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Hovey's Island

STORMWATER MANAGEMENT REPORT (DRAFT)

Town of Henderson
Jefferson County, New York
September 14, 2023

OWNER:
Sun Communities
15530 Snowshoe Road
Henderson, NY 13650

PREPARED FOR:
Town of Henderson

PREPARED BY:
Bergmann Associates
18 Corporate Woods Boulevard, Suite 400
Albany, NY 12211

Contents

Section I General Information

A. Project Description

This Stormwater Management Report is for the proposed development located at 15530 Snowshoe Road in the Town of Henderson, Jefferson County, New York. The proposed project consists of the development of approximately 28± acres of an existing 39.1 ± acre island, known as Hovey's Island. Hovey's Island and the contiguous Association Island are owned by Sun Communities, which has a total acreage of 98.33 ± acres. The project will include 117 new campsites, each with an associated single-family cabin, driveways and access roadways, utilities, and landscaping. Proposed site disturbance will total approximately 27.62 acres of land.

This report addresses Water Quality Volume (WQv), Runoff Reduction Volume (RRv) and stormwater quantity mitigation for the proposed development as shown in the project drawings. The proposed design complies with both the New York State Department of Environmental Conservation (NYSDEC) State Pollution Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity (GP-0-20-001) and Town of Henderson requirements.

B. Soil Classification

According to the Natural Resources Conservation Service (NRCS) Soils Report, there are five (5) mapped soil units identified within the project boundary (see Appendix D). Beaches (0 to 8% slopes) (Be), has a hydrologic soil group A meaning it has a high infiltration rate (low runoff potential) when thoroughly wet. Chaumont silty clay (0 to 3% slopes) (CIA), has a hydrologic soil group D meaning it has a poor infiltration rate (high runoff potential) when thoroughly wet. Chaumont silty clay (3 – 8% slopes) (CIB), has a hydrologic soil group D meaning it has a poor infiltration rate (high runoff potential) when thoroughly wet. Kingsbury silty clay (0 – 2% slopes) (KgA) has a has a hydrologic soil group D meaning it has a low infiltration rate (high runoff potential) when thoroughly wet. Udorthents, smoothed (0 – 8% slopes) (Ub), has a hydrologic soil group A meaning it has a High infiltration rate (low runoff potential) when thoroughly wet.

The complete list of soils found within the project boundary is identified in the table below (see Appendix D for the NRCS Soils Report).

Table I – Jefferson County Soils Summary

Symbol	Soil Name	Hydrologic Soil Group
Be	Beaches (0 to 3% slopes)	A
CIA	Chaumont silty clay (3 to 8% slopes)	D
CIB	Chaumont silty clay (0 to 3% slopes)	D
KgA	Kingsbury silty clay (0 to 3% slopes)	D
Ub	Udorthents, smoothed (0 to 8% slopes)	A

Section II Hydrology

A. Methodology

Stormwater runoff rates discharged from the site under the existing conditions provide the basis on which to compare the impacts of the proposed site improvements. Design points are established where runoff exits the site to provide a fixed location at which existing and proposed stormwater discharge rates and quantities can be compared. The areas draining to each design point were delineated using topographic survey maps, grading plans and utility plans. HydroCAD 10.00 by HydroCAD Software Solutions LLC was used to model the existing and proposed conditions. This program simulates the USDA Soil Conservations Service's TR-20 hydrologic model to analyze discharges from drainage areas.

The parameters required to calculate stormwater runoff are area, curve number, and time of concentration. Each drainage area is evaluated using the guidelines described in USDA Soil Conservation Service's TR-55 to determine the curve number and time of concentration.

The runoff curve number (CN) is based on a weighted average of ground cover and soil type. The underlying soil types are described in site-specific soil maps provided in Appendix D. Site and grading plans and survey maps outline existing and proposed ground cover. CN values for specific locations are determined from the tables presented in TR-55.

Time of concentration (Tc) represents the amount of time it takes for runoff to travel from the hydraulically most distant point of the watershed to the point of analysis. Surface roughness, slope, channel shape and flow patterns are the factors that affect the time of concentration. Stormwater runoff flows through the drainage area as sheet flow, shallow concentrated flow, open channel flow, or concentrated flow (such as in storm sewers). For this report sheet flow will become shallow concentrated flow after a maximum of 100 feet for the existing and proposed conditions. The sum of the travel times over the various surfaces within the assumed flow path for a specific drainage area determines that area's time of concentration. The figures and formulas in TR-55 are employed to compute travel times for sheet flow and shallow concentrated flow. A value of 3 feet per second was used for flow velocity through pipes. A minimum time of concentration of 0.1 hours (6 minutes) as specified within TR-55 was utilized.

The stage-storage-discharge relationship for the proposed underground detention area is determined from structural data and outlet structure characteristics. Discharge rates and storage volumes at various elevations (stage) are represented by this relationship.

B. Existing Conditions

The existing drainage area is comprised of a total of 26.15± acres. The drainage area was analyzed as one whole area, EX-1, as all drainage flows into the same adjacent watercourse, Lake Ontario. The parcel to be developed consists of under-developed land and is a localized island that drains straight into the adjacent lake, so no drainage enters the site from adjacent off-site properties.

Drainage Area EX-1, consisting of 26.15± acres, encompasses the project site. This area consists of grass and wooded areas with a small amount of gravel and some small buildings. entirely of grass and landscaped areas. Runoff travels via sheet and shallow concentrated flow in all directions, and continues off-site into Lake Ontario. Lake Ontario's water line will be designated as Design Point #1 (DP-1).

Table II summarizes the hydrologic characteristics of the drainage areas described above. See Appendix A for computations for the existing drainage conditions.

Table II - Existing Conditions Summary

Drainage Area	Description	Size (ac)	Composite Cn	Tc (min)
Area EX-1	Consists primarily of grass and wooded areas. Runoff from this area travels via sheet and shallow concentrated flow in all directions and continues off site.	26.15 ±	80	28.5

C. Proposed Conditions

The proposed drainage area is comprised of a total of 26.15± acres and consists of impervious rooftop and paved areas along with grassed and landscaped areas. The drainage area was divided into five (5) separate areas designated as Drainage Areas PR-1, PR-2, PR-3, PR-4 & PR-5. These areas have unique flow paths and therefore have been analyzed separately.

Drainage Area P-1, consisting of 5.08± acres, encompasses the north-western portion of the site. This area consists primarily of impervious paved areas and buildings with landscaped area. Runoff from this area travels via sheet flow, shallow concentrated flow and pipe flow in a westerly direction to a proposed aboveground bioretention area, which eventually discharges into Lake Ontario. This discharge point will be designated as Design Point #1 (DP-1).

Drainage Area P-2, consisting of 4.36± acres, encompasses the northern portion of the site. This area consists primarily of impervious paved areas and buildings with landscaped area. Runoff from this area travels via sheet flow, shallow concentrated flow and pipe flow in an easterly direction to a proposed aboveground bioretention area, which eventually discharges into Lake Ontario. This discharge point will be designated as Design Point #2 (DP-2).

Drainage Area P-3, consisting of 4.43± acres, encompasses the south-western portion of the site. This area consists primarily of impervious paved areas and buildings with landscaped area. Runoff from this area travels via sheet flow, shallow concentrated flow and pipe flow in a southerly direction to a proposed aboveground wet-swale, which eventually discharges into Lake Ontario. This discharge point will be designated as Design Point #3 (DP-3).

Drainage Area P-4, consisting of 5.03± acres, encompasses the southern portion of the site. This area consists primarily of impervious paved areas and buildings with landscaped area. Runoff from this area travels via sheet flow, shallow concentrated flow and pipe flow in a southerly direction to a proposed aboveground wet-swale, which eventually discharges into Lake Ontario. This discharge point will be designated as Design Point #4 (DP-4).

Drainage Area P-5, consisting of 7.24± acres, encompasses the eastern portion of the site. This area consists primarily of impervious paved areas and buildings with landscaped area. Runoff from this area travels via sheet flow, shallow concentrated flow and pipe flow in an easterly direction to a proposed aboveground wet-swale, which eventually discharges into Lake Ontario. This discharge point will be designated as Design Point #5 (DP-5).

Table III summarizes the hydrologic characteristics of the drainage areas described above. See Appendix B for computations for the proposed drainage conditions.

Table III - Proposed Conditions Summary

Drainage Area	Description	Size (ac)	Composite Cn	Tc (min)
Area P-1	Consists primarily of impervious and landscaped areas. Runoff from this area travels via sheet and shallow concentrated flow into a bioretention area and continues off site.	5.08 ±	87	6.0
Area P-2	Consists primarily of impervious and landscaped areas. Runoff from this area travels via sheet and shallow concentrated flow into a bioretention area and continues off site.	4.63 ±	86	6.0
Area P-3	Consists primarily of impervious and landscaped areas. Runoff from this area travels via sheet and shallow concentrated flow into a wet swale and continues off site.	4.43 ±	88	6.0
Area P-4	Consists primarily of impervious and landscaped areas. Runoff from this area travels via sheet and shallow concentrated flow into a wet swale and continues off site.	5.03 ±	87	6.0
Area P-5	Consists primarily of impervious and landscaped areas. Runoff from this area travels via sheet and shallow concentrated flow into a wet swale and continues off site.	7.24 ±	88	6.0

The following site planning practices were used to prepare the final site plan.

Table IV - Site Planning Practices

Practice	Description
Preservation of Undisturbed Areas	Grading limits are minimized to the maximum extent practical. Existing wetlands have been kept to a minimum. A portion of the site will remain undisturbed as wooded areas.
Preservation of Buffers	The existing wetland buffer will be preserved in its existing condition to the maximum extent possible.
Reduction of clearing and Grading	Clearing of trees will be minimized. A portion of the site will remain as wooded areas. Grading has been limited to the minimum amount needed for roads, driveways, foundations, utilities, and stormwater management facilities.
Locating Development in Less Sensitive Areas	The development will occur outside of the existing wetland areas. The development will also take place on less steep areas of site, preserving the wooded areas and areas of the floodplains.
Roadway Reduction	Roadways have been reduced to the maximum extent practical to limit the amount of impervious area.
Sidewalk Reduction	Sidewalks have been reduced to the maximum extent practical to limit the amount of impervious area.
Driveway Reduction	Driveways have been reduced to the maximum extent practical to limit the amount of impervious area.
Cul-de-sac Reduction	Cul-de-sac reduction is not applicable to this project.
Building Footprint Reduction	The building footprint has been reduced to the maximum extent practical to limit the amount of impervious area.
Parking Reduction	Parking has been reduced to the minimum extent needed for the project.
Soil Restoration and Open Space Design	In disturbed areas where no permanent construction shall occur, soil shall undergo de-compaction treatment and additional topsoil shall be installed to allow for establishing of a uniform, dense vegetative cover.

Section III Stormwater Management & NPDES Phase II Requirements

State Pollutant Discharge Elimination System (SPDES)

Since the subject site will have land disturbance of more than 1-acre a State Pollutant Discharge Elimination System (SPDES) permit will be required as part of the project. A Storm Water Pollution Prevention Plan (SWPPP) will be developed in accordance with the permit regulations. The SWPPP will be prepared in compliance with the New York State DEC Design Manual and meet the following criteria as the principal objectives contained in an approved SWPPP.

1) Reduction or elimination of erosion and sediment loading to water-bodies during construction activities. Controls will be designed in accordance with the New York State Standards and Specifications for Erosion and Sediment Control.
2) Control the impact of stormwater runoff on the water quality of the receiving waters.
3) Control the increase in volume and peak runoff rate of runoff during and after construction.
4) Maintenance of stormwater controls during and after completion of construction.

The aforementioned objectives will be accomplished by incorporating several of the design criteria outlined within the Technical Guidelines provided by the New York State Department of Environmental Conservation Stormwater Management Design Manual and summarized below.

A. Water Quality Volume

The Water Quality Volume (WQv) requirement is designed to improve the quality of stormwater leaving the site. The WQv is based on the site area that drains to the stormwater treatment practices. Due to poor draining soils and bedrock encountered close to the surface (Refer to Appendix D, Geotechnical report) across the project site limiting practice depth, Bioretention Areas (F-5) and Wet Swales (O-2) were chosen to provide the necessary Water Quality Volume (WQv). This project is not located within a section 303(d) watershed requiring enhanced phosphorus treatment, therefore additional WQv requirements are not necessary for this project.

The required WQv for the full site development is 39,563 CF. Drainage areas P-1 & P-2 will each have a separate Bioretention Area (F-5) to accommodate the required WQv for the drainage area. Drainage areas P-3, P-4 & P-5 will each have a separate Wet Swale (O-2) to accommodate the required WQv for the drainage area. WQv calculations for each drainage area are provided in Appendix C and are summarized in the Table below.

Table V - Water Quality Volume

Water Quality Volume Summary			
Drainage Area	Water Quality Volume Required (CF)	Water Quality Volume Provided (CF)	Practice
P-1	7,293	7,293	Bioretention Area
P-2	5,879	5,879	Bioretention Area
P-3	7,063	7,063	Wet Swale
P-4	7,411	7,411	Wet Swale
P-5	11,917	11,917	Wet Swale

B. Runoff Reduction Volume

The required Runoff Reduction Volume (RRv) of 7,351 CF has been achieved via the Bioretention Areas (F-5) utilizing soil media for filtration and underdrains. Drainage areas P-1 & P-2 will each have a separate Bioretention Area (F-5) to accommodate the required RRv for the project site.

RRv calculations are provided in Appendix C and are summarized in the Table below.

Table VI - Runoff Reduction Volume

Runoff Reduction Volume			
Drainage Area	Runoff Reduction Volume Required (CF)	Runoff Reduction Volume Provided (CF)	Practice
P-1	5,351	6,840	Bioretention Area
P-2	2,000	2,448	Bioretention Area

C. Channel Protection Volume, Overbank Flood and Extreme Storm

Channel Protection Volume, Overbank Flood and Extreme Storm control is not required as the site discharges directly into a fifth order stream, Henderson Bay, which is a part of Lake Ontario.

D. Green Infrastructure

Provided in Table VII below is a list of green infrastructure techniques acceptable for runoff reduction and a justification of technical feasibility

Table VII - Green Infrastructure Practices

Group	Practice	Description
Runoff Reduction Techniques	Conservation of Natural Areas	Grading limits are minimized to the maximum extent practical. Existing wetlands will not be disturbed, wooded areas within the property will not be disturbed to the maximum extent possible. No permanent conservation areas or easements are applicable to this project.
	Sheetflow to Riparian Buffers or Filter Strips	A majority of the forested areas, stream buffers, and riparian buffers will be conserved.
	Vegetated Open Swale	The existing poorly-drained soils and high bedrock do not allow for use of vegetated swales.
	Tree Planting / Tree Box	Clearing of trees will be minimized. Grading has been limited to the minimum amount needed for roads, driveways, foundations, utilities, and stormwater management facilities. Existing trees will be saved to the maximum extent practical while new trees will be added on-site.
	Stream Daylighting for Redevelopment Projects	Not applicable for the proposed site.

	Rain Garden	Not technically feasible. Rain gardens cannot be used to treat runoff from parking lots or roadways. Additionally, the on-site soils are very poorly drained and not conducive to using rain gardens.
	Green Roof	This is not a practical alternative for this development.
	Stormwater Planter	Stormwater planters are not designed to treat runoff from parking lots or roadways. Additionally, the on-site soils are very poorly drained and not conducive for stormwater planters.
	Rain Tank / Cistern	Not feasible due to space constraints around buildings and quantity of residential houses.
	Porous Pavement	Porous pavement is not feasible due to poorly drained soils and residential driveways.
	Standard Management Practices	Due to poorly drained soils and existing high levels of bedrock, infiltration could not be utilized. Bioretention areas were chosen where bedrock was determined to be lower, and wet-swales in areas of high bedrock as they had no minimum separation to impermeable layers.

Section IV Summary of Findings

A. Conclusion

Based on the analysis provided in this report, the proposed stormwater management practices will have been designed in accordance with the New York State Stormwater Management Design Manual for water quality treatment. Therefore, this project meets the NYSDEC and Town of Henderson requirements for stormwater quality and runoff from the developed site.

Appendix A

Existing Conditions Drainage Map

18 Corporate Woods Boulevard,
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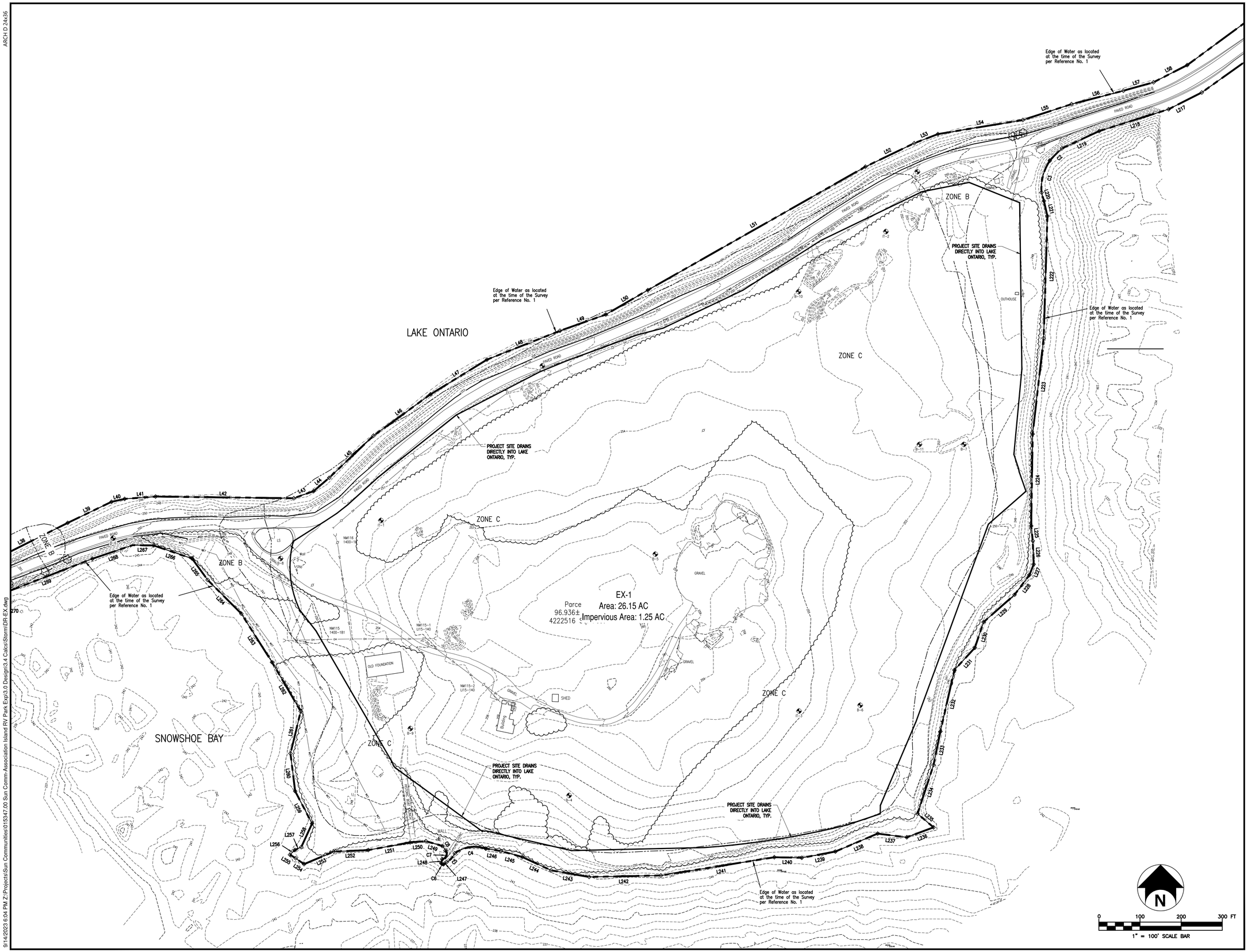

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SUN COMMUNITIES

HOVEYS ISLAND

TOWN OF HENDERSON
JEFFERSON COUNTY
NEW YORK

Date Revised	Description

NOT FOR CONSTRUCTION
60 % SUBMISSION

Project Manager	Discipline Lead
R. DARLING, PE	R. DARLING, PE
Designer	Reviewer
S. AL GBURI	P. HOLSBERGER, PE
Date Issued	Project Number
7/6/2023	15347.00

Sheet Name

EXISTING CONDITIONS DRAINAGE MAP

Drawing Number

DR-EX

Appendix B

Proposed Conditions Drainage Map

18 Corporate Woods Boulevard,
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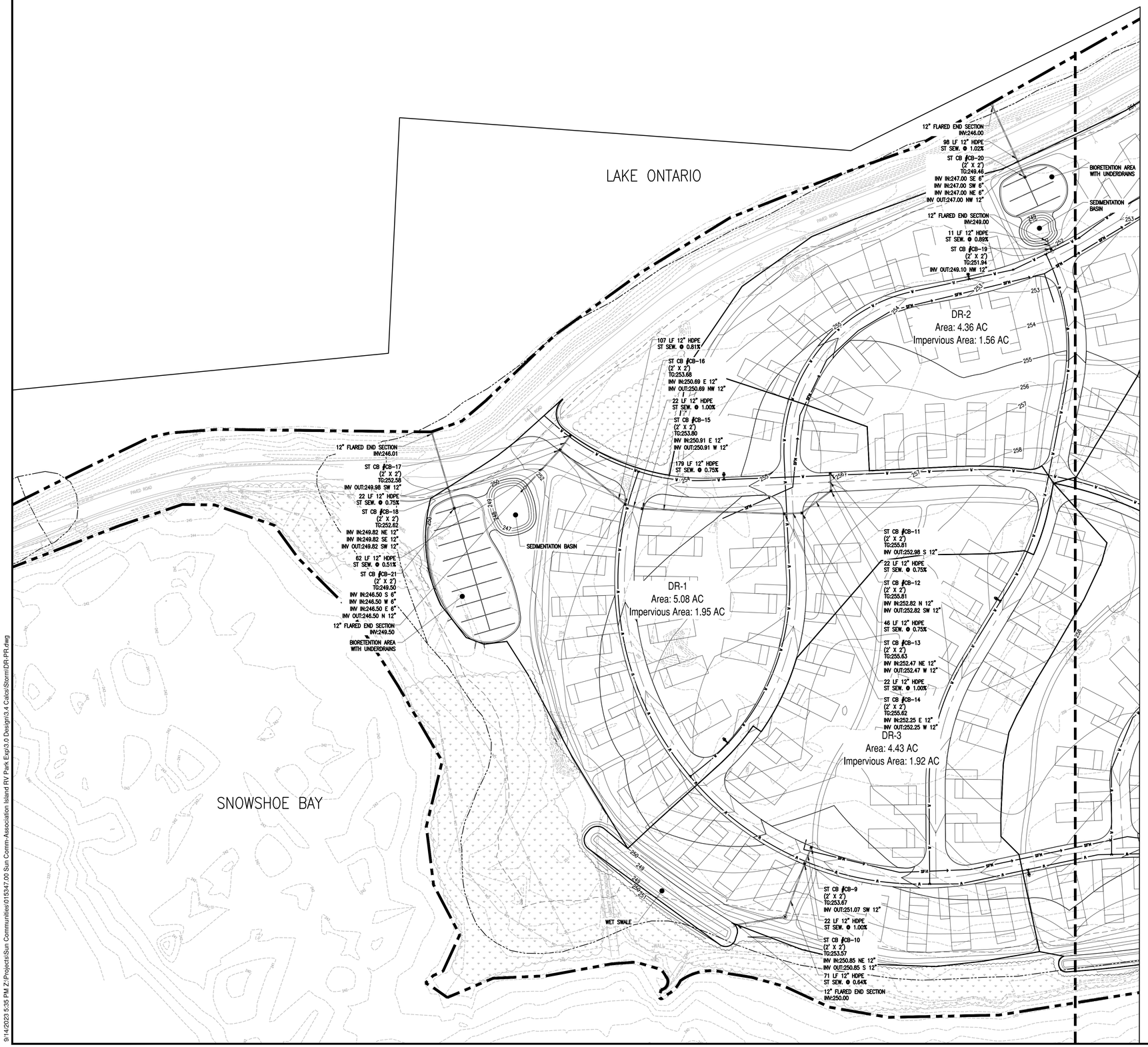
ARCH D 24x36



GRADING LEGEND:

75	PROPOSED MAJOR CONTOUR
76	PROPOSED MINOR CONTOUR
TC=78.01 BC=77.51	PROPOSED TOP OF CURB / BOTTOM OF CURB ELEVATION
TW/BW=152.50	PROPOSED TOP OF WALL / BOTTOM OF WALL
77.73	PROPOSED SPOT ELEVATION
EG=77.73	EXISTING ELEVATION
HP=77.73	PROPOSED HIGH POINT ELEVATION
TG=77.73	PROPOSED TOP OF GRATE ELEVATION
RIM=77.73	PROPOSED RIM ELEVATION
2.5%	PROPOSED SLOPE
72	EXISTING CONTOUR

N

0 60 120 180 FT

1" = 60' SCALE BAR

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Designer: S. AL GBURI	Reviewer: P. HOLSBERGER, PE
Date Issued: 7/6/2023	Project Number: 15347.00

Sheet Name

PROPOSED CONDITIONS DRAINAGE MAP I

Drawing Number

DR-PR1

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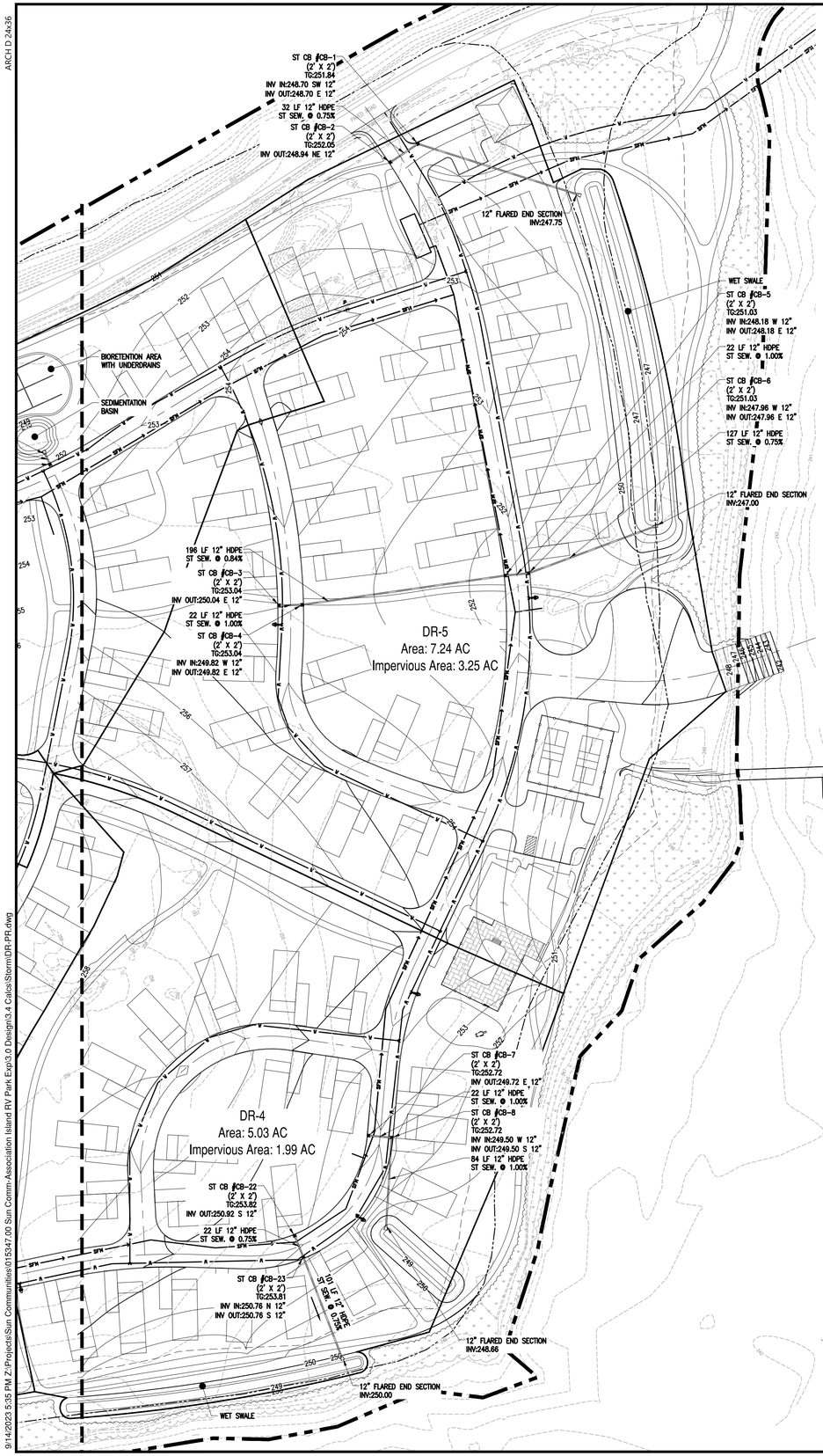

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×TG=77.73	PROPOSED TOP OF GRATE ELEVATION
×RIM=77.73	PROPOSED RIM ELEVATION
2.5%	PROPOSED SLOPE
72	EXISTING CONTOUR

N

0 60 120 180 FT

1" = 60' SCALE BAR

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SUN COMMUNITIES

HOVEYS ISLAND

TOWN OF HENDERSON
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Date Revised	Description

NOT FOR CONSTRUCTION
60 % SUBMISSION

Project Manager: R. DARLING, PE	Discipline Lead: R. DARLING, PE
Designer: S. AL GBURI	Reviewer: P. HOLSBERGER, PE
Date Issued: 7/6/2023	Project Number: 15347.00

Sheet Name

PROPOSED CONDITIONS DRAINAGE MAP II

Drawing Number

DR-PR2

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Appendix C

NYSDEC GI Worksheets - Water Quality and Runoff Reduction Calculations

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Version 1.7
Last Updated: 10/02/2015

Total Water Quality Volume Calculation
WQv(acre-feet) = [(P)(Rv)(A)] /12

Is this project subject to Chapter 10 of the NYS Design Manual (i.e. WQv is equal to post-development 1 year runoff volume)?.....	No

Design Point:	1	
P=	1.00	*inch*

Manually enter P, Total Area and Impervious Cover.

Breakdown of Subcatchments

Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Description
1	5.08	1.95	38%	0.40	7,293	Bioretention
2	4.36	1.56	36%	0.37	5,879	Bioretention
3	4.43	1.92	43%	0.44	7,063	Wet Swale
4	5.03	1.99	40%	0.41	7,411	Wet Swale
5	7.24	3.25	45%	0.45	11,917	Wet Swale
6						
7						
8						
9						
10						
Subtotal (1-30)	26.14	10.66	41%	0.42	39,563	Subtotal 1
Total	26.14	10.66	41%	0.42	39,563	Initial WQv

Identify Runoff Reduction Techniques By Area

Technique	Total Contributing Area *(Acre)*	Contributing Impervious Area *(Acre)*	Notes
Conservation of Natural Areas	0.00	0.00	*minimum 10,000 sf*
Riparian Buffers	0.00	0.00	*maximum contributing length 75 feet to 150 feet*
Filter Strips	0.00	0.00	
Tree Planting	0.00	0.00	*Up to 100 sf directly connected impervious area may be subtracted per tree*
Total	0.00	0.00	

Recalculate WQv after application of Area Reduction Techniques

	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Runoff Coefficient Rv	WQv *(ft^3)*
"<<Initial WQv"	26.14	10.66	41%	0.42	39,563
Subtract Area	0.00	0.00			
WQv adjusted after Area Reductions	26.14	10.66	41%	0.42	39,563
Disconnection of Rooftops		0.00			
Adjusted WQv after Area Reduction and Rooftop Disconnect	26.14	10.66	41%	0.42	39,563
WQv reduced by Area Reduction techniques					0

Minimum RRv

Enter the Soils Data for the site		
Soil Group	Acres	S
A	0.00	55%
B	0.00	40%
C	0.00	30%
D	25.99	20%
Total Area	25.99	
Calculate the Minimum RRv		
S =	0.20	
Impervious =	10.66	*acre*
Precipitation	1	*in*
Rv	0.95	
Minimum RRv	7,351	*ft3*
	0.17	af

Runoff Reduction Volume and Treated volumes						
	Runoff Reduction Techiques/Standard SMPs		Total Contributing Area	Total Contributing Impervious Area	WQv Reduced (RRv)	WQv Treated
			(acres)	(acres)	cf	cf
Area/Volume Reduction	Conservation of Natural Areas	RR-1	0.00	0.00		
	Sheetflow to Riparian Buffers/Filter Strips	RR-2	0.00	0.00		
	Tree Planting/Tree Pit	RR-3	0.00	0.00		
	Disconnection of Rooftop Runoff	RR-4		0.00		
	Vegetated Swale	RR-5	0.00	0.00	0	
	Rain Garden	RR-6	0.00	0.00	0	
	Stormwater Planter	RR-7	0.00	0.00	0	
	Rain Barrel/Cistern	RR-8	0.00	0.00	0	
	Porous Pavement	RR-9	0.00	0.00	0	
	Green Roof (Intensive & Extensive)	RR-10	0.00	0.00	0	
Standard SMPs w/RRv Capacity	Infiltration Trench	I-1	0.00	0.00	0	0
	Infiltration Basin	I-2	0.00	0.00	0	0
	Dry Well	I-3	0.00	0.00	0	0
	Underground Infiltration System	I-4	0.00			
	Bioretention & Infiltration Bioretention	F-5	9.44	3.51	9288	3884
	Dry swale	O-1	0.00	0.00	0	0
Standard SMPs	Micropool Extended Detention (P-1)	P-1				
	Wet Pond (P-2)	P-2				
	Wet Extended Detention (P-3)	P-3				
	Multiple Pond system (P-4)	P-4				
	Pocket Pond (p-5)	P-5				
	Surface Sand filter (F-1)	F-1				
	Underground Sand filter (F-2)	F-2				
	Perimeter Sand Filter (F-3)	F-3				
	Organic Filter (F-4	F-4				
	Shallow Wetland (W-1)	W-1				
	Extended Detention Wetland (W-2	W-2				
	Pond/Wetland System (W-3)	W-3				
	Pocket Wetland (W-4)	W-4				
	Wet Swale (O-2)	O-2	16.70	7.15		26391.000
Totals by Area Reduction →			0.00	0.00	0	
Totals by Volume Reduction →			0.00	0.00	0	
Totals by Standard SMP w/RRV →			9.44	3.51	9288	3884
Totals by Standard SMP →			16.70	7.15		26391
Totals (Area + Volume + all SMPs) →			26.14	10.66	9,288	30,275
	Impervious Cover √	okay				

NOI QUESTIONS

#	NOI Question	Reported Value	
		cf	af
28	Total Water Quality Volume (WQv) Required	39563	*0.908*
30	Total RRV Provided	9288	*0.213*
31	Is RRv Provided ≥WQv Required?	No	
32	Minimum RRv	7351	*0.169*
32a	Is RRv Provided ≥ Minimum RRv Required?	Yes	
33a	Total WQv Treated	30275	*0.695*
34	Sum of Volume Reduced & Treated	39563	*0.908*
34	Sum of Volume Reduced and Treated	39563	*0.908*
35	Is Sum RRv Provided and WQv Provided ≥WQv Required?	Yes	

Apply Peak Flow Attenuation			
36	Channel Protection	*Cpv*	
37	Overbank	*Qp*	
37	Extreme Flood Control	*Qf*	
	Are Quantity Control requirements met?		

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k — The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: *Sand* - 3.5 ft/day (City of Austin 1988); *Peat* - 2.0 ft/day (Galli 1990); *Leaf Compost* - 8.7 ft/day (Claytor and Schueler, 1996); *Bioretention Soil* (0.5 ft/day (Claytor &

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
1	5.08	1.95	0.38	0.40	7292.67	1.00	Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops		0.00	38%	0.40	7,293	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.					0	*ft^3*	

Soil Information			
Soil Group	D		
Soil Infiltration Rate	0.00	*in/hour*	*Okay*
Using Underdrains?	Yes	*Okay*	

Calculate the Minimum Filter Area				
		Value	Units	Notes
WQv		7,293	*ft^3*	
Enter Depth of Soil Media	*df*	2.5	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	*Af*	6077	*ft^2*	

Determine Actual Bio-Retention Area			
Filter Width	190	*ft*	
Filter Length	75	*ft*	
Filter Area	14250	*ft^2*	
Actual Volume Provided	17100	*ft^3*	

Determine Runoff Reduction			
Is the Bioretention contributing flow to another practice?	No	Select Practice	
RRv	6,840		
RRv applied	6,840	*ft^3*	*This is 40% of the storage provided or WQv whichever is less.*
Volume Treated	453	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*
Volume Directed	0	*ft^3*	This volume is directed another practice
Sizing √	OK		*Check to be sure Area provided ≥ Af*

Bioretention Worksheet

(For use on HSG C or D Soils with underdrains)

Af=WQv*(df)/[k*(hf+df)(tf)]

Af	Required Surface Area (ft2)
WQv	Water Quality Volume (ft3)
df	Depth of the Soil Medium (feet)
hf	Average height of water above the planter bed
tf	Volume Through the Filter Media (days)

k — The hydraulic conductivity [ft/day], can be varied depending on the properties of the soil media. Some reported conductivity values are: *Sand* - 3.5 ft/day (City of Austin 1988); *Peat* - 2.0 ft/day (Galli 1990); *Leaf Compost* - 8.7 ft/day (Claytor and Schueler, 1996); *Bioretention Soil* (0.5 ft/day (Claytor & Schueler, 1996)

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
2	4.36	1.56	0.36	0.37	5879.37	1.00	Bioretention
Enter Impervious Area Reduced by Disconnection of Rooftops			36%	0.37	5,879	<<WQv after adjusting for Disconnected Rooftops	
Enter the portion of the WQv that is not reduced for all practices routed to this practice.						*ft^3*	

Soil Information			
Soil Group	D		
Soil Infiltration Rate	0.00	*in/hour*	*Okay*
Using Underdrains?	Yes	*Okay*	

Calculate the Minimum Filter Area				
		Value	Units	Notes
WQv		5,879	*ft^3*	
Enter Depth of Soil Media	*df*	2.5	*ft*	*2.5-4 ft*
Enter Hydraulic Conductivity	*k*	0.5	*ft/day*	
Enter Average Height of Ponding	*hf*	0.5	*ft*	*6 inches max.*
Enter Filter Time	*tf*	2	*days*	
Required Filter Area	*Af*	4899	*ft^2*	

Determine Actual Bio-Retention Area			
Filter Width	85	*ft*	
Filter Length	60	*ft*	
Filter Area	5100	*ft^2*	
Actual Volume Provided	6120	*ft^3*	

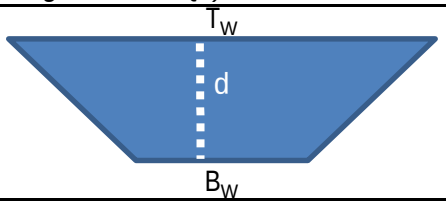
Determine Runoff Reduction				
Is the Bioretention contributing flow to another practice?		No	Select Practice	N/A
RRv	2,448			
RRv applied	2,448	*ft^3*	*This is 40% of the storage provided or WQv whichever is less.*	
Volume Treated	3,431	*ft^3*	*This is the portion of the WQv that is not reduced in the practice.*	
Volume Directed	0	*ft^3*	This volume is directed another practice	
Sizing √	OK		*Check to be sure Area provided ≥ Af*	

Dry Swale Worksheet

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
3	4.43	1.92	0.43	0.44	7062.64	1.00	
Enter Impervious Area Reduced by Disconnection of Rooftops			43%	0.44	7,063	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			Pretreatment Technique
Pretreatment (10% of WQv)	706	ft^3	

Calculate Available Storage Capacity			
Bottom Width	8	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	8	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	1%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	1.5	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	32	*ft*	
Area	30.00	*sf*	
Minimum Length	212	*ft*	
Actual Length	230	*ft*	
End Point Depth check	1.50	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	7,606	ft^3	
Soil Group (HSG)		D	

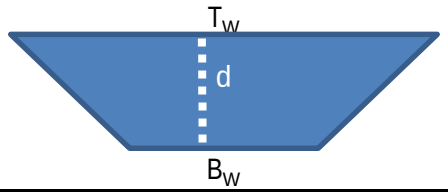
Runoff Reduction				
Is the Dry Swale contributing flow to another practice?		No	Select Practice	
RRv	1,521	ft^3	Runnoff Reduction equals 40% in HSG A and B and 20% in HSG C and D up to the WQv	
Volume Treated	5,541	ft^3	This is the difference between the WQv calculated and the runoff reduction achieved in the swale	
Volume Directed	0	ft^3	This volume is directed another practice	
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv	

Dry Swale Worksheet

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
4	5.03	1.99	0.40	0.41	7411.01	1.00	
Enter Impervious Area Reduced by Disconnection of Rooftops			40%	0.41	7,411	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			Pretreatment Technique
Pretreatment (10% of WQv)	741	ft^3	

Calculate Available Storage Capacity			
Bottom Width	8	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	4	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	1%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	1.5	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	20	*ft*	
Area	21.00	*sf*	
Minimum Length	318	*ft*	
Actual Length	400	*ft*	
End Point Depth check	1.50	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	9,141	ft^3	
Soil Group (HSG)		D	

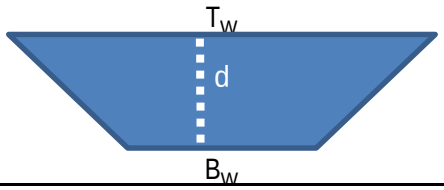
Runoff Reduction				
Is the Dry Swale contributing flow to another practice?			Select Practice	
RRv	1,828	ft^3	Runnoff Reduction equals 40% in HSG A and B and 20% in HSG C and D up to the WQv	
Volume Treated	5,583	ft^3	This is the difference between the WQv calculated and the runoff reduction achieved in the swale	
Volume Directed	0	ft^3	This volume is directed another practice	
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv	

Dry Swale Worksheet

Design Point:	1

Enter Site Data For Drainage Area to be Treated by Practice							
Catchment Number	Total Area *(Acres)*	Impervious Area *(Acres)*	Percent Impervious *%*	Rv	WQv *(ft^3)*	Precipitation *(in)*	Description
5	7.24	3.25	0.45	0.45	11917.44	1.00	
Enter Impervious Area Reduced by Disconnection of Rooftops			45%	0.45	11,917	<<WQv after adjusting for Disconnected Rooftops	

Pretreatment Provided			Pretreatment Technique
Pretreatment (10% of WQv)	1,192	ft^3	

Calculate Available Storage Capacity			
Bottom Width	8	*ft*	Design with a bottom width no greater than eight feet to avoid potential gullying and channel braiding, but no less than two feet
Side Slope (X:1)	9	*Okay*	Channels shall be designed with moderate side slopes (flatter than 3:1) for most conditions. 2:1 is the absolute maximum side slope
Longitudinal Slope	1%	*Okay*	*Maximum longitudinal slope shall be 4%*
Flow Depth	1.5	*ft*	*Maximum ponding depth of one foot at the mid-point of the channel, and a maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Top Width	35	*ft*	
Area	32.25	*sf*	
Minimum Length	333	*ft*	
Actual Length	350	*ft*	
End Point Depth check	1.50	*Okay*	*A maximum depth of 18" at the end point of the channel (for storage of the WQv)*
Storage Capacity	12,479	ft^3	
Soil Group (HSG)		D	

Runoff Reduction					
Is the Dry Swale contributing flow to another practice?				Select Practice	
RRv	2,496	ft^3	Runnoff Reduction equals 40% in HSG A and B and 20% in HSG C and D up to the WQv		
Volume Treated	9,422	ft^3	This is the difference between the WQv calculated and the runoff reduction achieved in the swale		
Volume Directed	0	ft^3	This volume is directed another practice		
Volume √	*Okay*		Check to be sure that channel is long enough to store WQv		

Appendix E

NRCS Soils Report and Geotechnical Investigation Report

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Jefferson County, New York

August 3, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:4,550 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jefferson County, New York
Survey Area Data: Version 22, Sep 10, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 19, 2020—Nov 5, 2020

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Be	Beaches	3.4	6.9%
ClA	Chaumont silty clay, 0 to 3 percent slopes	8.8	17.9%
ClB	Chaumont silty clay, 3 to 8 percent slopes	16.3	33.2%
KgA	Kingsbury silty clay, 0 to 2 percent slopes	5.8	11.8%
Ub	Udorthents,smoothed	6.0	12.2%
Totals for Area of Interest		**49.0**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Jefferson County, New York

Be—Beaches

Map Unit Setting

National map unit symbol: 9slw
Elevation: 0 to 100 feet
Mean annual precipitation: 33 to 50 inches
Mean annual air temperature: 45 to 46 degrees F
Frost-free period: 110 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Udipsamments, beaches, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udipsamments, Beaches

Typical profile

H1 - 0 to 70 inches: loamy sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Aquents

Percent of map unit: 8 percent
Landform: Depressions
Hydric soil rating: Yes

Windsor

Percent of map unit: 7 percent
Hydric soil rating: No

Saprists

Percent of map unit: 5 percent
Landform: Swamps, marshes
Hydric soil rating: Yes

ClA—Chaumont silty clay, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9sms
Elevation: 250 to 1,020 feet
Mean annual precipitation: 33 to 50 inches
Mean annual air temperature: 45 to 46 degrees F
Frost-free period: 110 to 170 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Chaumont and similar soils: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chaumont

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Clayey glaciolacustrine deposits or glaciomarine deposits

Typical profile

H1 - 0 to 5 inches: silty clay
H2 - 5 to 11 inches: clay
H3 - 11 to 22 inches: clay
H4 - 22 to 27 inches: silty clay
H5 - 27 to 31 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: F142XB005VT - Clayplain
Hydric soil rating: No

Minor Components

Kingsbury
Percent of map unit: 5 percent
Hydric soil rating: No

Covington
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Wilpoint
Percent of map unit: 5 percent
Hydric soil rating: No

Guffin
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Unnamed soils, rock outcrop and fragments
Percent of map unit: 3 percent

Livingston
Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

ClB—Chaumont silty clay, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9smt
Elevation: 250 to 950 feet
Mean annual precipitation: 33 to 50 inches
Mean annual air temperature: 45 to 46 degrees F
Frost-free period: 110 to 170 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Chaumont and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chaumont

Setting
Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear

Parent material: Clayey glaciolacustrine deposits or glaciomarine deposits

Typical profile

H1 - 0 to 5 inches: silty clay
H2 - 5 to 11 inches: clay
H3 - 11 to 22 inches: clay
H4 - 22 to 27 inches: silty clay
H5 - 27 to 31 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: F142XB005VT - Clayplain
Hydric soil rating: No

Minor Components

Kingsbury

Percent of map unit: 5 percent
Hydric soil rating: No

Wilpoint

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed soils, rock fragments and rock outcrops

Percent of map unit: 3 percent

Covington

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

Guffin

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Livingston

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

KgA—Kingsbury silty clay, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 9spq
Elevation: 80 to 600 feet
Mean annual precipitation: 33 to 50 inches
Mean annual air temperature: 45 to 46 degrees F
Frost-free period: 110 to 170 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Kingsbury and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kingsbury

Setting

Landform: Lake plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Calcareous, clayey glaciomarine deposits or glaciolacustrine deposits

Typical profile

H1 - 0 to 12 inches: silty clay
H2 - 12 to 28 inches: clay
H3 - 28 to 60 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: F142XB005VT - Clayplain
Hydric soil rating: No

Minor Components

Chaumont
Percent of map unit: 5 percent
Hydric soil rating: No

Livingston
Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Vergennes
Percent of map unit: 4 percent
Hydric soil rating: No

Unnamed soils
Percent of map unit: 4 percent

Guffin
Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

Ub—Udorthents,smoothed

Map Unit Setting
National map unit symbol: 9srx
Elevation: 250 to 1,330 feet
Mean annual precipitation: 33 to 50 inches
Mean annual air temperature: 45 to 46 degrees F
Frost-free period: 110 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition
Udorthents, smoothed, and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Smoothed

Typical profile
H1 - 0 to 4 inches: channery loam
H2 - 4 to 70 inches: very gravelly sandy loam

Properties and qualities
Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 5.95 in/hr)
Depth to water table: About 36 to 72 inches

Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Urban land

Percent of map unit: 5 percent
Hydric soil rating: No

Collamer

Percent of map unit: 5 percent
Hydric soil rating: No

Canandaigua

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Dumps

Percent of map unit: 5 percent
Hydric soil rating: No

Sun

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Bombay

Percent of map unit: 5 percent
Hydric soil rating: No

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CME Associates, Inc.

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www.cmeassociates.com

Transmittal

October 7, 2021

Sun Association Island RV, LLC (Client)
c/o Sun Communities, Inc.
c/o ATWELL, LLC
1250 East Diehl Road, Suite 300
Naperville, IL 60563

Attn: Mr. Brian A. Styck, P.E., Project Manager

Re: Association Island Expansion Project
Henderson, New York
CME Project No.: 27803-05

Gentlepeople:

Enclosed you will find….

Number of Copies	Report Number	Description
1	27803B-01-1021	Geotechnical Data Report

This report was emailed to Mr. Brian A. Styck at bstyck@atwell-group.com on 10/07/21.

Respectfully submitted,
CME Associates, Inc.

Chen Liu, Ph.D., EIT
Geotechnical Engineer

CL.cw

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October 7, 2021

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c/o ATWELL, LLC
1250 East Diehl Road, Suite 300
Naperville, IL 60563
Phone: 630.557.0800
Cell: 602.499.0428

Attn: Mr. Brian A. Styck, P.E., Project Manager
bstyck@atwell-group.com

Re: Geotechnical Data Report
Association Island Expansion Project
Henderson, New York
CME Report No.: 27803B-01-1021

1.0 INTRODUCTION

CME Associates, Inc. (CME) was retained by Sun Association Island RV, LLC (Client) to provide subsurface exploration and geotechnical services for the subject project. CME conducted a subsurface exploration for the subject project in September 2021. The Scope of Basic Services and this report have been provided pursuant to the Consultant Contract between CME and Client, executed on 06/01/2021 and 09/14/2021, through Purchases Order Nos. 1314 and 1387, respectively, which reference CME Proposal/Agreement No.: 05.6378, dated 04/13/2021 and CME Proposal/Agreement No.: 05.6492, dated 08/09/2021.

This report provides a summary of exploration activities conducted at the subject project site. This exploration consisted of advancing 27 Test Borings and performing 3 Infiltration Tests. Geotechnical recommendations for the proposed structure required in the agreement will be provided under a separate cover after CME receives the following information from Client.

- Site Plan
- Grading Plan with finish floor elevation of the proposed Buildings
- Loading information (maximum unfactored wall/column loads at foundation level)
- Progress Plans, including Foundation Plan, Cross-Sections, etc. (if available)

2.0 EXPLORATION METHODOLOGY

2.1 Exploration Layout and Utility Clearance

Test Boring locations were staked in the field by CME based on the attached *Soil Boring Location Plan 1*, Drawing No.CN-A, dated 11/25/2020 and *Soil Boring Location Plan 2*, Drawing No.CN-A, dated 08/25/2021 for two islands at the subject project. Following the field mark out, CME contacted Dig Safely New York (DSNY) to clear public utilities at the Test Boring locations. Test Boring locations were slightly shifted to avoid utility conflicts and access issues. *CME Exploration Location Plans*, labeled ELP-1 and ELP-2, depict the as-drilled Test Boring locations. GPS coordinates and elevation at grade for all exploration locations were obtained using a hand-held GPS survey equipment (Spectra Precision Ranger 3). Please refer to the attached *GPS Coordinates and Elevations Tables* for a description of equipment and datum used, as well as for GPS coordinates and elevations at the exploration locations.

2.2 Test Borings

Test Borings were advanced using a Central Mine Equipment Model 550X, ATV mounted, rotary exploration drill rig, equipped with 3-¼" I.D. hollow stem augers. Soil sampling was conducted using a 140-pound hammer dropping through a distance of 30 inches to drive a 2" O.D. split barrel sampler in general conformance with ASTM Standard Practice D1586. Rock coring was performed in general conformance with ASTM Standard Practice D2113. The boreholes were backfilled with grout to closely match existing grade. The *Subsurface Exploration – Test Boring Logs*, labeled B-1 to B-11, IT-1 to IT-3, and SB-1 to SB-13, are attached. *Bedrock Core Photographs* are also attached to this report.

Samples were logged and visually classified in the field by a CME Driller, and a portion of each soil sample was placed and sealed in a glass jar. Bedrock cores were placed and secured in a wooden box. The soil and rock classifications were later reviewed by a CME Senior Geologist and spot checked by the undersigned Engineer in CME's AASHTO re:source[1] accredited East Syracuse Laboratory. The visual soil classifications were made using a modified Burmister Classification System, as practiced by CME and as generally described in the attached document, entitled "*General Information & Key to the Test Boring Logs*".

2.3 Infiltration Testing

Three Infiltration Tests (labeled IT-3, IT-01 and IT-02) were conducted by a CME Professional Geologist on 09/28/21 in general conformance with the New York State Stormwater Management Design Manual, Appendix D: Infiltration Testing Requirements. The test locations and depths were selected by Mr. Brian A. Styck, P.E., Project Manager of ATWELL, LLC. Please note, Infiltration Tests IT-1 and IT-2 were deleted due to the shallow depths of bedrock encountered while drilling Borings IT-1 and IT-2. The test details and results of Infiltration Tests IT-3, IT-01 and IT-02 are given in the attached, *Infiltration Test Reports*.

2.4 Laboratory Testing

Laboratory index testing on selected soil samples, consisting of Atterberg Limit Testing and Particle Size Analysis, was conducted in CME's East Syracuse Laboratory. Please refer to the attached, *Laboratory Test Summary Report*, for test methods and results.

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[1]**AASHTO re:source** – American Association of State Highway & Transportation Officials (AASHTO) Materials Reference Laboratory, a Federal Agency having jurisdiction to assess laboratory competency according to the Standards of the United States of America. CME East Syracuse accreditation includes testing of Portland Cement Concrete, Aggregate and Soil Materials. www.AASHTOresource.org.

3.0 STANDARD OF CARE

CME endeavored to conduct services identified herein in a manner consistent with that level of care and skill ordinarily exercised by members of the industry currently practicing in the same locality and under similar conditions as this project. No warranty, either expressed or implied, is made or intended by CME's proposal, contract, and written and oral reports, all of which warranties are hereby expressly disclaimed. CME shall not be responsible for the acts or omissions of Client, its contractors, agents and consultants. CME may rely upon information supplied by Client, its contractors, agents and consultants or information available from generally accepted reputable sources, without independent verification, and CME assumes no responsibility for the accuracy thereof.

4.0 CLOSING

CME's services have been provided according to the requirements of the referenced CME Proposal/Agreement. No other representations, expressed or implied, are intended or made with respect to the information provided herein, and including but not limited to, its suitability for use by others.

Respectfully Submitted,

CME Associates, Inc.

Chen Liu, Ph.D., EIT
Geotechnical Engineer

CME Associates, Inc.

Roonak Ghaderi, Ph.D., EIT
Geotechnical Engineer

CL.cw

Attachment Listing:

Soil Boring Location Plan 1, Drawing No.CN-A, dated 11/25/2020 (1 of 1)
Soil Boring Location Plan 2, Drawing No.CN-A, dated 08/25/2021 (1 of 1)
CME Exploration Location Plans, ELP-1 and ELP-2 (2 of 2)
GPS Coordinates and Elevations Tables (2 of 2)
CME Subsurface Exploration – Test Boring Logs, B-1 to B-11, IT-1 to IT-3, SB-1 to SB-13 (27 of 27)
Bedrock Core Photographs (4 of 4)
Infiltration Test Reports (3 of 3)
Laboratory Test Summary Report (2 of 2)
General Information & Key to Test Boring Logs (4 of 4)

Attachment to CME Report No. 27803B-01-1021

Soil Boring Location Plan 1

LEGEND

BOUNDARY LINE

PROPOSED ROADWAY CENTERLINE

BUILDING SETBACK LINE

SITE DATA

EXISTING ZONING DISTRICT — I – ISLAND DISTRICT

SITE AREA	EXISTING DEVELOPMENT	66.39 ACRES
	PROPOSED EXPANSION	32 ACRES
	TOTAL	98.39 ACRES

PROPOSED SITES

RV PULL–THRU	32 (17%)
RV BACK–IN (PERPENDICULAR)	155 (83%)
TOTAL	187

BUILDING SETBACKS	REQUIRED
FROM ADJACENT ROADWAY	150'
FROM WATERFRONT	75'

RECREATION SPACE

REQUIRED — 20% OF SITE AREA EXCLUDING REQUIRED SETBACKS
AREA OF SITE EXCLUDING SETBACKS: 22.73 ACRES
= 22.73 ACRES X 20% = 4.55 ACRES

PROVIDED — 4.58 ACRES

811 Know what's below. Call before you dig.

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR; NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

ATWELL
866.850.4200 www.atwell-group.com
1250 EAST DIEHL ROAD, SUITE 300
NAPERVILLE, IL 60563
DESIGN FIRM #184-005876

TOWN OF HENDERSON
JEFFERSON COUNTY, NEW YORK

CLIENT
SUN COMMUNITIES, INC.
1000 ISLANDS KOA
15530 SNOWSHOE ROAD
HENDERSON, NY

CONCEPT PLAN A

DATE
NOVEMBER 25, 2020

REVISIONS

SCALE 0 50 100
1" = 100 FEET

DR. REK | CH. JPC
P.M. J. CRABLE
BOOK --
JOB 20004042
SHEET NO.
CN-A

CAD FILE: 20004042CN-01 CONCEPT PLAN A 2020-11-23.DWG

Attachment to CME Report No. 27803B-01-1021

Soil Boring Location Plan 2

Know what's **below.** **Call** before you dig.

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

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TOWN OF HENDERSON
JEFFERSON COUNTY, NEW YORK

CLIENT
SUN COMMUNITIES, INC.
ASSOCIATION ISLAND
15530 SNOWSHOE ROAD
HENDERSON, NY

AERIAL EXHIBIT

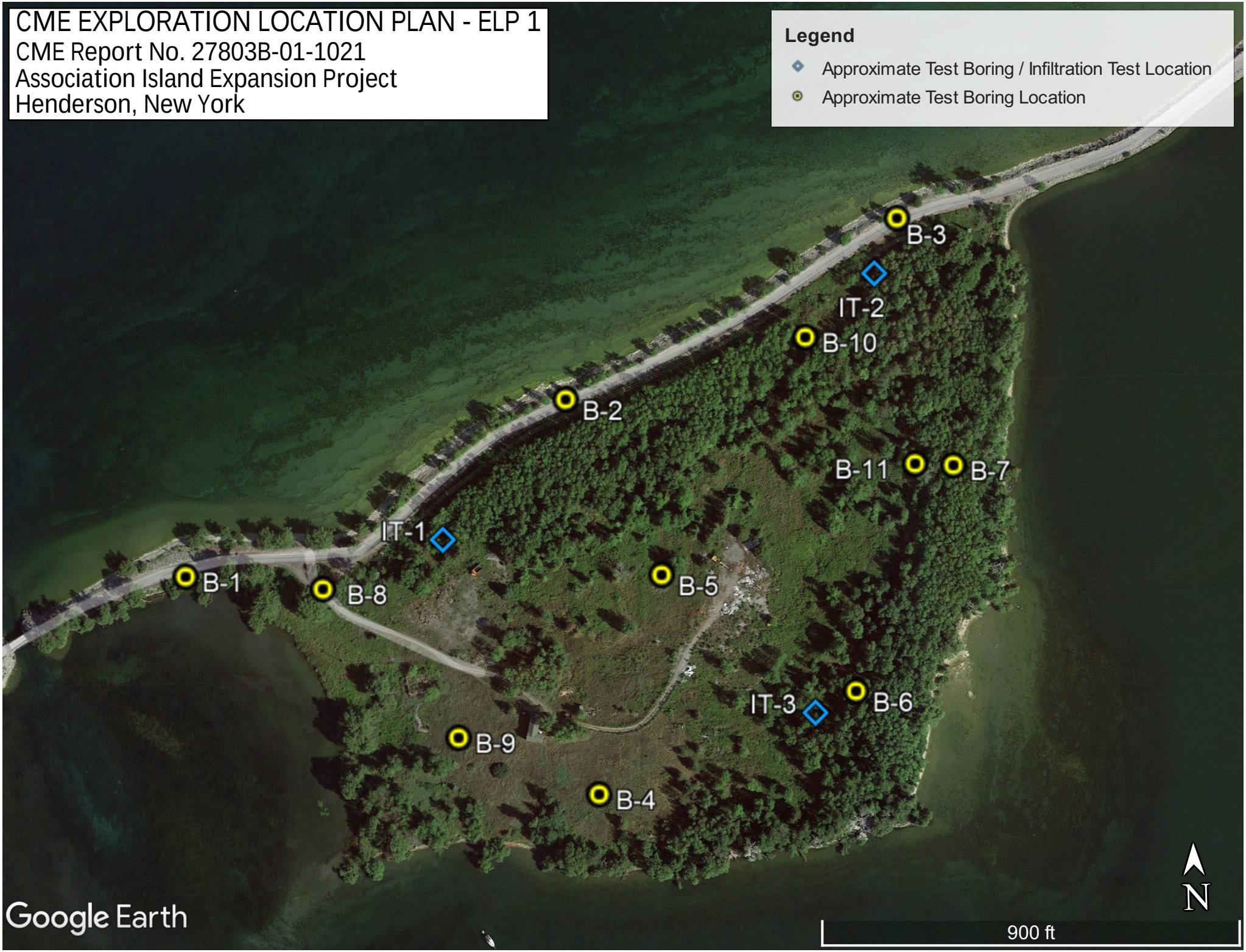
DATE
AUGUST 25, 2021

REVISIONS

SCALE 0 50 100
1" = 100 FEET

DR. MSB/BAS | CH. BAS
P.M. B. STYCK
BOOK --
JOB 20004042.01
SHEET NO.
CN-A

CAD FILE: 20004042CN-03 CONCEPT PLAN REV. #2 2021-08-27.DWG


CME EXPLORATION LOCATION PLAN - ELP 1
CME Report No. 27803B-01-1021
Association Island Expansion Project
Henderson, New York
Legend
Approximate Test Boring / Infiltration Test Location
Approximate Test Boring Location
B-3
IT-2
B-10
B-2
B-11
B-7
IT-1
B-1
B-8
B-5
IT-3
B-6
B-9
B-4
N
900 ft
Google Earth


CME EXPLORATION LOCATION PLAN - ELP 2
CME Report No. 27803B-01-1021
Association Island Expansion Project - Phase 2
Henderson, New York
Legend
Approximate Test Boring / Infiltration Test Location
Approximate Test Boring Location
SB-11
SB-12
SB-10
Bay Drive
SB-13
SB-9
SB-3
SB-5
SB-4
SB-8
SB-2
SB-6 / IT-02
SB-1 / IT-01
SB-7
Google Earth
N
1000 ft

Attachment to CME Report No.: 27803B-01-1021

GPS Coordinates and Elevations Table
Association Island Expansion Project, Henderson, New York

TABLE 1			
Boring ID	**Latitude**	**Longitude**	**Elevation (FT.)**
B-1	43.88748575	-76.22779451	249.9
B-2	43.88846477	-76.22466122	253.1
B-3	43.88947558	-76.22192386	250.8
B-4	43.88614213	-76.22447680	253.6
B-5	43.88742022	-76.22391955	257.9
B-6	43.88670641	-76.22236234	252.2
B-7	43.88801681	-76.22151943	250.9
B-8	43.88739069	-76.22667996	251.4
B-9	43.88649670	-76.22560852	254.0
B-10	43.88879172	-76.22269688	252.0
B-11	43.88803182	-76.22183109	252.2
IT-1	43.88765092	-76.22570346	251.9
IT-2	43.88914492	-76.22213157	250.6
IT-3	43.88657610	-76.22270822	254.7
Water's Edge	43.88769836	-76.22652037	245.6

Notes:
AMSL: Above Mean Sea Level

1. GPS coordinates were obtained utilizing a Spectra Precision Ranger 3 GPS survey equipment.
2. NYSDOT CORS positions are based on NAD 83 (2011).
3. Elevations are based on the North American Vertical Datum of 1988 (NAVD 1988).

Attachment to CME Report No.: 27803B-01-1021

GPS Coordinates and Elevations Table
Association Island Expansion Project - Phase 2, Henderson, New York

TABLE 1			
Boring ID	**Latitude**	**Longitude**	**Elevation (FT.)**
SB-1 / IT-01	43.89299646	-76.21547071	249.5
SB-2	43.89340136	-76.21507360	248.7
SB-3	43.89380858	-76.21575874	250.7
SB-4	43.89343330	-76.21601793	251.6
SB-5	43.89382530	-76.21681601	251.8
SB-6 / IT-02	43.89326301	-76.21698177	251.4
SB-7	43.89286693	-76.21742512	250.3
SB-8	43.89366819	-76.21873402	251.1
SB-9	43.89478279	-76.21795114	250.2
SB-10	43.89578142	-76.21707567	249.9
SB-11	43.89736223	-76.21294161	248.3
SB-12	43.89659563	-76.21074525	249.5
SB-13	43.89517654	-76.21176607	249.4
Water's Edge	43.89307469	-76.21518559	245.5

Notes:
AMSL: Above Mean Sea Level

1. GPS coordinates were obtained utilizing a Spectra Precision Ranger 3 GPS survey equipment.
2. NYSDOT CORS positions are based on NAD 83 (2011).
3. Elevations are based on the North American Vertical Datum of 1988 (NAVD 1988).

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	B-1
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/14/21
Client:	Sun Association Island RV, LLC c/o Sun Commumities, Inc.	**Date Finished**	09/14/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	249.9'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/14/21	While Drilling	None Noted	6.0'
09/14/21	Before Casing Removed	5.0'	8.0'
09/14/21	After Casing Removed	None Noted	out
09/14/21	After Casing Removed	caved @ 1.5'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/17	23-29-22-16		FILL; Grey/Brown silt, cmf gravel, cmf sand, silt (moist)	51
1								
2	2	2.0	4.0	SS/15	17-17-12-18		Similar as above (moist)	29
3								
4	3	4.0	6.0	SS/15	14-12-13-12		Similar as above (moist)	25
5								
6	4	6.0	8.0	SS/14	7-9-4-5		Similar as above (moist)	13
7								
8	5	8.0	10.0	SS/10	6-3-2-2		Grey/Brown CLAY, little SILT, trace cmf GRAVEL, trace cmf SAND (wet, medium stiff)	5
9								
10							Bottom of Boring @ 10.0'	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	B-2
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/15/21
Client:	Sun Association Island RV, LLC c/o Sun Commumities, Inc.	**Date Finished**	09/15/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	253.1'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/15/21	While Drilling	None Noted	4.0'
09/15/21	Before Casing Removed	None Noted	6.2'
09/15/21	After Casing Removed	None Noted	out
09/15/21	After Casing Removed	caved @ 2.5'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/14	9-10-12-9		FILL; Brown silt, cmf gravel, cmf sand, asphalt pieces, roots (moist)	22
1								
2	2	2.0	4.0	SS/18	7-8-9-12		Brown SILT, little CLAY (moist, very stiff)	17
3								
4	3	4.0	6.0	SS/16	8-9-11-19		Brown SILT, little CLAY, trace ROOTS (moist, very stiff)	20
5								
6	4	6.0	6.1	SS/1	100@1"		Brown mf GRAVEL, little SILT, little cmf SAND (moist, hard) *Auger refusal @ 6.2' on possible top of bedrock.*	100+
7							Bottom of Boring @ 6.2'	
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**B-3**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/16/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/16/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	250.8'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/16/21	While Drilling	None Noted	2.0'
09/16/21	Before Casing Removed	None Noted	3.9'
09/16/21	After Casing Removed	None Noted	out
09/16/21	After Casing Removed	caved @ 1.5'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/10	10-15-14-9		FILL; Brown cmf gravel, cmf sand, silt, roots (moist)	29
1								
2	2	2.0	3.7	SS/14	10-13-13-100@2"		Brown SILT, trace cmf GRAVEL, trace cmf SAND, trace ROOTS (moist, very stiff)	26
3							*Spoon refusal @ 3.7'.*	
4							*Auger refusal @ 3.9' on possible top of bedrock.*	
							Bottom of Boring @ 3.9'	
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

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Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**B-4**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/14/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/14/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	253.6'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/14/21	While Drilling	None Noted	2.0'
09/14/21	Before Casing Removed	None Noted	3.3'
09/14/21	After Casing Removed	None Noted	out
09/14/21	After Casing Removed	caved @ 3.0'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse, m - medium, f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1A	0.0	0.5	SS/16	2-3-4-6	0.5	Topsoil and Organic Material (moist)	7
	1B	0.5	2.0				Brown SILT and CLAY, little highly weathered ROCK	
1							FRAGMENTS, trace ROOTS (moist, medium stiff)	
2	2	2.0	3.0	SS/11	8-24-100@0"		Brown CLAY, little SILT, trace ROCK FRAGMENTS (Limestone)	100+
							(moist, hard) *Spoon refusal @ 3.0'.*	
3							*Auger refusal @ 3.3' on possible top of bedrock.*	
4							Bottom of Boring @ 3.3'	
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**B-5**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/14/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/14/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	257.9'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/14/21	While Drilling	None Noted	4.0'
09/14/21	Before Casing Removed	None Noted	5.8'
09/14/21	After Casing Removed	None Noted	out
09/14/21	After Casing Removed	caved @ 2.8'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1A	0.0	0.5	SS/15	2-3-5-5	0.5	Topsoil and Organic Material (moist)	7
	1B	0.5	2.0				Brown/Grey CLAY, some SILT, trace ROOTS (moist, stiff)	
1								
2	2	2.0	4.0	SS/17	5-9-20-41		Light Grey/Brown SILT, little CLAY, little cmf GRAVEL, trace ROOTS (moist, very stiff)	29
3								
4	3	4.0	4.5	SS/6	40-100@0"		Brown/Grey SILT, some weathered ROCK FRAGMENTS (Limestone) (moist, hard)	100+
5							*Spoon refusal @ 4.5'.*	
6							*Auger refusal @ 5.8' on possible top of bedrock.*	
7							Bottom of Boring @ 5.8'	
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**B-6**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/14/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/14/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	252.2'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/14/21	While Drilling	None Noted	4.0'
09/14/21	Before Casing Removed	None Noted	5.0'
09/14/21	After Casing Removed	None Noted	out
09/14/21	After Casing Removed	caved @ 1.0'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1A	0.0	0.5	SS/15	1-4-4-6	0.5	Topsoil and Organic Material (moist)	8
	1B	0.5	2.0				Brown/Grey CLAY, little SILT, trace ROOTS (moist, stiff)	
1								
2	2	2.0	4.0	SS/16	6-10-11-14		Brown/Grey SILT, little CLAY, trace fine GRAVEL, trace cmf SAND (moist, very stiff)	21
3								
4	3	4.0	4.8	SS/8	18-100@3"		Brown CLAY, little SILT, trace ROCK FRAGMENTS (Limestone) (moist, hard) *Spoon refusal @ 4.8'.* *Auger refusal @ 5.0' on possible top of bedrock.*	100+
5							Bottom of Boring @ 5.0'	
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**B-7**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/15/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/15/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	250.9'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/15/21	While Drilling	None Noted	2.0'
09/15/21	Before Casing Removed	None Noted	3.2'
09/15/21	After Casing Removed	None Noted	out
09/15/21	After Casing Removed	caved @ 1.8'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/16	3-6-6-9		Brown SILT, trace CLAY, trace ROOTS (moist, stiff)	12
1								
2	2	2.0	2.9	SS/9	10-100@5"		Brown SILT, little ROCK FRAGMENTS (Limestone), trace mf GRAVEL, trace cmf SAND (moist, hard) *Spoon refusal @ 2.9'.*	100+
3							*Auger refusal @ 3.2' on possible top of bedrock.*	
4							Bottom of Boring @ 3.2'	
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**B-8**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/14/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/14/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	251.4'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	NQ-Core
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/14/21	While Drilling	None Noted	6.0'
09/14/21	Before Casing Removed	2.0' *	7.0'
09/14/21	After Casing Removed	2.3'	out
09/14/21	After Casing Removed	caved @ 5.6'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse, m - medium, f - fine; and - 35 to 50% / some - 20 to 35%, little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/18	12-29-42-63		FILL; Grey/Brown cmf gravel, cmf sand, silt (moist)	71
1								
2	2	2.0	4.0	SS/14	24-40-17-9		FILL; Grey cmf gravel, silt, cmf sand, clay, roots (moist)	57
3								
4	3	4.0	6.0	SS/10	7-8-11-17		Grey cmf GRAVEL, trace cmf SAND, trace SILT, trace CLAY (moist, medium compact)	19
5								
6	4	6.0	7.0	SS/12	18-13-100@0"		Brown mf GRAVEL, some cmf SAND, little SILT, trace CLAY (moist, very compact)	100+
7							*Spoon and auger refusal @ 7.0' on possible top of bedrock.*	
	R-1	7.0	12.0	C/54	NQ-Core	7.0		
8							Grey LIMESTONE with interbedded SHALE layers (⅛"-1" thick) throughout core, moderately to highly weathered, thinly to medium bedded, hard. Broken zone @ 7.0'-8.3'. Horizontal fracture @ 9.2'.	43%
9								
10							Recovery: 54"/60" = 90% | RQD: 26"/60" = 43%	
11							10 Pieces, 19" Chips and Fragments *7'-8' @ 6 min/ft, 8'-9' @ 8.5 min/ft, 9'-12' @ 2 min/ft, no water loss* Coring conducted in 5th gear, 2400 rpm, 700 psi	
12							Bottom of Boring @ 12.0'	
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks: * Water added to borehole during coring process.

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**B-9**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/15/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/15/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	254.0'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	NQ-Core
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/15/21	While Drilling	None Noted	2.0'
09/15/21	Before Casing Removed	None Noted	4.7'
09/15/21	After Casing Removed	None Noted	out
09/15/21	After Casing Removed	caved @ 1.8'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse, m - medium, f - fine; and - 35 to 50% / some - 20 to 35%, little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1A	0.0	1.5	SS/17	2-8-15-49		Brown SILT, little CLAY, trace Roots (moist, very stiff)	23
1								
2	2B	1.5	2.0				Grey cmf GRAVEL, little cmf SAND, trace SILT (moist)	
3	2	2.0	2.2	SS/2	100@2"		Grey mf GRAVEL, little cmf SAND, trace SILT (moist, very compact)	100+
4	3	4.0	4.5	SS/5	100@5"		Brown highly weathered ROCK FRAGMENTS (Shale), little SILT (moist) *Spoon refusal @ 4.5'.*	100+
5						4.7	*Auger refusal @ 4.7' on top of bedrock.*	
6	R-1	4.7	8.3	C/42	NQ-Core		Grey LIMESTONE with interbedded SHALE layers (⅛"-1¼" thick) throughout core, moderately to highly weathered, thinly to medium bedded, hard. Broken zones @ 4.7'-6.4' and 7.3'- 8.1'. Recovery: 42"/42" = 100% | RQD: 6"/42" = 14% 12 Pieces, 24" Chips and Fragments *3.25 min/ft, no water loss* *Coring conducted in 5th gear, 2400 rpm, 650 psi*	14%
7								
8								
9							Bottom of Boring @ 8.3'	
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
6035 Corporate Drive
East Syracuse, NY 13057
Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**B-10**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/15/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/15/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	252.0'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	NQ-Core
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/15/21	While Drilling	None Noted	4.0'
09/15/21	Before Casing Removed	1.2' *	4.0'
09/15/21	After Casing Removed	1.2'	out
09/15/21	After Casing Removed	caved @ 3.3'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	1.7	SS/15	1-3-12-100@2"		Brown CLAY, little SILT, trace mf GRAVEL, trace cmf SAND, trace ROOTS (moist, stiff)	15
1								
2	2	2.0	3.1	SS/10	14-83-100@1"		Brown SILT, little ROCK FRAGMENTS (Limestone), little CLAY (moist, hard) *Spoon refusal @ 3.1'.*	100+
3							*Auger refusal @ 4.0' on top of bedrock.*	
						4.0		
4	R-1	4.0	9.0	C/60	NQ-Core		Grey LIMESTONE with interbedded SHALE layers (⅛"-1" thick) throughout core, moderately to highly weathered, thinly to medium bedded, hard. Broken zone @ 4.0'-5.0' and 5.4'-5.8'. Recovery: 60"/60" = 100% RQD: 40"/60" = 67% 8 Pieces, 13" Chips and Fragments *3.75 min/ft, no water loss* *Coring conducted in 5th gear, 2500 rpm, 600 psi*	67%
5								
6								
7								
8								
9							Bottom of Boring @ 9.0'	
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks: * Water added to borehole during coring process.

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**B-11**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/15/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/15/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	252.2'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/15/21	While Drilling	None Noted	4.0'
09/15/21	Before Casing Removed	None Noted	5.2'
09/15/21	After Casing Removed	None Noted	out
09/15/21	After Casing Removed	caved @ 3.5'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/17	2-4-6-8		Brown SILT, trace CLAY, trace ROOTS (moist, stiff)	10
1								
2	2A	2.0	3.0	SS/18	71-11-46-64		Brown SILT, little CLAY (moist, hard)	57
3	2B	3.0	4.0				Brown/Grey cmf GRAVEL and SILT, trace cmf SAND (moist, very compact)	
4	3	4.0	4.7	SS/8	32-100@2"		Grey/Brown highly weathered ROCK FRAGMENTS (Shale), some SILT, trace mf GRAVEL, trace cmf SAND (moist) *Spoon refusal @ 4.7'. Auger refusal @ 5.2' on possible top of bedrock.*	100+
5							Bottom of Boring @ 5.2'	
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

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Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**IT-1**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/20/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/20/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	251.9'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/20/21	While Drilling	None Noted	2.0'
09/20/21	Before Casing Removed	None Noted	3.0'
09/20/21	After Casing Removed	None Noted	out
09/20/21	After Casing Removed	caved @ 2.0'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/19	2-4-4-4		Brown/Grey CLAY, little SILT, trace cmf SAND, trace ROOTS (moist, stiff)	8
1								
2	2	2.0	3.0	SS/12	12-100@6"		Brown/Grey SILT, little CLAY, little cmf SAND, trace mf GRAVEL (moist, hard)	100+
3							*Spoon and auger refusal @ 3.0' on possible top of bedrock.* *See remark 1.*	
4							Bottom of Boring @ 3.0'	
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks: 1. Per Client instruction, no IT pipe was installed due to shallow bedrock.

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Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**IT-2**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/20/21
Client:	Sun Association Island RV, LLC c/o Sun Commumities, Inc.	**Date Finished**	09/20/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	250.6'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/20/21	While Drilling	None Noted	2.0'
09/20/21	Before Casing Removed	None Noted	2.4'
09/20/21	After Casing Removed	None Noted	out
09/20/21	After Casing Removed	caved @ 1.0'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	1.9	SS/19	3-6-9-100@5"		Brown/Grey SILT, trace fine GRAVEL, trace cmf SAND (moist, very stiff)	15
1							*Spoon refusal @ 1.9' on possible cobble or top of weathered bedrock.*	
2							*Auger refusal @ 2.4' on possible top of bedrock. See remark 1.*	
3							Bottom of Boring @ 2.4'	
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks: 1. Per Client instruction, no IT pipe was installed due to shallow bedrock.

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	IT-3
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/20/21
Client:	Sun Association Island RV, LLC c/o Sun Commumities, Inc.	**Date Finished**	09/20/21
Location:	See CME Exploration Location Plan, ELP-1	**Surface Elev.**	254.7'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/20/21	While Drilling	None Noted	6.0'
09/20/21	Before Casing Removed	None Noted	7.3'
09/20/21	After Casing Removed	None Noted	out
09/20/21	After Casing Removed	caved @ 3.0'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/20	2-3-3-4		Brown CLAY, little SILT, trace ROOTS (moist, medium stiff)	6
1								
2	2	2.0	4.0	SS/16	5-8-15-17		Grey/Brown SILT, some CLAY, little cmf SAND, trace mf GRAVEL (moist, very stiff)	23
3								
4	3	4.0	6.0	SS/15	13-17-33-38		Grey/Brown SILT, some CLAY, little cmf SAND, trace cmf GRAVEL (moist, hard)	50
5								
6	4	6.0	7.2	SS/12	71-32-100@3"		Grey/Brown CLAY, some SILT, little ROCK FRAGMENTS (Limestome), little cmf SAND, trace mf GRAVEL (moist, hard) *Spoon refusal @ 7.2'. Auger refusal @ 7.3' on possible top of bedrock.*	100+
7								
8							Bottom of Boring @ 7.3'	
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-1/IT-01**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/20/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/20/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	249.5'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	NQ-Core
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/20/21	While Drilling	None Noted	4.0'
09/20/21	Before Casing Removed	None Noted	4.5'
09/20/21	After Casing Removed	None Noted	out
09/20/21	After Casing Removed	caved @ 4.3'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse, m - medium, f - fine; and - 35 to 50% / some - 20 to 35%, little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1A	0.0	0.2	SS/19	5-8-6-6	0.2	Topsoil and Organic Material (moist)	14
	1B	0.2	2.0				Brown SILT, trace fine SAND, trace ROOTS (moist, stiff)	
1								
2	2	2.0	4.0	SS/18	5-6-9-26		Brown/Grey SILT, little CLAY, trace mf GRAVEL, trace ROOTS (moist, stiff)	15
3								
4	3	4.0	4.5	SS/6	100@6"		Brown/Grey ROCK FRAGMENTS (Limesonte), little SILT (moist)	100+
						4.5	*Spoon and auger refusal @ 4.5' on top of bedrock.*	
5	R-1	4.5	9.5	C/58	NQ-Core		Grey LIMESTONE with interbedded SHALE layers throughout (⅛"-¾" thick), thinly to medium bedded, moderately weathered, hard. Broken zones @ 4.9'-5.2', 5.8'-6.2' and 6.8'-7.0'. Vertical fracture with heavy weathering and sediment infilling @ 4.5'-4.9'. Horizontal fractures @ 6.4' and 7.2'. Recovery: 58"/60" = 97% | RQD: 33"/60" = 55% 7 Pieces, 14" Chips and Fragments *1.5 min/ft, no water loss* *Coring conducted in 5th gear, 2200 rpm, 500 psi*	55%
6								
7								
8								
9								
10							Bottom of Boring @ 9.5'	
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
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Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-2**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/20/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/20/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	248.7'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/20/21	While Drilling	None Noted	4.0'
09/20/21	Before Casing Removed	None Noted	5.9'
09/20/21	After Casing Removed	None Noted	out
09/20/21	After Casing Removed	caved @ 2.7'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse, m - medium, f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1A	0.0	0.2	SS/13	3-3-6-6	0.2	Topsoil and Organic Material (moist)	9
	1B	0.2	2.0				Miscellaneous FILL; clay, silt, cmf gravel, cmf sand, ceramic pieces (moist)	
1								
2	2A	2.0	3.0	SS/17	3-6-40-72		Grey/Brown mottled CLAY, little SILT, trace cmf SAND (moist, hard)	46
3	2B	3.0	4.0				Grey cmf GRAVEL, little SILT, trace cmf SAND (moist)	
4	3	4.0	5.9	SS/16	30-42-20-100@5"		Grey/Brown CLAY, some weathered ROCK FRAGMENTS, little cmf GRAVEL, trace cmf SAND (moist, hard)	62
5							*Spoon and auger refusal @ 5.9' on possible top of bedrock.*	
6							Bottom of Boring @ 5.9'	
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
6035 Corporate Drive
East Syracuse, NY 13057
Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-3**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/20/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/20/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	250.7'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/20/21	While Drilling	None Noted	6.0'
09/20/21	Before Casing Removed	None Noted	6.3'
09/20/21	After Casing Removed	None Noted	out
09/20/21	After Casing Removed	caved @ 1.5'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse, m - medium, f - fine; and - 35 to 50% / some - 20 to 35%, little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1A	0.0	0.2	SS/14	4-5-8-8	0.2	Topsoil and Organic Material (moist)	13
	1B	0.2	2.0				Brown SILT, little cmf GRAVEL, trace cmf SAND, trace ROOTS (moist, stiff)	
1								
2	2	2.0	4.0	SS/20	6-4-4-5		Brown/Grey CLAY, some SILT (moist, stiff)	8
3								
4	3	4.0	6.0	SS/12	7-23-13-7		Brown SILT and cmf GRAVEL, trace CLAY, trace cmf SAND, trace ROOTS (moist, hard)	36
5								
6	4	6.0	6.2	SS/3	100@3"		Brown/Grey CLAY, little ROCK FRAGMENTS (Limestone), little SILT (moist, hard) *Spoon refusal @ 6.2'.*	100+
7							*Auger refusal @ 6.3' on possible top of bedrock.*	
8							Bottom of Boring @ 6.3'	
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
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Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-4**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/20/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/20/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	251.6'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/20/21	While Drilling	None Noted	4.0'
09/20/21	Before Casing Removed	None Noted	5.0'
09/20/21	After Casing Removed	None Noted	out
09/20/21	After Casing Removed	caved @ 2.0'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/12	5-14-10-7		Brown SILT, little cmf GRAVEL, trace cmf SAND, trace ROOTS (moist, very stiff)	24
1								
2	2	2.0	4.0	SS/18	7-5-6-7		Brown/Grey SILT, little CLAY, trace ROOTS (moist, stiff)	11
3								
4	3	4.0	5.0	SS/12	7-8-100@0"		Brown/Grey SILT and CLAY, trace ROCK FRAGMENTS (Limestone) (moist, hard)	100+
5							*Spoon and auger refusal @ 5.0' on possible top of bedrock.*	
6							Bottom of Boring @ 5.0'	
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
6035 Corporate Drive
East Syracuse, NY 13057
Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-5**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/20/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/20/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	251.8'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/20/21	While Drilling	1.3'	Spoon Hole
09/20/21	Before Casing Removed	3.6'	6.5'
09/20/21	After Casing Removed	3.8'	out
09/20/21	After Casing Removed	caved @ 4.3'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/16	1-2-3-6		FILL; Brown clay, silt, roots, wood (moist)	5
1								
2	2	2.0	4.0	SS/7	3-2-1-2		Miscellaneous FILL; Brown/Grey wood, silt, ceramic pieces, clay (wet)	3
3								
4	3	4.0	6.0	SS/15	1-2-4-32		Grey mf GRAVEL and cmf SAND, little SILT, little CLAY (moist, loose)	6
5								
6	4	6.0	6.5	SS/6	32-100@0"		Grey weathered ROCK FRAGMENTS (Limestone) (wet) little SILT, trace cmf SAND (wet)	100+
7							*Spoon and auger refusal @ 6.5' on possible top of bedrock.*	
8							Bottom of Boring @ 6.5'	
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
6035 Corporate Drive
East Syracuse, NY 13057
Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	SB-6/IT-02
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/20/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/20/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	251.4'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/20/21	While Drilling	None Noted	4.0'
09/20/21	Before Casing Removed	None Noted	6.1'
09/20/21	After Casing Removed	None Noted	out
09/20/21	After Casing Removed	caved @ 2.9'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse, m - medium, f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1A	0.0	0.2	SS/15	2-5-8-7	0.2	Topsoil and Organic Material (moist)	13
	1B	0.2	2.0				Brown CLAY, little cmf GRAVEL, little SILT, trace cmf SAND, trace ROOTS (moist, stiff)	
1								
2	2	2.0	4.0	SS/20	4-5-8-9		Brown/Grey SILT, some CLAY, trace ROOTS (moist, stiff)	13
3								
4	3	4.0	6.0	SS/18	9-10-11-20		Brown/Grey CLAY, some cmf GRAVEL, little SILT, trace cmf SAND (moist, very stiff)	21
5								
6	4	6.0	6.1	SS/1	100@1"		Grey ROCK FRAGMENTS (Limestone) and ROCK FLOUR (moist)	100+
7							*Spoon and auger refusal @ 6.1' on possible top of bedrock.*	
8							Bottom of Boring @ 6.1'	
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
6035 Corporate Drive
East Syracuse, NY 13057
Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-7**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/20/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/20/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	250.3'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/20/21	While Drilling	None Noted	4.0'
09/20/21	Before Casing Removed	None Noted	5.8'
09/20/21	After Casing Removed	None Noted	out
09/20/21	After Casing Removed	caved @ 2.1'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1A	0.0	0.2	SS/11	8-21-11-18	0.2	Topsoil and Organic Material (moist)	32
	1B	0.2	2.0				FILL; Brown/Grey mf gravel, cmf sand, silt, roots (moist)	
1								
2	2	2.0	4.0	SS/12	12-11-10-9		Miscellaneous FILL; Brown/Grey cmf gravel, cmf sand, silt, ash (moist)	21
3								
4	3	4.0	5.8	SS/11	9-7-9-100@4"		Grey weathered ROCK FRAGMENTS (Limestone), little SILT (wet)	16
5							*Spoon and auger refusal @ 5.8' on possible top of bedrock.*	
6							Bottom of Boring @ 5.8'	
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
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East Syracuse, NY 13057
Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-8**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/16/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/16/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	251.1'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/16/21	While Drilling	None Noted	6.0'
09/16/21	Before Casing Removed	None Noted	6.5'
09/16/21	After Casing Removed	None Noted	out
09/16/21	After Casing Removed	caved @ 2.0'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse, m - medium, f - fine; and - 35 to 50% / some - 20 to 35%, little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1A	0.0	0.2	SS/14	10-11-7-3	0.2	Topsoil and Organic Material (moist)	18
	1B	0.2	2.0				FILL; Brown cmf gravel, cmf sand, silt (moist)	
1								
2	2	2.0	4.0	SS/16	4-6-12-16		Brown SILT, trace fine SAND, trace ROOTS (moist, very stiff)	18
3								
4	3	4.0	6.0	SS/20	12-31-30-24		Grey/Brown SILT, some cmf SAND, little mf GRAVEL (moist, hard)	61
5								
6	4	6.0	6.3	SS/4	100@4"		Brown SILT, little cmf SAND, trace mf GRAVEL (moist, hard)	100+
7							*Spoon refusal @ 6.3'.* *Auger refusal @ 6.5' on possible top of bedrock.*	
8							Bottom of Boring @ 6.5'	
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
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East Syracuse, NY 13057
Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-9**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/16/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/16/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	250.2'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/16/21	While Drilling	None Noted	4.0'
09/16/21	Before Casing Removed	None Noted	8.0'
09/16/21	After Casing Removed	None Noted	out
09/16/21	After Casing Removed	caved @ 1.5'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1A	0.0	0.2	SS/12	4-4-4-8	0.2	Topsoil and Organic Material (moist)	8
	1B	0.2	2.0				Brown/Grey CLAY, little SILT, trace cmf GRAVEL, trace cmf SAND, trace ROOTS (moist, stiff)	
1								
2	2	2.0	4.0	SS/15	4-3-4-6		Grey/Brown CLAY, little SILT (moist, stiff)	7
3								
4	3	4.0	6.0	SS/19	4-4-8-12		Grey CLAY, some SILT, trace cmf SAND (moist, stiff)	9
5								
6	4	6.0	7.9	SS/22	13-19-20-100@5"		Brown/Grey CLAY, some cmf GRAVEL, little SILT, trace cmf SAND (moist, hard)	39
7								
8							*Spoon refusal @ 7.9'.* *Auger refusal @ 8.0' on possible top of bedrock.*	
9							Bottom of Boring @ 8.0'	
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
6035 Corporate Drive
East Syracuse, NY 13057
Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-10**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/16/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/16/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	249.9'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/16/21	While Drilling	None Noted	6.0'
09/16/21	Before Casing Removed	None Noted	6.7'
09/16/21	After Casing Removed	None Noted	out
09/16/21	After Casing Removed	caved @ 2.0'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/14	3-5-5-6		Brown CLAY, some SILT, trace mf GRAVEL, trace cmf SAND, trace ROOTS (moist, stiff)	10
1								
2	2	2.0	4.0	SS/8	5-8-5-5		Brown SILT, little CLAY, little mf GRAVEL, trace cmf SAND (moist, stiff)	13
3								
4	3	4.0	6.0	SS/10	4-5-8-12		Brown CLAY, some cmf GRAVEL, little SILT, trace cmf SAND (moist, stiff)	13
5								
6	4	6.0	6.5	SS/6	13-100@0"		Grey/Brown CLAY, some cmf GRAVEL, little SILT, trace fine SAND (moist, hard) *Spoon refusal @ 6.5'* *Auger refusal @ 6.7' on possible top of bedrock.*	100+
7							Bottom of Boring @ 6.7'	
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
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East Syracuse, NY 13057
Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-11**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/16/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/16/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	248.3'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/16/21	While Drilling	None Noted	2.0'
09/16/21	Before Casing Removed	None Noted	3.2'
09/16/21	After Casing Removed	None Noted	out
09/16/21	After Casing Removed	caved @ 3.2'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/8	8-6-4-3		Brown SILT, some CLAY, trace mf GRAVEL, trace cmf SAND, trace ROOTS (moist, stiff)	10
1								
2	2	2.0	3.2	SS/10	2-2-100@2"		Brown/Grey mottled CLAY, little SILT, trace ROCK FRAGMENTS (Limestone), trace mf GRAVEL, trace cmf SAND, trace ROOTS (moist, hard) *Auger refusal @ 3.2' on possible top of bedrock.*	100+
3								
4							Bottom of Boring @ 3.2'	
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

CME Associates, Inc.
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East Syracuse, NY 13057
Phone: 315-701-0522

SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-12**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/16/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/16/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	249.5'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/16/21	While Drilling	None Noted	4.0'
09/16/21	Before Casing Removed	None Noted	5.0'
09/16/21	After Casing Removed	None Noted	out
09/16/21	After Casing Removed	caved @ 3.5'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/15	4-7-5-8		FILL; Brown cmf gravel, silt, cmf sand, roots (moist)	12
1								
2	2A	2.0	3.0	SS/14	4-7-17-17		Brown CLAY, little mf GRAVEL, little SILT, trace cmf SAND (moist, very stiff)	24
3	2B	3.0	4.0				Grey cmf GRAVEL, little cmf SAND, trace SILT (moist)	
4	3	4.0	4.1	SS/1	100@1"		Grey ROCK FRAGMENTS (Limestone), little ROCK FLOUR, trace SILT (moist) *Spoon refusal @ 4.1'* *Auger refusal @ 5.0' on possible top of bedrock.*	100+
5							Bottom of Boring @ 5.0'	
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**SB-13**
Page No.	1 of 1
Report No.	27803B-01-1021

Project Name:	Association Island Expansion, Henderson, New York	**Date Started**	09/16/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	**Date Finished**	09/16/21
Location:	See CME Exploration Location Plan, ELP-2	**Surface Elev.**	249.4'

METHODS OF INVESTIGATION

Driller:	Beau Fletcher	**Casing:**	3¼" ID H.S.A.
Driller:	Ryan Casatelli	**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:	CME 550X	**Soil Sampler:**	2" OD Split Barrel
Type:	ATV Mounted	**Hammer Wt:**	140 lbs.
Rod Size:	AWJ	**Hammer Fall:**	30 in.

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
09/16/21	While Drilling	None Noted	4.0'
09/16/21	Before Casing Removed	None Noted	7.7'
09/16/21	After Casing Removed	None Noted	out
09/16/21	After Casing Removed	caved @ 3.5'	out

LOG OF BORING SAMPLES / VISUAL CLASSIFICATION OF MATERIAL

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
0	1	0.0	2.0	SS/14	6-14-12-8		FILL; Brown cmf gravel, clay, silt, cmf sand, roots (moist)	26
1								
2	2	2.0	4.0	SS/7	12-9-8-12		Brown CLAY and cmf GRAVEL, little SILT, trace cmf SAND (moist, very stiff)	17
3								
4	3	4.0	6.0	SS/10	7-4-7-11		Dark Grey/Brown CLAY, some cmf GRAVEL, little SILT, trace cmf SAND (moist, stiff)	11
5								
6	4	6.0	7.6	SS/15	11-8-10-100@1"		Dark Grey/Brown CLAY, little SILT, trace mf GRAVEL, trace cmf SAND, trace ORGANIC MATERIAL (moist, very stiff)	18
7							*Spoon refusal @ 7.6'.* *Auger refusal @ 7.7' on possible top of bedrock*	
8							Bottom of Boring @ 7.7'	
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks:

Bedrock Core Photographs
Attachment to CME Report No: 27803B-01-1021

Photograph 1 Boring: SB-1 Run 1 Depth 4.5' - 9.5' See Photographs Nos. 2 and 3 for detailed views.

Photograph 2 SB-1 Run 1 Top Depth 4.5' -7.0'

Photograph 3 SB-1 Run 1 Bottom Depth 7.0' - 9.5'

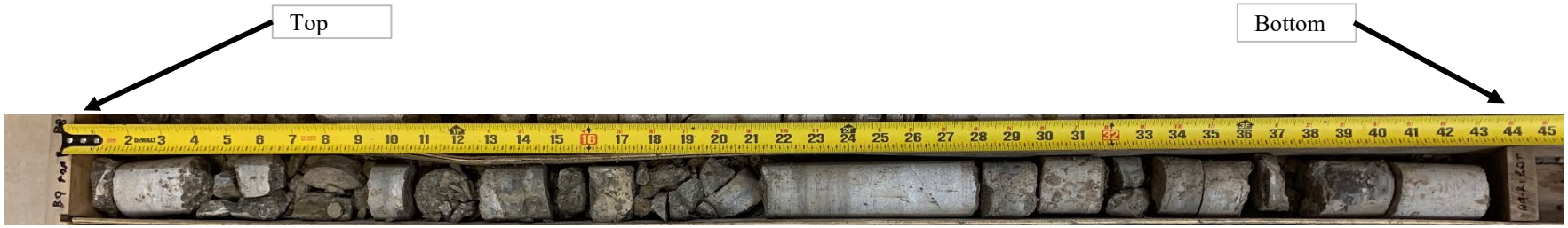
Bedrock Core Photographs
Attachment to CME Report No: 27803B-01-1021

Photograph 4 Boring: B-8 Run 1 Depth 7.0' - 12.0' See Photographs Nos. 5 and 6 for detailed views.

Photograph 5 B-8 Run 1 Top Depth 7.0' - 9.5'

Photograph 6 B-8 Run 1 Bottom Depth 9.5' - 12.0'

Bedrock Core Photographs
Attachment to CME Report No: 27803B-01-1021



Photograph 7 Boring: B-9 Run 1 Depth 4.7' - 8.3' See Photographs Nos. 8 and 9 for detailed views.

Photograph 8 B-9 Run 1 Top Depth 4.7' - 6.7'

Photograph 9 B-9 Run 1 Bottom Depth 6.7' - 8.3'

Bedrock Core Photographs
Attachment to CME Report No: 27803B-01-1021

Photograph 10 Boring: B-10 Run 1 Depth 4.0' - 9.0' See Photographs Nos. 11 and 12 for detailed views.

Photograph 11 B-10 Run 4 Top Depth 4.0' - 6.5'

Photograph 12 B-10 Run 1 Bottom Depth 6.5' - 9.0'

INFILTRATION TEST REPORT

CME Associates, Inc.

Test ID: IT-3

Project:	Association Island Exansion Henderson, New York	CME Report No.:	27803B-01-1021
		Test Date:	09/28/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	Test Location:	See Exploration Location Plan, ELP-1
		Technician:	Bryan Reles, P.G.

Test Preparation and Dimensions

Casing Installed in: ☐ Test Pit ☑ Borehole

Casing Diameter and Type: 4 inch I.D. PVC

A	Existing Grade Elevation (ft):		254.7 ±
B	Casing Stickup Length Above Grade (ft):		1.50
C	Top of Casing Elevation (ft):	(A+B)=	256.2 ±
D	Depth to Bottom of Test Hole, Below Top of Casing (ft):		6.00
E	Bottom of Test Hole Elevation:	(C-D)=	250.2 ±

Burmister Classification of Soil at Bottom of Hole: Grey/Brown SILT, some CLAY, little cmf SAND, trace cmf GRAVEL

Thickness/Type of Scour/Sediment Protection Layer Installed: 3" of Pea Gravel

Date and Time Pre-Soaked: 09/27/21 8:48

Depth to Water Level, Below Top of Casing

Just After Pre-Soak Filling (ft): 5.30

Just Prior to First Test Filling (ft): 5.60 Date: 9/28/21 Time: 12:50

Test Observations

Run 1			Run 2			Run 3			Run 4		
Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)	Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)	Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)	Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)
12:55	0:00	4.00	14:00	0:00	4.00		0:00			0:00	
12:56	0:01	4.00	14:01	0:01	4.00		0:01			0:01	
12:57	0:02	4.00	14:02	0:02	4.00		0:02			0:02	
12:58	0:03	4.00	14:03	0:03	4.00		0:03			0:03	
13:00	0:05	4.00	14:05	0:05	4.00		0:05			0:05	
13:05	0:10	4.00	14:10	0:10	4.00		0:10			0:10	
13:10	0:15	4.00	14:15	0:15	4.00		0:15			0:15	
13:25	0:30	4.00	14:30	0:30	4.00		0:30			0:30	
13:40	0:45	4.00	14:45	0:45	4.00		0:45			0:45	
13:55	1:00	4.00	15:00	1:00	4.00		1:00			1:00	

Test Results

Run:	Run 1	Run 2	Run 3	Run 4
Infiltration Rate (feet/hour):	0.00	0.00		
Infiltration Rate (inches/hour):	0.00	0.00		

Final Infiltration Rate (inches/hour): 0.00

☐ Based on average of all four runs

☑ Based on result of last run

Note(s)

1. Test performed in general conformance with NYS Stormwater Management Design Manual, Appendix D: Infiltration Testing Requirements.
2. IT casing installed adjacent to soil boring IT-3.
3. Test pipe bailed dry and recharged prior to the start of second test.

INFILTRATION TEST REPORT

CME Associates, Inc.

Test ID: IT-01

Project:	Association Island Exansion, Phase 2 Henderson, New York	CME Report No.:	27803B-01-1021
		Test Date:	09/28/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	Test Location:	See Exploration Location Plan, ELP-2
		Technician:	Bryan Reles, P.G.

Test Preparation and Dimensions

Casing Installed in: ☐ Test Pit ☑ Borehole

Casing Diameter and Type: 4 inch I.D. PVC

A	Existing Grade Elevation (ft):		249.5 ±
B	Casing Stickup Length Above Grade (ft):		1.50
C	Top of Casing Elevation (ft):	(A+B)=	251.0 ±
D	Depth to Bottom of Test Hole, Below Top of Casing (ft):		3.00
E	Bottom of Test Hole Elevation:	(C-D)=	248.0 ±

Burmister Classification of Soil at Bottom of Hole: Brown SILT, trace fine SAND, trace ROOTS

Thickness/Type of Scour/Sediment Protection Layer Installed: 3" of Pea Gravel

Date and Time Pre-Soaked: 09/27/21 9:06

Depth to Water Level, Below Top of Casing

Just After Pre-Soak Filling (ft): 2.15

Just Prior to First Test Filling (ft): 2.65 Date: 9/28/21 Time: 9:31

Test Observations

Run 1			Run 2			Run 3			Run 4		
Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)	Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)	Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)	Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)
9:33	0:00	1.00	10:34	0:00	0.95	11:35	0:00	1.00		0:00	
9:34	0:01	1.10	10:35	0:01	0.95	11:36	0:01	1.00		0:01	
9:35	0:02	1.15	10:36	0:02	0.95	11:37	0:02	1.00		0:02	
9:36	0:03	1.15	10:37	0:03	0.95	11:38	0:03	1.00		0:03	
9:38	0:05	1.20	10:39	0:05	0.95	11:40	0:05	1.00		0:05	
9:43	0:10	1.30	10:44	0:10	0.95	11:45	0:10	1.00		0:10	
9:48	0:15	1.30	10:49	0:15	0.95	11:50	0:15	1.00		0:15	
10:03	0:30	1.30	11:04	0:30	0.95	12:05	0:30	1.00		0:30	
10:18	0:45	1.30	11:19	0:45	0.95	12:20	0:45	1.00		0:45	
10:33	1:00	1.30	11:34	1:00	0.95	12:35	1:00	1.00		1:00	

Test Results

Run:	Run 1	Run 2	Run 3	Run 4
Infiltration Rate (feet/hour):	0.00	0.00	0.00	
Infiltration Rate (inches/hour):	0.00	0.00	0.00	

Final Infiltration Rate (inches/hour): 0.00

☐ Based on average of all four runs

☑ Based on result of last run

Note(s)

1. Test performed in general conformance with NYS Stormwater Management Design Manual, Appendix D: Infiltration Testing Requirements.
2. IT casing installed adjacent to soil boring SB-1.
3. Test pipe bailed dry and recharged prior to the start of third test.

INFILTRATION TEST REPORT

CME Associates, Inc.

Test ID: IT-02

Project:	Association Island Exansion, Phase 2 Henderson, New York	CME Report No.:	27803B-01-1021
		Test Date:	09/28/21
Client:	Sun Association Island RV, LLC c/o Sun Communities, Inc.	Test Location:	See Exploration Location Plan, ELP-2
		Technician:	Bryan Reles, P.G. / Skye Schumacher

Test Preparation and Dimensions

Casing Installed in: ☐ Test Pit ☑ Borehole

Casing Diameter and Type: 4 inch I.D. PVC

A	Existing Grade Elevation (ft):		251.4 ±
B	Casing Stickup Length Above Grade (ft):		3.00
C	Top of Casing Elevation (ft):	(A+B)=	254.4 ±
D	Depth to Bottom of Test Hole, Below Top of Casing (ft):		5.90
E	Bottom of Test Hole Elevation:	(C-D)=	248.5 ±

Burmister Classification of Soil at Bottom of Hole: Grey/Brown SILT, some CLAY, trace ROOTS

Thickness/Type of Scour/Sediment Protection Layer Installed: 3" of Pea Gravel

Date and Time Pre-Soaked: 09/27/21 8:58

Depth to Water Level, Below Top of Casing

Just After Pre-Soak Filling (ft): 5.20

Just Prior to First Test Filling (ft): 5.20 Date: 9/28/21 Time: 9:18

Test Observations

Run 1			Run 2			Run 3			Run 4		
Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)	Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)	Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)	Real Time (hh:mm)	Elapsed Time (h:mm)	Depth to Water Level, Below Top of Casing (feet)
9:23	0:00	3.95	10:30	0:00	3.90		0:00			0:00	
9:24	0:01	3.95	10:31	0:01	3.90		0:01			0:01	
9:25	0:02	3.95	10:32	0:02	3.90		0:02			0:02	
9:26	0:03	3.95	10:33	0:03	3.90		0:03			0:03	
9:28	0:05	3.95	10:35	0:05	3.90		0:05			0:05	
9:33	0:10	3.95	10:40	0:10	3.90		0:10			0:10	
9:38	0:15	3.95	10:45	0:15	3.90		0:15			0:15	
9:53	0:30	3.95	11:00	0:30	3.90		0:30			0:30	
10:08	0:45	3.95	11:15	0:45	3.90		0:45			0:45	
10:23	1:00	3.95	11:30	1:00	3.90		1:00			1:00	

Test Results

Run:	Run 1	Run 2	Run 3	Run 4
Infiltration Rate (feet/hour):	0.00	0.00		
Infiltration Rate (inches/hour):	0.00	0.00		

Final Infiltration Rate (inches/hour): 0.00

☐ Based on average of all four runs

☑ Based on result of last run

Note(s)

1. Test performed in general conformance with NYS Stormwater Management Design Manual, Appendix D: Infiltration Testing Requirements.
2. IT casing installed adjacent to soil boring SB-6.
3. Water did not move from pre-charge level. Test pipe bailed dry and recharged prior to the start of both tests.

CME Associates, Inc.

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East Syracuse, New York 13057
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LABORATORY TEST SUMMARY
Association Island, Henderson, New York
CME Report No.: 27803L-01-1021
October 6, 2021

CME Representatives obtained soil samples from Test Borings advanced as part of the Subsurface Exploration Program conducted for the subject project. Selected samples were delivered to CME's East Syracuse facility, an AASHTO re:source[1] accredited laboratory for various laboratory testing. The results are presented below:

Sample ID Notations: SB or B - Test Boring, S - Sample

I. Atterberg Limits Testing (ASTM D4318)

Sample ID	Liquid Limit	Plastic Limit	Plasticity Index	Natural Moisture (%)
SB-3; S-2	63	27	36	29.5
SB-9; S-2	89	30	59	40.9

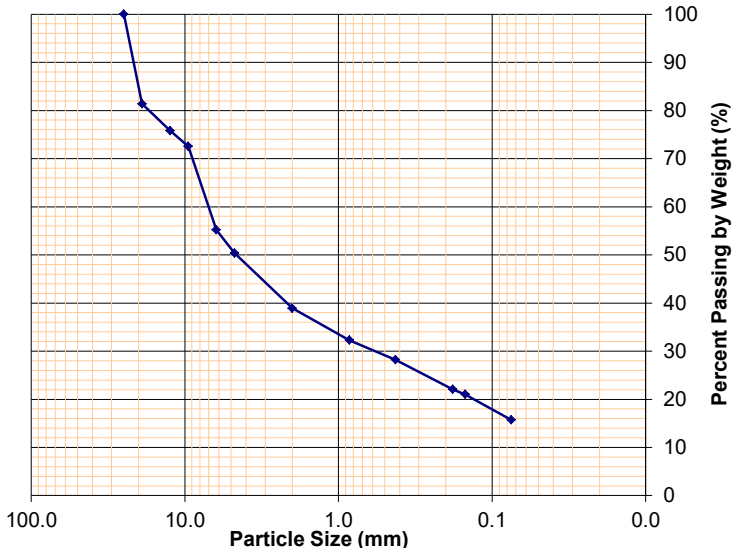
II. Particle Size Analysis (ASTM D422)

Sample #
B-8; S-4

Classification
Brown mf GRAVEL, some cmf SAND, little SILT, trace CLAY

Sieve Designation	Sieve Size (mm)	% Passing by Dry Weight
1"	25.0	100
3/4"	19.0	81
1/2"	12.5	76
3/8"	9.5	73
1/4"	6.25	55
No.4	4.75	50
No.10	2.00	39
No.20	0.850	32
No.40	0.425	28
No.80	0.180	22
No.100	0.150	21
No.200	0.075	16

Grain Size Distribution Curve



Sample # **Classification**

[1]**AASHTO re:source** – American Association of State Highway & Transportation Officials (AASHTO) Materials Reference Laboratory, a Federal Agency having jurisdiction to assess laboratory competency according to the Standards of the United States of America. CME East Syracuse accreditation includes testing of Portland Cement Concrete, Aggregate and Soil Materials. www.AASHTOresource.org.

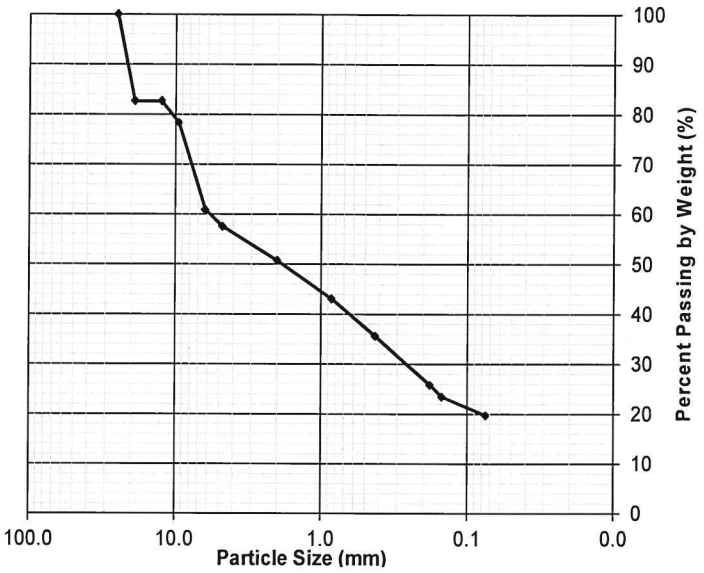
CME Associates, Inc.

Sample #
SB-5; S-3

Classification
Grey mf GRAVEL and cmf SAND, little SILT, little CLAY

Grain Size Distribution Curve

Sieve Designation	Sieve Size (mm)	% Passing by Dry Weight
1"	25.0	100
3/4"	19.0	83
1/2"	12.5	83
3/8"	9.5	78
1/4"	6.25	61
No.4	4.75	58
No.10	2.00	51
No.20	0.850	43
No.40	0.425	36
No.80	0.180	26
No.100	0.150	23
No.200	0.075	20



If you have any questions regarding this report please contact our office.

Hannah Kloiber
Laboratory Supervisor

GENERAL INFORMATION & KEY TO TEST BORING LOGS

The **Subsurface Exploration – Test Boring Logs** produced **by CME Associates, Inc.** (CME) present observations and mechanical data collected by the CME Drill Crew while at the site, supplemented, at times, by classification of the materials removed from the borings determined through visual identification by technicians in the laboratory. It is cautioned that the materials removed from the borings represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface conditions between adjacent borings or between the sampled intervals. The data presented on the Exploration Logs together with the recovered samples will provide a basis for evaluating the character of the subsurface conditions relative to the proposed construction. The evaluation must consider all the recorded details and their significance relative to each other. Often, analyses of standard boring data indicate the need for additional testing and sampling procedures to more accurately evaluate the subsurface conditions. Any evaluations of the contents of CME's report and the recovered samples must be performed by Licensed Professionals having experience in Soil Mechanics, Geological Sciences and Geotechnical Engineering. The information presented in this Key defines some of the methods, procedures and terms used on the CME Exploration Logs to describe the conditions encountered. Refer to the Log on page 4 for key number.

Key No. **Description**

1. The figures in the **DEPTH SCALE** column define the vertical scale of the Boring Log.

2. The **SAMPLE NO.** is used for identification on the sample containers and in the Laboratory Test Report or Summary.

3. The **SAMPLE DEPTH** column gives the depth range from which a sample was recovered.

4. The **TYPE / SAMPLE RECOVERY** column is used to signify the various types of samples. "SS is Split Spoon, "U" is Undisturbed Tube, and "C" is Rock Core. For soil and rock samples, the recovered length of the sample is recorded in inches.

5. **BLOWS ON SAMPLER** – This column shows the results of the "Standard Penetration Test (SPT) ASTM D1586", recording the number of blows required to drive a 2-inch outside diameter (O.D.) split spoon sampler into the ground beneath the casing. The number of blows required for each six inches of penetration is recorded. The total number of blows required for the 6-inch to 18-inch interval is summarized in the **SPT "N"** column and represents the "Standard Penetration Number". The outside diameter of the sampler, the hammer weight and the length of drop are noted in the **Methods of Investigation** portion of the log. A "WH" or "WR" in this column indicates that the sample spoon advanced a 6-inch interval under the **W**eight of **H**ammer + Rod or **W**eight of **R**od, respectively. If a rock core sample is taken, the core bit size designation is given here.

6. The **DEPTH OF CHANGE** column designates the depth (in feet) that the driller noted a compactness or stratum change. In soft materials or soil strata exhibiting a consistent relative density, it is difficult for the driller to determine the exact change from one stratum to the next. In addition, a grading or gradual change may exist. In such cases the depth noted is approximate or estimated only and may be represented by a dashed line. When continuous split spoon sampling is not employed, or an interval of several feet exists between samplings, the Depth of Change may not be indicated at all.

7. **VISUAL CLASSIFICATION OF MATERIAL** – Soil materials sampled and recovered are described by the Driller or Geotechnical Representative on the original field log. Notes of the Drillers observations are also placed in this column. Recovered samples may also be visually classified by a Geologist, Engineer, or Soil Technician. Visual soil classifications are made using a modified Burmister System as practiced by CME and as generally described in this Key and abbreviated on the Test Boring Log. This modified Burmister System is a type of visual-manual textural classification estimated by the Driller, Geologist, Engineer, or Technician on the basis of weight-fraction of the recovered material and estimated plasticity, among other characteristics. See Table 1 **"Classification of Materials"**. The description of the relative compactness or consistency is based upon the standard penetration number as defined in Table 2. The description of the recovered sample moisture condition is described as dry, moist, wet, or saturated. Water used to advance the boring may affect the moisture content of the recovered sample. Special terms may be used to describe recovered materials in greater detail, such terms are listed in ASTM D653. When sampling gravelly soils with a standard two-inch O.D. Split Spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders, cobbles, and large gravel is sometimes, but not necessarily, detected by observation of the casing advancement and sampler blows and/or through the "action" of the drill rig, sampler and/or casing as reported by the Driller.

   The description of **Rock** is based upon the recovered rock core. Terms frequently used in the description are included in Tables 3, 4 and 5. The length of core run is defined as length of penetration between retrievals of the core barrel from the bore hole, expressed in inches. The core recovery expresses the length of core recovered from the core barrel per core run, in percent. The size core barrel used is noted in Column 5. An "N" size core, being larger in diameter than "A" size core, often produces better recovery, and is frequently utilized where accurate information regarding the geologic conditions and engineering properties is needed. An estimate of in-situ rock quality is provided by a modified core recovery ratio known as the **"Rock Quality Designation" (RQD)**. This ratio is determined by considering only pieces of core that are at least 4 inches long and are hard and sound. Breaks obviously caused by drilling are ignored. The percentage ratio between the total length of such core recovered and the length of core drilled on a given run is the RQD. Table 4 indicates in-situ rock quality as related to the **RQD**.

8. The **SPT "N"** or **RQD** is given in this column as applicable to the specific sample taken. In Very Compact coarse-grained soils and in Hard fine-grained soils the N-value may be indicated as 50+ or 100+. This typically means that the blow count was achieved prior to driving the sampler the entire 6-inch interval or the sampler refused further penetration. For an "N"size rock core, the RQD is reported here, expressed in percent (%).

9. **GROUNDWATER OBSERVATIONS** and timing noted by the Drill Crew are shown in this section. It is important to realize that the reliability of the water level observations depend upon the soil type (e.g. water does not readily stabilize in a hole through fine grained soils), and that drill water used to advance the boring may have influenced the observations. Groundwater levels typically fluctuate seasonally so those noted on the log are only representative of that exhibited during the period of time noted on the log. One or more perched or trapped water levels may exist in the ground seasonally. All the available resources and data should be evaluated. If definite conclusions cannot be made, it is often prudent to examine the conditions more thoroughly through test pit excavations or through groundwater observation well installations.

10. **METHODS of INVESTIGATION** provides pertinent information regarding the identity of the Drill Crew members, inspector (if any), drill rig make and model, drill rig mount vehicle, casing and type of advancement, soil and rock sampling tools and appurtenances used in the installation of the Test Boring.

TABLE 1 - CLASSIFICATION OF MATERIALS	
GROUP	**COARSE GRAINED SOILS TEXTURAL SIZES**
BOULDERS	larger than 12" diameter
COBBLES	12" diameter to 3" sieve
GRAVEL	3" - coarse - 1" - medium - 1/2" - fine - #4 sieve
SAND	#4 - coarse - #10 - medium - #40 - fine - #200 sieve
GROUP	**FINE GRAINED SOILS SIZE (PLASTICITY*)**
SILT	#200 sieve (0.074mm) to 0.005mm size (see below *)
CLAY	0.005mm size to 0.001 mm size (see below *)
GROUP	**ORGANIC SOILS, PEAT, MUCK, MARL**
ORGANIC	Based on smell, visual-manual and laboratory testing

ABBREVIATIONS	**TERM**	**ESTIMATED PERCENT OF TOTAL SAMPLE BY WEIGHT**
f - fine	and	35 to 50%
m - medium	some	20 to 35%
c - coarse	little	10 to 20%
	trace	0 to 10%

***PLASTICITY DESCRIPTIONS and INDICATOR FIELD TESTS**			
		DRY STRENGTH TEST	
TERM	**PLASTICITY INDEX**	**INDICATION**	**FIELD TEST RESULT**
non-plastic	0 - 3	Very low	falls apart easily
slightly plastic	4 - 15	Slight	easily crushed by fingers
plastic	15 - 30	Medium	difficult to crush
highly plastic	31 or more	High	impossible to crush with fingers
Other Field Tests include: Dilatancy, Thread and Shine Testing			

*TABLE 2 - DESCRIPTION OF SOIL COMPACTNESS OR CONSISTENCY based on SPT "N"**		
Primary Soil Type	**Descriptive Term of Compactness**	**Range of Standard Penetration Resistance (N)**
COARSE GRAINED SOILS	Very Loose	less than 4 blows per foot
(More than half of Material is larger than No. 200 sieve size)	Loose	4 to 10
	Medium Compact	10 to 30
	Compact	30 to 50
	Very Compact	Greater than 50
FINE GRAINED SOILS	**Descriptive Term of Consistency**	**Range of Standard Penetration Resistance (N)**
(More than half of material is smaller than No. 200 sieve size)	Very Soft	less than 2 blows per foot
	Soft	2 to 4
	Medium Stiff	4 to 8
	Stiff	8 to 15
	Very Stiff	15 to 30
	Hard	Greater than 30
*The number of blows of 140-pound weight falling 30 inches to drive a 2-inch O.D., 1-3/8 inch I.D. sampler 12 inches is defined as the Standard Penetration Resistance, designated "N".		

TABLE 3 - ROCK CLASSIFICATION TERMS		
Rock Classification Terms		**Field Test or Meaning of Term**
Hardness	Soft	Scratched by fingernail. Crumbles under firm blows with a geologic pick.
	Medium Soft	Shallow indentations (1 to 3 mm) can be made by firm blows of a geologic pick. Can be peeled with a pocketknife with difficulty.
	Medium Hard	Scratched distinctly by penknife or steel nail. Can't be peeled or scraped with knife.
	Hard	Scratched with difficulty by penknife or steel nail. Requires more than one blow with a geologic hammer to break it
	Very Hard	Cannot be scratched by penknife or steel nail. Breaks only by repeated heavy blows with a geologic hammer.
Bedding (Divisional planes and/or surfaces separating it from layers above and below)	Thinly Laminated Laminated Thinly Bedded Medium Bedded Thickly Bedded Massive	less than 1/8th inch 1/8th to 1 inch 1 inch to 4 inches 4 inches to 12 inches 12 inches to 48 inches greater than 48 inches

TABLE 4 **Relation of Rock Quality Designation (RQD) and in-situ Rock Quality**	
RQD %	**Rock Quality Term Used**
90 to 100	Excellent
75 to 90	Good
50 to 75	Fair
25 to 50	Poor
0 to 25	Very Poor

TABLE 5 – BEDROCK WEATHERING CLASSIFICATION	
Classification	**Diagnostic Features**
Fresh	No visible sign of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	Slight discoloration inwards from open fractures, otherwise similar to Fresh.
Moderately Weathered	Discoloration throughout. Strength somewhat less than fresh rock but cores cannot be broken by hand or scraped with knife. Texture observed.
Highly Weathered	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Completely Weathered	Minerals decomposed to soil, but fabric and structure preserved (e.g. Saprolite). Specimens easily crumbled or penetrated.
Residual Soil	Advanced state of decomposition resulting in plastic soils. Rock fabric and structure completely destroyed. Large volume change.

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SUBSURFACE EXPLORATION TEST BORING LOG

Boring No.	**B-2**		
Page No.	1 of 1		
Report No.			
Project Name:		**Date Started**	
Client:		**Date Finished**	
Location:		**Surface Elev.**	

METHODS OF INVESTIGATION

Driller:	10	**Casing:**	10
Driller:		**Casing Hammer:**	
Inspector:		**Other:**	
Drill Rig:		**Soil Sampler:**	
Type:		**Hammer Wt:**	
Rod Size:		**Hammer Fall:**	

GROUNDWATER OBSERVATIONS

Date	Time	Depth (Ft.)	Casing At (Ft.)
	While Drilling	9	9
	Before Casing Removed		
	After Casing Removed		
	After Casing Removed		

LOG OF BORING SAMPLES | **VISUAL CLASSIFICATION OF MATERIAL**

Depth Scale (Feet)	Sample No.	Sample Depth (Ft.) From	Sample Depth (Ft.) To	Type / Sample Rec. (in.)	Blows on Sampler Per 6 Inches	Depth of Change (Ft.)	c - coarse m - medium f - fine / and - 35 to 50% / some - 20 to 35% / little - 10 to 20% / trace - 0 to 10%	SPT "N" or RQD %
1	2	3	3	4	5	6	7	8

SS - Split Spoon, U - Undisturbed Tube, C - Core, WH - Weight of Hammer + Rod, WR - Weight of Rod

Remarks: