



ADDENDUM NO. 01

To: Prospective Bidders & Plan Holders

From: Craig A. Johnson, P.E.
Crist Engineers, Inc.

Date: June 23, 2025

Project: Package C – Wastewater Treatment Plant Improvements
Wynne, Arkansas

Bid Date: July 29, 2025

Bid Time: 2:00 PM

Location: Wynne Water Utilities
550 Falls Blvd, N.
Wynne, Arkansas 72396

The BIDDER shall properly acknowledge Addendum No. 01 as required in Article 3 of Document 004100 on the Bid Form as confirmation that the BIDDER has examined the following Addenda and the related changes to the Contract Documents. Lack of proper acknowledgement on the Bid Form may deem a bid non-responsive.

The Contract Documents dated June 2025, are hereby amended as follows:





Prospective Bidders & Plan Holders

Addendum No. 01

Package C – Wastewater Treatment Plant Improvements

Page 2 of 2

ITEM #1: Informational Purposes Only – Geotechnical Investigation

- A. See the attached Geotechnical Investigation that is meant to be for informational purposes only.

END ADDENDUM NO. 01

Supplemental Information to Bidders

GEOTECHNICAL REPORT

Wynne WWTP Improvements Package C



Wynne Water Utilities

Crist Engineers, Inc.
Job 2155



CRIST ENGINEERS, INC.

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205 Executive Court
Little Rock, Arkansas 72205

Telephone (501) 664-1552
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ATTENTION BIDDERS

The geotechnical reports are provided to Bidders for the Wynne Wastewater Treatment Plant Improvements project as supplemental information only and not considered to be a part of the contract documents. The geotechnical reports were specifically prepared for the Wynne Water Utility under separate contract from the Engineer of Record. Components of the geotechnical reports' recommendations and conclusions were utilized for components of design. The interpretation of the geotechnical reports' information, recommendations, findings, conclusions, or other information provided herein is at the sole discretion of the Bidder.

Mark Wyatt

From: Mark Wyatt <mwyatt@grubbsengineers.com>
Sent: Wednesday, October 30, 2024 14:54
To: Craig Johnson; Morgan Ussery
Cc: john@wekivaengineering.com; Vellea Scott
Subject: RE: Wynne WWTP - Geotechnical Report
Attachments: 24.00367z_WWTP Impvts-Wynne.pdf

Craig and Morgan,

Here's our report for the Wynne WWTP project. Please let us know any questions.

Thanks! mark

Mark E. Wyatt, P.E.

President

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October 30, 2024
Job No. A24184.00367

City of Wynne, Arkansas
c/o Crist Engineers, Inc.
1 Executive Center Court
Little Rock, Arkansas 72211

Attn: Mr. Craig A. Johnson, P.E.
Vice President

RESULTS of GEOTECHNICAL INVESTIGATION WASTEWATER TREATMENT PLANT IMPROVEMENTS WYNNE, ARKANSAS

INTRODUCTION

This report presents the final results of the geotechnical investigation performed for the planned improvements to the wastewater treatment plant in Wynne, Arkansas. This study was authorized by the City of Wynne on August 13, 2024. This geotechnical investigation has been performed in general accordance with our proposal of August 9, 2024. Interim results and preliminary foundation recommendations for the headworks, RAS/WAS pump building, and the UV structure were provided in our submittal of October 1, 2024.

We understand the improvement project includes various new wastewater treatment units and supporting buildings. The specified geotechnical scope of work included drilling 11 sample borings and installing two (2) piezometers. The primary project facets are summarized below.

- Headworks. The headworks bottom is planned at about El 216, approximately 16 ft below existing grade.
- Junction box. This will be a small unit extending to about El 225, about 9-ft depth.
- Administration building. The new building will be an at-grade structure with an anticipated subgrade at El 233.5.
- RAS/WAS pump building. This is expected to be an at-grade structure.
- UV structure. The new unit bottom is planned at El 226, which is approximately 6 ft below existing grade.
- Blower pad. The blower will be supported on an at-grade mat.
- Electrical building. The electrical building will be an at-grade masonry block building.
- Flow measurement meter. This unit will extend about 6 ft below grade.
- Maintenance building. This will be an at-grade metal building.



Foundation loads for the improvement structures and units are expected to be light. Site grading is expected to be minor. The improvements will include excavations up to 16 to 18 ft for below-grade structures.

The purposes of this study were to explore subsurface conditions at selected locations on the WWTP site and to develop recommendations to guide design and construction of foundations and below-grade walls. The following report sections discuss the results of the field and laboratory studies. Recommendations for foundation and bottom slab design, lateral earth pressures on below-grade walls, considerations for deep excavations, groundwater considerations, site grading, and construction recommendations are discussed in subsequent sections.

SUBSURFACE EXPLORATION

Subsurface conditions at the WWTP have been investigated by drilling 11 sample borings to 15- to 25-ft depth. The site vicinity is shown on Plate 1. The approximate boring locations are shown on the Plans of Borings, Plate 2. The boring locations were selected by the Engineer with some boring locations offset as required for access and to avoid utility conflicts.

The location of the RAS/WAS pump station was revised after the field operations had started. Logs of the borings, presenting descriptions of the soils encountered and results of the field and laboratory tests, are presented as Plates 3 through 13. The ground surface elevations at the boring locations, as inferred from the topographic information provided by the Engineer, are also shown on the logs. It must be recognized that the elevations shown are approximate and actual elevations may vary. A key to the terms and symbols used on the boring logs is presented as Plate 14.

The borings were drilled with a track-mounted CME-55 rotary-drilling rig using dry-auger drilling procedures. Samples were obtained using a 2-inch-diameter split-barrel sampler driven into the strata by blows of a 140-lb automatic hammer dropped 30 inches, in accordance with Standard Penetration Test (SPT) procedures. The number of blows required to drive the standard split-barrel sampler the final 12 inches of an 18-inch total drive, or portion thereof, is defined as the Standard Penetration Number (N). Recorded N-values are shown on the appropriate boring logs in the "Blows Per Ft" column.

Selected undisturbed samples of cohesive soils were obtained using a 3-in.-diameter thin-walled tube hydraulically advanced into the soil. Undrained shear strength of the cohesive soils was estimated in the field using a calibrated hand penetrometer. Estimated shear strength values are plotted on the log forms, in tons per sq ft, as circles enclosing an "x".



All samples were removed from sampling tools in the field, examined and visually classified by a field geologist. Samples were then placed in appropriate containers to prevent moisture loss and/or change in condition during transfer to our laboratory for further examination and testing.

The borings were advanced using dry-auger procedures in order to facilitate observation of groundwater levels. The observations regarding groundwater are noted in the lower-right portion of each log and are discussed in subsequent sections of this report.

Groundwater levels were measured in the borings during and after completion of drilling. To obtain long-term groundwater data, open standpipe piezometers were installed at two (2) locations (Borings 1 and 5). The piezometers consist of 2-inch-diameter, Schedule 40 PVC, flush-thread well pipe placed in 6-in.-diameter boreholes. Each piezometer included a 5- to 10-ft-long, 0.010-in. slotted screen section, a 20/40 filter sand pack and a bentonite seal. The borehole annulus above the bentonite seal was backfilled to near the ground surface with bentonite. Flush mount covers were set at the top of each piezometer. Piezometer details are provided in Appendix A.

LABORATORY TESTING

To evaluate pertinent physical and engineering characteristics of the foundation and subgrade soil, laboratory tests consisting of natural water content determinations and classification tests were performed on selected representative soil samples. A total of 72 natural water content determinations were performed to develop information on *in-situ* water content for each boring. The results of these tests are plotted on the log as solid circles in accordance with the scale and symbols shown in the legend located in the upper-right corner.

To verify field classification and to evaluate soil plasticity, 13 liquid and plastic (Atterberg) limit determinations and 15 sieve analyses were performed on selected representative samples. The Atterberg limits are plotted on the log as small pluses inter-connected with a dashed line using the water content scale. The percent of soil passing the No. 200 Sieve is noted in the "Minus No. 200" column on the log form. Classification test results, as well as soil classification by the Unified Soil Classification System and AASHTO Classification System, are summarized in Appendix B.

SITE and SUBSURFACE CONDITIONS

Site Conditions

The Wynne Wastewater Treatment Plant is located west of the city of Wynne, Arkansas about 2.5 miles west of the city center. The existing treatment plant is on the west side of Bowden Street, south of the intersection with Hwy. 284. The plant area is an existing wastewater treatment



plant which was out of service at the time of the field studies (September 2024). Areas outside of the existing units are generally open land with a short grass cover and various existing plant features. Several of the existing plant units are abandoned. A concrete slab is presently on the site of the new maintenance building. Aggregate access drives are present through and around the WWTP. The site terrain is predominantly flat, although localized topographic rises are present at existing units. Surface drainage is considered poor.

Site Geology

The surface geology of the project site is mapped on the Geologic Map of Arkansas¹, as the Quaternary age Terrace Deposits. The Terrace Deposits consist of a complex sequence of unconsolidated sandy gravel, sand, silt, clayey silt and clay. Terrace deposits are often lenticular and discontinuous. The thickness of the terrace deposits can vary widely between locations. Bedrock (Paleozoic rocks) in this vicinity is reported to be about 3300 ft deep.

Seismic Conditions

The Cross County, Arkansas site is located in Seismic Zone 3, defined by the Arkansas Building Authority (2005) as the zone of greatest seismic potential. Based on the subsurface conditions encountered in the borings and the site geology, a Seismic Site Class D (stiff soil profile) is considered applicable in accordance with the criteria of the International Building Code (IBC 2021 and ASCE 7, Chapter 20) and AWWA D100-11. The liquefaction potential is considered to be very low for the predominantly cohesive soils encountered in the borings.

Based on ASCE 7-16, the Peak Ground Acceleration (PGA) for this site with a Risk Category II is predicted to be 0.631. For the Seismic Site Class D, the Site Factor Value (F_{PGA}) is 1.2. Consequently, the site modified peak ground acceleration (PG_{AM}) value of 0.757 is considered fitting for the project location.

Subsurface Conditions

Based on the results of the borings performed for this study, the subsurface stratigraphy may be generalized into primary strata as follows.

Stratum I: The surface soils are locally comprised of on-site fill extending to about 2-ft depth (see Borings 1 and 4). The on-site fill consists of firm to stiff brown, tan, and grayish brown silty clay with silt pockets, ferrous nodules, and a trace of fine gravel. The Stratum I on-site fill has low plasticity with variable poor to fair compaction and high to moderate compressibility. The depth, content, and compaction of the on-site fill could vary across the site.

¹ Geologic Map of Arkansas, Arkansas Geological Commission and U.S. Geological Survey; 1993



- Stratum II:** The surface soils or the near-surface soils below the on-site fill are natural units of soft to very stiff tan, reddish tan, brown, light brown, brownish gray, and gray clayey silt and silty clay extending to 23- to 24-ft depth. The clayey silt and silty clay contain silt partings, pockets, and layers, minor amounts of fine sand, occasional organic inclusions and stains, and ferrous nodules and stains. The clayey silt and silty clay units are interbedded and vary in thickness and vertical stratigraphy. The Stratum II soils have low to medium plasticity and exhibit variable low to moderate shear strength and high to low compressibility. The silt content generally increases with depth.
- Stratum IIa:** Locally, loose light brown silt is below the Stratum II clayey silt/silty clay at 18-ft depth (see Boring 5). The discontinuous silt stratum exhibits low relative density and high compressibility.
- Stratum III:** The basal stratum encountered within the exploration depths of the borings is loose to medium dense tan slightly silty fine sand. The fine sand has low to medium relative density and high to moderate compressibility. The sand units extend to depths in excess of 25 feet.

Groundwater Conditions

Groundwater was not encountered within the exploration depths of the borings drilled in September 2024. It has been our experience in this area that groundwater levels are relatively deep, largely due to groundwater depletion by irrigation wells. Nevertheless, shallow perched groundwater could be present around the existing units, in unit backfill, and in the backfill of underground utility lines.

ANALYSES and RECOMMENDATIONS

Foundation Design

Foundations for the WWTP improvements must satisfy two (2) basic and independent design criteria. First, foundations must have an acceptable factor of safety against bearing failure under maximum design loads. Secondly, movement of foundations due to consolidation or swelling of the underlying strata should not exceed tolerable limits for the structure or equipment operational requirements. Construction factors, such as installation of foundations, excavation procedures and surface and groundwater conditions, must also be considered.

Excavations for the improvements could extend up to 16 ft below existing grades. Based on the results of the borings and the anticipated light foundation loads of the new units, the structural loads of the units may appropriately be supported on footing or mat foundation systems. Recommendations for foundations, lateral earth pressures on deep unit walls, and bottom slabs/floor slabs are discussed below.



Headworks, Junction Box, Flow Measurement Meter, and UV Structure (Borings 1, 2, 5, and 9)

The headworks, junction box, flow measurement meter, and UV structure may be supported on individual or continuous footings or rigid mats founded in the firm to very stiff tan, brown, light brown, reddish tan, gray, and brownish gray silty clay (Stratum II). It is expected that foundation elements will be supported at depths ranging from 6 and 16 ft below existing grades.

Individual or continuous footings or mats supported in the stiff silty clay as recommended may be sized based on a maximum net allowable soil bearing pressure of 2000 lbs per sq foot. The recommended bearing value includes a minimum factor of safety of 3.0 with respect to the measured shear strength of the firm to very stiff silty clay. Long-term settlement of foundations proportioned based on this allowable bearing pressure should be less than 1 in. and within tolerable limits for the structures. Differential settlement may be estimated as about one-half of the total settlement value.

For mats supported on the firm to very stiff silty clay, mat design may be based on a modulus of subgrade reaction (k) value of 100 lbs per sq in. per in. for the silty clay bearing stratum. An increased modulus of subgrade reaction value can be developed by utilizing crushed stone base (ARDOT Standard Specifications Section 303, Class 7) below the mat. With a minimum of 6 in. of crushed stone base under mats, a modified k value of 150 lbs per sq in. per in. may be used in design. With a minimum of 12 in. of crushed stone base under mats, a modified k value of 200 lbs per sq in. per in. is considered fitting. Clean crushed stone (ASTM C33 Size 57 or 67) may be substituted or placed over crushed stone base to develop the modified k values recommended above.

Uplift resistance of the structure foundations will be provided by the weight of the units and the foundations. Resistance to lateral forces will be developed by the passive resistance of the foundation soils and sliding resistance at the foundation bottoms. The passive resistance of the soil within about 1 ft of the ground surface should be neglected. Below 1-ft depth, an ultimate passive resistance value of 300 lbs per sq ft may be assumed for the stable on-site firm to very stiff silty clay and compacted select fill. Resistance to sliding may also be evaluated using an ultimate friction value ($\tan \delta$) of 0.33 for concrete on the recommended bearing stratum. An appropriate factor of safety must be included in analysis of sliding.

The WWTP headworks, junction box, flow measurement meter, and UV structure units will be constructed at depths ranging from approximately 6 to 16 ft below existing grade. In no case should foundation elements be founded less than 1.5 ft below lowest final grade. Continuous footings should have a minimum width of 18 in. and individual footings should have a minimum dimension of 24 inches. All foundation excavations and any undercuts should be observed by the Geotechnical Engineer to verify suitable bearing capacity and adequate undercut.



RAS/WAS Pump, Maintenance, Electrical, and Administrative Buildings (Borings 3, 7, 8, 10, and 11)

We recommend that the foundation loads of the RAS/WAS pump, maintenance, electrical, and administrative buildings be supported on a shallow footing foundation system. Continuous or individual footings should be founded in the natural stiff to very stiff light tan, brown, and brownish gray silty clay (Stratum II), stiff to very stiff gray to light tan clayey silt (Stratum II), or in compacted select fill. Footings must not be founded in the on-site fill (Stratum I) or surficial to near-surface zones of weak clayey silt or silty clay.

Footings founded in natural stiff to very stiff silty clay/clayey silt (Stratum II) or compacted select fill as recommended may be sized based on maximum net allowable soil bearing pressures of 2000 and 2500 lbs per sq ft for continuous and individual footings, respectively. The recommended bearing values include a minimum factor of safety of 3.0 with respect to the measured shear strength of the stiff to very stiff silty clay/clayey silt and the anticipated shear strength of properly compacted select fill. Post-construction settlement of foundations supported as recommended should be less than 1.0 inch. Differential settlement should be less than about one-half of the total value.

The depth to the stiff to very stiff silty clay/clayey silt that is suitable for bearing varies from the surface to about 6 ft or more below existing grades. Undercut of some foundations could be required to develop suitable bearing. Estimated footing undercut depths are summarized in the table below.

Unit/Structure	Representative Boring(s)	Estimated footing undercut depth, ft
Administration Building	Boring 3	minimal
Electrical Building	Boring 8	minimal
RAS/WAS Pump Building	Borings 3 and 7	Up to 4 ft
Maintenance Building	Borings 10 and 11	2 to 6 ft

The estimated footing depths above are with respect to existing grades. These depths are estimates only. Undercut requirements and as-built footing depths will vary with seasonal site conditions and final grading plans.

Footing excavations may be undercut to the suitable bearing stratum and backfilled with select fill, flowable fill (minimum compressive strength 300 psi), or lean concrete. Footings supported on undercut backfill as recommended may be sized for the previously recommended bearing pressures. Total or differential settlement of foundations proportioned based on the recommended allowable bearing pressures should be less than 1.0 inch.



Footing undercuts backfilled with select fill should have a minimum width determined by a 1-horizontal to 2-vertical (1H:2V) projection from the edge of the footing to the undercut bottom. Undercuts backfilled with flowable fill or lean concrete may be excavated neat to plan footing dimensions. Where site conditions warrant mass undercut, footings may be founded in the compacted undercut backfill. Mass undercuts should extend at least 5 ft outside the building limits to the extent possible.

Uplift resistance of footings will be developed by structure dead loads and the weight of foundation units. Resistance to lateral forces will be developed by the passive resistance of the foundation soils and sliding resistance at the footing bottom. The passive resistance of the soil within the upper 1 ft should be neglected. Below 1-ft depth, an ultimate passive resistance value of 300 lbs per sq ft may be assumed for the stable on-site soils and compacted select fill. Resistance to sliding may also be evaluated using an ultimate friction value ($\tan \delta$) of 0.33 for concrete on the recommended bearing strata. An appropriate factor of safety must be included in analysis of sliding.

Continuous footings should have a minimum width of 18 in. and individual footings should have a minimum dimension of 24 inches. Perimeter footings and footings in unheated areas should extend a minimum of 1.5 ft below final grade for embedment and frost protection. Interior footings or thickened sections can be founded in suitable bearing strata or compacted select fill at shallower depths consistent with structural requirements for thickness. All footing excavations and undercuts should be observed by the Geotechnical Engineer to verify adequate bearing capacity.

Floor Slabs

Slab-on-ground or slab-on-fill construction is recommended for the building floor slabs. Subgrade preparation must include thorough proof-rolling to verify subgrade stability. Depending on final grading plans, seasonal site conditions, and compaction of the on-site fill, undercuts on the order of 2 to 4 ft, more or less, could be required for floor slab construction. Where moisture transmission through the slab is an operational or aesthetic concern, we also recommend that at-grade floor slabs be supported on a 4- to 6-in.-thick clean crushed stone layer placed on a properly prepared subgrade. The granular layer should be densified with vibrating equipment prior to floor slab construction. Impervious sheeting should be placed between the slab and granular course to act as a vapor retarder.

Blower Pad (Boring 6)

The blower pad will be supported on an at-grade mat with top of mat planned at about 1 ft above existing grade. Information on the blower pad dimensions and loading has not been developed



at this time. The subgrade and bearing stratum at the blower pad location is comprised of stiff clayey silt underlain by stiff silty clay. However, below about 4-ft depth the bearing stratum of soft to firm silty clay exhibits decreasing shear strength and increasing compressibility with depth.

The blower pad may be supported on continuous footings or a rigid mat founded in the stiff brown clayey silt (Stratum II), the stiff brown and grayish tan silty clay (Stratum II), or compacted select fill. Footings should bear at a minimum depth of 1.5 ft below lowest adjacent grade. A mat foundation may be founded at shallower depths consistent with the required mat thickness. However, the mat should be underlain by crushed stone aggregate base (ARDOT Standard Specifications Section 303, Class 7) to at least 1.5 ft below lowest adjacent grade. We recommend that the blower pad foundation elements be founded as shallow as structural requirements allow to reduce the potential for encountering and/or transferring loads to the more compressible soils below about 4-ft depth.

Continuous footings or mats supported in the stiff silty clay as recommended may be sized based on a maximum net allowable soil bearing pressure of 1250 lbs per sq foot. The recommended bearing value includes a minimum factor of safety of 3.0 with respect to the measured shear strength of the surficial and near-surface stiff clayey silt/silty clay. Long-term settlement of blower foundations proportioned based on this allowable pressure should be less than 1 in. and within tolerable limits for the structure. Differential settlement may be estimated as about one-half of the total values.

For a mat supported on the silty clay, mat design may be based on a modulus of subgrade reaction (k) value of 100 lbs per sq in. per in. for the silty clay bearing stratum. An increased modulus of subgrade reaction value can be developed by utilizing crushed stone base (ARDOT Standard Specifications Section 303, Class 7) below the mat. With a minimum of 6 in. of crushed stone base under mats, a modified k value of 150 lbs per sq in. per in. may be used in design.

Uplift resistance of the blower pad foundations will be provided by the weight of the unit and the foundations. Resistance to lateral forces will be developed by the passive resistance of the foundation soils and sliding resistance at the foundation bottoms. The passive resistance of the soil within about 1.5 ft of the ground surface should be neglected. Below 1.5-ft depth, an ultimate passive resistance value of 300 lbs per sq ft may be assumed for the stable on-site soils and compacted select fill. Resistance to sliding may also be evaluated using an ultimate friction value ($\tan \delta$) of 0.33 for concrete on the recommended bearing stratum. An appropriate factor of safety must be included in analysis of sliding.



Below-Grade Walls – Lateral Earth Pressures

Several new units, including the headworks, junction box, flow measurement meter, and UV structure, will be extend below grade and will include below-grade walls. It is expected that below-grade walls will be fixed at the top by inside corners, interior baffle walls, top slabs and/or other features. Consequently, the below-grade walls will be acted on by at-rest lateral earth pressures. Where the below-grade walls are free to rotate about the base, such as during construction, active earth pressures will be mobilized. The below-grade walls are anticipated to be supported on continuous footings or mat foundations as previously recommended.

Lateral earth pressure envelopes for static and dynamic loading have been developed for below-grade walls. Lateral earth pressures will vary with soil backfill type, degree of backfill compaction, and drainage conditions. We recommend that wall backfill consist of clean crushed stone or low-plasticity select fill. ASTM D448 Size 57 or Size 67 stone is suitable for clean stone backfill. All clean stone backfill must be separated from the surrounding soils by a suitable geotextile filter fabric. Select fill as recommended in the Site Grading section of this report is suitable for backfill use as low-plasticity select fill.

Pressure envelopes illustrating equivalent fluid pressures, dynamic (seismic) lateral pressures, and lateral earth pressure coefficients are provided in Appendix C for below-grade walls backfilled with either clean crushed stone or low-plasticity select fill. The lateral earth pressure values have been calculated based on both drained and undrained conditions. Undrained conditions assume that the walls will be subject to full hydrostatic pressure. Drained conditions assume positive and continuous drainage of infiltrated water from the backfill. Where drainage cannot be assured, then undrained conditions should be assumed.

To reduce lateral earth pressures, the clean crushed stone backfill may be placed in a zone extending on a 1-horizontal to 1-vertical (1H:1V) configuration from the base of the wall to the ground surface. Temporary excavation configurations must be adjusted as required for adequate short-term stability. Where a retention system is utilized to retain temporary cuts, and is designed as a permanent structure, the clean stone backfill may be limited to backfilling to the retention system. It must be recognized that where clean stone is used for backfill, excavation of piping trenches and future excavations for repair or maintenance will be extremely difficult.

Clean granular backfill should be placed in nominal 10- to 12-in.-thick lifts and densified by vibrating equipment or other suitable means. The clean stone backfill should be isolated from the



native soil and fine-grained backfill by a suitable geotextile filter fabric. A filter fabric such as Mirafi 140N or approved equal is recommended.

For walls backfilled with low-plasticity select fill, wall backfill should be compacted to a minimum of 95 percent of the maximum dry density as determined by Standard Proctor (ASTM D698) procedures. Maximum particle size in wall backfill should be limited to about 1.5 inches. The top 12 in. of wall backfill should consist of low-permeability clayey soils to reduce infiltration of surface water into backfill. Compaction within 5 ft of walls should be performed with hand compaction equipment. Care should be taken when compacting as overcompaction may cause damage to walls.

Design of bottom mats should consider uplift forces equivalent to a water level at the ground surface unless positive drainage is assured at a lower elevation. A total unit weight of 100 lbs per cu ft is recommended for undrained backfill. Use of pressure relief valves in bottom mats may also be considered. In conjunction with structure dead loads, additional uplift restraint may be provided with a thickened bottom slab, extended exterior slab edges, or other means. Additional recommendations for uplift resistance can be provided upon request.

It must be recognized that there will be some settlement of backfill around below-grade walls. Concrete flatwork and other architectural features constructed over the backfill will be subject to variable amounts of post-construction settlement. Locating foundation elements in wall backfill should be avoided to the extent possible. We recommend that this situation be evaluated by the Civil Engineer and the Geotechnical Engineer on a case-by-case basis.

Site Grading and Subgrade Preparation

Site preparation is expected to begin with demolition of the existing units where required. Following required demolition, stripping the zone of organic-containing surface soils will be required. In general, the stripping depth is estimated to be about 6 inches. All abandoned foundations and underground utilities in the project areas should be completely removed unless specifically accepted by the Owner.

After required demolition, stripping, and cutting, and prior to any fill placement, the subgrade should be proof-rolled with a loaded tandem-wheel dump truck or similar equipment. All soft, unstable, or otherwise unsuitable soils encountered in the project area should be excavated, reprocessed and recompacted or replaced with select fill, whichever is appropriate. The subgrade at this time (October 2024) is presently dry and stable. However, the surface soils are generally moisture sensitive and are currently desiccated. Localized undercuts of about 2 to 6 ft, more or less,



may be required during wet seasons. Unless undercut is required or excavations will be performed, we recommend that all subgrade be scarified to at least 6-in. depth, processed and moisture conditioned, and recompacted prior to placing fill.

The on-site silty clay and clayey silt, free of organics and debris and with a maximum plasticity index (PI) of 18, are suitable for use as select fill or backfill. It must be recognized that these soils will be challenging to work with at elevated water content levels with water content likely to require adjustment for compaction. Some segregation of the on-site soils may be required as moderately plastic clay, i.e., with PI greater than 18, is locally present. Imported borrow for use as select fill or backfill should consist of an approved clayey sand (SC), sandy clay (CL), or clayey gravel (GC) having a liquid limit less than 40 and a maximum plasticity index (PI) of 18. All fill and backfill should be free of organic materials and durable rock fragments in excess of about 3-in. dimension and with a maximum PI of 18. Fill and backfill should be approved by the Geotechnical Engineer.

Recompacted soils, fill, and backfill should be compacted to at least 95 percent of the Modified Proctor (ASTM D1557) maximum dry density within a water content range of 2 percent below to 3 percent above the optimum value. We have recommended that where low-plasticity select fill is utilized for wall backfill it be compacted to a minimum of 95 percent of the maximum dry density as determined by Standard Proctor (ASTM D698) procedures. Fill and backfill should be placed in horizontal, nominal 6- to 8-in.-thick loose lifts. Each lift of backfill and fill should be tested and approved prior to placement subsequent lifts.

CONSTRUCTION CONSIDERATIONS

Positive surface drainage should be established at the start of work, be maintained during construction and following completion of the project to prevent surface water ponding and subsequent saturation of subgrade soils. Density and water content of all earthwork should be maintained until the work is completed. Foundation or subgrade soils that become saturated by ponding water or runoff should be excavated to undisturbed soils.

Groundwater was not encountered within the borings in September 2024. Nevertheless, some seasonal shallow perched water could be present. Limited seepage into shallow excavations, if encountered, can probably be controlled by ditching or via sump-and-pump methods. If seepage infiltration cannot be controlled, construction of drains and/or the use of granular backfill (i.e., No. 57 stone) will be warranted. Granular backfill should be fully encapsulated in a filter fabric and vented to positive discharge into storm lines or to daylight.



All foundation excavations and undercuts should be observed by the Geotechnical Engineer to verify suitable bearing and adequate undercut. Concrete should be placed in footing and mat excavations expeditiously following final clean up and approval to limit changes in foundation conditions. Foundation excavations should be clean and dry at the time of concrete placement. Where foundation excavations will be left open for extended periods, the bearing stratum should be protected with a thin layer of seal concrete.

All excavations must comply with Local, State and Federal requirements for worker safety. Based on the results of the borings, the on-site soils typically classify as Type C soils by OSHA criteria (OSHA Regulations 29 CFR 1926 subpart P – Excavation) due to the predominance of on-site fill. Consequently, temporary open-cut excavations in these areas can probably be made on 1-½-horizontal to 1-vertical (1.5H:1V) configurations. Where left open for extended periods, the open cuts should be flattened to provide for long-term stability. It should be noted that open cuts in the on-site clay will tend to slake and degrade with time. Consequently, periodic re-grading or flattening could be required during the work.

Stability of short-term excavations must be evaluated in the field by qualified persons based on specific site observations. Soil stockpiles and equipment should not be allowed near the edges of temporary cuts. Where excavations will remain open for extended periods or where groundwater seepage is encountered, temporary slopes must be monitored on a continuous basis and flattened as warranted by site conditions.

Where space constraints limit use of open cuts, excavations may be cut with near-vertical side walls. Temporary support for vertical cut excavations may utilize cantilevered soldier piles or drilled shaft retention walls, cantilevered or tied-back steel piles with lagging, steel sheeting with helical or deadman tie-back systems, or other suitable systems. Depending on the system and design criteria selected, support systems are subject to lateral movements and potential loss of ground at the top of excavations. Soil movement and settlement related to the selected support system must be evaluated based on the proximity of adjacent foundations and structures.

Temporary bracing or excavation support for excavations should be designed by a Professional Engineer and monitored by the Engineer or a designated representative. All excavations must comply with local, state and federal requirements for worker safety. Bracing or retention systems should be monitored on a continuous basis for movement or loss of ground.



CLOSING

Site preparation, grading work, and foundation and below-grade wall construction should be monitored by the Engineer or a designated representative thereof. Subsurface conditions significantly at variance with those encountered in the borings should be brought to the attention of the Geotechnical Engineer. The conclusions and recommendations of this report should then be reviewed in light of the new information.

The following illustrations are attached and complete this submittal.

Plate 1	Site Vicinity
Plate 2	Plan of Borings
Plates 3 through 13	Boring Logs
Plate 14	Key to Terms and Symbols
Appendix A	Piezometer Logs
Appendix B	Classification Test Results
Appendix C	Lateral Earth Pressure Envelopes

* * * * *

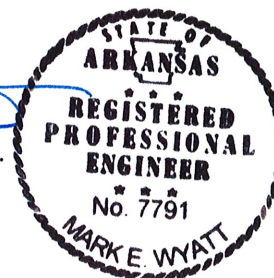
We appreciate the opportunity to be of service to you on this project. Should you have any questions regarding this report, or if we may be of additional assistance during final design or construction, please call on us.

Sincerely,

**GRUBBS, HOSKYN,
BARTON & WYATT, LLC**

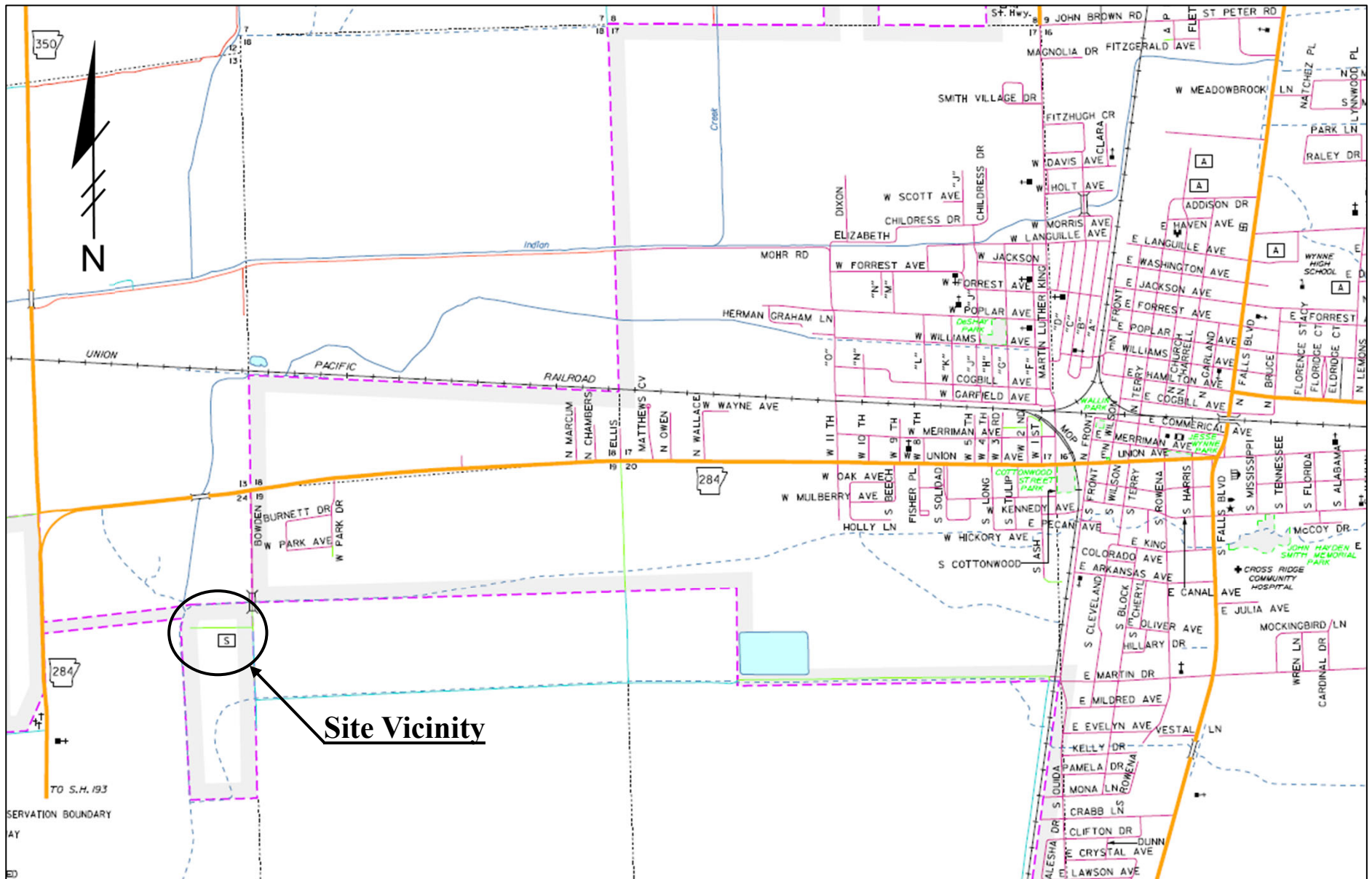
Vellela M. Scott, P.E.
Principal Engineer

Mark E. Wyatt, P.E.
President

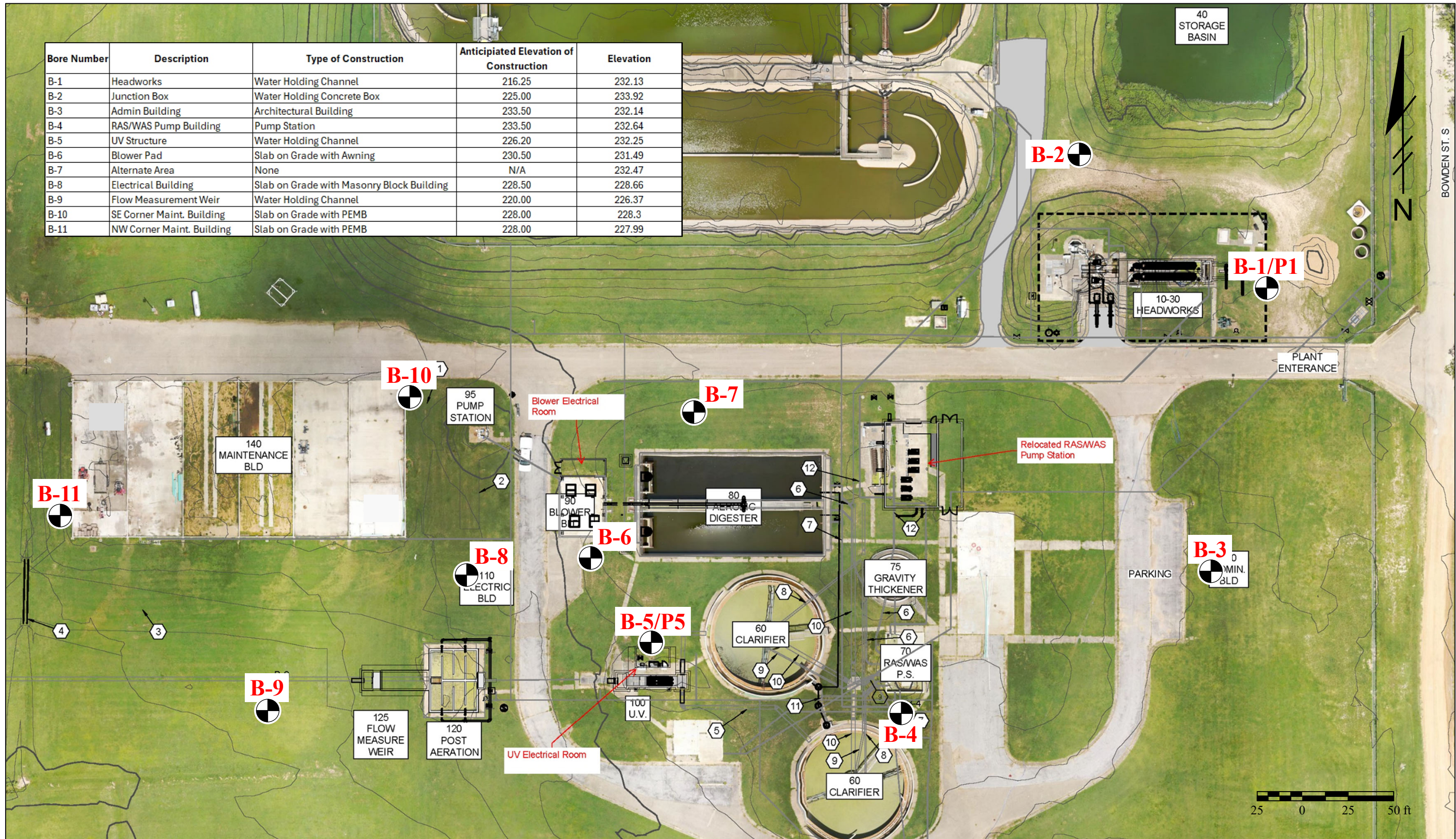


VMS/MEW:jw

Copies submitted: City of Wynne
 c/o Crist Engineers, Inc.
 Attn: Mr. Craig Johnson, P.E. (1-email)
 Attn: Mr. Morgan Ussery (1-email)



Bore Number	Description	Type of Construction	Anticipiated Elevation of Construction	Elevation
B-1	Headworks	Water Holding Channel	216.25	232.13
B-2	Junction Box	Water Holding Concrete Box	225.00	233.92
B-3	Admin Building	Architctural Building	233.50	232.14
B-4	RAS/WAS Pump Building	Pump Station	233.50	232.64
B-5	UV Structure	Water Holding Channel	226.20	232.25
B-6	Blower Pad	Slab on Grade with Awning	230.50	231.49
B-7	Alternate Area	None	N/A	232.47
B-8	Electrical Building	Slab on Grade with Masonry Block Building	228.50	228.66
B-9	Flow Measurement Weir	Water Holding Channel	220.00	226.37
B-10	SE Corner Maint. Building	Slab on Grade with PEMB	228.00	228.3
B-11	NW Corner Maint. Building	Slab on Grade with PEMB	228.00	227.99





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LOG OF BORING NO. 1

Wastewater Treatment Plant Improvements
Wynne, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - Headworks

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %
						0.2 0.4 0.6 0.8 1.0 1.2 1.4							
						PLASTIC LIMIT +	WATER CONTENT ●					LIQUID LIMIT +	
			SURF. EL: 232±			10	20	30	40	50	60	70	
			Firm grayish brown silty clay w/silt pockets and occasional ferrous nodules and stains (fill)	9			●						
			Stiff tan and reddish tan silty clay w/silt pockets and partings, dry	23		●							
5			- very stiff, brownish gray w/occasional ferrous nodules and stains below 4 ft	29		●	+			+			95
				29		●							
			Stiff light brown and gray silty clay, slightly sandy w/organic stains	16			●						
			- firm with occasional ferrous nodules and stains below 13 ft	9			●						
15													
			Firm tan clayey silt	9			●	+					99
20													
			Medium dense tan fine sand, slightly silty	13		●							
25													
			Notes: 1. Set Piezometer P1 2. Drilled with CME-55										
COMPLETION DEPTH: 25.0 ft				DEPTH TO WATER				DATE: 9/17/2024					
DATE: 9-17-24				IN BORING: Dry									

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LOG OF BORING NO. 2

Wastewater Treatment Plant Improvements
Wynne, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - Junction Box

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %
						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
			SURF. EL: 234±										
						PLASTIC LIMIT			WATER CONTENT			LIQUID LIMIT	
						10	20	30	40	50	60	70	
			Stiff grayish brown and brownish gray silty clay w/silt pockets and occasional ferrous nodules and stains	18			●						
			Stiff light tan clayey silt, dry	23		●							
5			Very stiff brown, tan, and light gray silty clay w/silt pockets	26		●							
			Very stiff brownish gray and reddish tan silty clay w/silt pockets and ferrous nodules and stains	28			●						
10				25			●	++					98
			- stiff below 13 ft										
15				18			●						
			- with more silt below 18 ft										
20				21			●						
			Note: Drilled with CME-55										
25													

COMPLETION DEPTH: 20.0 ft
DATE: 9-18-24

DEPTH TO WATER
IN BORING: Dry

DATE: 9/18/2024



**Grubbs, Hoskyn,
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Consulting Engineers

LOG OF BORING NO. 3

Wastewater Treatment Plant Improvements
Wynne, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - Admin Building

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %
						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
			SURF. EL: 232±										
						PLASTIC LIMIT			WATER CONTENT			LIQUID LIMIT	
						+						+	
						10	20	30	40	50	60	70	
			Stiff brownish gray clayey silt, sandy w/silt pockets	12			●						93
			Stiff to very stiff light brown silty clay w/silt pockets and partings	24			●	+	+				
5				24			●						
			- stiff, brown and gray below 6 ft	13									
10			Stiff light brown clayey silt w/occasional decayed organics	12									93
15			Stiff gray and brown silty clay w/silt pockets	11									93
			Note: Drilled with CME-55										93
20													
													93
25													

COMPLETION DEPTH: 15.0 ft
DATE: 9-18-24

DEPTH TO WATER
IN BORING: Dry

DATE: 9/18/2024



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. 4

Wastewater Treatment Plant Improvements
Wynne, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - RAS/WAS Pump Building

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %
						0.2 0.4 0.6 0.8 1.0 1.2 1.4							
						PLASTIC LIMIT +	WATER CONTENT ●				LIQUID LIMIT +		
			SURF. EL: 233±			10	20	30	40	50	60	70	
			Stiff brown and tan silty clay, slightly sandy w/trace fine gravel (fill)	15			●						
			Stiff brown and light tan silty clay, slightly sandy w/silt partings	15			●	+	+				95
5			- with fewer silt partings below 4 ft	13				●					
				14				●					
			- firm to stiff, brown below 8 ft	10				●					
10													
			Stiff light brown and reddish tan silty clay w/occasional organic inclusions	11				●					
15													
			Firm tan clayey silt	7				●					
20			Note: Drilled with CME-55										
25													
COMPLETION DEPTH: 20.0 ft				DEPTH TO WATER				DATE: 9/18/2024					
DATE: 9-18-24				IN BORING: Dry									

COMPLETION DEPTH: 20.0 ft
DATE: 9-18-24

DEPTH TO WATER
IN BORING: Dry

DATE: 9/18/2024



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. 5

Wastewater Treatment Plant Improvements
Wynne, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - UV Structure

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %	
						0.2	0.4	0.6	0.8	1.0	1.2	1.4		
						PLASTIC LIMIT +	WATER CONTENT ●					LIQUID LIMIT +		
			SURF. EL: 232±			10	20	30	40	50	60	70		
			Soft grayish brown and brown silty clay	6			●							
			Stiff brown and tan silty clay w/silt pockets and partings, dry	15		●								
5				13			●							
			- with organic stains below 6 ft	15			●							
			Firm brown silty clay	9			+	●	-	+			97	
10														
			- stiff, light brown, slightly sandy below 13 ft	16			●							
15														
			Loose light brown silt, moist	7				●	-NON-PLASTIC-				100	
20														
			Loose tan fine sand, slightly silty	9										
25														
			Notes: 1. Set Piezometer P5 2. Drilled with CME-55											
COMPLETION DEPTH: 25.0 ft				DEPTH TO WATER				DATE: 9/18/2024						
DATE: 9-18-24				IN BORING: Dry										

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LOG OF BORING NO. 6
Wastewater Treatment Plant Improvements
Wynne, Arkansas

LOCATION: See Plate 2 - Blower Pad

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %
						0.20.40.60.81.01.21.4							
						PLASTIC LIMIT	WATER CONTENT					LIQUID LIMIT	
			SURF. EL: 231±			10	20	30	40	50	60	70	
			Stiff brown clayey silt, slightly sandy w/occasional ferrous nodules and stains	14			20	25	35				87
			Stiff brown and grayish tan silty clay w/silt pockets and ferrous nodules and stains	17			25						
5			Soft brown silty clay w/occasional decayed organics	5			25	30	40				100
			- firm at 6 to 13 ft	8			30						
10				7			25						
			- stiff, tan below 13 ft	16			30						
15			Note: Drilled with CME-55										
20													
25													
COMPLETION DEPTH: 15.0 ft				DEPTH TO WATER				DATE: 9/19/2024					
DATE: 9-19-24				IN BORING: Dry									

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LOG OF BORING NO. 7
Wastewater Treatment Plant Improvements
Wynne, Arkansas

LOCATION: See Plate 2 - Alternate Area

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %
						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
						PLASTIC LIMIT +				WATER CONTENT ●			
			SURF. EL: 232±			10	20	30	40	50	60	70	
			Soft brown clayey silt, slightly sandy	6			●						
			Firm brown, brownish gray, and light tan silty clay w/silt pockets	8		+	●			+			94
5			- stiff below 4 ft	12			●						
			Firm brown, tan, and gray silty clay w/occasional organic stains	9		+	●		+				99
			- stiff at 8 to 13 ft	12			●						
10													
			- firm to stiff with silt pockets and occasional ferrous nodules and stains below 13 ft	10			●						
15			Note: Drilled with CME-55										
20													
25													
COMPLETION DEPTH: 15.0 ft				DEPTH TO WATER				DATE: 9/19/2024					
DATE: 9-19-24				IN BORING: Dry									

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LOG OF BORING NO. 8
Wastewater Treatment Plant Improvements
Wynne, Arkansas

LOCATION: See Plate 2 - Electrical Building

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT						- No. 200 %		
						0.20.40.60.81.01.21.4								
						PLASTIC LIMIT +	WATER CONTENT ●				LIQUID LIMIT +			
			SURF. EL: 229±			10	20	30	40	50	60	70		
5			Stiff brown silty clay w/silt pockets and ferrous stains	15			●						94	
			Stiff light tan clayey silt, dry - very stiff below 2 ft	25		●	+ -- +							
10			Very stiff tan and light tan silty clay w/silt pockets and partings, dry - brown and light tan below 6 ft	31			●						98	
				43		●	+ --- +							
				33			●							
15			Very stiff tan and reddish tan silty clay w/occasional ferrous nodules and stains	25			●							
			Note: Drilled with CME-55											
20														
25														
COMPLETION DEPTH: 15.0 ft				DEPTH TO WATER				DATE: 9/19/2024						
DATE: 9-19-24				IN BORING: Dry										

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**Grubbs, Hoskyn,
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LOG OF BORING NO. 9

Wastewater Treatment Plant Improvements
Wynne, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - Flow Measurement Weir

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT							- No. 200 %
						0.2	0.4	0.6	0.8	1.0	1.2	1.4	
			SURF. EL: 226±										
						PLASTIC LIMIT			WATER CONTENT			LIQUID LIMIT	
						10	20	30	40	50	60	70	
			Soft brown silty clay w/occasional silt pockets	6									
			- very soft below 2 ft	3									
5			Firm gray and tan silty clay w/ferrous nodules and stains, moist	7									
				9									97
10			Firm brown and gray silty clay w/occasional organic stains	9									
15			Stiff tan and grayish tan silty clay w/numerous ferrous nodules and stains	12									
20			Stiff tan and reddish tan clayey silt w/ferrous nodules and stains										
25			Very soft to soft grayish brown clayey silt	4									
			Note: Drilled with CME-55										
COMPLETION DEPTH: 25.0 ft				DEPTH TO WATER				DATE: 9/19/2024					
DATE: 9-19-24				IN BORING: Dry									

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**Grubbs, Hoskyn,
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Consulting Engineers

LOG OF BORING NO. 10

Wastewater Treatment Plant Improvements
Wynne, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - Maintenance Building

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %	
						0.2	0.4	0.6		0.8
			SURF. EL: 228±							
			Stiff brown and tan silty clay	12						
			Firm tan and light tan silty clay w/silt pockets, dry	7						
5			- soft, brown and grayish tan below 4 ft	5						
			Firm to stiff gray clayey silt, moist	10						
10			Firm to stiff brownish gray silty clay w/silt pockets	10						
			Stiff gray, tan, and reddish tan silty clay w/ferrous nodules and stains	18						
15			Note: Drilled with CME-55							
20										
25										

COMPLETION DEPTH: 15.0 ft
DATE: 9-19-24

DEPTH TO WATER
IN BORING: Dry

DATE: 9/19/2024



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF BORING NO. 11

Wastewater Treatment Plant Improvements
Wynne, Arkansas

TYPE: Auger

LOCATION: See Plate 2 - Maintenance Building

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	BLOWS PER FT	UNIT DRY WT LB/CU FT	COHESION, TON/SQ FT			- No. 200 %		
						0.2	0.4	0.6		0.8	1.0
			SURF. EL: 228±			PLASTIC LIMIT: 10 WATER CONTENT: 40 LIQUID LIMIT: 70					
5			Firm light brown silty clay w/ferrous nodules and stains	7							
			- stiff with silt pockets below 2 ft	15							98
			- light brown and tan below 4 ft	16							
10			Stiff brownish gray and brown clayey silt w/occasional organic stains	12							
			- firm, brown below 8 ft	9							
15			Stiff tan, brown, and reddish tan silty clay w/ferrous nodules and stains	13							
			Note: Drilled with CME-55								
20											
25											

COMPLETION DEPTH: 15.0 ft
DATE: 9-19-24

DEPTH TO WATER
IN BORING: Dry

DATE: 9/19/2024

SYMBOLS AND TERMS USED ON BORING LOGS

SOIL TYPES

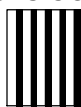
(SHOWN IN SYMBOLS COLUMN)



Gravel



Sand



Silt

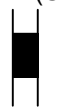


Clay

Predominant type shown heavy

SAMPLER TYPES

(SHOWN ON SAMPLES COLUMN)



Shelby
Tube



Rock
Core



Split
Spoon



No
Recovery



Cutting

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (major portion retained on No. 200 sieve): Includes (1) Clean gravels and sands, and (2) silty or clayey gravels and sands. Condition is rated according to relative density, as determined by laboratory tests.

DESCRIPTIVE TERM

N-VALUE

RELATIVE DENSITY

VERY LOOSE

0-4

0-15%

LOOSE

4-10

15-35%

MEDIUM DENSE

10-30

35-65%

DENSE

30-50

65-85%

VERY DENSE

50 and above

85-100%

FINE GRAINED SOILS (major portion passing No. 200 sieve): Includes (1) Inorganic and organic silts and clays, (2) gravelly, sandy, or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests.

DESCRIPTIVE TERM

UNCONFINED COMPRESSIVE STRENGTH TON/SQ. FT.

VERY SOFT

Less than 0.25

SOFT

0.25-0.50

FIRM

0.50-1.00

STIFF

1.00-2.00

VERY STIFF

2.00-4.00

HARD

4.00 and higher

NOTE: Slickensided and fissured clays may have lower unconfined compressive strengths than shown above, because of planes of weakness or cracks in the soil. The consistency ratings of such soils are based on penetrometer readings.

TERMS CHARACTERIZING SOIL STRUCTURE

SLICKENSIDED - having inclined planes of weakness that are slick and glossy in appearance.

FISSURED - containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical.

LAMINATED - composed of thin layers of varying color and texture.

INTERBEDDED - composed of alternate layers of different soil types.

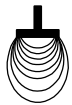
CALCAREOUS - containing appreciable quantities of calcium carbonate.

WELL GRADED - having a wide range in grain sizes and substantial amounts of all intermediate particle sizes.

POORLY GRADED - predominantly of one grain size, or having a range of sizes with some intermediate sizes missing.

Terms used on this report for describing soils according to their texture or grain size distribution are in accordance with the UNIFIED SOIL CLASSIFICATION SYSTEM, as described in Technical Memorandum No.3-357, Waterways Experiment Station, March 1953

APPENDIX A



**Grubbs, Hoskyn,
Barton & Wyatt, Inc.**
Consulting Engineers

LOG OF PIEZOMETER NO. P1
Wastewater Treatment Plant Improvements
Wynne, Arkansas

LOCATION: Boring 1

DEPTH, FT	SYMBOL	DESCRIPTION OF MATERIAL		DEPTH, FT	EL, FT
		SURF. EL: 232±		0	232
		Firm grayish brown silty clay w/silt pockets and occasional ferrous nodules and stains (fill)			
		Stiff tan and reddish tan silty clay w/silt pockets and partings, dry			
		- very stiff, brownish gray w/occasional ferrous nodules and stains below 4 ft			
10		Stiff light brown and gray silty clay, slightly sandy w/organic stains			
		- firm with occasional ferrous nodules and stains below 13 ft		8	224
				10	222
20		Firm tan silty clay		19	213
		Medium dense tan fine sand, slightly silty		24	208
				24.5	207.5
				25	207

Top of Riser Casing

Backfill Material
Type: Bentonite Chunks

Riser Casing
Dia: 2 in.
Type: Flush Thread PVC

Top of Seal

Annular Seal
Type: 3/8" Bentonite Pellets

Top of Filter Pack

Filter Pack
Type: 20/40 Sand

Bottom of Riser/
Top of Screen

Screen
Dia: 2 in. Type:
Openings Width: 0.010 in.
Type: Flush Thread PVC

Bottom of Screen

Bottom of Slump

Bottom of Hole

Hole Dia: 6 in.

NOTE:

BORING COMPLETION DATE: 9/17/2024

DEPTH TO WATER
IN BORING: Dry

DATE: 9/17/2024

PLATE

LOG OF PIEZOMETER NO. P5
Wastewater Treatment Plant Improvements
Wynne, Arkansas

[illegible]

PLATE

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APPENDIX B

SUMMARY of CLASSIFICATION TEST RESULTS

PROJECT: Wastewater Treatment Plant Improvements

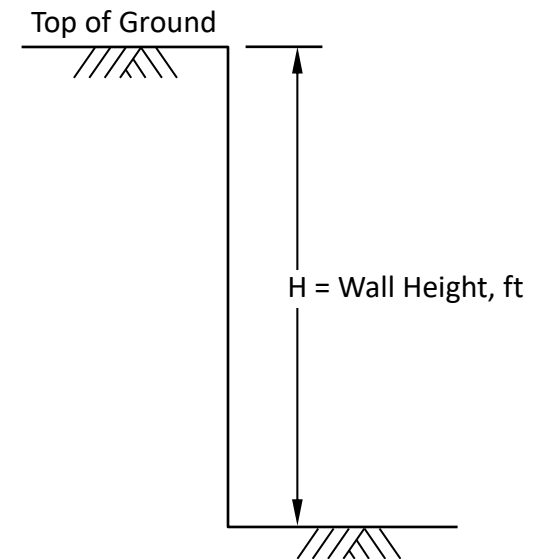
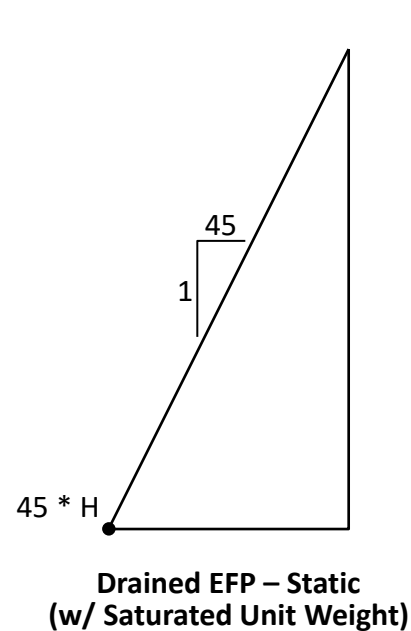
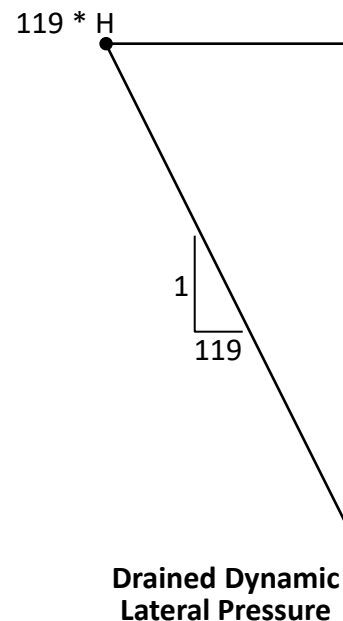
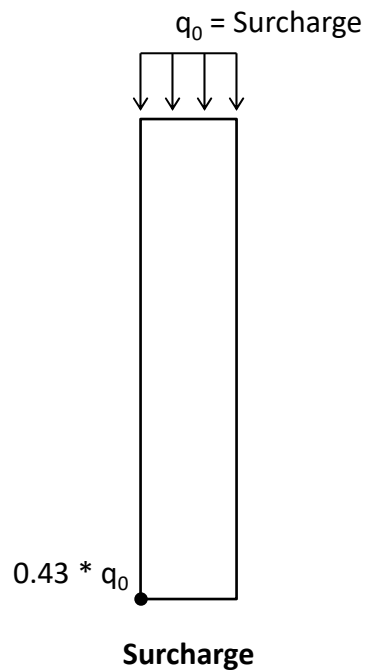
LOCATION: Wynne, Arkansas

GHBW JOB NUMBER: A24184.00367

BORING NO.	SAMPLE DEPTH (ft)	WATER CONTENT (%)	ATTERBERG LIMITS			PERCENT PASSING #4	PERCENT PASSING #200	USCS CLASS.	AASHTO CLASS.
			LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX				
1	4.5-5.5	14	48	17	31	100	95	CL	A-7-6
1	19-20	28	33	26	7	100	99	CL-ML	A-4
2	9-10	16	25	21	4	100	98	CL-ML	A-4
3	2.5-3.5	15	34	24	10	100	93	CL	A-4
4	2.5-3.5	16	29	18	11	100	95	CL	A-6
5	9-10	22	---	---	---	100	97	CL	A-6
5	19-20	28	NON-PLASTIC			100	100	ML	A-4
6	0.5-1.5	18	33	21	12	94	87	CL-ML	A-6
6	4.5-5.5	26	38	22	16	100	100	CL	A-6
7	2.5-3.5	24	49	20	29	100	94	CL	A-7-6
7	6.5-7.5	26	35	21	14	100	99	CL	A-6
8	2.5-3.5	9	35	25	10	100	94	ML	A-4
8	6.5-7.5	11	34	19	15	100	98	CL	A-6
9	6.5-7.5	26	38	20	18	100	97	CL	A-6
10	2.5-3.5	13	---	---	---	100	96	CL	A-6
11	2.5-3.5	21	---	---	---	100	98	CL	A-6

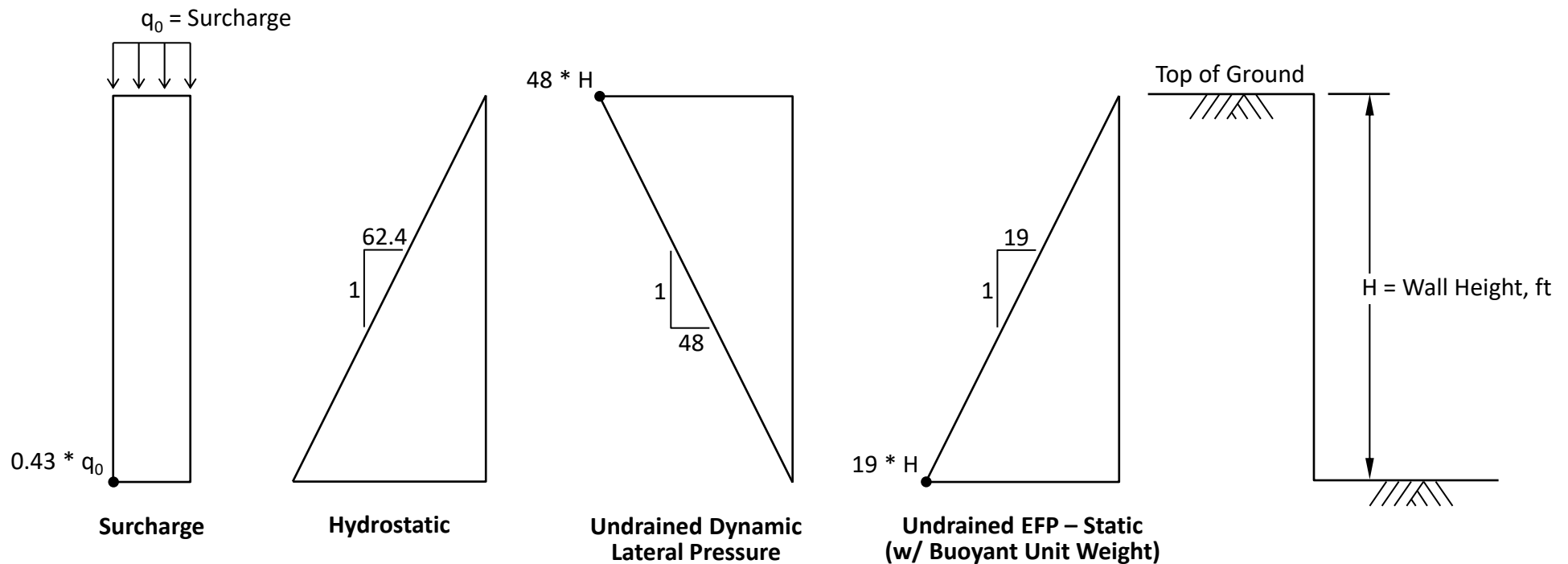
APPENDIX C

Clean Stone Backfill At-Rest Drained Earth Pressures



- NOTES: 1. EFP = equivalent fluid pressure, lbs per sq ft
2. ASTM D448 #67 or #57: TUW $\leq$ 105 pcf

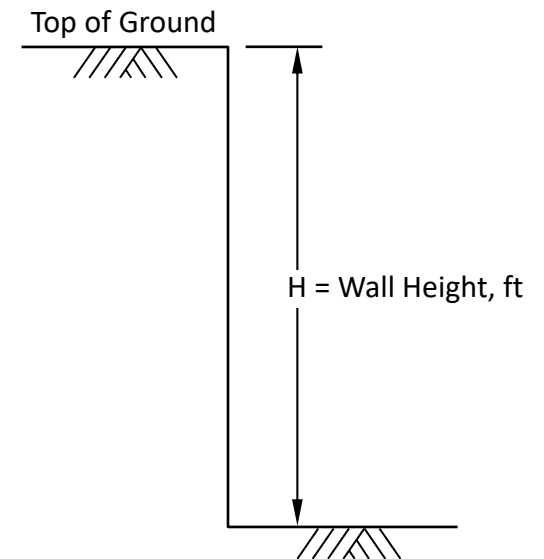
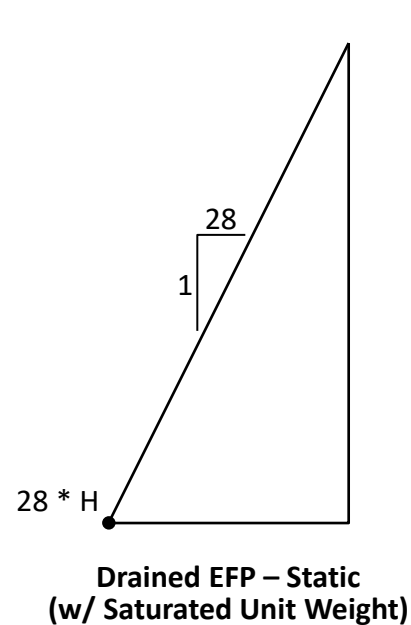
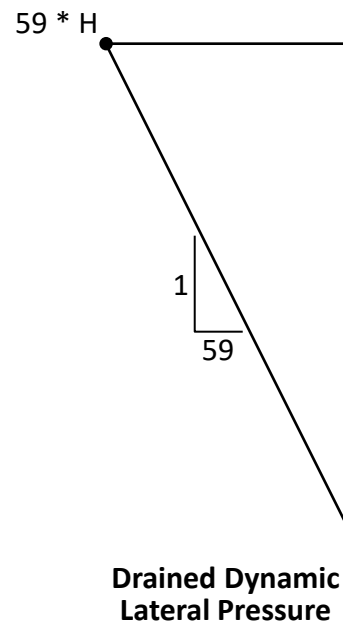
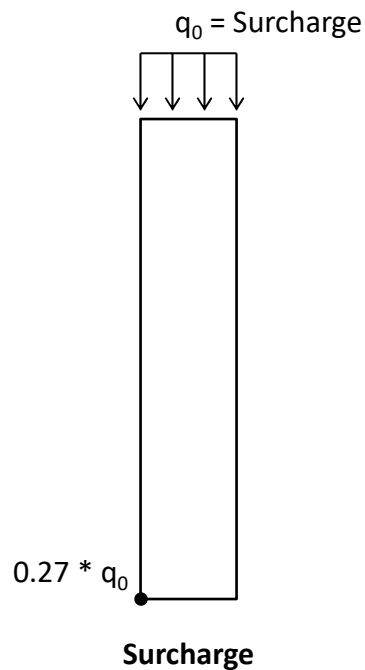
Clean Stone Backfill At-Rest Undrained Earth Pressures



- NOTES:
1. EFP = equivalent fluid pressure, lbs per sq ft
 2. Hydrostatic pressure can be adjusted for water depth
 3. ASTM D448 #67 or #57: BUW ≤ 43 pcf

Clean Stone Backfill

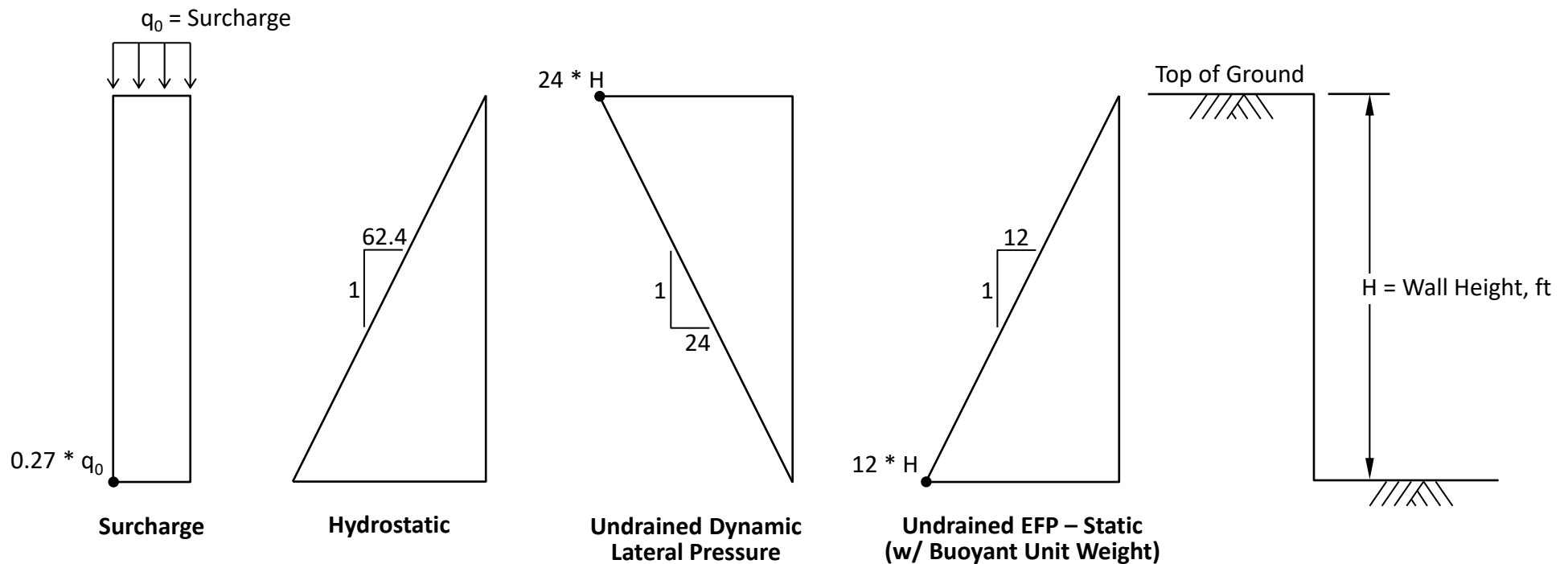
Active Drained Earth Pressures



- NOTES: 1. EFP = equivalent fluid pressure, lbs per sq ft
2. ASTM D448 #67 or #57: TUW $\leq$ 105 pcf

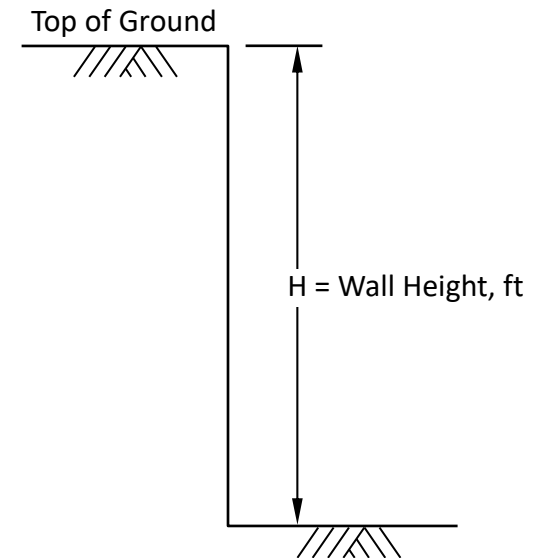
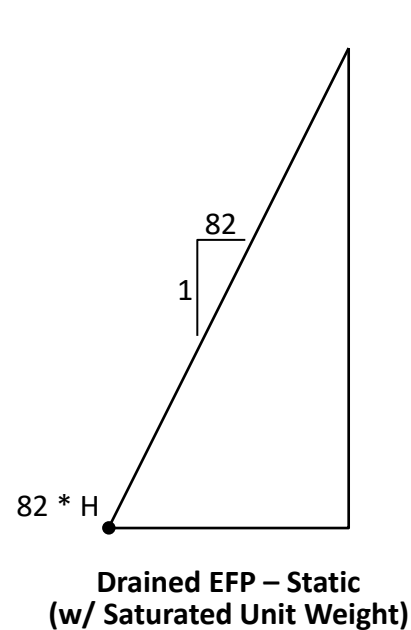
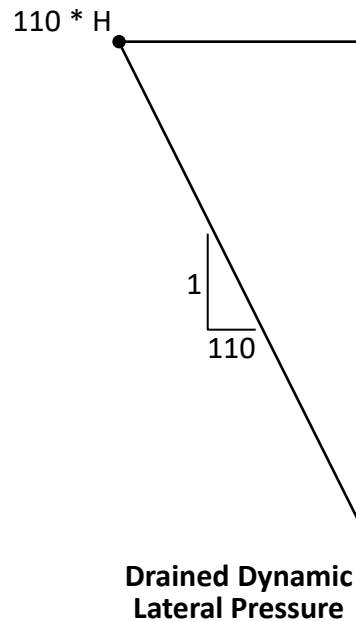
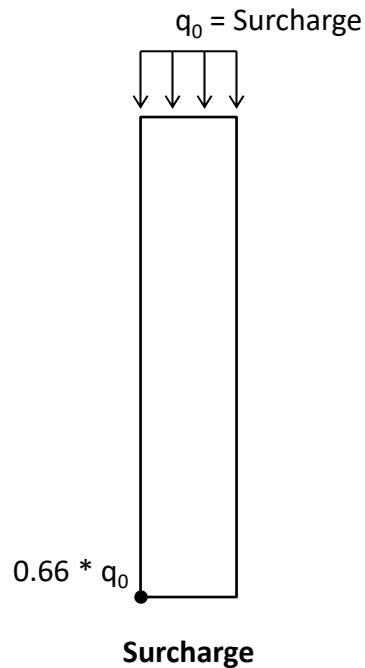
Clean Stone Backfill

Active Undrained Earth Pressures



- NOTES:
1. EFP = equivalent fluid pressure, lbs per sq ft
 2. Hydrostatic pressure can be adjusted for water depth
 3. ASTM D448 #67 or #57: BUW ≤ 43 pcf

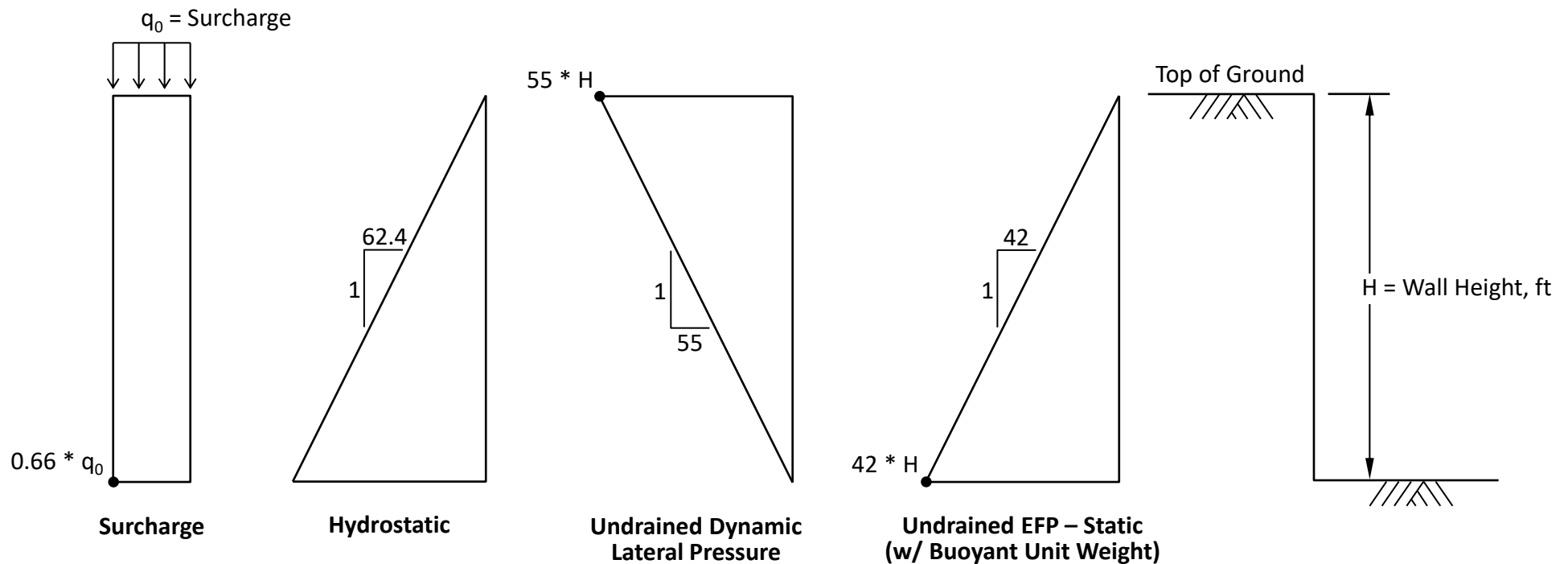
Low PI Select Fill Backfill At-Rest Drained Earth Pressures



- NOTES: 1. EFP = equivalent fluid pressure, lbs per sq ft
2. Select fill: TUV $\leq$ 125 pcf

Low PI Select Fill Backfill

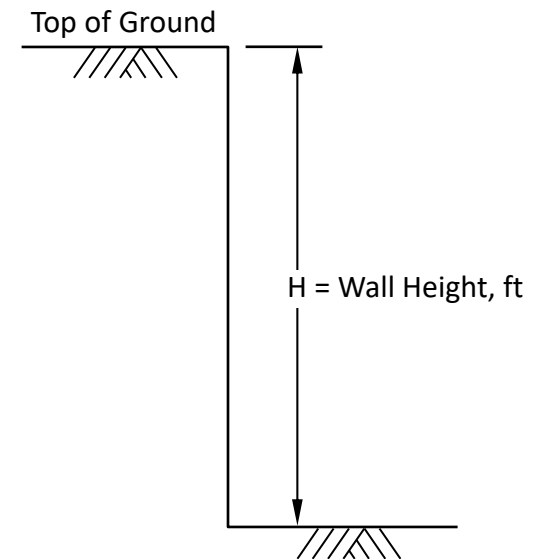
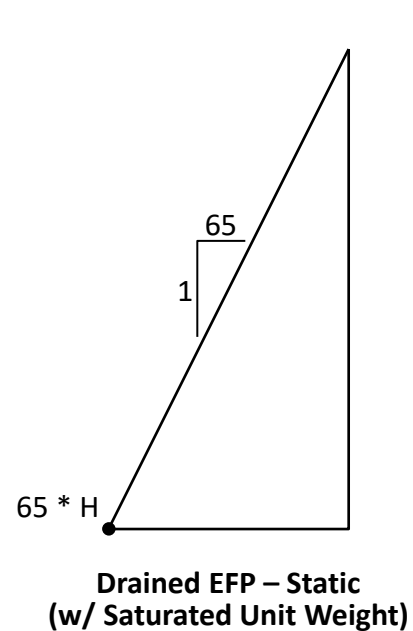
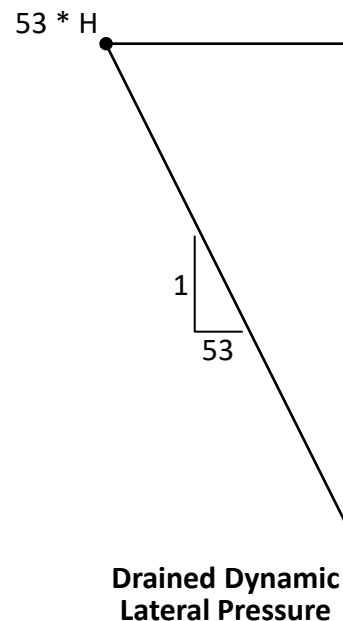
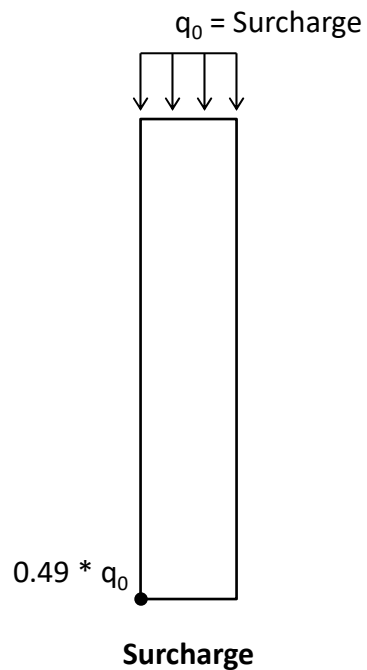
At-Rest Undrained Earth Pressures



- NOTES:
1. EFP = equivalent fluid pressure, lbs per sq ft
 2. Hydrostatic pressure can be adjusted for water depth
 3. Select fill: BUW $\leq$ 63 pcf

Low PI Select Fill Backfill

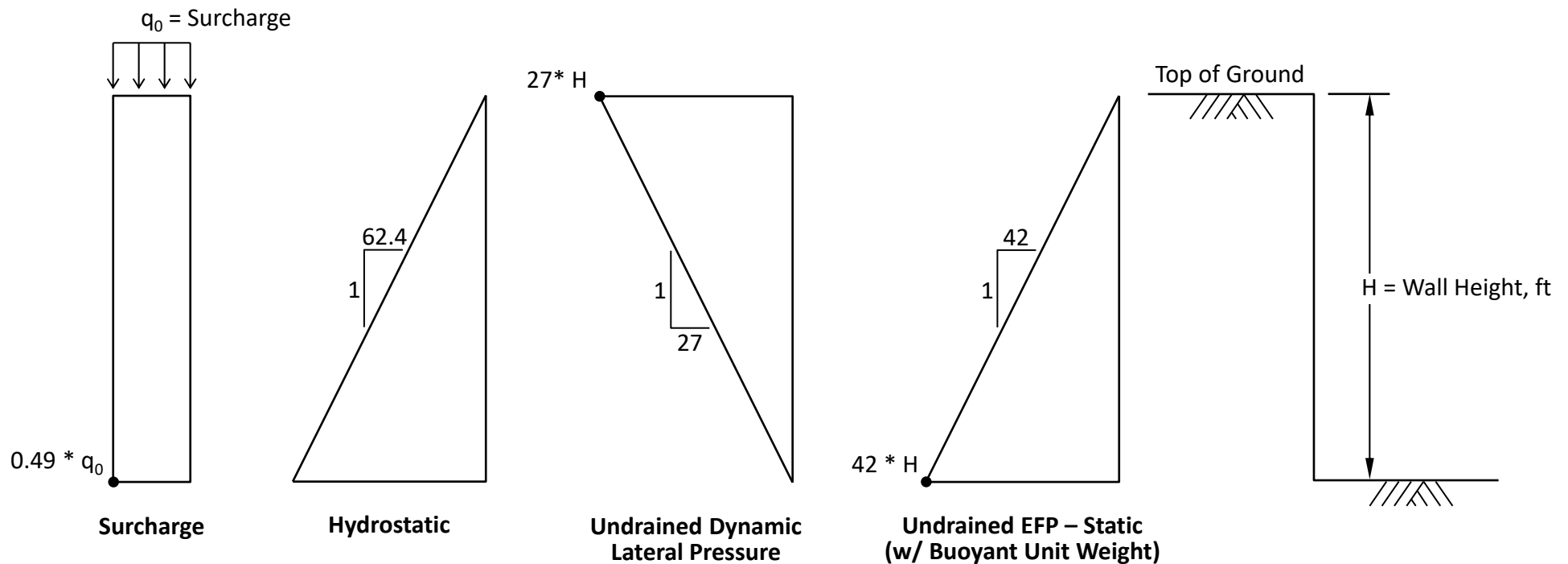
Active Drained Earth Pressures



- NOTES: 1. EFP = equivalent fluid pressure, lbs per sq ft
2. Select fill: TUW $\leq$ 125 pcf

Low PI Select Fill Backfill

Active Undrained Earth Pressures



- NOTES:
1. EFP = equivalent fluid pressure, lbs per sq ft
 2. Hydrostatic pressure can be adjusted for water depth
 3. Select fill: BUW $\leq$ 63 pcf