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Ser 09A2/608
16 MAY 1983

California Regional Water Quality Control Board
San Francisco Bay Region
1111 Jackson Steet, Room 6040
Oakland, California 94607

Attention: Mr. Robert Samaniego

Subject: MCON Project P-183, Solid Waste Disposal System, Naval Air Station, Alameda, California; closure plan

Gentlemen:

Harding Lawson Associates (HLA), the Navy's designer of the subject project, has worked with your geologist, Mr. Bud Eagle, in hopes of resolving comments presented in your letter dated September 8, 1982. The enclosed HLA letter dated April 26, 1983, provides you with the response to Mr. Eagle's concerns. The Navy believes HLA has properly designed the subject project and with your approval, plans to construct the subject project in the Fall of 1983.

The enclosed Initial Assessment Study and HLA letter dated April 13, 1983, are provided for your information. The Initial Assessment Study suggests that additional testing be performed at the project site. The HLA letter provides the results of additional testing. This Command believes that the data in the letter further supports the HLA design as an appropriate landfill closure plan.

The Navy design team would like to meet with you as soon as possible to discuss the status of the closure plan approval. Please contact Mr. Jim Washington, (415) 877-7402, to schedule this meeting.

Sincerely,

[illegible], III
[illegible]der
[illegible]ps
[illegible] Navy
Asst. Head, Acquisition Dept.

Enclosures
(1) HLA ltr 2176, 059.01 dtd April 26, 1983
(2) Initial Assessment Study of Naval Air Station, Alameda dtd April 1983
(3) HLA ltr 2176, 059.01 dtd April 13, 1983

Copy to:
NAS Alameda
NAVFACENGCOM Code 112

Harding Lawson Associates

[redacted]

2176,059.01

Commanding Officer
Western Division
Naval Facilities Engineering Command
P. O. Box 727
San Bruno, California 94066

Attention: Mr. James Washington
Code 405

Gentlemen:

This letter presents our response to a memorandum dated August 26, 1982, from the State Water Resources Control Board (SWRCB). The subject of the memorandum was a review of two documents concerning the sanitary landfill at the Alameda Naval Air Station, Alameda, California. It was written by Mr. Bud Eagle, Senior Engineering Geologist for Mr. Robert Samaniego of the California Regional Water Quality Control Board (CRWQCB). This review was undertaken in August 1982 although HLA had prepared and submitted the sanitary landfill site study in March 1978 and the closure plan on November 12, 1980.

HLA also has completed a basis of design report dated November 20, 1980, and construction plans and specifications entitled Solid Waste Disposal System dated February 5, 1982. The plans and specifications are for closing the landfill site in accordance with the CRWQCB's Resolution No. 77-7 (Minimum Criteria for Proper Closure of Class II Solid Waste Disposal Sites) and incorporating a dredged disposal facility into the closure design by installing dikes and a decant weir. We understand that Mr. Eagle has reviewed these more recent documents but still has some concerns about the project.

Engineers
Geologists &
Geophysicists

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The following are our specific comments to issues raised by Mr. Eagle:

- Concern was expressed that waste materials extend to depths of about 20 feet which is below the water table and is in violation of State code. It should be pointed out that this was standard construction practice prior to the promulgation of any state regulations. This practice was stopped in the early to mid-1970's and the wastes were placed above the water table until the site ceased operating. Therefore, this is an existing condition that occurred many years ago with no intention to violate the regulations. While strict interpretation of the regulations would consider this a violation, this is a condition shared by numerous landfills on the fringes of San Francisco Bay and it is not practical to attempt to remove the debris.

- Mr. Eagle stated that the wrong coefficient of permeability was used to calculate the seepage which produced an inaccurate estimate of discharge. However, a check of the March 1978 landfill site study report, page 73, shows that the correct coefficient of permeability of 0.01 centimeters per second (cps) and a seepage discharge of 7,000 to 13,000 gallons per day are correct. We do not know how Mr. Eagle arrived at the other figures. He further states that the use of an assumed coefficient of permeability is questionable and that the value "can vary by several orders of magnitude". This appears to be somewhat of an exaggeration as most textbooks define permeability for free-draining fine sand as varying from 0.1 to 0.001 cps. Therefore, the use of 0.01 cps appears to be a reasonable value.

  In addition, HLA drilled 18 test borings in the hydraulic sand fill in a large area around Area 97 (east of the seaplane lagoon) in 1979. Twenty tests were run to determine the amount of soil passing the No. 200 sieve. The results indicated that the average was 20 percent (4 to 40 percent) passing No. 200 sieve. Permeability tests run on two of the samples indicated permeabilities of 4×10^{-3} and 4×10^{-4} cps. Based on these data, using a permeability of 1×10^{-2} cps is very conservative.

The rate of discharge for seepage that has flowed under the hydraulic fill in the dredged spoil area is discussed. It is Mr. Eagle's opinion that a higher flow rate should have been used. However, he apparently has not considered that the flow path under the dredged spoil area is many times further than the flow path where the debris is near the sea wall. Also, dilution is occurring as evidenced by recent water quality tests (attached) which show that the levels of various constituents which are in the water are lowest in this area.

- The recent water quality tests show that the levels of contaminants in the ground water are very low. It is still our opinion that with values as low as these that a cutoff wall is of questionable value. If the barrier was not installed and the water quality should decrease, there is a 60-foot width available between the sea wall and the toe of the dike to install the barrier at a later date.

- Mr. Eagle's concern that if only the western and southern perimeter areas were sealed with a barrier, uplift pressures might damage the impermeable cover if the "water table were to rise significantly". It is our opinion that if the western and southern perimeters were completely sealed,* that the water level would only rise slightly before the overall ground-water flow would take the path of least resistance and flow around the landfill and drain into the bay north and east of the existing landfill where it is assumed that the perimeter dikes are also somewhat pervious. It is not known what is meant by a "significant rise in the water table". Since the hydraulic gradient is nearly flat, being about 0.001 foot/foot, a rise high enough to cause the cover to be damaged seems extremely unlikely.

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*HLA's recommendation was to only seal the portions of the south and west perimeters where the debris is adjacent to the sea wall, not all of these areas.

- Concern was expressed by Mr. Eagle that differential settlement could occur and cause the impervious cover to crack. Since the debris has been in-place from several to many years and much of the fill is under water, the tendency for abrupt differential settlement which would cause cracking is low. Settlement is expected to be relatively uniform except in the zone adjacent to the existing dredge pond. Some gradual differential settlement will occur in this zone along the boundary but it should not be abrupt.

  We do not believe that cracking as a result of differential settlement is a major concern. However, cracking might occur as a result of shrinkage cracks forming in the impervious cap prior to the use of the pond. If this happens, the surface of the pond should be disced to close the cracks and surface rolled to compact it. If impervious soils are the first dredged materials to be placed in the pond, the impervious soil cap will be increased by the thickness of the deposited soil.

- Concern has been expressed about the material to be used for the impermeable cap and that water from the dredging would penetrate the cap. The design specifications require that the permeability of the soil cap will be 1×10^{-6} cps or less. It is assumed that the Navy will have inspectors on the job during construction to see that the design criteria are achieved.

  The second concern can be alleviated by limiting the type and depth of material to be first placed in the pond on top of the impermeable cap. This concept is illustrated by the curves on the attached plate. For example, to protect the subsurface from infiltration of dredge water, the thickness of slurry and duration of the dewatering period can be controlled. Assuming a steady-state condition* in the dredged pond with a water head of 6 feet, it would take 60 days for the water to completely penetrate the cap.

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*Steady-state condition is one where the outflow of water from the dredge pond equals the inflow of water and hence the water head remains constant. This is the system planned for the landfill when it is used as a dredged spoil disposal site.

Under actual conditions the free water would have been drained off the slurry within 30 days and the water head would be ever decreasing as drying occurs. At some point drying of the surface will cause capillary tension to completely remove the effect of the water head from the cap.

- The closure plan does not contain supporting data to show that water drained from the dredged materials can meet standards for discharge and suspended solids because the source or sources of the material to be dredged is unknown at this time. Each source will be taken on a case-by-case basis and examined to determine if the water from the dredging can be discharged back into the bay. Based upon our experience at numerous dredged spoil disposal sites on land, this project should not pose any significant problems in meeting water quality standards. The closure report does state that water will meet the State standards.

- The methods of constructing the dredged disposal area dikes were not discussed in the closure report, but are discussed in detail in the Solid Waste Disposal Plans dated February 5, 1982.

The disposal area is located with a sufficient setback from the sea wall so that its influence on the sea wall stability is relatively small. The computed static factor of safety for the sea wall/dike configuration is 1.7. A pseudostatic analysis using a 0.1 g horizontal force gives a factor of safety of 1.2. Therefore, the horizontal force required to obtain a factor of safety of 1.0 is greater than 0.1 g. As explained below, the fact that the pseudostatic factor of safety is less than 1.0 does not mean that failure will occur.

During a large earthquake and a maximum credible earthquake along the Hayward fault, the bedrock acceleration may reach 0.3 g and 0.4 g, respectively. However, some attenuation will occur because of the plastic soils underlying the site. Dynamic analyses performed for sites around San Francisco Bay indicate that during the cyclic loading resulting from an earthquake, lateral displacement occurs only for short periods of time. The stresses induced in the embankment by an earthquake will exceed the strength of the embankment momentarily. The total extent

of the movement will be limited by reversals in the direction of the earthquake force. The severity of the earthquake determines both the amount of movement which may occur with each reversal in loading and the number of reversals which are likely to occur. Therefore, lateral yielding of the slope can occur.

To actually determine how much movement would occur during a given earthquake, it would be necessary to perform a dynamic analysis. Based on our experience with dynamic analyses in the area, we judge that the lateral displacement during a large earthquake and a maximum credible earthquake would be less than one foot and as much as several feet, respectively. However, neither of these conditions necessarily defines failure. Failure would be defined by a complete collapse of the sea wall structure which would allow the sea water to enter the landfill area.

In summary, Mr. Eagle has raised some pertinent questions which we have answered. It is our opinion that, if sound engineering practices are followed the closed landfill can be used satisfactorily for a dredged disposal facility.

Yours very truly,

HARDING LAWSON ASSOCIATES

Lyle E. Lewis

Lyle E. Lewis,
Civil Engineer - 16360

LEL/JCD/jd

Attachments

3 copies submitted

ANALYTICAL SCIENCE ASSOCIATES, Inc.

4560 HORTON ST. • EMERYVILLE, CA 94608 • (415) 547-6390

HLA Project No. 2176,059.01
April 1, 1983

ABSTRACT

Samples were received from the Alameda Naval Air Station on March 16 and 17 for the screening of Priority Pollutants. No contaminants were detected in the volatile or Base-Neutral fraction. The acid and pesticide fractions contained traces of phenol and polychlorinated biphenyls. No metals were detected above 1 ppm.

METHODS

I Volatile Fraction

Samples were analyzed by gas-chromatography[1,2] for the volatile priority pollutants using GCFID and GCHSD under the following analytical conditions:

Instrument	:	Perkin Elmer 3B
Column	:	SP 1000/Carbopack B
Program	:	50^{o}-200^{o} @ 8^{o}/minute

II Base Neutral/Acid Fraction

Samples were analyzed by GCFID under the following analytical conditions:

Instrument	:	Perkin Elmer 3920
Column	:	1% SP2150 DB; Tenax 60/80
Program	:	50^{o}-270^{o} @ 8^{o}/minute; 180^{o}-300^{o}

Methods (continued)

III Pesticide Fraction

The 6, 15 and 50 percent Florisil fractions were analyzed[3] by GCHSD under the following conditions:

Instrument	:	Perkin Elmer 3B
Column	:	3% OV1
Temperature	:	180°C

IV Metals

Samples were filtered (0.45 um) and analyzed by Atomic Absorption spectroscopy.

RESULTS

Data are presented in Table I. Only the actual organic components found have been reported.

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1. 40 CFR, part 141 app. C
2. Sampling and Analysis Procedures for the Screening of Industrial Effluents. EPA 1979
3. Methods for the Organic Analysis of Water and Wastes. EPA 1980.

TABLE I

LANDFILL WELL NO.	17	18	3	19	9	8	near 6	near 12
Sample ID	9001	9002	9003	9004	9005	9006	9007	9008
Cadmium	0.053	0.03	0.024	0.024	0.018	0.011	0.012	0.009
Copper	0.72	0.06	0.06	0.04	0.04	0.03	0.06	0.08
Lead	0.17	0.09	0.07	0.05	0.06	0.06	0.07	0.06
Selenium	0.08	0.04	0.03	0.04	0.04	0.04	0.03	0.04
Silver	k0.05	k0.05	k0.05	k0.05	k0.05	k0.05	k0.05	k0.05
Zinc	0.48	0.13	0.038	0.032	0.16	0.013	0.044	0.076
Oil & Grease	30	20	15	50	80	40	20	15
Phenol (ppb)	26	11	k10	k10	11	10	11	10
TICH (ppb, as arochlor 1248)	0.52	0.08	0.05	0.60	0.40	k0.05	0.20	0.10
Arsenic	0.09	0.06	0.05	0.06	0.04	0.04	0.05	0.05
Beryllium	0.012	k0.01	k0.01	k0.01	k0.01	k0.01	k0.01	k0.01
pH	7.4	7.0	7.3	7.1	7.2	7.2	7.5	7.7
Conductivity	6400	19,000	13,000	16,000	2700	3500	1500	1300
Nickel	0.11	0.11	0.10	0.13	0.12	0.07	0.06	0.07

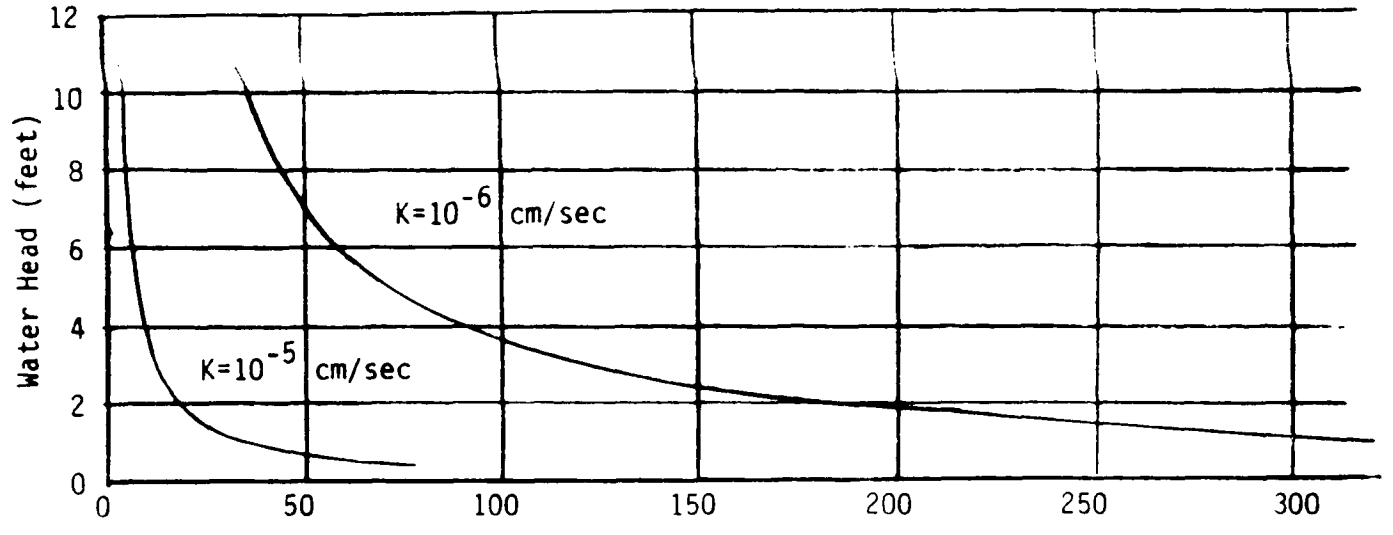
All values in ppm unless otherwise noted.

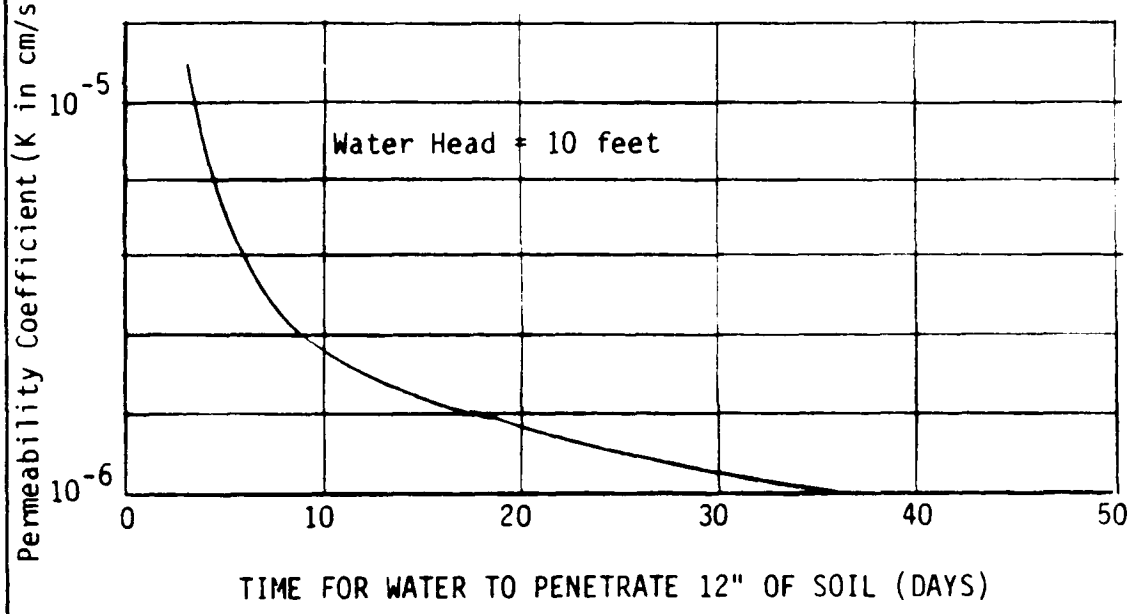
ADDENDUM

LANDFILL WELL NO.	17	18	3	19	9	8	near 6	near 12
Sample ID	9001	9002	9003	9004	9005	9006	9007	9008
Chromium	k0.05	k0.05	k0.05	k0.05	k0.05	k0.05	k0.05	k0.05
Mercury	0.0008	k0.0001	k0.0001	k0.0001	0.0002	k0.0001	k0.0001	k0.0001
Magnesium	120	420	420	420	57	68	33	35

All values in ppm unless otherwise noted.

k = less than value





HLA
Harding Lawson Associates
Engineers, Geologists & Geophysicists

TIME FOR WATER TO PENETRATE 12" OF SOIL
Sanitary Landfill
NAS Alameda, California

PLATE
A

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
L.E. Lewis	2176,059.01	LEL	4/26/83		

Harding Lawson Associates

April 13, 1983

2176,059.01

Commanding Officer
Western Division
Naval Facilities Engineering Command
P. O. Box 727
San Bruno, California 94066

Attention: Code 405
Mr. James Washington

Gentlemen:

This letter presents the results of Harding Lawson Associates' (HLA) ground-water sampling and water chemistry testing for the Alameda Naval Air Station landfill which has been inactive since about 1977.

BACKGROUND

Starting in 1976, HLA has performed various studies of the landfill and its operations. The results of those studies were summarized in our report dated March 1, 1978. In 1982, HLA completed plans and specifications for closing the landfill which included constructing dikes and weirs so that the area could be used for the disposal of dredged materials.

Prior to our recent assignment, water quality monitoring was performed by HLA in 1976 and 1977 for our March 1978 report. The water samples were tested for parameters normally associated with sanitary landfills which were of concern to the California Regional Water Quality Control Board at that time. The only parameters relevant to this assignment were the heavy metals and oil and grease.

Recently, a draft copy of the Initial Assessment Study (IAS) of Naval Air Station, Alameda, California, dated February 1983, by Ecology and Environment, Inc., was available for review. It indicated that large quantities (405,000 tons) of solvents, oil, and heavy metals were among many possible contaminants which may have been placed in the landfill during its existence. Our letter of March 2, 1983, provided initial review comments of the IAS study. In our letter, we recommended that as many of the existing monitoring wells in the landfill that could be found be sampled and water quality tests be performed to indicate if the alleged materials were present in the landfill in sufficient quantity to be of concern.

As the IAS report was to be published in final form early in April of 1983, the work was to be completed quickly so that the results could be used in the report. This necessitated a rapid field sampling and testing program.

SAMPLING AND TESTING

Since 1977, some minor grading has been done and some dredged sand has been placed in the southerly portion of the site. During the grading, apparently some of the monitoring wells were destroyed. In addition, some wells could not be located because they were either under water or hidden by high grass which covers much of the site. For these reasons, we were only able to locate six of the original 15 observation wells. Samples also were taken from water which was ponded in the area of Observation Wells 6 and 12.

The sampling was performed on March 16 and 17, 1983. Prior to sampling each observation well, at least five well volumes of subsurface water were withdrawn. The water samples were placed in containers* such that the head space was zero to prevent the loss of any volatile constituents. At the end of each day, the samples were taken to Analytical Science Associates (ASA) of Emeryville, California, for laboratory testing using chain of custody procedures. The testing included gas chromatograph scans for the Environmental Protection Agency's list of 129 priority pollutants. On March 31, 1983, the results were transmitted to you by telephone. A copy of the ASA test report with well numbers added is attached.

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*40 milliliter glass vial, 1 liter glass bottle and 250 milliliter plastic bottle.

CONCLUSIONS

We have reviewed the test data and compared it, where possible, to the previous test data from the monitoring wells. Although less than half of the wells were located and sampled, the results of the samples taken from the widely scattered observation wells indicate that:

1. The heavy metal concentrations are about the same as they were in 1977 (all less than one part per million)

2. No volatile or base neutral fractions were detected

3. The acid fraction contained only a trace of phenol

4. The total identifiable chlorinated hydrocarbon (TICH) fraction indicated a slight trace of PCB

Based on this analysis, it does not appear that significant amounts of materials are present in the landfill at hazardous levels.

If you have questions concerning our work or wish us to discuss the results with you, please call.

Yours very truly,

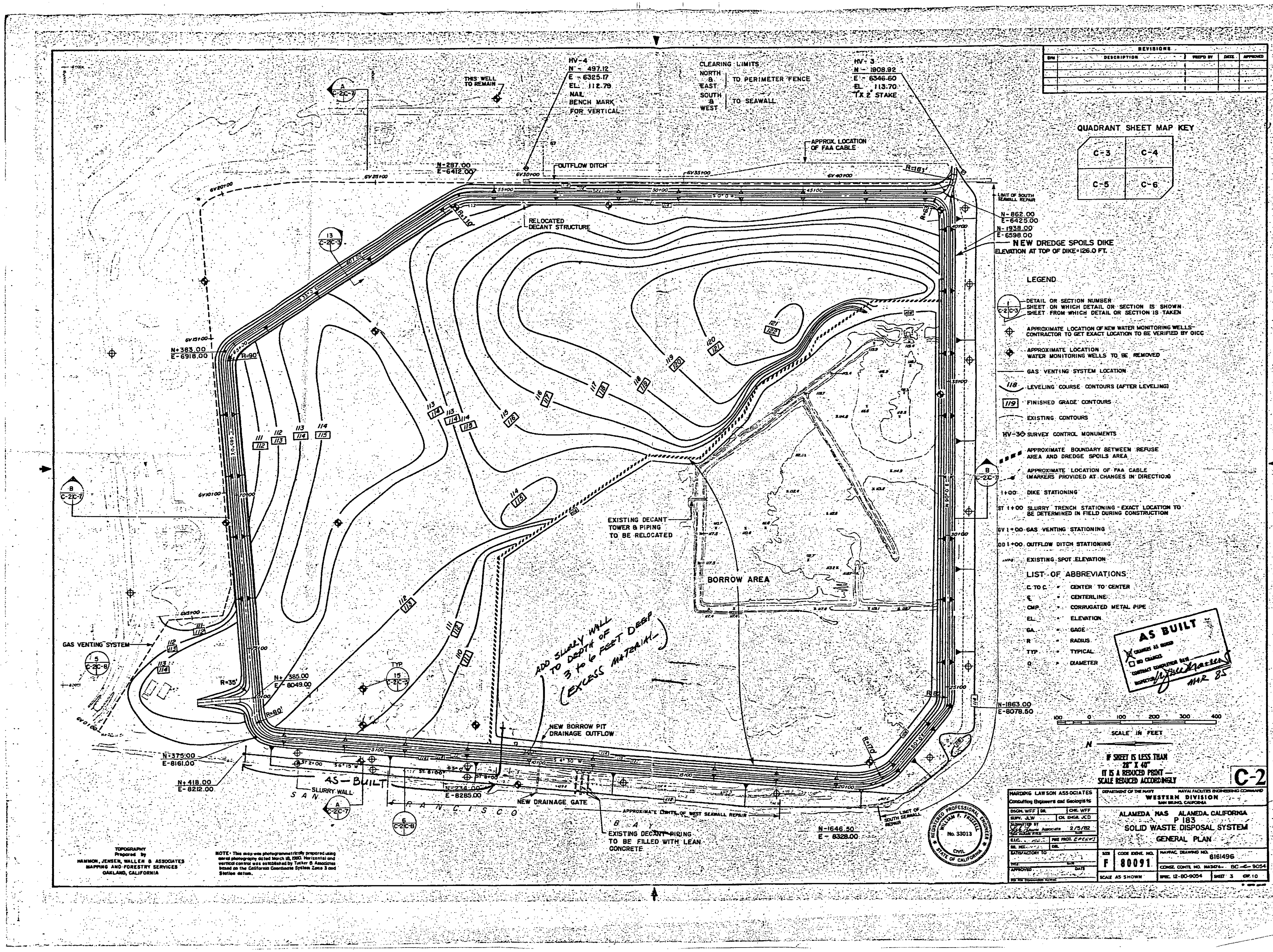
HARDING LAWSON ASSOCIATES

Lyle E. Lewis

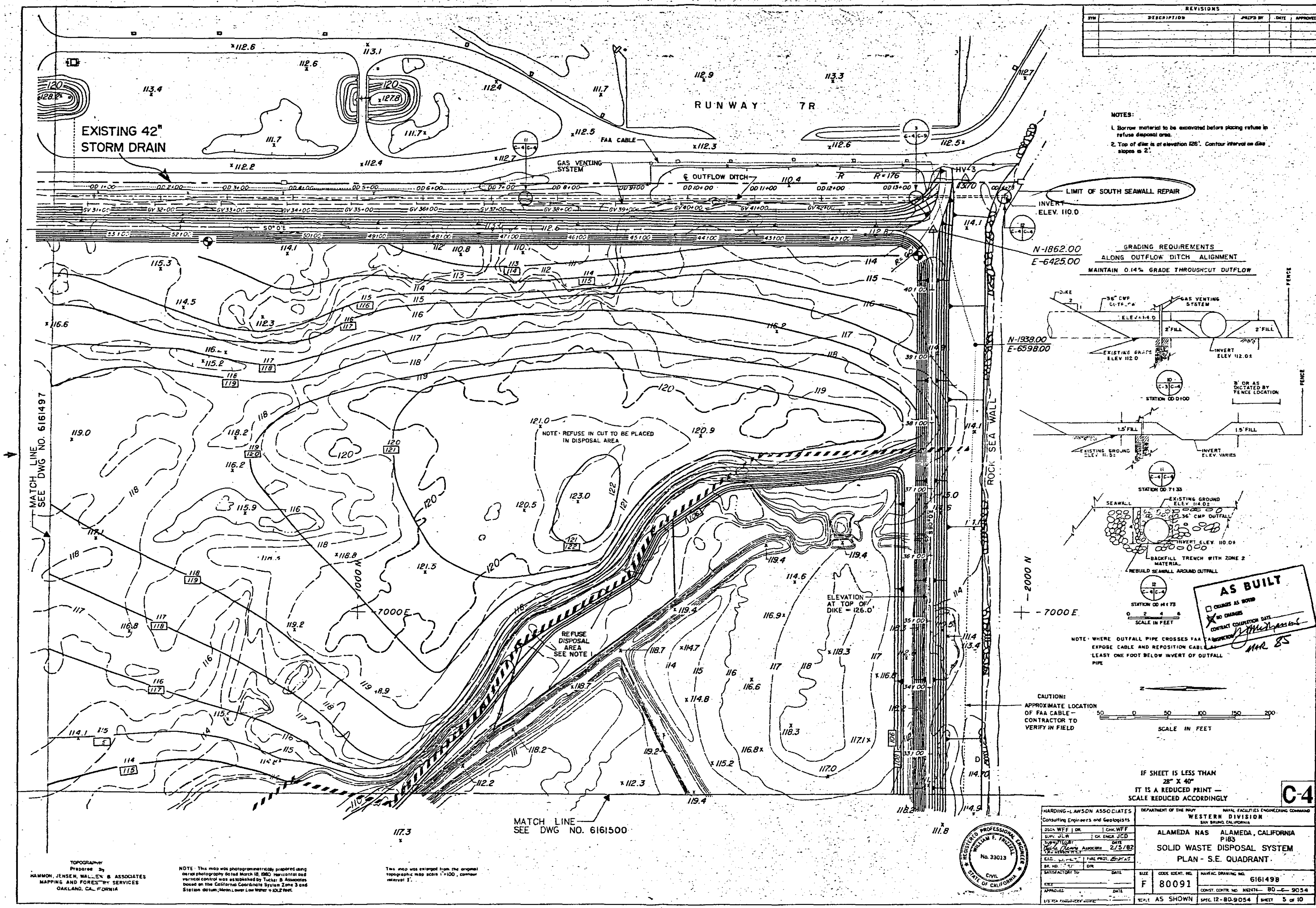
Lyle E. Lewis,
Civil Engineer - 16360

LEL/JCD/jd

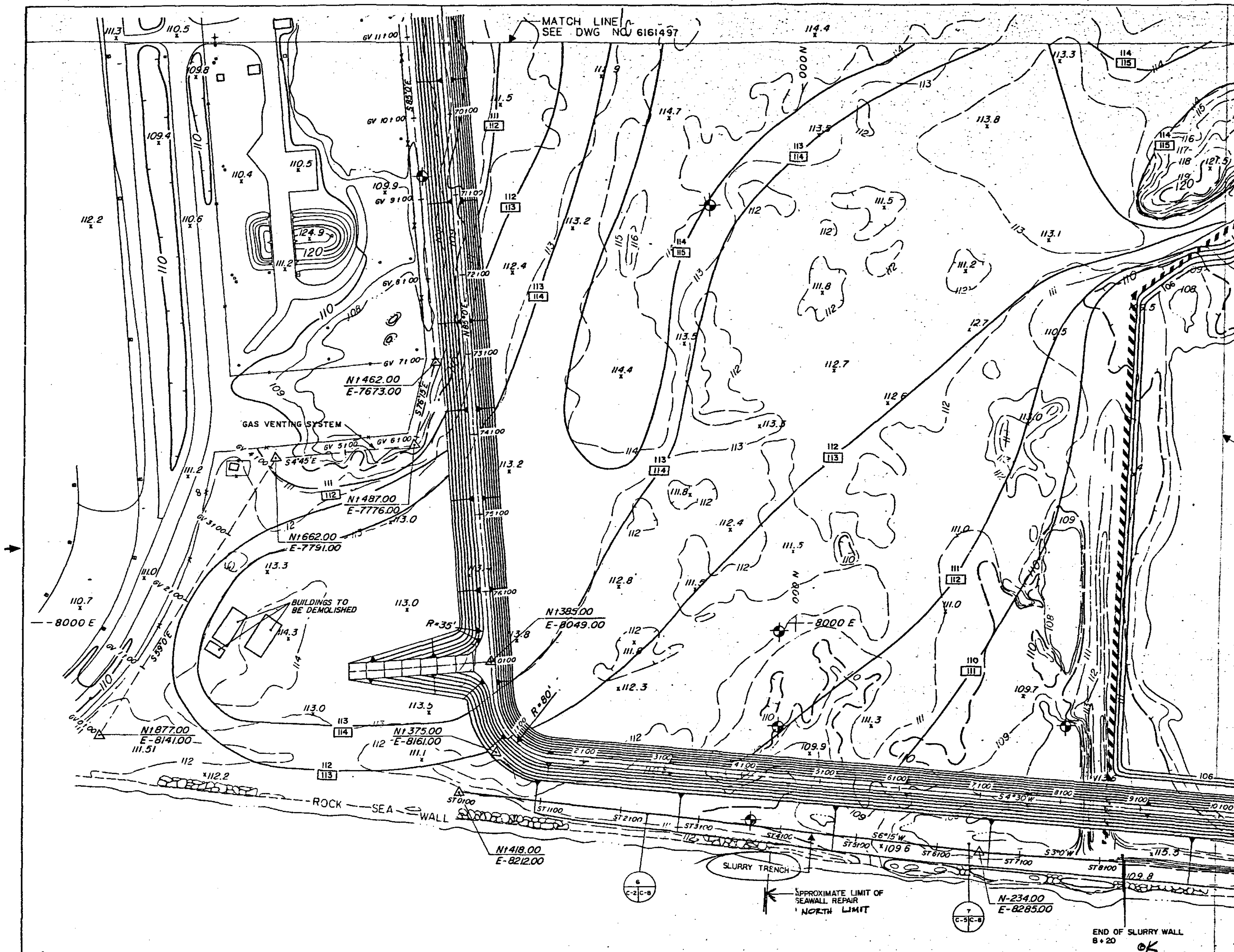
5 copies submitted
cc: NEESA
Port Hueneme, California 93043
Attention: Code 112N John Accardi
Building 835, Wing 2 Room 200F



HV-4
N - 497.12
E - 6325.17
EL. 112.79
NAIL BENCH MARK FOR VERTICAL
THIS WELL TO REMAIN
CLEARING LIMITS
NORTH & EAST TO PERIMETER FENCE
SOUTH & WEST TO SEAWALL
HV-3
N - 1908.92
E - 6346.60
EL. 113.70
1"X 2" STAKE
APPROX. LOCATION OF FAA CABLE
OUTFLOW DITCH
N-287.00
E-6412.00
RELOCATED DECANT STRUCTURE
N-862.00
E-6425.00
N-1939.00
E-6598.00
NEW DREDGE SPOILS DIKE
ELEVATION AT TOP OF DIKE=126.0 FT.
LIMIT OF SOUTH SEAWALL REPAIR
QUADRANT SHEET MAP KEY
C-3
C-4
C-5
C-6
LEGEND
DETAIL OR SECTION NUMBER
SHEET ON WHICH DETAIL OR SECTION IS SHOWN
SHEET FROM WHICH DETAIL OR SECTION IS TAKEN
APPROXIMATE LOCATION OF NEW WATER MONITORING WELLS-CONTRACTOR TO GET EXACT LOCATION TO BE VERIFIED BY OICC
APPROXIMATE LOCATION WATER MONITORING WELLS TO BE REMOVED
GAS VENTING SYSTEM LOCATION
LEVELING COURSE CONTOURS (AFTER LEVELING)
FINISHED GRADE CONTOURS
EXISTING CONTOURS
HV-30 SURVEY CONTROL MONUMENTS
APPROXIMATE BOUNDARY BETWEEN REFUSE AREA AND DREDGE SPOILS AREA
APPROXIMATE LOCATION OF FAA CABLE (MARKERS PROVIDED AT CHANGES IN DIRECTION)
1+00 DIKE STATIONING
ST 1+00 SLURRY TRENCH STATIONING - EXACT LOCATION TO BE DETERMINED IN FIELD DURING CONSTRUCTION
GV 1+00 GAS VENTING STATIONING
OD 1+00 OUTFLOW DITCH STATIONING
EXISTING SPOT ELEVATION
LIST OF ABBREVIATIONS
C TO C CENTER TO CENTER
℄ CENTERLINE
CMP CORRUGATED METAL PIPE
EL. ELEVATION
GA. GAGE
R RADIUS
TYP TYPICAL
⌀ DIAMETER
AS BUILT
CHANGES AS NOTED
NO CHANGES
MAR 85
N+383.00
E-6918.00
EXISTING DECANT TOWER & PIPING TO BE RELOCATED
BORROW AREA
ADD SLURRY WALL TO DEPTH OF 3 to 6 FEET DEEP (EXCESS MATERIAL)
GAS VENTING SYSTEM
N+385.00
E-8049.00
N-375.00
E-8161.00
N+418.00
E-8212.00
AS-BUILT
SLURRY WALL
NEW BORROW PIT DRAINAGE OUTFLOW
N-234.00
E-8285.00
NEW DRAINAGE GATE
SAN FRANCISCO BAY
APPROXIMATE LIMITS OF WEST SEAWALL REPAIR
EXISTING DECANT PIPING TO BE FILLED WITH LEAN CONCRETE
N-1646.50
E-8328.00
LIMIT OF SOUTH SEAWALL REPAIR
N-1863.00
E-8078.50
SCALE IN FEET
100 0 100 200 300 400
N
IF SHEET IS LESS THAN 28" X 40" IT IS A REDUCED PRINT — SCALE REDUCED ACCORDINGLY
C-2
TOPOGRAPHY Prepared by HAMMON, JENSEN, WALLER & ASSOCIATES MAPPING AND FORESTRY SERVICES OAKLAND, CALIFORNIA
NOTE: This map was photogrammetrically prepared using aerial photography dated March 18, 1980. Horizontal and vertical control was established by Tucker & Associates based on the California Coordinate System Zone 3 and Station datum.
REGISTERED PROFESSIONAL ENGINEER WILLIAM F. FRIZELL No. 33013 CIVIL STATE OF CALIFORNIA
HARDING LAWSON ASSOCIATES
Consulting Engineers and Geologists
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
WESTERN DIVISION
SAN BRUNO, CALIFORNIA
ALAMEDA NAS ALAMEDA, CALIFORNIA
P 183
SOLID WASTE DISPOSAL SYSTEM
GENERAL PLAN
SIZE F
CODE IDENT. NO. 80091
NAVFAC DRAWING NO. 8161496
SCALE AS SHOWN
SPEC. 12-80-9054
SHEET 3 OF 10



MARKED UP AS-BUILTS FOR WESDIV



NOTE:
Top of dike at elevation 126'. Contour interval on dike slopes is 2'.

AS BUILT
CHANGES AS NOTED
NO CHANGES

SCALE IN FEET

IF SHEET IS LESS THAN
28" X 40"
IT IS A REDUCED PRINT —
SCALE REDUCED ACCORDINGLY

C-5

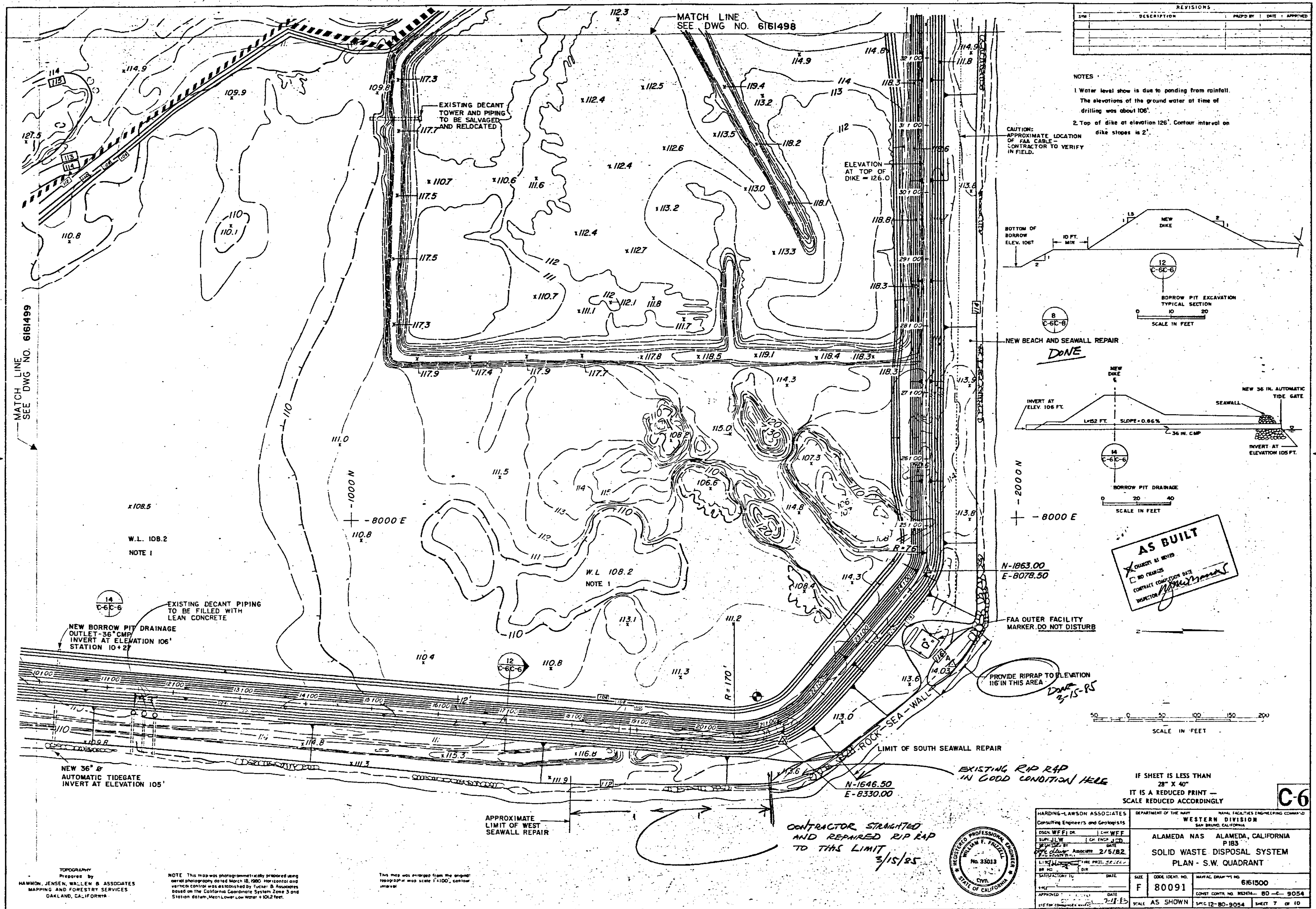
TOPOGRAPHY
Prepared by
HAMMON, JENSEN, WALLEN & ASSOCIATES
MAPPING AND FORESTRY SERVICES
OAKLAND, CALIFORNIA

NOTE: This map was photogrammetrically prepared using aerial photography dated March 18, 1980. Horizontal and vertical control was established by Tucker & Associates based on the California Coordinate System Zone 3 and Station datum; Mean Lower Low Water +101.2 feet

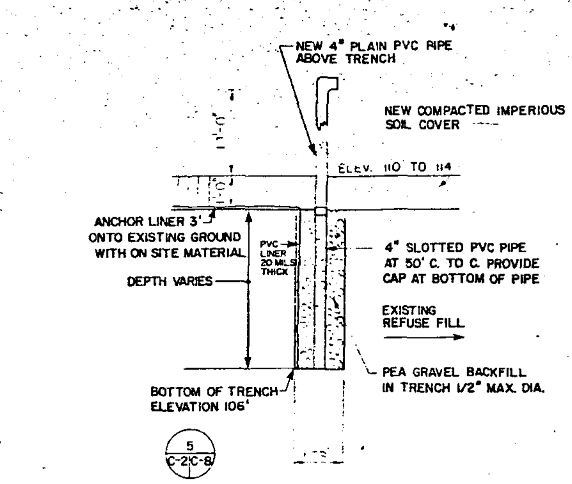
This map was enlarged from the original topographic map scale 1"=100', contour interval

REGISTERED PROFESSIONAL ENGINEER
WILLIAM F. FRIZZELL
No. 33013
CIVIL
STATE OF CALIFORNIA

HARDING-LAWSON ASSOCIATES Consulting Engineers and Geologists	DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND — WESTERN DIVISION — SAN BRUNO, CALIFORNIA
DSGN. WFF / DR. / CHK. WFF / SUPV. JLW / CH. ENGR. JCD / SUBMITTED BY Associate DATE 2/3/82 / FIRE PROT. / BR. HD. / DIR. / SATISFACTORY TO / DATE / TITLE / APPROVED / DATE 7-19-83 / FOR COMMANDER NAVFAC	ALAMEDA NAS ALAMEDA, CALIFORNIA P183 SOLID WASTE DISPOSAL SYSTEM PLAN - N.W. QUADRANT
SIZE F / CODE IDENT. NO. 80091 / SCALE AS SHOWN	NAVFAC DRAWING NO. 6161499 / CONST. CONTR. NO. N62474-80-C-9054 / SPEC. 12-80-9054 / SHEET 6 OF 10



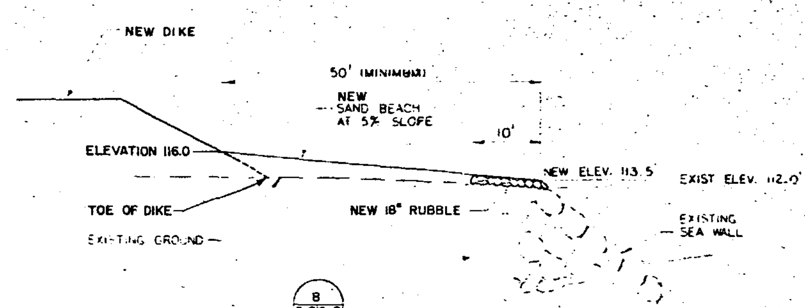
MATCH LINE
SEE DWG NO. 6161498
MATCH LINE
SEE DWG NO. 6161499
EXISTING DECANT TOWER AND PIPING TO BE SALVAGED AND RELOCATED
ELEVATION AT TOP OF DIKE = 126.0
CAUTION: APPROXIMATE LOCATION OF FAA CABLE - CONTRACTOR TO VERIFY IN FIELD.
NOTES
1. Water level show is due to ponding from rainfall. The elevations of the ground water at time of drilling was about 106'.
2. Top of dike at elevation 126'. Contour interval on dike slopes is 2'.
REVISIONS
BOTTOM OF BORROW ELEV. 106'
NEW DIKE
BORROW PIT EXCAVATION TYPICAL SECTION
SCALE IN FEET
NEW BEACH AND SEAWALL REPAIR
DONE
INVERT AT ELEV. 106 FT.
SLOPE = 0.86%
36 IN. CMP
NEW 36 IN. AUTOMATIC TIDE GATE
SEAWALL
INVERT AT ELEVATION 105 FT.
BORROW PIT DRAINAGE
SCALE IN FEET
AS BUILT
W.L. 108.2
NOTE 1
W.L 108.2
NOTE 1
EXISTING DECANT PIPING TO BE FILLED WITH LEAN CONCRETE
NEW BORROW PIT DRAINAGE OUTLET-36" CMP INVERT AT ELEVATION 106' STATION 10+27
N-1863.00
E-8078.50
FAA OUTER FACILITY MARKER. DO NOT DISTURB
PROVIDE RIPRAP TO ELEVATION 116' IN THIS AREA
Done 3-15-85
SCALE IN FEET
ROCK SEA WALL
LIMIT OF SOUTH SEAWALL REPAIR
EXISTING RIP RAP IN GOOD CONDITION HERE
N-1646.50
E-8330.00
NEW 36" Ø AUTOMATIC TIDEGATE INVERT AT ELEVATION 105'
APPROXIMATE LIMIT OF WEST SEAWALL REPAIR
CONTRACTOR STRAIGHTED AND REPAIRED RIP RAP TO THIS LIMIT 3/15/85
IF SHEET IS LESS THAN 28" X 40" IT IS A REDUCED PRINT — SCALE REDUCED ACCORDINGLY
C-6
TOPOGRAPHY Prepared by HAMMON, JENSEN, WALLEN & ASSOCIATES MAPPING AND FORESTRY SERVICES OAKLAND, CALIFORNIA
HARDING-LAWSON ASSOCIATES Consulting Engineers and Geologists
DEPARTMENT OF THE NAVY NAVAL FACILITIES ENGINEERING COMMAND WESTERN DIVISION SAN BRUNO, CALIFORNIA
ALAMEDA NAS ALAMEDA, CALIFORNIA
P183
SOLID WASTE DISPOSAL SYSTEM
PLAN - S.W. QUADRANT
F 80091 6161500
AS SHOWN
SPEC 12-80-9054
SHEET 7 OF 10



5 / C-2 C-8

DETAIL — PERIMETER GAS VENTING SYSTEM

0 2 4 SCALE IN FEET

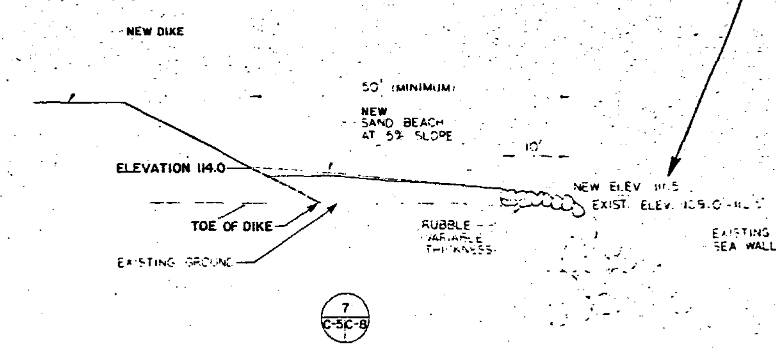


8 / C-6 C-8

SLOPE REPAIR — SOUTH SEA WALL

0 2 4 SCALE IN FEET

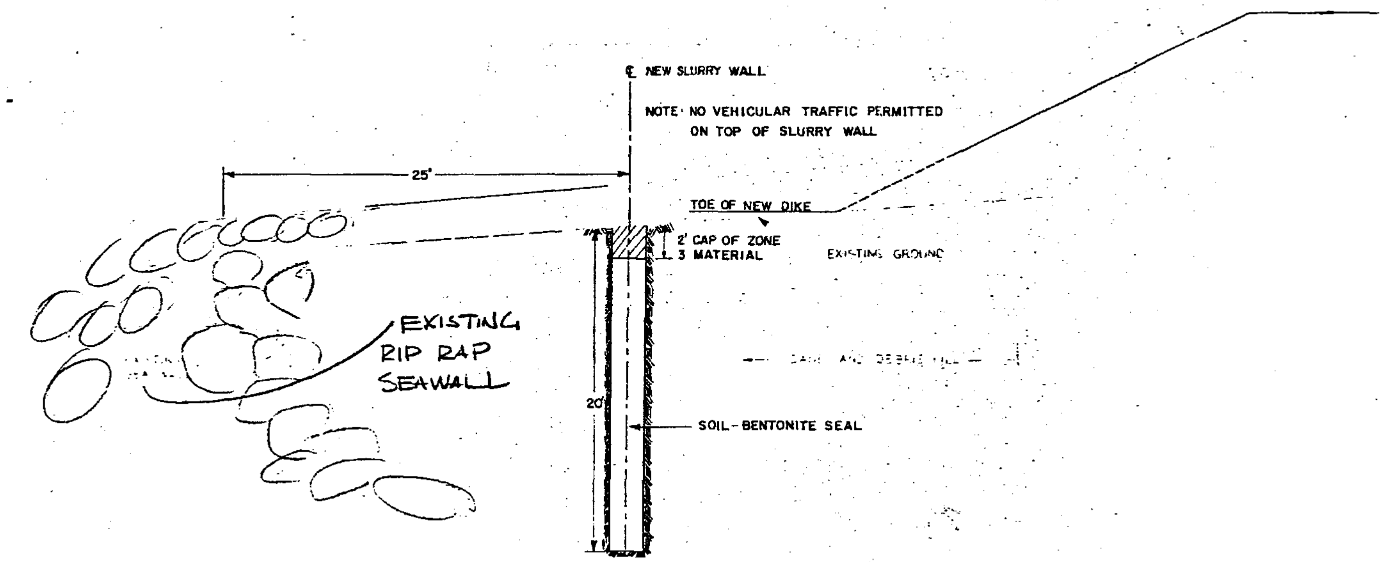
NOTE:
REPAIR WORK SHALL BE DONE ONLY UP TO ELEVATION 111.5'.



7 / C-5 C-8

SLOPE REPAIR — WEST SEA WALL

0 2 4 SCALE IN FEET



6 / C-2 C-8

DETAIL—SEEPAGE CONTROL SLURRY WALL

NOT TO SCALE

AS BUILT
☐ CHANGES AS NOTED
☒ NO CHANGES
CONTRACT COMPLETION DATE Mar 86

IF SHEET IS LESS THAN 28" X 40" IT IS A REDUCED PRINT SCALE REDUCED ACCORDINGLY

C-8

REGISTERED PROFESSIONAL ENGINEER WILLIAM F. FRIZZELL No. 33013 CIVIL STATE OF CALIFORNIA

HARDING LAWSON ASSOCIATES
Consulting Engineers and Geologists

DSGN. WFF | DR. TL | CHK. WFF
SUPV. JLW | CH. ENGR. JCD
Associate 2/3/82
APPROVED DATE 7-11-83

WESTERN DIVISION
SAN BRUNO, CALIFORNIA

ALAMEDA NAS ALAMEDA, CALIFORNIA
P 183
SOLID WASTE DISPOSAL SYSTEM

SIZE F | CODE IDENT. NO. 80091 | 6161502
N62474-80-C-9054
12-80-9054 | SHEET 9 OF 10