KAW VALLEY ENGINEERING, INC.

GEOTECHNICAL ENGINEERING REPORT
POTTAWATOMIE COUNTY JUSTICE CENTER
ARMER STREET AND NORTH 1ST STREET
WESTMORELAND, KANSAS

Prepared For:

POTTAWATOMIE COUNTY, KANSAS
207 North 1st Street
Westmoreland, Kansas

Prepared By:

KAW VALLEY ENGINEERING, INC.
14700 West 114th Terrace
Lenexa, Kansas 66215

October 27, 2011

Project No. **C11G6066**

Consulting Engineers

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KAW VALLEY ENGINEERING, INC.

October 27, 2011

C11G6066

Mr. Robert Reece
Pottawatomie County, Kansas
207 North 1st Street
Westmoreland, Kansas 66549

C/o Mr. Tim Cummins
Treanor Architects, P.A.
1617 Walnut Street
Kansas City, Missouri 64108

RE: GEOTECHNICAL ENGINEERING REPORT
POTTAWATOMIE COUNTY JUSTICE CENTER
ARMER STREET AND NORTH 1ST STREET
WESTMORELAND, KANSAS

Dear Mr. Reece:

Presented in this report are the results of a subsurface exploration conducted for the referenced project. This report preparation was conducted in accordance with our proposal dated October 4, 2011. Authorization to proceed with geotechnical services for this site was provided on October 4, 2011. The purpose of this study was to determine subsurface conditions at the site and to develop geotechnical parameters related to design and construction of the project.

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EXECUTIVE SUMMARY

Information, conclusions, and recommendations, which in our opinion, are significant to design and construction of this project are given below. Additional details, the general subsurface profile, other related items, and general information regarding the various phases of our exploration are included in the main body of the report.

The subsurface profile is comprised of fat (high plastic) and lean (low plastic) undisturbed clay soils overlying shale and limestone bedrock. Based upon conditions encountered during the exploration and the proposed finish floor elevations of 1,207.2 feet for the partial basement and 1,220.5 feet for the main level, it is our opinion that the proposed building may be supported by a combination of isolated shallow spread and strip or trench footings founded upon a combination of the existing undisturbed clay soils and newly placed structural fill. A net allowable bearing capacity of 3,000 pounds per square foot may be used for design of the foundation system.

PROJECT AND SITE DESCRIPTION

The site is located to both the north and south of Armer Street (including the street which is to be removed), east of the intersection of North 1st Street and Armer Street in Westmoreland, Kansas. The topography generally slopes slightly down to the east towards North 2nd Street, with approximately 8.9 feet of elevation change between the borings. The building is to be a 60,000 square foot, 2-story, L-shaped structure with a 14,000 square foot partial basement in the southeast potion of the building. Finish floor elevations are 1,207.2 feet for the basement and 1,220.5 feet for the first floor. The maximum structural loads provided by the client are 235 kips for individual columns, and 6.3 kips per linear foot for load bearing walls. The site and surrounding area are displayed on Plate 1.

Based on historical aerial photographs and conversations with Mr. Steve Roggenkamp, an engineering technician with Pottawatomie County, we believe there are uncontrolled fills of up to 11.5 feet on the site. These fills were placed in the locations of previous basements and cisterns. Mr. Roggenkamp, indicated the approximate locations as shown in Appendix A.

FIELD EXPLORATION

The field exploration was performed on October 7, 10, 11, and 12, 2011, and included drilling 14 test borings, identified as B-1 through B-14, within the proposed building footprint area. The boring locations were estimated with measurements from existing surface features. The surface elevations were determined by differential leveling using the finish floor elevation of the north entrance to the Pottawatomie County Courthouse, south of the project site, as a benchmark with an elevation of 1,220.49 feet. The boring locations and elevations are displayed on Plate 1 and the logs of the borings, respectively.

The borings were drilled using a CME 55 drill rig, with 4-inch O.D. continuous flight augers. Samples were obtained utilizing primarily thin walled tubes and a split-barrel sampler (standard penetration test). Soil samples were obtained at various depths through the depths of the borings with maximum intervals of 5 feet. The borings were drilled to depths ranging from 13.5 to 38.2 feet below the existing ground surface. Detailed logs of the borings are displayed on Plates 2 through 20.

The borings were logged in the field by the driller, based upon visual classifications of materials encountered during drilling, as well as the driller's interpretation of the subsurface conditions between samples. Final boring logs included with this report represent the engineer's interpretation of the field logs and include revisions based upon results of the laboratory testing and a geologist's review of the samples.

LABORATORY TESTING PROGRAM

The laboratory testing program was designed to determine the pertinent engineering and index properties of the soil. Moisture content, dry density, unconfined compressive strength, and Atterberg limits tests were performed on selected samples. Results of the laboratory tests are displayed upon the boring logs. All tests were performed in accordance with applicable ASTM standards.

SUBSURFACE CONDITIONS

Stratigraphy. The undisturbed soils at the site are composed of glacial till (unstratified drift, deposited directly by a glacier). Composition of the till is primarily composed of fat (high plastic) clay and lean (low plastic) clay with varying inclusions of gravel and sand. Portions of the site have clays underlain by gravel and sand deposits, which are likely glacial meltwater (outwash) deposits.

Deeper uncontrolled fill was placed in old basement and cistern excavations, as was encountered within Boring B-3. Some fill was also likely placed for site grading of previous and existing structures and Armer Street. Composition of the fill is primarily lean clay with varying inclusions of gravel, brick, sand, and wood. Fill depths in the old basement/cistern excavations reach 11.5 feet. The deeper fills are along the north side of the site. The approximate locations of the existing uncontrolled fills are shown on a drawing in Appendix A. All of the fills are underlain by the undisturbed glacial till soils.

Bedrock materials, primarily shales with some thin interbedded limestone seams, are present beneath the till soils at depths ranging from 7.0 feet at Boring B-9 to in excess of 35 feet at Boring B-14. The bedrock surface is considerable deeper in the eastern portion of the site. This indicates a possible historic valley in the east portion of the site prior to deposition of the glacial till soils. Surface elevations of the bedrock materials range from 1,215.3 feet at Boring B-9 to deeper than 1,180.2 feet at Boring B-14. The saturated gravel and sand (glacial outwash) at the bottom of B-14 is believed to be near the bedrock surface. This was noted to be the case in Boring B-4.

The in-situ dry densities of samples tested ranged from 89.8 to 105.0 pounds per cubic foot (pcf), with moisture contents ranging from 15.0 to 38.0 percent. Unconfined compressive strengths of selected samples from the clays ranged from 1,463 to 12,443 pounds per square foot (psf). Atterberg limit tests indicate the upper soil stratum classifies primarily as CL and CH, inorganic clays of low and high plasticity, respectively, in accordance with the Unified Soil Classification System. These soils typically have low and high swell potentials, respectively.

Groundwater. Groundwater was encountered while drilling in Boring B-4 at a depth of 38.0 feet. The water level upon completion of drilling in Borings B-4 was 37.5 feet. Groundwater was not encountered in the other borings. It should be understood that the level of the groundwater may fluctuate due to rainfall and other climatic factors, and the groundwater may or may not be present during construction or at other times during the life of the project.

DESIGN CONSIDERATIONS AND RECOMMENDATIONS

On the basis of the planned finish floor elevations, cuts and fills of up to 15 and 7 feet, respectively, will be required in the building area. We recommend that the proposed building be founded on continuous strip, trench, and isolated spread footings bearing upon a combination of the existing undisturbed clay soils and newly placed structural fill.

Site Preparation. Site preparation should commence with stripping of all vegetation, topsoil, and pavement materials from the building and pavement areas. Stripping should extend a minimum of 5 feet beyond the building footprint. A minimum stripping depth of approximately 8 inches should be anticipated. However, stripping depths will likely vary and should be adjusted to remove all vegetation and root systems. Old basement and cistern fills (as found in the north half of the property) and any other unsuitable fills should also be removed at this time. **It is critical that this be observed by a representative of the geotechnical engineer to review that all uncontrolled fill is removed.** Soils removed during site stripping operations could be used for final site grading outside the proposed building and pavement areas.

Required tree removal should also be accomplished at this time. Care should be taken to thoroughly remove all root systems from the proposed building area. Materials disturbed during removal of stumps should be undercut and replaced with structural fill. A zone of desiccated soils may exist in the vicinity of the trees. The desiccated soils have a higher swell potential and should also be undercut and replaced with structural fill.

Immediately after site stripping, the area of the proposed building footprint should be cut below planned design grade to a level that will allow placement of a minimum of 18 inches of lower plasticity structural fill below the floor slab and 12 inches below the pavement areas. The undercutting for the building area should extend a minimum of 5 feet outside all building wall lines. The low plasticity structural fill below the floor slab is recommended to reduce the potential for subgrade movement. The recommended lower plasticity structural fill thickness is in addition to any granular sections that will be required below the floor slab. Based on anticipated grading and subsurface conditions encountered at this site, it does not appear as though there is suitable material on-site for use as the lower plasticity structural fill below the floor slab.

Following stripping and cutting to grade, the moisture content of the exposed soils should be evaluated. Depending on the in-situ moisture content of the exposed soils, moisture conditioning of the exposed grade may be required. The moisture content of the exposed grade should be adjusted to within the range recommended for structural fill, to allow the exposed material to be compacted to a minimum density of 95 percent as determined by the standard Proctor compaction procedure. Extremely wet or unstable areas that hamper compaction of the subgrade may require undercutting and replacement with structural fill or other stabilization techniques.

Following moisture conditioning of the exposed soils, it is recommended that the exposed grade be proofrolled to provide a more stable base for placement of structural fill and to assist in identifying soft or disturbed areas. Unsuitable areas identified by the proofrolling operation should be undercut and replaced with structural fill. Proofrolling can be accomplished through use of a fully-loaded, tandem-axle dump truck or similar equipment providing an equivalent subgrade loading. Following proofrolling, suitable structural fill should be placed to design grade as soon as practical to avoid moisture changes in the underlying soils.

Where fill is being placed on a slope steeper than 5:1 (horizontal:vertical), the existing slope should be benched as fill placement progresses to reduce the potential for slippage between existing slopes and new fills. Benches should be level, with vertical heights between 12 and 36 inches, and be wide enough to accommodate compaction and earth moving equipment.

Subgrade preparation in the proposed pavement areas should be performed following the same process as the preparation for the structure. After stripping and/or cutting to grade to allow placement of 12 inches of low plastic structural fill, the exposed materials should also be moisture conditioned and proofrolled prior to paving. Any soft or unstable areas observed during proofrolling should be undercut and brought up to planned grade with structural fill.

Structural Fill. On-site soils (excluding the uncontrolled fill materials) are acceptable as general fill and backfill materials with the exception of within 18 inches below the slab-on-grade and 12 inches below parking/drive areas. Because of deleterious materials present in the existing uncontrolled fills, these may only be used in site grading outside of structure and pavement areas. All structural fill should consist of approved materials, free of organic matter, debris, and particles larger than 3 inches. Imported fill material should consist of low swell potential cohesive soils with a liquid limit less than 45 and a plasticity index between 10 and 25.

The soils within 18 inches of the building floor slab and 12 inches of the parking/drive areas should consist of a lower plasticity cohesive soil having a liquid limit less than 45 percent. In lieu of importing low plasticity material for use as low plasticity fill beneath the building floor slab and pavement areas, the on-site clay soils can be stabilized with Class "C" fly ash following the methodology outlined in the "Fly Ash Stabilization" section of this report.

Fill should be placed in lifts having a maximum loose lift thickness of 8 inches, and should be compacted to a minimum of 97% of the material's maximum dry density to within 18 inches of the floor slab base materials as determined by ASTM D 698 (standard Proctor compaction). Within 18 inches of the floor slab base, the minimum recommended compaction is 95% of maximum density per standard Proctor. The fill for the parking and drive areas should be compacted to a minimum of 95% of the material's maximum dry density as determined by standard Proctor. The moisture content of the fill at the time of compaction should be within a range of optimum moisture to 3% above optimum moisture content as defined by the standard Proctor compaction procedure. Moisture contents should be maintained within this range until completion of the floor slab and pavement.

The geotechnical engineer should approve all fill material. Approval requires that a moisture-density relationship and Atterberg limits be performed for each proposed fill material prior to its placement.

All utility trenches should be backfilled with either on-site or imported fill material. Granular materials such as clean sand or gravel should not be used to bed utilities or backfill trenches unless the bottom of the trench is graded so that water flows away from the structure and pavement areas.

Final slopes greater than 3:1 (horizontal:vertical) should not be used for ease of maintenance. Continuous observation by the geotechnical engineer or his representative should be maintained during site preparation and compaction of all fill and backfill materials.

Fly Ash Stabilization. In order to reduce the effects of the high swell potential of the on-site soils, the on-site high plastic clays can be fly ash stabilized, thereby removing the need to import low plastic fill soils. Following site stripping and grading, stabilization should begin by stockpiling the top 12 inches of the existing soil in the structure area and the top 6 inches of the existing soil in pavement areas. Scarify and moisture condition the exposed surfaces for a minimum depth of 6 inches at a moisture content of 5 to 8% above optimum moisture. Add 15% Type C fly ash by dry weight (i.e. 8 pounds per square foot of area per 6 inch lift), and blend with moisture-conditioned soil utilizing a Bomag pulvamixer or approved equivalent. Recompact the soil and fly ash mixture to a minimum dry density of 95% of the maximum dry density, with the moisture content between optimum moisture and 3% above optimum as determined by ASTM D 698. Moisture condition, mix, and recompact the stockpiled material in 6-inch lifts utilizing the procedures outlined above. Compaction of the fly ash treated soils should be completed within two hours of incorporation of the fly ash.

Foundations. On the basis of the planned maximum loading conditions and finish floor elevations, the structural loads for the foundations may be supported by a combination of isolated shallow spread and strip or trench footings founded on a combination of the undisturbed soils and newly placed structural fill. **It is critical that all newly placed structural fill up to bearing elevation, particularly in the old basement/cistern fills, be carefully controlled. Appropriate placement and compaction procedures will develop the bearing capacity and lessen the potential of differential movement between new fill and undisturbed soil areas.** A net allowable bearing pressure of 3,000 pounds per square feet (psf) may be used to design and proportion these footings.

The base of the exterior footings should be placed a minimum of 3 feet below the lowest adjacent exterior grade for frost protection. Interior footings, within areas which will be continuously heated, may be placed a minimum of 2 feet below the interior finished floor.

Isolated footings should have a minimum width of 24 inches. Strip and trench footings should have minimum widths of 18 and 12 inches, respectively. Trench footings should be reinforced with a minimum of two number 4 bars at both the top and bottom. The base of footing excavations should be free of all water, loose debris, and not allowed to become excessively wet or dry prior to placement of concrete.

All footing excavations should be observed by the geotechnical engineer of record or a representative to verify the suitability of the bearing material prior to placement of reinforcing steel.

Slab-On-Grade. The slab-on-grade should be designed such that axial column loads are not transferred through the slab. A 4-inch layer of open graded gravel (ASTM C33 No. 57) should be placed directly below the slab-on-grade. A moisture barrier should be placed between the slab and the open graded gravel. A minimum of 18 inches of fly ash stabilized on-site soil conforming with the guidelines provided within the "Fly Ash Stabilization" section of this report, or imported engineered fill conforming with guidelines provided within the "Structural Fill" section, should be constructed prior to placement of the open graded gravel course. We recommend that the slab-on-grade be designed for a modulus of subgrade reaction of 125 pounds per cubic inch. It is recommended that a sub-slab drainage system for the basement portion of the structure be incorporated in the design. This could be incorporated into the basement wall drainage system as recommended in the "Lateral Pressures" section of this report.

Thickened slab sections can be used to support interior non-load bearing walls provided that:

- Loads do not exceed 900 pounds per linear foot.
- Thickened sections have a minimum thickness and width of 8 inches and 12 inches, respectively.
- Thickness and reinforcement are consistent with structural requirements.

Settlement. Footings proportioned and constructed as recommended above should experience total settlement of less than 1 inch with differential settlement between any two footings being no more than 1/2 inch.

Drainage. The site should be graded so that surface water flows away from the structure and pavement areas and is not allowed to accumulate near or under the slab-on-grade or pavement. Where sidewalks or paving do not immediately adjoin the structure, a grade of at least 5 % for a minimum of 10 feet from the perimeter walls is recommended.

Seismic Soil Classification. According to the 2006 International Building Code, the site soils are best characterized by the "Class C" site classification. This classification can be utilized by the structural engineer as a seismic design parameter.

Pavement Sections. The CBR value for the soils encountered on the site is estimated to be between 2 and 3; therefore, the following pavement sections are recommended for the parking areas and drives. Recommendations for both flexible and rigid pavements are presented.

- Light Auto Parking and Drives:

  Asphaltic Concrete
    2.0" KDOT BM-2
    4.0" KDOT BM-2B
    8.0" Compacted/Moisture Conditioned Soils

  Portland Cement Concrete
    5.0" Portland Cement Concrete
    4.0" Compacted Granular Base Course
    8.0" Compacted/Moisture Conditioned Soils

- Truck Access and Drives:

  Asphaltic Concrete
    2.0" KDOT BM-2
    6.0" KDOT BM-2B
    8.0" Compacted/Moisture Conditioned Soils

  Portland Cement Concrete
    8.0" Portland Cement Concrete
    4.0" Compacted Granular Base Course
    8.0" Compacted/Moisture Conditioned Soils

Pavement in the dumpster and dock areas should be the portland cement concrete section as recommended in the truck access and drives section. Also, preventative maintenance action(s) may be needed for the asphaltic concrete parking and drives in order to maintain the service conditions (i.e. crack sealing).

Lateral Pressures. Unrestrained walls below grade should be designed for an equivalent active fluid pressure of 40 psf/ft. Restrained walls below grade should be designed for an "at-rest" equivalent fluid pressure of 60 psf/ft. These pressures assume no hydrostatic loads are allowed to build up behind the walls.

To lessen the potential of hydrostatic loading on the walls and/or seepage into the lower level, it is recommended that a granular drainage chimney be installed against the walls, and a perforated drain line be installed at the base of the chimneys. The drain line should be sloped to provide positive gravity drainage outside the building area or should extend to a sump where water can be collected and removed. The drainage chimney should be backfilled with free draining granular material extending vertically above the drain line to within 2 feet of final grade. The remaining portion of the excavation should be backfilled with cohesive soils to minimize the infiltration of surface water. The granular section behind the wall should have a minimum width of 8 inches and should be encapsulated in a suitable filter fabric to minimize intrusion of fines. The use of a prefabricated drainage blanket on the foundation wall may also be considered to prevent hydrostatic loading. Drainage blankets should be installed in accordance with the manufacturer's recommendations. In addition, it is recommended that a subfloor drainage system be installed under the basement portion of the structure. Drain lines under the slab could be incorporated into the wall drainage system.

The southern wall of the jail area intersects the western wall of the basement area. Lateral loads resulting from bearing of the southern wall of the jail will impose localized lateral loading onto the western basement wall. Reinforcing steel should be designed to resist up to an additional 1,200 psf within the localized area, typically 2 feet either side of the perpendicular wall.

Uplift. Uplift forces, if any, may be resisted by the weight of the footings.

OBSERVATION OF CONSTRUCTION

The conclusions and recommendations given in this report are based on interpretation of boring data and our experience. Variations may occur from conditions observed within test borings; therefore, it is imperative to involve the geotechnical engineer in the final design and construction process.

Field observation services are viewed as a continuation of the design process. Unless these services are provided, the geotechnical engineer will not be responsible for improper use of recommendations, or failure by others to recognize conditions which may be detrimental to the successful completion of the project.

LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based on the site conditions and project layout described herein and further assume that the conditions observed in the exploratory borings are representative of the subsurface conditions throughout the site, i.e., the subsurface conditions elsewhere on the site are the same as those disclosed by the borings. If, during construction, subsurface conditions different from those encountered in the exploratory borings are observed or appear to be present beneath excavations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary.

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

We recommend that we be retained to review the project layout and those portions of plans and specifications that pertain to foundations and earthwork to determine if they are consistent with our findings and recommendations. In addition, we are available to observe construction, particularly site grading, earthwork, and foundation construction. We would be available to make other field observations as may be necessary.

This report was prepared for the exclusive use of the Owner, Architect, and Engineer for evaluating the design of the project as it relates to the geotechnical aspects discussed herein. It should be made available to prospective contractors for information on factual data only and not as a warranty of subsurface conditions included in the report. Unanticipated soil conditions may require that additional expense be made to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

* * * * * *

The following plates are attached to and complete this report:

Plate 1 - Boring Location Plan

Plates 2 through 20 - Logs of Borings

Boring Log Reference Legend

Appendix A - Approximate Uncontrolled Fill Locations

* * * * * *

We appreciate the opportunity to be of service to you on this project. Please contact us if you have any questions or comments.

Respectfully submitted,
Kaw Valley Engineering, Inc.

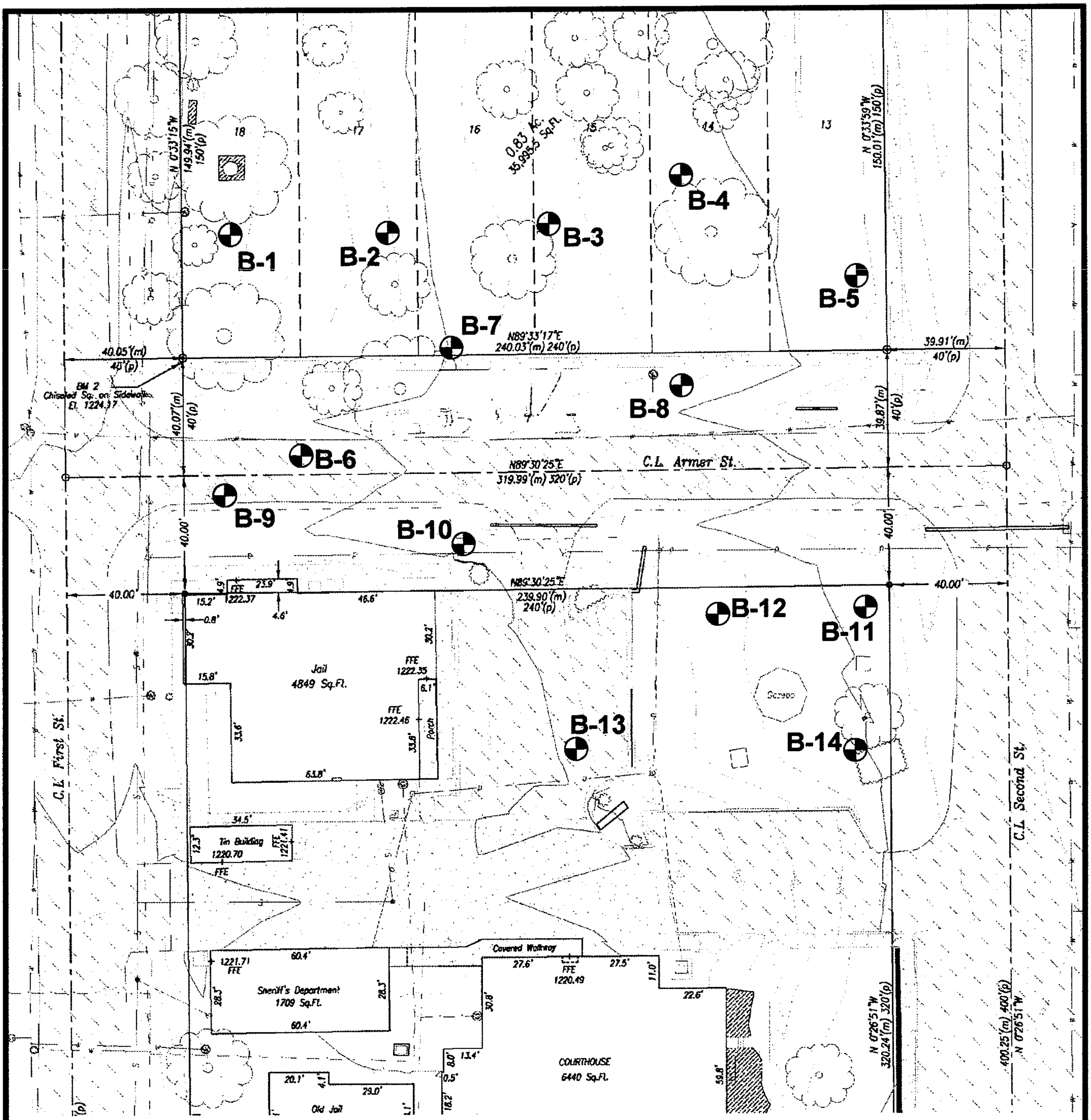
Robert M. Halastik II, P.E.
Staff Engineer

Michael R. Osbourn, P.E.
Principal

11676
10.27.11

Copies submitted - Client (3)

Copies submitted - Architect (1)



LEGEND

● **B-#** BORING LOCATION

KAW VALLEY ENGINEERING, INC.
14700 W. 114th TER., LENEXA, KANSAS 66215
tel (913) 894-5150 fax (913) 894-5977
e-mail: lx@kveng.com

PROJECT #: C11G6066

POTTAWATOMIE COUNTY JUSTICE CENTER

ARMER STREET AND NORTH 1st STREET
WESTMORELAND, KANSAS
BORING LOCATION MAP
NOT TO SCALE
PLATE 1

LOG OF BORING B-1

SHEET 1 OF 1

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/11/11 - 10/11/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,223.0'

FIELD DATA			LABORATORY DATA		ATTERBERG LIMITS								
DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM	
												TOPSOIL - 6"	1222.5'
			24									LEAN CLAY: Dark gray brown; stiff; slightly moist	1221.0'
5			22	17.3	50	17	33					FAT CLAY: Gray brown; stiff; slightly moist; with gravel (GLACIAL TILL)	1218.0'
10			23	21.8				99.2	7,334			FAT CLAY: Brown; stiff; moist; with gravel (GLACIAL TILL)	1211.5'
												SHALE: Light brown; soft; highly weathered	1209.5'
												LIMESTONE	1209.1'
												SHALE: Light gray; soft; highly weathered	1208.7'
		T = 26/50-6"										SHALE: Maroon; moderately hard; moderately weathered	1208.3'
15												SHALE: Light gray; moderately hard; moderately weathered	1208.0'

BORING TERMINATED AT 15.0'

20

25

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-2

SHEET 1 OF 1

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/11/11 - 10/11/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,220.3'

FIELD DATA		LABORATORY DATA								
DEPTH (FT)	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)
		10	27.1							
		11	22.7				99.2	5,078		
5										
	T = 4/6/13		32.0							
10										
	T = 20/50-4"									
15										
	T = 50-3"									
20										
25										

BORING TERMINATED AT 18.8'

DESCRIPTION OF STRATUM

Description	Elevation
TOPSOIL - 6"	1219.8'
LEAN CLAY: Dark gray brown; stiff; slightly moist	1218.3'
LEAN CLAY: Gray brown; stiff to very stiff; slightly moist to moist (GLACIAL TILL)	1215.3'
FAT CLAY: Brown; stiff; moist (GLACIAL TILL) Becoming red brown; with gravel; very moist	1208.4'
LIMESTONE: Light gray	1207.2'
SHALE: Light gray; soft; highly weathered	1206.5'
SHALE: Gray; moderately hard; moderately weathered	1206.3'
SHALE: Maroon; moderately hard; moderately weathered	1203.3'
SHALE: Gray and light brown; moderately hard to hard; calcareous; moderately to slightly weathered	1201.5'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-3

SHEET 1 OF 1

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/7/11 - 10/7/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,217.6'

	FIELD DATA			LABORATORY DATA								
						ATTERBERG LIMITS						
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)
			T = 1/1/2		23.4							
	5											
			T = 0/1/1									
	10											
			T = 3/7/8		18.6							
	15											
			T = 3/4/4									
	20											
	25											

BORING TERMINATED AT 20.0'

DESCRIPTION OF STRATUM

FILL: Lean clay; dark gray brown; firm to soft; slightly moist

1216.6'

FILL: Lean clay; gray brown; very soft; moist; with sand; trace brick, gravel, and wood

1206.1'

LEAN TO FAT CLAY: Light brown with gray brown;; stiff; moist; trace sand and gravel (GLACIAL TILL)

1201.6'

LEAN CLAY: Gray brown; stiff; moist; with gravel (GLACIAL TILL)

1197.6'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-4

SHEET 1 OF 2

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/10/11 - 10/10/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - 38.0'
Water level upon completion of drilling - 37.5'

SURFACE ELEVATION: 1,215.8'

FIELD DATA				LABORATORY DATA								
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)
				22	21.2	57	22	35	89.8	7,836		
				21	18.5				98.0	10,680		
	5											
				18	20.5							
	10											
				13	18.9							
	15											
				23								
	20											
				24								
	25											

DESCRIPTION OF STRATUM

TOPSOIL - 6" 1215.3'

LEAN CLAY: Dark gray brown; stiff; slightly moist 1214.3'

FAT CLAY: Gray brown; very stiff; moist (GLACIAL TILL) 1208.8'

FAT CLAY: Brown; stiff; moist; with small gravel (GLACIAL TILL) 1201.3'

FAT CLAY: Brown to light brown; stiff; moist; with sand and gravel (GLACIAL TILL) 1197.3'

LEAN CLAY: Light brown; firm; moist; silty and sandy; trace gravel (GLACIAL TILL)

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-4

SHEET 2 OF 2

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/10/11 - 10/10/11
DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - 38.0'
Water level upon completion of drilling - 37.5'

	FIELD DATA			LABORATORY DATA									
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													LEAN CLAY: Light brown; firm; moist; silty and sandy; trace gravel (GLACIAL TILL) *(continued)*
		■		24									
	30												1185.3'
													LEAN CLAY: Light brown; firm; moist; silty; trace sand (GLACIAL TILL)
													1182.8'
		■	T = 23/50-6"										GRAVEL: With clay, sand, and sand seams; saturated (GLACIAL TILL - OUTWASH)
	35												
													1178.6'
		▼ ▽											SHALE: Gray; hard; slightly weathered
		■	T = 50-2"										1177.6'

BORING TERMINATED AT 38.2'

40

45

50

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-5

SHEET 1 OF 1

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/7/11 - 10/7/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,214.1'

	FIELD DATA			LABORATORY DATA									
						ATTERBERG LIMITS							
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													TOPSOIL - 6" 1213.6'
													LEAN CLAY: Dark gray brown; firm; slightly moist 1212.6'
		◣	T = 2/2/4		18.7	59	20	39					FAT CLAY: Gray brown; stiff; moist (GLACIAL TILL) 1209.1'
		◣	T = 4/5/7		23.3								
	5												LEAN CLAY: Light brown; stiff; moist (GLACIAL TILL) 1207.6'
													LEAN TO FAT CLAY: Red brown; stiff to very stiff; moist; trace coarse grained sand (GLACIAL TILL) 1199.6'
		◣	T = 2/4/5		22.9								
	10												
		◣	T = 4/6/10		19.3								
	15												LEAN CLAY: Yellow brown with gray brown; stiff; moist; with thin silt seams; trace fine grained sand (GLACIAL TILL) 1194.1'
		◣	T = 3/4/4		22.6								
	20												
	25												

BORING TERMINATED AT 20.0'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-6

SHEET 1 OF 1

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/12/11 - 10/12/11
DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,221.1'

FIELD DATA			LABORATORY DATA								
DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)
	◣	T = 4/5/8		21.8							
	◣	T = 2/3/4		26.0							
		T = 50-0"									

BORING TERMINATED AT 13.5'

DESCRIPTION OF STRATUM

ASPHALT - 3" — 1220.8'
GRAVEL - 3" — 1220.6'
FILL: Lean clay; dark gray brown; stiff; slightly moist — 1218.6'
FAT CLAY: Brown; stiff; moist; with small gravel (GLACIAL TILL)
Becoming light reddish brown; trace coarse grained sand and small gravel — 1209.6'
LIMESTONE: Light gray; with interbedded shale seams — 1207.6'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Asphalt

LOG OF BORING B-7

SHEET 1 OF 2

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas

DATE(S) DRILLED: 10/10/11 - 10/10/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,219.2'

FIELD DATA			LABORATORY DATA								
DEPTH (FT)	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
											TOPSOIL - 6" 1218.7'
											LEAN CLAY: Dark gray brown; stiff; slightly moist 1218.2'
		24		63	20	43					FAT CLAY: Gray brown; stiff; slightly moist (GLACIAL TILL)
		17	18.1				102.3	12,433			1214.7'
5		10	15.0								FAT CLAY: Brown; stiff; slightly moist; with gravel (GLACIAL TILL) 1210.2'
10											FAT CLAY: Brown; stiff; moist; with limestone fragments (GLACIAL TILL) 1208.2'
											LIMESTONE: Light gray 1207.8'
											SHALE: Gray and light brown; soft; highly weathered 1206.7'
	T = 8/25/32										SHALE: Maroon with some gray; soft to moderately hard; highly to moderately weathered 1204.4'
15											SHALE: Gray; soft to moderately hard; highly to moderately weathered 1200.7'
	T = 1/1/1										FAT CLAY: Red brown; very soft; very moist (Bedrock fracture) 1199.7'
											COAL - 2" 1199.5'
20											HIGHLY WEATHERED LIMESTONE: Light brown; soft; highly weathered 1196.7'
25	T = 12/20/21										SHALE: Gray to dark gray; soft to moderately hard; argillaceous; moderately weathered 1194.2'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-7

SHEET 2 OF 2

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/10/11 - 10/10/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

	FIELD DATA			LABORATORY DATA									
						ATTERBERG LIMITS							
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			BORING TERMINATED AT 25.0'										
	30												
	35												
	40												
	45												
	50												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-8

SHEET 1 OF 1

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas

DATE(S) DRILLED: 10/11/11 - 10/11/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,216.2'

	FIELD DATA			LABORATORY DATA									
						ATTERBERG LIMITS							
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													TOPSOIL - 6" 1215.7'
													FILL: Lean clay; dark gray brown; stiff; slightly moist; with gravel 1214.2'
				18	22.8				92.8				FAT CLAY: Gray brown; stiff; moist (GLACIAL TILL)
				19	23.0				98.3				
	5												1210.7'
													FAT CLAY: Brown; stiff; moist; with gravel and shale fragments (GLACIAL TILL)
				12	24.8				100.2	4,721			
	10												1202.2'
				24	21.7				104.9	1,463			LEAN CLAY: Light brown; stiff; moist; silty; trace gravel (GLACIAL TILL)
	15												
				24	25.2								1196.2'
	20												
			BORING TERMINATED AT 20.0'										
	25												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-9

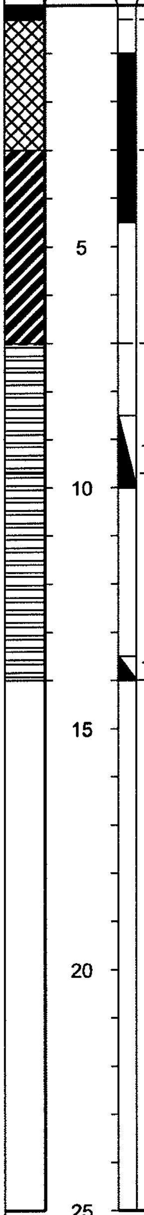
SHEET 1 OF 1

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/11/11 - 10/11/11
DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,222.3'



FIELD DATA	LABORATORY DATA									
N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
										ASPHALT - 4" 1222.0'
	21									FILL: Gravel with gray brown clay; firm; slightly moist 1219.3'
	17	26.2				96.7				FAT CLAY: Brown; stiff; slightly moist; with gravel (GLACIAL TILL) 1215.3'
T = 2/4/9		38.0								SHALE: Light brown; soft; calcareous; argillaceous; with limestone nodules; highly weathered 1212.6'
T = 50-6"										SHALE: Gray and light brown; moderately hard; moderately weathered 1208.3'

BORING TERMINATED AT 14.0'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Asphalt

LOG OF BORING B-10

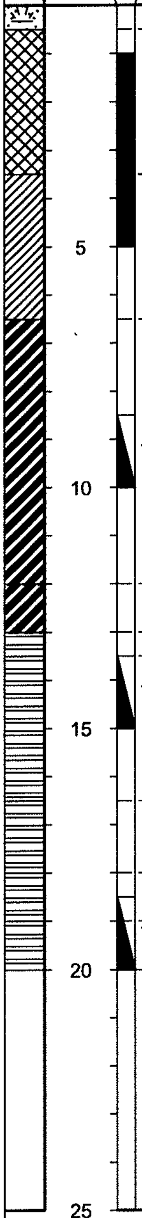
SHEET 1 OF 1

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/12/11 - 10/12/11
DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,220.3'



FIELD DATA	LABORATORY DATA								
N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)
	16								
	11	22.7				99.3	8,980		
T = 4/8/10									
T = 7/18/24		16.5							
T = 16/32/28									

BORING TERMINATED AT 20.0'

DESCRIPTION OF STRATUM

TOPSOIL - 6"	1219.8'
FILL: Lean clay; dark gray brown; stiff; slightly moist; with gravel	1216.8'
LEAN CLAY: Gray brown; stiff; slightly moist (GLACIAL TILL)	1213.8'
FAT CLAY: Red brown; very stiff; moist (GLACIAL TILL)	1208.3'
FAT CLAY: Light brown; stiff; slightly moist; with sand and gravel (GLACIAL TILL)	1207.3'
SHALE: Gray and light brown; soft; highly weathered	1206.8'
SHALE: Maroon; soft to moderately hard; highly to moderately weathered	1203.8'
SHALE: Gray; moderately hard; moderately weathered	1202.3'
SHALE: Maroon; soft to moderately hard; highly weathered	1201.3'
SHALE: Red brown with gray; soft; with highly weathered limestone seams; highly weathered	1200.3'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-11

SHEET 1 OF 1

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/10/11 - 10/10/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,214.4'

FIELD DATA				LABORATORY DATA								
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)
				14								
				12								
				14	23.0				102.5			
				21	23.3				101.4	2,570		
				24	30.0				94.5			

Depth (ft): 5, 10, 15, 20, 25

DESCRIPTION OF STRATUM

TOPSOIL - 6" — 1213.9'

LEAN CLAY: Dark gray brown; stiff; slightly moist (GLACIAL TILL) — 1210.9'

LEAN CLAY: Gray brown; stiff; moist (GLACIAL TILL) — 1208.9'

LEAN TO FAT CLAY: Brown; stiff; moist; trace gravel (GLACIAL TILL) — 1205.4'

FAT CLAY: Brown; stiff; slightly moist; with gravel (GLACIAL TILL) — 1201.9'

LEAN CLAY: Brown and light brown; stiff; slightly moist; sandy and silty (GLACIAL TILL) — 1194.4'

BORING TERMINATED AT 20.0'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-12

SHEET 1 OF 2

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT:	Pottawatomie County, Kansas
PROJECT:	Pottawatomie County Justice Center
NUMBER:	C11G6066
LOCATION:	Armer Street and North 1st Street - Westmoreland, Kansas

DATE(S) DRILLED: 10/11/11 - 10/11/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,216.2'

FIELD DATA				LABORATORY DATA								
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)
				13		39	15	24				
	5			24	24.1							
	10			12								
	15			13	24.5				97.6	1,862		
	20			21	22.8				101.5	2,562		
	25			23	31.9							

DESCRIPTION OF STRATUM

TOPSOIL - 6"	1215.7'
LEAN CLAY: Dark gray brown; stiff; slightly moist	1213.7'
LEAN CLAY: Gray brown; stiff; moist (GLACIAL TILL)	1211.7'
LEAN CLAY: Brown; stiff; moist (GLACIAL TILL)	1210.2'
FAT CLAY: Brown; stiff; slightly moist; with gravel (GLACIAL TILL)	1207.2'
FAT CLAY: Brown and light brown; stiff; moist; trace gravel (GLACIAL TILL)	1199.2'
LEAN CLAY: Light brown; stiff; slightly moist; silty; trace gravel (GLACIAL TILL)	1191.2'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-12

SHEET 2 OF 2

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/11/11 - 10/11/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUPNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

	FIELD DATA			LABORATORY DATA									
						ATTERBERG LIMITS							
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
			BORING TERMINATED AT 25.0'										
	30												
	35												
	40												
	45												
	50												

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-13

SHEET 1 OF 2

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

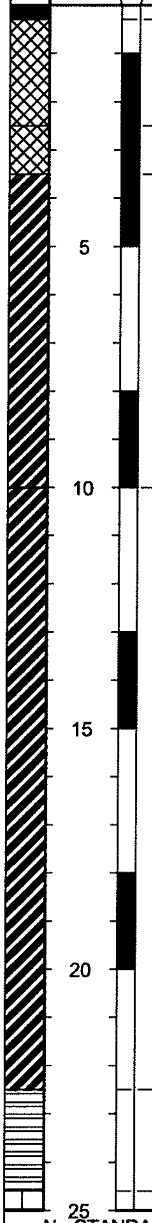
CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas

DATE(S) DRILLED: 10/12/11 - 10/12/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,219.4'



N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
										ASPHALT - 3" — 1219.1'
										FILL: Lean to fat clay; stiff; slightly moist; trace gravel
	11									
										1216.9' — FILL: Lean clay; dark gray brown; stiff; slightly moist
										1215.9' — FAT CLAY: Brown; stiff; slightly moist; with gravel (GLACIAL TILL)
	12									
	14	19.8								
										1209.4' — FAT CLAY: Brown and light brown; stiff; slightly moist; trace sand and gravel (GLACIAL TILL)
	16	22.4				104.4	4,094			
	23	21.1				104.7	4,220			
										1196.9' — SHALE: Gray brown; soft; highly weathered
										1194.8'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Asphalt

LOG OF BORING B-13

SHEET 2 OF 2

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/12/11 - 10/12/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

	FIELD DATA			LABORATORY DATA									
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													LIMESTONE: Light gray *(continued)* 1194.2'
													SHALE: Gray and light brown; moderately hard; moderately weathered
			T = 50-6"										
	30												1187.1'
													LIMESTONE: Light gray 1186.8'
													SHALE: Light gray; hard; moderately weathered
			T = 50-2"										1185.7'
	35												
	40												
	45												
	50												

BORING TERMINATED AT 33.7'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Asphalt

LOG OF BORING B-14

SHEET 1 OF 2

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/11/11 - 10/11/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry

SURFACE ELEVATION: 1,215.2'

FIELD DATA				LABORATORY DATA									
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	PLASTIC LIMIT PL	PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)	DESCRIPTION OF STRATUM
													TOPSOIL - 6" 1214.7'
				24	20.2								LEAN CLAY: Dark gray brown; stiff; slightly moist 1213.2'
				21	20.3								LEAN CLAY: Gray brown; stiff; slightly moist (GLACIAL TILL) 1210.7'
	5												LEAN CLAY: Brown; stiff; slightly moist (GLACIAL TILL) 1209.7'
				24									FAT CLAY: Brown; stiff; slightly moist; with gravel (GLACIAL TILL) 1205.7'
	10			16	20.0				105.0	2,721			FAT CLAY: Brown and light brown; stiff; slightly moist; with gravel; trace sand (GLACIAL TILL) 1201.2'
	15												LEAN CLAY: Light brown; stiff; slightly moist; trace sand and gravel (GLACIAL TILL)
	20			15									
	25			23	31.1				91.5	3,021			

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

LOG OF BORING B-14

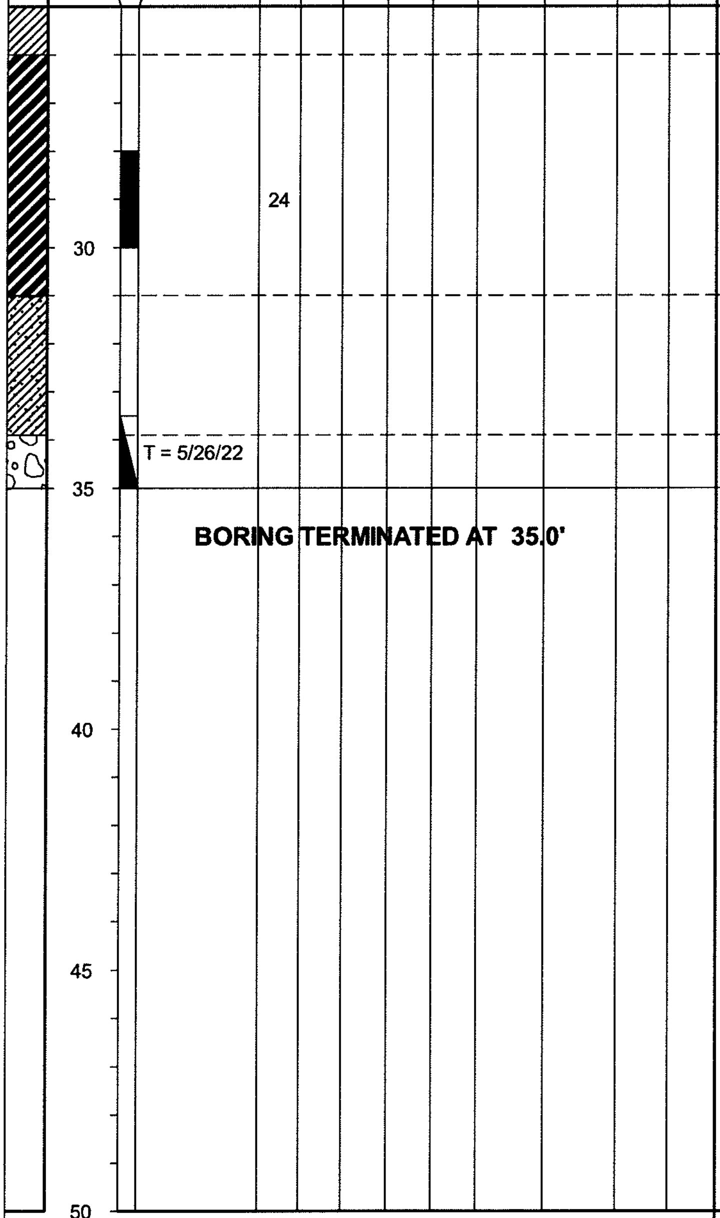
SHEET 2 OF 2

KAW VALLEY ENGINEERING, INC.
14700 W 114TH TERRACE
LENEXA, KANSAS 66215
Telephone: (913)894-5150
Fax: (913)894-5977

CLIENT: Pottawatomie County, Kansas
PROJECT: Pottawatomie County Justice Center
NUMBER: C11G6066
LOCATION: Armer Street and North 1st Street - Westmoreland, Kansas
DATE(S) DRILLED: 10/11/11 - 10/11/11

DRILLING METHOD(S): 4" CFA
DRILL RIG: CME 55
DRILL RIG OPERATOR: Reece Nigh
LOGGED BY: Michael Compton

GROUNDWATER INFORMATION:
Water level while drilling - Dry
Water level upon completion of drilling - Dry



FIELD DATA				LABORATORY DATA								
SOIL SYMBOL	DEPTH (FT)	SAMPLES	N: BLOWS/FT P: TONS/SQ FT T: BLOWS/SIX INCHES REC: % RQD: %	RECOVERY (IN)	MOISTURE CONTENT (%)	ATTERBERG LIMITS LIQUID LIMIT LL	ATTERBERG LIMITS PLASTIC LIMIT PL	ATTERBERG LIMITS PLASTICITY INDEX PI	DRY DENSITY POUNDS/CUBIC FT	COMPRESSIVE STRENGTH (POUNDS/SQ FT)	CONFINING PRESSURE (POUNDS/SQ IN)	MINUS NO. 200 SIEVE (%)
	28-30	■		24								
	33.5-35	◣	T = 5/26/22									

BORING TERMINATED AT 35.0'

DESCRIPTION OF STRATUM

1189.2'
FAT CLAY: Light brown; soft to firm; moist (GLACIAL TILL)

1184.2'
SANDY CLAY: Brown and light brown; firm; moist; with gravel (GLACIAL TILL)

1181.3'
GRAVEL: With sand; trace clay (GLACIAL TILL - OUTWASH)
1180.2'

N - STANDARD PENETRATION TEST RESISTANCE
P - POCKET PENETROMETER RESISTANCE
T - BLOWS PER SIX INCHES
REC - ROCK CORE RECOVERY
RQD - ROCK QUALITY DESIGNATION

REMARKS:
Surficial conditions - Grass

BORING LOG REFERENCE LEGEND

DESCRIPTIVE SOIL CLASSIFICATION

Soil description is based on the Unified Soil Classification System as outlined in ASTM Designation D-2487. The Unified Soil Classification group symbol for soil descriptions shown on the boring logs corresponds with the group names listed below. The description includes soil constituents, consistency, relative density, color and any other appropriate descriptive terms. Geologic description of bedrock, when encountered, is also shown in the description column. Refer to the appropriate notes for bedrock classification.

Group Symbol	Group Name	Group Symbol	Group Name	Group Symbol	Group Name	Group Symbol	Group Name
GW	Well graded gravel	SW	Well graded sand	CL	Lean clay	CH	Fat clay
GP	Poorly graded gravel	SP	Poorly graded sand	ML	Silt	MH	Elastic silt
GM	Silty gravel	SM	Silty sand	OL	Organic clay Organic silt	OH	Organic clay Organic silt
GC	Clayey gravel	SC	Clayey sand			PT	Peat

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf

< 500	Very Soft
500 – 1,000	Soft
1,001 – 2,000	Firm
2,001 – 4,000	Stiff
4,001 – 8,000	Very Stiff
8,001 – 16,000	Hard
> 16,000	Very Hard

RELATIVE PROPORTIONS

Descriptive Term(s) (Components also Percent in Sample)	Sand & Gravel Percent of Dry Wt.	Fines Percent of Dry Wt.
Trace	< 15	<5
Some	15 – 29	5 - 12
Modifier	> 30	> 12

RELATIVE DENSITY OF COARSE-GRAINED SOILS

N - (blows/ft)	Relative Density
0 – 3	Very Loose
4 – 9	Loose
10 – 29	Medium Dense
30 – 49	Dense
50+	Very Dense

GRAIN SIZE TERMINOLOGY

Major Component	Size Range
Cobbles	12 in to 3 in
Gravel	3 in to #4 sieve
Sand	#4 to #200 sieve
Silt or Clay	Passing #200 sieve

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. In pervious soil the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels is not possible with only short-term observation.

DEFINITIONS OF ABBREVIATIONS

CR – Core recovery, length of core recovered in each run compared to the length drilled expressed as percent
LL – Liquid limit of specimen
N – Number of blows to penetrate last 12 inches with 140-pound hammer in standard penetration test
Blow count reported for each 6-inch interval on logs
PL – Plastic limit of specimen
RQD – Rock quality designation, aggregate length of core pieces greater than 4 inches long, expressed as percent of length drilled
TW – Thin walled tube
SS – Standard penetration test
NQ2 – 2 inches diameter core
CFA – Continuous flight augers
HSA – Hollow stem augers
EOB – End of boring

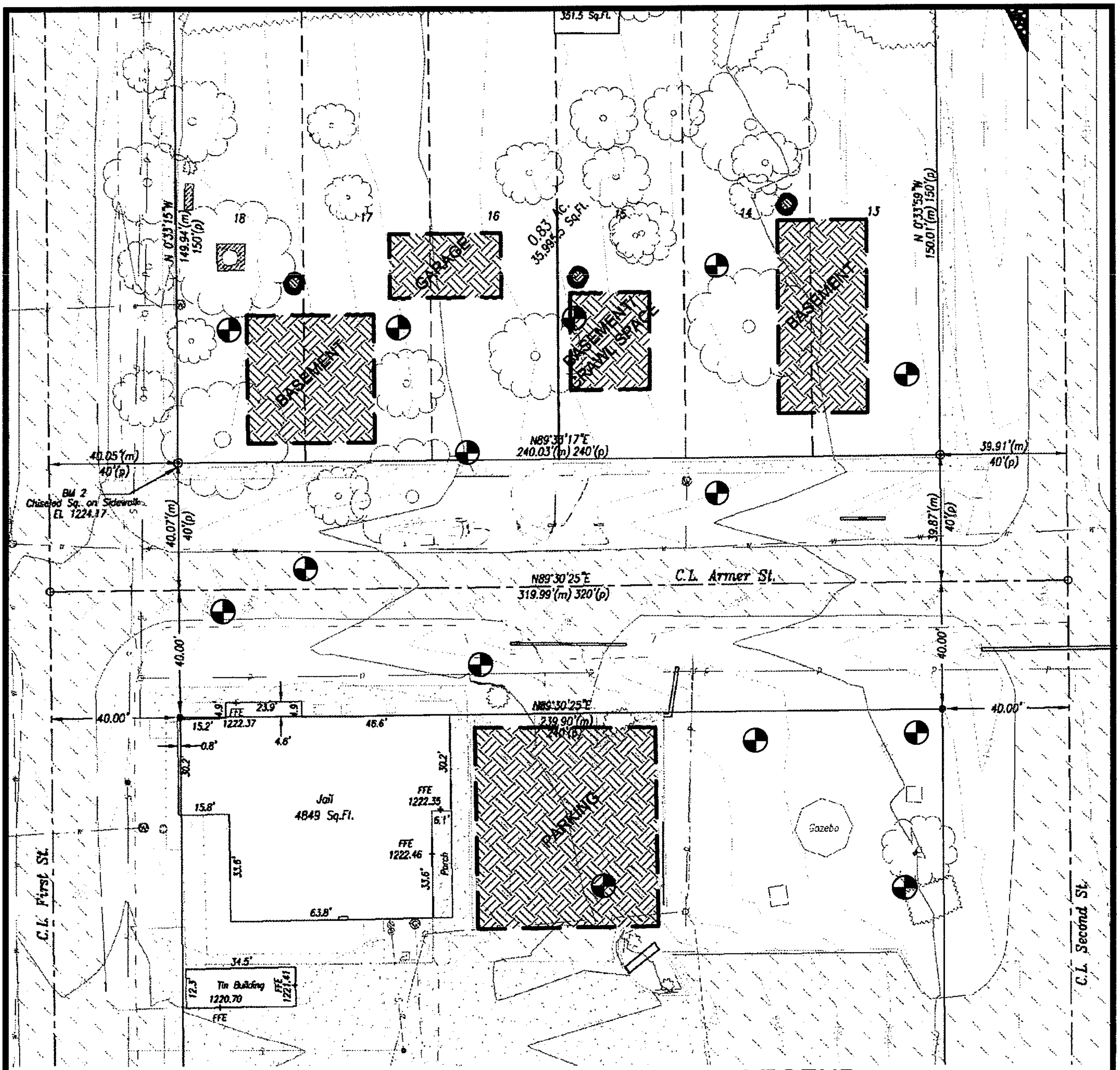
▽ Initial water level reading

▼ Delayed water level reading

KAW VALLEY ENGINEERING

APPENDIX A

APPROXIMATE UNCONTROLLED FILL LOCATIONS



LEGEND

◒ BORING LOCATION

● APPROXIMATE CISTERN LOCATION

▨ APPROXIMATE FILL LOCATION

KAW VALLEY ENGINEERING, INC.
14700 W. 114th TER., LENEXA, KANSAS 66215
tel (913) 894-5150 fax (913) 894-5977
e-mail: lx@kveng.com

PROJECT #: C11G6066

POTTAWATOMIE COUNTY JUSTICE CENTER

ARMER STREET AND NORTH 1st STREET
WESTMORELAND, KANSAS
APPROXIMATE UNCONTROLLED FILL LOCATIONS
NOT TO SCALE