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Site Address 164th St. SW to 36th Ave W

Date Copied 7/27/01 By Claris

- Title page with the following information:
 - Company (Author) name
 - Report date
 - Project Name
 - Company's job number
 - Site address
- Executive Summary / Introduction of the report
- Table of contents
- Project Location Map / Vicinity Map
- Site / Exploration Plans, Boring Location Plans
- Cross-sections / Subsurface profiles
- Exploration Logs
- Monitoring Well Logs
- Cone Penetrometer Logs
- Groundwater Elevation Tables / Data

- Includes data from Previous Reports
- No new data / data review
- Missing Data / Illegible Data
Explanation _____

Comments: _____



TERRA ASSOCIATES, Inc.

Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

98-102838

4095

August 15, 1997
Project No. T-3705

Mr. John Wayland
Trammell Crow Residential
4010 Lake Washington Boulevard NE, Suite 330
Kirkland, Washington 98033



Subject: Preliminary Geotechnical Report
Carillon Gardens Apartments
164th Street SW and 36th Avenue West
Snohomish County, Washington

Dear Mr. Wayland:

As requested, we have conducted a preliminary geotechnical engineering study for the subject project. The attached report presents our findings and recommendations for the geotechnical aspects of project design and construction.

In the southern portion of the site, we encountered a large amount of loose debris fill that will not be suitable for foundation or pavement subgrades in its existing condition. We also found peaty organic soils in the northwestern part of the site. In our opinion, these soil conditions are not suitable for site development. We recommend removal of these debris fills and organic soils and replacement with structural fill.

Our field exploration indicates the rest of the site is generally underlain at shallow depths by dense glacial till composed of silty sand with gravel. These soil conditions will be suitable for development, provided the recommendations in this report are incorporated into project design and construction.

We trust the information presented is sufficient for your current needs. If you have any questions or need additional information, please call.

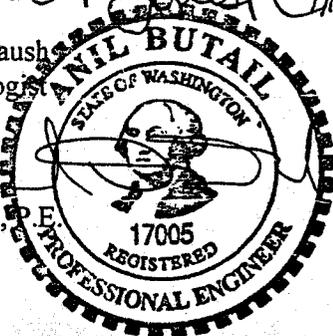
Sincerely yours,
TERRA ASSOCIATES, INC.

David P. Laush

David P. Laush
Staff Geologist

Anil Butail

Anil Butail, P.E.
President



8-15-97

EXPIRES 12/9/1997

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**Preliminary Geotechnical Report
Carillon Gardens Apartments
164th Street SW and 36th Avenue West
Snohomish County, Washington**

1.0 PROJECT DESCRIPTION

The proposed development of the Carillon Gardens Apartments project consists of constructing 23 apartment buildings with associated utilities and parking. Access and utilities will likely be from 164th Street SW, which borders the south edge of the property. Access may also be provided from the existing side streets Admiralty Way and/or 36th Avenue West. A preliminary site plan showing pertinent site features was provided to us at the time we conducted our study.

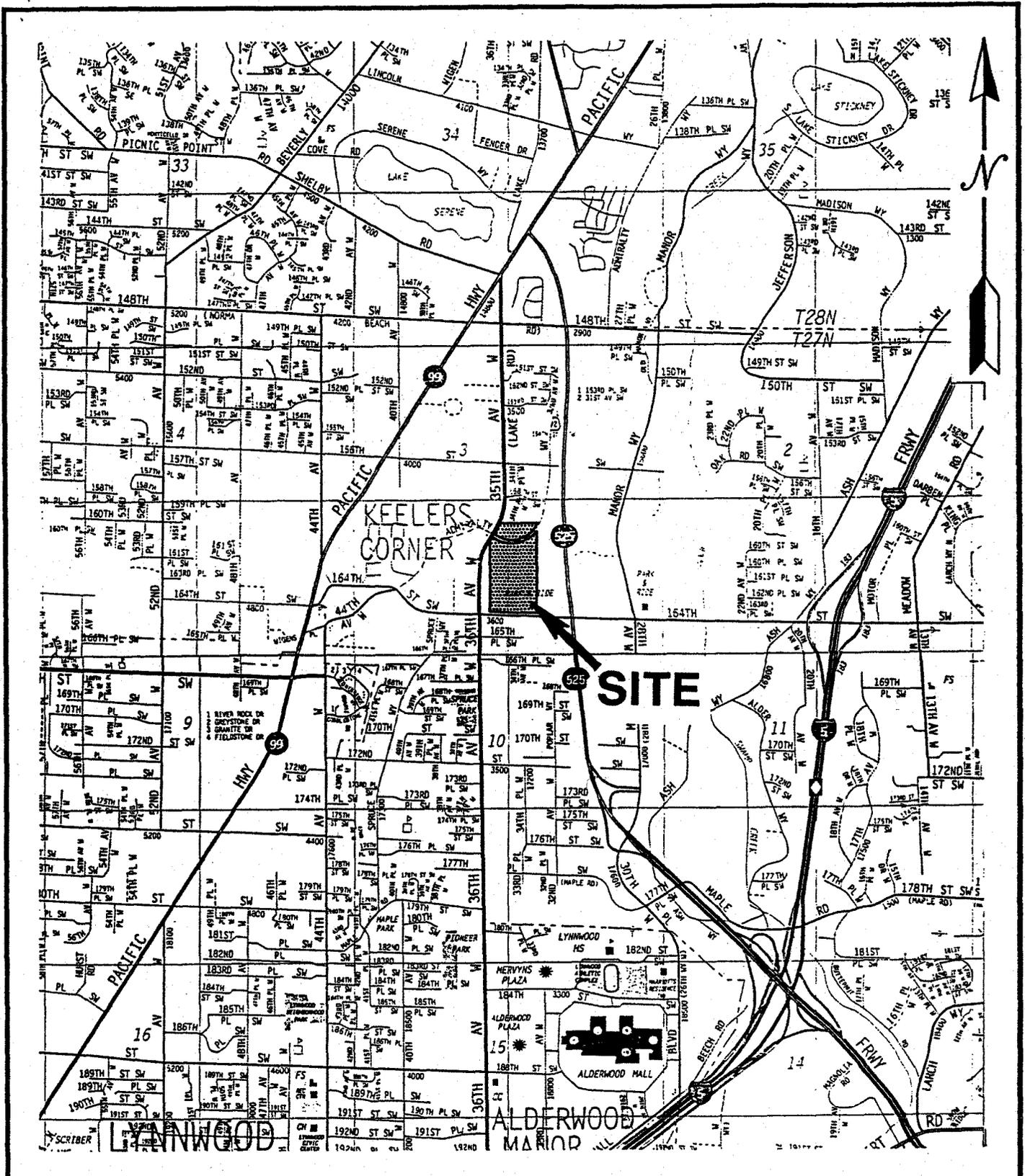
Two wetlands areas will be protected and buffer areas provided adjacent to the wetlands. A detention pond will be constructed in the central portion of the site. Based on our experience with similar projects, we expect the apartment structures will be supported by a system of bearing walls and isolated columns. The buildings will likely be two to three-story, wood-framed structures with the main floor level framed over a crawl space. For two-story to three-story buildings, we expect load-bearing walls will carry two to four kips per lineal foot, and isolated spread footings will carry loads of 50 to 75 kips.

The recommendations contained in the following sections of this report are based on conceptual design information and should be considered preliminary. Once actual features are known, we should review them in order to modify or supplement our recommendations. We should also review final design drawings and construction specifications to verify that our recommendations have been properly interpreted and incorporated into project design and construction.

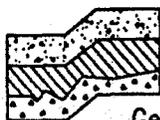
2.0 SCOPE OF WORK

On July 24 and 25, 1997, we excavated 26 test pits to a maximum depth of 12.5 feet below existing surface grades. Using the information obtained from our subsurface exploration, we performed analyses to develop geotechnical recommendations for project design and construction. Specifically, this report addresses the following:

- Soil and groundwater conditions
- Site preparation and grading
- Excavations



REFERENCE: THE THOMAS GUIDE, SNOHOMISH COUNTY, WASHINGTON, PAGES 435 AND 455, 1997 EDITION.



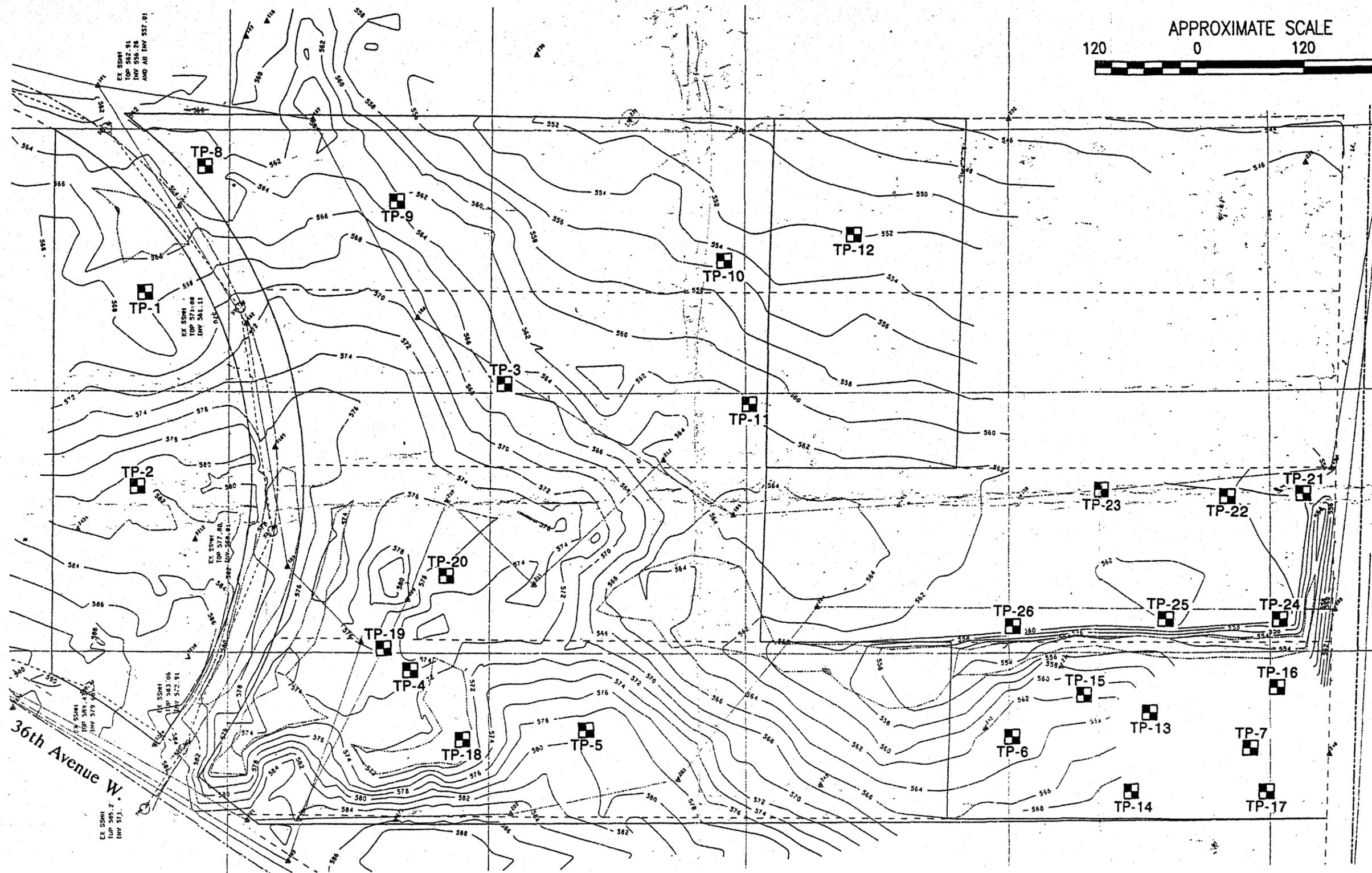
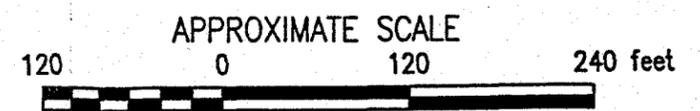
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VICINITY MAP
CARILLON GARDENS
SNOHOMISH COUNTY, WASHINGTON

Proj. No.3705

Date AUG. 1997

Figure 1



LEGEND:
 [Symbol] APPROXIMATE TEST PIT LOCATION

REFERENCE:
 PRELIMINARY TOPOGRAPHIC PLAN PREPARED BY OSTERGAARD-ROBINSON & ASSOCIATES, INC., JOB No. 96143, DATED 2/12/97, PRINTED 7/16/97.

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EXPLORATION LOCATION PLAN
 CARILLON GARDENS
 SNOHOMISH COUNTY, WASHINGTON

Proj. No. 3705	Date AUG. 1997	Figure 2
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Test Pit No. ~~7-1~~

Logged by: DPL

Approximate Elev. 568 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	18 inches Forest Duff/Topsoil/Humus.	
		16.8
	Gray-brown silty SAND with gravel, wet, medium dense to dense, some mottling, fine to medium grains, some medium coarse grain lenses. (SM)	16.1
5	Gray silty SAND with gravel, moist, dense to very dense, cemented, fine grained. Glacial Till. (SM)	9.5
		8.4
10	Test pit terminated at 9.5 feet. No groundwater seepage encountered.	
15		

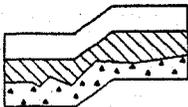
Test Pit No. ~~11-2~~

Logged by: DPL

Approximate Elev. 580 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	18 inches Topsoil/Sod.	
	Red-brown sandy SILT, wet, soft (ML)	
	Gray-brown silty SAND with gravel, wet, medium dense, fine to medium grains, semi-cemented, some mottling. (SM)	18.8
		17.5
5	Gray silty SAND with gravel, moist, dense to very dense, cemented, fine grained. Glacial Till. (SM)	9.3
10		9.2
15	Test pit terminated at 11 feet. No groundwater seepage encountered.	



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**TEST PIT LOGS
CARILLON GARDENS APARTMENTS
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3705	Date AUG 1997	Figure A-2
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Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 566 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	12 inches Topsoil/Forest Duff.	
	Red-brown sandy SILT, wet, soft, roots. (ML)	23.6
		17.3
5	Gray-brown to gray silty SAND with gravel, wet, medium dense to dense, fine grained with some medium to coarse lenses, some mottling in top 2 to 3 feet.	16.0
		12.7
10		11.5
15	Test pit terminated at 12 feet. Slight groundwater seepage at 9.0 feet.	

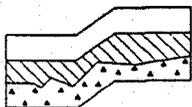
Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 572 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	Dark brown to black organic rich soils, wet to saturated, wood branches and logs, peaty type layers, very soft. (OL/Pt)	60.1
5		
10	Gray silty SAND to sandy SILT, wet, medium dense, some gravel. (ML)	24.1
15	Test pit terminated at 11 feet. Heavy groundwater seepage from 0 to 10 feet. Easily caved from 0 to 10 feet.	



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TEST PIT LOGS
CARILLON GARDENS APARTMENTS
SNOHOMISH COUNTY, WASHINGTON

Proj. No. T-3705 Date AUG 1997 Figure A-3

Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 578 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	18 inches Topsoil/Forest Duff.	20.0	
5	Gray-brown to gray sandy SILT to silty SAND, wet, medium dense to dense, fine grained. (ML/SM)		
10	Gray silty SAND with some gravel, wet, dense, fine grained, with medium to coarse sand lenses, interbedded with gray sandy SILT, moist, hard, some gravel. (SM/ML)	17.4	
		17.6	
		14.9	
15	Test pit terminated at 12 feet. Slight groundwater seepage from sand lenses from 6 to 10 feet.		

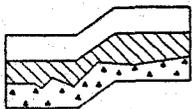
Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 564 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	(8 inches Topsoil/Sod) Red-brown to tan-gray sandy SILT, wet, soft to stiff, some gravel, some mottling. (ML)	26.5	
		21.8	
5	Gray silty SAND with gravel, moist, dense, fine grained, cemented. Glacial Till. (SM)	11.7	
		11.1	
10		11.1	
15	Test pit terminated at 10 feet. No groundwater seepage encountered.		



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TEST PIT LOGS
CARILLON GARDENS APARTMENTS
SNOHOMISH COUNTY, WASHINGTON

Proj. No. T-3705	Date AUG 1997	Figure A-4
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Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 567 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	(6 inches Topsoil/Sod)	13.3
	FILL: Brown to dark brown silty SAND with gravel, wet, loose to medium dense, concrete pieces, asphalt pieces, small logs, old roots, organics.	
5		13.9
	Tan-brown to red-brown silty SAND with gravel, wet, medium dense, fine grained.	
10	Gray silty SAND with gravel, moist, dense, fine grained, cemented. Glacial Till. (SM)	10.7
		10.2
15	Test pit terminated at 12 feet. Caving observed from 0 to 8 feet.	

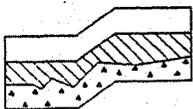
Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 563 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	12 inches Forest Duff/Humus.	
	Gray-brown silty SAND trace gravel, wet, medium dense, fine to coarse grains. (SM)	13.4
5		14.7
	Gray silty SAND with gravel, wet to moist, dense, fine grained, semi-cemented, medium to coarse sand lenses. Glacial Till. (SM)	
10		11.6
15	Test pit terminated at 10 feet. Moderate groundwater seepage at 5 feet.	



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TEST PIT LOGS
CARILLON GARDENS APARTMENTS
SNOHOMISH COUNTY, WASHINGTON

Proj. No. T-3705 Date AUG 1997 Figure A-5

Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 562 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	24 inches Forest Duff/Humus.	
5	Gray-brown silty SAND with gravel, wet, medium dense, semi-cemented, some mottling, fine to medium grains. (SM)	20.9
5	Gray silty SAND with gravel, moist, dense, cemented, fine grained. Glacial Till. (SM)	10.9
10		10.0
15	Test pit terminated at 9 feet. No groundwater seepage encountered.	

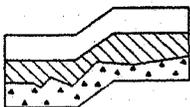
Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 554 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	18 inches Forest Duff/Humus.	
5	Gray-brown silty SAND with gravel, wet, medium dense, fine to medium grains. (SM)	17.5
5	Gray silty SAND with gravel, wet to moist, medium dense to dense, cemented, fine grained, medium to coarse sand lens at 9 to 9.5 feet. Glacial Till. (SM)	13.9
10		9.9
15	Test pit terminated at 11 feet. Moderate groundwater seepage at 9 feet.	



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CARILLON GARDENS APARTMENTS
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3705	Date AUG 1997	Figure A-6
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Test Pit No. TP 11

Logged by: DPL

Approximate Elev. 560 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	18 inches Forest Duff/Humus.	
	Red-brown sandy SILT, wet, stiff, some roots. (ML)	26.6
		17.6
5	Gray-brown silty SAND with gravel, wet, medium dense, fine to medium grains, semi-cemented. (SM)	23.0
10	Gray silty SAND with gravel, moist, dense, cemented, fine grained. Glacial Till. (SM)	12.8
15	Test pit terminated at 11 feet. Slight groundwater vein seepage at 6 and 10 feet.	

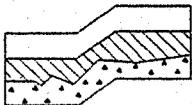
Test Pit No. TP 12

Logged by: DPL

Approximate Elev. 562 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	12 inches Topsoil/Sod.	
	Red-brown sandy SILT with some gravel, wet, soft. (ML)	30.4
	Gray-brown silty SAND with gravel, wet, medium dense, fine grained, some mottling from 2 to 3 feet.	19.8
5		
	Gray silty SAND with gravel, moist, dense, fine grained, cemented. Glacial Till. (SM)	11.6
10		14.8
15	Test pit terminated at 11 feet. No groundwater seepage encountered.	



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CARILLON GARDENS APARTMENTS
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3705

Date AUG 1997

Figure A-7

Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 560 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	FILL: Brown to blackish brown sandy silt with gravel, wet, loose to medium dense, organics, 6-inch to 2-foot size pieces of asphalt, 1-foot to 3-foot size pieces of concrete, wood and old roots.		
5			
10			
10	Red-brown sandy SILT, wet, soft to stiff. (ML)		
10	Gray silty SAND with gravel, moist, dense, cemented. Glacial Till. (SM)		
15	Test pit terminated at 11 feet. No groundwater seepage encountered. Some caving in top 0 to 9 feet.		

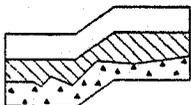
Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 568 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	FILL: Brown to blackish brown sandy SILT with gravel, wet, loose, organics, asphalt, concrete, wood, roots.		
5			
5			
5	Red-brown sandy SILT, wet, soft to stiff. (ML)		
5	Gray silty SAND with gravel, moist, dense, cemented. Glacial Till. (SM)		
10	Test pit terminated at 6.5 feet. No groundwater seepage encountered.		
15			



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**TEST PIT LOGS
CARILLON GARDENS APARTMENTS
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3705	Date AUG 1997	Figure A-8
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Test Pit No. ████ 15

Logged by: DPL

Approximate Elev. 562 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	FILL: Brown to black silty SAND to sandy SILT, wet, loose to medium dense 4 foot long pieces of concrete, asphalt, wood, roots, organics.		
5			
	Red-brown sandy SILT, wet, soft to stiff. (ML)		
10	Test pit terminated at 8.5 feet. No groundwater seepage encountered.		
15			

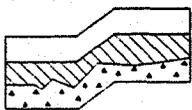
Test Pit No. ████

Logged by: DPL

Approximate Elev. 564 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	FILL: Brown to black silty SAND to sandy SILT, wet, loose to medium dense, concrete, asphalt, wood, roots, organics.		
5			
	Red-brown sandy SILT, wet, soft to stiff. (ML)		
10	Test pit terminated at 12.5 feet. No groundwater seepage encountered.		
15			



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CARILLON GARDENS APARTMENTS
SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3705	Date AUG 1997	Figure A-9
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Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 568 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	FILL: Brown to dark brown silty SAND with gravel, wet, loose to medium dense, small pieces of asphalt, concrete, wood. (SM)		
5	Red-tan sandy SILT, wet, stiff. (ML)		
5	Gray-brown to gray silty SAND with gravel, wet to moist, dense, cemented, fine grained. (SM)		
10	Test pit terminated at 8 feet. No groundwater seepage encountered.		
15			

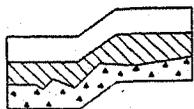
Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 572 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Brown to dark brown sandy SILT, wet, soft, roots. (ML)		
5	Gray silty SAND with gravel, wet, some mottling, medium dense. (SM)		
10	Test pit terminated at 5 feet. No groundwater seepage encountered.		
15			



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SNOHOMISH COUNTY, WASHINGTON

Proj. No. T-3705	Date AUG 1997	Figure A-10
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Test Pit No. ~~TD 10~~

Logged by: DPL

Approximate Elev. 576 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	Dark brown to black sandy SILT with organics, wet to saturated, soft, many small logs, roots. (OL)		
5			
5	Gray-brown silty SAND, wet to moist, medium dense, fine grained. (SM)		
10	Test pit terminated at 8 feet. Heavy groundwater seepage at 6 feet.		
15			

Test Pit No. ~~TD 09~~

Logged by: DPL

Approximate Elev. 575 ft.

Date: 7/24/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	12 inches Topsoil/Forest Duff.		
5	Brown sandy SILT, wet, soft. (ML)		
5	Gray silty SAND with gravel, wet to moist, dense, fine grained. Glacial Till. (SM)		
10	Test pit terminated at 6 feet. No groundwater seepage encountered.		
15			



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SNOHOMISH COUNTY, WASHINGTON**

Proj. No. T-3705

Date AUG 1997

Figure A-11

Test Pit No. ~~TP 01~~

Logged by: DPL

Approximate Elev. 558 ft.

Date: 7/25/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	(6 inches Topsoil/Sod)	16.9
5	FILL: Brown silty SAND with gravel, wet, loose, organics, car parts, wood, pieces of concrete.	
	Gray sandy SILT with gravel, wet, soft, mottled. (ML)	16.9
10	Test pit terminated at 9.5 feet. Some caving of fill soils. No groundwater seepage encountered.	
15		

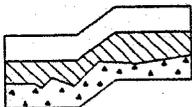
Test Pit No. ~~TP 02~~

Logged by: DPL

Approximate Elev. 560 ft.

Date: 7/25/97

Depth (ft.)	Soil Description	Moisture Content (%)
0	(6 inches Topsoil/Sod)	11.3
5	FILL: Brown silty SAND with gravel, wet to moist, loose, small sticks, organic layer at 3 feet.	
	FILL: Blue-gray sandy SILT, wet, soft, roots, sticks, organics.	20.9
	Red-brown to gray silty SAND with gravel, wet, loose to medium dense.	12.9 16.4
10	Test pit terminated at 9.5 feet. Some caving of fill soils. Moderate groundwater seepage at 8.5 feet.	
15		



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Proj. No. T-3705 Date AUG 1997 Figure A-12

Test Pit No. ~~TP-23~~

Logged by: DPL

Approximate Elev. 561 ft.

Date: 7/25/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	(6 inches Topsoil/Sod) FILL: Brown silty SAND with gravel, moist, medium dense, small sticks, old water line, concrete pieces.	18.4	
5	Red-brown to gray brown silty SAND with gravel, moist, medium dense to dense, cemented last 6 inches. (SM)	12.6 11.2	
10	Test pit terminated at 7.5 feet. No groundwater seepage encountered.		
15			

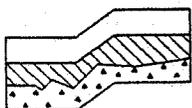
Test Pit No. ~~TP-24~~

Logged by: DPL

Approximate Elev. 560 ft.

Date: 7/25/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	(6 inches Topsoil/Sod)	11.9	
5	FILL: Brown silty SAND with gravel, moist, medium dense, organics, pieces of wood pieces of asphalt, concrete, rubber tire, layer of straw.		
10	Gray-brown sandy SILT, wet, soft, some gravel. (ML)	18.0	
15	Test pit terminated at 10.5 feet. No groundwater seepage encountered. Some caving of fill soils.		



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Proj. No. T-3705	Date AUG 1997	Figure A-13
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Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 562 ft.

Date: 7/25/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	(4 inches Topsoil/Sod)		
5	FILL: Brown silty SAND to gray sandy SILT, wet, loose to soft, organic rich, pieces of asphalt, wood, electrical wire.		
10	Becomes saturated at 11 feet.		
15	No native soils observed in the test pit. Test pit terminated at 11.5 feet. Some caving of fill soils. No groundwater seepage encountered.		

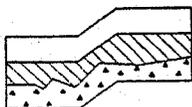
Test Pit No. [REDACTED]

Logged by: DPL

Approximate Elev. 560 ft.

Date: 7/25/97

Depth (ft.)	Soil Description	Moisture Content (%)	
0	(6 inches Topsoil/Sod)		
5	FILL: Brown to dark gray sandy SILT, wet, soft, organics, pieces of asphalt, concrete, wood, pvc pipe.	18.8	
10	Black organic layer, wet, peaty, small logs.	94.8	
	Gray sandy SILT, wet, stiff, some mottling. (ML)	15.7	
15	Test pit terminated at 11 feet. Some caving of fill soils. Moderate groundwater seepage at 10.5 feet.		



TERRA ASSOCIATES
Geotechnical Consultants

TEST PIT LOGS
CARILLON GARDENS APARTMENTS
SNOHOMISH COUNTY, WASHINGTON

Proj. No. T-3705

Date AUG 1997

Figure A-14