Environmental Services, Inc.

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WORK PLAN
WELL INSTALLATION
ARROYO SCHOOL SITE
SAN LORENZO, CALIFORNIA

7/92

L&W Project 5186
July 24, 1992

Prepared for
San Lorenzo Unified School District
15510 Usher Street
San Lorenzo, CA

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WORK PLAN

Introduction

This Work Plan describes the work to be carried out in installing a downgradient groundwater monitoring well at the Arroyo School Site in San Lorenzo California. The Arroyo School Site is the location of where a leaking underground fuel oil tank was removed. There are now three groundwater monitoring wells which were installed in order to assess any impact on the groundwater below the site. Groundwater gradients calculations over the last year have indicated that there are no monitoring wells in a down gradient direction from the removed tank.

The July 9, 1992 letter from the Alameda County Health Care Services Agency requires the installation of the downgradient well as well as addressing the further delineation and remediation of the soil contamination. In order to comply with the TRI-Regional Board Staff Recommendations for the Preliminary Evaluation and Investigation of Leaking Underground Tank Sites the downgradient well will be established as described in this work plan.

Site Information

The school facility operated a 6000 gallon underground fuel oil tank as part of its heating system. A decision was made to remove the tank and on January 3, 1991 the tank was excavated and removed in accordance with local and state requirements. Soil samples were collected from the excavation under direction of Alameda County personnel. Analysis of these samples and visual evidence indicated a high concentration of diesel contamination in the soil.

During removal of the tank backfill it was discovered that the diesel fuel had spread beyond the backfill limits and a course of soil and groundwater exploration was recommended and carried out and presented in our report dated February 16, 1991.

The following summarizes site-related work done to date:

01/03/91 6000 gallon fuel tank removed.
01/16/91 Borings 1 through 6 drilled.
01/25/91 Borings 7 through 11 drilled.
01/28/91 Borings 12 through 13 drilled.
01/31/91 Monitoring wells MW 1 through MW 3 installed.
02/07/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
03/15/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
04/16/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
07/15/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
10/15/91 Monitoring wells MW 1 through MW 3 monitored and sampled.
01/03/92 Monitoring wells MW 1 through MW 3 monitored and sampled.
04/14/92 Monitoring wells MW 1 through MW 3 monitored and sampled.

Site Description
The area investigated is at the Arroyo School located at 15701 Lorenzo Avenue, San Lorenzo, California. The site investigated is an essentially level paved area with only minimal slope to provide surface drainage. Figure 1 in Appendix A is a Vicinity Map showing the location of Arroyo School in relation to the nearby streets. The tank which was removed was located between the maintenance boiler room portion of the building and temporary class rooms. This general location is in the approximate middle of the school complex.

Facility Map
The attached Figure 2 shows the tank location, the locations of the all boring done to date and the three groundwater monitoring wells installed in January 1991 as well as other significant features on the site.

Soil Conditions
The generalized soil profile at the site could be summarized as several feet of FILL overlying silty CLAY which extended to the depths explored. The fill was typically a brown gravelly sand SILT to a sandy silty GRAVEL, field identified in the Unified Soil Classification System as ML or GM. This material is typical a coarse grained soil with gravels varying up to several inches in dimension. Sand and silt contents varied. The underlying clays were classified as CL and are cohesive, fine grained soils which generally exhibit lower porosities and permeabilities than ML soils.

PROPOSED WORK

Well Installation
One downgradient groundwater monitoring well will be constructed at the site at the proposed location shown on Figure 3 attached. The proposed location is downgradient of the original tank location and is in the only position that can be reached by normal drilling equipment. The boiler room and various underground utilities dictate the final location of the proposed monitoring well. The proposed location is in the approximate center of the range of the groundwater gradient which have been determined for the last year.

The boring for the monitoring well will be drilled with eight inch diameter hollow stem augers to about ten feet below the first encountered groundwater. The total drilling depth should be between 20 and 25 feet below ground surface. Soil samples will be taken from the boring at five foot intervals to the groundwater table and retained for analyses. Upon completion of drilling and sampling, the boring will be converted to a two inch diameter groundwater monitoring wells.

After drilling to the required depth, the well will be installed within the hollow stem auger. The sand filter pack will be placed down the hollow stem auger as the auger is withdrawn. A sanitary seal consisting of pre-wetted bentonite pellets and neat cement grout will then be installed to within about one foot of the ground surface. Typical details of the proposed well installation along with type of materials to be used are shown on Figure 4, attached.

After development and a 72 hour stabilization period, the well will be monitored for groundwater elevations and free product and a water sample will be taken from the well using local and state protocols.

The three original wells were monitored during July 1992. After the initial monitoring of the downgradient well, the four wells will then be monitored and sampled on a quarterly basis to continue to evaluate the impact to the groundwater below the site.

Soil Borings

Three soil boring will be drilled and sampled on the same day as the well installation. The exact number will depend on drilling efficiency and actual conditions. The borings will be drilled with 8 inch hollow stem augers and the data will be used to further delineate the spread of soil contamination. The proposed boring locations are shown on Figure 3 attached. Each boring will be drilled down to the groundwater table with soil samples taken at 5 foot intervals.

Sampling and Laboratory Analyses

All sampling will be done in accordance with the attached Sampling Protocol. All soil and groundwater samples taken during the work will be analyzed in a California Certified Laboratory for:

Total Petroleum Hydrocarbons as Diesel (TPH-D),
Purgeable Hydrocarbons Benzene, Toluene, Ethylbenzene, Xylenes (BTEX),
Total Oil and Grease (TOG),

Schedule

Work will begin as soon as possible after approval of this Work Plan is received and well drilling and installation permits are received from Zone 7 of the Alameda County Flood Control and Water Conservation District. It is anticipated that the drilling program and construction of the well will be complete within two weeks of notification of approval.

Report Preparation

After the after all field work is finished and analytical data is received, a Quarterly Report will be published detailing the installation, and all analytical results. The report will contain the methodologies used in drilling, sampling

and laboratory procedures. Appropriate drawings and illustrations showing the spread of any contaminants in the soil and groundwater as well as a calculated groundwater gradient. Laboratory certificates of all analytical results with accompanying Chain-of-Custody documentation will be included as well as the DWR Water Well Drillers reports. Copies if the report will be forwarded to the Hazardous Materials Division of the Department of Environmental Health of the Alameda County Health Care Services Agency and the California Regional Water Quality Control Board, San Francisco Bay Region.

The report will contain our conclusions and recommendations addressing the site conditions and future exploration and remedial tasks which should lead to site closure.

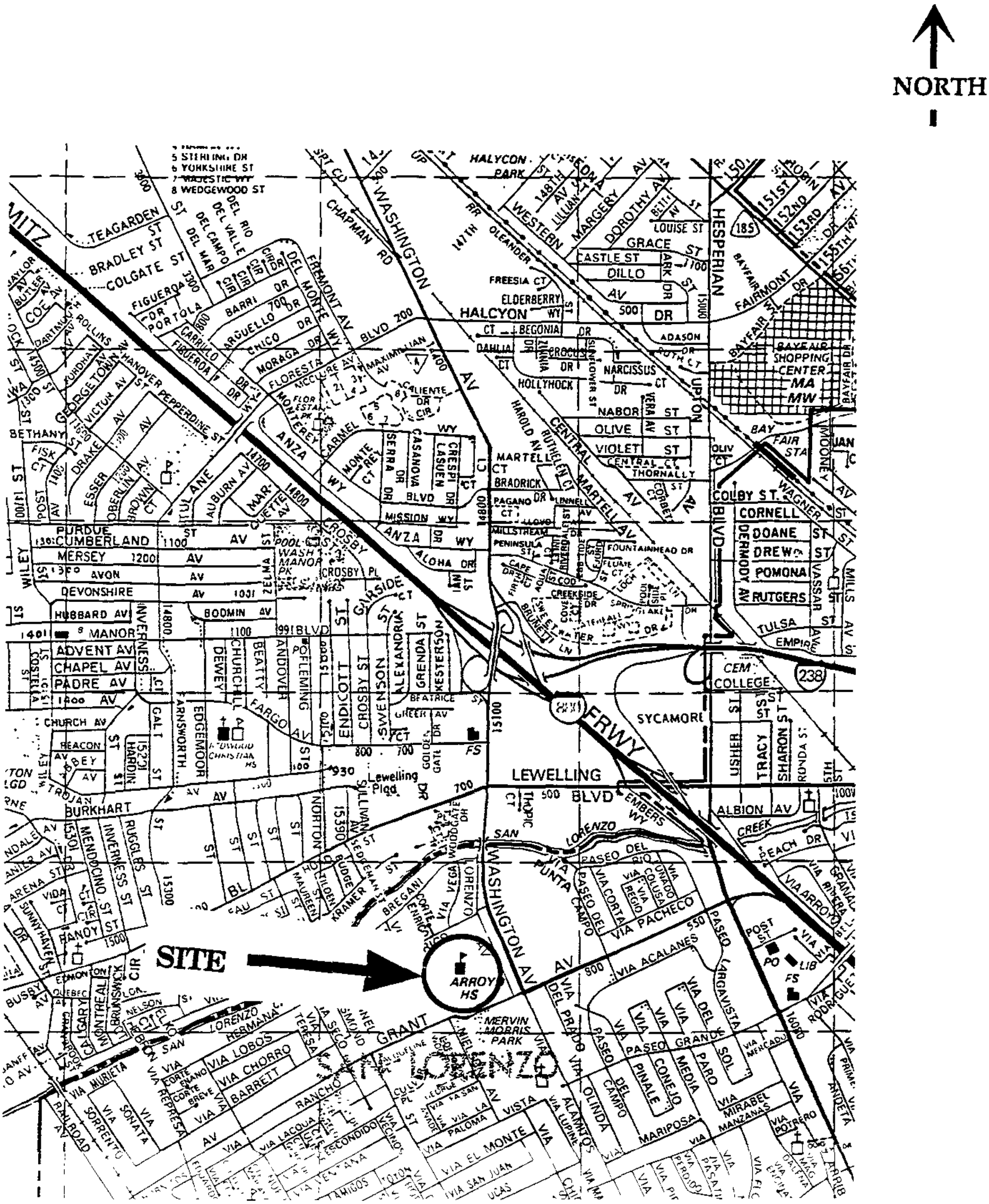
Waste Management

All soil cutting generated during drilling operations will be contained either in DOT drums or on plastic sheeting within a secure area on the site until analyses are complete. If the results indicate that the soil is classified as hazardous waste, it will be disposed of at a proper facility. Purge water generated during well development and water sampling episodes will be contained in drums until the analytical results are available and proper disposal methods are indicated.

ATTACHMENTS
Figures 1 through 4
Sampling Protocol

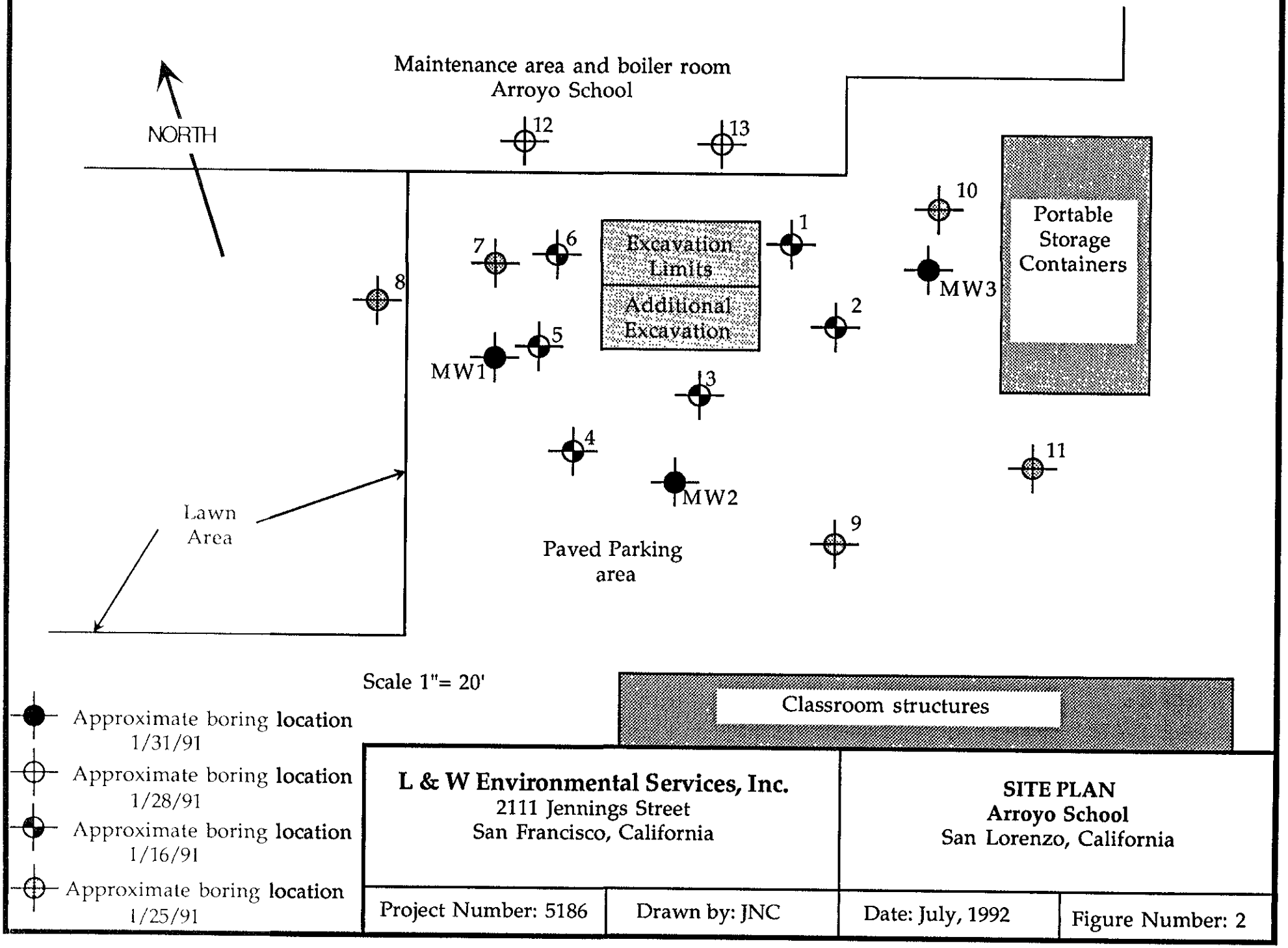
WORK PLAN
WELL INSTALLATION
ARROYO SCHOOL SITE
SAN LORENZO, CALIFORNIA

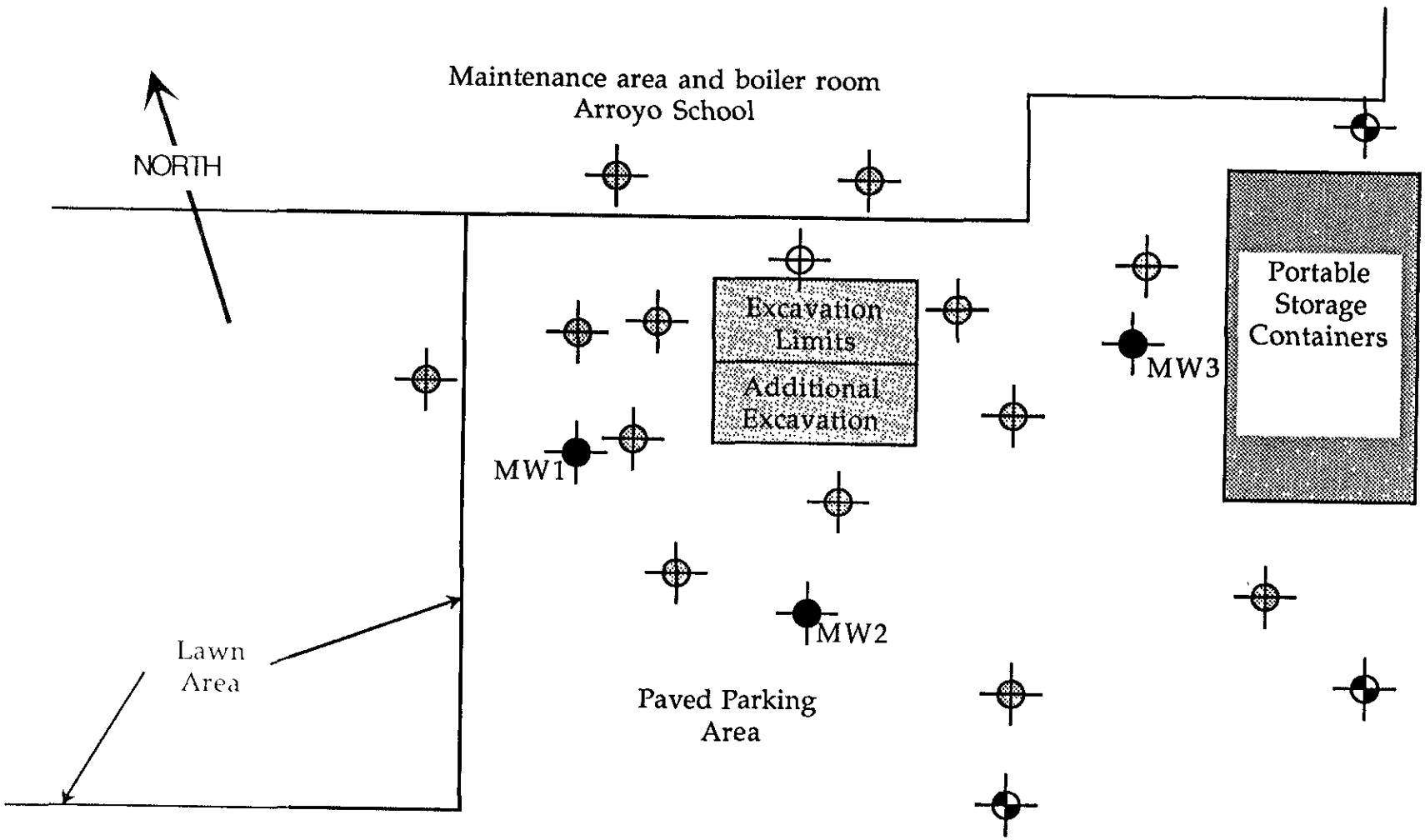
L&W Project 5186
July 24, 1992



L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California	Vicinity Map Arroyo High School San Lorenzo, California

Project Number: 5186	Drawn by: JNC	Date: July, 1992	Figure Number: 1


Maintenance area and boiler room
Arroyo School
NORTH
12
13
10
Portable
Storage
Containers
Excavation
Limits
Additional
Excavation
1
7
6
8
MW3
2
5
MW1
3
4
11
MW2
Lawn
Area
Paved Parking
area
9
Scale 1"= 20'
Classroom structures
Approximate boring location
1/31/91
Approximate boring location
1/28/91
Approximate boring location
1/16/91
Approximate boring location
1/25/91
L & W Environmental Services, Inc.
2111 Jennings Street
San Francisco, California
SITE PLAN
Arroyo School
San Lorenzo, California
Project Number: 5186
Drawn by: JNC
Date: July, 1992
Figure Number: 2



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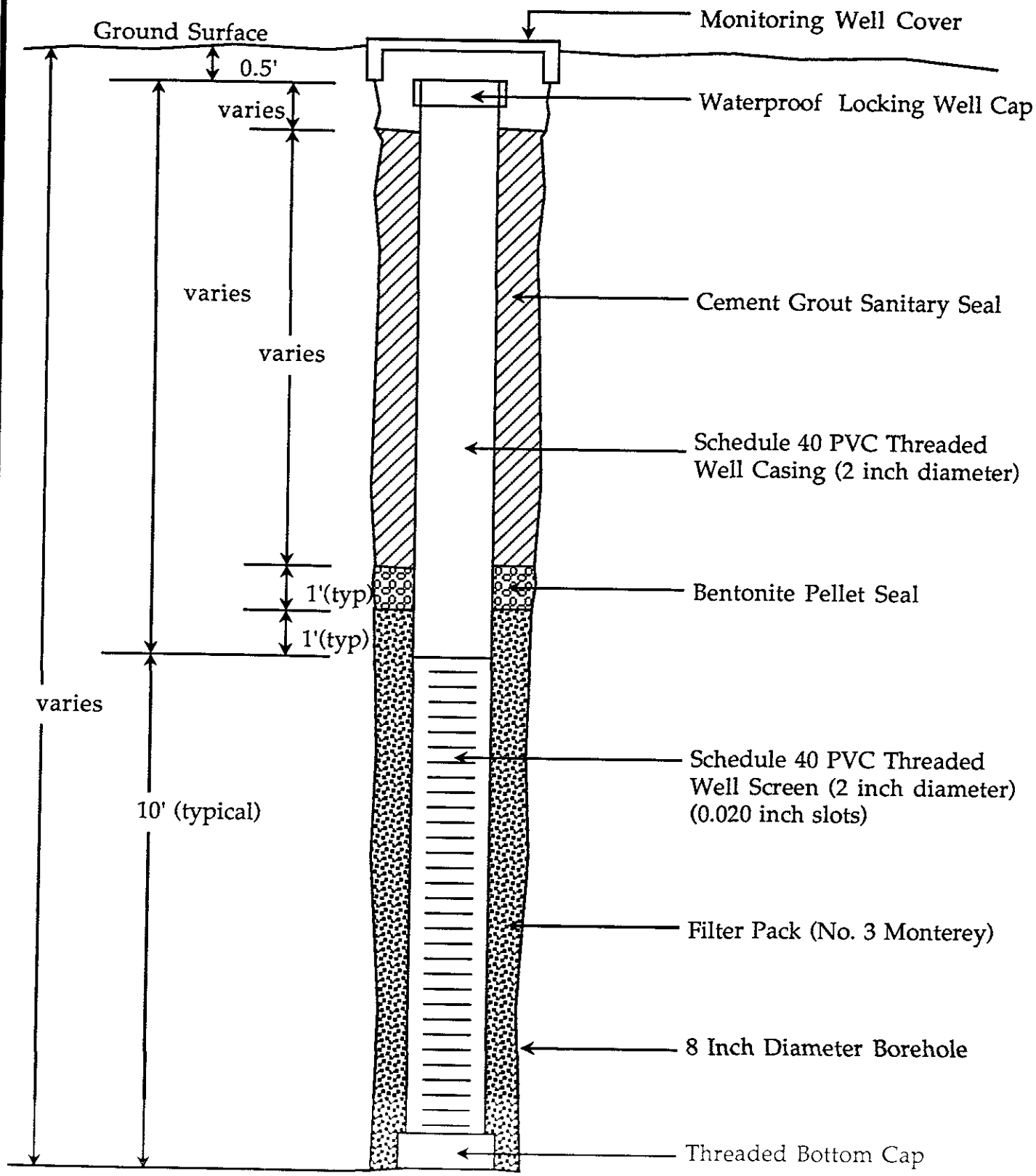
2111 Jennings Street
San Francisco, California

PROPOSED DRILLING LOCATIONS
Arroyo School
San Lorenzo, California

Project Number: 5186	Drawn by: JNC	Date: July, 1992	Figure Number: 3



L & W Environmental Services, Inc. 2111 Jennings Street San Francisco, California	Monitoring Well Installation Detail	Project Number 5186
	Arroyo School San Lorenzo, California	Date: July, 1992
		Figure Number 4

L&W Environmental Services Inc.
SAMPLING PROTOCOL

Soil Sampling From Excavation
The following guidelines should be followed when sampling from any excavation during tank removal or during various remediation procedures.

Soil samples shall be collected in decontaminated thin wall brass or stainless steel tubes that measure at least three inches long and one inch in diameter. The tubes shall be filled in such a manner as to allow no headspace in the tube after sampling. The manner of filling the tubes will vary according to actual site conditions and consistencies of the soil. The preferred method of filling is to drive the tube into the exposed soil with a mallet or a specifically designed hammer driver. The method of driving shall be such as not to damage the tube. If the soil cannot be sampled directly from its natural state because of the depth of the excavation, the presence of water or other reasons, a backhoe may obtain a bucket of soil from the area to be sampled. The tube may then be driven into the soil in the backhoe bucket as described above.

When the sample is collected, each end of the tube should be covered with aluminum foil or teflon sheets, capped with a lid, taped, labeled and immediately placed in a refrigerated environment. The label shall include the job name and number, a unique cross reference number and the date and time of sampling. Care should be taken throughout to avoid contamination of both the inside and outside of the tube and its contents. Samples should be collected as soon as possible after the soil is exposed. After collecting, the sample data should be entered on a Chain-of-Custody form.

Soil Sampling From Drill Holes
In all circumstances possible, soil samples from drill holes shall be obtained with a split barrel sampler containing decontaminated thin wall brass or stainless steel tubes. Actual tubes dimensions will depend on the sampler type but should measure at least three inches long and one inch in diameter. The sampler should be driven or hydraulically pressed into undisturbed beyond the augers. A full tube should be selected from the split barrel sampler. If no full tubes are available, cuttings from other partially filled tubes may be used to eliminate any headspace. In instances where a sample of the cuttings is desired, the cuttings shall be placed in a decontaminated thin wall brass or stainless steel tube using a decontaminated instrument or with methods as described in the "Soil Sampling From Excavation" section. After the sample is collected, each end of the tube should be covered with aluminum foil or teflon sheets, capped with a lid, taped, labeled and immediately placed in a refrigerated environment. The label shall include the job name and number, a unique cross reference number and the date and time of sampling. Care should be taken throughout to avoid contamination of both the inside and outside of the tube and its contents. Samples should be

collected as soon as possible after the soil is exposed. After collecting, the sample data should be entered on a Chain-of-Custody form.

Water Sampling from Excavations

Water samples taken from open excavations shall be obtained by filling an appropriate container directly from the water which collects in the excavation. If direct access is not available, a decontaminated teflon or disposable bailer shall be used to obtain the sample and transfer it to appropriate containers. Types of appropriate containers and amounts of sample are dependent on the analyses required. Information regarding types and amounts of samples are available from the laboratory or the project manager and shall be obtained before sampling.

The containers must be filled in such a manner so that no head space is present after the container is capped. The headspace can be checked by inverting the container after it is capped and observing the contents for bubbles. Sometimes it is not possible to collect a sample without air bubbles, particularly if the water is aerated. In these cases, the sampler should record the problem and account for probable error. Cooling samples may also produce headspace but this will disappear once the sample is warmed for analysis.

After the sample is collected and capped, it should be labeled and immediately placed in a refrigerated environment. The label shall include the job name and number, a unique cross reference number and the date and time of sampling. Care should be taken throughout to avoid contamination of both the inside and outside of the container and its contents. After collecting, the sample data should be entered on a Chain-of-Custody form.

Water Sampling from Monitoring Wells

Sampling from monitoring wells involves purging and sampling with a more complicated sampling protocol. The protocol for monitoring well sampling is contained in a separate document.

Decontamination and Cleaning

It is very important that all collection equipment be decontaminated before collecting a sample. Equipment must be cleaned upon arrival at the project site and between each sampling episode to insure that there is no cross contamination between samples or that there is no introduction of contamination into previously clean areas.