FINAL REPORT

SITE CONTAMINATION SCREENING STUDY AND GEOTECHNICAL EVALUATION

CORNERSTONE DEVELOPMENT COMPANY

By
Dames & Moore
October, 1986
Job #11911-010-16

Dames & Moore

Dames & Moore

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October 24, 1986

Cornerstone Development Company
Waterfront Place Building
1011 Western Avenue, Suite 500
Seattle, Washington 98104

Attention: Ms. Karen Ross

Final Report
Site Contamination Screening Study and Geotechnical Evaluation
Proposed Commercial Development
Seattle, Washington, for the
Cornerstone Development Company

Dames & Moore is pleased to submit four copies of our Final Report, "Site Contamination Screening Study and Geotechnical Evaluation". We are pleased to have had the opportunity to be of service to you. If you have any questions, please do not hesitate to contact the undersigned.

Yours very truly,

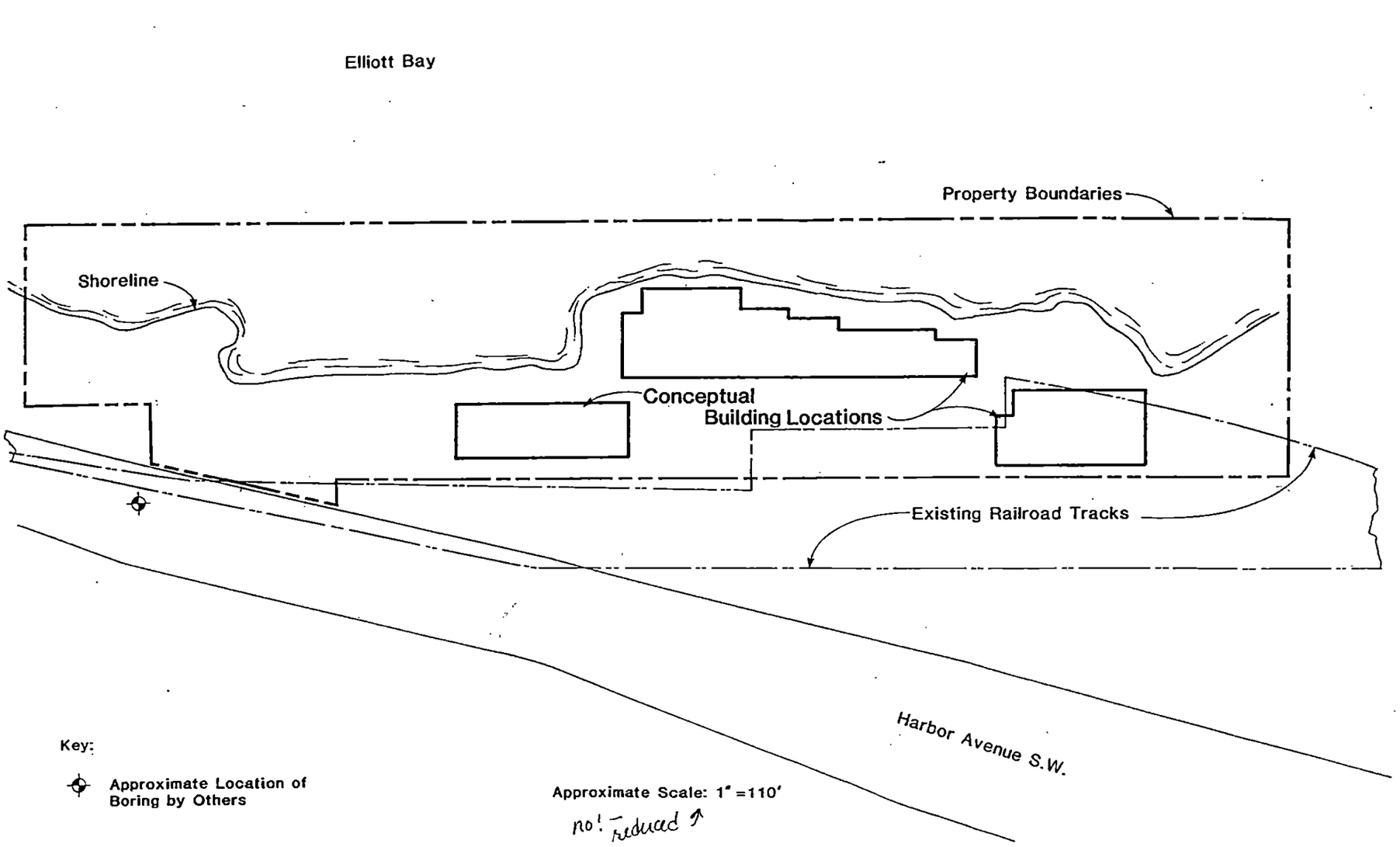
DAMES & MOORE

By J. Michael Blackwell
J. Michael Blackwell
Partner

And James B. Harakas
James B. Harakas, P.E.
Associate

JMB:JBH:lac/emw
11911-010-005
4 copies submitted

GEO/R:010-1.0



Site Plan Showing Conceptual Building and Nearby Soil Boring Locations

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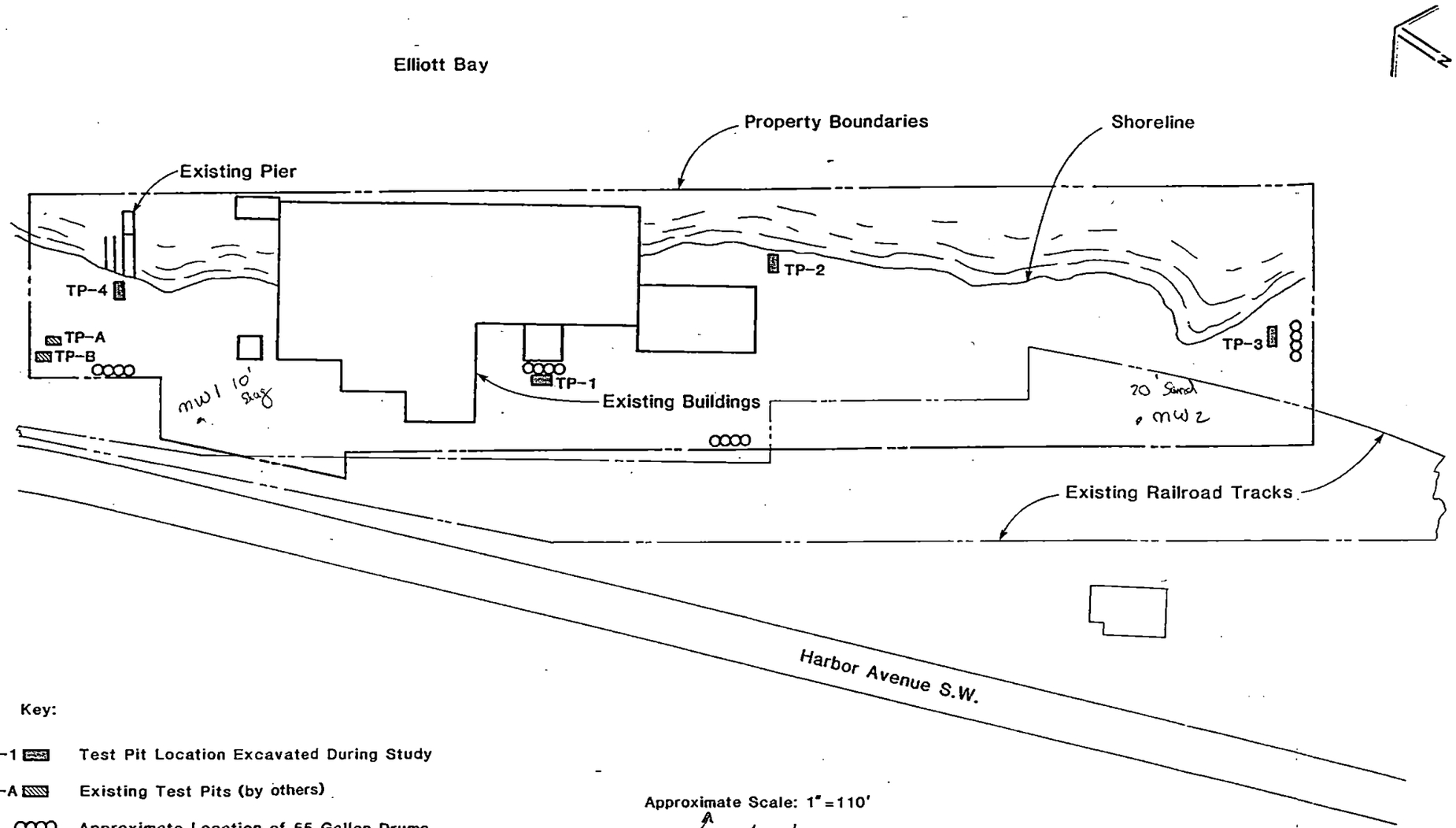
Job No. 11911-010

Plate 2



Key:

TP-1 Test Pit Location Excavated During Study

TP-A Existing Test Pits (by others)

Approximate Location of 55 Gallon Drums

Approximate Scale: 1" = 110'

no - reduced

Reference:

Building outlines obtained from aerial photograph dated 1974 and an undated map provided by Cornerstone Development

Site Plan Showing Test Pit and 55 Gallon Drum Locations

Dames & Moore

Job No. 11911-010

Plate 3

Drawn by Date Designed by Date QA/QC by Date App. by Date

5. Developed a preliminary indication of the types of foundations which might be required for support of the proposed structures. We include preliminary pile penetration depths and allowable supporting capacities;

6. Excavated test pits to assess near-surface conditions;

7. Collected soil samples from the test pits for chemical analysis; and

8. Provided recommendations for further study.

Tasks 1, 2, 3, 4, 5, and 8 were initially included in our proposal of September 25, 1986, which was authorized on September 29, 1986. Our initial review of site history indicated a need for chemical sampling and testing; we were therefore verbally authorized to include Tasks 6 and 7 on October 10, 1986.

PART 1
CONTAMINATION SCREENING

Site History

We have reviewed archival topographic maps from the period 1875 to 1973 and six sets of aerial photographs taken over the period 1936 to 1974. From this review, and from discussions with the present owner (Marine Power and Equipment, Inc.) and employees of the Port of Seattle, the following outline of site history has been prepared:

- The original natural shoreline ran along the approximate present alignment of Harbor Avenue S.W.

- At some point before 1936, the site was filled to near the present shoreline. Minor amounts of fill were placed in later years. Judging from the test pits that we logged, the fill consists of mineral soil typical of that found in the adjacent upland, with considerable amounts of admixed refractory brick, slag, railroad ballast, and scrap metal.

- Historical site uses that we have identified include a scrap-metal loading facility, a sheet metal fabrication facility, a staging area for vehicles to be loaded at other locations, a general cargo warehouse, and a moorage and crew-change location for fuel barges and lighters. We have probably not identified all historic site uses, nor have we identified all past owners.

But we believe that the activities that we have identified are likely to be representive of activities that have been carried out on the site.

Surface Conditions

The site is now occupied by a wood-frame single-story warehouse, together with additions and outbuildings as sketched on Plate 3. The yard area near the building is partly paved, but most of the balance of the site is characterized by bare soil with scattered brush and trash.

In several parts of the site (see Plate 3) we noted a number of 55-gallon drums. Some of these drums were observed to be full, while others either contain small amounts of liquid or are empty. Labels on some of the drums indicate that the content are organic liquid (petroleum products, isocyanate formulations, for example), but many of the drums are not labeled.

A striking surface feature is a hard iron-oxide crust lying along much of the shoreline and extending landward approximately 10 to 12 feet. Typically, this crust is about 1/2 foot thick. Based on our visual observations, it appears that this crust is the result of oxidation of scrap metal in the aggressive marine environment near the shore.

Test Pit Sampling and Testing

We excavated, logged, sampled, and backfilled four test pits at the location shown on Plate 3. In addition, we logged two other pits in the northwest corner of the site, excavated earlier by others for unknown purposes. Test pit logs are shown on Plate 4 and 4a.

Samples from our test pits were composited and chemically tested for a variety of metals and organic constituents. Sampling methods, chemical testing methods, and a discussion of data interpretation issues are included in Appendix A. Appendices B and C provide a record of sample custody and original laboratory reports, respectively.

The chemical analysis results are presented in Table 1. These results indicate that lead, chromium, nickel, and zinc were detected in the samples from all four test pits. Cadmium, mercury, and cyanide were detected in some of the test pits, but at much lower concentrations. The total ABN organic and total chlorinated pesticides screens detected concentrations in all four test pits. PCB's were not detected.

Depth in Feet	USCS Symbol	Description
		TEST PIT A (Existing)
0 - 7'	SM	(2 to 4 inches crushed rock surfacing) Rock, brick, tile, slag in a matrix of silty sand with gravel and organics with some metal and wood (loose to medium dense) (fill) 60 to 70 percent rubble and debris Bottom of test pit at 7 feet below existing grade. Ground water observed at 6-foot depth on 10-10-86
		TEST PIT B (Existing)
0 - 7'	SM	(2 to 4 inches of crushed rock surfacing) Rock fragements, slag, brick, clay pipe, metal and wood in a matrix of silty fine to medium sand and fine to coarse gravel (loose to medium dense) (fill) Varies from 50 to 90 percent rubble and debris Bottom of test pit at 7 feet below existing grade. Ground water observed at 6-foot depth on 10-10-86.
		TEST PIT 1 (Excavated 10-10-86)
0 -7½'	ML	Gray, clayey silt mixed with zones of tan sandy silt with brick, rock concrete, and wood rubble (soft to medium stiff) (fill) Approximately 30 to 40 percent rubble and debris Bottom of test pit at 7½ feet beneath existing grade. Groundwater encountered at 7-foot depth during exavation.

Log of Test Pits

Dames & Moore

Depth in Feet	USCS Symbol	Description
		TEST PIT 2 (Excavated 10-10-86)
0 - 2'	SM	Brown, gravelly silty fine sand with some slag, organics, brick, and concrete rubble (medium dense) (fill)
2 - 3'	SP	Black, fine sand with rock and some metal debris (loose) (fill)
3 - 5½'	ML	Brown to greenish gray clayey silt with sandy silt layers and lenses with some roots (medium stiff)
		Bottom of test pit at 5½ feet below existing grade. Ground water encountered at 5½-foot depth during excavation.
		TEST PIT 3 (Excavated 10-10-86)
0 - 2'	SP	Brown, fine to medium sand with some concrete rubble and cobbles (medium dense) (fill)
2 - 6½'	SP	Metal, rebar, bricks, and slag in matrix of brown fine to medium sand (dense) (fill)
		Approximately 30 percent rubble and debris
		Bottom of test pit at 6½ feet below existing grade. No ground water encountered during excavation
		TEST PIT 4 (Excavated 10-10-86)
0 - 3½'	SP	Rock, brick, slag, and metal in a matrix of brown fine to medium sand with silt (very dense) (fill)
		Test pit terminated at 3½ feet due to hard excavating conditions; metal plate encountered. No ground water encountered during excavation.

Log of Test Pits

Dames & Moore

TABLE 1
ANALYTICAL RESULTS
(Concentrations in mg/kg [ppm])

Test Pit	Lead	Chromium	Cadmium	Nickel	Mecury	Zinc	Cyanide	Total ABN	Total Chlor. Pestcides	Total PCB's
TP-1	350	49	10	57	<0.1	790	0.6	18	1.6	<0.1
TP-2	130	140	<0.5	100	0.4	110	<0.5	94	0.38	<0.1
TP-3	510	70	1.1	210	0.2	1,200	<0.5	112	1.09	<0.1
TP-4	72	550	0.6	260	<0.1	170	<0.5	98	0.22	<0.1
EP TOX*	100	100	20	NA	4.0	NA	NA	NA	NA	NA

ABN: Acid/Base/Neutral Organics
PCB: Polychlorinated Biphenyls
NA: Not Applicable

* Estimated "total" concentration, judged equivalent to the EP Toxicity criteria for classfication as a "Dangerous Waste".

CONCLUSIONS AND RECOMMENDATIONS

We believe that the test pits are in locations that are representative of current surface features. However, given the complex site history, the composite samples, and the screening style of chemical analyses, it appears that the results of the chemical testing carried out to date are inconclusive. Additional sampling and testing would be necessary to fully establish the extent and degree of possible contamination.

Based on the investigation that we have carried out, it is our opinion that there is a likelihood (but not a certainty) that some part of the fill soils underlying the site would be classified as "dangerous waste" under current State of Washington regulations. We cannot yet provide an estimate as to the volume of material that would be so classified.

The cost implications of the presence of dangerous waste on this site will depend on site grading and development plans and on the specific remedial measures that might be proposed by the developer and approved by the Department of Ecology, the responsible agency. The following list of activities are examples of possible measures:

- Covering the site with an impermeable barrier (such as paving) without the requirement for specific waste-related remedial activities.
- Material from foundation excavations and utility trenches may require disposal at a hazardous waste disposal site. The nearest such facility is located near Arlington, Oregon.
- Installation of a ground-water barrier, to prevent or retard movement of leachate from the fill to the adjacent environment.
- Respiratory and skin protection for workers, during excavation and grading.

If better definition of the degree and extent of contamination on this site is necessary, we recommend that the following additional activities be carried out:

1. Analyze the four composite soil samples for chromium and lead using the EP Toxicity method. This will provide information necessary to establish whether or not excavated soils would be dangerous wastes based on the EP Toxicity criteria for metals;

2. If any of the composite-sample EP Toxicity threshold criteria are exceeded, analyze the depth discrete samples from that test pit using the EP Toxicity method. This will allow a more accurate estimation of the volume of excavated soil that may be classified as dangerous waste;

3. Analyze the four composite soil samples for polynuclear aromatic compounds (PNA) specifically. This will provide information necessary to clarify whether or not excavated soils would be dangerous wastes based on the total PNA criteria;

4. If any of the composite sample PNA concentrations exceed the 100 mg/kg threshold criteria, analyze the depth discrete samples from that test pit for PNA organics. This will allow more accurate estimation of the volume of excavated soil that may be classified as dangerous wastes on that basis; and

5. Conduct additional subsurface soil sampling and chemical analysis to better define the extent of contamination at the site. This would involve additional test pit excavation and/or soil borings. This will allow more accurate estimation of the extent and volume of excavated soil that may be classified as dangerous waste and would be necessary for accurate excavation and disposal cost planning.

PART 2
GEOTECHNICAL EVALUATION

Anticipated Subsurface Conditions

An understanding of the probable subsurface conditions beneath the project area has been developed through a review of the geologic literature, information in our files, and aquisition and review of published information developed by others for the METRO Renton Effluent Transfer System. The location of a subsurface exploration completed by others near the project area is shown on the Site Plan, Plate 2.

A review of the available data indicates that the probable subsurface soil profile beneath the project area consists of fill, sand and gravel alluvium and colluvium, and glacially consolidated sand, gravel, and silt. The fill soils are expected to be relatively granular with a variable silt content. Some weak and compressible silty soils and deleterious substances may also be included in the site fill materials. It is probable that the fill beneath the project area will be generally

loose, of variable thickness, and characterized by low to moderate strength and moderate compressibility.

The alluvial and colluvial deposits, in general, consist of sand and gravel soils with occasional lenses and layers of silt. The available information suggests that the alluvial and colluvial deposits extend to depths on the order of 15 to 20 feet below the existing ground surface near the northwest corner of the project area. We expect, however, that the thickness of these soils will increase towards the east and south. These materials are normally consolidated and are, therefore, loose to medium dense in place. They are characterized by moderate strength and low to moderate compressibility. The deposits of silt, where present, are expected to be medium stiff and characterized by low to moderate strength and moderate compressibility.

The normally consolidated sand and gravel soils overlie deposits of dense to very dense sand, gravel, and hard silt that have been glacially consolidated. These soils possess high strength and are essentially uncompressible when subjected to the types of loads induced by building foundations.

Water levels beneath the site are expected to conform generally with the mean high water level of Elliott Bay. Some variation in the elevation of the upper boundary of the ground water and zones of perched water above that level should be anticipated.

CONCLUSIONS AND RECOMMENDATIONS

It is our preliminary conclusion that the subject property is geotechnically suitable for the commercial development as currently envisioned. Any filling that might be required to achieve proposed final ground surface elevations should not induce large settlements assuming that significant compressible soil deposits are not present beneath the project area. However, because of the anticipated loose and variable condition of the existing site fill materials and ground-water levels that may influence the liquefaction potential of the granular fill and normally consolidated sand deposits beneath the project area, it is our preliminary recommendation that the proposed buildings be supported on pile foundations.

Many types of pile foundations will be suitable for support of the structures. The most economical pile foundation type in this area consists of a drilled and cast-in-place concrete pile section. Conventional dimensions of auger-cast piles include 12-, 14-, and

16-inch diameters. These and other pile foundations will derive their supporting capacity by penetration into the dense to very dense glacial soils expected to underlie the project area. Pile lengths in the range of 30 to 50 feet measured from the existing ground surface should be expected. Allowable downward pile capacities on the order of 40, 55, and 75 tons are feasible for auger-cast pile diameters of 12, 14, and 16 inches, respectively.

Many other types of pile foundations will also be suitable for support of the proposed structures. We anticipate that driven timber, concrete, and steel piles will provide adequate supporting capacity with proper penetration into the dense glacial soil deposits. Typically, allowable downward pile capacities in the 20 to 30 ton range are achievable with timber pile foundations that would penetrate on the order of 5 to 10 feet into the supporting soils. Concrete and steel pile foundations will provide allowable downward capacities on the order of 50 to over 100 tons, depending upon the pile type, diameter, and penetration.

We recommend that a geotechnical investigation, including site specific drilled borings, be conducted for the proposed development once the final building locations have been selected. Based on the conceptual building dimensions and siting shown on Plate 2, it is our opinion that six borings would be appropriate for developing an understanding of the subsurface soil conditions within the limits of the building areas. Preliminarily, we anticipate that the borings would extend to depths on the order of 40 to 60 feet below current site elevations. Actual boring depths would be determined in the field so that the explorations achieve penetration into the glacial soils sufficient to provide information that will be utilized during analysis of pile capacities.

The geotechnical investigation should also include a program of laboratory testing to identify the pertinent physical characteristics of the soils encountered. The results of the site exploration and the laboratory testing programs will be utilized during our engineering analyses that will form the basis for our conclusions and recommendations regarding site preparation and foundation support. In the event that spread foundations are feasible in some areas of the site, we will provide recommendations for allowable soil bearing pressures, minimum width and depth requirements, and estimates of foundation settlement. Where pile foundations are required, we will discuss appropriate pile types with your designers and provide recommendations regarding allowable pile capacity and penetration requirements. Verbal recommendations will be

provided as information becomes available. The findings, conclusions, and recommendations developed during our geotechnical investigation will be summarized in a final written report upon completion of our study.

Yours very truly,

DAMES & MOORE

By J. Michael Blackwell
Partner

And James B. Harakas, P.E.
Associate

This report has been prepared exclusively for Cornerstone Development Company for the express purpose of initial site evaluation. The use of this report for any other purpose is not authorized by Dames & Moore.

JMB:JBH:lac/emw
11911-010-005
4 copies submitted

GEO/R:010-1.1

PROJECT BIBLIOGRAPHY

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Walker and Associates, Aerial Photograph #K-507, Seattle, Washington. Scale 1:200, 1936.

Walker and Associates, Aerial Photograph #A-46-84, Seattle, Washington. Scale 1:200, 1946.

Walker and Associates, Aerial Photograph #2S-5, Seattle, Washington. Scale 1:200, 1956.

Walker and Associates, Aerial Photograph #A95-8-28, Seattle, Washington. Scale 1:200, 1961.

Walker and Associates, Aerial Photograph #KC-69 5-15, Seattle, Washington. Scale 1:200, 1969.

Walker and Associates, Aerial Photograph #KC-74 1-4-15, Seattle, Washington. Scale 1:200, 1974.

APPENDIX A

Chemical Sampling and Testing

APPENDIX A
CHEMICAL SAMPLING AND TESTING

SOIL SAMPLE COLLECTION

The test pits were excavated with a subcontracted backhoe. We collected samples from discrete depths in the test pits for chemical analysis. The samples were collected with a stainless steel scoop from the bottom of the test pits at depths of 1, 3, 5, and 7 feet below ground surface, depending upon the depth of the test pit (e.g., 1 and 3 feet in TP-4). The soil samples were collected after digging down 3 to 4 inches below the bottom of the test pit to ensure that representative soils undisturbed by the backhoe bucket were collected. Replicate samples were collected at each depth to allow for composite as well as depth-discrete analyses (see below). The sampling scoop was cleaned before and after collecting each sample by washing with a dilute trisodium phosphate solution, triple rinsing with distilled water, and then air drying.

The samples were placed in glass jars with teflon-lined screw caps that were supplied by the analytical laboratory. The sample jars were sealed tightly and labeled with the following information: date; time; test pit location number; sample number; depth; sampler initials; job number; and general remarks. The samples were stored in an ice chest cooled with blue ice until delivery to the analytical laboratory. A complete chain-of-custody form accompanied the samples to the analytical laboratory. These chain-of-custody forms are supplied in Appendix A.

All field operators were continuously supervised by a chemist and soil engineer from our Seattle office.

ANALYTICAL METHODS

The soil samples were submitted to Laucks Testing Laboratories, Inc. (Seattle, Washington) for analysis. Due to the rapid turnaround time required, two measures were taken to provide as much information as possible regarding potential chemical contamination at the site:

1. The samples were composited to reduce the time required for analysis. The composite sample for each test pit was made by mixing together an aliquot from one of the replicate samples from all depths in that pit. For example, the composite sample for Test Pit TP-1 was made by mixing together aliquots from one of the 1-, 3-, and 5-foot replicate samples. The undisturbed

replicate samples were stored by Laucks for possible depth-discrete analyses at a later time.

2. We used analytical screening methods. The four composite samples were analyzed for metals, total acid/base/neutral (ABN) organics, chlorinated pesticides, and polychlorinated biphenyls (PCB's) by the following methods:

ANALYTE	EPA METHOD NO./ANALYTICAL METHOD
Lead (Pb)	6010
Chromium (Cr)	6010
Cadmium (Cd)	6010
Nickel (Ni)	6010
Mercury (Hg)	7471
Zinc (Zn)	6010
Cyanide (CN)	9010
Total ABN Organics	Gas chromatography/flame ionization detection (GC/FID) calibrated against a polynuclear aromatic (PNA) hydrocarbon standard and reported as phenanthrene.
Total Chlorinated Pesticides	Gas chromatography/electron capture detection (GC/ECD) calibrated against, and reported as, methoxychlor.
Total PCB's	Gas chromatography/electron capture detection (GC/ECD) calibrated against PCB standards.

ANALYTICAL DATA INTERPRETATION

The results of the organic screening methods for total ABN organics and for total chlorinated pesticides must be interpreted with an understanding of the non-specific character of the data and the fact that the ABN screen is subject to interferences from organic compounds containing oxygen, nitrogen, and phosphorous. The following discussion is based on a comparison of the results to criteria established by the State of Washington (Dangerous Waste Regulations, WAC 173-303) regarding dangerous and extremely hazardous wastes.

The chromium concentations detected in Test Pits TP-2 and TP-4, and the lead concentrations detected in Test Pits TP-1, TP-2, and TP-3

theoretically exceed the dangerous materials threshold level for these metals. These threshold levels for chromium and lead are based on the EP Toxicity Extraction Test, which involves extracting metals from a soil sample into water and analyzing the water extract for metals. This test is specified as a way of determining whether a material is to be considered a dangerous waste. The result is a measure of the metal concentrations that could leach from the soil samples. Table 1 contains these results for total metal concentrations in soil.

If we assume that all of the metal in the soil is leachable, then we can calculate the total soil concentration which the EP Toxicity Criteria Level cannot exceed when the soil is extracted. For chromium and lead, this total soil concentration is 100 mg/kg. Soil samples with total chromium or lead concentrations below 100 mg/kg cannot exceed the EP Toxicity criteria, even if all of the metal is leachable (a condition that is highly unlikely). So, comparison of the results for chromium and lead in Table 1 with the 100 mg/kg calculated concentration shows that the composite samples from the test pits listed above exceed this theoretical concentration. This does not mean that if the EP Toxicity test were conducted for these samples that the chromium and lead concentrations would exceed the threshold criteria, but only that the concentrations <u>may</u> exceed the threshold criteria.

The total ABN organics screen results for Test Pits TP-2, TP-3, and TP-4 are near or exceed the total polynuclear aromatic hydrocarbon (PNA) threshold criteria of 100 mg/kg. Since the ABN screen is a measure of total organics and is not measuring only PNA compounds, we can only say that the data indicate that the PNA threshold criteria may be exceeded in these samples. Also, the effects of interferences to this method must be resolved before the concentration detected by this screening method can be attributed to only PNA compounds.

APPENDIX B

Chain-of-Custody Forms

(1 of 3)

JOB NO. 11911-010-05

CHAIN OF CUSTODY RECORD

GENERATOR INFORMATION

Facility MPF (Rainestone)

Address Harbor Hwy S

Telephone( )

COLLECTOR INFORMATION

Collected by Dames + Moore (H. Inlow)

Address 155 108th St NE Suite 500

Seattle WA 98125

Telephone (206) 453-0560

SAMPLE INFORMATION

No.	DEPTH	TYPE	DATE	TIME
TP1-1A	1.0	Soil	10/10	1350
TP1-1B	1.0	Soil	10/10	1330
TP1-3A	3.0	Soil	10/10	1345
TP1-3B	3.0	Soil	10/10	1405
TP1-5A	5.0	Soil	10/10	1355
TP1-5B	5.0	Soil	10/10	1355
TP1-6A	6.0	Soil	10/10	1419
TP1-6B	6.0	Soil	10/10	1415
TP1-6C	6.0	Water	10/10	1415 Hold
TP2-1A	1.0	Soil	10/10	1430

Suspected Waste Constituents Metals, Organic Solvents

Field Conditions/Remarks Clear Day, Windy (40 MPH South) Upper 40's

SAMPLE ALLOCATIONS

Name Burlington Labs Inc

Address

Telephone (206) 747-5060

_____ sample received intact

_____ sample received damaged or missing (describe on back)

(Signature) 10/11/86 (Date)

CHAIN OF POSSESSION

	Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
1.	[signature]	10/10/86	1615	[signature]	10/10/86	4:15 PM
2.						
3.						
4.						

Distribution

White-w/shipment-for consignee files
Canary-w/shipment-forward to Dames & Moore
Attn:

Pink-with report
Goldenrod-Dames & Moore - Job File

(2013)

JOB NO. 1711-010-05

CHAIN OF CUSTODY RECORD

HB

GENERATOR INFORMATION

Facility MTF (Ravenstone)

Address 41 Kobar Hwy S

Telephone( )

COLLECTOR INFORMATION

Collected by Dames & Moor (H.Below)

Address 155 NE 100th St Suite 500
Seattle WA 98125

Telephone(206) 523-0560

SAMPLE INFORMATION

No.	DEPTH	TYPE	DATE	TIME
TP2-1B	1.0	Soil	10/10	1430
TP2-1C	Surface	Soil	10/10	1430
TP2-1D	Surface	Soil	10/10	1430
TP2-3A	3.0	Soil	10/10	1442
TP2-3B	3.0	Soil	10/10	1442
TP2-5A	5.0	Soil	10/10	1450
TP2-5B	5.0	Soil	10/10	1450
TP3-1A	1.0	Soil	10/10	1508
TP3-1B	1.0	Soil	10/10	1508
TP3-3A	3.0	Soil	10/10	1510

Suspected Waste Constituents Metals + Organic Solvents

Field Conditions/Remarks See pg 1

SAMPLE ALLOCATIONS

Name Lonza Labs Inc

Address

Telephone( )

_____ sample received intact

_____ sample received damaged or missing (describe on back)

S. [signature] 10/11/96
(Signature) (Date)

CHAIN OF POSSESSION

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
1. [signature]	10/10/96	1615	S [signature]	10/11/96	4:15 PM
2.					
3.					
4.					

Distribution

White-w/shipment-for consignee files
Canary-w/shipment-forward to Dames & Moore
Attn:

Pink-with report
Goldenrod-Dames & Moore - Job File

(Lot B) HB

JOB NO. 11911-010-05

CHAIN OF CUSTODY RECORD

GENERATOR INFORMATION

Facility NPF (Cornerstone)

Address Harbor Hwy S

Telephone( )

COLLECTOR INFORMATION

Collected by Dames & Moore (M. Edlund)

Address 155 NE 100th St Suite 501

Seattle WA 98125

Telephone(206) 523-0560

SAMPLE INFORMATION

No.	DEPTH	TYPE	DATE	TIME
TP3-3B	3.0	Soil	10/10	1510
TP3-5A	5.0'	Soil	10/10	1525
TP3-7A	7.0'	Soil	10/10	1545
TP3-1C	Surface	Soil	10/10	1504
TP4-1A	1.0	Soil	10/10	1405
TP4-1B	1.0	Soil	10/10	1405
TP4-3A	3.0'	Soil	10/10	1425
TP4-7B	3.0'	Soil	10/10	1425

Suspected Waste Constituents Sceepg 1

Field Conditions/Remarks See pg 1

SAMPLE ALLOCATIONS

Name [illegible] Labs Inc

Address

Telephone( )

_____ sample received intact

_____ sample received damaged or missing (describe on back)

[signature] 10/10/16
(Signature) (Date)

CHAIN OF POSSESSION

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
1. [signature]	10/10/16	1615	[signature]	10/10/16	4:15 PM
2.					
3.					
4.					

Distribution

White-w/shipment-for consignee files
Canary-w/shipment-forward to Dames & Moore
Attn:

Pink-with report
Goldenrod-Dames & Moore - Job File

APPENDIX C

Analytical Data

Laucks
Testing Laboratories, Inc.
940 South Harney St., Seattle, Washington 98108 (206)767-5060

Chemistry, Microbiology, and Technical Services

Certificate

CLIENT Dames & Moore
P.O. Box 75981
Seattle, WA 98125-0981
ATTN: Harlan Borow

LABORATORY NO. 99284

DATE Oct. 21, 1986

PO# SA 4418 ADD 12

REPORT ON SOIL AND WATER

SAMPLE IDENTIFICATION

Submitted 10/10/86 and identified as shown below:

TESTS PERFORMED AND RESULTS:

SOIL

1)	TP1-1A	1.0	Soil	10/10/86	13:30
2)	TP1-3A	3.0	Soil	10/10/86	13:45
3)	TP1-5A	5.0	Soil	10/10/86	13:55
4)	TP1-6A	6.0	Soil	10/10/86	14:15
5)	TP2-1A	1.0	Soil	10/10/86	14:30
6)	TP2-3A	3.0	Soil	10/10/86	14:42
7)	TP2-5A	5.0	Soil	10/10/86	14:50
8)	TP3-1A	1.0	Soil	10/10/86	15:08
9)	TP3-3A	3.0	Soil	10/10/86	15:10
10)	TP3-5A	5.0'	Soil	10/10/86	15:25
11)	TP3-7A	7.0'	Soil	10/10/86	15:45
12)	TP4-1A	1.0	Soil	10/10/86	04:05
13)	TP4-2A	3.0'	Soil	10/10/86	04:25
14)	TP1-1B	1.0	Soil	10/10/86	13:30
15)	TP1-3B	3.0	Soil	10/10/86	13:45
16)	TP1-5B	5.0	Soil	10/10/86	13:55
17)	TP1-6B	6.0	Soil	10/10/86	14:15
18)	TP2-1B	1.0	Soil	10/10/86	14:30
19)	TP2-1C	Surface	Soil	10/10/86	14:30
20)	TP2-1D	Surface	Soil	10/10/86	14:30
21)	TP2-3B	3.0	Soil	10/10/86	14:42
22)	TP2-5B	5.0	Soil	10/10/86	14:50
23)	TP3-1B	1.0	Soil	10/10/86	15:08
24)	TP3-1C	Surface	Soil	10/10/86	15:08
25)	TP3-3B	3.0'	Soil	10/10/86	15:10
26)	TP4-1B	1.0	Soil	10/10/86	04:05
27)	TP4-2B	3.0'	Soil	10/10/86	04:25

WATER

28)	TP1-6C	6.0	Water	10/10/86	14:15

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Selected soil samples were composited prior to analysis on an equal weight basis in accordance with the following scheme. All other samples were held without analysis at your request.

Composite A: Sample numbers 1 - 4
Composite B: Sample numbers 5 - 7
Composite C: Sample numbers 8 - 11
Composite D: Sample numbers 12 - 13

Composites were analyzed in accordance with Test Methods for Evaluating Solid Waste, (SW 846), U.S.E.P.A., July, 1982: Methods 7471 (mercury); 9010 (cyanide) and 6010 (other inorganic metals), with results as shown below:

	A	B	C	D	Method Blank
Total Solids, %	81.7	84.4	89.4	86.2	---
	parts per million (mg/kg), dry basis				
Nickel	57.	100.	210.	260.	L/2.
Cadmium	10.	L/0.5	1.1	0.6	L/0.5
Chromium	49.	140.	70.	550.	2.
Lead	350.	130.	510.	72.	L/10.
Zinc	790.	110.	1200.	170.	3.
Mercury	L/0.1	0.4	0.2	L/0.1	L/0.1
Cyanide	0.6	L/0.5	L/0.5	L/0.5	L/0.5

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Samples were further screened for the presence of base/acid/neutral (BAN) compounds and pesticides/PCBs by GC/FID and GC/ECD, respectively. Screening techniques can be suject to interferences and should be interpreted accordingly. Copies of chromatograms are attached to aid in this interpretation.

	A	B	C	D	Method Blank
	parts per million (mg/kg)				
BAN Screen, calculated on the response of phenanthrene	18.	94.	112.	98.	L/10.
	parts per billion (ug/kg)				
Pesticide Screen, calculated on the response of methoxychlor *	1600.	380.	1090.	220.	90.
Total PCBs **	L/100.	L/100.	L/100.	L/100.	L/100.

Key

L/ indicates "less than"
* Values reported have been blank-corrected.
** No PCB patterns were observed in any of the samples.

Respectfully submitted,

Laucks Testing Laboratories, Inc.

J. M. Owens

JMO:laj