RECEIVED

By Alameda County Environmental Health at 3:51 pm, Apr 22, 2014

ARC™
Document Solutions

Alameda County Environmental Health
1131 Harbor Bay Parkway
Alameda, CA 94502-6577

Re: ARC Document Solutions (Formerly City Blue Print)
RWQCB Case#01-0210
1700 Jefferson St
Oakland CA, 94612

ARC has directed Applied Water Resources Corporation (AWR) to provide, on our behalf, professional environmental consulting services to the best of their ability. To the best of my knowledge, the information in this report is accurate and all local Agency and/or Regional Water Quality Control Board regulations and guidelines have been followed.

This report was prepared by AWR and ARC has relied on their advice and assistance. I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge.

Sincerely,

Matt Westbrock

Matt Westbrock - Asst. Corp. Controller
Authorized Representative

Attachment: Report

APPLIED WATER RESOURCES
CORPORATION

1600 Riviera Avenue, Suite 310, Walnut Creek, California 94596
925 426 1112

March 27, 2014

Mr. Mark Detterman
Alameda County Department of Environmental Health-LOP
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502

RE: Work Plan Addendum
1700 Jefferson Street, Oakland, California

Dear Mr. Detterman:

On behalf of ARC Document Solutions and pursuant to a letter issued by ACEH on July 12, 2013, Applied Water Resources (AWR) has prepared the enclosed Work Plan Addendum for 1700 Jefferson Street, Oakland, California (Site). This addendum describes activities performed including a records review, geophysical investigation, utility mapping, and soil gas sampling. Based on the findings, this addendum recommends adjusting the boring locations proposed in the *Conceptual Site Model and Work Plan* (ERS January 2013) and the *Addendum to the Conceptual Site Model and Work Plan* (ERS May 2013).

The objectives for the recent investigation were to

- Identify utility corridors and remaining USTs, pipelines and other infrastructure associated within the former gas station.
- Determine whether a preferential contaminant migration pathway exists along the utility corridor to explain the elevated concentrations of petroleum observed in MW-5 well located approximately 160 feet north of the former service station.

Although the property is oriented along an axis to the southeast, for the purpose of this addendum, project north will be defined along Jefferson St.

Records Review

Building plans, Sanborn Fire Insurance Maps, aerial photographs were reviewed in order to see possible locations of former dispenser islands as well as former and current utility corridors that may serve as preferential pathways for contaminant migration.

Permit History and Building Plans

A request to review building plans as well as a history of all permits issued was submitted to the City of Oakland. A plan from October 3, 1939 was obtained and showed the possible locations of the former underground storage tanks (USTs), the former dispenser island, and the former gas station building. The plan also showed possible former pumps existing in the southwest corner of the property (Appendix A). However, it is unclear whether these pumps in the southwest corner of the Site are associated with the gas station and the former tanks.

Permit history revealed that 17th street had been widened by the City of Oakland and the size of the property had been reduced by approximately 25 feet in the north-south direction. The service station had also moved its southern wall and the property boundary was reduced by an additional 7 feet in length (Appendix A).

The City of Oakland also provided AWR with a map showing sanitary sewer and storm drain locations in the vicinity of the Site (Appendix A). It was found that a storm drain is located adjacent to the western side of the property running in the north-south direction along Jefferson Street towards MW-5 (Figure 3).

Sanborn Fire Insurance Maps

Sanborn maps were originally created to assess fire insurance liabilities, and have become a useful resource for conducting environmental reviews of properties. Sanborn maps are included in Appendix A. The Sanborn maps revealed that residential dwellings existed on the property prior to building the service station. The Sanborn maps did not reveal the location of the former USTs or dispenser island.

Aerial Photographs

Aerial photographs dating as far back as 1930 from Photo Science Inc.'s archive were reviewed. Aerial photographs revealed the following:

- 1930: The sunken courtyard north of the property had existed at that time and two dwellings existed on the property.
- 1941: The service station appears in the aerial photograph and is surrounded by many vehicles. It appears that the dispenser island may have existed under the awning, consistent with the building plans from 1939.
- Between 1973 and 1975: The service station building appears smaller and 17th street has been widened. The awning where the dispenser islands were presumably located is still visible in these photographs.
- 1988: The service station building was removed along with all asphalt and concrete on the property.

Geophysical Investigation and Utility Survey

Geophysical Investigation

Geophysical surveys are a cost effective and non-intrusive means to identify anomalies in the subsurface. These anomalies can range from simple variations in soil type, changes in density, and may respond to the presence of foundations, pipelines, and buried metal objects, such as tanks. On October 26, 2013, a geophysical investigation was conducted in the parking lot of the Site by NORCAL

Geophysical Consultants, Inc. The investigation was performed in order to identify preferential pathways that may be leading out of the site and into nearby utility corridors, remaining USTs or pipelines from the former USTs, the backfilled excavation of the former USTs, and the backfilled excavation of the dispenser island.

All areas within the limits of the geophysical survey area depicted in Figure 2 were assessed using terrain conductivity (TC), vertical magnetic gradient (VMG), and ground penetrating radar (GPR). Anomalies identified from these technologies were further evaluated using metal detection (MD) and electromagnetic line location (EMLL). Findings from the geophysical report and a description of the technology behind these methods are described in detail in the attached geophysical report (Appendix B).

No former utility corridors were identified at the Site during the geophysical investigation. It appears from both the GPR and TC surveys, that the Site had been graded prior to construction of the current building. An electrical utility line associated with a transformer located on the property was identified running east-west on the property and traced off the property towards Jefferson St crossing over the storm drain before connecting to the main electrical line running north south along Jefferson St (Appendix B; Plate 1, Figure 3).

The geophysical survey did not indicate the presence of any USTs or piping associated with the former USTs. However, an area in the center of the Site was identified as a possible backfill area related to the former UST excavation (Appendix B; Plate 4). Based on the geophysical survey and building plans, the former dispenser island is located in the area depicted on Figure 2.

Utility Survey

Because utility trenches can act as preferential pathways for contaminant migration, a private utility locator, Geotech Utility Locating, LLC, was contracted to trace utilities adjacent to the Site along 17th street, Jefferson St, and 18th Street on October 28th, 2013. Utility covers were removed, as possible, to measure the depth to the utility line and invert elevations of all utilities, which are indicated in Figure 3.

Depth to the storm drain and sanitary sewer measured directly to the bottom of the pipe. Depth to the water, electrical and gas lines were estimated using a magnetic pipe locating tool. Both the sanitary sewer and the storm drain flow to the north along Jefferson St., which is based on the measured invert elevations, and the change in pipe diameter observed in the storm drain system.

Based on utility depth, flow direction and location relative to the former tanks and dispenser islands, the most likely utility contaminant migration pathway is along the storm drain to the west of the property. Also, based on the soil borings discussed in the section below, the backfill material in the storm drain consists of loosely consolidated sand, which would facilitate the transportation of petroleum contamination.

Soil Gas Screening and Sampling

Based on the geophysical and utility survey results, and the site history, seven soil gas boring locations (A1 through A7) were proposed and investigated on November 16, 2013 (Figure 3). After the upper asphalt and concrete was cored, subsurface investigations were advanced with a hand auger to avoid damaging underground utilities. Soil gas well construction and sampling were conducted in accordance with AWR's standard operating procedures (Appendix C).

Shallow Lithology

Each boring encountered approximately 8” of asphalt underlain by approximately 6” of asphalt base (AB). An old concrete lateral was encountered at approximately 4.5 feet bgs in A4 and a 12” concrete slab underneath the asphalt and AB was encountered in A6. A sandy uniform fill material was encountered in each of the borings advanced through the storm trench beneath the asphalt base/concrete to five feet bgs. A native sandy clay material was encountered beneath the asphalt base in the A1 location.

Temporary Soil Gas Well Construction

Six temporary soil gas wells (A1 through A4, A6, and A7) were installed to evaluate contaminant migration in the utility corridor and residual petroleum contamination. All soil gas wells were installed to five feet bgs with the exception of A4, which was installed to 2.5 feet bgs because concrete was encountered at 4.5 feet bgs.

Saturated soil was encountered in boring A5 at 21 inches bgs. Because the shallow saturated conditions would significantly affect soil gas migration, the boring was abandoned and no temporary soil gas well was constructed at the A5 location. The source of the shallow ground water encountered at the A5 location is unknown.

All temporary soil gas wells were constructed in the storm drain utility corridor with the exception of A1, which was advanced to 5 feet bgs and installed in a native sandy clay material in the southwest corner of the original property boundary. The A1 location was advanced in order to evaluate whether or not residual contamination exists in relation to the former pumps that were indicated in the 1939 building plan.

Soil Gas Screening and Sampling

Each temporary soil gas well was allowed to stabilize for a minimum of one hour prior to screening or sampling. A vacuum pump was attached to the end of the tubing, one case volume of soil gas was purged and a screening sample was collected into a tedlar bag. A photoionization detector (PID) was used to measure the concentration of volatile chemicals within the Tedlar bag. The maximum concentration measured was recorded. Concentrations were measured until they appeared to stabilize within approximately 10% for three consecutive measurements.

A soil gas sample was collected from the A2 location into a 1.4 liter Summa canister under a shroud supplied with helium gas. The soil gas sample was analyzed by EPA method TO-15 for volatile organic compounds (VOCs) and Helium by ASTM D1946. During sampling, no helium or vacuum leaks were observed in the screening gauges, and the laboratory did not detect helium in the samples. These quality control measures indicate that there were no significant leaks in the sample train or the well annulus, and that soil gas sample is of high quality and representative of subsurface conditions. The analytical report is presented in Appendix D.

Soil Gas Screening and Sampling Results

No petroleum odors or staining were noted during the installation of the temporary soil gas wells. PID readings from the six soil gas wells ranged from 0.4 to 0.9 ppm and are presented in Table 1.

Based on the findings from the soil gas survey, utility and geophysical surveys, a preferential contaminant migration pathway does not appear to exist along the storm drain utility corridor.

Proposed Site Investigation

Based on the findings, this addendum recommends adjusting the boring locations proposed in the *Conceptual Site Model and Work Plan* (ERS January 2013) and the *Addendum to the Conceptual Site Model and Work Plan* (ERS May 2013). The following changes are recommended:

- Based on the geophysical survey results, six soil borings are proposed in the former service station area as shown in Figure 4. These soil borings are designed to evaluate the presence of residual vadose zone contamination in the area of the former USTs, dispenser island, and backfilled area.
- Five temporary soil gas wells to a depth of 5 feet bgs are proposed at the locations shown in Figures 2 and 4 to assess potential vapor intrusion risk. In the event that access to the courtyard location is restricted, an additional temporary soil gas well will be installed at the southern location on 18th St to 16 feet bgs because the courtyard has been measured to be approximately 11 feet bgs.
- Six grab ground water samples are proposed as shown in Figure 4. Soil samples will be collected at these locations and logged for lithology and screened with a PID to determine an appropriate ground water sampling depth. Grab ground water samples will be collected through dual tube sampling equipment to prevent cross contamination between zones.

The proposed work is a guide to investigation and is subject to change depending on actual field conditions and investigation findings. All fieldwork will be performed under the supervision of a California Professional Geologist.

We hope this Addendum meets your needs. Please call me at 925-426-1112 with your comments.

Regards,

Applied Water Resources

Tyson Fulmer
Project Geologist

TYSON R. FULMER
No. 9062
Exp. 11/30/14
TRF

Distribution List

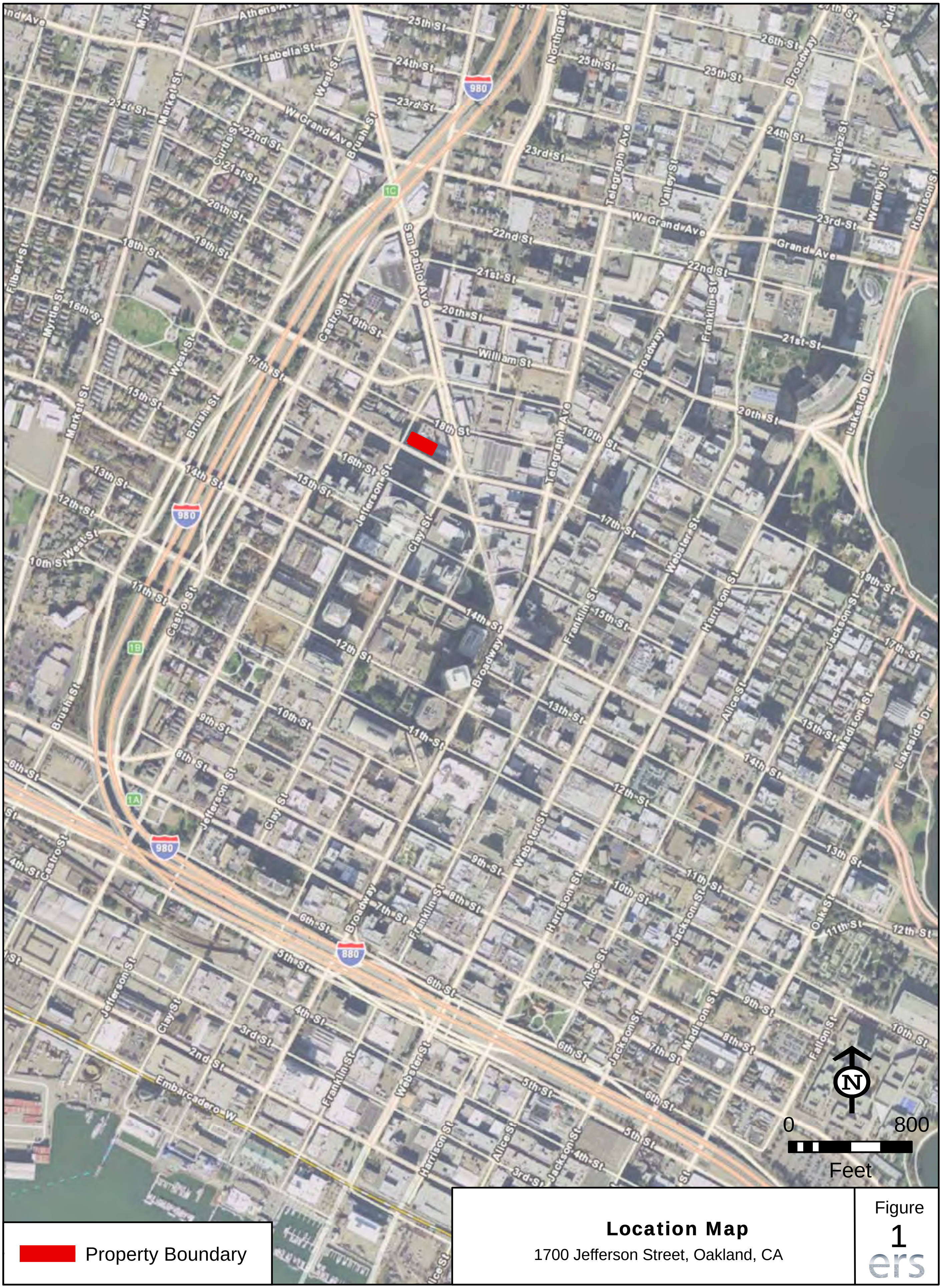
Matthew Westbrook
ARC Document Solutions
1981 N. Broadway, Suite 385
Walnut Creek CA 94596

Figures:

Tables

Appendices

FIGURES



🟥 Property Boundary

Location Map

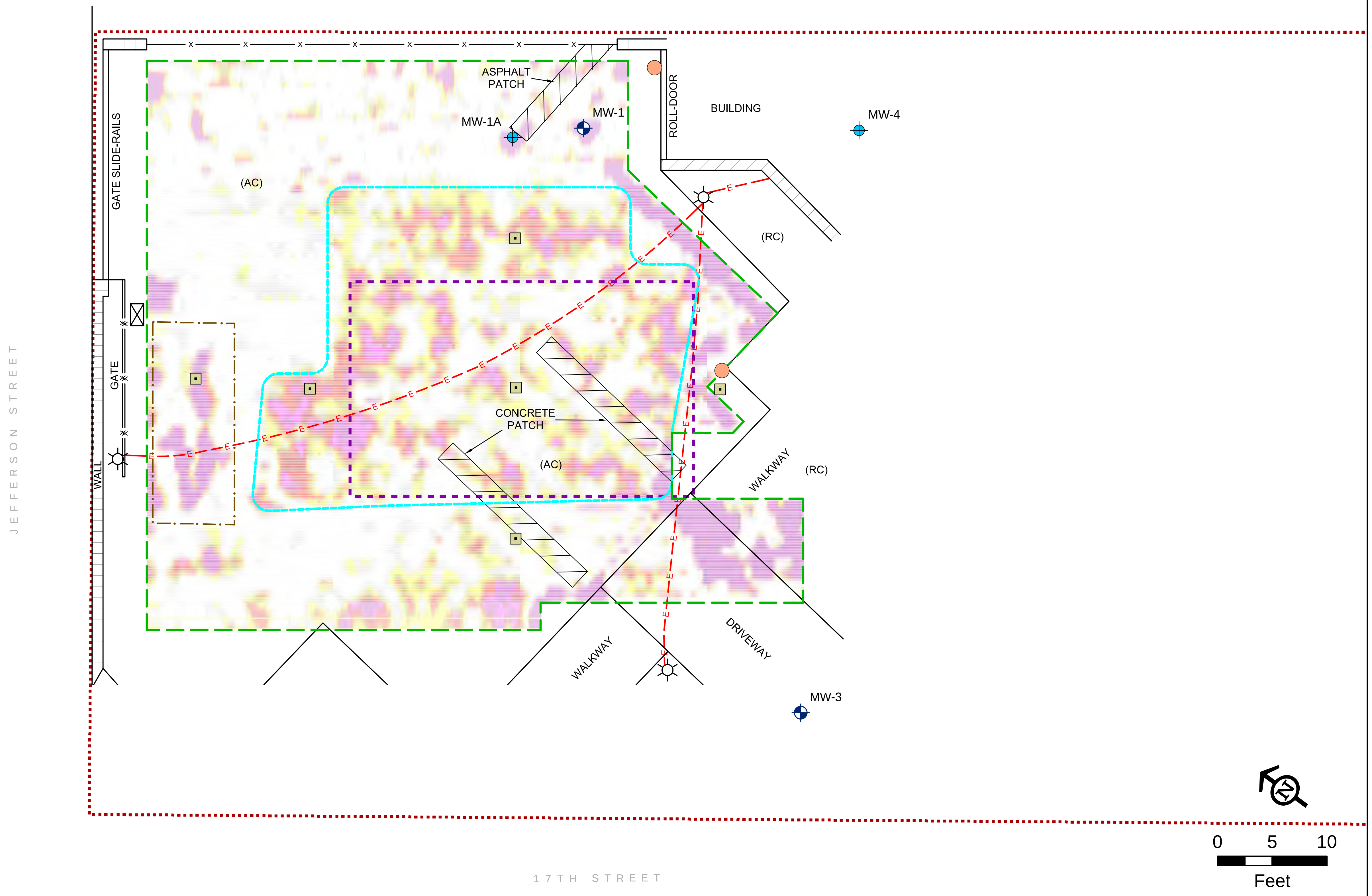
1700 Jefferson Street, Oakland, CA

Figure

1

ers

Enivoronmental Risk Specialties Corporation



Base Map Source: NORCAL Plate 4

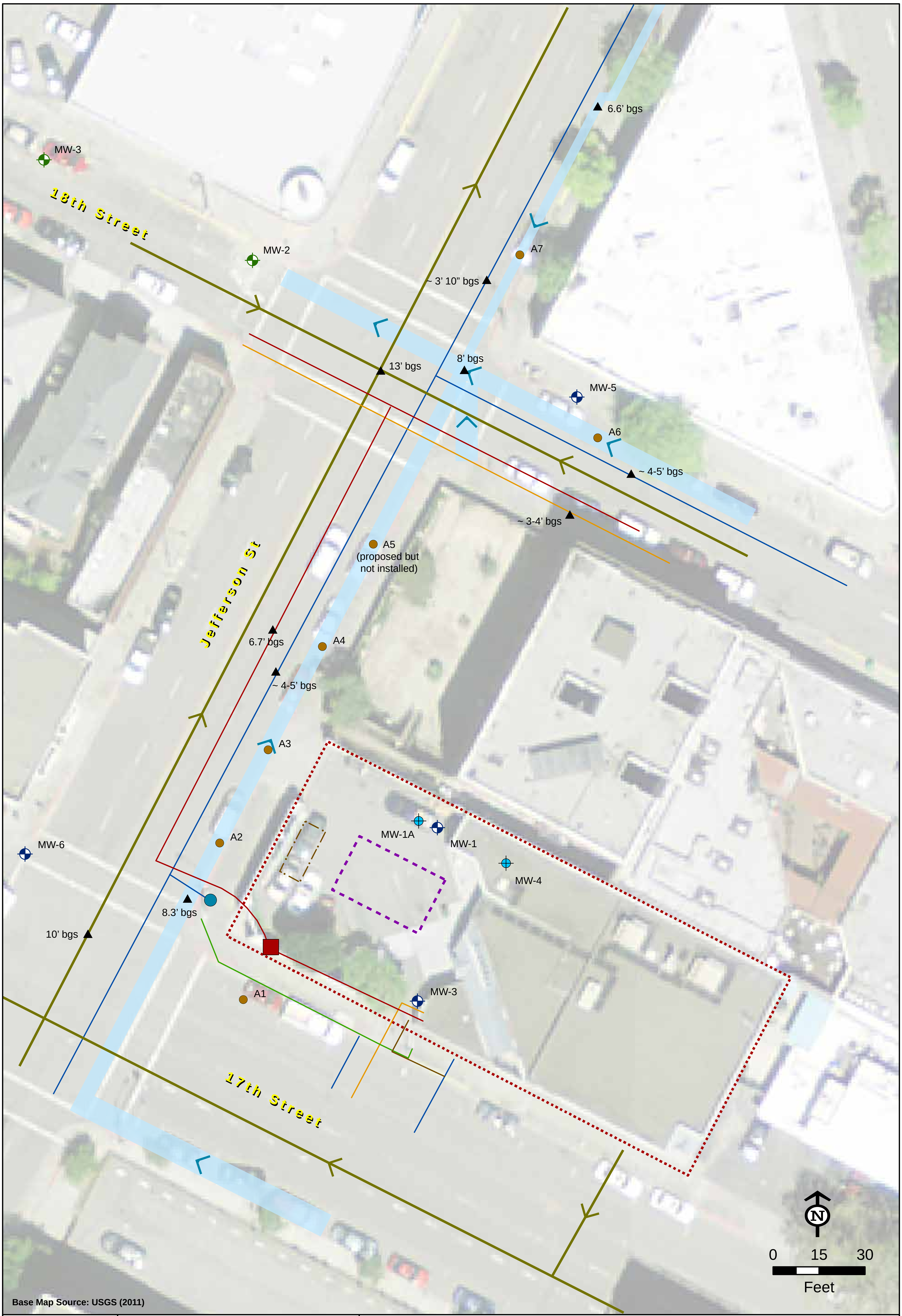
APPLIED WATER RESOURCES

Figure - 2

Ground-Penetrating Radar Overview

1700 Jefferson Street, Oakland, CA

●	Proposed Soil Gas Well
▣	Proposed Soil Sample
▼	Proposed Ground Water Sample
⊕	Monitor Well
⊕	Extraction Well
▭	Former Dispenser Island (approx)
▭	Tank Removal Excavation Area (approx)
▭	Property Boundary
— —	Limits of GPR Survey
⬭	GPR Anomaly Interpreted as Possible Backfill Zone
—E—	Electric Line
—x—	Fence
☒	Gate Control Fence
(AC)	Asphalt
(RC)	Reinforced Concrete



Base Map Source: USGS (2011)

APPLIED WATER RESOURCES

Figure - 3

Soil Gas Boring Locations

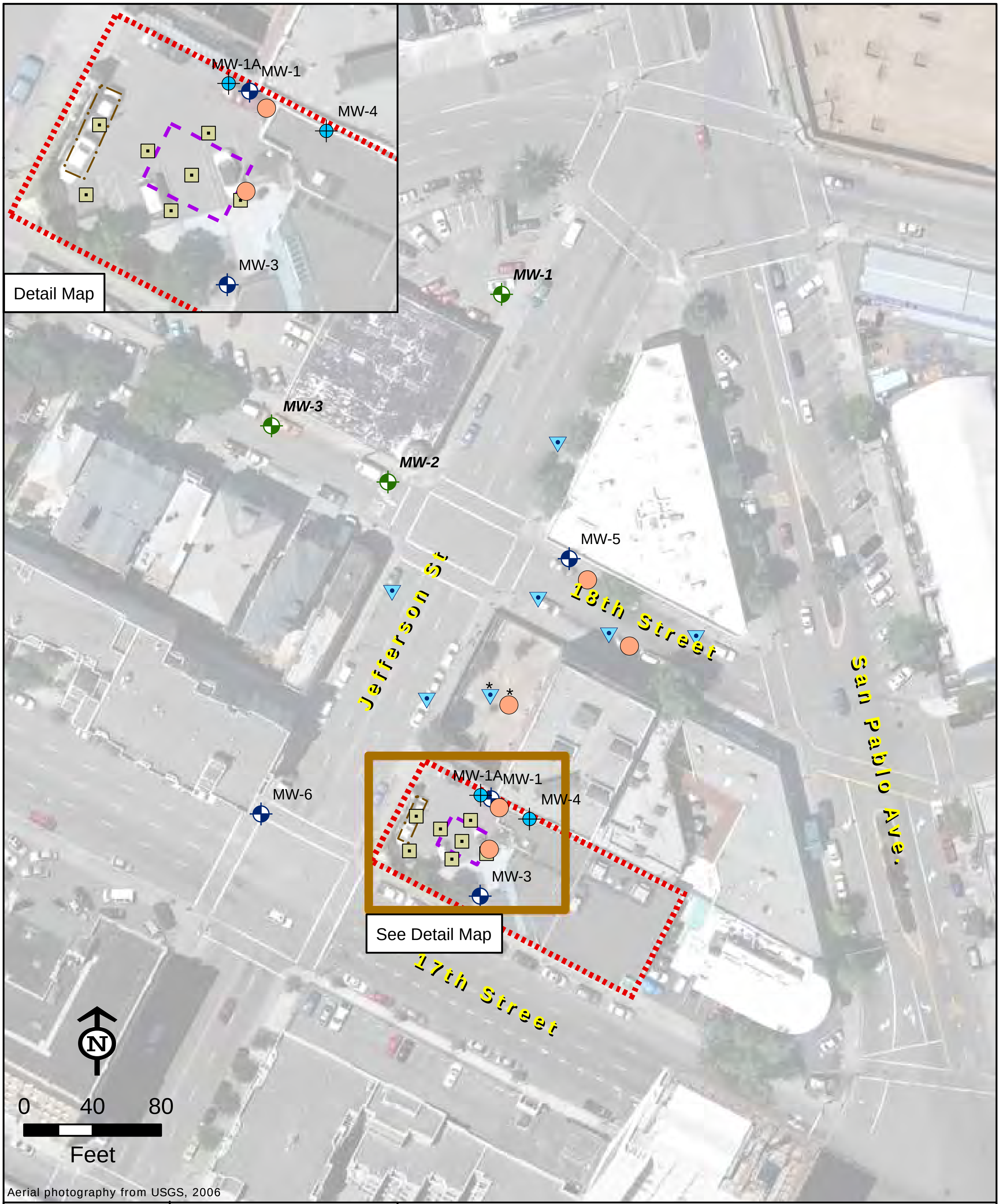
1700 Jefferson Street, Oakland, CA

- ● Soil Gas Boring Locations
- ⊕ Monitor Well
- ⊕ Extraction Well
- ⊕ 612 18th Street Monitor Well
- ● Hydrant
- ■ Transformer

Utlity Lines (Surveyed Limits)

- — AT & T
- — Street Lighting
- — Electrical
- — Gas
- — Sanitary Sewer
- — EBMUD Water
- ▭ Storm Drains

- ▲ Utility Line Depths
- ⬚ Former Dispenser Island (approx)
- ⬚ Tank Removal Excavation Area (approx)
- ⬚ Property Boundary



Aerial photography from USGS, 2006

APPLIED WATER RESOURCES

Figure - 4

Proposed Sampling Locations

1700 Jefferson Street,
Oakland, CA

● Proposed Soil Gas Well
▣ Proposed Soil Sample
▽ Proposed Ground Water Sample
⊕ Monitor Well
⊕ Extraction Well
⊕ 612 18th Street Monitor Well
– – Tank Removal Excavation Area (approx)
▪▪▪▪ Property Boundary
⬚ Former Dispenser Island (approx)

* = If Access Allowed

TABLES

Table 1
Soil Gas Screening and Sample Analytical Results
1700 Jefferson St, Oakland, CA

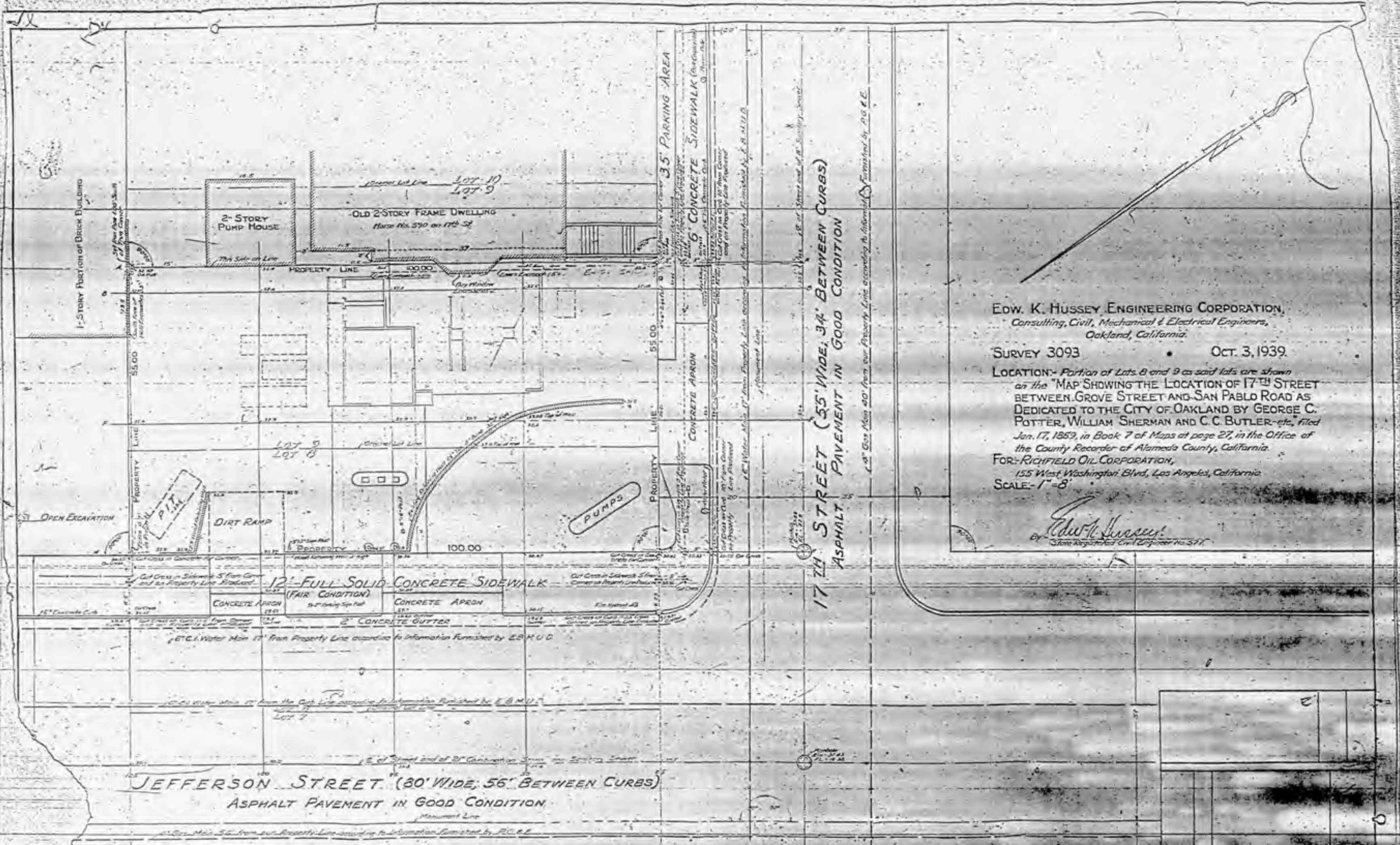
Location ID	Sample Date	Maximum PID Concentration	Acetone	Carbon Disulfide	n-Hexane	2-Butanone	Tetrahydrofuran	Cyclohexane	Benzene	n-Heptane	4-Methyl-2-Pentanone	Toluene	Ethylbenzene	m,p-Xylenes	o-Xylene	1,2,4-Trimethylbenzene
		ppm	µg/m^3													
Environmental Screening Levels			135780000	--	--	--	--	--	420	--	--	1.30E+06	4900	440,000	440,000	--
A1	11/16/2013	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--
A2	11/16/2013	0.9	26	4.9	3.4	8.6	6.6	510	3.1	4.9	4.3	110	6	29	12	5.3
A3	11/16/2013	0.4	--	--	--	--	--	--	--	--	--	--	--	--	--	--
A4	11/16/2013	0.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--
A6	11/16/2013	0.5	--	--	--	--	--	--	--	--	--	--	--	--	--	--
A7	11/16/2013	0.6	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

ppm:	parts per million
µg/m^3	micrograms per cubic meter
PID:	photoionization detector

ESLs are derived from Table E-2 Shallow Soil Gas Screening Levels for Evaluation of Potential Vapor Intrusion for Commercial Land Use

APPENDIX A



Edw. K. Hussey Engineering Corporation,
Consulting, Civil, Mechanical & Electrical Engineers,
Oakland, California.

SURVEY 3093 • OCT. 3, 1939.

LOCATION:- *Portion of Lots 8 and 9 as said lots are shown on the* "MAP SHOWING THE LOCATION OF 17TH STREET BETWEEN GROVE STREET AND SAN PABLO ROAD AS DEDICATED TO THE CITY OF OAKLAND BY GEORGE C. POTTER, WILLIAM SHERMAN AND C.C. BUTLER-etc," *filed Jan. 17, 1869, in Book 7 of Maps at page 27, in the Office of the County Recorder of Alameda County, California.*

FOR:- *RICHFIELD OIL CORPORATION,*
155 West Washington Blvd, Los Angeles, California.

SCALE:- 1" = 8'

By- Edw. K. Hussey
State Registered Civil Engineer No. 377.

FOR OFFICE USE ONLY

HOUSING DIVISION
FIRE MARSHAL APPROVAL
SPECIAL ACTIVITY PERMIT NO.
MOVING PERMIT NO.
PORT OF OAKLAND APPROVAL
PLUMBING PERMIT NO.
HEALTH DEPT. APPROVAL
B OF Z S A ITEM NO.
H A & A B RES. NO.
ZONING OR PLANNING NO.

BUILDING & HOUSING DEPARTMENT — CITY OF OAKLAND
WRITE IN INK – FILE ALL COPIES

Inspected

DATE FILED
DATE ISSUED MAR 29 19
PERMIT NO. C77194

APPLICATION FOR PERMIT TO:

ALTER X ADD TO NEW CONSTR
REPAIR WRECK OTHER

JOB LOCATION 1700 - Jefferson St
OWNER'S NAME Mosaric Homes of California
OWNER'S ADDRESS c/o Contractor
OWNER'S PHONE NO. 357-6711

FIELD CHECK BY DATE
Approved YES
REMARKS (conditions noted)

1700 JEFFERSON ST

VALUE:
$ 4000 -

R. R. Tax $
SMIP $ .50
Address Fee $
General Fee $ 50.00
Checking Fee $
Receipt No.

ADDITIONAL COST:
$
Date

TOTAL FEES $ 10.50
Add'l Fee $
Add'l Checking Fee $
Add'l SMIP $

TOTAL VALUE:
$
TOTAL FEES $

PLAN FILED Yes ✓ No SURVEYS FILED Yes No ✓
MAP NO. 63 TRACT NAME/NO.
TYPE OF BUILDING I II III [✓ IV] V H.T. 1 hr. N
OCCUPANCY GROUP A B C D E [✓ F] G H I J
ZONING DISTRICT R C M S
FIRE ZONE [✓ 1] 2 3

ADDITION [✓ ALTERATION] REPAIR

Present use of building Service Station Families 0 Rms
Proposed use of building Service Station Families 0 Rms
Size of existing building 27 x 22' Number of stories high 1
Describe briefly all proposed construction work Relocate end wall of existing service station due to road widening by City of Oakland

Contractor (if any) Aladdin Heating Corp
1111 Aladdin Ave, San Leandro Certified Architect
Phone No. 357-6711
State License No. 64481 City License No. 67874 Licensed Civil Engineer June 74

I hereby agree to save, indemnify and keep harmless the City of Oakland and its officers, employees and agents against all liabilities, judgments, costs and expenses which may in any wise accrue against the City in consequence of the granting of this permit or from the use or occupancy of any sidewalk, street or sub-sidewalk, or otherwise by virtue thereof, and will in all things strictly comply with the conditions under which this permit is granted.

x
Signature of Applicant

NEW CONSTRUCTION

Size of new building x
Height to highest point
No. of Stories
Specific type of Occupancy
State how many buildings now on lot and give use of each
Number of Families
Size of Lot x
Material of Exterior Walls
Footing Width Depth in Ground Width of Wall Mudsill
Studs x @ ctrs. Floor Joists x @ ctrs. Ceiling Joists x @ ctrs.
Rafters x @ ctrs. Roof Covering

VALUATION OF PROPOSED WORK: $

Including all labor and material and all permanent lighting, heating, ventilating, water supply, plumbing, fire sprinkler, electric wiring and elevator equipment therein or thereon.

COST OF WORK TO BE CHECKED BEFORE FINAL INSPECTION.

Permission is hereby granted to do the work described in this application in accordance with the provisions of the Oakland Building Code and related ordinances.

Approved: LAWRENCE A. LANE
Chief Building Inspector
By

TO BE SIGNED ONLY WHEN ISSUED TO OWNER.

I hereby certify that I am the applicant for a Building Permit, and that in the performance of the work for which such permit is issued, I will not employ any person or persons in any manner so as to become subject to the provisions of the Labor Code of the State of California relating to workmens compensation insurance.

Signature of Owner

CONSTRUCTION LENDER
(If none, write none)

Name
Branch
Street Address
City State Zip

FORM 339-6 (REV 8-73) DEPARTMENT COPY

FOR INSPECTIONS TELEPHONE 273-3441

PLOT PLAN

AFFIDAVIT

I hereby make affidavit that the information contained in this application and on the plans and specifications is true and contains a correct description of the proposed work. All said work is to be done in accordance with the State Housing Act. I am authorized to act as agent for the owner.

____

Subscribed and sworn to before me this

____day of__________193__

____________________ Deputy City Clerk

REPORT OF INVESTIGATOR

PLANS CHECKED

Zoning
Setback Line
Fire Limits
Area Limit
Court Areas
Height Limit
Garage Area
Ventilation
Chimneys and Flues
Type of Frame
Exterior Walls
Floor Construction
Soil
Foundation
Retaining Walls
Engineering

APPROVED: ________________ Plan Checker

No. A81923

APPLICATION

Permit for Steel Serv Stat.

At 1700 Jefferson St (House Number)

J. J. Bunny Owner

F. E. Stolte Co Contractor

Cost $5000 Fee $20 ✓

Issued NOV 2 . .

NOV 2

Permission is hereby granted to erect, alter or repair the building described in this application in accordance with the Building Ordinances of the City of Oakland, and to the satisfaction of the Building Inspector.

Approved E. U. ROUSSELL
Chief Building Inspector

By __________

THIS PERMIT DOES NOT COVER ANY ELECTRICAL OR PLUMBING WORK.

F. O. K. ________

R. O. K. ________

W. O. K. ________

L. O. K. ________

PLASTER O. K. ________

FINAL O. K. NOV 2 [illegible] — B.

WRITE IN INK—FILE TWO COPIES

APPLICATION FOR A BUILDING PERMIT

APPLICATION IS HEREBY MADE TO THE BUILDING DEPARTMENT OF THE CITY OF OAKLAND FOR PERMISSION TO DO THE FOLLOWING WORK AT

Number 1700 Jefferson Street ~~Ave.~~

WRITE PLAINLY FULL DESCRIPTION OF WORK TO BE DONE
All new construction must be described as to size, span and spacing

Erect New Steel Service Station Bldg

Asphalt Paving, Concrete Drives

Roof Covering Steel

Rafters

Ceiling Joist

Plates

Fire Stops

Studs 1st Story

Studs 2nd Story Steel

Studs 3rd Story

Plate City Manager Permit 10924

Fl. Joist

Plates

Underpinning

Mudsill, R.W.

Foundation Concrete

Entire [illegible] work $ 5000.00
(This mus[illegible] everything necessary for complete construction of work)

Building now used as

Building to be used as Service Station By Richfield Oil Co

I hereby agree to save, indemnify and keep harmless the City of Oakland and its officers, employees and agents against all liabilities, judgments, costs and expenses which may in any wise accrue against the City in consequence of the granting of this permit, or from the use or occupancy of any sidewalk, street or sub-sidewalk or otherwise by virtue thereof, and will in all things strictly comply with the conditions under which this permit is granted.

Contractor F. C. Stolte Co. (If any)

Address 1405 San Antonio Ave

~~Architect~~ Alameda

Address

Owner J. J. Bruning

Address Concord Calif

By

Ordinance 1465 N.S., Section 86: "When a building is ready for lathing or sheathing on the inside, the Building Inspector shall be notified. The rough STUDDING SHALL NOT BE COVERED or in any way concealed from view until inspection has been made and the written approval of the Building Inspector obtained."

The department will call up Telephone No. AL 4776 if any alterations or changes are necessary on the plans submitted.

STATE LICENSE No. 26096 ~~4~~ CITY LICENSE No. 23073

Form D18—3M—10169

CITY OF OAKLAND
BUILDING AND HOUSING DEPARTMENT
INTER-DEPARTMENTAL CORRESPONDENCE

To: Fire Marshal Attention: Craig Patterson Date: 8/27/73

From: C Staton Division: Bldg

Re: Address 1700 Jefferson St

Owner Masonic Home of Ca Address Calif Phone

Contractor Aladdin Heating Co Address 1111 Aladdin Ave San Leandro Phone 357-6711

Please Reply to Following:

Any objection to a final bldg decreased in size
C71869

Signed C Staton

Title Bldg Div

REPLY

NO OBJECTION TO A FINAL ON THE ABOVE WORK.

RECEIVED
SEP 19 1973
Building and Housing Department
Building Division

Signed C Patten

Title FIRE INSP.

Date 9-18-73

ORIGINAL—RETURN TO OFFICE OF ORIGIN

[illegible] (7/60)

OAKLAND
NAL SERVICES DEPARTMENT
HALL PLAZA, ROOM 203
CALIF. 94612

BUILDING PERMIT APPLICATION

THIS IS YOUR PERMIT WHEN PROPERLY FILLED OUT, SIGNED, VALIDATED AND FEES PAID.

BUILDING ADDRESS 1700 JEFFERSON
TRACT BLOCK PAGE LOT PARCEL
NAME BLUE PRINT SERVICE COMPANY
ADDRESS 333 13TH ST. PHONE 444-6771
CITY OAKLAND ST. CA ZIP 94612.
TENANT'S NAME AND TELEPHONE NUMBER (IF APPLICABLE) NONE
NAME LICENSE #
ADDRESS PHONE
CITY ST. ZIP

( ) I hereby affirm that I am licensed under provisions of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code, and my license is in full force and effect.

LICENSE AND CLASS 383524 C-21 CITY BUSINESS TAX#
CONTRACTOR NAME THOMAS D. EYCHNER CO. INC.
ADDRESS 3430 HOLLIS 655-8000
CITY OAKLAND ST. 94608 ZIP PHONE
SIGNATURE R. M. Eychner DATE 6/2/87

I hereby affirm that I am exempt from the Contractor's License Law for the following reason (Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he is licensed pursuant to the provisions of the Contractor's License Law Chapter 9 (commencing with Sec. 7000) of Division 3 of the Business and Professions Code, or that he is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than $500):

☐ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or through his own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he did not build or improve for the purpose of sale).

☐ I, as owner of the property, am exempt from the sale requirements of the above due to: (1) I am improving my principal place of residence or appurtenances thereto, (2) the work will be performed prior to sale, (3) I have resided in the residence for the 12 months prior to completion of the work, and (4) I have not claimed exemption in this subdivision on more than two structures more than once during any three-year period. (Sec. 7044, Business and Professions Code)

☐ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractor's License Law).

☐ I am exempt under Sec. ________, B&P.C. for this reason ________

Signature of Owner or Authorized Agent Date

I hereby affirm that I have a certificate of consent to self-insure, or a certificate of Workers' Compensation Insurance, or a certified copy thereof (Sec. 3800, Lab C.).

Policy # 326768 Company Name STATE COMP FUND
☐ Certified copy is hereby furnished.
☑ Certified copy is filed with the city building inspection department.
Signature R. M. Eychner Date 6/2/87
(This section need not be completed if the permit is for one hundred dollars ($100) or less.)

I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Workers' Compensation Laws of California
Signature Date

NOTICE TO APPLICANT: If, after making this Certificate of Exemption, you should become subject to the Workers' Compensation provisions of the Labor Code, you must forthwith comply with such provisions or this permit shall be deemed revoked

I hereby affirm that there is a construction lending agency for the performance of the work for which this permit is issued (Sec. 3097, Civ. C.).
LENDERS NAME
LENDERS ADDRESS

I CERTIFY THAT I HAVE READ THIS APPLICATION AND STATE THAT THE INFORMATION GIVEN IS TRUE AND CORRECT. I AGREE TO COMPLY WITH ALL LOCAL ORDINANCES AND STATE LAWS RELATING TO BUILDING CONSTRUCTION AND I MAKE THIS STATEMENT UNDER PENALTY OF LAW. I HEREBY AUTHORIZE REPRESENTATIVES OF THIS CITY TO ENTER UPON THE ABOVE MENTIONED PROPERTY FOR INSPECTION PURPOSES. NOTICE!! THIS PERMIT WILL EXPIRE BY LIMITATION IF WORK IS NOT STARTED IN 180 DAYS OR IF WORK IS ABANDONED FOR MORE THAN 180 DAYS. DO NOT CONCEAL OR COVER ANY CONSTRUCTION UNTIL THE WORK IS INSPECTED AND THE INSPECTION IS RECORDED ON THE BACK OF THE JOB COPY OF THIS PERMIT. ALL INSPECTION REQUESTS ARE REQUIRED 24 HOURS IN ADVANCE OF THIS INSPECTION.

I hereby agree to save, indemnify and keep harmless the City of Oakland and its officers, employees and agents against all liabilities, judgments, costs and expenses which may accrue against the City in consequence of the granting of this permit or from the use or occupancy of any sidewalk, street or subsidewalk, or otherwise by virtue thereof, and will in all things strictly comply with the conditions under which this permit is granted.

☐ Contractor
☐ Owner
x R. M. Eychner Date 6/2/87
Signature of Contractor or Owner or Agent
x R.M. EYCHNER
Also PRINT NAME
☑ Authorized Agent for ☑ Contractor ☐ Owner
Address of Agent OAKLAND CA. 94608 655-8000
CITY STATE ZIP TELEPHONE

APPL. 111 25.00
BLDG 111 150.00
MICR 111 3.00
SUBTOTAL 178.00
CHECK TL 178.00
A29254 C001 R01 T13:50
06/02/87

Permit No. 38702775
Call for Inspection 273-3444

DATE ISSUED 6-2-87 DATE FILED 6/2/87

☐ NEW ☐ REPAIR ☐ ADDITION
☐ MOVE ☐ ALTERATION ☑ DEMOLITION
☐ OTHER

DESCRIBE BRIEFLY ALL PROPOSED CONSTRUCTION WORK.
DEMOLISH & REMOVE A
1 STORY GAS STATION

Plan Filed ________ Survey filed ________
Size of Bldg. 32 x 24 No. of Stories 1
Number of Units ________ Height at Highest Point 14
Proposed Use of Bldg. ________
Present Use of Bldg. GAS STATION
Number of Bldgs. on lot ________ Use of each ________
________ Lot Size ________
TYPE OF BUILDING I II III IV V F.R. H.T. 1 hr. N
OCCUPANCY GROUP A__ B__ E__ H__ I__ R__ M__
FIRE SPRINKLERS ________ SPECIAL INSPECTION REQUIRED ________
ZONING R____ C5 M____ S____
Roof Covering ________
Exterior Wall ________
Valuation of Proposed Work $ 5,000.00
Include all labor and materials, all lighting, heating, ventilation, water supply, plumbing, electrical, fire sprinklers, elevator equipment therein and thereon

FOR OFFICIAL USE ONLY

VALUE:
$ 5,000.00

Appl. Fee	$ 25
Checking Fee	$
B.H. Tax	$
Pl. Pl. Rev.	$
TOTAL	$
General Fee	$ 150.00
Checking Fee	$
State Regs	$
Mic. Sur.	$ 3.00
SMIP	$
Address Fee	$
TOTAL	$ 178.00
Add'l Fee	$
Add'l Ch Fee	$
Add'l State Regs.	$
Add'l Sur.	$
Add'l SMIP	$
TOTAL	$

ADDITIONAL COST:
$ ________
Date ________

TOTAL VALUE:
$ ________

Initial		
	LICENSE/OWNER VERIFICATION	6/2/87
R.H.D. K	ZONING & PLANNING NO.	6/2/87
JAH K	FIRE MARSHAL OVER	6/2/87
	HEALTH DEPT.	
	PORT OF OAKLAND	
	HOUSING CONSERVATION	
	MOVING PERMIT NO.	
	SPECIAL ACTIVITY NO.	
	BE&A ITEM NO.	
	HA&AB RES. NO.	
	HANDICAP APPEALS	
	OTHER	

APPL REC'D BY GMM
APPL FIELD CHKD BY ✓ DATE
PLAN CHECKED BY ✓ DATE
PLANS PROCESSED BY DATE ✓
PERMIT ISSUED BY CB
8/6/87 FINAL INSPECTION JB

PERMIT NO. 8702775
DISTRICT NO. 5
ADDRESS 1700 Jefferson
DATE FILED 6-2-87

APPROVAL REQUIRED BY ENGINEERING SERVICES DIVISION

There are no PROPOSED STREET OPENINGS, PUBLIC EASEMENTS OF RECORD

or ______________________________

in this Office which are in conflict with this application.

REMARKS: ______________________________

ENGINEERING SERVICES

By ______________________ DATE ____________

FORMS OK

ROUGH OK

FIREPLACE

WIRE (EXT.) OK

LATH (INT.) OK

GYPSUM BD. OK
PLASTER OK

FINAL OK 8/6/87

SPECIAL INSPECTION REQUIRED FOR:

WALL AT EAST SIDE
APPEARS TO BE ON
OTHER PROPERTY?

DO NOT FINAL UNTIL
UG. TANKS REMOVED OK.

CITY OF OAKLAND
INSPECTIONAL SERVICES DEPARTMENT
ONE CITY HALL PLAZA, ROOM 203
OAKLAND, CALIF. 94612

BUILDING PERMIT APPLICATION

THIS IS YOUR PERMIT WHEN PROPERLY FILLED OUT, SIGNED, VALIDATED & FEES PAID.

& OUTSIDE PC.

BUILDING ADDRESS 1700 JEFFERSON ST. 8,9,10,11
TRACT B CONDEMNED TO CITY BLOCK PAGE MAP 7 PG 27 LOT PARCEL
OWNER BPSC. - (BLUE PRINT SERVICE COMPANY)
ADDRESS 149 2ND ST. PHONE
CITY OAKLAND, ST. CA. ZIP
TENANT'S NAME AND TELEPHONE NUMBER (IF APPLICABLE) PAUL KOZG - 415-495-8700
NAME GARCIA/WAGNER LICENSE # C-9677
ADDRESS 555 SUTTER ST. PHONE 415-986-0302
CITY S.F. CA. ST. 94102 ZIP

I hereby affirm that I am licensed under provisions of Chapter 9 (commencing with Section 7000) of Division 3 of the Business and Professions Code, and my license is in full force and effect.

LICENSE # AND CLASS
CITY BUSINESS TAX #
CONTRACTOR NAME DOME CONSTRUCTION CORP.
ADDRESS 80 CAROLINA
CITY S F ST. CA ZIP 94103 PHONE 864 6140
SIGNATURE Richard S. DATE 9-25-87

I hereby affirm that I am exempt from the Contractor's License Law for the following reason (Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure, prior to its issuance, also requires the applicant for such permit to file a signed statement that he is licensed pursuant to the provisions of the Contractor's License Law Chapter 9 (commencing with Sec. 7000) of Division 3 of the Business and Professions Code, or that he is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than $500).

☐ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or through his own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he did not build or improve for the purpose of sale).

☐ I, as owner of the property, am exempt from the sale requirements of the above due to: (1) I am improving my principal place of residence or appurtenances thereto, (2) the work will be performed prior to sale, (3) I have resided in the residence for the 12 months prior to completion of the work, and (4) I have not claimed exemption in this subdivision on more than two structures more than once during any three year period. (Sec. 7044, Business and Professions Code).

☐ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractor's License Law)

☐ I am exempt under Sec. ________, B&P.C. for this reason ________

Signature of Owner or Authorized Agent Date

I hereby affirm that I have a certificate of consent to self-insure, or a certificate of Workers' Compensation Insurance, or a certified copy thereof (Sec. 3800, Lab C.).

Policy # Company Name

☑ Certified copy is hereby furnished.
☐ Certified copy is filed with the city building inspection department.

Signature Date 9/25/87

(This section need not be completed if the permit is for one hundred dollars ($100) or less.)

I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Workers' Compensation Laws of California.

Signature Date

NOTICE TO APPLICANT: If, after making this Certificate of Exemption, you should become subject to the Workers' Compensation provisions of the Labor Code, you must forthwith comply with such provisions or this permit shall be deemed revoked

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LENDERS NAME
LENDERS ADDRESS

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I hereby agree to save, indemnify and keep harmless the City of Oakland and its officers, employees and agents against all liabilities, judgments, costs and expenses which may accrue against the City in consequence of the granting of this permit or from the use or occupancy of any sidewalk, street or subsidewalk, or otherwise by virtue thereof, and will in all things strictly comply with the conditions under which this permit is granted.

☑ Contractor
☐ Owner

X Richard S. DOME CONSTRUCTION CORP Date 9-25-87
Signature of Contractor or Owner or Agent
X RICHARD S. WAGNER DOME CONST.
ALSO PRINT NAME

☑ Authorized Agent for ☑ Contractor ☐ Owner

Address of Agent 80 CAROLINA SF CA 94103 864 6140
CITY STATE ZIP TELEPHONE

Permit No 88703561
Call for Inspection 273-3444

DATE ISSUED 9-25-87 DATE FILED 9 JUNE 87

☒ NEW ☐ REPAIR ☐ ADDITION
☐ MOVE ☐ ALTERATION ☐ DEMOLITION
☐ OTHER #38765

DESCRIBE BRIEFLY ALL PROPOSED CONSTRUCTION WORK.
α 8" CMU BUILDING W/ B/U ROOF, ASPHALT PARKING LOT, LANDSCAPING, 8" CMU SITE WALLS W INTERMEDIATE FENCING FOR ACCESS & VISUAL SECURITY

Plan Filed YES Survey filed
Size of Bldg. 7,800 SQ.FT. No. of Stories 1
Number of Units N/A Height at Highest Point 16'0"
Proposed Use of Bldg. REPROGRAPHICS
Present Use of Bldg. NONE: PARKING LOT
Number of Bldgs. on lot 1 Use of each N/A
Lot Size
TYPE OF BUILDING I II III IV [✓ V] F.R. H.T. 1 hr [✓ N]
OCCUPANCY GROUP A__ B2 E__ H__ I__ R__ M__
FIRE SPRINKLERS ______ SPECIAL INSPECTION REQUIRED YES
ZONING R____ C S1 M____ S____
Roof Covering B/U/GRAVEL
Exterior Wall 8" CMU
Valuation of Proposed Work $600,000
Include all labor and materials, all lighting, heating, ventilation, water supply, plumbing, electrical, fire sprinklers, elevator equipment therein and thereon.

FOR DEPARTMENTAL OFFICIAL USE ONLY

VALUE: OUTSIDE PC	Appl. Fee	$ 25.00
	Checking Fee	$ 405.27
	F.R. Tax	$
	Pl. Pl. Rev.	$ 185.00
$600,000	TOTAL	$ 615.27
	General Fee	$ 2533.50
	Checking Fee	$
	State Regs	$ 130.03
	Sc. Sur.	$ 46.67
	SMIP	$ 35.
ADDITIONAL COST:	Address Fee	$ 20.00
$	TOTAL	$ 2785.20
Date	Add'l Fee	$
	Add'l Ch Fee	$
TOTAL VALUE:	Add'l State Regs.	$
	Add'l Sur.	$
$	Add'l SMIP	$
	TOTAL	$

INITIAL		DATE FILED
	LICENSE/OWNER VERIFICATION	9/25/87
	ZONING & PLANNING NO.	
	FIRE MARSHAL OUT	
	HEALTH DEPT.	
	PORT OF OAKLAND	
	HOUSING CONSERVATION	
	MOVING PERMIT NO.	
	SPECIAL ACTIVITY NO.	
	BE&A ITEM NO.	
	HA&AB RES. NO.	
	HANDICAP APPEALS	
	OTHER.	

APPL REC'D BY
APPL FIELD CHKD BY DATE
PLAN CHECKED BY OUTSIDE DATE
PLANS PROCESSED BY DATE 9-17-87
PERMIT ISSUED BY CZ
FINAL INSPECTION CZ

PERMIT NO. 88703561
DISTRICT NO. 3
ADDRESS 1700 JEFFERSON
DATE FILED 9 JUNE 87

BUILDING INSPECTION INSPECTIONAL SERVICES DEPARTMENT

CITY OF OAKLAND
BUILDING CERTIFICATE OF OCCUPANCY

No. 40031 BD   Print Shop   December 12, 19 88

THIS IS TO CERTIFY that the GROUP B1 TYPE VN (1) One STORY building

at 1700 Jefferson which is owned

by
BPYC
149 - 2nd Street
Oakland, CA 94606

in FIREZONE ________ USE ZONE C51 , OHC Variance No. ________ Dated ________

Building Permit No. B8703561 Building Completion Date 11/04/88 has been inspected

and the following occupancy thereof is hereby authorized:

Occupancies:	Number Habitable Rooms
Cellar	
Basement	
1st Story 1 Office, 3 Photo Rooms, 2 Water Closets, 1 Production Area	0
____ Story	
____ Story	
____ Story	
____ Story	
____ Add Story as necessary	

Prior Cert. of Occup. ________ Date ________ TOTAL 0

Prior Cert. of Occup. void on ________ Rental Units (Yes or No) No

Re-Inspt. Dates ________ License (Yes or No) ________

PARKING: Number of Detached Off-Street
Parking spaces provided:
(4) Four

Chief Building Inspector

The Certificate of Occupancy shall not be construed as authority to violate, cancel, alter or set aside any of the provisions or requirements of any laws or ordinances of the City of Oakland nor shall such issuance thereafter prevent requiring corrections of errors or of violations of any applicable law or ordinance of the City of Oakland.

Necessary licenses shall be obtained, as this Certificate does not of itself constitute a license.

INSULATION CERTIFICATION

This is to certify that insulation has been installed in conformance with the current energy regulations, California Administrative Code, Title 25, State of California, in the building located at:

SITE ADDRESS: City Blue Print MFG. Oakland

Sound and
EXTERIOR WALLS
Manufacturer Owens Corning Thickness/Type 3½ Batt R-Value 11

CEILINGS
BATTS: Manufacturer Owens Corning Thickness/Type 3½ batt R-Value 11
Metal Roof Deck ~~BLOWN:~~ Manufacturer Owens Corning Thickness/Type 2" 705 FS 25 Foil R-Value 8.7
Wt./Bag ____ Sq.Ft. Covered ____ # Bags Used ____

FLOORS
Manufacturer ____ Thickness/Type ____ R-Value ____

GENERAL CONTRACTOR: Dome Construction LICENSE #: ____
BY: ____ TITLE ____ DATE: ____

COAST INSULATION COMPANY, A DIVISION OF
SCHMID INSULATION CONTRACTORS, INC. LICENSE #: 466440 C-2
BY: Robert Manoe TITLE: General Manager DATE: 7-20-88

INSULATION CERTIFICATION

This is to certify that insulation has been installed in conformance with the current energy regulations, California Administrative Code, Title 25, State of California, in the building located at:

SITE ADDRESS: City Blue Print MFG. Oakland

Sound and
EXTERIOR WALLS
Manufacturer Owens Corning Thickness/Type 3½ Batt R-Value 11

CEILINGS
BATTS: Manufacturer Owens Corning Thickness/Type 3½ Batt R-Value 11
Metal Roof Deck ~~BLOWN:~~ Manufacturer Owens Corning Thickness/Type 2" 705 FS25 Foil R-Value 8.7
Wt./Bag ____ Sq.Ft. Covered ____ # Bags Used ____

FLOORS
Manufacturer ____ Thickness/Type ____ R-Value ____

GENERAL CONTRACTOR: Dome Construction LICENSE #: ____
BY: ____ TITLE: ____ DATE: ____

COAST INSULATION COMPANY, A DIVISION OF
SCHMID INSULATION CONTRACTORS, INC. LICENSE #. 465440 C-2
BY: Robert Manoe TITLE: General Manager DATE: 7-20-88

CITY OF OAKLAND
BUILDING AND HOUSING DEPARTMENT
Building Division
City Hall - 1421 Washington Street
Oakland, CA 94612

SUBJECT: TEMPORARY CERTIFICATE OF OCCUPANCY

A Temporary Certificate of Occupancy is requested for the following portion(s) of the building at:

(Address) 1700 JEFFERSON (Permit No.) B8703561

Describe requested area by floor, room, or other method: NEW BUILDING B-1

Length of Time Requested: 60

I will submit this form to the Building Section of the Building and Housing Department after approval has been granted by ALL of the agencies listed below and prior to the temporary occupancy of the area(s) described above.

Name (Please Print) CITY BLUE GERALD A. FULTS
Address 1700 JEFFERSON
City OAKLAND State CA Zip
Phone Number 444-6774 Date 7-19-88
Signature of Requestee

To the Personnel of the following agencies: Please sign and date where indicated if above request has been approved by you. If you cannot approve the request, indicate why not, IN PENCIL, under "Remarks." If additional space is needed under "Remarks," use back side or attach another sheet and so note.

Agency	Phone No.	When Approved Sign and Date	Remarks
Fire Prevention Bureau	273-3851	Christie Myers 7/20/88	
Plumbing Section	273-3291	R J Holmes 7-19-88	- Temp o/k
WALTER HAIRE Mechanical Section	273-3291 273 3442	J Walter 7/21/88	
JIM WILLIAMS Electrical Section	273-3341	James Williams 7/19/88	
Zoning Division	273-3911	B. Quesada 7-19-88	
Engineering - Underground	273-3437	Eng Services 7/19/88 Sewers Sidewalks 7/19/88	
Building Section	273-3441	Carl Zavattero 7-21-88	

Other:

12/3/81

APPROVALS FOR OFFICE USE ONLY
Check Each Item

Port of Oakland
Freeway Review

Board of Examiners & Appeals
Zoning or Planning C-51 1-30-79

INSPECTIONS:

PLAN FILED Yes ☑ No ☐

This is a new sign bearing the U. L. Seal of Inspection. Yes ☒ No ☐

This is an existing sign and will require an inspection and seal of approval by Oakland Electrical Inspection Division before being erected. Yes ☐ No ☒

This sign is not being erected to be viewed primarily from a freeway, or Bay Area Rapid Transit System.

(Signature)

INSPECTIONAL SERVICES DEPARTMENT — CITY OF OAKLAND

APPLICATION FOR SIGN PERMIT

Write in Ink—File All Copies—Circle Type of Sign

ELECTRIC [✓ NON-ELECTRIC] TEMPORARY

[✓ Ground Sign] Wall Sign Roof Sign

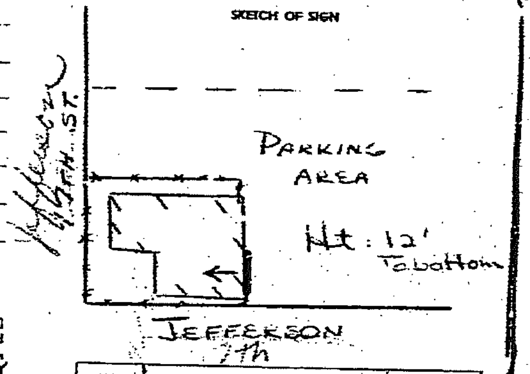
Combination Sign Marquee Sign Sign Tower

Projecting Sign Other (Describe) Billboard

Size 12' x 25' Weight

Transformers, Number and V. A.

SKETCH OF SIGN



NO.		SIZE
	Bolts	
	Lag Screws	
	Turn Buckles	
	Guy Wires	
	Top Wires	
	Angle Iron	
	Flat Iron	
Projection from Building		
Height above Sidewalk		24'

FILE COPY

1700 JEFFERSON ST.

Date FEB 1 1979 Bldg. Per. No. 39679

Zone Map No. 63 Elec. Per. No.

Job Location

Owner FOSTER + KLEISER

Address 1601 MARITIME ST
OAKLAND

Phone No. 835-5900

Sign Contractor SAME AS ABOVE

Address

Phone No. 835-5900

State License 2918 City License 5-70

VALUE:	FEES:	
$ 300.00	Sign Permit	$ 10–
	Checking	$
	Total	$ 10–
	Electrical	$

I hereby agree to save, indemnify and keep harmless the City of Oakland against all liabilities, judgments, costs and expenses which may in any wise accrue against the said city in consequence of the granting of this permit, or in consequence of the use or occupancy of any sidewalk, street or other public place, or in any other wise by virtue thereof, and will in all things strictly comply with the conditions of this permit, and with all ordinances, rules and regulations of the City of Oakland relating to the installation of signs.

Signature of Applicant

Approved:

Chief Building Inspector

By

Supervising Electrical Inspector

By

FOR BUILDING INSPECTIONS TELEPHONE 273-3441
FOR ELECTRICAL INSPECTIONS TELEPHONE 273-3341

Y OF OAKLAND
INSPECTIONAL SERVIC ARTMENT
CITY HALL 11TH FLOOR
14TH & WASHINGTON ST.
OAKLAND, CALIF. 94612
PHONE (415) 273-3341

ELEC 112 428.50
APPL 111 25.00
MICR 111 9.07
SUBTOTAL 462.57
CHECK TL 462.57
#40510 C001 R01 T17:03
10/22/87

ELECTRICAL PERMIT APPLICATION

THIS IS YOUR PERMIT WHEN PROPERLY FILLED OUT SIGNED & VALIDATED.

BUILDING ADDRESS 1700 JEFFERSON
TRACT BLOCK PAGE LOT PARCEL
NAME BLUE PRINT SERVICE CO
ADDRESS 149 2ND ST. SF PHONE
CITY ST ZIP 94103
NAME GARCIA / WAGNER LICENSE #
ADDRESS 545 SUTTER ST. PHONE
CITY S.F. 94102 ZIP

LICENSE # AND CLASS 292464 CITY BUSINESS TAX # 4179471
CONTRACTOR NAME Jacobs ELECTRIC
ADDRESS 3318 17th ST.
CITY S.F. ST. ZIP 94110 PHONE 626-7521
SIGNATURE DATE

I hereby affirm that I am exempt from the Contractor's License Law for the following reason (Sec. 7031.5, Business and Professions Code: Any city or county which requires a permit to construct, alter, improve, demolish, or repair any structure prior to its issuance, also requires the applicant for such permit to file a signed statement that he is licensed pursuant to the provisions of the Contractor's License Law Chapter 9 (commencing with Sec. 7000) of Division 3 of the Business and Professions Code or that he is exempt therefrom and the basis for the alleged exemption. Any violation of Section 7031.5 by any applicant for a permit subjects the applicant to a civil penalty of not more than five hundred dollars ($500).):

☐ I, as owner of the property, or my employees with wages as their sole compensation, will do the work, and the structure is not intended or offered for sale (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who does such work himself or through his own employees, provided that such improvements are not intended or offered for sale. If, however, the building or improvement is sold within one year of completion, the owner-builder will have the burden of proving that he did not build or improve for the purpose of sale.).

☐ I, as owner of the property, am exclusively contracting with licensed contractors to construct the project (Sec. 7044, Business and Professions Code: The Contractor's License Law does not apply to an owner of property who builds or improves thereon, and who contracts for such projects with a contractor(s) licensed pursuant to the Contractor's License Law.).

☐ I am exempt under Sec. ______, B.&P.C. for this reason ______

Signature Date

I hereby affirm that I have a certificate of consent to self-insure, or a certificate of Workers' Compensation Insurance, or a certified copy thereof (Sec. 3000, Lab. C.).

Policy # ______ Company Name ______

☐ Certified copy is hereby furnished.
☒ Certified copy is filed with the city building inspection department ✓
Signature Date

(This section need not be completed if the permit is for one hundred dollars ($100) or less.)
I certify that in the performance of the work for which this permit is issued, I shall not employ any person in any manner so as to become subject to the Workers' Compensation Laws of California.

Signature Date

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LENDERS NAME ______
LENDERS ADDRESS ______

I CERTIFY THAT I HAVE READ THIS APPLICATION AND STATE THAT THE INFORMATION GIVEN IS TRUE AND CORRECT. I AGREE TO COMPLY WITH ALL LOCAL ORDINANCES AND STATE LAWS RELATING TO BUILDING CONSTRUCTION AND I MAKE THIS STATEMENT UNDER PENALTY OF LAW. I HEREBY AUTHORIZE REPRESENTATIVES OF THIS CITY TO ENTER UPON THE ABOVE MENTIONED PROPERTY FOR INSPECTION PURPOSES. NOTICE!! THIS PERMIT WILL EXPIRE BY LIMITATION IF WORK IS NOT STARTED IN 90 DAYS OR IF WORK IS ABANDONED FOR MORE THAN 90 DAYS. DO NOT CONCEAL OR COVER ANY CONSTRUCTION UNTIL THE WORK IS INSPECTED AND THE INSPECTION IS RECORDED ON THE BACK OF THE JOB COPY OF THIS PERMIT. ALL INSPECTION REQUESTS ARE REQUIRED 24 HOURS IN ADVANCE OF THE INSPECTION.

☑ Contractor
☐ Owner
X ______ Date 10-22-87
Signature of Contractor Owner or Agent

☐ Agent for ☑ Contractor ☐ Owner

Address of Agent ______ CITY STATE ZIP TELEPHONE

PTS

DATE ISSUED 10/22/87 APPROVED BY MR

☒ NEW ☐ REPAIR ☐ ADDITION
☐ MOVE ☐ ALTERATION ☐ DEMOLITION
☐ OTHER

REMARKS
NEW BUILDING

15 SERVICE 600 WIRE 4 VOLTS 208 SYSTEM
2-W METERS ______ 3-W METERS ______ 4-W METERS ______

REF	DESCRIPTION	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
15	SERVICE	1			20	—
16	METERS (EXTRA)					
17	CIRCUITS	90			180	—
2	APARTMENTS					
18	OUTLETS (ROUGH)	120		.50	60	—
21	FIXTURES	71			42	—
22	SWITCHES	21		.50	10	50
23	RECEPTACLES	47				
3	RANGE					
4	DRYER					
4	RANGE TOP					
4	OVEN					
5	FAN (EXHAUST)					
6	DISPOSAL	1			3	00
6	DISHWASHER	1			3	00
7	AIR CONDITIONER	3			20.	—
24	HEATERS (AIR)					
24	HEATERS (WATER)					
29	FURNACE					
14	SWIMMING POOL					
8	BEVERAGE CASE					
8	FREEZER CASE					
12	VEGETABLE CASE					
9	DENTAL UNIT					
11	STERILIZER					
10	GASOLINE DISP.					
13	MOTION PICTURE MACH.					
26	SIGN (NEW)	1			20	—
27	SIGN (EXISTING)					
28	OUTLINE LIGHTING					
30	MOVED BLDG.					
31	SERVICE (TEMPORARY)					
32	MISC. APPARATUS	6			20	—
					428	50
1	APPLICATION FEE				$25.	—
	SUB TOTAL				453	50
34	MINIMUM FEE					
33	SURCHARGE 2%				9	07
	GRAND TOTAL				462	57

DATE	INSPECTION	INSPECTOR
11/24/87	UNDERGROUND	JR
	ROUGH	
	UTILITY NOTIFIED	
10/2/88	FINAL	JW

PERMIT NO. E8704603

DISTRICT NO. 4

ADDRESS 1700 JEFFERSON

ELECTRICAL INSPECTION RECORD

[illegible]/25/[illegible] Underground Rk

[illegible]/22/[illegible] Upper Rk JW

[illegible] Perimeter Walls Rk JW

4/14/88 All WALLS Rk JW

4/2/88 Progress

4/29/88 Sheetrock ceil Rk JW

5/27/88 # 763-8734 - Re. using LT Standard
as a SB.
Underground Rk JW

7/1/88 T Bar Ceil Rk

Westinghouse 800A Main GFI
Secondary FD25K

6/4/88 N/A 10:30 Am

1700 JEFFERSON ST

1

FOR OFFICE USE ONLY

HOUSING DIVISION

FIRE MARSHAL APPROVAL

SPECIAL ACTIVITY PERMIT NO.

MOVING PERMIT NO

PORT OF OAKLAND APPROVAL

PLUMBING PERMIT NO.

HEALTH DEPT. APPROVAL

B OF E & A ITEM NO.

H A B & A S REF. NO.

ZONING OR PLANNING NO. [illegible]
Legal nonconforming [illegible]
[illegible]
([illegible] area)
4-30-73

BUILDING & HOUSING DEPARTMENT — CITY OF OAKLAND
WRITE IN INK — FILE ALL COPIES

DATE FILED

DATE ISSUED APR 20 1973 PERMIT NO. C71869

APPLICATION FOR PERMIT TO:

ALTER 2 ADD TO NEW CONSTR
REPAIR WRECK OTHER

JOB LOCATION 1700 JEFFERSON ST

OWNER'S NAME MASONIC HOMES OF CALIF

OWNER'S ADDRESS CONTRACTOR

OWNER'S PHONE 7-6711

FIELD CHECK BY DATE

Approved YES

REMARKS (conditions noted)

FOR OFFICE USE ONLY

VALUE:

$ 1500

SMIP $ 50

Address Fee $

General Fee $ 15 00 Receipt No.

Checking Fee $ 9 00

TOTAL FEES $ 24 50

ADDITIONAL COST:

$ Add'l Fee $

Add'l Checking Fee $

Date

Add'l SMIP $

TOTAL VALUE:

$ TOTAL FEES $

PLAN FILED Yes ✓ No SURVEYS FILED Yes No ✓

MAP NO. 63 TRACT NAME/NO.

TYPE OF BUILDING I II III [✓ IV] V H.T. 1 hr. N

OCCUPANCY GROUP A B C D E [✓ F] G H I J

ZONING DISTRICT R G 51 M S

FIRE ZONE [✓ 1] 2 3

ADDITION [✓ ALTERATION] REPAIR

NEW CONSTRUCTION

Size of new building x

Height to highest point

No. of Stories

Number of Families

Size of Lot x

Material of Exterior Walls

Specific type of Occupancy

State how many buildings now on lot and give use of each

Footing Width Depth in Ground Width of Wall Mudsill

Studs x @ ctrs. Floor Joists x @ ctrs. Ceiling Joists x @ ctrs.

Rafters x @ ctrs. Roof Covering

VALUATION OF PROPOSED WORK: $

Including all labor and material and all permanent lighting, heating, ventilating, water supply, plumbing, fire sprinkler, electric wiring and elevator equipment therein or thereon.

COST OF WORK TO BE CHECKED BEFORE FINAL INSPECTION.

Permission is hereby granted to do the work described in this application in accordance with the provisions of the Oakland Building Code and related ordinances.

Approved: LAWRENCE A. LAIR
Building Inspector

By WG

TO BE SIGNED ONLY WHEN ISSUED TO OWNER.	**CONSTRUCTION LENDER** (If none, write none)
I hereby certify that I am the applicant for a Building Permit, and that in the performance of the work for which such permit is issued, I will not employ any person or persons in any manner so as to become subject to the provisions of the Labor Code of the State of California relating to workmen's compensation insurance.	Name Branch Street Address
Signature of Owner	City State Zip

FORM 333-4 (REV. 6-72) DEPARTMENT COPY

Present use of building SERVICE STATION Families Rms

Proposed use of building SERVICE STATION Families Rms

Size of existing building 39' x 22' Number of stories high 1

Describe briefly all proposed construction work RELOCATE END WALL
OF EXISTING SERVICE STATION DUE TO
ROAD WIDENING BY CITY OF OAKLAND.

Contractor: (if any) ALADDIN HEATING CORP Certified Architect

Address 1111 ALADDIN AVE San Leandro

Phone No. 357-6711 Licensed Civil Engineer

State License No. 614 B1 City License No. June 73

I hereby agree to save, indemnify and keep harmless the City of Oakland and its officers, employees and agents against all liabilities, judgments, costs and expenses which may in any wise accrue against the City in consequence of the granting of this permit or from the use or occupancy of any sidewalk, street or sub-sidewalk, or otherwise by virtue thereof, and will in all things strictly comply with the conditions under which this permit is granted.

Signature of Applicant

FOR INSPECTIONS TELEPHONE 273-3441

PLOT PLAN

APPROVAL REQUIRED BY OFFICE OF PUBLIC WORKS:

There are no PROPOSED STREET OPENINGS, PUBLIC EASEMENTS OF RECORD

or

In this Office which are in conflict with this application.

REMARKS:

OFFICE OF PUBLIC WORKS

By

Date 4-20-73

FORMS OK

FIREPLACE OK

WIRE (EXT.) OK

LATH (INT.) OK

GYPSUM OK

PLASTER

ROUGH OK

CCS 8/27/73
Check Plan
& [illegible]

FINAL OK CCS 9/20/73

APPROVAL REQUIRED BY OFFICE OF PUBLIC WORKS.

There are no PROPOSED STREET OPENINGS, PUBLIC EASEMENTS OF RECORD

or ______________________________

in this Office which are in conflict with this application.

REMARKS ______________________________

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OFFICE OF PUBLIC WORKS

By ______________________ Date ______________

FORMS OK

ROUGH OK

FIREPLACE OK

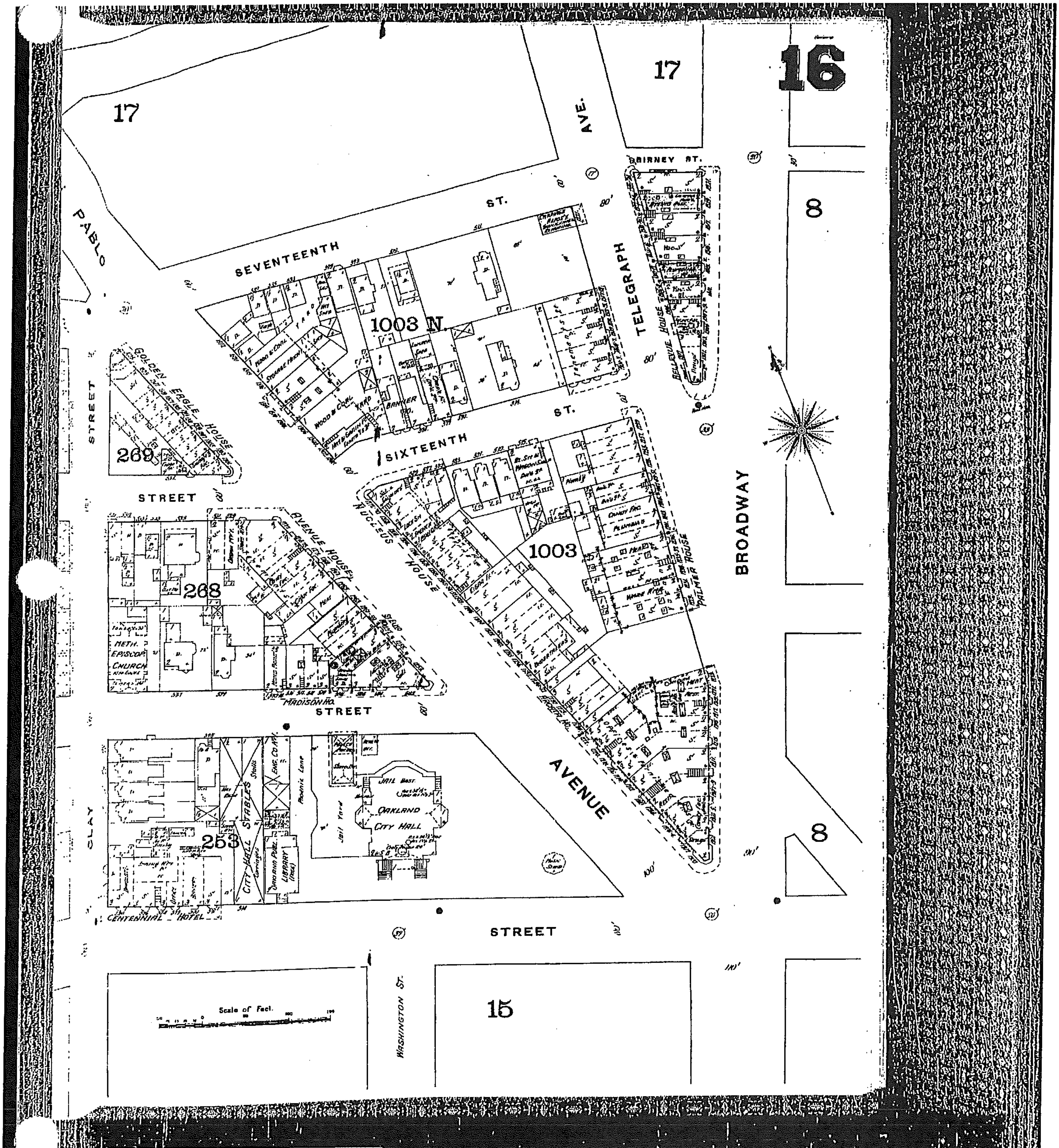
WIRE (EXT.) OK

LATH (INT.) OK

GYPSUM BD. OK
PLASTER OK

FINAL OK CES 4/10/74

PLOT PLAN



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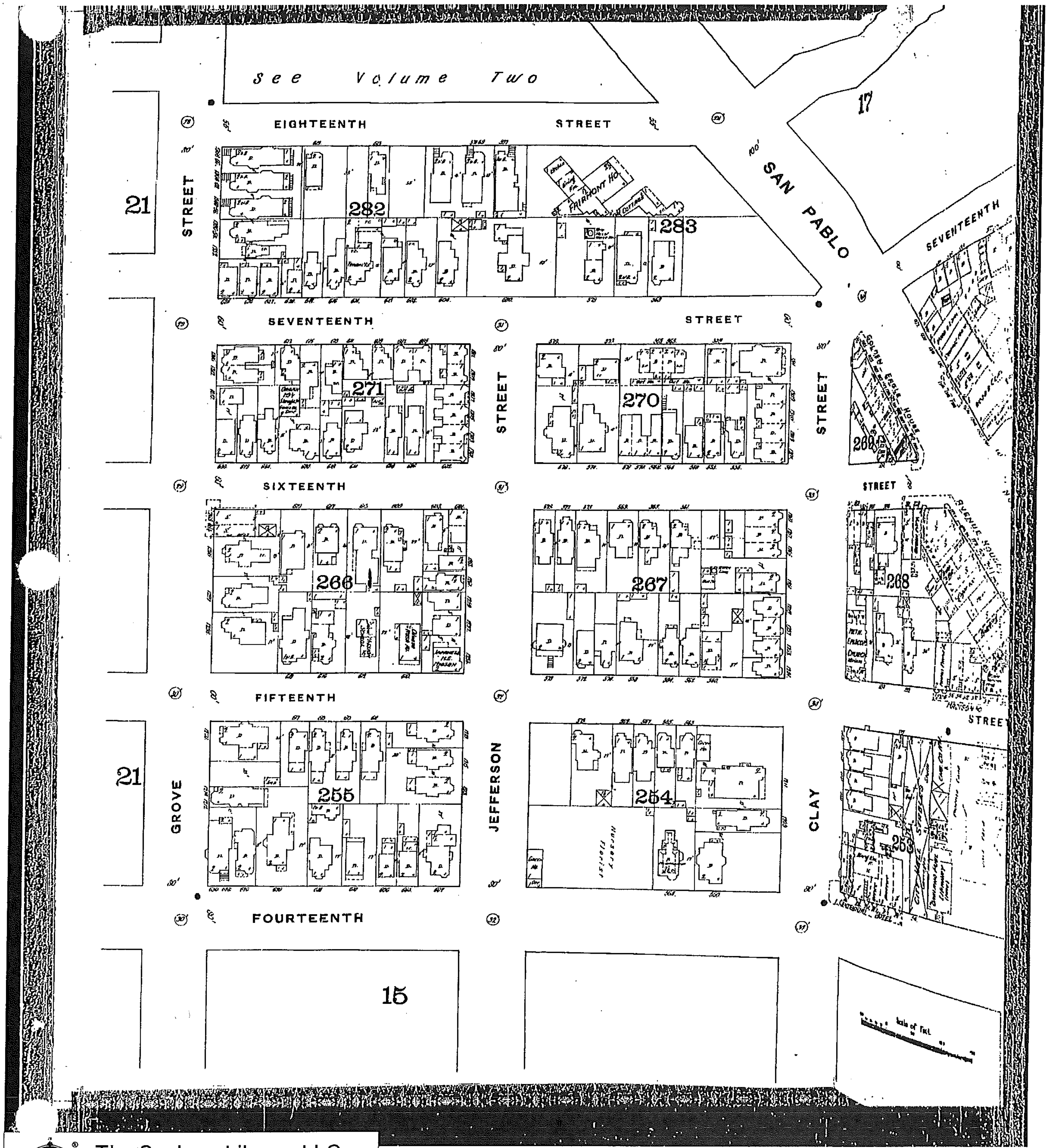
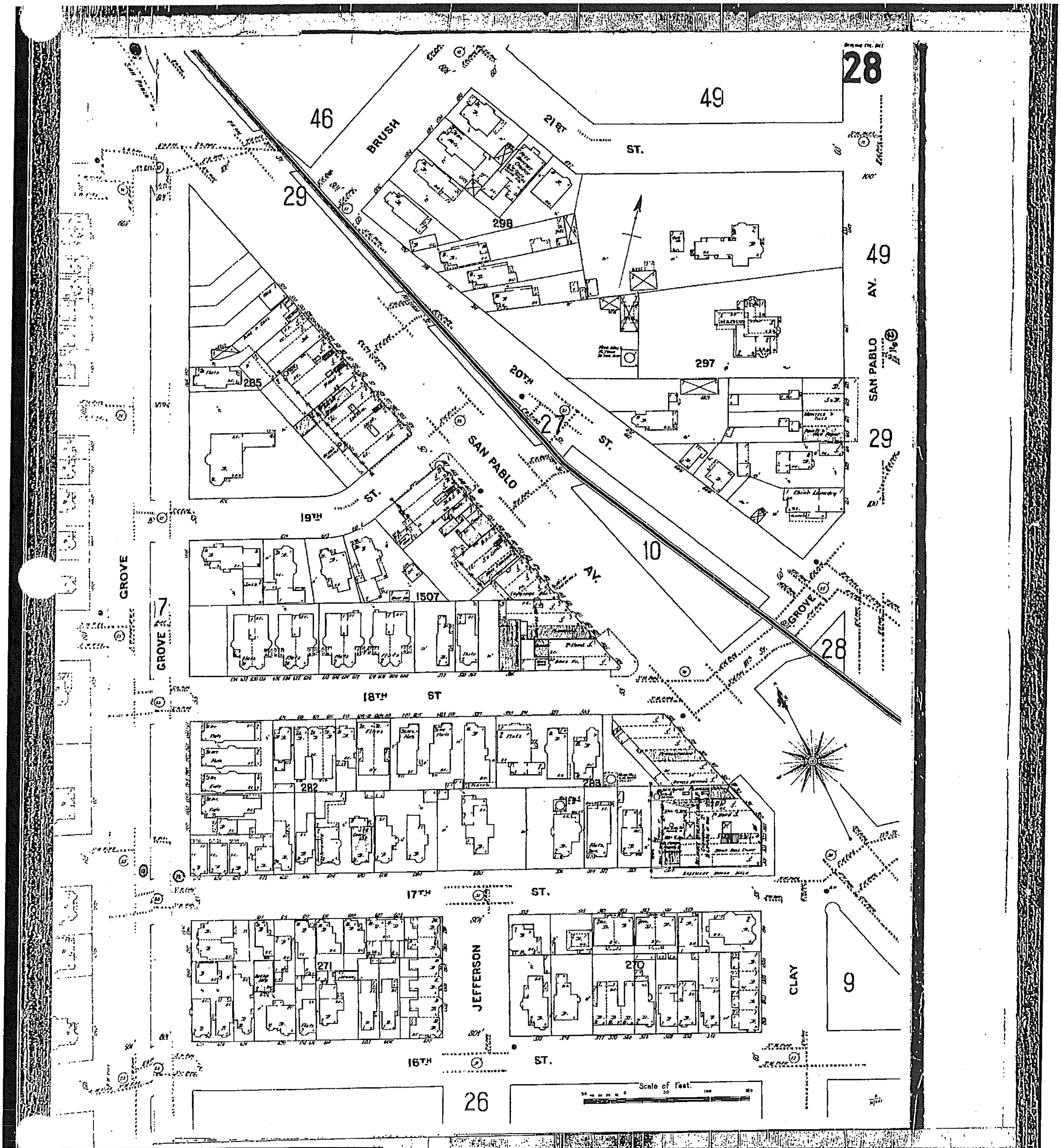
Year

TDW

EDR Research Associate



The Sanborn Library, LLC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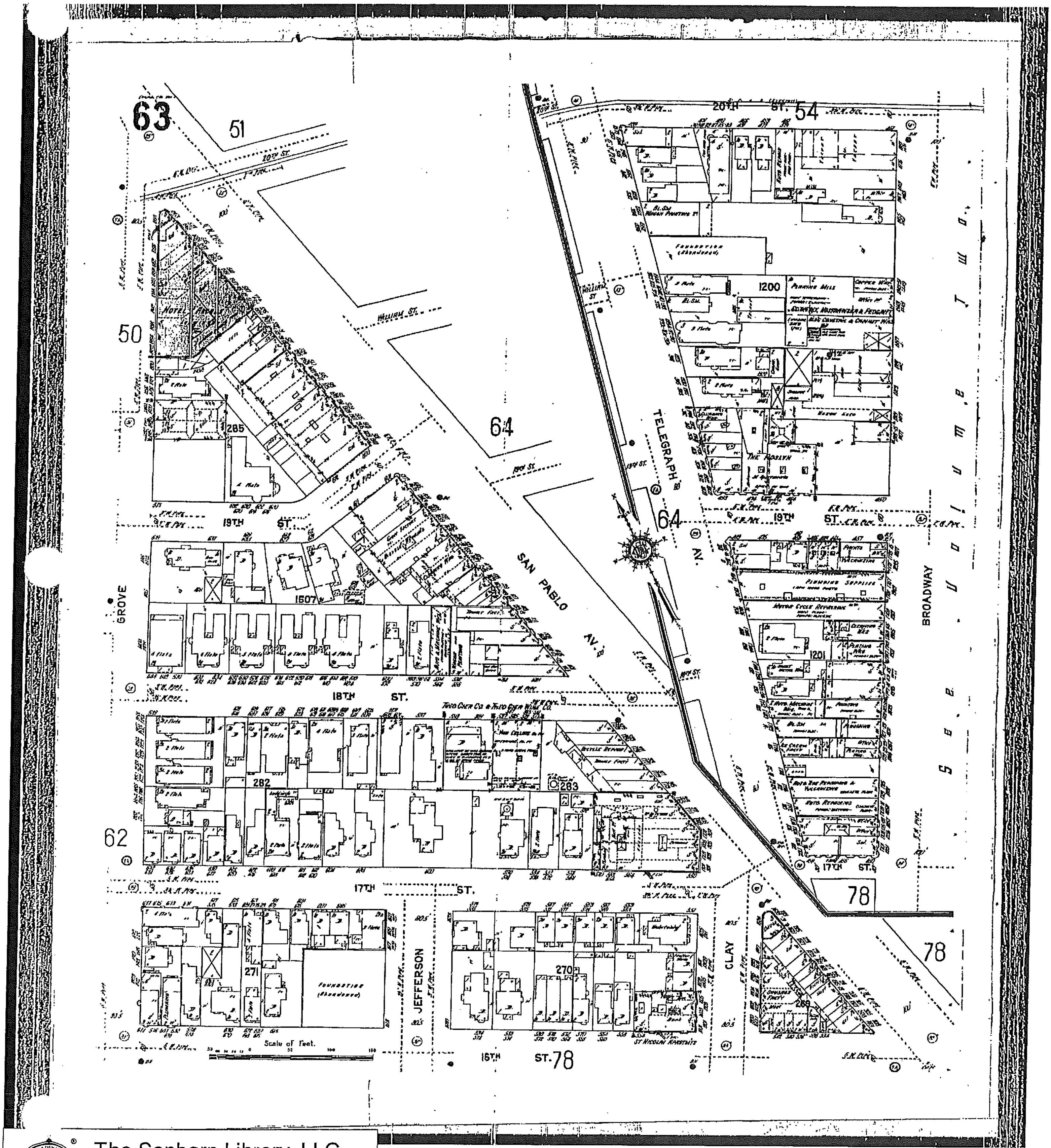

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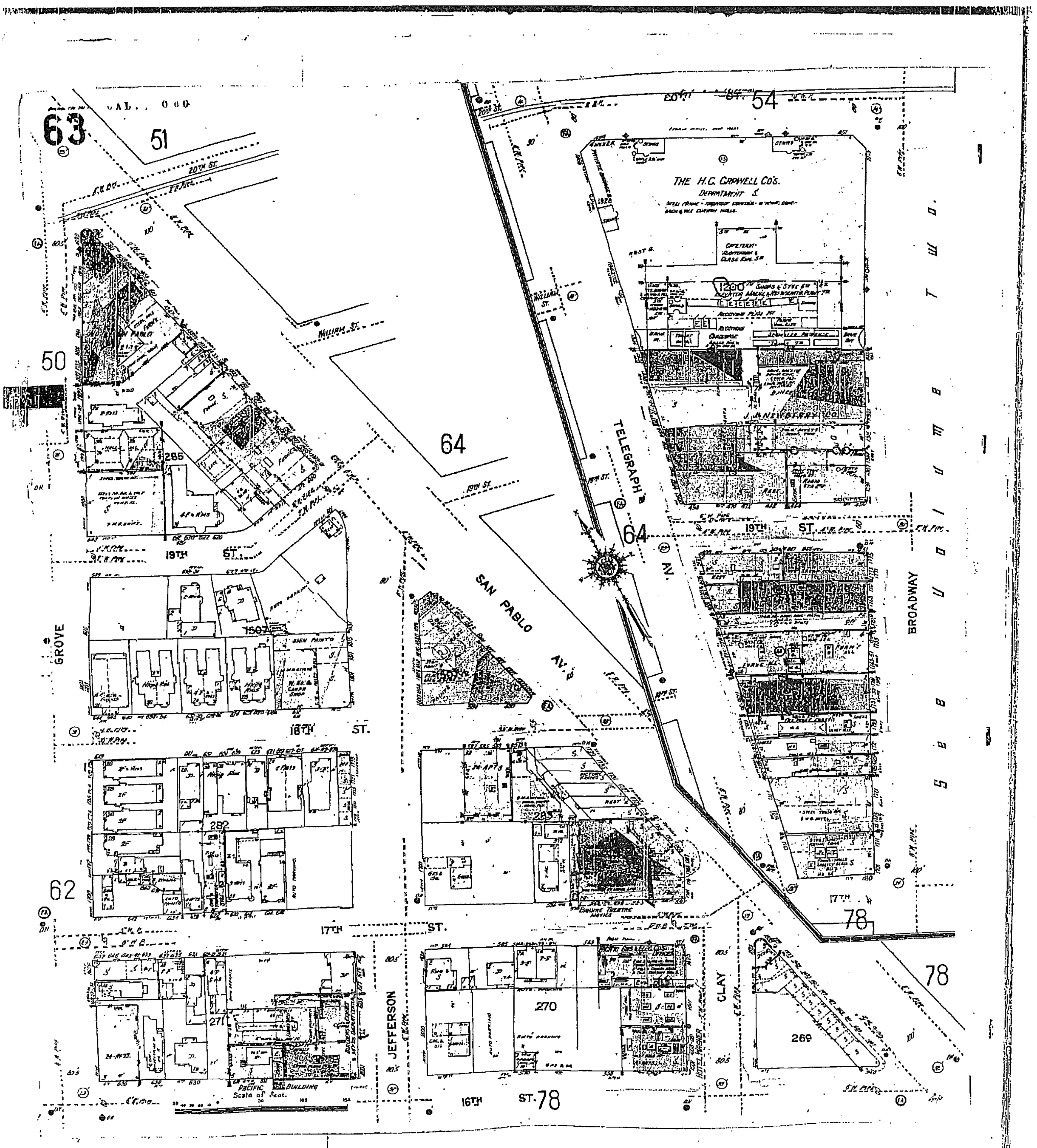

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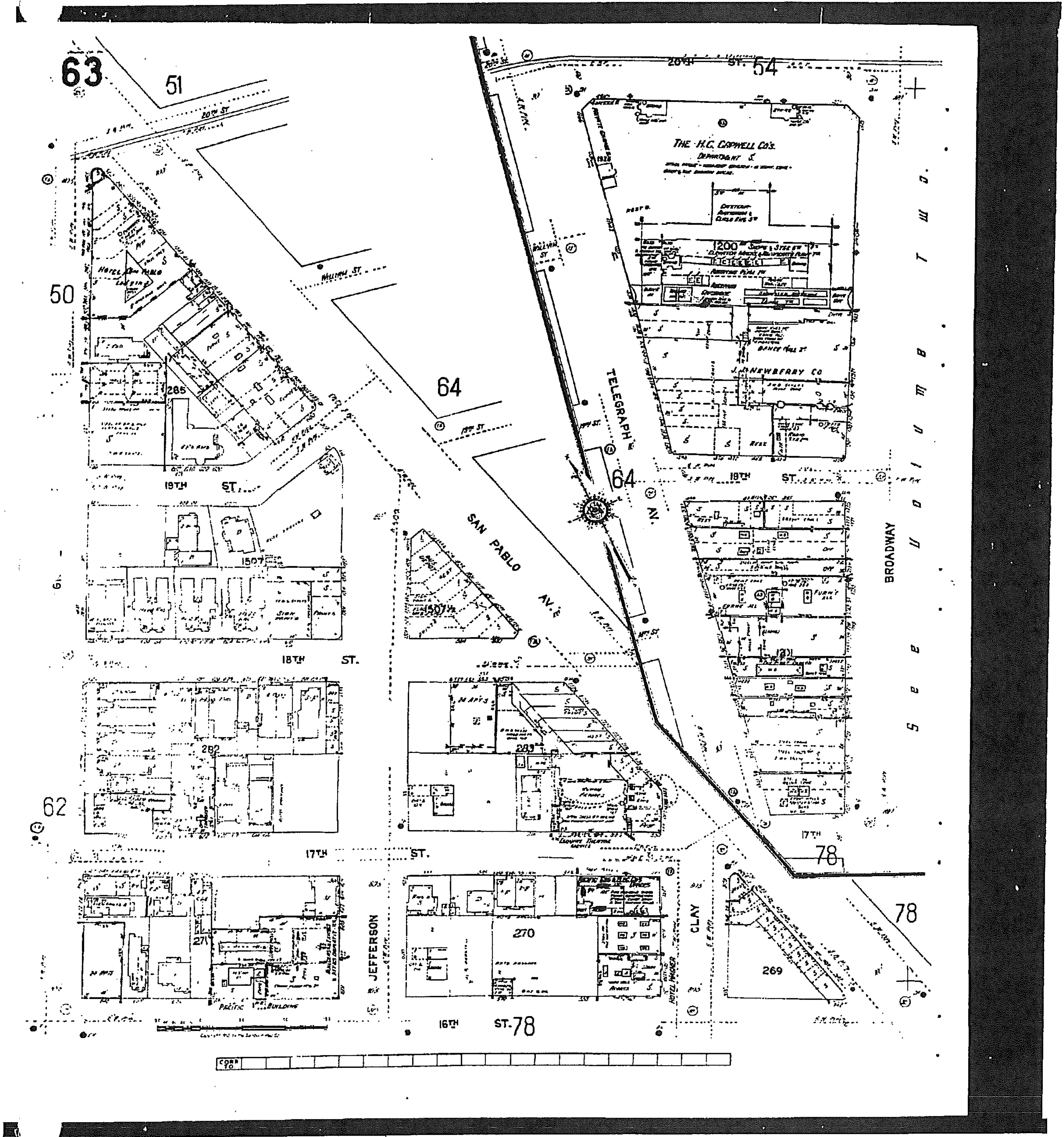

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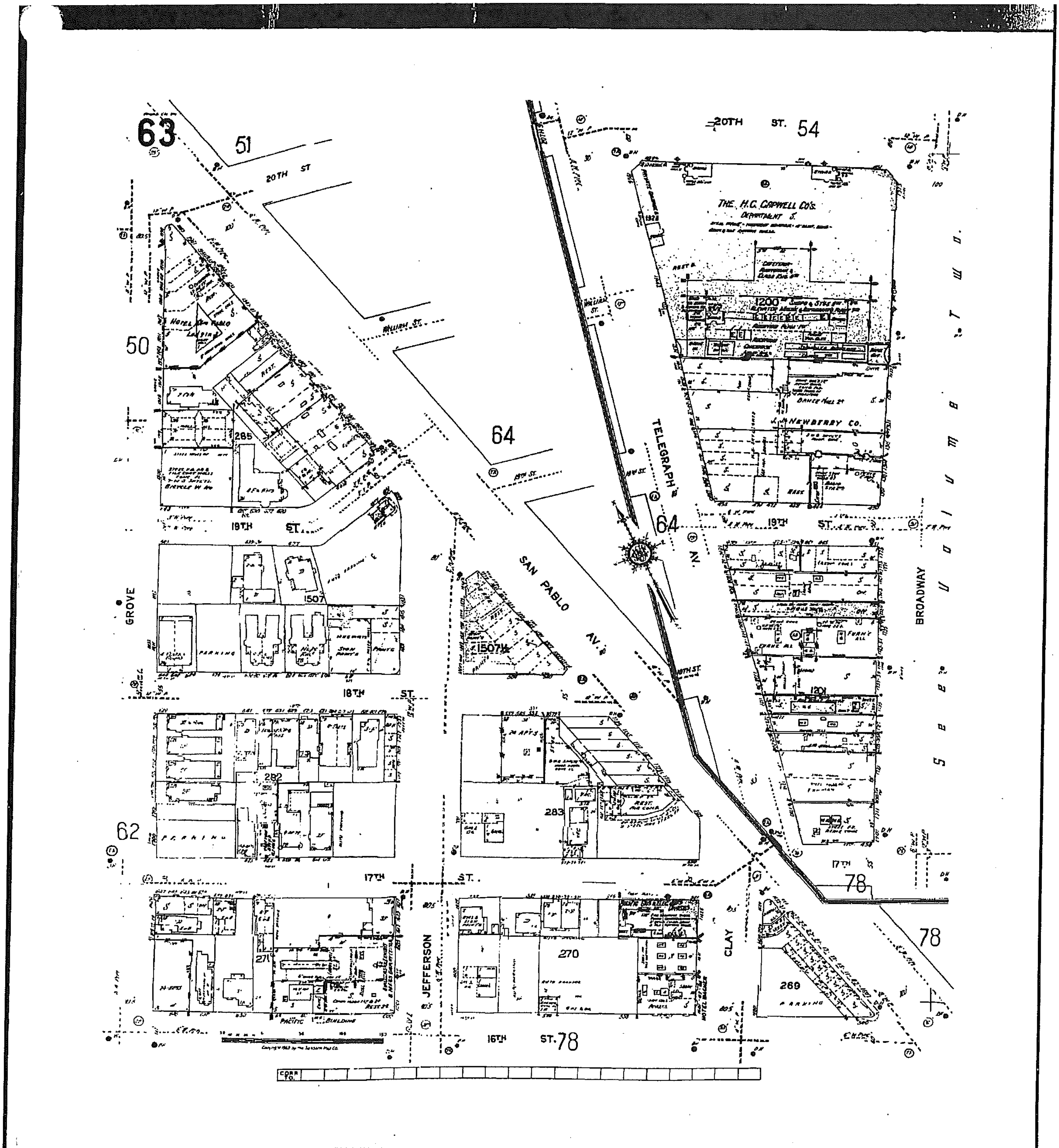
Year EDR Research Associate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TELEGRAPH AV.
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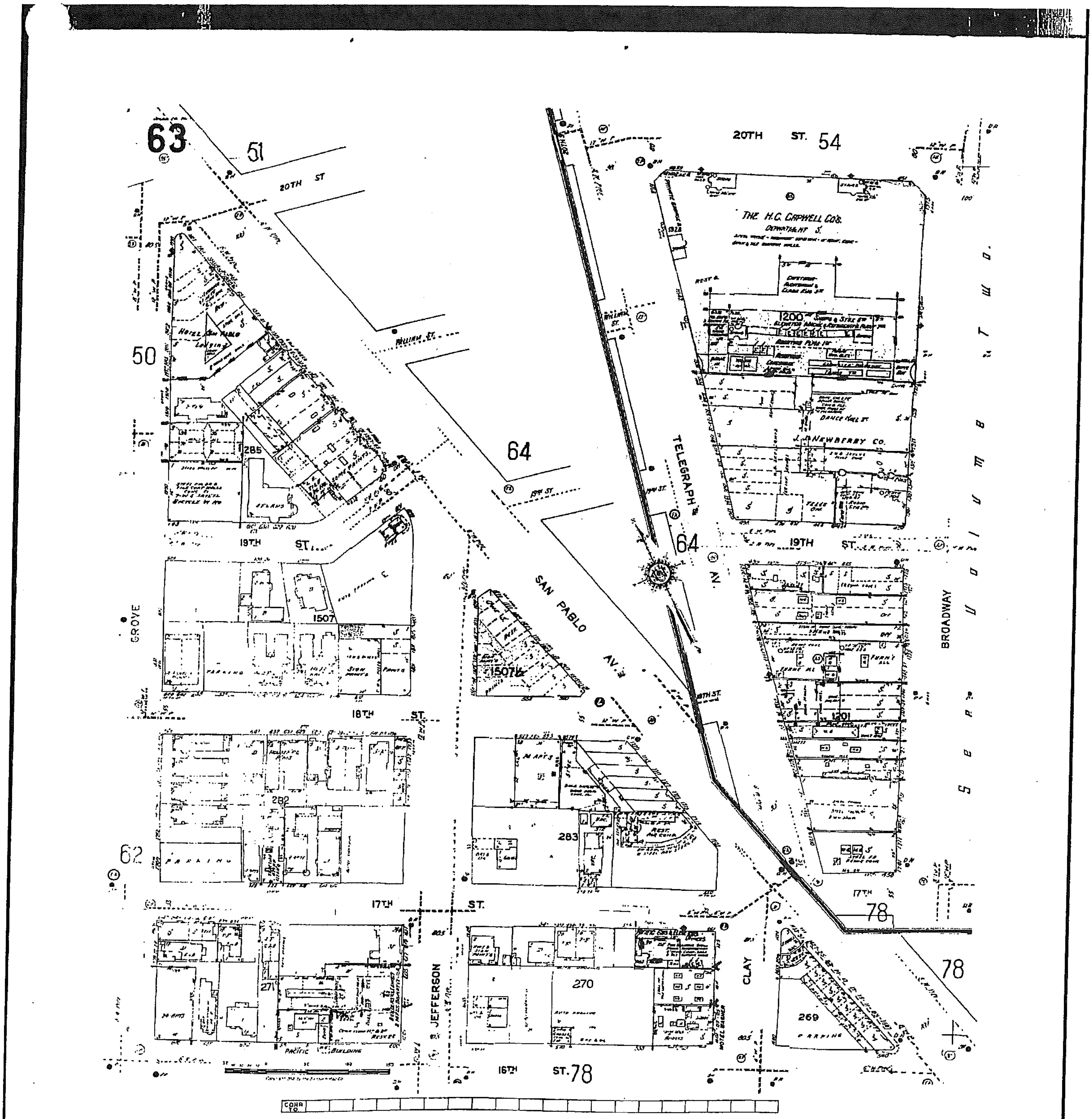

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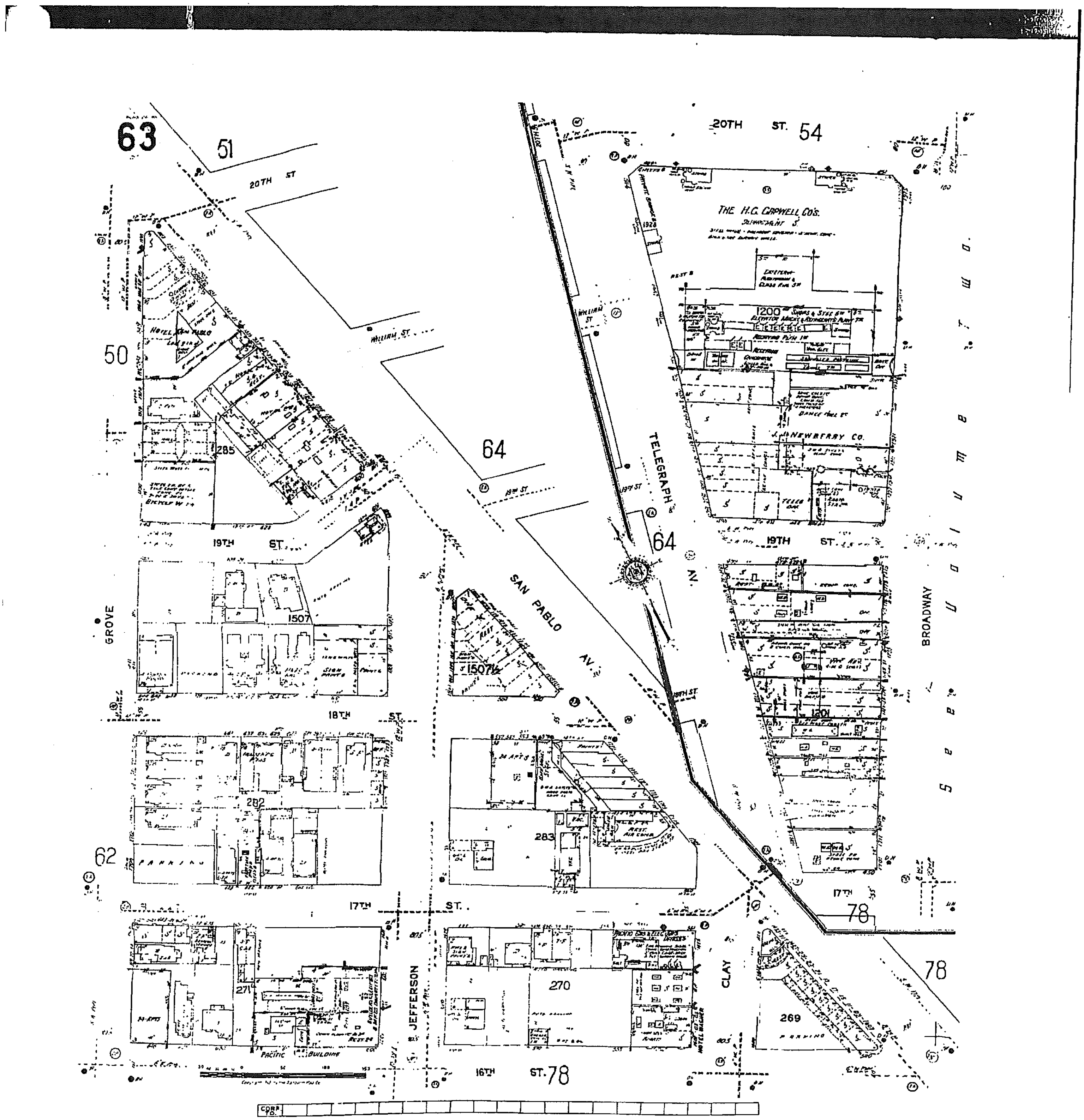
Year
EDR Research Associate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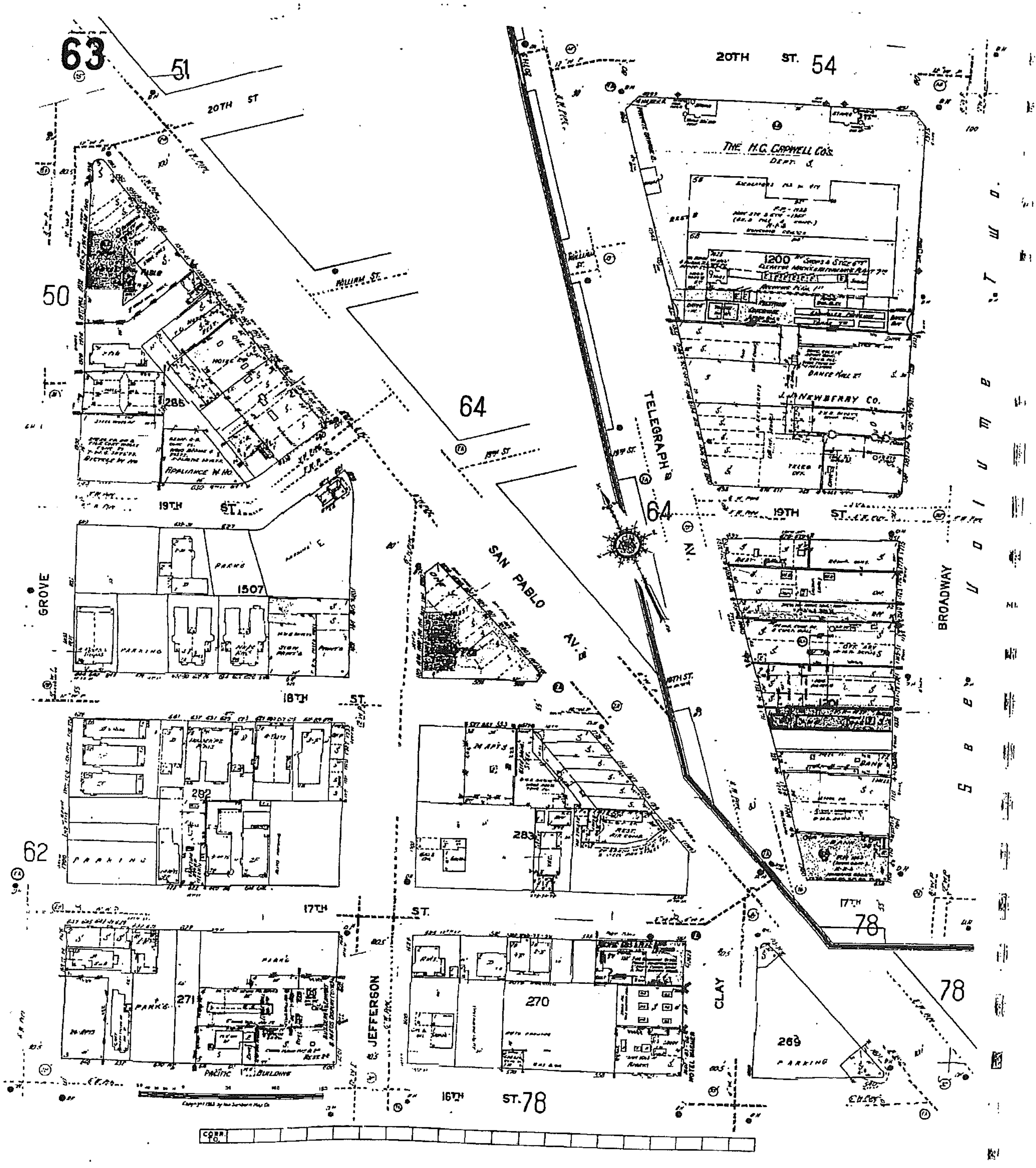
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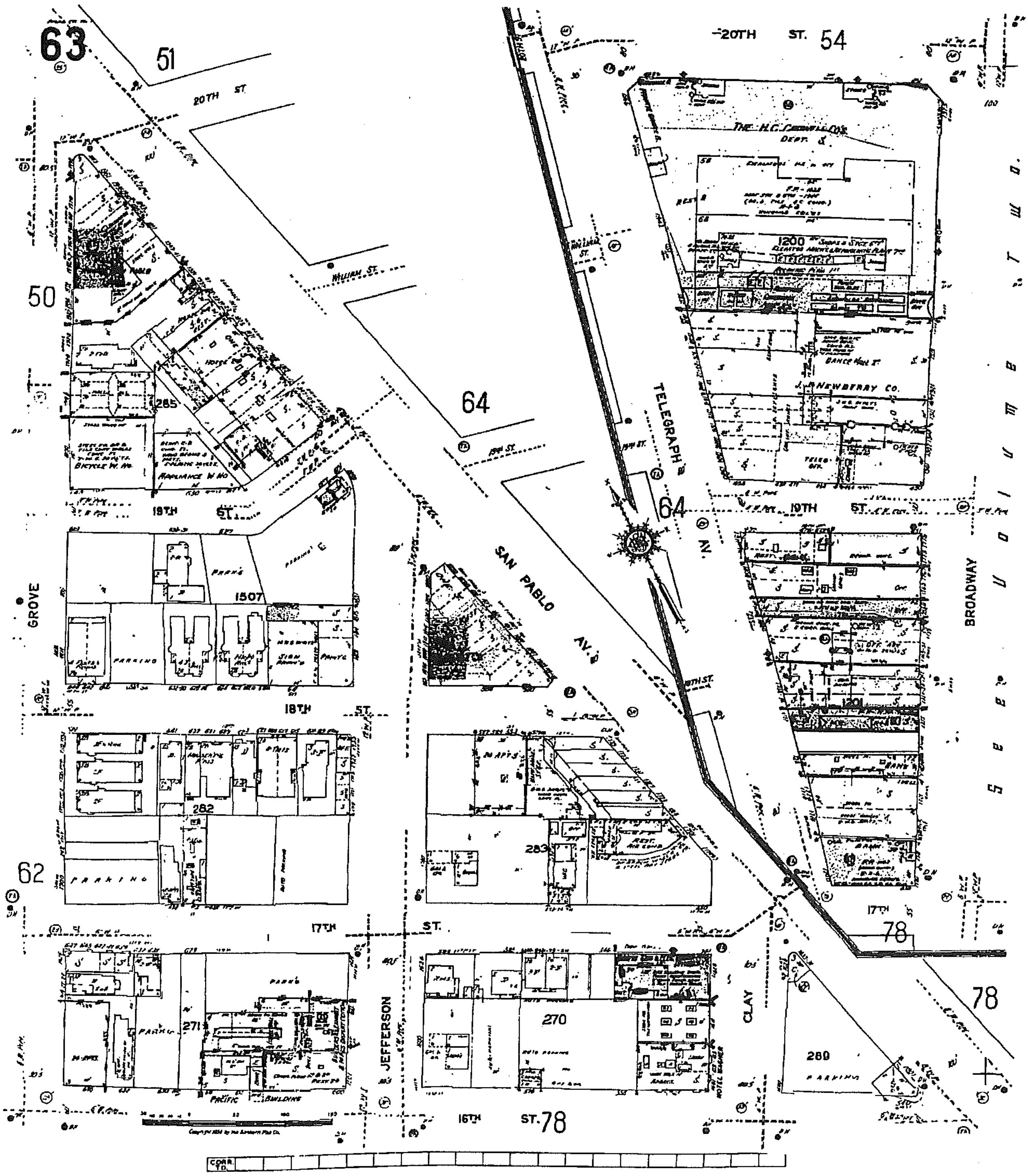

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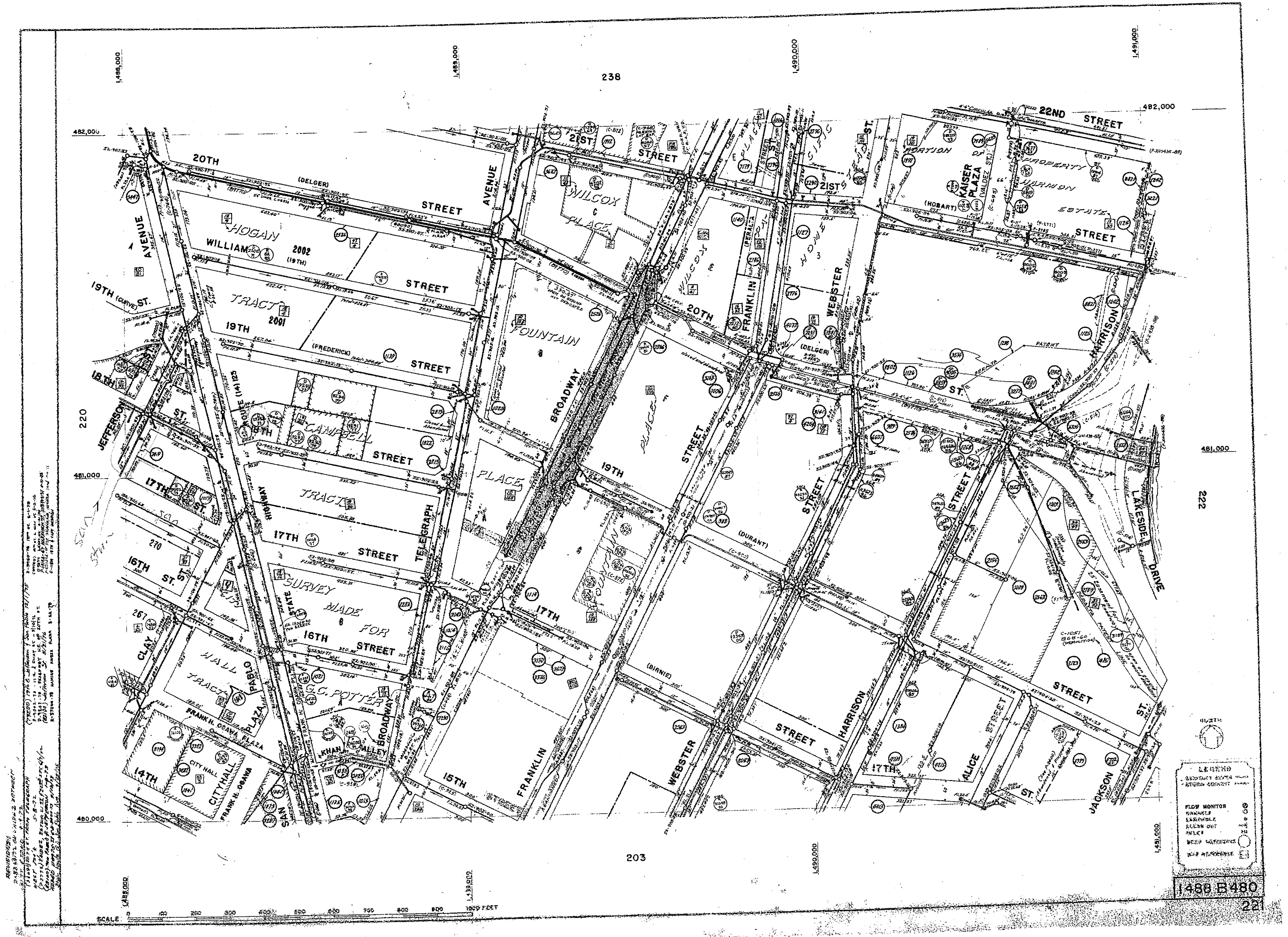
Year

TDW

EDR Research Associate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(FREDERICK)
18TH ST.
18TH STREET
CAMPBELL
JEFFERSON
ROUTE (14) 123
17TH ST.
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PLAZA
G.C. POTTER
FRANK H. OGAWA PLAZA
CITY HALL
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FOUNTAIN B PLACE
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PORTION OF KAISER PLAZA
(VALDEZ ST.)
(HOBART)
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PATENT
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LAKESIDE DRIVE
ALICE
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JACKSON
STREET
ST.
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LEGEND
FLOW MONITOR
1488 B480
221
SCALE 0 100 200 300 400 500 600 700 800 900 1000 FEET
REVISIONS

APPENDIX B

NORCAL GEOPHYSICAL CONSULTANTS, INC.

December 3, 2013

Applied Water Resources Corporation
1600 Riviera Avenue, Suite 310
Walnut Creek, CA 94596

Subject: Geophysical Investigation
1700 Jefferson Street Site
Oakland, California
NORCAL Job No. 13-1047.05

Attention: Ms. Yola Bayram

This report presents the findings of a geophysical investigation performed by NORCAL Geophysical Consultants, Inc. for Applied Water Resources Corporation (AWR) at 1700 Jefferson Street, Oakland, California. The geophysical investigation was conducted on October 26, 2013 by California Professional Geophysicist David J. Bissiri (PGp No. 1009) and Field technician Chris Bissiri. Background information and site logistical support were provided by Ms. Yola Bayram of AWR.

1.0 SITE DESCRIPTION

The geophysical investigation was conducted in the parking lot of a commercial building located on the northeast corner of Jefferson and 17th Streets in Oakland (Plate 1). The dimensions of the parking lot are approximately 60-ft by 60-ft. It is bounded on the south and west by concrete block walls, a metal fence on the north, and on the east by walkways and a concrete driveway leading to a storage room. A wing of the building with a roll-door is located in the northeast corner of the parking lot. Additional cultural features that were evident include:

- an above-ground electrical transformer in the planter area along the southern wall
- two existing monitoring wells MW-1 and MW-1A near the roll-up door in the northeast corner
- three light standards, two along the perimeter walls and one adjacent to the building wing
- a steel gate and associated slide-rails along the west wall
- two narrow parallel east-west concrete patches adjacent to the driveway leading to the storage room

According to information provided by AWR, the site was previously the location of a gasoline station. Based on available Google Earth imagery, the service station was demolished sometime prior to 1993. While the records indicate that the associated underground storage tanks (USTs) were supposedly removed, off-site monitoring wells indicate that another contaminant source (such as an undocumented UST) or a preferential pathway for containments (such as a utility trench) may still exist within the parking lot.

The approximately 60- by 60- foot area of investigation, as designated by AWR, comprised the accessible areas of the parking lot and planter areas.

2.0 PURPOSE

The purpose of the investigation is to delineate underground features that may be associated with the former gasoline station. The anticipated subsurface targets at this site include the following:

- USTs and buried demolition debris
- underground utility lines
- possible backfilled zones

3.0 GEOPHYSICAL METHODS

The geophysical investigation employed the following four geophysical methods:

1. Terrain Conductivity (TC) Survey: The TC method is used to delineate local variations of the electrical conductivity of the subsurface. These variations are typically caused by a combination of changes in soil type, porosity, moisture content, and the presence of buried objects. The TC method is primarily used to detect variations in electrical conductivity caused by non-metallic objects but it can, in some instances, detect metallic material as well.

2. Vertical Magnetic Gradient (VMG) Survey: This method measures local variations in the vertical gradient of the earth's magnetic field in order to delineate the location and lateral extent of buried ferrous objects. VMG surveys are especially well suited for detecting large steel objects such as USTs.

3. Ground penetrating radar (GPR) Survey: GPR is used to image the subsurface by measuring the time it takes for a RF signal to be reflected back from sub-grade objects and features. The reflections result from variations in the electrical dielectric properties of the shallow subsurface. As with the TC method, these variations can be caused by a combination of changes in compaction, density, mineralogy, moisture content, and porosity. Buried metallic objects can also cause reflections. Typically, we use GPR to further characterize targets identified with other methods. Under favorable conditions GPR can delineate a buried object's approximate size and depth of burial.

4. Metal Detection (MD) Survey: The MD method is used to detect and delineate shallowly buried metallic objects. It is typically used to further characterize suspect metallic objects initially delineated with the VMG and TC methods.

5. Electromagnetic Line Location (EMLL) Survey: The method is used to trace out the locations and alignments of those underground utility lines capable of carrying an electrical current. These lines typically consist of live electrical, telephone, and metallic water and gas lines.

More detailed descriptions of the geophysical methods, our standard data acquisition and analysis procedures, the geophysical instrumentation and the limitations of the geophysical methods are provided in Appendix A.

4.0 DATA ACQUISITION AND ANALYSIS

Prior to collecting the geophysical data, we established a survey grid based on a rectangular coordinate system to provide horizontal control. Using a fiberglass measuring tape, we established a north-south baseline along the west side of the parking lot. We then marked-out a series of parallel lines oriented perpendicular to the baseline spaced 4-feet apart.

VMG and TC data were collected at regular intervals (stations) along the east-west trending grid lines described above. The VMG data were collected at approximately 1.5-ft intervals along the delineated lines spaced 4-feet apart. The TC data were collected at approximately 1.25-ft intervals along lines 2-feet apart. Following data acquisition, we transferred the VMG and TC data to a field computer for preliminary on-site processing. The processed data were then used to create VMG and TC contour maps. These maps were evaluated for areas with significant VMG and TC variations. Variations that could not be attributed to obvious above-ground sources were deemed anomalous. VMG and TC anomalies are often caused by the effects of former subsurface structures, USTs, buried debris, and disturbed soil or backfill.

After our preliminary on-site analysis of the VMG and TC data we conducted limited MD and EMLL surveys in the vicinity of the identified VMG and TC anomalies, as site conditions allowed. This was done in an attempt to further delineate the approximate location, alignment, and extent of shallowly buried metallic objects believed to be the sources of the VMG/TC anomalies. The MD surveys typically consisted of at least two perpendicular traverses approximately 20-feet long centered over the suspect target. Variations in the instrument response were noted as the surveys progressed. In areas where the response indicated possible buried metallic objects we obtained additional traverses of differing lengths and orientations as needed. The EMLL surveys consisted of using the ambient signals emitted by active utilities to trace out the alignments of utilities suspected to extend through the survey area.

Our final task on site was to conduct a 3-dimensional (3-D) GPR time-slice investigation of the flat, asphalt portion of the survey area. This consisted of collecting a series of continuous radar profiles along traverses spaced 1-foot apart and then processing the data to produce a series of plan-view radar images of the sub-surface. These images, or "slices", were then evaluated for radar reflections suggestive of UST's, utilities, buried debris, and backfilled zones.

5.0 RESULTS

The results of the geophysical investigation are illustrated on the Geophysical Survey Map presented on Plate 1. This map depicts the locations of six localized TC anomalies, three suspected electric utility lines, and large semi-rectangular GPR anomaly. Descriptions of these features are provided in the following sections.

5.1 TERRAIN CONDUCTIVITY (TC)

The Terrain Conductivity Contour Map (Plate 2) exhibits four distinct areas with assemblages of highly convoluted and contorted contour closures, as depicted by the irregularly-shaped black features:

- a roughly triangular area in the southeast portion of the survey area
- an "L"-shaped area near the roll-door in the northeast portion of the survey area
- another "L"-shaped area in the northwest portion of the survey area
- and a localized, semi-circular area adjacent to the light standard located along the western survey boundary

Based on our follow-up work with the MD, EMLL, and GPR, all the above TC variations can be attributed to known above-ground features and not to below-ground features. However, the TC contour map depicts additional localized contour closures (highlighted with red shading) that are considered anomalous and which can be attributed to probable below-ground features. The three largest TC anomalies are located in the central portion of the survey area, where they form an arc extending northeastward from near the middle of the western boundary. Follow-up work with the MD and EMLL suggest that these three anomalies can be attributed to one of three suspect electric lines that extend between the building and the three light standards (an additional fourth electric line was detected in the southern planter area, see below). The remaining three smaller anomalies are located in the vicinity of the two monitoring wells. Follow-up investigation with the metal detector indicated that they are most likely caused by miscellaneous buried debris.

5.2 VERTICAL MAGNETIC GRADIENT (VMG)

The VMG Contour Map shown on Plate 3 also exhibits several zones of irregularly-shaped assemblages of localized, convoluted and contorted contour closures. These zones are most evident within approximately 5-feet of the survey boundaries, though there are some smaller, less prominent zones located more toward the central portion of the survey area. Based on our follow-up work, all of these VMG variations can be attributed to either known above-ground features, the electrical lines noted above or minor amounts of miscellaneous metallic debris.

5.3 THREE DIMENSIONAL (3D) TIME-SLICE

The 3D Time-Slice Image shown on Plate 4 displays several areas having mottled patterns of yellows, reds, and purple shading. These patterns depict variations in the reflection characteristics of the sub-surface at a depth of approximately 4-feet below ground surface. The purple shading along the eastern boundary is attributed to the effects of the walkway and driveway leading to the storeroom. The GPR patterns along the southern, western, and northern boundaries are attributed to localized natural variations of compaction and/or moisture content of the subsurface, or the well boxes of the monitoring wells.

However, there is a large, approximately rectangular area of mottled GPR reflections in the central portion of the survey area that is not attributed to such sources. Based on our evaluation of this image and other similar images obtained at other depths (not shown), we interpret this zone as possibly representing a zone of backfill. Based on its shape, relatively large size (approximately 30-feet by 35-feet), and location, our interpretation is that this zone may represent a back-filled tank-cavity of the former gasoline station, though other backfilled features such as a former building basement cannot be ruled out. South of this zone, between the southern concrete patch and the walkway, there is a smaller triangular zone of similar mottling. While this pattern is suggestive of another backfilled zone, we do not believe it is for this triangular feature was not seen on images from any other depth, whereas the larger suspected backfilled zone was seen at other depths.

5.4 UTILITY LINES

The EMLL survey delineated four suspected electrical underground utility lines as depicted by the red dashed lines labeled "-E-" on Plate 1 and described below:

- The first consists of a line extending eastward from the light standard located along the western wall to the light standard located in the northeast corner, next to the roll-door.
- The second consists of a line extending southward from the light standard next to the roll-door to the light standard located in the southern planter area next to the driveway in the southeast corner
- The third extends eastward from the light standard next to the roll-door to the building
- The fourth extends eastward through the southern planter area and appears to be associated with the above-ground electric transformer. This line may be the main electrical service lateral for the current facility.

6.0 LIMITATIONS

There are limitations unique to the geophysical methods used for this investigation. For example, USTs and/or metallic debris may be buried deeper than the detection capabilities of the geophysical method, or there may be a lack of contrast in physical properties between native soils and buried objects. Above- or below-ground cultural features (such as chain link fences, underground utilities, and buried debris) may cause interference that limits or masks the detection of nearby buried objects. Since the accuracy of our findings is subject to these limitations, it should be noted that not all USTs and buried objects or features can be detected or characterized by the geophysical techniques used for this investigation.

7.0 STANDARD CARE AND WARRANTY

The scope of NORCAL's services for this project consisted of using geophysical methods to characterize the shallow subsurface. The accuracy of our findings is subject to specific site conditions and limitations inherent to the techniques used. We performed our services in a manner consistent with the standard of care ordinarily exercised by members of the profession currently employing similar methods. No warranty, with respect to the performance of services or products delivered under this agreement, expressed or implied, is made by NORCAL.

We appreciate the opportunity to provide our services to Applied Water Resources Corporation for this project. If you have any questions, or require additional geophysical services, please do not hesitate to call on us.

Respectfully,

NORCAL Geophysical Consultants, Inc.

David Bissiri
Professional Geophysicist, PGp-1009

DJB/KGB/tt

Enclosure: Plates 1 through 4
Appendix A Geophysical Methods, Instrumentation, and Limitations

Appendix A

Geophysical Methodology, Instrumentation, Data Analysis, and Limitations

Vertical Magnetic Gradient (VMG)

VMG Methodology

VMG is a method commonly used to detect ferrous objects. This is accomplished by measuring the lateral variations of the earth's magnetic field. Since the magnetic field at any given point on the earth's surface is the vector sum of the earth's field combined with the magnetic fields of nearby metal objects, by removing or suppressing the earth's field the local magnetic variations due to ferrous objects may be detected. The basis for vertical magnetic gradient surveying starts with measuring the total intensity of the magnetic field at two elevations at a given sampling point. These are referred to as total field measurements (TF) and are recorded in units of nanoTesla (nT). While these total field measurements can be used by themselves, experience has shown that for environmental and engineering investigations it is often more useful to measure the vertical rate of change of the total field magnetic intensity. This rate of change is referred to as the vertical magnetic gradient (VMG), and is measured in units of nanoTesla/meter (nT/m).

Both TF and VMG measurements are related to the same phenomena (i.e. the magnetic field); however, each has certain advantages over the other. Between the two, the VMG method is often chosen for environmental/engineering investigations because of the following:

1) VMG measurements are generally less affected by nearby *above* ground objects, especially objects to the side of the instrument. This reduces magnetic interference caused by such objects.

2) VMG measurements are not affected by temporal (diurnal) variations in the earth's magnetic field, unlike TF measurements. This eliminates one more variable from the data.

3) VMG effects attenuate more rapidly with increasing distance from magnetic sources than TF measurements, thus allowing more precise determination of a buried object's location. It should be noted, however, that because the VMG method is very sensitive, the effects of small near surface objects can be amplified and act as a source of noise in VMG data.

Instrumentation

A vertical magnetic gradiometer is the device that is used to obtain the VMG data. The instrument typically used by NORCAL is a Geometrics 858 Cesium-vapor magnetometer. This instrument operates on the "optical pumping" principle and consists of a control console and two total field magnetic sensors that are mounted on a vertical staff. One sensor is mounted at about shoulder-height and the other sensor is mounted at about knee-height. The magneto- meter console features a built-in computer that stores the raw TF data, calculates the VMG values, and records survey grid information. The instrument obtains the VMG values by simultaneously measuring the total magnetic field intensity at the two sensors, taking their difference in magnetic intensity, and then dividing that calculated value by their separation distance. The survey information is recorded and later uploaded to a field computer for further processing.

Computer Processing

VMG data are typically processed in the field on a portable computer. The uploaded data are converted into a format suitable for contouring using the program ***SURFER*** from Golden Software. This program calculates an evenly spaced array of values (data grid) based on the measured field data. These gridded values are then contoured to produce VMG contour maps for interpretation.

Contour Map Interpretation

Generally speaking, in a region with fairly uniform magnetic conditions the VMG values will vary smoothly from one area to another. Under these conditions, contour lines are usually spaced far apart. In contrast, in those areas where VMG variations are stronger, the contours are closely spaced. In some cases the variations are so strong that the contours become highly contorted and convoluted. These contorted contours may form roughly concentric circles, tightly wound loops and whorls, or elongated parallel lines. Actual magnitude and shape of the contour lines is dependent on the relative position and size of the magnetic object with respect to the location of the magnetic sensors.

Roughly concentric circles that look like bull's-eyes are generally referred to as monopoles. Monopoles that are roughly limited in extent to the data point spacing of the sampling grid are often caused by relatively small, near surface objects with limited cross-section. These typically consist of well caps, pull boxes, balls of wire, etc. On the other hand, larger monopoles that extend across an area of several data points are typically associated with larger, deeper objects such as well casings, reinforced concrete footers, ends of pipelines, etc. In other cases, two monopoles, one positive and one negative, may be in close proximity and form a pair of high-low closures known as a dipole. Dipoles are often, but not always, attributed to larger objects such as USTs, vaults, buried ordnance, etc. that have a substantial diameter or width.

Irregular patterns of loops and whorls are often indicative of several magnetic objects being present with variable shape, mass, and distribution. These VMG patterns are the most difficult to interpret. Past experience has shown that such patterns are usually associated with debris fields, landfills, and demolition sites.

A series of parallel contours typically indicates that an elongate object such as a building wall, fence, or underground pipeline is the magnetic source.

Regardless of whether the contours form monopoles, dipoles, or irregular whorls, if there are no obvious nearby above ground sources that could cause such magnetic variations, then subsurface objects are suspected. Contours are typically considered anomalous when large differences in data readings (on the order of several hundred to several thousands of nT/m) from one data station to the next are displayed. The anomalous variations are called VMG anomalies.

Limitations

Buried ferrous metal objects produce localized variations in the earth's magnetic field. The magnetic intensity associated with these objects depends on the mass of the metal and the distance the metal object is from the magnetometer sensor. As a general rule, anomaly magnitude typically decreases and anomaly width increases as distance (depth) to the source increases, thereby making detection more difficult. In addition, the ability to detect a buried metal object is based on the intensity of these variations in contrast to the intensity of background variations. The intensity of background variations is based on the amount of above and below ground metal that is present within the survey area. Cultural features such as chain-link fences, buildings, debris, railroad spurs, utilities, above ground electric lines, etc. typically produce magnetic variations with high intensities. These variations may mask the magnetic effects from buried metal objects and thus make it very difficult to determine whether the magnetic variations are associated with below ground metal or above/below ground cultural features.

Terrain Conductivity (TC)

Methodology

The TC method provides information on the lateral variation of the electrical conductivity of the subsurface. These changes in conductivity can arise from natural changes in soil composition or from buried foreign objects. Operating on the principle of electromagnetic induction, the method utilizes an instrument having two coils separated by a fixed distance. One of these coils transmits a primary radio-frequency signal that induces a current flow (secondary signal) in the earth. The other coil senses a secondary signal resulting from the induced current flow. For measurement purposes the secondary signal is broken down into both quadrature and in-phase components. The quadrature component is used to determine the value of electrical conductivity and is measured in milliSiemens/meter (mS/m) for absolute units and parts-per-million (ppm) for relative units. This component is useful for detecting both metallic and non-metallic objects. The in-phase component also changes with conductivity, but varies in a different fashion than the quadrature component. This component is useful when only the location of metallic objects is of interest. In-phase measurements are expressed in parts-per-million (ppm).

The principle behind the electromagnetic induction method is based on the fact that when highly resistive material is subjected to a time-varying electromagnetic field (such with RF) there is a linear relationship between the quadrature component and conductivity. In contrast, when highly conductive materials like metals are encountered, both quadrature and in-phase components can be quite large and their behavior is often non-linear. When trying to characterize resistive material, such as soil and rock, measurement of the quadrature component is most useful, though the quadrature component is also affected by conductive metals. When only trying to characterize metallic material, then the in-phase component is typically used.

Instrumentation

The instrument used by NORCAL for shallow subsurface investigations is a Geophysical Survey Systems Multi-Frequency Profiler EMP 400 terrain conductivity meter. This instrument consists of transmitting and receiving coils mounted at opposites ends of a horizontal boom with a control console in between. The separation distance of the coils is approximately 4 feet. By using up to four selectable induction frequencies ranging from 1 KHz to 16 KHz at the same time, different effective sampling depths can be obtained. In most cases these sampling depths range from less than a foot to greater than 15 feet. Data is obtained by carrying the instrument at ankle-level and taking readings at regular intervals, usually between 2- to 10-feet apart. The resulting TC data is automatically stored in digital memory, along with station locations and any field notes.

Computer Processing

TC data are typically processed in the field on a portable computer. The uploaded data are converted into a format suitable for contouring using the program ***SURFER*** from Golden Software. This program calculates an evenly spaced array of values (data grid) based on the measured field data which are then contoured to produce TC contour maps of each induction frequency for interpretation.

Contour Map Interpretation

Generally speaking, in a region with fairly uniform conductivity conditions the TC values will vary smoothly from one area to another. Under these conditions, contour lines are usually spaced far apart. In contrast, in those areas where lateral TC variations are stronger, the contours are more closely spaced. In some cases the variations are so strong that the contours become highly contorted. These contorted contours may form roughly concentric circles suggestive of bull's-eyes, tightly wound loops and whorls similar to finger prints, or elongated parallel lines. Actual magnitude and shape of the contour lines is dependent on the how rapidly the conductivity of the subsurface changes and if there are any metallic objects present that can affect the instrument readings.

Roughly concentric circles are generally referred to as monopoles. Monopoles that are roughly limited in extent to the data point spacing of the sampling grid are often caused by relatively small, near surface metallic objects with limited cross-section. These typically consist of well caps, pull boxes, balls of wire, etc. On the other hand, larger monopoles that extend across an area of several data points are typically associated with larger, deeper objects such USTs, concrete pads, backfilled zones, etc.

Irregular patterns of loops and whorls are often indicative of several conductive objects with variable shape, size, conductivity, and distribution being present. These irregular TC patterns are the most difficult to interpret. Past experience has shown that such patterns are usually associated with debris fields, landfills, and demolition sites.

A series of generally parallel contour lines typically indicates the source is an elongate object such as a building wall, fence, or underground pipeline. If the parallel contours are more or less straight, then this indicates the object was oriented roughly parallel to the direction of the Profiler coil boom during data collection. If the contour lines form a series of parallel, undulating contours (also referred to as a "herring bone" pattern), then this indicates the source was oriented roughly perpendicular to the Profiler boom during data collection.

Regardless of whether the contours form discrete monopoles, irregular patterns, or parallel lines, if there are no obvious nearby above ground sources that could cause such variations, then subsurface objects are suspected. TC contours are typically considered anomalous when differences larger than a few tens of milliSiemens per meter (mS/m) are displayed from one data station to the next.

Limitations

Buried ferrous metal objects often produce large localized variations, or anomalies, in terrain conductivity. As a general rule, anomaly magnitude typically decreases, and anomaly width increases, as distance (depth) to the source increases. This can make detection of small, deeply buried metallic objects difficult. In addition, the ability to detect a buried metal object is based on the intensity of these variations in contrast to the intensity of background variations. The intensity of background variations is based on the conductivity of the soil and the amount of above and below ground metal present within a survey area. Cultural features such as chain link fences, buildings, debris, railroad spurs, utilities, above ground electric lines, etc. typically produce variations with high intensities. These variations may mask the TC effects of buried metal objects and thus make it very difficult to determine whether the variations are associated with below ground metal or known above/below ground cultural features.

Apart from the physical limitations of the instrument and the unwanted effects from secondary objects, the ability to detect subsurface features is also dependent upon the density of data acquisition points. If the distance between data acquisition points is significantly larger than the size of the target object, then the object may not be detected.

Metal Detection (MD)

MD Methodology

This method uses the principle of electromagnetic induction to detect shallowly buried metal objects such as USTs, metal utility conduits, rebar in concrete, manhole covers, and various metallic debris. This is done by carrying a hand-held radio transmitter-receiver unit above the ground and continuously scanning the surface. A primary coil broadcasts a radio signal from a transmitter which induces secondary electrical currents in metal objects. These secondary currents in turn produce a magnetic field which is detected by the receiver.

Instrumentation

The MD instrument that we typically use for shallow subsurface investigations is a Fisher TW-6 pipe and cable locator. This instrument is expressly designed to detect metallic pipes, cables, USTs, manhole covers, and other large, shallowly buried metallic objects. The instrument operates by generating both a meter reading (unitless) and an audible response when near a metal object. The peak instrument response usually occurs when the unit is directly over the object. The TW-6 does not provide a recordable data output that can be used for later computer processing. Results are generally limited to marking the interpreted outlines of detected objects in the field and mapping their locations.

Limitations

In general, the response of the MD instrument is roughly proportional to the horizontal surface area of near surface buried objects (typically in the upper three or four feet). This relationship can be used to advantage in discriminating between metal debris, reinforced concrete pads, and pipelines. However, in the presence of above ground metal objects such as fences, walls, parked cars, and metal debris, this is no longer valid. In some instances, the presence of such objects can make it very difficult to determine whether the instrument responses are associated with below ground targets or above ground cultural features. When multiple sources are present it may not be possible to identify individual targets. Also, relatively large objects that have a limited horizontal cross-section such as well casing and fence posts are sometimes difficult to detect.

Ground Penetrating Radar (GPR)

GPR Methodology

Ground penetrating radar is a method that provides a continuous, high resolution graphical cross-section of the shallow subsurface. The method entails repeatedly radiating an electromagnetic pulse into the ground from an antenna as it is moved along a traverse. Reflected signals are received by an antenna (often the same one used to generate the signal) and sent to a control unit for processing. The control unit then converts the varying amplitude of reflected radar signals as a function of time into a cross-sectional image showing signal amplitude as a function of depth.

GPR is particularly sensitive to variations of two electrical properties. One property is conductivity (the ability of a material to conduct a charge when a field is applied) and the other is permittivity (the ability of a material to hold a charge when a field is applied). These two properties determine how far a signal can propagate. They also determine the strength of reflected signals that can be generated at material boundaries. Reflections result because of the differences in these electrical properties on either side of a boundary.

Most soil and earthen-like materials such as concrete are electrically resistive and have a relatively low permittivity. As a result, they are relatively transparent to electromagnetic energy.

This means that only a portion of the radar signal incident upon them is reflected back to the surface. On the other hand, when the signal encounters an object composed of a material that has the opposite electrical properties, especially one with a high permittivity (such as metal) much of the incident energy is reflected. This difference in transmittivity and reflectivity determines how deep a given radar signal can penetrate into the ground and still yield interpretable results.

Instrumentation

We typically perform GPR surveys using a Geophysical Survey Systems, Inc. SIR-3000 Subsurface Interface Radar System equipped with either a 400 or 500 megahertz (MHz) transducer. This unit is comprised of a combined control/data recording console that is connected by a telemetry cable to the antenna. This system is often chosen for investigating environmental sites since it usually provides both the resolution and depth penetration needed for characterizing the upper three to four feet of the subsurface.

Data Interpretation

The interpretation of GPR data can be done in two ways. The first is referred to as two-dimensional (2-D) and involves examining the graphical records for reflections from buried objects. 2-D GPR records represent a vertical "slice" of the subsurface along a single traverse (or profile) which displays changes in reflected signal strength with horizontal position as a function of arrival time. Reflections that arrive earlier in time are placed in the upper portions of the record and reflections that arrive later are placed lower, towards the bottom of the records. Horizontal position is across the top of the record. For display purposes, almost any color range can be used to denote differences in reflected signal strength, but typically a simple black-and-white display is used.

In areas with relatively uniform conditions, with no buried objects producing reflections, 2-D records, or profiles, typically appear as a series of alternating dark and light horizontal bands. In areas where there are subsurface objects producing reflections, the horizontal banding is disrupted. Discrete objects typically produce reflections having the appearance of inverted "U"s, forming what are known as "hyperbolic reflections". Metallic objects often produce markedly strong reflections, in many cases forming multiple reflections appearing as a series of inverted U's cascading down the record. Non-metallic objects can produce similar reflections, but the multiples are typically much weaker.

An object's burial depth may also be estimated from GPR profiles. As mentioned above, GPR measures signal amplitude as a function of time. However, the translation of the radar signal's travel time (technically known as time-depth) to an actual distance (true depth) is not always a simple one. Strictly speaking, in order to translate from time-depth to true depth the signal velocity within each time interval must be known. Since this is not routinely determined in the field, estimated velocities are often used for determining the approximate depth to a reflector. The empirical values for GPR signal propagation velocities within commonly encountered soils are obtained from published tables.

The second way GPR data can be displayed is referred to as a three-dimensional (3-D) time-slice. In this case, the data is displayed as a horizontal "slice" of a plan area at a specified depth below grade. The data is obtained from multiple parallel 2-D traverses and are processed to display variations in signal amplitude in both horizontal and vertical directions.

Limitations

The ability to detect subsurface targets is dependent on specific site conditions. These conditions include depth of burial, the size or diameter of the target, the condition of the specific target in question, the type of backfill material associated with the target, and the surface conditions over the target. Typically, the depth of detection will be reduced as the clay and/or moisture content in the subsurface increases. As a result, depths of detection (using a 500 Mhz antenna) typically range from as deep as six feet to as little as a few inches.

Electromagnetic Line Locating (EMLL)

EMLL Methodology

This method uses radio signals that are emitted by conductive utility lines to trace out their alignments. Under certain conditions, metallic utility conduits and pipelines can act as radio antennas. Energized utilities like electric, telephone, and grounded water lines often carry electrical currents. Radio signals are radiated from the lines as a result of these currents. These types of signals are referred to as "passive signals" since only a receiver tuned to the appropriate frequency is required to trace them. Other utilities like natural gas lines, drain lines, cathodic protection lines, etc. are not normally energized and thus require a radio signal placed on them in order to be traced. These types of signals are referred to as "active signals" and are placed on the lines by a radio transmitter, either by induction or by directly connecting a lead to them.

Whether the radio signal is passive or active, the surface trace of a line is determined the same way. A specialized radio receiver is carried along a series of traverses and the strength of the emitted signal noted. In most cases, the line is located below the point where the signal is strongest. After a series of traverses have been completed and the position of strongest signal strength has been determined, the alignment of the utility becomes apparent.

EMLL Instrument

The EMLL instrument used for this investigation was a Radio Detection RD 400. This instrument consists of a specialized radio receiver and a separate transmitter. The receiver is a multi-frequency, multiple antenna device that is capable of determining the relative strength and direction of signals broadcast from buried pipes and cables. The receiver generates both a meter reading (unitless) and an audible response when near an energized line. It does not provide any recordable output. The receiver is usually capable of tracing a line buried to a depth of about ten feet. The transmitter is a multi-frequency device with variable power output. In most cases, the highest power setting is sufficient to trace out a line for several hundred feet.

EMLL Limitations

The EMLL works by detecting radio signals. In many cases, the sources of these signals are from isolated known subsurface utility lines. In some cases however, other signals may be present. These other signals may be emitted by overhead electric and telephone lines, grounded water lines, and commercial radio towers. These other signals may distort or completely mask the primary signal of interest. In other cases, the primary signal may actually "jump" from one underground conductor to another, leading to erroneous results. Finally, traceable currents can only be detected as long as there is electrical continuity. Metal conduits having insulating joints and non-metallic utilities cannot be traced with EMLL.

Standard Field Procedures

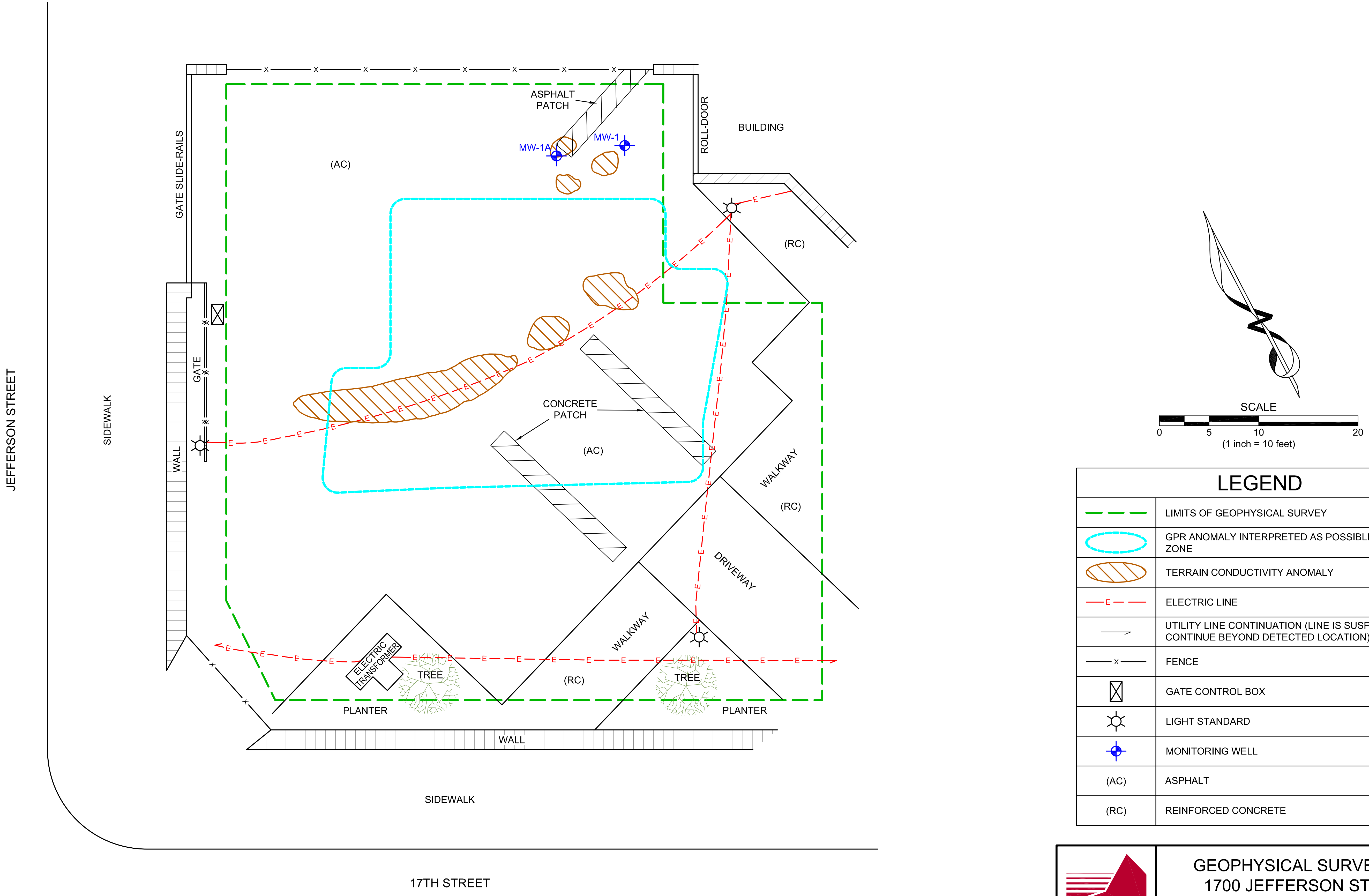
Our standard field procedures when investigating sites for the presence of buried debris, underground utility lines, backfilled zones, and buried structures typically consist of the following four steps:

1. Initially use a specialized hand-held metal detector (MD) to scan accessible areas by carrying the instrument along a series of bi-directional traverses spaced from 3- to 5-feet apart. When a metallic object is detected, additional traverses of varying spacing and orientation are conducted as needed in order to further characterize the detected object. The location and extent of the object is then marked on the ground.

2. We use a specialized radio receiver (EMLL) to detect the time-varying electromagnetic fields (radio signals) that radiate from some underground utilities. These signals are referred as "ambient", or "passive", signals and are often emitted by energized electric, telephone, and signaling cables. Water lines used as electric grounds can also emit these signals. Utilities are detected by carrying a specialized radio receiver along a series of closely spaced traverses until a signal of interest is encountered. Once the peak signal of a utility line is located, the signal is then followed up and down the alignment of the line as far as necessary and its location marked.

3. We use the same specialized radio receiver (EMLL) as above to trace out the active radio signals that are placed on metallic, but otherwise un-energized, underground utilities. Once the peak signal of a utility line is located, the signal is then followed up and down the alignment of the line as far as necessary and its location marked.

4. Finally, use ground penetrating radar (GPR) to delineate utility lines, their backfilled trenches, and zones of disturbed soil. Unlike the two methods above GPR has the capability to detect both metallic and non-metallic targets, though it can be more limited in its depth of detection and is more time consuming in its use. GPR data is collected by pushing the cart-mounted instrument along a series of traverses across the expected trend of the target. As the cart progresses along the traverse the data is digitally recorded and displayed on a color monitor. When a target of interest is encountered, its position is marked on the ground. The position can also be marked on the electronic data record.



LEGEND

— —	LIMITS OF GEOPHYSICAL SURVEY
⬭	GPR ANOMALY INTERPRETED AS POSSIBLE BACKFILL ZONE
▨	TERRAIN CONDUCTIVITY ANOMALY
—E— —	ELECTRIC LINE
→	UTILITY LINE CONTINUATION (LINE IS SUSPECTED TO CONTINUE BEYOND DETECTED LOCATION)
—x—	FENCE
☒	GATE CONTROL BOX
☼	LIGHT STANDARD
⊕	MONITORING WELL
(AC)	ASPHALT
(RC)	REINFORCED CONCRETE

NORCAL

GEOPHYSICAL SURVEY MAP
1700 JEFFERSON STREET

LOCATION: OAKLAND, CALIFORNIA

CLIENT: APPLIED WATER RESOURCES

NORCAL GEOPHYSICAL CONSULTANTS INC.

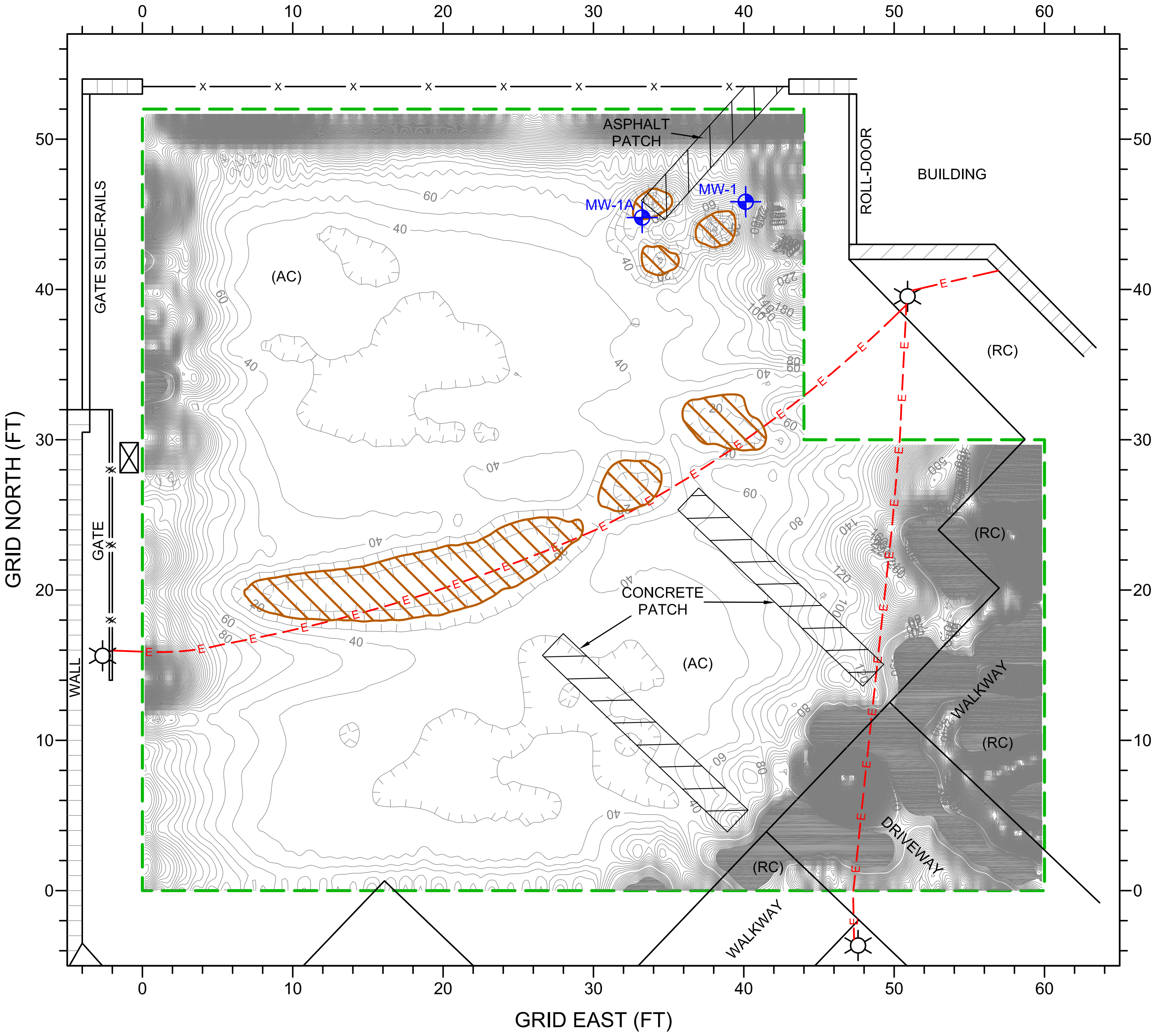
JOB #: 13-1047.05

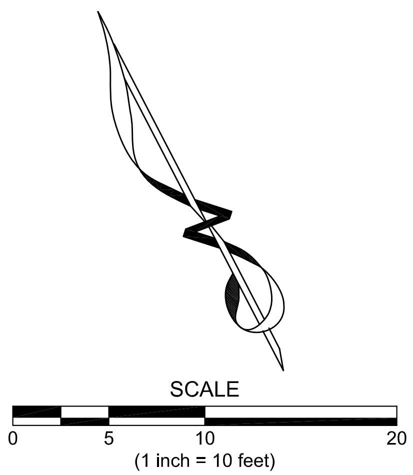
DATE: DEC. 2013

DRAWN BY: G.RANDALL

APPROVED BY: DJB

PLATE
1





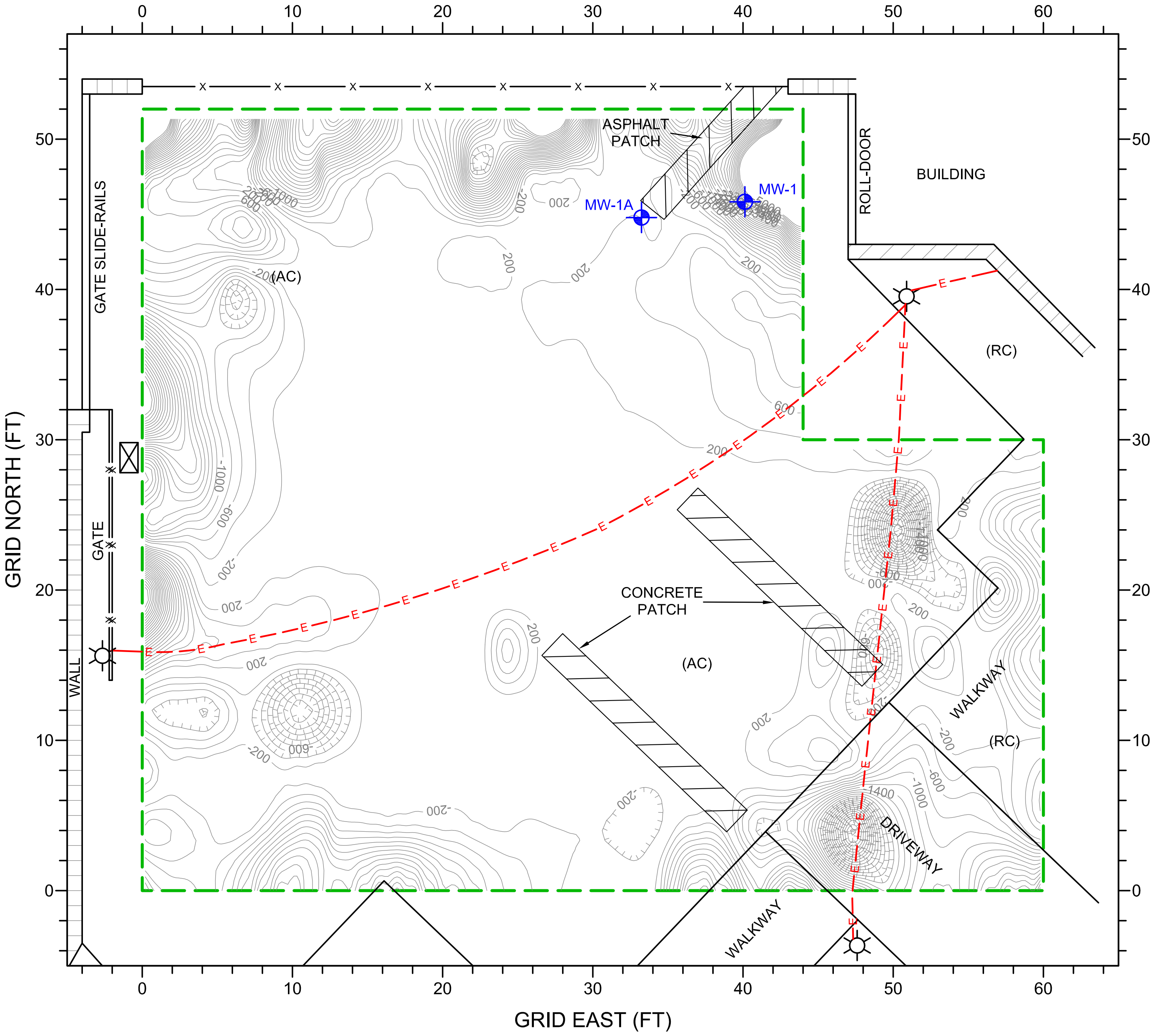
LEGEND

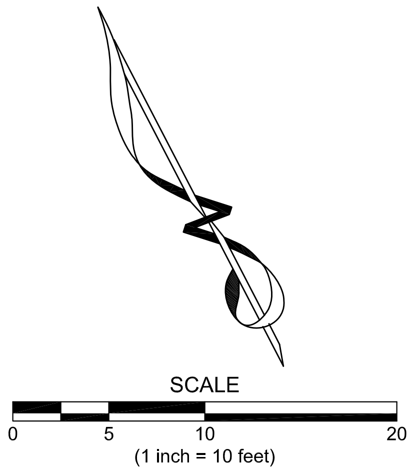
— — —	LIMITS OF TERRAIN CONDUCTIVITY SURVEY
—0—	TERRAIN CONDUCTIVITY CONTOUR (CONTOUR INTERVAL = 10 mS/m)
▨	TERRAIN CONDUCTIVITY ANOMALY
—E— —	ELECTRIC LINE
→	UTILITY LINE CONTINUATION (LINE IS SUSPECTED TO CONTINUE BEYOND DETECTED LOCATION)
—x—	FENCE
☒	GATE CONTROL BOX
☼	LIGHT STANDARD
⌖	MONITORING WELL
(AC)	ASPHALT
(RC)	REINFORCED CONCRETE

NORCAL

TERRAIN CONDUCTIVITY
CONTOUR MAP
1700 JEFFERSON STREET

LOCATION: OAKLAND, CALIFORNIA
CLIENT: APPLIED WATER RESOURCES
NORCAL GEOPHYSICAL CONSULTANTS INC.
JOB #: 13-1047.05
DATE: DEC. 2013
DRAWN BY: G.RANDALL
APPROVED BY: DJB
PLATE
2





LEGEND

— — —	LIMITS OF VERTICAL MAGNETIC GRADIENT SURVEY
~ 0 ~	VERTICAL MAGNETIC GRADIENT CONTOUR (CONTOUR INTERVAL = 200 nT/m)
— E — —	ELECTRIC LINE
→	UTILITY LINE CONTINUATION (LINE IS SUSPECTED TO CONTINUE BEYOND DETECTED LOCATION)
— x —	FENCE
☒	GATE CONTROL BOX
☼	LIGHT STANDARD
⊕	MONITORING WELL
(AC)	ASPHALT
(RC)	REINFORCED CONCRETE

NORCAL

VERTICAL MAGNETIC GRADIENT
CONTOUR MAP
1700 JEFFERSON STREET

LOCATION: OAKLAND, CALIFORNIA

CLIENT: APPLIED WATER RESOURCES

NORCAL GEOPHYSICAL CONSULTANTS INC.

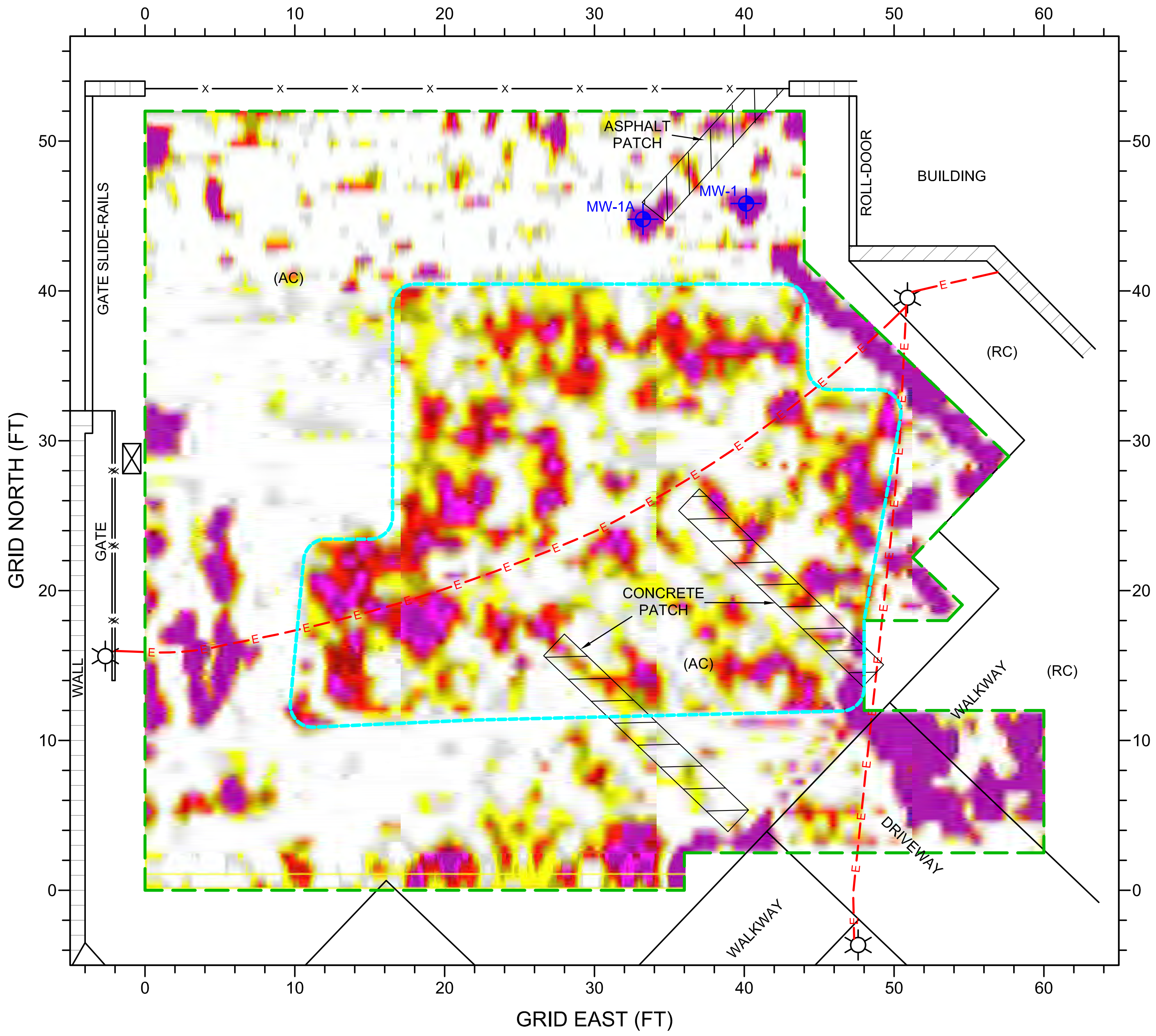
JOB #: 13-1047.05

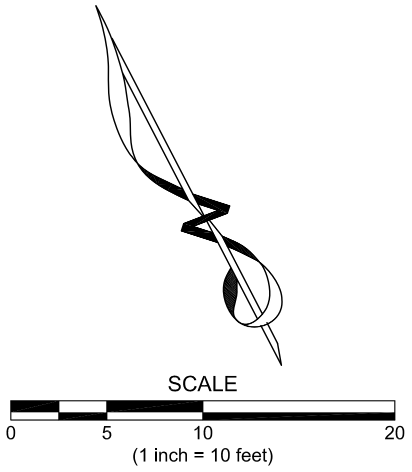
DATE: DEC. 2013

DRAWN BY: G.RANDALL

APPROVED BY: DJB

PLATE
3





LEGEND

– – –	LIMITS OF GPR SURVEY
◯	GPR ANOMALY INTERPRETED AS POSSIBLE BACKFILL ZONE
—E— —	ELECTRIC LINE
——x——	FENCE
☒	GATE CONTROL BOX
☼	
⊕	MONITORING WELL
(AC)	ASPHALT
(RC)	REINFORCED CONCRETE

NORCAL

3D GPR TIME-SLICE IMAGE
~4-FEET BELOW GROUND SURFACE
1700 JEFFERSON STREET

LOCATION: OAKLAND, CALIFORNIA

CLIENT: APPLIED WATER RESOURCES

NORCAL GEOPHYSICAL CONSULTANTS INC.

JOB #: 13-1047.05

DATE: DEC. 2013

DRAWN BY: G.RANDALL

APPROVED BY: DJB

PLATE 4

APPENDIX C

INSTALLATION of TEMPORARY SOIL GAS WELL and COLLECTION of SCREENING LEVEL SOIL GAS SAMPLE

This document describes Applied Water Resources' standard operating procedures (SOPs) to install a temporary soil gas well and collect a screening level sample of soil gas. Screening level samples of soil gas could be used as part of a site investigation, such as to delineate a source area, assess shallow preferential pathways, evaluate potential migration within underground utility corridors, map a shallow plume of volatile compounds in ground water, etc.

This SOP is not appropriate for the collection of soil gas samples for purpose of assessing risk to indoor air quality.

This SOP is based on guidance from the soil gas investigations advisory (DTSC, 2012). Specific field procedures are summarized below.

Construction of a Temporary Soil Gas Well

Temporary soil gas wells are typically used for one or two sampling events and then decommissioned in accordance with the local regulating agency requirements and the methods described in the Well Abandonment Section.

The Work Plan and the objectives of the investigation should specify the depth at which the soil gas sample should be collected. The boring within which the soil gas well is constructed is typically created by using direct push drilling equipment, but can be advanced using hollow, solid stem, or hand auger. The borehole diameter will be a minimum of 2 inches. If soil conditions are stable, then the soil gas well can be constructed in an open, uncased, borehole. If soil conditions are unstable, then the borehole will be cased prior to well construction.

All equipment, tools, and materials used to construct the borehole and well must be clean, dry, and free of chemicals, including cleaning chemicals. Implement the following steps once the desired depth of the borehole and soil gas sampling depth has been determined:

1. Drill the borehole to the desired sampling depth.
2. Place a minimum 2-inch thick bed of sand in the bottom of the boring to ensure that the tubing is not in direct contact with the bottom. Sand will be RMC Lonestar 2/12 mix, or similar.
3. Place a clean 3/4-inch diameter PVC pipe into the borehole that extends from the top of the sand at the bottom of the borehole to 1 to 3 feet above ground surface.
4. Measure and cut a length of the sample tubing that is equal to the desired sampling depth plus 1 to 5 feet. The additional length of tubing will remain above ground surface to enable collection of the soil gas sample.

5. The sample tubing will be made of material that will not react with site contaminants (i.e. Teflon, stainless steel) and with an inside diameter of 1/8 to 1/4 inches that is appropriate for the equipment to be used to collect the soil gas sample. Attach a filter at the bottom of the tubing to prevent sand from entering the tubing.

6. Install the tubing into the borehole by threading the tubing through the PVC pipe to the top of the sand. Placement of the tubing within the PVC will keep the tubing centered within the borehole, keep the filter completely within the sand pack materials, and maintain integrity of the well seal by eliminating contact of the tubing with the native geologic materials.

7. Place a minimum of 6 inches and maximum of 10 inches of sand pack above the filter. Use a separate small diameter PVC pipe to tremie sand into borings deeper than 15 feet to avoid bridging. Do not place sand directly into the PVC pipe containing the tubing because the sand will likely bridge and lock the tubing within the PVC pipe, preventing proper completion of the well.

8. Lift PVC pipe containing the tubing to the top of the sand pack while keeping the tube bottom with filter at the desired depth. If present, also raise the borehole casing and tremie pipe to the top of the sand pack. Measure the depth to the top of the sand pack and add additional sand as necessary. Record all the final depth to the top of sand pack.

9. Place a minimum 6 inches and maximum of 12 inches of dry granular bentonite above the sand pack.

10. Prepare a thick bentonite grout mixture by hydrating bentonite within a container at ground surface. The mixture should approximate the consistency of applesauce.

11. Remove the PVC pipe containing the tubing. Remove the tremie pipe. While holding the sample tubing so that it is centered within the borehole, fill the borehole to the surface with hydrated bentonite grout mixture.

12. If present, remove the borehole casing and add more bentonite grout to top off the boring to ground surface.

13. Install a gas-tight valve or fitting at the end of the tubing and protect the temporary well and tubing with a barricade, flagging, or similar.

14. If the well is permanent, complete the installation with a traffic rated well box.

Collecting a Screening Level Sample of Soil Gas

Following completion of the soil gas well, allow the subsurface to equilibrate back to representative conditions for at least one hour prior to collecting a soil gas sample. Do not collect soil gas screening samples during or within two days of a rainfall event.

1. Assess the sample tubing and confirm that the well is intact and its integrity has not been compromised.
2. Calculate the volume of air within the soil gas well that will be purged prior to collecting a soil gas sample. One purge volume is the sum of the following volumes:
    - The internal volume of tubing,
    - The void space of the sand pack around the bottom of the tubing and filter (assume 30% porosity), and
    - The void space of the dry bentonite in the annular space, (assume 30% porosity). Assume this bentonite has not been hydrated.
3. Attach a centrifugal or vacuum pump to the ground surface end of the tubing and a Tedlar bag (or similar) to collect the screening level sample of soil gas. Following the removal of each purge volume, collect a soil gas sample within the Tedlar bag.
4. Using a meter designed to measure the target analytes (i.e. photoionization detector, 4-Gas meter, or Flame Ionization Detector), measure the concentration of volatile chemicals within the Tedlar bag. Monitor the meter continuously for at least 30 seconds and record the maximum concentration measured.
5. Continue purging and measuring concentrations until concentrations appear to stabilize within approximately 10% for three consecutive measurements. If concentrations do not stabilize after 10 purge volumes, then sampling may cease.

Well Abandonment

After sample collection ceases at a soil gas well, the well will be abandoned with concurrence from the local regulating agency. Unless otherwise directed by the regulatory agency, the following steps should be followed when decommissioning a soil gas well:

1. Either remove the tubing by pulling out of the borehole, or cut the well tubing as far below ground surface as possible;
2. Remove the hydrated bentonite grout to within approximately 1 foot of finished grade. If the borehole was advanced through hard surface materials (e.g. asphalt, concrete), fill the borehole

with suitable materials to finished grade. If the borehole was advanced through soil, fill the last foot of the borehole hole with compacted native material.

3. If the borehole and soil gas well penetrates a confining clay unit, then overdrilling the borehole to remove all sand materials followed by tremie grouting is recommended to prevent potential contaminant migration across distinct lithologic zones. The driller will utilize methods that assure the overdrilling does not drift off the borehole and soil gas well. All overdrilled holes will be grouted in accordance with local regulatory specifications.
4. In all cases, restore pavement and vegetation to approximate original conditions, or as requested by the land owner.

References

DTSC, California EPA, and RWQCB San Francisco and Los Angeles; *Advisory, Active Soil Gas Investigations*, April 2012.

This document describes Applied Water Resources' standard operating procedures (SOPs) to install a temporary soil gas well and collect a sample of soil gas. This SOP is based on guidance from the soil gas investigations advisory (DTSC, 2012). Specific field procedures are summarized below.

Construction of a Temporary Soil Gas Well

Temporary soil gas wells are typically used for one or two sampling events and then decommissioned in accordance with the local regulating agency requirements and the methods described in the Well Abandonment Section.

The Work Plan and the objectives of the investigation should specify the depth at which the soil gas sample should be collected. The boring within which the soil gas well is constructed is typically created by using direct push drilling equipment, but can be advanced using hollow, solid stem, or hand auger. The borehole diameter will be a minimum of 2 inches. If soil conditions are stable, then the soil gas well can be constructed in an open, uncased, borehole. If soil conditions are unstable, then the borehole will be cased prior to well construction.

All equipment, tools, and materials used to construct the borehole and well must be clean, dry, and free of chemicals, including cleaning chemicals. Implement the following steps once the desired depth of the borehole and soil gas sampling depth has been determined:

1. Drill the borehole to the desired sampling depth.
2. Place a minimum 2-inch thick bed of sand in the bottom of the boring to ensure that the tubing is not in direct contact with the bottom. Sand will be RMC Lonestar 2/12 mix, or similar.
3. Place a clean 3/4-inch diameter PVC pipe into the borehole that extends from the top of the sand at the bottom of the borehole to 1 to 3 feet above ground surface.
4. Measure and cut a length of the sample tubing that is equal to the desired sampling depth plus 1 to 5 feet. The additional length of tubing will remain above ground surface to enable collection of the soil gas sample.
5. The sample tubing will be made of material that will not react with site contaminants (i.e. Teflon, stainless steel) and with an inside diameter of 1/8 to 1/4 inches that is appropriate for the equipment to be used to collect the soil gas sample. Attach a filter at the bottom of the tubing to prevent sand from entering the tubing.
6. Install the tubing into the borehole by threading the tubing through the PVC pipe to the top of the sand. Placement of the tubing within the PVC will keep the tubing centered within the borehole, keep the filter completely within the sand pack materials, and maintain integrity of the well seal by eliminating contact of the tubing with the native geologic materials.

7. Place a minimum of 6 inches and maximum of 10 inches of sand pack above the filter. Use a separate small diameter PVC pipe to tremie sand into borings deeper than 15 feet to avoid bridging. Do not place sand directly into the PVC pipe containing the tubing because the sand will likely bridge and lock the tubing within the PVC pipe, preventing proper completion of the well.

8. Lift PVC pipe containing the tubing to the top of the sand pack while keeping the tube bottom with filter at the desired depth. If present, also raise the borehole casing and tremie pipe to the top of the sand pack. Measure the depth to the top of the sand pack and add additional sand as necessary. Record all the final depth to the top of sand pack.

9. Place a minimum 6 inches and maximum of 12 inches of dry granular bentonite above the sand pack.

10. Prepare a thick bentonite grout mixture by hydrating bentonite within a container at ground surface. The mixture should approximate the consistency of applesauce.

11. Remove the PVC pipe containing the tubing. Remove the tremie pipe. While holding the sample tubing so that it is centered within the borehole, fill the borehole to the surface with hydrated bentonite grout mixture.

12. If present, remove the borehole casing and add more bentonite grout to top off the boring to ground surface.

13. Install a gas-tight valve or fitting at the end of the tubing and protect the temporary well and tubing with a barricade, flagging, or similar.

14. If the well is permanent, complete the installation with a traffic rated well box.

Preparation for Purging and Collecting a Soil Gas Sample

Subsurface conditions are disturbed during drilling and probe placement. To allow for the subsurface to equilibrate back to representative conditions, the purge volume test, leak test and sampling of soil gas will not be conducted for at least two hours following soil gas well installation. For soil gas wells installed with hollow stem or hand auger drilling methods, do not conduct the purge volume test, leak test and soil gas sampling for at least 48 hours after soil gas well installation. Do not collect soil gas screening samples during or within two days of a rainfall event (greater than ½ inches of rain over 24 hours). Soil gas samples will be free of water, and no sample will be collected if water is observed during purging. Purge volume tests, leak tests and soil gas sampling methods are based on the soil gas investigations advisory (DTSC, 2012).

Purge Volume Test

The purpose of purging is to ensure that stagnant air is removed from the well and sampling system and that samples are representative of subsurface conditions. The purge volume test is used to determine the appropriate amount of air to remove prior to sampling. A purge volume test will be conducted on permanent soil gas wells that will be used for routine monitoring. If there are multiple wells at a site, the purge volume test will be conducted at the location with the highest estimated concentrations of the target compound. For temporary soil gas wells, no purge volume test is required and a default of three purge volumes will be used.

The purge volume test is conducted by collecting and analyzing a sample for target compounds after removing one, three and ten purge volumes. The purge volume test samples should be analyzed with the same analytical method as the constituents of concern and bioattenuation indicators as applicable.

One purge volume is the sum of the following volumes:

- The internal volume of tubing,
- The void space of the sand pack around the bottom of the tubing and filter (assume 30% porosity), and
- The void space of the dry bentonite in the annular space, (assume 30% porosity). Assume this bentonite has not been hydrated.

Sample Vacuum Shut in Test

In order to note possible leaks in the sample canister, a shut-in test is conducted. A dedicated pressure gauge is used to record pressure in each sample canister for a minimum of five minutes prior to sampling. If a significant change in pressure is observed, a different sample canister will be used for sample collection.

Recording, Labeling, Storage, Handling, and Transport

All samples should be labeled with a unique sample identification, the location of the sample, date and time of collection. Purge and sample volume, flow rates, helium concentrations, vacuum check and shut in test data are recorded in the field form for soil gas sampling (Appendix B). Samples are stored away from direct sunlight in coolers or boxes and transported under standard chain of custody procedures to a NELAP certified analytical laboratory.

Unshrouded Soil Gas Sampling with Leak Check Compound

A leak test is used to evaluate whether ambient air is introduced into the soil gas sample during the collection process. A leak test will be conducted at every soil gas well each time a soil gas sample is collected to evaluate the integrity of the sample. Introducing ambient air may result in an underestimation of actual site contaminant concentrations or may introduce external contaminants into samples from ambient air. The leak check compound should be selected based on the target analytical compounds for the site. The compound should not interfere with the target analytes. Verify with the proposed analytical laboratory the appropriateness of a leak check compound prior to sampling and request that the compound is reported in addition to the target analytes.

1. Prior to removing any hardware, record the pressure on the gauge located on the sample train in order to note possible leaks. If the gauge reads 0, use a new sample train.
2. Connect the sample train to the downhole tubing with a nut and ferrule fitting.
3. To purge, connect the sample train to a 6-liter summa canister. Volume of air will be calculated either based on the flow rate indicated on the summa can flow reducer or the change in pressure observed in the summa canister.
4. Once the appropriate volume has been purged, remove the sample train from the purge canister and connect to a 1.4 liter summa canister for sampling.
5. Once the sample canister is connected and air is flowing based on the train pressure readings, apply a clean paper towel soaked in the liquid leak check compound (i.e. acetone, isopropyl alcohol) to the fittings and the top of the well seal.
6. Once the sample train pressure gauge reads less than 4 inches of mercury, disconnect the sample canister from the train and store as described.

Soil Gas Sampling with Helium Shrouds

Soil gas sampling using helium shrouds helps indicate whether a leak is present in the train or the well seal prior to sample collection. If a leak is detected during the purging of the well, corrective measures are implemented such as hydrating or molding the bentonite seal, tightening the fittings, or repairing any holes in the tubing. Helium per ASTM method D1946 will be analyzed in all samples to determine the presence of leaks in the sample train or the well seal. Soil gas sampling using helium shrouds is conducted as described in the field manual provided by Curtis and Tompkins Laboratory (Appendix A).

Well Abandonment

After sample collection ceases at a soil gas well, the well will be abandoned with concurrence from the local regulating agency. Unless otherwise directed by the regulatory agency, the following steps should be followed when decommissioning a soil gas well:

1. Either remove the tubing by pulling out of the borehole, or cut the well tubing as far below ground surface as possible;
2. Remove the hydrated bentonite grout to within approximately 1 foot of finished grade. If the borehole was advanced through hard surface materials (e.g. asphalt, concrete), fill the borehole with suitable materials to finished grade. If the borehole was advanced through soil, fill the last foot of the borehole hole with compacted native material.
3. If the borehole and soil gas well penetrates a confining clay unit, then overdrilling the borehole to remove all sand materials followed by tremie grouting is recommended to prevent potential contaminant migration across distinct lithologic zones. The driller will utilize methods that assure the overdrilling does not drift off the borehole and soil gas well. All overdrilled holes will be grouted in accordance with local regulatory specifications.
4. In all cases, restore pavement and vegetation to approximate original conditions, or as requested by the land owner.

References

DTSC, California EPA, and RWQCB San Francisco and Los Angeles; *Advisory, Active Soil Gas Investigations*, April 2012.

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GRAB GROUND WATER SAMPLING -
STANDARD OPERATING PROCEDURES (SOP)

Table of Contents

1. PURPOSE

This document focuses on the equipment, field procedures, and level of accuracy and quality control measures required for grab ground sampling. This SOP will be used to guide AWR field staff to perform the grab ground water sampling efforts properly, to maintain consistency of field procedures, and to facilitate the assurance of the quality and reliability of data obtained from all grab ground water sampling events.

2. EQUIPMENT

Ground water monitoring and sampling need, at a minimum, the following equipment and supplies:

- Sampling Sheets, Logs and Site Information
  - Project description, site maps, chain-of-custody, SOP, QAPP, Work Plan, field data forms, activity logs, camera, GPS unit, clipboard, well condition checklist, indelible ink pen.
  - Health & Safety Plan (HASP)
  - Site information including previous monitoring data and boring logs as applicable.
  - Permission /notification to access land/home owner/tenant and contact information.
- Safety Equipment
  - Hardhat, boots, safety vest/suit, and latex or nitrile gloves or appropriate Personal Protective Equipment (PPE) as specified in the HASP.
  - Sun and heat protection (at least 1 liter of water per hour and sunblock)
  - Traffic control cones and tapes
  - Cellular phone with contact numbers
  - Flashlight
  - Hearing protection
- Soil Logging Equipment
  - 10x or 15x magnifying hand lens
  - Munsell Soil chart
  - Putty knife
  - Photo ionization detector (PID)

- Sampling Equipment
  - Depth to Water level indicator (sounder)
  - Pump or bailer rope/cable (no cotton or cloth)
  - Calibrated buckets or similar device for purge water
  - Purging pump or bailers
  - Water quality meter(s) capable measuring the parameters identified in the work plan,
  - Sampling pump or bailers
  - Tools for opening soil liners, string, tubing, and duck or Teflon tapes
  - Multi-phase sounder, if needed.
- Sampling Supplies
  - Laboratory-supplied sample bottles/containers
  - QA/QC sample bottles (trip blanks, field blanks, etc.)
  - Filtering apparatus and all accessories if sampling in field
  - Ice chest(s) with water ice
  - Ziploc® or similar plastic sampling bags
  - Encore or Terracore samplers for gasoline and VOC sampling
- Decontamination Equipment
  - Decon water, soap such as Liquinox® or similar solution
  - Rinse buckets for decontamination
  - Waste storage drums and buckets
  - Deionized (DI) water

3. PROCEDURES

Ground water monitoring and sampling include the following procedures, and should be performed in the following order:

1. Project preparation
2. Equipment decontamination
3. Soil Boring
4. Collect the ground water sample and measure field parameters
5. Follow QA/QC sampling procedures and handling of ground water samples

4. PROJECT PREPARATION

The following work should be conducted prior to arriving the site:

- Contact project manager
- Review project description, site direction, site maps, list of chemicals to be analyzed, HASP
- Determine the extent of the sampling effort, the sampling methods to be employed, and required equipment and supplies according to the sampling Work Plan or Quality Assurance Project Plan (QAPP) plans for the site.
- Obtain necessary permits, utility clearance and access agreements.
- Obtain an Underground Service Alert (USA) ticket at least 48 hours prior to drilling activities and schedule a private utility locator as needed.
- Obtain appropriate sampling and monitoring equipment.
- Decontaminate or pre-clean equipment, and ensure that it is in working order.
- Prepare schedules, and coordinate with staff, client, and regulatory agencies, if appropriate.
- As needed, perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.
- Prepare chain-of-custody and sample labels
- Use stakes, flags, or other identifiers and mark all sampling locations. Specific site characteristics including morphology, water table, nature and extent of contaminant should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.
- Contact analytical lab to coordinate and bottle order preparation and delivery and sample courier pickup or drop off point.
- Notify site manager/site contact, project manager, grout inspectors, and encroachment permit inspectors (if necessary) at least 48 hours prior to field effort.

5. EQUIPMENT DECONTAMINATION

After checking in with the project manager, a decontamination area and traffic control cones should be setup prior to well gauging and sampling, if necessary. Any non-dedicated downhole gauging, purging or sampling equipment should be decontaminated prior to use in a Liquinox® (or similar) solution wash. Wash solution is also pumped through purging pumps and rinsed with potable water. The same equipment should be rinsed again with potable water or de-ionized water to remove residual soap.

6. SOIL BORING

Soil borings will be advanced by a licensed C-57 drilling contractor as specified in the work plan. A trained geologist will be present to log the soil samples as they are produced from the borehole. The geologist is instructed to remain a safe distance from the drill rig during operation to avoid potential injury. Based on the site data, to the extent possible, borings should be advanced in the order from cleanest to dirtiest to avoid potential for cross contamination. Sampling equipment should be either dedicated or decontaminated between each sampling location as described above.

6.1. Fugitive Data

Establish communication with the driller to obtain fugitive data to be noted in the comments section of the borelog. Attention should be paid to relative differences in the drilling behavior, the depth of these observations, and fugitive data should be compared to observations in the recovered soil sample. Relevant fugitive data may include the following:

- Rig chatter
- Tip resistance
- Pull down force
- Duration for sample collection
- Swelling of soil sample (packed or blown liners)

6.2. Dual Tube Sampling Method

To avoid potential cross contamination with soil lying above the water bearing zone, the dual tube direct push drilling method should be employed prior to ground water and soil sample collection. This method ensures the hole is cased off to the total depth during soil sample collection and recovery to prevent contact between shallow soil and the ground water bearing zone or mixing of ground water between two separate ground water-bearing zones. Once the target ground water sampling zone is reached, the outer casing is retracted to expose the desired ground water sampling interval. 1-inch or less diameter PVC should be inserted in the borehole at this point with a screened section at the base to decrease the amount of sediment collected in the grab ground water samples.

If there is minimal potential for cross contamination, the continuous core drilling method may be used. Under this sampling method, the drill rods are removed from the boring after each soil sample is collected and the grab ground water sample would be collected from an open hole.

7. LOGGING SOIL SAMPLES

7.1. Lithologic Descriptions

The site lithology should be described according to the United Soil Classification System (USCS) ASTM D2487. At a minimum the description should include the following

- Soil type
- Color (Munsel)
- Sorting
- Grain size with percentages most to least
- Any modifiers
- Soil consistency
- Moisture content

Changes in lithology shall be indicated with a solid line if the contact is sharp, a dashed line if there is a gradational contact, and a dashed line with question marks if the contact depth is unknown. For consolidated, hard rock soil lithologic descriptions, refer to Soil Rock Logging and Classification and Presentation Manual, California Department of Transportation (CalTrans), 2010.

When drilling through contaminated soil, observations regarding the nature of contamination should be recorded in the notes section of the bore log. These observations should include at a minimum a description of the following:

- Odors
- Staining or soil discoloration
- Photo ionization detector (PID) readings, every 6” and at significant changes in lithology.
- Contaminant migration observations (i.e. maximum contamination is observed at the base of the sand layer or contamination is migrating through fissures in the clay layer)

7.2. Measure Depth to Water

Prior to sample collection, measure the depth to water using an electric water level meter as described below.

- Lower the electrode probe slowly into the well until the indicator shows that the circuit is closed and contact with the water surface is made.

- Place the nail of the index finger on the insulated wire at the MP and read the depth to water. Raise the electrode to a height that is slightly above the depth to water to see if the water is rising in the boring.

- Make a note of the depth to water and whether the depth to water has stabilized in the well. Note the initial depth to water will be indicated based on the first significant water bearing zone as noted in the lithologic description. The static water level will be based on the measured depth to water in the soil boring.

7.3. Ground water Sampling Methods

7.3.1. SAMPLE COLLECTION WITH DEDICATED TUBING AND A BALL CHECK VALVE

- Cut an appropriately sized length of HDPE tubing to extend to the base of the bore hole leaving at least two feet above the top of casing.

- Attach the ball check valve to the dedicated tubing and insert the tube into the PVC casing installed in the borehole. The check valve should be located in the middle of the screen zone.

- Rapidly raise and lower the dedicated tubing a distance of approximately six inches until water is observed at the top of the dedicated tubing and repeat the motion until sample bottles are filled.

- Either decontaminate tubing between locations, or dispose and dedicate new tubing for additional locations.

7.3.2. SAMPLE COLLECTION WITH A BAILER

- Attach a stainless or disposable polyethylene bailer with a ball check valve to a string and lower downhole to the base of the screen zone.

- Fill the bailer with water and retrieve using the dedicated string.

- Decant water from the bailer into the sample bottles and repeat until all sample bottles are filled.

- Either decontaminate tubing between locations, or dispose and dedicate new tubing for additional locations.

7.3.3. SAMPLE COLLECTION WITH A PERISTALTIC PUMP

- Cut an appropriately sized length of HDPE tubing to extend to the base of the bore hole leaving at least two feet above the top of casing.
- Insert the tube into the PVC casing installed in the borehole. The pump intake should be located in the middle of the screen zone.
- Attach approximately 6 inches of silicone tubing to the top of the HDPE tubing and place the silicone tubing in the peristaltic pump head. There should be approximately 2 feet of HDPE tubing attached to the other end of the silicone tubing.
- Connect the pump to a power source, check to make sure the flow direction of the pump is in the right position, turn the pump on and adjust flow rate accordingly and fill sample bottles.

8. QA/QC SAMPLING PROCEDURES AND SAMPLE HANDLING

Collected samples are placed in appropriate laboratory-supplied containers, labeled, documented on a chain of custody form, and placed on ice in a chilled cooler for transport to a NELAP certified analytical laboratory. Analytical detection limits should match or surpass standards required by relevant local or regional guidelines.

8.1. Quality Control Samples

To prevent contamination of the samples in the field, the following measures should be taken:

- Put on a clean pair of latex gloves prior to sampling each well;
- Advance and sample borings in the order of increasing degree of contamination based on available site data; and
- Based on the site conditions, regulatory requirements, or clients' request, include trip blanks and equipment blanks to QC the sample handling and transportation procedures, and include duplicate samples to QC the lab procedures.

The collection of blank and duplicate samples required by the project are specified in the Work Plan. All blank and duplicate samples, with the exception of the temperature blank, will be analyzed by the same analytical methods as the original sample unless otherwise specified in the Work Plan or QAPP:

- Trip blank samples will be prepared by the laboratory using DI water. Samples will accompany the bottles from the lab to the field and back to the lab for analysis without being opened. The bottles will be from the same package used for the sample collection. Trip blanks are prepared by the laboratory. They are transported to the site in the same manner along with other laboratory-supplied sample bottles/containers. The trip blank are not opened in the field, and are returned to the laboratory with the collected ground water samples.

- Duplicate samples will be collected in the same manner and directly after the original sample is collected. The sample label and COC will not reference the original sample in the sample name. The field technician will indicate in the well sampling data sheet the well the duplicate sample was collected from. Duplicate samples are collected to verify the repeatability of laboratory procedures. The number of duplicates is determined based on the number of monitoring wells and the size of the monitoring program.

- Field blank samples will be filled with a laboratory provided DI water in the field using the same equipment and sample design that is used to collect the monitor well samples. Anything that comes into contact with the actual sample will come into contact with the field blank. Field blank samples are different from the equipment blank samples because they are collected without using the field equipment. Field blanks can be poured into laboratory bottles or siphoned using dedicated tubing.

- Temperature blank samples will be filled with DI water provided by the laboratory. These samples will be stored in the base of the cooler and delivered to the lab for a temperature check upon receipt. A temperature blank can be made in the field using a 250ml polyethylene container and DI water.

- Equipment blanks are obtained in the field to determine if the non-dedicated field sampling equipment has been effectively decontaminated. For sampling equipment used to collect samples (i.e. sampling pumps, valves, etc.), laboratory provided DI water is collected with the equipment to generate an equipment blank. For any non-dedicated equipment that comes into contact with the sample (i.e water level meter, water parameter probes, etc.) equipment rinsate blanks are collected from DI water that is poured over the field equipment that comes into contact with the sample. The rinsate water is poured through a funnel that will be decontaminated between each rinsate sample collection. Depending on the method used to collect the sample, the sample may be a combination of the rinsate and equipment blanks. The equipment blanks are transported to the laboratory in the same manner along with other collected ground water samples, and are analyzed for the same chemical constituents as the ground water samples collected at the site.

9. CLOSE MONITORING EVENT

The following work should be performed prior to leaving the site:

- Decon the equipment

- Seal the drums that store soil cuttings, and place them in a secure area

- Remove the cones/tapes and clean the ground

- Checkout with the site manager and call the project manager in the office

REFERENCES

ASTM 2002. *Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations.* Designation: D 6771-02

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SOIL SAMPLING -
STANDARD OPERATING PROCEDURES (SOP)
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1. PURPOSE

This document focuses on the equipment, field procedures, and level of accuracy and quality control measures required for soil sampling. This SOP will be used to guide AWR field staff to perform soil sampling, maintain consistency of field procedures, and facilitate the assurance of the quality and reliability of data obtained from all soil sampling events monitoring events. This SOP is designed to facilitate the collection of soil samples from a drill or direct push rig or the collection of shallow soil samples with hand tools. This SOP is not intended to direct sediment sampling from a river, lake or seafloor.

2. EQUIPMENT

Soil sampling efforts need the following equipment and supplies:

- Sampling Sheets, Logs and Site Information
    - Project description, site maps, chain-of-custody, SOP, QAPP, Work Plan, field data forms, activity logs, camera, GPS unit, clipboard, well condition checklist, indelible ink pen.
    - Health and Safety Plan (HASP)
    - Site information including previous investigation and monitoring data with boring logs and cross-sections if available
    - Permission /notification to access land/home owner/tenant and contact information.
- Safety Equipment
    - Hardhat, boots, safety vest/suit, and gloves or appropriate Personal Protective Equipment (PPE) as specified in the HASP
    - Traffic control cones and tapes
    - Sun and heat protection (at least 1 liter of water per hour and sunblock)
    - Cellular phone with Contact Numbers
- Soil Sampling and Lithology Logging Equipment
    - Tape measure
    - Lithology Description aids: Munsell color chart, hand lens, grain size chart, USCS definitions
    - Survey stakes, flags, or buoys and anchors
    - GPS device
    - Camera and film
    - Stainless steel, plastic, or other appropriate composition bucket
    - Cooler(s) with wet ice
    - Spade or shovel, putty knife

  - Hand auger if necessary with extension rods
  - T-handle sampler for collection by EPA Method 5035
  - Backhoes or excavator as needed
  - Direct Push or Augur drilling rig as needed
- Sampling Supplies and Containers
  - 4/8/16oz, wide-mouth jars w/Teflon-lined lids
  - Ziploc or similar plastic bags
  - Sample jar labels
  - Chain of custody forms
  - Custody seals
- Decontamination Equipment
  - Decontamination supplies/equipment: Bucket with Alcoanox® or similar detergent and water
  - Rinse buckets for decontamination
  - Waste storage drums and buckets
  - Deionized (DI) water

3. PROCEDURES

Each soil sampling project will include the following procedures, and should be performed in the designated order:

1. Project Preparation
2. Equipment Decontamination
3. Soil Sample Methods
4. QA/QC Sampling Procedures
5. Close Monitoring Event

4. PROJECT PREPARATION

- Coordinate with project manager
- Review project description, site direction, site maps, list of chemicals to be analyzed, HASP
- Review the sampling methods to be employed, and the equipment and supplies required according to the Work Plan and/or Quality Assurance Project Plan (QAPP)
- Obtain necessary permits, utility clearance and access agreements.

- Obtain appropriate sampling and monitoring equipment.
- Decontaminate sampling equipment and ensure that it is in working order.
- Prepare schedules, and coordinate with staff, client, land owner/operator, and regulatory agencies, if appropriate.
- As needed, perform a general site survey prior to site entry in accordance with the site-specific health and safety plan.
- Prepare chain-of-custody and sample labels
- Use stakes, flags, or other identifiers and mark all sampling locations. Specific site characteristics including morphology, water table, nature and extent of contaminant should be considered when selecting sample location. If required, the proposed locations may be adjusted based on site access, property boundaries, and surface obstructions.
- Contact analytical lab to coordinate and bottle order preparation and delivery and sample courier pickup or drop off point.
- Notify site manager/site contact at least 24 hours prior to field effort.

5. EQUIPMENT DECONTAMINATION

After checking in with the site manager, a decontamination area and traffic control cones should be setup prior to well gauging and sampling. Any non-dedicated sampling equipment should be decontaminated prior to use. Equipment should be scrubbed in a Liquinox® solution wash. Wash solution is also pumped through purging pumps and rinsed with potable water. The same equipment should be rinsed again with potable water or de-ionized water if the latter is required.

6. SOIL SAMPLE METHODS

Soil samples may be collected using a variety of methods and equipment, depending on the portion of the soil profile required (surface versus subsurface), and the type of sample required (disturbed versus undisturbed) and the soil type. SOPs are described in this section for soil sampling using a trowel or hand Scoop, a hand augur, a backhoe or excavator, or a direct push or hollow stem augur drill rig

6.1. Soil Sample Handling and Laboratory Conveyance

Regardless of the means used to collect soil, samples will be handled and conveyed to the laboratory as described below.

- For composite sample, either direct the laboratory to homogenize the sample, or in the field homogenize grab samples in a plastic, glass or stainless steel mixing container using the appropriate tool (stainless steel spoon, trowel, or pestle).
- Chemical preservation of solids is generally not recommended, but check with the laboratory for proper preservation methods and sample hold times.

- If collecting into a glass or plastic jar, fill container at a minimum to the volume/weight specified per the analytical method and secure the cap tightly.
- If collecting samples from an acetate brass tube or other core barrel liner, cap the ends with the manufacturer recommended end caps with Teflon tape as specified per the Sampling Work Plan or QAPP. Acetate and plastic liners may be cut at the desired interval using a clean saw blade.
- Unless otherwise specified in the Work Plan or QAPP, soil samples analyzed for volatile organic compounds (VOCs) will be collected to comply with the USEPA Method 5035. This is described in further detail in Section qqq.
- Label and tag sample containers, and record appropriate data on soil sample data sheets (depth, location, color, lithology description, other relevant observations).
- Mark all sampling locations with marking paint, flagging, stakes, as determined by field conditions. If sufficient satellite contact can be obtained, use a handheld GPS device, to generate coordinates for the sample locations. If minimal or no satellite connection can be established, indicate on a site map the locations of all sample collection points and approximate distances to building or other recognizable features. Sample locations will be professionally surveyed per specification in the Work Plan or QAPP.
- Place sample containers in sealable plastic bags, and if required, place containers into an iced shipping container. If required by the laboratory analysis, samples should be cooled to 4°C or frozen as soon as possible.
- Complete chain of custody forms and deliver to laboratory as soon as possible to minimize sample holding time.
- Follow required decontamination and disposal procedures

6.2. Sample Recovery with a Trowel or Hand Scoop

Collection of surface soil can be accomplished with tools such as stainless steel or polycarbonate spades, shovels, and scoops. Surface soil can be removed to the required depth with a garden spade, then use a stainless steel or plastic scoop to collect the sample. A stainless steel or plastic scoop or lab spoon will suffice in most applications, and if possible the sample can be collected using the sample container. The following procedures are intended for soil samples collection with a scoop or trowel:

- Using a pre-cleaned shovel or trowel to remove the vegetation and top layer of soil, then loosen the desired volume of soil from the sampling area.
- Transfer the discrete sample into an appropriate sample container.

6.3. Sample Recovery with a Hand Auger

A hand auger bores a hole to a desired sampling depth and then is withdrawn. Be sure to use the appropriate hand augur tip based on the anticipated soil conditions. The auger tip is then replaced with a split tube core sampler that is attached to a slide hammer, which is lowered down the borehole, and driven into the soil at the completion depth. The split sampler can be lined with an acetate or similar material liner to aid in sample collection and reduce sample exposure. The core is then withdrawn and the sample collected from the split sampler. Use the following procedure to collect soil samples with a hand auger:

- Insert the auger into the material to be sampled at a 0° to 45° from vertical. This orientation minimizes spillage of the sample from the sampler. Extraction of samples may require tilting of the sampler.
- Rotate the auger once or twice to cut a core of material.
- Slowly withdraw the auger, making sure that the slot is facing upward.
- An acetate core may be inserted into the auger prior to sampling, if characteristics of the soils or body of water warrant. By using this technique, an intact core can be extracted.
- Transfer the sample into an appropriate sample or homogenization container.

6.4. Soil Sample Collection Using an Excavator or Backhoe

Soil sample collection can be made easier with the aid of heavy earth moving equipment. The following instructions are to assist in the collection of representative soil samples from trenches advanced with excavation equipment.

- Prior to advancing trenches with heavy earth moving equipment, conduct a tailgate meeting with the excavation operator to discuss related communication and all health and safety protocols for heavy equipment operation.
- Advance excavation trench to the desired depth interval for sample collection per the Work Plan or QAPP.
- Collect soil sample from the bucket of the excavator per the methods described in Section 6.1 and 6.2.
- If necessary to enter the trench to collect samples, assure compliance with all OSHA related confined space protocols per California Code of Regulations (CCR 5157), prior to entering excavation pit. Collect samples from the pit sidewall per Section 6.1 and 6.2.

6.5. Sample Recovery from a Drill Rig

For soil sample recovery using a direct push or drill rig, follow these procedures to ensure accurate and representative sample collection. While the drilling contractor will generally prepare and advance the sampler, *it is the responsibility of the field geologist to assure that samples are collected per the specifications in this SOP*. If the drilling contractor has failed to furnish the proper equipment, or refuses to advance the sampler as instructed, stop work and contact the Project Manager.

The methods described below serves as a general guide for soil sample collection from a drill rig. Sample collection methods may change depending on the field drilling conditions or equipment limitations. Any variations or deviations from the Work Plan and/or QAPP will be discussed with the Technical Project Manager prior to sample collection and noted in the field data sheets.

- Prior to advancement of any boring with power equipment, verify that Underground Service Alert (USA) has responded to the ticket and marked their facilities, and if specified, a private utility locator has cleared the site. If possible, hand clear the upper 5-feet of the boring location to check for utilities.

- Conduct a tailgate meeting with the drilling contractor to discuss related communication and health and safety protocols.
- Pay special attention to the orientation of the sample barrel and the top of the soil sample. It is common for material (slough) to fall to the total depth of the hole and be collected in the sample liner. Refer to the lithologic log to determine where the in situ material begins.
- Confined sand layers under certain hydrologic conditions are prone to traveling up the borehole to seek the static water level (flowing or heaving sands). Pay special attention to the base of the sample hole to determine the presence of heaving sands. Drilling and soil sample collection methods may change depending on the presence of heaving sands.

6.5.1. Direct Push Rig (Geoprobe or similar)

- Advance to the top of the desired sampling depth. Per the specifications in the Work Plan or QAPP, assure that the proper barrel size and technique (i.e. macrocore, dual tube, closed piston) is used.
- Assemble the coring device by inserting the acetate core (liner) into the sample barrel sampler and placing the "shoe" at the end of the sample barrel.
- For loose sandy materials place a "sand catcher" into the tip of the liner with the convex surface positioned inside the acetate core to ensure adequate sample recovery.
- Screw the handle onto the upper end of the sampling tube and add extension rods as needed.
- Drive or push the sampler into the subsurface to the desired sample collection depth.
- Record the length of the tube that penetrated the sample material.
- Pull or "trip out" the drilling rods out of the subsurface.
- Unscrew the "shoe" and slide the acetate core out of the sampler tube, cut and cap as described in section 4.1.

6.5.2. Hollow Stem Auger Drilling Rig

- Advance to the top of the desired sampling depth. Per the specifications in the Work Plan or QAPP, assure that the proper augur diameter and drilling technique are used.
- Assemble the sample barrel (split spoon sampler or similar) and insert liners (acetate, brass, etc.) as specified. Use a sand catcher for loose sandy materials to ensure sample recovery.
- Insert the sample barrel into the hollow stem hole and attach rods to lower to the total depth of the hole.
- Push or hammer the sample barrel to the desired sample depth. Record the number of hammer blows for every 6-inch sample interval.
- Open the shoe at the base of the sample barrel and collect samples as described in Section 4.1.

6.6. EPA Method 5035 Compliant Soil Sample Collection

Unless specified otherwise in the Work Plan or QAPP soil samples for VOCs will be collected consistent with 5035 soil sampling guidance (DTSC, 2004). Soil samples will be collected with Pre-cleaned and sealed sample containers provided by the laboratory or manufacturer. The “T”-handle used to collect samples will either be: 1) certified pre-cleaned and dedicated to each sample location, 2.) Not come into contact with the sample container, or 3) be thoroughly decontaminated between each sample location.

To minimize volatilization during sample collection, VOC samples will be collected immediately after the soil core has been exposed to atmospheric conditions, put on ice and delivered to the laboratory as soon as possible. All other specifications and sampling details are provided in the Guidance document (DTSC, 2004).

6.7. Sampling Soil for Mercury Analysis

Mercury Low level and methyl mercury sampling for water will be compliant with the specifications in Method 1669 (USEPA, 1996). This method requires the “clean hands dirty hands” approach to field sampling. Therefore a minimum of two trained sampling personnel must be on site to collect low leve and methyl mercury samples.

7. QUALITY ASSURANCE (QC) MEASURES

To prevent contamination of the samples in the field, the following measures should be taken:

- Put on a clean pair of latex gloves prior to sampling each well;
- Collect soil samples order of increasing degree of contamination based on historical analytical results. However, if the purpose of the soil sampling is to delineate the extent of contamination, this guidance does not apply.
- Based on the site conditions, regulatory requirements, or clients’ request, include duplicate and other QA/QC samples per the specifications in the Work Plan or Quality Assurance Project Plan (QAPP).

8. CLOSING OF MONITORING EVENT

The following work should be performed prior to leaving the site:

- Decontaminate the equipment
- Stake and record GPS location coordinates for all soil sampling locations
- Seal the drums, if any that store waste soil, and place them in a secure area
- Remove the cones/tapes and clean the ground
- Checkout with the site manager and call the project manager in the office

9. REFERENCES

ASTM 2002. *Standard Practice for Low-Flow Purging and Sampling for Wells and Devices Used for Ground-Water Quality Investigations.* Designation: D 6771-02

DTSC , Guidance Document for the Implementation of United states environmental protection agency Method 5035: Methodologies for Collection, Preservation, storage, and preparation of soils To be analyzed for volatile organic compounds, 2004

APPENDIX D

Curtis & Tompkins, Ltd.
Analytical Laboratories, Since 1878

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (510) 486-0900

Laboratory Job Number 250876
ANALYTICAL REPORT

Applied Water Resources
1600 Rivera Ave Suite 310
Walnut Creek, CA 94596

Project : STANDARD
Location : 1700 Jefferson
Level : II

Sample ID	Lab ID
A2	250876-001
COMP	250876-002

This data package has been reviewed for technical correctness and completeness. Release of this data has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature. The results contained in this report meet all requirements of NELAC and pertain only to those samples which were submitted for analysis. This report may be reproduced only in its entirety.

Signature: ______________________ Date: 11/27/2013

Tracy Babjar
Project Manager
tracy.babjar@ctberk.com
(510) 204-2226

NELAP # 01107CA

CASE NARRATIVE

Laboratory number:	**250876**
Client:	**Applied Water Resources**
Location:	**1700 Jefferson**
Request Date:	**11/18/13**
Samples Received:	**11/18/13**

This data package contains sample and QC results for one air sample, requested for the above referenced project on 11/18/13. The sample was received intact.

Volatile Organics in Air by MS (EPA TO-15):
High RPD was observed for naphthalene and 1,2,4-trichlorobenzene in the BS/BSD for batch 205401; these analytes were not detected at or above the RL in the associated sample. No other analytical problems were encountered.

Volatile Organics in Air GC (ASTM D1946):
No analytical problems were encountered.

CHAIN OF CUSTODY

Curtis & Tompkins Laboratories
ENVIRONMENTAL ANALYTICAL TESTING LABORATORY
In Business Since 1878

2323 Fifth Street
Berkeley, CA 94710

Phone (510) 486-0900
Fax (510) 486-0532

Page 1 of 1
Chain of Custody #
C&T LOGIN # 250876

Project No: 1700 Jefferson
Project Name: 1700 Jefferson
Project P. O. No:
EDD Format: Report Level ☐ II ☐ III ☐ IV
Turnaround Time: ☐ RUSH ☒ Standard

Sampler: Y. Bayram
Report To: Yola Bayram
Company: AWR Corp
Telephone: 925 4261112
Email: ybayram@awrcorp.net

Lab No.	Sample ID.	SAMPLING		MATRIX				# of Containers	CHEMICAL PRESERVATIVE					ANALYTICAL REQUEST															
		Date Collected	Time Collected	Water	Solid	Air			HCl	H2SO4	HNO3	NaOH	None	TO-15	He														Hold
1	A2	11-16-13	1443			X		1					X	X	X														
2	Comp	11-16-13	1500		X			1					X																X

Notes:

SAMPLE RECEIPT
☐ Intact
☐ Cold
☐ On Ice
☐ Ambient

RELINQUISHED BY:
DATE: 11-16-13 TIME: 1600
DATE: TIME:
DATE: TIME:

RECEIVED BY:
Tina Raikar DATE: 11/18/13 TIME: ~~1000~~
DATE: TIME:
DATE: TIME:

COOLER RECEIPT CHECKLIST

Curtis & Tompkins, Ltd.

Login # 250876 Date Received 11/18/13 Number of coolers 1
Client AWR CORP Project 1700 JEFFERSON

Date Opened 11/18/13 By (print) TR (sign) Tina Raikar
Date Logged in ↓ By (print) ↓ (sign) ↓

1. Did cooler come with a shipping slip (airbill, etc) YES [✓ NO]
   Shipping info

2A. Were custody seals present? .... ☐ YES (circle) on cooler on samples ☒ NO
    How many Name Date

2B. Were custody seals intact upon arrival? YES NO [✓ N/A]

3. Were custody papers dry and intact when received? [✓ YES] NO

4. Were custody papers filled out properly (ink, signed, etc)? [✓ YES] NO

5. Is the project identifiable from custody papers? (If so fill out top of form) [✓ YES] NO

6. Indicate the packing in cooler: (if other, describe)

☐ Bubble Wrap ☐ Foam blocks ☐ Bags ☒ None
☐ Cloth material ☐ Cardboard ☐ Styrofoam ☐ Paper towels

7. Temperature documentation: * Notify PM if temperature exceeds 6°C

Type of ice used: ☐ Wet ☐ Blue/Gel ☒ None Temp(°C)

☐ Samples Received on ice & cold without a temperature blank; temp. taken with IR gun

☐ Samples received on ice directly from the field. Cooling process had begun

8. Were Method 5035 sampling containers present? YES [✓ NO]
   If YES, what time were they transferred to freezer?

9. Did all bottles arrive unbroken/unopened? [✓ YES] NO

10. Are there any missing / extra samples? YES [✓ NO]

11. Are samples in the appropriate containers for indicated tests? [✓ YES] NO

12. Are sample labels present, in good condition and complete? [✓ YES] NO

13. Do the sample labels agree with custody papers? [✓ YES] NO

14. Was sufficient amount of sample sent for tests requested? [✓ YES] NO

15. Are the samples appropriately preserved? YES NO [✓ N/A]

16. Did you check preservatives for all bottles for each sample? YES NO [✓ N/A]

17. Did you document your preservative check? YES NO [✓ N/A]

18. Did you change the hold time in LIMS for unpreserved VOAs? YES NO [✓ N/A]

19. Did you change the hold time in LIMS for preserved terracores? YES NO [✓ N/A]

20. Are bubbles > 6mm absent in VOA samples? YES NO [✓ N/A]

21. Was the client contacted concerning this sample delivery? YES [✓ NO]
    If YES, Who was called? By Date:

COMMENTS

Rev 10, 11/11

Volatile Organics in Air

Lab #:	250876	Location:	1700 Jefferson
Client:	Applied Water Resources	Prep:	METHOD
Project#:	STANDARD	Analysis:	EPA TO-15
Field ID:	A2	Diln Fac:	1.630
Lab ID:	250876-001	Batch#:	205401
Matrix:	Air	Sampled:	11/16/13
Units (V):	ppbv	Received:	11/18/13
Units (M):	ug/m3	Analyzed:	11/22/13

Analyte	Result (V)	RL	Result (M)	RL
Freon 12	ND	0.82	ND	4.0
Freon 114	ND	0.82	ND	5.7
Chloromethane	ND	0.82	ND	1.7
Vinyl Chloride	ND	0.82	ND	2.1
1,3-Butadiene	ND	0.82	ND	1.8
Bromomethane	ND	0.82	ND	3.2
Chloroethane	ND	0.82	ND	2.2
Trichlorofluoromethane	ND	0.82	ND	4.6
Acrolein	ND	3.3	ND	7.5
1,1-Dichloroethene	ND	0.82	ND	3.2
Freon 113	ND	0.82	ND	6.2
Acetone	11	3.3	26	7.7
Carbon Disulfide	1.6	0.82	4.9	2.5
Isopropanol	ND	3.3	ND	8.0
Methylene Chloride	ND	0.82	ND	2.8
trans-1,2-Dichloroethene	ND	0.82	ND	3.2
MTBE	ND	0.82	ND	2.9
n-Hexane	0.95	0.82	3.4	2.9
1,1-Dichloroethane	ND	0.82	ND	3.3
Vinyl Acetate	ND	0.82	ND	2.9
cis-1,2-Dichloroethene	ND	0.82	ND	3.2
2-Butanone	2.9	0.82	8.6	2.4
Ethyl Acetate	ND	0.82	ND	2.9
Tetrahydrofuran	2.2	0.82	6.6	2.4
Chloroform	ND	0.82	ND	4.0
1,1,1-Trichloroethane	ND	0.82	ND	4.4
Cyclohexane	150	0.82	510	2.8
Carbon Tetrachloride	ND	0.82	ND	5.1
Benzene	0.96	0.82	3.1	2.6
1,2-Dichloroethane	ND	0.82	ND	3.3
n-Heptane	1.2	0.82	4.9	3.3
Trichloroethene	ND	0.82	ND	4.4
1,2-Dichloropropane	ND	0.82	ND	3.8
Bromodichloromethane	ND	0.82	ND	5.5
cis-1,3-Dichloropropene	ND	0.82	ND	3.7

ND= Not Detected
RL= Reporting Limit
Result M= Result in mass units
Result V= Result in volume units

Volatile Organics in Air

Lab #:	250876	Location:	1700 Jefferson
Client:	Applied Water Resources	Prep:	METHOD
Project#:	STANDARD	Analysis:	EPA TO-15
Field ID:	A2	Diln Fac:	1.630
Lab ID:	250876-001	Batch#:	205401
Matrix:	Air	Sampled:	11/16/13
Units (V):	ppbv	Received:	11/18/13
Units (M):	ug/m3	Analyzed:	11/22/13

Analyte	Result (V)	RL	Result (M)	RL
4-Methyl-2-Pentanone	1.0	0.82	4.3	3.3
Toluene	29	0.82	110	3.1
trans-1,3-Dichloropropene	ND	0.82	ND	3.7
1,1,2-Trichloroethane	ND	0.82	ND	4.4
Tetrachloroethene	ND	0.82	ND	5.5
2-Hexanone	ND	0.82	ND	3.3
Dibromochloromethane	ND	0.82	ND	6.9
1,2-Dibromoethane	ND	0.82	ND	6.3
Chlorobenzene	ND	0.82	ND	3.8
Ethylbenzene	1.4	0.82	6.0	3.5
m,p-Xylenes	6.6	0.82	29	3.5
o-Xylene	2.7	0.82	12	3.5
Styrene	ND	0.82	ND	3.5
Bromoform	ND	0.82	ND	8.4
1,1,2,2-Tetrachloroethane	ND	0.82	ND	5.6
4-Ethyltoluene	ND	0.82	ND	4.0
1,3,5-Trimethylbenzene	ND	0.82	ND	4.0
1,2,4-Trimethylbenzene	1.1	0.82	5.3	4.0
1,3-Dichlorobenzene	ND	0.82	ND	4.9
1,4-Dichlorobenzene	ND	0.82	ND	4.9
Benzyl chloride	ND	0.82	ND	4.2
1,2-Dichlorobenzene	ND	0.82	ND	4.9
1,2,4-Trichlorobenzene	ND	0.82	ND	6.0
Hexachlorobutadiene	ND	0.82	ND	8.7
Naphthalene	ND	3.3	ND	17

Surrogate	%REC	Limits
Bromofluorobenzene	96	70-130

ND= Not Detected
RL= Reporting Limit
Result M= Result in mass units
Result V= Result in volume units

Batch QC Report

Volatile Organics in Air

Lab #:	250876	Location:	1700 Jefferson
Client:	Applied Water Resources	Prep:	METHOD
Project#:	STANDARD	Analysis:	EPA TO-15
Matrix:	Air	Batch#:	205401
Units (V):	ppbv	Analyzed:	11/22/13
Diln Fac:	1.000		

Type: BS

Lab ID: QC717450

Analyte	Spiked	Result (V)	%REC	Limits
Freon 12	16.67	18.14	109	70-130
Freon 114	16.67	18.45	111	70-130
Chloromethane	16.67	18.41	110	70-130
Vinyl Chloride	16.67	18.96	114	70-130
1,3-Butadiene	16.67	18.50	111	70-130
Bromomethane	16.67	19.31	116	70-130
Chloroethane	16.67	18.24	109	70-130
Trichlorofluoromethane	16.67	17.97	108	70-130
Acrolein	16.67	19.26	116	62-130
1,1-Dichloroethene	16.67	17.35	104	70-130
Freon 113	16.67	17.13	103	70-130
Acetone	16.67	18.04	108	67-130
Carbon Disulfide	16.67	18.34	110	70-130
Isopropanol	16.67	20.29	122	60-130
Methylene Chloride	16.67	16.53	99	68-130
trans-1,2-Dichloroethene	16.67	17.81	107	70-130
MTBE	16.67	16.57	99	70-130
n-Hexane	16.67	17.45	105	70-130
1,1-Dichloroethane	16.67	19.01	114	70-130
Vinyl Acetate	16.67	21.24	127	70-130
cis-1,2-Dichloroethene	16.67	17.53	105	70-130
2-Butanone	16.67	18.44	111	70-130
Ethyl Acetate	16.67	17.47	105	70-130
Tetrahydrofuran	16.67	15.70	94	70-130
Chloroform	16.67	17.67	106	70-130
1,1,1-Trichloroethane	16.67	18.00	108	70-130
Cyclohexane	16.67	17.66	106	70-130
Carbon Tetrachloride	16.67	18.46	111	70-130
Benzene	16.67	17.20	103	70-130
1,2-Dichloroethane	16.67	18.42	111	70-130
n-Heptane	16.67	17.80	107	70-130
Trichloroethene	16.67	17.82	107	70-130
1,2-Dichloropropane	16.67	18.84	113	70-130

*= Value outside of QC limits; see narrative
RPD= Relative Percent Difference
Result V= Result in volume units

Batch QC Report

Volatile Organics in Air

Lab #:	250876	Location:	1700 Jefferson
Client:	Applied Water Resources	Prep:	METHOD
Project#:	STANDARD	Analysis:	EPA TO-15
Matrix:	Air	Batch#:	205401
Units (V):	ppbv	Analyzed:	11/22/13
Diln Fac:	1.000		

Analyte	Spiked	Result (V)	%REC	Limits
Bromodichloromethane	16.67	18.25	109	70-130
cis-1,3-Dichloropropene	16.67	19.00	114	70-130
4-Methyl-2-Pentanone	16.67	18.07	108	70-130
Toluene	16.67	17.72	106	70-130
trans-1,3-Dichloropropene	16.67	18.71	112	70-130
1,1,2-Trichloroethane	16.67	18.39	110	70-130
Tetrachloroethene	16.67	18.68	112	70-130
2-Hexanone	16.67	18.83	113	70-130
Dibromochloromethane	16.67	20.10	121	70-130
1,2-Dibromoethane	16.67	19.89	119	70-130
Chlorobenzene	16.67	19.35	116	70-130
Ethylbenzene	16.67	15.47	93	70-130
m,p-Xylenes	33.33	31.90	96	70-130
o-Xylene	16.67	15.42	93	70-130
Styrene	16.67	21.20	127	70-130
Bromoform	16.67	20.34	122	70-130
1,1,2,2-Tetrachloroethane	16.67	17.83	107	70-130
4-Ethyltoluene	16.67	17.85	107	70-130
1,3,5-Trimethylbenzene	16.67	16.33	98	70-130
1,2,4-Trimethylbenzene	16.67	16.28	98	70-130
1,3-Dichlorobenzene	16.67	17.94	108	70-130
1,4-Dichlorobenzene	16.67	17.44	105	70-130
Benzyl chloride	16.67	19.38	116	70-130
1,2-Dichlorobenzene	16.67	17.11	103	70-130
1,2,4-Trichlorobenzene	16.67	12.87	77	62-130
Hexachlorobutadiene	16.67	13.74	82	68-130
Naphthalene	16.67	13.15	79	54-136

Surrogate	%REC	Limits
Bromofluorobenzene	92	70-130

*= Value outside of QC limits; see narrative
RPD= Relative Percent Difference
Result V= Result in volume units

Batch QC Report

Volatile Organics in Air

Lab #:	250876	Location:	1700 Jefferson
Client:	Applied Water Resources	Prep:	METHOD
Project#:	STANDARD	Analysis:	EPA TO-15
Matrix:	Air	Batch#:	205401
Units (V):	ppbv	Analyzed:	11/22/13
Diln Fac:	1.000		

Type: BSD

Lab ID: QC717451

Analyte	Spiked	Result (V)	%REC	Limits	RPD	Lim
Freon 12	16.67	17.92	107	70-130	1	20
Freon 114	16.67	18.06	108	70-130	2	20
Chloromethane	16.67	18.14	109	70-130	1	27
Vinyl Chloride	16.67	18.52	111	70-130	2	23
1,3-Butadiene	16.67	17.83	107	70-130	4	21
Bromomethane	16.67	18.98	114	70-130	2	20
Chloroethane	16.67	18.22	109	70-130	0	20
Trichlorofluoromethane	16.67	17.61	106	70-130	2	20
Acrolein	16.67	18.97	114	62-130	2	31
1,1-Dichloroethene	16.67	16.73	100	70-130	4	20
Freon 113	16.67	16.87	101	70-130	2	23
Acetone	16.67	16.23	97	67-130	11	20
Carbon Disulfide	16.67	18.03	108	70-130	2	20
Isopropanol	16.67	19.65	118	60-130	3	21
Methylene Chloride	16.67	16.17	97	68-130	2	23
trans-1,2-Dichloroethene	16.67	17.09	103	70-130	4	20
MTBE	16.67	16.12	97	70-130	3	20
n-Hexane	16.67	17.05	102	70-130	2	20
1,1-Dichloroethane	16.67	18.46	111	70-130	3	20
Vinyl Acetate	16.67	20.94	126	70-130	1	21
cis-1,2-Dichloroethene	16.67	17.24	103	70-130	2	20
2-Butanone	16.67	18.12	109	70-130	2	20
Ethyl Acetate	16.67	16.98	102	70-130	3	20
Tetrahydrofuran	16.67	15.46	93	70-130	2	20
Chloroform	16.67	17.30	104	70-130	2	20
1,1,1-Trichloroethane	16.67	17.23	103	70-130	4	20
Cyclohexane	16.67	17.39	104	70-130	2	20
Carbon Tetrachloride	16.67	17.81	107	70-130	4	20
Benzene	16.67	16.82	101	70-130	2	20
1,2-Dichloroethane	16.67	17.77	107	70-130	4	20
n-Heptane	16.67	17.53	105	70-130	1	20
Trichloroethene	16.67	17.02	102	70-130	5	20
1,2-Dichloropropane	16.67	17.75	107	70-130	6	20

*= Value outside of QC limits; see narrative
RPD= Relative Percent Difference
Result V= Result in volume units

Batch QC Report

Volatile Organics in Air

Lab #:	250876	Location:	1700 Jefferson
Client:	Applied Water Resources	Prep:	METHOD
Project#:	STANDARD	Analysis:	EPA TO-15
Matrix:	Air	Batch#:	205401
Units (V):	ppbv	Analyzed:	11/22/13
Diln Fac:	1.000		

Analyte	Spiked	Result (V)	%REC	Limits	RPD	Lim
Bromodichloromethane	16.67	17.73	106	70-130	3	20
cis-1,3-Dichloropropene	16.67	18.21	109	70-130	4	20
4-Methyl-2-Pentanone	16.67	17.12	103	70-130	5	20
Toluene	16.67	17.17	103	70-130	3	23
trans-1,3-Dichloropropene	16.67	18.00	108	70-130	4	20
1,1,2-Trichloroethane	16.67	18.29	110	70-130	1	20
Tetrachloroethene	16.67	18.64	112	70-130	0	20
2-Hexanone	16.67	18.52	111	70-130	2	21
Dibromochloromethane	16.67	19.65	118	70-130	2	20
1,2-Dibromoethane	16.67	19.45	117	70-130	2	20
Chlorobenzene	16.67	18.38	110	70-130	5	21
Ethylbenzene	16.67	15.61	94	70-130	1	20
m,p-Xylenes	33.33	32.35	97	70-130	1	20
o-Xylene	16.67	15.18	91	70-130	2	20
Styrene	16.67	20.94	126	70-130	1	21
Bromoform	16.67	20.35	122	70-130	0	20
1,1,2,2-Tetrachloroethane	16.67	17.90	107	70-130	0	24
4-Ethyltoluene	16.67	17.75	107	70-130	1	22
1,3,5-Trimethylbenzene	16.67	15.86	95	70-130	3	23
1,2,4-Trimethylbenzene	16.67	16.01	96	70-130	2	24
1,3-Dichlorobenzene	16.67	17.82	107	70-130	1	22
1,4-Dichlorobenzene	16.67	17.18	103	70-130	1	22
Benzyl chloride	16.67	19.20	115	70-130	1	21
1,2-Dichlorobenzene	16.67	16.98	102	70-130	1	22
1,2,4-Trichlorobenzene	16.67	19.30	116	62-130	40 *	28
Hexachlorobutadiene	16.67	16.27	98	68-130	17	27
Naphthalene	16.67	21.78	131	54-136	49 *	29

Surrogate	%REC	Limits
Bromofluorobenzene	92	70-130

*= Value outside of QC limits; see narrative
RPD= Relative Percent Difference
Result V= Result in volume units

Batch QC Report

Volatile Organics in Air

Lab #:	250876	Location:	1700 Jefferson
Client:	Applied Water Resources	Prep:	METHOD
Project#:	STANDARD	Analysis:	EPA TO-15
Type:	BLANK	Units (M):	ug/m3
Lab ID:	QC717452	Diln Fac:	1.000
Matrix:	Air	Batch#:	205401
Units (V):	ppbv	Analyzed:	11/22/13

Analyte	Result (V)	RL	Result (M)	RL
Freon 12	ND	0.50	ND	2.5
Freon 114	ND	0.50	ND	3.5
Chloromethane	ND	0.50	ND	1.0
Vinyl Chloride	ND	0.50	ND	1.3
1,3-Butadiene	ND	0.50	ND	1.1
Bromomethane	ND	0.50	ND	1.9
Chloroethane	ND	0.50	ND	1.3
Trichlorofluoromethane	ND	0.50	ND	2.8
Acrolein	ND	2.0	ND	4.6
1,1-Dichloroethene	ND	0.50	ND	2.0
Freon 113	ND	0.50	ND	3.8
Acetone	ND	2.0	ND	4.8
Carbon Disulfide	ND	0.50	ND	1.6
Isopropanol	ND	2.0	ND	4.9
Methylene Chloride	ND	0.50	ND	1.7
trans-1,2-Dichloroethene	ND	0.50	ND	2.0
MTBE	ND	0.50	ND	1.8
n-Hexane	ND	0.50	ND	1.8
1,1-Dichloroethane	ND	0.50	ND	2.0
Vinyl Acetate	ND	0.50	ND	1.8
cis-1,2-Dichloroethene	ND	0.50	ND	2.0
2-Butanone	ND	0.50	ND	1.5
Ethyl Acetate	ND	0.50	ND	1.8
Tetrahydrofuran	ND	0.50	ND	1.5
Chloroform	ND	0.50	ND	2.4
1,1,1-Trichloroethane	ND	0.50	ND	2.7
Cyclohexane	ND	0.50	ND	1.7
Carbon Tetrachloride	ND	0.50	ND	3.1
Benzene	ND	0.50	ND	1.6
1,2-Dichloroethane	ND	0.50	ND	2.0
n-Heptane	ND	0.50	ND	2.0
Trichloroethene	ND	0.50	ND	2.7
1,2-Dichloropropane	ND	0.50	ND	2.3
Bromodichloromethane	ND	0.50	ND	3.4
cis-1,3-Dichloropropene	ND	0.50	ND	2.3

ND= Not Detected
RL= Reporting Limit
Result M= Result in mass units
Result V= Result in volume units

Batch QC Report

Volatile Organics in Air

Lab #:	250876	Location:	1700 Jefferson
Client:	Applied Water Resources	Prep:	METHOD
Project#:	STANDARD	Analysis:	EPA TO-15
Type:	BLANK	Units (M):	ug/m3
Lab ID:	QC717452	Diln Fac:	1.000
Matrix:	Air	Batch#:	205401
Units (V):	ppbv	Analyzed:	11/22/13

Analyte	Result (V)	RL	Result (M)	RL
4-Methyl-2-Pentanone	ND	0.50	ND	2.0
Toluene	ND	0.50	ND	1.9
trans-1,3-Dichloropropene	ND	0.50	ND	2.3
1,1,2-Trichloroethane	ND	0.50	ND	2.7
Tetrachloroethene	ND	0.50	ND	3.4
2-Hexanone	ND	0.50	ND	2.0
Dibromochloromethane	ND	0.50	ND	4.3
1,2-Dibromoethane	ND	0.50	ND	3.8
Chlorobenzene	ND	0.50	ND	2.3
Ethylbenzene	ND	0.50	ND	2.2
m,p-Xylenes	ND	0.50	ND	2.2
o-Xylene	ND	0.50	ND	2.2
Styrene	ND	0.50	ND	2.1
Bromoform	ND	0.50	ND	5.2
1,1,2,2-Tetrachloroethane	ND	0.50	ND	3.4
4-Ethyltoluene	ND	0.50	ND	2.5
1,3,5-Trimethylbenzene	ND	0.50	ND	2.5
1,2,4-Trimethylbenzene	ND	0.50	ND	2.5
1,3-Dichlorobenzene	ND	0.50	ND	3.0
1,4-Dichlorobenzene	ND	0.50	ND	3.0
Benzyl chloride	ND	0.50	ND	2.6
1,2-Dichlorobenzene	ND	0.50	ND	3.0
1,2,4-Trichlorobenzene	ND	0.50	ND	3.7
Hexachlorobutadiene	ND	0.50	ND	5.3
Naphthalene	ND	2.0	ND	10

Surrogate	%REC	Limits
Bromofluorobenzene	86	70-130

ND= Not Detected
RL= Reporting Limit
Result M= Result in mass units
Result V= Result in volume units

Curtis & Tompkins Laboratories Analytical Report

Lab #:	250876	Location:	1700 Jefferson
Client:	Applied Water Resources	Prep:	METHOD
Project#:	STANDARD	Analysis:	ASTM D1946
Analyte:	Helium	Batch#:	205330
Field ID:	A2	Sampled:	11/16/13
Matrix:	Air	Received:	11/18/13
Units:	ppmv	Analyzed:	11/21/13
Units (Mol %):	MOL %		

Type	Lab ID	Result	RL	Result (Mol %)	RL	Diln Fac
SAMPLE	250876-001	ND	1,600	ND	0.16	1.630
BLANK	QC717181	ND	1,000	ND	0.10	1.000

ND= Not Detected
RL= Reporting Limit
Result Mol %= Result in Mole Percent

Batch QC Report

Curtis & Tompkins Laboratories Analytical Report

Lab #:	250876	Location:	1700 Jefferson
Client:	Applied Water Resources	Prep:	METHOD
Project#:	STANDARD	Analysis:	ASTM D1946
Analyte:	Helium	Diln Fac:	1.000
Matrix:	Air	Batch#:	205330
Units:	ppmv	Analyzed:	11/21/13

Type	Lab ID	Spiked	Result	%REC	Limits	RPD	Lim
BS	QC717179	100,000	97,050	97	70-130		
BSD	QC717180	100,000	97,160	97	70-130	0	20

RPD= Relative Percent Difference