REPORT
ROADWAY EXPLORATION REPORT
UNI/DEL 42-4.92/0.00
UNION & DELAWARE COUNTIES, OHIO
PID#: 111381

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NEAS PROJECT 20-0072

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EXECUTIVE SUMMARY

The Ohio Department of Transportation (ODOT) has proposed a roadway rehabilitation project (UNI/DEL-42-4.92/0.00, PID 111381) along U.S. Route 42 (US-42) just south of the City of Delaware in Union and Delaware Counties, Ohio. The project limits extend south to north along US-42 from about Watkins-California Road (Rd) (Union Straight Line Mile (SLM) 4.92) to about State Route 257/745 (SR-257/745) (Delaware SLM 1.41). It is our understanding that the overall project objective is to rehabilitate the project portion of US-42, which has degraded due to age and heavy traffic loading. As part of the proposed rehabilitation project, US-42 is to be widened as well as undergo partial-width full-depth pavement replacement. It is our understanding that for maintenance of traffic (MOT) purposes, full-depth pavement replacement for the project will exclude the center 12 ft of pavement which is planned to be milled and overlaid.

National Engineering & Architectural Services, Inc. (NEAS) has been contracted to perform geotechnical engineering services for the project. The purpose of the geotechnical engineering services was to perform geotechnical explorations within the project limits to obtain information concerning the subsurface soil and groundwater conditions relevant to the design and construction of the project. Between September 18, 2020 and December 7, 2020, NEAS performed the site reconnaissance and exploration program for the project. The subsequent document presents the results of a subgrade and pavement coring exploration for the project portion of US-42 to undergo widening and full-depth pavement replacement. As part of the rehabilitation project, NEAS advanced a total of 26 borings to be utilized for subgrade characterization purposes and obtained a total of 11 pavement cores to be utilized in the evaluation of existing pavement section buildup.

The subgrade conditions encountered below the existing pavement is relatively consistent and consists of natural soils comprised of moderately to highly plastic sandy silt and silt/clay combinations. These subgrade soils encountered within the project limits classified as either A-1-a, A-1-b, A-2-4, A-2-6, A-4a, A 6a, A 6b, or A 7-6 type soils.

Unstable subgrade conditions that may require stabilization per ODOT's Geotechnical Bulletin 1 (GB1) guidelines were encountered within the extents of the existing US-42 subgrade. With respect to unstable soils along the project portions of US-42, thirteen (13) of the twenty-six (26) borings performed encountered soil with a corrected SPT-N (N_{60}) value below 12 blows per foot within 3 feet of proposed top of subgrade. Therefore, it is our opinion that subgrade conditions are generally satisfactory, and pavement can be supported by the underlying subsurface material utilizing typical ODOT methods of stabilization as further detailed in Section 5.2.1. of this report. In general, it is recommended that stabilization in the form either Excavate and Replace (Item 204 with geotextile) or Chemical Stabilization (Item 206) be performed along the project portion of US-42. It is NEAS's opinion that the subgrade soils will provide adequate pavement support assuming it is designed and constructed in accordance with the recommendations provided within this report, as well as all applicable ODOT standards and specifications.

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1. INTRODUCTION

1.1. General

National Engineering & Architectural Services, Inc. (NEAS) presents our Roadway Exploration Report for the Ohio Department of Transportation (ODOT) roadway rehabilitation project (UNI/DEL-42-4.92/0.00, PID 111381) along U.S. Route 42 (US-42) within Union and Delaware County, Ohio. The overall project objective is to rehabilitate the project portion of US-42 which has degraded due to age and heavy traffic loading. The planned rehabilitation will provide a uniform pavement condition along the route as well as preserve and improve the safety of the route. As part of the proposed rehabilitation project, segments of US-42 within the project limits are to be widened as well as undergo partial-width full-depth pavement replacement. The segments of US-42 planned to undergo widening and partial-width full-depth replacement is the segment from about Watkins-California Road (Rd) (Union Straight Line Mile (SLM) 4.92) to about State Route 257/745 (SR-257/745) (Delaware SLM 1.41). It is our understanding that for maintenance of traffic (MOT) purposes, full-depth pavement replacement for the project will exclude the center 12 ft of pavement which is planned to be milled and overlaid. This report presents a summary of the project encountered surficial (i.e., pavement buildup) and subsurface conditions as well as our recommendations for subgrade stabilization, pavement design parameters for the widening and/or full-depth replacement of the project portions of US-42. In general, the pavement subgrade analysis and recommendations presented are in accordance with ODOT's January 2021 revision of *Geotechnical Bulletin 1* (GB1) (ODOT [1], 2021) and *Pavement Design Manual* (PDM) (ODOT, 2021).

The exploration was conducted in general accordance with NEAS's proposal to Johnson, Mirmiran & Thompson, Inc. (JMT), dated May 19, 2020 and with the provisions of ODOT's *Specifications for Geotechnical Explorations* (SGE) dated July 2020 (ODOT, 2020).

The scope of work performed by NEAS as part of the referenced project included: 1) a review of published geotechnical information; 2) perform 26 total test borings; 3) obtain 11 total pavement cores extending through the existing pavement section to top of subgrade; 4) record and document field and laboratory measurements of the pavement cores obtained; 5) laboratory testing of soil samples in accordance with the SGE; 6) perform geotechnical engineering analysis to assess subgrade stabilization requirements and recommended pavement design parameters; and, 7) the development of this summary report.

2. GEOLOGY AND OBSERVATIONS OF THE PROJECT

2.1. Geology and Physiography

The project site is located within the Central Ohio Clayey Till Plain physiographic region which is characterized as well-defined moraines with intervening flat-lying ground moraine and intermorainal lake basins. The region consists of clayey till at the surface and contains few large streams and limited sand and gravel outwash. Elevations of the region ranges from 700 to 1,150 ft above mean sea level (amsl), with moderate relief (100 ft). The geology within this region is described as clayey, high-lime Wisconsinan-age till and lacustrine materials over Lower Paleozoic-age carbonate rocks (i.e., limestone or dolostone) and, in the east, shales. Loess in this region is thin to absent (ODGS, 1998).

The geology in the majority of the project area is mapped as varying amounts of till over Devonian-age Limestone. From the beginning of the project to about 1000 ft north of Harriott Rd, the site is mapped as an average of 40 ft of till over the limestone bedrock, while from about 1000 ft north of Harriott Rd to the

end of the project the site is mapped as an average of 20 ft of till over the limestone bedrock. The Wisconsinan-age till mapped throughout the project is described as consisting of an unsorted mix of clay, silt, gravel and boulders with possible silt, sand and gravel lenses.

Based on the Bedrock Geologic Units Map of Ohio (USGS & ODGS, 2005), bedrock is mapped as alternating between Columbus Limestone and Delaware Limestone throughout the project area. Columbus Limestone consists of both limestone and dolomite that can be described as gray to brown in color weathering to brown, massively bedded and fossiliferous in the upper two thirds. Delaware Limestone consists of predominantly limestone described as gray to brown in color, thin to massively bedded, and may contain argillaceous partings, nodules and layers. According to the ODNR bedrock topography map of Ohio, bedrock elevations at the project site can be expected to range from 840 ft amsl to 940 ft amsl, putting bedrock at depths between approximately 10 and 60 ft below ground surface (bgs).

The majority of soils directly underlying project site have been mapped (Web Soil Survey) by the Natural Resources Conservation Service as being Blount silt loam. The Blount series is described as very deep, somewhat poorly drained soils that formed in till on wave-worked till plains and near-shore zones. Blount series soils are comprised of predominantly fine-grained (silt and clay) cohesive soils and classify mainly as A-4, A-6 and A-7 soils according to the AASHTO method of soil classification. Though Blount silt loam is mapped as the dominant unit underlying the project site, various other less prominent soil series were mapped within the project boundaries. Of these units, the most dominant included Pewamo silt clay loam, Glynwood silt loam and Wetzel silty clay loam. The Pewamo series is described as very deep, very poorly drained soils that formed in till on moraines, near-shore zones and lake plains. The Glynwood series is described as very deep, moderately well drained soils which are moderately deep or deep to dense till formed in a thin layer of loess and the underlying till on ground moraines and end moraines. The Wetzel series is described as very deep, poorly drained soils formed in clayey till on till plains, moraines and lake plains. The various soil series mapped throughout the project area are comprised of predominantly fine-grained (silt and clay) cohesive soils and classify mainly as A-4, A-6 and A-7 type soils according to the AASHTO method of soil classification (USDA, 2015).

2.2. Hydrology/Hydrogeology

The groundwater can be expected at an elevation consistent with that of the Scioto River as it is the most dominant hydraulic influence in the vicinity of the project area. It should be noted that perched groundwater systems may also exist due to the presence of fine-grained soils making it difficult for groundwater to permeate to the natural phreatic surface.

The project site is not located within a Flood Hazard area based on available mapping by the Federal Emergency Management Agency's (FEMA) National Flood Hazard mapping program (FEMA, 2016),

2.3. Mining and Oil/Gas Production

One (1) active surface mine is noted on ODNR’s Abandoned Underground Mine Locator within the immediate vicinity of the project’s boundaries (ODNR [1], 2016). The identified active mine is located on the west side of US-42 between Harriott Rd and Watkins Rd with the nearest boundary of the surface mine approximately 1000 ft west of US-42 along Jerome Rd.

No oil or gas wells were noted on ODNR’s Ohio Oil & Gas Locator within the immediate vicinity of the project’s boundaries (ODNR [2], 2016).

2.4. Historical Records and Previous Phases of Project Exploration

A historic record search was performed through ODOT's Geotechnical Data Management System (GeoMS) and the following report/plans were available for review and evaluation for this report:

- Soil Profile Sheets and Geotechnical Exploration Findings for the Ohio Department of Highways project DEL-42/257/745-0.95/7.55/6.59, prepared by the State of Ohio Department of Highways State Testing Laboratory, submitted on February 5, 1944, April 4, 1944 and September 12, 1945.
- Structure Foundation Exploration sheets for the ODOT project UNI-42-6.72 for the replacement of Bridge No. UNI-42-0672 over Eversole Run, prepared by Professional Service Industries, Inc., dated November 21, 1988.

Historical soil borings associated with the above plans were reviewed, however, were not utilized for our evaluation of subsurface conditions for the roadway improvements or at proposed structure locations, and therefore, are not referenced or presented within this report.

2.5. Field Reconnaissance

A field reconnaissance visit for the overall project area was conducted on September 18, 2020 along US-42 within the project limits. Site conditions, including the existing pavement conditions, were noted, and photographed during the visit. Photographs of notable pavement distress and a summary of our observations by roadway segment are provided below.

2.5.1. Land Use and Cover

The land use of most of the project area consists of agricultural properties. Other land uses of the area surrounding the project include: 1) industrial facilities; 2) commercial properties; and 3) residential properties (i.e., single family homes, apartments, etc.).

2.5.2. US-42 from Beginning of Project to Harriott Road

In general, the pavement condition along this section US-42 was observed to be fair with signs of weathering and surface wear consisting of frequent moderate severity longitudinal and transverse cracking, as well as occasional moderate severity patching and wheel track cracking (Photograph 1). The roadway in this section is close to grade with the surrounding area which is relatively flat. The roadway slopes very gradually downwards from southwest to northeast. The roadway drains to vegetated open drainage swales on either side of the roadway. Signs of standing water (i.e., cattails) were observed in areas off the eastern shoulder of the roadway along the section of US-42 between Bell Rd and Harriott Rd (Photograph 2).

Three (3) project culverts were observed along this section of US-42 during our site visit. The first culvert located near the beginning of the project (Culvert UNI-42-5.019) consisted of a reinforced concrete box culvert with signs of concrete deterioration at the outlet (i.e., exposed reinforcing steel) observed as well as standing water within the culvert (Photograph 3). The second project culvert located directly across from the Living Waters Church (Culvert UNI-42-5.371) also consisted of a box culvert with the outlet (westside) appearing to be in similar condition to the first culvert. The inlet consisted of a catch basin with a steel grate which appeared to be in good condition. The third project culvert located about a half mile south of Harriott Rd along US-42 (Culvert UNI-42-7.048) consisted of a 30-inch diameter concrete pipe with headwalls which showed signs of concrete deterioration (i.e., spalling and exposed reinforcing steel) at both inlet and outlet. The outlet of UNI-42-7.048 was also noted as partially obstructed by debris (Photograph 4).

Photograph 1: Pavement condition near beginning of project

Photograph 2: Signs of standing water off eastern shoulder of US-42

Photograph 3: Outlet of Culvert UNI-42-5.019

Photograph 4: Outlet of Culvert UNI-42-7.048

2.5.3. US-42 from Harriott Road to End of Project

In general, the pavement condition along this section of US-42 was observed to be fair to good with signs of weathering and surface wear consisting of frequent low severity longitudinal and transverse cracking, as well as occasional crack sealing deficiencies (Photograph 5). The roadway in this section is close to grade with the surrounding area which is relatively flat. The roadway slopes very gradually downwards from southwest to northeast. The roadway drains to vegetated open drainage swales on either side of the roadway. The roadway along this segment appeared to be stable with no signs of instability due to geotechnical related issues.

One (1) project culvert (Culvert UNI-42-7.661) was observed along this section of US-42 located just north of Harriott Rd. This culvert consisted of a 36-inch diameter concrete pipe culvert with minor signs of concrete deterioration (i.e., spalling and exposed rebar) observed at both the inlet and outlet but otherwise appeared to be functioning properly with no significant obstructions.

Photograph 5: Pavement condition of US-42 from Harriott Road to End

Photograph 6: Inlet of Culvert UNI-42-7.661

3. GEOTECHNICAL EXPLORATION

3.1. Subgrade Exploration Program

The subsurface exploration for the project was conducted by NEAS between October 28, 2020 and December 7, 2020 and included 26 borings drilled to depths between 7.5 and 25 ft bgs. The boring locations were selected by NEAS in general accordance with the guidelines contained in the SGE with the intent to evaluate subsurface soil and groundwater conditions. Borings were typically located either within existing pavement areas that are planned to undergo full-depth replacement, within areas where widening is planned or in close proximity to project culverts that may require extension or replacement. Target boring locations were located in the field by NEAS prior to drilling utilizing handheld GPS equipment. The boring locations were drilled in areas that were not restricted by underground utilities or dictated by terrain (i.e. steep embankment slopes). Each individual project boring log (included within Appendix B) includes the recorded boring latitude and longitude location (based on the surveyed Ohio State Plane North, NAD83, location) and the corresponding ground surface elevation. The boring locations are depicted on the Soil Profile Sheets provided in Appendix A. It should be noted that a number of borings were drilled for project structures (i.e., culverts) but can also serve as roadway borings for this report and therefore, are included within the subgrade evaluation portions of this report.

Borings were drilled using either a CME 55T or CME 45B truck-mounted drilling rig utilizing 3.25-inch (inner diameter) hollow stem augers. Soil samples for subgrade borings were typically recovered continuously to a depth of 7.5 ft bgs, while samples for subgrade/culvert borings were typically recovered continuously to a depth of 7.5 ft bgs and at 2.5-ft intervals thereafter, each using an 18-inch split spoon sampler (AASHTO T-206 “Standard Method for Penetration Test and Split Barrel Sampling of Soils.”). The soil samples obtained from the exploration program were visually observed in the field by the NEAS field representative and preserved for review by a Geologist for possible laboratory testing. Standard penetration tests (SPT) were conducted using CME auto hammers that have been calibrated to be between 81.7% and 68.4% efficient with a most recent calibration date of December 5, 2019, as indicated on the boring logs (Appendix B).

Field boring logs were prepared by drilling personnel and included pavement description (where present), lithological description, SPT results recorded as blows per 6-inch increment of penetration and estimated

unconfined shear strength values on specimens exhibiting cohesion (using a hand-penetrometer). Groundwater level observations were recorded both during and after the completion of drilling. These groundwater level observations are included on the individual boring logs (provided in Appendix B). After completing the borings, the boreholes were backfilled with either auger cuttings, bentonite chips, or a combination of these materials and patched accordingly with the cold patch asphalt and/or concrete when drilling through the existing pavement.

3.2. Pavement Coring Exploration Program

The coring exploration program for this project was conducted by NEAS between November 3, 2020 and December 16, 2020 that included a total of eleven (11) pavement cores. Pavement cores were performed through the existing pavement at various project boring locations (B-001-0-20, B-006-0-20, B-009-0-20, B-011-0-20, B-014-0-20, B-016-0-20, B-017-0-20, B-019-0-20, B-020-0-20, B-024-0-20 and B-025-0-20). As described in Section 3.1. of this report, the indicated target boring/coring locations were located in the field by NEAS prior to drilling utilizing handheld GPS equipment in areas that were not restricted by maintenance of traffic efforts or utilities. Measurements, location information, photographs and other details of each core sample can be found in the Pavement Core Logs included within Appendix C. The approximate location for each core is depicted on the Soil Profile Sheets provided in Appendix A.

Cores were drilled using a portable, truck-mounted, electric powered coring drill with a 4-inch (outer diameter) diamond tipped drill bit and utilizing water as the circulating fluid. Asphalt and concrete thicknesses were measured in the field after the cores were extracted and down-hole measurements were made. Each core sample was then photographed, logged, and placed in a core box for transportation to NEAS's laboratory. Following field documentation and photographs, the core hole was backfilled to existing grade with either asphalt patch or concrete (where appropriate). Once in the laboratory the cores were: 1) re-measured for thickness verification and photographed; 2) checked for composition; and, 3) reviewed for individual layer identification and subsequent measurements.

3.3. Laboratory Testing Program

The laboratory testing program consisted of classification testing, moisture content determinations, and unconfined compressive strength of soil testing. Data from the laboratory testing program were incorporated onto the boring logs (Appendix B). Soil samples are retained at the laboratory for 60 days following report submittal, after which time they will be discarded.

3.3.1. Classification Testing

Representative soil samples were selected for index property (Atterberg Limits) and gradation testing for classification purposes on approximately 43% of the samples. At each boring location, the upper two samples obtained below the proposed top of subgrade elevation were generally tested while additional samples were selected for testing with the intent of properly classifying the subsurface soil and groundwater conditions within the planned project limits. Soils not selected for testing were compared to laboratory tested samples/strata and classified visually. Moisture content testing was conducted on all samples. The laboratory testing was performed in general accordance with applicable AASHTO specifications and ODOT Supplements.

Final classification of soil strata in accordance with AASHTO M-145 "Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes," as modified by ODOT "Classification of

Soils" was made once laboratory test results became available. The results of the soil classification are presented on the boring logs in Appendix B.

3.3.2. Unconfined Compressive Strength of Cohesive Soil Test Results

Unconfined compressive strength testing was performed in accordance with AASHTO T-208 "Standard Method of Test for Unconfined Compressive Strength of Cohesive Soil" on two (2) relatively undisturbed (Shelby Tube), cohesive samples obtained during the exploration program. The samples were obtained from borings B-002-0-20 and B-011-0-20 with the tested samples classified as Silty Clay (A-6b) and Clay (A-7-6), respectively. A summary of the Unconfined Compressive Strength of Cohesive Soil test is shown in Table 1 below, while the laboratory testing reports are included within Appendix B.

Table 1: Unconfined Compressive Strength Test Results

Boring Number	Depth of Test Specimen (ft bgs)	Classification	Wet Density (psf)	Unconfined Compressive Strength (psf)	Undrained Shear Strength (psf)	Strain at Failure (%)
B-002-0-20	9.0 - 9.5	A-6b	134.3	8417	4,209	6.0
B-011-0-20	8.7 - 9.2	A-7-6	124.5	1273	637	0.9

4. FINDINGS

The subsurface conditions encountered during NEAS's explorations are described in the following subsections. The boring logs generated by NEAS represent our interpretation of the subsurface conditions encountered at each boring location based on our site observations, field logs, visual review of the soil samples by NEAS's geologist, and laboratory test results. The lines designating the interfaces between various soil strata on the NEAS boring logs represent the approximate interface location; the actual transition between strata may be gradual and indistinct. The subsurface soil and groundwater characterizations included herein, including summary test data, are based on the subsurface findings from the geotechnical explorations performed by NEAS as part of the referenced project. At the time of the composition of this report, pavement grade information has been assumed to be consistent with project plans prepared by JMT, accessed by NEAS on April 19, 2021. It should be noted that for the purposes of this report and our analysis the term 'subgrade' has been assumed to represent soils and/or soil conditions from 1.5 ft below proposed final pavement grades to a depth of 7.5 ft below the proposed pavement grades. Where proposed roadway grades are very near the existing grades, the proposed roadway subgrade is assumed at a depth of 1.5 ft below existing grades.

4.1. Core Results

The thicknesses of the cores obtained were measured at the associated borings locations shown on the Soil Profile Sheets provided in Appendix A. A summary of these measurements along with the material encountered is summarized in Table 2. Laboratory photographs and logs of each of the cores are presented in the Pavement Core Logs included within Appendix C.

Table 2: Pavement Core Summary

Boring ID (Location)	Core ID	Alignment	Asphalt Thickness (in)	Concrete Thickness (in)	Total Thickness (in)
B-001-0-20	C-001	SR-42	10.00	-	10.00
B-006-0-20	C-006	SR-42	10.25	6.50	16.75
B-009-0-20	B-009	SR-42	10.75	-	10.75
B-011-0-20	B-011	SR-42	11.75	0.75	12.50
B-014-0-20	B-014	SR-42	11.00	-	11.00
B-016-0-20	B-016	SR-42	9.50	-	9.50
B-017-0-20	B-017	SR-42	11.50	-	11.50
B-019-0-20	B-019	SR-42	9.50	-	9.50
B-020-0-20	B-020	SR-42	10.25	-	10.25
B-024-0-20	B-024	SR-42	11.25	-	11.25
B-025-0-20	B-025	SR-42	10.75	-	10.75

4.2. Existing Pavement

The pavement section thicknesses in terms of asphalt, concrete and granular base were measured at representative project subgrade borings during the subsurface exploration for the project and are recorded on the test boring logs provided in Appendix B. A summary of these measurements is provided in Table 3 below.

Table 3: Measured Pavement Thickness at Boring Locations

Boring ID	Proposed Alignment	Asphalt thickness (in)	Concrete thickness (in)	Base thickness (in)	Total thickness (in)	Boring ID	Proposed Alignment	Asphalt thickness (in)	Concrete thickness (in)	Base thickness (in)	Total thickness (in)
B-001-0-20	SR-42	10.0	6.0	-	16.0	B-014-0-20	SR-42	10.0	3.0	-	13.0
B-002-0-20	SR-42	10.0	4.0	-	14.0	B-015-0-20	SR-42	10.0	-	5.0	15.0
B-003-0-20	SR-42	10.0	-	-	10.0	B-016-0-20	SR-42	10.0	-	5.0	15.0
B-004-0-20	SR-42	10.0	4.0	-	14.0	B-017-0-20	SR-42	10.0	-	5.0	15.0
B-005-0-20	SR-42	10.0	6.0	-	16.0	B-018-0-20	SR-42	12.0	-	2.0	14.0
B-006-0-20	SR-42	10.0	4.0	-	14.0	B-019-0-20	SR-42	9.0	-	5.0	14.0
B-007-0-20	SR-42	12.0	-	6.0	18.0	B-020-0-20	SR-42	9.0	-	8.0	17.0
B-008-0-20	SR-42	12.0	-	6.0	18.0	B-021-0-20	SR-42	9.0	-	5.0	14.0
B-009-0-20	SR-42	12.0	-	6.0	18.0	B-022-0-20	SR-42	13.0	-	5.0	18.0
B-010-0-20	SR-42	10.0	4.5	3.5	18.0	B-023-0-20	SR-42	12.0	-	2.0	14.0
B-011-0-20	SR-42	12.0	-	6.0	18.0	B-024-0-20	SR-42	9.0	-	8.0	17.0
B-012-0-20	SR-42	10.0	4.0	4.5	18.5	B-025-0-20	SR-42	12.0	-	2.0	14.0
B-013-0-20	SR-42	10.0	-	3.0	13.0	B-026-0-20	SR-42	12.0	-	5.0	17.0

4.3. Subgrade Conditions

The subgrade conditions encountered below the existing pavement is relatively consistent and consists of natural soils comprised of moderately to highly plastic sandy silt and silt/clay combinations. These subgrade soils encountered within the project limits classified as either A-1-a, A-1-b, A-2-4, A-2-6, A-4a, A-6a, A-6b, or A-7-6 type soils. The following subsections present a brief summary of the subsurface conditions encountered along the project portion of US-42 with problem areas highlighted where present.

4.3.1. US-42 Subgrade Soils

Along US-42, eighty-six percent (86%) of the samples taken along the roadway were classified as fine-grained cohesive soils and were comprised of: 1) cohesive Sandy Silt (A-4a, 2% of samples); 2) Silt and Clay (A-6a, 21% of samples); 3) Silty Clay (A-6b, 20% of samples); and, 4) Clay (A-7-6, 44% of samples). With respect to the consistency of the fine-grained soils, the descriptions varied from medium stiff to hard correlating to converted SPT-N values (N_{60}) between 5 and 37 blows per foot (bpf), and unconfined compressive strengths (estimated by means of hand penetrometer) between approximately 1.5 and in excess of 4.5 tons per square foot (tsf). Natural moisture contents ranged from 6 to 29 percent. Based on Atterberg Limit tests performed on representative samples of the fine-grained subgrade soils obtained along the project portions of US-42, the liquid and plastic limits ranged from 24 to 64 percent and from 17 to 29 percent, respectively.

The remaining fourteen percent (14%) of the samples taken along US-42 were identified as coarse-grained, non-cohesive soils and were comprised of: 1) Gravel with Sand (A-1-b, 2% of samples); 2) Gravel and Stone Fragments with Sand and Silt (A-2-4, 8% of samples); 3) Gravel (A-1-a, 2% samples); and, 4) Gravel with Sand, Silt and Clay (A-2-6, 1 sample). With respect to the relative density of the coarse-grained soils, the descriptions varied from loose to medium dense correlating to N_{60} values between 7 and 30 bpf. Natural moisture contents ranged from 5 to 22 percent.

4.3.2. Groundwater

Groundwater was not encountered within the proposed subgrade depths during drilling in any of the borings performed at the site as part of the roadway exploration. It should be noted that groundwater is affected by many hydrologic characteristics in the area and may vary from those measured at the time of the exploration. Groundwater readings are presented on each individual boring log included within Appendix B.

5. ANALYSES AND RECOMMENDATIONS

We understand that partial reconstruction and widening of segments of US-42 is planned as part of the roadway rehabilitation project UNI/DEL-42-4.92/0.00, PID 11381. For this purpose, a subgrade exploration and subsequent analysis was completed for the referenced project. The analysis completed for the proposed rehabilitation included a subgrade (GB1) analysis performed in accordance with ODOT's GB1 criteria utilizing the ODOT provided *GB1: Subgrade Analysis Spreadsheet* (GB1_SubgradeAnalysis.xls, Version 14.5 dated January 18, 2019). Input information for the spreadsheet was based on the soil characteristics gathered during and NEAS's subgrade exploration (i.e., SPT results, laboratory test results, etc.).

Based on our evaluation of the subsurface conditions and our geotechnical engineering analyses of the proposed rehabilitation project, it is our opinion that pavement can be supported by the underlying subsurface material utilizing localized stabilization consisting of typical excavate and replace practices. The following sections provide further detail about the analysis performed and the recommended remediation.

5.1. Subgrade Analysis

A GB1 analysis was performed to identify the method, location, and dimensions (including depth) of required subgrade stabilization for the project. In addition to identifying stabilization recommendations, pavement design parameters are also determined to aid in pavement section design. The subsections below present the results of our GB1 analysis including pavement design parameters and unsuitable subgrade conditions identified within the project limits. The GB1 analysis spreadsheet is provided in Appendix D.

Again, it should be noted that for the purposes of this report and our analysis, the term 'proposed subgrade' has been assumed to represent soils and/or soil conditions from 1.5 ft below proposed final pavement grades to a depth of 7.5 ft below the proposed pavement grades. Where proposed roadway grades are very near the existing grades, the proposed roadway subgrade is assumed at a depth of 1.5 ft below existing grades.

5.1.1. Pavement Design Recommendations

It is our understanding that pavement analysis and design is to be performed to determine the proposed pavement sections for the segments within the project limits to undergo full depth replacement and widening. A GB1 analysis was performed using the subgrade soil data obtained during our field exploration program to evaluate the soil characteristics and develop pavement parameters for use in pavement design. The subgrade analysis parameters recommended for use in pavement design are presented in Table 4 below. Provided in the table are ranges of maximum, minimum and average N_{60L} values for the project portion of US-42 as well as the design CBR value recommended for use in pavement design.

Table 4: Pavement Design Values

Segment	Maximum N_{60L}	Minimum N_{60L}	Average N_{60L}	Average PI Values	Design CBR
US-42	18	5	10	21	5

5.1.2. Unsuitable Subgrade

Per ODOT's GB1, the presence of select subgrade conditions (i.e., unsuitable) are prohibited within the subgrade zone for new pavement construction. These unsuitable subgrade conditions generally include the presence of rock and specific soil types. With respect to the proposed rehabilitation project these subgrade conditions are further discussed in the following subsections.

5.1.2.1. Rock

Rock was not encountered within the subgrade of the borings performed within the project US-42 limits. Per ODOT's GB1, if rock is encountered within 24 inches of the bottom of the proposed asphalt or concrete pavement it is to be removed in accordance with 204.05 of the ODOT CMS and replaced with Item 204 Embankment.

5.1.2.2. Unsuitable Soils

Unsuitable soil types per the GB1, which include A-4b, A-2-5, A-5, A-7-5, A-8a, A-8b, were not encountered in the subgrade of US-42 within the referenced project limits. Furthermore, soils with a liquid limit greater than 65 were not encountered within the subgrade of the borings performed within the project roadway limits. Per ODOT's GB1, subgrade soils of the indicated types and characteristics should either be removed and replace to a depth of 36 inches or chemically stabilized (depending on the specific soil type encountered).

5.1.3. Unstable Soils

The GB1 recommends subgrade stabilization for soils considered unstable in which the N_{60} value of a particular soil sample (SS) at a referenced boring location is less than 12 bpf and in some cases less than 15 bpf (i.e., where moisture content is greater than optimum plus 3 percent). Based on the specific N_{60} value at the subject boring, *Figure B - Subgrade Stabilization* within the GB1 recommends a depth of subgrade stabilization for ODOT standard stabilization methods. It should be noted that although a soil sample's N_{60} value may meet the criteria to be considered an unstable soil, the depth in which the unstable soil is

encountered in relation to the proposed subgrade is considered when each individual subgrade boring is analyzed. For example, if the GB1 recommends an excavate and replace of 12 inches within a weak soil underlying 18 inches of stable material, it would be unreasonable to recommend the removal of both the stable and unstable material for a total of 30 inches of excavate and replace.

Based on N_{60} values encountered within the project borings, our GB1 analysis suggests the need for 12 to 15 inches of either chemical treatment or excavate and replace at select locations. A summary of the boring locations where unstable soils were encountered and determined to have a potential impact on subgrade performance are shown in Table 5 below. Also included is the associated GB1 recommended remediation depth at that location.

Table 5: Unstable Soil Locations Summary

Boring ID	Average HP (tsf)	N_{60}	Moisture Above Optimum (%)	Depth Below Subgrade (ft)	Remediation Depth (inches)		
					Excavate and Replace (Item 204 w/ Geotextile)	Excavate and Replace (Item 204 w/ Geogrid - SS 861)	Chemical Stabilization (Item 206)
Roadway Segment: US-42							
B-001-0-20	4.00	8	4	0.0 - 1.5	12	-	14
B-003-0-20	2.75	10	2	0.0 - 1.5	12	-	14
B-004-0-20	-	8	1	0.0 - 1.5	12	-	14
B-006-0-20	3.75	8	4	0.0 - 1.5	12	-	14
B-007-0-20	3.25	9	3	0.0 - 1.5	12	-	14
B-009-0-20	3.75	7	-	0.0 - 1.5	15	-	14
B-010-0-20	-	8	-	0.0 - 1.5	12	-	14
B-011-0-20	3.50	10	6	0.0 - 1.5	12	-	14
B-014-0-20	3.25	10	5	0.0 - 1.5	12	-	14
B-016-0-20	3.00	11	4	0.0 - 1.5	12	-	12
B-019-0-20	2.50	8	3	0.0 - 1.5	12	-	14
B-021-0-20	3.75	8	-	0.0 - 1.5	12	-	14
B-022-0-20	2.00	11	4	0.0 - 1.5	12	-	14

It should be noted that *Figure B - Subgrade Stabilization* does not apply to soil types A-1-a, A-1-b, A-3, or A-3a, nor to soils with N_{60L} values of 15 or more. Per GB1 guidance, *these soils should be reworked to stabilize the subgrade.*

5.1.3.1. High Moisture Content Soils

High moisture content soils are defined by the GB1 as soils that exceed the estimated optimum moisture content (per *Figure A - Optimum Moisture Content* within the GB1) for a given classification by 3 percent or more. Per the GB1, soils determined to be above the identified moisture content levels are a likely indication of the presence of an unstable subgrade and may require some form of subgrade stabilization. Similar to our analysis of unstable soils, although a soil sample's moisture content may meet the criteria to be considered high, the depth in which the high moisture soil is encountered in relation to the proposed subgrade is considered when each individual subgrade boring is analyzed for stabilization recommendations. Summaries of the boring locations where high moisture content conditions were encountered in the top 3 ft of the proposed subgrade within the proposed project limits are shown in Table 6.

Table 6: High Moisture Content Soils Location Summary

Boring ID	Moisture Content (%)	Optimum Moisture Content (%)	Depth Below Subgrade (ft)
Roadway Segment: US-42			
B-003-0-20	23	18	1.5 - 3.0
B-012-0-20	25	21	1.5 - 3.0
B-013-0-20	22 & 21	10	0.0 - 3.0
B-017-0-20	19	16	0.0 - 1.5
B-023-0-20	24	18	1.5 - 3.0
B-024-0-20	15 & 19	10 & 16	0.0 - 3.0

5.2. Stabilization Recommendations

5.2.1. Subgrade Stabilization

Unstable subgrade conditions that require stabilization per GB1 guidelines were encountered within the proposed roadway subgrade. Unstable soils (i.e., weak soils), as previously indicated in Section 5.1. of this report, were encountered within the subgrade depths in various borings performed throughout the project. Based on our analyses, as unstable soils that require stabilization per GB1 guidelines were encountered throughout the project limits within more than approximately 30 percent of the total subgrade area, we recommend stabilization in the form either Excavate and Replace (Item 204 with geotextile) or Chemical Stabilization (Item 206) be performed along the project portion of US-42. In areas where Chemical Stabilization (Item 206) may not be practical or economical, we recommend these areas be stabilized in the form of Excavate and Replace (Item 204 with geotextile).

Based on: 1) the results of our GB1 analysis; 2) the performance and condition of the existing pavement; 3) the review of the unstable subgrade conditions as described in Section 5.1.3. of this report; and, 4) the subsequent conclusions regarding recommended stabilization, Table 7 below presents our recommendations for subgrade stabilization depths for the project.

Table 7: Summary of Stabilization

Segment(s)	Remediation Depth (inches)		
	Excavate and Replace (Item 204 w/ Geotextile)	Excavate and Replace (Item 204 w/ Geogrid - SS 861)	Chemical Stabilization (Item 206)
US-42	12	-	14

Subgrade stabilization is estimated to extend to the depths indicated within Table 7 with any excavated material being replaced with material in accordance with Section F "Excavate and Replace (Item 204)" of the ODOT GB1. Stabilization limits should extend 18-inches beyond the edge of the proposed paved roadway, shoulder or median.

5.2.2. Chemical Stabilization

If chemical stabilization is selected as the method of subgrade stabilization, lime is recommended to be utilized as the stabilizing chemical for this portion of US-42 as the subgrade soils consist primarily of cohesive material. Guidance from ODOT's GB1 states that “Lime may be used to stabilize unstable subgrades which have a PI of 16 or greater, consisting of A-6b, A-7-5, or A-7-6 soils”. Additionally, the chemical stabilization of the US-42 subgrade soils should be performed to the recommended depths provided in Table 7 above and extend a minimum of 18-inches beyond the edge of the paved roadway, shoulder or median. The mix design should be conducted in accordance with ODOT's CMS Supplement

1120 (Mixture Design for Chemically Stabilized Soils). For design purposes it may be assumed that the lime addition will be 5% using the following formula.

$$\text{Lime: } C = 0.75 \times T \times 115 \times 0.05$$

Where:

C = amount of chemical in pounds / square yard and

T = thickness of the treatment zone in inches

- A dry density of 115-pounds per cubic foot (pcf) is assumed.

It should be noted that per ODOT's GB1, typical chemical stabilization equipment cannot stabilize areas less than 8 ft in width. If it is anticipated that the project will require multiple maintenance of traffic phases, it is recommended that the roadway work is coordinated with the maintenance of traffic schemes in such a way that an 8-ft minimum width for chemical stabilization exists. If areas of less than 8 ft in width are anticipated, subgrade soils may be excavated out, mixed with stabilization chemical, and compacted in place, though this method is not practical for large areas.

5.2.3. Embankment Construction Recommendations

In areas where additional embankment material is proposed along existing slopes (i.e., side-hill sliver fills) that are steeper than 8H:1V but flatter than 4H:1V, it is recommended that the proposed embankment be benched into the existing slopes in accordance with Item 203.05 “Embankment Construction Methods” of the ODOT CMS.

For areas where additional embankment material is proposed along existing slopes that are steeper than 4H:1V, it is recommended that the proposed embankment be designed and constructed in accordance with ODOT’s GB2. For sidehill fills planned on existing slopes steeper than 4H:1V, ODOT’s GB2 recommends that *the embankment slopes be constructed utilizing special benching in order to blend the new embankment with the existing slope to prevent the development of a weak shear plane at the interface between the proposed fill and existing slope material* (ODOT [2], 2017). Based on the available cross-sections, a special benching scheme similar to that shown in Figures 1, 2 or 3, as appropriate, of the ODOT GB2 should be used in areas where special benching is recommended. The height and width dimensions of the special benching scheme shown in these figures should be arranged to minimize the required cut and fill quantities, though the height of a single bench shall not exceed 20 ft without a stability analysis and design per OSHA requirements. Additionally, it may be appropriate to adjust the bench slope shown from a 1H:1V to a 1.75H:1V slope if the existing slope is made up of primarily granular materials. The benched material should be replaced with compacted engineered fill per Item 203 of the ODOT CMS, while proper lift thicknesses and material density should be maintained in the proposed fill per Item 203.06 of the ODOT CMS. In situations where it is not practical to extend the final bench through the existing roadway due to maintenance of traffic concerns, a benching scheme similar to that shown in Figure 1a of the ODOT GB2 can be used in order to avoid impacting the existing roadway, guardrail or shoulder. This scheme results in the placement of a temporary over-steepened fill that can later be “shaved-off” to bring the slope to the final proposed grade.

6. QUALIFICATIONS

This investigation was performed in accordance with accepted geotechnical engineering practice for the purpose of characterizing the subsurface conditions along the referenced roadway portion. This report has

been prepared for JMT, ODOT and their design consultants to be used solely in evaluating the subgrade soils within the project limits and presenting geotechnical engineering recommendations specific to this project. The assessment of general site environmental conditions or the presence of pollutants in the soil, rock and groundwater of the site was beyond the scope of this geotechnical exploration. Our recommendations are based on the results of our field explorations, laboratory test results from representative soil samples, and geotechnical engineering analyses. The results of the field explorations and laboratory tests, which form the basis of our recommendations, are presented in the appendices as noted. This report does not reflect any variations that may occur between the borings or elsewhere on the site, or variations whose nature and extent may not become evident until a later stage of construction. In the event that any changes occur in the nature, design or location of the proposed rehabilitation work, the conclusions and recommendations contained in this report should not be considered valid until they are reviewed, and have been modified or verified in writing by a geotechnical engineer.

It has been a pleasure to be of service to JMT in performing this geotechnical exploration for the UNI/DEL-42-4.92/0.00 roadway rehabilitation project. Please call if there are any questions, or if we can be of further service.

Respectfully Submitted,

Brendan P. Andrews, P.E.
Project Geotechnical Engineer

Kevin C. Arens, P.E.
Geotechnical Engineer

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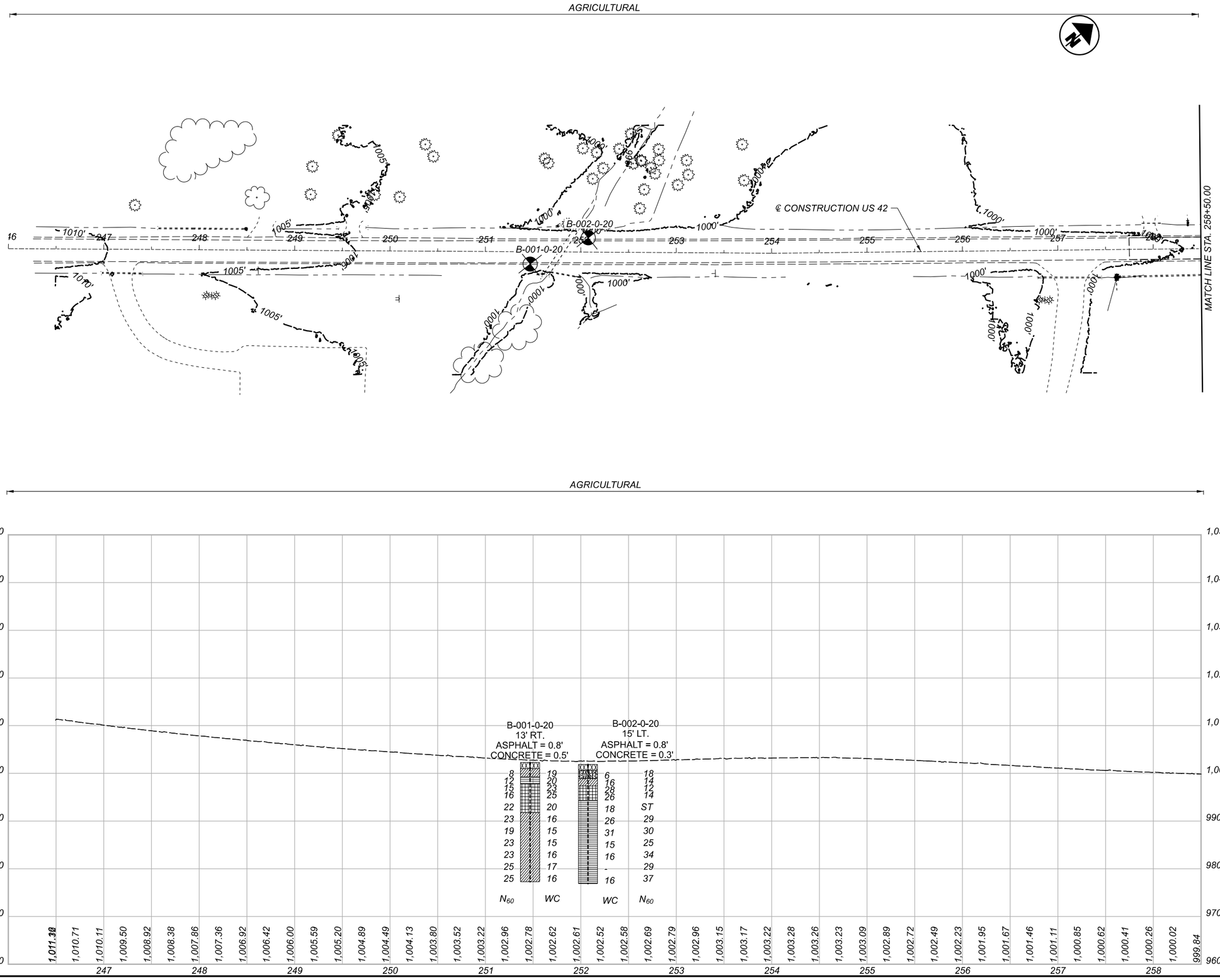
APPENDIX A

SOIL PROFILE SHEETS



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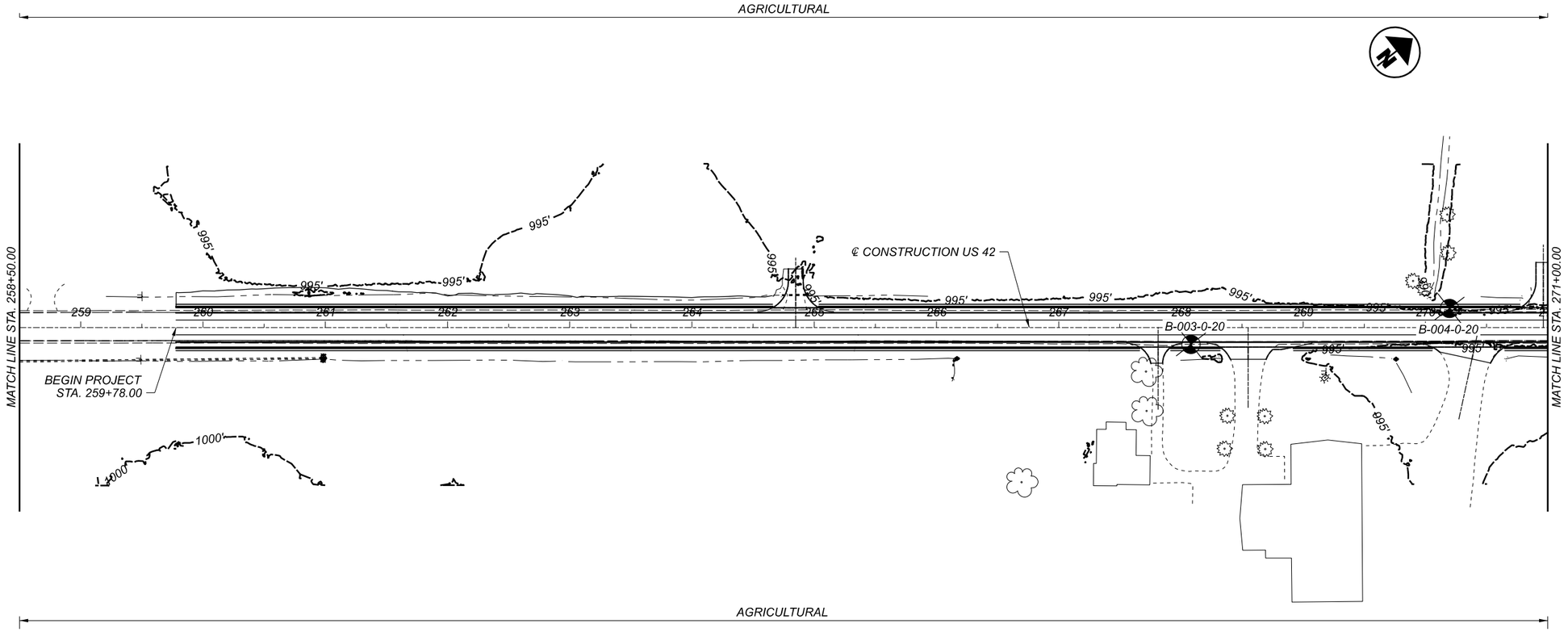

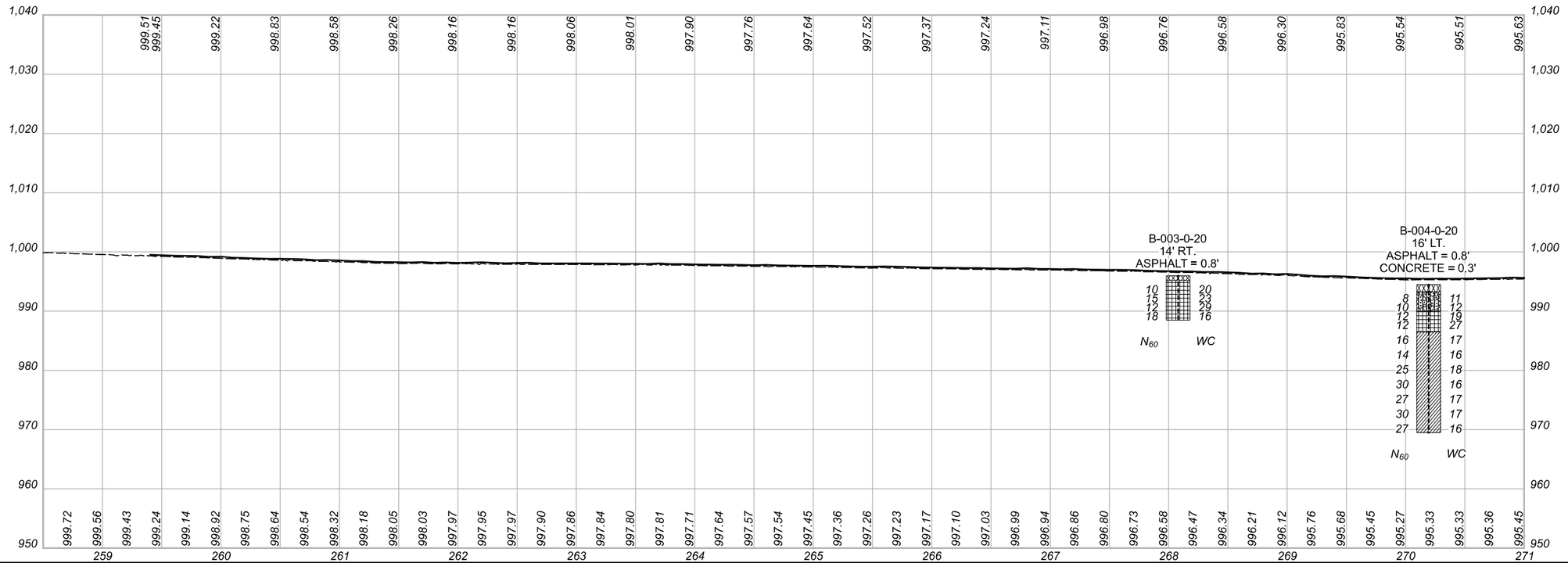

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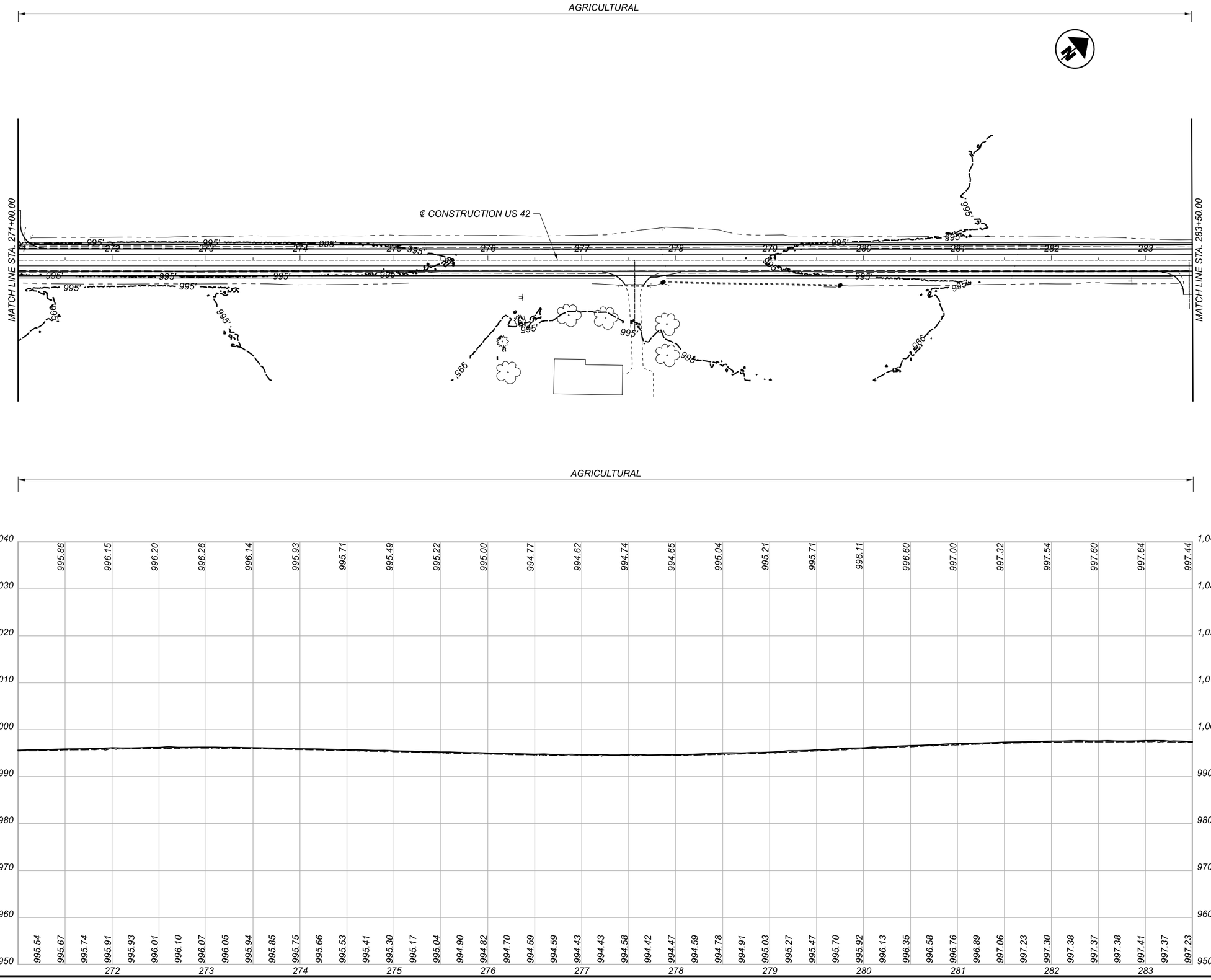

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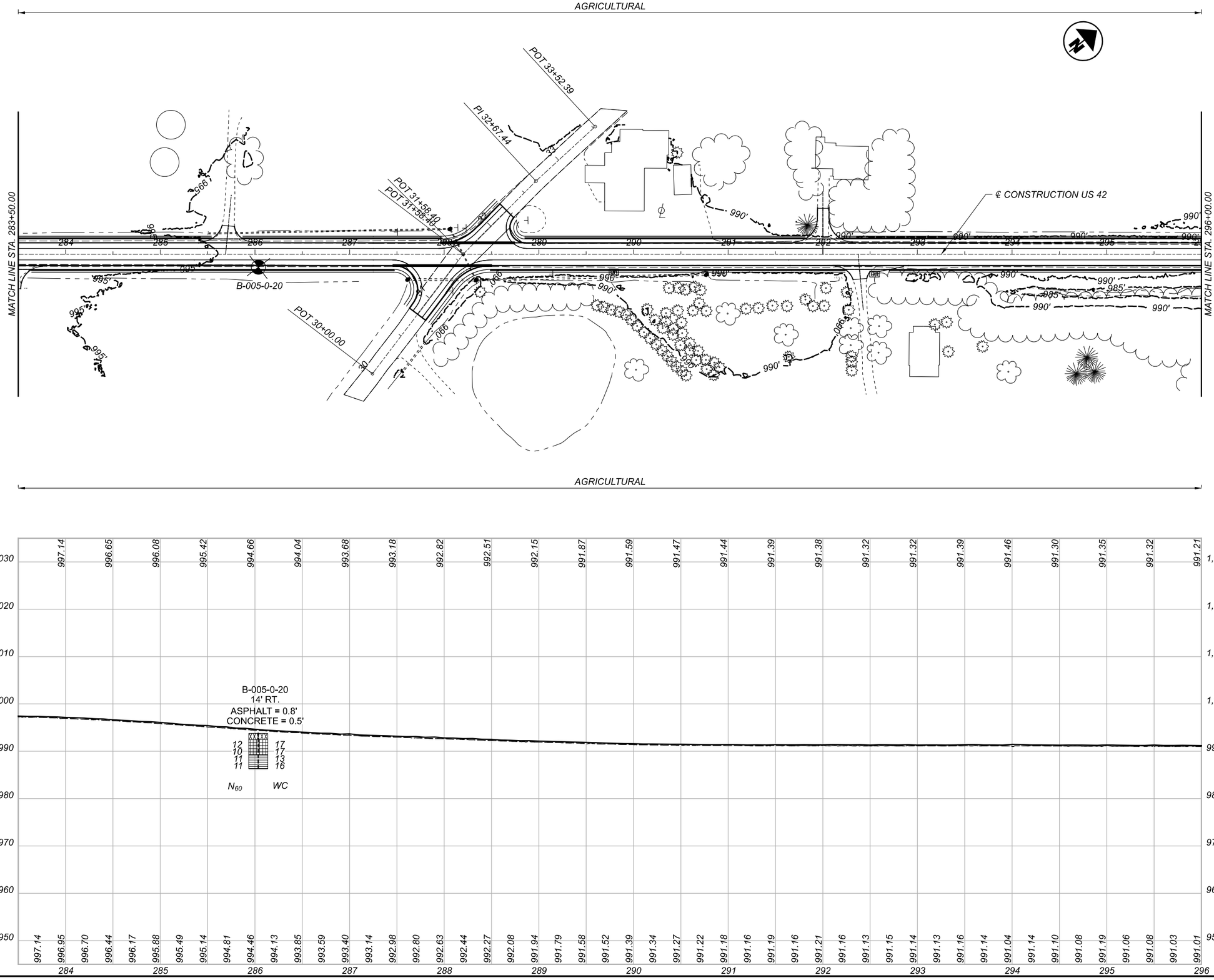

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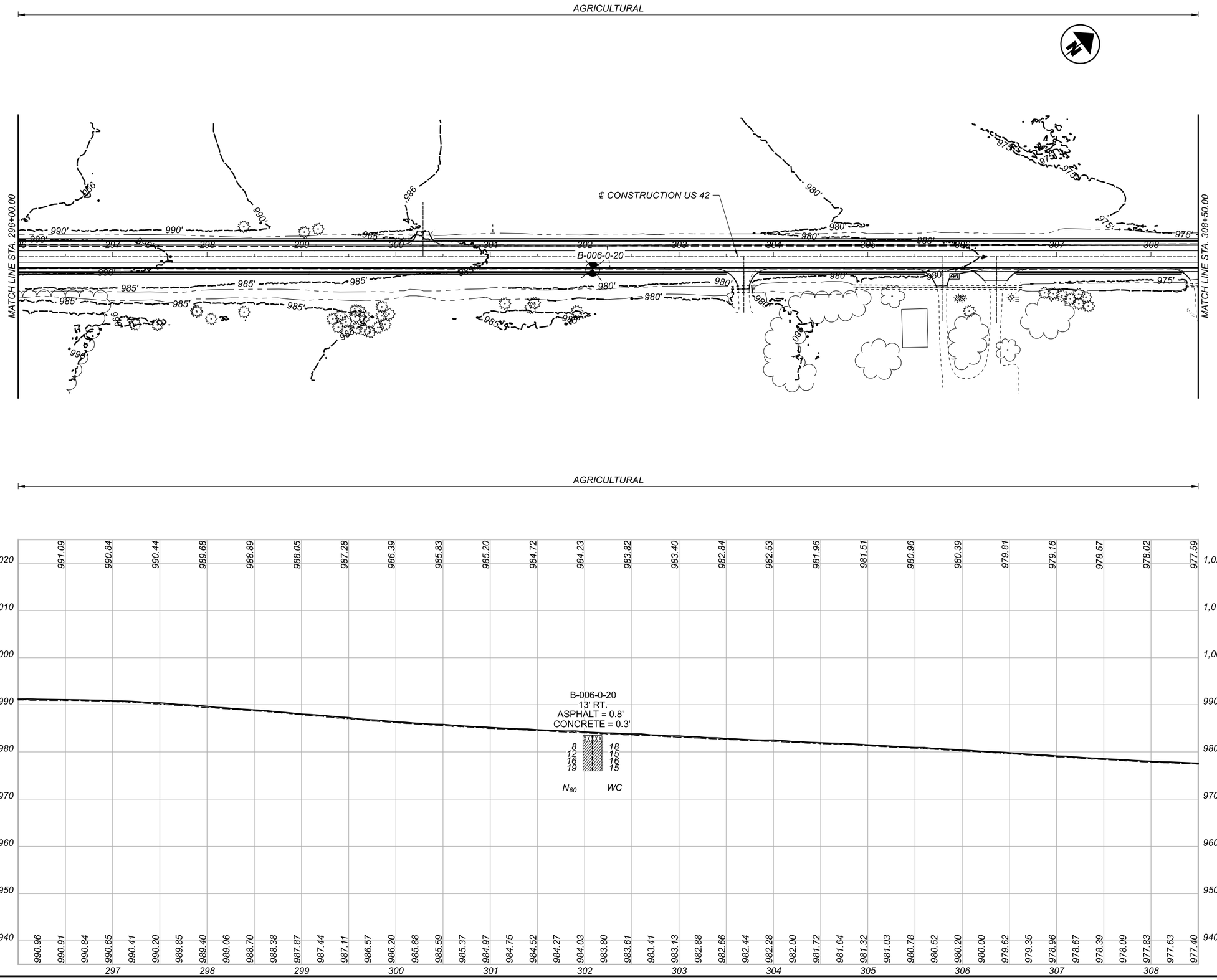

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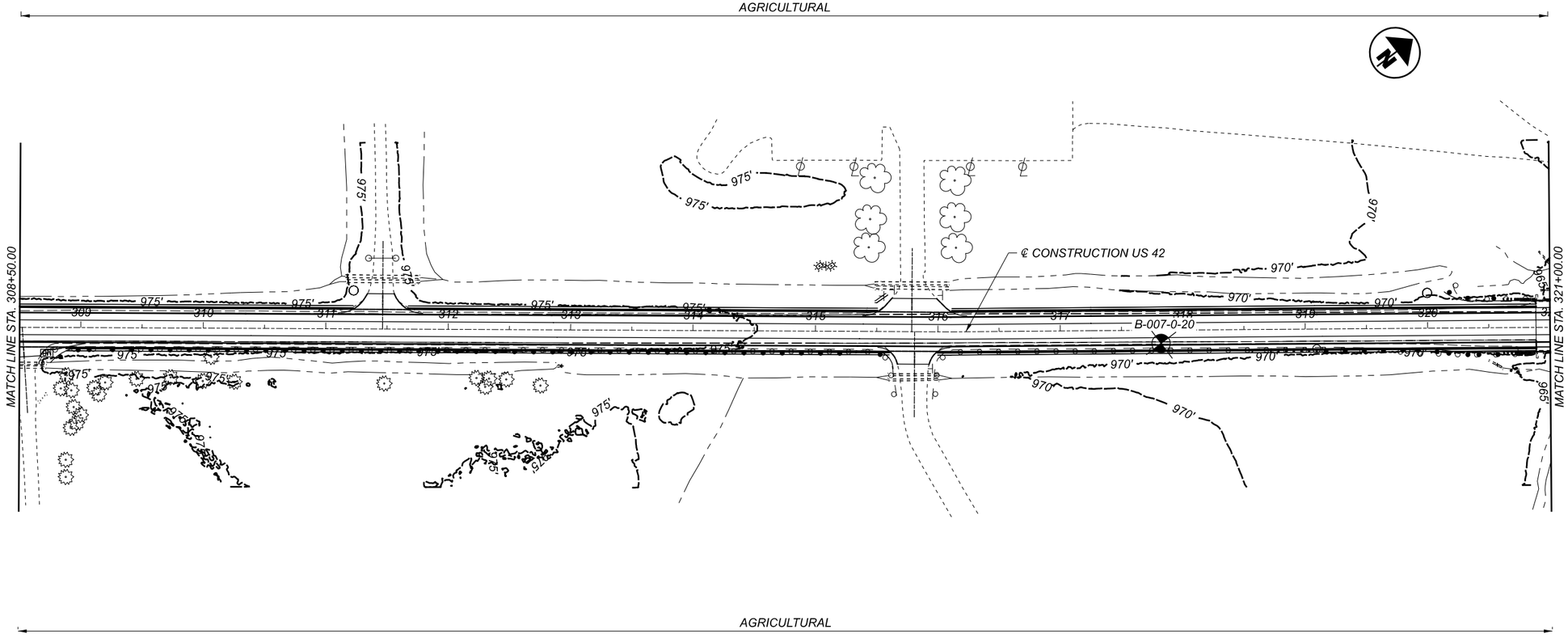

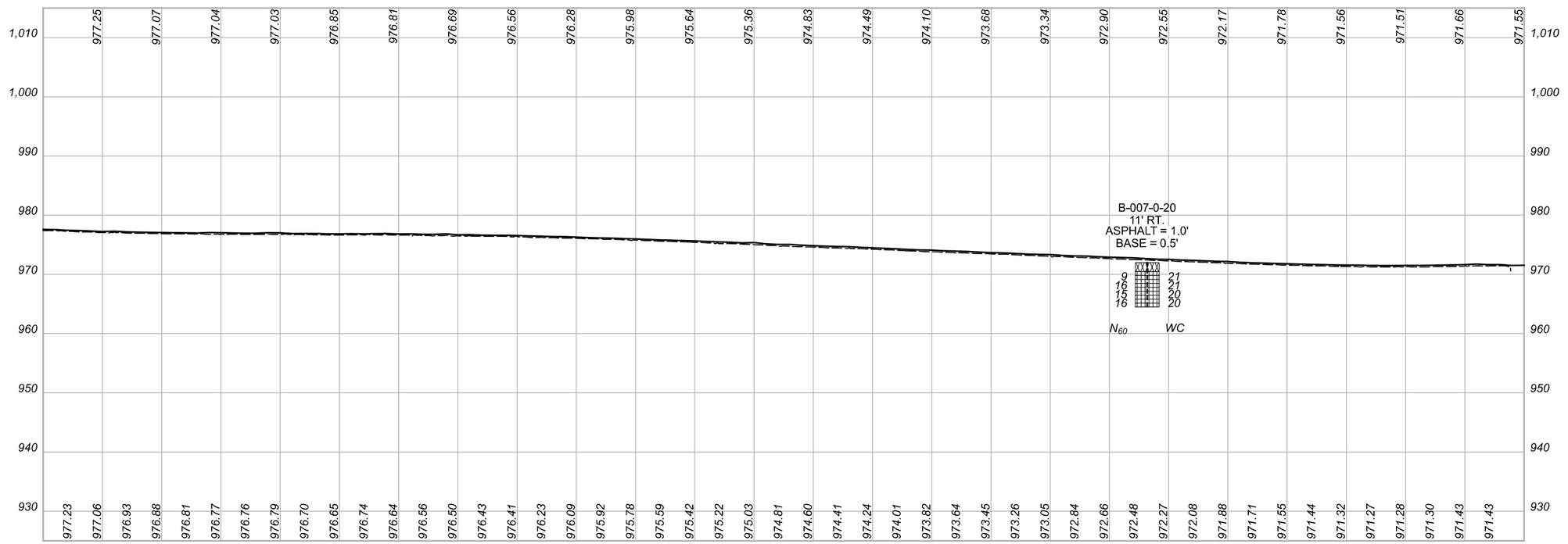

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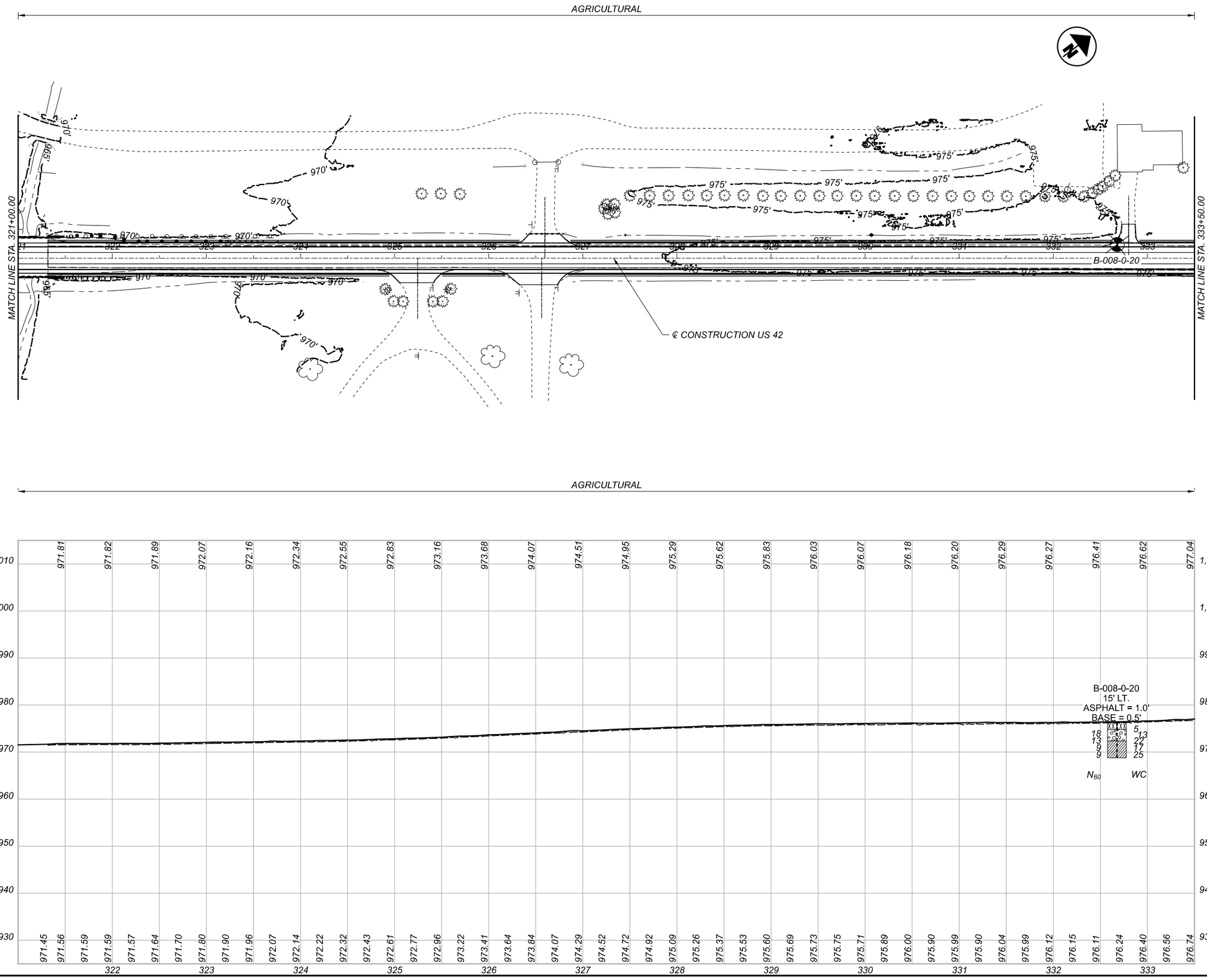

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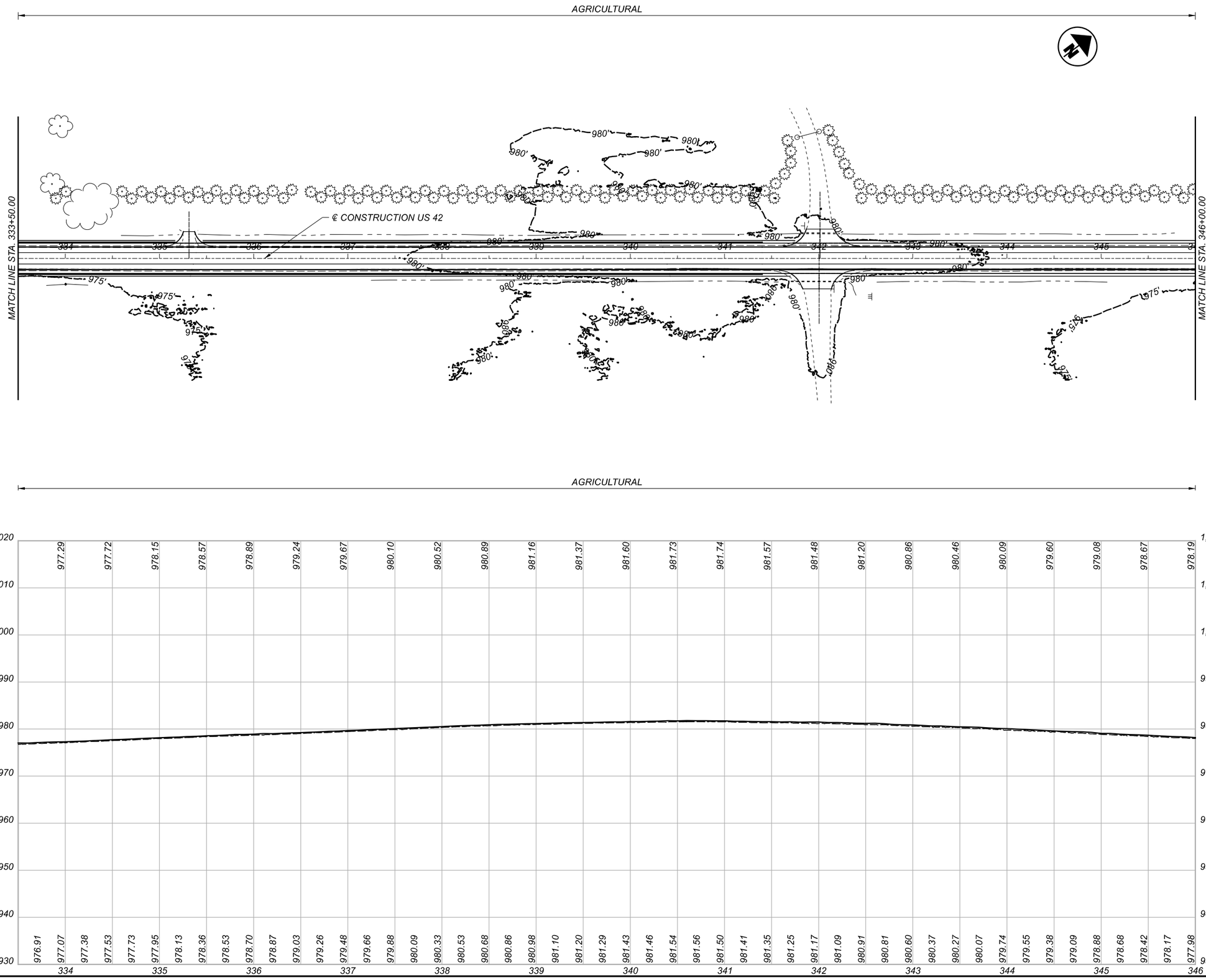

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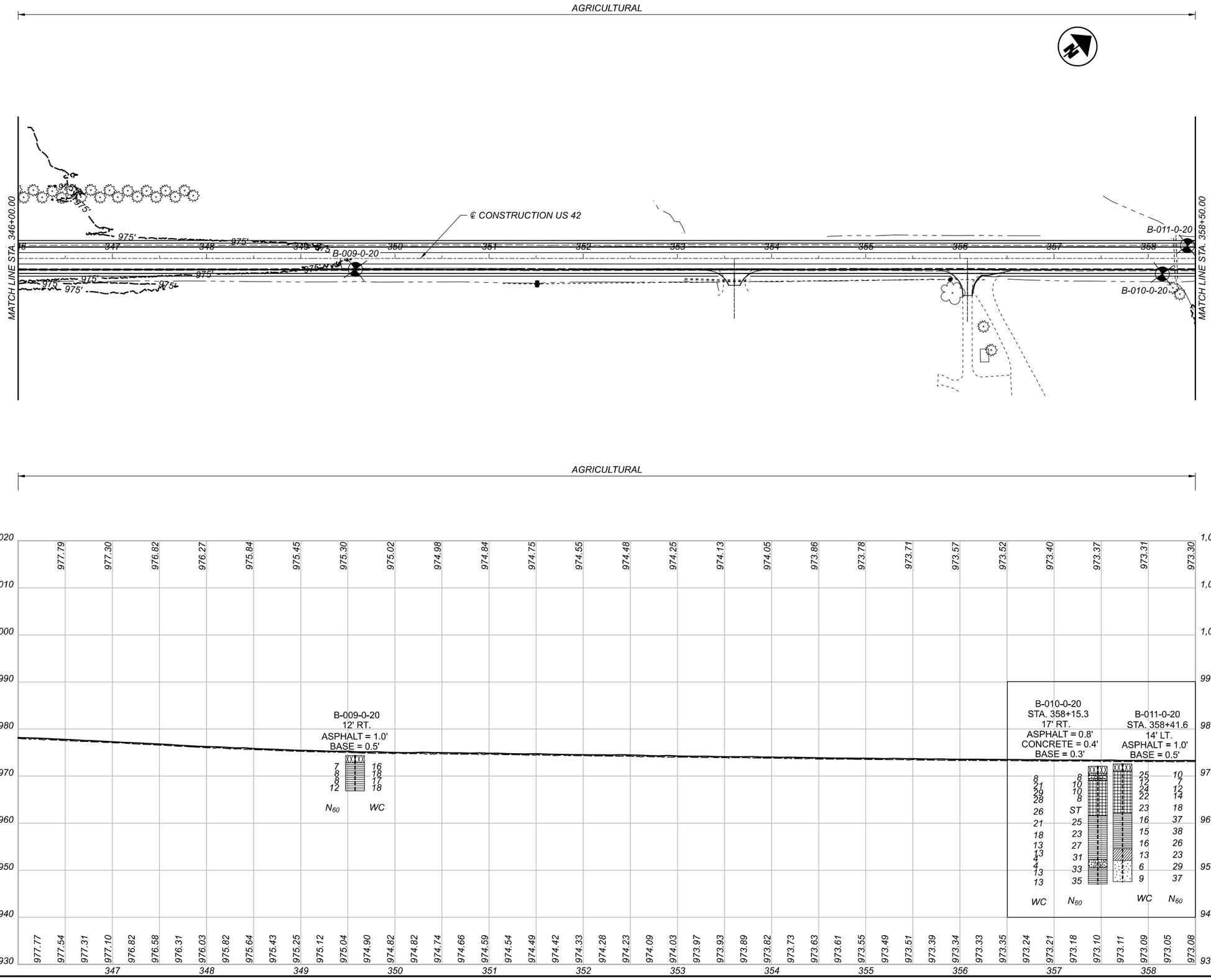

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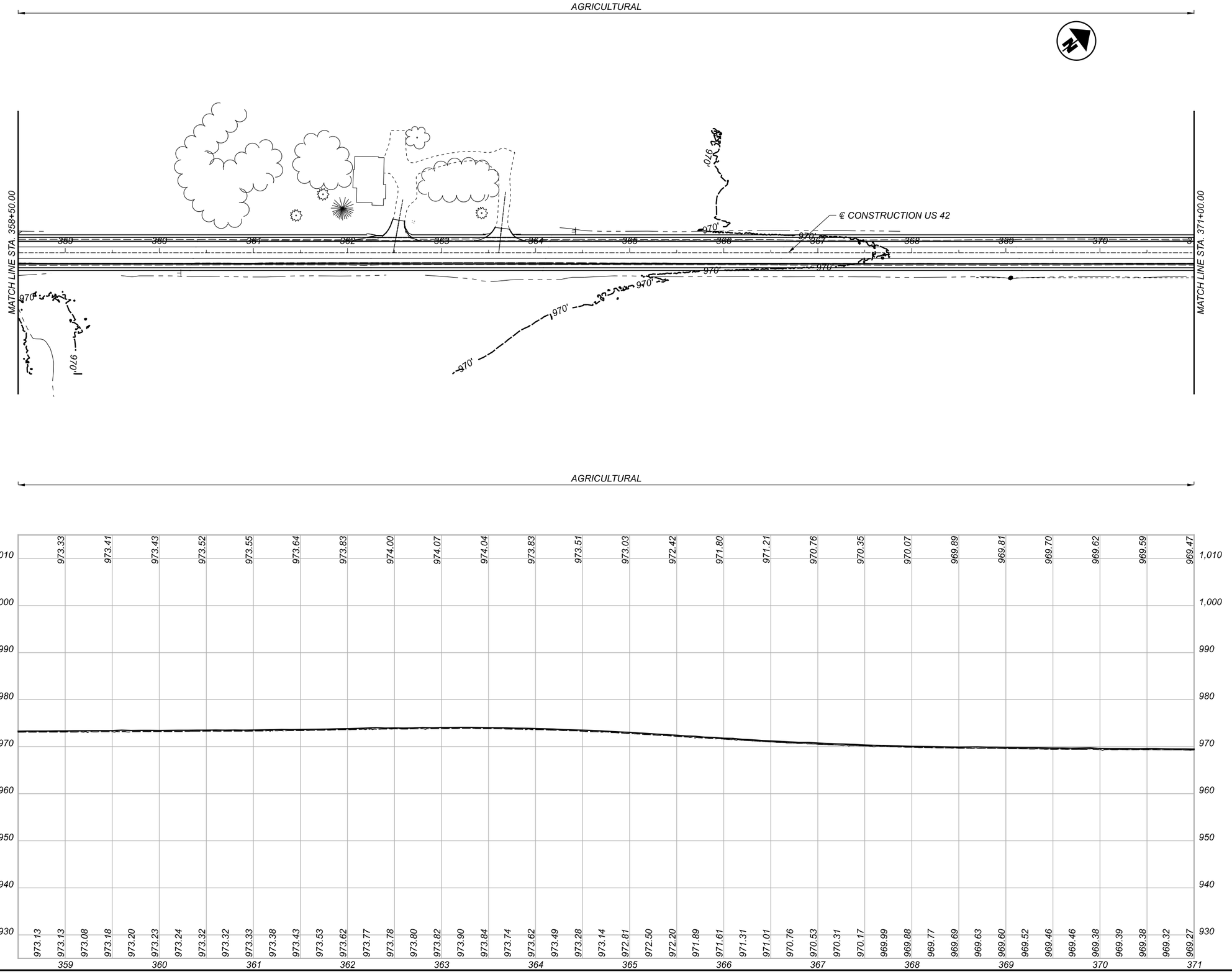

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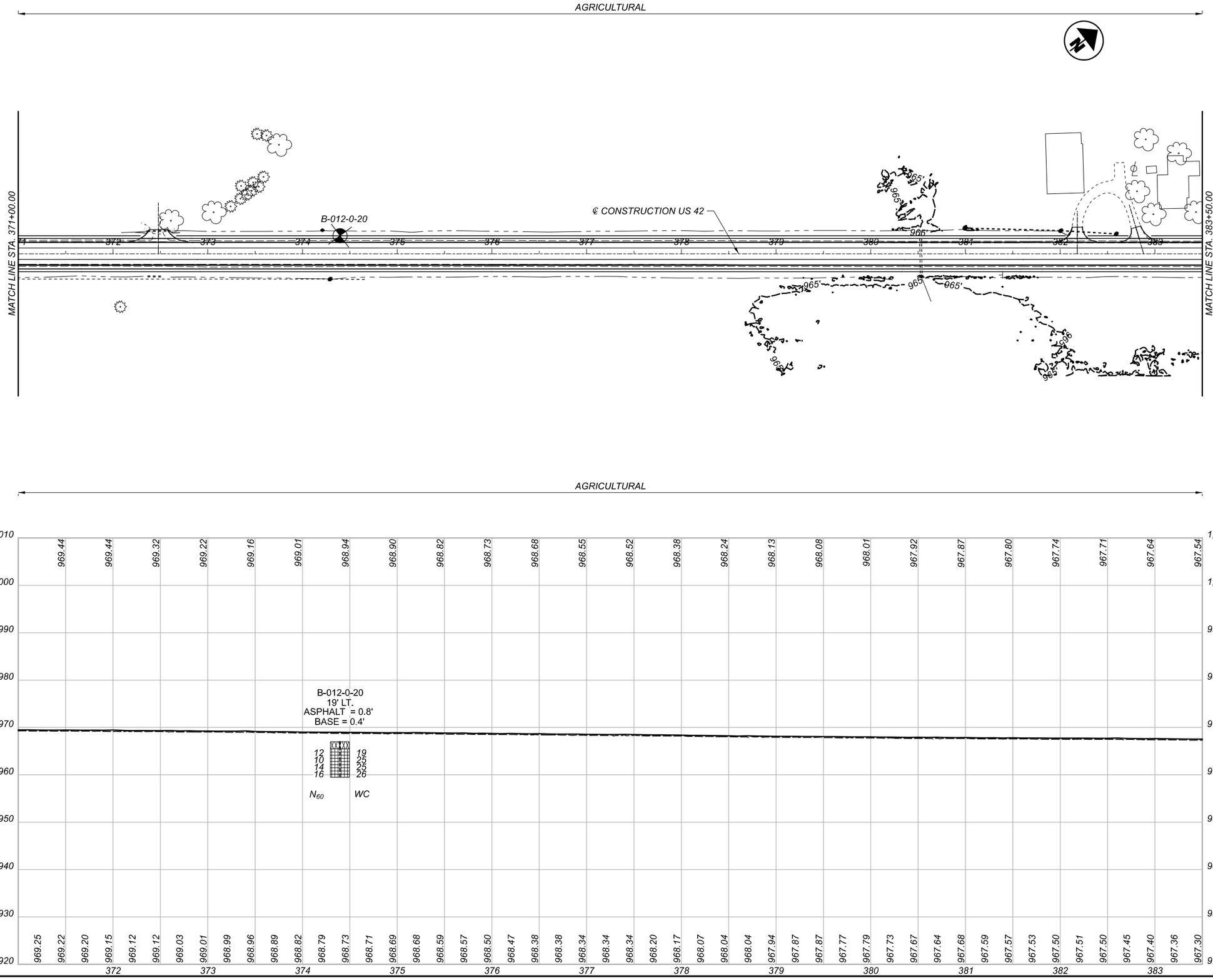
COLUMBUS, OH, 43231
TEL:614.714.0299
WWW.NEASINC.COM

DESIGNER: AI
REVIEWER: BPA 05-24-21
PROJECT ID: 111381
SUBSET: 16 TOTAL: 37
SHEET TOTAL



HORIZONTAL SCALE IN FEET
0 25 50 100

SOIL PROFILE
STA. 371+00 TO STA. 383+50 US 42

UNI_DEL-42-4.29_0.00

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COLUMBUS, OH, 43231
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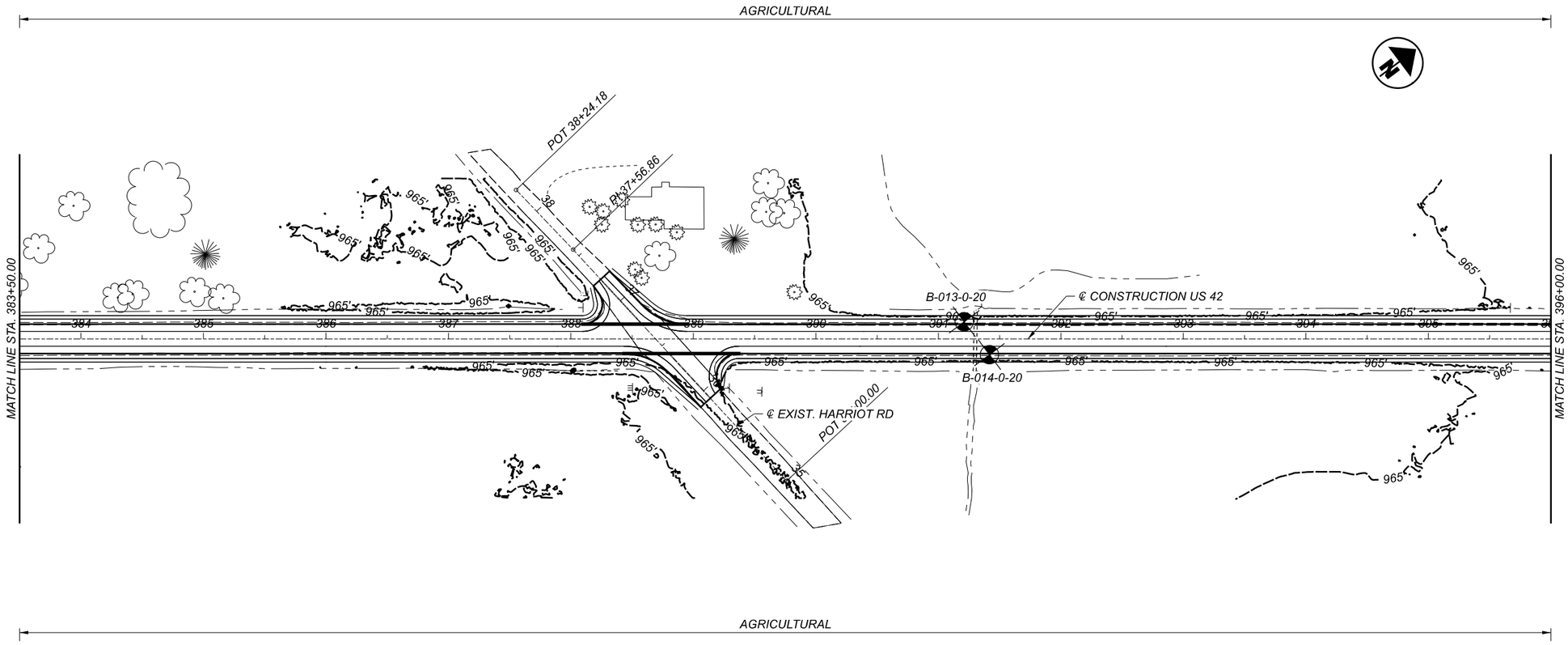
DESIGNER
AI

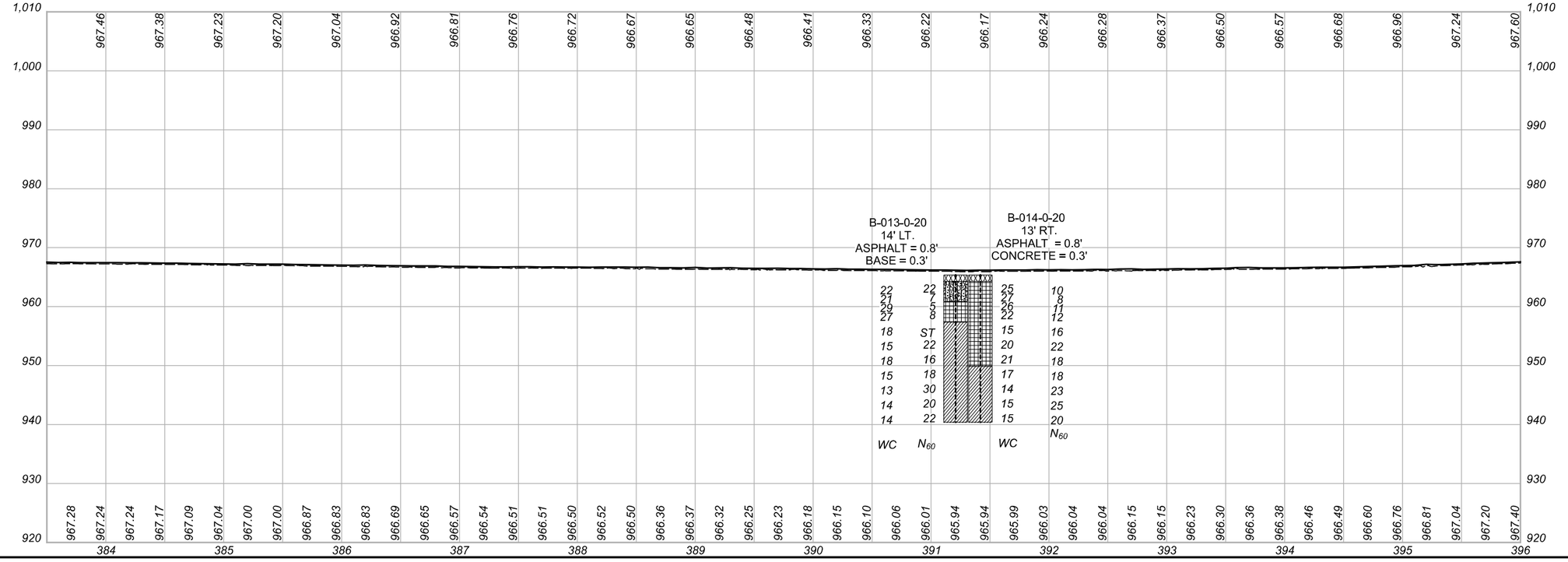
REVIEWER
BPA 05-24-21

PROJECT ID
111381

SUBSET 17 | TOTAL 37

SHEET | TOTAL





HORIZONTAL SCALE IN FEET
0 25 50 100

SOIL PROFILE
STA. 383+50 STA. 396+00 US 42

DESIGN AGENCY
NEAS
National Engineering & Architectural Services Inc.
2800 CORPORATE EXCHANGE DR, SUITE 240
COLUMBUS, OH, 43231
TEL:614.714.0299
WWW.NEASINC.COM

DESIGNER AI
REVIEWER BPA 05-24-21
PROJECT ID 111381
SUBSET 18 TOTAL 37
SHEET TOTAL

UNI_DEL-42-4.29_0.00

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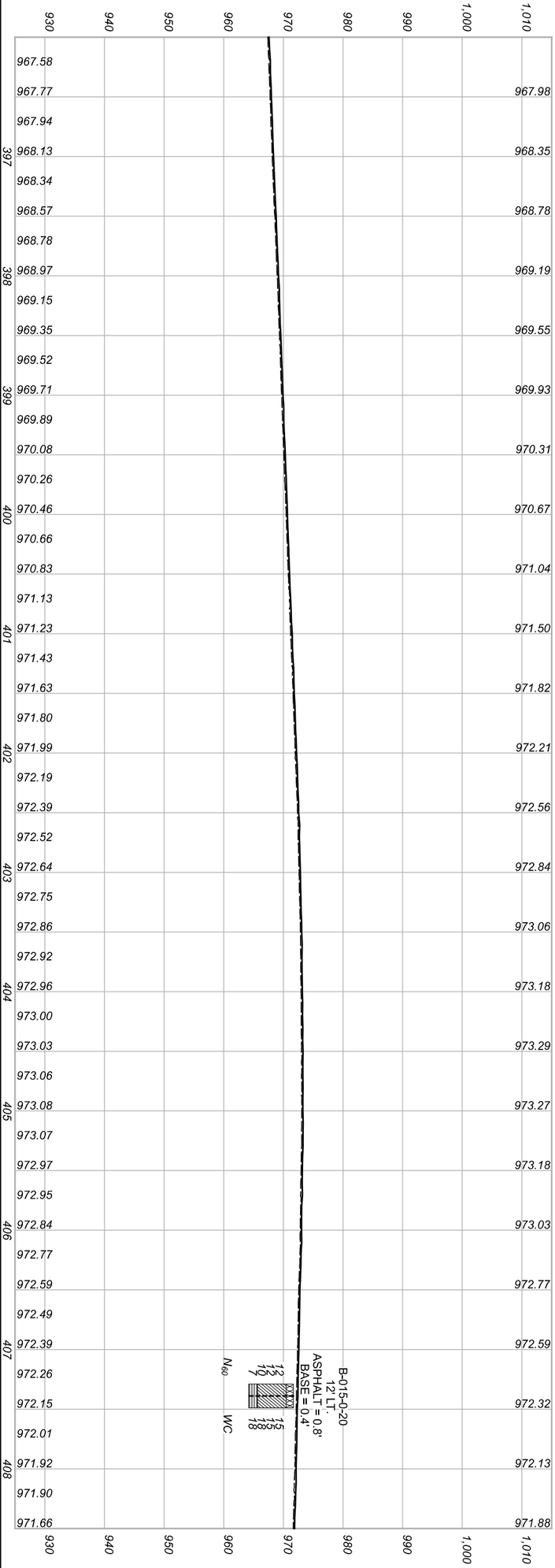

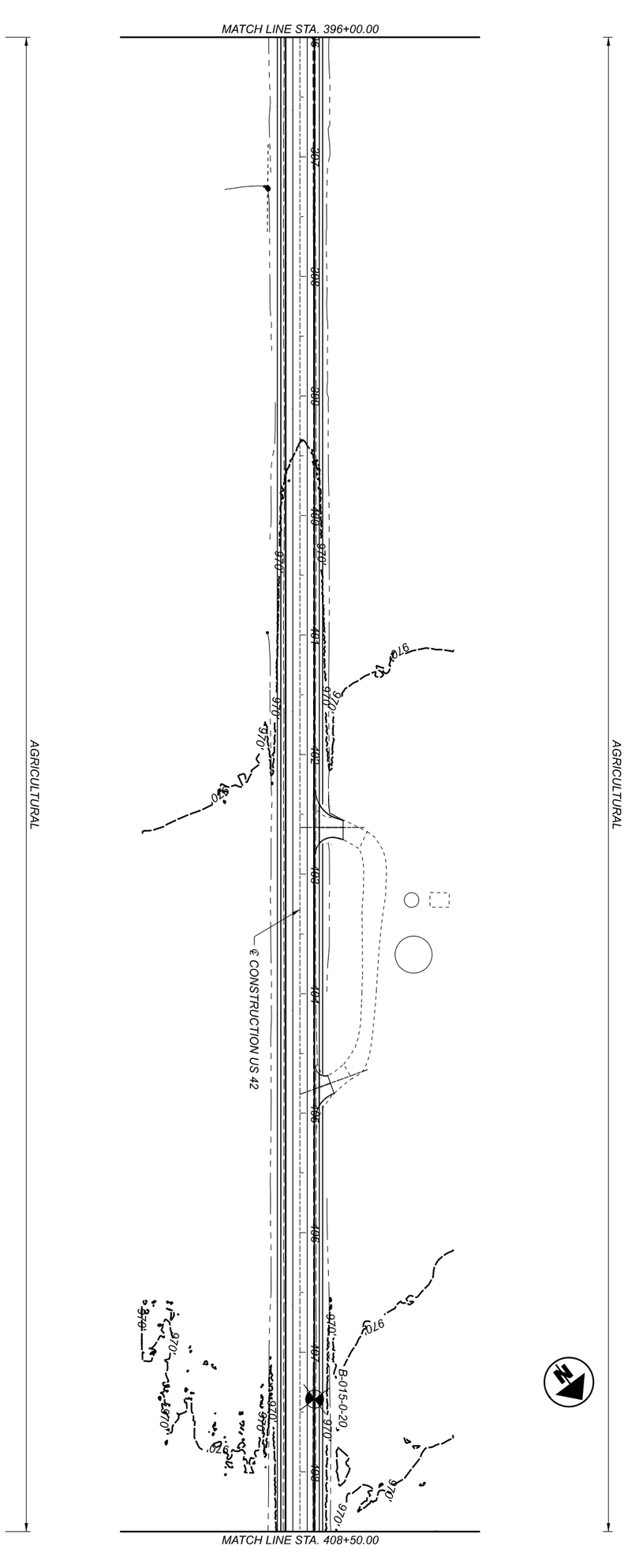

DESIGN AGENCY
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2800 CORPORATE EXCHANGE DR. SUITE 240
COLUMBUS, OH. 43231
TEL:614.714.0299
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DESIGNER AI

REVIEWER BPA 05-24-21

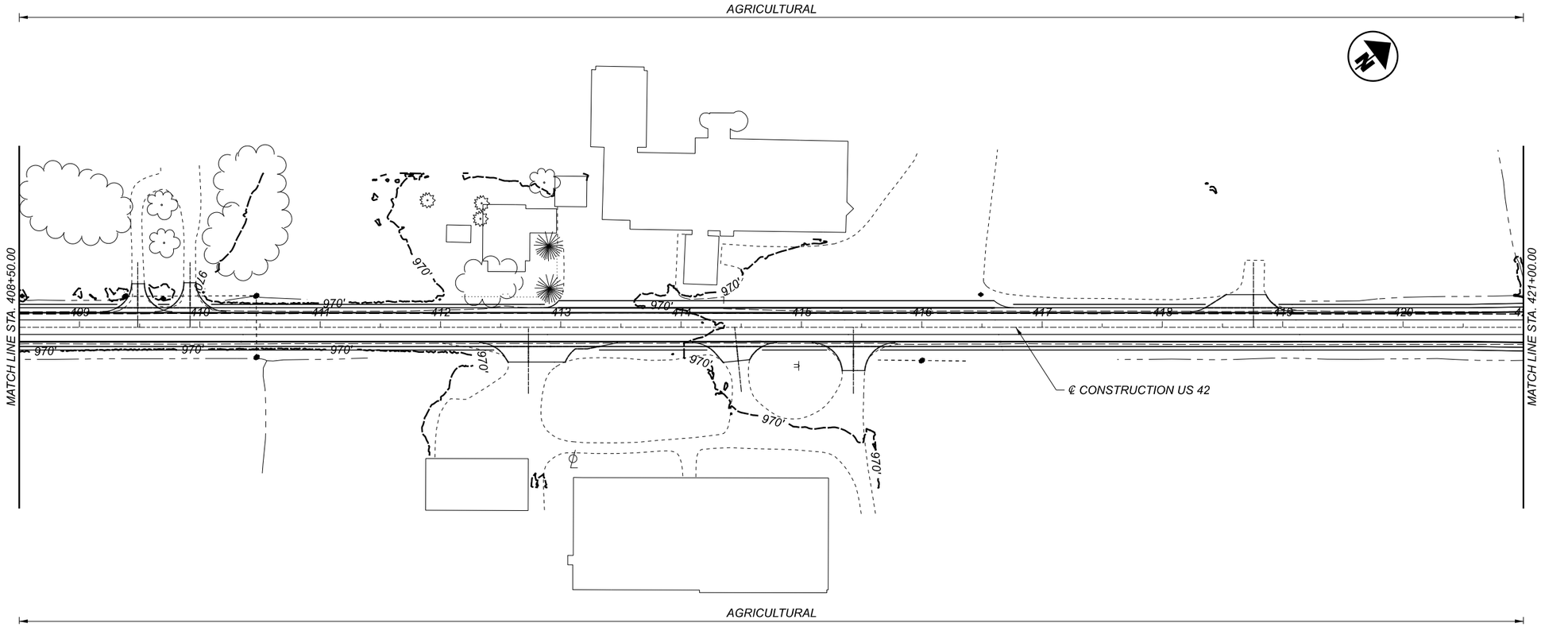
PROJECT ID 111381

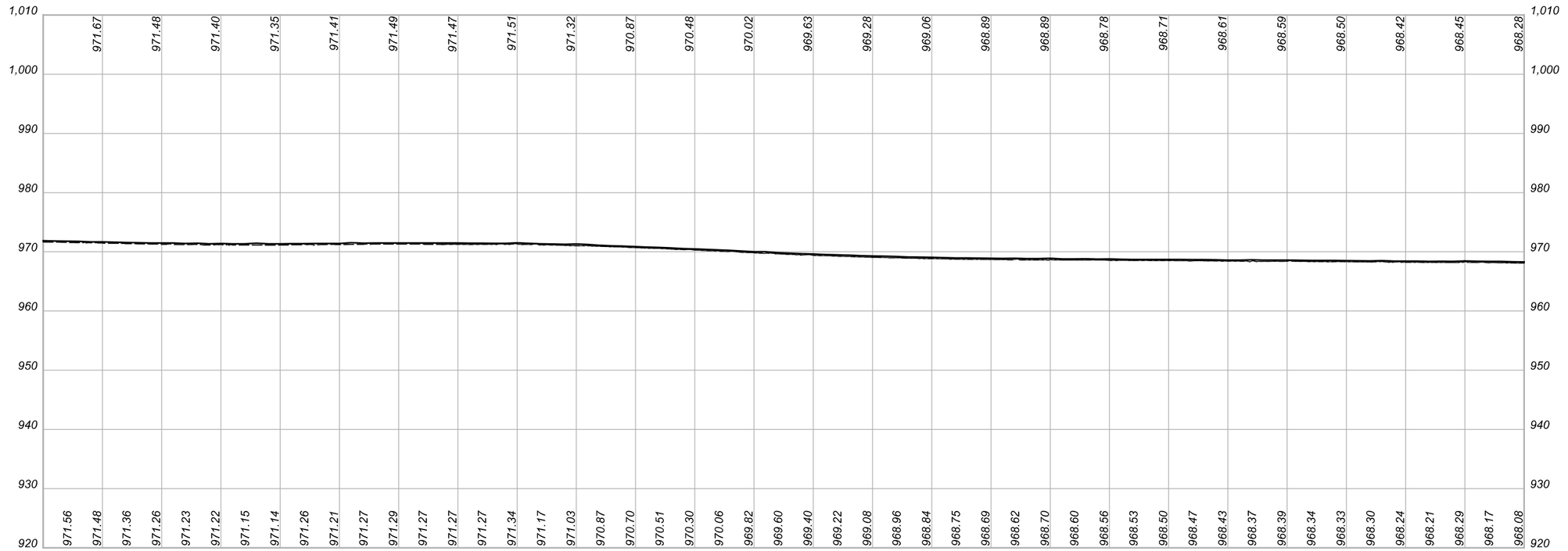
SUBSET 19 TOTAL 37

SHEET 1 TOTAL

SOIL PROFILE
STA. 396+00 TO STA. 408+50 US 42

HORIZONTAL SCALE IN FEET
0 50
25 100





HORIZONTAL SCALE IN FEET
0 25 50 100

SOIL PROFILE
STA. 408+50 TO STA. 421+00 US 42

DESIGN AGENCY
NEAS
National Engineering & Architectural Services Inc.
2800 CORPORATE EXCHANGE DR, SUITE 240
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DESIGNER: AI
REVIEWER: BPA 05-24-21
PROJECT ID: 111381
SUBSET: 20 TOTAL: 37
SHEET TOTAL

UNI_DEL-42-4.29_0.00

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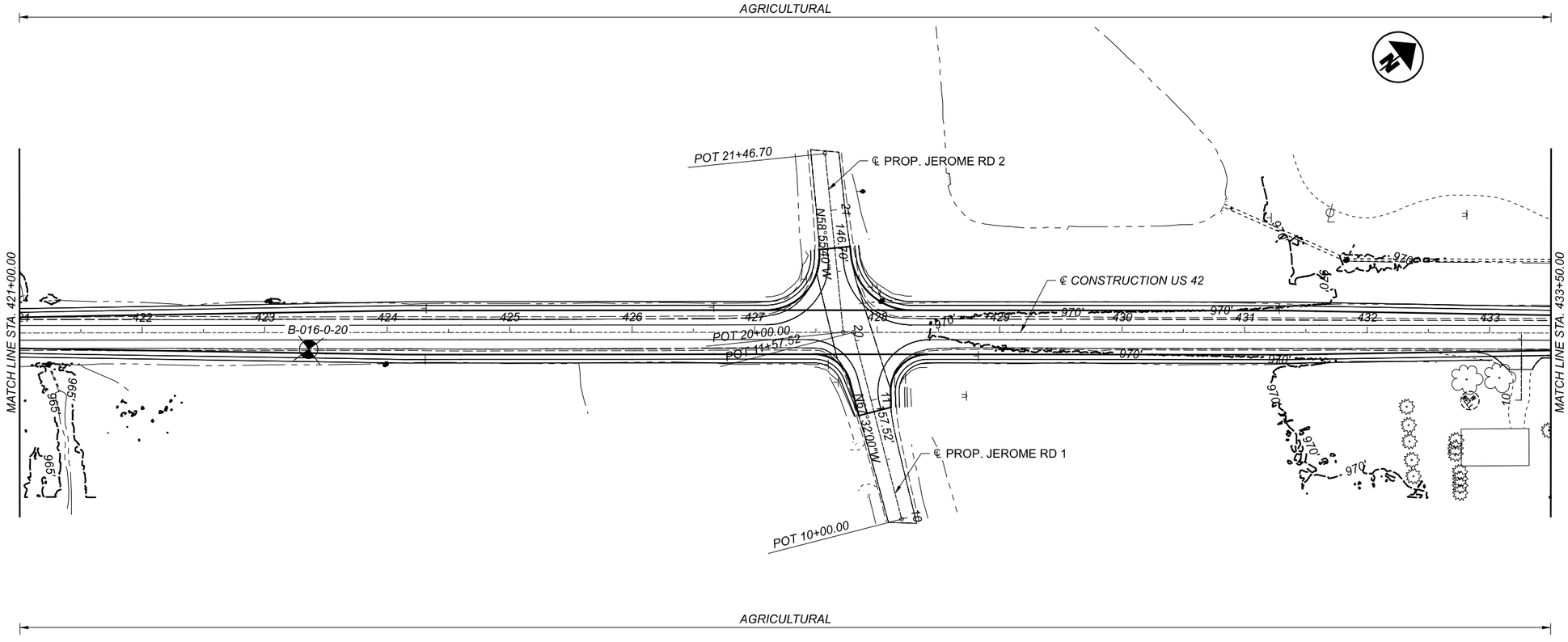

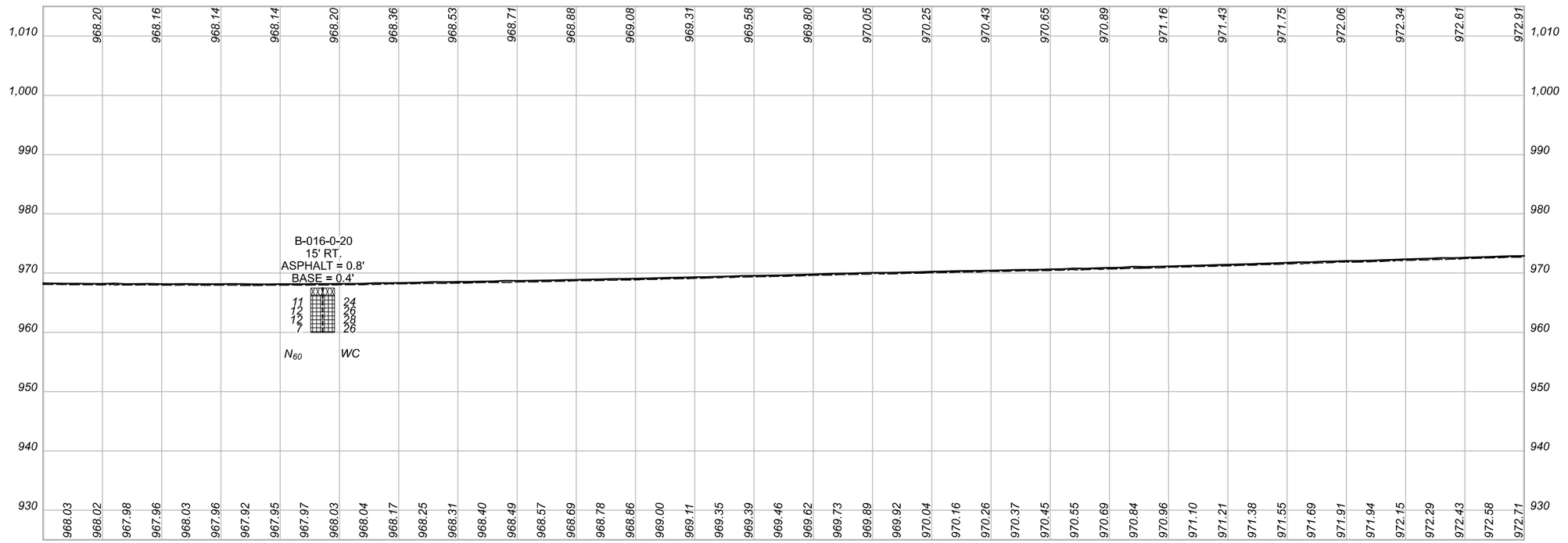

HORIZONTAL SCALE IN FEET
0 25 50 100

SOIL PROFILE
STA. 421+00 TO STA. 433+50 US 42

UNI_DEL-42-4.29_0.00

MODEL: III38I_IP037 PAPERSIZE: 17x11 (in.) DATE: 5/24/2021 TIME: 4:06:30 PM USER: akhail
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DESIGN AGENCY
NEAS
National Engineering & Architectural Services Inc.
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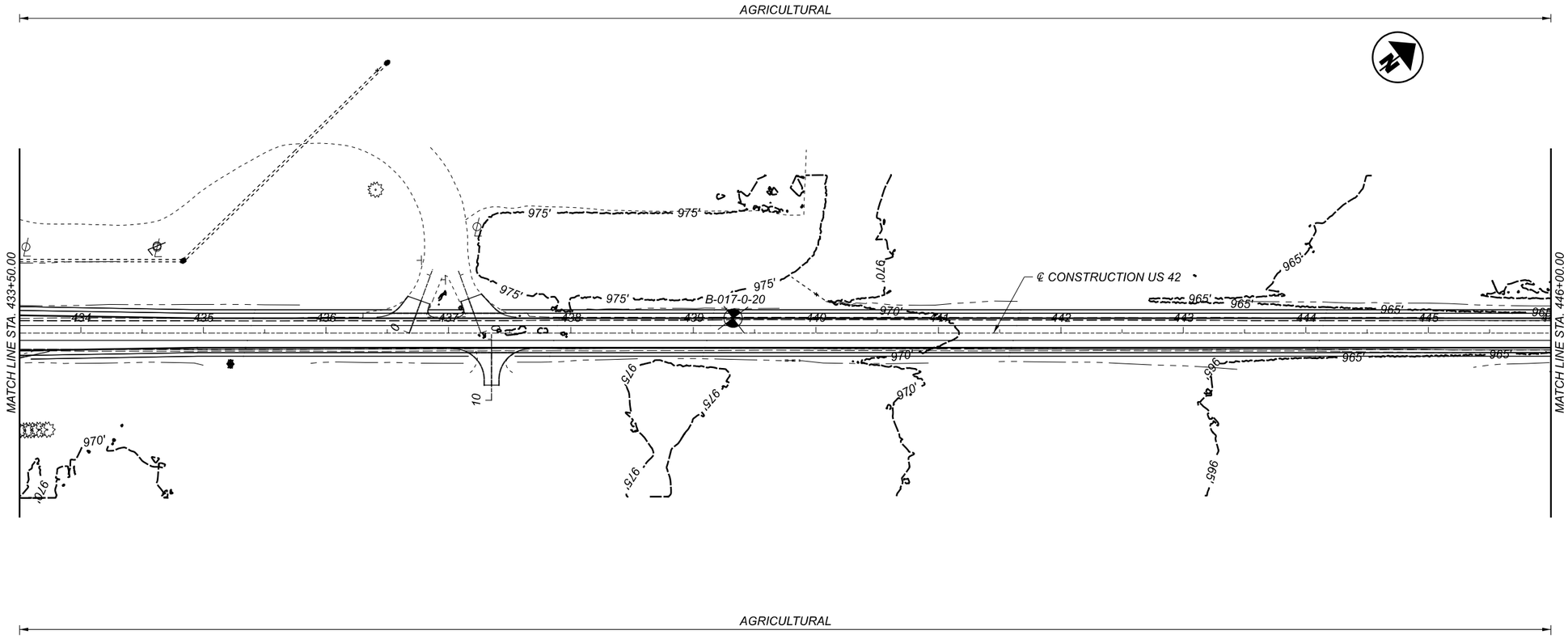
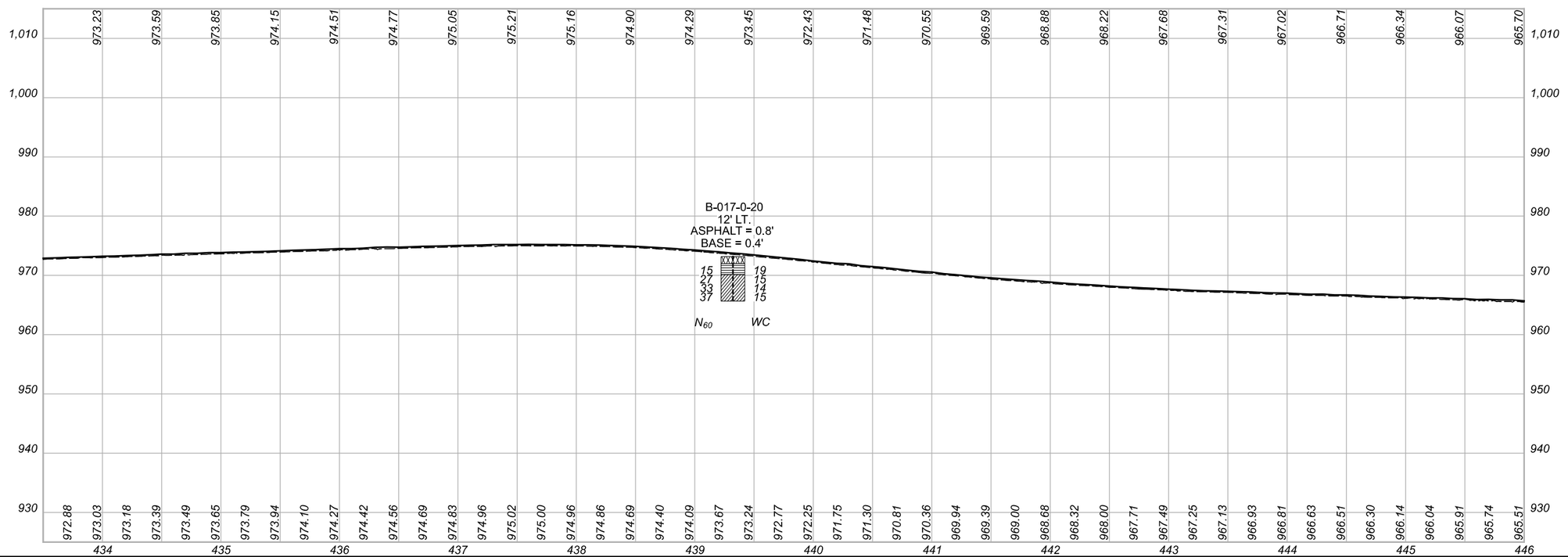
COLUMBUS, OH, 43231
TEL:614.714.0299
WWW.NEASINC.COM

DESIGNER: AI
REVIEWER: BPA 05-24-21
PROJECT ID: 111381
SUBSET: 21 TOTAL: 37
SHEET: TOTAL:





HORIZONTAL SCALE IN FEET
0 25 50 100

SOIL PROFILE
STA. 433+50 TO STA. 446+00 US 42

UNI_DEL-42-4.29_0.00

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P:\OHDOT\WorkSets\lll38l UNI-DEL-42-4.92\400-Engineering\Geotechnical\Sheets\lll38l_IP016.dgn

DESIGN AGENCY
NEAS
National Engineering & Architectural Services Inc.
2800 CORPORATE EXCHANGE DR, SUITE 240
COLUMBUS, OH, 43231
TEL:614.714.0299
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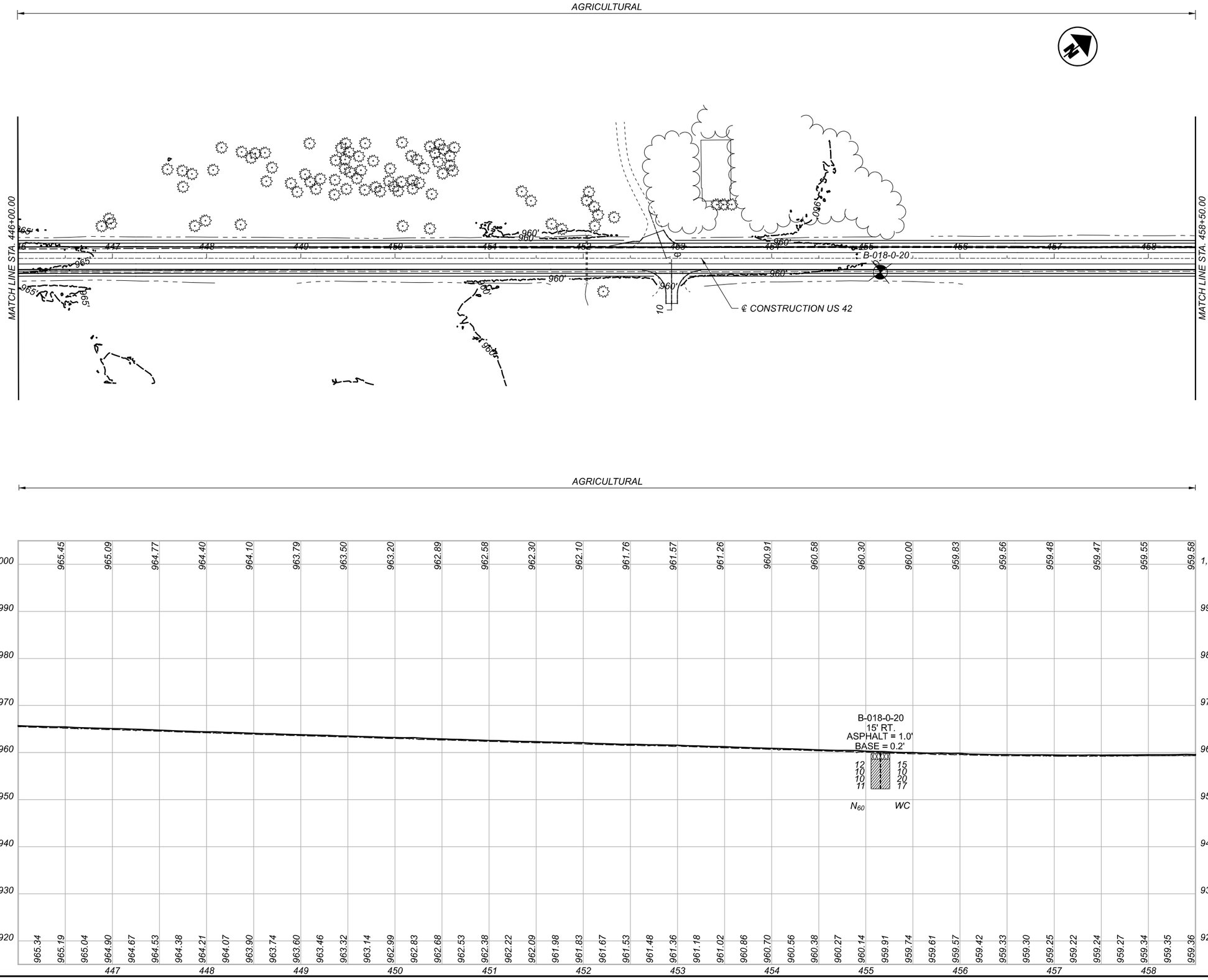
DESIGNER: AI
REVIEWER: BPA 05-24-21
PROJECT ID: 111381
SUBSET: 22 TOTAL: 37
SHEET: TOTAL:



HORIZONTAL SCALE IN FEET
0 25 50 100

SOIL PROFILE
STA. 446+00 TO STA. 458+50 US 42

UNI_DEL-42-4.29_0.00

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DESIGN AGENCY
NEAS
National Engineering & Architectural Services Inc.
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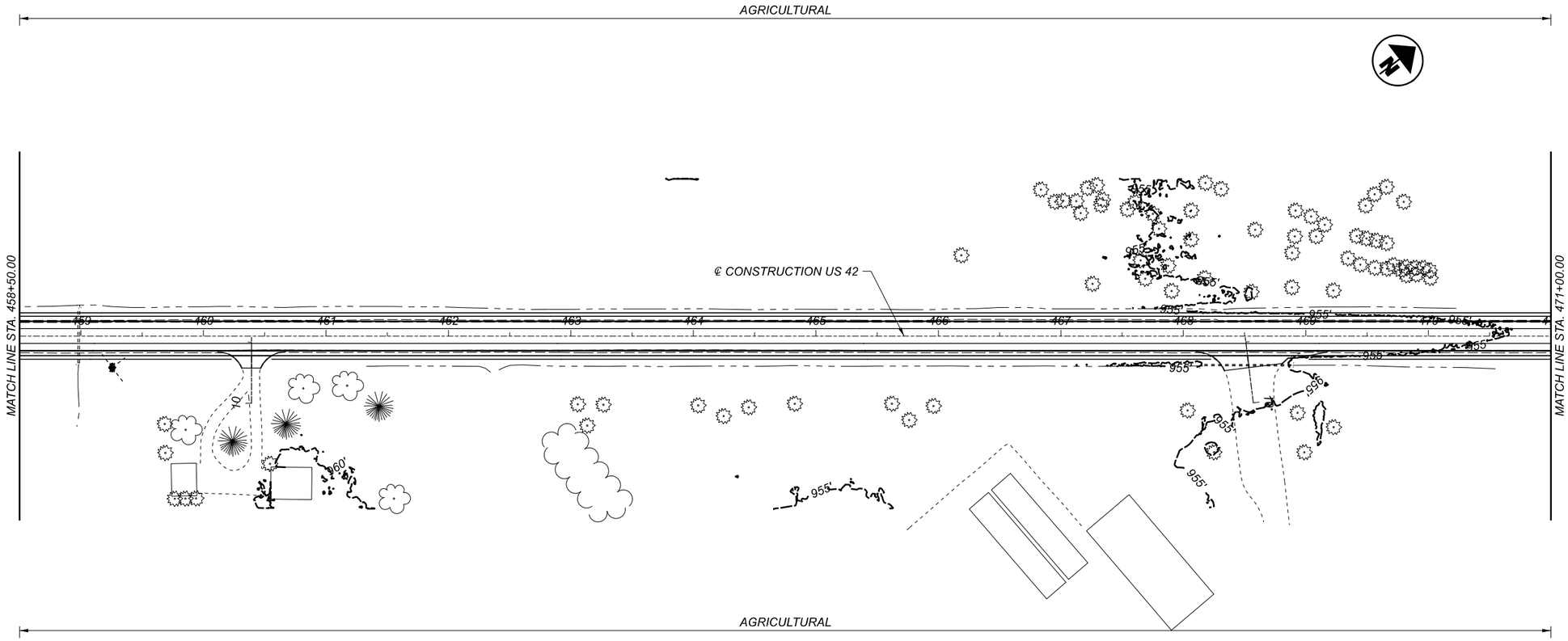
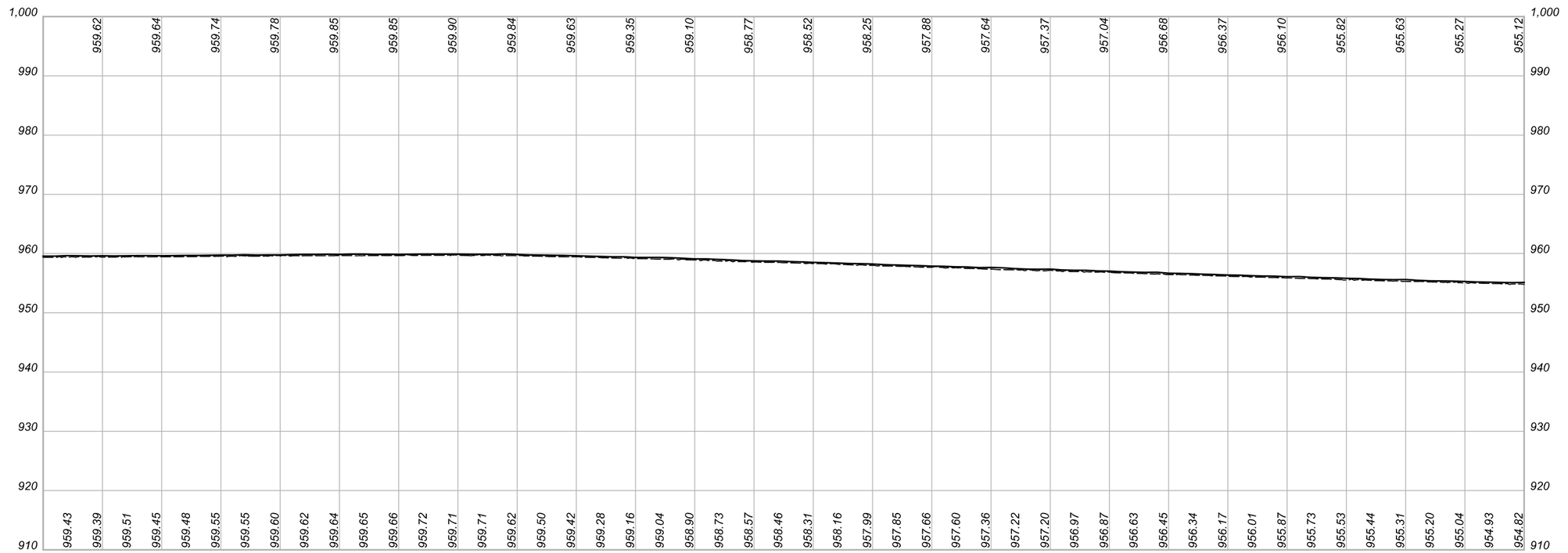
COLUMBUS, OH, 43231
TEL:614.714.0299
WWW.NEASINC.COM

DESIGNER: AI
REVIEWER: BPA 05-24-21
PROJECT ID: 111381
SUBSET: 23 TOTAL: 37
SHEET: TOTAL:





HORIZONTAL SCALE IN FEET
0 25 50 100

SOIL PROFILE
STA. 458+50 TO STA. 471+00 US 42

DESIGN AGENCY
NEAS
National Engineering & Architectural Services Inc.
2800 CORPORATE EXCHANGE DR, SUITE 240
COLUMBUS, OH, 43231
TEL:614.714.0299
WWW.NEASINC.COM

DESIGNER: AI
REVIEWER: BPA 05-24-21
PROJECT ID: 111381
SUBSET: 24 TOTAL: 37
SHEET TOTAL

UNI_DEL-42-4.29_0.00

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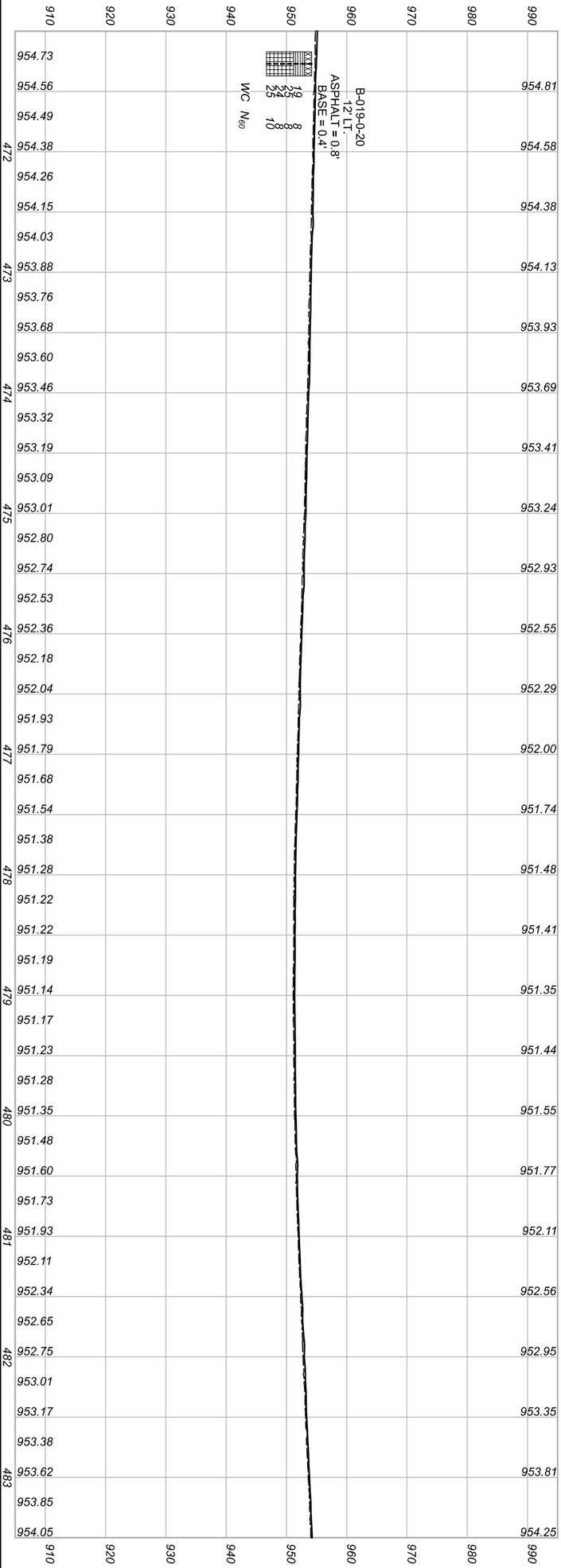
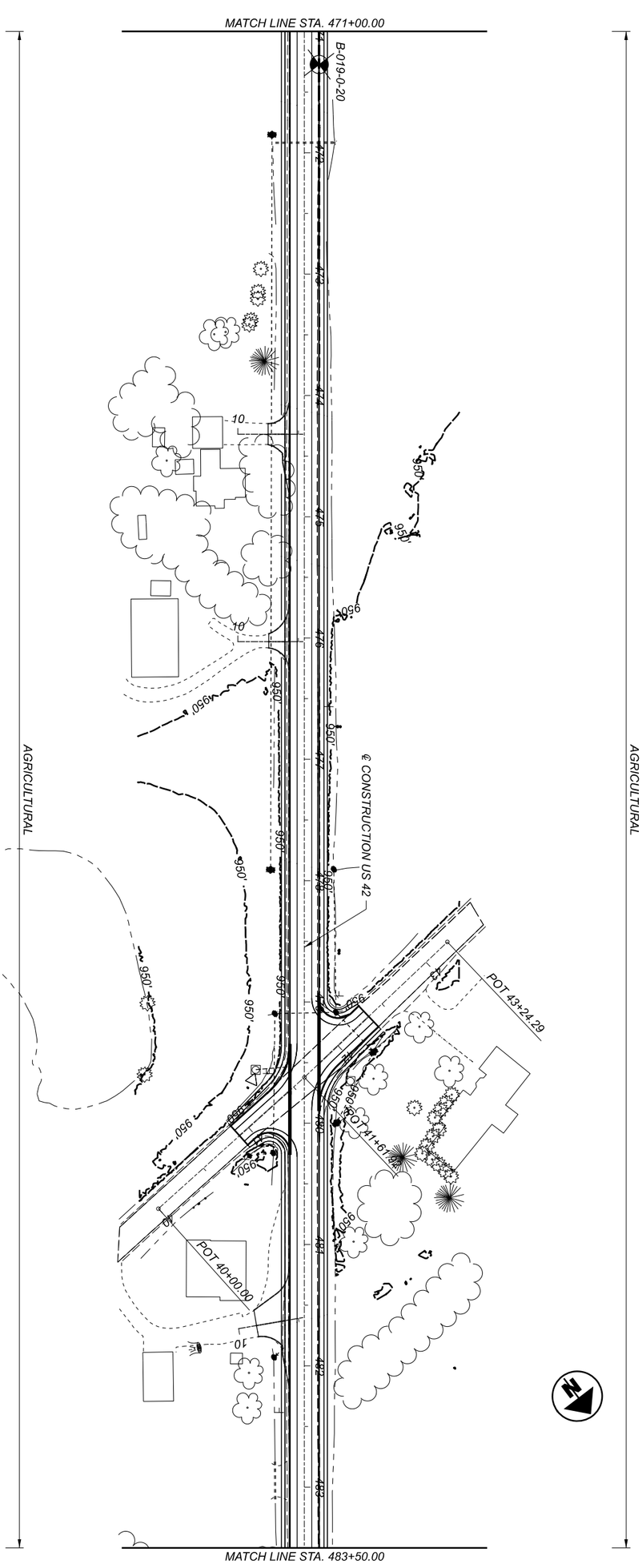


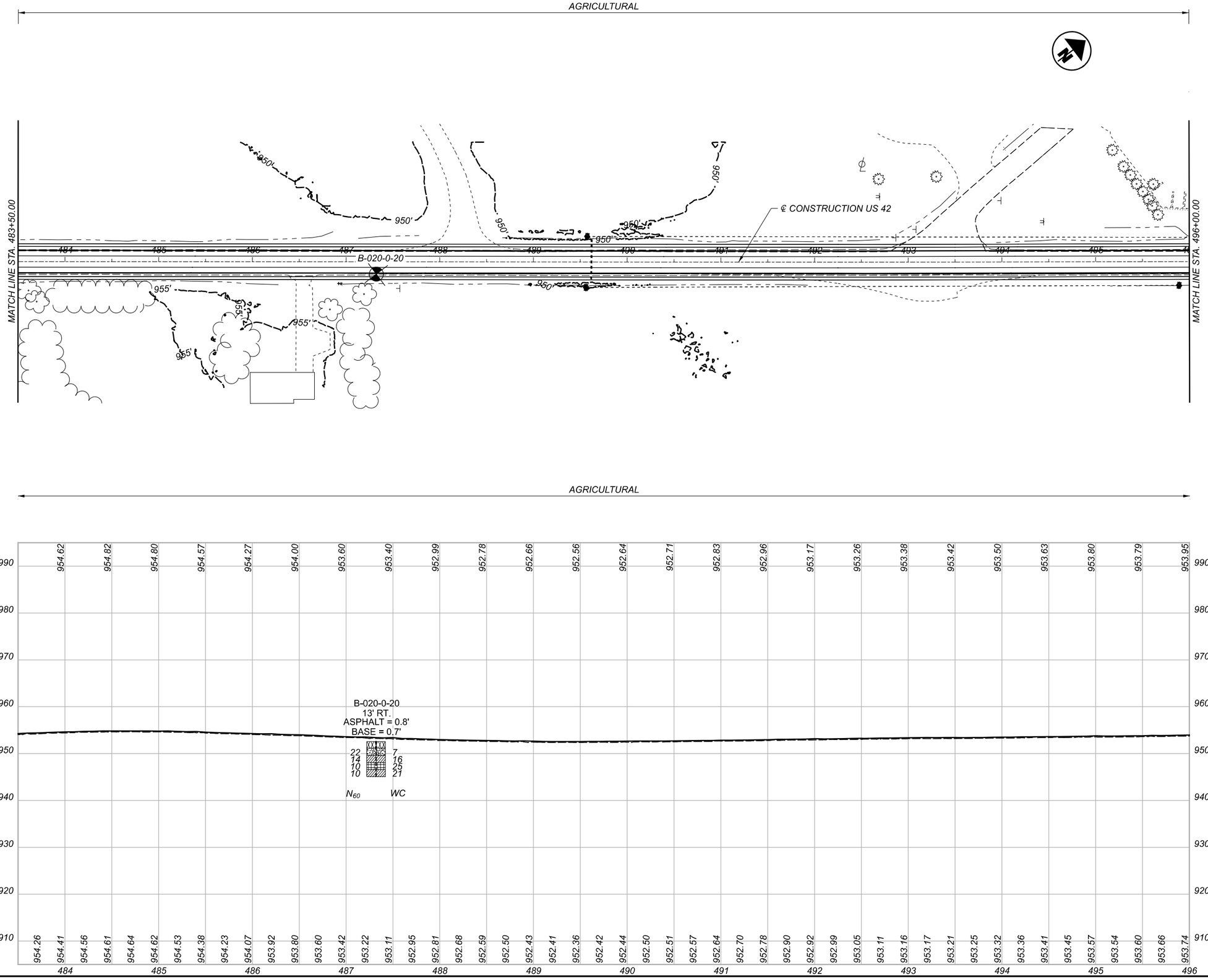


SOIL PROFILE
STA. 471+00 TO 483+50 US 42

HORIZONTAL
SCALE IN FEET
0 50
25 100

DESIGN AGENCY
2800 CORPORATE EXCHANGE DR. SUITE 240
COLUMBUS, OH. 43231
TEL:614.714.0299
WWW.NEASINC.COM

DESIGNER AI
REVIEWER BPA 05-24-21
PROJECT ID 111381
SUBSET 25 TOTAL 37
SHEET TOTAL



HORIZONTAL SCALE IN FEET
0 25 50 100

SOIL PROFILE
STA. 483+50 TO STA. 496+00 US 42

UNI_DEL-42-4.29_0.00

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DESIGN AGENCY
NEAS
National Engineering & Architectural Services Inc.
2800 CORPORATE EXCHANGE DR, SUITE 240
COLUMBUS, OH, 43231
TEL:614.714.0299
WWW.NEASINC.COM

DESIGNER AI
REVIEWER BPA 05-24-21
PROJECT ID 111381
SUBSET 26 TOTAL 37
SHEET TOTAL

UNI_DEL-42-4.29_0.00

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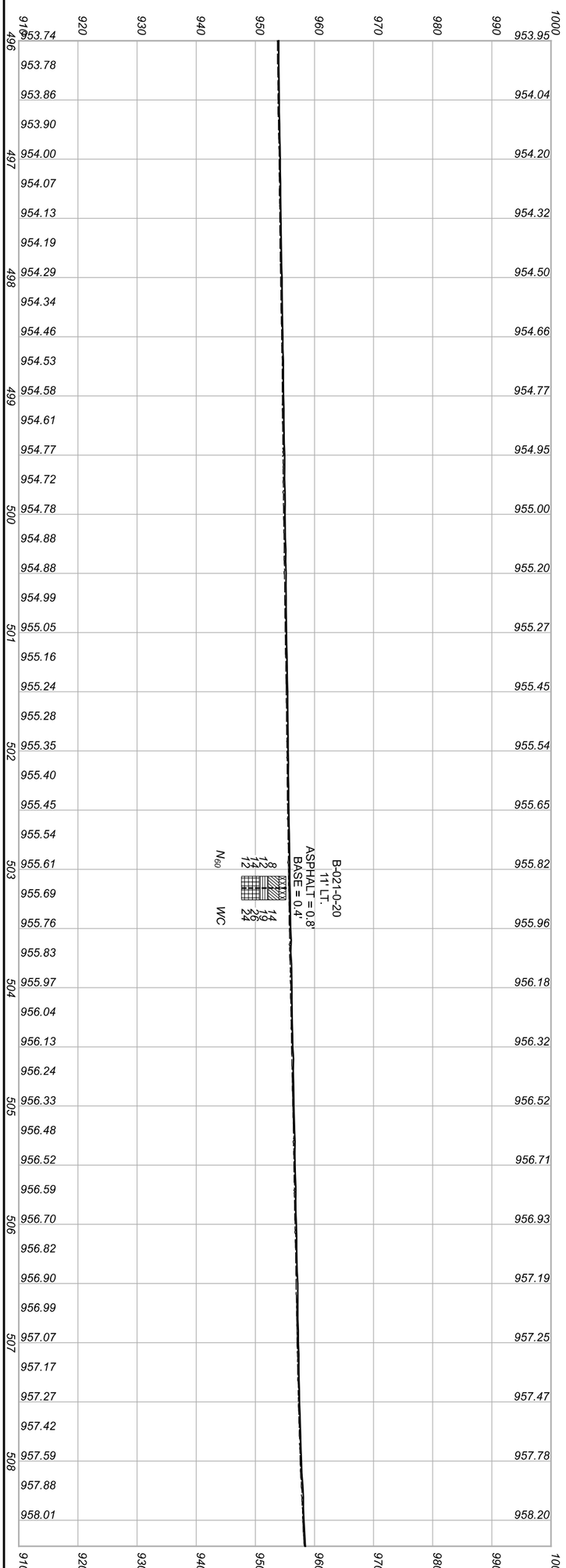
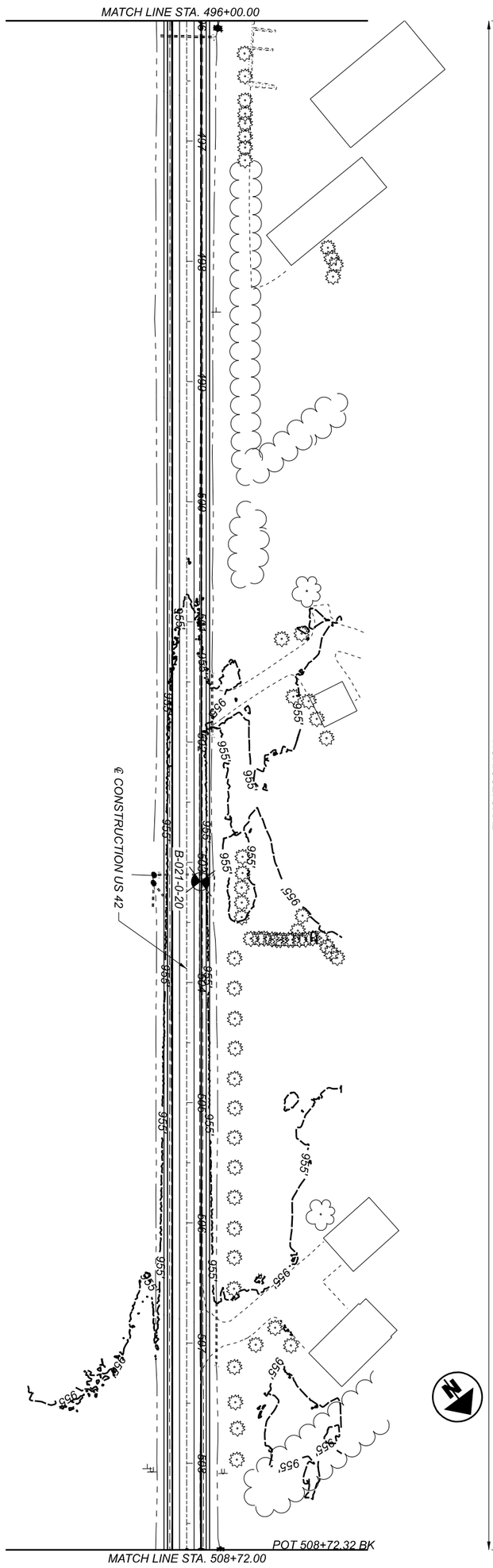


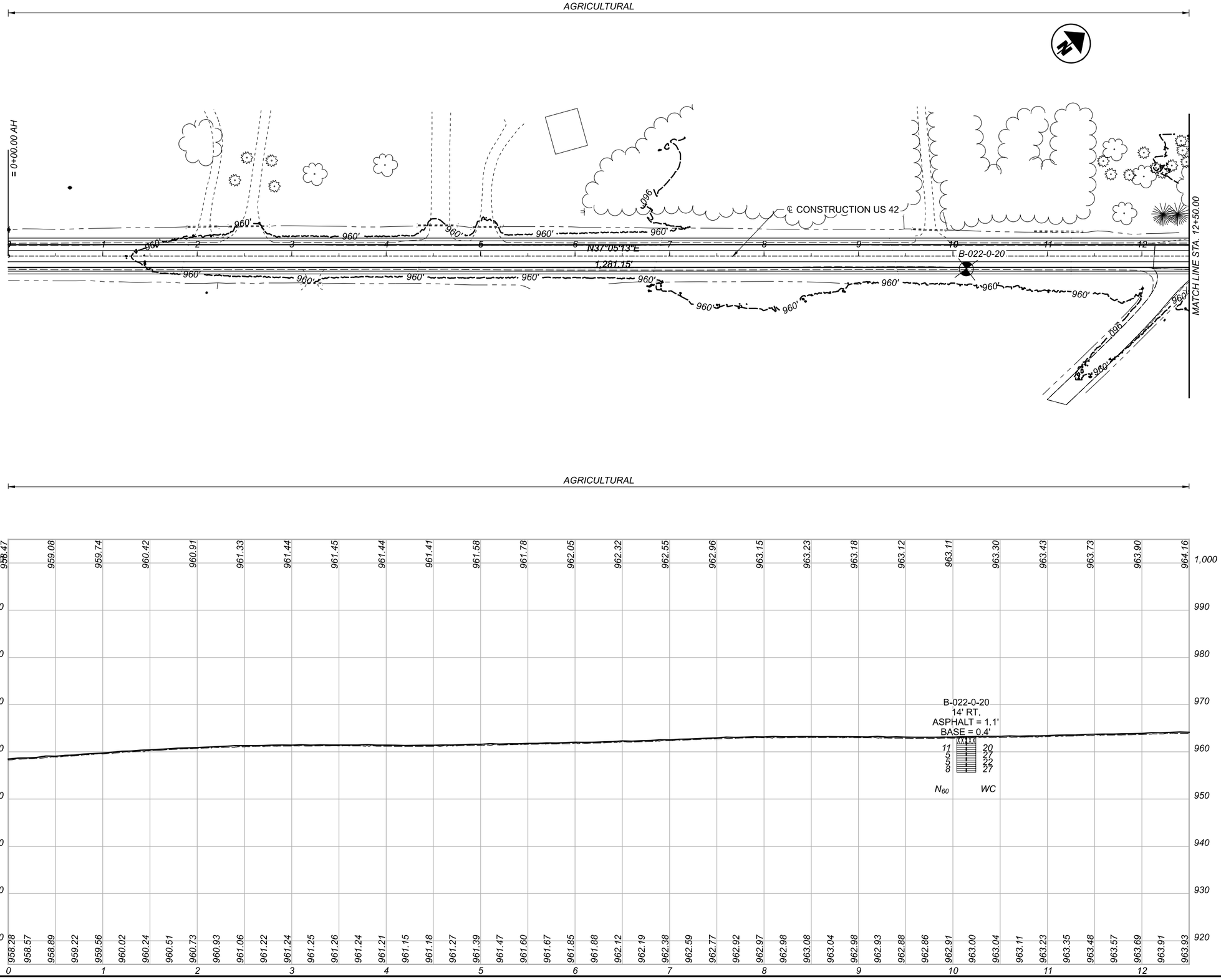


SOIL PROFILE
STA. 496+00 TO STA. 508+72 US 42

HORIZONTAL SCALE IN FEET
0 50
25 100

DESIGN AGENCY
EAS
2800 CORPORATE EXCHANGE DR. SUITE 240 COLUMBUS, OH. 43231 TEL:614.714.0299 WWW.NEASINC.COM

DESIGNER AI
REVIEWER BPA 05-24-21
PROJECT ID 111381
SUBSET 27 TOTAL 37
SHEET 1 TOTAL



HORIZONTAL SCALE IN FEET
0 25 50 100

SOIL PROFILE
STA. 0+00 TO STA. 12+50 US 42

UNI_DEL-42-4.29_0.00

MODEL: III38LIP073 PAPERSIZE: 17x11 (in.) DATE: 5/24/2021 TIME: 4:07:47 PM USER: akhall
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DESIGN AGENCY
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National Engineering & Architectural Services Inc.
2800 CORPORATE EXCHANGE DR, SUITE 240
COLUMBUS, OH, 43231
TEL:614.714.0299
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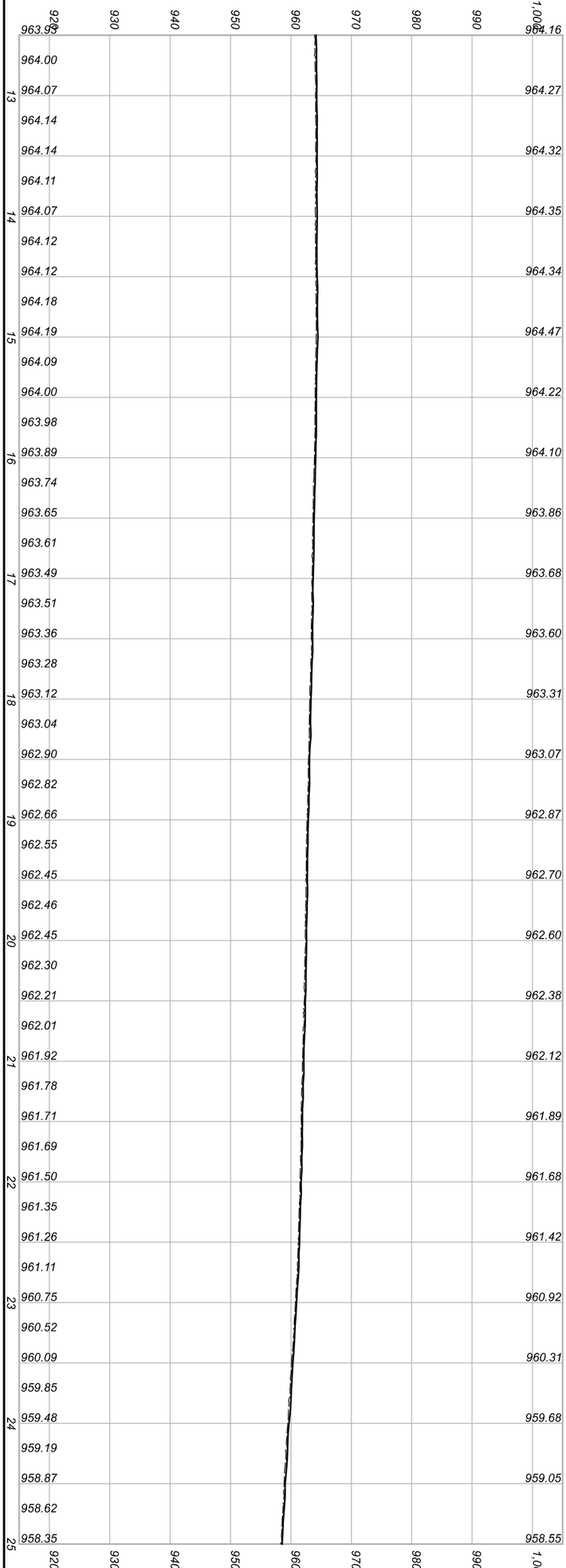
DESIGNER
AI

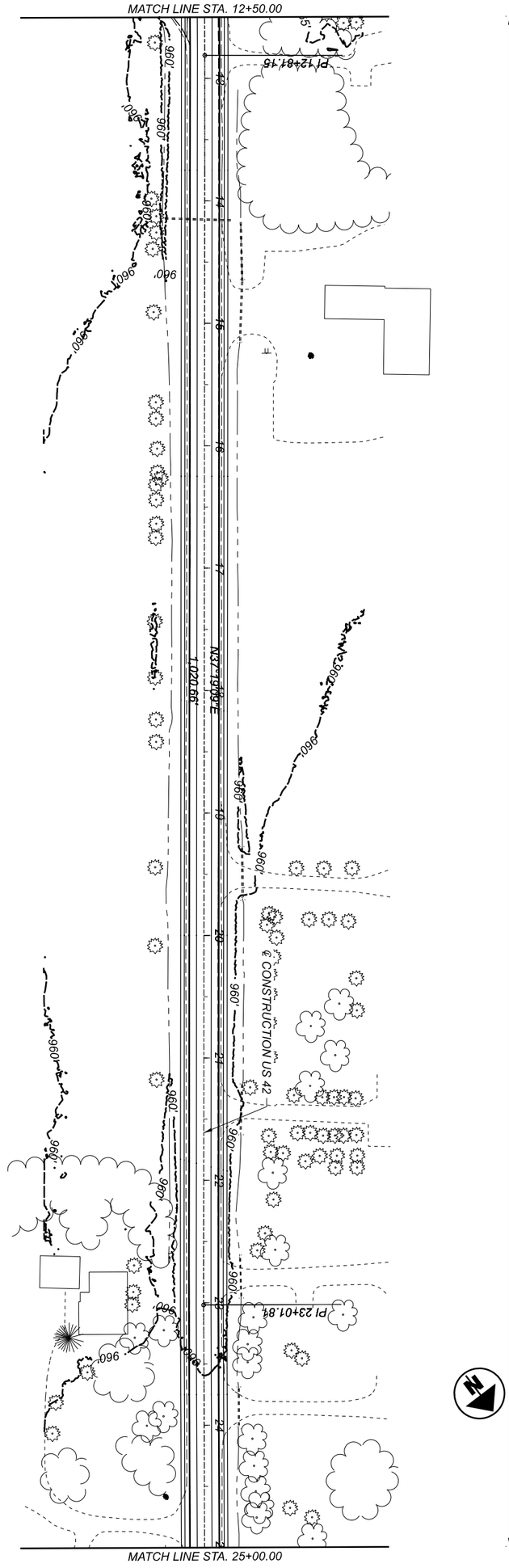
REVIEWER
BPA 05-24-21

PROJECT ID
111381

SUBSET	TOTAL
28	37

SHEET	TOTAL

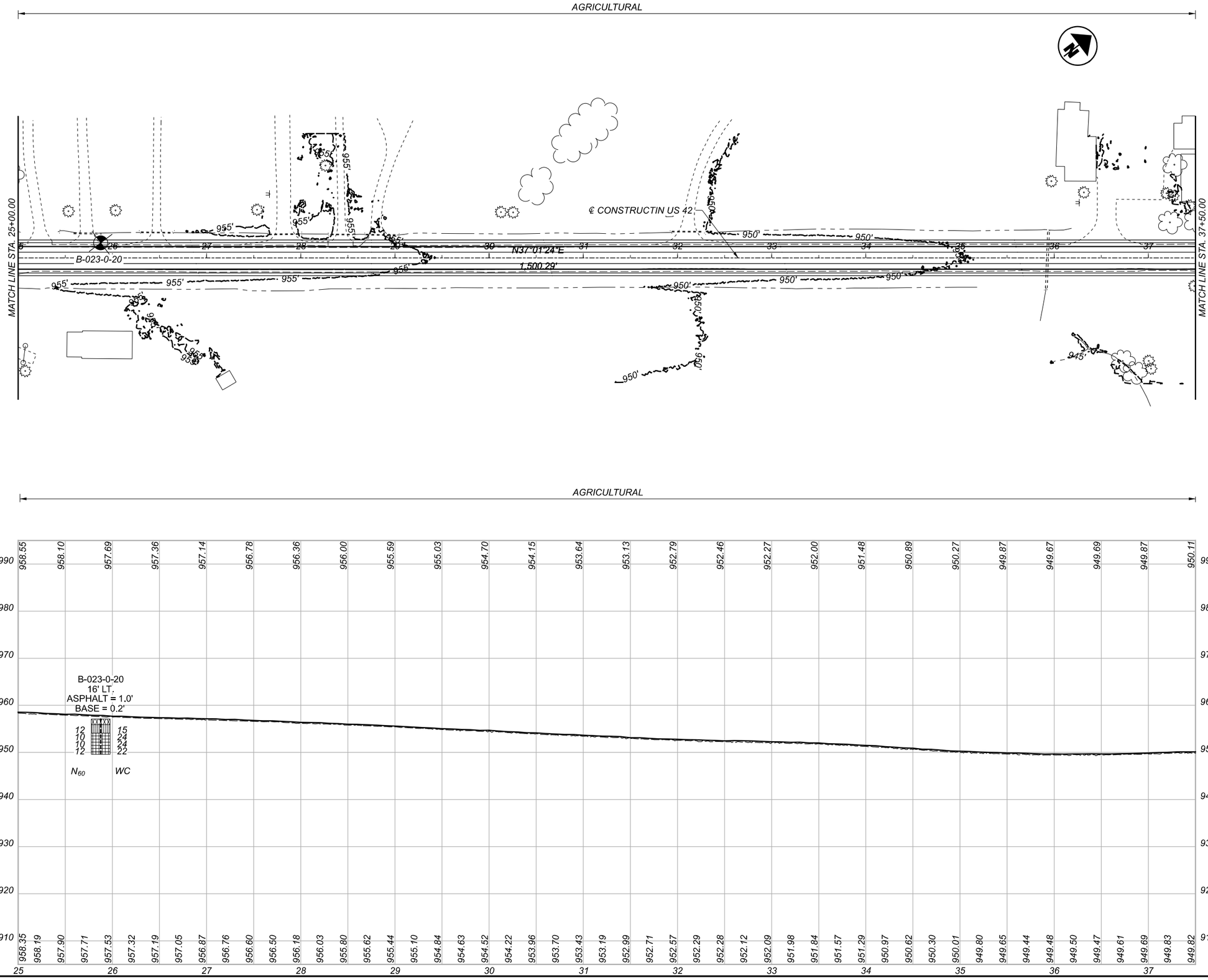




DESIGN AGENCY	2800 CORPORATE EXCHANGE DR. SUITE 240 COLUMBUS, OH. 43231 TEL:614.714.0299 WWW.NEASINC.COM		
DESIGNER	AI		
REVIEWER	BPA 05-24-21		
PROJECT ID	111381		
SUBSET	29	TOTAL	37
SHEET	1	TOTAL	

SOIL PROFILE
STA. 12+50 TO STA. 25+00 US 42

HORIZONTAL SCALE IN FEET
0 50
25 100



HORIZONTAL SCALE IN FEET
0 25 50 100

SOIL PROFILE
STA. 25+00 TO STA. 37+50 US 42

UNI_DEL-42-4.29_0.00

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DESIGN AGENCY
NEAS
National Engineering & Architectural Services Inc.
2800 CORPORATE EXCHANGE DR, SUITE 240
COLUMBUS, OH, 43231
TEL:614.714.0299
WWW.NEASINC.COM

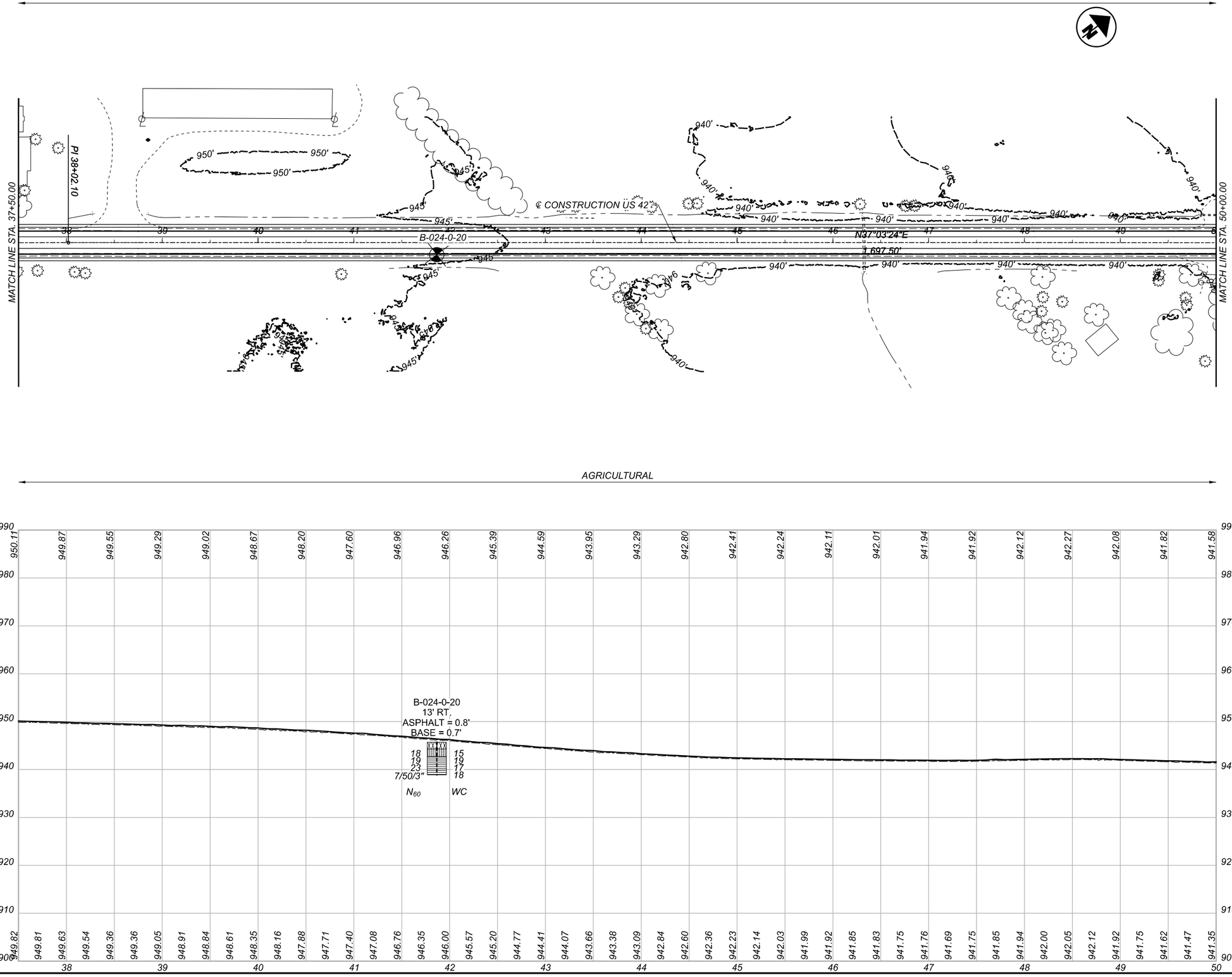
DESIGNER
AI

REVIEWER
BPA 05-24-21

PROJECT ID
111381

SUBSET 30 | TOTAL 37

SHEET | TOTAL



HORIZONTAL SCALE IN FEET
0 25 50 100

SOIL PROFILE
STA. 37+50 TO STA. 50+00 US 42

UNI_DEL-42-4.29_0.00

MODEL: III38I_JP076 PAPERSIZE: 17x11 (in.) DATE: 5/24/2021 TIME: 4:08:20 PM USER: akholl
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DESIGN AGENCY
NEAS
National Engineering & Architectural Services Inc.
2800 CORPORATE EXCHANGE DR, SUITE 240
COLUMBUS, OH, 43231
TEL:614.714.0299
WWW.NEASINC.COM

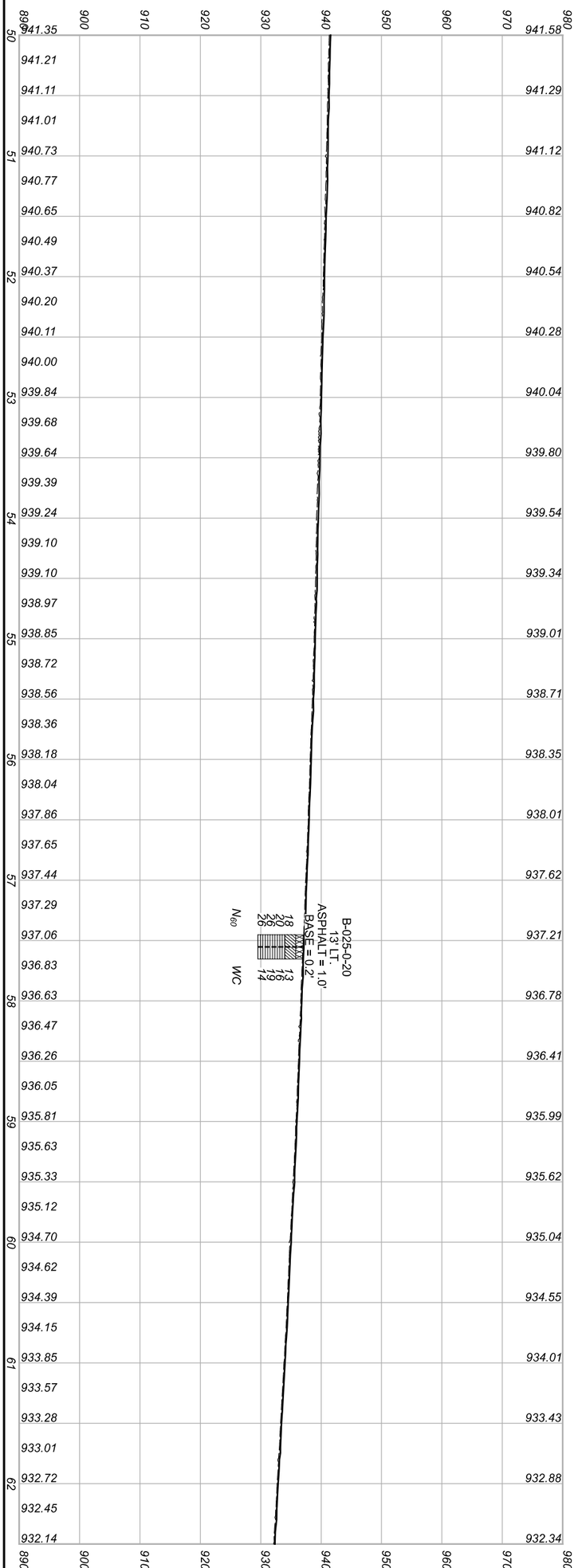
DESIGNER
AI

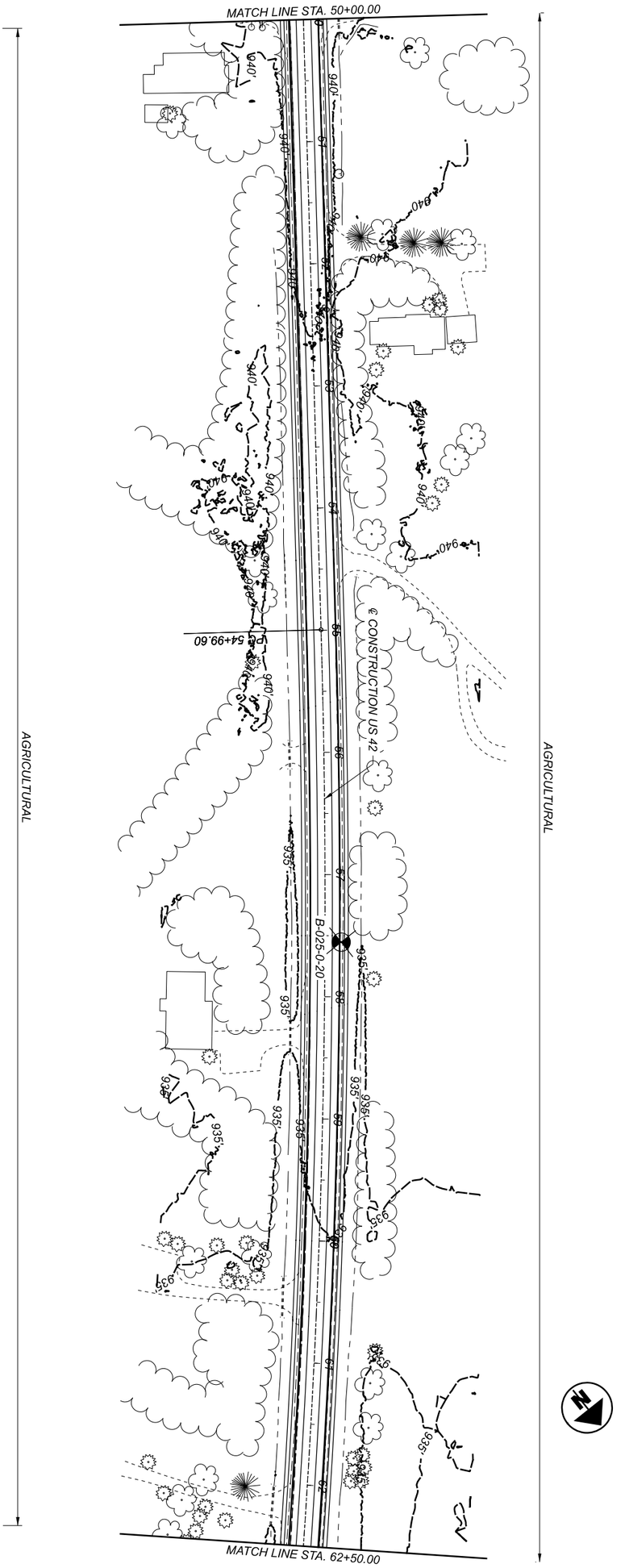
REVIEWER
BPA 05-24-21

PROJECT ID
111381

SUBSET 31 | TOTAL 37

SHEET | TOTAL



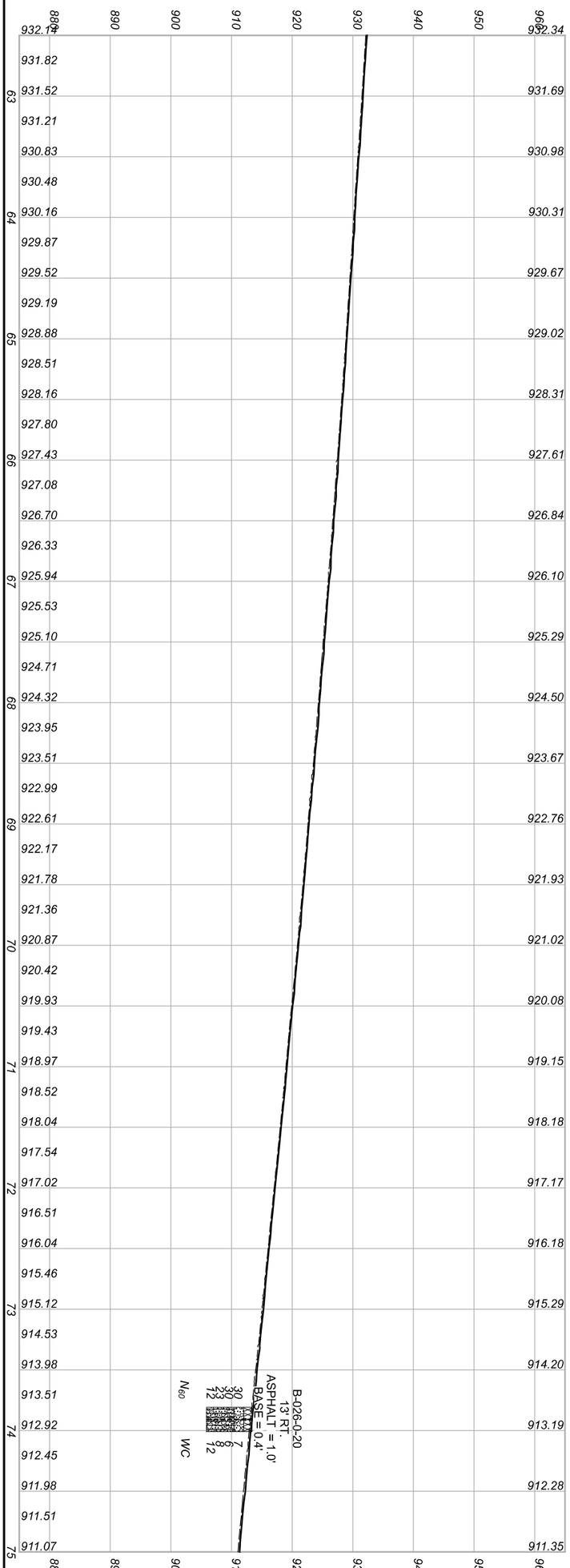


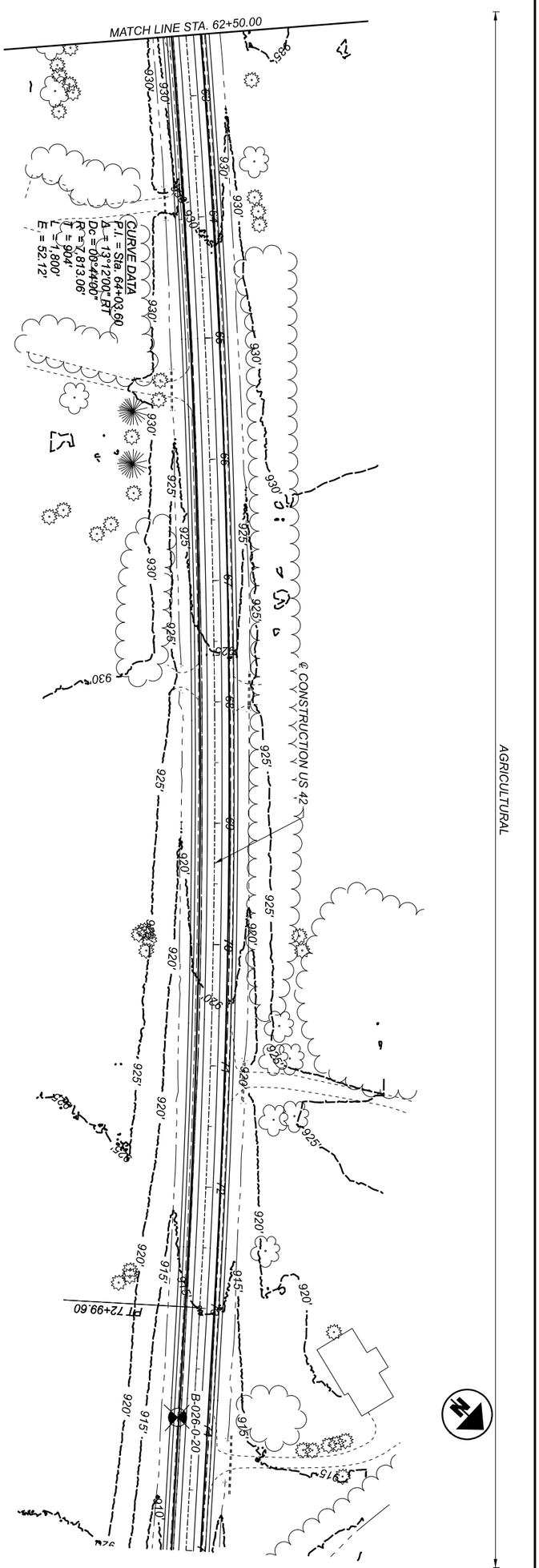
SOIL PROFILE
STA. 50+00 TO STA. 62+50 US 42

HORIZONTAL SCALE IN FEET
0 50
25 100

DESIGN AGENCY
2800 CORPORATE EXCHANGE DR. SUITE 240
COLUMBUS, OH. 43231
TEL:614.714.0299
WWW.NEASINC.COM

DESIGNER AI
REVIEWER BPA 05-24-21
PROJECT ID 111381
SUBSET 32 TOTAL 37
SHEET 1 TOTAL





DESIGN AGENCY
2800 CORPORATE EXCHANGE DR. SUITE 240
COLUMBUS, OH. 43231
TEL:614.714.0299
WWW.NEASINC.COM

DESIGNER AI

REVIEWER BPA 05-24-21

PROJECT ID 111381

SUBSET 33 TOTAL 37

SHEET 1 TOTAL

SOIL PROFILE
STA. 62+50 TO STA. 75+00 US 42

HORIZONTAL SCALE IN FEET
0 50
25 100

APPENDIX B

SOIL BORING LOGS & LABORATORY TEST RESULTS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:29 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 251+47, 13' RT.	EXPLORATION ID B-001-0-20
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 1002.6 (MSL) EOB: 25.0 ft.	PAGE 1 OF 1
START: 12/4/20 END: 12/4/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.165714, -83.226744	

MATERIAL DESCRIPTION AND NOTES	ELEV. 1002.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10.0" ASPHALT AND 6.0" CONCRETE (DRILLERS DESCRIPTION)	1001.3																	
VERY STIFF, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	999.6	1	5 3 3	8	56	SS-1	4.00	6	7	11	47	29	35	20	15	19	A-6a (10)	
VERY STIFF, BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	998.1	2	4 4 5	12	56	SS-2	3.50	9	6	12	45	28	37	21	16	20	A-6b (10)	
VERY STIFF TO HARD, BROWN AND GRAY, **CLAY**, "AND" SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, MOIST TO DAMP	992.1	3	4 5 6	15	67	SS-3	4.50	-	-	-	-	-	-	-	-	23	A-7-6 (V)	
		4	4 6 6	16	67	SS-4	3.75	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
		5																
		6																
		7																
		8																
		9	4 7 9	22	61	SS-5	4.50	2	4	10	41	43	43	21	22	20	A-7-6 (13)	
HARD, GRAYISH BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		10																
		11	5 7 10	23	78	SS-6	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
		12																
		13																
		14	5 6 8	19	67	SS-7	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
		15																
		16																
		17	6 8 9	23	67	SS-8	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
		18																
		19	6 7 10	23	78	SS-9	4.50	2	5	9	42	42	31	18	13	16	A-6a (9)	
		20																
		21																
		22	5 7 11	25	78	SS-10	4.50	-	-	-	-	-	-	-	-	17	A-6a (V)	
		23																
		24	6 7 11	25	78	SS-11	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
	977.6	EOB 25																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 252+08, 15' LT.	EXPLORATION ID B-002-0-20
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 1002.2 (MSL) EOB: 25.0 ft.	PAGE 1 OF 1
START: 12/7/20 END: 12/7/20	SAMPLING METHOD: SPT / ST	ENERGY RATIO (%): 81.7	LAT / LONG: 40.165893, -83.226688	

MATERIAL DESCRIPTION AND NOTES	ELEV. 1002.2	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10.0" ASPHALT AND 4.0" CONCRETE (DRILLERS DESCRIPTION)	1001.0																	
MEDIUM DENSE, BROWN AND GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, CONTAINS CONCRETE FRAGMENTS, DAMP **(FILL)**	999.2	1	37 6 7	18	11	SS-1	-	-	-	-	-	-	-	-	-	6	A-2-4 (V)	
VERY STIFF, BROWN, **SILT AND CLAY**, SOME SAND, LITTLE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	997.7	2	4 5 5	14	56	SS-2	4.00	14	12	14	38	22	35	21	14	16	A-6a (7)	
VERY STIFF TO HARD, BROWN, **CLAY**, "AND" SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP	994.7	3	2 3 6	12	61	SS-3	4.50	1	4	9	36	50	59	29	30	28	A-7-6 (20)	
		4	4 5 5	14	56	SS-4	3.50	-	-	-	-	-	-	-	-	26	A-7-6 (V)	
VERY STIFF TO HARD, BROWN AND BROWNISH GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, MOIST TO DAMP @9.0' TO 9.5'; Qu = 8417 PSF @ 6.0%		5																
		6																
		7																
		8																
		9			88	ST-1	4.25	4	5	8	38	45	37	19	18	18	A-6b (11)	
		10																
		11	10 11 10	29	28	SS-5	2.50	-	-	-	-	-	-	-	-	26	A-6b (V)	
		12																
		13																
		14	3 10 12	30	22	SS-6	3.25	-	-	-	-	-	-	-	-	31	A-6b (V)	
		15																
		16																
		17	8 9 9	25	33	SS-7	4.50	4	4	8	38	46	36	19	17	15	A-6b (11)	
		18																
		19	13 15 10	34	33	SS-8	4.50	-	-	-	-	-	-	-	-	16	A-6b (V)	
		20																
@21.0'; SS-9 CONTAINS NO RECOVERY		21																
		22	10 11 10	29	0	SS-9	-	-	-	-	-	-	-	-	-	-		
		23																
		24																
	977.2	EOB 25	14 15 12	37	28	SS-10	4.50	-	-	-	-	-	-	-	-	16	A-6b (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

5710 Westbourne Avenue
Columbus, OH 43213
614-892-0162

Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

(Project: UNI/DEL-42-4.92/0.00, Boring Location: B-002-0-20, ST-1, Depth: 9.0 - 9.5ft)

Tested Date: 2/15/2021

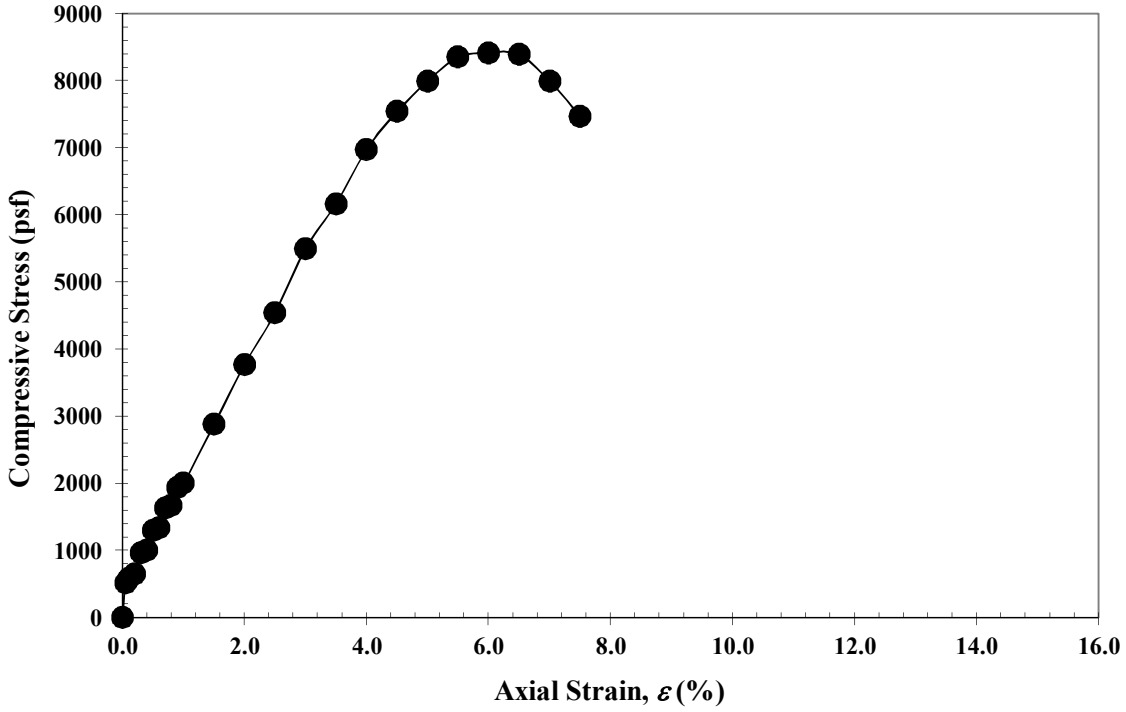
Specimen Properties

Average Dia., D_{avg} (in):	2.85
Average Height, H_{avg} (in):	5.75
Area, A (in^2):	6.40
Volume, V (in^3):	36.78
Wet Mass of Specimen (lb):	2.9
Moisture Content (%):	18.1
Dry Mass of Specimen (lb):	2.4
Wet Unit Weight, γ (lb/ft^3):	134.3
Dry Unit Weight, γ_d (lb/ft^3):	113.7

Final Specimen Figure

Results

Unconfined Compressive Strength (psf):	**8417**
Strain (%):	**6.0**



Notes: Hard, brown mottled with orangish brown and gray, SILTY CLAY, little sand, trace gravel, damp. Specimen contains gravel >1/6 of the specimen diameter, results shown may differ from the results of a specimen which meets the maximum particle size allowance of ASTM D2166

PROJECT: UNI/DEL-42-4.92/0.00
TYPE: SUBGRADE
PID: 111381 SFN:
START: 12/4/20 END: 12/4/20

DRILLING FIRM / OPERATOR: NEAS / R. WEBB
SAMPLING FIRM / LOGGER: NEAS / R. WEBB
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 12/5/19
ENERGY RATIO (%): 81.7

STATION / OFFSET: 268+08, 14' RT.
ALIGNMENT: US-42
ELEVATION: 996.3 (MSL) EOB: 7.5 ft.
LAT / LONG: 40.169332, -83.223125

EXPLORATION ID B-003-0-20

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10.0" ASPHALT (DRILLERS DESCRIPTION)	996.3 995.5																	
VERY STIFF TO HARD, BROWN AND GRAY, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST TO DAMP		1 2 3 4 5 6 7	3 4 3	10	33	SS-1	2.75	6	9	10	33	42	43	19	24	20	A-7-6 (14)	
			4 5 6	15	33	SS-2	4.50	5	6	10	32	47	41	20	21	23	A-7-6 (13)	
			3 4 5	12	44	SS-3	4.25	-	-	-	-	-	-	-	-	29	A-7-6 (V)	
	988.8	EOB	3 6 7	18	72	SS-4	4.50	-	-	-	-	-	-	-	-	16	A-7-6 (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 270+20, 16' LT.	EXPLORATION ID B-004-0-20
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 994.8 (MSL) EOB: 25.0 ft.	PAGE 1 OF 1
START: 12/7/20 END: 12/7/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.169842, -83.222750	

MATERIAL DESCRIPTION AND NOTES	ELEV. 994.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10.0" ASPHALT AND 4.0" CONCRETE (DRILLERS DESCRIPTION)	993.6																	
LOOSE, BROWN AND GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, LITTLE CLAY, SS-1 CONTAINS IRON STAINING, DAMP	990.3		3 3 3	8	22	SS-1	-	35	16	14	24	11	30	20	10	11	A-2-4 (0)	
			2 3 4	10	17	SS-2	-	-	-	-	-	-	-	-	-	12	A-2-4 (V)	
VERY STIFF, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, SOME SAND, SOME SILT, TRACE TO LITTLE GRAVEL, CONTAINS IRON STAINING, DAMP TO MOIST	986.8		3 4 5	12	44	SS-3	4.00	10	16	15	29	30	43	21	22	19	A-7-6 (10)	
			3 4 5	12	39	SS-4	3.00	-	-	-	-	-	-	-	-	27	A-7-6 (V)	
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE TO LITTLE GRAVEL, CONTAINS IRON STAINING, DAMP TO MOIST			3 5 7	16	39	SS-5	4.50	-	-	-	-	-	-	-	-	17	A-6a (V)	
			4 4 6	14	28	SS-6	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
			7 8 10	25	44	SS-7	4.50	-	-	-	-	-	-	-	-	18	A-6a (V)	
			7 10 12	30	39	SS-8	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
			6 8 12	27	39	SS-9	3.50	-	-	-	-	-	-	-	-	17	A-6a (V)	
			8 10 12	30	44	SS-10	3.50	7	5	9	43	36	28	17	11	17	A-6a (8)	
	969.8	EOB	7 10 10	27	39	SS-11	4.00	-	-	-	-	-	-	-	-	16	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:29 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 286+04, 14' RT.	EXPLORATION ID B-005-0-20
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 994.1 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 12/4/20 END: 12/4/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.173253, -83.219232	

MATERIAL DESCRIPTION AND NOTES	ELEV. 994.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10.0" ASPHALT AND 6.0" CONCRETE (DRILLERS DESCRIPTION)	992.8																	
HARD, BROWN MOTTLED WITH GRAY, **CLAY**, SOME SILT, SOME SAND, TRACE TO LITTLE GRAVEL, DAMP	989.6	1	3 5 4	12	17	SS-1	4.25	11	10	12	29	38	45	22	23	17	A-7-6 (12)	
		2	5 3 4	10	17	SS-2	4.50	-	-	-	-	-	-	-	-	17	A-7-6 (V)	
HARD, BROWN MOTTLED WITH GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP	986.6	3	4 4 4	11	33	SS-3	4.50	-	-	-	-	-	-	-	-	13	A-6b (V)	
		4 EOB	4 4 4	11	56	SS-4	4.50	5	6	10	37	42	36	19	17	16	A-6b (11)	
		5																
		6																
		7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00
TYPE: SUBGRADE
PID: 111381 SFN:
START: 12/4/20 END: 12/4/20

DRILLING FIRM / OPERATOR: NEAS / R. WEBB
SAMPLING FIRM / LOGGER: NEAS / R. WEBB
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 12/5/19
ENERGY RATIO (%): 81.7

STATION / OFFSET: 302+09, 13' RT.
ALIGNMENT: US-42
ELEVATION: 983.8 (MSL) EOB: 7.5 ft.
LAT / LONG: 40.176766, -83.215769

EXPLORATION ID B-006-0-20

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10.0" ASPHALT AND 4.0" CONCRETE (DRILLERS DESCRIPTION)	983.8																	
	982.6	1																
VERY STIFF TO HARD, BROWN AND GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		2	3 3 3	8	56	SS-1	3.75	2	5	12	47	34	29	18	11	18	A-6a (8)	
		3	2 4 5	12	50	SS-2	4.50	6	7	11	39	37	31	17	14	15	A-6a (10)	
		4	4 6 6	16	56	SS-3	4.50	-	-	-	-	-	-	-	-	16	A-6a (V)	
		5	4 6 8	19	72	SS-4	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
	976.3	6																
		EOB 7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00
TYPE: SUBGRADE
PID: 111381 SFN:
START: 11/6/20 END: 11/6/20

DRILLING FIRM / OPERATOR: NEAS / R. WEBB
SAMPLING FIRM / LOGGER: NEAS / R. WEBB
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 55T
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 12/5/19
ENERGY RATIO (%): 68.4

STATION / OFFSET: 317+82, 11' RT.
ALIGNMENT: US-42
ELEVATION: 972.3 (MSL) EOB: 7.5 ft.
LAT / LONG: 40.180220, -83.212385

EXPLORATION ID B-007-0-20

MATERIAL DESCRIPTION AND NOTES	ELEV. 972.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	970.8	1																
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, SOME TO "AND" SILT, TRACE TO LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, SS-1 CONTAINS ASPHALT FRAGMENTS, DAMP TO MOIST		2	7 4 4	9	28	SS-1	3.25	6	7	6	30	51	58	20	38	21	A-7-6 (20)	
		3	5 7 7	16	39	SS-2	4.50	1	2	3	36	58	46	22	24	21	A-7-6 (15)	
		4	5 6 7	15	39	SS-3	3.75	-	-	-	-	-	-	-	-	20	A-7-6 (V)	
		5	7 8 6	16	56	SS-4	4.50	-	-	-	-	-	-	-	-	20	A-7-6 (V)	
	964.8	6 EOB																
		7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 1.5'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 55T	STATION / OFFSET: 332+68, 15' LT.	EXPLORATION ID B-008-0-20
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 976.6 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 11/6/20 END: 11/6/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 68.4	LAT / LONG: 40.183544, -83.209305	

MATERIAL DESCRIPTION AND NOTES	ELEV. 976.6	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	975.1	1																
MEDIUM DENSE TO DENSE, BROWN, **GRAVEL**, SOME SAND, LITTLE SILT, TRACE CLAY, DAMP	972.7	2	18 11 5	18	28	SS-1	-	57	18	10	12	3	NP	NP	NP	5	A-1-a (0)	
		3	7 5 6	13	44	SS-2A	-	-	-	-	-	-	-	-	-	13	A-1-a (V)	
		4				SS-2B	2.25	-	-	-	-	-	-	-	-	22	A-6a (V)	
VERY STIFF, GRAY BECOMING BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP TO MOIST		5	4 4 4	9	39	SS-3	2.50	7	8	11	45	29	29	18	11	17	A-6a (8)	
	969.1	6	3 4 4	9	39	SS-4	2.75	-	-	-	-	-	-	-	-	25	A-6a (V)	
		7 EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 1.5'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00
TYPE: SUBGRADE
PID: 111381 SFN:
START: 12/3/20 END: 12/3/20

DRILLING FIRM / OPERATOR: NEAS / R. WEBB
SAMPLING FIRM / LOGGER: NEAS / R. WEBB
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 12/5/19
ENERGY RATIO (%): 81.7

STATION / OFFSET: 349+58, 12' RT.
ALIGNMENT: US-42
ELEVATION: 974.7 (MSL) EOB: 7.5 ft.
LAT / LONG: 40.187236, -83.205641

EXPLORATION ID B-009-0-20

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
	974.7																	
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	973.2																	
VERY STIFF TO HARD, BROWN BECOMING BROWN WITH TRACE GRAY AND ORANGISH BROWN MOTTLES, **SILTY CLAY**, SOME SAND, TRACE TO LITTLE GRAVEL, CONTAINS IRON STAINING, DAMP		1	3 2 3	7	39	SS-1	3.75	14	14	12	34	26	38	21	17	16	A-6b (8)	
		2	3 3 3	8	39	SS-2	4.50	-	-	-	-	-	-	-	-	18	A-6b (V)	
		3	3 3 3	8	44	SS-3	3.25	9	12	11	34	34	36	19	17	17	A-6b (9)	
		4	3 4 5	12	33	SS-4	3.50	-	-	-	-	-	-	-	-	18	A-6b (V)	
	967.2	5 EOB																
		6																
		7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:29 - X:\ACTIVE PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 358+15, 17' RT.	EXPLORATION ID B-010-0-20
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 972.4 (MSL) EOB: 25.0 ft.	PAGE 1 OF 1
START: 12/3/20 END: 12/3/20	SAMPLING METHOD: SPT / ST	ENERGY RATIO (%): 81.7	LAT / LONG: 40.189122, -83.203808	

MATERIAL DESCRIPTION AND NOTES	ELEV. 972.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10.0" ASPHALT, 4.5" CONCRETE, AND 3.5" BASE (DRILLERS DESCRIPTION)	970.9	1																
LOOSE, BROWN AND GRAY, **STONE FRAGMENTS WITH SAND, SILT, AND CLAY**, CONTAINS CONCRETE FRAGMENTS, DAMP **(FILL)**	969.4	2	10 3 3	8	22	SS-1	-	47	14	11	17	11	33	20	13	8	A-2-6 (0)	
		3	3 3 4	10	22	SS-2	4.50	-	-	-	-	-	-	-	-	21	A-7-6 (V)	
STIFF TO HARD, DARK BROWN AND BLACK, **CLAY**, LITTLE TO "AND" SAND, TRACE TO "AND" SILT, TRACE GRAVEL, SLIGHTLY ORGANIC, DAMP TO MOIST		4																
		5	3 3 4	10	56	SS-3	4.25	2	5	9	36	48	58	27	31	29	A-7-6 (20)	
		6																
		7	2 2 4	8	33	SS-4	3.00	-	-	-	-	-	-	-	-	28	A-7-6 (V)	
		8																
@8.7' TO 9.2'; Qu = 1273 PSF @ 0.9%		9			100	ST-1	1.50	0	29	7	10	54	58	23	35	26	A-7-6 (16)	
	961.9	10																
HARD, BROWN BECOMING GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, MOIST TO DAMP		11																
		12	7 8 10	25	78	SS-5	4.50	-	-	-	-	-	-	-	-	21	A-6b (V)	
		13																
		14	5 8 9	23	67	SS-6	4.50	2	4	9	39	46	37	20	17	18	A-6b (11)	
		15																
		16																
		17	8 9 11	27	67	SS-7	4.50	-	-	-	-	-	-	-	-	13	A-6b (V)	
		18																
		19	11 11 12	31	67	SS-8A	4.50	-	-	-	-	-	-	-	-	13	A-6b (V)	
	952.6	20				SS-8B	-	-	-	-	-	-	-	-	-	4	A-1-b (V)	
DENSE, GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND**, LITTLE SILT, TRACE CLAY, DAMP	950.9	21				SS-9A	-	-	-	-	-	-	-	-	-	4	A-1-b (V)	
		22	10 11 13	33	67	SS-9B	4.50	-	-	-	-	-	-	-	-	13	A-6b (V)	
HARD, GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP		23																
		24	11 12 14	35	67	SS-10	4.50	-	-	-	-	-	-	-	-	13	A-6b (V)	
	947.4	EOB 25																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

5710 Westbourne Avenue
Columbus, OH 43213
614-892-0162

Unconfined Compressive Strength of Cohesive Soil (ASTM D2166)

(Project: UNI/DEL-42-4.92/0.00, Boring Location: B-010-0-20, ST-1, Depth: 8.7 - 9.2ft)

Tested Date: 2/15/2021

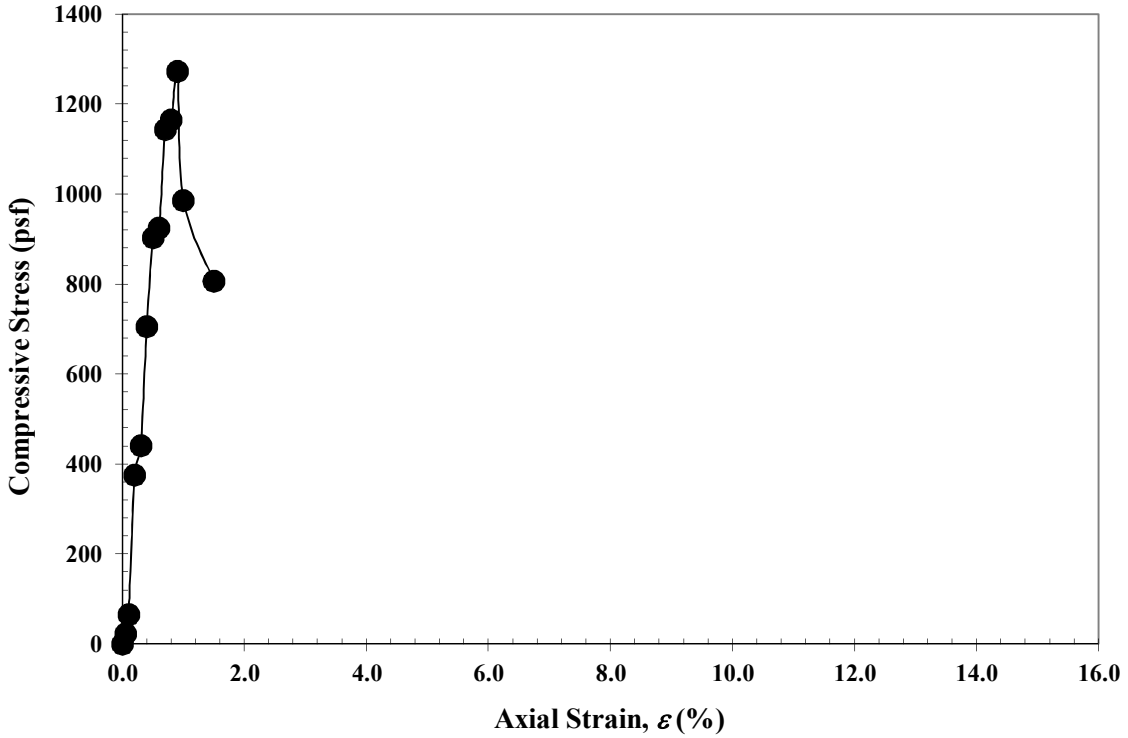
Specimen Properties

Average Dia., D_{avg} (in):	2.88
Average Height, H_{avg} (in):	5.76
Area, A (in^2):	6.50
Volume, V (in^3):	37.45
Wet Mass of Specimen (lb):	2.7
Moisture Content (%):	25.7
Dry Mass of Specimen (lb):	2.1
Wet Unit Weight, γ (lb/ft^3):	124.5
Dry Unit Weight, γ_d (lb/ft^3):	99.1

Final Specimen Figure

Results

Unconfined Compressive Strength (psf):	**1273**
Strain (%):	**0.9**



Notes: Medium stiff, brownish gray mottled with orangish brown, CLAY, "and" sand, trace silt, trace gravel, moist. Specimen contained slickensides after testing

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 358+42, 14' LT.	EXPLORATION ID B-011-0-20
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 972.9 (MSL) EOB: 25.0 ft.	PAGE 1 OF 1
START: 11/5/20 END: 11/5/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.189230, -83.203838	

MATERIAL DESCRIPTION AND NOTES	ELEV. 972.9	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
12.0" ASPHALT AND 6.0" BASE (DRILLERS DESCRIPTION)	971.4																	
VERY STIFF TO HARD, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, SOME TO "AND" SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, SS-2 CONTAINS NO INTACT SOIL FOR HP READINGS, DAMP TO MOIST			3 3 4	10	28	SS-1	3.50	0	5	10	40	45	53	22	31	25	A-7-6 (19)	
			2 3 2	7	11	SS-2	-	-	-	-	-	-	-	-	-	12	A-7-6 (V)	
			3 4 5	12	33	SS-3	2.75	3	6	11	35	45	53	21	32	24	A-7-6 (19)	
			4 5 5	14	56	SS-4	3.00	-	-	-	-	-	-	-	-	22	A-7-6 (V)	
	962.4																	
HARD, BROWNISH GRAY AND GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP			5 6 7	18	67	SS-5	4.25	-	-	-	-	-	-	-	-	23	A-7-6 (V)	
			5 12 15	37	44	SS-6	4.50	1	4	8	43	44	36	19	17	16	A-6b (11)	
			5 14 14	38	56	SS-7	4.50	-	-	-	-	-	-	-	-	15	A-6b (V)	
	954.9																	
HARD, GRAY, **SILT AND CLAY**, LITTLE SAND, LITTLE GRAVEL, DAMP			4 8 11	26	67	SS-8	4.50	-	-	-	-	-	-	-	-	16	A-6b (V)	
	952.4																	
MEDIUM DENSE TO DENSE, GRAY, **COARSE AND FINE SAND**, SOME GRAVEL, LITTLE SILT, TRACE CLAY, DAMP			8 8 9	23	44	SS-9	4.50	14	8	11	33	34	31	17	14	13	A-6a (8)	
			10 10 11	29	44	SS-10	-	-	-	-	-	-	-	-	-	6	A-3a (V)	
	947.9																	
		EOB	9 13 14	37	67	SS-11	-	-	-	-	-	-	-	-	-	9	A-3a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 13.0'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00
TYPE: SUBGRADE
PID: 111381 SFN:
START: 11/18/20 END: 11/18/20

DRILLING FIRM / OPERATOR: NEAS / R. WEBB
SAMPLING FIRM / LOGGER: NEAS / R. WEBB
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 12/5/19
ENERGY RATIO (%): 81.7

STATION / OFFSET: 374+40, 19' LT.
ALIGNMENT: US-42
ELEVATION: 967.3 (MSL) EOB: 7.5 ft.
LAT / LONG: 40.192770, -83.200461

EXPLORATION ID B-012-0-20

MATERIAL DESCRIPTION AND NOTES	ELEV. 967.3	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10.0" ASPHALT AND 4.0" CONCRETE AND 4.5" BASE (DRILLERS DESCRIPTION)	965.8	1																
VERY STIFF, DARK BROWNISH GRAY, **CLAY**, SOME TO "AND" SILT, TRACE TO LITTLE SAND, TRACE TO SOME GRAVEL, DAMP TO MOIST		2	4 4 5	12	28	SS-1	3.75	21	6	7	29	37	47	22	25	19	A-7-6 (13)	
		3	4 4 3	10	33	SS-2	3.50	2	2	7	41	48	51	24	27	25	A-7-6 (17)	
		4 5	3 5 5	14	39	SS-3	2.50	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
	959.8	6 7 EOB	3 6 6	16	44	SS-4	2.75	-	-	-	-	-	-	-	-	26	A-7-6 (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:29 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 391+21, 14' LT.	EXPLORATION ID B-013-0-20
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 965.7 (MSL) EOB: 25.0 ft.	PAGE 1 OF 1
START: 11/4/20 END: 11/4/20	SAMPLING METHOD: SPT / ST	ENERGY RATIO (%): 81.7	LAT / LONG: 40.196477, -83.196876	

MATERIAL DESCRIPTION AND NOTES	ELEV. 965.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10.0" ASPHALT AND 3.0" BASE (DRILLERS DESCRIPTION)	964.6																	
LOOSE TO MEDIUM DENSE, BROWN AND DARK GRAY, **GRAVEL AND STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, MOIST	961.2		4 8 8	22	22	SS-1	-	-	-	-	-	-	-	-	-	22	A-2-4 (V)	
			3 2 3	7	17	SS-2	-	-	-	-	-	-	-	-	-	21	A-2-4 (V)	
STIFF TO VERY STIFF, DARK GRAY AND BROWN, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, MOIST	957.7		1 2 2	5	67	SS-3	2.00	4	5	7	34	50	57	21	36	29	A-7-6 (19)	
			1 2 4	8	56	SS-4	2.25	-	-	-	-	-	-	-	-	27	A-7-6 (V)	
VERY STIFF TO HARD, BROWNISH GRAY BECOMING GRAY, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, DAMP					96	ST-1	2.75	1	5	10	44	40	33	19	14	18	A-6a (10)	
			4 7 9	22	67	SS-5	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
			4 5 7	16	67	SS-6	3.75	2	6	11	40	41	33	18	15	18	A-6a (10)	
			6 6 7	18	56	SS-7	3.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
			8 8 14	30	67	SS-8	4.00	-	-	-	-	-	-	-	-	13	A-6a (V)	
			8 6 9	20	67	SS-9	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	
	940.7	EOB	7 8 8	22	78	SS-10	4.50	4	7	11	42	36	28	16	12	14	A-6a (9)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 13.0'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:29 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 391+42, 13' RT.	EXPLORATION ID B-014-0-20
TYPE: CULVERT	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 965.7 (MSL) EOB: 25.0 ft.	PAGE 1 OF 1
START: 11/4/20 END: 11/4/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.196479, -83.196755	

MATERIAL DESCRIPTION AND NOTES	ELEV. 965.7	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10.0" ASPHALT AND 3.0" CONCRETE (DRILLERS DESCRIPTION)	964.6																	
VERY STIFF TO HARD, DARK BROWN AND BLACK BECOMING BROWN MOTTLED WITH GRAY, **CLAY**, "AND" SILT, LITTLE SAND, TRACE GRAVEL, SS-1 THROUGH SS-3 ARE SLIGHTLY ORGANIC, MOIST TO DAMP			1 3 4	10	28	SS-1	3.25	5	5	9	37	44	52	23	29	25	A-7-6 (18)	
			3 3 3	8	39	SS-2	3.50	1	4	8	37	50	59	24	35	27	A-7-6 (20)	
			2 4 4	11	33	SS-3	3.25	-	-	-	-	-	-	-	-	26	A-7-6 (V)	
			4 4 5	12	56	SS-4	2.75	-	-	-	-	-	-	-	-	22	A-7-6 (V)	
			6 5 7	16	56	SS-5	4.25	-	-	-	-	-	-	-	-	15	A-7-6 (V)	
			6 7 9	22	78	SS-6	4.50	2	4	7	38	49	41	21	20	20	A-7-6 (12)	
			6 5 8	18	67	SS-7	4.50	-	-	-	-	-	-	-	-	21	A-7-6 (V)	
	950.2																	
HARD, BROWNISH GRAY, **SILT AND CLAY**, SOME SAND, TRACE TO LITTLE GRAVEL, MOIST TO DAMP			5 6 7	18	67	SS-8	4.50	-	-	-	-	-	-	-	-	17	A-6a (V)	
			7 7 10	23	78	SS-9	4.50	11	10	14	38	27	26	15	11	14	A-6a (6)	
			7 8 10	25	78	SS-10	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
	940.7	EOB	8 7 8	20	78	SS-11	4.25	-	-	-	-	-	-	-	-	15	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 14.0'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00
TYPE: SUBGRADE
PID: 111381 SFN:
START: 11/4/20 END: 11/4/20

DRILLING FIRM / OPERATOR: NEAS / R. WEBB
SAMPLING FIRM / LOGGER: NEAS / R. WEBB
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 12/5/19
ENERGY RATIO (%): 81.7

STATION / OFFSET: 407+39, 12' LT.
ALIGNMENT: US-42
ELEVATION: 972.0 (MSL) EOB: 7.5 ft.
LAT / LONG: 40.200051, -83.193436

EXPLORATION ID B-015-0-20

PAGE 1 OF 1

MATERIAL DESCRIPTION AND NOTES	ELEV. 972.0	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10" ASPHALT AND 5" BASE (DRILLERS DESCRIPTION)	970.8	1																
VERY STIFF TO HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, LITTLE GRAVEL, CONTAINS IRON STAINING, DAMP		2	6 4 5	12	67	SS-1	4.00	16	8	10	41	25	31	20	11	15	A-6a (7)	
		3	4 4 5	12	33	SS-2	4.25	-	-	-	-	-	-	-	-	15	A-6a (V)	
	966.0	4																
		5	3 3 4	10	28	SS-3	4.50	-	-	-	-	-	-	-	-	18	A-6a (V)	
STIFF TO VERY STIFF, BROWN, **SILTY CLAY**, SOME SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP	964.5	6	3 2 3	7	39	SS-4	2.00	8	11	10	36	35	40	20	20	18	A-6b (11)	
		EOB 7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 2.0'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 423+36, 15' RT.	EXPLORATION ID B-016-0-20
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 967.8 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 11/4/20 END: 11/4/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.203537, -83.189970	

MATERIAL DESCRIPTION AND NOTES	ELEV. 967.8	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10" ASPHALT AND 5" BASE (DRILLERS DESCRIPTION)	966.6	1																
STIFF TO VERY STIFF, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, "AND" SILT, TRACE TO LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST		2	3 4 4	11	56	SS-1	3.00	0	3	9	48	40	47	23	24	24	A-7-6 (15)	
		3	4 4 5	12	44	SS-2	2.75	-	-	-	-	-	-	-	-	26	A-7-6 (V)	
		4	3 4 5	12	61	SS-3	1.75	2	3	7	37	51	64	24	40	28	A-7-6 (20)	
		5	1 2 3	7	39	SS-4	2.25	-	-	-	-	-	-	-	-	26	A-7-6 (V)	
	960.3	6 EOB																
		7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 1.5'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:29 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 439+32, 12' LT.	EXPLORATION ID B-017-0-20
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 973.5 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 11/4/20 END: 11/4/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.207103, -83.186648	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
10" ASPHALT AND 5" BASE (DRILLERS DESCRIPTION)	973.5																	
	972.3	1																
VERY STIFF, BROWN, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP	970.5	2	3 5 6	15	44	SS-1	4.00	2	7	11	38	42	38	19	19	19	A-6b (12)	
HARD, BROWN, **SILT AND CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP		3	6 8 12	27	72	SS-2	4.50	4	7	12	41	36	32	19	13	15	A-6a (9)	
		4	7 10 14	33	67	SS-3	4.50	-	-	-	-	-	-	-	-	14	A-6a (V)	
	966.0	5	6 11 16	37	67	SS-4	4.50	-	-	-	-	-	-	-	-	15	A-6a (V)	
		6																
		EOB 7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 1.5'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00
TYPE: SUBGRADE
PID: 111381 SFN:
START: 11/4/20 END: 11/4/20

DRILLING FIRM / OPERATOR: NEAS / R. WEBB
SAMPLING FIRM / LOGGER: NEAS / R. WEBB
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 12/5/19
ENERGY RATIO (%): 81.7

STATION / OFFSET: 455+16, 15' RT.
ALIGNMENT: US-42
ELEVATION: 960.1 (MSL) EOB: 7.5 ft.
LAT / LONG: 40.210548, -83.183193

EXPLORATION ID B-018-0-20

MATERIAL DESCRIPTION AND NOTES	ELEV. 960.1	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
12" ASPHALT AND 2" BASE (DRILLERS DESCRIPTION)	958.9																	
VERY STIFF TO HARD, BROWN, **SILT AND CLAY**, SOME TO "AND" SAND, TRACE TO LITTLE GRAVEL, CONTAINS IRON STAINING, DAMP TO MOIST		1 2 3 4 5	2 4 5	12	33	SS-1	4.50	10	12	11	40	27	34	19	15	15	A-6a (8)	
			3 3 4	10	33	SS-2	4.25	20	23	14	27	16	33	18	15	10	A-6a (3)	
			3 4 3	10	28	SS-3	3.50	-	-	-	-	-	-	-	-	20	A-6a (V)	
@ 6.0' SS-4 BECOMES BROWN MOTTLED WITH GRAY AND ORANGISH BROWN	952.6	6 7 EOB	3 3 5	11	44	SS-4	4.50	-	-	-	-	-	-	-	-	17	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 2.0'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:30 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 471+27, 12' LT.	EXPLORATION ID B-019-0-20
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 954.5 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 10/28/20 END: 10/28/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.214141, -83.179824	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
9.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	954.5																	
	953.3	1																
VERY STIFF, GRAY AND BROWN, **SILTY CLAY**, LITTLE SAND, LITTLE GRAVEL, DAMP	951.5	2	5 3 3	8	44	SS-1	2.50	19	9	11	37	24	35	19	16	19	A-6b (8)	
VERY STIFF, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, "AND" SILT, TRACE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST		3	4 3 3	8	56	SS-2	2.75	0	2	8	41	49	50	20	30	25	A-7-6 (18)	
		4	1 2 4	8	56	SS-3	2.25	-	-	-	-	-	-	-	-	24	A-7-6 (V)	
	947.0	5	2 3 4	10	78	SS-4	2.50	-	-	-	-	-	-	-	-	25	A-7-6 (V)	
	EOB	6																
		7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:30 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 487+32, 13' RT.	EXPLORATION ID B-020-0-20
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 952.9 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 10/27/20 END: 10/28/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.217633, -83.176320	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
9.0" ASPHALT AND 8.0" BASE (DRILLERS DESCRIPTION)	952.9																	
	951.5	1																
MEDIUM DENSE, BROWN, **GRAVEL WITH SAND**, LITTLE SILT, TRACE CLAY, DAMP	949.9	2	14 8 8	22	11	SS-1	-	-	-	-	-	-	-	-	-	7	A-1-b (V)	
VERY STIFF, BROWN, **SILT AND CLAY**, SOME SAND, LITTLE GRAVEL, DAMP	948.4	3 4	7 5 5	14	33	SS-2	3.00	13	13	13	37	24	35	20	15	16	A-6a (7)	
VERY STIFF, BROWN MOTTLED WITH ORANGISH BROWN, **CLAY**, SOME SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST	946.9	5 6	4 3 4	10	44	SS-3	2.75	2	5	11	34	48	53	21	32	25	A-7-6 (19)	
HARD, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **SILT AND CLAY**, SOME SAND, LITTLE GRAVEL, CONTAINS IRON STAINING, MOIST	945.4	7 EOB	3 3 4	10	44	SS-4	4.50	-	-	-	-	-	-	-	-	21	A-6a (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 1.5'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:30 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00
TYPE: SUBGRADE
PID: 111381 SFN:
START: 10/28/20 END: 10/28/20

DRILLING FIRM / OPERATOR: NEAS / R. WEBB
SAMPLING FIRM / LOGGER: NEAS / R. WEBB
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 12/5/19
ENERGY RATIO (%): 81.7

STATION / OFFSET: 503+16, 11' LT.
ALIGNMENT: US-42
ELEVATION: 955.5 (MSL) EOB: 7.5 ft.
LAT / LONG: 40.221166, -83.173013

EXPLORATION ID B-021-0-20

MATERIAL DESCRIPTION AND NOTES	ELEV. 955.5	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
9.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	954.3	1																
VERY STIFF, BROWN, **SILT AND CLAY**, SOME SAND, SOME GRAVEL, DAMP	952.5	2	5 3 3	8	33	SS-1	3.75	25	13	14	30	18	31	20	11	14	A-6a (3)	
VERY STIFF, DARK BROWN, **SILTY CLAY**, SOME SAND, LITTLE GRAVEL, DAMP	951.0	3 4	2 4 5	12	44	SS-2	2.75	13	11	13	35	28	38	19	19	19	A-6b (9)	
VERY STIFF, DARK BROWN MOTTLED WITH ORANGISH BROWN, **CLAY**, "AND" SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST	948.0	5 6	2 5 5	14	78	SS-3	2.25	-	-	-	-	-	-	-	-	26	A-7-6 (V)	
	EOB	7	3 4 5	12	78	SS-4	2.25	-	-	-	-	-	-	-	-	24	A-7-6 (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:30 - X:\ACTIVE PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 10+14, 14' RT.	EXPLORATION ID B-022-0-20
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 963.2 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 10/28/20 END: 10/28/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.224586, -83.169590	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
13.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	963.2																	
	961.7	1																
STIFF TO VERY STIFF, GRAY AND BROWN, **SILTY CLAY**, LITTLE SAND, TRACE TO LITTLE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP TO MOIST		2	7 4 4	11	56	SS-1	2.00	18	9	10	35	28	39	20	19	20	A-6b (9)	
		3	2 2 2	5	56	SS-2	2.00	2	4	7	49	38	37	18	19	27	A-6b (12)	
		4	2 2 2	5	56	SS-3	1.50	-	-	-	-	-	-	-	-	22	A-6b (V)	
		5	2 2 4	8	67	SS-4	2.00	-	-	-	-	-	-	-	-	27	A-6b (V)	
	955.7	6 EOB																
		7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 1.5'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00
TYPE: SUBGRADE
PID: 111381 SFN:
START: 10/28/20 END: 10/28/20

DRILLING FIRM / OPERATOR: NEAS / R. WEBB
SAMPLING FIRM / LOGGER: NEAS / R. WEBB
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 12/5/19
ENERGY RATIO (%): 81.7

STATION / OFFSET: 25+88, 16' LT.
ALIGNMENT: US-42
ELEVATION: 957.1 (MSL) EOB: 7.5 ft.
LAT / LONG: 40.228093, -83.166300

EXPLORATION ID B-023-0-20

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
12.0" ASPHALT AND 2.0" BASE (DRILLERS DESCRIPTION)	957.1																	
	955.9	1																
HARD, BROWNISH GRAY, **SANDY SILT**, LITTLE CLAY, TRACE GRAVEL, DAMP	954.1	2	7 4 5	12	67	SS-1	4.25	4	19	16	43	18	24	18	6	15	A-4a (5)	
STIFF TO VERY STIFF, BROWN MOTTLED WITH GRAY AND ORANGISH BROWN, **CLAY**, "AND" SILT, LITTLE SAND, TRACE GRAVEL, CONTAINS IRON STAINING, MOIST		3	4 3 4	10	56	SS-2	2.25	0	3	9	38	50	48	20	28	24	A-7-6 (17)	
		4	2 3 4	10	67	SS-3	1.75	-	-	-	-	-	-	-	-	24	A-7-6 (V)	
		5	3 4 5	12	67	SS-4	2.25	-	-	-	-	-	-	-	-	22	A-7-6 (V)	
	949.6	6 EOB																
		7																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:30 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 41+87, 13' RT.	EXPLORATION ID B-024-0-20
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 945.7 (MSL) EOB: 6.8 ft.	PAGE 1 OF 1
START: 10/28/20 END: 10/28/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.231570, -83.162805	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GR	CS	FS	SI	CL	LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
9.0" ASPHALT AND 8.0" BASE (DRILLERS DESCRIPTION)	945.7																	
	944.3	1																
VERY STIFF, GRAYISH BROWN, **SANDY SILT**, LITTLE CLAY, TRACE TO LITTLE GRAVEL, DAMP	942.7	2	7 4 9	18	17	SS-1	2.50	-	-	-	-	-	-	-	-	15	A-4a (V)	
STIFF TO VERY STIFF, GRAYISH BROWN BECOMING BROWN AND GRAY, **SILTY CLAY**, LITTLE SAND, TRACE GRAVEL, CONTAINS TRACE IRON STAINING, DAMP		3	3 7 7	19	17	SS-2	1.50	-	-	-	-	-	-	-	-	19	A-6b (V)	
		4	4 7 10	23	78	SS-3	3.75	1	6	13	42	38	36	19	17	17	A-6b (11)	
	938.9	5	7 50/3"	-	67	SS-4	3.00	2	6	12	40	40	38	18	20	18	A-6b (12)	
		6 EOB																

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE CAVE-IN AT 3.0'.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

STANDARD ODOT SOIL BORING LOG (8.5 X 11) - OH DOT.GDT - 5/20/21 11:30 - X:\ACTIVE PROJECTS\ACTIVE SOIL PROJECTS\UNI-DEL-42-4.92-0.00 (B-001 - B-026)\GINT FILES\UNI-DEL-42-4.92

PROJECT: UNI/DEL-42-4.92/0.00	DRILLING FIRM / OPERATOR: NEAS / R. WEBB	DRILL RIG: CME 45B	STATION / OFFSET: 57+55, 13' LT.	EXPLORATION ID B-025-0-20
TYPE: SUBGRADE	SAMPLING FIRM / LOGGER: NEAS / R. WEBB	HAMMER: CME AUTOMATIC	ALIGNMENT: US-42	
PID: 111381 SFN:	DRILLING METHOD: 3.25" HSA	CALIBRATION DATE: 12/5/19	ELEVATION: 937.0 (MSL) EOB: 7.5 ft.	PAGE 1 OF 1
START: 10/28/20 END: 10/28/20	SAMPLING METHOD: SPT	ENERGY RATIO (%): 81.7	LAT / LONG: 40.235063, -83.159515	

MATERIAL DESCRIPTION AND NOTES	ELEV.	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
12.0" ASPHALT AND 2.0" BASE (DRILLERS DESCRIPTION)	937.0 935.8	1																
HARD, BROWN, **SILT AND CLAY**, SOME SAND, LITTLE GRAVEL, CONTAINS IRON STAINING, DAMP	934.0	2	8 7 6	18	67	SS-1	4.50	19	15	13	30	23	32	18	14	13	A-6a (5)	
VERY STIFF TO HARD, BROWN MOTTLED WITH ORANGISH BROWN AND GRAY, **SILTY CLAY**, SOME SAND, TRACE GRAVEL, CONTAINS IRON STAINING, DAMP		3 4	4 7 8	20	56	SS-2	2.75	8	10	13	34	35	36	19	17	16	A-6b (10)	
		5	5 7 12	26	67	SS-3	2.50	-	-	-	-	-	-	-	-	19	A-6b (V)	
	929.5	6 7 EOB	7 9 10	26	67	SS-4	4.50	-	-	-	-	-	-	-	-	14	A-6b (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

PROJECT: UNI/DEL-42-4.92/0.00
TYPE: SUBGRADE
PID: 111381 SFN:
START: 10/28/20 END: 10/28/20

DRILLING FIRM / OPERATOR: NEAS / R. WEBB
SAMPLING FIRM / LOGGER: NEAS / R. WEBB
DRILLING METHOD: 3.25" HSA
SAMPLING METHOD: SPT

DRILL RIG: CME 45B
HAMMER: CME AUTOMATIC
CALIBRATION DATE: 12/5/19
ENERGY RATIO (%): 81.7

STATION / OFFSET: 73+91, 13' RT.
ALIGNMENT: US-42
ELEVATION: 913.4 (MSL) EOB: 7.5 ft.
LAT / LONG: 40.238210, -83.155350

EXPLORATION ID B-026-0-20

MATERIAL DESCRIPTION AND NOTES	ELEV. 913.4	DEPTHS	SPT/ RQD	N_{60}	REC (%)	SAMPLE ID	HP (tsf)	GRADATION (%) GR	CS	FS	SI	CL	ATTERBERG LL	PL	PI	WC	ODOT CLASS (GI)	BACK FILL
12.0" ASPHALT AND 5.0" BASE (DRILLERS DESCRIPTION)	912.0	1																
MEDIUM DENSE, BROWN, **GRAVEL WITH SAND**, LITTLE SILT, TRACE CLAY, DAMP	910.4	2	10 11 11	30	17	SS-1	-	-	-	-	-	-	-	-	-	7	A-1-b (V)	
MEDIUM DENSE, BROWN AND GRAY, **STONE FRAGMENTS WITH SAND AND SILT**, TRACE CLAY, CONTAINS IRON STAINING, DAMP TO MOIST		3 4 5 6	14 13 9	30	67	SS-2	-	49	15	10	20	6	NP	NP	NP	6	A-2-4 (0)	
			13 13 4	23	17	SS-3	-	-	-	-	-	-	-	-	-	8	A-2-4 (V)	
	905.9	7 EOB	3 4 5	12	28	SS-4	-	-	-	-	-	-	-	-	-	12	A-2-4 (V)	

NOTES: GROUNDWATER NOT ENCOUNTERED DURING DRILLING. HOLE DID NOT CAVE.

ABANDONMENT METHODS, MATERIALS, QUANTITIES: PLACED 0.5 BAG ASPHALT PATCH; SHOVELED SOIL CUTTINGS

APPENDIX C

PAVEMENT CORING LOGS

Core Log: C-001 (B-001-0-20)

Core Location: UNI-42-4.92 to DEL-42-1.41
SR-42 NB Lane
Near: 40.165714, -83.226744

Project: UNI/DEL-42-4.92/0.00, PID 111381 **Date:** 12/16/2020
Location: Union and Delaware Counties, OH **Core Type / Alignment:** Pavement / SR-42
Client: JMT, Inc. **Coring Crew:** NEAS - CA
Core Barrel Size (O.D.): 4.00" **Hole Patched w/:** Asphalt Patch

Photograph and Core Length	Description and Noted Features of Core Sample
	FACE OF THE CORE IS AT ZERO - ±1.00” Surface Course - ±4.50” Surface Course - ±4.50” Base Course **Total Core Recovery = 10.00"**

Abbreviations and Notes

Core Log: C-006 (B-006-0-20)

Core Location: UNI-42-4.92 to DEL-42-1.41
SR-42 SB Lane
Near: 40.176766, -83.215769

Project: UNI/DEL-42-4.92/0.00, PID 111381 **Date:** 12/16/2020
Location: Union and Delaware Counties, OH **Core Type / Alignment:** Pavement / SR-42
Client: JMT, Inc. **Coring Crew:** NEAS - CA
Core Barrel Size (O.D.): 4.00" **Hole Patched w/:** Asphalt Patch

Photograph and Core Length	Description and Noted Features of Core Sample
	FACE OF THE CORE IS AT ZERO - ±1.50” Surface Course - ±3.75” Surface Course - ±2.50” Base Course - ±2.50” Base Course - ±6.50” Concrete **Total Core Recovery = 16.75**

Abbreviations and Notes

Core Log: C-009 (B-009-0-20)

Core Location: UNI-42-4.92 to DEL-42-1.41
SR-42 NB Lane
Near: 40.187236, -83.205641

Project: UNI/DEL-42-4.92/0.00, PID 111381 **Date:** 12/16/2020
Location: Union and Delaware Counties, OH **Core Type / Alignment:** Pavement / SR-42
Client: JMT, Inc. **Coring Crew:** NEAS - CA
Core Barrel Size (O.D.): 4.00" **Hole Patched w/:** Asphalt Patch

Photograph and Core Length	Description and Noted Features of Core Sample
	FACE OF THE CORE IS AT ZERO - ±4.75” Surface Course - ±3.50” Surface Course - ±2.50” Intermediate Course - ±3.00” Base Course **Total Core Recovery = 10.75"**

Abbreviations and Notes

Core Log: C-011 (B-011-0-20)

Core Location: UNI-42-4.92 to DEL-42-1.41
SR-42 SB Lane
Near: 40.189230, -83.203838

Project: UNI/DEL-42-4.92/0.00, PID 111381 **Date:** 11/20/2020
Location: Union and Delaware Counties, OH **Core Type / Alignment:** Pavement / SR-42
Client: JMT, Inc. **Coring Crew:** NEAS - CA
Core Barrel Size (O.D.): 4.00" **Hole Patched w/:** Asphalt Patch

Photograph and Core Length	Description and Noted Features of Core Sample
	FACE OF THE CORE IS AT ZERO - ±1.75” Surface Course - ±3.25” Surface Course - ±3.50” Intermediate Course - ±3.25” Base Course - ±0.75” Concrete **Total Core Recovery = 12.50"**

Abbreviations and Notes

Core Log: C-014 (B-014-0-20)

Core Location: UNI-42-4.92 to DEL-42-1.41
SR-42 NB Lane
Near: 40.196479, -83.196755

Project: UNI/DEL-42-4.92/0.00, PID 111381 **Date:** 11/20/2020
Location: Union and Delaware Counties, OH **Core Type / Alignment:** Pavement / SR-42
Client: JMT, Inc. **Coring Crew:** NEAS - CA
Core Barrel Size (O.D.): 4.00" **Hole Patched w/:** Asphalt Patch

Photograph and Core Length	Description and Noted Features of Core Sample
	FACE OF THE CORE IS AT ZERO - ±1.50” Surface Course - ±4.00” Surface Course - ±3.00” Intermediate Course - ±2.50” Base Course **Total Core Recovery = 11.00"**

Abbreviations and Notes

Core Log: C-016 (B-016-0-20)

Core Location: UNI-42-4.92 to DEL-42-1.41
SR-42 NB Lane
Near: 40.203537, -83.189970

Project: UNI/DEL-42-4.92/0.00, PID 111381 **Date:** 11/20/2020
Location: Union and Delaware Counties, OH **Core Type / Alignment:** Pavement / SR-42
Client: JMT, Inc. **Coring Crew:** NEAS - CA
Core Barrel Size (O.D.): 4.00" **Hole Patched w/:** Asphalt Patch

Photograph and Core Length	Description and Noted Features of Core Sample
	FACE OF THE CORE IS AT ZERO - ±9.50” Asphalt **Total Core Recovery = 9.50"**

Abbreviations and Notes

Core Log: C-017 (B-017-0-20)

Core Location: UNI-42-4.92 to DEL-42-1.41
SR-42 SB Lane
Near: 40.207103, -83.186648

Project: UNI/DEL-42-4.92/0.00, PID 111381 **Date:** 11/20/2020
Location: Union and Delaware Counties, OH **Core Type / Alignment:** Pavement / SR-42
Client: JMT, Inc. **Coring Crew:** NEAS - CA
Core Barrel Size (O.D.): 4.00" **Hole Patched w/:** Asphalt Patch

Photograph and Core Length	Description and Noted Features of Core Sample
	FACE OF THE CORE IS AT ZERO - ±1.75” Surface Course - ±4.00” Surface Course - ±4.00” Intermediate Course - ±1.75” Base Course **Total Core Recovery = 11.50"**

Abbreviations and Notes

Core Log: C-019 (B-019-0-20)

Core Location: UNI-42-4.92 to DEL-42-1.41
SR-42 SB Lane
Near: 40.214141, -83.179824

Project: UNI/DEL-42-4.92/0.00, PID 111381 **Date:** 11/3/2020
Location: Union and Delaware Counties, OH **Core Type / Alignment:** Pavement / SR-42
Client: JMT, Inc. **Coring Crew:** NEAS - CA
Core Barrel Size (O.D.): 4.00" **Hole Patched w/:** Asphalt Patch

Photograph and Core Length	Description and Noted Features of Core Sample
	FACE OF THE CORE IS AT ZERO - ±3.25” Surface Course - ±3.75” Surface Course - ±2.50” Base Course **Total Core Recovery = 9.50"**

Abbreviations and Notes

Core Log: C-020 (B-020-0-20)

Core Location: UNI-42-4.92 to DEL-42-1.41
SR-42 NB Lane
Near: 40.217633, -83.176320

Project: UNI/DEL-42-4.92/0.00, PID 111381 **Date:** 11/3/2020
Location: Union and Delaware Counties, OH **Core Type / Alignment:** Pavement / SR-42
Client: JMT, Inc. **Coring Crew:** NEAS - CA
Core Barrel Size (O.D.): 4.00" **Hole Patched w/:** Asphalt Patch

Photograph and Core Length	Description and Noted Features of Core Sample
	FACE OF THE CORE IS AT ZERO - ±2.75” Surface Course - ±4.50” Surface Course - ±3.00” Base Course **Total Core Recovery = 10.25"**

Abbreviations and Notes

Core Log: C-024 (B-024-0-20)

Core Location: UNI-42-4.92 to DEL-42-1.41
SR-42 NB Lane
Near: 40.231570, -83.162805

Project: UNI/DEL-42-4.92/0.00, PID 111381 **Date:** 11/3/2020
Location: Union and Delaware Counties, OH **Core Type / Alignment:** Pavement / SR-42
Client: JMT, Inc. **Coring Crew:** NEAS - CA
Core Barrel Size (O.D.): 4.00" **Hole Patched w/:** Asphalt Patch

Photograph and Core Length	Description and Noted Features of Core Sample
	FACE OF THE CORE IS AT ZERO - ±1.50” Surface Course - ±5.75” Surface Course - ±4.00” Base Course **Total Core Recovery = 11.25"**

Abbreviations and Notes

Core Log: C-025 (B-025-0-20)

Core Location: UNI-42-4.92 to DEL-42-1.41
SR-42 SB Lane
Near: 40.235063, -83.159515

Project: UNI/DEL-42-4.92/0.00, PID 111381 **Date:** 11/3/2020
Location: Union and Delaware Counties, OH **Core Type / Alignment:** Pavement / SR-42
Client: JMT, Inc. **Coring Crew:** NEAS - CA
Core Barrel Size (O.D.): 4.00" **Hole Patched w/:** Asphalt Patch

Photograph and Core Length	Description and Noted Features of Core Sample
	FACE OF THE CORE IS AT ZERO - ±1.25” Surface Course - ±2.50” Surface Course - ±3.00” Intermediate Course - ±2.25” Base Course - ±1.75” Base Course **Total Core Recovery = 10.75"**

Abbreviations and Notes

APPENDIX D

GEOTECHNICAL BULLETIN 1 (GB1) ANALYSIS SPREADSHEETS

OHIO DEPARTMENT OF TRANSPORTATION

OFFICE OF GEOTECHNICAL ENGINEERING

PLAN SUBGRADES
Geotechnical Bulletin GB1

UNI/DEL-42-4.92/0.00
111381

Widening and full depth replacement of segments of State Route 42 (SR-42)

NEAS Inc.

Prepared By: Brendan P. Andrews, PE
Date prepared: Thursday, May 20, 2021

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NO. OF BORINGS: 26

#	Boring ID	Alignment	Station	Offset	Dir	Drill Rig	ER	Boring EL.	Proposed Subgrade EL	Cut Fill
1	B-001-0-20	CENTERLINE US-42	251+47	13	RT	CME 45B	82	1002.6	1001.1	1.5 C
2	B-002-0-20	CENTERLINE US-42	252+08	15	LT	CME 45B	82	1002.2	1000.7	1.5 C
3	B-003-0-20	CENTERLINE US-42	268+08	14	RT	CME 45B	82	996.3	994.8	1.5 C
4	B-004-0-20	CENTERLINE US-42	270+20	16	LT	CME 45B	82	994.8	993.3	1.5 C
5	B-005-0-20	CENTERLINE US-42	286+04	14	RT	CME 45B	82	994.1	992.6	1.5 C
6	B-006-0-20	CENTERLINE US-42	302+09	13	RT	CME 45B	82	983.8	982.3	1.5 C
7	B-007-0-20	CENTERLINE US-42	317+82	11	RT	CME 55T	68	972.3	970.8	1.5 C
8	B-008-0-20	CENTERLINE US-42	332+68	15	LT	CME 55T	68	976.6	975.1	1.5 C
9	B-009-0-20	CENTERLINE US-42	349+58	12	RT	CME 45B	82	974.7	973.2	1.5 C
10	B-010-0-20	CENTERLINE US-42	358+15	17	RT	CME 45B	82	972.4	970.9	1.5 C
11	B-011-0-20	CENTERLINE US-42	358+42	14	LT	CME 45B	82	972.9	971.4	1.5 C
12	B-012-0-20	CENTERLINE US-42	374+40	19	LT	CME 45B	82	967.3	965.8	1.5 C
13	B-013-0-20	CENTERLINE US-42	391+21	14	LT	CME 45B	82	965.7	964.2	1.5 C
14	B-014-0-20	CENTERLINE US-42	391+42	13	RT	CME 45B	82	965.7	964.2	1.5 C
15	B-015-0-20	CENTERLINE US-42	407+39	12	LT	CME 45B	82	972.0	970.5	1.5 C
16	B-016-0-20	CENTERLINE US-42	423+36	15	RT	CME 45B	82	967.8	966.3	1.5 C
17	B-017-0-20	CENTERLINE US-42	439+32	12	LT	CME 45B	82	973.5	972.0	1.5 C
18	B-018-0-20	CENTERLINE US-42	455+16	15	RT	CME 45B	82	960.1	958.6	1.5 C
19	B-019-0-20	CENTERLINE US-42	471+27	12	LT	CME 45B	82	954.5	953.0	1.5 C
20	B-020-0-20	CENTERLINE US-42	487++32	13	RT	CME 45B	82	952.9	951.4	1.5 C
21	B-021-0-20	CENTERLINE US-42	503+16	11	LT	CME 45B	82	955.5	954.0	1.5 C
22	B-022-0-20	CENTERLINE US-42	10+14	14	RT	CME 45B	82	963.2	961.7	1.5 C
23	B-023-0-20	CENTERLINE US-42	25+88	16	LT	CME 45B	82	957.1	955.6	1.5 C
24	B-024-0-20	CENTERLINE US-42	41+87	13	RT	CME 45B	82	945.7	944.2	1.5 C
25	B-025-0-20	CENTERLINE US-42	57+55	13	LT	CME 45B	82	937.0	935.5	1.5 C
26	B-026-0-20	CENTERLINE US-42	73+91	13	RT	CME 45B	82	913.4	911.9	1.5 C

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
1	B	SS-1	1.5	3.0	0.0	1.5	8		4	35	20	15	47	29	76	19	15	A-6a	10			N_{60} & Mc		12"	
	001-0	SS-2	3.0	4.5	1.5	3.0	12		3.5	37	21	16	45	28	73	20	16	A-6b	10			N_{60} & Mc			
	20	SS-3	4.5	6.0	3.0	4.5	15		4.5							23	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	16	8	3.75							25	18	A-7-6	16						
2	B	SS-1	1.5	3.0	0.0	1.5	18									6	10	A-2-4	0						
	002-0	SS-2	3.0	4.5	1.5	3.0	14		4	35	21	14	38	22	60	16	16	A-6A	7						
	20	SS-3	4.5	6.0	3.0	4.5	12		4.5	59	29	30	36	50	86	28	26	A-7-6	20						
		SS-4	6.0	7.5	4.5	6.0	14	12	3.5							26	18	A-7-6	16						
3	B	SS-1	1.5	3.0	0.0	1.5	10		2.75	43	19	24	33	42	75	20	18	A-7-6	14			N_{60}		12"	
	003-0	SS-2	3.0	4.5	1.5	3.0	15		4.5	41	20	21	32	47	79	23	18	A-7-6	13			Mc			
	20	SS-3	4.5	6.0	3.0	4.5	12		4.25							29	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	18	10	4.5							16	18	A-7-6	16						
4	B	SS-1	1.5	3.0	0.0	1.5	8			30	20	10	24	11	35	11	10	A-2-4	0			N_{60}		12"	
	004-0	SS-2	3.0	4.5	1.5	3.0	10									12	10	A-2-4	0			N_{60}			
	20	SS-3	4.5	6.0	3.0	4.5	12		4	43	21	22	29	30	59	19	18	A-7-6	10						
		SS-4	6.0	7.5	4.5	6.0	12	8	3							27	18	A-7-6	16						
5	B	SS-1	1.5	3.0	0.0	1.5	12		4.25	45	22	23	29	38	67	17	19	A-7-6	12						
	005-0	SS-2	3.0	4.5	1.5	3.0	10		4.5							17	18	A-7-6	16			N_{60}			
	20	SS-3	4.5	6.0	3.0	4.5	11		4.5							13	16	A-6B	16						
		SS-4	6.0	7.5	4.5	6.0	11	10	4.5	36	19	17	37	42	79	16	16	A-6B	11						
6	B	SS-1	1.5	3.0	0.0	1.5	8		3.75	29	18	11	47	34	81	18	14	A-6A	8			N_{60} & Mc		12"	
	006-0	SS-2	3.0	4.5	1.5	3.0	12		4.5	31	17	14	39	37	76	15	14	A-6A	10						
	20	SS-3	4.5	6.0	3.0	4.5	16		4.5							16	14	A-6A	10						
		SS-4	6.0	7.5	4.5	6.0	19	8	4.5							15	14	A-6A	10						
7	B	SS-1	1.5	3.0	0.0	1.5	9		3.25	58	20	38	30	51	81	21	18	A-7-6	20			N_{60} & Mc		12"	
	007-0	SS-2	3.0	4.5	1.5	3.0	16		4.5	46	22	24	36	58	94	21	19	A-7-6	15						
	20	SS-3	4.5	6.0	3.0	4.5	15		3.75							20	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	16	9	4.5							20	18	A-7-6	16						
8	B	SS-1	1.5	3.0	0.0	1.5	18			NP	NP	NP	12	3	15	5	6	A-1-A	0						
	008-0	SS-2	3.0	4.5	1.5	3.0	13									13	6	A-1-A	0						
	20	SS-3	4.5	6.0	3.0	4.5	9		2.5	29	18	11	45	29	74	17	14	A-6A	8						
		SS-4	6.0	7.5	4.5	6.0	9	9	2.75							25	14	A-6A	10						
9	B	SS-1	1.5	3.0	0.0	1.5	7		3.75	38	21	17	34	26	60	16	16	A-6B	8			N_{60}		15"	
	009-0	SS-2	3.0	4.5	1.5	3.0	8		4.5							18	16	A-6B	16			N_{60}			
	20	SS-3	4.5	6.0	3.0	4.5	8		3.25	36	19	17	34	34	68	17	16	A-6B	9						
		SS-4	6.0	7.5	4.5	6.0	12	7	3.5							18	16	A-6B	16						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
10	B	SS-1	1.5	3.0	0.0	1.5	8			33	20	13	17	11	28	8	10	A-2-6	0			N_{60}		12"	
	010-0	SS-2	3.0	4.5	1.5	3.0	10		4.5							21	18	A-7-6	16			N_{60} & Mc			
	20	SS-3	4.5	6.0	3.0	4.5	10		4.25	58	27	31	36	48	84	29	24	A-7-6	20						
		SS-4	6.0	7.5	4.5	6.0	8	8	3							28	18	A-7-6	16						
11	B	SS-1	1.5	3.0	0.0	1.5	10		3.5	53	22	31	40	45	85	25	19	A-7-6	19			N_{60} & Mc		12"	
	011-0	SS-2	3.0	4.5	1.5	3.0	7									12	18	A-7-6	16			N_{60}			
	20	SS-3	4.5	6.0	3.0	4.5	12		2.75	53	21	32	35	45	80	24	18	A-7-6	19						
		SS-4	6.0	7.5	4.5	6.0	14	7	3							22	18	A-7-6	16						
12	B	SS-1	1.5	3.0	0.0	1.5	12		3.75	47	22	25	29	37	66	19	19	A-7-6	13						
	012-0	SS-2	3.0	4.5	1.5	3.0	10		3.5	51	24	27	41	48	89	25	21	A-7-6	17			N_{60} & Mc			
	20	SS-3	4.5	6.0	3.0	4.5	14		2.5							25	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	16	10	2.75							26	18	A-7-6	16						
13	B	SS-1	1.5	3.0	0.0	1.5	22									22	10	A-2-4	0			Mc			
	013-0	SS-2	3.0	4.5	1.5	3.0	7									21	10	A-2-4	0			N_{60} & Mc			
	20	SS-3	4.5	6.0	3.0	4.5	5		2	57	21	36	34	50	84	29	18	A-7-6	19						
		SS-4	6.0	7.5	4.5	6.0	8	5	2.25							27	18	A-7-6	16						
14	B	SS-1	1.5	3.0	0.0	1.5	10		3.25	52	23	29	37	44	81	25	20	A-7-6	18			N_{60} & Mc		12"	
	014-0	SS-2	3.0	4.5	1.5	3.0	8		3.5	59	24	35	37	50	87	27	21	A-7-6	20			N_{60} & Mc			
	20	SS-3	4.5	6.0	3.0	4.5	11		3.25							26	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	12	8	2.75							22	18	A-7-6	16						
15	B	SS-1	1.5	3.0	0.0	1.5	12		4	31	20	11	41	25	66	15	15	A-6A	7						
	015-0	SS-2	3.0	4.5	1.5	3.0	12		4.25							15	14	A-6A	10						
	20	SS-3	4.5	6.0	3.0	4.5	10		4.5							18	14	A-6A	10						
		SS-4	6.0	7.5	4.5	6.0	7	7	2	40	20	20	36	35	71	18	16	A-6B	11						
16	B	SS-1	1.5	3.0	0.0	1.5	11		3	47	23	24	48	40	88	24	20	A-7-6	15			N_{60} & Mc		12"	
	016-0	SS-2	3.0	4.5	1.5	3.0	12		2.75							26	18	A-7-6	16			N_{60} & Mc			
	20	SS-3	4.5	6.0	3.0	4.5	12		1.75	64	24	40	37	51	88	28	21	A-7-6	20						
		SS-4	6.0	7.5	4.5	6.0	7	7	2.25							26	18	A-7-6	16						
17	B	SS-1	1.5	3.0	0.0	1.5	15		4	38	19	19	38	42	80	19	16	A-6B	12			Mc			
	017-0	SS-2	3.0	4.5	1.5	3.0	27		4.5	32	19	13	41	36	77	15	14	A-6A	9						
	20	SS-3	4.5	6.0	3.0	4.5	33		4.5							14	14	A-6A	10						
		SS-4	6.0	7.5	4.5	6.0	37	15	4.5							15	14	A-6A	10						
18	B	SS-1	1.5	3.0	0.0	1.5	12		4.5	34	19	15	40	27	67	15	14	A-6A	8						
	018-0	SS-2	3.0	4.5	1.5	3.0	10		4.25	33	18	15	27	16	43	10	14	A-6A	3			N_{60}			
	20	SS-3	4.5	6.0	3.0	4.5	10		3.5							20	14	A-6A	10						
		SS-4	6.0	7.5	4.5	6.0	11	10	4.5							17	14	A-6A	10						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

#	Boring	Sample	Sample Depth		Subgrade Depth		Standard Penetration		HP (tsf)	Physical Characteristics						Moisture		Ohio DOT		Sulfate Content (ppm)	Problem		Excavate and Replace (Item 204)		Recommendation (Enter depth in inches)
			From	To	From	To	N_{60}	N_{60L}		LL	PL	PI	% Silt	% Clay	P200	M_C	M_{OPT}	Class	GI		Unsuitable	Unstable	Unsuitable	Unstable	
19	B	SS-1	1.5	3.0	0.0	1.5	8		2.5	35	19	16	37	24	61	19	16	A-6B	8			N_{60} & Mc		**12"**	
	019-0	SS-2	3.0	4.5	1.5	3.0	8		2.75	50	20	30	41	49	90	25	18	A-7-6	18			N_{60} & Mc			
	20	SS-3	4.5	6.0	3.0	4.5	8		2.25							24	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	10	8	2.5							25	18	A-7-6	16						
20	B	SS-1	1.5	3.0	0.0	1.5	22									7	6	A-1-B	0						
	020-0	SS-2	3.0	4.5	1.5	3.0	14		3	35	20	15	37	24	61	16	15	A-6A	7						
	20	SS-3	4.5	6.0	3.0	4.5	10		2.75	53	21	32	34	48	82	25	18	A-7-6	19						
		SS-4	6.0	7.5	4.5	6.0	10	10	4.5							21	14	A-6A	10						
21	B	SS-1	1.5	3.0	0.0	1.5	8		3.75	31	20	11	30	18	48	14	15	A-6A	3			N_{60}		**12"**	
	021-0	SS-2	3.0	4.5	1.5	3.0	12		2.75	38	19	19	35	28	63	19	16	A-6B	9			N_{60} & Mc			
	20	SS-3	4.5	6.0	3.0	4.5	14		2.25							26	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	12	8	2.25							24	18	A-7-6	16						
22	B	SS-1	1.5	3.0	0.0	1.5	11		2	39	20	19	35	28	63	20	16	A-6B	9			N_{60} & Mc		**12"**	
	022-0	SS-2	3.0	4.5	1.5	3.0	5		2	37	18	19	49	38	87	27	16	A-6B	12			N_{60} & Mc			
	20	SS-3	4.5	6.0	3.0	4.5	5		1.5							22	16	A-6B	16						
		SS-4	6.0	7.5	4.5	6.0	8	5	2							27	16	A-6B	16						
23	B	SS-1	1.5	3.0	0.0	1.5	12		4.25	24	18	6	43	18	61	15	13	A-4A	5						
	023-0	SS-2	3.0	4.5	1.5	3.0	10		2.25	48	20	28	38	50	88	24	18	A-7-6	17			N_{60} & Mc			
	20	SS-3	4.5	6.0	3.0	4.5	10		1.75							24	18	A-7-6	16						
		SS-4	6.0	7.5	4.5	6.0	12	10	2.25							22	18	A-7-6	16						
24	B	SS-1	1.5	3.0	0.0	1.5	18		2.5							15	10	A-4A	8			Mc			
	024-0	SS-2	3.0	4.5	1.5	3.0	19		1.5							19	16	A-6B	16			HP & Mc			
	20	SS-3	4.5	6.0	3.0	4.5	23		3.75	36	19	17	42	38	80	17	16	A-6B	11						
		SS-4	6.0	7.5	4.5	6.0		18	3	38	18	20	40	40	80	18	16	A-6B	12						
25	B	SS-1	1.5	3.0	0.0	1.5	18		4.5	32	18	14	30	23	53	13	14	A-6A	5						
	025-0	SS-2	3.0	4.5	1.5	3.0	20		2.75	36	19	17	34	35	69	16	16	A-6B	10						
	20	SS-3	4.5	6.0	3.0	4.5	26		2.5							19	16	A-6B	16						
		SS-4	6.0	7.5	4.5	6.0	26	18	4.5							14	16	A-6B	16						
26	B	SS-1	1.5	3.0	0.0	1.5	30									7	6	A-1-B	0						
	026-0	SS-2	3.0	4.5	1.5	3.0	30			NP	NP	NP	20	6	26	6	10	A-2-4	0						
	20	SS-3	4.5	6.0	3.0	4.5	23									8	10	A-2-4	0						
		SS-4	6.0	7.5	4.5	6.0	12	12								12	10	A-2-4	0						

OHIO DEPARTMENT OF TRANSPORTATION

Subgrade Analysis

V. 14.5 1/18/2019

PID: 111381

County-Route-Section: UNI/DEL-42-4.92/0.00
No. of Borings: 26

Geotechnical Consultant: NEAS Inc.
Prepared By: Brendan P. Andrews, PE
Date prepared: 5/20/2021

Chemical Stabilization Options		
320	Rubblize & Roll	No
206	Cement Stabilization	No
	Lime Stabilization	Option
206	Depth	14"

Excavate and Replace Stabilization Options	
Global Geotextile Average(N60L):	12"
Average(HP):	0"
Global Geogrid Average(N60L):	0"
Average(HP):	0"

Design CBR	5

% Samples within 6 feet of subgrade			
$N_{60} \leq 5$	3%	HP ≤ 0.5	0%
$N_{60} < 12$	45%	0.5 < HP ≤ 1	0%
$12 \leq N_{60} < 15$	27%	1 < HP ≤ 2	9%
$N_{60} \geq 20$	12%	HP > 2	78%
M+	22%		
Rock	0%		
Unsuitable	0%		

Excavate and Replace at Surface	
Average	0"
Maximum	0"
Minimum	0"

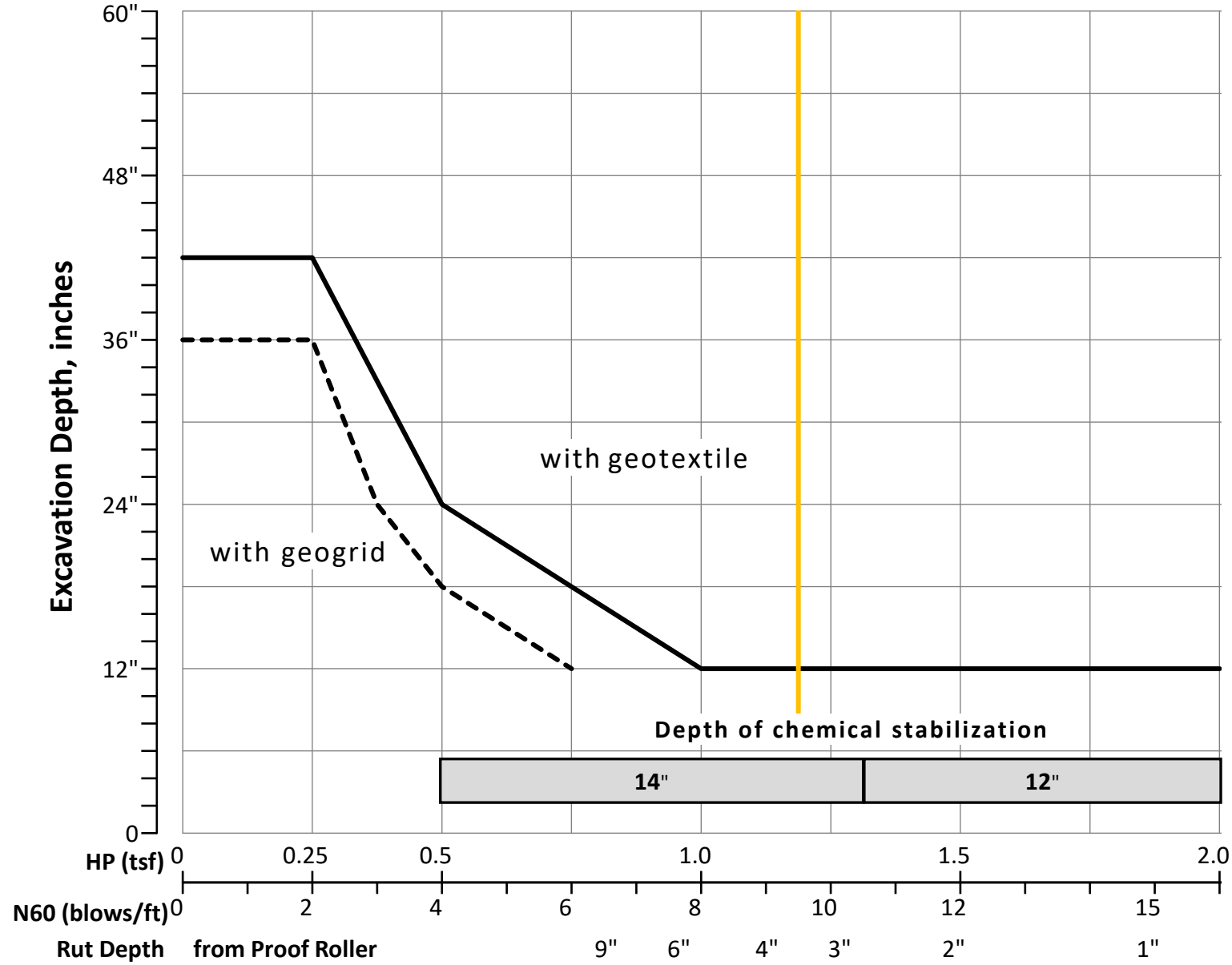
% Proposed Subgrade Surface	
Unstable & Unsuitable	63%
Unstable	63%
Unsuitable	0%

	N_{60}	N_{60L}	HP	LL	PL	PI	Silt	Clay	P 200	M_C	M_{OPT}	GI
Average	13	10	3.39	41	20	21	36	35	70	19	16	12
Maximum	37	18	4.50	64	29	40	49	58	94	29	26	20
Minimum	5	5	1.50	24	17	6	12	3	15	5	6	0

Classification Counts by Sample

ODOT Class	Rock	A-1-a	A-1-b	A-2-4	A-2-5	A-2-6	A-2-7	A-3	A-3a	A-4a	A-4b	A-5	A-6a	A-6b	A-7-5	A-7-6	A-8a	A-8b	Totals
Count	0	2	2	8	0	1	0	0	0	2	0	0	22	21	0	46	0	0	104
Percent	0%	2%	2%	8%	0%	1%	0%	0%	0%	2%	0%	0%	21%	20%	0%	44%	0%	0%	100%
% Rock|Granular|Cohesive	0%	14%									86%								100%
Surface Class Count	0	2	2	6	0	1	0	0	0	2	0	0	12	10	0	17	0	0	52
Surface Class Percent	0%	4%	4%	12%	0%	2%	0%	0%	0%	4%	0%	0%	23%	19%	0%	33%	0%	0%	100%

GB1 Figure B – Subgrade Stabilization



OVERRIDE TABLE

Calculated Average	New Values	Check to Override
3.39	0.50	☐ HP
9.50	6.00	☐ N60L

Average HP
Average N_{60L}