NorthWest Colorado Consultants, Inc.

Geotechnical / Environmental Engineering • Materials Testing

January 17, 2023

Routt County
Scott Cowman
136 6th Street, Suite 201
Steamboat Springs, CO 80487

Job Number: 22-12813

Subject: Subsoil and Foundation Investigation, Proposed Wastewater Treatment Building, Town of Phippsburg WWTP, County Road 12, Routt County, Colorado.

Scott,

This report presents the results of the Subsoil and Foundation Investigation for the proposed Wastewater Treatment Building to be constructed at the Town of Phippsburg Wastewater Treatment Plant (WWTP) located on County Road 12, north of the Town of Phippsburg in Routt County, Colorado. The approximate location of the project site is shown in Figure #1.

NWCC, Inc.'s (NWCC) scope of work included obtaining data from cursory observations made at the site, logging of two (2) test holes, sampling of the probable foundation soils and laboratory testing of the samples obtained. This report presents recommendations for economically feasible and safe type foundations, as well as allowable soil pressures and other design and construction considerations that are advisable, but not necessarily routine to quality design and building practices.

Proposed Construction: NWCC understands the proposed building will consist of a one-story metal structure constructed over a concrete multi-compartment treatment tank. The building will be constructed over the structural concrete slab on top of the tank. The treatment tank will be constructed with a structural concrete slab-on-grade floor system located approximately 12 to 14 feet beneath the existing ground surface.

For design purposes, NWCC has assumed that building loadings will be light to moderate, typical of this type of construction. If loadings or conditions are significantly different from those above, NWCC should be notified to reevaluate recommendations in this report.

Site Conditions: The proposed building will be located southeast of the existing wastewater treatment ponds and east-northeast of the existing entry gate, north of County Road 12 in Routt County, Colorado. An alternate site is located south of the existing building located east of the wetland pond in the northern portion of the site. Vegetation at the building sites primarily consists of grasses and weeds.

Topography of the building site is variable and generally slopes gently to moderately down to the east. An existing two-track dirt road runs from County Road 12 to the existing building in the northeast corner of the site. Access roads are also located between the four existing ponds at the site.

Subsurface Conditions: To investigate the subsurface conditions at the site, two test holes were advanced on October 11, 2022 with a truck-mounted drill rig using 4-inch diameter continuous flight augers. A site plan showing existing features, along with the approximate test hole locations is presented in Figure #2.

Subsurface conditions encountered at the site were variable and generally consisted of a layer of fill materials overlying natural clays, sands and gravels and claystone-shale bedrock to the maximum depth investigation, 25 feet below the existing ground surface (bgs). Graphic logs of the exploratory test holes are presented in Figure #3 and the associated Legend and Notes are presented in Figure #4.

Fill materials were encountered at the ground surface in both test holes and extended to depths of 5 to 6 feet bgs. The fill materials consisted of clays with sand and gravel lenses which were fine to coarse grained, low to moderately plastic, soft to medium stiff, moist to very moist and brown to gray in color. A sample of the fill materials classified as a CL soil in accordance with the Unified Soil Classification System (USCS). Natural clays were encountered beneath the fill materials and extended to depths of 10 feet bgs in Test Hole 1 and 10½ feet bgs in Test Hole 2. The natural clays were sandy to very sandy, low to moderately plastic, soft to medium stiff, moist to wet and brown to gray in color. A sample of the clays classified as a CL soil in accordance with the USCS.

Natural sands and gravels were encountered beneath the clays and extended to a depth of 13feet bgs in both test holes. The sands and gravels were silty to slightly silty, fine to coarse grained with occasional cobbles, very low to non-plastic, dense, very moist to wet and brown to gray in color. A sample of the sands and gravels classified as an SP-GP soil in accordance with the USCS. Claystone-shale bedrock was encountered below the sands and gravels in both test holes and extended to the maximum depth investigated in each test hole. The claystone-shale bedrock was slightly sandy, fine-grained, low to moderately plastic, hard to very hard, moist and gray to dark gray in color. A sample of the claystone-shale bedrock classified as a CL soil in accordance with the USCS.

Swell-consolidation testing conducted on a sample of the natural clays indicates the material tested will exhibit a moderate to high degree of consolidation under relatively light loading (1,000 psf) and then exhibit a very low swell potential when wetted under constant load. Swell-consolidation testing conducted on a sample of the claystone-shale bedrock indicates the material tested will exhibit a low to moderate swell potential when wetted under constant load. The swell-consolidation test results are presented in Figures #5 and #6, and all the other laboratory test results are summarized in the attached Table 1.

Based on anticipated geologic site conditions, NWCC recommends a **Site Class B** designation be used in structural design calculations in accordance with Table 20.3-1 in Chapter 20 of ASCE 7-10.

Groundwater was encountered in Test Hole 1 at 9 feet bgs at the time of drilling and when measured 9 days after drilling. Groundwater was encountered in Test Hole 2 at 10 feet bgs at the time of drilling and when measured 9 days after drilling. It should be noted that the groundwater conditions at the site can be expected to fluctuate with seasonal changes in precipitation and runoff.

Foundation Recommendations: Based on the subsurface conditions encountered in the test holes, the results of the field and laboratory investigations and our assumptions regarding the proposed construction, NWCC believes an economically feasible and safe type of foundation system for the proposed structure to be constructed at the site would consist of structural slabs, or spread/continuous footings placed directly on the natural sands and gravels, claystone-shale bedrock or on properly compacted structural fill materials placed over the sands and gravels or claystone-shale bedrock. Due to the consolidation potential of the existing fill materials and natural clays, NWCC does not recommend foundations be constructed on these materials. Differential foundation movements of 1 to 2 inches could occur due to the swell potential of the claystone-shale bedrock.

1) Foundations placed on the natural sands and gravels or properly compacted structural fill materials placed over the natural sands and gravels or bedrock should be designed using an allowable soil bearing pressure of 3,000 psf. Foundations placed directly on the claystone-shale bedrock can be designed using an allowable bearing pressure of 5,000 psf. Due to the swell potential of the claystone-shale bedrock, NWCC recommends the foundations also be designed with a minimum dead load pressure of at least 700 psf to minimize the differential movements of the foundation.

2) Structural slabs or pad sizes should be computed using the above soil pressures and placed on the natural sands and gravels or claystone-shale bedrock or on properly compacted structural fill materials placed over the natural sands and gravels or claystone-shale bedrock.

3) Any existing fill materials, topsoil and organic materials and natural clays found beneath the footings when excavations are opened should be removed from the excavations and foundations extended down to the natural sands and gravels or bedrock prior to structural fill or concrete placement. Foundation design should be closely checked to assure that it distributes loads per the allowable pressures given. Any fill materials placed beneath the foundations should be a non-expansive granular soil approved by NWCC prior to placement. Groundwater will likely be encountered in the foundation excavations; therefore, NWCC recommends that clean gravel fill materials meeting the gradation specifications for Colorado Department of Transportation (CDOT) Class A or Class B Filter Materials be used. The fill materials placed under the foundations should be uniformly placed and compacted in 6 to 8-inch loose lifts and compacted to at least 100% of the maximum standard Proctor density and within 2% of the optimum moisture content determined in accordance with ASTM D-698, or to at least 80% of the maximum relative density in accordance with ASTM D4253/4254 if free draining gravels are used as structural fill. The structural fill

materials should extend out from the edge of the foundations on a 1(horizontal) to 1(vertical) or flatter slope.

4) Foundation walls should be designed and reinforced to span an unsupported distance of 10 feet or the length between pads, whichever is greater.

5) Structural slabs or pads should be placed well enough below final backfill grades to protect them from frost heave. Forty-eight (48) inches is typical for this location considering normal snow cover and other winter factors.

6) The proposed foundations elevations will likely be below the groundwater level. Therefore, it will be necessary to dewater the foundations excavations during construction. If the concrete is not to be placed in the excavations within 24 hours, we would recommend that a layer of lean concrete or 1 ½ inch gravels be placed in the base of the foundation excavations immediately after the excavations are completed. This "mud mat" will reduce disturbance of the natural soils or bedrock caused by exposure to the elements and the construction operations.

7) Based on experience, NWCC estimates total settlement for foundations and pads designed and constructed as discussed in this section will be approximately 1 inch or less. Additional bearing capacity values along with the associated settlements are presented in Figures #7 and #8.

8) NWCC must be retained by the client to observe the foundation excavations when they are near completion to identify bearing soils and confirm the recommendations in this report, as well as test the structural fill materials for compaction.

Alternate Deep Foundation Recommendations: If the potential differential foundation movement of the foundations is not tolerable, an alternative would be to use a deep foundation system consisting of either helical screw piles or rammed aggregate piers advanced into the natural sands and gravels or bedrock encountered below the existing fill materials and natural clays.

Helical Piles: The helical screw pile foundations will place the bottom of the foundations in a zone of relatively stable moisture content, reduce the risk of foundation movement from the swell-consolidation potential of the clays and eliminate the need for removing these materials from beneath the foundations.

Foundation movement should be less than ½-inch if the following design and construction conditions are observed. The following recommendations have been included for foundation design purposes.

A helical screw pile foundation system should be designed by a qualified engineer, using industry standards and be installed by a licensed/certified installer. If pile groups are required, we recommend a minimum pile spacing of 3 times the largest helix to achieve the maximum capacity of each individual pile. Lateral loads should be resisted using battered piles or tiebacks or through passive soil pressures against foundation walls or grade beams.

We strongly recommend that at least two test piles be advanced at the site and observed by NWCC so that the torque versus depth relationships can be established and the proper shaft and helix size and type can be determined. In addition, load testing of the helical screw piles is strongly recommended to verify the design capacity of the piles. A representative of this office should observe the test piles/load test and helical screw pile installations.

NWCC also recommends the following:

- Minimum 6-inch diameter single helix.
- Minimum pile depth of 6 feet to the upper helix.
- Minimum installation torque of 4,000 ft-lbs.
- Full-time installation observation by a qualified special inspector.
- Review of the Contractor's quality control plan regarding instrumentation calibration and testing, materials QC, and pile installation procedures.

Rammed Aggregate Piers: An alternative foundation would consist of rammed aggregate piers (RAP) with structural slabs, or spread/continuous footings placed over the RAP. The rammed aggregate piers are typically constructed to bridge poor bearing soils, such as the existing fill materials and natural clays encountered at this site, extending down to a suitable bearing layer, such as the underlying natural sands and gravels. A RAP foundation system should develop an end bearing pressure of at least 4,000 psf for aggregate piers founded in the sand and gravels. A RAP foundation system has the advantage of not only supporting shallow foundation elements, but also supporting floor slab areas and improving the engineering characteristics of the existing fill materials and native soils between the piers, thus decreasing the potential for floor slab movement and eliminating the need for structural slabs or structural floors over crawlspaces.

RAP foundation elements are designed as proprietary foundation systems. If a RAP foundation system is selected, NWCC should be contacted to coordinate with the RAP contractor/design team during foundation design.

Foundation Walls and Retaining Structures: Foundation walls and retaining structures, which are laterally supported and can be expected to undergo only a moderate amount of deflection, may be designed for an at-rest lateral earth pressure computed based on an equivalent fluid unit weight of 50 pcf for free draining granular backfill and 70 pcf for on-site soils. For the portion of the tank walls that will be below the groundwater table, an at-rest lateral earth pressure computed based on an equivalent fluid unit weight of 85 pcf for free draining granular backfill and 97 pcf for on-site soils.

Cantilevered retaining structures at the site can be expected to deflect sufficiently to mobilize full active earth pressure condition. Therefore, cantilevered structures may be designed for a lateral earth pressure

computed based on an equivalent fluid unit weight of 35 pcf for imported, free draining granular backfill and 50 pcf for on-site soils. For the portion of the tank walls that will be below the groundwater table, an at-rest lateral earth pressure computed based on an equivalent fluid unit weight of 80 pcf for free draining granular backfill and 90 pcf for on-site soils.

Foundation walls and retaining structures should be designed for appropriate hydrostatic and surcharge pressures such as adjacent buildings, traffic and construction materials. An upward sloping backfill and/or natural slope will also significantly increase earth pressures on foundation walls and retaining structures and the structural engineer should carefully evaluate these additional lateral loads when designing foundation and retaining walls.

Lateral resistance of retaining wall foundations placed on undisturbed natural soils at the site will be a combination of sliding resistance of the footings on the foundation materials and passive pressure against the sides of footings. Sliding friction can be taken as 0.4 times the vertical dead load. Passive pressure against the sides of the footing can be calculated using an equivalent fluid pressure of 250 pcf. Fill placed against the sides of footings to resist lateral loads should be compacted to at least 100% of the maximum standard Proctor density and near the optimum moisture content.

NWCC recommends imported granular soils for backfilling foundation walls and retaining structures because their use results in lower lateral earth pressures. Imported granular materials should be placed to within 2 to 3 feet of the ground surface. Imported granular soils should be free draining and have less than 5 percent passing the No. 200 sieve. Granular soils placed behind foundation and retaining walls should be sloped from the base of the wall at an angle of at least 45 degrees from the vertical. The upper 2 to 3 feet of fill should be a relatively impervious soil or pavement structure to prevent surface water infiltration into the backfill.

Wall backfill should be carefully placed in uniform lifts and compacted to at least 95 percent of the maximum standard Proctor density and near the optimum moisture content. Care should be taken not to overcompact backfill since this could cause excessive lateral pressure on the walls. Some settlement of foundation wall backfill materials will occur even if the backfill materials are placed correctly.

Surface Drainage: Proper surface drainage at this site is of paramount importance for minimizing infiltration of surface drainage into wall backfill and bearing soils, which could result in increased wall pressures, differential foundation and slab movement. The following drainage precautions should be observed during construction and at all times after the structures have been completed:

1) The ground surface surrounding structures should be sloped (minimum of 1.0 inch per foot) to drain away from structures in all directions to a minimum of 10 feet from structures. Ponding must be avoided. If possible, raising top of foundation walls to achieve a better surface grade is advisable.

2) Non-structural backfill placed around structures should be compacted to at least 95% of the maximum standard Proctor density at or near the optimum moisture content in order to minimize future settlement of the fill. Backfill should be placed immediately after the braced foundation walls are able to structurally support the fill. Puddling or sluicing must be avoided.

3) Top 2 to 3 feet of soil placed within 10 feet of foundations should be impervious in nature to minimize infiltration of surface water into wall backfill.

4) Roof downspouts and drains should discharge well beyond the limits of all backfill. Roof overhangs, which project two to three feet beyond foundation walls, should be considered if gutters are not used.

5) Landscaping, which requires excessive watering and lawn sprinkler heads, should be located a minimum of 10 feet from the foundation walls of the structures.

6) Plastic membranes should not be used to cover ground surface adjacent to foundation walls.

Site Grading: General site grading guidelines are provided below for initial planning and design. Our office should review the construction plans as they are being prepared so that we can verify that our recommendations are being properly incorporated into the plans.

1) Temporary cuts for foundation construction should be constructed to OSHA standards for temporary excavations. Permanent, unretained cuts for driveways or building sites should be kept as shallow as possible and should not exceed a 3(Horizontal) to 1(Vertical) configuration for topsoil and organic materials and natural clays. We recommend these cuts be limited to 5 feet in height. The risk of slope instability will be significantly increased if groundwater seepage is encountered in the cuts. NWCC office should be notified immediately to evaluate the site if seepage is encountered, or deeper cuts are planned and determine if additional investigations and/or stabilization measures are warranted.

2) Excavating during periods of low runoff at the site can reduce potential slope instability during excavation. Excavations should not be attempted during the spring or early summer when seasonal runoff and groundwater levels are typically high.

3) Fills up to 10 feet in height can be constructed at the site and should be constructed to a 2(Horizontal) to 1(Vertical) or flatter configuration. The fill areas should be prepared by stripping any existing fill materials and topsoil and organics, scarification and compaction to at least 95% of the maximum standard Proctor density and within 2% of optimum moisture content as determined by ASTM D698. The fills should be properly benched/keyed into the natural hillsides after the natural topsoil and organic materials have been removed. The fill materials should consist of the

on-site soils (exclusive of topsoil, organics or silts) and be uniformly placed and compacted in 6 to 8-inch loose lifts to the minimum density value and moisture content range indicated above.

4) Proper surface drainage features should be provided around all permanent cuts and fills and steep natural slopes to direct surface runoff away from these areas. Cuts, fills and other stripped areas should be protected against erosion by revegetation or other methods. Areas of concentrated drainage should be avoided and may require the use of riprap for erosion control. NWCC recommends that a maximum of 4 inches of topsoil be placed over the new cut and fill slopes. It should be noted that the newly placed topsoil materials may slough/slide off the slopes during the spring runoff seasons until the root zone in the vegetated cover establishes.

5) A qualified engineer experienced in this area should prepare site grading and drainage plans. The contractor must provide a construction sequencing plan for excavation, wall construction and bracing and backfilling for the steeper and more sensitive portions of the site prior to starting the excavations or construction.

Pavement Section Recommendations: Pavement section alternatives presented below are based on anticipated soil conditions, assumed traffic loadings, pavement design procedures presented in the AASHTO Guide for Design of Pavement Structures, and our experience with similar sites and conditions in this part of Routt County. AASHTO pavement design procedures have been adopted and are used by the Colorado Department of Transportation (CDOT). NWCC has assumed the proposed pavement areas will be subjected to automobiles with occasional delivery trucks.

Based on the soil conditions encountered at the site during our investigation and our understanding of the proposed construction, the materials to be encountered at proposed pavement subgrade elevations will most likely consist of clay fill materials. The clay fill materials and natural clays generally classified as CL soils in accordance with the USCS, which is the worst-case scenario. NWCC recommends the pavement areas subjected to both truck and automobile traffic, such as the main roadway be constructed with a minimum of 4 inches of hot mix asphalt (HMA) overlying a minimum of 4 inches of CDOT class 6 aggregate base course (ABC) and a minimum of 8 inches of subbase aggregates (Pit Run). The pavement areas subjected to automobiles only, such as the parking stalls, can be paved with a minimum of 3 inches of HMS, 4 inches of CDOT class 6 aggregate base course (ABC), and a minimum of 6 inches of subbase aggregates (subbase).

NWCC recommends the asphalt pavement material (HMA) consist of an approved “Superpave” mix designed by a qualified, registered engineer. The mix design should be designed using the SX gradation and mixed with PG 58-28 oil or other performance graded asphaltic materials. The mix should be produced and placed by a qualified contractor and should be compacted to between 92 and 96 percent of the maximum theoretical (Rice) density or at least 92 percent of the maximum Rice density. Quality control activities should be conducted on paving materials at the time of placement.

Base course materials (ABC) should consist of a well-graded aggregate base course material that meets CDOT Class 6 ABC grading and durability requirements and the subbase should consist of well-graded aggregate materials that meet CDOT Class 2 ABC grading and durability requirements.

ABC and subbase materials should be uniformly placed and compacted in 4 to 6-inch loose lifts to at least 95 % of the maximum modified Proctor density and within +/- 2 % of the optimum moisture content as determined by ASTM D1557.

NWCC recommends the areas subjected to heavy truck turning movements, such as the pads in front of trash dumpsters, if used, be paved with a rigid pavement section consisting of at least 8 inches of Portland cement concrete (PCC).

Concrete pavement materials shall be based on a mix design established by a qualified engineer. Concrete should have a minimum 28-day compressive strength of 4,500 psi, be air-entrained with approximately 6 percent air, and have a maximum water/cement ratio of 0.42. Concrete should have a maximum slump of 4 inches and should contain control joints no greater than 10 to 12 feet on center, depending on slab configurations. The depth of the control joints should be at least ¼ of the slab thickness.

Prior to placement of any subgrade fill materials the existing clay fill materials should be scarified and recompacted to a depth of 12 inches. The scarified fill materials and subgrade materials should be compacted in 6 to 8 inch lifts to at least 95 % of the maximum standard Proctor density and within +/- 2 % of the optimum moisture content as determined by ASTM D698. The finished subgrade surface, after recompaction, should also be sloped at least 1 percent to avoid ponding and to reduce the potential for wetting and expansion of the subgrade soils. The finished subgrade surface should be proof rolled with a loaded tandem dump truck or loaded water truck and any areas deflecting or rutting should be removed and or stabilized prior to placing the subbase aggregates.

The collection and diversion of surface and subsurface drainage away from the paved areas is extremely important to the satisfactory performance of the pavement. The design of the surface and subsurface drainage features should be carefully considered to remove all water from paved areas and to prevent ponding of water on and adjacent to paved areas.

Limitations: The recommendations provided in this report are based on the soils and bedrock materials encountered at this site and NWCC's assumptions regarding the proposed construction. NWCC believes this information gives a high degree of reliability for anticipating behavior of the proposed structures; however, NWCC's recommendations are professional opinions and cannot control nature, nor can they assure the soils and bedrock profiles beneath those or adjacent to those observed. No warranties expressed or implied are given on the content of this report.

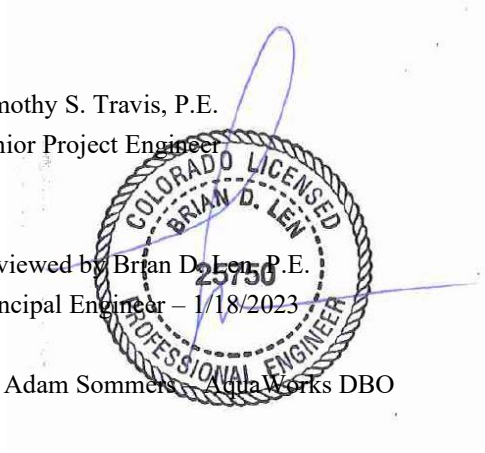
Expansive soils and bedrock materials were encountered at this site. These soils and bedrock materials are stable at their natural moisture content but can shrink or swell with changes in moisture. The behavior of expansive soils and bedrock materials is not fully understood. The swell or consolidation potential of a site can change erratically both in lateral and vertical extent. Moisture changes also occur erratically, resulting

in conditions, which cannot always be predicted. Recommendations presented in this report are based on the current state of the art for foundations and floor slabs on swelling soils and bedrock materials. As noted previously, the owner must be made aware there is a risk in construction on these types of soils and bedrock materials. Performance of the structures will depend on following the recommendations and in proper maintenance after construction is complete. As water is the main cause for volume change in the soils, it is necessary that the changes in moisture content be kept to a minimum. This requires judicious irrigation and providing positive surface drainage away from the structures. Any distress noted in the structures should be brought to the attention of NWCC.

This report is based on the investigation at the described site and on specific anticipated construction as stated herein. If either of these conditions is changed, the results would also most likely change. Therefore, NWCC strongly recommends that our firm be contacted prior to finalizing the construction plans so that we can verify our recommendations are being properly incorporated into the construction plans. Man-made or natural changes in the conditions of a property can also occur over time. In addition, changes in requirements due to state-of-the-art knowledge and/or legislation do from time to time occur. As a result, the findings of this report may become invalid due to these changes. Therefore, this report is subject to review and not considered valid after a period of 3 years or if conditions as stated above are altered. It is the responsibility of the owner or his representative to ensure that the information in this report is incorporated into the plans and/or specifications and construction of the project. It is advisable that a contractor familiar with construction details typically used to dealing with the local subsurface and climatic conditions be retained to build the structure.

If you have any questions regarding this report or if NWCC may be of further service, please do not hesitate to contact us.

Sincerely,
NWCC, INC.



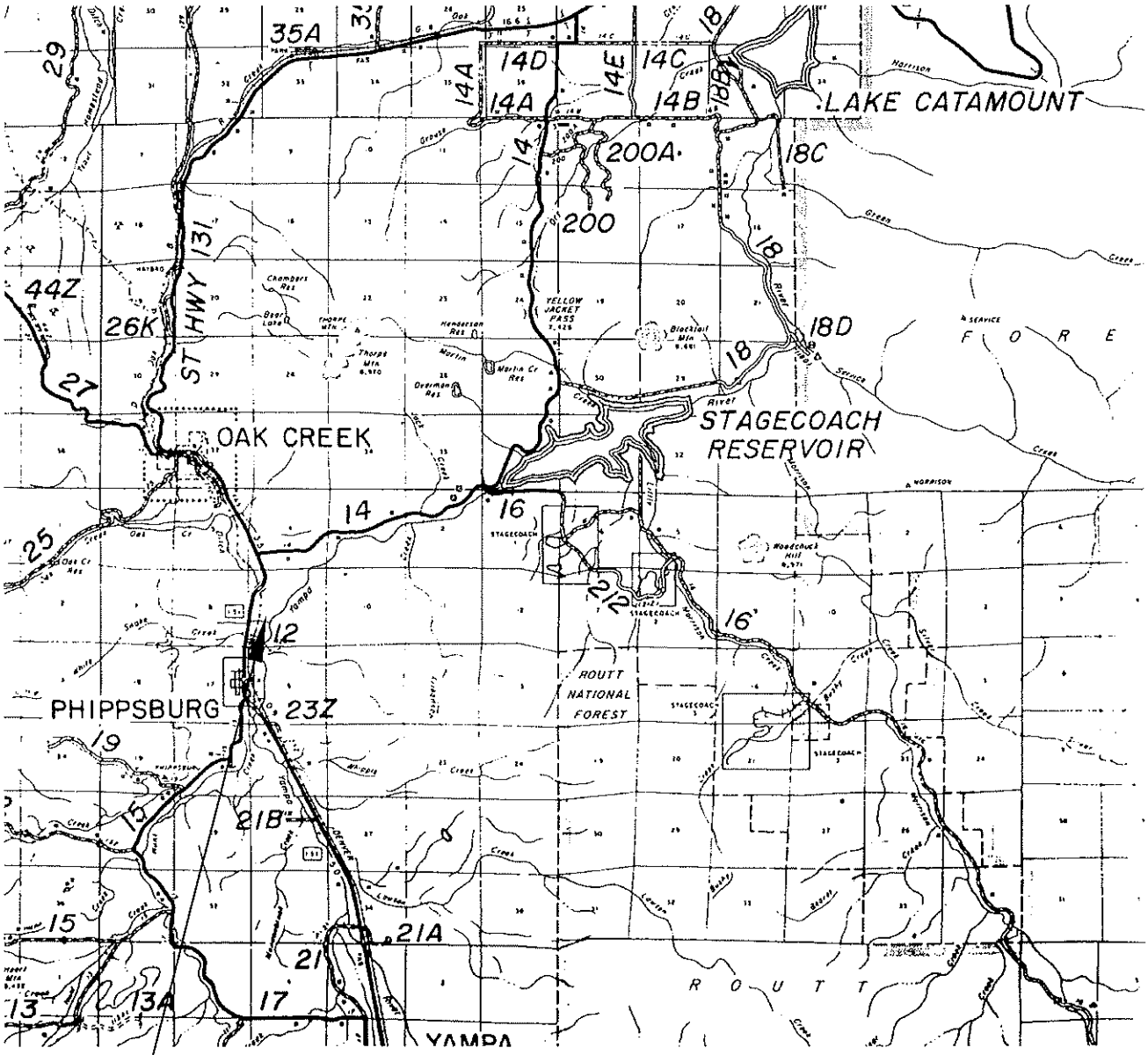
Timothy S. Travis, P.E.
Senior Project Engineer

Reviewed by Brian D. Len, P.E.
Principal Engineer – 1/18/2023

cc: Adam Sommers – AquaWorks DBO

N

NOT TO SCALE



Title: VICINITY MAP		**Date:** 1/16/2023
Job Name: Proposed Wastewater Treatment Building		**Job No.** 22-12813
Location: Town of Phippsburg WWTF, Routt County, CO		**Figure** #1

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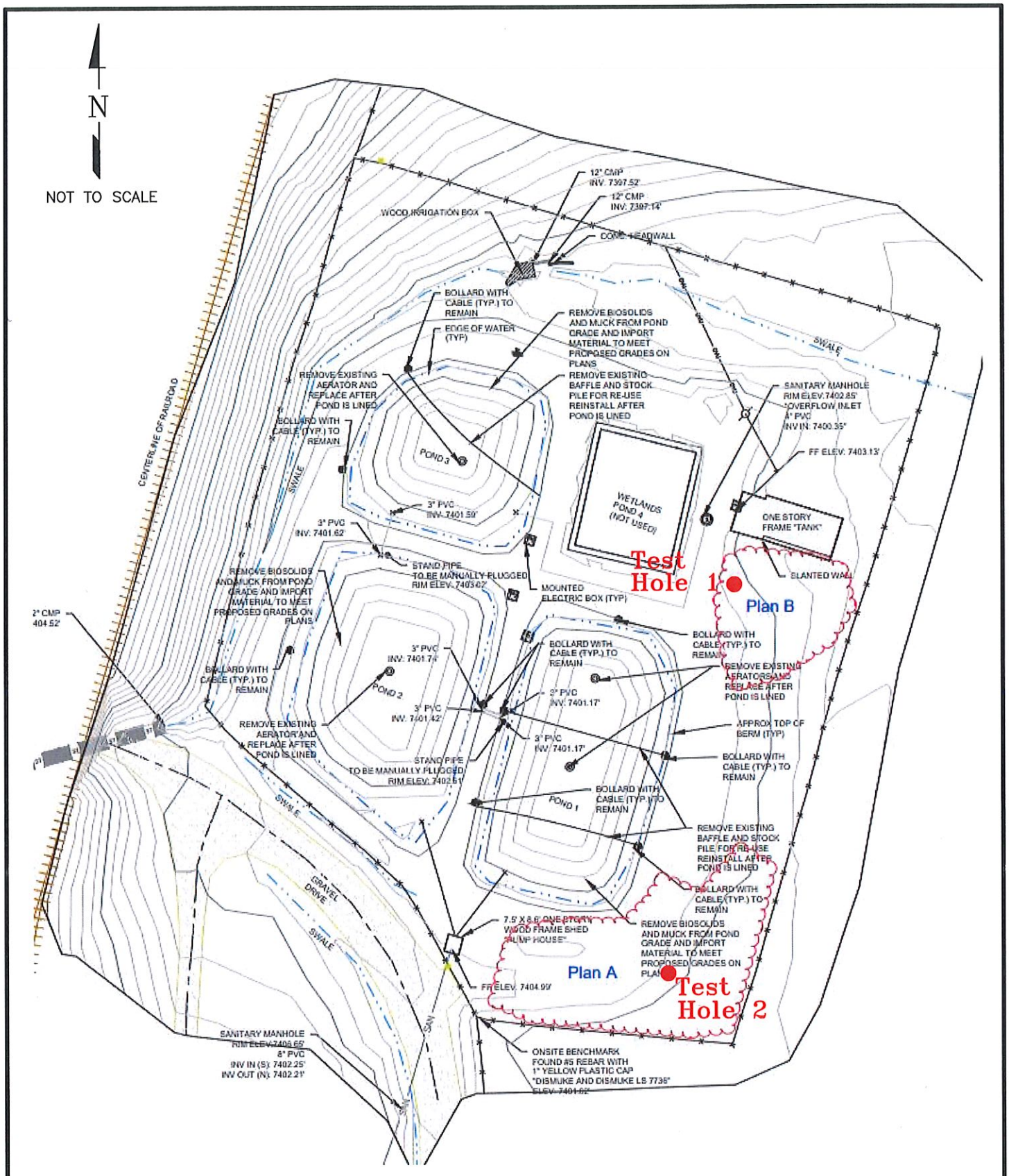
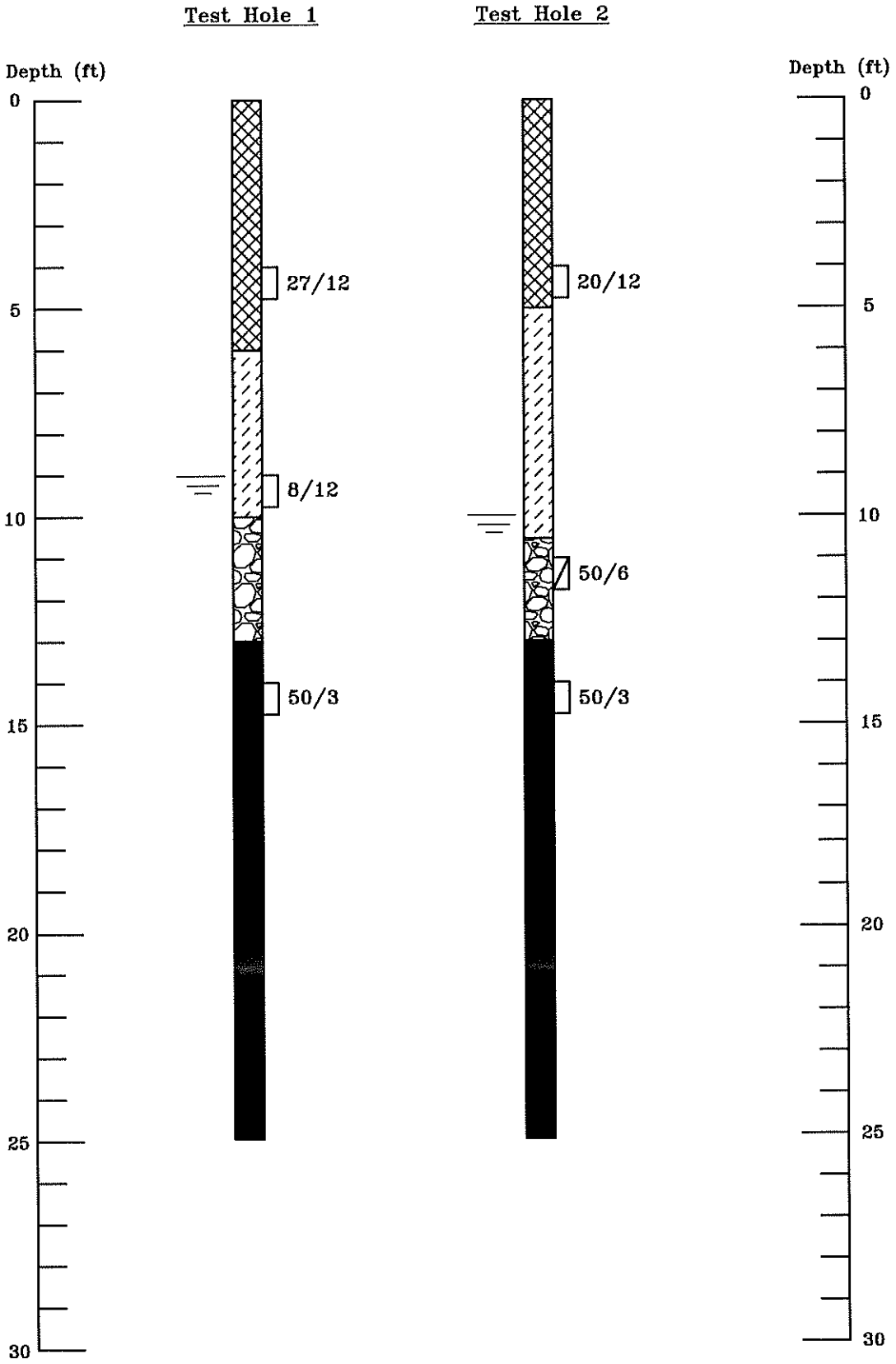


Title: SITE PLAN–LOCATION OF TEST HOLES		**Date:** 1/16/2023	NWCC North West Colorado Consultants, Inc. Geotechnical / Environmental Engineering - Materials Testing
Job Name: Proposed Wastewater Treatment Building		**Job No.** 22-12813	(970)879-7888 Fax (970)879-7891 2580 Copper Ridge Drive Steamboat Springs, Colorado 80487
Location: Town of Phippsburg WWTF, Routt County, CO		**Figure** #2	



Title: LOGS OF EXPLORATORY TEST HOLES		Date: 1/16/2023	NWCC North West Colorado Consultants, Inc. Geotechnical / Environmental Engineering - Materials Testing (970)879-7668 Fax (970)879-7891 2580 Copper Ridge Drive Steamboat Springs, Colorado 80487
Job Name: Proposed Wastewater Treatment Building		Job No. 22-12813	
Location: Town of Phippsburg WWTF, Routt County, CO		Figure #3	

LEGEND:

FILL: Clays with sand and gravel lenses, fine to coarse grained, low to moderately plastic, soft to medium stiff, moist to very moist and brown to dark brown in color.

CLAY: Sandy to very sandy, low to moderatley plastic, soft to medium stiff, moist to wet and brown to gray in color.

SAND AND GRAVEL: Silty to slightly silty, fine to grained with occasional cobbles, very low to non-plastic, dense, very moist to wet and brown to gray in color.

CLAYSTONE-SHALE BEDROCK: Slightly sandy, fine-grained, low to moderately plastic, hard to very hard, moist and gray to dark gray in color.

Drive Sample, 2-inch I.D. California Liner Sampler.

Drive Sample, 1 3/8-inch I.D. Split Spoon Sampler.

27/12 Drive Sample Blow Count, indicates 27 blows of a 140-pound hammer falling 30 inches were required to drive the sampler 12 inches.

Indicates depth at which groundwater was encountered at the time of drilling.

NOTES:

1) The test holes were drilled on October 11, 2022 with a truck-mounted drill rig using 4-inch diameter continuous flight power augers.

2) Locations of the test holes were determined in the field by pacing from topographic features at the site.

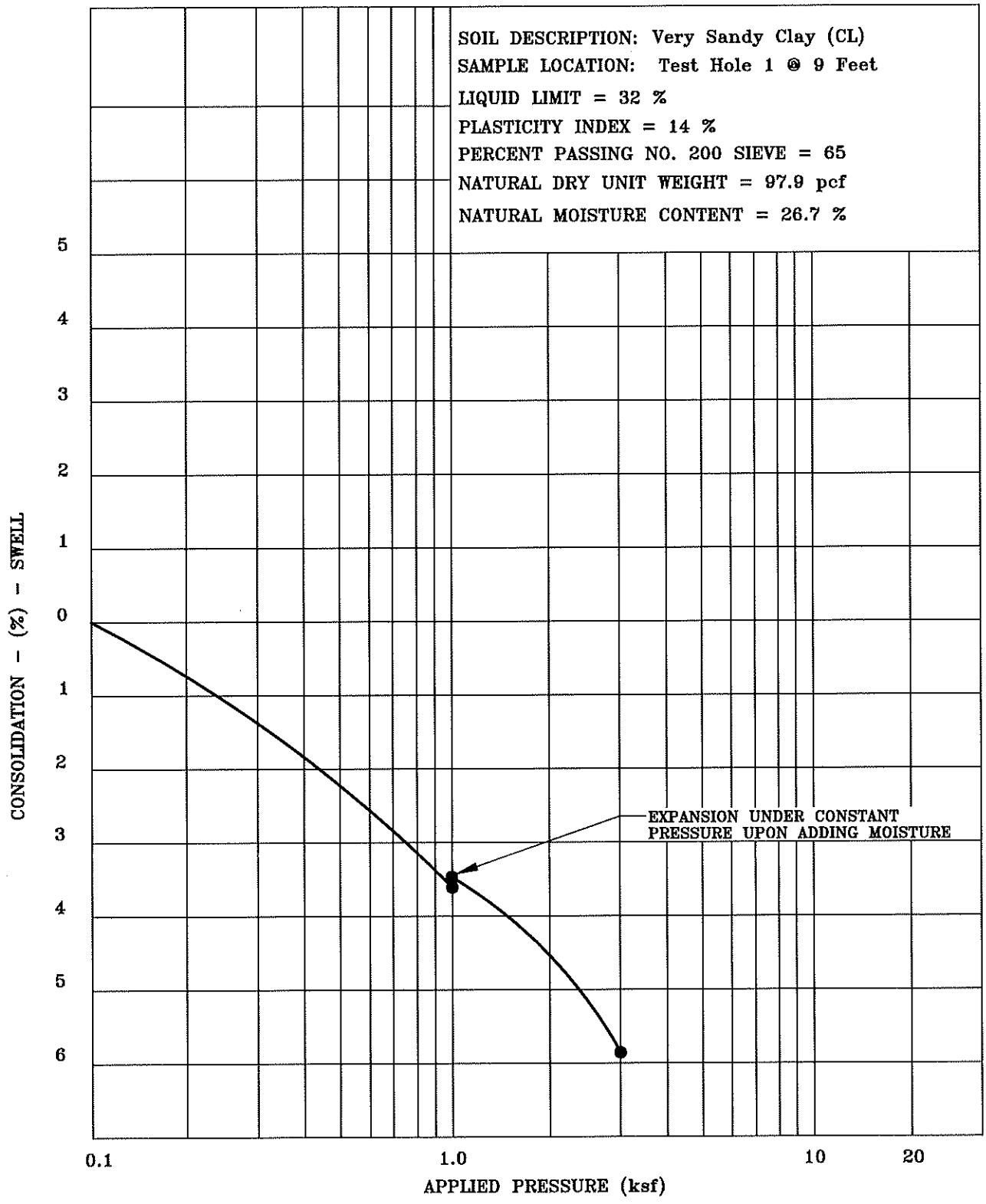
3) Elevations of the test holes were not measured and logs are drawn to the depths investigated.

4) The lines between materials shown on the logs represent the approximate boundaries between material types and transitions may be gradual.

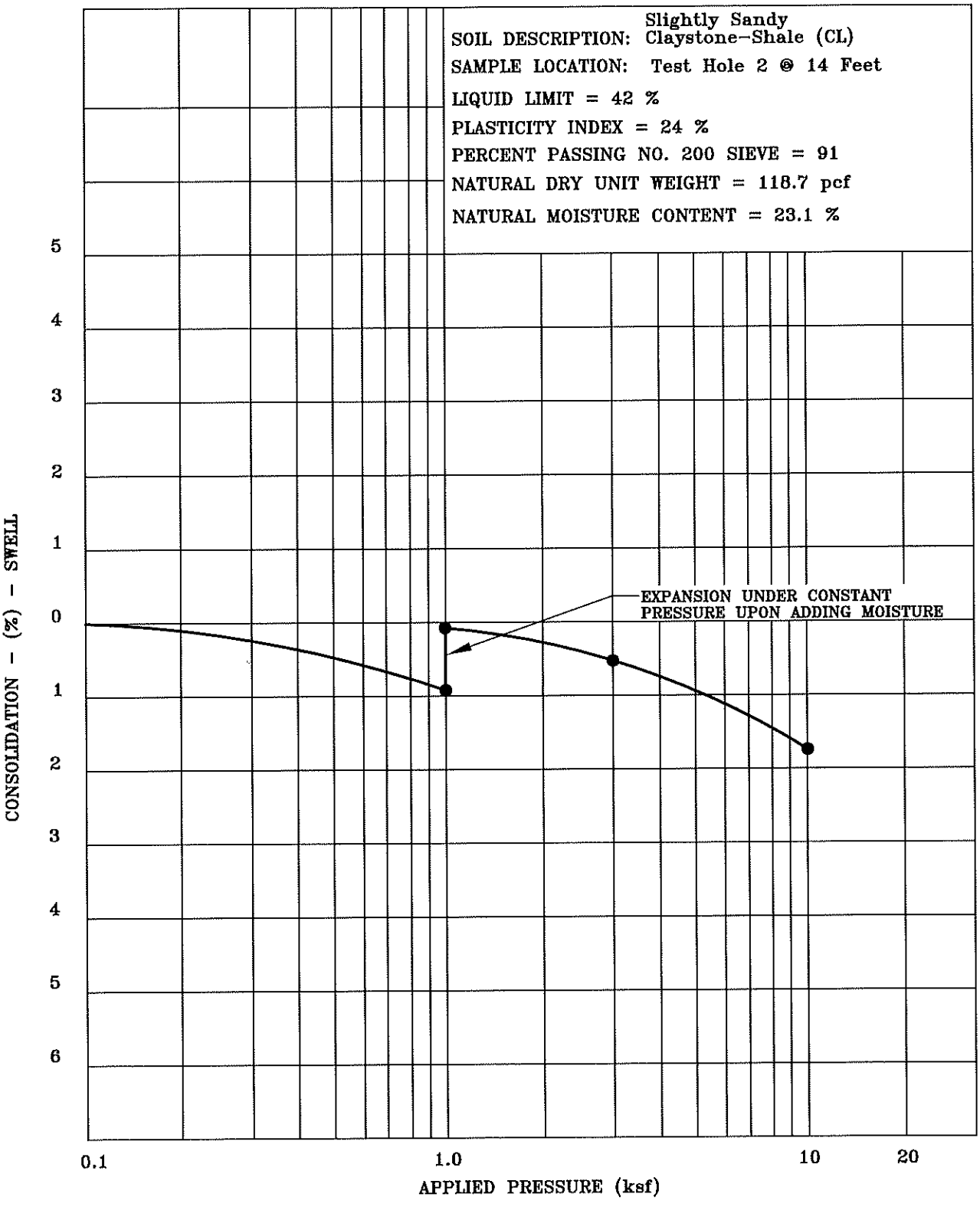
5) The water level readings shown on the logs were made at the time and under the conditions indicated. Fluctuations in the water levels will probably occur with time.

Title: LEGEND AND NOTES	Date: 1/16/2023	NWCC Northwest Colorado Consultants, Inc. Geotechnical / Environmental Engineering - Materials Testing
Job Name: Proposed Wastewater Treatment Building	Job No. 22-12813	(970)879-7888 · Fax (970)879-7891 2580 Copper Ridge Drive Steamboat Springs, Colorado 80487
Location: Town of Phippsburg WWTF, Routt County, CO	Figure #4	

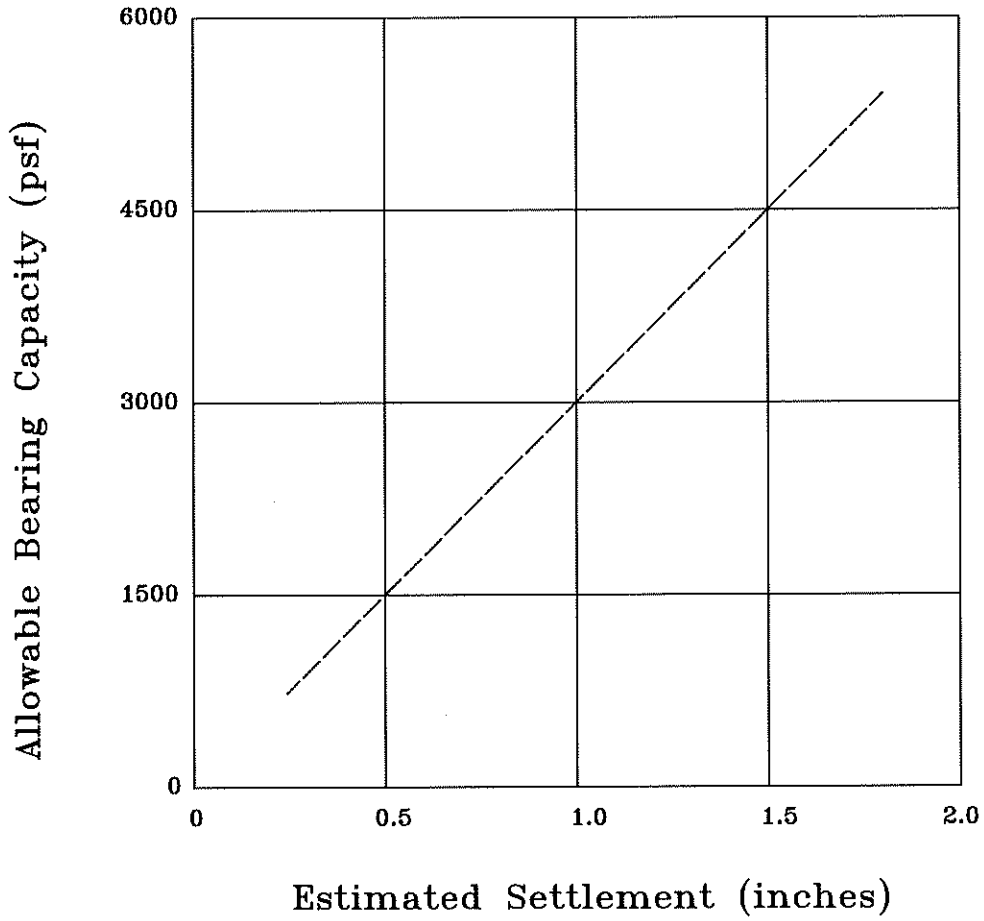
SOIL DESCRIPTION: Very Sandy Clay (CL)
SAMPLE LOCATION: Test Hole 1 @ 9 Feet
LIQUID LIMIT = 32 %
PLASTICITY INDEX = 14 %
PERCENT PASSING NO. 200 SIEVE = 65
NATURAL DRY UNIT WEIGHT = 97.9 pcf
NATURAL MOISTURE CONTENT = 26.7 %



Title: SWELL-CONSOLIDATION TEST RESULTS		Date: 1/16/2023	NWCC Northwest Colorado Consultants, Inc. Geotechnical / Environmental Engineering - Materials Testing (970)879-7688 Fax (970)879-7691 2580 Copper Ridge Drive Steamboat Springs, Colorado 80487
Job Name: Proposed Wastewater Treatment Building		Job No. 22-12813	
Location: Town of Phippsburg WWTF, Routt County, CO		Figure #5	



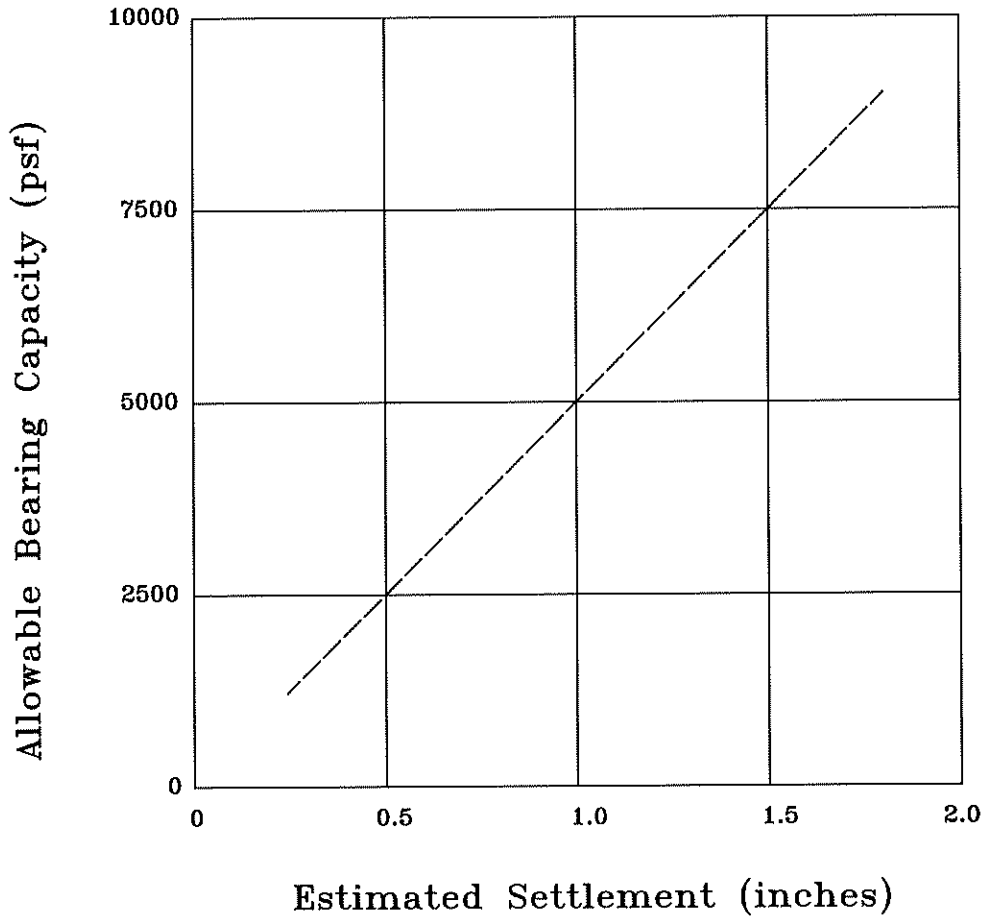
Title: SWELL-CONSOLIDATION TEST RESULTS		Date: 1/16/2023	NWCC North West Colorado Consultants, Inc. Geotechnical / Environmental Engineering - Materials Testing (970)879-7688 - Fax (970)879-7691 2560 Copper Ridge Drive Steamboat Springs, Colorado 80487
Job Name: Proposed Wastewater Treatment Building		Job No. 22-12813	
Location: Town of Phippsburg WWTF, Routt County, CO		Figure #6	



Note: These values are based on footing widths of 1 to 4 feet. If the footing width is to be greater than 4 feet in width, then we should be notified to re-evaluate these recommendations.

Title: BEARING CAPACITY CHART–SANDS & GRAVELS		Date: 12/20/23
Job Name: Proposed Wastewater Treatment Building		Job No. 22-12813
Location: Town of Phippsburg WWTF, Routt County, CO		Figure #7

NWCC
Northwest Colorado Consultants, Inc.
Geotechnical / Environmental Engineering / Materials Testing
(970)879-7888 · Fax (970)879-7891
2580 Copper Ridge Drive
Steamboat Springs, Colorado 80487



Note: These values are based on footing widths of 1 to 4 feet. If the footing width is to be greater than 4 feet in width, then we should be notified to re-evaluate these recommendations.

Title: BEARING CAPACITY CHART–BEDROCK	Date: 1/16/2023	NWCC North West Colorado Consultants, Inc. Geotechnical / Environmental Engineering - Materials Testing
Job Name: Proposed Wastewater Treatment Building	Job No. 22–12813	(970)879-7888 · Fax (970)879-7891 2580 Copper Ridge Drive Steamboat Springs, Colorado 80487
Location: Town of Phippsburg WWTF, Routt County, CO	Figure #8	

NWCC, Inc.

TABLE 1

SUMMARY OF LABORATORY TEST RESULTS

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (pcf)	ATTERBERG LIMITS		GRADATION		PERCENT PASSING No. 200 SIEVE	UNCONFINED COMPRESSIVE STRENGTH (psf)	SOIL or BEDROCK DESCRIPTION	UNIFIED SOIL CLASS.
TEST HOLE	DEPTH (feet)			LIQUID LIMIT (%)	PLASTICITY INDEX (%)	GRAVEL (%)	SAND (%)				
1	4	21.7	96.4	37	16	13	20	67		Fill–Gravelly, Sandy Clay	CL
1	9	26.7	97.9	32	14	0	35	65		Very Sandy Clay	CL
2	11	10.7		nv	np	47	46	7		Slightly Silty, Sands and Gravels	SP–GP
2	14	23.1	118.7	42	24	0	9	91		Slightly Sandy Claystone–Shale	CL

JOB NUMBER: 22–12813