

#146d

SOILS INVESTIGATION
MAINTENANCE BUILDING ADDITION
PORT OF TACOMA

of

ADAMS HODSDON BESSETTE
TACOMA

W.O. 8950

OCTOBER 1989

Grover C. Way, P.E.

SOILS INVESTIGATION
MAINTENANCE BUILDING ADDITION
PORT OF TACOMA

of

ADAMS HODSDON BESSETTE
TACOMA

W.O. 8950

OCTOBER 1989

GROVER C. WOOD JR.

Grover C. Way, P.E.

CONSULTING SOILS ENGINEER

504 SOUTH 11th STREET
TACOMA, WASHINGTON 98402
Area Code (206) 272-8363

October 31, 1989

Adams Hodsdon Bessette
5308 - 12th Street East
Tacoma, Washington 98421

WO 8950

Attention: Mr. Noel R. Adams, P.E.

Subject: Maintenance Building Addition
Port of Tacoma

Gentlemen:

I have completed a soils investigation for the subject project, in accordance with our recent discussions. A brief description of the investigation is presented in this report, together with indicated recommendations.

PROPOSED PROJECT

The project consists of an addition to the east end of the existing Maintenance Building at the Port of Tacoma. The addition is to be approximately 50 by 100 feet, with construction matching the existing building.

INVESTIGATION

Soil conditions in the addition area were explored by making a total of four test borings, essentially at the four corners of the addition. Locations are shown on the Site Plan, Plate 1. The borings were made by Drilling Unlimited, Inc., of Seattle; three were made on October 16, 1989, and one on October 20, 1989. Logs of the borings are included in the Appendix; soil descriptions on these logs are visual field classifications based on the Unified Soil Classification System.

The borings were made using a truck-mounted drilling rig specifically set up for soil sampling, with hollow-stem augers to advance the drill holes. All soil samples were obtained with a two-inch O.D. split-spoon sampler in accordance with ASTM D-1586. Either the Standard Penetration Resistance or the amount of sampler penetration resulting from 50 hammer blows is shown on the logs.

Laboratory testing was limited to running moisture content tests on all samples recovered. These test results are included on the logs. Testing was done in my lab in Tacoma.

Water level observations recorded on the logs were obtained during the drilling operations.

SOIL CONDITIONS

The top 10 to 15 feet is covered by a bank-run sand and gravel. This material is very dense near the ground surface, and decreases in density with increasing depth. The material at the bottom of this layer was probably end-dumped with little or no effort at compaction.

Below the bank-run fill material a sequence of silty fine sands and fine to medium sands was encountered. Some of these soils may be dredged fill materials; in the Port area it is difficult to distinguish between dredged fill and native soils, since the origin in both cases is identical. These materials are generally in a loose condition.

Groundwater level was encountered at depths ranging from 11 to 14 feet. This level would be influenced by tidal variations.

A strong creosote odor was noted in samples from all four borings, as identified on the logs, with the greatest concentration being in Boring 1. The zone of potential contamination appears to be within the normal variation of groundwater level. Soil samples exhibiting such odors were surrendered to the Port of Tacoma.

RECOMMENDATIONS

The existing building is supported on spread footing foundations which have been designed for an allowable soil bearing pressure of 2000 psf. The addition may also be supported on conventional spread footing foundations at frost depth. Footings may be designed for a maximum soil bearing pressure of 3200 psf; settlements at full applied soil pressure will be one inch. Settlements at smaller applied pressures may be assumed linear.

The analysis indicates that soil bearing pressure beneath the existing footings along the east wall may be increased, provided the footings themselves are structurally adequate to sustain the higher load. Increasing the allowable soil bearing pressure to 3200 psf will produce an additional footing settlement of 0.38 inches.

- continued -

Port of Tacoma
Maintenance Building Addition
October 31, 1989

WO 8950
Page 3

RECOMMENDATIONS, continued.

The existing floor slab is to be replaced as a part of the new construction. The new slab may be designed for a modulus of subgrade reaction $K = 500$ psi/inch. The existing railroad tracks and ties should be removed as a part of the demolition, and any facilities which penetrate the existing slab (such as the sand tank) should be either removed or cut off at least two feet below the bottom of the new slab. Voids resulting from such removal should be carefully backfilled with clean well-graded bank-run sand and gravel compacted to at least 97 percent of maximum density, ASTM D-1557.

A seismic analysis made for the new addition indicates a possibility of soil liquifaction below a depth of about ten feet for a strong earthquake. This condition also exists for the existing building. It is recommended that no allowable increase in soil bearing pressure be made for seismic loads.



Respectfully submitted,

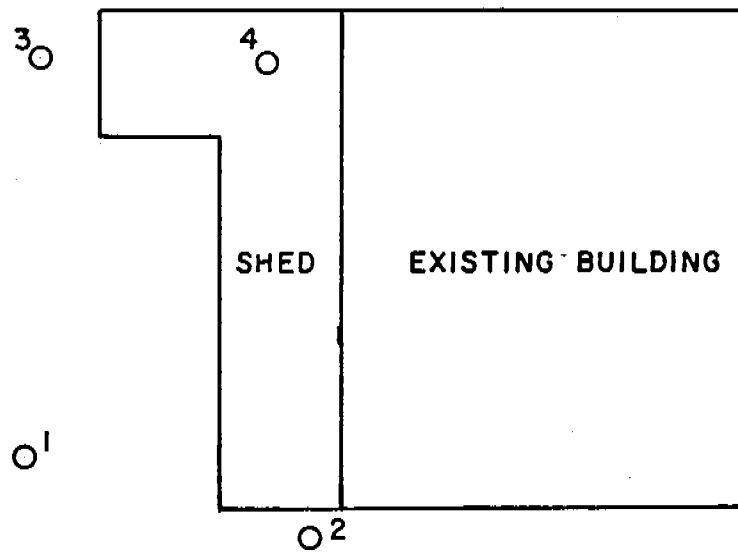
Grover C. Way
Grover C. Way, P.E.
Soils Engineer

cc: Port of Tacoma

Grover C. Way, P.E.
CONSULTING SOILS ENGINEER



SCALE: 1" = 40'



O² TEST BORING NUMBER AND LOCATION.

Grover C. Way, P.E.
CONSULTING SOILS ENGINEER

MAINTENANCE BUILDING ADDITION

SITE PLAN

W.O. 8950

OCTOBER 1989



PLATE

- APPENDIX -

Grover C. Way, P.E.
CONSULTING SOILS ENGINEER

RECORD OF SUBSURFACE EXPLORATION

BORING NO. 1





Sheet 1 of 1

Project PORT OF TACOMA - MAINTENANCE BUILDING ADDITION Job No. 8950

Boring Location SEE SITE PLAN

Ground Water Depth 12½ FEET Date 10-16-89 Date Started 10-16-89

Surface Elevation NOT NOTED Datum _____ Date Completed 10-16-89

Symbol	Description	Depth	Sample	Blows per Ft.	m.c.		Other
	Grey Gravelly Fine to Medium Sand (SP)						
			SS-1	35	4.2		
		5					
			SS-2	14	5.8		
			SS-3	10	---		
	10'						
			SS-4	18	---		
	Grey Fine to Medium Sand (SP)						
			SS-5	11	---		
		15					
			SS-6	8	---		
			SS-7	16	24.3		
	15'						
			SS-8	5	28.4		
	Grey Silty Fine Sand (SM)						
	20'						
	Bottom of Boring						
	Strong Creosote Odor Noted, Samples 3 Through 6						

RECORD OF SUBSURFACE EXPLORATION

BORING NO. 2




Sheet 1 of 1

Project PORT OF TACOMA - MAINTENANCE BUILDING ADDITION Job No. 8950

Boring Location SEE SITE PLAN

Ground Water Depth NOT NOTED Date Date Started 10-16-89

Surface Elevation NOT NOTED Datum Date Completed 10-16-89

Symbol	Description	Depth	Sample	Blows per Ft.	m.c.		Other
	Brown to Grey Fine to Coarse Sand & Fine to Coarse Gravel (GW)	5	SS-1	59	5.6		
			SS-2	30	6.7		
			SS-3	50/4"	--		
	Grey Fine to Medium Sand (SP)	10	SS-4	12	--		
			SS-5	10	27.4		
			SS-6	14	29.7		
	Grey Silty Fine Sand (SM)	15	SS-7	7	34.0		
			SS-8	10	26.7		
			SS-9	15	32.3		
	Grey Silty Fine to Medium Sand (SM)	25					
	Bottom of Boring	30					
	Strong Creosote Odor Noted, Samples 3 & 4						
		35					
		40					

RECORD OF SUBSURFACE EXPLORATION

BORING NO. 3



Sheet 1 of 1

Project PORT OF TACOMA - MAINTENANCE BUILDING ADDITION Job No. 8950

Boring Location SEE SITE PLAN

Ground Water Depth 14 FEET Date 10-16-89 Date Started 10-16-89

Surface Elevation NOT NOTED Datum _____ Date Completed 10-16-89

Symbol	Description	Depth	Sample	Blows per Ft.	m.c.		Other
	Brown to Grey Fine to Coarse Sand & Fine to Coarse Gravel (GW)	5	SS-1	72	6.2		
			SS-2	38	7.1		
			SS-3	8	11.9		
	Grey Gravelly Fine to Coarse Sand (SW)	10	SS-4	9	21.9		
			SS-5	22	--		
			SS-6	23	27.4		
	Grey Silty Fine Sand (SM)	20	SS-7	7	32.2		
			SS-8	4	46.7		
			SS-9	3	39.3		
	Bottom of Boring Strong Creosote Odor Noted, Sample 5	30					
		35					
		40					

RECORD OF SUBSURFACE EXPLORATION

BORING NO. 4





Sheet 1 of 1

Project PORT OF TACOMA - MAINTENANCE BUILDING ADDITION Job No. 8950

Boring Location SEE SITE PLAN

Ground Water Depth 11.0 FEET Date 10-20-89 Date Started 10-20-89

Surface Elevation NOT NOTED Datum Date Completed 10-20-89

Symbol	Description	Depth	Sample	Blows per Ft.	m.c.		Other
	Brown to Grey Gravelly Fine to Coarse Sand (SW)						
			SS-1	50/6"	6.4		
		5					
			SS-2	46	4.0		
			SS-3	7	15.1		
		10					
			SS-4	6	15.1		
		12'					
	Grey Fine to Medium Sand (SP)		SS-5	4	--		
		15					
			SS-6	12	28.9		
			SS-7	5	28.9		
		20					
	Grey Silty Fine Sand (SM)		SS-8	2	28.8		
		25					
			SS-9	5	30.2		
	- Bottom of Boring - Strong Crosote Odor Noted Sample 5	29'					
		30					
		35					
		40					