



UNIVERSAL ENGINEERING SCIENCES

Consultants In: Geotechnical Engineering • Environmental Sciences
Geophysical Services • Construction Materials Testing • Threshold Inspection
Building Inspection • Plan Review • Building Code Administration

LOCATIONS:

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- Rockledge
- Sarasota
- Tampa
- Tifton
- West Palm Beach

April 26, 2021

Poulos & Bennett, LLC
2602 E. Livingston Street
Orlando, Florida 32803

Attention: Mr. Lance Bennett, P.E.
lbennett@poulosandbennett.com

Reference: Limited Geotechnical Exploration
Cyrils Drive Roadway Widening – Ponds
Sunbridge Community
Osceola County, Florida
UES Project No.: 0130.1700290.0013
UES Document No.: 1861197

Dear Mr. Bennett:

We understand that you are in the process of permitting for the proposed Sunbridge Community in Osceola County, Florida. UES has previously performed various explorations for the above referenced project. We were provided with the following documents for our use during this phase of the exploration:

- Cyrils Drive / Narcoossee Road to Absher Road – Road Widening, Post Development Basin Map, dated March 9, 2021 and prepared by Poulos & Bennett. *This plan showed the four pond locations where the SPT borings were requested. However, during our field activities, we were requested to not perform borings within Basin 102.*

UES performed a total of six (6) SPT borings within the three pond locations (except Basin 102). The six (6) SPT borings, designated CP-01 and CP-04 through CP-08, shown on the attached Boring Location Plan in Appendix B-2, were performed in general accordance with the procedures of ASTM D 1586 “Standard Method for Penetration Test and Split-Barrel Sampling of Soils”. SPT sampling was performed continuously within the top 10 feet to detect variations in the near surface soil profile and on approximate 5 feet centers thereafter.

Survey control was not provided for the test boring locations before our field exploration program. The boring locations were staked on site by using handheld GPS devices and subsequently performed by UES. The indicated test boring locations should be considered accurate to the degree of the methodologies used. The approximate boring locations are shown in Appendix B



2.0 STORMWATER MANAGEMENT DESIGN

We understand that this phase of the project will include three (3) stormwater ponds (excluding Basin 102). Borings CP-01 and CP-04 through CP-08 were performed within these pond areas. Our recommended design parameters are summarized in Table I below.

TABLE I
STORMWATER MANAGEMENT DESIGN PARAMETERS

Design Parameter	Estimated Values					
Pond	Pond E-1	Pond 107			Pond 108	
Relevant Boring Logs	CP-01	CP-04	CP-05	CP-06	CP-07	CP-08
Estimated Seasonal High Groundwater Depth (feet)	2.5	1	2	1	1	1
Estimated Average Wet SHGWT Depth (feet)	3.5	2	3	3	3	3
Estimated Seasonal Low Groundwater Depth (feet)	6.5	5	6	5	5	5

Ground surface elevations at the boring locations would be beneficial to help us to identify any anomalies in our measured and estimated seasonal high groundwater levels, as well as improve the usefulness the groundwater information during the civil engineering design of the site.

It is our understanding that the information contained in the above table will be used to design the wet stormwater ponds for this project.

4.0 CLOSURE

We appreciate the opportunity to be working with you on this project and look forward to a continued association. Please do not hesitate to contact us if you should have any questions, or if we may further assist you as your plans proceed.

Sincerely yours,

UNIVERSAL ENGINEERING SCIENCES, INC.

Certificate of Authorization No. 549

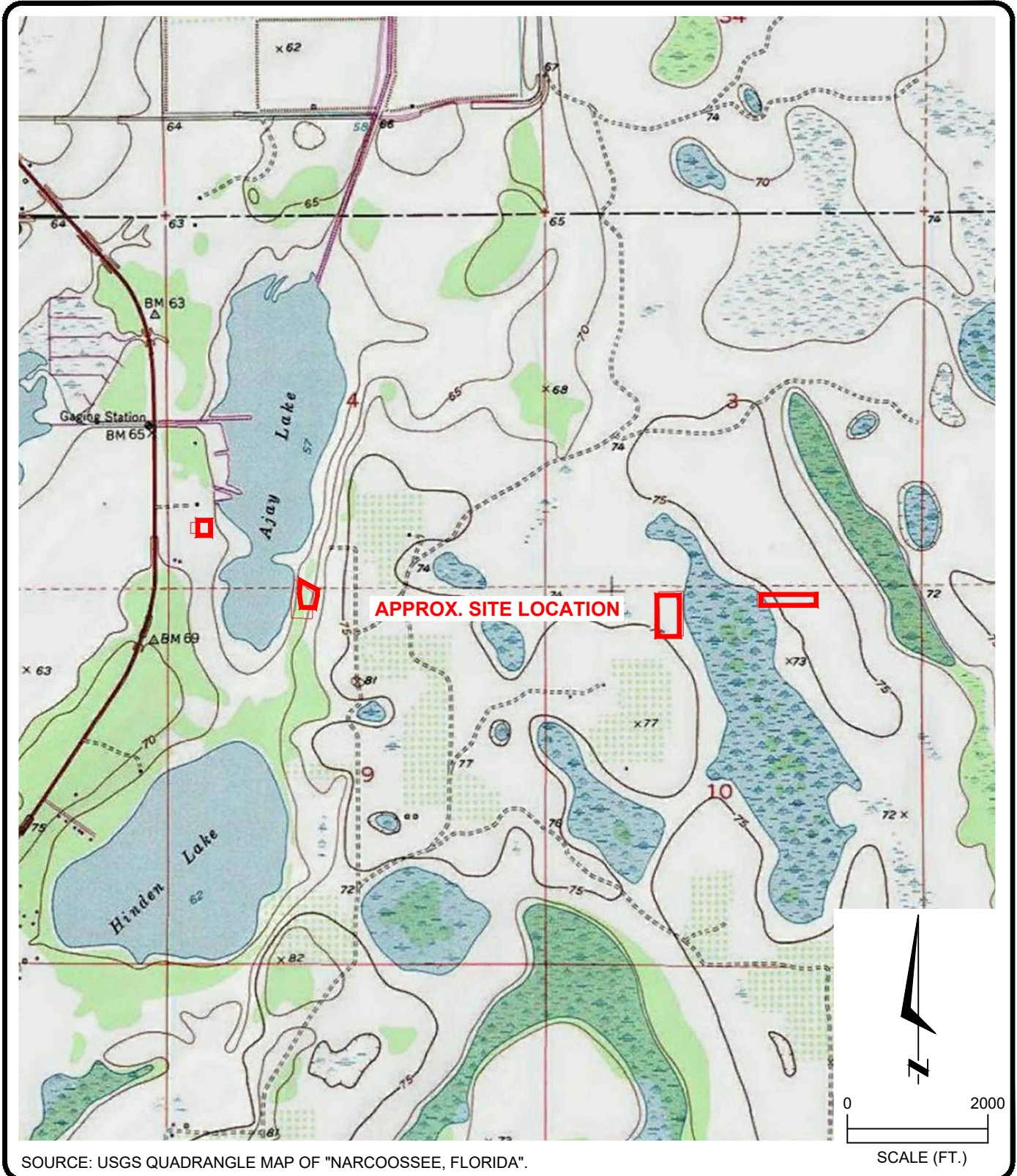
Ricardo C. Kiriakidis, PhD., P.E.
 Geotechnical Department Manager

Gautham S. Pillappa, M.S., P.E.
 Senior Geotechnical Engineer
 Florida Registration No. 82816

Attachments: **Appendix A**
 USGS Site Location Map
Appendix B
 Soil Boring Location Plan
 Boring Logs

APPENDIX A





SOURCE: USGS QUADRANGLE MAP OF "NARCOOSSEE, FLORIDA".

SCALE (FT.)

21-0230-01



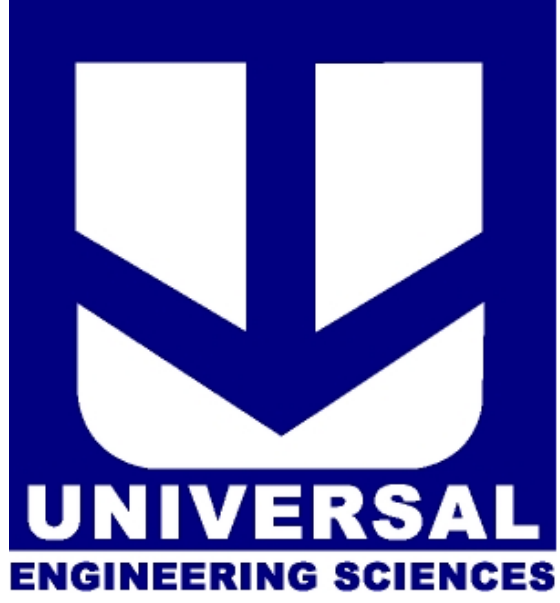
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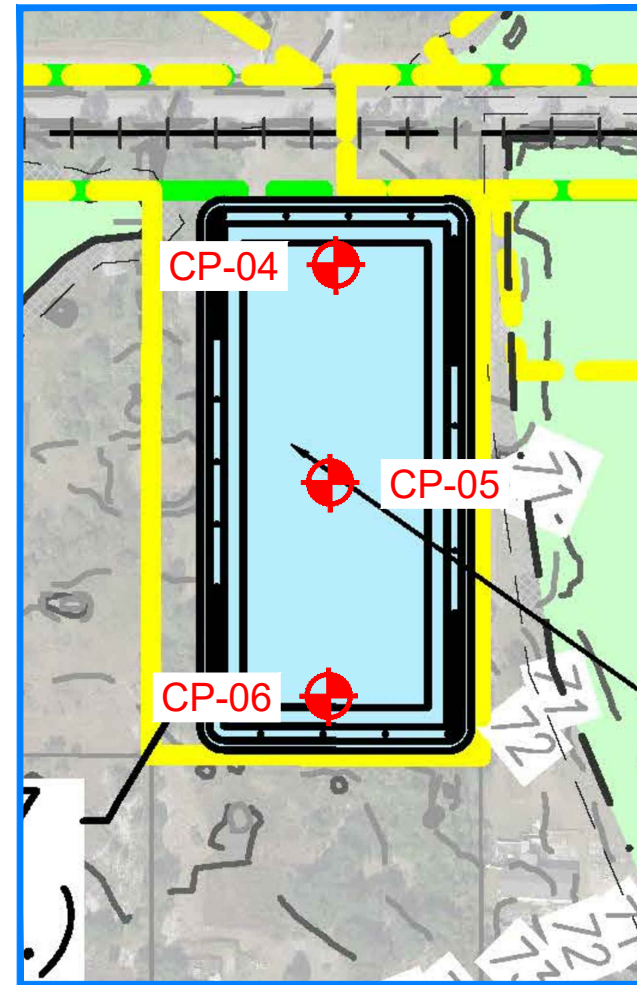
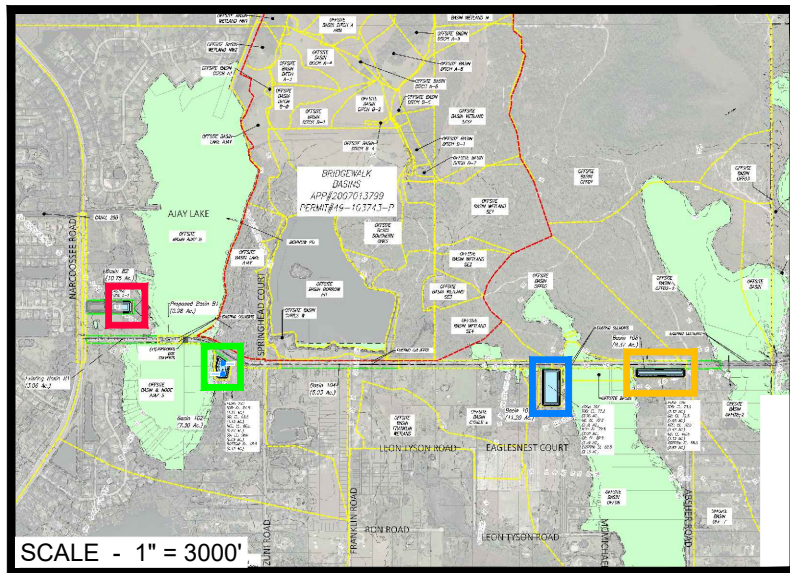
LIMITED GEOTECHNICAL EXPLORATION
CYRILS DRIVE ROADWAY WIDENING - PONDS
OSCEOLA COUNTY, FLORIDA

SITE LOCATION MAP

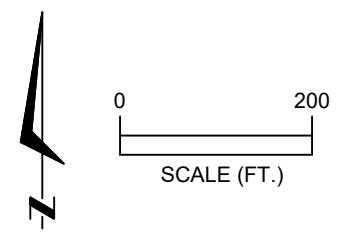
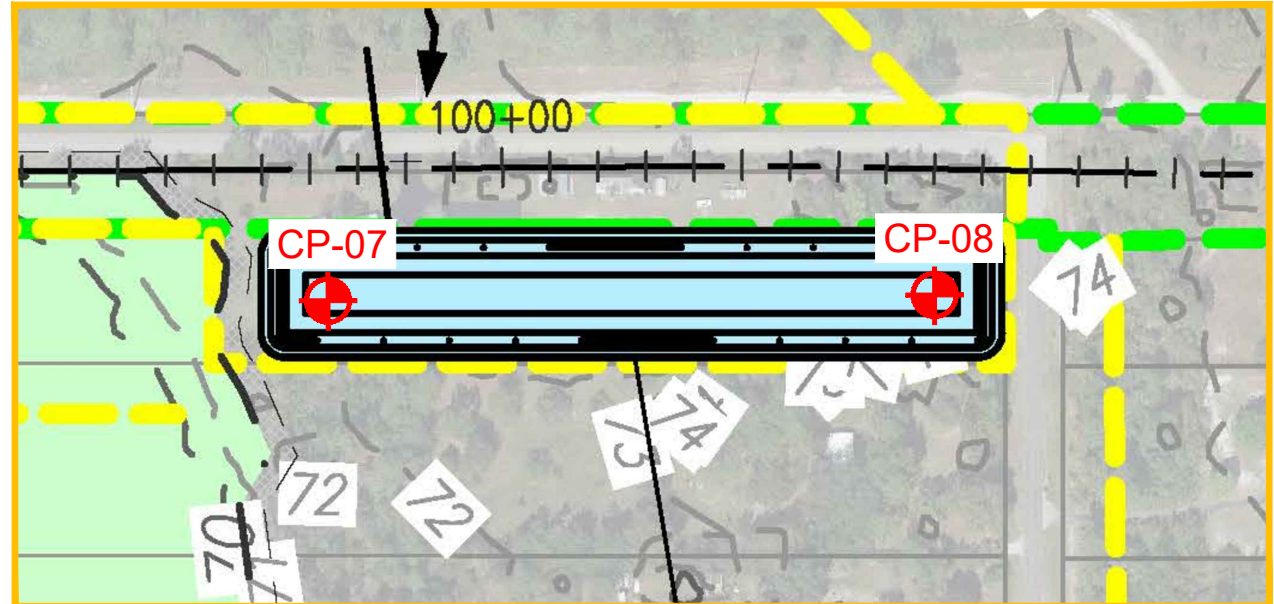
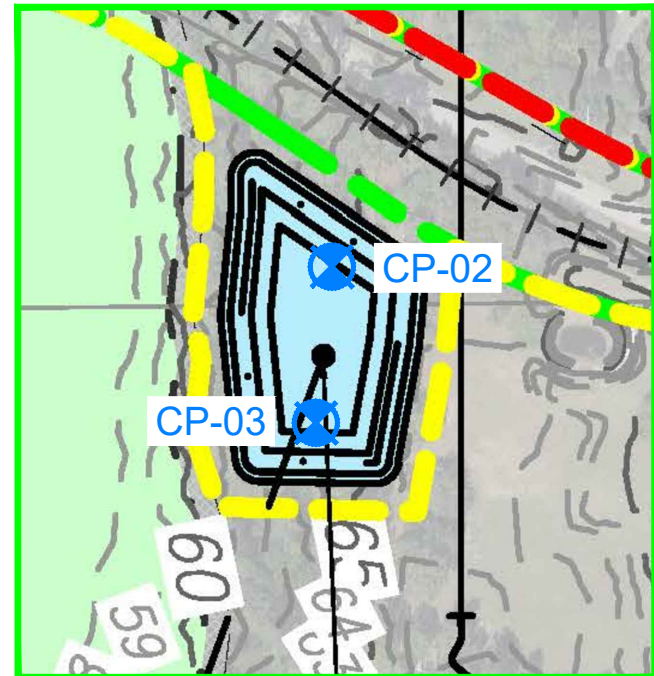
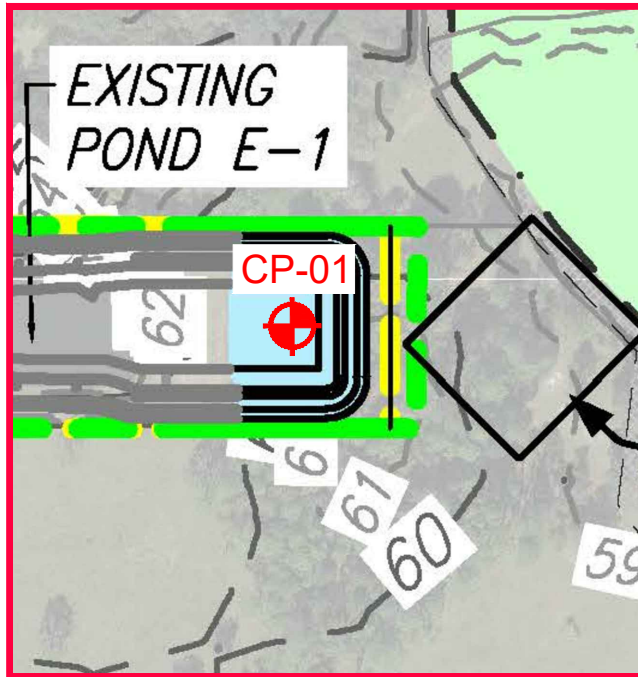
DRAWN BY: N.F.	DATE: 4 - 19 - 2021	CHECKED BY: G.P.	DATE: 04.26.2021
SCALE: AS SHOWN	PROJECT NO: 0130.1700290.0013	REPORT NO: 1861197	PAGE NO: A-1

APPENDIX B






- LEGEND**
- ◆ APPROX. STANDARD PENETRATION TEST BORING LOCATION (SPT) PERFORMED 4/16/2021
 - ◆ BORINGS NOT PERFORMED PER CLIENT'S REQUEST



21-0230-01

THIS DRAWING CREATED USING PLAN PROVIDED BY CLIENT.

POULOS & BENNETT	
FOR: LIMITED GEOTECHNICAL EXPLORATION CYRILS DRIVE ROADWAY WIDENING - PONDS OSCEOLA COUNTY, FLORIDA	DATE: 4-19-2021
DRAWN BY: N.F.	DATE: 04.26.2021
CHECKED BY: G.P.	SCALE: AS SHOWN
REPORT NO: 1861197	PROJECT NO: 0130.1700290.0013
BORING LOCATION PLAN	
 UNIVERSAL ENGINEERING SCIENCES	
PAGE NO:	B-2



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0130.1700290.0013

REPORT NO.: 1861197

PAGE: B-2.1

PROJECT: LIMITED GEOTECHNICAL EXPLORATION
CYRILS DRIVE ROADWAY WIDENING - PONDS
OSCEOLA COUNTY, FLORIDA

BORING I.D.: **CP-01**

SHEET: **1 of 1**

SECTION: TOWNSHIP:

RANGE:

CLIENT: POULOS & BENNETT
LOCATION: SEE BORING LOCATION PLAN

G.S. ELEVATION (ft): N.S. DATE STARTED: 4/16/21

WATER TABLE (ft): 5.5 DATE FINISHED: 4/16/21

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

DATE OF READING: 4/16/2021 DRILLED BY: ORL - JB/WR

EST. SHGWT (ft): 2.5 TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N BLOWS / FT	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT/DAY)	ORG. CONT. (%)
									LL	PI		
0						Loose dark brown silty fine SAND & some organics [SM]						
		4-4-4	8	▽								
		3-3-2	5			-- very loose						
5		2-1-2	3	▽			12	30				9
		1-1-1	2			Very loose dark brown fine SAND with silt [SP-SM]						
		1-1-2	3			-- brown	6	22				
		2-3-3	6			-- loose						
10												
						-- medium dense, dark red brown						
15		6-11-11	22									
						-- light brown						
20		8-13-14	27									
25		5-7-10	17									
						BORING TERMINATED AT 25.0 FEET						



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0130.1700290.0013

REPORT NO.: 1861197

PAGE: B-2.2

PROJECT: LIMITED GEOTECHNICAL EXPLORATION
CYRILS DRIVE ROADWAY WIDENING - PONDS
OSCEOLA COUNTY, FLORIDA

BORING I.D.: **CP-04**

SHEET: **1 of 1**

SECTION: TOWNSHIP:

RANGE:

CLIENT: POULOS & BENNETT
LOCATION: SEE BORING LOCATION PLAN

G.S. ELEVATION (ft): N.S. DATE STARTED: 4/16/21

WATER TABLE (ft): 4.0 DATE FINISHED: 4/16/21

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

DATE OF READING: 4/16/2021 DRILLED BY: ORL - JB/WR

EST. SHGWT (ft): 1.0 TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N BLOWS / FT	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT/DAY)	ORG. CONT. (%)
									LL	PI		
0				▽		Medium dense grey brown fine SAND with silt and trace organics [SP-SM]						
		4-7-7	14			-- dark brown						
		7-6-7	13	▼								
5		6-5-7	12									
		4-5-9	14					28				3
		4-5-7	12									
10		5-5-8	13									
						-- dense						
15		13-22-25	47				6	24				
20		15-19-23	42									
						-- medium dense						
25		12-12-13	25			BORING TERMINATED AT 25.0 FEET						

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UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0130.1700290.0013

REPORT NO.: 1861197

PAGE: B-2.3

PROJECT: LIMITED GEOTECHNICAL EXPLORATION
CYRILS DRIVE ROADWAY WIDENING - PONDS
OSCEOLA COUNTY, FLORIDA

BORING I.D.: **CP-05**

SHEET: **1 of 1**

SECTION: TOWNSHIP:

RANGE:

CLIENT: POULOS & BENNETT
LOCATION: SEE BORING LOCATION PLAN

G.S. ELEVATION (ft): N.S. DATE STARTED: 4/16/21

WATER TABLE (ft): 5.0 DATE FINISHED: 4/16/21

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

DATE OF READING: 4/16/2021 DRILLED BY: ORL - JB/WR

EST. SHGWT (ft): 2.0 TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N BLOWS / FT	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT/DAY)	ORG. CONT. (%)
									LL	PI		
0						Loose dark brown fine SAND [SP]						
		3-4-4	8	▽		Medium dense light brown fine SAND with silt [SP-SM]						
		3-5-6	11									
5		5-7-12	19	▼		-- brown	6	18				
		9-12-11	23			-- dark brown						
		8-9-12	21									
10		10-12-12	24									
						-- very dense						
15		41-50/4"	50/4"									
20		50/4"	50/4"									
						-- red brown						
25		12-14-17	31			BORING TERMINATED AT 25.0 FEET						



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0130.1700290.0013

REPORT NO.: 1861197

PAGE: B-2.4

PROJECT: LIMITED GEOTECHNICAL EXPLORATION
CYRILS DRIVE ROADWAY WIDENING - PONDS
OSCEOLA COUNTY, FLORIDA

BORING I.D.: **CP-06**

SHEET: **1 of 1**

SECTION: TOWNSHIP:

RANGE:

CLIENT: POULOS & BENNETT
LOCATION: SEE BORING LOCATION PLAN

G.S. ELEVATION (ft): N.S. DATE STARTED: 4/16/21

WATER TABLE (ft): 4.0 DATE FINISHED: 4/16/21

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

DATE OF READING: 4/16/2021 DRILLED BY: ORL - JB/WR

EST. SHGWT (ft): 1.0 TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N BLOWS / FT	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT/DAY)	ORG. CONT. (%)
									LL	PI		
0						Loose grey brown fine SAND [SP]						
		2-2-3	5	▽								
		3-4-5	9	▼		Loose dark brown silty fine SAND with trace organics [SM]		23				5
5		7-7-8	15			Medium dense dark brown fine SAND with silt [SP-SM]						
		9-9-10	19				6	21				
		7-8-9	17									
10		9-9-11	20									
						-- loose, dark red brown						
15		3-4-5	9									
						-- medium dense, red brown						
20		5-9-10	19									
						-- light brown						
25		9-13-13	26			BORING TERMINATED AT 25.0 FEET						



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0130.1700290.0013

REPORT NO.: 1861197

PAGE: B-2.5

PROJECT: LIMITED GEOTECHNICAL EXPLORATION
CYRILS DRIVE ROADWAY WIDENING - PONDS
OSCEOLA COUNTY, FLORIDA

BORING I.D.: **CP-07**

SHEET: **1 of 1**

SECTION: TOWNSHIP:

RANGE:

CLIENT: POULOS & BENNETT
LOCATION: SEE BORING LOCATION PLAN

G.S. ELEVATION (ft): N.S. DATE STARTED: 4/16/21

WATER TABLE (ft): 4.0 DATE FINISHED: 4/16/21

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

DATE OF READING: 4/16/2021 DRILLED BY: ORL - JB/WR

EST. SHGWT (ft): 1.0 TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N BLOWS / FT	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT/DAY)	ORG. CONT. (%)
									LL	PI		
0						Loose grey brown fine SAND [SP]						
		4-3-4	7	▽								
		3-4-5	9	▼		Loose dark brown fine SAND with silt [SP-SM]						
5		3-3-4	7			-- brown						
		3-3-4	7									
		2-3-2	5			-- dark brown	6	23				
10		3-3-3	6									
						-- dense						
15		14-21-18	39									
20		13-20-21	41									
						-- medium dense, brown						
25		9-12-14	26									
						BORING TERMINATED AT 25.0 FEET						

W-11590.GPJ



UNIVERSAL ENGINEERING SCIENCES BORING LOG

PROJECT NO.: 0130.1700290.0013

REPORT NO.: 1861197

PAGE: B-2.6

PROJECT: LIMITED GEOTECHNICAL EXPLORATION
CYRILS DRIVE ROADWAY WIDENING - PONDS
OSCEOLA COUNTY, FLORIDA

BORING I.D.: **CP-08**

SHEET: **1 of 1**

SECTION: TOWNSHIP:

RANGE:

CLIENT: POULOS & BENNETT
LOCATION: SEE BORING LOCATION PLAN

G.S. ELEVATION (ft): N.S. DATE STARTED: 4/16/21

WATER TABLE (ft): 4.0 DATE FINISHED: 4/16/21

REMARKS: SHGWT = SEASONAL HIGH GROUNDWATER TABLE, N.S. = NOT SURVEYED

DATE OF READING: 4/16/2021 DRILLED BY: ORL - JB/WR






EST. SHGWT (ft): 1.0 TYPE OF SAMPLING: ASTM D 1586

DEPTH (FT.)	SAMPLE	BLOWS PER 6" INCREMENT	N BLOWS / FT	W.T.	SYMBOL	DESCRIPTION	-200 (%)	MC (%)	ATTERBERG LIMITS		K (FT/DAY)	ORG. CONT. (%)
									LL	PI		
0						Very loose grey brown fine SAND [SP]						
		2-1-2	3	▽								
		2-1-2	3	▼		Loose dark red brown fine SAND with silt [SP-SM]						
5		3-4-5	9									
		3-3-4	7									
		2-3-5	8				6	21				
10		3-4-5	9									
						-- dense						
15		14-17-20	37									
						-- very dense						
20		30-50/5"	50/5"									
						-- red brown						
25		27-50/5"	50/5"			BORING TERMINATED AT 25.0 FEET						

W-11590.GPJ



SYMBOLS AND ABBREVIATIONS

<u>SYMBOL</u>	<u>DESCRIPTION</u>
N-Value	No. of Blows of a 140-lb. Weight Falling 30 Inches Required to Drive a Standard Spoon 1 Foot
WOR	Weight of Drill Rods
WOH	Weight of Drill Rods and Hammer
	Sample from Auger Cuttings
	Standard Penetration Test Sample
	Thin-wall Shelby Tube Sample (Undisturbed Sampler Used)
RQD	Rock Quality Designation
	Stabilized Groundwater Level
	Seasonal High Groundwater Level (also referred to as the W.S.W.T.)
NE	Not Encountered
GNE	Groundwater Not Encountered
BT	Boring Terminated
-200 (%)	Fines Content or % Passing No. 200 Sieve
MC (%)	Moisture Content
LL	Liquid Limit (Atterberg Limits Test)
PI	Plasticity Index (Atterberg Limits Test)
NP	Non-Plastic (Atterberg Limits Test)
K	Coefficient of Permeability
Org. Cont.	Organic Content
G.S. Elevation	Ground Surface Elevation

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS More than 50% retained on the No. 200 sieve*	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	GW Well-graded gravels and gravel-sand mixtures, little or no fines
			GP Poorly graded gravels and gravel-sand mixtures, little or no fines
	SANDS More than 50% of coarse fraction passes No. 4 sieve	GRAVELS WITH FINES	GM Silty gravels and gravel-sand-silt mixtures
			GC Clayey gravels and gravel-sand-clay mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	CLEAN SANDS 5% or less passing No. 200 sieve	SW** Well-graded sands and gravelly sands, little or no fines
			SP** Poorly graded sands and gravelly sands, little or no fines
SANDS with 12% or more passing No. 200 sieve		SM** Silty sands, sand-silt mixtures	
		SC** Clayey sands, sand-clay mixtures	
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve*	SILTS AND CLAYS Liquid limit 50% or less	ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy 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 diamicaceous fine sands or silts, elastic silts
		CH	Inorganic clays or clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity
		PT	Peat, muck and other highly organic soils

*Based on the material passing the 3-inch (75 mm) sieve

** Use dual symbol (such as SP-SM and SP-SC) for soils with more than 5% but less than 12% passing the No. 200 sieve

RELATIVE DENSITY

(Sands and Gravels)

- Very loose – Less than 4 Blow/Foot
- Loose – 4 to 10 Blows/Foot
- Medium Dense – 11 to 30 Blows/Foot
- Dense – 31 to 50 Blows/Foot
- Very Dense – More than 50 Blows/Foot

CONSISTENCY

(Sils and Clays)

- Very Soft – Less than 2 Blows/Foot
- Soft – 2 to 4 Blows/Foot
- Firm – 5 to 8 Blows/Foot
- Stiff – 9 to 15 Blows/Foot
- Very Stiff – 16 to 30 Blows/Foot
- Hard – More than 30 Blows/Foot

RELATIVE HARDNESS

(Limestone)

- Soft – 100 Blows for more than 2 Inches
- Hard – 100 Blows for less than 2 Inches

MODIFIERS

These modifiers Provide Our Estimate of the Amount of Minor Constituents (Silt or Clay Size Particles) in the Soil Sample

- Trace – 5% or less
- With Silt or With Clay – 6% to 11%
- Silty or Clayey – 12% to 30%
- Very Silty or Very Clayey – 31% to 50%

These Modifiers Provide Our Estimate of the Amount of Organic Components in the Soil Sample

- Trace – Less than 3%
- Few – 3% to 4%
- Some – 5% to 8%
- Many – Greater than 8%

These Modifiers Provide Our Estimate of the Amount of Other Components (Shell, Gravel, Etc.) in the Soil Sample

- Trace – 5% or less
- Few – 6% to 12%
- Some – 13% to 30%
- Many – 31% to 50%

APPENDIX C



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.

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 constructor — 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 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 the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many 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;
- 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. *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 geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by:* the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this 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 geotechnical-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 confirmation-dependent recommendations included in your report. *Confirmation-dependent 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 confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront 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. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical 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 Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors 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 constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors 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 constructors fail to 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 the risk of such outcomes, 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.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* 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 environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold-prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical-engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of 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. Confer with your GBC-Member geotechnical engineer for more information.



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CONSTRAINTS & RESTRICTIONS

The intent of this document is to bring to your attention the potential concerns and the basic limitations of a typical geotechnical report.

WARRANTY

Universal Engineering Sciences has prepared this report for our client for his exclusive use, in accordance with generally accepted soil and foundation engineering practices, and makes no other warranty either expressed or implied as to the professional advice provided in the report.

UNANTICIPATED SOIL CONDITIONS

The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on the Boring Location Plan. This report does not reflect any variations which may occur between these borings.

The nature and extent of variations between borings may not become known until excavation begins. If variations appear, we may have to re-evaluate our recommendations after performing on-site observations and noting the characteristics of any variations.

CHANGED CONDITIONS

We recommend that the specifications for the project require that the contractor immediately notify Universal Engineering Sciences, as well as the owner, when subsurface conditions are encountered that are different from those present in this report.

No claim by the contractor for any conditions differing from those anticipated in the plans, specifications, and those found in this report, should be allowed unless the contractor notifies the owner and Universal Engineering Sciences of such changed conditions. Further, we recommend that all foundation work and site improvements be observed by a representative of Universal Engineering Sciences to monitor field conditions and changes, to verify design assumptions and to evaluate and recommend any appropriate modifications to this report.

MISINTERPRETATION OF SOIL ENGINEERING REPORT

Universal Engineering Sciences is responsible for the conclusions and opinions contained within this report based upon the data relating only to the specific project and location discussed herein. If the conclusions or recommendations based upon the data presented are made by others, those conclusions or recommendations are not the responsibility of Universal Engineering Sciences.

CHANGED STRUCTURE OR LOCATION

This report was prepared in order to aid in the evaluation of this project and to assist the architect or engineer in the design of this project. If any changes in the design or location of the structure as outlined in this report are planned, or if any structures are included or added that are not discussed in the report, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and the conclusions modified or approved by Universal Engineering Sciences.

USE OF REPORT BY BIDDERS

Bidders who are examining the report prior to submission of a bid are cautioned that this report was prepared as an aid to the designers of the project and it may affect actual construction operations.

Bidders are urged to make their own soil borings, test pits, test caissons or other investigations to determine those conditions that may affect construction operations. Universal Engineering Sciences cannot be responsible for any interpretations made from this report or the attached boring logs with regard to their adequacy in reflecting subsurface conditions which will affect construction operations.

STRATA CHANGES

Strata changes are indicated by a definite line on the boring logs which accompany this report. However, the actual change in the ground may be more gradual. Where changes occur between soil samples, the location of the change must necessarily be estimated using all available information and may not be shown at the exact depth.

OBSERVATIONS DURING DRILLING

Attempts are made to detect and/or identify occurrences during drilling and sampling, such as: water level, boulders, zones of lost circulation, relative ease or resistance to drilling progress, unusual sample recovery, variation of driving resistance, obstructions, etc.; however, lack of mention does not preclude their presence.

WATER LEVELS

Water level readings have been made in the drill holes during drilling and they indicate normally occurring conditions. Water levels may not have been stabilized at the last reading. This data has been reviewed and interpretations made in this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, tides, and other factors not evident at the time measurements were made and reported. Since the probability of such variations is anticipated, design drawings and specifications should accommodate such possibilities and construction planning should be based upon such assumptions of variations.

LOCATION OF BURIED OBJECTS

All users of this report are cautioned that there was no requirement for Universal Engineering Sciences to attempt to locate any man-made buried objects during the course of this exploration and that no attempt was made by Universal Engineering Sciences to locate any such buried objects. Universal Engineering Sciences cannot be responsible for any buried man-made objects which are subsequently encountered during construction that are not discussed within the text of this report.

TIME

This report reflects the soil conditions at the time of exploration. If the report is not used in a reasonable amount of time, significant changes to the site may occur and additional reviews may be required.

