ADDENDUM NUMBER THREE (3)
TO
JONATHAN CREEK SOIL RECLAMATION PROJECT
PROJECT NO. 17.00158

This Addendum Number Three (3) is issued this the 6th day of December, 2017 to all parties who hold a set of Bid Documents for the project entitled: **"Jonathan Creek Soil Reclamation Project"**. This Addendum Number Three (3) shall become part of the Contract Documents and its receipt acknowledged on the bid documents at the time of bidding.

The following additions, revisions, and/or clarifications shall be made to the Contract Documents:

General

A. Attached is a Geotechnical Report for the soil which will be brought to the Jonathan Creek Soil Reclamation Site. The Geotechnical Report will become a part of the bidding and contract documents. The soil which will be brought to the Jonathan Creek Soil Reclamation Site is coming from the area surrounding boring B-6 and B-7.

B. For the Iran Divestment Form please use 17.00158 for the Bid Number and the Contract Number.

Bid Documents

C. Bid Schedule

Replace the Bid Schedule with the attached Bid Schedule which includes item 1a Clearing and Grubbing.

D. Measurement and Payment – Item 1a – Clearing and Grubbing

Include the following text in the Measurement and Payment for pay item 1a Clearing and Grubbing:

ITEM 1A – CLEARING AND GRUBBING

Work included in this line item of payment shall include all clearing and grubbing within the limits of disturbance shown on the Drawings, stockpiling material onsite, and final placement on top of proposed contours.

The quantity of clearing and grubbing will be paid for at the contract lump sum price in accordance with the Contract Documents. The lump sum price will be the full compensation for all labor, equipment, and materials necessary for clearing and grubbing (topsoil or vegetative material) onsite as described in these specifications

and/or shown on the Drawings. No compensation will be given for clearing and grubbing outside of the limits of disturbance without prior approval from Engineer. Included in this item is the stockpile of the clear and grubbed material onsite. After compacted material has satisfied the proposed contours and has been approved by the Engineer, the clear and grubbed material will be spread evenly across the site prior to seeding. This placement of the stockpiled materials is included in this line item.

E. Bid Form – Article 6.01

Replace the entirety of 6.01 with the following text:

Bidder agrees that the Work will be substantially complete within 90 calendar days after the date when the Contract Times commence to run as provided in the Modified General Conditions, and will be completed and ready for final payment in accordance with the Modified General Conditions within 110 calendar days after the date when the Contract Times commence to run.

F. Modified General Agreement – Article 3.02A

Replace the entirety of 3.02A with the following text:

The Work will be substantially completed within 90 calendar days, and completed and ready for final payment in accordance with the Modified General Conditions within 110 calendar days.

G. Modified General Agreement – Article 3.03A

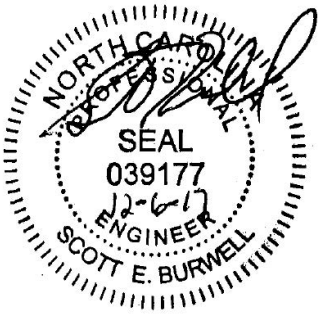
Replace the entirety of 3.03A with the following text:

Contractor and Owner recognize that time is of the essence and that Owner will suffer financial loss if the Work is not completed within the times specified in Paragraph 3.02 above, plus any extensions thereof allowed in accordance with Article 12 of the Modified General Conditions. The parties also recognize the delays, expense, and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring any such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty), Contractor shall pay Owner **$100.00** for each calendar day that expires after the time specified in Paragraph 3.02 above for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the Contract Time or any proper extension thereof granted by Owner, Contractor shall pay Owner **$100.00** for each calendar day that expires after the time specified in Paragraph 3.02 above for completion and readiness for final payment until the Work is completed and ready for final payment.

This Addendum Number Three (3) is issued this the 6th day of December, 2017.

McGILL ASSOCIATES, P.A.
CONSULTING ENGINEERS
ASHEVILLE, NORTH CAROLINA
17.00158

END OF ADDENDUM NO. 3



BID SCHEDULE

ITEM #	DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL AMOUNT
1	Mobilization/General Requirements	LS	1		
1a	Clearing and Grubbing	LS	1		
2	Skimmer Sediment Basin	LS	1		
3	Permanent Diversion Ditch	LF	1050		
4	Slope/Ditch Matting	SY	1200		
5	Erosion Control Maintenance for County Installed Measures	LS	1		
6	Earthwork	CY	35000		
7	Undercut Excavation, Remain Onsite	CY	1500		
8	Select Backfill	CY	750		
9	Washed Stone for Base Stabilizaiton	TON	1215		
10	Geogrid for Base Stabilization	SY	2250		
11	Seeding	LS	1		
				TOTAL BID PRICE	

August 11, 2016

Mr. Don Warren
PM Environmental, Inc.
8320 University Executive Park Drive, Suite 106
Charlotte, NC 28262

Revised Report of Preliminary Geotechnical Exploration
Waynesville Retail Shopping Center
Waynesville, North Carolina
KEG Project No. JA16-3085-01

Mr. Warren:

Kessel Engineering Group, PLLC (KEG) is pleased to submit this report of preliminary geotechnical exploration for the proposed Waynesville Retail Shopping Center project in Waynesville, North Carolina. The purpose of this preliminary exploration was to explore the general subsurface conditions at the site and to provide preliminary geotechnical recommendations for the proposed project.

PROJECT INFORMATION

Project information was provided by Mr. Don Warren of PM Environmental, Inc. in various recent emails and during a July 20, 2016 on-site meeting with our Mr. Bernie Kessel, P.E. and Ms. Courtney King, P.E. We have also been provided with the following digital documents pertaining to the project:

- *4575.00 Frazier at Russ Waynesville-SK4-20150715-over topo.pdf*, showing the proposed site layout superimposed over existing topographic contours.
- *4575.00 Frazier at Russ Waynesville-SK4-20150715-over aerial.pdf*, showing the proposed site layout superimposed over existing aerial photography.
- An aerial of the site indicated the requested boring 9 boring locations and requested boring depths.

The project site is located in the mountains of Western North Carolina. The project site is roughly pie-shaped and is bound by US Highway 74, Russ Avenue and Frazier Street in Waynesville, North Carolina (reference attached *Site Location Plan*). The majority of the site consists of a relatively gently sloping, low lying area that is currently occupied by multiple buildings, paved areas and grassed areas. The northeast portion of the site is situated roughly 15 to 20 feet higher in elevation and is occupied by a hotel and associated pavements. The westernmost portion of the site consists of a grassed field which slopes downhill to the east and southeast toward the main portion of the site.

Project plans include the construction of a new 49,098 sf retail shopping center, a 7,200 sf outparcel building, and associated parking lots and infrastructure components at the project site. Detailed site grading plans have not been provided. Detailed foundation loading has not been provided; however, for the purpose of this exploration, we have assumed maximum individual column and continuous wall loads are on the order of 200 kips and 10 kips per linear foot, respectively.

FIELD EXPLORATION

The site was explored by performing 7 soil test borings and 2 hand auger borings at the approximate locations shown on the attached *Field Exploration Plan*. Soil test borings extended to depths of 10 to 30 feet beneath the existing ground surface or asphalt surface. Hand auger borings extended to refusal

depths of 20 to 24 inches beneath the existing asphalt surface. Boring locations were determined in the field by our Ms. Courtney King, P.E. with the assistance of Mr. Don Warren by referencing the provided plans and identifiable site landmarks. The ground surface elevation at each boring location was estimated by referencing the 5 feet contour intervals shown on the provided plans.

Soil test borings were advanced by mechanically twisting a continuous flight steel hollow-stem auger into the ground. Soil sampling and penetration testing were performed in general accordance with ASTM D1586. At assigned intervals, soil samples were obtained using a standard 1.4-inch I.D., 2-inch O.D., split-tube sampler. The sampler was first seated 6 inches to penetrate loose cuttings and then driven an additional 12 inches with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final 12 inches was recorded and is designated the "standard penetration resistance." The penetration resistance, once properly evaluated, is an index to the strength of the soil and foundation supporting capability. Representative portions of the soil samples collected by the soil test borings were placed in sealed containers and transported to the laboratory where they were visually classified by a geotechnical engineer.

Hand auger borings extended through asphalt core holes and were advanced by manually twisting a sharpened steel auger into the subgrade. Asphalt cores were extracted using a rotary core drill with a 6-inch diameter core bit. The materials encountered were identified in the field from cuttings brought to the surface by the auger. Where auger refusal was encountered in aggregate base course materials, the bottom of the boring was advanced further downward with the assistance of a pry bar and hammer. Asphalt cores were collected and transported to our laboratory where they were measured to determine the average thickness of each core in accordance with ASTM D3549.

Soil test borings and hand auger borings were backfilled with soil cuttings at the completion of the field work. Borings that were advanced through asphalt were also capped relatively flush with the surrounding pavement with asphalt cold patch material. Soil descriptions and penetration resistance data are tabulated on the soil test boring logs (B-1, B-2, B-3, B-4, B-5, B-6 and B-7) and hand auger boring logs (HAB-1 and HAB-2) attached to this report.

SITE GEOLOGY

The project site is located in the Blue Ridge Physiographic Province. The bedrock in this region is a complex crystalline formation that has been faulted and contorted by past tectonic movements. The rock has weathered to residual soils which form the mantle for the hillsides and hilltops. The typical residual soil profile in areas not disturbed by erosion or grading consists of clayey soils near the surface where weathering is more advanced, underlain by sandy silts and silty sands.

The boundary between soil and rock is not sharply defined and there is often a transitional zone, termed "partially weathered rock" overlying the parent bedrock. Partially weathered rock (PWR) is defined, for engineering purposes, as residual material with a standard penetration resistance in excess of 100 blows per foot. Weathering is facilitated by fractures, joints, and the presence of less resistant rock types. Consequently, the profile of the partially weathered rock is irregular even over short horizontal distances. Also, it is not unusual to find lenses and boulders of hard rock and/or zones of partially weathered rock within the soil mantle, well above the general bedrock level.

Quite often, the upper soils along drainage features and in flood plain areas are water-deposited (alluvial) materials that have been eroded and washed down from adjacent higher ground. These alluvial soils are usually soft and compressible, having never been consolidated by pressures in excess of their present overburden.

SUBSURFACE CONDITIONS

The following descriptions provide a summary of the subsurface conditions encountered by the soil test borings and hand auger borings. The attached logs contain information recorded at each boring location. The lines designating the interfaces between various strata represent approximate boundaries and the transition between strata may be gradual. Subsurface conditions may vary between boring locations.

Soil Test Borings

Soil test borings B-1 and B-2 were performed in the field on the western side of the project site. With the exception of surficial fill at B-2, soil test borings B-1 and B-2 encountered residuum until their termination depths of 10 feet and 25 feet, respectively.

Soil test borings B-3, B-4 and B-5 were performed in proximity to existing buildings on the central portion of the project site. Soil test borings B-3, B-4 and B-5 encountered fill and alluvium to depths of 5½ to 12 feet underlain by residuum.

Soil test borings B-6 and B-7 were performed adjacent to the hotel on the (upper) northeastern portion of the project site. Soil test borings B-6 and B-7 encountered residuum from the ground surface to their termination depths of 30 feet beneath the existing ground surface. The subsurface conditions encountered by the soil test borings are summarized in the following table:

SUMMARY OF ENCOUNTERED SUBSURFACE CONDITIONS ENCOUNTERED BY SOIL TEST BORINGS
(MEASURED IN FEET BELOW THE EXISTING GROUND SURFACE)

Soil Test Boring	Fill and/or Alluvium	Residuum	Termination Depth
B-1	-	0 to 10	10
B-2	0 to 3	3 to 25	25
B-3	0 to 5½	5½ to 20	20
B-4	0 to 8	8 to 30	30
B-5	0 to 12	12 to 20	20
B-6	-	0 to 30	30
B-7	-	0 to 30	30

"-" = material not encountered

At the time of drilling, groundwater was encountered by B-2 at 14 feet, by B-3 at 5½ feet, by B-4 at 8½ feet and by B-5 at 17 feet. Soil test borings B-3 and B-4 were left open until the end of the day and groundwater was re-measured at depths of 2 to 2½ feet beneath the existing ground surface. Immediately after the completion of drilling, B-1, B-5, B-6 and B-7 were caved and dry at depths of 3 feet, 12½ feet, 18 feet and 15½ feet, respectively. Borehole cave-in often occurs in the vicinity of the groundwater level. Ground water levels may fluctuate several feet with seasonal rainfall variations and with changes in the water level in drainage features. Normally, the highest groundwater levels occur in late winter and spring and the lowest levels occur in late summer and fall.

The fill encountered by the soil test borings consisted of very loose and loose silty sands some of which contained trace topsoil and fingerling roots. The alluvium consisted of firm to stiff sandy silts, loose clayey sands and loose silty sands. The alluvium encountered by B-4 and B-5 also contained trace fragments of rounded cobbles. The residuum consisted of soft to very stiff sandy silts, very loose to dense silty sands and partially weathered rock.

Hand Auger Borings
Hand auger borings HAB-1 and HAB-2 were performed on Frazier Street. Hand auger boring HAB-1 encountered 4¼ inches of asphalt underlain by at least 20 inches of aggregate base course materials. Hand auger boring HAB-2 encountered 4½ inches of asphalt underlain by at least 24 inches of aggregate base course materials. Hand auger borings were unable to penetrate the aggregate base course material.

PRELIMINARY CONCLUSIONS AND RECOMMENDATIONS
As noted previously, this exploration is preliminary and should be used for planning and to determine feasibility of the proposed project. However, assuming subsurface conditions encountered by the borings are representative of subsurface conditions elsewhere at the site, the following preliminary conclusions and recommendations should be applicable for this site.

Shallow Groundwater
The soil test borings performed for this exploration encountered shallow groundwater. As noted previously, groundwater was encountered by B-3 and B-4 at depths of 2 to 2½ feet beneath the existing ground surface. Additionally, B-1 was dry and caved at a depth of 3 feet which may be an indication of shallow groundwater. Shallow groundwater may be present elsewhere at the site at varying depths.

While site grading plans and building elevations have yet to be determined, we anticipate that groundwater control will be required in order to accommodate the proposed construction. Groundwater control can be accomplished by the installation of a subsurface system of French drains which capture and control groundwater to gravity flow into the site stormwater drainage system. Dewatering may also be accomplished by means of gravity ditches and pumping from gravel-lined cased sumps.

We recommend that groundwater be lowered to an elevation of at least 2 feet below the bearing elevation of proposed foundations and to an elevation of at least 4 feet below the proposed pavement surfaces. If areas containing shallow groundwater are to be raised with newly placed earthwork fills, dewatering will likely be required in order to accommodate the placement of engineered fill. In these areas, we recommend that groundwater be temporarily lowered to an elevation of at least 2 feet below the ground existing ground surface.

Existing Fill and Alluvium
The soil test borings performed for this exploration encountered existing fill and alluvium. As noted previously, existing fill and alluvium were encountered by B-2, B-3, B-4 and B-5 to depths of up to 3 to 12 feet beneath the existing ground surface. Existing fill and alluvium may be present elsewhere at the site at varying depths. The existing fill and alluvium encountered by the borings had N-values ranging from 4 to 11 blows per foot and contained some trace topsoil and fingerling roots.

While the majority of the existing fill and alluvium appears suitable to support the proposed construction, the type and consistency of these materials varies considerably. As such, we anticipate that some isolated areas of existing fill and alluvium will require remediation in order to accommodate the proposed construction.

Areas containing existing fill and alluvium which are to provide subgrade support for foundations, grade-slabs, pavements and newly placed earthwork fills may require remediation. Remediation will likely be limited to select undercutting to depths of 1 to 2 feet and replacement with engineered fill (described below in the *Engineered Fill* section of this report). However, it may be possible that additional remedial measures will be required such as additional undercutting, the installation of geogrid reinforcement or the placement of select backfill. Once project plans are more definitive, we recommend that the existing fill

and alluvium be further explored as discussed below in the *Supplemental Geotechnical Exploration* section of this report.

Foundations

While details regarding the exact location and elevation of the proposed buildings have yet to be finalized, soil test boring data indicates that the site is suitable to support the proposed buildings on shallow foundations. As noted in the preceding sections of this report, groundwater control and remediation of existing fill and alluvium will likely be required at the site. Assuming these items are addressed, foundations may be preliminarily designed for allowable soil bearing pressures of 2,000 to 3,000 psf depending on column location, load intensity, foundation depths, and locations. Based on our experience with similar soils, loading as described should produce settlements within tolerable limits for most conventional commercial buildings. At a minimum, we recommend that the minimum widths for individual column and continuous wall footings be 30 and 24 inches, respectively. The minimum widths are considered advisable to provide a margin of safety against a local or punching shear failure of the foundation soils. Additionally, footings should bear at least 36 inches below final grade to develop the recommended bearing pressures, provide frost protection, and provide protective embedment.

Floor Slabs and Pavements

Assuming the presence of shallow groundwater and the presence of exiting fill and alluvium are addressed, the on-site soils and newly placed engineered fill constructed atop the same will provide suitable subgrade support for properly designed floor slabs and pavement systems. The design of floor slabs and pavements should be based on testing of existing in-place soils or laboratory testing of proposed borrow soils which will provide direct subgrade support for the slabs and pavements. However, based on our experience on similar projects in this region, we offer the following preliminary recommendations for pavement section assuming a 15 to 20 year service life:

PRELIMINAY RECOMMENDATIONS FOR PAVEMENT SECTIONS			
Pavement Type	Layer	Material	Thickness (inches)
Flexible (Light Duty)	Surface	SF-9.5A or SF-9.5B Superpave	2.0
	Base	Aggregate Base Course	8.0
Flexible (Heavy Duty)	Surface	SF-9.5A or SF-9.5B Superpave	1.5
	Intermediate	I-19.0B Superpave	2.5
	Base	Aggregate Base Course	8.0

The asphalt surface and intermediate courses should conform to the North Carolina Department of Transportation (NCDOT) Standard Specification, Section 610, for Type SF-9.5A and I-19.0B Superpave mixtures. The base course material should be Aggregate Base Course conforming to NCDOT Standard Specification, Section 520. The base course should be compacted to at least 100 percent of the modified Proctor (ASTM D 1557) maximum dry density. Related civil design factors such as subgrade drainage, shoulder support, cross-sectional configurations, surface elevations, and environmental factors which will significantly affect the service life must be included in the preparation of the construction drawings and specifications. Normal periodic maintenance will be required.

Hand auger boring data indicates that new pavements planned along Frazier Street could be successfully constructed atop the existing pavement section with some remediation. We note that the existing pavements along Frazier Street contain isolated areas of distress which mostly appear to be associated

with the construction of underground utility lines. Once project plans are more definitive, we recommend that the existing pavements along Frazier Street be further explored as discussed below in the *Supplemental Geotechnical Exploration* section of this report.

Abandoning Existing Structures and Utilities
A number of existing site features such as buildings, pavements and sidewalks are to be demolished prior to construction. Existing utilities will also require relocation or abandonment. This work should include the removal of construction debris. Existing abandoned utilities should be removed and the resulting trenches filled with engineered fill or abandoned utilities should be plugged prior to construction. If pipes are not removed or plugged, they may serve as conduits for subsurface erosion resulting in settlement. Trench backfill over left-in-place utility lines may require densification or replacement.

Earthwork
The residual soils encountered by the soil test borings generally appear suitable for use as engineered fill. However, adjustments in moisture content may be required in order to achieve appropriate compaction. Earthwork should include proofrolling the existing soil subgrade prior to the placement of earthwork fills. Earthwork should also include proofrolling the resultant soil subgrade in the area of earthwork cuts prior the installation of foundations, grade-slabs and pavements. Proofrolling will help identify any soft areas.

Engineered Fill
Engineered fill used for raising site grades should be uniformly compacted in thin (6-inch to 12-inch loose measure) lifts to at least 95 percent of the standard Proctor maximum dry density (ASTM D-698) and within 3 percent of optimum moisture content. In general, soils with a unit weight of less than 95 pcf and having a Plasticity Index (PI) greater than 30 (less than 15 is preferable) and should not be used for engineered fill. Borrow materials should be free of concentrated organics and organic debris.

Before filling operations begin, representative samples of each proposed fill material should be collected and tested to determine the compaction and classification characteristics and to verify its suitability for use as engineered fill. The maximum dry density and optimum moisture content should be determined. Once compaction begins, a sufficient number of density tests should be performed by an engineering technician working under the direction of the geotechnical engineer to measure the degree of compaction being obtained.

Retaining Walls (if planned)
Detailed grading plans have not yet been developed for this site. However, we anticipate that site retaining walls may be utilized to accommodate finished grades along the upper, northeastern portion of the site. The design of site retaining walls constructed on sloping sites is often governed by global stability. Sloping conditions and global stability should be considered during retaining wall design.

The following soil parameters are recommended for use in developing preliminary lateral earth pressures for retaining wall feasibility evaluation. For walls retaining undisturbed residuum, we recommend an angle of internal friction value of 30 degrees, a cohesion value of zero psf, and a soil unit weight of 120 pcf be utilized to develop preliminary lateral earth pressures. Depending on final site grading plans, it may be necessary to collect undisturbed field samples and perform triaxial shear laboratory testing in order to determine soil strength parameters for final design purposes.

Provision for drainage of water which collects behind retaining structures should be provided. The drainage system should have sufficient capacity to prevent the buildup of excess hydrostatic head behind retaining walls. The drainage system should incorporate appropriately graded sand and aggregate material or geotextile fabric to prevent the loss of fines which could be transported in the drainage system. Drain cleanouts should be provided.

Slopes
Confined excavations such as for utility installation should conform to OSHA regulations. Our experience suggests that permanent cut and fill slopes placed on a suitable foundation should be constructed at 2H:1V (Horizontal:Vertical) or flatter. Fill slopes should be adequately compacted. Cut and fill slope surfaces should be protected from erosion by grassing or other means. Permanent slopes of 3H:1V or flatter may be desirable for mowing.

Seismic Site Classification
As previously noted, building locations have not been provided at this time. However, based on the definitions of the North Carolina State Building Code and our experience in this area, the soil boring data gathered during this preliminary geotechnical exploration indicate this site will have a seismic site classification of "D." Seismic site classification for proposed structures should be determined after building locations have been finalized.

Additional Geotechnical Evaluation
This exploration is preliminary in nature and should be used for general site planning and feasibility evaluation only. Further exploration and evaluation will be required prior to design of the foundations, grade slabs and pavements. The scope of additional geotechnical work will depend on the proposed building locations, finished floor elevations, actual loading conditions, pavement plans along Frazer Street, etc. Additional subsurface exploration and evaluation would likely require additional borings, test pits, pavement analysis and laboratory testing. Once the project plans are more definite we will be pleased to discuss more specifically requirements of the next phase of the geotechnical exploration.

BASIS OF RECOMMENDATIONS
Our evaluation of the general foundation support conditions for this preliminary geotechnical exploration has been based on our understanding of the project information and the data obtained in our field exploration. The general subsurface conditions utilized in our evaluation of foundations are based on interpolation of subsurface data between the widely spaced borings. In evaluating the data obtained in this preliminary geotechnical exploration, we have examined previous correlations between penetration resistances and foundation bearing pressures observed in soil conditions similar to those at the site.

We appreciate the opportunity to offer our professional services on this project. If you have any questions concerning this report, please do not hesitate to contact us. We hope that you will give KEG consideration to providing additional geotechnical and construction materials testing services as this project enters the next phase.

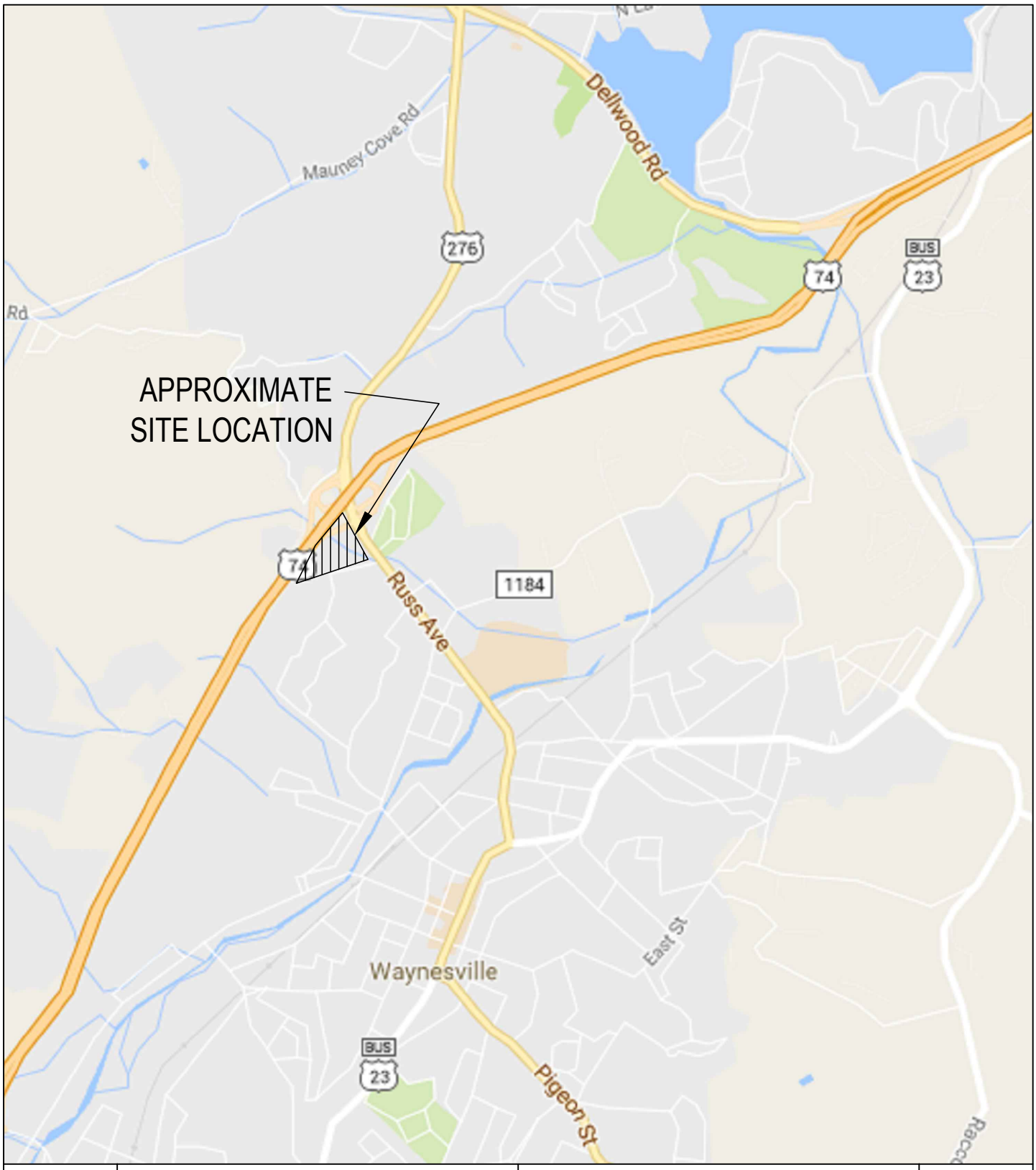
Sincerely,
KESSEL ENGINEERING GROUP, LLC (Firm License No. P-0420)

NORTH CAROLINA PROFESSIONAL SEAL 33838 8-11-16 ENGINEER COURTNEY A. KING

Courtney A. King, P.E.
Senior Engineer
Registered, North Carolina 33838

Bernie Kessel (CAK)
Bernie Kessel, P.E.
Principal Engineer
Registered, North Carolina 21108

Attachments: Site Location Plan (Figure 1)
Field Exploration Plan (Figure 2)
Soil Test Borings Logs (B-1, B-2, B-3, B-4, B-5, B-6 and B-7)
Hand Auger Boring Logs (HAB-1 and HAB-2)
Key to Soil Classifications and Consistency Descriptions
Distribution: Mr. Don Warren of PM Environmental, Inc.; via email to warren@pmenv.com



N	SITE LOCATION PLAN PROJECT NO. JA16-3085-01 DATE: 08-09-2016	WAYNESVILLE RETAIL SHOPPING CENTER WAYNESVILLE, NORTH CAROLINA	FIGURE 1

KESSEL ENGINEERING GROUP
582 HENDERSONVILLE ROAD SUITE ONE | ASHEVILLE NC 28803 | P:[828] 277-6351 | F:[828] 277-6355
WWW.THEKESSELGROUP.COM

N

KESSEL ENGINEERING GROUP

WAYNESVILLE RETAIL SHOPPING CENTER
WAYNESVILLE, NORTH CAROLINA
KEG PROJECT NO: JA16-3085-01

FIELD EXPLORATION PLAN DATE: 08-09-2016
REFERENCE: Waynesville NC Parcel Map with Proposed Geo Borings - Revised 2016-07-18.

0 50' 100' 200'
SCALE: 1" = 100'-0"

FIGURE
2

KESSEL ENGINEERING GROUP
582 HENDERSONVILLE ROAD SUITE ONE | ASHEVILLE NC 28803 | P:[828] 277-6351 | F:[828] 277-6355
WWW.THEKESSELGROUP.COM

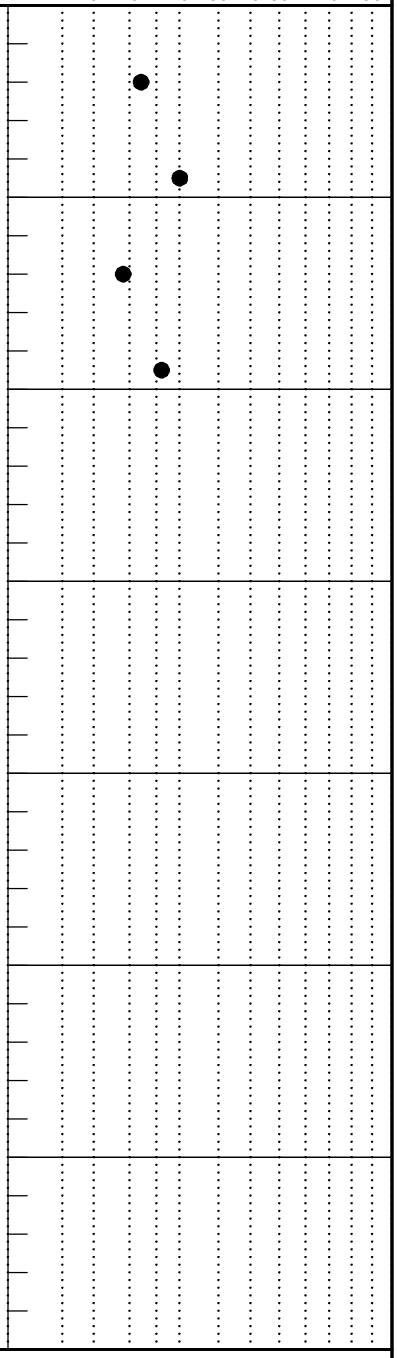
SOIL TEST BORING NO. B-1

KESSEL ENGINEERING GROUP

PROJECT:	Waynesville Retail Shopping Center	PROJECT NO.:	JA16-3085-01
CLIENT:	PM Environemtal, Inc.	DATE START:	7-24-16 END: 7-24-16
LOCATION:	See Figure 1	ELEVATION:	2715 (feet)
DRILLER:	Jordan Environmental	LOGGED BY:	C. King
DRILLING METHOD:	Hollow Stem Auger		

DEPTH TO - WATER> INITIAL: ▽ _____ AFTER 24 HOURS: ▼ _____ CAVING> 3 ft

ELEVATION/ DEPTH (FT)	DESCRIPTION	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT
	Grass and Fingerling Roots		
	Stiff and Very Stiff, Red, Reddish Orange and Gray, Slightly Clayey, Sandy SILT (Residuum)	4 5 7	N = 12
		3 6 14	N = 20
2710 — 5	Loose to Firm, Reddish Orange and Brown, Micaceous, Silty, Fine to Medium SAND	3 4 5	N = 9
		4 7 9	N = 16
2705 — 10	Boring terminated at 10.0 feet. No groundwater encountered at time of boring. Borehole dry and caved at 3 feet at time of boring.		
2700 — 15			
2695 — 20			
2690 — 25			
2685 — 30			



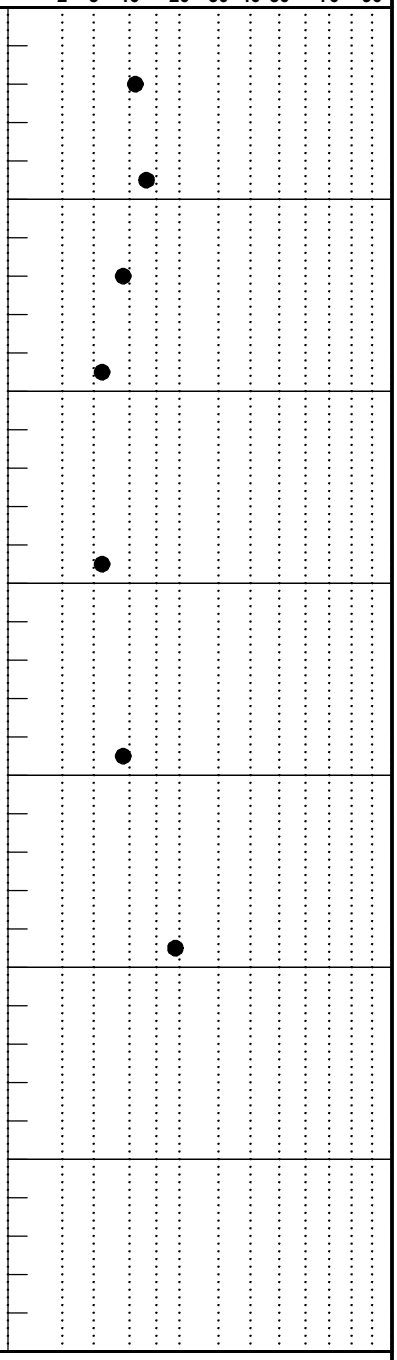
SOIL TEST BORING NO. B-2

KESSEL ENGINEERING GROUP

PROJECT:	Waynesville Retail Shopping Center	PROJECT NO.:	JA16-3085-01
CLIENT:	PM Environemtal, Inc.	DATE START:	7-24-16 END: 7-24-16
LOCATION:	See Figure 1	ELEVATION:	2710 (feet)
DRILLER:	Jordan Environmental	LOGGED BY:	C. King
DRILLING METHOD:	Hollow Stem Auger		

DEPTH TO - WATER> INITIAL: ▽ 14 ft AFTER 24 HOURS: ▼ CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT
	Grass and Fingerling Roots		
	Loose, Brown and Gray, Silty, Fine SAND with Trace Topsoil (Fill)	4 5 6	N = 11
	Stiff, Brown and Gray, Sandy SILT (Residuum)	5 6 7	N = 13
2705 — 5	Firm to Soft, Tan and Gray, Moist, Micaceous, Sandy SILT	7 7 2	N = 9
2700 — 10		1 2 4	N = 6
	Loose, Brown, Tan and White, Wet, Micaceous, Silty, Fine SAND		
2695 — 15		1 2 4	N = 6
2690 — 20		3 3 6	N = 9
	Firm, Brown and White, Wet, Very Micaceous, Silty, Fine SAND		
2685 — 25		5 7 12	N = 19
	Boring terminated at 25.0 feet. Groundwater encountered at 14 feet at time of boring.		
2680 — 30			



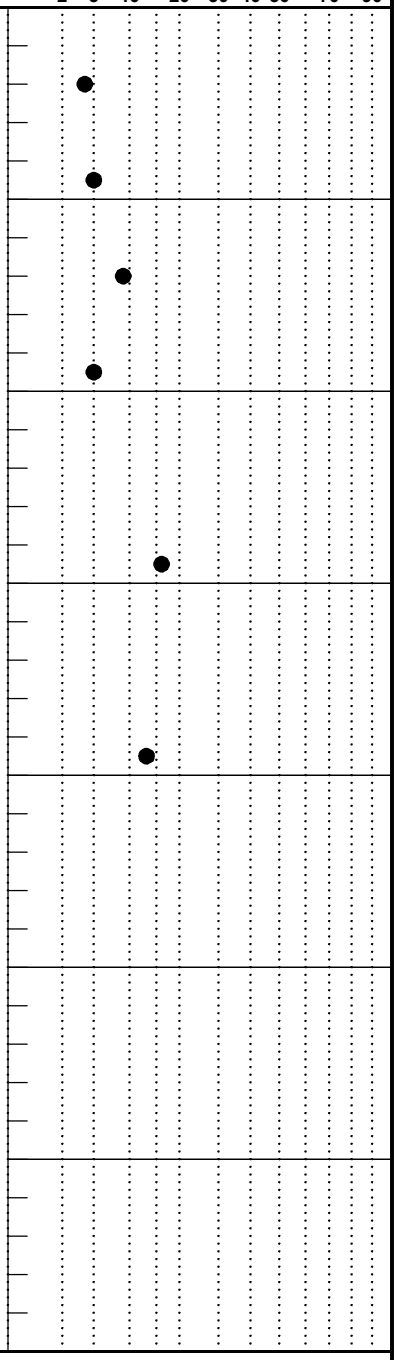
SOIL TEST BORING NO. B-3

KESSEL ENGINEERING GROUP

PROJECT:	Waynesville Retail Shopping Center	PROJECT NO.:	JA16-3085-01
CLIENT:	PM Environemtal, Inc.	DATE START:	7-24-16 END: 7-24-16
LOCATION:	See Figure 1	ELEVATION:	2710 (feet)
DRILLER:	Jordan Environmental	LOGGED BY:	C. King
DRILLING METHOD:	Hollow Stem Auger		

DEPTH TO - WATER> INITIAL: 5.5 ft AFTER 6 HOURS: 2 ft CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT
	Grass and Fingerling Roots		
	Very Loose, Brown, Slightly Micaeous, Silty, Fine to Medium SAND (Fill)	2 2 2	N = 4
	Loose, Brown and Gray, Slightly Micaceous, Silty, Fine SAND with Trace Fingerling Roots (Fill or Alluvium)	4 2 3	N = 5
2705 — 5			
	Loose to Firm, Brown, White and Tan, Wet, Very Micaceous, Silty, Fine to Coarse SAND (Residuum)	3 4 5	N = 9
		2 2 3	N = 5
2700 — 10			
		4 9 7	N = 16
2695 — 15			
		4 5 8	N = 13
2690 — 20	Boring terminated at 20.0 feet. Groundwater encountered at 5.5 feet at time of boring and 2 feet 6 hours after drilling.		
2685 — 25			
2680 — 30			



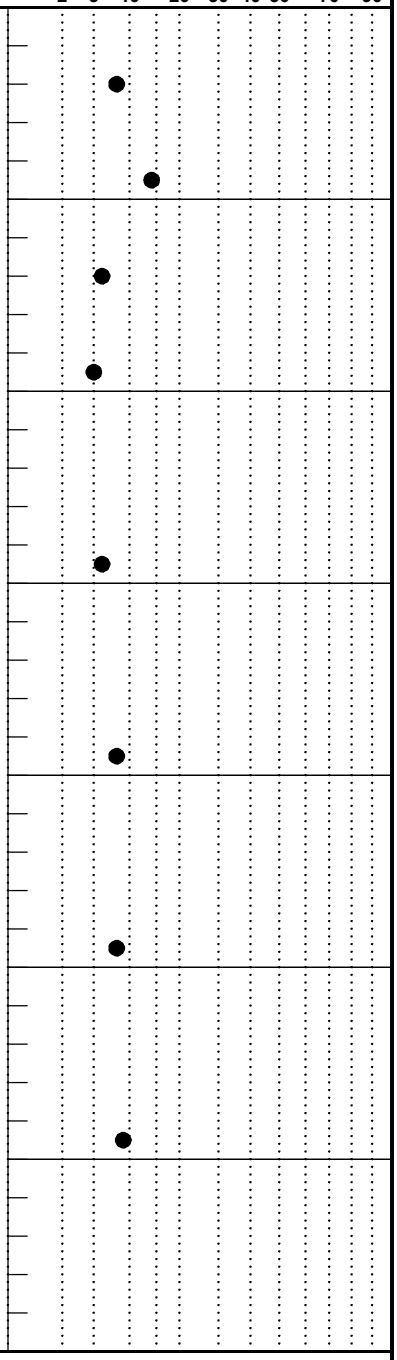
SOIL TEST BORING NO. B-4

KESSEL ENGINEERING GROUP

PROJECT:	Waynesville Retail Shopping Center	PROJECT NO.:	JA16-3085-01
CLIENT:	PM Environemtal, Inc.	DATE START:	7-24-16 END: 7-24-16
LOCATION:	See Figure 1	ELEVATION:	2710 (feet)
DRILLER:	Jordan Environmental	LOGGED BY:	C. King
DRILLING METHOD:	Hollow Stem Auger		

DEPTH TO - WATER> INITIAL: 8.5 ft AFTER 5 HOURS: 2.5 ft CAVING>

ELEVATION/ DEPTH (FT)	DESCRIPTION	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT
	ASPHALT		
	STONE BASE		
	Loose, Orange and White, Slightly Micaceous, Silty, Fine SAND (Fill)	2 4 4	N = 8
	Stiff, Brown and Gray, Wet, Sandy SILT (Alluvium)	8 8 6	N = 14
2705 — 5			
	Firm, Brown, Wet, Sandy SILT with Fragments of Rounded Cobbles (Alluvium)	3 3 3	N = 6
	Firm, Gray and Brown, Wet, Micaceous, Sandy SILT (Residuum)	2 3 2	N = 5
2700 — 10			
	Loose, Brown and Gray, Wet, Very Micaceous, Silty, Fine to Medium SAND	3 3 3	N = 6
2695 — 15			
		3 3 5	N = 8
2690 — 20			
		3 3 5	N = 8
2685 — 25			
		4 3 6	N = 9
2680 — 30	Boring terminated at 30.0 feet. Groundwater encountered at 8.5 feet at time of boring and 2.5 feet 5 hours after drilling.		



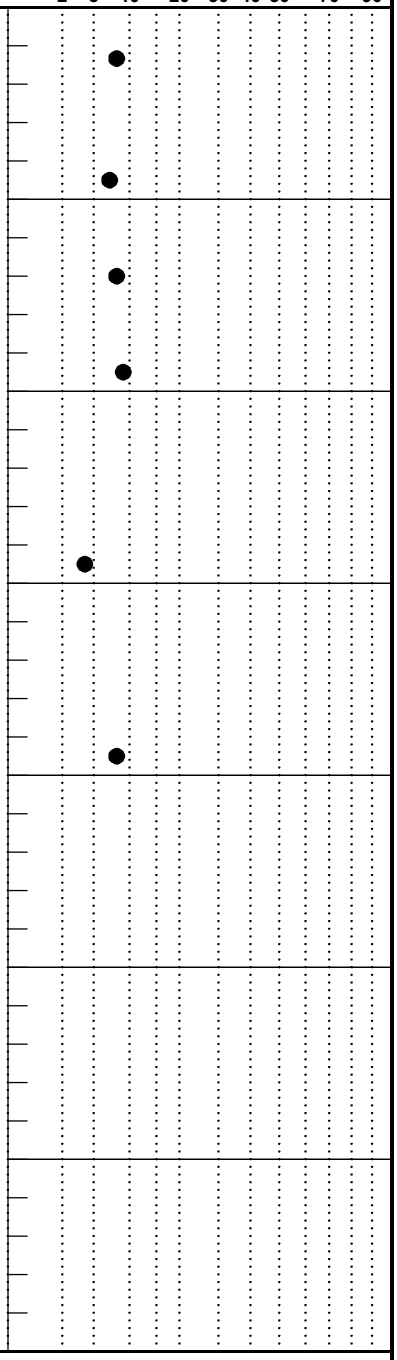
SOIL TEST BORING NO. B-5

KESSEL ENGINEERING GROUP

PROJECT:	Waynesville Retail Shopping Center	PROJECT NO.:	JA16-3085-01
CLIENT:	PM Environemtal, Inc.	DATE START:	7-24-16 END: 7-24-16
LOCATION:	See Figure 1	ELEVATION:	2695 (feet)
DRILLER:	Jordan Environmental	LOGGED BY:	C. King
DRILLING METHOD:	Hollow Stem Auger		

DEPTH TO - WATER> INITIAL: ▽ 17 ft AFTER 24 HOURS: ▼ _____ CAVING> 12.5 ft

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT	
	GRAVEL				
	Loose, Brown, Micaceous, Silty, Fine to Medium SAND (Fill)		3 4 4	N = 8	
			3 3 4	N = 7	
2690 — 5					
	Loose, Brown, Micaceous, Silty, Fine to Medium SAND with Trace Topsoil and Fingerling Roots (Fill)		3 4 4	N = 8	
	Loose, Gray, Clayey SAND with Trace Fragments of Rounded Cobbles (Alluvium)		5 5 4	N = 9	
2685 — 10					
	Very Loose, Gray, Brown and White, Wet, Micaceous, Silty SAND (Residuum)		2 2 2	N = 4	
2680 — 15					
	Loose, Gray, Brown and White, Wet, Micaceous, Silty SAND (Residuum)		2 3 5	N = 8	
2675 — 20	Boring terminated at 20.0 feet. Groundwater encountered at 17 feet at time of boring. Borehole dry and caved at 12.5 feet at time of boring.				
2670 — 25					
2665 — 30					



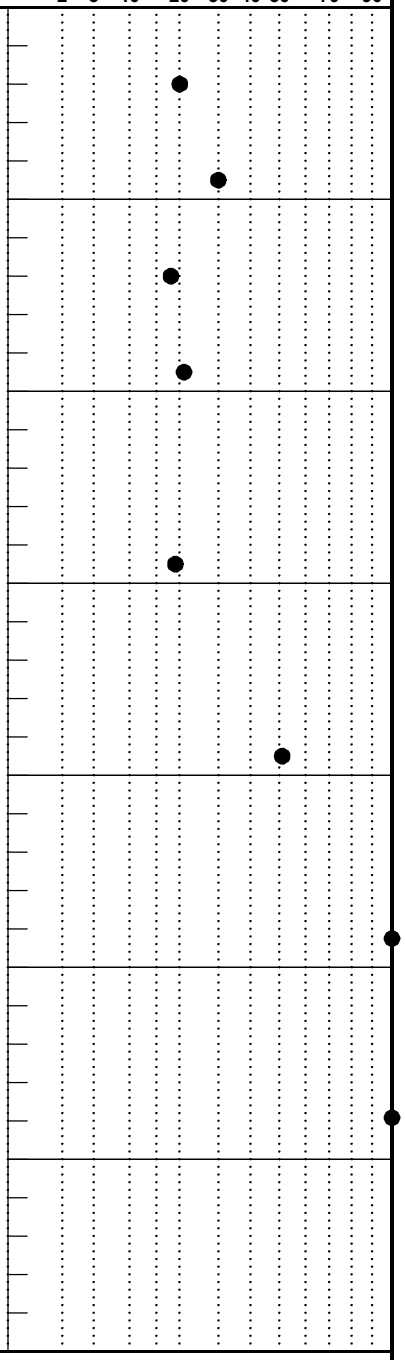
SOIL TEST BORING NO. B-6

KESSEL ENGINEERING GROUP

PROJECT:	Waynesville Retail Shopping Center	PROJECT NO.:	JA16-3085-01
CLIENT:	PM Environemtal, Inc.	DATE START: 7-24-16	END: 7-24-16
LOCATION:	See Figure 1	ELEVATION:	2720 (feet)
DRILLER:	Jordan Environmental	LOGGED BY:	C. King
DRILLING METHOD:	Hollow Stem Auger		

DEPTH TO - WATER> INITIAL: ▽ _____ AFTER 24 HOURS: ▼ _____ CAVING> 18 ft

ELEVATION/ DEPTH (FT)	DESCRIPTION	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT
	ASPHALT		
	STONE		
	Firm, Very Firm and Dense, Brown, Orange, Gray and Black, Micaceous, Silty, Fine to Medium SAND (Residuum)	5 7 13	N = 20
2715 — 5		12 14 16	N = 30
		7 8 10	N = 18
2710 — 10		6 8 13	N = 21
2705 — 15		9 9 10	N = 19
2700 — 20		28 23 28	N = 51
	PARTIALLY WEATHERED ROCK which sampled as Dark Brown, Wet, Very Micaceous, Silty, Fine to Medium SAND	15 32 50/3	N = 50/3
2695 — 25		35 50/4	N = 50/4
2690 — 30	Boring terminated at 30.0 feet. No groundwater encountered at time of boring. Borehole dry and caved at 18 feet at time of boring.		



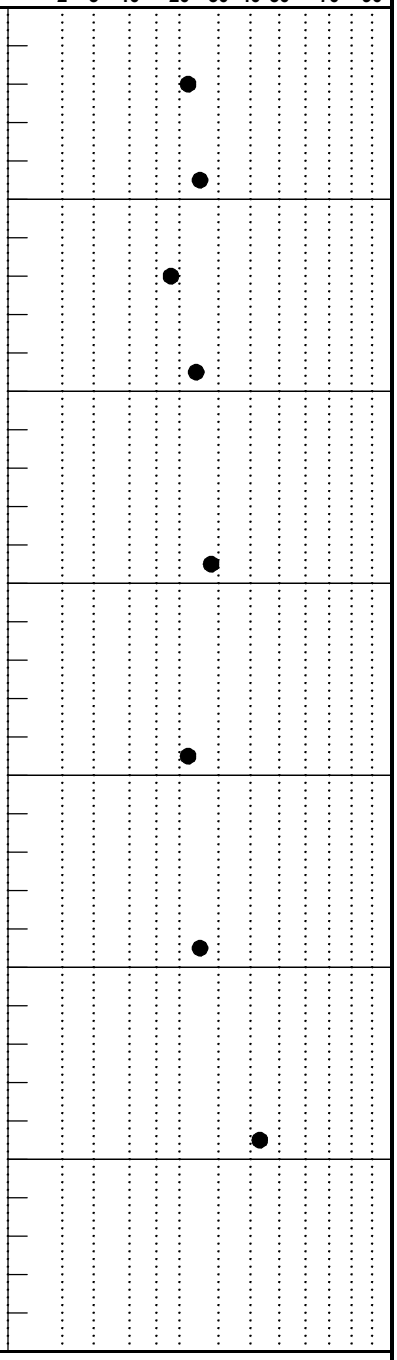
SOIL TEST BORING NO. B-7

KESSEL ENGINEERING GROUP

PROJECT:	Waynesville Retail Shopping Center	PROJECT NO.:	JA16-3085-01
CLIENT:	PM Environemtal, Inc.	DATE START:	7-24-16 END: 7-24-16
LOCATION:	See Figure 1	ELEVATION:	2720 (feet)
DRILLER:	Jordan Environmental	LOGGED BY:	C. King
DRILLING METHOD:	Hollow Stem Auger		

DEPTH TO - WATER> INITIAL: ▽ _____ AFTER 24 HOURS: ▼ _____ CAVING> 15.5 ft

ELEVATION/ DEPTH (FT)	DESCRIPTION	SAMPLES	STANDARD PENETRATION RESULTS BLOWS/FOOT
	ASPHALT		
	STONE		
	Very Firm, Tan and Brown, Micaceous, Silty, Fine to Medium SAND (Residuum)	7 10 12	N = 22
2715 — 5		7 9 16	N = 25
		4 5 13	N = 18
2710 — 10		11 11 13	N = 24
	Very Firm, Dark Brown, Orange and White, Very Micaceous, Silty, Fine to Coarse SAND		
2705 — 15		9 12 16	N = 28
2700 — 20		5 9 13	N = 22
2695 — 25		8 10 15	N = 25
	Dense, Dark Brown, Orange and White, Wet, Very Micaceous, Silty, Fine to Coarse SAND		
2690 — 30		12 16 27	N = 43
	Boring terminated at 30.0 feet. No groundwater encountered at time of boring. Borehole dry and caved at 15.5 feet at time of boring.		



HAND AUGER BORING NO. HAB-1

KESSEL ENGINEERING GROUP

PROJECT:	Waynesville Retail Shopping Center	PROJECT NO.:	JA16-3085-01
CLIENT:	PM Environemtal, Inc.	DATE START:	7-26-16 END: 7-26-16
LOCATION:	See Figure 1	ELEVATION:	2705 (feet)
PERFORMED BY:	KEG Representatives	LOGGED BY:	L. Barnhill
DRILLING EQUIPMENT:	Hand Auger		

DEPTH TO - WATER> INITIAL: ▽ _____ AFTER 24 HOURS: ▼ _____ CAVING> _____

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES
	4.25 Inches ASPHALT		
	20-Inches AGGREGATE BASE COURSE		
2704			
2	Hand auger refusal encountered at 2.1 feet. No groundwater encountered at time of boring.		
2702			
4			
2700			
6			
2698			
8			
2696			
10			
2694			
12			
2692			

Below a depth of 12 inches hole was explored by pry bar and hammer.

HAND AUGER BORING NO. HAB-1
Sheet 1 of 1

HAND AUGER BORING NO. HAB-2

KESSEL ENGINEERING GROUP

PROJECT: Waynesville Retail Shopping Center
PROJECT NO.: JA16-3085-01
CLIENT: PM Environemtal, Inc.
DATE START: 7-26-16 END: 7-26-16
LOCATION: See Figure 1
ELEVATION: 2690 (feet)
PERFORMED BY: KEG Representatives
LOGGED BY: L. Barnhill
DRILLING EQUIPMENT: Hand Auger
DEPTH TO - WATER> INITIAL: ▽ _____ AFTER 24 HOURS: ▼ _____ CAVING> _____

ELEVATION/ DEPTH (FT)	DESCRIPTION	SOIL TYPE	SAMPLES
	4.5 Inches ASPHALT		
	24-Inches AGGREGATE BASE COURSE		
2688 — 2			
	Hand auger refusal encountered at 2.5 feet. No groundwater encountered at time of boring.		
2686 — 4			
2684 — 6			
2682 — 8			
2680 — 10			
2678 — 12			

Below a depth of 12 inches hole was explored by pry bar and hammer.

HAND AUGER BORING NO. HAB-2
Sheet 1 of 1

KEY TO SOIL CLASSIFICATIONS AND CONSISTENCY DESCRIPTIONS

Penetration Resistance* Blows per Foot	Relative Density
SANDS	
0 to 4	Very Loose
5 to 10	Loose
11 to 20	Firm
21 to 30	Very Firm
31 to 50	Dense
over 50	Very Dense

Particle Size Identification

Boulder: Greater than 300 mm
Cobble: 75 to 300 mm
Gravel:
Coarse - 19 to 75 mm
Fine - 4.75 to 19 mm
Sand:
Coarse - 2 to 75 mm
Medium - 0.425 to 2 mm
Fine - 0.075 to 0.425 mm
Silts & Clay: Less than 0.075 mm

Penetration Resistance* Blows per Foot	Consistency
SILTS and CLAYS	
0 to 2	Very Soft
3 to 4	Soft
5 to 8	Firm
9 to 15	Stiff
16 to 30	Very Stiff
31 to 50	Hard
over 50	Very Hard

* ASTM D 1586

KEY TO DRILLING SYMBOLS

Grab Sample

Split Spoon Sample

Undisturbed Sample

Groundwater Table at Time of Drilling

Groundwater Table 24 Hours after Completion of Drilling

KEY TO SOIL CLASSIFICATIONS

Well-graded Gravel
GW

Low Plasticity Clay
CL

Clayey Silt
MH

Silty Sand
SM

Poorly-graded Gravel
GP

Sandy Clay
CLS

Sandy Silt
MLS

Topsoil
TOPSOIL

Partially Weathered Rock
BLDRCBBL

Silty Clay
CL-ML

Sand
SW

Bedrock
BEDROCK

High Plasticity Clay
CH

Silt
ML

Clayey Sand
SC

Concrete
AS