APPENDIX

- **Report of Pavement Evaluation** *(dated 09/20/2022)*
- **Weld Wire Slab** *(dated 09/15/2022)*

June 24, 2022
Revised September 20, 2022

Atkins North America, LLC
192 Anderson Street
Suite 150
Marietta, Georgia 30060

Attention: Mr. Wade C. Kelly, PE CCM
Vice President, Sr. Project Director

Reference: **Report of Pavement Evaluation**
Public Recycling Center Pavement
Marietta, Cobb County, Georgia
Contour Project No: G22ATK03

Dear Wade:

Contour Engineering, LLC (Contour) has completed the pavement evaluation for the project referenced above. The pavement evaluation was completed in general accordance with the scope of services outlined in Contour's Proposal Number: G22ATK-385. The following letter report includes a summary of the project information, results of our field program, and recommendations.

PROJECT INFORMATION

The subject site is located at the Public Recycling Drop-off Center addressed as 1775 County Services Parkway in Marietta, Cobb County, Georgia. The site is improved with existing asphalt pavement, a manufactured mobile home (used as former office space) including gated and landscaped areas. It is our understanding portions of asphalt paved areas for access drives and parking are experiencing pavement distress that require pavement rehabilitation. This project includes expansion of the existing parking lot into an adjacent grassed area to the east. The purpose of our exploration is to perform a pavement evaluation of these areas and provide pavement rehabilitation recommendations.

FIELD EXPLORATION

The field exploration consisted of performing a site reconnaissance and extracting a total of two (2) pavement cores designated as HA-1 and HA-2. The locations of the cores are illustrated on the Hand Auger Location Plan included in the Appendix as Figure 3. Photographic documentation of each core is included in the Appendix as Contour's Project Report dated May 19, 2022. At each core location, the thickness of the existing pavement section was determined. The following table summarizes the measured pavement section at each core location.

TABLE 1:
Pavement Thicknesses Encountered

Boring No.	Asphalt Pavement (inches)	Graded Aggregate Base "GAB" (inches)
HA-1	1.75	8.5
HA-2	1.75	8.0

Note: HA-3 was located within a grassed are so no coring was required.

Hand Auger Borings

The hand auger borings were advanced by twisting a steel bucket auger and manually removing the soil cuttings. The consistency of the subsurface soils was determined by performing dynamic cone penetration (DCP) tests starting just below the pavement section and at 1-foot intervals thereafter. More specifically, this is accomplished by driving an E-sized diameter steel rod with a 1.5-inch diameter and a 45-degree cone point into the soil using a 15-pound steel ring weight falling 20 inches. The conical point of the DCP is seated, and then driven an additional 1¾ inches with blows of the hammer. The number of blows required to achieve the 1¾ inch penetration is recorded.

Upon completion of the fieldwork, each location was backfilled with soil cuttings. Locations in asphalt pavement areas were capped with cold patch asphalt to restore the ground surface to its original elevation.

SUBSURFACE CONDITONS

Subsurface Conditions

Our findings are presented in the Summary of Hand Auger Borings provided in the Appendix attached at the end of this report. Beneath the surficial materials, the hand auger borings encountered fill materials and residual soils to their termination or refusal depths ranging from 2 to 4 feet below the existing ground surface. Surficial materials consisted of asphalt overlying Graded Aggregate Base or topsoil.

Fill materials, soils that have been placed by man, were encountered beneath the topsoil in hand augers boring HA-3, to a depth of approximately 1 ½ feet below the existing ground surface. The fill materials were classified as silty sand (SM). Dynamic Cone Penetrometer (DCP) values within the fill material were approximately 10 blows per 1 ¾ inch.

Residual (virgin) soils, formed by in-place weathering of the parent rock, were encountered beneath the pavement section or fill materials in each hand auger boring. The residual soils were classified as silty sand (SM) with DCP values ranging from 9 to 20+ blows per 1 ¾ inch.

FINDINGS

Observations

During our visual evaluation of the pavement areas, the overall condition of the pavements observed was judged to be poor to fair. The primary form of asphalt distress consisted of load cracking with severe levels of load cracking (alligator cracking). Other forms of pavement distress observed include block, transverse, and longitudinal cracking, pavement delamination and potholes.

Photographic documentation of our observations is included in the Appendix of this report. These photographs depict the general site conditions encountered.

Laboratory Program

Representative portions of each recovered split-spoon sample were transported to our laboratory for further visual classification and testing. Using the Unified Soil Classification System (ASTM D-2487), the subsoil conditions are stratified and described in an illustrated form on the Summary of Hand Auger Borings included in the Appendix.

Additionally, one (1) bulk sample was obtained from the site. Select samples were transported to our laboratory for further testing. The following laboratory tests were performed select samples:

- Standard Proctor Tests (ASTM D-698);
- Atterberg Limits (ASTM D-4318);
- Particle-Size Analysis (ASTM D-6913);
- Natural Moisture Content (ASTM D-2216); and
- California Bearing Ration Tests (ASTM D-1883).

Table 2. Summary of Laboratory Testing

Boring No.	Depth (Ft)	Atterberg Limits		In-Situ Moisture Content (%)	Standard Proctor		CBR Value	Sieve Analysis		USCS
		Liquid Limit (LL)	Plastic Index (PI)		Optimum Moisture Content (%)	Max. Dry Density (pcf)		Fines (%)	Coarse (%)	
HA-2	0 -3	NV	NP	12.2	11.5	116.7	6.1	45.3	54.7	SM

Note: NV= No Value, NP= Non-Plastic
Complete laboratory test results are included in the Appendix.

RECOMMENDATIONS

A portion of the site has existing pavement; while the remainder appears to be covered with grasses and other vegetation. As a result, several options for pavement rehabilitation were considered. For the existing pavement area, we considered a mill and inlay and also overlaying existing pavement. However, due to pavement sections of less than 2 inches and severe pavement distresses these options were determined not to be viable options. Therefore, we recommend constructing a new pavement section throughout the site. We note that it may be possible to reuse the existing GAB as long as it is evaluated prior to use for the new pavement section.

If it is desired to reuse existing GAB, areas containing GAB should be evaluated after removal of the existing asphalt but prior to placement of the new asphalt and/or concrete pavement. The area should be evaluated by a geotechnical engineer and proofrolled with a 20 to 30-ton loaded tandem-axle dump truck or other pneumatic-tired vehicle of similar size and weight. The purpose of the evaluation is to locate soft or weak areas at the time of construction. Any unsuitable materials observed during the evaluation and/or proofrolling operations will have to be remediated. Actual means of remediation will depend on site conditions at the time of construction and final plans. Typical remediation may include partial or complete removal of GAB and/or unstable soils and placement of a stabilization fabric such as TX 140 followed by crushed stone or structural fill. We recommend that the county have a contingency budget to remediate isolated areas of soft subgrades.

As alternative, we recommend constructing a new pavement section through Full Depth Reclamation (FDR). FDR is the process of pulverizing and mixing the existing pavement to a certain depth and then add Portland cement to the pulverized/mixed material to create a new base material. In addition, FDR will help remediate soft and unstable subgrades. After FDR process is completed, asphalt pavement then can be placed to create a new pavement section.
Placement of the asphalt should be performed per the State of Georgia Standard Specifications Construction of Transportation Systems, 2021 Edition Section 828.

The FDR process should follow the Georgia Department of Transportation (GDOT) Section 315 specifications for cement stabilized reclaimed base construction. We recommend a minimum of an 8-inch FDR base beneath the new asphalt pavement section. For the treated FDR base, the following table provides our preliminary recommendation for the cement application rate to be used. A detailed laboratory test program should be performed prior to placement to determine the exact amount of cement that will be required.

Cement Application Rates for 8-inch Depth of Treatment	
Remediation Application	**Application Rate (Pounds per Square Yard)**
FDR Application	60

STRUCTURAL FILL PLACEMENT

All structural fill should be free of organics, with a maximum particle size of 3 inches, and moisture conditioned to maintain a moisture content within two percentage points above or below the soil's optimum moisture content as determined by the Standard Proctor tests (ASTM D-698). Where groundwater is encountered above finished grades, drying will be required prior to reuse as structural fill.

Off-site borrow materials may also be used as structural fill provided that they have a liquid limit (LL) and a plastic index (PI) not exceeding 40 and 20 percent, respectively. All structural fill should be free of organics and moisture conditioned to maintain a moisture content within two percentage points above and below the soil's optimum moisture content.

All structural fill to be used on site should be evaluated and approved by the geotechnical engineer to confirm that the material meets the specified requirements. Laboratory tests including Standard Proctors (ASTM D-698), sieve analysis (ASTM D-6913) and Atterberg Tests (ASTM D-4318) will be required during construction on the proposed fill soils to evaluate the soil's suitability to be reused as structural fill.

<u>Suitability of On-Site Soils</u>
Based on the boring data and visual classification of the encountered soils, the on-site residual soils are suitable for re-use as structural fill, provided that the soils are moisture conditioned and placed/compacted in accordance to the requirements specified in this report.

<u>Soil Placement and Compaction Requirements</u>
Structural fill should be placed in thin loose lifts not exceeding 8 inches in thickness and tested by a soils technician to determine the compaction percentage. Contour recommends that the minimum level of compaction of 98 percent of the soil's maximum standard Proctor density value (ASTM D-698).

NEW PAVEMENT SECTION

A pavement thickness design was performed by Contour based on provided traffic loads of 2 50,000 pound trucks per day for seven days of the week. For the design, we have assumed that subgrade soils will be prepared in accordance with this report, will have a minimum CBR value of 6, a pavement design life of 20 years, and placement quality control per the State of Georgia Department of Transportation (GDOT) Standard Specifications and the American Association of State Highway and Transportation Officials (AASHTO) criteria. The following traffic conditions were also for the pavement design:

<u>Standard duty pavement areas</u>
Standard duty pavement areas are intended for car traffic only and no truck traffic. The following table summarizes the results of our standard duty pavement thickness design:

STANDARD DUTY		
COMPONENT	OPTION 1 (inches)	OPTION 2 (inches)
Asphalt Surface Course (9.5 mm Superpave)	1.25	1.5
Asphalt Binder Course (19 mm Superpave)	1.75	----
Asphalt Binder Course (12.5mm Superpave)	----	1.5
Graded Aggregate Base (GAB)	6.0	6.0

Heavy-duty pavement areas

Heavy-duty pavement areas are intended to receive truck traffic. It is our understanding the Recycle Center will receive no more than 6 truck trips per day. The table on the next page summarizes the results of our heavy-duty pavement thickness design:

HEAVY DUTY		
COMPONENT	ASPHALT (inches)	CONCRETE (inches)
Asphalt Surface Course (9.5 mm Superpave)	1.5	----
Asphalt Binder Course (19 mm Superpave)	2.0	----
Concrete	----	6.0
Graded Aggregate Base (GAB)	8.0	6.0

HEAVY DUTY (FDR)		
COMPONENT	ASPHALT (inches)	CONCRETE (inches)
Asphalt Surface Course (9.5 mm Superpave)	1.5	----
Asphalt Binder Course (19 mm Superpave)	2.0	----
Concrete	----	6.0
FDR Base	8.0	8.0

If pavement areas are subjected to heavier loading conditions than those assumed, a pavement re-evaluation may be required. The flexible pavement (asphalt) sections recommended above are not be suitable for the support of heavy concentrated static or wheel loads and/or dynamic (impact) loading conditions such as those produced at dumpster pads and unloading/loading areas of the roll-off dumpsters. Thus, heavy-duty concrete pavement is recommended in dumpster pad and truck roll-off areas where repetitive truck turning and stopping is anticipated.

The following materials may be used for the above pavement sections:

- Asphaltic Concrete Binder, 9.5 mm Superpave Type 2, Section 828
- Asphaltic Concrete Binder, 19 mm Superpave, Section 828

- Crushed Stone Graded Aggregate Base Course, Section 815
- Portland Cement Concrete Pavement, Section 430

The referenced specifications are from the State of Georgia Standard Specifications Construction of Transportation Systems, 2021 Edition.

The compaction, quality and gradation of the GAB crushed stone base will directly affect the quality and life of the pavement section. Consequently, we recommend a minimum compaction of 98 percent of the maximum dry density for the GAB crushed stone material as determined by either the modified Proctor compaction test (ASTM D 1557, Method D) or the Modified AASHTO (T-180).

A geotechnical testing firm should observe placement and compaction of the base course material and perform density tests to confirm that the material has been placed in accordance with our recommendations. GAB materials should extend at least 2 feet horizontally beyond the planned pavement edges.

In addition, the quality and life of the pavement is also contingent upon periodic inspection and maintenance. Over time, cracks may form within the pavement. The cracks should be filled or patched in order to prevent water infiltration into the underlying base material and soil subgrade.

Contour recommends that positive drainage should be maintained to prevent the ponding of water. We also recommend that measures be taken to contain water from irrigation system to within landscape islands. Water infiltration into the underlying soil subgrade will reduce the soil's bearing capacity and result in pavement failure.

CLOSING

We appreciate the opportunity to work with you on this project and look forward in assisting you with any future projects. Should you have any questions regarding this report or if we may be of further service, please contact our office.

Sincerely,
Contour Engineering, LLC

Eddie Sorrell Jr.
Project Engineer

James E. Gough, P.E.
Principal Engineer

Appendix: Figure 1 – Site Vicinity Map
Figure 2 – Aerial View of Site
Figure 3 – Hand Auger Location Plan
Contour's Project Report 05/19/2022 – Coring Documentation
Photographic Documentation
Summary of Hand Auger Borings
Laboratory Testing Results

ATTACHMENTS

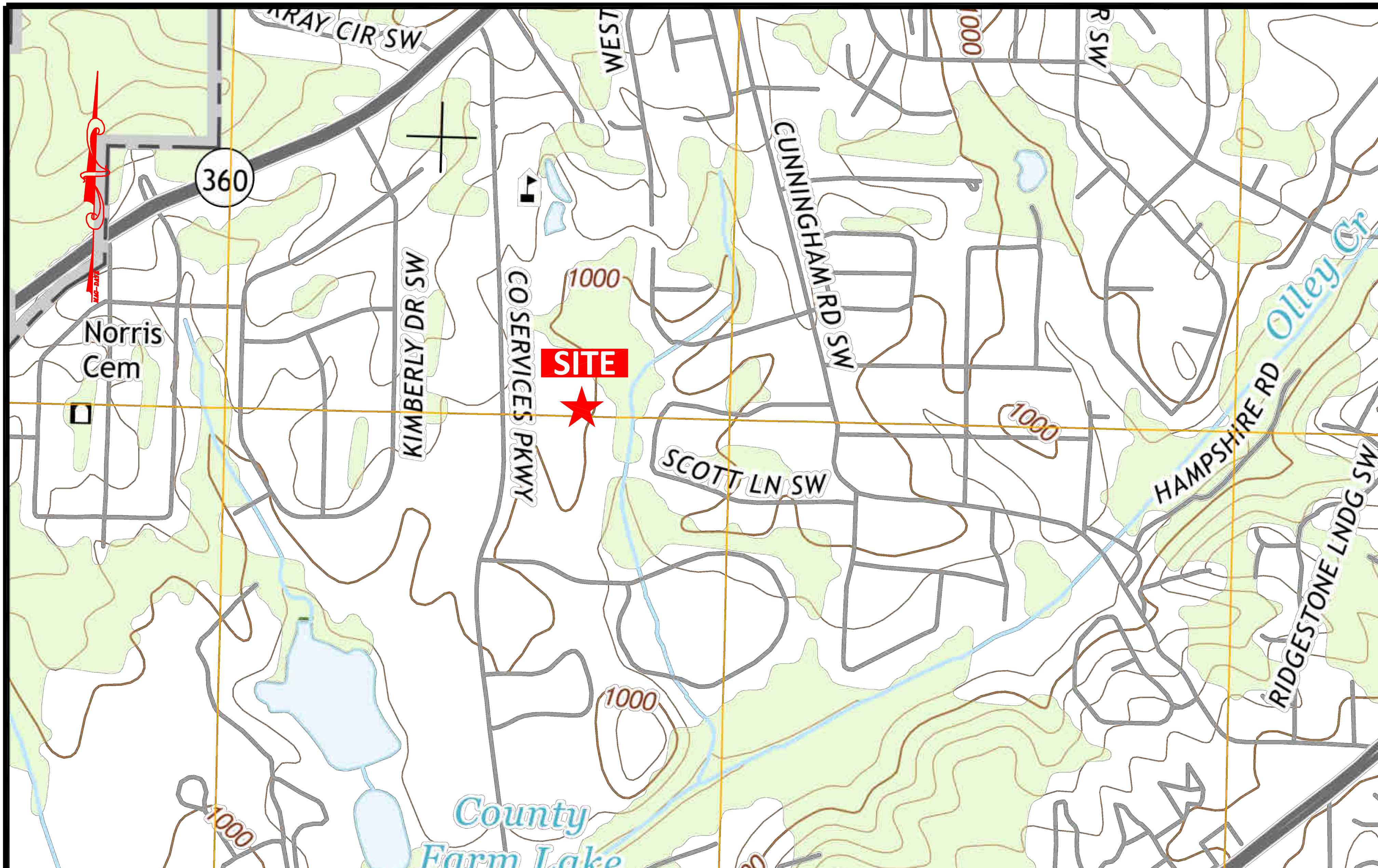

FIGURE 1: SITE VICINITY MAP

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LEGEND

Source: USGS Topographic Map - Marietta, GA Quadrangle

Scale: Not to Scale

PROJECT

Geotechnical Exploration

Public Recycling Center Pavement
Marietta, Cobb County, Georgia
Project No.: G22ATK03

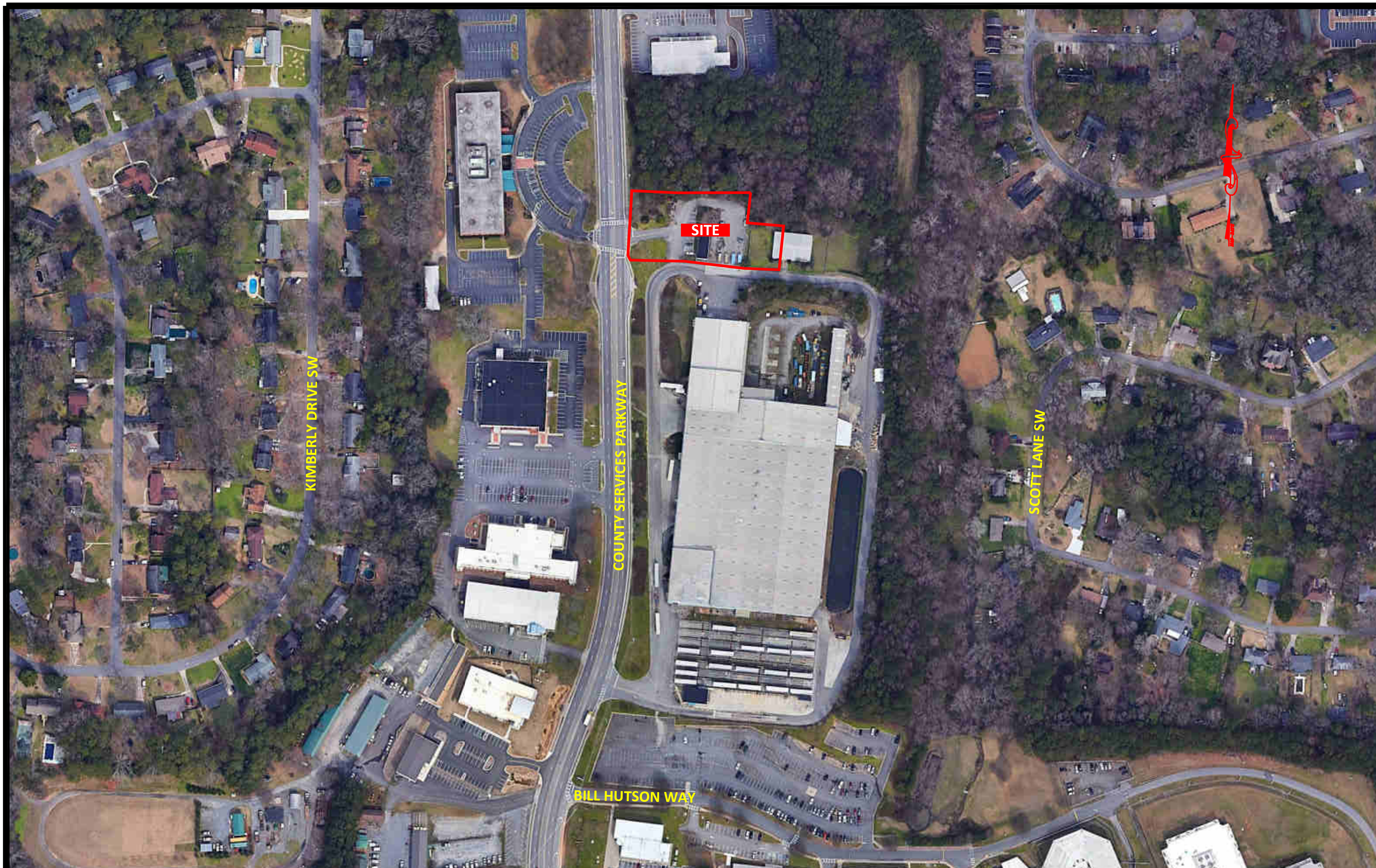

FIGURE 2: AERIAL VIEW

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Source: Google Earth Imagery

Scale: Not to Scale

PROJECT
Geotechnical Exploration
Public Recycling Center Pavement
Marietta, Cobb County, Georgia
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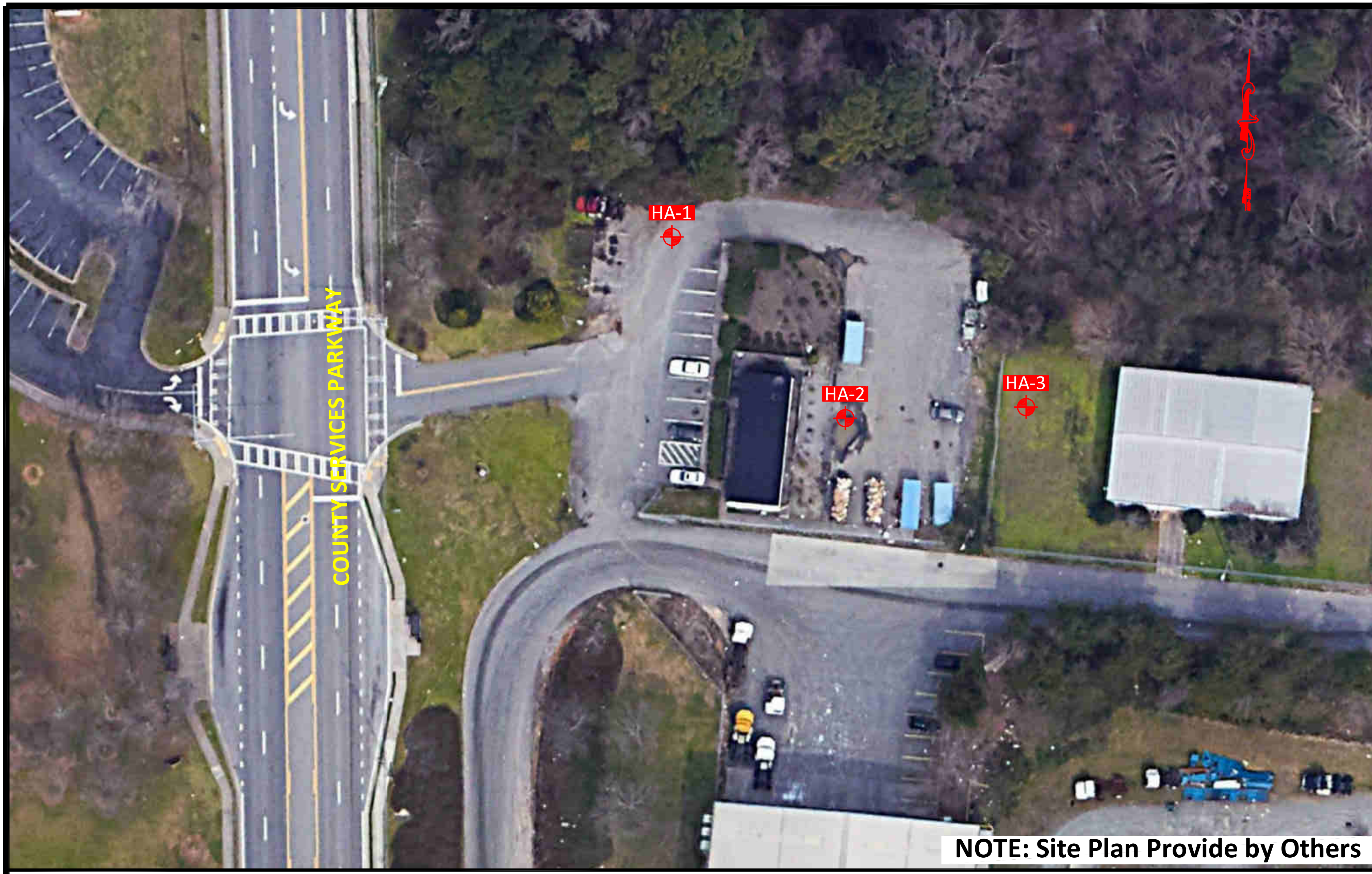

FIGURE 3: HAND AUGER LOCATION PLAN

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HA-1 - Approximate Hand Auger Location

Scale: Not to Scale

PROJECT

Geotechnical Exploration
Public Recycling Center Pavement
Marietta, Cobb County, Georgia
Project No.: G22ATK03

Report Pictures

Photo 1 - HA-1 = Asphalt 1.75” Aggregate 8.5”

Report Pictures

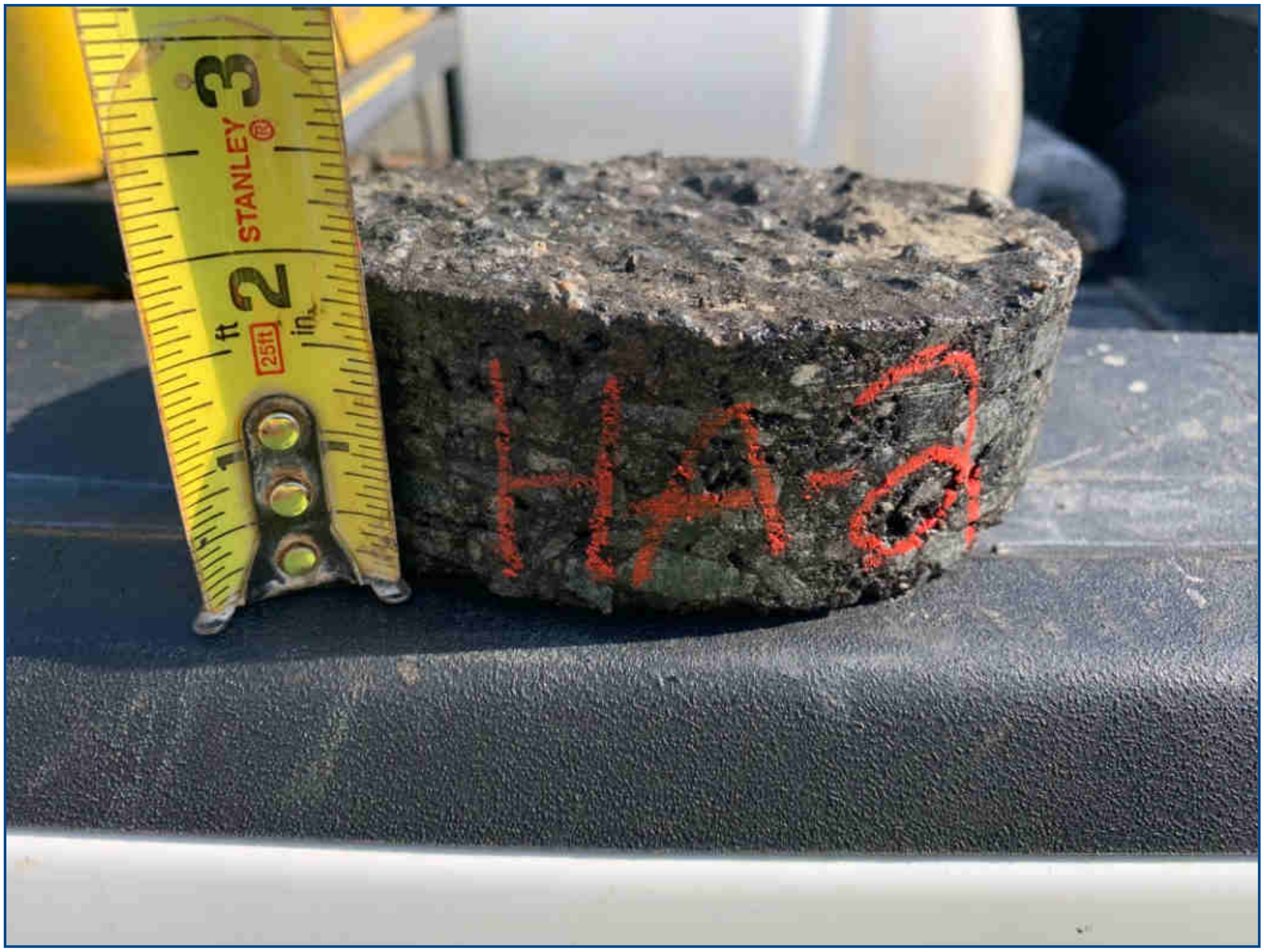

Photo 2 - HA-2 = Asphalt 1.75” Aggregate 8”

PHOTOGRAPHIC DOCUMENTATION
Public Recycling Center Pavement
Marietta, Cobb County, Georgia
Project No.: G22ATK03

PHOTOGRAPH 1
View of alligator cracking in pavement area.

PHOTOGRAPH 2
View of pothole in pavement area.

PHOTOGRAPH 3
View of access drive area, no pavement distress observed.

PHOTOGRAPH 4
View of pothole in pavement area.

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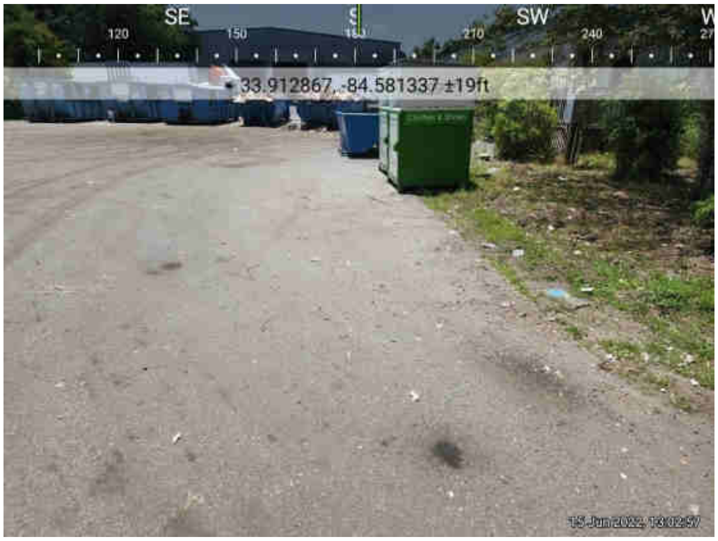
PHOTOGRAPHIC DOCUMENTATION
Public Recycling Center Pavement
Marietta, Cobb County, Georgia
Project No.: G22ATK03



PHOTOGRAPH 5
View of pavement in rear of property.

PHOTOGRAPH 6
View of deteriorated pavement.

PHOTOGRAPH 7
View of deteriorated pavement.
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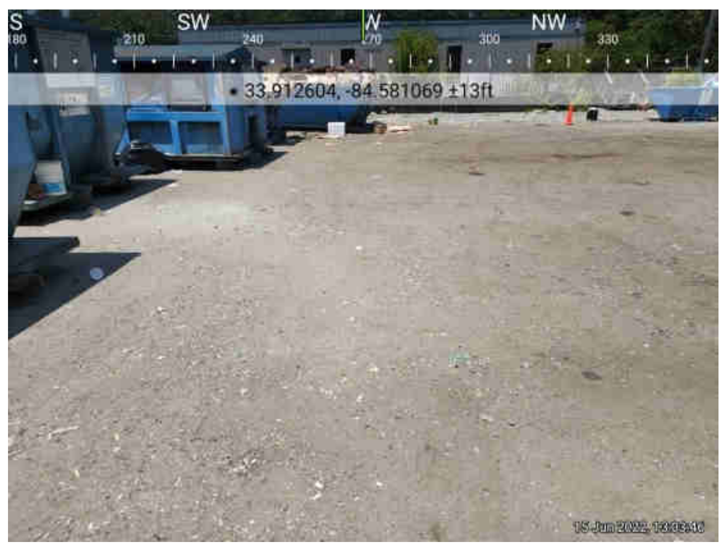

PHOTOGRAPH 8
View of deteriorated pavement.
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<u>SUMMARY OF HAND AUGER BORINGS</u>

Public Recycling Center Pavement

Marietta, Cobb County, Georgia

Contour Project No.: G22ATK03

Hand Auger Boring No.	Depth (Feet)	Description	Dynamic Cone Penetrometer	
			Depth (ft)	Blows per 1-¾ in.
HA-1	0 – 0.85	ASPHALT: 1 ¾ inches ; Aggregate: 8 ½ inches		
	0.85 – 1.5	RESIDUUM: Red-brown, clayey SAND (SC)	1	9
	1.5 - 2	Tan-brown-white, silty SAND (SM), with mica, trace weathered rock fragments	2	20+
		Hand Auger Refusal at 2 ft.		
HA-2	0 – 0.67	ASPHALT: 1 ¾ inches ; Aggregate: 8 inches		
	0.67 – 3	RESIDUUM: Tan-brown-white, silty SAND (SM), trace mica, trace weathered rock fragments	1	20+
			2	12
			3	20+
		Hand Auger Refusal at 3 ft.		

<u>SUMMARY OF HAND AUGER BORINGS</u>

Public Recycling Center Pavement

Marietta, Cobb County, Georgia

Contour Project No.: G22ATK03

Hand Auger Boring No.	Depth (Feet)	Description	Dynamic Cone Penetrometer	
			Depth (ft)	Blows per 1-¾ in.
HA-3	0 – 0.5	TOPSOIL – 6 inches		
	0.5 – 1.5	FILL: Brown-tan, silty SAND (SM)	1	10
	1.5 – 4	RESIDDUM: Tan-brown-white, silty SAND (SM), trace mica	2	20+
			3	14
		Hand Auger Refusal at 4 ft.	4	11

PROCTOR TEST REPORT

Curve No.: P-1

Project No.: G22ATK03 **Date:** 5-23-22
Project: Public Recycling Center Pavement
Client: Atkins
Location: HA-2
Sample Number: S-1 **Depth:** 0-3'
Remarks:

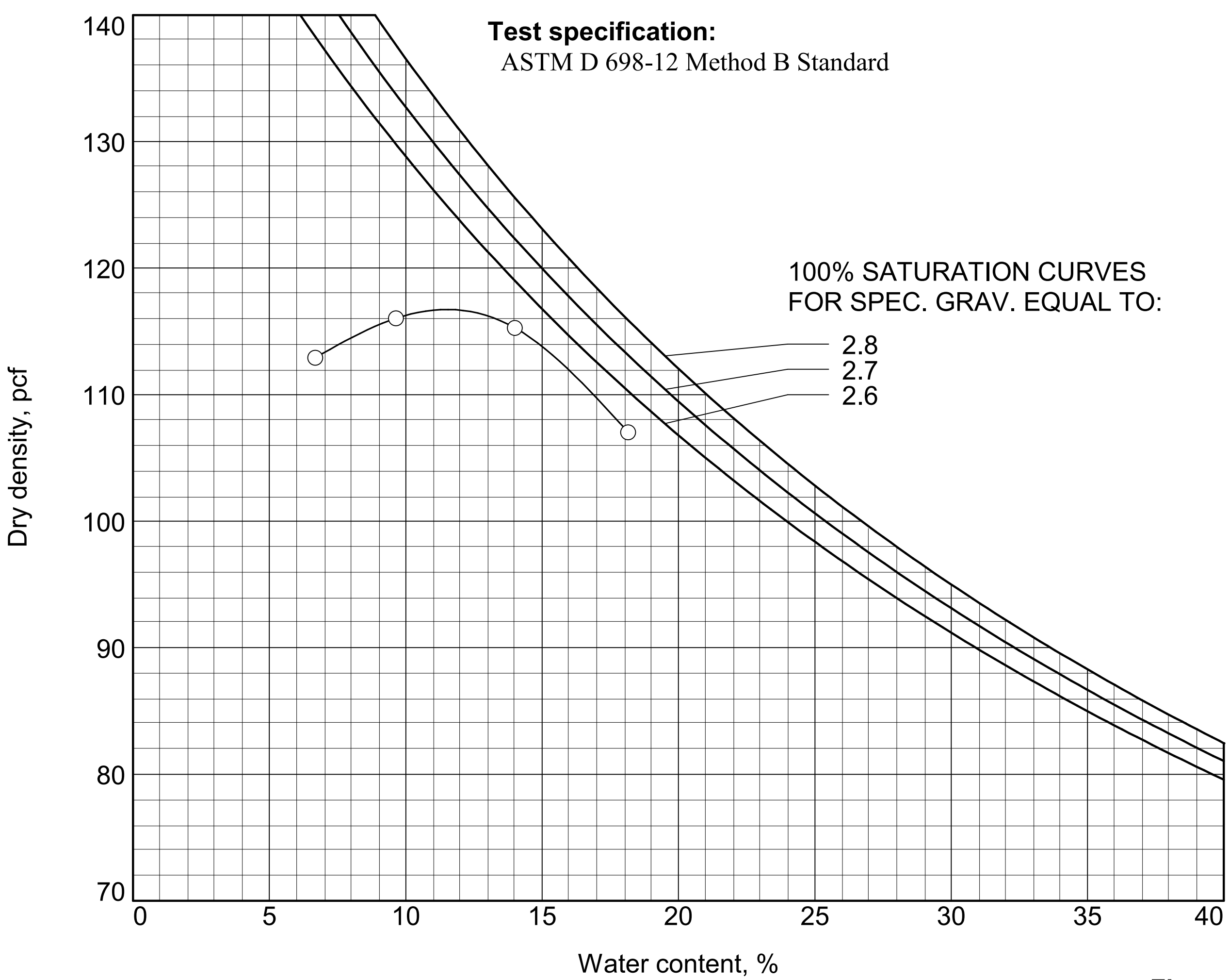
MATERIAL DESCRIPTION

Description: Brown red silty SAND (SM)

Classifications - **USCS:** SM **AASHTO:** A-2-4(0)
Nat. Moist. = 12.2 % **Sp.G. =**
Liquid Limit = NV **Plasticity Index =** NP
%<No.10 = 85.2 % **%<No.40 =** 58.8 %
%<No.60 = 40.1 % **%<No.200 =** 13.5 %

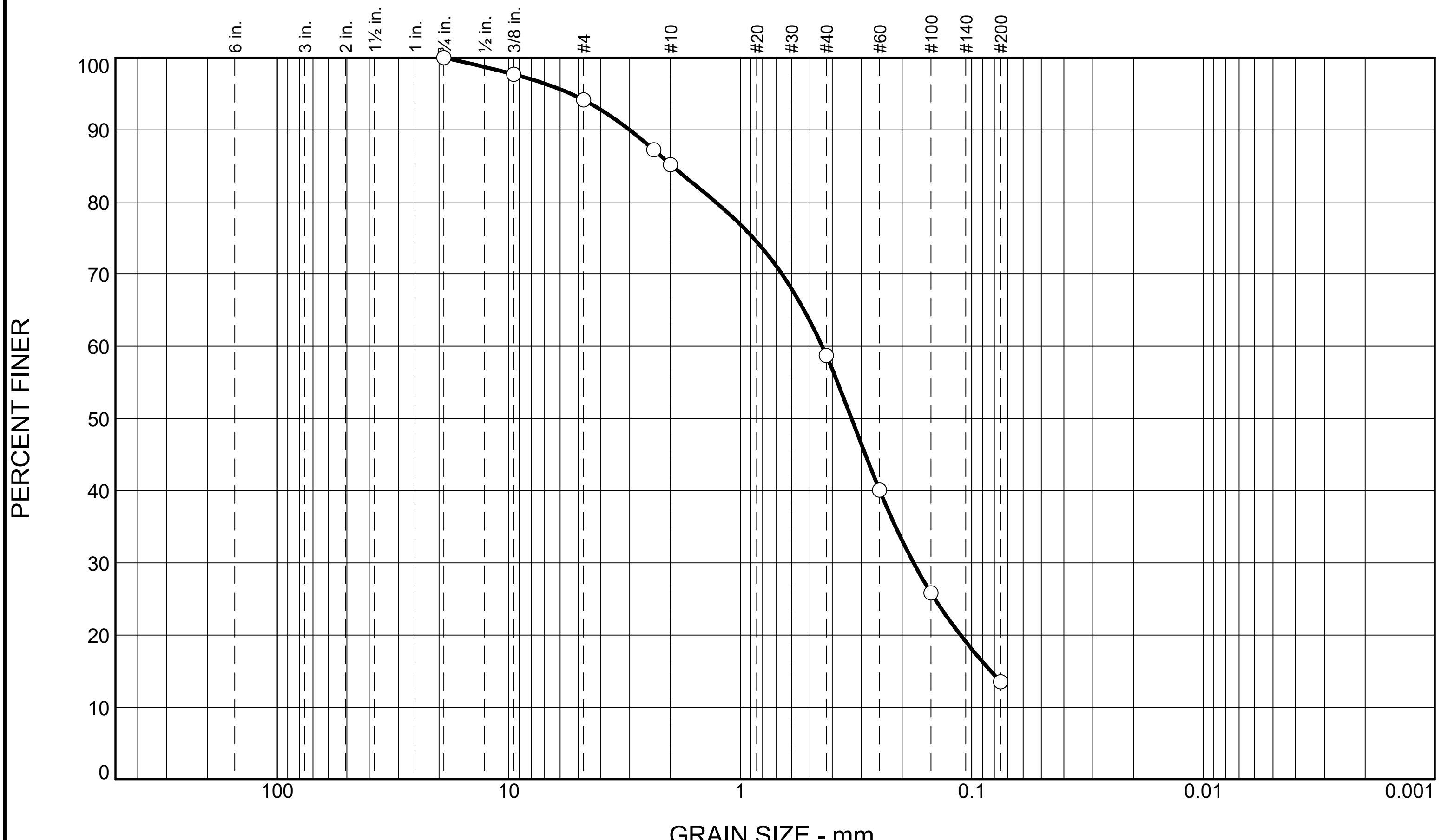
TEST RESULTS
Maximum dry density = 116.7 pcf
Optimum moisture = 11.5 %

Test specification:
ASTM D 698-12 Method B Standard



Figure

Particle Size Distribution Report



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0	0.0	5.9	8.9	26.4	45.3	13.5	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
.75	100.0		
.375	97.7		
#4	94.1		
#8	87.2		
#10	85.2		
#40	58.8		
#60	40.1		
#100	25.8		
#200	13.5		

* (no specification provided)

Material Description

Brown red silty SAND (SM)

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 3.0072 D_{85}= 1.9704 D_{60}= 0.4424
D_{50}= 0.3301 D_{30}= 0.1783 D_{15}= 0.0825
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-2-4(0)

Remarks

Location: HA-2
Sample Number: S-1 **Depth:** 0-3' **Date:** 5-23-22

CONTOUR ENGINEERING

Client: Atkins
Project: Public Recycling Center Pavement

Project No: G22ATK03 **Figure**

CALIFORNIA BEARING RATIO

ASTM D-1883

Public Recycling Center Pavement

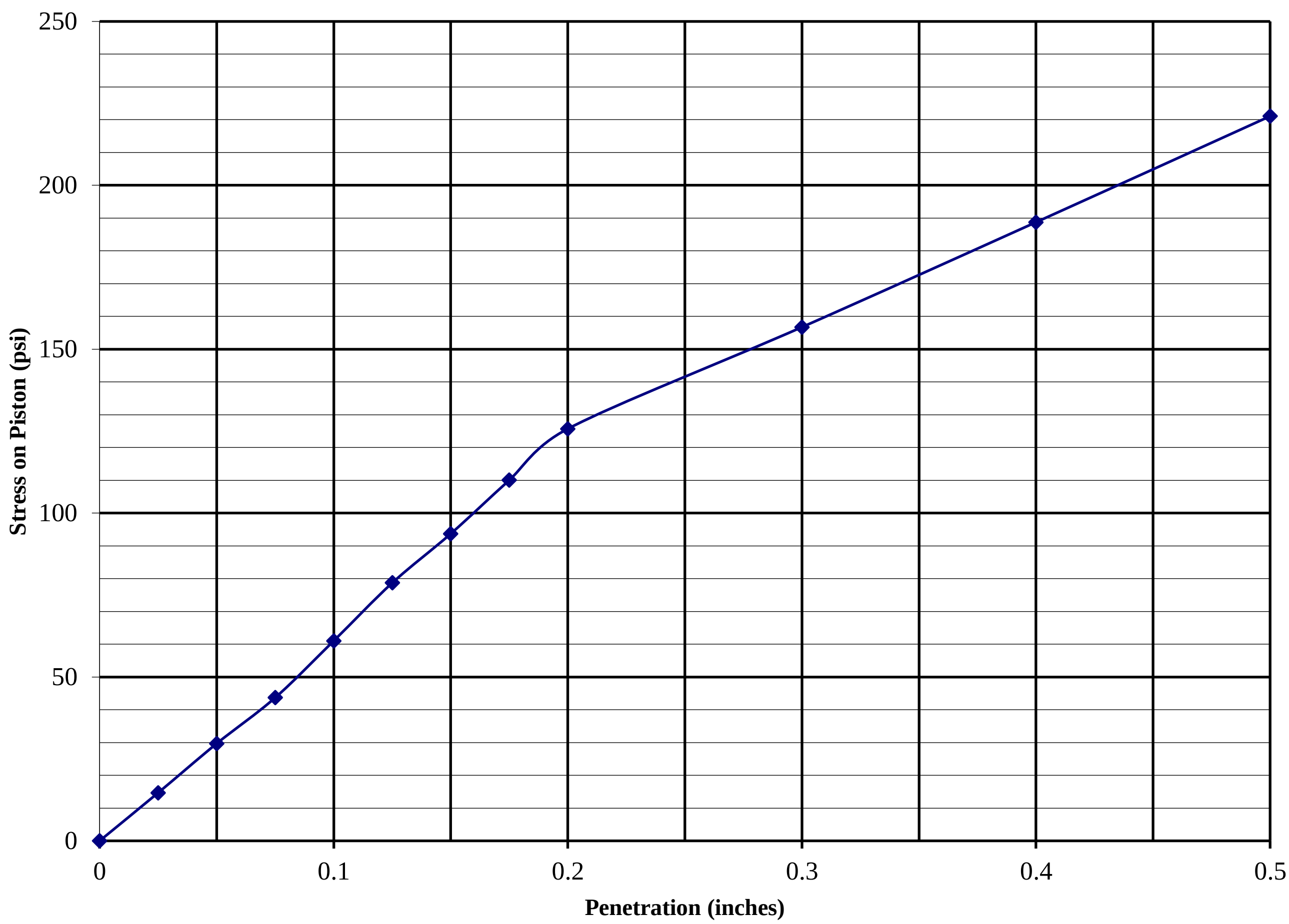
Marietta, Georgia

G22ATK03

Sampled No.: S-1 Sample Description: Brown red silty SAND (SM)

Date: 6/3/2022

Surcharge Load	10
Condition of Sample	Soaked
Dry Density Before Soaking (pcf)	114.5
Moisture Content Before Soaking (%)	12.5
Dry Density After Soaking (pcf)	111.8
Moisture Content After Soaking (%)	17.9
Swell (in)	0.040
Bearing Ratio as tested at 0.100	6.1
Bearing Ratio as tested at 0.200	8.4



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Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, clients can benefit from a lowered exposure to the subsurface problems that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed below, contact your GBA-member geotechnical engineer. Active involvement in the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Geotechnical-Engineering Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. *Those who rely on a geotechnical-engineering report prepared for a different client can be seriously misled.* No one except authorized client representatives should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one – not even you – should apply this report for any purpose or project except the one originally contemplated.*

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read it *in its entirety*. Do not rely on an executive summary. Do not read selected elements only. *Read this report in full.*

You Need to Inform Your Geotechnical Engineer about Change

Your geotechnical engineer considered unique, project-specific factors when designing the study behind this report and developing the confirmation-dependent recommendations the report conveys. A few typical factors include:

- the client's goals, objectives, budget, schedule, and risk-management preferences;
- the general nature of the structure involved, its size, configuration, and performance criteria;
- the structure's location and orientation on the site; and
- other planned or existing site improvements, such as retaining walls, access roads, parking lots, and underground utilities.

Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

This Report May Not Be Reliable

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, that it could be unwise to rely on a geotechnical-engineering report whose reliability may have been affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If your geotechnical engineer has not indicated an "apply-by" date on the report, ask what it should be*, and, in general, *if you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying it. A minor amount of additional testing or analysis – if any is required at all – could prevent major problems.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface through various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing were performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgment to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team from project start to project finish, so the individual can provide informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, *they are not final*, because the geotechnical engineer who developed them relied heavily on judgment and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* revealed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a full-time member of the design team, to:

- confer with other design-team members,
- help develop specifications,
- review pertinent elements of other design professionals' plans and specifications, and
- be on hand quickly whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction observation.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for informational purposes only*. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report, but they may rely on the factual data relative to the specific times, locations, and depths/elevations referenced. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely*. Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures*. If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. As a general rule, *do not rely on an environmental report prepared for a different client, site, or project, or that is more than six months old.*

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, none of the engineer's services were designed, conducted, or intended to prevent uncontrolled migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration.*** Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

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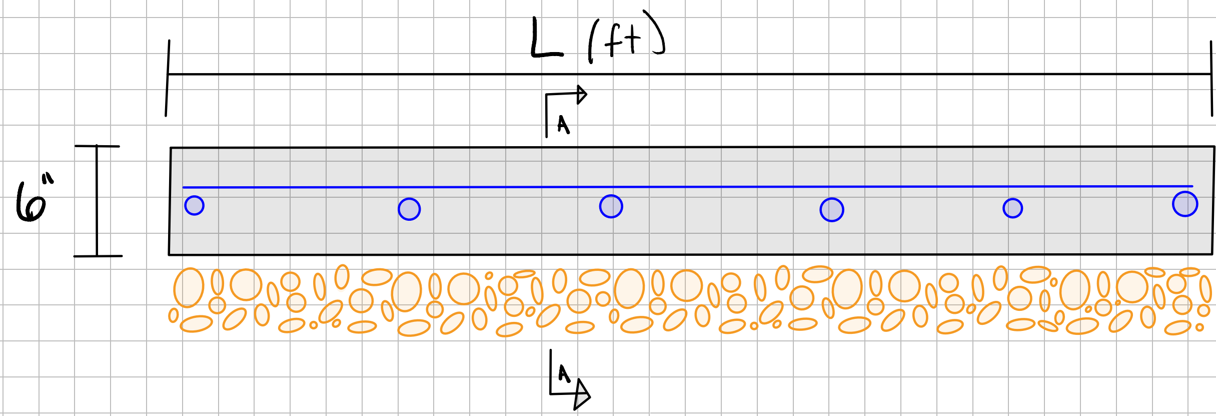
PROJECT 6" Slab NO.

DESIGNED KNK DATE 9/15/22

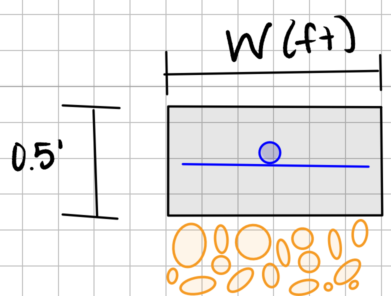
CHECKED PEP DATE 09/15/22

ARCADIS

6" slab with temperature & shrinkage reinforcement



ELEVATION VIEW (NTS)



Section A-A
(NTS)

For components 6in or less, reinforcing may be single layer

$$A_s \geq \frac{1.30\, b\, h}{2(b+h) f_y} \quad \text{(LRFD 5.10.6-1)}$$

b = 12 in
h = 6 in
f_y = 60 ksi

$$A_s \geq \frac{1.30\,(12\,in)(6\,in)}{2\,(12\,in + 6\,in)\,60\,ksi} = 0.043\ in^2/ft$$

Use D5 @ 12 in (see attached Welded Wire Mesh Chart)

$A_{s\,(D5)} = 0.05\ in^2 > 0.043\ in^2$ ✓ okay

Welded Wire Mesh Chart

WIRE SIZE NUMBER		NOMINAL DIAMETER	NOMINAL WEIGHT	AREA - SQ. IN. PER FOOT OF WIDTH FOR VARIOUS SPACINGS						
				CENTER TO CENTER SPACING						
SMOOTH	DEFORMED	INCHES	LBS/LIN. FT.	2"	3"	4"	6"	8"	10"	12"
W31	D31	0.628	1.054	1.860	1.240	0.930	0.620	0.465	0.372	0.310
W30	D30	0.618	1.020	1.800	1.200	0.900	0.600	0.450	0.360	0.300
W28	D28	0.597	0.952	1.680	1.120	0.840	0.560	0.420	0.336	0.280
W26	D26	0.575	0.934	1.560	1.040	0.780	0.520	0.390	0.312	0.260
W24	D24	0.553	0.816	1.440	0.960	0.720	0.480	0.360	0.288	0.240
W22	D22	0.529	0.748	1.320	0.880	0.660	0.440	0.330	0.264	0.220
W20	D20	0.504	0.680	1.200	0.800	0.600	0.400	0.300	0.240	0.200
W18	D18	0.478	0.612	1.080	0.720	0.540	0.360	0.270	0.216	0.180
W16	D16	0.451	0.544	0.960	0.640	0.480	0.320	0.240	0.192	0.160
W14	D14	0.422	0.476	0.840	0.560	0.420	0.280	0.210	0.168	0.140
W12	D12	0.390	0.408	0.720	0.480	0.360	0.240	0.180	0.144	0.120
W11	D11	0.374	0.374	0.660	0.440	0.330	0.220	0.165	0.132	0.110
W10.5		0.366	0.357	0.630	0.420	0.315	0.210	0.157	0.126	0.105
W10	D10	0.356	0.340	0.600	0.400	0.300	0.200	0.150	0.120	0.100
W9.5		0.348	0.323	0.570	0.380	0.285	0.190	0.142	0.114	0.095
W9	D9	0.338	0.306	0.540	0.360	0.270	0.180	0.135	0.108	0.090
W8.5		0.329	0.289	0.510	0.340	0.255	0.170	0.127	0.102	0.085
W8	D8	0.319	0.272	0.480	0.320	0.240	0.160	0.120	0.096	0.080
W7.5		0.309	0.255	0.450	0.300	0.225	0.150	0.112	0.090	0.075
W7	D7	0.298	0.238	0.420	0.280	0.210	0.140	0.105	0.084	0.070
W6.5		0.288	0.221	0.390	0.280	0.195	0.130	0.097	0.078	0.065
W6	D6	0.276	0.204	0.360	0.240	0.180	0.120	0.090	0.072	0.060
W5.5		0.264	0.187	0.330	0.220	0.165	0.110	0.082	0.066	0.055
W5	D5	0.252	0.170	0.300	0.200	0.150	0.100	0.075	0.060	0.050
W4.5		0.240	0.153	0.270	0.180	0.135	0.090	0.067	0.054	0.045
W4	D4	0.225	0.136	0.240	0.160	0.120	0.080	0.060	0.048	0.040
W3.5		0.211	0.119	0.210	0.140	0.105	0.070	0.052	0.042	0.035
W3		0.195	0.102	0.180	0.120	0.090	0.060	0.045	0.036	0.030
W2.9		0.192	0.098	0.174	0.116	0.087	0.058	0.043	0.035	0.029
W2.5		0.178	0.085	0.150	0.100	0.075	0.050	0.037	0.030	0.025
W2.1		0.162	0.070	0.126	0.084	0.063	0.042	0.031	0.025	0.021
W1.4		0.135	0.049	0.084	0.056	0.042	0.028	0.021	0.017	0.014

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