Dennis SYT + action

TAT

TESTING AND TECHNOLOGY

25 L Commercial Blvd. • Novato, CA. • 94949 • (415) 883-5070
1027 Alabama St. • Vallejo, CA. • 94590 • (707) 648-5014
FAX • (415) 883-0859

PRECISION TANK TESTING & MONITORING WELL SERVICES

October 2, 1989

Jay Groh
THE SCOTT COMPANY
1919 Market Street
Oakland, CA 94607

Dear Jay,

Please let us to take this opportunity to thank you for allowing TAT to be of service to you.

Enclosed are the results of the underground storage tank test performed on August 1st & 7th at A.N.R. Trucking Co.

As you already know,on August 7th (re-test), the tank failed with an apparent piping leak within 12 inches of grade.

I have sent a copy of these reports on to Edgar Howell of the County of Alameda Enviromental Health Department for your convenience.

If you have any further questions please feel free to call me at, (415) 883-5070.

Sincerely,

Jolene Latchin

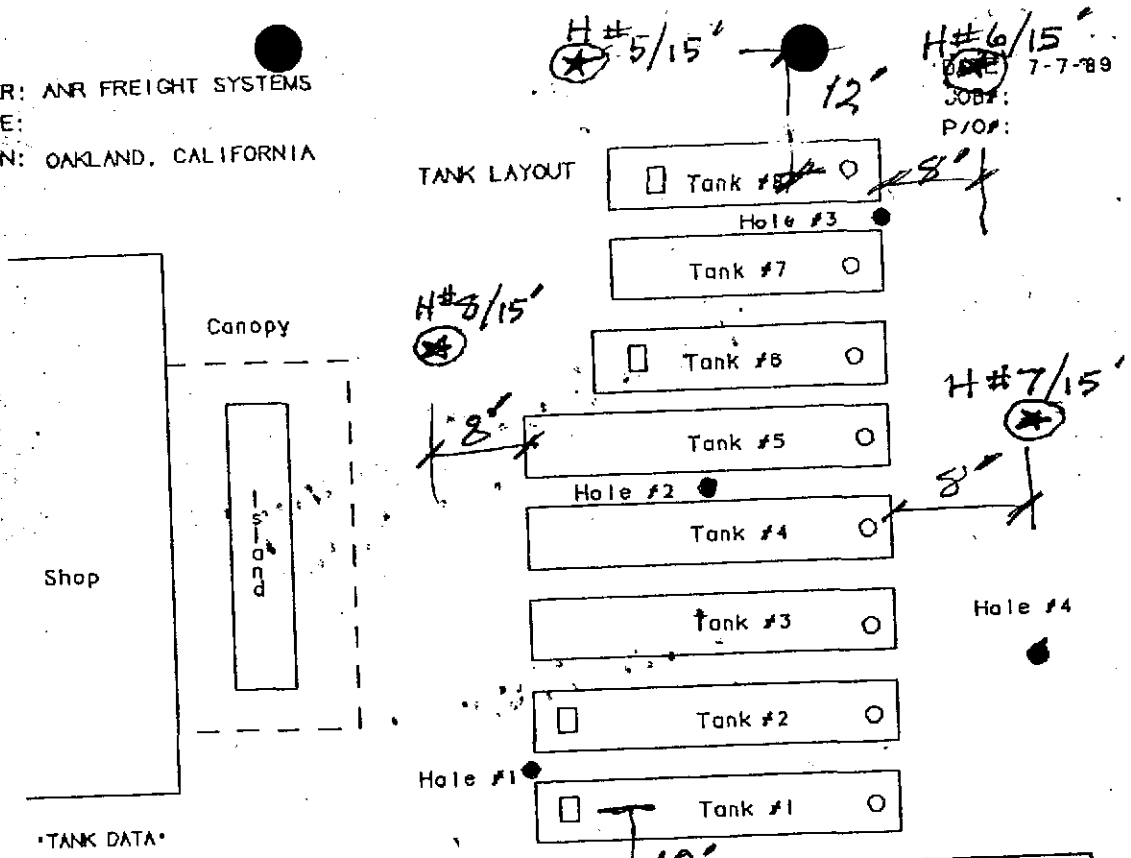
Jolene Latchin
Office Manager

JL/cg enclosures

CC: Edgar Howell, County of Alameda Environmental Health

CUSTOMER: ANR FREIGHT SYSTEMS
SITE:
LOCATION: OAKLAND, CALIFORNIA

DATE: 7-7-89
JOB#:
P/O#:



TANK DATA

	Contents	Capacity	Composition	Tank/Soil Potential	Cover	Delivery
Tank #1	Deisel	20,000 gal	Steel		Concrete	Red Jacket
Tank #2	Deisel	20,000 gal	Steel	- .537	Concrete	Siphon
Tank #3	Deisel	20,000 gal	Steel	- .623	Concrete	Suction
Tank #4	Deisel	20,000 gal	Steel	- .745	Concrete	Suction
Tank #5	Deisel	20,000 gal	Steel	- .786	Concrete	Suction
Tank #6		10,000 gal	Steel	- .815	Concrete	Suction
Tank #7	Oil	8,000 gal	Steel	- .735	Concrete	Suction
Tank #8	Gasoline	8,000 gal	Steel	- .680		Suction
R1 =		OHMS CM @ 5'				
R2 =		OHMS CM @ 10'				

COMMENTS
● Previous Holes H#1 thru H#4
⊛ New Holes H#5 thru H#9

RECOMMENDATION
Tommy — ⊛ are approximate.
Field Locate as Reqd.
Provide Layout of sample Holes

NESCO
NATIONAL ENVIRONMENTAL SERVICE COMPANY
TULSA, OKLA
918 622-4633

TESTING AND TECHNOLOGY
25 L COMMERCIAL
NOVATO, CA 94949
(415) 883-5070

INVOICE # 2537 TEST DATE 8/1/89

COMPANY NAME A.N.R. TRUCKING

TANK ADDRESS 2225 7th STREET OAKLAND 94607

CONTACT NAME RANDY PHONE #

SUB-THROUGH THE SCOTT CO. / JAY GROH PHONE # 834-2333

MAILING ADDRESS 1919 MARKET STREET OAKLAND 94607

TANK INFORMATION

TANK #	ONE
PRODUCT	30W OIL
CAPACITY	6,000
CONSTRUCTION	STEEL
DIAMETER	95"
FILL PIPE	30"
TANK BOTTOM DEPTH	125"/128"
PUMP TYPE	SUCTION
VAPOR RECOVERY	NONE
TANK WATER	0

TEST INFORMATION

TEST EQUIPMENT	HORNER
FULL SYST/TANK ONLY	FULL
DATE/TIME FILLED	7/31
GALLONS TO TOP OFF	5600
GROUND WATER DEPTH	10'+
TANK BTM PRESSURE	-

RESULTS

PASS - FAIL	FAIL
LOSS RATE	+.2185 / HR.

COMMENTS Recommend a re-test due to large calculated gain.

TESTING AND TECHNOLOGY

TEST REPORT HORNER `EZY CHEK' LEAK DETECTOR

COMPANY A.N.R. TRUCKING DATE 8/1/89 INVOICE 2537 TANK # 1

PRODUCT 30W OIL CAPACITY 6,000 MEASURED API 29.5 TEMPERATURE 78.6

ADJUSTED API 28.2 COEF OF EXPANSION .00043770 TEMP SHIFT FACTOR 2.6262

CALIBRATING ROD .05 DIVIDED BY # LINES 30.5 = CHART CALIB FACTOR .0016

OTHER 8 GALLONS ADDED AT 10:00 TO OVERFILL TANK FOR TEST

TIME	TEST HEIGHT	CHART #'S	GAIN LOSS	CHART FACTR	LEVEL RESLT	TEMP STRT	TEMP END	GAIN LOSS	TEMP FACTR	TEMP RESULT	30 MIN RESULT IN GAL	HOURLY RESULT GAL/HR
11:30	+31"		COMMENCED TESTING									
12:00			-55	.0016	-.0880	.323	.375	+.052	2.626	+.1365	-.2245	
12:30			-60		-.0960	.375	.264	-.111		-.2915	+.1995	-.0250
13:00			-56		-.0896	.264	.193	-.071		-.1864	+.0968	+.2963
13:30			-46		-.0736	.193	.125	-.068		-.1785	+.1049	+.2017
14:00			-57		-.0912	.125	.047	-.078		-.2048	+.1136	+.2185
					RAISED TEST HEIGHT							
15:30	+60"		-70		-.1120	.372	.300	-.072		-.1890	+.0770	
16:00			-85		-.1360	.300	.226	-.074		-.1943	+.0583	+.1353
16:30			-90		-.1440	.226	.158	-.068		-.1785	+.0345	+.0928

RESULTS CERTIFIED TIGHT NO AT TEST HEIGHT OF +31" LOSS RATE (GPH) +2185 (+/-)

TESTED BY _____
DAVE DUPONT

COMMENTS THESE FIGURES WERE COMPILED FROM 6 HOURS OF READINGS EVERY 6 MINUTES. RECOMMEND A RE-TEST DUE TO THE LARGE TEMPERATURE CHANGES

THE DATA FOR THIS TEST MEETS NFPA 329 STANDARDS. THE EQUIPMENT USED TO GENERATE THIS DATA IS ABLE TO DETECT A PRODUCT LOSS AT THE RATE OF 0.05 GALLONS PER HOUR. THIS IS NOT TO BE CONSTRUED AS AN ALLOWABLE LEAK RATE, BUT RATHER AS AN ACCURACY TOLERANCE OF THE TESTING EQUIPMENT WHICH ALLOWS FOR THE MANY VARIABLES INVOLVED. TAT GUARANTEES ONLY THAT THE DATA FOR THIS REPORT MEETS NFPA CRITERIA ON THE DAY OF THIS TEST, TAT MAKES NO WARRANTY OF TANK AND/OR LINE FITNESS NOR DO WE ASSUME RESPONSIBILITY FOR ANY LEAKAGE WHICH MAY HAVE OCCURRED AS A RESULT OF THIS TEST.

TESTING AND TECHNOLOGY
(415) 883-5070

INVOICE # 2537 TEST DATE 8/7/89

COMPANY NAME A.N.R. TRUCKING

TANK ADDRESS 2225 7th STREET OAKLAND

CONTACT NAME RANDY PHONE #

SUB-THROUGH THE SCOTT CO. / JAY GROH PHONE # 834-2333

MAILING ADDRESS 1919 MARKET STREET OAKLAND 94607

TANK INFORMATION

TANK #	ONE
PRODUCT	30W OIL
CAPACITY	6,000
CONSTRUCTION	STEEL
DIAMETER	95"
FILL PIPE	30"
TANK BOTTOM DEPTH	125"/128"
PUMP TYPE	SUCTION
VAPOR RECOVERY	NONE
TANK WATER	0

TEST INFORMATION

TEST EQUIPMENT	HORNER
FULL SYST/TANK ONLY	FULL
DATE/TIME FILLED	8/4
GALLONS TO TOP OFF	50
GROUND WATER DEPTH	10'+
TANK BTM PRESSURE	-

RESULTS

PASS - FAIL	FAIL
LOSS RATE	-.1528 @ 48" -.0402 @ 16"

COMMENTS Results suggest a leak in the piping within 12" of grade.

TESTING AND TECHNOLOGY

TEST REPORT HORNER `EZY CHEK' LEAK DETECTOR

COMPANY A.N.R. TRUCKING DATE 8/7/89 INVOICE 2537 TANK # 1 RE-TEST

PRODUCT 30W OIL CAPACITY 6,000 MEASURED API 29.5 TEMPERATURE 74.2

ADJUSTED API 29 COEF OF EXPANSION .0004315 TEMP SHIFT FACTOR 2.5890

CALIBRATING ROD .05 DIVIDED BY # LINES 30.1 = CHART CALIB FACTOR .0016

OTHER 30 GALLONS ADDED AT 09:00 TO OVERFILL TANK FOR TEST

TIME	TEST HEIGHT	CHART #'S	GAIN LOSS	CHART FACTR	LEVEL RESLT	TEMP STRT	TEMP END	GAIN LOSS	TEMP FACTR	TEMP RESULT	15 MIN RESULT IN GAL	HOURLY RESULT GAL/HR
11:00	+48"	51	24 -27	.0016	-.0432	.461	.452	-.009	2.589	-.0233	-.0199	
11:15		75	46 -29		-.0464	.452	.451	-.001		-.0025	-.0439	
11:30		46	20 -26		-.0416	.451	.449	-.002		-.0050	-.0366	
11:45		60	30 -30		-.0480	.449	.446	-.003		-.0075	-.0405	
12:00		84	61 -23		-.0368	.446	.444	-.002		-.0050	-.0318	-.1528
					LOWERED TEST HEIGHT							
12:45	+16"	80	67 -13		-.0208	.433	.426	-.007		-.0180	-.0028	
13:00		67	53 -14		-.0224	.426	.422	-.004		-.0103	-.0121	
13:15		53	40 -13		-.0208	.422	.417	-.005		-.0129	-.0079	
13:30		40	26 -14		-.0224	.417	.415	-.002		-.0050	-.0174	-.0402

RESULTS CERTIFIED TIGHT NO AT TEST HEIGHT OF +48" LOSS RATE (GPH) -.1528 (+/-)

AT TEST HEIGHT OF +16" LOSS RATE (GPH) -.0402 (+/-)

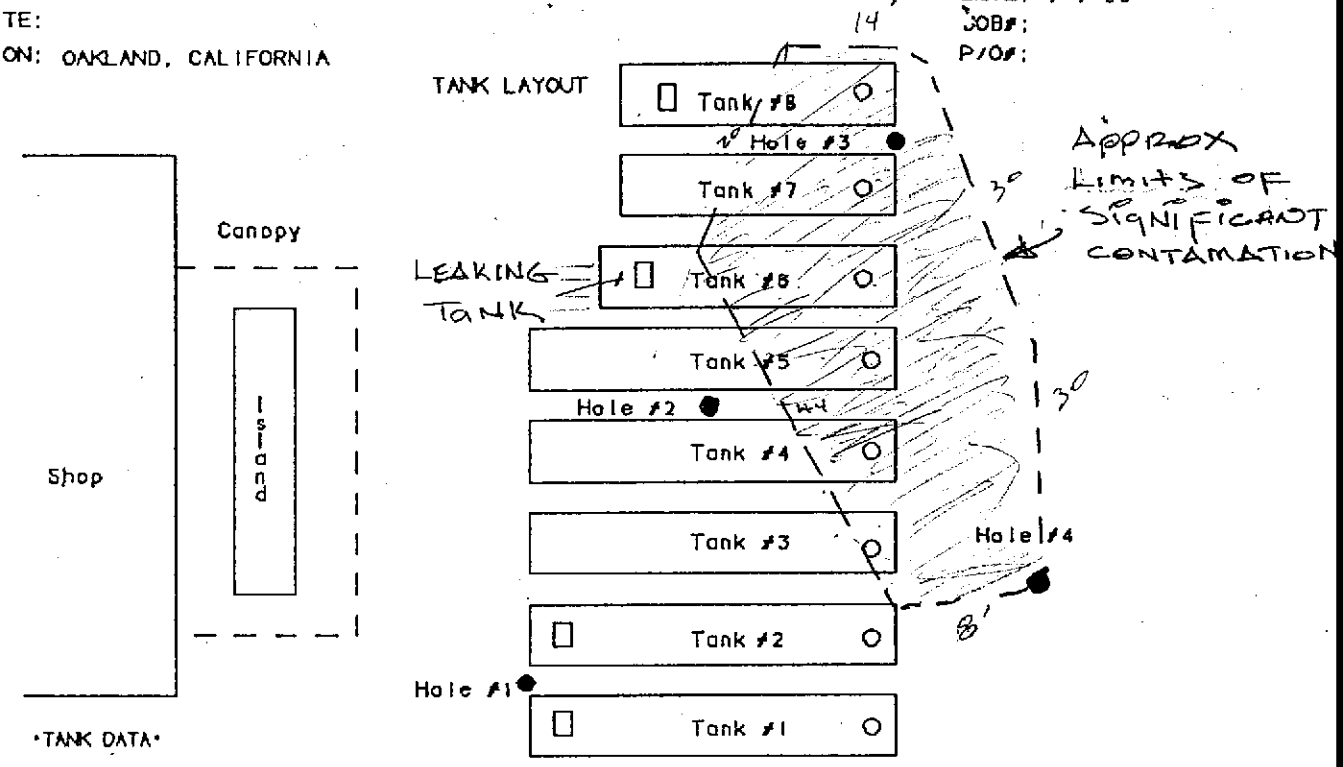
TESTED BY _____
DAVE DUPONT

COMMENTS Results suggest a leak in piping within 12" of grade

THE DATA FOR THIS TEST MEETS NFPA 329 STANDARDS. THE EQUIPMENT USED TO GENERATE THIS DATA IS ABLE TO DETECT A PRODUCT LOSS AT THE RATE OF 0.05 GALLONS PER HOUR. THIS IS NOT TO BE CONSTRUED AS AN ALLOWABLE LEAK RATE, BUT RATHER AS AN ACCURACY TOLERANCE OF THE TESTING EQUIPMENT WHICH ALLOWS FOR THE MANY VARIABLES INVOLVED. TAT GUARANTEES ONLY THAT THE DATA FOR THIS REPORT MEETS NFPA CRITERIA ON THE DAY OF THIS TEST, TAT MAKES NO WARRANTY OF TANK AND/OR LINE FITNESS NOR DO WE ASSUME RESPONSIBILITY FOR ANY LEAKAGE WHICH MAY HAVE OCCURRED AS A RESULT OF THIS TEST.

CUSTOMER: ANR FREIGHT SYSTEMS
SITE:
LOCATION: OAKLAND, CALIFORNIA

DATE: 7-7-89
JOB#:
P/O#:



TANK DATA

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Tank #1	Deisel	20,000 gal	Steel	- .723	Concrete	Red Jacket
Tank #2	Deisel	20,000 gal	Steel	- .537	Concrete	Siphon
Tank #3	Deisel	20,000 gal	Steel	- .623	Concrete	Suction
Tank #4	Deisel	20,000 gal	Steel	- .745	Concrete	Suction
Tank #5	Deisel	20,000 gal	Steel	- .788	Concrete	Suction
Tank #6		10,000 gal	Steel	- .815	Concrete	Suction
Tank #7	Oil	8,000 gal	Steel	- .735	Concrete	Suction
Tank #8	Gasoline	8,000 gal	Steel	- .680		Suction
R1 =		OHMS CM^3 @ 5'				
R2 =		OHMS CM^3 @ 10'				

COMMENTS

RECOMMENDATION

NESCO
NATIONAL ENVIRONMENTAL SERVICE COMPANY
TULSA, OKLA
918 622-4533

METLAB Testing Services, Inc.

6825 East 38th Street Tulsa, Oklahoma 74145
(918) 664-7767

BTEX and TPH

Client: NESCO Metlab No.: 89-5485

Analyst: D. Devasher Date received: 9/29/89

Matrix: Soil Amount used: 4g

Detection Limits are expressed in ug/l ug/kg mg/l mg/kg

Sample I.D.	Benzene	Toluene	Ethyl_Benzene	Xylene	TPH
1-1-16'	0.115	0.118	0.624	0.244	3.449
2-1-15'	0.020	0.036	0.212	0.074	3.030
1-2-5'	<0.001	0.015	0.024	0.161	3.237
2-2-15'	0.059	0.090	0.024	0.636	4.397
1-3-5'	<0.001	<0.001	<0.001	<0.001	1.291
2-3-15'	0.031	0.037	0.039	0.148	0.634
1-4-5'	<0.001	0.013	<0.001	0.019	0.068
2-4-15'	<0.001	0.024	0.024	0.103	0.252

Comments: Location: Oakland, CA #1188

Results reported in parts per million. Testing run by GC/PID

Approved By: Kenneth Hess

Kenneth Hess, Supervisor
Organic Environmental Dept.

METLAB

BTEX and TPH

Client: NESCO Metlab No: 89-3887

Analyst: Ken Hess Date received: 7/7/89

Matrix: soil/water Amount used: 4g/10ml

Detection Limits are expressed in ug/L ug/Kg mg/L mg/Kg

Sample ID	Benzene	Toluene	Ethyl Benzene	Xylenes	TPH
104 Hole #1 10'	0.002	0.035	0.038	0.260	10.453
105 Hole #2 10'	0.048	0.376	0.477	0.570	14.233
106 Hole #3 10'	0.637	0.420	0.243	1.303	13.982
107 Hole #4 4'	<0.001	0.030	0.061	0.300	11.400
108 Hole #4 10'	<0.001	0.002	0.003	0.007	0.176
W17 Hole #1 9.5'	0.025	0.175	0.367	0.542	13.115
W18 Hole #3 13'	1.357	0.470	0.053	1.134	16.113
W19 Hole 34 9'	<0.001	0.198	0.259	0.458	13.418

Comments: ANR Freight - Oakland, CA
Results are parts per million

OAKLAND, CA.

Table 2-1
Leaching Potential Analysis for Gasoline and Diesel
Using Total Petroleum Hydrocarbons(TPH)
and Benzene, Toluene, Xylene and Ethylbenzene (BTX&E)

The following table was designed to permit estimating the concentrations of TPH and BTX&E that can be left in place without threatening ground water. Three levels of TPH and BTX&E concentrations were derived (from modeling) for sites which fall into categories of low, medium or high leaching potential. To use the table, find the appropriate description for each of the features. Score each feature using the weighting system shown at the top of each column. Sum the points for each column and total them. Match the total points to the allowable BTX&E and TPH levels.

SITE FEATURE	SCORE	SCORE 10 PTS IF CONDITION IS MET	SCORE	SCORE 9 PTS IF CONDITION IS MET	SCORE	SCORE 5 PTS IF CONDITION IS MET
Minimum Depth to Ground Water from the Soil Sample (feet)		>100		51-100	0	25-50\1
Fractures in subsurface (applies to foothills or mountain areas)	10	None		Unknown		Present
Average Annual Precipitation (inches)		<10	9	10-25		26-40\2
Man-made conduits which increase vertical migration of leachate	10	None		Unknown		Present
Unique site features: recharge area, coarse soil, nearby wells, etc	10	None		At least one		More than one
COLUMN TOTALS→TOTAL PTS	30	+	9	+	0	= 39
RANGE OF TOTAL POINTS	49pts or more		41 - 48 pts		40pts or less	
MAXIMUM ALLOWABLE B/T/X/E LEVELS (PPM)	1/50/50/50		.3/.3/1/1		NA\3	
MAXIMUM ALLOWABLE TPH LEVELS (PPM) GASOLINE	1000		100		10	
MAXIMUM ALLOWABLE TPH LEVELS (PPM) DIESEL	10000		1000		100	

\1 If depth is greater than 5 ft. and less than 25 ft., score 0points.
If depth is 5 ft. or less, this table should not be used.

\2 If precipitation is over 40 inches, score 0 points.

\3 Levels for BTX&E are not applicable at a TPH concentration of 10ppm (gasoline) or 100ppm (diesel)

TOTAL TANK MANAGEMENT PROFILE INFORMATION SHEET

LOCATION NUMBER OAK

NAME ANR FREIGHT SYSTEMS Pg 1

ADDRESS 2225 7th St.

CITY, STATE, ZIP OAKLAND, CA. 94607

TELEPHONE 415-658-6300 Smokey

NUMBER OF UST's 8 TYPE Steel

	Gals.	Size	Cover	Fill Size	Age	Pump Maker	Leak Detect	Tank/Soil Half Cell	Vent
1.)	20,000	10X35	CONC	4"	1964±	RED JAK	NO	-.723	-.602
2.)	20,000	10X35	CONC	4"	1964	SYPHON	NO	-.537	-.602
3)	20,000	10X35	CONC	4"	1964	SUCT	NO	-.623	-.604
4)	20,000	10X35	CONC	4"	1964	SUCT	NO	-.745	-.605
5)	20,000	10X35	CONC	4"	1964	SUCT	NO	-.766	-.604

PIPING

STEEL ✓ FIBERGLASS _____ UNKNOWN _____

PRESSURE _____ SUCTION ✓ UNKNOWN _____

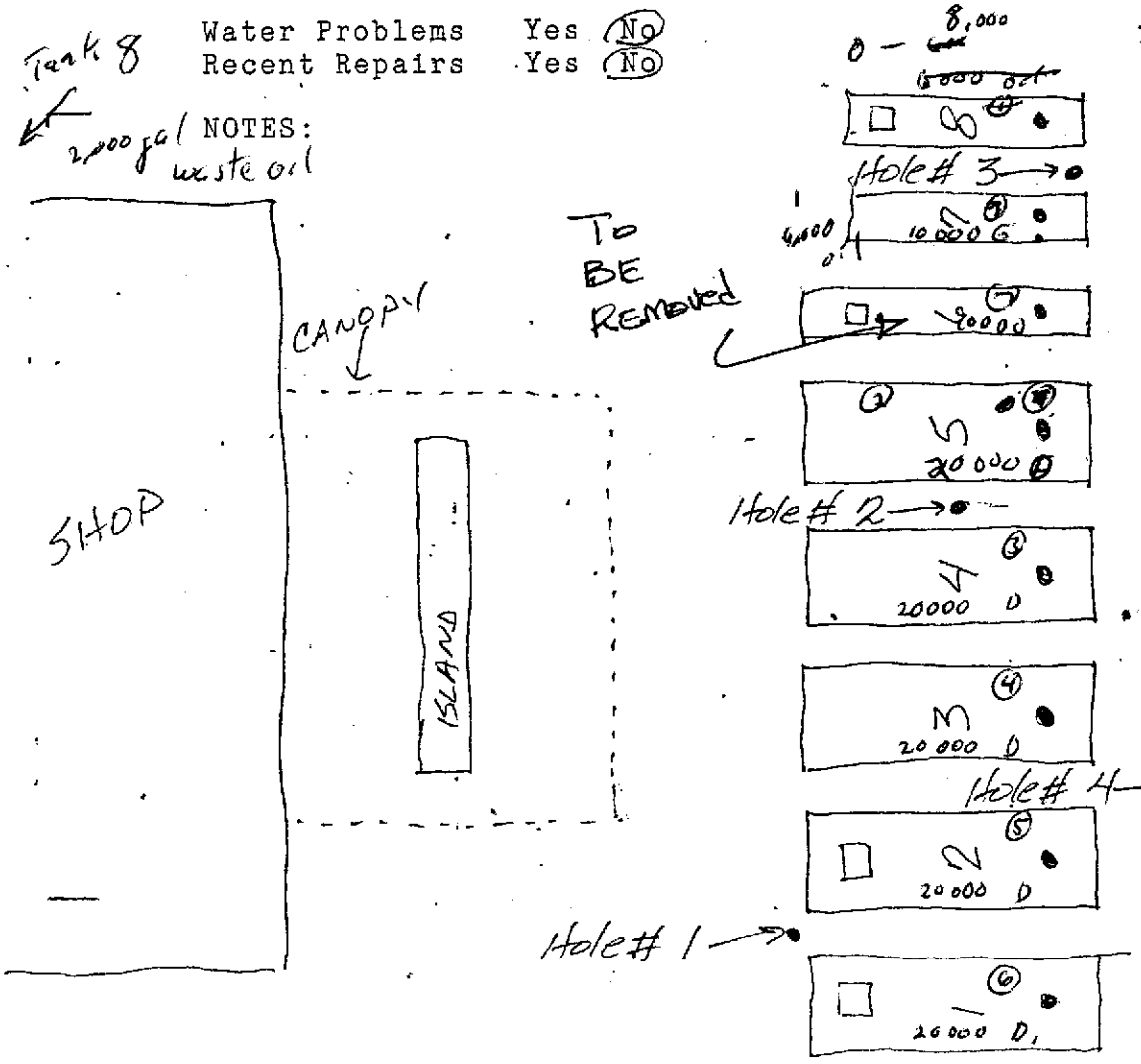
DATE INSTALLED 1964±

Water Problems Yes (No)

Recent Repairs Yes (No)

Tank 8 ← 2,000 gal waste oil

NOTES:



Sample	Hole	Depth
104	1	10'
105	2	10'
106	3	10'
107	4	4'
108	4	10'
W17	1'	9½'
W18	3'	10'
W19	4	9'

Hole	Depth	Reading	Set
1	5	43.5	200k
1	10	4.15	20k
2	5	37.4	200k
2	10	8.35	20k
3	5	18.9	200k
3	10	8.57	20k
4	5	19.45	20k
4	10	9.97	20k

METLAB

BTEX and TPH

Client: NESCO Metlab No: 89-3887

Analyst: Ken Hess Date received: 7/7/89

Matrix: soil/water Amount used: 4g/10ml

Detection Limits are expressed in ug/L ug/Kg mg/L mg/Kg

Sample ID	Benzene	Toluene	Ethyl Benzene	Xylenes	TPH
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W18 Hole #3 13'	1.357	0.470	0.053	1.134	16.113
W19 Hole 34 9'	<0.001	0.198	0.259	0.458	13.418

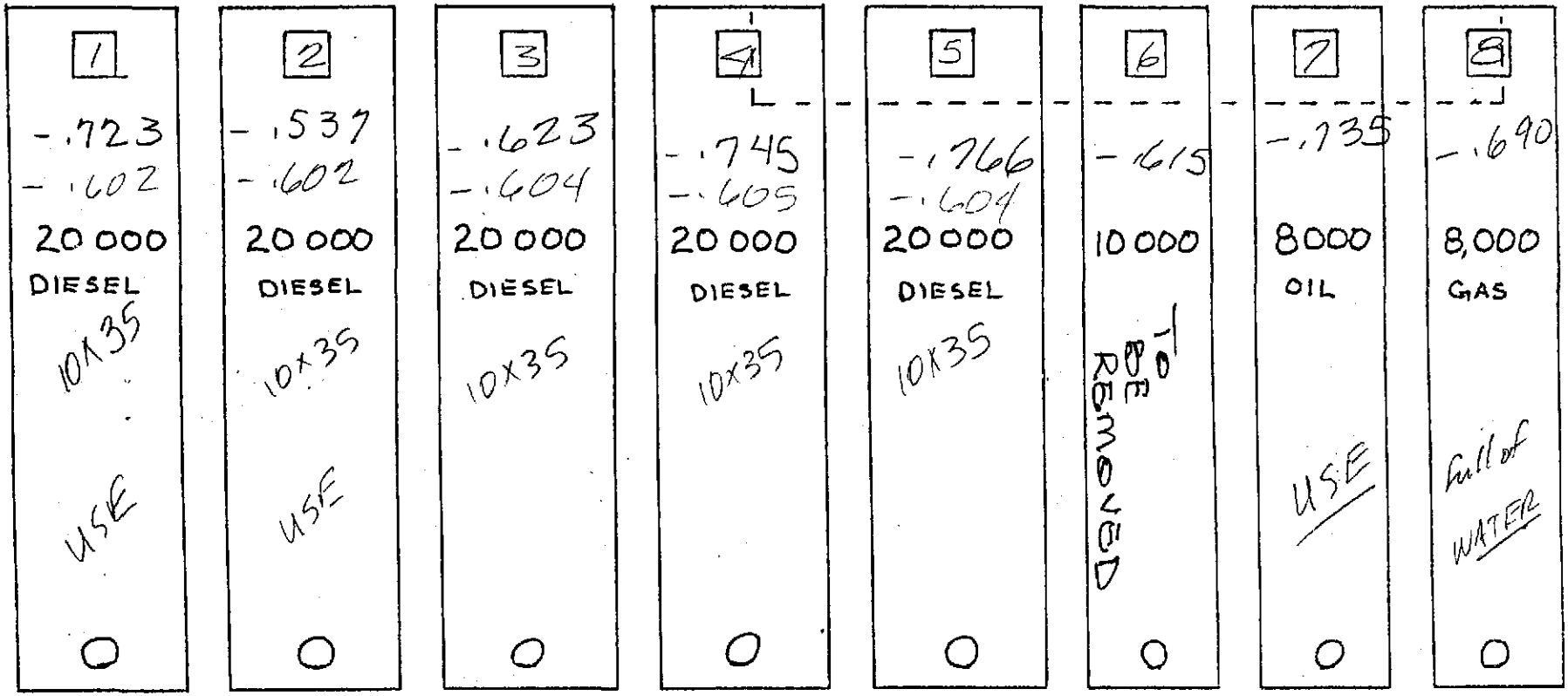
Comments: ANR Freight - Oakland, CA
Results are parts per million

ANR FREIGHT

OAKLAND, Calif.

EXISTING CANAPY

FUEL ISLAND



LOCATION NUMBER 1733

NAME ANR Freight

ADDRESS 2225 7th St.

CITY, STATE, ZIP Oakland CA 94607

TELEPHONE 415 658 6300

NUMBER-OF-UST's 3 TYPE

Gals.	Size	Cover	Fill Size	Age	Pump Maker	Leak Detect	Tank/Soil Half Cell

PIPING

STEEL FIBERGLASS UNKNOWN

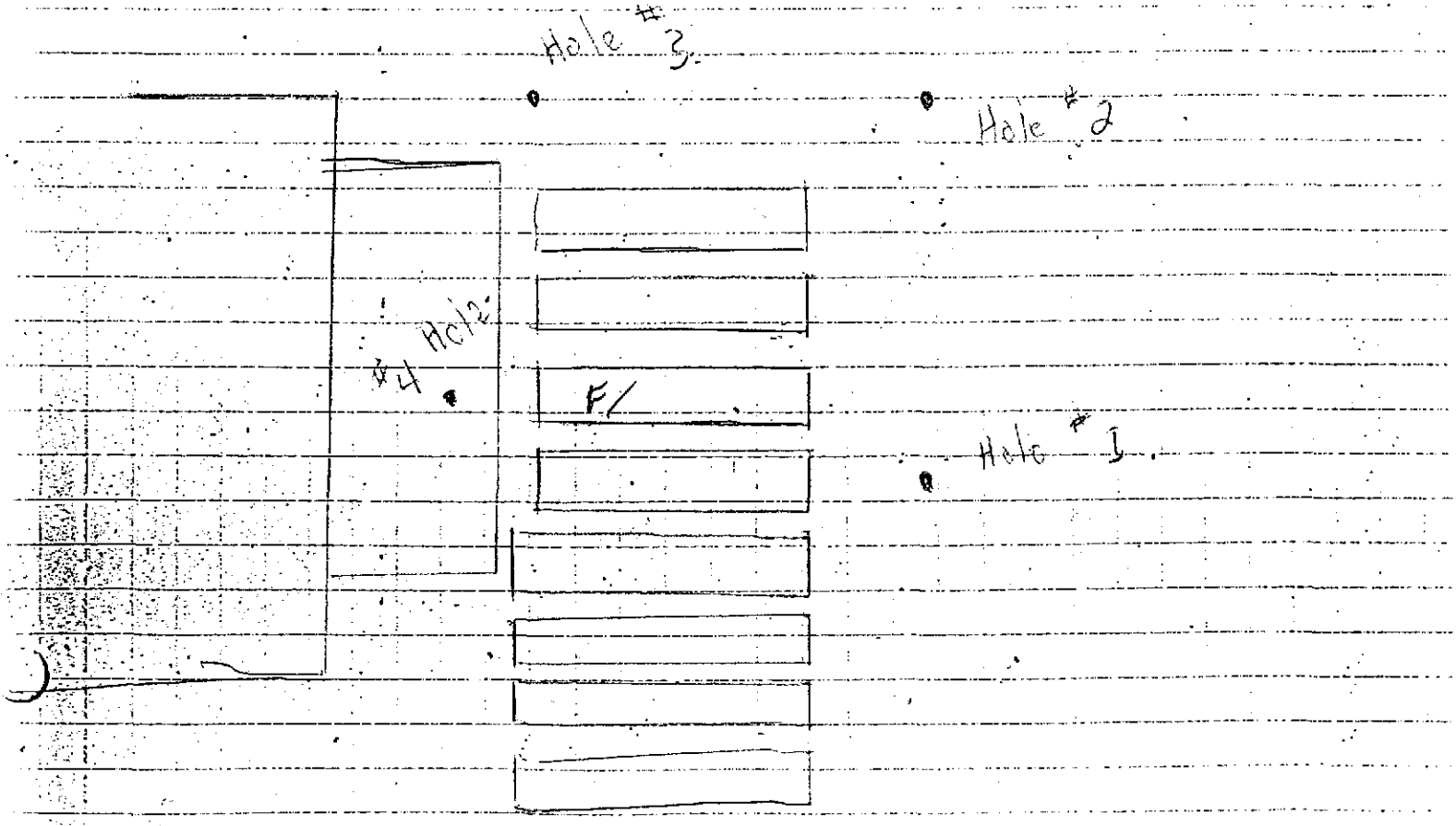
PRESSURE SUCTION UNKNOWN

DATE INSTALLED

Water Problems Yes No

Recent Repairs Yes No

NOTES:



METLAB Testing Services, Inc.

6825 East 38th Street Tulsa, Oklahoma 74145
(918) 664-7767

BTEX and TPH

Client: NESCO Metlab No.: 89-5485

Analyst: D. Devasher Date received: 9/29/89

Matrix: Soil Amount used: 4g

Detection Limits are expressed in ug/l ug/kg mg/l mg/kg

Sample I.D.	Benzene	Toluene	Ethyl_Benzene	Xylene	TPH
1-1-16'	0.115	0.118	0.624	0.244	3.449
2-1-15'	0.020	0.036	0.212	0.074	3.030
1-2-5'	<0.001	0.015	0.024	0.161	3.237
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2-4-15'	<0.001	0.024	0.024	0.103	0.252

Comments: Location: Oakland, CA #1188

Results reported in parts per million. Testing run by GC/PID

Approved By: Kenneth Hess

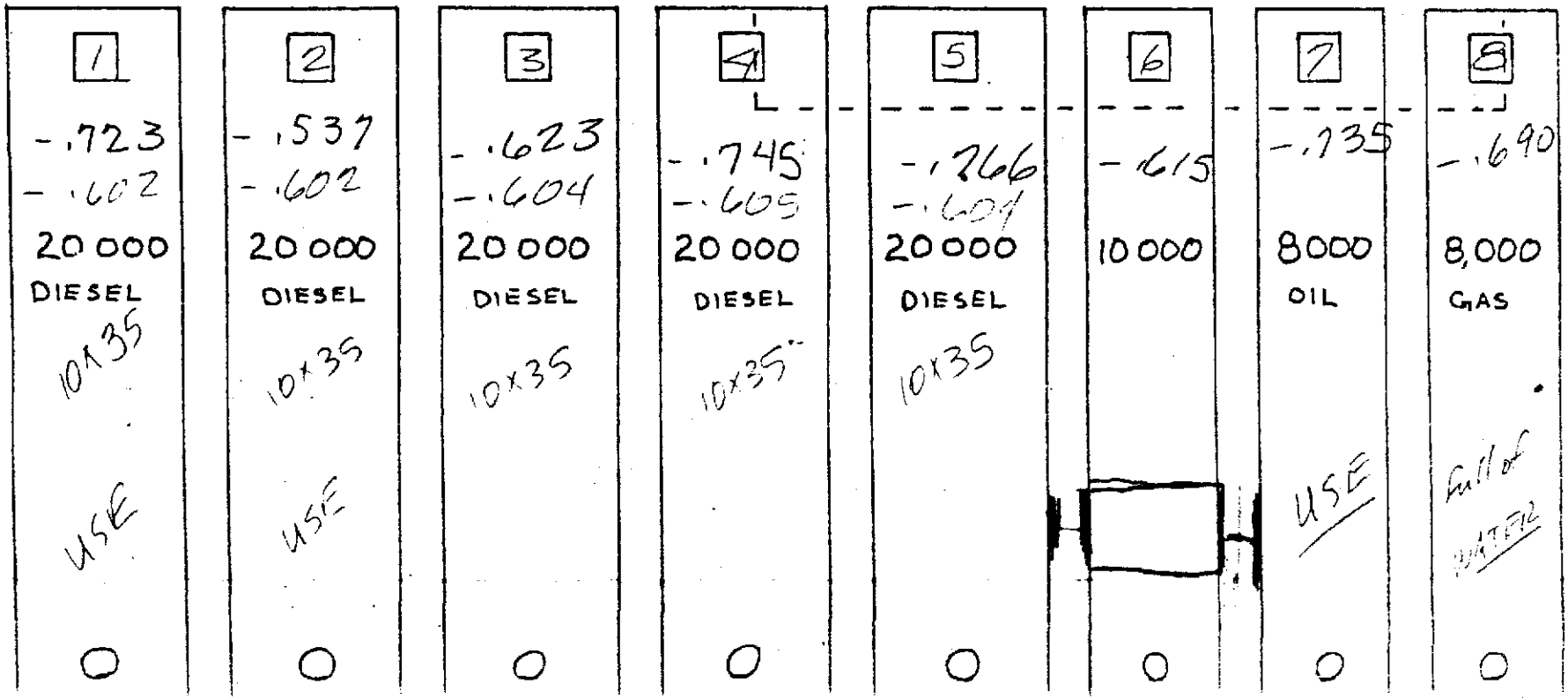
Kenneth Hess, Supervisor
Organic Environmental Dept.

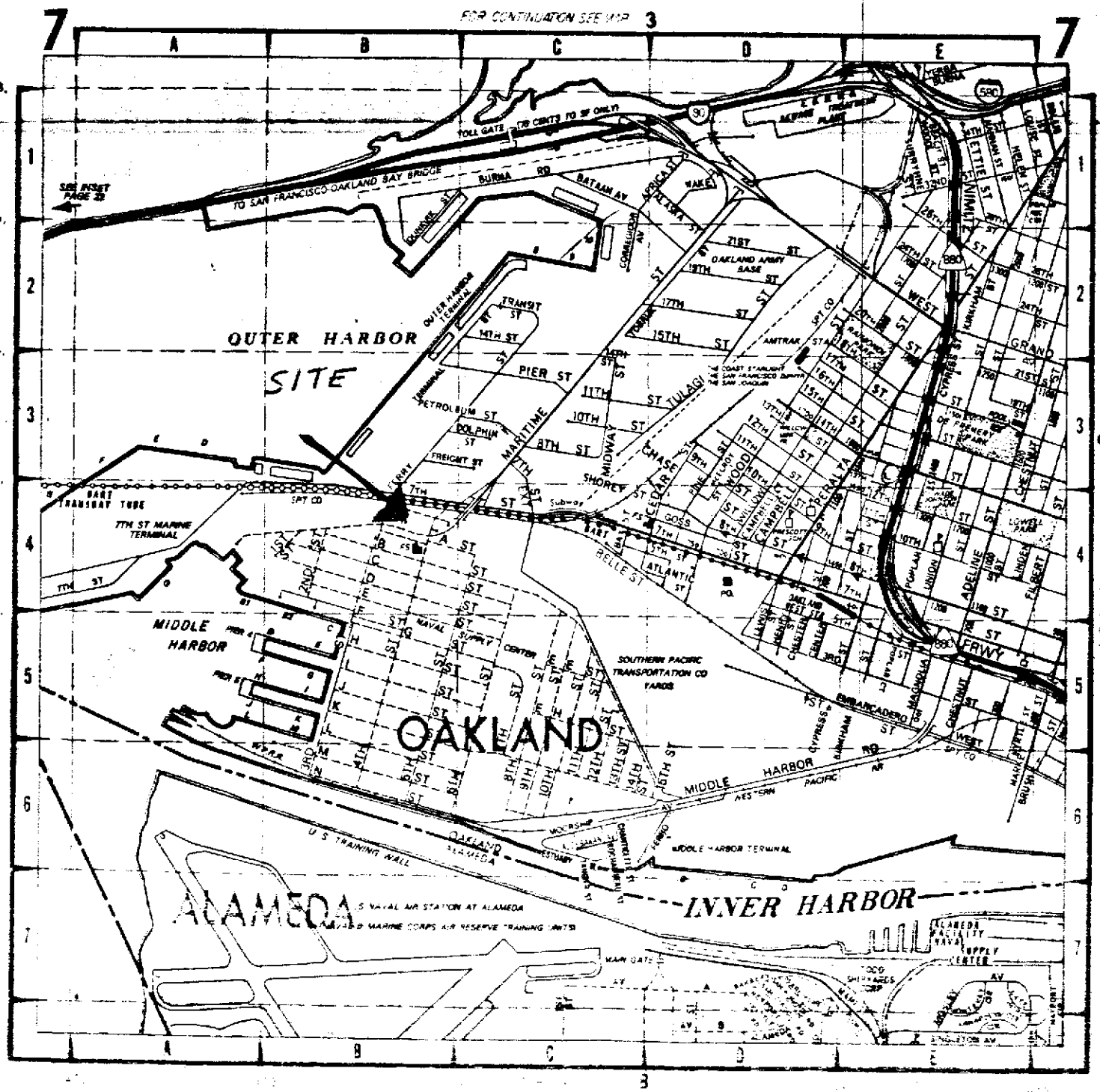
ANIC FREIGHT

OAKLAND, Calif.

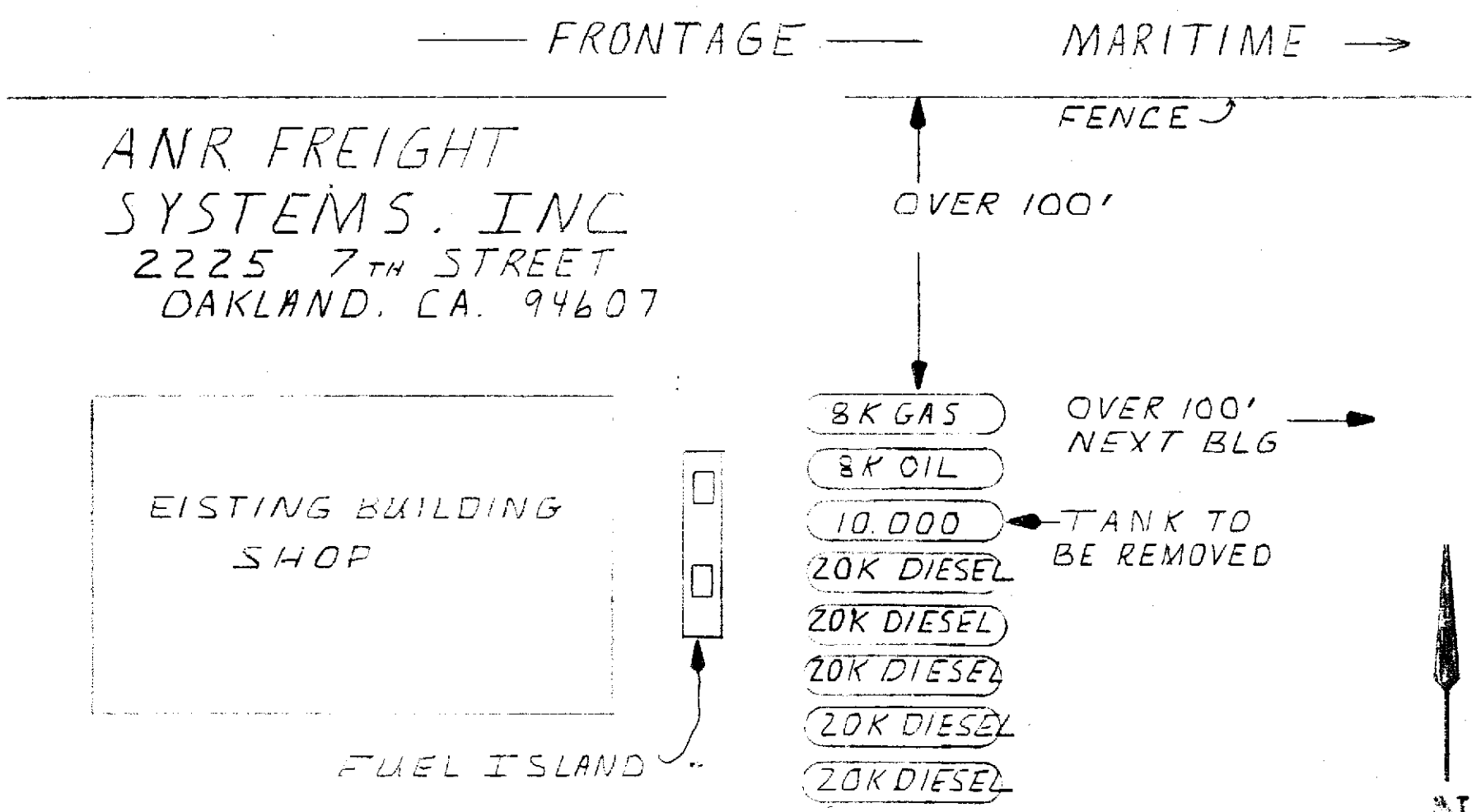
EXISTING CANAPY

FUEL ISLAND





BART - RAILROAD - 7TH STREET



SECTION 07140

FLUID APPLIED WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Provide fluid applied membrane waterproofing system, with cant strips, internal corners, and accessories as required for complete watertight installation at decks.

1.2 SYSTEM DESCRIPTION

A. Design Requirements: Manufacturer's representative shall be responsible for providing review of Project requirements and ensuring products provided for Project are suitable for application indicated.

1. Application: Intent is to have fluid applied waterproofing system applied over compacted subgrade with no mud slab. Manufacturer's representative may recommend system with fluid applied waterproofing or combination of materials.

B. Performance Requirements: System shall be capable of preventing both water intrusion from beneath concrete slab-on-grade and capable of preventing underground toxic gases from passing into building.

1.3 SUBMITTALS

A. Product Data: Furnish manufacturer's literature, recommendations for surface conditioner, flashing, joint cover sheet and crack sealants, and temperature range for application of waterproofing.

B. Shop Drawings: Submit shop drawings for special conditions not covered by manufacturer's product data.

C. Certificates: Submit manufacturer's representative's certification indicating work is appropriate for application indicated and has been installed in accordance with manufacturer's recommendations and installation instructions.

1.4 QUALITY ASSURANCE

A. Qualification of Installer: Minimum five years successful experience in projects of similar scope.

B. Regulatory Requirements: Comply with applicable requirements limiting volatile organic compound (VOC) emissions.

1. Comply with applicable Air Quality Management District limitations for volatile organic compound (VOC) emissions.

1.5 PROJECT CONDITIONS

A. Do not apply waterproofing during inclement weather or when air temperature is below 40 degrees F.

B. Do not apply waterproofing to unsuitable surfaces.

1.6 WARRANTY

A. Special Warranty: Provide for correcting failures of waterproofing to resist water and toxic gas penetration, except where failures are result of structural failures of building. Hairline cracking of concrete due to temperature or shrinkage is not considered structural failure.

1. Repair waterproofing and pay for or replace damaged materials and surfaces.

2. Special Warranty Period: Two years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. LBI Technologies, Inc./Liquid Boot.

B. American Hydrotech, Inc./MM6125, Standard Unreinforced Assembly.

C. Grace Construction Products/Procor over Preprufe 300.

D. Substitutions: Refer to Division 1.

2.2 MATERIALS

A. Fluid Applied Waterproofing System: One part, bitumen modified polyurethane fluid applied elastomeric waterproofing membrane system with accessory materials as recommended by manufacturer's representative for specific application.

1. Geotextile Substrate: Provide non-woven geotextile recommended by manufacturer for application of fluid applied waterproofing directly to compacted fill without mud slab where recommended by manufacturer's representative.

2. Reinforcing: Apply where part of specified system based on manufacturer recommendations for specific application.

3. Sheet Membrane: Provide sheet membrane waterproofing set on compacted fill as substrate for fluid applied waterproofing where manufacturer's fluid applied waterproofing is not suitable for application using other methods.

B. Protection Board: Provide protection board where recommended by waterproofing manufacturer for application indicated.

C. Accessories: Provide materials compatible with membrane compound and as recommended by waterproofing manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ensure drains, sleeves, curbs and projections which pass through waterproofing are properly and rigidly installed.

B. Ensure compacted subsoil surfaces are free of projections which may be detrimental to proper installation of waterproofing; repair surfaces as required by manufacturer's recommendations.

C. Clean surfaces of foreign matter detrimental to proper installation of waterproofing.

D. Metal Surfaces: Remove contaminants which may adversely affect adhesion or performance of waterproofing; apply metal primer.

E. Use drop cloths or masking to protect adjacent surfaces.

3.2 APPLICATION

A. Apply waterproofing system including accessories in accordance with manufacturer's recommendations and installation instructions and in accordance with manufacturer's representative's specific recommendations for this Project.

B. Apply and spread waterproofing to thickness recommended by manufacturer for type of application involved.

1. Minimum Total Thickness: Provide thickness recommended by manufacturer's representative for this specific Project, but in no case shall waterproofing membrane be less than 80 mil dry film thickness.

C. Seal items projecting through waterproofing.

D. After complete installation, close off area to prevent unauthorized traffic and to prevent other work over waterproofing other than that required to pour cast-in-place concrete.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Manufacturer's representative shall inspect work of Project on regular basis and provide certification waterproofing has been installed in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 07141

FLUID APPLIED GAS VAPOR BARRIER SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Provide fluid applied gas vapor barrier membrane system with accessories as required for complete gas tight vapor barrier installation.

1. Provide gas vapor barrier providing protection from following gases.

a. Methane.
b. Other hydrocarbon vapors in concentrations up to 20,000ppm.
c. Hydrogen Sulfide.
d. Radon.

1.2 SYSTEM DESCRIPTION

A. Design Requirements: Manufacturer's representative shall be responsible for providing review of Project requirements and ensuring products provided for Project are suitable for application indicated.

1. Application: Intent is to have fluid applied gas vapor barrier system applied over compacted subgrade with no mud slab.

B. Performance Requirements: System shall be capable of preventing underground toxic gases from beneath concrete slab-on-grade from passing into building.

1. Hydrogen Sulfide Gas Permeability: None detected, ASTM D1343.

2. Benzene, Toulene, Ehtylene, Xylene, Gasoline, Hexane, Perchloroethylene: Passed in gas permeability and weight change, ASTM D543, D412, and D1434, tested at 20,000 ppm).

3. Sodium Sulfate (2% water solution): Passed in gas permeability and weight change, ASTM D543, D412, and D143.

4. Radon Permeability: Zero permeability to Radon (222 Rn), tested by US Department of energy.

5. Bonded Seam Strength Test: Passed, ASTM D6392.

6. Micro Organism Resistance (Soil Burial): Passed, ASTM D4068-88, average weight change, average tensile strength change, average tensile stress change, average elongation change, bonded seams, methane permeability.

7. Methane Permeability: Passed, ASTM 1434-82.

8. Oil Resistance Test: Passed, ASTM D543-87, average weight change, average tensile strength change, average tensile stress change, average elongation change, bonded seams, methane permeability.

9. Heat Aging: Passed, ASTM D4068-88, average tensile strength change, average tensile stress change, average elongation change, bonded seams.

10. Dead Load Seam Strength: Passed, City of Los Angeles test.

11. Environmental Stress-Cracking: Passed, ASTM D1693-78.

1.3 SUBMITTALS

A. Product Data: Furnish manufacturer's literature, installation recommendations specific for this Project, and temperature range for application of materials.

B. Shop Drawings: Submit shop drawings for special conditions not covered by manufacturer's product data.

C. Samples: Submit samples of membrane, protection materials, drainage mat, geotextiles

D. Certificates: Submit manufacturer's representative's certification indicating work is appropriate for application indicated and has been installed in accordance with manufacturer's recommendations and installation instructions.

1. Installer Training and Approval: Submit certification indicating installer has been trained by manufacturer and is approved by manufacturer for application of materials for this Project.

1.4 QUALITY ASSURANCE

A. Qualification of Installer: Minimum five years successful experience in projects of similar scope, trained and approved by system manufacturer.

B. Regulatory Requirements: Comply with applicable requirements limiting volatile organic compound (VOC) emissions.

1. Comply with applicable Air Quality Management District limitations for volatile organic compound (VOC) emissions.

C. Pre-Installation Meeting: Convene one week prior to commencing work; require attendance of parties directly affecting underlayment.

1. Review substrate, installation conditions, procedures, and coordination required with related work.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in original unbroken packages bearing manufacturer's label showing brand, weight, volume, and batch number.

B. Store materials at site in strict compliance with manufacturer's recommendations.

1.6 PROJECT CONDITIONS

A. Protect adjacent areas not to receive membrane system. Where necessary apply masking to prevent staining of surfaces to remain exposed where membrane abuts other finish surfaces.

B. Perform work when existing and forecasted weather conditions are within manufacturer's recommendations.

C. Minimum Clearance Required for Application: Comply with manufacturer recommendations, minimum 2 feet for 90 degree spray wand, 4 feet for conventional spray wand.

D. Do not apply membrane system during inclement weather or when air temperature is below 32 degrees F.

E. Do not apply membrane system to unsuitable surfaces.

F. Plumbing, electrical, mechanical, and structural items under and passing through membrane system shall be positively secured in proper position and protected prior to membrane application.

G. Install membrane system before installation of cast-in-place concrete reinforcing steel unless otherwise approved by manufacturer's representative at pre-installation meeting.

1.7 WARRANTY

A. Special Warranty: Provide for correcting failures of gas vapor barrier system to resist toxic gas penetration, except where failures are result of structural failures of building. Hairline cracking of concrete due to temperature or shrinkage is not considered structural failure.

1. Special Warranty Period: Two years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. LBI Technologies, Inc. (714.384.0111)/Liquid Boot.

B. Substitutions: Not permitted.

2.2 MATERIALS

A. Fluid Applied Gas Vapor Barrier Membrane System: LBI/Liquid Boot high build polymer modified asphaltic emulsion, water borne, fluid (spray) applied elastomeric membrane system membrane system with accessory materials as recommended by manufacturer's representative for specific application.

1. Applied Membrane Thickness: Provide for minimum 60 dry mil thickness.

2. Accelerated Weathering and Ultraviolet Exposure: No adverse effect after 500 hours, ASTM D822.

3. Elongation: 1,332% without reinforcement, 90% recovery, ASTM D412.

4. Tensile Strength: 58 psi without reinforcement, ASTM D412.

5. Puncture Resistance with 8 oz. non-Woven Geotextile both Sides: 286 lbs, ASTM D4833.

B. Prefabricated Drainage Mat: Liquid Boot UltraDrain 6200, for vertical surfaces.

C. Geotextile Substrate: Typar 3401/3631, or 3801 non-woven geotextile as recommended by system manufacturer for application of fluid applied membrane system directly to compacted fill without mud slab.

D. Gas Vapor Vent Piping: Liquid Boot GeoVent System.

E. Protection: Provide protection as recommended by membrane system manufacturer for application indicated.

1. Horizontal Surfaces: Liquid Boot UltraShield P-105 unless otherwise recommended by system manufacturer for application indicated.

2. Vertical Surfaces: Liquid Boot UltraShield P-100 unless otherwise recommended by system manufacturer for application indicated.

F. Accessories: Provide materials compatible with membrane compound and as recommended by membrane system manufacturer.

1. Adhesive System: Provide Liquid Boot UltraGrip for Liquid Boot UltraShield and Liquid Boot UtraDrain.

2. Cold Joints, Cracks, Form Tie Holes: Cover with Hardcast CRT 1602 Tape, 3" wide, unless otherwise recommended by system manufacturer for application indicated.

PART 3 - EXECUTION

3.1 PREPARATION

A. Comply with manufacturer recommendations for preparation of surfaces to receive membrane system.

B. Ensure drains, sleeves, curbs and projections which pass through membrane system are properly and rigidly installed.

C. Immediately prior to beginning application, not more than 24 hours, ensure compacted subsoil surfaces are free of projections that could be detrimental to proper installation of membrane system; repair surfaces as required by manufacturer's recommendations.

D. Clean surfaces of foreign matter detrimental to proper installation of membrane system.

E. Metal Surfaces: Remove contaminants which may adversely affect adhesion or performance of membrane system; apply metal primer.

F. Use drop cloths or masking to protect adjacent surfaces.

G. Ensure sub-grade is properly compacted to not less than 90% dry density and is moisture conditioned in accordance with manufacturer recommendations.

H. Ensure sub-grade is free of standing water.

I. Remove stones and dirt clods greater than 1/4".

J. Ensure form stakes that penetrate membrane system are rebar bend over and are to be left in slab.

K. Ensure trenches are cut oversize to accommodate membrane system and protection course with perpendicular to sloped sides and maximum obtainable compaction.

L. Ensure adjoining grades are finish graded and compacted.

M. Ensure excavated walls are free of roots and protruding rocks.

3.2 APPLICATION

A. Apply membrane system system including accessories in accordance with manufacturer's recommendations and installation instructions and in accordance with manufacturer's representative's specific recommendations for this Project.

1. Roll out geotextile on sub-grade with heat-rolled side facing up. Overlap seams minimum six inches. Lay geotextile tight at inside corners. Apply 10 mil tack coat of membrane "A" side without catalyst within seam overlap.

2. Line trenches with geotextile extending at least 6" onto adjoining sub-grade if slab and footings are sprayed separately. Overlap seams minimum 6". Lay geotextile tight at inside corners. Apply 10 mil tack coat of membrane "A" side without catalyst within seam overlap.

3. Minimize use of nails to secure geotextile to dirt subgrade. Remove nails before spraying membrane if possible. Nails that cannot be removed from dirt subgrade are to be patched with geotextile or Hardcast reinforcing tape overlapping nail head by minimum 2". Apply thin coat of membrane under geotextile patch when patching with geotextile.

4. Seal around penetrations in accordance with manufacturer recommendations.

B. Spray apply membrane system to minimum 60 mil dry film thickness as recommended by manufacturer for type of application involved.

1. Minimum Total Thickness: Provide thickness recommended by manufacturer's representative for this specific Project, but in no case shall membrane system membrane be less than 60 mil dry film thickness.

2. Increase thickness to 100 mil dry film thickness if shotcrete is applied directly to membrane.

3. Remove standing water from membrane before proceeding with second coat If second coat is required.

4. After membrane has cured and been checked for proper thickness and flaws, install protection material in accordance with manufacturer recommdnations.

C. Seal items projecting through membrane system.

1. Clean metal penetrations by sanding with emery cloth.

2. Cut geotextile around penetrations so geotextile lays flat on sub-grade.

3. Spray apply membrane to 60 mil dry film thickness around penetration, completely encapsulating collar assembly to minimum 1-1/2" above membrane.

4. Allow to cure prior to application of membrane.

5. Wrap penetration with polypropylene cable tie at 2" above base of penetration. Tighten cable tie firmly so as to squeeze but not cut cured membrane collar.

D. After complete installation, close off area to prevent unauthorized traffic and to prevent other work over membrane system other than that required to pour cast-in-place concrete.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Manufacturer's representative shall inspect work of Project on regular basis and provide certification membrane system has been installed in accordance with manufacturer's recommendations.

1. Inspect for dry film thickness, holes, shadow shrinkage, and other damage.

2. Where dry film thickness is questionable, cut samples 2" square and measure with mil-reading caliper, per 500 square feet.

3. Repair test areas in accordance with manufacturer recommendations; extend test patch minimum 3" beyond hole.

3.4 PROTECTION

A. Do not penetrate membrane.

B. Keep membrane free of dirt, debris, and traffic until protective cover is in place.

END OF SECTION