Report of
Geotechnical Engineering Investigation
Wabash Valley Health Clinic Addition
1436 Locust Street
Terre Haute, Indiana
Patriot Project No. 19-0837-02G

Prepared For:

Wabash Valley Health Center
1436 Locust Street
Terre Haute, IN 47807
Attn: Charles Welker

Prepared By:

Patriot Engineering and Environmental, Inc.
1359 N. Aberdeen Ave.
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July 5, 2019

PATRIOT ENGINEERING
and ENVIRONMENTAL, Inc.
Engineering Value for Project Success

July 5, 2019

Wabash Valley Health Center
1436 Locust Street
Terre Haute, IN 47807
Attn: Charles Welker

RE: Report of
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Wabash Valley Health Clinic Addition
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Terre Haute, Indiana
Patriot Project No. 19-0837-02G

Dear Mr. Welker:

Attached is the report of our subsurface investigation for the proposed addition to the Wabash Valley Health Clinic in Terre Haute, Indiana. This investigation was completed in general accordance with our Proposal No. P19-0900-02G dated May 24, 2019. Approval to conduct this investigation was afforded in the form of a signed acceptance agreement dated May 28th.

This report includes detailed and graphic logs of the test borings drilled at the proposed project site. Also included in the report are the results of laboratory tests performed on samples obtained from the site, and geotechnical recommendations pertinent to the site development, design, and construction.

We appreciate the opportunity to perform this geotechnical engineering investigation and look forward to working with you during the construction phase of the project. If you have any questions regarding this report or if we may be of any additional assistance regarding any geotechnical aspect of the project, please do not hesitate to contact our office.

Respectfully submitted,
Patriot Engineering and Environmental, Inc.

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REPORT OF GEOTECHNICAL ENGINEERING INVESTIGATION

Wabash Valley Health Clinic Addition
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1.0 INTRODUCTION

1.1 General

The Wabash Valley Health Center is planning an addition to their clinic located at 1436 Locust Street in Terre Haute, Indiana. The building addition will affix to the west side of the existing facility, covering a footprint area of approximately 36-ft. by 85-ft. The project will also include a stairway addition to the north side of the existing building as well as parking and civil stormwater management improvements. Wabash Valley Health Clinic has employed Patriot Engineering & Environmental, Inc. (Patriot) to perform a Geotechnical investigation of the proposed project site to assist in the design and construction planning process. The results of our geotechnical engineering investigation for the project are presented in this report.

1.2 Purpose and Scope

The purpose of this investigation has been to determine the general near surface and subsurface conditions within the project area and to develop the geotechnical engineering recommendations necessary for the design and construction of the building addition, building improvements and civil developments associated with the project. This was achieved by drilling test borings, and by conducting laboratory tests on samples collected from the borings. This report contains the results of our findings, an engineering interpretation of these results with respect to the available project information, and recommendations to aid in the design and construction of the proposed improvements and additions.

2.0 PROJECT INFORMATION

The project site is located between Locust Street to the south and 1st Avenue to the north and bisected by a parallel alley which runs between the building and the proposed northside parking areas. The site is situated in the middle of the block between N. 14th Street and N. 15th Street.

The proposed project is expected to include an approximately 36’ x 85’ building addition on the west side of the existing facility, as well as a stairway to the northside entrance. The overall project would also include new parking areas and related stormwater management improvements, most likely in the form of drywells. The building addition will involve a raised first floor to match that of the existing building. The anticipated average grade raise would be 6.5-feet. Footings for the new addition are going to be designed to bear away from the existing building which is supported on a basement level which is situated half-height below grade. The purpose of this design is to avoid surcharge lateral loads being applied on the basement walls by the new footings.

Based on information furnished by Michael Waldbieser, the Project Structural Engineer, we expect that the proposed structure will have wall loads not exceeding 3.1-kips per lineal feet (klf) and isolated column loads not exceeding 25-kips. We have assumed that floor loads will not exceed 200-pounds per square foot (psf). The proposed building addition’s finished floor elevation is expected to match the first floor elevation of the existing building, which is about 6.5-feet above the exterior surrounding grade. The grade raise would be accomplished by stem walls extending upward with interior structural backfill to support the slab.

3.0 INVESTIGATIONAL PROCEDURES

3.1 Field Work

A total of **five** (**5**) borings were drilled, sampled, and tested at the project site on June 9, 2019, at the approximate locations shown on the Boring Location Map in Appendix A. Each of the borings was drilled at the preplanned locations marked by our representative, except for Boring B-1 which was offset after meeting auger refusal just below the surface on apparent concrete. That boring was adjusted about 8-feet to the west to afford full depth drilling. Borings B-1 and B-2 representing the building addition were drilled to a depth of 25-feet below the surface. The other borings representing pavements and stormwater management features were drilled to 15-feet below the surface. All depths are given as feet below the existing ground surface.

The borings were advanced using 3¼” I.D. (inside diameter) hollow-stem augers. Samples were recovered in the undisturbed material below the bottom of the augers using the standard drive sample technique in accordance with ASTM D 1586-74. A 2" O.D. (outside diameter) by 1-$^{3}/_{8}$" I.D. split-spoon sampler was driven a total of 18-inches with the number of blows of a 140-pound hammer falling 30-inches recorded for each 6-inches of penetration. The sum of blows for the final 12-inches of penetration is the

Standard Penetration Test result commonly referred to as the N-value (or blow-count). Split-spoon samples were recovered at 2.5-feet intervals, beginning at a depth of 1-foot below the existing surface grade, extending to a depth of 10-feet, then at 5-foot intervals thereafter to the termination of the boring. Water levels were monitored at each borehole location during drilling and upon completion of the boring. The boreholes were backfilled with auger cuttings prior to demobilization for safety considerations.

The positions of the borings have been located using a handheld global positioning system (GPS). The approximate latitude and longitude of the borings are noted on the individual boring logs, and in the following table.

Table 3.1 – *Boring Coordinates*

Boring Number	Latitude (North)	Longitude (West)
B-1*	39° 28.676’	87° 23.686’
B-2	39° 28.667’	87° 23.686’
B-3	39° 28.667’	87° 23.698’
B-4	39° 28.693’	87° 23.659’
B-5	39° 28.695’	87° 23.684’

*coordinates of offset/completed boring

3.2 Laboratory Evaluation

Upon completion of the boring program, all of the samples retrieved during drilling were returned to *Patriot*’s soil testing laboratory where they were visually examined and classified. A laboratory-generated log of each boring was prepared based upon the driller’s field log, laboratory test results, and our visual examination. Test boring logs and a description of the classification system are included in Appendix A in this report. Indicated on each log are: the primary strata encountered, the depth of each stratum change, the depth of each sample, the Standard Penetration Test results, groundwater conditions, and selected laboratory test data. The laboratory logs were prepared for each boring giving the appropriate sample data and the textural description and classification.

Representative samples recovered in the borings were selected for testing in the laboratory to evaluate their physical properties and engineering characteristics. Laboratory analyses included visual soil classification (ASTM D2488/D2487) and particle-size analysis (ASTM D422). Natural moisture content and estimated unconfined compressive strength (Qp) were also determined for cohesive soils. The results of all laboratory tests are summarized in Section 4.2 below, in the appendices of this report and are referenced on the boring log as appropriate.

4.0 SITE AND SUBSURFACE CONDITIONS

4.1 Site Conditions

The area that will support the new building addition currently serves as a paved parking/drive area, as is the northside stairway addition. The northeastern parcel proposed for parking is currently a paved, in-service parking lot, while the proposed northwestern parking lot is currently an undeveloped, grass covered lot.

Historical aerial imagery indicates that the current and proposed parking lots along the 1st Avenue side of the project area have supported previous structures, as would be expected in this mature part of the city. The northwestern parking lot appears to have had several structures on it, as well as numerous mature trees, as recently as 1-year ago. The northeastern parking lot appears to have been a paved parking lot since somewhere around 2006 or after. Prior to that, the parcel appears to have also supported structures and a grass lot. The prior structures all appear to be single-family dwellings and respective ancillary structures.

4.2 Subsurface Conditions

Our interpretation of the subsurface conditions is based upon widely spaced soil borings drilled at the approximate locations shown on the Boring Location Map in Appendix A. The following discussion is general; for more specific information, please refer to the boring logs presented in Appendix A. It should be noted that the dashed stratification lines shown on the soil boring logs indicate approximate transitions between soil types. In situ stratification changes could occur gradually or at different depths. All depths discussed below refer to depths below the existing ground surface.

The majority of the project area is covered with asphalt pavement that serves as alleyways, parking and driveways serving the surrounding civic facilities. Our borings B-1 through B-3 were performed in these paved areas which indicate asphalt depths ranging from about 5 to 6-inches. Boring B-4 was performed in an existing traffic island in the center of the existing employee parking lot. This raised traffic island was filled with coarse gravel to a depth of about 6-inches. Boring B-5 was positioned in the undeveloped proposed northeast parking lot and possessed topsoil to a depth of about 4-inches.

The surfacial materials are typically underlain by profile consisting of FILL or POSSIBLE FILL, which is comprised of very loose to loose SILTY SAND and CLAYEY SAND with occasional trace CINDERS, BRICK FRAGMENTS and gravel. The original boring location for Boring B-1 also indicates the presence of concrete below the asphalt. The depth of concrete was not determined due to auger refusal. Only Boring B-4 did not indicate the FILL profile. Where present, the FILL profile was noted as extending to depths of about 3 to 11-feet below the existing ground surface. Standard Penetration Test N-values (blow counts) in this material varied from weight of hammer (woh) advancement to 9 blows per foot with an average of about 4-bpf.

Below the FILL profile, or beneath the surficial layer in Boring B-4, the project borings typically encountered very loose to loose SILTY SAND, SAND with minor silt or gravel fractions. Boring B-1 also indicated the presence of a discontinuous deposit of stiff SANDY SILTY CLAY. Standard Penetration Test N-values (blow counts) in the sands varied from 2 to 9 blows per foot with an average of about 5-bpf. The blow count in the isolated clay layer in Boring B-1 was 6-bpf, with corresponding moisture content of 16-percent and an estimated unconfined compressive strength of 1.75 tons per square foot (tsf) using a hand penetrometer. All of the project borings terminated within the granular soil deposition at depths of 15 and 25-feet below the surface.

4.3 Groundwater Conditions

During the drilling process, sampling tools were routinely observed for the existence of free-water which would indicate groundwater presence. Additionally, the open boreholes were also observed for water above the collapse depth after the removal of the augers upon the completion of each hole. Based on these methods, groundwater was not encountered in any of the project test borings drilled at the site.

The term groundwater pertains to any water that percolates through the soil found on site. This includes any overland flow that permeates through a given depth of soil, perched water, and water that occurs below the “water table”, a zone that remains saturated and water-bearing year round.

It should be recognized that fluctuations in the groundwater level should be expected over time due to variations in rainfall and other environmental or physical factors. The true static groundwater level can only be determined through observations made in cased holes over a long period of time, the installation of which was beyond the scope of this investigation.

5.0 DESIGN RECOMMENDATIONS

5.1 Basis

Our recommendations are based on data presented in this report, which include soil borings, laboratory testing and our experience with similar projects. Subsurface variations that may not be indicated by a dispersive exploratory boring program can exist on any site. If such variations or unexpected conditions are encountered during construction, or if the project information is incorrect or changed, we should be informed immediately since the validity of our recommendations may be affected.

5.2 Foundations

Conventional spread footings are typically considered the most economical and efficient means of structural support. However, the existence of loose and very loose sands as well as apparent FILL material and the necessity to raise the grade with additional surcharge soils pose some concerns that will need to be addressed for the use of shallow spread footings. Failure to properly prepare the bearing soils will result in excessive settlement and poor foundation performance.

Based on the findings of the project borings and analysis using the proposed loads, the proposed structure could be supported on conventional spread footings bearing on well prepared bearing soils. The preparation of the bearing subgrade to receive the new footings would involve the **undercutting of all footings to a minimum depth of 3-feet below the bearing grade**. The excavations would also be overexcavated laterally 1-foot for each 2-feet of undercutting in accordance with Illustration A at the end of this report. The compaction of the exposed undercut grade as well as the replacement of controlled backfill are discussed in Section 6 of this report. For proper foundation performance, all foundation subgrade preparation must be witnessed by a *Patriot* representative and must be completed in strict accordance with the narrative describing the necessary undercutting and backfilling described in Section 6 of this report.

Upon satisfactory completion of the undercutting and backfilling to prepare the bearing subgrade, footings should be proportioned using a net allowable soil bearing pressure not exceeding 1,500 pounds per square foot (psf) for column footings or strip (wall) footings. For proper performance at the recommended bearing pressure, foundations must be constructed in compliance with the recommendations for footing excavation inspection that are discussed in the Construction Considerations Section 6.0 of this report.

In using the above net allowable soil bearing pressures, the weight of the foundation and backfill over the foundation need not be considered. Hence, only loads applied at or above the minimum finished grade adjacent to the footing need to be used for dimensioning the foundations. Each new foundation should be positioned so it does not induce significant pressure on adjacent foundations; otherwise the stress overlap must be considered in the design.

All exterior foundations and foundations in unheated areas should be located at a depth of at least 30-inches below final exterior grade for frost protection. However, interior foundations or those protected from frost influence can bear at depths of approximately 12-inches below the finished floor. We recommend that strip footings be at least 18-inches wide and column footings be at least 24-inches wide for bearing capacity considerations.

We estimate that the total foundation settlement should not exceed approximately 1-inch and that differential settlement should not exceed about ¾-inch. Careful field control during construction is necessary to minimize the actual settlement that will occur.

Positive drainage of surface water, including downspout discharge, should be maintained away from structure foundations to avoid wetting and weakening of the foundation soils both during construction and after construction is complete.

5.3 Slabs-on-Grade

The slab associated with the building addition will rest upon approximately 6-feet of compacted, grade raise fill. It is assumed that the fill will be granular fill such as “B” borrow sand or pit run sand & gravel and will be placed in controlled lifts, applying sufficient compactive effort and verification by testing to attain a minimum of 95% of a Standard Proctor maximum dry density. With these assumptions, a modulus of subgrade reaction, “K_{30}” value of 300-pounds per cubic inch (pci), is recommended for the design of soil-supported floor slabs. It should be noted that the “K_{30}" modulus is based on a 30-inch diameter plate load. Adjustments to design may be necessary to accommodate larger are loads.

We recommend that all floor slabs be designed as "floating", that is, fully ground supported and not structurally connected to walls or foundations. This is to minimize the possibility of cracking and displacement of the floor slab because of differential movements between the slab and the foundation. Although the movements are estimated to be within the tolerable limits for the structural safety, such movements could be detrimental to the slabs if they were rigidly connected to the foundations. If the slabs are to be rigidly connected to walls or other portions of the structures, they should be designed as structural elements that transfer loads to the walls, piers and foundations.

It is assumed that the grade-raise fill for the project will consist of clean, granular soils. Those soils would suffice for under-slab drainage. If clean granular soils are not used, the final lift should involve a minimum 6-inch thick, clean granular base course that includes not more than 10-percent fines. The granular base course is intended to help distribute loads and equalize moisture conditions beneath the slab. All slabs should be liberally jointed and designed with the appropriate reinforcement for the anticipated loading conditions.

5.4 Lateral Earth Pressures

The magnitude of the lateral earth pressure is dependent on the method of backfill placement, the type of backfill soil, drainage provisions and whether or not the wall is permitted to yield during and/or after placement of the backfill. When a wall is held rigidly against horizontal movement, the lateral pressure against the wall is greater than the "active" earth pressure that is typically used in the design of free-standing retaining walls. Therefore, rigid walls should be designed for higher "at-rest" pressures (using an at-rest lateral earth pressure coefficient, K_o), while yielding walls can be designed for active pressures (using an active lateral earth pressure coefficient, K_a).

The foundation walls proposed for the project site are expected to be rigid walls which extend to the raised grade elevation, approximately 6.5-feet above the current surface. Provided **a clean open-graded granular material such as INDOT “B” borrow sand is used for backfill**, a total soil unit weight (γ_t) of 125-pcf and an at-rest lateral earth pressure coefficient (K_o) of 0.45 can be used for calculating the lateral earth pressures. This would correspond to an equivalent fluid pressure of 57-pounds per square foot (psf) per foot of wall height. This equivalent fluid pressure would increase linearly from zero (0) psf at the ground surface, to its maximum at the base of the wall. If the backfill against walls will consist of “dirtier” granular soils with fines of more than 10% (borrow such as “red sand” or “bank run”), the values should be adjusted to 135-pcf for total soil unit weight (γ_t), and 0.48 for the at-rest lateral earth pressure coefficient (K_o).

Any structures such as free-standing walls proposed for the project should be designed utilizing a total soil unit weight (γ_t) of 125-pcf and an active lateral earth pressure coefficient (**K_a**) of 0.30 for calculating the lateral earth pressures. This would correspond to an equivalent fluid pressure of 38-pounds per square foot (psf) per foot of wall height. This equivalent fluid pressure would increase linearly from zero (0) pounds per square foot (psf) at the ground surface, to a maximum at the base of the wall. This assumes backfill comprised of **open-graded granular material such as INDOT #8 or #23 aggregate.** Soils containing more than 10-percent fines should not be used for backfill directly behind free-standing walls.

The shear resistance against base sliding can be computed by multiplying the minimum normal force on the base of the footing times the applicable coefficient of friction. Lateral earth pressures can be computed as discussed above. A minimum factor of safety of 1.5 is recommended for sliding stability.

Table 5.4: Summary of Lateral Earth Design Pressures:

Backfill Material	Soil Unit Weight (γ_t) (pcf)	At-Rest Coefficient (K_o)	Active Coefficient (K_a)	Passive Coefficient (K_p)	Coefficient of Friction
Clean, granular fill (<10% fines)	125	0.45	0.30	3.2	0.39
Silty or Clayey Granular fill (>10% fines)	135	0.48	0.32	3.1	0.36

It has been assumed that the static weight per axle of equipment utilized for the compaction of the backfill materials adjacent to the below-grade wall will not exceed 2 tons per axle for non-vibratory equipment and 1 ton per axle for vibratory equipment. All heavy equipment, including compaction equipment heavier than recommended above, should not be allowed closer to the wall (horizontal distance) than the vertical distance from the backfill surface to the bottom of the wall.

5.5 Seismic Considerations

For structural design purposes, we recommend using a ***Site Classification of "D"*** as defined by the 2014 Indiana Building Code (modified 2012 International Building Code (IBC)). Furthermore, along with using a Site Classification of "D", we recommend the use of the maximum considered spectral response acceleration and design spectral response acceleration coefficients provided in Table No. 5.5 below.

TABLE NO. 5.5: SEISMIC DESIGN
SPECTRAL RESPONSE ACCELARATION COEFFICIENTS

PERIOD (SECOND)	MAXIMUM CONSIDERED SPECTRAL RESPONSE ACCELERATION COEFFICIENT	SOIL FACTOR	DESIGN SPECTRAL RESPONSE ACCELERATION COEFFICIENT
0.2	$S_S = 0.259$ g	1.593	$S_{DS} = 0.275$ g
1.0	$S_1 = 0.114$ g	2.344	$S_{D1} = 0.178$ g

These values were obtained from on-line seismic hazard calculation software seismicmaps.org and atccouncil.org, utilizing latitude 39.4777 North and longitude 87.3942 West as the designation for identifying the location of the parcel, applying IBC 2015 references. Other earthquake resistant design parameters should be applied consistent with the minimum requirements of the governing Indiana Building Code.

5.6 Pavements

The near surface soils encountered below the topsoil during our investigation are generally suitable for pavement support. If construction is performed during a wet or cold period, the contractor will need to exercise care during the grading and fill placement activities in order to achieve the necessary subgrade soil support for the pavement system. (See Section 6.0 for Construction Considerations.) The base soil for the pavement section will need to be firm and dry. The subgrade should be sloped properly in order to provide good base drainage. To minimize the effects of groundwater or surface water conditions, the base section for the roadway should be sufficiently high above adjacent ditches and properly graded to provide pavement surface and pavement base drainage.

Based upon the near surface soil encountered in the borings and assuming subgrade preparation in strict accordance with the recommendations set forth in Section 6.0 of this report, we recommend using a CBR value of **9** for pavement design purposes. It should be recognized though, that the recommended CBR value is based on empirical relationships only, and laboratory CBR tests may determine a higher allowable CBR value. Minimum pavement sections should include at least 6-inches of crushed stone aggregate such as INDOT #53 gradation supporting at least 3-inches of asphalt pavement or 4-inches of reinforced concrete pavement regardless of CBR-generated sections. Pavements such as dumpster pads that will support stationary items for extended periods must always be comprised of reinforced concrete, not asphalt paving.

Our recommendations are based on the assumption that the paved areas will be constructed on proofrolled natural soil, or on structural fill overlying the same. Serviceable pavements can be achieved by different combinations of materials and thicknesses, varied to provide roughly equivalent strengths.

5.7 Stormwater Management

It is our understanding that surface runoff from the pavements will be managed through the installation of infiltration structures such as drywells or infiltration trenches. These systems typically serve to collect surface water, provide temporary storage during storm events, then release the water into underlying strata.

Based on the findings of the available borings, laboratory testing of select samples and our experience at nearby sites, we recommend that the drainage system should interface with the granular soils with minor silt and clay content noted in the borings at depths below approximately 8-feet beneath the current surface elevation. A *Patriot* representative should be allowed to observe the excavations to verify that the appropriate soil profile has been reached. If shallower stormwater structure installations are desired, appreciably slower design infiltration rates would apply.

Assuming installation to a minimum depth of 8-feet below the current surface and soils consistent with the findings of our borings, we recommend that the drainage system should be designed using the following soil drainage parameters:

Kperm = 10^{-2} cm/sec, or a permeability/infiltration rate of 5-inches per hour

Although deepening the structures could connect with cleaner sands, it is unlikely that any infiltration efficiency would be realized since groundwater conditions, especially during storm events, would likely impede dissipation from stormwater structures.

6.0 CONSTRUCTION CONSIDERATIONS

6.1 Site Preparation

All areas that will support foundations, floors, pavements or newly placed structural fill must be properly prepared. All loose surficial soil or "topsoil", asphalt pavement and other unsuitable materials must be removed. Unsuitable materials include: frozen soil, relatively soft material, relatively wet soils, deleterious material, or soils that exhibit a high organic content.

Four (4) to six (6) inches of loose surfacial topsoil or pavement were encountered in the borings. The surface materials were measured at discrete locations as shown on the Boring Plan (Appendix A). The material thickness measured at the boring locations may or may not be representative of the overall average thickness at the site. Therefore, it is possible that the actual stripping depth will significantly vary from this data. The data presented should be viewed only as a guide to the approximate stripping depth that will be required to remove organic or asphalt material at the surface. Additional field exploration by *Patriot* would be required to provide an accurate estimate of the stripping depth. This limited data indicates that a minimum stripping depth will be required to remove the materials at the surface, followed by the potential for additional stripping and/or scarification and recompaction as may be required to achieve suitable subgrade support. It is also important that the site is not overly stripped based merely on visual observations, particularly by dark coloration. The extent of stripping should be determined by *Patriot* during the site preparation activities through sampling and testing to determine organic content or other deleterious matter.

Prior to construction of floor slabs, pavements or the placement of new structural fill, the exposed subgrade must be evaluated by a *Patriot* representative which will include proofrolling of the subgrade. Proofrolling should consist of repeated passes of a loaded, pneumatic-tired vehicle such as a tandem-axle dump-truck or scraper. The proofrolling operations should be observed by a *Patriot* representative, and the proofrolling vehicle should be loaded as directed by *Patriot*. Any area found to rut, pump, or deflect excessively should be compacted in-place or, if necessary, undercut and replaced with structural fill, compacted as specified below.

Care must be exercised during grading and fill placement operations. The combination of heavy construction equipment traffic and excess surface moisture can cause pumping and deterioration of the near surface soils. The severity of this potential problem depends to a great extent on the weather conditions prevailing during construction. The contractor must exercise discretion when selecting equipment sizes and also make a concerted effort to control construction traffic and surface water while the subgrade soils are exposed. We recommend that heavy construction equipment (i.e., dump trucks, scrapers, etc.) be rerouted away from the building and pavement areas. If such problems do arise, the operations in the affected area should be halted and the *Patriot* representative contacted to evaluate the condition.

6.2 Foundation Excavations

A *Patriot* representative should be present during the excavation of all foundations for the project. This will allow our representative to observe the excavated soils and view the bearing conditions on an ongoing basis and make corrections as-needed during digging. This will ultimately provide more efficient and timely effort in completion of the undercutting and over-excavation process. Inspections will include hand auger probing, visual inspection, comparison to the findings of the project soil borings and possible testing with dynamic cone penetrometer or other engineering equipment.

As discussed in Section 5.2 earlier in this report, it will be necessary to undercut, over-excavate and backfill for proper support of the new footings. The effort is necessary to reduce overall total and differential settlement and improve and equalize the bearing capacity of the soils that will support the new footings.

All footings must be undercut to a minimum depth of 3-feet below the bearing elevation. In addition to excavation depth, the digging must extend laterally a minimum distance beyond the edge of the footing to accommodate the load stress from the footing. The over-excavation must extend at a 1H:2V slope outward from the edge of the footing. For example, if the depth to the bottom of excavation is 3-feet below the bottom of the foundation, the excavation would need to extend laterally beyond the edge of the footing at least 1.5-feet, as shown in Illustration A found at the conclusion of this report.

Upon reaching the minimum depth, the footings should be compacted in-place using repeated passes of vibratory roller or large vibratory plate compactor, insuring complete coverage of the exposed bearing surface. Compactive effort should continue until the in-place soils have attained 100% of the Standard Proctor maximum dry density, or until compactive efforts are unable to attain additional density. Proper moisture content of the subgrade soils will be necessary to allow for the efficient densification of the in-place soils. The process must be tested, witnessed and verified by a *Patriot* representative for compliance with the intent of this report.

Once the bottom of the undercut excavation is suitably prepared, the excavation can be backfilled in controlled lifts and compacted to the bottom of footing elevation. Backfilling should be performed in accordance with Section 6.3 below.

We recommend that all footings should be poured the same day the excavations are prepared to protect the bearing surface from desiccation or wetting, weathering or other disturbance that could compromise the soils supporting the new foundation. If it is not possible to complete the forming, reinforcement installation and placement of concrete in the same day as subgrade preparation, the foundation excavation must be protected from all disturbances or other forms of deterioration. Drying or wetting and re-compaction may be necessary prior to concrete placement if excavations are allowed to remain exposed. Construction traffic on the exposed surface of the bearing soil will potentially cause some disturbance of the subgrade and consequently loss of bearing capacity. However, the degree of disturbance can be minimized by proper protection of the exposed surface and/or limiting construction activities on the bearing surface.

Excavation slopes should be maintained within OSHA requirements. Based on the findings of the soil borings, we believe that the soil conditions at this site should be classified as Type C in accordance with OSHA 29 CFR parts 1926.650 through 1926.652. It should be recognized, however, that this information is provided as preliminary as determined by discrete borings of in situ materials. The contractor's "competent person", as defined by law, must classify the actual soils and conditions in the field relating to excavation protection, health and safety. We recommend that any surcharge fill or heavy equipment be kept at least 5-feet away from the edge of any excavation.

Also, excavations that occur near existing in-use foundations should be carefully performed making a conscious effort not to undermine the support of the in-use foundations. If it is necessary to excavate soil adjacent to and below the bearing elevation of any in-use foundations**,** *Patriot* should be contacted to make further recommendations regarding these excavations. Please refer to Illustration B at the end of this report for further details.

6.3 Structural Fill and Fill Placement Control

Structural fill, defined as any fill which will support structural loads, should be clean and free of organic material, debris, deleterious materials and frozen soils. Samples of the proposed fill materials should be tested prior to initiating the earthwork and backfilling operations to determine the classification, the natural and optimum moisture contents and maximum dry density and overall suitability as a structural fill.

In general, the on-site soils appear suitable for use as structural fill for the project, although some materials may need to be disposed of due to urban fill content (i.e. cinders). Some of the soils also contain appreciable silt and clay content which may cause them to be difficult to use during wet seasons.

It should be noted that soils encountered during construction activities may be subject to special considerations or handling due to potential environmental impacts. Soils containing debris, foreign matter or other contaminants designated as special or hazardous as designated by state, local or federal regulatory agencies may require individualized handling and/or disposal. Designation and testing of materials for special treatment or direction for handling are outside the scope of this investigation.

All structural fill beneath floor slabs, adjacent to foundations and over foundations, should be compacted to at least 95-percent of its maximum Standard Proctor dry density (ASTM D-698). This minimum compaction requirement should be increased to 100-percent of the maximum Standard Proctor dry density for fill supporting footings, provided these are designed as outlined in Recommendations, Section 5.0.

In cut or on-grade areas where pavement sections are planned, the upper 10-in. of subgrade must be scarified and compacted to a dry density of at least 100-percent of the Standard Proctor maximum dry density (ASTM D-698). Any grade-raise fill placed within 1-ft of the base of the pavement section should also be compacted to at least 100 percent of the Standard Proctor maximum dry density. This can be reduced to 95-percent for engineered fill placed more than 1-ft below the base of the pavement section.

To achieve the recommended compaction of the structural fill, we suggest that the fill be placed and compacted in layers not exceeding eight (8) inches in loose thickness. All fill placement should be monitored by a *Patriot* representative.

Fill placement control and field density (compaction) testing should be conducted by a *Patriot* representative during construction. Fill placement inspection should involve full-time observation of newly placed materials during fill and/or backfill operations to control lift thickness, material quality and compaction effort. Field density testing should be performed in accordance with ASTM D6938, nuclear gauge method, or ASTM 1556, sand-cone method. The frequency of testing should produce a minimum of one (1) density test result per 2,500-square feet, per material-lift, and as necessary to adequately represent the area and compaction effort.

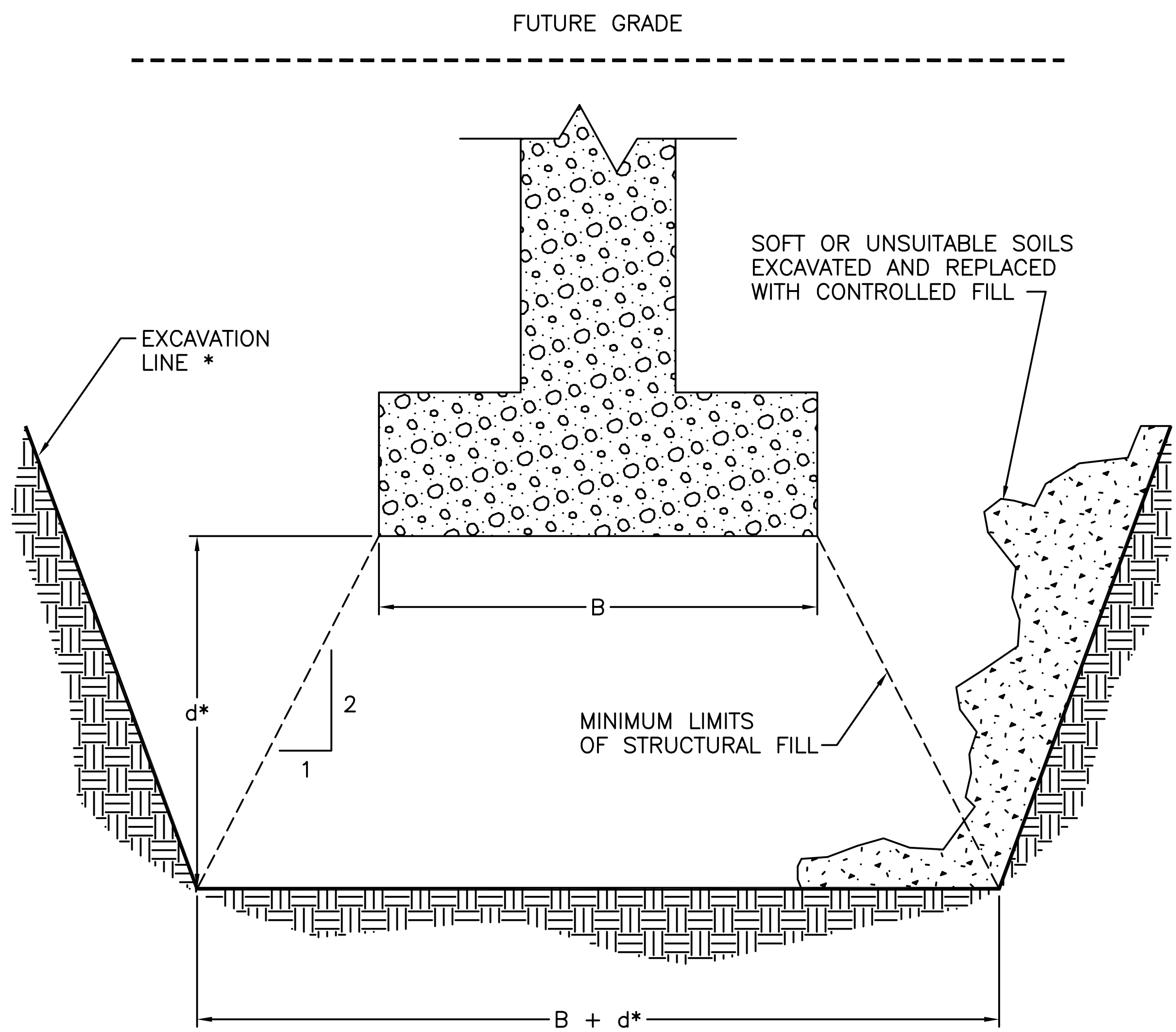
Compaction can be attained through various means of compaction equipment and techniques. In general, sheepsfoot rollers perform more efficiently in cohesive soils, while vibratory smooth drums and plates perform better with granular soils. “Flooding” or “jetting” with water as a means of compaction is generally considered unacceptable.

6.4 Groundwater

Groundwater was not encountered during drilling in any of the project borings, Likewise, the borings were dry at the cave in depths shown on the boring logs. The available site information as well as our experience in the vicinity of this site indicate that groundwater is below the anticipated excavation depth associated with foundations or drywells. However, localized and sporadic groundwater infiltration may occur into the excavations on this site, depending on seasonal conditions. Groundwater inflow into shallow excavations above the groundwater table is expected to be adequately controlled by conventional methods such as gravity drainage and/or pumping from sumps. More significant inflow can be expected in deeper excavations below the groundwater table requiring more aggressive dewatering techniques, such as well or wellpoint systems. For groundwater to have minimal effects on the construction, foundation excavations should be constructed and poured in the same day, if possible.

7.0 ILLUSTRATIONS

See Illustrations A and B on the following pages. These illustrations are presented to further visually clarify several of the construction considerations presented in Section 6.2.



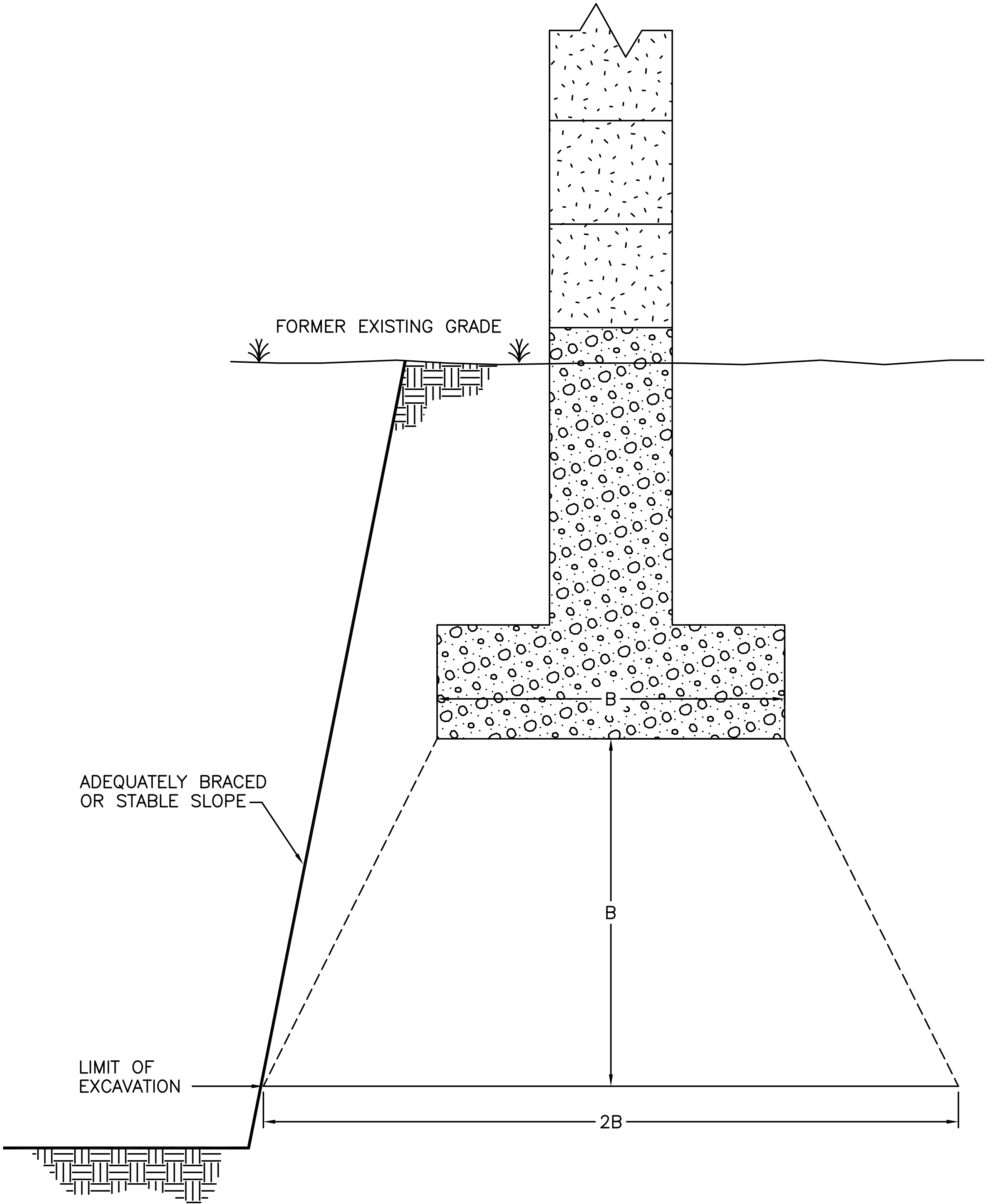
*d IS DEPTH TO SUITABLE SOILS

* IN COMPLIANCE WITH OSHA STANDARDS

PATRIOT ENGINEERING
and ENVIRONMENTAL, INC.
1359 N. Aberdeen Ave. Terre Haute, IN 47804
(812)466.5559 FAX (812)466.5509

Excavation for Footings
In an Area of Fill
ILLUSTRATION A

PROJECT NO.	FIGURE
PAT–UC	1



PATRIOT ENGINEERING
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Excavation Near Existing
In Use Foundations
ILLUSTRATION B

PROJECT NO.	FIGURE
PAT–UC1	1

APPENDIX A

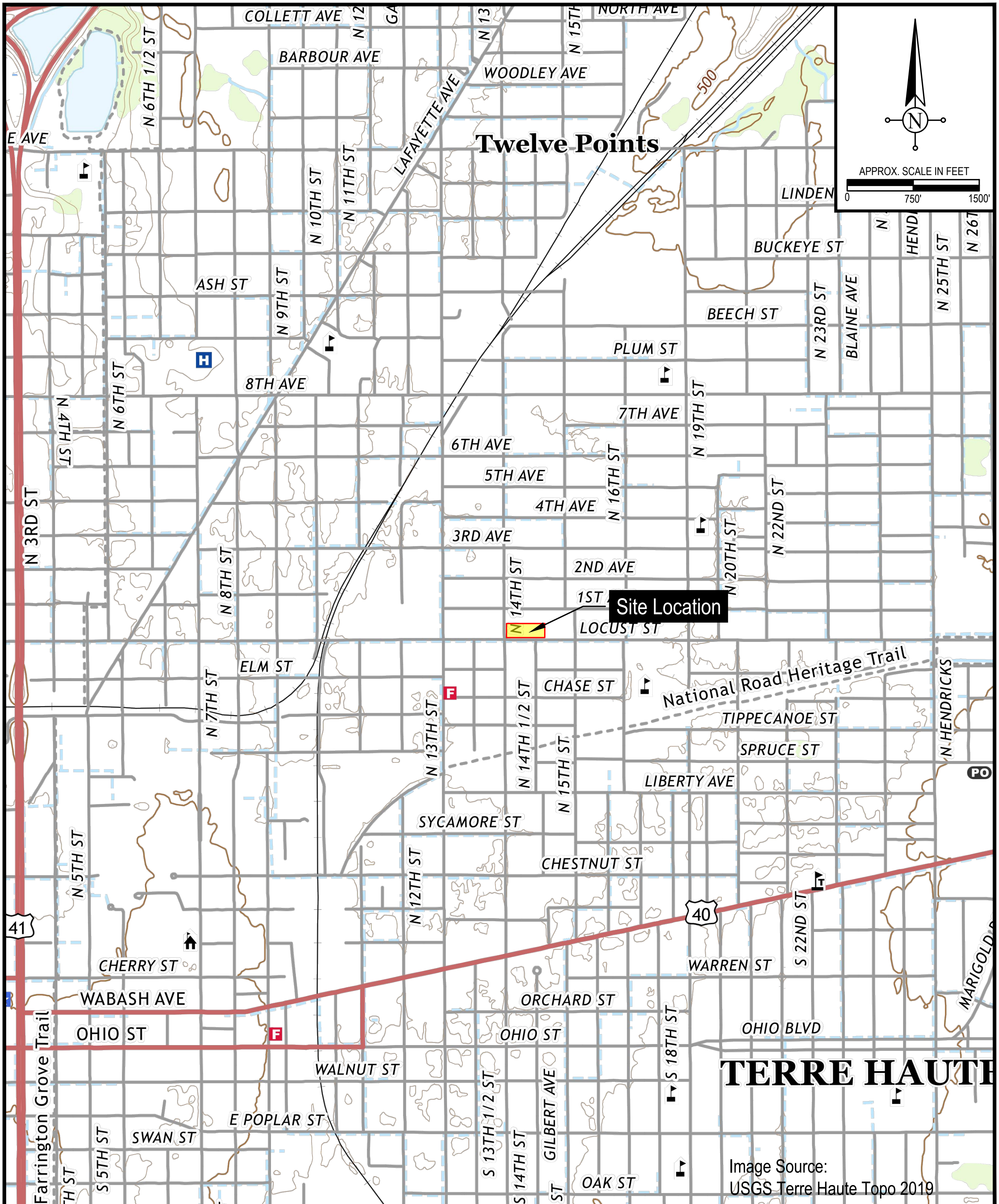
Site Vicinity Map

Boring Log Key

Unified Soil Classification

Boring Location Map

Boring Logs



Patriot Engineering & Environmental, Inc.

Project: Wabash Valley Health Center
1436 Locust Street
Terre Haute, Indiana

Project Number: 19-0837-02	Drawn By: J. DuMond
Date: June 19, 2019	Approved: T. Govert
	DWG: 19-0837-02_geo

Figure 1

Site Vicinity Map

BORING LOG KEY

UNIFIED SOIL CLASSIFICATION SYSTEM
FIELD CLASSIFICATION SYSTEM
FOR SOIL EXPLORATION

NON COHESIVE SOILS
(Silt, Sand, Gravel and Combinations)

Density

Very Loose	-4 blows/ft. or less
Loose	-5 to 10 blows/ft.
Medium Dense	-11 to 30 blows/ft.
Dense	-31 to 50 blows/ft.
Very Dense	-51 blows/ft. or more

Grain Size Terminology

Soil Fraction		Particle Size	US Standard Sieve Size
Boulders		Larger than 12"	Larger than 12"
Cobbles		3" to12"	3" to 12"
Gravel:	Coarse	¾" to 3"	¾" to 3"
	Small	4.76mm to ¾"	#4 to ¾"
Sand:	Coarse	2.00mm to 4.76mm	#10 to #4
	Medium	0.42mm to 2.00mm	#40 to #10
	Fine	0.074mm to 0.42mm	#200 to #40
Silt		0.005mm to 0.074 mm	Smaller than #200
Clay		Smaller than 0.005mm	Smaller than #200

RELATIVE PROPORTIONS FOR SOILS

Descriptive Term	Percent
Trace	1 - 10
Little	11 - 20
Some	21 - 35
And	36 - 50

COHESIVE SOILS
(Clay, Silt and Combinations)

Consistency	Unconfined Compressive Strength (tons/sq. ft.)	Field Identification (Approx.) SPT Blows/ft.
Very Soft	Less than 0.25	0 - 2
Soft	0.25 – < 0.5	3 - 4
Medium Stiff	0.5 - < 1.0	5 - 8
Stiff	1.0 - < 2.0	9 -15
Very Stiff	2.0 - < 4.0	16 - 30
Hard	Over 4.0	> 30

Classification on logs are made by visual inspection.

Standard Penetration Test - Driving a 2.0" O.D., $1^{3/8}$" I.D., sampler a distance of 1.0 foot into undisturbed soil with a 140 pound hammer free falling a distance of 30.0 inches. It is customary for **Patriot** to drive the spoon 6.0 inches to seat into undisturbed soil, then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6.0 inches of penetration on the drill log (Example - 6/8/9). The standard penetration test results can be obtained by adding the last two figures (i.e. 8 + 9 = 17 blows/ft.).

Strata Changes - In the column "Soil Descriptions" on the drill log the horizontal lines represent strata changes. A solid line (———) represents an actually observed change, a dashed line (- - - - - -) represents an estimated change.

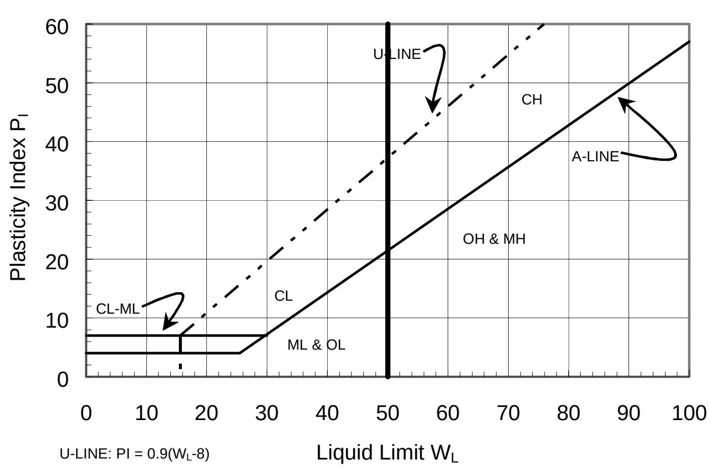
Groundwater observations were made at the times indicated. Porosity of soil strata, weather conditions, site topography, etc., may cause changes in the water levels indicated on the logs.

Groundwater symbols: ▼-observed groundwater elevation, encountered during drilling; ∇-observed groundwater elevation upon completion of boring.

PATRIOT ENGINEERING
and Environmental, Inc.

Unified Soil Classification

Major Divisions			Group Symbol	Typical Names	Classification Criteria for Coarse-Grained Soils		
Coarse-grained soils (more than half of material is larger than No. 200)	Gravels (more than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (little or no fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_U \geq 4$ $1 \leq C_C \leq 3$	$C_U = \frac{D_{60}}{D_{10}}$	$C_C = \frac{D^2_{30}}{D_{10} D_{60}}$
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW ($C_U < 4$ or $1 > C_C > 3$)		
		Gravels with fines (appreciable amount of fines)	GM *d* *u*	Silty gravels, gravel-sand-silt mixtures	Atterberg limits below A line or $P_I < 4$		Above A line with $4 < P_I < 7$ are borderline cases requiring use of dual symbols
			GC	Clayey gravels, gravel-sand-clay mixtures	Atterberg limits above A line or $P_I > 7$		
	Sands (more than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	$C_U \geq 6$ $1 \leq C_C \leq 3$	$C_U = \frac{D_{60}}{D_{10}}$	$C_C = \frac{(D_{30})^2}{D_{10} D_{60}}$
			SP	Poorly graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW ($C_U < 6$ or $1 > C_c > 3$)		
		Sands with fines (appreciable amount of fines)	SM *d* *u*	Silty sands, sand-silt mixtures	Atterberg limits below A line or $P_I < 4$		Limits plotting in hatched zone with $4 \leq P_I \leq 7$ are borderline cases requiring use of dual symbols
			SC	Clayey sands, sand-clay mixtures	Atterberg limits above A line with $P_I > 7$		
Fine-grained soils (more than half of material is smaller than No. 200)	Silt and clays (liquid limit <50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity	1. Determine percentages of sand and gravel from grain size curve. 2. Depending on percentages of fines (fraction smaller than 200 sieve size), coarse-grained soils are classified as follows: Less than 5% - GW, GP, SW, SP More than 12% - GM, GC, SM, SC 5-12% - Borderline cases requiring dual symbols		
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
			OL	Organic silts and organic silty clays of low plasticity			
	Silts and clays (liquid limit >50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts			
			CH	Inorganic clays or high plasticity, fat clays			
			OH	Organic clays of medium to high plasticity, organic silts			
	Highly organic soils		PT	Peat and other highly organic soils			



U-LINE: $PI = 0.9(W_L-8)$
A-LINE: $PI = 0.73(W_L-20)$

Plasticity Chart

Patriot Engineering & Environmental, Inc.

NOTES:
1. Boring locations were staked by PATRIOT. All locations are shown as approximate.
2. All locations were determined in the field with references to existing landmarks.
3. Source: Michael Waldbieser Engr. Site Plan
4. Scale as shown.

Project: Wabash Valley Health Center
1436 Locust Street
Terre Haute, Indiana

	Drawn By: J. DuMond
Project Number: 19-0837-02	Approved: T. Govert
Date: June 19, 2019	DWG: 19-0837-02_geo

Figure 2

Soil Boring Location Map

PATRIOT ENGINEERING and Environmental Inc.

Indianapolis, Terre Haute, Evansville, Fort Wayne, Lafayette, Bloomington
Louisville, KY Dayton, Cincinnati, OH Nashville, TN

LOG OF BORING B-1

Wabash Valley Health Clinic Addition
1436 Locust Street
Terre Haute, IN

Client Name	: Wabash Valley Health Clinic	Driller	: Raymond Z.
Project Number	: 19-0837-02G	Sampling	: Splitspoon
Logged By	: T. Govert	Weather	: Cloudy, 75°F
Start Date	: 6/9/19	Latitude	: 39° 28.676' N
Drilling Method	: HSA	Longitude	: 87° 23.686' W

Water Levels
▼ During Drilling: Dry
▽ After Completion: Dry

Depth in Feet	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0				Asphalt paving (6")						
		SC		Dark Brown, moist, very loose CLAYEY SAND with trace CINDERS (FILL)	1	78	woh			Original location encountered concrete beneath the asphalt that could not be penetrated with the auger; boring was completed 8-feet West of original location.
		SM		Dark Brown, moist, loose fine-grained SILTY SAND (FILL)	2	67	woh/2/3			
5		SC		Grayish Brown, moist, loose to very loose CLAYEY SILTY SAND (possible FILL)	3	89	4/4/5			
					4	78	2/1/3			
10		CL		Brown, moist, stiff SANDY SILTY CLAY	5	67	2/2/4	1.75	16	
15		SM		Brown, moist, very loose SILTY SAND with trace clay	6	56	2/1/2			
20										Borehole collapsed at 21-feet after auger removal.
		SP-SM		Brown, moist, loose fine to medium-grained SAND with trace silt	7	89	1/3/2			
25				Boring terminated at 25-ft.						

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Louisville, KY Dayton, Cincinnati, OH Nashville, TN

LOG OF BORING B-2

Wabash Valley Health Clinic Addition
1436 Locust Street
Terre Haute, IN

Client Name	: Wabash Valley Health Clinic	Driller	: Raymond Z.
Project Number	: 19-0837-02G	Sampling	: Splitspoon
Logged By	: T. Govert	Weather	: Cloudy, 75°F
Start Date	: 6/9/19	Latitude	: 39° 28.667' N
Drilling Method	: HSA	Longitude	: 87° 23.686' W

Water Levels
▼ During Drilling: Dry
▽ After Completion: Dry

Depth in Feet	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0				Asphalt paving (6")						
		SC		Dark Brown, moist, very loose CLAYEY SAND with trace BRICK FRAGMENTS, CINDERS (FILL)	1	44	woh			
		SM		Grayish Brown, moist, very loose fine-grained SILTY SAND (possible FILL)	2	89	woh/1/1			
5		SM		Brown, moist, loose to very loose SILTY SAND	3	89	2/3/3			
					4	56	2/1/1			
10		SW		Brown, moist, very loose to loose well-graded SAND with trace small gravel	5	67	2/2/2			
15					6	89	2/1/4			Borehole collapsed at 19-feet after auger removal.
20		SW		Grayish Brown, moist, loose well-graded SAND with some gravel	7	44	3/4/3			
25										

Boring terminated at 25-ft.

PATRIOT ENGINEERING and Environmental Inc.
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Louisville, KY Dayton, Cincinnati, OH Nashville, TN

LOG OF BORING B-3

Wabash Valley Health Clinic Addition
1436 Locust Street
Terre Haute, IN

Client Name	: Wabash Valley Health Clinic	Driller	: Raymond Z.
Project Number	: 19-0837-02G	Sampling	: Splitspoon
Logged By	: T. Govert	Weather	: Sunny, 72°F
Start Date	: 6/9/19	Latitude	: 39° 28.667' N
Drilling Method	: HSA	Longitude	: 87° 23.698' W

Water Levels
▼ During Drilling: Dry
▽ After Completion: Dry

Depth in Feet	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0				Asphalt paving (5")						
		SC		Dark Brown, moist, very loose SILTY CLAYEY SAND with trace BRICK fragments (FILL)	1	78	2/1/2			
		SM		Brown, moist, very loose SILTY SAND with trace clay	2	56	2/1/1			
5		SM		Reddish Brown & Tan Mottled, moist, loose SILTY SAND	3	89	3/3/4			
10		SP-SM		Reddish Brown, moist, very loose SAND with trace silt	4	89	2/2/2			
15		SP-SM		Brown, moist, very loose SAND with trace small gravel, silt & clay	5	67	2/1/3			Borehole collapsed at 13-feet after auger removal. Sample #5: Particle-size analysis performed
20										
25										

Boring terminated at 15-ft.

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LOG OF BORING B-4

Wabash Valley Health Clinic Addition
1436 Locust Street
Terre Haute, IN

Client Name	: Wabash Valley Health Clinic	Driller	: Raymond Z.
Project Number	: 19-0837-02G	Sampling	: Splitspoon
Logged By	: T. Govert	Weather	: Cloudy, 70°F
Start Date	: 6/9/19	Latitude	: 39° 28.693' N
Drilling Method	: HSA	Longitude	: 87° 23.659' W

Water Levels
▼ During Drilling: Dry
▽ After Completion: Dry

Depth in Feet	Water Level	USCS	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0		GP	Coarse Gravel (6")						
		SM	Reddish Brown, moist, very loose SILTY SAND	1	56	2/1/2			
		SP-SM	Brown, moist, loose SAND with trace silt	2	67	3/2/4			
5		SM	Reddish Brown, moist, loose SILTY SAND with trace gravel	3	44	2/4/4			
		SP-SM	Brown, moist, loose SAND with a little small gravel, trace silt	4	56	2/3/2			
10									Borehole collapsed at 12-feet after auger removal.
				5	67	2/4/5			Sample #5: Particle-size analysis performed
15			Boring terminated at 15-ft.						
20									
25									

PATRIOT ENGINEERING and Environmental Inc.

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Louisville, KY Dayton, Cincinnati, OH Nashville, TN

LOG OF BORING B-5

Wabash Valley Health Clinic Addition
1436 Locust Street
Terre Haute, IN

Client Name	: Wabash Valley Health Clinic	Driller	: Raymond Z.
Project Number	: 19-0837-02G	Sampling	: Splitspoon
Logged By	: T. Govert	Weather	: Cloudy, 70°F
Start Date	: 6/9/19	Latitude	: 39° 28.695' N
Drilling Method	: HSA	Longitude	: 87° 23.684' W

Water Levels
▼ During Drilling: Dry
▽ After Completion: Dry

Depth in Feet	Water Level	USCS	GRAPHIC	DESCRIPTION	Samples	Rec %	SPT Results	qp tsf	w %	REMARKS
0		GP		Topsoil (4")						
		SM		Dark Brown, moist, loose SILTY SAND with trace CINDERS & small gravel (FILL)	1	56	2/3/4			
		SM		Dark Brown, moist, very loose SILTY SAND with trace clay	2	67	2/1/2			Sample #2: Particle-size analysis performed
5		SP-SM		Brown, moist, loose fine-grainedSAND with trace silt	3	78	3/2/3			
		SP-SM		Reddish Brown, moist, very loose to loose SAND with trace small gravel, silt & clay	4	67	2/1/1			Sample #4: Particle-size analysis performed
10										
					5	56	2/2/3			Borehole collapsed at 14.5-feet after auger removal.
15										

Boring terminated at 15-ft.

20

25

APPENDIX B

General Qualifications

and

Standard Clause for Unanticipated Subsurface Conditions

GENERAL QUALIFICATIONS

of Patriot Engineering's Geotechnical Engineering Investigation

This report has been prepared at the request of our client for his use on this project. Our professional services have been performed, findings obtained, and recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report or on the test borings logs regarding vegetation types, odors or staining of soils, or other unusual conditions observed are strictly for the information of our client and the owner.

This report may not contain sufficient information for purposes of other parties or other uses. This company is not responsible for the independent conclusions, opinions or recommendations made by others based on the field and laboratory data presented in this report. Should there be any significant differences in structural arrangement, loading or location of the structure, our analysis should be reviewed.

The recommendations provided herein were developed from the information obtained in the test borings, which depict subsurface conditions only at specific locations. The analysis, conclusions, and recommendations contained in our report are based on site conditions as they existed at the time of our exploration. Subsurface conditions at other locations may differ from those occurring at the specific drill sites. The nature and extent of variations between borings may not become evident until the time of construction. If, after performing on-site observations during construction and noting the characteristics of any variation, substantially different subsurface conditions from those encountered during our explorations are observed or appear to be present beneath excavations we must be advised promptly so that we can review these conditions and reconsider our recommendations where necessary.

If there is a substantial lapse of time between the submission of our report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, we urge that our report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse.

We urge that Patriot be retained to review those portions of the plans and specifications that pertain to earthwork and foundations to determine whether they are consistent with our recommendations. In addition, we are available to observe construction, particularly the compaction of structural backfill and preparation of the foundations, and such other field observations as may be necessary.

In order to fairly consider changed or unexpected conditions that might arise during construction, we recommend the following verbiage (Standard Clause for Unanticipated Subsurface Conditions) be included in the project contract.

STANDARD CLAUSE FOR UNANTICIPATED SUBSURFACE CONDITIONS

"The owner has had a subsurface exploration performed by a soils consultant, the results of which are contained in the consultant's report. The consultant's report presents his conclusions on the subsurface conditions based on his interpretation of the data obtained in the exploration. The contractor acknowledges that he has reviewed the consultant's report and any addenda thereto, and that his bid for earthwork operations is based on the subsurface conditions as described in that report. It is recognized that a subsurface exploration may not disclose all conditions as they actually exist and further, conditions may change, particularly groundwater conditions, between the time of a subsurface exploration and the time of earthwork operations. In recognition of these facts, this clause is entered in the contract to provide a means of equitable additional compensation for the contractor if adverse unanticipated conditions are encountered and to provide a means of rebate to the owner if the conditions are more favorable than anticipated.

At any time during construction operations that the contractor encounters conditions that are different than those anticipated by the soils consultant's report, he shall immediately (within 24 hours) bring this fact to the owner's attention. If the owner's representative on the construction site observes subsurface conditions which are different than those anticipated by the consultant's report, he shall immediately (within 24 hours) bring this fact to the contractor's attention. Once a fact of unanticipated conditions has been brought to the attention of either the owner or the contractor, and the consultant has concurred, immediate negotiations will be undertaken between the owner and the contractor to arrive at a change in contract price for additional work or reduction in work because of the unanticipated conditions. The contract agrees that the following unit prices would apply for additional or reduced work under the contract. For changed conditions for which unit prices are not provided, the additional work shall be paid for on a time and materials basis."

Another example of a changed conditions clause can be found in paper No. 4035 by Robert F. Borg, published in ASCE Construction Division Journal, No. CO2, September 1964, page 37.