

MIDLANTIC ENGINEERING, INC.
120 COMMERCE ROAD
PITTSTON TOWNSHIP, PA 18640-9552

GEOTECHNICAL ENGINEERING REPORT

**VA MEDICAL CENTER – ELEVATED WATER STORAGE TANK
WILKES-BARRE, PA**

(Project #12230)

PREPARED FOR:

**HATCH MOTT MACDONALD
27 BLEEKER STREET
MILBURN, NJ 07041**

SEPTEMBER 18, 2012



September 18, 2012

Hatch Mott MacDonald
27 Bleeker Street
Millburn, NJ 07041

ATTENTION: Mr. Craig DeWitt, P.E.
craig.dewitt@hatchmott.com

REFERENCE: GEOTECHNICAL ENGINEERING REPORT (#12230)
VA Medical Center – Elevated Water Storage Tank
Wilkes-Barre, PA

Mr. DeWitt:

Submitted herewith is our geotechnical engineering report for the above referenced project. Our services have been performed in accordance with our proposal/agreement dated April 18, 2011 and your signed proposal/agreement dated August 22, 2012.

1. SCOPE OF SERVICES

Services performed included site reconnaissance, drilling and logging four test borings at the proposed water tank location, and preparation of our report. Our geotechnical engineering analysis and report includes the following:

- a. Review of available mining survey data to determine the extent of previous mining operations and possible effects on proposed developments.
- b. Our evaluation of the estimated subsurface conditions at the proposed water tank location based on the test boring data.
- c. Recommended foundation requirements for support of the proposed water tank.
- d. Recommendations regarding handling of groundwater in design and construction.
- e. Recommended earthwork requirements for construction of backfill including an assessment of on-site materials to be excavated for use as fill.

- f. Seismic design classifications of subgrade conditions per IBC 2009 table 1613.5.2.
- g. Comments regarding geotechnical construction methods that should be considered both in the design and in the development of construction plans and specifications.

Services with respect to environmental considerations, wetlands investigations, erosion control, construction cost estimates and construction observation and testing are not included in the scope of services under this phase of our contract.

2. DESCRIPTION OF SITE AND PROPOSED CONSTRUCTION

The proposed water tank location is set on the northeast end of the hospital facility in Wilkes-Barre, Luzerne County, Pennsylvania. The base of the water tank is to be set close to the existing surface grade at El 864.0. The new water tank will be approximately 70' northwest of the existing water tank. The project vicinity is indicated on the USGS quadrangle map included as dwg. 12230-1 in Enclosure (3).

The proposed construction will include a self-supporting foundation for a 400,000-gallon water tank. The specific base and support reaction loadings for the proposed tank have not been finalized.

The information listed above was provided to us by your office, or was obtained during our own site visits.

3. SUBSURFACE CONDITIONS

In order to evaluate subsurface conditions in the proposed water tank location, one test boring and three shallow auger borings were drilled under our supervision on September 4, 2012. The test boring near the center of the tank foundation area was drilled to a depth of 34 feet. The results of the test borings, the water level observation data, and test boring location plan are included in Enclosure (3).

3.1 Test Boring Data and Stratification

The test boring data indicates the following generalized strata underlie the proposed development area to the depths investigated:

<u>Stratum</u>	<u>Depths</u>	<u>Description</u>
Stratum F (fill)	from ground surface to a depth of about 0.5 feet to 1.0 feet	asphalt, 2A subbase stone – FILL
Stratum B	below surface topsoil and Stratum F to depths of 1.5 to 3 feet	brown silty SAND with gravel (SM); very compact (N=50+)
Stratum DR	below Stratum F and Stratum B to depths of 2 to 5 feet	gray, brown DISINTEGRATED ROCK with silty sand; very compact (N=50+)
Stratum R	below Stratum DR to maximum depth cored of 34 feet	gray moderately to slightly weathered SANDSTONE, highly to slightly fractured and gray slightly weathered SHALE, moderately fractured, occasional coal lenses, (Rec=100%; RQD=0% to 90%)

Numbers after the description of the soil strata indicate the minimum and maximum penetration resistances, or N values, recorded in each stratum. The N values indicate the penetration resistance in blows per foot of a standard 2-inch O.D., 1 $\frac{3}{8}$ inch I.D. sampling spoon driven with a 140-pound hammer falling 30 inches per ASTM D-1586. The sampling spoon is driven an initial depth of 6 inches to assure the sampling spoon is in undisturbed material, and the number of blows required to drive the sampling spoon an additional 12 inches is taken as the N value.

The soil symbols indicated in the stratum descriptions and on the boring logs represent the Unified Soil Classification (ASTM D-2488) group symbols based on visual observation of the specimens recovered. Criteria for visual classification of soil samples are given in Enclosure (1) of this report. The visual soil classifications may vary from the classifications determined by laboratory testing.

The center test boring was core drilled 30 feet into the rock with NX size core drilling equipment for identification and evaluation purposes. The percentages after the descriptions of rock stratum indicate the variation in core recovery, which is the length of rock core recovered expressed as a percent of the total core length drilled. The Rock Quality Designation (RQD) is also provided, which is defined as the total length of NX size rock core segments recovered greater than 4 inches in length, discounting drilling breaks, expressed as a percentage of the total core length. The visual classification of rock is based on the criteria for Engineering Description of Rocks, included in Enclosure (1).

3.2 Geology

The shallow fill materials of Stratum F are associated with previous site developments and site usage. The fill materials may extend to greater depths in areas of former utility lines or former foundation excavation areas.

The natural soil materials of Stratum B represent glacial till deposits. These materials are moderately over-consolidated.

The disintegrated rock materials of Stratum DR are residual materials derived from the in-place weathering of the parent bedrock. The underlying bedrock materials of Stratum R consist of interbedded sandstone and shale of the Lewellyn formation of the Pennsylvanian geologic age.

Mining maps were reviewed at the Department of the Interior's Office of Surface Mining to study the previous surface and subsurface mining activities in the project area. Numerous anthracite coal veins have been mined throughout the study region. The subsurface mining has been performed by room-and-pillar mining and generally indicates secondary mining has been completed. The sequence of mined coal measures below the development area is indicated in the following table:

<u>Item</u>	<u>Approx. Elevation</u>	<u>Comments</u>
ground surface	El 865+/-	
top of rock	El 864 to 860+/-	
Top Red Ash vein	El 680 to El 670+/-	room-and-pillar mining
Bottom Red Ash vein	El 660 to El 650+/-	room-and-pillar; secondary mining indicted

The surface map of the mining operations indicate there are no mining structures in the immediate area of the new tank. The mining related adjacent sites including the entryways to the uppermost mine levels, are indicated on the Mining Map – Surface in Enclosure (2). The mapping of the surface features, the uppermost subsurface mine levels, and the estimated mine level cross-section for the site are included in Enclosure (2).

3.3 Groundwater

Groundwater observations were performed at the completion of the test borings and the results are shown on the boring logs. Groundwater was not encountered at the test borings to the depths investigated. The test borings were backfilled after completion.

Water level readings at the boring locations are considered to be reliable indication of groundwater conditions at the time indicated. Fluctuations in groundwater levels, as well as perched water, may be expected with variations in precipitation, evaporation, adjacent construction activity, and similar factors.

4. MINE SUBSIDENCE POTENTIAL

Abandoned mine workings have the potential for producing ground surface distortion as a result of mine subsidence. Mechanisms that can produce such distortion include roof fall, loss of pillar support, and pothole development. These mine subsidence mechanisms are examined for the study site as follows:

4.1 Roof Fall or Pillar Failure

The unsupported rock roofs in mine passageways have the potential for collapsing into the passageway. In the analysis of roof stability, the upward propagation of a roof collapse is dependent upon the spanning capabilities of the caprock and/or the development of a linear arch in the caprock. If various geologic discontinuities exist in the strata, they may cause a roof fall. The roof fall can continue until a general arch condition is developed in a more competent stratum at a higher elevation or until the void is filled with the bulking action of the fall rock.

The uppermost mine levels within the study area are the Top Red Ash and Bottom Red Ash veins. The veins are relatively thin through this portion of the study site with about 180 feet of sandstone and shale caprock overburden. Based on the composition of the caprock materials and the lapse of time from the last mining, substantial closure of these mine levels is completed.

The probability of future surface distortion due to roof collapse or pillar failure at the level of the Top Red Ash and Bottom Red Ash veins is considered to be very remote at this location.

4.2 Pothole Development

Soil particles potentially can erode through openings in overburden caprock and into open mine voids. This subsurface soil erosion then propagates to the ground surface in the form of a localized pothole. Pothole development is the most common form of subsidence related to mine workings in this region.

The uppermost subsurface mine through the center and south ends of the site is the Top Red Ash vein. Based on the geologic mapping, we estimate over 180 feet of sandstone and shale caprock above the workings of the Top Red Ash vein. The probability of pothole subsidence affecting these portions of the site are considered to be very remote.

4.3 Preliminary Assessment

The potential of future roof collapse or mine pillar collapse propagating to the surface and causing surface distortion at the study location is considered very remote. No mine level remediation is considered necessary for the proposed development.

5. FOUNDATION ENGINEERING ANALYSIS

Our foundation engineering analysis is based upon the subsurface information data developed from the test boring program, laboratory analyses, and the site and structural data furnished to us. It is anticipated the proposed tank support elements will be designed for vertical bearing, lateral, and uplift loading.

5.1 Shallow Foundations

The test borings at the tank location indicate the rock of Stratum R at shallow depths of about 2 feet to 4 feet below existing surface grades. These materials are considered suitable for direct support of footings or structural slabs. We recommend a maximum net allowable design bearing pressures of 12 ksf, and a design modulus of subgrade reaction of $k_s = 800$ pci, for shallow foundations founded on undisturbed rock subgrades of Stratum R.

The estimated footing subgrade depths are for design and construction planning. Final footing subgrades should be observed by a representative of the project engineer during construction. Any materials considered unsuitable for the recommended design bearing pressure should be undercut to sound bearing subgrade materials and replaced with concrete.

For shear considerations, all footings should be constructed to minimum widths of 3 feet. All exterior footings should be founded at a minimum depth of 3.5 feet below adjacent surface grades for frost protection.

Considering the above recommendations, we anticipate the total post-construction settlement for footings will not exceed 1/4-inch. Settlements of this magnitude are anticipated to be within tolerable limits for these structural elements.

5.2 Tie-Downs

Tie-downs may be considered for lateral and uplift resistance at support locations. The tie-down anchors may be grouted into the sandstone of Stratum R. We recommend an unfactored design skin friction resistance of 75 psi for the sandstone of Stratum R.

The depth of the tie-down into the rock of Stratum R can be estimated at the test boring locations as indicated on the logs. The actual depths of tie-downs may vary at other locations and will be determined from drilling resistance at the tie-down locations.

The tie-downs should also be embedded to a minimum depth so that the entire design uplift force for the tie-down can be resisted by the dead weight of a rock and overburden cone with its apex at the base of the tie-down anchor. The cone angle for this calculation may be considered at 75°. The constructed tie-downs should be pre-stressed to 115% of design loads for uplift resistance.

5.3 Summary of Recommended Design Parameters

A summary of the recommended subgrade and backfill parameters are provided for this project site as follows:

<u>Design Parameter</u>	<u>Stratum R</u>
- Allowable Net Bearing Pressure	$q_a = 12 \text{ ksf}$
- Modulus of Subgrade Reaction	$k_s = 800 \text{ pci}$
- Angle of Internal Friction	$\phi = 45^\circ$
- Unit Weight	$\gamma_s = 160 \text{ pcf}$
- Sliding Resistance	$f = 0.50$
- Tie-down Resistance	grout/rock = 75 psi
- Seismic Zone (TM 5-809-10)	2-moderate
- Seismic Design Classification (IBC 161.3.5.2)	Class B

6. CONSTRUCTION CONSIDERATIONS

The following recommendations are provided for construction planning and utilization of the engineering recommendations provided in this report.

6.1 Rock Excavation

Rock excavation methods may be necessary to excavate to the lowest foundation grades, depending on final design grade. This rock may consist of the sandstone of Stratum R. Rock excavation techniques should be anticipated in small foundation excavation areas. Local ripping techniques or excavation by use of ram hoes and jackhammers may be adequate for the materials and quantities to be excavated. Blasting is not expected to be permitted on the hospital site.

The actual top of rock elevations encountered during excavation may vary from the estimates provided at the test boring locations. Sudden changes in hardness of the material to be excavated should be expected due to variable weathering of the bedrock. Variations in the amount of material that may be excavated by conventional and ripping methods should also be anticipated depending on the type and size of equipment used.

6.2 Foundation Construction

Foundation subgrades for the support locations will be founded in the sandstone rock of Stratum R. The foundation subgrades should be observed by a representative of the project geotechnical engineer to verify that the foundations are placed on suitable bearing materials as recommended herein. Foundations should generally be excavated to the sizes indicated on the structural plans and poured in-place against the natural subgrade materials.

Care should be taken during the excavation for all foundations to minimize disturbance of the bearing materials. All loose and disturbed materials should be removed prior to concrete placement.

6.3 Structural Backfill

Structural backfill of foundation elements will consist of materials classified as SM, SW, SP, GM, GW, or GP per ASTM D-2487, and will be free of any material designated as deleterious. The fill materials should be placed in shallow horizontal layers of maximum 9 inches loose lift thickness and compacted with the necessary type of compaction equipment to attain at least 95 percent of the maximum dry density per ASTM D-1557. Proposed fill soils should be at a moisture content that will facilitate adequate compaction, within 2% of the optimum moisture content per ASTM D-1557.

The on-site soil and gravel materials of Stratum B and the excavated rock materials of Stratum DR and Stratum R are generally considered suitable for re-use as structural backfill. Rock fragments may be used in the structural fill, but should not exceed 6 inches in the largest dimension. Also, PennDOT type OGS, 2A, or 2RC coarse aggregate materials are considered suitable as backfill materials in structural areas.

7. OBSERVATION REQUIREMENTS AND LIMITATIONS

The analyses and recommendations submitted in this report are based upon the data obtained from the test borings at the specific location indicated on the boring location plan. This report does not reflect any variations which may occur between the borings and adjacent locations. The nature and extent of variations between the borings and adjacent areas may not become evident until the course of construction. It is therefore recommended that on-site observation and testing of foundation installation be performed during the construction period to ascertain if re-evaluation of the recommendations of this report must be made.

Allowances should be established to account for possible additional costs that may be required for construction of foundations and/or excavation as recommended in this report. Additional costs may be incurred for various reasons including variable rock depths, variable water levels, possible foundation redesign, disturbances of subgrade, etc.

We have prepared this report in accordance with generally accepted geotechnical engineering practices, and make no other warranties, either expressed or implied, as to the professional services provided under the terms of the agreement and included in this report.

We appreciate the opportunity to be of service to you for this project. Please do not hesitate to contact us for further clarification of any aspect of this study.

Sincerely,

MIDLANTIC ENGINEERING, INC.



Timothy Burns, P.E.
President

Encls:

- (1) Classification Parameters
 - Identification of Soils
 - Engineering Description of Rocks
- (2) Mining Mapping Data
 - Mine Map – Surface, Figure No. 2-1
 - Mine Map – Est. Mine Level Cross-Section - Figure No. 2-2
 - Mine Map – Top Red Ash, Figure No. 2-3
 - Mine Map – Bottom Red Ash, Figure No. 2-4
- (3) Subsurface Investigation Report
 - General Notes (1 Sheet)
 - Test Boring Logs (B-1 through B-4)
 - Project Vicinity Plan, dwg. 12230-1
 - Test Boring Location Plan, dwg. 12230-2



IDENTIFICATION OF SOILS

I. Definition of Soil Group Names – ASTM D-2487-83			Symbol	Group Name
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels – More than 50% of coarse fraction retained on No. 4 sieve Coarse, ¾” to 3” Fine, No. 4 to ¾”	Clean Gravels	GW	well-graded gravel
		Less than 5% fines	GP	poorly graded gravel
		Gravels with Fines	GM	silty gravel
		More than 12% fines	GC	clayey gravel
	Sands – 50% or more of coarse fraction passes No. 4 sieve Coarse: No. 10 to No. 4 Medium: No. 40 to No. 10 Fine: No. 200 to No. 40	Clean Sands	SW	well-graded sand
		Less than 5% fines	SP	poorly graded sand
		Sands with Fines	SM	silty sand
	More than 12% fines	SC	clayey sand	
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays – Liquid Limit less than 50 Low to medium plasticity	Inorganic	CL	lean clay
			ML	silt
		Organic	OL	organic clay organic silt
	Silts and Clays – Liquid Limit 50 or more Medium to high plasticity	Inorganic	CH	fat clay
			MH	elastic silt
		Organic	OH	organic clay
				organic silt
Highly Organic Soils	Primarily organic matter, dark in color, and organic odor		PT	peat

II. Definition of Minor Component Proportions		Approximate Percentage of Fraction by Weight
adjective form	gravelly, sandy	30% or more coarse grained
with	sand, gravel	15% or more coarse grained
	silt, clay	5% to 12% fine grained
trace	sand, gravel	Less than 15% coarse grained
	silt, clay	Less than 5% fine grained

III. Glossary of Miscellaneous Terms

symbols	Unified Soil Classification Symbols are shown above as group symbols. Use a Line Chart for laboratory identification. Dual symbols are used for borderline classifications.
boulders & cobbles	Boulders are considered rounded pieces of rock larger than 12 inches, while cobbles range from 3 to 12 inch size.
disintegrated rock	Residual rock material with a standard penetration resistance (SPT) of more than 60 blows per foot, and less than refusal. Refusal is defined as a SPT of 100 blows for 2" or less penetration.
rock fragments	Angular pieces of rock, distinguished from transported gravel, which have separated from original vein or strata and are present in a soil matrix.
quartz	A hard silica mineral often found in residual soils
ironite	Iron oxide deposited within a soil layer forming cemented deposits
cemented sand	Usually localized rock-like deposits within a soil stratum composed of sand grains cemented by calcium carbonate or other materials.
mica	A soft plate of silica mineral found in many rocks, and in residual or transported soil derived therefrom.
organic materials (excluding peat)	Topsoil: Surface soils that support plant life and which contain considerable amounts of organic matter; Organic Matter: Soil containing organic colloids throughout its structure; Lignite: Hard, brittle decomposed organic matter with low fixed carbon content (a low grade of coal).
fill	Man made deposit containing soil, rock and often foreign matter
probable fill	Soils which contain no visually detected foreign matter but which are suspect with regard to origin
lenses	0 to 2 inch seam of minor soil component
layers	2 to 12 inch seam of minor soil component
pocket	Discontinuous body of minor soil component
color shades	Light to dark to indicate substantial difference in color
moisture conditions	Wet, moist, or dry to indicate visual appearance of specimen



ENGINEERING DESCRIPTION OF ROCKS

Each rock description should be composed of the following elements: weathering, color, rock type, and fracturing.

WEATHERING:

- Fresh:** Freshly broken surfaces appear bright and unweathered. Fractures may show slight brown staining or discoloration. Ringing sound when rock is struck with hammer.
- Slightly Weathered:** Rock generally fresh, but joints stained, and discoloration extends into rock up to 1 inch. Fractures may have slight soil filling. Rock rings if struck with hammer.
- Moderately Weathered:** Significant portions of rock show discoloration and weathering effects. Grains are dull and discolored; some look clayey. Rock has dull sound under hammer and show significant loss of strength as compared to fresh rock.
- Highly Weathered:** Entire rock except quartz grains discolored and dull. Core surfaces often appear pitted or partly washed away. Rock shows severe loss of strength. Dead sound when struck with hammer.

NAMES: (common rock types)

Metamorphic Rocks: Classified by foliation and mineral composition

1. Gneiss: Medium to coarse grained, irregularly banded rock often with alternating light and dark layers.
2. Schist: Fine to medium grained, strongly banded rock, layers are thinner and more distinct than Gneiss. Has a definite "Layered look."

Sedimentary Rocks: Classified by grain size

1. Shale: Fine grained, compressed clay and/or silt.
2. Sandstone: Composed of sand size particles.

Igneous Rocks: Classified by mineral composition only.

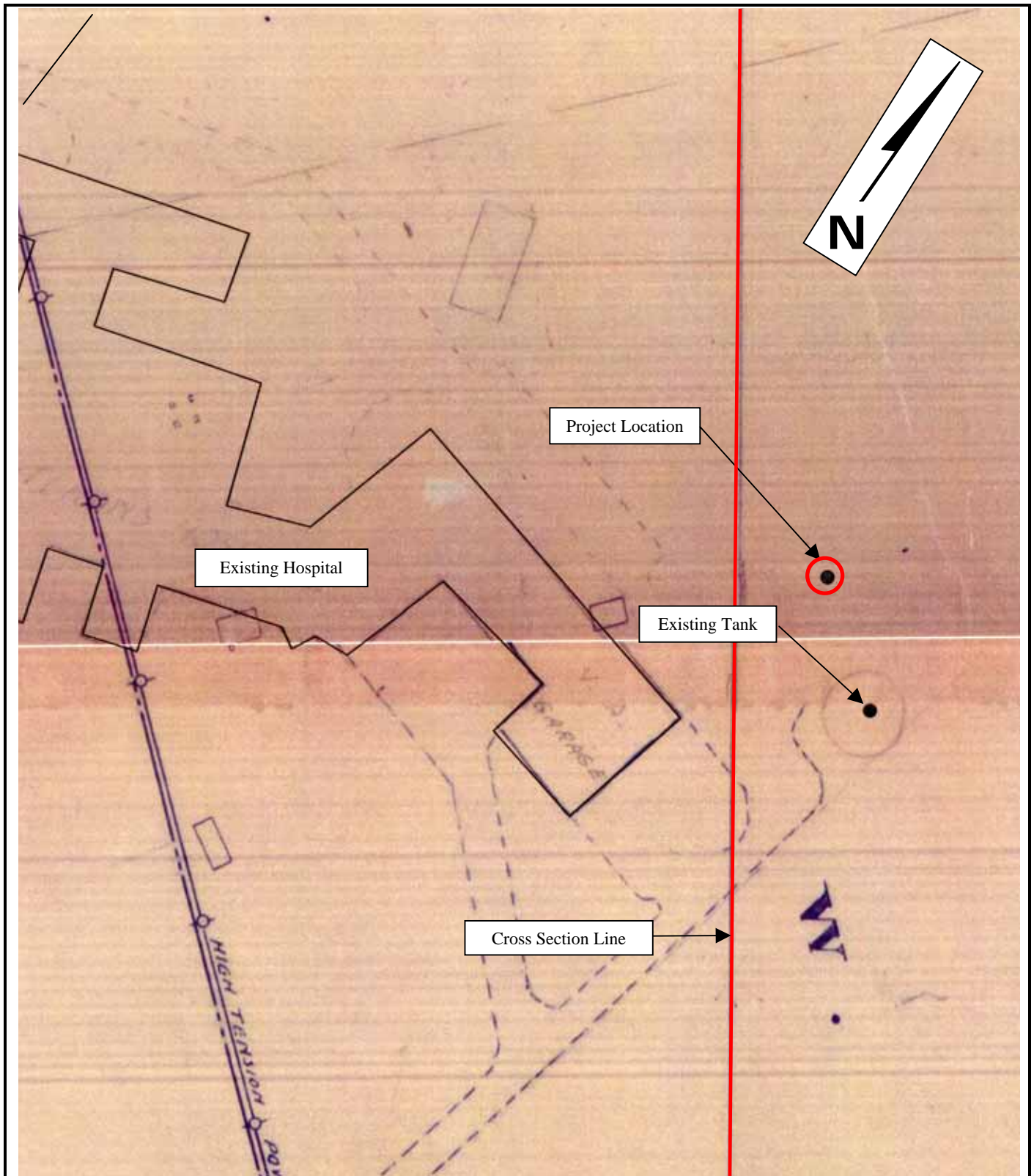
1. Granite: Mixture of quartz, feldspar, and mica; does not have foliation.
2. Diorite: Contains at least 50% dark minerals.

FRACTURING: (natural fractures exclusive of drilling breaks)

<u>Spacing</u>	<u>Fracturing</u>
more than 3 feet	massive
1 foot – 3 feet	slightly fractured
2 inches – 1 foot	moderately fractured
less than 2 inches	highly fractured

EXAMPLES:

1. Slightly weathered, gray GNEISS rock, moderately fractured
2. Highly weathered, brown and gray SCHIST rock, highly fractured



120 Commerce Road • Pittston Township, PA 18640-9552
570/655-2200 (phone) • 570/655-2212 (fax)

Drawing Title:

Mining Map - Surface

VA Medical Center – Elevated Water Storage Tank
Wilkes-Barre, PA

Drawn By:

MS

Checked By:

TB

Scale:

1" = 100'

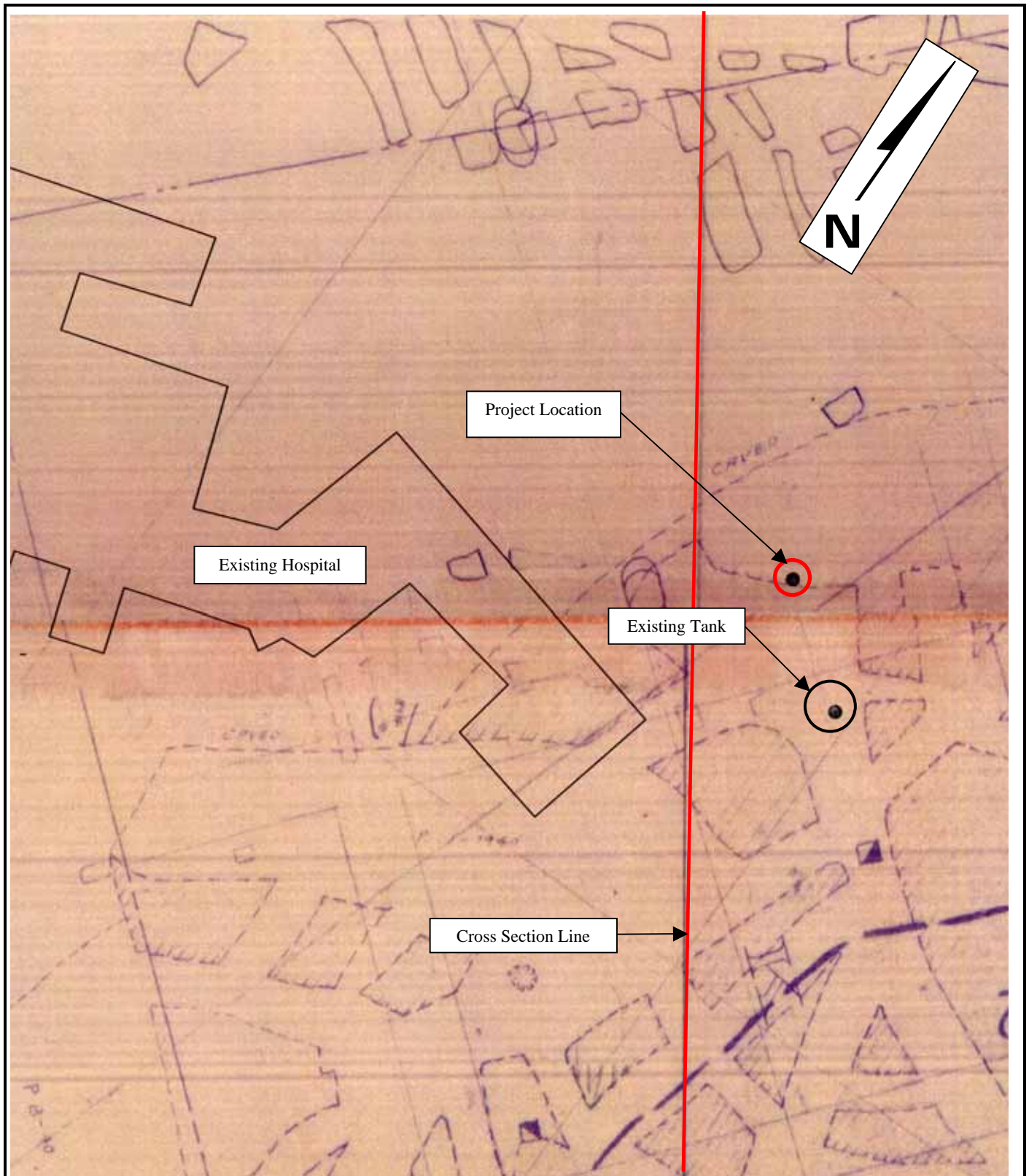
Date:

9/18/12

Project No.:

12230

Sheet No.



120 Commerce Road • Pittston Township, PA 18640-9552
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Drawing Title:

Mining Map – Top Red Ash Vein

VA Medical Center – Elevated Water Storage Tank
Wilkes-Barre, PA

Drawn By:

MS

Checked By:

TB

Scale:

1" = 100'

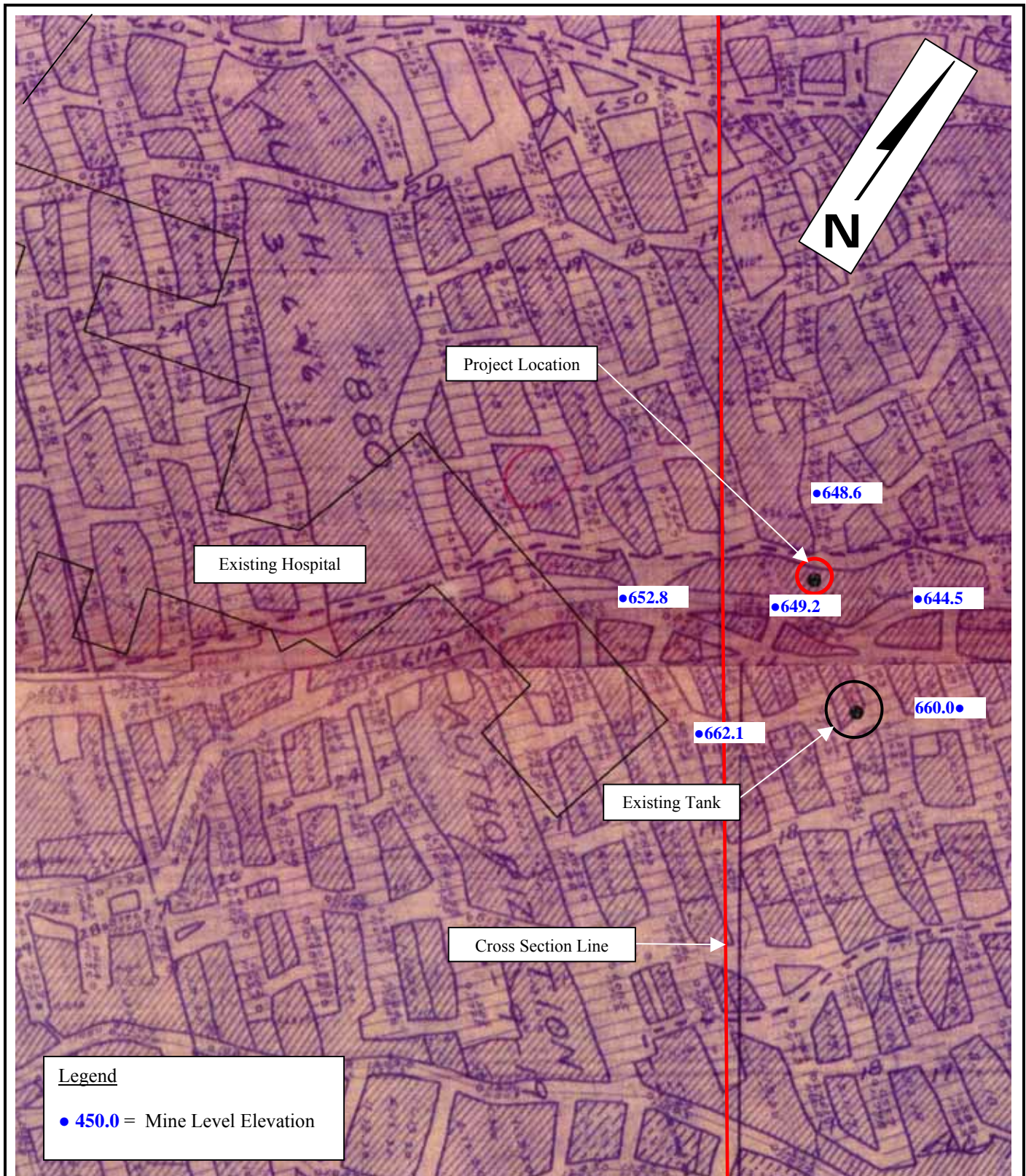
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12230

Sheet No.



120 Commerce Road • Pittston Township, PA 18640-9552
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Drawing Title:

Mining Map – Bottom Red Ash Vein

VA Medical Center – Elevated Water Storage Tank
Wilkes-Barre, PA

Drawn By:

MS

Checked By:

TB

Scale:

1" = 100'

Date:

9/18/12

Project No.:

12230

Sheet No.

SUBSURFACE INVESTIGATION REPORT

- General Notes (1 Sheet)
- Test Boring Logs (B-1 through B-4)
- Project Vicinity Plan, dwg. 12230-1
- Test Boring Location Plan, dwg. 12230-2

GENERAL NOTES

1. Numbers in the sampling data column indicate the number of blows required to drive a 2-inch O.D., 1 $\frac{3}{8}$ -inch I.D. sampling spoon through three 6-inch intervals, or as indicated, using a 140-pound hammer falling 30 inches, according to ASTM D-1586.
2. Strata descriptions are based on visual inspection and are in accordance with the Unified Soil Classification System per ASTM D-2488.
3. Refusal at the surface of rock, boulder, or obstruction is defined as a penetration resistance of 100 blows per 2 inches penetration or less.
4. Key to abbreviations and symbols:

M% = Moisture Content	NX = Rock Core Size
* = No Sample Recovery	Rec. = Rock Core Recovery
■ = Area Sampled	RQD = Rock Quality Designation
5. The boring logs and related information depict subsurface conditions at these specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and groundwater conditions at these boring locations.
6. The stratification lines represent the approximate boundary between soil and rock types as determined in the drilling and sampling operation. Some variation may be expected vertically between samples taken. The soil profile, water level observations and penetration resistances presented on these boring logs have been made with reasonable care and accuracy and must be considered only an approximate representation of subsurface conditions to be encountered at the particular location.
7. Estimated groundwater levels are indicated on the logs. These are only estimates from available data and may vary with precipitation, porosity of the soil, site topography, and similar factors.



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TEST BORING LOG

Project: VA Medical – Elevated Water Storage Tank
Wilkes-Barre, PA

Test Loc. No.: **B-1**
Contract No.: **12230**

ME, Inc. Rep.: JG
Date Drilled: 09/04/12
Equip. Used: Diedrich D-50
Surface Elev.: 864.0±

Groundwater Observations

	Date	Time	Depth
Encountered:	09/04/12		none
Completion:	09/04/12		dry

Depth (ft.)	Strata Description	Class.	Str'm	Elev.	InSitu Depth	Testing Test Data	M (%)	Remarks
	6" asphalt/ 6" subbase stone		F	863.0		4+50/2"		
	brown silty SAND with gravel	SM	B	861.0				
	gray DISINTEGRATED ROCK		DR	860.0		50/2"		
5	gray moderately weathered SANDSTONE, highly fractured		R		5	Rec=100% RQD=0%		
10	gray slightly weathered SANDSTONE, moderately fractured				10	Rec=100% RQD=30%		
15					15	Rec=100% RQD=55%		
	@ 17.8': vertical fracture, highly fractured, coal inclusions							
20	gray slightly weathered SANDSTONE, slightly fractured				20	Rec=100% RQD=87%		
25	@ 24.5': conglomerate @ 24'-28': with coal lenses				25	Rec=100% RQD=61%		
30	@ 30.3' to 30.8': black anthracite coal layer				30	Rec=100% RQD=58%		
	gray slightly weathered SHALE, moderately fractured			830.0				
35	Bottom of Boring at 34.0 feet				35			
40					40			

Comments: Backfilled upon completion.



MIDLANTIC ENGINEERING

TEST BORING LOG

Project: VA Medical – Elevated Water Storage Tank
Wilkes-Barre, PA

Test Loc. No.: **B-2**
Contract No.: **12230**

ME, Inc. Rep.: JG
Date Drilled: 09/04/12
Equip. Used: Diedrich D-50
Surface Elev.: 868.0±

Groundwater Observations

	Date	Time	Depth
Encountered:	09/04/12		none
Completion:	09/04/12		dry

Depth (ft.)	Strata Description	Class.	Str'm	Elev.	In Situ Testing		M (%)	Remarks
					Depth	Test Data		
	6" topsoil			867.5				
1	DISINTEGRATED ROCK		DR		1			
2				866.0	2			
3	Auger Refusal – Top of Rock Bottom of Boring at 2.0 feet		R		3			
4					4			
5					5			
6					6			
7					7			
8					8			
9					9			
10					10			
11					11			
12					12			
13					13			
14					14			
15					15			
16					16			
17					17			
18					18			
19					19			
20					20			

Comments: Backfilled upon completion.



MIDLANTIC ENGINEERING

TEST BORING LOG

Project: VA Medical – Elevated Water Storage Tank
Wilkes-Barre, PA

Test Loc. No.: **B-3**
Contract No.: **12230**

ME, Inc. Rep.: JG
Date Drilled: 09/04/12
Equip. Used: Diedrich D-50
Surface Elev.: 862.0±

Groundwater Observations

	Date	Time	Depth
Encountered:	09/04/12		none
Completion:	09/04/12		dry

Depth (ft.)	Strata Description	Class.	Str'm	Elev.	InSitu Testing Depth	Test Data	M (%)	Remarks
	6" asphalt/ 6" subbase		F	861.0	1			
1					2			
2	DISINTEGRATED ROCK		DR	859.6	3	50/4"		
3	Auger Refusal – Top of Rock Bottom of Boring at 2.4 feet		R		4			
4					5			
5					6			
6					7			
7					8			
8					9			
9					10			
10					11			
11					12			
12					13			
13					14			
14					15			
15					16			
16					17			
17					18			
18					19			
19					20			

Comments: Backfilled upon completion.



MIDLANTIC ENGINEERING

TEST BORING LOG

Project: VA Medical – Elevated Water Storage Tank
Wilkes-Barre, PA

Test Loc. No.: **B-4**
Contract No.: **12230**

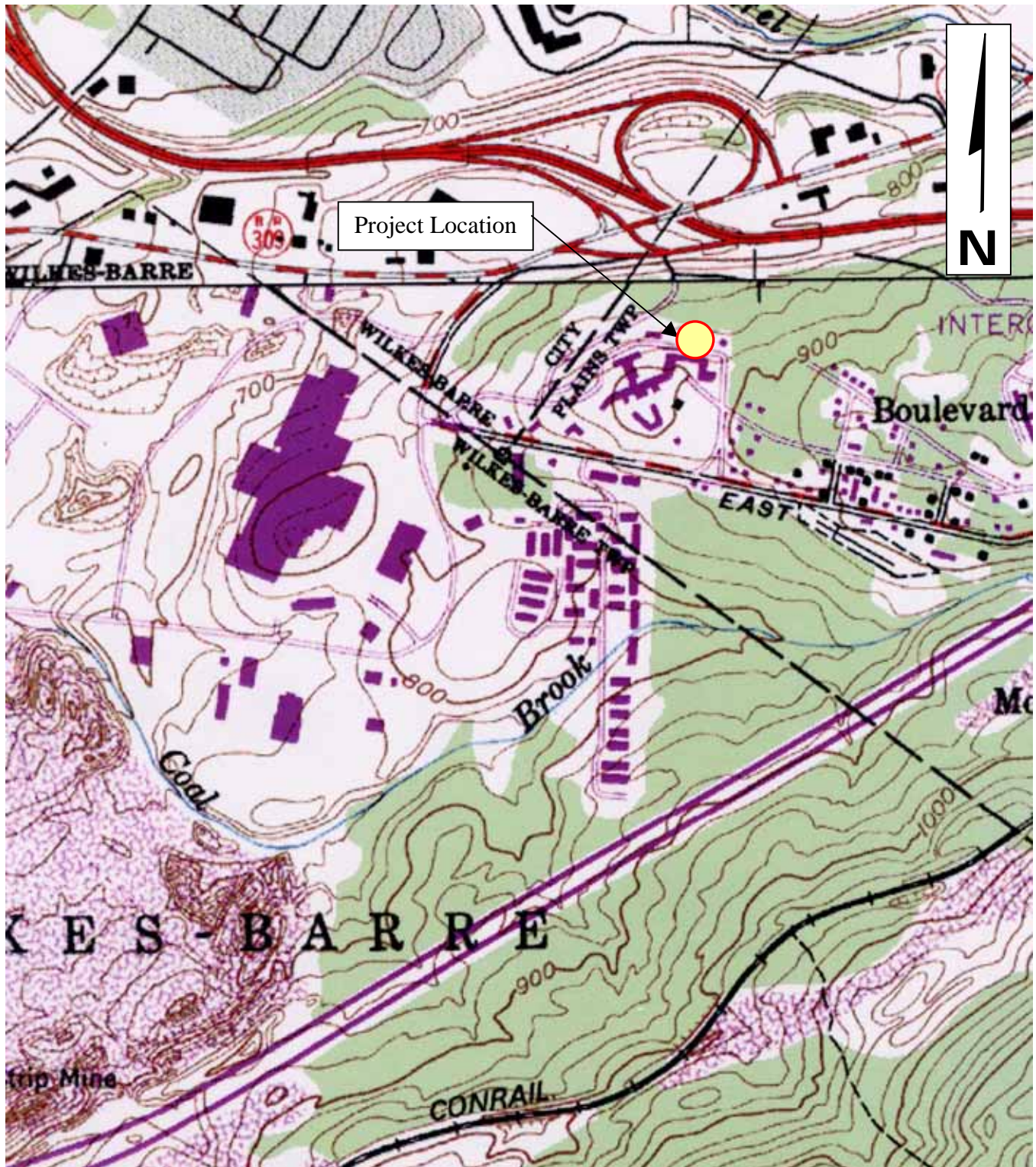
ME, Inc. Rep.: JG
Date Drilled: 09/04/12
Equip. Used: Diedrich D-50
Surface Elev.: 868.0±

Groundwater Observations

	Date	Time	Depth
Encountered:	09/04/12		none
Completion:	09/04/12		dry

Depth (ft.)	Strata Description	Class.	Str'm	Elev.	InSitu Testing Depth	Test Data	M (%)	Remarks
	6" topsoil			867.5				
1	DISINTEGRATED ROCK		DR		1			
2				865.9	2			
3	Auger Refusal – Top of Rock Bottom of Boring at 2.1 feet		R		3	50/1"		
4					4			
5					5			
6					6			
7					7			
8					8			
9					9			
10					10			
11					11			
12					12			
13					13			
14					14			
15					15			
16					16			
17					17			
18					18			
19					19			
20					20			

Comments: Backfilled upon completion.



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570/655-2200 (phone) • 570/655-2212 (fax)

Drawing Title:

Project Vicinity Plan

VA Medical Center– Elevated Water Storage Tank
Wilkes-Barre, PA

Drawn By:

MS

Checked By:

TB

Scale:

1" = 1000'

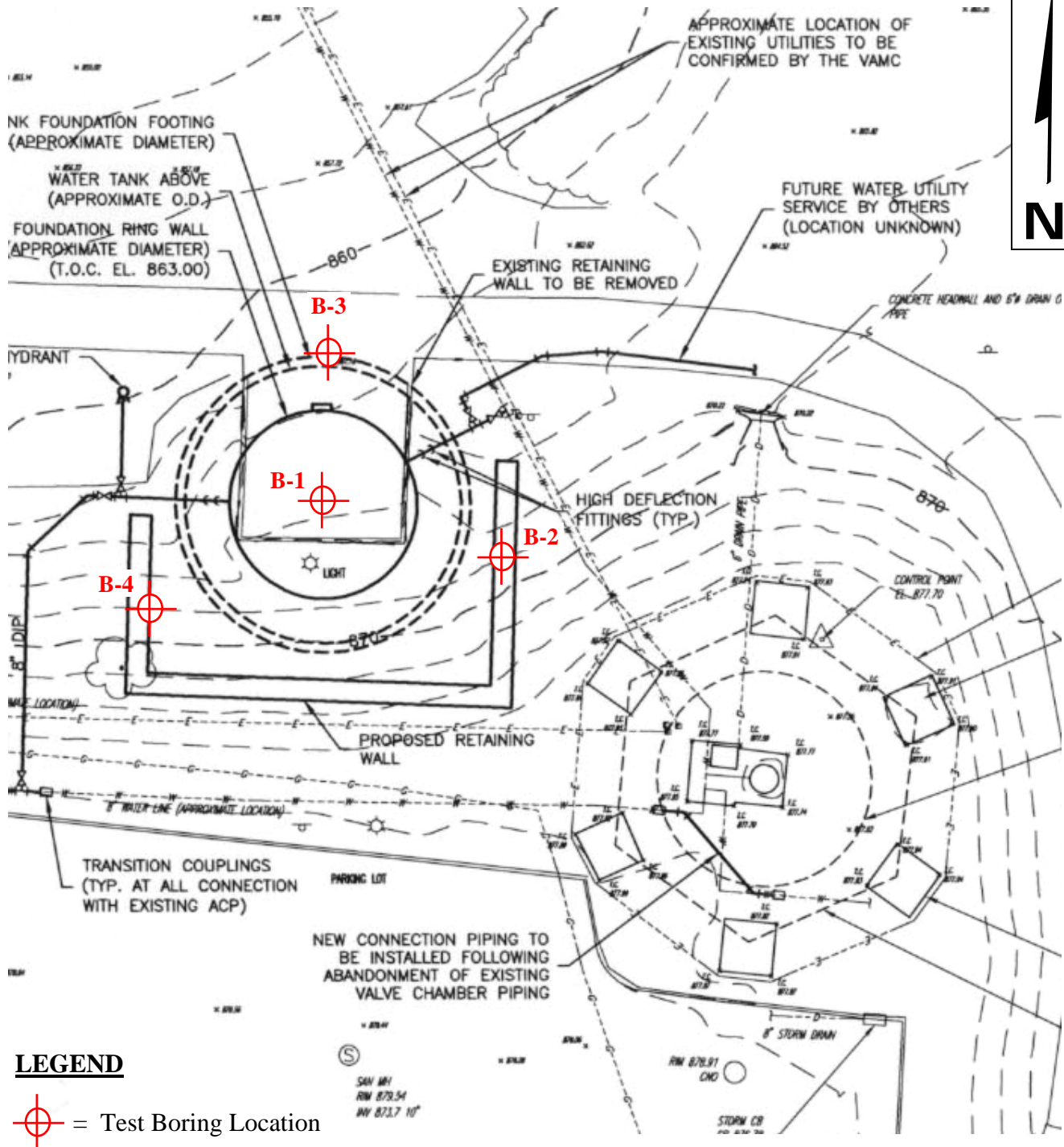
Date:

9/18/12

Project No.:

12230

Sheet No.



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Drawing Title:

Test Boring Location Plan

VA Medical Center – Elevated Water Storage Tank
Wilkes-Barre, PA

Drawn By:
MS

Checked By:
TB

Scale:
1"=30'

Date:
9/18/12

Project No.:
12230

Sheet No.
1 of 1