportation and its designers, based on our understanding of the project as described in this report. Any modification or final decisions in the design concept from the descriptions in this report should be made known to URS Corporation for possible modifications of our recommendations.

FIGURES

SHEETS



SOURCE: MAINE GIS, FRYEBURG, JULY 2000

URS Corporation
115 Water Street
Hallowell, ME 04347
Tel: 207.623.9188
Fax: 207.622.6085
www.urscorp.com

SCALE:	1" = 2000'
DATE:	FEB 2010
FILE NO:	MDOT FRYEBURG
DESIGN:	CAM
APPROVED:	WNVC
DRAWN:	CAM

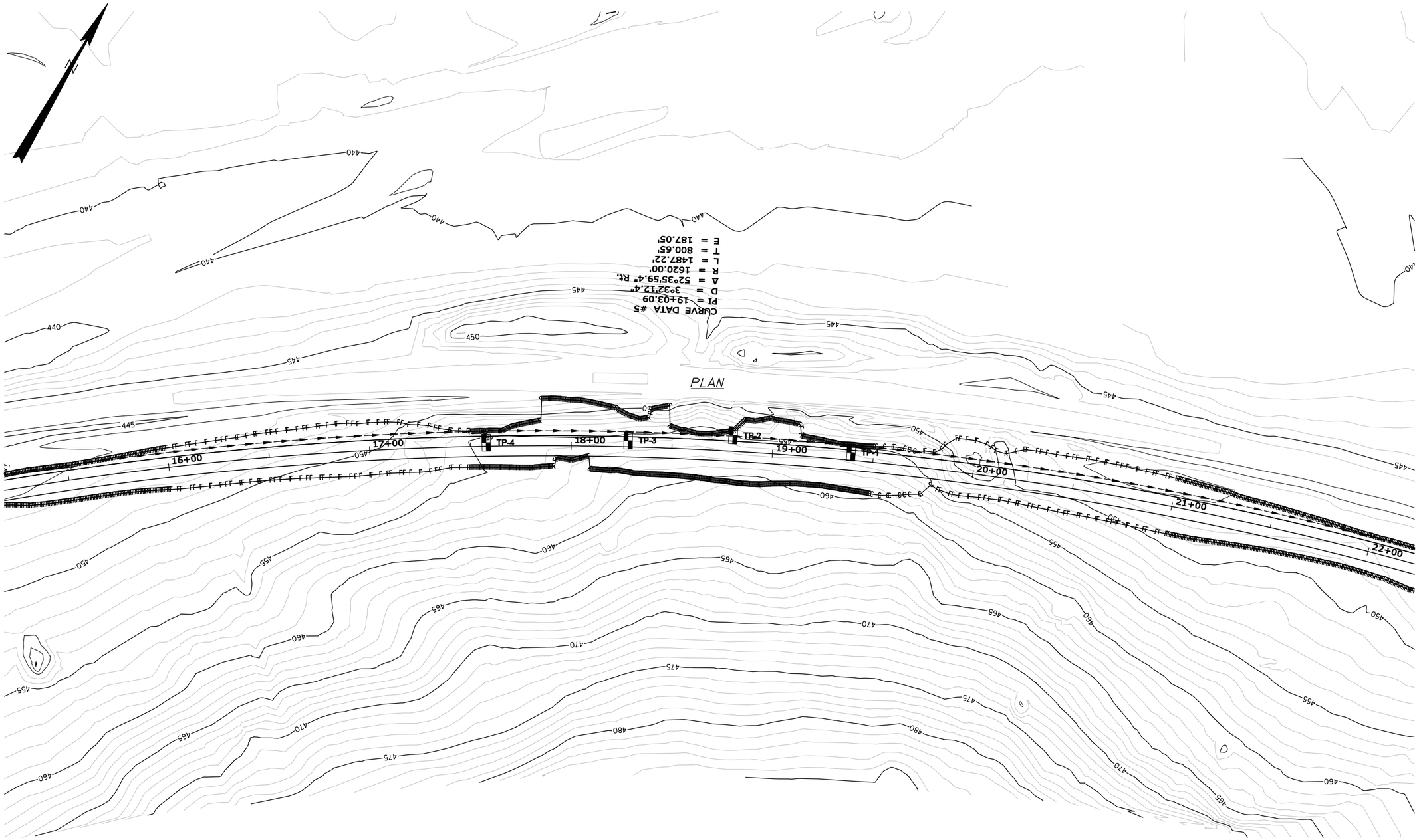
CLIENT: MAINE DOT
PROJ: 154 PORTLAND ROAD FRYEBURG, ME
PROJECT NO: 39460544

TITLE: SITE LOCATION MAP GEOTECHNICAL REPORT FRYEBURG RAIL TRAIL

FIGURE NO.: 1

P:\acad-2008\1234\dwg\mdot fryeburg.dwg, flg 1 locus, 2/26/2010 9:12:56 AM

Filename: ...\MSTA\BORING_LOC_PLAN.dgn Division: HIGHWAY Username: marlon_lucero Date:2/24/2010



Notes:

1. *Base drawings for plan provided by SEA Consultants, Inc.*

HORIZ 25 0 25 50
VERT 5 0 5 10
SCALE (IN FEET)

LEGEND:

TP-# TEST PIT & NO.

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

MEDOT PIN
16130

PROJ. MANAGER: M.N. VAN COURT		BY	DATE
DESIGN-DETAILED	D. ANDREWS	M. LUCERO	02/17/10
CHECKED-REVIEWED			
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

SIGNATURE

3601
P.E. NUMBER

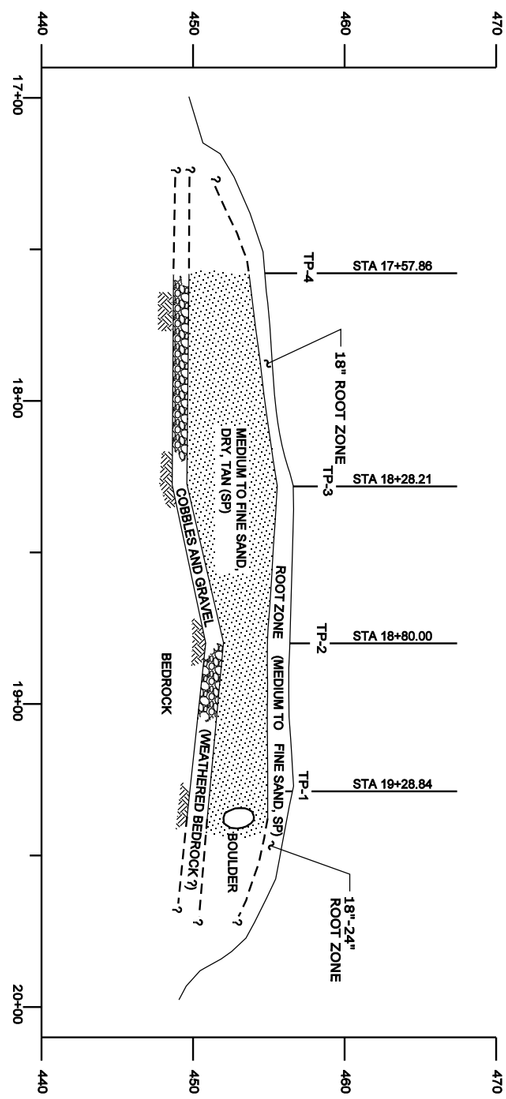
FEBRUARY 2010
DATE

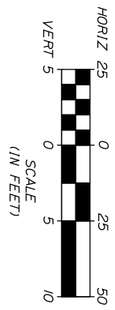
FRYEBURG MAINE RAIL TRAIL
FRYEBURG, MAINE

TEST PIT LOCATION PLAN

SHEET NUMBER

1





SHEET NUMBER 2

FRYEBURG MAINE RAIL TRAIL
FRYEBURG, MAINE

SUBSURFACE
INTERPRETATIVE PROFILE

PROJ. MANAGER: W.N. VAN COURT		BY	DATE
DESIGN-DETAILED	D. ANDREWS	M. LUCERO	02/17/10
CHECKED-REVIEWED			
DESIGN2-DETAILED2			
DESIGN3-DETAILED3			
REVISIONS 1			
REVISIONS 2			
REVISIONS 3			
REVISIONS 4			
FIELD CHANGES			

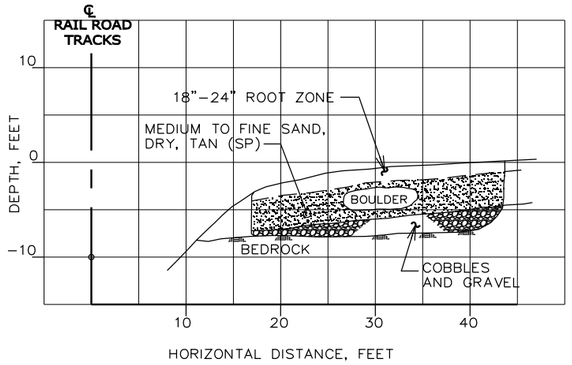
SIGNATURE
3601
P.E. NUMBER
FEBRUARY 2010
DATE

STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

MEDOT PIN
16130

Project:	Fryeburg Maine Rail Trail	Log of Test Pit
Project Location:	Fryeburg, Maine	TP-1
Project Number:	MEDOT PIN 16130	

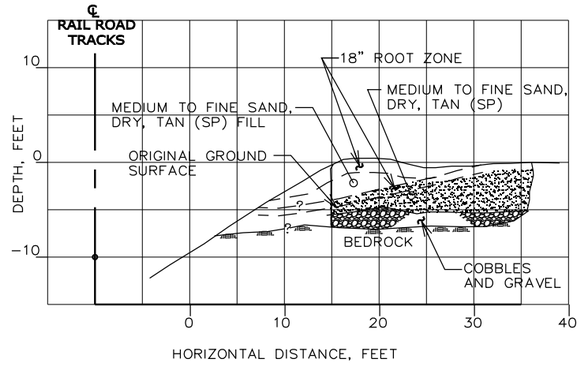
Date(s) Excavated:	January 7, 2010	Logged By:	David Andrews	Checked By:	WAN
Length of Excavation:	See Sketch Log	Width of Excavation:	4 FEET	Depth of Excavation:	See Sketch Log
Excavation Equipment:	CAT 315 Backhoe	Excavation Contractor:	Watson	Approximate Surface Elevation:	456.55
Water Observations:	DRY			Sampling Method(s):	N/A
Location:	STATION 19+38.84	LEFT 3.87 FT CENTER OF TEST PIT			



NOTE: BOULDER APPEARS TO BE BLASTED ROCK.

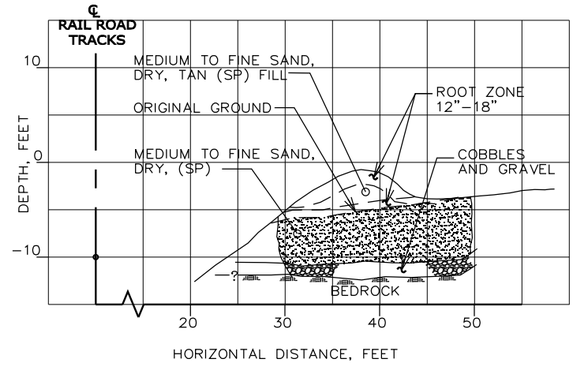
Project:	Fryeburg Maine Rail Trail	Log of Test Pit
Project Location:	Fryeburg, Maine	TP-2
Project Number:	MEDOT PIN 16130	

Date(s) Excavated:	January 7, 2010	Logged By:	David Andrews	Checked By:	WAN
Length of Excavation:	See Sketch Log	Width of Excavation:	4 FEET	Depth of Excavation:	See Sketch Log
Excavation Equipment:	CAT 315 Backhoe	Excavation Contractor:	Watson	Approximate Surface Elevation:	457.72
Water Observations:	DRY			Sampling Method(s):	N/A
Location:	STATION 18+80.00	LEFT 7.86 FT CENTER OF TEST PIT			



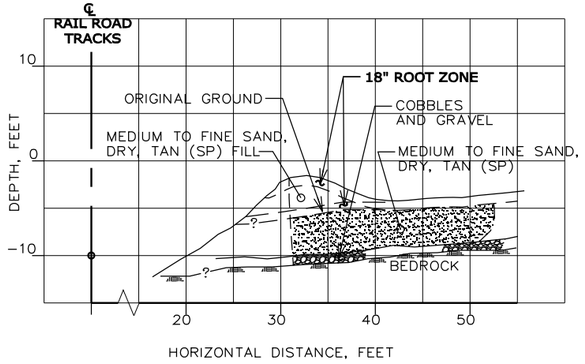
Project:	Fryeburg Maine Rail Trail	Log of Test Pit
Project Location:	Fryeburg, Maine	TP-3
Project Number:	MEDOT PIN 16130	

Date(s) Excavated:	January 7, 2010	Logged By:	David Andrews	Checked By:	WAN
Length of Excavation:	See Sketch Log	Width of Excavation:	4 FEET	Depth of Excavation:	See Sketch Log
Excavation Equipment:	CAT 315 Backhoe	Excavation Contractor:	Watson	Approximate Surface Elevation:	458.23
Water Observations:	DRY			Sampling Method(s):	N/A
Location:	STATION 18+28.21	LEFT 3.11 FT CENTER OF TEST PIT			



Project:	Fryeburg Maine Rail Trail	Log of Test Pit
Project Location:	Fryeburg, Maine	TP-4
Project Number:	MEDOT PIN 16130	

Date(s) Excavated:	January 7, 2010	Logged By:	David Andrews	Checked By:	WAN
Length of Excavation:	See Sketch Log	Width of Excavation:	4 FEET	Depth of Excavation:	See Sketch Log
Excavation Equipment:	CAT 315 Backhoe	Excavation Contractor:	Watson	Approximate Surface Elevation:	456.87
Water Observations:	DRY			Sampling Method(s):	N/A
Location:	STATION 17+57.86	LEFT 1.77 FT CENTER OF TEST PIT			



STATE OF MAINE
DEPARTMENT OF TRANSPORTATION

MEDOT PIN
16130

PROJ. MANAGER: W.N. VAN COURT		
DESIGN-DETAILED	D. ANDREWS	DATE
CHECKED-REVIEWED	M. LUCERO	02/17/10
DESIGN2-DETAILED2		
DESIGN3-DETAILED3		
REVISIONS 1		
REVISIONS 2		
REVISIONS 3		
REVISIONS 4		
FIELD CHANGES		

SIGNATURE
3601
P.E. NUMBER
FEBRUARY 2010
DATE

FRYEBURG MAINE RAIL TRAIL
FRYEBURG, MAINE

TEST PIT LOGS

SHEET NUMBER
3

Filename: ...\MSTA\fryeburg_TP_log.dgn Division: HIGHWAY Username: marlon_lucero Date:2/25/2010

APPENDIX A

SITE PHOTOGRAPHS

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Maine DOT	Fryeburg, Maine	39460544

Photo No.	Date:
01	1/7/10

Direction Photo Taken:

NA

Description:

TP-1 showing soil overlying bedrock

Photo No.	Date:
02	1/7/10

Direction Photo Taken:

NA

Description:

Granite outcrop in rail road cut

PHOTOGRAPHIC LOG

Client Name:	Site Location:	Project No.
Maine DOT	Fryeburg, Maine	39460544

Photo No.	Date:
03	1/7/10

Direction Photo Taken:

East

Description:

Berm at approximately Station 17+ 45

Photo No.	Date:
04	1/7/10

Direction Photo Taken:

East

Description:

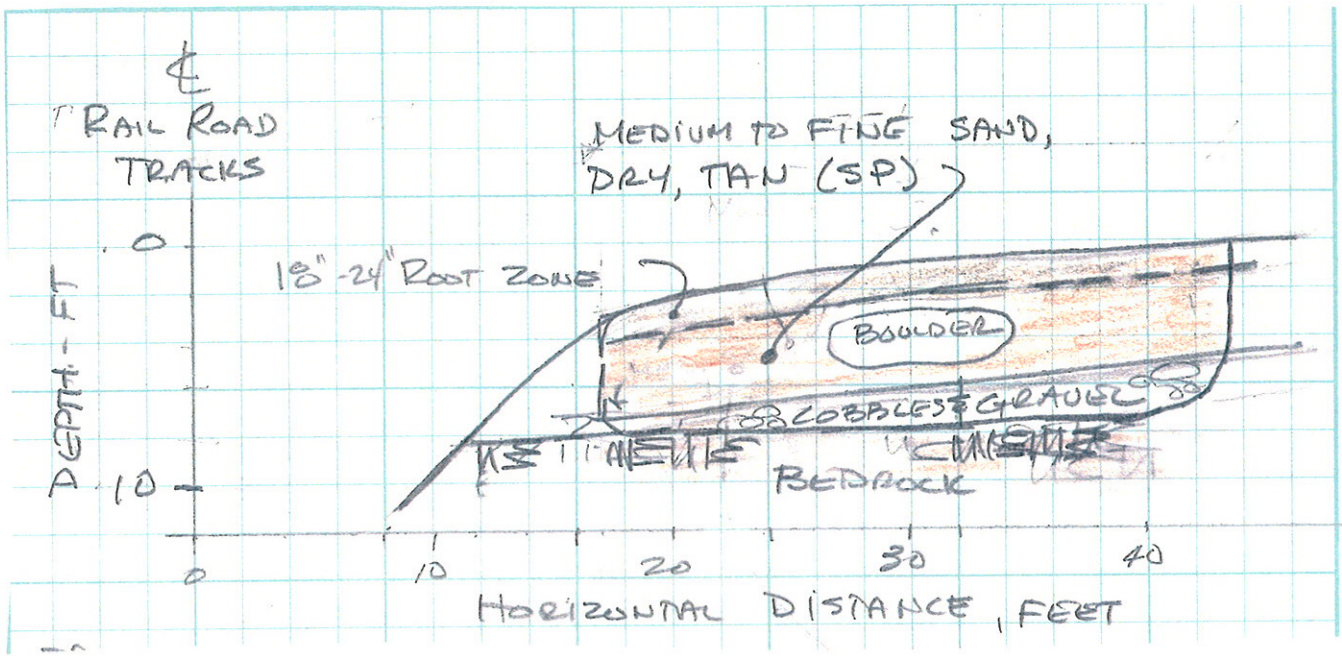
Rail road cut. Note berm in upper right corner of photograph

APPENDIX B

BORING LOGS

Project: Fryeburg Maine Rail Trail Project Location: Fryeburg, Maine Project Number: MEDOT PIN 16130	Log of Test Pit TP-1

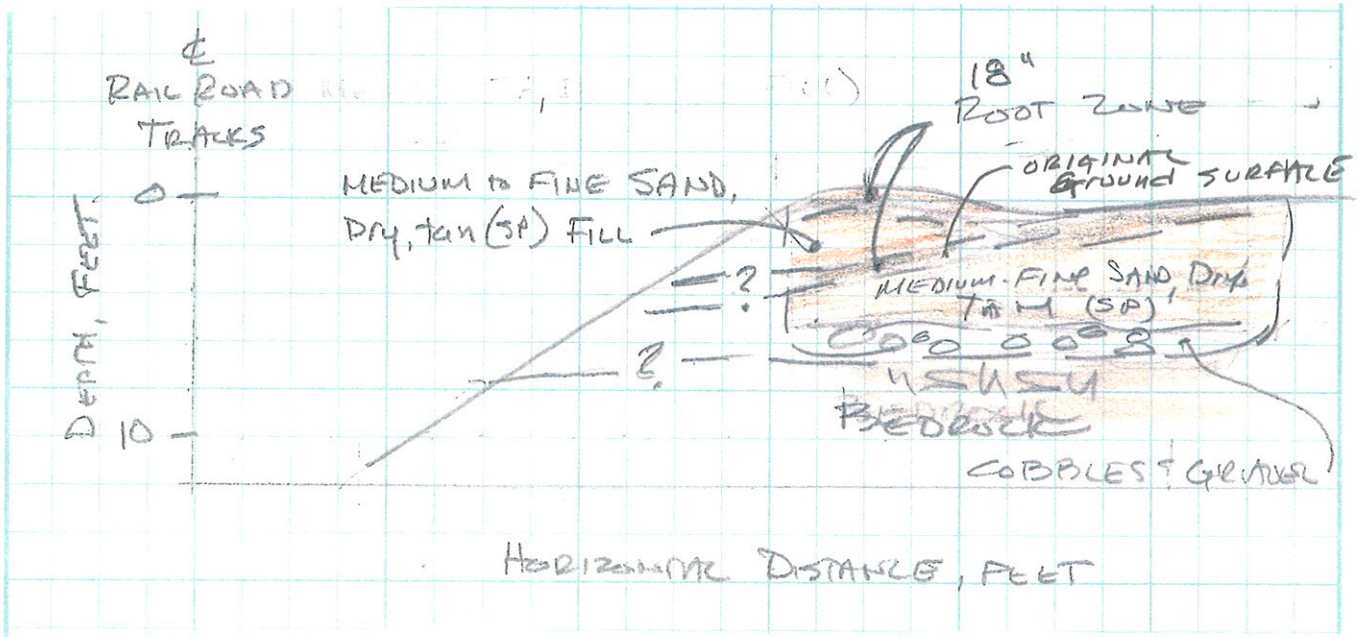
Date(s) Excavated: January 7, 2010	Logged By: David Andrews	Checked by: WAN
Length of Excavation: See sketch log	Width of Excavation: 4 FEET	Depth of Excavation: see sketch log
Excavation Equipment: CAT 315 Backhoe	Excavation Contractor: Watson	Approximate Surface Elevation: not determined
Water Observations: DRY		Sampling Method(s): n a
Location: STATION 19 + 25 Right 10 ft. (center of test pit		



NOTE: BOULDER APPEARS TO BE BLASTED ROCK.

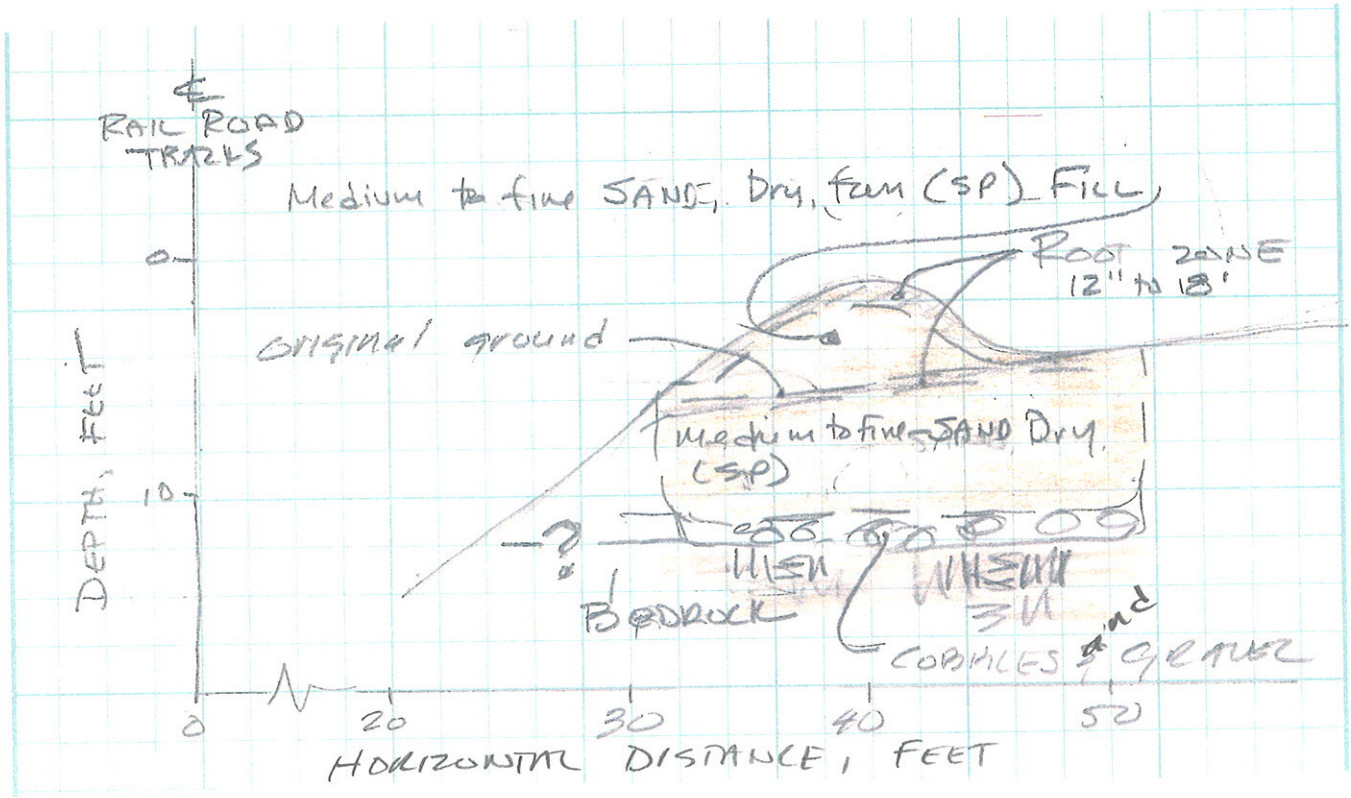
Project: Fryeburg Maine Rail Trail Project Location: Fryeburg, Maine Project Number: MEDOT PIN 16130	Log of Test Pit TP. 2

Date(s) Excavated: January 7, 2010	Logged By: David Andrews	Checked by: WAN
Length of Excavation: See sketch log	Width of Excavation: 4 FEET	Depth of Excavation: see sketch log
Excavation Equipment: CAT 315 Backhoe	Excavation Contractor: Watson	Approximate Surface Elevation: not determined
Water Observations: DRY		Sampling Method(s): n a
Location: STATION 18 + 75 Right 14 ft. Center of test pit		



Project: Fryeburg Maine Rail Trail Project Location: Fryeburg, Maine Project Number: MEDOT PIN 16130	Log of Test Pit TP-3

Date(s) Excavated: January 7, 2010	Logged By: David Andrews	Checked by: WAN
Length of Excavation: see sketch log	Width of Excavation: 4 FEET	Depth of Excavation: see sketch log
Excavation Equipment: CAT 313 Backhoe	Excavation Contractor: Watson	Approximate Surface Elevation: not determined
Water Observations: DRY		Sampling Method(s): n a
Location: STATION 18 + 15 Right 41 ft. (center of test pit		



Project: Fryeburg Maine Rail Trail Project Location: Fryeburg, Maine Project Number: MEDOT PIN 16130	Log of Test Pit TP-4

Date(s) Excavated: January 7, 2010	Logged By: David Andrews	Checked by: WAN
Length of Excavation: See sketch log	Width of Excavation: 4 FEET	Depth of Excavation: see sketch log
Excavation Equipment: CAT 315 Backhoe	Excavation Contractor: Watson	Approximate Surface Elevation: not determined
Water Observations: DRY		Sampling Method(s): n a
Location: STATION 17 + 45 Right 42 ft. (center of test pit