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February 18, 2011

Stone Environmental Engineering & Science
14 West First Street
Dayton, Ohio 45402

Attn: Mr. Charley S. Halsey, P.E.

Re: Geotechnical Engineering Services Report
Proposed Dayton Power & Light Facility Addition
1317 Troy Street
Dayton, Ohio
PSI Project Number 0105300

Dear Mr. Halsey:

Thank you for choosing Professional Service Industries, Inc. (PSI) as your consultant for the referenced project. Per your authorization, PSI has completed a geotechnical engineering study for the referenced project. The results of the study are discussed in the accompanying report, three (3) copies of which are enclosed.

It is considered imperative that the geotechnical engineer and/or their representative be present during earthwork operations, foundation and floor slab installations to observe the field conditions with respect to the design assumptions and specifications. PSI will not be held responsible for interpretations and field quality control observations made by others.

If you have any questions pertaining to this report, please contact our office at (937) 898-1200. PSI would be pleased to continue providing geotechnical services throughout the implementation of the project, and we look forward to working with you and your organization on this and future projects.

Respectfully submitted,
PROFESSIONAL SERVICE INDUSTRIES, INC.

Mark Salveter, P.E.
Branch Manager

Paul S. Hundley, P.E.
Regional Engineer

cc: Client – 3 Copies

Enclosures

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PROJECT INFORMATION

Project Authorization

The following Table summarizes (in chronological order) the Project Authorization History for the services performed and represented in this report by Professional Service Industries, Inc. (PSI):

PROJECT TITLE: PROPOSED DP&L FACILITY ADDITION		
Document and Reference Number	**Date**	**Requested/Provided By**
Request for Proposal	1/5/11	Mr. Charley S. Halsey, P.E. of Stone Environmental Engineering & Science
PSI Proposal Number: 0105-36315	1/6/11	Mark Salveter, P.E. and Mark J. Carlson, P.E. of PSI
Notice to Proceed	1/24/11	Mr. Charley S. Halsey, P.E. of Stone Environmental Engineering & Science

Project Description

PSI understands Stone Environmental Engineering & Science is currently developing information with regard to a proposed building addition to the existing DP&L facility located at 1317 Troy Street in Dayton, Ohio. The proposed addition will reportedly consist of a single-story, pre-engineered metal structure with a concrete slab-on-grade measuring approximately 24,000 square feet in plan. New asphalt parking areas are envisioned for the north side of the proposed addition including new gated entrances from Air City Avenue. It is anticipated that the column and wall loads will not exceed about 150 kips, and 4 kips per lineal foot, respectively and that the slab-on-grade loading will not exceed about 150 pounds per square foot. The existing structure is a slab-on-grade floor system. No other information relative to the spatial geometry or other aspects of the project is available at this time.

The following Table lists the material and information provided for this project:

DESCRIPTION OF MATERIAL	PROVIDER/SOURCE	DATE
Final Site Plan	Stone Environmental Engineering & Science	1/5/11
Soil Boring Plan	Pinnacle Architects	1/26/11

The geotechnical recommendations presented in this report are based on the available project information, building location and the subsurface materials described in this report. If any of the information noted above is incorrect, please inform PSI in writing so that we may amend the recommendations presented in this report if appropriate and if desired by the client. PSI will not be responsible for the implementation of its recommendations when it is not notified of changes in the project.

Purpose and Scope of Services

The purpose of this study was to explore the subsurface conditions at the site to prepare

recommendations for foundation and pavement section systems for the proposed construction. PSI's contracted scope of services included drilling five (5) soil test borings at the site to depths of approximately 10 feet to 15 feet below the ground surface, select laboratory testing, and preparation of this geotechnical report. This report briefly outlines the testing procedures, presents available project information, describes the site and subsurface conditions, and presents recommendations regarding the following:

- Grading procedures for site development.
- Review of geologic setting
- Foundation types, depths and allowable bearing capacities.
- Seismic coefficients for use in seismic design.
- Pavement section design and pavement subgrade preparation.
- Comments regarding factors that could impact construction and performance of the proposed construction.

The scope of services did not include an environmental assessment for determining the presence or absence of wetlands, or hazardous or toxic materials in the soil, bedrock, surface water, groundwater, or air on, below, or around this site. Any statements in this report or on the boring logs regarding odors, colors, and unusual or suspicious items or conditions are strictly for informational purposes. Prior to further development of this site, an environmental assessment is advisable.

PSI's scope also did not provide any service to investigate or detect the presence of moisture, mold or other biological contaminants in or around any structure, or any service that was designed or intended to prevent or lower the risk of the occurrence or the amplification of the same. Client should be aware that mold is ubiquitous to the environment with mold amplification occurring when building materials are impacted by moisture. Client should be aware that site conditions are outside of PSI's control, and that mold amplification will likely occur, or continue to occur, in the presence of moisture. As such, PSI cannot and shall not be held responsible for the occurrence or reoccurrence of mold amplification.

SUBSURFACE CONDITIONS

Subsurface Conditions

The site subsurface conditions were explored with five (5) soil test borings (i.e., three [3] borings within the proposed building addition area, and two [2] borings within parking and drive areas). Building boring depths measured approximately 15 feet and pavement borings extended to depths of approximately 10 feet below the existing ground surface.

The boring locations and depths were suggested by PSI and reviewed with client prior to drilling. PSI personnel staked the borings in the field by measuring distances from available surface features. The surface elevations at the borings should be surveyed prior to construction activities.

The borings were advanced utilizing 3¼ inch inside diameter, hollow-stem auger drilling methods. Soil samples were routinely obtained during the drilling process. Select soil samples were later tested in the laboratory to obtain soil material properties for the foundation and pavement recommendations. Drilling, sampling, and laboratory testing was accomplished in general accordance with ASTM procedures.

At the time of field exploration, the ground surface at the location of Borings B-1 and B-3 was surficially covered with crushed limestone gravel (i.e., an existing gravel parking/storage lot) measuring approximately 6 to 9 inches thick. At the location of Boring B-2, the ground surface was encompassed with a layer of asphalt pavement measuring approximately 2 inches in thickness, underlain by an approximately 6 inch layer of crushed limestone base material. Alternatively, at the location of Borings B-4 and B-5 the ground surface was encompassed with a layer of deleterious topsoil fill measuring about 8 to 10 inches in thickness.

Old undocumented fill materials including sand fill and sandy clay fill with varying amounts of gravel, brick fragments, cinders, and root fibers were encountered beneath the aforementioned near-surface materials extending to depths of approximately 1.8 feet to 6.5 feet beneath the existing ground surface. The Atterberg limits of the sandy clay fill encountered within the proposed building addition area indicate the material is high plasticity clay with a liquid limit of 63 percent and plastic limit of 34 percent. Please note that a buried concrete slab was encountered at the location of Boring B-2 only, from a depth of approximately 2.3 to 2.8 feet. It should be expected that the thickness of the asphalt pavement, crushed limestone, topsoil fill and old undocumented fill will vary between the boring locations. The following Table summarizes the specific depths of the old undocumented sandy clay fill stratum:

BORING NUMBER	UNDERLYING NATURAL SOIL DESCRIPTION	APPROXIMATE DEPTH TO NATURAL STRATUM (FT)*
B-1	Brown Sand & Gravel	5.5
B-2	Brown Sandy Clay	6.5
B-3	Brown Sandy Clay	3.0
B-4	Brown Sand & Gravel	6.5
B-5	Brown Sandy Clay	1.8

*As measured beneath the existing site grades.

At the locations of Borings B-2, B-3 and B-5 the aforementioned old undocumented fill materials were subsequently underlain by natural brown lean sandy clay extending to depths ranging from approximately 4.0 to 8.7 feet. Beneath the above referenced cohesive soils, brown sand and gravel was encountered to the explored (terminal) depths of all of the borings. Please note that at the location of Boring B-3 a light brown sandy clay layer was encountered within the granular soils from a depth of 13.0 feet to 14.5 feet.

Calibrated penetrometer test results indicate that the estimated unconfined compressive strength of the tested cohesive (clay) soil samples ranged from approximately ½ tons per square foot (tsf) to greater than 4 ½ tsf which indicates a soft to hard consistency. The standard penetration values (N-values) recorded during the sampling of the granular materials (sands) ranged from 11 to 35 blows per foot, indicating a medium dense to dense relative density. The following Table briefly summarizes the range of results from the field and laboratory testing programs. Please refer to the attached boring logs and laboratory data sheets for more specific information:

SOIL STRATA TYPE	Approximate Depth, feet	RANGE OF VALUES	
		Standard penetration, N	Moisture content, %
Unsuitable Materials*	0 to 6.5	3 to SSR**	7 to 17
Natural Sandy Clay***	1.8 to 14.5	8 to 13	11 to 22
Sand and Gravel	4.0 to 15.0	11 to 35	N/A

*Includes asphalt pavement, crushed limestone fill, topsoil fill, sand fill, sandy clay fill, and buried concrete materials.

**SSR = Split Spoon Refusal (greater than 50 blows for one six inch increment)

***Encountered at the location of Borings B-2, B-3 and B-5 only.

The above subsurface description is of a generalized nature to highlight the major subsurface stratification features and material characteristics. The boring logs included in the Appendix should be reviewed for specific information at individual boring locations. These records include soil/rock descriptions, stratifications, penetration resistances, and locations of the samples and laboratory test data. The stratifications shown on the boring logs represent the conditions only at the actual boring locations. Variations may occur and should be expected between boring locations. The stratifications represent the approximate boundary between subsurface materials and the actual transition may be gradual. Water level information obtained during field operations is also shown on these boring logs. The samples that were not altered by laboratory testing will be retained for sixty (60) days from the date of this report and then will be discarded.

Groundwater Level Measurements

Free groundwater was not observed in the borings during drilling, indicating that groundwater at the site at the time of the exploration was either below the terminated depths of the borings, or that the soils encountered are relatively impermeable. Although free groundwater was not encountered at this time, water can be present within the depths explored during other times of the year depending upon climatic and rainfall conditions. Additionally, discontinuous zones of perched water may exist within the overburden materials and/or at the contact with bedrock.

In fine-grained soils such as the sandy clay at this site, the free groundwater levels in the boreholes are often not representative of the actual groundwater level, because the boreholes remain open for a relatively short time. To obtain longer-term measurements, it is necessary to install water level observation wells or piezometers. In fine-grained soils, the depth of the soil color change from brown to gray can be an indicator of the prevailing groundwater level. Above the prevailing groundwater level, fine-grained soils oxidize to a brown color.

The groundwater level at the site, as well as perched water levels and volumes, will fluctuate based on variations in rainfall, snowmelt, evaporation, surface run-off and other related hydrogeologic factors. The water level measurements presented in this report are the levels that were measured

loaded structural features or slabs and 1 foot of pavements, remediation is recommended. Lightly loaded structures are defined as having normal operating loads of less than 2 kips per linear foot for walls and 50 kips for columns. Fat clays have the potential for volume change with changes in the soil moisture content. In severe cases, movement and distress to footings and foundation walls can occur. If encountered during building construction, remedial measures are recommended in select areas of the site to reduce the shrink/swell potential. **However, due to the aforementioned required undocumented fill removal beneath foundations, and the soil conditions encountered within the proposed building floor slab locations, remediations on the order of 1 foot or less are anticipated for floor slab support.**

GEOTECHNICAL RECOMMENDATIONS

The following geotechnical related recommendations have been developed on the basis of the subsurface conditions encountered and PSI's understanding of the proposed development. Should changes in the project criteria occur, a review must be made by PSI to determine if modifications to our recommendations will be required.

Site Preparation

PSI recommends that asphalt pavement, existing buried concrete slabs, topsoil, vegetation, roots, soft, organic, frozen, or unsuitable soils in the construction areas be stripped from the site and either wasted or stockpiled for later use in non-structural areas. It should also be noted that it is not unusual for these deleterious materials to vary from these values in the open field. Where the option is selected to remove all fill within the building footprint and replace it with compacted fill, the area and extent of removal must be 5 feet outside all exterior footing limits. A representative of the geotechnical engineer should determine and document the depth of removal at the time of construction.

In this region, these otherwise competent silts and lean clays can undergo a significant loss of stability when construction activities are performed during wetter portions of the year. PSI anticipates that the soils in the project area can become easily disturbed if subjected to conventional rubber tire or narrow track-type equipment. Soils that become disturbed would need to be excavated and replaced; however, this remedial excavation may expose progressively wetter soils with depth, thus compounding the problem condition. Thus, a normal approach to subgrade preparation may not be possible. Appropriate wide-track equipment selection should aid in minimizing potential disturbance.

After stripping to the proposed subgrade level (a minimum of 2 feet below finished subgrade level), as required, the building area should be proof-rolled with a loaded tandem-axle dump truck or similar heavy rubber tired vehicle (typically with an axial load greater than nine (9) tons). Soils that are observed to rut or deflect excessively (typically greater than one (1) inch) under the moving load should be undercut and replaced with properly compacted low plasticity fill material. The proof-rolling and undercutting activities should be witnessed by a representative of the geotechnical engineer and should be performed during a period of dry weather. If the earthwork activities take place during wet seasons, lime stabilization of the subgrade could be required prior to engineered fill placement. Care should be taken during construction activities not to allow excessive drying or wetting of exposed soils. The subgrade soils should be scarified and compacted to at least 98% of the materials' standard Proctor maximum dry density, in general accordance with ASTM procedures, to a depth of at least twelve (12) inches below the surface. New fill for building

structures, asphalt, and concrete should not be placed on frozen ground.

After subgrade preparation and observation have been completed, fill placement required to establish grade may begin. Low-plasticity structural fill materials placed beneath the lightly loaded structural features or slabs should be free of organic or other deleterious materials and have a maximum particle size of less than three (3) inches. Low-plasticity soils are defined as having a liquid limit less than forty-five (45) and plasticity index less than twenty (20). The insitu crushed limestone fill, sand fill, or **lean** sandy clay fill can be recompacted as engineered fill provided they are free of any organic or other deleterious topsoil material. A representative of PSI should be on-site to observe, test, and document the placement of the fill. If the fill is too dry, water should be uniformly applied and thoroughly mixed into the soil by disking or scarifying. Close moisture content control will be required to achieve the recommended degree of compaction. If wet or cool season earthwork is necessary, PSI recommends the use of imported fill materials meeting the requirements of Ohio Department of Transportation (ODOT) No. 304 aggregate.

Fill should be placed in maximum loose lifts of eight (8) inches and compacted to at least 98% of the materials' standard Proctor maximum dry density, and within a range of the optimum moisture content as designated in the table below, as determined in general accordance with ASTM procedures. Each lift of compacted-engineered fill should be tested and documented by a representative of the geotechnical engineer prior to placement of subsequent lifts. The edges of compacted fill should extend a minimum of five (5) feet beyond the building footprint, or a distance equal to the depth of fill beneath the footings, whichever is greater. The measurement should be taken from the outside edge of the footing to the toe of the excavation prior to sloping.

In utility trenches, shallow foundation excavations, and other areas where large compaction equipment cannot be used, granular engineered fill should be placed as backfill. PSI recommends the use of material meeting Ohio Department of Transportation (ODOT) No. 304, for use as granular engineered fill. Engineered fill should be placed in accordance with the recommendations stated in this section of the report.

The fill placed should be tested and documented by a geotechnical technician and directed by a geotechnical engineer to evaluate the placement of fill material. It should be noted that the geotechnical engineer of record can only certify the testing that is performed and the work observed by that engineer or staff in direct report to that engineer. The fill should be evaluated in accordance with the following Table:

MATERIAL TESTED	PROCTOR TYPE	MIN % DRY DENSITY	PLACEMENT MOISTURE CONTENT RANGE	FREQUENCY OF TESTING *2
Structural Lean Clay Fill (Cohesive)	Standard	98%	-2 to +2 %	1 per 5,000 ft^2 of fill placed / lift
Structural Fill (Granular)	Standard	98%	-2 to +2 %	1 per 5,000 ft^2 of fill placed / lift
Random Fill (non load bearing)	Standard	90%	-3 to +3 %	1 per 6,000 ft^2 of fill placed / lift
Utility Trench Backfill	Standard	98%	-2 to +2 %	1 per 150 lineal foot / lift

*1 Relative Density as determined in general accordance with ASTM D4253 and D4254. *2 Minimum 2 per lift.

Tested fill materials that do not achieve either the required dry density or moisture content range shall be recorded, the location noted, and reported to the Contractor and Owner. A re-test of that area should be performed after the Contractor performs remedial measures.

Foundation Recommendations

The planned construction can be supported on conventional spread-type footing foundations bearing on either **competent naturally deposited soils, properly compacted and documented engineered fill, or lean concrete monoliths bearing on competent natural soils. Undercutting during foundation excavation must be anticipated due to the old undocumented fill encountered at all of the boring locations.** If it is desired for the planned foundations to bear on properly compacted and documented fill, the geotechnical engineer should be allowed to review the material as to ensure its consistency with the recommended bearing pressures. Spread footings for building columns and continuous footings for bearing walls can be designed for allowable soil bearing pressures of **2,500 pounds per square foot (psf)** based on dead load plus design live load. PSI recommends a minimum dimension of twenty-four (24) inches for square footings and eighteen (18) inches for continuous footings to minimize the possibility of a local bearing capacity failure. The estimated depth of undercutting (depth below existing site grades) is shown in the following Table:

BUILDING BORING NUMBER	FOUNDATION BEARING SOIL DESCRIPTION	ESTIMATED MINIMUM FOOTING UNDERCUT OR FILL REMOVAL DEPTH (FT)*
B-1	Brown Sand & Gravel	5.5
B-2	Brown Sandy Clay	6.5
B-3	Brown Sandy Clay	3.0

* Depth below existing site grade at the time of drilling

New footings adjacent to the existing building should be placed at the same elevation as the

existing foundations. Where excavations are extended adjacent to, and below, the footings supporting the existing building, it will be necessary to underpin those footings to transmit their loads to the same elevation as the new foundations. If required, an evaluation of this condition should be made by PSI. Care should be exercised where excavations are performed nearby by to the existing structure so as to prevent undermining of the existing foundations, floor slabs and pavements. Temporary shoring may be needed if safe lateral distances are not available to accommodate a stable slope for the excavation sidewalls. New foundations must be designed for the superimposed loads from the existing footings. Minor relative differential settlement between the new and existing construction should be expected. Construction joints should be provided between the existing building and the addition.

Exterior footings and footings in unheated areas should be located at a depth of thirty-six (36) inches or deeper below the final exterior grade to provide adequate frost protection. If the building is to be constructed during the winter months or if footings will likely be subjected to freezing temperatures after foundation construction, then the footings should be protected from freezing. PSI recommends that interior footings be a minimum depth of eighteen (18) inches below the finished floor elevation.

The foundation excavations should be observed and documented by a representative of PSI prior to steel or concrete placement to assess that the foundation materials are consistent with the materials discussed in this report, and therefore are capable of supporting the design loads. Soft or loose soil zones encountered at the bottom of the footing excavations should be removed to the level of suitable natural soils, and replaced with adequately compacted structural fill. Fill placed below the foundations where unsuitable materials are removed should extend one (1) foot outside the foundation limits for every one (1) foot in thickness between the intended bearing surface and the underlying, suitable natural soils. Alternately, the foundations may be extended through unsuitable soils to bear on the underlying suitable material. Cavities formed as a result of excavation of soft or loose soil zones should be backfilled with lean concrete or dense graded compacted crushed stone.

After opening, footing excavations should be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond. If possible, the foundation concrete should be placed during the same day the excavation is made. If it is required that footing excavations be left open for more than one day, they should be protected to reduce evaporation or entry of moisture.

Based on the known subsurface conditions and site geology, laboratory testing and past experience, PSI anticipates that properly designed and constructed footings supported on the recommended materials should experience total and differential settlement between adjacent columns of less than one (1) inch and ¾ inch, respectively.

Be advised that as a part of the foundation selection process, there is a cost/benefit evaluation. Although PSI is recommending a specific foundation type, we have not accomplished the cost/benefit evaluation.

Earthquake and Seismic Design Consideration

The 2007 International Building Code requires a site class for the calculation of earthquake design forces. This class is a function of soil type (i.e., depth of soil and strata types). Based on the depth

to rock and the estimated shear strength of the soil at the boring locations, **Site Class "D"** is recommended. The USGS-NEHRP probabilistic ground motion values near latitude 39.7862° and longitude -84.1732° are as follows:

Period (seconds)	2% Probability of Event in 50 years * (%g)	Site Coefficients	Max. Spectral Acceleration parameters	Design Spectral Acceleration parameters	
PGA	9.3	---	---	--	
0.2 (S_s)	18.9	F_a = 1.600	S_{ms} = 0.302	S_{Ds}= 0.202	T_0= 0.110
1.0 (S_1)	6.9	F_v = 2.400	S_{m1} = 0.166	S_{D1}= 0.110	T_s= 0.548

The Site Coefficients, F_a and F_v were interpolated from IBC 2007 Tables 1615.1.2(1) and 1615.1.2(2) as a function of the site classifications and the mapped spectral response acceleration at the short (S_s) and 1 second (S_1) periods.

According to Section 1802.2.6 and 1802.2.7 of IBC 2007, sites supporting structures in design category "C" and below must be evaluated for slope instabilities, liquefaction and surface rupture due to faulting or lateral spreading. A detailed study of these effects was beyond PSI's scope of services. However, the following table presents a qualitative assessment of these issues considering the site class, the subsurface soil properties, the groundwater elevation, and probabilistic ground motions:

Hazard	Relative Risk	Comments
Liquefaction	Low	The soil within the upper 50 feet of the subsurface profile is a relatively dense and/or cohesive soil
Slope Stability	Low	The site is relatively flat and does not/will not incorporate significant cut or fill slopes
Surface Rupture	Low	The site is not underlain by a mapped Holocene-aged fault

A more detailed evaluation of these issues can be performed for an additional scope and/or fee.

Floor Slab Recommendations

The floor slab can be grade supported on naturally occurring sandy clay, newly placed and compacted engineered fill, or the existing undocumented sandy clay fill provided the upper twenty-four (24) inches of fill classified as lean clay or sand and is removed and compacted as structural fill. Proof-rolling, as discussed earlier in this report, should be accomplished to identify soft or unstable soils that should be removed from the floor slab area prior to fill placement and/or floor slab construction. These soils should be replaced with properly compacted structural fill as described earlier in this report.

PSI recommends that a minimum four (4) inch thick trimmable, compactable granular material be placed beneath the floor slab to enhance drainage. The soil surface shall be graded to drain away from the building without low spots that can trap water prior to placing the granular drainage layer. Polyethylene sheeting should be placed to act as a vapor retarder where the floor will be in contact with moisture sensitive equipment or products such as tile, wood, carpet, etc., as directed by the design engineer. The decision to locate the vapor retarder in direct contact with the slab or beneath

the layer of granular fill should be made by the design engineer after considering the moisture sensitivity of subsequent floor finishes, anticipated project conditions, and the potential effects of slab curling and cracking. The floor slabs should have an adequate number of joints to reduce cracking resulting from differential movement and shrinkage.

For subgrade prepared as recommended and properly compacted fill, a modulus of subgrade reaction, *k* value, of **100 pounds per cubic inch (pci)** may be used in the grade slab design based on correlation to values typically resulting from a 1 ft. x 1 ft. plate load test. However, depending on how the slab load is applied, the value will have to be geometrically modified. The value should be adjusted for larger areas using the following expression for cohesive and cohesionless soil:

Modulus of Subgrade Reaction, $k_s = (\frac{k}{B})$ for cohesive soil and

$$k_s = k(\frac{B+1}{2B})^2 \text{ for cohesionless soil}$$

where: k_s = coefficient of vertical subgrade reaction for loaded area,
k = coefficient of vertical subgrade reaction for 1 square foot area, and
B = effective width of area loaded, in feet

The precautions listed below should be followed for construction of slab-on-grade pads. These details will not reduce the amount of movement, but are intended to reduce potential damage should some settlement of the supporting subgrade take place. Some increase in moisture content is inevitable as a result of development and associated landscaping. However, extreme moisture content increases can be largely controlled by proper and responsible site drainage, building maintenance and irrigation practices.

- Cracking of slab-on-grade concrete is normal and should be expected. Cracking can occur not only as a result of heaving or compression of the supporting soil and/or bedrock material, but also as a result of concrete curing stresses. The occurrence of concrete shrinkage crack , and problems associated with concrete curing may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement, finishing, and curing, and by the placement of crack control joints at frequent intervals, particularly where re-entrant slab corners occur. The American Concrete Institute (ACI) recommends a maximum panel size (in feet) equal to approximately three times the thickness of the slab (in inches) in both directions. For example, joints are recommended at a maximum spacing of twelve (12) feet based on having a four-inch slab. PSI also recommends that the slab be independent of the foundation walls. Using fiber reinforcement in the concrete can also control shrinkage cracking.
- Areas supporting slabs should be properly moisture conditioned and compacted. Backfill in all interior and exterior water and sewer line trenches should be carefully compacted to reduce the shear stress in the concrete extending over these areas.

Exterior slabs should be isolated from the building. These slabs should be reinforced to function as independent units. Movement of these slabs should not be transmitted to the building foundation or superstructure.

Utilities Trenching

Excavation for utility trenches shall be performed in accordance with OSHA regulations as stated in 29 CFR Part 1926. It should be noted that utility trench excavations have the potential to

degrade the properties of the adjacent fill materials. Utility trench walls that are allowed to move laterally can lead to reduced bearing capacity and increased settlement of adjacent structural elements and overlying slabs.

Backfill for utility trenches is as important as the original subgrade preparation or structural fill placed to support either a foundation or slab. Therefore, it is imperative that the backfill for utility trenches be placed to meet the project specifications for the structural fill of this project. PSI recommends that flowable fill or lean mix concrete be utilized for utility trench backfill. If on-site soils are placed as trench backfill, the backfill for the utility trenches should be placed in four (4) to six (6) inch loose lifts and compacted to a minimum of 98% of the maximum dry density achieved by the standard Proctor test. The backfill soil should be moisture conditioned to be within 2% of the optimum moisture content as determined by the standard Proctor test. Up to four (4) inches of bedding material placed directly under the pipes or conduits placed in the utility trench can be compacted to the 90% compaction criteria with respect to the standard Proctor. Compaction testing should be performed for every 200 cubic yards of backfill place or each lift within 200 linear feet of trench, which ever is less. Backfill of utility trenches should not be performed with water standing in the trench. If granular material is used for the backfill of the utility trench, the granular material should have a gradation that will filter protect the backfill material from the adjacent soils. If this gradation is not available, a geosynthetic non-woven filter fabric should be used to reduce the potential for the migration of fines into the backfill material. Granular backfill material shall be compacted to meet the above compaction criteria. The clean granular backfill material should be compacted to achieve a relative density greater than 75% or as specified by the geotechnical engineer for the specific material used.

Pavement Recommendations

PSI's scope of services did not include extensive sampling and CBR testing of existing subgrade or potential sources of imported fill for the specific purpose of detailed pavement analysis. Instead, this report is based on pavement-related design parameters that are considered to be typical for the area soils types.

In large areas of pavement, or where pavements are subject to significant traffic, a more detailed analysis of the subgrade and traffic conditions should be made. The results of such a study will provide information necessary to design an economical and serviceable pavement.

The recommended thicknesses presented below are considered typical and minimum for the assumed parameters. The client, the owner, and the project principals should be aware that thinner pavement sections might result in increased maintenance costs and lower than anticipated pavement life. The pavement subgrade should be prepared as discussed below.

The PSI recommendation is based on the subgrade soils being prepared to achieve a minimum CBR of three (3). On this basis, it is possible to use a locally typical "standard" pavement section consisting of the following:

RECOMMENDED THICKNESSES (INCHES)		
PAVEMENT MATERIALS *	**CAR PARKING**	**DRIVEWAYS**
Asphaltic Surface Course	1½	1½
Asphaltic Binder Course	2	3½
Crushed stone (3/4-inch minus)	8	12
Or		
Portland Cement Concrete	5	6
Crushed stone (3/4-inch minus)	4	4

*Pavement materials should conform to local and state guidelines, if applicable.

Asphalt Pavement

PSI recommends that the bituminous concrete mix meet the general guidelines as outlined in ODOT Item 448 for the base and surface courses. The granular base course should be built at least 2 feet wider than the pavement on each side to support the tracks of the slipform paver. This extra width is structurally beneficial for wheel loads applied at pavement edge. The asphalt base course should be compacted to a minimum of 92% of the Maximum Theoretical Density as determined by ASTM D2041.

Concrete Pavement

Because the pavement at this site will be subjected to freeze-thaw cycles, PSI recommends that an air entrainment admixture be added to the concrete mix to achieve an air content in the range of 5% to 7% to provide freeze-thaw durability in the concrete. Concrete with a 28 day specified compressive strength of 4,000 psi should be adequate in this area. A mixture with a maximum slump of four (4) inches is acceptable. If a water reducing admixture is specified, the slump can be higher. It is recommended that admixtures be submitted to the owner in advance of use in the concrete.

Pavement for any dumpster areas or areas subject to consistent heavy loads should be constructed of Portland cement concrete with load transfer devices installed where construction joints are required. A thickened edge is recommended on the outside of slabs subjected to wheel loads. This thickened edge usually takes the form of an integral curb. Fill material should be compacted behind the curb or the edge of the outside slabs should be thickened. The following are recommended to enhance the quality of the pavement.

- Moisten subgrade just prior to placement of concrete.
- Cure fresh concrete with a liquid membrane-forming curing compound.
- Keep automobile traffic off the slab for three (3) days and truck traffic off the slab for seven (7) days, unless tests are made to determine that the concrete has gained adequate strength (i.e., usually 70% of design strength).

Pavement Subgrade Preparation

Prior to paving, the prepared subgrade should be proof-rolled using a loaded tandem axle dump truck or similar type of pneumatic tired equipment with a minimum gross weight of nine (9) tons per single axle. Localized soft areas identified should be repaired prior to paving. Moisture content of the subgrade should be maintained between –2% and +3% of the optimum at the time of paving. It may require rework when the subgrade is either desiccated or wet.

Construction traffic should be minimized to prevent unnecessary disturbance of the pavement subgrade. Disturbed areas, as verified by PSI, should be removed and replaced with properly compacted material.

The edges of compacted fill should extend a minimum two (2) feet beyond the edges of the pavement, or a distance equal to the depth of fill beneath the pavement, whichever is greater. The measurement should be taken from the outside edge of the pavement to the toe of the excavation prior to sloping.

Pavement Drainage & Maintenance

PSI recommends pavements be sloped to provide rapid surface drainage. Water allowed to pond on or adjacent to the pavement could saturate the subgrade and cause premature deterioration of the pavements, and removal and replacement may be required. **It must be emphasized that if water is allowed to pond beneath the pavement, then freeze-thaw cycles will cause subsequent heaving of the pavement section (and ultimately failure).** Consideration should be given to the use of interceptor drains to collect and remove water collecting in the granular base. The interceptor drains could be incorporated with the storm drains of other utilities located in the pavement areas.

Periodic maintenance of the pavement should be anticipated. This should include sealing of cracks and joints and by maintaining proper surface drainage to avoid ponding of water on or near the pavement areas. Underdrains, sub-drains and underslab drains presented in this report will not prevent moisture vapor that can cause mold growth.

CONSTRUCTION CONSIDERATIONS

PSI should be retained to provide observation and testing of construction activities involved in the foundation, earthwork, and related activities of this project. PSI cannot accept responsibility for conditions that deviate from those described in this report, nor for the performance of the foundation system if not engaged to also provide construction observation and testing for this project.

Moisture Sensitive Soils/Weather Related Concerns

The upper fine-grained soils encountered at this site will be sensitive to disturbances caused by construction traffic and to changes in moisture content. During wet weather periods, increases in the moisture content of the soil can cause significant reduction in the soil strength and support capabilities. In addition, soils that become wet may be slow to dry and thus significantly retard the progress of grading and compaction activities. It will, therefore, be advantageous to perform earthwork and foundation construction activities during dry weather.

Drainage and Groundwater Considerations

PSI recommends that the Contractor determine the actual groundwater levels at the site at the time of the construction activities to assess the impact groundwater may have on construction. Water should not be allowed to collect in the foundation excavation, on floor slab areas, or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of collected rainwater, groundwater, or surface runoff. Positive site drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slabs. The grades should be sloped away from the building and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and floor slab areas of the building.

Excavations

In Federal Register, Volume 54, Number 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its "Construction Standards for Excavations, 29 CFR, part 1926, Subpart P". This document was issued to better enhance the safety of workers entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, basement excavation or footing excavations, be constructed in accordance with the new OSHA guidelines. It is PSI's understanding that these regulations are being strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractor's "responsible person", as defined in 29 CFR Part 1926, should evaluate the soil exposed in the excavations as part of the contractor's safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations.

PSI is providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor's or other parties' compliance with local, state, and federal safety or other regulations.

GEOTECHNICAL RISK

The concept of risk is an important aspect of the geotechnical evaluation. The primary reason for this is that the analytical methods used to develop geotechnical recommendations do not comprise an exact science. The analytical tools which geotechnical engineers use are generally empirical and must be used in conjunction with engineering judgment and experience. Therefore, the solutions and recommendations presented in the geotechnical evaluation should not be considered risk-free and, more importantly, are not a guarantee that the interaction between the soils and the proposed structure will perform as planned. The engineering recommendations presented in the preceding section constitutes PSI's professional estimate of those measures that are necessary for the proposed structure to perform according to the proposed design based on the information generated and referenced during this evaluation, and PSI's experience in working with these conditions.

REPORT LIMITATIONS

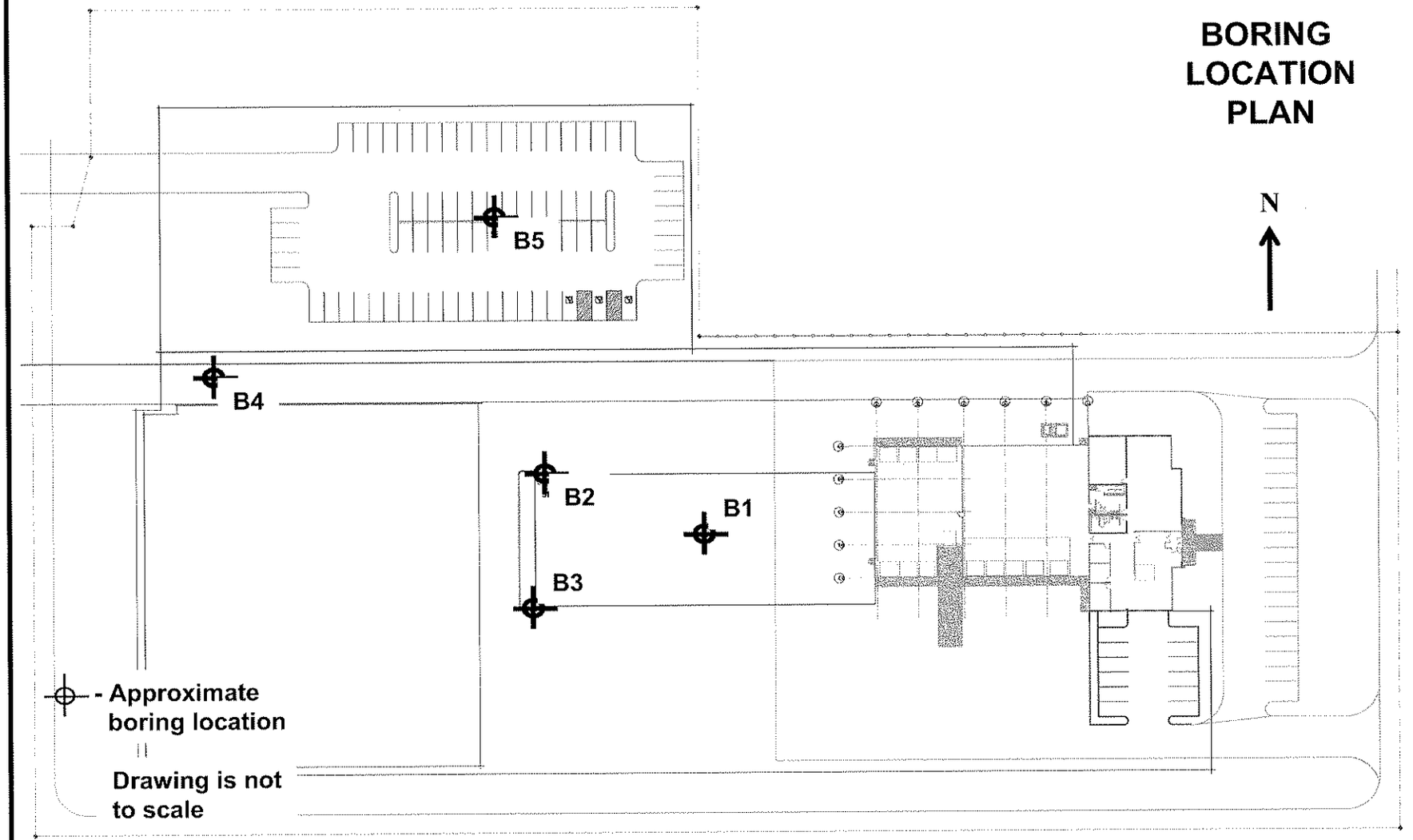
The recommendations submitted are based on the available subsurface information obtained by PSI and design details furnished by Stone Environmental Engineering & Science. If there are revisions to the plans for this project or if deviations from the subsurface conditions noted in this report are encountered during construction, PSI should be notified immediately to determine if changes in the foundation recommendations are required. If PSI is not retained to perform these functions, PSI will not be responsible for the impact of those conditions on the project.

The geotechnical engineer warrants that the findings, recommendations, specifications, or professional advice contained herein have been made in accordance with generally accepted professional geotechnical engineering practices in the local area. No other warranties are implied or expressed.

After the plans and specifications are more complete, the geotechnical engineer should be retained and provided the opportunity to review the final design plans and specifications to check that our engineering recommendations have been properly incorporated into the design documents. At that time, it may be necessary to submit supplementary recommendations. This report has been prepared for the exclusive use of Stone Environmental Engineering & Science for the specific application to the proposed Dayton Power & Light facility located at 1317 Troy Street in Dayton, Ohio.

Appendix

BORING LOCATION PLAN



PSI Information To Build On
Engineering • Consulting • Testing

Proposed DP&L Facility Addition
1317 Troy Street
Dayton, Ohio

PSI Project
No. 0105300

BORING LOG

PSI No.: **0105300**

Client: **Stone Environmental Engineering & Science**

Project: **Proposed DP&L Facility Addition - 1317 Troy Street, Dayton, Ohio**

Boring No.: **1** (1 of 1) | Total Depth **15.0'** | Elev: **N/A±** | Location: **See Boring Location Plan**

Type of Boring: **3 1/4" HSA** | Started: **1/28/11** | Completed: **1/28/11** | Driller: **JE**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows / REC/RQD	Sample Depth (Feet)	N VALUE (bpf) PL %MC LL (10 20 30 40 50 60 70 80 90)	qp (tsf)	REC (in)
	0.8	Crushed Limestone (9")					
		Brown fine to medium SAND **FILL**, little gravel, moist					
	2.5	Stiff to Very Stiff, Dark Brown SANDY CLAY **FILL**, trace gravel, moist	6-4-3	2.5		1.75	16
				4.0			
	5.5			5.0			
		Medium Dense to Dense, Brown SAND & GRAVEL, moist	6-7-7	6.5		2.75	11
				8.5			
			8-12-23	10.0		-	16
				13.5			
			7-14-23			-	12
	15.0	End of borehole at 15 feet.		15.0			

BL_STD 0105300 DP&L FACILITY ADDITION.GPJ PSI_STD.GDT 2/17/11

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments for regular sampling. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

BORING LOG

PSI No.: **0105300**

Client: **Stone Environmental Engineering & Science**

Project: **Proposed DP&L Facility Addition - 1317 Troy Street, Dayton, Ohio**

Boring No.: **2** (1 of 1) | Total Depth **15.0'** | Elev: **N/A±** | Location: **See Boring Location Plan**

Type of Boring: **3 1/4" HSA** | Started: **1/28/11** | Completed: **1/28/11** | Driller: **JE**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows / REC/RQD	Sample Depth (Feet)	N VALUE (bpf) PL %MC LL (10 20 30 40 50 60 70 80 90)	qp (tsf)	REC (in)
	0.2	ASPHALT (2")					
	0.7	Crushed Limestone Base (6")					
	1.5	Brown fine to medium SAND **FILL**, little gravel, moist					
	2.3	Dark Brown SANDY CLAY **FILL**, trace gravel and brick fragments, moist		2.5			
	2.8	CONCRETE					
		Soft to Firm, Dark Brown SANDY CLAY **FILL**, trace gravel, moist	54-7-5	4.0		-	8
				5.0			
			2-2-1			0.50	6
	6.5	Brown SANDY CLAY, trace gravel, miost		6.5			
	8.7	Medium Dense, Brown SAND & GRAVEL, moist	3-6-5	8.5		-	8
				10.0			
				13.5			
			7-7-7			-	8
	15.0	End of borehole at 15 feet.		15.0			

BL_STD 0105300 DP&L FACILITY ADDITION.GPJ PSI_STD.GDT 2/17/11

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments for regular sampling. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

BORING LOG

PSI No.: **0105300**

Client: **Stone Environmental Engineering & Science**

Project: **Proposed DP&L Facility Addition - 1317 Troy Street, Dayton, Ohio**

Boring No.: **3** (1 of 1) | Total Depth **15.0'** | Elev: **N/A±** | Location: **See Boring Location Plan**

Type of Boring: **3 1/4" HSA** | Started: **1/28/11** | Completed: **1/28/11** | Driller: **JE**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows / REC/RQD	Sample Depth (Feet)	N VALUE (bpf) PL %MC LL (10 20 30 40 50 60 70 80 90)	qp (tsf)	REC (in)
	0.5	Crushed Limestone (6")		0.0			
		Brown fine to medium SAND **FILL**, little gravel, moist	50/5"	1.5		-	5
	1.8	Dark Brown, High Plasticity SANDY CLAY **FILL**, trace gravel, moist		2.5			
	3.0	Very Stiff, Brown Lean SANDY CLAY, trace gravel, moist	4-6-7	4.0		3.5	12
	4.0	Medium Dense, Brown SAND & GRAVEL, moist		5.0			
			13-11-10	6.5		-	13
				8.5			
			8-8-12	10.0		-	14
	13.0	Hard, Light Brown SANDY CLAY, trace gravel, moist		13.5			
	14.5		6-17-18			4.5+	18
	15.0	Dense, Brown SAND & GRAVEL, moist		15.0			
		End of borehole at 15 feet.					

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments for regular sampling. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

BL_STD 0105300 DP&L FACILITY ADDITION.GPJ PSI_STD.GDT 2/17/11

BORING LOG

PSI No.: **0105300**

Client: **Stone Environmental Engineering & Science**

Project: **Proposed DP&L Facility Addition - 1317 Troy Street, Dayton, Ohio**

Boring No.: **4** (1 of 1) | Total Depth **10.0'** | Elev: **N/A±** | Location: **See Boring Location Plan**

Type of Boring: **3 1/4" HSA** | Started: **1/28/11** | Completed: **1/28/11** | Driller: **JE**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows / REC/RQD	Sample Depth (Feet)	N VALUE (bpf) PL %MC LL (10 20 30 40 50 60 70 80 90)	qp (tsf)	REC (in)
	0.8	TOPSOIL FILL (10")	2-3-3	0.0		-	4
		Stiff to Very Stiff, Dark Brown SANDY CLAY **FILL**, trace gravel and cinders, moist		1.5			
			3-6-21	2.5		2.25	12
				4.0			
			3-2-3	5.0		1.25	12
	6.5	Medium Dense, Brown SAND & GRAVEL, moist		6.5			
			3-4-7	8.5		-	8
	10.0	End of borehole at 10 feet.		10.0			

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments for regular sampling. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

BL_STD 0105300 DP&L FACILITY ADDITION.GPJ PSI_STD.GDT 2/17/11

BORING LOG

PSI No.: **0105300**

Client: **Stone Environmental Engineering & Science**

Project: **Proposed DP&L Facility Addition - 1317 Troy Street, Dayton, Ohio**

Boring No.: **5** (1 of 1) | Total Depth **10.0'** | Elev: **N/A±** | Location: **See Boring Location Plan**

Type of Boring: **3 1/4" HSA** | Started: **1/28/11** | Completed: **1/28/11** | Driller: **JE**

Elevation	Depth	DESCRIPTION OF MATERIALS (Classification)	* Sample Blows / REC/RQD	Sample Depth (Feet)	qp (tsf)	REC (in)
	0.7	TOPSOIL FILL (8")	2-2-4	0.0	-	9
	1.8	Dark Brown, Lean SANDY CLAY **FILL**, trace gravel, root fibers and cinders, moist		1.5		
		Very Stiff, Brown SANDY CLAY, trace gravel, moist	2-3-5	2.5	2.5	7
	4.0			4.0		
		Medium Dense, Brown SAND & GRAVEL, moist		5.0		
			21-13-13	6.5	-	10
				8.5		
			11-14-15		-	0
	10.0			10.0		
		End of borehole at 10 feet.				

N VALUE (bpf) — PL %MC LL — 10 20 30 40 50 60 70 80 90

BL_STD 0105300 DP&L FACILITY ADDITION.GPJ PSI_STD.GDT 2/17/11

*Number of blows required for a 140 lb hammer dropping 30" to drive 2" O.D., 1.375" I.D. sampler a total of 18 inches in three 6" increments for regular sampling. The sum of the second and third increments of penetration is termed the standard penetration resistance, N.

Professional Service Industries, Inc.
5599 Webster Avenue
Dayton, OH 45414

Phone: (937) 898-1200
Fax: (937) 898-1230

Aggregate/Soil Test Report

Report No: MAT:0105300-1-S1
Issue No: 1

Client: STONE ENVIRONMENTAL
14 WEST FIRST STREET
DAYTON, OH 45344

CC:

Project: DP&L OFFICE/TRUCK GARAGE ADD
DAYTON, OH

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Approved Signatory: Mark Salveter (Branch Manager)

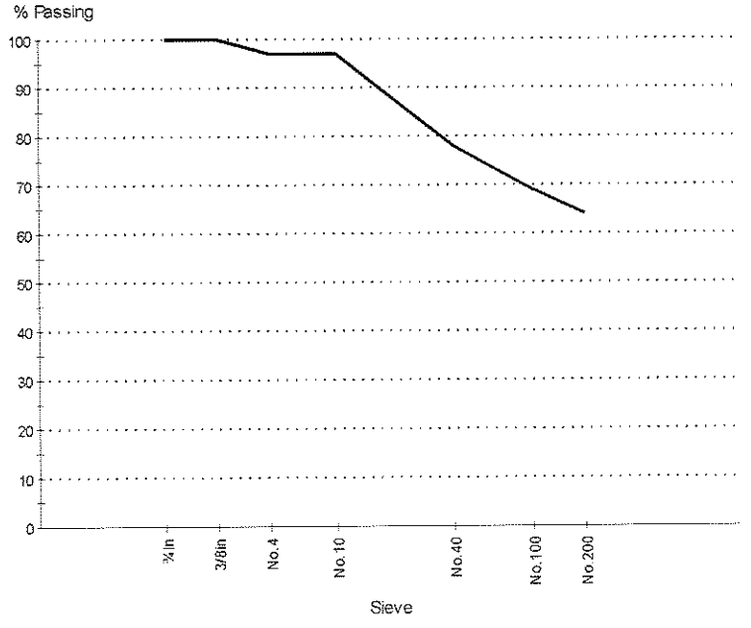
Date of Issue: 2/17/2011

Sample Details

Sample ID:	0105300-1-S1
Client Sample ID:	
Date Sampled:	02/09/11
Sampled By:	Mark Salveter
Specification:	Sieve with #200 Wash
Supplier:	
Source:	
Material:	Dark Brown SANDY CLAY
Sampling Method:	
General Location:	B-1 2.5' - 4'
Location:	B-1 2.5' - 4'

Sample Description:

Particle Size Distribution



Grading: ASTM C 136 - 06, ASTM C 117 - 04

Drying by: Oven

Date Tested:

Sieve Size	% Passing	Limits
¾in	100	
3/8in	100	
No.4	97	
No.10	97	
No.40	78	
No.100	69	
No.200	64	

COBBLES	GRAVEL		SAND			FINES (64.0%)	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
(0.0%)	(0.0%)	(3.0%)	(0.0%)	(19.0%)	(14.0%)		

D85: 0.0186 D60: 0.0431 D50: 0.0108
D30: 0.0007 D15: 0.0001 D10: 0.0000

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Dayton, OH 45414

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Aggregate/Soil Test Report

Report No: MAT:0105300-1-S2
Issue No: 1

Client: STONE ENVIRONMENTAL
14 WEST FIRST STREET
DAYTON, OH 45344

CC:

Project: DP&L OFFICE/TRUCK GARAGE ADD
DAYTON, OH

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Approved Signatory: Mark Salveter (Branch Manager)

Date of Issue: 2/17/2011

Sample Details

Sample ID:	0105300-1-S2 Lift:
Client Sample ID:	
Date Sampled:	02/09/11
Sampled By:	Mark Salveter
Specification:	Sieve with #200 Wash
Supplier:	
Source:	
Material:	Dark Brown SANDY CLAY
Sampling Method:	
General Location:	B-3, 2.5' - 3'
Location:	B-3, 2.5' - 3'

Other Test Results

Description	Method	Result	Limits
Liquid Limit	ASTM D 4318 - 05	63	
Method		Method A	
Plastic Limit		34	
Plasticity Index		29	
Sample history		Oven-dried	
Material retained on 425µm (No. 40) (%)		0.0	

Particle Size Distribution

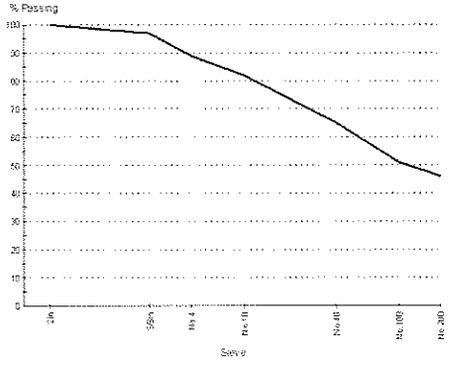
Method: ASTM C 136 - 06, ASTM C 117 - 04

Drying by: Oven

Date Tested:

Sieve Size	% Passing	Limits
2in	100	
3/8in	97	
No.4	89	
No.10	82	
No.40	65	
No.100	51	
No.200	46	

Chart



Comments

N/A

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Dayton, OH 45414

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Fax: (937) 898-1230

Aggregate/Soil Test Report

Report No: MAT:0105300-1-S3
Issue No: 1

Client: STONE ENVIRONMENTAL
14 WEST FIRST STREET
DAYTON, OH 45344

CC:

Project: DP&L OFFICE/TRUCK GARAGE ADD
DAYTON, OH

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Approved Signatory: Mark Salveter (Branch Manager)

Date of Issue: 2/17/2011

Sample Details

Sample ID: 0105300-1-S3 Lift:
Client Sample ID:
Date Sampled: 02/09/11
Sampled By: Mark Salveter
Specification:

Supplier:
Source:
Material: Brown SANDY CLAY, trace gravel
Sampling Method:
General Location: B-3, 3' - 4'
Location: B-3, 3' - 4'

Other Test Results

Description	Method	Result	Limits
Liquid Limit	ASTM D 4318 - 05	29	
Method		Method A	
Plastic Limit		17	
Plasticity Index		12	
Sample history		Air-dried	
Material retained on 425µm (No. 40) (%)		0.0	

Particle Size Distribution

Method:
Drying by:
Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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Aggregate/Soil Test Report

Report No: MAT:0105300-1-S4
Issue No: 1

Client: STONE ENVIRONMENTAL
14 WEST FIRST STREET
DAYTON, OH 45344

CC:

Project: DP&L OFFICE/TRUCK GARAGE ADD
DAYTON, OH

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Approved Signatory: Mark Salveter (Branch Manager)

Date of Issue: 2/17/2011

Sample Details

Sample ID:	0105300-1-S4 Lift:
Client Sample ID:	
Date Sampled:	02/09/11
Sampled By:	Mark Salveter
Specification:	
Supplier:	
Source:	
Material:	Dark Brown SANDY CLAY
Sampling Method:	
General Location:	B-5, 1' - 1.5'
Location:	B-5, 1' - 1.5'

Other Test Results

Description	Method	Result	Limits
Liquid Limit	ASTM D 4318 - 05	42	
Method		Method A	
Plastic Limit		25	
Plasticity Index		17	
Sample history		Air-dried	
Material retained on 425µm (No. 40) (%)		0.0	

Particle Size Distribution

Method:

Drying by:

Date Tested:

Sieve Size	% Passing	Limits

Chart

Comments

N/A

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