Appendix D:
Right-of-Way Contact List / Affected Property Owners

Franklin County	
John O'Grady	Kevin L. Boyce
Franklin County Commissioner	Franklin County Commissioner
President	373 S. High Street
373 S. High Street	Columbus, Ohio 43215
Columbus, Ohio 43215	
Erica C. Crawley	Kenneth N. Wilson
Franklin County Commissioner	Franklin County Administrator
373 S. High Street	373 S. High Street
Columbus, Ohio 43215	Columbus, Ohio 43215
Jennifer Fish	Adam W. Fowler, P.E., P.S.
Franklin County Soil and Water	Franklin County Engineer
1404 Goodale Boulevard, Suite 100	970 Dublin Road
Columbus, Ohio 43212	Columbus, Ohio 43215

City of Upper Arlington	
Ukeme Awakessien Jeter	Heidi Munc
City of Upper Arlington Council President / Mayor	City of Upper Arlington Council
3600 Tremont Rd	3600 Tremont Rd
Upper Arlington, OH 43221	Upper Arlington, OH 43221
614-583-5040	614-583-5040
Brian C. Close	John J Kulewicz
City of Upper Arlington Council Vice President	City of Upper Arlington Council
3600 Tremont Rd	3600 Tremont Rd
Upper Arlington, OH 43221	Upper Arlington, OH 43221
614-583-5040	614-583-5040
Kathy Adams	Jim Lynch
City of Upper Arlington Council	City of Upper Arlington Council
3600 Tremont Rd	3600 Tremont Rd
Upper Arlington, OH 43221	Upper Arlington, OH 43221
614-583-5040	614-583-5040
Todd Walter	Krystal Gonchar
City of Upper Arlington Council	City of Upper Arlington City Clerk
3600 Tremont Rd	3600 Tremont Rd
Upper Arlington, OH 43221	Upper Arlington, OH 43221
614-583-5040	614-583-5040
August Polen	Steven Schoeny
City of Upper Arlington Deputy Clerk of Courts	City of Upper Arlington City Manager
3600 Tremont Rd	3600 Tremont Rd
Upper Arlington, OH 43221	Upper Arlington, OH 43221
614-583-5060	614-583-5040
Chad Gibson	Aaron Scott
City of Upper Arlington Community Development	City of Upper Arlington Engineering Division
3600 Tremont Rd	4100 Roberts Rd
Upper Arlington, OH 43221	Upper Arlington, OH 43221
614-583-5074	614-583-5351

Clinton Township	
Jessica Jessberger	Rebecca Grimm
Clinton Township Trustee	Clinton Township Trustee
3820 Cleveland Avenue	3820 Cleveland Avenue
Columbus, Ohio 43224	Columbus, Ohio 43224
614-257-7433	614-361-2732
David Clark	
Clinton Township Trustee	
3820 Cleveland Avenue	
Columbus, Ohio 43224	
614-499-8803	

City of Columbus	
Hon. Andrew Ginther	Shannon G. Hardin
City of Columbus Mayor	City of Columbus Council President
90 W. Broad Street	90 W. Broad Street
Columbus, Ohio 43215	Columbus, Ohio 43215
Nancy Day-Achauer	Nicholas Bankston
Councilmember	Councilmember
90 W. Broad Street	90 W. Broad Street
Columbus, Ohio 43215	Columbus, Ohio 43215
Lourdes Barroso de Padilla	Rob Dorans
Councilmember	President Pro Tem
90 W. Broad Street	90 W. Broad Street
Columbus, Ohio 43215	Columbus, Ohio 43215
Otto Beatty	Emmanuel V. Remy
Councilmember	Councilmember
90 W. Broad Street	90 W. Broad Street
Columbus, Ohio 43215	Columbus, Ohio 43215
Melissa Green	Christopher L. Wyche
Councilmember	Councilmember
90 W. Broad Street	90 W. Broad Street
Columbus, Ohio 43215	Columbus, Ohio 43215
Scott Messer	Kelly Scocco
City of Columbus Director	City of Columbus Director
Department of Building and Zoning Services	Department of Public Service
111 N. Front Street	111 N. Front Street
Columbus, Ohio 43215	Columbus, Ohio 43215

Affected Property Owners	
State of Ohio	Dewey Mann
Ohio State University	Director of Waterman
1534 N High St	2490 Carmack Rd
Columbus OH 43201	Columbus, OH 43210
Cindy Kennedy	
Assistant Director of Real Estate Operations	
1534 N High St	
Columbus OH 43201	

Perry Township	
Chet J Chaney	Andy English
Perry Township Trustee	Perry Township Trustee
7125 Sawmill Road	7125 Sawmill Road
Dublin, OH 43016	Dublin, OH 43016
614-889-2669	614-889-2669
James Roper	
Perry Township Trustee	
7125 Sawmill Road	
Dublin, OH 43016	
614-889-2669	

Attachment E

1501 Reedsdale Street
Suite 302
Pittsburgh, PA 15233
Main: 877 627 3772

Colliers Engineering & Design

Memorandum

To: NiSource Inc.

From: Jacqueline M. McCort

Date: June 28, 2024

Subject: Threatened and Endangered Species Review

North Columbus High Pressure (NCHP) Pipeline Project - University

Project No.: 21004202A

On behalf of NiSource Inc., Colliers Engineering & Design (CED) conducted a Threatened and Endangered Species Desktop Review for the North Columbus High Pressure (NCHP) Pipeline Project – University located north of Columbus, Ohio within Franklin County (hereinafter referred to as "Project Study Area"). The University Project includes the installation of 20-inch-high pressure steel pipelines and additional workspaces. A total of 2.15 miles of 20-inch pipeline is proposed. A total of 2.36 acres of additional workspace is proposed.

The Project Study Area is comprised of a 100-foot wide survey corridor centered on the proposed pipeline alignment for 2.15 miles. The Project Study Area is located at latitudinal coordinates 40.010514 N and longitudinal coordinates -83.014027 W. The additional workspaces are located adjacent to the project alignment, near the central and eastern end of the alignment. Access to these additional workspaces can be achieved from Defiance Drive and Kenny Road. Access to the Subject Property can be achieved from Ackerman Road, N Star Road, Kenny Road, Ridgeview Road, and Brandon Road. The Project Study Area is located in Upper Arlington, Ohio (Figure 1, **Appendix A**). Based on a review of the *Northwest Columbus Ohio* Quadrangle USGS Map and historical aerial photographs, the Project Study Area appears to be mainly residential/commercial properties with small, forested areas. The Project Study Area is relatively flat with elevations that range from 750 to 950 feet above mean sea level (MSL). The Project Study Area is located in the Eastern Corn Belt Plains ecoregion.

Some populations of plants and animals are declining because of natural forces or their inability to coexist with human activity. Plants and animals with Endangered or Threatened status are protected under the Endangered Species Act (ESA) of 1973 (16 US 1531 et seq.). Federal Species of Concern (FSC) are species not legally protected under the ESA and are not subject to any of its provisions, including Section 7, until they are formally proposed or listed as Endangered or Threatened.

CED conducted a threatened and endangered species review to become aware of the potential presence of Endangered or Threatened listed species that are located within the Project Study Area

or within the vicinity. The United States Fish and Wildlife Service (USFWS) web page was reviewed to determine species that have Federal protection in Franklin County within the state of Ohio. A refined search, using the USFWS Information for Planning and Consultation (IPaC) database, was performed to provide a more detailed list of species and critical habitat under USFWS jurisdiction that are known or expected to occur within the Project Study Area. Table 1 provides the USFWS IPaC Species List for the Project Study Area (full document is provided in **Appendix B**). Upon our request of a project review, USFWS provided initial recommendations dated August 15, 2023, and indicated they do not anticipate adverse effects to federally endangered, threatened, or proposed species, or proposed or designated critical habitat (letter is provided in **Appendix C**). This determination was reiterated by USFWS in their updated recommendations dated February 6, 2024 (letter provided in **Appendix C**).

In addition to the review of federal databases, CED conducted a review of the Ohio Department of Natural Resources (ODNR) web page regarding natural heritage resources surrounding the Project Study Area. The ODNR provides results of potential occurrences of rare species, natural communities, and federally listed species that have been documented within the immediate vicinity of the Project Study Area. Table 2 lists species that, as of May 22, 2023, potentially occur in Franklin County. CED submitted an initial consultation letter on May 24, 2024, to the ODNR requesting comment. ODNR database results were received on June 26th, 2024 (**Appendix D**). Table 3 provides the ODNR Natural Heritage Database that has listed six (6) species that occur within one (1) mile of the project area; however, none have been noted by ODNR as having been recorded within the project limits.

Table 1. USFWS IPaC Species List for Project Study Area

Common Name	Scientific Name	Status
Insects		
Monarch Butterfly	*Danaus plexippus*	C
Mammals		
Indiana Bat	*Myotis sodalis*	E
Northern Long-eared Bat	*Myotis septentrionalis*	E
Tricolored Bat	*Perimyotis subflavus*	PE
Clams		
Rayed Bean	*Villosa fabalis*	E
Salamander Mussel	*Simpsonaias ambigua*	PE

Notes:
E – Federally Endangered.
T – Federally Threatened.
PE – Proposed Endangered.

PT – Proposed Threatened.
C – Candidate Species.

Table 2. ODNR Franklin County Species List as of May 22, 2023

Common Name	Scientific Name	State Status	Federal Status
Mammals			
Indiana Myotis	*Myotis sodalis*	E	E
Black Bear	*Ursus americanus*	E	-
Northern Long-eared Bat	*Myotis septentrionalis*	T	T
Star-nosed Mole	*Condylura cristata*	SC	-
Big Brown Bat	*Eptesicus fuscus*	SC	-
Red Bat	*Lasiurus borealis*	SC	-
Hoary Bat	*Lasiurus cinereus*	SC	-
Snowshoe Hare	*Lepus americanus*	SC	-
Woodland Vole	*Microtus pinetorum*	SC	-
Ermine	*Mustela erminea*	SC	-
Little Brown Bat	*Myotis lucifugus*	SC	-
Tri-colored Bat	*Perimyotis subflavus*	SC	-
Deer Mouse	*Peromyscus maniculatus*	SC	-
Smoky Shrew	*Sorex fumeus*	SC	-
Southern Bog Lemming	*Synaptomys cooperi*	SC	-
Badger	*Taxidea taxus*	SC	-
Common Gray Fox	*Urocyon cinereoargenteus*	SC	-
Evening Bat	*Nycticeius humeralis*	SI	-
American Bison	*Bison bison*	X	-

Birds			
Upland Sandpiper	*Bartramia longicauda*	E	-
American Bittern	*Botaurus lentiginosus*	E	-
Cattle Egret	*Bubulucus ibis*	E	-
Lark Sparrow	*Chondestes grammacus*	E	-
Northern Harrier	*Circus hudsonius*	E	-
Sandhill Crane	*Grus canadensis*	T	-
Least Bittern	*Ixobrychus exilis*	T	-
Black-crowned Night-Heron	*Nycticorax nycticorax*	T	-
Barn Owl	*Tyto alba*	T	-
Sharp-sinned Hawk	*Accipiter striatus*	SC	-
Henslow's Sparrow	*Ammodramus henslowii*	SC	-
Grasshopper Sparrow	*Ammodramus savannarum*	SC	-
Great Egret	*Ardea alba*	SC	-
Common Nighthawk	*Chordeiles minor*	SC	-
Sedge Wren	*Cistothorus platensis*	SC	-
Black-billed Cuckoo	*Coccyzus erythropthalmus*	SC	-
Northern Bobwhite	*Colinus virginianus*	SC	-
Bobolink	*Dolichonyx oryzivorus*	SC	-
American Coot	*Fulica americana*	SC	-
Common Gallinule	*Gallinula galeata*	SC	-
Red-headed Woodpecker	*Melanerpes erythrocephalus*	SC	-
Vesper Sparrow	*Pooecetes gramineus*	SC	-

Sora Rail	*Porzana carolina*	SC	-
Prothonotary Warbler	*Protonotaria citrea*	SC	-
Virginia Rail	*Rallus limicola*	SC	-
Cerulean Warbler	*Setophaga cerulea*	SC	-
Northern Shoveler	*Anas clypeata*	SI	-
Green-Winged Teal	*Anas crecca*	SI	-
American Black Duck	*Anas rubripes*	SI	-
Veery	*Catharus fuscescens*	SI	-
Hermit Thrush	*Catharus guttatus*	SI	-
Brown Creeper	*Certhia americana*	SI	-
Least Flycatcher	*Empidonax minimus*	SI	-
Wilsons Snipe	*Gallinago delicata*	SI	-
Dark-eyed Junco	*Junco hyemalis*	SI	-
Yellow-crowned Night-Heron	*Nyctanassa violacea*	SI	-
Nashville Warbler	*Oreothlypis ruficapilla*	SI	-
Northern Waterthrush	*Parkesia noveboracensis*	SI	-
Golden-crowned Kinglet	*Regulus satrapa*	SI	-
Blackburnian Warbler	*Setophaga fusca*	SI	-
Magnolia Warbler	*Setophaga magnolia*	SI	-
Red-breasted Nuthatch	*Sitta canadensis*	SI	-

Yellow-bellied Sapsucker	*Sphyrapicus varius*	SI	-
Winter Wren	*Troglodytes hiemalis*	SI	-
Golden-winged Warbler	*Vermivora chrysoptera*	SI	-
Bell's Vireo	*Vireo bellii*	SI	-
Insects			
-	*Chimarra socia*	E	-
Two-spotted Skipper	*Euphyes bimacula*	SC	-
-	*Agroperina lutosa*	SC	-
Precious Underwing	*Catocala pretiosa*	SC	-
Slender Clearwing	*Hemaris gracilis*	SI	-
Fish			
Iowa Darter	*Etheostoma exile*	E	-
Spotted Darter	*Etheostoma maculatum*	E	-
Tonguetied Minnow	*Exoglossum laurae*	E	-
Goldeye	*Hiodon alosoides*	E	-
Northern Brook Lamprey	*Ichthyomyzon fossor*	E	-
Shortnose Gar	*Lepisosteus platostomus*	E	-
Popeye Shiner	*Notropis ariommus*	E	-
Lake Chubsucker	*Erimyzon sucetta*	T	-
Tippecanoe Darter	*Etheostoma tippecanoe*	T	-
Paddlefish	*Polyodon spathula*	T	-
Muskellunge	*Esox masquinongy*	SC	-
Blue catfish	*Ictalurus furcatus*	SC	-

Blacknose Shiner	*Notropis heterolepis*	X	-
Longhead Darter	*Percina macrocephata*	X	-
Clams/Mollusk			
Butterfly	*Ellipsaria lineolata*	E	-
Elephant-ear	*Elliptio crassidens*	E	-
Purple Cats paw	*Epioblasma obliquata*	E	E
Snuffbox	*Epioblasma triquetra*	E	E
Longsolid	*Fusconaia subrotunda*	E	-
Pink Mucket	*Lampsilis abrupta*	E	E
Pocketbook	*Lampsilis ovata*	E	-
Washboard	*Megalonaias nervosa*	E	-
Clubshell	*Pleurobema clava*	E	E
Ohio Pigtoe	*Pleurobema cordatum*	E	-
Rabbitsfoot	*Theliderma cylindrica*	E	T
Rayed Bean	*Villosa fabalis*	E	E
Black Sandshell	*Ligumia recta*	T	-
Threehorn Wartyback	*Obliquaria reflexa*	T	-
Fawnsfoot	*Truncilla donaciformis*	T	-
Pondhorn	*Uniomerus tetralasmus*	T	-
Elktoe	*Alasmidonta marginata*	SC	-
Purple Wartyback	*Cyclonaias tuberculata*	SC	-
Wavy-rayed Lampmussel	*Lampsilis fasciola*	SC	-
Creek Heelsplitter	*Lasmigona compressa*	SC	-
Round Pigtoe	*Pleurobema sintoxia*	SC	-

Kidneyshelll	*Ptychobranchus fasciolaris*	SC	-
Deertoe	*Truncilla truncata*	SC	-
Mucket	*Actinonaias ligamentina ligamentina*	X	-
Rough Pigtoe	*Pleurobema plenum*	X	-
Reptiles/Amphibians			
Smooth Greensnake	*Opheodrys vernalis*	E	-
Eastern Cricket Frog	*Acris crepitans crepitans*	SC	-
Four-toed Salamander	*Hemidactylium scutatum*	SC	-
Flowering Plants			
American Sweet-flag	*Acorus americanus*	P	-
Gattinger's-foxglove	*Agalinis gattingeri*	T	-
Spreading Rock Cress	*Arabis patens*	E	-
Prairie False Indigo	*Baptisia lacteal*	P	-
Prairie Brome	*Bromus kalmii*	P	-
Pale Umbrella-sedge	*Carex acuminatus*	E	-
Cypress-knee Sedge	*Carex decomposita*	P	-
Tall Larkspur	*Delphinium exaltatum*	P	-
One-sided Rush	*Juncus secundus*	P	-
Scaly Blazing-star	*Liatris squarrosa*	P	-
Weak Spear Grass	*Poa saltuensis ssp. Languida*	P	-
Abor Vitae	*Thuja occidentalis*	P	-
Three-birds Orchid	*Triphora trianthophora*	P	-
Rock Elm	*Ulmus thomasii*	P	-

Notes:

E – Endangered.
T – Threatened.
X – Extirpated.
P – Proposed Threatened.
C – Candidate Species.
SC – Species of Concern.
SI – Special Interest

Table 3. ODNR's Natural Heritage Database data within one (1)-mile of the project area

Common Name	Scientific Name	Status
Lark Sparrow	*Chondestes grammacus*	E
Purple Wartyback	*Cyclonaias tuberculata*	SC
Elktoe	*Alasmidonta marginata*	SC
Wavy-rayed Lampmussel	*Lampsilis fasciola*	SC
Black Sandshell	*Ligumia recta*	SC
Round Pigtoe	*Pleurobema sintoxia*	SC
Kidneyshell	*Ptychobranchus fasciolaris*	SC

Notes:
E – Endangered.
T – Threatened.
X – Extirpated.
P – Proposed Threatened.
C – Candidate Species.
SC – Species of Concern.
SI – Special Interest

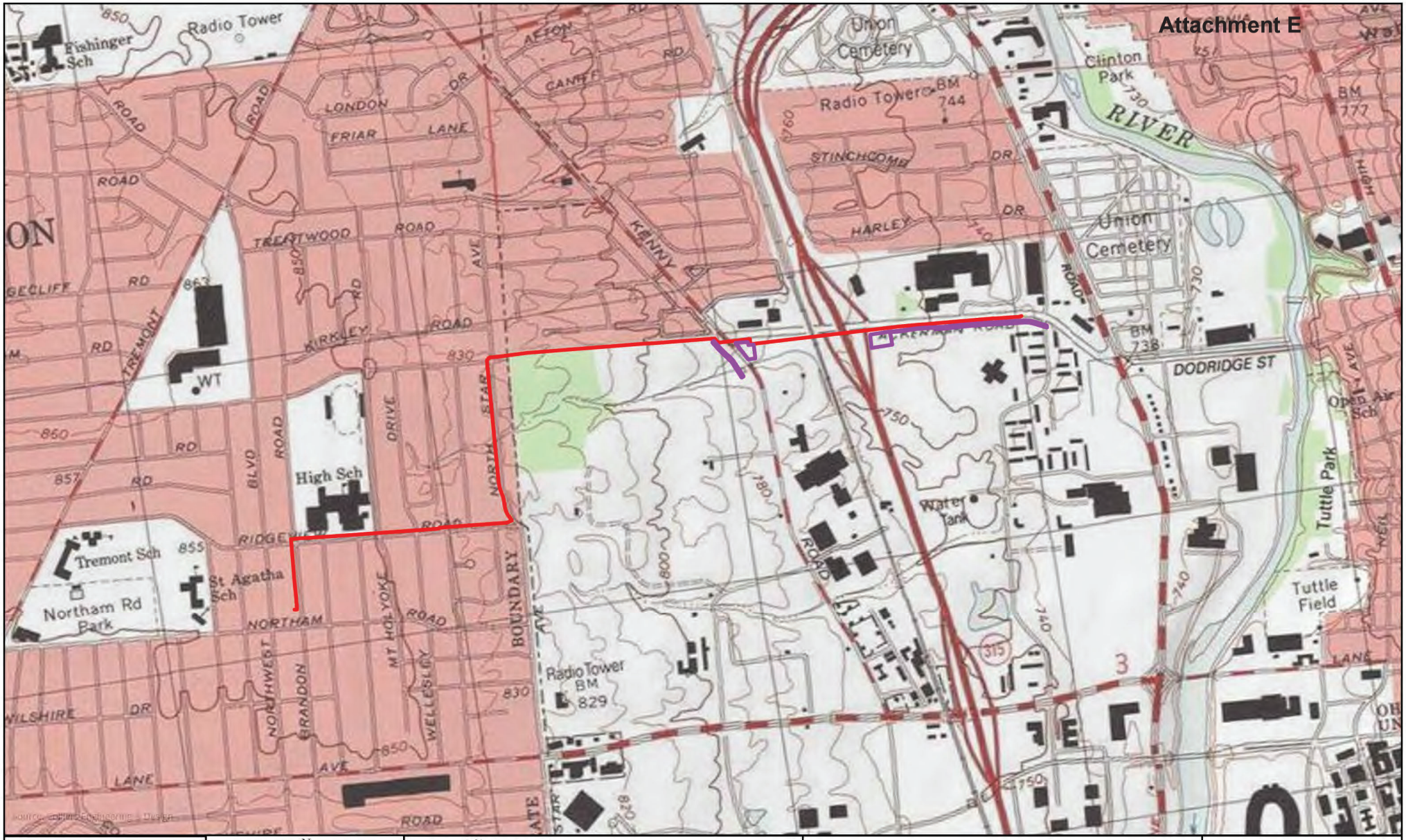
A Threatened and Endangered Species Desktop Review was conducted for the North Columbus High Pressure Pipeline Project – University Project. The Project Study Area appears to be within developed land uses. In summary, the comprehensive database search determined there is the potential for six (6) species with federal protection to occur within the Project Study Area; however, the USFWS does not anticipate any adverse impacts to these species based on the proposed project design. The ODNR does not have record of any protected species occurring within the project limits. All species identified by ODNR as occurring within one mile of the project limits are freshwater mussels with the exception of Lark sparrow. All native mussel species are protected in Ohio and consultation with ODNR regarding the trenching of a perennial stream near Kenny Road is ongoing to ensure that the project will have no adverse impacts on mussel populations. Lark sparrows require open grassy habitats with

scattered trees and shrubs for breeding, including orchards, fallow fields, open woodlands, mesquite grasslands, savanna, sagebrush steppe, and grasslands. Such habitat is not present within the proposed alignment. When not within existing paved roadway, the alignment traverses through mowed/maintained lawn and wooded edge on the periphery of agricultural fields on the OSU campus and surrounding area.

Colliers
Engineering
& Design

APPENDIX A

Attachment E



Prepared For:

NiSource Inc.
801 E. 86th Avenue
Merrillville, IN 46410

Prepared By:

Colliers Engineering & Design

Pittsburgh Office
1501 Reedsdale Street, Ste 302
Pittsburgh, PA 15233
T: 610.254.9140

N
W E
S

0 0.05 0.1 0.2
Miles
0 0.1 0.2 0.4
Kilometers

Scale: 1:18,000

Alignment
Workspaces

Vicinity Map

University

Franklin County, Ohio

Date Saved: 5/31/2024	CED PN:21004202A	Revised by: MF

Figure 1

Colliers
Engineering
& Design

APPENDIX B

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ohio Ecological Services Field Office
4625 Morse Road, Suite 104
Columbus, OH 43230-8355
Phone: (614) 416-8993 Fax: (614) 416-8994

In Reply Refer To: 05/23/2024 15:36:20 UTC
Project Code: 2024-0094888
Project Name: NCHP Phase 2 - University

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological

evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see https://www.fws.gov/program/migratory-bird-permit/what-we-do.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see https://www.fws.gov/library/collections/threats-birds.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit https://www.fws.gov/partner/council-conservation-migratory-birds.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Code in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

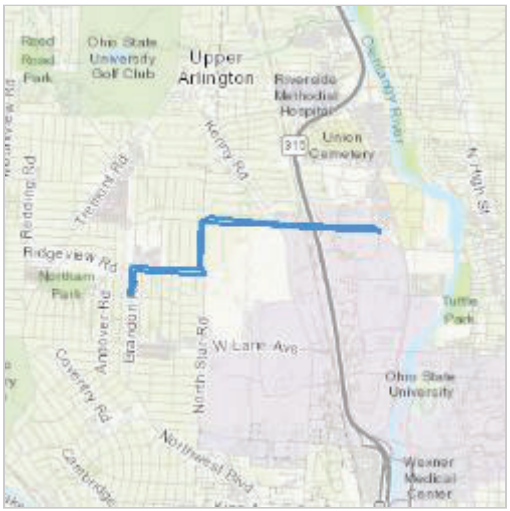
This species list is provided by:

Ohio Ecological Services Field Office
4625 Morse Road, Suite 104
Columbus, OH 43230-8355
(614) 416-8993

PROJECT SUMMARY

Project Code: 2024-0094888
Project Name: NCHP Phase 2 - University
Project Type: Natural Gas Distribution
Project Description: Installation of natural gas utility line
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@40.0156047,-83.04808601571494,14z



Counties: Franklin County, Ohio

ENDANGERED SPECIES ACT SPECIES

There is a total of 6 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 1 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Indiana Bat *Myotis sodalis* There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/5949	Endangered
Northern Long-eared Bat *Myotis septentrionalis* No critical habitat has been designated for this species. This species only needs to be considered under the following conditions: ▪ This species only needs to be considered if the project includes wind turbine operations. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat *Perimyotis subflavus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

CLAMS

NAME	STATUS
Rayed Bean *Villosa fabalis* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/5862	Endangered
Salamander Mussel *Simpsonaias ambigua* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/6208	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

IPAC USER CONTACT INFORMATION

Agency: Colliers Engineering & Design
Name: Tanner Dickson
Address: 5275 Parkway Plaza Blvd
Address Line 2: Suite 100
City: Charlotte
State: NC
Zip: 28217
Email tanner.dickson@collierseng.com
Phone: 8909803033

Colliers
Engineering
& Design

APPENDIX C

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993 / FAX (614) 416-8994

August 15, 2023

Project Code: 2023-0084418

Dear Tanner Dickson:

The U.S. Fish and Wildlife Service (Service) has received your recent correspondence requesting information about the subject proposal. We offer the following comments and recommendations to assist you in minimizing and avoiding adverse impacts to threatened and endangered species pursuant to the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq), as amended (ESA).

Federally Threatened and Endangered Species: Due to the project type, size, location, and the proposed implementation of seasonal tree cutting (clearing of trees ≥3 inches diameter at breast height between October 1 and March 31) to avoid impacts to the endangered Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*), and the proposed endangered tri-colored bat (*Perimyotis subflavus*) we do not anticipate adverse effects to any other federally endangered, threatened, or proposed species, or proposed or designated critical habitat. Should the project design change, or additional information on listed or proposed species or their critical habitat become available, or if new information reveals effects of the action that were not previously considered, coordination with the Service should be initiated to assess any potential impacts.

Section 7 Coordination: If there is a federal nexus for the project (e.g., federal funding provided, federal permits required to construct), then no tree clearing should occur on any portion of the project area until consultation under section 7 of the ESA, between the Service and the federal action agency, is completed. We recommend the federal action agency submit a determination of effects to this office, relative to the Indiana bat and northern long-eared bat, for our review and concurrence. This letter provides technical assistance only and does not serve as a completed section 7 consultation document.

Stream and Wetland Avoidance: Over 90% of the wetlands in Ohio have been drained, filled, or modified by human activities, thus is it important to conserve the functions and values of the remaining wetlands in Ohio (https://epa.ohio.gov/portals/47/facts/ohio_wetlands.pdf). We recommend avoiding and minimizing project impacts to all wetland habitats (e.g., forests, streams, vernal pools) to the maximum extent possible in order to benefit water quality and fish and wildlife habitat. Additionally, natural buffers around streams and wetlands should be preserved to enhance beneficial functions. If streams or wetlands will be impacted, the U.S. Army Corps of Engineers should be contacted to determine whether a Clean Water Act section 404 permit is required. Best management practices should be used to minimize erosion, especially on slopes. Disturbed areas should be mulched and revegetated with native plant

species. In addition, prevention of non-native, invasive plant establishment is critical in maintaining high quality habitats.

Thank you for your efforts to conserve listed species and sensitive habitats in Ohio. We recommend coordinating with the Ohio Department of Natural Resources due to the potential for the proposed project to affect state listed species and/or state lands. Contact Mike Pettegrew, Environmental Services Administrator, at (614) 265-6387 or at mike.pettegrew@dnr.ohio.gov.

If you have questions, or if we can be of further assistance in this matter, please contact our office at (614) 416-8993 or ohio@fws.gov.

Sincerely,

Keith Lott
Acting Field Office Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993 / FAX (614) 416-8994

June 25, 2024

Project Code: 2024-0078967

Dear Tanner Dickson:

The U.S. Fish and Wildlife Service (Service) has received your recent correspondence requesting information about the subject proposal. We offer the following comments and recommendations to assist you in minimizing and avoiding adverse impacts to threatened and endangered species pursuant to the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq), as amended (ESA).

Federally Threatened and Endangered Species: Due to the project type, size, location, and the proposed implementation of seasonal tree cutting (clearing of trees ≥3 inches diameter at breast height between October 1 and March 31) to avoid impacts to the endangered Indiana bat (*Myotis sodalis*) and northern long-eared bat (*Myotis septentrionalis*), and the proposed endangered tricolored bat (*Perimyotis subflavus*) we do not anticipate adverse effects to any other federally endangered, threatened, or proposed species, or proposed or designated critical habitat. Should the project design change, or additional information on listed or proposed species or their critical habitat become available, or if new information reveals effects of the action that were not previously considered, coordination with the Service should be initiated to assess any potential impacts.

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Stream and Wetland Avoidance: Over 90% of the wetlands in Ohio have been drained, filled, or modified by human activities, thus is it important to conserve the functions and values of the remaining wetlands in Ohio (https://epa.ohio.gov/portals/47/facts/ohio_wetlands.pdf). We recommend avoiding and minimizing project impacts to all wetland habitats (e.g., forests, streams, vernal pools) to the maximum extent possible in order to benefit water quality and fish and wildlife habitat. Additionally, natural buffers around streams and wetlands should be preserved to enhance beneficial functions. If streams or wetlands will be impacted, the U.S. Army Corps of Engineers should be contacted to determine whether a Clean Water Act section 404 permit is required. Best management practices should be used to minimize erosion, especially on slopes. Disturbed areas should be mulched and revegetated with native plant

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If you have questions, or if we can be of further assistance in this matter, please contact our office at (614) 416-8993 or ohio@fws.gov.

Sincerely,

Erin Knoll
Field Office Supervisor

Colliers
Engineering
& Design

APPENDIX D

Ohio Department of Natural Resources

MIKE DEWINE, GOVERNOR MARY MERTZ, DIRECTOR

Office of Real Estate
Tara Paciorek, Chief
2045 Morse Road – Bldg. E-2
Columbus, Ohio 43229
Phone: (614) 265-6661
Fax: (614) 267-4764

June 26, 2024

Tanner Dickson
Colliers Engineering & Design
5275 Parkway Plaza Boulevard, Suite 100
Charlotte, North Carolina 28217

Re: 24-0809_#21004202A NCHP University Phase 2

Project: The proposed project involves the installation of 2.15 miles of 20-inch-high pressure steel pipelines and some additional workspaces.

Location: The proposed project is located in Perry and Clinton townships, Franklin County, Ohio.

The Ohio Department of Natural Resources (ODNR) has completed a review of the above referenced project. These comments were generated by an inter-disciplinary review within the Department. These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act, the Coastal Zone Management Act, Ohio Revised Code and other applicable laws and regulations. These comments are also based on ODNR's experience as the state natural resource management agency and do not supersede or replace the regulatory authority of any local, state, or federal agency nor relieve the applicant of the obligation to comply with any local, state, or federal laws or regulations.

Natural Heritage Database: The Natural Heritage Database has the following data within one mile of the project area:

Lark Sparrow (*Chondestes grammacus*), E
Elktoe (*Alasmidonta marginata*), SC
Purple Wartyback (*Cyclonaias tuberculata*), SC
Wavy-rayed Lampmussel (*Lampsilis fasciola*), SC
Round Pigtoe (*Pleurobema sintoxia*), SC
Kidneyshell (*Ptychobranchus fasciolaris*), SC

Conservation status abbreviations are as follows: E = state endangered; T = state threatened; P = state potentially threatened; SC = state species of concern; SI = state special interest; U = state status under review; X = presumed extirpated in Ohio; FE = federally endangered, and FT = federally threatened. The review was performed on the specified project area as well as an additional one-mile radius. Records searched date from 1980. Features searched include locations of rare and endangered plants and animals determined to be of value to the conservation of their species, high quality plant communities, animal breeding assemblages, and outstanding geological features.

The species listed above are not recorded within the boundaries of the specified project area. However, please note that Ohio has not been completely surveyed and we rely on receiving information from many

sources. Therefore, a lack of records for an area is not a statement that rare species or unique features are absent from that area.

Fish and Wildlife: The Division of Wildlife (DOW) has the following comments.

The DOW recommends that impacts to streams, wetlands and other water resources be avoided and minimized to the fullest extent possible, and that Best Management Practices be utilized to minimize erosion and sedimentation.

The project is within the vicinity of records for the little brown bat (*Myotis lucifugus*), a state endangered species. Because presence of state endangered bat species has been established in the area, summer tree cutting is not recommended, and additional summer surveys would not constitute presence/absence in the area. However, limited summer tree cutting inside this buffer may be acceptable after further consultation with DOW (contact Eileen Wyza at Eileen.Wyza@dnr.ohio.gov).

In addition, the entire state of Ohio is within the range of the Indiana bat (*Myotis sodalis*), a state endangered and federally endangered species, the northern long-eared bat (*Myotis septentrionalis*), a state endangered and federally endangered species, the little brown bat (*Myotis lucifugus*), a state endangered species, and the tricolored bat (*Perimyotis subflavus*), a state endangered species. During the spring and summer (April 1 through September 30), these bat species predominately roost in trees behind loose, exfoliating bark, in crevices and cavities, or in the leaves. However, these species are also dependent on the forest structure surrounding roost trees. The DOW recommends tree cutting only occur from October 1 through March 31, conserving trees with loose, shaggy bark and/or crevices, holes, or cavities, as well as trees with DBH ≥ 20 if possible.

The DOW also recommends that a desktop habitat assessment is conducted, followed by a field assessment if needed, to determine if a potential hibernaculum is present within the project area. Direction on how to conduct habitat assessments can be found in the current USFWS "*RANGE-WIDE INDIANA BAT & NORTHERN LONG-EARED BAT SURVEY GUIDELINES*." If a habitat assessment finds that a potential hibernaculum is present within 0.25 miles of the project area, please send this information to Eileen Wyza for project recommendations. If a potential or known hibernaculum is found, the DOW recommends a 0.25-mile tree cutting and subsurface disturbance buffer around the hibernaculum entrance, however, limited summer or winter tree cutting may be acceptable after consultation with the DOW. If no tree cutting or subsurface impacts to a hibernaculum are proposed, this project is not likely to impact these species.

The project is within the range of the following listed mussel species.

Federally Endangered
clubshell (*Pleurobema clava*)
rayed bean (*Villosa fabalis*)
northern rifflesheIl (*Epioblasma torulosa rangiana*)
snuffbox (*Epioblasma triquetra*)
purple cat's paw (*Epioblasma o. obliquata*)

Federally Threatened
rabbitsfoot (*Quadrula cylindrica cylindrica*)

State Endangered
elephant-ear (*Elliptio crassidens crassidens*)
pocketbook (*Lampsilis ovata*)

long solid (*Fusconaia maculata maculate*)
washboard (*Megalonaias nervosa*)
Ohio pigtoe (*Pleurobema cordatum*)

State Threatened
pondhorn (*Uniomerus tetralasmus*)
Salamander Mussel (*Simpsonaias ambigua*)

Due to the location, and that there is no in-water work proposed in a perennial stream of sufficient size, this project is not likely to impact these species.
This project must not have an impact on native mussels. This applies to both listed and non-listed species, as all species of mussel are protected in Ohio. Per the Ohio Mussel Survey Protocol (2022), all Group 2, 3, and 4 streams (Appendix A) require a mussel survey. Per the Ohio Mussel Survey Protocol, Group 1 streams (Appendix A) and unlisted streams with a watershed of 5 square miles or larger above the point of impact should be assessed using the Reconnaissance Survey for Unionid Mussels (Appendix B) to determine if mussels are present. Mussel surveys may be recommended for these streams as well. Therefore, if in-water work is planned in any stream that meets any of the above criteria, the DOW recommends the applicant provide information to indicate no mussel impacts will occur. If this is not possible, the DOW recommends a professional malacologist conduct a mussel survey in the project area. If mussels that cannot be avoided are found in the project area, the DOW recommends a professional malacologist collect and relocate the mussels to suitable and similar habitat upstream of the project site. Mussel surveys and any subsequent mussel relocation should be done in accordance with the Ohio Mussel Survey Protocol. If there is no in-water work proposed, impacts to mussels are not likely.

The project is within the range of the following listed fish species.

State Endangered
goldeye (*Hiodon alosoides*)
shortnose gar (*Lepisosteus platostomus*)
Iowa darter (*Etheostoma exile*)
spotted darter (*Etheostoma maculatum*)
northern brook lamprey (*Ichthyomyzon fossor*)
tonguetied minnow (*Exoglossum laurae*)
popeye shiner (*Notropis ariommus*)

State Threatened
lake chubsucker (*Erimyzon sucetta*)
paddlefish (*Polyodon spathula*)

The DOW recommends no in-water work in perennial streams from March 15 through June 30 to reduce impacts to indigenous aquatic species and their habitat. If no in-water work is proposed in a perennial stream, this project is not likely to impact these or other aquatic species.

Due to the potential of impacts to federally listed species, as well as to state listed species, we recommend that this project be coordinated with the US Fish & Wildlife Service.

Thank you for affording us the opportunity to comment.

Water Resources: The Division of Water Resources has the following comment.

The local floodplain administrator should be contacted concerning the possible need for any floodplain permits or approvals for this project.

ODNR appreciates the opportunity to provide these comments. Please contact Mike Pettegrew at mike.pettegrew@dnr.ohio.gov if you have questions about these comments or need additional information.

Mike Pettegrew
Environmental Services Administrator

Ohio Department of Natural Resources

MIKE DEWINE, GOVERNOR MARY MERTZ, DIRECTOR

Office of Real Estate
Tara Paciorek, Chief
2045 Morse Road – Bldg. E-2
Columbus, OH 43229
Phone: (614) 265-6661
Fax: (614) 267-4764

June 28, 2023

Jacqueline McCort
Colliers Engineering & Design
5275 Parkway Plaza Boulevard, Suite 100
Charlotte, North Carolina 28217

Re: 23-0629; University Project

Project: The proposed project involves the installation of 20-inch-high pressure steel pipelines.

Location: The proposed project is located in Clinton Township, Franklin County, Ohio.

The Ohio Department of Natural Resources (ODNR) has completed a review of the above referenced project. These comments were generated by an inter-disciplinary review within the Department. These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.), the National Environmental Policy Act, the Coastal Zone Management Act, Ohio Revised Code and other applicable laws and regulations. These comments are also based on ODNR's experience as the state natural resource management agency and do not supersede or replace the regulatory authority of any local, state, or federal agency nor relieve the applicant of the obligation to comply with any local, state or federal laws or regulations.

Natural Heritage Database: The Natural Heritage Database has the following data within one mile of the project area:

Lark Sparrow (*Chondestes grammacus*), E
Yellow-crowned Night-heron (*Nyctanassa violacea*), SI
Elktoe (*Alasmidonta marginata*), SC
Purple Wartyback (*Cyclonaias tuberculata*), SC
Wavy-rayed Lampmussel (*Lampsilis fasciola*), SC
Black Sandshell (*Ligumia recta*), SC
Round Pigtoe (*Pleurobema sintoxia*), SC
Kidneyshell (*Ptychobranchus fasciolaris*), SC
Rayed Bean (*Villosa fabalis*), E, FE
Waterfall

The review was performed on the specified project area as well as an additional one-mile radius. Records searched date from 1980. Conservation status abbreviations are as follows: E = state endangered; T = state threatened; P = state potentially threatened; SC = state species of concern; SI = state special interest; U = state status under review; X = presumed extirpated in Ohio; FE = federally endangered, and FT = federally threatened. The species and features listed above are not recorded within the specified project area boundaries.

Please note that Ohio has not been completely surveyed and we rely on receiving information from many sources. Therefore, a lack of records for an area is not a statement that rare species or unique features are absent from that area.

Fish and Wildlife: The Division of Wildlife (DOW) has the following comments.

The DOW recommends that impacts to streams, wetlands and other water resources be avoided and minimized to the fullest extent possible, and that Best Management Practices be utilized to minimize erosion and sedimentation.

The project is within the vicinity of records for the little brown bat (*Myotis lucifugus*), a state endangered species. Because presence of state endangered bat species has been established in the area, summer tree cutting is not recommended, and additional summer surveys would not constitute presence/absence in the area. However, limited summer tree cutting inside this buffer may be acceptable after further consultation with DOW (contact Eileen Wyza at Eileen.Wyza@dnr.ohio.gov).

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rabbitsfoot (*Quadrula cylindrica cylindrica*)

State Endangered
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pocketbook (*Lampsilis ovata*)
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Mike Pettegrew
Environmental Services Administrator

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
4625 Morse Road, Suite 104
Columbus, Ohio 43230
(614) 416-8993 / FAX (614) 416-8994

June 25, 2024

Project Code: 2024-0078967

Dear Tanner Dickson:

The U.S. Fish and Wildlife Service (Service) has received your recent correspondence requesting information about the subject proposal. We offer the following comments and recommendations to assist you in minimizing and avoiding adverse impacts to threatened and endangered species pursuant to the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq), as amended (ESA).

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If you have questions, or if we can be of further assistance in this matter, please contact our office at (614) 416-8993 or ohio@fws.gov.

Sincerely,

Erin Knoll
Field Office Supervisor

Attachment F

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

Table of Contents

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

DLZ
ARCHITECTURE • ENGINEERING • PLANNING
SURVEYING • CONSTRUCTION SERVICES

INNOVATIVE IDEAS
EXCEPTIONAL DESIGN
UNMATCHED CLIENT SERVICE

FINAL REPORT
OF
SUBSURFACE EXPLORATION

NCHP Pipeline Project – University

Franklin County, Ohio

Prepared For:

Campos EPC, LLC
33 North LaSalle Street, Suite 3400
Chicago, IL 60602

Prepared By:

DLZ OHIO, INC.

DLZ Job No. 2221-3009.00

July 17, 2023

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 3.4 miles of new 20-inch and 24-inch steel gas pipeline along a corridor within the Cities of Upper Arlington and Columbus. 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 determined by performing a total of thirteen borings, designated as NC-201 to NC-209 and KR-1, KR-2, OH-1, and OH-2, for the project. Soil samples were obtained for visual classification.

The NC-200 series borings, except NC-208, generally encountered 3.5 to 13 inches of asphalt concrete at the ground surface. Beneath the asphalt concrete, boring NC-206 also encountered 3.5 inches of Portland cement concrete. The remaining borings NC-208, KR-1, KR-2, OH-1, and OH-2 were located off of paved surfaces and generally encountered 2 to 12 inches of topsoil, however, boring OH-1 located adjacent to an on-ramp shoulder did not encounter any topsoil.

Underlying the surface materials, borings NC-202, NC-203, NC-204, NC-207, NC-209, and OH-2 encountered fill and possible fill consisting of medium dense to dense granular soils (SP and SC-SM) and stiff to very stiff cohesive soils (CL and CL-ML). Underlying the fill, possible fill or surface materials, the NC-200 series borings generally encountered medium stiff to hard lean clay (CL) and silty clay (CL-ML) occasionally with interbedded layers of medium dense to dense sands (SC-SM) to the boring completion depths.

Boring OH-1 encountered medium stiff to hard cohesive soils (CL-ML) to a depth of 7 feet followed by loose to very dense granular soils (SP, GP, and ML) to the completion depth of the boring. Beneath the fill soil, boring OH-2 generally encountered approximately 10 feet of stiff to very stiff cohesive soils (ML and CL) followed by medium dense to very dense granular soils (SW) to the completion depth of 49.3 feet, where split-spoon refusal was encountered. Auger chatter was observed in both OH-1 and OH-2 between depths of 7.0 and 48.5 feet. Up to 4-inch diameter cobbles were observed in the auger cuttings in boring OH-1.

Borings KR-1 and KR-2 primarily encountered very stiff to hard cohesive soils (CL and CL-ML) throughout the depth of the borings.

Groundwater seepage was first encountered in borings NC-202, NC-209, KR-1, KR-2, OH-1, and OH-2 at depths of 4.0, 7.0, 38.5, 38.5, 8.5, and 13.5 feet, respectively. The remaining borings did not encounter groundwater seepage. At the completion of drilling, a measurable water level at the depth of 34.0 was recorded in boring NC-202. Sand heave was encountered in borings OH-1 and OH-2 at depths of 16.0 and 18.5 feet, respectively. Prior to adding water to suppress the sand heave, a measurable water level at 9.2 feet was reported in boring OH-1.

Open cut excavation methods are anticipated to be the primary installation method for the proposed gas pipeline, however, horizontal directional drilling methods are planned at two crossing locations. The proposed gas pipeline will generally be 6 to 8 feet below the existing ground surface within the open excavation portions of the alignment and at depths of 35 to 40 feet at the two crossing locations.

Open Excavation

Based on the boring information, medium stiff to hard clays with isolated areas of medium dense to dense sands are anticipated to be encountered underlying the surface materials to the invert elevations. Given the present scope of work for the project, the clay soils or sands 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.

Horizontal Directional Drilling

Borings KR-1 and KR-2 primarily encountered very stiff to hard cohesive soils (CL and CL-ML) throughout the depth of the borings. Both borings encountered an interbedded wet sand seam at depths of between approximately 38.5 and 40.0 feet.

Boring OH-1 generally encountered medium stiff to hard lean clay (CL-ML) and loose to very dense granular soils (SP, GP, and ML) to the completion depth of the boring. Boring OH-2 generally encountered medium dense to very dense granular soils (SW) to the completion depth of 49.3 feet, where a split-spoon refusal was encountered. Auger chatter was observed in both borings, and up to 4-inch diameter cobbles were observed in the auger cuttings in boring OH-1.

Obstructions

Drill rig chatter as well as cobbles were encountered in borings OH-1 and OH-2. It should be expected that cobbles or boulders will be encountered during installation of the trenchless crossing under SR-315. The difficulty of advancing through cobbles or boulders will vary based on their composition and size. Unconfined strengths of cobbles and boulders can be expected to be in excess of 30 ksi. 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.

Table of Contents

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 3.4 miles of new 20-inch and 24-inch steel gas pipeline along a corridor within the Cities of Upper Arlington and Columbus.

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.

3.0 EXPLORATION

3.1 FIELD EXPLORATION

A total of thirteen borings, designated as NC-201 to NC-209, KR-1, KR-2, OH-1, and OH-2, were drilled for the project between April 7 and June 22, 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) and Solid-Stem Augers (SSA). 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 presented in Appendix I. Boring logs and information concerning the drilling procedures are also presented in Appendix I. The ground surface elevations at the boring locations are listed on the individual boring logs.

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 NC-200 series borings, except NC-208, generally encountered 3.5 to 13 inches of asphalt concrete at the ground surface. Beneath the asphalt concrete, boring NC-206 also encountered 3.5 inches of Portland cement concrete. The remaining borings NC-208, KR-1, KR-2, OH-1, and OH-2 were located off of paved surfaces and generally encountered 2 to 12 inches of topsoil, however, boring OH-1 located adjacent to an on-ramp shoulder did not encounter any topsoil.

Underlying the surface materials, borings NC-202, NC-203, NC-204, NC-207, NC-209, and OH-2 encountered fill and possible fill consisting of medium dense to dense granular soils (SP and SC-SM) and stiff to very stiff cohesive soils (CL and CL-ML). Underlying the fill, possible fill, or surface materials, the borings generally encountered medium stiff to hard lean clay (CL) and silty clay (CL-ML) occasionally with interbedded layers of medium dense to dense sands (SC-SM) to the boring completion depths.

Boring OH-1 encountered medium stiff to hard cohesive soils (CL-ML) to a depth of 7 feet followed by loose to very dense granular soils (SP, GP, ML, SC-SM) to the completion depth of the boring. Beneath the fill soil, boring OH-2 generally encountered approximately 10 feet of stiff to very stiff cohesive soils (ML and CL) followed by medium dense to very dense granular soils (SW) to the completion depth of 49.3 feet, where a split-spoon refusal was encountered. Auger chatter was observed in both OH-1 and OH-2 between depths of 7.0 and 48.5 feet. Up to 4-inch diameter cobbles were observed in the auger cuttings in boring OH-1.

Borings KR-1 and KR-2 primarily encountered very stiff to hard cohesive soils (CL and CL-ML) throughout the depth of the borings.

4.1.1 SOIL CORROSIVITY

Selected soil samples were tested for potential corrosivity (pH, resistivity, redox potential, Chloride, Sulfate, Sulfide) and the available 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-201	5.5' - 7.0'	7.9	7.3	673	16.9	186	250	Positive
NC-204	5.5' - 7.0'	7.9	7.2	817	8.7	255.3	310	Positive
NC-208	5.5' - 7.0'	7.5	7.0	2680	-	-	290	-

4.2 GROUNDWATER CONDITIONS

Groundwater seepage was first encountered in borings NC-202, NC-209, KR-1, KR-2, OH-1, and OH-2 at depths of 4.0, 7.0, 38.5, 38.5, 8.5, and 13.5 feet, respectively. The remaining borings did not encounter groundwater seepage. At the completion of drilling, a measurable water level at the depth of 34.0 was recorded in boring NC-202. Sand heave was encountered in borings OH-1 and OH-2 at depths of between 16.0 and 18.5 feet, respectively. Prior to adding water to suppress the sand heave, a measurable water level at 9.2 feet was reported in boring OH-1.

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 two crossing locations where horizontal direction drilling construction is planned. The invert of the proposed gas pipeline will generally be 6 to 8 feet below the existing ground surface in open cuts and up to 38.6 feet deep at the two crossing locations. Based on the subsurface conditions encountered in the borings, stiff to hard clays are anticipated to be encountered at the invert elevations of the proposed gas pipeline. It should be noted that within the vicinity of the OSU crossing (KR-1 and KR-2) a thin wet sand

seam was encountered immediately below the anticipated invert elevations. Given the present scope of work for the project, the existing soils are considered suitable for support of the proposed work, provided the recommendations provided in this report are followed.

The primary geotechnical concerns associated with the planned improvements are the presence of groundwater above the anticipated invert elevations of the proposed pipeline and the potential presence of cobble/boulder obstructions along a portion of the proposed alignment.

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 approximately 6 to 8 feet along the open cut portions of the alignment. Based on the boring information, stiff to hard cohesive soils are generally anticipated to be encountered at this invert depth. According to the current project information, 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. Due to the inherent nature of glacial deposits at the project location, cobbles and boulders should be expected within the open excavations. 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.

5.2 UNDERGROUND UTILITY SUPPORT AND HORIZONTAL DIRECTIONAL DRILLING

Borings KR-1, KR-2, OH-1, and OH-2 were drilled to determine the subsurface conditions along two horizontal directional drilling alignments: OSU and SR-315. Bearing support and settlement are typically not a concern for gas pipeline construction because the weight of the soil removed generally will be more than the proposed pipe. The following information is provided only for general guidance. The Horizontal Directional Drilling (HDD) contractor is solely responsible for determining the appropriate mud pressure for the HDD operations.

5.2.1 OSU

Boring KR-1 and KR-2 generally encountered very stiff to hard cohesive soils throughout the depth of the borings. Both borings encountered an interbedded sand seam at depths of between 38.5 and 40.0 feet, where seepage was encountered.

5.2.2 OH-315

Boring OH-1 generally encountered medium stiff to hard lean clay and loose to very dense granular soils to the completion depth of the boring. Auger chatter was observed between depths of 7.0 and 28.5 feet, and up to 4-inch diameter cobbles were observed in the auger cuttings, indicating the presence of cobbles and possible boulders in boring OH-1. Boring OH-2 generally encountered approximately 10 feet of stiff to very stiff cohesive followed by medium dense to very dense granular soils to the completion depth of 49.3 feet, where a split-spoon refusal was encountered. Auger chatter was observed at depths of between 35.0 and 48.5 feet, indicating the possible presence of cobbles and boulders.

Seepage was first encountered in borings OH-1 and OH-2 at depths of 8.5 and 13.5 feet below the ground surface, respectively. Sand heave was encountered in borings OH-1 and OH-2 at depths of between 16.0 and 18.5 feet, respectively. Prior to adding water to suppress the sand heave, a measurable water level at 9.2 feet was reported in boring OH-1.

5.2.3 POTENTIAL OBSTRUCTIONS

Drill rig chatter was repeatedly observed while advancing the augers in OH-1 and OH-2. Additionally, cobbles were observed in the soil cuttings in boring OH-1. It should be expected that cobbles or boulders will be encountered during installation of the trenchless crossing under SR-315.

Additionally, due to the inherent nature of glacial deposits at the project location, cobbles and boulders should be expected at locations not disclosed in the borings. Depending on their consistency, size and hardness, the presence of any cobbles and boulders could be an impediment to the excavations.

The difficulty of advancing through cobbles or boulders will vary based on their composition and size. Unconfined strengths of cobbles and boulders can be expected to be in excess of 30 ksi. 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 not encountered in the shallow borings with the exception of NC-202 and NC-209 where seepage was first observed depths of 4.0 and 7.0 feet, respectively. The deeper borings encountered groundwater at depths of between 8.5 and 38.5 feet. Consequently, groundwater should be anticipated during construction.

Additionally, some groundwater should be expected to be encountered in isolated granular seams, areas with water bearing granular soils and existing underground utility trenches.

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 – Thirteen (13) Borings

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.

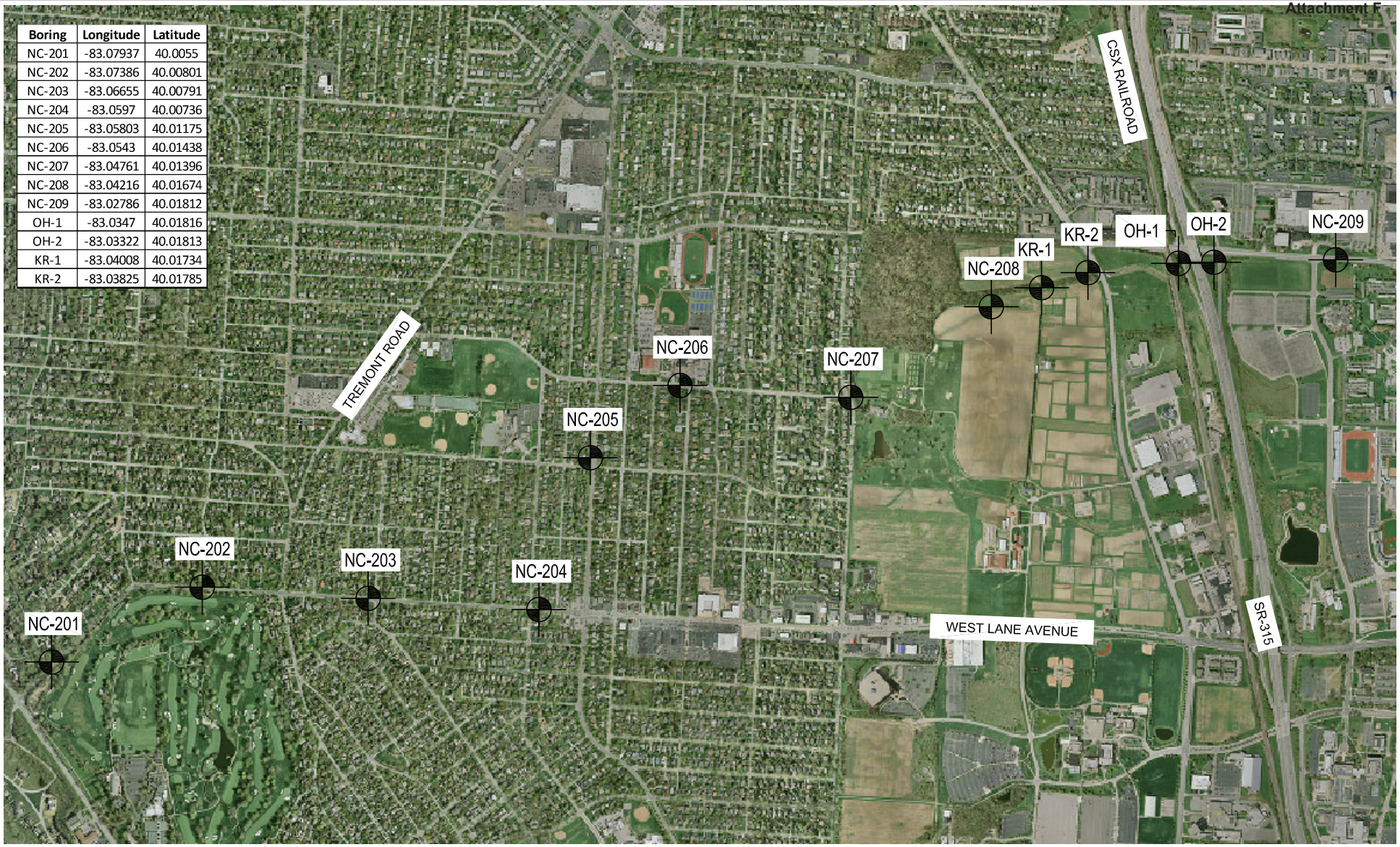
14. Soil Symbology

	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

Attachment F

Boring	Longitude	Latitude
NC-201	-83.07937	40.0055
NC-202	-83.07386	40.00801
NC-203	-83.06655	40.00791
NC-204	-83.0597	40.00736
NC-205	-83.05803	40.01175
NC-206	-83.0543	40.01438
NC-207	-83.04761	40.01396
NC-208	-83.04216	40.01674
NC-209	-83.02786	40.01812
OH-1	-83.0347	40.01816
OH-2	-83.03322	40.01813
KR-1	-83.04008	40.01734
KR-2	-83.03825	40.01785



DLZ

Legend

Boring

0 1000
500
Scale in feet

Campos
NCHP Pipeline Project - University
Boring Location Plan

Orientation

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

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

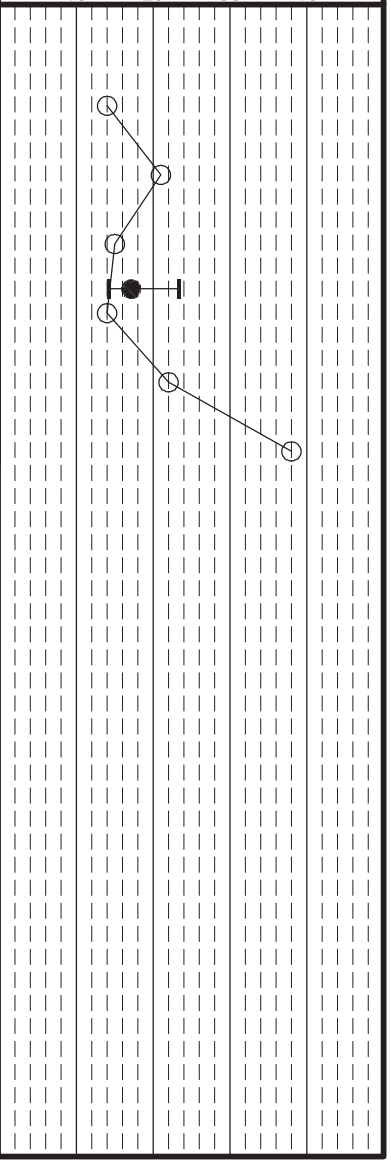
LOG OF: Boring NC-201 | *Location:* As per plan | *Date Drilled:* 4/22/2022

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:* AM

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
0.8							Asphalt Concrete - 10"							
		3 5 5	9	S-1		2.0	Very stiff brown sandy LEAN CLAY (CL); damp. S-1 contains gasoline-like odor.							
		7 7 8	12	S-2		2.5	@ 2.5'-4.0'; silt seam.							
5		4 5 6	18	S-3		4.0								
		4 5 5	18	S-4		1.75	**ORP = 16.9 mV** @ 5.5 - 7.0'; stiff.		6	3	8	19	38	26
		5 7 9	18	S-5		3.25								
10.0	10	9 15 12	18	S-6		4.5+	@ 8.5'-10.0', hard.							
							Bottom of Boring - 10.0'							
	15													
	20													
	25													



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

LOG OF: Boring NC-202 | *Location:* As per plan | *Date Drilled:* 4/22/2022

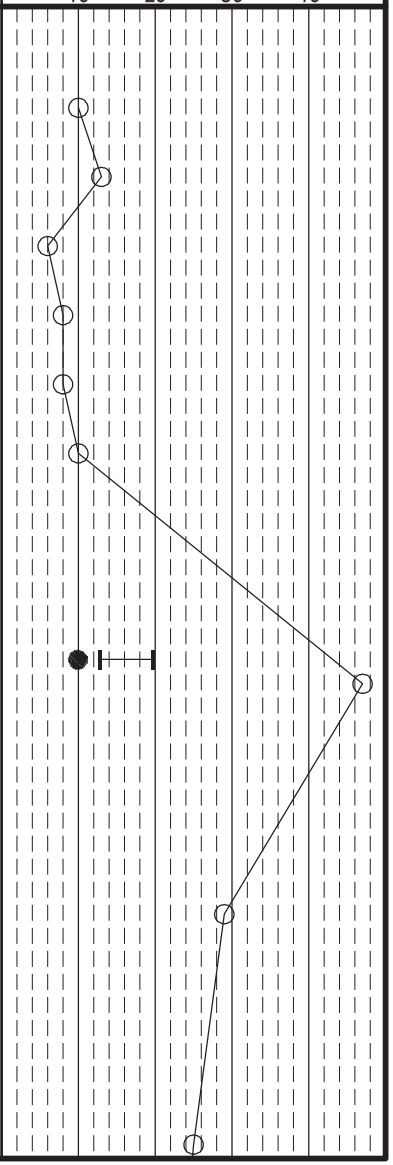
WATER OBSERVATIONS:
Water seepage at: 4.0'
Water level at completion: 34.0'

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

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

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

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
0.8							Asphalt Concrete - 9"							
2.5		3 3 4	9	S-1		3.0	POSSIBLE FILL: Very stiff brown SILTY CLAY (CL-ML); damp.							
		3 2 7	12	S-2		1.5	POSSIBLE FILL: Stiff to very stiff gray and brown LEAN CLAY (CL); damp to moist.							
5		7 2 2	5	S-3		0.5	@4.0'-5.5'; soft to medium stiff, contains slight organic odor.							
		3 3 3		S-4		1.5								
8.5		1 3 3	11	S-5		2.25	@7.0'-8.5'; contains rootlets.							
10		4 3 4	16	S-6		0.75	Medium stiff brown and light gray LEAN CLAY (CL); moist.							
13.5														
15		15 16 18	18	S-7		3.0	Very stiff light gray sandy SILTY CLAY (CL-ML); damp to moist.		8	5	9	16	37	25
20		8 10 11	7	S-8		3.75								
25		5 6 12	10	S-9										



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

LOG OF: Boring NC-202 | *Location:* As per plan | *Date Drilled:* 4/22/2022

WATER OBSERVATIONS:
Water seepage at: 4.0'
Water level at completion: 34.0'

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

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

Natural Moisture Content, % - ●

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

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	N_{60} Value
							Very stiff light gray sandy SILTY CLAY (CL-ML); damp to moist. (continued)								
30		4 5 11	18	S-10											
		10 19 50/4	16	S-11											50+
35.1 35		50/1	1	S-12			@ 34.5', splitspoon refusal. Recovered one piece of gravel. Advanced augers to 35.0 and attempted to resample. Encountered refusal and recovered one piece of gravel.								50+
							Bottom of Boring - 35.1'								
40															
45															
50															

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

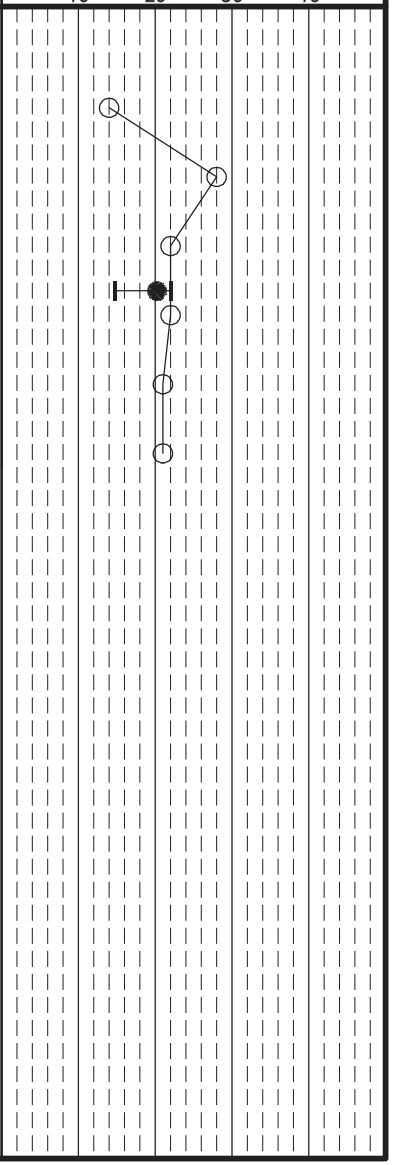
LOG OF: Boring NC-203 | *Location:* As per plan | *Date Drilled:* 4/22/2022

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

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

DRILLING METHODS - 2.25" 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
1.1							Asphalt Concrete - 13"							
2.5		22 5 5	2	S-1			FILL: Medium dense light brown SAND (SP); damp.							
		13 12 8	17	S-2		3.5	Very stiff to hard brown sandy SILTY CLAY (CL-ML); damp to moist.							
5		10 8 8	14	S-3		3.25								
		9 8 8	18	S-4		4.25			7	5	11	14	37	26
		15 7 8	16	S-5		4.5								
10.0	10	11 8 7	18	S-6		3.5								
							Bottom of Boring - 10.0'							
	15													
	20													
	25													



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

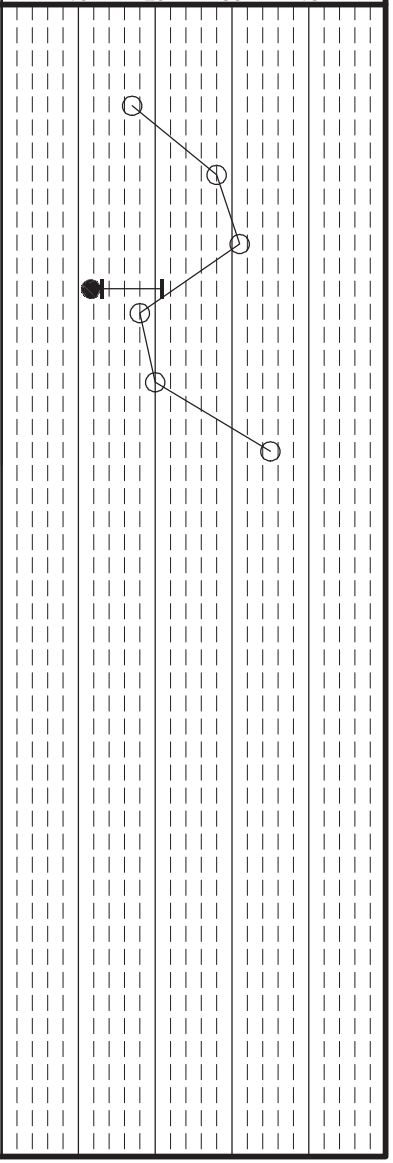
LOG OF: Boring NC-204 | *Location:* As per plan | *Date Drilled:* 4/22/2022

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

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

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

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
0.8							Asphalt Concrete - 10"							
2.5		14 6 6	7	S-1			FILL: Medium dense light brown SAND (SP) with gravel; damp.							
		12 4 16	13	S-2		3.25	Very stiff to hard sandy LEAN CLAY (CL); damp.							
5		13 12 10	9	S-3			**ORP = 8.7 mV**							
		9 7 6	15	S-4		2.5			15	5	9	15	31	25
		7 6 8	18	S-5		3.75								
10.0 10		9 12 13	18	S-6		4.5+								
							Bottom of Boring - 10.0'							
15														
20														
25														



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

LOG OF: Boring NC-205 | *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

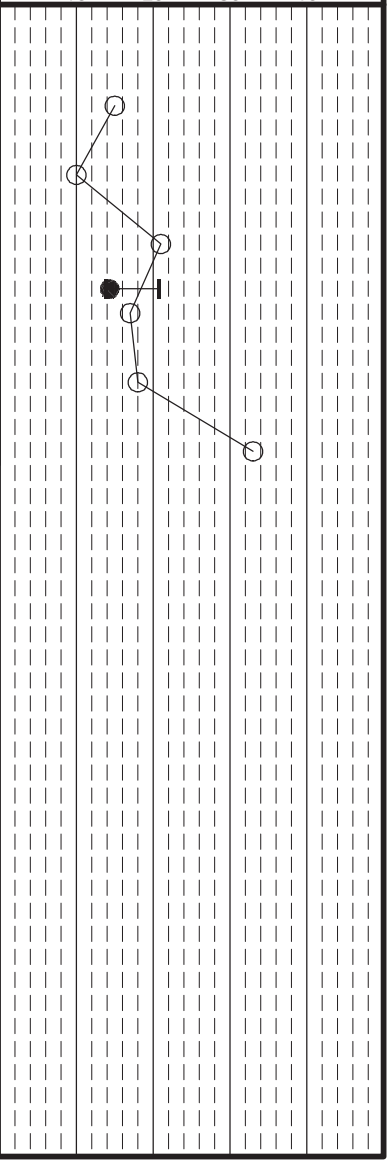
Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

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							Asphalt Concrete - 6"							
		5 5 6	14	S-1		3.0	Very stiff brown LEAN CLAY (CL); damp.							
		3 3 4	12	S-2		1.0	@2.5'-4.0', medium stiff to stiff, moist							
4.0														
5		7 6 9	15	S-3		4.5+	Very stiff to hard brown sandy SILTY CLAY (CL-ML); damp to moist.							
		6 5 7		S-4		3.5			7	7	13	19	32	22
		14 5 8	18	S-5		4.5+								
10.0		14 13 11	10	S-6		4.5								
10							Bottom of Boring - 10.0'							
15														
20														
25														

Natural Moisture Content, % - ●

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

10 20 30 40



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

LOG OF: Boring NC-206 | *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

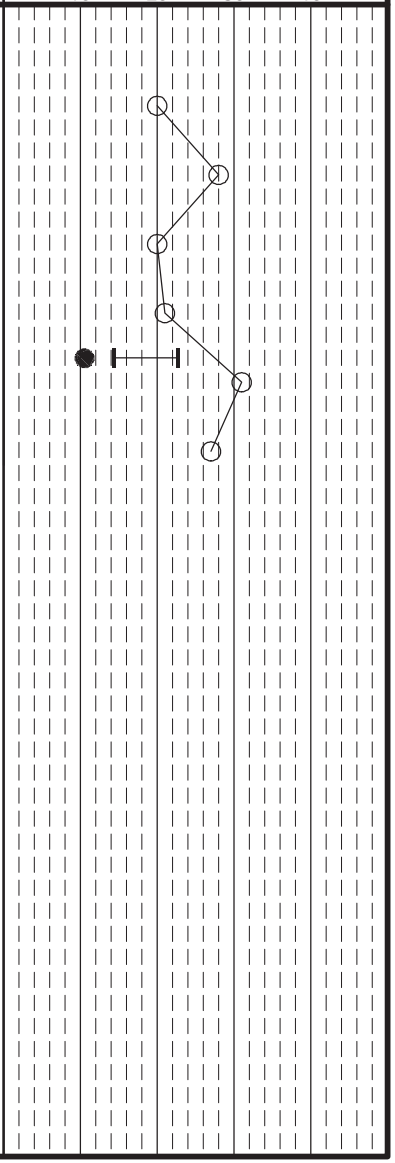
Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

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
0.6							Asphalt Concrete - 3.5" Portland Cement Concrete - 3.5"							
		7 6 8	14	S-1		3.5	Very stiff brown sandy LEAN CLAY (CL); damp to moist.							
		14 10 10	18	S-2		3.0								
5		6 6 8	12	S-3		3.5	S-3 contains 2" orangish brown silt seam @4.0'-7.0', moist, contains shale fragments							
7.0		4 5 10	18	S-4		1.0	@5.5'-7.0', medium stiff to stiff.							
		17 12 10	18	S-5		4.5+	Hard brownish gray sandy LEAN CLAY (CL); contains shale fragments; damp.		5	6	11	18	37	23
10.0 10		14 10 9	12	S-6		4.5+								
							Bottom of Boring - 10.0'							
15														
20														
25														

Natural Moisture Content, % - ●

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

10 20 30 40



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

LOG OF: Boring NC-207 | *Location:* As per plan | *Date Drilled:* 4/7/2022

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

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

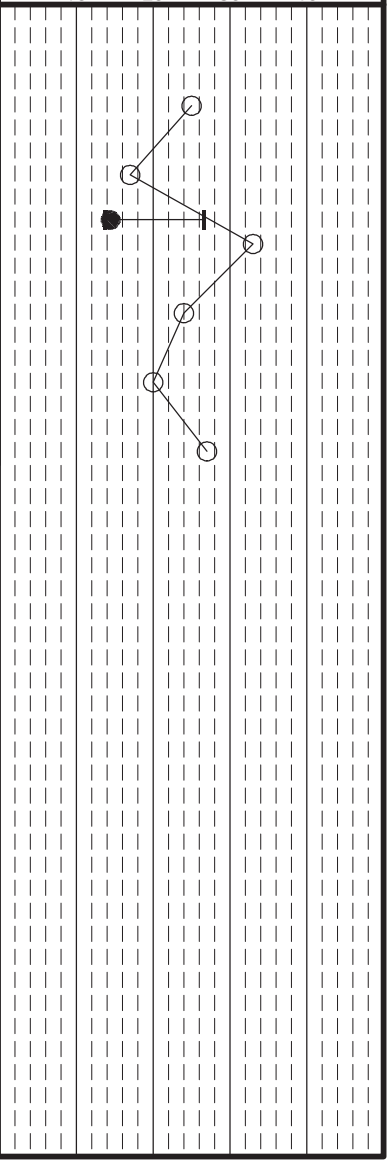
Rig (#) / ER: - CME 75 (408737) / 83.7% | *Driller:* KC | *Logger:* JC

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		21 8 10	12	S-1			FILL: Medium dense brown and dark brown silty, clayey SAND (SC-SM) with gravel; contains aggregate base fragments; damp.							
4.0		6 6 6	15	S-2		2.5	Very stiff brown LEAN CLAY (CL) with sand; damp to moist.							
5.5		11 12 12	8	S-3			Hard brown and dark brown sandy LEAN CLAY (CL); damp to moist.		8	9	12	14	33	24
		13 10 7	18	S-4		2.0	Stiff to very stiff brown sandy LEAN CLAY (CL); damp to moist.							
		4 5 9	18	S-5		2.0	@7.0'-10.0', contains trace iron oxide staining							
10.0		6 9 10	15	S-6		2.75								
							Bottom of Boring - 10.0'							

Natural Moisture Content, % - ●

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

10 20 30 40



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

LOG OF: Boring NC-208 | *Location:* As per plan | *Date Drilled:* 6/21/2022

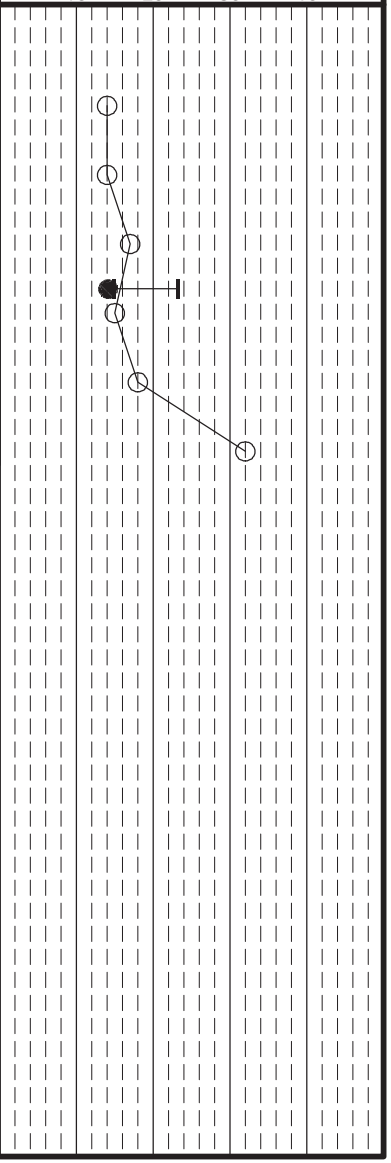
WATER OBSERVATIONS:
Water seepage at: None
Water level at completion: None

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

Rig (#) / ER - CME 55 (404185) / 91.0% | *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
1.0							Topsoil - 12"							
		3 5 4	12	1		1.0	Medium stiff to stiff brown sandy LEAN CLAY (CL); damp to moist.							
		2 4 5	18	2		1.0								
5		4 5 6	18	3		1.0								
		3 4 6	18	4		0.75	@5.5'-10.0', mottled brown and gray.		9	4	8	15	36	28
		3 5 7	18	5		1.25								
10.0		7 10 11	18	6		3.5	@8.5'-10.0', very stiff.							
10							Bottom of Boring - 10.0'							
15														
20														
25														

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 - University | *Job No.* 2221-3009.00

LOG OF: Boring NC-209 | *Location:* As per plan | *Date Drilled:* 4/7/2022

WATER OBSERVATIONS:
Water seepage at: 7.0'
Water level at completion: Not recorded

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
0.6							Asphalt Concrete - 7"							
2.5		3 3 6	9	S-1			FILL: Medium dense light brown and brown silty, clayey SAND (SC-SM); contains aggregate base fragments, slight asphalt odor; damp.							
		4 4 5	12	S-2			Medium dense light brown and brown silty, clayey SAND (SC-SM) with gravel; contains shale fragments; damp.							
5.5		7 6 5	10	S-3										
7.0		3 3 4	14	S-4		2.0	Stiff to very stiff brown sandy LEAN CLAY (CL); moist.							
		5 8 9	18	S-5			Medium dense brown clayey GRAVEL (GC) with sand; wet.		33	10	14	9	20	14
10.0		9 8 9	18	S-6										
							Bottom of Boring - 10.0'							

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 - University | *Job No.* 2221-3009.00

LOG OF: Boring KR-1 | *Location:* As per plan | *Date Drilled:* 6/21/2022

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

WATER OBSERVATIONS:
Water seepage at: 38.5'
Water level at completion: None (prior to adding water); 1.5' (at completion)
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	Natural Moisture Content, % - ● (PL, LL, N_{60} Value, Non-Plastic - NP)
1.0							Topsoil - 12"								
		4 3 4	18	S-1		4.5+	Hard dark brown LEAN CLAY (CL); damp.								
		3 4 4	18	S-2		4.5+									
5		4 4 5	18	S-3		1.25	@4.0'-5.5', stiff.								
7.0		4 7 7	18	S-4		4.5+									
		8 10 15	18	S-5		4.5+	Hard dark gray sandy SILTY CLAY (CL-ML); damp.		2	6	11	20	39	22	
10		6 7 7	18	S-6		4.5+									
13.5															
		15 16 27	18	S-7		4.25	Hard gray sandy LEAN CLAY (CL); damp to moist.								65
15															
		19 24 25	18	S-8		4.5+									74
20															
		19 33 35	18	S-9		4.5+									103
25															

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

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

LOG OF: Boring KR-1 | *Location:* As per plan | *Date Drilled:* 6/21/2022

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

WATER OBSERVATIONS:
Water seepage at: 38.5'
Water level at completion: None (prior to adding water); 1.5' (at completion)
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	Natural Moisture Content, % - ● PL N_{60} Value ○ LL / Non-Plastic - NP
							Hard gray sandy LEAN CLAY (CL); damp to moist. (continued)								
30		13 19 28	18	S-10		4.5+			6	5	11	16	38	24	71
35		15 13 13	18	S-11		4.5+									
40		8 12 14	18	S-12		4.5+	@38.5'-39.5', wet gravel and sand seam.								
45		8 12 10	18	S-13		4.5+									
50.0 50		10 12 12	14	S-14		4.5+	Bottom of Boring - 50.0'								

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

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

LOG OF: Boring KR-2 | *Location:* As per plan | *Date Drilled:* 6/22/2022

WATER OBSERVATIONS:
Water seepage at: 38.5'
Water level at completion: None (prior to adding water); 1.5' (at completion)
DRILLING METHODS - 3.25" HS Augers
ABANDONMENT - bentonite-cement grout

Rig (#) / ER: - CME 55 (404185) / 91.0% | *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
1.0							Topsoil - 12"							
		3 3 4	10	S-1		-	Medium stiff to stiff dark brown LEAN CLAY (CL); damp.							
4.0		2 2 2	7	S-2		-								
5		2 3 3	9	S-3		-	Stiff brown LEAN CLAY (CL) with sand; damp.							
5.5														
7.0		1 2 3	16	S-4		-	Stiff SILTY CLAY (CL-ML) with sand; moist.							
		12 16 14	18	S-5		4.5+	Hard gray sandy LEAN CLAY (CL); damp.							
10		10 12 13	18	S-6		4.5+								
15		15 15 24	18	S-7		4.5+								
20		15 16 25	18	S-8		4.5+								
25		12 14 18	18	S-9		4.5+								

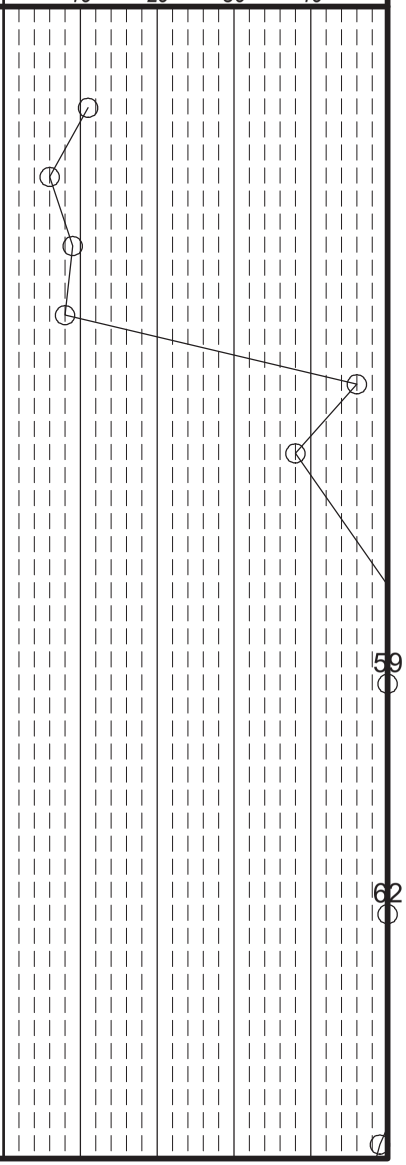
Natural Moisture Content, % - ●

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

10 20 30 40

59

62



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

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

LOG OF: Boring KR-2 | *Location:* As per plan | *Date Drilled:* 6/22/2022

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

WATER OBSERVATIONS:
Water seepage at: 38.5'
Water level at completion: None (prior to adding water); 1.5' (at completion)
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	Natural Moisture Content, % - ● PL N_{60} Value ○ LL / Non-Plastic - NP
							Hard gray sandy LEAN CLAY (CL); damp. (continued)								
30		10 12 15	18	S-10		4.5+			7	6	10	17	37	23	● ○
35		8 11 12	18	S-11		4.5+									
40		18 19 21	18	S-12		4.5+	@38.5'-40.0', wet sand seam.								61 ○
45		20 24 23	18	S-13		4.5+									71 ○
50.0 50		12 15 20	18	S-14		4.5+	Bottom of Boring - 50.0'								53 ○

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

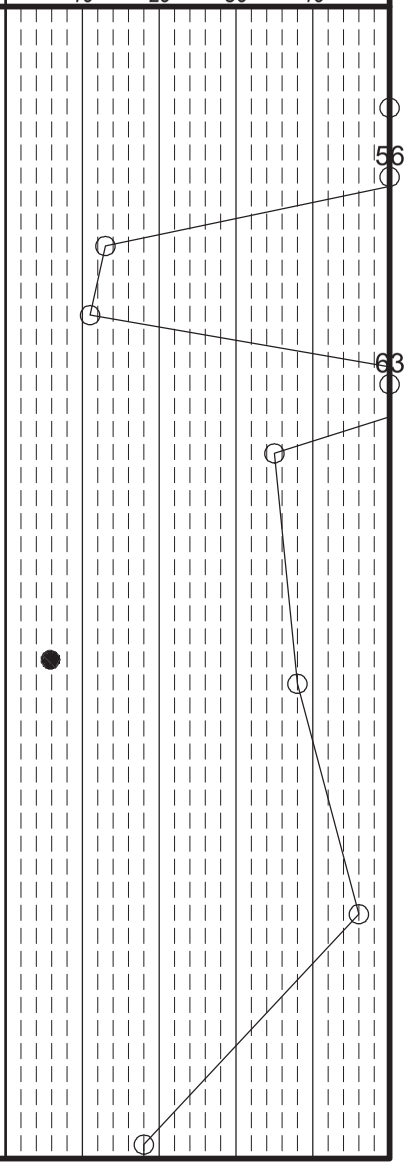
Client: Campos EPC, LLC | *Project:* NCHP Pipeline - University | *Job No.* 2221-3009.00

LOG OF: Boring OH-1 | *Location:* As per plan | *Date Drilled:* 6/9/2022

WATER OBSERVATIONS:
Water seepage at: 8.5'
Water level at completion: 9.2' (prior to adding water)
3.0' (includes added water)
DRILLING METHODS - 3.25" HS Augers
ABANDONMENT - bentonite-cement grout

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

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
							Hard gray SILTY CLAY (CL-ML); damp.							
		18 20 16	18	S-1		4.5+								
		22 25 15	8	S-2		4.5+								
4.0														
		5 4 5	16	S-3		1.25	Medium stiff to stiff brownish gray SILTY CLAY (CL-ML); damp.							
5														
		3 4 4	18	S-4		1.0								
7.0														
		8 20 25		S-5			Dense to very dense brown sandy GRAVEL with silt (GP-GM); damp.							
		8 10 15	9	S-6			@7.0'-28.5', occasional chatter. ▼							
10							@8.5', becomes wet.							
		13 12 15	10	S-7					67	8	12	5	5	3
15							@15.0'-18.5', heavy chatter.							
							@ 16.0'; encountered sand heave.							
		13 15 18	6	S-8										
20														
23.5														
		5 6 7	3	S-9			Medium dense gray and brown GRADATION (GP); wet.							
25														



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

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

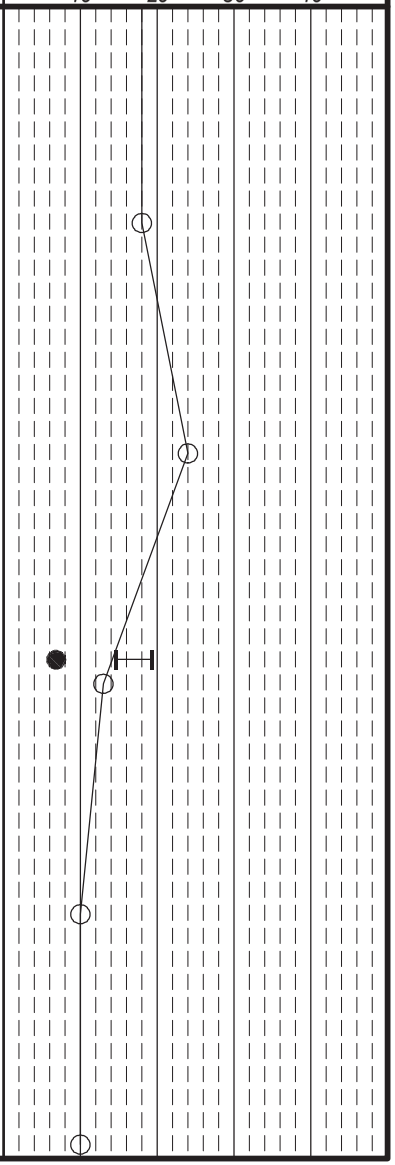
LOG OF: Boring OH-1 | *Location:* As per plan | *Date Drilled:* 6/9/2022

WATER OBSERVATIONS:
Water seepage at: 8.5'
Water level at completion: 9.2' (prior to adding water)
3.0' (includes added water)
DRILLING METHODS - 3.25" HS Augers
ABANDONMENT - bentonite-cement grout

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

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
28.5							Medium dense gray and brown GRAVEL (GP); wet. (continued)							
30		4 5 8	5	S-10		3.0	Medium dense gray SILT (ML); moist to wet. @30.0'-33.5', 2" to 4" cobbles surfacing in the cuttings.							
35		9 10 7	15	S-11										
38.5														
40		3 4 5	10	S-12			Medium dense gray SILTY, CLAYEY SAND with gravel (SC-SM); wet.		26	9	14	13	24	14
43.5														
45		6 4 3	3	S-13			Loose to medium dense brown SAND (SP) with gravel; wet.							
50.0		3 2 5	2	S-14			Bottom of Boring - 50.0'							

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 - University | *Job No.* 2221-3009.00

LOG OF: Boring OH-2 | *Location:* As per plan | *Date Drilled:* 6/8/2022

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

WATER OBSERVATIONS:
Water seepage at: 13.5'
Water level at completion: Not Recorded

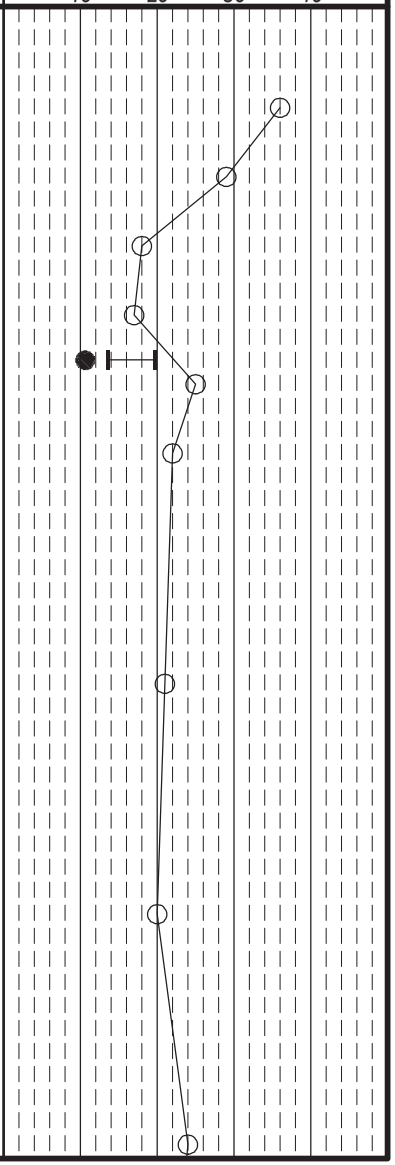
DRILLING METHODS - 3.25" HS Augers
ABANDONMENT - bentonite-cement grout

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
0.2							Topsoil - 2"							
		12 14 12	18	S-1			FILL: Medium dense to dense brown clayey, silty SAND (SC-SM) with gravel; damp.							
4.0		10 11 10	9	S-2										
5		4 6 7	15	S-3		2.0	Stiff to very stiff brown LEAN CLAY (CL); damp.							
5.5														
		3 5 7	16	S-4		3.75	Very stiff gray sandy SILTY CLAY (CL-ML); damp.							
		6 8 10	18	S-5		4.0			2	6	12	18	45	17
10		10 10 6		S-6										
13.5														
		4 7 8	12	S-7			Medium dense dark brown SAND (SW) with gravel; wet.							
15														
		7 8 6	11	S-8			@ 18.5'; encountered sand heave.							
20														
		8 9 8	10	S-9										
25														

Natural Moisture Content, % - ●

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

10 20 30 40



Bottom of Boring - 49.3'

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

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

LOG OF: Boring OH-2 | *Location:* As per plan | *Date Drilled:* 6/8/2022

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

WATER OBSERVATIONS:
Water seepage at: 13.5'
Water level at completion: Not Recorded

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
							Medium dense dark brown SAND (SW) with gravel; wet. (continued)							
30		7 8 7	11	S-10										
35		7 7 10	1	S-11			@35.0'-36.0', chatter.							
38.5														
40		8 6 7	9	S-12			Medium dense dark brown GRAVEL (GW) with sand; wet. @40.0'-48.5', occassional chatter.		64	12	17	4	2	1
45		21 16 19	18	S-13			@43.5'-49.3', dense to very dense.							
49.3		21 50/4	9	S-14										
50														

Natural Moisture Content, % - ●

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

10 20 30 40 50+

Bottom of Boring - 49.3'

Attachment F

DLZ

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

CLIENT: Campos

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

COMP. BY: NB DATE: 8/9/22

TEST PERFORMED USING: pH PAPER ☐ pH METER ☒ REV. BY: SR DATE: 8/11/22

Boring Number	Sample Number	Depth	pH in Water (nearest 0.1)	pH in Calcium Chloride (nearest 0.1)
NC-201	4	5.5'-7.0'	7.9	7.3
NC-204	4	5.5'-7.0'	7.9	7.2
NC-208	4	5.5'-7.0'	7.5	7.0
[illegible]	[illegible]	[illegible]		[illegible]
[illegible]	[illegible]	[illegible]		

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:	8/9/2022
DLZ Job Number:	2221-3009.00	Comp. By	KK
Client:	Campos	Rev. By	SR

Boring No. NC-201 Sample No. S-4 Depth 5.5'-7.0'

Mass of Resistivity Box full of Soil	0.601	lbs
Mass of Resistivity Box Empty	0.280	lbs
Mass of Soil to Fill Resistivity Box	0.3210388	lbs
Volume of Resistivity Box	0.002643	ft^3
Wet Density of Soil @ Test	121.5	lbs/ft^3
Moisture Content @ Test	26.1	%
Dry Density of Soil @ Test	96.4	lbs/ft^3
Ohms of Resistatance @ given Conditions	673	Ohms-cm

Boring No. NC-204 Sample No. S-4 Depth 5.5'-7.0'

Mass of Resistivity Box full of Soil	0.600	lbs
Mass of Resistivity Box Empty	0.280	lbs
Mass of Soil to Fill Resistivity Box	0.3209065	lbs
Volume of Resistivity Box	0.002643	ft^3
Wet Density of Soil @ Test	121.4	lbs/ft^3
Moisture Content @ Test	23.6	%
Dry Density of Soil @ Test	98.2	lbs/ft^3
Ohms of Resistatance @ given Conditions	817	Ohms-cm

Note: Testing performed near liquid limit.

DLZ

Soil Resistivity Test Report

Project Name:	NCHP	Date:	8/9/2022
DLZ Job Number:	2221-3009.00	Comp. By	KK
Client:	Campos	Rev. By	SR

Boring No. NC-208 **Sample No.** S-4 **Depth** 5.5'-7.0'

Mass of Resistivity Box full of Soil	0.570	lbs
Mass of Resistivity Box Empty	0.280	lbs
Mass of Soil to Fill Resistivity Box	0.2908353	lbs
Volume of Resistivity Box	0.002643	ft^3
Wet Density of Soil @ Test	110.0	lbs/ft^3
Moisture Content @ Test	39.4	%
Dry Density of Soil @ Test	78.9	lbs/ft^3
Ohms of Resistatance @ given Conditions	2,680	Ohms-cm

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: 8/4/2022

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-201	4	5.5'-7.0'	Bag		B-17	17	1004	13	13	12	13	250	0.025
					20.00								
NC-204	4	5.5'-7.0'	Bag		B-13	13	1009	15	16	16	16	310	0.031
					20.02								
NC-208	4	5.5'-7.0'	Bag		B-5	5	1007	14	15	14	14	290	0.029
					20.01								

Remarks: *Sample had to be diluted to 1/80 to get a reading; value in report converts the "reading" to 1/20

ANALYTICAL REPORT

Lab Project # L22-19605

Received: 09/13/2022
Reported: 10/06/2022

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

Date/Time Sampled:
Sampled By: None Provided
Sampled Matrix: Other
Containers: 1

Project Name: **2221-3009.00**

Sample ID: **NC-201,5-4,5.5'-7.0'**
Lab Sample # **L22-19605-02**

Analyte	Results	Units	PQL	Method	Analyst	Extraction Date	Analysis Date
Chloride	186.00	mg/Kg	3.00	AASHTO T291	BRM		10/06/2022
Sulfide, AWWA	10			AWWA	BRM		10/03/2022
	10- excessive bubbling						

Analysis Certified By: Lana L Jackson

1101 N. Cole Street - Lima, Ohio 45805
419.223.1362 - Fax 419.227.3792
800.436.1243

1502 W. Fourth St. - Mansfield, Ohio 44906
419.525.1644 - Fax 419.524.5575
800.635.3222

1776 Marion-Waldo Rd. - Marion, Ohio 43302
740.389.5991 - Fax 740.389.1481
800.873.2835

www.alloway.com

ANALYTICAL REPORT

Lab Project # L22-19605

Received: 09/13/2022
Reported: 10/06/2022

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

Date/Time Sampled:
Sampled By: None Provided
Sampled Matrix: Other
Containers: 1

Project Name: **2221-3009.00**

Sample ID: **NC-204,5-4,5.5'-7.0'**
Lab Sample # **L22-19605-03**

Analyte	Results	Units	PQL	Method	Analyst	Extraction Date	Analysis Date
Chloride	255.30	mg/Kg	3.00	AASHTO T291	BRM		10/06/2022
Sulfide, AWWA	10			AWWA	BRM		10/03/2022
	10- excessive bubbling						

Analysis Certified By: Lana L Jackson

1101 N. Cole Street - Lima, Ohio 45805
419.223.1362 - Fax 419.227.3792
800.436.1243

1502 W. Fourth St. - Mansfield, Ohio 44906
419.525.1644 - Fax 419.524.5575
800.635.3222

1776 Marion-Waldo Rd. - Marion, Ohio 43302
740.389.5991 - Fax 740.389.1481
800.873.2835

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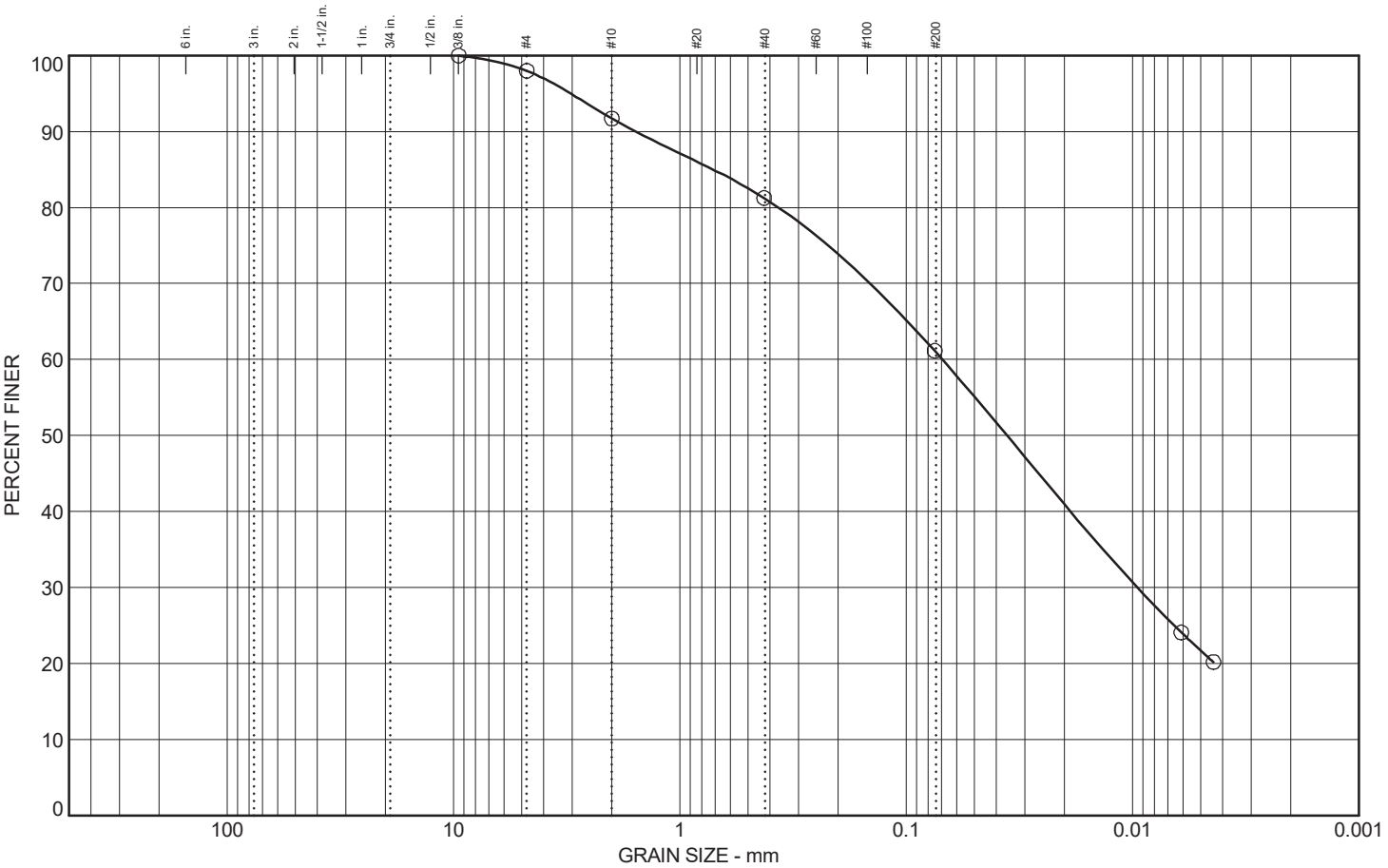
PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	0.0	2.0	6.3	10.5	20.1	39.4	21.7

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5	100.0		
4.75	98.0		
2	91.7		
0.425	81.3		
0.075	61.1		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 11.0%

Atterberg Limits

LL= 21 PL= 16 PI= 5

Coefficients

D_{85}= 0.74 D_{60}= 0.069 D_{50}= 0.035
D_{30}= 0.009 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL-ML AASHTO = A-4

Remarks

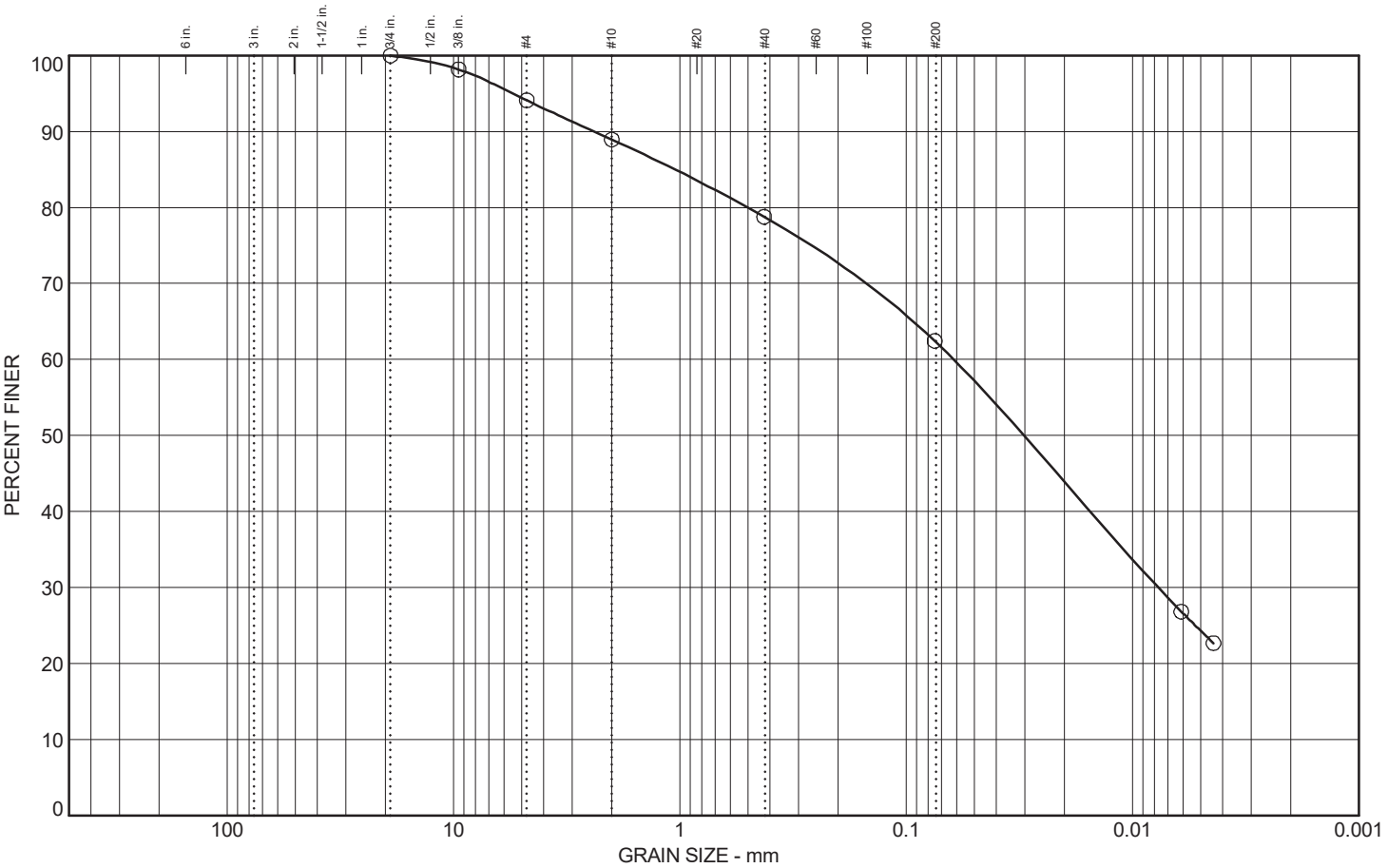
Group Index = 0

Sample No.: S-5 **Source of Sample:** KR-1 **Date:**
Location: - **Depth / Elev:** 7'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - University
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	5.9	5.2	10.2	16.3	38.2	24.3

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	98.2		
4.75	94.1		
2	88.9		
0.425	78.8		
0.075	62.4		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 10.8%

Atterberg Limits

LL= 23 PL= 13 PI= 10

Coefficients

D_{85}= 1.096 D_{60}= 0.063 D_{50}= 0.031
D_{30}= 0.008 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-4

Remarks

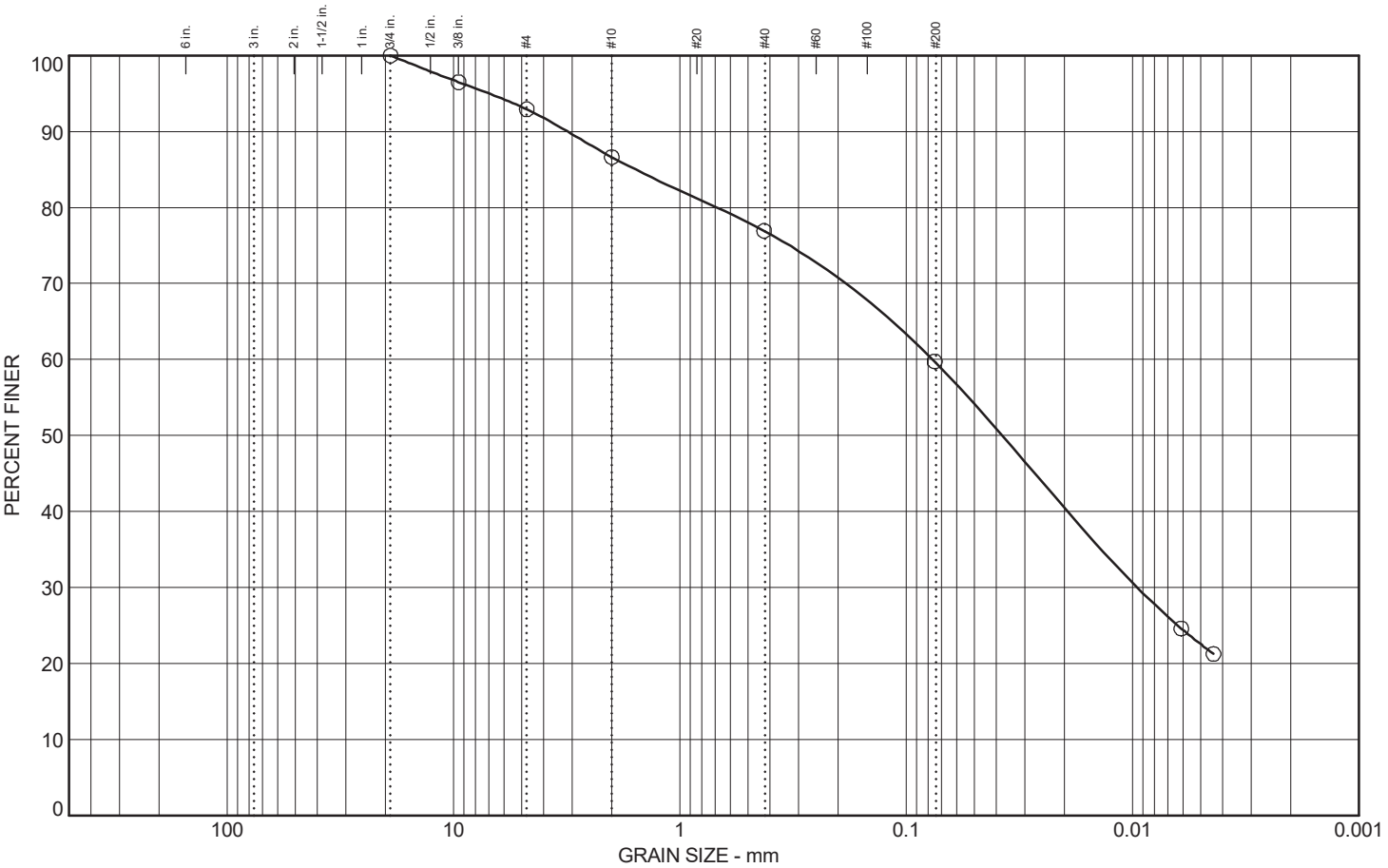
Group Index = 3

Sample No.: S-10 **Source of Sample:** KR-1 **Date:**
Location: - **Depth / Elev:** 28.5'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - University
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	7.1	6.3	9.7	17.2	37.2	22.5

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	96.5		
4.75	92.9		
2	86.6		
0.425	76.9		
0.075	59.7		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 10.4%

Atterberg Limits

LL= 23 PL= 13 PI= 10

Coefficients

D_{85}= 1.541 D_{60}= 0.077 D_{50}= 0.037
D_{30}= 0.009 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-4

Remarks

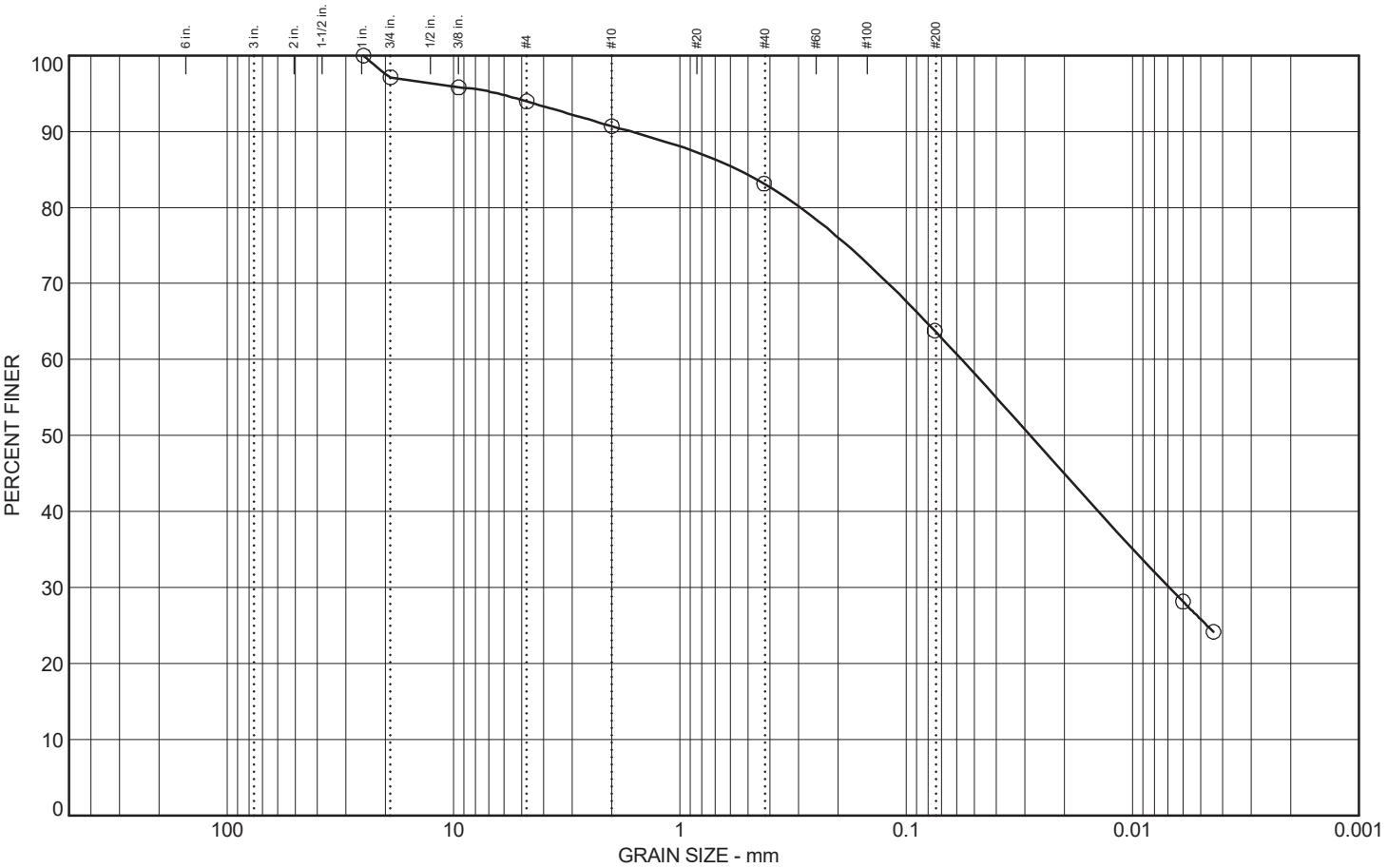
Group Index = 3

Sample No.: S-10 **Source of Sample:** KR-2 **Date:**
Location: - **Depth / Elev:** 28.5'

DLZ

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

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	2.9	3.2	3.3	7.6	19.4	38.0	25.8

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
25	100.0		
19	97.1		
9.5	95.8		
4.75	94.0		
2	90.7		
0.425	83.1		
0.075	63.8		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 17.1%

Atterberg Limits

LL= 23 PL= 14 PI= 9

Coefficients

D_{85}= 0.621 D_{60}= 0.057 D_{50}= 0.028
D_{30}= 0.007 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-4

Remarks

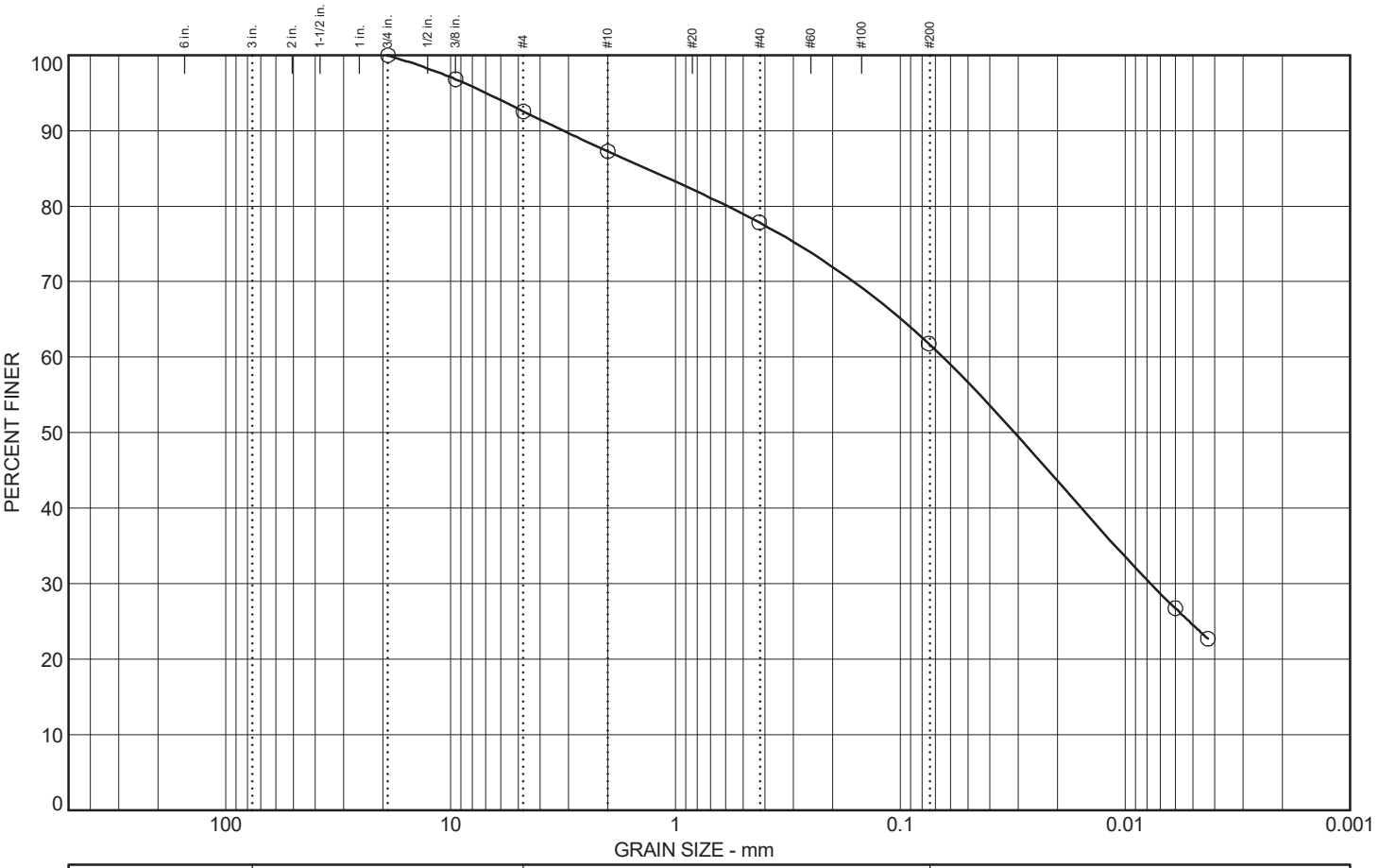
Group Index = 3

Sample No.: S-4 **Source of Sample:** NC-201 **Date:**
Location: - **Depth / Elev:** 5.5'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - University
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	7.4	5.3	9.4	16.0	37.3	24.5

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	96.8		
4.75	92.6		
2	87.3		
0.425	77.8		
0.075	61.8		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 9.9%

Atterberg Limits

LL= 20 PL= 13 PI= 7

Coefficients

D_{85}= 1.378 D_{60}= 0.066 D_{50}= 0.032
D_{30}= 0.008 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL-ML AASHTO = A-4

Remarks

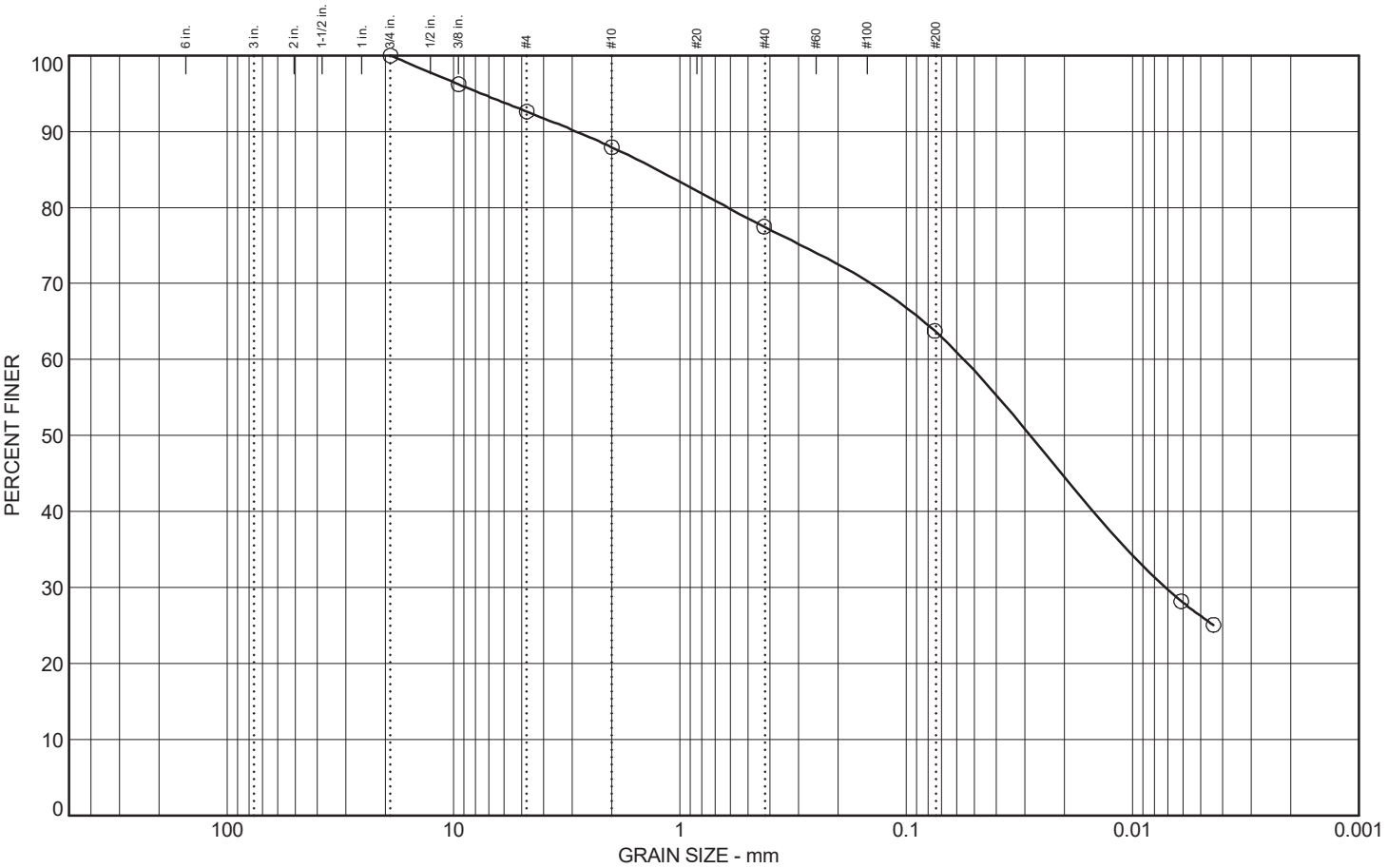
Group Index = 1

Sample No.: S-7 **Source of Sample:** NC-202 **Date:**
Location: - **Depth / Elev:** 13.5'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - University
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	7.4	4.7	10.5	13.7	37.5	26.3

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	96.2		
4.75	92.6		
2	87.9		
0.425	77.5		
0.075	63.8		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 20.2%

Atterberg Limits

LL= 22 PL= 15 PI= 7

Coefficients

D_{85}= 1.295 D_{60}= 0.058 D_{50}= 0.028
D_{30}= 0.007 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL-ML AASHTO = A-4

Remarks

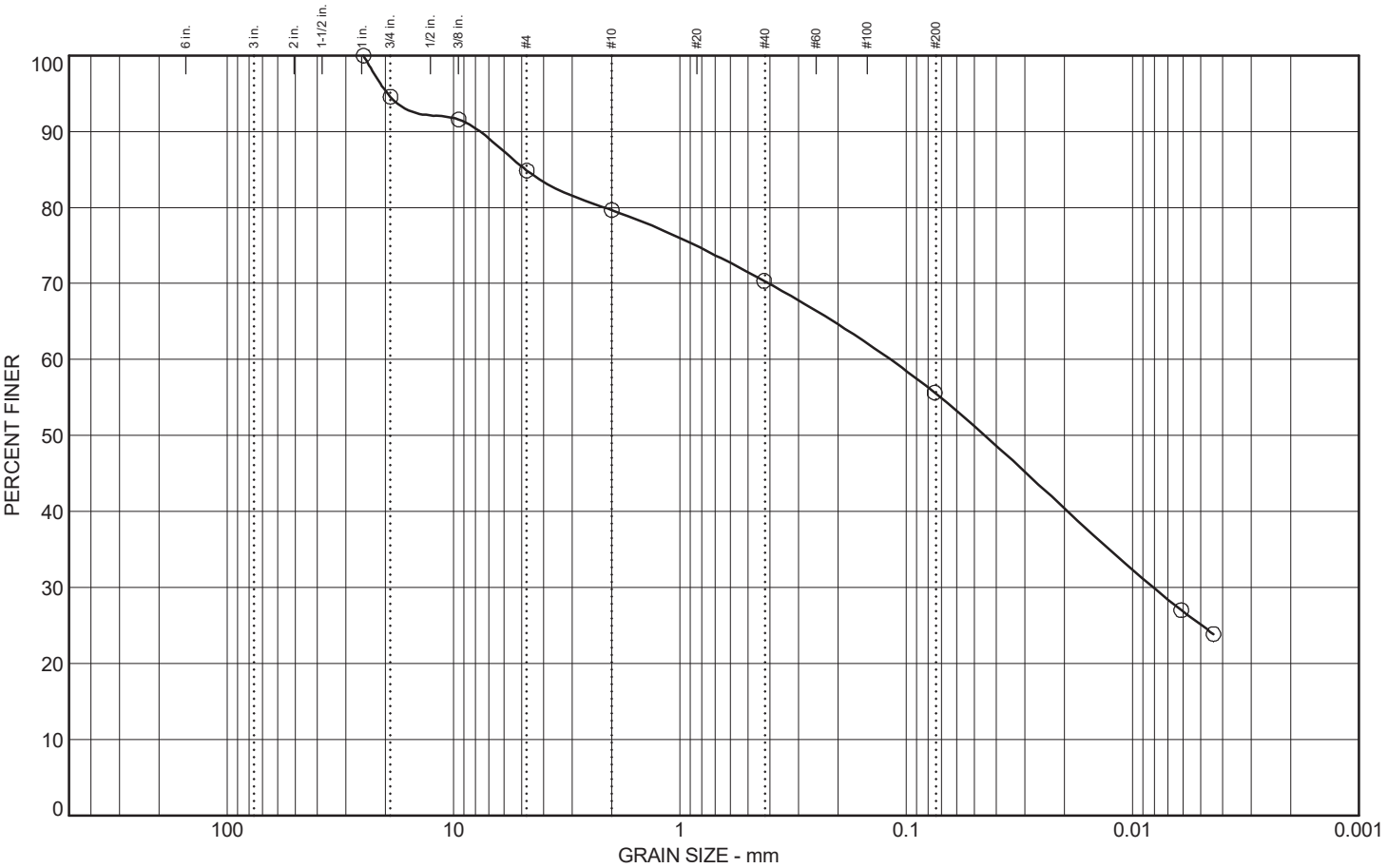
Group Index = 2

Sample No.: S-4 **Source of Sample:** NC-203 **Date:**
Location: - **Depth / Elev:** 5.5'

DLZ

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

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	5.4	9.7	5.2	9.3	14.7	30.5	25.1

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
25	100.0		
19	94.6		
9.5	91.6		
4.75	84.9		
2	79.7		
0.425	70.3		
0.075	55.6		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand, fine to coarse gravel

General Characteristics

Moisture Content = 11.6%

Atterberg Limits

LL= 21 PL= 13 PI= 8

Coefficients

D_{85}= 4.82 D_{60}= 0.126 D_{50}= 0.046
D_{30}= 0.008 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-4

Remarks

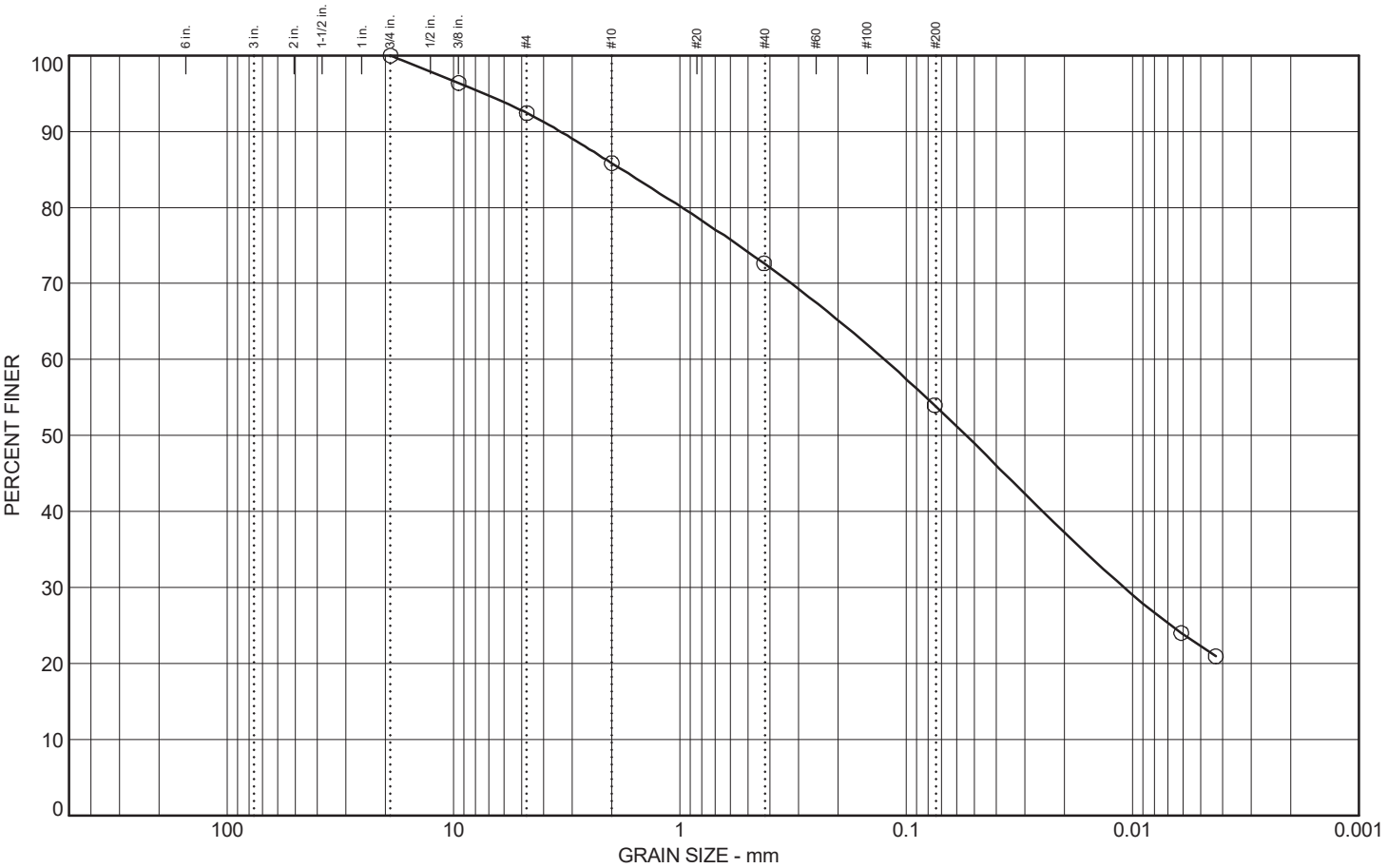
Group Index = 1

Sample No.: S-4 **Source of Sample:** NC-204 **Date:**
Location: - **Depth / Elev:** 5.5'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - University
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	7.6	6.6	13.2	18.7	31.7	22.2

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	96.4		
4.75	92.4		
2	85.8		
0.425	72.6		
0.075	54.0		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 14.3%

Atterberg Limits

LL= 21 PL= 14 PI= 7

Coefficients

D_{85}= 1.813 D_{60}= 0.131 D_{50}= 0.054
D_{30}= 0.01 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL-ML AASHTO = A-4

Remarks

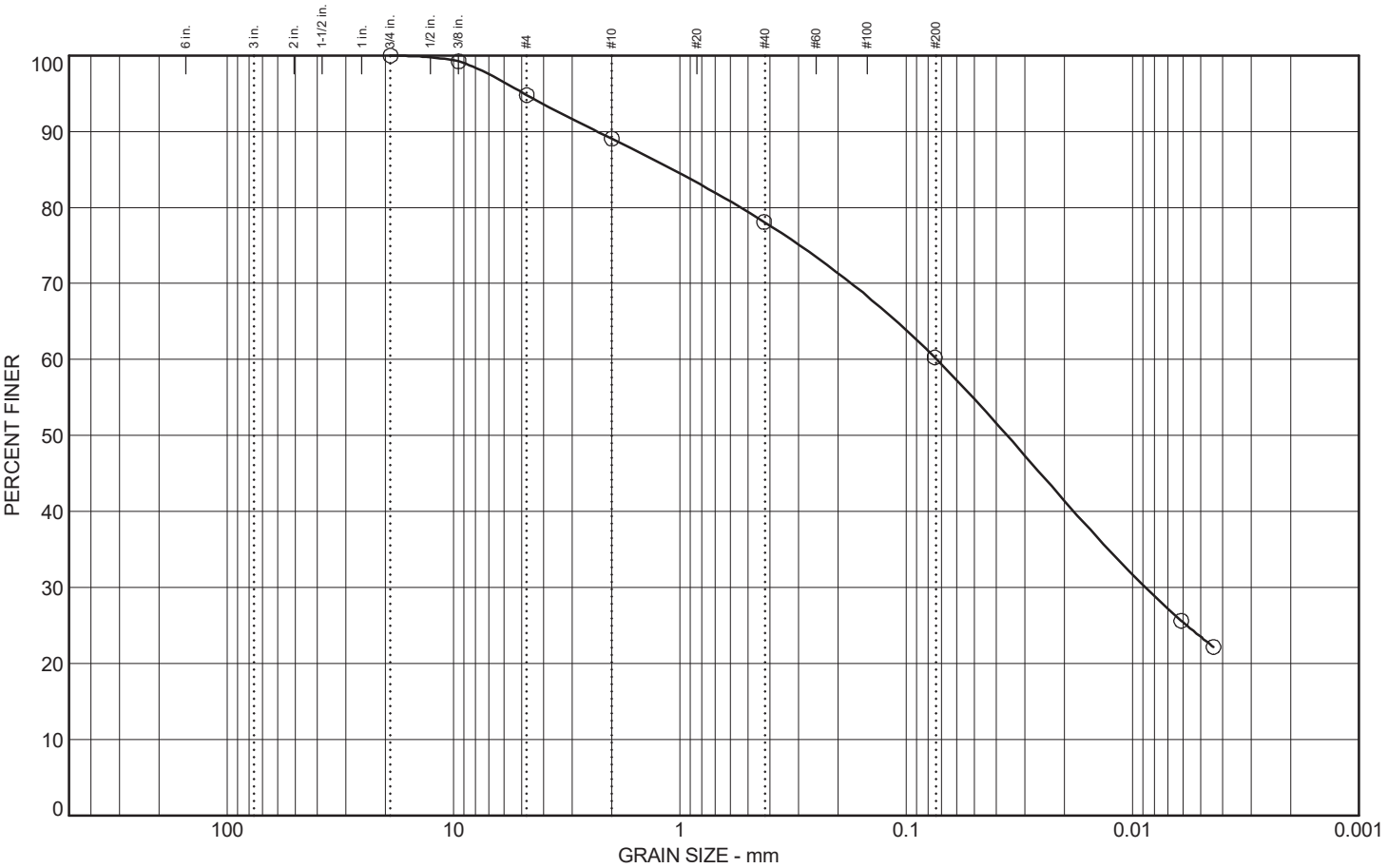
Group Index = 1

Sample No.: S-4 **Source of Sample:** NC-205 **Date:**
Location: - **Depth / Elev:** 5.5'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - University
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	5.2	5.7	11.0	17.8	36.8	23.5

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	99.2		
4.75	94.8		
2	89.1		
0.425	78.1		
0.075	60.3		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 10.5%

Atterberg Limits

LL= 23 PL= 14 PI= 9

Coefficients

D_{85}= 1.127 D_{60}= 0.074 D_{50}= 0.036
D_{30}= 0.008 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-4

Remarks

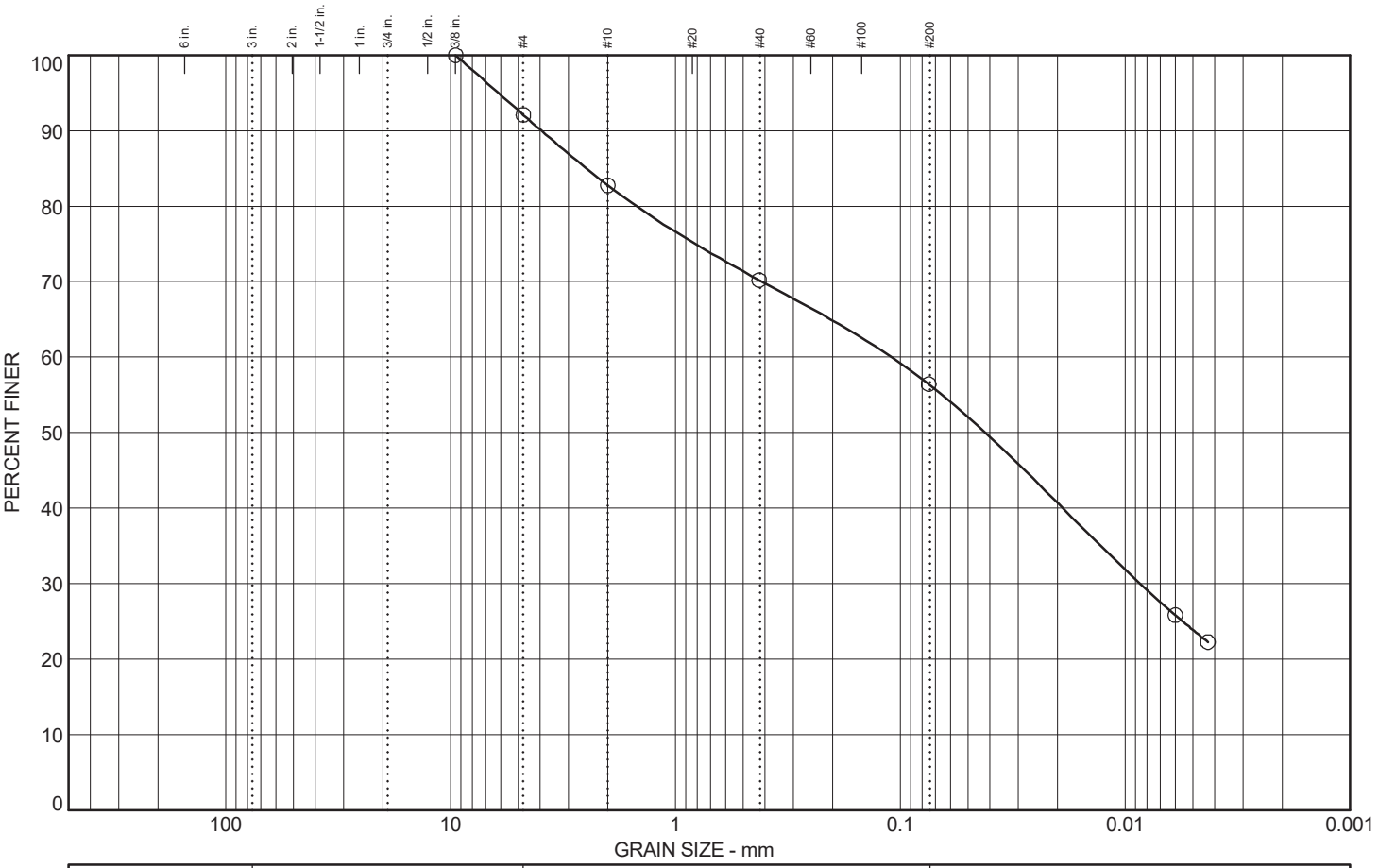
Group Index = 2

Sample No.: S-5 **Source of Sample:** NC-206 **Date:**
Location: - **Depth / Elev:** 7'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - University
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	7.9	9.3	12.5	13.8	32.6	23.9

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5	100.0		
4.75	92.1		
2	82.8		
0.425	70.2		
0.075	56.4		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 14.4%

Atterberg Limits

LL= 27 PL= 14 PI= 13

Coefficients

D_{85}= 2.463 D_{60}= 0.118 D_{50}= 0.044
D_{30}= 0.008 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-6

Remarks

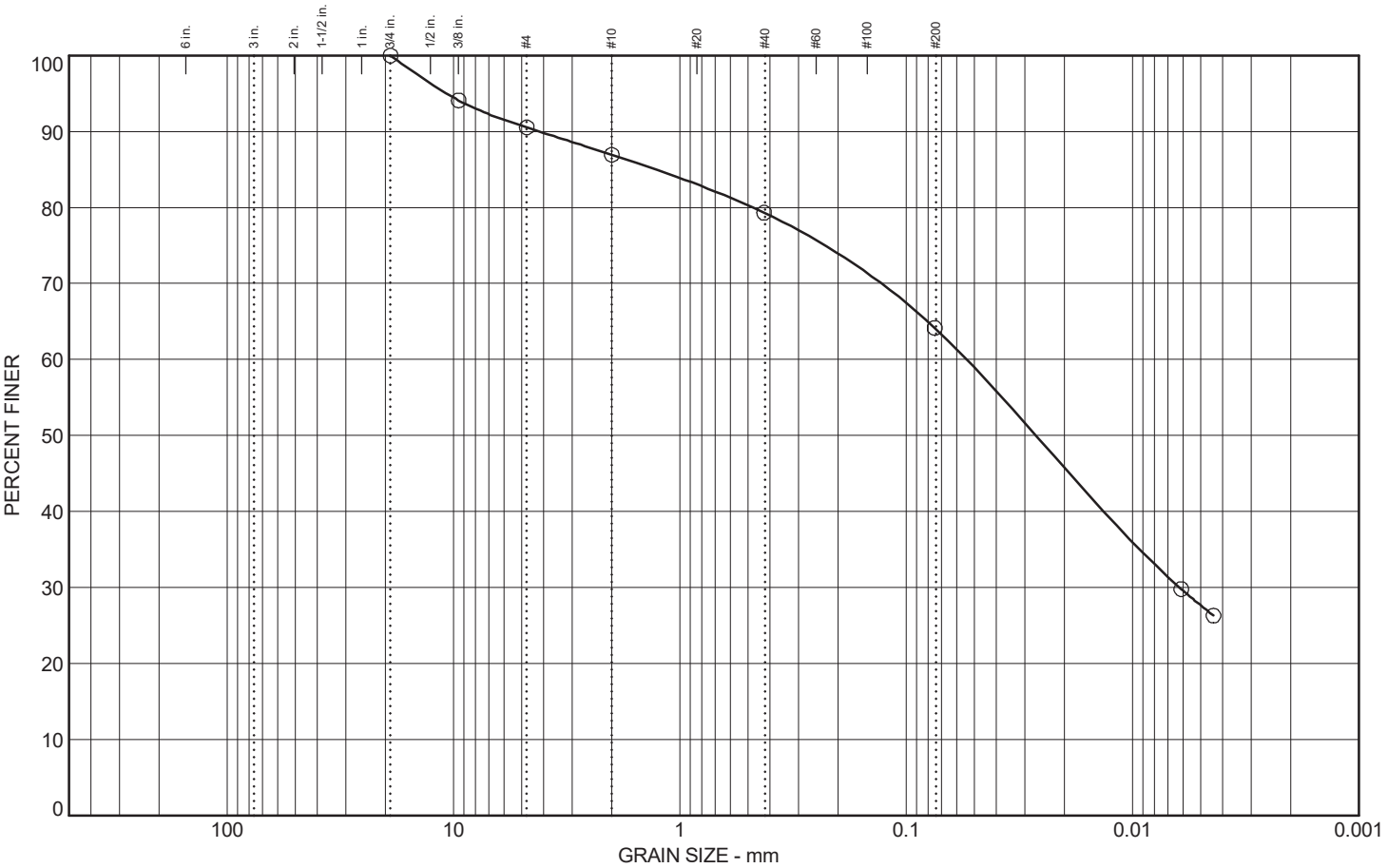
Group Index = 4

Sample No.: S-3 **Source of Sample:** NC-207 **Date:**
Location: - **Depth / Elev:** 4'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - University
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	9.5	3.6	7.6	15.2	36.5	27.6

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
19	100.0		
9.5	94.1		
4.75	90.5		
2	86.9		
0.425	79.3		
0.075	64.1		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 14.1%

Atterberg Limits

LL= 23 PL= 15 PI= 8

Coefficients

D_{85}= 1.351 D_{60}= 0.055 D_{50}= 0.027
D_{30}= 0.006 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL AASHTO = A-4

Remarks

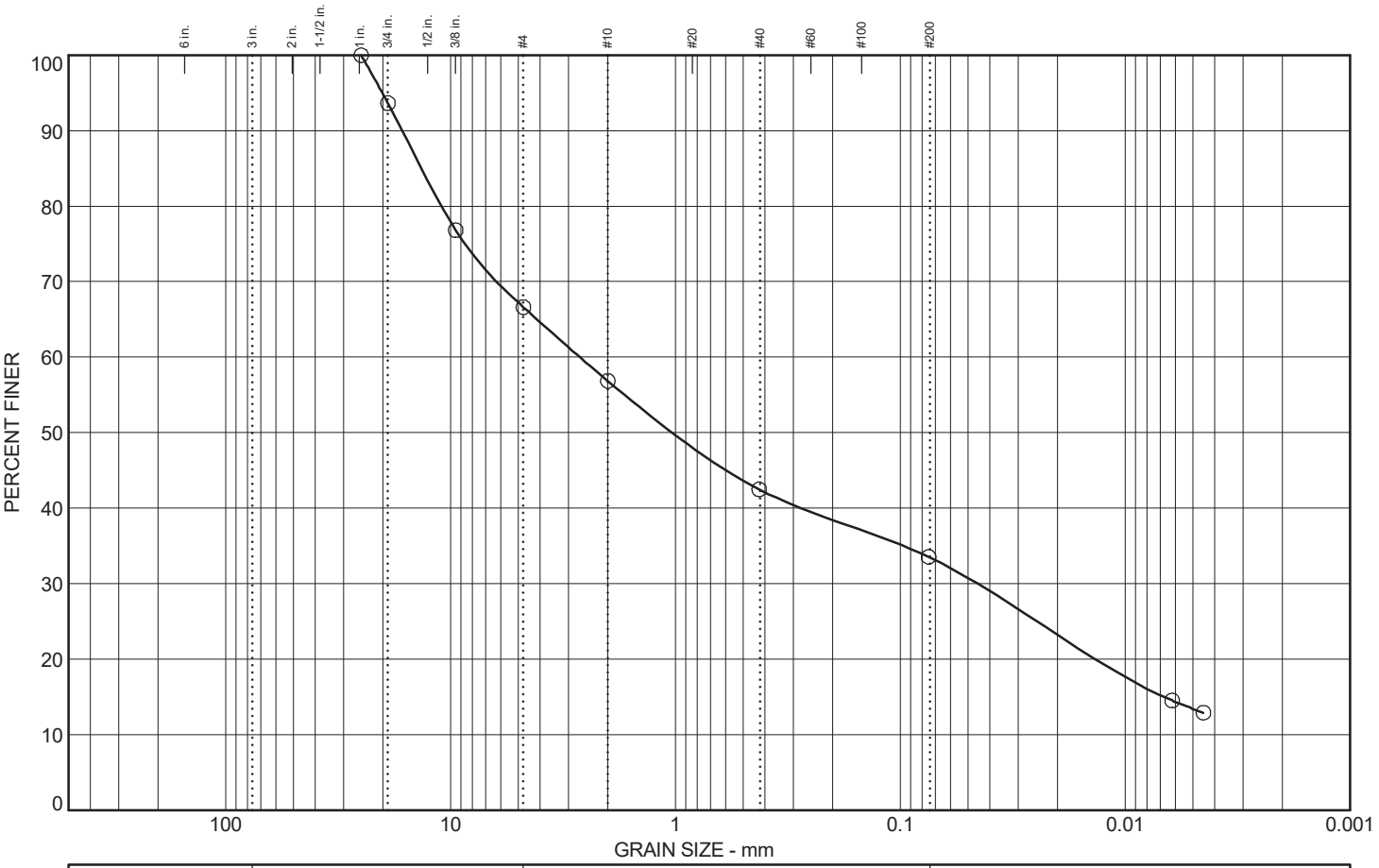
Group Index = 2

Sample No.: 4 **Source of Sample:** NC-208 **Date:**
Location: - **Depth / Elev:** 5.5'

DLZ

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

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	6.4	27.0	9.8	14.4	8.9	20.1	13.4

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
25	100.0		
19	93.6		
9.5	76.8		
4.75	66.6		
2	56.8		
0.425	42.5		
0.075	33.5		

* (no specification provided)

Soil Description

fine gravel, low plasticity clay, medium to coarse sand

General Characteristics

Moisture Content = 17.4%

Atterberg Limits

LL= 27 PL= 17 PI= 10

Coefficients

D_{85}= 13.31 D_{60}= 2.645 D_{50}= 0.956
D_{30}= 0.047 D_{15}= 0.007 D_{10}=
C_u= C_c=

Classification

USCS = GC AASHTO = A-2-4

Remarks

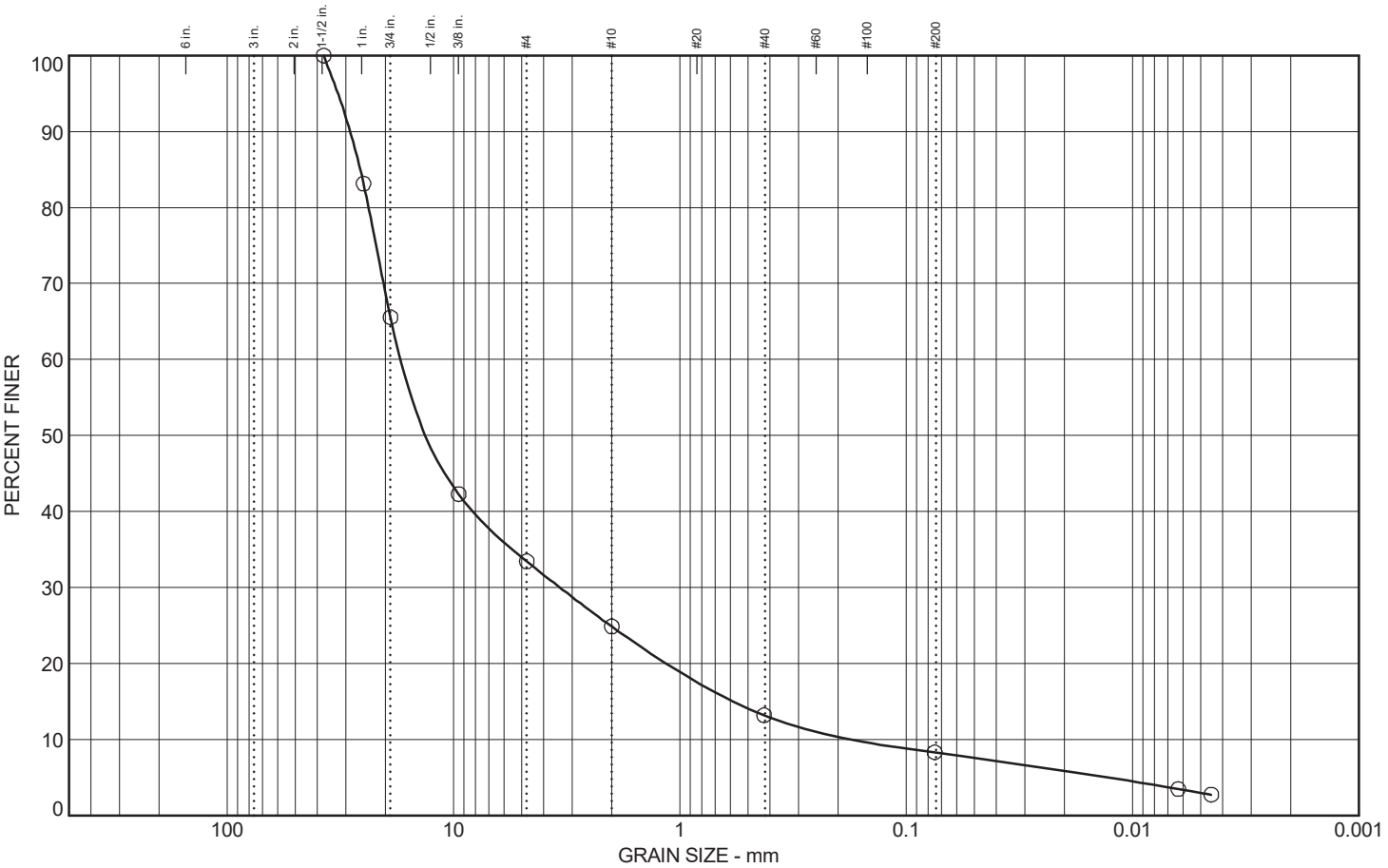
Group Index = 0

Sample No.: S-5 **Source of Sample:** NC-209 **Date:**
Location: - **Depth / Elev:** 7'

DLZ

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

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	34.5	32.1	8.6	11.7	4.9	5.3	2.9

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
37.5	100.0		
25	83.1		
19	65.5		
9.5	42.3		
4.75	33.4		
2	24.8		
0.425	13.2		
0.075	8.3		

* (no specification provided)

Soil Description

General Characteristics

Moisture Content = 5.8%

Atterberg Limits

LL= PL= PI=

Coefficients

D_{85}= 26.141 D_{60}= 16.106 D_{50}= 11.956
D_{30}= 3.365 D_{15}= 0.542 D_{10}= 0.138
C_u= 117.00 C_c= 5.11

Classification

USCS = AASHTO =

Remarks

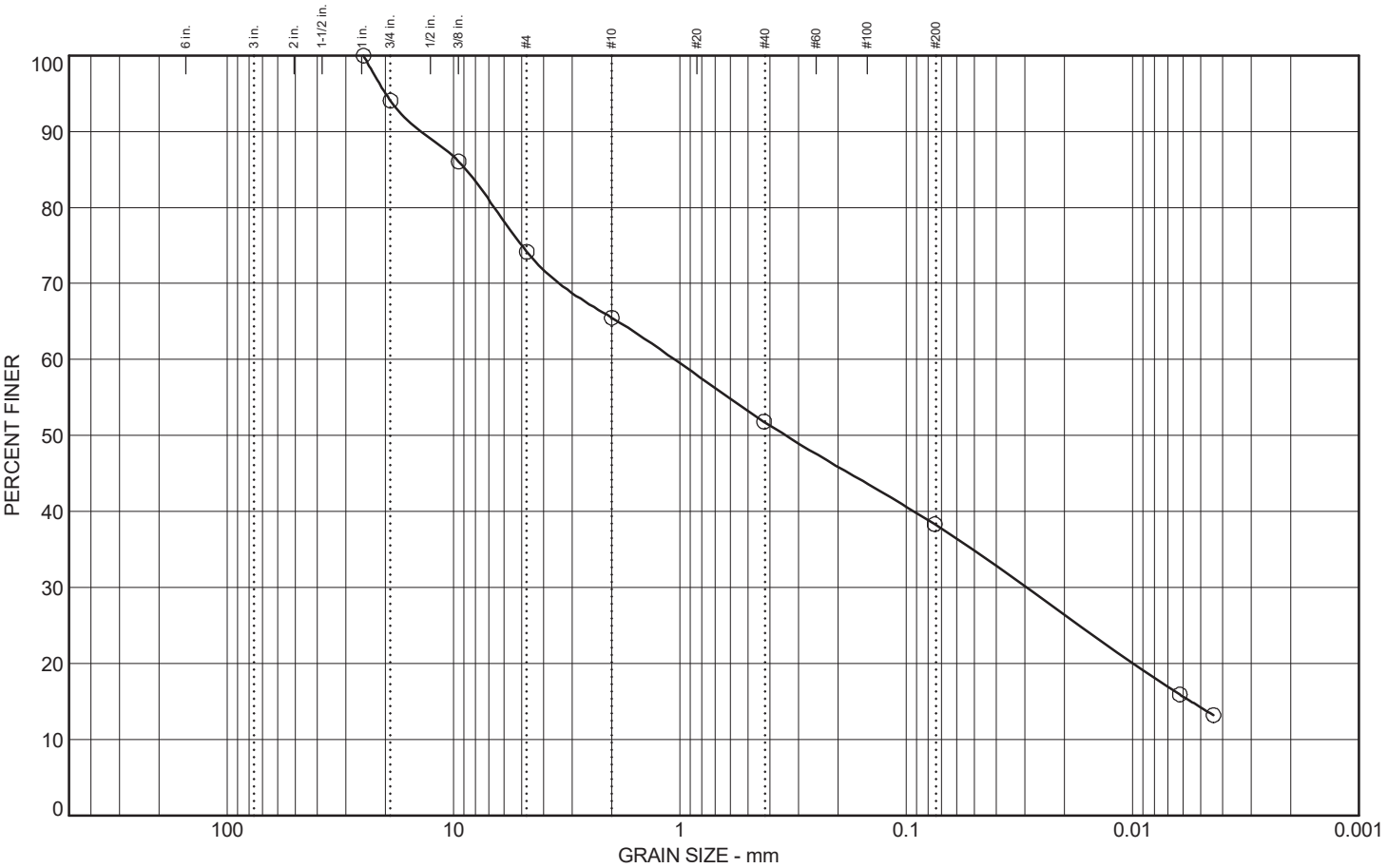
Group Index =

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

DLZ

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

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	5.9	19.9	8.7	13.7	13.5	24.1	14.2

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
25	100.0		
19	94.1		
9.5	86.0		
4.75	74.2		
2	65.5		
0.425	51.8		
0.075	38.3		

* (no specification provided)

Soil Description

fine to medium sand, low plasticity clay, fine gravel

General Characteristics

Moisture Content = 6.8%

Atterberg Limits

LL= 19 PL= 15 PI= 4

Coefficients

D_{85}= 8.939 D_{60}= 1.074 D_{50}= 0.337
D_{30}= 0.03 D_{15}= 0.006 D_{10}=
C_u= C_c=

Classification

USCS = SC-SM AASHTO = A-4

Remarks

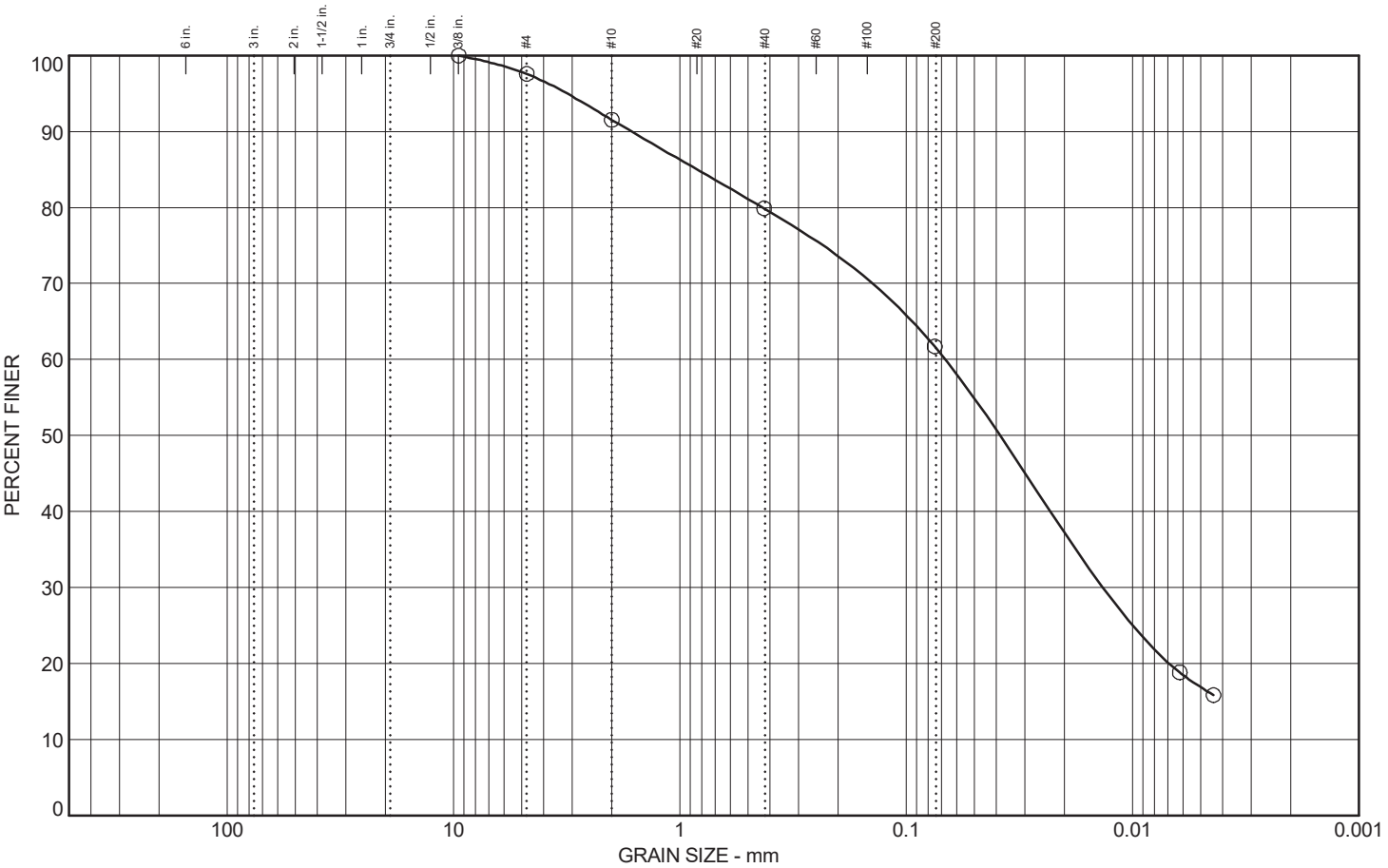
Group Index = 0

Sample No.: S-12 **Source of Sample:** OH-1 **Date:**
Location: - **Depth / Elev:** 38.5'

DLZ

Client: Campos EPC, LLC
Project: NCHP Pipeline - University
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	2.4	6.0	11.7	18.2	44.8	16.9

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
9.5	100.0		
4.75	97.6		
2	91.5		
0.425	79.9		
0.075	61.7		

* (no specification provided)

Soil Description

low plasticity clay, fine to medium sand

General Characteristics

Moisture Content = 10.6%

Atterberg Limits

LL= 20 PL= 14 PI= 6

Coefficients

D_{85}= 0.839 D_{60}= 0.068 D_{50}= 0.038
D_{30}= 0.012 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS = CL-ML AASHTO = A-4

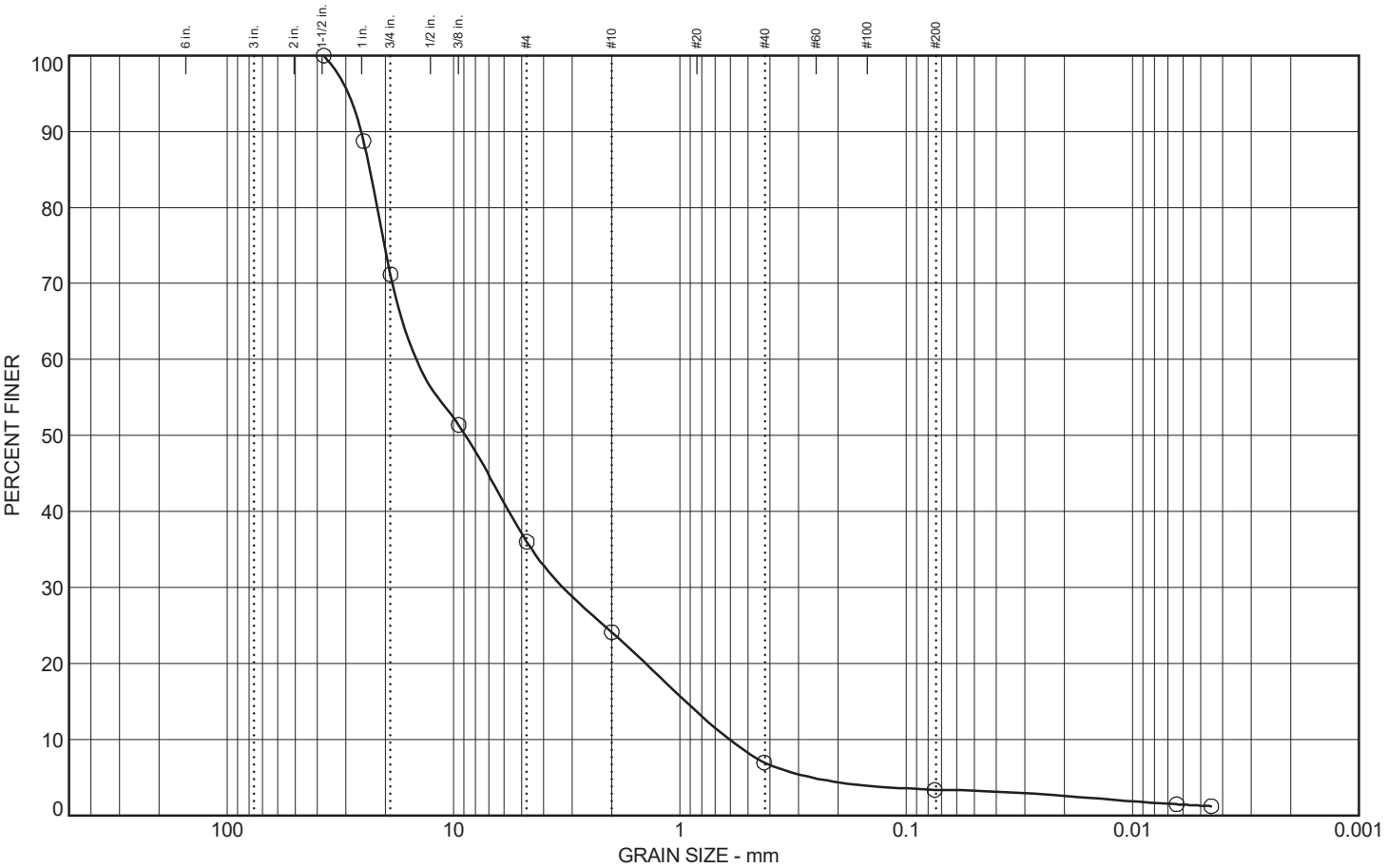
Remarks

Group Index = 1

Sample No.: S-5 **Source of Sample:** OH-2 **Date:**
Location: - **Depth / Elev:** 7'

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

PARTICLE SIZE DISTRIBUTION TEST REPORT



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0.0	28.8	35.2	11.9	17.2	3.6	2.1	1.3

SIEVE SIZE (mm)	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
37.5	100.0		
25	88.7		
19	71.2		
9.5	51.4		
4.75	36.0		
2	24.1		
0.425	6.9		
0.075	3.3		

* (no specification provided)

Soil Description

fine to coarse gravel, medium to coarse sand

General Characteristics

Moisture Content = 3.2%

Atterberg Limits

LL= PL= PI=

Coefficients

D_{85}= 23.577 D_{60}= 12.845 D_{50}= 8.928
D_{30}= 3.071 D_{15}= 0.88 D_{10}= 0.56
C_u= 22.93 C_c= 1.31

Classification

USCS = GW AASHTO =

Remarks

Group Index =

Sample No.: S-12 **Source of Sample:** OH-2 **Date:**
Location: - **Depth / Elev:** 38.5'

DLZ

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

Attachment G

Colliers Engineering & Design

North Columbus High Pressure University Phase II Project
Columbus, Franklin County, Ohio

June 12, 2024

Intensive Phase I Cultural Resources Investigation
Columbus, Franklin County, Ohio

Prepared for:

NiSource, Inc

801 E. 86th Avenue Merrillville, Indiana 46410

Prepared by:

Jacob C. Spuck M.S.
Principal Investigator

Prepared by:

Natalie K. Thomas M.S.
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Colliersengineering.com

Project No. 21004202A

Table of Contents

Appendix

List of Figures

List of Tables

ACRONYMS AND ABBREVIATIONS

APE	Area of Potential Effect
ACHP	Advisory Council on Historic Preservation
Bgs	Below Ground Surface
B.P.	Before Present
CED	Colliers Engineering & Design
CFR	Code of Federal Regulations
CRM	Cultural Resources Management
cm	centimeter
ESRI	Environmental Systems Research Institute
GPS	global positioning system
km	kilometer
NETR	Nationwide Environmental Title Research
NCHP	North Columbus High Pressure
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OAI	Ohio Archaeology Inventory
OHC	Ohio History Connection
Project	North Columbus High Pressure University Phase II Project
SHPO	State Historic Preservation Office

STP	Shovel Test Pit
USC	United States Code
USGS	United States Geological Survey

ABSTRACT

Colliers Engineering & Design (CED), on behalf of NiSource, conducted a Phase I intensive level cultural resource survey for the new construction of approximately 2.2 miles (3.5 kilometers [km]) of 20-inch below ground high pressure natural gas pipeline for the North Columbus High Pressure University Phase II Project (Project) in the City of Columbus, Franklin County, Ohio. The purpose of the intensive cultural resource survey was to identify archaeological resources and/or historic structures that might be affected by the proposed Project.

The investigation was performed for compliance with Section 106 of the National Historic Preservation Act (NHPA) (54 U.S.C. § 306108). The Ohio State Historic Preservation Office is the official agency of the State of Ohio which was designated the Ohio History Connection (OHC) in 1967. This report conforms to the Ohio History Connection's *Archaeology Guidelines (2022) and Guidelines for Conducting History/Architecture Surveys in Ohio (2014),* the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 *Federal Register* 44716) and Ohio Revised Code Section 149.53, and Archaeological and Historic Survey and Salvage Work (2015). CED personnel who conducted the research and fieldwork meet or exceed the Secretary of the Interior's Standards and Guidelines for Archeology and Historic Preservation (48 *Federal Register* 44716).

Prior to fieldwork, a background literature and records review and an intensive survey consisting of pedestrian survey with shovel testing and photographic documentation. The project will involve the construction of approximately 2.2 miles (3.5 km) of 20-inch below ground high pressure natural gas pipeline in the City of Columbus, Franklin County, Ohio.

The Area of Potential Effects (APE) is the geographic area within which the project may directly or indirectly alter the character or use of historic properties, including archaeological sites, above-ground historic resources, and properties listed or eligible for listing in the National Register of Historic Places (NRHP) ([per 36 CFR 800.4(d)(1)]). The Area of Potential Effects (Project APE) includes all areas directly and indirectly affected by the Project with the limit of ground disturbance. For the archaeological and architectural survey this includes all potential areas subject to ground disturbing activities (direct APE), and for the architectural survey this includes all potential historic structures within a 0.5-mile (0.8-km) radius of any ground disturbing activities.

As proposed, the direct APE consists of a combined total area of 15.2 acres (6.2 hectares). The background literature and records review completed by CED found that no archaeological or historic architectural resources were located within or immediately adjacent to the direct APE. 18 archaeological sites and ten aboveground historic resources were determined to be located within 0.5 mile (0.8 km) of the direct APE.

Jacob Spuck served as the Principal Investigator, Kristi Bodine served as field director and Natalie Thomas served as the Project architectural historian. Fieldwork for the Phase I intensive level pedestrian survey was undertaken by Jacob Spuck and Kristi Bodine from July 31, 2023 to May 24, 2024. The survey documented a heavily disturbed setting dominated by agricultural activity and urban construction fill. Based on the results of the survey and the extent of the proposed Project activities, no intact, significant cultural resources will be affected by construction within the Project APE. In accordance with Section 106

of the NHPA, and the guidelines set forth by OHC, CED recommends a finding of **NO HISTORIC PROPERTIES AFFECTED** within the Project APE.

Should cultural materials and/or human remains be encountered during construction, work in the immediate area will cease and the qualified archaeologist will evaluate and provide recommendations for future management. All findings will be reported to, and activities coordinated with, the appropriate interested parties.

MANAGEMENT SUMMARY

Project Title. North Columbus High Pressure University Phase II Project

Report Date. June 5, 2024.

Project Description. NiSource is proposing the construction of approximately 2.2 miles (3.5 km) of 20-inch below ground high pressure natural gas pipeline. The report is limited to the proposed ground disturbing area associated with the proposed pipeline construction. The direct APE is located within urban, commercial and residential areas, wooded areas, wetland areas and plowed agricultural areas

Location. The easternmost boundary of the direct APE begins approximately 200 feet (61 meters) west of the Ackerman Rd and Defiance Drive intersection in Columbus, Franklin County, Ohio. From there, the direct APE parallels the southern flank of Ackerman Rd west. From the Ackerman Drive and Kenny Rd intersection the direct APE traverses west through a thin wooded corridor, before turning south at North Star Rd at the North Star Rd and Zollinger Rd intersection. At the North Star Rd and Ridgeview Rd intersection the direct APE then turns west before turning south at Brandon Rd. The westernmost boundary of the direct APE terminates approximately 160 feet (48.7 meters) north of the Northman Rd and Brandon Rd intersection. The Project is depicted on the *Northwest Columbus, Ohio* US Geological Survey (USGS) 7.5-minute topographic quadrangle map.

Principal Investigator. Jacob Spuck M.S.

Purpose of Work. The survey was designed to identify archaeological and architectural resources, if any, that could be impacted by the Project and to offer recommendations for the avoidance, further study, and/or National Register of Historic Preservation (NRHP) eligibility of these resources. All work was conducted in support of NiSource's compliance with Section 106 of the NHPA (54 U.S.C. § 306108) and its implementing regulations (36 CFR 800).

Area Surveyed. The entirety of the Project APE was investigated for cultural resources.

Date of Work. July 31, 2023 to May 24, 2024.

Number of Resources. No belowground archaeological resources were identified within the direct APE. Although ten historic resources were documented within 0.5 mile (0.8 km) of the direct APE, none of these resources were determined to be within the viewshed of the direct APE.

Curation. Artifacts were not encountered during archaeological fieldwork, and therefore no curation took place.

Comments. In accordance with Section 106 of the NHPA (54 U.S.C. § 306108), and the guidelines set forth by OHC, CED has made a reasonable and good faith effort to identify cultural resources within each Project APE. Based on the results of the survey and the extent of the proposed Project activities, no intact, significant cultural resources will be affected by construction within the Project APE. CED recommends a finding of **NO HISTORIC PROPERTIES AFFECTED ([per 36 CFR 800.4(d)(1)])** within the Project APE.

1.0 INTRODUCTION

Colliers Engineering & Design (CED), on behalf of NiSource, conducted a Phase I intensive level cultural resource survey for the new construction of approximately 2.2 miles (3.5 kilometers [km]) of 20-inch below ground high pressure natural gas pipeline for the North Columbus High Pressure University Phase II Project (Project) located in Columbus, Franklin Couty, Ohio (Figure 1 and Figure 2).The enclosed report focuses on the proposed Project and details the survey methodology, results, and recommendations from the Phase I survey. The survey was undertaken to comply with guidelines established by the Ohio Historic Connection (OHC).

The purpose of the investigation was to locate and identify cultural resources within the Area of Potential Effects (Project APE), using guidelines set forth by the OHC, in their 1994 document entitled Archaeology Guidelines (OHC 1994). Identification of existing historic resources allowed for an assessment to be made of their significance in light of the criteria for inclusion in the National Register of Historic Places (NRHP). Recommendations were then formulated for avoidance or mitigation procedures of any culturally sensitive or significant properties.

These activities are stipulated within legislation enacted over the past 40 years, including the National Historic Preservation Act (NHPA) of 1966 (as amended) and its associated implementing regulations (36 CFR 800) outlined by the Advisory Council on Historic Preservation (ACHP). To accomplish this, several research strategies were employed:

- Background research, specifically a literature and physiographic review of the central Ohio region.
- Pedestrian survey of the direct APE, which included surface inspection of exposed soils, fixed-interval shovel testing in areas not previously disturbed, and photographic documentation of architectural resources.

The Phase I intensive-level survey was conducted from July 31, 2023, to May 24, 2024, under the direction of CED Principal Investigator Jacob Spuck, M.S.

2.0 PROJECT DESCRIPTION

The Project as currently proposed would involve the construction of approximately 2.2 miles (3.5 km) of 20-inch below ground high pressure natural gas pipeline. The report is limited to the proposed ground disturbing area associated with the proposed pipeline construction. The Project APE is located within urban, commercial and residential areas, wooded areas, wetland areas and plowed agricultural areas.

2.1 DEFINITION OF THE PROEJCT APE AND DIRECT APE

The Project APE is the geographic area within which the project may directly or indirectly alter the character or use of historic properties, including archaeological sites, above-ground historic resources, and properties listed or eligible for listing in the NRHP ([per 36 CFR 800.4(d)(1)]). The Project APE includes all areas directly and indirectly affected by the Project with the limit of ground disturbance. For the archaeological and architectural survey this includes all potential areas subject to ground disturbing activities (direct APE), and for the architectural survey this includes all potential historic structures within a 0.5-mile (0.8-km) radius of any ground disturbing activities.

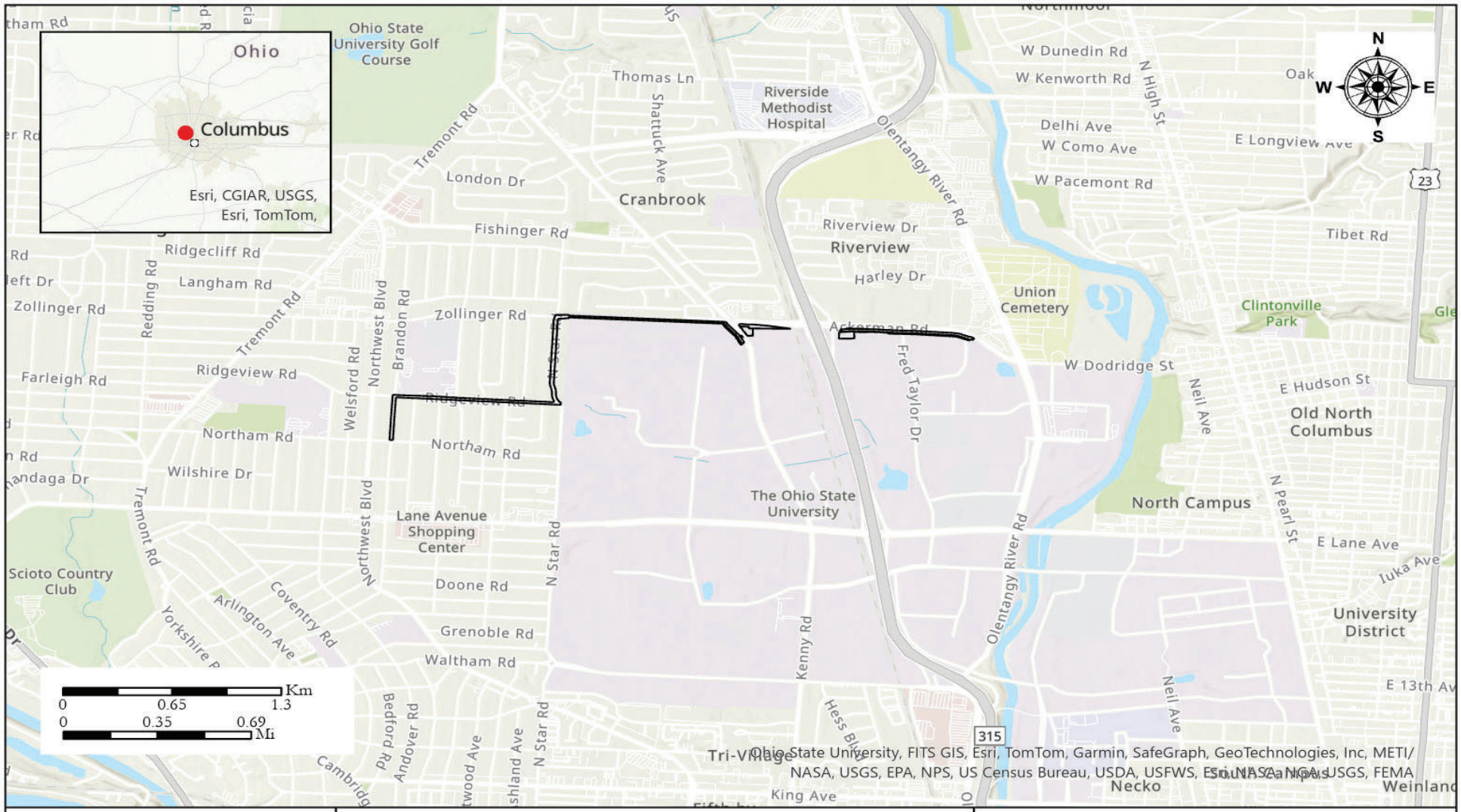
2.2 EXISTING CONDITIONS AND VICINITY CHARACTERISTICS

The direct APE consists of a 15.2-acre (6.2-hectare) area associated with the construction of a proposed 20-inch natural gas line. The easternmost boundary of the direct APE begins approximately 200 feet (61 meters) west of the Ackerman Rd and Defiance Dr intersection in Columbus, Franklin County, Ohio. From there, the direct APE parallels the southern flank of Ackerman Rd west. From the Ackerman Dr and Kenny Rd intersection the direct APE traverses west through a thinly wooded corridor, before turning south at North Star Rd at the North Star Rd and Zollinger Rd intersection. At the North Star Rd and Ridgeview Rd intersection the direct APE then turns west before turning south at Brandon Rd. The westernmost boundary of the direct APE terminates approximately 160 feet (48.7 meters) north of the Northman Rd and Brandon Rd intersection. The direct APE consisted of urban, commercial and residential areas, wooded areas, wetland areas and plowed agricultural areas.

2.3 REPORT ORGINIZATION

The following report and supporting documentation are presented in the format established for Phase I survey report submittals by the OHC. Therefore, the report begins with a detailed methodology, synthesizing the background research and environmental data to develop an analytical framework for locating and assessing cultural resources within the Project APE (Chapter 3.0). A synopsis of the existing background research, environmental and cultural factors defined for the Project APE are presented from Chapters 4.0 through 6.0, respectively. The methodologies employed by CED during the Phase I survey are detailed in Chapter 7.0. The discussion and analyses of the data collected during the Phase I archaeological survey are presented in Chapter 8.0. A summary of the conclusions and recommendations generated from the Phase I archaeological survey are presented in Chapter 9.0.

Figure 1: Project APE on Topographic Map



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Project APE on Topographic Map
NCHP-University Phase II Project
Phase I Archaeological Survey
Franklin County, Ohio

Date:	CED Project Number:	Drawn by:
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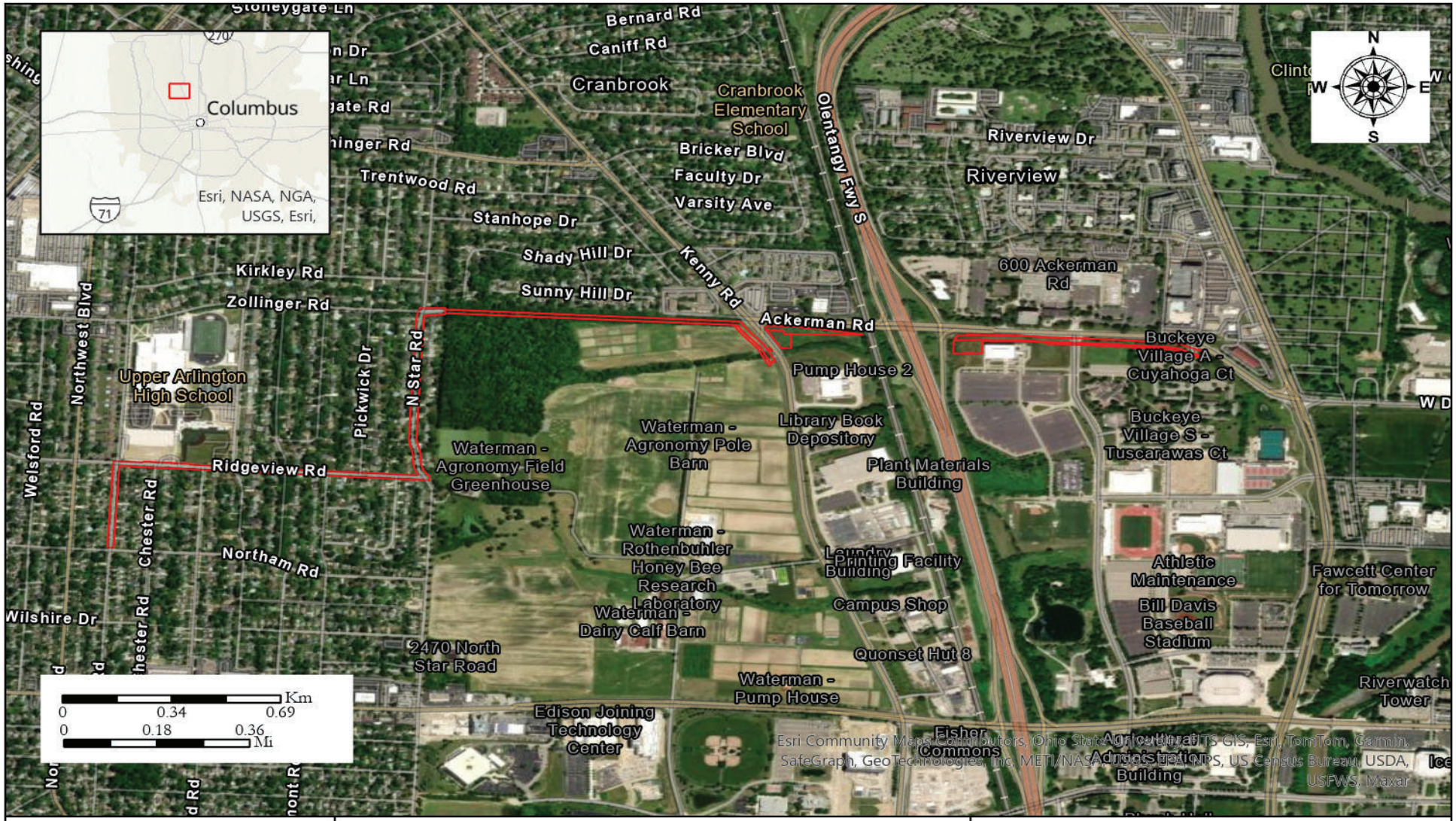
Project APE

Figure 2:Project APE on Aerial Photograph



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Project APE on Aerial Photograph
NCHP-University Phase II Project
Phase I Archaeological Survey
Franklin County, Ohio

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Project APE

3.0 METHODOLOGY

A methodology was developed to guide the field reconnaissance. This methodology was assembled by examining a variety of factors relevant to the Project. The factors involved in this analysis include existing and prehistoric environmental conditions and vegetation patterns; the known archaeological record of the region, both prehistoric and historic; and previous archaeological and historic architectural Cultural Resource Management (CRM) related experience of the staff at CED. The scope of work for the Phase I survey consisted of background research; windshield and pedestrian reconnaissance surveys; and a previous cultural resources desktop survey conducted by CED.

The Project is located in a suburban commercial and residential section of Franklin County, Ohio. The easternmost boundary of the direct APE begins approximately 200 feet (61 meters) west of the Ackerman Rd and Defiance Dr intersection in Columbus, Franklin County, Ohio. From there, the direct APE parallels the southern flank of Ackerman Rd west. From the Ackerman Dr and Kenny Rd intersection the direct APE traverses west through a thinly wooded corridor, before turning south at North Star Rd at the North Star Rd and Zollinger Rd intersection. At the North Star Rd and Ridgeview Rd intersection the direct APE then turns west before turning south at Brandon Rd. The westernmost boundary of the direct APE terminates approximately 160 feet (48.7 meters) north of the Northman Rd and Brandon Rd intersection. The direct APE consisted of urban, commercial and residential areas, wooded areas, wetland areas and plowed agricultural areas.

No archaeological sites were identified within the direct APE. However, the direct APE has been surveyed three times with the earliest survey occurring in 1976 and the most recent in 2012. A review of historic mapping and aerial photographs revealed that heavy ground disturbing activities such as paving, construction and plowing have taken place within the direct APE over the past century. As a result, the direct APE is considered to have a medium probability of containing cultural resources. Due to limited visibility throughout the direct APE, the most effective method for conducting a systematic archaeological survey was to establish a 15-meter shovel testing interval per OHC guidelines.

The historic architectural survey was conducted through background research and a pedestrian survey to identify and document historic age resources within the Project APE.

4.0 BACKGROUND RESEARCH

Prior to and during the field reconnaissance of the Project APE, CED conducted background research in an effort to develop a context for the prehistoric and historic landscape documented across the portion of Franklin County, Ohio in which the Project is located. Research involved the identification of all OHC previously inventoried cultural resources located within 0.5 mile (0.8 km) of the direct APE (Figure 3). All previously identified cultural resources can be found in the OHC archives for: the Ohio Archaeology Inventory (OAI) database which is maintained by the OHC. In conjunction with the data obtained from the OAI database, an examination was undertaken of previous cultural resource reports.

Because the OAI database was not functioning as of June 2024, CED consulted with OHC directly in June 2024, in an effort to obtain cultural resource data within 0.5 mile (0.8 km) of the direct APE with the data obtained as follows:

- 18 archaeological sites are located within 0.5 mile (0.8 km) of the direct APE.
- Ten historic architectural resources are located within 0.5 mile (0.8 km) of the direct APE in addition to three cemeteries.
- Six CRM-related reports have been filed within 0.5 mile (0.8 km) of the direct APE, of which three intersected the direct APE.

The background research did not identify any archaeological sites or above-ground historic archaeological resources within the direct APE. However, ten previously identified historic architectural resources and three cemeteries were located within 0.5 mile (0.8 km) of the direct APE (see Figure 3).

4.1 PREVIOUS CULTURAL RESOURCE SURVEYS

The direct APE has been surveyed a total of three times with the earliest survey occurring in 1976 and the most recent in 2012 (Table 1). A total of six previously conducted surveys were completed within a 0.5-mile (0.8-km) buffer of the direct APE, of which three directly intersected the direct APE.

Table 1. Previously Conducted Cultural Resource Surveys within 0.5 mile (0.8 km) of the direct APE.

Project Name	Investigating Firm	Date of Survey	Distance to direct APE
Archaeological Survey of Proposed Interstate 315 - (Columbus & Worthington) Franklin County, Ohio	Ohio Department of Transportation	1976	Intersects
An Archaeological Literature Review and Survey: Proposed Olentangy River Bicycle Path in the City of Columbus, Clinton Township, Franklin County, Ohio	ASC Group, Inc.	1990	640-Meters NE (2099.7-ft)
Phase I Cultural Resources Survey of NiSource's Proposed Ackerman Road 20-inch Natural Gas	URS Corp., Cincinnati	2012	Intersects

Project Name	Investigating Firm	Date of Survey	Distance to direct APE
Pipeline Project in the City of Columbus, Franklin County, Ohio			
Phase I Cultural Resources Survey of the American Electric Power's Roberts-OSU Transmission Line Project in Columbus Township, Franklin County, Ohio	URS Corp., Cincinnati	2010	762-Meters S (2500-ft)
Phase II National Register Testing of Site 33-FR-801, for the Proposed Ackerman Road 20-inch Natural Gas Pipeline Project in the City of Columbus, Franklin County, Ohio (OPSB case # 11-3534-GA-BTX)	URS Corp., Cincinnati	2012	Intersects
An Eligibility Assessment of Site 33FR801 within the Proposed Olentangy River Bicycle Path in The City of Columbus, Clinton Township, Franklin County, Ohio	ASC Group, Inc	1991	750-Meters NE (2460.6-ft)

4.2 INVENTORIED ARCHAEOLOGICAL RESOURCES

A total of 18 OAI-listed archaeological sites have been inventoried within 0.5 mile (0.8 km) of the direct APE, as listed in Table 2 below. Information related to temporal affiliations used for Table 2 was originally obtained from OHC's online mapping system during a 2022 desktop review. Additional temporal information and NRHP eligibility for sites was not obtained since OHC's online mapping system went down in 2023, nor was it provided in the shapefiles obtained in the June 2024 data request that CED submitted to OHC.

Table 2. Previously Recorded Archaeological Sites within 0.5 mile (0.8 km) of the direct APE.

OHI/OAI Number	Location	Site Type/ Temporal	Eligibility
FR0094	Terrace southwest of direct APE	Unknown	Unknown
FR0200	Terrace east of direct APE	Prehistoric	Unknown
FR0201	Terrace east of direct APE	Prehistoric	Unknown
FR0202	Terrace east of direct APE	Prehistoric	Unknown
FR0205	Terrace east of direct APE	Prehistoric	Unknown
FR0802	Terrace east of direct APE	Prehistoric	Unknown

OHI/OAI Number	Location	Site Type/ Temporal	Eligibility
FR0803	Terrace east of direct APE	Prehistoric	Unknown
FR0801	Terrace east of direct APE	Prehistoric and Historic	Unknown
FR2892	Shoulder south of direct APE	Unknown	Unknown
FR2891	Shoulder south of direct APE	Unknown	Unknown
FR0404	Terrace south of direct APE	Unknown	Unknown
FR0403	Terrace south of direct APE	Unknown	Unknown
FR0405	Shoulder south of direct APE	Unknown	Unknown
FR0406	Shoulder south of direct APE	Unknown	Unknown
FR0407	Shoulder south of direct APE	Unknown	Unknown
FR0408	Terrace south of direct APE	Unknown	Unknown
FR0409	Terrace south of direct APE	Unknown	Unknown
FR0410	Terrace south of direct APE	Unknown	Unknown

4.3 INVENTORIED HISTORIC RESOURCES

A total of ten historic architectural resources are located within 0.5 mile (0.8 km) of the direct APE according to OHC data received in June 2024 (Table 3). All ten of the historic resources identified were historic buildings and structures. Four of these structures are listed as eligible on the NRHP, including the Baird House, Hansel House, John Allen House and the unnamed structure located at 1904 Berkshire Rd. All other resources had unknown eligibility and were therefore treated as eligible for inclusion in the NRHP. In addition, three cemeteries are located within a 0.5-mile (0.8 km) radius of the direct APE.

Table 3. Previously Recorded Historic Resources Within 0.5 mile (0.8 km) of the direct APE.

OHI/OAI Number	Name of Resource	Date of Significance	Address
FRA0208409	Amaranth Abbey	1925	316 W Dodridge Ave
FRA0209109	Industrial Nucleonics Corp	Unknown	650 Ackerman Rd
FRA0209609		1870	2781 Olentangy River Rd

FRA0346709	Baird House	1936	1874 Collingswood Rd
FRA0346809	Hansel House	1929	1964 Collingswood Rd
FRA0346909	De Long House	1931	1967 Collingswood Rd
FRA0347109	John Allen House	1920	2500 Henthorn Rd
FRA0347409		1936	1904 Berkshire Rd
FRA1010513	Dodridge Street Dam	1971-1972	Olentangy River
FRA1010609	Union Cemetery Dam	1971-1972	Olentangy River

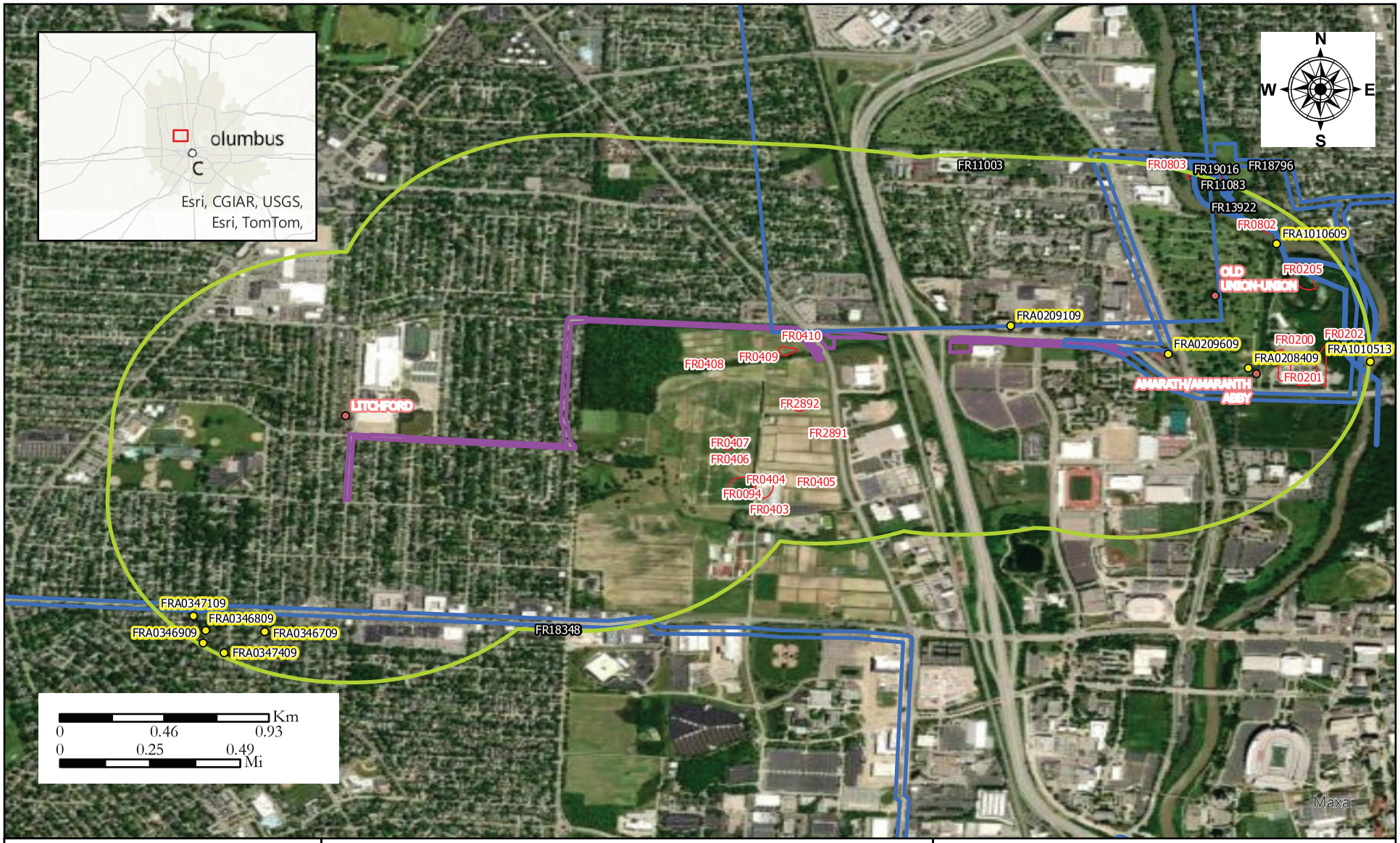
4.4 HISTORIC-ERA MAPPING

Review of historic-era mapping (Table 4) revealed that the direct APE was mostly undeveloped in the mid to late nineteenth century (Matthews and Taintor 1856). During the early to mid-twentieth century, the direct APE remained largely undeveloped, with the exception of sporadic development in the central and western portions of the direct APE (USGS 1901; USGS 1965).

Table 4. Historic-era Mapping Consulted for research purposes within the Project APE.

Date	Reference	Title	Comments
1856	Matthews & Taintor	*Illustrated Atlas of Franklin County, Ohio*	Depicts road alignments, property owners, structures
1901	USGS	*Dublin, Ohio 15-minute Series*	Depicts road alignments. and structures
1965	USGS	*Northeast Columbus, Ohio 7.5-minute Series Quadrangle*	Depicts road alignments. and structures

Figure 3:OHC Resources within the Project APE.



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Cultural Resources and Prior Cultural Resource Surveys on
Aerial Photograph
NCHP-University Phase II Project
Phase I Archaeological Survey
Franklin County, Ohio

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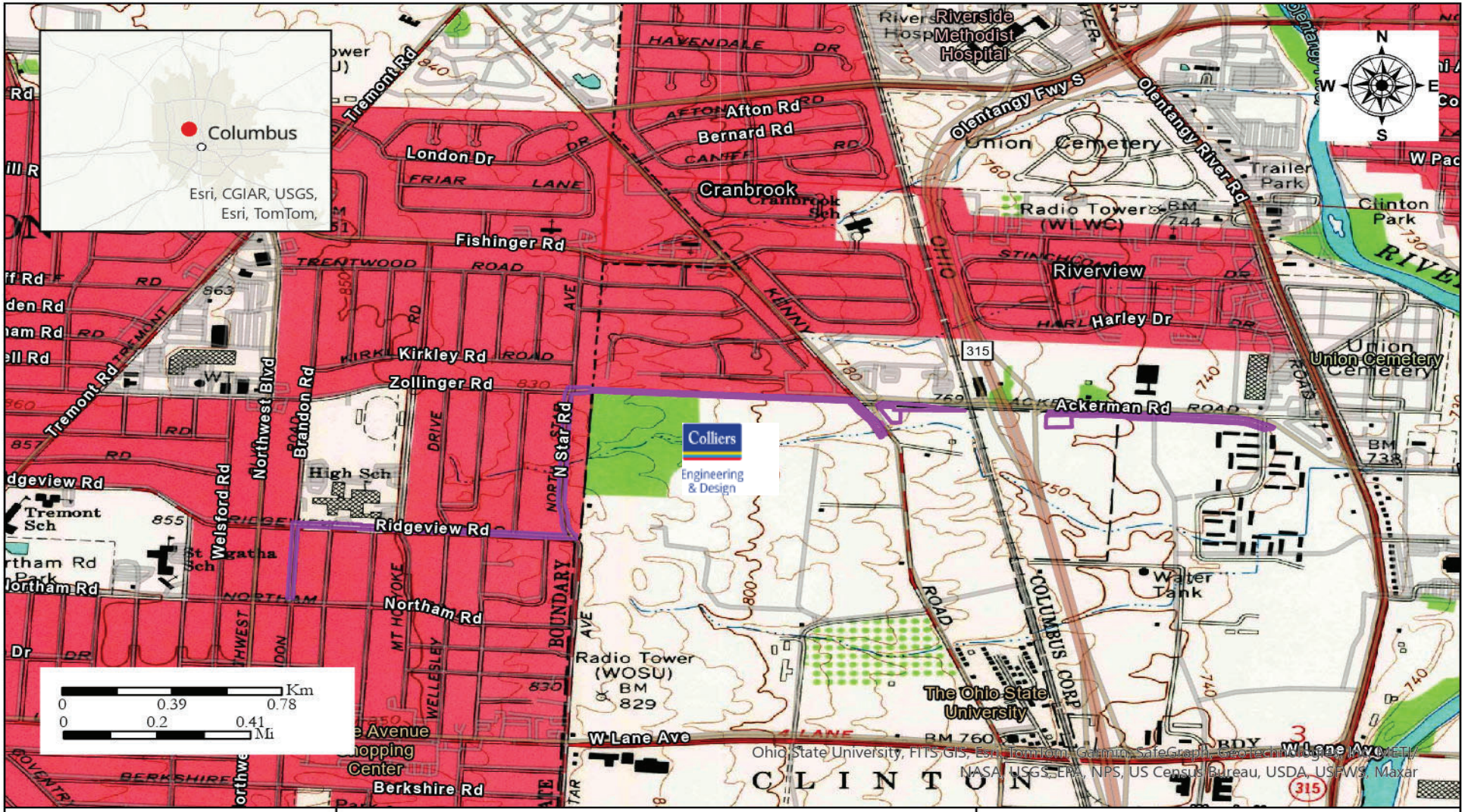
- Project APE
- Archaeological Sites within 0.5-mile (0.8-km) of direct APE
- Previously Surveyed Areas within 0.5-mile (0.8-km) of direct APE
- Cemeteries within within 0.5-mile (0.8-km) of direct APE
- Historic Structures within 0.5-mile (0.8-km) of direct APE
- 0.5-mile (0.8-km) buffer

Figure 4: Historic Topographic Map from 1965 showing the Project APE.



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Project APE on 1965 Historic USGS Topographic Map
NCHP-University Phase II Project
Phase I Archaeological Survey
Franklin County, Ohio

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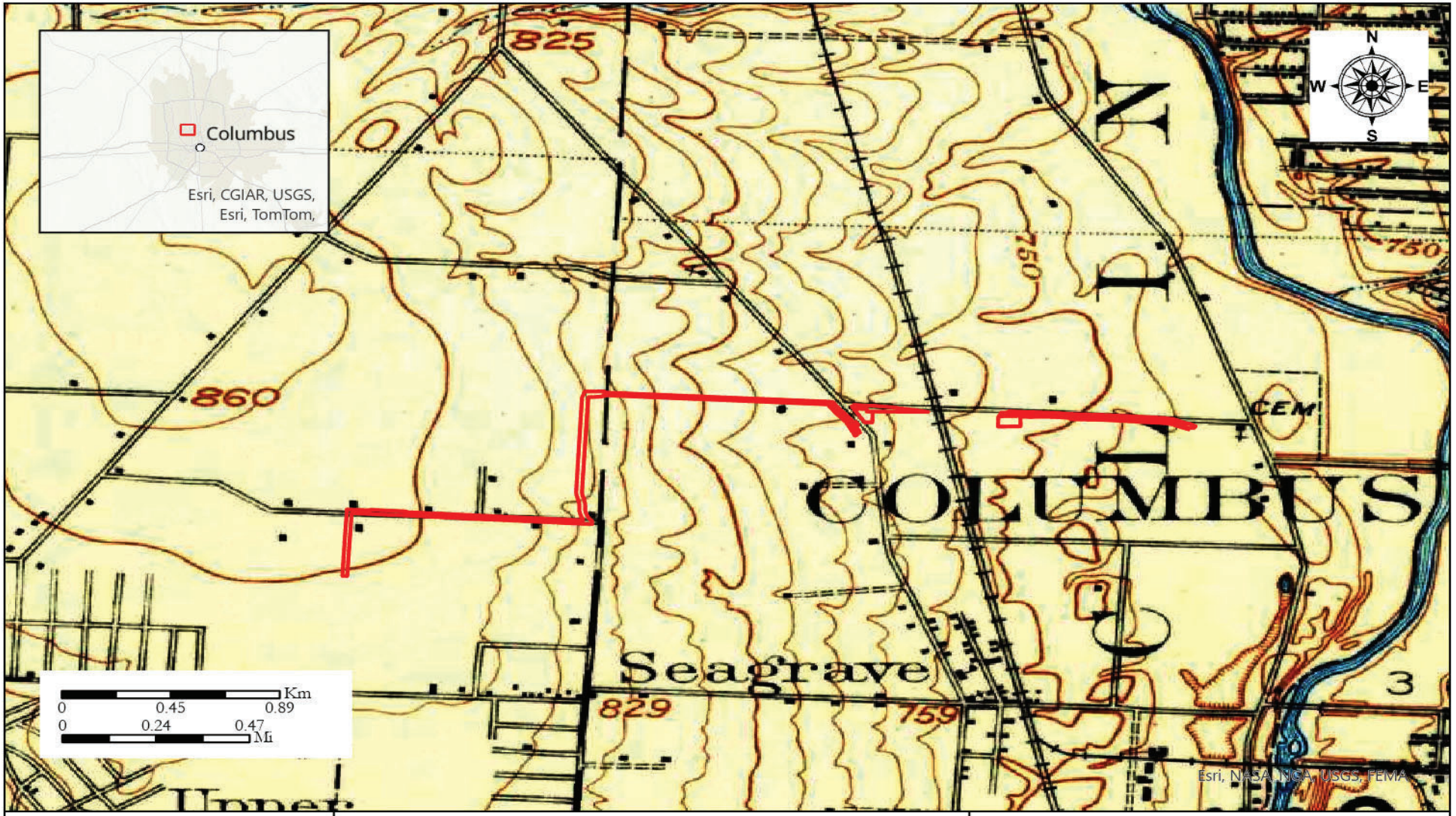
Project APE

Figure 5: Historic Topographic Map from 1901 showing the Project APE.



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Project APE on 1901 Historic Topographic Map
NCHP-University Phase II Project
Phase I Archaeological Survey
Franklin County, Ohio

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Legend

Project APE

Colliers
Engineering
& Design

5.0 ENVIRONMENTAL OVERVIEW

The following narrative describes the prehistoric and historic environmental setting of the Project area in Franklin County, Columbus, Ohio in order to develop a context for understanding the location and preservation of cultural resources. Environmental conditions, including climate, and the related floral and faunal communities, significantly influenced the type and extent of prehistoric settlement and subsistence patterns.

5.1 PHYSIOGRAPHY AND GEOLOGY

The Project area is located in the Till Plains ecoregion of the Eastern Corn Belt Plains physiographic province of Ohio. The Till Plains ecoregion covers most of southwestern Ohio all the way through central Indiana. This ecoregion is flat to rolling and has outwash plains and terminal moraine glacial features. The Project area is underlain by Wisconsinan glacial deposits consisting of mostly loam. Most of the forests have been cleared for agriculture and now the area is utilized mostly for soybean, corn, and livestock production. The Project is underlain by the Columbus limestone geological formation. The Columbus limestone geological formation consists of limestone and dolomite that ranges from dark grey to brown. The far eastern portion of the Project area is bordered by the Ohio Shale geological formation. There are also sand filled burrows two to five meters thick bordering the formation. Shale and sandstone also make up a majority of the valley's lowlands and ridges. Dolostone layers underline the main formation of the region (Slucher et. al 2006).

Elevation within the direct APE range from a low of approximately 737 feet (224.6 meters) Above Mean Sea Level (AMSL) in the eastern portion of the direct APE to 857 feet (261.2 meters) AMSL in the western portion of the direct APE.

5.2 SOILS

As noted in the previous section, the soils in the Project area formed in glacial outwash and ancient lake sediments.The soils in the direct APE can be typified as Alfisols. Alfisols are soils that have formed in areas that have enough precipitation to precipitate clays downward through the soil pedon. These soils generally formed under forest or brush cover and are typically fertile. Within the United States, Alfisols, soils of the Corn belt, are found in Ohio, Indiana, Michigan, and Wisconsin. Urban and anthropogenically modified soils are also commonly found throughout the Project area. In urban areas, such as downtown and suburban Columbus, soils can be heavily impacted by human activities, construction, and development. These urban soils may be compacted, have reduced organic matter, be more prone to erosion. And be less likely to contain intact archaeological resources.

Within the direct APE, approximately 70 percent of the area is mapped as belonging to the Crosby series (Table 5). A total of seven soil series are mapped within the direct APE (NRCS 2024). The soils within the direct APE are loamy heavily modified soils which are prominent in densely populated urban areas and previously glaciated areas. The soils within the direct APE would generally be considered to have low to medium probability of containing archaeological resources.

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Table 5. Soil Types within the direct APE.

Soil Symbol	Soil Name	Slope %	Drainage	Landform
CeB	Celina silt loam	2-6	Moderately Well Drained	Till plains
CrB	Crosby silt loam, Southern Ohio Till Plain	2-6	Somewhat Poorly Drained	Recessional moraines, ground moraines, water-lain moraines
CsA	Crosby-Urban land complex	0-2	Somewhat Poorly Drained	Urban areas, recessional moraines, ground moraines, water-lain moraines
CsB	Crosby-Urban land complex	2-6	Somewhat Poorly Drained	Till plains
Ko	Kokomo silty clay loam	0-2	Very Poorly Drained	Depressions on till plains
Ut	Udorthents-Urban land complex, gently rolling	2-12	Unknown	Urban areas
Ux	Urban land-Ockley complex, 0 to 6 percent slopes	0-6	Well Drained	Terraces

5.3 HYDROLOGY

The gently rolling topography of Franklin County, Ohio is a result of meltwater and ancient glacial outwash lakes associated with Wisconsin glacial advances. The stream pattern within the region ranges from dendritic to deranged/initial with many small streams and springs flowing into and out of low lying swampy/marshy areas. Franklin County's hydrogeology is characterized by a diverse geologic setting. The county sits on a variety of bedrock formations, including limestone, shale, and sandstone. Limestone is particularly important in the region as it is prone to the development of karst topography, which forms when groundwater dissolves the limestone over time, creating sinkholes, caves, and other unique features. The county contains several principal aquifers, which are important sources of groundwater. The most significant of these aquifers is the Ohio River Valley aquifer system, which consists of sand and gravel deposits and serves as a critical source of drinking water for the region.

5.4 FLORA AND FAUNA

During the Late Pleistocene, the Project area was covered in a coniferous forest consisting of spruce and fir trees. These trees were suited for the cool, moist climate (Braun, 1950). At some time in the Late Pleistocene there was a dry, warmer period that caused a shift from spruce and fir tree forests to pine and oak forests (Braun, 1950).

Around 8000 BP there was a warming/drying trend. During this period, oak and hickory dominated the landscape. At the end of the warming trend, around 4000 BP, (Braun,1950) characterizes the Project area as belonging to the Beech Maple Forest region.

The Beech Maple Forest region dominated much of the Till Plains and is characterized by forests with beech (*Fagus grandifolia*) in the upper canopy and sugar maple (*Acer saccharum*) in the understory (Braun,1950). In some areas where there are poorly drained soils at lower elevations, there are hydro-mesophytic trees including swamp white oak (Quercus bicolor) and American elm (*Ulmus americana*). Higher elevations with better drained soils often have beech, sugar maple, and American basswood (*Tilia americana*) (Braun, 1950).

Most of Franklin County was originally covered in woodlands with oak, hickory, walnut, ash, birch and sugar maple being the dominant species. Agriculture is the primary land use in Franklin County. Naturally occurring plants consist of perennial grasses and weeds in areas that were prairie, and in some smaller low swampy areas known as muck, may have originally supported sedges, rushes, and possibly other wetland vegetation.

During the Late Pleistocene, the development of open grazing lands and boreal forests would have supported a wide array of mammals adapted to cool climates. Evidence suggests that these types of biomes along the glacier's southern margins were exploited by megafauna indigenous to these areas, specifically the woodland musk ox (*Ovibos moschatus*), mastodon and woolly mammoth (*Mammut* sp.), barren ground caribou (*Rangifer tarandus*), giant beaver (*Castoroides* sp.), and moose-elk (*Cervacles scotti*) (Cleland, 1966; Prufer and Baby 1963; Ritchie and Funk, 1973).

Over the course of several hundred years, climatic moderation gradually altered the glacial-boreal ecosystem in the Midwest. This trend, which has usually been assigned to some indeterminate time period beginning around 9000 B.P., was typified by a warmer climate with predominantly drier seasons. The megafauna of the Late Pleistocene suffered massive extinction and was replaced by smaller animals that filled the opening faunal ecological niches. These smaller animals are similar to contemporary species.

Contemporary faunal resources within the Project area include both openland and woodland wildlife. Openland wildlife consists of several bird species such as pheasants, quail, meadowlarks, field sparrows, and doves, and mammal species such as cottontail rabbits (*Sylvilagus floridanus*), red foxes (*Vulpes vulpes*), and woodchucks (*Marmota monax*) (Meeker et al. 1973). Woodland wildlife consists of bird species such as ruffed grouse (*Bonasa umbellus*), woodcock (*Philohela minor*), thrushes, vireos, tanagers, and woodpeckers, and mammal species such as squirrels (*Sciurus* sp.), gray foxes (*Urocyon cinereoargenteus*), white-tailed deer (*Odocoileus virginianus*), raccoons (*Procyon lotor*), and opossum (*Didelphis virginiana*) (Meeker et al 1973). Several large mammals that were important to prehistoric subsistence patterns that have been subsequently hunted into local extinction include elk or wapiti (*Cervus elaphas*), bison (a possible Late Prehistoric species), cougar (*Felis concolor*), black bear (*Ursus americanus*), and wolves (*Canis* sp.).

5.5 PALEOENVIRONMENT

A cool spruce pine forest with patches of grassland areas dominated the Late Glacial environment of Ohio, while deciduous trees were found in particularly favorable areas. These three elements were arranged in a mosaic pattern determined by local edaphic factors forming a parkland ecological setting not found in the region today. Grasslands increased in the glaciated section (including the areas effected by glacial outwash) of the state and deciduous elements were most common in the south. With the warming of the Late Glacial period, the region was becoming a more closed coniferous forest, but the shrinking of the parkland was at least slowed or stabilized during the Younger Dryas, from 11,500 B.P. to 10,250 B.P. After this period (10,250 B.P.) the forests of the Middle Atlantic region were first dominated by pine and hemlock and after 9000 B.P. they became more deciduous in character. This occurred rapidly in the non-glaciated regions and more slowly in the glaciated region. For example, the oak forest did not dominate southern New England until well after 8000 B.P. During Paleoindian and Early Archaic times, riverine environments would have offered the most food resources for humans. After 8800 B.P., human food resources in the oak forest also would have been available in a variety of upland settings.

Since the structure of vegetation controls the character and species composition of animal populations, it is "fundamental to hunting communities in determining their lifestyle" (Evans, 1978). This is also true for early Euro-American communities for whom vegetational patterns determined, in large part, the choice of settlement sites (Gordon 1969; Hulbert 1930). For example, (Gordon, 1969) reports that “stands of mixed oak, walnut, basswood, and black (sugar) maple had a high priority among the Woodland Indians and the early buyers of land for farming. They soon learned that the forest soils that supported such magnificent forests were possessed of extraordinary natural fertility.”

The floral and concomitant faunal reconstructions are based on two types of evidence: palynological and early land survey records. The former indicates the types and frequencies of floral species present in an assemblage, while the latter data indicate the distribution of natural forest types prior to European settlement. The earliest vegetational patterns of the post-glacial succession and subsequent shifts in climax forest constituents are derived primarily from palynological evidence. More recent forest types (post- Hypsithermal) are assumed to have been quite similar to those present at the time of contact. Work done by Yarnell (1964) reveals that, “the climate probably remained much the same for the past 4,000 years…except for relatively minor fluctuations and the general vegetational patterns have not changed much during this period.” With a stable climate, vegetational patterns over the past 4,000 years in most of the eastern United States have also remained fairly consistent. Consequently, direct historic reconstruction can be based provisionally on vegetation patterns observed at the time of the first European pioneers.

Knowledge of past climate is based predominantly on palynological evidence that indicates broad floral patterns sensitive to specific climatic characteristics. Eastern United States climatic trends in Late Pleistocene times were shaped by the glaciers that penetrated well into the Project area from points originating in northern Canada. This sequence developed in the Late Pleistocene, when a moist, cool climate succeeded a drier, cooler period.

Around 8000 BP a warming/drying trend occurred which is often referred to as the “Hypsithermal” or “Altithermal”. This trend profoundly affected vegetation patterns until 4000 BP. Modern floral patterns were in place sometime after 4000 BP by the end of the Hypsithermal period. Warm air masses from the Gulf of Mexico influenced the vegetation and climactic patterns of the region. The major climatic event during the late Holocene is the “Little Ice Age” or the Neo-Boreal episode, which dates from 348 BP to 50 BP or ca. AD 1600 to AD 1900. This shift to a cooler climate may have had a dramatic effect on local prehistoric populations, perhaps resulting in a shorter growing season. The impact on Late Prehistoric populations is poorly understood, but some researchers suggest changes in community size and plans, as well as social organization, were a result of this phenomenon (Henderson 1998).

6.0 CULTURAL OVERVIEW

The following discussion synthesizes various sources regarding the current state of knowledge on the prehistoric and historic-era cultural landscapes across northern Ohio in general, and Franklin County specifically. The compilation and analysis of pertinent regional data, both archaeological and architectural, provide an intellectual framework for assessing and synthesizing identified cultural resources within the current Project APE, particularly through the development of cogent research questions applicable to each identified resource. Within this framework, the choice of specific dates for dividing one cultural period from another is somewhat arbitrary since continuity of occupation for most areas in the eastern United States is well documented (Broyles 1971; Michels and Smith 1967). Additionally, regional variations can make such dates approximations at best. For ease of communication, however, it is convenient to use an accepted, standardized timeline based on significant distinctions among artifact assemblages. This pertinent regional information can provide a framework for addressing the problem of site significance, as well as suggesting certain research questions concerning the area's cultural resources

6.1 PALEOINDIAN OCCUPATION (12,000-9,500 B.P.)

Some researchers believe that the Americas were populated before the more accepted Paleoindian occupation. In the Northeast United States, the earliest date for cultural material is found at the Meadowcroft Rockshelter in Pennsylvania, with C14 dates (SI- 2345) between 16,225 B.P. and 13,300 B.P. (Adovasio et al. 1991). At Meadowcroft, a Miller lanceolate projectile point which dated to 12,000 B.P. was recovered, and below this projectile point were firepits dating to 15,000 B.P. Within these levels, artifacts recovered included bone, wood, basketry, shell, and cordage (Adovasio and Page 2002: 157). Stone tools and debitage manufactured from high-quality raw material were also identified such as rhomboidal knives, unifacial choppers and scrapers, sharp-pointed knives, microengravers, and small blades (Adovasio and Page 2002). Meadowcroft Rockshelter is one of the few “Preclovis” sites identified in North and South America.

The Paleoindian cultural tradition is recognized as part of a widespread, homogenous, conservative New World culture typified by a distinctive lithic artifact assemblage. The most visible and diagnostic item in this assemblage is the fluted projectile point. Other artifact types, which remain consistent from the Holcombe Beach site in Michigan (Fitting et al. 1966) to the Debert site in Nova Scotia (MacDonald 1968), represent predominantly hunting, butchering, and hide-working activities. The lack of non-lithic artifacts in Paleoindian assemblages can most likely be attributed to conditions unfavorable for their preservation, although it is assumed that bone tools and ornaments were utilized. For example, a culturally-modified mastodon (*Mammut americanum*) rib was recovered at the Hiscock site in western New York. This artifact has been radiocarbon dated between 11,140 B.P. and 11, 240 B.P. (Laub et al. 1996).

Paleoindian sites are reported from the American Southwest to Nova Scotia, with very little interregional variation in material culture. Because sites from this period reflect areas where small groups of people performed specific tasks for a short time, theymaintain low archaeological profiles. Most information about this earliest cultural development must therefore be inferred from sparse

surface recoveries of artifacts and considered in conjunction with relevant palaeoecological and geomorphological data.

Based on the available information, post-Pleistocene subsistence strategies must have been geared for coping with a harsh and rapidly changing environment. Evidencesuggests that open grazing lands and boreal forests along the glacier's margins were exploited for woodland musk ox, mastodon, barren ground caribou (*Rangifer tarandus*), woolly mammoth, giant beaver, and moose-elk (*Cervacles scotti*) (Cleland 1966:91-92; Prufer and Baby 1963:55; Ritchie and Funk 1973). In western New York, remains of the American mastodon, caribou, moose-elk, and California condor (*Gymnogyps californianus*) have been recovered at a site dating from 9140 BC to 9240 BC (Laub et al.1996).

In the Midwest and Northeast, Paleoindian sites are typically located on hilltops andbluffs overlooking open portions of main river valleys and larger tributary valleys, and frequently occur at the confluence of rivers on high Wisconsin-age terraces. Seeman and Prufer (1982) have identified three variables which they believe influence the locationand recovery of Paleoindian artifacts: 1) fluted points tend to be recovered in majorstream valleys and at confluences, 2) they often occur in close proximity to the sources ofgood quality cherts, and 3) Paleoindian fluted points are rarely found in swampy bottomlands or rugged highlands such as those found in eastern Ohio.

Around 9000 BC, climatic moderation gradually altered the glacial-boreal ecosystem in the Midwest. The warming climate and eventually drier conditions initiated an increase of deciduous forest elements which by 5000 BC had become established as the dominant forest type (Cleland 1966:20-23). Cyclical plants developed and smaller animals filled the opening faunal ecological niches. These climatic changes forced changes in human behavior. The emergence of more specialized ecological adaptations marks the end of the Paleoindian period, and the beginning of the Archaic.

6.2 ARCHAIC PERIOD (8000-900 B.C.)

While the later period of the Archaic in Ohio is well-documented, the prehistoric landscapes present during the earliest 3000 years of Archaic activity has been significantly less well documented. Purtill (2009:568) suggests that while early contexts for prehistory in Ohio identify a largely empty Early and Middle Archaic landscape, archaeological research has helped illuminate these temporal periods, especially in north and central regions of the state. As of December 2004, absolute dates of occupation had been established for five Early Archaic occupations (Purtill 2009:569), none of which occur within five miles of the Project. Purtill (2009) identifies 2,890 site locations which contain material diagnostic to the Early Archaic, almost all of which occur across the Till and Lake Plain regions of Ohio; the unglaciated uplands in southeastern Ohio are almost entirely devoid of Early Archaic activity.

During the Early Archaic period, circa 8000-6000 BC, the expanding deciduous forests produced a more favorable habitat for game species, particularly the white-tailed deer (Cleland 1966:92). Concurrently, there was a shift from the Paleoindian lanceolate fluted points to smaller more diversified types such as bifurcates including the MacCorkle, LeCroy, and Kanawha points or knives. Woodworking and milling tools were added to the assemblage, including axes, gouges, drills, and grinding stones (Chapman 1975:6; Jennings 1978:12). Small mobile groups gradually became more geographically restricted as seasonally oriented hunting and gathering activities were focused on smaller,more well exploited territories (Potter 1978:17). A narrow yet nutritious spectrum of plant

foods seems to have been utilized, with deer hunting being the major subsistence activity (Chapman 1975:232-233; Cleland 1966:92). Occupational preferences appear to have centered on the uplands. Early Archaic sites in Ohio tend to be small and scattered, limited to surface discoveries, and usually located in uplands near secondary stream valleys.

Purtill's recent (2009:565-605) re-analysis of the Early Archaic period in Ohio updated a relative timeline for Ohio, within which five Early Archaic contexts have produced absolute dates. The theoretical framework updated by Purtill establishes an occupational range for the Early Archaic in Ohio extending from approximately 10,950 B.P. through 8450 B.P., manifest archaeologically, in chronological order, through the presence of "hafted-biface horizons" including Early Side Notched, Charleston, Thebes, Kirk/Palmer,Kirk Stemmed, Large Bifurcate and Small Bifurcate. Purtill notes that Early Archaic lithic assemblages often contain unifacial and bifacial tools in context with diagnostic PPK specimens.

At least three distinct areas of specific lithic resource utilization have been defined for theEarly Archaic in Ohio. In the northern half of the state, across the Lake and Till Plains and Glaciated Plateau, an Upper Mercer chert industry has been documented across a wide swath of sites in the region. Bowen (1994) defines an Upper Mercer "lithic supply zone" for northern Ohio, as identified through the presence of over 90 percent of Large Bifurcate Upper Mercer tools from archaeological deposits across the region. Several researchers (notably Stothers 1996 and Bowen 1991) have identified a second supply zone focused on exploiting natural outcrops of Pipe Creek in northern Ohio, which extends around the shores of Lake Erie as far north as southern Ontario. A third zone hasbeen defined in the southwestern corner of the state, centered around the Miami River watersheds, which displays chert bifaces fashioned from Harrison County chert (Bowen 1994, Litfin 1993). Purtill (2009) postulates a possible fourth supply zone present within the southern limits of the state, along the Ohio River watershed, dominated by the exploitation of Paoli chert from outcrops across the river on the uplands of northern Kentucky. Interestingly, Purtill indicates that the later stages of the Early Archaic in Ohio contain evidence of increased abandonment from these primary chert resource zones, towards the exploitation of smaller localized outcrops of raw material, correspondent with a shift away from the Large Bifurcate-biface tradition to the Small Bifurcate-horizon biface trends which extend into the Middle Archaic (Purtill 2009:571- 572).

During the Middle Archaic period, circa 6000-3000 BC, the continuing improvement inthe climate led to a greater variety of available resources. The diversification ofsubsistence-related activities increased and an emphasis on the exploitation of seasonalresources began to grow in importance. The Middle Archaic economy became morediffuse with an emphasis still on deer hunting, but with utilization of a wider variety ofplant foods (Cleland 1966:92-93). Specialization in certain activities generated a morecomplex social structure within the band network as evidenced by what Griffin (1978:229) calls the early indication of "status differentiation among the band members." The material remnants of Middle Archaic culture expanded to reflect the increasinglysophisticated technology adapted to the intensive exploitation of forest and riverinebiomes. The Early Archaic bifurcate point types in Ohio appear to have been replaced bya widespread tradition of large side-notched points including types such as the Raddatz orGodar (Fitzhugh 1972:8; Justice 1987:60-71). There was an increase of ground andpolished stone tools, full grooved axes, pendants, and winged and cylindrical bannerstones used as atlatl weights. Bone tools begin to appear in the artifact assemblage(Chapman

1975:6; Griffin 1978:133), although it is almost certain that bone tools were inuse previously but are only found in significant numbers after the Middle Archaic for taphonomic reasons.

In most parts of Ohio, Middle Archaic sites are usually found along majorwaterways where artifacts reflect a reliance on aquatic resources and an unusually high number of bone tools are often present. Floral and faunal remains indicate that nuts, white-tailed deer, turkey, and passenger pigeon (*Ectopistes migratorius*) predominated in the diet (Cantley and Novick 1980).

Purtill's 2009 analysis of the Ohio Archaic identified a total of 452 Middle Archaic sites inventoried with the OHC as of 2004, a significantly lower number than the 2,890 EarlyArchaic and 3,661 Late Archaic inventoried occupations. The steep decline in site frequency across the glaciated portions of the state appears to begin in the latter stages of the Early Archaic, as the trend away from the large zones of raw material exploitation (specifically Upper Mercer in north and central Ohio) towards localized chert-resource extraction coincides with the abandonment of the large hafted biface toolkit to smaller PPK and tool types. Purtill (2009:582-583) postulates that these are the archaeological manifestations of rapid population decline across the region, which would rebound dramatically into the subsequent Late Archaic period.

In the Late Archaic period, circa 3000-900 BC, the expansion of deciduous forest reachedits most northern limit around 2000 BC, and the climate was warmer than present day (Cleland 1966:93). Coinciding with an increase of territorial permanence was the appearance of regional cultural adaptations exemplified by the Glacial Kame, Red Ochre,and Old Copper cultures (Cleland 1966). A wider array of specialized objects were utilized during the Late Archaic such as steatite and sandstone bowls, stone tubes and beads, polished plummets, net sinkers, whistles and rattles, birdstones, boatstones, and bone awls, needles, and perforators (Chapman 1975:6). Ceremonialism became increasingly important as evidenced through more elaborate, formalized mortuary practices and the presence of exotic burial goods which were procured through emerging trade networks (Chapman and Otto 1976:20).

The generally accepted model for Late Archaic settlement and subsistence patterns is thatof mobile, hunter-gatherers with a band level social structure (Jobe 1983). The size and composition of these mobile groups would vary in accordance to the distribution and availability of resources across the landscape and through the seasons (Boisvert 1986). During the spring and summer, the exploitation of shellfish, fish, turtles, migratory birds, and other aquatic resources produced concentrations of sites that can be characterized as small camps on slight knolls. Winter camp sites were situated above the valleys for the effective exploitation of upland game such as deer, other medium-sized mammals, and birds.

The first evidence of cultigens is associated with this time period. In Missouri and Kentucky, they occur as early as 2300 BC (Chomko and Crawford 1978:405). At Salts Cave, chenopodium (*Chenopodium* spp.), sunflower (*Helianthus annuus*), and yellow flowered gourd squash seed (*Cucurbita pepo*) were reported dating approximately to 1500 BC (Yarnell 1973). Sumpweed (*Iva annua*), sunflower, chenopodium, and maygrass (*Phalaris caroliniana*) remains were recovered from human paleofeces dating to 1150 BC at Hooton Hollow, a rockshelter in eastern Kentucky (Gremillion 1996).

6.3 WOODLAND OCCUPATION (900 BC to AD 1000)

The Early Woodland period in Ohio, circa 900-100 BC, appears to represent a cultural expansion of the Late Archaic, and is characterized by a greater tendency toward territorial permanence, as well as an increasing elaboration of ceremonial exchange and mortuary rituals. Burial practices, which formed the core around which Early Woodland mortuary complexes evolved, were, in fact, extant throughout the Archaic, and persisted into the Early Woodland (Webb 1947; Griffin 1968:133-134). Evidence that the Early Woodland diet was supplemented by domestication of various native and non-native cultigens like sunflower and chenopodium (Struever and Vickery 1973:11-19), should be amended to note the earlier use of these cultivated garden crops in the Archaic (Yarnell 1973).

In Ohio, the local Early Woodland expression was the Adena culture, noted for the use of pottery and the use of constructed conical mounds for interment (Chapman and Otto 1976:21). Ritualized status, rank burials, and construction of burial mounds probably had their origins in previous Late Archaic ceremonial complexes. Similar to the Late Archaic, the Adena were a semi-sedentary people, however, they were more territorially restrictive, which was in part evidenced through the occurrence of semi-permanent village sites and the first manufacture of pottery (Chapman and Otto 1976:21). Several types of ceramics are commonly associated with the Adena: Fayette Thick, Adena plain, and Montgomery incised. However, Fayette Thick ceramics recovered at the West Runway site (15Be391), located at the Greater Cincinnati/Northern Kentucky International Airport in Boone County, Kentucky dated to 640 BC (Duerksen et al. 1995), which predates the generally accepted timeframe for Adena. Rather than being associated with Adena, therefore, Fayette thick ceramics are contemporary to the Marion Thick wares from Indiana and are associated with the pre-Adena Early Woodland in the Central Ohio Valley. These recent investigations have resulted in researchers in Kentucky considering the Adena a Middle Woodland phenomenon (Railey 1990; Duerksen et al. 1995).

Finely manufactured leaf-shaped blades and a variety of stemmed projectile points such as Cresap, Robbins, and Adena were manufactured (Chapman and Otto 1976:21). Copper was used to fashion ornaments such as beads, bracelets, rings, gorgets, and reels (Potter 1978). Other typical artifacts included tubular pipes, quadraconcave gorgets, pendants of banded slate materials, full grooved axes, hematite celts, and incised stone tablets (Chapman and Otto 1976:210). In the vicinity of the Project, the Danbury Site (33Ot16), located on the peninsula north of Sandusky Bay, displayed evidence of four pit features which contained Early Woodland ceramic vessel fragments, in context with wood charcoal samples dated from 920 B.C. to 800 B.C., and 1120 B.C. to 910 B.C. (Redmond 2006).

The Middle Woodland period, circa 100 BC - AD 500, represents a period of complex sociocultural integration across regional boundaries via networks of trade. This concept has been described as the Hopewell Interaction Sphere by Caldwell (1964) and Struever (1964). The designation “Hopewell" has been applied to a particular archaeological assemblage that has been found from western New York to western Missouri and fromthe Gulf of Mexico to Lake Huron. Mayer-Oakes (1955:15) and Griffin (1978:246) recognized two dominant complexes existing during the Middle Woodland: one, known as Hopewell, in southern Ohio, and the other, comprising the Havana societies, in the Illinois River valley and adjacent areas. Both are regarded as Hopewell, but the Ohio focus, a culmination of Late Archaic and Early Woodland trends, is more elaborate in terms of stylistic traits, mortuary ceremonialism, and complexity of earthworks.

Hopewell is characterized by elaborate geometric earthworks, enclosures, and mounds that are often associated with multiple burials and a wide array of exotic ceremonial goods. Ceremonially, the Hopewell appear to represent a continuation of the Adena, but on a more expanded and elaborate scale (Dragoo 1962:13). Hopewellian trade networks were more extensive and materials used in the manufacture of ceremonial objects were acquired from various regions of North America: copper and silver from the Upper Great Lakes; quartz crystals and mica from the Lower Allegheny mountain region; obsidian and grizzly bear teeth from the west; shark and alligator teeth, marine shell, and pearls from the Gulf Coast region (Prufer and Baby 1964:75). Some of the ceremonial artifacts that were produced include obsidian knives and blades; stone platform pipes with human and animal effigies; copper breast plates, ear spools, and celts; mica zoomorphic and geometric shapes; and highly decorated ceramic vessels (Jennings 1978:233). Lithic types attributed to the Hopewell are Snyders points, Hopewell leaf-shaped blades, small side-notched points without basal grinding, prismatic bladelets and associated polyhedral cores, and flake knives, most of which were manufactured from high grade flint, another important trade commodity (Chapman and Otto 1976:23; Mayer-Oakes 1955:15).

Middle Woodland subsistence was based on hunting and collecting, and small-scale agriculture, probably more accurately described as horticulture. Wymer (1997) hasposited that 60 to nearly 90 percent of seeds recovered from Ohio Hopewell sites are components of the Eastern Agricultural Complex - maygrass, erect knotweed (*Polygonum erectum*), and chenopodium. Other significant cultigens include sumpweed, sunflower, and yellow flowered gourd squash. Significant wild species include hickory nuts (*Carya* spp.), black walnut (*Juglans nigra*), butternut (*Juglans cinera*), acorn (*Quercus* spp.), and hazelnut (*Corylus americanus*). Horticultural and plant gathering activities provided for the majority of the Middle Woodland diet, but were complimented by hunting, fishing, and gathering focused on the white-tailed deer. Other notable animal species taken include black bear, elk or wapiti, beaver (Castor canadensis), various fish species and mussels (Griffin 1968).

Settlement patterns in the Middle Woodland have been described as a series of vacant ceremonial centers surrounded by outlying, inhabited farming villages (Prufer 1964). This "Vacant Center - Dispersed Agricultural Hamlet," model is based on the Mesoamerican Vacant Ceremonial Center-Dispersed Agricultural Hamlet pattern, wherein the ceremonial center is the focus of settlement, but is, itself, not a center of domestic activity (Dancey and Pacheco 1997). This model has recently been updated by Dancey and Pacheco (1997) and referred to as the "Dispersed Sedentary Community Model." The model is still based on the concept of isolated households dispersed across the landscape, usually organized around regional drainages. These small settlements are widely dispersed to allow for a subsistence strategy, which combines horticulture and hunting and collecting. Other components of the settlement pattern include: "outlying camps, public works, and symbolic places" (Dancey and Pacheco 1997:8). The hamlets belong to a "ritual precinct," a ceremonial center of burial mounds and earthworks which provide a focus for ceremonial activities and, possibly, trade and interaction with groups of other "ritual precincts."

The ebb of the Middle Woodland cultural florescence marked the beginning of the Late Woodland period, circa AD 500 – AD 1000. From 100 BC to AD 500, the Scioto Hopewell had reached a cultural apex (Shane and Murphy 1967:144). Around the sixth century AD, a decline and realignment took place, the exact causes of which are unknown. Much speculation has been put forth on the causes of

this change. Cleland (1966:94-95) theorized the breakdown of territories and intergroup contacts was due tothe concentration upon one subsistence activity, a focal agricultural economy. Farnsworth (1973) also suggests a similar hypothesis that a new subsistence strategy based on maize agriculture resulted in greater dietary self-sufficiency and less reliance onan exchange-redistributive network. Dancey (1996) explains the breakdown as the result of a redirection of energy toward intensification of labor and community aggregation.

Regardless of the reasons, it is evident that by AD 700, major changes in subsistence and settlement were occurring, and that there was more diversity in occupation patterns. Ceremonial centers were abandoned, trade networks dissipated, and less emphasis was placed on burial ceremonialism. The advent of the Late Woodland period in central Ohio is characterized by seasonal camps, scattered mostly along permanent drainages. Brose (2000 : 99) outlines a chronological sequence for the Late Woodland in northern Ohio beginning with the Riviere au Vase phase (AD 850-950), developing from westward-migrating Point Pleasant traditions, followed by the Younge and Wolf phases up to approximately 1400 A.D., at which point the Late Prehistoric Sandusky tradition fortified villages. Ceramic variation represents one of the primary indicators of the gradual transition between the Riviere au Vase and Younge phase occupations, with indications that both cultures were influenced by peripheral Fort Ancient societies of north-central Ohio (Brose 2000).

An increase in population would have put stress on resources. The utilization of upland and bottomland sites during the Late Woodland is suggestive of the dichotomous settlement system documented for early historic groups in the Plains and northeast United States. This system is composed of two distinct types of sites occupied on a seasonally interchangeable basis. During the summer, a base camp or village is established with habitation structures and cultivated fields and is reoccupied from year to year. After the harvest, these sites would be temporarily abandoned for hunting camps in the nearby forests. This major territorial reorganization, between the Middle and Late Woodland periods, indicated the gradual restriction of the total catchment area, thus suggesting morespatially confined and more autonomous social units.

Significant Late Woodland sites in Ohio include the Danbury Site (33Ot16), a multi-component prehistoric settlement and mortuary area situated on the northern fringe of Sandusky Bay. This large occupation contains a dense concentration of storage pits and aquatic resource and ceramics midden dating to the Late Woodland, in context with burials which reflect Younge Tradition characteristics (Stothers and Abel 1993).

6.4 LATE PREHISTORIC OCCUPATION (AD 1000 - AD 1600)

The Late Prehistory of central Ohio is associated with the Shawnee, Delaware (Lenape), Wyandot and Miami tribes, which were present at the end of the Late Woodland and to what has been viewed as the displacement period. Increasing European footprint across The Ohio region during the seventeenth century greatly changed the dynamics of the region, leading to significant upheaval for the Native populations. Stone tools continued to be essential for various tasks during the Late Prehistoric period. These tools included projectile points (arrowheads and spear points), scrapers, knives, drills, and grinding stones. They were used for hunting, butchering animals, processing plant materials, and other daily activities. Late Prehistoric Native Americans in Central Ohio created

distinctive pottery styles. Their ceramics often featured intricate designs and decorations, including incised, stamped, or appliqué motifs. The pottery was both functional, serving as containers for storage and cooking, and artistic expressions of their culture. During the Late Prehistoric period, long-distance trade networks connected Central Ohio to other regions. Artifacts made from materials not naturally found in the area, such as marine shell beads or copper objects, indicate the existence of trade connections. Occupations focused on maize agriculture supplemented with hunting and fishing. Deer, turkey, elk, mussels, and fish were all part of the subsistence base (Converse 2003). By A.D. 1650 to A.D. 1700, European trade goods begin appearing in artifact collections from Ohio sites. These trade goods included glass beads, brass kettles, iron objects, and tinklers or janglers. These objects probably were the result of indirect trade by Indian traders with European settlers/ traders.

6.5 OHIO HISTORIC PERIOD

Prior to the last half of the seventeenth century, several Native American tribes were occupying the region now known as present day Ohio. These tribes included the Shawnee, Miami, Wyandot, Delaware, Ottawa, Seneca-Cayuga, Erie and Mingo (Wheeler-Voegelin 1974:2-4, 63-64). These tribes had diverse cultures, languages, and histories. They relied on a mix of hunting, gathering, and agriculture for sustenance and had their unique social structures and governance systems. With the arrival of European settlers and increasing encroachment on their lands, many of these tribes faced significant challenges, leading to forced removals and displacement from their ancestral territories.

Late Prehistoric cultures present during the 1400s and 1500s disappeared from both the archaeological record and the early French accounts of the region (Brose 2000). Two tribal groups known to occupy the area in the Late Prehistoric period, The Shawnee and The Delaware were displaced westward by the influx of Northern Europeans. Originally, the Shawnee territorial lands were located in Southern Ohio. Conquered by the Iroquois in 1672, subsequent resettlement "brought them [Shawnee] into association with a variety of different tribes," such as the Delaware and Creek Tribes (Callender 1978:622). They [Shawnee] settled with the Delaware in eastern Pennsylvania. Later, both groups were displaced into the Ohio River Valley, arriving in western Pennsylvania and central Ohio between 1720 and 1745. Shawnee villages were typically semi-permanent settlements composed of bark-covered lodges, sweathouses, and communal structures used for ritual and secular celebrations (Clark 1974:85-90). During the summer months, crops were tended in fields near the towns and, in the fall, the inhabitants dispersed to winter camps in sheltered valleys to hunt and trap (Clark 1974).

The early 1700s saw significant exploration and settlement by Europeans in the Ohio Country. French traders and missionaries, led by figures like Robert de La Salle and Louis Jolliet, ventured into the region and established relations with Native American tribes for trade purposes. French forts and trading posts were set up along major waterways, including the Ohio River and its tributaries.

During the mid-1700s, as part of the Ohio Country, the area that would become Columbus came under the control of the French due to their alliances with various Native American groups. However, after the French and Indian War (1754-1763), the region, along with the rest of the Ohio Country, was ceded to Great Britain in the Treaty of Paris in 1763. Following the American Revolution, the Ohio Country was opened up to westward settlement. In 1788, a group of settlers led by Lucas Sullivant established

Franklinton, a town located on the west bank of the Scioto River. Franklinton became the first permanent white settlement in the area. In the 1800s, Columbus, Ohio, experienced significant growth and development, evolving from a small frontier town into a thriving city and the capital of Ohio. The 1850s saw the arrival of railroads in Columbus, providing additional transportation options and enhancing the city's connectivity to other regions.

6.6 COLUMBUS, OHIO HISTORIC CONTEXT

The early settlement of Ohio can be traced back to the late 18th century when it was part of the Northwest Territory. The area attracted pioneers and settlers due to its fertile land and abundant natural resources (Roseboom 1902).

As settlers moved westward Central Ohio emerged as an important region for settlement and development. Franklin County, located in the heart of Central Ohio was originally inhabited by Native American tribes including the Shawnee and Wyandot. However, with the arrival of Euro-American settlers in the early 19th century the landscape of the region underwent dramatic changes. The establishment of permanent settlements paved the way for the county's development (Brown 2012).

The first permanent settlement in Franklin County was established in 1797 by Lucas Sullivant who laid out the town of Franklinton on the western bank of the Scioto River. Franklinton quickly became a hub for trade and commerce attracting settlers from various parts of the country. The construction of the National Road in the early 19th century further facilitated the influx of people into the region (Adams 2005).

As Franklinton grew a neighboring town named Columbus emerged on the eastern bank of the Scioto River. In 1812 the Ohio General Assembly designated Columbus as the state capital solidifying its importance in the region. The selection of Columbus as the capital was influenced by its central location and the potential for economic growth. The construction of the Ohio and Erie Canal in the 1820s further enhanced Columbus' significance as a transportation hub connecting the city to other parts of Ohio and beyond (Rose 2008). The city's strategic location at the confluence of major transportation routes contributed to its emergence as a regional center for trade and commerce (www.ohiohistory.org 2023).

The city experienced significant growth in the 19th century attracting industries such as manufacturing, railroads, and government institutions (Klein 2002). One influential figure in the growth of Columbus was James Leonard who served as the city's mayor from 1834 to 1836. Leonard played a pivotal role in the development of public services including the establishment of a city water system and the construction of Columbus City Hall (Jones 1998).

The late 19th and early 20th centuries witnessed significant industrialization and economic growth in Franklin County and Columbus. The discovery of natural resources such as coal and limestone fueled the development of various industries including manufacturing mining and steel production. This period also saw the expansion of transportation networks with the introduction of railroads and streetcars further boosting trade and commerce in the region (Brown 2012).

During this period, Columbus also saw an influx of immigrants, particularly from Germany and Ireland, who played a crucial role in the city's industrial and cultural development. The establishment of breweries, textile mills, and other manufacturing enterprises fueled economic growth and contributed to the diversification of the local economy. At the same time, the city's population swelled through migration of rural residents and the Great Migration of African Americans from the South to urban centers in search of employment opportunities (Brown 2012).

Clintonville, a neighborhood located in North Columbus was initially settled by pioneers in the early 19th century and was known for its fertile farmland. The arrival of the Columbus and Delaware Railroad in the 1850s facilitated the growth of Clintonville attracting residents and businesses to the area (Clintonville Historical Society 2023).

The early 20th century witnessed the growth of the automobile industry, which had a profound impact on the City of Columbus, leading to the establishment of manufacturing plants and the development of a robust transportation infrastructure. The availability of well-paying jobs in the automotive sector attracted a steady stream of migrants from rural areas and other parts of the country, further fueling the city's population growth (Jones 1998; Johnson 2017).

Columbus also experienced significant urban development during the early 20th century, with the construction of new residential neighborhoods, commercial districts, and public infrastructure. The city's skyline began to take shape, as skyscrapers and other iconic structures emerged, transforming the urban landscape. Urban planning initiatives, such as the implementation of zoning regulations and the creation of public parks, aimed to accommodate the growing population and enhance the quality of life for residents (Brown 2012).

The post-World War II era brought about profound changes in the social, economic, and demographic fabric of Columbus. The city experienced a period of rapid growth and prosperity, driven by the expansion of industries such as manufacturing, technology, and finance. The establishment of research institutions and universities further bolstered Columbus' reputation as a hub for innovation and knowledge-based industries (Weisenburger 2010).

At the same time, the phenomenon of suburbanization began to reshape the city's demographic and spatial dynamics. As more residents sought homeownership and a suburban lifestyle, new residential developments emerged on the outskirts of the city, leading to the proliferation of suburban communities. The construction of interstate highways and the availability of affordable housing options facilitated the outward expansion of the metropolitan area, altering the urban-rural balance and giving rise to new patterns of spatial organization (Weisenburger 2010).

In the early 21st century, Columbus has grappled with a range of contemporary challenges and opportunities that have shaped its ongoing development. The city has sought to position itself as a center for innovation and entrepreneurship, leveraging its strengths in research, technology, and healthcare to attract investment and talent. Initiatives such as the Smart Columbus program have aimed to harness the power of data and technology to address urban challenges and improve the quality of life for residents.

Colliers
Engineering
& Design

In recent decades the City of Columbus has continued to thrive and evolve. The city has embraced technological advancements, becoming a center for innovation and entrepreneurship. The establishment of research institutions such as The Ohio State University has further fostered growth in various fields including healthcare technology and finance (Weisenburger 2010).

7.0 FIELD METHODS

While conducting the Phase I survey, CED followed the guidelines established for survey work in Ohio, as detailed in *Archaeological Guidelines* (OPHO 1994). The following section details these methodologies, as applied to the collection and processing of data from the archaeological survey. The primary analytical methodology utilized for the survey can be found in the Methodology (Chapter 3.0) developed by CED prior to the initiation of fieldwork.

7.1 ARCHAEOLOGICAL FIELD METHODS

Prior to entering the field, electronically created GIS mapping files were input into maps, including the Project APE and the direct APE. A surface walkover was completed for the entire direct APE. The objective of the pedestrian survey was to ascertain the presence or absence of cultural material within the direct APE. Following the surface walkover, the entire direct APE, which was not wet, disturbed, or lacking sufficient surface visibility to be formally pedestrian-surveyed at fixed intervals, was tested by shovel tests at 15-meter intervals. All test units were recorded with a Global Positioning System (GPS) unit with sub-meter accuracy. The focus of shovel testing was to determine if these locations contained any buried artifacts, features, buried soils, and to access soil stratigraphy, congruent with the 1994 OHC guidelines. All soil removed from each shovel test was screened through ¼-inch mesh hardware cloth in an effort to recover relatively small artifacts. No artifacts were uncovered in any of the STP's, and therefore artifact curation and cataloguing were determined to be unnecessary.

7.1.1 ABOVEGROUND HISTORIC RESOURCES

Although no aboveground historic resources were identified within the direct APE, these resources would have been photographed by archaeologists and investigated as an archaeological resource. Shovel Test Pits (STP's) would be placed around the perimeter of standing structures to identify subsurface historic artifact deposits.

7.1.2 ARTIFACTS

No artifacts were uncovered in any of the STP's, and therefore artifact curation and cataloguing were determined to be unnecessary.

7.4 HISTORIC ARCHITECTURAL SURVEY METHODS

As part of the Phase I cultural resource assessment, CED conducted research to identify previously surveyed historic properties and architectural resources within the Project APE and within 0.5 mile (0.8 km) of the direct APE. At the time of this report, previous surveys and studies of the surrounding neighborhoods were unavailable through the OHC database as it was not operational. CED relied heavily on digitally available Information from local historical societies and archives, county and city land records, historic maps, aerial photography, and libraries. Prior to entering the field, electronically created GIS mapping files were input into maps, including the Project APE for visual reference.

After the initial research was performed, a pedestrian survey was then conducted of all properties within the viewshed of the direct APE. During the survey, a photographic record was made of all

buildings and structures within the viewshed of the direct APE and a log of all photographs taken during the project was compiled.

7.4.1 Eligibility Criteria

All newly identified historic resources within the Project APE were evaluated for National Register eligibility. Those that are 50 years of age or older were evaluated for NRHP eligibility under standard National Register Criteria A–D. Any resources less than 50 years of age were evaluated under National Register Criterion Consideration G.

Buildings more than 50 years of age may be eligible for inclusion in the NRHP based on four criteria presented in 36 CFR §60.4[a–d]. These four criteria are applied following the identification of relevant historic themes or patterns. In brief, a resource may possess significance for one or more of the following:

a) its association with events that have made a significant contribution to the broad patterns of history; or
b) its association with the lives of persons significant in our past; or
c) its illustration of a type, period, or method of construction, or for its aesthetic values, or its representation of the work of a master, or if it represents a significant and distinguishable entity whose components may lack individual distinction; or
d) its ability or potential to yield information important in prehistory or history [36 CFR §60.4(a–d)].

Not only must a resource possess significance in order to be eligible for inclusion in the NRHP, it must also maintain a certain level of integrity. The National Register defines seven aspects of integrity: (1) location, (2) setting, (3) design, (4) materials, (5) workmanship, (6) feeling, and (7) association. Although not all seven aspects of integrity must be present for a resource to be eligible, the resource must retain, overall, the defining features and characteristics that were present during the property's period of significance.

Resources less than 50 years old must be evaluated under *Criterion Consideration G: Properties that Have Achieved Significance in the Last Fifty Years* [36 CFR §60.4]. This criterion requires that such resources must be "exceptionally important" to qualify for NRHP listing. Additionally, for a resource less than 50 years in age to be eligible for NRHP inclusion, it must also meet one of the standard criteria for resources 50 years or older discussed above (i.e., Criteria A, B, C, or D) and retain its integrity.

8.0 SURVEY RESULTS

CED has completed a Phase I cultural resource survey for a 15.2-acre (6.2-hectare) area in association with the proposed construction of a natural gas pipeline system. This survey included both archaeological and historic architectural surveys to identify and assess archaeological resources and historic architectural properties that might be affected by the proposed Project. The survey included background research, windshield and pedestrian reconnaissance surveys, an archaeological (subsurface) investigation, and a historic architectural survey and evaluation. Results of the survey and recommendations are summarized in the sections below.

8.1 ARCHAEOLOGICAL SURVEY RESULTS

Fieldwork was conducted from July 31, 2023 to May 24, 2024, that included intensive pedestrian survey of the entire 15.2-acre (6.2-hectare) direct APE as well as shovel test excavation. The direct APE consisted of urban, commercial and residential areas, wooded areas, wetland areas and plowed agricultural areas (Photographs 1, 2, 4, 6, 7, 9 and 10). The shovel tests were distributed at 15-meter intervals in areas without standing surface water or clear surface disturbances. CED conducted the Phase I cultural resources survey for the direct APE according to OHC guidelines (OHC 1994). Within the 15.2-acre (6.2-hectare) direct APE, 8.1 acres (3.3 hectares) were considered to be disturbed, while 0.9 acres (0.4 hectares) were determined to be wet/inundated. Another 0.4 acres (0.2 hectares) had surface visibility greater than 50 percent and was therefore surveyed by a pedestrian survey at 15-meter (49.2-foot) intervals. The remaining 5.8 acres (2.3 hectares) were surveyed by shovel testing at 15-meter (49.2-foot) intervals. A total of 59 shovel tests were excavated throughout the direct APE (Figure 6). Undisturbed areas, which were exclusively located in the central and eastern portions of the direct APE, consisted predominately of poorly-drained hydric soils, soils with thick plow zones, and partially disturbed urban soils.

STP A19 (Photograph 3) was located in the eastern portion of the direct APE on the shoulder of a four-lane highway within a commercial area. STP A19 consisted of a brown 10YR 4/3 silt loam A-horizon with approximately 15 percent sub-rounded gravel. The A-horizon extended to a depth of 9 centimeters (cm) (3.5 inches) below the ground surface (BGS). Underlying the A-horizon was a very gravelly dark yellowish-brown 10YR 4/4 silt loam fill horizon with approximately 80 percent sub-rounded gravel. The fill horizon extended to a depth of 14 cm (5.5 inches) BGS, where shovel refusal occurred, and the shovel test was terminated.

STP A34 (Photograph 5) was located in the central portion of the direct APE on a poorly drained footslope, which was surrounded by transportation and commercial infrastructure. STP A34 consisted of a brown 10YR 4/3 silt clay loam mottled with dark greenish-gray Gley 2 4/10G Ag-horizon. The Ag-horizon consisted of 20 percent sub-rounded gravel and extended to a depth of 14 cm (5.5 inches) BGS, where the STP began filling with water and was therefore terminated.

STP A45 (Photograph 8) was located in the central portion of the direct APE on a somewhat poorly drained footslope surrounded by a thin forest corridor, residential development, and plowed agricultural areas. STP A45 consisted of a brown 10YR 4/3 silt loam Ap-horizon with approximately 25 percent sub-angular gravel. The Ap-horizon extended to a depth of 24 cm (9.4 inches) BGS. Underlying

the Ap-horizon was a gravelly yellowish-brown 10YR 5/4 silt loam Bw-horizon with approximately 30 percent sub-rounded gravel. The Bw-horizon extended to a depth of 35 cm (13.8 inches) BGS, where shovel refusal occurred, and the shovel test was therefore terminated.

Due to very high levels of ground disturbance and wet/inundated areas, only 6.2 acres (2.5 hectares) of the total 15.2-acre (6.2-hectare) direct APE were subject to shovel testing and formally gridded pedestrian survey. A total of 59 STPs were excavated throughout 5.8 acres (2.3 hectares) of the direct APE, while an additional 0.4 acres (0.2 hectares) were subject to gridded pedestrian survey. None of the 59 excavated STPs were positive for artifacts or cultural resources, and no artifacts or cultural resources were located during the pedestrian survey of the direct APE. No archaeological resources were identified within the direct APE.

Photograph 1: Eastern portion of the direct APE near STP A12, showing disturbances related to transportation and utilities, facing west.

Photograph 2: Eastern portion of the direct APE near STP A24, showing utility disturbances, facing east.

Photograph 3: STP A19 Soil Profile showing disturbed gravelly soils.

Photograph 4: Near STP A 30 in central portion of the direct APE, facing east.

Photograph 5: Soil Profile for STP A34 in center portion of the direct APE, showing partially hydric soil.

Photograph 6: Pedestrian surveyed section in the center of the direct APE south of STP A38, facing south.

Photograph 7: Center portion of the direct APE near STP A42, facing west.

Photograph 8: STP A45 Soil Profile.

Photograph 9: Wetland area west of STP A57 in center of direct APE, facing west.

Photograph 10: Disturbance associated with Ridgeview Road within western section of the direct APE, facing north.

8.2 PHASE I HISTORIC ARCHITECTURE SURVEY RESULTS

To account for indirect effects, a 0.5-mile (0.8-km) buffer surrounding the direct APE was used, and this area is referred to as the indirect APE. Both the direct and indirect APE comprise the Project APE.

The architectural survey revealed that no historic structures were located within the direct APE. Ten historic structures were located within a 0.5-mile (0.8-km) radius of the direct APE, which included four eligible structures, and six structures with unknown eligibility for listing on the NRHP. In addition, three cemeteries were located within a 0.5-mile (0.8-km) radius of the direct APE. All ten structures are located outside of the direct APE, and outside of the viewshed of the direct APE. Based on the extent of the proposed Project activities, no intact, significant cultural resources, including historic structures, will be affected by construction associated with this project. CED recommends a finding of No Historic Properties Affected (per 36 CFR 800.4(d)(1)]) within the Project APE.

Figure 6: Results of survey of the Project APE on Aerial Photograph.

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NiSOURCE
801 E. 86th Avenue
Merrillville, Indiana 46410

Prepared By:
Pittsburgh Office
1501 Reedsdale St
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Phase I Survey Results of the Project APE on Aerial Photograph
NCHP-University Phase II Project
Phase I Archaeological Survey
Franklin County, Ohio

Date:	CED Project Number:	Drawn by:
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- Project APE
- Disturbed Area
- STP's
- Pedestrian Survey Area
- Wet Area

9.0 SUMMARY AND RECOMMENDATIONS

9.1 PHASE I ARCHAEOLOGICAL SURVEY SUMMARY

CED conducted the Phase I cultural resources survey for the 15.2-acre (6.2-hectare) direct APE according to OHC guidelines. Standard archaeological reconnaissance techniques, including shovel testing as well as surface walkover and formally gridded pedestrian survey, were utilized. The archaeological fieldwork was performed by CED from July 31, 2023, to May 24, 2024. Of the 15.2-acre (6.2-hectare) direct APE, 8.1 acres (3.3 hectares) were considered to be disturbed, while 0.9 acres (0.4 hectares) were determined to be wet/inundated. Another 0.4 acres (0.2 hectares) had surface visibility greater than 50 percent and was therefore surveyed by a pedestrian survey at 15-meter intervals. The remaining 5.8 acres (2.3 hectares) were surveyed by shovel testing at 15-meter intervals. A total of 59 shovel tests were excavated throughout the direct APE, all of which were negative for archaeological resources. No archaeological resources were identified at any point during the Phase I archaeological survey.

Should cultural materials and/or human remains be encountered during construction, work in the immediate area will cease and the qualified archaeologist will evaluate and provide recommendations for future management. All findings will be reported to, and activities coordinated with, the appropriate interested parties.

9.2 PHASE I HISTORIC ARCHITECTURAL SURVEY SUMMARY

CED conducted the Phase I cultural resources survey for the historic architectural survey according to OHC guidelines (OHC 1994). Standard architectural survey techniques including background research and a visual pedestrian survey were completed. The historic architectural fieldwork was performed by CED from July 31, 2023 to May 24, 2024.

Based on the extent of the proposed Project activities for Project no intact, significant cultural resources will be affected by construction within the Project area. In accordance with Section 106 of the NHPA (36 CFR 800), and the guidelines set forth by OHC, CED recommends a finding of No Historic Properties Affected per 36 CFR 800.4(d)(1)]) within the Project APE.

10.0 REFERENCES

Adams, J.
2005. A History of Franklin County, Ohio. The Ohio State University Press.

Adovasio, J.M., J. Donahue, and R. Stuckenrath
1991 The Meadowcroft Rockshelter Radiocarbon Chronology 1975-1990. American Antiquity 55(2): 348-354.

Adovasio, J.M., and J. Page
2002 The First Americans: In Pursuit of Archaeology's Greatest Mystery. Random House.

Boisvert, R.A.
1986 Late Archaic Settlement Models in the Middle Ohio Valley: A Perspective from Big Bone Lick, Kentucky. Unpublished Masters Thesis, University of Kentucky, Lexington.

Bowen, J.E.
1991 The Early Archaic Savannah Lakes Phase of North-Central Ohio. Ohio Archaeologist 41(1):24-29.

1994 Upper Mercer Flint Large Bifurcates of the Ohio Region. Sandusky Valley Chapter, Archaeological Society of Ohio, Upper Sandusky.

Braun, E.L.
1950 Deciduous Forests of Eastern North America. Hafner Publishing Co. New York, New York. Reprinted 1972.

Brose, D.S.
2000 Late Prehistoric Societies of Northeastern Ohio and Adjacent Portions of the South Shore of Lake Erie, A Review, in Cultures Before Contact: The Late Prehistory of Ohio and Surrounding Regions. Edited by R.A. Genheimer. The Ohio Archaeological Council, Columbus, Ohio.

Brown, A.
2012 Columbus, Ohio: Two Centuries of Business and Environmental Change. University of Pittsburgh Press.

Broyles, B. J.
1971 Second Preliminary Report: The St. Alban's Site, Kanawha Valley, West Virginia, 1964-1968. West Virginia Geological and Environmental Survey, Report of Archaeological Investigations 3. Morgantown.

Caldwell, J.R.
1964 Interaction Spheres in Prehistory. In Hopewell Studies, J.R. Caldwell and R.L. Hall, (eds.), Illinois State Museum, Scientific Paper 12 (6) : 133-143. Springfield, Illinois.

Callender, C.
1978 Shawnee. In Handbook of North American Indians, Volume 15, Northeast, edited by Bruce Trigger, pages 662-635. Washington, D.C.: Smithsonian Institution.

Cantley, C.E., and A.L. Novick
1980 Archaeological Research in the Hocking River Valley, Ohio: A Research Design for Hocking County. Manuscript on file. Ohio Historical Society, Columbus.

Chapman, J.
1975 The Rose Island Site and the Bifurcate Point Tradition. Report of Investigations No. 14, Department of Anthropology, University of Tennessee, Knoxville, Tennessee.

Chapman, J.R., and M.P. Otto
1976 An Archaeological Reconnaissance Survey of the Sandy Springs Area, Adams County, Ohio. Ms. on file, Ohio Historical Society, Columbus, Ohio.

Chomko, S., and G. Crawford
1978 Plant Husbandry in Prehistoric Eastern North America: New Evidence for Its Development. American Antiquity 43 (3): pp. 405-407.

Clark, J.E.
1974 Shawnee Indian Migration: A System Analysis. Unpublished Ph.D. dissertation, Department of Anthropology, University of Kentucky, Lexington, Kentucky.

Cleland, C.W.
1966 The Prehistoric Animal Ecology and Ethnozoology of the Upper Great Lakes Region. University of Michigan Museum of Anthropology, Anthropology Papers No. 29.

Columbus Historical Society.
n.d. Mayors of Columbus. Retrieved from https://columbushistory.org/mayors-of-columbus. Accessed 2023.

Clintonville Historical Society.
n.d. Clintonville History. Retrieved from http://www.clintonvillehistory.org/history.html. Accessed 2023.

Converse, R.N.
2003 The Archaeology of Ohio. Ohio Archaeological Society, Columbus, Ohio.

Dancey, W.S.
1996 Putting an End to the Hopewell. In A View from the Core, pp. 394-405. P.J. Pacheco (editor), Ohio Archaeological Council, Columbus.

Dancey, W. S. and P. J. Pacheco
1997 A Community Model of Ohio Hopewell Settlement. In Ohio Hopewell Community Organization, pp. 3-40. W.S. Dancey and P.J. Pacheco (editors), Kent State University Press, Ohio.

Dragoo, D.W.
1962 The Development of the Adena Culture and Its Role in the Formation of the Ohio Hopewell. Hopewellian Studies, edited by J. Caldwell and R. Hall, pp. 1-34. Illinois State Museum Scientific Papers 12.

Duerksen, K., S. Wall, K.A. Russell, G. Perkins, D.A. Miller, L.R. Kimball, M. Jacobs,
J.F. Doershuk, R. Adams, and C.A. Bergman
1995 Kramer Projectile Points and Early Woodland Activity at the West Runway Site (15Be391), Boone County, Kentucky. In Current Archaeological Research in Kentucky: Volume Three, pp. 889-112.

Evans, J.G.
1978 An Introduction to Environmental Archaeology. Cornell University Press.

Farnsworth, K.B.
1973 An Archaeological Survey of the Macoupin Valley. Illinois State Museum, Report of Investigation #26, Research Papers #7 Springfield.

Fitting, J.E.; J. DeVischer and E.J. Wahla
1966 The Paleo-Indian Occupation of the Holcombe Beach. University of Michigan Museum of Anthropology, Anthropology Paper No. 27.

Fitzhugh, W.
1972 The Eastern Archaic: Commentary and Northern Perspective. Pennsylvania Archaeologist 42 (4): 1-19.

Gordon, R.B.
1969 The Natural Vegetation of Ohio in Pioneer Days. Ohio State University, Columbus, Ohio.

Gremillion, K. J.
1966 Early Agricultural Diet in Eastern North America: Evidence from Two Kentucky Rockshelters. American Antiquity, 61(3):520-536.

Griffin, James B.
1968 Observation on Illinois Prehistory in the Late Pleistocene and Early Recent Times. In The Quaternary of Illinois, edited R.E. Bergstrom. Illinois College of Agriculture, Urbana, Illinois.

1978 The Midlands and Northeastern United States. In Ancient Native Americans, edited by J.D. Jennings, pp. 221-280. W.H. Freeman and Company, San Francisco, California.

Henderson, A.G.
1998 Middle Fort Ancient Villages and Organizational Complexity in Kentucky. Unpublished Ph.D. dissertation, Department of Anthropology, University of Kentucky, Lexington.

Hulbert, A.B.
1930 Soil: Its Influence on the History of the United States; With Special Reference to Migration and the Scientific Study of Local History. Yale University Press, New Haven, Connecticut.

Jennings, J.D.
1978 Prehistory of North America (Second Edition). McGraw-Hill, New York, New York.

Jobe, C.
1983 Late Archaic of the Upper Ohio, Miami-Whitewater, and Kentucky-Licking River Drainages. Ms. on file, Ohio Historic Preservation Office, Ohio Historical Society, Columbus, Ohio.

Justice, N. D.
1987 Stone Age Spear and Arrow Points of the Midcontinental and Eastern United States. Indiana University Press, Bloomington, Indiana.

Laub, R.S., J. Tomenchuk, and P.L. Storck
1996 A Dated Mastadon Bone Artifact form the Late Pleistocene of New York.
Archaeology of Eastern North America 24:1-17.

Litfin, J.C.
1993 Early Archaic Band Territoriality: A Projectile Point and Chert Raw Material Perspective. Master's thesis, Department of Anthropology, University of Cincinnati.

MacDonald, G.F.
1968 Debert: A Paleo-Indian Site in Central Nova Scotia. National Museum of Canada Anthropology Papers No. 16.

Matthews & Taintor
1856 Franklin County Map 1856. Electronic document.

Mayer-Oaks, W.
1955 Prehistory of the Upper Ohio Valley: An Introductory Archaeological Study.
Anthropological Series 2, Annals of the Carnegie Museum 34, Pittsburgh, Pennsylvania.

Michels, J.W. and I.F. Smith
1967 Archaeological Investigations of Sheep Rockshelter, Huntington County, Pennsylvania. Pennsylvania State University, University Park.

Nationwide Environmental Title Research (NETR)
2022a 1953 Aerial Imagery. Available online: https://www.historicaerials.com/viewer, accessed May 2024.
2022b 1971 Aerial Imagery. Available online: https://www.historicaerials.com/viewer, accessed May 2024.
2022c 2004 Aerial Imagery. Available online: https://www.historicaerials.com/viewer, accessed May 2024.

Natural Resources Conservation Service (NRCS)
2024 US Department of Agriculture, Natural Resources Conservation Services. Electronic document, http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm, accessed May 2024.

Ohio History Connection (OHC)
1994 Archaeology Guidelines. Data obtained from https://www.transportation.ohio.gov/ on 6/11/2024.
2024 Data obtained from https://www.ohiohistory.org/ on 05/31/2024.

Potter, M.A.
1978 Adena Culture Contact and Settlement. In Adena: The Seeking of an Identity. B.K. Swartz (ed.) Ball State University, Muncie, Indiana.

Prufer, O.H., and R.S. Baby
1963 Paleo-Indians of Ohio. Ohio Historical Society, Columbus, Ohio.

1964 The Hopewell Complex of Ohio. In Hopewell Studies, J.R. Caldwell and R.L. Hall, eds., Illinois State Museum Scientific Papers 12.

Purtill, M.P.
2009 The Ohio Archaic: A Review. In Archaic Societies, Diversity and Complexity across the Midcontinent, T.E. Emerson, D.L. McElrath, A.C. Fortier eds., State University of New York Press, Albany.

Railey, J.A.
1990 The Woodland Period. In The Archaeology of Kentucky: Past Accomplishments and Future Directions, edited by David Pollack, pp. 237-247. State Historic Preservation Comprehensive Plan Report No. 1. Kentucky Heritage Council, Frankfort, Kentucky.

Redmond, B.G.
2006 Saving the Danbury Site (33Ot16): Investigation of Woodland to Late Prehistoric Settlement and Mortuary Behavior Along the Lake Erie Shore. The Cleveland Museum of Natural History.

Ritchie, W.A. and R.E. Funk

1973 Aboriginal Settlement Patterns in the Northeast. New York State Museum and Science Service, Memoir 20. New York State University, Albany, New York.

Seeman, M.F. and O.H. Prufer
1982 An Updated Distribution of Ohio Fluted Points. Midcontinental Journal of Archaeology 7 (2): 155-169.

Shane, O.C., and J.L. Murphy
1967 A Survey of the Hocking Valley, Ohio. In Studies in Ohio Archaeology, O.H. Prufer and D.H. McKenzie (eds.), pp. 329-356. The Press of Western Reserve University: Cleveland.

Slucher, E.R., Swinford, E.M., Larsen, G.E., and others
2006 Bedrock geologic map of Ohio: Ohio Division of Geological Survey Map BG-1, version 6.0, scale 1:500,000.

Stothers, D.M.
1996 Resource Procurement and Band Territories: A Model for the Lower Great Lakes Paleoindian and Early Archaic Settlement Systems. Archaeological of Eastern North America 24:173-216.

Stothers, D.M. and T.J. Abel
1993 Archaeological Reflections of the Late Archaic and Early Woodland Time Periods in the Western Lake Erie Region. Archaeology of Eastern North America 21: 25-109.

US Geological Survey (USGS)
1901 Topographic Map of Dublin, Ohio 1:64000. Available online: https://ngmdb.usgs.gov/topoview/, accessed May 2024.
1965 Topographic Map of Northwest Columbus, Ohio 1:24000. Available online: https://ngmdb.usgs.gov/topoview/, accessed May 2024.
2023 Topographic Map of Northwest Columbus, Ohio 1:24000. Available online: https://ngmdb.usgs.gov/topoview/, accessed May 2024.

Webb, C. H.
1947 The Poverty Point Culture. Geoscience and Man Volume 17.

Wheeler-Voegelin, E.
1974 Ethnohistory of Indian Use and Occupancy in Ohio and Indiana Prior to 1795.

Wymer, D.A.
1997 Paleoethnobotany in the Licking River, Ohio. In Ohio Hopewell Community Organization, edited by W.S. Dancey and P. J. Pacheco, pp. 153-171, The Kent State University Press, Kent State, Ohio.

Yarnell, Richard A.
1964 Aboriginal Relationships Between Culture and Plant Life in the Upper Great Lakes Region. Museum of Anthropology, University of Michigan Anthropology Papers No. 23.

1973 The Origins of Agriculture: Native Plant-Husbandry North of Mexico. Paper Presented for the IXth International Congress of Anthropological and Ethnological Sciences, Chicago, Illinois.

Resume

Jacob Spuck, M.S., GISP, PWS, QISP, FAA 107 UAV Pilot

Principal Investigator | Environmental and Archaeology

Colliers Engineering & Design

Education

Ph.D. Candidate, Physical Geography, Florida State University, 2023
MS Environmental Planning, Indiana University of PA, 2009
BS Physical Geography/Archaeology, Clarion University of PA, 2008

Professional Certifications

FAA 107 Licensed Pilot
GIS Professional (License #52110)
Professional Wetland Scientist (Number 3300)
Qualified Industrial Stormwater Practitioner
Erosion and Sedimentation Planning
Advanced Open Water SCUBA Diver (PADI)
Underwater Archaeology Survey Specialized Diver (PADI)
Nitrox Diver (PADI)
OSHA 40 Hr HAZWOPER Training
OSHA 30 Hr Training
OSHA 10 Hr Training
Red Cross CPR/First Aid

Affiliations & Memberships

Pennsylvania BHP Professional Consultants
American Association of Certified Planners
American Cultural Resources Association
Corp Officer
Geographic Information Systems Certification Institute, GIS Professional
Society of Military Engineers (Seattle, Washington Division)
USGS Student Member and GIS
Society of Wetland Scientists

Experience

Jacob Spuck is a professional in the Environmental and Cultural Resources Management field with over 16 years of working experience. During this time, he has obtained many skills and qualities including specialties in Geophysics, Fluvial/Coastal-Marine/Lacustrine Geomorphology, Maritime and Terrestrial Archaeology, Remote Sensing, Geographic Information Systems, Environmental Planning, and NEPA project management. In addition, Mr. Spuck's research in geoarchaeology within the transportation and energy sectors has been published and presented at several national and international venues. Mr. Spuck is currently listed in 11 states throughout the eastern United States, Pacific and Midwest as a professional Geomorphologist and Prehistoric Archaeology/Historic consultant and has completed two Army Corp of Engineers Wetland Delineation Certificates for the northeast United States. In addition, he is a licensed GIS Professional through the GISCI (License #52110) and certified NPDES Planner. Over the past decade, he has accumulated 35 hours of classroom Project Manager Education (PMP) and has also received his Remote Airman (UAV) Certificate under part 107 of the FAA. Mr. Spuck's application for licensure as both a Registered Professional Archaeologist (RPA) and Professional Wetland Scientist (PWS) have also been submitted for approval, and he is also a certified NAUI Open Water Diver/Specialty/Enriched Air Diver as well as a member of the Pennsylvania Shipwreck Survey Team (PASST) and New Jersey Historical Divers (NJHD), with experience in numerous underwater environments. Mr. Spuck has experience in 42 States and four Countries. His primary archaeological research focuses on performing geoarchaeological studies in complex areas, such as fluvial, lacustrine and tidal/coastal areas. Mr. Spuck has also performed many Geophysical surveys and UAV flights to obtain LiDAR/Remote Sensing data across the country. Mr. Spuck has also completed projects for numerous DoD clients including the Navy, Army, Space Force and ACOE. Jacob has been featured on several documentaries, including one with renowned archaeologist Dr. James Adovasio on the oldest known archaeological site in North America, Meadowcroft Rock Shelter.

Representative Projects

- **Class III Survey of the 99-acre Buckeye Tartesso Drainage Improvement Project in Maricopa County, AZ (August 2023-Feburary 2024).**

Served as Principal Investigator and Field Director for 99-acre drainage improvement project located entirely on State Land. Project included five site revisits and identified 13 isolated occurrences with both prehistoric and historic components. Completed all fieldwork and reporting for the project.

- **Phase I Archaeological Investigations for the Lavaca-Navidad River Authority Project (2024)**

  Served as geoarchaeologist for pipeline project in southeastern, Texas.

- **Phase I Archaeological Investigations for the Line WA Pipeline (2024)**

  Served as geoarchaeologist for pipeline project in northern, Texas.

- **Class I and Class III Background Research Survey of the 886-acre Bard Ranch Development Project. Maricopa County, AZ (September 2023-Feburary 2024).**

  Served as Principal Investigator for 886-acre development project located on private land. Completed Class I Background research report which will be combined with Class III survey in 2024. Will serve as Principal Investigator and Field Director for 2024 Class III survey.

  Phase I Archaeological Survey of the Princeton South Pipeline Replacement Franklin County, KS (January 2024)
  Served as Principal Investigator and Field Director for 10-acre pipeline replacement project in eastern Kansas. Completed pedestrian survey and shovel testing as well as serving as lead author for Phase I Cultural Resources Report.

- **Research Design For the Class III Survey of 38,163 Acres of State Land in Graham County, AZ (August-November 2023).**

  Served as lead QA/QC for Class III reporting documents.

- **Phase I Archaeological Assessment of the Ballenger Road Development Project in Frederick County, MD (November 2023).**

  Served as Principal Investigator and Field Director for 3-acre development project in central Maryland. Completed shovel testing for entire Project area and served as lead author of Phase I Archaeological Report.

- **Archaeological Monitoring at Arlington National Cemetery in Arlington County, VA (August to December 2023).**

  Served as Principal Investigator for five archaeological monitoring sessions for Arlington National Cemetery Pylon Stabilization. Identified and curated historic artifacts associated with excavations on ANC property.

- **Phase I Archaeological Assessment of the NCHP Pipeline Project in Delaware County, OH (June-September 2023).**

  Served as Principal Investigator and Field Director for proposed 22-acre pipeline development project in central Ohio. Completed shovel testing and pedestrian survey for entire Project area and served as lead author of Phase I Archaeological Report.

- **Wetland Delineations of the 28-acre Lander Development Site, Cambria County, PA**
  Served as Senior Wetland Scientist and Fluvial Geomorphologist. Completed wetland and stream delineations and reporting for five resources that Mr. Spuck identified in the field.

- **Phase I Archaeological Survey of AM 88 Pipeline Replacement Jefferson County, AR (July 2023)**
  Served as Principal Investigator and Field Director for 12-acre pipeline replacement project in eastern Arkansas. Completed pedestrian survey and shovel testing as well as serving as lead author for Phase I Cultural Resources Report.

- **Phase I Archaeological Survey of K-North Pipeline Replacement Howard County, AR (July 2023)**
  Served as Principal Investigator and Field Director for 3-acre pipeline replacement project in western Arkansas. Completed pedestrian survey and shovel testing as well as serving as lead author for Phase I Cultural Resources Report.

- **Phase I Archaeological Survey of the Grand Avenue Development Project Bergen County, NJ (June 2023)**
  Served as Principal Investigator and Field Director for 2-acre commercial development project in northern New Jersey. Completed shovel testing as well as serving as lead author for Phase I Cultural Resources Report.

- **Davis-Monthan Air Force Base Environmental Assessment Pima County, AZ (January-May 2023).**

  Served as Archaeological Principal Investigator for Cultural Resources sections of Environmental Assessment. Supervised ongoing fieldwork on the installation.

- **NAVFAC Midlant Integrated Cultural Resource Management Plan for 4 installations MA, NH, CT (October 2022-June 2023).**

  Served as Principal Investigator for Integrated Cultural Resource Management Plan's for four NAVFAC Midlant Installations. Completed background research, site evaluations, archaeological site evaluations and conditions, and preservation recommendations.

- **MCAS Yuma Archaeological Assessment Yuma, AZ (January-May 2023).**

  Served as Archaeological Principal Investigator for Cultural Resources sections of Environmental Assessment. Supervised ongoing fieldwork on the installation.

- **Nevada Test and Training Range Archaeological Assessment Nye County, NV (March-June 2023).**

  Served as Archaeological Principal Investigator for 200 acre Cultural Resources Assessment.

- **Altus Air Force Bae Environmental Assessment CO, TX, NM, OK, KA (Janurary-April 2023).**

  Served as Archaeological Principal Investigator for Cultural Resources and sections of Environmental Assessment. The project involved shifting military airspace over several sacred sites of the Great Plains. Supervised field director on the installation. Led tribal correspondence efforts.

- **Sheppard Air Force Base Environmental Assessment Wichita County, TX (October 2022-Janurary 2023).**

  Served as Archaeological Principal Investigator for Cultural Resources and Environmental sections of Environmental Assessment. Completed archaeological site visit and fieldwork on the installation. Led Tribal Correspondence Efforts.

- **Naval Stations Great Lakes Integrated Natural Resources Management Plan Chicago, IL (September 2022-May 2023).**

  Lead author for INRMP for NAVFAC.

- **Naval Stations Norfolk Integrated Natural Resources Management Plan Norfolk, VA (September 2022-Janurary 2023).**

  Lead author for INRMP for NAVFAC.

- **Naval Stations Yorktown Integrated Natural Resources Management Plan Norfolk, VA (September 2022-Janurary 2023).**

  Lead author for INRMP for NAVFAC.

- **Fort Rucker Cultural Resources Programmatic Agreement Dale County, AL (September 2022-November 2023).**

  Served as Lead Author of Cultural Resources Programmatic Agreement for Fort Rucker Army Base.

- **Luke Air Force Base Environmental Assessment Maricopa County, AZ (December 2021-September 2022)**

  Served as Archaeological Principal Investigator for Cultural Resources sections of Environmental Assessment. Supervised ongoing fieldwork on the installation.

- **Archaeological Investigations Adjacent to Quarters I & K (704) Located at Naval Support Activity Norfolk Naval Shipyard (NNSY) Portsmouth, VA (2021)**

  Served as Archaeological Project Manager and Principal Investigator. Supervised the completion of the Draft and Final Report.

- **Phase I Archaeological Survey and Inventory of Approx. 39 Acres at Joint Expeditionary Base Little Creek-Fort Story Virginia Beach, VA (2021)**

Served as Archaeological Project Manager and Principal Investigator. Supervised the completion of the Draft and Final Report.

- **Historic Land use Study and Phase I Archaeological Survey Investigations at NNSY Annexes and Areas Portsmouth, VA (2021)**

  Served as Archaeological Project Manager and Principal Investigator. Supervised the completion of the Draft and Final Report, as well as deep testing/geomorphological management plan.

- **Phase I Archaeological Survey of over 1800 acres at Davey Crockett National Forest (2020-2022)**

  Mr. Spuck served as Principal Investigator and Field Director for a Phase I Archaeological Survey of over 1800 acres of land in Davey Crockett National Forest. The team re-evaluated 17 sites and identified 32 newly recorded sites. Mr. Spuck was the lead author of the Phase I Archaeological Report submitted to the USFS.

- **Integrated Cultural Resources Management Plan (ICRMP) for MCAS Beaufort, SC, & Townsend Bombing Range, GA Beaufort, SC and Townsend, GA (2021)**

  Served as Sr. Archaeologist. Drafted the revised Cultural Resources Management (ICRMP) for MCAS Beaufort and Townsend Bombing Range.

- **Phase I Archaeological Investigations of the Phase I Heartland Greenway Carbon Capture Pipeline NE, IA, MN, SD, IL (2020-2021)**

  Served as Sr. Archaeologist for this project. Completed background research and research design. Coordinated closely with the Rock Island ACOE and Upper Great Plains tribes to develop archaeological and geomorphological methodology. Completed all Geomorphological work for 82 stream crossings throughout five states. Supervised all fieldwork throughout the project and managed 32 field technicians for the completion of fieldwork.

- **Geodatabase Cultural Resources Updates Bureau of Land Management-California Desert District Palm Springs, CA (2020)**

  Served as Archaeological Project Manager and for Bureau of Land Management Cultural Resources Geodatabase updates. Created and supervised methodology for implementing data from hundreds of Cultural Resource reports into digital format.

- **Phase I Archaeological Surveys for AT&T Telecommunications Development (2014-2020) TX, OH, WA, ID, MT, FL, WI, SD, OK, WY, CO, UT**

  Served as Archaeological Principal Investigator for hundreds of telecom projects throughout the United States which included archaeological testing and reporting. Mr. Spuck led all fieldwork and reporting efforts.

Resume

- **US Forest Service: Chewelah Phase I Archaeological Assessment Stevens County, WA (2020)**

  Served as GIS Project Manager and Staff Archaeologist for approximately 3 miles of proposed recreational trail for USFS. Completed several site re-visits as well as identified several new archaeological sites.

- **Re-evaluation of 13 Archaeological Sites at Fort Hood. Bell and Coryell, TX (2020)**

  Mr. Spuck re-evaluated 13 archaeological sites at the United States Army Fort Hood Base. Site re-evaluations included 41BL0662B, 41BL0795A1, 41BL0795A2, 41BL0908A, 41BL0909A, 41BL0913, 41BL0918A1, 41BL0918A2, 41BL01011, 41CV0339, 41CV0394B, 41CV0903B, 41CV01635. Mr. Spuck documented background research and findings in report as well as recommended mitigation efforts.

- **Army Corp of Engineers: Master Plan Revision for Cottage Grove Lake, Lane County, OR (2020)**

  Served as Principal Investigator and Project Lead for wetlands, cultural resources, endangered/invasive species and environmental planning efforts for the Cottage Grove Lake Reservoir. Completed Master Plan Document which will serve as a regulatory land use document for 25 years. Served as lead correspondence for state and local agencies.

- **Army Corp of Engineers: Master Plan Revision for Dorena Lake Lane County, OR (2020)**

  Served as Principal Investigator and Project Lead for wetlands, cultural resources endangered/invasive species and environmental planning efforts for the Dorena Lake Reservoir. Completed Master Plan Document which will serve as a regulatory land use document for 25 years. Served as lead correspondence for state and local agencies.

- **Class III Intensive Archaeological Survey of 220 acres at Cavalier Space Force Base Pembina County, ND (2019)**

  Served as Project Manager and Principal Investigator for Class III inventory of a 220-acre area of Cavalier Space Force Base. Handled all permitting, correspondence and reporting.

- **U.S. Army Corps of Engineer and District of Columbia National Guard, Laurel, Maryland: Oak Hill Phase I Archaeological Survey, D.C. Army National Guard in Maryland. Laurel, MD (2019)**

  Served as Archaeological Project Manager for 58-acre archaeological inventory is for the D.C. National Guard (DCNG). In his role as Program Manager, Mr. Spuck is leading administrative oversight of the contract requirements and works directly with the Contract Project Manager.

- **Class III Intensive Cultural and Historic Resources Survey of the Peterson ISS Air Force Base Colorado Springs, CO (2019)**

  Served as Project Manager and Principal Investigator for Class III inventory of a section of Peterson ISS in the eastern front range of Colorado. Handled all permitting, correspondence and reporting.

- **Class III Intensive Cultural and Historic Resources Survey of 660 acres at Buckley Space Force Base Aurora, CO (2019)**

  Served as Project Manager and Principal Investigator for Class III inventory of a 630-acre area of Cavalier Space Force Base. Handled all permitting, correspondence and reporting.

- **Geoarchaeological Analysis of the 28.5-acre Kapunakea Development Site Maui County, HI (2018)**

  Performed LiDAR and Geoarchaeological analysis for a 28.5-acre residential development site. Performed literature review background analysis, and identified nine possible archaeological features, including two mound sites, two enclosure sites, one terrace site, one historic foundation site, two potential C-shaped sites, and one potential L-shaped site.

- **Geoarchaeological Analysis of the 29.6-acre Waikapu Development Site Maui County, HI (2018)**

  Performed LiDAR and Geoarchaeological analysis for a 29.6-acre residential development site. Performed literature review background analysis, and identified six possible archaeological features, including one terrace site, and five potential mound/burial sites.

- **Geoarchaeological Analysis of the Maui Lani Phase 8 Archaeological Survey Area Maui County, HI (2018)**

  Performed LiDAR and Geoarchaeological analysis for a 33-acre residential development site. Analyzed several already previously identified sites.

- **Geoarchaeological Analysis of the 33-acre Kelawea Development Site, Maui County, HI (2018)**

  Performed LiDAR and Geoarchaeological analysis for a 33-acre residential development site. Performed literature review background analysis, and identified 18 possible archaeological features, including three potential mound sites, six potential enclosure sites, two historic railroad sites, three C-shaped sites, one L-shaped site and three historic wall sites.

- **Geoarchaeological Analysis of the 28.4-acre Makena Development Site Maui County, HI (2018)**

  Performed LiDAR and Geoarchaeological analysis for a 28.4-acre residential development site. Performed literature review background analysis, and

identified nine possible archaeological features, including two terrace sites, two mound sites, three enclosure sites, one terrace site and one C-shaped site.

- **National Park Service: Archaeological Data Recovery for Ross Lake National Recreational Area Whatcom County, WA (2018)**

  Served as archaeological and GIS support for data recovery project of 8-acre area in northern Washington.

- **Mon/Fayette and Duquesne Light Phase I Geoarchaeological and Geophysical Investigations Allegheny County, PA (2018)**

  Served as PI for this project involving geomorphological and ground-penetrating radar (GPR) investigations, as well as backhoe trench soil analysis for an urban area of proposed transportation infrastructure. All soils were determined to be historic and redeposited which limited further archaeological investigations. GPR survey also identified a possible historic barn foundation, and deeply buried sediment deposits in a hazardous area where deep testing was not feasible.

- **Baltimore Gas and Electric: Phase I Archaeological and Geomorphological Investigations Baltimore, MD (2017)**

Served as PI for this wetland mitigation project involving both terrestrial and underwater components as part of a Phase I archaeological project. Performed an initial geomorphological and archaeological assessment in order to date soils and underwater sediment within the project area. Created both terrestrial and underwater paleoenvironmental models to determine probability of areas to contain archaeological resources.

- **Pennsylvania Department of Transportation (PennDOT): Phase I and Phase II SR 118 Archaeological and Geophysical Evaluations for PA SR 118 Improvements Luzerne County, PA (2017)**

Served as PI for archaeology for this project located a nineteenth-century blacksmith shop and excavated the structure boundaries. Used GPR to identify other structures in the area. Completed archaeological report with background review, fieldwork analysis and recommendations.

- **PA Turnpike Commission: Phase IB Archaeological and Geomorphological Evaluations for the Pennsylvania Turnpike Exit 57-62 Roadway Improvements Allegheny and Westmoreland County, PA (2017)**

Served as PI for geomorphology and archaeology. Analyzed project stratigraphy and identified buried soils located below Holocene alluvium. Completed archaeological report with background review, fieldwork analysis and recommendations.

- **Phase IB Archaeological and Geomorphological Evaluations for WV 02 Improvements (WVDOH) New Cumberland, WV (2017)**

Served as PI for geomorphology and archaeology. Analyzed project stratigraphy and identified buried soils located below Holocene alluvium. Completed archaeological report with background review, fieldwork analysis and recommendations.

- **WVDOH: Phase I Archaeological and Geomorphological Evaluations for Interstate 79 Exit 153 Improvements Morgantown, WV (2017)**

Served as Archaeological PI for geomorphology and archaeology. Conducted auger borings throughout the Study Area in order to determine prior disturbance. Completed archaeological report with background review, fieldwork analysis, and recommendations.

- **Tennessee Department of Transportation: Archaeological and Geomorphological Evaluations for Clifty Creek and Town Stream Mitigation Henry County, TN (2016)**

Served as Archaeological PI and Geomorphologist for two stream mitigation projects in western Tennessee. Conducted over 100 auger probes in order to document and date soils and landforms. Performed microscopic sediment and grain- size sifting analysis to determine origin of soils. Completed two high-quality reports with extensive literature reviews on local geomorphology and relevant geoarchaeology topics.

- **JV 494 Bridge Replacement (PA Rapid Bridge Replacement) Fayette County, PA (2016)**

Served as Senior Wetland Scientist and Fluvial Geomorphologist. Completed wetland delineations and Stream and wetland monitoring for Bridge Replacement.

- **JV 555 Bridge Replacement (PA Rapid Bridge Replacement) Westmoreland County, PA (2016)**

Served as Senior Wetland Scientist and Fluvial Geomorphologist. Completed wetland delineations and Stream and wetland monitoring for Bridge Replacement.

- **JV 168 Bridge Replacement (PA Rapid Bridge Replacement) Berks County, PA (2016)**

Served as Senior Wetland Scientist and Fluvial Geomorphologist. Completed wetland delineations and Stream and wetland monitoring for Bridge Replacement.

- **JV 361 Bridge Replacement (PA Rapid Bridge Replacement) Armstrong County, PA (2016)**

Served as Senior Wetland Scientist and Fluvial Geomorphologist. Completed wetland delineations and Stream and wetland monitoring for Bridge Replacement.

- **2018: JV 221 Bridge Replacement (PA Rapid Bridge Replacement) Somerset County, PA (2016)**

Served as Senior Scientist and Fluvial Geomorphologist. Completed wetland delineations and Stream and wetland monitoring for Bridge Replacement. Assisted with Eastern small-footed bat habitat survey, which was identified as a "Potential Impact" by the Pennsylvania Game Commission.

- **JV 568 Waste Laydown Area (PA Rapid Bridge Replacement), Bedford County, PA (2016)**

Served as Senior Scientist and Fluvial Geomorphologist. Completed wetland delineations and Stream and wetland monitoring for Bridge Replacement. Completed Prairie Sedge, A Sedge, Labrador Marsh Bedstraw and Baltic Rush habitat survey, which was identified as a "Potential Impact" by the Pennsylvania Game Commission.

- **JV 31 Bridge Replacement (PA Rapid Bridge Replacement), Bedford County, PA (2016)**

Served as Senior Wetland Scientist and Fluvial Geomorphologist. Completed wetland delineations and Stream and wetland monitoring for Bridge Replacement.

- **JV 452 Bridge Replacement (PA Rapid Bridge Replacement), Washington County, PA (2016)**

Served as Senior Wetland Scientist and Fluvial Geomorphologist. Completed wetland delineations and Stream and wetland monitoring for Bridge Replacement.

- **JV 521 Bridge Replacement (PA Rapid Bridge Replacement), Washington County, PA (2016)**

Served as Senior Wetland Scientist and Fluvial Geomorphologist. Completed wetland delineations and Stream and wetland monitoring for Bridge Replacement.

- **JV 565 Bridge Replacement (PA Rapid Bridge Replacement), Westmoreland County, PA (2016)**

Served as Senior Wetland Scientist and Fluvial Geomorphologist. Completed wetland delineations and Stream and wetland monitoring for Bridge Replacement.

- **JV 388 Bridge Replacement (PA Rapid Bridge Replacement) Indiana County, PA (2016)**

Served as Senior Wetland Scientist and Fluvial Geomorphologist. Completed wetland delineations and Stream and wetland monitoring for Bridge Replacement.

- **FEMA: Phase I Archaeological and Geomorphological Evaluations for Depue, IL, FEMA Flood wall Project (2016)**

Served as PI and Geomorphologist for Phase I Archaeological report on low terrace soil morphology for FEMA. Documented soils and supervised backhoe trenches in order to determine if buried soil horizons may be present. Created Cross sections and Figures using specialized Geology software to accompany report.

- **Shell: Northeast Ethane Pipeline Phase I, II and III Archaeological Assessments PA, OH, and WV (2015)**

Served as PI and GIS Analyst. Managed field crew. Managed incoming pipeline and oil/gas infrastructure daily data. Created reroute Field Maps and GPS files for all environmental field surveys and research. Maintained online portal database for Pipebook with real-time GIS updates. Assisted with GIS workflow development and mainstreamed GIS data management policies and procedures.

- **PennDOT: Phase II Archaeological and Geomorphological Evaluations for Emergency Skinners Falls bridge repair Wayne County, PA (2015)**

Served as PI and Geomorphologist. Managed field crew. Conducted geomorphological investigations and deep testing on low and middle terraces along the Delaware River. Identified and documented several layers of historic fill, as well as Holocene and Pleistocene-aged strata. Evaluated prehistoric landforms within the project area. Created detailed elevation profiles and cross-sections. Also reviewed historic maps and documentation to identify likely areas of historic flood deposits. Lead author of Archaeology and Geomorphology Phase IA report.

- **FEMA: Phase II GIS Hazard Assessment for Historic Structures Cameron, Monroe and Bedford Counties, PA (2014-2015)**

Served as PM. Led elevation tech crews in the field for a windshield survey in 3 counties. Used state of the art geospatial tools to obtain elevation data on historic structures located within floodplains. Utilized 2-centimeter accuracy GPS in the field along with laser rangefinder to obtain elevations of structures from remote locations. Elevations were recorded and entered into real-time GPS for quick processing. Created detailed report maps including precise flood zone and historic structure maps.

- **PennEast Pipeline Company: Phase I Archaeological and Geomorphological Assessment of Penn East Pipeline Eastern PA and Western NJ (2014)**

Served as GIS specialist. GIS mapping and figures of all above-ground historic resources for Phase I report. Used spatial tools to create maps for several hundred properties to be included in report. Conducted deep testing Geomorphological investigations on complex floodplains along high-order channels.

- **PennDOT: Phase III Archaeological Evaluations for the Pennsylvania Turnpike Construction, Yukon Westmoreland County, PA (2012-2014)**

Served as PI and GIS specialist. Created detailed maps for Geomorphology and archaeology fieldwork. Used archaeological models to map high- probability archaeological areas and determine appropriate methods. Georeferenced historic maps for project area. Served as field director for Phase II and Phase III Archaeological Assessment.

- **PennDOT: Phase IA Geomorphological Evaluations for I-95 Sector-B Philadelphia, PA (2013-2014)**

Served as Geomorphologist. Evaluated prehistoric landforms within the project area. Built Geomorphology model and reviewed soil boring data to identify areas most likely to contain in-situ cultural resources. Also reviewed historic maps and completed in-depth literature review to identify changes in shorelines of both extinct and modern-day stream channels. Lead author of Geomorphology Phase IA report to be included in final Archaeological Phase IA report.

- **Kinder Morgan: UMTP Natural Gas Line, Phase I and Phase II Archaeological and Geomorphological Evaluations Harrison County, OH (2013)**

Served as Archaeological PI and Geomorphologist for a Phase I evaluation of approximately 14 miles of natural gas line replacements. Tasks included supervision of field crew, GIS/GPS mapping of historic and prehistoric site boundaries, Archaeological and Geomorphological Phase IA deep testing report preparation. Deep testing identified sediments from several glacial outwash lakes which were documented and recorded. Several small Archaic sites were also identified to be within the right-of-way.

- **Amazon: Proposed Amazon Solar Farm, Phase I Archaeological Evaluations Accomack County, VA (2013)**

Crew Chief for the Phase I archaeological evaluation of a proposed solar farm. Responsibilities included GIS mapping using iPad and GPS unit, supervision of field crew and mitigation decision-making based on newly discovered historic and prehistoric sites.

- **Columbia Gas: Phase I Geomorphology and Archaeological Investigations of the Proposed Southwestern, PA Columbia Gas Line Greene, Washington and Allegheny County, PA (2013)**

Served as PI for Geomorphological and Archaeological Phase I testing. The line was approximately 30 miles long and crossed over 50 ephemeral and perennial stream channels. Determined age, origin and depths of soils in order to make recommendations for archaeological testing. The line crossed several larger order streams with greater than 2 meters of alluvium. Deep testing was recommended in these areas. Used spatial modeling to determine most appropriate testing locations on terraces adjacent to stream channels. Completed and submitted detailed geomorphological report to Columbia Gas.

- **Shell: Phase I Archaeological Investigations of the Proposed Center Township Water Well Replacement Beaver County, PA (2011-2012)**

Served as PI for Archaeological Phase I investigations of two water well replacements along the Ohio River. Performed GIS/GPS mapping as well as shovel testing along a

terrace of the Ohio River. Work also involved a non-site report with elevation, geology, land use and historic mapping.

- **PNG: Phase I Archaeological Investigations of the Proposed TP-371 PNG Natural Gas Line. Indiana and Armstrong County, PA (2010-2012)**

Served as Field Director for Phase I Archaeological Investigations of a 32 mile 36-inch Natural Gas line. Supervised a large crew in the field, Performed GIS mapping and determined most appropriate archaeological testing methods. Discovered multiple nineteenth-century historic sites, as well as isolated prehistoric artifacts. Provided archaeology report to client.

- **Florida State University: Sediment Analysis of Hurricane-related Deposits Puerto Rico (2009-2012)**

Served as Geomorphologist. Evaluated geomorphological and sedimentological data from the island of Puerto Rico related to a prior hurricane.

- **Angelina Gathering Company Bog Turtle habitat Survey Bradford County, PA (2010)**

Served as Sr. Scientist. Completed Bog Turtle Habitat Survey and Wetland Delineations for proposed pipeline. Mapped and reported on potential Bog Turtle habitat locations.

- **Northern Harrier Endangered Species Survey Location: Allegheny County, PA (2010-2011)**

Served as Sr. Scientist. Completed and mapped Habitat Suitability mapping for Northern Harrier. Developed monitoring plan and led field monitoring efforts for Northern Harrier Survey during breeding season. Survey consisted of approximately 8 field surveys per week (twice daily for 4 days) for a period of 3 months in summer 2013 and 3 months in summer 2014.

- **Environmental Investigations for several hundreds of miles of Peoples Natural Gas Infrastructure Western PA (2009-2011)**

Served as Sr. Wetland Scientist. Performed Desktop review for client's potential land purchase. Used sub-meter GPS and GIS to record and document all stream channels, public utilities, wetlands, tanks and existing roads. Completed water quality and geochemistry studies. Provided detailed maps to clients and a report providing recommendations for possible additional testing.

- **Wetland and Stream Delineations for various Municipalities and Townships Allegheny, Beaver, Butler, Green, Westmoreland, Indiana County, PA (2010)**

Served as Environmental specialist. Created detailed maps for environmental fieldwork. Conducted wetland and stream delineations for entirety of project.

- **Wetland Delineations for PennDOT, Various areas PA Route 22 Blairesville, Indiana County, PA (2010)**

Served as Sr. Environmental Scientist. Supervised Mussel Survey and Wetland Delineations for bridge replacement project. Coordinated with Fish and Boat Commission.

- **Range Resources: Phase I and Phase II Archaeological Investigations of the Range Resources Ed Zappi Wellpad Site Washington, PA (2010-2011)**

Served as PI for a 6.5-acre wellpad site with multiple access roads and laydown yards. Performed GIS/GPS mapping and supervised Field Crew. Identified deeply buried Archaic period artifacts. Completed Phase I report recommending Phase II testing based off of artifact density model performed within the project area. Disked and plowed fields near site locations followed by a Pedestrian Survey to identify additional artifacts. Ultimately presented mitigation alternative to client.

- **Nobel Energy: Phase I Environmental Assessment for the proposed Nobel Energy Bolitho Natural Gas Wellpad Site Doddridge County, WV (2010)**

Served as GIS specialist and Research lead. Performed Desktop review for client's potential land purchase. Used sub-meter GPS and GIS to record and document all stream channels, public utilities, wetlands, tanks and existing roads. Completed water quality and geochemistry studies. Provided detailed maps to clients and a report providing recommendations for possible additional testing.

- **Virginia Department of Transportation (VDOT): Phase I Archaeological Investigations for the Rollins Ford Roadway Expansion Fairfax County, VA (2009)**

Served as PI for the proposed VDOT expansion of Rollins Ford Road in northern Virginia. Performed GIS/GPS mapping, conducted geomorphological testing along floodplains and terraces that determined appropriate depth of test pits. Identified three woodland-period fishing artifacts along stream channel. Determined and mapped site boundaries within project area.

- **PennDOT: Phase I Geomorphological Investigations for the Ford City Sewerage Project Armstrong County, PA (2008-2009)**

Served as Geomorphologist for a Phase I Geomorphology project along the Allegheny River. Performed several backhoe trenches along low-lying terraces which revealed both Wisconsin glacial outwash and recent alluvial deposits. Testing also revealed fill and disturbed soils associated with human activities from a glass factory in the 1930s. Provided GIS mapping and report to client as well as wetland delineation boundaries. Soils were dated and stratigraphy was recorded.

- **PennDOT: Phase I Geomorphological Investigations at the Proposed SR 1015 Carlton Bridge Replacement Crawford County, PA (2008-2009)**

Served as Geomorphologist for a Phase I Geomorphology project along French Creek in a previously glaciated area. Examined stream cutbanks and performed several backhoe trenches and auger cores along low-lying terraces which revealed both glacial outwash and recent alluvial deposits. In addition to a report with GIS figures for the client, soils were dated and stratigraphy was recorded.

Resume

Colliers Engineering & Design

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OHIO HISTORIC PRESERVATION OFFICE:
RESOURCE PROTECTION AND REVIEW

Section 106 Review - Project Summary Form

For projects requiring a license from the Federal Communications Commission, please use FCC Forms 620 or 621. DO NOT USE THIS FORM.

SECTION 1: GENERAL PROJECT INFORMATION

All contact information provided must include the name, address and phone number of the person listed. Email addresses should also be included, if available. Please refer to the Instructions or contact an OHPO reviewer (mailto:Section106@ohiohistory.org) if you need help completing this Form. Unless otherwise requested, we will contact the person submitting this Form with questions or comments about this project.

Date: 6/18/2024

Name/Affiliation of person submitting form: Jacob Spuck
Principal Investigator
Colliers Engineering and Design

Mailing Address: 1501 Reedsdale Street Suite 302, Pittsburgh, PA 15233

Phone/Fax/Email: 814-657-2006 jacob.spuck@collierseng.com

A. Project Info:

1. This Form provides information about:
   New Project Submittal:
   YES NO

   Additional information relating to previously submitted project:
   YES NO

   OHPO/RPR Serial Number from previous submission:

2. Project Name (if applicable):
   Phase I Archaeological Report for the North Columbus High Pressure University Phase II Project Submission

3. Internal tracking or reference number used by Federal Agency, consultant, and/or applicant to identify this project (if applicable):

Project Address or vicinity:

B. City/Township:
Columbus, Ohio

C. County:
Franklin County

D. Federal Agency and Agency Contact. *If you do not know the federal agency involved in your project, please contact the party asking you to apply for Section 106 Review, not OHPO, for this information. HUD Entitlement Communities acting under delegated environmental review authority should list their own contact information.*

E. Type of Federal Assistance. *List all known federal sources of federal funding, approvals, and permits to avoid repeated reviews.*

F. State Agency and Contact Person (if applicable):

G. Type of State Assistance:

H. Is this project being submitted at the direction of a state agency **solely** under Ohio Revised Code 149.53 or at the direction of a State Agency? *Answering yes to this question means that you are sure that no federal funding, permits or approvals will be used for any part of your project, and that you are seeking comments only under ORC 149.53.*

YES NO

I. Public Involvement- Describe how the public has been/will be informed about this project and its potential to affect historic properties. Please summarize how they will have an opportunity to provide comments about any effects to historic properties. (This step is required for all projects under 36 CFR § 800.2):

J. Please list other consulting parties that you have contacted/will contact about this project, such as Indian Tribes, Certified Local Governments, local officials, property owners, or preservation groups. (See 36 CFR § 800.2 for more information about involving other consulting parties). Please summarize how they will have an opportunity to provide comments:

SECTION 2: PROJECT DESCRIPTION AND AREA OF POTENTIAL EFFECTS (APE)

Provide a description of your project, its site, and geographical information. You will also describe your project's Area of Potential Effects (APE). Please refer to the Instructions or contact an OHPO reviewer if you need help with developing the APE or completing this form.

In replies, please use
2024-FRA-61640

July 11, 2024

Jacob Spuck
Principal Investigator
Colliers Engineering and Design
1501 Reedsdale Street Suite 302,
Pittsburgh, PA 15233

RE: Section 106—North Columbus High Pressure University Phase II Project, Columbus, Franklin County, Ohio

Dear Mr. Spuck:

This is in response to the receipt, on June 18, 2024, of the submissions related to the **North Columbus High Pressure University Phase II Project.** We appreciate the opportunity to comment on this project. The comments of Ohio's State Historic Preservation Office (SHPO) are made pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated regulations at 36 CFR Part 800 and Ohio Revised Code 149.53.

The proposed undertaking is for the new construction of approximately 2.2 miles (3.5 kilometers [km]) of 20-inch below ground high pressure natural gas pipeline.

The report, North Columbus High Pressure University Phase II Project Columbus, Franklin County, Ohio (Intensive Phase I Cultural Resources Investigation Columbus, Franklin County, Ohio) [Colliers Engineering & Design*;* Spuck and Thomas 2024] was submitted to the SHPO office for review. The APE for the undertaking includes approximately 15.2 acres (6.2 hectares).

The survey documented a heavily disturbed setting dominated by agricultural activity and urban construction fill. Based on the results of the survey and the extent of the proposed Project activities, no intact, significant cultural resources will be affected by construction within the Project APE. In accordance with Section 106 of the NHPA, and the guidelines set forth by OHC, CED recommends a finding of NO HISTORIC PROPERTIES AFFECTED within the Project APE.

Based on the information submitted, it is the opinion of SHPO that the proposed undertaking will have no effect on historic properties listed in or eligible for listing in the National Register of Historic Places. No further coordination is necessary unless the project changes or new or additional historic properties are discovered during the implementation of the project. In such a situation, the SHPO should be contacted as per 36 CFR 800.13. Please be advised that this is a Section 106 decision. This review decision may not extend to other SHPO programs.

800 E. 17th Ave., Columbus, OH 43211-2474 • 614.297.2300 • ohiohistory.org

If you have any questions, please contact me by email at dgagliano@ohiohistory.org. Thank you for your cooperation.

Sincerely,

Dawn Walter Gagliano, Project Reviews Manager
Resource Protection and Review
State Historic Preservation Department

Ser. No. 1103679

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