January 22, 2026

Alex Holtze
ASH Holdings LLC
3425 Merryman Pl SE
Olympia, WA 98501

Re: 5th Ave Townhomes Soils Report for Design Infiltration Rates
Site Address: 585 5th Ave SW, Tumwater, WA 98512
Tax Parcel No.: 33203200001

Dear Mr. Holtze:

At your request, I have prepared this soils report. A site visit was performed on 12/12/25 to assess site conditions.

The subject site consists of an undeveloped lot in a mostly cleared area of a residential area. The lot is located on the west side of 5th Avenue SW.

The site topography is generally sloping from the west to east. The property is bordered on all sides by residential lots. The approximately 1.69 acre (Per Thurston County Assessor data) property is vegetated with grass, shrubs and a few trees.

The United States Natural Resource Conservation Service maps the soils in the area as Kapowsin silt loam. These soils are listed as Type D soils.

Groundwater was in one of the test pits.

The existing tributary offsite Stormwater generally sheet flows onto the site on the northern portion of the property. The stormwater then drains through the property and discharges via sheet flow on the southwestern portion of the parcel. The project is located in an aquifer recharge area and a wellhead protection area as defined by the Thurston County Health Department, the EPA or by the county. There are no known ravines, or wetlands located on the site. There are no known basin plans for the area. Refer to the attachments for applicable Soils Maps.

The Washington Geologic Information Portal lists the onsite soils as the following:

Geologic Unit Label: Qgd

Geologic Age: Quaternary (Pleistocene)

Lithology: Pleistocene continental glacial drift

Geologic Unit Description: Pleistocene till and outwash clay, silt, sand, gravel, cobbles, and boulders deposited by or originating from continental glaciers; locally includes peat, nonglacial sediments, modified land, and artificial fill.

There were two test pits dug and three small pit infiltration test dug onsite to determine soil infiltration feasibility. It appeared to have soils consistent with Kapowsin silt loam. There were three soil sieve test performed at the bottom of each of the small pit infiltration test locations. Each of the tests revealed similar soils shown to be SM - Silty Sand with Gravel down to approximately 42". Below this level to approximately 5' is fractured weathered basalt. Ground water was observed in the lower test pit located in the flow line of the natural grade in the weathered basalt. It appeared to be flowing quickly.

On 12/12/26 The there small pit infiltration tests were performed per Thurston County Surface Water Design Manual.

Small Pit Test 1: The measured infiltration rate was 12.00 inches per hour.

Idesign = Imeasured x Ftesting x Fgeometry x Fplugging

For single ring: Fgeometry = 4D/W + 0.05 = 4(12in/48 in) + 0.05 = 1.05 therefore use 1.0
Fplugging = 0.8 for fine sands and loamy sands
Ftesting = 0.5

Idesign = 4.8 inches per hour

As a result of this test the recommended design infiltration rate for the infiltration trench and permeable pavement is 4.8 inches per hour.

Small Pit Test 2: The measured infiltration rate was 33 inches per hour.

Idesign = Imeasured x Ftesting x Fgeometry x Fplugging

For single ring: Fgeometry = 4D/W + 0.05 = 4(12in/48 in) + 0.05 = 1.05 therefore use 1.0
Fplugging = 0.8 for fine sands and loamy sands
Ftesting = 0.5

Idesign = 4.8 inches per hour

As a result of this test the recommended design infiltration rate for the infiltration trench and permeable pavement is 13.2 inches per hour.

Small Pit Test 3: The measured infiltration rate was 3.20 inches per hour.

Idesign = Imeasured x Ftesting x Fgeometry x Fplugging

For single ring: Fgeometry = 4D/W + 0.05 = 4(12in/48 in) + 0.05 = 1.05 therefore use 1.0
Fplugging = 0.8 for fine sands and loamy sands
Ftesting = 0.5

Idesign = 1.28 inches per hour

As a result of the above tests we recommend using a design infiltration rate of 4.8 in/hr for the onsite bioretention pond and 1.28 in/hr for the frontage bioretention pond.

Once again, thank you for the opportunity to work with you on this project. Please feel free to give me a call if you have any questions.

Sincerely,

The Land Developer, Inc.



Erik B. Ainsworth, PE
President



Attachments:
SCS Soils Map
Site plan with soil logs
Sieve Report



Map Scale: 1:1,770 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 25 50 100 150

Feet: 0 50 100 200 300

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N 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 1:24,000.

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: Thurston County Area, Washington
Survey Area Data: Version 18, Aug 27, 2024

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

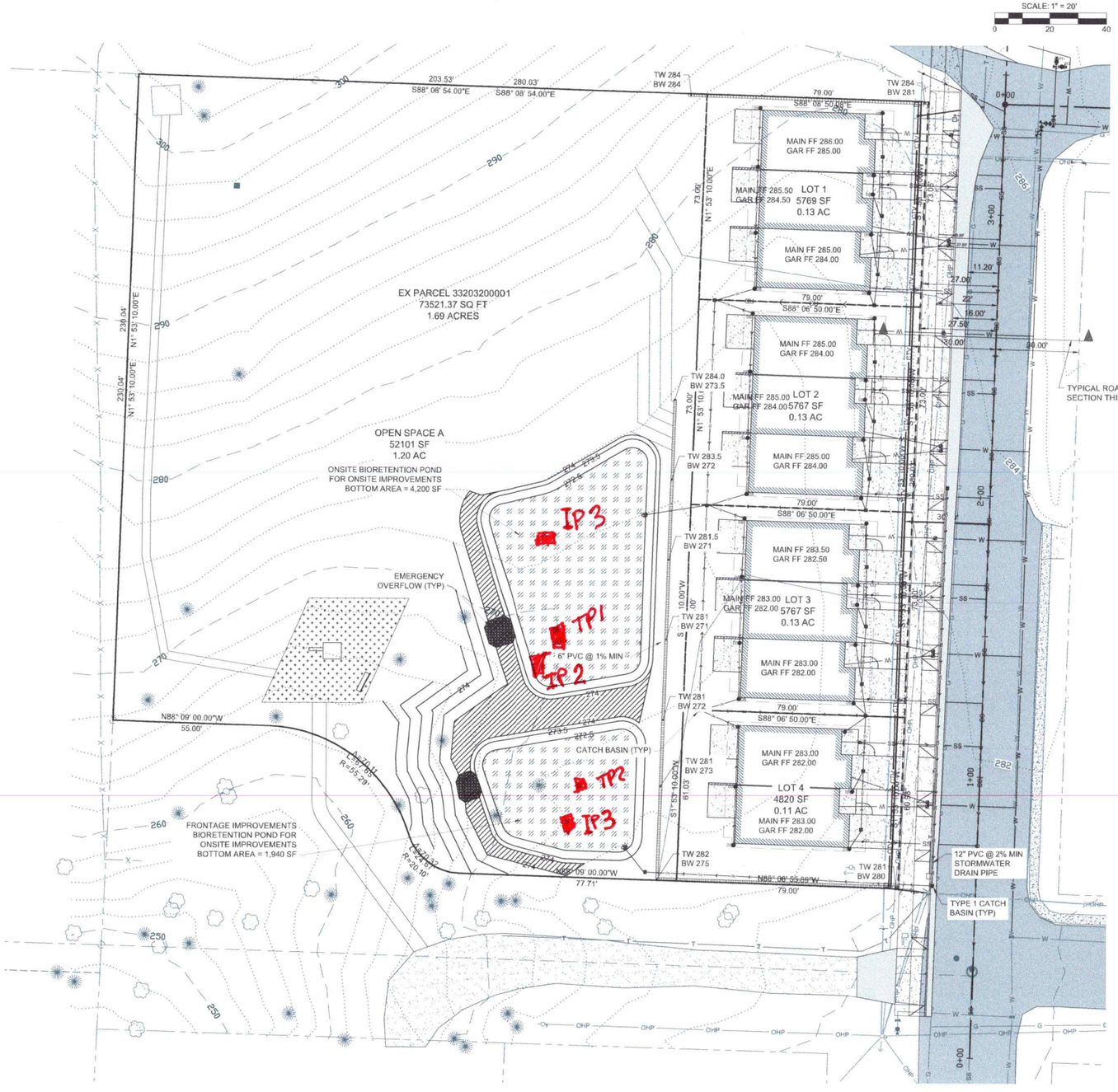
Date(s) aerial images were photographed: Jul 31, 2022—Aug 14, 2023

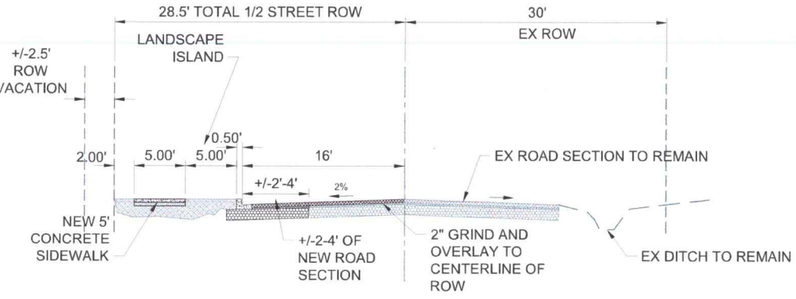
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
39	Giles silt loam, 3 to 15 percent slopes	0.2	1.7%
52	Kapowsin silt loam, 15 to 30 percent slopes	13.5	98.3%
Totals for Area of Interest		**13.7**	**100.0%**

SE 1/4, SECTION 27, TOWNSHIP 18 N., RANGE 2 W., W.M.





B FRONTAGE STREET SECTION
N.T.S.

THE LAND DEVELOPER'S ENGINEERED SOLUTION
a division of THE LAND DEVELOPER, INC.
5737 LINDERSON WAY SW.
TUMWATER, WA. 98501
PO BOX 4420, TUMWATER, WA. 98501
(360) 890-4806
E-MAIL: erik@thelanddeveloper.com

STATE OF WASHINGTON ERIK A. BRAATEN 38284 REGISTERED PROFESSIONAL ENGINEER
9/24/2026

REVISIONS: DATE:

5TH AVE TOWNHOMES

GRADING & DRAINAGE PLAN

PROJECT:
HOLTZE TOWNHOMES
5 585 S 5TH AVE SW
TUMWATER, WA 98512

CLIENT:
ASH HOLDINGS LLC
3425 MERRYMAN PL SE
OLYMPIA, WA 98501

DRAWN BY: EBA
DATE: 9/24/25
AGENCY NO:
SHEET: 3 OF 4
JOB NO: 21-132

Project: 5th Ave Townhomes	Project Number: 23-093	Client: Alex Holtze	Test Pit No. 2
Address, City, State 585 5th Ave SW, Tumwater, WA 98512		Excavator pit test	
Logged By: EBA	Date: Started: 11AM		
Weather: Overcast	Completed: 12:00PM		
	Backfilled: YES		
	Groundwater Depth: None observed	Elevation:	Total Depth of test pit: 8'

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors **Rock Description:** modifierm color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.	Dry Density (pcf)	Moisture Content (%)	Additional Test
					Brown silty sand with gravel topsoil with roots			
	☒	3			Brown Medium Dense Silty Sand with Gravel SM Bulk/ Bag Sample			
5					Brown Medium Dense fractured weathered basalt			
					End test pit @ 5 ft, No groundwater observed			
10								

Civil Engineering

Boring Log: Sheet __of ___

- Standard Penetration Slit Spoon Sampler (SPT)
- California Sampler
- Shelby Tube
- CPP Sampler
- Bulk/ Bag Sample
- Stabllized Ground water
- Groundwater At time of Drilling

Project: 5th Ave Townhomes	Project Number: 23-093	Client: Alex Holtze	Test Pit No. 1
Address, City, State 585 5th Ave SW, Tumwater, WA 98512		Excavator pit test	
Logged By: EBA	Date: Started: 11AM		
Weather: Overcast	Completed: 12:00PM		
	Backfilled: YES		
	Groundwater Depth: Observed @ 42"	Elevation:	Total Depth of test pit: 8'

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log	Lithology **Soil Group Name:** modifier, color, moisture, density/consistency, grain size, other descriptors **Rock Description:** modifierm color, hardness/degree of concentration, bedding and joint characteristics, solutions, void conditions.	Dry Density (pcf)	Moisture Content (%)	Additional Test
					Brown silty sand with gravel topsoil with roots			
	☒	1			Brown Medium Dense Silty Sand with Gravel SM Bulk/ Bag Sample			
	▼							
					Brown Medium Dense fractured weathered basalt GROUNDWATER FLOWING THROUGH FRACTURED ROCK			
5								
					End test pit @ 5 ft, groundwater observed @ 42"			
10								

Civil Engineering

Boring Log: Sheet __of ___

- Standard Penetration Slit Spoon Sampler (SPT)
- California Sampler
- Shelby Tube
- CPP Sampler
- Bulk/ Bag Sample
- ▼ Stabllized Ground water
- ▽ Groundwater At time of Drilling

MATERIALS TESTING & CONSULTING, INC.

Testing Laboratory: Olympia Laboratory

Sieve Report

Project:	5th Townhomes / Q.C. - The Land Developers - 2025	**Date Received:**	16-Dec-25
Project #:	21-132 / 25S036	**Sampled By:**	Client
Client:	The Land Developer's Engineered Solution	**Date Tested:**	17-Dec-25
Source:	IP2 @ 1.5'	**Tested By:**	G. Dudley
Sample#:	S25-1009	**Control No.:**	

Unified Soil Classification System, ASTM-2487
SM, Silty Sand with Gravel
Sample Color:
Brown

Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281

Specifications
No Specs

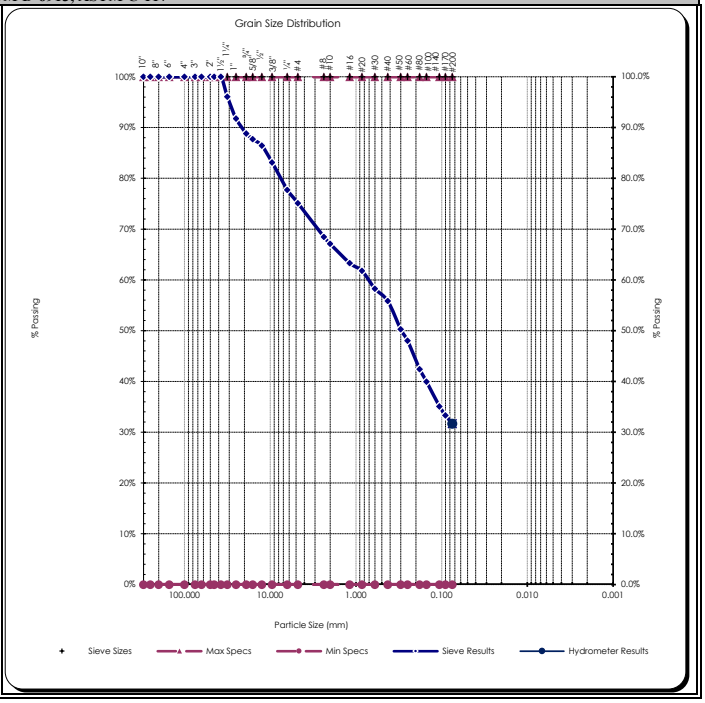
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.012	mm	% Gravel =	24.9%	Coeff. of Curvature, C_C = 0.29
$D_{(10)}$ =	0.024	mm	% Sand =	43.4%	Coeff. of Uniformity, C_U = 30.55
$D_{(15)}$ =	0.036	mm	% Silt & Clay =	31.7%	Fineness Modulus = 2.73
$D_{(30)}$ =	0.071	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.294	mm	Plasticity Index =	n/a	Moisture %, as sampled = 19.6%
$D_{(60)}$ =	0.723	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	21.372	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	21/37		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

Method(s) ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50	100%	100%	100.0%	0.0%
1.25"	31.50		96%	100.0%	0.0%
1.00"	25.00	92%	92%	100.0%	0.0%
3/4"	19.00	89%	89%	100.0%	0.0%
5/8"	16.00		88%	100.0%	0.0%
1/2"	12.50	86%	86%	100.0%	0.0%
3/8"	9.50	83%	83%	100.0%	0.0%
1/4"	6.30		78%	100.0%	0.0%
#4	4.75	75%	75%	100.0%	0.0%
#8	2.36	68%	68%	100.0%	0.0%
#10	2.00	67%	67%	100.0%	0.0%
#16	1.18		63%	100.0%	0.0%
#20	0.850	62%	62%	100.0%	0.0%
#30	0.600		58%	100.0%	0.0%
#40	0.425	56%	56%	100.0%	0.0%
#50	0.300		50%	100.0%	0.0%
#60	0.250	48%	48%	100.0%	0.0%
#80	0.180	42%	42%	100.0%	0.0%
#100	0.150	40%	40%	100.0%	0.0%
#140	0.106		35%	100.0%	0.0%
#170	0.090		33%	100.0%	0.0%
#200	0.075	31.7%	31.7%	100.0%	0.0%

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All results apply only to actual locations and materials tested. MTC uses the simple acceptance/simple rejection decision rule to determine in-tolerance and out-of-tolerance or pass/fail comply (yes/no) conditions, and no measurement of uncertainty is applied in this determination. As a mutual protection to clients, the public, and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions, or extracts from or regarding our reports is reserved pending our written approval.

Comments:

Reviewed by: Chandler Kirk-Patterson
Chandler Kirk-Patterson
WABO Supervising Laboratory Technician

- End of Report -

MATERIALS TESTING & CONSULTING, INC.

Testing Laboratory: Olympia Laboratory

Sieve Report

Project:	5th Townhomes / Q.C. - The Land Developers - 2025	**Date Received:**	16-Dec-25
Project #:	21-132 / 25S036	**Sampled By:**	Client
Client:	The Land Developer's Engineered Solution	**Date Tested:**	17-Dec-25
Source:	IP3 @ 1.5'	**Tested By:**	G. Dudley
Sample#:	S25-1010	**Control No.:**	

Unified Soil Classification System, ASTM-2487
SM, Silty Sand with Gravel
Sample Color:
Brown

Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281

Specifications
No Specs

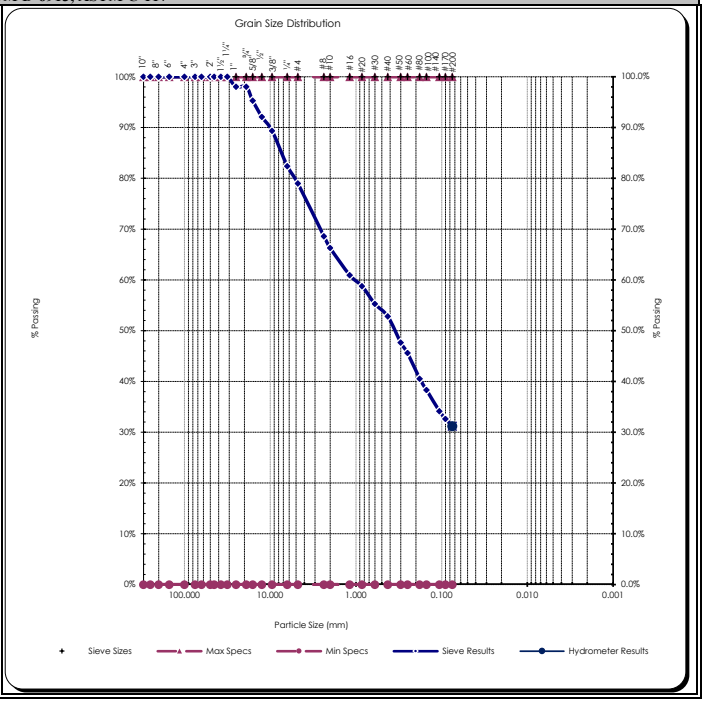
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.012	mm	% Gravel =	21.0%	Coeff. of Curvature, C_C = 0.21
$D_{(10)}$ =	0.024	mm	% Sand =	47.8%	Coeff. of Uniformity, C_U = 43.13
$D_{(15)}$ =	0.036	mm	% Silt & Clay =	31.2%	Fineness Modulus = 2.63
$D_{(30)}$ =	0.072	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.357	mm	Plasticity Index =	n/a	Moisture %, as sampled = 21.0%
$D_{(60)}$ =	1.037	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	10.200	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	13/22		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

Method(s) ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50	100%	100%	100.0%	0.0%
1.00"	25.00	98%	98%	100.0%	0.0%
3/4"	19.00	98%	98%	100.0%	0.0%
5/8"	16.00		95%	100.0%	0.0%
1/2"	12.50	92%	92%	100.0%	0.0%
3/8"	9.50	89%	89%	100.0%	0.0%
1/4"	6.30		82%	100.0%	0.0%
#4	4.75	79%	79%	100.0%	0.0%
#8	2.36	69%	69%	100.0%	0.0%
#10	2.00	66%	66%	100.0%	0.0%
#16	1.18		61%	100.0%	0.0%
#20	0.850	59%	59%	100.0%	0.0%
#30	0.600		55%	100.0%	0.0%
#40	0.425	53%	53%	100.0%	0.0%
#50	0.300		48%	100.0%	0.0%
#60	0.250	46%	46%	100.0%	0.0%
#80	0.180	41%	41%	100.0%	0.0%
#100	0.150	38%	38%	100.0%	0.0%
#140	0.106		34%	100.0%	0.0%
#170	0.090		33%	100.0%	0.0%
#200	0.075	31.2%	31.2%	100.0%	0.0%

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Comments:

Reviewed by: Chandler Kirk-Patterson
Chandler Kirk-Patterson
WABO Supervising Laboratory Technician

- End of Report -

MATERIALS TESTING & CONSULTING, INC.

Testing Laboratory: Olympia Laboratory

Sieve Report

Project:	5th Townhomes / Q.C. - The Land Developers - 2025	**Date Received:**	16-Dec-25
Project #:	21-132 / 25S036	**Sampled By:**	Client
Client:	The Land Developer's Engineered Solution	**Date Tested:**	17-Dec-25
Source:	IP1 @ 1.5'	**Tested By:**	G. Dudley
Sample#:	S25-1008	**Control No.:**	

Unified Soil Classification System, ASTM-2487
SM, Silty Sand with Gravel
Sample Color:
Brown

Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281

Specifications
No Specs

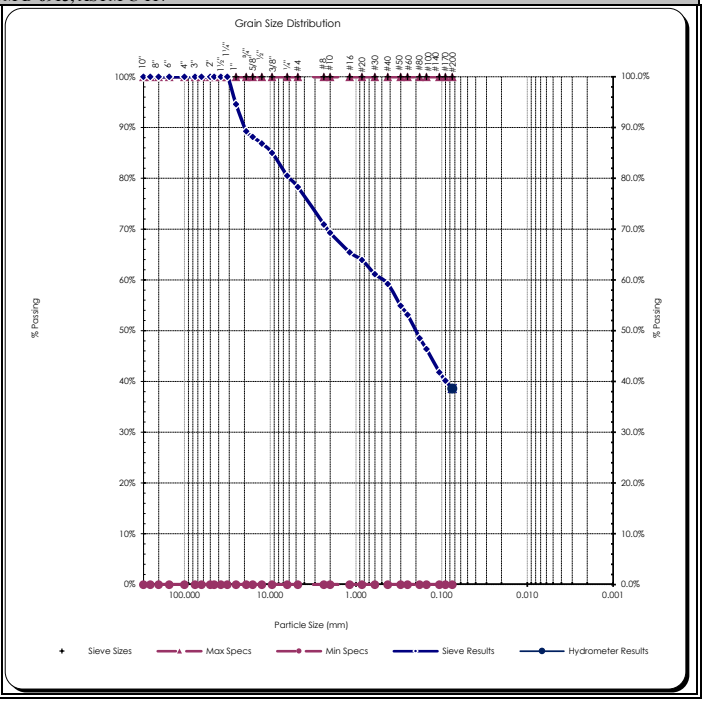
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.010	mm	% Gravel =	21.7%	Coeff. of Curvature, C_C = 0.35
$D_{(10)}$ =	0.019	mm	% Sand =	39.7%	Coeff. of Uniformity, C_U = 25.51
$D_{(15)}$ =	0.029	mm	% Silt & Clay =	38.6%	Fineness Modulus = 2.49
$D_{(30)}$ =	0.058	mm	Liquid Limit =	n/a	Plastic Limit = n/a
$D_{(50)}$ =	0.202	mm	Plasticity Index =	n/a	Moisture %, as sampled = 22.2%
$D_{(60)}$ =	0.496	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =
$D_{(90)}$ =	19.810	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =
Dust Ratio =	58/89		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =

Method(s) ASTM C-136, ASTM D-6913, ASTM C-117

Sieve Size US	Sieve Size Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50	100%	100%	100.0%	0.0%
1.00"	25.00	95%	95%	100.0%	0.0%
3/4"	19.00	89%	89%	100.0%	0.0%
5/8"	16.00		88%	100.0%	0.0%
1/2"	12.50	87%	87%	100.0%	0.0%
3/8"	9.50	85%	85%	100.0%	0.0%
1/4"	6.30		80%	100.0%	0.0%
#4	4.75	78%	78%	100.0%	0.0%
#8	2.36	71%	71%	100.0%	0.0%
#10	2.00	69%	69%	100.0%	0.0%
#16	1.18		65%	100.0%	0.0%
#20	0.850	64%	64%	100.0%	0.0%
#30	0.600		61%	100.0%	0.0%
#40	0.425	59%	59%	100.0%	0.0%
#50	0.300		55%	100.0%	0.0%
#60	0.250	53%	53%	100.0%	0.0%
#80	0.180	49%	49%	100.0%	0.0%
#100	0.150	46%	46%	100.0%	0.0%
#140	0.106		42%	100.0%	0.0%
#170	0.090		40%	100.0%	0.0%
#200	0.075	38.6%	38.6%	100.0%	0.0%

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Comments:

Reviewed by: Chandler Kirk-Patterson
Chandler Kirk-Patterson
WABO Supervising Laboratory Technician

- End of Report -

PIT TEST 1

AVERAGE INF RATE:	0.200	IN/MIN
	12.00	in/hr
	1	F-GEOMETRY
	0.8	F PLUGGING
	0.5	F TESTING
ADJ INF RATE:	4.8	IN/HR

PIT TEST 2

AVERAGE INF RATE:	0.550	IN/MIN
	33.00	in/hr
	1	F-GEOMETRY
	0.8	F PLUGGING
	0.5	F TESTING
ADJ INF RATE:	13.2	IN/HR

PIT TEST 3

AVERAGE INF RATE:	0.053	IN/MIN
	3.20	in/hr
	1	F-GEOMETRY
	0.8	F PLUGGING
	0.5	F TESTING
ADJ INF RATE:	1.28	IN/HR