ADDENDUM NO. 2
TO
CONTRACT DOCUMENTS
FOR
CITY OF ELYRIA
WWPCP ACTIVATED SLUDGE AERATION TANK IMPROVEMENTS PROJECT
NOVEMBER 17, 2025

BID OPENING DATE
NOVEMBER 25, at 2:00 PM (UNCHANGED)

This addendum consists of TWO (2) pages and TWO (2) attachments.

ATTENTION BIDDERS:

This Addendum forms a part of the contract documents and modifies the original bidding documents. Acknowledge receipt of this addendum in the space provided on the "proposal forms." Failure to do so may subject the bidder to disqualification.

The drawings and specifications for the above reference project are hereby corrected, modified or supplemented as follows:

PROJECT SPECIFICATIONS

A. None

DETAILED SPECIFICATIONS:

A. None

DRAWINGS

A. None.

CONTRACTOR QUESTIONS

1. On sheets c1-c5 There is a long run of storm sewer pipe that appears to be 36" pipe. On the drawings it just says 36" ID pipe. Doesn't say what this pipe is. I am trying to see if I can find anything in the specs about it, but could you ask if they know what this pipe is supposed to be? If its RCP we don't quote anyway, but if its Ductile, or PVC or HDPE or something like that I don't want to miss it
   Response: The 36" pipe referenced on the drawings is Fiberglass Reinforced Polymer Mortar (FRPM)Pipe per specifications 01 10 10 and 33 26 15

2. The only geotechnical boring is located at the aerobic tanks. Some information on the soils/groundwater around the southern piping work would be crucial if available.
   Response: Attachment A includes a geotechnical design memorandum for another project that was done at the WWPCP in 2023. Although not in the exact location of the WWHT diversion sewer, borings B-303 and B-304 were located at the top of the hill at the WWPCP within 1,000 feet of the WWHT diversion sewer.

3. The current Run #3 (MH5-MH4) is located 10' off the eastern wall of the trickling filters. Assuming open cut installation we are going to need to know the extent & elevation of the trickling filter foundations to properly determine how to shore our excavation/support the existing structure.
   Response: Record drawings for the Trickling Filter construction are included as Attachment B.

4. For the connections to the existing detritus/holding tanks, we would need you to provide the cores/wall sleeves for the final connections. Am I correct in assuming by the time we are tying into the detritus effluent splitter box, bypass pumping will either no longer be required, or will already have it in place?
   Response: The connection detail is being prepared and will be included in Addendum #3. Flow management during connection at the detritus tank splitter box is the responsibility of the contractor.

5. Are there butterfly valves with motors in classified areas that require explosion proof NEMA 7 enclosures? Specification note ..... "Enclosure: a. Watertight to IP68, classification. Enclosure must be certified NEMA 6 for all units except those in classified areas."
   Response: No, there are no butterfly valves with motors that require NEMA 7 enclosures, so NEMA 7 enclosures should not be required.

6. Instrumentation and control questions
   1. What other major hardware needs to be in our enclosure?
   2. Can I get a proper list of the various drives (part numbers), what they operate?
   3. Are there any sensors or other hardware that is on communication and not analog IO?
   4. What is the timeline for the project?

   Response: Control Panel requirements are specified in Section 40 95 13. Communication System Architecture is shown on sheet I-02. The project needs to be completed by December 31, 2026.

7. For the Bid Items 19-22, please confirm what BFV spec section applies to each bid item?
   Response: 4" and 6" Butterfly Valves (currently bid items 21 and 22 per the revised bid form in Addendum #1) are described in spec section 40 23 13.01. 4" and 6" Air Flow Valves (currently bid items 23 and 24 per the revised bid form in Addendum #1) are described in spec section 40 23 13.06.

8. What bid item is the IMLR piping components to go in?
   Response: The IMLR piping components should be included in Bid Item 16 per the revised bid form and Measurement and Payment specification provided in Addendum #1

LIST OF ATTACHMENTS

A. Additional Geotech Information
B. Record Drawings for Trickling Filters

Cc.: To all plan holders
File

END OF ADDENDUM NO. 2

ATTACHMENT A

Additional Geotech Information

AECOM
1300 East 9th Street,
Suite 500
Cleveland, OH 44114
216.622.2300

Memorandum

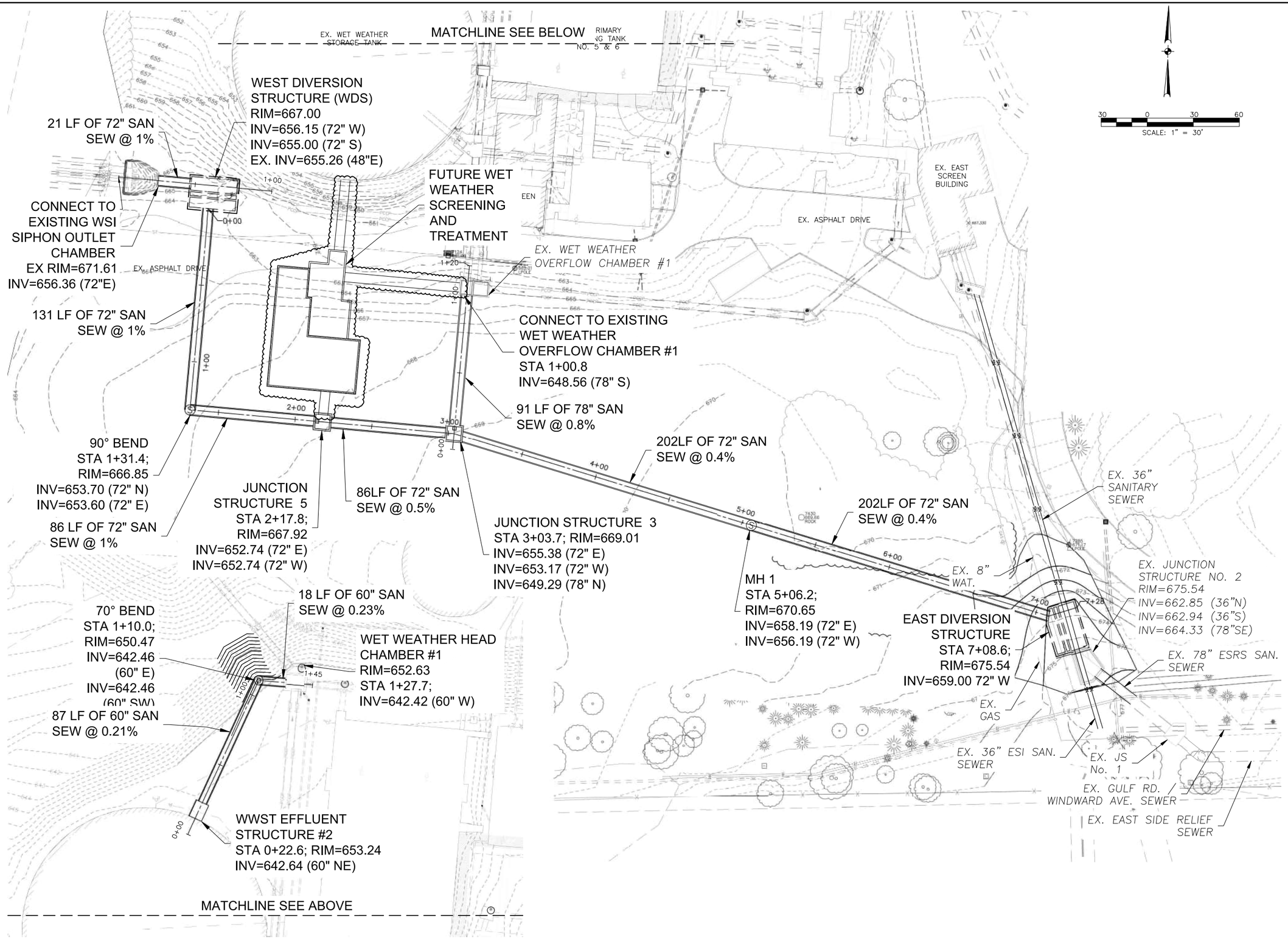
To	Kathy McKillips,P.E., City of Elyria	Pages 20
Subject	City of Elyria Waste Water Pollution Control Plant Improvements Phase 1 - Wet Weather Screening Facilities Geotechnical Design Memorandum	
From	Makarand Jakate, P.E., AECOM Daniel Starkey, P.E., AECOM Steven Benton, P.E., AECOM	
Date	September 28, 2023	

This memorandum has been prepared in support of the Wet Weather Diversion Structures and Piping Improvements and Wet Weather Screening and Treatment Improvements proposed at the City of Elyria Waste Water Pollution Control Plant (WWPCP) in the City of Elyria, Ohio (City). The memorandum describes AECOM Corporation's (AECOM's) geotechnical exploration and analysis, and presents geotechnical recommendations for the design and construction of the new facilities and associated piping/ manholes/ junction structures/ diversion structures to be constructed in the Wet Weather Diversion and Piping Improvements project.

Project Understanding

A new 78-inch diameter East Side Relief Sewer (ESRS) will control sewer surcharging/ flooding and reduce overflows primarily on the east side of the City. The additional flow anticipated from the ESRS will result in exceedance of the flow capacity of the WWPCP. Hence, WWPCP improvements are planned to incorporate the additional flow generated by the ESRS. The WWPCP improvements will be performed in 2 stages, Phase 1 and Phase 2.

Phase 1 WWPCP improvements consist of construction of East and West Diversion Structures with associated piping improvements and a new effluent structure for the existing Wet Weather Storage Tank (WWST). Future Phase 2 WWPCP improvements will likely include construction of a new wet weather screening and treatment building and associated piping improvements to accomoadte the treatment processes. The proposed WWPCP improvements are shown graphically in Figure 1 – Proposed WWPCP Improvements.



AECOM

PROJECT

WET WEATHER DIVERSION STRUCTURES AND PIPING IMPROVEMENTS, AND FUTURE WET WEATHER SCREENING AND TREATMENT IMPROVEMENTS

WASTEWATER POLLUTION CONTROL PLANT
1194 GULF ROAD
ELYRIA, OH

CLIENT

CITY OF ELYRIA
DEPARTMENT OF PUBLIC SERVICE
131 COURT STREET
ELYRIA, OH

CONSULTANT

AECOM
1300 EAST 9th STREE, SUITE 500
CLEVELAND, OH 44114
216.910.2000 tel 216.910.2010 fax
www.aecom.com

REGISTRATION

ISSUE/REVISION

I/R	DATE	DESCRIPTION

PROJECT NUMBER

60332065

FIGURE 1:
PROPOSED WWPCP IMPROVEMENTS

Existing Conditions

The current treatment facilities at the Elyria WWPCP include three major trunk sewers or Interceptors, which convey wastewater flow from the City to the WWPCP.

Along the east side of the WWPCP, the East Side Interceptor (ESI) enters from the south and joins with the Gulf Road/ Windward Avenue sewer. The combined sewer flows are conveyed west to the East Screening Building, where the wastewater is screened prior to continuing on to the West Primary Treatment train during dry weather or to the East Primary Treatment train during wet weather conditions.

Along the west side of the WWPCP, the West Side Interceptor (WSI) conveys wastewater flow to the West Screening Building (WSB) via a three-barrel inverted siphon sewer into the West Influent Chamber. After screening of the wastewater in the WSB, the wastewater flows to the West Primary Treatment train during both dry and wet weather conditions.

Flows greater than the existing capacities of the East and West Primary Treatment trains are diverted to the existing 1.85-million gallon (MG) Wet Weather Storage Tank (WWST). The WWST has a 3.5 feet wide by approximately 4-feet high ring trough around the outer perimeter. Any flows beyond the capacity of the existing WWST are collected in the overflow ring trough and conveyed to existing Wet Weather Head Chamber No. 1 and on to the Black River.

The Elyria WWPCP is located in a former valley, which was backfilled with fill soils to create a level area for the WWPCP. Consequently many of the facilities within the WWPCP are surrounded by fill soils. Majority of the east and south areas of the WWPCP are open landscaping, with various wastewater treatment facilities such as Administration Buildings, Screening Buildings, Treatment Tanks, WWST and associated sewers and structures located along the central and northern areas of the plant limits. The Black River flows along the west edge of the WWPCP and is approximately 100 feet lower than the WWPCP.

Based on the proposed project plans, the existing grade elevation ranges from EL 678 at the east end of the WWPCP near the ESRS sewer/ East Diversion Structure to EL 662 at the west end of WWPCP near the West Diversion Structure. Surface elevations drop steeply to the north to the existing WWST and Primary Settling Tanks.

Proposed WWPCP Phase 1 Improvements

The following memorandum deals specifically with the WWPCP Phase 1 - Wet Weather Diversion Structures and Piping Improvements, which constitute the first portion of the WWPCP improvements to be constructed in 2023/2024. Figure 1 provides an overview of the entire WWPCP improvements as proposed.

Phase I improvements will be completed to manage the increased flows when the ESRS sewer is constructed and connected to the WWPCP. The improvements include construction of new East and West Diversion Structures and modification to the existing WWST with associated piping and structures such as Junction Structures and manholes. Our specific understanding of the project elements is as summarized below and is based on the project plans available at the time of this memorandum.

East Diversion Structure: A new East Diversion Structure (EDS) will be constructed on the existing 36-inch diameter East Side Interceptor (ESI). This Diversion Structure will receive flows for the ESI, the 36-inch diameter Gulf Road/ Windward Avenue sewer and the new 78-inch diameter East Side Relief Sewer (ESRS Phase 1 sewer). Flow to the WWPCP will be controlled by a new sluice gate, with the excess flow overtopping a weir in the EDS and entering the new 72-inch wet weather sewer which will convey the flow to Junction Structure JS-3 and from there to the existing Wet Weather Overflow Chamber No. 1. The EDS will be constructed of reinforced concrete and will be partially covered. The EDS will have approximate plan dimensions of 31 feet long by 22 feet wide with a central weir and is anticipated to be 10 to 12 feet deep below grade surface (bgs). On the south side of the EDS, the 78-inch diameter ESRS joins with the 36-inch diameter ESI in the adjacent existing Junction Structure No. 2. The 36-inch diameter Effluent sewer to the WWPCP with the new sluice gate will be constructed along the north wall of the Structure. Overflows will top the weir and flow into the new 72-inch diameter wet weather influent sewer located west of the weir and exiting along the northwest wall of the EDS.

West Diversion Structure: A new West Diversion Structure (WDS) will be constructed to replace the existing West Influent Chamber to allow for diversion of flows from the existing 72-inch diameter West Side Interceptor (WSI). The WDS will receive flows from the WSI with regular flow to the WWPCP via a 48-inch diameter sewer controlled by a new sluice gate along the east wall of the WDS. The WDS will be constructed with a weir to direct the excess wet weather flow overtop the weir and enter the new 72-inch wet weather influent sewer which will convey the flow to Junction Structure JS-5 and from there to Junction Struture JS-3 where it will combine with wet weather flow from the EDS and be conveyed to the existing Wet Weather Overflow Chamber No. 1. The WDS will be constructed of reinforced concrete and will be partially covered. The WDS will have approximate plan dimensions of 32 feet long by 22 feet wide. Overflows topping the weir will flow via the new 72-inch diameter wet weather influent sewer out the south of the structure to Junction Structure JS-5. The new West Diversion Structure is anticipated to be 13 to 14 feet deep bgs.

Modifications to the WWST: The existing Wet Weather Storage Tank will be modified to allow more flow to enter and exit the tank. The floor slab of the existing ring trough around the WWST will be removed on the north side of the tank, thereby creating a 3.5 feet wide by 7 feet long hole (inside dimensions) to allow overflows into a rectangular 11 feet long by 7 feet wide collection structure. A new 60-inch diameter conveyance sewer will convey the flow from this collection structure to the existing Wet Weather Head Chamber No. 1.

Conveyance Sewers with associated structures: The conveyance sewers along with associated structures constructed in Phase 1 consist primarily of the 72-inch wet weather influent sewers from the EDS and WDS to Junction Structure JS-3 and 78-inch diameter influent sewer to existing Wet Weather Overflow Chamber No. 1, and the 60-inch diameter conveyance sewer from the north side of the WWST to existing West Weather Head Chamber No. 1.

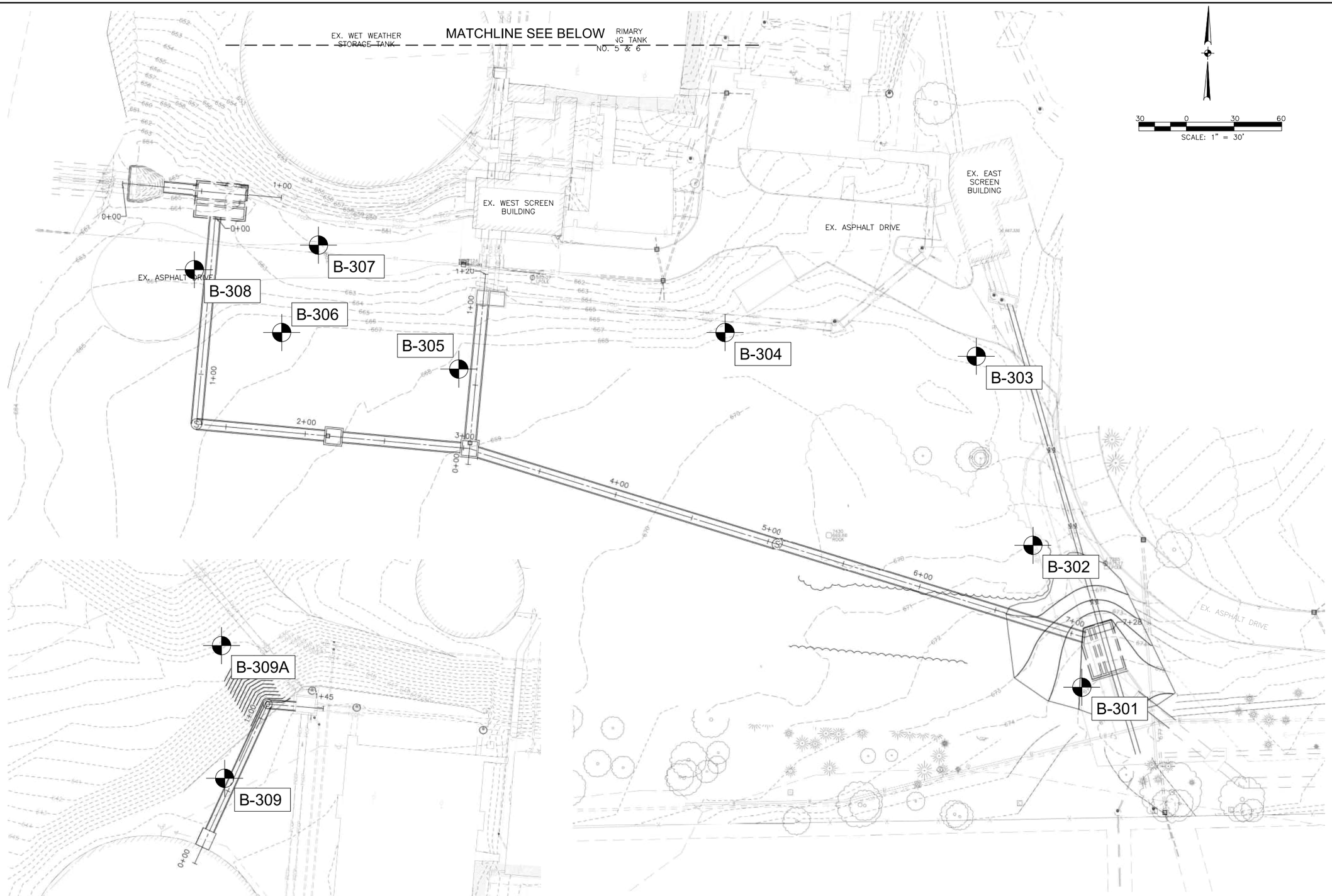
The wet weather influent sewers consist of the following sections:

- From the EDS, the first section consists of an approximately 400 feet long section of 72-inch diameter sewer from the EDS to Junction Structure JS-3. This section of the sewer has a slope of 0.4% with an invert at a depth of 10 to 19 feet bgs.
- From the WDS, the first section consists of an approximately 100 feet long section of 72-inch diameter sewer from the WDS to Junction structure JS-5, including a 90-degree bend. This section of the sewer has a slope of 1% and an invert approximately 12 to 15 feet bgs.
- In the future, Junction Structure JS-5 will connect to the north to the proposed Wet Weather Screening Building which will connect directly to the existing WWST. However, until that time, flow from the WDS will continue to the east in a 72-inch diameter sewer from JS-5 to JS-3. This section of sewer has a slope of 0,5% and is 15 to 19 feet bgs.
- The last section of the wet weather influent sewer consists of an approximately 78 feet long section of 78-inch diameter sewer from JS-3 to the existing Wet Weather Influent Chamber No. 1. This section of sewer has a slope of 0.8% and is approximately 17 to 19 feet bgs.
- The new WWST effluent conveyance sewer consists of an approximately 105 feet long section of 60-inch diameter sewer from the WWST to the existing Wet Weather Head Chamber No. 1 with an associated 70-degree bend. This section of the sewer will have a slope of 0.21% and an invert located approximately 10 feet bgs.

The major elements of the Phase 1 improvements described above along with soil borings performed for these elements are shown in the attached Figure 2 – Soil Boring Locations.

Proposed WWPCP Phase 2 Improvements

Phase 2 improvements consist of the proposed Wet Weather Screening and Treatment building and associated piping connections from JS-5 to the proposed building and from the building to the existing WWST. Details of the proposed building have not been developed at this time. The new WWTB will be located south of the existing WWST within the south-western portion of the WWPCP limits in an open green space area south of the existing access road. The WWTB is expected to be a one-story above grade masonry wall building with a multi-level basement. .



AECOM

PROJECT

WET WEATHER DIVERSION STRUCTURES AND PIPING IMPROVEMENTS

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1300 EAST 9th STREE, SUITE 500
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FIGURE 2:
SOIL BORING LOCATIONS

General Geologic Setting

The project area is located approximately five to ten miles south of the Lake Erie shoreline and has historically been subjected to multiple glacial advances and retreats. The site is located within the Berea Headlands sub-region of the Erie Lake Plain physiographic region of Ohio, according to the Ohio Department of Natural Resources (ODNR) Division of Geological Survey (DGS) publication "Physiographic Regions of Ohio" (1998). The Erie Lake Plain is a part of the Interior Low Plateaus province within the Interior Plains division of Ohio. The general terrain of the Erie Lake Plain consists of areas of low relief along the southern shore of Lake Erie, separated from the lake by shoreline cliffs.

The Berea Headlands sub-region is underlain by the Berea Sandstone and Bedford Shale, Undivided bedrock formations. According to United States Geological Survey (USGS) Online Spatial Data, the bedrock consists primarily of sandstone and shale. The upper portion of the bedrock consists of brown sandstone with minor shale interbeds, ranging in thickness from 5 to 125 feet. The sandstone is underlain by gray to brown shale, ranging in thickness from 80 to 180 feet.

The ODNR DGS publication "Surficial Geology of the Lorain and Put-in-Bay 30x60 Minute Quadrangles" (2005) indicates that the surficial soils in the project location consists of Wisconsinan-age sand and gravel, silt, and glacial till. Surficial soils are glacial and glaciolacustrine in origin. Thickness of surficial soil averages between 10 and 20 feet in the project vicinity. Silt deposits may contain thin sand partings and clay, sand, or gravel layers. Sand and gravel are interbedded within sand and gravel layers, which may also contain thin, discontinuous layers of silt and clay. Till soils consist of a mix of silt, clay, sand, gravel, boulders, and contain lenses of silt, sand, or gravel. According to the ODNR 2005 publication, bedrock depth in general averages from 10 to 20 feet across the project site.

Subsurface Exploration

Ten exploratory borings were drilled and are shown in Figure 2. Borings B-301 through B-309A were drilled in the WWPCP property limits. The ten borings were drilled between September 3, 2015 and September 10, 2015. All borings were drilled by AECOM's subcontractor, Ohio TestBor (OTB). Borings B-301 through B-308 were drilled using a truck-mounted Mobile B-57 drill rig, while borings B-309 and B-309A were drilled using a rubber-track ATV-mounted Mobile B-57 drill rig. The borings were extended to depths ranging from 10 to 30 feet below existing ground surface (bgs).

Proposed boring locations were marked in the field by AECOM engineers and referenced to existing surface features. Boring locations were based upon proposed alignment alternatives being considered at the time of this investigation. After initial field marking, AECOM's subcontractor OTB notified the Ohio Utility Protection Service (OUPS) and requested marking of underground utilities at each boring location.

The City of Elyria Department of Public Works was also notified of the drilling activities prior to the start of work. Boring locations were adjusted in the field by the drilling subcontractor based on equipment access conditions and conflicts with utility markings.

Borings B-301 through B-308 were drilled using 3.25-inch inner diameter, continuous flight, hollow-stem augers, while borings B-309 and B-309A were drilled using 2.25-inch inner diameter, continuous flight, hollow-stem augers.

A 2-inch split spoon was used for the soil sampling. Groundwater levels were measured during drilling, and at drilling completion. Upon completion of drilling and sampling, borings were subsequently backfilled with drill cuttings. Borings drilled through pavement were backfilled to the surface with asphalt cold patch.

An AECOM geologist or geotechnical engineer was present for the drilling of all borings to monitor and direct the driller, classify and log samples, and collect samples. Soil and rock samples were collected from the borings for visual classification and testing. The samples were obtained by Standard Penetration Testing (SPT) with a split-spoon sampler at 2-1/2 feet intervals, in general accordance with ASTM D 1586. Soil samples obtained were transported to the AECOM Cleveland office on Euclid Avenue for review, storage and assignment for laboratory testing of selected soil samples.

A complete set of boring logs, including legend sheets for soil and rock descriptions and types of sampling, are provided in Appendix A. Table 1 below summarizes the as-surveyed completed boring locations, surveyed elevations, and total borehole depth.

Table 1: Summary of Soil Boring Locations

Boring ID	Northing (ft)	Easting (ft)	Surface Elevation (ft)	Total Borehole Depth (ft bgs)
B-301	633467.68	2080775.66	673.7	30.0
B-302	633556.99	2080744.90	670.1	15.0
B-303	633675.95	2080709.23	668.4	15.0
B-304	633690.88	2080551.14	664.5	15.0
B-305	633669.58	2080383.58	667.9	24.4
B-306	633690.895	2080272.14	666.5	28.7
B-307	633745.88	2080295.27	661.9	19.5
B-308	633730.44	2080217.21	663.7	10.0
B-309	633977.95	2080373.34	650.6	23.5
B-309A	633977.95	2081141.34	636.0	15.0

Subsurface Conditions

The exploration encountered a relatively uniform subsurface profile across the project site, consisting of predominantly fine-grained deposits. From highest to lowest elevation, the subsurface layers generally consisted of surficial materials, fill materials, native fine-grained deposits, and shale bedrock. The sections below describe the subsurface conditions encountered in greater detail.

Surficial Materials: Surface materials at all boring locations but B-308 consisted of grass and topsoil. Topsoil thicknesses ranged from 3 to 17 inches. Boring B-308 was drilled within an existing asphalt driveway. Pavement materials consisted of 6 inches of asphalt underlain by 10 inches of gravel and sand subbase.

Fill Materials: Fill materials were encountered in all borings but B-302, and generally extended to depths ranging from 3 to 8 feet bgs. Fill materials generally consisted of medium stiff to stiff silt or lean clay with varying amounts of sand and gravel. The fill materials encountered in B-309 extended to a depth of 17 ft bgs and consisted of dark brown and gray lean clay with gravel, sand, peat, wire fragments, and plastic. A seam of No. 57 crushed limestone, approximately 9 inches thick, was encountered in B-309 at a depth of 11 feet bgs.

Native Fine-Grained Deposits: Native fine-grained deposits were encountered below the surficial or fill material in all of the borings and extended to bedrock at depths ranging from 8 to 21.8 ft bgs. The deposits generally consisted of a moist, brown becoming gray with depth, stiff to hard lean clay (CL) with varying quantities of sand and trace quantities of gravel and/or rock fragments. Pocket penetrometer results generally varied from 3.5 to greater than 4.5 tsf, with an average value near 4.5 tsf, indicating a mostly very stiff to hard consistency. The fine-grained deposit in boring B-303 from 5.5 to 11.8 feet bgs had pocket penetrometer readings of 1.0 to 1.5 tsf indicating a soft consistency.

In borings B-301 and B-303, a layer of sandy silt to silty sand, 0.7 to 2.8 feet in thickness, was encountered below the fine-grained deposits and above bedrock. The sand and silt layers had a medium dense to hard consistency, and likely consist of residual bedrock.

Bedrock: Bedrock was encountered below the cohesive till deposits in all borings but B-302 and B-309A. Bedrock was encountered at depths ranging from 8.0 to 21.8 feet bgs and consisted of red to gray shale, moderately to severely weathered, with soft to medium hardness. The bedrock was able to be drilled to a depth of up to 15 feet using a hollow-stem auger.

Groundwater: Water was encountered within granular pockets/ layers at 6.8 feet bgs in B-304 and at 13.5 feet bgs in B-309. Water was not encountered in any other borings. Due to the short time the boreholes were open and the tendency of drilling to seal off groundwater flow paths, these groundwater levels encountered may not be representative of the long-term groundwater levels at the site. In addition, groundwater levels also tend to fluctuate due to seasonal changes.

While the soil deposits were predominately moist and not wet during drilling, the presence of sand pockets/ lenses is relatively common in Northeast Ohio glacial tills and granular layers overlying the till as encountered in Borings B-304 and B-309. These materials may hold groundwater, occasionally under pressure due to confinement by the more fine-grained, low

permeability soils above. The Contractor should be prepared to deal with potential groundwater released by excavation in these materials, as encountered in select locations.

Geotechnical Recommendations

The following sections present geotechnical preliminary recommendations to assist design and construction of the various elements of the proposed wet weather improvements. These recommendations are based on visual observations of the completed geotechnical investigation. The recommendations and analysis are presented below for each specific element of the project.

Proposed Wet Weather Screening and Treatment Building (WWTB)

Summary of Subsurface Conditions: Boring B-306 was drilled within the footprint of the WWTB and indicates a generalized subsurface profile anticipated at the location of the WWTB. The profile, from the ground surface downward, generally consists of surficial 1.0 feet thick topsoil material, a 4.5 foot thick layer of stiff to very stiff cohesive fill soils, a 7.5 foot thick native stiff to hard clay (till or completely weathered shale) layer to 13 feet bgs, and weathered bedrock consisting of severely weathered shale to the termination depth of 29 feet bgs. Groundwater was not encountered in the boring.

Interpreted Ground Behavior:

- Based on the limited thickness encountered, the surface materials and fill soils are not anticipated to pose specific construction challenges for the proposed open cut WWSF construction.
- The native clay soils increase in strength with depth, and hard clay till from 5.5 feet to 13 feet bgs is a relatively competent material (as indicated by relatively high SPT and pocket penetrometer measurements made during the geotechnical exploration); therefore, significant deformations or ground loss/ settlement adjacent to or within properly implemented open cut excavations is not expected. The native soils are anticipated to be stable and capable of supporting the WWTB structure foundation and the intermediate bypass channel foundation.
- Boring indicates that weathered shale bedrock exists at the lower central effluent channel foundation bearing level for the WWTB lower level. The weathered shale present in lower portions of the effluent channel may present slightly more difficult excavating conditions than the overlying cohesive till layer at the bypass channel excavation level. However, excavations extending a few feet into shale bedrock can likely be advanced using standard equipment without special attachments. The Contractor should anticipate hard excavation with lower progress rates, especially in the excavations that proceed through the hard till layer with broken shale fragments.

Excavation Support and Groundwater Control:

- Based on the anticipated subsurface conditions, excavations for the WWTB can be implemented using open cut techniques. The consistencies of the onsite soils should allow excavation with a moderate size hydraulic excavator or backhoe. After excavation, unsupported sidewalls should be sloped back or shored to permit safe working conditions, in accordance with OSHA requirements for protective systems (29 CFR 1926.652). Surface water should be diverted away from open excavations.
- Alternately, since this facility is in a congested area just south of an active roadway with various existing utilities located within 25 feet of the excavation, a braced structural excavation support system may be utilized, if desired. The Contractor

should be responsible for the design of this system and the project plans and specifications should require a performance-based contractor design.

- Significant groundwater infiltration into excavations is not anticipated at this location since the majority of the soil and rock formations expected to be encountered are comprised of relatively low permeability materials. Minor groundwater may be encountered within the silty sand lenses or other localized coarse-grained zones interbedded within the native till deposit, and also at the clay till-weathered bedrock interface. Rates of inflow are anticipated to be minimal to moderate and could likely be managed using a system of sumps and pumps.

Design and General Construction Recommendations:

- It is anticipated that the structural loads from the WWTB will be relatively light with wall loads ranging from 1.5 to 2 kips per foot. It is recommended that the WWTB building be supported on shallow spread footings bearing on engineered fill soils placed to replace the stiff to very stiff lean clay fill soilsl, the stiff to hard native clay soils or the weathered shale bedrock dependent on the level of bearing. The foundations for the first floor level will bear on engineered fill placed to replace the stiff to very stiff cohesive fill soils encountered to a depth of 5.5 feet bgs. The foundations for the intermediate level screen channel will likely bear within the stiff to hard native clay soils (similar to clay till) encountered to a depth of 13 feet bgs. The foundations for the lowermost effluent channel and tank levels will likely bear within the weathered shale bedrock encountered to the termination depth. All these bearing surfaces are considered adequate to support the WWTB shallow spread foundations.

- Shallow spread footings bearing on undisturbed stiff to hard lean clay a minimum of 4 feet below existing grade may be designed for a recommended net allowable bearing capacity of 3,000 pounds per square foot (psf).

- Estimated settlement of shallow spread footings constructed as recommended herein is less than 1 inch of total settlement at discrete column locations, and approximately ½ inch of differential settlement from center to edge of wall foundations or across the WWTB building footprint.

- For analyses of sliding resistance of the shallow foundations, an ultimate friction factor between soil and concrete of 0.40 should be utilized. Foundation should be sized to provide a minimum factor of safety of 1.5 against sliding.

- Exterior shallow spread footings should bear at least 42 inches below the final grade to protect against frost heave, regardless of the depth where suitable bearing strata described above are first encountered.

- To prevent a localized, punching shear failure, interior column footings should have minimum dimensions of at least 3 feet square, and exterior columns of at least 2 feet square. Provided that the loads are applied uniformly to the footings, strip footings for masonry walls should be constructed in accordance with the Ohio Basic Building Code with footings at least 8 inches wider than the wall supported thereon.

- The depth to the bearing surface may vary in the field based on the soil conditions encountered during construction. All proposed bearing surfaces should be verified by

a qualified geotechnical engineer or engineering technician. If a bearing surface is deemed unacceptable for the prescribed bearing capacity, excavation should proceed to a depth where competent material is encountered.

- At any footing where an overexcavation is required, the footing may either be constructed at the lower elevation, or the overexcavation can be backfilled to the design bearing elevation with lean concrete, or low strength material (LSM) / flowable fill having a minimum strength of 500 psi.

- To minimize the potential for differential settlement, one structure should not bear on two different materials. If varying bearing materials are encountered in one footing excavation, the entire footing excavation should proceed through the upper bearing material and into the lower bearing material, unless otherwise directed by a qualified geotechnical engineer.

- Footing excavations should be free of loose material and standing water, and be inspected by a qualified geotechnical engineer or technician prior to placement of concrete. All concrete for foundations should be placed on the day of the excavations. Care should be taken by the contractor to ensure that the bearing surface is not permitted to deteriorate. Cautionary measures may include: (1) expediting the placement of concrete; (2) over-excavation and placement of a layer of lean concrete or low strength material (LSM) / flowable fill.

- Bearing surface grade changes for shallow spread footings between varying levels for the WWTB should occur in vertical steps cut no steeper than 2 horizontal to 1 vertical with a maximum vertical grade change within any stepped footing limited to a maximum of 2 feet.

- The floor of the new WWTB building will likely consist of a rigid slab-on-grade. Other interior and exterior slabs may also be constructed to support miscellaneous equipment for the project.

- Any topsoil/ fill soil encountered within a foot of the proposed finished floor bearing level should be undercut and replaced by a minimum 6-inch thick layer of granular Structural Fill that should then be compacted and proofrolled, up to the subgrade elevation of the new slab.

- The WWTB floor slab and any other interior slabs should be isolated from columns and support walls to allow for differential movement (e.g., should be designed as “floating” slabs).

- Exterior slabs should be provided with a minimum 6-inch thick free-draining aggregate base course consisting of AASHTO No. 57 stone. The aggregate base course should be positively drained away from the bearing surface of the slab.

- Floor slabs, constructed as recommended above, may be designed using a modulus of subgrade reaction equal to 150 pounds per cubic inch.

- Earth pressures on WWTB walls may be computed using equivalent earth pressures as follows:
    - At-Rest Pressure (Restrained Walls): 75 pcf
    - Active Pressure (Unrestrained Walls): 55 pcf

- If surcharge pressures will exist at the ground surface adjacent to underground walls, 75% of the total surcharge load should be assumed to act in a uniform distribution across the vertical depth of the wall.

- New asphalt pavement constructed along the east and west perimeter of the WWTB to provide truck access to these areas can be supported on subgrades of the existing materials on site, prepared as recommended previously by undercutting, placing a minimum 6-inch thick aggregate base course (ODOT CMS Item 304 or equivalent) and an underdrain system should be provided below all pavements. The pavement subgrade and aggregate base course should be graded to drain by gravity toward the underdrain system. The underdrain system should be discharged into the site stormwater system. Provided that all of these recommended features are incorporated, a California Bearing Ratio (CBR) value of 6 can be assigned to the subgrade soils for pavement design.

- Based on the subsurface conditions revealed by the borings and laboratory testing, the site is designated Seismic Site Class D, as defined in the 2005 Ohio Building Code, Section 1615.1.1.

East Diversion Structure

Summary of Subsurface Conditions: Boring B-301 was drilled in the vicinity of the EDS and presents a generalized subsurface profile anticipated at the location of the new cast-in-place EDS. The profile, from the ground surface downward, generally consists of surficial 1-1/2 feet thick topsoil material, a 6-1/2 foot thick layer of medium stiff to hard silt/ sandy silt fill soils to 8 feet bgs, a 13-1/2 foot thick native hard lean clay or sandy silt (till) layer with boulders to 21.8 feet bgs, and weathered bedrock consisting of severely weathered shale to the termination depth of 30 feet bgs. Groundwater was not encountered in the boring.

Interpreted Ground Behavior:

- Based on the limited thickness encountered, the surface materials and fill soils are not anticipated to pose specific construction challenges for the proposed open cut construction.
- The native clay soils increase in strength with depth, and hard clay till from 8 feet to 21.8 feet bgs is a relatively competent material (as indicated by relatively high SPT and pocket penetrometer measurements made during the geotechnical exploration); therefore, significant deformations or ground loss/ settlement adjacent to or within properly implemented open cut excavations is not expected. The native soils are anticipated to be stable and capable of supporting the EDS structure.
- Boring indicates majority of the excavation to the proposed bearing level of the EDS will extend through the hard clay till soils. The excavations extending into the clay till can likely be advanced using standard equipment without special attachments. The Contractor should anticipate hard excavation with lower progress rates, especially in the portion of excavations that proceed through the hard till layer with broken shale fragments.

Excavation Support and Groundwater Control:

- Based on the anticipated subsurface conditions, shallow excavations to a depth of 12 to 14 feet bgs for the EDS can be implemented using open cut techniques since the area within the excavation is anticipated to be clear of utilities, except for the deep Interceptor sewers that are supposed to tie into the EDS. Since the excavations will extend through the cohesive fill soils and terminate in the stiff upper native cohesive soils, open cut methods of excavation are considered applicable. Open cut excavations are anticipated to encounter the cohesive fill, and native fine-grained till deposits. These deposits are anticipated to be dry to moist due to the presence of large amount of fines. Excavations will also take place in an open field without any existing structures or utilities located in the immediate vicinity except for the deep Interceptor sewers. Open cuts should have side slopes not exceeding 1H: 1V. In any event, unsupported sidewalls after excavation should be sloped back or shored to permit safe working conditions, in accordance with OSHA requirements for protective systems (29 CFR 1926.652). The consistencies of the onsite soils should allow excavation with a moderate size hydraulic excavator or backhoe. Where cuts are made in close proximity to existing structures or utilities, it is recommended that a positive support system (i.e., trench boxes or shields) be utilized. The Contractor should be prepared to use diversion trenches, sumps, and pumps to control minor seepage and inflows, that may occur in excavations left open for a longer duration of time. Such equipment should be on-hand during construction. Surface water should be diverted away from open excavations.
- Significant groundwater infiltration into excavations is not anticipated at this location since the majority of the soil and rock formations expected to be encountered are comprised of relatively low permeability materials. Minor groundwater may be encountered within the silty sand lenses or other localized coarse-grained zones interbedded within the native till deposit, and also at the clay till-weathered bedrock interface. Rates of inflow are anticipated to be minimal to moderate and could likely be managed using a system of sumps and pumps.

Design and General Construction Recommendations:

- The bearing surface (hard clay till) layer is considered adequate to support the EDS. The structure floor will bear on undisturbed stiff to hard lean clay till and may be designed for a recommended net allowable bearing capacity of 4,000 pounds per square foot (psf).

- The floor slab for the EDS may be designed using a modulus of subgrade reaction equal to 200 pounds per cubic inch.

- Earth pressures on the EDS walls may be computed using equivalent earth pressures as follows:
    - At-Rest Pressure (Restrained Walls): 75 pcf
    - Active Pressure (Unrestrained Walls): 55 pcf

West Diversion Structure

Summary of Subsurface Conditions: Boring B-308 was drilled in the vicinity of the WDS and presents a generalized subsurface profile anticipated at the location of the new cast-in-place WDS. The profile, from the ground surface downward, generally consists of surficial 1-1/4 ft thick asphalt pavement and subbase material, a 3-1/2 foot thick layer of gravel fill for roadway subgrade fill layer to 5 feet bgs, a 3 foot thick native soft to medium stiff native clay

deposit to 8 feet bgs, and highly to severely weathered bedrock consisting of severely weathered shale to the termination depth of 10 feet bgs. Groundwater was encountered within the granular fill layer at a depth of 4.8 feet in the boring but is anticipated to represent perched water from surface drainage in the pavement and granular layers trapped above the underlying native cohesive soils.

Interpreted Ground Behavior:

- Based on the thickness encountered, the surface materials and fill soils may need to be positively supported during the proposed construction.
- The native soft to medium stiff clay soils to a depth of 8 feet bgs also have limited strength to stand unsupported for a long period of time and will need positive face support. The shale bedrock beyond a depth of 8 feet bgs is a relatively competent material (as indicated by relatively high SPT and pocket penetrometer measurements made during the geotechnical exploration); therefore, significant deformations or ground loss/ settlement adjacent to or within properly implemented excavations is not expected. The native soils above the bedrock will need positive support while the shale bedrock is anticipated to be stable and capable of supporting the WDS structure.
- Boring indicates majority of the excavation to the proposed bearing level of the WDS will extend through the granular fill and relatively soft native clay soils to a depth of 8 feet. The excavations extending to the shale bedrock can likely be advanced using standard equipment without special attachments. The Contractor should anticipate hard excavation with lower progress rates, especially in the portion of excavations that proceed through the shale bedrock.

Excavation Support and Groundwater Control:

- Based on the anticipated subsurface conditions, shallow excavations to a depth of 14 feet bgs for the WDS can be implemented using open cut techniques with positive face support such as in a trenchbox or alternate earth retention system. Unsupported sidewalls after excavation should be sloped back or shored to permit safe working conditions, in accordance with OSHA requirements for protective systems (29 CFR 1926.652). The consistencies of the onsite soils should allow excavation with a moderate size hydraulic excavator or backhoe. Where cuts are made in close proximity to existing structures or utilities, it is recommended that a positive support system (i.e., trench boxes or shields) be utilized. The Contractor should be prepared to use diversion trenches, sumps, and pumps to control minor seepage and inflows, that may occur in excavations left open for a longer duration of time. Such equipment should be on-hand during construction. Surface water should be diverted away from open excavations.
- Significant groundwater infiltration into excavations is not anticipated at this location since the groundwater encountered during drilling is anticipated to represent trapped perched water with little recharge capabilities. In addition, a majority of the cohesive soil and shale rock formations expected to be encountered are relatively low permeability materials. Minor groundwater may also be encountered within the upper granular fill soils or other localized coarse-grained zones interbedded within the native till deposit, and also at the clay till-weathered bedrock interface. Rates of inflow are anticipated to be minimal to moderate and could likely be managed using a system of sumps and pumps.

Design and General Construction Recommendations:

- The bearing surface (weathered shale bedrock) layer is considered adequate to support the WDS. The structure floor will bear on undisturbed shale bedrock and may be designed for a recommended net allowable bearing capacity of 4,000 pounds per square foot (psf).

- The final bearing surface on weathered shale is subject to deformation and softening if left open for a long duration of time. It is recommended that a layer of flowable fill be placed above the exposed face of the shale bedrock prior to placement of concrete floor of the WDS to protect the bearing surface.

- The floor slab for the WDS may be designed using a modulus of subgrade reaction equal to 200 pounds per cubic inch.

- Earth pressures on the WDS walls may be computed using equivalent earth pressures as follows:
    - At-Rest Pressure (Restrained Walls): 75 pcf
    - Active Pressure (Unrestrained Walls): 55 pcf

Modifications to the WWST and Effluent Conveyance Sewer

Summary of Subsurface Conditions: Borings B-309 and B-309A were drilled in the vicinity of the proposed WWST modifications and Effluent Conveyance Sewer and presents a generalized subsurface profile anticipated at the location. The profile, from the ground surface downward, generally consists of surficial 3/4 feet thick topsoil underlain by 11 to 17 foot thick, medium stiff to hard clay fill soils with peat, plastic and wire fragments. The fill layer was underlain by highly weathered shale to the explored depth at B-309 and by hard clay till layer at B-309A. Trapped perched groundwater was encountered within the granular fill layer (specifically crushed limestone fragments) at a depth of 10.5 feet in boring B-309 with water seeping into the boring at a rate of 0.3 gpm. However, no groundwater was encountered in boring B-309A indicating that the perched water is localized in granular layers trapped above the underlying native cohesive soils.

Interpreted Ground Behavior:

- Based on the thickness and variable consistency encountered, the surface materials and fill soils may need to be positively supported during the proposed construction. In addition the soils contained granular zones that may be wet and will require positive face support to prevent sloughing.
- The native weathered shale bedrock or hard clay till encountered below a depth of 12 to 15 feet bgs is a relatively competent material (as indicated by relatively high SPT and pocket penetrometer measurements made during the geotechnical exploration); therefore, significant deformations or ground loss/ settlement adjacent to or within properly implemented excavations is not expected. The shale bedrock/ hard clay till is anticipated to be stable and capable of supporting the outlet structure constructed adjacent to the ring trough of the WWST.
- The Effluent Conveyance Sewer is approximately 8 to 10 feet bgs, with the excavation for the sewer installation extending through surficial and variable cohesive fill layers. The excavations are not expected to extend to the shale bedrock and can likely be advanced using standard equipment without special attachments.

Excavation Support and Groundwater Control:

- Based on the anticipated subsurface conditions, shallow excavations for the collector structure, Effluent Conveyance sewer and associated manhole an anticipated depth of 10 feet bgs can be implemented using open cut techniques with positive face support such as in a trenchbox or alternate earth retention system. Since the excavation will be adjacent to the ring trough channel of the WWST, with associated base slab removal, the proposed braced excavation will also have to support the existing WWST opening along the north face of the excavation. Unsupported sidewalls after excavation should be sloped back or shored to permit safe working conditions, in accordance with OSHA requirements for protective systems (29 CFR 1926.652). The consistencies of the onsite soils should allow excavation with a moderate size hydraulic excavator or backhoe. Where cuts are made in close proximity to existing structures or utilities, it is recommended that a positive support system (i.e., trench boxes or shields) be utilized. The Contractor should be prepared to use diversion trenches, sumps, and pumps to control minor seepage and inflows, that may occur in excavations left open for a longer duration of time. Such equipment should be on-hand during construction. Surface water should be diverted away from open excavations.
- Significant groundwater infiltration into excavations is not anticipated at this location since the groundwater encountered during drilling is anticipated to represent trapped perched water with little recharge capabilities. In addition, majority of the cohesive soil and shale rock formations expected to be encountered are relatively low permeability materials. Minor groundwater may also be encountered within the upper granular fill soils or other localized coarse-grained zones interbedded within the native till deposit, and also at the clay till-weathered bedrock interface. Rates of inflow are anticipated to be minimal to moderate and could likely be managed using a system of sumps and pumps.

Design and General Construction Recommendations:

- In general, the weathered shale bedrock or hard clay till layer is considered adequate to support the structures. The structures may be designed for a recommended net allowable bearing capacity of 3,000 pounds per square foot (psf).

EDS Wet Weather Influent Conveyance Sewer

Summary of Subsurface Conditions: Borings B-301 through B-305, along with B-307 were drilled along the proposed alignment of the influent conveyance sewer and associated structures. The profile, from the ground surface downward, generally consists of surface materials, a relatively thin layer of cohesive fill soils extending to depths of 3 to 8 feet bgs, native clay (cohesive) till, and weathered bedrock consisting of moderately to severely weathered shale extending to depths ranging from 8 to 22 feet bgs. Perched, localized groundwater was encountered at a depth of 6.8 feet bgs within a granular deposit within the fill layer in boring B-304 at time of drilling. No groundwater was encountered in the rest of the borings.

Interpreted Ground Behavior:

- Based on the limited thickness encountered, the surface materials and fill soils are not anticipated to pose specific construction challenges for the proposed open cut construction.
- The native clay soils increase in strength with depth, and hard clay till present throughout the alignment of the influent conveyance sewer is a relatively competent material (as indicated by relatively high SPT and pocket penetrometer measurements made during the geotechnical exploration); therefore, significant deformations or ground loss/ settlement adjacent to or within properly implemented trench excavations is not expected. Trench bottoms within this material are anticipated to be stable without the need for specific treatments.
- Results indicate that weathered shale bedrock exists at the expected pipe installation depth in a few localized pockets. These localized pockets of weathered shale may present somewhat more difficult excavating conditions than in the overlying till. However, excavations extending a few feet into bedrock can likely be advanced using standard equipment without special attachments. The Contractor should anticipate hard excavation with lower progress rates, especially in the excavations that proceed through the hard till layer with broken shale fragments.

Excavation Support and Groundwater Control:

- Based on the anticipated subsurface conditions, excavations for installation of the infuent conveyance sewer and associated structures can be implemented using open cut techniques. However, since this segment is in a congested area with various existing utilities for the normal operation of the WWPCP located within 25 feet of the proposed sewer alignment, open cut excavations should be implemented using positive face support and continuous side support. Applicable support systems include trench boxes (which may need to be stacked given the depth of the proposed sewer). Owing to the presence of nearby structures which may be susceptible to damage from ground vibration, excavations requiring impact or vibratory pile driving (such as sheet piling) should not be considered.
- Unsupported faces (such as the open ends of the positive face support system) should be limited to the allowable slopes per Occupational Safety and Health Administration (OSHA) requirements at all times during excavation, both to maintain safe working conditions and to minimize the potential for undermining/ ground loss around the support system. Furthermore, where allowable slopes cannot be achieved within the excavation limits indicated in the project documents, positive face support should be utilized.
- The overburden soils within this segment may be considered OSHA Type B materials, while bedrock may be considered OSHA Type A material.
- To limit potential for ground loss/ settlement in the vicinity of the excavation trench, it is recommended that the maximum length of trench excavation open at any given time be limited to approximately 50 feet.
- Significant groundwater infiltration into excavations is not anticipated along the sewer alignment since the majority of the soil and rock formations expected to be encountered are comprised of relatively low permeability materials. Minor groundwater may be encountered within localized granular lenses or coarse-grained zones interbedded within the native till deposit, and at the clay till-weathered bedrock interface. Rates of inflow are anticipated to be minimal to moderate and could likely

be managed using a system of sumps and pumps. It is further recommended that the sewer be constructed from downstream to upstream, to facilitate management of groundwater collection and control. Exposing limited reaches of the sewer and backfilling installed sections of the sewer before proceeding with further excavation may also help limit the amount of groundwater inflow anticipated in the open excavations.

Design and General Construction Recommendations:

- The subsurface soils at the bedding level of the new sewer will likely consist of stiff to very stiff, native cohesive lean clay till soils. These soils are considered to be capable of supporting the new sewer. Granular imported soil consisting of crushed limestone similar to ODOT 57 material may be specified for pipe bedding if unsuitable, poor, soft soils are encountered at the bedding level.

- Soil materials removed from excavations along the sewer may be considered for use as trench backfill above the zone of pipe bedding. The total unit weight of compacted backfills over piping and manhole bases may be assumed as 130 pcf.

- Pipe backfill material above the pipe zone can also consist of granular backfill material similar to ODOT 304 material in off-road areas, lawn and landscaping areas. Pipe backfill proposed under existing/ future roadway and pavement areas may consist of ODOT 304 granular material, especially in the upper 5 feet immediately beneath proposed subgrades as specified on the Drawings. Compaction of backfill materials should be in accordance with ODOT CMS or project Drawings and Specifications.

- Appropriate pipe design checks, including pipe crushing and deflection calculations should be performed.
- Competent, fresh to moderately weathered shale bedrock with high Rock Quality Designation (RQD) greater than 50 was not encountered within the borings. However, due to variability in bedrock elevations, it is recommended to include a small contingency amount of rock excavation for contractual bidding purposes.

- Surface materials, including existing pavement will need to be removed and replaced at the end of the project. The trench excavation width should be limited to the minimum extent necessary for pipe installation as shown on the Drawings and the action of heavy machinery on the existing pavement should be carefully controlled, to minimize disruption to the community, and impact to traffic and restoration requirements.

Limitations

The conclusions and recommendations presented in this memorandum are based on the assumption that our understanding of the existing site conditions and the scope of the project do not change substantially from what has been described herein, and that soil conditions do not deviate substantially from those represented by the borings taken during the subsurface exploration. Maintaining communication with AECOM is recommended to ensure that the suggestions made herein are properly interpreted and incorporated into the WWTB improvements design and construction.

Our project understanding has been stated in this memorandum. In the event that changes are made to the nature, design, or location of the proposed improvements, the conclusions and recommendations presented herein should not be considered valid, unless AECOM has reviewed the changes and addresses their impact on the recommendations provided.

The conclusions and recommendations presented in this memorandum are based on our analysis of the data collected for this project. The recommendations presented in this memorandum should not be used for other projects or purposes. Conclusions or recommendations made from these data by others are their responsibility. Our services were provided in a manner consistent with the level of care and skill ordinarily exercised by other professional consultants under similar circumstances and at the same period of time. No other representation is intended.

APPENDIX A

SOIL BORING LOGS

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 15% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 15% FINES	SM	SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

☒ Split Spoon

■ Pushed Shelby Tube

▽ Water Level at Time of Drilling

▼ Water Level after Drilling (with date measured)

The percentage of gravel, sand, and fines are stated in terms indicating a range of percentages, as follows:

Trace - Particles are present but estimated to be less than 5% Few - 5 to 10% Little - 15 to 25%

Some - 30 to 45% Mostly - 50 to 100%

Cohensionless Density with SPT Resistance:

0-4 Very Loose 5-9 Loose 10-29 Med. Dense 30-49 Dense 50+ Very Dense

Cohesive Consistency with SPT Resistance:

0-2 Very Soft 3-4 Soft 5-8 Med. Stiff 9-15 Stiff 16-30 Very Stiff 31+ Hard

GEOLOGIC LOG SYMBOLS AND ABBREVIATIONS

Project Name: MDC-SHCST

Location: Hartford, CT

AECOM

AECOM	CLIENT: **City of Elyria**	LOG OF BORING NUMBER: **B-301**
	PROJECT NAME: **Elyria Wet Weather Screening Facilities**	ARCHITECT-ENGINEER: **AECOM**

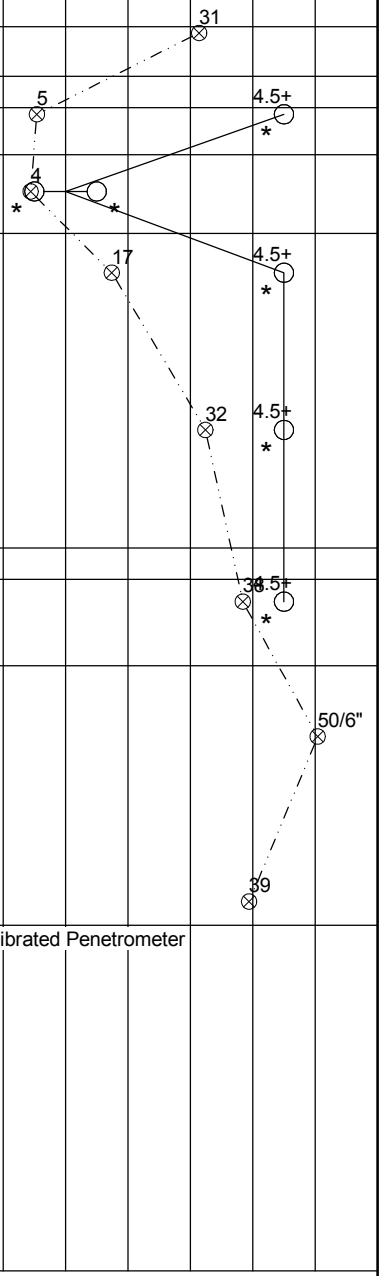
SITE LOCATION: **Elyria, OH**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
				SURFACE ELEVATION +673.7	
				17" TOPSOIL	
				1.4	
	1	SS		Dense, damp, light brown, SANDSTONE FRAGMENTS, possible boulder or cobble zone [FILL]	
				3.0	
				4.0 Loose, damp, dark brown, sandy SILT (ML), trace organics, gravel [FILL]	
5.0	2	SS		5.5 Hard, damp, mottled light brown and gray, sandy SILT (ML), trace gravel, rock fragments [FILL]	
	3	SS		Soft to medium stiff, brown, moist, SILT (ML), some sand [FILL]	
				8.0 2" clay seam at 6.8'	
10.0	4	SS		Hard, damp to moist, grayish brown, lean CLAY (CL), little sand, trace shale fragments [TILL]	
15.0	5	SS			
				18.0	
				19.0 BOULDER, hard drilling from 18.0' to 19.0'	
20.0	6	SS		Hard, damp, reddish gray, sandy SILT (ML) with shale fragments [TILL]	
				21.8	
25.0	7	SS		SHALE, reddish gray, highly weathered, very weak	
30.0	8	SS		becomes grayish red	
				30.0	



* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **633467.68**	BORING STARTED: **09/04/15**	AECOM OFFICE: **Cleveland, Ohio**	
EASTING: **2080775.659**	BORING COMPLETED: **09/04/15**	LOGGED BY: **E. BOGEN**	SHEET NO.: **1** OF **1**
WL: **None encountered**	RIG/FOREMAN: **Mobile B-57/A. Fay**	APP'D BY:	AECOM JOB NO.: **60332065**

AECOM LOG 60332065_ELYRIA_WWSF.GPJ FS_DATATEMPLATE.GDT 10/27/15

AECOM	CLIENT: **City of Elyria**	LOG OF BORING NUMBER: **B-302**
	PROJECT NAME: **Elyria Wet Weather Screening Facilities**	ARCHITECT-ENGINEER: **AECOM**

SITE LOCATION: **Elyria, OH**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	Penetration (BLOWS/FT)	Unconfined Compressive Strength (TONS/FT.^{2})
					SURFACE ELEVATION +670.1			
					1.0 TOPSOIL			
	1	SS			Hard, damp to dry, brown with red mottling, lean CLAY (CL), trace rock fragments [POSSIBLE FILL]		12	4.5+ *
5.0	2	SS					7	4.5+ *
	3	SS			8.0		15	4.5+ *
10.0	4	SS			Hard, damp to moist, grayish brown, lean CLAY (CL), little sand, trace gravel		20	4.5+ *
					11.8 Hard, damp to moist, gray, lean CLAY (CL), little sand, trace rock fragments			
15.0	5	SS			15.0		28	4.5+ *

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **633556.994**	BORING STARTED: **09/04/15**	AECOM OFFICE: **Cleveland, Ohio**	
EASTING: **2080744.901**	BORING COMPLETED: **09/04/15**	LOGGED BY: **E. BOGEN**	SHEET NO.: **1** OF **1**
WL: **None encountered**	RIG/FOREMAN: **Mobile B-57/A. Fay**	APP'D BY:	AECOM JOB NO.: **60332065**

AECOM LOG 60332065_ELYRIA_WWSF.GPJ FS_DATATEMPLATE.GDT 10/27/15

AECOM	CLIENT: **City of Elyria**	LOG OF BORING NUMBER: **B-303**
	PROJECT NAME: **Elyria Wet Weather Screening Facilities**	ARCHITECT-ENGINEER: **AECOM**

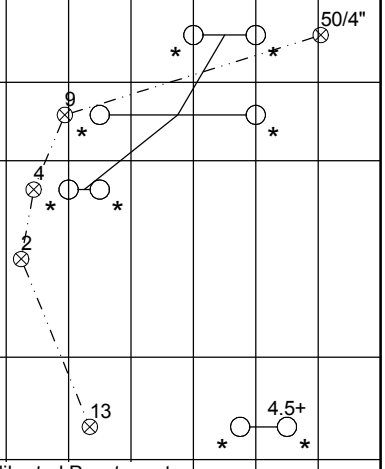
SITE LOCATION: **Elyria, OH**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
				SURFACE ELEVATION +668.4	
				0.3 3" TOPSOIL	
	1	SS		Stiff, dry, brown, silty CLAY (CL-ML) and sand, some gravel, concrete fragments, rock fragments, brick fragments [FILL]	
				3.0	
5.0	2	SS		Stiff to soft, moist, dark brown, clayey SAND (SC), trace fine gravel [FILL]	
				5.5	
	3	SS		Soft, moist dark brown and dark gray, lean CLAY (CL), some rock fragments, gravel	
10.0	4	SS			
				11.8	
				SHALE, red, highly to completely weathered, very weak	
15.0	5	SS		15.0	



* Calibrated Penetrometer

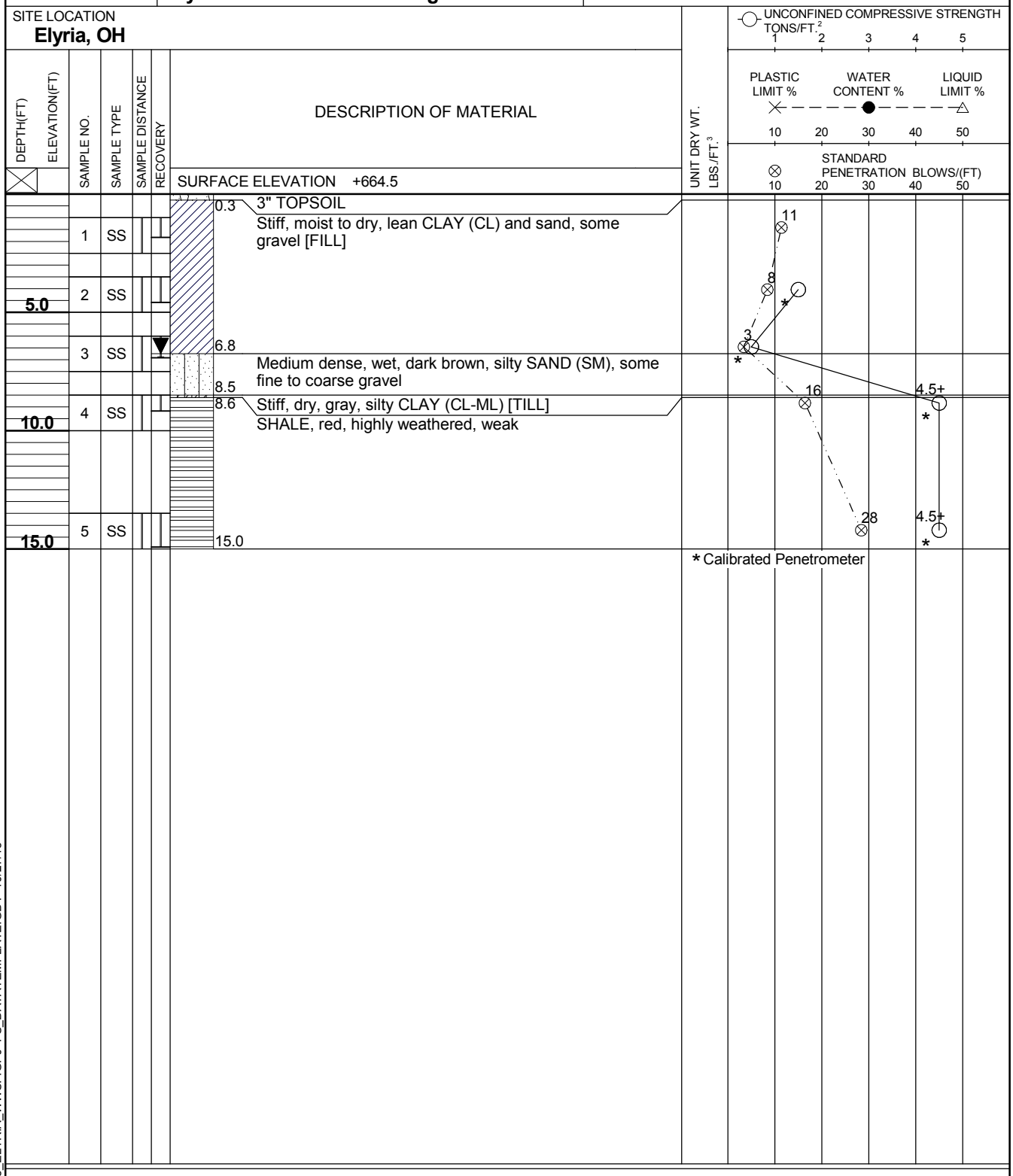
The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **633675.946**	BORING STARTED: **09/03/15**	AECOM OFFICE: **Cleveland, Ohio**	
EASTING: **2080709.227**	BORING COMPLETED: **09/03/15**	LOGGED BY: **A. HEITGER**	SHEET NO.: **1** OF **1**
WL: **None encountered**	RIG/FOREMAN: **Mobile B-57/A. Fay**	APP'D BY:	AECOM JOB NO.: **60332065**

AECOM LOG 60332065_ELYRIA_WWSF.GPJ FS_DATATEMPLATE.GDT 10/27/15

AECOM	CLIENT: **City of Elyria**	LOG OF BORING NUMBER: **B-304**
	PROJECT NAME: **Elyria Wet Weather Screening Facilities**	ARCHITECT-ENGINEER: **AECOM**

SITE LOCATION: **Elyria, OH**



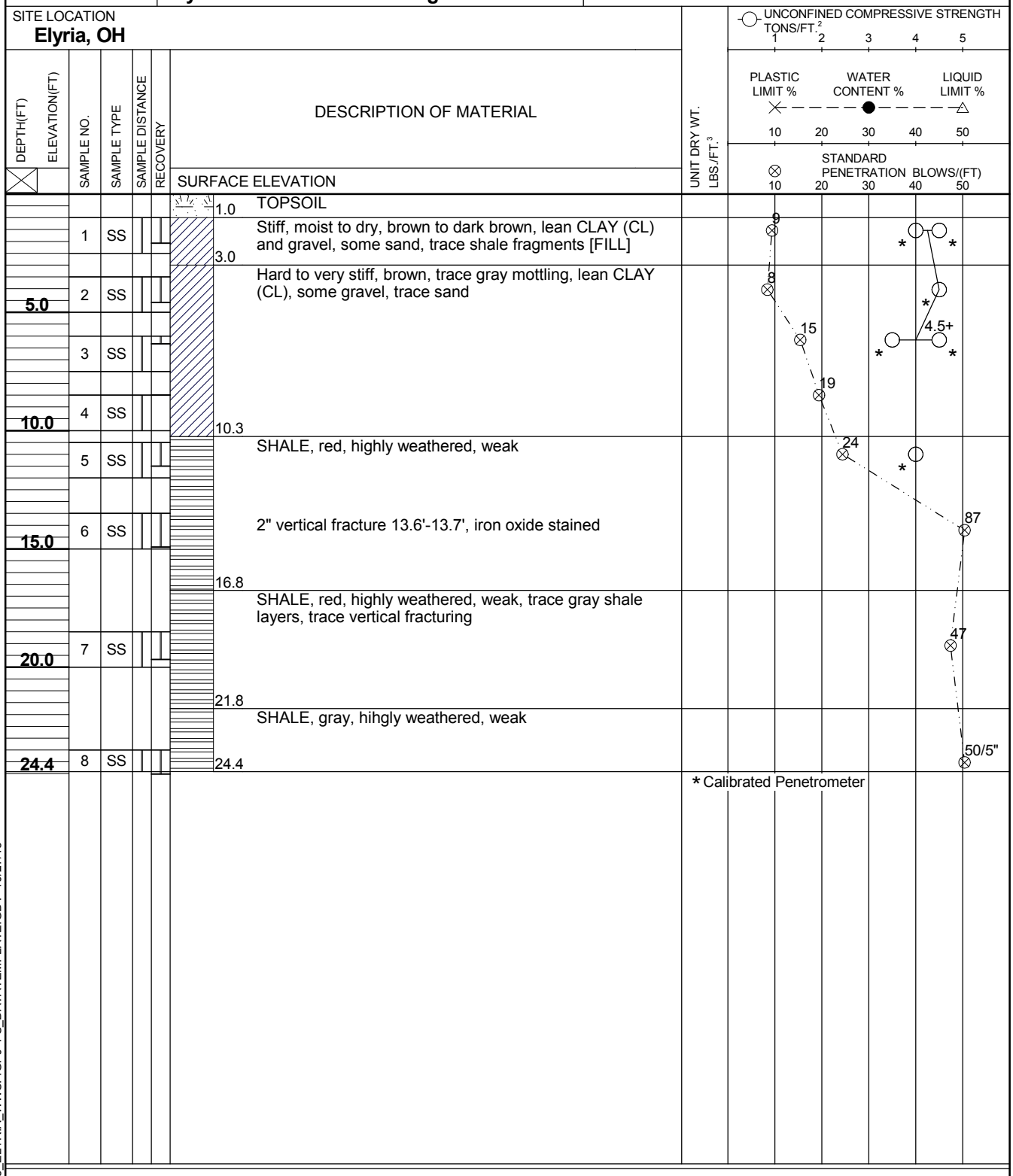
The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **633690.882**	BORING STARTED: **09/03/15**	AECOM OFFICE: **Cleveland, Ohio**	
EASTING: **2080551.136**	BORING COMPLETED: **09/03/15**	LOGGED BY: **A. HEITGER**	SHEET NO.: **1** OF **1**
WL: **6.75'**	RIG/FOREMAN: **Mobile B-57/A. Fay**	APP'D BY:	AECOM JOB NO.: **60332065**

AECOM LOG 60332065_ELYRIA_WWSF.GPJ FS_DATATEMPLATE.GDT 10/27/15

AECOM	CLIENT: **City of Elyria**	LOG OF BORING NUMBER: **B-305**
	PROJECT NAME: **Elyria Wet Weather Screening Facilities**	ARCHITECT-ENGINEER: **AECOM**

SITE LOCATION: **Elyria, OH**



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **633667.885**	BORING STARTED: **09/03/15**	AECOM OFFICE: **Cleveland, Ohio**	
EASTING: **2080383.587**	BORING COMPLETED: **09/03/15**	LOGGED BY: **A. HEITGER**	SHEET NO.: **1** OF **1**
WL: **None encountered**	RIG/FOREMAN: **Mobile B-57/A. Fay**	APP'D BY:	AECOM JOB NO.: **60332065**

AECOM LOG 60332065_ELYRIA_WWSF.GPJ FS_DATATEMPLATE.GDT 10/27/15

AECOM	CLIENT: **City of Elyria**	LOG OF BORING NUMBER: **B-306**
	PROJECT NAME: **Elyria Wet Weather Screening Facilities**	ARCHITECT-ENGINEER: **AECOM**

SITE LOCATION: **Elyria, OH**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	STANDARD PENETRATION BLOWS/(FT)
				SURFACE ELEVATION +666.5		
				1.0 TOPSOIL		
	1	SS		1.8 Very stiff, damp, brown, lean CLAY (CL), little sand, shale fragments, trace organics [FILL]		14
				Very stiff, damp, gray, lean CLAY (CL), little sand some to trace shale fragments [FILL]		11
5.0	2	SS		5.5		
	3	SS		6.8 Stiff to very stiff, moist, mottled brown, gray, and red, lean CLAY (CL), trace shale fragments.		6
				Hard, damp, red with brown mottling, lean CLAY (CL), some shale fragments [TILL]		12
10.0	4	SS				4.5+
				13.7		
15.0	5	SS		SHALE, brown with gray and red mottling, highly weathered, very weak		37
20.0	6	SS		becomes grayish red		50/5"
25.0	7	SS		becomes gray, trace iron oxide staining		55/6"
28.7	8	SS		28.7		50/2"

* Calibrated Penetrometer

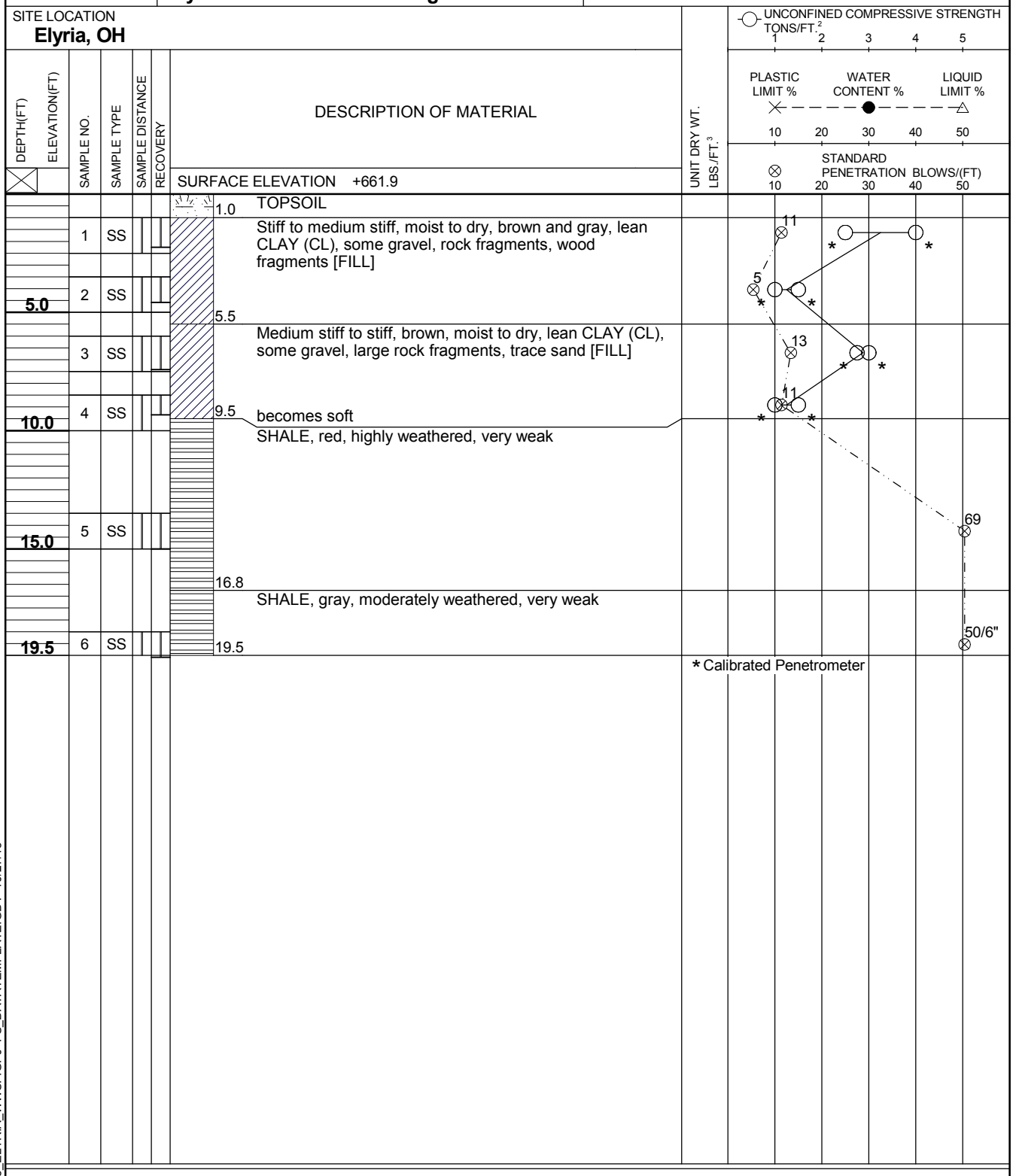
The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **633690.895**	BORING STARTED: **09/04/15**	AECOM OFFICE: **Cleveland, Ohio**	
EASTING: **2080272.138**	BORING COMPLETED: **09/04/15**	LOGGED BY: **E. BOGEN**	SHEET NO.: **1** OF **1**
WL: **None encountered**	RIG/FOREMAN: **Mobile B-57/A. Fay**	APP'D BY:	AECOM JOB NO.: **60332065**

AECOM LOG 60332065_ELYRIA_WWSF.GPJ FS_DATATEMPLATE.GDT 10/27/15

AECOM	CLIENT: **City of Elyria**	LOG OF BORING NUMBER: **B-307**
	PROJECT NAME: **Elyria Wet Weather Screening Facilities**	ARCHITECT-ENGINEER: **AECOM**

SITE LOCATION: **Elyria, OH**



The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **633745.881**	BORING STARTED: **09/03/15**	AECOM OFFICE: **Cleveland, Ohio**	
EASTING: **2080295.273**	BORING COMPLETED: **09/03/15**	LOGGED BY: **A. HEITGER**	SHEET NO.: **1** OF **1**
WL: **None encountered**	RIG/FOREMAN: **Mobile B-57/A. Fay**	APP'D BY:	AECOM JOB NO.: **60332065**

AECOM LOG 60332065_ELYRIA_WWSF.GPJ FS_DATATEMPLATE.GDT 10/27/15

AECOM	CLIENT: **City of Elyria**	LOG OF BORING NUMBER: **B-308**
	PROJECT NAME: **Elyria Wet Weather Screening Facilities**	ARCHITECT-ENGINEER: **AECOM**

SITE LOCATION: **Elyria, OH**

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)

DEPTH(FT)	ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
						SURFACE ELEVATION +663.7	
						0.5 6" ASPHALT	
						1.3 10" GRAVEL AND SAND SUBBASE	
		1	SS			Dense, moist, dark gray and brown GRAVEL (GP), some rock fragments, clay, sand, slag fragments [FILL]	
5.0		2	SS			4.8	
						Soft, moist, dark brown, silty CLAY (CL-ML) and sand 6.0	
		3	SS			Soft to medium stiff, moist, brown, trace gray, lean CLAY (CL) 8.0	
						SHALE, red, highly weathered, weak	
10.0		4	SS			10.0	

31, 13, 5, 12

* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING **633730.436**	BORING STARTED **09/03/15**	AECOM OFFICE **Cleveland, Ohio**	
EASTING **2080217.21**	BORING COMPLETED **09/03/15**	LOGGED BY **A. HEITGER**	SHEET NO. **1** OF **1**
WL **4.8'**	RIG/FOREMAN **Mobile B-57/A. Fay**	APP'D BY	AECOM JOB NO. **60332065**

AECOM LOG 60332065_ELYRIA_WWSF.GPJ FS_DATATEMPLATE.GDT 10/27/15

AECOM	CLIENT: **City of Elyria**	LOG OF BORING NUMBER: **B-309**
	PROJECT NAME: **Elyria Wet Weather Screening Facilities**	ARCHITECT-ENGINEER: **AECOM**

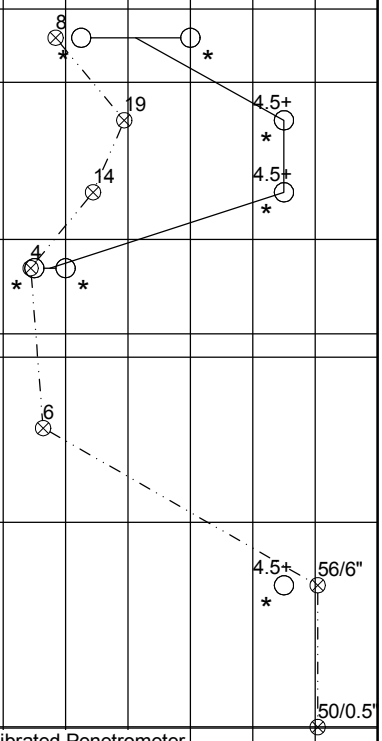
SITE LOCATION: **Elyria, OH**

DEPTH(FT)	ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}
						SURFACE ELEVATION +650.6	
						0.7 8" TOPSOIL	
		1	SS			Stiff to very stiff, moist, brown, lean CLAY (CL), some sand, trace to some gravel [FILL]	
						3.0	
5.0		2	SS			Hard, moist, brown, trace red, gray, lean CLAY (CL), some sand, trace to some gravel, trace slag fragments [FILL]	
		3	SS			becomes with reddish brown shale fragments	
						8.0	
10.0		4	SS			Medium stiff, moist, brown to grayish brown, trace red, lean CLAY (CL) and gravel, some sand, trace organics [FILL]	
						11.0 1" seam of limestone screenings at 9.8'	
						11.8 NO. 57 CRUSHED LIMESTONE in cuttings [FILL]	
15.0		5	SS			Loose, moist to wet, dark brown and gray, trace blue, black, lean CLAY (CL) and gravel, some peat, trace wire fragments, plastic fragments [FILL]	
						17.0	
20.0		6	SS			SHALE, gray to brown, highly weathered, extremely weak, oxidation staining	
23.5		7	SS			23.5 SHALE, dark brown, slightly weathered, weak	

UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5)

PLASTIC LIMIT % — WATER CONTENT % — LIQUID LIMIT % (10 20 30 40 50)

STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)



* Calibrated Penetrometer

The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **633977.949**	BORING STARTED: **09/10/15**	AECOM OFFICE: **Cleveland, Ohio**	
EASTING: **2080373.342**	BORING COMPLETED: **09/10/15**	LOGGED BY: **T. GEORGE**	SHEET NO.: **1** OF **1**
WL: **13.5'**	RIG/FOREMAN: **Mobile B-57 ATV/D. Hepner**	APP'D BY:	AECOM JOB NO.: **60332065**

AECOM LOG 60332065_ELYRIA_WWSF.GPJ FS_DATATEMPLATE.GDT 10/27/15

AECOM	CLIENT: **City of Elyria**	LOG OF BORING NUMBER: **B-309A**
	PROJECT NAME: **Elyria Wet Weather Screening Facilities**	ARCHITECT-ENGINEER: **AECOM**

SITE LOCATION: **Elyria, OH**

DEPTH(FT) / ELEVATION(FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	UNIT DRY WT. LBS./FT.^{3}	UNCONFINED COMPRESSIVE STRENGTH TONS/FT.^{2} (1 2 3 4 5) / PLASTIC LIMIT % / WATER CONTENT % / LIQUID LIMIT % (10 20 30 40 50) / STANDARD PENETRATION BLOWS/(FT) (10 20 30 40 50)
					SURFACE ELEVATION +636.0		
					0.7 8" TOPSOIL		
	1	SS			Medium stiff to stiff, moist, brown, trace dark gray, tan, trace reddish brown, lean CLAY (CL), some sand, trace gravel [FILL]		4
					3.0		
	2	SS			Medium stiff to stiff, moist, brown with gray mottling, lean CLAY (CL), some sand, trace gravel [POSSIBLE FILL]		8
5.0							
	3	SS			becomes with dark gray shale fragments		6
	4	SS					8
10.0							
					11.8		
					Hard, moist, brown with gray mottling, lean CLAY (CL), some sand, trace gravel		20
	5	SS					4.5+
15.0					15.0		

* Calibrated Penetrometer

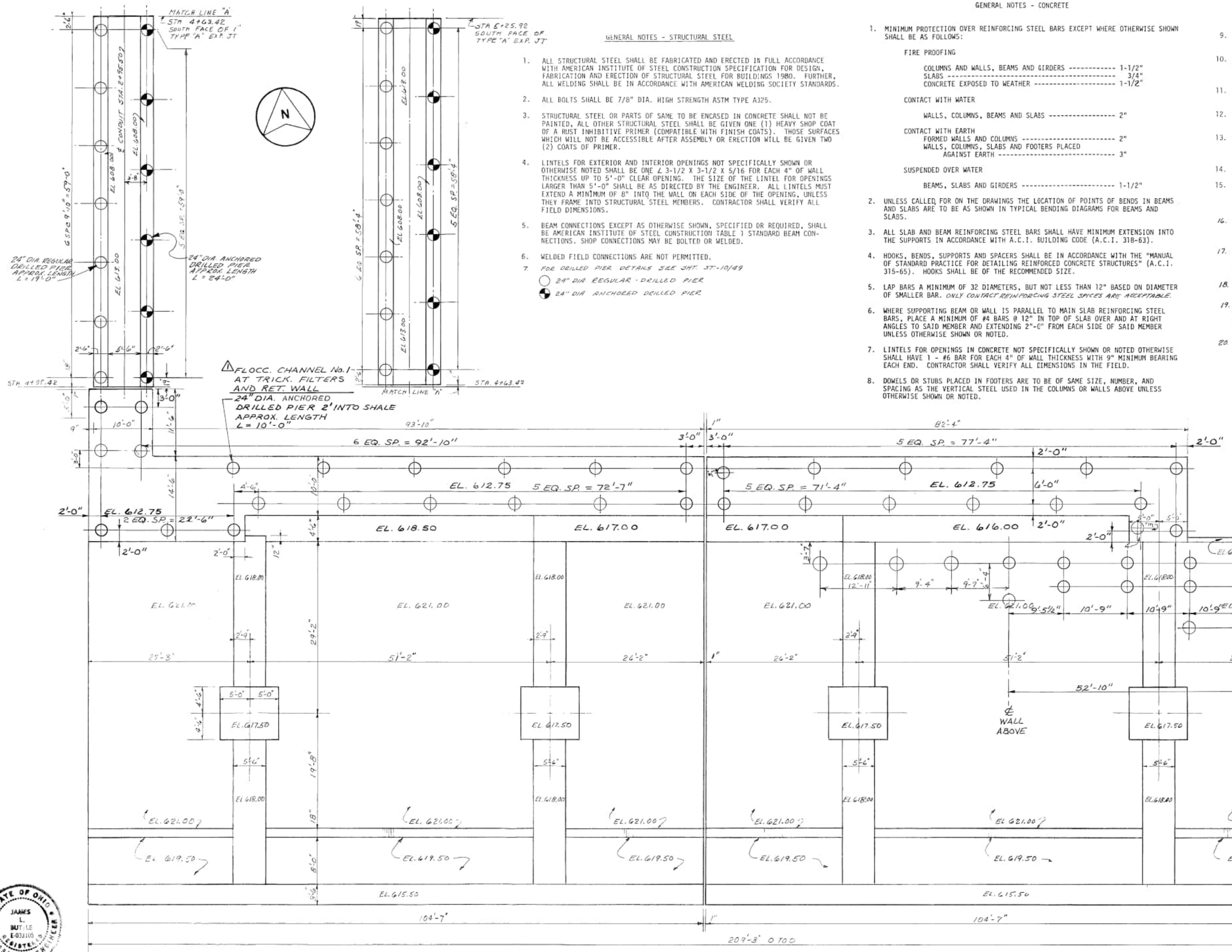
The stratification lines represent the approximate boundary lines between soil types: in situ, the transition may be gradual.

NORTHING: **633978**	BORING STARTED: **09/10/15**	AECOM OFFICE: **Cleveland, Ohio**	
EASTING: **2081141**	BORING COMPLETED: **09/10/15**	LOGGED BY: **T. GEORGE**	SHEET NO.: **1** OF **1**
WL: **None encountered**	RIG/FOREMAN: **Mobile B-57 ATV/D. Hepner**	APP'D BY:	AECOM JOB NO.: **60332065**

AECOM LOG 60332065_ELYRIA_WWSF.GPJ FS_DATATEMPLATE.GDT 10/27/15

ATTACHMENT B

Record Drawings for Trickling Filters



⚠ FLOCC. CHANNEL No. 1 AT TRICK. FILTERS AND RET. WALL
24" DIA. ANCHORED DRILLED PIER 2' INTO SHALE APPROX. LENGTH L = 10'-0"

⚠ TRICKLING FILTER
24" DIA. REGULAR DRILLED PIER 2' INTO SHALE APPROX. LENGTH L = 15'-0"

⚠ NOTE:
PIER EMBEDMENT INTO SLAB IS 2" INSTEAD OF 4" AS SHOWN IN STANDARD DETAIL. ALL OTHER DIMENSIONS REMAIN AS SHOWN.
TYPICAL FOR TRICKLING FILTER AREA ONLY.

GENERAL NOTES - STRUCTURAL STEEL

1. ALL STRUCTURAL STEEL SHALL BE FABRICATED AND ERECTED IN FULL ACCORDANCE WITH AMERICAN INSTITUTE OF STEEL CONSTRUCTION SPECIFICATION FOR DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS 1980. FURTHER, ALL WELDING SHALL BE IN ACCORDANCE WITH AMERICAN WELDING SOCIETY STANDARDS.
2. ALL BOLTS SHALL BE 7/8" DIA. HIGH STRENGTH ASTM TYPE A325.
3. STRUCTURAL STEEL OR PARTS OF SAME TO BE ENCASED IN CONCRETE SHALL NOT BE PAINTED, ALL OTHER STRUCTURAL STEEL SHALL BE GIVEN ONE (1) HEAVY SHOP COAT OF A RUST INHIBITIVE PRIMER (COMPATIBLE WITH FINISH COATS). THOSE SURFACES WHICH WILL NOT BE ACCESSIBLE AFTER ASSEMBLY OR ERECTION WILL BE GIVEN TWO (2) COATS OF PRIMER.
4. LINTELS FOR EXTERIOR AND INTERIOR OPENINGS NOT SPECIFICALLY SHOWN OR OTHERWISE NOTED SHALL BE ONE ∠ 3-1/2 X 3-1/2 X 5/16 FOR EACH 4" OF WALL THICKNESS UP TO 5'-0" CLEAR OPENING. THE SIZE OF THE LINTEL FOR OPENINGS LARGER THAN 5'-0" SHALL BE AS DIRECTED BY THE ENGINEER. ALL LINTELS MUST EXTEND A MINIMUM OF 8" INTO THE WALL ON EACH SIDE OF THE OPENING, UNLESS THEY FRAME INTO STRUCTURAL STEEL MEMBERS. CONTRACTOR SHALL VERIFY ALL FIELD DIMENSIONS.
5. BEAM CONNECTIONS EXCEPT AS OTHERWISE SHOWN, SPECIFIED OR REQUIRED, SHALL BE AMERICAN INSTITUTE OF STEEL CONSTRUCTION TABLE 1 STANDARD BEAM CONNECTIONS. SHOP CONNECTIONS MAY BE BOLTED OR WELDED.
6. WELDED FIELD CONNECTIONS ARE NOT PERMITTED.
7. FOR DRILLED PIER DETAILS SEE SHT. ST-10/49
   - ○ 24" DIA REGULAR - DRILLED PIER
   - ◔ 24" DIA ANCHORED DRILLED PIER

GENERAL NOTES - CONCRETE

1. MINIMUM PROTECTION OVER REINFORCING STEEL BARS EXCEPT WHERE OTHERWISE SHOWN SHALL BE AS FOLLOWS:

   FIRE PROOFING

COLUMNS AND WALLS, BEAMS AND GIRDERS	1-1/2"
SLABS	3/4"
CONCRETE EXPOSED TO WEATHER	1-1/2"

   CONTACT WITH WATER

WALLS, COLUMNS, BEAMS AND SLABS	2"

   CONTACT WITH EARTH

FORMED WALLS AND COLUMNS	2"
WALLS, COLUMNS, SLABS AND FOOTERS PLACED AGAINST EARTH	3"

   SUSPENDED OVER WATER

BEAMS, SLABS AND GIRDERS	1-1/2"

2. UNLESS CALLED FOR ON THE DRAWINGS THE LOCATION OF POINTS OF BENDS IN BEAMS AND SLABS ARE TO BE AS SHOWN IN TYPICAL BENDING DIAGRAMS FOR BEAMS AND SLABS.
3. ALL SLAB AND BEAM REINFORCING STEEL BARS SHALL HAVE MINIMUM EXTENSION INTO THE SUPPORTS IN ACCORDANCE WITH A.C.I. BUILDING CODE (A.C.I. 318-63).
4. HOOKS, BENDS, SUPPORTS AND SPACERS SHALL BE IN ACCORDANCE WITH THE "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES" (A.C.I. 315-65). HOOKS SHALL BE OF THE RECOMMENDED SIZE.
5. LAP BARS A MINIMUM OF 32 DIAMETERS, BUT NOT LESS THAN 12" BASED ON DIAMETER OF SMALLER BAR. ONLY CONTACT REINFORCING STEEL SPICES ARE ACCEPTABLE.
6. WHERE SUPPORTING BEAM OR WALL IS PARALLEL TO MAIN SLAB REINFORCING STEEL BARS, PLACE A MINIMUM OF #4 BARS @ 12" IN TOP OF SLAB OVER AND AT RIGHT ANGLES TO SAID MEMBER AND EXTENDING 2"-0" FROM EACH SIDE OF SAID MEMBER UNLESS OTHERWISE SHOWN OR NOTED.
7. LINTELS FOR OPENINGS IN CONCRETE NOT SPECIFICALLY SHOWN OR NOTED OTHERWISE SHALL HAVE 1 - #6 BAR FOR EACH 4" OF WALL THICKNESS WITH 9" MINIMUM BEARING EACH END. CONTRACTOR SHALL VERIFY ALL DIMENSIONS IN THE FIELD.
8. DOWELS OR STUBS PLACED IN FOOTERS ARE TO BE OF SAME SIZE, NUMBER, AND SPACING AS THE VERTICAL STEEL USED IN THE COLUMNS OR WALLS ABOVE UNLESS OTHERWISE SHOWN OR NOTED.

GENERAL NOTES - CONCRETE (CONT'D.)

9. UNLESS OTHERWISE SHOWN, ALL COLUMN TIES ARE TO BE TYPE T2 AND ALL BEAM STIRRUPS ARE TO BE TYPE S3. SEE THE "MANUAL OF STANDARD PRACTICE".
10. BEAMS, GIRDERS, BRACKETS, COLUMN CAPITALS AND HAUNCHES SHALL BE CONSIDERED AS PART OF THE FLOOR SYSTEM AND SHALL BE PLACED MONOLITHICALLY THEREWITH UNLESS OTHERWISE SHOWN OR NOTED.
11. VERTICAL CONSTRUCTION JOINTS IN BEAMS AND SLABS ARE NOT SHOWN. LOCATIONS ARE SUBJECT TO APPROVAL BY THE ENGINEER.
12. ALL EXPOSED EDGES OF CONCRETE WALLS, SLABS, BEAMS, ETC. SHALL BE CHAMFERED 1" UNLESS OTHERWISE SHOWN.
13. ALL CONSTRUCTION JOINTS BETWEEN POURS IN THE WALLS AND SLABS OF TUNNELS AND GALLERIES SHALL BE TREATED WITH AN APPROVED BONDING AGENT BEFORE COMMENCING NEW POURS.
14. ALL CONCRETE SHALL BE CLASS "A" UNLESS NOTED AS CLASS "B" CONCRETE.
15. WHENEVER POSSIBLE, EXISTING STEEL REINFORCEMENT EXPOSED BY REMOVAL OF EXISTING CONCRETE IS TO BE INCORPORATED INTO NEW CONCRETE AS DOWELS. ALL EXISTING CONCRETE IS TO BE PAINTED WITH AN APPROVED BONDING AGENT BEFORE POURING NEW CONCRETE AGAINST IT.
16. ADDITIONAL WATERSTOP TO BE USED ON ALL JOINTS FOR TRICKLING FILTER COLUMNS. ELSEWHERE WATERSTOP TO BE USED ON ALL JOINTS TO 1'-0" ABOVE HIGH WATER ELEVATION.
17. CONTRACTOR SHALL SUBMIT FOR APPROVAL ALL CONSTRUCTION JOINTS. IN GENERAL ALL POURS ON SLABS SHALL NOT BE LARGER THAN 50'x 50' AND WALL LIFTS 50'.
18. CURING COMPOUND WILL NOT BE PERMITTED ON ANY EXPOSED WALLS.
19. ALL SLABS ON GRADE TO BE ON 12" FOUNDATION CUSHION EXCEPT WHERE ON DRILLED PIERS OR SHALE. WHEN ON SHALE A 6" CONCRETE MUD MAT IS REQUIRED, SEE SPECIFICATIONS.
20. COORDINATE WITH ALL OTHER DWGS. FOR INSERTS, EMBEDDED ITEMS, ETC.
21. THE GENERAL CONTRACTOR SHALL HAVE A "POUR" RELEASE SIGNED BY ALL CONTRACTORS AND INSPECTORS PRIOR TO POURING.

DRILLED PIER AND EXCAVATION PLAN

THIS IS NOT A RECORD DRAWING. SEE SUPPLEMENTAL SHEETS FURNISHED BY THE CONTRACTOR WITH SIMILAR DRAWING NUMBERS.

1345-284

STATE OF OHIO — JAMES L. BUTLER — E-033105 — REGISTERED PROFESSIONAL ENGINEER
James L Butler

NO.	DESCRIPTION	DATE
⚠	ADDITION OF PIERS FOR EAST TR. FIL. & FLOCC. CH.	9/22/86
	REVISED AS BUILT	3-87

REVISIONS

HAVENS AND EMERSON INC.
CONSULTING ENGINEERS

STATE OF OHIO — GEORGE D. SIMPSON — 19423 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY KJN DRAWN BY KJN
APPROVED BY R.W. Krotz
SUBMITTED BY D. Simpson HAVENS AND EMERSON INC.
DATE 10-14-83

APPROVED BY
DATE 11-26-85
CITY ENGINEER

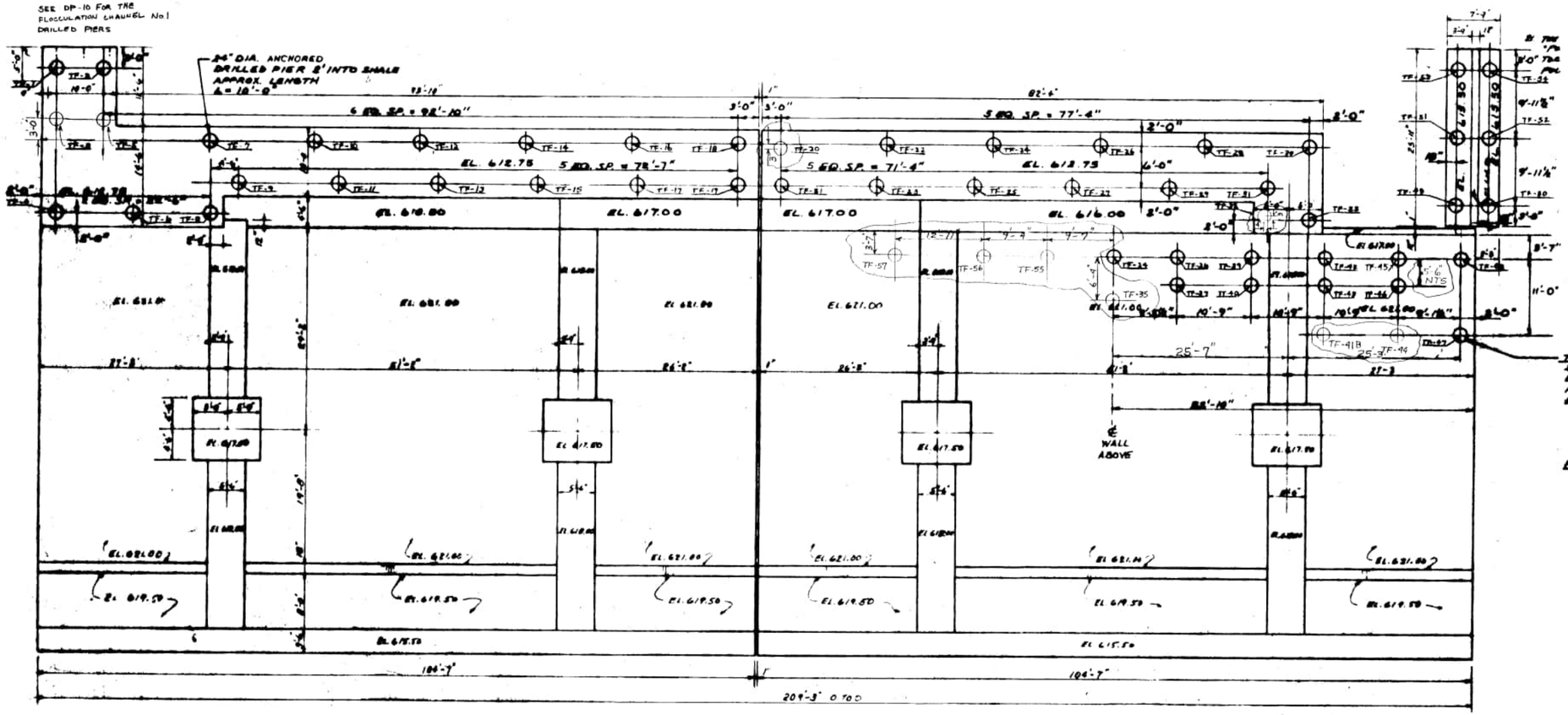
CITY OF ELYRIA, OHIO
DEPARTMENT OF PUBLIC SERVICE

WATER POLLUTION CONTROL PLANT IMPROVEMENTS

SECONDARY TREATMENT EXPANSION
CONTRACT 5
STRUCTURAL
TRICKLING FILTER COLUMNS AND FLOCCULATION CHANNEL NO. 1
PIER AND EXCAVATION PLAN

SCALE 1/8" : 1'-0"
FILE NO. 1430- 5.038
SHEET NO. ST.01/49

N



NOTE:
PIER EMBEDMENT INTO SHALE IS 2" INSTEAD OF 4" AS SHOWN IN STANDARD DETAIL. ALL OTHER DIMENSIONS REMAIN AS SHOWN.
TYPICAL FOR TRICKLING FILTER AREA ONLY.

DRILLED PIERS TRICKLING FILTER		
DRILLED PIER NUMBER	PROPOSED TOP ELEVATION	ACTUAL TOP ELEVATION
TF-1 THRU TF-33	612.92	
TF-34 THRU TF-48, 55-57	621.17	
TF-49 THRU TF-54	615.67	

RECORD DRAWING

AS BUILT 11-88 BRT

National ENGINEERING & CONTRACTING CO.
STRONGSVILLE, OHIO

CITY OF ELYRIA, OHIO
WATER POLLUTION CONTROL PLANT
IMPROVEMENTS
CONTRACT 5
SPEC. SECTION NO. ____

NECCO JOB # 8601
BY (INC.) ____
T.M. ____

ELYRIA W.P.C.P.
TRICKLING FILTER
DRILLED PIER LAYOUT & ELEVATIONS
8601
DRAWN BY VEP CHECKED BY ____ DATE 9-30-86
DP-12

STATE OF OHIO JAMES L. BUTTLE E-033105 REGISTERED PROFESSIONAL ENGINEER
James L Buttle

1345-284A

NO.	DESCRIPTION	DATE
	REVISIONS	

HAVENS AND EMERSON INC.
CONSULTING ENGINEERS

STATE OF OHIO GEORGE D SIMPSON 19423 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY ____ DRAWN BY ____
APPROVED BY R.W. KROTZ
SUBMITTED BY HAVENS AND EMERSON INC.
DATE 10-14-83

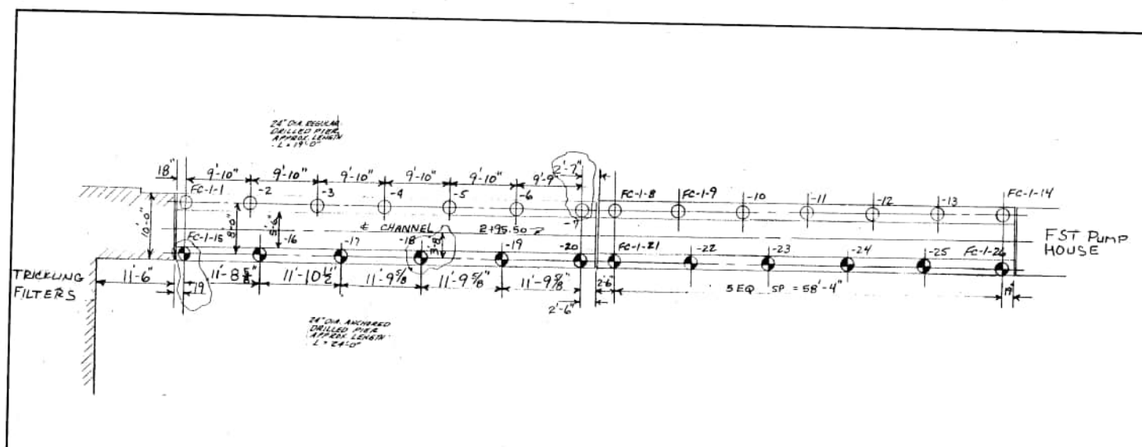
APPROVED BY
CITY ENGINEER
DATE 11-26-85

CITY OF ELYRIA, OHIO
DEPARTMENT OF PUBLIC SERVICE

WATER POLLUTION CONTROL PLANT IMPROVEMENTS

SECONDARY TREATMENT EXPANSION
CONTRACT 5
STRUCTURAL
TRICKLING FILTER COLUMNS AND FLOCCULATION CHANNEL NO. 1
PIER AND EXCAVATION PLAN

SCALE NTS
FILE NO. 1430-5.038
SHEET NO. ST.01A/49



DRILLED PIERS FLOCCULATION CHANNEL No. 1			
DRILLED PIER NUMBER	TYPE	PROPOSED TOP ELEVATION	ACTUAL TOP ELEVATION
FC-1-1 THRU FC-1-14	BEARING	608.33	
FC-1-15 THRU FC-1-26	UP LIFTING	612.58	

FOR DRILLED PIER DETAILS SEE SHT. 37
○ 24" DIA. REGULAR - DRILLED PIER
24" DIA. ANCHORED DRILLED PIER

RECORD DRAWING

CITY OF ELYRIA, OHIO WATER POLLUTION CONTROL PLANT IMPROVEMENTS CONTRACT 1345 CONTRACT SPEC. SECTION NO.	NRCCO JOB # 8601 BY ENG./ / / T.M.

REMARKS: ELYRIA WPCP - 8601
FLOCCULATION CHAMBER No. 1
DRILLED PIER LAYOUT & ELEVATIONS AS BUILT 11-88

NATIONAL ENGINEERING & CONTRACTING COMPANY
STRONGSVILLE, OHIO 44136

REF. DWG. NO. 1345-285
SKETCH NO. DP-10
BY: JJL DATE: 7-15-86

STATE OF OHIO JAMES L. BUTTLE E-033105 REGISTERED PROFESSIONAL ENGINEER
James L Buttle

RECORD DRAWING

1345-2848

NO.	DESCRIPTION	DATE
	REVISIONS	

HAVENS AND EMERSON INC.
CONSULTING ENGINEERS

STATE OF OHIO GEORGE D. SIMPSON 19423 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY ____ DRAWN BY ____
APPROVED BY R.W. Krotz
SUBMITTED BY H.D. Simpson HAVENS AND EMERSON INC.
DATE 10-14-83

APPROVED BY
James L Buttle CITY ENGINEER
DATE 11-26-85

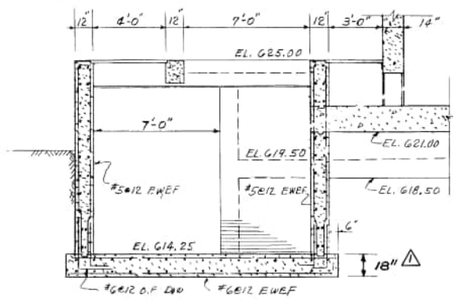
CITY OF ELYRIA, OHIO
DEPARTMENT OF PUBLIC SERVICE

WATER POLLUTION CONTROL PLANT IMPROVEMENTS

SECONDARY TREATMENT EXPANSION
CONTRACT 5
STRUCTURAL
TRICKLING FILTER COLUMNS
AND FLOCCULATION CHANNEL NO. 1
PIER AND EXCAVATION PLAN

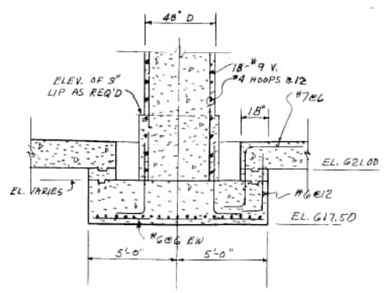
SCALE NTS
FILE NO. 1430-5.038
SHEET NO. ST.018/49

36



SECTION $E_{ST.02} - E_{ST.02}$

SCALE: 1/4" : 1'-0"



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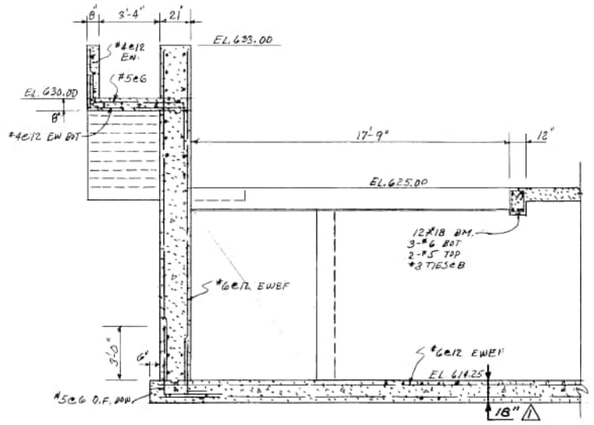

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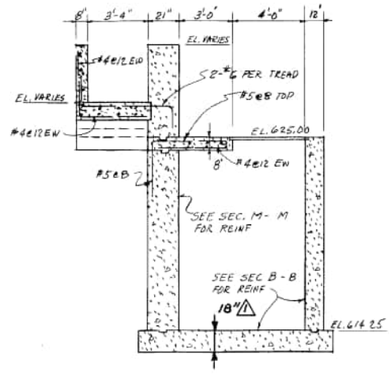

SECTION $N_{ST.02} - N_{ST.02}$

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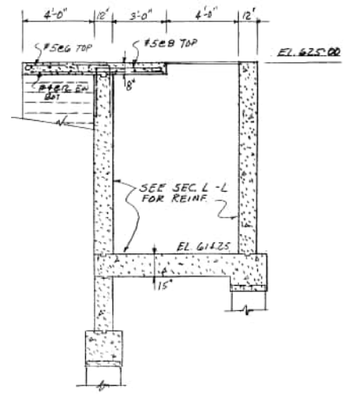
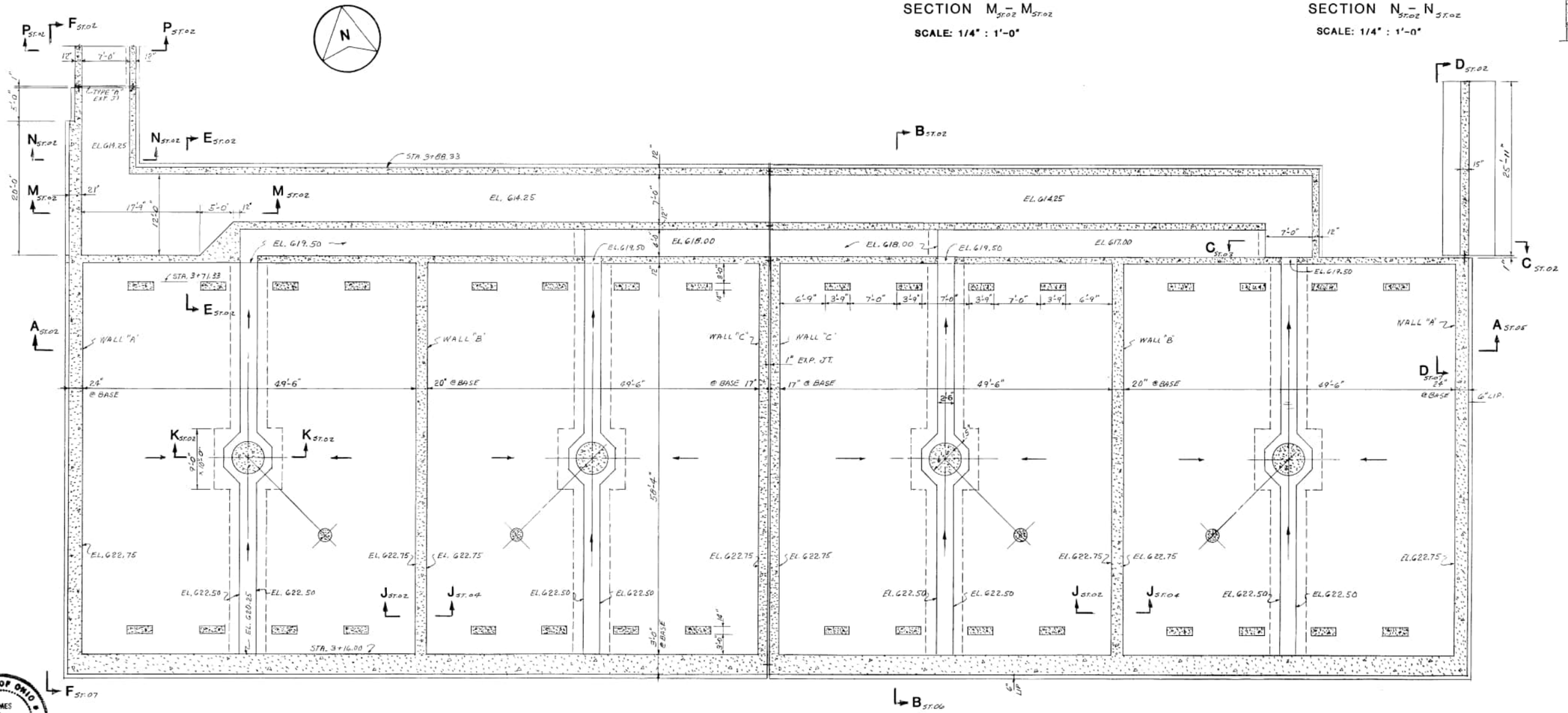


SECTION $P_{ST.02} - P_{ST.02}$

SCALE: 1/4" : 1'-0"



PLAN AT EL.623.00 ±

SCALE: 1/8" : 1'-0"

RECORD DRAWING 1345-285

STATE OF OHIO — JAMES L. BUTTLE E-033105 REGISTERED PROFESSIONAL ENGINEER

James L Buttle

NO.	DESCRIPTION	DATE
1	THICKEN SLAB	9/22/86
	AS BUILT	3-89

REVISIONS

HAVENS AND EMERSON INC.
CONSULTING ENGINEERS

STATE OF OHIO — GEORGE D. SIMPSON 19423 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY KSN DRAWN BY KSN
APPROVED BY RW Kropf
SUBMITTED BY D.D. Simpson, HAVENS AND EMERSON INC.
DATE 10-14-83

APPROVED BY
Tommy J. Sharp, CITY ENGINEER
DATE 11-26-85

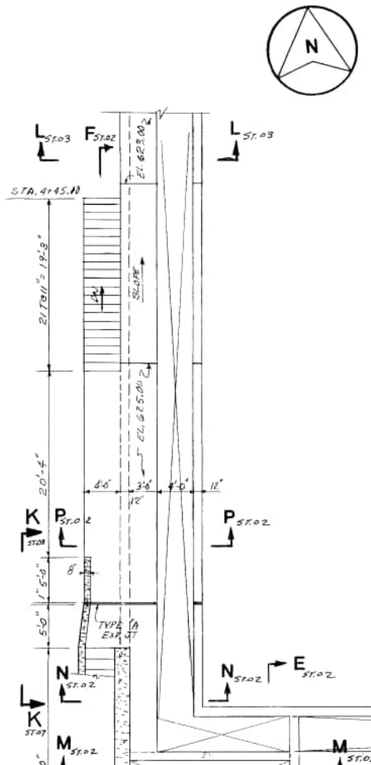
CITY OF ELYRIA, OHIO
DEPARTMENT OF PUBLIC SERVICE

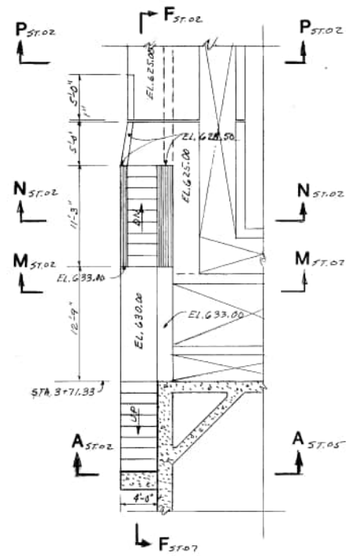
WATER POLLUTION CONTROL PLANT IMPROVEMENTS

SECONDARY TREATMENT EXPANSION
CONTRACT 5

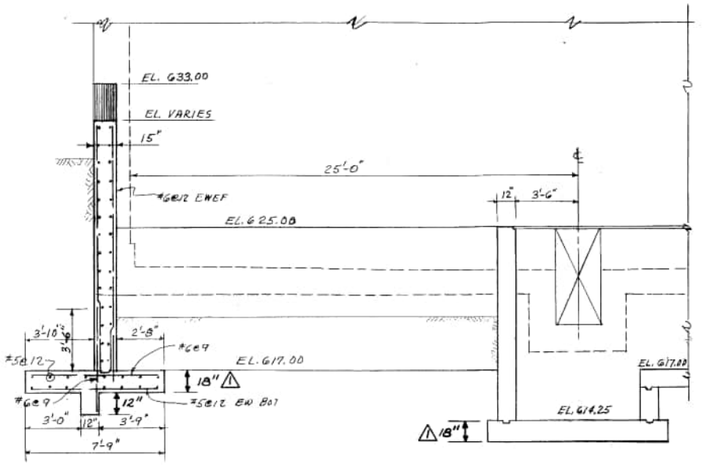
STRUCTURAL
TRICKLING FILTERS COLUMNS
PLAN AND SECTIONS

SCALE: AS SHOWN
FILE NO. 1430-5.039
SHEET NO. ST. 02/49

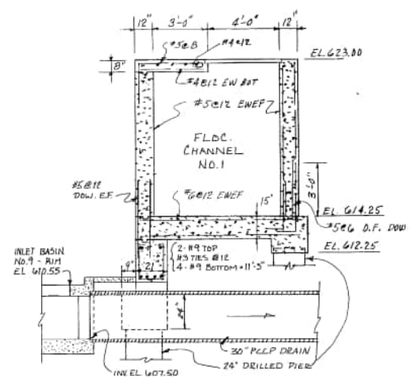




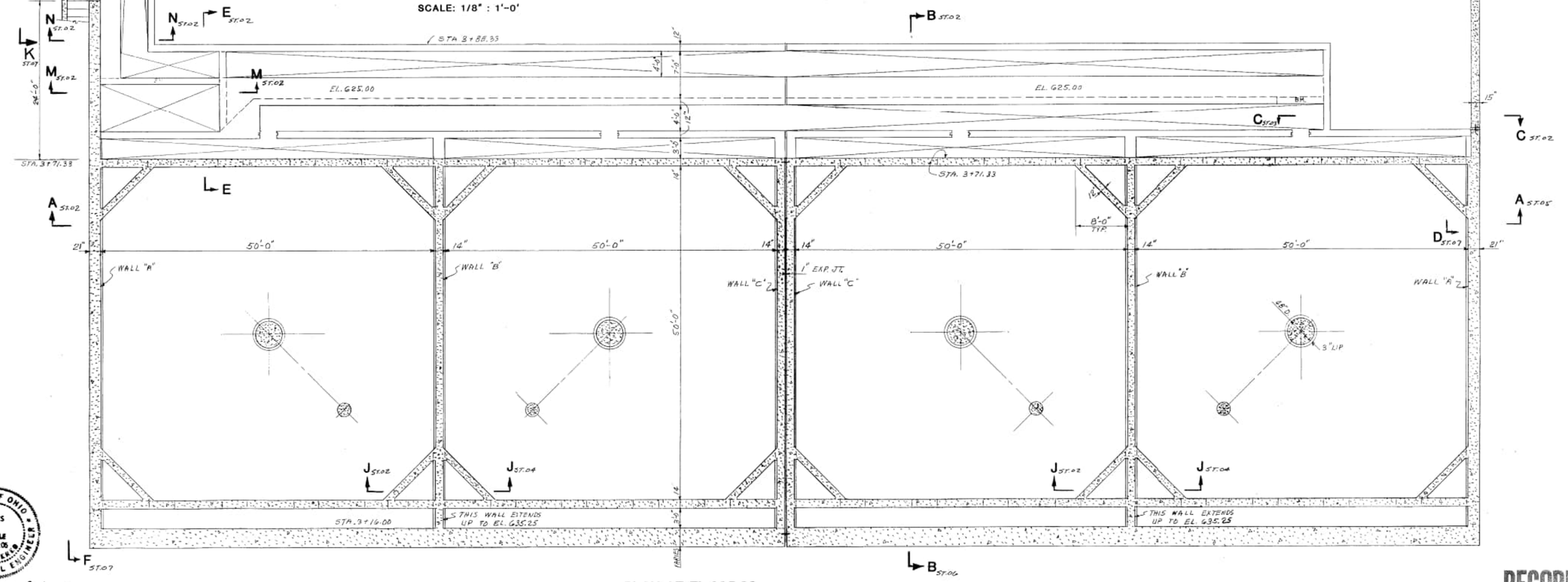
PARTIAL PLAN AT EL. 634.00
SCALE: 1/8" : 1'-0"



SECTION C ST.02 — C ST.03
SCALE: 1/4" : 1'-0"



SECTION L ST.03 — L ST.03
SCALE: 1/4" : 1'-0"



PLAN AT EL.625.00
SCALE: 1/8" : 1'-0"

STATE OF OHIO · JAMES L. BUTTLE · E-033106 · REGISTERED PROFESSIONAL ENGINEER

James L Buttle

RECORD DRAWING 1345-286

NO.	DESCRIPTION	DATE
1	THICKEN SLAB AS BUILT	9/22/86 3-89

REVISIONS

HAVENS AND EMERSON INC.
CONSULTING ENGINEERS

STATE OF OHIO · GEORGE D. SIMPSON 19423 · REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY KJN DRAWN BY KJN
APPROVED BY R.W. Kreutz
SUBMITTED BY D.D. Simpson HAVENS AND EMERSON INC.
DATE 10-14-83

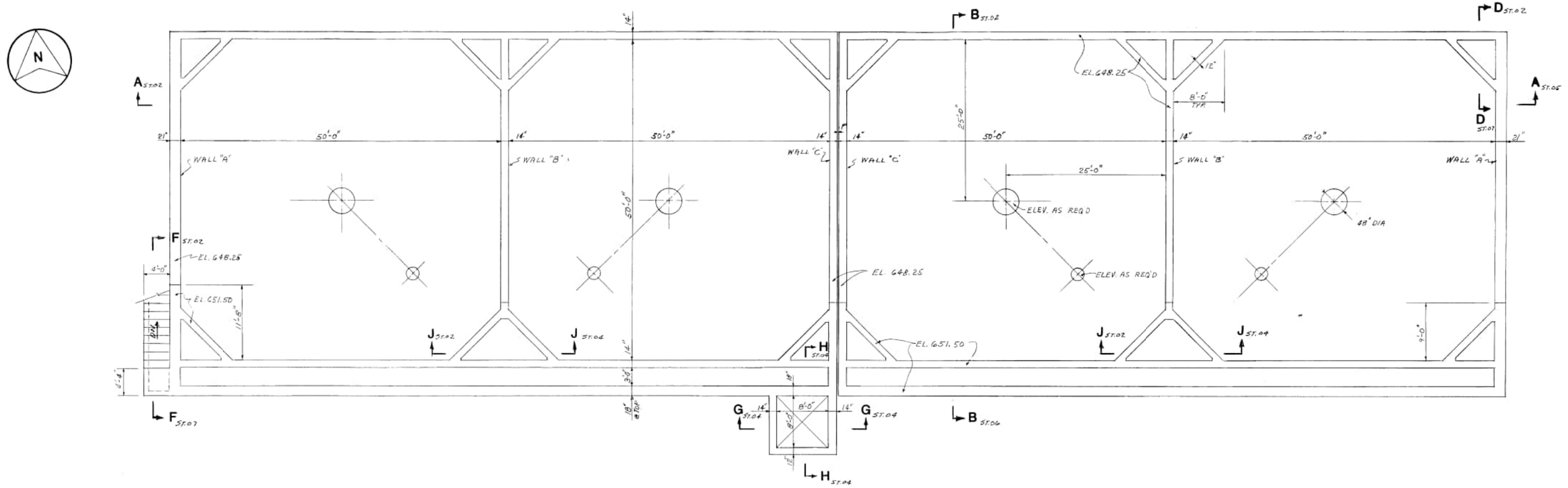
APPROVED BY Tommy G. Shipp CITY ENGINEER
DATE 11-26-85

CITY OF ELYRIA, OHIO
DEPARTMENT OF PUBLIC SERVICE

WATER POLLUTION CONTROL PLANT IMPROVEMENTS

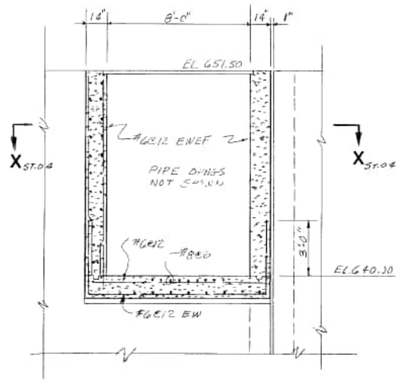
SECONDARY TREATMENT EXPANSION
CONTRACT 5
STRUCTURAL
TRICKLING FILTER COLUMNS
PLANS AND SECTIONS

SCALE: AS SHOWN
FILE NO. 1430-5.040
SHEET NO. ST. 03/49



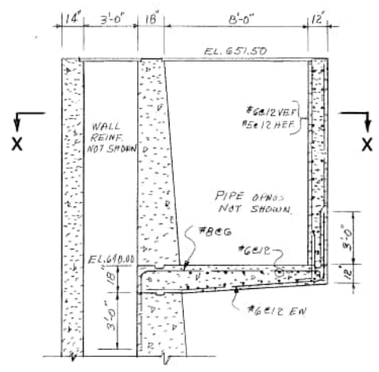
TOP PLAN AT EL.651.50

SCALE: 1/8" : 1'-0"



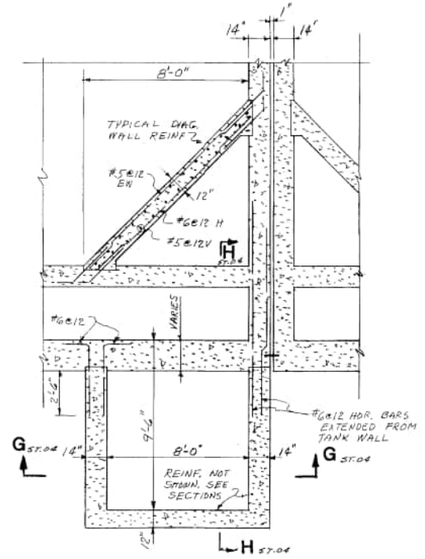
SECTION $G_{ST.04}$ – $G_{ST.04}$

SCALE: 1/4" : 1'-0"



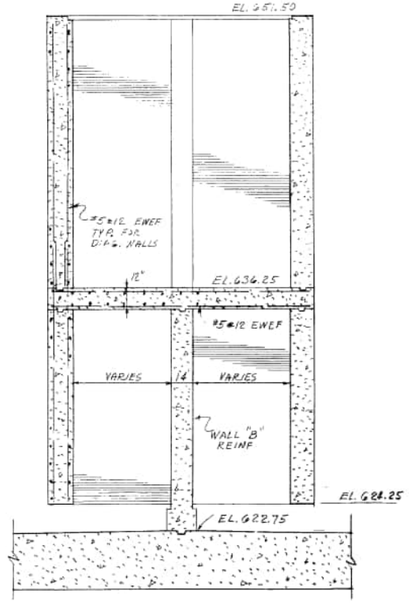
SECTION $H_{ST.04}$ – $H_{ST.04}$

SCALE: 1/4" : 1'-0"



SECTIONAL PLAN $X_{ST.04}$ – $X_{ST.04}$

SCALE: 1/4" : 1'-0"



SECTION $J_{ST.02}$ – $J_{ST.04}$

SCALE: 1/4" : 1'-0"

RECORD DRAWING 1345-287

STATE OF OHIO JAMES L. BUTTLE E-033105 REGISTERED PROFESSIONAL ENGINEER

James L Buttle

NO.	DESCRIPTION	DATE
	AS BUILT	3-89

REVISIONS

HAVENS AND EMERSON INC.
CONSULTING ENGINEERS

STATE OF OHIO GEORGE D. SIMPSON 19423 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY KJN DRAWN BY KJN
APPROVED BY R.W. Krotz
SUBMITTED BY S.D. Simpson HAVENS AND EMERSON INC.
DATE 10-14-83

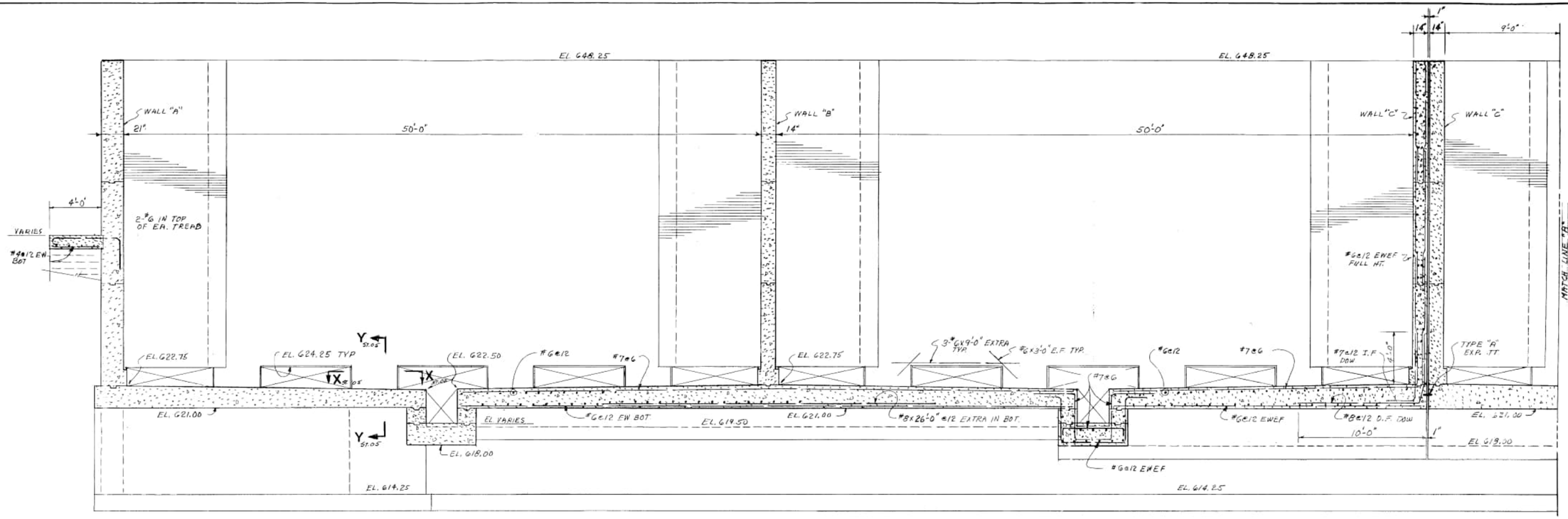
APPROVED BY
CITY ENGINEER
DATE 11-26-85

CITY OF ELYRIA, OHIO
DEPARTMENT OF PUBLIC SERVICE

WATER POLLUTION CONTROL PLANT IMPROVEMENTS

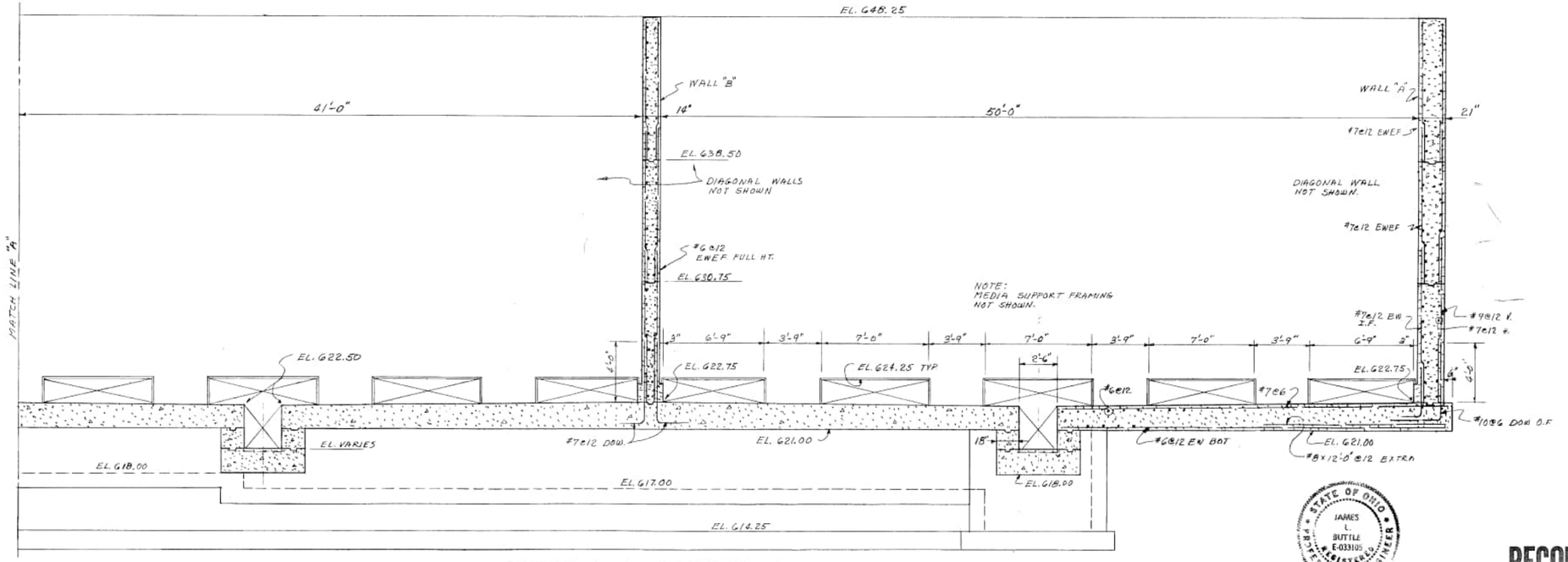
SECONDARY TREATMENT EXPANSION
CONTRACT 5
STRUCTURAL
TRICKLING FILTER COLUMNS PLANS AND SECTIONS

SCALE: AS SHOWN
FILE NO. 1430-5.041
SHEET NO. ST.04/49

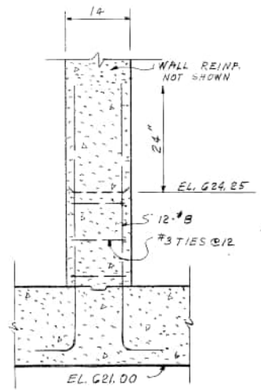


SECTION $A_{ST.05}$–$A_{ST.05}$

SCALE: 1/4" : 1'-0"

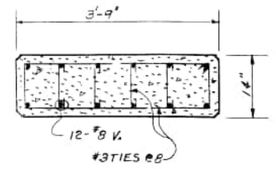


SECTION $A_{ST.05}$–$A_{ST.05}$ (CONTINUED)



SECTION $Y_{ST.05}$–$Y_{ST.05}$

SCALE: 3/4"–1'–0"



SECTION $X_{ST.05}$–$X_{ST.05}$

SCALE: 3/4"–1'–0"

RECORD DRAWING

1345–288

NO.	DESCRIPTION	DATE
	AS BUILT	3-89

REVISIONS

HAVENS AND EMERSON INC.
CONSULTING ENGINEERS

STATE OF OHIO — GEORGE D. SIMPSON 19423 — REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY KJN DRAWN BY KJN
APPROVED BY R.W. KROTZ
SUBMITTED BY D.D. Dumpier HAVENS AND EMERSON INC
DATE 10-14-83

APPROVED BY
Lonny D. Sleppy CITY ENGINEER
DATE 11-26-85

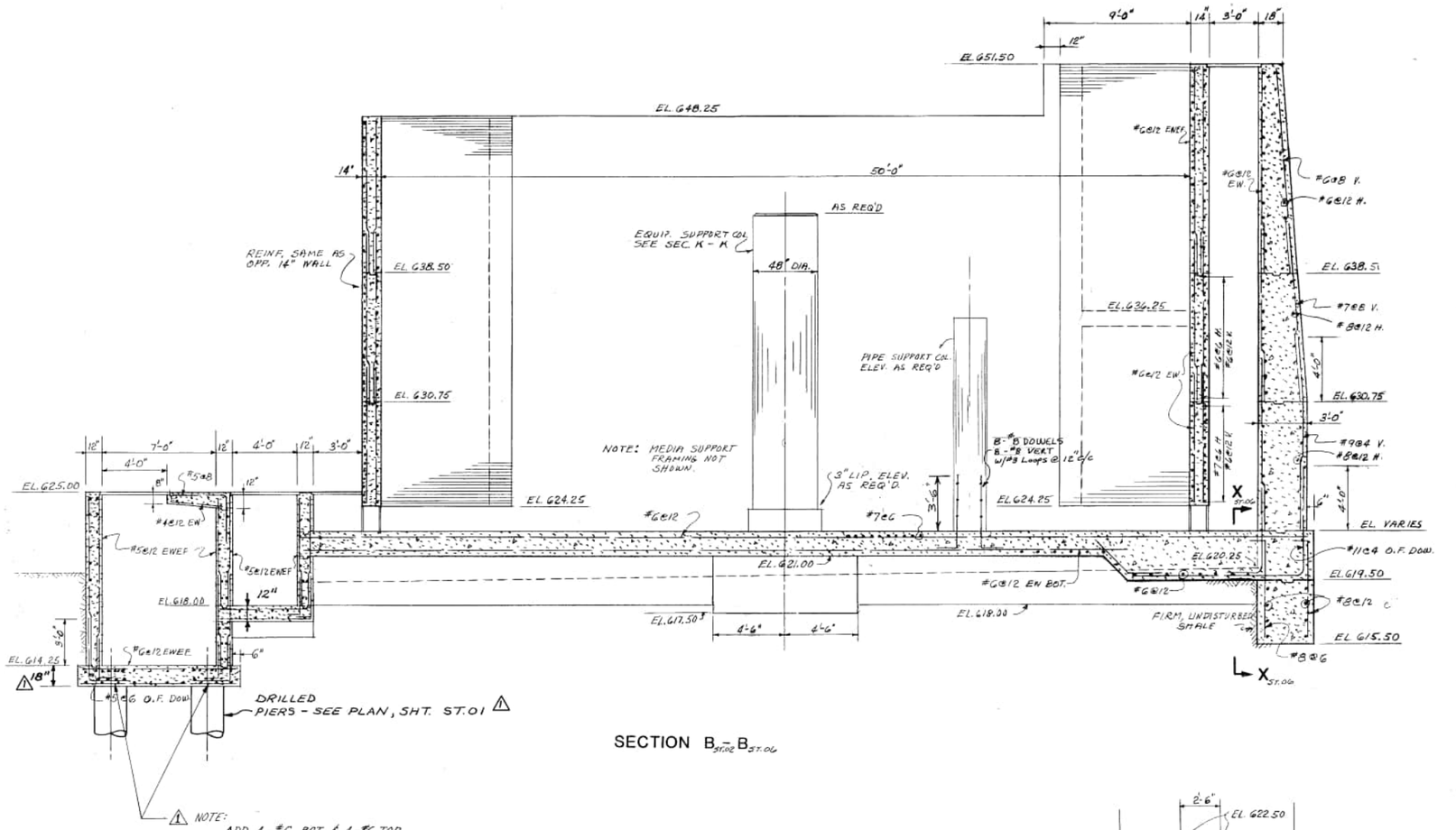
CITY OF ELYRIA, OHIO
DEPARTMENT OF PUBLIC SERVICE

WATER POLLUTION CONTROL PLANT IMPROVEMENTS

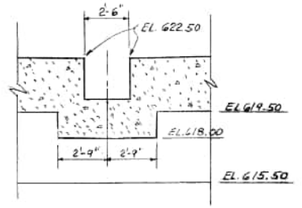
SECONDARY TREATMENT EXPANSION
CONTRACT 5
STRUCTURAL
TRICKLING FILTER COLUMNS
SECTIONS

SCALE: AS SHOWN
FILE NO.: 1430–5.042
SHEET NO.: ST.05/49

STATE OF OHIO — JAMES L. BUTTLE E-033105 — REGISTERED PROFESSIONAL ENGINEER
James L. Buttle



SECTION $B_{ST.02} - B_{ST.06}$



SECTION $X_{ST.06} - X_{ST.06}$

⚠ NOTE:

REFER DWG.

1345-285 — IN SEC. E-E, M-M, N-N CHANGE BTM. SLAB THICKNESS FROM 15" TO 18"

1345-286 — IN SEC. C-C CHANGE RETAINING WALL & CHANNEL BTM. SLAB THICKNESS FROM 15" TO 18", AND CHANGE RET. WALL BTM. KEY BEAM DEPTH FROM 15" TO 12"

STATE OF OHIO · JAMES L. BUTTLE E-033105 · REGISTERED PROFESSIONAL ENGINEER

James L Buttle

RECORD DRAWING 1345-289

NO.	DESCRIPTION	DATE
⚠	THICKEN BTM. SLAB, ADD RE-STEEL AND DRILLED PIERS	9/22/86
	REVISED AS BUILT	3-89

REVISIONS

HAVENS AND EMERSON INC.
CONSULTING ENGINEERS

STATE OF OHIO · GEORGE D. SIMPSON 19423 · REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY KJN DRAWN BY KJN
APPROVED BY R.W. KEOTE
SUBMITTED BY S.D. Simpson HAVENS AND EMERSON INC.
DATE 10-14-83

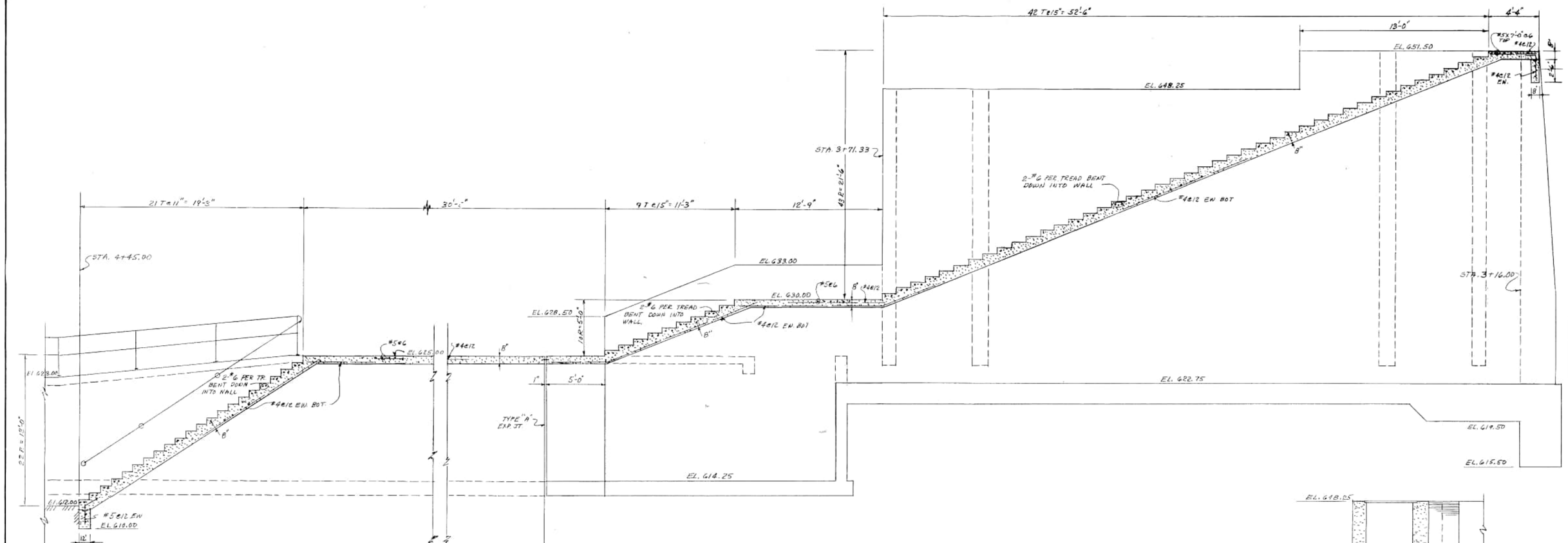
APPROVED BY Lonny D. Shipp CITY ENGINEER
DATE 11-26-85

CITY OF ELYRIA, OHIO
DEPARTMENT OF PUBLIC SERVICE

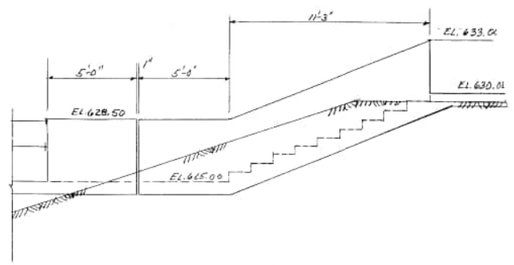
WATER POLLUTION CONTROL PLANT IMPROVEMENTS

SECONDARY TREATMENT EXPANSION
CONTRACT 5
STRUCTURAL
TRICKLING FILTER COLUMNS
SECTIONS

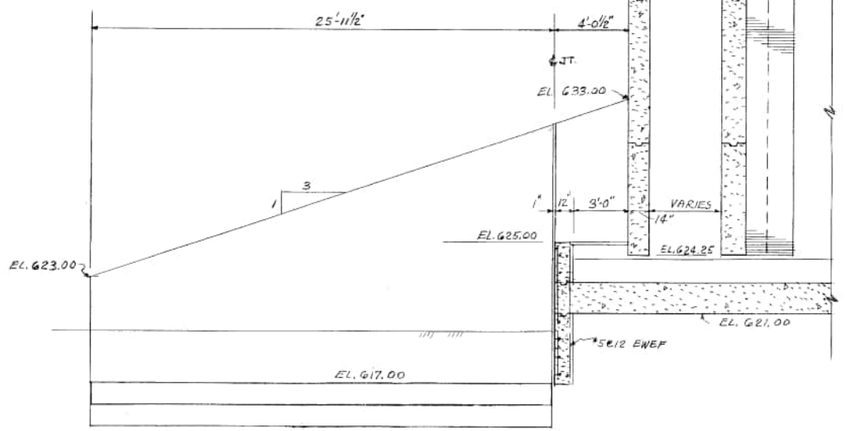
SCALE 1/4" : 1'-0"
FILE NO 1430-5.043
SHEET NO. ST.06 / 49



SECTION $F_{STA\ 2} - F_{ST.07}$



SECTION $K - K_{STA\ 3}$ $_{ST.07}$



SECTION $D_{STA\ 2} - D_{ST.07}$

RECORD DRAWING 1345-290

STATE OF OHIO JAMES L. BUTTLE E-033105 REGISTERED PROFESSIONAL ENGINEER

James L Buttle

NO.	DESCRIPTION	DATE
	AS BUILT	3-87

REVISIONS

HAVENS AND EMERSON INC.
CONSULTING ENGINEERS

STATE OF OHIO GEORGE D. SIMPSON 19423 REGISTERED PROFESSIONAL ENGINEER

DESIGNED BY KJN DRAWN BY KJN
APPROVED BY R.W. Krotz
SUBMITTED BY D.D. Simpson HAVENS AND EMERSON INC.
DATE 10-14-83

APPROVED BY
Lonny D. Shivley CITY ENGINEER
DATE 11-26-85

CITY OF ELYRIA, OHIO
DEPARTMENT OF PUBLIC SERVICE

WATER POLLUTION CONTROL PLANT IMPROVEMENTS

SECONDARY TREATMENT EXPANSION
CONTRACT 5
STRUCTURAL
TRICKLING FILTER COLUMNS
SECTIONS

SCALE 1/4" : 1'-0"
FILE NO. 1430- 5.044
SHEET NO. ST.07/ 49