Cornerstone
Geotechnical, Inc.
Consulting Geotechnical Engineers & Geologists

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SEP 25 2008
COA Engineering Dept.

September 24, 2008

Mr. Travis McNeal
1725 – 220th Street SE
Bothell, Washington 98021

Supplemental Geotechnical Letter
3721 – 172nd Street NE
Arlington, Washington 98223
CG File No. 2512

Dear Mr. McNeal:

INTRODUCTION

This supplemental letter presents the results of our infiltration testing for the proposed Smokey Point Town Center commercial development. The site is located at 3721 – 172nd St. NE, Arlington, Washington. We have previously prepared a geotechnical report for the site, dated November 30, 2007 and a letter, dated July 23, 2008. Your civil engineer, Insight Engineering, has provided us with revised Plan sheets C4 and C5 for the project, and a geotechnical report for the adjacent property to the south, dated March 3, 2000 by Terra & Associates, Inc.

We understand that you plan to develop the site into a Hotel with approximately 80 rooms and a strip mall. The infiltration system will consist of 5 different infiltration galleries. We have included in Figure 1 the current planned design for the system. We understand that you have used a design infiltration rate of 2 inches per hour as recommended in the 1992 Department of Ecology Manual. Your civil engineer has also used the high groundwater table as identified in the Terra Report. The high water table in February of 2000 on the adjacent property to the south was at an elevation of 120.1 feet. The current design includes a 3 foot buffer above the high groundwater table. We have attached the Terra report to this letter to reference the high groundwater table and the soil gradational conditions.

INFILTRATION TESTING

We completed eight infiltration tests in general accordance with the 1980 "Falling Head Percolation Test Procedure" by EPA for On-Site Wastewater Treatment and Disposal Systems.

A 6-inch-diameter PVC pipe was placed in each of the eight hand excavations and backfilled around with soil from the excavation. The pipes were installed to case the holes during test preparation and during the infiltration test. The holes were excavated to a depth of approximately 3.0 to 3.5 feet. The approximate location of the infiltration holes is shown on Figure 1.

The holes were soaked for about one hour prior to running the infiltration tests. After the soaking period, we completed three Falling Head Tests in each location that measured the drop in the water level by making manual measurements. We used the lowest rate recorded to represent the infiltration rate below:

Infiltration Test No.	Rate inches/hour
1	54
2	138
3	81
4	72
5	87
6	108
7	114
8	93

CONCLUSIONS AND RECOMMENDATIONS

It is our opinion that the infiltration system as planned is feasible for the site. The 2 inches per hour used by the civil engineer as the design rate is conservative and has adequate factor of safety for the long term infiltration design. It is our opinion the documented high groundwater table by Terra Associates is applicable for this site. The infiltration galleries are planned 3 feet above the high groundwater table and the bottom of the trenches are approximately 3 to 3½ feet below the surface. This lower infiltration rate also includes effects from the groundwater, which will cause the water to migrate laterally.

It is very important to reduce contaminated water into the system during construction or after construction is completed. We recommend that the contractor take precautions to protect all the infiltration systems.

We have prepared this report for Mr. Travis McNeal and his agents, for use in planning and design of this project. The data and report should be provided to prospective contractors for their bidding and estimating purposes, but our report, conclusions and interpretations should not be construed as a warranty of subsurface conditions.

Within the limitations of scope, schedule and budget for our services, we have strived to take care that our services have been completed in accordance with generally accepted practices followed in this area at the time this report was prepared. No other conditions, expressed or implied, should be understood.

We appreciate the opportunity to be of service to you. If there are any questions concerning this report or if we can provide additional services, please call.

Sincerely,

Cornerstone Geotechnical, Inc.

9/24/08

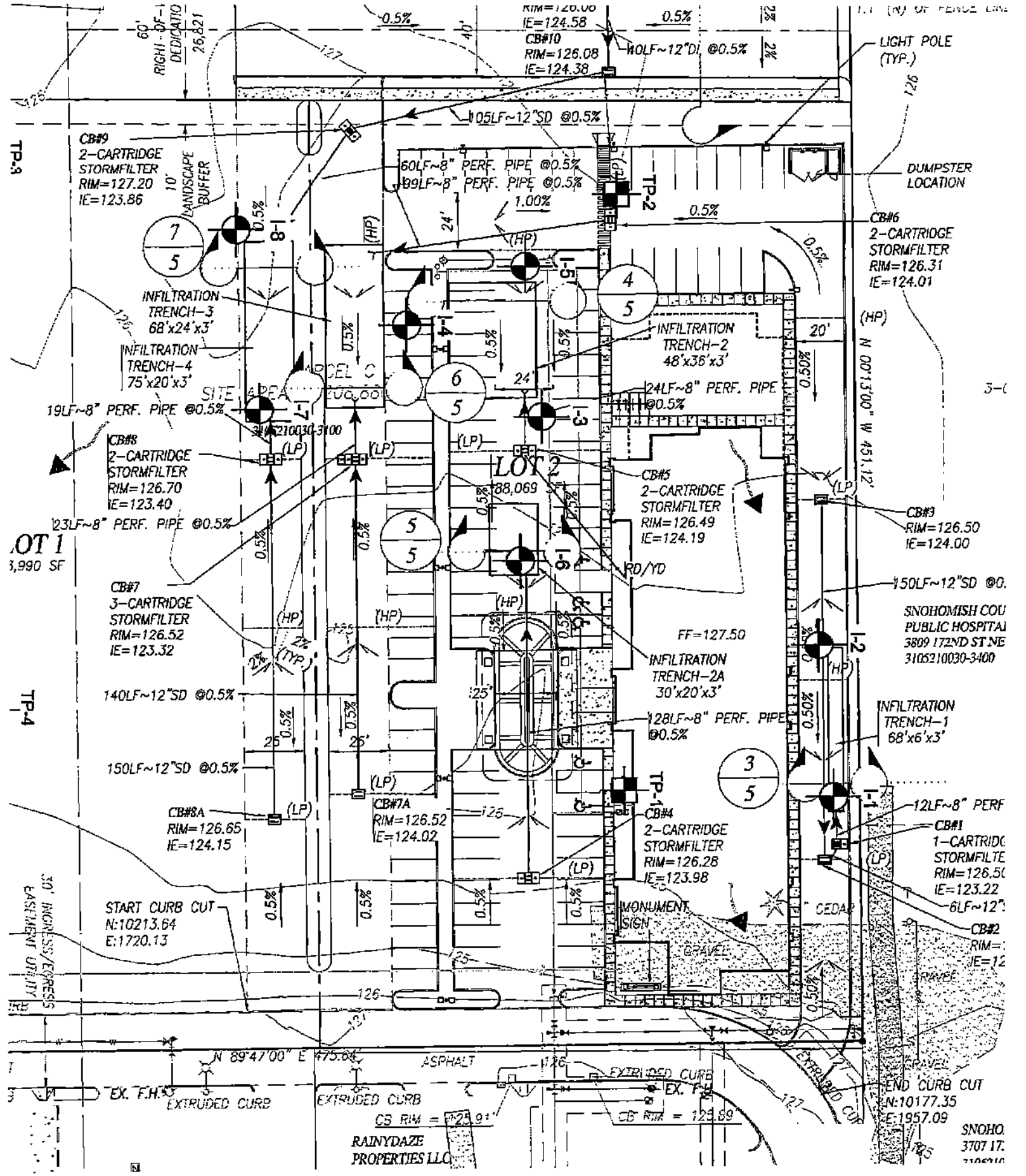
EXPIRES 08/16/2010

Rick B. Powell, PE
President

RBP:am

Three Copies Submitted
One Figure and Attachment
Information about this Geotechnical Engineering Report

cc: Mr. Brian Kalab, Insight Engineering (one Copy)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LIGHT POLE (TYP.)
105LF~12"SD @0.5%
CB#9
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RIM=127.20
IE=123.86
10' LANDSCAPE BUFFER
60LF~8" PERF. PIPE @0.5%
89LF~8" PERF. PIPE @0.5%
1.00%
DUMPSTER LOCATION
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2-CARTRIDGE STORMFILTER
RIM=126.31
IE=124.01
INFILTRATION TRENCH-3
68'x24'x3'
INFILTRATION TRENCH-4
75'x20'x3'
INFILTRATION TRENCH-2
48'x36'x3'
24LF~8" PERF. PIPE @0.5%
N 00°13'00" W 451.12'
19LF~8" PERF. PIPE @0.5%
SITE AREA
PARCEL C
210030-3100
CB#8
2-CARTRIDGE STORMFILTER
RIM=126.70
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23LF~8" PERF. PIPE @0.5%
LOT 2
88,069 SF
CB#5
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CB#3
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LOT 1
3,990 SF
CB#7
3-CARTRIDGE STORMFILTER
RIM=126.52
IE=123.32
RD/YD
150LF~12"SD @0.5%
SNOHOMISH COU
PUBLIC HOSPITAL
3809 172ND ST NE
3105210030-3400
FF=127.50
INFILTRATION TRENCH-2A
30'x20'x3'
140LF~12"SD @0.5%
128LF~8" PERF. PIPE @0.5%
INFILTRATION TRENCH-1
68'x6'x3'
150LF~12"SD @0.5%
CB#8A
RIM=126.65
IE=124.15
CB#7A
RIM=126.52
IE=124.02
CB#4
2-CARTRIDGE STORMFILTER
RIM=126.28
IE=123.98
12LF~8" PERF
CB#1
1-CARTRIDG
STORMFILTE
RIM=126.5
IE=123.22
6LF~12"
START CURB CUT
N:10213.64
E:1720.13
MONUMENT SIGN
CEDAR
GRAVEL
CB#2
RIM=
IE=12
30' INGRESS/EGRESS EASEMENT UTILITY
N 89°47'00" E 475.64'
ASPHALT
EX. F.H.
EXTRUDED CURB
CB RIM = 125.91
RAINYDAZE PROPERTIES LLC
CB RIM = 125.69
END CURB CUT
N:10177.35
E:1957.09
SNOHO
3707 17
TP-1
TP-2
TP-3
TP-4
I-1
I-2
I-3
I-4
I-5
I-6
I-7
I-8

TERRA ASSOCIATES, Inc.
Consultants in Geotechnical Engineering, Geology
and
Environmental Earth Sciences

March 3, 2000
Project No. T-4603

Mr. Scott Becraft
Sundance Management
12205 – 8th Street NE
Lake Stevens, Washington 98258

Subject: Geotechnical Engineering Evaluation
Pavement Subgrade and Stormwater Infiltration Facilities
Smokey Point Towncenter, Phase I
Arlington, Washington

Reference: Geotechnical Report, Proposed Smokey Point Project, Arlington, Washington, prepared by Shannon and Wilson, Inc., Project No. W-7031-01, dated August 1995

Dear Mr. Becraft:

As requested, we have completed a geotechnical engineering review of the pavement subgrade requirements and stormwater infiltration facilities for the subject project. To complete our work, we used soil information as summarized in the above referenced geotechnical report prepared by Shannon and Wilson, Inc. and supplemented this information by observing soil conditions at five additional soil test pits excavated at the site on February 2, 2000. The following summarizes our findings, conclusions, and recommendations.

SITE CONDITIONS

Surface

The site is an undeveloped parcel located on the north side of 172nd Street SE east of Smokey Point Boulevard in the City of Arlington in Snohomish County, Washington. The approximate location of the site is shown on the attached Vicinity Map, Figure 1. The site is bordered by an undeveloped parcel to the north, 172nd Street to the south, a fast food restaurant to the west, and residential homes to the east. Topographic conditions on the site are shown on a site plan prepared by Group Four, Inc. dated January 12, 2000. The attached Exploration Location Plan, Figure 2, is based on this site plan.

09/10/2008 14:13 14259039362 INSIGHT ENGINEERING PAGE 02/14

The site is relatively flat. It is primarily a grass field with numerous two- to three-foot diameter fir tree stumps scattered over the site. Scattered mature deciduous trees and low brush cover the mid to eastern part of the site. We did not observe surface water on-site.

Soils

The soil conditions at the site as described in the referenced report and observed at the supplemental test pits consist of 6 to 12 inches of sod and topsoil overlying loose mottled brown sand with silt. The mottled brown sand changes to medium dense gray-brown with depth. This layer of sand with silt extends to about six feet below the existing ground surface. Beneath the gray-brown sand with silt, we observed medium dense clean gray sand to the termination depth of the test pits. This sand unit was found in a saturated condition and caved easily.

The soils encountered in Test Pits TP-4 and TP-5 located along the driveway are similar to the shallow soils encountered in the other test pits. Below the topsoil, the soil was mottled gray-brown sand with silt. The soil was loose to medium dense.

The *Geologic Map of the Marysville Quadrangle, Washington*, by James P. Minard (1985), shows the soils in the vicinity of the site belonging to the Marysville Sand Member of the Vashon recessional outwash. These soils are classified as well-drained sand with fine gravel overlying till. The soils observed in our test pits were generally consistent with the mapped classification.

Figures 3 through 5 present detailed descriptions of the subsurface conditions encountered in the test pits. The approximate test pit locations are shown on Figure 2.

Groundwater

We evaluated groundwater conditions at the site by observing seepage levels in the open test pits and by measuring the water levels in slotted PVC standpipes installed in Test Pits TP-1, TP-2, and TP-3. These test pits are located in the vicinity of the proposed infiltration gallery along the southern edge of the project site. We encountered groundwater in all of the test pits. Heavy groundwater seepage was encountered at about six feet below the ground surface. We measured the water levels in the standpipes on February 17, 2000, following their installation. The measured water levels are as follows: TP-1, 4.9 feet; TP-2, 5.8 feet; TP-3, 6.0 feet. (All depths are referenced to the existing ground surface).

Fluctuations in the groundwater levels will occur on a seasonal basis. Given the time of year our exploration was performed, it is our opinion that the water levels observed reflect seasonal high levels. We expect water levels will gradually drop during the upcoming drier summer and early fall months.

Pavement Subgrades

In our opinion, the native sand with silt that underlies the upper six to eight inches of organic surface material will provide suitable support for pavement structures. We recommend that the native soil subgrade be scarified a minimum depth of 12 inches and moisture conditioned as necessary, and then compacted to a minimum of 95 percent of the soil's maximum dry density as determined by ASTM Test Designation D-698 (Standard Proctor). If this soil is placed as fill to establish subgrade elevation, it should be compacted in loose lift thicknesses not exceeding 12 inches to these same requirements. Regardless of the degree of compaction, the pavement subgrade must be in a firm and stable condition prior to paving. Pavement subgrades should be proofrolled with heavy rubber tired construction equipment to verify stable and nonyielding conditions.

The pavement design section is dependent upon the supporting capability of the subgrade soils and the traffic conditions to which it will be subjected. As a retail center, we expect that the majority of traffic using the facility will consist of light passenger and commercial vehicles with limited heavy traffic in the form of delivery trucks and trash removal vehicles. Based on this information and with a stable subgrade prepared as recommended above, we recommend the following pavement sections:

- Two inches of asphalt concrete (AC) over six inches of crushed rock base
- Two inches of AC over four inches of asphalt treated base (ATB)

Based on visual examination of the subgrade soils, laboratory test results and our experience with pavement subgrades in the Smokey Point area, we believe the subgrade will be fairly well drained and therefore, would not regard the soils as being highly frost susceptible. Therefore, in our opinion, we do not believe it would be necessary to support the pavement sections on a minimum of 12 inches of non-frost susceptible soils, which would be imported to the site, as recommended in the referenced report prepared by Shannon and Wilson, Inc.

STORMWATER INFILTRATION FACILITIES

The infiltration facilities will consist of a system of buried perforated pipes that are bedded and backfill in washed drainage aggregate. Currently, the infiltration gallery will include three perforated pipes that will be installed in a gravel bed having dimensions of 30 by approximately 110 feet. The bottom depth of the infiltration gallery is planned at about three feet below existing site grades.

As discussed earlier, soil conditions encountered at the location of the proposed infiltration gallery consist primarily of outwash sands with varying amounts of silt and gravel. The groundwater level at the time of exploration was noted to be at a depth of five to six feet below the ground surface. At the proposed construction elevation, the bottom of the infiltration gallery will about two to three feet above the current seasonal high groundwater table. Because of these conditions, deep vertical migration of infiltrated water will not occur because the groundwater table will act as a barrier. As a result, the flow will be forced to occur laterally, developing mounding beneath the infiltration gallery.

Mr. Scott Becraft
March 3, 2000

We analyze the potential mounding condition over a flow duration period of five days. In this analysis, we assumed the infiltration gallery would be completely inundated with a constant water head at a depth of one foot below the final surface grade. Soil permeability selected for analysis was based on the results of the grain size analyses, which are attached as Figures 6 through 9. Based on the results of our mounding analysis, discharge of development stormwater by infiltration will still be feasible, however the rate of discharge will be limited because of the position of the groundwater table. Based on our analysis, we recommend designing the facility using an infiltration rate of no greater than two inches per hour.

Untreated stormwater must not be allowed to discharge into the infiltration system. Only treated water with suspended sediments removed should be routed to discharge by infiltration. Maintenance of the infiltration facility should be performed on a regularly scheduled basis. Once a year, the infiltration gallery should be checked and cleaned of any sediment accumulation. Failure to maintain the infiltration gallery on a regular basis will likely result in a diminished infiltration capacity.

LIMITATIONS

We prepared this report in accordance with generally accepted geotechnical engineering practices. This report is the property of Terra Associates, Inc. and is intended for specific application to the Smokey Point Towncenter, Phase I project. This report is for the exclusive use of Sundance Management Group and their authorized representatives. No other warranty, expressed or implied, is made.

The analyses and recommendations presented in this report are based upon data obtained from the test pits excavated on-site. Variations in soil conditions can occur, the nature and extent of which may not become evident until construction. If variations appear evident, Terra Associates, Inc. should be requested to reevaluate the recommendations in this report prior to proceeding with construction.

We appreciate the opportunity to be of service during this phase of the subject project and look forward to working with you during the final design and construction phases. We trust the information presented is sufficient for your current needs. If you have any questions or require additional information, please call.

Sincerely yours,
TERRA ASSOCIATES, INC.

Maher A. Shebl, Ph.D.
Staff Engineer

Theodore J. Schepper, P.E.
Principal Engineer

THEODORE J. SCHEPPER — STATE OF WASHINGTON — 25742 — REGISTERED PROFESSIONAL ENGINEER

EXPIRES 6/18/2001

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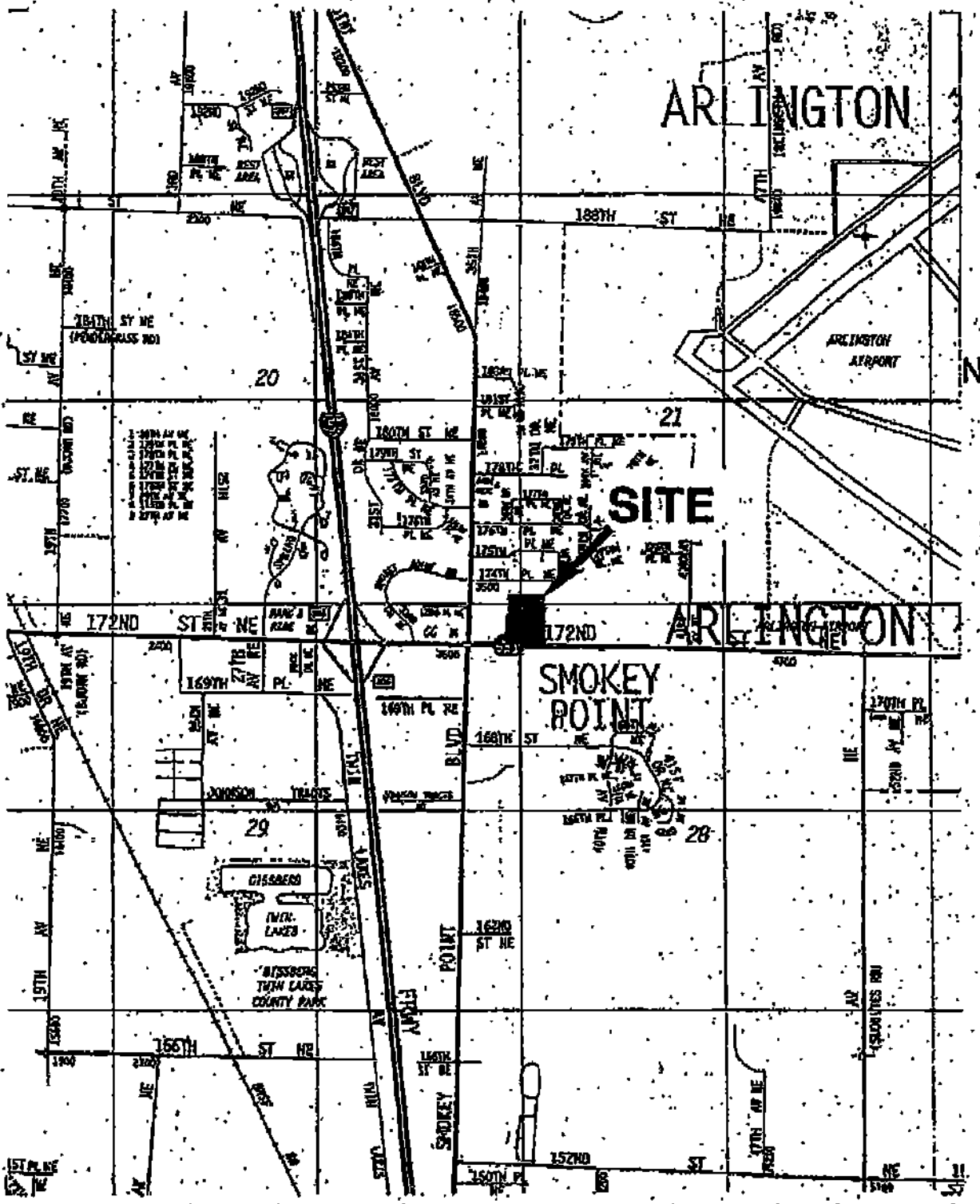

REFERENCE: THE THOMAS GUIDE, METROPOLITAN PUGET SOUND, PAGES 316 AND 336, 2000 EDITION.

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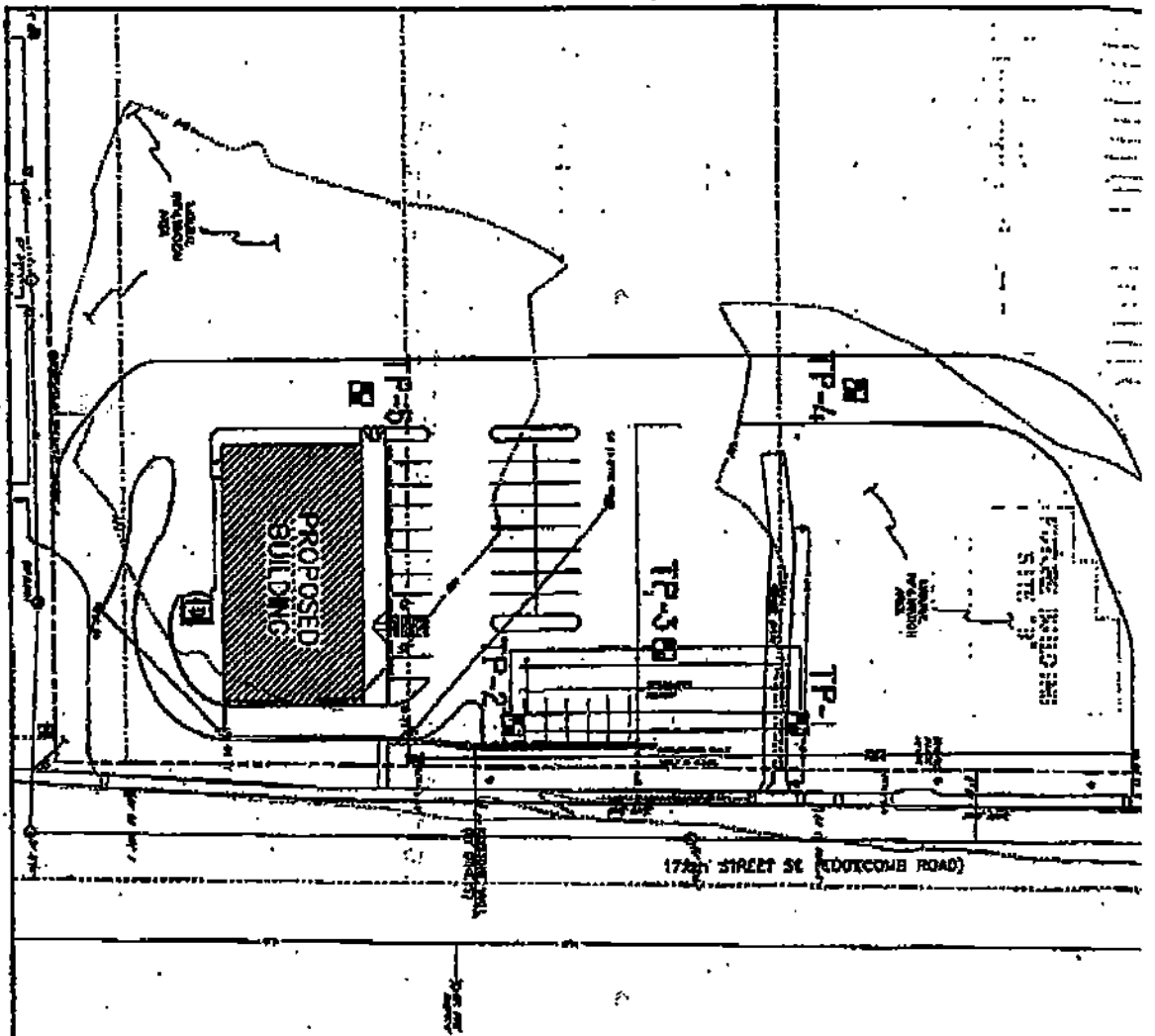
VICINITY MAP
SMOKEY POINT TOWNCENTER, PHASE 1
ARLINGTON, WASHINGTON

Proj.No. 4603	Date MAR. 2000	Figure 1



APPROXIMATE SCALE
0 50 100 feet

LEGEND:
TP-2 APPROXIMATE TEST PIT LOCATION

REFERENCE:
SITE PLAN PREPARED AND PROVIDED BY GRUMP FOUR, INC., JOB No. 94-1522, DATED 01/00.

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Geotechnical Consultants

EXPLORATION LOCATION PLAN
SUCKEY POINT TOWNCENTER, PHASE 1
ARLINGTON, WASHINGTON

Proj.No. 4603 | Date MAR. 2000 | Figure 2

Test Pit No. TP-1

Logged by: MAS

Date: 2/2/00

Depth (ft.)	Soil Description	Moisture Content (%)
0	Dark brown sandy SILT with organics and grass roots.	
	Mottled gray-brown, fine to medium SAND with silt, loose to medium dense, moist. (SP-SM)	17
5	Gray fine to medium SAND with gravel, medium dense, very wet. (SP)	21
10	Test pit terminated at 10 feet. Caving at 4.5 feet. Standpipe installed. Heavy groundwater seepage at 6 feet.	
15		

Test Pit No. TP-2

Logged by: MAS

Date: 2/2/00

Depth (ft.)	Soil Description	Moisture Content (%)
0	Dark brown sandy SILT with organics and grass roots.	
	Mottled grey-brown fine to medium SAND with silt, loose to medium dense, moist. (SP-SM)	10
5	Gray, fine to medium SAND with gravel, medium dense, very wet. (SP)	22
10	Test pit terminated at 10 feet. Caving at 5 feet. Heavy groundwater seepage encountered at 6 feet. Standpipe installed.	
15		

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TEST PIT LOGS
SMOKEY POINT TOWNCENTER, PHASE I
ARLINGTON, WASHINGTON

Proj. No. T-4603 | Date MAR 2000 | Figure 3

Test Pit No. TP-3

Logged by: MAS

Date: 2/2/00

Depth (ft.)	Soil Description	Moisture Content (%)
0	Dark brown sandy SILT with organics and grass roots.	
	Mottled gray-brown fine to medium SAND with silt, loose to medium dense, moist. (SP-SM)	14
5	Gray, fine to medium SAND with gravel, medium dense, very wet. (SP)	13
10	Test pit terminated at 10 feet. Caving at 5.5 feet. Heavy groundwater seepage encountered at 6 feet. Standpipe installed.	
15		

Test Pit No. TP-4

Logged by: MAS

Date: 2/2/00

Depth (ft.)	Soil Description	Moisture Content (%)
0	Dark brown sandy SILT with organics. (ML)	
	Gray SAND with silt.	
5	Test pit terminated at 3 feet.	
10		

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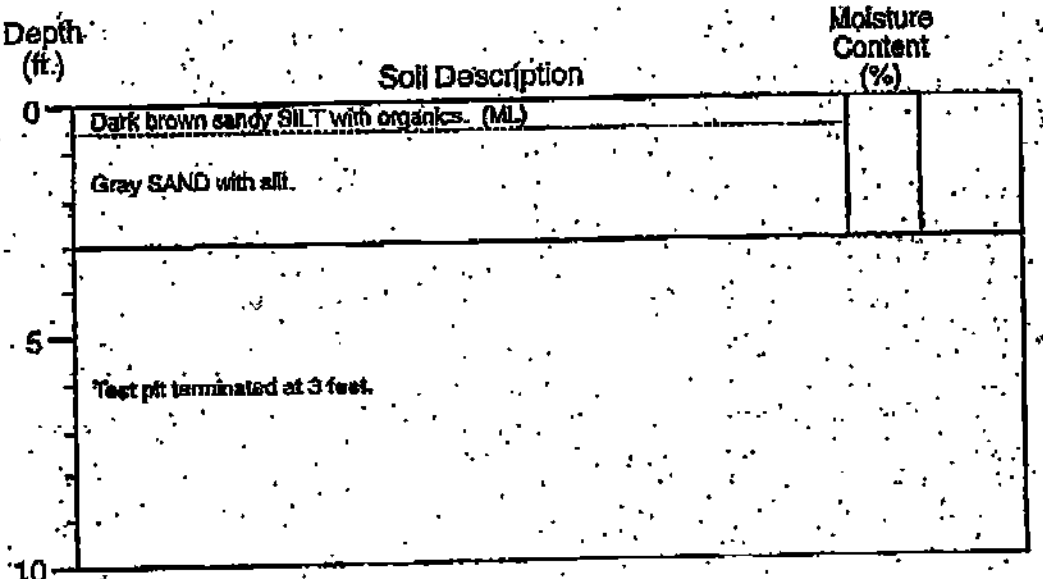
TEST PIT LOGS
SMOKEY POINT TOWNCENTER
ARLINGTON, WASHINGTON

Proj. No. T-4603	Date MAR 2000	Figure 4

Test Pit No. TP-5

Logged by: MAS

Date: 2/2/00



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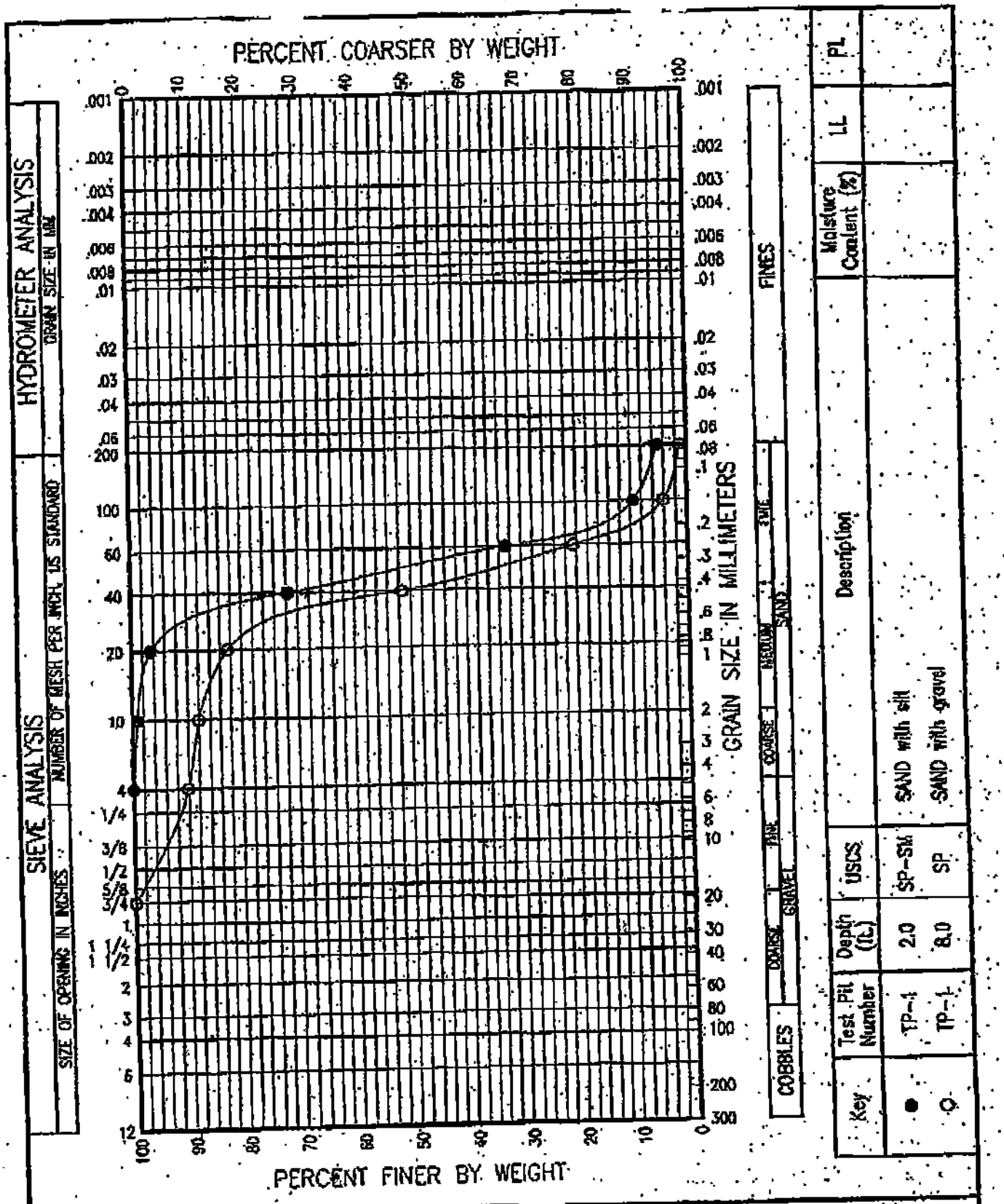
TEST PIT LOGS
SMOKEY POINT TOWNCENTER
ARLINGTON, WASHINGTON

Proj. No. T-4603	Date MAR 2000	Figure 5



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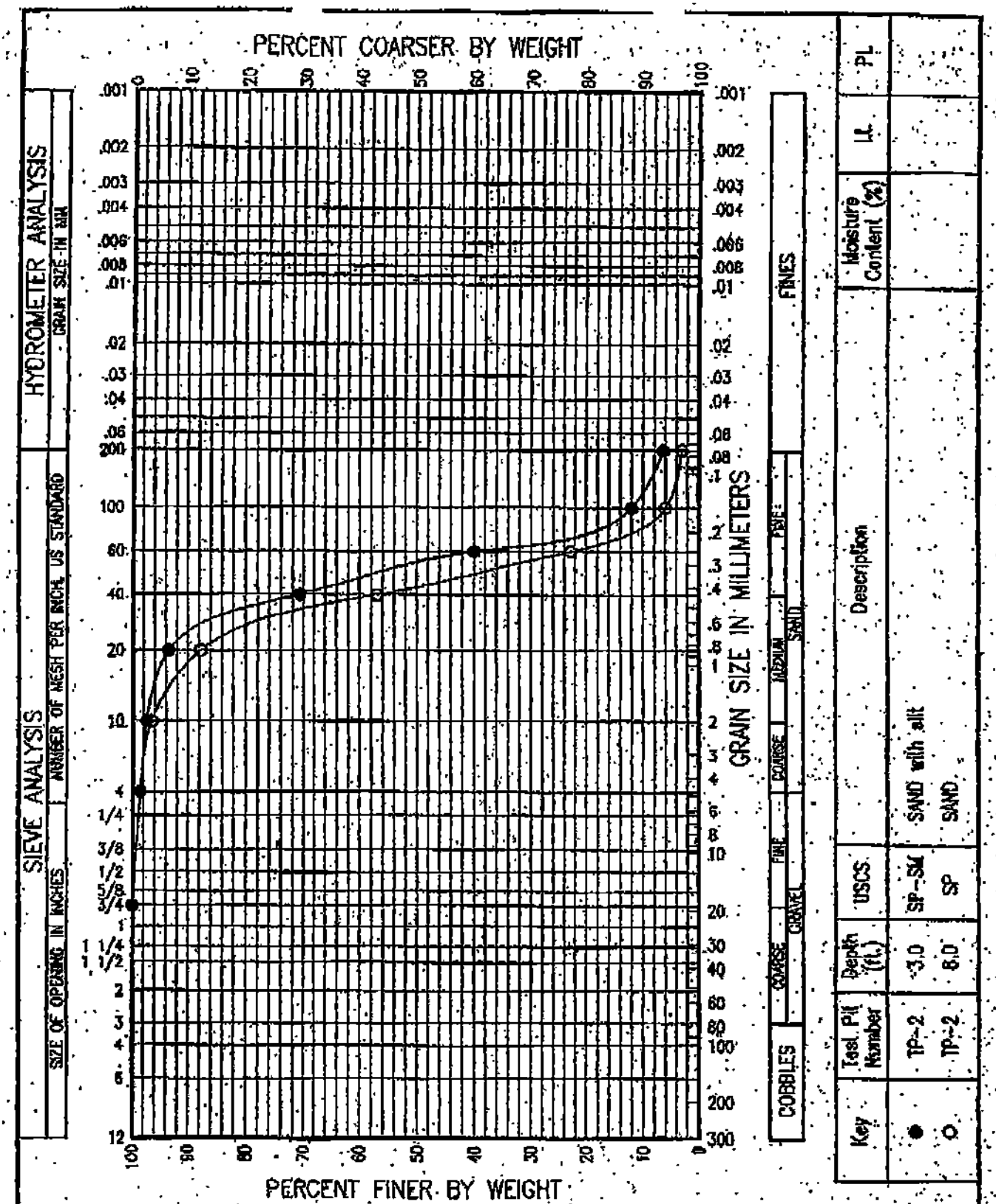
GRAIN SIZE ANALYSIS
SMOKEY POINT TOWNCENTER, PHASE 1
ARLINGTON, WASHINGTON

Proj.No. 4603	Date MAR. 2000	Figure 6



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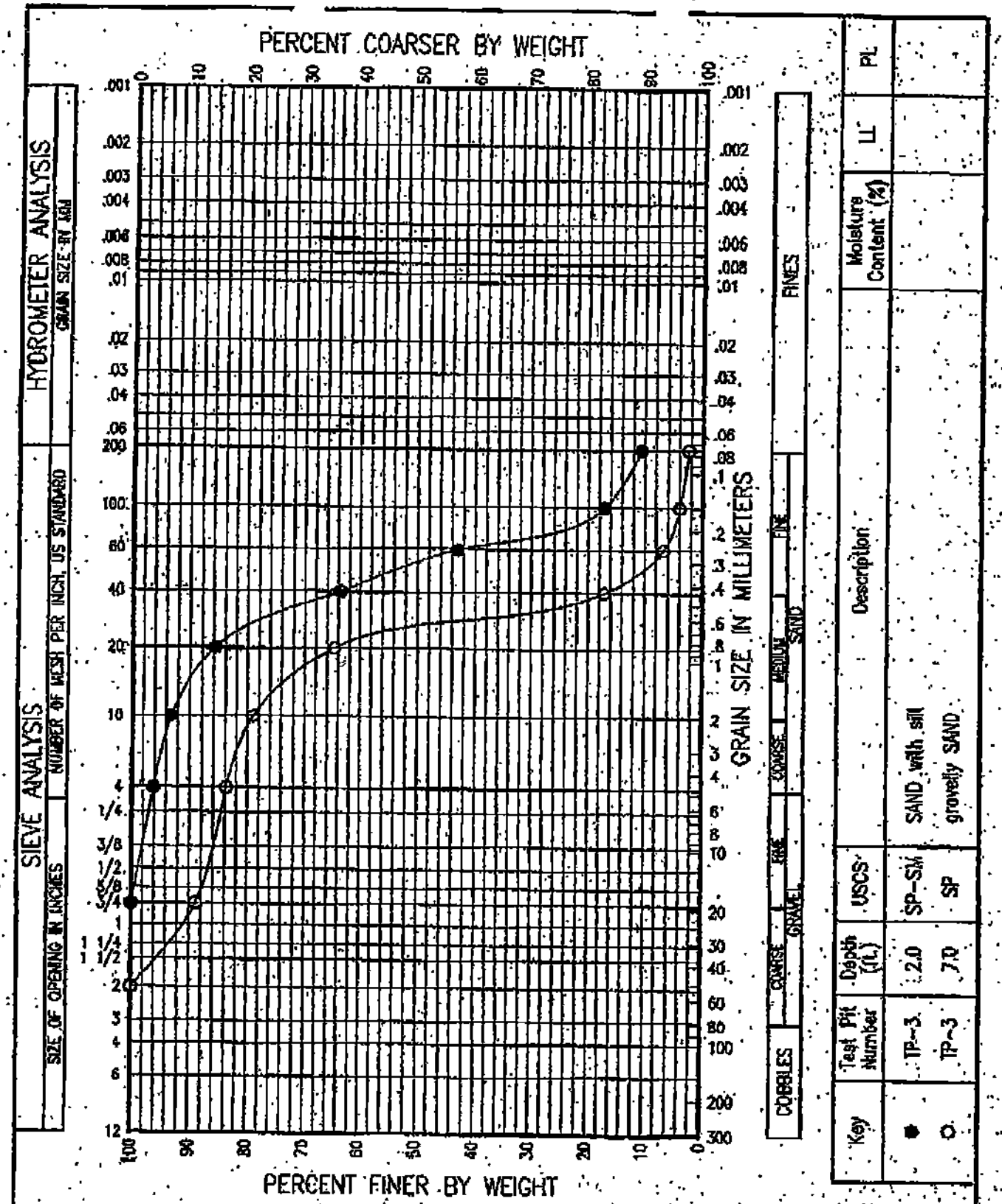
GRAIN SIZE ANALYSIS
SMOKEY POINT TOWNCENTER, PHASE 1
ARLINGTON, WASHINGTON

Proj.No. 4603 | Date MAR. 2000 | Figure 7



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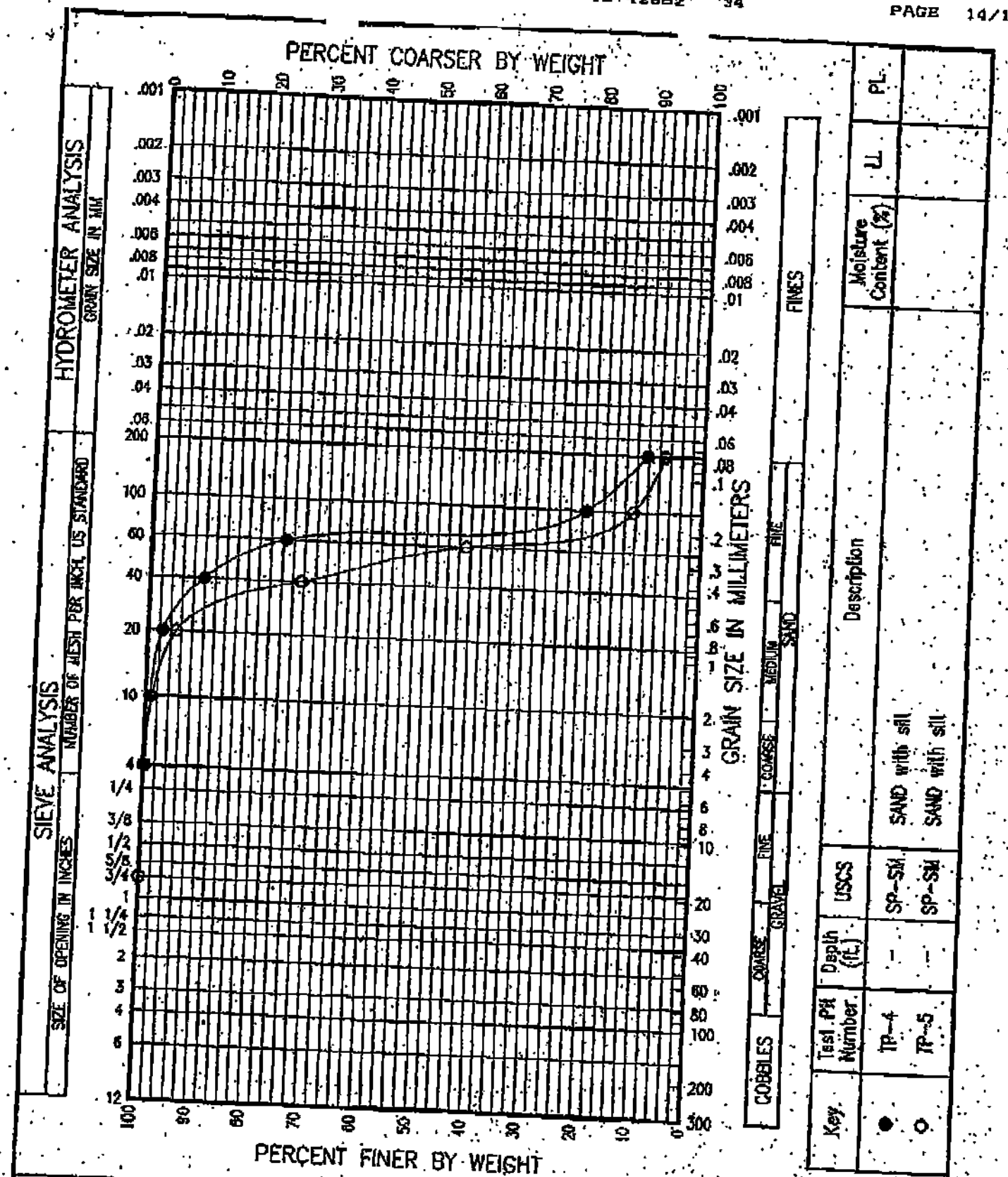
GRAIN SIZE ANALYSIS
SMOKEY POINT TOWNCENTER, PHASE 1
ARLINGTON, WASHINGTON

Proj.No. 4603	Date MAR. 2000	Figure 8



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GRAIN SIZE ANALYSIS
SMOKEY POINT TOWNCENTER, PHASE 1
ARLINGTON, WASHINGTON

Proj.No. 4603	Date MAR. 2000	Figure 9