HARRISON HILLS CITY SCHOOL DISTRICT
HARRISON COUNTY, OHIO

HARRISON CENTRAL MAZEROSKI FIELD

ADDENDUM #01

SEPTEMBER 10, 2021

THRASHER PROJECT #101-060-10240

TO WHOM IT MAY CONCERN:

A Pre-Bid Conference was held on Thursday, September 09, 2021 on the above-referenced project, a copy of the sign in sheet is included in this Addendum. The following are clarifications and responses to questions posed by contractors for the above-referenced project.

A. GENERAL

An issue was raised with steel bar joist lead times. The consensus was that lead times are currently 6-8 months. The architect will investigate and discuss with the Owner on how best to proceed. Any change will be issued in a subsequent addendum. Until instructed otherwise, the Contractor shall bid the project as designed.

The Geotechnical Report is attached to this addendum for reference.

B. SPECIFICATIONS

None

C. DRAWINGS

None

D. QUESTIONS AND RESPONSES

QUESTION
1. Is there any chance of a one week bid extension?

RESPONSE
This will be discussed with the Owner and addressed in a subsequent addendum. The bid date remains as published until further notice.

QUESTION

2. Can soil spoils remain on-site?

RESPONSE

Yes, spoils are permitted to remain on site. Specific areas will be designated by the Owner during construction.

QUESTION

3. Are there milestone dates for separate contracts held by the Owner (Musco and AstroTurf)?

RESPONSE

There are not currently milestone dates established for the Owner's separate contracts.

QUESTION

4. Will the General Contractor be penalized for delays caused by work under separate contracts?

RESPONSE

Every effort has been made to delineate scopes of work to avoid overlaps and potentials for delay. The Critical Paths for each separate scope are independent to the greatest extent possible. The General Contractor will not be penalized for delays in scopes of work that are not under their contract, and the General Contractor's Substantial Completion date and criteria are specific to their scope of work.

QUESTION

5. Is a bid bond required.

RESPONSE

Yes, a bid bond is required. Refer to the contract documents for requirements.

QUESTION

6. Is this project sales tax exempt?

RESPONSE

Yes, this project is sales tax exempt. The Owner will provide documentation to the successful contractor.

QUESTION

7. Is this project subject to prevailing wage rates?

RESPONSE

Yes, State prevailing wage rates are applicable to this project and will be provided in a subsequent addendum.

If you have any questions or comments, please feel free to contact me at your earliest convenience. As a reminder, bids will be received until 12:00 p.m. on Thursday, September 23, 2021 at 100 Huskies Way, Cadiz, OH 43907. Good luck to everyone and thank you for your interest in the project.

Sincerely,

THE THRASHER GROUP, INC.

Joshua Lyons, NCARB, AIA
Project Manager

STATE OF OHIO
JOSHUA LYONS
1917654
REGISTERED ARCHITECT
09/10/2021

HARRISON HILLS CITY SCHOOL DISTRICT
HARRISON COUNTY, OHIO
HARRISON CENTRAL MAZEROSKI FIELD

PRE-BID CONFERENCE
Thursday, September 09, 2021

Thrasher Project #101-060-10240

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HARRISON HILLS BASEBALL FIELD
HARRISON COUNTY, OHIO

GEOTECHNICAL INVESTIGATION REPORT

Prepared For:
The Thrasher Group, Inc.
400 3rd St. SE, Suite 309
Canton, OH 44702

Prepared By:
Resource International, Inc.
6350 Presidential Gateway
Columbus, OH 43231

Rii Project No. W-21-096

August 2021

August 25, 2021

Mr. Josh Lyons, AIA, NCARB
Architect
The Thrasher Group, Inc.
400 3rd St. SE, Suite 309
Canton, OH 44702

Re: Geotechnical Investigation
Harrison Hills Baseball Field
Harrison County, Ohio
Rii Project No. W-21-096

Mr. Lyons:

Resource International, Inc. (Rii) is pleased to submit this geotechnical investigation report for the above-referenced project. Engineering logs have been prepared and are attached to this report along with field and laboratory test results. This report includes recommendations for the design and construction of the proposed baseball field for the Harrison Hills City School District within Harrison County, Ohio.

We sincerely appreciate the opportunity to be of service to you on this project. If you have any questions concerning the geotechnical investigation or this report, do not hesitate to contact us.

Sincerely,

RESOURCE INTERNATIONAL, INC.

Peyman P. Majidi, P.E.	Jonathan P. Sterenberg, P.E.
Project Engineer	Vice President– Geotechnical Services

Enclosure: Geotechnical Investigation Report

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APPENDICES

1.0 INTRODUCTION

This report is a presentation of the geotechnical investigation performed for the design and construction of the baseball field for the Harrison Hills City School District within Harrison County, Ohio. The site of the proposed new facility is an existing baseball field with associated driveways within Sally Buffalo Park. A vicinity map depicting the location of the site is provided on the boring plan in Appendix I.

Based on the project information provided, it is understood that the baseball field will be shifted approximately 80 feet to the northeast, and includes a new press box, new dugouts, new outfield fencing, a scoreboard, a detention basin, and associated driveways and parking lots.

1.1 Existing Site Conditions

The proposed site is located within Sally Buffalo Park, approximately one mile to the west of Cadiz in Harrison County, Ohio. The surface topography of the area is characterized by flat areas with low relief, having an average surface elevation around 1200 feet mean sea level (msl). Based on the Environmental Site Assessment report of the area prepared by Resource International, Inc. (Rii), it is understood that the proposed area used to be a surface mining operation as early as 1960 with continual operations until mid-1990s. Regionally, the area slopes to the east and south toward the Sally Buffalo Creek.

1.2 Site Geology

Physiographically, the site lies within the unglaciated portion of Ohio, within the Appalachian Plateaus Province, and within the Little Switzerland Plateau District. This district contains a topography that is highly dissected with high-relief, with mostly fine-grained rocks, including red shales and red soils that are prone to landslides. The soil encountered at the project site consists of residuum derived from local bedrock, including areas of colluvium located primarily within low-lying zones.

Based on the Bedrock Topography and Geology Maps, obtained from the Ohio Department of Natural Resources (ODNR), the underlying bedrock at the sites consist of two formations, the Monongahela Group and the Conemaugh Group. Both of these units are of Upper Pennsylvanian-age and are characterized by lithologies that commonly intertongue and intergrade and change rapidly both vertically and horizontally in rock types. The Monongahela Group, which is the younger unit of the two, is comprised of interbedded shale, siltstone, sandstone, mudstone, limestone (non-marine), and coal and can be as thick as 350 feet. The Conemaugh Group is comprised of interbedded shale, siltstone, sandstone, mudstone and lesser amounts of limestone and coal and can be as thick as 350 to 490 feet. The mudstones in both units are subject to severe surface weathering. Red shales and red soils are common and prone to landslides, especially where bedrock is exposed.

The top of bedrock generally follows the rolling site terrain, generally with thin overburden soil on hilltops and slopes and deeper soils in valley bottoms. All of the borings, while containing various types of rock fragments throughout, did not encounter the bedrock surface above their completion depths between 10 and 20 feet below the ground surface. However, the bedrock surface can be weathered with surficial rock being softer and augerable, which produces pulverized rock and soil making the exact bedrock surface hard to determine without coring of the rock. Area water well logs, from ODNR, indicate bedrock is shallow, ranging from 1 to 12 feet below the ground surface.

2.0 SUBSURFACE INVESTIGATION

On July 15, a total of eight (8) soil borings were performed for the proposed baseball field, extended to depths ranging from 10.0 to 20.0 feet below the existing ground surface. The borings were performed at the locations illustrated on the boring plan provided in Appendix I. A summary of the boring program is as follows:

Table 1. Boring program

Boring	Design Element	Boring Depth
B-1	Driveway / Parking Lot	10 ft
B-2		10 ft
B-3	Press Box	20 ft
B-4	Wall / Fence	15 ft
B-5	Field / Drainage	10 ft
B-6	Parking Lot	10 ft
B-7	Parking Lot / Scoreboard	15 ft
B-8	Outfield Wall / Detention Basin	15 ft
	TOTAL:	**105 ft**

The boring locations were determined and field located by Rii personnel. During the field reconnaissance, Rii personnel documented the existing site conditions and mapped all boring locations. Rii utilized a handheld GPS unit to obtain northing and easting coordinates at the boring locations. Approximate ground surface elevations at the boring locations were determined using topographic information from the basemap provided by the Thrasher Group.

The borings were drilled with an ATV-mounted (CME-750X) rotary drilling machine utilizing a 4.5-inch outside diameter continuous flight auger to advance the holes. Standard penetration test (SPT) and split spoon sampling was performed at 2.5-foot increments to a depth of 10.0 feet and at 5.0-foot increments thereafter to the boring termination depth. The SPT, per the American Society for Testing and Materials (ASTM) designation D1586, is conducted using a 140-pound hammer free falling 30 inches to drive a 2.0-inch outside diameter split spoon sampler 18 inches. Rii utilized a calibrated automatic drop hammer to generate consistent energy transfer to the sampler. Driving resistance is recorded on the boring logs in terms of blows per 6.0-inch interval of the driving distance. The second and third intervals are added to obtain the number of blows per foot (N). SPT blow counts aid in estimating soil characteristics used to calculate bearing capacities and settlement potential. Measured blow count (N_m) values are corrected to an equivalent (60 percent) energy ratio, N_{60}, by the following equation. Both values are represented on boring logs presented in Appendix III.

$$N_{60} = N_m*(ER/60)$$

Where:
N_m = measured N value
ER = drill rod energy ratio, expressed as a percent, for the system used

The hammers for the CME-750X ATV-mounted drill used for this project was calibrated on September 14, 2020 and has a drill rod energy ratio of 86.2 percent.

Hand penetrometer readings, which provide a rough estimate of the unconfined compressive strength of the soil, were reported on the boring logs in units of tons per square foot (tsf) and were utilized to classify the consistency of the cohesive soil in each layer. An indirect estimate of the unconfined compressive strength of the cohesive split spoon samples can be made from a correlation with the blow counts (N_{60}). Please note that split spoon samples are considered to be disturbed and the laboratory determination of their shear strengths may vary from undisturbed conditions.

Upon completion of drilling, the borings were backfilled with the soil cuttings generated during the drilling process.

During drilling, field personnel prepared field logs showing the encountered subsurface conditions. Soil samples obtained from the drilling operation were preserved in sealed glass jars and delivered to the soil laboratory. In the laboratory, the soil samples were visually classified and select soil samples were tested as noted in Table 2.

Table 2. Laboratory Test Schedule

Laboratory Test	Test Designation	Number of Tests Performed
Natural Moisture Content	ASTM D2216	13
Plastic and Liquid Limits	ASTM D4318	8
Gradation – Hydrometer	ASTM D422	8

These tests are necessary to classify the soil based on the Unified Soil Classification System (USCS) in accordance with ASTM D2487. The results are also used to estimate engineering properties needed to provide foundation and pavement design recommendations and soil related construction considerations. Results of the laboratory testing are presented in Appendix IV and, in part, on the boring logs in Appendix III. A description of the soil terms used throughout this report is presented in Appendix II.

3.0 SUBSURFACE PROFILE

Interpreted engineering logs have been prepared based on the field logs, visual classification of samples and laboratory test results. Classification of the borings follows the current USCS specifications. The following is a summary of what was found in the test borings and what is represented on the boring logs.

3.1 Surface Materials

With the exception of boring B-2, all borings were performed within the proposed area of design and construction and encountered between 2 to 9 inches of topsoil at the existing surface as identified by the significant presence of organics and vegetation. Boring B-2 was performed in a paved surface and encountered 5 inches of asphalt overlying 4 inches of aggregate base.

3.2 Subsurface Soils

Below surficial material, existing fill material consisting of both cohesive and granular soils were encountered in all borings to depth ranging from 5.5 feet to 18.0 feet below existing grade. The existing fill materials were described as gray and brown lean clay with sand, sandy lean clay, sandy silt (USCS CL, ML) and gray to dark gray clayey sand, poorly graded gravel (USCS SC, GP) and contained sandstone and coal fragments. Below surficial material and existing fill, natural cohesive and granular material were encountered extending to boring termination depths. The natural cohesive soils were described as dark gray sandy lean clay, sandy silt (USCS CL, ML) and brownish gray silty sand with gravel (USCS SM).

The shear strength and consistency of the natural cohesive soils are primarily derived from the hand penetrometer values (HP). The cohesive soils encountered ranged from stiff ($1.0 < HP \leq 2.0$ tsf) to very stiff ($2.0 < HP \leq 4.0$ tsf). The unconfined compressive strength of the cohesive soil samples tested, as estimated from the hand penetrometer, ranged from 1.5 to 3.0 tsf. The relative density of natural granular soils is primarily derived from SPT blow count (N_{60}). Based on the SPT blow counts obtained, the granular soils encountered ranged from medium dense ($10 < N_{60} < 30$ blows per foot [bpf]) to dense ($30 \leq N_{60} \leq 50$ bpf). Blow counts recorded from the SPT sampling ranged from 19 bpf to 34 bpf.

It must be noted that higher blow counts corresponding to very dense granular soils were encountered in borings B-3 and B-4 at depths where rock fragments consisted of cobbles were encountered. The split spoon sampler upon encountering cobbles generally registers a higher blow count which is considered an anomaly and not representative of the actual shear strength of the soils.

Natural moisture contents of the cohesive soil samples tested ranged from 8 to 21 percent. The natural moisture contents of the soil samples tested for plasticity index ranged from 8 percent below to 7 percent above their corresponding plastic limits. In general, the soils exhibited natural moisture contents estimated to range from significantly below to slightly above optimum moisture levels.

3.3 Bedrock

Bedrock was not encountered in any of the borings performed for this investigation.

3.4 Groundwater

Seepage was encountered initially in boring B-1 at the depth of 0.8 feet beneath existing ground surface. The remaining borings were encountered dry, meaning no appreciable amount of moisture was observed in the boreholes.

Please note that short-term water level readings are not necessarily an accurate indication of the actual groundwater level. In addition, groundwater levels or the presence of groundwater are considered to be dependent seasonal fluctuations in precipitation. A more comprehensive description of the subsurface conditions encountered during the drilling program can be found on the boring logs in Appendix III.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Data obtained from the drilling and testing program have been used to determine foundation support capabilities and the settlement potential for the soil encountered at the site. These parameters have been used to provide guidelines for the design of the structure foundation and pavement support systems, as well as the construction specifications related to the placement of foundation and pavement systems and general earthwork recommendations, which are discussed in the following paragraphs. Allowable bearing capacity considers the gross loading, which includes weight of foundation concrete for elements placed below the existing ground and the loading from the superstructures.

4.1 Shallow Foundation Recommendations

Borings B-3, B-4 and B-7 were performed for the press box, wall / fence and scoreboard, respectively. As previously stated, these borings encountered existing fill at their anticipated bearing depths. Given the history of the area, and this site in particular, the existing fill can be attributed to spoils from the mining operations. Based on the nature of the fill, it must be understood that there is a potential risk for differential settlement which cannot be quantified in an uncontrolled fill, and which will need to be accepted by the owner. Given the N_{60} blow counts observed in the field along with the hand penetrometer values obtained, and based on the performance of the existing structures and site features over the history of the existing baseball field, Rii believes this risk to be minimal. However, if the owner is unwilling to accept this risk, Rii recommends that existing fill be partially over excavated up to 5 feet below the proposed bottom of footing elevation and backfilled with either compacted engineered fill or low strength mortar (LSM) in accordance with Item 613 of the Ohio Department of Transportation (ODOT) Construction and Materials Specification (CMS). If engineered fill is used, the over excavations should extend down and out from the bottom of the proposed foundation edge at a 45 degree plane to remove this material from the zone of influence of the structure. If Item 613 LSM is utilized as the backfill material, then vertical excavations may be utilized (in accordance with OSHA guidelines).

Conventional shallow foundations bearing on competent engineered fill should be proportioned for a **maximum allowable bearing capacity of 3.0 ksf**.

Footing concrete should be placed as soon as possible following footing excavation, preferably the same day, to avoid potential water related damage. Footings should be kept dry and clean until footing concrete is placed in order to minimize damage to the bearing surface.

4.1.1 Slab-on-Grade Recommendations

Floor slabs may be placed on the newly placed controlled fill, or natural cohesive materials provided that the subgrade has been proofrolled and prepared in accordance with Section 4.6.

Floor slabs should be designed and constructed as “floating” slabs that are structurally independent of building foundations. Adequate expansion joints should be incorporated into the floor slabs near the foundations so that the floor slabs do not impose additional loads on the foundations. The expansion joints would also allow the foundations and floor slabs to settle independently of each other.

Provided that the slab-on-grade is prepared in accordance with Section 4.6, a modulus of subgrade reaction, K, of 140 pounds per cubic inch (pci) should be used in the design of concrete floor slabs at this site. The use of vapor barriers or capillary breaks is recommended for two reasons:

- The installation of sheet vapor barriers or capillary breaks retards moisture migration from the soil subgrade into the concrete floor slab, reducing the moisture content of the floor slab and subsequently reducing the possible problems with the adhesion of vinyl floor tile (if applicable).

- In areas where no vinyl tile will be installed, vapor barriers or granular capillary breaks will reduce the likelihood of differential shrinkage of the floor slabs that can cause floors to curl.

Therefore, per ACI specifications, it is recommended to place a 6-mil visqueen capillary break over a minimum of 6.0-inches fine aggregate below all concrete slabs.

The subgrade soils should be thoroughly proofrolled to identify any soft, wet, or weak zones prior to placement of subbase stone or concrete.

4.2 Drilled Shaft Foundations

For the scoreboard foundation, Rii recommends a deep foundation system consisting of drilled shafts be employed. **It is recommended that drilled shaft foundations be extended to bear at or below elevation 1081 msl. Drilled shafts extending to this elevation may be designed for a maximum allowable end bearing capacity of 7.0 ksf. If additional capacity is required, an allowable side friction of 0.5 ksf may be used. Side friction should be neglected in the upper 5.0 feet of the shaft, however.**

The end bearing capacity presented is estimated using empirical equations based on the derived characteristics of the soil types encountered in the subject borings drilled. The drilled shaft capacities noted above were analyzed utilizing a factor of safety of 2.5. Drilled shaft lengths should measure a minimum of three (3) times the diameter. Drilled shafts should be designed in strict accordance with the current Ohio Building Code (OBC). Per the OBC the structural capacity of the shafts must be in compliance with the following guideline:

- Design load stresses in the concrete must not exceed 0.33 f'c.

For structure foundations supported on drilled shafts extended to the elevations noted above, total and differential settlements are estimated to be less than ½ inch if they are designed using the allowable bearing capacities provided.

4.2.1 Drilled Shaft Considerations

The minimum requirements for proper inspection of drilled shaft construction are as follows:

- A qualified inspector should record the material types being removed from the hole as excavation proceeds.

- When the bearing material has been encountered and identified and/or the design tip elevation has been reached, the shaft walls and base should be observed for anomalies, unexpected soft soil conditions, obstructions or caving.

- Concrete placed freefall should not be allowed to hit the sidewalls of the excavation or the rebar cage and should not pass through any water.
- Structural stability of the rebar cage should be maintained during the concrete pour to prevent buckling.
- The volume of concrete should be checked to ensure voids did not result during extraction of the casing (if utilized).
- The placement of all concrete for the drilled shafts shall follow the American Concrete Institute's Design and Construction of Drilled Piers (ACI 336.3R-93).
- If concrete is placed by tremie method, it must be done so with a rigid tremie pipe under adequate head pressure to displace water or slurry if groundwater has entered the caisson (all tremie procedures shall follow applicable ACI specifications).
- Pulling casing with insufficient concrete inside should be restricted.
- The bottom of drilled shaft excavation should be clean and free of loose material. Any loose material observed should be removed using a clean-out bucket (muck bucket).

The use of casing for drilled shafts is recommended under any of the following conditions:

- Caving material is encountered at any time during the drilling of the shaft.
- Groundwater is encountered at any time during the drilling of the shaft, or groundwater seepage occurs in the drilled shaft.
- Down hole inspection is planned (casing is required for this instance).

Due to the nature of the mine spoil and the presence of granular soils, the use of temporary casing will likely be required to maintain an open excavation below the groundwater table.

4.3 Seismic Site Classification

Based on the soil conditions at the site, as indicated by the test borings and estimated from local geological references, the seismic analysis and design procedures for the proposed structure should be based on Site Class D (stiff soil profile) per the current Ohio Building Code.

4.4 Pavement Subgrade Recommendations

Borings B-1, B-2, B-6 and B-7 were performed for the proposed driveway and parking lots and encountered cohesive and granular soils described as gray, brown, brownish gray lean clay with sand, sandy lean clay (USCS CL), grayish brown to gray clayey sand with gravel, silty sand with gravel and poorly graded gravel (USCS SC, SM, GP). The subsurface conditions encountered at the anticipated subgrade elevation for the driveways and parking lot consist of very stiff sandy lean clay (USCS CL) and medium dense to dense poorly graded gravel, clayey sand with gravel (USCS GP, SC). Based on the soil conditions encountered, **it is recommended that pavement design be based on a California Bearing Ratio (CBR) value of 5, with a corresponding resilient modulus (M_R) of 6,000 psi**. Correlation charts indicate a modulus of subgrade reaction (K) equal to 135 pci and a soil support value (SSV) of 3.8.

As recommended previously, the subgrade soil should be thoroughly proofrolled in accordance with the recommendations presented in Section 4.6 to identify any soft, wet or weak zones prior to placement of aggregate subbase stone or pavement materials. At a minimum, the soils will likely require moisture conditioning as recommended in Section 4.6 of this report. However, if the soils continue to present evidence of deformation during the proofrolling, then it is recommended that the soils be stabilized via a 1.0-foot undercut and replacement with granular engineered fill.

Materials utilized for pavement construction should meet material and procedural details as outlined by the ODOT, the Asphalt Institute and/or the American Concrete Institute, as applicable.

Pavement design is dependent on the inclusion of adequate surface and subsurface drainage in order to maintain the compacted subgrade near optimum moisture conditions throughout the lifetime of the pavement.

Sources of borrow material, if required, should be designated in advance of construction. The material should be tested in the laboratory to verify the soil exhibits a minimum design CBR value of 5. The fill soil should be placed and compacted in accordance with the recommendations presented in Section 4.6.

4.5 Detention Basin Recommendations

Based on information provided by the design team, it is understood that a detention basin (dry pond) is being planned at the east side of the proposed baseball field, adjacent to the existing basketball courts.

As part of this geotechnical investigation one boring, B-8, was performed to depth of 15.0 feet below existing grade for the detention pond. Based on subsurface condition encountered at this boring, existing granular fill soils identified as poorly graded gravel with sand were seen overlying cohesive material identified as sandy lean clay (USCS GP, CL). The poorly graded gravel was encountered to depth of 8.0 feet below existing grade. In general, the granular soils such as the types encountered in the site, are considered good drainage layers by the porosity inherent to these soils.

The permeability of the granular soils encountered along the side slopes of basin and at the proposed invert elevation of the basin is anticipated to range between 1.0×10^{-4} and 1.0×10^{-2} m/s, based on correlations with the grain size distribution of the material. For reference, the typical hydraulic conductivity for a soil used in a clay liner is 1×10^{-7} cm/s.

Based on soil stability considerations of the slopes under both dry and fully saturated (full reservoir) conditions, which are considered to be the normal operation conditions, it is recommended that all slopes for the proposed basins be constructed at no steeper than 3H:1V (horizontal to vertical).

4.5.1 Pipe Support

It is anticipated that utility piping will be required that will transport stormwater from the surrounding region to the basin. The subsurface conditions at the proposed invert elevation of the proposed basin are anticipated to consist of stiff to very stiff lean clay with sand (USCS CL). The soils appear adequate for pipe support in their current condition.

The pipe bedding surface should be inspected during construction to verify satisfactory conditions. If any soft, very loose and/or organic soils are encountered during construction, they should be over excavated and replaced below the pipe with properly compacted granular fill (i.e., No. 57 stone). The stone should be placed to the bottom of the pipe. In general, 2.0 feet of compacted crushed stone would be sufficient to help the pipe bridge any soft or loose soil.

Please note that the stability of subgrade soils for the pipes is dependent on proper groundwater control throughout construction. Therefore, it is recommended that groundwater, if encountered, be controlled as recommended in Section 4.6.2 of this report. Any open excavations should be constructed with a shoring system or a maximum excavation back slope pursuant to OSHA guidelines, as presented in Table 3 of Section 4.6.1. Soil parameters for the design of any excavation shoring systems are provided in Table 4 and Table 5.

4.6 Construction Considerations

The site work shall conform to the local specifications. If local specifications are not available, the latest ODOT CMS should be implemented. Site preparation should begin with general clearing, including the complete removal of all topsoil, vegetation, debris, existing pavement sections, unsuitable existing fill materials (as determined by a geotechnical engineer or an experienced soil technician), or any otherwise unsuitable materials from within the footprint of the proposed structure and pavement areas.

Prior to placing engineered fill, the slab-on-grade and/or pavement materials, the proposed subgrade surfaces should be thoroughly proofrolled with sufficient proofrolling apparatus (preferably a fully loaded tandem axle dump truck). A geotechnical engineer or an experienced soil technician should be present during proofrolling. Deflection, cracking or rutting of the subgrade surface during a proofroll indicates inadequate subgrade stability.

Areas of excess yielding should be stabilized using one of the following options: 1) scarifying, drying and recompacting, 2) mixing wet soil with dry soil, 3) undercutting unsuitable surficial soil and replacing it with controlled engineered fill, 4) modifying the soil by adding a chemical such as lime, cement or lime kiln dust, or 5) using a geogrid subgrade reinforcement system in conjunction with granular fill. Other methods of subgrade stabilization are available and certainly may be effective (both physically and economically) in stabilizing the soil. The adequacy of any stabilization method should be verified through the construction of a test section. All proposed subgrade surfaces should be shaped to promote positive drainage, with a minimum slope of 2 percent or 0.25 inches per foot. Adequate drainage is necessary for maintaining the stability of the subgrade. Care should be taken during final grading so that no areas of potential ponding or standing water remain at the subgrade surface.

After materials are excavated to design grade, proper control of subgrade and new fill compaction should be performed by the geotechnical engineer and/or his/her representative. Generally, materials utilized for engineered fill should free of waste construction debris and other deleterious materials and meet the following requirements:

- Maximum Dry Density per ASTM D698 — > 110 pcf
- Liquid Limit — < 40
- Plasticity Index — < 15
- Organic Matter — < 3 percent
- Maximum Particle Size — < 3 inches
- Silt Content (between 0.075 and 0.005 mm) — < 45 percent

Compacted granular fill shall meet the above specification and additionally shall have a maximum 35 percent passing the No. 200 sieve.

The majority of the site's natural soils (excluding sod, topsoil, and/or organic containing materials) are generally considered suitable for reuse as structural fill when compacted at its optimum moisture content. Fill soil placed for foundation support should be placed in loose lifts not to exceed 8.0 inches. Fill soil placed under structures shall be compacted to not less than 100 percent of maximum dry density obtained by a Standard Proctor Test (ASTM D698). Compaction of fill material beneath any paved section should be performed to no less than 98 percent of Standard Proctor. Fill soil containing excess moisture shall be required to dry prior to or during compaction to a moisture content not greater than 3.0 percent above or below optimum moisture levels. However, for material which displays pronounced elasticity or deformation under the action of loaded rubber tire construction equipment, the moisture content shall be reduced to optimum if necessary to secure stability. Drying of wet soil shall be expedited by the use of plows, discs, or by other approved methods when so ordered by the site geotechnical engineer. Fill soil should not be placed in a frozen condition, and fill soil should not be placed on a frozen subgrade.

Underground utilities should be bedded in crushed granular stone, such as No. 57 or No. 8 stone, extending from 4.0 inches below the pipe to the springline of the pipe or 12.0 inches above the pipe for concrete and PVC pipe, respectively. The stone will serve as a leveling course and will provide a stable working platform. Compaction of backfill material within trench excavations located beneath any structure or pavement areas should be performed at no less than 98 percent of Standard Proctor using granular backfill placed in lifts no thicker than 8.0 inches.

4.6.1 Excavation Considerations

All trenching and excavation procedures should follow applicable Occupational Safety and Health Administration (OSHA) standards, including adequate safety precautions conforming to OSHA standards for the personnel installing underground lines. During excavation, if slopes cannot be laid back to OSHA Standards due to adjacent structures or other obstructions, trench boxes or temporary sheeting or shoring may be required. The following table should be utilized as a general guide for implementing OSHA guidelines when estimating excavation back slopes at the various boring locations. Actual excavation back slopes must be field verified by qualified personnel at the time of excavation in strict accordance with OSHA guidelines.

Table 3. Excavation Back Slopes

Soil	Maximum Back Slope	Notes
Soft to Medium Stiff Cohesive	1.5 : 1.0	Above Ground Water Table and No Seepage
Stiff Cohesive	1.0 : 1.0	Above Ground Water Table and No Seepage
Very Stiff to Hard Cohesive	0.75 : 1.0	Above Ground Water Table and No Seepage
All Granular & Cohesive Soil Below Ground Water Table or with Seepage	1.5 : 1.0	None

For the soil types encountered in the borings, the “in-situ” unit weight (γ), cohesion (c), effective angle of friction (φ'), and lateral earth pressure coefficients for at-rest conditions

(k_o), active conditions (k_a), and passive conditions (k_p) have been estimated and are provided in Table 4 and Table 5.

Table 4. Estimated Undrained (Short-term) Soil Parameters for Design

Soil Type	γ (pcf) [1]	c (psf)	φ'	k_a	k_o	k_p
Soft to Medium Stiff Cohesive Soil	110	750	0°	N/A	N/A	N/A
Stiff Cohesive Soil	115	1,500	0°	N/A	N/A	N/A
Very Stiff to Hard Cohesive Soil	120	3,000	0°	N/A	N/A	N/A
Very Loose to Loose Granular Soil	120	0	28°	0.36	0.53	2.77
Medium Dense Granular Soil	125	0	30°	0.33	0.50	3.00
Compacted Cohesive Engineered Fill	120	2,000	0°	N/A	N/A	N/A
Compacted Granular Engineered Fill	130	0	33°	0.30	0.46	3.39

1. *When below groundwater table, use effective unit weight, $\gamma' = \gamma$ - 62.4 pcf and add hydrostatic water pressure.*

Table 5. Estimated Drained (Long-term) Soil Parameters for Design

Soil Type	γ (pcf) [1]	c (psf)	φ'	k_a	k_o	k_p
Natural Cohesive Soil	120	0	26°	0.39	0.56	2.56
Very Loose to Loose Granular Soil	120	0	28°	0.36	0.53	2.77
Medium Dense Granular Soil	125	0	30°	0.33	0.50	3.00
Compacted Cohesive Engineered Fill	120	0	28°	0.36	0.53	2.77
Compacted Granular Engineered Fill	130	0	33°	0.30	0.46	3.39

1. *When below groundwater table, use effective unit weight, $\gamma' = \gamma$ - 62.4 pcf and add hydrostatic water pressure.*

These parameters are considered appropriate for the design of all subsurface structures and any excavation support systems. Subsurface structures (where the top of the structure is restrained from movement) should be designed based on at-rest (k_o) conditions. For proposed temporary retaining structures (where the top of the structure is allowed to move), earth pressure distributions should be based on active (k_a) and passive (k_p) conditions. The values in this table have been estimated from correlation charts based on minimum standards specified for compacted engineered fill materials. These recommendations do not take into consideration the effect of any surcharge loading or a sloped ground surface (a flat surface is assumed). Earth pressures on excavation support systems will be dependent on the type of sheeting and method of bracing or anchorage.

4.6.2 Groundwater Considerations

Based on the groundwater observations made during and at the completion of drilling, groundwater would not be anticipated during construction of this project. Where/if groundwater is encountered in other areas, proper groundwater control should be employed and maintained to prevent disturbance to excavation bottoms consisting of cohesive soil, and to prevent the possible development of a quick or "boiling" conditions where soft silts and/or fine sands are encountered. It is preferable that the groundwater level, if encountered, be maintained at least 36.0 inches below the deepest excavation. A proper dewatering system will be required to maintain a dry, workable condition within the excavations for the proposed waterline. Based on the soil conditions encountered at borings, Rii anticipates conventional sump and pump methods may be sufficient for groundwater control in local area.

5.0 LIMITATIONS OF STUDY

The above recommendations are predicated upon construction inspection by a qualified soil technician under the direct supervision of a professional geotechnical engineer. Adequate testing and inspection during construction are considered necessary to assure adequate construction of the structure foundations and pavement subgrade.

Our recommendations for this project were developed utilizing soil information obtained from the test borings that were made at the proposed site. At this time we would like to point out that soil borings only depict the soil conditions at the specific locations and time at which they were made. The conditions at other locations on the site may differ from those occurring at the boring locations.

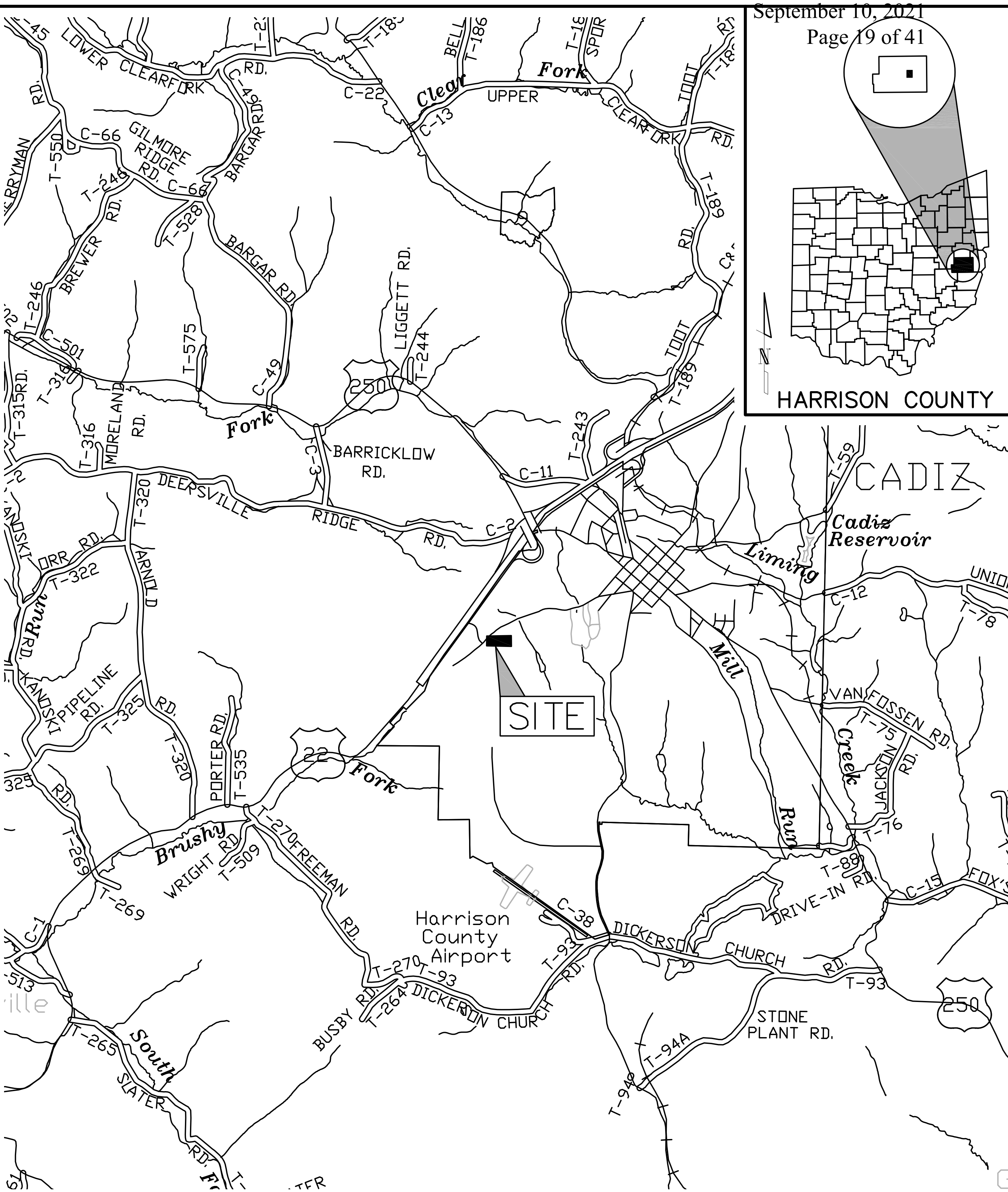
The conclusions and recommendations herein have been based upon the available soil information and the preliminary design details furnished by a representative of the owner of the proposed project. Any revision in the plans for the proposed construction from those anticipated in this report should be brought to the attention of the geotechnical engineer to determine whether any changes in the foundation or earthwork recommendations are necessary. If deviations from the noted subsurface conditions are encountered during construction, they should also be brought to the attention of the geotechnical engineer.

The scope of our services does not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report or on the test boring logs regarding odors, gases, staining of soils or other unusual conditions observed are strictly for the information of our client.

Our professional services have been performed, our findings obtained and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. Resource International is not responsible for the conclusions, opinions or recommendations made by others based upon the data included.

Appendix I

VICINITY MAP AND BORING PLAN

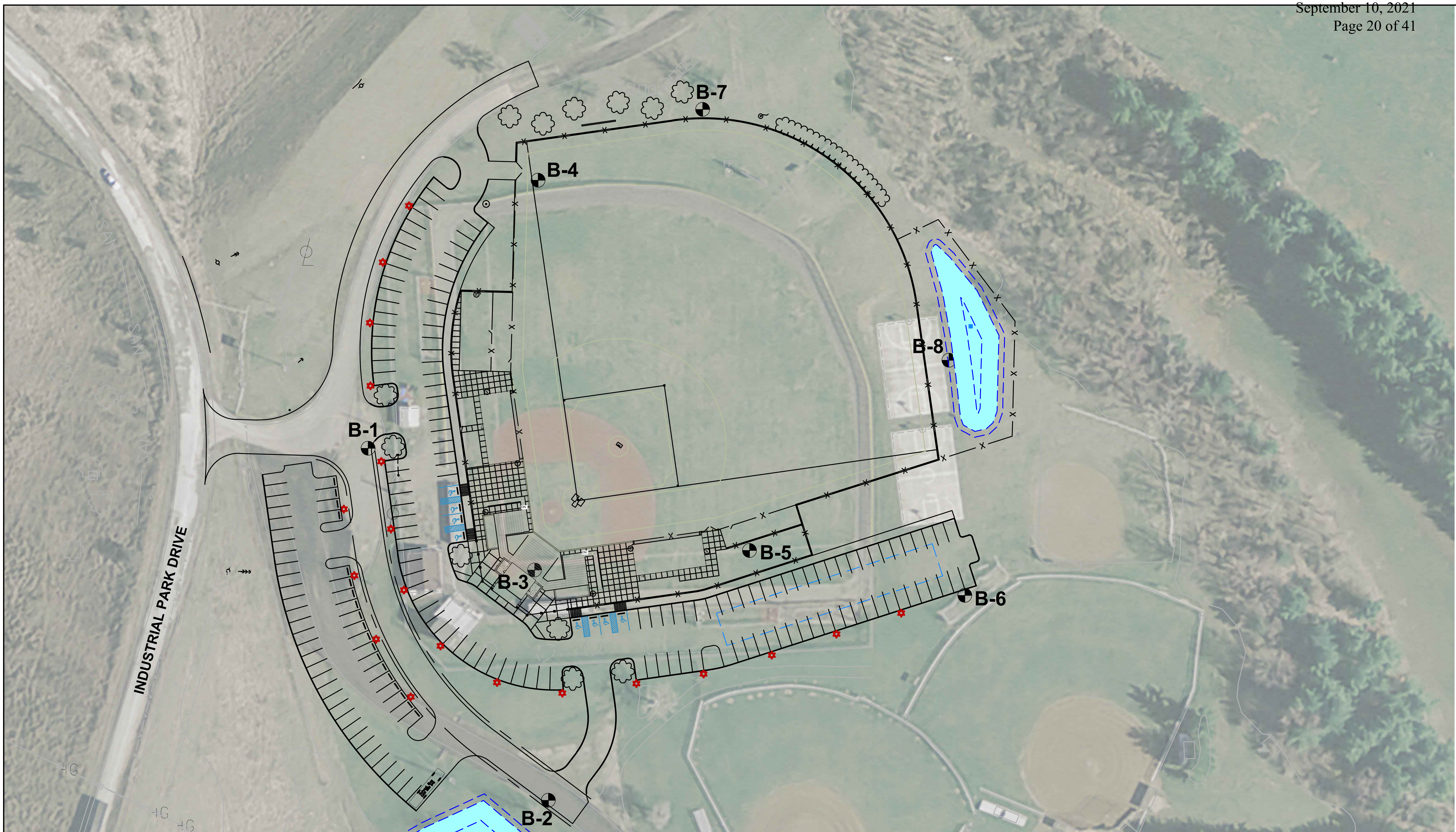


VICINITY MAP

GEOTECHNICAL INVESTIGATION
HARRISON HILLS BASEBALL FIELD
HARRISON, OHIO

RII PROJECT NO. W-21-096	DRAWN JAS
	REVIEWED PPM
SCALE: 1"=5000' (0, 2500, 5000)	DATE 8-20-21

RESOURCE INTERNATIONAL



BORING PLAN
GEOTECHNICAL INVESTIGATION HARRISON HILLS BASEBALL FIELD
HARRISON COUNTY, OHIO

RII PROJECT NO. W-21-096	DRAWN JAS
SCALE: 1"=80'	REVIEWED PPM
0 40 80	DATE 8-20-21

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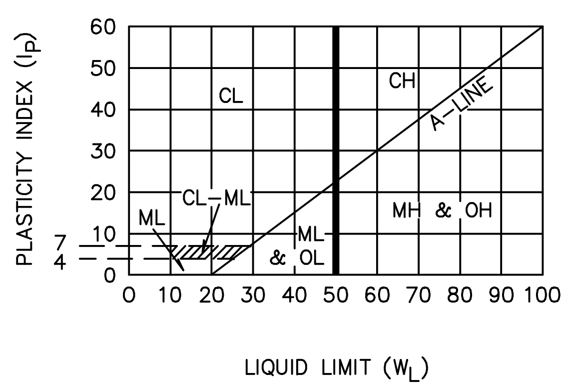
Appendix II

DESCRIPTION OF SOIL TERMS

UNIFIED SOIL CLASSIFICATION SYSTEM
(ASTM D 2487)

MAJOR DIVISION			GROUP SYMBOLS	TYPICAL NAMES	CLASSIFICATION CRITERIA	
COARSE–GRAINED SOILS MORE THAN 50% RETAINED ON 75μm (NO. 200) SIEVE	GRAVELS 50% OR MORE OF COARSE FRACTION RETAINED ON 4.75 mm (NO. 4) SIEVE	CLEAN GRAVELS	GW	WELL–GRADED GRAVELS AND GRAVEL–SAND MIXTURES, LITTLE OR NO FINES	CLASSIFICATION ON BASIS PERCENTAGE OF FINES LESS THAN 5% PASS 75 μm SIEVE: GW, GP, SW, SP MORE THAN 12% PASS 75 μm SIEVE: GM, GC, SM, SC 5% TO 12% PASS 75 μm SIEVE: BORDERLINE CLASSIFICATION REQUIRING USE OF DUAL SYMBOLS	$C_U=D_{60}/D_{10}$ GREATER THAN 4 $C_Z=\frac{(D_{30})^2}{D_{10} * D_{60}}$ BETWEEN 1 AND 3
			GP	POORLY GRADED GRAVELS AND GRAVEL–SAND MIXTURES, LITTLE OR NO FINES		NOT MEETING BOTH CRITERIA FOR GW
		GRAVELS WITH FINES	GM	SILTY GRAVELS, GRAVEL–SAND–SILT MIXTURES		ATTERBERG LIMITS PLOT BELOW "A" LINE OR PLASTICITY INDEX LESS THAN 4
			GC	CLAYEY GRAVELS, GRAVEL–SAND–CLAY MIXTURES		ATTERBERG LIMITS PLOT ABOVE "A" LINE AND PLASTICITY INDEX GREATER THAN 7
	SANDS MORE THAN 50% OF COARSE FRACTION PASSES 4.75 mm (NO. 4) SIEVE	CLEAN SANDS	SW	WELL–GRADED SAND AND GRAVELLY SANDS, LITTLE OR NO FINES		$C_U=D_{60}/D_{10}$ GREATER THAN 6 $C_Z=\frac{(D_{30})^2}{D_{10} * D_{60}}$ BETWEEN 1 AND 3
			SP	POORLY GRADED SANDS AND GRAVELLY SANDS, LITTLE OR NO FINES		NOT MEETING BOTH CRITERIA FOR SW
		SANDS WITH FINES	SM	SILTY SANDS, SAND–SILT MIXTURES		ATTERBERG LIMITS PLOT BELOW "A" LINE OR PLASTICITY INDEX LESS THAN 4
			SC	CLAYEY SANDS, SAND–CLAY MIXTURES		ATTERBERG LIMITS PLOT ABOVE "A" LINE AND PLASTICITY INDEX GREATER THAN 7

MAJOR DIVISION		GROUP SYMBOLS	TYPICAL NAMES	CLASSIFICATION CRITERIA
FINE–GRAINED SOILS 50% OR MORE PASSES 75 μm (NO. 200) SIEVE	SILTS AND CLAYS LIQUID LIMIT 50% OR LESS	ML	INORGANIC SILTS, VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS	 PLASTICITY CHART FOR THE CLASSIFICATION OF FINE–GRAINED SOILS
		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
		OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50%	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDS OR SILTS, ELASTIC SILTS	
		CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
		OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY	
HIGHLY ORGANIC SOILS		PT	PEAT, MUCK AND OTHER HIGHLY ORGANIC SOILS	FIBROUS ORGANIC MATTER; WILL CHAR, BURN, OR GLOW

DESCRIPTION OF SOIL TERMS

The following terminology was used to describe soils throughout this report and is generally adapted from ASTM 2487/2488.

Granular Soils – USCS GW, GP, GM, GC, SW, SP, SM, SC, ML (non-plastic)
The relative compactness of granular soils is described as:

Description	Blows per foot – SPT (N_{60})		
Very Loose	Below		5
Loose	5	-	10
Medium Dense	11	-	30
Dense	31	-	50
Very Dense	Over		50

Cohesive Soils – USCS ML, CL, OL, MH, CH, OH, PT
The relative consistency of cohesive soils is described as:

Description	Unconfined Compression (tsf)		
Very Soft	Less than		0.25
Soft	0.25	-	0.5
Medium Stiff	0.5	-	1.0
Stiff	1.0	-	2.0
Very Stiff	2.0	-	4.0
Hard	Over		4.0

Gradation - The following size-related denominations are used to describe soils:

Soil Fraction		Size
Boulders		Larger than 12”
Cobbles		12” to 3”
Gravel	coarse	3” to ¾”
	fine	¾” to 4.75 mm (¾” to #4 Sieve)
Sand	coarse	4.75 mm to 2.0 mm (#4 to #10 Sieve)
	medium	2.0 mm to 0.42 mm (#10 to #40 Sieve)
	fine	0.42 mm to 0.074 mm (#40 to #200 Sieve)
Silt		0.074 mm to 0.005 mm (#200 to 0.005 mm)
Clay		Smaller than 0.005 mm

Modifiers of Components – The following modifiers indicate the range of percentages of the minor soil components:

Term	Range		
Trace	0%	-	10%
Little	10%	-	20%
Some	20%	-	35%
And	35%	-	50%

Moisture Table - The following moisture-related denominations are used to describe cohesive soils:

Term	Range
Dry	0% to 10%
Damp	>2% below Plastic Limit
Moist	2% below to 2% above Plastic Limit
Very Moist	>2% above Plastic Limit
Wet	≥ Liquid Limit

Organic Content – The following terms are used to describe organic soils:

Term	Organic Content (%)
Slightly organic	2-4
Moderately organic	4-10
Highly organic	>10

Bedrock – The following terms are used to describe bedrock hardness:

Term	Parameter
Very Weak	Can be carved with knife and scratched by fingernail.
Weak	Can be grooved or gouged with knife readily.
Slightly Strong	Can be grooved or gouged 0.05 in deep with knife.
Moderately Strong	Can be scratched with knife or pick.
Strong	Can be scratched with knife or pick with difficulty.
Very Strong	Cannot be scratched by knife or pick. Hard repeated blows of hammer to detach specimen.
Extremely Strong	Cannot be scratched by knife or pick. Hard repeated blows of hammer to chip hand specimen.

Appendix III

BORING LOGS:

B-1 through B-8

BORING LOGS

Definitions of Abbreviations

AS = Auger sample

GI = Group index as determined from the Ohio Department of Transportation classification system

HP = Unconfined compressive strength as determined by a hand penetrometer (tons per square foot)

LL_o = Oven-dried liquid limit as determined by ASTM D4318. Per ASTM D2487, if LL_o/LL is less than 75 percent, soil is classified as "organic".

LOI = Percent organic content (by weight) as determined by ASTM D2974 (loss on ignition test)

PID = Photo-ionization detector reading (parts per million)

QR = Unconfined compressive strength of intact rock core sample as determined by ASTM D2938 (pounds per square inch)

QU = Unconfined compressive strength of soil sample as determined by ASTM D2166 (pounds per square foot)

RC = Rock core sample

REC = Ratio of total length of recovered soil or rock to the total sample length, expressed as a percentage

RQD = Rock quality designation – estimate of the degree of jointing or fracture in a rock mass, expressed as a percentage:

$$\frac{\sum \text{segments equal to or longer than 4.0 inches}}{\text{core run length}} \times 100$$

S = Sulfate content (parts per million)

SPT = Standard penetration test blow counts, per ASTM D1586. Driving resistance recorded in terms of blows per 6-inch interval while letting a 140-pound hammer free fall 30 inches to drive a 2-inch outer diameter (O.D.) split spoon sampler a total of 18 inches. The second and third intervals are added to obtain the number of blows per foot (N_m).

N_{60} = Measured blow counts corrected to an equivalent (60 percent) energy ratio (ER) by the following equation: $N_{60} = N_m*(ER/60)$

SS = Split spoon sample

2S = For instances of no recovery from standard SS interval, a 2.5 inch O.D. split spoon is driven the full length of the standard SS interval plus an additional 6.0 inches to obtain a representative sample. Only the final 6.0 inches of sample is retained. Blow counts from 2S sampling are not correlated with N_{60} values.

3S = Same as 2S, but using a 3.0 inch O.D. split spoon sampler.

TR = Top of rock

W = Initial water level measured during drilling

▼ = Water level measured at completion of drilling

Classification Test Data

Gradation (as defined on Description of Soil Terms):

GR = % Gravel
SA = % Sand
SI = % Silt
CL = % Clay

Atterberg Limits:

LL = Liquid limit
PL = Plastic limit
PI = Plasticity Index

WC = Water content (%)

RESOURCE INTERNATIONAL, INC.

PROJECT: W-21-096 NAME: Harrison Hills Baseball Field CLIENT: The Thrasher Group, Inc. START: 7-15-21 END: 7-15-21	DRILLING FIRM / OPERATOR: RII / SB/ET SAMPLING FIRM / LOGGER: RII / JK DRILLING METHOD: 4.5" CFA SAMPLING METHOD: SPT	DRILL RIG: CME 750X (310218) HAMMER: Automatic CALIBRATION DATE: 9/14/20 ENERGY RATIO (%): 86.2	NORTHING 2382085.917 EASTING: 221163.128 ELEVATION: 1088.0 ft. COMPLETION DEPTH: 10.0 ft.	EXPLORATION ID **B-1** PAGE 1 OF 1

ELEV. 1088.0	DEPTHS	SAMPLE ID	SPT/ RQD	N_{60}	REC (%)	HP (tsf)	MATERIAL DESCRIPTION AND NOTES	GR	SA	SI	CL	LL	PL	PI	WC	USCS CLASS	BACK FILL
1087.2							0.8' - Gravel (9.0")										
	1–2	SS-1	3 3 4	10	89	3.0	**FILL**: Very stiff, gray and brown to brownish gray **LEAN CLAY WITH SAND**, damp.								18	CL (V)	
1082.5	4–5	SS-2	5 20 14	49	100	2.5		1.1	21.2	34.6	43.0	42	25	17	21	CL	
	6–7	SS-3	6 7 14	30	100		**POSSIBLE FILL**: Very stiff, brownish gray **SANDY LEAN CLAY**, moist.									CL (V)	
1078.0	9–10 EOB	SS-4	4 5 6	16	100	2.0	-Sandstone fragments in SS-4									CL (V)	

NOTES: Seepage @ 0.8'; Cave-in depth @ 9.0'

ABANDONMENT METHODS, MATERIALS, QUANTITIES: Compacted with the auger 12.5 lbs bentonite chips and soil cuttings.

RESOURCE INTERNATIONAL, INC.

PROJECT: W-21-096
NAME: Harrison Hills Baseball Field
CLIENT: The Thrasher Group, Inc.
START: 7-15-21 END: 7-15-21

DRILLING FIRM / OPERATOR: RII / SB/ET
SAMPLING FIRM / LOGGER: RII / JK
DRILLING METHOD: 4.5" CFA
SAMPLING METHOD: SPT

DRILL RIG: CME 750X (310218)
HAMMER: Automatic
CALIBRATION DATE: 9/14/20
ENERGY RATIO (%): 86.2

NORTHING 2382245.058
EASTING: 220852.273
ELEVATION: 1077.4 ft.
COMPLETION DEPTH: 10.0 ft.

EXPLORATION ID **B-2**
PAGE 1 OF 1

ELEV. 1077.4	DEPTHS	SAMPLE ID	SPT/ RQD	N_{60}	REC (%)	HP (tsf)	MATERIAL DESCRIPTION AND NOTES	GR	SA	SI	CL	LL	PL	PI	WC	USCS CLASS	BACK FILL
1077.0							0.4' - Asphalt (5.0")										
1076.6	1						0.4' - Aggregate Base (4.0")										
	2	SS-1	4 2 8	14	72	3.5	**FILL**: Very stiff, brownish gray **SANDY LEAN CLAY**, damp.								17	CL (V)	
	3																
	4–5	SS-2	4 8 8	23	89	2.5		7.6	29.8	36.1	26.6	38	23	15	19	CL	
	6						Shale and sandstone fragments present throughout										
	7	SS-3	4 4 3	10	67	2.5										CL (V)	
	8																
1067.4	9	SS-4	3 4 6	14	86	2.5										CL (V)	
	EOB 10																

GRADATION (%): GR, SA, SI, CL. ATTERBERG: LL, PL, PI.

NOTES: Groundwater not encountered during drilling

ABANDONMENT METHODS, MATERIALS, QUANTITIES: Compacted with the auger 12.5 lbs bentonite chips and soil cuttings. Pavement patched with asphalt cold patch.

RESOURCE INTERNATIONAL, INC.

PROJECT: W-21-096	DRILLING FIRM / OPERATOR: RII / SB/ET	DRILL RIG: CME 750X (310218)	NORTHING 2382232.849	EXPLORATION ID **B-3**
NAME: Harrison Hills Baseball Field	SAMPLING FIRM / LOGGER: RII / JK	HAMMER: Automatic	EASTING: 221055.586	
CLIENT: The Thrasher Group, Inc.	DRILLING METHOD: 4.5" CFA	CALIBRATION DATE: 9/14/20	ELEVATION: 1087.5 ft.	PAGE
START: 7-15-21 END: 7-15-21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.2	COMPLETION DEPTH: 20.0 ft.	1 OF 1

ELEV. 1087.5	DEPTHS	SAMPLE ID	SPT/ RQD	N_{60}	REC (%)	HP (tsf)	***MATERIAL DESCRIPTION AND NOTES***	GRADATION (%) GR	SA	SI	CL	ATTERBERG LL	PL	PI	WC	USCS CLASS	BACK FILL
1086.9							0.6' - Topsoil (7.0")										
	1 – 2	SS-1	3 3 5	11	100	4.5+	**FILL**: Hard, brown to gray **SANDY SILT**, damp.									ML (V)	
	4 – 5	SS-2	10 10 13	33	100	4.5	-Sandstone and shale fragments present throughout	2.2	46.6	37.2	14.0	NP	NP	NP	8	ML	
1082.0	6 – 7	SS-3	5 3 3	9	100	1.5	**FILL**: Stiff, gray to dark gray **LEAN CLAY WITH SAND**, moist.									CL (V)	
1079.5	9	SS-4	18 45 50/2"	-	100		**FILL**: Medium dense to very dense, gray to dark gray **CLAYEY SAND**, moist. -Coal, shale and sandstone framents present throughout -Cobbles @ 9.0' and 11.0'									SC (V)	
	11 – 12	SS-5	12 5 7	17	100			14.7	41.1	25.4	18.8	31	7	24	10	SC	
1074.5	14 – 15	SS-6	4 4 4	11	83		**FILL**: Medium dense to dense, dark gray **POORLY GRADED GRAVEL**, moist. -Coal and sandsone fragments present throughout									GP (V)	
	16 – 17	SS-7	12 14 10	34	100											GP (V)	
1069.5	19	SS-8	5 5 8	19	100	2.5	Very stiff, dark gray **SANDY SILT**, moist. -Coal fragments in SS-8									ML (V)	
1067.5	EOB 20																

NOTES: Groundwater not encountered during drilling; Cave-in depth @ 18.3'

ABANDONMENT METHODS, MATERIALS, QUANTITIES: Compacted with the auger 75 lbs bentonite chips and soil cuttings

RESOURCE INTERNATIONAL, INC.

PROJECT: W-21-096	DRILLING FIRM / OPERATOR: RII / SB/ET	DRILL RIG: CME 750X (310218)	NORTHING 2382235.976
NAME: Harrison Hills Baseball Field	SAMPLING FIRM / LOGGER: RII / JK	HAMMER: Automatic	EASTING: 221399.797
CLIENT: The Thrasher Group, Inc.	DRILLING METHOD: 4.5" CFA	CALIBRATION DATE: 9/14/20	ELEVATION: 1086.1 ft.
START: 7-15-21 END: 7-15-21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.2	COMPLETION DEPTH: 15.0 ft.

EXPLORATION ID **B-4**
PAGE 1 OF 1

ELEV. 1086.1	DEPTHS	SAMPLE ID	SPT/ RQD	N_{60}	REC (%)	HP (tsf)	MATERIAL DESCRIPTION AND NOTES	GR	SA	SI	CL	LL	PL	PI	WC	USCS CLASS
1085.4							0.7' - Topsoil (8.0")									
	1–2	SS-1	5 5 5	14	72	4.25	**FILL**: Stiff to hard, brown to dark gray **LEAN CLAY**, damp. -Coal fragments in SS-1								18	CL (V)
	4–5	SS-2	11 15 10	36	100	2.0										CL (V)
1078.1	6–7	SS-3	4 4 4	11	83		-Sandstone fragments in SS-2 and SS-3 -Cobbles @ 8.0'	0.6	14.2	45.6	39.6	31	18	13	13	CL
	9	SS-4	9 50/1"	-	57		**FILL**: Dense to very dense, grayish brown to gray **POORLY GRADED GRAVEL**, noist. -Cobbles @ 9.0' -Limestone and sandstone fragments present throughout									GP (V)
1073.1	11–12	SS-5	28 12 10	32	83											GP (V)
1071.1	14–15 EOB	SS-6	4 11 17	40	81	3.0	Very stiff, gray **SANDY LEAN CLAY**, damp. -Sandstone fragments in SS-6									CL (V)

NOTES: Groundwater not encountered during drilling

ABANDONMENT METHODS, MATERIALS, QUANTITIES: Compacted with the auger 25 lbs bentonite chips and soil cuttings

00-2021-USCS BORING LOG - OH DOT.GDT - 8/23/21 15:21 - U:\GI8\PROJECTS\2021\W-21-096.GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: W-21-096	DRILLING FIRM / OPERATOR: RII / SB/ET	DRILL RIG: CME 750X (310218)	NORTHING 2382422.499
NAME: Harrison Hills Baseball Field	SAMPLING FIRM / LOGGER: RII / JK	HAMMER: Automatic	EASTING: 221072.863
CLIENT: The Thrasher Group, Inc.	DRILLING METHOD: 4.5" CFA	CALIBRATION DATE: 9/14/20	ELEVATION: 1086.9 ft.
START: 7-15-21 END: 7-15-21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.2	COMPLETION DEPTH: 10.0 ft.

EXPLORATION ID **B-5**
PAGE 1 OF 1

ELEV. 1086.9	DEPTHS	SAMPLE ID	SPT/ RQD	N_{60}	REC (%)	HP (tsf)	***MATERIAL DESCRIPTION AND NOTES***	GR	SA	SI	CL	LL	PL	PI	WC	USCS CLASS	BACK FILL
1086.3							0.6' - Topsoil (7.0")										
	1–2	SS-1	5 6 6	17	92	4.5+	**FILL**: Stiff to hard, dark gray **SANDY LEAN CLAY**, damp.									CL (V)	
	4–5	SS-2	4 3 4	10	72		-Sandstone and coal fragments in SS-1 and 2	11.0	37.4	51.5		36	22	14	14	CL	
1078.9	6–7	SS-3	1 4 5	13	42	2.0										CL (V)	
1076.9	9–10 EOB	SS-4	4 2 2	6	50	1.75	Stiff, brownish gray to gray **SANDY SILT**, damp. -Sandstone and coal fragments in SS-4									ML (V)	

00-2021-USCS BORING LOG - OH DOT.GDT - 8/23/21 15:21 - U:\GI8\PROJECTS\2021\W-21-096.GPJ

NOTES: Groundwater not encountered during drilling

ABANDONMENT METHODS, MATERIALS, QUANTITIES: Compacted with the auger 12.5 lbs bentonite chips and soil cuttings

RESOURCE INTERNATIONAL, INC.

PROJECT: W-21-096	DRILLING FIRM / OPERATOR: RII / SB/ET	DRILL RIG: CME 750X (310218)	NORTHING 2382612.494
NAME: Harrison Hills Baseball Field	SAMPLING FIRM / LOGGER: RII / JK	HAMMER: Automatic	EASTING: 221033.203
CLIENT: The Thrasher Group, Inc.	DRILLING METHOD: 4.5" CFA	CALIBRATION DATE: 9/14/20	ELEVATION: 1086.2 ft.
START: 7-15-21 END: 7-15-21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.2	COMPLETION DEPTH: 10.0 ft.

EXPLORATION ID **B-6**
PAGE 1 OF 1

ELEV. 1086.2	DEPTHS	SAMPLE ID	SPT/ RQD	N_{60}	REC (%)	HP (tsf)	***MATERIAL DESCRIPTION AND NOTES***	GR	SA	SI	CL	LL	PL	PI	WC	USCS CLASS	BACK FILL
1086.0							0.2' - Topsoil (2.0")										
	1–2	SS-1	6 7 8	22	100		**FILL**: Medium dense to dense, grayish brown to gray **POORLY GRADED GRAVEL**, moist to very moist.								7	GP (V)	
	3.5–5	SS-2	8 7 5	17	100											GP (V)	
	6–7.5	SS-3	4 6 28	49	69		-Coal, cinders and sandstone fragments present throughout									GP (V)	
1076.2	8.5–10 EOB	SS-4	4 6 12	26	89											GP (V)	

GRADATION (%): GR, SA, SI, CL; ATTERBERG: LL, PL, PI

NOTES: Groundwater not encountered during drilling

ABANDONMENT METHODS, MATERIALS, QUANTITIES: Compacted with the auger 12.5 lbs bentonite chips and soil cuttings.

00-2021-USCS BORING LOG - OH DOT.GDT - 8/23/21 15:21 - U:\GI8\PROJECTS\2021\W-21-096.GPJ

RESOURCE INTERNATIONAL, INC.

PROJECT: W-21-096	DRILLING FIRM / OPERATOR: RII / SB/ET	DRILL RIG: CME 750X (310218)	NORTHING: 2382381.192	EXPLORATION ID
NAME: Harrison Hills Baseball Field	SAMPLING FIRM / LOGGER: RII / JK	HAMMER: Automatic	EASTING: 221462.313	**B-7**
CLIENT: The Thrasher Group, Inc.	DRILLING METHOD: 4.5" CFA	CALIBRATION DATE: 9/14/20	ELEVATION: 1091.0 ft.	PAGE
START: 7-15-21 END: 7-15-21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.2	COMPLETION DEPTH: 15.0 ft.	1 OF 1

ELEV. 1091.0	DEPTHS	SAMPLE ID	SPT/ RQD	N_{60}	REC (%)	HP (tsf)	MATERIAL DESCRIPTION AND NOTES	GR	SA	SI	CL	LL	PL	PI	WC	USCS CLASS	BACK FILL
1090.2							0.8' - Topsoil (9.0")										
	1–2	SS-1	7 / 7 / 14	30	94		**FILL**: Loose to medium dense, gray to brown and brownish gray **CLAYEY SAND WITH GRAVEL**, damp to moist.									SC (V)	
	4–5	SS-2	9 / 11 / 10	30	100			16.3	39.2	29.5	14.9	29	20	9	12	SC	
	6–7	SS-3	4 / 3 / 3	9	100		-Sandstone fragments present throughout									SC (V)	
1083.0	8						Medium dense to dense, brownish gray **SILTY SAND WITH GRAVEL**, moist.										
	9–10	SS-4	4 / 4 / 9	19	100											SM (V)	
							-Cobble @ 10.5'										
	11–12	SS-5	7 / 17 / 7	34	100										8	SM (V)	
1076.0	14–15 EOB	SS-6	5 / 6 / 7	19	100											SM (V)	

NOTES: Groundwater not encountered during drilling

ABANDONMENT METHODS, MATERIALS, QUANTITIES: Compacted with the auger 25 lbs bentonite chips and soil cuttings

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RESOURCE INTERNATIONAL, INC.

PROJECT: W-21-096	DRILLING FIRM / OPERATOR: RII / SB/ET	DRILL RIG: CME 750X (310218)	NORTHING 2382598.444	EXPLORATION ID **B-8**
NAME: Harrison Hills Baseball Field	SAMPLING FIRM / LOGGER: RII / JK	HAMMER: Automatic	EASTING: 221240.889	
CLIENT: The Thrasher Group, Inc.	DRILLING METHOD: 4.5" CFA	CALIBRATION DATE: 9/14/20	ELEVATION: 1087.6 ft.	PAGE
START: 7-15-21 END: 7-15-21	SAMPLING METHOD: SPT	ENERGY RATIO (%): 86.2	COMPLETION DEPTH: 15.0 ft.	1 OF 1

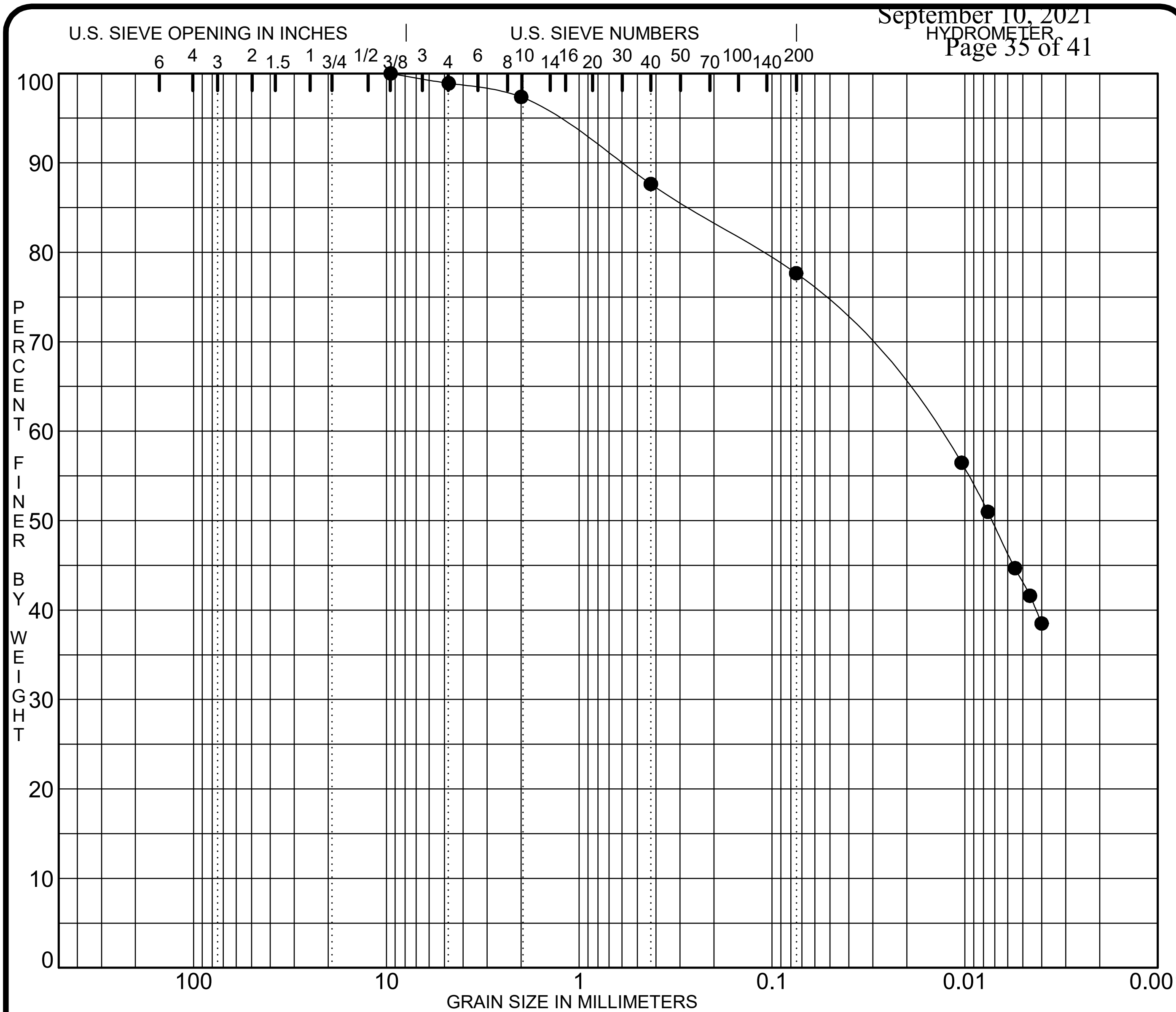
ELEV. 1087.6	DEPTHS	SAMPLE ID	SPT/ RQD	N_{60}	REC (%)	HP (tsf)	***MATERIAL DESCRIPTION AND NOTES***	GR	SA	SI	CL	LL	PL	PI	WC	USCS CLASS	BACK FILL
1087.2	0.4						0.4' - Topsoil (5.0")										
	1–2	SS-1	3 25 12	53	86		**FILL**: Medium dense to very dense, gray **POORLY GRADED GRAVEL WITH SAND**, moist to very moist.									GP (V)	
	4–5	SS-2	6 8 2	14	100											GP (V)	
1079.6	6–7	SS-3	5 5 11	23	86											GP (V)	
	8.5–10	SS-4	2 2 3	7	67	1.5	Stiff, brownish gray **SANDY LEAN CLAY**, damp.	2.7	38.9	33.9	24.5	35	22	13	17	CL	
1072.6	13.5–15 (EOB)	SS-5	6 8 8	23	100		-Sandstone fragments in SS-5									CL (V)	

NOTES: Groundwater not encountered during drilling; Cave-in depth @ 14.2'

ABANDONMENT METHODS, MATERIALS, QUANTITIES: Compacted with the auger 25 lbs bentonite chips and soil cuttings

Appendix IV

LABORATORY TEST RESULTS



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

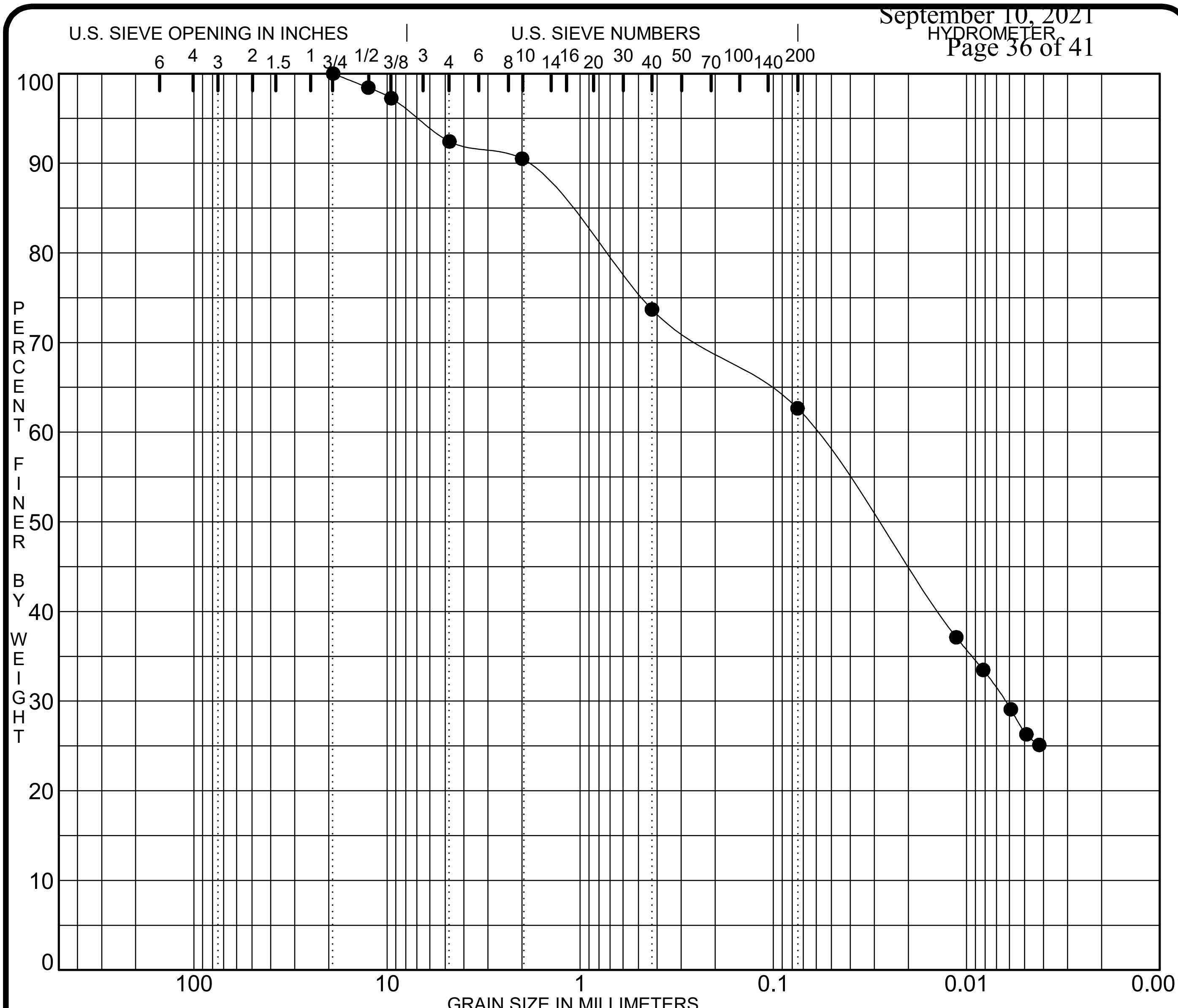
	Specimen ID	Depth	Classification	MC%	LL	PL	PI	Cc	Cu
●	**B-1**	**3.5**	**LEAN CLAY with SAND CL**	**21**	**42**	**25**	**17**		

	Specimen ID	Depth	D100	D60	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand medium	%Sand fine	%Silt	%Clay
●	**B-1**	**3.5**	**9.50**	**0.01**			**0.0**	**1.1**	**1.5**	**9.7**	**10.0**	**34.6**	**43.0**

PROJECT **Harrison Hills Baseball Field** PROJECT NO. **W-21-096**

GRADATION CURVES

Resource International, Inc.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

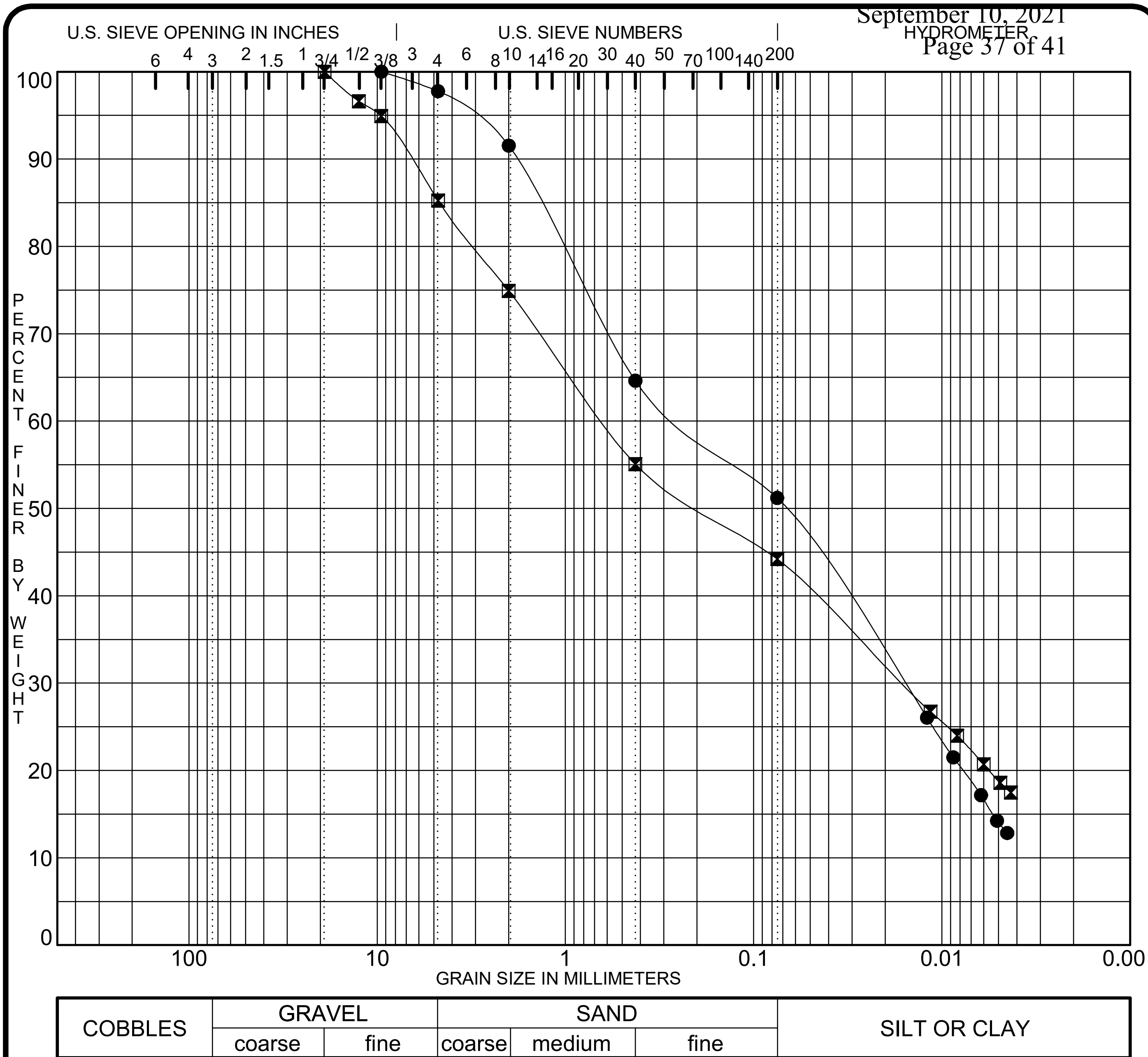
	Specimen ID	Depth	Classification	MC%	LL	PL	PI	Cc	Cu
●	B-2	3.5	SANDY LEAN CLAY CL	19	38	23	15		

	Specimen ID	Depth	D100	D60	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand medium	%Sand fine	%Silt	%Clay
●	B-2	3.5	19.00	0.06	0.006		0.0	7.6	1.9	16.8	11.0	36.1	26.6

PROJECT **Harrison Hills Baseball Field** PROJECT NO. **W-21-096**

GRADATION CURVES

Resource International, Inc.



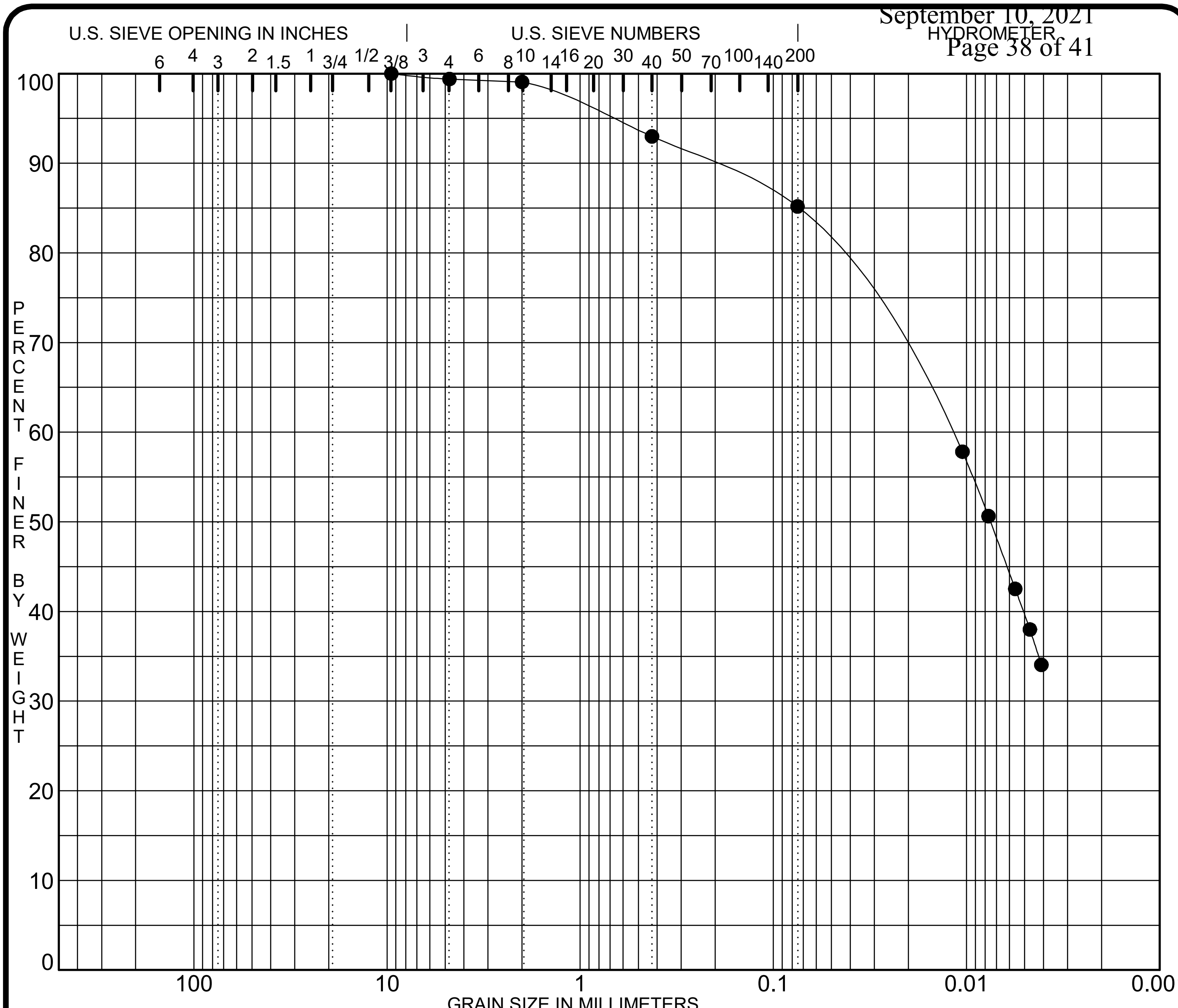
	Specimen ID	Depth	Classification	MC%	LL	PL	PI	Cc	Cu
●	**B-3**	**3.5**	**SANDY SILT ML**	**8**	**NP**	**NP**	**NP**		
⧗	**B-3**	**11.0**	**CLAYEY SAND SC**	**10**	**31**	**7**	**24**		

	Specimen ID	Depth	D100	D60	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand medium	%Sand fine	%Silt	%Clay
●	**B-3**	**3.5**	**9.50**	**0.23**	**0.016**		**0.0**	**2.2**	**6.2**	**26.9**	**13.4**	**37.2**	**14.0**
⧗	**B-3**	**11.0**	**19.00**	**0.62**	**0.016**		**0.0**	**14.7**	**10.4**	**19.8**	**10.9**	**25.4**	**18.8**

PROJECT **Harrison Hills Baseball Field** PROJECT NO. **W-21-096**

GRADATION CURVES

Resource International, Inc.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

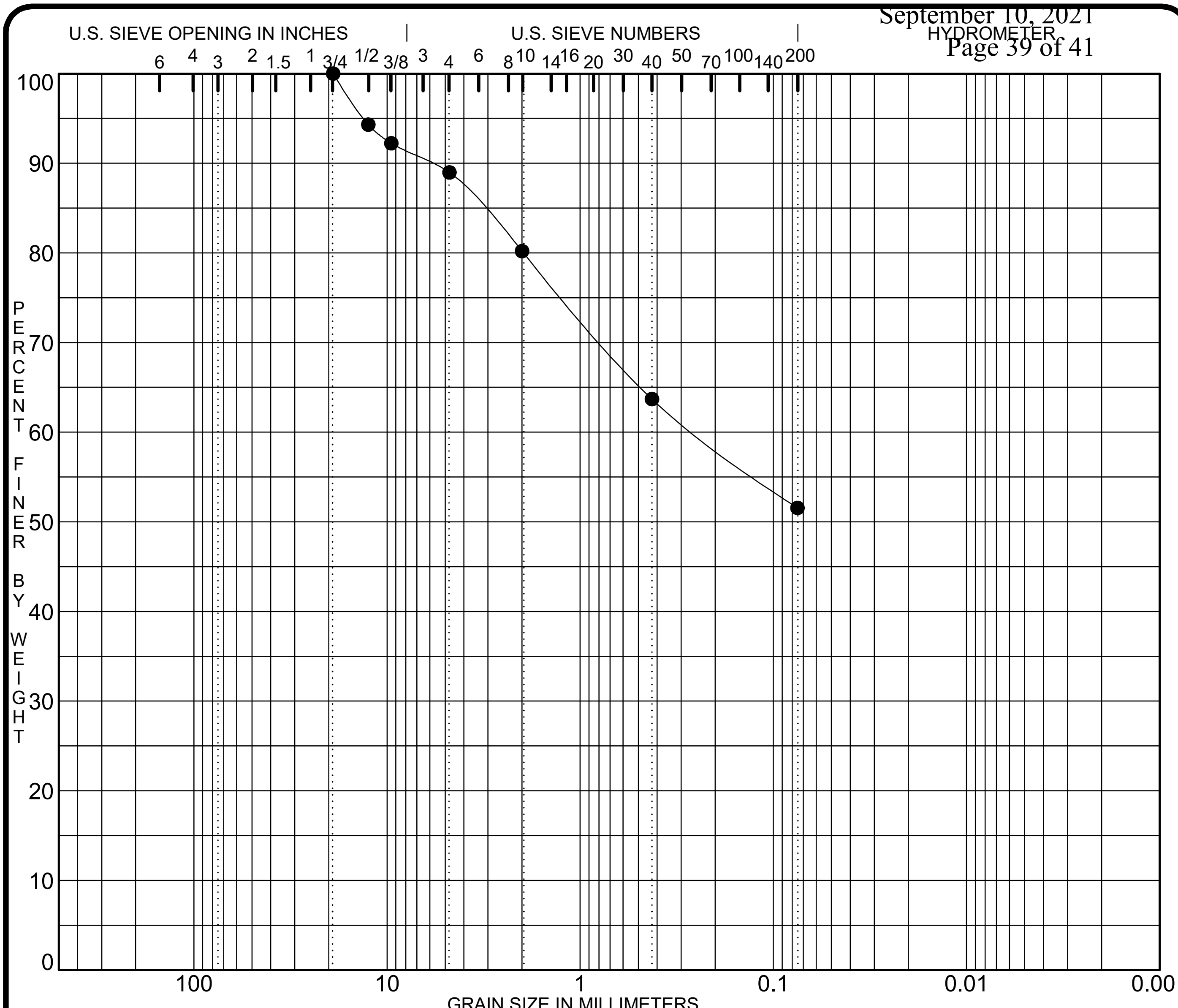
	Specimen ID	Depth	Classification	MC%	LL	PL	PI	Cc	Cu
●	**B-4**	**6.0**	**LEAN CLAY CL**	**13**	**31**	**18**	**13**		

	Specimen ID	Depth	D100	D60	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand medium	%Sand fine	%Silt	%Clay
●	**B-4**	**6.0**	**9.50**	**0.01**			**0.0**	**0.6**	**0.3**	**6.1**	**7.8**	**45.6**	**39.6**

PROJECT **Harrison Hills Baseball Field** PROJECT NO. **W-21-096**

GRADATION CURVES

Resource International, Inc.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

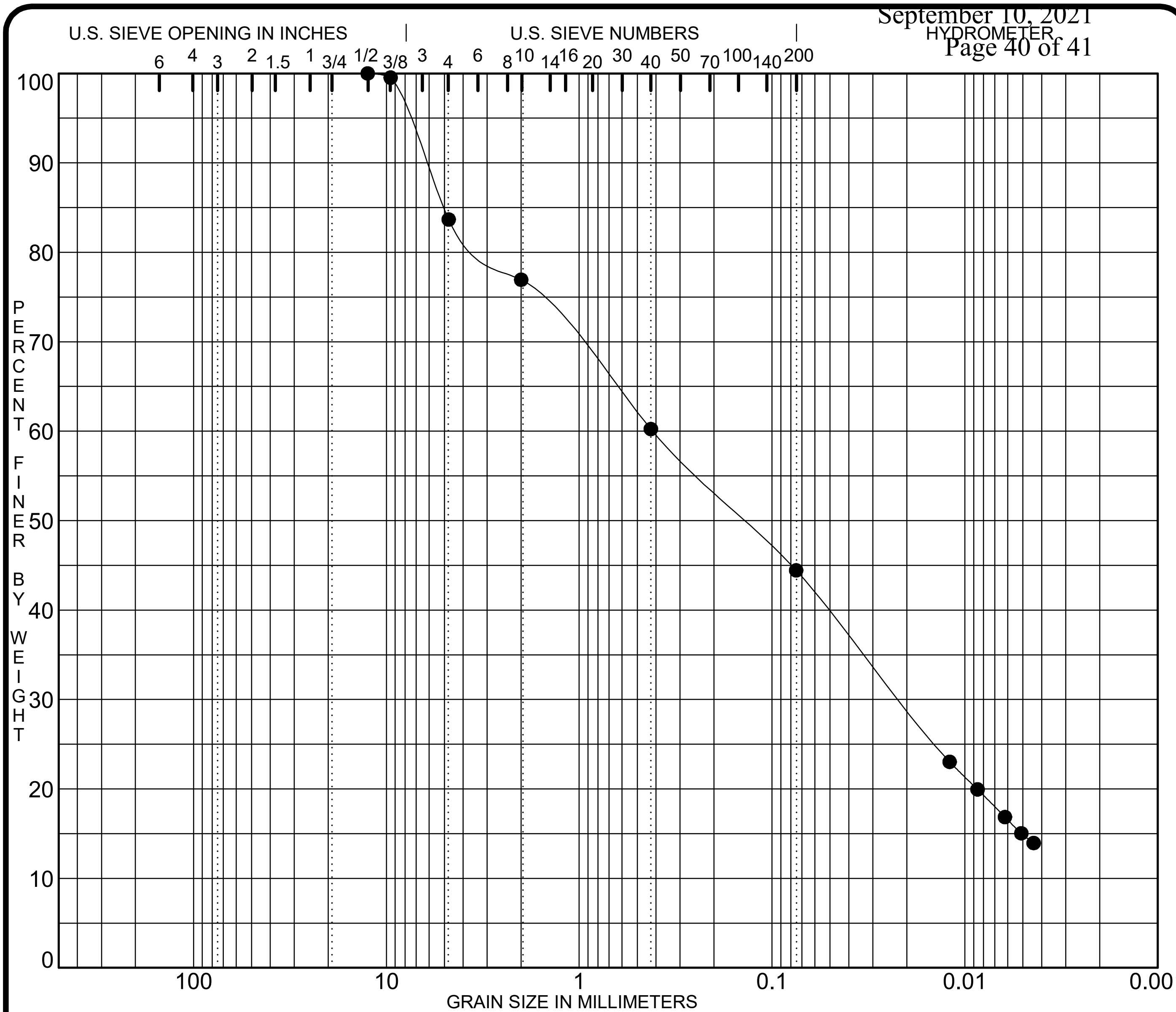
	Specimen ID	Depth	Classification	MC%	LL	PL	PI	Cc	Cu
●	**B-5**	**3.5**	**SANDY LEAN CLAY CL**	**14**	**36**	**22**	**14**		

	Specimen ID	Depth	D100	D60	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand medium	%Sand fine	%Silt	%Clay
●	**B-5**	**3.5**	**19.00**	**0.25**			**0.0**	**11.0**	**8.8**	**16.5**	**12.1**	**51.5**	

PROJECT **Harrison Hills Baseball Field** PROJECT NO. **W-21-096**

GRADATION CURVES

Resource International, Inc.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen ID	Depth	Classification	MC%	LL	PL	PI	Cc	Cu
●	**B-7**	**3.5**	**CLAYEY SAND with GRAVEL SC**	**12**	**29**	**20**	**9**		

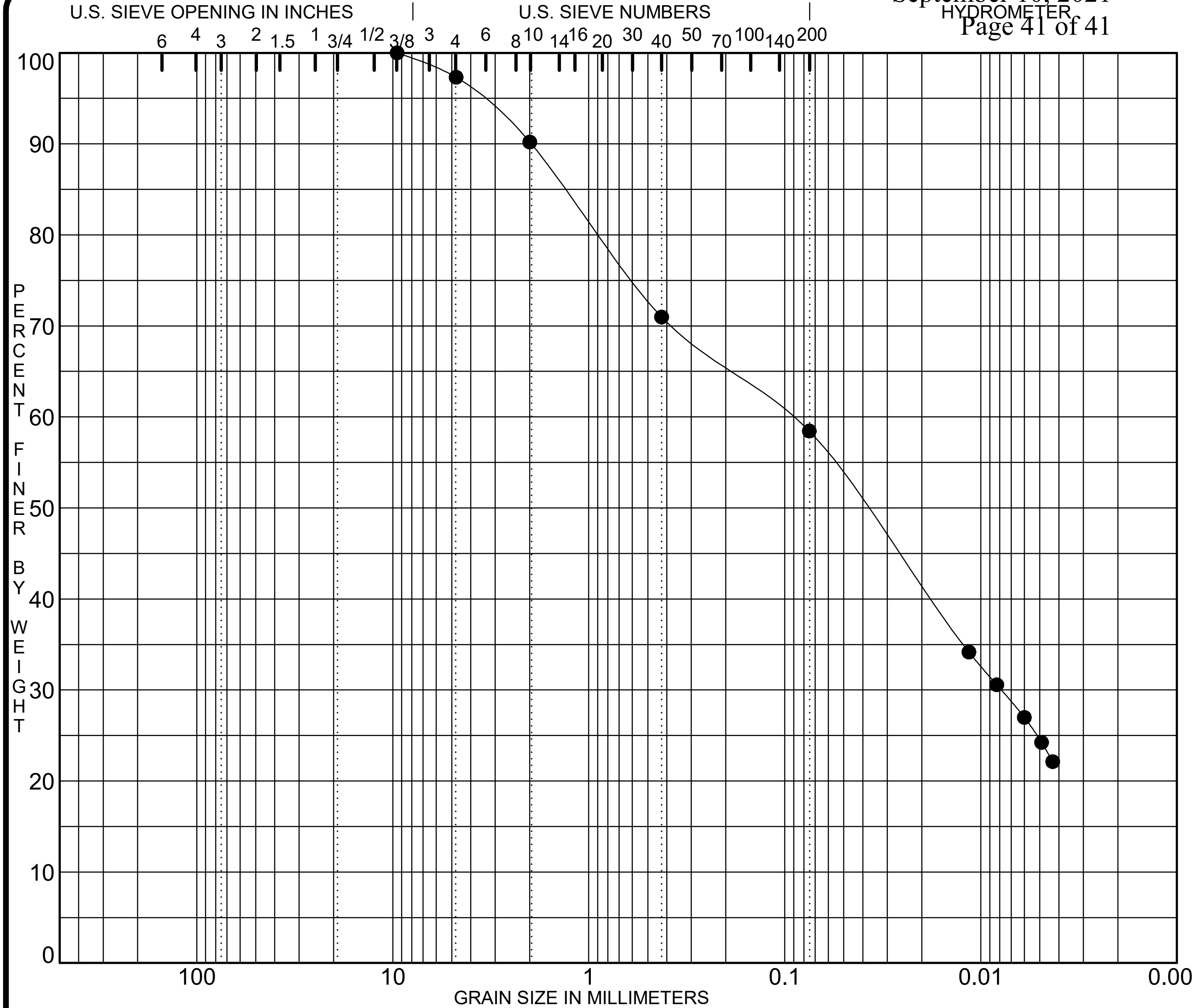
	Specimen ID	Depth	D100	D60	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand medium	%Sand fine	%Silt	%Clay
●	**B-7**	**3.5**	**12.50**	**0.41**	**0.022**		**0.0**	**16.3**	**6.7**	**16.7**	**15.8**	**29.5**	**14.9**

PROJECT **Harrison Hills Baseball Field**

PROJECT NO. **W-21-096**

GRADATION CURVES

Resource International, Inc.



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen ID	Depth	Classification	MC%	LL	PL	PI	Cc	Cu
●	**B-8**	**8.5**	**SANDY LEAN CLAY CL**	**17**	**35**	**22**	**13**		

	Specimen ID	Depth	D100	D60	D30	D10	%Gravel coarse	%Gravel fine	%Sand coarse	%Sand medium	%Sand fine	%Silt	%Clay
●	**B-8**	**8.5**	**9.50**	**0.09**	**0.008**		**0.0**	**2.7**	**7.1**	**19.2**	**12.5**	**33.9**	**24.5**

PROJECT **Harrison Hills Baseball Field** PROJECT NO. **W-21-096**

GRADATION CURVES

Resource International, Inc.