From:	Kathy Angus
To:	BOS Legislation, (BOS); Beinart, Amy (BOS); Gibson, Lisa (CPC); Ronen, Hillary
Cc:	Barbara Underberg; Marilyn Waterman; Herbert Felsenfeld
Subject:	Fwd: Email 1 of 3 BOS File No. 200800, 3516 and 3526 Folsom Street
Date:	Friday, July 31, 2020 3:14:45 PM
Attachments:	Rune Storesund 2016-12-01 Pipeline Review.pdf Rune Storesund 2016-12-11 Pipeline Impact.docx Rune Storesund 2017-06-05 PipelineReview.docx Rune Storesund 2017-06-14 Pipeline Review.pdf EDT 2017-09-11 Appellant Supplemental Ltr.pdf Email Viani 20190530.pdf Email Viani 20190708.pdf

Re: Appeal of CEQA Revised Mitigated Negative Declaration for 3516 and 3526 Folsom Street dated 4/24/2020

As appellants of this case, we would like to insure that all of the documents submitted by the following professionals with directly relevant expertise and credentials in geotechnical engineering and experience with safety of PG&E gas transmission pipelines are included.

Rune Storesund, D.Eng., P.E., G.E., Executive Director of UC Berkeley Center for Catastrophic Risk Management
Lawrence B. Karp, Architect. Civil and Geotechnical Engineer
Robert Bea, Professor Emeritus of Civil and Environmental Engineering, UC Berkeley Center for Catastrophic Risk Management
Engineering Design and Testing Corp., Forensic Engineers, Kenneth R. Ridings, P.E. and Steven P. Viani, P.E.

In fact, Consulting Engineers Karp, Storesund and Bea were so alarmed by the safety implications that they all agreed to provide their services pro bono.

With respect to the project's Vibration Management Plan, the consultants' geotechnical and pipeline expertise is particularly relevant:

"Vibration is often grouped with noise and regarded as a kindred topic. Noise, after all, begins as vibration, and vibration is as much a part of acoustics as is noise.
"By comparison, though, noise is simple. It always occurs in air, and except in special circumstances . . . the characteristic impedance of air is more or less always the same. . . . Airborne sound almost always propagates as a compression wave, and the speed of sound is about the same at all frequencies. . . .
"Vibration, by contrast, occurs in media ranging from rock or solid concrete, through water and soil to lightweight panels. It can propagate as a compression wave, a shear wave, a variety of surface waves, bending waves, torsional waves, either separately or together." [From Rupert Taylor Ltd., Noise and Vibration Consultants, website: ruperttaylor.com.]

In contrast to the analysis by engineers specifically experienced in underground vibrations, particularly as they affect the gas transmission line, the expertise of both the author, Paul Donovan, and the reviewer, David Buehler, of the Vibration Management Plan is limited to noise vibration.

David Buehler is Board Certified in noise control engineering (P.E. INCE Bd. Cert.), and according to Illingworth & Rodkin, Inc., Paul R. Donovan, Sc.D.: "Although Dr. Donovan has a broad background in acoustics, his particular areas of expertise include tire noise, sound intensity methods, aeroacoustics and wind tunnel testing, and structure-borne sound analysis." [From the website of Illingworth & Rodkin, Inc.]

In light of this, we are concerned that the assessments from our consultants have not all been adequately addressed by the Revised Final Mitigated Negative Declaration, so we are attaching them here to be sure they are easily available to supervisors and planners.

The following documents and websites were referenced in and/or used as source material for the CEQA RFMND appeal letter dated 4/24/2020. Most of these documents have been previously submitted in the course of this environmental review process. As indicated below, they are either attached or, due to size, are being sent attached to a separate email.

1. Bea, Robert, Professor Emeritus of Civil and Environmental Engineering, UC Berkeley Center for Catastrophic Risk Management, 6/29/2016, signed letter of support and power point.
    [Referenced on page 4.] (due to document size, to be emailed separately in Email 3 of 3)

2. Storesund, Rune, D.Eng., P.E., G.E., Executive Director of UC Berkeley Center for Catastrophic Risk Management, 12/1/2016, Independent Project Review.
    [Referenced in footnotes 2, 5, 6 and 8.] (attached)

3. Storesund, Rune, D.Eng., P.E., G.E., 12/11/2016, Impact to PG&E Transmission Line 109. (attached)

4. Storesund, Rune, D.Eng., P.E., G.E., 6/5/2017, Independent Project Review.
    [Referenced in footnote 12.] (attached)

5. Storesund, Rune, D.Eng., P.E., G.E., 6/14/2017, Review of Proposed Pipeline Impacts. (attached)

6. Karp, Lawrence B., Architect. Civil and Geotechnical Engineer, 9/12/2017, Unacceptable Extension, Folsom Street, Protracted in 1861, Structure on 40.3% Gradient Slope Upon Large Gas Line in Landslide Area, Bernal Heights, San Francisco, Environmental Impact Report Required.
    [Referenced in footnotes 3, 4, 7, 13 and 16.] (due to document size, to be emailed separately in Email 2 of 3)

7. Lawrence Karp, 9/12/2017, Testimony at the Board of Supervisors Hearing (pdf page 33 of BOS File 170851, Attachment 11, "Post Pkt Material").

8. Ridings, Kenneth R., P.E. and Viani, Steven P., P.E., (EDT) Engineering Design and Testing Corp., 9/11/2017, Independent Evaluation of the San Francisco Planning Department Mitigated Negative Declaration, submitted as Exhibit O by Zacks, Freedman & Patterson. (attached)

9. Viani, Steven P., P.E., Forensic Engineer, Emails dated 5/30/19 and 7/8/19.
    [Referenced on page 8.] (attached)

10. Website of U.S. Department of Transportation, Pipeline and Hazardous Materials Administration: https://www.phmsa.dot.gov/

11. Website of U.S. Department of Transportation, Pipeline and Hazardous Materials Administration, Pipelines and Informed Planning Alliance: https://primis.phmsa.dot.gov/comm/pipa/LandUsePlanning.htm

12. Thornely-Taylor, R.M., "Ground Vibration Prediction and Assessment," http://ruperttaylor.com/Ground%20Vibration%20Prediction%20and%20Assessment.pdf
    [Referenced in footnote 15.]

13.. Buehler, David, P.E. INCE Bd. Cert., October 17, 2019, Review of Vibration Management Plan Prepared for 3516-3526 Folsom Residential Construction.
    [Referenced in footnote 11.]

14. Website of Illingworth & Rodkin, Inc.: https://iandrinc.com/our_team/paul-r-donavan-sc-d-principal/
[Referenced in footnote 14.]

15. Illingworth and Rodkin, Inc., Construction Vibration Evaluation for 3516 and 3526 Folsom Street, March 24, 2017.
[Referenced in footnotes 18-20.]

Thank you for your consideration of these issues.

Kathy Angus
Bernal Heights South Slope Organization

--
Kathy Angus

From:	Kathy Angus
To:	BOS Legislation, (BOS); Beinart, Amy (BOS); Ronen, Hillary; Gibson, Lisa (CPC)
Cc:	Barbara Underberg; Herbert Felsenfeld; Marilyn Waterman
Subject:	Email 2 of 3, BOS File No. 200800, 3516 and 3526 Folsom Street
Date:	Friday, July 31, 2020 3:19:28 PM
Attachments:	Lawrence Karp 2017-09-12 EIR Required.pdf

Re: Appeal of CEQA Revised Mitigated Negative Declaration for 3516 and 3526 Folsom Street dated 4/24/2020

Due to the (relatively) large size of the attached document (and that seven documents were already attached to Email 1), the following document is being emailed separately:

6. Karp, Lawrence B., Architect. Civil and Geotechnical Engineer, 9/12/2017, Unacceptable Extension, Folsom Street, Protracted in 1861, Structure on 40.3% Gradient Slope Upon Large Gas Line in Landslide Area, Bernal Heights, San Francisco, Environmental Impact Report Required.
[Referenced in footnotes 3, 4, 7, 13 and 16.] (due to document size, emailed separately in Email 2 of 3)

If you have trouble receiving any of these documents, please let me know.
Thank you.
Kathy Angus
Bernal Heights South Slope Organization

--
Kathy Angus

From:	Kathy Angus
To:	BOS Legislation, (BOS); Beinart, Amy (BOS); Ronen, Hillary; Gibson, Lisa (CPC)
Cc:	Barbara Underberg; Marilyn Waterman; Herbert Felsenfeld
Subject:	Email 3 of 3, BOS File No. 200800, 3516 and 3526 Folsom Street
Date:	Friday, July 31, 2020 3:20:40 PM
Attachments:	Robert Bea 2016-06-29 signed support letter & power point.pdf

Re: Appeal of CEQA Revised Mitigated Negative Declaration for 3516 and 3526 Folsom Street dated 4/24/2020

Due to the (relatively) large size of the attached document (and that seven documents were already attached to Email 1), the following document is being emailed separately:

1. Bea, Robert, Professor Emeritus of Civil and Environmental Engineering, UC Berkeley Center for Catastrophic Risk Management, 6/29/2016, signed letter of support and power point.
[Referenced on page 4.] (due to document size, to be emailed separately in Email 3 of 3)

If you have trouble receiving any of these documents, please let me know.
Thank you.
Kathy Angus
Bernal Heights South Slope Organization

--
Kathy Angus

UNIVERSITY OF CALIFORNIA, BERKELEY

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TELEPHONE: (925) 631-1587

E-MAIL: bea@ce berkeley edu

CENTER FOR CATASTROPHIC RISK MANAGEMENT
DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING
BERKELEY, CALIFORNIA 94720-1710

June 29, 2016

**Re: Inquiry about Gas Transmission Pipeline 109 from concerned SF residents
Proposed Project at 3516-3526 Folsom Street, San Francisco, CA**

Dear Neighbors of Gas Transmission Pipeline 109:

Given the background information you have provided, yes, you should be concerned. There are several points in your summary that provide good basis for your concerns:

1) Old (1980's) PG&E gas transmission pipeline installed in area with highly variable topography,
2) Lack of records on the construction, operation, and maintenance of the pipeline,
3) No definitive guidelines to determine if the pipeline is 'safe' and reliable',
4) Apparent confusion about responsibilities (government, industrial-commercial) for the pipeline safety, reliability, and integrity.

This list is identical to the list of concerns that summarized causation of the San Bruno Line 132 gas pipeline disaster.

The fundamental 'challenge' associated with communicating your concern is tied to the word 'safe'. Unfortunately, it has been very rare that I have encountered organizations that have a good understanding of what that word means, and less of an understanding of how to demonstrate that a given system is 'safe enough.'

During my investigation of the San Bruno disaster, I did not find a single document (including trial deposition transcripts) that clearly indicated PG&E or the California PUC had a clear understanding of the word 'safe': "*freedom from undue exposure to injury and harm*." Further, it was clear they did not have a clear understanding of the First Minimal Principle of Civil Law: "*It is lawful to impose risks on people if and only if it is reasonable to assume that they have sufficient knowledge to understand the risks and have consented to accept those risks*."

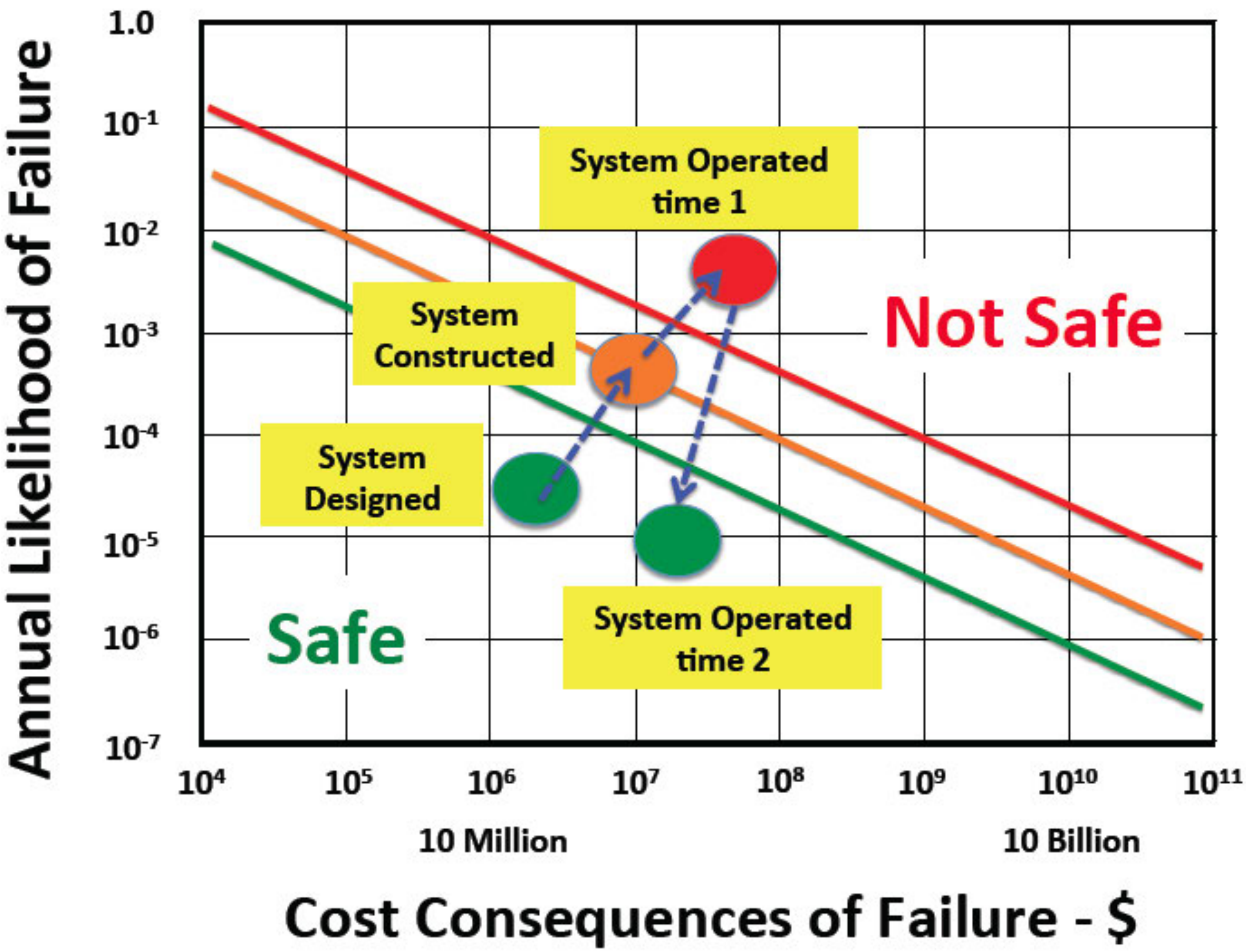
Much of this situation is founded in 'ignorance'. It is very rare for me to work with engineers or managers who have an accurate understanding of what the word 'safe' means - and no clue about how to determine if a system is either safe or unsafe. The vast majority of governmental regulatory agencies are even worse off.

I have attached a graph that helps me explain the important concepts associated with determining if a system is either safe or unsafe. The vertical scale is the annual likelihood of failure. The horizontal scale is the consequences associated with a failure. The diagonal lines separate the graph into two quadrants: Safe and Not Safe. If the potential consequences can be very high, then the probability of failure must be very low. Uncommon common sense.

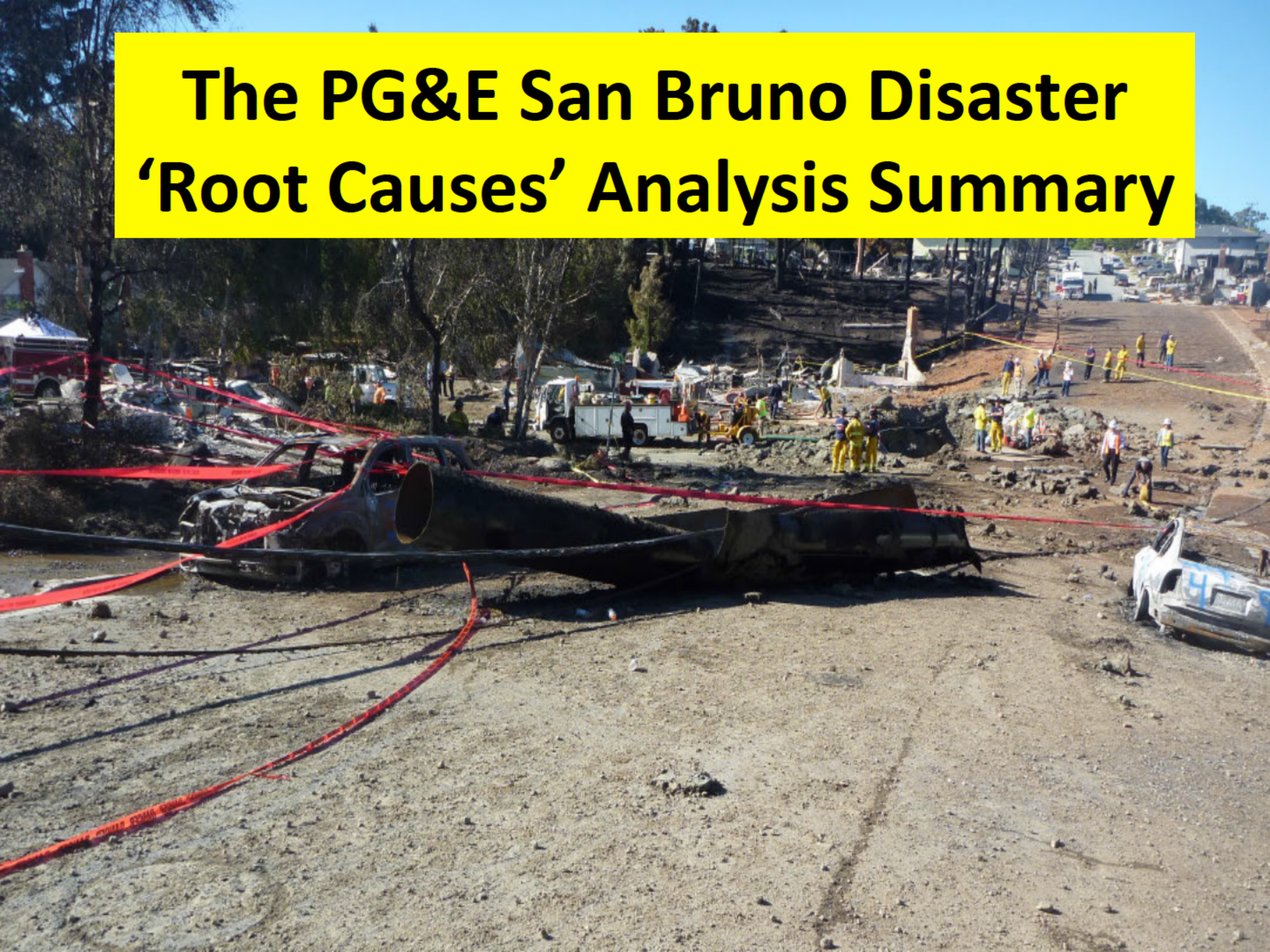
On the graph, I show a system that was designed for a particular 'risk' (combination of likelihood and consequences of failure). When it was constructed, the risk increased due to construction 'malfunctions' - like bad welding. When the system was put into service, the risk increased further - perhaps due to poor corrosion protection and due to the area around the pipeline being populated with homes, businesses, schools and other things that increase the potential consequences of a major failure. Once it is determined that the system that was originally designed to be safe is no longer safe, then it is necessary to do things that will allow the system to be safely operated—reduce the likelihood of failure (e.g. repair the corrosion) and reduce the consequences of failure (e.g. install pressure control shut off sensors and equipment that can detect a loss of gas and rapidly shut down the system)—or replace the segment of the pipeline that no longer meets safety-reliability requirements.

After I completed my investigation of the San Bruno disaster, I prepared a series of 'graphics' that summarized my findings. A copy of the file is attached. I hope it will help you understand how to better communicate your valid concerns regarding this development.

Robert Bea
Professor Emeritus
Center for Catastrophic Risk Management
University of California at Berkeley
email: bea@ce.berkeley.edu



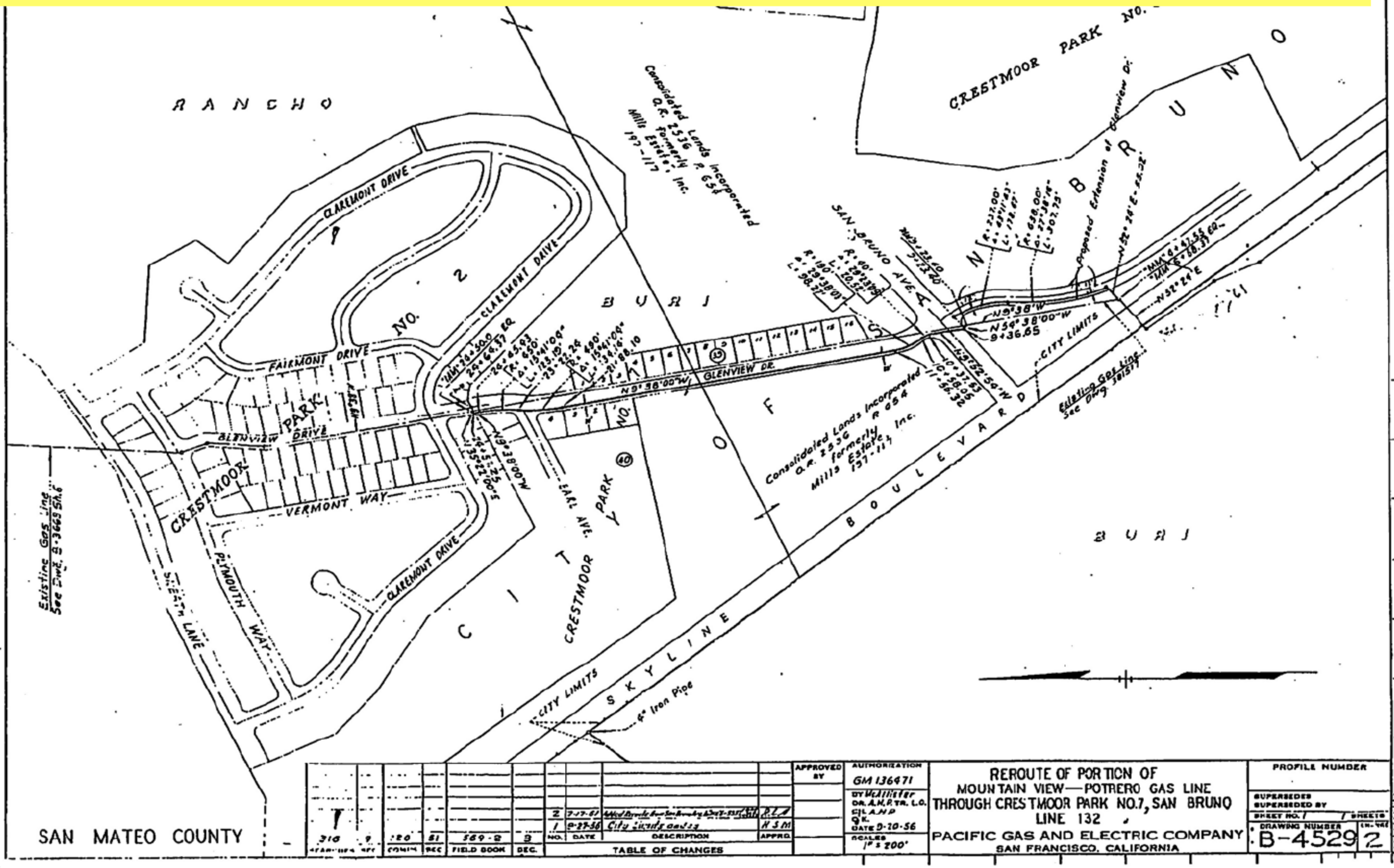
The PG&E San Bruno Disaster 'Root Causes' Analysis Summary



Crestmoor High Consequence Area

Installing Segment 180 in 1956

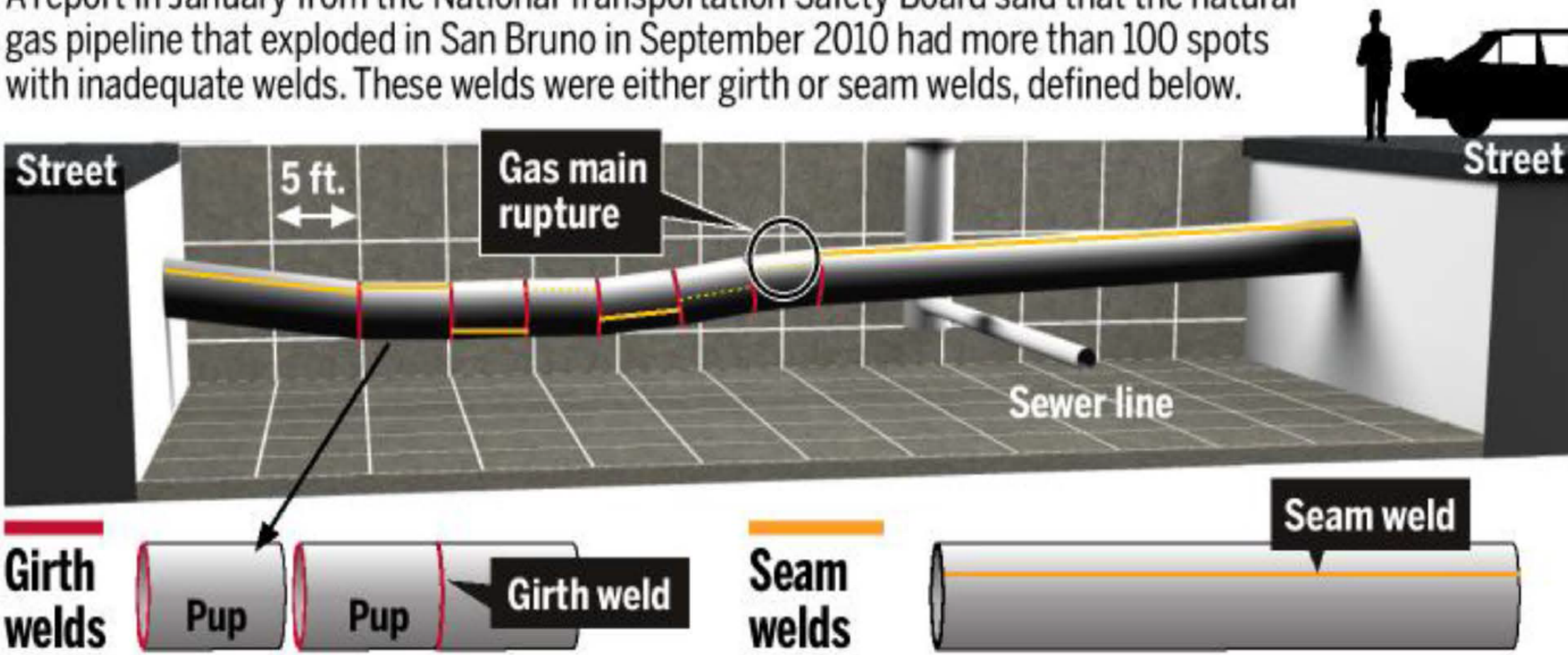
PG&E plans sent to field for 1956 relocation – details not provided for ravine profile



PG&E did not provide the construction 'details' to accommodate the change in vertical direction at the bottom of the 'ravine'

Gas pipeline construction

A report in January from the National Transportation Safety Board said that the natural gas pipeline that exploded in San Bruno in September 2010 had more than 100 spots with inadequate welds. These welds were either girth or seam welds, defined below.



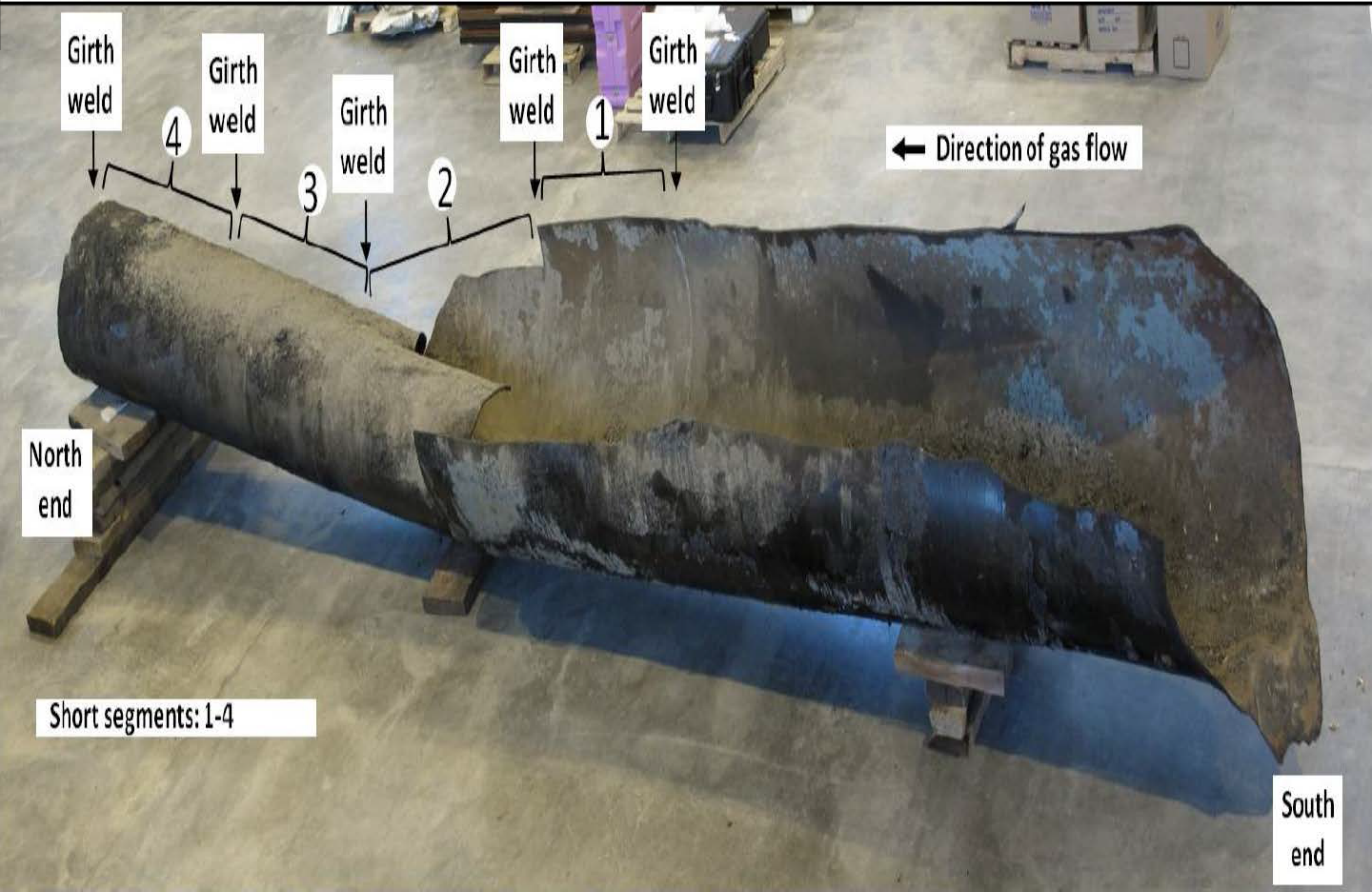
Within the 44-foot section of the damaged pipeline were six smaller pieces, known as "pups," all welded end-to-end at the girth on-site in 1956.

Done at a factory, pipes were made by rolling steel sheets and welding them at the seam. Investigators found numerous welds only penetrated halfway through the steel when they should have gone all the way.

Source: National Transportation Safety Board

PAI/MERCURY NEWS

PG&E installed a 'litter of pups' to accommodate the change in vertical direction at the bottom of the 'ravine'



Longitudinal welds inside pipe missing

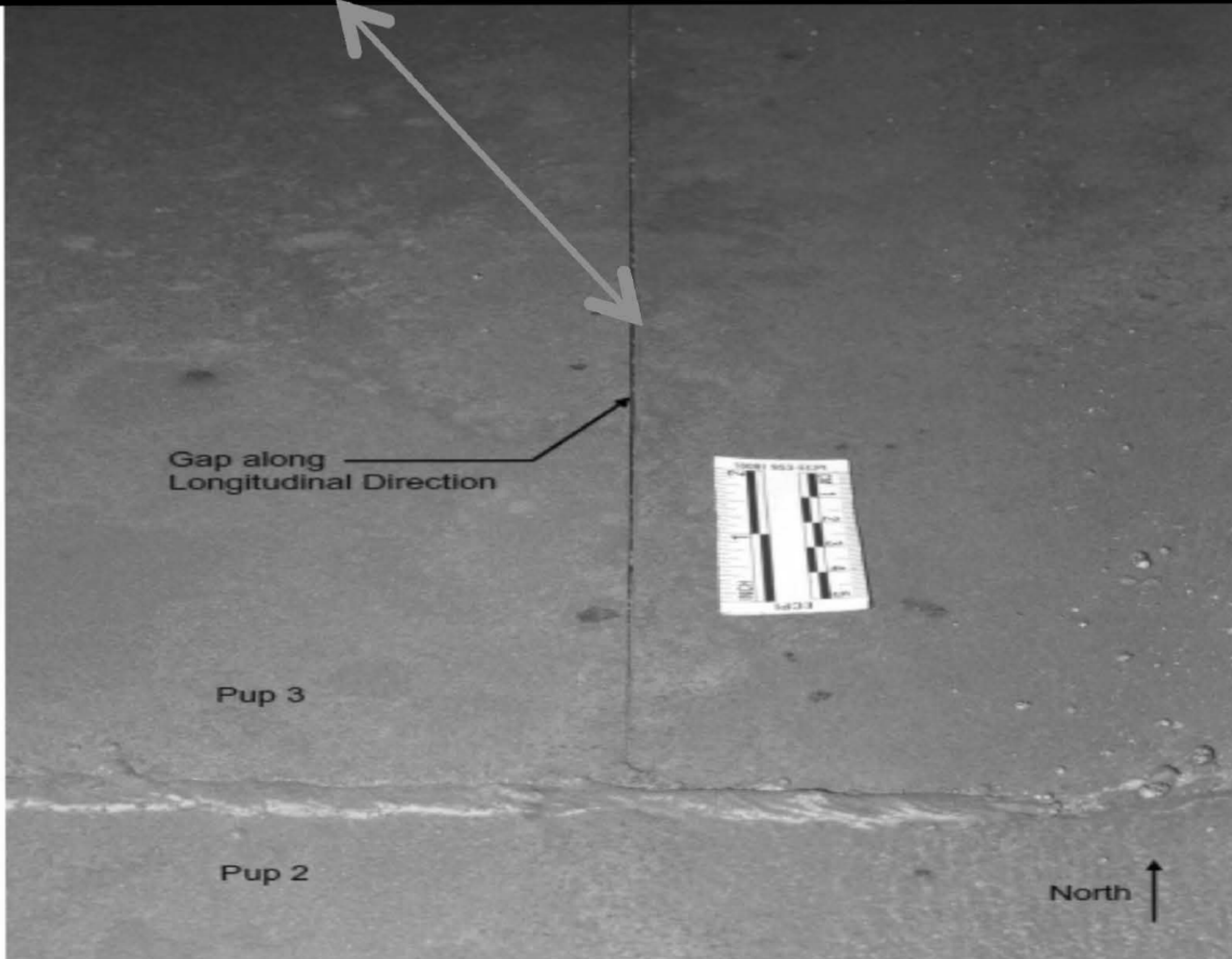


Figure 9: Inside wall of pup 3 showing a longitudinal gap that extended the length of the pup.

Welded from outside and ground flush

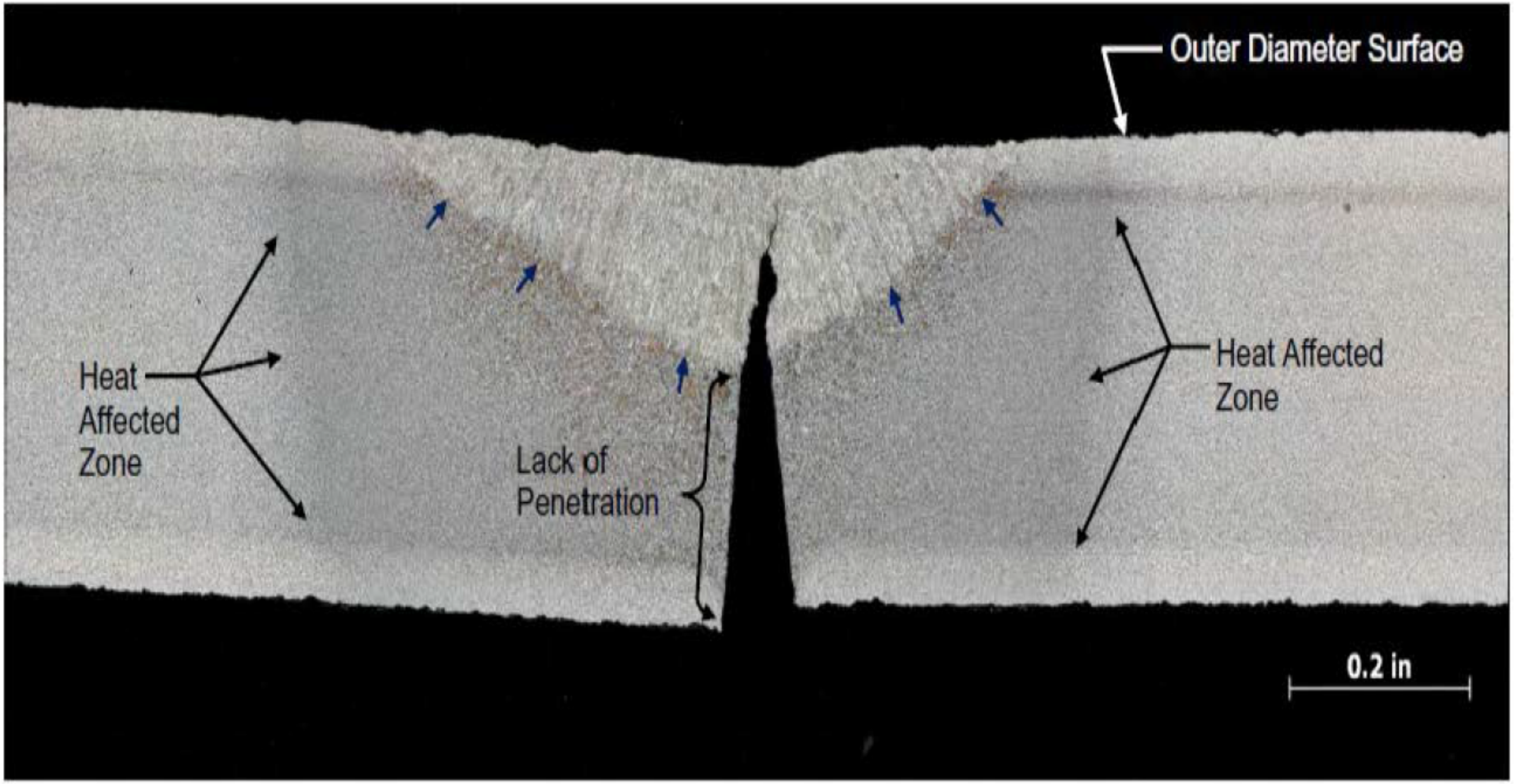


Figure 48: Etched metallographic cross section of the longitudinal seam in pup 3 taken 10 inch north of girth weld C3. The microstructure of the weld was consistent with a fusion welding process along the outer diameter surface of the seam. Blue arrows – weld pool boundary along outer diameter surface seam.

Weld flaws propagated by pressure fluctuations & ‘spiking’

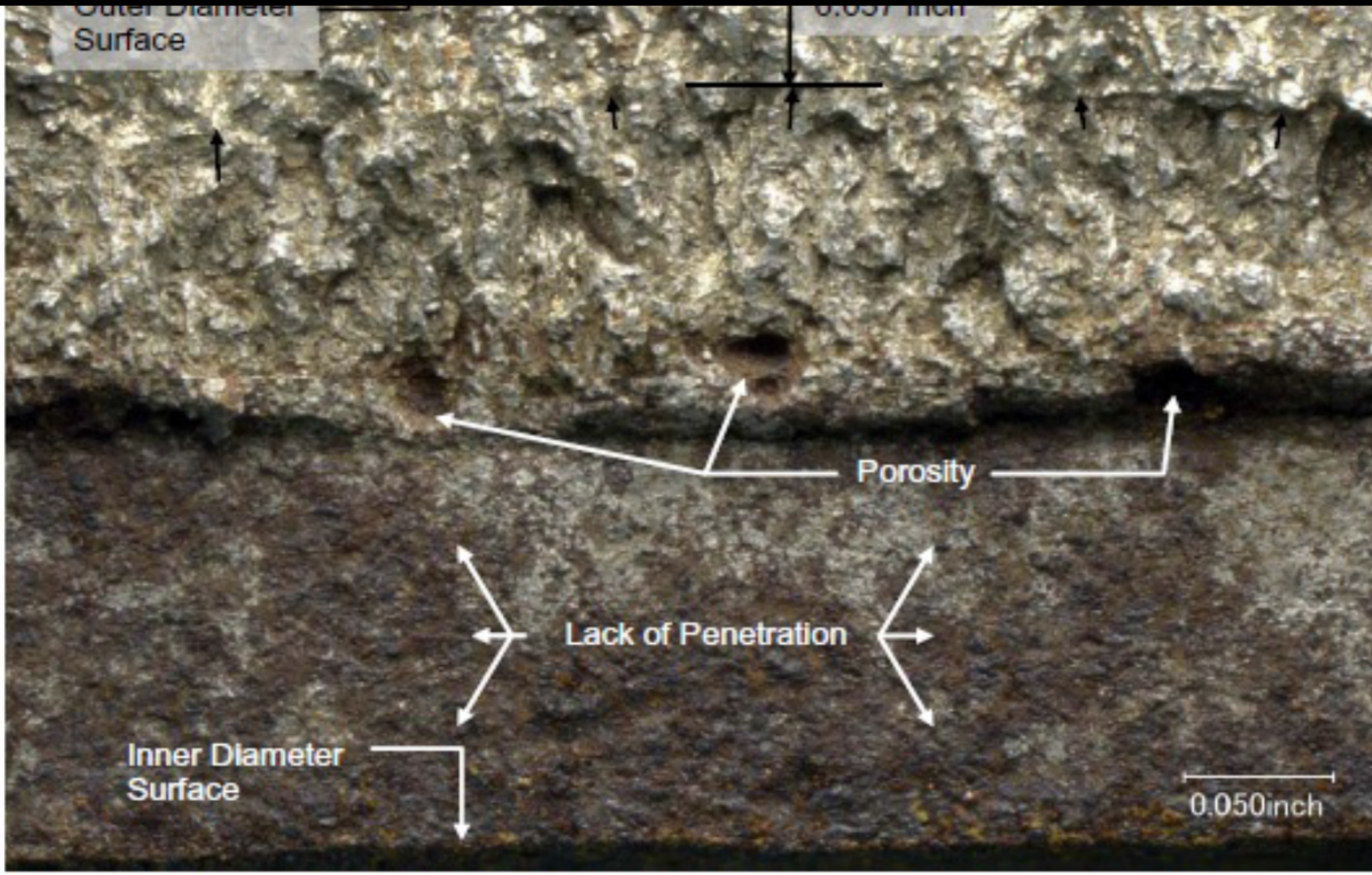


Figure 35: Micrograph of the initiation site in pup 1 at the 21.4 inch mark, the deepest point of the crack arrest mark. The profile of the arrest mark is indicated by the black arrows.

PG&E Milpitas control room operator:
"We're Screwed!"

The history of Line 132 Segment 180

'A Tyranny of Incremental Disastrous Decisions'

1956 construction 'work arounds' to relocate Line 132 and install Segment 180

1968 start intentional pressure 'Spiking' to maintain MAOP

1978 no action taken to hydrostatically test Line 132

1985 no action taken to replace Line 132 as part of the GPRP

1987 no action taken to uncover pipeline to determine what was 'in the ground'

The history of Line 132 Segment 180
'A Tyranny of Incremental Disastrous Decisions'

1988 no action taken to determine cause of leak in Line 132

1996 no actions taken to install RCVs or ASVs to reduce effects of rupture

1998 no actions taken to validate information contained in pipeline GIS

2000 replaced GPRP with Risk Management Program to reduce costs

2003 repeat intentional pressure 'Spiking' to maintain MAOP

2004 integrity survey discloses 13 leaks with 'unknown' causes

Line 132 Bunker Hill longitudinal weld leak

The history of Line 132 Segment 180

'A Tyranny of Incremental Disastrous Decisions'

2008 no actions taken to determine 'unknown' causes of 26 leaks in Line 132

2008 repeat intentional pressure 'Spiking' to maintain MAOP

2008 no inspection of Segment 180 uncovered for sewer replacement

2009 Enterprise Risk Management report recognizes pipeline explosion risks

2010 audit of PG&E's Integrity Management Program discloses dilution through exception process and insufficient allocation of resources

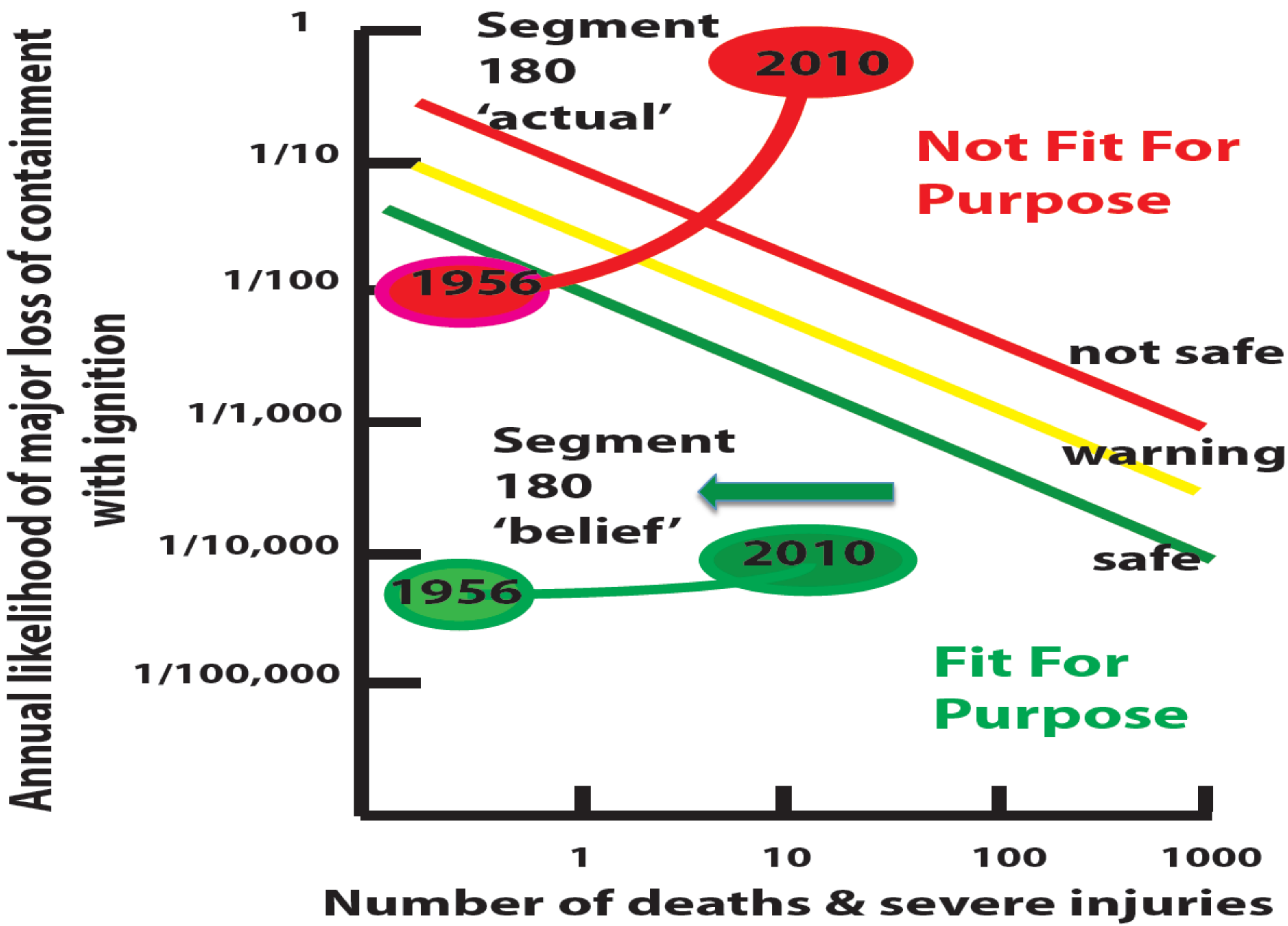
The history of Line 132 Segment 180

'A Tyranny of Incremental Disastrous Decisions'

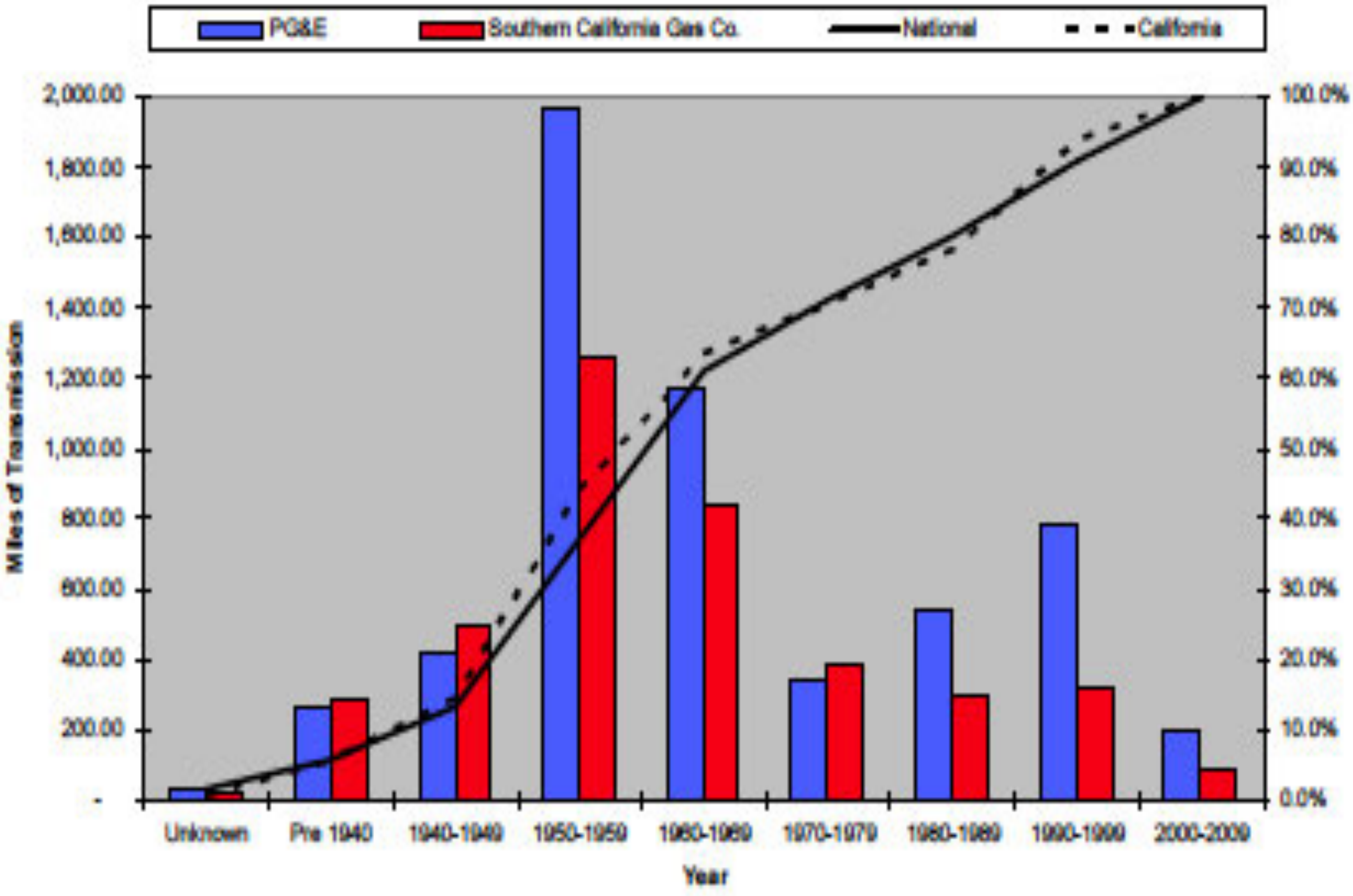
2010 additional manufacturing defect discovered in Line 132 girth weld

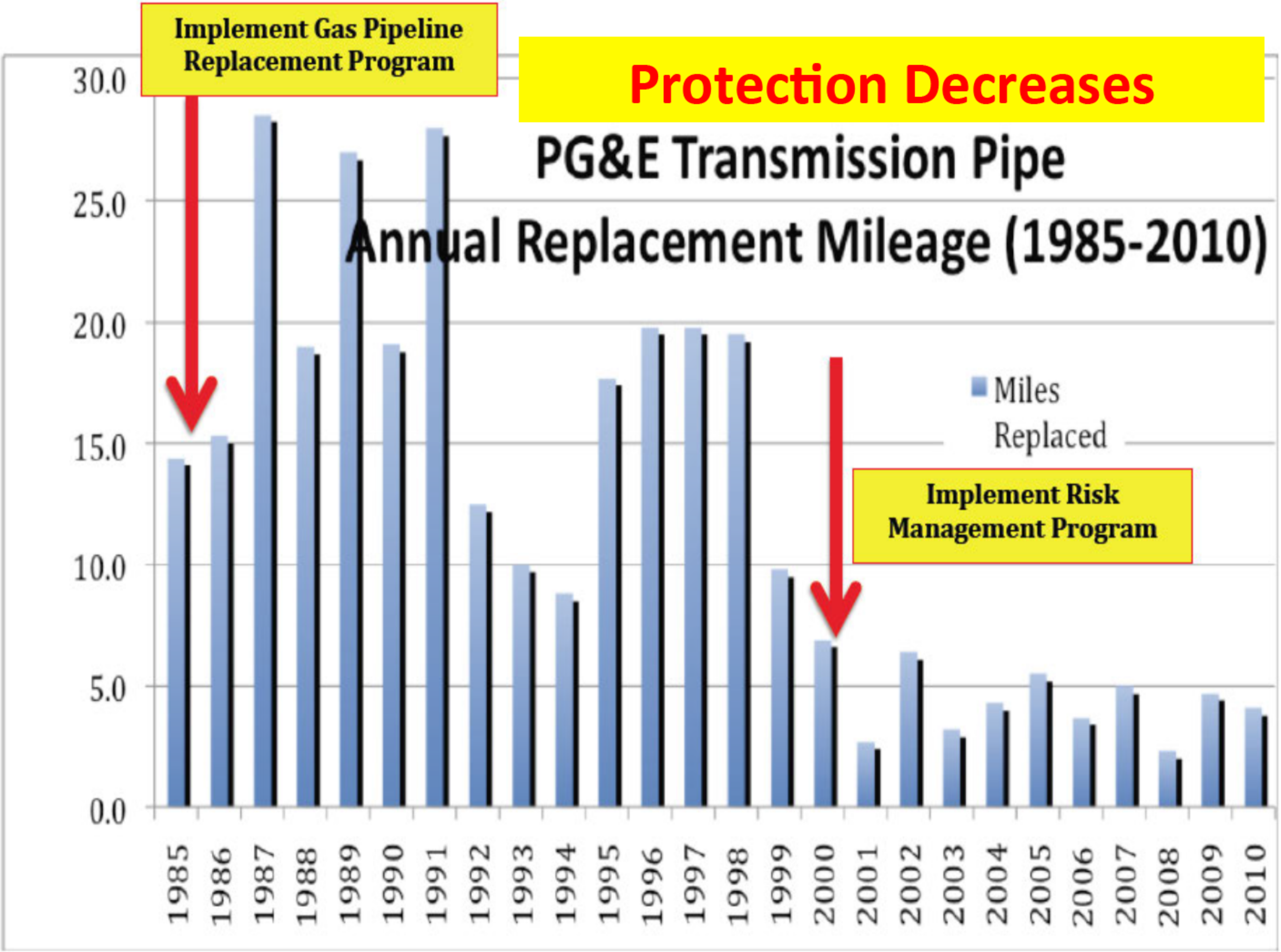
2010 September 9 at 6:11 PM Line 132 Segment 180 ruptures with catastrophic effects

PG&E Segment 180 Integrity Mis-management



Production Increases




Implement Gas Pipeline Replacement Program
Protection Decreases
PG&E Transmission Pipe
Annual Replacement Mileage (1985-2010)
Miles Replaced
Implement Risk Management Program
30.0
25.0
20.0
15.0
10.0
5.0
0.0
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Tony Earley
PG&E CEO
"I saw a company that lost its way"
(New PG&E CEO Tony Early)
June 9, 2012
PG&E
SS AT PGE.COM
©2012 Pacific Gas and Electric Company. This advertisement has been paid for by PG&E Corporation shareholders.

Line 132 Segment 180
was
MANAGED TO FAILURE
by
PG&E

Storesund Consulting
154 Lawson Road, Kensington, CA 94707
510-225-5389 (cell) email: rune@storesundconsulting.com

December 1, 2016

SF Board of Supervisors
San Francisco City Hall
1 Dr Carlton B Goodlett Pl #244
San Francisco, CA 94102

Subject: Independent Project Review
3516 & 3526 Folsom Street
San Francisco, California

Dear President Breed and Honorable Members of the Board of Supervisors,

This letter is in response to a request for an independent assessment of the proposed 3516 & 3526 Folsom Street development. My qualifications are presented in the attached resume. I am a practicing Geotechnical Engineer (CA License Number 2855), I provide gas pipeline risk reviews for the State of California Department of Education, and have participated in forensic engineering projects over the last 10 years with damage claims in excess of $2 billion and more than 8,000 hour of direct forensic analyses. My most recent engagement was a geotechnical forensic evaluation of the March 2014 Oso Landslide in Washington State, which resulted in the tragic loss of 43 individuals. In addition to private consulting, I am the Executive Director of the Center for Catastrophic Risk Management at UC Berkeley.

This geotechnical review is the requested independent assessment and is based on documents included in the Discretionary Review, Full Analysis by San Francisco Planning Department (dated October 4, 2016) as well as a set of geotechnical reports prepared by Mr. H. Allen Gruen (dated August 3, 2013).

The proposed projects are located immediately adjacent to a major PG&E transmission natural gas pipeline (Figure 1, Figure 2, Figure 3). This major pipeline is located immediately below the primary access road for the construction (Figure 4, Figure 5), immediately adjacent to significant proposed new utility work (e.g. gas service, water supply, sewer) as well as removal of existing pipeline soil cover (Figure 6, Figure 7), and immediately adjacent to significant proposed bedrock excavation (depths on the order of 6 to 10 feet per the submitted architectural elevations (such as sheet A-3), as seen in .

Construction-related stressing, as well as accidental 3rd party damage, has the potential to degrade the integrity of the PG&E natural gas transmission line, exposing the surrounding neighbors to increased risk of death and injury from the potential of construction-induced puncture or degradation of pipeline integrity.

Unlike lots further west and further east (Gates Street, Banks Street) that are not immediately adjacent to a transmission line, these specific parcels are unique in their proximity to a significant hazard.

Major items of concern include at this particular project site:

- Geotechnical borings do not extend to the proposed depth of excavation, providing information on competence of bedrock and anticipated level of effort to excavate;
- No explicit discussion about induced ground vibrations during rock excavation and associated potential degradation of the PG&E transmission line integrity;
- No explicit discussion about negative impacts of construction traffic to the PG&E transmission line integrity; and
- Significant construction operations immediately adjacent to the active PG&E transmission pipeline.

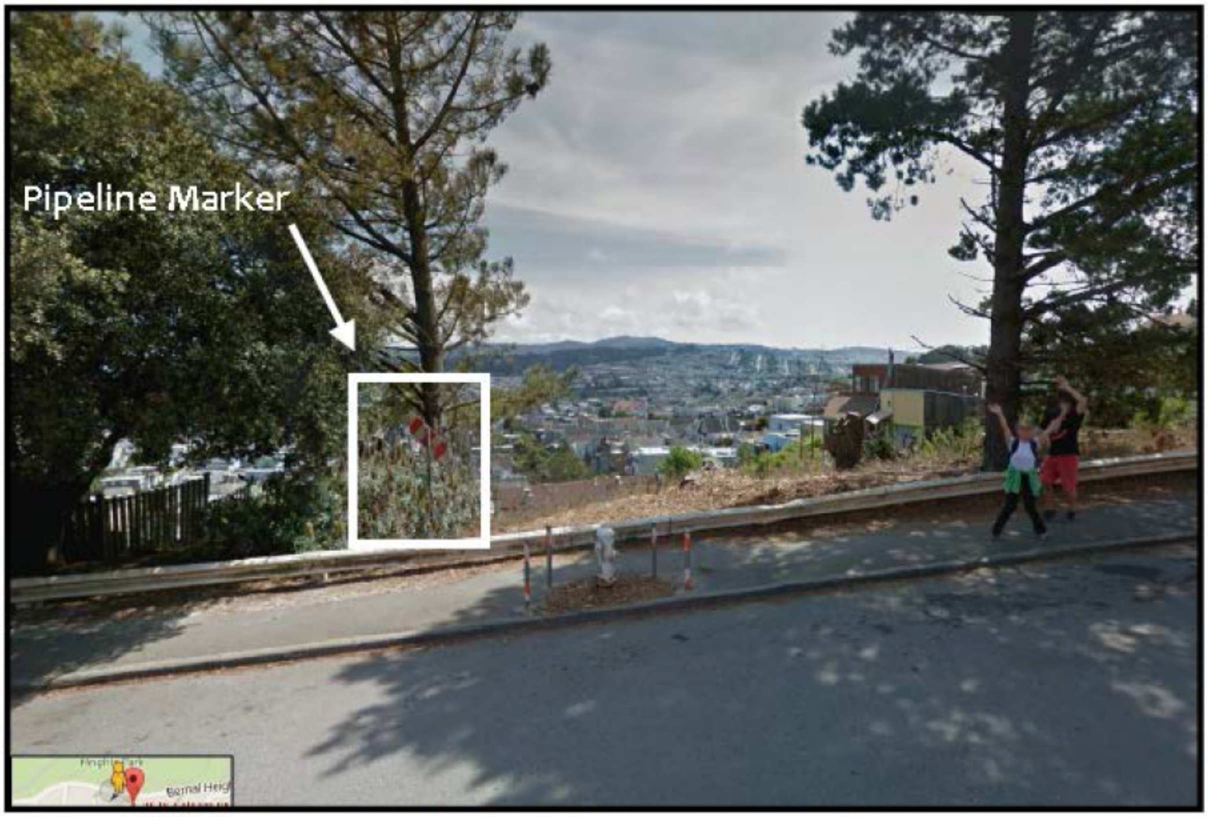
Extreme care and caution should be exercised at this site, including careful review of the proposed construction activities. At a minimum, a thorough constructability review and consequence analysis should be performed to assess the safety implications associated with working in such close proximity to an active natural gas transmission line. An appropriate (peer-reviewed) active monitoring program to verify no undue harm is being done to the transmission pipeline during construction should be designed and implemented.

Given the uncertainties of actual pipe integrity, strong consideration should be given to replacing the segment of pipeline to ensure maximum integrity and minimal exposure of residents to undue injury or death as a result of the anticipated heavy excavation and ground disturbance activities.

Overview of parcel locations relative to transmission line.

Figure 1: Overview of parcels with proposed development. Note that the PG&E transmission line is directly under the primary access.

Site Photo



View from Bernal Heights Boulevard, near intersection with Folsom Street
(Source: Google Maps, July 2015; Accessed March 23, 2016)

Figure 2: Pipeline marker at Bernal Heights Boulevard.

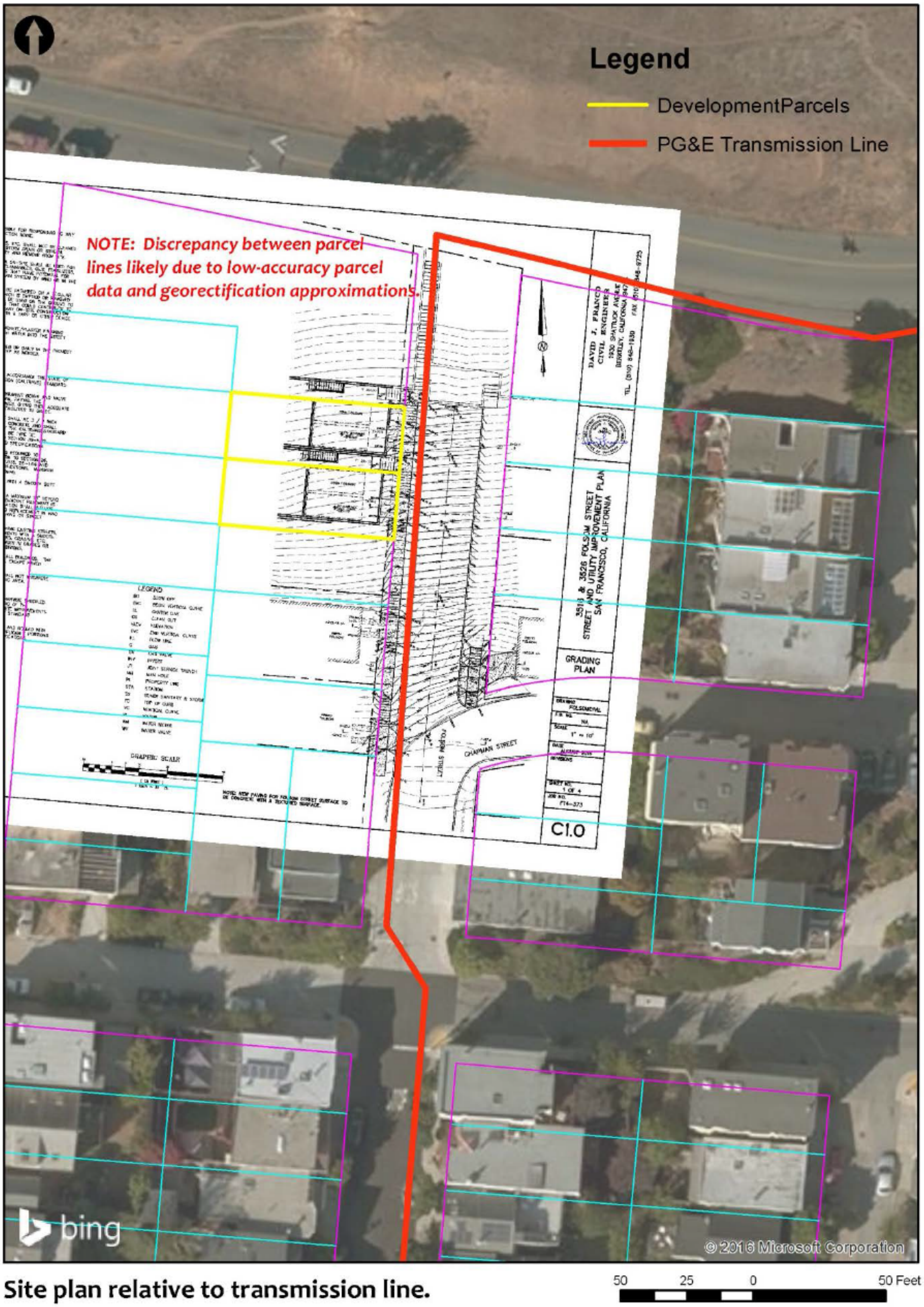
Site Photo

View of Folsom Street (looking up to Project Site)
(Source: Google Maps, July 2015; Accessed March 18, 2016)

SAN FRANCISCO
PLANNING DEPARTMENT

Discretionary Review Hearing
Case Numbers:
2013.1383DRP-10 & 2013.1768DRP-09
3516 & 3526 Folsom Street

Figure 3: Pipeline marker at corner of Folsom & Chapman.



Site plan relative to transmission line.

Figure 4: PG&E transmission line relative to proposed site plan.

CAMERA 5: View from Chapman Street at Folsom Street looking North-West

Figure 5: Approximate PG&E transmission gas line alignment relative to proposed structures.

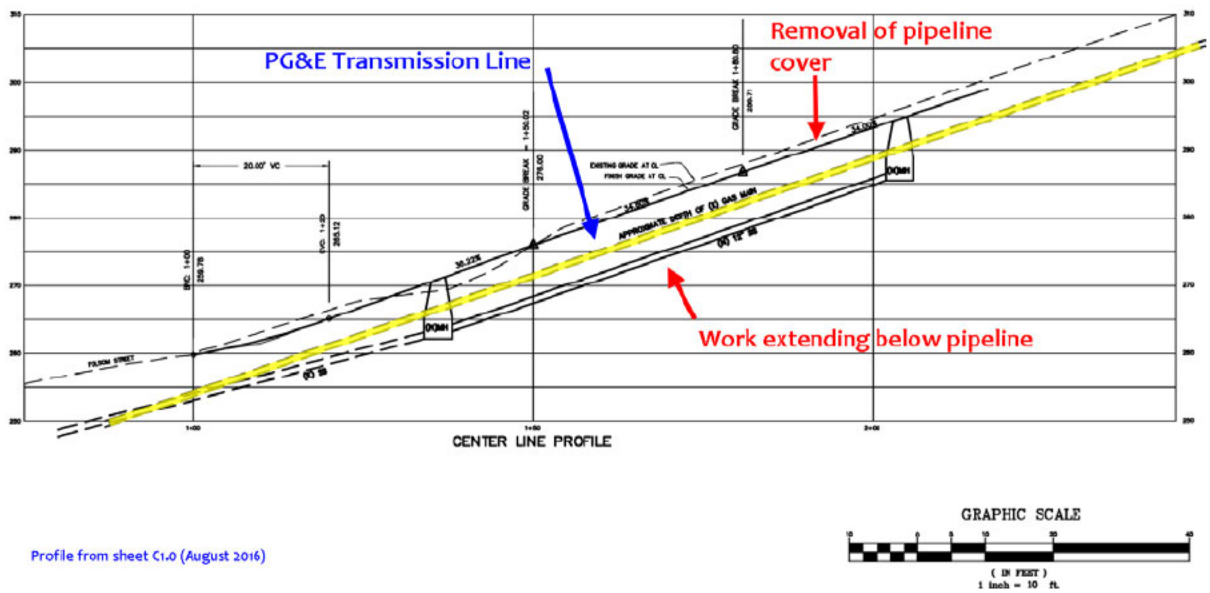


Figure 6: Plans call for removal of pipeline cover as well as construction work <u>below</u> the existing pipeline.

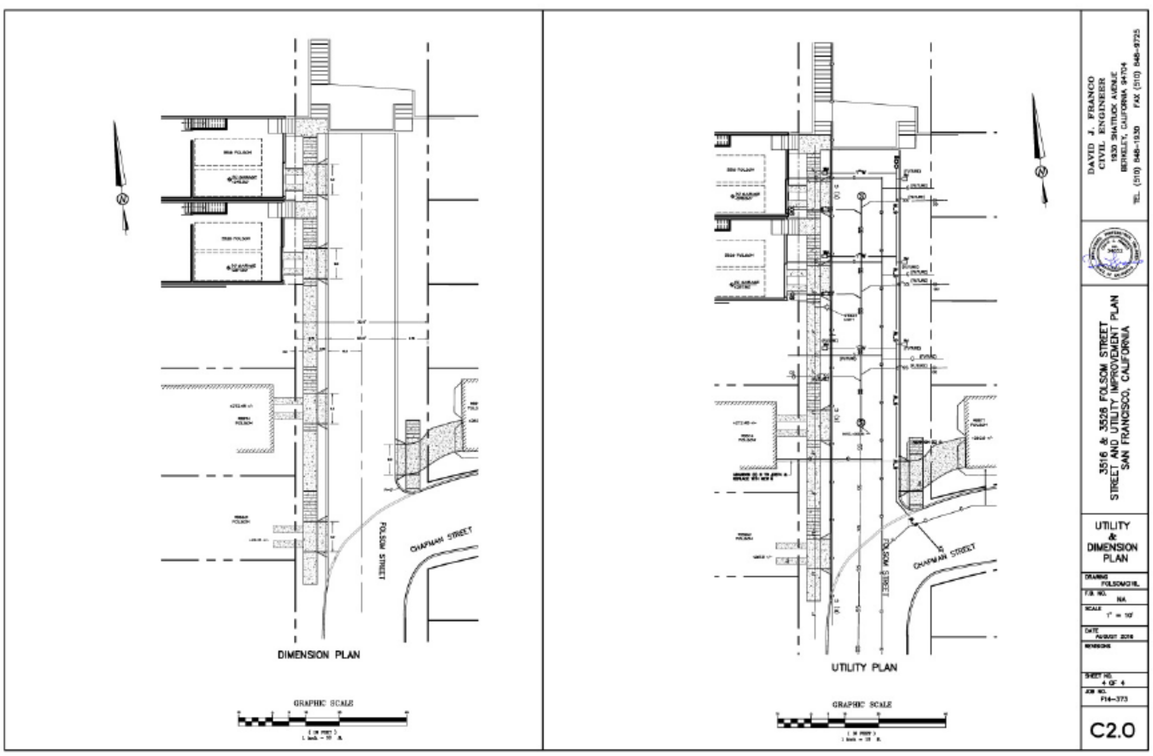


Figure 7: Proposed utilities <u>immediately adjacent</u> to the PG&E transmission line.

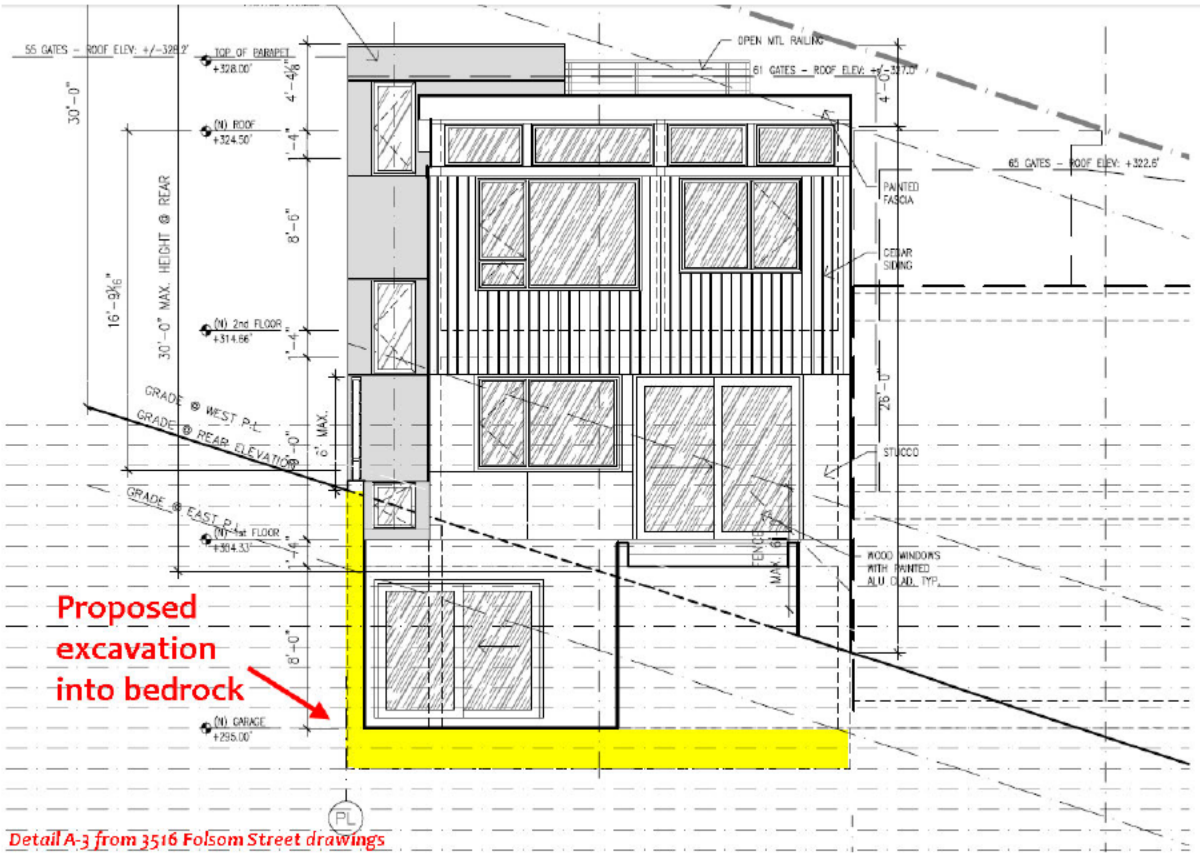


Figure 8: Significant cuts into bedrock resulting in ground vibrations.

No payments for services have been received and no future promises of compensation have been offered.

I reserve the right to update my independent review based on new information.

Please contact me with any questions or comments by phone at (510) 225-5389 or via email at rune@storesundconsulting.com.

Sincerely,

STORESUND CONSULTING

Rune Storesund, D.Eng., P.E., G.E.
Consulting Engineer

UC Berkeley Center for Catastrophic Risk Management
Executive Director

Attachment **Dr. Rune Storesund Resume**

EDUCATION:

D. Eng Civil Engineering, University of California, Berkeley, 2004-2009
(*Dissertation: Life-Cycle Reliability-Based River Restoration*)

Management of Technology Certificate Program, HAAS, UC Berkeley, 2007

M.S. Civil Engineering, University of California, Berkeley, 2002 (Geotechnical Engineering)

B.S. Civil Engineering, University of California, Berkeley, 2000
B.A. Anthropology, University of California, Santa Cruz, 2000

QUALIFICATIONS:

- California, Civil Engineer, RCE 64473
- California, Geotechnical Engineer, GE 2855
- Louisiana, Civil Engineer, RCE 35034
- Hawaii, Civil Engineer PE-15439
- Washington, Civil Engineer PE 52924
- California Safety Assessment Program Disaster Service Worker
- NAUI Scuba Diver Openwater I (1994)
- Offshore Survival Certification

EXPERIENCE:

Dr. Storesund has 16 years of planning, design, engineering, and construction experience and has worked on a variety of projects throughout California, the United States, and internationally. Dr. Storesund provides consulting services in all aspects of civil, geotechnical, water resources, ecological, restoration, and sustainability engineering projects. His expertise is on the application of reliability and risk-based approaches to engineering projects (with a specialization in environmental restoration and flood control projects) in order to effectively manage project uncertainties. Dr. Storesund has participated in all aspects of engineering projects; from preliminary reviews to detailed analyses to construction observations and post-project monitoring. He provides expert forensic engineering services for geotechnical and civil infrastructure systems. In addition to traditional engineering services, he provides consultations on field instrumentation and monitoring programs as well as Terrestrial LiDAR field survey services. His doctoral research was on life-cycle, reliability-based river restoration.

Dr. Storesund is the Executive Director of UC Berkeley's Center for Catastrophic Risk Management (risk.berkeley.edu). The Center for Catastrophic Risk Management (CCRM) is a group of academic researchers and practitioners who recognize the need for interdisciplinary solutions to avoid and mitigate tragic events. This group of internationally recognized experts in the fields of engineering, social science, medicine, public health, public policy, and law was formed following the tragic consequences of Hurricane Katrina to formulate ways for researchers and experts to share their lifesaving knowledge and experience with industry and government. CCRM's international membership provides experience across cultures and industries that demonstrate widespread susceptibility to pervasive threats and the inadequacy of popular, checklist-based remedies that are unlikely to serve in the face of truly challenging problems.

Dr. Storesund serves as an on-call expert Geotechnical Engineer to the State of California's Department of Consumer Affairs for their annual examination.

PROJECTS: Projects Dr. Storesund has worked on are listed below:

Environmental Restoration

Louisiana Coastal Protection and Restoration (LACPR): Working with Environmental Defense, Dr. Storesund provided consultation services on proposed coastal restoration efforts in Louisiana, submitted by the United States Army Corps of Engineers (USACE). Dr. Storesund developed planning and design evaluation metrics by which to evaluate the adequacy of the proposed restoration alternatives. Additionally, Dr. Storesund is perfored a technical review of the risk-based design prepared by the USACE.

Yosemite Slough Restoration: Dr. Storesund served as a project engineer, providing geotechnical recommendations during design. Project specifications were developed for this restoration project in San Francisco, California. The USACE SPECSINTACT program was used to develop the specifications.

Hamilton Wetland Restoration Project Shaping Contract, Novato, California: Dr. Storesund served as the geotechnical engineer of record for this earthwork project to shape dredge spoils into habitat features. Four areas (North Seasonal Wetland, Wildlife Corridor, Tidal Panne, and South Seasonal Wetland), each having different habitat requirements, were configured as part of the restoration project. A special low-permeability bottom was developed to minimize water infiltration and maximize salt retention in the seasonal tidal areas (habitat feature).

Redwood Creek, Napa County, California: Dr. Storesund provided topographic as-built and photographic documentation for this in-stream habitat enhancement project. Boulder features were added to provide channel roughness and resting pools for migrating fish.

Upper Napa River Restoration Project, Napa County, California: Dr. Storesund served as the lead engineer providing civil, geotechnical, environmental, hydrological engineering and topographic mapping services for a four-mile stretch of the Napa River south of Calistoga, California. The project was sponsored by the California Land Stewardship Institute.

Sulphur Creek Monitoring, Hayward, California: Dr. Storesund is conducting annual geomorphic monitoring (for a total of 10 years) of this completed restoration project in Hayward, California. The project included slope stabilization and installation of habitat features (rock boulders). The monitoring includes surveys (cross-sectional, thalweg) and photo monitoring.

Kirby Canyon Landfill Mitigation, Santa Clara County, California: Dr. Storesund provided geotechnical engineering recommendations for this dam removal and creek restoration project. The site is located in a very steep canyon, with high gradients. In addition, the dam had been overtopped during previous storms, resulting in very deeply incised ravines forming (which needed to be backfilled).

Waldo Point Wetland Restoration, Marin County, California: This project is a wetland restoration project. Dr. Storesund provided topographic survey and piezometer monitoring services to establish connectivity parameters between San Francisco Bay and the proposed wetland mitigation site.

Huichica Creek Fish Passage: A fish-friendly culvert was designed as part of Caltran's Highway 36 widening project in Sonoma County, California. Dr. Storesund developed the conceptual and final designs, project specifications, and project cost estimate.

Great Valley Grasslands, Merced County, California: Dr. Storesund served as the project manager and project engineer for this floodplain reconnection project at the Great Valley Grasslands State Park. His evaluations consisted of a site reconnaissance, erosion/scour susceptibility screening, and hydraulic analysis of inundation through a series of existing culverts.

Pond 1 Restoration, Mountain View, California: Storesund Consulting performed a topographic survey of existing conditions to develop a base map for grading to alter onsite flood discharge to minimize inundation times (and prevent die-off of vegetation due to temporary storm water retainage). We developed grading plans, specifications, performed construction staking and performed an as-built survey using Terrestrial LiDAR methods.

ECCC Souzal, Antioch, California: Storesund Consulting performed a high-resolution RTK GPS survey of this wildlife area in order to generate a detailed topo to evaluate micro-watersheds for vernal pool development.

Hess Creek Restoration, Clayton, California: Storesund Consulting performed a high-resolution RTK GPS survey of this incised creek stretch to be restored. The survey results were integrated with available aerial LiDAR topography. We also provided geotechnical recommendations for the restoration plans.

Rancho San Vicente, New Almaden, California: Storesund Consulting provided geotechnical recommendations for this restoration project which involved the removal/stabilization of 16,000 CY of earthen fill dumped into a ravine on County Park Land. The recommendations involved environmental contamination, grading operations, temporary haul roads, slope stability, and earthwork.

Port of Richmond, Operable Unit 2: Dr. Storesund provided geotechnical design on this environmental remediation and restoration project within the Port of Richmond. The mitigation consisted of a subaqueous cap (comprised of Bay Mud) in the inlet, installation of rip-rap along the shoreline revetment zone, and installation of a concrete facing and asphalt concrete cap to isolate in place sediments.

Port of Oakland, Operable Unit 2: Dr. Storesund provided geotechnical design support services to Land Marine Geotechnics on this reclamation and restoration project within the Port of Oakland. Dredged spoils were used to abandon a deep-draft U.S. Navy pier at the Port of Oakland.

Storm Water Pollution Prevention Plans

Oakley Civic Center Frontage Improvements, State Route 4, Oakley, California: A SWPPP was prepared for this widening project in Oakley. The existing Main Street in the project limits has two westbound lanes and one lane eastbound. The project added pavement, roadway entries/exits, curb, gutter and sidewalks on the south side of Main Street, as well as street lights along both sides of Main Street.

Brentwood Boulevard Widening and Reconstruction From Woodfield Lane to Central Boulevard, Brentwood, California: A SWPPP was prepared for this project which widens the current Brentwood Boulevard (State Route 4) between Woodfield Lane and Central Boulevard from the existing geometry of a three-lane with two way left turn lanes to a four-lane roadway with a raised landscape median and turn pockets at intersections. Project demolition included removal of curb and gutter, sidewalk sections, damaged pavement sections, and removal of select trees.

Mainstreet Roadway Improvement Plans for Subdivision 8916, Oakley, California: A SWPPP was prepared for this roadway improvement project in Oakley, California. The project added pavement curb & gutter and sidewalk to the west side of the existing roadway in order to facilitate future addition of a second eastbound lane.

Sand Creek Road Intersection Improvement Project, Brentwood, California: A SWPPP was prepared for this project which expands an existing intersection and widens the roadway. The project added pavement, curb & gutter, and sidewalks.

Sausalito Yacht Harbor, Sausalito, California: Dr. Storesund developed a design for treatment of storm water runoff in the large parking lot adjacent to the Sausalito Yacht Harbor as part of a bulkhead wall replacement project. The design involved the installation of a permeable rock infiltration zone under a walkway area. This infiltration area was designed to treat storm water runoff before it enters Richardson Bay.

Flood Control

California Rural Levee Repair Criteria Committee: This advisory committee was charged with developing rural levee repair and improvement criteria to be applied for planned or emergency work. The group worked in conjunction with DWR, interested stakeholders, and USACE. Dr. Storesund provided engineering (seismic, geotechnical marine, ecological, water resources) and risk-based decision making input to this group. This committee was active between 2012 and 2014.

USACE West Sacramento Flood Control Project, West Sacramento, California: Dr. Storesund served as a field engineer responsible for field construction quality control program, which consisted of sand cone density testing, nuclear gauge density testing, associated geotechnical laboratory testing, and issuing a final services during construction report.

Warm Springs Dam Control Structure Study, Sonoma County, California: Dr. Storesund served as the project manager and project engineer for this crack evaluation study for the San Francisco US Army Corps of Engineers. The study was performed in conjunction with PB. The vertical control structure for Warm Springs Dam suffered from water infiltration due to cracking of the concrete control structure. A LiDAR imaging and visual observation mapping was conducted of the cracks. Repair recommendations and cost estimate were provided to the US Army Corps of Engineers.

Las Gallinas Coastal Inundation Study, Marin County, California: Dr. Storesund served as a project engineer for this study (for the San Francisco US Army Corps of Engineers) that evaluated overtopping conditions during storm events for an existing flood protection system. Dr. Storesund developed a GIS terrain and inundation maps based on overtopping analyses.

Upper Penitencia Creek, Subsurface Geotechnical Exploration, Santa Clara County, California: Dr. Storesund served as the project engineer for this United States Corps of Engineers project which consists of on-land, subsurface geotechnical exploration along a portion of Upper Penitencia Creek. The requested services include drilling, sampling, field classification, laboratory testing, and Unified Soil Classification System (USCS) for soil borings at select locations along the creek alignment. The purpose of the soil borings was to provide subsurface data for the preliminary design of flood control structures, such as levees, floodwalls, culverts, and weirs along Upper Penitencia Creek. Dr. Storesund coordinated and managed Fugro's field operation exploration program that consisted of 22 soil test borings. Following the field exploration, Dr. Storesund managed the QA/QC review of all field and laboratory data. Dr. Storesund also managed the data report preparation.

Geotechnical Study Northern Borrow Area, Bulge And Pacheco Pond Levees, Hamilton Wetlands Restoration Area, Novato, California: Dr. Storesund served as the project engineer for this project which consisted of a geotechnical study for the Bulge and Pacheco Levees located in the Hamilton Wetlands Restoration Area. The project site is situated at the former Hamilton Army Air Field in Novato, California. The purpose of the geotechnical field exploration and laboratory testing program was to obtain information on subsurface conditions in the Northern Borrow Area in order to estimate the amount and nature of potential borrow material. The scope of services performed included:

- Conducting a field exploration program consisting of 18 test pits to determine the subsurface profile in the Northern Borrow Area;
- Conducting a laboratory testing program to obtain soil properties of the samples collected during our field exploration; and
- Preparing this geotechnical report presenting the results of our geotechnical field exploration, laboratory testing program, and a discussion of the exploration results.
- Specified development / review

USACE San Lorenzo Flood Control, Santa Cruz, California: Dr. Storesund served as a field engineer responsible for field density testing, performing associated geotechnical laboratory testing, and issuing a final services during construction report for this levee project in Santa Cruz.

USACE Napa River Flood Protection, Napa, California: Dr. Storesund served as a field engineer responsible for field density testing, performing associated geotechnical laboratory testing, and issuing a final services during construction report for this levee project in Napa.

Codornices Creek Restoration Project, Between Fifth and Eighth Streets, Albany and Berkeley, California: Dr. Storesund served as the project engineer for this geotechnical study. The purpose of this project is to restore the existing Codornices Creek, located between the City of Albany and the City of Berkeley, to a more natural setting using bioengineering and biotechnical methods. Dr. Storesund was responsible for the geotechnical field exploration and laboratory-testing program. The scope of our services included: Compiling and reviewing available geotechnical and geologic data; conducting a field exploration and laboratory-testing program; evaluation of slope stability and erosion susceptibility; development of embankment fill recommendations and general construction considerations; and preparing a final geotechnical report that included the results of our geotechnical field exploration and laboratory testing program, discussion of geotechnical issues, and geotechnical recommendations

Water Storage Reservoirs

Napa, Sonoma, and Lake Counties, California: Provided engineering design recommendations and construction observations services for water storage reservoirs for various agricultural clients. Reservoirs are off-stream, agricultural purpose reservoirs or are on-stream reservoirs with embankment heights less than 25 feet and store less than 50 acre-feet. Thus, the reservoirs are not within the jurisdiction of the California Department of Dam Safety (DSOD). Projects include construction of earth embankments and placement of either low permeability compacted soil liners or installation of geosynthetic liner systems.

- **Brooks Reservoir, Napa County, California:** 2.5 acre-foot, off-stream water storage reservoir formed by constructing three earthen embankments and lined with a geosynthetic liner.
- **Platt Reservoir, Sonoma County, California:** An off-stream reservoir formed by constructing a compacted earthen embankment with on-site soils. The reservoir was lined with a geosynthetic liner. The project included installation of an underdrain system to preclude the “floating” of the synthetic liner if the reservoir is drained during periods of high groundwater as well as a cut slope drain to intercept hillside groundwater flows. Dr. Storesund was also responsible for issuing a final services during construction report for the project.

- **Mondavi Dutra Dairy Reservoir, Napa County, California:** Dr. Storesund served as a field engineer responsible for embankment keyway inspections, field density testing, and concrete placement quality control during the enlargement of this reservoir in Napa County. Dr. Storesund was also responsible for issuing a final geotechnical services during construction report for the project.
- **Amber Knolls Reservoir, Lake County, California:** Dr. Storesund served as a field engineer responsible for embankment keyway inspections, field density testing, and concrete placement quality control during the construction of this reservoir in Lake County. Dr. Storesund was also responsible for issuing a final geotechnical services during construction report for the project.
- **Red Hills Reservoir, Lake County, California:** Dr. Storesund served as a field engineer responsible for embankment keyway inspections, field density testing, and concrete placement quality control during the construction of this reservoir in Lake County. Dr. Storesund was also responsible for issuing a final geotechnical services during construction report for the project.
- **Chimney Rock Vineyard, Napa County, California:** Dr. Storesund served as a field engineer responsible for embankment keyway inspections and field density testing during the construction of this reservoir in Napa County.
- **Hershey Vineyard Reservoir, Sonoma County, California:** Dr. Storesund served as a staff engineer responsible for generating design recommentions and issuing of a final geotechnical design report for this reservoir project in Sonoma County.
- **BV Reservoir No. 10 Rehabilitiation, St. Helena, California:** Dr. Storesund served as a field engineer responsible for the execution of the field investigation program and issuance of a final geotechnical design report for this reservoir rehabilitation project in St. Helena.

Off-Stream Storage Projects (Sonoma and Santa Clara Counties, California): Dr. Storesund worked in close conjunction with the Center for Ecosystem Management and Restoration (CEMAR) and Trout Unlimited (TU) on a number of off-stream water storage reservoir projects, designed to help landowners manage water resources in a manner that balances water use with habitat and minimum required in-stream flows for listed coho salmon and steelhead trout. These projects include:

- **Grape Creek Streamflow Stewardship Project, Healdsburg, California:** Dr. Storesund served as the project manager and project engineer for this off-stream reservoir storage project, providing all aspects of engineering planning (permit assistance, conceptual layouts), design (site geotechnical exploration and survey, analyses, development of plans, specifications, and estimates), and construction oversight during construction. The Grape Creek Streamflow Stewardship Project (GCSSP) is a cooperative project designed to help landowners manage water resources in a manner that balances water use with habitat and minimum required in-stream flows for listed coho salmon and steelhead trout. An existing flashboard dam and containment berm was replaced with a new reservoir adjacent to the creek to allow passage of river flows while providing the farmer with an agricultural water supply.
- **Little Arthur Creek Streamflow Stewardship, Healdsburg, California:** Dr. Storesund served as the project manager and project engineer for this off-stream reservoir storage project, providing all aspects of engineering planning (permit assistance, conceptual layouts), design (site geotechnical exploration and survey, analyses, development of plans, specifications, and estimates), and construction oversight during construction. The Little Arthur Creek Streamflow Stewardship Project (LACSSP) is a cooperative project designed to help landowners develop water supply security in a manner that improves in stream flows and habitat for listed steelhead trout.
- **Pescadero Creek Streamflow Stewardship, Healdsburg, California:** Dr. Storesund served as the project manager and project engineer for this off-stream reservoir storage project, providing all aspects of engineering planning (permit assistance, conceptual layouts), design (site geotechnical exploration and survey, analyses, development of plans, specifications, and estimates), and construction oversight during construction. The Pescadero Creek Streamflow Stewardship Project is a cooperative project designed to help landowners develop water supply security in a manner that improves in stream flows and habitat.

Whitethorn Elementary School Auxiliary Water Storage System, Whitethorn, California: Dr. Storesund served as the principal engineer on this conservation project performed in collaboration with Trout Unlimited and Sanctuary Forest. The project entailed installation of sixteen 5,000 gallon water tanks so that the school could divert water during wet months. Dr. Storesund performed the permitting, planning, engineering, construction bid documentation, and review services.

Residential

MLK Plaza Homes, Oakland, California: Dr. Storesund provided field density testing services for this low income housing project in Oakland. The project consisted of constructing thirteen new two-story residential structures at the site as well as associated improvements.

Standard Pacific Homes' Dublin Ranch, Dublin, California: Dr. Storesund served as a field engineer for this residential development in Dublin, observing mass grading operations, performed field density tests on housing pads, roadways, utility trenches, special inspections on rebar placement, concrete placement, post-tensioning, and performed related geotechnical laboratory testing. Dr. Storesund was also responsible for inspection and evaluation of erosion control systems in place during mass grading operations.

Palomares Hills, San Anselmo, California: Dr. Storesund served as a field engineer providing construction observations and field density testing during construction of retaining walls for this residential development.

Lund Ranch Creek, Pleasanton, California: Dr. Storesund provided construction observation services during a creek restoration project located within the Lund Ranch Creek residential development in Pleasanton. The restoration project involved bank erosion mitigation through placement of rock rip rap.

University Avenue Housing, Berkeley, California: Dr. Storesund served as a field and project engineer for this multi-unit residential housing project. An existing Salvation Army structure and parking lot were demolished and replaced with the new housing structure. Dr. Storesund performed the field exploration, engineering analyses, foundation recommendations, and prepared the final geotechnical design report.

The Estates at Happy Valley, Sun City, Arizona: Dr. Storesund served as a field engineer responsible for the execution of a field investigation program, which involved hollow stem auger drilling and geotechnical sampling for this mass grading residential development project in Sun City.

Educational

Children's Hospital Oakland Upgrade, Oakland, California: Dr. Storesund served as a staff engineering providing pipeline thrust block design recommendations for this facility upgrade project in Oakland.

Bessie Carmichael School, San Francisco, California: Dr. Storesund served as a staff engineer providing drilled pier design recommendations for this new school situated between the existing Saint Michael Ukrainian Orthodox Church and the Vineyard Christian Fellowship Church in San Francisco. It is three-story structure with a total footprint area of approximately 24,000 square feet. The facility features a single-story gymnasium and multi-purpose room with an elevated roof, a central courtyard area, and an asphalt-paved playground adjacent to the school building.

Blue Oaks School, Napa, California: Dr. Storesund served as a field engineer for this school renovation project in Napa. The field services consisted of field density testing on pavement subgrades and base rock.

Vista College Facility, Berkeley, California: Dr. Storesund served as a field engineer responsible for logging test pits to identify the foundations for existing structures surrounding the project site. The facility upgrade consisted of a new six to eight-story building for Vista College on the south side of Center Street, between Shattuck Avenue and Milvia Street in Berkeley. Excavations on the order of 15 to 20 feet were required to construct the basement level. The new foundations consisted of 36-inch diameter drilled piers with lengths from 50 to 70 feet.

New Alameda Elementary School, Alameda, California: Dr. Storesund served field as a field engineer responsible for the execution of the field exploration for this project. The new school will consist of classroom buildings and multi-use buildings. The scope of work for this investigation included a site reconnaissance by a State of California Certified Engineering Geologist, subsurface exploration utilizing both exploratory borings and Cone Penetration Testing, laboratory testing, engineering analyses of the field and laboratory data, and preparation of this report. The data obtained and the analyses performed were for the purpose of providing design and construction criteria for site earthwork, building foundations, slab-on-grade floors, retaining walls and pavements.

Ocean Branch Library, San Francisco, California: Dr. Storesund served as a staff engineer responsible for generating foundation recommendations for this new library structure in San Francisco.

Commercial

Clear Channel Outdoor, Oakland, California: Dr. Storesund served as a staff engineer responsible for providing drilled pier design recommendations for this outdoor billboard structure. The proposed billboard structure was supported by four 24-inch diameter, 3/8-inch thick hollow steel pipe columns.

JB Radiator Complex, Sacramento, California: Dr. Storesund provided geotechnical recommendations for foundation grading for a new storage tank at a site with expansive soils.

Linde Processing Facility, Richmond, California: Dr. Storesund performed a field exploration program (CPT) to characterize onsite soil conditions and provided foundation design recommendations for new infrastructure developments at the property.

Moraga Country Club Landslide Mitigation, Moraga, California: Dr. Storesund served as a field engineer for three landslide mitigation projects at the Moraga Country Club. Dr. Storesund provided field density testing services and general construction observations. He was responsible for summarizing the field data and issuing a construction report.

Moss Landing Powerplant, Moss Landing, California: Dr. Storesund served as a field engineer for this power plant upgrade project in Moss Landing. Dr. Storesund provided construction observations auger cast pile installation for the main generating structure and piezometer monitoring during the construction and dewatering of the water cooling intake structure.

Coliseum Lexus Dealership, Oakland, California: Dr. Storesund served as a staff engineer responsible for generating foundation design recommendations and issuing the final geotechnical report for this dealership in Oakland.

Infiniti of Oakland Dealership, Oakland, California: Dr. Storesund served as a field engineer responsible for the implementation and execution of the field investigation program for this project which consisted of advancing three cone penetration tests (CPTs). In addition, he was also responsible for generating foundation design recommendations and issuing a final geotechnical design report.

Sho*Ka*Wah Casino Bridge, Hopland, California: Dr. Storesund served as a field engineer for this bridge and parking lot and suspension bridge project in Hopland. Dr. Storesund provided concrete sampling, keyway inspection, and field density testing services during construction.

Anthropologie – Berkeley, Berkeley, California: Dr. Storesund served as a field engineer responsible for executing the field exploration program for this structural upgrade project in Berkeley. Dr. Storesund was also responsible for the issuing of a final geotechnical design report

2150 Shattuck, Berkeley, California: Dr. Storesund served as a field engineer for this seismic retrofit project in Berkeley. Dr. Storesund was responsible for the monitoring of micropile installation and load testing. He was also responsible for quality control of the injected micropile grout.

Bayer Building 55, Berkeley, California: Dr. Storesund served as a field engineer responsible for field density testing services during construction for this new commercial facility in Berkeley.

Chino Bandito, Chandler, Arizona: Dr. Storesund served as a field engineer responsible for the execution of the field investigation program, which involved hollow stem auger drilling and geotechnical sampling for this 11,500 square foot commercial development project in Chandler.

150 Powell Street, San Francisco, California: Dr. Storesund served as the project manager and project engineer for this structural renovation project near Union Square. The historic building required the façade structure to be saved and incorporated into the new structure. Dr. Storesund developed and implemented an exploration program that involved test pits to expose and evaluate the condition of spread footings. Foundation design services were also provided for temporary construction features (tieback walls, support frame for façade) and permanent features (foundations) as well as support and observation services during construction.

390 Fremont Street, San Francisco, California: Dr. Storesund provided geotechnical engineering support to a property owner adjacent to a high-rise construction project that involved installation of a shoring system, excavation to a depth of 70 ft, excavation of soil and bedrock, and development and evaluation of a monitoring program during the excavation activities.

Waterfront and Offshore Facilities

California Tsunami Hazard Policy Committee: The California Tsunami Policy Working Group (CTPWG) is a voluntary advisory body operating under the California Natural Resources Agency (CNRA), Department of Conservation, and is composed of experts in earthquakes, tsunamis, flooding, structural and coastal engineering and natural hazard policy from government, industry, and non-profit natural hazard risk-reduction organizations. The working group serves a dual purpose as an advisor to State programs addressing tsunami hazards and as a consumer of insights from the SAFRR Tsunami Scenario project, raising awareness and facilitating transfer of policy concepts to other coastal states in the nation. CTPWG's role is to identify, evaluate and make recommendations to resolve issues that are preventing full and effective implementation of tsunami hazard mitigation and risk reduction throughout California's coastal communities. Dr. Storesund provided engineering (seismic, geotechnical marine, ecological, water resources) and risk-based decision making input to this group. This committee was active between 2011 and 2013.

Emeryville Shoreline Protection Project, Emeryville, California: Dr. Storesund was a project engineer overseeing the construction of this shoreline improvement project. Site grades were raised 2-4 feet above existing grade and an enlarged shoreline breakwater slope was constructed.

Alcatraz Hydrodynamic Evaluation, City and County of San Francisco, California: Dr. Storesund was the project manager and project engineer for this coastal hazard screening evaluation at Alcatraz. The purpose of the screening was to inform long-range planning activities, accounting for shoreline erosion and sea level rise. The recommendations were provided to the National Park Service, in association with Kleinfelder.

Emeryville Marina Breakwater, Emeryville, California: Dr. Storesund was a project engineer responsible for the planning and execution of a field exploration and geotechnical laboratory testing program for this breakwater and pier project in Emeryville. Dr. Storesund also completed the geotechnical design recommendations and issued the design report.

Nelson's Marine Shoreline Stabilization, Alameda, California: Dr. Storesund served as the project manager and project engineer for this shoreline stabilization and remediation project at an abandoned boat yard within the Oakland Estuary. The project required an alternatives analysis (approach and cost estimate), decision matrix, development of remediation plans, specifications, and estimates. Field efforts included site surveys (RTK GPS) and geotechnical exploration.

Seadrift Shoreline Study, Stinson Beach, California: Dr. Storesund served as a project engineer and performed a site characterization study (based on historical topographic maps and aerial photographs), conducted hydrodynamic characterization, and aided with the design of the extension of an existing sheet pile bulkhead system along Bolinas Lagoon.

Loch Lomond Breakwater Improvement Project, San Rafael, California: Dr. Storesund was the project manager and a project engineer for the improvement of an existing 1,500 foot long rip rap breakwater structure. He performed a hydrodynamic evaluation during the planning phase to establish design criteria, managed the project (preparation of project plans, specifications, and estimates), and provided civil and geotechnical engineering expertise.

Harbor Point Shoreline Stabilization Project, Tiburon, California: Dr. Storesund served as a project engineer and performed a site characterization study (based on historical topographic maps and aerial photographs), conducted hydrodynamic characterization, and aided with the design of a shoreline stabilization solution.

Martin Luther King Jr. Drive Shoreline Study, Bay farm Island, California: Dr. Storesund served as the project manager and project engineer for this Bay Trail feasibility study for the East Bay Regional Park District (teamed with Creegan D'Angelo Engineers). Dr. Storesund prepared a screening-level coastal engineering guidance document and technical review of alternative plan elements.

Richmond Marina Breakwater Improvements, Richmond, California: Dr. Storesund served as a support staff engineer for this breakwater improvement project in Richmond. The project entailed wave and tide surveys, wind pattern evaluations, and preliminary foundation recommendations to upgrade an existing breakwater structure.

Third Street Boat Ramp, Lakeport, California: Dr. Storesund was a staff engineer responsible for organizing and performing the geotechnical exploration for this public boat ramp improvement project in Lakeport.

Dow Chemical Wharf, Pittsburg, California: Dr. Storesund was the project manager and a project engineer for the evaluation of an existing wharf to evaluate its ability to accommodate larger supply ships. After the initial review, Dr. Storesund was responsible for the development of alternatives, preparation of project permits, design of a new mooring system (including specifications and cost estimate), and construction observations and load testing.

Alviso Marina County Park, Alviso, California: Dr. Storesund served as a field engineer responsible for the implementation of Fugro's geotechnical exploration for the Alviso Marina County Park, Phase 1 Master Plan Implementation Project in Alviso. The geotechnical exploration consisted of two test borings, two Cone Penetration Tests (CPTs). Fugro evaluated the geotechnical conditions for the design and construction of the new parking area, a planted mound area (which includes the placement and compaction of up to 5 feet of engineered fill), and a 24-inch high by 18-inch wide flood control wall.

Brooklyn Basin Dredging Study, Oakland, California: Dr. Storesund served as the project manager for this maintenance dredging study commissioned by the San Francisco US Army Corps of Engineers to URS Corporation.

Pipelines and Water tanks

NCFCWCD South Segment Sewer Replacement, Napa, California: Dr. Storesund served as a field engineer, observing construction of a 54-inch to 66-inch diameter sanitary sewer line in Napa. The project, separated into two segments, realigned and replaced approximately 4,500 lineal feet of mainline sewer outside the river flood plain as part of the Napa River Project. Construction observations pertained to pressure grouting ground improvement, pipeline subgrade inspections, pipe bedding and backfill observations, trench backfill density testing, AC pavement density testing, concrete sampling, pipe segment seal testing, and observations of lightweight concrete backfill of old sewer line.

PG&E Line 131 Pigging Project, Alameda County, California: Dr. Storesund served as field engineer, coordinating and conducting geotechnical exploratory test pits for a new PG&E maintenance access facility to service two 18-inch, high-pressure, gas mains. Site improvements included an enlarged access road and maintenance pad, rock cut slopes, and minor pipeline realignment.

Newby Island Gas Transmission Pipeline, Milpitas, California: Dr. Storesund served as a field engineer providing construction observations on trench backfill operations on a landfill methane gas recovery pipeline installed at the base of an existing Santa Clara County Flood Control Levee. Trench backfill consisted of lightweight concrete slurry, designed to isolate the installed pipeline and protect the structural integrity of the existing levee system.

South Transmission System Project Tanks, Sonoma County, California: Dr. Storesund served as a field engineer during the geotechnical exploration of this project. Seven water tank sites were evaluated during the field operations. Geotechnical explorations included seismic refraction studies, vertical soil borings, and geologic reconnaissance mapping.

Girard Vineyard, 50k Gallon Water Tank, Napa County, California: Dr. Storesund served as a field engineer during the geotechnical exploration of this project. Two tank sites were evaluated during the field operations by excavating test pits. Site-specific foundation design recommendations were generated.

Granada Sanitary District CIP, San Mateo County, California: Dr. Storesund organized and performed the field exploration for this project which consisted of "jack and bore" operations under Highway 1 in Granada. Engineering foundation design recommendations were generated for temporary shoring required during the construction process.

Earthquake Fault Explorations

North Livermore Properties, Livermore, California: Dr. Storesund served as a support field engineer for the project geologist on this fault rupture hazard study in Livermore. Tasks included geologic mapping, study of stereo-paired aerial photographs, and an extensive fault trenching investigation. Dr. Storesund was responsible for the setup of the fault trench shoring and dewatering pumping system design. Dr. Storesund also assisted the project geologist in field logging the excavated fault trench.

Centex Homes' Farber Property, Livermore, California: Dr. Storesund served as a field engineer, assisting the project geologist, for a fault rupture hazard study for a proposed residential development located within the Alquist-Priolo Special Studies Zone for the Greenville Fault. The investigation included excavation and detailed logging of two trenches, totaling over 800 feet in length.

Alameda County Sherriff's Facility Landslide Assessment, Hayward, California: Dr. Storesund served as a field engineer providing assistance during the fault trenching phase of the field investigation. The project involves demolishing the existing Animal Control Facility and constructing a new 160,000 square foot building that will include facilities for the Sheriff and Coroner and a parking garage for about 500 cars. The proposed building will be a multi-level structure, and the garage will extend one or two levels below grade. The structure will be a critical facility and must remain operational following an earthquake. Other improvements will include driveways, a visitor's parking lot, underground utilities and landscaping. Preliminary schematics suggest that the facility will occupy the entire 4-acre site. The project included evaluating potential landslide and surface fault rupture hazards at the site.

Osgood Road Fault Trench, Fremont, California: Dr. Storesund served as the project manager responsible for the organization and implementation of backfill operations on a fault rupture hazard study for a proposed new PG&E gas main alignment in Fremont within a BART right-of-way zone. A total of three trenches (totaling approximately 350 linear feet and 12 feet deep) were excavated and backfilled according to BART specifications.

Dumbarton Quarry and Associates, Hayward, California: Dr. Storesund served as a support field engineer for the project geologist on this fault rupture hazard study project at the La Vista Quarry in Hayward. Tasks included geologic mapping, study of stereo-paired aerial photographs, and an extensive fault trenching investigation. Dr. Storesund was responsible for the setup of the fault trench shoring and dewatering pumping system design. Dr. Storesund also assisted the project geologist in field logging the excavated fault trench

LBL-50X AP Fault Study, Berkeley, California: Dr. Storesund acted as a field engineer for the fault location study for a proposed 6-story building to be constructed on a steep hillside within the State designated Fault Rupture Hazard Zone for the active Hayward Fault. The steep, vegetated slope made excavation of continuous trenches difficult and numerous trenches had to be excavated to provide appropriate coverage. No evidence of active or potentially active faulting was encountered in the trenches.

Transportation

Caltrans I-238 Widening Project, Alameda County, California: Dr. Storesund served as both a field engineer responsible for the coordination and implementation of the field investigation program and a staff engineer performing design calculations and analyses. The I-238 project includes the widening of the freeways and related replacement or improvement of existing connectors, overcrossings, and railroad underpasses. Existing embankments are to be widened which requires installation of concrete and MSE retaining wall. Field investigations performed for the project included an extensive subsurface exploration program utilizing continuous flight solid and hollow stem augers, rotary wash borings and Cone Penetration Test (CPTs) soundings. In addition, available subsurface data from previous investigations was reviewed as were published geologic and soil survey data. The field exploration program was complemented with geotechnical laboratory testing. Following completion of the field investigation and laboratory testing, analyses were performed to evaluate geotechnical engineering aspects of project, particularly settlement and liquefaction hazard studies.

Caltrans I-880/Mission Boulevard Widening Project, Alameda County, California: Dr. Storesund served as a support staff engineer for the I880/Mission Boulevard Widening Project. The project involved over 100 test borings, geotechnical laboratory analyses, engineering foundation design recommendations, flexible pavement design, and seismic design criteria for five roadway bridges and one railroad bridge. Other improvements included: a cut and cover tunnel box, box culverts, retaining walls, and ancillary structures.

Caltrans Guadalupe Highway 87 Renovation, San Jose, California: Dr. Storesund served as a field engineer providing AC pavement density testing Quality Control services during the construction phase of this project. The project included widening of the existing Highway 87, construction of a new overpass over Highway 101, and other retaining walls and street improvements.

Port of Oakland's Oakland Airport Expansion, Oakland, California: Dr. Storesund served as a field engineer for this roadway widening and expansion project, providing construction observations and testing services for, utility trench backfill compaction testing, roadway subgrade and base rock density testing, AC pavement testing, and concrete sampling. The project consisted of the construction of new roadway over and underpasses, roadway widening, and utility upgrades.

Petaluma Transit Mall, Petaluma, California: Dr. Storesund was the project engineer for this streetscape project in Petaluma who was responsible for the organization and execution of the field exploration program as well as generating design recommendations. The proposed streetscape improvements included sidewalks, PCC and AC pavements, information kiosks, and lighting standards.

Reid-Hillview Airport, San Jose, California: Dr. Storesund was the field engineer for this runway rehabilitation project. Dr. Storesund was responsible for quality control observations related to pavement section construction.

Nut Tree Airport, Fairfield, California: Dr. Storesund was a field engineer for this runway rehabilitation and expansion project in Fairfield. Dr. Storesund was responsible observations during new runway grading operations, pavement section construction, and provided support during asphalt content laboratory analyses.

First Street Bridge Replacement Project, Napa, California:
Dr. Storesund served as the project engineer for this project which involved the First Street Bridge Replacement Project located in Napa, California. Dr. Storesund coordinated and managed Fugro's field operation exploration program, performed the field exploration, analyzed the collected data, and provided a preliminary geotechnical design report.

Independent Technical Reviews (ITR)

Pier 36/Brannan Street Wharf Demolition, City and County of San Francisco, California: Dr. Storesund served as the project manager and project engineer for this technical review (on behalf of the San Francisco District US Army Corps of Engineers), which consisted of a geotechnical evaluation of submitted calculations and plans. The project entails the demolition of an existing wharf to make room for the construction of a new public open space wharf and associated boating facilities.

Hamilton Wetland Restoration Levee Raising Project, Novato, California: Dr. Storesund served as a project engineer for this technical review (on behalf of the San Francisco District US Army Corps of Engineers), which consisted of a geotechnical evaluation of submitted calculations, plans, and specifications. The project entails the raising of existing flood protection levees to account for settlements (experienced and anticipated) to the levees.

Marysville Unified School District Pipeline Review, Marysville, California: Dr. Storesund, as part of CCRM, performed a review of a natural gas pipeline risk assessment (per California Department of Education protocols) for the Marysville Unified School District.

Twin Rivers Unified School District Pipeline Review, Sacramento, California: Dr. Storesund, as part of CCRM, performed a review of a natural gas field risk assessment (per California Department of Education protocols) for the Twin Rivers Unified School District.

Milford Township School District Pipeline Review, Milford, Pennsylvania: Dr. Storesund, as part of CCRM, performed a review of a natural gas field risk assessment for the Milford Township School District on the citing of a new school.

Princeville, North Carolina Flood Risk Management Feasibility Study Integrated Feasibility Report and Environmental Assessment: Dr. Stroresund served as an expert reviewer for this USACE IEPR for the proposed Princeville flood protection improvement project. The tentatively selected plan (TSP) included measures to extend the existing levee and raise U.S. Highway 258 and Shiloh Farm Road north of the Town of Princeville to create a barrier to circumvention of the existing levee, as well as ramping residential, farm, and commercial driveways and subdivision streets to meet the new elevation. The TSP also includes non-structural measures consisting of an updated flood warning and evacuation plan, continued floodplain management and updating of local building and zoning codes, a flood risk management education and communication plan for both the community and local schools, and flood warning measures, all of which were ultimately deemed essential to an adequate flood risk management strategy for the Town of Princeville. The estimated cost of the TSP is $21,096.00 million.

Risk Assessments

Multiple Lines of Defense, Coastal Louisiana: Dr. Storesund worked in conjunction with the Lake Pontchartrain Basin Foundation to conduct an initial qualitative risk assessment of the hurricane flood protection system in the greater New Orleans area. The assessments follow the Quality Management Assessment System (QMAS) protocols. The assessment provides the basis for initial definition of the system, stakeholders, and identifies primary Factors of Concern. This assessment is the pre-cursor to detailed quantitative risk assessments.

Tsunami Risk-Based Design Committee, Northern California: Dr. Storesund is the Chair of this committee, sponsored by the ASCE San Francisco Section. The aim of the Working Group is to accomplish the following: (1) Formulate a group of appropriate stakeholders (local, county, state, federal levels); (2) Conduct a summary of 'best practices' and available resources (perhaps through a series of workshops) (a) Risk standards (b) Hazard studies (reports, maps, etc) (c) Design standards; (3) Develop Policy Statement (goals based on best practices and available info); and (4) Develop Guidelines for Risk-Based Tsunami Design Criteria in Coastal California.

PG&E Risk Management Framework Assessment: Dr. Storesund served as the project manager on an assessment committee to provide insights on their risk management framework. The insights included: (a) is the right RMF being used for the stated goals?; (b) are all significant RMR relationships being captured?; (c) strategies for visualizing and mapping risk; (d) identifying the 'right' risks and prioritizing; and (e) RMF resilience and maturity. Potential actionable outputs include: (1) reference practices (organizational examples); (2) listing of RMF activities to expand and advance; (3) listing RMF activities to modify/reconfigure; and (4) RMF performance metrics (i.e. targeted monitoring and review, leading/lagging indicators).

Forensic Evaluations

Bayer Communications Building, Berkeley, California: Dr. Storesund served as the field engineer to survey and evaluate settlements in the Bayer Communications Building, which was the 'nerve center' for all communication operations at the facility. Site surveys consisted of floor level surveys, review of historical soil exploration programs, and review of nearby construction activities. The study found that excavation operations associated with the upgrade of a sewer line immediately adjacent to the structure led to lateral stress relaxation and vertical displacement of the footings.

Bell Carter Foods Distressed Structure, Lafayette, California: Dr. Storesund organized and performed the foundation exploration which involved drilling soil test borings within the structure using portable hydraulic drilling equipment. The purpose of the project was to identify the foundation instability mechanism and provide mitigation strategies.

Mississippi River Gulf Outlet Wave-Induced Erosion, St. Bernard Parish, Louisiana: Dr. Storesund provided state of the art engineering analyses examining the contribution of damage to the Mississippi River Gulf Outlet levees as a result of wave action from Hurricane Katrina in 2005. The evaluations required the development of a validated method to assess the plausible range of erosion susceptibilities due to wave impact and run-up. These evaluations were published in the ASCE Journal of Waterway, Port, Coastal and Ocean Engineering.

Investigation of the Greater New Orleans Area Flood Defense System Failure, New Orleans, Louisiana: Dr. Storesund was a consultant for the National Science Foundation sponsored investigation of the failure of the New Orleans Flood Defense System. He aided in the initial field reconnaissance to survey system damage and contributed to the technical analyses evaluating system failure mechanisms. He aided in the use of state of the art methods for erosion sampling and testing as well as LiDAR remote sensing survey methods on the Mississippi River Gulf Outlet levees. Copies of the findings from the evaluation can be accessed at: www.ce.berkeley.edu/~new_orleans.

Upper Jones Tract Levee Failure, San Joaquin County, California: Dr. Storesund provided engineering evaluations associated with the June 2004 breach of the Upper Jones Tract Levee in conjunction with Dr. J. David Rogers. The evaluations included bathymetric surveys, RTK GPS surveys, development of digital terrain models using bathymetry and Aerial LiDAR data, hydraulic modeling, and levee failure analyses (seepage, slope stability). Dr. Storesund was responsible for: project management, planning, and tracking; geotechnical engineering evaluation and analyses; hydrodynamic evaluations; general engineering evaluations; standard of care evaluations; technical data evaluation; computer graphics/animations; digital cartography; scientific and technical writing. Dr. Storesund provided deposition and trial testimony.

East Bank Industrial Area (Lower 9th Ward), New Orleans, Louisiana: Dr. Storesund provided engineering support services to Dr. Robert Bea and Dr J. David Rogers for a field exploration program that included geoprobes, CPTs, and pump testing of the onsite "swamp/marsh" material in order to back calculate the permeability of this deposit. The work was performed in close coordination with all experts (plaintiffs and defense). Dr. Storesund served as the project manager for his $1.3 million project (completed in 3 months). Dr. Storesund was responsible for: project management, planning, and tracking; geotechnical engineering evaluation and analyses; hydrodynamic evaluations; general engineering evaluations; standard of care evaluations; technical data evaluation; computer graphics/animations; digital cartography; scientific and technical writing.

PNG Landslide, Papua New Guinea: Storesund Consulting worked in conjunction with Prof. J. David Rogers, Prof. Calvin Alexander, and Mr. Eldon Gath to assess the causal mechanism(s) of a landslide in Papua New Guinea. Available data was reviewed and a field reconnaissance trip to the failure site was performed in summer of 2012. Dr. Storesund provided geotechnical and liar data interpretation services.

LiDAR Surveys

Sunol Dam Removal, Alameda County, California: In 2006, the San Francisco Public Utilities Commission removed Sunil dam to improve fish passage, restore a self-sustaining population of steelhead to the Alameda Creek watershed, and reduce or eliminate an existing public safety hazard. The dam contained an estimated 37,000 yd^3 of impounded sediment. To create a baseline for future monitoring of impounded sediment transport, a combination of Aerial Liar, Terrestrial LiDAR, and conventional survey data was compiled and synthesized to generate a three dimensional model of the study area. High resolution characterization of the impounded sediments was accomplished using Terrestrial LiDAR, with an approximate point spacing of centimeters.

Pit Dam 3 Mapping, Burney, California: Storesund Consulting provided a Terrestrial LiDAR scan of select areas at the PGE Pit Dam 3 facility to aid in the evaluation of a fault system at the site. A high-accuracy point cloud was rendered of the fault are, allowing field geologists to geolocate fault features with high accuracy. Additionally, fault trenches were scanned and rectified orthoimages were rendered to aid in mapping fault trace features.

Quadrus Hill, Menlo Park, California: Storesund Consulting performed Terrestrial LiDAR scanning services for this office complex in a landscaped boulder area where high-precision mapping of boulder features was required to correctly situate a new deck.

Intarcia, Fremont, California: Dr. Storesund provided Terrestrial LiDAR scanning services for this project to map existing structural conditions as well as mechanical, electrical, and plumbing (MEP) facilities to facilitate BIM modeling and routing of new utilities (using 'clash detection').

1245 Market, San Francisco, California: Dr. Storesund provided Terrestrial LiDAR scanning services for this project to map existing structural conditions as well as mechanical, electrical, and plumbing (MEP) facilities to facilitate BIM modeling and routing of new utilities (using 'clash detection').

Veterans Administration Facility, Mather, California: Dr. Storesund provided Terrestrial LiDAR scanning services for this project to map existing structural conditions as well as mechanical, electrical, and plumbing (MEP) facilities to facilitate BIM modeling and routing of new utilities (using 'clash detection').

Yosemite Slough Wetland Erosion Study, San Francisco, California: Storesund Consulting performed annual erosion/deposition monitoring using Terrestrial LiDAR for the wetland restoration project. Hydrodynamic modeling was performed estimating erosion/deposition. This monitoring program provided a high resolution digital terrain model by which to measure erosion/deposition across the restoration area (3 acres).

Causby Mine Survey, Stanislaus County, California: Dr. Storesund served as the project manager and project engineer for this LiDAR mapping project of an abandoned mine tunnel for the U.S. Forest Service. Mapping consisted of the entrance and exit (for construction access) as well as the interior of the tunnel (for volume estimates and layout purposes). State of the Art LiDAR processing software was used to model the interior of the tunnel in 3D.

Tocaloma Backwater Project, Marin County, California: Dr. Storesund provided RTK GPS and Terrestrial LiDAR surveys for this backwater restoration project for the County of Marin. The work was provided for Balance Hydrologics (who performed the design). Aerial LiDAR was merged with the Terrestrial LiDAR to create a full 3D terrain model of the restoration area.

Arroyo de la Laguna, Alameda County, California: Arroyo de la Laguna is part of the stream system that includes the Dublin, Pleasanton, Livermore, as well as upland portions of northern Santa Clara County. Watershed hydrology and channel function have been historically impacted by urbanization (including drainage and flood control), roads, railroads, gravel mining, and the construction of Del Valle Reservoir, resulting in channel incision on the order of six meters. Severe stream bank erosion was identified on the outer bends of an "S" curve of the Arroyo de la Laguna Creek. Terrestrial LiDAR was used to generate cost-effective, high-accuracy mapping of as-built conditions of newly completed stream and river restoration projects, thereby establishing a baseline by which future monitor efforts can evaluate overall project performance through time.

Salt Pond A21, Alameda County, California: Dr. Storesund performed Terrestrial LiDAR survey for researchers at the University of California at Berkeley on this 160-acre wetland restoration project in Fremont, California. The surveys were used to monitor sediment accretion, scour, and erosion progression within this recently breached salt pond.

Tennessee Hollow, San Francisco, California: A storm drain creek daylighting project was completed at the San Francisco Presidio. LiDAR surveys were used to establish baseline topography following completion of construction in January of 2006. Subsequent surveys were performed to evaluate vegetation growth rates and growth zones. The baseline survey is anticipated to serve as an overall baseline by which future channel stability can be evaluated.

AMR, Roseville, California: Storesund Consulting provided high-resolution RTK GPS topographic survey and Terrestrial LiDAR surveys of vernal pools to provide a baseline micro-topographic terrain model which became the design 'template' for restoration of 150 acre vernal pool site.

Cache Creek, Woodland, California: Terrestrial LiDAR surveys were conducted at two specific locations where the creek channel shifted into the creek bank, causing the formation of a tall vertical bank. The terrestrial LiDAR surveys were conducted to map the conditions of the vertical bank. Additionally, aerial LiDAR surveys were also performed at this site and future studies will compare and contrast the resolution and accuracy between these two methods at this site.

Goodwin Creek, Oxford, Mississippi: The Goodwin Creek watershed is organized and instrumented for conducting extensive research on upstream erosion, stream erosion and sedimentation, and watershed hydrology. Land use and management practices that influence the rate and amount of sediment delivered to streams from the uplands range from timbered areas to row crops. About 13 percent of the watershed total area is under cultivation and the rest in idle pasture and forest land. Terrestrial LiDAR surveys were performed at one location in an attempt to evaluate the feasibility of utilizing LiDAR to measure and quantify sediment transport and vertical bank retreat rates.

Coldwater Creek, Mississippi: Coldwater Creek is part of a United States Department of Agriculture National Sedimentation Laboratory research watersheds. The quantity and quality of aquatic habitats along the lowland floodplain rivers in agricultural landscapes are in steep decline as a result of nonpoint source pollution. Terrestrial LiDAR surveys were performed at the site of an ephemeral gully in order to ascertain the feasibility of mapping these features with LiDAR to develop 3D surfaces by which more detailed analyses can be performed (including erosion rates) as opposed to the traditional cross-sectional survey method, which may not fully capture the behavior of the site.

Tolay Lake, Petaluma, California: This collaborative effort between the Sonoma County Parks and Recreation, Ducks Unlimited, and United States Geological Survey, will restore a seasonal lake on Tolay Creek in Sonoma County. Existing agricultural fields will be converted to a county park and will serve as a duck reserve in the fall and winter. Terrestrial LiDAR surveys were preformed to develop a detailed topographic map of the project site. Over 200 acres were surveyed in two days.

Ben Mar, Benicia, California: Dr. Storesund performed Terrestrial LiDAR survey for the United States Geological Survey on this 25-acre wetland restoration project in Benicia, California as part of a Caltrans mitigation project. The surveys were used to monitor sediment accretion within the completed restoration area.

Tilden Step Pool, Berkeley, California: Storesund Consulting worked in conjunction with Dr. Anne Chin (University of Colorado, Boulder) by mapping as-built conditions of a step pool sequence in Tilden Park. Change analyses will be performed over three storm events to ascertain step pool stability.

Colorado Wildfire Step Pool Evaluation, Colorado: Storesund Consulting worked in conjunction with Dr. Anne Chin (University of Colorado, Boulder) by analyzing terrestrial LiDAR scans of study areas before and after storm events to ascertain step pool stability.

Verona Bridge Creek Restoration, Pleasanton, California: Storesund Consulting performed a Terrestrial LiDAR survey of this in-stream habitat enhancement and slope stability restoration project in Pleasanton. The project was designed by the National Resource Conservation District.

Tubb, Vallejo, California: Dr. Storesund performed Terrestrial LiDAR survey for the United States Geological Survey on this 60-acre wetland restoration project in Sonoma County, California. The surveys were used to monitor sediment accretion within the completed restoration area.

Rodeo Creek, Hercules, California: LiDAR scanning services were performed on the newly acquired Rodeo Creek East Bay Regional Park property in Rodeo, California. Rodeo Creek was incised 20-30 feet below the floodplain and heavily vegetated, making it difficult to perform conventional topographic surveys. As a result of the LiDAR surveys, a 3D surface, topography, and cross-sections over a 1,000 foot stretch of creek was cost-effectively mapped.

Winfield Pin Oaks Levee Investigation, Winfield, Missouri: The Winfield Pin Oak levee is maintained by the Cap Au Gris Drainage and Levee District. The levee system (Figure 23) is estimated to prevent flooding of the protected area (493 hectares) up to a 14-year return period flood event on the Mississippi River. This site was overtopped for an extended period of time and breached as a result of overtopping-induced erosion. Terrestrial LiDAR surveys (georeferenced using RTK GPS) were performed in October 2008 for subsequent forensic analyses.

Norton Woods Levee Investigation, Elsberry, Missouri: The Elsberry levee at Norton Woods is maintained by the Elsberry Drainage District. This breach was the result of either a through-seepage induced or overtopping-induced (low crest elevation) failure. High water marks observed in the field indicate that the floodwaters did not exceed the general levee crest elevation. Terrestrial LiDAR surveys (georeferenced using RTK GPS) were performed in October 2008 for subsequent forensic analyses.

Kickapoo Levee Investigation, Elsberry, Missouri: The Elsberry levee at Kickapoo is maintained by the Elsberry Drainage District. This breach was reported by local residents to have been the result of through-seepage in the roadway base course that traversed the levee crest. The extents of levee erosion were generally limited to the pre-breach roadway alignment. Terrestrial LiDAR surveys (georeferenced using RTK GPS) were performed in October 2008 for subsequent forensic analyses.

San Francisco Pier 9, San Francisco, California: Storesund Consulting provided Terrestrial LiDAR scanning services for this renovation project to enable a 3D check against existing as-built documentation and facilitate BIM modeling. The new facility is a 3D printing center for Autodesk.

AT&T Facility MEP Scanning, California: Storesund Consulting provided Terrestrial LiDAR scanning services for this expansion project to map existing mechanical, electrical, and plumbing (MEP) facilities to facilitate BIM modeling as well as routing of a new fuel supply pipeline (using 'clash detection').

UCSF Helen Diller Center, San Francisco, California: Storesund Consulting provided Terrestrial LiDAR scanning services for this project to map existing structural conditions as well as mechanical, electrical, and plumbing (MEP) facilities to facilitate BIM modeling and routing of new utilities (using 'clash detection').

Novartis, Burlingame, California: Storesund Consulting provided Terrestrial LiDAR scanning services for this project to map existing structural conditions as well as mechanical, electrical, and plumbing (MEP) facilities to facilitate BIM modeling and routing of new utilities (using 'clash detection').

San Antonio Station, Mountain View, California: Storesund Consulting provided Terrestrial LiDAR scanning services for this project to map existing structural conditions as well as mechanical, electrical, and plumbing (MEP) facilities to facilitate BIM modeling and routing of new utilities (using 'clash detection').

Veterans War Memorial Building, San Francisco, California: Storesund Consulting provided Terrestrial LiDAR scanning services for this project to map existing structural conditions as well as mechanical, electrical, and plumbing (MEP) facilities to facilitate BIM modeling and routing of new utilities (using 'clash detection').

HWY 84 Interchange, Redwood City, California: Storesund Consulting performed a Terrestrial LiDAR scan of the HWY 84/HWY101 interchange in Redwood City to facilitate an improvement program.

Bryants Creek Levee Investigation, Elsberry, Missouri: The Elsberry levee at Kickapoo is maintained by the Elsberry Drainage District. This breach (Figure 52) occurred at the location of a duck pond that was reported to have been installed immediately adjacent to the levee system in order to attract ducks for the duck club located at the site. Terrestrial LiDAR surveys (georeferenced using RTK GPS) were performed in October 2008 for subsequent forensic analyses.

Indian Graves Levee Investigation, Quincy, Illinois: The Indian Graves Levee system is maintained by the Indian Graves Drainage District. The estimated protection level for the levee system is a 50-year return period flood and the protected area encompasses over 2,800 hectares. The sand with clay core levee system is situated immediately East of the Mississippi River. There were three breaches, two under seepage induced and one overtopping induced breach. Terrestrial LiDAR surveys (georeferenced using RTK GPS) were performed in October 2008 for subsequent forensic analyses.

Two Rivers Levee Investigation, Oakdale, Iowa: The Two Rivers Levee system is maintained by the Iowa Flint Creek Levee District No. 16. The estimated protection level for the levee system is a 100-year return period flood and the protected area encompasses approximately 7,100 hectares. The levee system is situated immediately South of the Iowa River, and west of the Mississippi River. Terrestrial LiDAR surveys (georeferenced using RTK GPS) were performed in October 2008 for subsequent forensic analyses.

Emeryville Shoreline Protection Project, Emeryville California: Terrestrial LiDAR was used to measure the volume of boulder rip-rap placed for this shoreline protection project. Due to the high void ratio and irregularity of the boulders, the very high point density of the Terrestrial LiDAR survey provided a more accurate modeling of rip-rap volume than traditional survey methods.

Dutra San Rafael Rock Quarry, San Rafael, California: The Dutra San Rafael quarry is one of the most active quarries in the Bay Area. LiDAR was used to image the physical configuration of the quarry, to create a 3D baseline survey. Subsequent LiDAR surveys will be compared against the initial baseline survey to determine material quantities as well as overall slope stability within the quarry.

Dutra Richmond Quarry, Richmond, California, California: LiDAR surveys were used to monitor a reclamation slope at the inactive Dutra Richmond Quarry. Due to the location of the slope and the geologic contacts, monitoring was required to demonstrate that no active movements are occurring and that the slope is stable. An initial baseline survey was performed in August, 2006 and subsequent surveys will be compared to the initial baseline to determine activity level.

Lower Santa Ynez, Santa Barbara County, California: The Lower Santa Ynez Bank Stabilization project was a collaborative effort with the California Conservation Corps and California Department of Fish and Game to utilize biotechnical methods to stabilize a 1,000-foot length of stream bank, adjacent to agricultural lands. Terrestrial LiDAR surveys were conducted to develop pre-project topography, as-built topography, erosion and scour quantities and estimated rates, and a coarse vegetation monitoring study.

Emery Point, Emeryville, California: Baseline Terrestrial LiDAR surveys were performed to monitor wave-induced erosion on Point Emery in Emeryville, California, which has experienced significant scour in the last 5 years. This man-made peninsula is a popular location with windsurfers and SF Bay Trail users. It is estimated that the location will be completely eroded in the next 25 years without mitigation.

Fremont Landing, Yolo County, California: The Fremont Landing project site is located along the south bank of the Sacramento River from RM 78.8 to 80.4 in one of the most hydraulically-complex portions of the river. At least five (5) major tributaries or distributaries are located within 2 miles of the site and all influence the hydrodynamics of the site. Terrestrial LiDAR surveys were performed to aid PWA develop a 2D hydrodynamic model of the project site and surrounding tributaries/distributaries. The model was used to allow examination of design issues related to fish stranding, rearing habitat, and flood conveyance.

Hamilton Wetland Restoration, Novato, California: This is a United States Army Corps of Engineers and California Coastal Commission joint project to convert over 500 acres of a decommissioned army airfield to a wetland restoration area using dredged spoil material. The area will consist of seasonal and tidal wetlands. Terrestrial LiDAR is being used to monitor fill placement and obtain volume quantities.

Mississippi River Gulf Outlet, New Orleans, Louisiana: LiDAR surveys were conducted of the southeastern completed levee segment. This survey was to serve as a baseline from which future LiDAR surveys can be conducted and analyses and evaluations of wind-induced wave impacts can be studies.

East Sand Slough Restoration, Red Bluff, California: Dr. Storesund provided terrestrial LiDAR mapping of this channel restoration project on the Sacramento River in Red Bluff, California. The LiDAR survey was integrated with existing bathymetry data. Habitat mapping using the collected LiDAR data was also conducted in general conformance with the California Rapid Assessment Method (CRAM) for Wetlands.

CZ-1 Site, Fresno County, California: Dr. Storesund provided terrestrial LiDAR mapping of this tree-root excavation and measurement study by Dr. Peter Hartsough (UC Davis) as part of his climate change research. The mapping of the tree roots provided Dr. Hartsough the ability to establish high-resolution digital root system baselines for future comparisons.

Research Projects

RESIN: Contemporary infrastructure, the systems necessary to provide sustainable services within the nation's power, transportation, waste management, water, and telecommunication sectors, has become very *complex*; that is adaptive, interdependent, unpredictable, nonlinear, and dynamic. This research seeks to discover new fundamental methods to assess and manage the resilience and sustainability of such complex systems (termed 3ICIS). These methods will facilitate the characterization of both resilience and sustainability by addressing multi-infrastructure, multi-physics, multi-scale (spatial, temporal), and multi-resource phenomena that impact the likelihood of these systems failing to achieve acceptable resilience and sustainability, as well as the associated consequences. The setting selected to develop these methods is the California Sacramento Delta focusing primarily on the following four critical infrastructure services, as well as interfaces with other critical infrastructure sectors as necessary:

- Water Supply – Includes water supply system for agriculture, commercial/industry, government, and the public. Issues of importance include supply, conveyance, and quality (*note: wastewater is part of this, but not addressed here*);
- Flood Protection – Includes the structural elements (levees, floodwalls, flood gates, dams, diversion channels, storm drain systems) as well as the natural rivers corridors, subsidence, settlement & consolidation, and hydrologic hazards (rain storms, snow melt) that inundate low lying areas and floodplains;
- Power Supply – Elements of the electrical power grid that supply electricity to agricultural, commercial/industrial, government and the public; and
- Ecosystem – Physical and biological components of the environment. Physical attributes include habitat areas, soil substrates, water supply and quality. Biological considerations include flora and fauna.

The California Sacramento Delta 3ICIS is a very complex highly interactive 'legacy' system embedded in similarly complex natural environmental and social - political systems. It is of critical importance directly for the population and environment of the State of California and indirectly for the rest of the United States.

The goals of this research project are to develop the following Quality Management Assessment System Process (QMAS):

1. System Definition and Conceptualization
2. Domain Expert / Key Informant Assessment Team Identification and Formation
3. Identification of the key vulnerabilities or chokepoints (aka Factors of Concern)
4. Failure Scenario Development
5. Detailed Qualitative and Quantitative Risk Assessment and Management that accounts for 3ICIS spatial variability, temporal variability (historical, current, future), and non-linearity (SYRAS++)

This research will answer the following fundamental questions:

1. What are the major drivers that threaten Resilience & Sustainability (current, future)?
2. What is the current Resilience & Sustainability state of the 3ICIS?
3. What future Resiliency & Sustainability states are expected given the status quo persists?
4. What are the potential consequences/impacts associated with future Resiliency & Sustainability states given the status quo persists?
5. What adaptation and mitigation strategies can be employed to create an "acceptable" Resilient & Sustainable 3ICIS?

2008 Midwest Levee Failure Investigation: Dr. Storesund was the lead researcher for this National Science Foundation sponsored collaborative research investigation between UC Berkeley, Texas A&M University, and the Missouri University of Science and Technology. The research was an immediate effort to collect sensitive and time-dependent perishable data will comprehensively characterize select levee failure locations to provide essential levee characterization and performance data for use in subsequent numerical analyses. The levee characterization consisted of:

1. An initial field reconnaissance to visit known breach sites along the Mississippi River between St. Louis, MO and Davenport, IA to document (via photographs) site conditions, collect eyewitness accounts, and develop a list for detailed site-specific analyses;

2. Conducting high-detail laser imaging survey (Terrestrial LiDAR) of breach and erosion/scour features in the levees. These surveys will be used to validate future numerical simulations that predict the final scour/erosion profile for specified overtopping conditions;

3. Characterization of the vegetative/grass cover on the earthen levee side slopes to determine erosion-resistance provided. This levee characteristic is <u>frequently</u> omitted from field characterization studies, yet is very important in the performance of the levee during overtopping conditions;

4. Characterization of the levee soil materials, including the United States Soil Classification (USCS) soil types, plasticity (Atterberg Limits), grain size distribution (sieve sizes), in-situ density, maximum dry density, Erosion Function Apparatus (EFA) erodibility characterization and jet erosion testing; and

5. Documentation of the river stage at the location of the levee failure based on eyewitness accounts as well as available USGS Stream Gage Data. This data is essential to correctly evaluate overtopping depths and durations and associated water velocities on the 'protected side' of the flood protection levee.

The sites investigated include: Brevator (Missouri); Winfield (MO); Cap au Gris (MO); Kings Lake (MO); Norton Woods (MO); Kickapoo (MO); Bryants Creek (MO); Indian Graves (IL); Two Rivers (IA).

National River Restoration Science Synthesis: The National River Restoration Science Synthesis (NRRSS) was a nation-wide effort to characterize the practice of river restoration. It consisted of three phases: synthesis of national and state restoration databases, phone surveys with select river restoration practitioners, and detailed river restoration post-project appraisals within California. Dr. Storesund was active, under the direction of Dr. G. M. Kondolf, and participated in the completion of 40 post project appraisals (PPA) of California river restoration projects. The PPA evaluations consisted of watershed delineations, hydraulic and hydrology characteristics determinations, review of planning and design approaches, review of permit applications, field surveys and performance assessments, and engineering documentation of post-construction performance.

Projects evaluated:

Ackerman Creek Restoration Project	Alameda Creek (Niles Dam Removal)
Alameda Creek (Sunol Dam Removal)	Alamo Creek (Main Branch)
Alamo Creek (East Branch) Project	Arroyo de la Laguna Bank Stabilization
Arroyo Mocho	Arroyo Viejo Creek Restoration
Baxter Creek (Booker T. Anderson)	Baxter Creek (Gateway)
Baxter Creek (Pointsett Park)	Bear Creek Restoration Project
Blackberry Creek (Thousand Oaks)	Brandy Creek (A-Frame Dam Removal)
Carmel River at deDampierre	Carmel River at Schulte Road
Castro Valley Creek Restoration	Cerrito Creek (El Cerrito Plaza)
Chorro Flats Enhancement Project	Clarks Creek
Clear Creek (McCormic Dam Removal)	Cold Creek
Crocker Creek Dam Removal	Cuneo Creek Restoration
Green Valley Creek	Lower Guadalupe River Reach B
Lower Ritchie Creek Dam Removal	Lower Silver Creek Reach I
Martin Canyon Creek	Miller Creek
Redwood Creek	Sausal Creek Restoration Project
Strawberry Creek	Tassajara Creek
Tennessee Hollow (Thompson Reach)	Uvas Creek Restoration
Village Creek (UC Berkeley)	Wildcat Creek at Alvarado Park
Wildcat Creek Flood Control Channel	Wilder Creek Restoration Project

More information on the NRRSS study and these specific PPA evaluations can

PROFESSIONAL AFFILIATIONS:

ASCE Leadership and Management Committee
Chair 2010 - 2012
Corresponding Member 2003 – 2009
ASCE San Francisco Section
Past President 2012-2013
President 2011-2012
President Elect 2010-2011
Vice President 2009 - 2010
American Society of Civil Engineers: San Francisco Section YMF President 2003-2004
ASCE San Francisco Section Water Resources Group
Director 2009 -2011
ASCE San Francisco Section Geotechnical Society Steering Committee
ASCE San Francisco Section Infrastructure Report Card Committee
ASCE GEO-Institute
National Academy of Forensic Engineers
National Society of Professional Engineers
California Society of Professional Engineers
UC Berkeley Geotechnical Engineering Society
UC Berkeley Engineering Alumni Society

AWARDS:

Eagle Scout, Troop 27, Eureka, California (1992)

Outstanding YMF Civil Engineer (2004) San Francisco Section ASCE

Outstanding YMF Civil Engineer in the Private Sector (2008) Western Regional Younger Member Council, ASCE

Outstanding ASCE Younger Member Forum Officer, ASCE Region 9 (2009)

President's Award, San Francisco Section ASCE (2012)

H.J. Brunnier Award, San Francisco Section ASCE (2013)

ASCE Edmund Friedman Young Engineer Award for Professional Achievement (2013)

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December 11, 2016

SF Board of Supervisors
San Francisco City Hall
1 Dr Carlton B Goodlett Pl #244
San Francisco, CA 94102

Subject: Impact to PG&E Transmission Line 109
3516 & 3526 Folsom Street
San Francisco, California

Dear President Breed and Honorable Members of the Board of Supervisors,

This letter is in response to a request for an independent assessment of potential damage to the PG&E Transmission Line 109 associated with construction activities of the proposed 3516 & 3526 Folsom Street development. I am a practicing Geotechnical Engineer (CA License Number 2855), I provide gas pipeline risk reviews for the State of California Department of Education, and have participated in forensic engineering projects over the last 10 years with damage claims in excess of $2 billion and more than 8,000 hour of direct forensic analyses. My most recent engagement was a geotechnical forensic evaluation of the March 2014 Oso Landslide in Washington State, which resulted in the tragic loss of 43 individuals. In addition to private consulting, I am the Executive Director of the Center for Catastrophic Risk Management at UC Berkeley.

This geotechnical review is the requested independent assessment and is based on documents included in the Discretionary Review, Full Analysis by San Francisco Planning Department (dated October 4, 2016) as well as a set of geotechnical reports prepared by Mr. H. Allen Gruen (dated August 3, 2013). I also reviewed the "Categorical Exemption Appeal" (3516-3526 Folsom Street), prepared by the San Francisco Planning Department (dated December 5, 2016) and "Appeal of CEQA Categorical Exemption Determination," prepared by Mr. Charles Olson (dated December 2, 2106).

I previously prepared a letter dated December 1, 2016 that presented my initial review of the proposed project, with respect to potential construction impacts to the PG&E Transmission Line.

Based on the facts associated with the proposed development, it is my expert opinion that a reasonable possibility of a significant effect exists with respect to degradation of the Transmission Line integrity as a result of the required rock excavation to achieve the delineated site grades shown in the project plans.

<u>Fact 1:</u> The proposed developments anticipate excavations on the order of 8-10 feet below grade. (see sheet A-3 from 3516 Folsom Street drawings).

<u>Fact 2</u>: Geotechnical soil borings performed at the site show the presence of chert bedrock at a depth of 3 to 5 feet below grade. See geotechnical reports prepared by Mr. H. Allen Gruen (dated August 3, 2013).

<u>Fact 2</u>: The geotechnical soil borings encountered 'refusal' at a depth of 3 to 5 feet. The borings were not advanced to the target depth of the proposed excavation. Typical geotechnical field exploration programs advance borings past the anticipated depth of structure foundations. This demonstrates that the ground conditions are hard bedrock and not softer soil subsurface conditions.

From 3516 Folsom Geotechnical Report (page 6):

"Bedrock was encountered in our borings at a depth of about 3 to 4 feet below the ground surface. We anticipate that excavations in the upper portion of bedrock at the site can be conducted with conventional equipment, although localized ripping may be required. Excavations extending deeper into the bedrock may require extra effort, such as heavy ripping, hoe-rams, or jack-hammering. We anticipated that the bedrock will become harder and more massive with increasing depth."

<u>Fact 3:</u> Bedrock excavations require heavy excavation equipment or rock blasting. These bedrock excavation techniques result in higher peak ground velocities than conventional soil excavation. Higher peak ground velocities result in increased fatigue on pipelines. Increased fatigue degrades pipeline integrity and results in premature failure of pipelines.

<u>Fact 4</u>: Stress concentrations occur at pipeline elbows. Elbows are located on PG&E Transmission Line 109 as the pipeline goes from a north-south alignment up Folsom Street, to an east-west alignment along Bernal Heights Boulevard. This pipeline bend is immediately adjacent to the proposed construction activity and is susceptible to fatigue-induced failure. (See Figure 1 on page 4 of the San Francisco Planning Department's Certificate of Determination, Exemption from Environmental Review, dated July 8, 2016).

<u>Fact 5</u>: PG&E has not 'cleared' the proposed rock excavation work associated with the development. PG&E is the only organization in a position to analyze the additional fatigue expected to be exerted on the pipeline from the bedrock excavation activity and <u>certify</u> that no appreciable degradation will occur. This pipeline has the potential to catastrophically fail and result in deaths within the blast radius of the pipeline.

To date, PG&E has only said the proposed construction activity would "present no particular issues with respect to patrolling and maintaining the pipeline." (Source: last paragraph, page 4, San Francisco Planning Department's Certificate of Determination, Exemption from Environmental Review, dated July 8, 2016). Being able to patrol a pipeline is very different from monitoring the integrity and time to failure of a major transmission pipeline.

PG&E has stated that "PG&E patrols its gas transmission pipeline at least quarterly to look for indicators of missing pipeline markers, construction activity and other factors that may threaten the pipeline. Line 109 through the neighborhood was last patrolled in May 2014 and everything was found to be normal." (source: Austin Sharp Q&A, Question 8).

Note that this does not address pipeline integrity and additional fatigue to the pipeline as a result of the proposed excavation in bedrock to construct these projects.

Further, PG&E notes that there are three integrity assessments. An in-line inspection allows for identification of metal loss or geometric abnormalities. Direct excavation allows for visual observation of the pipeline. Pressure testing allows for confirmation that the pipeline can sustain prescribed pressure levels. While PG&E has performed evaluations to ascertain corrosion, this is not representative of the full integrity of the pipeline.

Thus, the unusual circumstance warranting more thorough environmental review is the proposed excavation into bedrock, resulting in enhanced ground velocities resulting in additional fatigue on the PG&E transmission line, which has the possibility to fail catastrophically. The actual integrity of Line 109 has not been characterized by PG&E, nor has the useful serviceable life been established. Based on this setting and the associated uncertainties with respect to actual pipeline integrity, it is my expert opinion that a reasonable possibility of a significant effect exists.

No payments for services have been received and no future promises of compensation have been offered.

I reserve the right to update my independent review based on new information.

Please contact me with any questions or comments by phone at (510) 225-5389 or via email at rune@storesundconsulting.com.

REGISTERED PROFESSIONAL ENGINEER
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6/30/17
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STATE OF CALIFORNIA

Sincerely,

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Consulting Engineer

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June 5, 2017

SF Board of Supervisors
San Francisco City Hall
1 Dr Carlton B Goodlett Pl #244
San Francisco, CA 94102

Subject: Independent Project Review
3516 & 3526 Folsom Street
San Francisco, California

Dear President Breed and Honorable Members of the Board of Supervisors,

This letter is in response to additional evaluations performed with regards to potential construction-induced degradation of the integrity and safety of PG&E's natural gas Line 109. I reviewed a memorandum prepared by Illingworth & Rodkin, Inc. (dated March 24, 2017), a letter prepared by Illingworth & Rodkin, Inc. (dated April 14, 2017), and a letter prepared by Mr. John Dolcini of Pacific Gas and Electric Company dated March 30, 2017.

In previous letters, I noted that construction-related stressing, as well as accidental 3rd party damage, has the potential to degrade the integrity of the PG&E natural gas transmission line, exposing the surrounding neighbors to increased risk of death and injury from the potential of construction-induced puncture or degradation of pipeline integrity.

As noted earlier, unlike lots further west and further east (Gates Street, Banks Street) that are not immediately adjacent to a transmission line, these specific parcels are unique in their proximity to a significant hazard. As a result of the increased risk exposure, this site should receive more scrutiny.

I raised the concern about impact to pipeline integrity. While a discussion was presented by Illingworth & Rodkin, Inc. about anticipated Peak Particle Velocities (PPVs), there was no explicit analysis of actual impact to the pipeline integrity. Illingworth & Rodkin, Inc. infer in their analyses that typical PPV thresholds apply to Line 109. However, there are a number of site-specific factors that make this site unique that do not appear to have been accounted for in the analyses. For example, the pipeline is situated on an incline with a 90-degree bend at the top of the hill. Most conventional pipelines are horizontal in utility trenches on much flatter ground. Ground vibrations will have a different extensional effect on an inclined pipe than a horizontal pipe. The only reliable method to ascertain the impact of these simplifications and generalizations is to calculate pipeline integrity model bias (comparison of predicted value vs actual value). No model bias value for this site was presented.

Mr. Dolcini's letter actually illustrates that PG&E's requirement of a minimum of 36 inches of soil cover is very likely violated at this location, with a PG&E-estimated 24 inches of soil cover. This 'discovery' would only have occurred through our strong suggestion that PG&E certify the integrity of the pipeline. It would not be surprising if a site-specific assessment will find additional deviations to be discovered that reveal a lower actual pipeline integrity vs an assumed pipeline integrity.

PG&E is the only organization in a position to analyze the additional fatigue expected to be exerted on the pipeline from the bedrock excavation activity and <u>certify</u> that no appreciable degradation will occur. This pipeline has the potential to catastrophically fail and result in deaths within the blast radius of the pipeline. To date, no such certification has been provided by PG&E.

Based on the facts and new analyses associated with the proposed development, it is my expert opinion that a reasonable possibility of a significant effect still exists with respect to degradation of the Transmission Line integrity as a result of the required rock excavation to achieve the delineated site grades shown in the project plans.

Given the uncertainties of actual pipe integrity, strong consideration should be given to replacing the segment of pipeline to ensure maximum integrity and minimal exposure of residents to undue injury or death as a result of the anticipated heavy excavation and ground disturbance activities.

My qualifications are presented in the attached resume. I am a practicing Geotechnical Engineer (CA License Number 2855), I provide gas pipeline risk reviews for the State of California Department of Education, and have participated in forensic engineering projects over the last 10 years with damage claims in excess of $2 billion and more than 8,000 hour of direct forensic analyses. My most recent engagement was a geotechnical forensic evaluation of the March 2014 Oso Landslide in Washington State, which resulted in the tragic loss of 43 individuals. In addition to private consulting, I am the Executive Director of the Center for Catastrophic Risk Management at UC Berkeley.

No payments for services have been received and no future promises of compensation have been offered.

I reserve the right to update my independent review based on new information.

Please contact me with any questions or comments by phone at (510) 225-5389 or via email at rune@storesundconsulting.com.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER
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Consulting Engineer

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June 14, 2017

SF Board of Supervisors
San Francisco City Hall
1 Dr Carlton B Goodlett Pl #244
San Francisco, CA 94102

Subject: Review of Proposed Pipeline Impacts
3516 & 3526 Folsom Street
San Francisco, California

Dear President Breed and Honorable Members of the Board of Supervisors,

I have reviewed the analyses upon which the proposed mitigation options[1] relative to PG&E's natural gas Line 109 (the "Transmission Line") have been generated. In my opinion, the analyses are inadequate, incomplete, and fall short of a rigorous evaluation of pipeline integrity and assurance of public safety given the potential harm as a result of rupture and ignition of natural gas from this transmission pipeline. As a result, a reasonable possibility of a significant effect still exists with respect to degradation of the Transmission Line integrity and the adequacy and feasibility of the proposed mitigation actions are very much in question.

While an assessment of a potential suite of ground velocities has been completed, no direct assessment of pipeline integrity impacts have been evaluated. The analyses presented associated with this negative declaration are indirect. The current analysis infers that peak particle velocities (PPV) below a certain threshold will not degrade pipeline integrity. Inference is not equivalent to a data-driven validated relationship by PG&E that explicitly establishes a direct correlation between peak particle velocity and degradation of pipeline integrity.

The American Society of Mechanical Engineers (ASME) has a standard (ASME B31.8S) that presents guidance on evaluation of gas pipeline integrity[2]. A multitude of factors that impact pipeline integrity are presented in this document. These factors include: pipe wall thickness, diameter, seam type and joint factor, year of installation, bending method, joining method and process of inspection, depth of cover, field coating methods, soil backfill, cathodic protection, coating type, nominal maximum and minimum operating pressures, leak/failure history, pipe wall temperature, OD/ID corrosion monitoring, pressure fluctuations, encroachments, vandalism, and external forces. It is unclear that all of these factors are fully accounted for in the PPV-Integrity relationship proposed by PG&E.

Further, ASME B31.8S recommends that validation of any assessment process is vital. "Validation of risk analysis results is one of the most important steps in any assessment process. This shall be done to assure that the methods used have produced results that are usable and are consistent with the operator's and industry's experience…A risk validation and process shall be identified and documented in the integrity and management program. Risk result validations can be

[1] San Francisco Planning Department, Mitigated Negative Declaration (April 19, 2017; amended June 8, 2017)
[2] ASME B31.8S-2004 "Managing System Integrity of Gas Pipelines"

successfully performed by conducting inspections, examinations, and evaluations at locations that are indicated as either high risk or low risk to determine if methods are correctly characterizing the risks." No such validation has been provided or referenced.

Based on the facts and new analyses associated with the proposed development, it is my expert opinion that a reasonable possibility of a significant effect still exists with respect to degradation of the Transmission Line integrity.

Given the uncertainties of actual pipe integrity, strong consideration should be given to replacing the segment of pipeline to ensure maximum integrity and minimal exposure of residents to potential undue injury or death as a result of the anticipated heavy excavation and ground disturbance activities.

No payments for services have been received and no future promises of compensation have been offered.

I reserve the right to update my independent review based on new information.

Please contact me with any questions or comments by phone at (510) 225-5389 or via email at rune@storesundconsulting.com.

REGISTERED PROFESSIONAL ENGINEER
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Sincerely,

STORESUND CONSULTING

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Consulting Engineer

UC Berkeley Center for Catastrophic Risk Management
Executive Director

UNACCEPTABLE EXTENSION
FOLSOM STREET, PROTRACTED IN 1861
STRUCTURE ON 40.3% GRADIENT SLOPE
UPON LARGE GAS LINE IN LANDSLIDE AREA
BERNAL HEIGHTS, SAN FRANCISCO
ENVIRONMENTAL IMPACT REPORT REQUIRED

LAWRENCE B. KARP CONSULTING ENGINEER

UNACCEPTABLE EXTENSION
FOLSOM STREET, PROTRACTED IN 1861
STRUCTURE ON 40.3% GRADIENT SLOPE
UPON LARGE GAS LINE IN LANDSLIDE AREA
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ENVIRONMENTAL IMPACT REPORT REQUIRED

LAWRENCE B. KARP
CONSULTING GEOTECHNICAL ENGINEER

FOUNDATIONS, WALLS, PILES
UNDERPINNING, TIEBACKS
DEEP RETAINED EXCAVATIONS
SHORING & BULKHEADS
EARTHWORK & SLOPES
CAISSONS, COFFERDAMS
COASTAL & MARINE STRUCTURES

SOIL MECHANICS, GEOLOGY
GROUNDWATER HYDROLOGY
CONCRETE TECHNOLOGY

September 12, 2017

London Breed, President
C&CSF Board of Supervisors
City Hall, Room 244
San Francisco, CA 94102

Subject: Unacceptable Extension of 1861 Protracted Folsom Street, Bernal Heights
Structure on 40.3% Gradient Slope Upon Large Gas Pipeline in Landslide Area
Environmental Impact Report Required

Dear President Breed and Members of the Board:

This report presents facts and a summary evaluation of them and results of field observations and civil engineering with review of documents that have been submitted to the Board pro and con for appeal of the Planning Department's (SFPD) proposed Mitigated Negative Declaration of Environmental Impact (MND) of 6/8/17. As this document is essentially the same as SFPD's CatEx Determination on 7/8/16 deciding to grant a CEQA Categorical Exemption (14 Cal Code Regs §15315) to the sponsor of the subject project, this report incorporates discussion and evidence of the same deficiencies and potential environmental impact that appeared in the CatEx Determination which cannot be remedied by the proposed meager mitigation.

I. Introduction

SFPD's defense of the community's appeal of the CatEx Determination was scrapped by SFPD on 1/24/17, minutes before the most recent rescheduled hearing. As with the CatEx Determination, there has been virtually no relevant and competent technical analysis, engineering, or environmental data submitted for the proposed installation of a permanent concrete structure that will be exercised producing daily vibrations to service six (6) building sites on top of and over an aging major gas pipeline (26 inch diameter) to create a street on a slope with a gradient of 40.3%, contrary to the SFPD's determination, unsubstantiated, at page 1 paragraph 1, of a 28% slope gradient and repeated, again unsubstantiated, at page 1 paragraph 1 of the MND. Very recently, without explanation, SFPD changed the slope to 32%. (SFPD 2017*b*) which is still incorrect. With good reason, this segment of Folsom Street, paper since 1861, has never been developed.

The project area, which includes the pipeline, is also below a mapped landslide area which existence has been denied by the Planning Department even though the map they publish as a guide for CatEx Determinations shows landsliding in Bernal Heights. A field trip by staff could not have missed the steep failing slope along Bernal Heights Boulevard directly above the project site, which project includes excavation, grading, and construction of a concrete roadway 145 feet long by 25 feet wide by 10 inches thick over the 26 year old longitudinally welded steel gas pipeline where the Planning Department has never required the developer to provide geotechnical data for existing bedding under and backfill around the pipe.

This report is based on evidence contained in the records of San Francisco's City Planning Department that has been either ignored, misinterpreted, or misunderstood. The record, considered in its entirety, contains substantial evidence to support a fair argument that the project may have a significant effect on the environment that has not been avoided or will be mitigated to a less than significant level by project modifications or proposed mitigation measures.

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II. The Westover Survey Has Gradient for a Developed Folsom Street Extension at 40+%

The 6/20/13 Westover survey is not on the list of references in any of the Gruen reports. Gruen's 6/28/13 logs show no elevations but instead in the box for that information a note "*ground surface" appears rather than any topographical identification, with site plan of the lots and streets shown as being level. Gruen's house report (Attachment E) is backdated to few days before 8/15/13 when SFDBI first officially published the minimum requirements for geotechnical reports (revised in 2015 and 2017). In any event, SFPD's "Determination of Categorical Exemption", on 7/8/16, which replaced an earlier Determination that was rescinded, was fatally flawed because of SFPD's failure to recognize (and properly consider) the actual steepness of the project's slope (40+% not 28%), failure to recognize (and properly consider) that absolutely no relevant geotechnical engineering information was secured for the project, and failure to recognize (and properly consider) the environmental consequences associated with the geotechnic mapping pertinent to the project site, and the street section described in the MND (SFPD 2017*a*, last Bullet, pg 56).

Coupled with the failure to secure a proper investigation of the project site, instead of causing the developer to address well known site specific data and maps produced by both the State and City/County agencies, such as California's 2001 "Seismic Mapping Act - Zones of Areas of Potential Liquefaction and Earthquake-Induced Landslides map of San Francisco (which shows the project site is located on a very steep slope below active landsliding) and San Francisco's 2008 Slope Protection Act which includes URS/Blume's map "Landslide Locations-San Francisco Seismic Safety Investigation-Geologic Evaluation"; "Figure 4", which although old, is a wall poster at the SFDBI, showing the project site in the middle of the instabilities mapped for Bernal Heights (end of Attachment F). Regardless of the dickering this year about what is supposed to be or what will be in any current slope protection map that may or may not be required to be followed, to a practicing geotechnical engineer all information must be considered so these maps are valuable as they will lead to further investigation. For those that argue that there is no official SPA in effect at this instant so no consideration of slope protection is necessary, SFDBI engineers and design professionals who work in San Francisco are aware that posted on the wall at the 2nd floor Plan Review Station of SFDBI as information for everyone are color enlargements of both the 1974 URS/Blume and the 2008 Seismic Hazard maps and they are both noted in the C&CSF "Geotechnical Report Requirements (beginning of Attachment F).

III. There is No Mitigation Possible for a 40+% Gradient Slope

SFPD adopted developer's distracting argument that house building can be mitigated to lessen transient vibrations from excavations for the houses, a minor problem compared to tons of concrete for the street, and its foundations required by the steep slope, which will generate vibrations from exercising the street by 12 daily trips according to SFPD (minimum). First, SFPD lacks the civil engineering expertise to determine that slope, normal to contour lines shown on the topographical map that was produced by the developer's land surveyor (Daniel Westover, LS 7779), is 40.3% (**Attachment A**). Second, in not recognizing the real problem of low cycle fatigue of the pipeline's weld metal at the longitudinal weld lines from constant vibrations in service transmitted to L-109 by the intended subgrade supported concrete structure (which is not allowed by PG&E), SFPD failed in their Initial Study to properly classify the potential environmental problem as significant as that determination would have led to an EIR which is what SFPD strives to avoid.

IV. Concrete Structure is Prohibited by PG&E & Street Cannot Meet SFDPW Standards

Conveniently, the developer has not submitted engineered plans to PG&E for approval and SFPD's MND conflicts with the plans (Franco 2016). The MND states "*For the street extension, top soil up to as much as 12 inches will be removed, and a cement concrete road surface with a thickness of 8 to 10 inches would be installed.*" (SFPD 2017*a*, bullet at bottom of page 56.) Grading and soil removal described in the MND would erase the "existing" cover over the pipeline thereby triggering the minimum three foot pipeline cover requirement which cannot be accomplished with existing L-109.

As the pipeline has been described by the following text: "*Current records ... depth of cover could be as shallow as 24 inches*" (PG&E 2017, Item 2), pipeline replacement would be required. There is no way to reduce the natural slope gradient without retaining walls crossing the pipeline. The gradient requires, for the street specified by City Planning to be 10 inches thick, a reinforced concrete section with foundations or keyways in Franciscan rock placed under the concrete upon the existing pipeline, which would mean hard transmission of daily vibrations to the pipeline caused by vehicles. Not discussed herein are the civil engineering plans (Franco 2016) as they specify asphalt pavement over aggregate base and show a retaining wall interfering with the pipeline. Structure over L-109 in the MND (even for the false gradient published by City Planning) is prohibited under PG&E regulations (PG&E 2017, Item 6).

The MND's emphasis is for "two residential building permit applications" dismissing the rest of the project, but a garage/off-street parking places is required for each residence. This requirement can only be satisfied by vehicular access to garages at each of the two houses (and the additional four houses if the street is approved by the Board of Supervisors by denying the appeal). The hook is that if the project is approved at this stage SFDPW will have a difficult task refusing to permit the project and it is unknown if PG&E will waive their rule about no structure within 10 feet of their pipeline as well as the total elimination of effective (but vital) inspections of leaks, corrosion, and cathodic protection by the installation of 227 tons of concrete not including foundations. Rightfully, after the 2010 San Bruno disaster, PG&E must require an EIR before waiving safety requirements.

In 1981 PG&E placed their L-109 pipeline in their right-of-way in very steep paper street protracted in 1861 because it was never expected to be an actual street as SFDPW has always disallowed this segment of Folsom Street. Nor should it be approved or accepted now by SFDPW (Order 183447, 3/24/15) as City streets are limited to 17% gradient, fire truck access is limited to 14% gradients, and dead end street widths need to be increased to 60 feet (**Attachment B**).

However, the developer, for this project, is attempting an end run around both SFDPW and PG&E by emphasizing the residences are all that matter at this time which kicks whatever PG&E and SFDPW require down the road, which is grossly improper under all of CEQA: "*All phases must be considered.*" (14 Cal Code Regs §15126). SFPD failed to submit and require for written comments from SFDPW and PG&E. This matter is environmentally sensitive to the community so unverified discussions by telephone or e-mail about intentions that only concern "*grading work*" (PG&E 2017, paragraph 1 line 1) which are not otherwise supported by approved engineering plans and specifications relevant to the MND, for the intended structures to be placed upon the pipeline, are insufficient to facilitate project approval by the Board of Supervisors. Review for compliance with PG&E Utility Standard TD-44905 "Gas Pipeline Rights-of-Way Management" would be a minimum requirement for the utility which would have to include characterizing the bedding and backfill for volume change by densification when loaded, exercised by the street, and shaking of concrete during an earthquake, and subdrainage. An EIR is necessary to properly investigate the project's environmental effects and inform the public.

V. PG&E Has Not Evaluated and Approved the Project

CEQA requires "Mitigation measures must be fully enforceable through permit conditions, agreements or other legal binding instruments (14 CCR §15126.4). In order for vehicles to access the two car garages for each house shown on the architectural plans for the buildings (SFPD 2016*b*) the vehicles would have to cross the near surface 26 inch diameter L-109 is planned to be covered with a 227 ton concrete structure not including foundations. Although the City Planning states that PG&E "has evaluated the proposed project" (SFPD 2017c) that is not true. Snippets of hearsay from the developer and purported telephone conversations by persons at the Planning Department about a single subject, vibrations due to house building, do not in any way constitute a proper evaluation of significant environmental effects for the full project which is required by Initial Study.

A list of questions were posed and answers were provided on 5/28/14 by PG&E employee Austin Sharp; however he declined to locate the pipeline and did not know its depth, and noted that regular inspections for leaks and levels of cathodic protection are regularly performed. He was not informed about the project's street construction which would eliminate the inspections he said must regularly occur. But there is no evidence that Mr. Sharp or anyone at PG&E he had consulted with knew about the steepness of the slope or anything about the project because with his e-mail he provided the questioner with a proprietary image "L109_Folsom_Street.pdf" (not in the record) as well as answers that all show a lack of significant knowledge about the project (**Attachment C**). The proprietary aerial image depicts the path of the pipeline but shows the project site (by boxing addresses 3516 and 3526 Folsom Street) far to the east and outside the path of the pipeline instead of west and over the pipeline which is the actual location of the project. The image is noted to be a PG&E's to be operated only by PG&E personnel. What this means is that neither Mr. Sharp nor apparently anyone else at PG&E knew the simple facts, steepness and location of the project and with that there is no record of site visits or review of documents which preclude proper "evaluation".

Genuine evaluation of the project would include engineering by PG&E's licensed professionals that would occur in a full investigation of the entire project including the concrete street and foundations for the concrete to be placed on a 40+% grade directly over the pipeline by PG&E, how welds and leaks and corrosion can be monitored, and how vibrations from in-service exercising of the street will affect the 26 year old pipeline. The research and investigation must culminate in a dated and signed report for the public to review and comment. Asking PG&E for such evaluation has been carefully avoided by the project sponsor and the agency, who have both to date supplied only innuendo.

VI. Vibrations: Minor Transient in MND, Major in Service for Project

Taking direction from the developer, who hired an acoustical and air quality company (not licensed architects or engineers) appropriate for remodel of a symphony hall, to opine in what have been purported to be engineering reports called "Memos", they concluded that excavations for building the residences will not produce significant vibrations that will affect the 26 inch diameter, 26 year old, welded steel gas pipeline (Illingworth & Rodkin 2017*a,b*). In California, engineering documents must be stamped and signed by licensed professional engineers (B&P Code §6735.1).

The reports use irrelevant data from New Hampshire and Hawaii to estimate the propagation of peak particle velocity (PPV) from assumed house building construction in the Franciscan formation of San Francisco and then made mathematical calculations to impress the City's Planning Department. To fit theoretical mathematical equations, the writers make compound assumptions about geotechnic conditions that have no basis in fact and simultaneously ignored the street construction specified by City Planning along with certain activity over the coming years. These types of postulations, which are prepared to make a case which the preparers are hired to make and serve no useful purpose, are known to qualified engineers as "junk science".

The Illingsworth & Rodkin memos reported an *"evaluation...of the potential for vibration levels from the residential building construction project at 3516 and 3526 Folsom Street of effecting a buried P&E gas line..."*. There is nothing about the massive concrete street construction and constant use of the street for the project that will be upon L-109 which cannot be accessed for inspections and repairs. The memos concern transient motions for building houses, not vibrations generated by in service vibrations constantly generated by 12+ trips per day for vehicles to and from the ultimate 6 houses, which do not include delivery trucks. Due to difficult access from the street to the garages vehicles have to be parked in tandem, which requires for use of a vehicle that is blocked by another one, one has to be driven into the street to allow the other exit or enter. That means at least 50% more transits over the new street.

There is no indication the depth of the pipeline at any point (which PG&E's estimates is less than 24 inches which would be reduced to less than 14 inches clearance between the top of the pipe and the bottom of the concrete street after 10 inches of soil removal and concrete construction noted in the MND). There are no reasons given why the "potholing" PG&E has suggested to locate the pipe has not been performed by Gruen which could have been done if the bedding and backfill to the pipe had been evaluated, a minimum requirement to evaluate the street phase of the project. There is no acknowledgment that the only construction PG&E has written about for the project is "grading work" with no review by PG&E of engineering plans and no written approval for the project. There is no mention that the referenced "soils" report shows a level project site and the fact that the characteristics of the bedding and backfill for the pipeline, which have failed before (**Attachment D**), are deliberately unknown. There is no understanding demonstrated by City Planning that the planned 227 tons of concrete used to build the street on a 40+% gradient cannot stand alone by friction so the concrete mass must have buttressing and anchoring foundations for the street or it will slide. And what will the construction vibrations from excavating into rock for the foundations for the street have on the pipeline even before the street is put into service? And of course how can the pipeline be inspected under the concrete for cracks and leaks, and level of cathodic protection?

VII. City Planning Accepted Obviously Superficial and Defective "Soils Reports"

SFPD failed, apparently because of undue influence or ignorance, to request and secure the most fundamental technical information necessary to properly assess the geotechnical aspects of the project. Where a proper report of geotechnical engineering investigation would absolutely be required for any excavation and grading project where there will be excavations ("up to 10 feet") into a very steep slope (for obvious reasons, since 1861 no street was actually constructed) below identified landslides, SFPD first turned to an extra shoddy boilerplate "soils report" produced in duplicate by Gruen on 8/3/13 and then unbelievably gave credence to an 11/29/16 "update" where Gruen's surrogage misstated the houses as being on one lot, and then being confident in stating nothing was done concerning the [street portion] of the project ("No other project details are known at this time"). Then, more paper, incomplete and substandard, was generated (group **Attachment E**).

These "reports", written for the the proposed houses (duplicates), showed miserable site plans for non-existent level lots in a level project area, and they contain absolutely no information about the project site which has to include, as there are garages shown on the plans, the proposed extension of Folsom Street including the near-surface pipeline, intended grading, and street construction which requires foundations. The proposed improvement of Folsom Street that was before SFPD has clear potential environmental impact, which would have been obvious to qualified design professionals.

Subsequent to the original report(s) for both new houses, which do not meet minimum standards for such reports, someone using the engineer's stamp (apparently to avoid liability for the stamp holder) produced more worthless documents. On 11/29/16 the developer submitted a "Geotechnical Report Update" for the houses (3516 and 3526 Folsom Street), reports that were improperly written with several short paragraphs, and signed by a Gruen surrogate (in violation of B&P Code §6735.1). The first stated the letter presented "*....an update of my geotechnical investigation for the proposed residence [sic] at 3516 and 3526 Folsom Street ....*" and under a paragraph titled "**Proposed Project**", "*It is my understanding that the project will consist of the design and construction of a new residence* [sic] *on an undeveloped lot* [sic]. *No other project details are known at this time.*"

The City adheres to constantly revised but strict geotechnical report requirements (e.g **Attachment F**) which were ignored (the 2015 version referenced the 1974 URS/Blume map per the Slope Protection Act (SPA), C&CSF 2008); the early 2017 version references the local 2000 Seismic Hazard Zones map.

Whether or not there is an exact SPA technically in effect exactly at this time is immaterial; the intent and data exists and it is important to consider by all geotechnical engineers. In SFPD's CatEx Determination and the MND, Gruen's papers were referenced without regard to the fact that nothing serious about the project was in them but should have been because the City's report requirements stress slope and grading information (as do all versions of the SPA). Nevertheless SFPD stated in their determination and MND that the project site was investigated when it was not. It is incomprehensible why SFPD took the Gruen papers without question. First, two new houses on two level lots, and second, two houses on one lot in the update, are not legitimate geotechnical documents pertaining to the grading of a slope having 40+% gradient over and on top of a large diameter gas pipeline in a landslide area. However, in the "update" it was admitted engineering about the project was unknown, which effectively voided the CatEx. For the purpose of CEQA (here the MND) the reports are superficial and defective.

In SFPD's CatEx Determination, nobody licensed as a design professional, gave as references for the Dermination (that there was "no possibility" of environmental impact) the superficial "reports" for houses that do not approach minimum ASCE Standards for site investigations (ASCE 1976) and SFDBI's report requirements which are primarily directed to excavations and grading of slopes and foundations in slopes, and they do not meet standards set forth in the California building codes as adopted tri-annually by C&CSF.

The Gruen house reports do not comply with recognized practice and standard-of-care and competence regulations required for California engineers contained in the Business & Professions Code, and misrepresentation prohibitions for California engineers contained in the California Code of Regulations for development in steep difficult areas let alone those that have large underground natural gas pipelines. Gruen and his surrogates know very little about the project that is the subject of the present appeal. SFPD's reliance in their MND on poor writings by Gruen for two identical houses only vaguely related to the project where vehicular access via an improved Folsom Street is intended by the developer (and also expressed by other lot owners than the project applicant who intend to rely on the project completion to access and develop their lots) reveals that the "Environmental Review Officer" is not qualified in civil and geotechnical engineering.

On 1/24/17, on the day the CatEx appeal hearing was to be heard (cancelled a few minutes before it was about to begin for good reason: "*A categorical exemption cannot be used for an activity where there is a reasonable possibility that the activity will have a significant effect on the environment due to unusual circumstances.)*" [i.e. the gradient and pipeline], 14 Cal Code Regs §15300c. Gruen's surrogate produced another document stamped but not signed by Gruen referring to Gruen in the third person. Here the surrogate (no initials this time) criticized Dr. Rune Storesund, geotechnical engineer and Executive Director of the University of California Berkeley's Center for Catastrophic Risk Management who, aside from that position also happens to provide private consulting for the State of California Department of Education, a truly qualified expert and acting *pro bono* to the community, no less. Gruen's surrogate, in responding to the Storesund reports (Storesund 2016*a,b*) where Storesund questioned the missing geotechnical information concerning the pipeline in the Gruen reports, stated that the information was available for the residences or was "*beyond the scope of our work for the residential development*" and other disclaimers. Gruen's loan of his professional engineering stamp to an unlicensed person is a serious violation of Business &Professions Code §6735.1, and allowing his stamp to aid and abet the Rules of Professional Conduct for engineers (Cal Code Regs §475(c)) is also a cause for discipline by the Board.

Lastly, after SFPD issued their amended MND on 6/8/17, on 7/6/17 Gruen produced a report purportedly about his geotechnical investigation for "planned Street and Utility Improvements" at the project site. The report is yet another incompetent document which City Planning did not question although there was no information asserted that could corroborate their standard denial of there not being any potential significant impact for the project.

On 1/24/17 Gruen's surrogate wrote the portion of the project site that was outside of the houses ("beyond the scope of our work for the residential development") but now, using that excuse again but stating he performed in accordance with his agreement with his assignment by the developer, he still provides no information what his assignment was actually about and he fails completely to confirm what City Planning had written that there will be no potential environmental impact from the project. This is because there will be significant potential environmental impact to the community from the project.

Gruen's 7/6/17 report is merely a reiteration of boiler plate paragraphs immaterial to the issues of the 40+% slope inclination and the near surface gas pipeline under pressure that runs down the middle of the undeveloped, for 156 years, paper Folsom Street, where construction is intended. These are apparently "details" as the report again, as was done on 11/29/16 by a surrogate, states "*No other project details are known at this time.*" The site plan again shows a level project site, the report does not address the extreme steepness of the site, and there is nothing about L-109's depth and ground characteristics such as density and grain size for P-109's bedding or backfill. There are no recommendations for design and construction of the concrete street and its necessary foundations for the 227 tons of concrete proposed to sit on the 40+% grade such as values to be used for friction between the concrete street and the ground, groundwater and subdrainage, and the effect on the pipeline from excavating into the hillside for foundations and long term in-service vibrations transmitted from the concrete street to subgrade from the many daily trips up and down the hillside that City Planning has written about (SFPD 2017*a*) as well as shaking during earthquakes.

VIII. Geotechnic Maps Show Project in a Very Steep Area Subject to Landsliding

As the activity is in a "uniquely sensitive environment" evidenced in this case by the State of California's "Seismic Hazard Zones" map of C&CSF (**Attachment G**) which is now used as the City's standard reference and based in part on that study, no less, is SFPD's own published "CatEx Determination Layers" map showing "Seismic Hazard Zone: Landslide" and "Slopes Over 20%" (**Attachment H**) which clearly apply to the subject project regardless of SFPD's denial in their CatEx determination which ignored mapping even though it is as precise as exists anywhere; the large diameter gas pipeline buried in the steep hillside of protracted Folsom Street where backfill has failed in the past (Attachment D), potential damage covered by expert reports ignored by SFPD that will be excavated and graded; the extreme steepness (Attachment A) of the hillside below an active landslide (40.3% gradient, not the 28% basis that is incorrectly stated (without substantiation) in both SFPD's documents (page 1, paragraph 1). Of all the mapped areas of San Francisco, the most prolific are the maps adopted that regard hazards of activity in areas of steep slopes and landsliding that goes with those steep slopes (e.g. Attachments F, G, H).

The exemption for an activity specifically does not apply if the activity may have an impact on an environmental resource of "*hazardous or critical concern where designated by, precisely mapped, and officially adopted pursuant to law by federal, state, or local agencies.*" 14 Cal Code Regs §15300.2(a). Full environmental review is necessary as CEQA does not allow (Practice Under CEQA §5.57A) an agency to rely on mitigation measures to conclude any project is categorically exempt so what SFPD has done to get around that regulation is to contrive a pathetically inadequate MND.

Locations below landslides are especially meaningful for geotechnical engineers (but not for SFPD) where the landsliding is above steep slopes that are proposed for excavation and grading. Engineers, but in this case planners, recognize the very real potential loss of lateral and subjacent support for land above, and accompanying change in groundwater regime, as being critical. The geotechnical maps are as precise as can exist under mapping standards in California for such engineering in lieu of an environmental review, which is the point of CEQA particularly applicable for the subject project.

IX. The 1861 Protracted Map Without Consideration of Topography Created "Junk Lots"

156 years ago the Bernal Heights area was protracted (on paper, without regard to topography) into 1783 small lots clustered around fictitious street names or extensions of existing streets. With the Subdivision Map Act, enacted by emergency legislation, the state outlawed subdivision by protraction. The paper subdivision, titled "Gift Map 3" (**Attachment I**), included Butler Street now known as Folsom Street. To illustrate the map's actual (never intended) use, the protraction showed 20 lots on the west side of Folsom (Butler) from "Powhatan" northward to "California Street" which indicated paper Folsom Street was to run up over and down the cliffs in Bernal Heights Park!

As the area developed, protracted lots were combined or abandoned leaving only 3 lots developed on the west side of Folsom north of Powhattan up to the end of developed Folsom Street where it turns into Chapman Street. Many of the individual protracted lots were ever built upon with houses nor were they ever intended to be, individually they were often judged near worthless. For instance, years after the assessors map was created, Lots 11 and 12 sold for $4,000 each to the City and Lot 13 (now known as 3516 Folsom, vacant) sold for $4.83. The proposed project, the development of Folsom, is north of the intersection with Chapman.

X. CEQA Prohibits "Piecemeal" Projects Resulting in Cumulative Effects

SFPD's Determination circumvents cumulative and compound evidence of requirements for an environmental review for this project, and presentation of the project (and handling by SFPD) which is obviously a CEQA prohibited "piecemeal" approach, 14 Cal Code §15303(a), to a project that will shortly service six steep hillside lots (admittedly, the record shows that other lot owners have indicated they will develop lots if Folsom Street is constructed) which, after the State's Subdivision Map Act and the SFDPW Subdivision Regulations, could not have been created. SFPD has no qualified staff to opine on the engineering aspects of the project (there are no licensed engineers or even other licensed design professionals such as architects and land surveyors on staff). Licensure, not a fancy in-house title to supplement wages, is evidence of qualification under California's Business & Professions Code.

XI. City Planning Failed to Recognize SFDPW's Need to Protect City's Slope

The lots immediately between the project site (Folsom paper Street) and Bernal Heights Boulevard, which is also directly below the landsliding shown on SFPD's CatEx (and other) maps, are shown in relative detail on the "Property Information Map" issued to the public as property information. For the Gift Map 3 lots combined over the end of Folsom Street, the annotated maps (**Attachment J**) show that all the lots above the project site (not the private lots to the east) are under "SFDPW jurisdiction" and they are noted as having "Slope Protection".

From a civil/geotechnical engineering, and community standpoint, it is imperative that the project is subjected to full environmental review (EIR) to properly inform the public below and lateral to the proposed project concerning the significant potential environmental impacts of the project.

XII. Planning Department Publishes the Map "CatEx Determination Layers"

Furthermore, and demonstrative of their questionable motives which bears repeating, SFPD has amazingly ignored their own detailed map which they generated and titled "CatEx Determination Layers, Printed May 17, 2015 [by] San Francisco Planning Department" (Attachment H). City Planning's own map shows two "Layers" that are allocated to "Seismic Hazard Zones" and "Slopes Over 20%" with the project site located on both steepness and hazard layers (the gradient of the site is 40+% which is double the map's threshold) and the slope's earthquake hazard is mapped directly overhead of the project site.

Incredibly, the SFPD reviewers failed to review their own map which they even made into a poster as noted on the map (and other maps that show "sensitive environment" were also not reviewed or if they were in some degree they were not understood). Even if they did not recognize the environmental hazards associated with excavating below an active landslide or chose to treat the hazards, without technical support, as being insignificant, City Planning's CatEx Determination, now replaced with a Mitigated Negative Declaraton to avoid environmental review is tantamount to making CEQA a nullity.

XIII. Planning Department's Initial Study for MND is Grossly Defective

The finding in City Planning's proposed Mitigated Negative Declaration "The project could not have a significant effect on the environment" (SFPD 2017*a*, (page ii)" is not based on substantial evidence and there is substantial evidence to the contrary in the record. And, the statement "In the independent judgment of the Planning Department, there is no substantial evidence that the project could have a significant effect on the environment", signed by someone for Lisa Gibson on 7/11/17, only means that the Planning Department does not have qualified persons on staff and has not performed a proper Initial Study.

In the Planning Department's "Summary of Environmental Effects" and "Evaluation of Environmental Effects", the following are false answers in the proposed Mitigated Negative Declaration:

Impact 1b (page 25)	Conflicts with PG&E and SFDPW regulations[1] (IV, V above). Box should have been checked for "Potentially Significant Impact"
Impact 4e (page 35)	Creates dead end on 40+% substandard width street w/o turn-around (IV above). Box should have been checked for "Potentially Significant Impact".
Impact 5b (page 44)	Vibrations affecting loading of pipeline[2] (I, III, VI, V above). Box should have been checked for "Potentially Significant Impact".
Impact 13a.ii (page 94)	Seismic shaking of concrete street/fdns will affect pipeline (IV, VII, VIII above) Box should have been checked for "Potentially Significant Impact".
Impact 13a.iv (page 94)	Project is in the vicinity of a landslide area (I, II, VI, VIII, XI, XII above). Box should have been checked for "Potentially Significant Impact".
Impact 13c (page 94)	Project is in the vicinity of off-site landsliding[3] (I, II, VI, VII, VIII, XI, XII above). Box should have been checked for "Potentially Significant Impact".

[1]True: "The proposed project includes the improvement of a currently unimproved 'paper' street segment of Folsom Street" (MND, page 25).

[2]Vibrations from excavating into the hillside for foundations for a concrete street on 40+% grade, loading on pipeline from concrete, and vibrations in service of street from automobile and truck trips will affect large diameter gas pipeline.

[3]False: "The project site and vicinity do not include any hills or cut slopes that could cause or be subject to a landslide." (MND, page 97).

Impact 15a (page 104)	Alteration of ground regime around large gas pipeline (I, II, III, IV, VII above). Box should have been checked for "Potentially Significant Impact".
Impact 15b (page 104)	Concrete structure will block leak/corrosion detection (I, III, IV, V, VI, VII above). Box should have been checked for "Potentially Significant Impact".
Impact 15h (page 104)	Conceal detection of corrosion/leaks may result in fires (I, III, IV, V, VI, VII above). Box should have been checked for "Potentially Significant Impact".
Impact 16c (page 104)	Conceal detection of corrosion/leaks may result in waste (I, III, IV, V, VI, VII above).. Box should have been checked for "Potentially Significant Impact".
Impact 18b (page 112)	Impacts 1b⇒16c have cumulative potential significant impacts on the environment. Mandatory: Box should have been checked for "Potentially Significant Impact".
Impact 18c (page 112)	Impacts 1b⇒16c have cumulative potential significant impacts on the environment. Mandatory: Box should have been checked for "Potentially Significant Impact".

XIV. Summary

In my professional opinion, earned by over 50 years involvement in geotechnical (soil and foundation) engineering in San Francisco, if the subject project is implemented without a proper and complete environmental review, which only an independent EIR under CEQA can provide, there is a potential for significant environmental impact to result from the project which is cumulative.

The potential exists not only during construction of house foundations which City Planning has taken the liberty to emphasize while ignoring the street construction phase of the project, but the cumulative impacts of constructing the street and the impacts of the street in service due over a near surface large diameter natural gas pipeline as well as the contribution of additional development of more buildings and use of a concrete structure and its foundations over the pipeline facilitated by the project which in turn is will be block inspections of leaks, weld fatigue, corrosion, and inspection and replacement of anodes for the cathodic protection, and is also likely to impair lateral and subjacent support in the landslide area in and above where the project is situated.

XV. Conclusion

My credentials include an earned doctorate and other degrees as well as a post-doctoral certificate in earthquake engineering from the University of California, Berkeley. As a public service, I have provided this report as assistance to the Bernal Heights neighborhood without fees or any other compensation. I will be present at the appeal hearing to answer any questions from Board Members.

Yours truly,

Lawrence B. Karp

***LAWRENCE B. KARP** CONSULTING ENGINEER*

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City & County of San Francisco, Planning Department (SFPD), October 4, 2016*b*; "Discretionary Review - Full Analysis", 903 pages.

City & County of San Francisco, Planning Department (SFPD), December 5, 2016*c*; "Categorical Exemption Appeal, 3516-3526 Folsom Street", 14 pages.

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City & County of San Francisco, Planning Department (SFPD), September 5, 2017*b*; "Mitigated Negative Declaration Appeal", 18 pages.

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Gruen, H. Allen dba Earth Mechanics Consulting Engineers - Geotechnical Engineering, November 29, 2016; "Geotechnical Report Update, Proposed Residence [sic] at 3516 & 3526 Folsom Street, San Francisco, California" letter prepared for Mr. James Fogarty - Blue Orange Designs, 2 pages. ["*It is my understanding that the project will consist of the design and construction of a new residence on an undeveloped lot* [sic]. *No other project details are known at this time.*"; document stamped but NOT signed by H. Allen Gruen per B&P Code §6735.1].

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Storesund Consulting, December 11, 2016*b*; "Impact to PG&E Transmission Line 109, 3516 & 3526 Folsom Street, San Francisco, California", report prepared for the SF Board of Supervisors, 3 pages,

U. S. Geological Survey, 1956 (Photorevised 1980); "San Francisco South Quadrangle California, 7.5 Minute Series (Topographic)", map, Scale 1:24,000 (1" = 2,000'), 1 sheet.

List of Attachments

A. Westover Surveying topographical survey map (contours annotated) & Thomas Bros map

B. DPW street steepness limit 17%, fire truck access limit 14%, 60 foot width for dead end street

C. PG&E e-mail 5/28/14 of proprietary image of different project with answers to questions

D. Photos of PG&E gas pipeline backfill restoration after failure in paper Folsom Street

E. Gruen and surrogate reports and letters 8/3/13, 11/29/16, 1/24/17, 4/14/17, 7/6/17.

F. C&CSF Geotechnical Report Requirements w/referenced landslide map

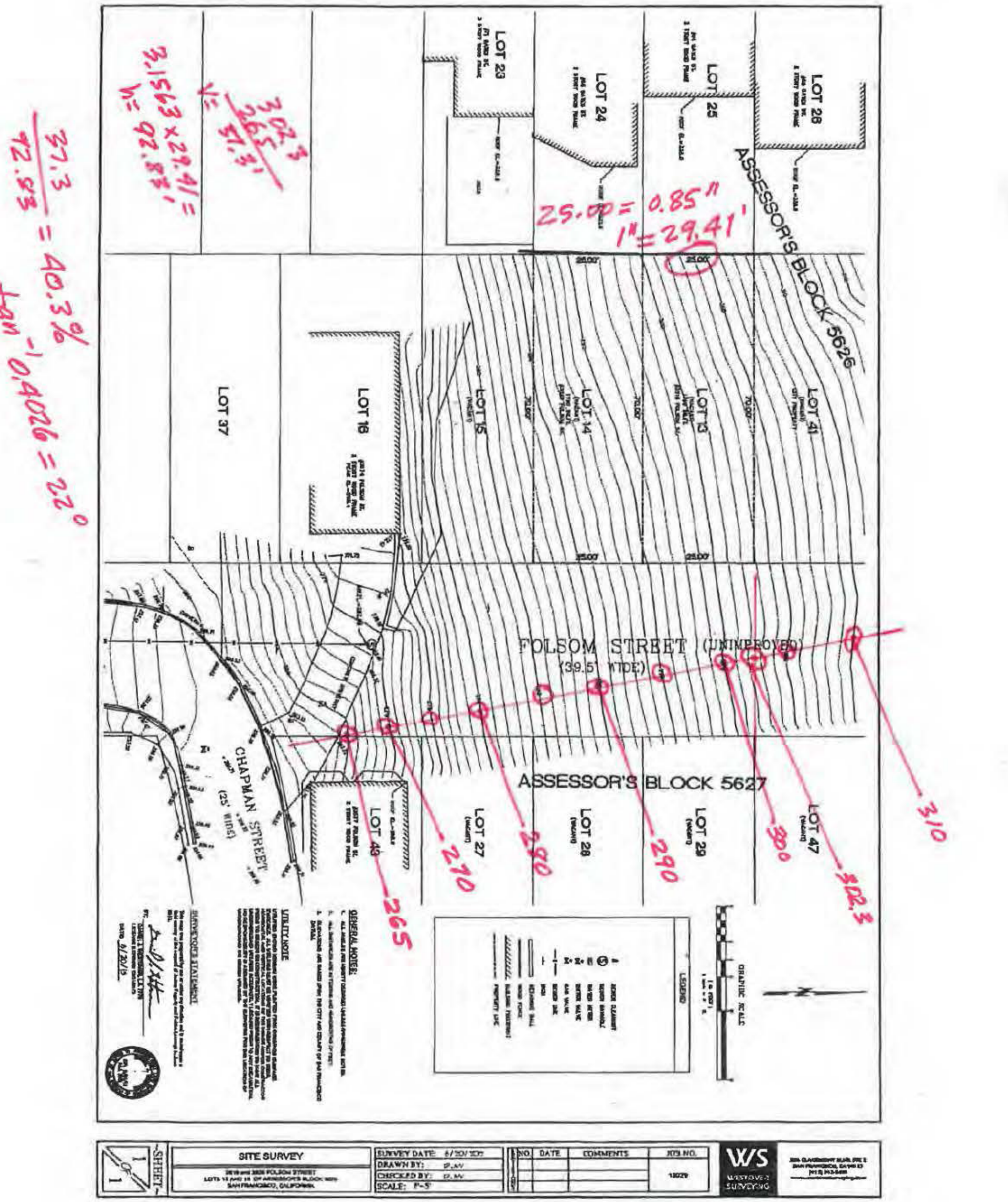
G. California Seismic Hazard Map for C&CSF, annotated enlargement of site, SP117 cover

H. City Planning's CatEx Layer Map & enlargements of site with legend

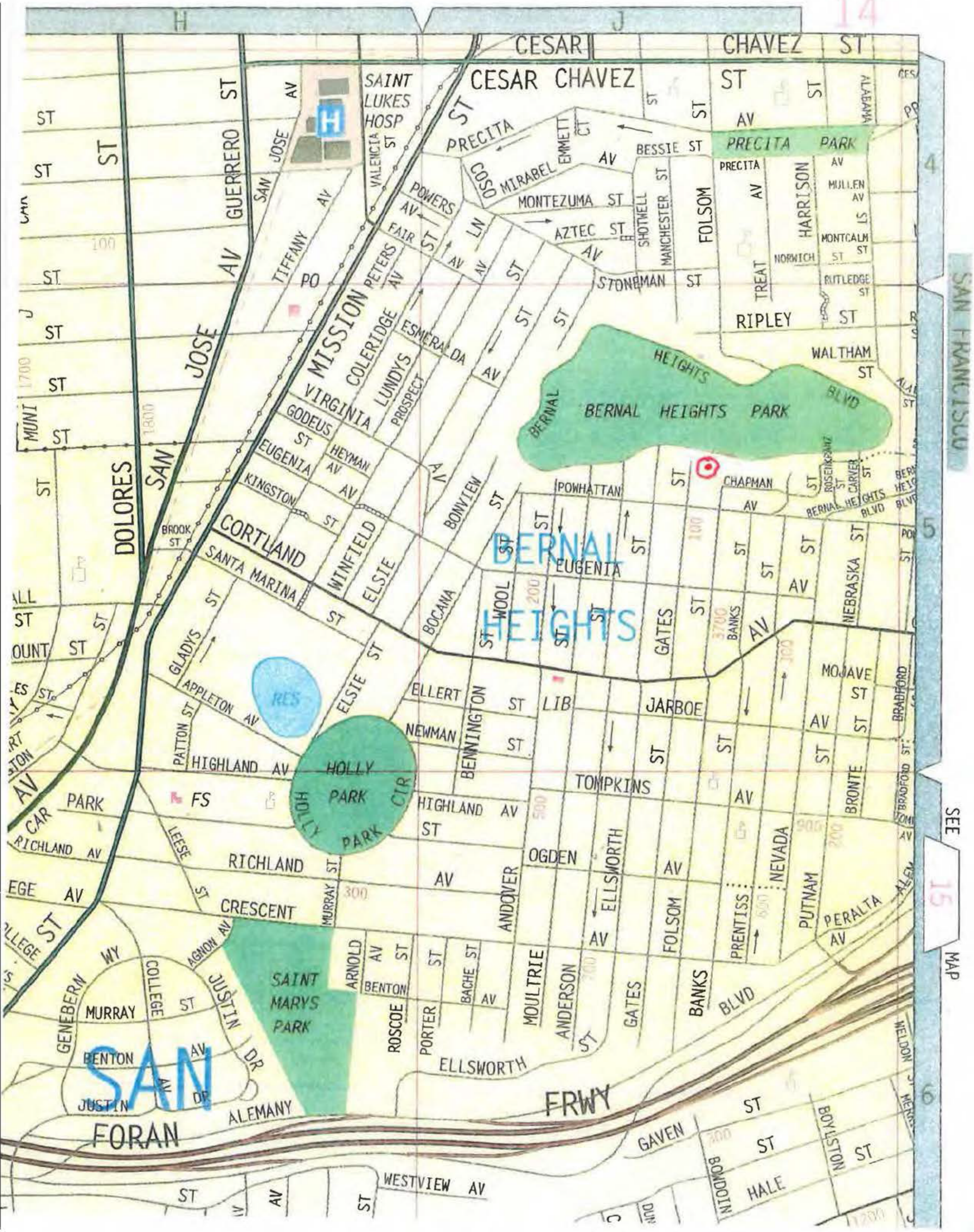
I. 1841 Gift Map 3, C&CSF assessors map of Block 5626, annotated & sale records for 3 lots

J. Aerial image & DPW slope protection maps, paper Folsom St. south of Bernal Heights Blvd

ATTACHMENT A



LOT 23
LOT 24
LOT 25
LOT 28
ASSESSOR'S BLOCK 5626
LOT 37
LOT 16
LOT 15
LOT 14
LOT 13
LOT 41
FOLSOM STREET (UNIMPROVED)
(39.5' WIDE)
CHAPMAN STREET
(25' WIDE)
ASSESSOR'S BLOCK 5627
LOT 43
LOT 27
LOT 28
LOT 29
LOT 47
GENERAL NOTES:
UTILITY NOTE
SURVEYOR'S STATEMENT
LEGEND
GRAPHIC SCALE
25.00
70.00
SITE SURVEY
SURVEY DATE
DRAWN BY:
CHECKED BY:
SCALE:
NO.
DATE
COMMENTS
JOB NO.
SHEET
WS
25.00 = 0.85"
1" = 29.41'
265
270
290
290
300
302.3
310
302.3
265
37.3'
V=
3.1563 × 29.41 =
h = 92.83'
37.3 / 92.83 = 40.3%
tan⁻¹ 0.4026 = 22°


H
J
CESAR CHAVEZ ST
SAINT LUKES HOSP
PRECITA PARK
BERNAL HEIGHTS PARK
BERNAL HEIGHTS
HOLLY PARK
SAINT MARYS PARK
RES
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SAN FRANCISCO
SEE 15 MAP
DOLORES ST
SAN JOSE AV
GUERRERO ST
MISSION ST
VALENCIA ST
TIFFANY AV
PRECITA AV
MIRABEL AV
EMMETT CT
COSO AV
BESSIE ST
MONTEZUMA ST
AZTEC ST
SHOTWELL ST
MANCHESTER ST
FOLSOM ST
HARRISON ST
TREAT AV
NORWICH ST
MULLEN AV
MONTCALM ST
RUTLEDGE ST
ALABAMA ST
STONEMAN ST
RIPLEY ST
WALTHAM ST
POWERS AV
FAIR AV
PETERS AV
COLERIDGE ST
ESMERALDA AV
LUNDYS LN
PROSPECT AV
VIRGINIA AV
GODEUS ST
HEYMAN AV
EUGENIA AV
KINGSTON ST
WINFIELD ST
ELSIE ST
BONVIEW ST
BERNAL HEIGHTS BLVD
POWHATTAN AV
CHAPMAN ST
ROSENKRANZ ST
CARVER ST
CORTLAND AV
BROOK ST
SANTA MARINA ST
GLADYS ST
BOCANA ST
WOOL ST
GATES ST
BANKS ST
NEBRASKA ST
APPLETON AV
PATTON ST
ELLERT ST
NEWMAN ST
BENNINGTON ST
JARBOE AV
MOJAVE ST
BRADFORD ST
HIGHLAND AV
HOLLY PARK CIR
TOMPKINS AV
BRONTE ST
CAREW PARK
RICHLAND AV
LEESE ST
MURRAY ST
OGDEN AV
ELLSWORTH ST
ANDOVER ST
NEVADA ST
PUTNAM ST
PRENTISS ST
PERALTA AV
CRESCENT AV
MOULTRIE ST
ANDERSON ST
ARNOLD AV
BENTON AV
ROSCOE ST
PORTER ST
BACHE ST
GENEBERN WY
COLLEGE AV
MURRAY ST
JUSTIN DR
AGNON AV
ALEMANY BLVD
FORAN FRWY
GAVEN ST
BOWDOIN ST
BOYLSTON ST
HALE ST
WESTVIEW AV
WELDON ST
MUNI
1700
1800
100
200
300
500
600
700
900
3700
4
5
6

ATTACHMENT B

SUBDIVISION REGULATIONS

2015

DEPARTMENT OF PUBLIC WORKS

CITY AND COUNTY OF SAN FRANCISCO

Adopted by Department of Public Works Order No. 183447

Approved March 24, 2015

Mohammed Nuru, Director of Public Works

Fuad Sweiss, City Engineer

Bruce Storrs, City and County Surveyor

PROFESSIONAL LAND SURVEYOR
BRUCE R. STORRS
No. 6914
STATE OF CALIFORNIA

C. STREET GUIDELINES

1. Alignment

All streets shall, as far as practicable, align with existing streets. The Subdivider shall justify any deviations based on written environmental and design objectives.

2. Intersecting Streets

Intersecting streets shall meet at right angles or as nearly so as practicable.

3. Naming

Streets of a proposed subdivision which are in alignment with existing streets shall bear the names of the existing streets. The Department of Public Works shall approve names for all new streets.

4. Street Grades

DPW shall not approve street grades in excess of 17% except as an exception and under unusual conditions.

Streets having grades in excess of 14% shall require separate consultation with the Fire Department prior to use for fire access purposes.

No gutter grade shall be less than 0.5%. The Subdivider shall provide concrete on any pavement grade less than 1.0%.

The Subdivider shall connect all changes in street grades, the algebraic sum of which exceeds 1.5%, with vertical curves of DPW-approved length sufficient to provide safe stopping sight distances and good riding quality. All changes in street grades shall have an absolute value of the algebraic difference in grades which does not exceed fifteen percent (15%), regardless of any vertical curves.

The Director with the consent of the SFFD may approve of any design modification to this standard on a case-by-case basis.

5. Surface Drainage

a. Subdivider shall grade streets to provide a continuous downhill path.

b. At low end cul-de-sacs and sumps, in addition to sewer drainage facilities, Subdivider shall provide surface drainage channels in dedicated easements as relief of overflow to prevent flooding of adjoining property.

c. Subdivider shall design street and drainage channel cross-sections to provide a transport channel for overland or surface flow in excess of the 5-years storm capacity of the sewer system. The channel capacity shall be the difference between the sewer capacity and the quantity of runoff generated by a 100-year storm as defined by the NOAA National Weather Service or by City-furnished data, applied over the tributary area involved.

d. Subdivider shall round street curb intersections by a curve generally having a radius equivalent to the width of the sidewalk and the design shall be in accordance with the Better Streets Plan. While allowing vehicle movements for emergency vehicles, the Subdivider shall use the smallest possible radius.

D. PRIVATE STREETS

Private streets shall have a minimum right-of-way width of 40 feet for through streets. Dead-end private streets shall have a minimum right-of-way width of 60 feet. The Subdivider shall consult with the Fire Department and Department of Building Inspection for all designs that might result in less than the minimum width.

E. BLOCKS

ATTACHMENT C

Pipeline Location is Not Exact
Call 811 before you dig

PG&E Pipeline Information
Facilities to be operated by PG&E personnel only

Subject: Fw: Fwd: Development on Upper Folsom Street Follow-Up Request
From: barbara underberg <bjunderberg@yahoo.com>
Date: Sun, 10 Sep 2017 18:23:03 +0000 (UTC)
To: "L. B. Karp" <lbk@lbkarp.com>

----- Forwarded Message -----
From: Herb Felsenfeld <herbfelsenfeld@gmail.com>
To: Deborah Gerson <dgerson646@gmail.com>; "bjunderberg@yahoo.com" <bjunderberg@yahoo.com>
Cc: Gail Newman <g-newman@comcast.net>
Sent: Saturday, September 9, 2017 5:31 PM
Subject: Fwd: Development on Upper Folsom Street Follow-Up Request

Barbara - I believe this is the e-mail you wanted.
Deborah - Thank You!!
Herb

---------- Forwarded message ---------
From: Deborah Gerson <dgerson646@gmail.com>
Date: Sat, Sep 9, 2017 at 5:06 PM
Subject: Fwd: Development on Upper Folsom Street Follow-Up Request
To: Herb Felsenfeld <herbfelsenfeld@gmail.com>

Here's the message from Austin Sharp that you wanted.
The date is 5/28/2014
---------- Forwarded message ----------
From: **Sharp, Austin** <AWSd@pge.com>
Date: Wed, May 28, 2014 at 4:57 PM
Subject: RE: Development on Upper Folsom Street Follow-Up Request
To: Herbert Felsenfeld <herbfelsenfeld@gmail.com>
Cc: Deborah Gerson <dgerson646@gmail.com>, "Fabien Lannoye (fabien@bluorange.com)" <fabien@bluorange.com>

Hi Deborah, Herb, and Fabien,

Please see below for the response to the questions that Deborah submitted to me. Herb, I will have the additional questions sometime next week. I will also be attending your design review board meeting tonight, so if you have any PG&E related questions I will be available to answer them. Look forward to seeing you there.

Background: Lot 13 and Lot 14, Block 5626; 3516 Folsom St.; 3526 Folsom St. Concerned neighbors require explicit information about Pipeline 109. Thus we are sending the following request for information to the developer and to you as a representative of PG&E. As the owner of the above listed lots, in the vicinity of Pipeline #109 in Bernal Heights, we, concerned neighbors, are asking you to provide the following information:

QUESTION(S) 1: Where exactly is pipeline 109?; identify the longitude and latitude coordinates.
RESPONSE(S) 1: Please see attachment "*L109_Folsom_Street.pdf*" for the location of Line 109 near 3516 and 3526 Folsom Street, San Francisco. PG&E does not provide latitude and longitude of natural

gas pipelines to outside parties (other than its regulators) for security reasons. To have PG&E identify the location of the gas lines in your street, please call USA, the Underground Service Alert, at 811.

QUESTION(S) 2: How deeply is #109 buried?
RESPONSE(S) 2: Gas transmission pipelines are typically installed with 36 to 48 inches of cover. However, the depth may vary as cover over the lines may increase or decrease over time due to land leveling and construction. Without digging and exposing the line, it is not possible to determine the exact depth.

QUESTION(S) 3: What is Pipeline #109 composed of?
RESPONSE(S) 3: Line 109 is a steel pipeline. In your neighborhood, this pipeline has a maximum allowable operating pressure (MAOP) of 150 pounds per square inch gage (psig), which is 19.8% of the pipe's specified minimum yield strength (SMYS). This provides a considerable margin of safety, since it would take a pressure of at least 750 psig to cause the steel in the pipe to begin to deform.

QUESTION(S) 4: How old is Pipeline #109?
RESPONSE(S) 4: Line 109 in this area was installed in 1981 and was strength tested at the time of installation.

QUESTION(S) 5: How big in diameter is Pipeline #109? What is the composition of the pipeline?
RESPONSE(S) 5: Line 109 in your vicinity is a 26-inch diameter steel pipeline.

QUESTION(S) 6: How/with what are the pipe seams welded?
RESPONSE(S) 6: Line 109 near 3516 and 3526 Folsom Street is constructed of API 5L-Grade B steel pipe, and has a double submerged arc weld along the longitudinal seam.

QUESTION(S) 7: How much gas runs through Pipeline #109?
RESPONSE(S) 7: Line 109 has a variable flow rate that is dependent on system operations and San Francisco area gas customer consumption. As points of reference, however, Line 109 observed flow rates of 1.55 – 2.375 million standard cubic feet per hour (MMSCFH) through the flow meter at Sullivan Avenue in Daly City on May 27, 2014.

QUESTION(S) 8: When were the last 3 inspections? Would you produce the documentation for these inspections.
RESPONSE(S) 8: PG&E has a comprehensive inspection and monitoring program to ensure the safety of its natural gas transmission pipeline system. PG&E regularly conducts patrols, leak surveys, and cathodic protection (corrosion protection) system inspections for its natural gas pipelines. Any issues identified as a threat to public safety are addressed immediately. PG&E also performs integrity assessments of certain gas transmission pipelines in urban and suburban areas.

Patrols: PG&E patrols its gas transmission pipelines at least quarterly to look for indications of missing pipeline markers, construction activity and other factors that may threaten the pipeline. Line 109 through the neighborhood was last patrolled in May 2014 and everything was found to be normal.

Leak Surveys: PG&E conducts leak surveys at least annually of its natural gas transmission pipelines. Leak surveys are generally conducted by a leak surveyor walking above the pipeline with leak detection instruments. Line 109 was last leak surveyed in April 2014 and no leaks were found.

Cathodic Protection System Inspections: PG&E utilizes an active cathodic protection (CP) system on its gas transmission and steel distribution pipelines to protect them against corrosion. PG&E inspects its CP systems every two months to ensure they are operating correctly. The CP systems on Line 109 in your area were last inspected in May 2014 and were found to be operating correctly.

Integrity Assessments: There are three federally-approved methods to complete a transmission pipeline integrity management baseline assessment: In-Line Inspections (ILI), External Corrosion Direct Assessment (ECDA) and Pressure Testing. An In-Line Inspection involves a tool (commonly known as a "pig") being inserted into the pipeline to identify any areas of concern such as potential metal loss (corrosion) or geometric abnormalities (dents) in the pipeline. An ECDA involves an indirect, above-ground electrical survey to detect coating defects and the level of cathodic protection. Excavations are performed to do a direct examination of the pipe in areas of concern as required by federal regulations. Pressure testing is a strength test normally conducted using water, which is also referred to as a hydrostatic test.

PG&E performed an ECDA on Line 109 in this area in 2009 and no issues were found. PG&E plans to perform the next ECDA on L-109 in this area in 2015. PG&E also performed an ICDA (Internal Corrosion Direct Assessment) on L-109 near 3516 and 3526 Folsom Street in 2012, and no issues were found.

Unfortunately, PG&E cannot provide the documentation from these inspections because they contain confidential information that PG&E only provides to its regulators.

QUESTION(S) 9: Is this pipeline equivalent in type to the exploded pipeline in San Bruno?
RESPONSE(S) 9: Line 109 near 3516 and 3526 Folsom Street is not equivalent to the pipe in San Bruno that failed. The pipeline in San Bruno that failed was PG&E natural gas transmission pipeline L-132, which had a diameter of 30 inches, was installed in 1956, and had an MAOP of 400 psig. As described in the responses above, L-109 in your area is a 26-inch diameter pipeline, was installed in 1981, and operates at an MAOP of 150 psig.

Thanks,

Austin

Austin Sharp I Expert Customer Impact Specialist
Pacific Gas and Electric Company
Phone: 650.598.7321
Cell: 650.730.4168
Email: awsd@pge.com

From: Herbert Felsenfeld [mailto:herbfelsenfeld@gmail.com]
Sent: Thursday, May 22, 2014 6:00 PM
To: Sharp, Austin
Cc: Deborah Gerson
Subject: Re: Development on Upper Folsom Street Follow-Up Request

I look forward to hearing from you, Austin by COB 05/28 with answers to Dr. Deborah Gerson's questions, and, I similarly look forward to hearing from with answers to my additional questions by COB 06/04.

Thank you kindly for your attention to our requests, as well for your timely and informative reply.

Sincerely,
Herb

On Thu, May 22, 2014 at 4:37 PM, Sharp, Austin <AWSd@pge.com> wrote:
Hi Herb,

I expect the responses for the questions sent over by Deborah mid next week, and then the additional responses from your questions in the letter most likely the week after. Please let me know if you have any questions. Thanks, Austin

Austin Sharp I Expert Customer Impact Specialist
Pacific Gas and Electric Company
Phone: 650.598.7321
Cell: 650.730.4168
Email: awsd@pge.com

From: Herbert Felsenfeld [mailto:herbfelsenfeld@gmail.com]
Sent: Saturday, May 17, 2014 3:26 PM
To: Sharp, Austin
Subject: Development on Upper Folsom Street Follow-Up Request

May 17, 2014

Thank you for talking with me on Friday, May 16, 2014, Mr. Sharp. Attached is a copy of a letter that will also be sent by US Mail. Hard copies will also be sent to Mr. Nick Bruno and Mr. Nick Stavropoulos.
Thank you for your response to the questions within one weeks time.

Yours truly,
Herb Felsenfeld

PG&E is committed to protecting our customers' privacy.
To learn more, please visit http://www.pge.com/about/company/privacy/customer/

L109_Folsom_Street.pdf	**Content-Type:**	application/pdf
	Content-Encoding:	base64

ATTACHMENT D


case


229 ZWC


PG E


229 ZWC
case


W20
case


W20
680E

ATTACHMENT E

REPORT
GEOTECHNICAL INVESTIGATION
Planned Residence At
3516 Folsom Street
San Francisco, California

Prepared for:

Mr. Fabien Lannoye
Bluorange Designs
241 Amber Drive
San Francisco, CA 94131

Prepared by:

H. Allen Gruen
Geotechnical Engineer
360 Grand Avenue, # 262
Oakland, California 94610
(510) 839-0765

Project Number: 13-4060

H. Allen Gruen, C.E., G.E.
Registered Geotechnical Engineer No. 2147

August 3, 2013

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INTRODUCTION

Purpose

A geotechnical investigation has been completed for the proposed residence at 3516 Folsom Street in San Francisco, California. The purposes of this study have been to gather information on the nature, distribution, and characteristics of the earth materials at the site, assess geologic hazards, and to provide geotechnical design criteria for the planned improvements.

Scope

The scope of our services was outlined in our Proposal and Professional Service Agreement dated June 16, 2013. Our investigation included a reconnaissance of the site and surrounding vicinity; sampling and logging two test borings to practical refusal at a maximum depth of 5 feet below the ground surface; laboratory testing conducted on selected samples of the earth materials recovered from the borings; a review of published geotechnical and geologic data pertinent to the project area; geotechnical interpretation and engineering analyses; and preparation of this report.

This report contains the results of our investigation, including findings regarding site, soil, geologic, and groundwater conditions; conclusions pertaining to geotechnical considerations such as weak soils, settlement, and construction considerations; conclusions regarding exposure to geologic hazards, including faulting, ground shaking, liquefaction, lateral spreading, and slope stability; and geotechnical recommendations for design of the proposed project including site preparation and grading, foundations, retaining walls, slabs on grade, and geotechnical drainage.

Pertinent exhibits appear in Appendix A. The locations of the test borings are depicted relative to site features on Plate 1, Boring Location Map. The logs of the test borings are displayed on Plates 2 and 3. Explanations of the symbols and other codes used on the logs are presented on Plate 4, Soil Classification Chart and Key to Test Data. Bedrock is described in accordance with the engineering geology rock terms presented on Plate 5.

References consulted during the course of this investigation are listed in Appendix B. Details regarding the field exploration program appear in Appendix C.

Proposed Development

It is our understanding that the project will consist of the design and construction of a new residence on an undeveloped lot. No other project details are known at this time.

FINDINGS

Site Description

As shown on the Boring Location Map, Plate 1, the project site is located northwest of the intersection of Folsom and Chapman Streets in San Francisco, California. The topography in the vicinity of the site slopes downward toward the south at an average inclination of about 3-½:1 (horizontal:vertical). At the time of our investigation, the subject site was undeveloped.

Geologic Conditions

The site is within the Coast Ranges Geomorphic Province, which includes the San Francisco Bay and the northwest-trending mountains that parallel the coast of California. Tectonic forces resulting in extensive folding and faulting of the area formed these features. The oldest rocks in the area include sedimentary, volcanic, and metamorphic rocks of the Franciscan Complex. This unit is Jurassic to Cretaceous in age and forms the basement rocks in the region.

Locally, the site is in the San Francisco South Quadrangle (1993). A published geologic map of the area (Bonilla, 1998) shows the area southwest of the site is underlain by colluvial deposits (slope debris and ravine fill) consisting of stony silty to sandy clay and the area northeast of the site is underlain by chert bedrock.

Earth Materials

Our borings at the subject site encountered about 3 to 4 feet of soil overlying chert bedrock. Boring 1 encountered about 4 feet of very stiff, lean clay with varying amounts of sand overlying the chert bedrock. Boring 2 penetrated about 2 feet of very stiff, silty clayey sand overlying hard, sandy lean clay that was underlain at a depth of about 3 feet by chert bedrock. Detailed descriptions of the materials encountered as well as test results are shown on the Boring Logs, Plates 2 and 3.

Groundwater

Free groundwater was not encountered in our borings to the maximum depth explored of 5 feet. It is our opinion that the free groundwater table will be below the planned site excavations. We anticipate that the depth to the free water table will vary with time and that zones of seepage may be encountered near the ground surface following rain or irrigation upslope of the subject site.

CONCLUSIONS

General

On the basis of our site reconnaissance and data review, we conclude that the site is suitable for support of the proposed improvements. The primary geotechnical concerns are founding improvements in competent earth materials and seismic shaking and related effects during earthquakes. These items are addressed below.

Foundation Support

It is our opinion that the planned improvements may be supported on a conventional spread footing foundation bearing in competent earth materials. If the spread footings would cover a substantial portion of the building area, a mat foundation may be used as an alternative to reduce forming and steel bending costs. The Structural Engineer may also choose to use drilled piers to support improvements, or for shoring and underpinning, if required. Detailed foundation design criteria are presented later in this report.

We estimate that improvements supported on foundations designed and constructed in accordance with our recommendations will experience post-construction total settlements from static loading of less than 1 inch with differential settlements of less than ½ inch over a 50-foot span.

Geologic Hazards

Faulting

The property does not lie within an Alquist-Priolo Earthquake Fault Zone as defined by the California Division of Mines and Geology. The closest mapped active fault in the vicinity of the site is the San Andreas Fault, located about 6 miles southwest of the site (CDMG, 1998). No active faults are shown crossing the site on reviewed published maps, nor did we observe evidence of active faulting during our investigation. Therefore we conclude that the potential risk for damage to improvements at the site due to surface rupture from faults to be low.

Earthquake Shaking

Earthquake shaking results from the sudden release of seismic energy during displacement along a fault. During an earthquake, the intensity of ground shaking at a particular location will depend on a number of factors including the earthquake magnitude, the distance to the zone of energy release, and local geologic conditions. We expect that the site will be exposed to strong earthquake shaking during the life of the improvements. The recommendations contained in the applicable Building Code should be followed for reducing potential damage to the improvements from earthquake shaking.

Liquefaction

Liquefaction results in a loss of shear strength and potential volume reduction in saturated granular soils below the groundwater level from earthquake shaking. The occurrence of this phenomenon is dependent on many factors, including the intensity and duration of ground shaking, soil density and particle size distribution, and position of the groundwater table (Seed and Idriss, 1982). The site does not lie within a liquefaction potential zone as mapped by the California Division of Mines and Geology for the City and County of San Francisco (CDMG, 2000). In addition, the earth materials encountered on our borings have a low potential for liquefaction. Therefore, it is our opinion that there is a low potential for damage to the planned improvements from liquefaction.

Lateral Spreading

Lateral spreading or lurching is generally caused by liquefaction of marginally stable soils underlying gentle slopes. In these cases, the surficial soils move toward an unsupported face, such as an incised channel, river, or body of water. Because the site has a low potential for liquefaction, we judge that there is a low risk for damage of the improvements from seismically-induced lateral spreading.

Densification

Densification can occur in clean, loose granular soils during earthquake shaking, resulting in seismic settlement and differential compaction. It is our opinion that earth materials subject to seismic densification do not exist beneath the site in sufficient thickness to adversely impact the planned improvements.

Landsliding

The geologic maps of the site vicinity reviewed for this study did not show landslides at the subject site. In addition, a map prepared by the California Division of Mines and Geology for the City and County of San Francisco (CDMG, 2000) does not indicate that the subject site lies within an area of potential earthquake-induced landsliding. During our site reconnaissance, we did not observe evidence of active slope instability at the site. Therefore, it is our opinion that the potential for damage to the improvements from slope instability at the site is low provided the recommendations presented in this report are incorporated into the design and construction of the project.

RECOMMENDATIONS

Site Preparation and Grading

General

The thickness of soil blanketing the site and the depth to bedrock can vary across the site. Design criteria are provided for foundations and retaining walls in soil and rock. Soil design criteria may be assumed within 4 feet of the current ground surface and rock design criteria may be assumed more than 4 feet below the current ground surface. However, if during construction. soil is observed more than 4 feet below the ground surface at foundation levels, the foundations will need to be deepened to bear in rock, or the foundations will need to be redesigned using the soil values. Likewise, if more than 2 feet of soil than what was anticipated from the borings is being retaining by subsurface walls, the portions of walls supporting the additional soil will need to be designed using the lateral earth pressures for soil conditions.

We assume that the planned improvements will be constructed at or below existing site grades. If site grades are raised by filling more than about 1 foot, we should be retained to calculate the impact of filling on slope stability, site settlements, and foundations.

Clearing

Areas to be graded should be cleared of debris, deleterious materials, and vegetation, and then stripped of the upper soils containing root growth and organic matter. We anticipate that the required depth of stripping will generally be less than 2 inches. Deeper stripping may be required to remove localized concentrations of organic matter, such as tree roots. The cleared materials should be removed from the site; strippings may be stockpiled for reuse as topsoil in landscaping areas or should be hauled off site.

Excavations

Bedrock was encountered in our borings at a depth of about 3 to 4 feet below the ground surface. We anticipate that excavations in the upper portions of bedrock at the site can be conducted with conventional equipment, although localized ripping may be required. Excavations extending deeper into the bedrock may require extra effort, such as heavy ripping, hoe-rams, or jack-hammering. We anticipate that the bedrock will become harder and more massive with increasing depth.

Overexcavation

Loose, porous soils and topsoil, if encountered, should be overexcavated in areas designated for placement of future engineered fill or support of improvements. Difficulty in achieving the recommended minimum degree of compaction described below should be used as a field criterion by the geotechnical engineer to identify areas of weak soils that should be removed and replaced as engineered fill. The depth and extent of excavation should be approved in the field by the geotechnical engineer prior to placement of fill or improvements.

Subgrade Preparation

Exposed soils designated to receive engineered fill should be cut to form a level bench, scarified to a minimum depth of 6 inches, brought to at least optimum moisture content, and compacted to at least 90 percent relative compaction, in accordance with ASTM test designation D 1557.

Material for Fill

It is anticipated that the on-site soil will be suitable for reuse as fill provided that lumps greater than 6 inches in largest dimension and perishable materials are removed, and that the fill materials are approved by the geotechnical engineer prior to use.

Fill materials brought onto the site should be free of vegetative mater and deleterious debris, and should be primarily granular. The geotechnical engineer should approve fill material prior to trucking it to the site.

Compaction of Fill

Fill should be placed in level lifts not exceeding 8 inches in loose thickness. Each lift should be brought to at least the optimum moisture content and compacted to at least 90 percent relative compaction, in accordance with ASTM test designation D 1557.

Underpinning

During excavations adjacent to existing structures or footings, care should be taken to adequately support the existing structures. When excavating below the level of foundations supporting existing structures, some form of underpinning may be required where excavations extend below an imaginary plane sloping at 1:1 downward and outward from the edge of the existing footings. All temporary underpinning design and construction are the responsibility of the contractor. Earth Mechanics is available to provide consultation regarding underpinning adjacent improvements.

Temporary Slopes

Temporary slopes will be necessary during the planned site excavations. In order to safely develop the site, temporary slopes will need to be laid back in conformance with OSHA standards at safe inclinations, or temporary shoring will have to be installed. All temporary slopes and shoring design are the responsibility of the contractor. Earth Mechanics is available to provide consultation regarding stability and support of temporary slopes during construction. The contractor may choose to excavate test pits to evaluate site earth materials and the need for temporary shoring.

Finished Slopes

In general, finished cut and fill slopes in soil should be constructed at an inclination not exceeding 2:1 (horizontal:vertical). Routine maintenance of slopes should be anticipated. The tops of cut slopes should be rounded and compacted to reduce the risk of erosion. Fill and cut slopes should be planted with vegetation to resist erosion, or protected from erosion by other measures, upon completion of grading. Surface water runoff should be intercepted and diverted away from the tops and toes of cut and fill slopes by using berms or ditches.

Seismic Design

The following seismic design parameters apply:

Site Class C
$S_s = 1.520$, $S_1 = 0.693$
$Fa = 1.0$, $Fv = 1.3$
$SM_s = 1.520$, $SM_1 = 0.901$
$SD_s = 1.013$, $SD_1 = 0.601$

Foundations

General

The thickness of soil blanketing the site and the depth to bedrock can vary across the site. Design criteria are provided for foundations in soil and rock. Soil design criteria may be assumed within 4 feet of the current ground surface and rock design criteria may be assumed more than 4 feet below the current ground surface. However, if during construction, soil is observed more than 4 feet below the ground surface at foundation levels, the foundations will need to be deepened to bear in rock, or the foundations will need to be redesigned using the soil values.

It is our opinion that the planned improvements may be supported on a conventional spread footing foundation bearing in competent earth materials. If the spread footings would cover a substantial portion of the building area, a mat foundation may be used as an alternative to reduce forming and steel bending costs. The Structural Engineer may also choose to use drilled piers to support improvements, or for shoring and underpinning, if required. Design criteria for each foundation type are presented below.

Spread Footings

Spread footings should extend at least 24 inches below lowest adjacent exterior grade, or 18 inches below lowest adjacent interior grade, whichever is lower. If soft or unstable soil areas are encountered at the bottom of the footings, localized deepening of the footing excavation will be necessary. Footing depths may be reduced if competent bedrock is exposed in footing excavations. Footings should be stepped to produce level tops and bottoms and should be deepened as necessary to provide at least 7 feet of horizontal clearance between the portions of footings designed to impose passive pressures and the face of the nearest slope or retaining wall.

Spread footings bottomed in soil can be designed to impose dead plus code live load bearing pressures and total design load bearing pressures of 2,000 and 3,000 psf, respectively. If foundations are bottomed in bedrock, the footings may be designed for maximum allowable rock contact pressures of 3,500 pounds per square foot (psf) for dead plus sustained live loads, and 5,000 psf for total loads, including wind or seismic forces.

There should be no isolated footing pads. We recommend that all new footings be interconnected and the foundation system should have upslope-downslope elements spaced no more than 20 feet apart. Resistance to lateral pressures can be obtained from passive earth pressures against the face of the footing and soil friction along the base of footings. A passive pressure equivalent to that obtained using a fluid weight of 250 pounds per cubic foot (pcf) and a friction factor of 0.3 may be used to resist lateral forces and sliding in soil. In bedrock, a uniform pressure of 3000 psf and a friction factor of 0.4 times the net vertical dead load may be used for design to resist lateral forces and sliding. These values include a safety factor of 1.5 and may be used in combination without reduction. Passive pressures should be disregarded in areas with less than 7 feet of horizontal soil confinement and for the uppermost 1-foot of foundation depth unless confined by concrete slabs or pavements.

Drilled Piers

Drilled, cast-in-place, reinforced concrete piers should be at least 14 inches in diameter and extend at least 10 feet below grade, or to practical drilling refusal in bedrock. Piers should be designed for a maximum allowable skin friction of 500 psf for combined dead plus sustained live loads in soil. In bedrock, piers should be designed for a maximum allowable skin friction of 1,000 psf for combined dead plus sustained live loads. The above values may be increased by one-third for total loads, including the effect of seismic or wind forces. The weight of the foundation concrete extending below grade may be disregarded. We recommend that all piers be interconnected with grade or tie beams and the foundation system should have upslope-downslope elements spaced no more than 20 feet apart.

Resistance to lateral displacement of individual piers will be generated primarily by passive earth pressures acting on the pier. Passive pressures in soil should be assumed equivalent to those generated by a fluid weighing 250 pcf acting on 2 pier diameters. In bedrock, a passive pressure equivalent to that generated by a uniform pressure of 3000 psf acting on 1.5 pier diameters may be used. Passive pressures should be neglected within 12 inches of the ground surface in areas not confined by slabs or pavements and in areas with less than 7 feet of horizontal confinement. Piers designed to resist lateral loads from retaining walls will reach their maximum lateral load carrying capacity at a depth of 8 times the pier diameter. A practical limit on the pier depth of twice the height of the retaining wall can be used, if less than 8 times the pier diameter.

Where groundwater is encountered during pier shaft drilling, it should be removed by pumping, or the concrete must be placed by the tremie method. If the pier shafts will not stand open, temporary casing may be necessary to support the sides of the pier shafts until concrete is placed. Concrete should not be allowed to free fall more than 5 feet to avoid segregation of the aggregate.

Mat Foundation

A mat foundation may be used to support the planned improvements. The mat can be designed for an average allowable bearing pressure in soil over the entire mat of 2,000 psf for combined dead plus sustained live loads, and 3,000 psf for total loads including wind or seismic forces. The weight of the mat extending below current site grade may be neglected in computing bearing loads. Localized increases in bearing pressures of up to 4,000 psf may be utilized. If the mat is bottomed in bedrock, the mat may be designed for maximum allowable rock contact pressures of 3,500 pounds per square foot (psf) for dead plus sustained live loads, and 5,000 psf for total loads, including wind or seismic forces, with localized increases up to 8,000 psf. For elastic design, a modulus of subgrade reaction for soil of 50 kips per cubic foot and for rock of 200 kips per cubic foot may be used.

Resistance to lateral pressures can be obtained from passive earth pressures against the face of the mat and soil friction along the base of the mat foundation. We recommend that an allowable passive equivalent fluid pressure in soil of 250 pcf and a friction factor of 0.3 times the net vertical dead load be used for design. In bedrock, a uniform pressure of 3000 psf and a friction factor of 0.4 times the net vertical dead load may be used for design to resist lateral forces and sliding. Passive pressures should be disregarded in areas with less than 7 feet of horizontal soil confinement and for the uppermost 1-foot of foundation depth unless confined by concrete slabs or pavements.

Retaining Walls

The thickness of soil blanketing the site and the depth to bedrock can vary across the site. Design criteria are provided for retaining walls in soil and rock. Soil design criteria may be assumed within 4 feet of the current ground surface and rock design criteria may be assumed more than 4 feet below the current ground surface. However, if more than 2 feet of soil than what was anticipated from the borings is being retaining by subsurface walls, the portions of walls supporting the additional soil will need to be designed using the lateral earth pressures for soil conditions.

Retaining walls should be fully backdrained. The backdrains should consist of at least a 3-inch-diameter, rigid perforated pipe, or equivalent such as a "high profile drain", surrounded by a drainage blanket. The pipe should be sloped to drain by gravity to appropriate outlets. Accessible subdrain cleanouts should be provided and maintained on a routine basis. The drainage blanket should consist of clean, free-draining crushed rock or gravel, wrapped in a filter fabric such as Mirafi 140N. The aggregate drainage blanket should be at least 1 foot in width and extend to within 1 foot of the surface. The uppermost 1-foot should be backfilled with compacted native soil to exclude surface water. Alternatively, the drainage blanket could consist of Caltrans Class 2 "Permeable Material" or a prefabricated drainage structure such as Mirafi Miradrain. The backdrain should extend down at least 8 inches below lowest adjacent grade.

Vertical retaining walls that are free to rotate at the top should be designed to resist active lateral soil pressures equivalent to those exerted by a fluid weighing 40 pcf where the backslope is level, and 60 pcf for backfill at a 2:1 (horizontal:vertical) slope. In areas where bedrock is exposed and backfill is placed behind the wall, the structural engineer may use active lateral earth pressures equivalent to those exerted by a fluid weighing 30 pcf where the backslope is level, and 45 pcf for backfill at a 2:1 (horizontal:vertical) slope. If the retaining wall is constructed directly against the bedrock with no backfill, the structural engineer may use active lateral earth pressures equivalent to those exerted by a fluid weighing 20 pcf where the backslope is level, and 26 pcf for backfill at a 2:1 (horizontal:vertical) slope. For intermediate slopes, interpolate between these values. We should be consulted to calculate lateral pressures on retaining walls that are tied-back or braced.

In addition to lateral earth pressures, retaining walls must be designed to resist horizontal pressures that may be generated by surcharge foundation loads applied at or near the ground surface. If a footing surcharge is located above a retaining wall within a horizontal distance of 0.4H, where H is the height of soil retained by the wall, then a horizontal lateral resultant force equal to 0.55 Q_L should be applied to the retaining wall at a height above the base of the wall equal to 0.6H. Q_L equals the equivalent resultant footing line load. This footing surcharge load applies equally to walls that are fixed or free to rotate. As an example, a retaining wall supporting 10 feet of soil has a footing 2 feet away from the top of the wall carrying a line load of 1,000 pounds per lineal foot. This footing is within 0.4H=4 feet of the retaining wall. The resultant horizontal force on the retaining wall from the footing surcharge load would be 0.55x1,000=550 pounds acting 0.6H=6 feet above the base of the retaining wall.

In addition to lateral earth pressures and adjacent footing loads, retaining walls must be designed to resist horizontal pressures that may be generated by surcharge loads applied at or near the ground surface. Where an imaginary 1:1 (H:V) plane projected downward from the outermost edge of a surcharge load intersects a retaining wall, that portion of the wall below the intersection should be designed for an additional horizontal thrust from a uniform pressure equivalent to one-third the maximum anticipated surcharge pressure in soil and one-fourth the maximum anticipated surcharge pressure in rock. In some cases, this value yields a conservative estimate of the actual lateral pressure imposed. We should be contacted if a more precise estimate of lateral loading on the retaining wall from surcharge pressures is desired.

Rigid retaining walls constrained against such movement could be subjected to "at-rest" lateral earth pressures equivalent to those exerted by the fluid pressures listed above plus a uniform load of 6•H pounds per square foot in soil and of 4•H pounds per square foot in rock, where H is the height of the backfill above footing level. Where an imaginary 1:1 (H:V) plane projected downward from the outermost edge of a surcharge load intersects a lower retaining wall, that portion of the constrained wall below the intersection should be designed for an additional horizontal thrust from a uniform pressure equivalent to one-half the maximum anticipated surcharge pressure in soil and one-third the maximum anticipated surcharge pressure in rock. In some cases, this value yields a conservative estimate of the actual lateral pressure imposed. We should be contacted if a more precise estimate of lateral loading on the retaining wall from surcharge pressures is desired.

A seismic pressure increment equivalent to a rectangular pressure distribution of 5H in psf may be used, where H is the height of the soil retained in feet.

Wall backfill should consist of soil that is spread in level lifts not exceeding 8 inches in thickness. Each lift should be brought to at least optimum moisture content and compacted to not less than 90 percent relative compaction, per ASTM test designation D 1557. Retaining walls may yield slightly during backfilling. Therefore, walls should be properly braced during the backfilling operations.

Where migration of moisture through retaining walls would be detrimental or undesirable, retaining walls should be waterproofed as specified by the project architect or structural engineer.

Retaining walls should be supported on footings designed in accordance with the recommendations presented above. A minimum factor of safety of 1.5 against overturning and sliding should be used in the design of retaining walls.

Slab-on-Grade Floors

The subgrade soil in slab and flatwork areas should be proof rolled to provide a firm, non-yielding surface. If moisture penetration through the slab would be objectionable, slabs should be underlain by a capillary moisture break consisting of at least 4 inches of clean, free-draining crushed rock or gravel graded such that 100 percent will pass the 1-inch sieve and none will pass the No. 4 sieve. Further protection against slab moisture penetration can be provided by means of a moisture vapor barrier membrane, placed between the drain rock and the slab. The membrane may be covered with 2 inches of damp, clean sand to protect it during construction.

Additional protection against moisture seepage into subsurface levels may be provided by installing a slab underdrain system. If selected, the slab underdrain system would consist of trenches, which are at least 12 inches deep and 6 inches wide, spaced no further than 10 feet apart beneath the floor slab. The bottoms of the trenches should slope to drain to a low-point by gravity. A 3-inch diameter, rigid perforated pipe should be placed near the bottom of the trench which is fully encapsulated in drain rock. The drainrock should be fully encapsulated in an approved filter fabric. The perforated pipes should be tied to closed conduits which outlet at appropriate discharge points.

Site Drainage

Positive drainage should be provided away from the improvements. Roof downspouts should discharge into closed conduits that drain into the site storm drain system. Surface drainage facilities (roof downspouts and drainage inlets) should be maintained entirely separate from subsurface drains (retaining wall backdrains and underslab drains). Drains should be checked periodically, and cleaned and maintained as necessary to provide unimpeded flow.

Supplemental Services

Earth Mechanics recommend that we be retained to review the project plans and specifications to determine if they are consistent with our recommendations. In addition, we should be retained to observe geotechnical construction, particularly site excavations, placement of retaining wall backdrains, fill compaction, and excavation of foundations, as well as to perform appropriate field observations and laboratory tests.

If, during construction, subsurface conditions different from those described in this report are observed, or appear to be present beneath excavations, we should be advised at once so that these conditions may be reviewed and our recommendations reconsidered. The recommendations made in this report are contingent upon our notification and review of the changed conditions.

If more than 18 months have elapsed between the submission of this report and the start of work at the site, or if conditions have changed because of natural causes or construction operations at or adjacent to the site, the recommendations of this report may no longer be valid or appropriate. In such case, we recommend that we review this report to determine the applicability of the conclusions and recommendations considering the time elapsed or changed conditions. The recommendations made in this report are contingent upon such a review.

These services are performed on an as-requested basis and are in addition to this geotechnical investigation. We cannot accept responsibility for conditions, situations or stages of construction that we are not notified to observe.

LIMITATIONS

This report has been prepared for the exclusive use of Bluorange Designs and their consultants for the proposed project described in this report.

Our services consist of professional opinions and conclusions developed in accordance with generally accepted geotechnical engineering principles and practices. We provide no other warranty, either expressed or implied. Our conclusions and recommendations are based on the information provided us regarding the proposed construction, the results of our field exploration and laboratory testing programs, and professional judgment. Verification of our conclusions and recommendations is subject to our review of the project plans and specifications, and our observation of construction.

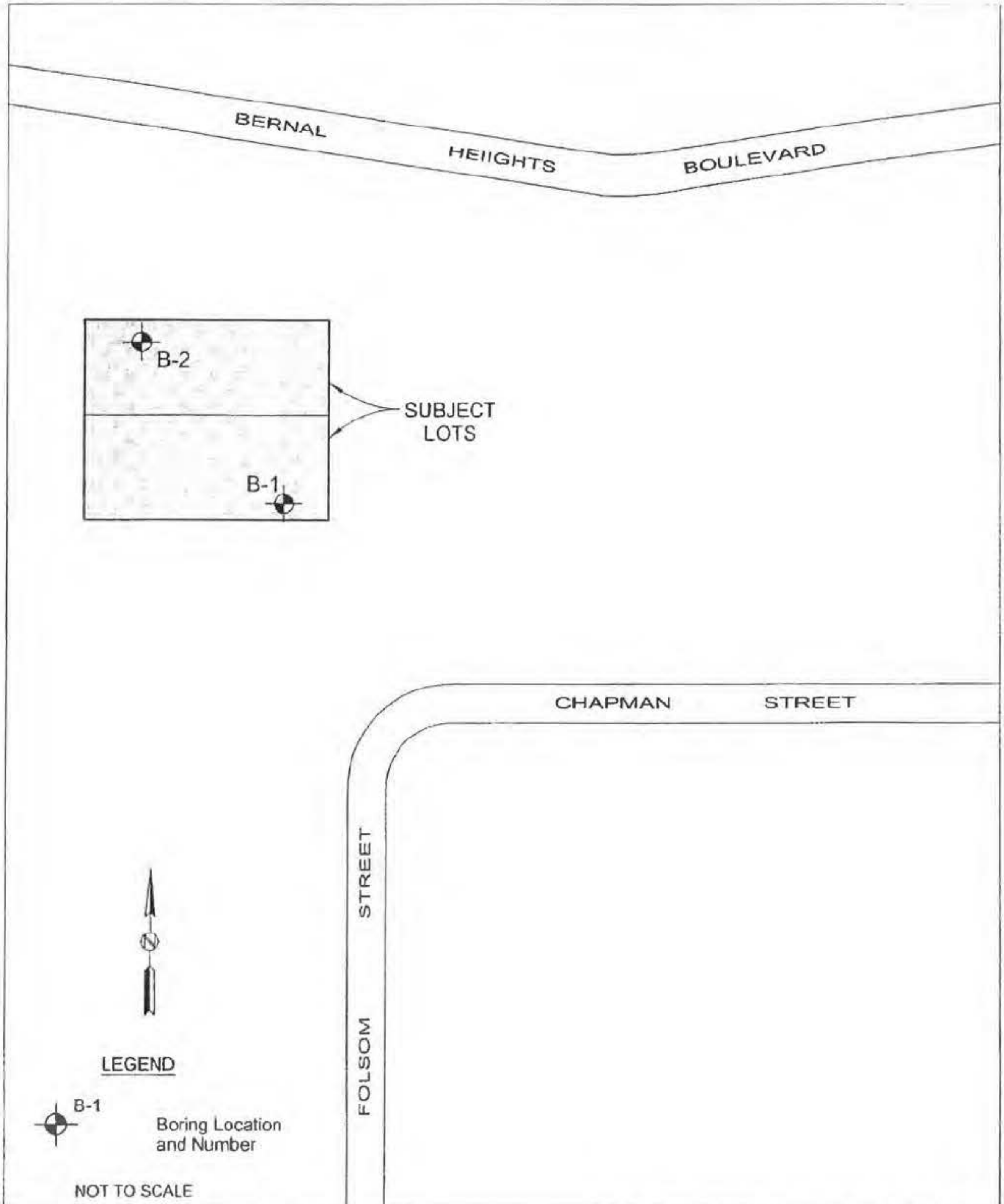
The test boring logs represent subsurface conditions at the locations and on the date indicated. It is not warranted that they are representative of such conditions elsewhere or at other times. Site conditions and cultural features described in the text of this report are those existing at the time of our field exploration, conducted on June 28, 2013, and may not necessarily be the same or comparable at other times.

The locations of the test borings were established in the field by reference to existing features and should be considered approximate only.

The scope of our services did not include an environmental assessment or an investigation of the presence or absence of hazardous, toxic, or corrosive materials in the soil, surface water, groundwater or air, on or below, or around the site, nor did it include an evaluation or investigation of the presence or absence of wetlands.

APPENDIX A

List of Plates



Earth Mechanics Consulting Engineers	Job. No: 13-4060 Appr: Drwn: LPDD Date: 7/1/13	BORING LOCATION MAP 3516 & 3526 Folsom Street San Francisco, California	PLATE 1

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot	Sample	DEPTH (FEET)	
					79		0	Brown Sandy Lean Clay (CL), moist, very stiff
							1	
		6.6		57				
					83		2	Mottled Orangish-Brown Lean Clay with Sand (CL), moist, very stiff
							3	
		25.1		81				
					82		4	Mottled Orangish-Brown Chert, firm, friable, moderately weathered
							5	Bottom of Boring = 5' No Free Water Encountered

EQUIPMENT: **Continuous Sampling** ELEVATION: *

LOGGED BY: **A.K.**

START DATE: **6-28-13**

FINISH DATE: **6-28-13**

* Existing ground surface

Earth Mechanics
Consulting Engineers

Job No: 13-4060
Appr:
Drwn: IPDD
Date: JUL 2013

LOG OF BORING 1

3516 & 3526 Folsom Street

San Francisco, California

PLATE 2

Other Laboratory Tests	Pocket Penetrometer (ksf)	Moisture Content (%)	Dry Density (pcf)	% Passing #200 sieve	Blows/Foot	Sample	DEPTH (FEET)	EQUIPMENT: Continuous Sampling ELEVATION: * LOGGED BY: A.K. START DATE: 6-28-13 FINISH DATE: 6-28-13
					58		0	Brown Silty Clayey Sand (CL-ML), moist, very stiff, with roots
							1	
		18.3		73				
					86		2	Light Mottled Brown Sandy Lean Clay (CL), moist, hard
		20.9		63				
		2.7		27	50/6"		3	Reddish-Brown Chert, firm, friable, moderately weathered

Bottom of Boring = 3.5'
No Free Water Encountered

* Existing ground surface

Earth Mechanics
Consulting Engineers

Job No: 13-4060
Appr:
Drwn: LPDD
Date: JUL 2013

LOG OF BORING 2

3516 & 3526 Folsom Street

San Francisco, California

PLATE 3

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CI	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION SYSTEM

Shear Strength, psf
Confining Pressure, psf

Consol	Consolidation	Tx	2630 (240)	Unconsolidated Undrained Triaxial
LL	Liquid Limit (in %)	Tx sat	2100 (575)	Unconsolidated Undrained Triaxial, saturated prior to test
PL	Plastic Limit (in %)	DS	3740 (960)	Unconsolidated Undrained Direct Shear
PI	Plasticity Index	TV	1320	Torvane Shear
Gs	Specific Gravity	UC	4200	Unconfined Compression
SA	Sieve Analysis	LVS	500	Laboratory Vane Shear
■	Undisturbed Sample (2.5-inch ID)	FS	Free Swell	
◪	2-inch-ID Sample	EI	Expansion Index	
◩	Standard Penetration Test	Perm	Permeability	
⊠	Bulk Sample	SE	Sand Equivalent	

KEY TO TEST DATA

Earth Mechanics
Consulting Engineers

Job No. 13-4060
Appr.
Drwn. LPDD
Date JUL 2013

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA
3516 & 3526 Folsom Street
San Francisco, California

PLATE 4

ROCK SYMBOLS

SHALE OR CLAYSTONE	CHERT	SERPENTINITE
SILTSTONE	PYROCLASTIC	METAMORPHIC ROCKS
SANDSTONE	VOLCANIC	DIATOMITE
CONGLOMERATE	PLUTONIC	SHEARED ROCKS

LAYERING

MASSIVE	Greater than 6 feet
THICKLY BEDDED	2 to 6 feet
MEDIUM BEDDED	8 to 24 inches
THINNLY BEDDED	2-1/2 to 8 inches
VERY THINNLY BEDDED	3/4 to 2-1/2 inches
CLOSELY LAMINATED	1/4 to 3/4 inches
VERY CLOSELY LAMINATED	Less than 1/4 inch

JOINT, FRACTURE, OR SHEAR SPACING

VERY WIDELY SPACED	Greater than 6 feet
WIDELY SPACED	2 to 6 feet
MODERATELY SPACED	8 to 24 inches
CLOSELY SPACED	2-1/2 to 8 inches
VERY CLOSELY SPACED	3/4 to 2-1/2 inches
EXTREMELY CLOSELY SPACED	Less than 3/4 inch

HARDNESS

SOFT - Pliable; can be dug by hand

FIRM - Can be gouged deeply or carved with a pocket knife

MODERATELY HARD - Can be readily scrached by a knife blade; scratch leaves heavy trace of dust and is readily visable after the powder has been blown away

HARD - Can be scratched with difficulty; scratch produces little powder and is often faintly visable

VERY HARD - Cannot be scratched with pocket knife; leaves a metallic streak

STRENGTH

PLASTIC - Capable of being molded by hand

FRIABLE - Crumbles by rubbing with fingers

WEAK - An unfractured specimen of such material will crumble under light hammer blows

MODERATELY STRONG - Specimen will withstand a few heavy hammer blows before breaking

STRONG - Specimem will withstand a few heavy ringing hammer blows and usually yields large fragments

VERY STRONG - Rock will resist heavy ringing hammer blows and will yield with difficulty only dust and small flying fragments

DEGREE OF WEATHERING

HIGHLY WEATHERED - Abundant fractures coated with oxides, carbonates, sulphates, mud, etc., thourough discoloration, rock disintegration, mineral decomposition

MODERATELY WEATHERED - Some fracture coating, moderate or localized discoloration, little to no effect on cementation, slight mineral decomposition

SLIGHTLY WEATHERED - A few stained fractures, slight discoloration, little or no effect on cementation, no mineral decomposition

FRESH - Unaffected by weathering agents, no appreciable change with depth

Earth Mechanics
Consulting Engineers

Job No: 13-4060
Appr:
Drwn: LPDD
Date: JUL 2013

ENGINEERING GEOLOGY
ROCK TERMS
3516 & 3526 Folsom Street
San Francisco, California

PLATE
5

APPENDIX B

List of References

1. Bonilla, M. G., 1998, *Preliminary Geologic Map of the San Francisco South 7.5' Quadrangle and Part of the Hunters Point 7.5' Quadrangle, San Francisco Bay Area, California*, United States Geological Survey Open-File Report OF-98-354, Scale 1:24,000.

2. California Department of Conservation, Division of Mines and Geology, 1998, *Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada*.

3. CDMG, 2000, State of California Seismic Hazards Zones, City and County of San Francisco, California Division of Mines and Geology.

4. Seed, H. B., and Idriss, E., 1982, *Ground Motion and Soil Liquefaction During Earthquakes*, Earthquake Engineering Research Institute Monograph.

5. United States Geological Survey, 1993, San Francisco South Quadrangle, 7.5 Minute Series, Scale 1:24,000.

APPENDIX C

Field Exploration

Our field exploration consisted of a geologic reconnaissance and subsurface exploration by means of two test borings logged by our Engineer on June 28, 2013. The test borings were drilled with a hand carried, portable drill rig utilizing continuous flight, 4-inch-diameter augers. The borings were drilled at the approximate locations shown on Plate 1.

The logs of the test borings are displayed on Plates 2 and 3. Representative undisturbed samples of the earth materials were obtained from the test borings at selected depth intervals with a 1.4-inch inside diameter, split-barrel Standard Penetration Test (SPT) sampler, a 2-inch inside diameter, split-barrel sampler, and a 2.5-inch inside diameter, modified California sampler.

Penetration resistance blow counts were obtained by dropping a 70-pound hammer through a 30-inch free fall. The sampler was driven 24 inches or less and the number of blows was recorded for each 6 inches of penetration. The blows per foot recorded on the Boring Logs represent the accumulated number of blows that were required to drive the sampler the last 12 inches or fraction thereof.

The soil classifications are shown on the Boring Logs and referenced on Plate 4. Bedrock is described in accordance with the engineering geology rock terms presented on Plate 5.

Laboratory Testing

Natural water contents and percentages of gravel, sand, and fines were determined on selected soil samples recovered from the test borings. The data are recorded at the appropriate sample depths on the Boring Logs.

APPENDIX D

Distribution

Mr. Fabien Lannoye
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Fabien@novadesignsbuilds.com
Fabien@bluorange.com

(4 wet signed and stamped originals)

EARTH MECHANICS CONSULTING ENGINEERS

Geotechnical Engineering

360 Grand Avenue • Suite 262
Oakland, CA 94610
Phone (510) 839-0765
Fax (510) 839-0716

November 29, 2016
Project Number: 13-4060

Mr. James Fogarty
Bluorange Designs
241 Amber Drive
San Francisco, CA 94131

Subject: Geotechnical Report Update
Proposed Residence at
3516 & 3526 Folsom Street
San Francisco, California

Dear Mr. Fogarty:

This letter presents an update of my geotechnical investigation report for the proposed residence at 3516 and 3526 Folsom Street in San Francisco, California. H. Allen Gruen, Geotechnical Engineer performed a geotechnical investigation for the project and presented results in the report dated August 3, 2013.

Proposed Project

It is my understanding that the project will consist of the design and construction of a new residence on an undeveloped lot. No other project details are known at this time.

Report Update

It is my opinion that, the findings, conclusions, and recommendations presented in our geotechnical investigation report dated August 3, 2013, are still valid and applicable for the proposed development.

I appreciate the opportunity to be of continued service to you on this project. If you have any questions, please call me at (510) 839-0765.

Sincerely,

H. Allen Gruen, C.E., G.E.
Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
H. ALLEN GRUEN
GE2147
EXP. 12-31-2017
GEOTECHNICAL
STATE OF CALIFORNIA

Mr. James Fogarty
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241 Amber Drive
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H. Allen Gruen

Geotechnical Engineer

360 Grand Avenue, # 262
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Phone (510) 839-0765
H.Allen.Gruen@gmail.com

January 24, 2017
Project Number: 13-4060c

Bluorange Designs
241 Amber Drive
San Francisco, CA 94131

Subject: Geotechnical Responses to Project Review Letter
3516 and 3526 Folsom Street
San Francisco, California

Dear Ladies and Gentlemen:

This letter presents my geotechnical responses to the project review letter by Storesund Consulting, dated December 1, 2016, for the proposed residences at 3516 and 3526 Folsom Street in San Francisco, California. H. Allen Gruen, Geotechnical Engineer performed a geotechnical investigation for the project and presented results in the report dated August 3, 2013.

- The reviewer notes that geotechnical borings do not extend to the proposed depth of excavations (about 6 feet deep). Our borings encountered chert bedrock at depths about 2 to 4 feet. Practical drilling refusal was encountered at the maximum depth explored of 5 feet. We anticipate that bedrock will extend for a significant depth below the subject site.

- Estimating induced ground vibrations caused by rock excavations causing potential degradation of the transmission line integrity was beyond our scope of work for the residential development.

- Determining negative impacts of construction traffic to the transmission line integrity was beyond our scope of work for the residential development.

- The construction operations for the subject residential development adjacent to the transmission pipeline are not expected to have a significant detrimental impact to the transmission pipeline.

I appreciate the opportunity to be of continued service to you on this project. If you have any questions, please call me at (510) 839-0765.

Sincerely,

H. Allen Gruen, C.E., G.E.
Geotechnical Engineer

H. ALLEN GRUEN

Geotechnical Engineer

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Oakland, CA 94610
Phone (510) 839-0765
H.Allen.Gruen@gmail.com

April 14, 2017
Project Number: 13-4060d

Bluorange Designs
241 Amber Drive
San Francisco, CA 94131

Subject: Geotechnical Consultation
3516 and 3526 Folsom Street
San Francisco, California

Dear Ladies and Gentlemen:

This letter presents my geotechnical consultation for the proposed residences at 3516 and 3526 Folsom Street in San Francisco, California. H. Allen Gruen, Geotechnical Engineer performed a geotechnical investigation for the project and presented results in the report dated August 3, 2013.

- The house foundations will require about 298 cubic yards of excavation for 3516 Folsom and 253 cubic yards for 3526 Folsom. I would estimate about 50 cubic yards of top soil, with the rest being chert. The deepest excavation (15'-0" maximum at rear of proposed foundation) will happen in chert.

- The chert bedrock at the subject site is firm and friable (with the definitions provided on Plate 5 of the geotechnical report.)

I appreciate the opportunity to be of continued service to you on this project. If you have any questions, please call me at (510) 839-0765.

Sincerely,

REGISTERED PROFESSIONAL ENGINEER H. ALLEN GRUEN GE2147 EXP. 12-31-2017 GEOTECHNICAL STATE OF CALIFORNIA

H. Allen Gruen, C.E., G.E.
Geotechnical Engineer

REPORT
GEOTECHNICAL INVESTIGATION
Planned Street and Utility Improvements At 3516 and 3526 Folsom Street San Francisco, California

Prepared for:

Mr. Fabien Lannoye
241 Amber Drive
San Francisco, CA 94131

Prepared by:

H. Allen Gruen
Geotechnical Engineer
360 Grand Avenue, # 262
Oakland, California 94610
(510) 839-0765

Project Number: 17-4702

REGISTERED PROFESSIONAL ENGINEER
H. ALLEN GRUEN
GE2147
EXP. 12-31-2017
GEOTECHNICAL
STATE OF CALIFORNIA

H. Allen Gruen, C.E., G.E.
Registered Geotechnical Engineer No. 2147

July 6, 2017

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INTRODUCTION

Purpose

A geotechnical investigation has been completed for the proposed street and utility improvements at 3516 and 3526 Folsom Street in San Francisco, California. The purposes of this study have been to gather information on the nature, distribution, and characteristics of the earth materials at the site, assess geologic hazards, and to provide geotechnical design criteria for the planned improvements.

Scope

The scope of my services was outlined in the Proposal and Professional Service Agreement dated April 6, 2017. My investigation included a reconnaissance of the site and surrounding vicinity; sampling and logging one test boring to practical refusal at a depth of 6-½ feet below the ground surface; laboratory testing conducted on selected samples of the earth materials recovered from the boring; a review of published geotechnical and geologic data pertinent to the project area; geotechnical interpretation and engineering analyses; and preparation of this report.

This report contains the results of my investigation, including findings regarding site, soil, geologic, and groundwater conditions; conclusions pertaining to geotechnical considerations such as weak soils, settlement, and construction considerations; conclusions regarding exposure to geologic hazards, including faulting, ground shaking, liquefaction, lateral spreading, and slope stability; and geotechnical recommendations for design of the proposed project including site preparation and grading, foundations, retaining walls, slabs on grade, and geotechnical drainage.

Pertinent exhibits appear in Appendix A. The location of the test boring is depicted relative to site features on Plate 1, Boring Location Map. The log of the test boring is displayed on Plate 2. Explanations of the symbols and other codes used on the log is presented on Plate 3, Soil Classification Chart and Key to Test Data.

References consulted during the course of this investigation are listed in Appendix B. Details regarding the field exploration program appear in Appendix C.

Proposed Street and Utility Improvements

It is my understanding that the project will consist of the design and construction of an extension of Folsom Street and associated utilities. I have reviewed the civil plans, dated August 2016, by David J. Franco Civil Engineer. No other project details are known at this time.

FINDINGS

Site Description

As shown on the Boring Location Map, Plate 1, the project site is located north of the intersection of Folsom and Chapman Streets in San Francisco, California. The topography in the vicinity of the site slopes downward toward the south at an average inclination of about 3-½:1 (horizontal:vertical). At the time of my investigation, the subject site was undeveloped.

Geologic Conditions

The site is within the Coast Ranges Geomorphic Province, which includes the San Francisco Bay and the northwest-trending mountains that parallel the coast of California. Tectonic forces resulting in extensive folding and faulting of the area formed these features. The oldest rocks in the area include sedimentary, volcanic, and metamorphic rocks of the Franciscan Complex. This unit is Jurassic to Cretaceous in age and forms the basement rocks in the region.

Locally, the site is in the San Francisco South Quadrangle (1993). A published geologic map of the area (Bonilla, 1998) shows the area southwest of the site is underlain by colluvial deposits (slope debris and ravine fill) consisting of stony silty to sandy clay and the area northeast of the site is underlain by chert bedrock.

Earth Materials

My boring at the subject site encountered sandy lean clay with gravel from the ground surface to practical refusal at a depth of 6-½ feet. The clay was firm near the ground surface and became stiff to hard with increasing depth. Detailed descriptions of the materials encountered as well as test results are shown on the Boring Log, Plate 2.

Groundwater

Free groundwater was not encountered in my boring to the maximum depth explored of 6-½ feet. It is my opinion that the free groundwater table will be below the planned site excavations. I anticipate that the depth to the free water table will vary with time and that zones of seepage may be encountered near the ground surface following rain or irrigation upslope of the subject site.

CONCLUSIONS

General

On the basis of my site reconnaissance and data review, I conclude that the site is suitable for support of the proposed improvements. The primary geotechnical concerns are founding improvements in competent earth materials and seismic shaking and related effects during earthquakes. These items are addressed below.

Foundation Support

It is my opinion that the planned improvements may be supported on a conventional spread footing foundation bearing in competent earth materials. If the spread footings would cover a substantial portion of the building area, a mat foundation may be used as an alternative to reduce forming and steel bending costs. The Structural Engineer may also choose to use drilled piers to support improvements, or for shoring and underpinning, if required. Detailed foundation design criteria are presented later in this report.

I estimate that improvements supported on foundations designed and constructed in accordance with my recommendations will experience post-construction total settlements from static loading of less than 1 inch with differential settlements of less than ½ inch over a 50-foot span.

Geologic Hazards

Faulting

The property does not lie within an Alquist-Priolo Earthquake Fault Zone as defined by the California Division of Mines and Geology. The closest mapped active fault in the vicinity of the site is the San Andreas Fault, located about 6 miles southwest of the site (CDMG, 1998). No active faults are shown crossing the site on reviewed published maps, nor did I observe evidence of active faulting during my investigation. Therefore I conclude that the potential risk for damage to improvements at the site due to surface rupture from faults to be low.

Earthquake Shaking

Earthquake shaking results from the sudden release of seismic energy during displacement along a fault. During an earthquake, the intensity of ground shaking at a particular location will depend on a number of factors including the earthquake magnitude, the distance to the zone of energy release, and local geologic conditions. I expect that the site will be exposed to strong earthquake shaking during the life of the improvements. The recommendations contained in the applicable Building Code should be followed for reducing potential damage to the improvements from earthquake shaking.

Liquefaction

Liquefaction results in a loss of shear strength and potential volume reduction in saturated granular soils below the groundwater level from earthquake shaking. The occurrence of this phenomenon is dependent on many factors, including the intensity and duration of ground shaking, soil density and particle size distribution, and position of the groundwater table (Seed and Idriss, 1982). The site does not lie within a liquefaction potential zone as mapped by the California Division of Mines and Geology for the City and County of San Francisco (CDMG, 2000). In addition, the earth materials encountered in my boring have a low potential for liquefaction. Therefore, it is my opinion that there is a low potential for damage to the planned improvements from liquefaction.

Lateral Spreading

Lateral spreading or lurching is generally caused by liquefaction of marginally stable soils underlying gentle slopes. In these cases, the surficial soils move toward an unsupported face, such as an incised channel, river, or body of water. Because the site has a low potential for liquefaction, I judge that there is a low risk for damage of the improvements from seismically-induced lateral spreading.

Densification

Densification can occur in clean, loose granular soils during earthquake shaking, resulting in seismic settlement and differential compaction. It is my opinion that earth materials subject to seismic densification do not exist beneath the site in sufficient thickness to adversely impact the planned improvements.

Landsliding

The site is mapped within an area of potential landslide hazard by URS/John A. Blume & Associates (1974). Qualifying projects may be subject to the Slope Protection Act (San Francisco Building Code 106A.4.1.4). The San Francisco Building Code (106A.4.1.4.3) states construction work that is subject to these requirements includes the construction of new buildings or structures having over 1000 square feet of new projected roof area and horizontal or vertical additions having over 1000 square feet of new projected roof area. In addition, these requirements apply to the following activity or activities, if, in the opinion of the Director, the proposed work may have a substantial impact on the slope stability of any property: shoring, underpinning, excavation or retaining wall work; grading, including excavation or fill, of over 50 cubic yards of earth materials; or any other construction activity.

The geologic map of the site vicinity reviewed for this study (Bonilla, 1998) did not show landslides at the subject site. In addition, a map prepared by the California Division of Mines and Geology for the City and County of San Francisco (CDMG, 2000) indicates that the subject site does not lie within an area of potential earthquake-induced landsliding. During his site reconnaissance, my field engineer did not observe evidence of active slope instability at the subject site. Therefore, it is my opinion that the potential for damage to the improvements from slope instability at the site is low provided the recommendations presented in this report are incorporated into the design and construction of the project.

RECOMMENDATIONS

Site Preparation and Grading

General

I drilled boring adjacent to the proposed road extension which encountered bedrock at depths of about 3 to 4 feet. The thickness of soil blanketing the subject site and the depth to bedrock can vary across the site. Design criteria are provided for foundations and retaining walls in soil and rock. Soil design criteria may be assumed within 4 feet of the current ground surface and rock design criteria may be assumed more than 4 feet below the current ground surface. However, if during construction, soil is observed more than 4 feet below the ground surface at foundation levels, the foundations will need to be deepened to bear in rock, or the foundations will need to be redesigned using the soil values. Likewise, if more than 2 feet of soil than what was anticipated from the boring is being retaining by subsurface walls, the portions of walls supporting the additional soil will need to be designed using the lateral earth pressures for soil conditions.

I assume that the planned improvements will be constructed at or below existing site grades. If site grades are raised by filling more than about 1 foot, I should be retained to calculate the impact of filling on slope stability, site settlements, and foundations.

Clearing

Areas to be graded should be cleared of debris, deleterious materials, and vegetation, and then stripped of the upper soils containing root growth and organic matter. I anticipate that the required depth of stripping will generally be less than 2 inches. Deeper stripping may be required to remove localized concentrations of organic matter, such as tree roots. The cleared materials should be removed from the site; strippings may be stockpiled for reuse as topsoil in landscaping areas or should be hauled off site.

Excavations

Bedrock was encountered in boring drilled adjacent to the subject site at depths of about 3 to 4 feet below the ground surface. I anticipate that excavations in the upper portions of bedrock at the site can be conducted with conventional equipment, although localized ripping may be required. Excavations extending deeper into the bedrock may require extra effort, such as heavy ripping, hoe-rams, or jack-hammering. I anticipate that the bedrock will become harder and more massive with increasing depth.

Overexcavation

Loose, porous soils and topsoil, if encountered, should be overexcavated in areas designated for placement of future engineered fill or support of improvements. Difficulty in achieving the recommended minimum degree of compaction described below should be used as a field criterion by the geotechnical engineer to identify areas of weak soils that should be removed and replaced as engineered fill. The depth and extent of excavation should be approved in the field by the geotechnical engineer prior to placement of fill or improvements.

Subgrade Preparation

Exposed soils designated to receive engineered fill should be cut to form a level bench, scarified to a minimum depth of 6 inches, brought to at least optimum moisture content, and compacted to at least 90 percent relative compaction, in accordance with ASTM test designation D 1557.

Material for Fill

It is anticipated that the on-site soil will be suitable for reuse as fill provided that lumps greater than 6 inches in largest dimension and perishable materials are removed, and that the fill materials are approved by the geotechnical engineer prior to use.

Fill materials brought onto the site should be free of vegetative mater and deleterious debris, and should be primarily granular. The geotechnical engineer should approve fill material prior to trucking it to the site.

Compaction of Fill

Fill should be placed in level lifts not exceeding 8 inches in loose thickness. Each lift should be brought to at least the optimum moisture content and compacted to at least 90 percent relative compaction, in accordance with ASTM test designation D 1557.

Underpinning

During excavations adjacent to existing structures or footings, care should be taken to adequately support the existing structures. When excavating below the level of foundations supporting existing structures, some form of underpinning may be required where excavations extend below an imaginary plane sloping at 1:1 downward and outward from the edge of the existing footings. All temporary underpinning design and construction are the responsibility of the contractor. Earth Mechanics is available to provide consultation regarding underpinning adjacent improvements.

Temporary Slopes

Temporary slopes will be necessary during the planned site excavations. In order to safely develop the site, temporary slopes will need to be laid back in conformance with OSHA standards at safe inclinations, or temporary shoring will have to be installed. All temporary slopes and shoring design are the responsibility of the contractor. Earth Mechanics is available to provide consultation regarding stability and support of temporary slopes during construction. The contractor may choose to excavate test pits to evaluate site earth materials and the need for temporary shoring.

Finished Slopes

In general, finished cut and fill slopes in soil should be constructed at an inclination not exceeding 2:1 (horizontal:vertical). Routine maintenance of slopes should be anticipated. The tops of cut slopes should be rounded and compacted to reduce the risk of erosion. Fill and cut slopes should be planted with vegetation to resist erosion, or protected from erosion by other measures, upon completion of grading. Surface water runoff should be intercepted and diverted away from the tops and toes of cut and fill slopes by using berms or ditches.

Seismic Design

The following seismic design parameters apply:

Site Class C
$S_s = 1.520$, $S_1 = 0.693$
Fa = 1.0, Fv = 1.3
$SM_s = 1.520$, $SM_1 = 0.901$
$SD_s = 1.013$, $SD_1 = 0.601$

Foundations

General

The thickness of soil blanketing the site and the depth to bedrock can vary across the site. Design criteria are provided for foundations in soil and rock. Soil design criteria may be assumed within 4 feet of the current ground surface and rock design criteria may be assumed more than 4 feet below the current ground surface. However, if during construction, soil is observed more than 4 feet below the ground surface at foundation levels, the foundations will need to be deepened to bear in rock, or the foundations will need to be redesigned using the soil values.

It is my opinion that the planned improvements may be supported on a conventional spread footing foundation bearing in competent earth materials. If the spread footings would cover a substantial portion of the building area, a mat foundation may be used as an alternative to reduce forming and steel bending costs. The Structural Engineer may also choose to use drilled piers to support improvements, or for shoring and underpinning, if required. Design criteria for each foundation type are presented below.

Spread Footings

Spread footings should extend at least 24 inches below lowest adjacent exterior grade, or 18 inches below lowest adjacent interior grade, whichever is lower. If soft or unstable soil areas are encountered at the bottom of the footings, localized deepening of the footing excavation will be necessary. Footing depths may be reduced if competent bedrock is exposed in footing excavations. Footings should be stepped to produce level tops and bottoms and should be deepened as necessary to provide at least 7 feet of horizontal clearance between the portions of footings designed to impose passive pressures and the face of the nearest slope or retaining wall.

Spread footings bottomed in soil can be designed to impose dead plus code live load bearing pressures and total design load bearing pressures of 2,000 and 3,000 psf, respectively. If foundations are bottomed in bedrock, the footings may be designed for maximum allowable rock contact pressures of 3,500 pounds per square foot (psf) for dead plus sustained live loads, and 5,000 psf for total loads, including wind or seismic forces.

There should be no isolated footing pads. I recommend that all new footings be interconnected and the foundation system should have upslope-downslope elements spaced no more than 20 feet apart. Resistance to lateral pressures can be obtained from passive earth pressures against the face of the footing and soil friction along the base of footings. A passive pressure equivalent to that obtained using a fluid weight of 250 pounds per cubic foot (pcf) and a friction factor of 0.3 may be used to resist lateral forces and sliding in soil. In bedrock, a uniform pressure of 3000 psf and a friction factor of 0.4 times the net vertical dead load may be used for design to resist lateral forces and sliding. These values include a safety factor of 1.5 and may be used in combination without reduction. Passive pressures should be disregarded in areas with less than 7 feet of horizontal soil confinement and for the uppermost 1-foot of foundation depth unless confined by concrete slabs or pavements.

Drilled Piers

Drilled, cast-in-place, reinforced concrete piers should be at least 14 inches in diameter and extend at least 10 feet below grade, or to practical drilling refusal in bedrock. Piers should be designed for a maximum allowable skin friction of 500 psf for combined dead plus sustained live loads in soil. In bedrock, piers should be designed for a maximum allowable skin friction of 1,000 psf for combined dead plus sustained live loads. The above values may be increased by one-third for total loads, including the effect of seismic or wind forces. The weight of the foundation concrete extending below grade may be disregarded. I recommend that all piers be interconnected with grade or tie beams and the foundation system should have upslope-downslope elements spaced no more than 20 feet apart.

Resistance to lateral displacement of individual piers will be generated primarily by passive earth pressures acting on the pier. Passive pressures in soil should be assumed equivalent to those generated by a fluid weighing 250 pcf acting on 2 pier diameters. In bedrock, a passive pressure equivalent to that generated by a uniform pressure of 3000 psf acting on 1.5 pier diameters may be used. Passive pressures should be neglected within 12 inches of the ground surface in areas not confined by slabs or pavements and in areas with less than 7 feet of horizontal confinement. Piers designed to resist lateral loads from retaining walls will reach their maximum lateral load carrying capacity at a depth of 8 times the pier diameter. A practical limit on the pier depth of twice the height of the retaining wall can be used, if less than 8 times the pier diameter.

Where groundwater is encountered during pier shaft drilling, it should be removed by pumping, or the concrete must be placed by the tremie method. If the pier shafts will not stand open, temporary casing may be necessary to support the sides of the pier shafts until concrete is placed. Concrete should not be allowed to free fall more than 5 feet to avoid segregation of the aggregate.

Mat Foundation

A mat foundation may be used to support the planned improvements. The mat can be designed for an average allowable bearing pressure in soil over the entire mat of 2,000 psf for combined dead plus sustained live loads, and 3,000 psf for total loads including wind or seismic forces. The weight of the mat extending below current site grade may be neglected in computing bearing loads. Localized increases in bearing pressures of up to 4,000 psf may be utilized. If the mat is bottomed in bedrock, the mat may be designed for maximum allowable rock contact pressures of 3,500 pounds per square foot (psf) for dead plus sustained live loads, and 5,000 psf for total loads, including wind or seismic forces, with localized increases up to 8,000 psf. For elastic design, a modulus of subgrade reaction for soil of 50 kips per cubic foot and for rock of 200 kips per cubic foot may be used.

Resistance to lateral pressures can be obtained from passive earth pressures against the face of the mat and soil friction along the base of the mat foundation. I recommend that an allowable passive equivalent fluid pressure in soil of 250 pcf and a friction factor of 0.3 times the net vertical dead load be used for design. In bedrock, a uniform pressure of 3000 psf and a friction factor of 0.4 times the net vertical dead load may be used for design to resist lateral forces and sliding. Passive pressures should be disregarded in areas with less than 7 feet of horizontal soil confinement and for the uppermost 1-foot of foundation depth unless confined by concrete slabs or pavements.

Retaining Walls

The thickness of soil blanketing the site and the depth to bedrock can vary across the site. Design criteria are provided for retaining walls in soil and rock. Soil design criteria may be assumed within 4 feet of the current ground surface and rock design criteria may be assumed more than 4 feet below the current ground surface. However, if more than 2 feet of soil than what was anticipated from the boring is being retaining by subsurface walls, the portions of walls supporting the additional soil will need to be designed using the lateral earth pressures for soil conditions.

Retaining walls should be fully backdrained. The backdrains should consist of at least a 3-inch-diameter, rigid perforated pipe, or equivalent such as a "high profile drain", surrounded by a drainage blanket. The pipe should be sloped to drain by gravity to appropriate outlets. Accessible subdrain cleanouts should be provided and maintained on a routine basis. The drainage blanket should consist of clean, free-draining crushed rock or gravel, wrapped in a filter fabric such as Mirafi 140N. The aggregate drainage blanket should be at least 1 foot in width and extend to within 1 foot of the surface. The uppermost 1-foot should be backfilled with compacted native soil to exclude surface water. Alternatively, the drainage blanket could consist of Caltrans Class 2 "Permeable Material" or a prefabricated drainage structure such as Mirafi Miradrain. The backdrain should extend down at least 8 inches below lowest adjacent grade.

Vertical retaining walls that are free to rotate at the top should be designed to resist active lateral soil pressures equivalent to those exerted by a fluid weighing 40 pcf where the backslope is level, and 60 pcf for backfill at a 2:1 (horizontal:vertical) slope. In areas where bedrock is exposed and backfill is placed behind the wall, the structural engineer may use active lateral earth pressures equivalent to those exerted by a fluid weighing 30 pcf where the backslope is level, and 45 pcf for backfill at a 2:1 (horizontal:vertical) slope. If the retaining wall is constructed directly against the bedrock with no backfill, the structural engineer may use active lateral earth pressures equivalent to those exerted by a fluid weighing 20 pcf where the backslope is level, and 26 pcf for backfill at a 2:1 (horizontal:vertical) slope. For intermediate slopes, interpolate between these values. I should be consulted to calculate lateral pressures on retaining walls that are tied-back or braced.

In addition to lateral earth pressures, retaining walls must be designed to resist horizontal pressures that may be generated by surcharge foundation loads applied at or near the ground surface. If a footing surcharge is located above a retaining wall within a horizontal distance of 0.4H, where H is the height of soil retained by the wall, then a horizontal lateral resultant force equal to 0.55 Q_L should be applied to the retaining wall at a height above the base of the wall equal to 0.6H. Q_L equals the equivalent resultant footing line load. This footing surcharge load applies equally to walls that are fixed or free to rotate. As an example, a retaining wall supporting 10 feet of soil has a footing 2 feet away from the top of the wall carrying a line load of 1,000 pounds per lineal foot. This footing is within 0.4H=4 feet of the retaining wall. The resultant horizontal force on the retaining wall from the footing surcharge load would be 0.55x1,000=550 pounds acting 0.6H=6 feet above the base of the retaining wall.

In addition to lateral earth pressures and adjacent footing loads, retaining walls must be designed to resist horizontal pressures that may be generated by surcharge loads applied at or near the ground surface. Where an imaginary 1:1 (H:V) plane projected downward from the outermost edge of a surcharge load intersects a retaining wall, that portion of the wall below the intersection should be designed for an additional horizontal thrust from a uniform pressure equivalent to one-third the maximum anticipated surcharge pressure in soil and one-fourth the maximum anticipated surcharge pressure in rock. In some cases, this value yields a conservative estimate of the actual lateral pressure imposed. I should be contacted if a more precise estimate of lateral loading on the retaining wall from surcharge pressures is desired.

Rigid retaining walls constrained against such movement could be subjected to "at-rest" lateral earth pressures equivalent to those exerted by the fluid pressures listed above plus a uniform load of 6•H pounds per square foot in soil and of 4•H pounds per square foot in rock, where H is the height of the backfill above footing level. Where an imaginary 1:1 (H:V) plane projected downward from the outermost edge of a surcharge load intersects a lower retaining wall, that portion of the constrained wall below the intersection should be designed for an additional horizontal thrust from a uniform pressure equivalent to one-half the maximum anticipated surcharge pressure in soil and one-third the maximum anticipated surcharge pressure in rock. In some cases, this value yields a conservative estimate of the actual lateral pressure imposed. I should be contacted if a more precise estimate of lateral loading on the retaining wall from surcharge pressures is desired.

A seismic pressure increment equivalent to a rectangular pressure distribution of 5H in psf may be used, where H is the height of the soil retained in feet.

Wall backfill should consist of soil that is spread in level lifts not exceeding 8 inches in thickness. Each lift should be brought to at least optimum moisture content and compacted to not less than 90 percent relative compaction, per ASTM test designation D 1557. Retaining walls may yield slightly during backfilling. Therefore, walls should be properly braced during the backfilling operations.

Where migration of moisture through retaining walls would be detrimental or undesirable, retaining walls should be waterproofed as specified by the project architect or structural engineer.

Retaining walls should be supported on footings designed in accordance with the recommendations presented above. A minimum factor of safety of 1.5 against overturning and sliding should be used in the design of retaining walls.

Slab-on-Grade Floors

The subgrade soil in slab and flatwork areas should be proof rolled to provide a firm, non-yielding surface. If moisture penetration through the slab would be objectionable, slabs should be underlain by a capillary moisture break consisting of at least 4 inches of clean, free-draining crushed rock or gravel graded such that 100 percent will pass the 1-inch sieve and none will pass the No. 4 sieve. Further protection against slab moisture penetration can be provided by means of a moisture vapor barrier membrane, placed between the drain rock and the slab. The membrane may be covered with 2 inches of damp, clean sand to protect it during construction.

Additional protection against moisture seepage into subsurface levels may be provided by installing a slab underdrain system. If selected, the slab underdrain system would consist of trenches, which are at least 12 inches deep and 6 inches wide, spaced no further than 10 feet apart beneath the floor slab. The bottoms of the trenches should slope to drain to a low-point by gravity. A 3-inch diameter, rigid perforated pipe should be placed near the bottom of the trench which is fully encapsulated in drain rock. The drainrock should be fully encapsulated in an approved filter fabric. The perforated pipes should be tied to closed conduits which outlet at appropriate discharge points.

Site Drainage

Positive drainage should be provided away from the improvements. Roof downspouts should discharge into closed conduits that drain into the site storm drain system. Surface drainage facilities (roof downspouts and drainage inlets) should be maintained entirely separate from subsurface drains (retaining wall backdrains and underslab drains). Drains should be checked periodically, and cleaned and maintained as necessary to provide unimpeded flow.

Supplemental Services

Earth Mechanics recommend that I be retained to review the project plans and specifications to determine if they are consistent with my recommendations. In addition, I should be retained to observe geotechnical construction, particularly site excavations, placement of retaining wall backdrains, fill compaction, and excavation of foundations, as well as to perform appropriate field observations and laboratory tests.

If, during construction, subsurface conditions different from those described in this report are observed, or appear to be present beneath excavations, I should be advised at once so that these conditions may be reviewed and my recommendations reconsidered. The recommendations made in this report are contingent upon my notification and review of the changed conditions.

If more than 18 months have elapsed between the submission of this report and the start of work at the site, or if conditions have changed because of natural causes or construction operations at or adjacent to the site, the recommendations of this report may no longer be valid or appropriate. In such case, I recommend that I review this report to determine the applicability of the conclusions and recommendations considering the time elapsed or changed conditions. The recommendations made in this report are contingent upon such a review.

These services are performed on an as-requested basis and are in addition to this geotechnical investigation. I cannot accept responsibility for conditions, situations or stages of construction that I are not notified to observe.

LIMITATIONS

This report has been prepared for the exclusive use of Fabien Lannoye and James Fogarty and their consultants for the proposed project described in this report.

My services consist of professional opinions and conclusions developed in accordance with generally accepted geotechnical engineering principles and practices. I provide no other warranty, either expressed or implied. My conclusions and recommendations are based on the information provided us regarding the proposed construction, the results of my field exploration and laboratory testing programs, and professional judgment. Verification of my conclusions and recommendations is subject to my review of the project plans and specifications, and my observation of construction.

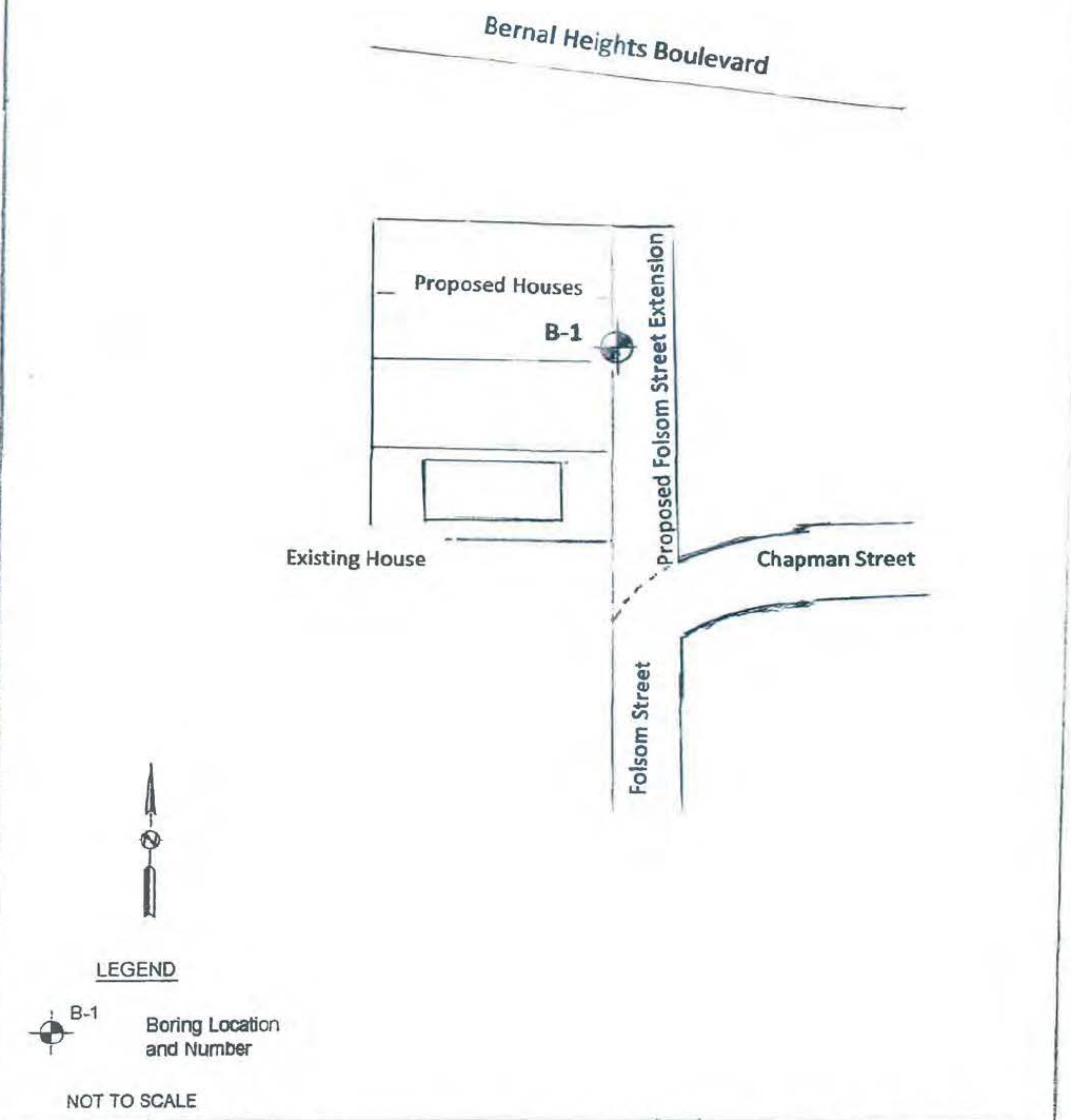
The test boring log represents subsurface conditions at the location and on the date indicated. It is not warranted that it is representative of such conditions elsewhere or at other times. Site conditions and cultural features described in the text of this report are those existing at the time of my field exploration, conducted on May 10, 2017, and may not necessarily be the same or comparable at other times.

The location of the test boring was established in the field by reference to existing features and should be considered approximate only.

The scope of my services did not include an environmental assessment or an investigation of the presence or absence of hazardous, toxic, or corrosive materials in the soil, surface water, groundwater or air, on or below, or around the site, nor did it include an evaluation or investigation of the presence or absence of wetlands.

APPENDIX A

List of Plates



H. Allen Gruen Geotechnical Engineer	Job. No: 17-4702 Appr: Drwn: LPDD Date:	BORING LOCATION MAP 3516 and 3526 Folsom Street San Francisco, California	PLATE 1

Location of Boring:

Project: 3516 FOLSOM ST	Boring No.: 1
	Total Depth: 6.5
Job No.: 17-4702	Logged By: KJ
Proj. Mgr.: AG	Date: 5-10-17
Drilling Contractor: ACCESS	
Hammer Wt.: 140	Drop: 30
Water Depth (ft.):	
Time:	
Date:	
Backfilled, Time:	Date: By:
Surface Elev.:	Datum:
Conditions:	

Sample Depth	Sampler Type	Blows/Foot	Inches Driven	Inches Recovered	Sample Condition	Pocket Penetrometer Shear Strength (KSF)	Moisture Content (%)	Dry Density (PSF)	% Passing #200 Sieve	Depth in Feet	Graphic Log	Description
										1		Brown Sandy LEAN CLAY (CL) with
	S&H	6								2		gravel, firm, moist
										3		
	S+H	12								4		- stiff
	2"	50								5		- Hard
										6		
	SPT	92										
										7		Refusal @ 6.5'
										8		
										9		No Free Water Encountered.
										10		
										11		
										12		
										13		
										14		
										15		
										16		
										17		
										18		
										19		
										20		

H. Allen Gruen
Geotechnical Engineer

Job No: 17-4702
Appr:
Drwn: LPDD
Date: 5-10-17

LOG OF BORING 1

3516 and 3526 Folsom Street
San Francisco, California

PLATE 2

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS More than Half > #200 sieve	GRAVELS MORE THAN HALF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL-SAND
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, POORLY GRADED GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVELS, POORLY GRADED GRAVEL-SAND-CLAY MIXTURES
	SANDS MORE THAN HALF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POOORLY GRADED SAND-SILT MIXTURES
			SC	CLAYEY SANDS, POORLY GRADED SAND-CLAY MIXTURES
FINE GRAINED SOILS More than Half < #200 sieve	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS, OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

UNIFIED SOIL CLASSIFICATION SYSTEM

Shear Strength, psf
Confining Pressure, psf

Consol	Consolidation	Tx	2630 (240)	Unconsolidated Undrained Triaxial
LL	Liquid Limit (in %)	Tx sat	2100 (575)	Unconsolidated Undrained Triaxial, saturated prior to test
PL	Plastic Limit (in %)	DS	3740 (960)	Unconsolidated Undrained Direct Shear
PI	Plasticity Index	TV	1320	Torvane Shear
Gs	Specific Gravity	UC	4200	Unconfined Compression
SA	Sieve Analysis	LVS	500	Laboratory Vane Shear
■	Undisturbed Sample (2.5-inch ID)	FS	Free Swell	
◪	2-inch-ID Sample	EI	Expansion Index	
◩	Standard Penetration Test	Perm	Permeability	
⊠	Bulk Sample	SE	Sand Equivalent	

KEY TO TEST DATA

H. Allen Gruen
Geotechnical Engineer

Appr:
Drwn: LPDD
Date:

SOIL CLASSIFICATION CHART AND KEY TO TEST DATA

3516 and 3526 Folsom Street
San Francisco, California

PLATE 3

APPENDIX B

List of References

1. Bonilla, M. G., 1998, *Preliminary Geologic Map of the San Francisco South 7.5' Quadrangle and Part of the Hunters Point 7.5' Quadrangle, San Francisco Bay Area, California*, United States Geological Survey Open-File Report OF-98-354, Scale 1:24,000.

2. California Department of Conservation, Division of Mines and Geology, 1998, *Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada.*

3. CDMG, 2000, State of California Seismic Hazards Zones, City and County of San Francisco, California Division of Mines and Geology.

4. Seed, H. B., and Idriss, E., 1982, *Ground Motion and Soil Liquefaction During Earthquakes*, Earthquake Engineering Research Institute Monograph.

5. United States Geological Survey, 1993, San Francisco South Quadrangle, 7.5 Minute Series, Scale 1:24,000.

APPENDIX C

Field Exploration

My field exploration consisted of a geologic reconnaissance and subsurface exploration by means of one test boring that was logged by my Engineer on May 10, 2017. The test boring was drilled with a hand carried, portable drill rig utilizing continuous flight, 4-inch-diameter augers. The boring was drilled at the approximate location shown on Plate 1.

The log of the test boring is displayed on Plate 2. Representative undisturbed samples of the earth materials were obtained from the test boring at selected depth intervals with a 1.4-inch inside diameter, split-barrel Standard Penetration Test (SPT) sampler, a 2-inch inside diameter, split-barrel sampler, and a 2.5-inch inside diameter, modified California sampler.

Penetration resistance blow counts were obtained by dropping a 140-pound hammer through a 30-inch free fall. The sampler was driven 24 inches or less and the number of blows was recorded for each 6 inches of penetration. The blows per foot recorded on the Boring Log represent the accumulated number of blows that were required to drive the sampler the last 12 inches or fraction thereof.

The soil classifications are shown on the Boring Log and referenced on Plate 3.

Laboratory Testing

Natural water contents and percentages of gravel, sand, and fines were determined on selected soil samples recovered from the test boring. The data are recorded at the appropriate sample depths on the Boring Log.

APPENDIX D

Distribution

Mr. Fabien Lannoye (4 wet signed and stamped originals)

241 Amber Drive
San Francisco, CA 94131
jfogarty@sonic.net
Fabien@bluorange.com

6734.2. Practice of mechanical engineering

Any person practices mechanical engineering when he professes to be a mechanical engineer or is in responsible charge of mechanical engineering work.

6735. Preparation, signing, and sealing of civil engineering documents

(a) All civil (including structural and geotechnical) engineering plans, calculations, specifications, and reports (hereinafter referred to as "documents") shall be prepared by, or under the responsible charge of, a licensed civil engineer and shall include his or her name and license number. Interim documents shall include a notation as to the intended purpose of the document, such as "preliminary," "not for construction," "for plan check only," or "for review only." All civil engineering plans and specifications that are permitted or that are to be released for construction shall bear the signature and seal or stamp of the licensee and the date of signing and sealing or stamping. All final civil engineering calculations and reports shall bear the signature and seal or stamp of the licensee, and the date of signing and sealing or stamping. If civil engineering plans are required to be signed and sealed or stamped and have multiple sheets, the signature, seal or stamp, and date of signing and sealing or stamping, shall appear on each sheet of the plans. If civil engineering specifications, calculations, and reports are required to be signed and sealed or stamped and have multiple pages, the signature, seal or stamp, and date of signing and sealing or stamping shall appear at a minimum on the title sheet, cover sheet, or signature sheet.

(b) Notwithstanding subdivision (a), a licensed civil engineer who signs civil engineering documents shall not be responsible for damage caused by subsequent changes to or uses of those documents, if the subsequent changes or uses, including changes or uses made by state or local governmental agencies, are not authorized or approved by the licensed civil engineer who originally signed the documents, provided that the engineering service rendered by the civil engineer who signed the documents was not also a proximate cause of the damage.

6735.1. Construction supervision; legal duty

The signing of civil engineering plans, specifications, reports, or documents which relate to the design of fixed works shall not impose a legal duty or responsibility upon the person signing the plans, specifications, reports, or documents to supervise the construction of engineering structures or the construction of the fixed works which are the subject of the plans, specifications, reports, or documents. However, nothing in this section shall preclude a civil engineer and a client from entering into a contractual agreement which includes a mutually acceptable arrangement for the provision of construction supervision services. Nothing contained in this subdivision shall modify the liability of a civil engineer who undertakes, contractually or otherwise, the provision of construction supervision services for rendering those services.

6735.3. Signing and sealing of electrical engineering documents

(a) All electrical engineering plans, specifications, calculations, and reports (hereinafter referred to as "documents") prepared by, or under the responsible charge of, a licensed electrical engineer shall include his or her name and license number. Interim documents shall include a notation as to the intended purpose of the document, such as "preliminary," "not for construction," "for plan check only," or "for review only." All electrical engineering plans and specifications that are permitted or that are to be released for construction shall bear the signature

ATTACHMENT F

City and County of San Francisco
Department of Building Inspection

Edwin M. Lee, Mayor
Tom C. Hui, S.E., C.B.O., Director

INFORMATION SHEET

NO. S-05

DATE : May 20, 2015

CATEGORY : Structural

SUBJECT : **Geotechnical Report Requirements**

PURPOSE : The purpose of this Information Sheet is to establish the permit work scope which will require the submittal of a geotechnical report.

REFERENCE : San Francisco Building Code (SFBC)
State of California Department of Conservation Division of Mines and Geology (CDMG) Seismic Hazard Zones Map for San Francisco, released November 17, 2000. [Note: Map is posted near 1660 Mission St. 2nd Floor Counter. "Liquefaction zones" are colored "Green," or Seismic Hazard Zones Map Indices listing property street addresses and/or blocks and lots which are in the potential landslide and liquefaction zones (see Attachments 1&2)]
Figure 4 of the San Francisco Seismic Safety Investigation report prepared by URS/John A. Blume & Associates, Engineers, June 1974. (Note: Map is posted near 1660 Mission St. 2nd Floor Counter. "Landslide Hazard Areas" are colored "Red")

DISCUSSION :

(A) Permit requiring geotechnical report

The following permit application submittal will require a geotechnical report:

1. New Building (with the exception of one-story storage or utility occupancy, including storage shed and garage)
2. Horizontal Additions if the footprint area increases more than 50% of the existing square footage
3. Horizontal and Vertical Additions increase more than 1000 square feet of projected roof area within the Landslide Hazard Areas (see Reference) per SFBC Section 106A.4.1.4.3 and per SFBC Section 106A.4.1.4.4.

[See SECTION (C) page 3]

4. Any of the following grading (per SFBC Section J104.3):
    a) Cut section is greater than 10 feet in vertical height.
    b) Cut slope is steeper than 2 horizontal to 1 vertical.
    c) The tops of cut banks are separated from any structure or major improvement by a distance, measured horizontally, less than the height of the bank.
    d) More than 5000 cubic yards are involved in grading.
    e) Grading performed at a site located within Earthquake Fault Zones, Seismic Hazard Zones, Landslide Zones (see Attachment 1), or Liquefaction Zones (see Attachment 2) as shown in the most recently published maps from California Geological Survey.

5. Slope of fill is steeper than two units horizontal to one unit vertical (50 percent slope) specified per SFBC Section J107.6, or deviate from the stipulated provisions in SFBC Section J107 Fills.

6. Any footings on/or adjacent to slopes steeper than one unit vertical in three units horizontal without clearances as indicated per SFBC Section 1808.7 and Figure 1808.7.1.

7. The design soil lateral loads are less than the minimum design requirements specified in Section 1610 Soil Lateral Loads.

8. The design load bearing value used exceeds values stipulated for Class 4 or 5 soil materials in SFBC Table 1806.2 Presumptive Load-Bearing Values.

9. Special foundation including but not limited to piles, piers, base isolation and any design not covered by code, excluding piers supporting a fence, sign or isolated post.

10. As required per Building Code:
    a) Expansive soil per SFBC Section 1803.5.3.
    b) Drainage system as an alternative to the requirements per SFBC Section J109 Drainage and Terracing.
    c) Water Table per SFBC Section 1803.5.4 to determine whether the existing ground-water table is above or within 5 feet below the elevation of the lowest floor level where such floor is located below the finished ground level adjacent to the foundation, unless waterproofing is provided in accordance with SFBC Section 1805.
    d) Ground improvement, including soil mix grouting and chemical soil grouting.
    e) Where shallow foundations will bear on controlled low-strength material (CLSM), a geotechnical investigation shall be conducted per SFBC Section 1803.5.9 Controlled low-strength material.
    f) Where geological investigation is deemed necessary per SFBC Section 1803 Geotechnical Investigations.

11. Permit scope subject to mandatory structural advisory review under SFBC Section 106A.4.1.2 Edgehill Slope Protection Area, Section 106A.4.1.3 Northwest Mt. Sutro Slope Protection Area.

12. All structures utilizing Modal Response Spectrum Analysis in accordance with ASCE 7-10 Section 12.9 Modal Response Spectrum Analysis.

Technical Services Division
1660 Mission Street – San Francisco CA 94103
Office (415) 558-6205 – FAX (415) 558-6401 – www.sfdbi.org

(B) Submittal requirements for geotechnical report (if required)

GEOTECHNICAL:

1. Provide original letter wet signed by geotechnical consultant, who is a licensed civil or geotechnical engineer, stating that they have reviewed and approved final structural plans.
   {Note: In addition to the licensed geotechnical or civil engineer, a licensed geologist is also required for properties subject to the Slope Protection Act [See SECTION (C) BELOW]}.

2. Provide two (2) sets of original geotechnical reports and one (1) CD-ROM:
   SOILS REPORTS: Effective November 1, 2011, DBI will no longer accept soils reports solely in "hard" copy format. Two (2) "hard" copies and one (1) copy on a CD-ROM in Adobe 'PDF' format are required. After DBI review, one "hard" copy will be returned to the applicant with a 'Received' stamp. DBI will retain its copy, and the CD-ROM will be sent to the State Department of Conservation, as required by state law.

3. Geotechnical report shall be in accordance with SFBC Section 1803.2 through Section 1803.6 and Section J104.3.

4. Civil engineers experienced in geotechnical engineering are authorized to practice geotechnical engineering. This includes preparing or reviewing soils reports.

(C) Projects subject to the Slope Protection Act (SFBC Section 106A.4.1.4)

Scope. Properties are subject to these requirements where any portion of the property lies within the areas of "Earthquake-Induced Landslide" in the Seismic Hazard Zone Map, released by California Department of Conservation, Division of Mines and Geology, dated November 17, 2000 (see Attachment 1), or amendments thereto; or within the "Landslide Hazard Areas" mapped as "Landslide Locations" in Figure 4 of the San Francisco Seismic Safety Investigation report prepared by URS/John A. Blume & Associates, Engineers, June 1974; or any successor map thereto. (see Reference)

Sites that are deemed stable by the geologist and where the geologist has mapped the site underlain by bedrock at depth shallower than the proposed depth of excavation are not required to be explored to depths specified in Section 1803.5.6.

Proposed construction work that is subject to these requirements includes the construction of new buildings or structures having over 1000 square feet of new projected roof area, and horizontal or vertical additions having over 1000 square feet projected roof area of newly constructed addition. In addition, these requirements shall apply to the following activity or activities, if determined by the plan reviewer that the proposed work may have a substantial impact on the slope stability of any property, such as: shoring, underpinning, excavation or retaining wall work; grading, including excavation or fill, of over fifty (50) cubic yards of earth materials; or any other construction activity. Such determination by plan reviewer shall be verified by supervisor or manager.

If required as above, permit applications submitted to the Department of Building Inspection for construction shall include report(s) prepared and signed by both a licensed geologist and a licensed geotechnical or civil engineer identifying areas of potential slope instability, defining potential risks of development due to geological and geotechnical factors, and drawing conclusions and making recommendations regarding the proposed development. These reports shall undergo design review by a licensed geotechnical or civil engineer. Such design review shall verify that appropriate geological and geotechnical issues have been considered and that appropriate slope instability mitigation strategies, including drainage plans if required, have been proposed.

Technical Services Division
1660 Mission Street – San Francisco CA 94103
Office (415) 558-6205 – FAX (415) 558-6401 – www.sfdbi.org

Procedure to request for Structural Advisory Committee (SAC). After reviewing all submitted information pursuant to Section 106A.4.1.4.4, the plan reviewer may request that the permit application be subject to review by a Structural Advisory Committee (SAC), as defined by Building Code Section 105A.6. Such request will be reviewed by Supervisor or Manager and needs to be approved by Deputy Director.

Site Permit Processing. For projects that may be subject to the Slope Protection Act, plan reviewer should request design professional to stipulate on plan the acknowledgement that: Addendum plan review may determine the project is subjecting to compliance with the Slope Protection Act that requires submittal of Geological and Geotechnical report(s) per SFBC Section 106A.4.1.4.4. Two (2) hard copies and one (1) CD_ROM of the report(s) shall be submitted to DBI upon request, prior to issuance of the structural or foundation addenda.

Tom C. Hui 5/20/15

Tom C. Hui, S.E., C.B.O. Date
Director
Department of Building Inspection

Attachments: Seismic Hazard Zones Map Indices

1. Addresses in LANDSLIDE ZONES
   www.sfdbi.org/IS_S05_Addresses_Landslide_Zones_Attachment01
2. Addresses in LIQUEFACTION ZONES
   www.sfdbi.org/IS_S05_Addresses_Liquefaction_Zones_Attachment02

This Information Sheet is subject to modification at any time. For the most current version, visit our website at http://www.sfdbi.org

San Francisco Seismic Safety Investigation

June 1974

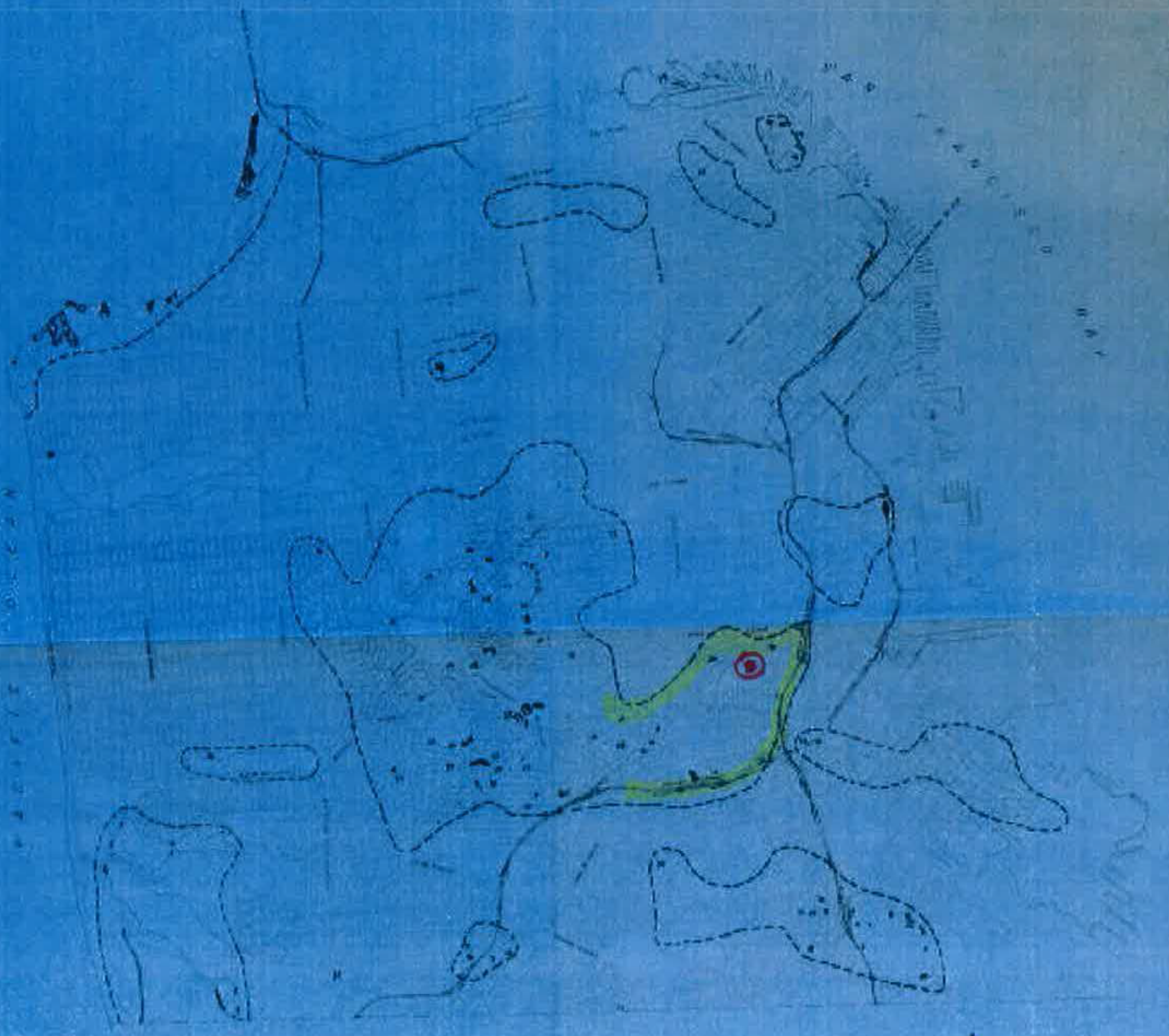
prepared for
The Department of City Planning
City of San Francisco

URS

John A. Blume & Associates, Engineers

San Francisco

A Member of URS Corporation



LANDSLIDE LOCATIONS

SAN FRANCISCO SEISMIC SAFETY INVESTIGATION
GEOLOGIC EVALUATION

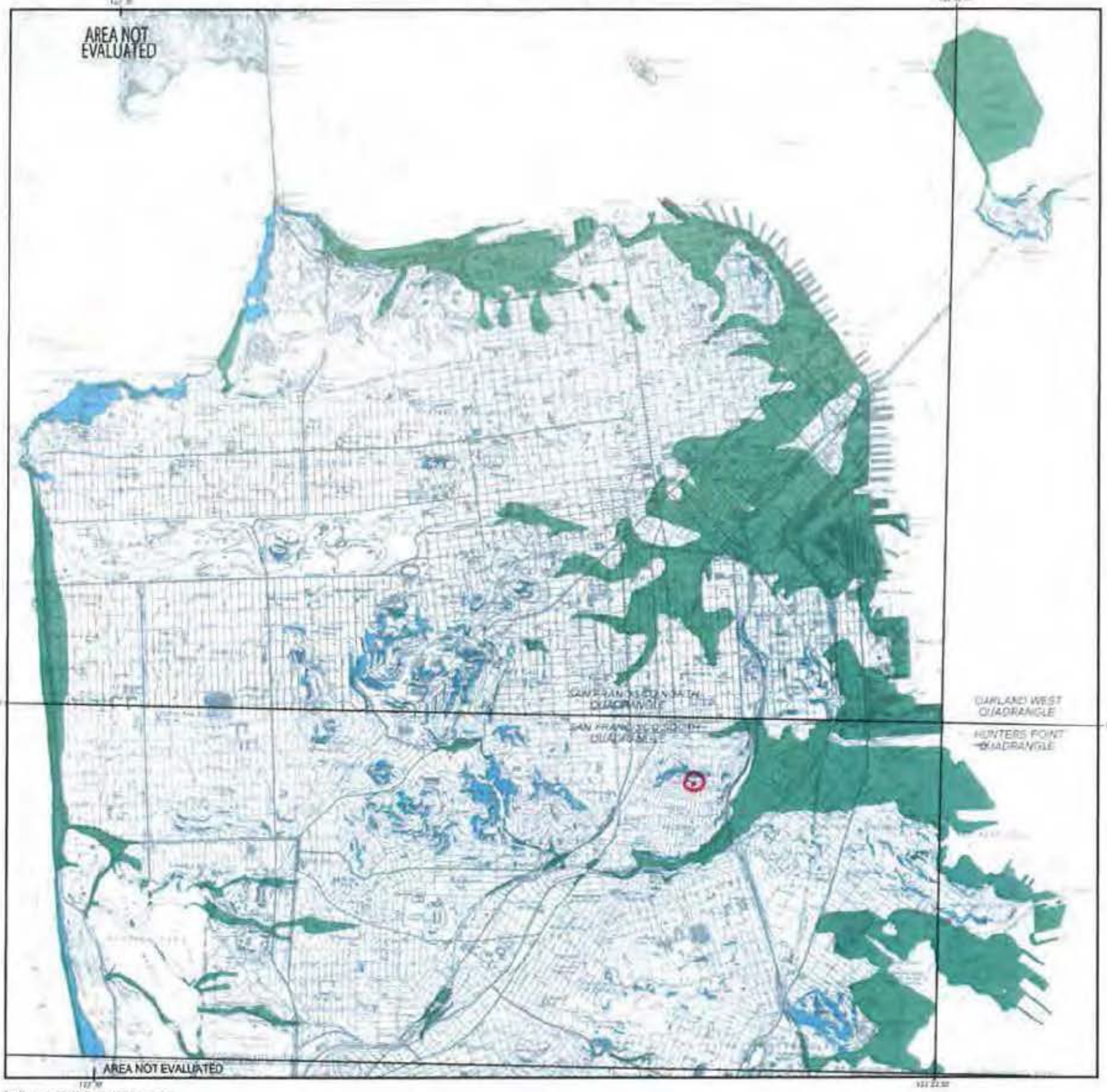
FIGURE 4

ATTACHMENT G

DIVISION OF MINES AND GEOLOGY
JAMES F. DAVIS, STATE GEOLOGIST

STATE OF CALIFORNIA-GRAY DAVIS, GOVERNOR
THE RESOURCES AGENCY-MARY D. NICHOLS, SECRETARY
DEPARTMENT OF CONSERVATION-DARRYL W. YOUNG, DIRECTOR

SEISMIC HAZARD ZONES
City and County of San Francisco



PURPOSE OF MAP

IMPORTANT - PLEASE NOTE

STATE OF CALIFORNIA
SEISMIC HAZARD ZONES

CITY AND COUNTY OF SAN FRANCISCO

OFFICIAL MAP

Released: November 17, 2000

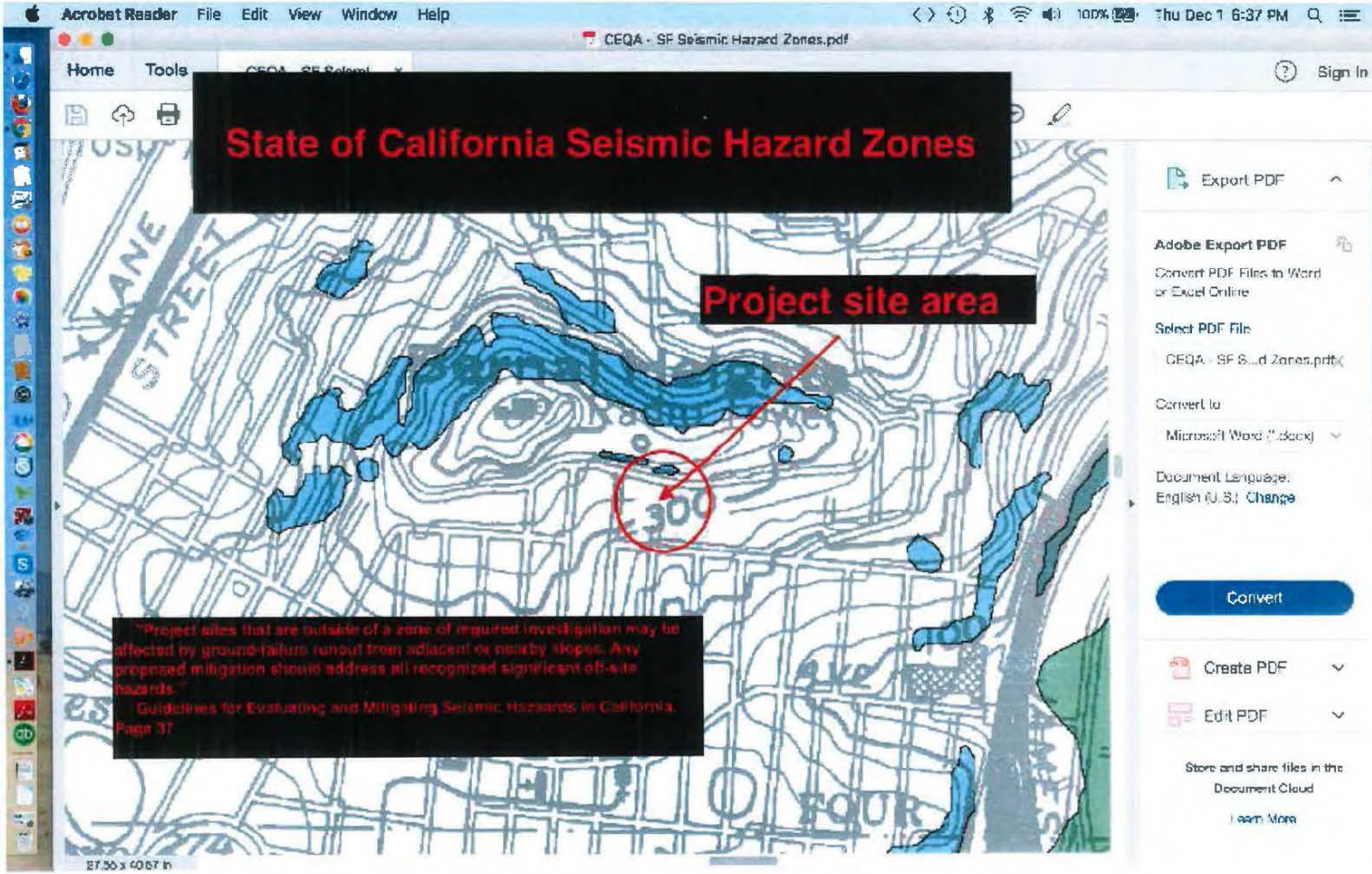
STATE GEOLOGIST

MAP EXPLANATION
Zones of Required Investigation:

Liquefaction

Earthquake-Induced Landslides

DATA AND METHODOLOGY USED TO DEVELOP THIS MAP ARE PRESENTED IN THE FOLLOWING:



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Thu Dec 1 6:37 PM
CEQA - SF Seismic Hazard Zones.pdf
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State of California Seismic Hazard Zones
Project site area
"Project sites that are outside of a zone of required investigation may be affected by ground-failure runout from adjacent or nearby slopes. Any proposed mitigation should address all recognized significant off-site hazards."
Guidelines for Evaluating and Mitigating Seismic Hazards in California, Page 37
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Adobe Export PDF
Convert PDF Files to Word or Excel Online
Select PDF File
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Microsoft Word (*.docx)
Document Language:
English (U.S.) Change
Convert
Create PDF
Edit PDF
Store and share files in the Document Cloud
Learn More

SPECIAL PUBLICATION 117

GUIDELINES FOR EVALUATING AND MITIGATING SEISMIC HAZARDS IN CALIFORNIA

Adopted March 13, 1997 by the State Mining and Geology Board in Accordance with the Seismic Hazards Mapping Act of 1990

Copies of these Guidelines, California's Seismic Hazards Mapping Act, and other related information are available on the World Wide Web at
Copies also are available for purchase from the Public Information Offices of the California Geological Survey.

CALIFORNIA GEOLOGICAL SURVEY'S PUBLIC INFORMATION OFFICES:

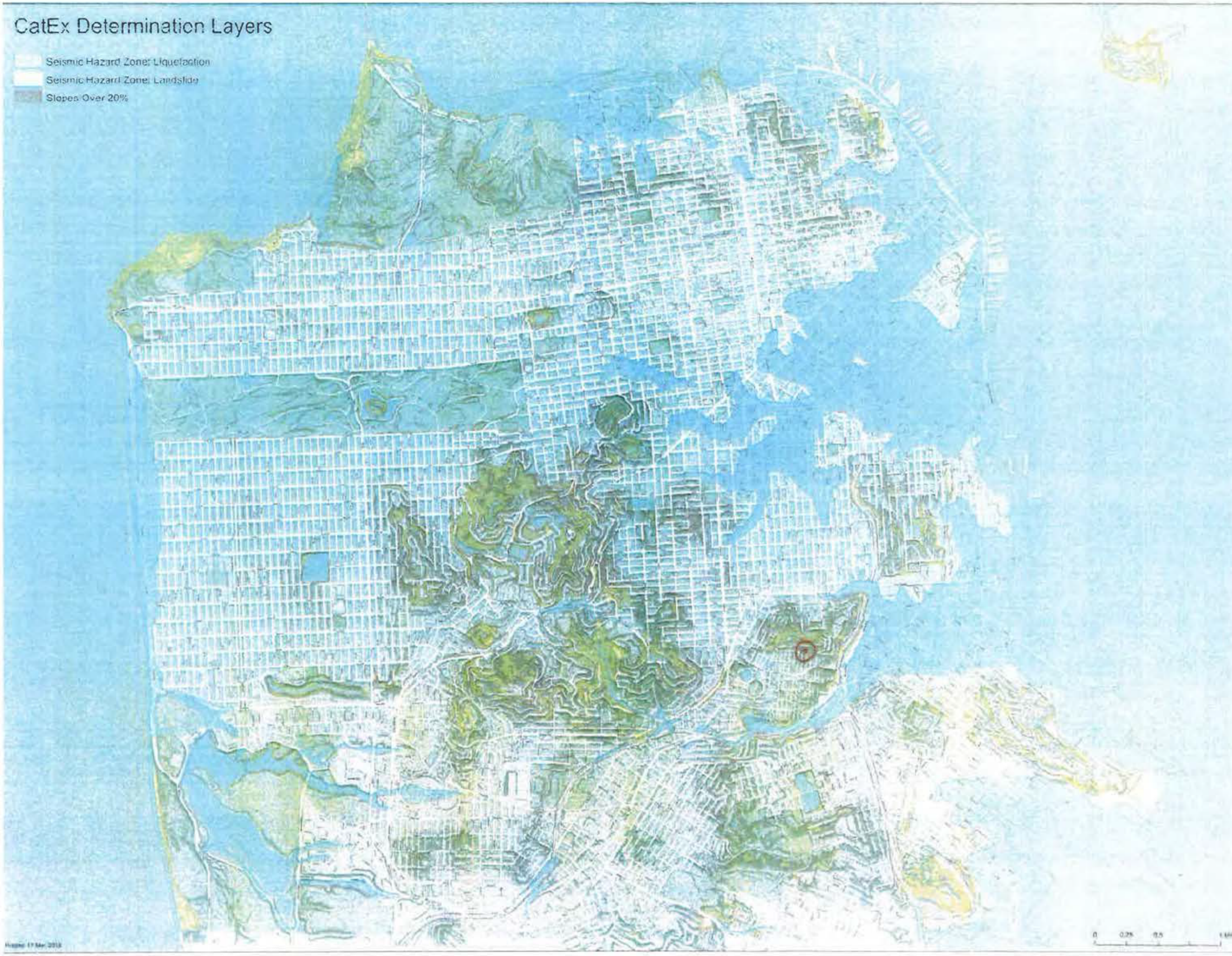
Southern California Regional Office
655 South Hope Street, Suite 700
Los Angeles, CA 90017-3231
(213) 239-0878

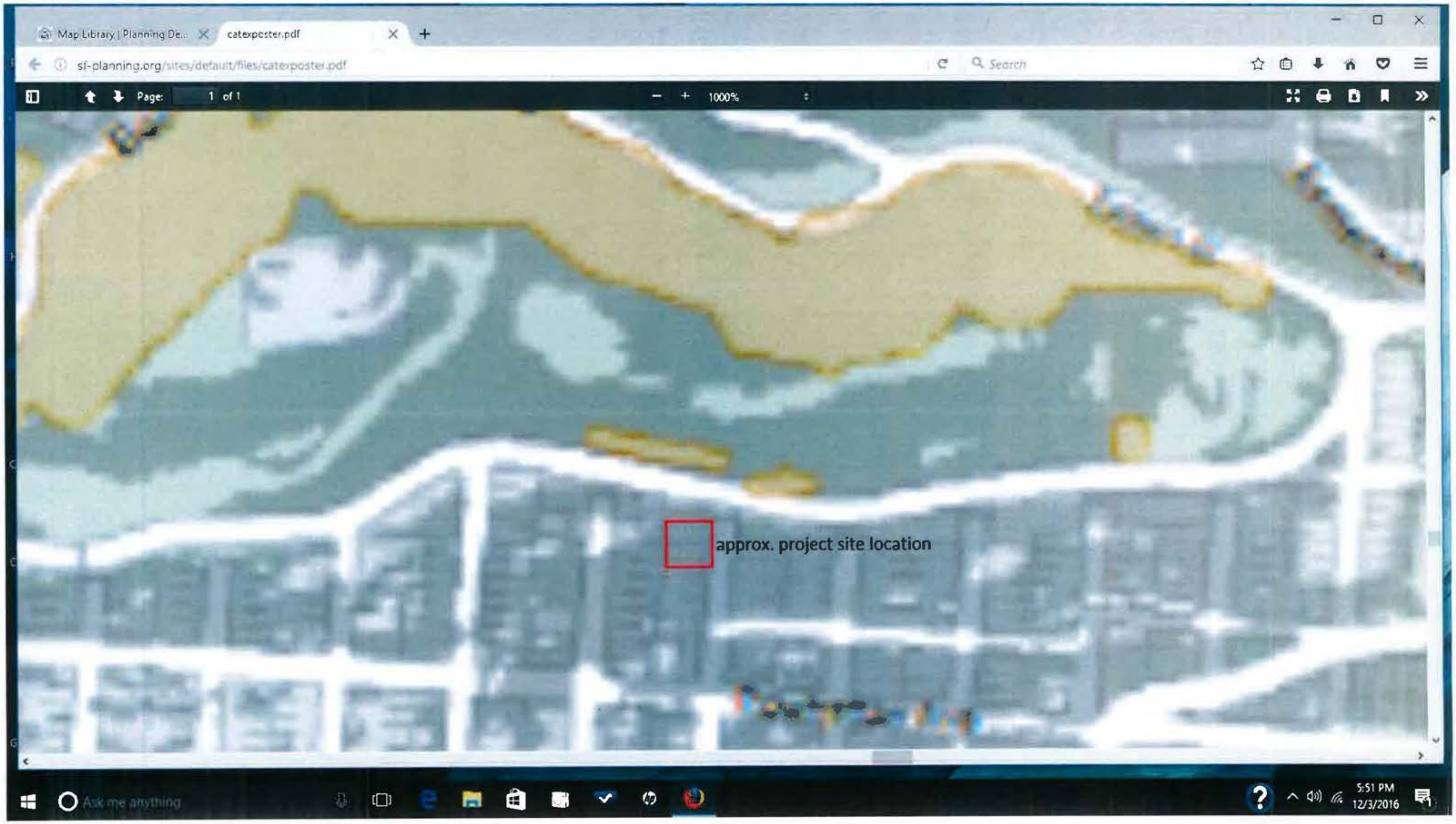
Publications and Information Office
801 K Street, MS 14-33
Sacramento, CA 95814-3532
(916) 445-5716

Bay Area Regional Office
185 Berry Street, Suite 210
San Francisco, CA 94107-1728
(415) 904-7707

ATTACHMENT H

SAN FRANCISCO PLANNING DEPARTMENT

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Page: 1 of 1
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approx. project site location
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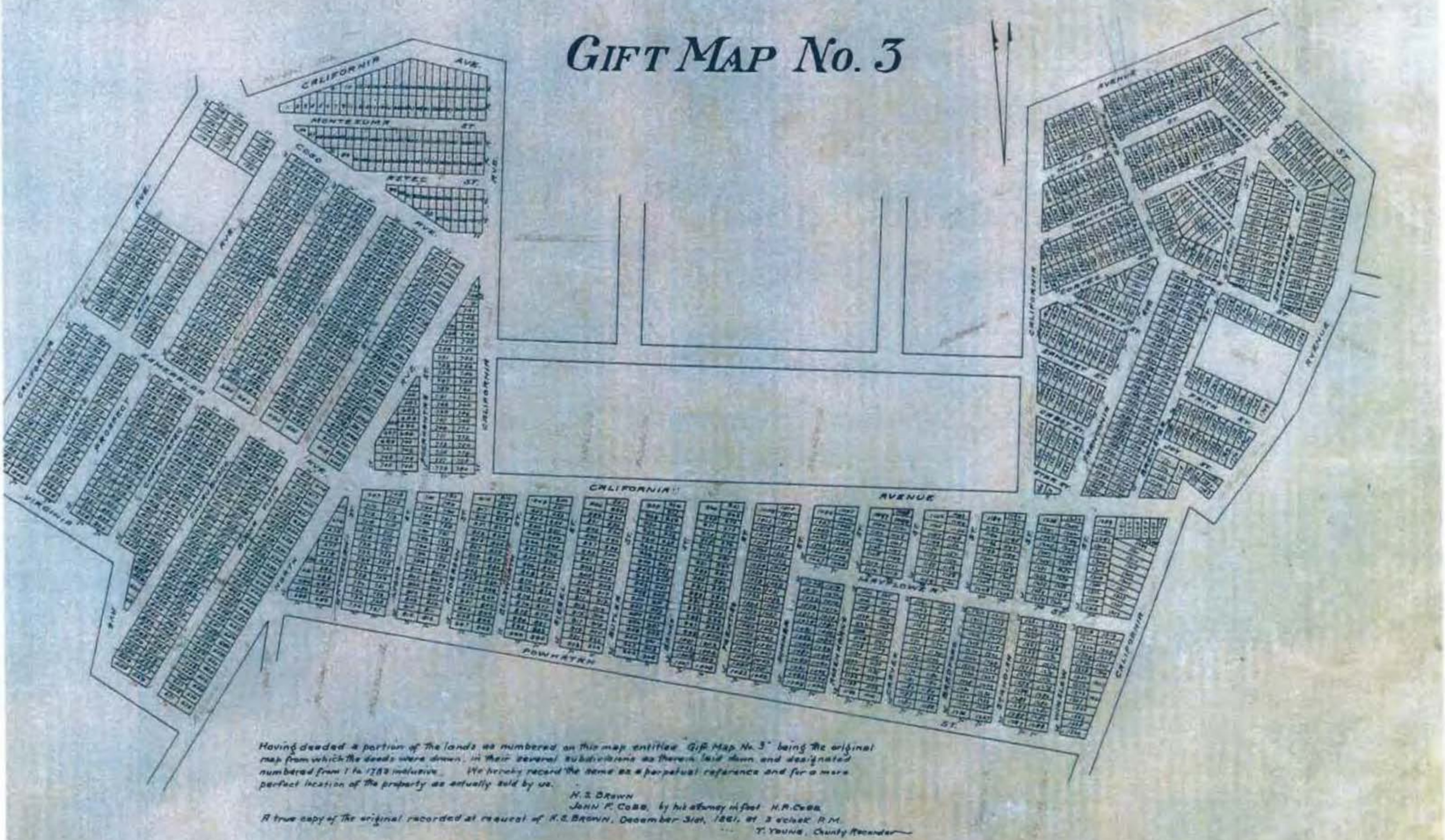
CatEx Determination Layers

- Seismic Hazard Zone: Liquefaction
- Seismic Hazard Zone: Landslide
- Slopes Over 20%

ATTACHMENT I

Gift Map No. 3

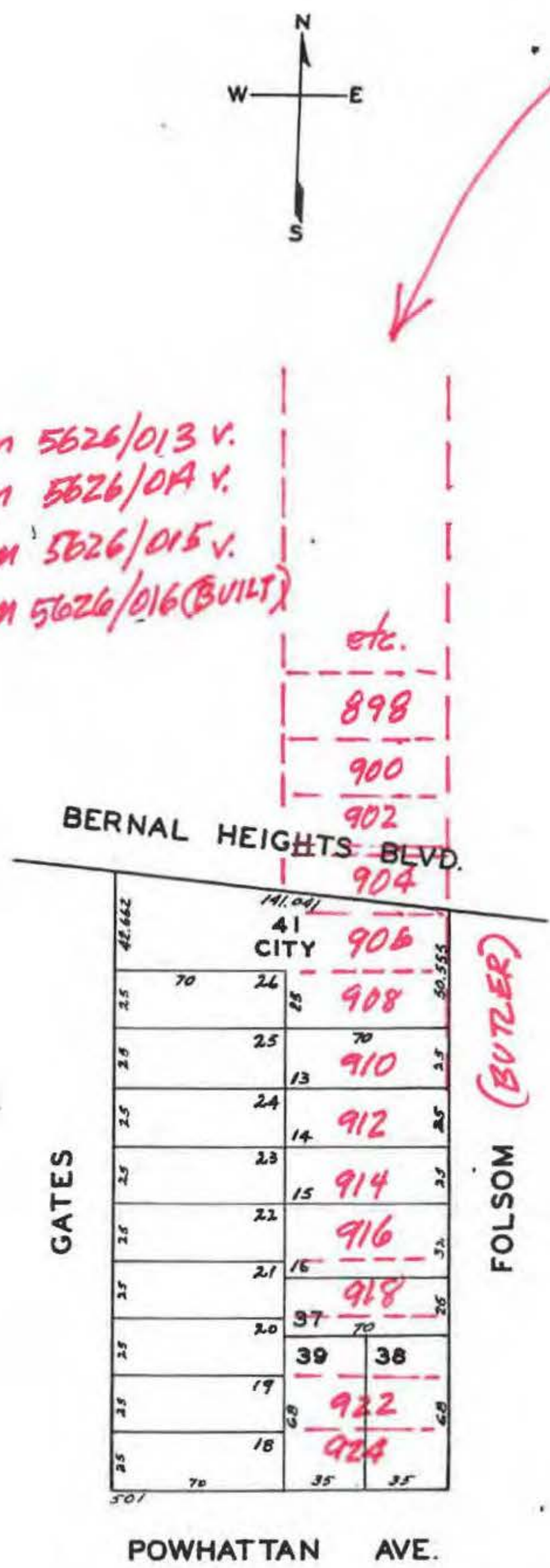

CALIFORNIA AVE.
MONTEZUMA ST.
COBB
AZTEC ST.
CALIFORNIA
CALIFORNIA AVENUE
POWHATAN ST.
MAYFLOWER ST.
PROSPECT
VIRGINIA
AVENUE
Having deeded a portion of the lands as numbered on this map entitled "Gift Map No. 3" being the original map from which the deeds were drawn, in their several subdivisions as therein laid down and designated numbered from 1 to 1782 inclusive. We hereby record the same as a perpetual reference and for a more perfect location of the property as actually sold by us.
H. S. BROWN
JOHN F. COBB, by his attorney in fact H. R. COBB
A true copy of the original recorded at request of H. S. BROWN, December 31st, 1861, at 3 o'clock P.M.
T. YOUNG, County Recorder

5626

GIFT MAP NO 3
LOTS 886-924

REVISED '62
" '66
" '69
" '70

910 → 3516 Folsom 5626/013 V.
912 → 3526 Folsom 5626/014 V.
914 → 3550 Folsom 5626/015 V.
916 → 3574 Folsom 5626/016 (BUILT)



K 7397

DEED NO. 169

Conveyance of Real Estate

SOLD FOR NONPAYMENT OF STATE AND COUNTY TAXES FOR THE YEAR 19 29

SALE NO. 2565, VOL. 34, PAGE 59, SUB. ____, BILL NO. 760

THIS INDENTURE, Made the 2nd day of July A.D. 19 35 between EDWARD F. BRYANT, Tax Collector of the City and County of San Francisco, State of California, first party, and the State of California, second party, witnesseth:

THAT WHEREAS, The real property hereinafter described was duly assessed for taxation in the year A.D. 19 29, to NELLIE V. HALL

and was thereafter on the 23rd day of June A.D. 19 30 duly sold to the State of California by EDWARD F. BRYANT, Tax Collector of said City and County of San Francisco, for nonpayment of delinquent taxes which had been legally levied in said year A.D. 19 29 for the year 19 29, and were a lien on said real property, the total amount for which the same was sold being FOUR AND 83/100 Dollars;

AND WHEREAS, The period of five years has elapsed since said sale and no person has redeemed the said property;

NOW THEREFORE, The said first party in consideration of the premises, and in pursuance of the statute in such case made and provided, does hereby grant to the said second party that certain real property in the City and County of San Francisco, State of California, more particularly described as follows, to wit:

The lot of land numbered 13 in Block Numbered 5626 as delineated and designated in Assessor's Map Book filed in the office of the City and County Recorder on October 22, 1929.

IN WITNESS WHEREOF, Said first party has hereunto set his hand the day and year first above written.

EDWARD F. BRYANT
Tax Collector of the City and County of San Francisco.

Witness:

T. J. SICOTTE

STATE OF CALIFORNIA
CITY AND COUNTY OF SAN FRANCISCO, } ss.

On this 15th day of August, in the year one thousand nine hundred thirty-five, before me, H. I. MULCREVY, County Clerk and ex officio Clerk of the Superior Court of the City and County of San Francisco, State of California, personally appeared the within named Edward F. Bryant, known to me to be the Tax Collector of said City and County of San Francisco, whose name is subscribed to the within instrument, and personally known to me to be the person who executed the within instrument and subscribed his name thereto as Tax Collector, and he duly acknowledged to me that he executed the same as such Tax Collector.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official Seal at my office in the City and County of San Francisco, the day and year in this Certificate first above written.

(Seal)

H. I. MULCREVY,
County Clerk and ex officio Clerk of the Superior Court

Filed for record at the request of EDWARD F. BRYANT, *Tax Collector*, Aug. 19, *A.D. 19* 35, *at* 30 *min. past* 8 *o'clock,* A. *M., and recorded in Vol* 2756 *of* Official Records, *page* 345

Leonard Jorshausen
RECORDER County Recorder

By ____ Deputy Recorder

Compared--Book NTLSH Compared--Document Kinroc

J. S. HAUKE
TO
CITY AND COUNTY OF S. F.

RESOLUTION NO.34125 (New Series)

RESOLVED, that the offers of sale made by the following named persons to sell to the City and County of San Francisco, the following described land required for the opening of Bernal Heights Boulevard, for the sums set forth opposite their names, be accepted:

J. S. HAUKE, all of Lots 11 and 12, in Block 5626, as per the Assessor's Block Books of the City and County of San Francisco, $2,800.00.

AND the City Attorney is hereby authorized to examine the titles to said property, and if the same is found satisfactory, to accept on behalf of the City, deeds conveying said property to the City, free and clear of all encumbrances and to record said deeds, together with a copy of this resolution in the office of the Recorder of the City and County of San Francisco, State of California.

ADOPTED--Board of Supervisors, San Francisco, March 16, 1931.

AYES: Supervisors Andriano, Canepa, Colman, Gallagher, Gerrity, Havenner, Hayden, Miles, Peyser, Shannon, Spaulding, Stanton, Suhr.

ABSENT: Supervisors Breyer, McGovern, McSheehy, Power, Roncovieri.

J. S. DUNNIGAN, Clerk.

APPROVED, San Francisco, March, 18, 1931.

ANGELO J. ROSSI, Mayor.

THIS INDENTURE, made this 27" day of March, One Thousand Nine Hundred Thirty-one, by and between JOSEPH S. HAUKE (also known as J. S. Hauke), a widower, of the City and County of San Francisco, State of California, the party of the first part, and the CITY AND COUNTY OF SAN FRANCISCO, a municipal corporation, the party of the second part,

WITNESSETH: That the said party of the first part, in consideration of the sum of TWO THOUSAND EIGHT HUNDRED AND 00/100 DOLLARS ($2,800.00), lawful money of the United States of America, to him in hand paid by the said party of the second part, the receipt whereof is hereby acknowledged, does by these presents, grant, bargain and sell unto the said party of the second part, and to its successors and assigns forever, all that certain lot, piece or parcel of land situate in the City and County of San Francisco, State of California, and more particularly described as follows, to-wit:

LOTS 906 and 908, according to Map entitled "Gift Map No. 3", filed in the office of the Recorder of the City and County of San Francisco, State of California, December 31, 1861, and recorded in Map Book "2 A and B", at page 15.

TOGETHER with the tenements, hereditaments and appurtenances thereunto belonging or appertaining, and the reversion and reversions, remainder and remainders, rents, issues and profits thereof.

TO HAVE AND TO HOLD the said premises, together with the appurtenances, unto the said party of the second part, and to its successors and assigns forever.

IN WITNESS WHEREOF, the said party of the first part has hereunto set his hand the day and year first hereinabove written.

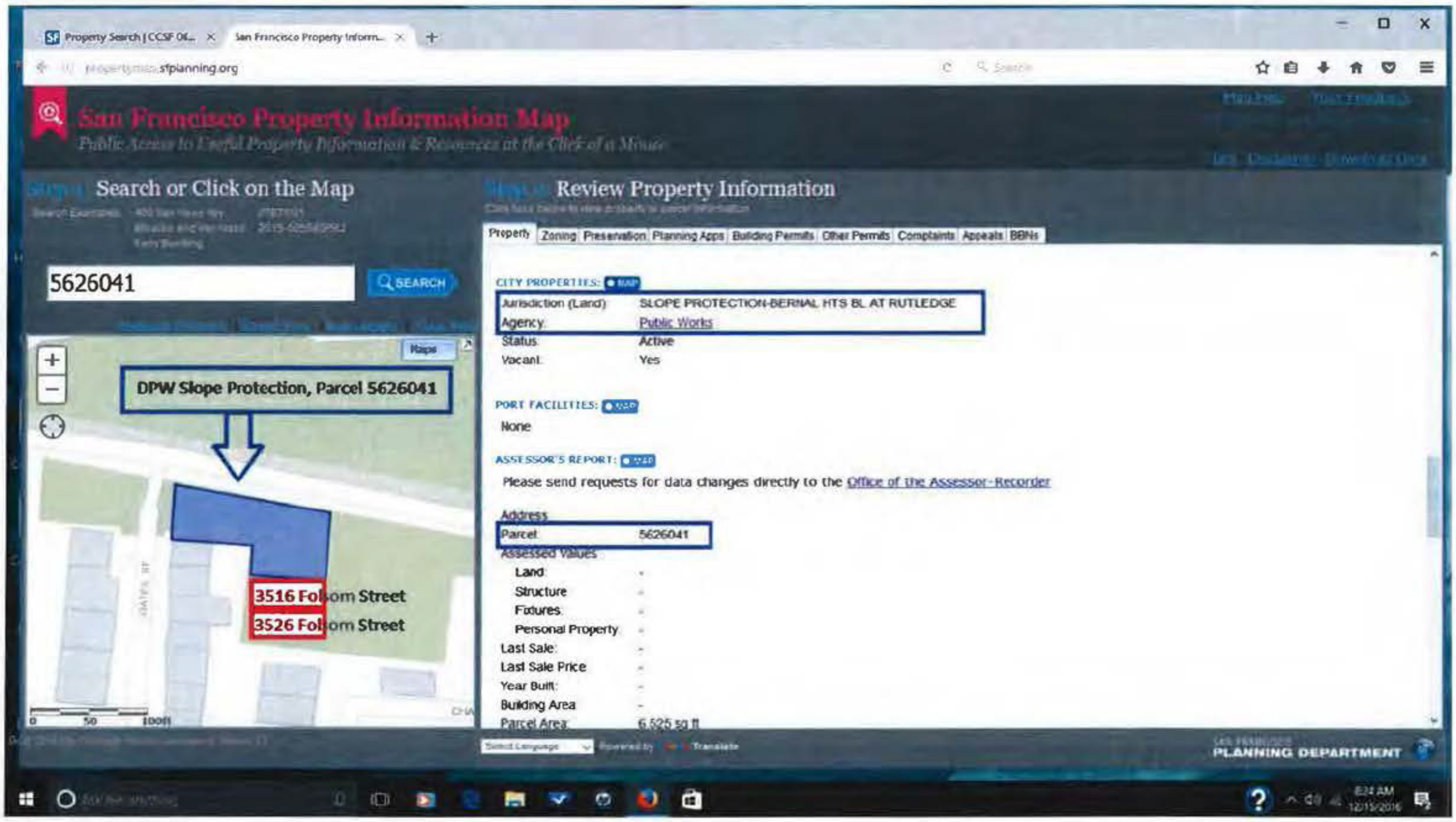
J. S. HAUKE
JOSEPH S. HAUKE

State of California,
City and County of San Francisco } ss.

ON the 27th day of March, in the year one thousand nine hundred and thirty-one, (1931) before me, Charles D. O'Connor, a Notary Public, in and for the said City and County,

ATTACHMENT J


3574 Folsom St


Property Search | CCSF Of...
San Francisco Property Inform...
sfplanning.org
San Francisco Property Information Map
Search or Click on the Map
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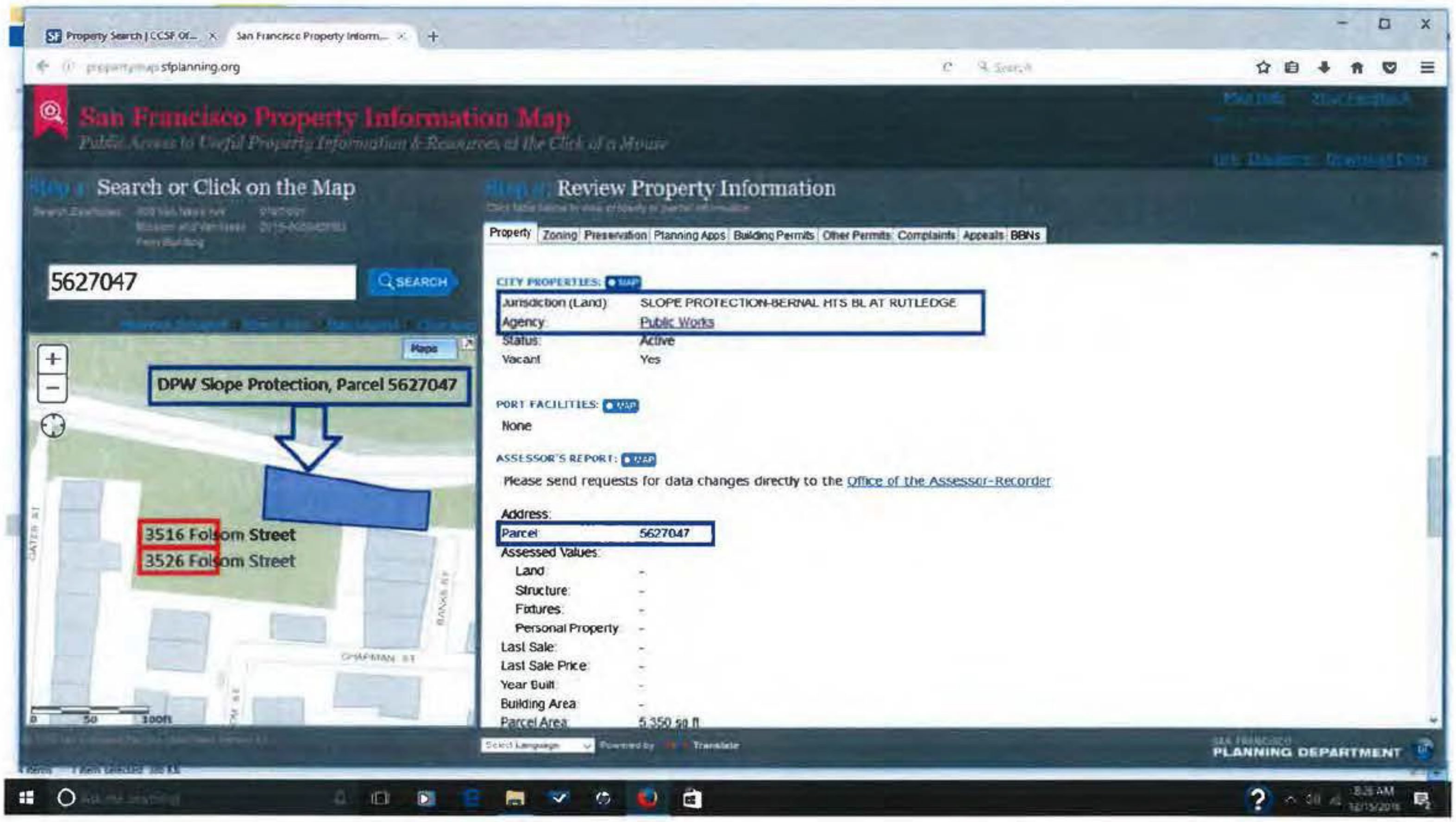
SEARCH
DPW Slope Protection, Parcel 5626041
3516 Folsom Street
3526 Folsom Street
Review Property Information
Property
Zoning
Preservation
Planning Apps
Building Permits
Other Permits
Complaints
Appeals
BBNs
CITY PROPERTIES:
Jurisdiction (Land) SLOPE PROTECTION-BERNAL HTS BL AT RUTLEDGE
Agency Public Works
Status Active
Vacant Yes
PORT FACILITIES:
None
ASSESSOR'S REPORT:
Please send requests for data changes directly to the Office of the Assessor-Recorder
Address
Parcel 5626041
Assessed Values
Land
Structure
Fixtures
Personal Property
Last Sale
Last Sale Price
Year Built
Building Area
Parcel Area 6,525 sq ft
PLANNING DEPARTMENT



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Zoning
Preservation
Planning Apps
Building Permits
Other Permits
Complaints
Appeals
BBNs
Maps
DPW Slope Protection, Parcel 5627047
3516 Folsom Street
3526 Folsom Street
CHAPMAN ST
BANKS ST
CITY PROPERTIES:
Jurisdiction (Land) SLOPE PROTECTION-BERNAL HTS BL AT RUTLEDGE
Agency Public Works
Status Active
Vacant Yes
PORT FACILITIES:
None
ASSESSOR'S REPORT:
Please send requests for data changes directly to the Office of the Assessor-Recorder
Address:
Parcel 5627047
Assessed Values:
Land -
Structure -
Fixtures -
Personal Property -
Last Sale -
Last Sale Price -
Year Built -
Building Area -
Parcel Area 5,350 sq ft
Translate
PLANNING DEPARTMENT

ZACKS, FREEDMAN & PATTERSON
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September 11, 2017

VIA HAND DELIVERY AND EMAIL

President London Breed
c/o Angela Calvillo, Clerk of the Board
San Francisco Board of Supervisors
1 Dr. Carlton B. Goodlett Place
City Hall, Room 244
San Francisco, CA 94102

Re: Appeal of CEQA Mitigated Negative Declaration
Planning Case No. 2013.1383ENV
Building Permit Application Nos. 2013.12.16.4318 and 2013.12.16.4322
3516 and 3526 Folsom Street ("Project Site")

Dear President Breed and Honorable Members of the Board of Supervisors:

Please find the following document enclosed:

Exhibit

O. Independent Evaluation of the San Francisco Planning Department Mitigated Negative Declaration, prepared by Engineering Design & Testing Corp. (Kenneth Ridings, P.E. and Steve Viani, P.E.), Sept. 11, 2017

The reviewing engineers conclude:

> As a result of these deficiencies in the MND, a significant possibility of a catastrophic release of natural gas from L109 during construction of the Project still exists. . . . **Based on our review and analysis, it is our expert opinion that there still exists a high risk that has not been mitigated based on our review of the MND. It is our opinion the failure to mitigate the risks are significant and a potential for damage and explosion of PG&E's gas transmission pipeline L109 still exists.** (Report, pp. 4, 10.)

Without question, this report constitutes substantial evidence requiring the preparation of an environmental impact report (EIR). A mitigated negative declaration cannot be adopted unless "there is **no substantial evidence** in light of the whole record before the public agency that the project, as revised, **may** have a significant effect on the environment." (Pub. Resources Code, § 21064.5 (emphasis added).)

"If the administrative record before the agency contains substantial evidence that the project may have a significant effect on the environment, **it cannot adopt a negative declaration**; it must go to on the third stage of the CEQA process: preparation and certification of an EIR." (Gentry v. City of Murrieta (1995) 36 Cal.App.4th 1359, 1372, as modified on denial of reh'g (Aug. 17, 1995) (emphasis added), citing Pub. Resources Code §§ 21100, 21151; Guidelines, §§ 15002, subd. (k)(3), 15063, subd. (b)(1), 15064, subds. (a)(1), (g)(1), 15362.))

Very truly yours,

ZACKS, FREEDMAN & PATTERSON, PC

Ryan J. Patterson
Attorneys for Herb Felsenfeld and Gail Newman

EXHIBIT O

ENGINEERING DESIGN & TESTING Corp.
ENGINEERS / CONSULTANTS / LABORATORIES

OAKLAND DISTRICT OFFICE:
POST OFFICE BOX 5126
CONCORD, CA 94524

(925) 674-8010
FACSIMILE TRANSMISSION:
(925) 674-8424

September 11, 2017

SF Board of Superviors
San Francisco City Hall
1 Dr, Carlton B Goodlett Pl. #244
San Francisco, CA 94102

REFERENCE: 3516 and 3526 Folsom Street, San Francisco, CA
SF Planning Department Case No. 2013.1383ENV
ED&T File Number: OAK2319-61292

Dear President Breed and Honorable Members of the Board of Supervisors,

This letter is in response to a request for Engineering Design & Testing (ED&T) to conduct an independent evaluation of the San Francisco Planning Department Mitigated Negative Declaration (MND) for the 3516 & 3526 Folsom Street project (Project) as it pertains to Pacific Gas & Electric Company's (PG&E) natural gas transmission pipeline L109. Mr. Steven Viani, P.E. and Mr. Kenneth Ridings, P.E. reviewed the following documents in the evaluation, which are sufficient to analyze the Project's MND:

- The MND with a focus on Impact NO-3 and referenced footnote documents, Figures 1-12 and Mitigation Measures
- MND Appeal dated September 5, 2017
- Spectra Energy Partners - Algonquin Incremental Market Project – Analysis of the West Roxbury Crushed Stone Operations on Construction and Operation of the West Roxbury Lateral dated March 31, 2014
- Letter from Lubin Olson to President London Breed dated September 1, 2017 regarding Appeal of MND
- Reported email from Austin Sharp with PG&E (date understood to be mid-2014) to Debra Gerson and Herb Felsenfeld (nearby neighbors to the project) and Fabien Lannoye (Bluorange Designs) contained as Appendix A in letter from Lubin Olson to President London Breed dated September 1, 2017
- 49 Code of Federal Regulations Part 192 – Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards

- ASME B31.8S-2016 Managing System Integrity of Gas Pipelines
- U.S. Department of Transportation - Pipeline and Hazardous Materials Administration – Reportable Incident Data
- Foot note 3: John Dolcini, Pipeline Engineer-Gas Transmission, Pacific Gas and Electric Company, Letter Re: 3516/3526 Folsom Street, March 30, 2017
- Foot note 20: Federal Transit Administration (FTA), Transit Noise and Vibration Impact Assessment, May 2006, pp. 8-1 to 8-3, Table 8-1.
- Foot note 30: US Department of Transportation, Federal Highway Administration, Construction Noise Handbook, Table 9.1, July 2011.
- Foot note 31: Illingworth and Rodkin, Inc., Construction Vibration Evaluation for 3516 and 3526 Folsom Street, March 24, 2017.
- Illingsworth & Rodkin Inc., Memo: Ground Characteristics and Effect on Predicted Vibration, April 14, 2017.
- California Department of Transportation, Transportation and Construction Vibration Guidance Manual, September 2013.
- PG&E Gas Transmission Pipeline Services—Integrity Management, 3516/26 Folsom Street, March 30, 2017.
- H. Allen Gruen, Geotechnical Engineer, Geotechnical Investigation, Planned Development at 3516 Folsom Street, San Francisco, California, August 3, 2013. H. Allen Gruen, Geotechnical Engineer, Geotechnical Investigation, Planned Development at 3526 Folsom Street, San Francisco, California, August 3, 2013.
- Geotechnical Report Update, Proposed Residence at 3516 & 3526 Folsom Street San Francisco, California by H. Allen Gruen,11/29/16
- Geotechnical Responses to Project Review Letter, Proposed Residence at 3516 & 3526 Folsom Street San Francisco, California by H. Allen Gruen, 1/24/17
- Review of Proposed Pipeline Impacts 3516 & 3526 Folsom Street, San Francisco, California, Storesund Consulting, June 14, 2017
- Mitigated Negative Declaration Appeal, 3516 & 3526 Folsom Street September 5, 2017, San Francisco Planning Department
- David J. Franco PE, 3516 & 3526 Folsom Street Grading Plan, 9/21/16
- Planned Street and Utility Improvements at 3516 & 3526 Folsom Street San Francisco, California by H. Allen Gruen, 7/6/17

Please note that the preceding is based on information available at the time of this writing. It is conceivable that additional information may be forthcoming which bears on stated observations and opinions. The right is reserved, therefore, to review and modify all observations and opinions at any future point in time should, in fact, additional information become available.

Mr. Ridings is a licensed Professional Mechanical Engineer in California and other states. I worked in the "gas department" at PG&E for 25 years beginning in 1979 and have worked at ED&T since 2005.

While at PG&E, I worked in field operations (gas distribution and transmission) for 9 years and in corporate staff support departments for 16 years. While in field operations I supervised multi-disciplined work groups responsible for the engineering, design, operations and maintenance of 2700 miles of distribution and transmission pipelines, including locating and marking underground pipes, investigated gas incidents and damage caused by third party dig-ins and reviewed street construction plans for conflicts with gas facilities.

While in corporate staff support at PG&E, I investigated the cause of and emergency response to gas distribution and transmission incidents; interpreted regulatory code requirements; developed certain engineering, construction, and operations and maintenance standards for gas distribution facilities; oversaw the development and implementation of certain construction, engineering, operations and maintenance standards, procedures for gas distribution piping systems including the locating and marking of underground pipes; and oversaw staff that provided training and technical support to field operations.

Currently at ED&T I conduct engineering investigations to determine the cause of damage to or from fuel gas piping systems and facilities; infrastructure utilities and piping systems; HVAC and refrigeration systems; fire suppression systems; cranes/heavy equipment, machinery and equipment.

Mr. Viani has over 40 years professional experience planning, designing and constructing, civil, environmental and geotechnical projects. I am a registered civil engineer in California and two other states. In addition, I am a licensed engineering (A) and building (B) contractor with a hazardous waste removal endorsement. Throughout my career, I have been involved with the CEQA process for a variety of projects including wastewater treatment, environmental remediation and environmental protection. During my tenure with ED&T, I have been involved with numerous related assignments involving the identification and assessment of vibration from construction equipment and blast related vibration damage.

The above qualifies us to evaluate the MND as it pertains to PG&E's gas transmission pipeline L109.

Please note that the preceding is based on information available at the time of this writing. It is conceivable that additional information may be forthcoming which bears on stated observations and opinions. The right is reserved, therefore, to review and modify all observations and opinions at any future point in time should, in fact, additional information become available.

Our Curriculum Vitaes are attached.

Based on our review of the Project and the aforementioned documents, ED&T's findings and expert opinions of the MND are:

1. The Construction Vibration Evaluation (Vibration Evaluation) performed by Illingworth and Rodkin, Inc. on behalf of Bluorange is not complete and does not accurately determine what vibration level is safe for L109.
2. The Vibration Evaluation does not adequately address the types of equipment that may be used and the vibration levels imparted on L109 by said equipment.
3. Impact NO-3 was not adequately analyzed and mitigated.
4. The height of soil (cover) on top of L109 in the Project area has not been determined. The cover must be determined prior to issuance of a mitigated negative declaration because the following steps cannot be taken without this information:
    a. Determination of whether the pipeline risk will increase, decrease or remain the same following construction of the project.
    b. Determination of whether the soil cover over the pipe is too shallow and what mitigation measures need to be imposed.
    c. Determination of safe designs and specifications for the Project to ensure that the Project remains stable, rather than being significantly changed during construction as a result of observed physical conditions of L109 and depth of cover.
5. That a PG&E inspector, or an independent, qualified third party inspector, be present for the entire project.
6. That every project employee be trained in PG&E's requirements and restrictions for working in the vicinity gas transmission pipelines and requirements that are specific to the Project.

As a result of these deficiencies in the MND, a significant possibility of a catastrophic release of natural gas from L109 during construction of the Project still exists.

Opinion 1: The Vibration Evaluation for the proposed project references a Caltrans report where a Peak Particle Velocity (PPV) value of 25 inches/second (ips) associated with explosives near buried pipe resulted in no damage to the pipe, as did values for explosives near buried pipe of 50-150 ips. PPV is the speed of a particle in a medium as it transmits a wave. It is a measurement of vibration. These vibrations can cause damage to any structure.

The MND states that the Vibration Evaluation utilized a "conservative" 12 ips, a value that was in the Spectra Energy report, as the criterion for potential damage to L109. The Spectra project involved determining the impacts of blasting at a rock quarry on a proposed natural gas transmission pipeline in Massachusetts.

Problems with the Vibration Evaluation and MND include:

- The vibrations were from explosives, not continuously vibrating equipment. It is understood that explosives are not planned for this project. Continuous vibrations impart cyclical loads on the pipe. The Caltrans documents suggest that acceptable PPV values for continuous vibrations are half of acceptable values for surface blasting.

- In the Caltrans report referenced in the Vibration Evaluation where no damage was observed when blasting vibration levels were at certain levels, there is no description as to the type of damage that was not observed or how it was determined that there was no damage. Was the pipe dug up and examined to see whether the pipe had bent? Was the determination of no damage made because no leaks were observed? Steel pipe can be damaged, compromising its strength, without immediately detectable leakage. No correlation is shown between the types of damages that were not observed in the referenced reports on the one hand, and the type of damage to L109 that may expected with elevated vibration levels on the other hand. Because a comparison of what constitutes damage was not made, the Caltrans report data is not a valid reference.

- The operating conditions, commodity and pipe specifications were not listed in the Caltrans report. L109 at the Project location is a 26-inch diameter steel pipe with a maximum operating pressure (MAOP) of 150 psig and at MAOP is at a 19.8% of the pipe's specified minimum yield strength. A higher stressed pipe will become damaged at a lower value PPV than a lower stressed pipe. There was no mention of operating stress levels of the pipes in the Caltrans report. Because a correlation between the operating stress levels in the Caltrans report pipes and L109 was not made, the Caltrans report data again is not a valid reference.

- The Spectra project involved surface explosions, different operating stress levels in the pipe than L109, and because the Spectra project involved the installation of new pipe, the physical condition of the pipe was known. Although PG&E may have inspection documents that show the physical condition of portions of L109 in the Project and adjoining area, this information was not used in the Vibration Evaluation. This section of L109 was installed in 1981 and the slope of the hill is steep. The slope in the project area is reported to be 28%. The slope of the hill from the north end of the project to Bernal Heights Road visually appears to be even steeper. Slippage of the pipe, localized corrosion, or impact damage may have taken place since 1981 and increased the stress levels in the pipe. It cannot be assumed that what was acceptable to the pipe in the Spectra project is acceptable for L109. As with the Caltrans reports, a correlation was not made between stress levels in the pipe. Further, the Spectra project involved installation of new pipe in what appears to be a nearly horizontal street. The Vibration Evaluation did not take into consideration the physical condition of L109 or bending stresses that may exist with the changes in grade.

  The Spectra analysis is inapplicable to the Project, and it is an inadequate basis for designing Project mitigation measures that will reduce Project impacts to a level of insignificance.

- The 2014 email from PG&E states that there are three federally-approved methods to complete a transmission pipeline integrity management baseline assessment:
  - In-Line Inspections (ILI) – An ILI involves a tool (commonly known as a "pig") being inserted into the pipeline to identify any areas of concern such as a potential metal loss (corrosion) or geometric abnormalities (dents) in the pipeline.

Please note that the preceding is based on information available at the time of this writing. It is conceivable that additional information may be forthcoming which bears on stated observations and opinions. The right is reserved, therefore, to review and modify all observations and opinions at any future point in time should, in fact, additional information become available.

- o External Corrosion Direct Assessment (ECDA) – Involves an indirect, above-ground electrical survey to detect coating defects and the level of cathodic protection. Excavations are performed to do a direct examination of the pipe in areas of concern as required by federal regulations.
- o Pressure Testing (PT) – PT is a strength test normally conducted using water, which is also referred to as a hydrostatic test.

PG&E performed an ECDA of L190 in this area in 2009 and another one was scheduled in 2015. No issues were found in 2009.

Based on the above, the Vibration Evaluation is not complete nor is it representative of this project and is not appropriate to use as a basis for determining safe levels of vibration to L109.

Since the Vibration Evaluation is not complete or representative, it cannot be used as a reference or comparison to validate PG&E's maximum vibration level of 2 ips. PG&E did not provide a basis for their PPV value of 2 ips and it does not appear that they were they asked to provide one. As a result, there is no basis for any of the maximum vibration levels in the Vibration Evaluation and MND.

Opinion 2: The Vibration Evaluation does not include types of equipment for some construction scenarios that are likely to occur such as excavation of the Chert bedrock, shoring and compaction of the street.

For example, compaction of the street above L109. PG&E's March 30, 2017 letter to the San Francisco Planning Department states that the depth of cover over L109 could be as shallow as 24 inches. Per the Grading Plan prepared by David Franco dated 9/21/16 indicates that roadway excavation is estimated to be 12-inches. Placement and compaction of subgrade and/or base rock will require the use of compaction equipment. For example, using the Vibration Evaluation value of 0.21 ips at 25 feet for a vibratory compactor from the Illingsworth March 24, 2017 report titled "Construction Vibration Evaluation for 3516 and 3526 Folsom Street", with the compactor 3.3 feet away from the pipe, the PPV at the pipe is calculated to be 4.3 ips. With the compactor 1 foot above the pipe, the PPV is calculated to be 26.26 ips. This PPV level is significantly higher than the 2.0 ips that PG&E has said is acceptable. Although the basis for PG&E's level has not been made known, it is reasonable to believe that significantly higher levels, such as 26.26 ips will damage L109, which may result in a catastrophic release of natural gas from L109.

Opinion 3: Based on Opinions 1 and 2, Impact NO-3 has not been adequately analyzed and mitigated.

Opinion 4: PG&E requires a minimum of 3 feet of soil cover over gas lines and a maximum of 7 feet. PG&E stated that the soil cover over L109 may be as low as 24-inches. PG&E did not address what corrective action is needed if the cover is less than required nor did they mention the risk impact if the cover is less than required.

Depth of cover may be a component of PG&E's Gas Transmission Pipeline Integrity Management program, a federal regulatory requirement of natural gas transmission system owners and operators such as PG&E. A less than required cover may impact the risk of that segment and mitigation measures may need to be taken. Mitigation measures are not included in the MND regarding the pipeline cover.

The impacts of less than required cover was not analyzed in the MND nor were mitigation measured addressed.

Any grading or excavation within 2 feet of L109 must be done by hand. Potholing and exposing the top portion of the pipe is required to determine which sections above the pipe can be graded or trenched by equipment. Potholing will expose the top portion of the pipe.

Grade cuts for street construction above L109 is 12-inches according to the Franco Grading Plan dated 9/2/16. Grade cuts of 12-inches would leave 12-inches above the pipeline where existing cover is 24-inches. Because of vibration and/or wheel loading restrictions, the equipment mentioned in the MND may not be safe to be used in shallow sections.

The design prepared for the extension of Folsom St. shown in the Grading Plan requires use of a full sized roller for compaction and the required level of aggregate base compaction is 95%, in 6 inch lifts. Compaction to 95% requires an increased number of passes over the more typical compaction level of 95% Modified Proctor testing. As noted above in Opinion 2, the PPV of a vibratory compactor 1 foot above the pipe is calculated to be 26.26 ips, which exceeds the maximum threshold of 2.0 set by PG&E.

Hand digging over L109 is required for all new utility crossings (water, sewer, electric, gas, communications) so there may be more locations where L109 will be potholed.

Exposing the pipeline before detailed design or construction begins also provides visual information regarding the physical condition of the pipe which can be used in performing the vibration analysis and PG&E's risk assessment of this section.

Given that:

- Some potholing and exposing L109 is required, and
- the information gained from potholing will yield information used in determining safe vibration levels, and
- the information from potholing will limit the types of construction equipment and activity in the vicinity of L109, and
- mitigation measures may be needed to correct less than required cover over L109,

exploratory potholing of L109 should have been completed prior to issuance of the MND.

Opinion 5: From January 2010 through September 8, 2017, excavation damage was the leading cause of unintended gas releases from transmission pipelines in California. PG&E is not under contract with the Project's general and sub-contractors/developer. Nor are the Project's general and sub-contractors/developer under contract with PG&E. There are many PG&E requirements/restrictions of the contractor when working within 10 feet of the pipeline, which is an approximate 3 feet from the front wall of the planned residences. Having an on-site inspector at all times would facilitate scheduling changes by the contractor and eliminate lack of communications and reduce the risk of damage to L109, but this was not required as a Mitigation Measure.

Opinion 6: Every Project employee should be trained in PG&E's requirements and restrictions for working in the vicinity of gas transmission pipelines. Given the significant risks posed by the Project, this should have been required as a Mitigation Measure.

Please note that the preceding is based on information available at the time of this writing. It is conceivable that additional information may be forthcoming which bears on stated observations and opinions. The right is reserved, therefore, to review and modify all observations and opinions at any future point in time should, in fact, additional information become available.

Based on our review and analysis, it is our expert opinion that there still exists a high risk that has not been mitigated based on our review of the MND. It is our opinion the failure to mitigate the risks are significant and a potential for damage and explosion of PG&E's gas transmission pipeline L109 still exists.

Regards,

Kenneth R. Ridings, P.E.

Steven P. Viani, P.E.

Attachments

Please note that the preceding is based on information available at the time of this writing. It is conceivable that additional information may be forthcoming which bears on stated observations and opinions. The right is reserved, therefore, to review and modify all observations and opinions at any future point in time should, in fact, additional information become available.

ENGINEER: MECHANICAL
PROCESS
UTILITIES

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Engineering Manager
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Concord, California 94524
(925) 674-8014
kenridings@edtengineers.com

EDUCATION

August, 1979	Bachelor of Science, Mechanical Engineering, University of Utah, Salt Lake City, Utah

PROFESSIONAL EXPERIENCE:

2005 to present	**Engineering Design and Testing Corp., Oakland, California** Assistant Vice President, District Engineering Manager and Consulting Engineer - Investigation of incidents involving natural gas piping systems and facilities; moisture intrusion and damage in residential and commercial buildings and industrial facilities; infrastructure utilities and piping systems; HVAC and refrigeration systems; fire suppression systems; cranes/heavy equipment, machinery and equipment. Services provided include failure analysis and causation identification, scope of damage evaluations, estimate repair/replacement costs, claims analysis, standards and codes interpretation, fire origin and cause, and construction monitoring and timeline scheduling.
1998 - 2004	**Pacific Gas & Electric Company, San Francisco, California** Manager – Conducted investigations of major gas incidents. Responsible for development and implementation of construction, engineering, operations and maintenance standards, procedures for gas distribution piping systems. Prepared expert testimony and testified in California Courts on behalf of PG&E's gas distribution capital and expense investments for the 1999 regulatory funding proceedings.
1993 – 1998	**Pacific Gas & Electric Company, San Francisco, California** Senior Distribution Engineer – Investigated cause and emergency response of gas distribution and transmission incidents. Interpreted regulatory code requirements. Developed engineering, construction, and operations and maintenance standards for pipe rehabilitation, valves, fittings, pressure control facilities and substructure enclosures. Investigated system operations, material, equipment, and facility failures.
1989 – 1993; 1984 – 1988	**Pacific Gas & Electric Company, Fresno, California** Division Engineer – Supervised multi-disciplined work groups responsible for the engineering, design, operations and maintenance of transmission and

distribution systems, including cathodic protection. Investigated gas incidents including fires and explosions and damage caused by third party dig-ins.

1988 – 1989 **Pacific Gas & Electric Company, Fresno, California**
Transmission and Regulation Supervisor – Supervised technical workgroup responsible for operations and maintenance on 2700 miles of pipeline and 165 pressure control stations. Scheduled work, prepared and directed system sequence of operations changes, and diagnosed system operations.

1984 **Pacific Gas & Electric Company, Antioch, California**
Area Engineer - Responsible for cathodic protection, facility records management, design and cost estimate preparation, engineering of gas transmission pipelines and associated facilities.

1979 – 1984 **Pacific Gas & Electric Company, Walnut Creek, California**
Engineer - Designed and engineered gas transmission pipe line, metering, and compressor station facilities. Specified water treatment and heat exchanger operations and maintenance at compressor stations. Performed pipe loading and stress analysis, and hydraulic capacity and system planning analysis.

1978-1979 **Northwest Pipe Line Company, Salt Lake City, Utah**
Engineering Intern – Facility engineering, perform cathodic protection analysis and prepare recommendations.

PROFESSIONAL ORGANIZATIONS:

ASM International (ASM)
American Society of Mechanical Engineers (ASME)
California Conference of Arson Investigators (CCAI)
East Bay Claims Association – Vice President 2012-13
National Association of Fire Investigators (NAFI)
National Fire Protection Association (NFPA)
National Society of Professional Engineers (NSPE)
National Association of Subrogation Professionals (NASP)

September 2015

PROFESSIONAL REGISTRATIONS:

Registered Professional Engineer – Arizona (#44546)
Registered Professional Engineer – California (#M27526)
Registered Professional Engineer – Idaho (#14379)
Registered Professional Engineer – Hawaii (#14923)
Registered Professional Engineer – Montana (#19897)
Registered Professional Engineer – Nevada (#021117)
Registered Professional Engineer – Oregon (#78334PE)
Registered Professional Engineer – Utah (#180944-2202)
Registered Professional Engineer – Washington (#42731)
National Council of Examiners for Engineering and Surveying (#28431)

CONTINUING EDUCATION:

2010 Fire Pump Seminar
National Fire Protection Association
Reno, Nevada

2007 Investigation of Gas & Electric Appliance Fires
Western Michigan University
Kalamazoo, Michigan

2006 Fire and Explosion Investigation
National Association of Fire Investigators
Sarasota, Florida

2006 Mechanical and Electrical Estimating
RS Means
Las Vegas, Nevada

EXPERIENCE – ENGINEERING INVESTIGATIONS (partial listing)

Natural Gas Pipeline and Facilities

Damage to Pipelines Caused by Third Party Dig-Ins – Multiple Locations, California

Examine damaged pipe and site location, review utility locate and mark records, review "call before you dig" records, review third party records, and determine cause of dig-in. Evaluate scope of damage, emergency response and repair activities. Review utility repair and pricing documents as to appropriateness of repairs and reasonableness of costs.

Compressor Station Fire – Gillette, Wyoming

Examine station and equipment, review operating records and other documents and determine cause of fire.

Gas Explosions and Fires – Multiple Locations, California

Investigate and determine whether natural gas fueled explosions and fires were caused by natural gas utility facilities and/or operations.

Underwater River Crossings – Calgary, Canada

Examine three separate pipeline crossings underneath flooded rivers, review inspection records, conduct underwater survey, and determine scope of damage of pipelines. Evaluate the repair/replacement scope of work and estimated costs.

Overpressurization of Low Pressure Distribution System – Alameda, California

Lead investigation and determine cause of overpressurization of a low pressure system and evaluate gas utility emergency response. Examine pressure control station equipment and maintenance records, system operation records, emergency response sequence of events.

Pressure Regulator Stations – Multiple Locations, California

Determine cause of pressure regulator valve failures at multiple regulator stations and metering facilities.

Commercial and Residential (Single and Multi-Story)

Moisture/Water Intrusion – Multiple Locations

Investigation of 200+ incidents involving water supply, irrigation, HVAC, waste, drainage, and fire sprinkler system piping and associated fittings, connector hoses, and equipment; water heaters and boilers; restroom and kitchen faucets and appliances; washing machines.

Heat and Smoke Damaged Generator Ductwork – Mesa, Arizona

Review of drawings, fire damage reports, repair costs, business interruption estimates and other documents to determine scope of damage. Review repair and pricing documents as to appropriateness of repairs and reasonableness of costs.

Leaking Chiller Tubes at Medical Center – Bakersfield, California

Examine chiller system and evaporator, review manufacturer drawings and equipment specifications, review operating records. Determine cause and scope of damage. Review repair and pricing documents as to appropriateness of repairs and reasonableness of costs.

Dry Cleaning Equipment – Chandler, Arizona

Examine equipment, review equipment specifications, service records and other documents, determine cause of leaks in equipment steam chamber.

Collapsed Car Lift – San Francisco, California

Examine steel member framed, hydraulic powered car lift, review manufacturer specifications, drawings and other documents, determine cause of collapse.

Hail Damaged Roof Top HVAC Condensers – Scottsdale, Arizona

Examine condensers, identify impact damage caused by hail and determine reparability. Review repair and pricing documents as to appropriateness of repairs and reasonableness of costs.

Leaking Hydraulic Elevator Casing – Multiple Locations

Examine elevator equipment, service records and other documents and determine cause of leak.

Water Damage to Elevator Components (multiple) – Multiple Locations

Examine elevator system components, identify water contacted components, and determine scope of damage, if any, to water contacted components. Evaluate repair cost proposals as to appropriateness of repair and associated costs.

Construction

Crane Tipover – San Ramon, California

Examine crane and highway construction site, review crane specifications, operator log and other documents and determine cause of tipover. Review repair and pricing documents as to appropriateness of repairs and reasonableness of costs.

Mechanical Lift Tipover – Groveland, California

Examine lift and residence construction site, review lift specifications and determine cause of tipover.

Crawler Crane Tipover – West Olive, Michigan

Examine crane at generation plant, determine scope of damage from tipover and cost to repair. Review repair and pricing documents as to appropriateness of repairs and reasonableness of costs.

Leaking Toilets in Condominiums Building – San Jose, California

Examine toilet installations, review manufacturer specifications and instructions, review test reports and determine cause of leaks.

Leaking Water Supply Valves in Multi-Unit Residential Buildings – Walnut Creek, California

Examine valves and installation, review manufacturer specifications and literature, determine cause of fractures in valve bodies.

Fire Investigations

Equipment and Appliances – Multiple Locations

Investigation of fires involving furnaces, water heaters, cooking and other appliances.

Industrial

Moisture/Water Intrusion – Multiple Locations

Investigation of incidents involving water supply, HVAC, boilers and water heater equipment, piping, and associated fittings.

Imploded Milk Storage Tank – Hanford, California

Examine tank, tank service and dairy operating records, manufacturer drawings and specifications and determine cause of implosion.

Imploded Fermentation Tank – Ukiah, California

Examine tank and process equipment at brewery, review operating records, drawings, sequence of operations, manufacturer specifications and other documents and determine cause of implosion. Review repair and pricing documents as to appropriateness of repairs and reasonableness of costs.

Imploded Storage Tank at Ethanol Plant – Cambridge, Nebraska

Examine plant and tank, review operating records and system design, coordinate testing of valve, and determine cause of collapse.

Single-Axis Solar Panel Tracker System Detachment – McCarran, Nevada
Examine tracker system and panels, review operating records and design documents, review snowfall and other weather records, and determine cause of detachment.

Ammonia Release at Cold Storage Facility – Phoenix, Arizona
Examine refrigeration equipment, review manufacturer specifications, review maintenance records, test components, and determine cause of ammonia release.

Utilities Service Interruption – Harahan, Louisiana
Review documents and determine duration and cause of service interruptions to a cold storage facility

Shiploader Tipover– Vancouver, Washington
Examine shiploader and bearing assembly, review design drawings and operating records, review video of incident, supervise other discipline engineers, and determine cause of tipover.

Damaged Retort MIG Thermometer – Corning, California
Examine retort, thermometer, and process equipment at olive processing facility, review operating records, FDA requirements, sequence of operations, manufacturer specifications and other documents and determine cause of damage to thermometer.

Logging Vehicle Fire Suppression System – Burns Lake, British Columbia, Canada
Examine fire damaged logging vehicle and fire suppression system, review multiple documents and determine why suppression system did not discharge.

Controlled Atmosphere Room at Cold Storage Facility – Multiple Locations, Washington
Examine facility Atmosphere Control System and refrigeration system, review test reports and facility records, and with a fruit harvest specialist, determine if damage to stored fruit was the result of a malfunction in the systems.

Chiller Coil Tube Leaks at Cold Storage Facility – Reedley, California
Examine facility and chiller tubes, review facility operations, review test reports and other documents and determine cause of leaks.

Fire Damaged Distillation Column at Ethanol Plant - Clinton, Iowa
Examine plant and column and review plant drawings and records. Determine scope of damage, cost of repairs and work schedule to facilitate repairs.

Digester Overpressure, Water Treatment Plant – Delano, California
Examine digester and associated equipment, review facility drawings, operating records and determine cause of overpressure.

Damaged PVC Piping System Containing CO2 Gas – Corning, California

Examine Carbon dioxide vaporizer and overhead PVC piping system in olive processing facility, review drawings, service records, weather records, operating and other documents and determine cause of damage.

Water Well Contamination – Live Oak, California

Examine well, review well inspection videos, water quality reports and other documents, and determine cause of contamination.

Water Well Collapse (2) – Corcoran, California

Examine well head and inspection videos, review drilling logs well test records and other operating documents and determine cause of collapse. Review repair documents as to appropriateness of repairs and reasonableness of costs.

Water Pumping Plant – Walnut Creek, California

Examine plant, review manufacturer specifications, design drawings and other documents, and determine cause of coupling detachment. Supervise other engineering disciplines to evaluate scope of water damage to building components, and electrical and mechanical equipment. Review repair documents as to appropriateness of repairs and reasonableness of costs.

Water Treatment Plant – Livermore, California

Examine damaged clarifier equipment, review construction, maintenance and test records, and determine cause of damage. Review repair documents as to appropriateness of repairs and reasonableness of costs.

Whirlybird Type Crane Tipover – Seattle, Washington

Examine crane, determine scope of damage, conduct research on used crane prices, and determine value of damage.

Fire Damaged Conveyor, Recycling Power Generation Plant – Oroville, California

Examine conveyor and associated electrical and mechanical equipment. Review construction drawings, operating records, repair cost estimates and other documents. Engage other engineering disciplines to determine scope of damage and reparability. Review repair documents as to appropriateness of repairs and reasonableness of costs.

Ammonia Refrigeration System – Coalinga, California

Examine refrigeration system, review facility and system drawings, service records and other documents and determine cause of ammonia release.

Corroded At-Grade Water Storage Tank – San Luis Obispo, California
Examine tank and attached piping, review cathodic protection system installation and service records, review other records, test insulation points, and determine cause. Determine scope of damage. Review repair documents as to appropriateness of repairs and reasonableness of costs. Monitor repair schedule.

Leaking At-Grade Gasoline Storage Tank – Las Vegas, Nevada
Examine tank, associated equipment, and tank farm cathodic protections system. Review tank and cathodic protection system drawings, operating records, manufacturer instructions, test records and other documents. Determine cause of leaks.

Marine

Ship Container Fire – Pacific Ocean
Examine ship containers and contents at Port of Seattle, review ship drawings and records, review manufacturer specification of container contents, and determine cause of fire.

Water Damaged Motors – Fairfield, California
Examine motors and packaging, review transport records and historical weather records, conduct laboratory tests, and determine if source of moisture was during transit or after motors were off-loaded from truck.

Pontoon Boat Lift Separation – Discovery Bay, California
Examine lift and documents and determine cause of separation.

Other

Hiker Fall – Muir Woods, California
Review documents, examine fall location, and determine if the involved trail had been maintained in accordance with regulatory requirements and to determine if the conditions of the incident location were dangerous and hazardous.

Roller Blader Fall – Ixtapa, Mexico
Conduct elevation survey and coefficient-of-friction tests on concrete trail.

Mobile Paper Shredder Truck – Fresno, California
Examine truck and paper shredder, review design drawings and determine cause of mechanical damage to shredder.

LEGAL CONSULTATION – PEER REVIEW (partial list)

Natural Gas Explosion – Seattle, Washington

Review gas utility maintenance and emergency response records, review Washington State regulatory requirements, review regulatory agency reports, review expert and testing agency reports and other documents and provide opinion as to the cause of the explosion.

Natural Gas Explosion – Sublette, Kansas

Review gas utility maintenance standards, maintenance and operating records, Kansas State regulatory requirements and other documents. Provide opinion as to cause of explosion.

Moisture Intrusion – Multiple

Review manufacturer, engineering, and investigation reports regarding separated piping system components. Provide opinions as to cause of separated components.

Steven P. Viani, P.E
spviani@aol.com
(916-952-8503)

Education and Specialized Training

BS Civil Engineering, California State University, Sacramento
Graduate courses in Geotechnical Engineering
Continuing education classes in claims avoidance, negotiations and project management
OSHA 40 hour training
USACOE Construction Quality Management Certification

Professional Registrations

Registered Civil Engineer in California, Arizona and Washington
Licensed A, B & Haz. Contractor (RMO Alvia Services Inc)

Employment History

State Water Resources Control Board (2-year assignment with Army Corps of Engineers)-Associate Engineer	(1977-1982)
Kellogg Corporation-Senior Engineer	(1982-1983)
Department of Health Services-Senior Engineer	(1984-1987)
Roy F. Weston, Inc.-Project Director	(1987-1990)
Canonie Environmental Services, Inc.-Western Regional Manager	(1990-1994)
Geo Con Inc.-Western Regional Manager	(1994-1998)
Layne-Christensen Co.-Western Regional Manager	(1998-1999)
BCN Company-Vice President of Operations	(1999-2001)
Donald B. Murphy Contractors Inc.-Regional Manager	(2001-2003)
Private Consulting/Alvia Services Inc	(2003-Present)

Representative Experience

Over the past 40 years, has held senior level positions in construction, consulting and governmental entities. Have managed, directed or performed projects ranging from $3000 Phase 1 Preliminary Site Assessments to $20 Million site remediations, including many large and significant environmental and geotechnical construction projects as a direct hire contractor. Have 25 plus years experience in managing business units and design departments with total P+L responsibility and staff management up to 35 people. Have worked nationwide and internationally in Asia and Europe.

Legal, Claims and Defect Oriented Experience

- Developed a remediation plan for the removal of construction debris in Malibu, CA. Project involved the determination of quantity, permitting, construction oversight and closure parcel containing illegally disposed debris. Los Angeles County and Coastal Commission involvement.
- Provided expert review of shoring/scaffolding failure at mid-rise residential/commercial building in San Francisco that was overloaded.
- Provided expert services for water damage and intrusion for single family housing, multi-family housing and businesses involving stucco, windows, roofs, siding from wind-driven rain, expansive soils and mechanical damage.
- Provide expert services for a fatal accident involving improperly secured construction equipment on a construction site in Northern California.

- Provided expert services, including accident reconstruction of a major fall injury case involving truck loading at an active wastewater treatment facility in the San Francisco area.
- Provided expert witness services for issues related to a subsiding rock retaining wall causing damage to an adjacent dwelling in San Francisco, CA.
- Provided inspection/evaluation of 50+ residential and commercial damaged by a refinery explosion in Utah.
- Provided expert engineering review of construction defects and standard of care associated with sewer lines, water lines, moisture intrusion, land movement, drainage systems, land development, soils testing, residential construction and other civil engineering defects.
- Provided expert witness services for cost and schedule claim by County of Monterey against CM and Prime Contractor involving asbestos containing materials and affected by mold.
- Provide expert witness service for pile driving operations affecting defectively designed and constructed stucco clad public library in LA area.
- Provided expert witness services and court testimony for construction defect case involving expansive soils, construction impacts and water damage to a house foundation in Irvine, CA.
- Provided expert services for construction dispute involving an environmental remediation groundwater collection and storage system constructed at a large refinery facility in New Jersey.
- Provided expert witness services for accident involving multi-party commercial construction site in Auburn, CA involving rolling scaffolding.
- Reviewed remedial measures for condo building in Sacramento affected by water intrusion through roofs, walls and walkways that resulted in mold.
- Provided expert witness testimony for contractual dispute involving adequacy of geotechnical report, differing site conditions and cost to repair for sewer line in Las Vegas, NV.
- Provided expert witness services for issues related to a subsiding rock retaining wall causing damage to an adjacent dwelling in San Francisco, CA.
- Provide expert services to insurance group for major excavation support failure in San Francisco to determine cause and cost to repair caused by differing soil conditions.
- Provide contract review and claims support for steel water reservoir project in Honouliuli, HI affected by delays, changes and differing site soil conditions.
- Provided contract review and cost to complete for a 900 unit military family housing project in Honolulu, HI. Project encountered with numerous changes that required renegotiation of unit prices, payment for acceleration and additional time related overhead.
- Successfully negotiated a $ 6 million termination for convenience claim for a Superfund site. Developed an estimate of contractor costs and negotiated a fair and reasonable settlement while representing a state government entity. Project required negotiation of an acceleration claim for previous contractor, expert testimony at various court proceedings and presentations to media.
- Prepared and negotiated a changed site conditions, acceleration, directed change, constructive change and defective and deficient contract document change order with the US Army Corps of Engineers for a slurry wall project.
- Developed and negotiated large change orders for quantity increases and changes for design/build environmental remediation projects.
- Developed claim document for high rise hotel in downtown Los Angeles involving directed changes, constructive changes, defective and deficient contract documents, acceleration and significant contractual issues.

Construction Oriented Experience

- Oversaw construction of large wastewater treatment plants, pump stations, earth-pressure balance and open road header tunnels and box sewers for Federal Government construction program in San Francisco. 12 foot diameter tunnel was 1 mile open face cut using road header and steel sets and wood lagging prior to permanent liner. Tunnel was constructed using Earth-pressure balance method with steel liner plate prior to permanent concrete liner was then cast.

- Designed and constructed micropile foundation system for elevated transit structure for BART.
- Designed and constructed a micropile supported foundation for Hotel Berry in Sacramento, CA.
- Constructed Administration, Switchyard and Electrical Control steel framed buildings consisting of about 50,000 square feet for a combined–cycle gas fired power plant.
- Designed/built a pre-engineered steel framed maintenance building for major northern California public utility at a wind energy facility.
- Designed and constructed a micropile foundation for a community college administration building in Alameda, CA.
- Designed and built a micropile project for a new state building in Sacramento.
- Designed and constructed micropile foundation system for elevated transit structure for BART.
- Designed and constructed a micropile supported foundation for Hotel Berry in Sacramento, CA.
- Designed and built a micropile slope stabilization project for the emergency support of a sewer main sliding into a creek in Thousand Oaks.
- Constructed slope stabilization for a hydro-electric powerhouse in the Sierra Nevada Mountains involving rock anchors, soil nails, drains and shotcrete.
- Constructed projects using ground anchors, tiebacks, compaction grouting, chemical grouting, jet grouting, soil mixing, shotcrete, micropiles, driven piles and sheet piles, often under design/build contracts.
- Constructed soil nail, soldier pile and wood lagged excavation support projects for building excavations and soil removal projects.
- Constructed numerous slurry wall projects for seepage control using soil-bentonite, soil-cement-bentonite, soil-cement-bentonite-fly ash and soil-attapulgite for groundwater control on civil and environmental projects. Size of barrier walls ranged from 100,000 sf to 350,000 sf.
- Constructed ADA upgrade and remodel for US Coast Guard Pacific Strike Force Facility in Novato.
- Investigated, designed and oversaw abatement of asbestos affected state buildings after Loma Prieta earthquake in 1989.
- Managed lead abatement, asbestos abatement, structural repairs and painting for 1400 military housing units at Beale Air Force base.
- Designed and managed asbestos abatement activities for 500,000 square feet of office space for TRW buildings in El Segundo.
- Performed ground improvement projects involving dynamic compaction and vibro compaction/vibro-replacement.

<u>Consulting Oriented Experience</u>

- On contract to provide soils investigation and consulting services to pool contractors in N. Calif.
- Provide consulting and design services for residential and commercial structures affected by fire, wind, structural design deficiencies, impacts, earthquakes and other factors.
- Planning and conceptual design for construction of a multi-waste stream processing center for an industrial waste recycling center in San Diego County, CA.
- Developed geotechnical reports for new housing, including stick-built and manufactured housing throughout California.
- Evaluation of AST's and treatment ponds at oil collection facility in Santa Maria, CA.
- Performed forensic investigations for wastewater treatment plants, schools, commercial buildings and houses for water intrusion damage, expansive soils, presence of mold and construction defects.
- Designed and oversaw abatement of numerous asbestos abatement projects in California.
- Planned and permitted high tech chemical storage and fabrication facilities internationally.
- Developed large scale Phase 1 property transfer program for major renovation of prime San Francisco real estate.

- Performed numerous Phase 1 Preliminary Site Assessments, Remedial Investigations, Feasibility Studies and Corrective Measures Studies using a variety of technologies.
- Assistant author on document concerning repairs and lining UST's.

Remediation and Environmental Experience

- Expert services related to evaluation and removal of UST and AST systems on California.
- Developed a Remedial Investigation /Feasibility Study for the Purity Oil Sales Superfund site in Malaga, CA. Site was former oil processor that had filled onsite ponds and AST's with construction debris containing oil, PCB, lead and asbestos that impacted soil, surface water and groundwater. RI/FS included on-site and off-site investigation, surface water sampling, development of remedial objectives and interim remedial measures.
- Developed a Remedial Investigation/Feasibility Study/Remedial Design for the removal of PCB's and PAH's from a site in Norwalk, CA. Documents were submitted to LAFD and City of Norwalk for approval prior to initiating cleanup. Clean closure granted.
- As part of a construction claim on a 4-story parking structure at San Francisco International Airport, evaluated an earthwork claim concerning the presence of hazardous waste, rock, trash and unsuitable materials and their effect on the project schedule. Further analysis of environmental requirements on illegal filling of wetlands in San Francisco Bay.
- Completed the remediation of the Capri Pumping Services site in East Los Angeles, CA. Site was contaminated with lead, copper, cadmium, solvents and petroleum hydrocarbons. Remediation of this State Superfund site included preparation of a health risk assessment for lead exposure to the surrounding community.
- Oversaw the remediation of the Jibboom Superfund Site in Sacramento, CA. Site was a former scrap yard that had impacted the area with lead, PCB, and hydrocarbons. Extensive air monitoring of the perimeter was performed to limit migration of contaminants. Later designed remediation of inside surfaces at remaining building involving PCB, lead and asbestos.
- Site manager for the McColl Superfund site in Fullerton, CA. Involvement included site sampling of surface and subsurface runoff, construction of site facilities and management of remedial contractors.
- Project manager for the Kyocera facility in Sorrento Valley, CA. Project involved leaking UST solvent tank that impacted groundwater and adjacent wetlands and ponds. Project included on-site and off-site investigation, development of remedial alternatives, permitting and monitoring.
- Remediated a PCP impacted groundwater plume using funnel-gate technology at a wood treating facility. Project involved innovative concept using activated carbon in a passive treatment system.
- Designed and remediated 2500 CY TCA impacted soil inside an existing manufacturing structure in Southern California.
- Designed, permitted and remediated 70,000 CY of TPH impacted soil removal for the closure of the Lockheed C plant in Burbank, California. Clean closure granted.
- Oversaw the design and construction of a groundwater treatment facility for pesticide contaminated soils in Fresno, California as well as excavation of 10,000 CY of pesticide impacted soils.
- Remediated a TCE/TCA impacted groundwater plume using a Deep Soil Mix (DSM) wall that was 65 feet deep and had a surface area of 50,000 SF at an active rail yard.
- Remediated soil impacted with solvents using vapor extraction at the Xerox site in Santa Ana. California. Project included permitting, monitoring and maintenance.
- Constructed a gasoline extraction trench using biopolymer slurry and an HDPE membrane at the port of Los Angeles.
- Developed environmental analysis for portion of former Superfund site that would be removed from Superfund designation to assess impacts on new owners of that piece of property.

Re: 3516 and 3526 Folsom Re: - files attached -Thank you for this afternoon's meeting

From: spviani@aol.com

To: bjunderberg@yahoo.com

Date: Thursday, May 30, 2019, 07:51 AM PDT

Barbara
Wanted to get back to you after I reviewed the information. First, no changes to our conversation memo.
I focused on the topo survey conducted on 6/20/13 (3500 Topo), with a drawing date of 12/19/17. The survey occurred well before the BOS hearing in Sept. 2017 and we were never provided this information. However, upon clo er e amination, it how the ituation we mentioned, mainly the pipe i very clo e to bottom of the improvements/roadway cut.
According to the topo drawing, the pipe elevation for Lot 13, (3516 Folsom) is 291.91 (say 292 feet). The pipe elevation at Lot 15 (vacant) is 275.36 feet, 47.42 feet away. This means the gas line rises at a rate of 0.35 feet per foot of run At the center of Lot 14 (3526 Fol om), appro imately midway between the pipe elevation , the calculated pipe elevation is 284.65 feet.
The pipe elevation for Lot 13 (3516 Folsom) shows it to be 291.91 feet, say 292. ft. From Site road section 3516, the garage slab elevation is 295 feet. When measured and accounting for the road improvements, the distance to the top of the pipe to the top of improvement i 5 feet Even with a layer of ba e, the area of di turbance i above the 2 foot zone around the pipe.
The pipe elevation for Lot 14 (3526 Folsom) is calculated to be 284.65 feet. From Site road section 3526, the garage slab elevation is 287 feet. When measured and accounting for the slope and road improvements, which are about 2.5 feet lower, or 284 50, the di tance to the top of the pipe to the top of improvement i 0 15 feet into the pipe The 26 inch gas line will need to be relocated.
This needs to be field verified, potholed on Lot 14, and it will affect the sewer line to 3526 as well.
Let me know if you need anything else.
Thank

Steven P. Viani P.E.
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Pilot Hill, CA 95664
916 952 8503 (P)
CSLB No. 945198
www.alviaservicesinc.com

In a message dated 5/24/2019 12:54:39 PM Pacific Standard Time, bjunderberg@yahoo.com writes:

> Hi Steve --
>
> Attached are the files we forwarded to the meeting participants. The first doc is Marilyn's response to the emergency plan The econd doc reflect my under tanding of the conver tion I had with you on Monday (Marilyn added my name and Wednesday's meeting date at the end). Please let me know if I misrepresented your thoughts. It is not too late to fix it.
>
> A mentioned, I have additional note from thi meeting to write up and di tribute I will definitely include you in my list.
>
> Thanks for your help and interest.
>
> Barbara Underberg

Re: 3516 and 3526 Folsom Street, Vibration Mgt., and Emergency Response & Evac. Plans

From: spviani@aol.com

To: bjunderberg@yahoo.com

Date: Monday, July 8, 2019, 06:33 AM PDT

Barbara:
Nice summary and backup. Did you receive my invoice? I would like to get paid for this work as agreed.
Thanks

Steven P. Viani P.E.
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In a message dated 7/5/2019 4:08:51 PM Pacific Standard Time, bjunderberg@yahoo.com writes:

> As neighbors we are concerned about the safety risks that the proposed development brings in general, and especially with regard to the proposed Folsom Street extension and impacts on PG&E gas transmission Line 109. We sought analysis and assessments from the following professionals with relevant expertise, specifically in the areas of geotechnical engineering and experience with PG&E gas transmission pipelines:
>
> Rune Storesund, D.Eng., P.E., G.E., Executive Director of UC Berkeley Center for Catastrophic Risk Management
> Lawrence B. Karp, Architect. Civil and Geotechnical Engineer
> Robert Bea, Professor Emeritus of Civil and Environmental Engineering, UC Berkeley Center for Catastrophic Risk Management
> Engineering Design and Testing Corp., Forensic Engineers, Kenneth R. Ridings, P.E. and Steven P. Viani, P.E.
>
> In fact, Consulting Engineers Karp, Storesund and Bea were so alarmed by the safety implications that they all agreed to provide their services pro bono.
>
> With respect to the project's Vibration Management Plan, the consultants' geotechnical and pipeline expertise is particularly relevant:
>
> "Vibration is often grouped with noise and regarded as a kindred topic. Noise, after all, begins as vibration, and vibration is as much a part of acoustics as is noise.
> "By comparison, though, noise is simple. It always occurs in air, and except in special circumstances . . . the characteristic impedance of air is more or less always the same. . . . Airborne sound almost always propagates as a compression wave, and the speed of sound is about the same at all frequencies. . . .
> "Vibration, by contrast, occurs in media ranging from rock or solid concrete, through water and soil to lightweight panels. It can propagate as a compression wave, a shear wave, a variety of surface waves, bending waves, torsional waves, either separately or together." [From Rupert Taylor Ltd., Noise and Vibration Consultants, website: ruperttaylor.com.]
>
> By contrast, the expertise of the author of the Vibration Management Plan is limited to noise:
>
> Illingworth & Rodkin, Inc., Paul R. Donovan, Sc.D.: "Although Dr. Donovan has a broad background in acoustics, his particular areas of expertise include tire noise, sound intensity methods,

aeroacoustics and wind tunnel testing, and structure-borne sound analysis." [From the website of Illingworth & Rodkin, Inc.]

So, we are concerned that the assessments from our consultants have not all been adequately addressed. For your convenience, listed below by consultant are the documents they have previously submitted in the course of this environmental review process:

1. Robert Bea, 6/29/2016, signed letter of support and power point (due to document size, to be emailed separately)
2. Rune Storesund, 12/1/2016, Independent Project Review (attached)
3. Rune Storesund, 12/11/2016, Impact to PG&E Transmission Line 109 (attached)
4. Rune Storesund, 6/5/2016, Independent Project Review (attached)
5. Rune Storesund, 6/14/2016, Review of Proposed Pipeline Impacts (attached)
6. Lawrence Karp, 9/12/2017, Unacceptable Extension, Folsom Street, Protracted in 1861, Structure on 40.3% Gradient Slope Upon Large Gas Line in Landslide Area, Bernal Heights, San Francisco, Environmental Impact Report Required (due to document size, to be emailed separately)
7. Lawrence Karp, 9/12/2017, Testimony at the Board of Supervisors Hearing (pdf page 33 of BOS File 170851, Attachment 11, "Post Pkt Material")
8. (EDT) Engineering Design and Testing Corp., 9/11/2017, Independent Evaluation of the San Francisco Planning Department Mitigated Negative Declaration, submitted as Exhibit O by Zacks, Freedman & Patterson (attached)

Generally, the following lists the main types of problems we are seeing in this process, with some overlap:

1. Disagreement with conclusions

2. Not enough information for complete analysis
For example, the condition of the portion of the pipeline affected by the project is incomplete. As an example, although PG&E removed the large tree that was above the pipeline between the project site and the pipeline elbow beneath Bernal Heights Blvd., the effect of the tree's roots on the pipeline has not been directly examined. According to PG&E's own studies, 90% of trees within 5 feet of a pipeline affect the pipeline coating.

3. Incomplete plans
For example, the configuration and elevations of the street, including the layout of utility crossovers are not resolved. The resolution of these issues could result in dramatic changes. In light of the most recent elevations provided in the revised site survey dated 12/19/2017, Steve Viani, one of the two consultants from EDT, writes:

"I focused on the topo survey conducted on 6/20/13 (3500 Topo), with a drawing date of 12/19/17. The survey occurred well before the BOS hearing in Sept. 2017 and we were never provided this information. However, upon closer examination, it shows the situation we mentioned, mainly the pipe is very close to bottom of the improvements/roadway cut.
"According to the topo drawing, the pipe elevation for Lot 13, (3516 Folsom) is 291.91 (say 292 feet). The pipe elevation at Lot 15 (vacant) is 275.36 feet, 47.42 feet away. This means the gas line rises at a rate of 0.35 feet per foot of run. At the center of Lot 14 (3526 Folsom), approximately midway between the pipe elevations, the calculated pipe elevation is 284.65 feet.

"The pipe elevation for Lot 13 (3516 Folsom) shows it to be 291.91 feet, say 292. ft. From Site road section 3516, the garage slab elevation is 295 feet. When measured and accounting for the road improvements, the distance to the top of the pipe to the top of improvements is 5 feet. Even with a layer of base, the area of disturbance is above the 2 foot zone around the pipe.

"The pipe elevation for Lot 14 (3526 Folsom) is calculated to be 284.65 feet. From Site road section 3526, the garage slab elevation is 287 feet. When measured and accounting for the slope and road improvements, which are about 2.5 feet lower, or 284.50, the distance to the top of the pipe to the top of improvements is 0.15 feet into the pipe. The 26 inch gas line will need to be relocated.

"This needs to be field verified, potholed on Lot 14, and it will affect the sewer line to 3526 as well."

4. Lack of rigor in PG&E and SFFD evaluation and approval of project plans.
For example, PG&E and SFFD approved the Evacuation Plan that assigns a designated assembly point to a location that is (1) above the pipeline, (2) down wind from the prevailing westerly winds, and (3) in the roadway likely to be used to access the project site in a emergency.
For example, PG&E approved the project plan that shows permanent structures (i.e., stairs) within 10 feet of the pipeline contradicting PG&E's own standards.

Other Notes Regarding the Vibration Management Plan:

- Tolerance Zones are areas around underground utilities and pipelines where excavation with mechanized equipment is prohibited by state law. In California, the Tolerance Zone is 24 inches. [CA Government Code 4216, 4216.1 through 4216.4 and 4216.18] The Vibration Management Plan (VMP) states: "As the existing soil is removed, the small bulldozer (or the Takeuchi TB175 configured with a blade and no excavator) could be operating at a distance of 1 foot from the gas line." [See pdf page 10.] There is no explanation as to why this exception would be allowed.

- As previous analyses have pointed out, pipeline vibrations concentrate at the elbow located at the intersection of Folsom Street and Bernal Heights Blvd. No process is in place to monitor the elbow, including potential damage to it in the event the Vibration Monitoring Equipment alarm is activated.

- There is no mention of drilling for piers for the structure of the Folsom Street extension. As currently configured, such piers would be adjacent to the pipeline and within the 24" clearance zone. Clearly, drilling for piers in such close proximity to the pipeline would likely exceed the proposed permitted ppv values of the Vibration Management Plan.

- There is no analysis of the potential impact of vibrations from equipment, such as a bulldozer, if it were to fall over on the steep hillside, whether or not it is in use. Such an incident occurred only two blocks away on the unpaved section of Banks Street between Chapman Street and Powhattan Avenue during the construction of infrastructure improvements under 1989 Proposition B. (No one was injured, but the bulldozer did smash a neighbor's car.)

- There is no analysis of the process for moving soil excavated from the east side of the pipeline to the conveyor belt on the west side of the pipeline, which would include vibration impacts and how to monitor the weight limitations of soil loads crossing the unprotected pipeline.

- Post-construction, there is no analysis of in-service vibrations from and load limitations of vehicles that will cross over the pipeline whether or not they are properly using the driveways. As a narrow dead-end street with a familiar name, it is to be expected that there will be vehicular incursions into the unprotected space above the pipeline, especially by commercial vehicles with wide turning radii.

- Post-construction, there is no process in place to monitor activity directly above the pipeline which lies unprotected between the proposed sidewalk and street (i.e., within the 10-ft. zone PG&E requires to be monitored during construction).

Notes Regarding the Emergency Response and Evacuation Plan:

- There is no explanation for the 300-foot radius on the Evacuation Route map. If 300' is the intended evacuation zone, it is wholly inadequate. For example, at only 100 psig for a 24" diameter pipeline, the recommended minimum evacuation distance is 547' according to Pipeline Association for Public Awareness. Pipeline No. 109 is 26" in diameter and its psig is anywhere from 150 psig (according to PG&E today) to 375 psig (according to NTSB, the psig in effect at the time of the San Bruno blast). [Pipeline Association for Public Awareness, Recommended Minimum Evacuation Distances for Natural Gas Pipeline Leaks and Ruptures:
pipelineawareness.org/media/1117/evacuation-distances-for-natural-gas.pdf]

- The Emergency Response and Evacuation Plan does not comport with the Emergency Planning and Community Right-to-Know Act (EPCRA) and is not adequately site-specific. Deficiencies not addressed in the Evacuation Plan include, but are not limited to the following:
- A clear chain of command.
- Specific evacuation procedures.
- A way to account for all persons after an evacuation.
- How the plan would be activated.
- Who would activate the plan.
- Where evacuation routes will be posted.

None of the above lists are intended to be exhaustive and some items have been mentioned before.

Thank you for your consideration of these issues.

Barbara Underberg
Bernal Heights South Slope Organization

invoice1.pdf
124.2kB