GEOTECHNICAL ENGINEERING SERVICES REPORT

Conducted on Panama City Joint Outpatient Clinic
Project No. 520-326 (A/E Minor)
Panama City, Bay County, Florida

KCI Project No . 10110414K

prepared for:

Mr. Wm. Walter Bolton, P.E., GC, LEED, AP CD+C
BES Design/Build, LLC
311 Fels Avenue
Fairhope, Alabama 36532

KCI TECHNOLOGIES
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Mr. Wm. Walter Bolton, P.E., GC, LEED, AP CD+C
BES Design/Build, LLC
311 Fels Avenue
Fairhope, Alabama 36532

21 November 2011

Subject: **Geotechnical Engineering Services Report**
Project No. 520-326 (A/E Minor)
Panama City Joint Outpatient Clinic
Panama City, Bay County, Florida

KCI Project No. 10110414K

Dear Mr. Bolton:

KCI Technologies, Inc. is pleased to submit two (2) originals plus a PDF electronic file of the report referenced above to BES, Inc. for the project referenced above.

Your selection of KCI to perform these services is sincerely appreciated. Please contact us should you have any questions or require additional information.

Sincerely,

KCI Technologies, Inc.

Theresa M. Bailey, P.E.
Senior Engineer

Anu Saxena, P.E.
Vice President
Florida Registration No. 45601

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Terms of Reference

KCI Technologies, Inc. was retained by BES Design/Build, LLC (BES or Client) to provide certain geotechnical design phase support services for the proposed Panama City Joint Outpatient Clinic project located on Magnolia Beach Road in Panama City, Bay County, Florida (hereafter referred to as the "project site"). Refer to **Figure 1** for a Project Site Location and Vicinity Map. These services were performed in general accordance with KCI Proposal and subsequent authorization by BES Design/Build, LLC.

1.2 Project Description, Background, and Available Information

The geotechnical exploration plan was developed based upon a review of plans prepared by BES delineating the building locations as well as other relevant site features, as summarized below.

- the approximate 10-ac project site involves the construction of a single-story, 28,605 sf primary building, a smaller future Navy clinic, associated paved areas, and water management features.

1.3 Purpose and Scope of Work

The purpose of the geotechnical services completed by KCI for the project site was to describe, in general terms, soil and ground-water conditions encountered at the site and to evaluate the subsurface conditions relative to design and construction of foundations for the proposed construction. To achieve this purpose, the scope of services included the following elements:

- advancing one (1) 60-ft deep test boring, four (4) 40-ft deep test borings, and two (2) 20-ft deep test borings below existing ground surface (egs) at locations coordinated with the project design team;
- advancing a series of 6-ft deep hand auger borings in proposed pavement areas;
- performing certain laboratory testing on retrieved samples, including two (2) permeability tests;
- compiling field exploration and boring data, as well as ground-water conditions;
- documenting observations and findings and providing preliminary guidelines for foundation design; and,
- providing two (2) copies of signed and sealed report by the principal or duly authorized official of the firm.

Limitations of the work performed for this project, including this report itself, are discussed in ***Section 5.0****.*

2.0 FIELD EXPLORATION PROGRAM

The field exploration program was performed on 11 through 13 November 2011. As discussed in **Section 1.3** above, subsurface conditions within the project site were explored by advancing a series of test borings at locations illustrated in **Figure 3** (Project Layout and Test Location Plan).

2.1 Test Borings

The test borings were advanced by a truck-mounted drill rig using a wet-rotary procedure. Representative soil samples were obtained using the split-barrel sampling procedure. In this procedure, a 2-in. outer-diameter, split-barrel sampler is driven into the soil by a 140-lb hammer with a free-fall of 30-in. The number of blows required to drive the sampler through a 12-in. interval is termed the Standard Penetration Resistance, or "N", value, and is indicated for each sample on the boring log. The "N" value may be taken as an indication of the relative density of granular soils in-situ.

Soil samples obtained during the field exploration program were sealed immediately in the field and brought to KCI's laboratory for further examination and testing, as necessary. Borehole was grouted as per applicable guidelines.

Boring logs are presented in **Figures 4A and 4B** and any laboratory test results are included at the respective sample depth on the test boring log. Hand auger logs are included in **Table 1**. It should be noted that the indicated boundaries between soil types are approximate, and that actual transition between soil types may be gradual.

2.2 Laboratory Testing Program

Laboratory tests are performed to assist in the classification of soils based on their mechanical and physical behavior. Based on the results of laboratory tests, an indication of physical properties for a soil can be determined. Laboratory tests completed on soil samples retrieved for this project include:

- twelve (12) moisture content determinations;
- twelve (12) minus #200 sieve tests; and,
- visual classification in general accordance with applicable procedures.

As noted above, results for each of these laboratory tests are summarized at the respective sample depths on the boring logs in **Figure 4.** Results of laboratory falling head permeability testing on soil samples from the water management areas, the range of permeability values to be: 2.8 in/hr in the northeast pond to 3.1 in/hr in the southeast pond.

These values are in the clean, poorly-graded sands observed in Borings B6 and B7. Soil porosity may be taken as 0.3.

Samples obtained from the field exploration program and not subject to laboratory testing have been stored at KCI's laboratory. These samples will be retained for a period of 90 days from the date of release of this report and then discarded, unless advised otherwise in writing from the Client.

3.0 SITE, GROUND-WATER, AND SOIL CONDITIONS

3.1 Site Features

The project site is located east of Thomas Drive and north of Magnolia Beach Road in Panama City, Bay County, Florida, as illustrated on the Project Site Location and Vicinity Map presented in **Figure 1**. The site itself is generally flat and reported to include some amount of dredged fill.

3.2 Ground-Water Conditions

At the time of the field exploration program ground-water was encountered at a high or shallow depth of 6.0 ft below egs in Boring B6 in the northeast portion of the project site and at a low or deepest depth of 8.25 ft in Boring B1 in the north-central portion of the project site. Based on information from the USDA-SCS, the surficial shallow geology of the project site is predominated by Mandarin Sand; refer to **Figure 2** for a USDA-SCS Soil Map delineating the project site. The Seasonal High Water Level (SHWL) is estimated to lie at approximately 4.0 ft below egs in the clean, poorly-graded sand layer across the project site.

Fluctuation in any ground-water level should be expected due to seasonal climatic changes, construction activity, development activities, rainfall variations, surface-water runoff, and other site specific factors related to terrain and topography. Since ground-water level variations are anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based on the assumption that variations will occur.

3.3 Subsurface Soil Conditions

Subsurface soils encountered at the boring locations are summarized below. Refer to test boring logs in **Figure 4.**

DEPTH (ft)	SOIL DESCRIPTION
0-4	Very loose to loose, poorly-graded sands (SP)
4 – 60	Medium dense to dense, poorly-graded sands (SP) with occasional seam of silty sands (SM) or clayey sands (SC)

- Shallow hand auger borings in proposed paved areas exhibited clean, poorly-graded sands (SP) to a depth of approximately 6 ft below egs.

4.0 OBSERVATIONS, CONCLUSIONS, AND RECOMMENDATIONS

Based on the field exploration program and information provided by the Client for this project, observations, conclusions, and recommendations are presented below.

4.1 Geotechnical Evaluation

- The field exploration program indicated the presence of shallow, very loose to loose, clean, poorly-graded sands to a depth of 4 ft below egs. The use of a heavier compactor (Dynapac CA-25 or engineer recommended equivalent) is recommended within proposed building areas to help ensure proper densification of the soils within the anticipated foundation stress zone.

4.2 Site Preparation, Fill Placement, and Inspection

- All the building area, including 5.0-ft outside the construction limits, should be stripped, excavated, and undercut of all obstructions, topsoil, and other organic or deleterious materials, including asphalt material. In localized areas where organics/roots or other deleterious materials extend to greater depths, further excavation and backfilling may become necessary. In accordance with standard practice, fill should not be placed until the stripped and/or excavated surface has been inspected by a geotechnical representative and approved for compaction and placement of structural backfill operations.

- All stripped or undercut areas should be proof-rolled with appropriate compaction equipment for site and soil conditions. This would typically consist of a vibratory drum type compactor such as Dynapac CA-25 (or engineer approved alternate). The moisture content should be adjusted as necessary to aid compaction efforts.

- Compaction should cease if deemed potentially detrimental to nearby or adjacent structures. It is recommended a vibratory roller maintain a minimum separation of 50 ft from existing structures. Within this zone use of a track-mounted bulldozer or a vibratory roller operating in a static mode is recommended.

- If any areas are observed to be "yielding" or "pumping" during compaction operations, localized cuts or trenches may be made to evaluate the conditions of the soils. Should yielding or pumping result from excessive soil moisture, then corrective alternates may be considered.

- As indicated above, localized unstable areas or areas containing organics/roots or other deleterious materials discovered during stripping and compaction may require excavation and backfilling.

4.2.1 Building Areas Requiring Fill

- When placing fill materials, lift thicknesses not greater than 12 in. prior to compaction, should be maintained at any one time. Each lift should be placed, compacted, and tested prior to placement of the next lift. Field density tests should be performed to at least 1.0-ft below the stripped, proof-rolled, and compacted surface of natural soils. Additional field density tests should be performed for each 1.0-ft lift of fill placed. Any areas not in compliance with the compaction requirements should be reworked and retested prior to placement of the next lift of fill. It is recommended that a field density test be performed for every 2,000-sq ft of building area.

- All fill material in the proposed building pad area should be compacted to 95 percent of the maximum dry density determined from ASTM D 155 7, *Test Method for Compaction Characteristics Using Modified Effort* or 98 percent of the maximum dry density determined from ASTM D 698, *Test Method for Compaction Characteristics Using Standard Effort.*

- Fill materials required to achieve elevated building pad areas should preferably consist of select fill containing less than 10 percent fines (i.e., less than 10 percent passing the # 200 sieve). It is noted that select fill towards the upper end of this limit (i.e., 7 to 10 percent fines) may require strict moisture control during compaction. Additionally, select fill would be free of organics and other deleterious materials. These soil types are less sensitive to moisture problems than other more silty or clayey soils so the use of select fills tends to reduce earthwork delays caused by seasonal rains.

4.2.2 Building Areas Requiring Cut

- The building area should not be cut due to the presence of lean sandy clays/clayey sands at a depth of 5.0 ft below existing grade. Foundations bearing at or on the clays will settle and/or rise with moisture changes.

4.3 Foundations

Based on the results of the field exploration program, we consider the subsurface conditions at the site favorable for support of the proposed structure on a properly designed monolithic slab-mat or spread footings foundation system. A conceptual design of a monolithic slab foundation is provided in **Figure 5**. Provided the site preparation and earthwork construction recommendations outlined in **Section 4.2** of this report are performed, a monolithic slab-mat foundation system may be designed in accordance with the guidelines listed below.

4.3.1 Bearing Pressure and Settlement

The perimeter haunched edge footings or spread footings may be designed utilizing an allowable net soil bearing pressure of 2,500 psf. Additionally, interior column footings can be incorporated into the monolithic slab design. Net bearing pressure is defined as the soil bearing pressure at the foundation bearing level in excess of natural overburden pressure at that level. The foundations should be designed based on the maximum load which could be imposed by all loading conditions. Utilizing these allowable net soil bearing pressures for the different foundation elements, the estimated total settlement is expected to be on the order of less than 1.0-in.

Regarding settlement in general, subsurface soil movements at the site will occur as a consequence of several interrelated stress conditions. The amount of movement which individual footings will experience is a function of the footing size and the imposed pressure intensity as well as the in-situ stress conditions within the zone influenced by the footing. Settlement estimations are based on empirical procedures using SPT N-values as a measure of relative in-situ density of soils. Foundations designed and proportioned as recommended above are capable of tolerating a total settlement of 1.0-in., half of which is the allowable differential settlement.

4.3.2 Foundation Size

The minimum thickness should be 18-in. (1.5-ft) for the haunched edge footings, even though the maximum allowable soil bearing pressure may not be achieved. A minimum width of 18 inches should be designed for spread footings. This width and thickness recommendation should control the minimum size of the foundations. A drawing is included that indicates the general interior and exterior haunched beams.

4.3.3 Bearing Depth

The exterior foundations should bear at a depth of at least 18-in. below the adjacent exterior final grades and any interior foundations should bear at a depth of at least 18-in. below the finish floor elevation (FFE) to provide confinement to the bearing level soils. The spread footings should bear at a depth of 24 in. below exterior finish grades.

4.3.4 Bearing Material

The foundations may bear in either the compacted suitable natural clayey sand soils or compacted structural fill. The bearing level soils,after compaction, should exhibit densities equivalent to 95 percent of the Modified Proctor maximum dry density as determined from ASTM D 1557, *Test Method for Compaction Characteristics Using Modified Effort* or 98 percent of the maximum dry density determined from ASTM D 698, *Test Method for Compaction Characteristics Using Standard Effort* to a depth of at least 2-ft below the foundation bearing levels. Field density tests should be performed to assess the efficiency of compaction in the foundation areas.

4.3.5 Floor Slab

A modulus of subgrade reaction of 100 lb/in^3 may be used for floor slab design provided that the slab is placed on soils similar to the near-surface in-situ soils prepare in accordance with the recommendations in this report.

5.0 LIMITATIONS

5.1 General

This geotechnical engineering services report has been prepared solely for the exclusive use of the Client, **BES Design/Build, LLC**, in accordance with generally accepted geotechnical engineering standards. No other warranty is expressed nor implied. It should be noted that the information presented in this report addresses only soils and deposits normally influenced by the proposed construction. Other conditions may exist which were not detected or were not made known to KCI.

The scope of services does not include an evaluation of deep soil or rock conditions where karstic subsurface conditions may exist. Furthermore, the scope of services does not deal with the possibility of eventual sinkhole development at the site. Deep borings, geophysical exploration, and resistivity surveys would be required in order to evaluate the structural condition and stability of soil and rock formations, and is beyond the scope for this project.

5.2 Scope of Services

This report has been prepared to aid in the evaluation of subsurface conditions only at the locations of test borings illustrated in **Figure 3**. The scope of services is limited to the specific project and location described herein, and the description of the project represents KCI's understanding of significant project aspects related to soil characteristics. In the event that any changes in the design or location of the structures as outlined in the report are planned, KCI must be informed so that the changes can be reviewed and the observation, comments, and conclusions of this report modified or approved in writing. **Any conclusions or recommendations made by others based on the data contained herein are not the**

responsibility of KCI, unless we are given the opportunity to review those conclusions and recommendations.

5.3 Changed Conditions

The information submitted in this report is based upon the data obtained from borings performed at locations indicated in the Project Layout and Test Location Plan and from any other information discussed in this report. **The report does not reflect any variations which occur between these soundings. In the performance of subsurface exploration, specific information is obtained at specific locations at specific times. However, it is known that site and subsurface conditions can change with time and under anthropologic influences. Additionally, variations in soil, rock, and ground-water conditions exist on most sites between boring locations.** The nature and extent of the variations may not become evident until construction. If variations then appear, it will be necessary to re-evaluate the recommendations of this report after performing on-site observations during the construction period and noting the characteristics of any variations.

It is the responsibility of the Client to see that the recommendations in this report are brought to the attention of all concerned parties. Because of the possibility of unanticipated subsurface conditions occurring, it is recommended that a "changed condition" clause be provided in contracts with the general contractor and with subcontractors involved in foundations or earthwork construction.

5.4 Reproduction

The reproduction of any portion of this report in plans or other engineering documents supplied to parties other than the Client or assigned parties must bear the language indicating that the information contained in the report is for general information only, and that neither the Client nor KCI are liable to such parties.

6.0 REFERENCES

Internet: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

WGS84
LAT: 30.160182° N
LONG: 85.740545° W
10110414K.dwg (11-16-2011)

TITLE: Project Site Location and Vicinity Map	SOURCE: Google Earth	FIGURE NO.: 1

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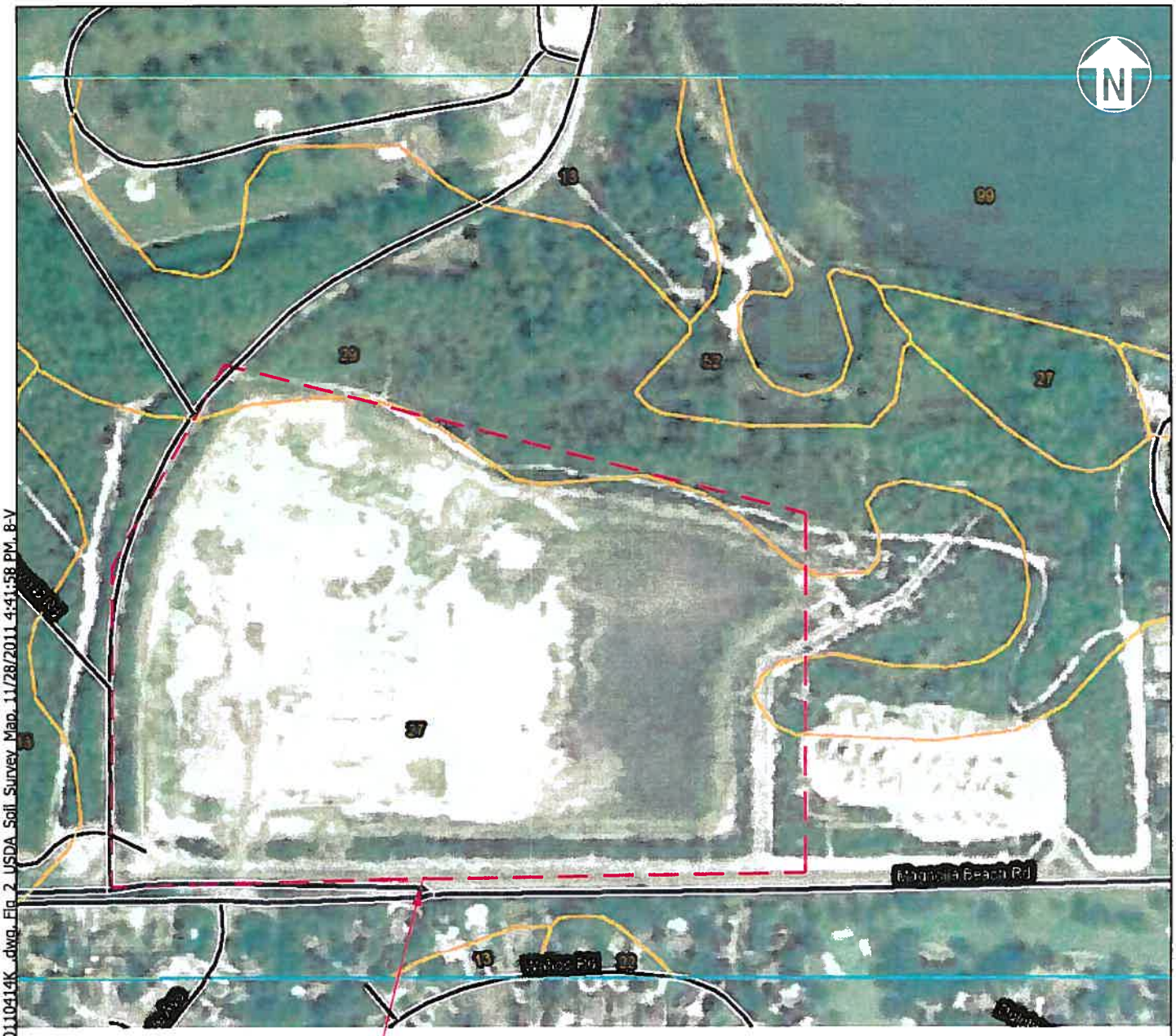
DATE	16 November 2011
DRAWN BY	JBC
CHECKED BY	JS
SCALE	nts
PROJECT NO.	10110414K

Geotechnical Exploration and Engineering
Consultation Services Report
Proposed Panama City Joint Outpatient Clinic
Project No. 520-326
Panama City, Bay County, Florida
for:
BES Design Build, LLC

P:\KCI\10110414K PCJOC Facility for BES\Drawing Files\KCI_DWGS\10110414K .dwg, Fig 1 Site Location Map, 11/28/2011 5:03:23 PM, 8-V



APPROXIMATE PROJECT LIMITS

LEGEND	
Map Unit Symbol	Map Unit Name
27	Mandarin sand
29	Rutlege sand

WGS84
LAT: 30.160182° N
LONG: 85.740545° W
10110414K.dwg (11-16-2011)

TITLE	SOURCE	FIGURE NO.
USDA–SCS Soil Survey Map	USDA–SCS Soil Survey Bay County, Florida [online]	2

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DATE	16 November 2011
DRAWN BY	JBC
CHECKED BY	JS
SCALE	nts
PROJECT NO.	10110414K

Geotechnical Exploration and Engineering
Consultation Services Report
Proposed Panama City Joint Outpatient Clinic
Project No. 520–326
Panama City, Bay County, Florida
for:
BES Design Build, LLC

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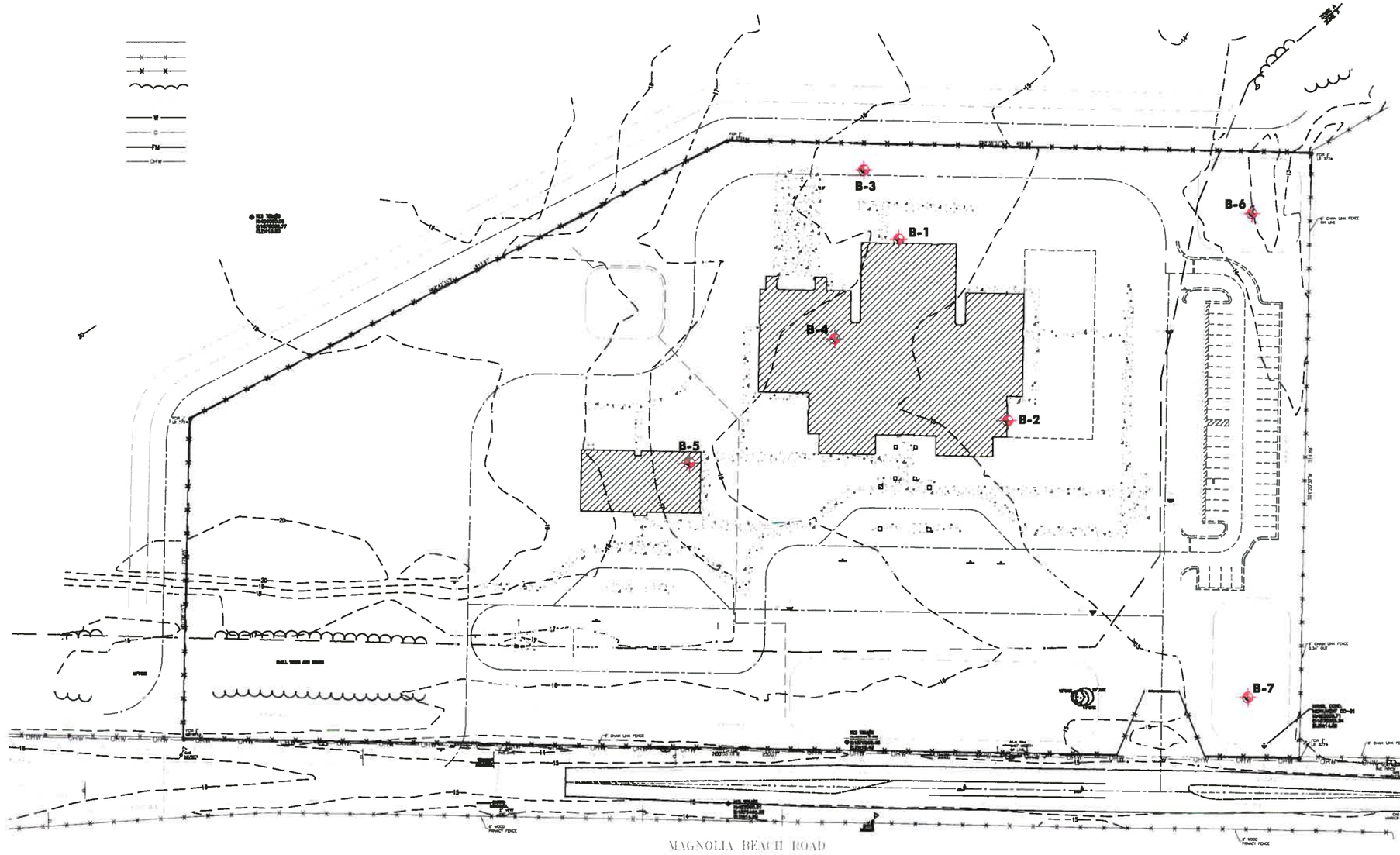

GRAPHIC SCALE

0 100' 200'

1 Inch = 100 feet

LEGEND

B-1 Test Boring(s) Location and Identification.

Note: This is not a survey. Test locations are approximate.

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NO.	REVISIONS	DATE	BY

	NAME	DATE
DESIGNED		
DRAWN	JBC	11/11
CHECKED	AS	11/11
APPROVED	AS	11/11

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PROJECT NAME
Proposed Panama City Joint Outpatient Clinic
Project No. 520-326
Panama City, Bay County, Florida

CLIENT
BES Design Build, LLC

SHEET TITLE
Project Layout and Test Location Plan

Figure No.
3

SOURCE
Base Plan provided by: Client

PROJECT NO.
10110414K

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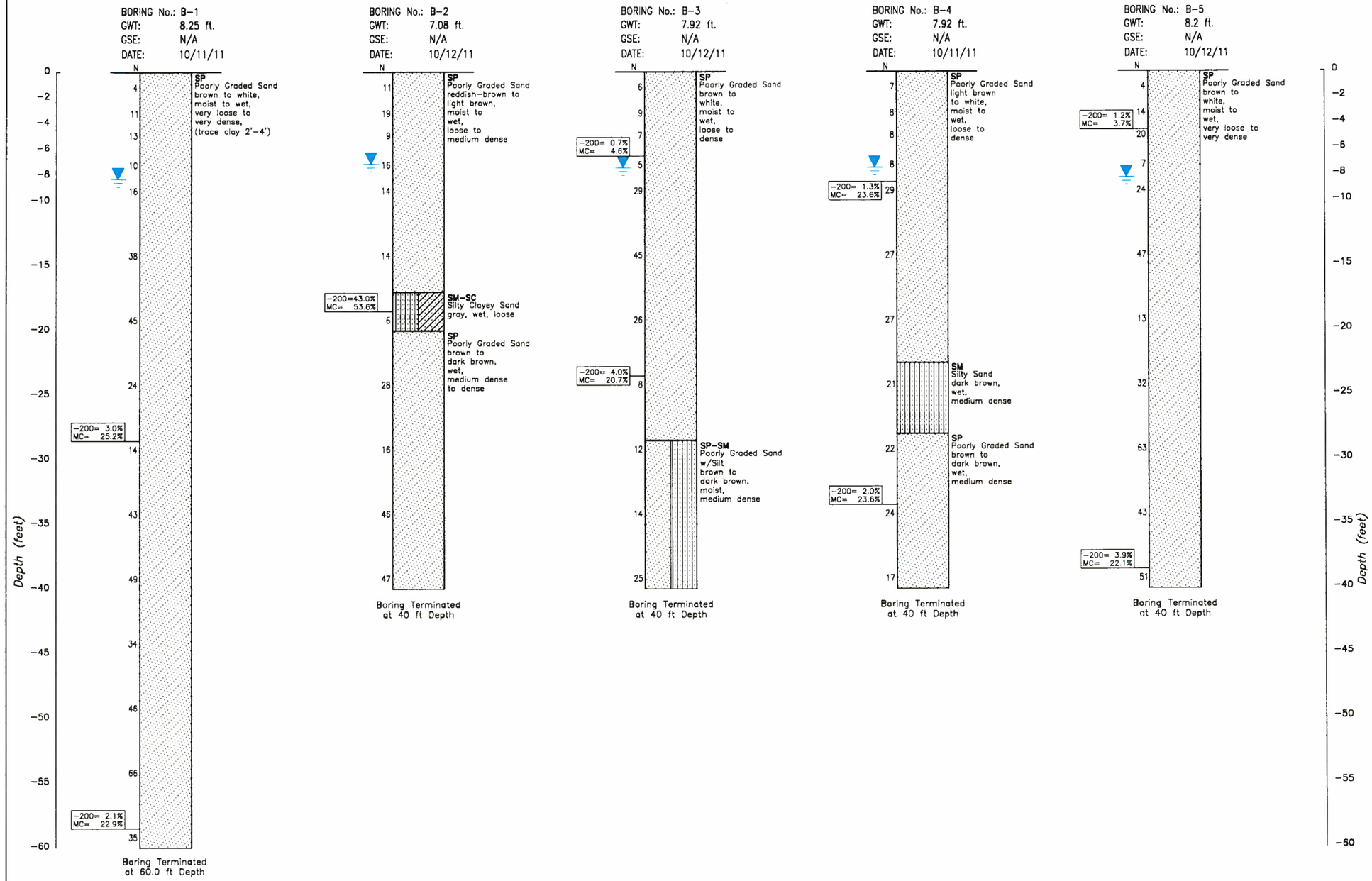

LEGEND

SP SAND	ML SILT	MH ELASTIC SILT
SM SILTY SAND	CL LEAN CLAY	CH FAT CLAY
SC CLAYEY SAND	SH SHELL	PT MUCK/PEAT
LS HARD LIMESTONE	-- SHELLY-GRAVEL	-- CONCRETE
WLS WEATHERED OR SOFT LIMESTONE	-- SHELLY-SAND	AS ASPHALT
SP-SC	-- SHELLY-CLAY	LB LIMEROCK BASE
SP-SM	-- SOIL/CEMENT	-- DEBRIS
-- CAVITY	OL ORGANIC SILTS	OH ORGANIC CLAY
GM SILTY-GRAVEL	GC GRAVELLY-CLAY	GP GRAVEL

SOIL PROPERTIES

GRANULAR SOILS (COHESIONLESS)

DESCRIPTIVE TERM FOR RELATIVE DENSITY	SPT N-VALUE (blows per ft)
very loose	0 - 4
loose	5 - 10
medium dense	11 - 30
dense	31 - 50
very dense	over 50

FINE GRAINED SOILS (COHESIVE)

DESCRIPTIVE TERM FOR CONSISTENCY	UNCONFINED COMPRESSIVE STRENGTH (ksf)	SPT N-VALUE (blows per ft)
very soft	0.5	0 - 2
soft	0.5 - 1.0	3 - 4
firm	1.0 - 2.0	5 - 8
stiff	2.0 - 4.0	9 - 15
very stiff	4.0 - 8.0	16 - 30
hard	8.0-10.0	31-50
very hard	10.0+	over 50

MOISTURE DESCRIPTION

- dry - absence of moisture, dusty, dry to the touch
- moist - damp, but no visible water
- wet - visible free water, usually soil is below water table

GNE GROUND WATER NOT ENCOUNTERED
GNM GROUND WATER NOT MEASURED
LL LIQUID LIMIT
PL PLASTIC LIMIT
PI PLASTICITY INDEX
-200 PERCENT PASSING NO. 200 U.S. STANDARD SIEVE (%)
MC NATURAL MOISTURE CONTENT (%)
WR WEIGHT OF ROD
WOH WEIGHT OF HAMMER
PH POST HOLED
N STANDARD PENETRATION RESISTANCE IN BLOWS PER 1ft (2ft SPOON - ASTM D-1586)
ORG ORGANIC CONTENT
TOD TIME OF DRILLING
GSE GROUND SURFACE ELEVATION
CASING USED
SP USCS SOIL CLASSIFICATION
NR NO RECOVERY
LOSS OF DRILLING FLUID CIRCULATION

GWT or GROUND WATER TABLE LEVEL (OBSERVED)

SHWL or SEASONAL HIGH WATER LEVEL (ESTIMATED)

TYPE OF RIG: IRA 200 (Manual Hammer)

NOTES:

1. THE BORINGS SHOWN REPRESENT SUBSURFACE CONDITIONS WITHIN THE BOREHOLE AT THE TIME OF DRILLING, NO WARRANTY AS TO THE SUBSURFACE CONDITIONS, STRATA DEPTH OR SOIL CONSISTENCY BETWEEN OR OUTSIDE THE BORING LOCATIONS IS EXPRESSED OR IMPLIED BY THIS DRAWING. DO NOT ASSUME THIS DATA IS A GUARANTEE OF THE DEPTH, EXTENT, OR CHARACTER OF THE MATERIAL PRESENT.
2. REFER TO PROJECT LAYOUT AND TEST LOCATION PLAN (FIGURE 3) FOR TEST LOCATIONS.

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NO.	REVISIONS	DATE	BY

	NAME	DATE
DESIGNED		
DRAWN	JBC	11/11
CHECKED	AS	11/11
APPROVED	AS	11/11

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PROJECT NAME
Proposed Panama City Joint Outpatient Clinic
Project No. 520-326
Panama City, Bay County, Florida

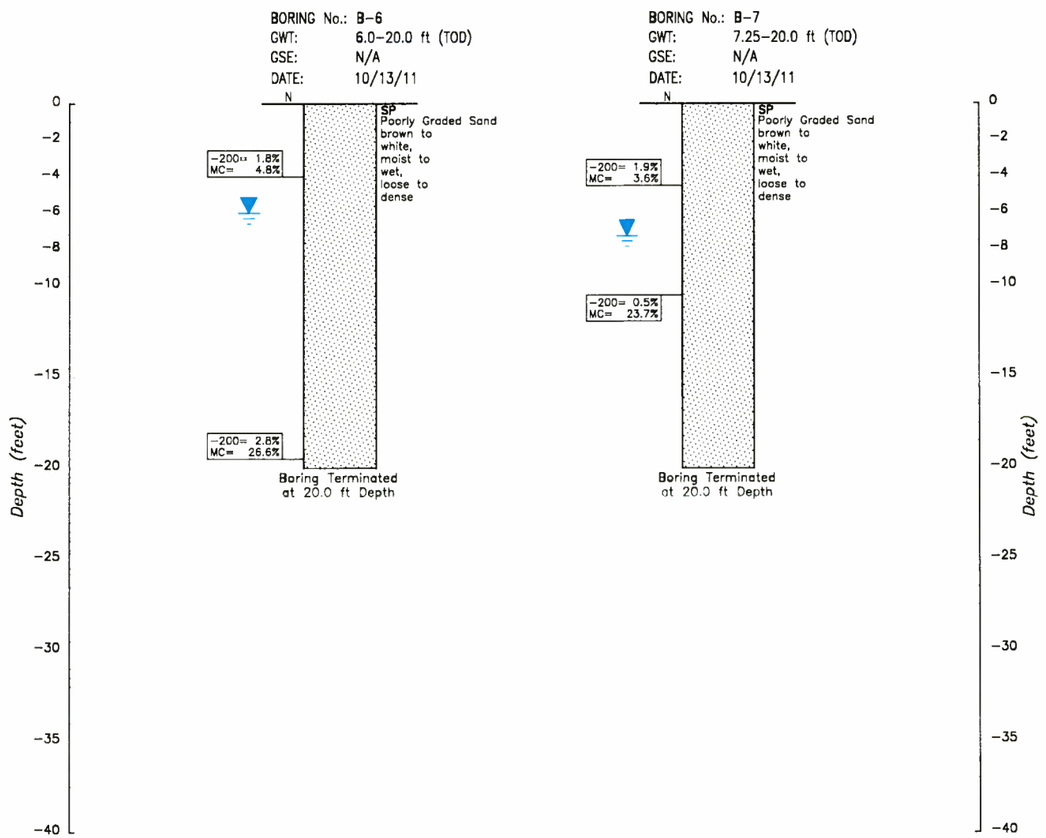
CLIENT
BES Design Build, LLC

SHEET TITLE
Soil Boring Profiles

Figure No.
4A

SOURCE

PROJECT NO.
10110414K



LEGEND

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NO.	REVISIONS	DATE	BY

	NAME	DATE
DESIGNED		
DRAWN	JBC	11/11
CHECKED	AS	11/11
APPROVED	AS	11/11

KCI TECHNOLOGIES
ENGINEERS | PLANNERS | SCIENTISTS | CONSTRUCTION MANAGERS

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Panama City, Bay County, Florida

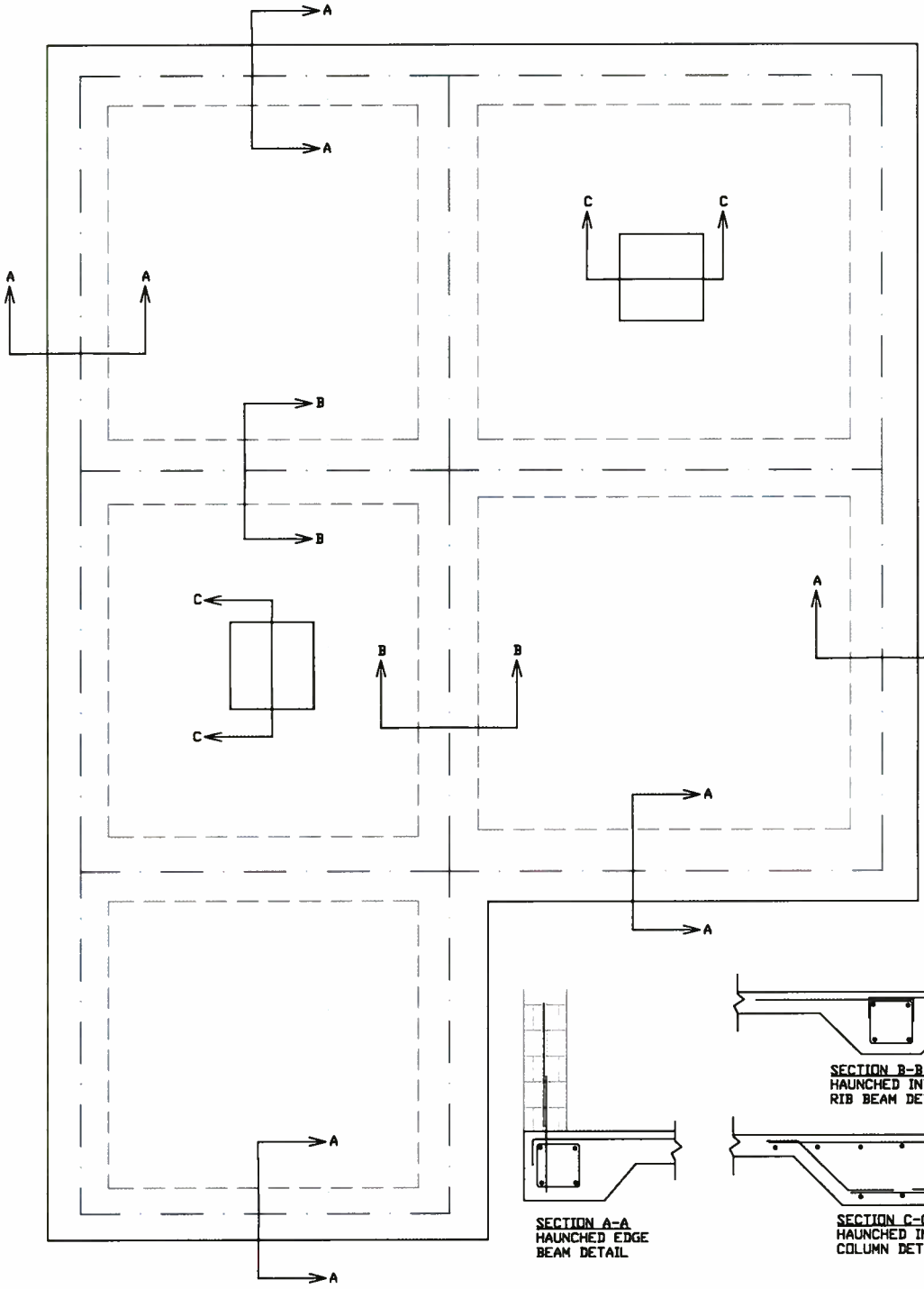
CLIENT
BES Design Build, LLC

SHEET TITLE
Soil Boring Profiles

Figure No.
4B

SOURCE

PROJECT NO.
10110414K



WGS84
LAT: 30.160182° N
LONG: 85.740545° W

10110414K.dwg (11-16-2011)

NOTES:
1. REBAR TO BE SPECIFIED AND DESIGNED BY STRUCTURAL ENGINEER
2. TOP & BOTTOM STEEL SHOULD BE PROVIDED TO RESIST POSITIVE & NEGATIVE BENDING MOMENTS
3. DOWELS TRANSFERRING STRESSES FROM THICKENED SECTION TO SLAB SHALL HAVE TRANSFER LENGTHS AS SPECIFIED BY STRUCTURAL ENGINEER

TITLE
Conceptual Details (not a design)
Monolithic Slab-Mat (MSM) Foundation

SOURCE

FIGURE NO.
5

KCI TECHNOLOGIES
KCI ENGINEERS | PLANNERS | SCIENTISTS | CONSTRUCTION MANAGERS

DATE 16 November 2011
DRAWN BY JBC
CHECKED BY JS
SCALE nts
PROJECT NO. 10110414K

Geotechnical Exploration and Engineering
Consultation Services Report
Proposed Panama City Joint Outpatient Clinic
Project No. 520-326
Panama City, Bay County, Florida
for:
BES Design Build, LLC

P:\KCI\10110414K PCJOC Facility for BES\Drawings Files\KCI DWGS\KCI MSM Foundations.dwg, Fig 5 MSM Foundations, 1/16/2012 10:58:02 AM, B-Y

Mr. Wm. Walter Bolton, P E., GC, LEED, AP CD+C
BES Design/Build, LLC
Geotechnical Engineering Services Report
Project No. 520-326 (A/E Minor)
Panama City Joint Outpatient Clinic
Panama City, Bay County, Florida

21 November 2011

APPENDIX A

Important Information About Your Geotechnical Engineering Report by ASFE

Important Information About Your

Geotechnical Engineering Report

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

The following information is provided to help you manage your risks.

Geotechnical 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 civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one—not even you*—should apply the report for any purpose or project except the one originally contemplated.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- 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,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- 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. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final*, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject To Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of 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 equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Rely on Your Geotechnical Engineer for Additional Assistance

Membership in ASFE exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE PROFESSIONAL FIRMS PRACTICING IN THE GEOSCIENCES

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