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## **APPENDIX G**

### **PIPELINE RISK ASSESSMENT**

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# Pipeline Risk Assessment

Los Alamitos High School  
3591 West Cerritos Avenue  
Los Alamitos, California 90720

## UltraSystems Environmental

16431 Scientific Way | Irvine, California 92618

January 28, 2019 | Project No. 210808001



Geotechnical | Environmental | Construction Inspection & Testing | Forensic Engineering & Expert Witness

Geophysics | Engineering Geology | Laboratory Testing | Industrial Hygiene | Occupational Safety | Air Quality | GIS

**Ninyo & Moore**  
Geotechnical & Environmental Sciences Consultants

# Pipeline Risk Site Assessment

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3591 West Cerritos Avenue  
Los Alamitos, California 90720

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January 28, 2019 | Project No. 210808001



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# 1 INTRODUCTION

Ninyo & Moore conducted this Pipeline Risk Analysis (PRA) of potential hazards from multiple pipelines within the vicinity of Los Alamitos High School located at 3591 West Cerritos Avenue, in the city of Los Alamitos, California (site). This PRA was conducted on behalf of UltraSystems Environmental (UltraSystems), in general accordance with our proposal number 05-00794A, dated August 20, 2018. We understand that the Los Alamitos Unified School District is planning to construct a new multi-story building that would encompass part of the existing administration building, which would be demolished and redeveloped with the planned building. The following sections identify the purpose, the involved parties, the scope of services, and the limitations and exceptions associated with the PRA.

## 1.1 Purpose

Ninyo & Moore has conducted this PRA in accordance with California Department of Education's (CDE) Guidance Protocol for School Site Pipeline Risk Analysis (CDE, 2007) as required by California Education Code §17213, California Code of Regulations Title 5, §14010(h). The CDE protocol provides a three-stage format to analyze risk of fatality from identified pipelines within 1,500 feet of a school site. Stage 1 is a screening analysis to evaluate if the relative risk to the school site from pipelines exceeds criteria defined in the protocol. If the risk exceeds Stage 1 criteria, the more complex Stage 2 probabilistic risk analysis is required. The Stage 2 analysis uses detailed analytical methods, figures, and tables to evaluate hazards and calculate individual risks, which are then compared to acceptable risk criteria. The protocol's acceptable individual risk criterion is an annual fatality probability of less than one fatality in a million. The consequence models used in a Stage 2 protocol risk analysis are generally conservative. Therefore, a pipeline that meets Stage 2 risk criteria required no further assessment. If risks from a large diameter, high-pressure pipelines exceed the criteria of a Stage 2 risk analysis, or where site conditions differ from the CDE protocol, a Stage 3 analysis is required. During Stage 3 risk analysis, site-specific parameters (e.g. failure rates, wind, etc.) can be used to model the effects of an explosion, flash fire, and/or jet fire from a leak or rupture of the pipeline, and calculate realistic individual risks, which are then compared to acceptable risk criteria.

## 1.2 Scope of Services

Ninyo & Moore's scope of services for this PRA consisted of calculating individual risks on site due to potential leak or rupture scenarios of multiple pipelines located within 1,500 feet of the site in general accordance with the CDE protocol for PRAs. For the evaluation of pipeline risk and considering aspects of the current and proposed site conditions and potential project constraints, the following scope of services was used to satisfy the project objectives.

- Obtain and compile pertinent information (if readily available) concerning contents, pressure, diameter, maintenance, and other construction details of high volume hazardous liquid, natural gas, and water pipelines within 1,500 feet of the site. Information was requested from agencies, operators, and the user of this report in accordance with PRA protocol.
- Performed a site reconnaissance to observe various field conditions including locations and distances to pipelines, storm water systems, protection and warning devices, and intermediate ground surface and buildings/property uses between the pipelines and the site.
- Model various input data into spreadsheets prepared in accordance with the CDE protocol. Calculate the individual risks for the various hypothetical leak and rupture scenarios from the pipelines.
- Prepared this PRA report, which contains a figure locating the pipeline relative to the site, a summary of pipelines and surrounding site conditions, and results of the risk calculations. The report also provides conceptual recommendations for mitigation measures, which may be used if risks to potential receptors exceed the acceptable limits outlined in the CDE protocol.

### 1.3 Significant Assumptions

Ninyo & Moore assumes the information sources from the third-parties, regulatory agencies, and interviewees utilized for this report provided adequate and accurate information. Other significant assumptions were not made during the preparation of this report.

### 1.4 Limitations and Exceptions

The environmental services described in this report have been conducted in general accordance with current regulatory guidelines and the standard of care exercised by environmental consultants performing similar work in the project area. No warranty, expressed or implied, is made regarding the professional opinions presented in this report.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires any additional information or has questions regarding the content, interpretations presented, or completeness of this document.

The findings, opinions, and conclusions are based on an analysis of the observed site conditions and the referenced literature. It should be understood that the conditions of a site could change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore

has no control. Ninyo & Moore cannot warrant or guarantee that not finding indicators of any particular hazardous material means that this particular hazardous material or any other hazardous materials do not exist on the site. Additional research, including invasive testing, can reduce the uncertainty, but no techniques now commonly employed can eliminate the uncertainty altogether.

## 1.5 User Reliance

This report may be relied upon by, and is intended exclusively for, the client and its assigns. Any use or reuse of the findings, opinions, and/or conclusions of this report by parties other than the above-referenced client is undertaken at said parties' sole risk.

## 1.6 Involved Parties

Mr. Dennis Fee, Senior Staff Engineer, performed a site reconnaissance on December 24, 2018, and performed document review and risk calculations in the months of October and November 2018 and January 2019. Mr. Patrick Cullip, Project Engineer, and Mr. John Jay Roberts, Principal Geologist, performed quality review.

## 2 SITE DESCRIPTION

The following table provides a general description of the subject site. Photographs taken during the site reconnaissance are provided in Appendix A.

Table 1 – General Site Setting	
General Site Setting	Description
Location	The site is located at 3591 West Cerritos Avenue in Los Alamitos, California (Figure 1).
Assessor Parcel No.	242-262-02 and -07 (County of Orange)
Property Owner	Los Alamitos Unified School District
Size (approximate)	47.6 acres
Site Use / Occupants	The site is used as a high school.
Structures	Structures present on the site include classroom buildings, administration buildings, athletic facilities, and other structures associated with a high school.
Roads	Los Alamitos High School is bounded to the south by West Cerritos Avenue and to the west by Norwalk Boulevard.
Heating and Cooling Systems	Observed on rooftops during site reconnaissance. Powered by electricity and natural gas supplied by Southern California Edison and the SoCal Gas Company, respectively.
Electricity Provider	Southern California Edison
Sewer Disposal Provider	The Rossmoor/Los Alamitos Sewer District
Potable Water Provider	Golden State Water Company
Site Vicinity Description	Residential properties to the north and east. Commercial buildings to the west and south.

### **3 PHYSICAL SETTING**

The following summarizes topographic, geologic, hydrogeologic, and meteorological conditions in the vicinity of the site, based upon the referenced documents review and/or our visual reconnaissance of the site.

#### **3.1 Topography**

According to the United States Geological Survey (USGS) 1981 Topographic Map for the Los Alamitos Quadrangle (USGS, 1981), the regional topography is relatively flat, and slopes gently to the southwest. The site elevation is between approximately 20 and 30 feet above mean sea level.

#### **3.2 Geology**

The site is located in the southern margin of the Los Angeles Basin, which is characterized by up to 4,200 feet of relatively unconsolidated Pleistocene marine and non-marine sediments, and up to 170 feet of unconsolidated non-marine sediments (California Department of Conservation [CDC], 1998). The Los Angeles Basin culminates in the coastal hills and mesas of the Newport-Inglewood Uplift. Based on the California Seismic Hazard Zone Map for the Los Alamitos Quadrangle, the entire Los Alamitos Quadrangle, of which the site is a part of, is an area where historic occurrence of liquefaction or local geological, geotechnical and groundwater conditions indicate a potential for liquefaction (CDC, 1999). The site is approximately 2 miles northeast of the Newport-Inglewood fault.

According to a boring logs obtained from the Unocal #4727 at 3501 Cerritos, adjoining the site to the southwest, the property is underlain with approximately 30 feet of silty and sandy clays, followed by approximately 10 feet of silty sands, to the depth explored of 40 feet below ground surface (bgs).

#### **3.3 Surface Water**

According to the United States Fish and Wildlife Wetlands map, the nearest surface water bodies are Coyote Creek and Carbon Creek, concrete channels adjoining to the west and north, respectively.

#### **3.4 Groundwater**

Recent groundwater information for the site was not available. However, according to the State Water Resources Control Board (SWRCB) GeoTracker website, groundwater was measured at the Unocal #4727 at 3501 Cerritos, adjoining the site to the southwest, in June 2018 between 10 and 14 feet bgs. The groundwater gradient was estimated to flow towards the southeast to southwest.

Groundwater levels, gradient, and flow direction can fluctuate due to seasonal variations, groundwater withdrawal or injection, changes in land use, and other factors.

### **3.5 Wind Conditions**

Ninyo & Moore obtained wind rose information from Long Beach Airport located approximately 4 miles west of the site (Appendix B). The information indicates that the wind in the vicinity is dominantly from the south and northwest. From the intersection of Norwalk/Los Alamitos Boulevard and Cerritos Avenue (where many underground pipelines are present), the wind would be blowing either parallel to the site (south) or towards the site (northwest). Wind speed is typically between 4 and 13 miles per hour, with an average speed of approximately 7 miles per hour. Due to the predominantly low wind speeds and high variability in direction, wind conditions are not considered as a significant factor in evaluating risk to the site from a pipeline rupture.

## **4 RECORDS REVIEW**

The following sections summarize records requested and reviewed for the PRA.

### **4.1 Maps**

Online maps were reviewed for the National Pipeline Mapping System (NPMS) and the Southern California Gas Company. Utility maps were also requested with the City of Los Alamitos. The following is a summary of our review.

#### **4.1.1 Utility Maps**

Ninyo & Moore requested utility maps within the site vicinity from the City of Los Alamitos on October 29, 2018. Utility maps for the adjoining roadways of Cerritos Avenue and Norwalk/Los Alamitos Boulevard were provided on November 8, 2018. A 1995 utility map showed a significant pipeline corridor near the intersection of Norwalk/Los Alamitos Boulevard and Cerritos Avenue (Appendix B). The following pipelines may apply to the CDE protocol:

- 8-inch diameter Shell Oil trending north along Norwalk Boulevard and transferring west along Cerritos Avenue.
- 8-inch diameter Texaco Oil pipeline trending east-west along Cerritos Avenue.
- 10-inch diameter Arco Oil pipeline trending east-west along Cerritos Avenue.
- Various 4 and 10-inch diameter SoCal Gas Lines trending north-south along Norwalk/Los Alamitos Boulevard and east-west along Cerritos Avenue.

#### **4.1.2 NPMS**

Ninyo & Moore researched high-pressure hazardous liquid and natural gas lines within the site vicinity on the NPMS. According to the NPMS, high pressure natural gas distribution lines are not present within 1,500 feet of the site. Multiple high pressure hazardous liquid pipelines are located within 1,500 feet of the site, which include:

- Pacific Pipeline Line 008 (ID 008A,C), permanently abandoned
- Crimson Pipeline East Crude Line 700 (ID 339), active, containing crude oil
- Plains Marketing Line 507 (ID 3890), active and unfilled, containing crude oil
- Plains Marketing Line 512 (ID 3889), active and unfilled, containing crude oil

#### **4.1.3 So Cal Gas Map**

Ninyo & Moore researched high-pressure natural gas lines within the site vicinity on the Southern California Gas Company Natural Gas Pipeline Map. According to the online map, a high pressure natural gas distribution line or transmission line is not present within 1,500 feet of the site. The nearest high-pressure line is a transmission line approximately one mile west of the site.

#### **4.1.4 State Water Resources Control Board (SWRCB) GeoTracker**

Adjoining to the southwest of the site is a vacant lot that was a former gas station (Unocal #4727), which has an open leaking underground storage tank (LUST) case with the Regional Water Quality Control Board (RWQCB). In the Third Quarter 2018 Groundwater Monitoring Report provided on the GeoTracker website (AECOM, 2018), a figure displaying approximate locations of gas/oil and water lines is available. Based on the figure, the following pipelines are in the vicinity of the site:

- 8-inch diameter Shell Oil trending north along Norwalk Boulevard and transferring west along Cerritos Avenue
- 8-inch diameter Chevron Oil pipeline trending east-west along Cerritos Avenue.
- 10-inch diameter PPS pipeline trending east-west along Cerritos Avenue.
- Various 4, 8, and 10-inch diameter SoCal Gas Lines trending north-south along Norwalk/Los Alamitos Boulevard and east-west along Cerritos Avenue.

The location of these pipelines is similar to the utility map provided by the City of Los Alamitos, dated from 1995.

## 4.2 Agency Provided Information

Ninyo & Moore made requests to specific agencies for relevant information on natural gas and hazardous liquid pipelines in the site vicinity. The agencies for which records were requested are based on the CDE Guidance Protocol. The following sections provide a summary of our review.

### 4.2.1 Office of the California State Fire Marshal, Pipeline Safety Division

Ninyo & Moore made requests to the Office of the State Fire Marshal Pipeline Safety Division (OSFM PSD) on October 29, 2018 to review records that may be available for the site. A list was provided by a representative of the OSFM PSD on November 8, 2018, which provided information on OSFM PSD jurisdictional pipelines within a 1,500-foot radius of the site. The following pipelines were listed:

- Chevron/LA 8-inch diameter Crude Oil Pipeline, CSFM ID 0413
- Crimson Pipeline L.P. 8-inch diameter and 10-inch diameter Crude Oil Pipelines, CSFM ID 0339
- Plains All American Mud/Nitrogen 8-inch diameter and 10-inch diameter Pipelines, CSFM ID 0107
- Plains All American 16-inch diameter Crude Oil Pipeline, CSFM ID 0386
- Plains All American 12-inch diameter Crude Oil Pipeline, CSFM ID 0385

### 4.2.2 California Public Utility Commission

Ninyo & Moore made a request to the California Public Utility Commission on October 29, 2018 to review records that may be available for natural gas lines within 1,500 feet of the site. According to a representative of the CPUC on October 30, 2018, files were not found for our request.

### 4.2.3 California Department of Conservation, Division of Oil, Gas and Geothermal Resources

Ninyo & Moore made a request to the CDC, Division of Oil, Gas, and Geothermal Resources (DOGGR) on October 29, 2018 to review records that may be available for natural gas lines within 1,500 feet of the site. According to a representative of the CDC DOGGR on October 30, 2018, files were not found for our request.

#### **4.2.4 California Department of Fish and Game, Office of Spill Prevention and Response**

Ninyo & Moore made a request to the California Department of Fish and Game, Office of Spill Prevention and Response (CDFG OSPR) on October 29, 2018 to review records that may be available for natural gas lines within 1,500 feet of the site. To date, a response has not been received from the CDFG OSPR.

### **4.3 Operator Provided Information**

Ninyo & Moore made requests to specific operators for relevant information on natural gas and hazardous liquid pipelines in the site vicinity. The operators for which records were requested were based on information provided by the Office of the State Fire Marshal and utility maps provided by the City of Los Alamitos. The following sections provide a summary of our review.

#### **4.3.1 So Cal Gas Company**

Ninyo & Moore made a request with the So Cal Gas Company for information regarding the 10-inch diameter natural gas pipeline trending parallel to the site along Norwalk Boulevard to the west. On January 22, So Cal Gas responded, indicating that no high pressure gas facilities operate in the vicinity of the site. The 10-inch natural gas line shown on utility maps operates at medium pressure, which is between 10 and 60 psi. The line is constructed of steel, and was de-rated in 1969.

#### **4.3.2 Plains Marketing**

Ninyo & Moore made a request with Plains Marketing (Plains) on October 29, 2018 for information on multiple pipelines within the site vicinity, based on information provided by the Office of the State Fire Marshal and the NPMS. According to a representative of Plains on October 30, 2018, Plains currently operates Line 508 Cerritos to Alamitos (12-inch diameter) and Line 513-517 Cerritos to El Real (16-inch diameter). Line 507 Alnor to Cerritos (12-inch diameter) and Line 512 Alnor to Cerritos Valve Box (16-inch diameter) were purged of crude oil on November 2006 and have been in retired status since. Plains also oversees an abandoned Line 8 Huntington Beach to Redondo Valve Box (8-inch diameter). Plains included a map displaying the pipelines, which is provided in Appendix B. Plains did not have records of releases within the site vicinity. Plains would not disclose further information on active pipelines, namely flow rate and operating pressure, citing safety reasons.

### **4.3.3 Crimson Pipelines**

Ninyo & Moore made a request with Crimson Pipelines (Crimson) on October 29, 2018 for information on a crude oil pipeline (CSFM ID 0339) within the site vicinity, based on information provided by the Office of the State Fire Marshal and the NPMS. According to a representative of Crimson on November 7, 2018, Crimson operates an 8-inch diameter crude oil link that trends north-south beneath Norwalk Boulevard. At the intersection of Cerritos Boulevard, the pipeline changes trajectory to the west. Crimson performs internal integrity tests on the pipeline on a five-year cycle. The pipeline has a maximum allowable operating pressure of 720 pounds per square inch (psi) and can see anywhere from 250 to 800 barrels of crude per hour. Crimson included maps displaying the pipeline, which is provided in Appendix B.

### **4.3.4 Chevron Pipe Line Company**

Ninyo & Moore made a request to the Chevron Pipe Line Company on November 12, 2018 to review records that may be available for high pressure crude oil lines that may be within 1,500 feet of the site. A request was made due to information provided by the Office of the State Fire Marshal. To date, a response has not been received from the Chevron Pipe Line Company.

### **4.3.5 Golden State Water Company**

Ninyo & Moore requested information on October 29, 2018 from the Golden State Water Company (GSWC), who provide municipal water to the City of Los Alamitos, regarding high-volume/high-pressure water pipelines within 1,500 feet of the site. According to a representative of GSWC on January 23, 2019, there are up to nine 12-inch pipelines operated by GSWC within a 1,500-foot radius of the site. GSWC included maps displaying the pipelines, which are provided in Appendix B. The nearest pipeline is a 12-inch diameter ductile iron pipeline running west to east underneath the south side of Cerritos Avenue, fronting the Los Alamitos High School from Los Alamitos Boulevard to Del Norte Way. System pressures of pipelines in the vicinity of the school range from 65 to 85 psi, with flow varying significantly seasonally and diurnally.

## **4.4 User Provided Information**

According to a representative of UltraSystems, previous Phase I reports or other environmental assessment reports were not prepared for Los Alamitos High School. A Subsurface Utility Report (Underground Solutions, 2018) was prepared for the Los Alamitos High School Project by Underground Solutions on July 11, 2018, and was provided to Ninyo & Moore for review. The

utility report investigated utilities such as water, electrical, natural gas, telecommunication, and irrigation lines that are present on the Los Alamitos High School campus. The report indicates that water lines are present on the site, but are small diameter (less than 12 inches) and do not apply to this report. Similarly, natural gas lines are present on the site ranging in diameter from two to four inches, but are too small a diameter to be a safety concern. A figure showing utilities on the site is presented in Appendix B.

## 5 SITE RECONNAISSANCE

The objective of the site reconnaissance was to obtain information regarding pipelines, surface flow directions, storm drains, and other notable features that could affect the impact of a pipeline rupture to the site. Mr. Dennis Fee conducted the reconnaissance on December 24, 2018. A site plan is provided as Figure 2 and photographic documentation is provided in Appendix A.

### 5.1 Methodology and Limiting Conditions

The site reconnaissance consisted of walking on public right-of-ways in the site vicinity (primarily along Cerritos Avenue and Norwalk/Los Alamitos Boulevard) to observe the evidence of utilities, as well as conditions that could affect pipeline rupture and flow, including topography, ground surface conditions, and storm drains.

### 5.2 General Site Setting

At the time of the site reconnaissance, the site was developed as a high school with school buildings and athletic fields. The western portion of the site was under construction at the time of the reconnaissance. The topography of the site is relatively flat. The site reconnaissance focused on features on the surrounding roadways (Cerritos Avenue and Norwalk/Los Alamitos Boulevard) that could affect the impact of a pipeline rupture and spill to site receptors. The following features were observed:

- **Topography** - The site vicinity is relatively flat. The adjoining roadways Norwalk/Los Alamitos Boulevard and Cerritos Avenue are both raised in the middle and slope outwards. A liquid release would therefore flow outwards from the middle of the roadways towards their edge.
- **Evidence of Utilities**- Utility manholes were observed on the adjoining roadways Norwalk/Los Alamitos Boulevard and Cerritos Avenue. Two water meters and control valves were observed along the edge of the site to the west and south. The diameters of the pipelines were 6 inches, consistent with utility maps provided for the site vicinity.
- **Curbed Areas** – An approximate eight-inch high curb is present that separates the adjacent roadways Cerritos Avenue and Norwalk/Los Alamitos Boulevard from the sidewalk and site. Liquid spills would need to overcome this curb to flow onto the site.

- **Storm Drains** – Two storm drain catch basins were observed during the site reconnaissance. One was located at the southeast edge of Norwalk Boulevard adjoining the site; the other was located at the northwest edge of Cerritos Avenue adjoining the site. The catch basins are located in low points in surrounding topography, such that liquids released on nearby sections of road would flow into them. The catch basin located along Norwalk Boulevard was covered with a tarp and sandbags at the time of the site reconnaissance.

### 5.3 Adjoining Property Observations

Adjoining properties were observed from publicly accessible vantage points (e.g., streets, sidewalks) during the site reconnaissance. The properties adjoining the site are as follows and as depicted on Figure 2:

- **North:** Coyote Creek and Carbon Creek, beyond which are residential properties.
- **East:** Residential properties
- **South, West:** Various commercial properties are located beyond Norwalk/Los Alamitos Boulevard (west) and Cerritos Avenue (south). Adjoining to the southwest of the site is a vacant lot that was a former gas station (Unocal #4727), which has an open leaking underground storage tank (LUST) case with the Regional Water Quality Control Board (RWQCB).

## 6 PIPELINE RISK ANALYSIS

The following sections describe the PRA, including pipeline specifications, potential causes of pipeline failure, and risk analysis assumptions, calculations, and results.

### 6.1 Pipeline Configurations and Specifications

Based on information provided by online resources, agencies and operators, a significant pipeline corridor exists along Cerritos Avenue and Norwalk/Los Alamitos Boulevard, adjoining to the south and west of the site, respectively. The following sections discuss high-pressure and high-volume pipelines that are present within 1,500 of the site:

#### 6.1.1 Natural Gas Pipelines

Natural gas lines identified as being within the site vicinity are limited to those displayed on utility maps provided by the City of Los Alamitos and a subsurface utility report (Underground Solutions, 2018), which range between two and ten inches in diameter. These natural gas lines are neither transmission lines, distribution lines, nor gathering lines based on their absence from the SoCal gas map, NPMS, and lack of information from the Office of the State Fire Marshal and the California Public Utilities Commission. According to So Cal Gas, no high pressure transmission lines operate in the vicinity of the site. The 10-inch natural gas line identified on utility maps is local distribution lines operating at a medium pressure, which is

between 10 and 60 psi. A natural gas pressure of 60 psi is too low to be applicable to the CDE protocol; therefore, natural gas lines were not evaluated further for the purposes of this report.

### **6.1.2 Crude Oil Pipelines**

According to information from maps, agencies, and operators, the following active crude lines are present within 1,500 feet of the site.

#### **Plains Line 508 CSFM ID 0385**

- Contents: Crude Oil
- Outer Diameter: 12 inches
- Construction Material: Steel
- Operating Pressure: Not available
- Flow Rate: Not available
- Closest Approach: 800 feet

#### **Plains Line 513-517 CSFM ID 0386**

- Contents: Crude Oil
- Outer Diameter: 16 inches
- Construction Material: Steel
- Maximum Operating Pressure: Not available
- Flow Rate: Not available
- Closest Approach: 800 feet

#### **Crimson CSFM ID 0339**

- Contents: Crude Oil
- Outer Diameter: 8 inches
- Construction Material: Steel
- Maximum Operating Pressure: 720 psi
- Flow Rate: 250-800 barrels/hour
- Closest Approach: 75 feet

#### **Chevron/LA CSFM ID 0413**

- Contents: Crude Oil
- Outer Diameter: 8 inches
- Construction Material: Not available
- Maximum Operating Pressure: Not available

- Flow Rate: Not available
- Closest Approach: 30 feet

As previously mentioned, Plains did not disclose the operating pressures or flow rates of Lines 508 and 513-517 for safety reasons. Additionally, Chevron has not responded to our request for information on the 8-inch diameter pipeline. For these pipelines, an economic flow rate (conservative estimate) is assumed in calculating impacts from potential releases, per the CDE protocol. Incident reports or other information regarding events with the potential to impact the site were not included in the documents provided to Ninyo & Moore by Plains or Crimson.

### **6.1.3 Water Pipelines**

Based on Utility Maps provided by the City of Alamos, and a utility map available on GeoTracker, a 6-inch diameter water line is present along Cerritos Avenue trending east-west. Based on the Underground Solutions 2018 report, multiple water and irrigation lines are present on the school campus ranging from ½-inch to 8 inches in diameter. Based on information provided by GSWC, a 12-inch diameter ductile iron pipeline runs west to east underneath the south side of Cerritos Avenue, fronting the Los Alamos High School from Los Alamos Boulevard to Del Norte Way. The pressure of this pipeline ranges from 65 to 85 psi, with flow varying significantly seasonally and diurnally.

## **6.2 Possible Causes of Pipeline Failure**

Many factors, both man-made and of natural origin, may lead to failure of a pipeline. In California, seismic hazards are more severe than in other parts of the United States, and so seismic hazards may be a significant cause of pipeline failures. Other causes of pipeline failures include corrosion, excavation damage, material and weld defects, equipment failure, and incorrect operations. Possible causes of pipeline failure are taken into account by the CDE protocol; however, some latitude is given to adjust the probability of failure based on the professional opinion of the risk analyst. CDE protocol provides a base probability (P0) of release from pipeline failure which includes several factors, such as seismic hazards. The seismic hazard factor assumes an average permanent ground displacement (PGD) factor based on several elements, including an average peak ground acceleration (PGA) of 0.3g. Based on a Geotechnical Engineering Report prepared by Terracon Consultants (Terracon, 2018), a PGA of 0.51g is expected at the site. Therefore, a probability adjustment factor (PAF) of 1.7 has been applied to the base probability.

For the PRA of crude oil pipelines within 1,500 feet of the site, data from the last 20 years was used to calculate the P0. In California, 270 reportable incidents have occurred for crude oil

pipelines within the last 20 years. A reportable incident may refer to a release from the pipeline, an event that results in an emergency shutdown of a pipeline, or an event that is significant in the judgement of the operator. Because approximately 3,472 miles of crude oil pipelines are located in California, a P0 of 0.0039 releases/mile-year was calculated. Multiplying this by our PAF of 1.7, the very conservative value of 0.0066 will be used for the adjusted base probability (PA).

### 6.3 Stage 1 Risk Analysis

The following criteria must be met in order to use a Stage 1 Risk Analysis for the PRA.

Table 2 – Stage 1 Risk Analysis Criteria	
Pipeline Parameter	Variable Value
Maximum Segment Length	1000 feet
Minimum distance from liquid pool to campus site property line	600 feet
Maximum circular pool diameter	200 feet
Maximum rectangular pool dimensions	
-Length	5280 feet
-Width	10 feet
Maximum failure rate (F0)	0.0013 releases/mi-yr

In addition, Stage 1 Risk Analysis applies when there is only a single high-pressure pipeline within 1,500 feet of the site. Because multiple pipelines that do not meet all of the above parameters are present within 1,500 feet of the site, Stage 2 Risk Analysis must be implemented for the PRA.

### 6.4 Stage 2 Risk Analysis

The CDE protocol's Stage 2 risk procedures were programmed into the Excel spreadsheet provided by the CDE to automate the require calculations (Appendix C). The pipeline failure/release statics provided in the CDE protocol implicitly include all pipeline failure types (e.g. leaks, ruptures) due to all types of mechanisms (e.g., aging, corrosion, construction/repair, external events, etc.), including the failure potential due to an average earthquake event (Section 6.2).

The property boundary is a distance of approximately 75 feet from the 8-inch diameter Crimson crude oil pipeline and 30 feet from the 8-inch diameter Chevron crude oil pipeline. Using standard assumptions of the CDE Stage 2 risk procedures, the total individual risks to the site from these pipelines would not exceed the individual risk criterion (IRC) of 1.0E-06 (one chance in a million each year). However, the total risks from both pipelines would be close to the minimal acceptable risk due to the high failure rate of crude oil pipelines and the close distance of these pipelines to the site. Note that the calculated Stage 2 risks for these pipelines are based on extremely conservative assumptions, which include:

- The pipeline is at its maximum flow rate at the time of the leak/rupture.
- A crude oil pipeline failure results in a significant release.
- Receptors are located on the nearest property line.
- The flow is outward from the source and creates a circular pool one centimeter in thickness.
- The release of crude oil is uninterrupted for 15 minutes.
- The released crude oil flows directly to the surface, and none of the released crude oil seeps into the ground
- The flow of the released crude oil is unimpeded by structures (i.e., storm drains) or topography
- The wind direction is directly towards the school

A Stage 3 analysis using more accurate data applicable to realistic scenarios was conducted for these pipelines (Section 6.5) per the CDE Protocol.

The spreadsheet results indicate that there would be no risk associated with all scenarios for the 12-inch diameter and 16-inch diameter Plains crude oil pipelines due to the distance of these pipelines from the site. The results indicate the total individual risks for the 12-inch and 16-inch diameter pipelines are both 0.00E+00.

## 6.5 Stage 3 Risk Analysis

On curbed roadways, liquid pipelines releases are expected to form non-circular pools. Therefore, a rectangular pool shape is assumed for this Stage 3 analysis of the two 8-inch diameter crude oil pipelines beneath Norwalk Boulevard (Crimson) and Cerritos Avenue (Chevron). Based on observations from the site reconnaissance, a curb of approximately 8 inches surrounds the adjoining roadways, which is considered the depth of the pools. A pool fire for a liquid pipeline release is considered the number one driver for risk to the site.

The Crimson crude oil pipeline is located west of the raised middle of Norwalk Boulevard. Based on the topography of the roadway, a release from this pipeline would flow towards the western edge of the street, away from the site. A rectangular area of impact was calculated based on the volume of crude oil released in a 15-minute period at a maximum flow rate. The width of the rectangular area is the distance of the pipeline to the nearest curb (approximately 30 feet), the depth being the curb height of 8 inches. Assuming the pool is the height of the curb, the length of the pool is approximately 55 feet long. The impacts of a pool fire from this location would not in any likelihood reach the site; therefore, the total individual risk of this pipeline is 0.00E+00.

The Chevron crude oil pipeline is located north of the raised middle of Cerritos Avenue, and therefore could flow towards the site to the north in the unlikely event of a release of crude oil. A rectangular area of impact was calculated based on the volume of crude oil released in a 15-minute period at a maximum flow rate (economic flow rate). The width of the rectangular area is the distance of the pipeline to the curb (approximately 24 feet), the depth being the curb height of 8 inches. Assuming the pool is the height of the curb, the length of the pool is 120 feet long. Based on CDE protocol, the impacts of a pool fire are calculated by splitting the area into multiple smaller rectangular and adding the impacts from all the smaller areas. Using this method, the impact distance where the fire heat radiation is at 5,000 British thermal units per hour-foot squared (BTU/hr-ft<sup>2</sup>) is approximately 58 feet from the pipeline. The calculated total individual risk of this pipeline is 2.7E-08.

## 6.6 Results of Impact Zones

The Los Alamitos High School has a population of approximately 3,500 students, faculty, and staff. In accordance with CDE Protocol, the site was divided into three zones in order to better evaluate potential impacts based on the population at risk from the 8-inch diameter crude oil pipelines. The impact analysis did not include calculated risks from the 12-inch diameter and 16-inch diameter Plains crude oil pipelines, and the Crimson 8-inch pipeline because their combined Total Individual Risk (TIR) was 0.00E+00.

For the Chevron pipeline, zones were established starting at the southern Cerritos Avenue property line and moving away from the property line north towards the opposite side of the site. Zone boundaries were established at intervals of 540 feet, with the zone boundaries parallel to the Cerritos Avenue property line. The distances from the pipeline to the beginning and end of the three zones were then used to calculate the TIR Indicator Ratio (TIRR) and the Population Risk Indicator (PRI) in accordance with CDE Protocol. For the PRI, it was assumed that 30% of receptors were outside at the time of the potential pipe rupture, and that the population was spread equally among the three zones. The calculated TIRR and PRI are 0.25 and 175, respectively. The TIRR of 0.25 indicates that the only risks to receptors are present at the southern edge of the site, which dissipates significantly to the north.

## 6.7 Waterline Risk Analysis

In accordance with CDE protocol, an evaluation of the physical impacts of a release from water pipelines in the site vicinity was conducted. The GSWC-operated 12-inch ductile iron pipeline trending west-east under Cerritos Avenue is the highest volume water line closest to the site, and thus was evaluated. Other water lines are either too small in diameter or a large distance and down gradient of the site. In the event that the 12-inch Cerritos Avenue waterline ruptured at a

velocity of 5 feet per second for 5 minutes (CDE protocol assumed values), approximately 1,170 cubic feet of water would be released. The released water, assuming all of it reaches the surface, would be almost entirely contained within the 8-inch curb of Cerritos Avenue. Furthermore, since the waterline is on the south side of Cerritos Avenue, it would flow away from the site based on the outward sloping topography of the roadway. The site is on relatively flat terrain, and significant pooling and accumulation of water in low-lying zones is not considered an issue. Based on this, and the lack of high-volume water lines that could release large quantities of water in a short time to the site, risks to the site population from the spillage and accumulation of water are considered insignificant.

## 7 CONCLUSIONS

Four pipelines, two 8-inch diameter crude oil pipelines, one 12-inch diameter crude oil pipeline, and one 16-inch diameter crude oil pipeline, are located within 1,500 feet of the site and were analyzed to evaluate the risk posed to potential receptors. The CDE Guidance Protocol for School Site Pipeline Risk Analysis was used to perform the risk analysis. Natural gas pipelines within the site vicinity operate at a medium pressure less than 60 psi, and thus do not apply to the CDE protocol. Stage II Risk Analysis was acceptable for the 12-inch diameter and 16-inch diameter pipelines due to their distance from the site. A Stage III Risk Analysis using real-world data was required for the two 8-inch diameter pipelines based on their close proximity to the site. Using the CDE protocol, the individual risks for the defined leak and rupture scenarios from the pipelines are acceptable (below the IRC of  $1.0\text{E}-06$  [one chance in a million each year]). The results indicate total individual risks for the crude oil pipelines as follows:

- A total individual risk for the 8-inch diameter Chevron pipeline is  $2.7\text{ E}-08$  based on the results of a Stage III analysis.
- Total individual risk for the 8-inch diameter Crimson pipeline is  $0.00\text{E}+00$  based on the results of a Stage III analysis.
- Total individual risks for the Plains 12-inch and 16-inch diameter pipelines are both  $0.00\text{E}+00$  based on the results of a Stage II analysis.

## 8 RECOMMENDATIONS

Based on the results of this PRA, the potential hazards at the site meet the acceptable risk criteria of the CDE protocol. The CDE protocol provides acceptable fatality criteria for small leak and full rupture events. However, if desired by Los Alamitos Unified School District to increase site safety and decrease probabilities of incidents occurring to the pipelines, the best course of action is to first prevent a significant accident from occurring, and second, create procedures to reduce the risk if an accident occurs. The following recommendations should therefore be considered:

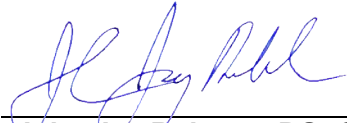
- Special permit procedures should be considered for any excavation adjacent to the pipelines within 1,500 feet of the site; namely the 8-inch diameter crude oil pipelines operated by Crimson and Chevron along Norwalk Boulevard and Cerritos Avenue, such as the presence of pipeline operation personnel during excavation, the issuance of a permit, and proper licensing of the excavation contractor. This would be in addition to the mandatory notification of the Underground Service Alert within 48 hours of proposed excavation so utilities and other underground structures can be marked. These actions would significantly reduce the potential for construction damage to the pipelines that could lead to a significant and potentially hazardous event.
- Crimson and Chevron should provide written assurances to the Los Alamitos Unified School District that they are in full compliance with all Federal, State, and local statutes, regulations, and laws relevant to the operation of the pipelines, and shall remain in compliance throughout the period they are in operation. These assurances should also apply to inspection and repair programs for the pipeline, shutoff valves, corrosion protection, and emergency response. Crimson and Chevron should notify the Los Alamitos School District when they have plans to work on these pipelines within 1,500 feet of the site.
- An emergency response and excavation plan should be prepared for the site (if not currently prepared and available) that includes, but are not limited to, considerations of a pipeline leak or rupture within the vicinity of the site. The plan should establish logical egress steps for evacuation that will reduce the chances of injury and/or fatality from events that could occur due to the rupture of pipelines.

## 9 REFERENCES

- AECOM, 2018, Third Quarter 2018 Groundwater Monitoring Report, Former Unocal Service Station No. 4727 (Chevron Site No. 306600), 3501 Cerritos Avenue, Los Alamitos, California, OCHCA Case Number 92UT123
- California Department of Conservation, 1998, Seismic Hazard Zone Report for the Los Alamitos 7.5-Minute Quadrangle, Los Angeles and Orange Counties, California
- California Department of Conservation, 1999, Seismic Hazard Zone Official Map for the Los Alamitos Quadrangle, released March 25
- California Department of Conservation, 1986,
- California Department of Education, 2017, Guidance Protocol for School Site Pipeline Risk Analysis, dated February
- CDC, see California Department of Conservation
- CDE, see California Department of Education
- National Pipeline Mapping System, 2018, Online Public Map Viewer, <https://www.npms.phmsa.dot.gov>, accessed in October and November
- Terracon, 2018, Geotechnical Engineering Report, Los Alamitos High School Aquatic Center, 3591 W. Cerritos Avenue, Los Alamitos, California, dated April 24
- Underground Solutions, 2018, West Coast Air Condition Co, Inc, Los Alamitos High School Project, Subsurface Utility Report, dated July 11
- United States Geological Survey, 1981, Los Alamitos, California: 7.5-minute series (topographic), Scale 1:24,000.
- USGS, see United States Geological Survey.

## 10 PROFESSIONAL STATEMENT

John Jay Roberts states that the PRA was performed under his direct supervision, and that he has reviewed and approved the report, and the methods and procedures employed in the development of the report conform to the minimum industry standards. Mr. Roberts states that Ninyo & Moore project personnel are properly experienced and/or certified to do the work described herein.



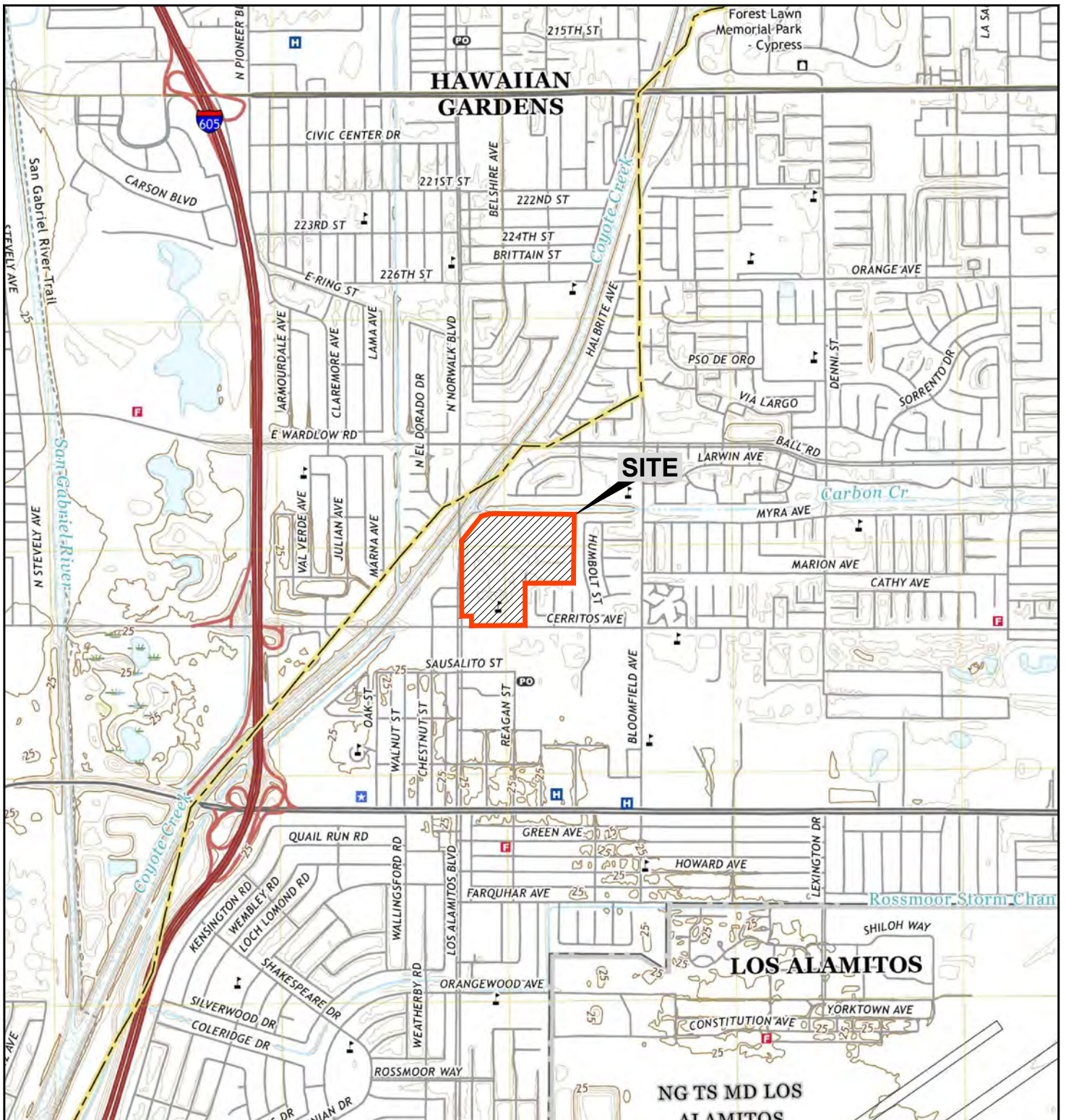
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**John Jay Roberts, PG, CEG**  
Principal Geologist



# FIGURES

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NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. | REFERENCE: USGS, 2015.

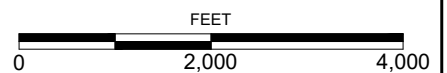
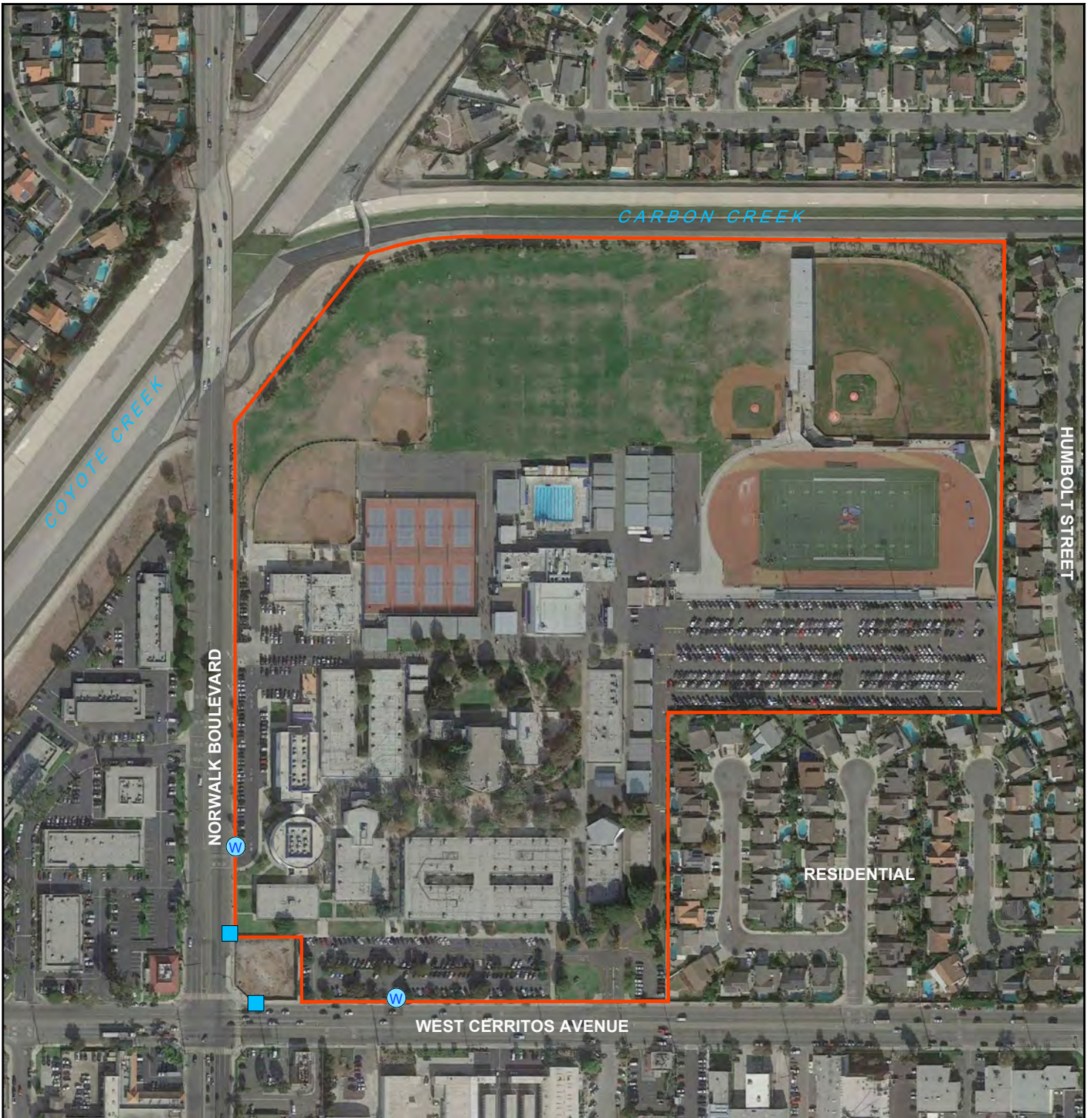


FIGURE 1

## SITE LOCATION

LOS ALAMITOS HIGH SCHOOL  
3591 WEST CERRITOS AVENUE  
LOS ALAMITOS, CALIFORNIA  
210808001 | 1/19



#### LEGEND

- SITE BOUNDARY
- STORM DRAIN CATCH BASIN
- WATER CONTROL VALVE

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. | REFERENCE: GOOGLE EARTH, 2018.

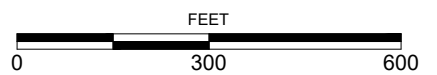
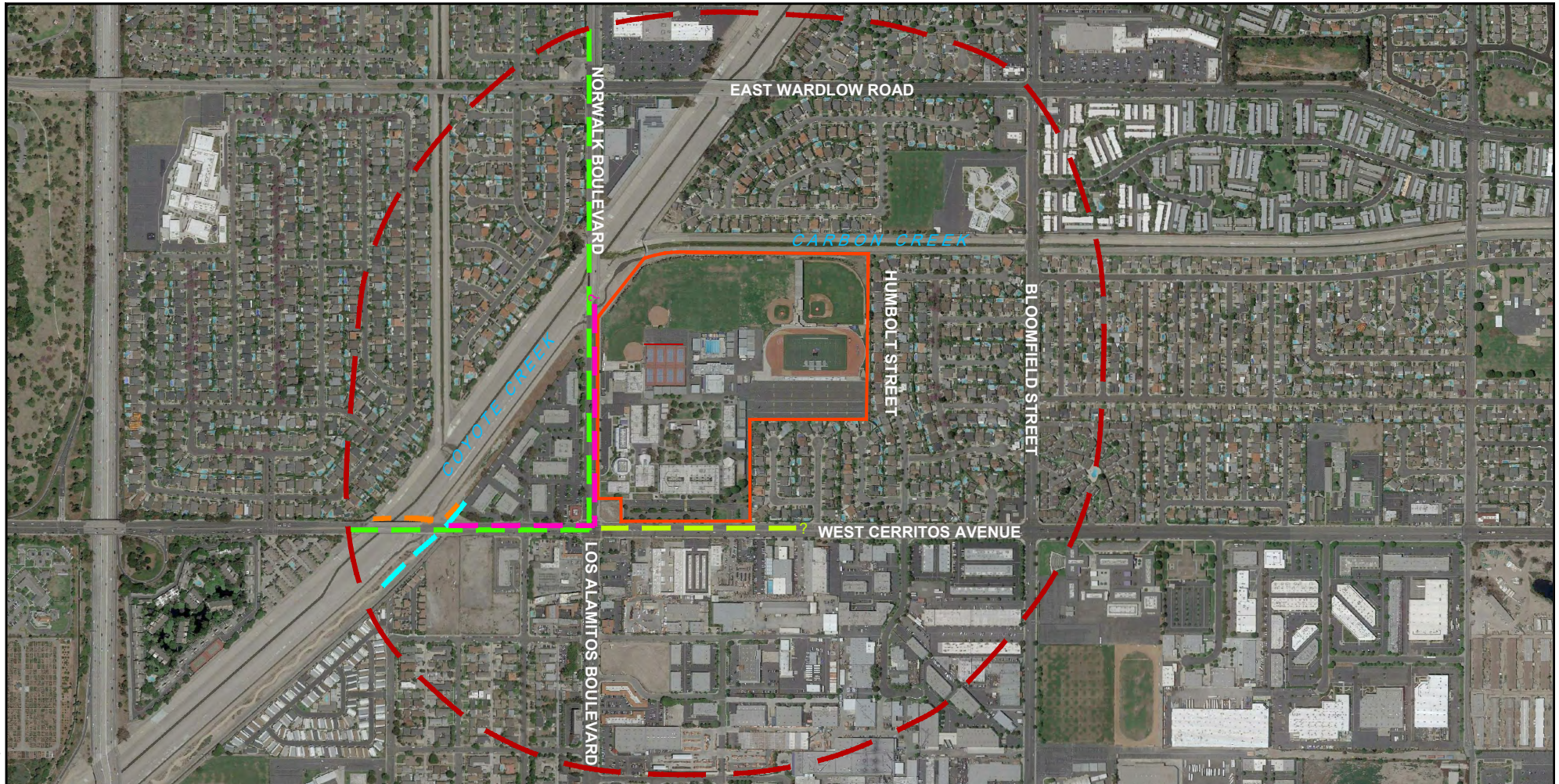


FIGURE 3

#### SITE PLAN

LOS ALAMITOS HIGH SCHOOL  
3591 WEST CERRITOS AVENUE  
LOS ALAMITOS, CALIFORNIA  
210808001 | 1/19



# LEGEND

	SITE BOUNDARY		PLAINS MARKETING 12" DIAMETER CRUDE OIL PIPELINE		CHEVRON 8" DIAMETER CRUDE OIL PIPELINE
	1,500' RADIUS FROM SITE		PLAINS MARKETING 16" DIAMETER CRUDE OIL PIPELINE		10" DIAMETER NATURAL GAS PIPELINE
	CRIMSON 8" DIAMETER CRUDE OIL PIPELINE				

NOTE: DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE. | REFERENCE: GOOGLE EARTH, 2018.



FEET

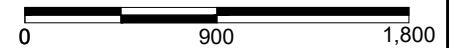


FIGURE 3

## PIPELINE LOCATIONS WITHIN 1,500 FEET RADIUS OF SITE

LOS ALAMITOS HIGH SCHOOL  
3591 WEST CERRITOS AVENUE  
LOS ALAMITOS, CALIFORNIA  
210808001 | 1/19



# APPENDIX A

## Photographs



**Photograph 1:** View looking east along Cerritos Avenue, adjoining the south of the site.



**Photograph 2:** View looking south along Norwalk Boulevard, adjoining the west of the site.

**FIGURE A-1**

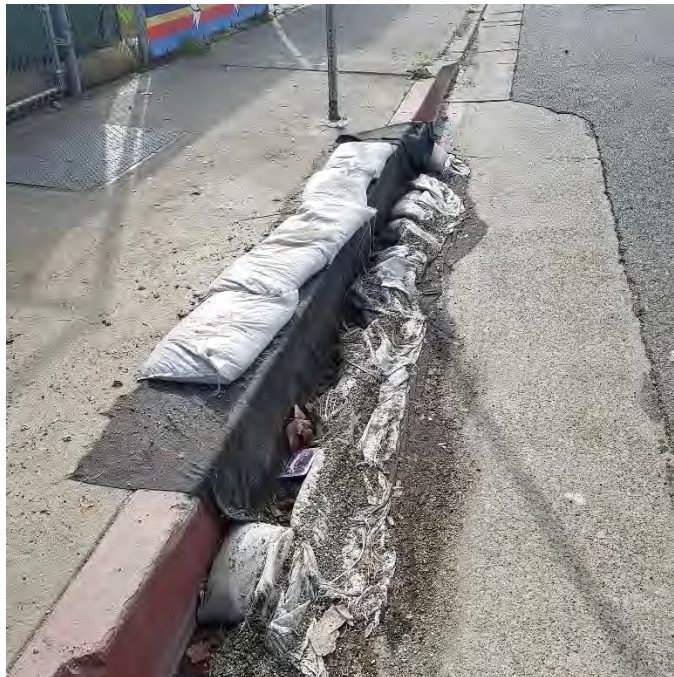
## **PHOTOGRAPHS**

LOS ALAMITOS HIGH SCHOOL  
LOS ALAMITOS, CALIFORNIA

210808001 | 1/19



**Photograph 3:** View of a stormwater catch basin on the sidewalk of Cerritos Avenue to the southwest of the site.



**Photograph 4:** View of a stormwater catch basin on the sidewalk of Norwalk Boulevard to the southwest of the site.

**FIGURE A-2**

## **PHOTOGRAPHS**

LOS ALAMITOS HIGH SCHOOL  
LOS ALAMITOS, CALIFORNIA

210808001 | 1/19



**Photograph 5:** View of water meter and control system adjoining the south of the site. The water pipeline is six inches in diameter.



**Photograph 6:** View of water meter and control system adjoining the south of the site. The water pipeline is six inches in diameter.

**FIGURE A-3**

## **PHOTOGRAPHS**

LOS ALAMITOS HIGH SCHOOL  
LOS ALAMITOS, CALIFORNIA

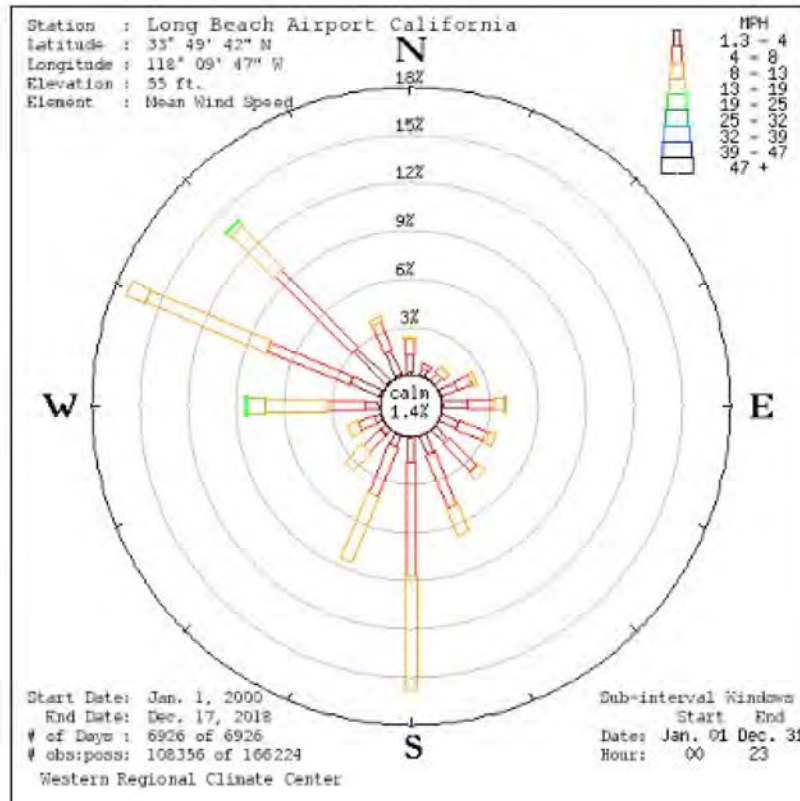
210808001 | 1/19



# APPENDIX B

## Supporting Documents

# Long Beach Airport California



## Long Beach Airport California - Wind Frequency Table (percentage)

Latitude : 33° 49' 42" N  
 Longitude : 118° 09' 47" W  
 Elevation : 55 ft.  
 Element : Mean Wind Speed

Start Date : Jan. 1, 2000  
 End Date : Dec. 17, 2018  
 # of Days : 6926 of 6926  
 # obs : poss : 108356 of 166224

Sub Interval Windows  
 Start End  
 Date Jan. 01 Dec. 31  
 Hour 00 23

(Greater than or equal to initial interval value and Less than ending interval value.)

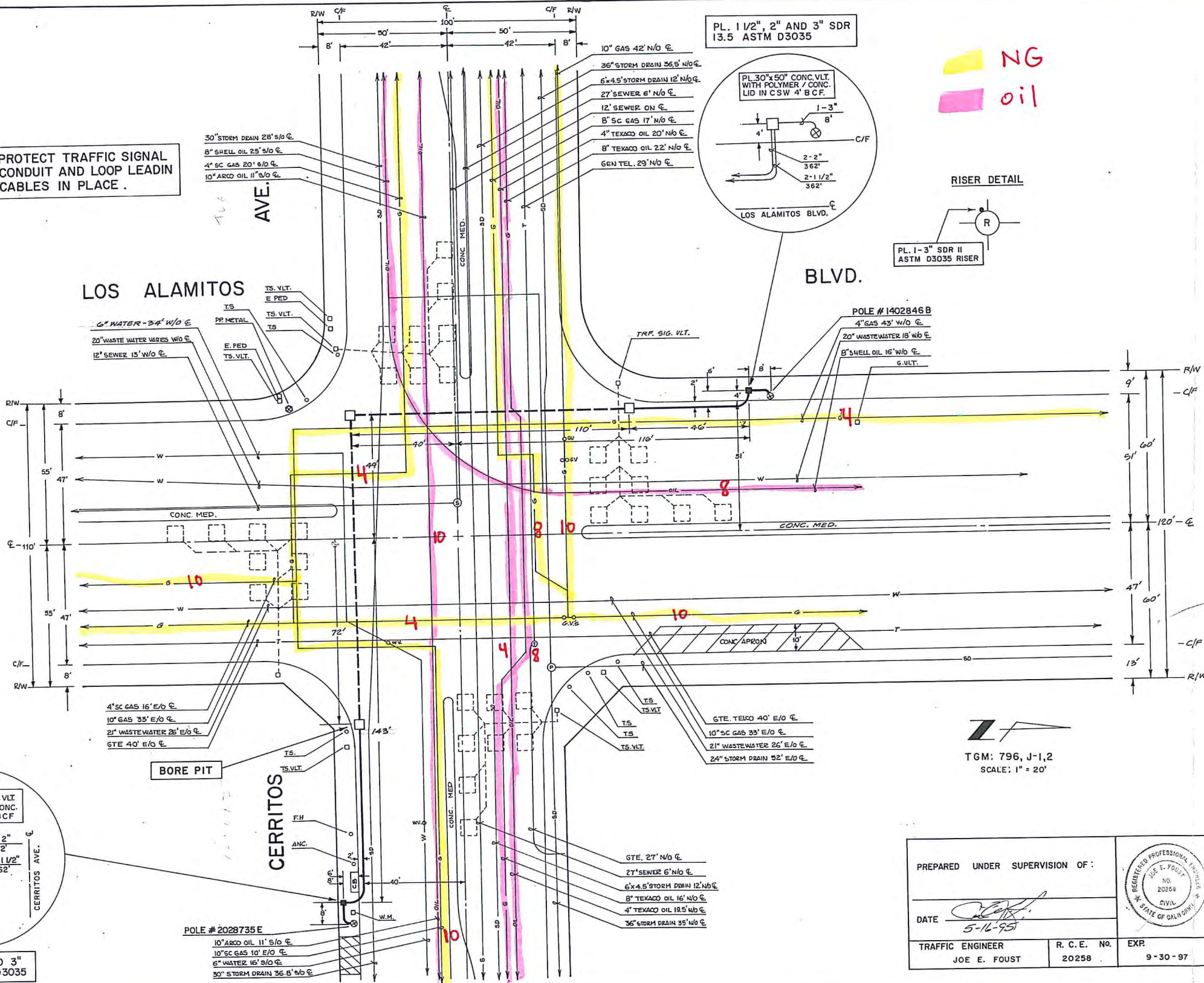
Range (mph)	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	Total
1.3 - 4	1.1	0.4	0.5	1.1	1.5	1.2	1.2	1.2	1.6	0.7	0.4	0.3	0.8	2.0	2.9	1.6	18.6
4 - 8	1.0	0.3	0.4	1.0	1.7	2.0	2.4	3.6	7.1	3.4	1.5	1.0	2.3	5.6	6.8	1.9	42.0
8 - 13	0.2	0.1	0.1	0.3	0.6	0.4	0.6	1.8	7.1	4.4	1.5	0.7	4.0	8.2	3.7	0.3	34.0
13 - 19	0.0	0.0	0.0	0.1	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.1	1.1	1.2	0.3	0.1	3.5
19 - 25	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.4
25 - 32	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
32 - 39	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39 - 47	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
47 -	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total(%)	2.3	0.8	1.1	2.4	3.9	3.7	4.3	6.7	15.8	8.6	3.4	2.2	8.3	17.1	13.8	4.0	98.5
Calm (<1.3)																	1.4
Ave Speed	4.8	4.8	5.0	5.3	5.6	5.3	5.7	6.3	7.1	7.5	7.2	7.0	9.1	8.3	6.6	5.3	6.9

DRAWING NUMBER  
116-469  
Sheet 1 of 1

DRAWING NUMBER

DRAWING NUMBER

CAUTION: PROTECT TRAFFIC SIGNAL CONDUIT AND LOOP LEADIN CABLES IN PLACE.



- GENERAL NOTES:**
- 1.) ALL WORK DONE SHALL CONFORM TO THE LATEST REVISIONS OF CITY OF LOS ALAMITOS STANDARD PLANS, ORANGE COUNTY ENVIRONMENTAL AGENCY STANDARD PLANS, AND STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (PREPARED BY THE SOUTHERN CALIFORNIA CHAPTERS OF THE APWA AND ASSOCIATED GENERAL CONTRACTORS OF AMERICA).
  - 2.) CITY OF LOS ALAMITOS STANDARD PLANS SHALL BE CONSIDERED A PART OF THESE PLANS, AND SHALL BE ON THE JOB SITE AT TIME OF CONSTRUCTION.
  - 3.) ALL CONSTRUCTION IN DEDICATED RIGHTS-OF-WAY MUST BE COVERED BY A PERMIT FROM THE CITY OF LOS ALAMITOS. NOTIFY CITY PUBLIC SERVICES INSPECTOR AT (310) 431-3538 EXT. 320 48 HOURS IN ADVANCE OF ALL WORK IN PUBLIC RIGHT-OF-WAY.
  - 4.) PRIOR TO STARTING OF ANY WORK, THE CONTRACTOR SHALL SET UP A JOB SITE PRE-CONSTRUCTION MEETING WITH THE CITY IN ATTENDANCE AND SHALL SUBMIT HIS PROPOSED CONSTRUCTION SCHEDULE IN CONFORMANCE WITH SECTION 6-1, CONSTRUCTION SCHEDULE & COMMENCEMENT OF WORK, AS OUTLINED IN THE LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION.
  - 5.) THE METHODS AND PROCEDURES FOR BARRICADE AND CHANNELIZATION DURING CONSTRUCTION SHALL CONFORM TO THE MANUAL OF WARNING SIGNS, LIGHTS & DEVICES FOR USE IN PERFORMANCE OF WORK UPON HIGHWAYS ISSUED BY THE DEPARTMENT OF TRANSPORTATION AND LATEST REVISION THEREOF.
  - 6.) CONTRACTOR SHALL FURNISH AND INSTALL ALL SIGNS, LIGHTS, BARRICADES, FLASHING ARROW BOARD AND ANY OTHER TRAFFIC CONTROL OR WARNING DEVICES, INCLUDING FLAGMEN, AS REQUIRED UNDER NOTE 5 ABOVE OR AS MAY BE REQUIRED BY THE CITY ENGINEER, FAILURE TO DO SO WILL BE CITED UNDER APPLICABLE SECTION OF THE C.V.C. AND THE L.A.M.C. AND CORRECTIVE COSTS TO THE CITY WILL BE CHARGED.
  - 7.) TRENCHING AND BACKFILL FOR OTHER THAN ROCKWHEEL METHOD SHALL BE PER CITY STANDARDS, BACKFILL WITH CRUSHED AGGREGATE BASE. ROCKWHEEL METHOD SHALL BE PER DETAIL HEREON.
  - 8.) RELATIVE COMPACTION OF 95% IS REQUIRED IN ALL SUBGRADE AND BASE MATERIALS ON ARTERIAL STREETS, 90% FOR ALL OTHER STREETS AND PAVING AREAS.
  - 9.) ALL CONCRETE TO BE CLASS "A", 6 SACK MIX.
  - 10.) ALL PCC AND AC TO BE JOINED SHALL BE SAWCUT IN A CLEAN, STRAIGHT LINE AS APPROVED BY THE CITY ENGINEER.
  - 11.) MAXIMUM LENGTH OF OPEN TRENCH SHALL BE THE DISTANCE NECESSARY TO ACCOMMODATE THE AMOUNT OF CONDUIT, CABLE OR PIPE ABLE TO BE INSTALLED AND BACKFILLED THE SAME DAY. NO OPEN TRENCHES WILL BE ALLOWED OVERNIGHT.
  - 12.) AS THE WORK IS PROGRESSING AND AT THE END OF EACH WORKING DAY, STREETS SHALL BE KEPT IN A SAFE, CLEAN, DUST FREE, MUD FREE CONDITION BY MEANS OF MECHANICAL SWEEPERS, WATER TRUCK OR ANY OTHER MEANS DEEMED NECESSARY TO ACCOMPLISH THE ABOVE. SECTION 7-8 OF THE "GREEN BOOK" SHALL BE STRICTLY ADHERED TO.
  - 13.) WORK WITHIN THE PUBLIC RIGHT-OF-WAY, ONCE BEGUN, SHALL BE PROSECUTED TO COMPLETION WITHOUT DELAY SO AS TO PROVIDE MINIMUM INCONVENIENCE TO ADJACENT PROPERTY OWNERS AND THE TRAVELLING PUBLIC. ALL TRENCHES SHALL BE FINISH-PAVED WITHIN 48 HOURS OF INITIAL EXCAVATION.
  - 14.) LOCATE AND PROTECT ALL EXISTING UTILITIES IN PLACE.
  - 15.) AT LEAST 48 HOURS PRIOR TO COMMENCING EXCAVATION, NOTIFY UNDERGROUND SERVICE ALERT (1-800-422-4133).
  - 16.) NO WORK SHALL BE DONE ON ADJACENT PROPERTIES WITHOUT OBTAINING WRITTEN PERMISSION FROM THE OWNERS OF THE ADJACENT PROPERTIES.
  - 17.) ANY LOT CORNER OR OCCEMA BM, MONUMENT OR THE DESTROYED OR DISPLACED SHALL BE RESTORED TO ITS ORIGINAL POSITION BY A LICENSED ENGINEER OR SURVEYOR. ANY CHANGE IN LOCATION OR ELEVATION SHALL BE REPORTED TO THE CITY ENGINEER AND OCCEMA BY A LICENSED ENGINEER OR LAND SURVEYOR ON 8 1/2" x 11" PAPER (ONE SIDE ONLY) SHOWING LOCATION AND TIES OR LEVEL RUN.
  - 18.) INDEMNIFICATION CLAUSE: CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY OF THE JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTIES; THAT THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS AND THAT THE CONTRACTOR SHALL DEFEND, INDEMNIFY AND HOLD THE OWNER AND THE ENGINEER HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT.
  - 19.) NOTIFY IN WRITING, EACH RESIDENT / OCCUPANT IN THE AREA IN WHICH CONSTRUCTION IS TO COMMENCE, AND ALSO DELIVER TO EACH RESIDENT / OCCUPANT, NOTICE OF SUCH CONSTRUCTION AT LEAST 48 HOURS IN ADVANCE OF SUCH CONSTRUCTION.
  - 20.) AS-BUILT DRAWINGS INCLUDING THE LOCATION OF ALL LINKATEL PACIFIC SHALL BE FILED WITH THE CITY ENGINEER PRIOR TO ACCEPTANCE OF IMPROVEMENTS.
  - 21.) RESTORATION OF EXISTING LANDSCAPING AND OTHER IMPROVEMENTS WITHIN CITY EASEMENTS SHALL BE TO EQUAL OR BETTER CONDITION AND TO THE SATISFACTION OF PROPERTY OWNER AND CITY ENGINEER.

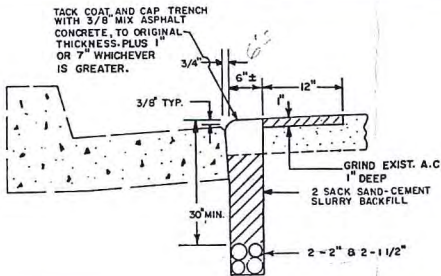
TOTAL FOOTAGE		MATERIAL DATA	
LINEAR TRENCH FTG.	364'	1 1/2" CNDT.	724'
2" CNDT.	724'	3" CNDT.	16'
3" CNDT.	(2)	RISER POLE	

CONDUITS TECHNICAL DATA			
SDR 13.5 ASTM D3035		SDR II ASTM D3035	
INSIDE DIA.	OUTSIDE DIA.	INSIDE DIA.	OUTSIDE DIA.
1 1/2"	1.900"	3"	3.5"
2"	2.375"		
3"	3.500"		

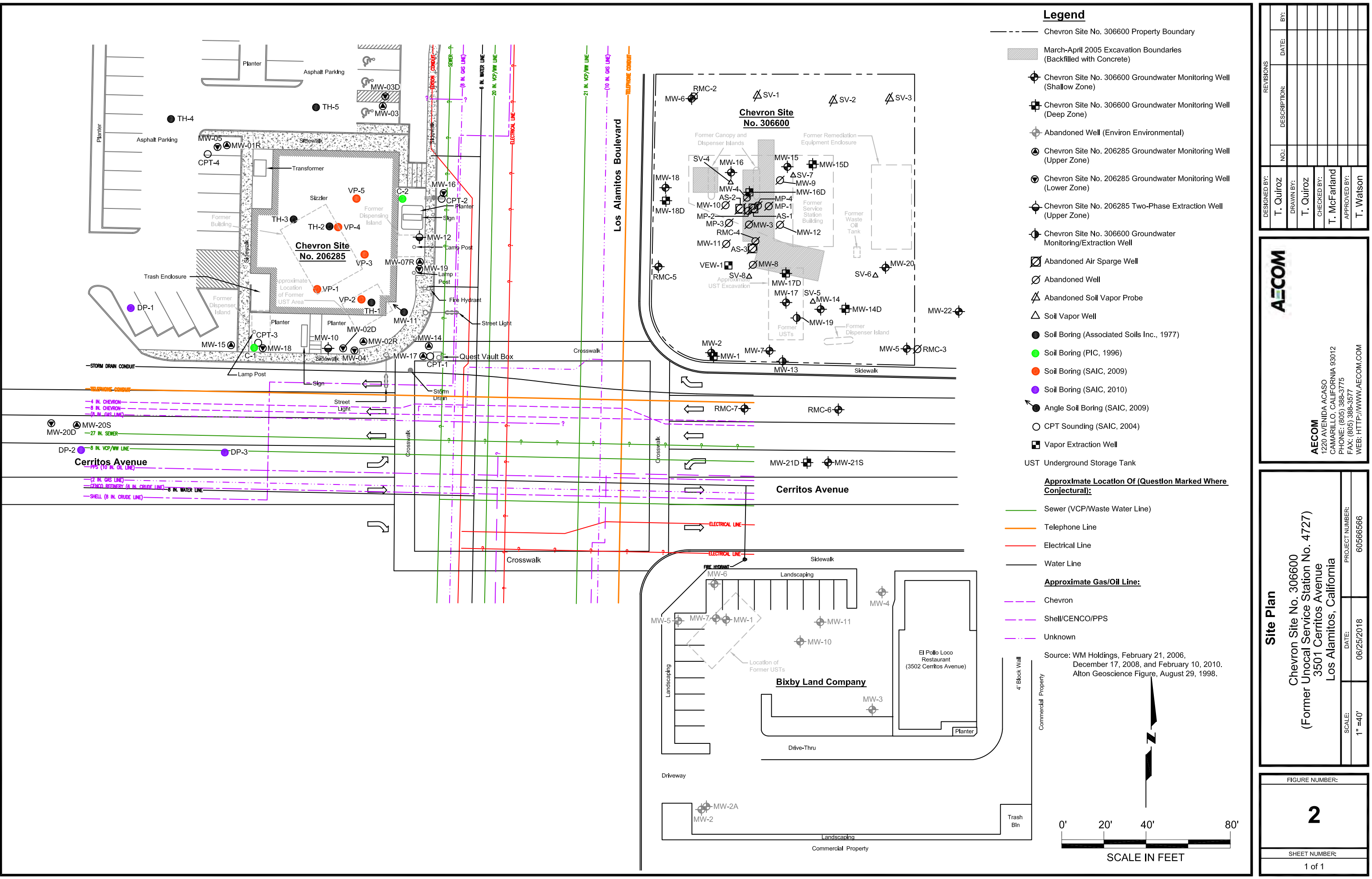
**ROCKWHEEL TRENCH DETAIL**

1. LATERAL CROSSINGS OF ARTERIAL STREETS USING SAWCUT METHOD SHALL HAVE TRENCH BACK FILLED WITH 2 SACK SAND-CEMENT SLURRY.

2. OPEN CUTS OTHER THAN BY ROCKWHEEL METHOD SHALL BE PER CITY STANDARDS.



REVISED	5 - 15 - 95	LINKATEL PACIFIC, L.P.	
		1924 DEERE AVE. SANTA ANA, CA. 92705	
GEO:		APPROVED BY CITY OF LOS ALAMITOS	
DRAFTER:		DATE:	
PLANT LAYOUT BY:		P.W.D./C.E.	
K & B ENGINEERING 23172 PLAZA POINTE DR. # 135 LAGUNA HILLS CA 92653 TELEPHONE No. (714) 472 - 4470		SCALE: 1" = 20' DATE: LOS ALAMITOS LOCATION: LOS ALAMITOS BLVD. AT CERRITOS AVE. TYPE OF DRAWING: FIBEROPTIC CONDUIT LAYOUT PROJECT NUMBER: BB-LA-OC-UG-F01	





## Office of the State Fire Marshal

Pipeline Safety Division

P.O. Box 944246

Sacramento, CA 94244-2460

Request ID: 10302018SFM001

Page 1 of 4

TO: NINYO & MOORE  
DENNIS FEE  
475 GODDARD, STE 200  
IRVINE, CA 92618

FROM: Lisa Dowdy

Phone: (916) 263-6300

Fax: (916) 263-3399

Phone: 949 753 7071

Fax:

EMail:

### PIPELINE LOCATION REQUEST FOR:

**3591 W CERRITOS AVENUE  
LOS ALAMITOS, CA 90720**

### THE FOLLOWING COMPANY(S) HAVE STATE FIRE MARSHAL JURISDICTIONAL PIPELINES IN THE AREA YOU HAVE REQUESTED:

#### **Chevron/LA**

CSFM ID 0413

SIZE 8

COMMODITY Crude Oil

*For more information and exact location of **Chevron/LA** pipelines and any other pipelines they may have in the area please call the following representative:*

Gerald McClellan (714) 228-1530

**Disclaimer:** The pipeline information and data represented in this correspondence varies in accuracy, scale, origin and completeness and may be changed at any time without notice. While the Office of the State Fire Marshal, Pipeline Safety Division (OSFM/PSD) makes every effort to provide accurate information, OSFM/PSD makes no warranties as to the suitability of this product for any particular purpose. Any use of this information is at the user's own risk.

For further information or suggestions regarding the data on this site, please contact the Office of the State Fire Marshal, Pipeline Safety Division at P.O. Box 944246, Sacramento, CA 94244 or call (916) 263-6300.



## Office of the State Fire Marshal

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### PIPELINE LOCATION REQUEST FOR:

**3591 W CERRITOS AVENUE  
LOS ALAMITOS, CA 90720**

### THE FOLLOWING COMPANY(S) HAVE STATE FIRE MARSHAL JURISDICTIONAL PIPELINES IN THE AREA YOU HAVE REQUESTED:

#### **Crimson Pipeline L.P.**

CSFM ID 0339

SIZE 8, 10

COMMODITY Crude Oil

*For more information and exact location of **Crimson Pipeline L.P.** pipelines and any other pipelines they may have in the area please call the following representative:*

Alex Morales (562) 595-9044

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# Office of the State Fire Marshal

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Fax: (916) 263-3399

Phone: 949 753 7071  
Fax:  
EMail:

## PIPELINE LOCATION REQUEST FOR:

**3591 W CERRITOS AVENUE  
LOS ALAMITOS, CA 90720**

## THE FOLLOWING COMPANY(S) HAVE STATE FIRE MARSHAL JURISDICTIONAL PIPELINES IN THE AREA YOU HAVE REQUESTED:

### Plains All American

CSFM ID 0107  
SIZE 8, 10  
COMMODITY Mud/Nitrogen

*For more information and exact location of **Plains All American** pipelines and any other pipelines they may have in the area please call the following representative:*

Steve Cadde (562) 728-2895

### Plains All American

CSFM ID 0386  
SIZE 16  
COMMODITY Crude Oil

*For more information and exact location of **Plains All American** pipelines and any other pipelines they may have in the area please call the following representative:*

Steve Cadde (562) 728-2895

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## Office of the State Fire Marshal

Pipeline Safety Division

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Sacramento, CA 94244-2460

Request ID: 10302018SFM001

Page 4 of 4

TO: NINYO & MOORE  
DENNIS FEE  
475 GODDARD, STE 200  
IRVINE, CA 92618

FROM: Lisa Dowdy

Phone: (916) 263-6300

Fax: (916) 263-3399

Phone: 949 753 7071

Fax:

EMail:

### PIPELINE LOCATION REQUEST FOR:

**3591 W CERRITOS AVENUE  
LOS ALAMITOS, CA 90720**

### THE FOLLOWING COMPANY(S) HAVE STATE FIRE MARSHAL JURISDICTIONAL PIPELINES IN THE AREA YOU HAVE REQUESTED:

#### Plains All American

CSFM ID 0385

SIZE 12

COMMODITY Crude Oil

*For more information and exact location of **Plains All American** pipelines and any other pipelines they may have in the area please call the following representative:*

Steve Cadde (562) 728-2895

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● Pipe

▲ Truck

■ Barge

◆ LPG

■ NG

SRS - Spill Releases

● <all other values>

IncidentReportable

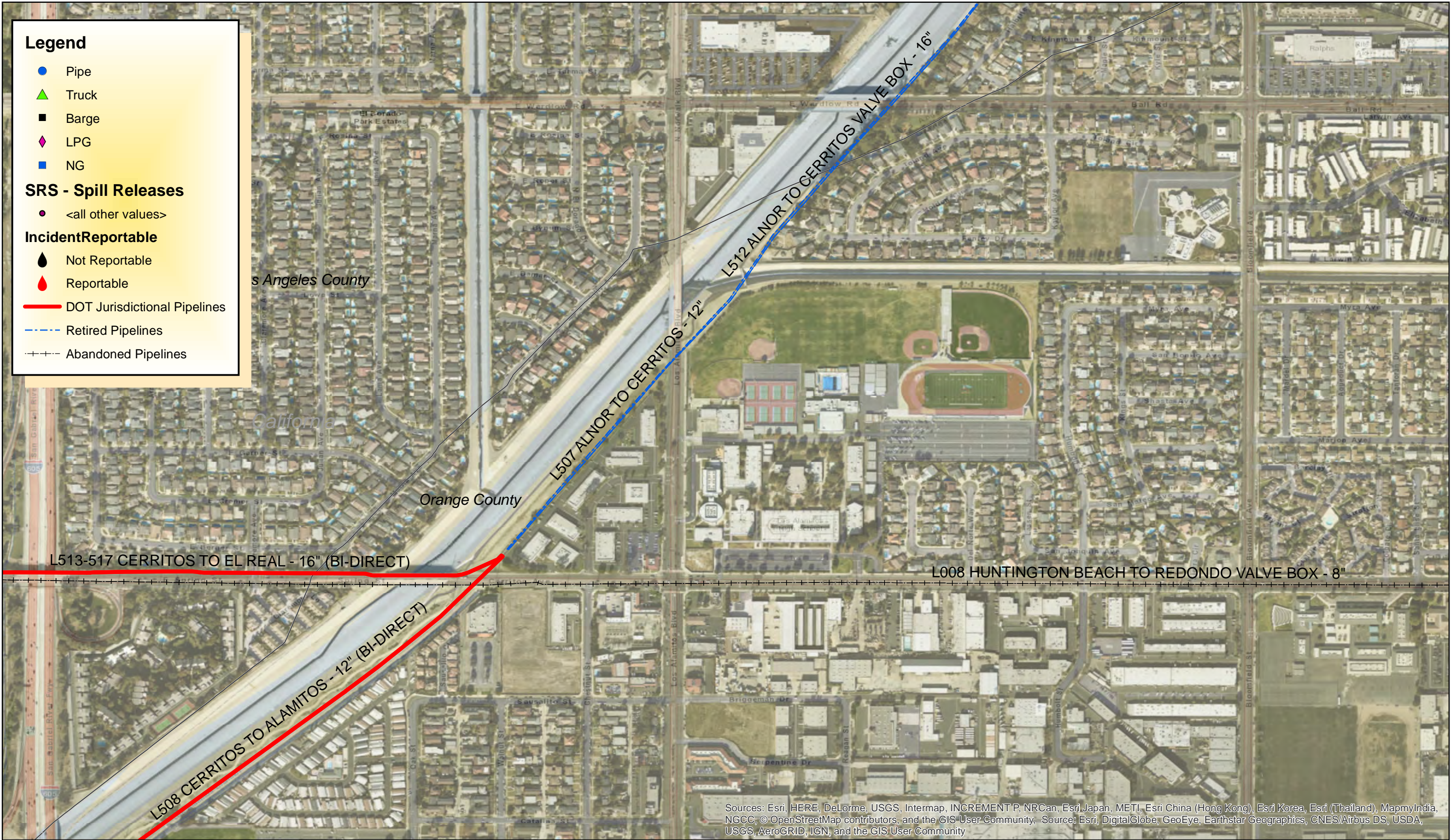
● Not Reportable

● Reportable

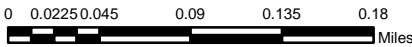
— DOT Jurisdictional Pipelines

- - - Retired Pipelines

+ + + Abandoned Pipelines



Sources: Esri, HERE, DeLorme, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), MapmyIndia, NGCC, © OpenStreetMap contributors, and the GIS User Community. Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



**PLAINS**  
ALL AMERICAN  
PIPELINE, L.P.

**CITY OF LOS ALAMITOS, CA**

Crude Oil	1:6,000
Requested By: Ninyo & Moore	Sheet No.: 1/1

R.O.W. LONG BEACH, CA LOS ALAMITOS, CA

ENV.

AERIAL

ALIGNMENT

PROFILE

PIPE DATA

NOTES:

1. USE 30 BENDS.

2. OIL LINE LAID IN NORWALK BLVD. SOUTH FROM STA. 763+97.56 TO STA. 986+12.01 UNDER L.A. CO. FRANCHISE NO. 895 & CO. RD. DEPT. PERMIT NO. 62960.

3. OIL LINE LAID IN LOS ALAMITOS BLVD. AND CERRITOS AVE. FROM STA. 986+12.01 TO STA. 1020+91.90 UNDER ORANGE CO. FRANCHISE NO. 212.

HORIZ: 40' 0' 40' 80'

VERT: 4' 2' 0' 4' 8'

SCALE IN FEET

SCALE IN FEET

THIS DOCUMENT IS CONFIDENTIAL AND IT SHALL NOT BE REPRODUCED OR REDISTRIBUTED WITHOUT PRIOR PERMISSION. NEITHER THE OPERATOR NOR THE OWNER MAKE ANY WARRANTY AS TO THE CORRECTNESS OR COMPLETENESS OF THE INFORMATION CONTAINED ON THIS DRAWING, AND THE USER ASSUMES ALL RISK OF LOSS TO PERSONS AND PROPERTY AS A RESULT OF RELIANCE THEREON.

0 12/23/15 FORMERLY SHELL DWGS Y-5353 & Y-5353-A

REV. NO. DATE DESCRIPTION OF REVISION

KPH CMB TE

BY CHK APP APP APP

CRIMSON PIPELINE L.P.

3760 Kilroy Airport Way, Suite 300  
Long Beach, California 90806

EAST CRUDE CSFM-339  
PIPELINE ALIGNMENT PLAN & SECTION  
LONG BEACH/LOS ALAMITOS, CA

SCALE: AS SHOWN DATE: 07/10/15

DRAWN: JS SHEET 1 OF 1

ECL-A-186

REV. 0

R.O.W.

ENV.

AERIAL

ALIGNMENT

PROFILE

PIPE DATA

LOS ALAMITOS, CA

8" EAST CRUDE

NORWALK BLVD.

LOS ALAMITOS BLVD.

CERRITOS AVE.

8" EAST CRUDE

ABANDONED 8" BREA CRUDE

1" PIPE

2" PIPE

48" R.C.P.

4" PLASTIC, EDISON

6"± ABOVE EAST CRUDE

18

ECL-A-506

16'-0"±

18'-5"±

18'-2"±

18'-1"±

40'-5"±

34'-2"±

22'-0"±

12'-5"±

TL-16-20

TL-16-20

GRADE ELEVATION

8" EAST CRUDE

VERIFY ELEVATION OF 8" EAST CRUDE (ELEV. FOR R.C.P. SHOWN ON Y-5354)

CAUTION

LOCATION OF PIPE LINES AS SHOWN MAY NOT BE EXACT. THE SPECIFIC LOCATIONS AND DEPTHS OF SUCH LINES MUST BE DETERMINED BY HAND EXCAVATION. BEFORE ANY EXCAVATION OR OTHER WORK NEAR THE LINES SHOWN ON THIS MAP, CONTACT CRIMSON PIPELINE, AT (866) 351-7473 24HRS. 7 DAYS A WEEK.

8" DIA., X-TRU COATING

8" DIA., 0.188 WALL, X-52 GRADE, X-TRU COATING

8" DIA., X-52 GRADE, X-TRU COATING

NOTES:

1. USE 3D BENDS.

2. BOLT AT POINT OF INTERSECTION CERRITOS AVE. & LOS ALAMITOS BLVD. ORANGE CO. HWY. DEPT.

3. OIL LINE LAID IN LOS ALAMITOS BLVD. AND CERRITOS AVE. FROM STA. 986+12.01 TO STA. 1020+91.90 UNDER ORANGE CO. FRANCHISE NO. 212.

HORIZ: 40' 0' 40' 80'

SCALE IN FEET

VERT: 4' 2' 0' 4' 8'

SCALE IN FEET

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0 12/23/15 FORMERLY SHELL DWGS Y-5354, Y-5355, & Y-5355-A

REV. NO. DATE DESCRIPTION OF REVISION

KPH CMB TE

BY CHK APP APP APP

CRIMSON PIPELINE L.P.

3760 Kilroy Airport Way, Suite 300  
Long Beach, California 90806

EAST CRUDE CSFM-339  
PIPELINE ALIGNMENT PLAN & SECTION  
LOS ALAMITOS, CA

SCALE: AS SHOWN  
DRAWN: JS

DATE: 07/10/15  
SHEET 1 OF 1

ECL-A-187

REV. 0



**PHMSA Pipeline Incidents: (1998-2017)**  
**Incident Type:** All Reported **System Type:** HAZARDOUS LIQUID **State:** CALIFORNIA  
**Offshore Flag :** ONSHORE **Commodity:** CRUDE OIL

Calendar Year	Number	Fatalities	Injuries	Total Cost As Reported	Barrels Spilled	Net Barrels Lost
1998	11	0	0	\$3,656,127	5,957	2,698
1999	6	0	0	\$900,000	6,652	222
2000	3	0	0	\$1,800,000	466	0
2001	6	0	1	\$2,015,964	1,691	173
2002	18	0	0	\$623,978	107	22
2003	13	0	0	\$408,959	1,613	370
2004	17	0	0	\$546,673	2,230	544
2005	16	0	0	\$14,701,752	4,910	1,681
2006	16	0	0	\$714,134	1,512	709
2007	20	0	0	\$3,029,403	896	145
2008	15	0	0	\$1,089,827	7,159	65
2009	15	0	0	\$1,197,569	279	22
2010	9	0	0	\$5,652,647	793	36
2011	16	0	0	\$5,051,720	212	112
2012	15	0	0	\$1,164,626	691	2
2013	12	0	0	\$3,945,625	547	15
2014	19	0	0	\$5,572,143	1,534	3
2015	17	0	0	\$148,524,117	4,560	2,160
2016	15	0	0	\$23,882,536	1,874	475
2017	11	0	0	\$742,238	267	5
<b>Grand Total</b>	<b>270</b>	<b>0</b>	<b>1</b>	<b>\$225,220,038</b>	<b>43,949</b>	<b>9,458</b>

**PHMSA Pipeline Incidents: Multi-Year Averages (1998-2017)**  
**Incident Type:** All Reported **System Type:** HAZARDOUS LIQUID **State:** CALIFORNIA  
**Offshore Flag :** ONSHORE **Commodity:** CRUDE OIL

State: CALIFORNIA

Commodity	Calendar Year	Interstate Miles	Intrastate Miles	Total Miles	Miles of Gathering	Breakout Tanks
BIOFUEL	2017		15.0	15.0	0.0	9
	2016		15.0	15.0	0.0	9
	2015		15.0	15.0	0.0	9
	2014		15.0	15.0	0.0	9
	2013		15.1	15.1		7
	2012		14.9	14.9		6
	2011		14.7	14.7		7
	2010		15.1	15.1	0.0	10
CRUDE OIL	2017	240.3	3,231.6	3,471.8	1,133.6	242
	2016	239.5	3,329.5	3,569.0	1,137.8	254
	2015	232.0	4,023.7	4,255.7	851.1	238
	2014	232.0	3,663.6	3,895.6	848.0	194
	2013	232.2	3,701.5	3,933.7	795.1	197
	2012	241.7	3,769.5	4,011.2	776.9	228
	2011	241.7	3,678.9	3,920.6	778.6	173
	2010	255.5	3,638.5	3,894.0	722.4	168
HVL FLAMM TOXIC	2017		119.6	119.6	0.0	5
	2016		195.4	195.4	0.0	8
	2015		153.6	153.6	0.0	6
	2014		80.0	80.0	3.1	4
	2013		101.2	101.2	0.0	4
	2012		101.2	101.2	0.0	4
	2011		202.6	202.6	0.0	2
	2010		202.6	202.6	0.0	2
REFINED PP	2017	991.4	2,439.0	3,430.4	0.0	429
	2016	991.7	2,405.7	3,397.4	0.0	465
	2015	992.1	2,363.4	3,355.5	0.0	433
	2014	978.5	2,304.7	3,283.2	0.0	460
	2013	977.0	2,316.1	3,293.1	0.0	464
	2012	979.0	2,369.1	3,348.0	0.0	464



**Mike Campisi**  
Pipeline Planning Assistant

9400 Oakdale Ave  
Chatsworth, CA 91311

January 22, 2019

Ninyo & Moore

**Email:** Dennis Fee - [dfee@ninyoandmoore.com](mailto:dfee@ninyoandmoore.com)  
**Subject:** So Cal Gas 10" Line along Los Alamitos Boulevard  
**DCF:** 0035-19NC26

The Transmission Department of SoCalGas does not operate any facilities within your proposed improvement. However, SoCalGas **Southeast Distribution** Region may maintain and operate facilities within your project scope.

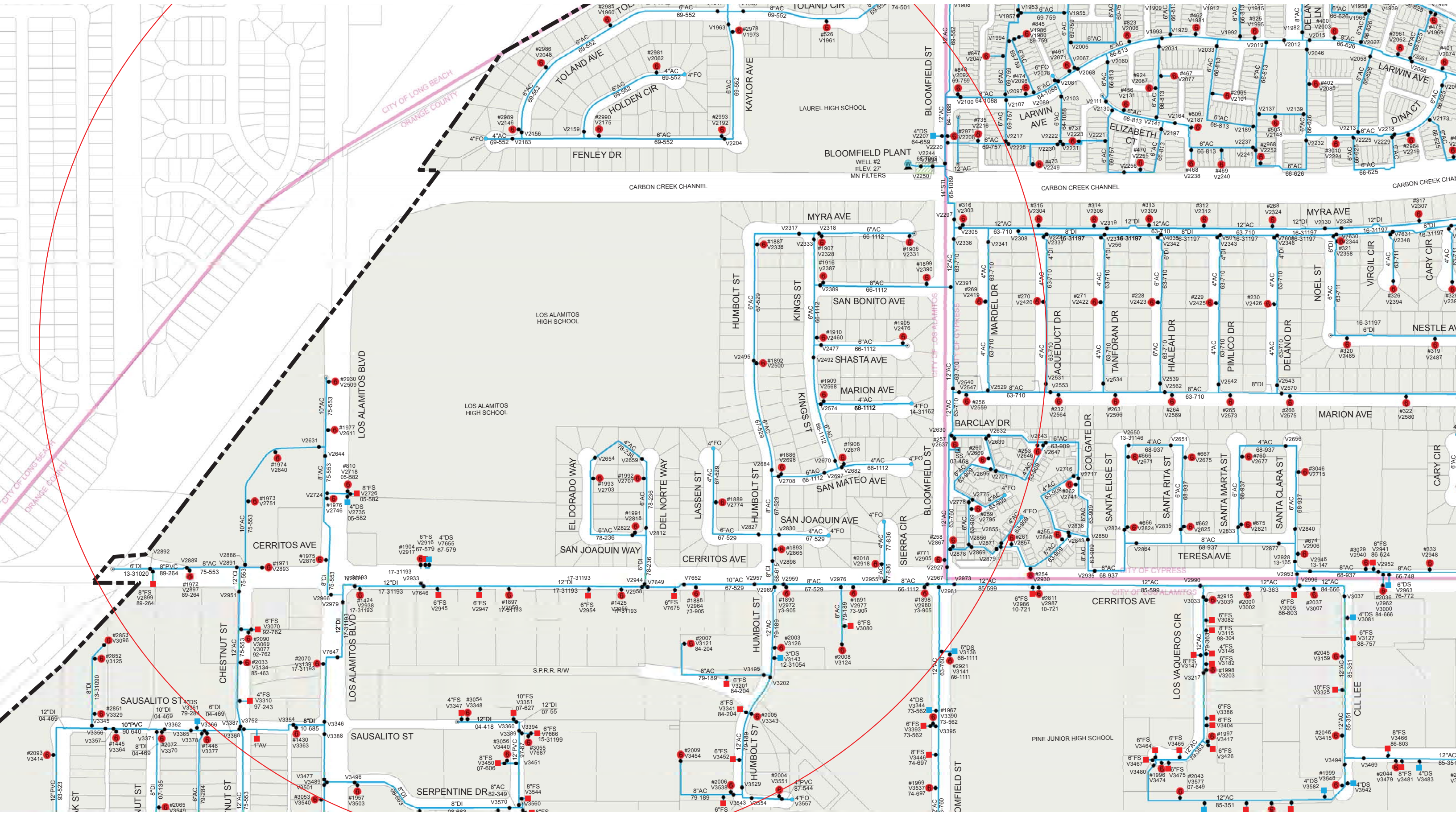
To assure no conflict with the **Southeast Distribution's** pipeline system, please contact them at [AtlasRequests/WillServeAnaheim@semprautilities.com](mailto:AtlasRequests/WillServeAnaheim@semprautilities.com).

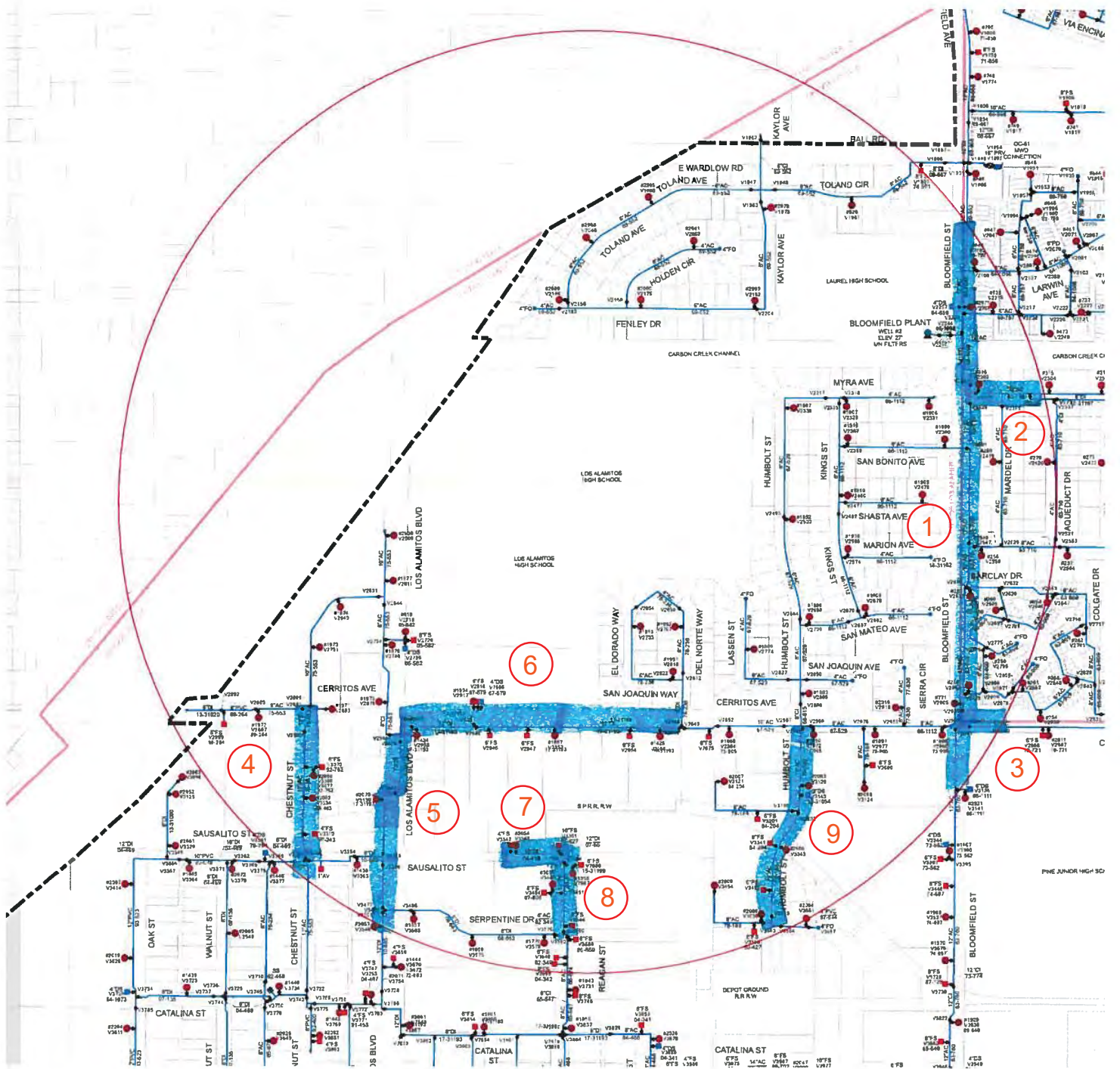
Sincerely,

**Mike Campisi**  
**Pipeline Planning Assistant**  
**SoCalGas Transmission Technical Services**  
[SoCalGasTransmissionUtilityRequest@semprautilities.com](mailto:SoCalGasTransmissionUtilityRequest@semprautilities.com)

January 22, 2019

1 of 1







# APPENDIX C

## Total Individual Risk Estimating Aid Worksheets

**TIR CALCULATIONS - BEGIN ZONE 1 - FRONT PROPERTY LINE**

Green cells (B19, B21, B47-53, D4-7, D10-15, H19, and H20) indicate data entry cells.

Input Data		
Product	crude oil	
Diameter	8	inches
Pressure	?	psig
R0	30	ft

XSEG	RX(1%)	Units
XSEG(LJF)	0	ft
XSEG(RJF)	99	ft
XSEG(LFF)	0	ft
XSEG(RFF)	0	ft
XSEG(LEX)	0	ft
XSEG(REX)	0	ft

1. These instruction boxes apply to Worksheets TIR1, 2, 3, and 4.
2. Enter the Input Data indicated for the case under analysis.
3. Enter the XSEG values from Worksheet "XSEG Calculations".
4. In the table below enter the F0 data for the appropriate type pf pipeline from the failure frequency data in the Protocol, Chapter 4.
5. Enter a value for the other green cell variables as explained in Chapter 4.

**Base and Conditional Probability Calculations**

Base		Leak		Rupture		Exposure	
F0	3.9E-03	PC(L)	0.8	PC(R)	0.2	PC(OCC)	0.16
P0	3.9E-03	PC(LIG)	0.03	PC(RIG)	0.03	PC(OUT)	0.25
PAF	1.7	PC(FIG)	0.95	PC(FIG)	0.95		
PA	6.6E-03	PC(JF)	0.95	PC(JF)	0.95		
		PC(FF)	0.05	PC(FF)	0.05		
		PC(EIG)	0.05	PC(EIG)	0.05		
Calculated Values:							
PA(LJF)	0.0E+00	PCI(LJF)	0.022	PCI(RJF)	0.005		
PA(RJF)	1.2E-04	PCI(LFF)	0.001	PCI(RFF)	0.000		
PA(LFF)	0.0E+00	PCI(LEX)	0.001	PCI(REX)	0.000	PC(EXPO)	0.04
PA(RFF)	0.0E+00						
PA(LEX)	0.0E+00						
PA(REX)	0.0E+00						

**Impact Probability Calculations**

Probability Term				Values			
PC(LJF) =	PA(LJF) x	PCI(LJF) x	PC(EXPO) =	0.0E+00	0.02	0.040	0.0E+00
PC(RJF) =	PA(RJF) x	PCI(RJF) x	PC(EXPO) =	1.2E-04	0.01	0.040	2.7E-08
PC(LFF) =	PA(LFF) x	PCI(LFF) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(RFF) =	PA(RFF) x	PCI(RFF) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00
PC(LEX) =	PA(LEX) x	PCI(LEX) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(REX) =	PA(REX) x	PCI(REX) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00

Based on data from impact distance figures in Section 4.6 and mortality figures in Section 4.5, enter the maximum impact probability at receptor location for each hazard in MAX PF(X) column.

**IR Calculation**

	MAX PF(X)		PC(X)	IR(X)
IR(LJF) =	0.00		0.0E+00	0.0E+00
IR(RJF) =	1.00		2.7E-08	2.70E-08
IR(LFF) =	0.00		0.0E+00	0.00E+00
IR(RFF) =	1.00		0.0E+00	0.00E+00
IR(LEX) =	0.00		0.0E+00	0.00E+00
IR(REX) =	0.00		0.0E+00	0.00E+00
TOTAL INDIVIDUAL RISK, TIR				2.7E-08
CDE INDIVIDUAL RISK CRITERION, IRC				1.0E-06
TIR/IRC RATIO				0.03
PROTOCOL TIR INDICATOR RATIO				0.25

6. Enter the maximum fatality probability that corresponds to the maximum impact for each hazard type according to the Protocol, Chapter 4.

**TIR CALCULATIONS - END ZONE 1 - BEGIN ZONE 2**  
Green cells (B19, B21, B47-B53, D4-7, and D10-15) indicate data entry cells.

Input Data		
Product	crude oil	
Diameter	8	inches
Pressure	?	psig
R0	30	ft

XSEG	RX(1%)	Units
XSEG(LJF)	0	ft
XSEG(RJF)	0	ft
XSEG(LFF)	0	ft
XSEG(RFF)	0	ft
XSEG(LEX)	0	ft
XSEG(REX)	0	ft

Base and Conditional Probability Calculations							
Base		Leak		Rupture		Exposure	
F0	3.9E-03	PC(L)	0.8	PC(R)	0.2	PC(OCC)	0.16
P0	3.9E-03	PC(LIG)	0.03	PC(RIG)	0.03	PC(OUT)	0.25
PAF	1.7	PC(FIG)	0.95	PC(FIG)	0.95		
PA	6.6E-03	PC(JF)	0.95	PC(JF)	0.95		
		PC(FF)	0.05	PC(FF)	0.05		
		PC(EIG)	0.05	PC(EIG)	0.05		
PA(LJF)	0.0E+00	PCI(LJF)	0.022	PCI(RJF)	0.005		
PA(RJF)	0.0E+00	PCI(LFF)	0.001	PCI(RFF)	0.000		
PA(LFF)	0.0E+00	PCI(LEX)	0.001	PCI(REX)	0.000	PC(EXPO)	0.04
PA(RFF)	0.0E+00						
PA(LEX)	0.0E+00						
PA(REX)	0.0E+00						

Impact Probability Calculations							
Probability Term				Values			
PC(LJF) =	PA(LJF) x	PCI(LJF) x	PC(EXPO) =	0.0E+00	0.02	0.040	0.0E+00
PC(RJF) =	PA(RJF) x	PCI(RJF) x	PC(EXPO) =	0.0E+00	0.01	0.040	0.0E+00
PC(LFF) =	PA(LFF) x	PCI(LFF) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(RFF) =	PA(RFF) x	PCI(RFF) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00
PC(LEX) =	PA(LEX) x	PCI(LEX) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(REX) =	PA(REX) x	PCI(REX) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00

Based on data from impact distance figures in Section 4.6 and mortality figures in Section 4.5, enter the maximum impact probability at receptor location for each hazard in MAX PF(X) column.

IR Calculation				
	MAX PF(X)		PC(X)	IR(X)
IR(LJF) =	0.00		0.0E+00	0.0E+00
IR(RJF) =	0.61		0.0E+00	0.0E+00
IR(LFF) =	0.00		0.0E+00	0.0E+00
IR(RFF) =	1.00		0.0E+00	0.0E+00
IR(LEX) =	0.00		0.0E+00	0.0E+00
IR(REX) =	0.00		0.0E+00	0.0E+00
TIR2 =				0.0E+00

TIR CALCULATIONS - END ZONE 2 - BEGIN ZONE 3  
Green cells (B19, B21, B47-53, D4-D7, and D10-D15) indicate data entry cells.

Input Data		
Product	crude oil	
Diameter	8	inches
Pressure	?	psig
R0	30	ft

XSEG	RX(1%)	Units
XSEG(LJF)	0	ft
XSEG(RJF)	0	ft
XSEG(LFF)	0	ft
XSEG(RFF)	0	ft
XSEG(LEX)	0	ft
XSEG(REX)	0	ft

Base and Conditional Probability Calculations							
Base		Leak		Rupture		Exposure	
F0	3.9E-03	PC(L)	0.8	PC(R)	0.2	PC(OCC)	0.16
P0	3.9E-03	PC(LIG)	0.03	PC(RIG)	0.03	PC(OUT)	0.25
PAF	1.7	PC(FIG)	0.95	PC(FIG)	0.95		
PA	6.6E-03	PC(JF)	0.95	PC(JF)	0.95		
		PC(FF)	0.05	PC(FF)	0.05		
		PC(EIG)	0.05	PC(EIG)	0.05		
PA(LJF)	0.0E+00	PCI(LJF)	0.022	PCI(RJF)	0.005		
PA(RJF)	0.0E+00	PCI(LFF)	0.001	PCI(RFF)	0.000		
PA(LFF)	0.0E+00	PCI(LEX)	0.001	PCI(REX)	0.000	PC(EXPO)	0.04
PA(RFF)	0.0E+00						
PA(LEX)	0.0E+00						
PA(REX)	0.0E+00						

Impact Probability Calculations							
Probability Term				Values			
PC(LJF) =	PA(LJF) x	PCI(LJF) x	PC(EXPO) =	0.0E+00	0.02	0.040	0.0E+00
PC(RJF) =	PA(RJF) x	PCI(RJF) x	PC(EXPO) =	0.0E+00	0.01	0.040	0.0E+00
PC(LFF) =	PA(LFF) x	PCI(LFF) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(RFF) =	PA(RFF) x	PCI(RFF) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00
PC(LEX) =	PA(LEX) x	PCI(LEX) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(REX) =	PA(REX) x	PCI(REX) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00

Based on data from impact distance figures in Section 4.6 and mortality figures in Section 4.5, enter the maximum impact probability at receptor location for each hazard in MAX PF(X) column.

IR Calculation				
	MAX PF(X)		PC(X)	IR(X)
IR(LJF) =	0.00		0.0E+00	0.0E+00
IR(RJF) =	0.01		0.0E+00	0.0E+00
IR(LFF) =	0.00		0.0E+00	0.0E+00
IR(RFF) =	1.00		0.0E+00	0.0E+00
IR(LEX) =	0.00		0.0E+00	0.0E+00
IR(REX) =	0.00		0.0E+00	0.0E+00
TIR3 =				0.0E+00

**TIR CALCULATIONS - END ZONE 3 - BACK PROPERTY LINE**  
Green cells (B19, B21, B47-B53, D4-D7, and D10-D15) indicate data entry cells.

Input Data		
Product	crude oil	
Diameter	8	inches
Pressure	?	psig
R0	30	ft

XSEG	RX(1%)	Units
XSEG(LJF)	0	ft
XSEG(RJF)	0	ft
XSEG(LFF)	0	ft
XSEG(RFF)	0	ft
XSEG(LEX)	0	ft
XSEG(REX)	0	ft

Base and Conditional Probability Calculations							
Base		Leak		Rupture		Exposure	
F0	3.9E-03	PC(L)	0.8	PC(R)	0.2	PC(OCC)	0.16
P0	3.9E-03	PC(LIG)	0.03	PC(RIG)	0.03	PC(OUT)	0.25
PAF	1.7	PC(FIG)	0.95	PC(FIG)	0.95		
PA	6.6E-03	PC(JF)	0.95	PC(JF)	0.95		
		PC(FF)	0.05	PC(FF)	0.05		
		PC(EIG)	0.05	PC(EIG)	0.05		
PA(LJF)	0.0E+00	PCI(LJF)	0.022	PCI(RJF)	0.005		
PA(RJF)	0.0E+00	PCI(LFF)	0.001	PCI(RFF)	0.000		
PA(LFF)	0.0E+00	PCI(LEX)	0.001	PCI(REX)	0.000	PC(EXPO)	0.04
PA(RFF)	0.0E+00						
PA(LEX)	0.0E+00						
PA(REX)	0.0E+00						

Impact Probability Calculations							
Probability Term				Values			
PC(LJF) =	PA(LJF) x	PCI(LJF) x	PC(EXPO) =	0.0E+00	0.02	0.040	0.0E+00
PC(RJF) =	PA(RJF) x	PCI(RJF) x	PC(EXPO) =	0.0E+00	0.01	0.040	0.0E+00
PC(LFF) =	PA(LFF) x	PCI(LFF) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(RFF) =	PA(RFF) x	PCI(RFF) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00
PC(LEX) =	PA(LEX) x	PCI(LEX) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(REX) =	PA(REX) x	PCI(REX) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00

Based on data from impact distance figures in Section 4.6 and mortality figures in Section 4.5, enter the maximum impact probability at receptor location for each hazard in MAX PF(X) column.

IR Calculation				
	MAX PF(X)		PC(X)	IR(X)
IR(LJF) =	0.00		0.0E+00	0.0E+00
IR(RJF) =	0.00		0.0E+00	0.0E+00
IR(LFF) =	0.00		0.0E+00	0.0E+00
IR(RFF) =	1.00		0.0E+00	0.0E+00
IR(LEX) =	0.00		0.0E+00	0.0E+00
IR(REX) =	0.00		0.0E+00	0.0E+00
TIR4 =				0.0E+00

### Population Risk Indicator

Zone	Distance from Pipeline (ft.)		Zone Boundary Mortality (RPF) (%)		Average Mortality (RPF) (%)	Zone Population	Zone PRI
	Begin	End	Begin	End			
1	30	570	100	0	50	350	175
2	570	1,110	0	0	0	350	0
3	1,110	1,650	0	0	0	350	0

Total PRI: **175**

**TIR CALCULATIONS - END ZONE 3 - BACK PROPERTY LINE**  
Green cells (B19, B21, B47-B53, D4-D7, and D10-D15) indicate data entry cells.

Input Data		
Product	crude oil	
Diameter	8	inches
Pressure	720	psig
R0	75	ft

XSEG	RX(1%)	Units
XSEG(LJF)	0	ft
XSEG(RJF)	0	ft
XSEG(LFF)	0	ft
XSEG(RFF)	0	ft
XSEG(LEX)	0	ft
XSEG(REX)	0	ft

Base and Conditional Probability Calculations							
Base		Leak		Rupture		Exposure	
F0	3.9E-03	PC(L)	0.8	PC(R)	0.2	PC(OCC)	0.16
P0	3.9E-03	PC(LIG)	0.03	PC(RIG)	0.03	PC(OUT)	0.25
PAF	1.7	PC(FIG)	0.95	PC(FIG)	0.95		
PA	6.6E-03	PC(JF)	0.95	PC(JF)	0.95		
		PC(FF)	0.05	PC(FF)	0.05		
		PC(EIG)	0.05	PC(EIG)	0.05		
PA(LJF)	0.0E+00	PCI(LJF)	0.022	PCI(RJF)	0.005		
PA(RJF)	0.0E+00	PCI(LFF)	0.001	PCI(RFF)	0.000		
PA(LFF)	0.0E+00	PCI(LEX)	0.001	PCI(REX)	0.000	PC(EXPO)	0.04
PA(RFF)	0.0E+00						
PA(LEX)	0.0E+00						
PA(REX)	0.0E+00						

Impact Probability Calculations							
Probability Term				Values			
PC(LJF) =	PA(LJF) x	PCI(LJF) x	PC(EXPO) =	0.0E+00	0.02	0.040	0.0E+00
PC(RJF) =	PA(RJF) x	PCI(RJF) x	PC(EXPO) =	0.0E+00	0.01	0.040	0.0E+00
PC(LFF) =	PA(LFF) x	PCI(LFF) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(RFF) =	PA(RFF) x	PCI(RFF) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00
PC(LEX) =	PA(LEX) x	PCI(LEX) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(REX) =	PA(REX) x	PCI(REX) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00

Based on data from impact distance figures in Section 4.6 and mortality figures in Section 4.5, enter the maximum impact probability at receptor location for each hazard in MAX PF(X) column.

IR Calculation				
	MAX PF(X)		PC(X)	IR(X)
IR(LJF) =	0.00		0.0E+00	0.0E+00
IR(RJF) =	0.00		0.0E+00	0.0E+00
IR(LFF) =	0.00		0.0E+00	0.0E+00
IR(RFF) =	1.00		0.0E+00	0.0E+00
IR(LEX) =	0.00		0.0E+00	0.0E+00
IR(REX) =	0.00		0.0E+00	0.0E+00
TIR4 =				0.0E+00

**TIR CALCULATIONS - BEGIN ZONE 1 - FRONT PROPERTY LINE**

Green cells (B19, B21, B47-53, D4-7, D10-15, H19, and H20) indicate data entry cells.

Input Data		
Product	crude oil	
Diameter	12	inches
Pressure	?	psig
R0	800	ft

XSEG	RX(1%)	Units
XSEG(LJF)	0	ft
XSEG(RJF)	0	ft
XSEG(LFF)	0	ft
XSEG(RFF)	0	ft
XSEG(LEX)	0	ft
XSEG(REX)	0	ft

1. These instruction boxes apply to Worksheets TIR1, 2, 3, and 4.
2. Enter the Input Data indicated for the case under analysis.
3. Enter the XSEG values from Worksheet "XSEG Calculations".
4. In the table below enter the F0 data for the appropriate type pf pipeline from the failure frequency data in the Protocol, Chapter 4.
5. Enter a value for the other green cell variables as explained in Chapter 4.

**Base and Conditional Probability Calculations**

Base		Leak		Rupture		Exposure	
F0	3.9E-03	PC(L)	0.8	PC(R)	0.2	PC(OCC)	0.16
P0	3.9E-03	PC(LIG)	0.03	PC(RIG)	0.03	PC(OUT)	0.25
PAF	1.7	PC(FIG)	0.95	PC(FIG)	0.95		
PA	6.6E-03	PC(JF)	0.95	PC(JF)	0.95		
		PC(FF)	0.05	PC(FF)	0.05		
		PC(EIG)	0.05	PC(EIG)	0.05		
Calculated Values:							
PA(LJF)	0.0E+00	PCI(LJF)	0.022	PCI(RJF)	0.005		
PA(RJF)	0.0E+00	PCI(LFF)	0.001	PCI(RFF)	0.000		
PA(LFF)	0.0E+00	PCI(LEX)	0.001	PCI(REX)	0.000	PC(EXPO)	0.04
PA(RFF)	0.0E+00						
PA(LEX)	0.0E+00						
PA(REX)	0.0E+00						

**Impact Probability Calculations**

Probability Term				Values			
PC(LJF) =	PA(LJF) x	PCI(LJF) x	PC(EXPO) =	0.0E+00	0.02	0.040	0.0E+00
PC(RJF) =	PA(RJF) x	PCI(RJF) x	PC(EXPO) =	0.0E+00	0.01	0.040	0.0E+00
PC(LFF) =	PA(LFF) x	PCI(LFF) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(RFF) =	PA(RFF) x	PCI(RFF) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00
PC(LEX) =	PA(LEX) x	PCI(LEX) x	PC(EXPO) =	0.0E+00	0.001	0.040	0.0E+00
PC(REX) =	PA(REX) x	PCI(REX) x	PC(EXPO) =	0.0E+00	0.000	0.040	0.0E+00

Based on data from impact distance figures in Section 4.6 and mortality figures in Section 4.5, enter the maximum impact probability at receptor location for each hazard in MAX PF(X) column.

**IR Calculation**

	MAX PF(X)		PC(X)	IR(X)
IR(LJF) =	0.00		0.0E+00	0.0E+00
IR(RJF) =	1.00		0.0E+00	0.00E+00
IR(LFF) =	0.00		0.0E+00	0.00E+00
IR(RFF) =	1.00		0.0E+00	0.00E+00
IR(LEX) =	0.00		0.0E+00	0.00E+00
IR(REX) =	0.00		0.0E+00	0.00E+00
TOTAL INDIVIDUAL RISK, TIR				0.0E+00
CDE INDIVIDUAL RISK CRITERION, IRC				1.0E-06
TIR/IRC RATIO				0.00
PROTOCOL TIR INDICATOR RATIO				#DIV/0!

6. Enter the maximum fatality probability that corresponds to the maximum impact for each hazard type according to the Protocol, Chapter 4.

XSEG Calculations														
Pipe Size, Pressure, and Hazard Type			Front Property Line - Begin Zone 1			Begin Zone 2			Begin Zone 3			End Zone 3 -Back Property Line		
Pipe Size	Press.	Hazard X	RX (1%)	R0	XSEG	RX (1%)	R0	XSEG	RX (1%)	R0	XSEG	RX (1%)	R0	XSEG
(in)	(psig)		(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
16	?	LJF	64	800	0	64	1333	0	64	1866	0	64	2400	0
16	?	RJF	760	800	0	760	1333	0	760	1866	0	760	2400	0
16	?	LFF	7	800	0	7	1333	0	7	1866	0	7	2400	0
16	?	RFF	140	800	0	140	1333	0	140	1866	0	140	2400	0
16	?	LEX	0	800	0	0	1333	0	0	1866	0	0	2400	0
16	?	REX	0	800	0	0	1333	0	0	1866	0	0	2400	0

Green cells (B6-B11, C6-C11, E6-E11, F6-F11, I6-I11, L6-L11, and O6-O11) indicate where input data are entered for the case being analyzed.

The numbers shown apply for a the specific example illustrated. Substitute the appropriate values for the actual number being analyzed.

The Pipe Size is the pipe diameter in inches. The Pressure is the operating pressure in pounds per square inch gage (psig).

Hazard acronyms are defined in the Protocol.

The 1% mortality (0.01) probability impact distance RX for each hazard is obtained from the appropriate hazard figure in the Protocol, Chapter 4.

R0 is the receptor distance being analyzed and is explained in the Protocol, Chapter 4.

XSEG is as described in the Protocol, Chapter 4.

Zones 1, 2, and 3 are defined in the Protocol, Chapter 4 for use in the TIR calculations. If more than three zones are used, as explained in the Protocol, Section 4, more worksheets of the same type as shown can be added.



# APPENDIX D

## CDE Protocol Forms 1 Through 5

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 1 – Administrative, Summary, and Signature Form**

Local Educational Agency			
Date	January 15, 2019		
Local Educational Agency	Los Alamitos Unified School District		
Contact			
Telephone Number			
E-mail Address			
Street Address			
Department or Mail Drop			
City	Los Alamitos		
County	Orange		
Zip Code			
Proposed School Campus Site			
Name	Los Alamitos High School		
Location Description	See attached Section 1 of this report for a complete location description of the site. The site is planned for construction of a new multi-story building.		
Pipeline of Interest			
Operator / Owner	Chevron		
Product Transported	Crude Oil		
Pipeline Diameter (inches)	8 inches		
Operating Pressure (psig)	Unknown		
Closet Approach to Property Line (or boundary between the usable and unusable portion of the site if the unusable portion faces the pipe-line.) (ft)	30 feet		
Individual Risk Estimate Result			
Type of Analysis (Check One)	Stage 1 →	Stage 2 →	Stage 3 → X
Individual Risk Estimate Value	2.7E-08 (0.000000027)		
Individual Risk Criterion	1.0E-06 (0.000001)		
IR Significance (check one)	Significant		
	Insignificant	X	

(Continued on next page)

California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 1 – Administrative, Summary, and Signature Form  
(Continued from previous page)

<b>Population Risk Indicator Result</b>		
<b>Protocol Average IR</b>	<b>1.1E-07 (0.00000044)</b>	
<b>IR Indicator (Average IR / Property Line IR Ratio)</b>	<b>0.25</b>	
<b>Population Risk Indicator</b>	<b>175</b>	
<b>Prevention and Mitigation Recommendations/Implementations</b> <i>(Add additional sheets with more details as needed.)</i>		
<b>Prevention Measures:</b> See attached sheets		
<b>Mitigation Measures:</b> See attached sheets		
<b>Conclusions/Other Suggestions/Recommendations:</b> See attached sheets		
<b>Certification and Signatures of Risk Analyst(s)</b>		
<p><i>This analysis was conducted according to the 2007 CDE Protocol except as noted. All modifications within the Stage 2 framework, and Stage 3 analyses and exceptions to the data and processes established in the 2007 CDE Protocol, if any, were based upon my professional opinion and in a manner consistent with the standards of care and skill ordinarily exercised by professionals working on similar projects.</i></p> <p><i>I certify that the estimated risk levels were derived based upon the 2007 CDE Protocol, unless otherwise noted, and that these levels demonstrate, within reasonable expectations of uncertainties for such estimates, that the estimated Individual Risk for the school site, as the site was planned at the time of this analysis, including mitigation measures, if any, meets the Individual Risk Criterion stated in the 2007 CDE Protocol, based on the information provided to me.</i></p>		
<b>Printed Name</b>	<b>Signature</b>	<b>Position or Title</b>
John Jay Roberts		Principal Geologist
<b>Notice: In the event that the Individual Risk Criterion could not be met, at the option of the LEA, CDE will still accept a report for review and consultation with the LEA.</b>		

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 2 - Pipeline Risk Analysis Input Data**

Date: <b>January 15, 2019</b>		
Local Educational Agency: <b>Los Alamitos Unified School District</b>		
Proposed School Site Name: <b>Los Alamitos High School</b>		
Proposed School Estimated Population: <b>3,500</b>		
<b>Product</b>	<b>Designate by an "X"</b>	
Natural gas (NG)		
Crude oil	X	
Gasoline		
Liquefied natural gas (LNG)		
Liquefied petroleum gas (LPG)		
Natural gas liquids (NGL)		
Other refined product (specify)		
Other substance (specify)		
<b>Pipeline Location Attributes</b>	<b>Units</b>	<b>Value</b>
Segment length	ft	Unknown
Closest approach to property line	ft	30
Closest approach to usable portion of the school site	ft	30
Land use by class location (49 CFR Part 192)	Class	3
<b>Pipeline Attributes</b>		
Diameter	inches	8
Maximum operating pressure	psig	Unknown
Average operating pressure	psig	Unknown
Depth of burial	ft	
Distance to nearest compressor (gas) or pump station (liquid)	ft	
Throughput		
<i>Liquid</i> (enter value, meter, etc.)	gpm	Unknown
Nearest block valve locations, upstream and downstream of segment of concern		
Above ground components within 1500-ft zone		
<i>Number</i>		
<i>Type</i>		
Pipeline location on terrain gradient relative to school (Designate with an "X" by appropriate description)		
<i>Flat</i>	X	
<i>Up gradient</i>		
<i>Down gradient</i>		
<i>"Convolutd"</i>		

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 3 - Standard Protocol Calculation Summary**

	Release Probability Calculations	Variable	Value	Data Source if Different from Protocol
<b>Basic Data Input</b>				
	Baseline frequency per pipeline mile	F0, releases/ mile-year	3.9E-03	Historical or default release frequency from Table 4-3 or Appendix B.
	Segment length within 1500-ft buffer	SEG, Miles	0.8	Determine from site maps, GIS, or other sources
	Nearest property line distance	R0, ft	30	Determine from maps
	Receptor location distance, if different than nearest property line	R(i), ft		Determine from maps
	Base release probability	P0	3.9E-03	$P0 = 1 - e^{(-F0 \times t)}$
	Probability adjustment factor	PAF	1.7	Default value selected by analyst
	Adjusted base probability	PA	6.6E-03	$PA = P0 \times PAF$
<b>Special Seismic Considerations</b>				
<p>Please summarize and/or list below any adjustments made to the Protocol base risk analysis estimates and the special seismic conditions and studies upon which these adjustments were based.</p> <p>If adjustments were based upon special seismic conditions, the signature(s) and titles of those professionals involved are required. Attach additional pages if needed.</p> <p>Possible causes of pipeline failure are taken into account by the CDE protocol; however, some latitude is given to adjust the probability of failure based on the professional opinion of the risk analyst. Peak ground acceleration (PGA) at the site was determined to be 0.51g, based on the findings of the Geotechnical Engineering Report prepared by Terracon Consultants. Therefore, a probability adjustment factor (PAF) of 1.7 was applied to the base probability, as the normal probability assumes a PGA of 0.3g. This PAF represents a very conservative human hazard-protective approach in that the PGA represents only a fraction of the seismic factor and application of this PAF overestimates the probability of pipeline failure.</p>				
<b>Signatures for Above, If Needed</b>				
	Printed Name	Signature	Title	
	John Jay Roberts		Principal Geologist	
<b>Protocol Basis Scenario Probabilities</b>				
	XSEG length, leak, ft:			
	Leak jet or pool fire		0	
	Leak flash fire		0	
	Leak gas or vapor explosion		0	

(Continued on next page.)

	Release Probability Calculations		Variable	Value	Data Source if Different from Protocol
	<i>Individual XSEG failure and release probabilities, leak, PA(LX):</i>				
	Leak jet or pool fire			0	
	Leak flash fire			0	
	Leak gas or vapor explosion			0	
	<i>XSEG length, rupture, ft:</i>				
	Rupture jet or pool fire			58	
	Rupture flash fire			14	
	Rupture gas or vapor explosion			0	
	<i>Individual XSEG failure and release probabilities, rupture, PA(RX):</i>				
	Rupture jet or pool fire			1.2E-04	
	Rupture flash fire			0	
	Rupture gas or vapor explosion			0	
Insert Protocol default values or exceptions to the Protocol default values:					(If values other than Protocol default values were used, indicate the value in the appropriate cell and indicate the data source.)
	Probability of leak	PC(L)	0.8	Default: 0.8	
	Probability of rupture	PC(R)	0.2	Default: 0.2	
	Probability of leak ignition	PC(LIG)	0.03	Default: gas 0.3 (FEMA 1989); gasoline, 0.09; liquids other than gasoline (e.g., crude oil): 0.03	
	Probability of rupture ignition	PC(RIG)	0.03	Default: gas 0.45 (FEMA 1989); gasoline: 0.09; liquids other than gasoline (e.g., crude oil): 0.03	

(Continued on next page)

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 3 - Standard Protocol Calculation Summary**  
(Continued from previous page)

	Release Probability Calculations	Variable	Value	Data Source if Different from Protocol
<b>Insert Protocol default values or exceptions to the Protocol default values:</b>			<b>(If value other than default used, indicate value in appropriate column and indicate data source.)</b>	
	Probability of fire on ignition	PC(FIG)	0.95	Default: gas 0.99 (FEMA 1989); liquid 0.95
	Probability of explosion on ignition	PC(EIG)	0.05	Default: gas 0.01; liquid 0.05
	Probability of flash fire	PC(FF)	0.05	Default: gas 0.01; liquid 0.05
	Probability of jet fire (gas pipelines) or pool fire (liquid pipelines)	PC(JF)	0.95	Default: gas = 0.98; liquid = 0.95
	Probability of occupancy	PC(OCC)	0.16	Default: 180 days per year, 8 hrs per day.
	Probability of outdoor exposure	PC(OUT)	0.25	Default: 2 hr outdoors during an 8-hour day onsite.
	Probability of leak jet/pool fire impact	PCI(LJF)	0.022	
	Probability of rupture jet/pool fire impact	PCI(RJF)	0.005	
	Probability of leak flash fire impact	PCI(LFF)	0.001	
	Probability of rupture flash fire impact	PCI(RFF)	0.000	
	Probability of leak explosion impact	PCI(LEX)	0.001	
	Probability of rupture explosion impact	PCI(REX)	0.000	
<b>Individual Risk Summary</b>				
	Leak jet fire IR	IR(LJF)	0	
	Rupture jet fire IR	IR(RJF)	2.7E-08	
	Leak flash fire IR	IR(LFF)	0	
	Rupture flash fire IR	IR(RFF)	0	
	Leak explosion IR	IR(LEX)	0	
	Rupture explosion IR	IR(REX)	0	
<b>Total IR and IRC</b>				
	<b>Total Individual Risk</b>		2.7E-08	
	<b>CDE Individual Risk Criterion</b>		1.0E-06	
<b>Check shaded boxes as follows:</b>				
	If TIF / IRC > 1.0			“Significant”
	If TIF / IRC <= 1.0		X	“Insignificant”
<b>IR and Population Risk Indicators</b>				
	IR Indicator		0.25	
	Population Risk Indicator		175	

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 4 - Alternative Calculations Summary**

**School Site: Los Alamitos High School**

**Listing of Attached Alternative Documentation:**

The Chevron crude oil pipeline is located north of the raised middle of Cerritos Avenue, and therefore could flow towards the site to the north in the unlikely event of a release of crude oil. A rectangular area of impact was calculated based on the volume of crude oil released in a 15-minute period at a maximum flow rate (economic flow rate). The width of the rectangular area is the distance of the pipeline to the curb (approximately 24 feet), the depth being the curb height of 8 inches. Assuming the pool is the height of the curb, the length of the pool is 120 feet long. Based on CDE protocol, the impacts of a pool fire are calculated by splitting the area into multiple smaller rectangular and adding the impacts from all the smaller areas. Using this method, the impact distance where the fire heat radiation is at 5,000 British thermal units per hour-feet squared (BTU/hr-ft<sup>2</sup>) is approximately 58 feet from the pipeline. The calculated total individual risk of this pipeline is 2.7E-08.

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 5 - Supplementary Documentation**

**School Site:** Los Alamitos High School

**Listing of Attached Supplementary Documentation:**

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 1 – Administrative, Summary, and Signature Form**

Local Educational Agency			
Date	January 15, 2019		
Local Educational Agency	Los Alamitos Unified School District		
Contact			
Telephone Number			
E-mail Address			
Street Address			
Department or Mail Drop			
City	Los Alamitos		
County	Orange		
Zip Code			
Proposed School Campus Site			
Name	Los Alamitos High School		
Location Description	See attached Section 1 of this report for a complete location description of the site. The site is planned for construction of a new multi-story building.		
Pipeline of Interest			
Operator / Owner	Crimson		
Product Transported	Crude Oil		
Pipeline Diameter (inches)	8 inches		
Operating Pressure (psig)	720 psig (max)		
Closet Approach to Property Line (or boundary between the usable and unusable portion of the site if the unusable portion faces the pipe-line.) (ft)	75 feet		
Individual Risk Estimate Result			
Type of Analysis (Check One)	Stage 1 →	Stage 2 →	Stage 3 → X
Individual Risk Estimate Value	0.00		
Individual Risk Criterion	1.0E-06 (0.000001)		
IR Significance (check one)	Significant		
	Insignificant	X	

(Continued on next page)

California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 1 – Administrative, Summary, and Signature Form  
(Continued from previous page)

<b>Population Risk Indicator Result</b>		
<b>Protocol Average IR</b>	<b>0.00</b>	
<b>IR Indicator (Average IR / Property Line IR Ratio)</b>	<b>N/A</b>	
<b>Population Risk Indicator</b>	<b>N/A</b>	
<b>Prevention and Mitigation Recommendations/Implementations</b> <i>(Add additional sheets with more details as needed.)</i>		
<b>Prevention Measures:</b> See attached sheets		
<b>Mitigation Measures:</b> See attached sheets		
<b>Conclusions/Other Suggestions/Recommendations:</b> See attached sheets		
<b>Certification and Signatures of Risk Analyst(s)</b>		
<p><i>This analysis was conducted according to the 2007 CDE Protocol except as noted. All modifications within the Stage 2 framework, and Stage 3 analyses and exceptions to the data and processes established in the 2007 CDE Protocol, if any, were based upon my professional opinion and in a manner consistent with the standards of care and skill ordinarily exercised by professionals working on similar projects.</i></p> <p><i>I certify that the estimated risk levels were derived based upon the 2007 CDE Protocol, unless otherwise noted, and that these levels demonstrate, within reasonable expectations of uncertainties for such estimates, that the estimated Individual Risk for the school site, as the site was planned at the time of this analysis, including mitigation measures, if any, meets the Individual Risk Criterion stated in the 2007 CDE Protocol, based on the information provided to me.</i></p>		
<b>Printed Name</b>	<b>Signature</b>	<b>Position or Title</b>
John Jay Roberts		Principal Geologist
<b>Notice: In the event that the Individual Risk Criterion could not be met, at the option of the LEA, CDE will still accept a report for review and consultation with the LEA.</b>		

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 2 - Pipeline Risk Analysis Input Data**

Date: <b>January 15, 2019</b>		
Local Educational Agency: <b>Los Alamitos Unified School District</b>		
Proposed School Site Name: <b>Los Alamitos High School</b>		
Proposed School Estimated Population: <b>3,500</b>		
<b>Product</b>	<b>Designate by an "X"</b>	
Natural gas (NG)		
Crude oil	X	
Gasoline		
Liquefied natural gas (LNG)		
Liquefied petroleum gas (LPG)		
Natural gas liquids (NGL)		
Other refined product (specify)		
Other substance (specify)		
<b>Pipeline Location Attributes</b>	<b>Units</b>	<b>Value</b>
Segment length	ft	
Closest approach to property line	ft	75
Closest approach to usable portion of the school site	ft	75
Land use by class location (49 CFR Part 192)	Class	3
<b>Pipeline Attributes</b>		
Diameter	inches	8
Maximum operating pressure	psig	720
Average operating pressure	psig	Unknown
Depth of burial	ft	6
Distance to nearest compressor (gas) or pump station (liquid)	ft	
Throughput		
<i>Liquid</i> (enter value, meter, etc.)	Barrels/hour	250-800
Nearest block valve locations, upstream and downstream of segment of concern		
Above ground components within 1500-ft zone		
<i>Number</i>		
<i>Type</i>		
Pipeline location on terrain gradient relative to school (Designate with an "X" by appropriate description)		
<i>Flat</i>	X	
<i>Up gradient</i>		
<i>Down gradient</i>		
<i>"Convolutd"</i>		

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 3 - Standard Protocol Calculation Summary**

	Release Probability Calculations	Variable	Value	Data Source if Different from Protocol
<b>Basic Data Input</b>				
	Baseline frequency per pipeline mile	F0, releases/ mile-year	3.9E-03	Historical or default release frequency from Table 4-3 or Appendix B.
	Segment length within 1500-ft buffer	SEG, Miles	0.8	Determine from site maps, GIS, or other sources
	Nearest property line distance	R0, ft	75	Determine from maps
	Receptor location distance, if different than nearest property line	R(i), ft		Determine from maps
	Base release probability	P0	3.9E-03	$P0 = 1 - e^{(-F0 \times t)}$
	Probability adjustment factor	PAF	1.7	Default value selected by analyst
	Adjusted base probability	PA	6.6E-03	$PA = P0 \times PAF$
<b>Special Seismic Considerations</b>				
<p>Please summarize and/or list below any adjustments made to the Protocol base risk analysis estimates and the special seismic conditions and studies upon which these adjustments were based.</p> <p>If adjustments were based upon special seismic conditions, the signature(s) and titles of those professionals involved are required. Attach additional pages if needed.</p> <p>Possible causes of pipeline failure are taken into account by the CDE protocol; however, some latitude is given to adjust the probability of failure based on the professional opinion of the risk analyst. Peak ground acceleration (PGA) at the site was determined to be 0.51g, based on the findings of the Geotechnical Engineering Report prepared by Terracon Consultants. Therefore, a probability adjustment factor (PAF) of 1.7 was applied to the base probability, as the normal probability assumes a PGA of 0.3g. This PAF represents a very conservative human hazard-protective approach in that the PGA represents only a fraction of the seismic factor and application of this PAF overestimates the probability of pipeline failure.</p>				
<b>Signatures for Above, If Needed</b>				
	Printed Name	Signature	Title	
	John Jay Roberts		Principal Geologist	
<b>Protocol Basis Scenario Probabilities</b>				
	XSEG length, leak, ft:			
	Leak jet or pool fire		0	
	Leak flash fire		0	
	Leak gas or vapor explosion		0	

(Continued on next page.)

	Release Probability Calculations		Variable	Value	Data Source if Different from Protocol
	<i>Individual XSEG failure and release probabilities, leak, PA(LX):</i>				
	Leak jet or pool fire			0	
	Leak flash fire			0	
	Leak gas or vapor explosion			0	
	<i>XSEG length, rupture, ft:</i>				
	Rupture jet or pool fire			55	
	Rupture flash fire			11	
	Rupture gas or vapor explosion			0	
	<i>Individual XSEG failure and release probabilities, rupture, PA(RX):</i>				
	Rupture jet or pool fire			0	
	Rupture flash fire			0	
	Rupture gas or vapor explosion			0	
Insert Protocol default values or exceptions to the Protocol default values:					(If values other than Protocol default values were used, indicate the value in the appropriate cell and indicate the data source.)
	Probability of leak	PC(L)	0.8	Default: 0.8	
	Probability of rupture	PC(R)	0.2	Default: 0.2	
	Probability of leak ignition	PC(LIG)	0.03	Default: gas 0.3 (FEMA 1989); gasoline, 0.09; liquids other than gasoline (e.g., crude oil): 0.03	
	Probability of rupture ignition	PC(RIG)	0.03	Default: gas 0.45 (FEMA 1989); gasoline: 0.09; liquids other than gasoline (e.g., crude oil): 0.03	

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**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 3 - Standard Protocol Calculation Summary**  
(Continued from previous page)

	Release Probability Calculations	Variable	Value	Data Source if Different from Protocol
<b>Insert Protocol default values or exceptions to the Protocol default values:</b>			<b>(If value other than default used, indicate value in appropriate column and indicate data source.)</b>	
	Probability of fire on ignition	PC(FIG)	0.95	Default: gas 0.99 (FEMA 1989); liquid 0.95
	Probability of explosion on ignition	PC(EIG)	0.05	Default: gas 0.01; liquid 0.05
	Probability of flash fire	PC(FF)	0.05	Default: gas 0.01; liquid 0.05
	Probability of jet fire (gas pipelines) or pool fire (liquid pipelines)	PC(JF)	0.95	Default: gas = 0.98; liquid = 0.95
	Probability of occupancy	PC(OCC)	0.16	Default: 180 days per year, 8 hrs per day.
	Probability of outdoor exposure	PC(OUT)	0.25	Default: 2 hr outdoors during an 8-hour day onsite.
	Probability of leak jet/pool fire impact	PCI(LJF)	0.022	
	Probability of rupture jet/pool fire impact	PCI(RJF)	0.005	
	Probability of leak flash fire impact	PCI(LFF)	0.001	
	Probability of rupture flash fire impact	PCI(RFF)	0.000	
	Probability of leak explosion impact	PCI(LEX)	0.001	
	Probability of rupture explosion impact	PCI(REX)	0.000	
<b>Individual Risk Summary</b>				
	Leak jet fire IR	IR(LJF)	0	
	Rupture jet fire IR	IR(RJF)	0	
	Leak flash fire IR	IR(LFF)	0	
	Rupture flash fire IR	IR(RFF)	0	
	Leak explosion IR	IR(LEX)	0	
	Rupture explosion IR	IR(REX)	0	
<b>Total IR and IRC</b>				
	<b>Total Individual Risk</b>		0	
	<b>CDE Individual Risk Criterion</b>		1.0E-06	
<b>Check shaded boxes as follows:</b>				
	If TIF / IRC > 1.0			“Significant”
	If TIF / IRC <= 1.0		X	“Insignificant”
<b>IR and Population Risk Indicators</b>				
	IR Indicator		N/A	
	Population Risk Indicator		N/A	

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 4 - Alternative Calculations Summary**

**School Site: Los Alamitos High School**

**Listing of Attached Alternative Documentation:**

The Crimson crude oil pipeline is located west of the raised middle of Norwalk Boulevard. Based on the topography of the roadway, a release from this pipeline would flow towards the western edge of the street, away from the site. A rectangular area of impact was calculated based on the volume of crude oil released in a 15-minute period at a maximum flow rate. The width of the rectangular area is the distance of the pipeline to the nearest curb (approximately 30 feet), the depth being the curb height of 8 inches. Assuming the pool is the height of the curb, the length of the pool is approximately 55 feet long. The impacts of a pool fire from this location would not in any likelihood reach the site; therefore, the total individual risk of this pipeline is 0.00E+00.

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 5 - Supplementary Documentation**

**School Site: Los Alamitos High School**

**Listing of Attached Supplementary Documentation:**

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 1 – Administrative, Summary, and Signature Form**

Local Educational Agency			
Date	January 15, 2019		
Local Educational Agency	Los Alamitos Unified School District		
Contact			
Telephone Number			
E-mail Address			
Street Address			
Department or Mail Drop			
City	Los Alamitos		
County	Orange		
Zip Code			
Proposed School Campus Site			
Name	Los Alamitos High School		
Location Description	See attached Section 1 of this report for a complete location description of the site. The site is planned for construction of a new multi-story building.		
Pipeline of Interest			
Operator / Owner	Plains		
Product Transported	Crude Oil		
Pipeline Diameter (inches)	12 inches		
Operating Pressure (psig)	Unknown		
Closet Approach to Property Line (or boundary between the usable and unusable portion of the site if the unusable portion faces the pipe-line.) (ft)	800 feet		
Individual Risk Estimate Result			
Type of Analysis (Check One)	Stage 1 →	Stage 2 →	X Stage 3 →
Individual Risk Estimate Value	0		
Individual Risk Criterion	1.0E-06 (0.000001)		
IR Significance (check one)	Significant		
	Insignificant	X	

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**California Department of Education**  
**CCR, Title 5, Pipeline Risk Analysis Report**  
**Form 1 – Administrative, Summary, and Signature Form**  
(Continued from previous page)

<b>Population Risk Indicator Result</b>		
<b>Protocol Average IR</b>	<b>0</b>	
<b>IR Indicator (Average IR / Property Line IR Ratio)</b>	<b>N/A</b>	
<b>Population Risk Indicator</b>	<b>N/A</b>	
<b>Prevention and Mitigation Recommendations/Implementations</b> <i>(Add additional sheets with more details as needed.)</i>		
<b>Prevention Measures:</b> See attached sheets		
<b>Mitigation Measures:</b> See attached sheets		
<b>Conclusions/Other Suggestions/Recommendations:</b> See attached sheets		
<b>Certification and Signatures of Risk Analyst(s)</b>		
<p><i>This analysis was conducted according to the 2007 CDE Protocol except as noted. All modifications within the Stage 2 framework, and Stage 3 analyses and exceptions to the data and processes established in the 2007 CDE Protocol, if any, were based upon my professional opinion and in a manner consistent with the standards of care and skill ordinarily exercised by professionals working on similar projects.</i></p> <p><i>I certify that the estimated risk levels were derived based upon the 2007 CDE Protocol, unless otherwise noted, and that these levels demonstrate, within reasonable expectations of uncertainties for such estimates, that the estimated Individual Risk for the school site, as the site was planned at the time of this analysis, including mitigation measures, if any, meets the Individual Risk Criterion stated in the 2007 CDE Protocol, based on the information provided to me.</i></p>		
<b>Printed Name</b>	<b>Signature</b>	<b>Position or Title</b>
John Jay Roberts		Principal Geologist
<b>Notice: In the event that the Individual Risk Criterion could not be met, at the option of the LEA, CDE will still accept a report for review and consultation with the LEA.</b>		

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 2 - Pipeline Risk Analysis Input Data**

Date: <b>January 15, 2019</b>		
Local Educational Agency: <b>Los Alamitos Unified School District</b>		
Proposed School Site Name: <b>Los Alamitos High School</b>		
Proposed School Estimated Population: <b>3,500</b>		
<b>Product</b>	<b>Designate by an "X"</b>	
Natural gas (NG)		
Crude oil	X	
Gasoline		
Liquefied natural gas (LNG)		
Liquefied petroleum gas (LPG)		
Natural gas liquids (NGL)		
Other refined product (specify)		
Other substance (specify)		
<b>Pipeline Location Attributes</b>	<b>Units</b>	<b>Value</b>
Segment length	ft	850
Closest approach to property line	ft	800
Closest approach to usable portion of the school site	ft	800
Land use by class location (49 CFR Part 192)	Class	3
<b>Pipeline Attributes</b>		
Diameter	inches	12
Maximum operating pressure	psig	Unknown
Average operating pressure	psig	Unknown
Depth of burial	ft	
Distance to nearest compressor (gas) or pump station (liquid)	ft	
Throughput		
<i>Liquid</i> (enter value, meter, etc.)	gpm	Unknown
Nearest block valve locations, upstream and downstream of segment of concern		
Above ground components within 1500-ft zone		
<i>Number</i>		
<i>Type</i>		
Pipeline location on terrain gradient relative to school (Designate with an "X" by appropriate description)		
<i>Flat</i>	X	
<i>Up gradient</i>		
<i>Down gradient</i>		
<i>"Convolutd"</i>		

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 3 - Standard Protocol Calculation Summary**

	Release Probability Calculations	Variable	Value	Data Source if Different from Protocol
<b>Basic Data Input</b>				
	Baseline frequency per pipeline mile	F0, releases/ mile-year	3.9E-03	Historical or default release frequency from Table 4-3 or Appendix B.
	Segment length within 1500-ft buffer	SEG, Miles	0.16	Determine from site maps, GIS, or other sources
	Nearest property line distance	R0, ft	800	Determine from maps
	Receptor location distance, if different than nearest property line	R(i), ft		Determine from maps
	Base release probability	P0	3.9E-03	$P0 = 1 - e^{(-F0 \times t)}$
	Probability adjustment factor	PAF	1.7	Default value selected by analyst
	Adjusted base probability	PA	6.6E-03	$PA = P0 \times PAF$
<b>Special Seismic Considerations</b>				
<p>Please summarize and/or list below any adjustments made to the Protocol base risk analysis estimates and the special seismic conditions and studies upon which these adjustments were based.</p> <p>If adjustments were based upon special seismic conditions, the signature(s) and titles of those professionals involved are required. Attach additional pages if needed.</p> <p>Possible causes of pipeline failure are taken into account by the CDE protocol; however, some latitude is given to adjust the probability of failure based on the professional opinion of the risk analyst. Peak ground acceleration (PGA) at the site was determined to be 0.51g, based on the findings of the Geotechnical Engineering Report prepared by Terracon Consultants. Therefore, a probability adjustment factor (PAF) of 1.7 was applied to the base probability, as the normal probability assumes a PGA of 0.3g. This PAF represents a very conservative human hazard-protective approach in that the PGA represents only a fraction of the seismic factor and application of this PAF overestimates the probability of pipeline failure.</p>				
<b>Signatures for Above, If Needed</b>				
Printed Name		Signature		Title
John Jay Roberts				Principal Geologist
<b>Protocol Basis Scenario Probabilities</b>				
	XSEG length, leak, ft:			
	Leak jet or pool fire		0	
	Leak flash fire		0	
	Leak gas or vapor explosion		0	

(Continued on next page.)

	Release Probability Calculations		Variable	Value	Data Source if Different from Protocol
	<i>Individual XSEG failure and release probabilities, leak, PA(LX):</i>				
	Leak jet or pool fire			0	
	Leak flash fire			0	
	Leak gas or vapor explosion			0	
	<i>XSEG length, rupture, ft:</i>				
	Rupture jet or pool fire			0	
	Rupture flash fire			0	
	Rupture gas or vapor explosion			0	
	<i>Individual XSEG failure and release probabilities, rupture, PA(RX):</i>				
	Rupture jet or pool fire			0	
	Rupture flash fire			0	
	Rupture gas or vapor explosion			0	
Insert Protocol default values or exceptions to the Protocol default values:					(If values other than Protocol default values were used, indicate the value in the appropriate cell and indicate the data source.)
	Probability of leak	PC(L)	0.8	Default: 0.8	
	Probability of rupture	PC(R)	0.2	Default: 0.2	
	Probability of leak ignition	PC(LIG)	0.03	Default: gas 0.3 (FEMA 1989); gasoline, 0.09; liquids other than gasoline (e.g., crude oil): 0.03	
	Probability of rupture ignition	PC(RIG)	0.03	Default: gas 0.45 (FEMA 1989); gasoline: 0.09; liquids other than gasoline (e.g., crude oil): 0.03	

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**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 3 - Standard Protocol Calculation Summary**  
(Continued from previous page)

	Release Probability Calculations	Variable	Value	Data Source if Different from Protocol
<b>Insert Protocol default values or exceptions to the Protocol default values:</b>			<b>(If value other than default used, indicate value in appropriate column and indicate data source.)</b>	
	Probability of fire on ignition	PC(FIG)	0.95	Default: gas 0.99 (FEMA 1989); liquid 0.95
	Probability of explosion on ignition	PC(EIG)	0.05	Default: gas 0.01; liquid 0.05
	Probability of flash fire	PC(FF)	0.05	Default: gas 0.01; liquid 0.05
	Probability of jet fire (gas pipelines) or pool fire (liquid pipelines)	PC(JF)	0.95	Default: gas = 0.98; liquid = 0.95
	Probability of occupancy	PC(OCC)	0.16	Default: 180 days per year, 8 hrs per day.
	Probability of outdoor exposure	PC(OUT)	0.25	Default: 2 hr outdoors during an 8-hour day onsite.
	Probability of leak jet/pool fire impact	PCI(LJF)	0.022	
	Probability of rupture jet/pool fire impact	PCI(RJF)	0.005	
	Probability of leak flash fire impact	PCI(LFF)	0.001	
	Probability of rupture flash fire impact	PCI(RFF)	0.000	
	Probability of leak explosion impact	PCI(LEX)	0.001	
	Probability of rupture explosion impact	PCI(REX)	0.000	
<b>Individual Risk Summary</b>				
	Leak jet fire IR	IR(LJF)	0	
	Rupture jet fire IR	IR(RJF)	0	
	Leak flash fire IR	IR(LFF)	0	
	Rupture flash fire IR	IR(RFF)	0	
	Leak explosion IR	IR(LEX)	0	
	Rupture explosion IR	IR(REX)	0	
<b>Total IR and IRC</b>				
	<b>Total Individual Risk</b>		0	
	<b>CDE Individual Risk Criterion</b>		1.0E-06	
<b>Check shaded boxes as follows:</b>				
	If TIF / IRC > 1.0			“Significant”
	If TIF / IRC <= 1.0		X	“Insignificant”
<b>IR and Population Risk Indicators</b>				
	IR Indicator		N/A	
	Population Risk Indicator		N/A	

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 4 - Alternative Calculations Summary**

**School Site: Los Alamitos High School**

**Listing of Attached Alternative Documentation:**

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 5 - Supplementary Documentation**

**School Site: Los Alamitos High School**

**Listing of Attached Supplementary Documentation:**

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 1 – Administrative, Summary, and Signature Form**

Local Educational Agency			
Date	January 15, 2019		
Local Educational Agency	Los Alamitos Unified School District		
Contact			
Telephone Number			
E-mail Address			
Street Address			
Department or Mail Drop			
City	Los Alamitos		
County	Orange		
Zip Code			
Proposed School Campus Site			
Name	Los Alamitos High School		
Location Description	See attached Section 1 of this report for a complete location description of the site. The site is planned for construction of a new multi-story building.		
Pipeline of Interest			
Operator / Owner	Plains		
Product Transported	Crude Oil		
Pipeline Diameter (inches)	16 inches		
Operating Pressure (psig)	Unknown		
Closet Approach to Property Line (or boundary between the usable and unusable portion of the site if the unusable portion faces the pipe-line.) (ft)	800 feet		
Individual Risk Estimate Result			
Type of Analysis (Check One)	Stage 1 →	Stage 2 →	X Stage 3 →
Individual Risk Estimate Value	0		
Individual Risk Criterion	1.0E-06 (0.000001)		
IR Significance (check one)	Significant		
	Insignificant	X	

(Continued on next page)

California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 1 – Administrative, Summary, and Signature Form  
(Continued from previous page)

<b>Population Risk Indicator Result</b>		
<b>Protocol Average IR</b>	<b>0</b>	
<b>IR Indicator (Average IR / Property Line IR Ratio)</b>	<b>N/A</b>	
<b>Population Risk Indicator</b>	<b>N/A</b>	
<b>Prevention and Mitigation Recommendations/Implementations</b> <i>(Add additional sheets with more details as needed.)</i>		
<b>Prevention Measures:</b> See attached sheets		
<b>Mitigation Measures:</b> See attached sheets		
<b>Conclusions/Other Suggestions/Recommendations:</b> See attached sheets		
<b>Certification and Signatures of Risk Analyst(s)</b>		
<p><i>This analysis was conducted according to the 2007 CDE Protocol except as noted. All modifications within the Stage 2 framework, and Stage 3 analyses and exceptions to the data and processes established in the 2007 CDE Protocol, if any, were based upon my professional opinion and in a manner consistent with the standards of care and skill ordinarily exercised by professionals working on similar projects.</i></p> <p><i>I certify that the estimated risk levels were derived based upon the 2007 CDE Protocol, unless otherwise noted, and that these levels demonstrate, within reasonable expectations of uncertainties for such estimates, that the estimated Individual Risk for the school site, as the site was planned at the time of this analysis, including mitigation measures, if any, meets the Individual Risk Criterion stated in the 2007 CDE Protocol, based on the information provided to me.</i></p>		
<b>Printed Name</b>	<b>Signature</b>	<b>Position or Title</b>
John Jay Roberts		Principal Geologist
<b>Notice: In the event that the Individual Risk Criterion could not be met, at the option of the LEA, CDE will still accept a report for review and consultation with the LEA.</b>		

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 2 - Pipeline Risk Analysis Input Data**

Date: <b>January 15, 2019</b>		
Local Educational Agency: <b>Los Alamitos Unified School District</b>		
Proposed School Site Name: <b>Los Alamitos High School</b>		
Proposed School Estimated Population: <b>3,500</b>		
<b>Product</b>	<b>Designate by an "X"</b>	
Natural gas (NG)		
Crude oil	X	
Gasoline		
Liquefied natural gas (LNG)		
Liquefied petroleum gas (LPG)		
Natural gas liquids (NGL)		
Other refined product (specify)		
Other substance (specify)		
<b>Pipeline Location Attributes</b>	<b>Units</b>	<b>Value</b>
Segment length	ft	750
Closest approach to property line	ft	800
Closest approach to usable portion of the school site	ft	800
Land use by class location (49 CFR Part 192)	Class	3
<b>Pipeline Attributes</b>		
Diameter	inches	16
Maximum operating pressure	psig	Unknown
Average operating pressure	psig	Unknown
Depth of burial	ft	
Distance to nearest compressor (gas) or pump station (liquid)	ft	
Throughput		
<i>Liquid</i> (enter value, meter, etc.)	gpm	Unknown
Nearest block valve locations, upstream and downstream of segment of concern		
Above ground components within 1500-ft zone		
<i>Number</i>		
<i>Type</i>		
Pipeline location on terrain gradient relative to school (Designate with an "X" by appropriate description)		
<i>Flat</i>	X	
<i>Up gradient</i>		
<i>Down gradient</i>		
<i>"Convolutd"</i>		

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 3 - Standard Protocol Calculation Summary**

	Release Probability Calculations	Variable	Value	Data Source if Different from Protocol
<b>Basic Data Input</b>				
	Baseline frequency per pipeline mile	F0, releases/ mile-year	3.9E-03	Historical or default release frequency from Table 4-3 or Appendix B.
	Segment length within 1500-ft buffer	SEG, Miles	0.14	Determine from site maps, GIS, or other sources
	Nearest property line distance	R0, ft	800	Determine from maps
	Receptor location distance, if different than nearest property line	R(i), ft		Determine from maps
	Base release probability	P0	3.9E-03	$P0 = 1 - e^{(-F0 \times t)}$
	Probability adjustment factor	PAF	1.7	Default value selected by analyst
	Adjusted base probability	PA	6.6E-03	$PA = P0 \times PAF$
<b>Special Seismic Considerations</b>				
<p>Please summarize and/or list below any adjustments made to the Protocol base risk analysis estimates and the special seismic conditions and studies upon which these adjustments were based.</p> <p>If adjustments were based upon special seismic conditions, the signature(s) and titles of those professionals involved are required. Attach additional pages if needed.</p> <p>Possible causes of pipeline failure are taken into account by the CDE protocol; however, some latitude is given to adjust the probability of failure based on the professional opinion of the risk analyst. Peak ground acceleration (PGA) at the site was determined to be 0.51g, based on the findings of the Geotechnical Engineering Report prepared by Terracon Consultants. Therefore, a probability adjustment factor (PAF) of 1.7 was applied to the base probability, as the normal probability assumes a PGA of 0.3g. This PAF represents a very conservative human hazard-protective approach in that the PGA represents only a fraction of the seismic factor and application of this PAF overestimates the probability of pipeline failure.</p>				
<b>Signatures for Above, If Needed</b>				
Printed Name		Signature		Title
John Jay Roberts				Principal Geologist
<b>Protocol Basis Scenario Probabilities</b>				
	XSEG length, leak, ft:			
	Leak jet or pool fire		0	
	Leak flash fire		0	
	Leak gas or vapor explosion		0	

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	Release Probability Calculations		Variable	Value	Data Source if Different from Protocol
	<i>Individual XSEG failure and release probabilities, leak, PA(LX):</i>				
	Leak jet or pool fire			0	
	Leak flash fire			0	
	Leak gas or vapor explosion			0	
	<i>XSEG length, rupture, ft:</i>				
	Rupture jet or pool fire			0	
	Rupture flash fire			0	
	Rupture gas or vapor explosion			0	
	<i>Individual XSEG failure and release probabilities, rupture, PA(RX):</i>				
	Rupture jet or pool fire			0	
	Rupture flash fire			0	
	Rupture gas or vapor explosion			0	
Insert Protocol default values or exceptions to the Protocol default values:					(If values other than Protocol default values were used, indicate the value in the appropriate cell and indicate the data source.)
	Probability of leak	PC(L)	0.8	Default: 0.8	
	Probability of rupture	PC(R)	0.2	Default: 0.2	
	Probability of leak ignition	PC(LIG)	0.03	Default: gas 0.3 (FEMA 1989); gasoline, 0.09; liquids other than gasoline (e.g., crude oil): 0.03	
	Probability of rupture ignition	PC(RIG)	0.03	Default: gas 0.45 (FEMA 1989); gasoline: 0.09; liquids other than gasoline (e.g., crude oil): 0.03	

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	Release Probability Calculations	Variable	Value	Data Source if Different from Protocol
<b>Insert Protocol default values or exceptions to the Protocol default values:</b>			<b>(If value other than default used, indicate value in appropriate column and indicate data source.)</b>	
	Probability of fire on ignition	PC(FIG)	0.95	Default: gas 0.99 (FEMA 1989); liquid 0.95
	Probability of explosion on ignition	PC(EIG)	0.05	Default: gas 0.01; liquid 0.05
	Probability of flash fire	PC(FF)	0.05	Default: gas 0.01; liquid 0.05
	Probability of jet fire (gas pipelines) or pool fire (liquid pipelines)	PC(JF)	0.95	Default: gas = 0.98; liquid = 0.95
	Probability of occupancy	PC(OCC)	0.16	Default: 180 days per year, 8 hrs per day.
	Probability of outdoor exposure	PC(OUT)	0.25	Default: 2 hr outdoors during an 8-hour day onsite.
	Probability of leak jet/pool fire impact	PCI(LJF)	0.022	
	Probability of rupture jet/pool fire impact	PCI(RJF)	0.005	
	Probability of leak flash fire impact	PCI(LFF)	0.001	
	Probability of rupture flash fire impact	PCI(RFF)	0.000	
	Probability of leak explosion impact	PCI(LEX)	0.001	
	Probability of rupture explosion impact	PCI(REX)	0.000	
<b>Individual Risk Summary</b>				
	Leak jet fire IR	IR(LJF)	0	
	Rupture jet fire IR	IR(RJF)	0	
	Leak flash fire IR	IR(LFF)	0	
	Rupture flash fire IR	IR(RFF)	0	
	Leak explosion IR	IR(LEX)	0	
	Rupture explosion IR	IR(REX)	0	
<b>Total IR and IRC</b>				
	<b>Total Individual Risk</b>		0	
	<b>CDE Individual Risk Criterion</b>		1.0E-06	
<b>Check shaded boxes as follows:</b>				
	If TIF / IRC > 1.0			“Significant”
	If TIF / IRC <= 1.0		X	“Insignificant”
<b>IR and Population Risk Indicators</b>				
	IR Indicator		N/A	
	Population Risk Indicator		N/A	

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 4 - Alternative Calculations Summary**

**School Site: Los Alamitos High School**

**Listing of Attached Alternative Documentation:**

**California Department of Education  
CCR, Title 5, Pipeline Risk Analysis Report  
Form 5 - Supplementary Documentation**

**School Site: Los Alamitos High School**

**Listing of Attached Supplementary Documentation:**



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