LUST 2712
Bell St Terminal - POS - Pier 66

PIER 66 UPLAND SOIL REMEDIATION

Central Waterfront
Alaskan Way
Seattle, Washington

Submitted to
Duncan Kelso
Port of Seattle Facilities Development
by
BAZ STEVENS ASSOCIATES
September 21, 1995

Pier 66 Upland Soil Remediation

Site Description

This site was the former location of the Seattle Auto Freight Depot and is located on the east side of the 2100 block of Alaskan Way between the Metro trolley tracks to the west and the Burlington Northern Railroad and a steep embankment to the east. Elliott Bay is across Alaskan Way to the west. To the north and south are vacant lots currently used for construction parking. The site is relatively level, surfaced with a sandy gravel, and currently occupied by several construction trailers.

Background

In November 1991, a 10,000-gallon suspected gasoline underground storage tank was removed from this site by B&C Equipment Company, Inc. under contract to the Port of Seattle. Appropriate notification was sent to the Washington state Department of Ecology. Sidewall samples from the excavated area contained concentrations of petroleum hydrocarbons as gasoline (WTPH-G) above the Model Toxics Control Act (MTCA) Method A Cleanup Level.

In February 1992, EMCON conducted a subsurface environmental assessment near the former tank excavation to document soil and groundwater quality with respect to petroleum hydrocarbons. Seven soil borings were advanced to depths ranging from 5 to 15 feet bgs. Three of these were completed as 2-inch diameter groundwater monitoring wells. Soil and groundwater samples contained combinations of gasoline-, diesel-, and oil-range hydrocarbons exceeding MTCA Method A Cleanup Levels.

In October 1993, EMCON conducted further soil samplings in the vicinity of the former UST in attempt to characterize the soils in both the vadose and saturated zones. Thirteen test pits at depths ranging from 9 to 11 feet bgs were excavated and soil samples were taken at depths from 2.5 to 10 feet bgs. EMCON concluded that an estimated 1,000 cubic yards of soil with TPH-G concentrations exceeding MTCA Method A Cleanup Levels were present in the unsaturated zone approximately 20 feet around the former UST. Further, it was estimated that an additional approximately 2,000 cubic yards of soil in the unsaturated zone were impacted by diesel- and oil-range hydrocarbons (WTPH-D and WTPH-O) in concentrations exceeding MTCA Method A Cleanup Levels at least 45 feet from the former UST.

The suspected storage of gasoline in the former UST and the location of the gasoline impacted soil suggested that the TPH-G concentrations detected resulted from releases associated with the former UST. On the other hand, both oil levels detected at significant distances from the former UST and the coal, wood and metal debris found in the fill material from the surface to approximately 9 feet bgs suggested that background hydrocarbon concentrations in the fill itself were responsible for the TPH-D and TPH-O concentrations rather than releases from the former UST.

Field Activities

Based upon 1993 test pit information (EMCON), a rough outline of the gasoline contaminated area was demarcated for excavation by PCL, the prime contractor for this work. Health and Safety plans and sampling services were provided by the subcontractor AGRA Earth and Environmental. Excavation commenced on June 12, 1995 at approximately 12:40 pm beginning with the northeast corner of the designated contaminated area. No stockpiling occured throughout this operation; all excavated soils were loaded via trackhoe into either 18 cu. yd. trucks or trucks-with-pups and hauled to the Rabanco facility at 3rd and Lander Streets.

In the top 7 to 8 feet of the excavation brick, asphalt, cement and construction debris were commonly mixed amidst variable brown sandy/gravelly/silty soil. Occassionally plastic pipe was evident as the digging moved westward. Digging continued southward on June 13 and required excavating to the depth of the groundwater interface (approximately 12 feet). Asphalt, tile, and other building debris continued to be evident. As expected, a 14-inch storm water pipe was encountered at a depth of approximately 8 feet bgs and initially left in place. However, olfactory indications required the excavation of the clays and silts below the pipe, which necessitated the destruction and removal of those sections of storm water pipe residing in the excavation zone. Both horizontal pilings (presumably placed for railway bed reinforcement) and vertical pilings were removed as they were encountered. Also a stormwater catchbasin, a storm water manhole, and the three monitoring wells associated with the former UST were destroyed in the excavation process.

A 2 to 4 foot thick horizontal clay and silt band existed throughout the excavated area beginning at a depth of approximately 8 feet bgs. Gasoline aroma was primarily associated with this band in both the center and the southern perimeter of the excavation area.

Please refer to AGRA Appendix A for soil sampling, quality assurance, and health/safety plans. Also refer to AGRA Appendix C for laboratory soil analytical results. Appendix D is a copy of the Port's submittal to the Washington Department of Ecology of a Notice of Intent to Decommision three monitoring wells. A summary of all analytical results is presented in AGRA Table 1.

The first round of confirmation sampling occurred on June 15, 1995 (please refer to AGRA Figure 2) which indicated that the central area and the southern perimeter of the excavation continued to have soils with TPH-G in excess of MTCA Method A criteria. Additional excavation ensued on June 19. Confirmation samples as well as test pit samples were taken subsequently (June 19) and results confirmed that all soil with gasoline concentrations above MTCA guidelines had been removed from the excavated area with the exception of an approximate 3-4 foot wide section along the storm drain pipe, which appeared to be associated with the clay band about 8 feet below ground surface (bgs), on the south central sidewall.

Further excavation occurred on the southern perimeter/sidewall on June 22. Limited amounts of contaminated soil were consistently only found in the clay layer immediately under the storm drain piping. Excavation ceased later that day. Confirmation sampling indicated that all the gasoline impacted soil was fully removed from all locations but one (AGRA Table 1, EX-6/23-2). Copies of area photographs appear in Appendix E.

In total, approximately 1800 cubic yards (2930 tons) of contaminated soil were removed and properly disposed (please refer to AGRA Appendix B for copy of Bills of Lading). The excavated area was backfilled with clean pit run and compacted according to Port specifications (Appendix F). Storm sewer pipe, catchbasin and manhole were replaced in the process.

Discussion

Existing data (EMCON, 1992 and 1994; SCS Engineers, 1994) indicate that there was no off site problem caused by this gasoline contaminated site. Presently, after much excavation the only remaining area of concern appeared localized to the storm drain piping vicinity. Based on field observations it appears that historically released product likely originally travelled through a more highly permeable pathway (sandy soil used as backfill for the storm water pipe) to reach the low permeable clay layer. Because the remaining contamination is now only found in the clay indicates that this is likely from an "old" source, i.e. product naturally degraded in the more permeable layer, but the contamination was slow to enter the less permeable strata and equally slow to degrade. Also, inherent to the clay layer is a large surface area to pore water volume which would mean greater product adsorption along with the potential for decreased ground water flushing.

Because of the impeding presence of an existing construction trailer and its associated utilities, the clay band's continued association with the storm water piping which required replacement if undermined, and the amount of "clean" soil required to access the contaminated soil now solely 8 to 12 feet bgs, it was practical and cost effective to cease chasing the relatively small amount of gasoline impacted soil left remaining on site. In addition, this decision was supported by the recognition that the minor amounts of remaining contamination would likely move out of the clay at very low rates and then be naturally degraded close to the source. Further, this is a tidally influenced site - a non drinking water aquifer - from which the pathway of potential concern is to Elliott Bay. No adverse effect from this site to the Bay was noted prior to the soils excavation; even less of a concern is appropriate now that nearly all of the contamination has been removed. Finally, the planned usage for this site is as a covered commercial facility.

Conclusion

Based upon test pit data obtained in 1993 and again in 1995 and evidenced by the proper disposal of 2930 tons of material, it appears that the vast majority of the gasoline impacted soils were removed from this site. What remains is isolated in a clay/silt layer 8 to 12 feet bgs approximately 3 feet wide and extending southward for an indeterminate distance estimated to be less than 10 feet. Due to the presence of utilities and construction offices, the chasing of this contamination was discontinued. Because the gasoline concentrations appear bound in the clay, water permeability there will likely be small. Therefore, the rate of contaminant loss from the clay will be small and the overall environmental impacts minimal.

References

AGRA, 1995
B&C Equipment Company, Inc., 1989
EMCON, 1992
EMCON, 1994
SCS Engineers, 1994

h:\p66soil

APPENDIX D
Notice of Intent to Decommission Three Monitoring Wells

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Notification Number A 02120

NOTICE OF INTENT TO DECOMMISSION A WELL

This form must be received by the Department of Ecology three days before you decommission a well. *Complete both sides of this form. Submit one form for each job site. Mail this form to Department of Ecology, Water Resources Program, Well Drilling Unit, P.O. Box 47600, Olympia, WA 98504-7600. Instructions for filling out this form are printed on the back.*

1. PROPERTY OWNER: PORT OF SEATTLE PHONE NO.(206) 728-3748
2. ADDRESS: c/o D. KLEIBER P.O. BOX 1209 SEATTLE, WA 98111
3. AGENT (If different from #1): _____ PHONE NO.(____) _____
4. ADDRESS: _____
5. JOB SITE/WELL LOCATION: _____ ¼ of the _____ ¼ Section_____ Township_____ Range_____ E.WM or W.WM (circle one)
6. STREET ADDRESS (if known): 2100 ALASKAN WAY, SEATTLE, WA.
7. WELL IDENTIFICATION NUMBER: 3 WELLS MW-1B, MW-2, MW-3 EMCON, FEB '92 (AKA B-13, B-14 B-15 SCS Engineers, July '94)
8. LOCATION OF WELL(S): (please check county)

☐ ADAMS COUNTY	01-ERO	☐ GRAYS HARBOR COUNTY	14-SWR	☐ PIERCE COUNTY	27-SWR
☐ ASOTIN COUNTY	02-ER0	☐ ISLAND COUNTY	15-NWR	☐ SAN JUAN COUNTY	28-NWR
☐ BENTON COUNTY	03-CRO	☐ JEFFERSON COUNTY	16-SWR	☐ SKAGIT COUNTY	29-NWR
☐ CHELAN COUNTY	04-CRO	☒ KING COUNTY	17-NWR	☐ SKAMANIA COUNTY	30-SWR
☐ CLALLAM COUNTY	05-SWR	☐ KITSAP COUNTY	18-NWR	☐ SNOHOMISH COUNTY	31-NWR
☐ CLARK COUNTY	06-SWR	☐ KITTITAS COUNTY	19-CRO	☐ SPOKANE COUNTY	32-ERO
☐ COLUMBIA COUNTY	07-ERO	☐ KLICKITAT COUNTY	20-CRO	☐ STEVENS COUNTY	33-ERO
☐ COWLITZ COUNTY	08-SWR	☐ LEWIS COUNTY	21-SWR	☐ THURSTON COUNTY	34-SWR
☐ DOUGLAS COUNTY	09-CRO	☐ LINCOLN COUNTY	22-ERO	☐ WAHKIAKUM COUNTY	35-SWR
☐ FERRY COUNTY	10-ERO	☐ MASON COUNTY	23-SWR	☐ WALLA WALLA COUNTY	36-ER0
☐ FRANKLIN COUNTY	11-ERO	☐ OKANOGAN COUNTY	24-CRO	☐ WHATCOM COUNTY	37-NWR
☐ GARFIELD COUNTY	12-ERO	☐ PACIFIC COUNTY	25-SWR	☐ WHITMAN COUNTY	38-ERO
☐ GRANT COUNTY	13-ER0	☐ PEND OREILLE COUNTY	26-ERO	☐ YAKIMA COUNTY	39-CRO

9. PLEASE FILL OUT THE PORTION BELOW CAREFULLY. The return address label must contain the name and address of the person submitting this notification. This portion will be validated and returned to them as proof of notification. Send the entire form to Department of Ecology; Water Resources Program, Well Drilling Unit, P.O. Box 47600, Olympia, WA 98504-7600.

THIS NOTIFICATION NUMBER MUST BE PROVIDED TO YOUR WELL DRILLER: A 02120

SUBMITTED BY (return address) ↓

NAME PORT OF SEATTLE ATTN: D. KLEIBER

MAILING ADDRESS P. O. Box 1209

CITY SEATTLE STATE WA ZIP 98111

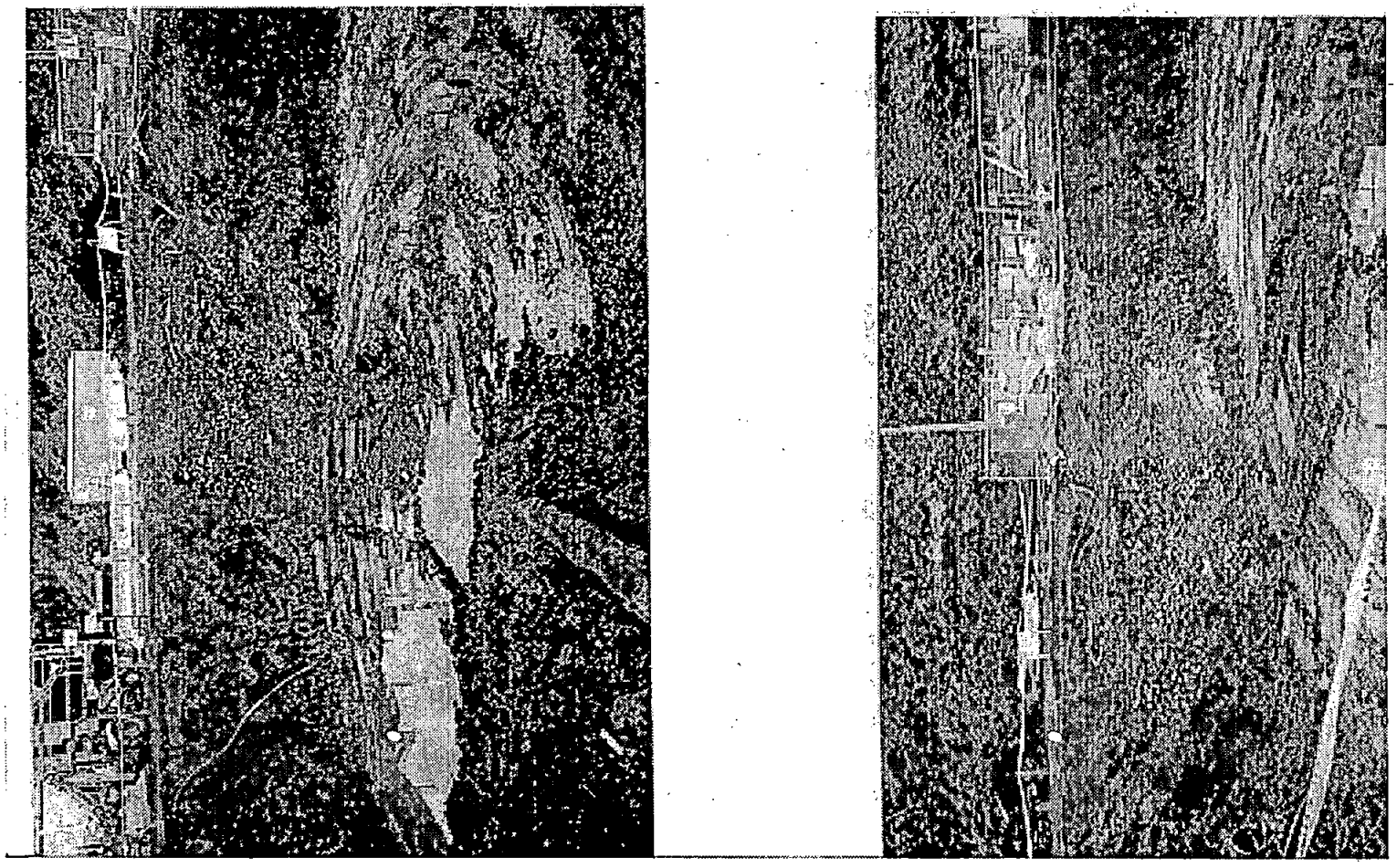
Agency Validation

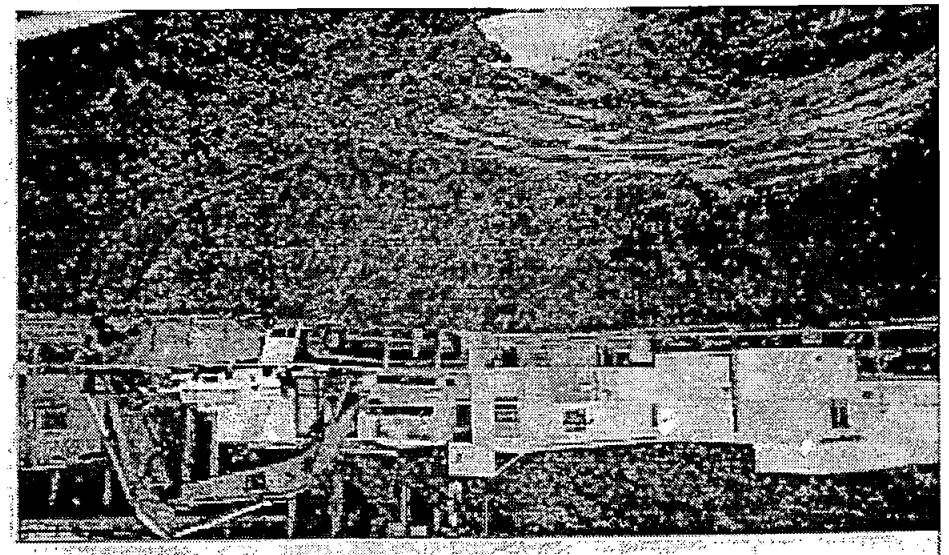
Date: _____

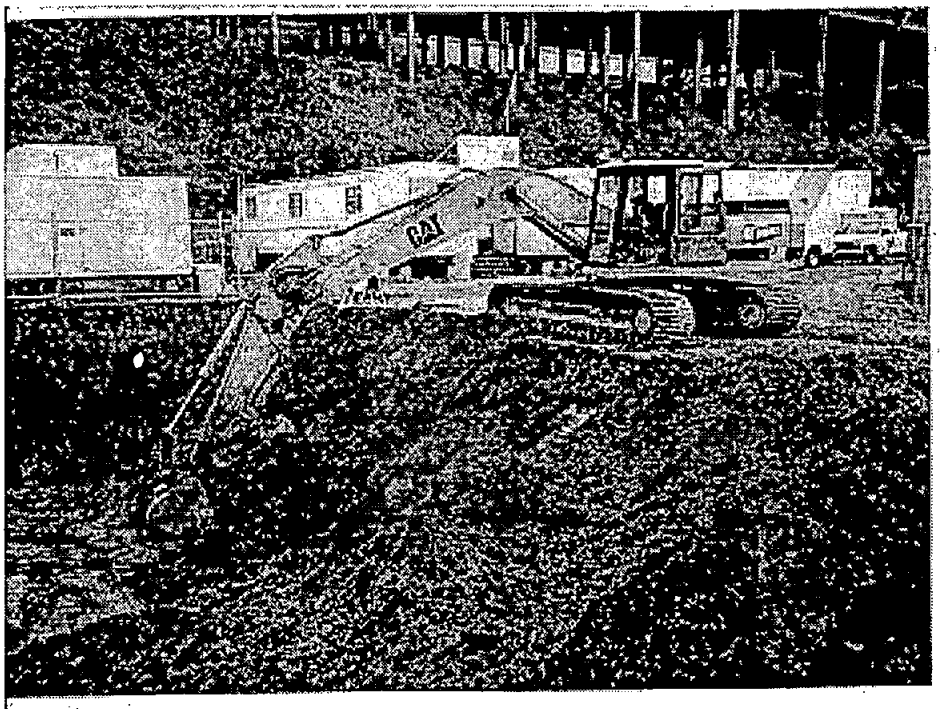
ECY 040-24 (7/93)

Continued on back →

APPENDIX E
Copies of Area Photographs






CAT

APPENDIX F
Soil Compaction Test Results

FAX

Port of Seattle

Central Waterfront Project

Number of Pages Including Cover Sheet: 9

DATE: August 16, 1995

FROM: Karl Hedlund
Port of Seattle

TO: Baz Stevens
Port of Seattle

PHONE:

FAX:

RE: **Agra Soil Compaction Tests**

Baz -

Here are the Soil Compactio Test Results that Julie forwarded to Port.

If you do not receive all pages, please call 727-4347.

P16-1

PCL

TRANSMITTAL SHEET

To Port of Seattle

Date 8/15/95

Attention Karl Heglund

Our Job No. 570DID

Re CWP - Soil Remediation

Transmittal No.

Spec. Section

☐ Shop Drawing Submittals ☐ Resubmittals

Gentlemen:

We are submitting/returning (under separate cover) the following documents which are:

☐ Reviewed ☐ For Your Approval ☐ Preliminary

☐ Reviewed as Noted ☐ For Your Records ☐ Revised

☐ Revise and Resubmit ☒ For Your Information ☐ As Built

NO. OF COPIES	SEPIAS	PRINTS	XEROX COPIES	DESCRIPTION
1			✓	Daily Field Reports - Soil Compaction
				6/28/95 - M68
				6/29/95 - M69
				6/27/95 - M67
				6/26/95 - M66

Remarks I believe these were previously sent along with daily reports. These may be duplicates.

Per Julie Schwarz Edwards

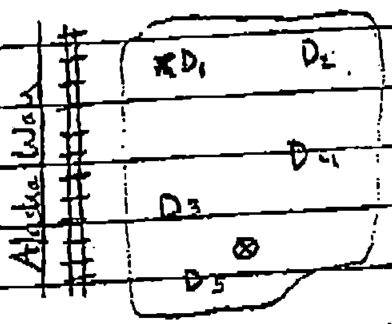
AGRA
Earth & Environmental

DAILY FIELD REPORT

PROJECT NAME: Pier 66

PROJECT No. 11-10182 | FIELD REPORT No. M-68
DATE 6-28-95 | PAGE 4 OF 6

SUMMARY OF FIELD COMPACTION TEST RESULTS



TEST No.	TEST METHOD	LOCATION	ELEV. (FEET)	DISTANCE BELOW GRADE	MAT'L TYPE	FIELD DRY DENSITY (PCF)	FIELD MOIST. (%)	FIELD COMP. (%)	VARIATION FROM OPTIMUM MOIST. (%)	PASS OR FAIL
D1				~5	1	119.0	5.0	95		P
D2				~5	1	119.4	4.6	95		P
D3				4	1	119.3	4.9	95		P
D4				4	1	119.0	4.6	95		P
D5				4	1	124.7	7.0	98		P

PERCENT COMPACTION BASED ON:

- ☐ STANDARD PROCTOR ASTM D 698
- ☒ MODIFIED PROCTOR ASTM D 1557
- ☐ OTHER

SPECIFICATION:

- ☐ 90% D 698 ☐ 95% D 698
- ☐ 90% D 1557 ☒ 95% D 1557
- ☐ OTHER

MATERIAL TYPE	REFERENCE SAMPLE No.	MATERIAL DESCRIPTION	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOIST. (%)
1	Blk 3	Gravelly Sand Borrow	127	12%

TEST NUMBER
DT = DENSITY TEST
RT = RETEST

TEST METHOD
N = NUCLEAR (ASTM D 2922)
SC = SAND CONE (ASTM D 1556)
DC = DRIVE CYLINDER (ASTM D 2937)

Continued ☐

AGRA E&E Field Rep. (Initials) AWZ   AGRA E&E Project Manager (Initials) ____   Contractor's Rep. (Initials) ____

AGRA Earth & Environmental

DAILY FIELD REPORT

PROJECT NAME: Rec Ctr

PROJECT No.: 11-10182

FIELD REPORT No.: M-69

DATE: 6-29-95

PAGE: 5 of 5

SUMMARY OF FIELD COMPACTION TEST RESULTS

TEST No.	TEST METHOD	LOCATION	ELEV. (FEET)	DISTANCE BELOW GRADE	MATL. TYPE	FIELD DRY DENSITY (PCF)	FIELD MOIST. (%)	FIELD COMP. (%)	VARIATION FROM OPTIMUM MOIST. (%)	PASS OR FAIL
D1	N			3"	1	120.4	7.1	95		P
D2				3"	1	122.1	6.0	96		
D3				2½"	1	120.4	6.7	95		
D4				—	1	121.6	5.6	96		
D5				1"	1	120.1	5.1	95		
D6				—	1	120.3	5.4	95		
D11										

Manhole

PERCENT COMPACTION BASED ON:

- ☐ STANDARD PROCTOR ASTM D 698
- ☒ MODIFIED PROCTOR ASTM D 1557
- ☐ OTHER

SPECIFICATION:

- ☐ 90% D 698
- ☐ 95% D 698
- ☐ 90% D 1557
- ☒ 95% D 1557
- ☐ OTHER

MATERIAL TYPE	REFERENCE SAMPLE No.	MATERIAL DESCRIPTION	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOIST. (%)
1	Bulk 3	Gravelly Sand Brown	127	12

TEST NUMBER

Dt = DENSITY TEST

RT = RETEST

TEST METHOD

N = NUCLEAR (ASTM D 2922)

SC = SAND CONE (ASTM D 1556)

DC = DRIVE CYLINDER (ASTM D 2937)

AGRA E&E Field Rep. (Initials): AWZ

AGRA E&E Project Manager (Initials): ____

Contractor's Rep. (Initials): ____

Continued ☐

AGRA Earth & Environmental

DAILY FIELD REPORT

PROJECT NAME Rei G6 | PROJECT No. 11-10182 | FIELD REPORT No. M-64 | DATE 6-29-95 | PAGE 5 OF 5

SUMMARY OF FIELD COMPACTION TEST RESULTS

TEST No.	TEST METHOD	LOCATION	ELEV. (FEET)	DISTANCE BELOW GRADE	MATL. TYPE	FIELD DRY DENSITY (PCF)	FIELD MOIST. (%)	FIELD COMP. (%)	VARIATION FROM OPTIMUM MOIST. (%)	PASS OR FAIL
D1	N			3'	1	120.4	7.1	95		P
D2				3'	1	122.1	6.0	96		
D3				2½'	1	120.4	6.7	95		
D8				—	1	121.1	5.6	96		
D9				1'	1	120.1	5.1	95		
D10				—	1	120.3	5.4	95		
D11										

LOCATION sketch: D8, Manhole ⊗, D9, D7, D4, D6, D10

PERCENT COMPACTION BASED ON:
- ☐ STANDARD PROCTOR ASTM D 698
- ☒ MODIFIED PROCTOR ASTM D 1557
- ☐ OTHER

SPECIFICATION:
- ☐ 90% D 698 ☐ 95% D 698
- ☐ 90% D 1557 ☒ 95% D 1557
- ☐ OTHER

MATERIAL TYPE	REFERENCE SAMPLE NO.	MATERIAL DESCRIPTION	MAXIMUM DRY DENSITY (PCF)	OPTIMUM MOIST. (%)
1	Bulk 3	Gravelly Sand Brown	127	12

TEST NUMBER
DT = DENSITY TEST
RT = RETEST

TEST METHOD
N = NUCLEAR (ASTM D 2922)
SC = SAND CONE (ASTM D 1556)
DC = DRIVE CYLINDER (ASTM D 2937)

AGRA E&E Field Rep. (Initials) AWZ AGRA E&E Project Manager (Initials) _____ Contractor's Rep. (Initials) _____ Continued ☐

AGRA Earth & Environmental

DAILY FIELD REPORT

PROJECT NAME	PROJECT No.	FIELD REPORT No.
Tier 66	1-1082	M-69
	DATE 6-29-95	PAGE 2 OF 5

COMMENTS (Describe work completed during the day; any problems and their solutions)

Structural Backfill

Placement and compaction of backfill continued throughout the day. The material was the same gravel borrow used the previous day. The material was compacted with a five ton vibratory drum roller. Six density tests were taken throughout the day on Shovel Contraction passing the 95% requirement

AGRA E&E Field Rep. (Initials) AVZ AGRA E&E Project Manager (Initials) _____ Contractor's Rep. (Initials) _____ Continued

AGRA
Earth & Environmental

DAILY FIELD REPORT

PROJECT No.	FIELD REPORT No.
11-10182	M-68
DATE	PAGE
6-28-95	2 of 6

PROJECT NAME Pier 66

COMMENTS (Describe work completed during the day; any problems and their solutions)

Structural Masonry –
AGRA representative Tracy Watson was on site for a visual inspection

Sprayed On Fireproofing
Application continued on the ~~M~~ Third level and northwest.

[redacted]
(~~Structural~~ backfill was placed and compacted in the excavated area along Alaska Way Gravel Borrow was brought in and placed in 1-2' lifts and compacted with a five ton vibratory roller. Five density tests were taken throughout the day and all showed passing results.

Continued ☐

AGRA E&E Field Rep. (Initials) ______ AGRA E&E Project Manager (Initials) ______ Contractor's Rep. (Initials) ______

AGRA Earth & Environmental

DAILY FIELD REPORT

PROJECT NAME	PROJECT No.	FIELD REPORT No.
Pier 66	11-10182	M-67
	DATE 6.27.95	PAGE 2 OF 4

COMMENTS (Describe work completed during the day; any problems and their solutions)

Structural Backfill & Sewer Placement

As noted in report #1 M-66 a 5 ton drum roller was arrived on the jobsite. Per in order to achieve compaction the structural backfill being placed east of Alaska Way where a gas tank and contaminated soil was removed. The area was compacted with a roller and was tested with a nuclear densometer. The results showed a passing compaction of 95% of a modified proctor.

Section of the sewer line and a catch basin were placed replacing the existing sewer that was portion of sewer line that was removed during excavation. The contractor used PVC pipe on a concrete catch basin. The soil under the sewerline was compacted with a flat vibratory plate compactor prior to placement to ensure compaction. The soil was tested with a 1/2" steel probe and verbal compaction throughout.

AGRA E&E Field Rep. (Initials) AWZ AGRA E&E Project Manager (Initials) _____ Contractor's Rep. (Initials) _____ Continued ☐

AGRA
th & Environmental

DAILY FIELD REPORT

PROJECT NAME	PROJECT No.	FIELD REPORT No.
Pier 66	12-10182	M-66
	DATE 6-26-95	PAGE 2 OF 5

COMMENTS (Describe work completed during the day; any problems and their solutions)

Structural Backfill

Backfill operation started on the excavated area where the contaminated soil was removed. The first three loads consisted of a clean washed sand to fill up to the water level of the surface water created from excavation. A gravel borrow was then brought in for the remaining fill. A sample of the borrow was taken back to the laboratory for a proctor test to ASTM D-1557. The area was compacted by running a loader across the area with many passes. Three density tests were taken of the area that showed 91% compaction. At this point the contractor was notified and a 5-ton steel drum roller is to be brought in and used tomorrow 6-27-95 to compact the area before any additional fill are placed.

AGRA E&E Field Rep. (Initials) AZ AGRA E&E Project Manager (Initials) _____ Contractor's Rep. (Initials) _____ Continued ☐