FINAL WORKPLAN

GROUNDWATER MONITORING WELL INSTALLATION AND GROUNDWATER MONITORING

MTA DIVISION 6
100 SUNSET AVENUE
VENICE, CALIFORNIA
LARWQCB FILE NO. 902910152
CONTRACT NO. ENO68-CWO-12

Prepared for:

Los Angeles County Metropolitan Transportation Authority
One Gateway Plaza
Los Angeles, California

MTA Project No. 200026
Task No. ~~10.02.01~~
Cost Center 8510

April 17, 2001

Prepared by:

URS

2020 East First Street, Suite 400
Santa Ana, California 92705
URS Project No. 57-0007056.01

Under Contract With:

Harding ESE
A MACTEC Company
2171 Campus Drive Suite 100
Irvine, California 92612

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WORKPLAN
GROUNDWATER MONITORING WELL INSTALLATION AND GROUNDWATER MONITORING
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY DIVISION 6

100 SUNSET AVENUE
VENICE, CALIFORNIA
LARWQCB FILE NO. 902910152
CONTRACT NO. ENO68 CWO-12

APRIL 17, 2001

PROJECT NO. 57-00070056.01

This workplan addresses work activities to be conducted for the soil and groundwater investigation at the Los Angeles County Metropolitan Transportation Authority Division 6. This workplan was prepared in general accordance with the scope of work described in MTA Contract ENO68, CWO-12 Metro Bus Division 6 Phase II Site Assessment executed on December 21, 2000 and additional requirements specified by the Los Angeles Regional Water Quality Control Board in their letter to MTA dated February 15, 2001. URS Corporation is under contract with Harding ESE and is a team subcontractor for the Los Angeles County Metropolitan Transportation Authority under contract ENO68 CWO-12 for environmental engineering services.

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Senior Environmental Manager

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URS Corporation (URS) is under contract with Harding ESE and is a team subcontractor for the Los Angeles County Metropolitan Transportation Authority (MTA) under contract EN068 CWO-12 for environmental engineering services. URS is retained to perform a soil and groundwater investigation at the MTA Division 16 passenger bus maintenance facility (the site) in Venice, California. The site location is illustrated on Figure 1.

The proposed activities shall be conducted in response to the Los Angeles Regional Water Quality Control Board (LARWQCB) letter "Underground Storage Tank Program-Division 6, Bus Terminal" dated February 15, 2001. The work described in this workplan has been based on the results of previous site investigations and UST removals conducted between February 1998 and the present.

1.1 BACKGROUND

The MTA Division 6 facility is located at 100 Sunset Avenue in Venice, California at the southeast corner of the intersection of Sunset Avenue and Main Street. The site location is illustrated in Figure 1. The surrounding area is primarily commercial and residential. The surface elevation of the site is approximately 27 feet above mean sea level (msl).

The site operates as a passenger bus fueling and maintenance yard. Until February 28, 1998, the northern portion of the site contained four single-walled steel underground storage tanks (USTs); (two 10,000-gallon diesel, one 8,000-gallon motor oil, and one 6,000-gallon gasoline) used for fueling buses. The USTs were removed on February 23, 1998 and replaced with four dual-wall fiberglass USTs (two 20,300-gallon diesel, one 8,000-gallon motor oil, and one 6,000-gallon gasoline). Results of previous subsurface investigation work at the site indicate that soil and groundwater has been impacted with petroleum hydrocarbons and methyl tertiary butyl ether (MTBE).

1.2 SUMMARY OF PREVIOUS SITE INVESTIGATIONS

Previous environmental site assessments and soil investigations were performed at the MTA Division 6 Bus Yard. A summary of the findings is presented below.

1.2.1 Bentley Company

In January 1996, MTA contracted Bentley Company to perform soil and groundwater sampling at 16 locations near the USTs at the northern portion of the site. The purpose of the investigation was to determine if petroleum hydrocarbons had been released to the subsurface.

Concentrations of gasoline range total petroleum hydrocarbons (TPH-g) were detected in soil from the subsurface as high as 1,690 milligrams per kilogram (mg/kg). Benzene was detected in groundwater at a maximum concentration of 0.083 milligrams per liter (mg/L).

1.2.2 Holquin, Fahan and Associates, Inc.

In July 1997, Holguin, Fahan and Associates, Inc. (HFA) performed an additional groundwater investigation. Groundwater samples were collected, via hydropunch, at five locations near the fuel USTs. Groundwater samples had detectable concentrations of TPH-g which ranged from not detected above laboratory limits up to 160,000 micrograms per liter (µg/L). Concentrations of benzene were also detected and ranged from 0.5 to 2,900 µg/L. MTBE was also detected and ranged from non-detect to 27,000 µg/L.

1.2.3 The Tyree Organization, Ltd.

In 1998, The Tyree Organization, Ltd. (Tyree) was contracted by MTA to remove and replace eight USTs at the site. On February 23, 1998, two 10,000-gallon diesel USTs, one 8,000-gallon motor oil UST, and one 6,000 gallon gasoline UST were removed from the northern portion of the site. On March 18, 1998, two 300-gallon diesel USTs and one 2,000-gallon used oil LUST were removed from the site. On June 30, 1998, a 500-gallon used oil UST was removed from the site.

At the northern UST portion of the site, soil samples were collected approximately 2 feet below each UST under the supervision of the Los Angeles County Fire Department (LACFD) inspector. Soil samples collected below the diesel tanks were analyzed for diesel range total petroleum hydrocarbons (TPH-d) and benzene, toluene, ethylbenzene and xylenes (BTEX). Soil samples collected below the gasoline tank were analyzed for TPH-g, BTEX, and MTBE. The soil samples collected below the oil tanks were analyzed for total recoverable petroleum hydrocarbons (TRPH) and BTEX. According to the Tyree UST removal report, the majority of the soil samples collected were also analyzed for lead.

Laboratory analysis of the soil samples collected from beneath the USTs at the northern portion of the site detected measurable concentrations of TPH-d, TPH-g, TRPH, toluene, ethylbenzene,

xylenes, MTBE, and total lead. TPH-d was detected at the southern ends of the 10,000-gallon diesel tanks at concentrations of 1,740 mg/kg and 5,000 mg/kg. TPH-g was detected in soil samples collected below the gasoline tank at concentrations of 16.3 mg/kg (southern end) and 1,390 mg/kg (northern end). TRPH concentrations of 472 mg/kg (southern end) and 23,600 mg/kg (northern end) were detected in the two samples collected below the 8,000-gallon motor oil UST.

Benzene was not detected in any of the soil samples collected below the USTs. Five of the soil samples collected below the USTs contained detectable concentrations of toluene, ethylbenzene, and xylene components. MTBE was detected in four soil samples collected ranging from 0.492 mg/kg to 46.8 mg/kg.

Total lead concentrations ranging from 45.8 mg/kg to 302 mg/kg were detected in soil samples obtained from beneath the USTs at the northern portion of the site.

1.2.4 URS Corporation

In August 1999 URS Corporation installed four 4-inch diameter groundwater monitoring wells and collected soil samples for laboratory analysis. Soil samples were analyzed for TPH-g, TPH-d, and MTBE.

Soil types encountered beneath the site included sandy fill material containing debris, sandy silty clay, poorly graded silty sand, and well graded gravelly sand. First groundwater beneath the site was encountered at approximately 23 feet below ground surface (bgs) during well installation activities.

Detectable concentrations of TPH-g and TPH-d were identified in the upper 10 feet at borings MW-1 and MW-2, both located on the east side of the USTs between the USTs and pump island. Concentrations ranged from 930 to 2,500 mg/kg for TPH-d and from non-detect to 790 mg/kg for TPH-g. Concentrations of TPH-g and TPH-d were not detected above the laboratory detection limits from depths of 15 to 23 feet bgs. Benzene, toluene, and ethylbenzene were not detected in soil above laboratory detection limits. Xylene was detected in the soil samples collected from 10 feet bgs in borings MW-1 and MW-3 at concentrations of 940 and 6.4 µg/kg, respectively.

MTBE was identified in soil samples collected from MW-1 and MW-4 at concentrations ranging from non-detect to 9.5 µg/kg in MW2 and from non-detect to 32 µg/kg in MW-1. URS concluded that the vertical and lateral extent of TPH and BTEX impacted soil generally appeared to be limited to the UST area and depths less than approximately 10 feet bgs. However, the

lateral extent of impacted soil was considered to be incompletely defined north and east of boring MW-1. MTBE concentrations in boring location MW-1 were identified at depths from 10 feet bgs to the capillary zone at approximately 23 feet bgs.

1.3 PREVIOUS GROUNDWATER MONITORING AND SAMPLING

Groundwater monitoring and sampling of monitoring wells MW-1, MW-2, MW-3, and MW-4 was conducted during seven events from August 12, 1988 to April 7, 2001. During the most recent groundwater sampling event conducted on April 7, 2001, depth to groundwater at the site ranged from 22.54 feet bgs in well MW-4 to 24.36 feet bgs in MW-2. Groundwater elevations ranged from 3.30 feet above mean sea level (msl) in MW-1 to 3.42 feet in well MW-4. The interpreted groundwater gradient, relatively flat across the site, is approximately 0.0001 ft/ft to the east-northeast with only 0.12 feet elevation difference between MW-1 and MW-4. The apparent groundwater flow direction is to the east-northeast. No free product has been encountered in the monitoring wells during water level measuring. Groundwater monitoring, sample dates and elevation data are summarized in Table 1. The interpreted groundwater potentiometric surface contours are illustrated on Figure 2 (URS, April 2001).

Concentrations of TRPH, TPH-g, TPH-d, BTEX, and/or MTBE have been detected in the four monitoring wells during the previous sampling rounds. Historical groundwater sample analytical results are summarized in Table 2 (URS, April 2001).

1.4 OBJECTIVES

The objective of the investigation described in this work plan is to:

- Investigate subsurface soil and groundwater conditions to further assess the lateral and vertical extent of the petroleum hydrocarbons and related fuel constituents identified in previous subsurface investigations.

1.5 SCOPE OF WORK

URS proposes the following scope of work to meet the objective of this investigation:

- Perform tasks necessary to initiate the field investigation and groundwater monitoring well installation, including preparing a site-specific Health and Safety Plan, conducting a geophysical survey to clear soil boring locations, obtaining all necessary permits, and establishing a traffic control plan.
- Advance three soil borings, to 40 or 45 feet below ground surface. One boring will be advanced on the MTA Division 6 site to 45 feet below ground surface, and two will be

advanced offsite in the downgradient direction to approximately 40 feet bgs. Soil will be collected at approximately five-feet intervals and analyzed to assess the vertical and lateral extent of petroleum hydrocarbons and related fuel constituents in soil.

- Install and develop three groundwater monitoring wells in the soil borings.
- Survey the new groundwater monitoring wells to a benchmark of known elevation.
- Prepare a report describing the field activities and results of the laboratory analyses.
- Conduct ongoing quarterly groundwater monitoring of the four existing and three new groundwater monitoring wells (i.e. seven monitoring wells).

The following sections describe the proposed scope of work and associated protocols and methodologies.

2.1 SITE DESCRIPTION

The MTA Division 6 facility is located at 100 Sunset Avenue in Venice, California at the southeast corner of the intersection of Sunset Avenue and Main Street. The site location is illustrated in Figure 1. The surrounding area is primarily commercial and residential. The surface elevation of the site is approximately 27 feet above mean sea level (msl).

The site operates as a passenger bus fueling and maintenance yard. Until February 28, 1998, the northern portion of the site contained four single-walled steel USTs (two 10,000-gallon diesel, one 8,000-gallon motor oil, and one 6,000-gallon gasoline) used for fueling buses. The USTs were removed on February 23, 1998 and replaced with four dual-wall fiberglass USTs (two 20,300-gallon diesel, one 8,000-gallon motor oil, and one 6,000-gallon gasoline).

2.2 REGIONAL GEOLOGY AND HYDROGEOLOGY

The site lies within the Ballona Gap region of the Santa Monica Basin. The Ballona gap forms an east-west trending trough that is filled by recent alluvial deposits. The alluvium is composed of interbedded sand, sandy clay, and gravelly sand and has a maximum thickness extending to approximately 50 feet below ground surface (bgs) (CDWR, 1961) in the vicinity of the site. The alluvium is underlain by the San Pedro Formation which is composed of stratified sand with beds of fine gravel, silty sand, and silt (CDWR, 1961).

The site is located in the Santa Monica Groundwater Basin. The aquifers found beneath the site are the Ballona and Silverado Aquifers. The Ballona Aquifer is commonly known as the "50-foot gravel" and is composed of gravel and coarse sand. The stratigraphic thickness of the Ballona Aquifer ranges from approximately 10 feet near the coast to approximately 40 feet near Beverly Hills (CDWR, 1961). In the vicinity of the site, the Ballona Aquifer is encountered at an approximate depth of 30 feet bgs (CDWR, 1961). Beneath the site, the Ballona Aquifer is directly underlain by, and merged with, the Silverado Aquifer. The Silverado Aquifer, composed of sand and gravel with small amounts of clay, ranges in thickness from 100 feet to 280 feet and is found at depths extending to between 420 feet bgs and 450 feet bgs (CDWR, 1961).

2.3 SITE GEOLOGY AND HYDROGEOLOGY

The soil textures at the site range from silty clay to gravelly sand. Five primary soil types were encountered during groundwater well installation activities and are summarized below:

The uppermost soil type encountered at the site is composed predominately of backfill material in the vicinity of the USTs. The backfill material is composed of moist, poorly graded sand in the general area, and pea gravel material in the immediate vicinity of the subsurface UST piping. The sandy backfill material extends from the surface to approximately 8 feet bgs.

The soil types encountered below the fill material included silty clay with sand, fine grained silty sand, medium to coarse grained poorly graded sand, and well graded gravelly sand.

Groundwater beneath the site was encountered approximately 23-25 feet bgs in gravely sand in wells MW-2, MW-3, and MW-4, and in poorly graded sand in well MW-1.

This section presents a discussion of pre-field activities to be conducted prior to beginning field investigation activities described in Section 4.0.

3.1 PRE-FIELD ACTIVITIES

3.1.1 Health and Safety Plan

A site-specific health and safety plan (HASP) will be prepared by URS prior to conducting field activities at the site. The HASP will describe specific health and safety requirements and guidelines for the proposed activities that will meet MTA requirements, and will be used in conjunction with the Illness and Injury Prevention Program (IIPP). In addition, URS employees and subcontractor employees assigned to the project will attend a tailgate safety meeting given by the Site Safety Officer (SSO) each day that field activities are performed.

3.1.2 Underground Utility and Geophysical Survey

Underground Service Alert will be notified at least 48 hours in advance of the proposed drilling activities. In addition, a geophysical survey will be conducted prior to performing subsurface work in order to identify the presence of potential utilities or underground structures. An area within an approximate 10-foot radius around the proposed boring location will be surveyed. Once a proposed boring location is surveyed and cleared of utilities, the location will be remarked to denote clearance for drilling. If utilities are detected within the surveyed area, paint markings will be made on the ground to denote the type of utility detected (e.g., electrical conduits) and the approximate location. In addition, an MTA site representative will also be consulted for identification and location of buried utilities and fuel lines.

3.1.3 Permits

Prior to initiating field activities all applicable permits for conducting the investigation and installing groundwater monitoring wells will be obtained. The permits that will be obtained include:

- A monitoring well installation permit from the Los Angeles County Department of Health Services,
- A street use permit from the Los Angeles Department of Public Works,
- A Drilling permit from the Los Angeles Department of Public Works, and
- A lane closure permit from the Los Angeles Department of Transportation.

3.1.4 Traffic Control

Two of the groundwater monitoring wells will be installed in the public right-of way along Main Street, either in the street or in the sidewalk (Figure 2). A Work Site Traffic Control Plan will be prepared and submitted with supporting documentation to the Los Angeles Department of Transportation. The Work Site Traffic Control Plan will be prepared in accordance with the State of California Work Area Traffic Control Handbook (WATCH Manual). Traffic control will be implemented during the field activities in accordance with the WATCH Manual and the Work Site Traffic Control Plan.

This section presents a discussion of field activities to be conducted for the soil and groundwater investigation. The additional soil borings and groundwater monitoring wells will be installed at locations designed to supplement the site data obtained from the four existing well locations.

4.1 FIELD ACTIVITIES

4.1.1 Soil Borings

A total of 3 soil borings that will be converted to groundwater monitoring wells will be advanced at the site in the locations shown on Figure 2. The soil borings have been located to further investigate the lateral extent of petroleum hydrocarbon impacted soil and groundwater. Two wells will be located offsite, downgradient of existing wells MW-1 and MW-4. One well will be installed cross-gradient from well MW-4. The MTA Division 6 facility is approximately 5 to 6 feet higher than Main Street. Therefore, so that the three new borings are installed to the same elevation relative to mean sea level, the on-site boring will be advanced to 45 feet bgs, and the two off-site borings will be advanced to 40 feet bgs.

Drilling of the borings and well installation will be performed using a hollow stem auger drilling rig (CME-75 or CME-85), with 8-inch outside diameter continuous-flight augers. Prior to drilling, boring locations will be hand augered to approximately 5 feet bgs to verify that there are no underground utilities.

4.1.2 Soil Sampling

Soil samples will be collected at approximately 5-foot intervals and at any significant change in lithology or change in observed contamination identified by the field geologist. Soil borings shall be completed to approximately 40 to 45 feet bgs. The soil samples will be collected using a modified California split-spoon sampler, fitted with three stainless steel liners. The sampler will be driven 18 inches (or to refusal) into undisturbed ground, by repeatedly dropping a 140-pound hammer from 30 inches above the sampler. The number of blows required to drive the sampler each 6 inches will be recorded. Refusal will be defined as requiring 50 hammer blows to advance the sampler 6 inches or less.

Soil from the middle and top stainless steel liners will be placed in a resealable plastic bag for approximately 15 minutes to allow volatile organic compounds (VOCs) in the soil to volatilize. The soil vapor will then be measured by inserting an organic vapor analyzer (OVA) or photoionization detector (PID) probe into the plastic bag. Background VOCs will be measured

prior to each measurement. The organic vapor monitoring results will be recorded on boring logs. The soil samples will be visually examined, described and classified in general accordance with the USCS. Soil descriptions will be recorded on the boring logs with other pertinent drilling notes. The bottom stainless steel liner from each sample interval will be sealed and capped, labeled, and stored in a chilled cooler for delivery to the laboratory.

A Registered Geologist or Professional Engineer experienced in environmental drilling and sampling will perform oversight of the drilling and sampling program. Boring logs will be prepared in accordance with the URS standard format for environmental drilling. At a minimum, boring logs shall contain geologic descriptions (USCS) of soil strata, depth to groundwater, depth to light non-aqueous phase liquid (LNAPL) if present, sample identification numbers, blow counts, and OVA readings for headspace analyses. A Registered Geologist will review boring logs.

During drilling activities, soil cuttings will be shoveled into 55-gallon drums. The drums will be labeled, identifying borings and depth intervals, and properly sealed or secured. MTA will dispose of the soil cuttings, which will be characterized from the borehole soil sample analytical results.

4.1.3 Soil Analysis

Soil samples will be collected from the borings and submitted for laboratory analyses. Soil samples will be analyzed for the following:

- U.S. Environmental Protection Agency (EPA) Method 8260B for VOCs including BTEX, MTBE, di-isopropyl alcohol (DIPE), ethyl tertiary butyl ether (ETBE), tertiary butyl alcohol (TBA), and tertiary amyl methyl ether (TAME),
- EPA Modified Method 8015 for TPH-g and TPH-d,
- EPA Method 418.1 for TRPH,
- EPA Method 8260B for VOCs including BTEX, MTBE, DIPE, ETBE, TBA, and TAME, and
- EPA Method 7241 for Total Lead.

All soil samples for volatile analyses (i.e. gasoline, VOCs) shall be collected using EPA Method 5035 (i.e. Encore™ Sampler) as required by the LARWQCB. The remaining samples to be analyzed for TPH-d, TRPH, and total lead will collected in stainless steel tubes, sealed with Teflon tape, capped with plastic end caps, labeled, stored in a chilled cooler, and submitted in accordance with EPA chain-of-custody field procedures.

4.1.4 Decontamination Procedures

Drill rigs and augers will be decontaminated by steam cleaning at the drilling company's maintenance facility prior to arriving at the site. The drilling company will provide enough clean equipment for each day of drilling and sampling. They will also provide a mobile steam cleaner for field decontamination of augers, and other large equipment used for drilling and/or sampling. Only properly decontaminated equipment approved by URS onsite personnel will be used for drilling and sampling.

The field decontamination process for smaller (non-disposable) soil sampling equipment (i.e., split spoon sampler), will consist of wiping the equipment of excess soil, washing in a solution of non-phosphate detergent (Liquinox), and rinsing with deionized water. The equipment will be cleaned prior to use, between each sample collection, and prior to leaving the site. All decontamination liquid and soil cuttings generated from drilling operations will be stored in 55-gallon Department of Transportation (DOT) approved drums, labeled, and properly sealed or secured. URS will stage the drums in an appropriate designated area on site for disposal by MTA.

4.1.5 Well Construction and Development

Monitoring well installation and development will be conducted in accordance with requirements prescribed in the California Code of Regulations, Title 23, Division 3, Chapter 16, Section 2649. Installation of the wells will be completed by: 1) advancing a small diameter hollow-stem auger boring to the desired depth, 2) reaming the borehole with a larger diameter auger, and 3) constructing a 4-inch diameter well inside of the reamed borehole.

Two groundwater monitoring wells will be located downgradient of existing wells MW-1 and MW-4 and will be located cross-gradient to MW-4, as shown on Figure 2. Each well will be installed to approximately 40 or 45 feet bgs. Prior to well construction, each borehole will be reamed with an 8-inch outside diameter auger. Each well will be completed with 4-inch Schedule 40 PVC casing with a 20-foot screened interval. The screened interval will extend from approximately 5 feet above the groundwater to approximately 1 foot above the bottom of the boring. A sand pack will be installed around the screened interval, using an appropriate sand material. The sand pack shall extend at least 2 feet above the top of the screen. Approximately 2 feet of hydrated bentonite will be placed above the sand pack. Cement grout with 5 percent bentonite will be used to backfill the remaining open annulus to the ground surface. The well casing will be cut approximately 6 inches below the surface pavement and fitted with a locking

seal plug. All monitoring wells will be completed with an eight-inch diameter, flush mounted, traffic rated well box with watertight lid. Monitoring well construction details are illustrated on Figure 3.

Each well will be developed at a minimum of 24 hours after well completion. Prior to development the well will be sounded with an oil/water interface probe to determine the water levels and the presence of any LNAPL. Development of the wells will be performed using a surge block and bailer. The surge block will be gently moved up and down inside the slotted portion of the casing to draw in fine-grained deposits from the formation near the well, the boring wall, and from the well's filter material. After surging the well, a bailer will be used to remove water containing suspended sediments from the well casing.

During development, purged groundwater will be monitored for turbidity, pH, conductivity, and temperature. Purging will continue until at least 3 casing volumes have been removed, turbidity decreases to a sustained level, and pH, conductivity and temperature are stable. Purged water will be stored on site in labeled/identified DOT approved 55-gallon drums for disposal by the MTA. The wastewater will be characterized based upon the groundwater sample analytical results.

4.1.6 Surveying

Following the installation and development of the wells, wellhead elevation(s) will be surveyed by a California State licensed surveyor to the nearest benchmark, within a range of 0.01 feet relative to mean seal level. Horizontal wellhead locations will be surveyed to the nearest 0.1-foot. Upon completion of the survey, the well locations will be depicted on a site plan that will be provided in the investigation report.

4.2 GROUNDWATER MONITORING AND SAMPLING

After completion of the well installation described in this workplan, all monitoring wells located at the site, including the four existing wells and the three new wells, will be incorporated into the ongoing quarterly groundwater monitoring program. Quarterly reports summarizing each sampling event will be submitted following completion of field activities and laboratory analyses. The reports will be submitted to the LARWQCB by the 15th day after the end of each quarter. The report will include a description of field activities, a summary of laboratory results in text and tabular format, conclusions and recommendations, site figures, laboratory reports,

chain-of-custody, and QA/QC documentation. The next quarterly monitoring event is scheduled for June, 2001.

4.2.1 Groundwater Monitoring

The depth to water will be measured using an oil/water interface probe. Depth measurements will be taken by lowering the probe into the well and obtaining two successive readings that agree to within 0.01 feet. Measurements will be recorded to the nearest 0.01 foot, and referenced to a mark at the top of the well casing.

Some of the natural attenuation parameters included in this monitoring program are sensitive to the effects of aeration and may be incidentally biased by groundwater sampling and laboratory analysis. Therefore, monitoring for these parameters will be conducted in the field.

Field parameters, including DO, ORP, pH, specific conductance, and temperature will be measured in-well, at the level of the screened interval. The measurements will be recorded using a YSI 600 Series field monitoring system equipped with monitoring probes in a protective housing (sonde). The sonde will be lowered into the well to approximately 5 feet below the static water level and allowed to equilibrate prior to recording the parameters.

4.2.2 Groundwater Sampling

Groundwater sampling will be conducted at a minimum of 72 hours following well completion. The following information will be collected prior to purging:

- The depth from the top of the well casing to the top of groundwater will be measured and recorded on a Well Purging and Sampling Log.
- The depth from the top of the casing to the bottom of the well will be measured and recorded on the Well Purging and Sampling Log.
- The height of the water column in each well casing will be calculated.
- One and three casing volumes of water in each well will be calculated.

Prior to collecting groundwater samples for laboratory analysis, groundwater will be purged from each well. Purging will be completed using a submersible pump equipped with dedicated polyethylene tubing. A minimum of three casing volumes of water will be purged from the well prior to sampling.

The following information will be recorded during purging:

- Measurements of temperature, pH, conductivity, and turbidity will be taken and recorded along with the discharge volume. Observations of clarity, color, and odor of the purge water will also be recorded. Measurements will be collected at approximately 5-gallon intervals but will be dependent of the casing volume. Field calibrations of pH, temperature, conductivity, and turbidity meters used during purging will be performed each day before purging.
- Purging will continue until pH, conductivity, and temperature of the purge water stabilize to within 5 percent and a minimum of three casing volumes of water have been removed.
- Final measurements for temperature, pH, conductivity, and turbidity will be collected prior to completion of purging. Information will be recorded on the well sampling form with the total volume purged.
- The time that the purging is completed.

Prior to sampling, the well will be allowed to recharge to at least 80 percent of the pre-purging water level. However, the well will be sampled within 2 hours following purging, regardless of recharge.

The following procedures will be followed each time a monitoring well is sampled:

- Sampling equipment and containers are checked for serviceability prior to use.
- Groundwater samples are collected using a disposable polyethylene bailer with a bottom emptying device.
- Water samples are placed in appropriate sample bottles supplied by the analytical laboratory.
- Sample bottles are placed in a cooler, chilled with ice immediately after sampling and delivered to the analytical laboratory for chemical analysis.
- Sample identification numbers, collection times, and analysis requested are recorded on appropriate chain-of-custody forms.
- Chain-of-custody forms are signed by the sampler and delivered with the samples to the analytical laboratory.

Sampling groundwater for VOCs will be conducted with care to minimize constituent loss by volatilization. Precautionary measures will include:

- Acquiring the sample with a bailer minimizing sample aeration.
- Avoiding aeration or agitation of the sample.
- Filling sample vial to capacity, taking care that no air bubbles are trapped in the vial when it is sealed.
- Storing the sample in an ice-chilled cooler.

- Analyzing the samples as soon as possible and prior to the prescribed holding times.

Groundwater samples will be transported to the analytical laboratory as soon as possible following collection. Samples will be packaged and shipped according to EPA and Department of Transportation (DOT) regulations. Groundwater samples will be analyzed for the following parameters during each quarterly monitoring event:

- EPA Method 8260B for VOCs including BTEX, MTBE, DIPE, ETBE, TBA, and TAME,
- EPA Modified Method 8015 for TPH-g and TPH-d,
- EPA Method 418.1 for TRPH,
- Method SM 3500-D for ferrous iron,
- EPA Method 300.0 for nitrates,
- EPA Method 350.2 for ammonia
- EPA Method 300.0 for sulfates,
- EPA Method 376.2 for sulfide, and
- Method RSK 175M for Methane.

During the June quarterly monitoring event, groundwater will also be analyzed for total dissolved solids (TDS) by EPA Method 160.1. The specific conductance data from the existing wells monitored to date suggest that the TDS for the groundwater at the site may exceed 3,000 µg/L. The TDS data will confirm if TDS does exceed 3,000 µg/L. This would qualify the groundwater at the site as "non-beneficial use" based on Resolution 88-53.

A completed chain-of-custody form for each cooler will be prepared and placed in a resealable plastic bag and taped to the inside of the cooler lid. Coolers will be wrapped with strapping tape at two locations to secure lids. Numbered and signed custody seals will be placed on the outside of each cooler.

4.2.3 Groundwater Sampling Decontamination Procedures

Groundwater samples will be collected using disposable polyethylene bailers to avoid cross-contamination between wells. Reusable groundwater sampling equipment will be decontaminated between each sampling event using the following procedures:

1. Wash with Liquinox and brush, to remove excess contaminants.
2. Second wash with Liquinox and brush.
3. Rinse with de-ionized water.

4. Second rinse with de-ionized water.
5. Dry with paper towels or drip dry.

Purged groundwater generated during the groundwater monitoring and sampling activities will be temporarily stored in 55-gallon drums. The drums will be properly sealed, labeled, and temporarily stored at an approved staging area, pending disposal by MTA. The wastewater will be characterized for disposal based upon the groundwater sample analytical results.

4.2.4 Quality Assurance Samples

The analytical laboratory will provide laboratory trip blanks that will accompany groundwater samples in each cooler. Each laboratory trip blank will consist of two 40-milliliter volatile organic analysis (VOA) vials preserved with hydrochloric acid for analysis by EPA Method 8260B for VOCs. Each VOA vial will be labeled by URS personnel with the sample identification, location, type, sampling method, and required analyses.

Following groundwater purging and sampling activities, one equipment rinsate blank per day will be prepared by collecting a deionized water rinse over the decontaminated submersible pump. After decontaminating the pump, deionized water will be poured over the pump and collected into sample vials and bottles for laboratory analysis (EPA 8260B).

Laboratory QA/QC samples will be analyzed to identify the precision and accuracy of the laboratory measurements. Laboratory QA/QC samples consist of method blanks and matrix spike/matrix spike duplicates (MS/MSD) that are run daily as part of the laboratory's QA/QC plan. The purpose of the method blank samples is to evaluate the potential for introduction (during laboratory sample handling) of an analyte into a sample extract that is not present at detectable levels in the sample matrix. The purpose of the MS/MSD samples is to evaluate the effects of the sample matrix on the measurement methodology.

A minimum of 10% of the total groundwater samples submitted for laboratory analysis will be analyzed in duplicate for quality assurance/quality control procedures.

4.2.5 Groundwater Sample Documentation And Tracking

Documentation of observations and data acquired in the field will provide information on the acquisition of samples and also provide a permanent record of field activities. The observations and data will be recorded with indelible ink in a permanently bound weatherproof field book with consecutively numbered pages and, if applicable, on field sampling data sheets.

The information in the field book will include the following as a minimum:

- Project name
- Location of sample
- Sampler's signature
- Date and time of sample collection
- Sample identification numbers and sample depth (if applicable)
- Description of samples (matrix sampled)
- Analysis to be performed
- Number and volume of samples
- Description of QA/QC samples (if collected)
- Sample methods
- Sample handling
- Field observations
- Personnel and equipment present

Changes or deletions in the field book should be lined out with a single strike mark, initialed and dated by person making change, and remain legible. Sufficient information should be recorded to allow the sampling event to be reconstructed without relying on the collector's memory.

URS will prepare an investigation report following completion of field activities and laboratory analyses. The report will include a description of field activities, a summary of laboratory results in text and tabular format, conclusions and recommendations, site figures, boring logs, laboratory reports, chain-of-custody, and QA/QC documentation.

CDWR (California Department of Water Resources Bulletin 104), 1961. Planned Utilization of the Groundwater Basins of the Coastal Plain of Los Angeles County.

Holquin, Fahan, and Associates, Inc., September 1997. Work Plan for Additional Site Assessment at Los Angeles County Metropolitan Transportation Authority Division 6 Bus Maintenance and Fuel Facility, 100 West Sunset Avenue, Venice, California.

The Tyree Organization, Ltd., May 1999. Report on Underground Storage Removal.

URS Greiner Woodward Clyde, April 1999. Division 6, Contamination Investigation and Monitoring Proposal.

URS Greiner Woodward Clyde, September 28, 1999. Groundwater Monitoring Well Installation Report, MTA Division 6, 100 Sunset Avenue, Venice, California.

URS, April 13, 2001, March 2001 First Quarter Groundwater Monitoring Report, MTA Division 6, 100 Sunset Avenue, Venice, California.

Table 1
Summary of Groundwater Elevation Data
MTA-Division 6
100 Sunset Avenue
Venice, CA
August 1999 through March 2001

Groundwater Monitoring Well	Casing Well Elevation (feet,msl)	Date Measured	Depth to Groundwater (feet, TOC)	Groundwater Elevation (feet, msl)
MW-1	27.07	8/12/99	24.41	2.66
	27.05 [1]	12/7/99	24.53	2.54
		3/14/00	24.01	3.06
		6/16/00	24.15	2.92
		10/16/00	24.39	2.68
		12/29/00	24.36	2.71
		3/5/01	23.75	3.30
MW-2	27.69	8/12/99	25.02	2.67
		12/7/99	25.15	2.54
		3/14/00	24.61	3.08
		6/16/00	24.75	2.94
		10/16/00	25.00	2.69
		12/29/00	24.97	2.72
		3/5/01	24.36	3.33
MW-3	27.24	8/12/99	24.51	2.73
	27.05 [1]	12/7/99	24.64	2.60
		3/14/00	24.10	3.14
		6/16/00	24.25	2.99
		10/16/00	NM	--
		12/29/00	24.27	--
		3/5/01	23.67	3.38
MW-4	25.96	8/12/99	23.21	2.75
		12/7/99	23.31	2.65
		3/14/00	22.81	3.15
		6/16/00	22.95	3.01
		10/16/00	23.17	2.79
		12/29/00	23.14	2.82
		3/5/01	22.54	3.42

Notes:

1) Re-surveyed elevation from March 5, 2001. Elevation of well casing remained the same for MW-2 and MW-4.

NM = Not Measured

msl = feet above mean sea level

TOC = feet below top of casing

Monitoring well MW-3 restored November 2000. Well elevation not availiable.

Table 2
Historical Summary of Groundwater Analytical Results
MTA Division 6
100 Sunset Avenue
Venice, CA
August 1999 through March 2001

Sample Number	Date	TRPH (mg/L)	TPH-d (µg/L)	TPH-g (µg/L)	Lead (µg/L)	Lead (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	MTBE (µg/L)	n-Propylbenzene (µg/L)	1,2,4-TMB (µg/L)	1,3,5-TMB (µg/L)
MW-1	8/12/99	--	6,300	7,700	ND	--	260	19	630	1,650	1,400	--	--	--
	12/7/99	--	3,200	2,600	15.8	--	66	ND	270	524	1,800	--	--	--
	3/14/00	--	5,300	5,800	12.2	--	130	ND	440	1,420	830	--	--	--
	6/16/00	--	ND	2,400	ND	--	40	ND	220	290	1,600	--	--	--
	10/16/00	ND	ND	1,400	ND	ND	12	ND	68	187	1,200	6.6	56	8.7
	10/16/00	ND	ND	1,800	ND	ND	14	ND	77	207.7	1,100	7.6	65	10
	12/29/00	ND	ND	1,200	--	ND	ND	ND	72	180	920	ND	67	ND
	12/29/00	ND	ND	1,200	--	ND	ND	ND	73	180	910	ND	70	ND
	3/7/01	ND(1.0)	ND(1000)	740	--	ND(0.005)	7.5	ND(5.0)	48	98	340	ND(1.0)	12	ND(1.0)
	3/7/01	ND(1.0)	ND(1000)	690	--	ND(0.005)	8.0	ND(5.0)	51	115	360	ND(1.0)	17	ND(1.0)
MW-2	8/12/99	--	ND	ND	13.8	--	ND	ND	ND	ND	11	--	--	--
	12/7/99	--	ND	ND	22	--	ND	ND	ND	ND	14	--	--	--
	3/14/00	--	ND	ND	18.7	--	ND	ND	ND	ND	5.3	--	--	--
	6/16/00	--	ND	ND	20.9	--	ND	ND	ND	ND	5.6	--	--	--
	10/16/00	ND	ND	ND	ND	ND	ND	ND	ND	ND	17	ND	ND	ND
	12/29/00	ND(1.0)	ND(1000)	ND(500)	--	ND(0.005)	1.4	ND(1.0)	ND(1.0)	ND(2.0)	32	ND(1.0)	ND(1.0)	ND(1.0)
	3/5/01	ND(1.0)	ND(1000)	ND(500)	--	ND(0.005)	ND(0.50)	ND(1.0)	ND(1.0)	ND(2.0)	9.0	ND(1.0)	ND(1.0)	ND(1.0)
MW-3	8/12/99	--	ND	ND	ND	--	ND	ND	ND	ND	5.8	--	--	--
	12/7/99	--	ND	ND	120	--	ND	ND	ND	ND	1.2	--	--	--
	3/14/00	--	ND	ND	54.6	--	ND	ND	ND	ND	1.5	--	--	--
	6/16/00	--	ND	ND	67.1	--	ND	ND	ND	ND	1.8	--	--	--
	10/16/00	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/29/00	ND(1.0)	ND(1000)	ND(500)	--	157	ND(0.50)	ND(1.0)	ND(1.0)	ND(2.0)	1.6	ND(1.0)	ND(1.0)	ND(1.0)
	3/5/01	ND(1.0)	ND(1000)	ND(500)	--	110	ND(0.50)	ND(1.0)	ND(1.0)	ND(2.0)	3.4	ND(1.0)	ND(1.0)	ND(1.0)
MW-4	8/12/99	--	ND	ND	ND	--	3	ND	ND	ND	250	--	--	--
	12/7/99	--	ND	ND	ND	--	ND	ND	ND	ND	470	--	--	--
	3/14/00	--	ND	ND	11.3	--	ND	ND	ND	ND	220	--	--	--
	6/16/00	--	ND	ND	ND	--	ND	ND	ND	ND	170	--	--	--
	10/16/00	13	ND	ND	ND	ND	0.61	ND	ND	ND	340	ND	ND	ND
	12/29/00	ND(1.0)	ND(1000)	ND(500)	--	ND(0.005)	1.7	ND(2.0)	1.7	ND(4.0)	360	ND(2.0)	ND(2.0)	ND(1.0)
	3/7/01	ND(1.0)	ND(1000)	ND(500)	--	ND(0.005)	ND(1.0)	ND(2.0)	ND(2.0)	ND(4.0)	360	ND(2.0)	ND(2.0)	ND(2.0)
MCL		-	-	-	15	15	1	150	700	1,750	13	-	-	-

Notes:

mg/L = milligrams per liter
µg/L = micrograms per liter
TRPH= Total recoverable petroleum hydrocarbons by EPA Method 418.1.
TPH-d = Total petroleum hydrocarbons as diesel by EPA Method 8015 modified
TPH-g = Total petroleum hydrocarbons as gasoline by EPA Method 8015 modified
BTEX = Benzene, Toluene, Ethylbenzene, and Xylenes by EPA Method 8260B
MTBE = Methyl-Tertiary-Butyl Ether by EPA Method 8260B
Lead by EPA Method 6010B from 8/12/99 to 10/16/00
Lead by EPA Method 7421 from 10/16/00 to present
TMB = Trimethylbenzene by EPA Method 8260B in ug/L
ND(x) = Not detected at or above indicated laboratory reporting limits
MCL = California Drinking Water Primary Maximum Contaminant Levels by California Code of Regulations Title 22 (22 CCR) Section 6444
(Updated May 23, 2000).
Results for MW-1 duplicates included since 10/16/00
Lead Action Level for tap water set forth in 22 CCR, Chapter 17.5, Section 64672.3 (Updated May 23, 2000)
MTBE primary MCL is 13 ug/L. The secondary MCL for MTBE is 5 ug/L (22 CCR Section 64449 (Updated May 23, 2000))
Bromomethane was detected once in groundwater sampled from well MW-1 on 12/29/00 at 21 ug/L. It was not detected at or above the reporting limit of 20 ug/L in the duplicate. It is likely present as a laboratory contaminar

SITE LOCATION MAP

Project No.: 57-00070056.01	Date: APRIL 2001	Project: MTA - DIVISION 6	Fig. 1

I:\ADMIN\MTASITE.CDR

URS

MAIN STREET

SUNSET AVE.

THORNTON PL

PUMP

FUEL AREA

MW-1
3.30

MW-2
3.33

MW-3
3.38

MW-4
3.42

3.40

3.35

TIRE STATION

TRANSPORTATION OFFICE

MAINTENANCE

MAINTENANCE

STEAM

54 BUS STALLS

PARKING STALLS

15 PARKING STALLS

BUS WASHER

1 2 3 4 5 6 7

TANK DESCRIPTION

1	DIESEL TANK	= 20,300 GAL.
2	DIESEL TANK	= 20,300 GAL.
3	MOTOR OIL	= 8,000 GAL.
4	UNLEADED GAS	= 6,000 GAL.
5	WASTE OIL	= 2,000 GAL.
6	DIESEL TANK	= 20,300 GAL.
7	WASTE OIL	= 2,000 GAL.

LEGEND

MW-1 / 3.30 — GROUNDWATER MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION IN FEET ABOVE MEAN SEA LEVEL

PROPOSED WELL LOCATION

—3.35— GROUNDWATER ELEVATION CONTOUR

0 40 80

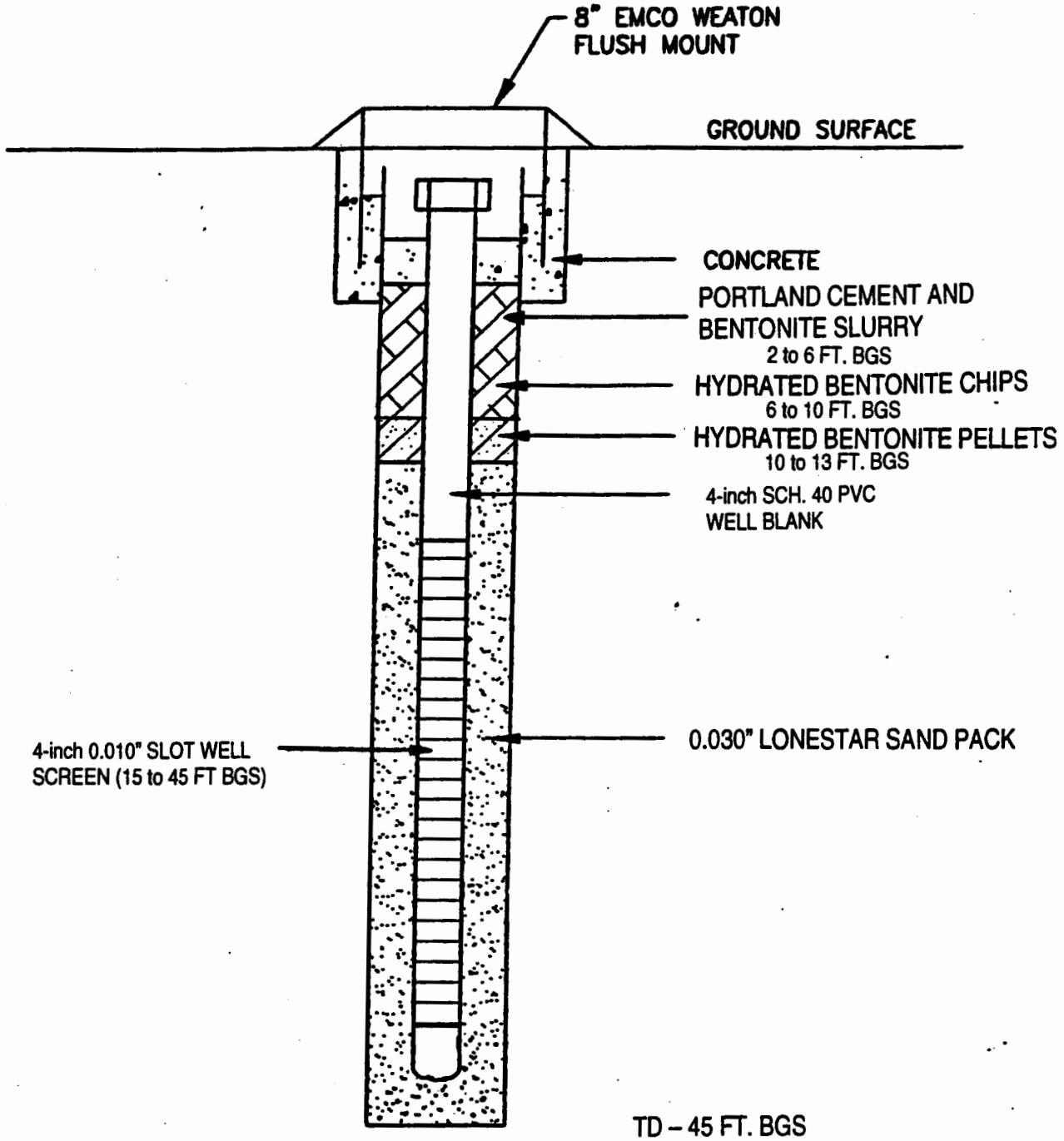
SCALE, feet

I:\57000700056.01\DIV. 6\APRIL 2001\GW-CHEM-0300-APRIL.DWG

URS Corporation

SITE PLAN WITH PROPOSED WELL LOCATIONS AND GROUNDWATER ELEVATIONS

Proj. No.:	57.00070056.01	Date:	APRIL 2001
Project:	MTA - DIV. 6 100 SUNSET AVENUE VENICE, CA.	CAD ID:	GW-CHEM-0300-APRIL
		Figure:	2



NOT TO SCALE

MONITORING WELL DETAIL

Project No.: 57-00070056.01	Date: APRIL 2001	Project: MTA – DIVISION 6	Figure 3