Florida Building Code, Sixth Edition (2017) - Energy Conservation

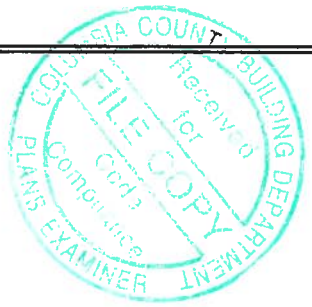
EnergyGauge Summit® Fla/Com-2017, Effective Date: Dec 31, 2017
IECC 2015 - Total Building Performance Compliance Option

Check List

Applications for compliance with the Florida Building Code, Energy Conservation shall include:

- ☐ This Checklist
- ☐ The full compliance report generated by the software that contains the project summary, compliance summary, certifications and detailed component compliance reports.
- ☐ The compliance report must include the full input report generated by the software as contigous part of the compliance report.
- ☐ Boxes appropriately checked in the Mandatory Section of the complaince report.

WARNING: INPUT REPORT NOT GENERATED.
To include input report in final submission, go to the Project Form, Settings Tab and check the box - "Append Input Report to Compliance Output Report"
Then rerun your calculation



PROJECT SUMMARY

Short Desc:	DOLLAR GENERAL	**Description:**	DG Lake City Birley
Owner:	DOLLAR GENERAL		
Address1:	2144 SW BIRLEY AVE	**City:**	Lake City
Address2:		**State:**	FLORIDA
		Zip:	32024
Type:	Retail	**Class:**	New Finished building
Jurisdiction:	LAKE CITY, COLUMBIA COUNTY, FL (221200)		
Conditioned Area:	8690 SF	**Conditioned & UnConditioned Area:**	8690 SF
No of Stories:	1	**Area entered from Plans**	9100 SF
Permit No:	0	**Max Tonnage**	12.5
		If different, write in:	

Compliance Summary

Component	Design	Criteria	Result
Gross Energy Cost (in $)	9,246.0	9,609.0	**PASSED**
LIGHTING CONTROLS			**PASSES**
EXTERNAL LIGHTING			**PASSES**
HVAC SYSTEM			**PASSES**
PLANT			**No Entry**
WATER HEATING SYSTEMS			**PASSES**
PIPING SYSTEMS			**PASSES**
Met all required compliance from Check List?			**Yes/No/NA**

IMPORTANT MESSAGE
Info 5009 -- -- -- An input report of this design building must be submitted along with this Compliance Report

CERTIFICATIONS

I hereby certify that the plans and specifications covered by this calculation are in compliance with the Florida Energy Code

Prepared By: NAWWAF AHMAD Building Official: _____

Date: _____ Date: _____

I certify that this building is in compliance with the FLorida Energy Efficiency Code

Owner Agent: _____ Date: _____

If Required by Florida law, I hereby certify (*) that the system design is in compliance with the Florida Energy Efficiency Code

Architect: _____ Reg No: _____

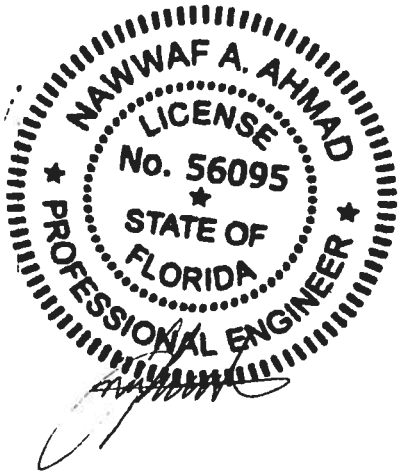
Electrical Designer: NAWWAF AHMAD Reg No: FL - PE 56095

Lighting Designer: NAWWAF AHMAD Reg No: FL - PE 56095

Mechanical Designer: NAWWAF AHMAD Reg No: FL - PE 56095

Plumbing Designer: NAWWAF AHMAD Reg No: FL - PE 56095

(*) Signature is required where Florida Law requires design to be performed by registered design professionals. Typed names and registration numbers may be used where all relevant information is contained on signed/sealed plans.



Project: DOLLAR GENERAL
Title: DG Lake City Birley
Type: Retail
(WEA File: FL_JACKSONVILLE_INTL_ARPT.tm3)

Building End Uses

	1) Proposed	2) Baseline
Total	*603.30*	*736.40*
	$9,246	*$11,304*
ELECTRICITY(MBtu/kWh/$)	603.30	736.40
	176792	215731
	$9,246	*$11,304*
AREA LIGHTS	195.60	234.30
	57303	68650
	$2,997	*$3,597*
MISC EQUIPMT	115.90	115.90
	33960	33960
	$1,776	*$1,780*
PUMPS & MISC	0.00	0.10
	4	16
	$0	*$1*
SPACE COOL	202.50	199.40
	59344	58418
	$3,104	*$3,061*
SPACE HEAT	0.70	11.40
	207	3331
	$11	*$175*
VENT FANS	88.60	175.30
	25974	51356
	$1,358	*$2,691*

Credits Applied: None
Passing Criteria = 9609
Design (including any credits) = 9246
Passing requires Proposed Building cost to be at most 85% of Baseline cost. This Proposed Building is at 81.8%

PASSES

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External Lighting Compliance

Description	Category	Tradable?	Allowance (W/Unit)	Area or Length or No. of Units (Sqft or ft)	ELPA (W)	CLP (W)
Ext Light 1	Building facades (by linear foot)	No	3.75	400.0	1,500	1,400

Tradable Surfaces: 0 (W) Allowance for Tradable: 750 (W) **PASSES**
All External Lighting: 1400 (W)
Complicance check includes a excess/Base allowance of 750.00(W)

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Lighting Controls Compliance

Acronym	Ashrae ID	Description	Area (sq.ft)	Design CP	Min CP	Compli-ance
SALES	25,001	Sales Area	7,424	4	3	**PASSES**
BATHROOM	6	Toilet and Washroom	176	1	1	**PASSES**
STOCKROOM	3	Storage & Warehouse - Bulky Active Storage	905	1	1	**PASSES**
OFFICE	17	Office - Enclosed	85	1	1	**PASSES**
BREAKROOM	17	Office - Enclosed	100	1	1	**PASSES**

PASSES

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System Report Compliance

RTU 12.5T **Lennox RTU** **Constant Volume Packaged System** **No. of Units 2**

Component	Category	Capacity	Design Eff	Eff Criteria	Design IPLV	IPLV Criteria	Comp-liance
Cooling System	Air Conditioners Air Cooled 135000 to 240000 Btu/h Clg Capacity	150000	12.00	11.00	12.40	12.40	PASSES
Heating System	Electric Furnace	47100	1.00	1.00			PASSES
Air Handling System -Supply	Air Handler (Supply) - Constant Volume	5000	0.60	0.82			PASSES

PASSES

Plant Compliance

Description	Installed No	Size	Design Eff	Min Eff	Design IPLV	Min IPLV	Category	Comp liance

None

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Water Heater Compliance

Description	Type	Category	Design Eff	Min Eff	Design Loss	Max Loss	Comp liance
Water Heater 1	Electric water heater	<= 12 [kW]	1.00	0.94			PASSES

PASSES

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Piping System Compliance

Category	Pipe Dia [inches]	Is Runout?	Operating Temp [F]	Ins Cond [Btu-in/hr .SF.F]	Ins Thick [in]	Req Ins Thick [in]	Compliance
Heating System (Steam, Steam Condensate, & Hot Water)	0.25	False	105.00	0.28	0.51	0.50	**PASSES**

PASSES

Mandatory Requirements (as applicable)

Mandatory requirements compiled by US Department of Energy and Pacific Northwest National Laboratory. Adopted with permission

Topic	Section	Component	Description	Yes	N/A	Exempt
1. To be checked by Designer or Engineer						
Insulation	C303.2	Envelope	Below-grade wall insulation installed per manufacturer's instructions.	☐	☐	☐
Insulation	C303.2	Envelope	Slab edge insulation installed per manufacturer's instructions.	☐	☐	☐
Insulation	C303.2	Envelope	Above-grade wall insulation installed per manufacturer's instructions.	☐	☐	☐
Insulation	C402.3	Envelope	High-albedo roofs satisfy one of the following: 3-year-aged solar reflectance >= 0.55 and thermal emittance >= 0.75 or 3-year-aged solar reflectance index >= 64.0.	☐	☐	☐
Fenestration	C402.4.4	Envelope	U-factor of opaque doors associated with the building thermal envelope meets requirements.	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.12.1	Mechanical	HVAC fan systems at design conditions do not exceed allowable fan system motor nameplate hp or fan system bhp.	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.12.2	Mechanical	HVAC fan motors not oversized beyond allowable limits.	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.3(8) Table	Mechanical	Heat Rejection Equipment: Minimum Efficiency Requirement meet those listed in Table C403.2.3(8)	☐	☐	☐
HVAC	C403.2.7	Mechanical	Exhaust air energy recovery on systems meeting Table C403.2.7(1) and C403.2.7(2).	☐	☐	☐
SYSTEM_SPECIFIC	C403.3	Mechanical	Air economizers provided where required, meet the requirements for design capacity, control signal, ventilation controls, high-limit shut-off, integrated economizer control, and provide a means to relieve excess outside air during operation.	☐	☐	☐
SYSTEM_SPECIFIC	C403.3.2	Mechanical	Economizer operation will not increase heating energy use during normal operation.	☐	☐	☐
SYSTEM_SPECIFIC	C403.3.4, C403.3.4.1, C403.3.4.2, C403.3.1	Mechanical	Water economizers provided where required, meet the requirements for design capacity, maximum pressure drop and integrated economizer control.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.2.1	Mechanical	Three-pipe hydronic systems using a common return for hot and chilled water are not used.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.2.3.1	Mechanical	Hydronic heat pump systems connected to a common water loop meet heat rejection and heat addition requirements.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.3.4	Mechanical	Open-circuit cooling towers having water cooled chiller systems and multiple or vairable speed condenser pumps, are designed so that tower cells can run in parallel with larger of flow crtieria.	☐	☐	☐
SYSTEM_SPECIFIC	C404.2	Mechanical	Service water heating equipment meets efficiency requirements.	☐	☐	☐
Wattage	C405.3	Interior Lighting	Exit signs do not exceed 5 watts per face.	☐	☐	☐
2. To be checked by Plan Reviewer						
Plan Review	C103.2	Envelope	Plans and/or specifications provide all information with which compliance can be determined for the building envelope and document where exceptions to the standard are claimed.	☐	☐	☐

Plan Review	C103.2	Mechanical	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the mechanical systems and equipment and document where exceptions to the standard are claimed. Load calculations per acceptable engineering st	☐	☐	☐
Plan Review	C103.2	Mechanical	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the service water heating systems and equipment and document where exceptions to the standard are claimed. Hot water system sized per manufact	☐	☐	☐
Plan Review	C103.2	Interior Lighting	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the interior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided shoul	☐	☐	☐
Plan Review	C103.2	Exterior Lighting	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the exterior lighting and electrical systems and equipment and document where exceptions to the standard are claimed. Information provided shoul	☐	☐	☐
Insulation	C402.2.5	Envelope	Slab edge insulation depth/length. Slab insulation extending away from building is covered by pavement or >= 10 inches of soil.	☐	☐	☐
Insulation	C402.2.6	Project	Radiant heating systems panels insulated to >=R-3.5 on face opposite space being heated.	☐	☐	☐
HVAC	C402.2.6	Mechanical	Thermally ineffective panel surfaces of sensible heating panels have insulation >= R-3.5.	☐	☐	☐
Insulation	C402.2.6	Envelope	Radiant panels and associated components, designed for heat transfer from the panel surfaces to the occupants or indoor space are insulated with a minimum of R-3.5.	☐	☐	☐
Air Leakage	C402.5.7	Envelope	Vestibules are installed on all building entrances. Doors have self-closing devices.	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.12.3	Mechanical	Fans have efficiency grade (FEG) >= 67. The total efficiency of the fan at the design point of operation <= 15% of maximum total efficiency of the fan.	☐	☐	☐
HVAC	C403.2.13	Mechanical	Unenclosed spaces that are heated use only radiant heat.	☐	☐	☐
HVAC	C403.2.4.2	Mechanical	Each zone equipped with setback controls using automatic time clock or programmable control system.	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.4.4	Mechanical	Zone isolation devices and controls installed where applicable.	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.4.7	Mechanical	Fault detection and diagnostics installed with air-cooled unitary DX units having economizers.	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.5	Mechanical	Hot water boilers supplying heat via one- or two-pipe systems include outdoor setback control.	☐	☐	☐
HVAC	C403.2.6.1	Mechanical	Demand control ventilation provided for spaces >500 ft2 and >25 people/1000 ft2 occupant density and served by systems with air side economizer, auto modulating outside air damper control, or design airflow >3,000 cfm.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.1.1	Mechanical	Hydronic and multizone HVAC system controls areVAV fans driven by mechanical or electrical variable speed drive per Table C403.4.1.1.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.1.3	Mechanical	Reset static pressure setpoint for DDC controlled VAV boxes reporting to central controller based on the zones requiring the most pressure.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.2	Mechanical	Temperature reset by representative building loads in pumping systems for chiller and boiler systems >500,000 Btu/h.	☐	☐	☐

SYSTEM_SPECIFIC	C403.4.2.3.2.1	Mechanical	Closed-circuit cooling tower within heat pump loop have either automatic bypass valve or lower leakage positive closure dampers. Open-circuit tower within heat pump loop have automatic valve to bypass all heat pump water flow around the tower. Open- or cl	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.2.4	Mechanical	Hydronic systems greater than 500,000 Btu/h designed for variable fluid flow.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.2.5	Mechanical	System turndown requirement met through multiple single-input boilers, one or more modulating boilers, or a combination of single-input and modulating boilers. Boiler input between 1.0 MBtu/h and 5 MBtu/h has 3:1 turndown ratio, boiler input between 5.0	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.2.6	Mechanical	Chilled water plants with multiple chillers have capability to reduce flow automatically through the chiller plant when a chiller is shut down. Boiler plants with multiple boilers have the capability to reduce flow automatically through the boiler plant	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.3, C403.4.3.2	Mechanical	Fan systems with motors >=7.5 hp associated with heat rejection equipment to have capability to operate at 2/3 of full-speed and auto speed controls to control the leaving fluid temperature or condensing temp/pressure of heat rejection device.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.4.5	Mechanical	Multiple zone HVAC systems have supply air temperature reset controls.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.4.6	Mechanical	Multiple zone VAV systems with DDC of individual zone boxes have static pressure setpoint reset controls.	☐	☐	☐
SYSTEM_SPECIFIC	C404.2.1	Mechanical	Gas-fired water-heating equipment installed in new buildings: where a singular piece of water-heating equipment >= 1,000 kBtu/h serves the entire building, thermal efficiency >= 90 Et. Where multiple pieces of water-heating equipment serve the building wi	☐	☐	☐
SYSTEM_SPECIFIC	C404.4	Mechanical	All piping insulated in accordance with section details and Table C403.2.10.	☐	☐	☐
SYSTEM_SPECIFIC	C404.5, C404.5.1, C404.5.2	Mechanical	Heated water supply piping conforms to pipe length and volume requirements. Refer to section details.	☐	☐	☐
SYSTEM_SPECIFIC	C404.6.3	Mechanical	Pumps that circulate water between a heater and storage tank have controls that limit operation from startup to <= 5 minutes after end of heating cycle.	☐	☐	☐
SYSTEM_SPECIFIC	C404.7	Mechanical	Water distribution system that pumps water from a heated-water supply pipe back to the heated-water source through a cold-water supply pipe is a demand recirculation water system. Pumps within this system have controls that start the pump upon receiving	☐	☐	☐
Wattage	C405.5.1	Exterior Lighting	Exterior lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	☐	☐	☐
Plan Review	C405.6	Project	Group R-2 dwelling units have separate electrical meters.	☐	☐	☐
Plan Review	C406	Project	Plans, specifications, and/or calculations provide all information with which compliance can be determined for the additional energy efficiency package options.	☐	☐	☐
SYSTEM_SPECIFIC	C408.2.2.2	Mechanical	HVAC hydronic heating and cooling coils have means to balance and have pressure test connections.	☐	☐	☐
SYSTEM_SPECIFIC	C408.2.2.2	Mechanical	HVAC hydronic heating and cooling coils have means to balance and have pressure test connections.	☐	☐	☐

3. To be checked by Inspector

Insulation	C303.1	Envelope	Roof insulation installed per manufacturerâ€™s instructions. Blown or poured loose-fill insulation is installed only where the roof slope is <=3 in 12.	☐	☐	☐
Insulation	C303.1	Envelope	Building envelope insulation is labeled with R-value or insulation certificate providing R-value and other relevant data.	☐	☐	☐
Fenestration	C303.1.3	Envelope	Fenestration products rated in accordance with NFRC.	☐	☐	☐
Fenestration	C303.1.3	Envelope	Fenestration products are certified as to performance labels or certificates provided.	☐	☐	☐
Insulation	C303.2, C402.2.4	Envelope	Floor insulation installed per manufacturer's instructions. Cavity or structural slab insulation installed in permanent contact with underside of decking or structural slabs.	☐	☐	☐
Insulation	C303.2.1	Envelope	Exterior insulation protected against damage, sunlight, moisture, wind, landscaping and equipment maintenance activities.	☐	☐	☐
Insulation	C303.2.1	Envelope	Exterior insulation is protected from damage with a protective material. Verification for exposed foundation insulation may need to occur during Foundation Inspection.	☐	☐	☐
Insulation	C402.1.3	Envelope	Non-swinging opaque doors have R-4.75 insulation.	☐	☐	☐
Insulation	C402.2.2	Envelope	Skylight curbs are insulated to the level of roofs with insulation above deck or R-5.	☐	☐	☐
Insulation	C402.2.2	Envelope	Insulation intended to meet the roof insulation requirements cannot be installed on top of a suspended ceiling. Mark this requirement compliant if insulation is installed accordingly.	☐	☐	☐
Air Leakage	C402.5	Envelope	Building envelope contains a continuous air barrier that has been tested and deemed to limit air leakage <= 0.40 cfm/ft2.	☐	☐	☐
Air Leakage	C402.5.1	Envelope	The building envelope contains a continuous air barrier that is sealed in an approved manner and either constructed or tested in an approved manner. Air barrier penetrations are sealed in an approved manner.	☐	☐	☐
Air Leakage	C402.5.1.1	Envelope	All sources of air leakage in the building thermal envelope are sealed, caulked, gasketed, weather stripped or wrapped with moisture vapor-permeable wrapping material to minimize air leakage.	☐	☐	☐
Air Leakage	C402.5.1.2.1	Envelope	The building envelope contains a continuous air barrier that is sealed in an approved manner and material permeability <= 0.004 cfm/ft2. Air barrier penetrations are sealed in an approved manner.	☐	☐	☐
Air Leakage	C402.5.1.2.2	Envelope	The building envelope contains a continuous air barrier that is sealed in an approved manner and average assembly air leakage <= 0.04 cfm/ft2. Air barrier penetrations are sealed in an approved manner.	☐	☐	☐
Air Leakage	C402.5.2, C402.5.4	Envelope	Factory-built fenestration and doors are labeled as meeting air leakage requirements.	☐	☐	☐
Air Leakage	C402.5.3	Envelope	Where open combustion air ducts provide combustion air to open combustion fuel burning appliances, the appliances and combustion air opening are located outside the building thermal envelope or enclosed in a room, isolated from inside the thermal envelope	☐	☐	☐
Air Leakage	C402.5.5, C403.2.4.3	Envelope	Stair and elevator shaft vents have motorized dampers that automatically close.	☐	☐	☐
Air Leakage	C402.5.5, C403.2.4.3	Envelope	Outdoor air and exhaust systems have motorized dampers that automatically shut when not in use and meet maximum leakage rates. Check gravity dampers where allowed.	☐	☐	☐
Air Leakage	C402.5.6	Envelope	Weatherseals installed on all loading dock cargo doors.	☐	☐	☐

Air Leakage	C402.5.8	Envelope	Recessed luminaires in thermal envelope to limit infiltration and be IC rated and labeled. Seal between interior finish and luminaire housing.	☐	☐	☐
HVAC	C403.2.1	Mechanical	HVAC systems and equipment design loads calculated in accordance with ANSI/ASHRAE/ACCA Standard 183 or by an approved equivalent computational procedure	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.10	Mechanical	HVAC piping insulation thickness. Where piping is installed in or under a slab, verification may need to occur during Foundation Inspection.	☐	☐	☐
HVAC	C403.2.3	Mechanical	HVAC equipment efficiency verified.	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.3	Mechanical	PTAC and PTHP with sleeves 16 in. by 42 in. labeled for replacement only as per Footnote b to Table C403.2.3(3).	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.4.1	Mechanical	Heating and cooling to each zone is controlled by a thermostat control. Minimum one humidity control device per installed humidification/dehumidification system.	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.4.1.1	Mechanical	Heat pump controls prevent supplemental electric resistance heat from coming on when not needed.	☐	☐	☐
HVAC	C403.2.4.1.2	Mechanical	Thermostatic controls have a 5 Â°F deadband.	☐	☐	☐
HVAC	C403.2.4.1.2	Mechanical	Thermostatic controls have a 5 Â°F deadband.	☐	☐	☐
HVAC	C403.2.4.1.3	Mechanical	Temperature controls have setpoint overlap restrictions.	☐	☐	☐
HVAC	C403.2.4.2.1, C403.2.4.2.2	Mechanical	Automatic Controls: Setback to 55°F (heat) and 85°F (cool); 7-day clock, 2-hour occupant override, 10-hour backup	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.4.2.3	Mechanical	Systems include optimum start controls.	☐	☐	☐
HVAC	C403.2.4.5, C403.2.4.6	Mechanical	Snow/ice melting system sensors for future connection to controls. Freeze protection systems have automatic controls installed.	☐	☐	☐
HVAC	C403.2.6.2	Mechanical	Enclosed parking garage ventilation has automatic contaminant detection and capacity to stage or modulate fans to 50% or less of design capacity.	☐	☐	☐
HVAC	C403.2.9	Mechanical	HVAC ducts and plenums insulated. Where ducts or plenums are installed in or under a slab, verification may need to occur during Foundation Inspection.	☐	☐	☐
SYSTEM_SPECIFIC	C403.2.9.1.3	Mechanical	Ductwork operating >3 in. water column requires air leakage testing.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.1.2	Mechanical	VAV fans have static pressure sensors located so controller setpoint <=1.2 w.c..	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.2.2	Mechanical	Two-pipe hydronic systems using a common distribution system have controls to allow a deadband >=15°F, allow operation in one mode for at least 4 hrs before changeover, and have rest controls to limit heating and cooling supply temperature to <=30 °F.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.2.3.3	Mechanical	Two-position automatic valve interlocked to shut off water flow when hydronic heat pump with pumping system >10 hp is off.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.4.5, C403.4.4.5.1-4	Mechanical	Zone controls can limit simultaneous heating and cooling and sequence heating and cooling to each zone.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.5	Mechanical	Condenser heat recovery system that can heat water to 85°F or provide 60% of peak heat rejection is installed for preheating of service hot water.	☐	☐	☐
SYSTEM_SPECIFIC	C403.4.6	Mechanical	Hot gas bypass limited to: <=240 kBtu/h - 50% capacity, >240 kBtu/h - 25% capacity	☐	☐	☐
SYSTEM_SPECIFIC	C404.3	Mechanical	Heat traps installed on non-circulating storage water tanks.	☐	☐	☐

SYSTEM_SPECIFIC	C404.3	Mechanical	Heat traps installed on supply and discharge piping of non-circulating systems.	☐	☐	☐
SYSTEM_SPECIFIC	C404.3	Mechanical	Heat traps installed on supply and discharge piping of non-circulating systems.	☐	☐	☐
SYSTEM_SPECIFIC	C404.6.1	Mechanical	Controls are installed that limit the operation of a recirculation pump installed to maintain temperature of a storage tank. System return pipe is a dedicated return pipe or a cold water supply pipe.	☐	☐	☐
SYSTEM_SPECIFIC	C404.6.1, C404.6.2	Mechanical	Automatic time switches installed to automatically switch off the recirculating hot-water system or heat trace.	☐	☐	☐
SYSTEM_SPECIFIC	C404.9.1	Mechanical	Pool heaters are equipped with on/off switch and no continuously burning pilot light.	☐	☐	☐
SYSTEM_SPECIFIC	C404.9.2	Mechanical	Time switches are installed on all pool heaters and pumps.	☐	☐	☐
SYSTEM_SPECIFIC	C404.9.2	Mechanical	Time switches are installed on all pool heaters and pumps.	☐	☐	☐
SYSTEM_SPECIFIC	C404.9.3	Mechanical	Vapor retardant pool covers are provided for heated pools and permanently installed spas.	☐	☐	☐
Controls	C405.2.1	Interior Lighting	Lighting controls installed to uniformly reduce the lighting load by at least 50%.	☐	☐	☐
Controls	C405.2.1	Interior Lighting	Occupancy sensors installed in required spaces.	☐	☐	☐
Controls	C405.2.1, C405.2.2.3	Interior Lighting	Independent lighting controls installed per approved lighting plans and all manual controls readily accessible and visible to occupants.	☐	☐	☐
Controls	C405.2.2.1	Interior Lighting	Automatic controls to shut off all building lighting installed in all buildings.	☐	☐	☐
Controls	C405.2.3	Interior Lighting	Daylight zones provided with individual controls that control the lights independent of general area lighting.	☐	☐	☐
Controls	C405.2.3, C405.2.3.1, C405.2.3.2	Interior Lighting	Primary sidelighted areas are equipped with required lighting controls.	☐	☐	☐
Controls	C405.2.3, C405.2.3.1, C405.2.3.3	Interior Lighting	Enclosed spaces with daylight area under skylights and rooftop monitors are equipped with required lighting controls.	☐	☐	☐
Controls	C405.2.4	Interior Lighting	Separate lighting control devices for specific uses installed per approved lighting plans.	☐	☐	☐
Wattage	C405.2.4	Interior Lighting	Additional interior lighting power allowed for special functions per the approved lighting plans and is automatically controlled and separated from general lighting.	☐	☐	☐
Controls	C405.2.5	Exterior Lighting	Automatic lighting controls for exterior lighting installed. Controls will be daylight controlled, set based on business operation time-of-day, or reduce connected lighting > 30%.	☐	☐	☐
Wattage	C405.4.1	Interior Lighting	Interior installed lamp and fixture lighting power is consistent with what is shown on the approved lighting plans, demonstrating proposed watts are less than or equal to allowed watts.	☐	☐	☐
Mandatory Additional	C406.4	Project	Enhanced digital lighting controls efficiency package: Interior lighting has following enhanced lighting controls in accordance with Section C405.2.2: Luminaires capable of continuous dimming and being addressed individually, <= 8 luminaires controlled in	☐	☐	☐
Mandatory Additional	C406.6	Project	Dedicate outdoor air system efficiency package: Buildings with hydronic and/or multiple-zone HVAC systems are equipped with an independent ventilation system designed to provide >= 100-percent outdoor air to each individual occupied space, as specified by	☐	☐	☐

Mandatory Additional	C406.7, C406.7.1	Project	Enhanced Service Water Heat System efficiency package. One of the following SWH system enhancements must satisfy 60 percent of hot water requirements, or 100 percent if the building otherwise complies with heat recovery per Section C403.4.5: Waste heat re	☐	☐	☐
HVAC	C408.2.2.1	Mechanical	Air outlets and zone terminal devices have means for air balancing.	☐	☐	☐
HVAC	C408.2.2.1	Mechanical	Air outlets and zone terminal devices have means for air balancing.	☐	☐	☐
Testing	C408.2.3.2	Mechanical	HVAC control systems have been tested to ensure proper operation, calibration and adjustment of controls.	☐	☐	☐

4. To be checked by Inspector at Project Completion and Prior to Issuance of Certificate of Occupancy

Post Construction	C303.3, C408.2.5.2	Interior Lighting	Furnished O&M instructions for systems and equipment to the building owner or designated representative.	☐	☐	☐
Post Construction	C303.3, C408.2.5.3	Mechanical	Furnished O&M manuals for HVAC systems within 90 days of system acceptance.	☐	☐	☐
Fenestration	C402.4.2.2	Envelope	Skylights in office, storage, automotive service, manufacturing, non-refrigerated warehouse, retail store, and distribution/sorting area have a measured haze value > 90 percent unless designed to exclude direct sunlight.	☐	☐	☐
Post Construction	C408.2.1	Mechanical	Commissioning plan developed by registered design professional or approved agency.	☐	☐	☐
Post Construction	C408.2.3.1	Mechanical	HVAC equipment has been tested to ensure proper operation.	☐	☐	☐
Post Construction	C408.2.3.3	Mechanical	Economizers have been tested to ensure proper operation.	☐	☐	☐
Post Construction	C408.2.4	Mechanical	Preliminary commissioning report completed and certified by registered design professional or approved agency.	☐	☐	☐
Post Construction	C408.2.5.1	Mechanical	Furnished HVAC as-built drawings submitted within 90 days of system acceptance.	☐	☐	☐
Post Construction	C408.2.5.1	Interior Lighting	Furnished as-built drawings for electric power systems within 90 days of system acceptance.	☐	☐	☐
Post Construction	C408.2.5.3	Mechanical	An air and/or hydronic system balancing report is provided for HVAC systems.	☐	☐	☐
Post Construction	C408.2.5.4	Mechanical	Final commissioning report due to building owner within 90 days of receipt of certificate of occupancy.	☐	☐	☐
Post Construction	C408.3	Interior Lighting	Lighting systems have been tested to ensure proper calibration, adjustment, programming, and operation.	☐	☐	☐

EnergyGauge Summit® v6.00

INPUT DATA REPORT

Project Information

Project Name: DOLLAR GENERAL
Project Title: DG Lake Citv Birlev
Address: 2144 SW BIRLEY AVE

State: FLORIDA
Zip: 32024

Owner: DOLLAR GENERAL

Orientation: 0 Deg Clockwise. Walls & Windows will be rotated accordingly
Building Type: Retail
Building Classification: New Finished building

No.of Stories: 1
GrossArea: 8690 SF

Zones

No	Acronym	Description	Type	Area [sf]	Multiplier	Total Area [sf]	
1	RETAIL	Zone 1	CONDITIONED	8690.4	1	8690.4	☐

Spaces

No	Acronym	Description	Type	Depth [ft]	Width [ft]	Height [ft]	Multiplier	Total Area [sf]	Total Volume [cf]

In Zone:	**RETAIL**									
1	SALES	Zo0Sp1	Sales Area	107.60	69.00	12.00	1	7424.4	89092.8	☐
2	BATHROOM	Zo0Sp2	Toilet and Washroom	17.60	10.00	8.00	1	176.0	1408.0	☐
3	STOCKROOM	Zo0Sp3	Storage & Warehouse - Bulky Active Storage	10.00	90.50	12.00	1	905.0	10860.0	☐
4	OFFICE	Zo0Sp3	Office - Enclosed	10.00	8.50	8.00	1	85.0	680.0	☐
5	BREAKROOM	Zo0Sp3	Office - Enclosed	10.00	10.00	10.00	1	100.0	1000.0	☐

Lighting

No	Type	Category	No. of Luminaires	Watts per Luminaire	Power [W]	Control Type	No.of Ctrl pts	
In Zone:	**RETAIL**							
In Space:	**SALES**							
1	Recessed Fluorescent - No vent	General Lighting	96	100	9600	Manual On/Off	4	☐
In Space:	**BATHROOM**							
1	Recessed Fluorescent - No vent	General Lighting	4	32	128	Manual On/Off	1	☐
In Space:	**STOCKROOM**							
1	Recessed Fluorescent - No vent	General Lighting	6	115	690	Manual On/Off	1	☐
In Space:	**OFFICE**							
1	Recessed Fluorescent - No vent	General Lighting	2	35	70	Manual On/Off	1	☐
In Space:	**BREAKROOM**							
1	Recessed Fluorescent - No vent	General Lighting	2	60	120	Manual On/Off	1	☐

Walls (Walls will be rotated clockwise by building rotation value)

No	Description	Type	Width [ft]	H (Effec) [ft]	Multi plier	Area [sf]	Orientation	Conductance [Btu/hr. sf. F]	Heat Capacity [Btu/sf.F]	Dens. [lb/cf]	R-Value [h.sf.F/Btu]
In Zone:	**RETAIL**										

1	STUCCO+STYRO+CMU	0.75 in. stucco, 2"styro,8"CMU,1x2 x24"oc,airspace,0.5" gyp	70.00	12.00	1	840.0	North	0.0838	11.224	50.24	11.9
2	STUCCO+STYRO+CMU	0.75 in. stucco, 2"styro,8"CMU,1x2 x24"oc,airspace,0.5" gyp	70.00	12.00	1	840.0	South	0.0838	11.224	50.24	11.9
3	Pr0Zo1Wa3	Metal siding/2x4@24"+R11Batt/5/8"Gyp	130.00	12.00	1	1560.0	East	0.0920	1.072	19.38	10.9
4	STUCCO+STYRO+CMU	Metal siding/2x4@24"+R11Batt/5/8"Gyp	130.00	12.00	1	1560.0	West	0.0920	1.072	19.38	10.9

Windows (Windows will be rotated clockwise by building rotation value)

No	Description	Orientation	Shaded	U [Btu/hr sf F]	SHGC	Vis.Tra	W [ft]	H (Effec) [ft]	Multiplier	Total Area [sf]
In Zone: RETAIL										
In Wall: SOUTH										
1	Pr0Zo1Wa1Wi1	South	No	0.4500	0.34	0.21	21.00	8.00	3	504.0

Doors

No	Description	Type	Shaded?	Width [ft]	H (Effec) [ft]	Multiplier	Area [sf]	Cond. [Btu/hr. sf. F]	Dens. [lb/cf]	Heat Cap. [Btu/sf. F]	R-Value [h.sf.F/Btu]
In Zone: RETAIL											
In Wall: EAST											
1	Pr0Zo1Wa3Dr1	Aluminum door, 1.25 in. polystyrene	No	3.00	7.00	2	21.0	0.1919	43.67	0.53	5.21
In Wall: WEST											
1	Pr0Zo1Wa3Dr1	Aluminum door, 1.25 in. polystyrene	No	3.00	7.00	2	21.0	0.1919	43.67	0.53	5.21

Roofs

No	Description	Type	Width [ft]	H (Effec) [ft]	Multiplier	Area [sf]	Tilt [deg]	Cond. [Btu/hr. Sf. F]	Heat Cap [Btu/sf. F]	Dens. [lb/cf]	R-Value [h.sf.F/Btu]	
In Zone: RETAIL												
1	Pr0Zo1Rf1	Mtl Bldg Roof/R-19 Batt	70.75	127.57	1	9025.6	0.00	0.0492	1.34	9.49	20.3	☐

Skylights

No	Description	Type	U [Btu/hr sf F]	SHGC	Vis.Trans	W [ft]	H (Effec) [ft]	Multiplier	Area [Sf]	Total Area [Sf]	
In Zone:											
In Roof:											☐

Floors

No	Description	Type	Width [ft]	H (Effec) [ft]	Multiplier	Area [sf]	Cond. [Btu/hr. sf. F]	Heat Cap. [Btu/sf. F]	Dens. [lb/cf]	R-Value [h.sf.F/Btu]	
In Zone: RETAIL											
1	Pr0Zo1Fl1	1 ft. soil, concrete floor, carpet and rubber pad	70.75	127.57	1	9025.6	0.2681	34.00	113.33	3.73	☐

Systems

RTU 12.5T **Lennox RTU** **Constant Volume Packaged System** **No. Of Units 2**

Component	Category	Capacity	Efficiency	IPLV	
1	Cooling System	150000.00	12.00	12.40	☐

2	Heating System	47100.00	1.00	☐
3	Air Handling System -Supply	5000.00	0.60	☐

Plant

Equipment	Category	Size	Inst.No	Eff.	IPLV	
						☐

Water Heaters

	W-Heater Description	Capacity	Cap.Unit	I/P Rt.	Efficiency	Loss	
1	Electric water heater	20	[Gal]	3 [kW]	1.0000 [Ef]	[Btu/h]	☐

Ext-Lighting

	Description	Category	No. of Luminaires	Watts per Luminaire	Area/Len/No. of units [sf/ft/No]	Control Type	Wattage [W]	
1	Ext Light 1	Building facades (by linear foot)	7	200	400.00	Photo Sensor control	1400.00	☐

Piping

No	Type	Operating Temperature [F]	Insulation Conductivity [Btu-in/h.sf.F]	Nomonal pipe Diameter [in]	Insulation Thickness [in]	Is Runout?	
1	Heating System (Steam, Steam Condensate, & Hot Water)	105.00	0.28	0.25	0.51	No	☐

Fenestration Used

Name	Glass Type	No. of Panes	Glass Conductance [Btu/h.sf.F]	SHGC	VLT	
ASHULTplTntWd-Vy-Fg frm	User Defined	3	0.4500	0.3400	0.2100	☐

Materials Used

Mat No	Acronym	Description	Only R-Value Used	RValue [h.sf.F/Btu]	Thickness [ft]	Conductivity [Btu/h.ft.F]	Density [lb/cf]	SpecificHeat [Btu/lb.F]	
264	Matl264	ALUMINUM, 1/16 IN	No	0.0002	0.0050	26.0000	480.00	0.1000	☐
214	Matl214	POLYSTYRENE, EXP., 1-1/4IN,	No	5.2100	0.1042	0.0200	1.80	0.2900	☐
187	Matl187	GYP OR PLAS BOARD,1/2IN	No	0.4533	0.0417	0.0920	50.00	0.2000	☐
178	Matl178	CARPET W/RUBBER PAD	Yes	1.2300					☐
265	Matl265	Soil, 1 ft	No	2.0000	1.0000	0.5000	100.00	0.2000	☐
48	Matl48	6 in. Heavyweight concrete	No	0.5000	0.5000	1.0000	140.00	0.2000	☐
267	Matl267	0.75" stucco	No	0.1563	0.0625	0.4000	16.00	0.2000	☐
215	Matl215	POLYSTYRENE, EXP., 2IN,	No	8.3350	0.1667	0.0200	1.80	0.2900	☐
105	Matl105	CONC BLK HW, 8IN, HOLLOW	No	1.1002	0.6667	0.6060	69.00	0.2000	☐
256	Matl256	WOOD, SOFT, 1-1/2IN	No	1.8939	0.1250	0.0660	32.00	0.3300	☐
23	Matl23	6 in. Insulation	No	20.0000	0.5000	0.0250	5.70	0.2000	☐
4	Matl4	Steel siding	No	0.0002	0.0050	26.0000	480.00	0.1000	☐
271	Matl271	2x4@24" oc + R11 Batt	No	10.4179	0.2917	0.0280	7.11	0.2000	☐
94	Matl94	BUILT-UP ROOFING, 3/8IN	No	0.3366	0.0313	0.0930	70.00	0.3500	☐

Constructs Used

No	Name	Simple Construct	Massless Construct	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F]	Density [lb/cf]	RValue [h.sf.F/Btu]	
1002	Aluminum door, 1.25 in. polystyrene	No	No	0.19	0.53	43.67	5.2	☐

Layer	Material No.	Material	Thickness [ft]	Framing Factor	
1	264	ALUMINUM, 1/16 IN	0.0050	0.000	☐
2	214	POLYSTYRENE, EXP., 1-1/4IN,	0.1042	0.000	☐
3	264	ALUMINUM, 1/16 IN	0.0050	0.000	☐

No	Name	Simple Construct	Massless Construct	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F]	Density [lb/cf]	RValue [h.sf.F/Btu]	
1010	0.75 in. stucco, 2"styro,8"CMU,1x2x24"oc,airspace,0.5"gyp	No	No	0.08	11.22	50.24	11.9	☐

Layer	Material No.	Material	Thickness [ft]	Framing Factor	
1	267	0.75" stucco	0.0625	0.000	☐
2	187	GYP OR PLAS BOARD,1/2IN	0.0417	0.000	☐
3	215	POLYSTYRENE, EXP., 2IN,	0.1667	0.000	☐
4	105	CONC BLK HW, 8IN, HOLLOW	0.6667	0.000	☐
5	256	WOOD, SOFT, 1-1/2IN	0.1250	0.000	☐

No	Name	Simple Construct	Massless Construct	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F]	Density [lb/cf]	RValue [h.sf.F/Btu]	
1055	Metal siding/2x4@24"+R11Batt/5/8"Gyp	No	No	0.09	1.07	19.38	10.9	☐

Layer	Material No.	Material	Thickness [ft]	Framing Factor	
1	4	Steel siding	0.0050	0.000	☐
2	271	2x4@24" oc + R11 Batt	0.2917	0.000	☐
3	187	GYP OR PLAS BOARD,1/2IN	0.0417	0.000	☐

No	Name	Simple Construct	Massless Construct	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F]	Density [lb/cf]	RValue [h.sf.F/Btu]	
1056	Mtl Bldg Roof/R-19 Batt	No	No	0.05	1.34	9.49	20.3	☐

Layer	Material No.	Material	Thickness [ft]	Framing Factor	
1	94	BUILT-UP ROOFING, 3/8IN	0.0313	0.000	☐
2	23	6 in. Insulation	0.5000	0.000	☐

No	Name	Simple Construct	Massless Construct	Conductance [Btu/h.sf.F]	Heat Capacity [Btu/sf.F]	Density [lb/cf]	RValue [h.sf.F/Btu]	
1057	1 ft. soil, concrete floor, carpet and rubber pad	No	No	0.27	34.00	113.33	3.7	☐

Layer	Material No.	Material	Thickness [ft]	Framing Factor	
1	265	Soil, 1 ft	1.0000	0.000	☐
2	48	6 in. Heavyweight concrete	0.5000	0.000	☐
3	178	CARPET W/RUBBER PAD		0.000	☐

HEAT & COOL LOAD CALCULATIONS SUMMARY

Project Name: DOLLAR GEN - Lake City, FL
Prepared by: rmv

05/6/2019
06:11AM

Air System Information

Air System Name	**RTU**		Number of zones	**1**
Equipment Class	**PKG ROOF**		Floor Area	**8900.0** ft²
Air System Type	**SZCAV**		Location	**Jacksonville IAP, Florida**

Sizing Calculation Information

Zone and Space Sizing Method:

Zone CFM	**Sum of space airflow rates**	Calculation Months	**Jan to Dec**
Space CFM	**Individual peak space loads**	Sizing Data	**Calculated**

Central Cooling Coil Sizing Data

Total coil load	**20.4**	Tons	Load occurs at	**Aug 1600**	
Total coil load	**245.0**	MBH	OA DB / WB	**93.5 / 76.9**	°F
Sensible coil load	**175.2**	MBH	Entering DB / WB	**80.8 / 68.6**	°F
Coil CFM at Aug 1600	**7668**	CFM	Leaving DB / WB	**59.7 / 58.6**	°F
Max block CFM	**7668**	CFM	Coil ADP	**57.3**	°F
Sum of peak zone CFM	**7668**	CFM	Bypass Factor	**0.100**	
Sensible heat ratio	**0.715**		Resulting RH	**56**	%
ft²/Ton	**435.9**		Design supply temp.	**58.0**	°F
BTU/(hr-ft²)	**27.5**		Zone T-stat Check	**1 of 1**	OK
Water flow @ 10.0 °F rise	**N/A**		Max zone temperature deviation	**0.0**	°F

Central Heating Coil Sizing Data

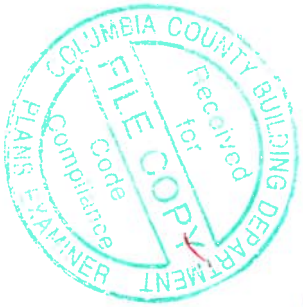
Max coil load	**167.8**	MBH	Load occurs at	**Des Htg**	
Coil CFM at Des Htg	**7668**	CFM	BTU/(hr-ft²)	**18.9**	
Max coil CFM	**7668**	CFM	Ent. DB / Lvg DB	**58.5 / 78.8**	°F
Water flow @ 20.0 °F drop	**N/A**				

Supply Fan Sizing Data

Actual max CFM	**7668**	CFM	Fan motor BHP	**0.00**	BHP
Standard CFM	**7660**	CFM	Fan motor kW	**0.00**	kW
Actual max CFM/ft²	**0.86**	CFM/ft²	Fan static	**0.00**	in wg

Outdoor Ventilation Air Data

Design airflow CFM	**2085**	CFM	CFM/person	**26.06**	CFM/person
CFM/ft²	**0.23**	CFM/ft²			



GSE Engineering & Consulting, Inc.

SUMMARY REPORT OF A GEOTECHNICAL SITE EXPLORATION

COMMERCIAL RETAIL – LAKE CITY AT SW BIRLEY AVENUE LAKE CITY, COLUMBIA COUNTY, FLORIDA

GSE PROJECT No. 13557

Prepared For:

CONCEPT DEVELOPMENT, INC.

APRIL 2018

Certificate of Authorization No. 27430

GSE Engineering & Consulting, Inc.

April 24, 2018

Mr. Al Tilly
Concept Development, Inc.
3917 NW 97th Boulevard
Gainesville, Florida 32606

Subject: Summary Report of a Geotechnical Site Exploration
Commercial Retail – Lake City at SW Birley Avenue
Lake City, Columbia County, Florida
GSE Project No. 13557

Dear Mr. Tilly:

GSE Engineering & Consulting, Inc. (GSE) is pleased to submit this geotechnical site exploration report for the above referenced project.

Presented herein are the findings and conclusions of our exploration, including the geotechnical parameters and recommendations to assist with building foundation, stormwater management, and pavement designs.

GSE appreciates this opportunity to have assisted you on this project. If you have any questions or comments concerning this report, please contact us.

Sincerely,

GSE Engineering & Consulting, Inc.

Mark Kalivoda, E.I.
Staff Engineer

COREY ALAN DUNLAP LICENSE No.77678 STATE OF FLORIDA PROFESSIONAL ENGINEER

This item has been digitally signed and sealed by
Corey A Dunlap
Digitally signed by Corey A Dunlap
Date: 2018.04.24 12:33:22 -04'00'
Printed copies of this document are not considered signed and sealed, and the signature must be verified on any electronic copies.

Corey A. Dunlap, P.E.
Senior Geotechnical Engineer
Florida Registration No. 77678

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www.gseengineering.com
Certificate of Authorization No. 27430

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1.0 INTRODUCTION

1.1 General

GSE Engineering & Consulting, Inc. (GSE) has completed this geotechnical exploration for the proposed commercial retail facility located in Lake City, Columbia County, Florida. This exploration was performed in accordance with GSE Proposal No. 2018-141 dated March 14, 2018. Mr. Al Tilly of Concept Development, Inc. authorized our services on March 28, 2018.

1.2 Project Description

This project will consist of a commercial retail store located at the southwest corner of Pinemont Road and SW Birley Avenue (Figure 1). The project will include a building, a parking lot with access driveways, and a stormwater management facility.

Mr. Tilly provided GSE with information about the project, including a Conceptual Plan illustrating the proposed site layout. The building will be approximately 9,100 square feet and will be located in in the central portion of the site. The parking lot will be north and east of the structure with an access driveway onto SW Birley Avenue. The stormwater management facility will be located north, west, and south of the proposed building; along the property boundary.

The structure is expected to be single-story high wall concrete masonry unit (CMU) and steel frame construction. Structural loads have not been provided, but are expected to be on the order of 1 to 2 kips per foot for non-load bearing CMU walls, and less than 50 kips for columns. The finished floor of the structure is anticipated to be constructed within 1 to 2 feet of the existing site grades.

A recent aerial photograph of the site was obtained. The site plan and aerial photograph were used in preparation of this exploration and report.

1.3 Purpose

The purpose of this geotechnical exploration was to determine the general subsurface conditions, evaluate these conditions with respect to the proposed construction, and prepare geotechnical parameters and recommendations to assist with building foundation, stormwater management, and pavement designs.

2.0 FIELD AND LABORATORY TESTS

2.1 General Description

The procedures used for field sampling and testing are in general accordance with industry standards of care and established geotechnical engineering practices for this geographic region. This exploration consisted of performing four (4) Standard Penetration Test (SPT) borings to depths of 20 feet below land surface (bls) in the area of the proposed building, four (4) auger borings to depths of 5 feet bls in the area of the parking lot, and five (5) auger borings to a depth of 15 feet bls in the area of the proposed stormwater management facility.

The soil borings were performed at the approximate locations as shown on Figure 2. The borings were located at the site using the provided site plan, Global Positioning System (GPS) coordinates, and obvious site features as reference. The boring locations should be considered approximate. The soil borings were performed on April 12, 2018.

2.2 Auger Borings

The auger borings were performed in accordance with ASTM D1452. The borings were performed with flight auger equipment that was rotated into the ground in a manner that reduces soil disturbance. After penetrating to the required depth, the auger was retracted and the soils collected on the auger flights were field classified and placed in sealed containers. Representative samples of each stratum were retained from the auger boring. Results from the auger borings are provided in Section 5.1.

2.3 Standard Penetration Test Borings

The soil borings were performed with a drill rig employing flight auger drilling techniques and Standard Penetration Testing (SPT) in accordance with ASTM D1586. The SPTs were performed continuously to 10 feet and at 5-foot intervals thereafter. Soil samples were obtained at the depths where the SPTs were performed. The soil samples were classified in the field, placed in sealed containers, and returned to our laboratory for further evaluation.

After drilling to the sampling depth, the standard two-inch O.D. split-barrel sampler was seated by driving it 6 inches into the undisturbed soil. Then the sampler was driven an additional 12 inches by blows of a 140-pound hammer falling 30 inches. The number of blows required to produce the next 12 inches of penetration were recorded as the penetration resistance (N-value). These values and the complete SPT boring logs are provided in Section 5.2.

Upon completion of the sampling, the boreholes were abandoned in accordance with Water Management District guidelines.

2.4 Soil Laboratory Tests

The soil samples recovered from the soil borings were returned to our laboratory, and examined to confirm the field descriptions. Representative samples were then selected for laboratory testing. The laboratory tests consisted of six (6) percent soil fines passing the No. 200 sieve determinations, six (6) natural moisture content determinations, one (1) Atterberg Limits test, and three (3) constant head hydraulic conductivity tests. These tests were performed in order to aid in classifying the soils and to further evaluate their engineering properties. The laboratory tests are provided in Section 5.3.

3.0 FINDINGS

3.1 Surface Conditions

Mr. Mark Kalivoda, E.I. with GSE visited the site on April 12, 2018 to observe the site conditions, mark the boring locations, and; with a representative of Jason Kite, LLC; clear lanes to allow access to the boring locations for drilling equipment.

The site is heavily wooded with large trees and thick underbrush. The site is bordered by Pinemount Road (CR 252) to the north and SW Birley Avenue to the east. Residential properties adjoin the site to the south and west.

The topography at the site is relatively level. Local hydrology appears to run from the south into the stormwater swale located near the property boundary to the north. Regional topography is gently sloping towards the southwest from the north and east. The Lake City West USGS Topographic Map indicates the ground surface elevations at the site are near elevations 110 to 115 feet[1] NAVD88.

3.2 Subsurface Conditions

The locations of the auger and SPT borings are provided on Figure 2. Complete logs for the borings are provided in Sections 5.1 and 5.2. Descriptions for the soils encountered are accompanied by the Unified Soil Classification System symbol (SM, SP-SM, etc.) and are based on visual examination of the recovered soil samples and the laboratory tests performed. Stratification boundaries between the soil types should be considered approximate, as the actual transition between soil types may be gradual.

The auger borings located in the proposed stormwater management facility indicate the soils across these areas are relatively consistent. The auger borings initially penetrated 5.5 to 7.5 feet of a near-surface sandy stratum consisting of poorly graded sand, and sand with silt (SP, SP-SM). This was underlain by clayey to very clayey sand (SC, SC/CL) with some interbedded strata of sand with clay (SP-SC) and poorly graded sand (SP) to the explored depth of 15 feet bls.

The auger borings located in the proposed roadways encountered sand with silt (SP-SM) from the ground surface to the boring termination depths of 5 feet bls.

The SPT borings within the area of the proposed building initially penetrated a 4.5 to 6 feet of poorly graded sand and sand with silt (SP, SP-SM). This was underlain by interbedded strata of clayey to very clayey sand, poorly graded sand, and sand with clay (SC, SC/CL, SP, SP-SC) to the explored depths of 20 feet bls.

The surficial layer of poorly graded sand and sand with silt (SP, SP-SM) is generally in a very loose to medium dense condition with N-values ranging from 2 to 27 blows per foot. The underlying clayey to very clayey sand, sand with clay, and poorly graded sand (SC, SP-SC, SP) is generally in a medium dense to very dense condition with N-values ranging from 15 to 56 blows per foot.

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[1] United States Geological Survey, Columbia, 2012, 7.5-minute, 24000.

The groundwater table was not encountered in the auger and SPT borings at the time of our investigation.

3.3 Review of Published Data

The majority of the site is mapped as one soil series by the Soil Conservation Service (SCS) Soil Survey for Columbia County[2]. The following soil description is from the Soil Survey.

Blanton fine sand, 0 to 5 percent slopes - This is a moderately well drained, nearly level to gently sloping soil on broad ridges and undulating side slopes. The areas of this soil range from about 20 to 1,000 acres and are irregular in shape.

Typically, the surface layer is gray fine sand about 7 inches thick. The subsurface layer is very pale brown fine sand in the upper 30 inches and light gray fine sand in the lower 15 inches. The subsoil extends to a depth of 80 inches. In the upper 10 inches, it is light yellowish brown fine sandy loam with brownish yellow mottles; in the next 5 inches, it is very pale brown with strong brown and pale brown mottles; and in the lower part, it is light brownish gray fine sandy loam with strong brown mottles.

Included with this soil in mapping are small areas of Albany, Alpin, Chipley, Lakeland, Ocilla, Troup, and Bonneau soils. These soils make up less than 15 percent of the map unit.

This Blanton soil has a water table at a depth of 5 to 6 feet most of the year. In wet seasons, a perched water table is above the subsoil for less than a month. The available water capacity is medium in the surface layer and low in the subsurface layer and subsoil. Permeability is rapid in the surface and subsurface layers and moderate in the subsoil. Natural fertility and the organic matter content are low.

3.4 Laboratory Soil Analysis

Selected soil samples recovered from the soil borings were analyzed for the percent soil fines passing the No. 200 sieve, natural moisture content, Atterberg Limits, and hydraulic conductivity. Samples selected for laboratory testing were collected at depths ranging from 2 to 20 feet bls. These tests were performed to confirm visual soil classification and evaluate their engineering properties. The complete laboratory report is provided in Section 5.3.

The laboratory tests indicate the tested soils consist of sand with silt, clayey sand, and very clayey sand. The tested sand with silt (SP-SM) contains between 8.1 and 8.7 percent soil fines passing the No. 200 sieve with natural moisture contents of about 6.5 to 7.5 percent. The tested clayey sand (SC) contains 20 and 29 percent soil fines passing the No. 200 sieve with natural moisture contents of about 16 and 18 percent. The tested very clayey sand (SC/CL) contains approximately 42 percent soil fines passing the No. 200 sieve with a natural moisture content of about 18 percent.

Atterberg Limits tests indicate the tested very clayey sand (SC/CL) has a Liquid Limit (LL) value of 45, Plastic Limit (PL) value of 25, and Plasticity Index (PI) value of 20. These values correspond to a material with low potential (LL < 50 and PI < 25) for expansive behavior[3].

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[2] Soil Survey of Columbia County, Florida. Soil Conservation Service, U.S. Department of Agriculture.

[3] U.S. Department of the Army USA, 1983, Foundations in Expansive Soils, TM 5-818-7, p. 4-1.

The constant head hydraulic conductivity test results indicate the near-surface sand with silt (SP-SM) has hydraulic conductivity values between 2.7 and 3.3 feet per day. Although not tested, the sand with clay (SP-SC) soils are expected to have similar hydraulic conductivity values. Tests were not conducted on the deeper clayey sand (SC) due to the limitations of the test method on soils having moderate to high fines content, but these soils are expected to have permeability values at least one order of magnitude lower than the sandy soils. The clay-rich soils containing greater than about 25 percent soil fines are expected to be confining soils.

4.0 EVALUATION AND RECOMMENDATIONS

4.1 General

The following recommendations are made based upon our understanding of the proposed construction, a review of the attached soil borings and laboratory test data, and experience with similar projects and subsurface conditions. If plans or the location of proposed construction changes from those discussed previously, GSE requests the opportunity to review and possibly amend our recommendations with respect to those changes.

The final design of a foundation system is dependent upon adequate integration of geotechnical and structural engineering considerations. Consequently, GSE must review the final foundation design in order to evaluate the effectiveness and applicability of our initial analyses, and to determine if additional recommendations may be warranted. Without such a review, the recommendations presented herein could be misinterpreted or misapplied resulting in potentially unacceptable performance of the foundation system.

The performance of site improvements may be sensitive to their post-construction relationship to site groundwater levels, seepage zones, or soil/rock characteristics exposed at final site grades. GSE recommends that use of boring information for final design of all site improvements be predicated on proper horizontal and vertical control of borings.

In this section of the report, we present our geotechnical parameters and recommendations to assist with building foundation, stormwater management, and pavement designs as well as our general site preparation guidelines.

4.2 Groundwater

The groundwater table was not encountered in the borings at the time of our exploration. However, you should expect groundwater to temporarily perch on top of the clayey sand after periods of heavy and seasonal rainfall. The perched groundwater table estimates are presented on the boring logs.

4.3 Building Foundations

The soil borings near the proposed building footprint indicate the soils at the site are relatively consistent. The borings indicate 4.5 to 6 feet of poorly graded sand and sand with silt overlying clayey to very clayey sand with interbedded layers of sand with clay and poorly graded sand. Laboratory tests conducted on the very clayey sand indicate it has low expansive potential.

Based upon the soil conditions encountered and our limited understanding of the structural loads and site grading, we recommend the building be supported by conventional, shallow strip and/or spread foundations. We recommend the shallow foundations be designed for a maximum allowable gross bearing pressure of 3,000 psf. The gross bearing pressure is defined as the soil contact pressure that can be imposed from the maximum structural loads, weight of the concrete foundations, and weight of the soil above the foundations. The foundations should be designed based upon the maximum load that could be imposed by all loading conditions.

The foundations should be embedded a minimum of 18 inches below the lowest adjacent grade. Interior foundations or thickened sections should be embedded a minimum of 12 inches. The foundations should have minimum widths of 18 inches for strip footings, and 24 inches for columns, even though the maximum soil bearing pressure may not be fully developed.

Due to the mostly sandy nature of the majority of the near-surface soils, we expect settlement to be mostly elastic in nature. The majority of the settlement will occur on application of the loads, during and immediately following construction. Using the recommended maximum bearing pressure, the assumed maximum structural loads, and the field and laboratory test data which we have correlated into the strength and compressibility characteristics of the subsurface soils, we estimate the total settlements of the structure to be 1 inch or less, with approximately half of it occurring upon load application (during construction).

Differential settlement results from differences in applied bearing pressures and the variations in the compressibility characteristics of the subsurface soils. For the building pad prepared as recommended, we anticipate differential settlement of less than 1/2 inch.

Post-construction settlement of the structures will be influenced by several interrelated factors, such as (1) subsurface stratification and strength/compressibility characteristics of the bearing soils; (2) footing size, bearing level, applied loads, and resulting bearing pressures beneath the foundation; (3) site preparation and earthwork construction techniques used by the contractor, and (4) external factors, including but not limited to vibration from off-site sources and groundwater fluctuations beyond those normally anticipated for the naturally-occurring site and soil conditions which are present.

Our settlement estimates for the structure are based upon our limited understanding of the structural loads and site grading and the use of successful adherence to the site preparation recommendations presented later in this report. Any deviation from our project understanding and/or our site preparation recommendations could result in an increase in the estimated post-construction settlement of the structure.

4.4 Flexible Pavement

Overall soil conditions encountered by our borings at this site are suitable for supporting conventional limerock base and asphalt wearing surface pavements. We have not been provided the anticipated traffic loading conditions; therefore, the following pavement component recommendations should be used only as guidelines. The below recommendations are intended to be minimums. Increasing base course and asphalt thicknesses would increase the design life of the pavement.

4.4.1 Stabilized Subgrade

The stabilized subgrade should have a minimum Limerock Bearing Ratio (LBR) of 40, with a minimum thickness of 12 inches. The stabilized subgrade can be imported material or a mixture of imported and on-site material. If a mix is proposed, a mix design should be performed to determine the optimum mix proportions. The stabilized subgrade should be compacted to a minimum of 98 percent of the Modified Proctor maximum dry density (ASTM D1557) for soils with less than 15 percent fines content. Soils with 15 percent or greater fines content should be compacted to 100 percent of the Standard Proctor maximum dry density (ASTM D698).

4.4.2 Base Course

The base course should consist of crushed limerock having a LBR of at least 100. Limerock should be obtained from a FDOT approved source, and should meet FDOT gradation requirements. The base course thickness should be a minimum of 6 inches in automobile parking areas and 8 inches in driveways. The base course should be compacted to at least 98 percent of the Modified Proctor maximum dry density (ASTM D1557).

The constructability of differing base course thicknesses may be difficult, and having a uniform 8-inch thick base course may be more practical.

4.4.3 Wearing Surface

The asphalt-wearing surface should consist of an FDOT Type SP Hot Mix Asphalt mixture. For automobile parking areas, the thickness should be a minimum of 1.5 inches. For driveway areas, the thickness should be a minimum of 2 inches. The asphalt-wearing surface should consist of an SP-12.5 mix. The asphalt should be compacted to at least 95 percent of the mix design density.

The constructability of differing asphalt thicknesses may be difficult, and having a uniform 2-inch thick asphalt wearing surface may be more practical.

4.5 Rigid Pavement

Concrete pavement is a rigid pavement that results in smaller load transfers to the subgrade soils than flexible pavement. For concrete pavement subgrade, we recommend using the existing surficial sands or recommended clean sand (SP) fill, compacted to at least 98 percent of the Modified Proctor maximum dry density without additional stabilization with the following stipulations:

1. Subgrade soils must be compacted to at least 98 percent of Modified Proctor maximum dry density to a depth of at least 2 feet prior to placement of concrete.

2. The surface of the subgrade soils must be smooth and any disturbances or wheel rutting corrected prior to placement of the concrete.

3. The subgrade soils must be moistened prior to placement of concrete.

4. Concrete pavement thickness should be uniform throughout, with the exception of thickened edges (curb or footing).

5. The bottom of the pavement should be separated from the estimated seasonal high groundwater level by at least 18 inches.

6. Limerock or any other impermeable base is not suitable unless it meets the minimum recommended permeability of 10 ft/day.

7. The upper 12 inches of subgrade underlying the base course must also be "free-draining" and water that enters the base and subgrade must be allowed to seep out by gravity or if this is not possible, underdrains must be incorporated into the subgrade. A "bathtub" condition within the base/subgrade must be avoided.

Our recommendations for slab thickness for heavy-duty concrete pavements is based on a.) subgrade soils are compacted to 98 percent of the Modified Proctor maximum dry density, b.) modulus of subgrade reaction (k) of 200 pounds per cubic inch, c.) a 20-year design life, and d.) previously stated design parameters. For an anticipated heavy-duty traffic group, a minimum pavement thickness of 8 inches is recommended, using Table 3.3 from the FDOT *Rigid Pavement Design Manual*, January 2009.

We recommend using concrete with a minimum 28-day compressive strength of 4,000 pounds per square inch and a minimum 28-day flexural strength (modulus of rupture) of at least 600 pounds per square inch based on the third point loading of concrete beam test samples. Minimum control joint spacing of 15 by 15 feet is suggested. Layout of sawcut control joints should form square panels, and the depth of sawcut joint should be at least 1/4 of the concrete slab thickness (a minimum 2-inch sawcut control joint depth for the recommended 8-inch slab thickness). The joints should be sawed within six hours of concrete placement or as soon as the concrete has developed sufficient strength to support workers and equipment.

For further details on concrete pavement construction, refer to "Guide to Jointing Non-reinforced Concrete Pavements" published by the Florida Concrete and Products Associates, Inc. and "Building Quality Concrete Parking Areas", published by the Portland Cement Association.

4.6 Site Preparation

The soils at this site should be suitable for supporting the proposed construction using normal, good practice site preparation procedures. The following recommendations are our general guidelines for site preparation.

4.6.1 Stripping

Strip the construction limits and 10 feet beyond the perimeter of all grass, roots, topsoil, pavement, and other deleterious materials. You should expect to strip to depths of 12 or more inches. Deeper stripping will likely be necessary due to major root systems present at the site.

4.6.2 Dewatering

Temporary dewatering is not expected to be necessary for this project. However, if needed, we anticipate dewatering can be accomplished with sumps placed near the construction area, or with underdrains connected to a vacuum pump.

In any case, the site should always be graded to promote runoff and limit the amount of ponding. Localized ponding of stormwater is expected without proper grading during construction, and could render previously acceptable surfaces unacceptable.

4.6.3 Proof-Rolling

Excavate the site to the design grades. Proof-roll the subgrade with heavy rubber-tired equipment, such as a loaded front-end loader or dump truck, to identify any loose or soft zones not found by the soil borings. The proof-rolling should be monitored by a geotechnical engineer or qualified technician.

4.6.4 Proof Compaction

Compact the subgrade to a density of at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557). The specified compaction should be obtained to a depth of 1 foot below the foundation bottoms and the existing grade prior to placing fill. Vibratory roller equipment should not be used within approximately 100 feet of existing structures. Lighter "walk-behind" compaction equipment may be used to achieve the degree of compaction.

Should clayey sand (SC) be encountered at the bearing surface, this material should be probed and visually confirmed to be unyielding in the upper 12 inches in lieu of density testing. If the foundation excavations penetrate the clayey sand, the excavation should be performed in a manner that reduces soil disturbance. Clayey sand soils (with fines content in excess of 15 percent) that are removed and replaced or appreciably disturbed need to be re-compacted to 98 percent of the Standard Proctor maximum dry density (ASTM D698).

4.6.5 Fill Placement

Imported fill placed to raise the site grades should consist of clean sand having less than 10 percent passing the No. 200 sieve. On-site soils meeting the requirements of Section 4.9 may also be used as structural fill. The fill should be placed in maximum 12-inch loose lifts that are compacted to at least 95 percent of the Modified Proctor maximum dry density (ASTM D1557). If lighter "walk-behind" compaction equipment is used, this may require lifts of 4 inches or less to achieve the required degree of compaction.

4.7 Quality Control and Construction Materials Testing

It should be noted that the geotechnical engineering design does not end with the advertisement of the construction documents. As the geotechnical engineer of record, GSE is the most qualified to perform the construction materials testing that will be required for this project. The benefits of having the geotechnical engineer of record also perform the construction materials testing are numerous. If GSE continues to be involved with the project through construction, we will be able to constantly re-evaluate and possibly alter our geotechnical recommendations in a timely and cost effective manner once final design and construction techniques are developed. This often results in cost savings for the project.

We recommend performing compaction testing beneath the concrete floor slab and the building foundations. We recommend one test be performed every 50 linear feet of continuous footing and every other column footing, per foot depth of fill or native material. We recommend a compaction test be performed for each 2,500 square feet of floor area or 10,000 square feet of pavement area per foot of fill or native material, or a minimum of three tests each, whichever is greater. Test all footing excavations to a depth of 12 inches at the frequencies stated above.

4.8 Stormwater Management

The soil conditions at the stormwater management facility are relatively consistent; initially penetrating poorly graded sand and sand with silt overlying clayey to very clayey sand with interbedded layers of sand with clay.

The water table was not encountered in the auger borings at the time of our exploration. We anticipate the seasonal high groundwater table to be perched on the clayey sands.

The laboratory permeability tests indicate the surficial layer of sand with silt has hydraulic conductivity values between 2.7 and 3.3 feet per day. The sand with clay soils are expected to have similar permeability values. The deeper clayey sand encountered below the surficial sandy material is friable and will have permeability values at least one order of magnitude lower than the sandy soils (and be similar to the silty sand with clay). The underlying clay-rich soils are expected to be confining soils.

Based upon our findings and test results, our recommended soil parameters for the stormwater management design in the explored areas are presented below. The recommended parameters consider the results of the permeability tests, wash 200 determinations, and our experience with these types of soils. The parameters below do not consider a factor of safety.

1. Base elevation of effective or mobilized aquifer (average depth of confining layer) equal to 7.5 feet bls.
2. Unsaturated vertical infiltration rate of 3 feet per day.
3. Horizontal hydraulic conductivity equal to 3 feet per day.
4. Specific yield (fillable porosity) of 25 percent.
5. Average seasonal high groundwater table depth equal to 7 feet bls.

In areas where clay-rich soils are present at the basin bottom, we recommend these soils be undercut a minimum of 2 feet and backfilled with the on-site sands and sands with silt (SP, SP-SM) having a maximum of 12 percent soil fines passing the No. 200 sieve. The intent of this undercutting and replacement is to provide a more uniform sand "blanket" at the basin bottom that allows the migration of water to the deeper deposits of sand. This sand blanket will also reduce the potential for clay-fines leaching out of the soils when water is present in the basin that can result in a thin layer of confining type material on the basin bottom that can reduce the effectiveness of the basin.

4.9 Fill Suitability

The soils encountered at this site within the explored depths range from sands (SP) to very clayey sands (SC/CL). A discussion of the suitability for reuse as structural fill for each soil classification according to the Unified Soil Classification System (USCS) designation is provided below.

SP, SP/SM – Sands (SP) and sand with silt (SP/SM) have less than 5 percent and 12 percent soil fines passing the No. 200 sieve, respectively, and are typically well draining soils that are suitable for reuse as structural fill. The sands with silt may require moisture conditioning (drying) to make the material more workable. These soils will require stockpiling and drying before they are reused if they are excavated from below the water table.

SM – Silty sands (SM) can have between 12 percent and 50 percent soil fines passing the No. 200 sieve. Silty sands are typically non-plastic or have low plasticity, and can be reused as structural fill with precautions. Silty sands can be moisture sensitive and difficult to work and compact and can rut if the moisture content is near or above the optimum moisture content. We recommend these soils be moisture conditioned (dried) so that the moisture content during use is at or below the optimum moisture content. Aerating and exposure to the sun is typically the most effective methods of drying these soils.

It may not be practical to reuse these materials during the wet season, as frequent rain showers may not allow these soils to dry to a workable moisture content. Suitable silty sands are limited to soil having less than 30 percent soil fines passing the No. 200 sieve. Silty sands with more than 30 percent soil fines are especially moisture sensitive, and are not recommended for reuse as structural fill. These soils will behave more as sandy silt, and for this reason, very silty sands having more than 30 percent soil fines passing the No. 200 sieve have been assigned a dual classification of SM/ML. Silty sand soils that are excavated from below the water table are not recommended for reuse as structural fill due to the amount of time that will be required to dry these soils to a workable condition.

SC – Clayey sand (SC) soils can have between 12 percent and 50 percent soil fines passing the No. 200 sieve. Clayey sands can have a high range of plasticity, varying from a PI of 7 or greater and plotting above the A-line to highly plastic. Friable clayey sands are typically suitable for use as structural fill with precautions. Clayey sands will be moisture sensitive and difficult to work and compact and can rut during placement if the moisture content is near or above the natural moisture content. We recommend these soils be moisture conditioned (dried) so that the moisture content during use is at or below the optimum moisture content. Aerating and exposure to the sun is typically the most effective methods of drying these soils. It may not be practical to reuse these materials during the wet season, as frequent rain showers may not allow these soils to dry to a workable moisture content. Suitable clayey sands are limited to soil having less than 30 percent soil fines passing the No. 200 sieve. Clayey sands with more than 30 percent soil fines passing the No. 200 sieve are especially moisture sensitive and are typically highly plastic, and are not recommended for reuse as structural fill. These soils will behave more as sandy clay, and for this reason, very clayey sands having more than 30 percent soil fines passing the No. 200 sieve have been assigned a dual classification of SC/CH or SC/CL. Clayey sand soils that are excavated from below the water table are not recommended for reuse as structural fill due to the amount of time that will be required to dry these soils to a workable condition.

ML, MH, CL, CH – Silts and clays are not suitable materials for reuse as structural fill.

When using on-site soils as fill materials, we recommend the silty and clayey sand soils (SM, SC) be used in the lower depths of the fill. Sand and sand with silt (SP, SP-SM) should be used in the upper portions of the fill. We recommend a minimum of 2 feet of sand (SP, SP-SM) cover the silty and clayey sand fill materials to reduce the potential for soggy surface conditions due to the low permeability characteristics of the silty and clayey sand materials.

4.10 Surface Water Control and Landscaping

Roof gutters should be considered to divert runoff away from the building. The gutter downspouts should discharge a minimum of 10 feet from the structure to reduce the amount of water collecting around the foundations. Where possible, the gutter downspouts should discharge directly into the storm sewer system or onto the asphalt paved areas in order to reduce the amount of water collecting around the foundations. Grading of the site should be such that water is diverted away from the building on all sides to reduce the potential for erosion and water infiltration along the foundation.

With respect to landscaping, it is recommended that existing and planted trees and large "tree-like" shrubbery with potential for developing large root systems be planted a minimum distance of half their mature height, and preferably their expected final height, away from the structure. The purpose of this is to reduce the potential for foundation or slab movements from the growth of root systems as the landscaping matures. Consideration should also be given to using landscaping that has a low water demand, so that excessive irrigation is not conducted around the structures.

5.0 FIELD DATA

5.1 Auger Boring Logs

GSE Engineering & Consulting, Inc.
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Gainesville, Florida 32608
Telephone: (352) 377-3233
Fax: (352) 377-0335

CLIENT Concept Development, Inc.
PROJECT NAME Commercial Retail - Lake City at SW Birley Avenue
PROJECT NUMBER 13557
PROJECT LOCATION Lake City, Columbia County, Florida

BORING NUMBER A-1

DATE PERFORMED 4/12/2018
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
▼ AT TIME OF DRILLING NE
▽ ESTIMATED SEASONAL HIGH >5 ft
LOGGED BY WDI
CHECKED BY MDK
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0		AU 1	(SP-SM) Gray SAND with silt
0.5			(SP-SM) Pale gray SAND with silt
1			
2			
3			
4		AU 2	
5			
5.0			Bottom of borehole at 5.0 feet.

BORING NUMBER A-2

DATE PERFORMED 4/12/2018
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
▼ AT TIME OF DRILLING NE
▽ ESTIMATED SEASONAL HIGH >5 ft
LOGGED BY WDI
CHECKED BY MDK
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0		AU 1	(SP-SM) Gray SAND with silt and roots
1			
2			
3			
3.0		AU 2	(SP-SM) Pale gray SAND with silt
4			
5			
5.0			Bottom of borehole at 5.0 feet.

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CLIENT Concept Development, Inc.
PROJECT NAME Commercial Retail - Lake City at SW Birley Avenue
PROJECT NUMBER 13557
PROJECT LOCATION Lake City, Columbia County, Florida

BORING NUMBER A-3

DATE PERFORMED 4/12/2018
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
AT TIME OF DRILLING NE
ESTIMATED SEASONAL HIGH >5 ft
LOGGED BY WDI
CHECKED BY MDK
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0			(SP-SM) Gray SAND with silt
1		AU 1	
2			
3			
3.5			(SP-SM) Pale gray to tan and orange SAND with silt
4		AU 2	
5			
5.0			Bottom of borehole at 5.0 feet.

BORING NUMBER A-4

DATE PERFORMED 4/12/2018
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
AT TIME OF DRILLING NE
ESTIMATED SEASONAL HIGH >5 ft
LOGGED BY WDI
CHECKED BY MDK
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0			(SP-SM) Gray SAND with silt
1			
2		AU 1	
3			
3.0			(SP-SM) Pale gray to tan SAND with silt
4			
5		AU 2	
5.0			Bottom of borehole at 5.0 feet.

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CLIENT Concept Development, Inc. **PROJECT NAME** Commercial Retail - Lake City at SW Birley Avenue

PROJECT NUMBER 13557 **PROJECT LOCATION** Lake City, Columbia County, Florida

DATE PERFORMED 4/12/2018 **BORING NUMBER P-1**

DRILLING CONTRACTOR Whitaker Drilling, Inc.

GROUND WATER LEVELS: LOGGED BY WDI

▼ AT TIME OF DRILLING NE CHECKED BY MDK

▽ ESTIMATED SEASONAL HIGH 6.5 ft, perched

NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0.0			(SP-SM) Gray to tan SAND with silt and roots
2.5		AU 1 PS	*%PASS - 200 = 8.3* *MC = 6.5* *k_h = 2.7 ft/day*
5.0			▽
7.5		AU 2	7.0 (SC) Pale gray and red clayey SAND
10.0		AU 3	10.0 (SC/CL) Pale gray, green, and orange very clayey SAND
12.5			13.5 (SP-SC) Brown SAND with clay
15.0		AU 4	15.0 Bottom of borehole at 15.0 feet.

DATE PERFORMED 4/12/2018 **BORING NUMBER P-2**

DRILLING CONTRACTOR Whitaker Drilling, Inc.

GROUND WATER LEVELS: LOGGED BY WDI

▼ AT TIME OF DRILLING NE CHECKED BY MDK

▽ ESTIMATED SEASONAL HIGH 10.5 ft, perched

NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0.0			(SP-SM) Gray SAND with silt
			0.5 (SP-SM) Pale brown SAND with silt
2.5		AU 1	
			3.5 (SP-SM) Pale brown to tan and orange SAND with silt
5.0		AU 2 PS	
			6.0 (SP-SC) Gray and orange SAND with clay
7.5		AU 3	▽
10.0			11.0 (SC) Pale gray clayey SAND
12.5		AU 4	
15.0			15.0 Bottom of borehole at 15.0 feet.

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CLIENT Concept Development, Inc. **PROJECT NAME** Commercial Retail - Lake City at SW Birley Avenue

PROJECT NUMBER 13557 **PROJECT LOCATION** Lake City, Columbia County, Florida

BORING NUMBER P-3

DATE PERFORMED 4/12/2018
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS: LOGGED BY WDI
▼ AT TIME OF DRILLING NE CHECKED BY MDK
▽ ESTIMATED SEASONAL HIGH 5.5 ft, perched
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0.0			(SP-SM) Gray SAND with silt
0.5			(SP-SM) Pale brown SAND with silt
2.5		AU 1 PS	*%PASS - 200 = 8.7* *MC = 7.5* *k_h = 2.8 ft/day*
3.5			(SP) Orange and gray SAND
5.0		AU 2 ▽	
6.0			(SC/CL) Gray and red very clayey SAND
7.5		AU 3	
10.0			
10.5			(SC) Gray clayey SAND
12.5		AU 4	
15.0			Bottom of borehole at 15.0 feet.

BORING NUMBER P-4

DATE PERFORMED 4/12/2018
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS: LOGGED BY WDI
▼ AT TIME OF DRILLING NE CHECKED BY MDK
▽ ESTIMATED SEASONAL HIGH 5.0 ft, perched
NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0.0			(SP-SM) Brown and gray SAND with silt
2.5		AU 1	
4.0			(SP) Orange SAND
5.0		AU 2 ▽	
5.5			(SC) Gray and orange clayey SAND
7.5		AU 3	
10.0			
		AU 4 PS	
12.5			
		AU 5	
15.0			Bottom of borehole at 15.0 feet.

(Continued Next Page)

GSE Engineering & Consulting, Inc.
5590 SW 64th Street, Suite B
Gainesville, Florida 32608
Telephone: (352) 377-3233
Fax: (352) 377-0335

CLIENT Concept Development, Inc.

PROJECT NAME Commercial Retail - Lake City at SW Birley Avenue

PROJECT NUMBER 13557

PROJECT LOCATION Lake City, Columbia County, Florida

DATE PERFORMED 4/12/2018 **BORING NUMBER P-5**

DRILLING CONTRACTOR Whitaker Drilling, Inc.

GROUND WATER LEVELS: LOGGED BY WDI

▼ AT TIME OF DRILLING NE CHECKED BY MDK

▽ ESTIMATED SEASONAL HIGH 7.0 ft, perched

NOTES

DEPTH (ft)	GRAPHIC LOG	SAMPLE TYPE NUMBER	MATERIAL DESCRIPTION
0.0			(SP-SM) Brown and gray SAND with silt
2.5		AU 1 PS	*%PASS - 200 = 8.1* *MC = 6.8* *k_h = 3.3 $^{ft}/_{day}$*
5.0		AU 2	
5.5			(SP-SC) Brown and orange SAND with clay
7.5		AU 3 ▽	
7.5			(SC) Gray and orange clayey SAND
10.0		AU 4	
12.5			
15.0		AU 5	
15.0			Bottom of borehole at 15.0 feet.

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5.2 Standard Penetration Test Soil Boring Logs

GSE Engineering & Consulting, Inc.
5590 SW 64th Street, Suite B
Gainesville, Florida 32608
Telephone: (352) 377-3233
Fax: (352) 377-0335

BORING NUMBER B-1

CLIENT Concept Development, Inc.
PROJECT NAME Commercial Retail - Lake City at SW Birley Avenue
PROJECT NUMBER 13557
PROJECT LOCATION Lake City, Columbia County, Florida
DATE STARTED 4/12/18 **COMPLETED** 4/12/18
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD SPT Flight Auger
▼ **AT TIME OF DRILLING** NE
LOGGED BY WDI **CHECKED BY** MDK
▽ **ESTIMATED SEASONAL HIGH** 5.5 ft, perched
NOTES

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	CONTACT DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	PERCENT PASS NO. 200 SIEVE	MOISTURE CONTENT, %	▲ SPT N VALUE ▲
0		(SP-SM) Very loose gray SAND with silt	2	SPT 1	2-2-2 (4)						20 40 60 80
		(SP) Very loose to loose pale gray SAND	4	SPT 2	1-2-1 (3)						
5		(SP-SM) Loose to medium dense brown and orange SAND with silt ▽	6	SPT 3	2-2-4 (6)						
		(SC) Medium dense to dense gray, orange, and brown clayey SAND		SPT 4	7-12-15 (27)						
				SPT 5	19-16-18 (34)						
10				SPT 6	18-23-22 (45)						
15				SPT 7	9-12-15 (27)						
			18								
		(SP-SC) Medium dense brown and gray SAND with clay									
20			20	SPT 8	10-16-12 (28)						
		Bottom of borehole at 20.0 feet.									

GSE Engineering & Consulting, Inc.
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BORING NUMBER B-2

CLIENT Concept Development, Inc. **PROJECT NAME** Commercial Retail - Lake City at SW Birley Avenue

PROJECT NUMBER 13557 **PROJECT LOCATION** Lake City, Columbia County, Florida

DATE STARTED 4/12/18 **COMPLETED** 4/12/18 **GROUND ELEVATION** _____ **HOLE SIZE** _____

DRILLING CONTRACTOR Whitaker Drilling, Inc. **GROUND WATER LEVELS:**

DRILLING METHOD SPT Flight Auger ▼ **AT TIME OF DRILLING** NE

LOGGED BY WDI **CHECKED BY** MDK ▽ **ESTIMATED SEASONAL HIGH** 13.5 ft, perched

NOTES _____

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	CONTACT DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	PERCENT PASS NO. 200 SIEVE	MOISTURE CONTENT, %	▲ SPT N VALUE ▲ (20 40 60 80)
0		(SP-SM) Very loose gray SAND with silt	2.5	SPT 1	2-1-1 (2)						
		(SP-SM) Very loose to loose pale gray SAND with silt		SPT 2	1-2-1 (3)						
5			5.5	SPT 3	2-3-3 (6)						
		(SP-SC) Medium dense brown and orange SAND with clay	7	SPT 4	3-6-9 (15)						
		(SP-SC) Medium dense gray and orange SAND with clay	8.5	SPT 5	11-15-12 (27)						
10		(SP-SC) Medium dense to dense light brown, gray, and orange SAND with clay ▽	14	SPT 6	12-15-20 (35)						
		(SC) Medium dense gray clayey SAND		SPT 7	12-9-11 (20)				29	16	
15			18.5								
		(SP) Medium dense gray SAND	20	SPT 8	8-12-15 (27)						
20		Bottom of borehole at 20.0 feet.									

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BORING NUMBER B-3

CLIENT Concept Development, Inc.
PROJECT NAME Commercial Retail - Lake City at SW Birley Avenue
PROJECT NUMBER 13557
PROJECT LOCATION Lake City, Columbia County, Florida
DATE STARTED 4/12/18 **COMPLETED** 4/12/18
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD SPT Flight Auger
▼ **AT TIME OF DRILLING** NE
LOGGED BY WDI **CHECKED BY** MDK
▽ **ESTIMATED SEASONAL HIGH** 13.5 ft, perched
NOTES _____

DEPTH (ft)	MATERIAL DESCRIPTION	CONTACT DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	PERCENT PASS NO. 200 SIEVE	MOISTURE CONTENT, %
0	(SP-SM) Very loose gray SAND with silt	0.5							
	(SP) Very loose pale gray SAND		SPT 1	2-2-1 (3)					
		2.5	SPT 2	1-2-2 (4)					
5	(SP) Very loose to loose light brown to tan and orange SAND		SPT 3	3-2-3 (5)					
		6	SPT 4	5-6-12 (18)					
	(SP-SC) Medium dense to dense gray and orange SAND with clay		SPT 5	14-14-20 (34)					
10			SPT 6	18-13-15 (28)					
	▽	14	SPT 7	8-11-13 (24)					
15	(SC) Medium dense gray clayey SAND								
			SPT 8	9-13-12 (25)				20	17
20		20							
	Bottom of borehole at 20.0 feet.								

▲ SPT N VALUE ▲ (20, 40, 60, 80)

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BORING NUMBER B-4

CLIENT Concept Development, Inc.
PROJECT NAME Commercial Retail - Lake City at SW Birley Avenue
PROJECT NUMBER 13557
PROJECT LOCATION Lake City, Columbia County, Florida
DATE STARTED 4/12/18 **COMPLETED** 4/12/18
GROUND ELEVATION _____ **HOLE SIZE** _____
DRILLING CONTRACTOR Whitaker Drilling, Inc.
GROUND WATER LEVELS:
DRILLING METHOD SPT Flight Auger
▼ **AT TIME OF DRILLING** NE
LOGGED BY WDI **CHECKED BY** MDK
▽ **ESTIMATED SEASONAL HIGH** 4.0 ft, perched
NOTES

DEPTH (ft)	MATERIAL DESCRIPTION	CONTACT DEPTH (ft)	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX	PERCENT PASS NO. 200 SIEVE	MOISTURE CONTENT, %
0	(SP-SM) Very loose to loose brown and gray SAND with silt		SPT 1	2-2-1 (3)					
			SPT 2	1-2-2 (4)					
		4.5	SPT 3	3-3-4 (7)					
5	(SC) Loose to medium dense brown, gray, and orange clayey SAND	6	SPT 4	6-10-17 (27)	45	25	20	42	18
	(SC/CL) Medium dense to very dense gray and orange very clayey SAND		SPT 5	21-29-27 (56)					
10			SPT 6	21-16-21 (37)					
		14	SPT 7	12-14-21 (35)					
15	(SC) Dense gray clayey SAND	17							
	(SP-SC) Dense gray SAND with clay		SPT 8	13-18-17 (35)					
20		20							
	Bottom of borehole at 20.0 feet.								

▲ SPT N VALUE ▲
20 40 60 80

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5.3 Laboratory Results

GSE Engineering & Consulting, Inc.

SUMMARY REPORT OF LABORATORY TEST RESULTS

Project Number: 13557

Project Name: Commercial Retail – Lake City at SW Birley Avenue

Boring Number	Depth (ft)	Soil Description	Natural Moisture Content (%)	Liquid Limit	Plastic Limit	Plasticity Index	Percent Passing No. 200 Sieve	Organic Content (%)	Hydraulic Conductivity (ft/day)	Unified Soil Classification
P-1	2 - 4	Gray to tan SAND with silt and roots	6.5				8.3		2.7	SP-SM
P-3	2 - 4	Pale Brown SAND with silt	7.5				8.7		2.8	SP-SM
P-5	2 - 4	Brown and gray SAND with silt	6.8				8.1		3.3	SP-SM
B-2	13.5 - 15	Gray clayey SAND	16				29			SC
B-3	18.5 - 20	Gray clayey SAND	17				20			SC
B-4	5.5 - 7	Gray and orange very clayey SAND	18	45	25	20	42			SC/CL

5.4 Key to Soil Classification

KEY TO SOIL CLASSIFICATION CHART

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests				SYMBOLS		GROUP NAME
				GRAPHIC	LETTER	
COARSE-GRAINED SOILS	Gravels	Clean Gravels	Cu ≥ 4 and 1 ≤ Cc ≤ 3		GW	Well graded GRAVEL
More than 50% retained on No. 200 sieve	More than 50% of coarse fraction retained on No. 4 sieve	Less than 5% fines	Cu < 4 and/or 1 > Cc > 3		GP	Poorly graded GRAVEL
		Gravels with fines	Fines classify as ML or MH		GM	Silty GRAVEL
		More than 12% fines	Fines classify as CL or CH		GC	Clayey GRAVEL
	Sands	Clean Sands	Cu ≥ 6 and 1 ≤ Cc ≤ 3		SW	Well graded SAND
	50% or more of coarse fraction passes No. 4 sieve	Less than 5% fines	Cu < 6 and/or 1 > Cc > 3		SP	Poorly graded SAND
		Sand with fines	Fines classify as ML or MH		SP-SM	SAND with silt
		5% ≤ fines < 12%	Fines classify as CL or CH		SP-SC	SAND with clay
		Sand with fines	Fines classify as ML or MH		SM	Silty SAND
		12% ≤ fines < 30%	Fines classify as CL or CH		SC	Clayey SAND
		Sand with fines	Fines classify as ML or MH		SM	Very silty SAND
		30% fines or more	Fines classify as CL or CH		SC	Very clayey SAND
FINE-GRAINED SOILS	Clays	inorganic	50% ≤ fines < 70%		CL/CH	Sandy CLAY
50% or more passes the No. 200 sieve			70% ≤ fines < 85%		CL/CH	CLAY with sand
			fines ≥ 85%		CL/CH	CLAY
	Silts and Clays	inorganic	PI > 7 and plots on/above "A" line		CL	Lean CLAY
	Liquid Limit less than 50		PI < 4 or plots below "A" line		ML	SILT
		organic	Liquid Limit - oven dried / Liquid Limit - not dried < 0.75		OL	Organic clay / Organic silt
	Silts and Clays	inorganic	PI plots on or above "A" line		CH	Fat CLAY
	Liquid Limit 50 or more		PI plots below "A" line		MH	Elastic SILT
		organic	Liquid Limit - oven dried / Liquid Limit - not dried < 0.75		OH	Organic clay / Organic silt
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor				PT	PEAT

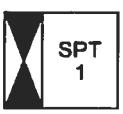
CORRELATION OF PENETRATION RESISTANCE WITH RELATIVE DENSITY AND CONSISTENCY

	No. OF BLOWS, N	RELATIVE DENSITY
	0 - 4	Very Loose
	5 - 10	Loose
SANDS:	11 - 30	Medium dense
	31 - 50	Dense
	OVER 50	Very Dense

	No. OF BLOWS, N	CONSISTENCY
	0 - 2	Very Soft
SILTS	3 - 4	Soft
&	5 - 8	Firm
CLAYS:	9 - 15	Stiff
	16 - 30	Very Stiff
	31 - 50	Hard
	OVER 50	Very Hard

	No. OF BLOWS, N	RELATIVE DENSITY
	0 - 8	Very Soft
	9 - 18	Soft
LIMESTONE:	19 - 32	Moderately Hard
	33 - 50	Hard
	OVER 50	Very Hard

SAMPLE GRAPHIC TYPE LEGEND



Location of SPT Sample

Location of Auger Sample

PARTICLE SIZE IDENTIFICATION

BOULDERS:		Greater than 300 mm
COBBLES:		75 mm to 300 mm
GRAVEL:	Coarse -	19.0 mm to 75 mm
	Fine -	4.75 mm to 19.0 mm
SANDS:	Coarse -	2.00 mm to 4.75 mm
	Medium -	0.425 mm to 2.00 mm
	Fine -	0.075 mm to 0.425 mm
SILTS & CLAYS:		Less than 0.075 mm

LABORATORY TEST LEGEND

LL	=	Liquid Limit, %
PL	=	Plastic Limit, %
PI	=	Plasticity Index, %
% PASS - 200	=	Percent Passing the No. 200 Sieve
MC	=	Moisture Content, %
ORG	=	Organic Content, %
k_h	=	Horizontal Hydraulic Conductivity, ft/day

6.0 LIMITATIONS

6.1 Warranty

This report has been prepared 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.

6.2 Auger and SPT Borings

The determination of soil type and conditions was performed from the ground surface to the maximum depth of the borings, only. Any changes in subsurface conditions that occur between or below the borings would not have been detected or reflected in this report.

Soil classifications that were made in the field are based upon identifiable textural changes, color changes, changes in composition or changes in resistance to penetration in the intervals from which the samples were collected. Abrupt changes in soil type, as reflected in boring logs and/or cross sections may not actually occur, but instead, be transitional.

Depth to the water table is based upon observations made during the performance of the auger and SPT borings. This depth is an estimate and does not reflect the annual variations that would be expected in this area due to fluctuations in rainfall and rates of evapotranspiration.

6.3 Site Figures

The measurements used for the preparation of the figures in this report were made using the provided site plan and by estimating distances from existing structures and site features. Figures in this report were not prepared by a licensed land surveyor and should not be interpreted as such.

6.4 Unanticipated Soil Conditions

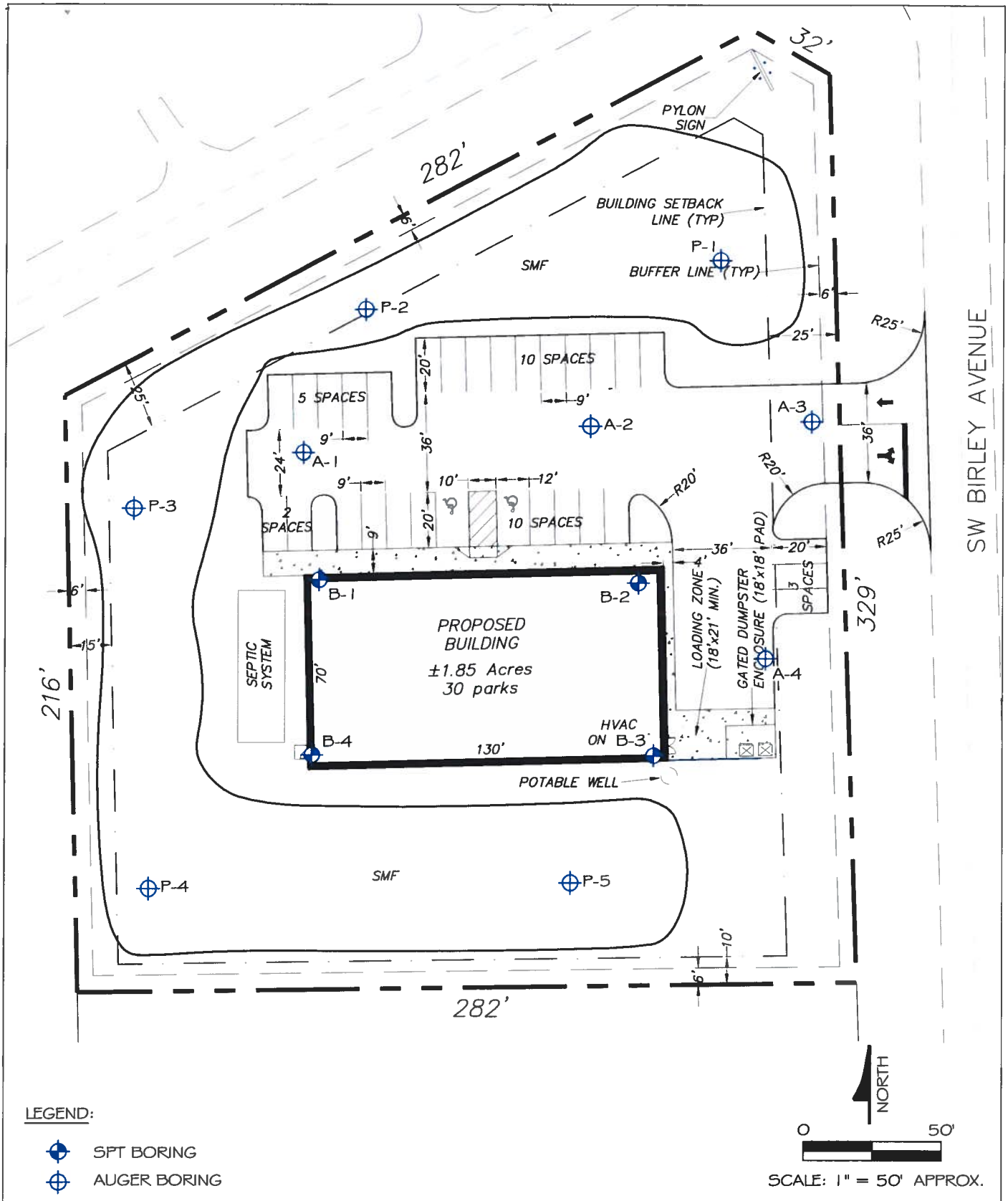
The analysis and recommendations submitted in this report are based upon the data obtained from soil borings performed at the locations indicated on Figure 2. This report does not reflect any variations that may occur between these borings.

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.

6.5 Misinterpretation of Soil Engineering Report

GSE Engineering & Consulting, Inc. 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 others make the conclusions or recommendations based upon the data presented, those conclusions or recommendations are not the responsibility of GSE.

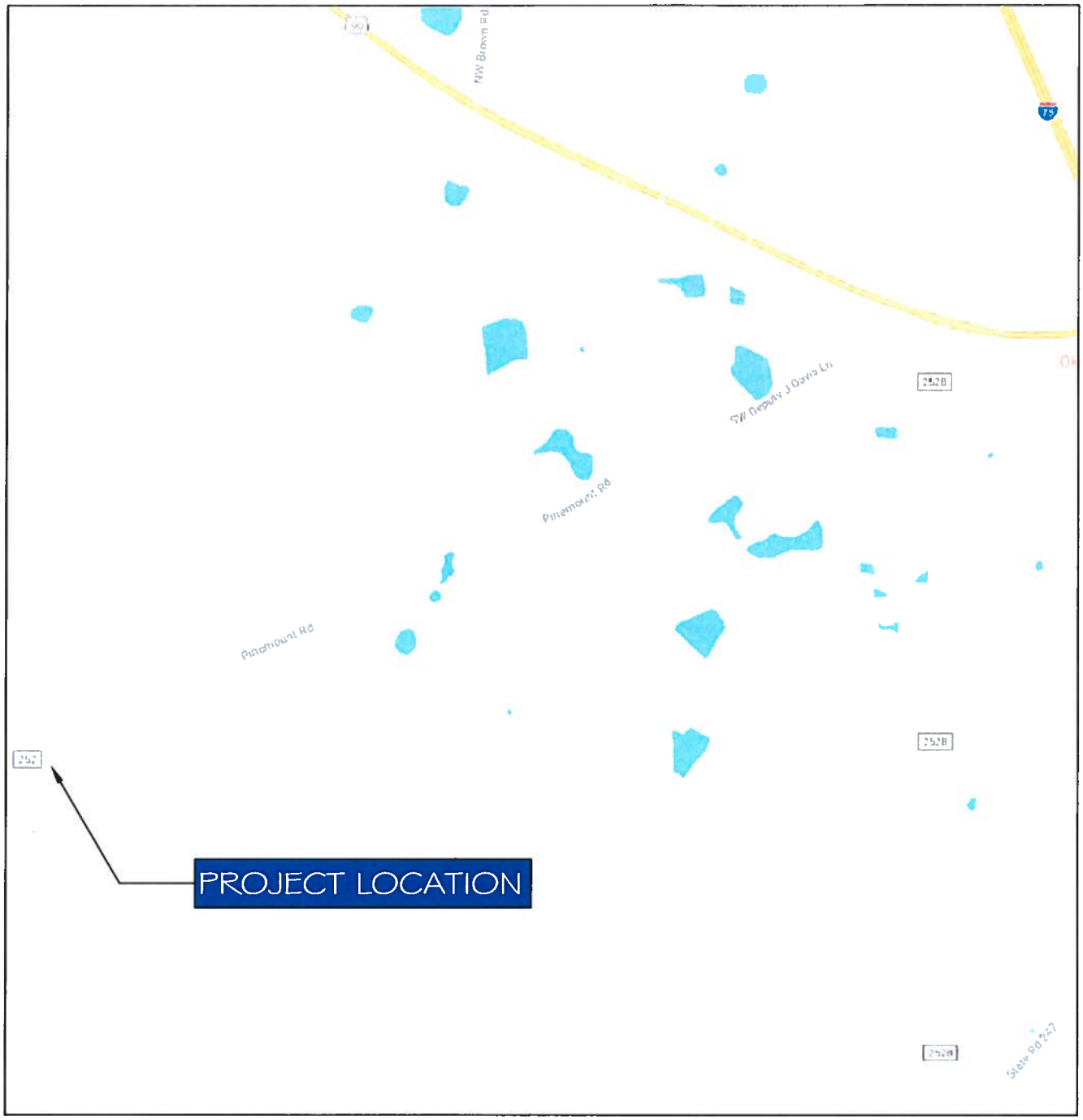
FIGURES



LEGEND:

- SPT BORING
- AUGER BORING

COMMERCIAL RETAIL LAKE CITY AT BIRLEY AVENUE LAKE CITY, COLUMBIA COUNTY, FLORIDA GSE PROJECT NO. 13557	SITE PLAN SHOWING APPROXIMATE LOCATIONS OF FIELD TESTS		
	DESIGNED BY : MDK CHECKED BY : CAD DRAWN BY : JMG	GSE Engineering & Consulting, Inc.	FIGURE 1



NORTH

NOT TO SCALE

COMMERCIAL RETAIL LAKE CITY AT BIRLEY AVENUE LAKE CITY, COLUMBIA COUNTY, FLORIDA GSE PROJECT NO. 13557	PROJECT SITE LOCATION MAP		
	DESIGNED BY: MDK CHECKED BY : CAD DRAWN BY : EEW	GSE Engineering & Consulting, Inc.	FIGURE 1