

**GEOTECHNICAL INVESTIGATION REPORT  
BERTRAM FIELD  
SALEM, MASSACHUSETTS**

**GSI Project No. 213120**

March 26, 2013

*Prepared for:*

Mr. Chris Huntress  
Huntress Sports  
17 Tewksbury Street  
Andover, MA 01810

*Prepared by:*

Geotechnical Services, Inc.  
55 North Stark Highway  
Weare, NH 03281

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March 26, 2013

Mr. Chris Huntress  
Huntress Sports  
17 Tewksbury Street  
Andover, MA 01810

Advanced via Email: [chris@huntressassociates.com](mailto:chris@huntressassociates.com)

**RE:     Proposal for Geotechnical Engineering Services  
         Bertram Field Renovation  
         Salem, Massachusetts  
         GSI Project No. 213120**

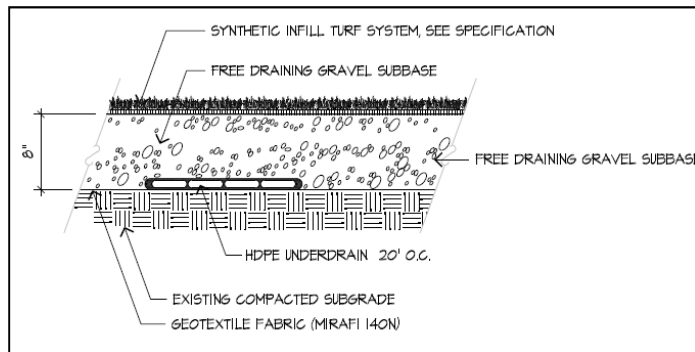
Dear Mr. Huntress:

Geotechnical Services, Inc. (GSI) is pleased to submit this report on the proposed design-development of the synthetic turf athletic field and 400M track at the Bertram Athletic field located in Salem, MA. The report consists of the subsurface data obtained through implementation of an exploration program, evaluation of the subsurface data, a summary of our understanding of the proposed development, and the results of an assessment for earthwork design options. In addition, issues identified as pertinent to the construction of the planned facilities are discussed. The work has been undertaken in accordance with our proposal letter, dated February 12, 2013 and your subsequent authorization. The content of this report is subject to the **Limitations** stated in Appendix A.

## PROJECT UNDERSTANDING

The project site is located at 29 Highland Avenue in Salem, MA (See Figure 1, Project Locus). We understand that the planned athletic field renovation will replace the existing grass turf with a synthetic turf surface and replace the existing track with a 400M international broke-back track. The overall site is generally flat. Exposed ledge is located along the northern limits of the site with ledge outcroppings on the order of 15 to 20-ft in height. Ledge was also observed underneath the seating and grandstand structure located along the western limits of the site and within the southeastern limits of the existing field. The existing field was apparently constructed with fill along the

southern and eastern limits of the site where the embankments range from about 8 to 10-ft in height (eastern limits) to over 20 to 30-ft in height (southern limits)



**Detail 1 - Typical Synthetic Turf System**

At the time this report was prepared, the proposed design of the synthetic turf system and the overall grading for the field has not been finalized for our review; however, we assume that the synthetic turf system will have a typical cross section shown in Detail 1 consisting of the synthetic turf infill, an 8-in. thick layer of free draining gravel Subbase and a geotextile fabric placed over the existing subgrade soils. The grading for the new synthetic field is assumed to

match that of the existing grades with the possibility of re-grading on the order of up to 2-ft (cut/fill).

## SUBSURFACE INVESTIGATION

Eleven (11) test pits, designated as TP-1 to TP-9 and TP-11 to TP-12, were excavated at the site on March 15, 2013 by N. Granese & Sons located in Salem, MA. Test pit TP-10 was not excavated due to the uncertainty of the location of an existing underground electrical utility in the area. The test pits were excavated using a backhoe loader under full supervision of a GSI engineer. The test pits were excavated to depths ranging from 2.5-ft (TP-11) to 6.3-ft (TP-3) below the existing grade. Each test pit excavation was observed by the GSI engineer and the soils encountered were classified in accordance with the Burmister Classification system. The approximate locations of

the test pits are shown on Figures 2, Exploration Location Plan. The finalized logs for the test pits are included in Appendix B.

## **SUBSURFACE CONDITIONS**

The subsurface conditions encountered in the investigation indicate that the site is underlain by the following soil units/deposits, described in order of increasing depth:

**Topsoil:** All of the test borings and test pits encountered the Topsoil layer at the ground surface. The Topsoil layer generally consists of organic silty soils. The thickness of this soil unit is typically 6-in. with pockets of thicker deposits up 20-in. (TP-6). A 3-in. thick layer of stone dust was encountered in TP-12 within the existing Shot Put area.

**Fill:** The Fill soils encountered at the site include general **Fill** soils, **Blast Rock Fill** and **Urban Fill**. The general **Fill** soils were encountered in most of the test pits and is generally described as a brown to orange, silty fine to medium SAND with varying amounts of gravel and cobbles. The **Blast Rock Fill** was encountered in test pit TP-6 and is generally described as a gray, fine to coarse GRAVEL and COBBLES. The thickness of the Blast Rock Fill was at least 2-ft before terminating the test pit due to groundwater. The **Urban Fill** was encountered in TP-2, TP-3 and TP-4 and is generally described as a black to dark brown silty fine to medium SAND and GRAVEL with varying amounts of coarse sand, cobbles, construction debris (asphalt and brick pieces) and coal ash. A distinct pocket of **Ash Fill** was encountered in TP-4 between 1.2 to 2.3-ft below the existing grade and is described as a black to dark brown, f/m SAND with some ash, clinker and little silt.

**Weathered Bedrock:** Weathered Bedrock was encountered in TP-7 at a depth of 3-ft below the existing grade. The test pit was advanced to 3.8-ft where refusal was encountered on competent bedrock.

**Bedrock:** probable bedrock was encountered in TP-1 (2.7-ft below grade), TP-7 (3.8-ft below grade), and TP-12 (3.8-ft below grade). Exposed bedrock was observed in the vicinity of TP-12 and just north of TP-1 during the exploration study. The approximate locations of the exposed bedrock that may impact the construction of the new field and track are shown on Figure 2.

**Groundwater:** No groundwater was observed in any of the test pits upon completion with the exception of TP-6 where the groundwater was encountered 2.5-ft below the existing grade. The groundwater in TP-6 is likely trapped or perched water above the bedrock surface. Groundwater levels should be expected to vary with season, precipitation, snowmelt, and other factors. As a result, groundwater levels encountered during construction may differ from those encountered in the explorations.

## **GEOTECHNICAL DESIGN RECOMMENDATIONS**

### **General**

As a general guideline, foundation design and construction must conform to the applicable provisions of the Massachusetts Building Code, 8<sup>th</sup> Edition (Building Code).

### **Athletic Field Subgrade**

Grading plans for the field renovation were not available at the time this report was prepared; however, we assume that minimal site grading (cutting and filling on the order of 2 ft or less) will be required to prepare the field and track for the planned construction.

We anticipate that the construction of the new athletic field and track will involve the following; stripping off the existing Topsoil, removing/relocating any existing utilities (drainage pipe, electric utilities and any other utilities), grading the field to the planned rough grade, proof-rolling the subgrade and constructing the synthetic turf system and track. The existing Fill soils are suitable for support of the synthetic turf system and track provided the subgrade is prepared using the recommendation provided herein.

## **CONSTRUCTION CONSIDERATIONS**

### **General**

In general, all excavation work, dewatering, and other construction activities should conform to the requirements of OSHA and all other applicable regulations. The site soils would typically be classified as Type C based on OSHA 29 CFR 1926.



## **Excavation**

Construction will involve stripping off the Topsoil, adding or cutting fill to achieve design grades, excavating bedrock and constructing the synthetic field and track. We anticipate that most of the site grading can be accomplished with conventional earth-moving equipment. Hoe-ramming and possible drilling and blasting may be required to excavate bedrock.

Temporary cut soil slopes should, typically, be stable if constructed no steeper than about 1.5H:1V. Some sloughing and raveling should be anticipated in temporary earth slopes.

## **Rock Excavation**

Bedrock may need to be removed to achieve the required excavation depths for the field and track subgrades and will likely require hoe ramming and blasting for mass removal of intact rock. The work should be conducted in a manner that minimizes disturbance to bedrock when excavating and blasting.

## **Blasting Considerations**

### **1. Blasting Near Fresh Concrete**

Criteria for blasting adjacent to freshly placed concrete should be established to reflect two types of concrete, Types A and B concrete. Type A concrete refers to mass concrete which will not undergo structural bending such as footings and slabs-on-grade. Type B concrete refers to structural concrete which could undergo structural bending such as walls and floor slabs. Blasting criteria for each concrete type are recommended as follows:

Type A Concrete Criteria - Concerns for blasting induced vibrations adjacent to Type A concrete are more related to the integrity of the rock mass below the concrete, rather than the concrete itself. If a footing is bearing on or near a rock mass being excavated, blasting may open joints or fractures, heaving the rock. Heaving could result in subsequent settlement of footings bearing above the rock. The following criteria are recommended for blasting adjacent to Type A concrete:

Concrete should not be poured within approximately 50-ft of where blasting will be required without review of contractor blasting procedures (including charge weights and delays), the nature of the rock to be blasted, and the geometry (elevation and distance) of the rock to be blasted with respect to the adjacent concrete.

Maximum vibration limits (peak particle velocity) recommended for Type A concrete are as follows:

<u>Type A Concrete Age</u>	<u>Maximum Peak Particle Velocity</u>
0 to 24 hours old	1.0 in./sec
1 to 7 days old	3.0 in./sec
Greater than 7 days old	4.0 in./sec

Type B Concrete Criteria - Concerns for Type B concrete are related primarily to the new concrete structure's ability to undergo vibration-induced bending. To limit the potential for damage, while allowing flexibility in construction sequencing, maximum vibration limits (peak particle velocity) recommended for Type B concrete are as follows:

<u>Type B Concrete Age</u>	<u>Maximum Peak Particle Velocity</u>
0 to 24 hours old	0.5 in./sec
1 to 7 days old	2.0 in./sec
Greater than 7 days old	3.0 in./sec

### **2. Other Considerations for Rock Blasting**

The Contractor should be responsible for preventing damage to any nearby existing or new structures, newly concreted foundation elements, utilities and other facilities resulting from blasting operations, and for conforming to applicable codes and regulations. Controlled blasting techniques are recommended to minimize ground vibrations and airblast overpressures.

Blasting should be conducted in such a manner that the resulting peak particle velocity of ground motion and the airblast overpressure at any nearby structures do not exceed levels recommended by the U.S. Bureau of Mines and



State and local regulations to protect residential and commercial structures. The Contractor should design each blasting round for the project accordingly. Blasting mats or other suitable cover must be utilized to control flyrock during blasting operations.

For the protection of the project team including the Owner and the Contractor from damage claims due to blasting or other construction operations, a pre- and post-construction survey of existing structures within 250-ft of the proposed construction, should be performed by a professional engineer registered in the Commonwealth of Massachusetts. Also, the construction should include monitoring and documenting vibration and airblast overpressure levels resulting from each blast round on the project.

A Blasting Impact Report may be required by the City of Salem prior to performing any blasting on the site. Such a report would usually provide estimates of anticipated blasting vibrations at the nearest building locations and describe the proposed precondition survey and monitoring programs.

Blasting should be conducted in a manner that minimizes disturbance to footing and slab subgrades. Overdrilling should be limited to a maximum of 1-ft below proposed subgrade. This will require careful elevation control during drilling and blasting.

### **Construction Dewatering**

Based on the available subsurface data it is anticipated that during the general site work, no significant dewatering measures will be necessary to conduct the construction "in-the-dry." The Contractor should take measures to prevent stormwater from entering into excavated areas, and be prepared to remove ponded surface water by means of localized sumps and pumps. The Contractor should select whichever dewatering procedures may be effective to maintain dry, stable excavation bottoms. Perched groundwater should be anticipated along the northern portion of the site (see TP-6).

### **Existing Utilities and Foundations of Former Structures**

Unknown and/or undocumented subsurface features, structures, and utilities may be present within the project site such as the clay pipe encountered in TP-11. The unknown structures and piping, along with the existing foundations and utilities for the existing seating structures, light poles, and associated construction debris should be anticipated during excavation work, and will need to be carefully removed to limit disturbance to underlying soil deposits and backfilled with compacted Granular Fill prior to construction of the planned field and track.

### **Preparation and Protection of Bearing Surfaces**

Final excavation should be conducted in a manner that minimizes disturbance to the subgrade soils when excavating for bearing surfaces. All final excavation and footing construction should be conducted in-the-dry. We recommend that the exposed subgrade soils be observed in the field by a geotechnical engineer to confirm the projected soil bearing conditions. It may be necessary to over-excavate and replace weak, disturbed or otherwise unacceptable foundation bearing materials.

Following excavation to bearing grades, exposed soil surfaces should be re-compacted (proofrolled) prior to placing engineered fill, or constructing foundations, with a minimum of four passes with a heavy vibratory roller or other heavy vibratory compaction equipment.

If subgrade protection difficulties are encountered due to surface or groundwater, various methods can be utilized:

- Leave subgrades high until immediately before forming and concreting to minimize the time the subgrade is exposed.
- Over excavate footings by 8 in. using a smooth edged bucket and backfill to the design bearing elevation using compacted Granular Fill.

Each such encounter is probably best resolved individually in the field upon observation of the subgrade conditions.

Where bedrock excavation is required underneath the synthetic field or track, the bedrock should be excavated at least 6-in. deeper than the planned field and track section and should be backfilled with compacted Granular Fill.

### **Compaction**

Minimum compaction requirements refer to percentages of the maximum dry density determined in accordance with ASTM D1557. Recommended compaction requirements are as follows:



<u>Location</u>	<u>Minimum Compaction Requirements</u>
-----------------	--

Beneath athletic field and track	95 %
-------------------------------------	------

Landscaped areas	90 % nominal compaction
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**Filling and Backfilling**

Placement of compacted soil fills should not be conducted when air temperatures are low enough (approximately 30 degrees F, or below) to cause freezing of the moisture in the fill during or before placement. Fill materials should not be placed on snow, ice or uncompacted frozen soil. Compacted fill should not be placed on frozen soil. No fill should be allowed to freeze prior to compaction. At the end of each day's operations, the last lift of fill, after compaction, should be rolled by a smooth-wheeled roller to eliminate ridges of uncompacted soil.

**Soil Materials**

- **Granular Fill**

Granular Fill should consist of clean, sand and gravel, free of organic material, snow ice, or other objectionable materials and should be well-graded within the following limits:

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
6 inch	100
No. 4	30-90
No. 40	10-50
No. 200	0-12

Granular Fill should be placed in 9-inch loose lift thickness, unless otherwise specified. Cobbles exceeding 6 inch in size should be screened and removed prior to compaction. Compaction equipment should be selected to meet the requirements of that particular location in earthwork operation, thus the Contractor should provide both vibratory and static rollers, as well as hand-guided vibratory plate compactors. Where vibratory plate compactor is used the loose lift thickness should not exceed 6 inch. A minimum of four systematic passes of the compaction equipment should be implemented to compact each lift.

- **Free Draining Granular Fill**

Free Draining Granular Fill should consist of clean sand and gravel meeting the following gradation requirements (note: this recommendation may be superseded by the synthetic turf manufacturer's gradation requirements for free draining subbase material):

<u>Sieve Size</u>	<u>Percent Passing by Weight</u>
1-inch	100
No. 4	60-90
No. 200	0-8

**CONSTRUCTION MONITORING**

It is recommended that a geotechnical engineer or technician qualified by training and experience be present during construction to:

- Confirm that soils used as fill and backfill are in accordance with the contract requirements.
- Observe and test placement and compaction of Granular Fill and other compacted fills.
- Observe preparation of field and pavement bearing surfaces.

Monitoring by experienced personnel will be important to the efficiency and integrity of the geotechnical aspects of the project construction. It is recommended that GSI be retained to provide the recommended monitoring services during construction. This will enable us to observe compliance with the design concepts, help resolve construction problems and to facilitate design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.



## **RECOMMENDATION FOR AN ENVIRONMENTAL ASSESSMENT OF SOILS**

As indicated above **Urban** and **Ash Fill** were encountered within TP-2, TP-3 and TP-4 and should be evaluated for the presence of possible hazardous materials. We recommend that an environmental characterization of these soils be considered to determine if they may impact the planned construction activities. An environmental assessment should be conducted by a Licensed Site Professional (LSP).

## **PLAN REVIEW**


It is recommended that GSI be provided the opportunity to review the final plans in order to confirm that the recommendations made in this report were interpreted and implemented as intended.

## **CLOSURE**

GSI appreciates the opportunity for participating in this early phase of the project, and looks forward to our continuing association during its subsequent phases towards its successful completion. In the mean time, please do not hesitate to contact us, if you have any questions on the content of this report.

Very truly yours,

**GEOTECHNICAL SERVICES, INC.**

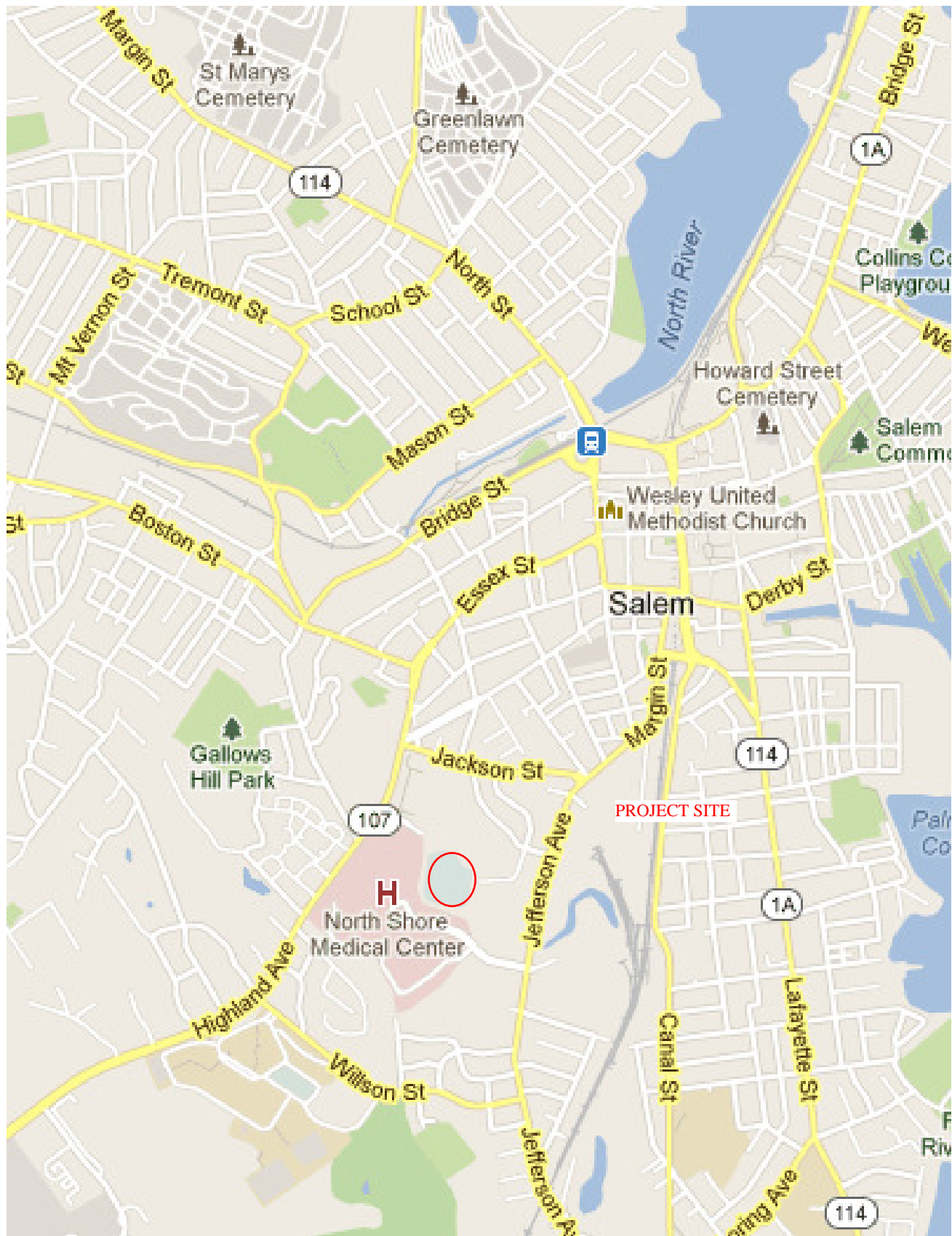
  
Glen V. Zoladz, P.E.  
*Project Manager*

Harry K. Wetherbee, P.E.  
*Principal Engineer*

Figure 1.      Project Locus  
Figure 2.      Exploration Location Plan

Appendix A.    Limitations  
Appendix B.    Test Pit Logs

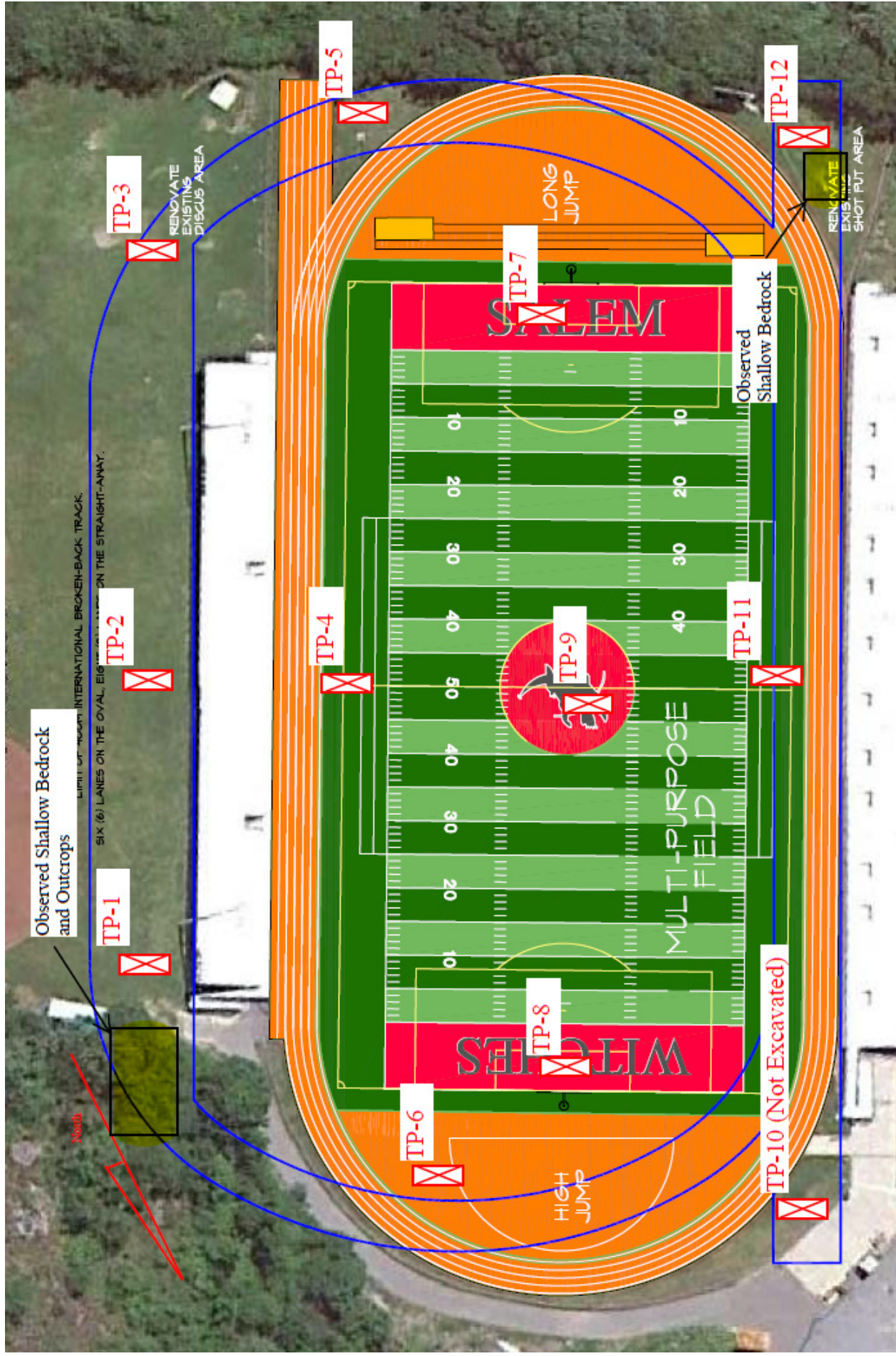




**FIGURE 1 – PROJECT LOCUS**

**BERTRAM FIELD  
SALEM, MA  
GSI PROJECT NO. 213120**





LEGEND:

TP-1



TEST BORING DESIGNATION AND APPROX. LOCATION



FIGURE 2 EXPLORATION LOCATION PLAN

BERTRAM FIELD  
SALEM, MA  
GSI PROJECT NO. 213120

**APPENDIX A**  
**LIMITATIONS**



## LIMITATIONS

### Explorations

1. The analyses, recommendations and designs submitted in this report are based in part upon the data obtained from preliminary subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report.
2. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretation of widely spaced explorations and samples; actual soil transitions are probably more gradual. For specific information, refer to the individual test pit and/or boring logs.
3. Water level readings have been made in the test pits and/or test borings under conditions stated on the logs. These data have been reviewed and interpretations have been made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors differing from the time the measurements were made.

### Review

4. It is recommended that this firm be given the opportunity to review final design drawings and specifications to evaluate the appropriate implementation of the recommendations provided herein.
5. In the event that any changes in the nature, design, or location of the proposed areas are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of the report modified or verified in writing by Geotechnical Services, Inc.

### Construction

6. It is recommended that this firm be retained to provide geotechnical engineering services during the earthwork phases of the work. This is to observe compliance with the design concepts, specifications, and recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to the start of construction.


### Use of Report

7. This report has been prepared for the exclusive use of Huntress Sports in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.
8. This report has been prepared for this project by Geotechnical Services, Inc. This report was completed for preliminary design purposes and may be limited in its scope to complete an accurate bid. Contractors wishing a copy of the report may secure it with the understanding that its scope is limited to evaluation considerations only.



**APPENDIX B**  
**TEST PIT LOGS**



Geotechnical Services, Inc. ♦ 18 Cote Avenue, Goffstown, NH 03045 Tel. 603.624.2722 Fax. 603.624.3733 ♦ 12 Rogers Road, Haverhill, MA 02222 Tel. 978.374.7744 Fax. 978.374.7799			<h1 style="text-align: center;">TEST PIT LOG</h1>				Test Pit No.															
							TP-1															
							Page 1 of 1															
	Project		Bertram Field		Project No.		213120															
Location		Salem, MA		Project Manager		G. Zoladz																
Client		Huntress Sports		Field Rep.		G. Zoladz																
Contractor		N. Granese & Sons, Inc.		Date		03/15/13																
Equipment		CAT 302		Weather		Sunny 30 <sup>0</sup> s																
Depth (ft)	Sample ID	Stratum Change Depth (ft)	Description of Soils				Obstructions/Remarks															
1		0.8	10-in. Topsoil <div style="text-align: center;">-TOPSOIL-</div>																			
2			Orange/brown, SILT and fine SAND, tr. gravel <div style="text-align: center;">-FILL-</div>																			
3		~2.67	Bottom of exploration at 2.7-ft on probable bedrock. No groundwater encountered.																			
4																						
5																						
6																						
7																						
8																						
9																						
<b>Standing Water in Completed Pit:</b> at depth N/E ft Elapsed time after completion of pit: 5 <input type="checkbox"/> hours <input checked="" type="checkbox"/> min.			<b>Boulders:</b> <table border="1"> <thead> <tr> <th>Diameter (in.)</th> <th>Number</th> </tr> </thead> <tbody> <tr> <td>12 to 24</td> <td>-</td> </tr> <tr> <td>&gt; 24</td> <td>-</td> </tr> </tbody> </table>		Diameter (in.)	Number	12 to 24	-	> 24	-	<b>Test Pit Dimensions:</b> <table border="1"> <tbody> <tr> <td>Depth</td> <td>2.7</td> <td>ft</td> </tr> <tr> <td>Length</td> <td>6</td> <td>ft</td> </tr> <tr> <td>Width</td> <td>2</td> <td>ft</td> </tr> </tbody> </table>		Depth	2.7	ft	Length	6	ft	Width	2	ft	<b>Survey Data:</b> Ground El. - ft El. Datum N/A
Diameter (in.)	Number																					
12 to 24	-																					
> 24	-																					
Depth	2.7	ft																				
Length	6	ft																				
Width	2	ft																				



# TEST PIT LOG

Test Pit No.

TP-2

Page 1 of 1

Project	Bertram Field	Project No.	213120
Location	Salem, MA	Project Manager	G. Zoladz
Client	Huntress Sports	Field Rep.	G. Zoladz
Contractor	N. Granese & Sons, Inc.	Date	03/15/13
Equipment	CAT 302	Weather	Sunny 30 <sup>0</sup> s

Depth (ft)	Sample ID	Stratum Change Depth (ft)	Description of Soils	Obstructions/Remarks
1		~0.5	6-in. Topsoil -TOPSOIL-	
2			Orange/brown, silty fine SAND -FILL-	
3		~2.3		
4			Black to dark br., f/m SAND and GRAVEL, some bricks, coal ash, clinker, occasional cobbles and boulders -URBAN FILL-	
5				
6		~6.3		
7			Bottom of exploration at 6.3-ft. No groundwater encountered	
8				
9				

**Standing Water in Completed Pit:**

at depth N/E ft

Elapsed time after completion of pit:

5



hours



min.

**Boulders:**Diameter (in.) Number

12 to 24

-

&gt; 24

-

**Test Pit Dimensions:**

Depth 6.3 ft

Length 7 ft

Width 2 ft

**Survey Data:**

Ground El. - ft

El. Datum N/A



# TEST PIT LOG

Test Pit No.

TP-3

Page 1 of 1

Project	Bertram Field	Project No.	213120
Location	Salem, MA	Project Manager	G. Zoladz
Client	Huntress Sports	Field Rep.	G. Zoladz
Contractor	N. Granese & Sons, Inc.	Date	03/15/13
Equipment	CAT 302	Weather	Sunny 30 <sup>0</sup> s

Depth (ft)	Sample ID	Stratum Change Depth (ft)	Description of Soils	Obstructions/Remarks
1		~0.5	6-in. Topsoil -TOPSOIL-	
2		~24	Orange/brown, silty fine SAND -FILL-	
3			Dark br., f/m SAND, silt and asphalt, occasional cobbles -URBAN FILL-	
4				
5				
6				
7			Bottom of exploration at 6-ft. No groundwater encountered	
8				
9				

**Standing Water in Completed Pit:**

at depth N/E ft  
Elapsed time after completion of pit:  
5 ☐ hours ☒ min.

**Boulders:**


Diameter (in.)	Number
12 to 24	-
> 24	-

**Test Pit Dimensions:**

Depth	6	ft
Length	7	ft
Width	2	ft

**Survey Data:**

Ground El.	-	ft
El. Datum	N/A	



# TEST PIT LOG

Test Pit No.

TP-4

Page 1 of 1

Project		Bertram Field		Project No.		213120	
Location		Salem, MA		Project Manager		G. Zoladz	
Client		Huntress Sports		Field Rep.		G. Zoladz	
Contractor		N. Granese & Sons, Inc.		Date		03/15/13	
Equipment		CAT 302		Weather		Sunny 30 <sup>0</sup> s	

Depth (ft)	Sample ID	Stratum Change Depth (ft)	Description of Soils	Obstructions/Remarks
1		~0.5	6-in. Topsoil <b>-TOPSOIL-</b>	
		~1.2	Brown, f/m SAND, tr. gravel <b>-FILL-</b>	
~2.3		Black to dark brown, f/m SAND, some ash, clinker, little silt <b>-ASH FILL-</b>		
~4.8		Brown, silty, f/c SAND, tr. gravel, bricks, occasional cobbles <b>-URBAN FILL-</b>		
		Bottom of Exploration at 4.8-ft. No groundwater encountered.		
2				
3				
4				
5				
6				
7				
8				
9				

<b>Standing Water in Completed Pit:</b> at depth N/E ft Elapsed time after completion of pit: 5 <input type="checkbox"/> hours <input checked="" type="checkbox"/> min.			<b>Boulders:</b> Diameter (in.) Number 12 to 24 - > 24 -		<b>Test Pit Dimensions:</b> Depth 4.8 ft Length 7 ft Width 2 ft		<b>Survey Data:</b> Ground El. - ft El. Datum N/A	
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# TEST PIT LOG

Test Pit No.

TP-5

Page 1 of 1

<b>Project</b>	Bertram Field	<b>Project No.</b>	213120
<b>Location</b>	Salem, MA	<b>Project Manager</b>	G. Zoladz
<b>Client</b>	Huntress Sports	<b>Field Rep.</b>	G. Zoladz
<b>Contractor</b>	N. Granese & Sons, Inc.	<b>Date</b>	03/15/13
<b>Equipment</b>	CAT 302	<b>Weather</b>	Sunny 30 <sup>0</sup> s

Depth (ft)	Sample ID	Stratum Change Depth (ft)	Description of Soils	Obstructions/Remarks
1		~1	12-in. Topsoil	
		~1.2	-TOPSOIL-	
			2-in thick Pavement	
2			Brown/gray, silty f/c SAND, some gravel, occasional cobbles	
3			-FILL-	
4				
5				
6		~6.1		
7			Bottom of Exploration at 6.1-ft. No groundwater encountered.	
8				
9				

**Standing Water in Completed Pit:**

at depth N/E ft  
Elapsed time after completion of pit:  
5 ☐ hours ☒ min.

**Boulders:**

**Diameter (in.)** **Number**  
12 to 24 -  
> 24 -

**Test Pit Dimensions:**

**Depth** 6.1 ft  
**Length** 7 ft  
**Width** 2 ft

**Survey Data:**

**Ground El.** - ft  
**El. Datum** N/A



# TEST PIT LOG

Test Pit No.

TP-6

Page 1 of 1

Project	Bertram Field	Project No.	213120
Location	Salem, MA	Project Manager	G. Zoladz
Client	Huntress Sports	Field Rep.	G. Zoladz
Contractor	N. Granese & Sons, Inc.	Date	03/15/13
Equipment	CAT 302	Weather	Sunny 30 <sup>0</sup> s

Depth (ft)	Sample ID	Stratum Change Depth (ft)	Description of Soils	Obstructions/Remarks
1			20-in. Topsoil  -TOPSOIL-	
2		~1.8	Dark gray, GRAVEL and COBBLES  -BLAST ROCK FILL-	
3				
4		~4		
5			Bottom of Exploration at 4-ft. Groundwater encountered at 2.5-ft. Groundwater may be perched over bedrock.	
6				
7				
8				
9				

**Standing Water in Completed Pit:**

at depth 2.5 ft

Elapsed time after completion of pit:

5

☐ hours☒ min.**Boulders:**Diameter (in.) Number

12 to 24

-

&gt; 24

-

**Test Pit Dimensions:**

Depth 4 ft

Length 7 ft

Width 2 ft

**Survey Data:**

Ground El. - ft

El. Datum N/A



# TEST PIT LOG

Test Pit No.

TP-7

Page 1 of 1

Project	Bertram Field	Project No.	213120
Location	Salem, MA	Project Manager	G. Zoladz
Client	Huntress Sports	Field Rep.	G. Zoladz
Contractor	N. Granese & Sons, Inc.	Date	03/15/13
Equipment	CAT 302	Weather	Sunny 30 <sup>0</sup> s

Depth (ft)	Sample ID	Stratum Change Depth (ft)	Description of Soils	Obstructions/Remarks
1		~0.5	6-in. Topsoil -TOPSOIL-	
2			Brown, silty f/m SAND, tr. gravel -FILL-	
3		~3		
4		~3.8	Orange, GRAVEL and COBBLES (angular), little f/c sand -WEATHERED BEDROCK-	
5			Bottom of Exploration at 3.8-ft on probable bedrock. No groundwater encountered.	
6				
7				
8				
9				

**Standing Water in Completed Pit:**

at depth N/E ft  
Elapsed time after completion of pit:  
5 ☐ hours ☒ min.

**Boulders:**

Diameter (in.)	Number
12 to 24	-
> 24	-

**Test Pit Dimensions:**

Depth	3.8	ft
Length	7	ft
Width	2	ft

**Survey Data:**

Ground El.	-	ft
El. Datum	N/A	



# TEST PIT LOG

Test Pit No.

TP-8

Page 1 of 1

Project	Bertram Field	Project No.	213120
Location	Salem, MA	Project Manager	G. Zoladz
Client	Huntress Sports	Field Rep.	G. Zoladz
Contractor	N. Granese & Sons, Inc.	Date	03/15/13
Equipment	CAT 302	Weather	Sunny 30 <sup>0</sup> s

Depth (ft)	Sample ID	Stratum Change Depth (ft)	Description of Soils	Obstructions/Remarks
1		~0.5	6-in. Topsoil -TOPSOIL-	
2			Dark brown, silty f/m SAND -FILL-	
3		~2.1	Orange/brown, SILT and fine SAND -FILL-	
4		~3.5	Bottom of Exploration at 3.5-ft. No groundwater encountered.	
5				
6				
7				
8				
9				

**Standing Water in Completed Pit:**

at depth N/E ft

Elapsed time after completion of pit:

5



hours



min.

**Boulders:****Diameter (in.)** **Number**

12 to 24

-

&gt; 24

-

**Test Pit Dimensions:****Depth** 3.5 ft**Length** 7 ft**Width** 2 ft**Survey Data:****Ground El.** - ft**El. Datum** N/A



# TEST PIT LOG

Test Pit No.

TP-9

Page 1 of 1

Project	Bertram Field	Project No.	213120
Location	Salem, MA	Project Manager	G. Zoladz
Client	Huntress Sports	Field Rep.	G. Zoladz
Contractor	N. Granese & Sons, Inc.	Date	03/15/13
Equipment	CAT 302	Weather	Sunny 30 <sup>0</sup> s

Depth (ft)	Sample ID	Stratum Change Depth (ft)	Description of Soils	Obstructions/Remarks
1		~0.5	6-in. Topsoil -TOPSOIL-	
2			Dark brown, silty f/m SAND, tr. gravel -FILL-	
3		~2.8	Orange, SILT and fine SAND -FILL-	
4		~3.8	Bottom of Exploration at 3.8-ft. No groundwater encountered.	
5				
6				
7				
8				
9				

**Standing Water in Completed Pit:**

at depth N/E ft  
Elapsed time after completion of pit:  
5 ☐ hours ☒ min.

**Boulders:**


Diameter (in.)	Number
12 to 24	-
> 24	-

**Test Pit Dimensions:**

Depth	3.8	ft
Length	7	ft
Width	2	ft

**Survey Data:**

Ground El.	-	ft
El. Datum	N/A	

Geotechnical Services, Inc. ♦ 18 Cote Avenue, Goffstown, NH 03045 Tel. 603.624.2722 Fax. 603.624.3733 ♦ 12 Rogers Road, Haverhill, MA 02222 Tel. 978.374.7744 Fax. 978.374.7799			<h1>TEST PIT LOG</h1>		Test Pit No.	
					<b>TP-11</b>	
					Page 1 of 1	
	Project		Bertram Field		Project No.	
Location		Salem, MA		Project Manager		G. Zoladz
Client		Huntress Sports		Field Rep.		G. Zoladz
Contractor		N. Granese & Sons, Inc.		Date		03/15/13
Equipment		CAT 302		Weather		Sunny 30 <sup>0</sup> s
Depth (ft)	Sample ID	Stratum Change Depth (ft)	Description of Soils		Obstructions/Remarks	
1			12-in. Topsoil  -TOPSOIL-			
2			Orange/brown, silty fine SAND  -FILL-			
3		~2.5	Terminated Exploration at 2.5-ft . Encountered Clay Pipe.			
4						
5						
6						
7						
8						
9						
<b>Standing Water in Completed Pit:</b> at depth N/E ft Elapsed time after completion of pit: 5 <input type="checkbox"/> hours <input checked="" type="checkbox"/> min.			<b>Boulders:</b> Diameter (in.) Number 12 to 24 - > 24 -		<b>Test Pit Dimensions:</b> Depth 2.5 ft Length 7 ft Width 2 ft	
					<b>Survey Data:</b> Ground El. - ft El. Datum N/A	



# TEST PIT LOG

Test Pit No.

TP-12

Page 1 of 1

Project	Bertram Field	Project No.	213120
Location	Salem, MA	Project Manager	G. Zoladz
Client	Huntress Sports	Field Rep.	G. Zoladz
Contractor	N. Granese & Sons, Inc.	Date	03/15/13
Equipment	CAT 302	Weather	Sunny 30 <sup>0</sup> s

Depth (ft)	Sample ID	Stratum Change Depth (ft)	Description of Soils	Obstructions/Remarks
1		~0.3	3-in. Layer of Stone Dust	
			Topsoil	
2		~1	Orange/brown, silty fine SAND, occasional cobbles	
3			-FILL-	
4		~3.8	Bottom of Exploration at 3.8-ft on probable bedrock	
5				
6				
7				
8				
9				

**Standing Water in Completed Pit:**

at depth N/E ft  
Elapsed time after completion of pit:  
5 ☐ hours ☒ min.

**Boulders:**

Diameter (in.)	Number
12 to 24	-
> 24	-

**Test Pit Dimensions:**

Depth	3.8	ft
Length	7	ft
Width	2	ft

**Survey Data:**

Ground El.	-	ft
El. Datum	N/A	