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ADDENDUM NO. 1

Date: JULY 3, 2019 TCVN

Owner: GREEN RIVER VALLEY WATER DISTRICT

Project: CONTRACT 1 – WATER TREATMENT PLANT EXPANSION

The following items are changes and/or clarifications of the plans and specifications and shall be included in the Bid. This Addendum shall supersede in the event of any conflicts. The Bidder shall acknowledge receipt of all Addenda in the appropriate space on the Bid Form. Failure to do so may result in disqualification of the Bid.

1. **Clarification, Prevailing Wages** – Prevailing Wages are not applicable to this Project.

2. **Clarification, American Iron and Steel** – The American Iron and Steel (AIS) provision of the 2017 Consolidated Appropriations Act does not apply to this Project.

3. **Clarification, Project Schedule** – The construction of the new Clearwell, Filter Addition and Chemical Feed Addition shall be initiated at the beginning of the project.

4. **Clarification, Concrete Testing** – The Contractor shall be responsible for the cost of all concrete testing. The Contractor shall submit the independent testing laboratory's credentials for approval by the Engineer.

5. **Clarification, Geotechnical Exploration** – Attached to this Addendum as a revised Report of Geotechnical Exploration. The elevations for borings B-1 through B-8 and B-18 were corrected.

6. **Clarification, Drilled Piers** - The drilled piers shall be embedded into competent bedrock a minimum of 8 inches. Probe holes shall be extended into the bedrock a minimum distance of 5 feet below the bottom of the drilled pier. The probe holes shall be 2 to 3 inches in diameter. Payment for the drilled piers and probe holes shall be as indicated in Bid Form. The Owner will be responsible for inspection and verification of the bedrock suitability.

7. **Clarification, Clearwell Demolition** – The Contractor will be responsible for removing the steel clearwell to a depth of 30" below the existing grade. The clearwell steel shall be removed from the site and properly disposed, or salvaged, in accordance with all applicable laws, regulations, codes, and ordinances. The new clearwell must be constructed and operational before the existing clearwells can be demolished. The floor elevation of the existing clearwells is 500.83 and overflow elevation is 516.00. The 400,000 gallon clearwell was constructed in approximately 1973 and the 300,000 gallon was constructed in 1980.

8. **Clarification, Yard Piping** – All piping 4" and larger used for raw, applied, finished, service, process, and high service water shall be Ductile Iron, minimum Class 200, unless

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called out otherwise on the Plans. All process basin drains 4" and larger shall be Ductile Iron, minimum Class 200.

9. **Clarification, Yard Piping** – All pipe fittings located in the yard shall be restrained using thrust blocks. Restraining glands and harnesses, EBAA Iron Megalugs or equal, may be used as an alternative. Each specific use of restraining glands and harnesses must be submitted and approved by the Engineer prior to installation.

10. **Clarification, Yard Piping** – Tracer wire and detector tape will be required for all non-ferrous yard piping.

11. **Clarification, Intake Improvements** – The existing intake shown on Sheet 2.2 can be completely taken out of service while the improvements are being made to the intake.

12. **Clarification, Hydrostatic Testing** – The Owner shall provide the water for the initial flushing and hydrostatic testing of the proposed waterlines and basins. Water needed for any subsequent testing shall be charged to the Contractor at $3.00/1,000 gallons.

13. **Clarification, Excess Excavation** – Excess dirt and rock may be disposed on-site at the locations selected by the Owner. Further, the filter sand and anthracite may also be disposed on-site. The Contractor shall stockpile topsoil to reuse as cover over the excess spoil, regrade the area to drain, seed and mulch.

14. **Clarification, Filter Rehabilitation** – The two (2) new filter must be operational before the work on the existing filters can be started. The Contractor will be limited to take two (2) existing filters out of service at any point in time.

15. **Section 00200, Instructions To Bidders** – The specifications shall be modified as follows;
    3.01 Revise to state "To demonstrate the Bidder's qualifications to perform the Work, after submitting its Bid and within **3** days of Owner's request, Bidder shall submit..."

16. **Section 00410, Bid Form** – Attached to this Addendum is a revised Bid Form. The Bid Form was revised to include additional unit prices and reduce the documents listed under Article 7–Attachments To This Bid.

17. **Section 04230, Veneer Masonry** – An allowance of $600/1,000 brick shall be utilized for selecting the brick used on the project. The allowance shall be used to adjust the material cost of the brick and included in a change order.

18. **Section 11027, Sample Pumps** – Grunfos, Taco, and Jesco are acceptable manufacturers for the sample pumps.

19. **Section 11214, Vertical Turbine Pumps** – The specifications shall be modified as follows;
    4.1 Quality Assurance
    Add "The assembled pump shall be certified to comply with NSF 61."
    Add "The pump manufacturer shall be ISO 9001 certified."
    Add "All iron and steel pump components shall be epoxy coated with a NSF 61 certified paint. Coating shall be as specified in Section 09960."

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Add "Factory Certified Performance Tests per Hydraulic Institute standards will be required for one pump designed for a particular flow and head. If the test results are not within Grade 2B tolerances, then all pumps shall be factory tested."

7.1.A. General

The Contractor shall furnish and install three (3) vertical turbine pumps. Motor starters, adjustable frequency drives, controls, and instrumentation shall be as specified in Division 16 and not part of the pump manufacturer's scope.

7.1.B. Discharge Head

Delete all reference to suction barrels. Remaining portions of this article to remain in effect. Add "Discharge head shall be provided with a NSF 61 epoxy coating, interior and exterior."

7.1.E. Impeller

Impeller shall be constructed from ASTM B584 C903 Tin Bronze. Remaining portions of this article to remain in effect.

7.1.G. Lineshaft

Lineshaft shall be constructed from 416SS. Remaining portions of this article to remain in effect.

7.1.I. Discharge Column Pipe

Column Pipe shall be constructed from ASTM A53 Grade B steel pipe, standard wall, with NSF 61 epoxy coating inside and outside. Remaining portions of this article to remain in effect.

7.1.J Suction Barrels

Suction Barrels are not to be furnished with the pumps. Delete all reference to suction barrels in specification 11214.

7.1.K Pumps Motor

Delete all reference to reduced voltage starting. The motors shall be inverter duty and driven through adjustable frequency drives. The motor shall be furnished with grounding rings. Remaining portions of this article to remain in effect.

20. **Section 11220, Vertical Paddle Flocculators** – The contract documents are herein modified as follows;

1.3 Design Criteria:

1. Velocity Gradient, G – 90 to 60 fps/ft
2. Tip Speed – 3.0 fps
3. Water Temperature - 40° F

2.1 Drive Unit

B. The motor shall be 1.5 Hp, TEFC, 230/460 volt, 3 ph, 60 Hz with a 1.15 service factor.

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C. The speed of the flocculators shall be adjusted through the Adjustable Frequency Drives specified in Section 16483 and shown on Plan Sheets E-5, E-6, and E-11.

2.2 Drive Shaft

A. The drive shaft shall be constructed from Type 304 Stainless Steel.

2.3 Paddle Reels

A. The paddle reel arms shall be constructed from Type 304 Stainless Steel.

21. **Section 11225, Tube Settler System** – The specifications shall be modified as follows;

1.5.D.1 – Tube settlers shall be certified to comply with ANSI/NSF Standard 61 by an NASI certified laboratory.

2.2.B – Structural Supports

10. Supports shall be fabricated using 316 stainless steel or 6061/6063 aluminum. Bolts, nuts, and other miscellaneous hardware shall be 316 stainless steel.

22. **Section 11240, Chemical Feed Equipment** – Lutz-Jesco, Prominent, and Pulsafeeder are acceptable manufacturers for the mechanically actuated diaphragm metering pumps. The fluoride pump shall be provided in a skid as detailed on Sheet 15.1. The two (2) alum pumps shall be provided loose for installation into the existing chemical feed piping.

23. **Section 11900, Water Distribution SCADA System** – The SCADA System supplier shall include all new pressure transducers for tank levels and pump station pressures. The pressure transducers shall be Danfoss Model MSB 3000 Series. The Owner shall provide the meters with a pulse or 4-20 mA output signal to integrate into the SCADA System. The SCADA System shall include 5 years of cellular or satellite service fees.

24. **Section 12350, Laboratory Casework** – The specifications shall be modified as follows;

1.3 Manufacturer

Add Kewaunee and Jamestown Metal Products as acceptable manufacturers.

25. **Section 13200, Bulk Chemical Storage Tanks** – Tanks TK-1 and TK-2 shall be furnished with a diameter between 3'-0" and 4'-0" and the tank construction material shall be XLPE. The level gauge indicated in the schedule for Tank TK-2 will not be required.

26. **Section 13220, Filter Equipment** – The specifications shall be modified as follows;

1.2.C.2 Flume Water MD: Add "Flume arrangements differing from the plans will be considered. The manufacturer shall submit calculations demonstrating that the alternative configuration does not create a significant increase in maldistribution"

1.3.A Manufacturer: Add "Leopold and De Nora are acceptable manufacturers for the filter equipment."

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2.2.D.7 Add "The surface agitator supply piping shall have a grooved connection located 6" from the filter's backwash gullet wall. The manufacturer of the surface agitators shall supply a 316 SS grooved coupling to connect with the Contractor's supply piping."

27. **Section 16670, Lightning Protection Systems** – The specifications shall be modified as follows;
    2.01 Acceptable Manufacturers
        Add Robbins Lightning as an acceptable manufacturer.

28. **Sheet 1.3 Regrade and Paving** – The plan sheet is being reissued since the original production didn't include the proposed contours. See attached plan sheet.

29. **Sheet 2.1, River Intake Improvements Site Plan** – Attached is a detail for the 6" Blowoff Assembly.

30. **Sheet 3.1, Spring Water Pump Station** – The 4" Service Water line shown in the Plan view and located between the building and the 4' manhole does not get constructed. The 4" Service Water line shall be constructed as shown on the Sections A/3.1 & C/3.1.

31. **Sheet 6.1, Filter Addition** – All of the filter valves 3" and larger shown on Sheet 6.1 shall be electric actuated butterfly valves with the exception of the 12" BFV located at the connection with the existing 12" Settled Water Line. The following table outlines the electric actuated valves for the new filters;

Function	Size	Quantity
Settled (Applied) Water	12"	2
Filter Effluent ROF	8"	2
Backwash ROF	12"	2
Backwash Waste	14"	2
Surface Agitator	3"	2
Rewash (Filter to Waste)	6"	2

Note: There are valves shown on Sheet 6.1 that are used for functions other than operation of the new filters. These valves will be noted as electric actuated if required.

32. **Sheet 9.1 & 9.2 HSPS No.3 Modifications** – The drawings incorrectly call for an 8" Swing Check to be installed on the discharge from the three (3) high service pumps. The three (3) check valves shall be 8" Silent Check Valves.
33. **Sheet 10.1, Existing Sedimentation Basin Modifications** – The concrete surfaces of the Sedimentation Basins 1 through 4 shall be repaired using the CIM Coating System specified in Section 09960.2.12. The basins shall be coated at the locations shown and described in Section A/10.1.

34. **Sheet 11.2, Existing Filter Building Renovation Plan** – The existing floors in the Entry, Laboratory, Console Rm 1, Console Rm 2, Storage, Toilet, and Office are terrazzo tiles and shall be refinished as indicated in the Finish Schedule. Refinishing the terrazzo tiles will consist of patching any holes and repairing area where tiles are missing, grinding to a 120 grit surface, and polishing.

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The renovation of the existing facilities will include painting all surfaces, equipment, piping, etc. that is currently painted. The Contractor shall prepare the surfaces as directed in the specifications and the paint manufacturer's application instructions.

35. **Sheet S3.1 & S5.3, Aluminum Grating** – The grating type called out on the plans is incorrect. The grating shall be as specified in Section 05530.2.05.B.

36. **Sheet S7.5, Detail 3** – Attached is a reprint of Detail 3 since portion of the text was cut-off.

37. **Sheet S7.5, Section C** – The caps for the two (2) drilled piers shall be 3'-0" square x 2'-0" deep as called for on Sheet S7.5.

R. Vaughn Williams, P.E. 7/3/19
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(502) 695-4357

REPORT OF GEOTECHNICAL EXPLORATION

AMERICAN ENGINEERS, INC.

OCTOBER 2018

GREEN RIVER VALLEY WATER DISTRICT

GREEN RIVER VALLEY WATER TREATMENT PLANT EXPANSION

HART COUNTY, KY

AEI
AMERICAN
ENGINEERS, INC.

October 30, 2018

Mr. Vaughn Williams, PE
President
Kenvirons, Inc. | Civil & Environmental Engineers
452 Versailles Road
Frankfort, KY 40601

Re: Report of Geotechnical Investigation
Green River Valley Water Treatment Plant Expansion
Hart County, KY
AEI Project No. 218-357

Dear Mr. Williams:

American Engineers, Inc. is pleased to submit this geotechnical report that details the results of our geotechnical exploration performed at the above referenced site.

The attached report describes the site and subsurface conditions and also details our recommendations for the proposed project. The Appendices to the report contains a boring layout, typed boring logs, and the results of laboratory testing.

We appreciate the opportunity to be of service to you on this project and hope to provide further support on this and other projects in the future. Please contact us if you have any questions regarding this report.

Respectfully,
AMERICAN ENGINEERS, INC.

Jacob Cowan, EIT
Geotechnical Engineer

Dennis Mitchell, PE, PMP
Director of Federal Geotechnical Services

REPORT OF GEOTECHNICAL EXPLORATION
GREEN RIVER VALLEY WATER TREATMENT PLANT EXPANSION
HART COUNTY, KY

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REPORT OF GEOTECHNICAL EXPLORATION
GREEN RIVER VALLEY WATER TREATMENT PLANT EXPANSION
HART COUNTY, KY

1 GENERAL SITE DESCRIPTION

The site of the existing water treatment plant is located on US 31E about 1,500 feet south of the US 31E and Glen Lily Road intersection in Hart County, Kentucky. At the time of the investigation, the site was covered with grass and existing water treatment plant structures. The existing topography of the site is best described as gently rolling within the proposed sedimentation basin footprint and relatively flat within the proposed clearwell footprint. Topographic relief across the proposed structure footprints is on the order of about 25 feet and typically decreased in elevation to the north.

It is our understanding that the new wastewater treatment plant additions will consist of a raw water pump station, two (2) sedimentation basins with the associated flocculation basins, two (2) filters including fluoride and chlorine rooms and a 1,450,000 gallon clearwell. Upon review of FEMA flood mapping, the clearwell foundation lies below the 100-year flood elevation of 515.97 feet. Structural loads were not known at the time of the investigation. However, we anticipate wall loads and contact pressures not to exceed 5 kips per linear foot (klf) and 2,000 pounds per square foot (psf), respectively. Table 1 below summarizes the bearing elevations for the proposed structures:

Table 1: Structure Bearing Elevations

Structure	Bearing Elevation (feet)
Raw Water Pump Station	513.0
Grit Separator	521.25
Flocculation Basins	517.75
Sedimentation Basins	512.75
Filters	516.25
Chemical Building	Varies
Clearwell	503.0

2 GENERAL SITE GEOLOGY

Available geologic mapping (*Geologic Map of the Canmer Quadrangle, USGS, 1969*) shows the site to be underlain by the Quaternary-aged Alluvium deposits and Upper Mississippian-aged St. Louis Limestone formation. Geologic mapping describes the Alluvium to consist of clay, silt, sand and gravel that is described as very poorly sorted

and crudely crossbedded in part. The primary lithology of the St. Louis Limestone formation consists of limestone with minor instances of siltstone and shale. Geologic mapping describes the limestone as gray to yellowish gray in color, fine to coarse grained, medium to thick bedded and silty. The siltstone and shale are described as yellowish-gray to light gray in color, thinly laminated to thinly bedded and occurs in limestone as thin partings. Geologic mapping indicates that the majority of the site lies within the Alluvium. However, the recovered soil and rock core properties are indicative of residuum derived from the St. Louis Limestone formation.

Karst potential mapping was reviewed for the area and indicates the site has low to very high potential for the development of karst features in the immediate vicinity of the proposed project. Moreover, geologic mapping indicates the presence of several sinkholes to the east of the site. As with most karst landscapes, overburden thickness varies greatly due to the differential rates of chemical weathering and patterns of surface drainage. Previous development can mask the presence of existing karst features; sinkholes, caves and springs are typical. No other geologic hazards were noted within the project limits during the site investigation. It should be understood and accepted by the Owner that there is always some risk of future ground subsidence when building in any region where geologic hazards are known to historically exist. It is impossible to fully identify the presence of all geologic hazards during the course of a typical geotechnical investigation.

3 SCOPE OF WORK PERFORMED

The geotechnical exploration consisted of drilling 12 soil test borings, two with rock core, and six (6) rockline soundings. All borings and soundings were drilled to auger refusal. The rock core borings were advanced five to ten feet into the underlying bedrock beyond the auger refusal depths. Boring locations were staked and elevated by AEI personnel. A copy of the boring layout is included in Appendix A following this report.

The borings were drilled by an AEI drill crew using a track-mounted drill rig equipped with continuous flight hollow-stem augers and NQ2-sized coring equipment. A Senior Engineering Technician was on site throughout the investigation to log the recovered soils. During logging of the soils, particular attention was given to the soil color, texture, consistency and apparent moisture content. Standard Penetration Tests (SPT's) were performed on two and one-half foot centers in the upper ten feet and on five foot centers thereafter. In addition, undisturbed Shelby Tubes (ST's) were obtained from selected depth intervals. Soil samples were collected from the split-barrel samplers and stored in sealed plastic bags at the site. Recovered rock core was logged with respect to texture, color, hardness, bedding thickness, recovery percentage and rock quality designation (RQD) percentage. All recovered samples were transported to our laboratory for further classification and testing. The individual soil samples were visually classified by experienced laboratory technicians and verified by a Professional Geologist

based on texture, strength, and plasticity. A copy of the boring logs is included in Appendix B.

The natural moisture content of the soil samples was determined in the laboratory. The natural moisture content is denoted as (W%) and shown as a percentage of the dry weight of the soil on the boring logs. In addition, Atterberg limits, sieve and hydrometer analyses, unconfined compressive strength and one-dimensional consolidation tests were performed on samples representative of the predominant soil horizons. The results of the laboratory tests are summarized in Appendix C.

The soils were classified in the laboratory in general accordance with the Unified Soil Classification System (USCS). The Unified symbol for each stratum is shown on the legend for the typed boring logs. The testing was performed in accordance with the generally accepted standards for such tests.

4 RESULTS OF THE EXPLORATION

4.1 GENERAL

Information provided in the Appendices for this report includes a boring layout, typed boring logs, results of the laboratory tests and other relevant geotechnical information. A description of the subsurface soil, bedrock and groundwater conditions follows.

4.2 SUBSURFACE SOIL CONDITIONS

The generalized subsurface conditions encountered at the boring locations, including descriptions of the various strata and their depths and thicknesses are presented on the typed Boring Logs in Appendix B.

Topsoil was encountered in all borings, with the exception of Borings B-3 and B-4, at the surface with thicknesses of one to 2 ½ inches. Beneath the topsoil, silty clay was encountered to depths of 1 ½ to three feet beneath the surface. The silty clay was typically described as containing variable amounts of gravel and sand, dark brown to brown in color, damp to moist of the anticipated optimum moisture content for compaction and medium stiff to stiff in soil strength consistency with isolated soft zones. Beneath the silty clay, sandy lean clay and lean clay were typically encountered to the auger refusal and termination depths. The clay typically described as either sandy lean clay or lean clay, containing variable amounts of gravel, silt and sand, red to reddish brown in color, moist to wet of the anticipated optimum moisture content and medium stiff to very stiff in soil strength consistency. In Boring B-9, sandy silt was encountered at 17 feet beneath the surface to auger refusal. The sandy silt was described as containing trace gravel, red to reddish brown in color, saturated of the anticipated optimum moisture content and medium stiff to very soft in soil strength consistency.

Visual classification, Atterberg Limits and grain size analyses testing were performed on representative samples. The results indicate that the near-surface clay soils typically classify as CL (Clay of Low plasticity), lean clay, and ML, silt, in accordance with the Unified Soil Classification System (USCS). Liquid limit test results range from 26 to 42 percent with corresponding plasticity indices ranging from two to 11 percent. Natural moisture content testing was also performed on recovered samples. Natural moisture contents range from about ten to 44 percent with most values between about 14 and 35 percent. Results of natural moisture content and Atterberg limits indicate the on-site soils are typically about near to nine percent wet of the plastic limit.

Unconfined compressive strength testing was performed on selected samples representative of the predominant soil horizons. Unconfined compressive strength, or Q_u results ranged from 1,145 to 5,455 pounds per square foot (psf) with corresponding dry unit weights ranging from 88 to 116 pounds per cubic foot (pcf). **Moreover, the unconfined compressive strength values decreased significantly for the samples recovered below the groundwater table.**

One-dimensional consolidation testing was performed on representative samples from Borings B-9 and B-17 and yielded compression (C_c) indices of 0.25 and 0.15, respectively, and recompression (C_r) indices of 0.02 and 0.01, respectively. All one-dimensional consolidation results can be found in Appendix C.

SPT-N values in the cohesive soils encountered ranged from three to 21 blows per foot (bpf), excluding 50+ blow counts, with most values between seven and 19 blows per foot (bpf). Corresponding Qp values in the soils ranged from 0.5 to greater than 4.5 tons per square foot, with most values between 1.0 and greater than 4.5 tons per square foot. Together, the SPT-N and Qp values indicate generally medium stiff to very stiff soil strength consistencies with isolated soft zones. **The soft zones were typically encountered below the groundwater table within the proposed clearwell footprint as indicated in Borings B-4, B-11, B-15 and B-17.**

The stratification shown on the boring logs is based on the field and laboratory data acquired during this exploration. The change in soil from one type to another shown at specific depths on the logs is, in general, not intended to indicate a zone of exact change but rather the general area of change from one soil type to another; in-situ, the transition is gradual.

4.3 BEDROCK CONDITIONS

Refusal, as would be indicated by the Driller on the field boring logs, indicates a depth where either essentially no downward progress can be made by the auger or where the N-value indicates essentially no penetration of the split-spoon sampler. It is normally indicative of a very hard or very dense material such as large boulders or the upper bedrock surface. Auger refusal was encountered in each of the borings, with the

exception of Borings B-3, B-5 and B-7, at depths ranging from about 4.2 to 32.4 feet beneath the existing ground surface. Rock coring was performed in Borings B-17 and B-18 to depths of five to ten feet beyond the auger refusal depth. The underlying bedrock recovered from rock coring was identified as limestone and was typically described as gray in color, fine to coarse grained, thin to thick bedded, slightly vuggy and stylolitic in some instances and hard. Rock core recovery percentages ranged from 91 to 100 percent. Rock Quality Designation (RQD) values ranged from 61 to 90 percent, indicative of fair to very good overall rock quality. Table 2 below summarizes the auger refusal depths encountered.

Table 2: Summary of Auger Refusal Data

Borehole	Auger Refusal Depth (feet)	Auger Refusal Elevation (feet)
*B-1	*4.2	*521.3
B-2	23.3	501.7
B-3	N/A	N/A
B-4	20.5	494.5
B-5	N/A	N/A
B-6	21.2	493.8
B-7	N/A	N/A
B-8	24.3	494.1
B-9	32.4	477.2
B-10	25.8	485.2
B-11	27.2	483.7
B-12	22.9	487.9
*B-13	*9.8	*500.9
B-14	29.4	480.3
B-15	20.0	484.9
B-16	28.5	475.9
B-17	21.5	484.1
B-18	7.0	510.2

*The boring may have refused on a boulder or other obstructing object.

4.4 GROUNDWATER CONDITIONS

Groundwater was encountered below the proposed clearwell footprint in Borings B-9, B-11, B-15 and B-17 at depths ranging from nine to 17 feet beneath the surface at the time of drilling. At the time of drilling, the groundwater depths ranged from about six to ten feet beneath the clearwell subgrade elevation. In cohesive soils such as those encountered at this site, a long time is required for the hydrostatic groundwater level to come to equilibrium in the boreholes. The short-term groundwater levels reported by the drill crew are not generally indicative of the long-term groundwater level. To

accurately determine the long-term groundwater level, as well as the seasonal and precipitation induced fluctuations of the groundwater level, it is necessary to install piezometers in the borings, and monitor them for an extended length of time. Frequently, groundwater conditions affecting construction in this region are caused by trapped or perched groundwater, which occurs within the soil materials or at the soil/rock interface in irregular, discontinuous locations. If these water bodies are encountered during excavation, they can produce seepage durations and rates that will vary depending on the recent rainfall activity and the hydraulic conductivity of the material. Table 3 summarizes the groundwater table depths and elevations at the time of drilling:

Table 3: Summary of Groundwater Table Data (at the time of drilling)

Borehole	Groundwater Table Depth (feet)	Groundwater Table Elevation (feet)
B-9	17.0	492.6
B-11	14.0	496.9
B-15	12.0	492.9
B-17	9.0	496.6

4.5 SEISMIC CONDITIONS

According to the current edition of the Kentucky Building Code and the subsurface conditions encountered in the borings, Site Class E should be utilized for any seismic structural design for the clearwell. Site Class D should be utilized for any seismic structural design for the remaining improvements on site.

Soil liquefaction analysis was outside the scope of this investigation. Prior studies in this region on similar soil types indicate that the potential for liquefaction is low to moderate and is primarily dependent on the variability of site soils and earthquake severity.

Consideration for seismic loading and liquefaction potential beyond this level of investigation is left to the discretion of the structural framing and foundation design engineer.

5 ANALYSES AND RECOMMENDATIONS

The recommendations that follow are based on our conceptual understanding of the project. As the site design is advanced, please notify us of any significant design changes so that our recommendations can be reviewed and modified as necessary.

5.1 GENERAL SITE WORK

5.1.1 On-Site Soils

The near-surface soils on this site are residual clays which classify as low plasticity lean clay, CL, in accordance with the USCS. Low plasticity soils exhibit low to moderate potential to swell or shrink when exposed to long-term increases or decreases in moisture content. These soils are suitable for use as fill material provided they are wetted or dried to a moisture content suitable for compaction.

Efforts should be made to minimize placing high plasticity soil, PI greater than 30, in the upper two feet of subgrade of proposed structural areas.

5.1.2 General Fill Requirements

Any material, whether borrowed on-site or imported to the site, placed as engineered fill on the project site beneath the proposed structure should be an approved material, free of environmental contamination, vegetation, topsoil, organic material, wet soil, construction debris, and rock fragments greater than six inches in diameter.

We recommend that any borrow material, if needed, consist of granular or lean clay materials or mixtures thereof with Unified Classifications of CL, SC, or GC. We further recommend high plasticity clays, known as fat clays (CH soils) not be *imported* to the site due to their potential for volume changes with fluctuations in moisture content.

The preferred off-site borrow material should have a Plasticity Index (PI) less than 30 and a standard Proctor maximum dry density of at least 95 pcf. Engineering classification and standard Proctor tests should be performed on all potential borrow soils and the test results evaluated by an AEI Geotechnical Engineer to evaluate the suitability of the soil for use as engineered fill.

5.1.3 Topsoil Stripping

Prior to earthwork operations, topsoil and surface plant material root mat should be stripped from both cut and fill areas.

5.1.4 Excavations

Temporary excavations should be properly sloped in accordance with the Kentucky Occupational Safety and Health Standards for the Construction Industry 29 CFR Part 1926, Subpart)- Excavations. The soil overburden at the site consists of Type B soils. Type B soils at the site can be laid back on temporary slopes not exceeding 1-½ Horizontal: 1 Vertical (1-½ H: 1V) in excavations not exceeding 20 feet in depth. Sloping or benching for excavations greater than 20 feet deep should be designed by a registered professional engineer.

5.1.5 Subgrade Evaluation/Conditioning

Once the topsoil is removed, areas to receive fill should be "proof-rolled" under the observation of an AEI Geotechnical Engineer or Technician to evaluate the subgrade for suitability for fill placement. The proof-rolling should be performed using heavy construction equipment such as a fully loaded single or tandem axle dump truck (approximately 20-25 tons), passing repeatedly over the subgrade at a slow rate of speed.

Subgrade soils that are considered unstable after proof-rolling should be stabilized by additional compaction or by removal and replacement with a crushed (angular) aggregate layer. The specific method of treatment will be based on the conditions present at the time the proof-rolling is performed and local availability of materials and economic factors. The selection of the appropriate method to mitigate degrading subgrade soils is dependent on the time of year site work is anticipated, cost, anticipated effectiveness, and scheduling impacts. For estimating purposes, AEI can assist in selecting this method considering all factors.

5.1.6 Soil Movement

Site grading should be maintained during construction so that positive drainage is promoted at all times. Final site grading should be accomplished in such a manner as to divert surface runoff and roof drains away from the foundation elements and paved areas. Precipitation runoff should be collected in storm sewers as quickly as possible. Maintenance should be performed regularly on paved areas to seal pavement cracks and reduce surface water infiltration into the pavement subgrade.

5.1.7 Site Soil Practices

Working with the on-site soils will demand sensible construction practices and techniques. Some of these include:

Prevent stripping too far in advance of actual earthwork needs. Problems arise when broad areas of clay/silt mixtures are exposed and allowed to become wet and soft from rainfall. Once saturated, deep rutting can occur by movement of construction equipment.

- Strip areas to receive fill in small, sequential areas as needed. These areas should be limited to the contractor's abilities to reasonably place and compact fill material.

- Schedule earthwork construction to take full advantage of a summer season. Generally, the on-site clays need to be placed at two percent wet of optimum moisture content to achieve compaction and reduce the potential for subgrade

volume change. This moisture range is difficult to achieve in the winter and early spring when rainfall activity is more prevalent and soil drying is not always possible.

- Maintain good surface drainage during earthwork construction. Grade construction areas on a daily basis if necessary to promote sheet drainage of precipitation and seal all engineered fill placed with a smooth drum steel roller at the end of each day.

- Perform frequent density tests during fill placement to confirm achievement of proper compaction.

5.1.8 Construction Debris/Old Foundations Removal

It is our understanding that old tank foundations or other construction debris may exist beneath the center of the proposed clearwell. In addition, shallow auger refusal was encountered in Boring B-13 and the boring is proximate to the anticipated old tank foundation location. **Test pits should be performed in this area to verify that at least two feet of soil cushion is present beneath the clearwell subgrade elevation.** Construction debris encountered should be evaluated and removed as necessary through mechanical efforts.

5.2 STRUCTURE FOUNDATIONS

5.2.1 Recommended Bearing Capacity Values

Based on the results of the borings, the on-site soils are judged suitable for moderate bearing pressures. A net allowable bearing capacity of 2,000 pounds per square foot may be utilized for wall and mat foundations bearing on native soil or engineered fill. Some areas may require undercutting to achieve the design bearing capacity. Soils which fail to meet the design bearing capacity in continuous or spread footing excavations should also be over-excavated and backfilled to the design bearing elevation with densified No. 57 stone wrapped in Type IV geotextile fabric.

In the event of encountering groundwater during excavation, the contractor should be prepared to divert excess groundwater away from all foundation elements by means of using sump pumps, excavating relief trenches and/or daylighting. The geotechnical data indicates that the groundwater table lies beneath the proposed clearwell near between Elevations 493 and 497 feet. However, the groundwater table depth will fluctuate depending on seasonal rainfall events and may vary at the time of construction (see Section 4.4). For constructability concerns, we recommend maintaining the groundwater table a minimum of three feet below subgrade elevations.

These recommendations are provided in consideration of the field-testing, laboratory testing, local codes, and our experience with materials of similar description.

5.2.2 Recommended Minimum Footing Dimensions

The *minimum* recommended width of continuous wall footings is 18 inches. The minimum recommended plan dimension for isolated spread footings is 24 inches. Actual foundation sizes should be determined by the foundation engineer based on design structure loads and the net allowable bearing values presented in 5.2.1.

5.2.3 Footing Trenches

We recommend that the bottom of exterior continuous strip spread footings extend a minimum of 24 inches below finished exterior grade to provide protection against frost penetration related problems in normal winters. Interior foundations not exposed to severe drying, freezing temperatures, and/or severe moisture fluctuations can be constructed at relatively shallow depths as appropriate for construction. Foundation construction should follow these recommendations:

- Foundation concrete should be placed in the excavations the same day the trenches are cut.
- Exposed bearing surfaces should be protected from severe drying, freezing, and water accumulation. A concrete “mud-mat” may be constructed over the bearing materials if the excavation must remain exposed to the elements for an extended period of time.
- Any loose soil, debris, or excess water should be removed from the bearing surface by hand cleaning prior to concrete placement.
- The foundation-bearing surface should be level or appropriately benched.
- Foundation materials that have deteriorated as a result of the elements should be removed prior to concrete placement.
- Foundation trenches should be “clean-cut” where possible and constructed without the use of forms.
- Reinforcing steel should be placed in all footings to provide strength to distribute loads on the foundation that may be overlying weak or more compressible foundation materials to stronger adjacent materials.

5.2.4 Below Grade Walls

Below grade walls should be designed utilizing the earth pressure coefficients in Table 2 below.

Table 2: Earth Pressure Coefficients

Earth Pressure Coefficient		Equivalent Fluid Pressure Above Water Table(pcf)	Equivalent Fluid Pressure Below Water Table(pcf)
Active Coefficient (Ka)	0.36	43	83
Passive Coefficient (Kp)	2.77	166	111
At-Rest Coefficient (Ko)	0.53	64	93

Note: Equivalent fluid pressures below water table ACCOUNT for groundwater hydrostatic pressures.

Typically, below grade walls restrained from rotation should be designed for at-rest (Ko) conditions. The design should also include the hydrostatic water pressure in addition to the appropriate earth pressure.

5.2.5 Potential Foundation Movement

Based on empirical settlement analyses, using the foundation loads previously estimated, it is anticipated that less than 1-inch of total settlement and less than ½-inch differential settlement will occur for beneath the clearwell perimeter provided the foundation/subgrade soils are properly prepared. Settlement at the remaining structure locations should not exceed ¾ inches of total settlement and ½-inch differential settlement.

These estimates assume that the foundations are designed and constructed according to the recommendations in this report and in conjunction with sound foundation construction practice.

5.2.6 Grade Supported Floor Slab Recommendations

The final floor slab design, including the amount of and type of steel reinforcement (welded wire mesh or bar reinforcing) will be dependent on the structural engineer's evaluation of the final grade slab thickness, concrete compressive strength, and actual slab loadings. A modulus of subgrade reaction of 125 pounds per cubic inch (pci) can be utilized for design.

5.3 GENERAL CONSIDERATIONS

5.3.1 Construction Monitoring/Testing

All construction operations involving earthwork and foundation construction should be performed in the presence of an experienced representative of AEI. The representative would operate under the direct supervision of an AEI Geotechnical Engineer. Field observations should be performed prior to and during concrete placement operations.

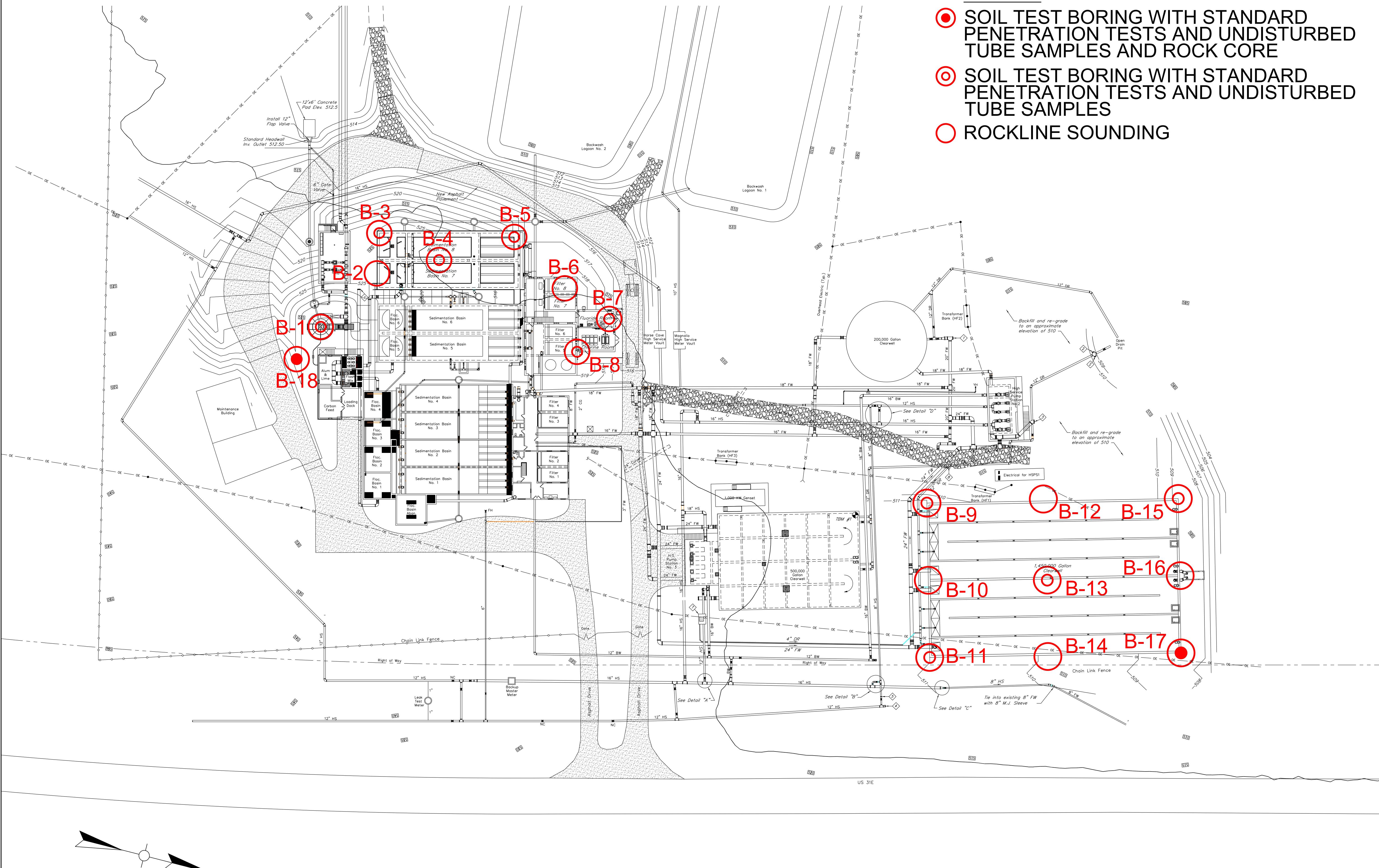
5.3.2 Limitations

The conclusions and recommendations presented herein are based on information gathered from the borings advanced during this exploration using that degree of care and skill ordinarily exercised under similar circumstances by competent members of the engineering profession. No warranties can be made regarding the continuity of conditions between the borings.

We will retain samples acquired for this project for a period of 30 days subsequent to the submittal date printed on the cover of this report. After this period, the samples will be discarded unless otherwise requested.

APPENDIX A

Boring Layout



LEGEND

- SOIL TEST BORING WITH STANDARD PENETRATION TESTS AND UNDISTURBED TUBE SAMPLES AND ROCK CORE
- SOIL TEST BORING WITH STANDARD PENETRATION TESTS AND UNDISTURBED TUBE SAMPLES
- ROCKLINE SOUNDING

NOTE: ALL BORING LOCATIONS ARE APPROXIMATE

NO.	DATE	DESCRIPTION
REVISIONS		

BORING LAYOUT

CLIENT: Green River Valley Water District

PROJECT: Green River Valley WTP Expansion

PLANS PREPARED AND SUBMITTED BY:
DESIGN CONSULTANT

AEI
AMERICAN ENGINEERS, INC.
PROFESSIONAL ENGINEERING
65 Aberdeen Drive
Glasgow, KY 42141
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Branch Offices
2500 Nelson Miller Parkway
Louisville, KY 40222
(502) 245-3813

1634 White Circle, Suite 101
Marietta, GA 30066
(770) 421-8422

www.aei.cc

SCALE: 1"=60'

DATE: 9-25-2018

DRAWN BY: J. COWAN

CHECKED BY: D. MITCHELL

FILE: T: PROJECTS\ 218-357 Green River Valley Water Treatment Plant\ Geotech\Reports\Report Parts

SHEET: B1

APPENDIX B

Boring Logs

FIELD TESTING PROCEDURES

The general field procedures employed by the Field Services Center are summarized in the following outline. The procedures utilized by the AEI Field Service Center are recognized methods for determining soil and rock distribution and ground water conditions. These methods include geophysical and in situ methods as well as borings.

Soil Borings are drilled to obtain subsurface samples using one of several alternate techniques depending upon the surface conditions. Borings are advanced into the ground using continuous flight augers. At prescribed intervals throughout the boring depths, soil samples are obtained with a split-spoon or thin-walled sampler and sealed in airtight glass jars and labeled. The sampler is first seated 6 inches to penetrate loose cuttings and then driven an additional foot, where possible, with blows from a 140 pound hammer falling 30 inches. The number of blows required to drive the sampler each six-inch increment is recorded. The penetration resistance, or "N-value" is designated as the number of hammer blows required to drive the sampler the final foot and, when properly evaluated, is an index to cohesion for clays and relative density for sands. The split spoon sampling procedures used during the exploration are in general accordance with ASTM D 1586. Split spoon samples are considered to provide *disturbed* samples, yet are appropriate for most engineering applications. Thin-walled (Shelby tube) samples are considered to provide *undisturbed* samples and obtained when warranted in general accordance with ASTM D 1587.

These drilling methods are not capable of penetrating through material designated as "refusal materials." Refusal, thus indicated, may result from hard cemented soil, soft weathered rock, coarse gravel or boulders, thin rock seams, or the upper surface of sound continuous rock. Core drilling procedures are required to determine the character and continuity of refusal materials.

Core Drilling Procedures for use on refusal materials. Prior to coring, casing is set in the boring through the overburden soils. Refusal materials are then cored according to ASTM D-2113 using a diamond bit attached to the end of a hollow double tube core barrel. This device is rotated at high speeds and the cuttings are brought to the surface by circulating water. Samples of the material penetrated are protected and retained in the inner tube, which is retrieved at the end of each drill run. Upon retrieval of the inner tube the core is recovered, measured and placed in boxes for storage.

The subsurface conditions encountered during drilling are reported on a field test boring record by the driller. The record contains information concerning the boring method, samples attempted and recovered, indications of the presence of various materials such as coarse gravel, cobbles, etc., and observations between samples. Therefore, these boring records contain both factual and interpretive information. The field boring records are on file in our office.

The soil and rock samples plus the field boring records are reviewed by a geotechnical engineer. The engineer classifies the soil in general accordance with the procedures outlined in ASTM D 2487 and D 2488 and prepares the final boring records which are the basis for all evaluations and recommendations.

Representative portions of soil samples are placed in sealed containers and transported to the laboratory. In the laboratory, the samples are examined to verify the driller's field classifications. Test Boring Records are attached which show the soil descriptions and penetration resistances.

The final boring records represent our interpretation of the contents of the field records based on the results of the engineering examinations and tests of the field samples. These records depict subsurface conditions at the specific locations and at the particular time when drilled. Soil conditions at other locations may differ from conditions occurring at these boring locations. Also, the passage of time may result in a change in the subsurface soil and ground water conditions at these boring locations. The lines designate the interface between soil or refusal materials on the records and on profiles represent approximate boundaries. The transition between materials may be gradual. The final boring records are included with this report.

Water table readings are normally taken in conjunction with borings and are recorded on the "Boring Logs". These readings indicate the approximate location of the hydrostatic water table at the time of our field investigation. Where impervious soils are encountered (clayey soils) the amount of water seepage into the boring is small, and it is generally not possible to establish the location of hydrostatic water table through water level readings. The ground water table may also be dependent upon the amount of precipitation at the site during a particular period of time. Fluctuations in the water table should be expected with variations in precipitation, surface run-off, evaporation and other factors.

The time of boring water level reported on the boring records is determined by field crews as the drilling tools are advanced. The boring water level is detected by changes in the drilling rate, soil samples obtained, etc. Additional water table readings are generally obtained at least 24 hours after the borings are completed. The time lag of at least 24 hours is used to permit stabilization of the ground water table which has been disrupted by the drilling operations. The readings are taken by dropping a weighted line down the boring or using as electrical probe to detect the water level surface.

Occasionally the borings will cave-in, preventing water level readings from being obtained or trapping drilling water above the caved-in zone. The cave-in depth is also measured and recorded on the boring records.

Sampling Terminology

Undisturbed Sampling: Thin-walled or Shelby tube samples used for visual examination, classification tests and quantitative laboratory testing. This procedure is described by ASTM D 1587. Each tube, together with the encased soil, is carefully removed from the ground, made airtight and transported to the laboratory. Locations and depths of undisturbed samples are shown on the "Boring Logs."

Bag Sampling: Bulk samples of soil are obtained at selected locations. These samples consist of soil brought to the surface by the drilling augers, or obtained from test pits or the ground surface using hand tools. Samples are placed in bags, with sealed jar samples of the material, and taken to our laboratory for testing where more mass material is required (i.e. Proctors and CBR's). The locations of these samples are indicated on the appropriate logs, or on the Boring Location Plan.

CLASSIFICATION SYSTEM FOR SOIL EXPLORATION

COHESIVE SOILS
(Clay, Silt, and Mixtures)

CONSISTENCY	SPT N-VALUE	Qu/Qp (tsf)
Very Soft	2 blows/ft or less	0 – 0.25
Soft	2 to 4 blows/ft	0.25 – 0.49
Medium Stiff	4 to 8 blows/ft	0.50 – 0.99
Stiff	8 to 15 blows/ft	1.00 – 2.00
Very Stiff	15 to 30 blows/ft	2.00 – 4.00
Hard	30 blows/ft or more	> 4.00

PLASTICITY

Degree of Plasticity	Plasticity Index (PI)
Low	0 – 7
Medium	8 – 22
High	over 22

NON-COHESIVE SOILS
(Silt, Sand, Gravel, and Mixtures)

DENSITY	SPT N-VALUE
Very Loose	4 blows/ft or less
Loose	4 to 10 blows/ft
Medium Dense	10 to 30 blows/ft
Dense	30 to 50 blows/ft
Very Dense	50 blows/ft or more

PARTICLE SIZE IDENTIFICATION

Boulders	12 inch diameter or more
Cobbles	3 to 12 inch diameter
Gravel	Coarse – 1 to 3 inch
	Medium – ½ to 1 inch
	Fine – ¼ to ½ inch
Sand	Coarse – 0.6mm to ¼ inch
	Medium – 0.2mm to 0.6mm
	Fine – 0.05mm to 0.2mm
Silt	0.05mm to 0.005mm
Clay	0.005mm

RELATIVE PROPORTIONS

Descriptive Term	Percent
Trace	1 – 10
Trace to Some	11 – 20
Some	21 – 35
And	36 – 50

NOTES

Classification – The Unified Soil Classification System is used to identify soil unless otherwise noted.

Standard "N" Penetration Test (SPT) (ASTM D1586) – Driving a 2-inch O.D., 1 3/8-inch I.D. sampler a distance of 1 foot into undisturbed soil with a 140-pound hammer free falling a distance of 30 inches. It is customary to drive the spoon 6-inches to seat the sampler into undisturbed soil, and then perform the test. The number of hammer blows for seating the spoon and making the tests are recorded for each 6 inches of penetration on the field drill long (e.g., 10/8/7). On the report log, the Standard Penetration Test result (i.e., the N value) is normally presented and consists of the sum of the 2nd and 3rd penetration counts (i.e., N = 8 + 7 = 15 blows/ft.)

Soil Property Symbols

Qu:	Unconfined Compressive Strength	N:	Standard Penetration Value (see above)
Qp:	Unconfined Comp. Strength (pocket pent.)	omc:	Optimum Moisture content
LL:	Liquid Limit, % (Atterberg Limit)	PL:	Plastic Limit, % (Atterberg Limit)
PI:	Plasticity Index	mdd:	Maximum Dry Density

AMERICAN ENGINEERS, INC.
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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/20/18 **COMPLETED** 9/20/18
GROUND ELEVATION 525.5 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (1 inch)	SPT 1	53	5-4-4 (8)	4.0	14				
		(CL-ML) silty CLAY, some gravel, dark brown, damp to moist, medium stiff	SPT 2	67	3-4-5 (9)	2.5	19				
		(CL) sandy lean CLAY, trace gravel, brown to reddish brown, moist, stiff									
			SPT 3	0	50						
		Refusal at 4.2 feet. Bottom of borehole at 4.2 feet.									

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PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/20/18 **COMPLETED** 9/20/18
GROUND ELEVATION 525 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5											
10											
15											
20											

Refusal at 23.3 feet.
Bottom of borehole at 23.3 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/20/18 **COMPLETED** 9/20/18
GROUND ELEVATION 521 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		(CL-ML) silty CLAY, some gravel, dark brown, damp to moist, stiff to medium stiff	SPT 1	100	6-9-6 (15)	2.0	17				
			SPT 2	60	3-3-4 (7)	2.0	20				
		(CL) sandy lean CLAY with gravel, red to reddish brown, moist, stiff to medium stiff	ST 1	55		3.5	16	26	15	11	
5			SPT 3	73	5-6-8 (14)	3.5	18				
10			SPT 4	73	4-5-7 (12)	3.0	21				
15			SPT 5	80	5-6-8 (14)	3.0	22				
20			SPT 6	73	3-4-4 (8)	1.5	34				

Bottom of borehole at 20.5 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/20/18 **COMPLETED** 9/20/18
GROUND ELEVATION 515 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		(CL-ML) silty CLAY, brown, moist, stiff	SPT 1	80	4-5-5 (10)	4.0	14				
		(CL) sandy lean CLAY, red to reddish brown, moist to wet, stiff to medium stiff	SPT 2	87	5-5-6 (11)	3.5	21				
5			SPT 3	80	5-6-8 (14)	3.5	25	42	17	25	
			SPT 4	73	6-7-10 (17)	3.0	26				
10			SPT 5	80	6-6-7 (13)	2.5	25				
15			SPT 6	87	3-3-4 (7)	2.5	36				
20			SPT 7	53	0-0-50 (50)	1.0	32				

Refusal at 20.5 feet.
Bottom of borehole at 20.5 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/20/18 **COMPLETED** 9/20/18
GROUND ELEVATION 514 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (1.5 inches)	SPT 1	67	4-4-4 (8)	3.5	17				
		(CL-ML) silty CLAY, brown, damp to moist, medium stiff to stiff	SPT 2	60	3-3-6 (9)	2.0	18				
		(CL) sandy lean CLAY, trace gravel, red to reddish brown, moist, very stiff to medium stiff									
5			SPT 3	73	6-7-10 (17)	3.5	27				
			SPT 4	80	7-7-8 (15)	3.5	19				
10			SPT 5	67	3-4-6 (10)	2.0	24				
15			SPT 6	80	4-5-6 (11)	2.0	22				
20			SPT 7	87	2-2-3 (5)	1.0	35				

Bottom of borehole at 20.5 feet.

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PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/19/18 **COMPLETED** 9/19/18
GROUND ELEVATION 515 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5											
10											
15											
20											

Refusal at 21.2 feet.
Bottom of borehole at 21.2 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/19/18 **COMPLETED** 9/19/18
GROUND ELEVATION 516 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (1.5 inches)	SPT 1	87	5-9-10 (19)	3.0	15				
		(CL-ML) silty CLAY, brown, damp to moist, very stiff	SPT 2	40	4-7-8 (15)	3.25	15				
		(CL) sandy lean CLAY, red to reddish brown, moist, stiff and very stiff									
5			SPT 3	67	4-4-4 (8)	2.5	18				
			SPT 4	87	6-7-9 (16)	2.0	18				
10			SPT 5	87	4-7-10 (17)	3.0	22				
15			SPT 6	87	5-5-6 (11)	2.0	35				
20			SPT 7	87	4-3-3 (6)	2.5	20				

Bottom of borehole at 20.5 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/19/18 **COMPLETED** 9/19/18
GROUND ELEVATION 518.4 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (1 inch)	SPT 1	67	4-4-4 (8)	2.5	17				
		(CL-ML) silty CLAY, trace to some gravel, dark brown, damp to moist, stiff	SPT 2	80	6-5-5 (10)	2.5	16				
		(CL) sandy lean CLAY, trace to some gravel, red to reddish brown, stiff to medium stiff	ST 1	100		3.5	31				
5			SPT 3	80	4-5-6 (11)	3.5	23				
10			SPT 4	73	5-7-6 (13)	3.0	16				
15			SPT 5	80	4-4-4 (8)	2.5	25				
20			SPT 6	60	2-3-3 (6)	1.0	19				
		Refusal at 24.3 feet.	SPT 7	100	50	1.0	27				
		Bottom of borehole at 24.3 feet.									

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PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/19/18 **COMPLETED** 9/19/18
GROUND ELEVATION 509.6 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 17.00 ft / Elev 492.60 ft
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (2 inches)	SPT 1	87	5-7-8 (15)	2.5	10				
		(CL-ML) silty CLAY, brown, dry to moist, trace organics, stiff	SPT 2	87	6-5-6 (11)	3.0	17				
		(CL) lean CLAY, trace gravel, trace to some sand, red to reddish brown, moist to saturated, medium stiff									
5			SPT 3	80	3-3-3 (6)	1.0	21				
			ST 1	100		4.5+	20				
10			SPT 4	80	6-7-7 (14)	4.5+	20				
15			SPT 5	73	4-4-3 (7)	2.25	18				
		▽ (ML) sandy SILT, trace gravel, red to reddish brown, saturated, medium stiff to very soft	ST 2	85		1.0	37	30	28	2	
20			SPT 6	67	2-3-4 (7)	1.0	41				
25			SPT 7	40	2-2-2 (4)	0.75	32				
30			SPT 8	33	0-0-0 (0)	0.5	56				

Refusal at 32.4 feet.
Bottom of borehole at 32.4 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/18/18 **COMPLETED** 9/18/18
GROUND ELEVATION 511 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5											
10											
15											
20											
25											

Refusal at 25.8 feet.
Bottom of borehole at 25.8 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/19/18 **COMPLETED** 9/19/18
GROUND ELEVATION 510.9 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 14.00 ft / Elev 496.90 ft
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (2 inches)	SPT 1	73	2-2-2 (4)	2.0	23				
		(CL-ML) silty CLAY, brown, damp to moist, soft to medium stiff	SPT 2	47	2-3-3 (6)	1.5	22				
		(CL) sandy lean CLAY, trace gravel, trace to some silt, red to reddish brown, moist, very stiff to soft									
5			SPT 3	80	5-6-7 (13)	2.5	18				
			SPT 4	87	7-10-9 (19)	N/A	16				
10			SPT 5	53	5-8-10 (18)	3.0	17				
		▽									
15			SPT 6	67	6-7-7 (14)	3.0	29				
20			SPT 7	80	4-4-4 (8)	3.0	34				
25			SPT 8	60	1-1-2 (3)	1.0	28				

Refusal at 27.2 feet.
Bottom of borehole at 27.2 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/18/18 **COMPLETED** 9/18/18
GROUND ELEVATION 510.8 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5											
10											
15											
20											
		Refusal at 22.8 feet. Bottom of borehole at 22.8 feet.									

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/19/18 **COMPLETED** 9/19/18
GROUND ELEVATION 510.7 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (1.5 inches)	SPT 1	73	4-8-4 (12)	3.0	14				
		(CL) lean CLAY with sand, trace gravel, brown, damp to moist, stiff	SPT 2	73	4-5-3 (8)	3.5	15	27	16	11	
5		(CL) lean CLAY, trace gravel, trace to some sand and silt, red to reddish brown, moist to wet, very stiff to soft	SPT 3	67	2-2-19 (21)	1.0	19				
			SPT 4	73	1-1-2 (3)	0.5	20				
			SPT 5	50	2-50	0.5	22				

Refusal at 9.8 feet.
Bottom of borehole at 9.8 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/18/18 **COMPLETED** 9/18/18
GROUND ELEVATION 509.7 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5											
10											
15											
20											
25											

Refusal at 29.4 feet.
Bottom of borehole at 29.4 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/19/18 **COMPLETED** 9/19/18
GROUND ELEVATION 504.9 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
▽ **AT TIME OF DRILLING** 12.00 ft / Elev 492.90 ft
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (2 inches)	SPT 1	73	2-3-4 (7)	2.0	20				
		(CL-ML) silty CLAY, dark brown, moist, trace organics, medium stiff to stiff	SPT 2	67	3-4-4 (8)	1.0	21				
		(CL) sandy lean CLAY, trace to some gravel, trace sand, red to brown, moist, stiff to medium stiff									
5			SPT 3	80	3-5-7 (12)	2.5	29				
			SPT 4	73	5-7-8 (15)	2.5	21				
10			SPT 5	80	4-5-5 (10)	2.25	19				
		▽									
15			SPT 6	73	3-3-2 (5)	0.5	23				
20			SPT 7	30	2-50	N/A	24				

Refusal at 20.0 feet.
Bottom of borehole at 20.0 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/18/18 **COMPLETED** 9/18/18
GROUND ELEVATION 504.4 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD Hollow Stem Auger
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		OVERBURDEN									
5											
10											
15											
20											
25											

Refusal at 28.5 feet.
Bottom of borehole at 28.5 feet.

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(270) 651-7220

CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/18/18 **COMPLETED** 9/18/18
GROUND ELEVATION 505.6 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD HSA/ Diamond impregnated coring bit
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
48hrs AFTER DRILLING 9.00 ft / Elev 496.60 ft

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (2.5 inches)									
		(CL-ML) silty CLAY, trace sand, brown, moist, medium stiff to stiff	SPT 1	80	2-3-3 (6)	1.5	19				
			SPT 2	80	4-6-9 (15)	2.75	16				
		(CL) sandy lean CLAY, trace to some of gravel, trace silt, reddish brown, moist to saturated, stiff to medium stiff									
5			SPT 3	87	6-7-8 (15)	3.25	22				
			ST 1	50		4.5+	22	30	16	14	
10			SPT 4	87	4-8-7 (15)	2.5	23				
15			SPT 5	80	4-5-4 (9)	2.0	41				
			ST 2	100		2.0	30				
20			SPT 6	100	2-2-50 (52)	0.25	44				
		LIMESTONE, gray, medium to coarse grained, thick bedded, slightly vuggy, stylolitic, hard	RC 1	100 (89)							
25			RC 2	100 (67)							

Refusal at 21.5 feet.
Bottom of borehole at 26.5 feet.

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CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky
DATE STARTED 9/20/18 **COMPLETED** 9/20/18
GROUND ELEVATION 527.5 ft
DRILLING CONTRACTOR Jim Powers
GROUND WATER LEVELS:
DRILLING METHOD HSA/ Diamond impregnated coring bit
AT TIME OF DRILLING ---
LOGGED BY Adam Cash **CHECKED BY** Jacob Cowan
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	REMARKS
0		TOPSOIL (1.5 inches)									
		(CL-ML) silty CLAY, some gravel, brown, damp to moist, stiff	SPT 1	73	5-6-6 (12)	2.0	16				
			SPT 2	60	3-10-2 (12)	2.0	19				
		(CL) sandy lean CLAY, trace gravel, reddish brown, moist, stiff									
5			SPT 3	73	4-3-6 (9)	2.5	26				
		LIMESTONE, gray, fine to medium grained, thin to thick bedded, slightly vuggy, hard	RC 1	91 (61)							
10			RC 2	100 (80)							Water loss at 10.0'
15			RC 3	100 (90)							

Refusal at 7.0 feet.
Bottom of borehole at 17.3 feet.

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KEY TO SYMBOLS

CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky

LITHOLOGIC SYMBOLS
(Unified Soil Classification System)


CL: USCS Low Plasticity Clay


CL-ML: USCS Low Plasticity Silty Clay


CLS: USCS Low Plasticity Sandy Clay


LIMESTONE: Limestone


MLS: USCS Sandy Silt


TOPSOIL: Topsoil

SAMPLER SYMBOLS


Rock Core


Standard Penetration Test


Shelby Tube

WELL CONSTRUCTION SYMBOLS

ABBREVIATIONS

LL - LIQUID LIMIT (%)
PI - PLASTIC INDEX (%)
W - MOISTURE CONTENT (%)
DD - DRY DENSITY (PCF)
NP - NON PLASTIC
-200 - PERCENT PASSING NO. 200 SIEVE
PP - POCKET PENETROMETER (TSF)

TV - TORVANE
PID - PHOTOIONIZATION DETECTOR
UC - UNCONFINED COMPRESSION
ppm - PARTS PER MILLION


Water Level at Time Drilling, or as Shown


Water Level at End of Drilling, or as Shown


Water Level After 24 Hours, or as Shown

APPENDIX C

Laboratory Testing Results

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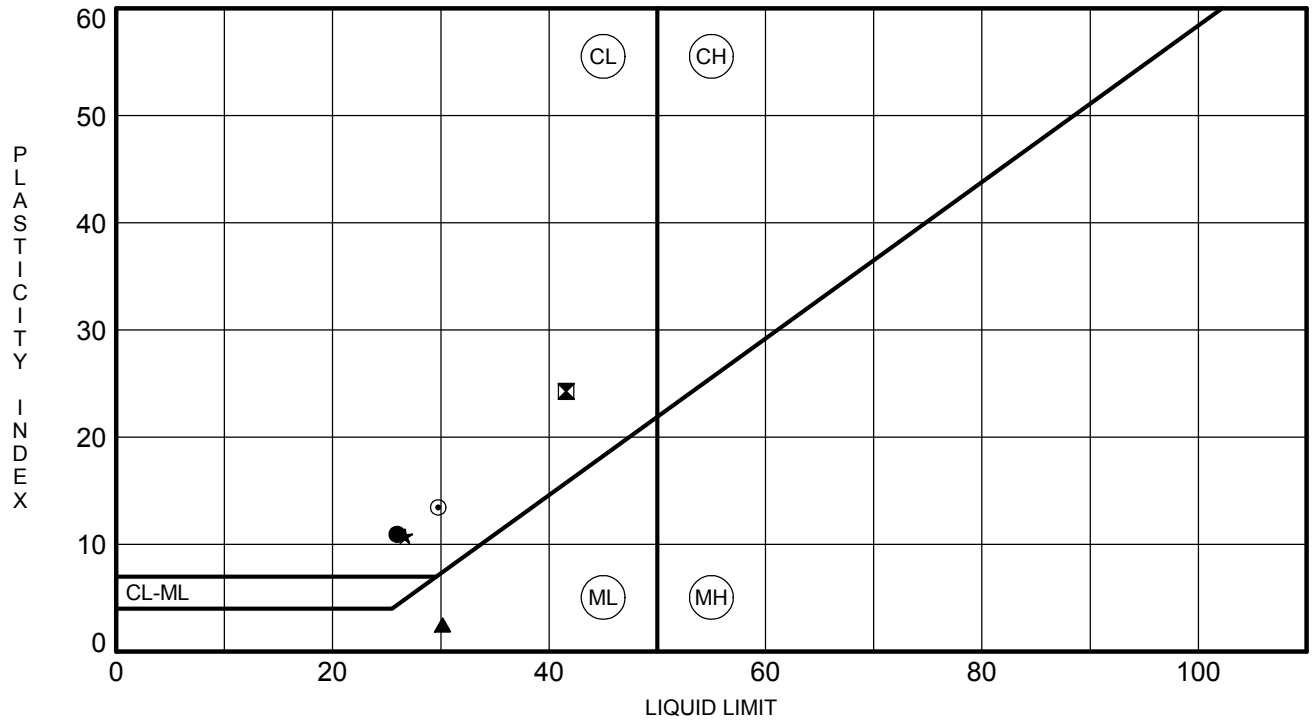
ATTERBERG LIMITS RESULTS

CLIENT Green River Valley Water District **PROJECT NAME** Green River Valley WTP Expansion

PROJECT NUMBER 218-357 **PROJECT LOCATION** Hart County, Kentucky



	BOREHOLE	DEPTH	LL	PL	PI	Fines	Classification
●	**B-3**	**3.5**	**26**	**15**	**11**	**54**	**SANDY LEAN CLAY with GRAVEL(CL)**
⊠	**B-4**	**4.0**	**42**	**17**	**25**	**68**	**SANDY LEAN CLAY(CL)**
▲	**B-9**	**17.0**	**30**	**28**	**2**	**57**	**SANDY SILT(ML)**
★	**B-13**	**1.5**	**27**	**16**	**11**	**71**	**LEAN CLAY with SAND(CL)**
⊙	**B-17**	**6.5**	**30**	**16**	**14**	**56**	**SANDY LEAN CLAY(CL)**

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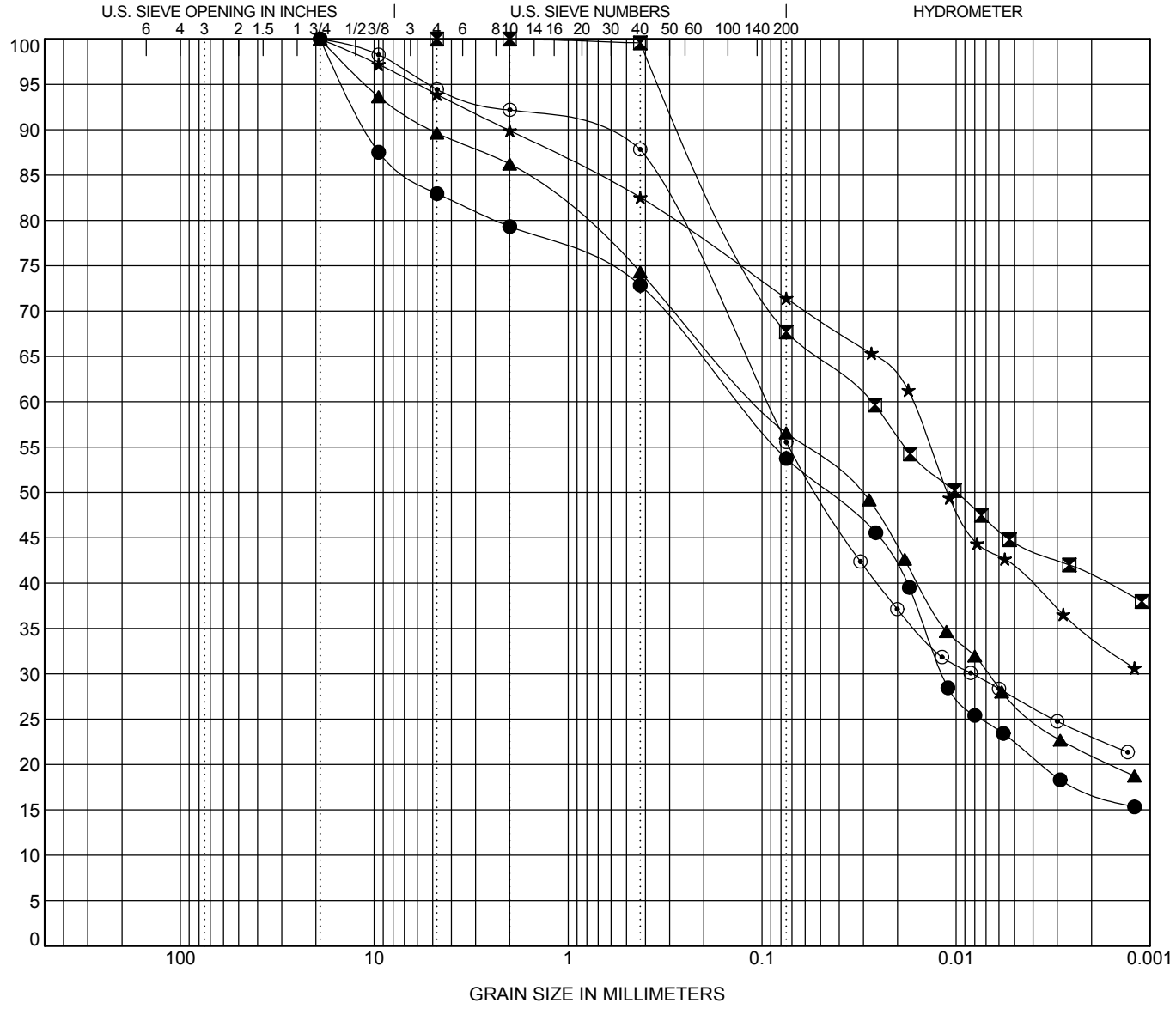
GRAIN SIZE DISTRIBUTION

CLIENT Green River Valley Water District **PROJECT NAME** Green River Valley WTP Expansion

PROJECT NUMBER 218-357 **PROJECT LOCATION** Hart County, Kentucky



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	BOREHOLE	DEPTH	Classification	LL	PL	PI	Cc	Cu
●	B-3	3.5	SANDY LEAN CLAY with GRAVEL(CL)	26	15	11		
⊠	B-4	4.0	SANDY LEAN CLAY(CL)	42	17	25		
▲	B-9	17.0	SANDY SILT(ML)	30	28	2		
★	B-13	1.5	LEAN CLAY with SAND(CL)	27	16	11		
⊙	B-17	6.5	SANDY LEAN CLAY(CL)	30	16	14		

	BOREHOLE	DEPTH	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-3	3.5	19	0.132	0.012		17.0	29.2	31.3	22.4
⊠	B-4	4.0	4.75	0.027			0.0	32.3	23.1	44.6
▲	B-9	17.0	19	0.105	0.007		10.4	33.1	29.7	26.9
★	B-13	1.5	19	0.017			6.1	22.5	29.8	41.7
⊙	B-17	6.5	19	0.095	0.008		5.6	38.9	28.2	27.4

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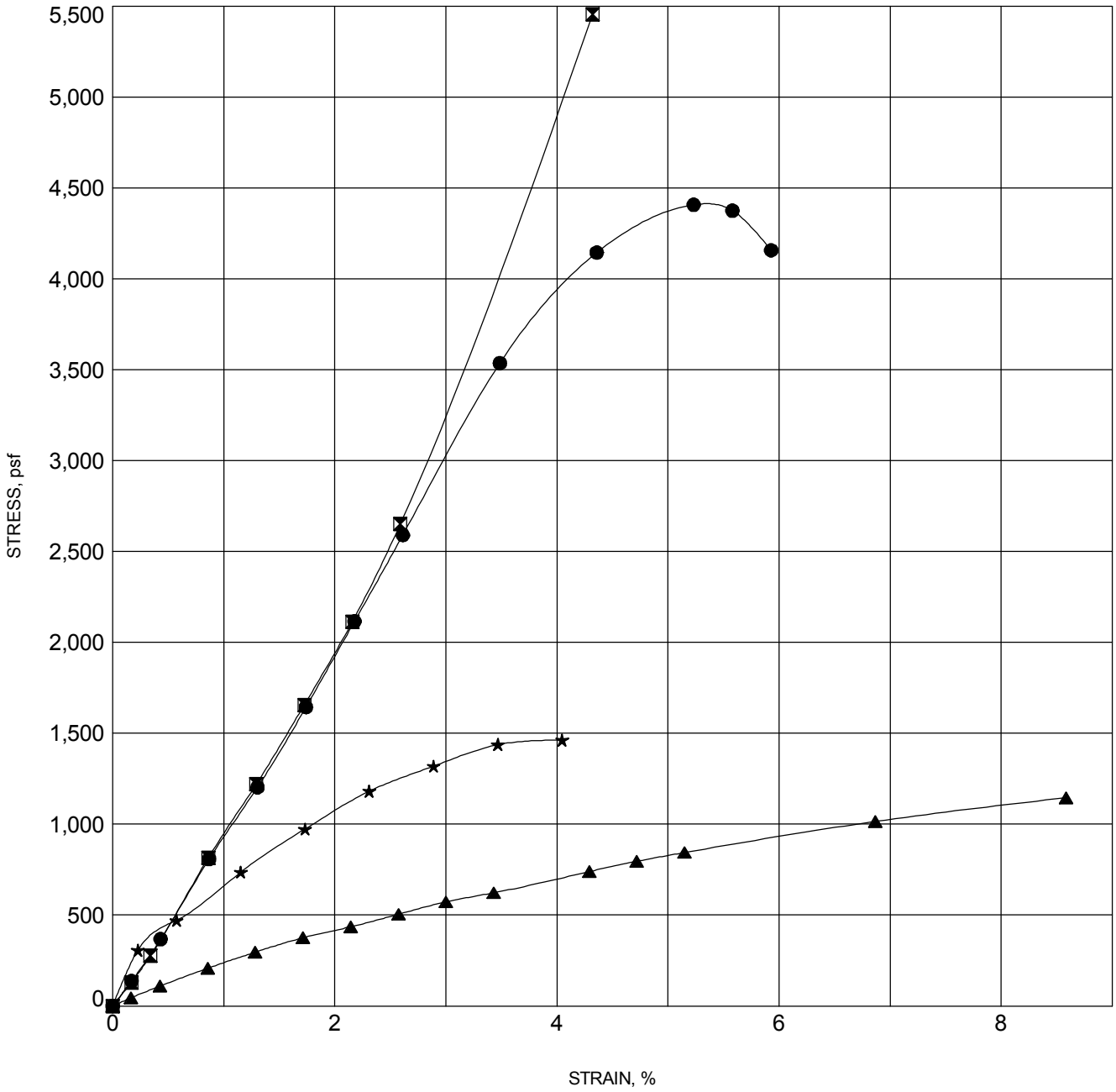
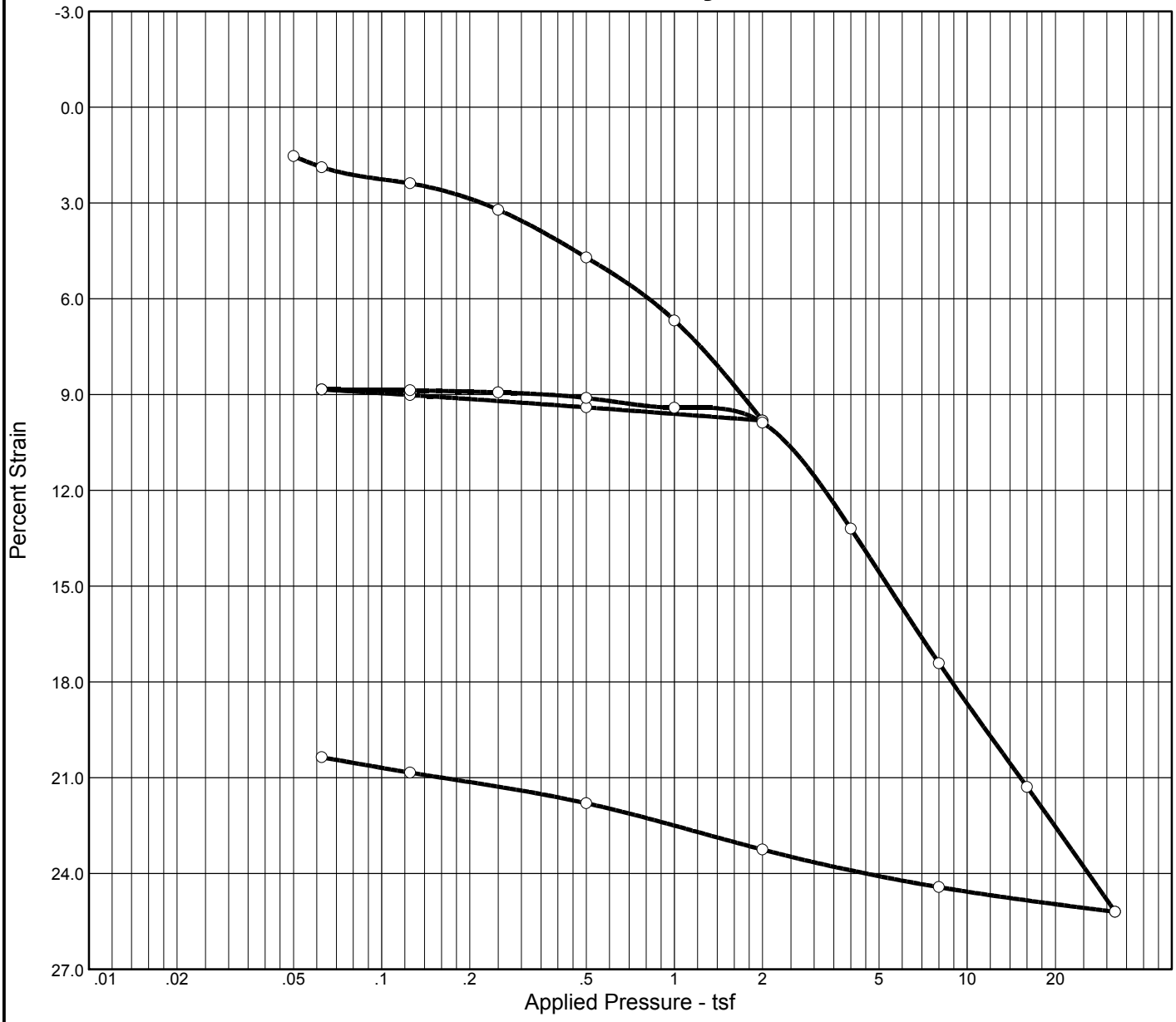
UNCONFINED COMPRESSION TEST

CLIENT Green River Valley Water District
PROJECT NAME Green River Valley WTP Expansion
PROJECT NUMBER 218-357
PROJECT LOCATION Hart County, Kentucky



	BOREHOLE	DEPTH	Classification	γ_d	Qu
●	B-8	3.5	SANDY LEAN CLAY(CL)	114	4407
⊠	B-9	6.5	LEAN CLAY(CL)	116	5455
▲	B-9	17.0	SANDY SILT(ML)	88	1145
★	B-17	17.0	SANDY LEAN CLAY(CL)	96	1463

Green River Valley WTP



MATERIAL DESCRIPTION	USCS	AASHTO
red to reddish brown sandy silt		

LL	PI	Sp. Gr.	Overburden (tsf)	Dry Dens. (pcf)		Moisture		Saturation		Void Ratio		P_c (tsf)	C_c
				Init.	Final	Init.	Final	Init.	Final	Init.	Final		
		2.705	1.10	87.3		32.8 %	26.3 %	95.0 %	100.0 %	0.935	0.541	1.33	0.25

Preparation Process:	D2435 Method	C_r	Swell Press. (tsf)	Swell %
Condition of Test:		0.02		

Project No. 218-357 **Client:** Green River Valley Water District

Project: Green River Water Treatment Plant

Source: B-9 **Elev./Depth:** 17'

Remarks:

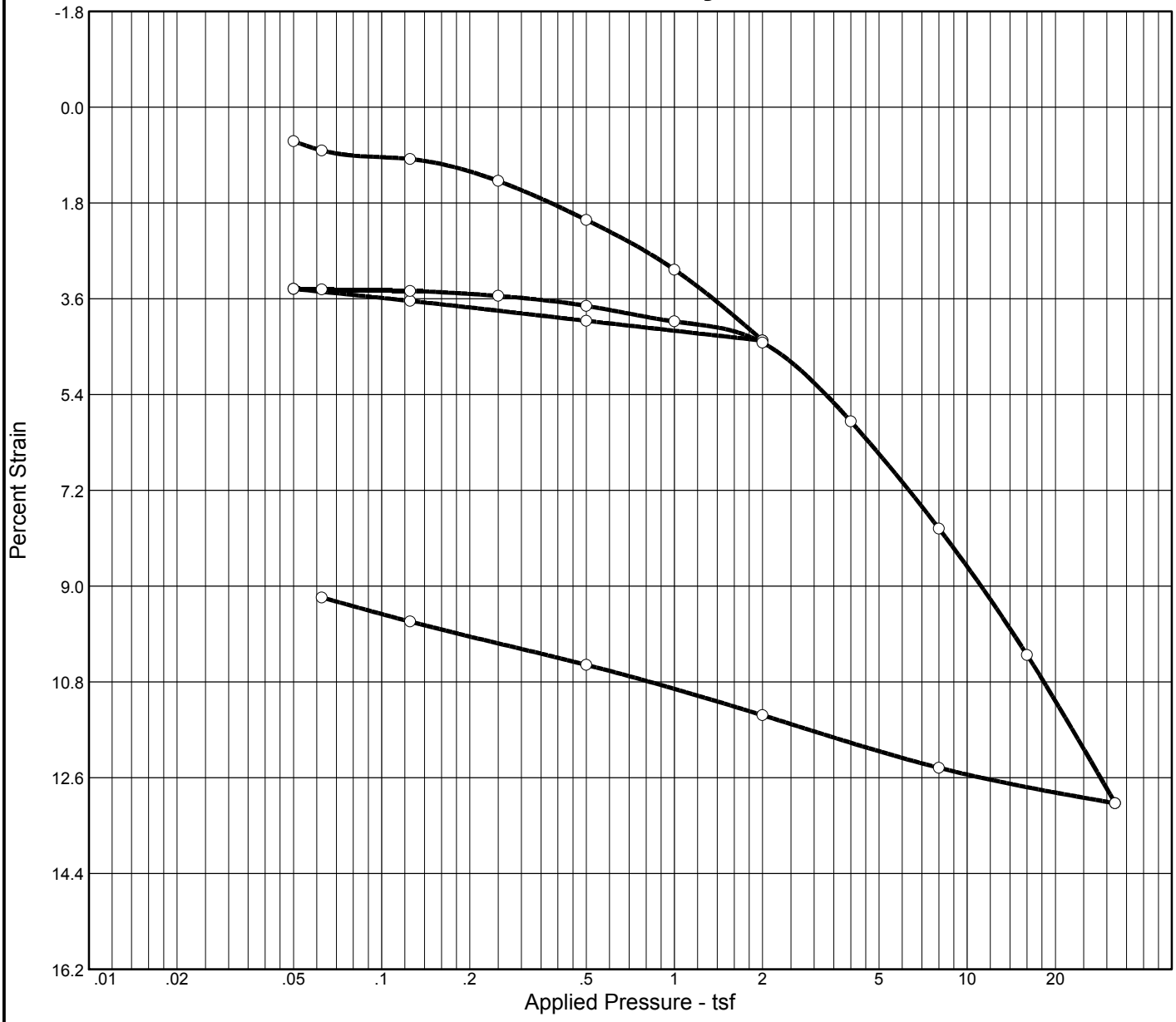
Checked By:

Title:

American Engineers, Inc.
Field Services Center
Glasgow, Kentucky

Figure

Green River Valley WTP



MATERIAL DESCRIPTION	USCS	AASHTO
reddish brown sandy lean clay		

LL	PI	Sp. Gr.	Overburden (tsf)	Dry Dens. (pcf)		Moisture		Saturation		Void Ratio		P_c (tsf)	C_c
				Init.	Final	Init.	Final	Init.	Final	Init.	Final		
		2.705	0.45	108.4		17.8 %		86.2 %		0.558	0.414	2.03	0.15

Preparation Process:	D2435 Method	C_r	Swell Press. (tsf)	Swell %
Condition of Test:		0.01		

Project No. 218-357 **Client:** Green River Valley Water District

Project: Green River Water Treatment Plant

Source: B-17 **Elev./Depth:** 6.5'

American Engineers, Inc.
Field Services Center
Glasgow, Kentucky

Remarks:

Checked By:

Title:

Figure

Your Geotechnical Engineering Report

To help manage your risks, this information is being provided because subsurface issues are a major cause of construction delays, cost overruns, disputes, and claims.

Geotechnical Services are Performed for Specific Projects, Purposes, and People

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering exploration conducted for an engineer may not fulfill the needs of a contractor or even another engineer. Each geotechnical engineering exploration and report is unique and is prepared solely for the client. No one except the client should rely on the geotechnical engineering report without first consulting with the geotechnical engineer who prepared it. The report should not be applied for any project or purpose except the one originally intended.

Read the Entire Report

To avoid serious problems, the full geotechnical engineering report should be read in its entirety. Do not only read selected sections or the executive summary.

A Unique Set of Project-Specific Factors is the Basis for a Geotechnical Engineering Report

Geotechnical engineers consider a numerous unique, project-specific factors when determining the scope of a study. Typical factors include: the client's goals, objectives, project costs, risk management preferences, proposed structures, structures on site, topography, and other proposed or existing site improvements, such as access roads, parking lots, and utilities. Unless indicated otherwise by the geotechnical engineer who conducted the original exploration, a geotechnical engineering report should not be relied upon if it was:

- not prepared for you or your project,
- not prepared for the specific site explored, or
- completed before important changes to the project were implemented.

Typical changes that can lessen the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a multi-story hotel to a parking lot
- finished floor elevation, location, orientation, or weight of the proposed structure, anticipated loads or
- project ownership

Geotechnical engineers cannot be held liable or responsible for issues that occur because their report did not take into account development items of which they were not informed. The geotechnical engineer should always be notified of any project changes. Upon notification, it should be requested of the geotechnical engineer to give an assessment of the impact of the project changes.

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that exist at the time of the exploration. A geotechnical engineering report should not be relied upon if its reliability could be in question due to factors such as man-made events as construction on or adjacent to the site, natural events such as floods, earthquakes, or groundwater fluctuation, or time. To determine if a geotechnical report is still reliable, contact the geotechnical engineer. Major problems could be avoided by performing a minimal amount of additional analysis and/or testing.

Most Geotechnical Findings are Professional Opinions

Geotechnical site explorations identify subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field logs and laboratory data and apply their professional judgment to make conclusions about the subsurface conditions throughout the site. Actual subsurface conditions may differ from those indicated in the report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risk associated with unanticipated conditions.

The Recommendations within a Report Are Not Final

Do not put too much faith on the construction recommendations included in the report. The recommendations are not final due to geotechnical engineers developing them principally from judgment and opinion. Only by observing actual subsurface conditions revealed during construction can geotechnical engineers finalize their recommendations. Responsibility and liability cannot be assumed for the recommendations

within the report by the geotechnical engineer who developed the report if that engineer does not perform construction observation.

A Geotechnical Engineering Report Is Subject To Misinterpretation

Misinterpretation of geotechnical engineering reports has resulted in costly problems. The risk of misinterpretation can be lowered after the submittal of the final report by having the geotechnical engineer consult with appropriate members of the design team. The geotechnical engineer could also be retained to review crucial parts of the plans and specifications put together by the design team. The geotechnical engineering report can also be misinterpreted by contractors which can result in many problems. By participating in pre-bid and preconstruction meetings and providing construction observations by the geotechnical engineer, many risks can be reduced.

Final Boring Logs Should not be Re-drawn

Geotechnical engineers prepare final boring logs and testing results based on field logs and laboratory data. The logs included in a final geotechnical engineering report should never be redrawn to be included in architectural or design drawings due to errors that could be made. Electronic reproduction is acceptable, along with photographic reproduction, but it should be understood that separating logs from the report can elevate risk.

Contractors Need a Complete Report and Guidance

By limiting what is provided for bid preparation, contractors are not liable for unforeseen subsurface conditions although some owners and design professionals believe the opposite to be true. The complete geotechnical engineering report, accompanied with a cover letter or transmittal, should be provided to contractors to help prevent costly problems. The letter states that the report was not prepared for purposes of bid development and the report's accuracy is limited. Although a fee may be required, encourage the contractors to consult with the geotechnical engineer who prepared the report and/or to conduct additional studies to obtain the specific types of information they need or prefer. A prebid conference involving the owner, geotechnical engineer, and contractors can prove to be very valuable. If needed, allow contractors sufficient time to perform additional studies. Upon doing this you might be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Closely Read Responsibility Provisions

Geotechnical engineering is not as exact as other engineering disciplines. This lack of understanding by clients, design professionals, and contractors has created unrealistic expectations that have led to disappointments, claims, and disputes. To minimize such risks, a variety of explanatory provisions may be included in the report by the geotechnical engineer. To help others recognize their own responsibilities and risks, many of these provisions indicate where the geotechnical engineer's responsibilities begin and end. These provisions should be read carefully, questions asked if needed, and the geotechnical engineer should provide satisfactory responses.

Environmental Issues/Concerns are not Covered

Unforeseen environmental issues can lead to project delays or even failures. Geotechnical engineering reports do not usually include environmental findings, conclusions, or recommendations. As with a geotechnical engineering report, do not rely on an environmental report that was prepared for someone else.

AEI
AMERICAN ENGINEERS, INC.
PROFESSIONAL ENGINEERING

65 Aberdeen Drive
Glasgow, KY 42141
270-651-7220

SECTION 00410

BID FORM

(ADDENDUM NO. 1)

Project Identification: Green River Valley Water District – Water Treatment Plant Expansion

Contract Identification Number: Contract 1 – Water Treatment Plant Expansion

ARTICLE 1 – BID RECIPIENT

1.01 This Bid is submitted to:

Green River Valley Water District, 1180 East Main Street, Horse Cave, KY 42749

1.02 The undersigned Bidder proposes and agrees, if this Bid is accepted, to enter into an Agreement with Owner in the form included in the Bidding Documents to perform all Work as specified or indicated in the Bidding Documents for the prices and within the times indicated in this Bid and in accordance with the other terms and conditions of the Bidding Documents.

ARTICLE 2 – BIDDER'S ACKNOWLEDGEMENTS

2.01 Bidder accepts all of the terms and conditions of the Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for **90** days after the Bid opening, or for such longer period of time that Bidder may agree to in writing upon request of Owner.

ARTICLE 3 – BIDDER'S REPRESENTATIONS

3.01 In submitting this Bid, Bidder represents that:

A. Bidder has examined and carefully studied the Bidding Documents, and any data and reference items identified in the Bidding Documents, and hereby acknowledges receipt of the following Addenda:

Addendum No.	Addendum, Date

B. Bidder has visited the Site, conducted a thorough, alert visual examination of the Site and adjacent areas, and become familiar with and satisfied itself as to the general, local, and Site conditions that may affect cost, progress, and performance of the Work.

C. Bidder is familiar with and has satisfied itself as to all Laws and Regulations that may affect cost, progress, and performance of the Work.

D. Bidder has carefully studied all: (1) reports of explorations and tests of subsurface conditions at or adjacent to the Site and all drawings of physical conditions relating to existing surface or subsurface structures at the Site that have been identified in the Supplementary

Conditions, especially with respect to Technical Data in such reports and drawings, and (2) reports and drawings relating to Hazardous Environmental Conditions, if any, at or adjacent to the Site that have been identified in the Supplementary Conditions, especially with respect to Technical Data in such reports and drawings.

E. Bidder has considered the information known to Bidder itself; information commonly known to contractors doing business in the locality of the Site; information and observations obtained from visits to the Site; the Bidding Documents; and any Site-related reports and drawings identified in the Bidding Documents, with respect to the effect of such information, observations, and documents on (1) the cost, progress, and performance of the Work; (2) the means, methods, techniques, sequences, and procedures of construction to be employed by Bidder; and (3) Bidder's safety precautions and programs.

F. Bidder agrees, based on the information and observations referred to in the preceding paragraph, that no further examinations, investigations, explorations, tests, studies, or data are necessary for the determination of this Bid for performance of the Work at the price bid and within the times required, and in accordance with the other terms and conditions of the Bidding Documents.

G. Bidder is aware of the general nature of work to be performed by Owner and others at the Site that relates to the Work as indicated in the Bidding Documents.

H. Bidder has given Engineer written notice of all conflicts, errors, ambiguities, or discrepancies that Bidder has discovered in the Bidding Documents, and confirms that the written resolution thereof by Engineer is acceptable to Bidder.

I. The Bidding Documents are generally sufficient to indicate and convey understanding of all terms and conditions for the performance and furnishing of the Work.

J. The submission of this Bid constitutes an incontrovertible representation by Bidder that Bidder has complied with every requirement of this Article, and that without exception the Bid and all prices in the Bid are premised upon performing and furnishing the Work required by the Bidding Documents.

ARTICLE 4 – BIDDER'S CERTIFICATION

4.01 Bidder certifies that:

A. This Bid is genuine and not made in the interest of or on behalf of any undisclosed individual or entity and is not submitted in conformity with any collusive agreement or rules of any group, association, organization, or corporation;

B. Bidder has not directly or indirectly induced or solicited any other Bidder to submit a false or sham Bid;

C. Bidder has not solicited or induced any individual or entity to refrain from bidding; and

D. Bidder has not engaged in corrupt, fraudulent, collusive, or coercive practices in competing for the Contract. For the purposes of this Paragraph 4.01.D:

1. "corrupt practice" means the offering, giving, receiving, or soliciting of anything of value likely to influence the action of a public official in the bidding process;

2. "fraudulent practice" means an intentional misrepresentation of facts made (a) to influence the bidding process to the detriment of Owner, (b) to establish bid prices at artificial non-competitive levels, or (c) to deprive Owner of the benefits of free and open competition;

3. "collusive practice" means a scheme or arrangement between two or more Bidders, with or without the knowledge of Owner, a purpose of which is to establish bid prices at artificial, non-competitive levels; and

4. "coercive practice" means harming or threatening to harm, directly or indirectly, persons or their property to influence their participation in the bidding process or affect the e execution of the Contract.

ARTICLE 5 – BASIS OF BID

5.01 Bidder will complete the Work in accordance with the Contract Documents for the following price(s):

Contract 1 – Water Treatment Plant Expansion

UNIT PRICES and ALLOWANCES:

A. Crushed Stone Structural Fill (KDOT 57)

The Crushed Stone Structural Fill Unit Price shall include all Crushed Stone Structural Fill required under the building additions, pump stations, process basins, etc. This Unit Price does not include any crushed stone associated with pipeline trenching, pavements, access roads, or contractor errors. This item does not apply to aggregate base under bituminous paving, sidewalks, or gravel drive areas. There will be no compensation for over excavation beyond the plan limits. The intent of this item is to establish a unit price for crushed stone fill in the event unforeseen subsurface conditions necessitate additional foundation stabilization beyond the plan limits. The unit price shall include all costs associated with removing and disposing of unsuitable foundation material and filling with crushed stone aggregate. Aggregate shall be compacted in 8 inch lifts. Copies of the purchase tickets, indicating the rock weight, shall be delivered to the Engineer's representative the day of the rock shipment. The tickets will be used for payment to the Contractor. No stockpiling of rock for structure fill purposes will be allowed. The cost associated with this item shall be included in the Complete Project, Lump Sum Base Bid. Upon completion of the Project, a Final Adjusting Change Order will be executed to reflect the actual quantity and cost of the structural rock fill.

Quantity	**Unit Price**	**Structural Fill Price**
1,800 Tons	$_____ /ton	$_____

B. Drilled Pier in Earth

The Drilled Pier in Earth Unit Prices shall include all costs associated with the installation of the drilled piers as indicated on the plans and required by the specifications. Each drilled pier will require a minimum of 8 inches of embedment into bearing rock and a probe hole for inspection of foundation material. Pricing for 8 inches of rock embedment shall be included in the drilled piers in earth pricing. Pricing for probe holes will be covered under a separate Bid Item. The intent of this bid item is to establish a unit price for drilled piers in earth in the event unforeseen subsurface conditions necessitate lengths different from those shown and/or additional piers are needed. If initial rock bearing conditions are deemed unsuitable and additional depth through rock is required, unit prices for Drilled Pier in Rock will be used, which is a separate bid item. The unit price shall include all cost associated with drilling and/or excavation, forms, tubes, concrete, and

reinforcement. The cost associated with this item shall be included in the Complete Project, Lump Sum Base Bid. Upon completion of the Project, a Final Adjusting Change Order will be executed to reflect the actual quantity and cost of all drilled piers in earth.

Drilled Pier in Earth

	Quantity	Unit Price	Drilled Pier
24" Drilled Pier	60 LF	$_____ /ft	$_____
30" Drilled Pier	220 LF	$_____ /ft	$_____
42" Drilled Pier	20 LF	$_____ /ft	$_____

C. Drilled Pier in Rock

The Drilled Pier in Rock Unit Prices shall include all costs associated with drilling and/or excavation, forms, tubes, concrete, and reinforcement. The cost associated with this item shall be included in the Complete Project, Lump Sum Base Bid. Upon completion of the Project, a Final Adjusting Change Order will be executed to reflect the actual quantity and cost of all drilled piers in rock.

Drilled Pier in Rock

	Quantity	Unit Price	Drilled Pier
24" Drilled Pier	10 LF	$_____ /ft	$_____
30" Drilled Pier	30 LF	$_____ /ft	$_____
42" Drilled Pier	5 LF	$_____ /ft	$_____

D. Drilled Pier Probe Holes

Each drilled pier will require a minimum 5 foot deep probe hole for inspection of foundation material. The intent of this bid item is to establish a unit price for probe holes in the event unforeseen subsurface conditions necessitate lengths different from those required and/or if additional piers are needed. The unit price shall include all cost associated with drilling probe holes. The cost associated with this item shall be included in the Complete Project, Lump Sum Base Bid. Upon completion of the Project, a Final Adjusting Change Order will be executed to reflect the actual quantity and cost of all drilled pier probe holes.

Drilled Pier Probe Holes

	Quantity	Unit Price	Pier Probe Hole
Pier Probe Holes	140 LF	$_____ /ft	$_____

E. Landscape Allowance

The Contractor shall include $10,000.00 in the Complete Project, Lump Sum Base Bid for Landscape materials and installation. When requested by the Owner, the Contractor shall obtain a minimum of three (3) proposals for landscaping work on the project site. The proposals shall be submitted to the Owner for final selection. Cost addition or deduction adjustment will be made by Change Order to reflect the actual landscaping cost.

Quantity	Unit Price	Landscape Allowance
1 Lump Sum	$10,000.00	$10,000.00

F. Laboratory Equipment Allowance

The Contractor shall include $10,000.00 in the Complete Project, Lump Sum Base Bid for the purchase of Laboratory Equipment. The Owner shall be responsible for selecting and obtaining proposals for the purchase of Laboratory Equipment. Proposals shall be delivered to the Contractor for purchasing the equipment. Cost addition or deduction adjustment will be made by Change Order to reflect the actual cost.

Quantity	Unit Price	Laboratory Allowance
1 Lump Sum	$10,000.00	$10,000.00

DEDUCTIVE ALTERNATES:

The following Alternates shall be included in the Complete Project, Lump Sum Base Bid. The Owner reserves the right to accept or deny the Alternate. Should the Owner choose to deny the Alternate, a Change Order shall be issued to the Contractor to reduce the contract price for the amount submitted for the Alternate. The Change Order shall be issued immediately after the signing of the Agreement.

G. **Alternate No. 1: Demolition of the Two (2) Existing Clearwells**

Alternate No. 1 shall include all costs associated with the demolition of the existing 300,000 gallon and 400,000 clearwells as shown on Plan Sheet 1.1. The Alternate shall include the costs associated with capping and removing the existing waterlines located in the vicinity of the existing clearwells unless the line needs to be removed to construct the new 1.45 MG Clearwell.

Alternate No. 1, Existing Clearwell Demolition, Lump Sum Bid … $_____

H. **Alternate No. 2: Grit Separator**

Alternate No. 2 shall include all costs associated with the Grit Separator as shown on Plan Sheet 4.1. The proposed 18" to 24" waterline located between the Spring Pump Station and existing Chemical Feed Building is not part of this Alternate and shall be installed with the fittings and valves as shown so the Owner may construct the Grit Separator later. The two (2) 24" tees shall be plugged. Alternate No. 2 shall include the two (2) 24" Butterfly

Valves located on the inlet and outlet piping, Grit Separator, Stairs, 8" Drain and Electric Actuated Plug Valve.

Alternate No. 2, Grit Separator, Lump Sum Bid …… $_____

I. **Alternate No. 3: Water Distribution SCADA System**

Alternate No. 3 shall include all costs associated with the new Water Distribution SCADA System as shown on Plan Sheet 17.1 and specified in Section 11900.

Alternate No. 3, Distribution SCADA System, Lump Sum Bid ….. $_____

COMPLETE PROJECT LUMP SUM BASE BID:

The Contract shall be awarded to the lowest responsible BIDDER based on the Complete Project Lump Sum Base Bid. Crushed Stone Structural Fill and Concrete Piers shall be bid at the estimated quantity and included in the Complete Project Lump Sum Base Bid. The Allowances and Alternates shall also be included into the Complete Project Lump Sum Base Bid.

Contract 1, Complete Project Lump Sum Base Bid ……..$ _____

Dollars

_____

Bid in Written Form

ARTICLE 6 – TIME OF COMPLETION

6.01 Bidder agrees that the Work will be substantially complete and will be completed and ready for final payment in accordance with Paragraph 15.06 of the General Conditions on or before the dates or within the number of calendar days indicated in the Agreement.

6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

7.01 The following documents are submitted with and made a condition of this Bid:

A. Required Bid security;
~~B. List of Proposed Subcontractors;~~
~~C. List of Proposed Suppliers;~~
~~D. List of Project References;~~
E. Evidence of authority to do business in the state of the Project; or a written covenant to obtain such license within the time for acceptance of Bids;
F. Contractor's License No.: _____
G. ~~Required Bidder Qualification Statement with supporting data;~~ and
H. **If Bid amount exceeds $10,000, signed Compliance Statement (RD 400-6). Refer to specific equal opportunity requirements set forth in the Supplemental General Conditions;**
I. **If Bid amount exceed $25,000, signed Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion – Lower Tier Covered Transactions (AD-1048);**
J. **If Bid amount exceeds $100,000, signed RD Instruction 1940-Q, Certification for Contracts, Grants, and Loans.**

ARTICLE 8 – DEFINED TERMS

8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

ARTICLE 9 – BID SUBMITTAL

BIDDER:

_____

By:
[Signature] _____

[Printed name] _____
(If Bidder is a corporation, a limited liability company, a partnership, or a joint venture, attach evidence of authority to sign.)

Attest:
[Signature] _____

[Printed name] _____

Title: _____

Submittal Date: _____

Address for giving notices:

_____

_____

_____

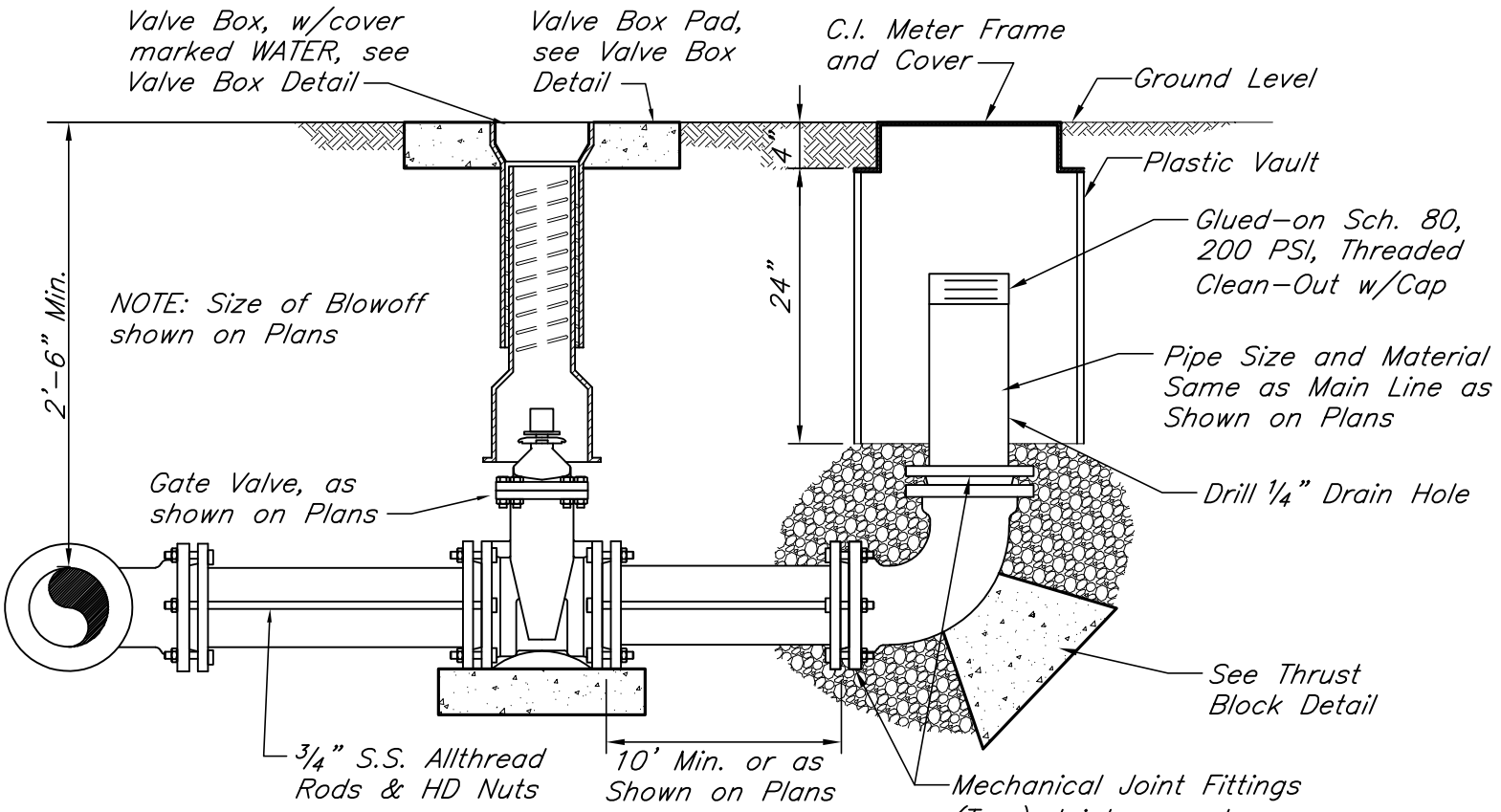
Telephone Number: _____

Fax Number: _____

Contact Name and e-mail address: _____

_____

Bidder's License No.: _____
(where applicable)



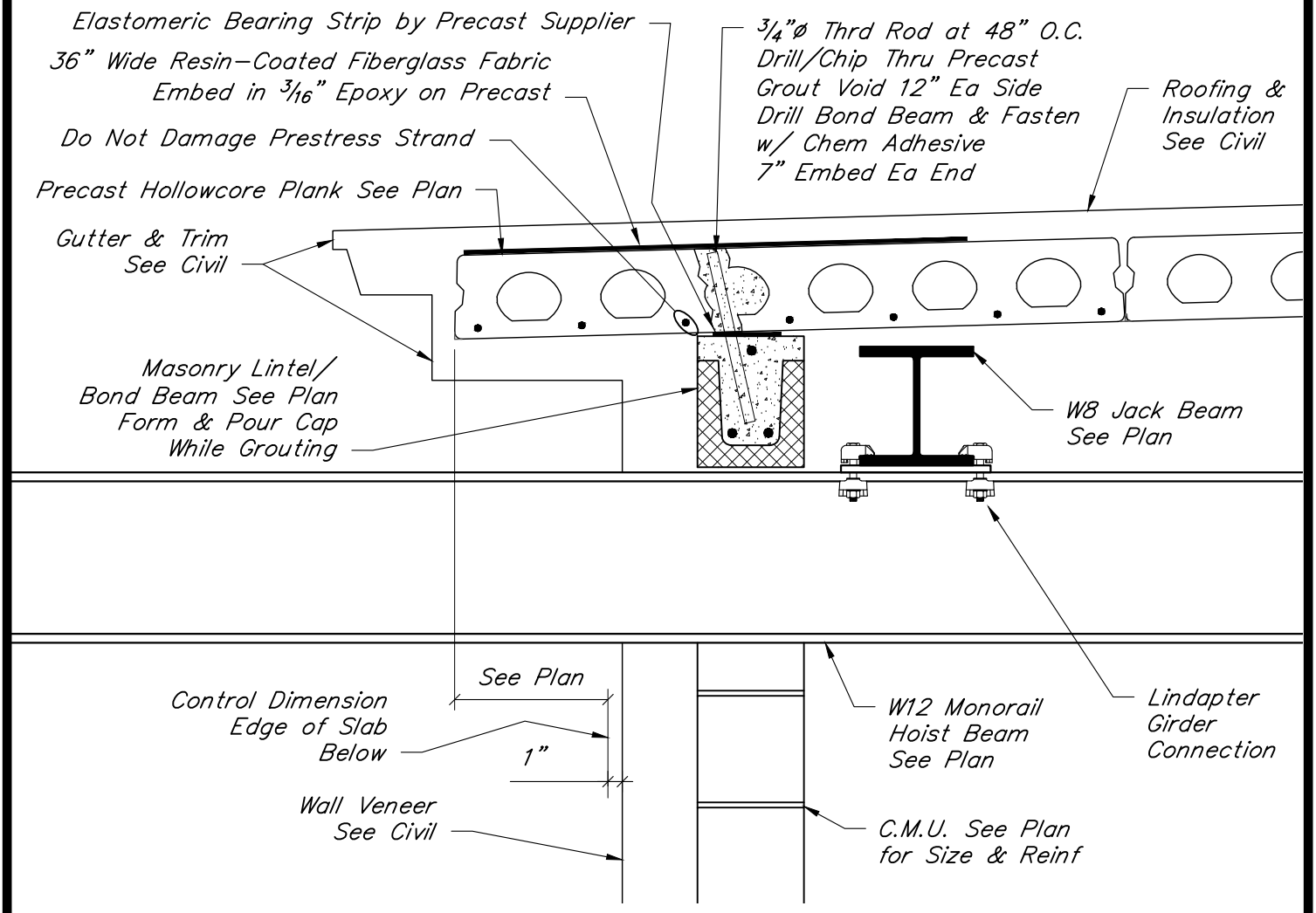
Note: If the Blowoff Assembly is in–line, the assembly shall have all–thread rods threaded to the M.J. Tee and Retainer Glands.

BLOWOFF ASSEMBLY DETAIL

July 2019

Scale: ¾"=1'–0"

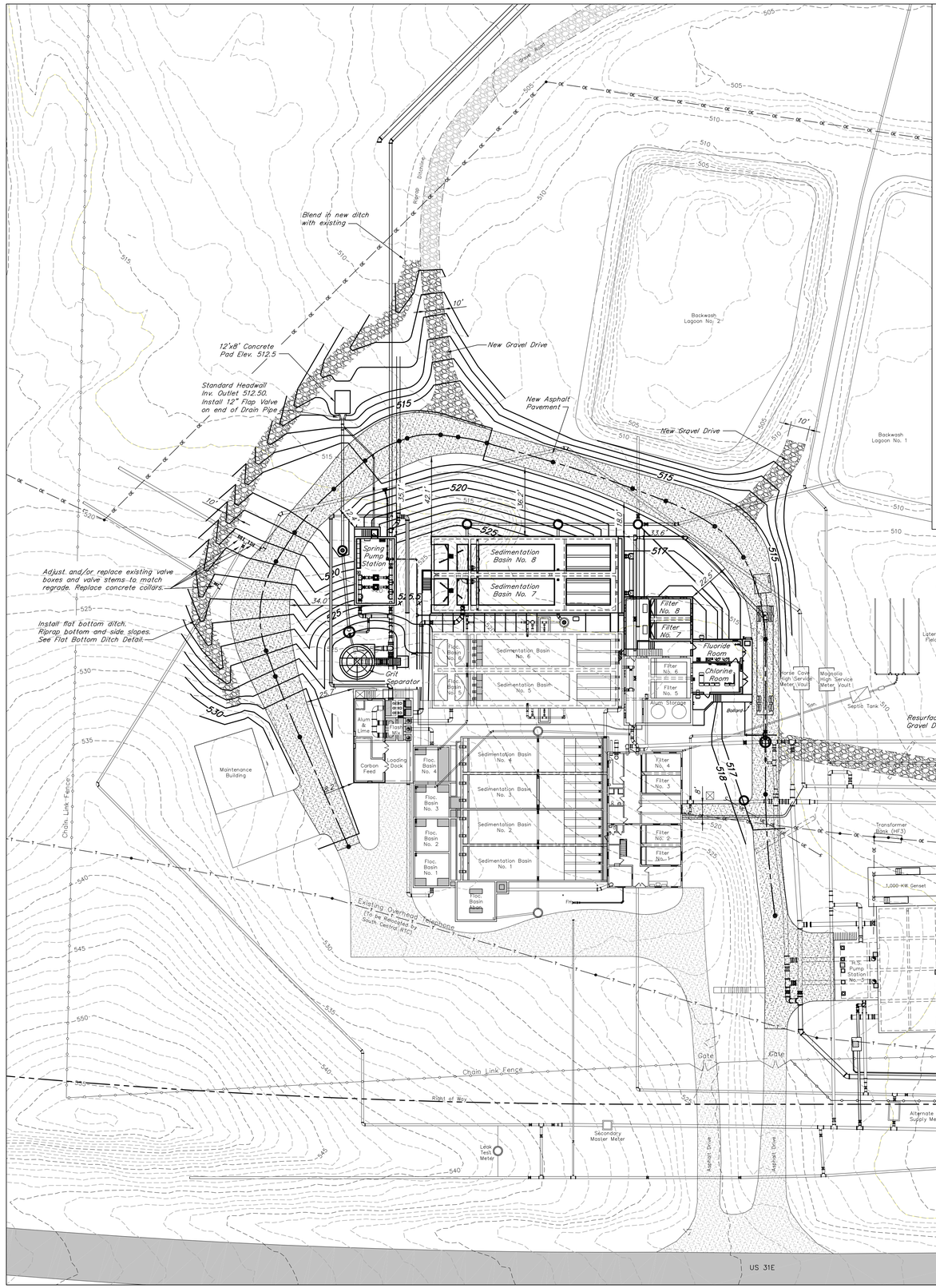
ADDENDUM NO.1

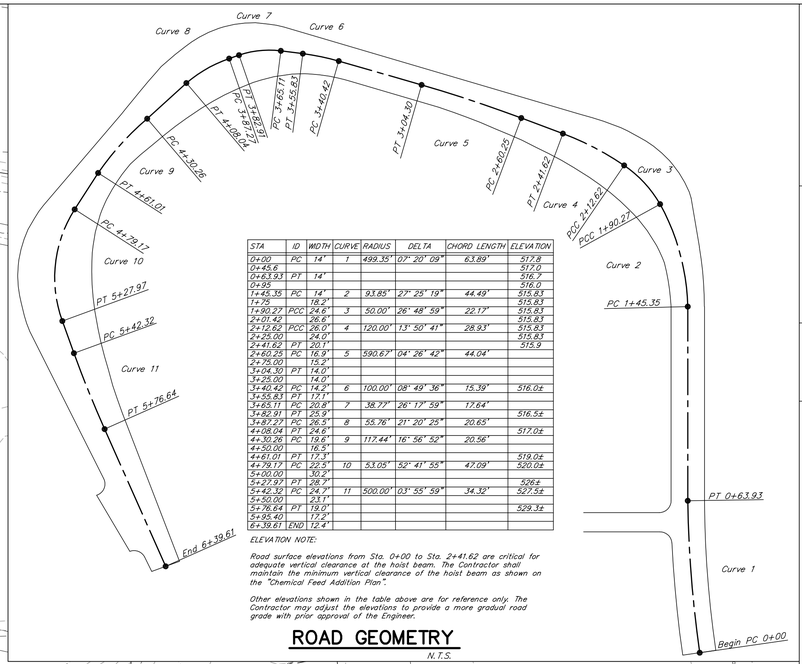


3/S7.5 DETAIL

1"=1'-0"

ADDENDUM NO. 1





STA	ID	WIDTH	CURVE	RADIUS	DELTA	CHORD LENGTH	ELEVATION
0+00	PC	14'	1	499.35'	07° 20' 09"	63.89'	517.8
0+45.6							517.0
0+63.93	PT	14'					516.7
0+95							516.0
1+45.35	PC	14'	2	93.85'	27° 25' 19"	44.49'	515.83
1+75		18.2'					515.83
1+90.27	PCC	24.6'	3	50.00'	26° 48' 59"	22.17'	515.83
2+01.42		26.6'					515.83
2+12.62	PCC	26.0'	4	120.00'	13° 50' 41"	28.93'	515.83
2+25.00		24.0'					515.83
2+41.62	PT	20.1'					515.9
2+60.25	PC	16.9'	5	590.67'	04° 26' 42"	44.04'	
2+72.00		15.2'					
3+04.30	PT	14.0'					
3+25.00		14.0'					
3+40.42	PC	14.2'	6	100.00'	08° 49' 36"	15.39'	516.0±
3+55.63	PT	17.1'					
3+65.11	PC	20.8'	7	38.77'	26° 17' 59"	17.64'	
3+82.91	PT	25.9'					516.5±
3+87.27	PC	26.5'	8	55.76'	21° 20' 25"	20.65'	
4+08.04	PT	24.6'					517.0±
4+30.26	PC	19.6'	9	117.44'	16° 56' 52"	20.56'	
4+50.00		16.5'					
4+61.01	PT	17.3'					519.0±
4+79.17	PC	22.5'	10	53.05'	52° 41' 55"	47.09'	520.0±
5+00.00		30.2'					
5+27.97	PT	28.7'					526±
5+42.32	PC	24.7'	11	500.00'	03° 55' 59"	34.32'	527.5±
5+50.00		23.1'					
5+76.64	PT	19.0'					529.3±
5+95.40		17.2'					
6+39.61	END	12.4'					

ELEVATION NOTE:

Road surface elevations from Sta. 0+00 to Sta. 2+41.62 are critical for adequate vertical clearance at the hoist beam. The Contractor shall maintain the minimum vertical clearance of the hoist beam as shown on the "Chemical Feed Addition Plan".

Other elevations shown in the table above are for reference only. The Contractor may adjust the elevations to provide a more gradual road grade with prior approval of the Engineer.

ROAD GEOMETRY

N.T.S.

GENERAL NOTES

1. *The roadway alignment shown hereon is based on the American Association of State Highway and Transportation Officials (AASHTO) "Policy on Geometric Design of Highways and Streets" (Green Book, 2011 edition). The design facilitates the maneuverability of an interstate semitrailer (WB-67). The Contractor shall ensure that the roadway alignment meets or exceeds these standards.*
2. *The "New Asphalt Pavement" shown hereon denotes the location of the new or relocated roadway. The Contractor shall resurface all existing asphalt pavement after construction is complete per the detail below.*
3. *Minimum slopes for regrade shall not exceed 4:1 unless otherwise noted.*

Existing Asphalt Pavement

Existing Crushed Stone

New Asphalt Pavement

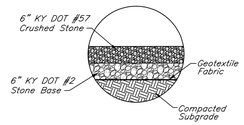
New Compacted Crushed Stone

New Asphalt Pavement area: 14,050 S.F.

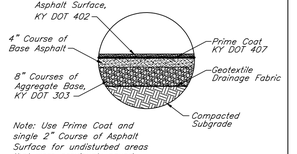
Resurface existing Pavement area: 10,350 S.F.

New Gravel Drive area: 1,500 S.F.

Resurface Gravel Drive area: 3,300 S.F.



COMPACTED GRAVEL DRIVE



Note: Use Prime Coat and single 2" Course of Asphalt Surface for undisturbed areas that were previously paved.

ASPHALT PAVEMENT

ADDENDUM NO.1

RE-GRADE & PAVING

GREEN RIVER VALLEY WATER DISTRICT
WATER TREATMENT PLANT EXPANSION
HART COUNTY, KENTUCKY

STATE OF KENTUCKY — R. WILSON WILLIAMS 18999 — LICENSED PROFESSIONAL ENGINEER — 5/22/19

DRAWN BY: JKD/PTH
CHECKED BY: RVW
DATE: May 2019
SCALE: 1"=30'
REVISIONS

KENVIRONS, INC.
FRANKFORT, KENTUCKY

PROJECT NO.
2014042

SHEET NO.
1.3

N:\P2014042\PLANS\1.3 Regrade_Paving.dwg, 7/3/2019 8:16:43 PM, Bluebeam PDF