Inadvertent Release Contingency Plan

NCHP Pipeline Replacement - University City of Columbus and Upper Arlington, Ohio

Campos EPC Project Number: 00026.0000.0071

Date: October 8, 2024

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1. Project Background

1.1 Project Description

The overall project consists of a single HDD crossing of a wetland on Ohio State University's forested property, in the City of Columbus, Ohio. The HDD will be installed on the northern edge of the Ohio State University property. The installation is proposed to be approximately 1800' feet of 20-inch steel pipe to replace the existing line.

1.2 Environmentally Sensitive Resources

The HDD will go under a small wetland that is classified as PEM. The wetland is situated over the top the pipeline's installation route. Potential inadvertent returns from the drilling phase of this project could have an impact on this wetland.

1.3 Environmental Inspection

While drilling or during any activities that may impact the wetland resource, NiSource requires that an experienced Environmental Inspector be present on-site to monitor activities.

1.4 Drilling Mud

One of the primary components of HDD installation is the drilling mud. Drilling fluids vary, but generally consist of a base mixture of water and Wyoming bentonite products. This mixture is referred to as "mud" or "drilling fluid" and can contain many additional additives.
The drilling mud enters the borehole through the drill bit and circulates back to either the entry or exit pit through the borehole. The primary function of the drilling fluid in an HDD are:

- ***Hydraulic excavation*** – when drilling mud leaves the bit at a high velocity it can excavate soil by erosion
- ***Transmission of hydraulic power*** – in rock, a mud motor is used and the drilling fluids transmit energy downhole to turn the mud motor and cut rock
- Transportation of soil and cuttings to the surface
- Cleaning and cooling drill bits and reamers
- Reduction of friction
- Borehole stabilization

As mentioned, drilling fluids primarily consist of water and bentonite clay. Bentonite clay is predominantly comprised of montmorillonite which is not listed as a hazardous material/substance as defined by U.S. Environmental Protection Agency's (USEPA) Emergency Planning and Community Right-to-know Act (EPCRA) or Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) regulatory criteria. If the product becomes a waste, it does not meet the criteria of a hazardous waste, as defined by the USEPA. Bentonite is non-toxic and commonly used in farming practices but has the potential to impact aquatic habitats and wildlife if discharged to waterways in significant quantities due to increases in localized turbidity.

The contractor may elect to use additives in their drilling mud to adjust the behavior and properties of the mud. Additives are supplementary to this mixture and often have more specialized properties for keeping positive balance within the bore. This balance is dictated by and tailored to the prevailing geology and the tooling used to perform the HDD.

It is imperative that the Material Safety Data Sheets for all additives provided to NiSource and the project team for pre-approval. If the Contractor intends to use a product that has not been pre-approved by NiSource and the project team, then the Contractor should submit the required documentation and wait for approval prior to using the product.

When conditions change within the geology or the mud, mud is not maintained, or pressures are not monitored and maintained, a loss in circulation may occur, and drilling fluid can be released. This drilling fluid may be released to the formation or may inadvertently return to the surface.

It is recommended that the contractor provide the MSDS's for all bentonite/additives (including polymers and surfactants) that will be used or may be used for the duration of the drill.

1.5 Plan Objectives

Numerous steps should be taken in the prevention, monitoring, and reacting to of inadvertent returns. Campos EPC has laid out the following guidelines or recommendations to avoid the inadvertent releases of drilling fluid whilst drilling. This plan should be reviewed by the contractor prior to the beginning of installation and proposed modifications should be discussed by the project team.

1.6 Disposal Considerations

Excess drilling fluids and drill cuttings will need to be managed throughout the construction efforts. The excess fluids and cutting should be disposed of offsite at an approved disposal facility.

2. Inadvertent Release Mitigation Efforts

2.1 Geotechnical Exploration

A geotechnical exploration program was undertaken, consisting of thirteen (13) borings along the proposed alignment to evaluate the subsurface soil and rock conditions. A geophysical investigation was also employed to check for the presence of Karst features and delineate boundaries of harder and softer subsurface material.

2.2 Bore Path Design

The bore path design was developed referencing the geology identified in the geotechnical and geophysical analyses, and in consideration of the risks of an inadvertent release during installation. Typically, the greater soil/rock cover the lower the risk of having an inadvertent drilling fluid release. With these factors in mind, an adequate depth of cover was chosen for the design to minimize the potential for inadvertent drilling release.

2.3 Hydrofracture Analysis

Hydrofracture occurs when the pressure of the drilling fluids in the bore hole exceeds the strength of the surrounding soils. The excess pressures fracture the soil around the bore hole and allow the fluids to escape the bore hole. A hydraulic fracture analysis was performed to evaluate the allowable drilling fluid pressures and how they compare to the anticipated fluid pressures during construction. The results of this analysis were utilized in the development of the designed HDD plan and profile.

2.4 Site Preparation Efforts

The contractor is responsible for preparing the site prior to beginning any drilling, as well as maintaining the site during drilling. Preparation should follow environmental best management practices and consist of some number of thought out and well-placed environmental control devices. Upon arrival, the contractor will walk and evaluate HDD entry and exit, and general centerline to determine which areas have increased potential for inadvertent return. Some of these areas may be locations where water pools naturally, waterways, wetlands, areas of lower depth of cover, areas with transitions, areas that on the surface are loaded with cobbles and boulders, etc. This walk allows the contractor to not only identify areas, but know which areas should be monitored more closely, and evaluate readiness for managing an IR should it occur in any area, regardless of difficulty reaching it. Within workspaces, containments should be set up around stationary equipment and ECDs/ECMs (erosion control measures) should be installed downslope of potential areas of immediate impact.

While Campos EPC respects the means and methods of contractors, recommendations of ECDs/ECMs/precautionary equipment may include the following:

1. Storm drain inlets will be secured by silt sock (securing may be by sandbag)
2. Numerous rolls of vis-queen
3. Silt fence placed and dug-in downslope of heavy equipment or workspaces.
4. Containment areas, consisting of self-standing enviro-basin, or polyethylene sheeting that can be rolled over straw wattles or four-by-four boards to create a barrier.
5. Spill kits, to deal with other than drilling fluid releases
6. IR kit, which may contain haybales, trash-bags, additional silt socks, additional silt fence, stakes, stake mallet, etc.
7. It is recommended that these materials be readily available in quantity to replace existing materials or respond to IRs.

3. Inadvertent Release Monitoring Plan

This section of the plan addresses monitoring approaches for early detection and mitigation when high risk circumstances present themselves onsite.

During drilling operations, the contractor will maintain the drilling fluid monitoring equipment onsite, and have personnel who are proficient in their use, having knowledge and experience pertinent to drilling fluid. As such, the personnel should be able to perform the following activities, with ease, or in order to evaluate the fluid properties and make adjustments to improve stability, increase cutting return, and reduce risk of IR:

1. Communicate directly with the driller at the driller's console/chair to receive reports of annular pressure, mud-motor stalls, and changing conditions that can only be immediately felt by the driller.
2. Maintain fluids in the mud tank, check levels, charge pressure, and measure the rate of depletion in relation to the progression of new-bore.
3. Monitor the condition of drill mud at least three times a day, and once for every observed change in material:
    a. Take mud weight with approved mud test kit and include units in notes
    b. Take viscosity with marsh funnel and accurate durational measurement
    c. Take sand content measurement by the book to monitor content of superfines that slip through filtration. If the sand content gets too high, disposal and remixture should be considered.
    d. Take PH measurements to ensure that the platelet content of the drill mud stays high (platelets are the armor that coats the bore-wall in permeable conditions and often help prevent seep progression leading to IR, acidic conditions destroy the ability for drill mud to form platelets and lowers the viscosity)
4. Recommend which surfactants/polymers (such as clay cutters (for balling), stabilizers, etc.) or natural remedies (ex. sawdust) should be used and recognize when deployment is necessary (surfactants and polymers are extremely potent, as in 1 quart can equal 50 bags of bentonite, product knowledge is critical)
5. Monitor the return pit for solids content accumulation as it relates to proper suspension and carrying. A pit that is full of dense cuttings, not being reclaimed by the mud reclaiming pump may indicate that the same situation is present in the bore, thus leading to an eventual build-up of down-hole material, which may cause annular pressure spikes and rises.
6. A competent person should visually inspect the bore path at the completion of each joint and inspect 100 feet upstream and downstream and if possible, laterally, along alignment.
7. Ensure with the driller that annular pressures do not exceed calculated predicted pressure for hydraulic fracturing and that spikes are noted, and steps taken to mitigate or reverse the rise in pressure. Steps can include tripping while rotating pipe, inspecting the degree of balling on tooling if it is suspected to be occurring, doing a bottoms-up (this is the circulation of mud equating to the entire current bore volume).

8. Inspect waterways and sites previously identified during the site work as areas of concern. When inspecting waterways, look for tan, brown to gray levels of turbidity that stand out and are joining the flow of water. Often, in slower waters, an IR will look like a cloud.
9. Contain all drilling fluids and cuttings for proper disposal at an approved facility and note the volume of cuttings in the spoils pit as it relates to drilled volume. The cutting volume should be within reasonable proximity of the drilled volume.
10. If possible, a vacuum truck with sufficient hoses to reach all areas along the bore alignment will be staged prior to and during drilling activities. If a vacuum truck cannot be staged onsite, the truck will be readily available. An interim pump will be onsite to reach low areas and aid the vacuum truck. It is recommended that this resource be capable of departing and arriving onsite within one hour.

4. Inadvertent Release Contingency Plan

This section of the plan lays out the response if an inadvertent release were to occur.

4.1 Materials

The drilling contractor shall have the necessary fluid containment and clean-up provisions onsite and readily available at all times during drilling operations. Examples of materials that should be kept onsite include:

- Brooms, squeegees, and shovels
- Disposal bags and ties
- Vac trucks
- Spill kits
- Straw bales (weed and invasive free)
- Compost filter sock (12-inch diameter minimum)
- Weighted sediment tube
- Wooden stakes and mallet
- Sand bags
- Silt fence
- Plastic sheeting
- Trash pumps
- Turbidity curtain

The contractor should include a list of proposed inadvertent release response materials in their work plan for review by the project team. Quantities of one-time-use materials may need to be replenished if they are utilized during the course of work.

4.2 Loss of Fluid Returns to Entry Pit

A loss of fluid returns to the entry pit is often the first sign of an inadvertent fluid release. Therefore, if a loss of fluid returns to the entry pit is observed, care should be taken to evaluate the next steps forward.

Should a loss or significant reduction of returns to the entry pit be observed during drilling operations, it is recommended that the following steps be taken:

1. Stop drilling/pumping fluids as soon as a loss of returns is observed.
2. Walk the alignment to see if fluid has returned to the ground surface.
3. Restart mud pumps and trip rods back several joints until returns are re-established.
4. Re-drill the hole while advancing the drill bit paying close attention that fluid returns are maintained.

If this procedure does not re-establish returns, alternative approaches such as a complete trip out or enlarging the borehole may be considered.

4.3 Fluid Release Response

In the event of an inadvertent drilling fluid release, the following procedures can be implemented to contain, minimize, and potentially stop the inadvertent return of drilling fluids:

1. Immediately and simultaneously kill charge pump and back trip (bottom-hole assembly) a full joint length off bottom (bore-face)
2. Get on location and characterize IR. Document location and proximity to centerline, size (volume), breadth, drilling conditions when IR occurred (hard/soft, rock/gravel, mud data, pressure data (over the last several joints) etc.), document setting (high grass, trees, marsh, waterway), and take pictures
3. Notify individuals whose contact information is listed below, and all appropriate personnel to include EI if onsite (environmental inspector).
4. Next check the return pit. This will be entry pit during pilot, but during ream can also be exit pit. Ensure that volume was as it was before IR. Next check mud recycler and ask when the mud tank was last topped off. Proceed by conveying with driller and move to inspect the remainder of the right-of-way/centerline vicinity (generously).
5. Make the best possible concise statement with the available information of fluid released and fluid lost (ex. T:1530, BHA at release STA 1000 + 75, Release at STA 1000 + 50 / 20 R off centerline, approx. 500 gal released, approx. 1,000 gal lost to shale formation, gravelly/discolored cuttings in returns, release amongst the pines and high-grass and accessible). Do NOT repeat hearsay.
6. Determine potential threats to the health and safety of workers by initiating cleanup and determine potential threats to the environment.
7. If environmental impacts are observed, remove and/or contain material to minimize affected area while minimizing disturbance to the area.
8. Consider countermeasure contingency simultaneously with consideration for what measures are necessary to monitor and control the potential continued release.
9. Once controls are in place, before resuming, allow formation to rest.
10. Once resuming or deploying LCM (loss circulation material), exercise extreme caution on flow rate and pressure. Check IR activity/dormancy in real-time, and returns, in real-time.
11. Consider other measures such as tripping all the way out or installing a burp-hole to relieve overhead pressure within the bore (ex. bore is 5′ below grade in entry pit, lengthen pit so bore begins 10′ below grade, ex. dig pit where bore is 10′ lower than at entry and lower reclaiming pump to 7′ and pump reclaimed mud to recycler from newly created burp-hole), if tripping all the way out note clay that may be clinging to tooling, take pictures, communicate with mud-engineer.
12. If in the water, consider the use of a containment structure, such as a piece of pile that can be placed over the IR and secured/driven, place pump etc.
13. Inspect all IRs in the presence of all involved parties.
14. Request environmental monitors onsite if needed to ensure environmental requirements are met.

4.4 Notification Contact Information

The following individuals shall be immediately notified in the event of an inadvertent release being observed at the ground surface or within the river.

Name	Agency	Title	Phone No.
Scott Brown	N/A	NiSource Environmental Coordinator	412-676-0329

ATTACHMENTS

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INNOVATIVE IDEAS
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FINAL REPORT
OF
SUBSURFACE EXPLORATION

NCHP Pipeline Project – Central Columbus

Franklin County, Ohio

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DLZ Job No. 2221-3009.00

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EXECUTIVE SUMMARY

This report includes the findings of the subsurface exploration performed for the proposed steel gas pipeline improvements in the greater City of Columbus, Ohio area. The proposed improvements will include the construction of approximately 3.9 miles of new 20-inch and 24-inch steel gas pipeline along a corridor within the City of Columbus and unincorporated Franklin County. The purpose of the subsurface exploration was to 1) determine the subsurface conditions to the depths of the borings, 2) evaluate the engineering characteristics of the subsurface materials, and 3) provide recommendations for the proposed improvements and design using the results of the subsurface exploration.

The subsurface conditions were to be determined by performing a total of eighteen borings, designated as NC-101 to NC-112, NHS-1, NHS-2, CR-1, CR-2, CA-1, and CA-2, for the project. Boring NHS-1 was removed from the boring program due to utility conflicts. Soil and bedrock samples were obtained for visual classification.

The borings generally encountered 1 to 5.5 inches of asphalt concrete at the ground surface except boring NC-110 where 6 inches of gravel was encounter. Beneath the asphalt concrete, borings NC-102, NC-103, and NHS-2 encountered 3 to 4 inches of brick and boring NC-109 approximately 3 inches of aggregate base. Beneath these surface materials, several borings encountered fill or possible fill consisting of loose to medium dense granular soils (SM, SC-SM) and stiff to hard cohesive soils (CL). Underlying the fill, possible fill or surface materials, the borings generally encountered stiff to hard lean clay (CL) and silty clay (CL-ML). These soils were encountered to the boring completion depths except in borings NC-101, 102, 103, and NHS-2, where weathered to decomposed shale was encountered at depths of between 4.0 and 5.5 feet below the ground surface. Where encountered, the shale was splitspoon sampled to the boring completion depths. Fat clay was encountered in boring NC-102 at depths of between 4 and 5.5 feet. Dense silt was encountered in boring NC-105 in the last splitspoon sample at depths of between 8.5 and 10 feet and medium dense to dense silt was encountered in boring CR-1 at depths of between 5.5 and 8.5 feet. A 1.5-foot layer of loose sand was encountered in boring NC-101 at depths of between 4.0 and 5.5 feet.

Boring CA-1 encountered occasional rig chatter between the depths of 10.0 and 17.0 feet, an indication of potential cobbles or boulders.

Groundwater seepage was first encountered in borings NC-103, NC-106, NC-112, and NHS-2 at depths of 4.0, 8.5, 8.5, and 18.5 feet below the ground surface, respectively. The remaining borings did not encounter groundwater seepage during drilling. At the completion of drilling, borings NC-105, NC-106, NC-108, and NHS-2 encountered measurable groundwater levels at 7.6, 9.6, 7.2, and 22.8 feet, respectively.

Open cut excavation methods are anticipated to be primary installation method for the proposed gas pipeline, however, three bore and jack crossings are planned. The proposed gas pipeline will generally be 5 feet below the existing ground surface within the open excavation portions of the alignment and up to 9.0 to 12.8 feet below the existing ground surface in the bore and jack sections.

Open Excavation

Based on the boring information, stiff to hard clays with isolated areas of loose to medium dense sands are anticipated to be encountered underlying the surface materials to the invert elevations, though from the western terminus of the pipeline to approximately Summit Street, weathered shale should be anticipated in the excavation. Given the present scope of work for the project, the clay soils and weathered shale should be capable of providing adequate bearing support for the proposed pipeline. We recommend that bedding material and backfilling procedures be in accordance with the ODOT CMS or the City's requirements to ensure suitable support for the proposed work.

Bore and Jack

It is understood that the anticipated invert of the proposed North High Street crossing will be approximately 9 feet below the ground surface. The subsurface conditions encountered in boring NHS-1 were very stiff to hard cohesive soils overlying weathered shale at depths of between 4 and 5.5 feet. Consequently, the proposed pipeline will include pits installed in very stiff to hard cohesive soils and weathered shale, and the pipe will be bored in weathered bedrock. Groundwater seepage was first encountered between depths of 15.0 and 18.5 feet in boring NHS-2.

The anticipated invert of the Norfolk Southern Railroad crossing (borings CR-1 and CR-2) and Cleveland Avenue crossing (borings CA-1 and CA-2) will be at depths of 11.2 and 12.8 feet below the ground surface, respectively. The borings encounter primarily stiff to hard cohesive soils to the completion depth of the borings except that boring CR-1 encountered loose to medium dense sandy fill and medium dense to dense silt between the existing ground surface and the depth of 8.5 feet. Consequently, the pits and boring alignment will be installed primarily in stiff to hard cohesive soils. Groundwater seepage was not encountered in the borings drilled at either of the crossing locations, however, isolated pockets or seams of seepage could be encountered.

Contractors should also be prepared to deal with any seepage intercepted from buried trenches, groundwater, or water from precipitation which enters the excavations.

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1.0 INTRODUCTION AND PROJECT DESCRIPTION

This report includes the findings of the subsurface exploration performed for the proposed steel gas pipeline improvements in the greater City of Columbus, Ohio area. The proposed improvements will include the construction of approximately 3.9 miles of new 20-inch and 24-inch steel gas pipeline along a corridor within the City of Columbus and unincorporated Franklin County.

The purpose of this exploration was to 1) determine the subsurface conditions to the depths of the borings, 2) evaluate the engineering characteristics of the subsurface materials, and 3) provide recommendations for the proposed improvements and design using the results of the surface exploration.

DLZ has performed the exploration in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are made as to the professional advice included in this report.

2.0 GEOLOGY AND OBSERVATIONS OF THE PROJECT

The site is located in the Columbus Lowland physiographic region in the Central Lowland province. The overburden is predominantly glacial till soils of Wisconsinan age. In general, soil materials are clayey and silty in nature with limited amounts of granular soils. Occasional thin lenses of sand and gravel are present within the clayey deposits.

Bedrock in the project area is the Ohio Shale of the Devonian System of the rock stratigraphic sequence. The Ohio Shale is a black to dark brown organic shale with gray non-organic laminations.

The project area is generally urbanized, with the proposed corridor wrapping along neighborhood streets. A review of the historic aerial mapping indicated that multiple streams are buried along the proposed alignment: West Tulane Road near North High Street and Beulah Road by Edgar Place.

3.0 EXPLORATION

3.1 FIELD EXPLORATION

A total of eighteen borings, designated as NC-101 to NC-112, NHS-1, NHS-2, CR-1, CR-2, CA-1, and CA-2, were planned to be drilled for the project. NHS-1 was removed from the program due to utility conflicts. The remaining borings were drilled between April 5 and June 28, 2022.

The borings were drilled using a truck mounted drill rig and were advanced between sampling intervals with 2¼-inch or 3¼-inch ID Hollow-Stem Augers (HSA). Disturbed soil samples were obtained with a 2-inch OD split-barrel sampler in general accordance with ASTM D-1586 (AASHTO T206) at continuous intervals to a depth of 10 feet and then at 5.0-foot intervals to the boring completion depths, where applicable.

Final logs, included in Appendix I, represent DLZ's interpretation of the field logs and may include modifications based on laboratory observations and tests of the field samples. The final logs describe the materials encountered, their estimated thicknesses, and the depths where samples were obtained.

Water level measurements were taken in each boring during drilling and upon completion of drilling. The borings were backfilled with a mixture of borehole cuttings and bentonite chips after the final water level measurements were obtained.

Information concerning the drilling procedures is presented in Appendix I. The approximate as-drilled boring locations are shown on the boring location plan which includes a table with approximate latitude and longitude coordinates and is presented in Appendix I. Boring logs and information concerning the drilling procedures are also presented in Appendix I.

4.0 FINDINGS

The following sections present the generalized subsurface conditions encountered by the borings. In the field, the actual soil transitions might be different both vertically and laterally. For more detailed information, please refer to the boring logs presented in Appendix I. Please note that the strata contact lines shown on the boring logs represent approximate boundaries between soil types.

4.1 SOIL CONDITIONS

The borings, except NC-110, generally encountered 3 to 5.5 inches of asphalt concrete at the surface. Borings NC-102, NC-103, and NHS-2 also encountered 3 to 4 inches of brick underlying the asphalt concrete. Boring NC-110 encountered 6 inches of gravel at the surface.

Underlying the surface materials, several borings encountered fill consisting of loose to medium dense granular soils (SM, SC-SM) and stiff to very stiff cohesive soils (CL). Underlying the fill or surface materials, the borings generally encountered stiff to hard lean clay (CL) and silty clay (CL-ML). These soils were encountered to the boring completion depth except in borings NC-101, 102, 103, 106, and NHS-2, where weathered to decomposed shale was encountered at depths of between 4.0 and 8.5 feet below the ground surface. Where encountered, the shale was splitspoon sampled to the boring completion depths.

Boring CA-1 encountered occasional rig chatter between the depths of 10.0 and 17.0 feet, an indication of potential cobbles or boulders.

4.1.1 SOIL CORROSIVITY

Selected soil samples were tested for corrosivity potential (pH, resistivity, redox potential, Chloride, Sulfate, Sulfide) and the results of the corrosion testing are tabulated below.

Table – Soil Corrosivity Testing Results

Boring	Depth	pH		Resistivity	Redox Potential	Chloride EPA 300.0	Sulfate ASTM C1580	Sulfide AWWA
		Water	CaCl	*Ohms-cm*	*mV*	*mg/kg dry*	*ppm*	*mg/kg*
NC-101	2.5' - 4.0'	7.5	7.3	396	336	865.0	360.0	Positive
NC-105	4.0' - 5.5'	7.6	7.0	2340	271	31.8	120.0	Positive
NC-109	7.0' - 8.5'	7.6	7.0	2900	457	26.6	120.0	Positive

The results generally indicated that the soils in borings NC-105 and NC-109 were mildly corrosive and the soil in boring NC-101 was highly corrosive for ductile iron pipe in accordance with the 10 point soil evaluation preocedure as established by the Ductile Iron Pipe Research Association (DIRPA).

4.2 GROUNDWATER CONDITIONS

Groundwater seepage was first encountered in borings NC-103, NC-106, NC-112, and NHS-2 at depths of 4.0, 8.5, 8.5, and 18.5 feet below the ground surface, respectively. The remaining borings did not encounter groundwater seepage during drilling. At the completion of drilling, borings NC-105, NC-106, NC-108, and NHS-2 encountered measurable groundwater levels at 7.6, 9.6, 7.2, and 22.8 feet, respectively.

Groundwater levels may fluctuate with seasonal variations and following periods of heavy or prolonged precipitation. Therefore, the readings indicated on the boring logs may not be representative of the long-term groundwater level. Long-term monitoring would be needed to obtain a more accurate estimate of the groundwater table elevation. Consequently, during construction or at other times during the project life, the water levels along the alignment may be higher or lower than observed at the time of the subsurface exploration.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Open cut excavation methods are anticipated to be the primary installation method for the proposed gas pipeline, however, there are three locations where bore and jack construction will be used for crossings. The invert of the proposed gas pipeline will generally be 6 to 8 feet below the existing ground surface in open cuts and between 9.0 and 12.8 feet deep along the bore and jack sections of the pipeline crossings. Based on the subsurface conditions encountered in the borings, stiff to hard clays with isolated areas of loose to medium

dense silt or sands and weathered shale are generally anticipated to be encountered at the invert elevations of the proposed gas pipeline. Given the present scope of work for the project, the clay soils and weathered shale are considered suitable for support of the proposed work, provided the recommendations provided in this report are followed. However, areas of potential fill within buried streams could be encountered as discussed in the sections below.

5.1 GAS PIPELINE – OPEN EXCAVATIONS

Where present, existing utilities should be adequately supported as necessary. Subgrades and fill foundations should be prepared in general accordance with ODOT CMS Item 203 "Roadway Excavation and Embankment" or the City's requirements.

It is anticipated that the proposed gas pipeline will be installed at a depth of 6 to 8 feet along the open cut portions of the alignment. Additionally, no new fill will be placed along the alignment of the proposed gas pipeline. Consequently, bearing support and settlement are not a concern for the proposed pipeline construction because there will be no changes in net loads. Based on the boring information, stiff to hard cohesive soils are anticipated to be encountered at the invert elevations of approximately 6 to 8 feet in most areas. However, weathered shale was encountered in borings NC-101, NC-102, and NC-103 at a depth of 5.5 feet, indicating weathered shale will be encountered along a portion of the open cut excavations. Excavations into the weathered shale should be expected to be like that of hard soil for the first few feet. However, zones of more competent shale could be present and additional effort may be required to first loosen the rock before removing it. Due to the inherent nature of glacial deposits at the project location, cobbles and boulders should be expected. Depending on their consistency, size and hardness, the presence of any cobbles and boulders could be an impediment to the excavations.

We recommend that bedding material and backfilling procedures be in accordance with the ODOT CMS or the local municipality requirements to provide suitable support for the proposed work. If any deleterious fill soils (organic material, construction/random debris, and uncontrolled fill) are encountered at the bearing elevations, they should be removed and replaced with engineered controlled fill. Granular soils should be used for engineered controlled fill. Historic mapping indicates that buried streams are present along West Tulane Road near North High Street and Beulah Road by Edgar Place, where buried manmade fills, obstructions, and other unsuitable bearing fill materials could be present, adversely affecting the excavation process.

5.2 UNDERGROUND UTILITY SUPPORT AND CROSSINGS

Borings NHS-2, CR-1, CR-2, CA-1, and CA-2 were drilled to determine the subsurface conditions along three Central Columbus bore and jack sections: North High Street, Norfolk Southern Railroad, and Cleveland Avenue. Bearing support and settlement are typically not a concern for the gas pipeline construction because the weight of the soil removed generally will be more than the proposed pipe. It is recommended that bedding material

and backfilling procedure be in accordance with the ODOT CMS or the local municipal requirements to provide suitable support for the proposed works.

5.2.1 NORTH HIGH STREET

Boring NHS-2 encountered very stiff to hard cohesive soils to a depth of 4.0 feet where weathered shale bedrock was encountered. The shale was not competent enough to be cored, only first encountering splitspoon refusal within the first six inches of a drive interval at a depth of 18.5 feet. The shale was sampled with a splitspoon sampler and advanced with augers to the completion depth of the boring, 23.9 feet. Free water was observed on the splitspoon sampler when the sample was taken at 18.5 feet, which indicated that seepage was encountered in an undisclosed seepage zone between depths of 15.0 and 18.5 feet.

The base of the North High Street trenchless crossing is reportedly to be 9 feet below the ground surface. Given the subsurface information, the trenchless crossing, using the anticipated bore and jack system, will encounter weathered shale bedrock. Excavation within the top few feet of the weathered bedrock will be like that of hard soil. However, even while not highly competent, excavation deeper than a few feet into the weathered shale bedrock should be expected to require additional effort to first loosen the shale bedrock before removal. Additionally, areas of more competent shale not disclosed in the boring should be expected to be encountered within the weathered shale.

5.2.2 NORFOLK SOUTHERN RAILROAD AND CLEVELAND AVENUE

Boring CR-1, for the Norfolk Southern Railroad crossing, encountered granular fill soils to a depth of 2.5 feet. Underlying the fill or pavement, borings CR-1 and CR-2 generally encountered stiff to hard cohesive soils to the boring completion depth. A layer of silt was interbedded in the cohesive soils at depths of between 5.5 and 8.5 feet in boring CR-1. Seepage was not encountered in either boring.

The Cleveland Avenue borings (CA-1 and CA-2) generally encountered stiff to hard cohesive soils to the boring completion depth. Seepage was not encountered in either of the borings. Boring CA-1 encountered occasional rig chatter between the depths of 10.0 and 17.0 feet, an indication of potential cobbles or boulders.

The Railroad crossing and the Cleveland Avenue crossing inverts will reportedly be 12.8 and 11.2 feet below the ground surface, respectively. Given the soil information, the trenchless crossings, using the anticipated bore and jack system, will encounter stiff to hard lean clay.

While seepage was not encountered in either location, seepage could potentially be intercepted within undisclosed saturated granular seams. In addition, due to the inherent nature of glacial deposits at the project location, cobbles and boulders should be expected. Depending on their consistency, size and hardness, the presence of any cobbles and boulders could be an impediment to the excavations. It is the contractor's

responsibility to select the appropriate means and methods of construction and adequate construction equipment based on the anticipated subsurface conditions.

5.3 EXCAVATION AND GROUNDWATER CONSIDERATIONS

All excavations should be constructed in accordance with applicable local, state and federal safety regulations including the current OSHA Excavation and Trench Safety Standards (29 CFR Part 1926). Excavations deeper than five feet must be laid back or braced to protect workers entering the excavations. Slopes or bracing for excavations 20 feet or more in depth must be designed by a registered professional engineer. The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, and/or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom.

Groundwater seepage was first encountered in borings NC-103, NC-106, NC-112, and NHS-2 at depths of 4.0, 8.5, 8.5, and 18.5 feet below the ground surface, respectively. At the completion of drilling, borings NC-105, NC-106, NC-108, and NHS-2 encountered measurable groundwater levels at 7.6, 9.6, 7.2, and 22.8 feet, respectively. Consequently, groundwater should be anticipated during construction. Additionally, older historic mapping indicates that buried streams are present along West Tulane Road near North High Street and Beulah Road by Edgar Place, which could potentially contain buried saturated sands. Additionally, groundwater should be expected to be encountered in isolated granular seams, areas with water bearing granular soils, along the soil and bedrock interface, existing underground utilities, and potentially buried streams encountered along the alignment.

Excavations below groundwater level should be anticipated for the construction of the proposed improvements. Excavations extending into water-bearing sand, silt, or gravel deposits can develop “quick condition” and “flow” or “run” when the confining effect of the overburden is removed. To prevent this occurrence and ensure “dry” working conditions, areas of the proposed excavations will need to be dewatered and the water level maintained a minimum of three feet below the bottom of the proposed excavation during construction.

Contractors should also be prepared to deal with any water from precipitation which enters the excavations. A dewatering specialist should be consulted prior to the construction.

6.0 CLOSING REMARKS

We appreciate having the opportunity to be of service to you on this project. Please do not hesitate to call if you have any questions concerning this report.

Respectfully submitted,

DLZ OHIO, INC.

Richard Hessler
Geotechnical Engineer

Eric W. Tse
Senior Geotechnical Engineer

APPENDIX I

General Information
Legend
Boring Location Plan
Boring Logs – Seventeen (17) Borings
Results of Laboratory Testing

GENERAL INFORMATION
DRILLING PROCEDURES AND LOGS OF BORINGS

Drilling and sampling were conducted in accordance with procedures generally recognized and accepted as standardized methods of investigation of subsurface conditions concerning geotechnical engineering considerations. Borings were drilled with either a truck-mounted or ATV-mounted drill rig.

Drive split-barrel sampling was performed in 1.5 foot increments at intervals not exceeding 5 feet. In the event the sampler encountered resistance to penetration of 6 inches or less after 50 blows of the drop hammer, the sampling increment was discontinued. Standard penetration data were recorded and one or more representative samples were preserved from each sampling increment.

In borings where rock was cored, NXM or NQ size diamond coring tools were used.

In the laboratory all samples were visually classified by a soils engineer. A limited number of samples, considered representative of foundation materials present, were selected for performance of grain-size analyses and plasticity characteristics tests. The results of these tests are shown on the boring logs.

The boring logs included in the Appendix have been prepared on the basis of the field record of drilling and sampling, and the results of the laboratory examination and testing of samples. Stratification lines on the boring logs indicating changes in soil stratigraphy represent depths of changes approximated by the driller, by sampling effort and recovery, and by laboratory test results. Actual depths to changes may differ somewhat from the estimated depths, or transitions may occur gradually and not be sharply defined. The boring logs presented in this report therefore contain both factual and interpretative information and are not an exact copy of the field log.

Although it is considered that the borings have disclosed information generally representative of site conditions, it should be expected that between borings conditions may occur which are not precisely represented by any one of the borings. Soil deposition processes and natural geologic forces are such that soil and rock types and conditions may change in short vertical intervals and horizontal distances.

Soil/rock samples will be stored at our laboratory for a period of six months. After this period of time, they will be discarded, unless notified to the contrary by the client.

LEGEND - BORING LOG TERMINOLOGY

Explanation of each column, progressing from left to right

1. Depth (in feet) - refers to distance below the ground surface.

2. Elevation (in feet) - is referenced to mean sea level, unless otherwise noted.

3. Standard Penetration (N) - the number of blows required to drive a 2-inch O.D., 1-3/8 inch I.D., split-barrel sampler, using a 140-pound hammer with a 30-inch free fall. The blows are recorded in 6-inch drive increments. Standard penetration resistance is determined from the total number of blows required for one foot of penetration by summing the second and third 6-inch increments of an 18-inch drive.

   50/n - indicates number of blows (50) to drive a split-barrel sampler a certain number of inches (n) other than the normal 6-inch increment.

   WOR – indicates the split-barrel sampler advanced the 6-inch increment from the weight of the rods alone.

   WOH – indicates the split-barrel sampler advanced the 6-inch increment from the combined weight of the hammer and rods alone.

4. The length of the sampler drive is indicated graphically by horizontal lines across the “Standard Penetration” and “Recovery” columns.

5. Sample recovery from each drive is indicated numerically in the column headed “Recovery”.

6. The drive sample location is designated by the heavy vertical bar in the “Sample No., Drive” column.

7. The length of hydraulically pressed “Undisturbed” samples is indicated graphically by horizontal lines across the “Press” column.

8. Sample numbers are designated consecutively, increasing in depth.

9. Soil Description

   a. The following terms are used to describe the relative compactness and consistency of soils:

   Granular Soils - Compactness

Term	Blows/Foot Standard Penetration
Very Loose	0 – 4
Loose	4 – 10
Medium Dense	10 – 30
Dense	30 – 50
Very Dense	over 50

   Cohesive Soils – Consistency

Term	Unconfined Compression tons/sq. ft	Blows/Foot Standard Penetration	Hand Manipulation
Very Soft	less than 0.25	below 2	Easily penetrated by fist
Soft	0.25 – 0.50	2 – 4	Easily penetrated by thumb
Medium Stiff	0.50 – 1.0	4 – 8	Penetrated by thumb with moderate pressure
Stiff	1.0 – 2.0	8 – 15	Readily indented by thumb but not penetrated
Very Stiff	2.0 – 4.0	15 – 30	Readily indented by thumb nail
Hard	over 4.0	over 30	Indented with difficulty by thumb nail

   b. Color - If a soil is a uniform color throughout, the term is single, modified by such adjective as light and dark. If the predominant color is shaded by a secondary color, the secondary color precedes the primary color. If two major and distinct colors are swirled throughout the soil, the colors are modified by the term “mottled”.

   c. Texture is based on the Unified Classification System. Soil particle size definitions are as follows:

Description	Size	Description	Size
Boulders	Larger than 8”	Sand-Coarse	4.75 mm to 2.00 mm
Cobbles	8” to 3”	-Medium	2.00 mm to 0.42 mm
Gravel-Coarse	3” to 3/4"	-Fine	0.42 mm to 0.074 mm
-Fine	3/4" to 4.76 mm	Silt	0.074 mm to 0.005 mm
		Clay	Smaller than 0.005 mm

   d. The primary soil component is listed first and may include a modifier before and/or after it as indicated by the USCS classification system. The minor components are listed in order of decreasing percentage of particle size.

Coarse Grained Soils	Fine Grained Soils
5% - 12% silt/clay - “with silt/clay” post-modifier	5% - 12% sand/gravel- “with sand/gravel” post-modifier
> 15% sand/gravel – “with sand/gravel” post-modifier	> 30% sand/gravel – “sandy/gravelly” pre-modifier
> 12% silt/clay – “silty/clayey” pre-modifier	

e. Minor modifiers to main soil descriptions are indicated as a percentage by weight of particle sizes.

trace	- 0 to 10%
little	- 10 to 20%

f. The moisture content of **cohesive soils** (silts and clays) is expressed relative to plastic properties.

Term	Relative Moisture or Appearance
Dry	Powdery
Damp	Moisture content slightly below plastic limit
Moist	Moisture content above plastic limit, but below liquid limit
Wet	Moisture content above liquid limit

g. Moisture content of **cohesionless soils** (sands and gravels) is described as follows:

Term	Relative Moisture or Appearance
Dry	No moisture present
Damp	Internal moisture, but none to little surface moisture
Moist	Free water on surface
Wet	Voids filled with free water

10. Rock hardness and rock quality description.

a. The following terms are used to describe the relative hardness of the **bedrock.**

Term	Description
Very Soft	Difficult to indent with thumb nails; resembles hard soil but has rock structure
Soft	Resists indentation with thumb nail but can be abraded and pierced to a shallow depth by a pencil point.
Medium Hard	Resists pencil point, but can be scratched with a knife blade.
Hard	Can be deformed or broken by light to moderate hammer blows.
Very Hard	Can be broken only by heavy blows, and in some rocks, by repeated hammer blows.

b. Rock Quality Designation, RQD - This value is expressed in percent and is an indirect measure of rock soundness. It is obtained by summing the total length of all core pieces which are at least four inches long, and then dividing this sum by the total length of the core run.

11. Gradation - when tests are performed, the percentage of each particle size is listed in the appropriate column (defined in Item 9c).

12. When a test is performed to determine the natural moisture content, liquid limit moisture content, or plastic limit moisture content, the moisture content is indicated graphically.

13. The corrected standard penetration (N60) value in blows per foot is indicated graphically.

14. Soil Symbology

	GW	Well-graded Gravel
	GP	Poorly-graded Gravel
	GW-GM	Well-graded Gravel with Silt
	GP-GM	Poorly-graded Gravel with Silt
	GM	Silty Gravel
	SW	Well-graded Sand
	SP	Poorly-graded Sand
	SW-SM	Well-graded Sand with Silt

	SP-SM	Poorly-graded Sand with Silt
	SM	Silty Sand
	SC-SM	Clayey, Silty Sand
	SC	Clayey Sand
	ML	Silt
	CL-ML	Low Plasticity Silty Clay
	CL	Low Plasticity Clay

Boring	Longitude	Latitude
NC-101	-83.015376	40.024019
NC-102	-83.008956	40.023099
NC-103	-83.001964	40.022806
NC-104	-82.990812	40.018709
NC-105	-82.987037	40.020905
NC-106	-82.981145	40.021398
NC-107	-82.973777	40.021142
NC-108	-82.968384	40.019884
NC-109	-82.962596	40.019734
NC-110	-82.955918	40.019905
NC-111	-82.955851	40.022054
NC-112	-82.966322	40.021785
CA-1	-82.965141	40.020164
CA-2	-82.964759	40.020150
CR-1	-82.997313	40.021809
CR-2	-82.996511	40.021867
NHS-2	-83.013499	40.023291

DLZ

Legend

Boring

0 1000

500

Scale in feet

Campos
NCHP Pipeline Project - Central Columbus
Boring Location Plan

Orientation

DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring CA-1 | *Location:* 13' south of plan | *Date Drilled:* 5/27/2022

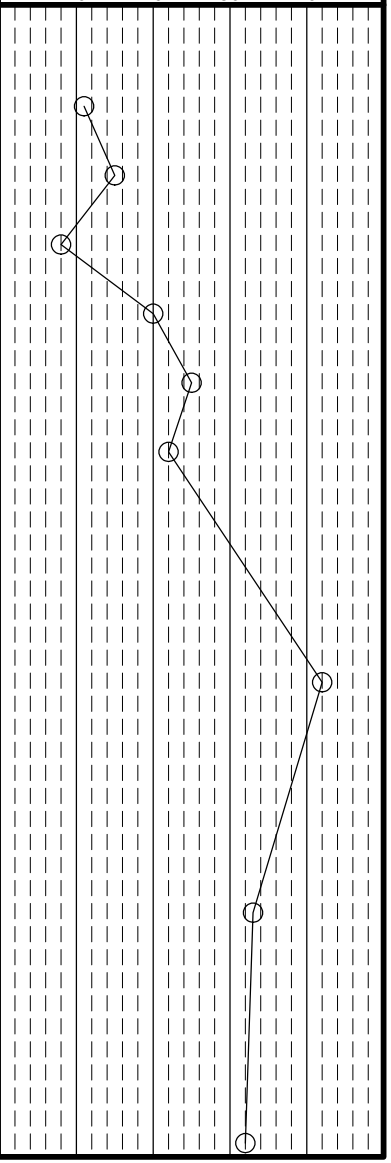
Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* AM

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - 3.25" HS Augers
ABANDONMENT - cuttings and bentonite chips

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.5							Asphalt Concrete- 6"							
2.0		8 4 4	12	S-1		2.25	FILL: Very stiff brown LEAN CLAY (CL); contains organics and piece of wood; damp.							
		4 5 6	17	S-2		2.25	Very stiff to hard mottled brown and gray LEAN CLAY (CL); damp.							
5		3 3 3	18	S-3		4.25								
		5 6 8	18	S-4		4.5+								
		5 8 10	18	S-5		4.25								
10		7 8 8	15	S-6		4.5+	@ 8.5' - 13.5'; gray. @ 10.0' - 17.0'; occassional rig chatter.							
13.5														
15		13 13 17	3	S-7		4.0	Very stiff brown and gray sandy LEAN CLAY (CL); damp.							
18.5														
20		9 10 14	13	S-8		4.5+	Hard brown and gray sandy SILTY CLAY (CL-ML); damp.							
		14 13 10	18	S-9		4.5+								
25.0	25						Bottom of Boring - 25.0'							

Natural Moisture Content, % - ●
PL ○ LL
N_{60} Value / Non-Plastic - NP
10 20 30 40



Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring CA-2 | *Location:* As per plan | *Date Drilled:* 4/7/2022

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - 3.25" HS Augers
ABANDONMENT - bentonite-cement grout

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.3							Asphalt Concrete - 3.5"							
		1 2 2	12	S-1		1.75	Stiff to very stiff dark brownish gray LEAN CLAY (CL); damp to moist.							
		2 3 5	15	S-2		2.25								
4.0														
5		3 4 5	18	S-3		2.75	Stiff to very stiff brown and dark brownish gray LEAN CLAY (CL) with sand; damp to moist.							
		2 3 3	6	S-4		2.0								
8.5		2 3 3	12	S-5		2.75								
10		3 7 8	18	S-6		3.5	Very stiff to hard grayish brown sandy LEAN CLAY (CL); contains trace shale fragments; damp. @8.5'-10.0', contains slight iron oxide staining. @10.0'-17.0', occassional brief rig chatter.							
15		4 6 7	18	S-7		3.75	@13.5'-25.0', dark gray.							
20		4 6 6	18	S-8		4.5+			6	3	5	25	31	30
25.0		12 18 20	18	S-9		4.5+	Bottom of Boring - 25.0'							

Natural Moisture Content, % - ●

PL — LL

N_{60} Value ○ / Non-Plastic - NP

10 20 30 40

DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring CR-1 | *Location:* As per plan | *Date Drilled:* 4/6/2022

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - 3.25" HS Augers
ABANDONMENT - cuttings and bentonite chips

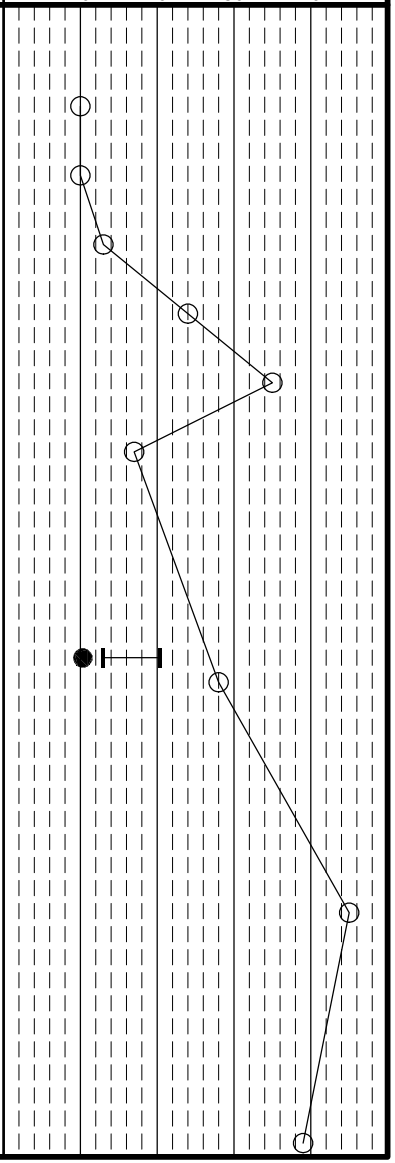
Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.3							Asphalt Concrete - 3.5"							
2.5		3 4 3	2	S-1			FILL: Loose to medium dense brown silty, clayey SAND (SC-SM) with gravel; contains asphalt and aggregate base fragments; damp.							
		4 3 4	10	S-2		2.5	Very stiff brown sandy LEAN CLAY (CL); damp to moist.							
5.5	5	4 5 4	18	S-3		3.0								
		4 5 12	18	S-4			Medium dense to dense brown sandy SILT (ML); moist.							
8.5		10 12 13	18	S-5										
	10	3 5 7	12	S-6		4.5+	Hard gray sandy SILTY CLAY (CL-ML); damp.							
	15	5 10 10	18	S-7		4.5+			6	5	9	20	36	24
	20	10 12 20	18	S-8		4.5+								
25.0	25	8 13 15	18	S-9		4.5+	Bottom of Boring - 25.0'							

Natural Moisture Content, % - ●

PL ○ N_{60} Value ○ LL / Non-Plastic - NP

10 20 30 40



DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring CR-2 | *Location:* As per plan | *Date Drilled:* 6/28/2022

Rig (#) / ER - CME 55 (404185) / 91.0% | *Driller* KC | *Logger* JC

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - 3.25" HS Augers
ABANDONMENT - cuttings and bentonite chips

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL N_{60} Value ○ LL / Non-Plastic - NP (10 20 30 40)
0.4							Asphalt Concrete - 5"								
2.5		4 4 5	18	S-1		1.5	Stiff brown to dark gray mottled LEAN CLAY (CL); contains organic material; moist.								
5.5	5	3 4 5	18	S-2		2.75	Stiff to very stiff light brown LEAN CLAY with sand (CL); moist.								
		2 2 8	18	S-3		2.0									
7.0		3 5 4	18	S-4		2.0	Stiff to very stiff brown SILT with sand (ML); moist to wet.								
		4 5 4	18	S-5		4.25	Hard gray LEAN CLAY with sand (CL); damp.								
	10	4 5 6	18	S-6		4.5+									
	15	4 4 4	18	S-7		4.5+									
	20	3 3 6	18	S-8		4.5+									
25.0	25	7 10 11	18	S-9		4.5+	Bottom of Boring - 25.0'								

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Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-101 | *Location:* As per plan | *Date Drilled:* 4/5/2022

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.4							Asphalt Concrete - 4.5"							
2.5		3 4 8	14	S-1		1.5	FILL: Stiff brown sandy LEAN CLAY (CL); contains asphalt fragments, trace shale fragments; damp.							
4.0		2 3 3	18	S-2		1.25	Stiff brown sandy LEAN CLAY (CL); contains shale fragments; moist. **ORP = 336 mV**		13	5	10	16	27	29
5.5		2 2 3	12	S-3			Loose brown and dark brown silty, clayey SAND (SC-SM); contains shale fragments; damp to moist.							
8.5		2 5 18	12	S-4			Gray and black SHALE; highly weathered to decomposed.							
		10 50/5	11	S-5										
8.8		50/4	4	S-6			Gray SHALE							
							Bottom of Boring - 8.8'							

Natural Moisture Content, % - ●

PL — LL

N_{60} Value ○ / Non-Plastic - NP

10 20 30 40

50+

50+

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Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-102 | *Location:* As per plan | *Date Drilled:* 4/6/2022

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.6							Asphalt Concrete - 3" Brick - 4"							
		2 2 3	6	S-1		4.0	FILL: Very stiff to hard brown LEAN CLAY (CL) with sand; contains gray silt cracks, trace brick fragments; damp.							
		3 3 3	14	S-2		3.5								
4.0														
5		7 10 14	18	S-3		3.0	Very stiff brown, gray, and dark brown sandy FAT CLAY (CH) with gravel; contains slight iron oxide staining; damp.		16	5	8	6	24	41
5.5														
		48 23 35	17	S-4			Gray SHALE; highly weathered to decomposed.							
		31 41 49	18	S-5			@7.0'-7.75', contains soft clay infill.							
8.9		50/5	5	S-6										
							Bottom of Boring - 8.9'							
10														
15														
20														
25														

Natural Moisture Content, % - ●

PL — N_{60} Value ○ — LL / Non-Plastic - NP

10 20 30 40

50

81

126

50+

DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-103 | *Location:* As per plan | *Date Drilled:* 4/6/2022

WATER OBSERVATIONS:
Water seepage at: 4.0'
Water level at completion: None

DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	% Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● (PL, LL, N_{60} Value, Non-Plastic - NP)
0.6							Asphalt Concrete - 3" Brick - 4"								
2.5		4 5 10	10	S-1		2.5	FILL: Medium dense brown silty, clayey SAND (SC-SM); contains brick fragments, shale fragments; damp.								
		9 8 10	18	S-2		4.0	Very stiff to hard dark brown sandy LEAN CLAY (CL); contains shale fragments; damp to moist.		11	9	7	15	34	24	
5.5		9 7 11	18	S-3		4.5+	@4.0'-5.5', contains 3.5" gravel seam.								
		23 34 32	18	S-4		4.5+	Dark brown to black SHALE; decomposed.								92
		10 33 50/3	15	S-5		4.5+	@7.0'-8.5', contains iron oxide staining.								50+
9.0		50/6	6	S-6		4.5+	@8.5'-9.0', dark gray.								50+
							Bottom of Boring - 9.0'								

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Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-104 | *Location:* As per plan | *Date Drilled:* 4/5/2022

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

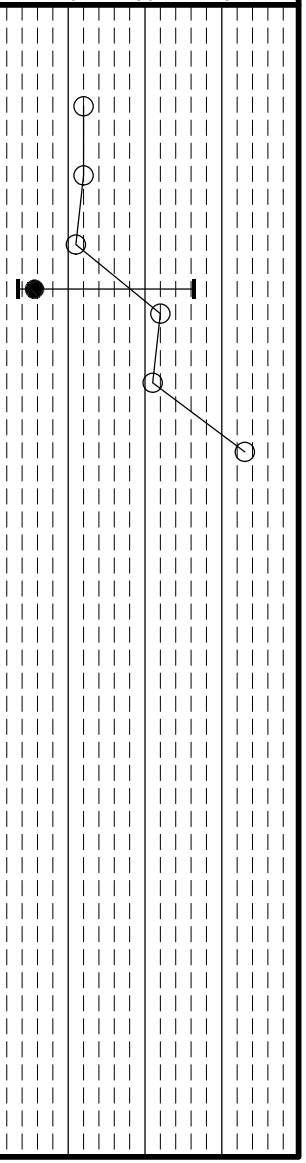
DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.4							Asphalt Concrete - 5"							
		6 9 7	18	S-1		4.5+	Hard brown sandy LEAN CLAY (CL); damp.							
		16 8 8	18	S-2		4.5+								
5		9 7 8	18	S-3		4.5+								
5.5		9 11 12	18	S-4		4.5+	Hard brown LEAN CLAY (CL) with sand; damp.		3	1	5	16	32	43
		13 12 10	18	S-5		4.5+								
10.0	10	8 12 19	18	S-6		4.5+	@8.5'-10.0', gray.							
							Bottom of Boring - 10.0'							
	15													
	20													
	25													

Natural Moisture Content, % - ●

PL ○ N_{60} Value ○ LL / Non-Plastic - NP

10 20 30 40



DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-105 | *Location:* As per plan | *Date Drilled:* 4/5/2022

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: 7.6'

DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

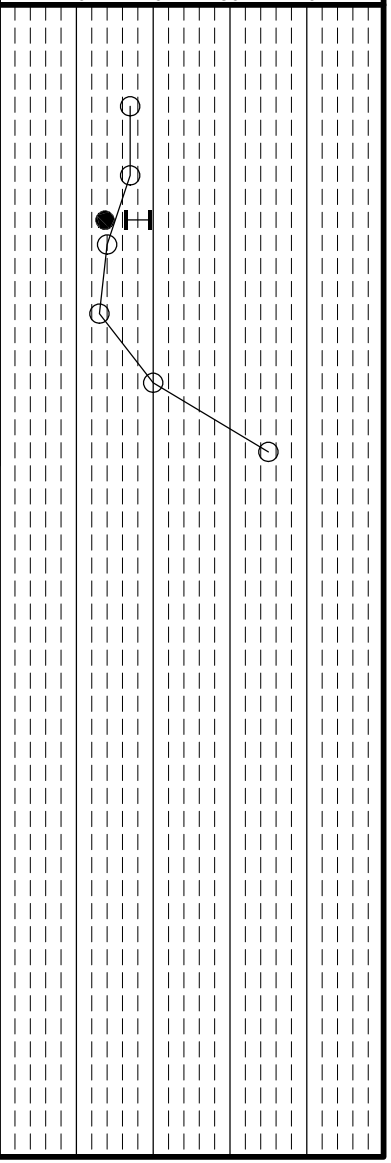
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.5							Asphalt Concrete - 5.5"							
2.5		4 6 6	18	S-1		3.0	Very stiff dark gray SILTY CLAY (CL-ML) with sand; contains slight organic odor; damp to moist.							
4.0		7 6 6	18	S-2		4.5	Hard brown LEAN CLAY (CL) with sand; contains dark brown silt pockets; damp to moist.							
5.5		7 5 5	18	S-3		1.5	Stiff brown sandy SILTY CLAY (CL-ML); moist.		3	3	10	19	40	25
		2 3 6	7	S-4		2.0	Stiff to very stiff brown sandy LEAN CLAY (CL); moist. **ORP = 271 mV**							
8.5		6 6 8	16	S-5										
10.0		9 12 13	18	S-6			Dense dark gray SILT (ML) with sand; damp to moist.							
							Bottom of Boring - 10.0'							

Natural Moisture Content, % - ●

PL / LL

N_{60} Value ○ / Non-Plastic - NP

10 20 30 40



DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-106 | *Location:* As per plan | *Date Drilled:* 4/5/2022

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

WATER OBSERVATIONS:
Water seepage at: 8.5'
Water level at completion: 9.6'

DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

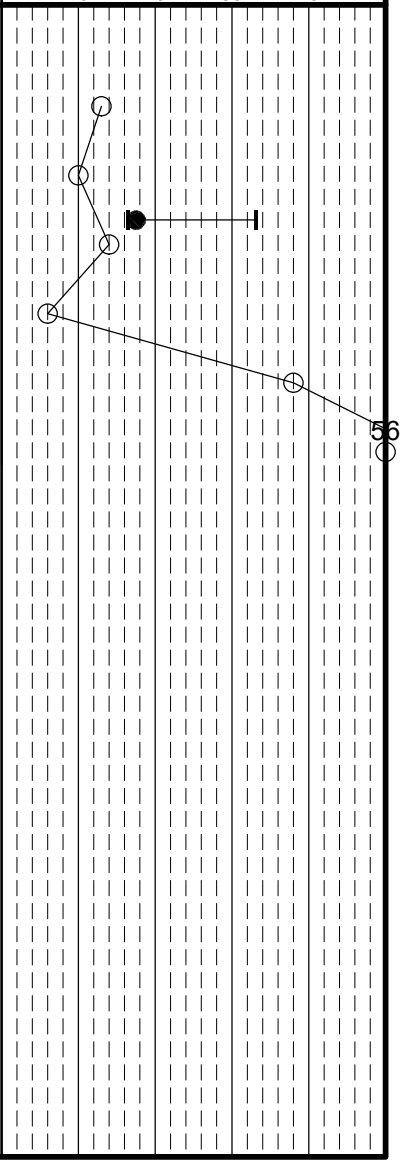
Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.3							Asphalt Concrete - 4"							
		4 4 5	12	S-1		3.5	Stiff to very stiff brown sandy LEAN CLAY (CL); damp to moist.							
		7 4 3	16	S-2		2.5								
5		4 4 6	7	S-3		1.5			13	4	10	13	32	28
		1 2 2	8	S-4		1.5								
7.0														
		12 12 15	18	S-5		4.5+	Hard dark gray sandy SILTY CLAY (CL-ML); contains slight iron oxide staining, shale fragments; damp.							
		20 23 17	18	S-6		4.5+	@8.5'-10.0', contains 3" wet sand seam.							
10.0														
							Bottom of Boring - 10.0'							

Natural Moisture Content, % - ●

PL — LL

N_{60} Value ○ / Non-Plastic - NP

10 20 30 40



DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-107 | *Location:* As per plan | *Date Drilled:* 4/8/2022

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

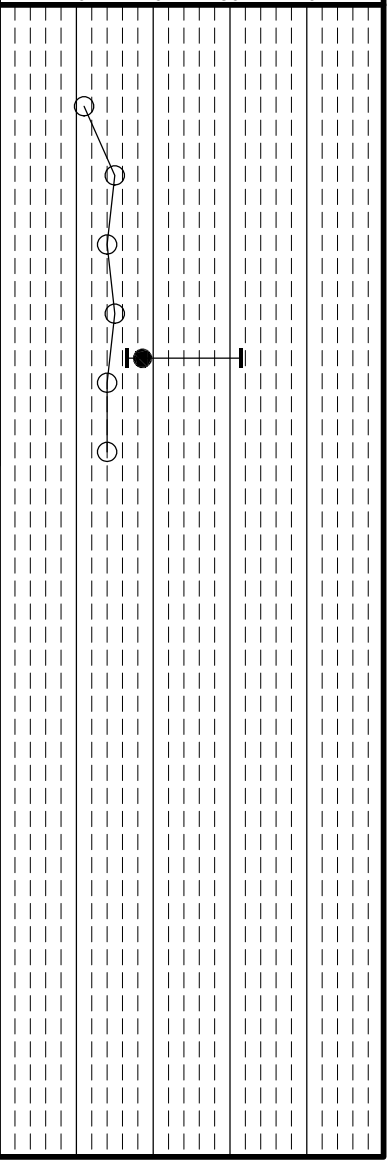
DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.4							Asphalt Concrete - 5"							
2.5		5 4 4	10	S-1		2.5	FILL: Very stiff dark gray LEAN CLAY (CL); contains trace iron oxide staining, slight rubber odor; damp to moist.							
		4 6 5	12	S-2		2.75	Stiff to very stiff dark brownish gray sandy LEAN CLAY (CL); contains shale fragments; moist.							
5		4 5 5	18	S-3		2.5								
		4 5 6	18	S-4		3.5								
		8 4 6	18	S-5		1.0	@7.0'-8.5', medium stiff to stiff.		5	5	9	16	34	31
10.0	10	6 4 6	18	S-6		2.0	@8.5'-10.0', dark gray.							
							Bottom of Boring - 10.0'							
15														
20														
25														

Natural Moisture Content, % - ●

PL ○ N_{60} Value ○ LL / Non-Plastic - NP

10 20 30 40



Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-108 | *Location:* As per plan | *Date Drilled:* 4/6/2022

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: 7.2'

DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.3							Asphalt Concrete - 4"							
		4 6 7	12	S-1		4.5+	Hard dark brown sandy LEAN CLAY (CL); contains orangish brown silt pockets, slight organic odor; damp to moist.							
		8 7 6	14	S-2		2.0	@2.5'-4.0', stiff to very stiff.		6	5	9	16	35	29
5		7 5 4	10	S-3		4.5+	@4.0'-7.0', contains trace shale fragments.							
7.0		7 11 10	7	S-4		4.5+								
		12 8 9	14	S-5		4.5+	Very stiff to hard dark gray sandy LEAN CLAY (CL); contains shale fragments; damp to moist.							
10.0	10	5 5 6	18	S-6		4.0								
							Bottom of Boring - 10.0'							
	15													
	20													
	25													

Natural Moisture Content, % - ●
PL ○ LL
N_{60} Value 10 20 30 40
Non-Plastic - NP

DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-109 | *Location:* As per plan | *Date Drilled:* 4/6/2022

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

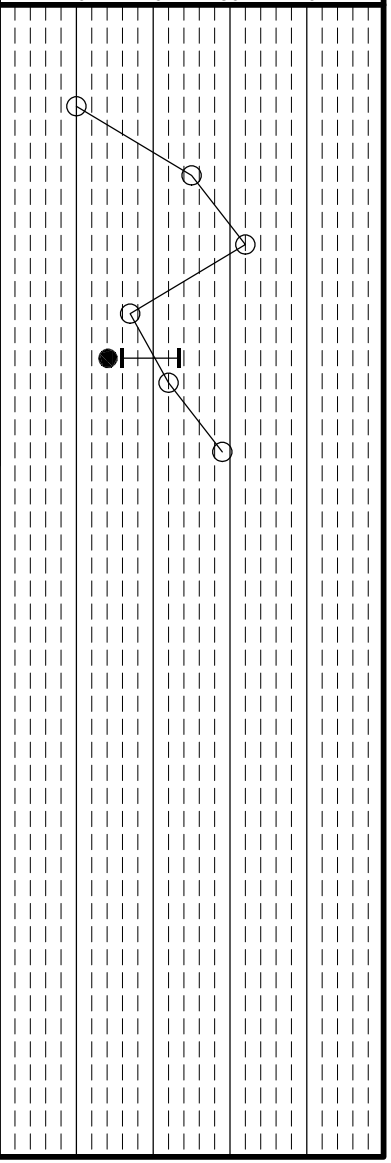
DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.3							Asphalt Concrete - 1" Aggregate Base - 3"							
2.5		3 3 4	18	S-1		2.0	Stiff to very stiff brown and dark brown LEAN CLAY (CL); damp to moist.							
		5 6 12	18	S-2		2.5	Very stiff to hard brown sandy LEAN CLAY (CL); damp to moist.							
5.0	5	12 13 10		S-3		2.5	@2.5'-4.0', contains black silt pockets. @4.0, brown and dark brown, contains trace shale fragments.							
7.0		7 7 5		S-4		4.5+	**ORP = 457 mV** @5.5'-7.0', contains orange sand pockets.							
		6 7 9		S-5		4.5+	Hard brown SILTY CLAY (CL-ML) with sand ; damp.		5	5	10	16	35	29
10.0	10	7 9 12		S-6		4.5+	@8.5'-10.0', contains trace shale fragments.							
							Bottom of Boring - 10.0'							
	15													
	20													
	25													

Natural Moisture Content, % - ●

PL ○ N_{60} Value ○ LL / Non-Plastic - NP

10 20 30 40



DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-110 | *Location:* As per plan | *Date Drilled:* 4/8/2022

WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

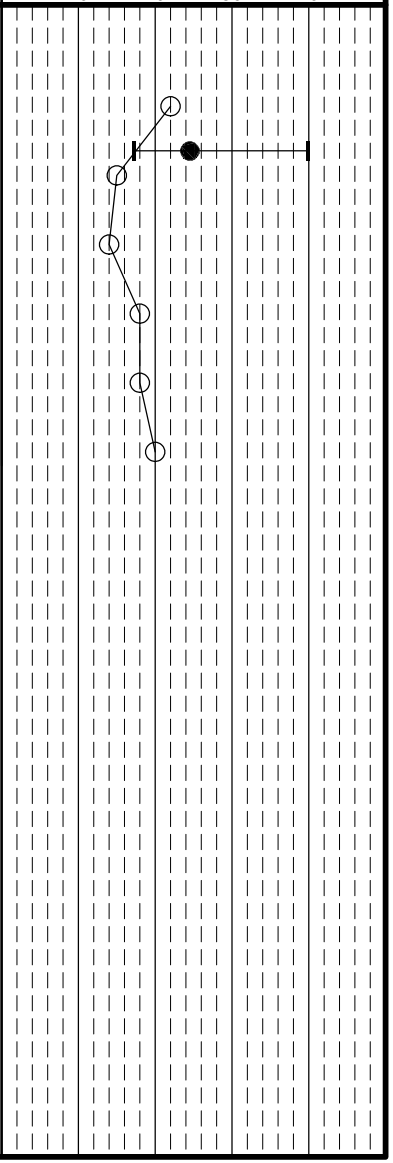
Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.5							Gravel at Surface - 6"							
2.5		10 8 8	8	S-1			FILL: Medium dense light brown, brown, and black silty SAND (SM) with gravel; contains aggregate base fragments; damp.							
4.0		4 5 6	7	S-2		1.5	Stiff brown LEAN CLAY (CL) with sand; moist.		1	1	4	12	33	49
5		4 5 5	10	S-3		1.5	Stiff brown LEAN CLAY (CL) with sand; contains shale fragments; damp to moist.							
7.0		7 7 6	14	S-4		4.0	@5.5'-7.0', very stiff to hard.							
		8 7 6	18	S-5		3.0	Very stiff brown sandy LEAN CLAY (CL); contains shale fragments; damp to moist.							
10.0	10	9 8 6	18	S-6		2.5								
							Bottom of Boring - 10.0'							
	15													
	20													
	25													

Natural Moisture Content, % - ●

PL ○ N_{60} Value ○ LL / Non-Plastic - NP

10 20 30 40



DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-111 | *Location:* As per plan | *Date Drilled:* 4/5/2022

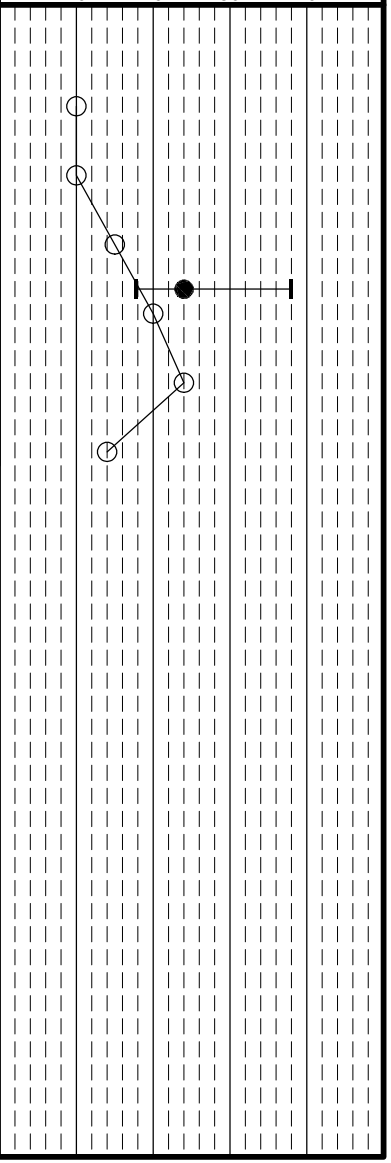
WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.3							Asphalt Concrete - 4"							
2.5		13 4 3	8	S-1			POSSIBLE FILL: Loose to medium dense light brown and brown silty, clayey SAND (SC-SM) with gravel; contains possible aggregate base fragments; damp.							
		3 3 4	14	S-2		3.0	Very stiff grayish brown LEAN CLAY (CL) with sand; contains shale fragments; damp to moist.							
5		8 6 5	18	S-3		2.5								
		3 5 9	18	S-4		3.0			2	2	5	13	35	43
		5 9 8	18	S-5		2.5	@7.0'-10.0', dark gray.							
10.0	10	6 5 5	18	S-6		2.0	@8.5'-10.0', contains slight organic odor.							
							Bottom of Boring - 10.0'							
	15													
	20													
	25													

Natural Moisture Content, % - ●
PL ○ N_{60} Value ○ LL / Non-Plastic - NP
10 20 30 40



DLZ Ohio, Inc. * 6121 Huntley Road, Columbus, Ohio 43229 * (614) 888-0040

Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NC-112 | *Location:* As per plan | *Date Drilled:* 4/6/2022

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

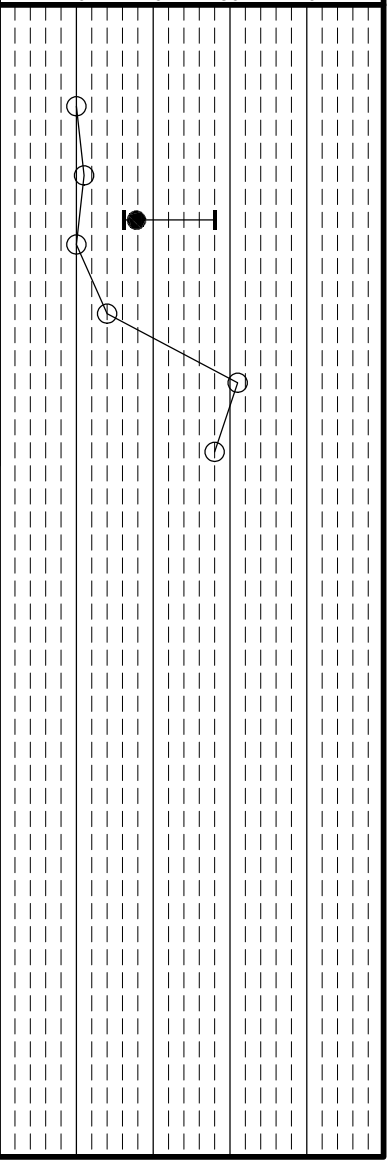
WATER OBSERVATIONS:
Water seepage at: 8.5'
Water level at completion: None

DRILLING METHODS - 2.25" SS Augers
ABANDONMENT - cuttings and bentonite chips

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay
0.4							Apshalt Concrete - 5"							
		3 4 3	8	S-1		2.5	Stiff to very stiff brown sandy LEAN CLAY (CL); damp to moist.							
		3 4 4	12	S-2		2.25								
5.0 5		3 3 4	18	S-3		1.5			3	4	10	18	35	30
		3 4 6	18	S-4		1.5	**ORP = 348 mV** @5.5'-8.5', contains shale fragments.							
8.5		6 10 12	18	S-5		1.75								
10.0 10		8 9 11	18	S-6			Very stiff to hard brownish gray sandy LEAN CLAY (CL); contains shale fragments; moist. S-6 contains wet sand seam.							
							Bottom of Boring - 10.0'							
15														
20														
25														

Natural Moisture Content, % - ●

PL ○ *LL*
N_{60} *Value* 10 20 30 40 / *Non-Plastic* - NP



Client: Campos EPC, LLC | *Project:* NCHP Pipeline - Central Columbus | *Job No.* 2221-3009.00

LOG OF: Boring NHS-2 | *Location:* As per plan | *Date Drilled:* 4/7/2022

Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

WATER OBSERVATIONS:
Water seepage at: 18.5'
Water level at completion: 22.8'

DRILLING METHODS - 3.25" HS Augers
ABANDONMENT - cuttings and bentonite chips

Depth (ft)	Elev. (ft)	Blows per 6"	Recovery (in)	Sample No. Drive	Sample No. Press / Core	Hand Penetrometer (tsf)	DESCRIPTION	Graphic Log	GRADATION % Aggregate	% C. Sand	% M. Sand	% F. Sand	% Silt	% Clay	Natural Moisture Content, % - ● PL / LL; N_{60} Value ○ / Non-Plastic - NP
0.5							Asphalt Concrete - 3" Brick - 3"								
		3 4 3	16	S-1		2.25	Very stiff to hard brown sandy LEAN CLAY (CL); contains trace shale fragments, trace iron oxide staining; moist.		5	8	13	20	33	21	
		4 5 16	18	S-2		4.5									
4.0															
5		48 50/4	10	S-3			Dark gray to black decomposed SHALE; contains trace iron oxide staining.								50+
5.5															
		45 50/3	9	S-4			Gray and dark gray SHALE; highly weathered to decomposed.								50+
		32 50/6	12	S-5			@7.0', gray.								50+
		21 50/5	11	S-6											50+
10															
		46 50/3	9	S-7			@13.5', gray and black.								50+
15															
18.5															
		50/6	6	S-8			Gray and black SHALE; highly weathered and decomposed. Sample drive S-8 encountered seepage on the outside of the splitspoon.								50+
20															
23.9		50/5	3	S-9											
							Bottom of Boring - 23.9'								50+
25															

Table No. 1
NCHP Central Columbus - Summary of Laboratory Testing Results

					Moisture	pH						
					Content	Water	CaCl	Resistivity	Redox	Chloride	Sulfate	Sulfide
					ASTM D2216	ASTM D4972			Potential	EPA 300.0	ASTM C1580	AWWA
Boring	**Sample No.**	**Depth**	**USCS Soil Class.**	**HP Value**	***%***	***N/A***		***Ohms-cm***	***mV***	***mg/kg dry***	***ppm***	***mg/kg***
NC-101	2	2.5' - 4.0'	CL	1.25 tsf	17.0	7.5	7.3	396	336	865	360	Positive
NC-105	3	4.0' - 5.5'	CL-ML	1.5 tsf	13.0	7.6	7.0	2,340	271	31.8	120	Positive
NC-109	5	7.0' - 8.5'	CL	4.5 tsf	14.0	7.6	7.0	2,900	457	26.6	120	Positive
NC-112	3	4.0' - 5.0'	CL	1.5 tsf	18.0				348			

DLZ

SUBJECT: **pH of Soils** PROCEDURE: **ASTM D4972**

CLIENT: Campos

PROJECT NAME: NCHP PROJECT NO.: 2221-3009.00 SHEET: 1 OF: 1

COMP. BY: AM DATE: 5/19/22

TEST PERFORMED USING: pH PAPER [ ] pH METER [X] REV. BY: SR DATE: 5/19/22

Boring Number	Sample Number	Depth	pH in Water (nearest 0.1)	pH in Calcium Chloride (nearest 0.1)
NC-101	2	2.0'-4.0'	7.5	7.3
NC-105	3	4.0'-5.5'	7.6	7.0
NC-109	5	7.0'-8.5'	7.6	7.0
NC-316	4	5.5'-7.0'	8.1	7.3

Notes

pH Meter Calibrated with buffer solutions prior to all testing.

6121 Huntley Road
Columbus, Ohio 43229-1003
(614) 888-0040

Soil Resistivity Test Report

Project Name:	**NCHP**	Date:	**5/19/2022**
DLZ Job Number:	**2221-3009.00**	Comp. By	**KK**
Client:	**Campos**	Rev. By	**SR**

Boring No. NC-101 Sample No. S-2 Depth 2.5'-4.0'

Mass of Resistivity Box full of Soil	**0.568**	lbs
Mass of Resistivity Box Empty	**0.279**	lbs
Mass of Soil to Fill Resistivity Box	**0.2886527**	lbs
Volume of Resistivity Box	**0.002643**	ft^3
Wet Density of Soil @ Test	**109.2**	lbs/ft^3
Moisture Content @ Test	**33.6**	%
Dry Density of Soil @ Test	**81.7**	lbs/ft^3
Ohms of Resistatance @ given Conditions	**396**	Ohms-cm

Boring No. NC-105 Sample No. S-3 Depth 4.0'-5.5'

Mass of Resistivity Box full of Soil	**0.585**	lbs
Mass of Resistivity Box Empty	**0.279**	lbs
Mass of Soil to Fill Resistivity Box	**0.3057828**	lbs
Volume of Resistivity Box	**0.002643**	ft^3
Wet Density of Soil @ Test	**115.7**	lbs/ft^3
Moisture Content @ Test	**32.2**	%
Dry Density of Soil @ Test	**87.5**	lbs/ft^3
Ohms of Resistatance @ given Conditions	**2,340**	Ohms-cm

Note: Testing performed near liquid limit.

DLZ

Soil Resistivity Test Report

Project Name:	**NCHP**	Date:	**5/19/2022**
DLZ Job Number:	**2221-3009.00**	Comp. By	**KK**
Client:	**Campos**	Rev. By	**SR**

Boring No. NC-109 Sample No. S-5 Depth 7.0'-8.5'

Mass of Resistivity Box full of Soil	**0.583**	lbs
Mass of Resistivity Box Empty	**0.279**	lbs
Mass of Soil to Fill Resistivity Box	**0.3033356**	lbs
Volume of Resistivity Box	**0.002643**	ft^3
Wet Density of Soil @ Test	**114.8**	lbs/ft^3
Moisture Content @ Test	**30.6**	%
Dry Density of Soil @ Test	**87.9**	lbs/ft^3
Ohms of Resistatance @ given Conditions	**2,900**	Ohms-cm

Boring No. NC-316 Sample No. S-4 Depth 5.5'-7.0'

Mass of Resistivity Box full of Soil	**0.586**	lbs
Mass of Resistivity Box Empty	**0.279**	lbs
Mass of Soil to Fill Resistivity Box	**0.306378**	lbs
Volume of Resistivity Box	**0.002643**	ft^3
Wet Density of Soil @ Test	**115.9**	lbs/ft^3
Moisture Content @ Test	**31.2**	%
Dry Density of Soil @ Test	**88.4**	lbs/ft^3
Ohms of Resistatance @ given Conditions	**697**	Ohms-cm

Note: Testing performed near liquid limit.

DLZ

DLZ

Sulfate Content Report

PROJECT NAME: NCHP | PROJECT NO.: 2221-3009.00 | SHEET: 1 OF 1

CLIENT: Campos | PROCEDURE: ASTM C1580 | COMP. BY: KK | DATE: 5/20/2022

Boring No.	Sample No.	Depth	Initial Can No.	Can No. / Weight	Can No. / Weight	Bottle No.	Beaker No.	Readings w/Dilution of 1/20			Average (ppm)	Actual (ppm) (Avg x 20)	Actual (% by Mass)
								1	2	3			
NC-101	2	2.5'-4.0'	Bag		B-13	13	1006	18	18	18	18	360	0.036
					20.02								
NC-105	3	4.0'-5.5'	Bag		B-2	2	1020	6	6	6	6	120	0.012
					20.03								
NC-109	5	7.0'-8.5'	Bag		B-15	15	1017	6	6	6	6	120	0.012
					20.01								
NC-316	4	5.5'-7.0'	Bag		B-7	7	1013	14	15	15	15	290	0.029
					20.02								

Remarks

6121 Huntley Road
Columbus, Ohio 43229-1003
(614) 888-0040

DLZ-081
Created 03/13/2013
Rev.01 09/26/2013

ANALYTICAL REPORT

Lab Project # L22-15122
Received: 05/25/2022
Reported: 06/09/2022
Date/Time Sampled:
Sampled By: None Provided
Sampled Matrix: Other
Containers: 1

DLZ Ohio, Inc.
Attn: Steve Robinson
6121 Huntley Rd.
Columbus, OH 43229

Project Name: **NiSource NCHP Pipeline**

Sample ID: **NC-101 #2**
Lab Sample # **L22-15122-09**

Analyte	Results	Units	PQL	Method	Analyst	Extraction Date	Analysis Date
Chloride	865	mg/Kg	3.00	AASHTO T291	BRM		06/07/2022
Sulfide, AWWA	10			AWWA	BRM		06/01/2022
	10- excessive bubbling						

Analysis Certified By: Amy Staley

ANALYTICAL REPORT

Lab Project # L22-15122
Received: 05/25/2022
Reported: 06/09/2022
Date/Time Sampled:
Sampled By: None Provided
Sampled Matrix: Other
Containers: 1

DLZ Ohio, Inc.
Attn: Steve Robinson
6121 Huntley Rd.
Columbus, OH 43229

Project Name: **NiSource NCHP Pipeline**

Sample ID: **NC-105 #3**
Lab Sample # **L22-15122-10**

Analyte	Results	Units	PQL	Method	Analyst	Extraction Date	Analysis Date
Chloride	31.8	mg/Kg	3.00	AASHTO T291	BRM		06/07/2022
Sulfide, AWWA	10			AWWA	BRM		06/01/2022
	10- excessive bubbling						

Analysis Certified By: Amy Staley

ANALYTICAL REPORT

Lab Project # L22-15122
Received: 05/25/2022
Reported: 06/09/2022
Date/Time Sampled:
Sampled By: None Provided
Sampled Matrix: Other
Containers: 1

DLZ Ohio, Inc.
Attn: Steve Robinson
6121 Huntley Rd.
Columbus, OH 43229

Project Name: **NiSource NCHP Pipeline**

Sample ID: **NC-109 #5**
Lab Sample # **L22-15122-11**

Analyte	Results	Units	PQL	Method	Analyst	Extraction Date	Analysis Date
Chloride	26.6	mg/Kg	3.00	AASHTO T291	BRM		06/07/2022
Sulfide, AWWA	10			AWWA	BRM		06/01/2022
	10- excessive bubbling						

Analysis Certified By: Amy Staley

ANALYTICAL REPORT

Lab Project # L22-15122
Received: 05/25/2022
Reported: 06/09/2022
Date/Time Sampled:
Sampled By: None Provided
Sampled Matrix: Other
Containers: 1

DLZ Ohio, Inc.
Attn: Steve Robinson
6121 Huntley Rd.
Columbus, OH 43229

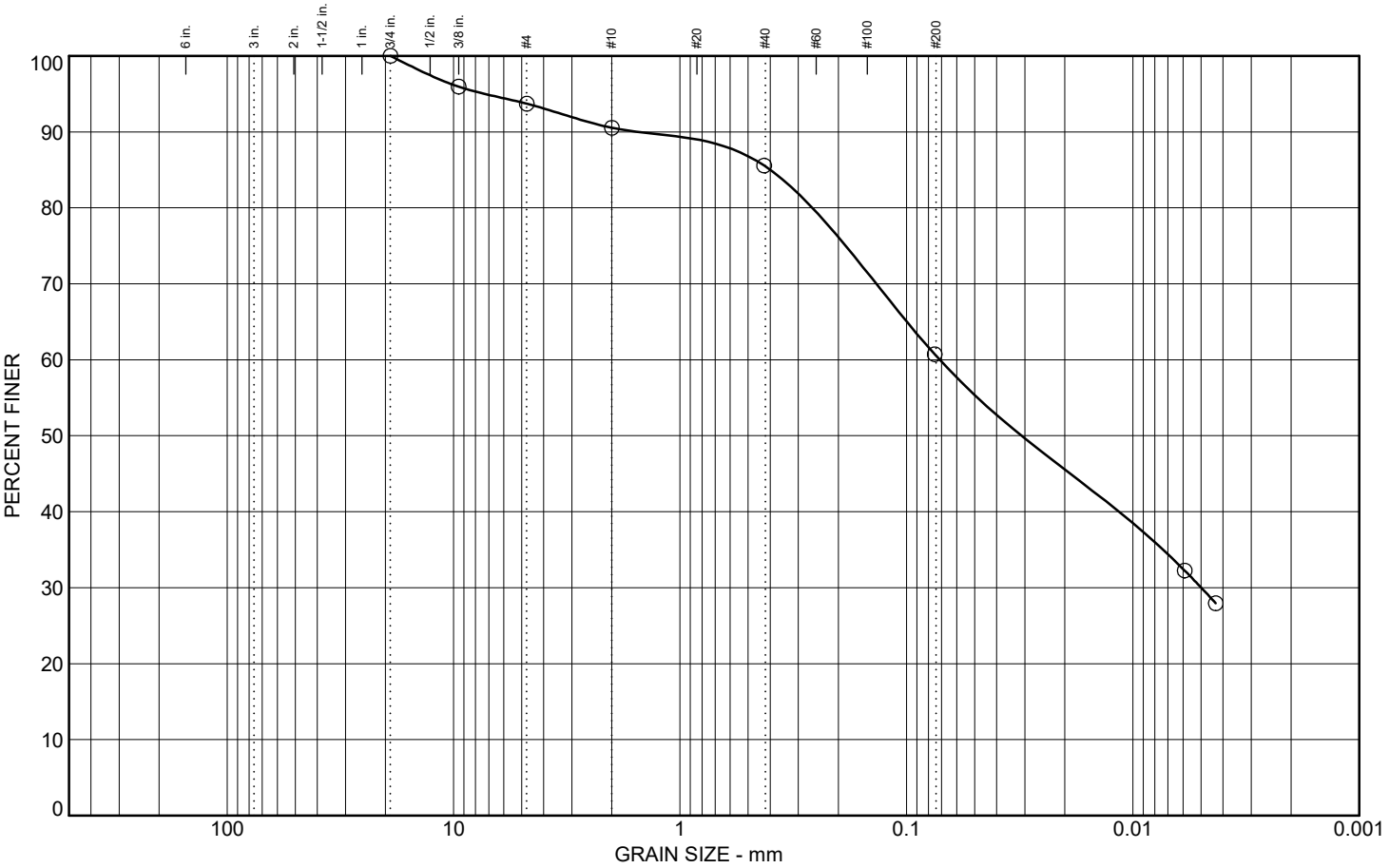
Project Name: **NiSource NCHP Pipeline**

Sample ID: **NC-316 #4**
Lab Sample # **L22-15122-12**

Analyte	Results	Units	PQL	Method	Analyst	Extraction Date	Analysis Date
Chloride	400	mg/Kg	3.00	AASHTO T291	BRM		06/07/2022
Sulfide, AWWA	10			AWWA	BRM		06/01/2022
	10- excessive bubbling						

Analysis Certified By: Amy Staley

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	6.3	3.2	5.0	24.8	30.7	30.0

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	96.0		
4.75	93.7		
2	90.5		
0.425	85.6		
0.075	60.7		

* (no specification provided)

Soil Description

low plasticity clay, fine sand

General Characteristics

Moisture Content = 11.0%

Atterberg Limits

LL= 26 PL= 12 PI= 14

Coefficients

D_{85}= 0.409 D_{60}= 0.07 D_{50}= 0.029
D_{30}= 0.005 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

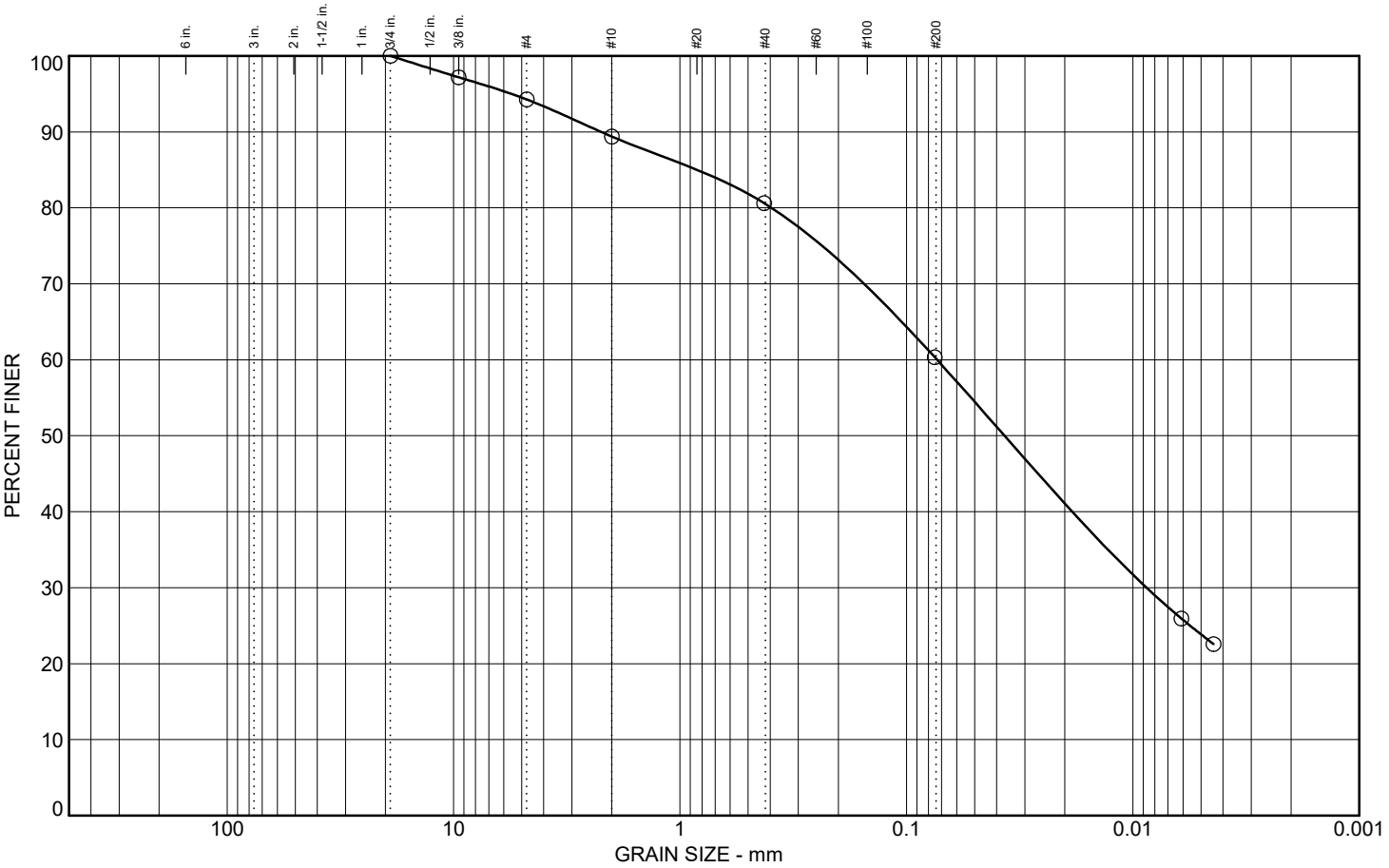
Group Index = 5

Sample No.: S-8 **Source of Sample:** CA-2 **Date:**
Location: - **Depth / Elev:** 18.5'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	5.7	4.9	8.8	20.3	36.4	23.9

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	97.2		
4.75	94.3		
2	89.4		
0.425	80.6		
0.075	60.3		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 10.3%

Atterberg Limits

LL= 20 PL= 13 PI= 7

Coefficients

D_{85}= 0.923 D_{60}= 0.073 D_{50}= 0.035
D_{30}= 0.008 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL-ML AASHTO = A-4

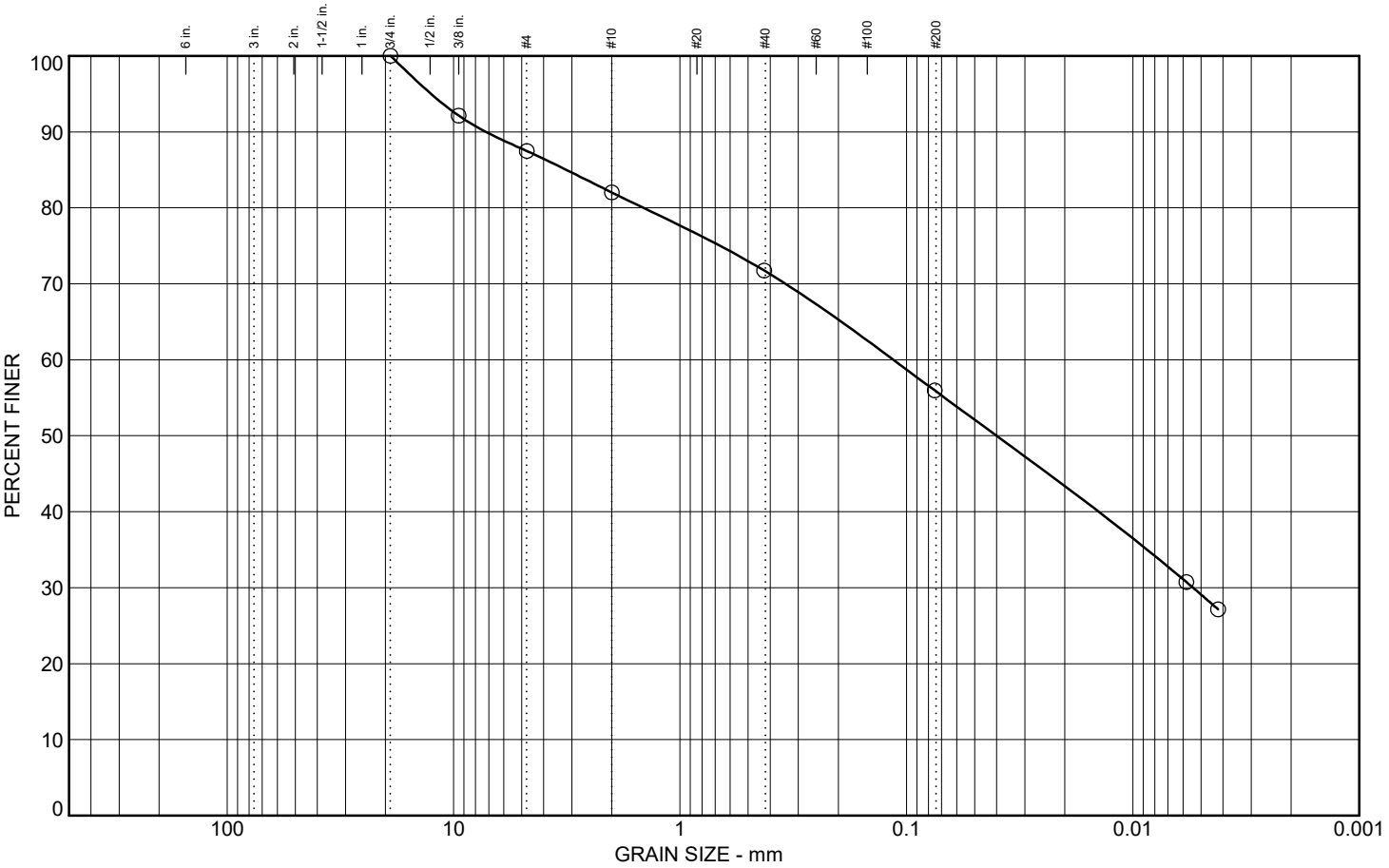
Remarks

Group Index = 1

Sample No.: S-7 **Source of Sample:** CR-1 **Date:**
Location: - **Depth / Elev:** 13.5'

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	12.5	5.5	10.3	15.8	26.9	29.1

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	92.1		
4.75	87.5		
2	82.0		
0.425	71.7		
0.075	56.0		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 17.0%

Atterberg Limits

LL= 30 PL= 16 PI= 14

Coefficients

D_{85}= 3.209 D_{60}= 0.117 D_{50}= 0.041
D_{30}= 0.005 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

Group Index = 5

Sample No.: S-2 **Source of Sample:** NC-101 **Date:**
Location: - **Depth / Elev:** 2.5'

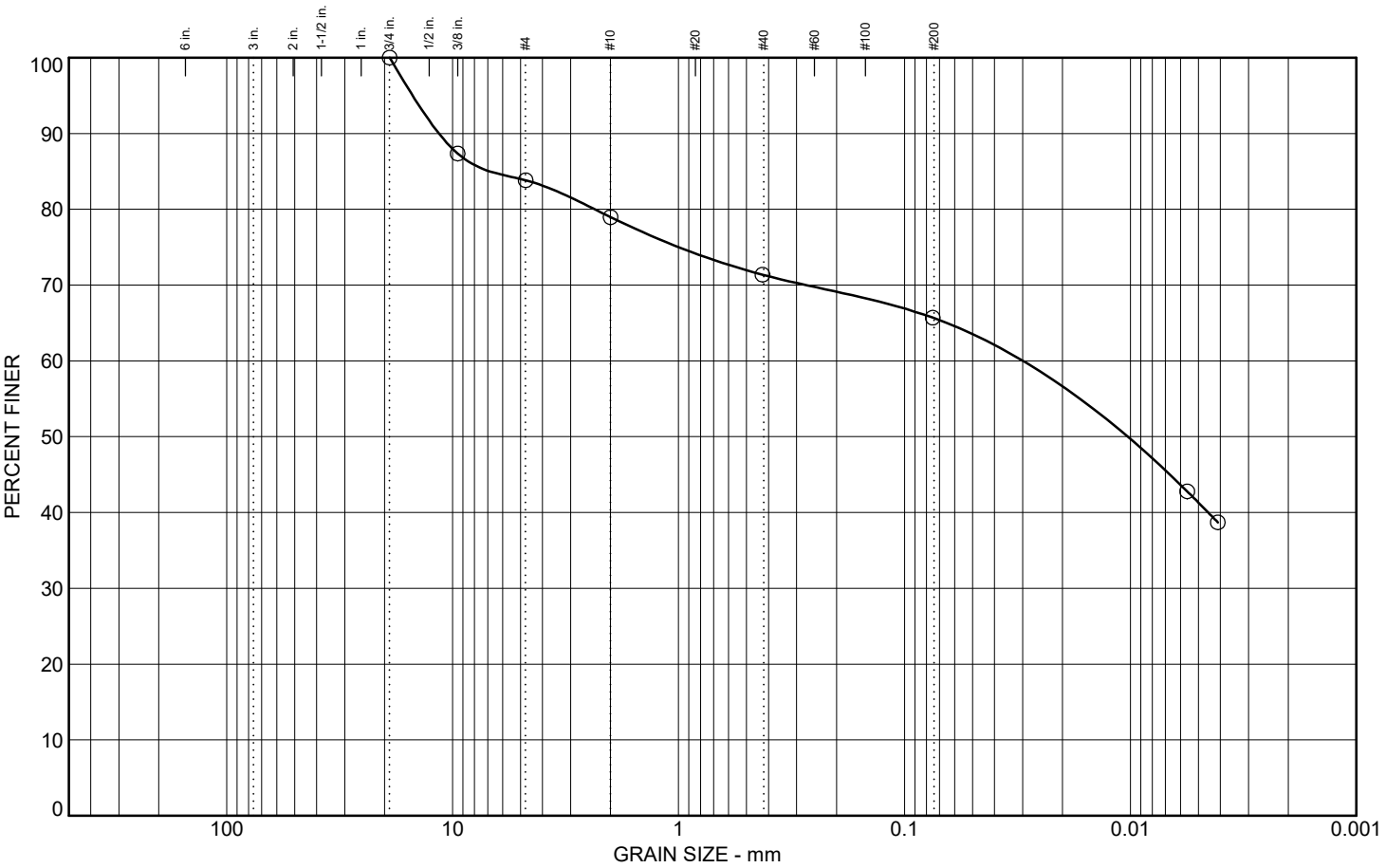
DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus

Project No: 2221-3009.00 **Figure**

GRAIN SIZE II - DLZ MOD - DLZ TEMPLATE VER 2-2.GDT - 8/25/22 11:41 - \\DLZCORP.COM\PAN-FILES$\FILES\PROJECTS\2022\2221\300900 CAMPOS EPC-NISOURC\GEOTECHNICAL\LOGS\2221-3009.00 NCHP PIPELINE (06-30-22).GPJ

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	16.2	4.9	7.6	5.7	24.4	41.3

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	87.3		
4.75	83.8		
2	79.0		
0.425	71.4		
0.075	65.7		

* (no specification provided)

Soil Description

high plasticity clay, fine to medium sand, fine gravel

General Characteristics

Moisture Content = 17.3%

Atterberg Limits

LL= 50 PL= 22 PI= 28

Coefficients

D_{85}= 5.986 D_{60}= 0.039 D_{50}= 0.013
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CH AASHTO = A-7-6

Remarks

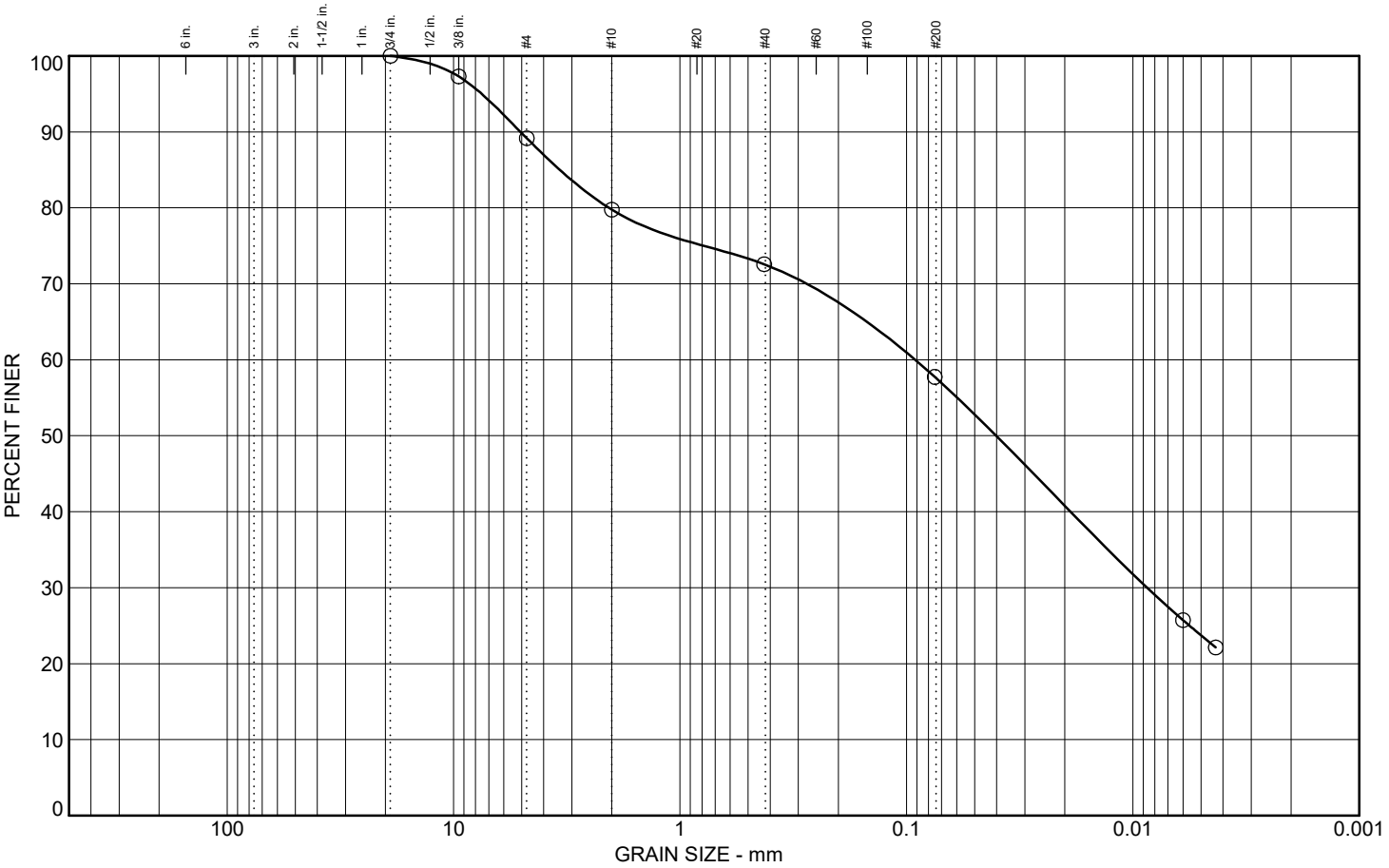
Group Index = 17

Sample No.: S-3 **Source of Sample:** NC-102 **Date:**
Location: - **Depth / Elev:** 4'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	10.8	9.4	7.2	14.8	34.0	23.8

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	97.3		
4.75	89.2		
2	79.8		
0.425	72.6		
0.075	57.7		

* (no specification provided)

Soil Description

low plasticity silt, fine and coarse sand

General Characteristics

Moisture Content = 18.0%

Atterberg Limits

LL= 33 PL= 24 PI= 9

Coefficients

D_{85}= 3.241 D_{60}= 0.098 D_{50}= 0.041
D_{30}= 0.008 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = ML AASHTO = A-4

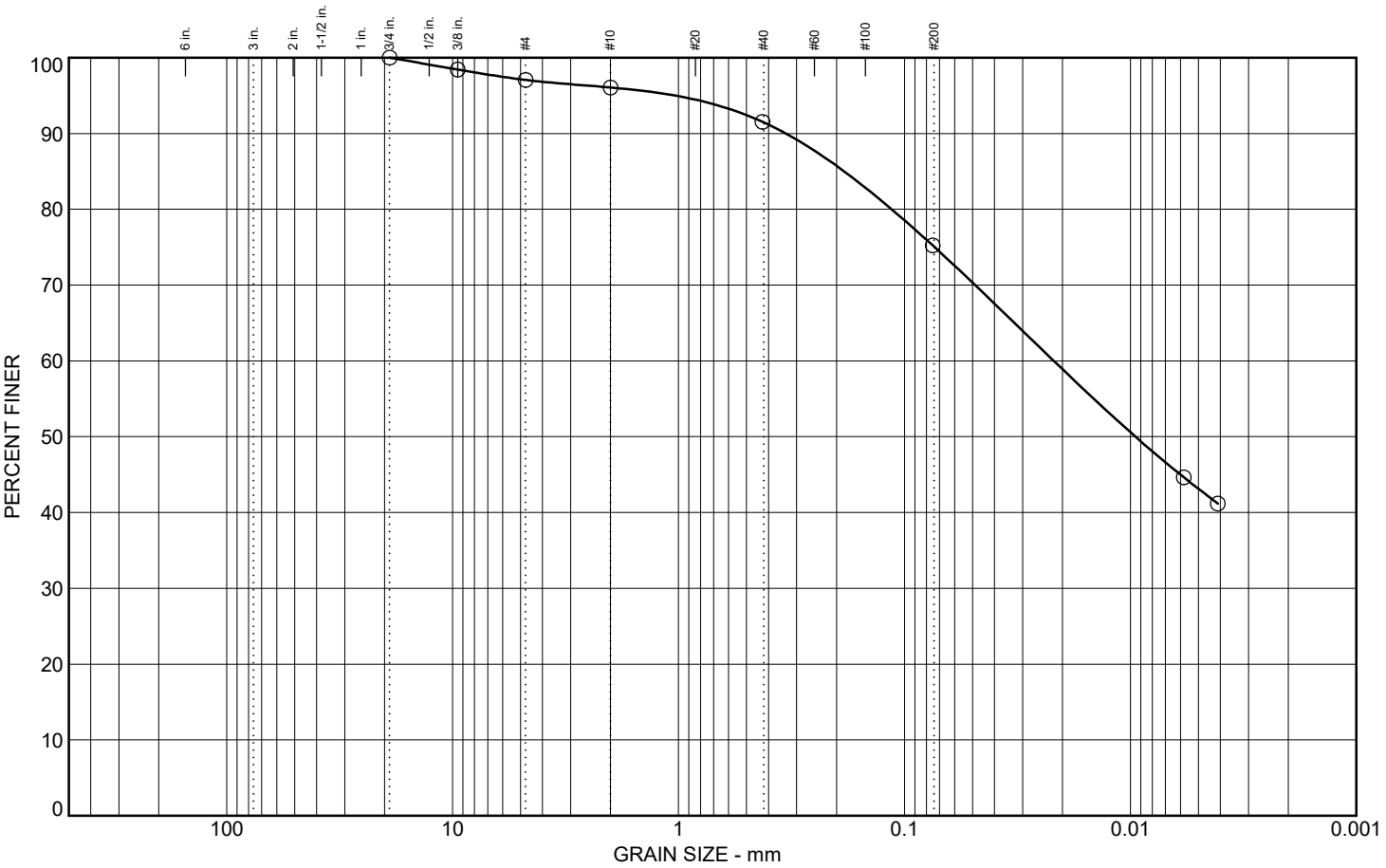
Remarks

Group Index = 3

Sample No.: S-2 **Source of Sample:** NC-103 **Date:**
Location: - **Depth / Elev:** 2.5'

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.9	1.0	4.5	16.3	32.1	43.2

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	98.4		
4.75	97.1		
2	96.1		
0.425	91.5		
0.075	75.2		

* (no specification provided)

Soil Description

moderate plasticity clay, fine sand

General Characteristics

Moisture Content = 15.6%

Atterberg Limits

LL= 36 PL= 13 PI= 23

Coefficients

D_{85}= 0.212 D_{60}= 0.021 D_{50}= 0.009
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

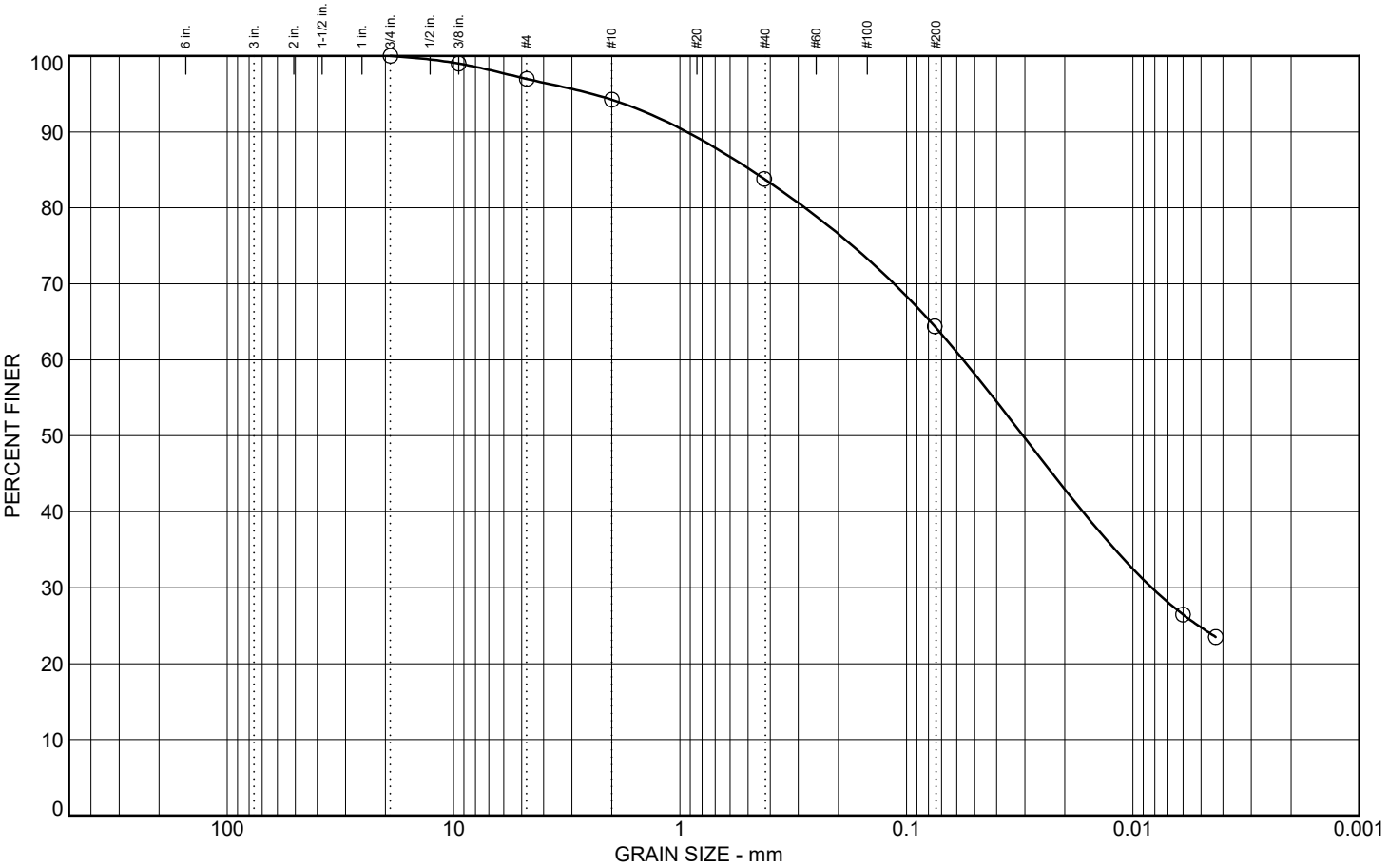
Group Index = 15

Sample No.: S-4 **Source of Sample:** NC-104 **Date:**
Location: - **Depth / Elev:** 5.5'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	3.0	2.7	10.4	19.4	39.6	24.8

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	99.0		
4.75	97.0		
2	94.2		
0.425	83.8		
0.075	64.4		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 13.7%

Atterberg Limits

LL= 20 PL= 16 PI= 4

Coefficients

D_{85}= 0.508 D_{60}= 0.056 D_{50}= 0.029
D_{30}= 0.008 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL-ML AASHTO = A-4

Remarks

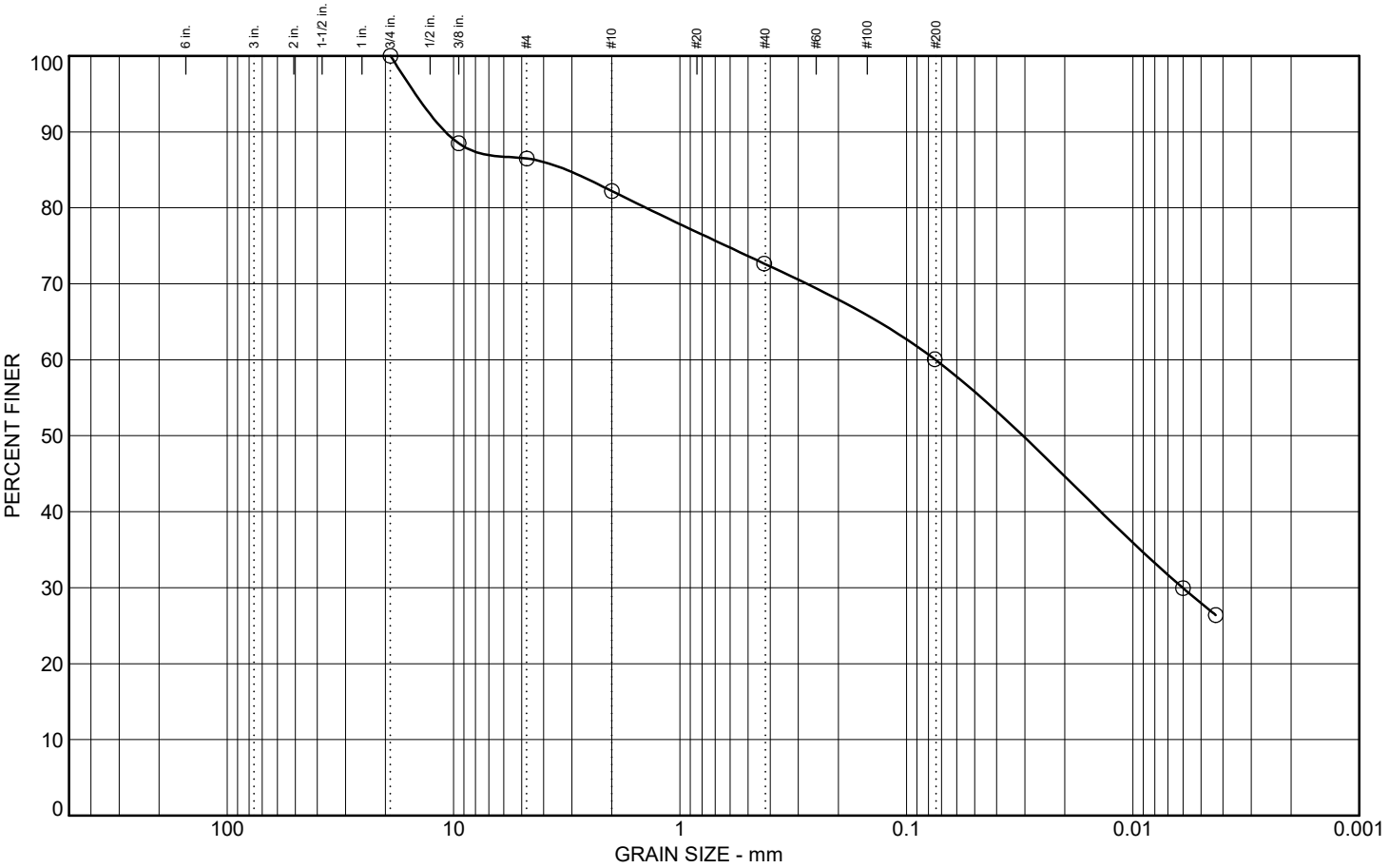
Group Index = 0

Sample No.: S-3 **Source of Sample:** NC-105 **Date:**
Location: - **Depth / Elev:** 4'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	13.5	4.3	9.6	12.6	32.1	28.0

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	88.5		
4.75	86.5		
2	82.2		
0.425	72.7		
0.075	60.1		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 17.5%

Atterberg Limits

LL= 33 PL= 16 PI= 17

Coefficients

D_{85}= 3.516 D_{60}= 0.075 D_{50}= 0.032
D_{30}= 0.006 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

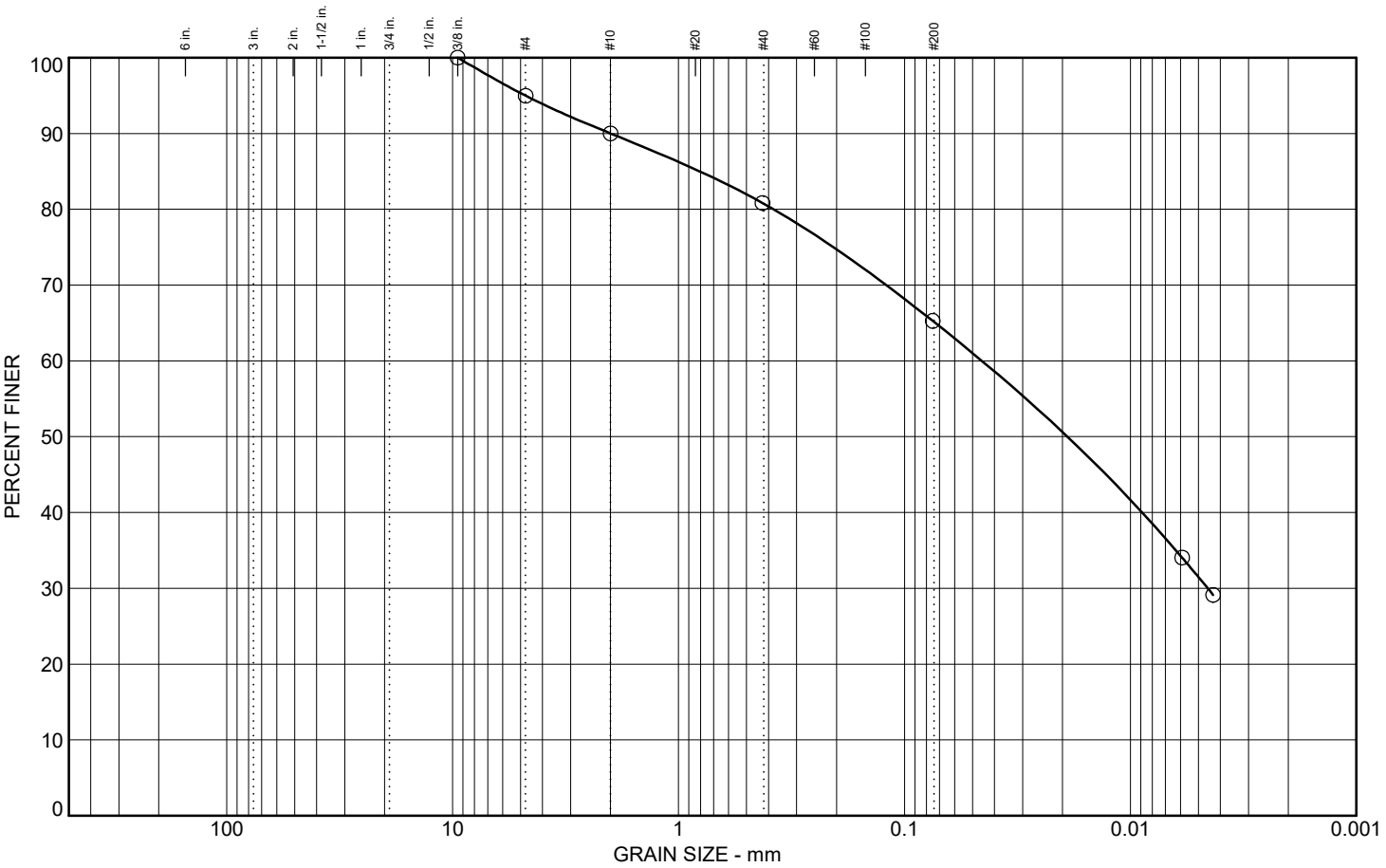
Group Index = 7

Sample No.: S-3 **Source of Sample:** NC-106 **Date:**
Location: - **Depth / Elev:** 4'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	5.0	5.0	9.2	15.6	33.8	31.5

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5	100.0		
4.75	95.0		
2	90.0		
0.425	80.8		
0.075	65.3		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 18.6%

Atterberg Limits

LL= 31 PL= 17 PI= 14

Coefficients

D_{85}= 0.86 D_{60}= 0.049 D_{50}= 0.022
D_{30}= 0.005 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

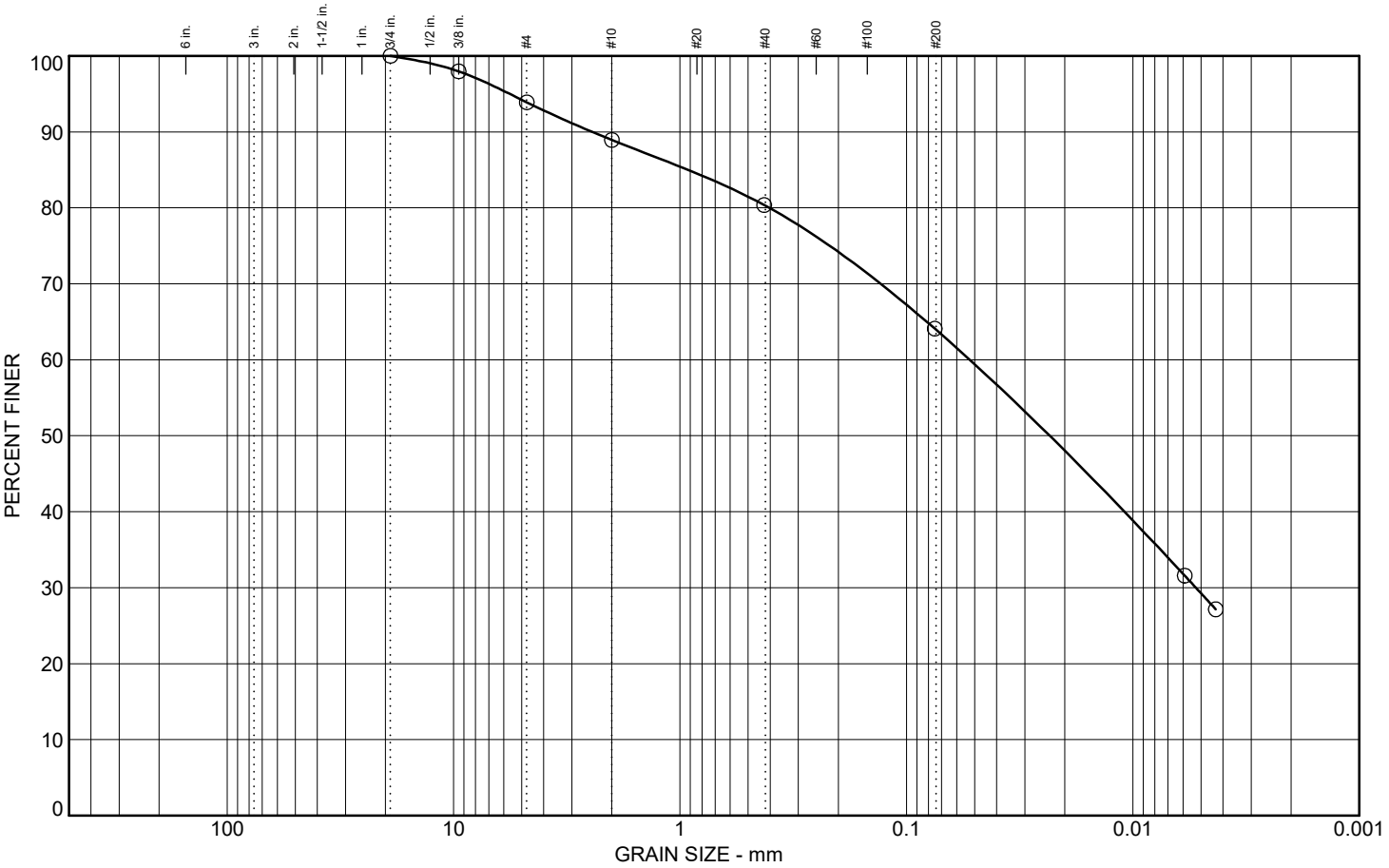
Remarks

Group Index = 7

Sample No.: S-5 **Source of Sample:** NC-107 **Date:**
Location: - **Depth / Elev:** 7'

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	6.1	4.9	8.6	16.3	34.8	29.3

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	98.0		
4.75	93.9		
2	88.9		
0.425	80.4		
0.075	64.1		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 14.8%

Atterberg Limits

LL= 26 PL= 15 PI= 11

Coefficients

D_{85}= 0.982 D_{60}= 0.054 D_{50}= 0.025
D_{30}= 0.005 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

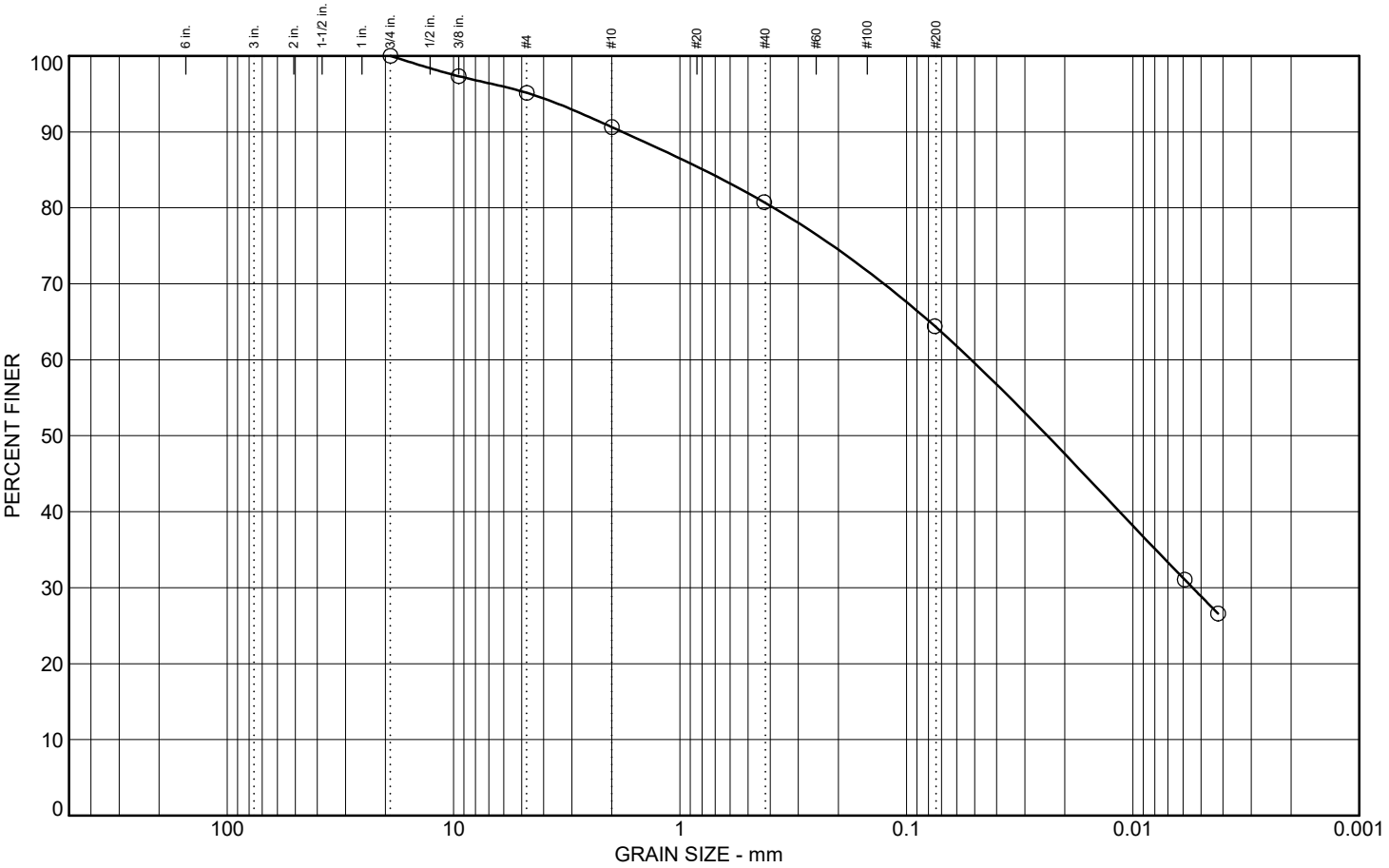
Group Index = 4

Sample No.: S-2 **Source of Sample:** NC-108 **Date:**
Location: - **Depth / Elev:** 2.5'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	4.9	4.5	9.9	16.3	35.5	28.9

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	97.3		
4.75	95.1		
2	90.6		
0.425	80.7		
0.075	64.4		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 14.1%

Atterberg Limits

LL= 23 PL= 16 PI= 7

Coefficients

D_{85}= 0.829 D_{60}= 0.054 D_{50}= 0.025
D_{30}= 0.005 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL-ML AASHTO = A-4

Remarks

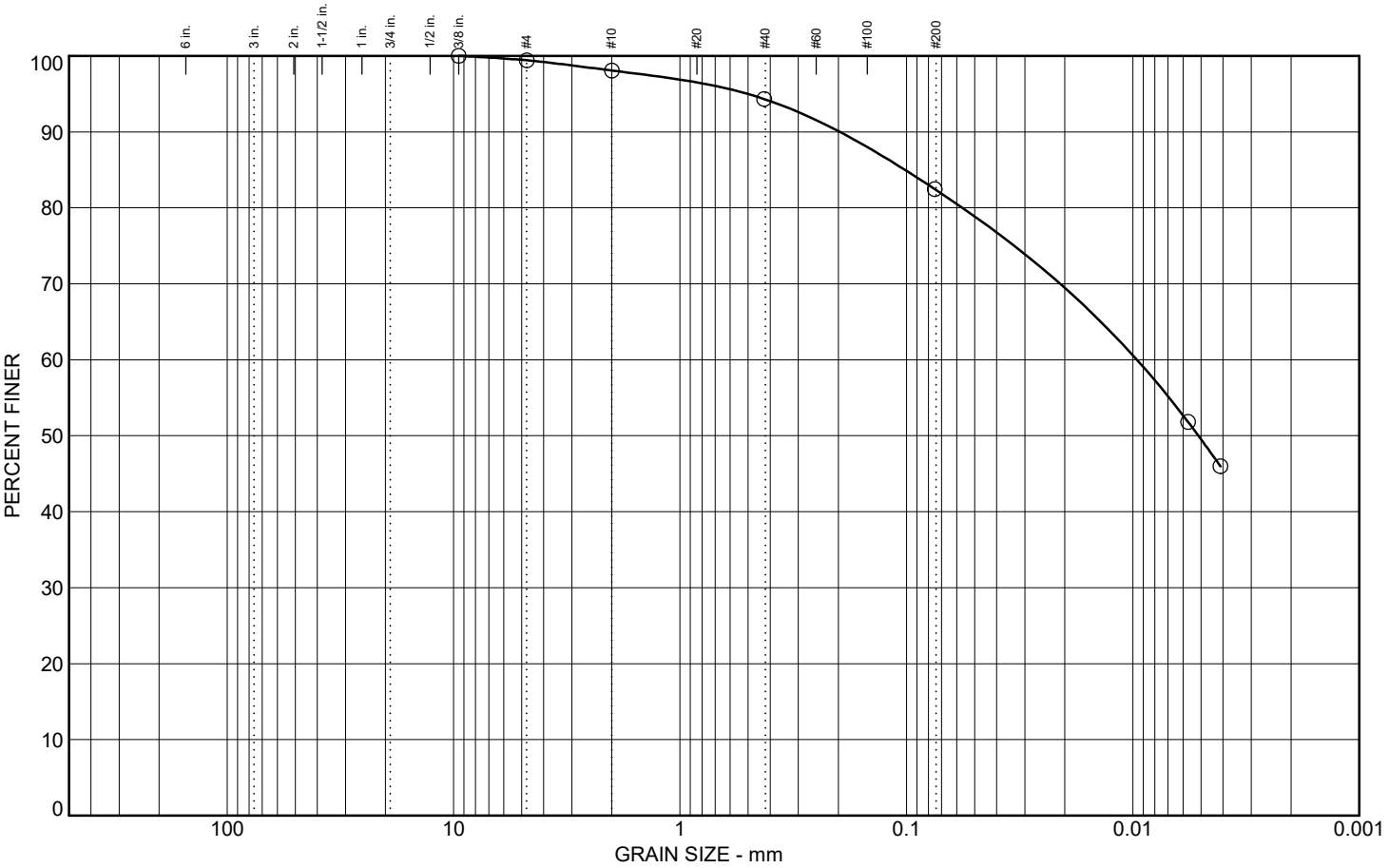
Group Index = 2

Sample No.: S-5 **Source of Sample:** NC-109 **Date:**
Location: - **Depth / Elev:** 7'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	0.6	1.3	3.7	11.9	33.0	49.5

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5	100.0		
4.75	99.4		
2	98.1		
0.425	94.3		
0.075	82.5		

* (no specification provided)

Soil Description

moderate plasticity clay, fine sand

General Characteristics

Moisture Content = 24.5%

Atterberg Limits

LL= 40 PL= 17 PI= 23

Coefficients

D_{85}= 0.109 D_{60}= 0.011 D_{50}= 0.005
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

Group Index = 18

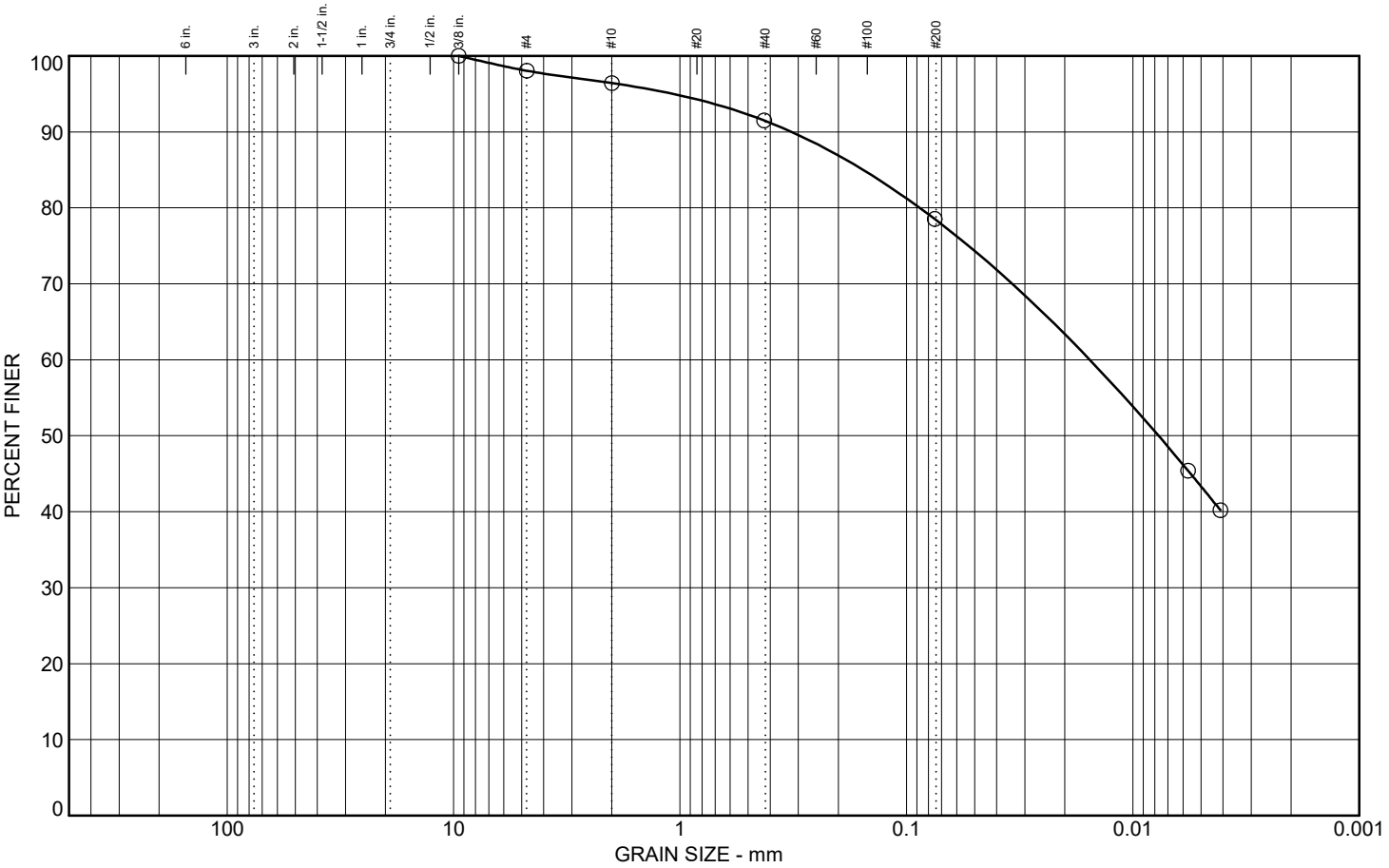
Sample No.: S-2 **Source of Sample:** NC-110 **Date:**
Location: - **Depth / Elev:** 2.5'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus

Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.0	1.6	4.9	13.0	35.2	43.3

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5	100.0		
4.75	98.0		
2	96.4		
0.425	91.5		
0.075	78.5		

* (no specification provided)

Soil Description

moderate plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 24.0%

Atterberg Limits

LL= 38 PL= 18 PI= 20

Coefficients

D_{85}= 0.178 D_{60}= 0.018 D_{50}= 0.008
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

Group Index = 15

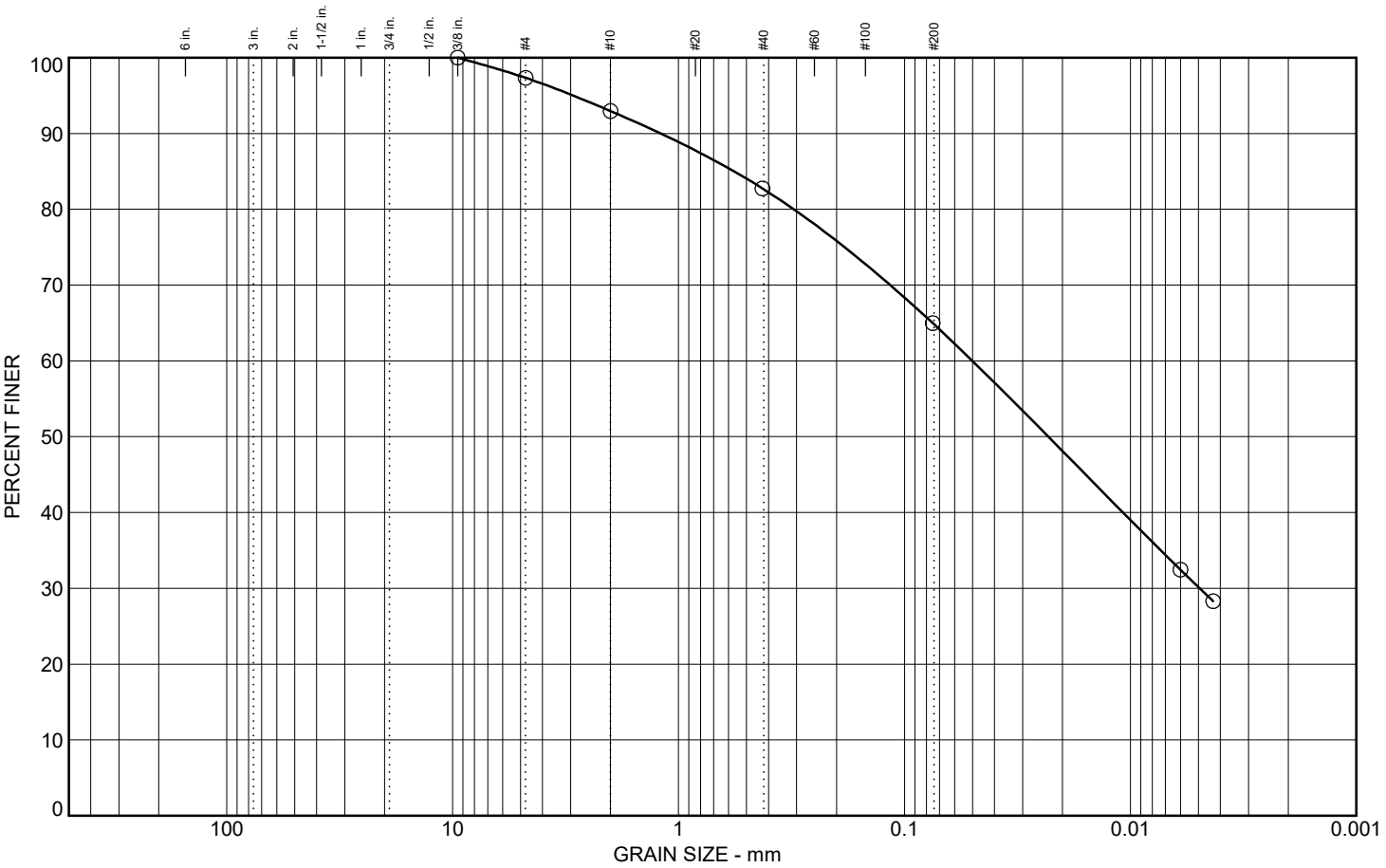
Sample No.: S-4 **Source of Sample:** NC-111 **Date:**
Location: - **Depth / Elev:** 5.5'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus

Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.7	4.4	10.2	17.8	34.8	30.2

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5	100.0		
4.75	97.3		
2	92.9		
0.425	82.7		
0.075	65.0		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 17.8%

Atterberg Limits

LL= 28 PL= 16 PI= 12

Coefficients

D_{85}= 0.599 D_{60}= 0.051 D_{50}= 0.023
D_{30}= 0.005 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

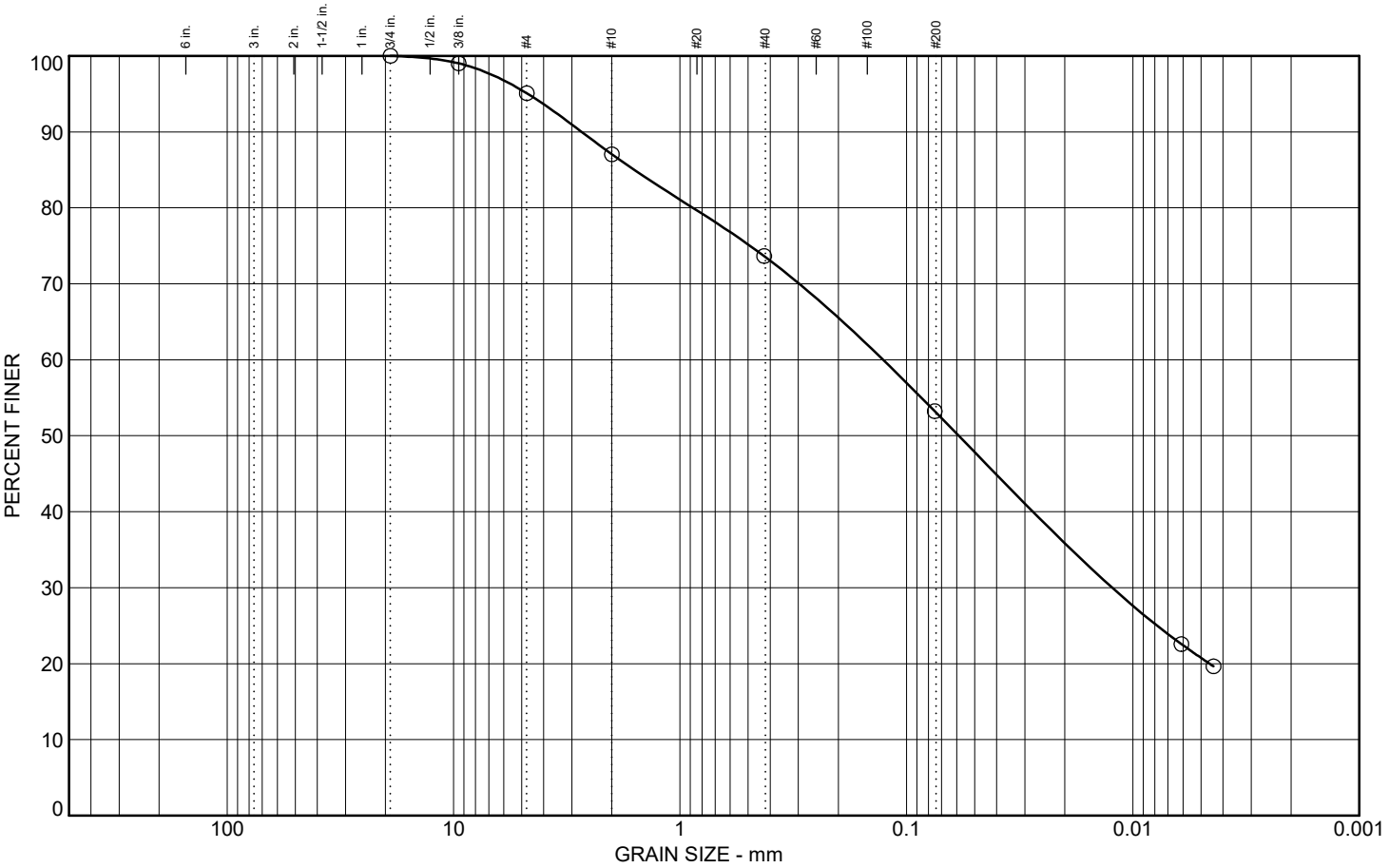
Remarks

Group Index = 5

Sample No.: S-3 **Source of Sample:** NC-112 **Date:**
Location: - **Depth / Elev:** 4'

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	4.9	8.0	13.4	20.4	32.4	20.8

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	99.0		
4.75	95.1		
2	87.0		
0.425	73.6		
0.075	53.2		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 13.0%

Atterberg Limits

LL= 22 PL= 14 PI= 8

Coefficients

D_{85}= 1.579 D_{60}= 0.133 D_{50}= 0.058
D_{30}= 0.011 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-4

Remarks

Group Index = 1

Sample No.: S-1 **Source of Sample:** NHS-2 **Date:**
Location: - **Depth / Elev:** 1'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - Central Columbus
Project No: 2221-3009.00 **Figure**