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April 27, 2007 Our Ref.: 053-7020

Alameda County Environmental Health Services
Environmental Protection
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

Attention: Ms. Donna Drogos

RE: SOURCE ZONE REMEDIATION PLAN ADDENDUM, FUEL LEAK CASE NO. RO0000278, DESERT PETROLEUM, 2008 1ST STREET, LIVERMORE, CALIFORNIA

Dear Ms. Drogos:

Golder Associates Inc. (Golder) has prepared this addendum to our Source Zone Remediation Plan[1] on behalf of Valley Gas (Formerly B&C Minimart) for the Dessert Petroleum (DP) site at 2008 1st Street, Livermore, California. This addendum has been prepared in response to and as requested by the Alameda County Environmental Health Services (ACEHS) in a letter dated March 26, 2007.[2] Pertinent excerpts of this ACEHS letter are included in Attachment A. Golder's responses to ACEHS's comments/requests, are in the following sections. The sections have been organized to correspond to the ACEHS letter.

a. COCs

The Source Zone Remediation Plan was prepared to address the chemicals present beneath the Groth property that might pose an unacceptable risk to future residents in buildings on that site. The current land use around the DP site is commercial; however, as part of a redevelopment effort being conducted by the City of Livermore, The Groth Brothers site is to be redeveloped as mixed high-density residential with integrated retail stores. The proposed redevelopment is the driver for an accelerated evaluation of potential vapor risk at the site and remedial action (as necessary). The source zone investigation[3], risk assessment[4], and source zone remediation plan were prepared at the request of the City of Livermore.[5]

In the conclusions of the risk assessment, Golder recommended remedial actions targeting dissolved benzene, with a cleanup goal of 418 microgram per liter (ug/L), and mitigating the non-aqueous phase liquid (NAPL) source area. Therefore, benzene and NAPL were the "chemicals of concern" (COCs). These remedial targets were the basis for the remedial action objectives described in the Source Zone Remediation Plan. The preferred alternative, in situ chemical oxidation (ISCO) using ozone, is a non-

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[1] Golder Associates Inc., *Source Zone Remediation Plan*, August 11, 2006.
[2] Alameda County Environmental Health Services, Letter to Mr. Balaji Angle, et al, March 26, 2007.
[3] Golder Associates Inc., *Field Investigation for Source Zone Remediation*, June 6, 2006.
[4] Golder Associates Inc., *Screening Vapor Intrusion Risk Assessment*, May 31, 2006.
[5] City of Livermore, Letter to Mr. Balaji Angle, August 5, 2005.

selective oxidation method. In an oxidizer-strength ranking of nine common oxidants ozone is behind only hydroxyl radical and sulfate radical[6]. Therefore, ozone is a powerful oxidizer and will create a non-selective oxidizing environment that will treat the organic chemicals present in the groundwater and soil. Therefore, even though other organic chemicals (methyl tertiary butyl ether and tetrachloroethene) present in the groundwater are not remedial targets, these chemicals should also be oxidized in the presence of ozone[7].

b. By-Products

As stated in the Source Zone Remediation Plan, to confirm the effectiveness of ozone as an oxidant and to assess whether ozone sparging will generate chemical species that are deleterious to groundwater quality, bench-scale testing will be performed using representative aquifer materials and groundwater. The aquifer materials and groundwater for the bench-scale testing will be collected during the installation of the sparge wells. The formation of by-products will be evaluated as part of the bench test.

c. Monitoring Well Network for Pilot Test

Golder proposes the addition of monitoring well MW-5 to the monitoring network and the installation of an additional monitoring well approximately 100 feet directly south of monitoring well MW-5. These two wells will monitor the pilot test effectiveness in the down gradient direction. The new monitoring well will be constructed in the same manner as MW-5.

For vertical monitoring, Golder proposes adding zone (Z) 1 (24 to 28.5 feet below ground surface (ft bgs)), Z2 (35.5 to 40 ft bgs), Z3 (48.6 to 55 ft bgs), and Z4 (60 to 65 ft bgs) of the multi-level monitoring well, CMT-4. Golder's intent for adding these zones of CMT-4 is to provide three dimensional monitoring of the oxidant dispersion and treatment effectiveness. Although CMT-4 is not down gradient of the pilot test ozone sparge points, the oxidant dispersion will not be greatly influenced by the natural groundwater movement, but will be influenced to a greater extent by the injection pressure in the sparge point and the permeability of the surrounding soil materials. In addition, the half-life of ozone in water is typically 30 minutes[8]; therefore, before the natural movement of the groundwater can have an appreciable effect on the migration of the injected ozone, the ozone will have reacted or degraded into dissolved oxygen. Golder will monitor dissolved oxygen concentrations in the downgradient wells (the new well and MW-5) as well as the other wells included in the monitoring program.

In order to evaluate displacement of impacted groundwater, Golder will increase the monitoring frequency of the non-sparge point monitoring locations to once every two weeks during sparging. In this manner, Golder will collect data to evaluate temporal and spatial trends. Concentration increases in one or more of the monitoring locations will indicate whether impacted groundwater has been

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[6] Interstate Technology & Regulatory Council (ITRC), *Technical and Regulatory Guidance for In Situ Chemical Oxidation of Contaminated Soil and Groundwater*, Second Edition, January 2005, Page 2.

[7] Interstate Technology & Regulatory Council (ITRC), *Technical and Regulatory Guidance for In Situ Chemical Oxidation of Contaminated Soil and Groundwater*, Second Edition, January 2005, Table 1-6, Page 17.

[8] Interstate Technology & Regulatory Council (ITRC), *Technical and Regulatory Guidance for In Situ Chemical Oxidation of Contaminated Soil and Groundwater*, Second Edition, January 2005, Page 14.

displaced.[9] Golder will also reduce the potential for displacement by pulsing the operation of the sparge points; continuous operation will likely involve sparging into one or two sparge points at one time and rotating from point to point in a programmed sequence.

d. Pilot Test Frequency

The Source Zone Remediation Plan included performing the pilot test for one to two months and Golder will recommend whether or not to operate for the second month based on the results of performance monitoring and whether the ozone sparge system has operated as planned. If the sparge results do not provide sufficient trends or the results are inadequate for evaluating full scale operating parameters, Golder will recommend operating for a longer period in an attempt to resolve the inadequacies with more data. If there are operational problems with the ozone sparging equipment such that continuous planned operation has not consistently occurred, Golder will recommend operating for a longer time period to collect data during periods of consistent operation. Golder will monitor groundwater as described above (once every two weeks) and in the Source Zone Remediation Plan in order to evaluate displacement and other phenomena of interest. This monitoring frequency has been chosen to provide data points in order to assess temporal and spatial trends during the proposed operational timeframe.

When the pilot test is completed, Golder recommends allowing the subsurface to equilibrate for two weeks before collecting samples to evaluate rebound. In full-scale remediation situations, rebound monitoring should typically be performed at least 3 months after the cessation of injections[10]; however, for this pilot study, that timeframe may be unrealistic due to the impending development of the Groth Brothers site. During rebound testing, Golder will monitor groundwater parameters such as dissolved oxygen and oxidation reduction potential. If these parameters are higher than the baseline values, Golder will evaluate whether or not the subsurface has re-equilibrated and consider extending the rebound period and re-sampling. If rebound has already occurred, extending the rebound period will be unnecessary. The data acquired during the pilot study is influenced by many factors and Golder will evaluate the data and make recommendations on a case-by-case basis.

e. Well Construction

Golder proposed nested ozone sparging wells for this pilot study for the following reasons:

- The target zone is sufficiently thick that if a sparge point was constructed over the entire length, the higher hydrostatic pressure at depth would force the sparge gas through the upper portion of the screen and no treatment would be accomplished in the lower part of the target zone. Therefore, installing two shorter sparge points at different depths will provide more efficient distribution of the sparge gas.

- Installing separate sparge points approximately 3 to 5 feet apart would require twice as many penetrations of the road surface within the City of Livermore

[9] Interstate Technology & Regulatory Council (ITRC), *Technical and Regulatory Guidance for In Situ Chemical Oxidation of Contaminated Soil and Groundwater*, Second Edition, January 2005, Page 56.

[10] Interstate Technology & Regulatory Council (ITRC), *Technical and Regulatory Guidance for In Situ Chemical Oxidation of Contaminated Soil and Groundwater*, Second Edition, January 2005, Page 56.

easement and more trenching and resurfacing to connect the sparge conveyance lines.

- The sparge points are not going to be installed across an aquitard or zone of lower permeability material such that cross-contamination may be encouraged. The geologic materials across the entire length of the target sparge zone are consistent and described as coarse-grained material.[11]

- The sparge points will be installed using stainless steel centralizers to maintain the sparge points and casing materials in positions away from the boring sidewalls to improve the seal between the two sparge points. Golder proposes to install a 3.5-foot thick bentonite seal between the two sparge points.

f. Utility Survey

Golder acquired a utility map for the site vicinity and this is included in Attachment B. Golder will attempt to acquire information regarding the potential petroleum pipeline reported to be in the vicinity of the site and the Groth Brothers site. This information will be discussed in the pilot study report.

[11] Golder Associates Inc., *Field Investigation for Source Zone Remediation*, June 6, 2006.

CLOSING

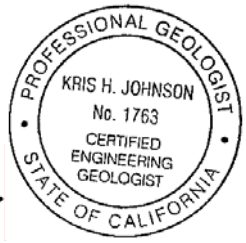
This material and data in this report were prepared under the supervision and direction of the undersigned. This report was prepared consistent with current and generally accepted geologic and environmental Consulting principles and practices that are within the limitation provided.

If you have any questions or comments, please call Kris Johnson at 650-386-3828 or Mark Naugle at 916-786-2424.

Sincerely,

GOLDER ASSOCIATES INC.

Mark H. Naugle, P.E.
Senior Engineer



Kris H. Johnson, C.E.G. 1763
Senior Consultant

Attachments: Attachment A – March 26, 2007 Letter from Alameda County Environmental Health Services (Pertinent Excerpts)

Attachment B – City of Livermore Utility Map

Distribution:

(1) Copy – Mr. Balaji Angle (hardcopy)
(1) Copy – Ms. Donna Drogos (electronic upload)
(1) Copy – GeoTracker Database (submitted electronically)
(1) Copy – Mr. Michael Veiluva (electronic)
(1) Copy – Mr. Glenn Young (electronic)
(1) Copy – Ms. Leah Goldberg (electronic)
(1) Copy – Golder Associates Inc.

ATTACHMENT A

March 26, 2007 Letter from Alameda County Environmental Health Services (Pertinent Excerpts)

ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
DAVID J. KEARS, Agency Director

ENVIRONMENTAL HEALTH SERVICES
ENVIRONMENTAL PROTECTION
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577
(510) 567-6700
FAX (510) 337-9335

March 26, 2007

Mr. Balaji Angle
B&C Gas Mini Mart
2008 1ST Street
Livermore, CA 94550

Mr. John Rutherford
Desert Petroleum
PO Box 1601
Oxnard, CA 93032

Dear Messrs. Angle and Rutherford:

Subject: Fuel Leak Case No. RO0000278, Desert Petroleum, 2008 1ST Street, Livermore, CA

ACEH staff has reviewed the "Field Investigation for Source Zone Remediation" (field investigation), dated June 6, 2006, the "Soil Vapor Intrusion Risk Assessment" (risk assessment), dated May 31, 2006, the "Source Zone Remediation Plan" (remediation plan), dated August 11, 2006, the "Fourth Quarter 2006 Groundwater Monitoring Report," dated January 16, 2007, and previous monitoring reports, all prepared by Golder Associates (Golder).

The above referenced reports provide data for source area characterization and soil gas sampling performed both on the subject site and off-site on the Groth property. Also, a soil vapor risk evaluation was performed for the Groth site. We note however, that a significant portion of additional work also requested in ACEH's letters dated July 5, 2005, and February 24, 2006, to address data gaps in the SCM and complete the evaluation of dissolved contaminant plumes, specifically for MTBE, has not been performed. Further, specific work directives by ACEH pertaining to monitoring of the dissolved plume, evaluation of alternative valid hypotheses for the migration of dissolved contaminants from your site, and evaluation of the risk of the contaminant plumes to the drinking water basin have been largely ignored in your reports.

Compliance with the City of Livermore's Polanco Act related work that pertains specifically to the residential redevelopment of the Groth property is required of you. However, not in lieu of the work required of you to address the contamination you caused to the regional drinking water aquifer and to your site. You are required to complete the work requested in this letter and ACEH's previous letters referenced above. Further failure on your part to perform the work required of you and submit the reports as specified below, will result in initiation of enforcement actions on your case; specifically, ACEH will request the SWRCB remove your site from the USTCF eligibility list.

This letter provides comments on your recently submitted reports and incorporates the items you have failed to address in ACEH's last two directive letters. In general, ACEH does not concur with the groundwater cleanup level proposed in the risk evaluation due to the data gaps present in the risk assessment, elimination of relevant exposure pathways, and failure to address all COCs. However, we are prepared to concur with Golder's recommendation for a pilot test although specific requirements for monitoring and evaluating the pilot test of your system are required.

Thus, this pathway cannot be eliminated from your risk assessment. Please address this data gap in SCM 2.0 and this pathway in your risk evaluation as part of the CAP requested below.

9. **Preferential Pathways** – Golder's risk assessment states that vapor migration along utility corridors was not specifically evaluated. This is a data gap in your SCM that you were requested to evaluate and have not. Free product, reported as fresh gasoline, was detected 900-feet downgradient of your site in MS-MW1. Deep utilities and a potential petroleum pipeline, (associated with previous land use at the Mill Spring Apartments) are reported to be in the vicinity of your site and the Groth site, and could act as a preferential pathway for contamination to move from your site, to the Groth site, and to Mill Springs Apartments, and/or other locations. This is a key data gap that could affect your analysis of risk to the Groth site. Please address this data gap in SCM 2.0 and this pathway in your risk evaluation as part of the CAP requested below.

10. **Depth to water** – The remediation plan states that depth to water has varied from 18 to 37-feet bgs since 1995. More correctly depth to water has varied from 17' bgs in 1997 to 69 feet bgs in 1992, and the first reported release at the site occurred in 1988. It is unclear why pre-1995 water levels are excluded. Please address this comment in the work plan addendum requested below.

11. **Remediation Pilot Test** – We concur with your remediation plan's proposal to evaluate the use of in-situ chemical oxidation (ISCO) with ozone as a pilot test. However, we request that you submit an amended plan for this work, by the date specified below, that addresses the following comments:

a. **COCs** - The remediation plan focuses only on treating benzene and NAPL near the water table (assumed current) and affecting cleanup for the Groth Property (see also Technical Comment A.1. regarding target cleanup zones). No other known COCs were discussed. For example, although MTBE is also a primary contaminant of concern contributing to a long-term groundwater problem, it is not mentioned in the source zone cleanup plan. Additionally, PCE (see attached) has been detected in both the MIP and monitoring wells associated with your site (see attachment) and your treatment approach must consider this contaminant also. Your source zone remediation plan is required to address all known COCs at the site.

b. **By-Products** – Please include an evaluation of all anticipated reaction by-products for all COCs and those potentially produced by the treatment method.

c. **Monitoring Network for Pilot Test** – The proposed network of wells to monitor the effectiveness of the pilot test is insufficient. Monitoring in the down-gradient direction is not proposed. A sampling and monitoring program to monitor oxidant dispersion and treatment effectiveness in three dimensions is an essential component for evaluation of your pilot test. We recommend that you install additional monitoring points to meet these criteria. Please include an explanation of your rationale for locating additional monitoring points and your monitoring frequencies. Include your plan for monitoring to differentiate between displacement of contaminated water and actual mass destruction.

d. **Pilot Test Frequency** – Please specify the time frames for your pilot test, how long before rebound is anticipated, timeframes to evaluate displacement, the basis for estimating these timeframes, proposed frequencies for different monitoring activities, etc.

e. **Well Construction** – Golder proposes the installation of nested wells for their treatment system. Nested wells are not acceptable at contaminated sites due to the difficulties in ensuring reliable seals between sampling zones. Poor seals can result in leakage between zones and are therefore not allowed. We request that you consider an alternative design for these wells.

f. **Utility Survey** – The utility survey portion of your conduit study has not been completed, as noted in SCM 1.1 and the risk assessment. The presence of deep utilities and a potential petroleum pipeline are reported to be in the vicinity of your site and the Groth site and could act as a preferential pathway for contamination, oxidant and/or by-products of the reaction. We request that you complete your evaluation of this data gap for your pilot test proposal.

12. Vertical Gradient - Anomalous data regarding vertical gradient in well pairs MW-11, MW-12, D-1, and D-2 has consistently been reported in the quarterly reports. We request that these anomalies be analyzed and the rationale for their occurrence be provided in SCM 2.0. Please include hydrographs and head profiles for these wells, your depth discrete wells (CMT), supply wells, etc., and an analysis of these graphs and other data to support your evaluation.

13. SCM Data Needs - Include <u>all</u> soil & groundwater analytical results and sample location maps, boring logs, and cross-sections in the SCM 2.0 requested below. This request encompasses data and maps from UST removal and/or closure through site investigation activities.

14. Corrective Action Plan – The purpose of the CAP is to use the information obtained during investigation activities to propose cost-effective final cleanup objectives for the entire contaminant plume and remedial alternatives for soil and groundwater that will adequately protect human health and safety, the environment, eliminate nuisance conditions, and protect water resources.

We require that you prepare a CAP for the final cleanup of contamination (MTBE, benzene, other petroleum products, and associated blending compounds and additives) in soil and groundwater caused by the unauthorized releases at your site. The CAP shall detail at least three technically and economically feasible methods, besides the no action, MNA, and natural attenuation alternatives, to restore and protect beneficial uses of water and to meet the cleanup objectives for each contaminant established in the CAP. The evaluation is to include cost estimates for each alternative and the timeframes to reach remediation objectives.

The CAP is to include a risk evaluation that: considers all COCs and all receptors; evaluates the threat posed by the residual pollution under changing conditions (e.g. increasing and decreasing groundwater levels, new supply well installed nearby, etc.) for as long as the residual pollution (adsorbed and dissolved) remains in place in the environment; determines cleanup levels (active remediation) and cleanup goals (water quality objectives); and calculates the likelihood of reaching cleanup objectives and the time it will take to reach cleanup levels and goals.

The CAP must propose a monitoring network capable of monitoring the effectiveness of on-going remediation (process monitoring). Note that this will likely require monitoring points in addition to your current network. The CAP must also propose verification sampling and monitoring (soil and groundwater) to confirm completion of corrective actions and evaluate CAP implementation effectiveness. Please submit your CAP by the date below.

ATTACHMENT B

City of Livermore Utility Map

GENERAL NOTES:

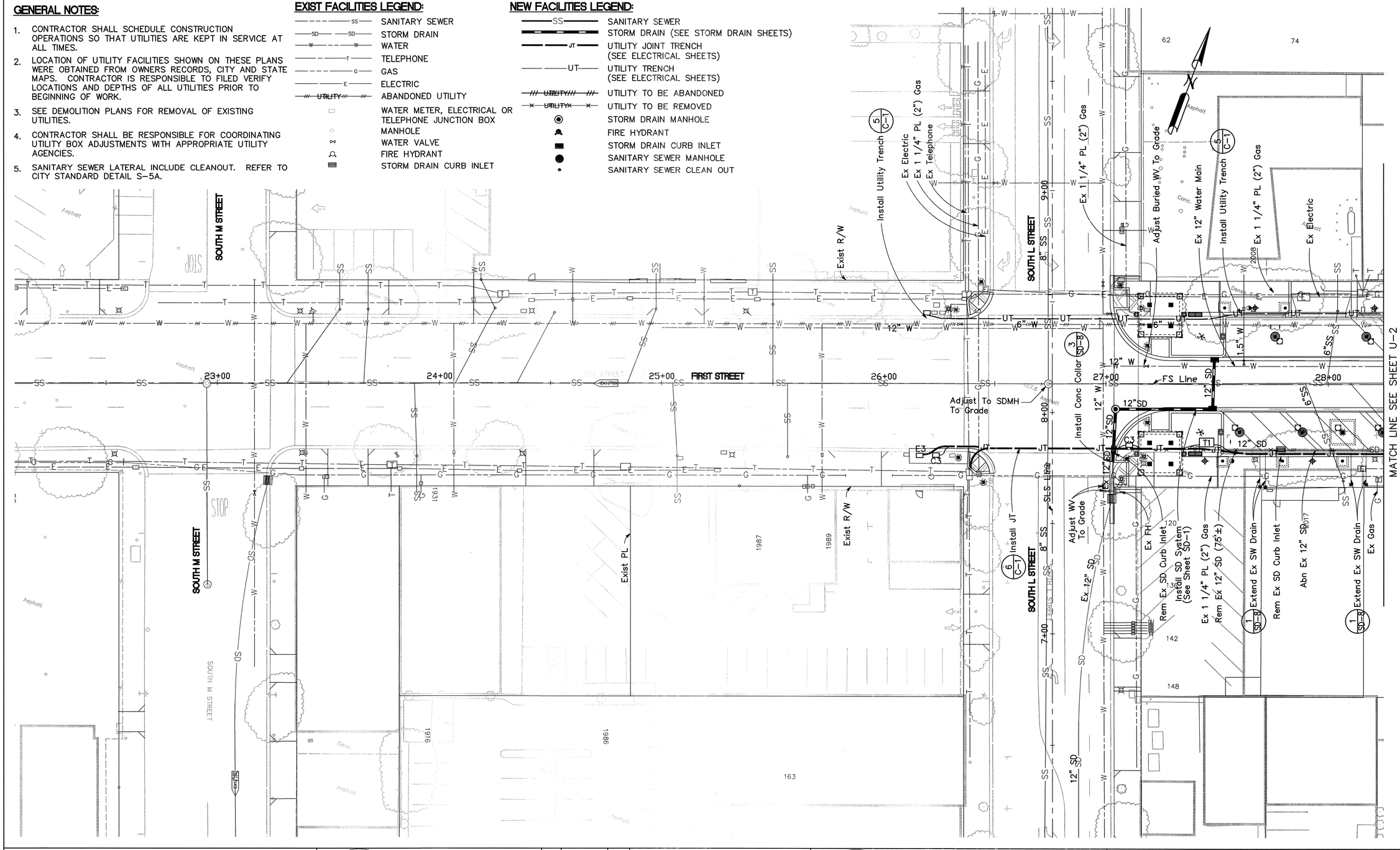
1. CONTRACTOR SHALL SCHEDULE CONSTRUCTION OPERATIONS SO THAT UTILITIES ARE KEPT IN SERVICE AT ALL TIMES.
2. LOCATION OF UTILITY FACILITIES SHOWN ON THESE PLANS WERE OBTAINED FROM OWNERS RECORDS, CITY AND STATE MAPS. CONTRACTOR IS RESPONSIBLE TO FILED VERIFY LOCATIONS AND DEPTHS OF ALL UTILITIES PRIOR TO BEGINNING OF WORK.
3. SEE DEMOLITION PLANS FOR REMOVAL OF EXISTING UTILITIES.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING UTILITY BOX ADJUSTMENTS WITH APPROPRIATE UTILITY AGENCIES.
5. SANITARY SEWER LATERAL INCLUDE CLEANOUT. REFER TO CITY STANDARD DETAIL S-5A.

EXIST FACILITIES LEGEND:

- SS — SANITARY SEWER
- SD — STORM DRAIN
- W — WATER
- T — TELEPHONE
- G — GAS
- E — ELECTRIC
- UTILITY — ABANDONED UTILITY
- WATER METER, ELECTRICAL OR TELEPHONE JUNCTION BOX
- MANHOLE
- WATER VALVE
- FIRE HYDRANT
- STORM DRAIN CURB INLET

NEW FACILITIES LEGEND:

- SS — SANITARY SEWER
- STORM DRAIN (SEE STORM DRAIN SHEETS)
- JT — UTILITY JOINT TRENCH (SEE ELECTRICAL SHEETS)
- UT — UTILITY TRENCH (SEE ELECTRICAL SHEETS)
- UTILITY — UTILITY TO BE ABANDONED
- UTILITY — UTILITY TO BE REMOVED
- STORM DRAIN MANHOLE
- FIRE HYDRANT
- STORM DRAIN CURB INLET
- SANITARY SEWER MANHOLE
- SANITARY SEWER CLEAN OUT



REGISTERED PROFESSIONAL ENGINEER ROBERTO J. ESCOBAR No. C58461 Exp. 12-31-06 CIVIL STATE OF CALIFORNIA

Roberto Escobar 2/9/05
APPROVED BY DATE

DESIGNED BY: RE/TW/PB
DRAWN BY: RE/FY
CHECKED BY: RE/TW/PB

NO.	DATE	BY	REVISIONS
1			

CITY OF LIVERMORE, CALIFORNIA, INCORPORATED 1876, COUNTY OF ALAMEDA

CITY OF LIVERMORE
COMMUNITY DEVELOPMENT DEPARTMENT
ENGINEERING DIVISION
City Project No. 200321

FIRST STREET STREETSCAPE IMPROVEMENTS
Phase I - L Street to Maple Street

UTILITY

U-1
Sheet 26
Of 106
Scale: 1"=20'

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3