

Attachment A
TRC Redacted Report

SOUTHERN CALIFORNIA GAS COMPANY NORTH - SOUTH PROJECT

PRESENTATION SUMMARY

Final Report Adelanto Compressor Station Adelanto to Moreno Pipeline Moreno to Whitewater Pipeline



Prepared for:



A  Sempra Energy utility®

Southern California Gas Company
555 W. Fifth Street
Los Angeles, CA 90013-1041

Prepared by:



123 Technology Drive West
Irvine, CA 92618

December 2013

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS.....	vii
EXECUTIVE SUMMARY	1
Purpose and Scope	1
Project Overview	1
Cost Summary.....	3
Environmental.....	4
Report Set-Up	4
1.0 PROJECT OVERVIEW.....	1-1
Adelanto Compressor Station	1-1
Moreno Valley Pressure Limiting Station	1-2
Adelanto to Moreno Pipeline.....	1-3
Moreno to Whitewater Pipeline.....	1-3
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations.....	1-4
2.0 PROJECT COMPONENTS AND KEY DEVELOPMENT ASSUMPTIONS	2-1
This section provides an overview of the PROJECT components and key development assumptions.	2-1
Adelanto Compressor Station	2-1
Moreno Valley Pressure Limiting Station	2-2
Adelanto to Moreno Pipeline.....	2-2
Moreno to Whitewater Pipeline.....	2-2
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations.....	2-3
3.0 ROUTE DESCRIPTION.....	3-1
Adelanto Compressor Station	3-1
Moreno Valley Pressure Limiting Station	3-1
Adelanto to Moreno Pipeline.....	3-1
Moreno to Whitewater Pipeline.....	3-2
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations.....	3-4
4.0 RIGHT OF WAY	4-1
Adelanto Compressor Station	4-1
Moreno Valley Pressure Limiting Station	4-1
Adelanto to Moreno Pipeline.....	4-1
Moreno to Whitewater Pipeline.....	4-3
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations.....	4-5
5.0 RIGHT OF WAY COST	5-1
Adelanto Compressor Station	5-1

Moreno Valley Pressure Limiting Station	5-1
Pipeline Right of Way Costs.....	5-2
Adelanto to Moreno Pipeline.....	5-2
Moreno to Whitewater Pipeline.....	5-3
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations.....	5-4
6.0 ENGINEERING AND CONSTRUCTION.....	6-1
Engineering and Design.....	6-1
Adelanto Compressor Station.....	6-1
Moreno Valley Pressure Limiting Station	6-4
Pipelines.....	6-4
Geotechnical Investigation	6-7
Adelanto Compressor Station.....	6-8
Moreno Valley Pressure Limiting Station	6-9
Adelanto to Moreno Pipeline.....	6-9
Moreno to Whitewater Pipeline.....	6-10
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations.....	6-11
Pipeline Survey.....	6-11
Adelanto Compressor Station.....	6-11
Moreno Valley Pressure Limiting Station	6-12
Adelanto to Moreno Pipeline.....	6-12
Moreno to Whitewater Pipeline.....	6-12
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations.....	6-12
Project Construction Management.....	6-12
Project Construction Management	6-12
Construction Inspection	6-12
Engineering and Construction Management Costs.....	6-14
Adelanto Compressor Station.....	6-14
Moreno Valley Pressure Limiting Station	6-14
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations.....	6-15
7.0 CONSTRUCTION	7-1
Adelanto Compressor Station.....	7-1
Details of Proposed Adelanto Station.....	7-1
Compressor Package.....	7-1
Gas Cooler	7-2
Buildings.....	7-2
Compressor Building.....	7-3
General layout of the building	7-3
Auxiliary Building	7-3

Adelanto Compressor Station Materials	7-5
Moreno Valley Pressure Limiting Station	7-5
Pipeline Construction.....	7-6
Adelanto to Moreno Pipeline.....	7-7
Pipeline Materials Details Costs	7-7
Pipeline Construction Detailed Costs	7-8
Moreno to Whitewater Pipeline	7-9
Pipeline Materials Details Costs	7-9
Pipeline Construction Detailed Costs	7-9
Moreno to Whitewater Pipeline.....	7-10
Pressure Limiting Stations Construction	7-11
Station Detail Feasibility Design	7-12
Desert Center Compressor Station.....	7-12
Shaver Summit Pressure Limiting Station.....	7-12
Whitewater Pressure Limiting Station.....	7-13
8.0 ENVIRONMENTAL PROJECT OVERVIEW	8-1
Overview.....	8-1
Timing, Level of Effort and Estimated Budget	8-2
Task I: Geotechnical Permitting Support.....	8-3
Task II: Environmental Data Collection.....	8-3
Cultural and Paleontological Surveys.....	8-3
Biological Surveys.....	8-3
Special-Status Species	8-4
Water Resources/Flooding.....	8-4
Air Quality	8-5
Soils, Geology and Hazardous Materials.....	8-5
Task III: Environmental Clearance/Permit Process.....	8-6
Task IV: Preconstruction Surveys and Mitigation Compliance	8-7
Task V: Construction Monitoring.....	8-7
Task VI: Post-Construction Monitoring and Ongoing Mitigation.....	8-7
Land Ownership / Land Use	8-11
Adelanto Compressor Station	8-11
Moreno Valley Pressure Limiting Station	8-11
Adelanto to Moreno Pipeline.....	8-11
Moreno to Whitewater Pipeline.....	8-12
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations.....	8-13
Environmental Feasibility Review Methods.....	8-13
Mapping Review.....	8-14
Field Investigations.....	8-14

Regulatory Background and Requirements	8-15
• Native American Graves Protection and Repatriation Act	8-15
• Paleontological Resource Preservation Act	8-15
• California Environmental Quality Act	8-16
• California Endangered Species Act	8-16
• California Species of Special Concern	8-16
• California Native Plant Protection Act	8-16
• California Lake and Streambed Alteration Program	8-16
• Natural Communities Conservation Planning Act	8-16
• California Native American Graves Protection and Repatriation Act	8-16
• California Public Resources Code	8-16
Local Regulations	8-16
• Western Riverside MSHCP	8-16
• West Mojave Plan HCP	8-16
9.0 RISK ANALYSIS	9-1
Overview	9-1
Risk Analysis	9-1
Methodology	9-2
10.0 REFERENCES	10-1
A. Addendum 1	I
Major Piping Systems	I
Electrical Systems	I
Station Power/Baseload Power Generation	I
Motor Control Center	I
Grounding, Lightning Protection, Cathodic Protection	II
Hazard Detection and Protection Systems	II
Other Station Systems	II
Site Access Control and Perimeter Security	II
Major Design Tasks by Discipline	III
Civil Design	III
Electrical Design	III
Mechanical Design	III
Structural Engineering	IV
Sample Drawing Lists	IV
Civil	IV
Electrical Drawings	IV
Mechanical Drawings	V



A Sempra Energy utility*

Structural Drawings	V
B. Addendum 2.....	VII
Alternatives to the Three Unit Design	VII
Future Expansion	VIII
Advantages of Modern Industrial Gas Turbines.....	X
Evaporative Cooling	XI
Alternatives to Consider on Station Design.....	XI

LIST OF ATTACHMENTS

- Attachment I:** Route Maps
- Attachment II:** Topography Map
- Attachment III:** Geological Map
- Attachment IV:** Land Ownership
- Attachment V:** Compressor Station and Pressure Limiting Station Drawings
- Attachment VI:** Cultural Resources Summary
- Attachment VII:** Pipeline Cost Estimate
- Attachment VIII:** Crossing List
- Attachment IX:** Environmental 1 Mile Map book

ACRONYMS AND ABBREVIATIONS

ACOE	Army Corps of Engineers
API	American Petroleum Institute
ARC	Abrasion Resistant Coating
ARO	Abrasion Resistant Overcoat
ASL	Above Sea Level
BA	Biological Assessment
BACT	best available control technology
BCC	Birds of Conservation Concern
bgs	below ground surface
BLM	Bureau of Land Management
BO	Biological Opinion
CalTrans	California Department of Transportation
CDCA	California Desert Conservation Area
CDFW	California Department of Fish and Wildlife
CEMS	Continuous Emission Monitoring System
CERMS	Continuous Emission Rate Monitoring System
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFG	California Fish and Wildlife
CFR	Code of Federal Regulations
CH ₄	Methane
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CO	Carbon Monoxide
CO ₂ e	Carbon Dioxide equivalent
COMS	Continuous Opacity Monitoring System
CPCN	Certificate of Public Convenience and Necessity
CPUC	California Public Utility Commission
CRHR	California Register of Historic Places
CWA	Clean Water Act
DL	Design Limit
DLN	Dry Low NO _x
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ERC	Emission Reduction Credit
ESA	Environmental Site Assessment

FBE	Fusion Bonded Epoxy
FESA	Federal Endangered Species Act
FLMP	Forest Land Management Plan
FONA	Federal Ozone Non-attainment Area
FSH	Forest Service Handbook
FTE	Full Time Employee
FWCA	Fish and Wildlife Conservation Act
GHG	Greenhouse Gases
GIS	Geographic Information Systems
GPS	Global Positioning System
HC	Hydrocarbon
HCP	Habitat Conservation Plan
HDD	horizontal directional drill
hp	horsepower
HVAC	Heating, Ventilation and Air Conditioning
LAER	Lowest Available Emission Rates
LSAA	Lake and Streambed Alteration Agreement
MAOP	maximum allowable operating pressure
MBTA	Migratory Bird Treaty Act
MCC	Motor Control Center
MDAQMD	Mohave Desert Air Quality Management District
MLD	Most Likely Descendent
MMBtu	millions of Btu
MMscfd	millions of cubic feet per day
MSHCP	Multiple Species Habitat Conservation Plan
MT	Metric Tons
NAGPRA	Native American Graves Protection and Repatriation Act
NAHC	Native American Heritage Commission
NCCP	Natural Community Conservation Plan
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fishery Service
N2O	Nitrous Oxide
NFPA	National Fire Protection Association
NH3	Ammonia
NOA	Notice of Availability
NOI	Notice of Intent
NOx	Oxides of Nitrogen
NPDES	National Pollutant Discharge Elimination System

NPS	National Park Service
NRHP	National Register of Historic Places
NTP	Notice to Proceed
NSR	New Source Review
ODC	Other Direct Costs
O&M	Operation and Maintenance
OHWM	Ordinary High Water Mark
PLS	Pressure Limiting Station
PM10	Particulate Matter up to 10 microns
ppmv	parts per million by volume
ppmvd	parts per million volumetric dry
PRPA	Paleontological Resources Preservation Act
PSEP	Pipeline Safety Enhancement Program
psig	pounds per square inch gauge
PTE	Potential to Emit
ROD	Record of Decision
ROW	rights-of-way
RWQCB	Regional Water Quality Control Board
SCR	Selective Catalytic Reduction
SHPO	State Historic Preservation Officer
SoCalGas	Southern California Gas Company
SO _x	Sulfur Oxide
SR	State Route
SSC	Species of Special Concern
SWPPP	Storm Water Pollution Prevention Plan
TBD	To Be Determined
TPY	Tons per Year
USA	Underground Service Alert
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
USFS	U.S. Forestry Service
USFWS	U.S. Fish and Wildlife Service
VOC	Volatile Organic Compounds
WUS	Waters of the United States

EXECUTIVE SUMMARY

Purpose and Scope

The purpose of this analysis is to provide a preliminary overview of Southern California Gas Company's (SoCalGas) proposed North-South Project (PROJECT). This analysis includes a summary of the anticipated PROJECT costs and environmental permitting requirements.

TRC was commissioned to carry out this study to provide a preliminary assessment to identify the issues, opportunities, constraints, and costs associated with siting and construction. The primary purpose of the study has been to provide to SoCalGas a final guidance document for identifying the overall scope and cost of the effort required to design, permit, and construct the PROJECT, and to mitigate challenges through the ultimate completion of the PROJECT.

Project Overview

The PROJECT consists of the following components:

- 1) the Adelanto Compressor Station Upgrade
- 2) the Adelanto to Moreno Pipeline and Moreno Valley Pressure Limiting Station (PLS),
- 3) the Moreno to Whitewater Pipeline, and New PLS at Whitewater
- 4) New PLS at Desert Center Station
- 5) New PLS at Shaver Summit Station

The existing Adelanto Compressor Station will be upgraded to be powered by three natural gas turbine-driven compressors providing approximately 30,000 site horsepower (hp) of compression, capable of delivering 800 million standard cubic feet per day (MMscfd) of natural gas at 850 pounds per square inch gage (psig) pressure for transmission to the Moreno Valley Pressure Limiting Station.

The Adelanto to Moreno Pipeline will be an approximately 60 mile long, 36 inch pipeline extending from the Adelanto Compressor Station to the Moreno Valley PLS. The pipeline is assumed to have nine mainline valves with blow down stations and will be situated in San Bernardino and Riverside Counties.

The Moreno Valley PLS will allow gas from the new Adelanto to Moreno Pipeline and from the new Moreno to Whitewater Pipeline to flow into any of the existing lines at the Moreno Valley PLS (Lines 1027, 1028, 2000, and 6900).

Figure 1 shows the overall pipeline alignment from the Adelanto Compressor Station to the Moreno Valley PLS.

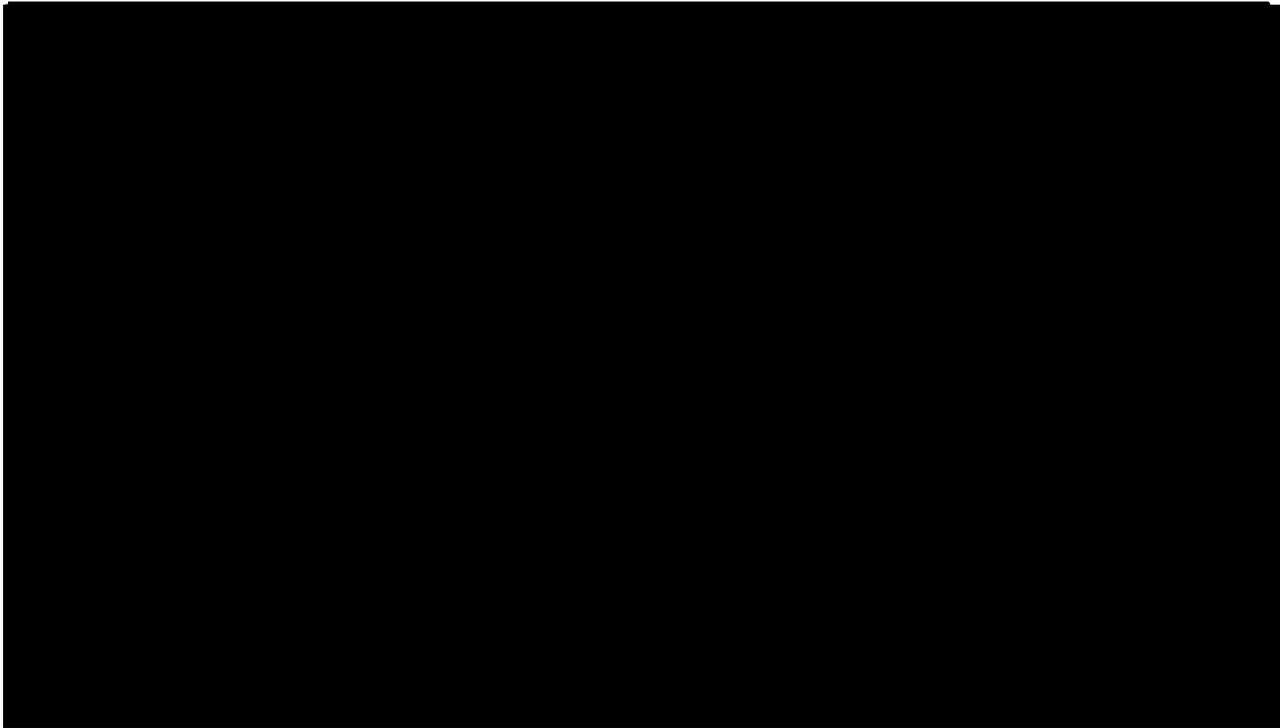


Figure 1

The Moreno to Whitewater Pipeline will be an approximately 31 mile long, 36 inch pipeline extending from the Moreno Valley PLS to Whitewater Station. The pipeline is assumed to have six mainline valves with blow down stations and will be situated in Riverside County.

The New PLS at Whitewater will provide pressure control from existing Line 2051/5000 into Lines 2000 and 2001.

Figure 2 shows the overall pipeline alignment from the Moreno Valley PLS to Whitewater Station.



Figure 2

The New PLS at Desert Center Station will provide pressure control from existing Line 5000 (L-5000) into Lines 1030 and 2000.

The New PLS at Shaver Summit Station will provide pressure control from existing L-5000 into Lines 2000 and 2001.

Cost Summary

The estimated cost for the PROJECT is \$560.4 million, including the compressor station, pipelines and pressure limiting stations design and engineering, property acquisitions, construction, as-built documentation and administrative phases of the PROJECT as summarized in Table C-1. The estimated cost does not include internal SoCalGas labor costs associated with the PROJECT. A more detailed cost estimate, with estimated costs by budget categories has been included as Tables C-2A through C-2E below the summary table.

The cost estimate is based on December 2013 dollars and has not been adjusted for inflation.

For all PROJECT materials, taxes are calculated at 9%. Legal fees were developed based on PROJECT needs.

The total cost reflected in Table C-1, below, is based on design and construction for the PROJECT. The table shows the allocation of funds based on the five project components. Detailed breakdowns of the cost estimate for the pipelines and compressor station can be found throughout this report.

Table C-1: Project Cost Estimate (\$ millions)	
Description	Total Project Cost
Adelanto Compressor Station	\$96.1
Moreno Valley PLS	\$2.1
Adelanto to Moreno Pipeline	\$296.3
Moreno to Whitewater Pipeline	\$160.6
New Whitewater, Shaver Summit and Desert Center PLS	\$5.2
Total	\$560.4

Environmental

A preliminary environmental overview of SoCalGas’ proposed PROJECT is included in this report. The analysis consists of a summary of the anticipated environmental permitting requirements; cost for labor (external consultants), permit fees, monitoring and mitigation; and scheduling the PROJECT. The Environmental section is organized according to the general tasks required for the environmental permitting process. These tasks are further described in the Environmental Project Overview subsection of the report. Each task contemplates critical activities for permitting the PROJECT and their associated costs, and outlines an approximate schedule. The cost for each task and the development of that cost is shown in Table 10.

Report Set-Up

This report is broken out into 10 major sections, with the technical sections being: Route and Right of Way, Engineering, Construction, Environmental, Risk Analysis and Additional Information (Addenda).

1.0 PROJECT OVERVIEW

Organization of the body of the report generally follows the organization of the Project Overview. Each major section is divided into subsections for the Adelanto Compressor Station, the Moreno Valley PLS, the Adelanto to Moreno Pipeline, the Moreno to Whitewater Pipeline and the three pressure limiting stations to be installed at Whitewater PLS, Shaver Summit PLS and Desert Center Compressor Station.

Adelanto Compressor Station

As part of the PROJECT, the existing Adelanto Compressor Station will be upgraded to be powered by three natural gas turbine-driven compressors providing approximately 30,000 site hp of compression and capable of delivering 800 MMscfd of natural gas at 850 psig pressure for transmission to the Moreno Valley PLS.

The compressor station operating range will vary from 75 MMscfd to 800 MMscfd, with a minimum station suction pressure of 475 psig and a maximum station discharge pressure of 850 psig. The design for the compressor station must provide full performance at all expected operating conditions up to 110°F. For purposes of this cost estimate, it is assumed that the existing unit will be upgraded with gas compressor sets manufactured by Solar Turbines. A three unit configuration is used for this estimate. An overall station layout is depicted in Attachment V, Compressor Station and Pressure Limiting Station Drawings.

Tables C-2A through C-2E show the overall cost breakdown of the PROJECT components.

Table C-2A: Adelanto Compressor Station Design and Construction Estimate	
Description	Total
Land Acquisition - Labor (Included in Table C-2C)	\$0
Land Acquisition Cost (Included in Table C-2C)	\$0
Legal/ Public Relations	\$200,000
Ministerial Permits	\$100,000
Environmental/Permitting	\$5,316,400
Survey	\$355,000
Maintenance Parts and Tools	\$150,000
Material	\$48,467,500
Supervisory Control and Data Acquisition	\$350,000
Construction Labor	\$24,116,000
Engineering	\$1,690,000

Station Block Wall	\$1,306,142
Station Electrical Supply Upgrade	\$250,000
Station Baseload Power Generation Equipment	\$6,280,000
Construction Management	\$2,311,000
As-built	\$115,000
Freight	\$1,500,000
Taxes	\$3,639,600
Total	\$96,146,642

Moreno Valley Pressure Limiting Station

The new Pressure Limiting Station at the existing Moreno Valley PLS will connect to both the Adelanto to Moreno Pipeline and the Moreno to Whitewater Pipeline to provide pressure control into the existing pipelines at the Moreno Valley PLS. The changes to the station are depicted in Attachment V, Compressor Station and Pressure Limiting Station Drawings.

Table C-2B: Moreno Valley PLS Tie-In with Pressure Limiting Station Design and Construction Cost Estimate	
Piping Modifications	
Land Acquisition - Labor (Included in Table C-2C)	\$0
Land Acquisition Cost	\$120,000
Legal/Public Relations (Included in Table C-2C)	\$0
Environmental/Permitting (Included in Table C-2C)	\$0
Survey	\$14,800
Material	\$929,000
Supervisory Control and Data Acquisition	\$20,000
Construction Labor	\$800,000
Engineering Design and Project Management	\$70,000
Construction Management	\$55,000
As-built	\$30,000
Taxes	\$83,600
Freight	\$20,000
Total	\$2,142,400

Adelanto to Moreno Pipeline

Southern California Gas Company (SoCalGas) proposes to install approximately 60 miles of 36-inch pipeline connecting the Adelanto Compressor Station to the Moreno Valley PLS.

The proposed route alignment is illustrated in the maps shown in Attachment I, Route Maps.

Table C-2C: Adelanto to Moreno Pipeline Design and Construction Estimate	
Description	Total
Land Acquisition – Labor	\$2,119,000
Land Acquisition Cost	\$10,790,115
Legal/ Public Relations	\$6,479,000
Ministerial Permits	\$1,200,000
Environmental/Permitting	\$14,300,000
Geotechnical Investigation	\$327,800
Survey	\$3,235,000
Material	\$80,907,303
Supervisory Control and Data Acquisition	\$900,000
Construction Labor	\$155,061,235
Engineering and Design	\$7,018,000
Construction Management	\$7,525,000
As-built	\$800,000
ROW Intrusion Monitoring/Methane Detection	\$5,686,000
Total	\$296,348,453

Moreno to Whitewater Pipeline

SoCalGas proposes to install approximately 31.5 miles of 36-inch pipeline between the existing Moreno Valley PLS and the existing Whitewater PLS.

There are no modifications to the Moreno Valley Compressor station proposed for this project. The pipeline is located in Riverside County and extends through private and public land (Caltrans and Bureau of Land Management [BLM]) land.

The proposed route alignment is illustrated in the maps shown in Attachment I, Route Maps.

Table C-2D: Moreno to Whitewater Pipeline Design and Construction Estimate	
Description	Total
Land Acquisition – Labor	\$1,801,275
Land Acquisition Cost	\$11,045,000
Legal/ Public Relations	\$3,600,000
Ministerial Permits	\$450,000
Environmental/Permitting	\$5,740,000
Geotechnical Investigation	\$172,635
Survey	\$1,617,500
Material	\$41,152,235
Supervisory Control and Data Acquisition	\$600,000
Construction Labor	\$83,558,000
Engineering and Design	\$3,509,000
Construction Management	\$4,112,775
As-built	\$400,000
ROW Intrusion Monitoring/Methane Detection	\$2,843,150
Total	\$160,601,570

Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations

These three new pressure limiting installations are located at existing pressure limiting stations at Whitewater PLS, Shaver Summit PLS and Desert Center Compressor Station. At Whitewater PLS, the new equipment will be used to provide pressure control to flowing gas volumes from the Moreno to Whitewater Pipeline into the other lines in the stations (generally referred to as L-2000, 2001 and 5000). At Shaver Summit and Desert Center PLS's, the new equipment will be used to provide pressure control from L-5000 into L-2000 and 2001. Pipeline into the other lines in the stations (generally referred to as Lines 2000 and 2001). The changes to the stations are depicted in Attachment V, Compressor Station and Pressure Limiting Station Drawings.

Table C-2E: Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations Design and Construction Estimate	
Description	Total
Land Acquisition - Labor (Included in Table C-2D)	\$0
Land Acquisition Cost (Included in Table C-2D)	\$0
Legal/Public Relations (Included in Table C-2D)	\$0
Environmental/Permitting (Included in Table C-2D)	\$0
Survey	\$38,400
Material	\$2,081,000
Supervisory Control and Data Acquisition	\$60,000
Construction Labor	\$2,310,000
Engineering Design and Project Management	\$235,800
Construction Management	\$135,300
As-built	\$90,000
Taxes	\$187,300
Freight	\$45,000
Total	\$5,182,800

2.0 PROJECT COMPONENTS AND KEY DEVELOPMENT ASSUMPTIONS

This section provides an overview of the PROJECT components and key development assumptions.

Adelanto Compressor Station

As provided by SoCalGas staff and operations personnel, the following considerations/design conditions for compressor station operation should be evaluated/included:

- Maximum Station Discharge Pressure - 850 psig
- Minimum Station Suction Pressure - 475psig
- Maximum Station Discharge Flow - 800 MMscfd
- Minimum Station Discharge Flow - 75 MMscfd
- Station Maximum Allowable Operating Pressure (MAOP) - 1,100 psig
- Future Compressor Horsepower - TBD hp
- Maximum ambient temperature for full performance - 110°F
- Minimum ambient temperature - 0°F
- Station elevation - 3,000 ft. ASL
- High temperature summer time performance must be maintained
- SoCalGas requires wide rangeability at the new station.
- While there can be some rangeability with a single unit, additional rangeability can be designed into the system by using multiple units each sized for approximately $100/(\textit{number of units})\%$ of the station maximum flow. For example, the three unit station proposed is planned for each unit to provide around 275 MMscfd or a bit more than 33% of the total station design flow rate.
 - A single large unit can be designed to accommodate rangeability, but it will require significant operation of the station recycle valve, causing the unit to operate in an inefficient manner.
 - If capacity and unit sizing can be matched, one or more of a multiple unit installation can sometimes provide the same flow rate performance as a larger unit on recycle while operating within the “sweet spot” of the smaller unit, increasing efficiency while reducing fuel use.
 - Additional units (more than two) can improve station rangeability while using station recycle even less than two larger units.

Moreno Valley Pressure Limiting Station

- Install a new PLS at Moreno Valley PLS.
- Design for connection to both Adelanto to Moreno Pipeline and Moreno to Whitewater Pipeline.
- Provide pressure control into all existing lines at the Moreno Valley PLS.

Adelanto to Moreno Pipeline

- Approximately 60-mile section of 36-inch pipeline.
- Install approximately nine mainline valves with blow-down and automatic/remote shut-in capability.
- 36" pipeline design with Fusion Bonded Epoxy (FBE) coating and Abrasion Resistant Overlay (ARO) rock shields where necessary;
- Design MAOP - 1,100 psig;
- Pipeline will be piggable, allowing for the passage of commonly available internal inspection tools;
- Construction corridor (right-of-way plus temporary area for construction activities) is assumed to be 100 feet wide.
- Based on preliminary assessment, no hazardous materials are expected to be found.
- Alignment traverses public and private lands within San Bernardino and Riverside Counties.
- Mile Posts [REDACTED] and [REDACTED] traverse vacant rural/semi-rural lands (approximately 40 miles).
- Mile Posts [REDACTED] traverse suburban/urban/industrial lands (approximately 20 miles).
- The route crosses various significant obstacles that will have to be carefully reviewed and will require creative detail design work. Some of these special crossings include:
 - The California Aqueduct
 - Santa Ana River
 - Flood Control Channels
 - Multiple highway crossings at the Cajon Pass (I-15)
 - The highway crossing on Highway 138
 - The highway crossing of Highway I-10
 - The highway crossing of Highway I-60

Moreno to Whitewater Pipeline

- Approximately 31.5-mile section of 36-inch pipeline;
- Install approximately six mainline valves with blow-down and automatic/remote shut-in capability;

- 36” pipeline design with Fusion Bonded Epoxy (FBE) coating and Abrasion Resistant Overlay (ARO) rock shields where necessary;
- Design MAOP - 1,100 psig;
- Pipeline will be piggable, allowing for the passage of commonly available internal inspection tools;
- Construction corridor (existing right-of-way plus area for construction activities) is assumed to be 85-100 feet wide. In most areas, work will be conducted adjacent to the existing L- [REDACTED], minimum space will be designed to 5-foot minimum between pipes;
- No hazardous materials will be identified during the Phase I Environmental Site Assessment (ESA) or geotechnical investigations;
- Alignment traverses public and private lands within Riverside County;
- Mile Posts [REDACTED] and [REDACTED] traverses vacant rural/semi-rural lands (approximately 24.75 miles);
- Mile Posts [REDACTED] traverses suburban/urban (approximately 6.75 miles);
- The route crosses various significant features that will have to be carefully reviewed and will require comprehensive detail design work. Some of these special places include:
 - The Whitewater River
 - Railroad Crossings
 - Narrow construction right-of-way along the power line corridor/golf course
 - The highway crossing on Highway 79
 - The highway crossing of Highway I-10 (two crossings)
 - The highway crossing of County Road 243

Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations

- Install pressure control equipment from Moreno to Whitewater Pipeline to the other lines in the yard at Whitewater Station.
- Install pressure control equipment from L-5000 to the other lines in the yards at Shaver Summit and Desert Center Stations
- All new Pressure Limiting facilities connect to L-2000 and L-2001 independently, with a single pressure regulation run supplying both L-2000 and L-2001.
 - Each Pressure Limiting station run has the ability to flow into either L-2000 or L-2001 or both.
- No consideration has been included for remote set point and control of the Pressure Limiting equipment, although the regulation control equipment specified can accommodate remote control.
- Station Construction
 - Whitewater pressure limiting station;

- Project to be done in conjunction with Moreno to Whitewater Pipeline because it is the eastern terminus of the pipeline project.
- This facility to be designed for 1,100 psig from Moreno to Whitewater Pipeline
- Shaver Summit pressure limiting station;
 - Consider as separate, standalone project because of location east of the Whitewater pressure limiting station.
- Desert Center compressor station.
 - Consider as separate, standalone project because of location east of the Shaver Summit pressure limiting station.

3.0 ROUTE DESCRIPTION

Adelanto Compressor Station

The upgraded station will be located within the existing property owned in fee by SoCalGas in Adelanto, near the intersection of [REDACTED] (Rd.) and [REDACTED] (Ln.) in Adelanto.

Moreno Valley Pressure Limiting Station

The new Moreno Valley PLS is expected to be installed at the location of the existing Moreno Valley PLS, approximately [REDACTED] ft. south of [REDACTED] and [REDACTED] in Moreno Valley. It is anticipated that additional land may be required to accommodate the additional facilities required for the tie-ins of the two new pipelines and the additional equipment required for pressure control.

Adelanto to Moreno Pipeline

Starting at the Adelanto Compressor Station, the pipeline runs approximately 60 miles in a southeasterly direction as shown in the drawings in Attachment I and described below until it reaches the Moreno Valley PLS.

Station [REDACTED] to [REDACTED] - The pipeline follows a dedicated road right-of-way. The area is mostly undeveloped with light residential toward the south end of the segment. Existing residential development is located on both sides of the dedicated right-of-way restricting construction equipment access and work space. Construction in this area is further restricted by the presence of two existing Kinder Morgan refined fuel lines, and sewer and utility lines servicing the existing residents. The right-of-way is wide enough to accommodate the gas pipeline; however a detail substructure analysis will need to be conducted to determine the exact alignment of the pipe. In this section, the new pipeline will run parallel to a SoCalGas existing transmission line (L-1185). The pipeline crosses the California Aqueduct at approximately Station [REDACTED].

Station [REDACTED] to [REDACTED] - The pipeline enters the San Bernardino National Forest and follows the existing natural gas pipeline (L-1185). Construction may be affected by the mountainous terrain and other environmental constraints. Right-of-way requirements will need to be carefully evaluated in this area during the planning stages to allow for adequate construction space and access roads. In this section, the new pipeline will run parallel to a SoCalGas existing transmission line (L-1185), unless the terrain requires pipeline crossing. This segment of the pipeline crosses the major freeway, [REDACTED], at two locations - once on the southbound lanes and once on the northbound lanes. The pipeline also crosses [REDACTED], requiring careful coordination with Caltrans for all three crossings. It is important to note that

while this segment is within the San Bernardino National Forest, it is also in a designated Federal Energy Corridor specifically reserved for energy related projects such as the proposed pipeline.

Station [REDACTED] to [REDACTED] - The pipeline exits the San Bernardino National Forest and travels in an easterly direction along rural roads, [REDACTED] and [REDACTED]. The pipeline heads in a southerly direction along [REDACTED] and then turns east along [REDACTED] to Station [REDACTED]. At Station [REDACTED], the pipeline turns south along [REDACTED] to [REDACTED]. On [REDACTED], the pipeline heads east and then south and southeast along the river wash until it reaches [REDACTED]. The pipeline continues along [REDACTED] to Station [REDACTED].

Station [REDACTED] to [REDACTED] - Pipeline construction in this segment is primarily along existing streets and public rights-of-way within an urban setting, which may make construction slow and difficult. The pipeline route parallels an existing natural gas line; therefore, careful substructure research will be required to assure the proper alignment is selected. Careful consideration will need to be given to traffic control plans and additional street surfacing requirements that may impact construction cost and traffic congestion along the route. In this segment, there are two major highway crossings, the [REDACTED] Freeway and the [REDACTED] Freeway. In addition to the highway crossings, the pipeline crosses the Santa Ana River and five significant flood control channels.

Station [REDACTED] to [REDACTED] - Pipeline construction in this segment is in generally uninhabited mountainous terrain. A portion of [REDACTED] from Station [REDACTED] to [REDACTED] is improved. Right-of-way requirements will need to be carefully evaluated in this area during the planning stages to allow for adequate construction space and access roads. There are no major highway or river crossings along this segment.

Station [REDACTED] to [REDACTED] - Pipeline construction in this segment is along unimproved surfaces and improved roads. The area is lightly developed with only occasional structures along the route. Traffic control will be required in some of the areas and paved road re-surfacing may add additional cost to the construction estimate. There is one highway crossing, the [REDACTED]. The pipeline route ends at the Moreno Valley PLS.

Moreno to Whitewater Pipeline

Starting at the Moreno Valley PLS the pipeline heads in an easterly direction as shown in the drawings in Attachment I and described below until it reaches the Whitewater PLS.

Station [REDACTED] to [REDACTED] - The pipeline route starts at Moreno Valley PLS. There is one road crossing, [REDACTED]. The area is undeveloped and construction space is available on either side of the proposed pipeline alignment. The pipeline continues east through unimproved land.

Station [REDACTED] to [REDACTED] - In this segment, the pipeline continues east along mountainous terrain parallel to the existing L-5000 Pipeline. The proposed alignment will parallel the existing L-5000 pipeline where feasible, but may deviate in areas where steep slopes make construction difficult. Access roads and temporary construction areas will need to be specified to account for steep slopes and material and equipment restrictions. Based on preliminary review of this segment, environmental constraints may result in a modified alignment.

Station [REDACTED] to [REDACTED] - The pipeline continues east through undeveloped, flat desert land. The west end of this segment is lightly developed with structures located along the southern side of the alignment. Traffic control is not likely to be required.

Station [REDACTED] to [REDACTED] - The pipeline continues east within a narrow utility corridor (electrical transmission and gas transmission lines) that extends through a developed residential area and a golf course. The urban setting and restricted right-of-way will make construction in this segment very difficult. Traffic control is likely to be required through 50 percent of this segment.

Station [REDACTED] to [REDACTED] - The pipeline continues east through undeveloped, flat desert lands with limited conflict with manmade structures. The western end of the segment is lightly developed with structures located along the southern side of the alignment. Traffic control is not likely to be required.

Station [REDACTED] to [REDACTED] - The pipeline extends through unimproved land until entering the City of Banning where the alignment transitions to improved roads. The area is sparsely developed with structures along the route similar to a low-density residential area. Traffic control will be required in some areas. Paved road re-surfacing may add additional cost to the construction estimate. The pipeline will cross the [REDACTED]

Station [REDACTED] to [REDACTED] - The pipeline continues east through flat, undeveloped desert land, with limited conflict with manmade structures. A portion of this segment is located within a railroad right of way that also intersects with an existing oil transmission pipeline owned by Kinder Morgan.

Station [REDACTED] to [REDACTED] - The pipeline heads east parallel to existing rail road tracks for approximately [REDACTED] miles. There is low-density residential development near the west end of the segment. Existing residential development is located on the south side of the right-of-way restricting construction equipment access and work space. Work in this area may be further restricted by the presence of the Kinder Morgan pipeline located adjacent to the proposed pipeline alignment. The right-of-way is wide enough to accommodate the proposed gas pipeline;

however a detailed substructure analysis will need to be conducted to determine the exact alignment.

Station [REDACTED] to [REDACTED] - The pipeline turns north crossing the [REDACTED], and extends through a low-density residential area. Existing residential development is located on both sides of the right-of-way restricting construction equipment access and work space. The pipeline continues east parallel to [REDACTED] for approximately 2.5 miles before it turns south, crosses the [REDACTED] and then continues east.

Station [REDACTED] to [REDACTED] - From the easterly [REDACTED] crossing, the pipeline follows the existing L-[REDACTED] pipeline until it reaches the Whitewater PLS. The area is mostly undeveloped desert land with no structures along the proposed alignment. The easterly portion of this segment traverses an existing wind farm for approximately 1.7 miles. The right-of-way is wide enough to accommodate the gas pipeline; however a detailed substructure analysis will need be conducted to determine the exact alignment.

Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations

The new pressure limiting facilities at all three stations are expected to be installed within the existing fenced areas under the control of SoCalGas. It is expected that all construction activities for the new pressure limiting equipment and tie-ins will occur within the existing fenced area.

Construction of the Moreno to Whitewater Pipeline will end at the Whitewater PLS. However, as noted above, all pressure limiting equipment installation and tie-in activities are expected to occur within the existing station fence.

4.0 RIGHT OF WAY

The topography map for the pipeline route is shown in Attachment II and illustrates the various terrain of the 60 mile pipeline alignment. Along with the topographic information, the geological map in Attachment III shows the various geological regions and potential fault crossings that will need to be evaluated carefully during the design phase of the PROJECT.

Adelanto Compressor Station

The upgraded station will be located on SoCalGas' Adelanto Compressor Station property. No right of way is required.

Moreno Valley Pressure Limiting Station

The new Moreno Valley PLS may require additional land to accommodate new facilities to be installed at the existing Moreno Valley PLS. The additional land will be adjacent to the existing land under the control of SoCalGas. Specific additional land location will be determined during detailed design.

Adelanto to Moreno Pipeline

Starting at the Adelanto Compressor Station the pipeline heads in southerly direction as shown in the drawings in Attachment I and described below. Right-of-way land ownership was mapped in Attachment IV based on the proposed alignment in Attachment I

Station [REDACTED] to [REDACTED] - The pipeline follows a dedicated road right-of-way. The study assumes the pipeline will be installed within the dedicated right-of way. Most of this right-of way is not improved and construction costs will be lower. Temporary work space adjacent to the street right-of-way was assumed to be available for about 75% of the alignment. There is low-density residential development on both sides of the right-of- way in Phelan restricting the availability of temporary work space. The right-of-way is wide enough to accommodate the gas pipeline; however a detail substructure analysis will need be conducted to determine the exact alignment of the pipe. In this segment, the pipeline crosses the California Aqueduct at approximately Station [REDACTED]. A design review with the appropriate authorities will be made to evaluate the right-of-way requirements for crossing the aqueduct. Other significant crossings in this segment are [REDACTED], [REDACTED] at Station [REDACTED]; [REDACTED] at Station [REDACTED]; and [REDACTED] at Station [REDACTED].

Station [REDACTED] to [REDACTED] - The pipeline enters the San Bernardino National Forest and follows the existing natural gas pipeline. The new right-of-way requested will parallel the existing right-of-way where it is feasible, but may deviate in areas where steep slopes make it difficult to

construct. Access roads and temporary construction areas will need to be specified to account for steep slopes and material and equipment restrictions. Terrain is mountainous and other environmental constraints may also be present, which could result in a modified alignment. It is important to note that while this segment is within the San Bernardino National Forest, it is also in a designated Federal Energy Corridor specifically reserved for energy related projects such as the proposed pipeline. There are three railroad crossings in this segment that will need to be permitted.

Construction access in this area will need to be carefully planned. The area is in the San Bernardino National Forest. The primary access points will be from an existing utility maintenance road originating at [REDACTED] and [REDACTED]. [REDACTED] provides access to the area between the railroad tracks but may require some grading to accommodate the larger equipment. Construction right-of-way access from I-15 should be considered. Early discussions with Caltrans should be initiated to define permitting requirement and restrictions to finalize the feasibility of this proposal.

South of [REDACTED], the construction right-of-way can be accessed from an existing utility road and Cleghorn Road, which are 1.25 miles apart. A service road at Station [REDACTED] connects the construction right-of way to [REDACTED] providing access under [REDACTED] for vehicles and construction equipment (1.5 miles south of [REDACTED]). At approximately 2.8 miles south of [REDACTED], an existing utility road connects to [REDACTED] northbound, providing additional access to the construction right-of-way at station [REDACTED]. [REDACTED] provides additional access for vehicles and construction equipment before the pipeline exits the National forest and enters [REDACTED].

Station [REDACTED] to [REDACTED] - The pipeline exits the San Bernardino National Forest and travels in an easterly direction along rural roads: [REDACTED] and [REDACTED]. The pipeline heads in a southerly direction along [REDACTED] and heads east along [REDACTED] to Station [REDACTED]. At Station [REDACTED], the pipeline turns south along [REDACTED] to [REDACTED]. On [REDACTED], the pipeline heads in an easterly and then south and southeast along the river wash until it reaches [REDACTED]. The pipeline continues along [REDACTED] to Station [REDACTED].

Station [REDACTED] to [REDACTED] - Pipeline right-of-way in this segment is primarily along existing public rights-of-way. The right-of-way will require careful sub structure research to assure the proper alignment is selected. In this segment, there are two major highway crossings requiring Caltrans approval: [REDACTED] and [REDACTED]. In addition to the highway crossings, the pipeline crosses the Santa Ana River and five significant flood control channels, which will require easements and permits.

Station [REDACTED] to [REDACTED] - Pipeline right-of-way in this segment is located in a rural mountainous area with little or no structures. It appears that this rural mountainous area may have the largest concentration of private landowners along the entire route. Right-of-way requirements will need to be carefully evaluated in this area to allow for adequate construction space and access roads. There are no major highway or river crossings along this segment.

Construction access to this area can be achieved utilizing existing roads. At the north end of the segment, [REDACTED] provides construction access 0.3 miles from [REDACTED]. [REDACTED] parallels the construction right-of-way through most of this segment. [REDACTED] and [REDACTED] provide additional access points. Once the pipeline heads south, it parallels [REDACTED] until it exits the mountain area. [REDACTED] provides construction access throughout this area without the need for additional access roads.

Station [REDACTED] to [REDACTED] - Pipeline right-of-way in this segment is through undeveloped land and improved roads. Detailed property analysis and engineering design will occur to determine the best right-of-way corridor for the pipeline. There is one highway crossing, the [REDACTED] [REDACTED] that will require a permit. The pipeline right-of-way ends at the Moreno Valley PLS.

Moreno to Whitewater Pipeline

Starting at the Moreno Valley Pressure Limiting Station the pipeline heads in an easterly direction as shown in the drawings in Attachment I, ending at the Whitewater Pressure Limiting Station as described below. Right-of-Way land ownership was mapped in Attachment IV based on the Attachment I proposed alignment for this PROJECT.

Station [REDACTED] to [REDACTED] - Pipeline route begins at the Moreno Valley PLS near Moreno Valley Compressor Station. Pipeline construction in this segment continues east along unimproved surfaces. The area is not developed and construction space is available on either side of the proposed pipeline alignment. There is one highway crossing at [REDACTED]. The right-of-way is wide enough to accommodate the gas pipeline; however a detailed substructure analysis will need to be conducted to determine the exact alignment of the pipe.

Station [REDACTED] to [REDACTED] - In this segment, the pipeline continues east through mountainous terrain parallel to L-5000. The proposed alignment will parallel L-5000 where feasible, but may deviate in areas where steep slopes make construction difficult. Access roads and temporary construction areas will need to be specified to account for steep slopes and material and equipment restrictions. Terrain is mountainous and other environmental constraints may also be present, which could result in a modified alignment. During detailed design, careful consideration will need to be given to L-5000 and topography. The majority of the right-of-way is unencumbered and there is space for construction equipment and trench spoils.

Construction access to the right-of-way can be achieved utilizing the existing right-of-way or existing roads. [REDACTED] traverses the mountain in a north-south alignment and can provide access to the pipe trucks and construction equipment. A second road (no name) approximately [REDACTED] miles to the east of [REDACTED] provides access to the right-of-way from the north. This road originates east of the [REDACTED] off ramp from the east bound [REDACTED]. Detailed engineering assessment will be conducted to identify any road improvements that may be required to provide equipment access.

Station [REDACTED] to [REDACTED] - The pipeline continues east through undeveloped, flat desert land with limited conflict with manmade structures. The westerly end of the segment is sparsely developed with structures along the southern side of the alignment. The right-of-way is wide enough to accommodate the gas pipeline; however a detail substructure analysis will need be conducted to determine the exact alignment of the pipe. Traffic control is not likely to be required.

Station [REDACTED] to [REDACTED] - The pipeline continues east within a narrow utility corridor (electrical transmission and gas transmission lines) that extends through existing residential buildings and a golf course. Traffic control is likely to be required throughout 50 percent of this segment. The right-of-way is confined by the high voltage transmission lines and L-5000. The limited work space will require the spoils to be stored off site while the pipeline is installed. This east end of this segment also crosses a golf course. Work along the course will have to be coordinated to minimize the impacting to the golf course.

Station [REDACTED] to [REDACTED] - The pipeline continues east through undeveloped, flat desert land with limited conflict with manmade structures. The westerly end of the segment is sparsely developed with structures along the southern side of the alignment. The right-of-way is wide enough to accommodate the gas pipeline; however a detailed substructure analysis will need to be conducted to determine the exact alignment of the pipe. Traffic control is not likely to be required.

Station [REDACTED] to [REDACTED] - The pipeline extends through unimproved land until entering the City of Banning where the alignment transitions to improved roads. The area is sparsely developed with structures along the route similar to a low-density residential area. Traffic control will be required in some of the areas and paved road re-surfacing may add additional cost to the construction estimate. The right-of-way is wide enough to accommodate the gas pipeline; however a detailed substructure analysis will need to be conducted to determine the exact alignment of the pipe. In this segment, the pipeline crosses the [REDACTED] at station [REDACTED]

Station [REDACTED] to [REDACTED] - The pipeline continues east through flat, undeveloped desert land, with limited conflict with manmade structures. A portion of this segment is located within a

railroad right of way that also intersects with an existing oil transmission pipeline owned by Kinder Morgan. This area is undeveloped land with no structures to interfere with the construction efforts. The pipeline alignment is approximately [REDACTED]. The airport is not considered a major commercial facility and is not expected to present a major obstacle to the construction of the pipeline.

Station [REDACTED] to [REDACTED] - The pipeline heads east parallel to existing [REDACTED] for approximately 6.6 miles, then crosses at approximately Station [REDACTED]. There is low-density residential toward the west end of the segment. The existing residential development is located on the south side of the right-of-way restricting construction equipment access and work space. Most of this right-of-way is not improved and construction costs will be lower than in other more congested areas. The construction work space is restricted by L-5000 and the Kinder Morgan Pipeline. Temporary work space adjacent to the right-of-way is assumed to be available for about 95% of the alignment. The right-of-way is wide enough to accommodate the gas pipeline; however, a detailed substructure analysis in the Cabazon area will need be conducted to determine the exact alignment of the pipe.

Station [REDACTED] to [REDACTED] - The pipeline turns north crossing the [REDACTED]. The pipeline continues east parallel to the freeway for approximately 2.5 miles before it turns south and crosses [REDACTED] and continues east. About 30% of the alignment has low-density residential on both sides of the right-of-way restricting the availability of temporary work space. The right-of-way is wide enough to accommodate the gas pipeline; however a detailed substructure analysis will need be conducted to determine the exact alignment of the pipe. In this segment, the pipeline crosses the I-10 Freeway at two locations at Station [REDACTED] and Station [REDACTED].

Station [REDACTED] to [REDACTED] - The pipeline follows L-5000 until it reaches the Whitewater PLS. The area is mostly undeveloped desert land with wind turbines along part of the way on the eastern end of the segment. Most of this right-of-way is not improved and construction costs will be lower than in other more congested areas. The construction work space is restricted by L-5000 and the wind turbines but does not represent a significant issue during construction. Temporary work space adjacent to the right-of-way is assumed to be available for about 100% of the alignment.

Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations

The new pressure limiting facilities at all three stations are expected to be installed within the existing fenced areas under the control of SoCalGas. It is expected that all construction activities specifically for the new pressure limiting equipment and tie-ins will occur within the existing fenced area. No right of way discussion is required.

5.0 RIGHT OF WAY COST

To support the permitting and land acquisition, the budget includes funds for legal support and public relations programs. As part of the legal support, funds will be used for legal review of easements and property documents. Also included in the legal budget are funds to support eminent domain action should it become necessary.

The public relations budget includes allowances for activities such as creation of an informational web site, community outreach and information programs during construction,

For the pipelines, after construction is completed, it is assumed that the sections of the pipeline outside dedicated roads and highways will have a 50 foot right-of-way.

Adelanto Compressor Station

No right of way is required therefore; there will be no right of way cost.

Moreno Valley Pressure Limiting Station

The new Moreno Valley PLS will be expanded at the existing location of the current Moreno Valley PLS. It is expected that additional land may be required as part of the expansion of the station.

The station is adjacent to [REDACTED], with access directly available from the paved street. No construction of new roads or modification to the existing roads is anticipated for work proposed at the PLS.

It is assumed that PLS access roads do not pose any environmental constraints since they are used for access to the station currently.

Some work may be required outside the existing fenced area, but it appears that this work will be either in previously disturbed areas or in areas that will be disturbed by the construction of the pipelines.

During the preliminary design phase of the project, temporary construction space for the PLS will be evaluated and defined. Any temporary work area will be environmentally surveyed and any impacts will be mitigated.

An allowance of \$120,000 is included in the cost estimate for an additional easement to accommodate new piping and equipment at the Moreno Valley PLS.

Pipeline Right of Way Costs

For the pipelines, after construction is completed, it is assumed that the sections of the pipeline outside dedicated roads and highways will have a 50 foot right-of-way.

Cost basis for private easements - Cost information to estimate land values throughout the route were obtained from various websites available on the internet. Land values ranged from about \$30,000 per acre in some of the remote areas to \$120,000 per acre in the vicinity of residential developments. To estimate the land cost, a standard base formula was used based on other projects successfully completed in California. The easement was valued using 50% of the land surface value. This is a one-time payment during the acquisition process.

Cost basis for temporary working space - Temporary working space was valued using a similar formula. The temporary work space was valued using 30% of the land surface value. This is also a one-time payment during the acquisition process.

Temporary work space during construction was also assumed to be an additional 50 feet in areas where space is available.

After construction is completed, it is assumed that the sections of the pipeline outside dedicated roads and highways will have a 50 foot right-of-way. The detail cost estimate includes the areas where a 50 foot easement is available and where temporary work space can be acquired for construction.

Adelanto to Moreno Pipeline

Temporary work space during construction was also assumed to be an additional 50 feet in areas where space is available.

Cost basis for private easements - It was estimated the project will require approximately 189 acres of permanent easements, including the area in the San Bernardino National Forest.

Cost basis for temporary working space - Included in the temporary work space estimate are two - ten acre sites with rail access to store pipe and materials as it is delivered from the mill and the manufacturing plants and before they are transported to the various construction crews. It was estimated the project will require approximately 293 acres of temporary work space, including the area in the San Bernardino National Forest and the two storage yards.

Pipeline Right of Way cost is estimated in Table C-3A

Table C-3A: Adelanto to Moreno Pipeline Right-of-Way Estimate	
Description	Total
Property Acquisition - Labor /per Diem	\$852,900
Construction Support - Labor/per Diem	\$1,074,000
Project Close-out - Labor/ per Diem	\$192,100
Total	\$2,119,000
Permanent Easements	\$5,793,732
Temporary Easements	\$4,996,383
Total	\$10,790,115
Table Grand Total	\$12,909,115

Pipeline Legal and Public Relations cost is estimated in Table C-3B

Table C-3B: Adelanto to Moreno Pipeline Legal/ Public Relations Estimate	
Description	Total
Legal Support	\$5,379,000
Public Relations	\$1,100,000
Total	\$6,479,000

Moreno to Whitewater Pipeline

Temporary work space during construction was also assumed to be an additional 35-50 feet in areas where space is available. The detail cost estimate includes the areas where a 50 foot easement is available and where temporary work space can be acquired for construction.

Cost basis for private easements - It was estimated the project will require approximately 41 acres of private easements, including the area across the mountains from station [REDACTED] to [REDACTED].

Cost basis for temporary working space - Included in the temporary work space estimate is one - ten acre site with rail access to store pipe and materials as it is delivered from the mill and the manufacturing plants and before they are transported to the various construction

crews. It was estimated the project will require approximately 194 acres of temporary work space, including a storage yards.

Pipeline Right of Way cost is estimated in Table C-4A

Table C-4A: Moreno to Whitewater Pipeline Right-of-Way Estimate	
Description	Total
Property Acquisition - Labor /per Diem	\$726,150
Construction Support - Labor/per Diem	\$951,125
Project Close-out - Labor/ per Diem	\$124,000
Total	\$1,801,275
Permanent Easements	\$9,502,000
Temporary Easements	\$1,543,000
Total	\$11,045,000
Table Grand Total	\$12,846,275

Pipeline Legal and Public Relations cost is estimated in Table C-4B

Table C-4B: Moreno to Whitewater Pipeline Legal/ Public Relations Estimate	
Description	Total
Legal Support	\$2,850,000
Public Relations	\$750,000
Total	\$3,600,000

Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations

It appears that all construction work, including staging, material and equipment storage and fabrication can be conducted within the existing fenced areas under the control of SoCalGas - with all work to be done in previously disturbed areas.

The stations are directly along the pipeline alignment. All stations are in the vicinity of developed roads and have existing service roads to provided needed access to the stations. No construction of new roads or modification to the existing roads is anticipated.

It is assumed that the access roads to the stations are environmentally clear, since they are used for access currently.

Cost for easements - There is no additional cost included for rights-of-way, since there is no additional land required to the new installations of pressure control facilities.

Any additional land that may be acquired at the Whitewater PLS is part of the pipeline portion of the PROJECT and is included in that feasibility estimates.

Cost for temporary work space - No additional temporary work space is included in the cost estimate for station construction as all material storage, staging, prefabrication and construction work is expected to be conducted within the fenced areas in previously disturbed locations.

Cost for permitting and land acquisition - Because the estimated costs of the PLS are so much less than the estimated costs of the pipeline portion of this project, all permitting costs that are developed for the pipeline portion can include the very minor relative costs for permitting of the stations. Because all work is to be done within the limits of the existing stations, there will be no land acquisition costs nor will there be any eminent domain costs, which could require a legal budget.

6.0 ENGINEERING AND CONSTRUCTION

Engineering and Design

Adelanto Compressor Station

Station Design Considerations

Engineering feasibility for the compressor station began with a site visit to document the existing layout and equipment at the Adelanto Compressor Station. Following the site visit, overall station drawings, including the existing compression equipment as well as the pipelines and valving within the current Adelanto yard were reviewed. Station design parameters provided by SoCalGas were evaluated to determine overall horsepower requirements and a “multiple units” method to satisfy both the maximum and minimum station flow rates with minimum station recycle.

As part of the PROJECT, the existing Adelanto Compressor Station will be upgraded to be powered by three natural gas turbine-driven compressors providing approximately 30,000 site hp of compression and capable of delivering 800 MMscfd of natural gas at 850 psig pressure for transmission to the Moreno Valley PLS.

The compressor station piping will be designed to accommodate pipeline flows from either direction.

The compressor station operating range will vary from 75 MMscfd to 800 MMscfd, with a minimum station suction pressure of 475 psig and a maximum station discharge pressure of 850 psig. The design for the compressor station must provide full performance at all expected operating conditions up to 110°F. For purposes of this cost estimate, it is assumed that the existing station will be upgraded with gas compressor sets manufactured by Solar Turbines. A three unit configuration is used for this estimate.

As the project design moves forward, additional engineering is required to thoroughly evaluate the horsepower and flow rate requirements of the station, working with a gas turbine compressor supplier, such as Solar Turbines, to assure that the operating parameters of the station are understood for all operating scenarios and that the horsepower and performance simulations in the pipeline analysis model match those of the turbine and compressor supplier.

The station controls portion of the project may be assigned to a specialized group dedicated to the design of compressor station controls and integration with compressor unit and hazard

detection systems. Coordination will also be required with SoCalGas system controllers to assure that required and useful information is provided in an easily recognizable manner

Some coordination will be required with SoCalGas communications group to assure that seamless communications for remote control and monitoring of station equipment occurs.

Cathodic protection for all underground piping and steel structures for the compressor station needs to be isolated from the pipeline systems and from the above-ground structures. Costs for the investigation, design and specification of the cathodic protection system have been included. This work may be done by SoCalGas cathodic protection group at their request.

Special attention will be paid to assuring isolation (or bonding) to eliminate interference between pipeline and compressor station cathodic protection systems.

Location for Upgraded Station

The current Adelanto Compressor Station is installed within an approximately 140,000 square foot (roughly 350 ft. x 350 ft.) fenced area at the northern end of the parcel owned by SoCalGas. The compression equipment is surrounded by existing pipeline facilities, also within the fence. The physical compression equipment is installed within an area of about 175 ft. x 120 ft. generally in the center of the fenced area, with the control building and auxiliary power generator installed across the station access road from the compression equipment.

The PROJECT includes new compression to be installed within SoCalGas' property. Because of the size of the southern portion of the parcel, the future station upgrade is more easily designed into the station and accommodated using the southern portion of the parcel.

The total parcel of land owned by SoCalGas is approximately 560 ft. x 875 ft. (490,000 square feet), with the existing Adelanto Station boundaries much less than half of the entire parcel. This provides sufficient room to install the new compressors outside the existing fence line - due south of the existing station. This will require additional large diameter piping runs from the new compressors to the tie-in points in the existing station. It also allows the existing compression to remain in service during construction.

Building the upgraded station outside the existing fenced area, on the southern end of the parcel owned in fee, is required in order to accommodate the size of the proposed new units. Several considerations for building outside the existing station fence include:

- Leave the current compression equipment in place

Leaving the current equipment in place eliminates the need to deal with any potential environmental remediation immediately. The entire compressor train can be isolated from the rest of the system, vented, inerted and left in place. Disposal of equipment can be done as opportunities are presented. However, the need to remediate any spills or other environmental issues can be deferred to a future time.

There is some potential for salvage of some existing station equipment, such as the gas cooler and the LM1500 turbine in the aftermarket/used equipment business sector. There may be some value in the existing vessels. However, they will need to be emptied, cleaned and inerted prior to removal from the site.

Because equipment such as the LM1500 turbine, the Clark compressor, the gas aftercooler and the above ground vessels can be removed without soil disturbance, there should not be any immediate environmental mitigation of the site required.

- Maintain existing pipeline valves power and control & auxiliary generator in place

The existing station control building is used for both compressor power and control and pipeline valves and appurtenances power and control. Leaving the existing control building in place allows the pipeline controls systems to remain in service during construction of the new station. Maintaining remote operation of Adelanto station valves is critical to system operation during construction.

As with the control building, the existing emergency generator can remain in service during construction.

- Better access during construction and operation

Constructing compressor station upgrades outside the existing station fence line will allow better ingress and egress during construction. With additional room between buildings and equipment, construction progress can be expected to be better. Operating access for maintenance, repairs, etc. will also be easier, especially if large equipment is be removed for overhaul, repair, etc.

- Fencing and access control

Building the new compressors outside of the existing fence also allows existing access control and security systems to remain in place, assuring compliance with any operating requirements that SoCalGas may have in place for this station.

Moreno Valley Pressure Limiting Station

Location of Station

The Moreno Valley PLS is located on the east side of [REDACTED], south of [REDACTED] [REDACTED]. in Moreno Valley. On the east side of [REDACTED] is one SoCalGas pipeline, entering the station area from the north - 30" L-2005. Extending south from the station are 16" L-1027, 24" L-1028, 30" L-6900 and 36" L-6900.

Proposed Tie-Ins

The new pressure limiting station will be tied into both the Adelanto to Moreno Pipeline and the Moreno to Whitewater Pipeline, both of which will be designed for a 1,100 psig MAOP. In order to support flows in both directions in the Adelanto to Moreno Pipeline, the station design will include a header-style design to allow gas flows either out of or into the pipeline.

Through ties into the existing station header, either of these lines can be tied into the existing lines at the pressure limiting station. Existing valves within the station can be operated to flow gas in either north-to-south or south-to-north directions into and out of any of the pipelines within the station.

Pipelines

The Engineering feasibility analysis for the proposed pipelines began with an evaluation of the proposed pipeline routes by studying aerial images, USGS maps, and existing utility corridors parallel to or in the vicinity of the proposed routes. (For the Moreno to Whitewater line, existing L-[REDACTED] pipeline alignment sheets were also reviewed). The analysis was followed by multiple site visits and visual inspections of the proposed alignments by the engineering and construction teams, as well as by aerial reconnaissance of the mountainous areas of the project. Representatives of SoCalGas were interviewed and their opinions and ideas solicited regarding engineering and operational practices. The drawings in Attachment I show the proposed alignment of the pipelines.

Pipeline Design - The pipelines will be designed in accordance with 49 Code of Federal Regulation (CFR) 192 - Transportation of Natural Gas and other Gas by Pipeline: Minimum Federal Safety Standards. Both proposed pipelines are 36 inches in diameter operating at a Maximum Allowable Operating Pressure (MAOP) of 1,100 psig. The pipe selected for the entire pipeline route is 36" API 5L X70 with 0.625" wall thickness. This pipe will meet the design pressure requirements for Class 3 locations as defined in 49 CFR 192 and will accommodate anticipated future location class changes without the need for operational changes.

Each pipeline and its fittings will be coated with Fusion Bonded Epoxy (FBE) to a thickness of approximately 15 mils. The weld joints will be sprayed with FBE. Abrasion Resistant Overcoat (ARO) or other Abrasion Resistant Coating (ARC) will be used for areas of extremely abrasive soils (rock areas). Weld joints in abrasive soils will also be coated with ARC and inspected before backfill.

The pipelines will be designed to accommodate modern internal inspection tools to provide SoCalGas with the ability to clean and inspect the pipelines on a regular basis. In order to accommodate the tools, the pipelines will be equipped with a launcher/receiver at each end of the line. All bends along the pipeline will be designed for a minimum of 9 foot radius ($r = 3R$). Valves at each end of the pipeline on the launchers/receivers and along the pipeline will be full port valves to allow for the internal inspection tools to traverse the pipeline. Barred tees will be installed to keep the tools from entering the station piping.

The exact location of mainline block valves and associated bridle and bypass valve installations will be determined during final design based on operational requirements and land availability for installation. Valves will be buried but the valve operators will be extended above grade to allow for ease of operations and maintenance. The operators will be pilot operated to activate a line shutdown in case of a sudden loss in pressure on the pipeline.

The engineering design estimate was broken into ten categories, which include site investigation and design development, project coordination, design drawings, design review, job showing, procurement, construction support, ROW documents, project closeout, and non-labor costs.

1. Site investigation includes anything required to develop design, site/archive investigations, job walks, code investigations, and interpretation and familiarization with client standards.
2. Project coordination includes project meetings both internal and external, project paperwork, coordination with project management and other disciplines and drawing reviews.
3. Design drawings include all physical drawings, plans, sections and details, orthographic and isometric, and all hours needed for plotting, blueprinting, checking, and project review.

4. Design reviews includes all coordination hours for project and client meetings, project paper work, coordination with governmental agencies, utilities, other firms, etc.
5. Job showing includes preparation of bid specifications and support, coordination with client, contractors, and agencies, and bid evaluations and recommendations.
6. Procurement includes preparation of requests for qualifications, coordination with vendors; bid summary, bid conditioning meetings, purchase order preparation, and vendor drawing review.
7. Construction support includes office and/or field support, construction bid meetings, drawing sets for permits, status reports, and budgets.
8. ROW documents includes coordination with project management and other disciplines, interdisciplinary specifications and drawing review, review of ROW documents, preparation of new easement documents, and legal description support.
9. Project closeout includes coordination hours, collection of construction records and delivering copies for filing.
10. Non-labor costs includes outside reproduction services, travel, word processing equipment, special materials and photo copies.

Adelanto to Moreno Pipeline

This portion of the PROJECT begins at the Adelanto Compressor Station and ends at the existing Moreno Valley PLS. The pipeline runs for approximately 60 miles in a generally southeasterly direction as shown on Attachment I. The line will be intertied with the Moreno to Whitewater Pipeline at Moreno Valley PLS.

The line has been specified to move approximately 800 MMscfd, providing sufficient capacity to accommodate maximum flows from the Adelanto Compressor Station.

There are nine (9) planned mainline valve locations for this pipeline in addition to the valves at the launcher/receiver at each end.

There were no engineering or constructability issues that would prevent this PROJECT from being constructed.

Moreno to Whitewater Pipeline

This portion of the PROJECT begins at the Whitewater Station and ends at the existing Moreno Valley PLS. The pipeline runs for approximately 31.5 miles in a westerly direction as shown on Attachment I. The line will be intertied with the Adelanto to Moreno Pipeline at Moreno Valley PLS.

There are six (6) planned mainline valve locations for this pipeline in addition to the valves at the launcher/receiver at each end.

There were no engineering or constructability issues that would prevent this PROJECT from being constructed.

Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations

The new Pressure Limiting equipment is designed to allow existing facilities to remain in service to allow for current normal operations, with the exception of a short shutdown to install reducing tees for the new pressure limiting equipment tie-ins.

Prior to construction of the new pressure limiting facility, a reducing tee, a short length of pipe and an isolation valve will be installed in each of the pipelines to allow normal pipeline operations to resume while the remainder of the pressure limiting equipment is installed. This will require only a short shutdown of each of the pipelines.

Geotechnical Investigation

Geotechnical investigation includes soil borings to determine subsurface conditions for compressor station foundation and piping installation and for pipeline installation including horizontal directional drilling and jack and bore locations. Specific information on the number and depth of borings is included for each project.

A right-of-way (ROW) reconnaissance and underground service alert (USA) field survey will be required to mark each soil boring location to ensure that the drilling equipment can access each soil boring location, to clear the area for other substructures and for the preparation of traffic control plans, as required. If a soil boring location is not accessible it will be relocated nearby to a suitable drilling location. In urban areas, where the proposed pipeline ROW is under paved roadways the soil boring locations will be adjusted to minimize or eliminate the requirement for a traffic control plan.

In urban roadways, the soil borings will require vacuum soil extraction/hand auger borehole clearance. It is anticipated that encroachment permits will be required from various government agencies since the ROW trends parallel to roadways, and crosses numerous roadways, creeks, streams and rivers, flood control channels, city and other government lands. It is believed that there are at least seven different agencies that will require encroachment permits. The cost of the

encroachment permits is estimated from correspondence with these agencies or previous work experience. The field work may require several field work phases for completion, since each agency will have different encroachment permit criteria potentially causing a delay in obtaining the permits. The quantity of soil borings that can be completed each day is expected to vary due to differing and challenging field conditions. Physical soil property testing will be performed on samples retained from the drilling activity and will include: Moisture Content, Dry Density, Sieve Analysis, Atterberg Limits, and Corrosion (Resistivity, pH, Chloride & Sulfide). This budgetary estimate includes labor and other direct costs (ODCs) for: preliminary planning and scheduling, preparation of work permits, subcontractor oversight, acquisition of encroachment permits from government agencies, health and safety coordination, and preparation of a summary report upon completion of field activities.

Work activities or services to be provided by other contractors as part of this work scope include the following: utility and borehole clearance, drilling, traffic control services, and laboratory testing. The costs for drilling methods other than hollow-stem auger are not provided herein.

Field and laboratory data to be analyzed, including engineering analysis to evaluate site earthwork, pipeline support and backfill requirements. Report will include the results of investigation, conclusions and geotechnical recommendations for design of the proposed pipeline. Report will also include a site plan, boring logs, and laboratory test data in addition to the following information:

- Site Conditions: Summary of the surface, subsurface, and groundwater conditions and the engineering properties of the soils encountered during the site investigation.
- Geologic Hazards: Review on a reconnaissance level, the potential geologic hazards along the alignment, including liquefaction, lateral spreading, differential seismic compaction, fault rupture, and ground shaking.
- Seismicity: Review of the regional seismicity including regional active faults, and maximum estimated ground shaking.
- Earthwork: Recommendations for earthwork criteria, including recommendations for clearing and site preparation, sub grade preparation, compaction, materials for fill, temporary cut and fill slopes, and trench backfill, as necessary.

Adelanto Compressor Station

An estimate has been included for geotechnical investigation within the work area for the upgraded compressor station and its facilities. The major investigation will focus on the major foundation areas for the compressor building, the gas cooler and the control building. Some additional minor investigation may be included, however, it is expected that little investigation beyond the building and cooler locations will be required.

At this point, because final major equipment footprints and locations are to be determined, the required geotechnical borings are to be determined.

The costs included in the station estimate are based on similar investigations required at similar facilities in the past.

Moreno Valley Pressure Limiting Station

No significant geotechnical investigation is required for these small, self-contained facilities that are structurally very strong, when compared to the weight generally installed.

Adelanto to Moreno Pipeline

Geotechnical borings for this project are estimated to be:

- Sixty (60) 10-foot below ground surface (bgs) geotechnical soil borings (one boring per mile) along the pipeline right-of-way (ROW)
- Six (6) 80-foot bgs geotechnical soil borings (three borings per location) at two horizontal directional drill locations, and
- Twenty six 15 foot bgs geotechnical soil borings (two borings per location) at thirteen jack & bore locations.

It is estimated that three (3) days of field reconnaissance will be required to complete ROW and USA surveys prior to the start of geotechnical borings.

It is further estimated that twenty (20) days of hollow-stem auger drilling will be required and that eleven (11) days of borehole clearance may be required. This estimate includes eleven (11) days of field work by a certified traffic control subcontractor for soil borings located within paved urban roadways or highways.

Overall, the geotechnical investigation will require thirty-seven (37) days of field labor/oversight.

Pipeline Geotechnical Costs are estimated in Table C-5A

Table C-5A: Adelanto to Moreno Pipeline Geotechnical Investigation Cost Estimate	
Description	Total
Site Investigation	\$74,000
Geophysical Survey/Reports	\$253,800
Total	\$327,800

Moreno to Whitewater Pipeline

- Thirty to forty five (30-45) 10-foot below ground surface (bgs) geotechnical soil borings (one boring per mile) along the pipeline right-of-way (ROW)
- Four (4) 40 and two (2) 80-foot bgs geotechnical soil borings (two borings per location) at three horizontal directional drill locations, and
- Eighteen (18) 15 foot bgs geotechnical soil borings (two borings per location) at ten jack and bore locations.

It is estimated that two (2) days of field reconnaissance will be required to complete ROW and USA surveys prior to the start of geotechnical borings. The preparation of traffic control plans is not anticipated to be required as no soil borings will be conducted in the street.

It is further estimated that ten (10) days of hollow-stem auger drilling will be required. Near urban roadways, railroad tracks or interstate highway locations, the soil borings will require vacuum soil extraction/hand auger borehole clearance and that two (2) days of borehole clearance may be required. As noted above, no traffic control plans are anticipated, so no traffic control subcontractor costs are required.

Overall, the geotechnical investigation will require eighteen to twenty-four (18-24) days of field labor/oversight.

Pipeline geotechnical costs are estimated in Table C-5B

Table C-5B: Moreno to Whitewater Geotechnical Investigation Cost Estimate	
Description	Total
Site Investigation	\$54,000
Geophysical Survey/Reports:	\$118,635
Total:	\$172,635

Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations

No significant geotechnical investigation is required for these small, self-contained facilities that are structurally very strong, when compared to the weight generally installed.

Pipeline Survey

The survey design estimate includes control, aerial photography, centerline staking for cultural and environmental surveys, topographic survey, ROW survey, survey mapping, plats and legal descriptions, construction staking and as-built survey. The survey costs for all preliminary surveys are based on project scope and design and engineering requirements.

Adelanto Compressor Station

Compressor Station Survey will be used prior to the start of detail design to provide information on all existing facilities for tie-ins to upgraded station piping and to provide a design grid for the station layout and construction drawing sheet layout.

Construction Survey will be required through a significant portion of the project. Survey will be required for the initiation of the project to document the site and to establish the site grid “on the ground”. Survey will also be required as grade and elevations are set for foundations, slabs, buildings, piping, etc. Survey will provide all as-built locations, elevations, documentation, etc.

Moreno Valley Pressure Limiting Station

Because this is a relatively small area, it is projected that laser scanning may be a good alternative for locating existing facilities within the station fence. Laser scanning will provide accurate location information for all existing equipment, making tie-in designs easier

Adelanto to Moreno Pipeline

The construction survey for as-built documentation is based on a 9 to 10 month construction period.

Moreno to Whitewater Pipeline

The construction survey for as-built documentation is based on a 6 to 8 month construction period.

Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations

Because each of these stations are located within relatively small areas, it is projected that laser scanning may be a good alternative for locating existing facilities within the station fences. Laser scanning will provide accurate location information for all existing equipment, making tie-in designs easier

Project Construction Management

Project Construction Management

In order to assure that the PROJECT is completed according to prepared plans, a project construction manager should be assigned to review construction progress and ensure that all construction tasks are completed; to ensure that all project inspection is current and well documented; and to ensure that any required reporting and documentation is current and complete.

The project construction manager will also track project progress, using this information for reporting to SoCalGas management his recommendation for progress payments against the contract and the construction portion of the spend plan.

Construction Inspection

Chief Inspector

The duties and responsibilities of the chief inspector require being knowledgeable and experienced in all phases of inspection. The chief inspector will supervise all phases of

the field quality control and technical staff assigned to the project to observe adherence to client company's construction contract drawings and specifications. He will delegate responsibilities and define limits of authority to each subordinate inspector and assure that all members of the quality control team know their respective duties.

Civil/Craft Inspection

The duties and responsibilities of the civil/craft inspector require that he perform all inspection and quality control duties relating to civil and structural installations as well as any other inspection duties as assigned by the Chief Inspector. He monitors the compliance of company's quality control standards, project specifications, codes, safety and environmental policies. He will keep a daily log of all activities and incidents and prepare appropriate report(s) for his assigned activities.

Piping/Welding Inspection

The duties and responsibilities of the piping/welding inspector require that he oversee welder qualifications, piping fabrication and installation, welding work, welding facilities, welding conditions, weld records and non-destructive examination (NDE) personnel qualifications, compliance to procedures and NDE documentation. He monitors the compliance of company's quality control standards, project specifications, codes, safety and environmental policies. He will keep a daily log of all activities and incidents and prepare appropriate report(s) for his assigned activities.

Electrical Inspection

The duties and responsibilities of the electrical inspector require that he oversee the installation of duct bank, cable tray and conduit, installation of cable and wire, installation of equipment, grounding systems, lightning protection systems, cathodic protection systems, etc. He monitors the compliance of company's quality control standards, project specifications, codes, safety and environmental policies. He will keep a daily log of all activities and incidents and prepare appropriate report(s) for his assigned activities.

Materials Management

The duties and responsibilities of the materials manager require that he oversee and manage the inventory, issuing and documentation of materials used during construction. Once material is delivered to the site, its physical control, preservation, security and damage control is his responsibility. As part of his material control responsibilities, he will validate material type, quantities and specification for all project materials using the

Bill of Materials, Material Test Reports, Purchase Orders and other purchasing information. He will maintain accurate records of installed quantities, coordinating with inspectors to assure that quantities are correct and that remaining quantities of material are adequate for the remainder of the PROJECT. He will assure that excess materials are identified and returned for credit or otherwise disposed of as directed by company. For material quality concerns and issues, Materials Management is also responsible for arranging material inspection, including company, contractor and material supplier representatives, as needed. He will track disposition of material inspection items.

Engineering and Construction Management Costs

Adelanto Compressor Station

Table C-6A: Adelanto Compressor Station Engineering, Design, and Construction Management Estimate	
Description	Total
Compressor Station Engineering and Design	\$1,690,000
Survey	\$355,000
Construction Management	2,311,000
As-Built Documentation	\$115,000
Total	\$4,471,000

Moreno Valley Pressure Limiting Station

Table C-6B: Moreno Valley PLS Engineering, Design, and Construction Management Estimate	
Description	Total
PLS Engineering and Design	\$70,000
Survey	\$14,800
Construction Management	\$55,000
As-Built Documentation	\$30,000
Total	\$169,800

Adelanto to Moreno Pipeline

Table C-6C: Adelanto to Moreno Pipeline Engineering, Design, and Construction Management Estimate	
Description	Total
Pipeline Engineering and Design	\$7,018,000
Survey	\$3,235,000
Construction Management	\$7,525,000
As-Built Documentation	\$800,000
Total	\$18,578,000

Moreno to Whitewater Pipeline

Table C-6D: Moreno to Whitewater Pipeline Engineering, Design, and Construction Management Estimate	
Description	Total
Pipeline Engineering and Design	\$3,509,000
Survey	\$1,617,500
Construction Management	\$4,112,775
As-Built Documentation	\$400,000
Total	\$9,639,275

Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations

Table C-6E: Whitewater, Shaver Summit, Desert Center PLS Engineering, Design, and Construction Management Estimate	
Description	Total
PLS Engineering and Design	\$235,800
Survey	\$38,400
Construction Management	\$135,300
As-Built Documentation	\$90,000
Total	\$499,500

7.0 CONSTRUCTION

Adelanto Compressor Station

Details of Proposed Adelanto Station

- The entire turbine/compressor package will be housed in an insulated pre-engineered metal building that will provide weather protection and sound attenuation for both the turbines and compressors.
- As industrial turbines, the Solar Turbines packages are more “self-contained” than the “aero-derivative” General Electric LM1500 unit that is being upgraded.
 - The lubricating oil vessels in the existing station yard are not required for the new installation. The unit oil tank is integrated on the skid for the engine package.
 - The overall size of the turbine/gearbox/compressor package is somewhat smaller than the existing LM1500
 - Local control consoles are mounted “on-skid”, rather than being remote from the unit outside the building/away from the skid.
- The compressor building will include a 10-ton overhead crane for moving heavy components during station maintenance activities.
- Housing the units in a building will increase security of the plant, while reducing operating noise.
- Housing the units in a building also provides additional working room for operators when compared to an equipment enclosure (such as that which houses the existing gas turbine), improving productivity and reducing unit down time.
- A perimeter block wall will also be constructed around the upgraded station, providing both additional security and noise abatement.

Compressor Package

Based on the station minimum suction and maximum discharge pressures (475 psig and 850 psig, respectively) and minimum and maximum station flow rates (75 to 800 MMscfd), TRC has estimated that the required horsepower at the station at 110°F is approximately 30,000 horsepower. [This corresponds to about 45,000 horsepower at sea level and 59°F (standard conditions)].

Using the design information provided, the following was determined:

- The minimum suction pressure of 475 psig yields a compression ratio of about 1.77 with the 850 psig discharge pressure.
- For purposes of the estimate, a Series-Parallel configuration was avoided, resulting in a single-turbine/single-compressor solution, providing a wider range of operation.
 - Because compression is needed at flow rates above 75 MMscfd, wide-ranging performance is needed (although low flow rates will require station recycle to maintain low flows with the solutions developed).
- Because the proposed maximum station compression ratio results in a station head exceeding 30,000 ft-lbf/lbm, meeting the design point using a parallel unit configuration requires a multi-stage centrifugal compressor solution.
 - Using a parallel unit configuration leads to a two-stage compressor solution in order to meet the design points.

Gas Cooler

The new gas cooler will be sized to match the flow rates and anticipated compressor discharge gas temperature.

The gas cooler will be an air-to-air cooler, using 480V, 3 phase motors in the 40 hp range to power the fans for the cooler. The cooler is an industry standard device to be provided by Smithco, GEA Rainey, Cooling Products, Inc. or similar.

Extruded headers will be used to collect compressor discharge and distribute it across the gas cooler inlet manifold and to collect gas cooler outlet and route to compressor station discharge piping back into the pipeline system.

Under highest station differential pressures (that is, maximum flow rate at maximum station differential pressure), discharge temperature from the compressors is expected to be about 185°F, due to the high ratio. Supplemental cooling may be required for additional discharge stream cooling on the hottest days.

Buildings

The buildings are pre-engineered metal buildings. The buildings are standard metal buildings of rigid frame construction in the short direction and braced in the long direction. The buildings will include all structural steel and exterior roofing and siding, structural members for cable tray supports and HVAC equipment within the building, doors, canopies, building trim, ventilators, etc. The buildings will be insulated and will use sound attenuation and interior metal acoustical panels.

Compressor Building

The compressor units will be housed in a building 65 ft. wide x 120 ft. long x 30 ft. high at the eaves, with the units situated perpendicular to the long axis of the building. Suction and discharge piping will be routed along the long axis of the skid, providing access to units through the center of the building.

The building is sized to provide sufficient room for the current horsepower requirements. No additional room for equipment within the existing building for future equipment is expected or will be accommodated.

The building will house the compressor units as well as all ancillary equipment, such as the surge control system valve and piping, unit oil tank mist eliminators, air receivers, fuel supply system piping and controls.

The building includes a 10-ton overhead bridge crane to assist in moving equipment during maintenance activities. This crane includes two speed drive, pendant and remote controls, caged access ladder and platform and a walkway with hand rails along the entire bridge.

Currently, the building is proposed to include three 10 hp wall mounted air supply fans with air operated louvers, one 1/2 horsepower wall mounted supply fan with air operated louver and four roof ventilators with air operated louvers.

General layout of the building

Central to the building layout are the gas compressor skids, their intake and exhaust ductwork and the main compressors suction and discharge lines. A preliminary version of one Compressor Building Layout is included in Attachment V - Compressor Building Interior Plan.

Raised structural platforms will be installed to provide easy access to unit operating and maintenance locations.

Auxiliary Building

Overall, the auxiliary building is 40 ft. wide x 80 ft. long x 16 ft. high at the eaves. It is sized to provide the areas in Attachment V - Auxiliary Building Interior Plan.

Control Room

A station control room approximately 20 ft. wide x 40 ft. long is located on one end of the building. The control room includes a galley kitchen and restroom. The control room

includes station computers and unit/station control equipment, drawing storage, desks, layout tables, etc. The control room will have an acoustical drop ceiling and conventional HVAC equipment to include cooling and heating capabilities

Electric Room

A separate room for the Motor Control Center, Uninterruptible Power Supply and batteries, Power Transformers, Communications Equipment, etc. is also 20 ft. x 40 ft., located directly behind the control room. Heating and ventilation will consist of two space heaters and power ventilation provided by a wall supply fan and roof exhaust - both with gravity dampers.

Work Shop

A work shop for repairs and equipment maintenance measures approximately 20 ft. long x 40 ft. wide and is located on the end of the building away from the control room. The work shop includes a 2-ton bridge crane for maintenance and repair activities. Heating and ventilation will consist of four space heaters and power ventilation provided by a wall supply fan and roof exhaust - both with gravity dampers. The work bay will have both a roll up door and personnel access door.

Between the control room and the electric room and the work shop are two rooms to provide a noise buffer between the two rooms.

Equipment Room

The equipment room measures approximately 20 ft. x 20 ft. The equipment room houses air compressor equipment providing instrument and plant air to the compressor station complex. Heating and ventilation will consist of two space heaters and power ventilation provided by a wall supply fan and roof exhaust - both with gravity dampers. The equipment room will have both a roll up door and a personnel door to provide access to the parts storage room.

Parts Storage Room

The parts storage room also measures approximately 20 ft. x 20 ft. It also includes a janitor sink, building water treatment equipment, etc. Heating and ventilation will consist of two space heaters and power ventilation provided by a wall supply fan and roof exhaust - both with gravity dampers. The parts storage room will have both a roll up door and personnel access door.

Adelanto Compressor Station Materials

Table C-7: Adelanto Compressor Construction Material Estimate	
Description	Total
Turbine Driven Compressors (3 Units)	\$27,600,000
Buildings	\$2,180,000
Gas Cooler	\$3,300,000
Major Piping and Fittings	\$930,000
Valves	\$1,810,000
Major Electrical Equipment	\$975,000
Concrete and Foundations	\$210,000
BACT Emissions Control Equipment	\$7,850,000
Miscellaneous Minor Materials	\$3,612,500
Total	\$48,467,500

Moreno Valley Pressure Limiting Station

The Engineering Feasibility analysis for the proposed Moreno Valley PLS began with an evaluation of the station and the tie-ins required for the Adelanto to Moreno Pipeline and the Moreno to Whitewater Pipeline, the configuration of equipment and the ability to accommodate SoCalGas' requested capabilities into the station.

Initial feasibility design began with review and evaluation of current station flow paths and capabilities. Following that, a conceptual design was developed and evaluated to allow both pipelines to tie into a common header, to allow flow out of or into the new pipelines and to allow reduced pressure flows into the existing L-1027, 1028, 2000 and 6900, using existing station valves.

The Moreno Valley PLS improvement uses a single run "worker/monitor" design to provide pressure control and overpressure protection from either or both lines entering the station (the Adelanto to Moreno Pipeline and the Moreno to Whitewater Pipeline). Actuated ball valve regulators provide pressure control. Measurement at strategic locations will provide information on the flow rate between connected facilities. Communications with SoCalGas' control center are included to provide sufficient information to monitor the operating condition and performance of the station. No cost estimate has been included for remote set point and control

of the Pressure Limiting equipment, although this can generally be easily designed into the equipment, if desired.

Pipeline Construction

Assumptions

1. Due to lack of geotechnical information, it was assumed that 10% of the trench will be excavated in very hard rock.
2. Excavated rock will have to be hauled off-site and clean fill imported into the trench.
3. An additional 35 to 50 feet of construction right-of-way is needed to construct the pipeline. After construction, it is assumed that 50 feet will become permanent ROW.
4. Tree removal will be minimal in most areas of construction. The areas traversed are mostly covered with small shrubs.
5. All roadway and wetland crossings will need extra work space.
6. Paved roadway crossings will be open cut where possible or by boring method.
7. State Highway crossings will be done by bore method.
8. Railroad crossings will be done by bore method.
9. Any waterway that is wider than 40 feet and has running water will be crossed using a directional bore.
10. Small waterway crossings will be open cut.
11. Pipe joints are assumed to be 80 feet in length for the rural, open areas and in urban and lightly populated areas
12. The welds on the pipeline will be coated with Fusion Bond Epoxy.
13. The pipeline will have a total of nine (9) mainline block valves and a launcher and receiver at each end for smart pigging. The block valves will be spaced no more than 8 miles apart as required by Federal Pipeline Safety regulations.
14. Test leads for cathodic protection will be installed at all road crossings and all casings.
15. Estimate includes 100% x-ray.
16. Top soil segregation is included in the construction estimate but replanting or crop replacement is included in the environmental cost estimate.
17. Estimate is based on using union labor.

18. Estimate is based on working 5 days a week, 8 hours each day. Cost savings may be achieved with a 6 day per week 10 hour day. For areas under encroachment permit, work hours will be accordance with the permit.
19. The pricing is based on separate contract awards - one award for the work at the Adelanto Compressor Station and Moreno Valley Pressure Limiting Station, one award for the Adelanto to Moreno pipeline work and one award for the Moreno to Whitewater pipeline work and the Pressure Limiting Stations at Whitewater PLS and eastward.

Type of Construction

1. Once the ROW is cleared, centerline of the pipeline will be established and construction can begin.
2. Small crews will progress at critical crossing points such as streams, rivers, paved streets and highways and these crossings will be completed ahead of the mainline crew.
3. Once there are enough crossings completed the mainline crew will begin construction. Open trench will be determined by the Contractor depending on access to the ROW and room to string pipe along the trench

Adelanto to Moreno Pipeline

Pipeline Materials Details Costs

Table C-8A: Adelanto to Moreno Pipeline Construction Material Estimate					
Item	Description	Quantity	UOM	Cost	Total
1	Pipe & Coating	348,480	Foot	\$163.67	\$57,035,722
2	Pipe Delivery	348,480	Foot	\$25.52	\$8,893,210
3	Ells (45 deg. and 90 deg)	300	Each		\$4,916,550
4	Valves (Pipeline 9 ea. 36", Launcher/Receiver (2) 36"; (2) 30" & (2) 24")	15	Lot		\$879,110
5	Other Materials	Various	Lot	\$0	\$2,048,200
6	Freight (other than Pipe)				\$1,295,349
7	Tax				\$5,839,162
	Total				\$80,907,303

Pipeline Construction Detailed Costs

Due to the diversity of the pipeline route, the pipeline can be constructed with utilizing four (4) construction spreads to be able to complete pipeline construction in approximately 9 to 10 months. Crew production rates were estimated for the various crews and shown on the table below.

Table C-8B: Adelanto to Moreno Pipeline Construction Crews and Production			
Crew No.	Total Footage	Average Lineal ft. per Day	Total number of Days
Crew 1	89,000	553	161
Crew 2	69,000	377	183
Crew 3	61,000	333	183
Crew 4	98,300	642	153
Totals	317,300	476	680

Throughout the entire project, an additional 50 feet of construction right-of-way is needed to construct the pipeline. After construction, it is assumed that 50 feet will become permanent ROW.

Table C-8C: Adelanto to Moreno Pipeline Construction Cost Estimate					
Item	Description	Quantity	UOM	Cost*	Total
1	Mobilization	1	Each	\$500,000	\$500,000
2	Unload -Stockpile Pipe	1	Each	\$805,000	\$805,000
3	Load Pipe - Haul to right-of-way	1	Each	\$805,000	\$805,000
4	County Paved Roads	26,935	Feet	\$544.00	\$14,652,640
5	County Dirt Roads	81,630	Feet	\$369.00	\$30,121,470
6	Light Residential - Paved	34,310	Feet	\$465.00	\$15,954,150
7	City Street Paved	77,465	Feet	\$613.00	\$47,486,045
8	SB National Forest	19,430	Feet	\$309.00	\$6,003,870
9	Cajon Pass-Cross Country	30,880	Feet	\$402.00	\$12,413,760
10	HDD Bores	3,100	Feet	\$567.00	\$1,757,700

11	Cross Country	44,000	Feet	\$309.00	\$13,596,000
12	Short bores	1,900	Feet	\$824	\$1,565,600
13	Conventional Bores	5,100	Feet	\$803	\$4,095,300
14	Mainline Valves	9	Each	\$225,000	\$2,025,000
15	Launcher/receiver	2	Each	\$60,000	\$120,000
16	Caliper Survey	1	Lot	\$200,000	\$200,000
17	X-Ray Services	727	Crew days	\$1,900	\$1,381,300
18	Hydro Testing and Drying	1	Lot	\$1,278,400	\$1,278,400
19	Demobilization	1	Each	\$300,000	\$300,000
	Total				\$155,061,235

*Price per foot is rounded to nearest dollar.

Moreno to Whitewater Pipeline

Pipeline Materials Details Costs

Table C-9A: Moreno to Whitewater Pipeline Construction Material Estimate					
Item	Description	Quantity	UOM	Cost	Total
1	Pipe & Coating	180,048	Foot	\$165.90	\$29,869,963
2	Pipe Delivery	180,048	Foot	\$25.52	\$4,594,825
3	Ells (45 deg. And 90 deg)	60	Each		\$600,000
4	Valves (Pipeline 6 ea. 36", Launcher/Receiver (2) 36"; (2) 30" & (2) 24")	12	Lot		\$708,330
5	Other Materials	Various	Lot	\$0	\$1,765,000
6	Freight (other than Pipe)				\$649,220
7	Tax				\$2,964,897
	Total				\$41,152,235

Pipeline Construction Detailed Costs

Due to the diversity of the pipeline route, the pipeline can be constructed with utilizing two (2) construction spreads to be able to complete pipeline construction in approximately 8 to 9

months. Crew production rates were estimated for the various crews and shown on the table below.

Table C-9B: Moreno to Whitewater Pipeline Construction Crews and Production			
Crew No.	Total Footage	Average Lineal ft. per Day	Total number of Days
Crew 1	77,000	367	210
Crew 2	88,000	419	210
Totals	165,000	393	420

Throughout the entire project, an additional 35 to 50 feet of construction right-of-way is needed to construct the pipeline, depending upon location. After construction, it is assumed that 50 feet will become permanent ROW.

Moreno to Whitewater Pipeline

Table C-9C: Moreno to Whitewater Pipeline Construction Cost Estimate					
Item	Description	Quantity	UOM	Cost*	Total
1	Mobilization	1	Each	\$250,000	\$250,000
2	Unload -Stockpile Pipe	1	Each	\$390,750	\$390,750
3	Load Pipe - Haul to right-of-way	1	Each	\$390,750	\$390,750
4	County Paved Roads	47,500	Feet	\$500.00	\$23,750,000
5	Narrow Right of Way	64,320	Feet	\$300.00	\$19,296,000
6	Mountain Terrain	41,000	Feet	\$700.00	\$28,700,000
7	Cross County	9,000	Feet	\$250.00	\$2,250,000
8	Conventional Bores	1,500	Feet	\$2,000.00	\$3,000,000
9	HDD Bores	3,000	Feet	\$780.00	\$2,340,000
10	Mainline Valves	6	Each	\$225,000	\$1,350,000
11	Launcher/receiver	2	Each	\$60,000	\$120,000
12	Caliper Survey	1	Lot	\$150,000	\$150,000
13	X-Ray Services	420	Crew days	\$1,800	\$756,000
14	Hydro Testing and Drying	1	Lot	\$664,500	\$664,500

15	Demobilization	1	Each	\$150,000	\$150,000
	Total				\$83,558,000

*Price per foot is rounded to nearest dollar.

Pressure Limiting Stations Construction

The Engineering Feasibility analysis for the three proposed PLS's began with an evaluation of each of the three stations, their configuration and the ability to accommodate SoCalGas' requested capabilities into the station.

Initial feasibility design began with review and evaluation of current station flow paths and capabilities. Following that, individual complete pressure limiting runs between the source of supply gas - Moreno to Whitewater pipeline and L-5000 (also referred to as L-2051 at some locations), L-2000 L-2001 (also referred to as L-1030 at some locations) were design conceptually.

While no site visits were conducted at the PLS sites, TRC did review strip maps with current station design as well as "Google Earth" images, showing "on the ground" details of the stations, including some details that were not available in the provided strip maps.

Information was solicited from representatives of SoCalGas regarding current and future plans for the pipeline facilities, flow rate performance required for each station and additional flow patch considerations and desires.

Ultimately, SoCalGas determined that the following flow path capabilities should be included in the new station design:

- All new Pressure Limiting equipment is to tie into the eastern side of the station block valves (the current upstream side).
 - No capability was included to tie into the western side (the downstream side) of the Whitewater station block valve.
- The new Pressure Limiting Stations are to connect to L-2000 and L-2001 on the east side of the station block valves

A single run pressure limiting concept was ultimately designed and evaluated for its ability to provide SoCalGas with the capabilities that were requested for the stations and to provide additional capabilities that may also be beneficial to system operations.

Station Detail Feasibility Design

Each of the Pressure Limiting Stations uses a “worker/monitor” design to provide pressure control and overpressure protection. Actuated ball valve regulators provide pressure control. Measurement at strategic locations will provide information on the flow rate between connected facilities. Communications with SoCalGas’ control center are included to provide sufficient information to monitor the operating condition and performance of the station. No cost estimate has been included for remote set point and control of the Pressure Limiting equipment, although this can generally be easily designed into the equipment, if desired.

All of the stations are of similar design, providing the same pressure control capabilities. The pressure limiting equipment can be installed within a minimum footprint of about 40 ft. in length by 15 ft. in width to accommodate both the pressure control run and the bypass run. If additional overall length is available, the equipment can be placed further apart, if desired. The most significant differences in each of the stations are the lengths of connecting piping between the pressure limiting equipment and the tie-ins on Lines 2000 and 2001.

From east-to-west on the L-2000/L-2001/L-5000 pipeline system, the following stations have new Pressure Limiting Station designs:

Desert Center Compressor Station

This easternmost station (about ■ miles east of Whitewater Pressure Limiting Station) has the following design criteria:

Station	Flow (MMscfd)		Downstream Pressure		Upstream Pressure	
	Max	Min	Max	Min	Max	Min
Desert Center	200	0	795	600	825	600

Shaver Summit Pressure Limiting Station

This station is about ■ miles east of the Whitewater Pressure Limiting Station. It has the following design criteria:

Station	Flow (MMscfd)		Downstream Pressure		Upstream Pressure	
	Max	Min	Max	Min	Max	Min
Shaver Summit	100	0	740	550	825	600

Whitewater Pressure Limiting Station

This pressure limiting station is located on the east end of the 36-inch pipeline project. It has the following design criteria:

Station	Flow (MMscfd)		Downstream Pressure		Upstream Pressure	
	Max	Min	Max	Min	Max	Min
Whitewater	300	0	705	475	825	600

8.0 ENVIRONMENTAL PROJECT OVERVIEW

Overview

This section provides an overview of the environmental permitting tasks anticipated for the PROJECT based on available information. The final schedule will be updated upon receipt of permit approvals.

Based on the desktop research, database searches and analysis of waters, sensitive species locations and mapped critical habitat, professional experience, informal consultation with several agencies and organizations, map reviews and 1-day field review, the following may be considered the most challenging environmental issues.

- The PROJECT will require approval from multiple federal, state and local agencies, including but not limited to, BLM, US Forest Service (USFS), US Army Corps of Engineering (USACE), US Fish and Wildlife Service (USFWS), California Department of Fish and Wildlife (CDFW), Regional Water Quality Control Board, Mojave Desert Air Quality Management District (MDAQMD), County of San Bernardino, and City of Adelanto. Environmental permitting/approval processes may be lengthy and costly.

Numerous wash/waters crossings occur along the proposed PROJECT route (more than 60 crossings were preliminarily identified along the Adelanto to Moreno section and another 20 crossings are assumed for the Moreno to Whitewater section). Crossing of these washes will utilize open trench method and Horizontal Directional Drilling (HDD). This includes the notable Santa Ana Creek (800+ foot-wide riparian corridor at anticipated crossing location), California aqueduct, and portions of the El Cajon wash (project parallels the wash and at a few places intersects the wash). A lengthy unnamed wash/riparian area exists along much of southern Reche Canyon Road directly along the dirt road, and along the paved section of the road. Avoidance of drainages (especially those with mature riparian vegetation) is recommend as much as is possible. Narrowing the impact areas and siting the proposed project outside of the washes/waters could eliminate the need for some HDDs and trenching through the drainages. Impacts to channels and associated riparian vegetation that cannot be avoided can potentially cause delays in the permitting process and increase mitigation costs.

At this stage in the planning process, critical habitat for the coastal California gnatcatcher, arroyo toad, Santa Ana Sucker and San Bernardino Merriam's kangaroo rat intersect the proposed route. Additionally, critical habitat for the southwestern willow flycatcher occurring along the Santa Ana River is less than a mile from the centerline of the proposed t route. At this time, it is assumed that BLM will be the lead federal permitting agency and therefore would lead the Section 7 consultation process with the US Fish and Wildlife Service (USFWS). A Biological Assessment must be prepared and submitted to the USFWS

due to the presence of critical habitat within the proposed route and impacts to species on federal land. USFWS will then issue a Biological Opinion to BLM. Impacts to protected species and/or their habitat that cannot be avoided can potentially cause delays in the permitting process and increase mitigation costs.

- Species surveys typically are valid for 1-2 years depending on when they are conducted and rainfall patterns. The planning process should consider the timing of surveys to minimize repeating surveys.
- From the review of an abbreviated cultural resources record search, it appears that only certain portions of the PROJECT route have been previously surveyed. The entire PROJECT route would need to be surveyed to determine if there are any additional cultural resources and whether impacts would occur to these resources.
- From the record search, there are 13 known cultural resources on the PROJECT route, several of which are listed on the National Register of Historic Places (NRHP) or are eligible for listing on the NRHP. The route will cross through an Archaeological District that is on the NRHP.
- Since there are known prehistoric and/or historic archaeological sites that are eligible or potentially eligible for the NRHP, the State Historic Preservation Office (SHPO) may require scientific excavation to recover data that would otherwise be lost during construction as a mitigation measure.
- Prehistoric archaeological sites, whether determined significant from a scientific point of view or not, may contain human burials.
- Paleontological resources could be present within the proposed project footprint. If significant fossil remains are discovered, salvage may be necessary. Salvage(s) would increase costs, and actual discoveries cannot be predicted.

None of these issues are considered fatal flaws at this time, but rather aspects of the proposed project that may require additional efforts during the project design, permitting and construction processes.

Timing, Level of Effort and Estimated Budget

The PROJECT schedule, level of effort, and estimated budget focuses on environmental permitting and related construction monitoring and compliance along with agency mitigation requirements.

The schedule for each task is included in the task description. Staffing requirements and costs for each pipeline project and the total cost for the projects, by item, are included in the table at the end of this section.

Task I: Geotechnical Permitting Support

SoCalGas Engineering will develop a preliminary geotechnical testing plan and with support from Environmental, identify any environmental permits for locations along the alignment requiring testing, to meet engineering code requirements. These locations will provide critical information to prepare engineering plans and support grading and building plans. If discretionary permits are required, SoCalGas will prepare and submit the required permit applications to respective agencies. Task description is based upon existing development along the alignment (64 miles of rural/semi-rural areas and approximately 27 miles of suburban/urban/industrial areas). A Phase I Environmental Site Assessment (ESA) will also be prepared to assess potential contamination within the project footprint.

Schedule: 7 months to complete

Task II: Environmental Data Collection

Cultural and Paleontological Surveys

Cultural Resource Surveys

SoCalGas will conduct a pedestrian field survey of the pipeline alignment and staging and PLS locations within the utility corridor. In addition, staff will conduct a literature search (California Historical Resources Information System archives and the Sacred Lands File from the Native American Heritage Commission [NAHC]). Following completion of the pedestrian survey, an evaluation of California Register of Historical Resources (CRHR) and National Register of Historic Places (NRHP) eligibility will be conducted for each cultural resource identified within the area of potential effect. SoCalGas will then prepare a technical report documenting the results.

Schedule: 6 months to complete

Paleontological Resources Technical Memo

SoCalGas will conduct initial paleontological literature search and synthesis of existing publicly available data for inclusion in a technical memorandum to support development of application materials.

Schedule: 6 months to complete

Biological Surveys

Wetland and Stream Delineation

SoCalGas will conduct jurisdictional determination of Waters of the US and state including state and federal wetlands in areas where project impacts may occur. The results will be included in a jurisdictional delineation report prepared according to the procedures described in the *Arid West Supplement to the 1987 Corps Wetland Delineation Manual (2006)* and other applicable resource documents for determining federal and state jurisdictional wetlands. There are an estimated 60 crossings that are potentially jurisdictional along the alignment based on review of available public information. However, a focused delineation of jurisdictional waters has not been conducted at this time. The jurisdictional delineation report would be prepared in support of permit applications for USACE, RWQCBs, and CDFW.

Schedule: 4 months to complete

Special-Status Species

SoCalGas will conduct a desktop analysis and coordinate with applicable agencies to identify special-status species within the project footprint. Focused surveys will be conducted to map the extent of their habitat and identify measures to avoid or minimize effects to these species. A report will be prepared documenting the findings.

Schedule: 8 months to complete

Rare Plant Surveys

SoCalGas will conduct a desktop analysis and focused rare plant surveys in accordance with USFWS, CDFW and the California Native Plant Society (CNPS) protocol. A report will be prepared documenting the findings. Focused surveys will be conducted to map the extent of rare plants within the project area of potential impact and identify measures to avoid or minimize effects to these plants. A report will be prepared documenting the findings.

Schedule: 9 months to complete

Water Resources/Flooding

SoCalGas will evaluate water resources along the project alignment. This will include groundwater resources as well as surface water.

SoCalGas will be hydrostatically testing the project in accordance with a testing protocol similar to that being conducted under the Pipeline Safety Enhancement Program (PSEP). Clean hydrostatic test water may be discharged into drainage channels, creeks, or storm drains (depending on location) in accordance with permits from the RWQCB.

Schedule: 9 months to complete

Air Quality

Adelanto Compressor Station

Air quality requirements for the proposed project include a major source Title V federal operating permit modification to install the new natural gas turbines at Adelanto Compressor Station. This application is subject to federal and state new source review (NSR) which requires the new turbines to meet federal lowest achievable emission rates (LAER), install Best Available Control Technology (BACT), and offset the increases of emissions. The LAER/BACT for this category will be similar to SoCalGas Wheeler Ridge turbine compressor station and could require installation of a selective catalytic reduction (SCR) system and associated supporting equipment. The turbine emissions will need to be monitored continuously with a CEMS. The station will also need to obtain emission reduction credits (ERCs) or offsets. Finally, the federal and state greenhouse gas programs will require purchasing of carbon dioxide equivalent allowances and potential mitigation for the increase in greenhouse gas emissions.

A permit modification such as this will require a minimum permit processing time of 14 months which includes the 45 day Environmental Protection Agency (EPA), and Public Review process under Title V, as well as time to secure emission reduction credits. Time to permit could change depending on potential negotiation with the air district or the EPA over permit conditions related to startup, shutdown and transitional operating times.

Pipelines and Pressure Limiting Stations

Baseline air quality information will be required to support preparation of a National Environmental Policy Act (NEPA)/California Environmental Quality Act (CEQA) environmental document. This data collection may include stationary monitoring or reliance on existing available public data. Calculations for estimated emissions will be performed to determine the appropriate permitting path for the project.

Schedule: 5 months to complete

Soils, Geology and Hazardous Materials

Soils and geologic information is available through the U.S. Department of Agriculture (USDA) and U.S. Geological Survey (USGS). This information would be obtained for the pipeline alignment to determine potential risk of upset and landslide/slope failure. Additionally, a Phase I ESA would be prepared by a third-party contractor to determine potential hazardous materials along the alignment. This information would be provided as part of the NEPA/CEQA process. A Phase I ESA will also be prepared to assess potential contaminated sites within the project footprint.

Schedule: 9 months to complete

Task III: Environmental Clearance/Permit Process

SoCalGas will prepare and file applications with the appropriate permitting agencies. Those agencies are anticipated to be the following:

- Federal Agency Permits/Grants/Certification
 - BLM: Right of Way Grant
 - U.S. Forest Service (USFS): Special Use Permit
 - U.S. Army Corps of Engineers (USACE): Clean Water Act (CWA) 404 Permit (Nationwide or Individual)
 - RWQCB: CWA 401 Water Quality Certification
 - RWQCB: CWA 402 NPDES Permit
- Federal Consultations
 - USFWS: ESA Section 7/10 Consultation (informal/formal)
 - State Historic Preservation Office (SHPO): National Historic Preservation Act (NHPA) Section 106 Consultation
- State Agency Permits and Agreements
 - California Department of Fish and Wildlife (CDFW) California Endangered Species Act (CESA) 2081 (Incidental Take Permit)
 - California Department of Fish and Wildlife (CDFW): Fish & Wildlife Code 1602 (Streambed Alteration Agreement)
 - California Department of Transportation (Caltrans): Encroachment permit
- Local Agency Permits
 - Mojave Desert Air Quality Management District
 - South Coast Air Quality Management District
 - Riverside County
 - Others

NEPA/CEQA compliance will occur as part of the agency discretionary review process of these applications. In addition to the time needed to prepare and process these applications, the following steps would be required, assuming that the PROJECT will be subject to these requirements and that an exemption from CEQA/NEPA requirements is not granted:

1. Issue a request for proposals for third-party environmental review
2. Review consultant proposals and contract negotiation

3. Issue Notice to Proceed (NTP)
4. Synthesize data collected under Task II into an environmental review document (environmental impact statement [EIS]/ environmental impact report [EIR])
5. Review by internal SoCalGas departments
6. Incorporate comments and prepare document public noticing and comment
7. Support public process including participating in a scoping meeting
8. Respond to public comments
9. Incorporate comments and prepare final document
10. Prepare notices identifying how document will support permitting
11. Participate in permitting activities.

Schedule: 2 years to complete

Task IV: Preconstruction Surveys and Mitigation Compliance

SoCalGas anticipates the need to conduct preconstruction clearance surveys for special-status species within 90 days of the start of construction. These surveys would be conducted in accordance with agency requirements, including seasonal restrictions. The intent of the surveys is to avoid impacts to listed species. It is anticipated that the surveys conducted under Task IV would eliminate 80 percent of the alignment along vacant lands, 100 percent of the suburban/urban lands, and the compressor/pressure limiting station/staging areas, resulting in 18 miles or less of focused areas of the alignment requiring surveys. The implementation of mitigation measures required to address construction impacts will also occur under this task.

Schedule: 1 year to complete

Task V: Construction Monitoring

SoCalGas will ensure proper construction monitoring occurs in accordance with agency approvals and best construction management practices. Additionally, required mitigation will be implemented. The estimate includes construction restoration and re-vegetation costs given the length of the line and the number of streams crossed. Additionally, this task would include implementation of a Storm Water Pollution Prevention Plan (SWPPP).

Schedule: 1 to 2 years to complete

Task VI: Post-Construction Monitoring and Ongoing Mitigation

Ensuring compliance with operation and maintenance requirements will require an ongoing level of effort for the life of the PROJECT and to meet restoration success criteria established by the resource agencies.

Schedule: 20 years to complete

Table 10 - Pipelines Environmental Tasks, Costs and Staffing Requirements

Task	Description	Key Activities	Cost Estimate per Phase- Adelanto to Moreno	Cost Estimate per Phase - Moreno to Whitewater	Total Cost- North - South Project	Staffing Requirements- Adelanto to Moreno (Adelanto Compressor Station and Pressure Limiting Stations Included in Cost)	Staffing Requirements- Moreno to Whitewater
I	Geotechnical Permitting Support	Preliminary Geotechnical testing and Phase I Environmental Site Assessment	\$150,000.00	\$130,000.00	\$280,000.00	Staffing Requirements: \$150,000	Staffing Requirements: \$130,000
II	Environmental Data Collection, Screening and Impact Analysis	Cultural Resources	\$400,000.00	\$200,000.00	\$600,000.00	Staffing Requirements: \$400,000 (4,000 hours) for cultural resources specialist (assumes 740 acres to survey, 40 acres of survey area per day per person; 20 site recordings; and preparation of the technical report)	Staffing Requirements: \$200,000 (2,000 hours) for cultural resources specialist (assumes 740 acres to survey, 40 acres of survey area per day per person; 20 site recordings; and preparation of the technical report)
		Biological Resources	\$300,000.00	\$100,000.00	\$400,000.00	Wetland and Stream Delineation: Staffing Requirements: \$300,000 (3,000 hours) for wetlands biologist (based on estimated 60 jurisdictional waters stream crossings, average cost of \$5,000 per crossing)	Wetland and Stream Delineation: \$100,000 (1,000 hours) for consultant wetlands biologist (assumes 20 jurisdictional crossings)
			\$250,000.00	\$100,000.00	\$350,000.00	Special Status Species Staffing Requirements: \$250,000 (2,500 hours) for a biologist	Staffing Requirements: \$100,000 (1,000 hours)
			\$200,000.00	\$100,000.00	\$300,000.00	Rare Plant: Staffing Requirements: \$200,000 (2,000 hours) for botanist/biologist	Rare Plant: Staffing Requirements: \$100,000 (1,000 hours)
		Water Resources/Flooding	\$100,000.00	\$100,000.00	\$200,000.00	Staffing Requirements: \$100,000	Staffing Requirements: \$100,000
		Air Quality Assessment	\$13,166,400.00	\$75,000.00	\$13,241,400.00	Staffing Requirements: Air quality monitoring at 2 monitoring stations included assumed in cost. As noted in Appendix	Staffing Requirements: \$75,000 (assumes two monitoring stations)
		Soils, Geology and Hazardous Materials	\$130,000.00	\$25,000.00	\$155,000.00	Staffing Requirements: \$130,000 (1,300 hours)	Staffing Requirements: \$25,000
III	Environmental Permit Process and Clearance to Proceed with Construction	Applications for Federal, State, and Local Permits NEPA and CEQA Environmental Review Process	\$2,500,000.00	\$1,100,000.00	\$3,600,000.00	Staffing Requirements: \$2,000,000 for third-party consultant to prepare CEQA/NEPA document on behalf of lead agency addressing all environmental issue areas. \$500,000 for permitting fees.	Staffing Requirements: \$850,000 (8,500 hours) for third-party environmental planner, biologist, cultural resources specialist, air quality specialist, and hazardous materials specialist to prepare CEQA/NEPA document on behalf of lead agency addressing all environmental issue areas. \$250,000 in permit fees
IV	Preconstruction Surveys and Mitigation Compliance	Cultural Resources, Biological Resources, Water Resources, Mitigation	\$6,250,000.00	\$1,450,000.00	\$7,700,000.00	Staffing Requirements: \$250,000 (2,500 hours) for biologist and cultural resources specialist Mitigation Compliance: \$6,000,000 wetland and other biological restoration costs	Staffing Requirements: \$500,000 (5,000 hours) for biologist, cultural resources and SWPPP specialist Mitigation Compliance: \$950,000 wetland and other biological restoration costs (assumes mostly urbanized area with low habitat value and up to 20 crossings)
V	Construction Monitoring	Cultural Monitoring Biological Resource Monitoring SWPPP Implementation	\$3,580,000.00	\$1,920,000.00	\$5,500,000.00	Staffing Requirements: \$1,660,000 (16,600 hours) for biologists (assumes 6 FTE, 5-10 schedule, for 12 months) \$1,400,000 (10,400 hours) for cultural resources	Staffing Requirements: \$880,000 (8,800 hours) for biologists (assumes 3 FTE, 5-10 schedule, for 12 months) to be a consultant)

Table 10 - Pipelines Environmental Tasks, Costs and Staffing Requirements

Task	Description	Key Activities	Cost Estimate per Phase- Adelanto to Moreno	Cost Estimate per Phase - Moreno to Whitewater	Total Cost- North - South Project	Staffing Requirements- Adelanto to Moreno (Adelanto Compressor Station and Pressure Limiting Stations Included in Cost)	Staffing Requirements- Moreno to Whitewater
						monitor and Native American monitor (4 FTE, 5-10 schedule, for 12 months) \$520,000 (5,200 hours) for consultant SWPPP monitoring (2 FTE, 5-10 schedule, for 12 months)	\$520,000 (5,200 hours) for cultural resources monitor and Native American monitor (2 FTE, 5-10 schedule, for 12 months) \$520,000 (5,200 hours) for consultant SWPPP monitoring (2 FTE, 5-10 schedule, for 12 months)
VI	Post-construction Mitigation and Monitoring	Long-term monitoring	\$440,000.00	\$440,000.00	\$880,000.00	Staffing Requirements: Years 1 - 5, \$300,000(3,000 hours) assumes 5 days per month for 5 years Years 6 - 10, \$60,000 (600 hours) assumes 1 day per month per year for 5 years; Years 10 - 20, \$80,000 (800 hours) assumes 2 days every three months	Staffing Requirements: Years 1 - 5, \$300,000(3,000 hours) assumes 5 days per month for 5 years Years 6 - 10, \$60,000 (600 hours) assumes 1 day per month per year for 5 years; Years 10 - 20, \$80,000 (800 hours) assumes 2 days every three months
		Subtotal	\$27,466,400.00	\$5,740,000.00	\$33,206,400.00		
		Estimated Expenses (2% of total budget) (e.g., GPS units, rental cars, laptops)	\$549,328.00	\$114,800.00	\$664,128.00		
Total			\$28,015,728.00	\$5,854,800.00	\$33,870,528.00		

Land Ownership / Land Use

For the state of California, Geological data was obtained from the U.S. Geological Survey (USGS) and the California Geological Survey. Fault data was downloaded from the USGS's Quaternary fault and fold database for the United States (<http://earthquakes.usgs.gov/regional/qfaults/>). Land ownership data was provided by the BLM (<http://www.blm.gov/ca/gis/>). Topography data was served through Esri's servers and compiled from data provided by the National Geographic Society (2011), i-cubed, DeLorme, NAVTEQ, TomTom, Intermap, iPC, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), and the GIS User Community.

Adelanto Compressor Station

The upgraded station will be located within the existing land owned in fee by SoCalGas in Adelanto, near the intersection of [REDACTED] and [REDACTED]. The entire parcel has been disturbed in the past. There is no investigation of land use beyond the current use of the plot.

Moreno Valley Pressure Limiting Station

The new Moreno Valley PLS is expected to require additional land to accommodate new facilities to be installed at the existing Moreno Valley PLS. The entire parcel and land around the parcel has been disturbed in the past. Detail design will determine the specifics of additional land requirements.

Adelanto to Moreno Pipeline

The lands crossed by the pipeline are described below:

- Undeveloped, Open Space - Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of natural vegetation. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.

The proposed pipeline alignment travels through dedicated public right-of way [REDACTED] through the City of Adelanto, City of Victorville and unincorporated areas of San Bernardino County.

- Undeveloped, Low Intensity - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.

The proposed pipeline remains in the dedicated public right-of-way and continues southerly on [REDACTED] to [REDACTED]. South of [REDACTED], the pipeline continues in a southerly direction on [REDACTED] until it crosses [REDACTED] and enters the [REDACTED]. The segment from [REDACTED] to [REDACTED] is primarily undeveloped with some areas of Low Intensity development.

- Shrub/Scrub - Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.

The proposed routing within the San Bernardino National Forest is undeveloped and dominated by low shrubs. The routing along the National Forest is topographically the most challenging from a construction perspective with numerous hills and gullies creating an overall change in elevation from over 4,200 ft. to about 2,700 ft. at the southern end of the National Forest.

- Developed, High Intensity – This segment begins at the exit point of [REDACTED] and routes through the town of Devore and on into the City of San Bernardino. This includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover.
- Developed, High Intensity - Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to 100 percent of the total cover.

This segment extends approximately [REDACTED] miles through the City of San Bernardino, the City of Loma Linda, the City of Redlands and some unincorporated areas of San Bernardino County. The land use along the proposed route is predominantly residential except for a 2 mile segment along the Santa Ana River and the San Bernardino Airport that is predominantly industrial. The last 4 miles, from Beaumont Avenue to the Riverside County line is predominantly zoned for rural living or agricultural.

- Undeveloped, Open Space - This land use has been defined earlier in the section.

From the Riverside County line to the Moreno Valley Pressure Limiting Station, the line follows an alignment mostly cross country along undeveloped, open space. The land is zoned for light residential, rural mountainous or open space rural depending on the final alignment selected and its location along the alignment.

Moreno to Whitewater Pipeline

The lands crossed by the pipeline are described below:

- Undeveloped, Open Space - Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of natural vegetation. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.

The proposed pipeline alignment travels cross country through the mountains between the Moreno Valley and the City of Beaumont.

- Shrub/Scrub - Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20% of total vegetation. This class includes true shrubs, young trees in an early successional stage or trees stunted from environmental conditions.

The proposed routing within unincorporated areas of Riverside County is undeveloped and dominated by low shrubs.

- Undeveloped, Open Space - This land use has been defined earlier in the section.

This segment begins at the exit point of the mountains located west of the City of Beaumont and ends at the crossing of State Route 243, a segment approximately ■ miles long.

- Undeveloped, Low Intensity - Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.

This segment is located in the City of Banning and the Cabazon area. The land through mostly undeveloped lands with an occasional structure. This segment extends for approximately 4 miles, two miles in the City of Banning area and two miles in the Cabazon area.

- Developed, High Intensity - Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Developed surfaces account for 80 to 100 percent of the total cover.

This segment extends approximately ■ miles through the City of Beaumont in an existing utility corridor traversing a golf course and a residential neighborhood.

Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations

The new pressure limiting stations are expected to be installed within the existing station under the control of SoCalGas. The entire property has been disturbed in the past. Detail design will determine if additional land is required. At this point, no additional disturbance for the pressure limiting facilities is expected beyond the existing fence.

Environmental Feasibility Review Methods

Environmental feasibility review of the PROJECT was performed using existing information from a variety of sources and one day of environmental field review. Environmental resource identification included desktop research involving Geographic Information Systems (GIS), visual review of mapping, conversations with project personnel and internet searches. For the purpose of this study, potential “sensitive” areas were initially identified by reviewing maps and current GIS data, and were then confirmed in the field wherever possible. Several roadless and off-road areas were not readily accessible and were not visited. Not all waterbodies and habitat types along the route were identified and/or visited in the field.

Mapping Review

SoCalGas provided TRC with the gas pipeline alignment and prior to field investigations TRC environmental specialists reviewed the alignment and made note of identifiable waters and wash locations. Additionally, TRC used a digital shape file of the pipeline centerline in GIS to view USGS topographic maps as well as recent aerial photography with available GIS ecological resource data layers. Mapping created via GIS includes aerial maps with resource data layers including but not limited to rare, endangered and threatened species, surface waters/washes and National Wetland Inventory mapped wetlands (see Attachment IX, Environmental Map book). Aerial photography provided an indication of the working space available at the waters crossings. Reviewing topographic maps assisted in learning the terrain and surface hydrology of the project area, such as sites that may hold water and/or could have perennial flow or areas that have steep grade.

Current mapping information and drainage crossings from the alignment sheets were compiled to prepare for field investigations of environmental sensitivity constraints and project construction challenges. All drainage crossings identified on the alignment sheets appear in the crossing table found in Attachment VIII. This information was also provided to TRC’s pipeline engineers to assist in their construction considerations and cost estimates. The following additional specialty documents/databases were reviewed:

- California Natural Diversity Database Search (CNDDDB), CDFW
- Western Riverside Multiple Species Habitat Conservation Plan (MSHCP) Covered Species Database, Riverside County
- California Desert Conservation Area Plan, BLM
- Forest Land Management Plan (FLMP), USFS
- West Mojave Plan Final Environmental Impact Report/Statement (EIR/EIS), BLM

Field Investigations

TRC environmental personnel and pipeline engineers conducted the field review in November and December of 2012. Field investigations included driving most of the proposed pipeline route during which Geographic Positioning Systems (GPS)-referenced

photographs were taken followed by field survey of areas of interest. Field surveys consisted of visiting selected areas on foot to ground-truth the potential engineering or environmental constraints seen during map reviews. Distinctive features such as wide wash crossings identified during the desktop review were confirmed in the field. Significant features that were visited along the route sections are described in the Route Description section (Section 5.0). As previously mentioned, not all waters/wash crossings were visited in the field due to access and schedule constraints. However, visits were made to most of those crossings that appeared to have the potential to pose challenges for pipeline design and/or construction.

Regulatory Background and Requirements

Requirements associated with biological resources, water resources, and cultural resources issues are expected to be central to the planning process and PROJECT compliance, since significant impacts could occur to these resources. Other resource considerations (e.g., air quality, noise, and traffic) while not specifically discussed below are addressed in the costing section, which includes performing studies for the essential resources and reporting potential and known impacts with applicable mitigation strategies in the joint EIS/EIR mentioned in the following section.

Applicable state, federal and local laws and rules the PROJECT must consider during the initial planning stage including route siting, the construction phase, and post-construction phase are listed below. This list is preliminary and does not include all applicable regulations. Additional regulations may apply.

Federal Regulations

- National Environmental Policy Act
- Federal Endangered Species Act
- National Forest Management Act
- Federal Clean Water Act
- Migratory Bird Treaty Act
- Birds of Conservation Concern
- National Historic Preservation Act
- Native American Graves Protection and Repatriation Act
- Paleontological Resource Preservation Act

State Regulations

- California Environmental Quality Act
- California Endangered Species Act
- California Species of Special Concern
- California Native Plant Protection Act
- California Lake and Streambed Alteration Program
- Natural Communities Conservation Planning Act
- California Native American Graves Protection and Repatriation Act
- California Public Resources Code

Local Regulations

- Western Riverside MSHCP
- West Mojave Plan HCP

9.0 RISK ANALYSIS

Overview

TRC can conclude that the PROJECT is constructible based on field investigation, document research and project experience. TRC has found no items that could stop the PROJECT entirely from either an environmental or construction standpoint. There are significant challenges to the construction of the PROJECT, but none are insurmountable.

Overall, the project concerns relating to this feasibility study include:

- The inability to review in the field, environmental and construction impacts to the PROJECT due to time restrictions to TRC personnel being required to conduct field evaluations and impact assessment from information available in public records. During this phase of the project, the PROJECT is still considered confidential and public contact was avoided.
- The inability to conduct informal discussions with environmental agencies due to the sensitive nature of the PROJECT
- The fluid nature of steel costs as well as construction costs and the effect of anticipated pipeline construction across the country
- Very constricted construction zones throughout the urban areas for the 36-inch pipeline alignment
- Significant legal and land acquisition costs

Risk Analysis

Project Risk Management includes the processes concerned with conducting risk management planning, identification, analysis, responses and monitoring and control on a project. Risk is defined as the probability of an undesirable event occurring and the significance of the consequence of that occurrence (an event and the probability and impact). The objectives of Project Risk Management are to increase the probability and impact of positive events and decrease the probability of impact of events adverse to the project. Risk differs from uncertainty, which considers only the likelihood of the occurrence of an event. The ability to anticipate and predict the occurrence of an event is important to managing risk in a project.

Risk analysis can be subjective and quantitative. Subjective risks vary by project and company. To properly assess the risk, an evaluation of the PROJECT risks has been performed. The size of the project and the project objectives can influence the level of risk acceptable to the project.

As an example, a \$50,000 risk to a \$50,000,000 project does not represent a significant risk to the project. A \$50,000 risk to a \$200,000 project is a significant risk to the project.

Company policy and tolerance for risk can equally influence the risk assessment for a project. Large companies with billion dollar assets have a higher tolerance for risk than companies with much smaller total assets.

In order to evaluate risks to the project, three elements associated with risk should be considered:

Probability of Occurrence of specific risks to successful project completion

The extremes of Probability of Occurrence range from “Extremely Likely” (that is, the occurrence of a project impact is almost certain) to “Extremely Unlikely” (the occurrence of a project impact is just possible, and would be very surprising)

Severity of the Impact if the risk is realized

The extremes of the Severity of the Impact range from a “Severe Impact - with Warning” (the project would be severely impacted including possible cancellation) to “Negligible Impact” (a small impact to project schedule, budget or performance requirements, probably only recognized by a discriminating project stakeholder)

Detection Capability of a risk to the project

The extremes of the Detection Capability range from “Very Remote” (the likelihood of anticipating the event is very remote) to “Almost Certain” (the event is almost certain to occur).

Methodology

A wide-ranging list of items which could be expected to occur during a project without regard to probability of occurrence or project impact was utilized for evaluation. Components of the project that were evaluated included:

- Engineering and Design
- Environmental
- Permitting
- Land Acquisition
- Public Relations
- Legal
- Financial
- Construction

Each item on the list was reviewed and kept or eliminated as it was determined to potentially impact the PROJECT.

The major categories identified for analysis were:

- General
 - Capital cost
 - Permitting
 - Right of Way
 - Financial
 - Public Relations
- Environmental
- Pipeline Construction
- Compressor Station

For each item identified, a subjective review and analysis was conducted.

Subjective Analysis

The most significant risk issues for each major category were identified and discussed. Based on the discussions, the following items can be expected to have the largest impacts on the PROJECT:

- Work stoppages due to local agency/concerned citizen's actions.
 - While significant opposition to the PROJECT during permitting may be expected in the urban areas, it may also be anticipated that local entities and private citizens may band together to affect the smooth flow of work required to complete the PROJECT using complaints to agencies, reporting of minor issues to news media, etc. to stop the PROJECT.
- Changes in PROJECT scope
 - On significantly large pipeline projects which require several years to design and permit prior to construction, there is the potential for market demand to change or supply sources to shift to other geographic sources causing SoCalGas to reduce their volume requirements prior to the PROJECT being completed. Of course, depending upon the changes required, the impact can be marginal to moderate or more. This change in scope can have a significant impact on the proposed rates, with a potentially cascading effect on the PROJECT scope. During this time of economic uncertainty, this item may be more highly rated for risk than it would be in a more economically stable market.

- **Permitting Considerations**

While permitting consideration does not rate significantly higher than many other risk factors, clearly, there is significant uncertainty in the conditions that may be imposed upon SoCalGas by federal, state and local authorities. Once the CPUC approval is provided, it is clear that the PROJECT will ultimately move forward, but the state and local conditions can prove to be onerous, or can require significant time to negotiate or clear in order to allow the PROJECT to move forward. An intelligent Public Relations program will be a key resource to address public concern and address issues brought out by the incident in San Bruno, California.

10.0 REFERENCES

- ACOE (U.S. Army Corps of Engineers). 2006. *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region*. ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-06-16. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
- ACOE (U.S. Army Corps of Engineers). 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0)*, ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-08-28. Vicksburg, MS: U.S. Army Engineer Research and Development Center.
- CDFW (California Department of Fish and Wildlife). 2000. *Guidelines for Assessing the Effects of Proposed Projects on Rare, Threatened, and Endangered Plants and Natural Communities*.
- CDFW (California Department of Fish and Wildlife). 2009. *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities*. Online. http://www.dfg.ca.gov/biogeodata/cnddb/pdfs/Protocols_for_Surveying_and_Evaluating_Impacts.pdf
- CDFWCDFW (California Department of Fish and Wildlife). 2012. *Staff Report on Burrowing Owl Mitigation*. State of California, Natural Resources Agency, Department of Fish and Wildlife. March 7, 2012. CNDDDB (California Natural Diversity Data Base). 2012. California Department of Fish and Wildlife. Search for the project corridor.
- Correa, Laurie, Director of Reserve Management & Monitoring, Western Riverside County Regional Conservation Authority. Personal Communication, November 2012.
- Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C. 131 pp.
- Kirtland, Karen, Consulting Biologist. Personal Communication, October 2012.
- Sogge, M.K., Ahlers, D., and Sferra, S.J. 2010. *A Natural History Summary and Survey Protocol for the Southwestern Willow Flycatcher*: USGS Survey Techniques and Methods 2A-10.
- Sogge, M.K., 2011. *Southwestern Willow Flycatcher Site*. USGS, Colorado Plateau Research Station. Online: <http://sbsc.wr.usgs.gov/cprs/research/projects/swwf/cprsmain.asp>. Site visited October 17, 2011. *Western Riverside Multiple Species Habitat Conservation*

Plan, Information retrieved December, 2012 Online
at: <http://www.cadreenvironmental.com/MSHCP.htm>

USDoI BLM (U.S. Department of the Interior Bureau of Land Management) California Desert District. 2006. *Final Environmental Impact Report and Statement for the West Mojave Plan*.

USFS (U.S. Forest Service). 2000. Forest Service Handbook.
Online: http://www.fs.fed.us/im/directives/dughtml/fsh_1.html.

USFWS (U.S. Fish and Wildlife Service). 1999a. *Arroyo Southwestern Toad (Bufo microscaphus californicus) Recovery Plan*. U.S. Fish and Wildlife Service, Portland, Oregon.

USFWS (U.S. Fish and Wildlife Service). 1999b. *Survey Protocol for the Arroyo Toad*.

USFWS (U.S. Fish and Wildlife Service). 2000. *Guidelines for Conducting and Reporting Botanical Inventories for Federally Listed, Proposed and Candidate Plants*.

USFWS (U.S. Fish and Wildlife Service). 2008a. *Birds of Conservation Concern 2008*. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. Online version available at: <http://www.fws.gov/migratorybirds/>.

USFWS (United States Fish and Wildlife Service). 2011a. *National Wetlands Inventory Mapper Application*. Online. Accessed November 2012

A. ADDENDUM 1

Additional Compressor Station Detail

Major Piping Systems

Station piping design will allow each unit to operate independently of any other unit, providing capabilities for reduced horsepower operation when needed, or to allow maintenance on single units within the station while the remaining units remain in service. The upgraded station will be designed so that gas can flow either north or south from the station discharge.

Each compressor will have 30” remotely actuated suction and discharge block valves as part of the unit isolation plan. Each unit will also be equipped with a 30” check valve to prevent backflow into the unit. A surge control system is included for each unit, to provide wide-ranging unit operation that is required for the upgraded station.

Electrical Systems

With the increase in the station size and number of compressor units, the existing utility electrical supply to the station will need to be upgraded to provide normally required power for routine station demands when the station is in stand-by mode. These demands include station lighting, security, status monitoring, etc. Costs have been included for this requirement.

Station Power/Baseload Power Generation

Baseload station power generation is included in the design of the station. Whenever gas compression is required, the baseload power generation will start to provide all power requirements to run the units and the required gas compression auxiliary equipment such as the gas cooler fans, required pumps and motors to support the compression process, unit controls, etc.

The maximum voltage anticipated is 480 VAC/3 phase/60 Hz.

Motor Control Center

The motor control center will provide all power and safety monitoring to the compressor station, including motor starters for electric motors, power distribution and control and safety shutdowns for electrical system faults.

Grounding, Lightning Protection, Cathodic Protection

The cost estimate includes costs for earth grounding for the electrical system, buildings and all major equipment. It also includes an estimate for lightning protection for the facility.

Cathodic protection is included for underground structures. There will need to be further study to evaluate electrical isolation between pipeline systems and compressor station systems to assure that cathodic protection current interference is evaluated and mitigated.

It is expected that there should be no influence from the overhead power lines located to the south of the parcel, but investigation should be included as part of the next level of design.

Hazard Detection and Protection Systems

The station design includes a complete hazard detection and protection system, which will interact with the station control system. The hazard detection and protection system is estimated including gas detection, smoke detection, rate of rise heat detection and motion detection in the Auxiliary Building.

The Compressor Building will include gas detection, smoke detection, rate of rise heat detection, UV flame detection and motion detection.

Both buildings will have flashing strobes and alarm horns to notify station occupants of gas detection system hazards. Additional flashing lights and horns will be installed in the yard to assure that station occupants are notified of a gas detector hazard alarm. At this point, there is an allowance included for fire suppression, but discussions with SoCalGas will determine the level of hazard suppression to be included in the station design.

Other Station Systems

Site Access Control and Perimeter Security

When the station upgrades are complete, the entire station (including the portion of the property now enclosed with chain link fencing) will be enclosed with a block wall, providing increased security for the entire station. The existing perimeter security system is intended to remain in service during construction and when the station upgrade is complete. The existing system will be expanded to include the additional area within the station block wall, providing a single, seamless perimeter intrusion monitoring system.

The new block wall will include vehicle and personnel access gates to provide entry to the station. All access gates will include sensors to indicate movement of the gate.

The installation of the new block wall will be scheduled and coordinated so that there is no loss of station security during the installation of the wall and the expansion of the perimeter security system.

Major Design Tasks by Discipline

Civil Design

- Plot Plan
- Demolition Plan
- Station Survey and Location Control
- Grading Plan
- Station Fencing and Access Control
- Drainage Control
- Building Design and Layout
- Station Sewage/Septic System

Electrical Design

- Utility Power Connection
- NFPA Hazardous Area Designations
- Station MCC and Transformers
- Power Distribution - 480V/208V/120V
- Raceway
- Wire and Cable
- Lighting
- Hazard Detection and Protection Systems
- Other Grounding and Protection Systems
- Emergency Power Generation
- Station Communications

Mechanical Design

- Prime Mover/Gas Compressor Design
- Ancillary Gas Compression Equipment
- Anti-Surge System
- Recycle System
- Gas Cooling
- Station Venting and Blow Down Control
- Yard Piping to Accommodate 2-Way Flow (north and south from the compressor)

- Building Ventilation and HVAC Systems
- Station Water Distribution/Plumbing
- Station Air System

Structural Engineering

- Geotechnical Review and Evaluation
- Rotating Equipment Foundations
- Buildings/Large Equipment Foundations
- Buildings Structural Review
- Supports for Above Ground Equipment and Pipe Supports

Sample Drawing Lists

Civil

- Title Sheet
- Drawings Index
- Engineering Notes and Legend
- Site Plan
- Grading and Drainage Plan
- Grading and Drainage Details
- Sewage/Septic Plan
- Sewage/Septic Details
- Site Access and Security Plan
- Site Access and Security Details

Electrical Drawings

- Title Sheet
- Drawings Index
- Engineering Notes and Legend
- Site Plan
- Electrical Key Plan
- Hazardous Location Plan
- Single Line Diagrams
- Schematics and Wiring Diagrams
- Panel Schedules
- Interconnecting Wiring Diagrams
- Electrical Details

- Instrumentation
- Power & Control
- Lighting
- Grounding
- Lightning Protection
- Cathodic Protection
- Yard Electrical Plans
 - Yard Electrical Plans to be developed as needed for each station coordinate grid
- Equipment Arrangement Plans
- Cable Tray Plan and Details
 - By building/location
- Panelboard Wiring Diagrams

Mechanical Drawings

- Title Sheet
- Drawings Index
- Engineering Notes and Legend
- Site Plan
- Process Flow Diagram
- Piping & Instrumentation Drawings (Multiple Sheets)
- Yard Piping Plans (Multiple Sheets)
 - Yard Piping Plans to be developed for each station coordinate grid
- Details, Sections and Elevations (Multiple Sheets)
 - Details, Sections and Elevations to be developed as needed to provide additional plan and profile information for fabrication and installation of piping, tubing and instrumentation.
- Isometric Details (Multiple Sheets)
 - Isometric Details to be developed as needed to provide additional isometric information for fabrication and installation of piping, tubing and instrumentation.

Structural Drawings

- Title Sheet
- Drawings Index
- Engineering Notes and Legend
- Site Plan
- Foundation Location Key Plan
- Building Slab Plan

- Building Slab Details
- Pier and Slab Footing Foundation Details
- Anchor Bolt Schedule
- Above Ground Structures Details
- Specialized Piping Anchors and Details

B. ADDENDUM 2

Compressor Station Alternatives

Alternatives to the Three Unit Design

For estimating purposes, all evaluation of compressor station alternatives were conducted using information from Solar Turbines for their specific pipeline compression packages.

While the initial design has determined that three Solar Mars 100 compressor packages provide the best solution for the information available at the time of this report, there are other units that can be specified to provide the required maximum station horsepower.

For example, rather than using three Mars 100 packages, the horsepower requirement can also be satisfied using either two Titan 130 gas compressor packages with evaporative cooling of the engine intake air stream to provide cooling of the intake charge under high ambient temperature conditions or two Titan 250 gas compressor packages..

TRC also evaluated horsepower requirements to support a 1,100 psig “system MAOP” case. This evaluation was conducted to assure that any proposed solution could also be expected to maintain the stated flow rates with a system maximum compressor station discharge pressure.

This evaluation found that the 1,100 psig system MAOP could be satisfied by adding either a fourth Mars 100 unit, a third Titan 130 package with evaporative cooling to the engine air intakes or adding evaporative cooling to the two Titan 250 packages.

All estimates prepared for this report assume natural gas fueled engines to provide power for the gas compressor. The preference is to provide motive power utilizing natural gas, assuring that adequate energy supplies are available to run the station even in the event of loss of power from the electric utility. Electric driven units provide a reduced cost when compared with natural gas turbine driven units. Generally, however, the cost savings realized from replacing the natural gas fueled gas turbine with an electric motor will be offset by the additional cost of high voltage electrical power required at the site, as well as the cost of electric power vs. natural gas fuel.

An additional case has been reviewed (but not fully evaluated) that will mix engine/compressor types to improve low pipeline flow rate performance. The overall cost for this case is within the range of the cost included in the report. Additional detailed analysis of expected pipeline operating conditions and compressor unit capabilities is required before this case can be considered completely viable.

If final system evaluation determines that the station will run more at the low end of the operating envelop provided, the final configuration can be changed to four lower horsepower units within the estimated project cost.

For the MAOP Design Points, with the 475 psig suction pressure and the 1,100 psig system MAOP, discharge pressure, the compression ratio is about 2.28. The Multi-stage compressor can achieve this ratio easily, but there is a trade off on flow.

If future station improvements drive toward the MAOP cases, just adding one unit at a later date might be the best solution.

This 30,000 site horsepower requirement leads to several different possible engine/compressor package solutions to provide the capability to meet pressures and flow rates. It would seem that either the four Mars 90 or the three Mars 100 engine/compressor packages will provide the best solution for meeting all station flow rate requirements. Additional evaluation of station annual flow rate requirements should drive toward the correct package selection.

Future Expansion

While SoCalGas has noted that the station design is to be based on a 1,100 psig MAOP, the specification of compression units for this phase of the project are based on the stated 850 psig maximum outlet pressure. Additional evaluation has been conducted to determine that the 1,100 psig MAOP can be accommodated by these units in the future, without having to replace those units entirely.

Four potential engine/compressor package alternatives are outlined below. For the purposes of this report, all are sourced from Solar Turbines.

- Four (4) Mars 90 engines with C51ML - 5 Stage compressors.
 - Each unit will provide a maximum flow rate of 225 MMscfd, for a station total of 900 MMscfd at 475 psig suction/850 psig discharge.
 - Each unit will provide approximately 8,800 HP at site conditions of 3,000 ft. elevation and 110°F ambient temperature.
 - Add a fifth engine/compressor package and add evaporative cooling for the turbine engine air inlet stream should allow us to meet MAOP pressure requirements with 800 MMscfd maximum station flow rate, with each unit flowing 200 MMscfd.
 - With evaporative cooling, the intake air charge should be able to be lowered to about 90°F from the 110°F ambient design temperature, yielding approximately 9,700 site horsepower, allowing each unit to flow 175 MMscfd.
- Three (3) Mars 100 engines with C51ML - 5 Stage compressors.

- Each unit will provide a maximum flow rate of 275 MMscfd, for a station total of 825 MMscfd at 475 psig suction/850 psig discharge.
- Each unit will provide approximately 10,700 HP at site conditions of 3,000 ft. elevation and 110°F ambient temperature.
- Add a fourth engine/compressor package to meet MAOP pressure requirements with 800 MMscfd maximum station flow rate, with each unit flowing 200 MMscfd.
- Two (2) Titan 130 engines with C51ML - 5 Stage compressors.
 - This configuration provides about 350 MMscfd for each unit, yielding a total of 700 MMscfd flow rate with no detailed design.
 - Each unit will provide approximately 13,600 site horsepower at site conditions noted above.
 - Further refinement of the compressor selection or the addition of evaporative cooling for the turbine engine air inlet stream should allow us to meet the 800 MMscfd station flow rate requirement.
 - With evaporative cooling, the intake air charge should be able to be lowered to about 90°F from the 110°F ambient design temperature, yielding approximately 15,500 site horsepower, allowing each unit to flow 400 MMscfd.
 - Add a third engine/compressor package with evaporative cooling to meet MAOP pressure requirements with 800 MMscfd maximum station flow rate.
- Two (2) Titan 250 engines with C61SL compressors.
 - This configuration will provide a maximum flow rate of 500 MMscfd per unit, for a station total of 1,000 MMscfd.
 - Each unit will provide approximately 19,400 site horsepower at site conditions noted above.
 - Add evaporative cooling to each of existing engine/compressor packages to lower the intake air charge to about 100°F, yielding approximately 21,500 site horsepower per unit, allowing each unit to flow 400 MMscfd.

One additional potential scenario has been proposed, but is not included as a solution at this point because it utilized two different sized engine/compressor packages. (Additional pipeline system information is needed to assure that the different units can be matched for performance, assuring that minimum and maximum flowrates can be met).

This scenario could pair two (2) Mars 90 engines with C51ML - 5 Stage compressors with a single (1) Titan 130 engine with a C51ML - 5 Stage compressor to yield a total station flow rate of 800 MMscfd, but providing lower horsepower/flow rate capability without station recycle - more closely matching the station's required minimum flow rate for compression. (This configuration should allow a station turn down to about 110 MMscfd before recycle is required

when a single Mars 90 is operating). The cost of compression for this installation is estimated at \$27.1 million for the design case and \$37.8 million for the MAOP case. This configuration should continue to provide the best range of horsepower to flow rate, but is fairly closely matched by the Mars 100 solution case of 4 units for the system MAOP case - for approximately the same cost.

Advantages of Modern Industrial Gas Turbines

As a modern, industrial gas turbine, the Solar Turbines equipment provides several advantages when compared to the existing LM1500 installation.

- As industrial gas turbines, the proposed packages use a skid mounted design. This design eliminates several of the large components that are required for the existing station, such as large lubrication storage tanks, separate lube oil pumping and storage outside the footprint of the unit.
- The overall length of the gas turbine/compressor skid is shorter than the existing gas turbine/compressor installation on separate pedestals.

The major component of the new compressor station is the gas compressor skid. The skid is a self-contained unit comprised of the natural gas driven turbine engine, natural gas centrifugal compressor, the starting system, fuel system, lubrication system, control system, on-skid electrical wiring and piping and manifolds.

The skid is provided as two sub-assemblies - the driver skid with the turbine engine and the driven skid with the natural gas compressor.

The driver skid includes the gas turbine engine mounted on a structural steel assembly built to provide a rigid foundation. Drip pans are included to collect any potential liquid leakage. The skid includes connection points for fuel, lube oil air and water on the outer edge of the skid. Electrical connections are made in on-skid junction boxes.

The driven skid includes the centrifugal gas compressor mounted on structural steel base designed to bolt up to the driver skid, forming a continuous base plate. The driven skid is complete and includes all necessary accessories, auxiliary and control systems required for operation.

The industrial turbine design of the Solar Turbines equipment (rather than aero-derivative design) results in the entire engine/compressor package being mounted on a skid which includes the required oil storage for the unit. As well, all oil control and piping is part of the skid, with the exception of the lube oil cooler piping which is routed from the skid to the lube oil cooler located outdoors.

The complete skid, comprised of the driver and driven sections is between 45 and 50 ft. long (depending on the engine used) x 10 ft. wide x 11 ft. tall. The complete skid weighs between 130,000 and 140,000 lbs.

Evaporative Cooling

Evaporative cooling for air intake charge for the gas turbine inlet on high ambient temperatures can reduce the horsepower requirement. Evaporative cooling is not appropriate for all cases (that is, evaporative cooling will not necessarily allow “across the board” downsizing of units, but it can be a method to improve high ambient temperature performance in some cases.

A very high level estimate for evaporative cooling for an installation such as at Adelanto Station is expected to be around \$250,000 to \$300,000 per unit - a significant savings when compared to installing additional horsepower that will be unneeded through most of the operating year.

However, this solution for additional power at high ambient temperatures needs to be evaluated along with emissions performance and anticipated station operating regimes throughout the year to determine if evaporative cooling is the best solution, especially if the units will run at reduced horsepower during much of the year.

Alternatives to Consider on Station Design

- Evaporative Cooling for Compressor Intake Charge in certain cases
- Refinement of Low Flow requirements - when low flow compression is required and the duration of low flow, especially when it would result in station recycle.
- Because of the potential wide range of flow rates (from 75 MMscfd to 800 MMscfd), multiple units have been specified to provide adequate turn down for low flow rates while combining to provide the maximum required volume flow rate. Further refinement of the time spent at minimum flow rates and the need for station recycle can help in determine the correct selection of units.
- The possible future increase in either flow rate, maximum discharge pressure or both can be accommodated by adding units to the station - eliminating the need to replace entire units for the increased performance requirements.
- Improvement of annual station flow rate and operating parameters to aid in engine/compressor package selection and to improve overall station emissions performance.

As station design is refined, individual unit sizing can be selected to allow a “best fit” of horsepower to station flow throughout station flow and pressure ranges. Depending on the operating parameters, this can result in reduced station emissions and longer overall calendar time between scheduled engine maintenance and overhauls.



Attachment I

Route Maps

Attachment II

Topography Map

Attachment III

Geological Map

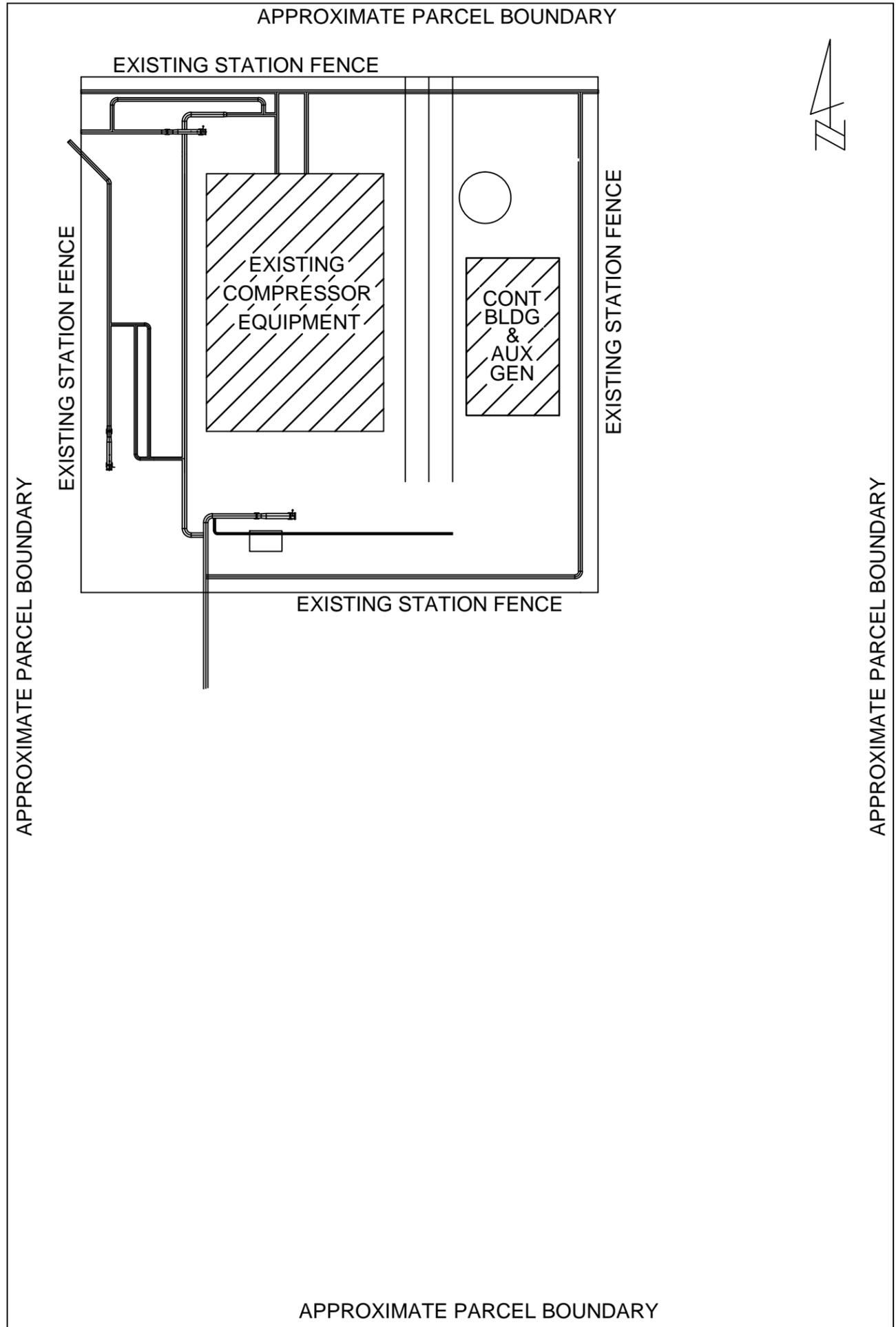


Attachment IV

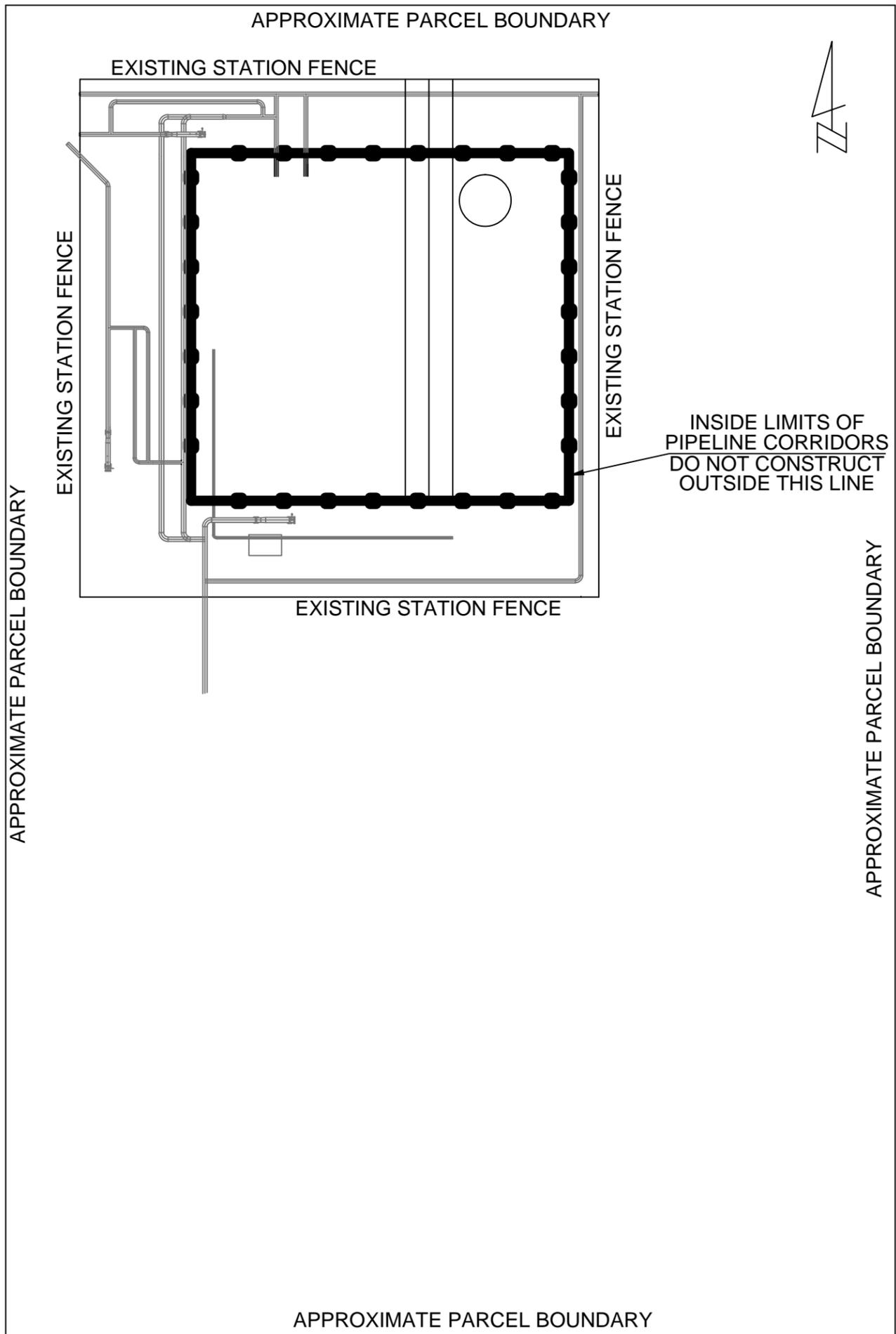
Land Ownership

Attachment V

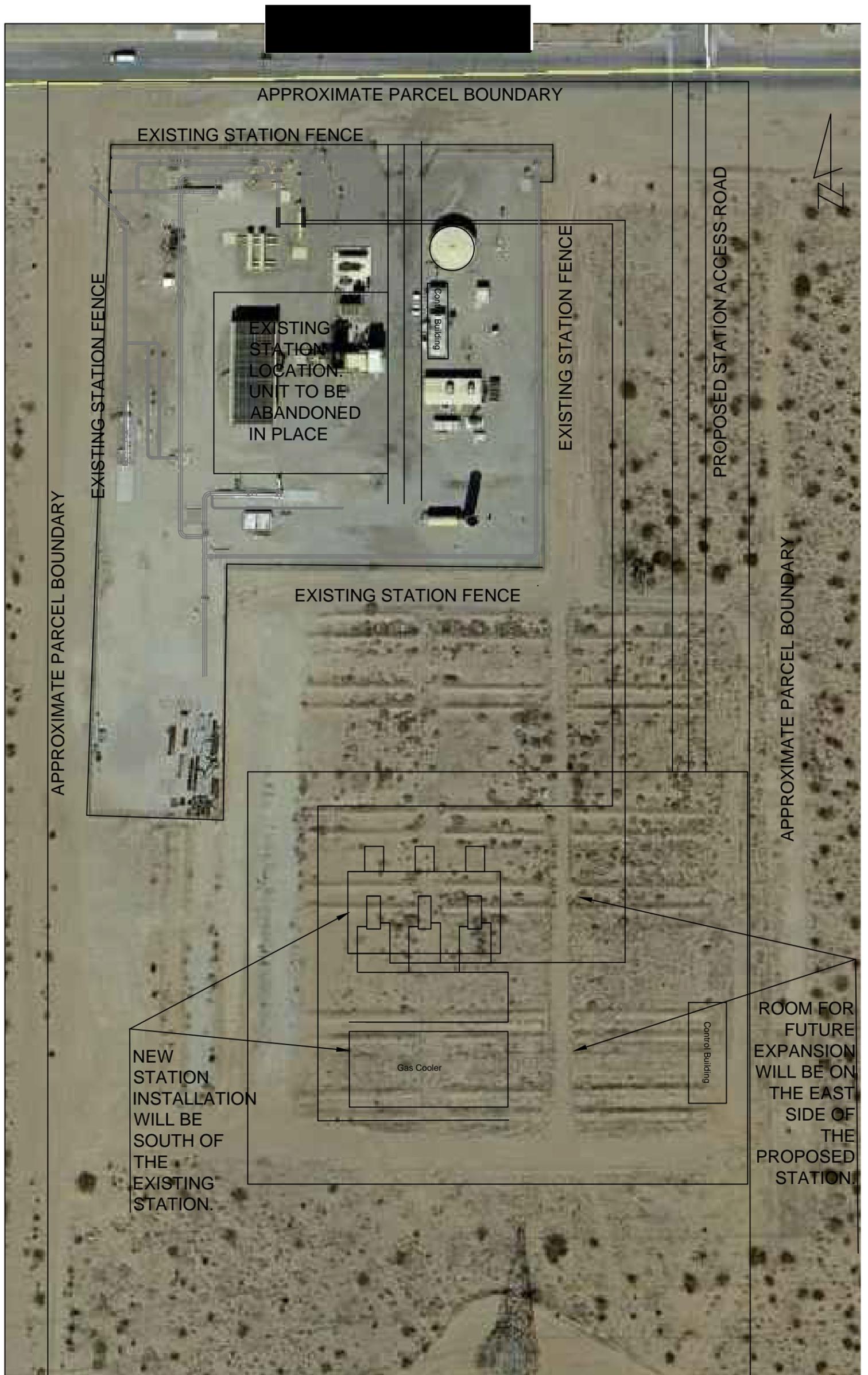
**Compressor Station
and
Pressure Limiting Station
Drawings**



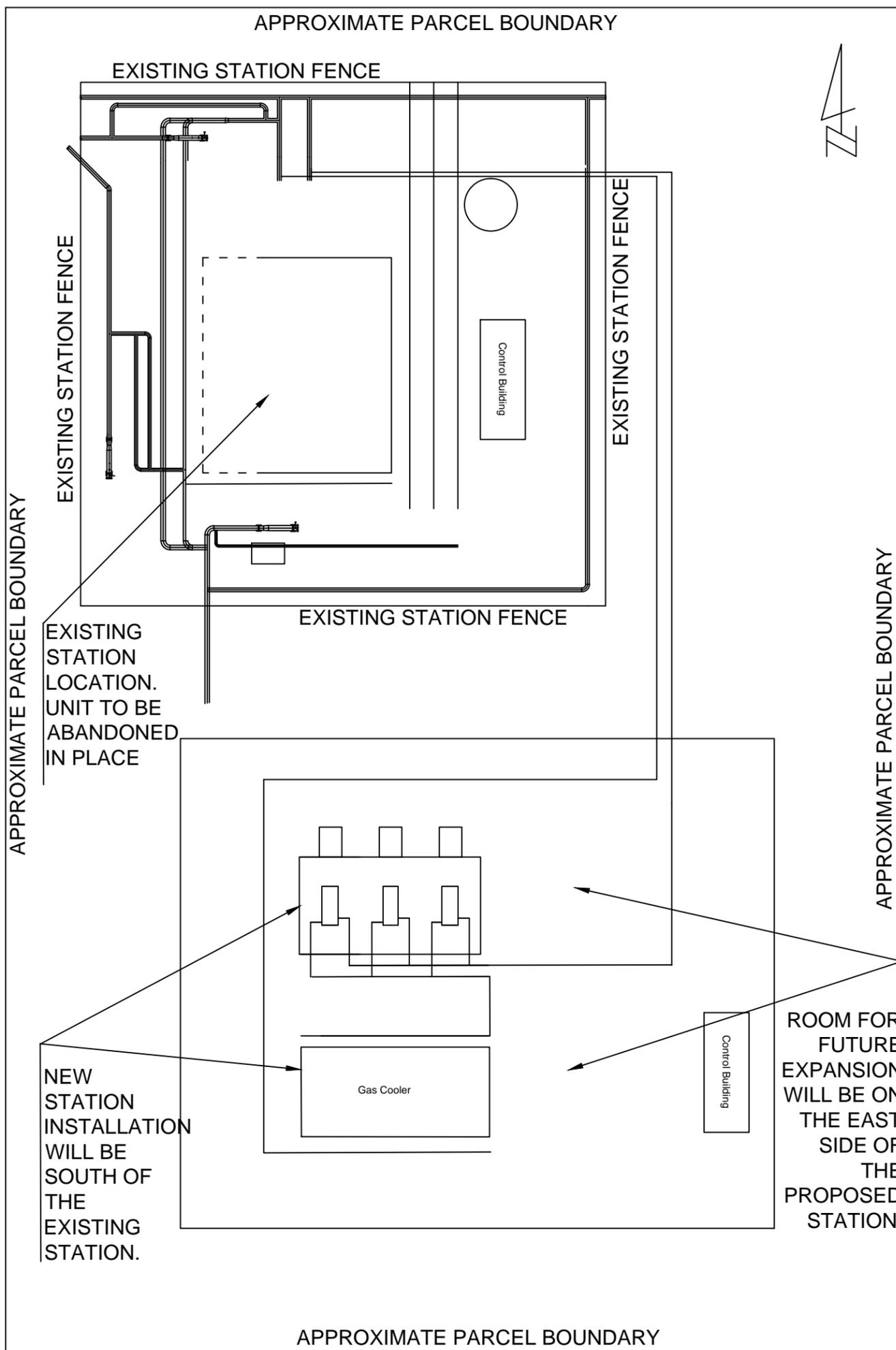
ADELANTO COMPRESSOR STATION EXHIBIT 1
CURRENT STATION LAYOUT



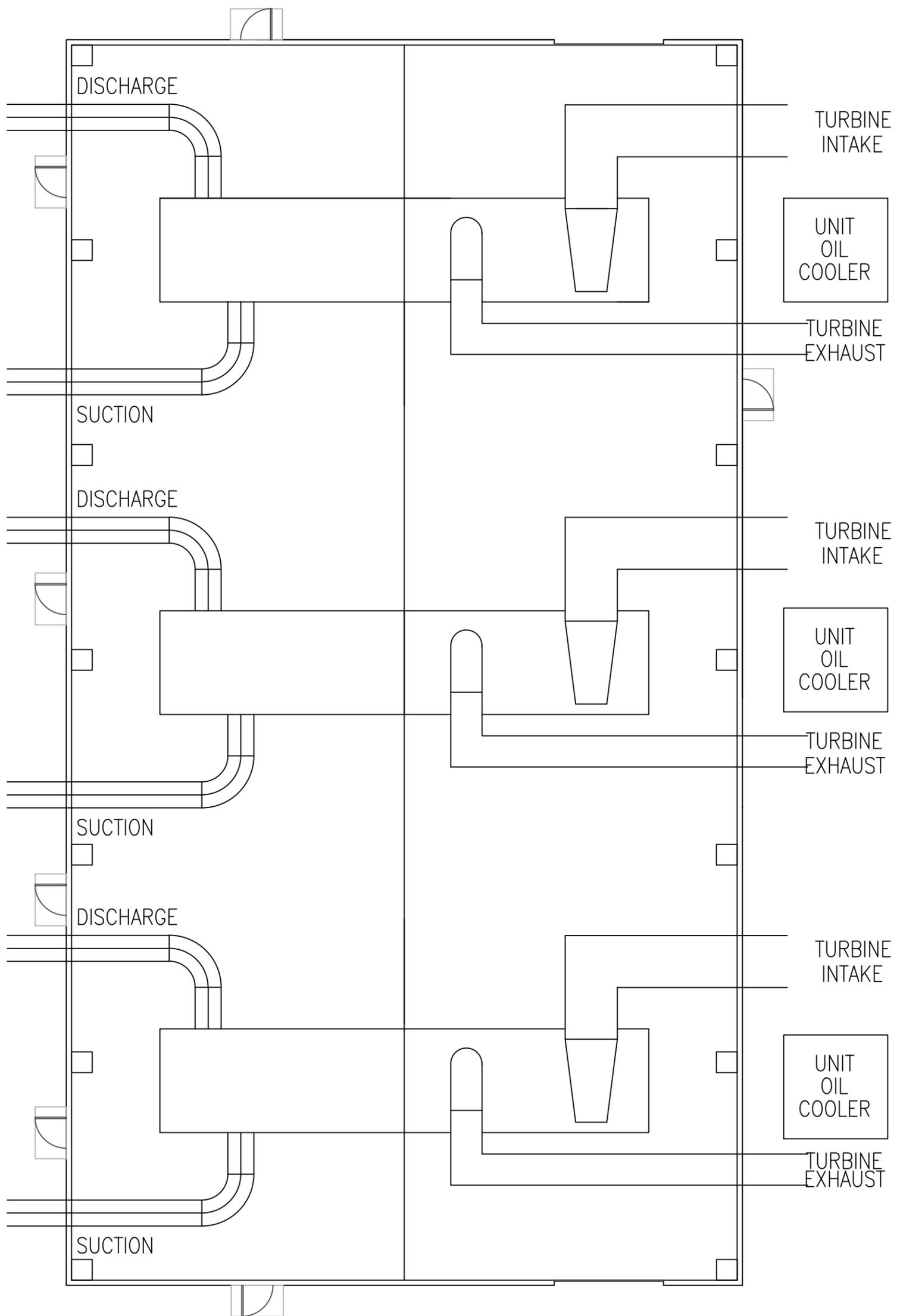
**ADELANTO COMPRESSOR STATION EXHIBIT 2
PIPING CORRIDORS TO BE AVOIDED**



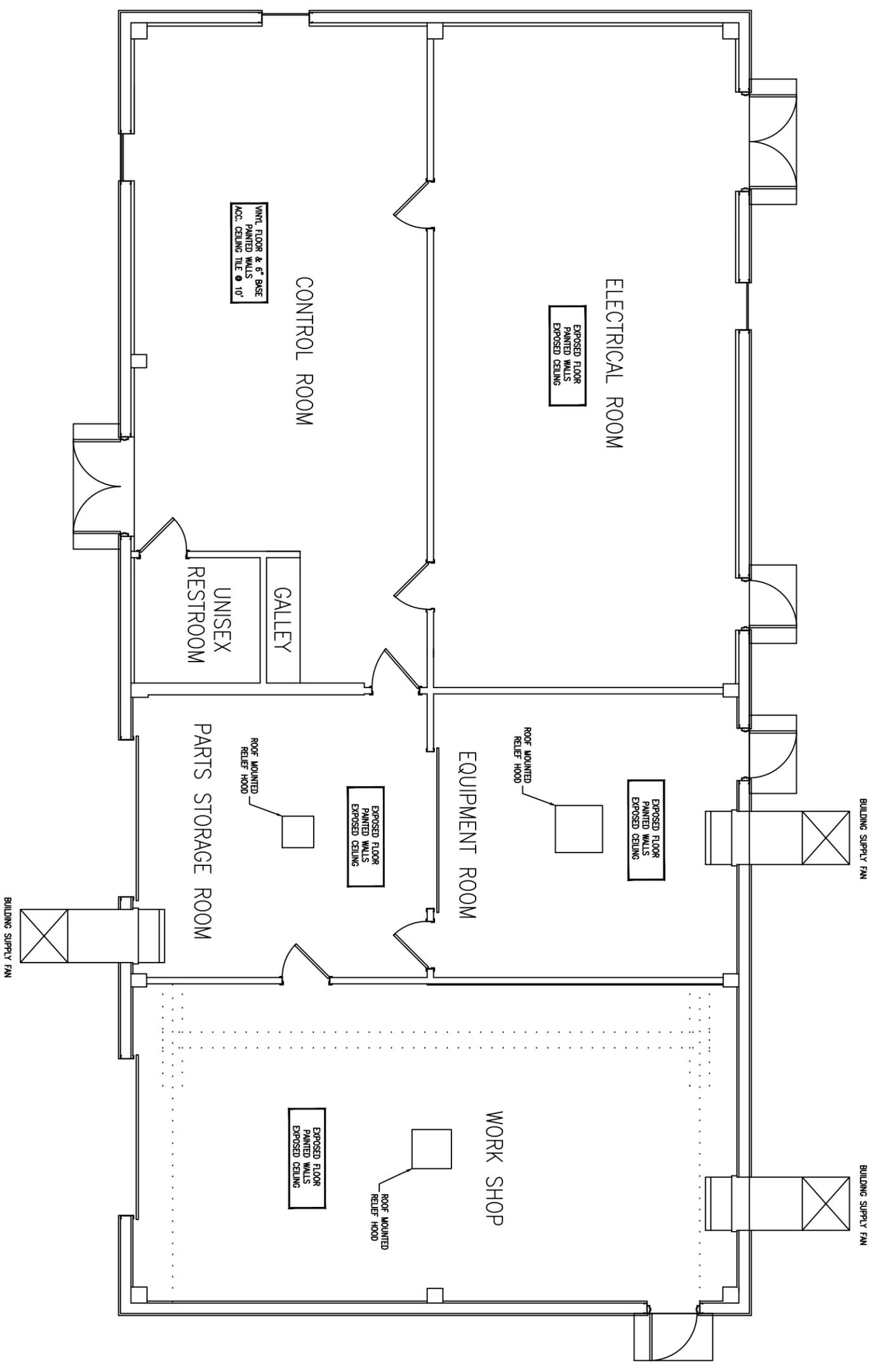
**ADELANTO COMPRESSOR STATION EXHIBIT 3
PROPOSED OVERALL STATION LAYOUTS**



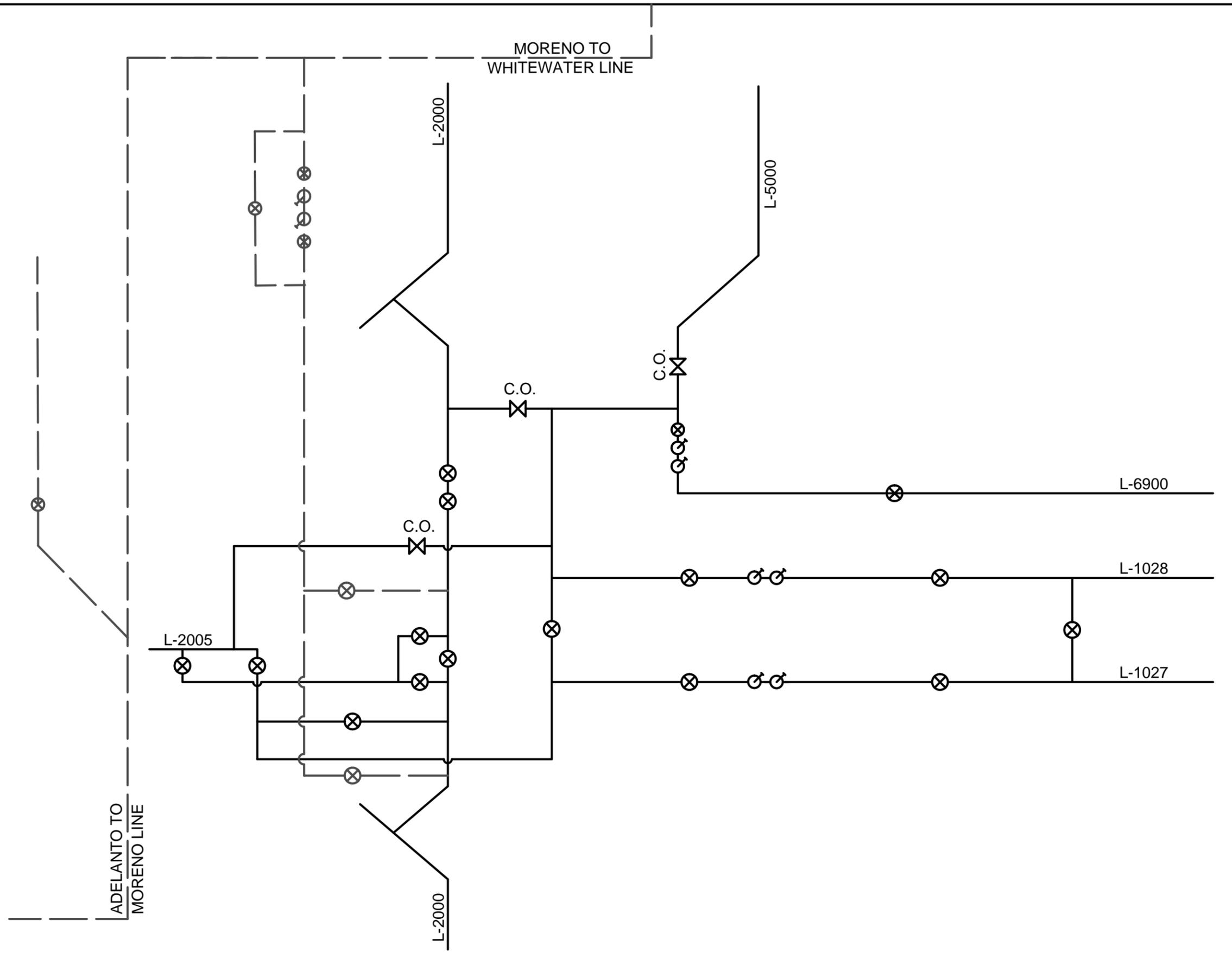
ADELANTO COMPRESSOR STATION EXHIBIT 3
 PROPOSED OVERALL STATION LAYOUTS



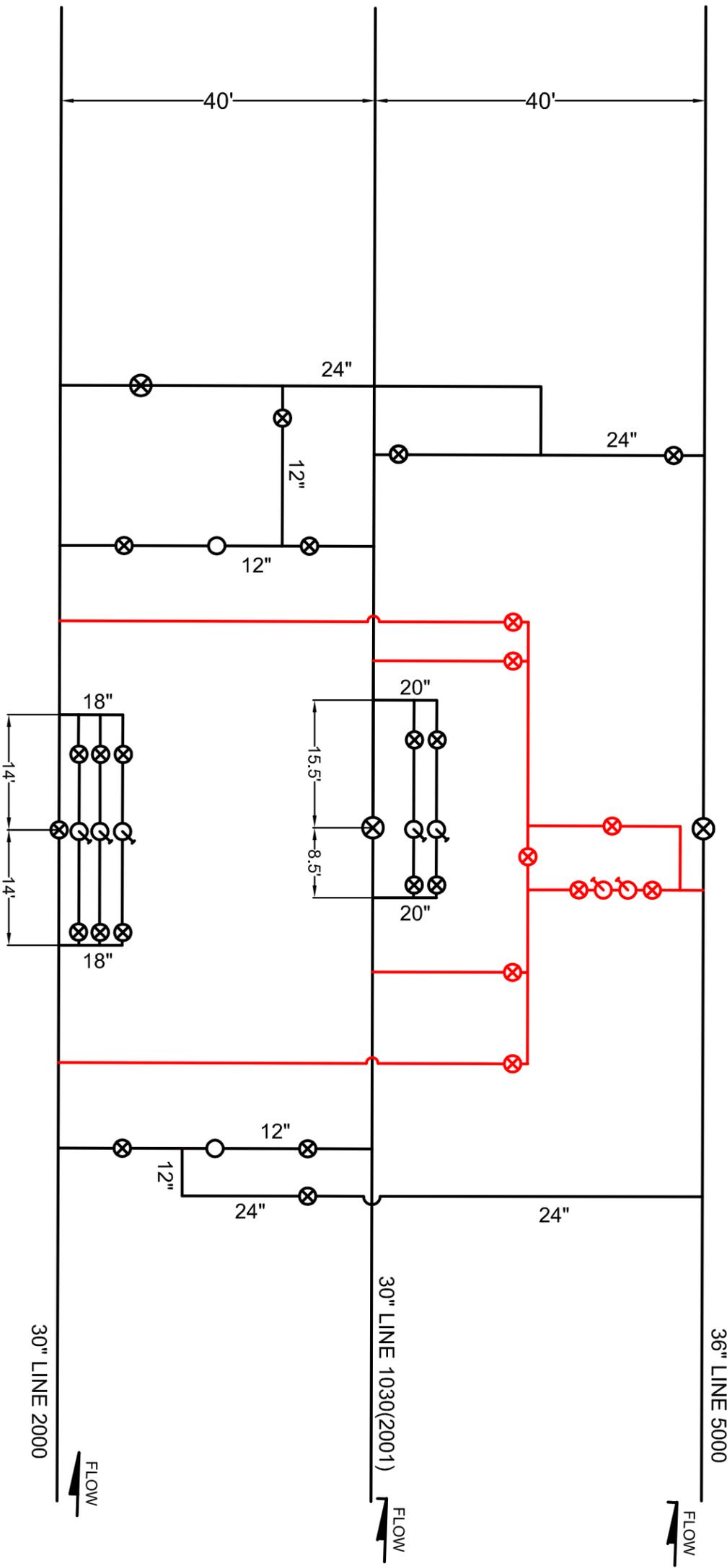
**ADELANTO COMPRESSOR STATION EXHIBIT 4
COMPRESSOR BUILDING INTERIOR PLAN**



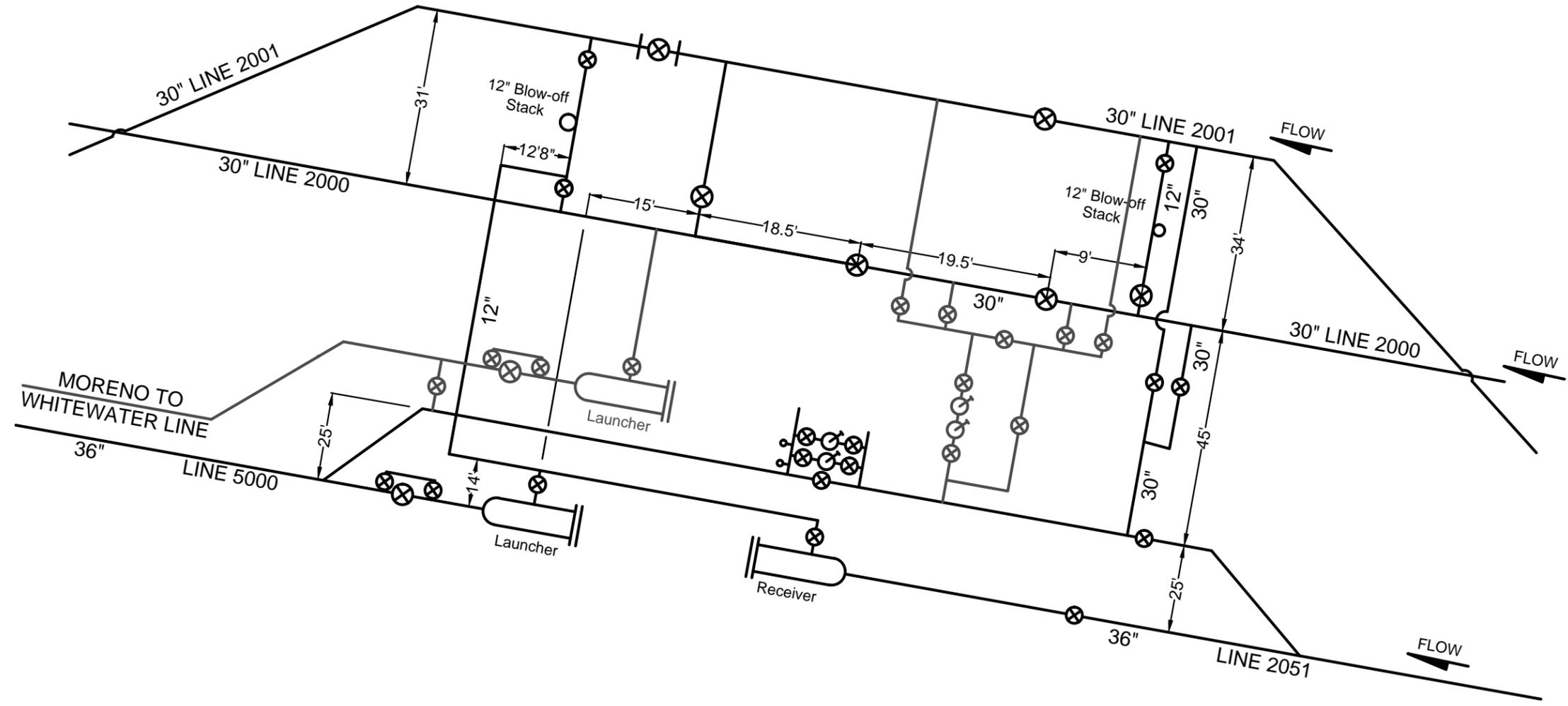
**ADELANTO COMPRESSOR STATION EXHIBIT 5
AUXILIARY BUILDING INTERIOR PLAN**



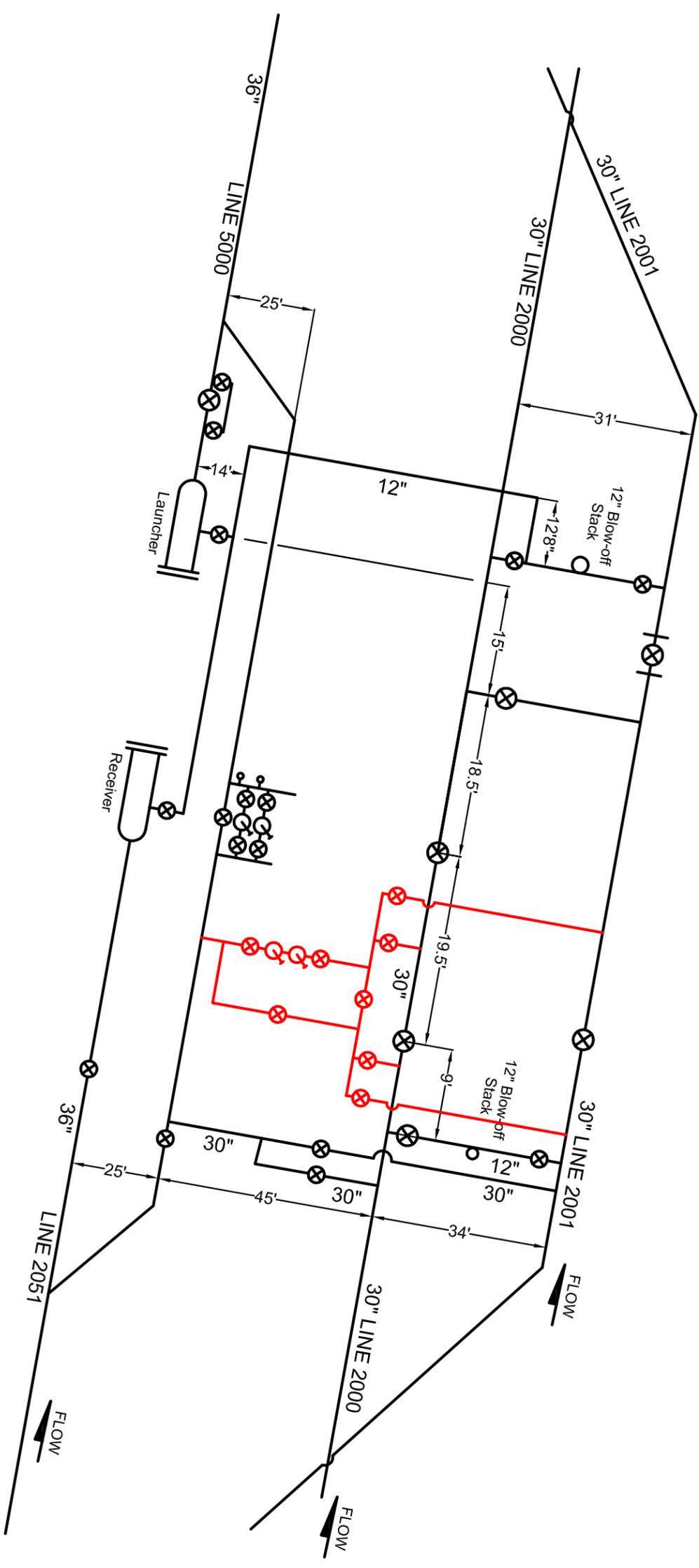
Moreno Valley Pressure Limiting Station



Shaver Summit
PLS



Whitewater PLS



Whitewater PLS

Attachment VI

Cultural Resources Summary

Cultural Resources Summary

Cultural resources information for existing conditions in the proposed Project area was obtained from the California Historic Resources Information System (CHRIS). The CHRIS maintains regional offices that manage cultural resource records for known cultural resource locations and related technical studies. Sources reviewed consisted of recorded archaeological and historic sites records on the Proposed Project route. The CHRIS maintains regional offices that manage site records for known cultural resource locations and related technical studies. The regional office for San Bernardino County is the San Bernardino Archaeological Information Center (SBAIC) housed at the San Bernardino County Museum, Redlands, and the regional office for Riverside County is the Eastern Information Center (EIC), housed at the University of California, Riverside. A review at the SBAIC was done on December 10, 2012 of the known cultural resource locations on the draft route, with a phone call to the EIC on December 11, 2012 using the draft maps. A pedestrian survey was not conducted as part of the analysis of Project critical issues.

Previously recorded Cultural Resources along the Project route.

Site number	Brief Description
SBR-113H	Prehistoric habitation site, and an historic hog farm operation, in National Register Crowder Canyon Archaeological District
SBR-114H	Prehistoric habitation site and historic homestead debris, in National Register Crowder Canyon Archaeological District
SBR-421	Prehistoric habitation site in National Register Crowder Canyon Archaeological District
SBR-713	Prehistoric habitation site in National Register Crowder Canyon Archaeological District
SBR-2910H	National Old Trails Highway, Eligible for National Register, on California Register-3926
SBR-3772	Lithic scatter located in National Register Crowder Canyon Archaeological District
SBR-4252H	Baldy Mesa Road
SBR-4272H	Santa Fe and Salt Lake Trail/Old Spanish Trail/Mojave Trail-California Historical Landmark (577)
SBR-6793H	Historic Railroad-Atchison, Topeka and Santa Fe, Eligible for National Register
SBR-6847	Historic Railroad-Old Kite Route, part of Atchison, Topeka and Santa Fe Railway
SBR-8092H	Mill Creek Zanja-California Historical Landmark (43), National Register 77-329
SBR-10330H	Southern Pacific Railroad
36-015497	Baseline Road-California Point of Historical Interest

Attachment VII

Pipeline Cost Estimate

North-South Project Cost Detail

1) Adelanto to Moreno Pipeline

- Material
- Construction
- Construction Management
- Land Acquisition - Labor
- Land Acquisition - Land
- Legal Services
- Public Relations
- Geotechnical Investigation
- Engineering

2) Moreno Valley PLS

- Material
- Construction
- Construction Management
- Engineering
- Survey

3) Adelanto Compressor Station

- Material
- Maintenance Parts and Tools
- Baseload Power Generation Equipment
- Construction
- Construction Management
- Engineering
- Survey

4) Moreno to Whitewater Pipeline

- Material
- Construction
- Construction Management
- Land Acquisition - Labor
- Land Acquisition - Land
- Legal Services
- Public Relations
- Geotechnical Investigation
- Engineering

5) Moreno Valley PLS

- Material
- Construction
- Construction Management
- Engineering
- Survey

Date:	PROJECT COST ESTIMATE - Material Costs								File name:	AFE	
By:	EEF	Project Name: - North South Project - Adelanto to Moreno Valley									
	Project Length	60	miles	Average Per ton					\$1,887	per ton	
		Quantity	Units	Material		Labor and Equipment		Per diem			
Task				Unit	Total	Unit	Total	Unit	Total		
No.	Task Description			Cost	Cost	Cost	Cost	Cost	Cost	TOTAL	Notes
1	Pipe, 36-inch, API 5Lx -X70 .625 wt	348,480	ft	\$145.75	\$50,790,960	\$0.00	\$0.00		\$0.00	\$50,790,960	
	Pipe footage	316,800									
	Equations	-									
	Elevation Gains - 5%	15,840									
	Scrap pipe - 5%	15,840									
2	Pipe wt	-	tons	\$0	\$0	\$0.00	\$0.00	\$ -	\$0.00	\$0	
3	Coating FBE 10 to 15 mils	348,480	ft	\$11	\$3,892,522	\$0.00	\$0.00	\$ -	\$0.00	\$3,892,522	
	Pipe Freight	348,480	ft	\$0	\$0	\$25.52	\$8,893,210	\$ -	\$0.00	\$8,893,210	
	Double Joining	348,480	ft	\$7	\$2,352,240	\$0.00	\$0	\$ -	\$0.00	\$2,352,240	
3	Pipe bends - 5 D 45 degrees Coated 10 to 15 mils	150	EA	\$12,500	\$1,875,000		\$0	\$0	\$0	\$1,875,000	
4	Pipe bends - 5 D 90 degrees coated 10 to 15 mils	150	EA	\$20,277	\$3,041,550	\$0	\$0	\$0	\$0	\$3,041,550	
5	Valves - 36-inch ANSI 600 full port BW ends 13,000lbs	9.00	EA	\$57,000	\$513,000	\$0	\$0	\$0	\$0	\$513,000	
6	Valves - 36-inch ANSI 600 full port Flanged ends Receiver/Launcher 17600lbs	4.00	EA	\$65,555	\$262,220.00	\$0.00	\$0.00	\$ -	\$0.00	\$262,220	
7	Valves - 30-inch ANSI 600 full port Flanged ends Receiver/Launcher 10,100lbs	-	EA	\$60,000	\$0.00	\$0.00	\$0.00	\$ -	\$0.00	\$0	
8	Valves - 10-inch ANSI 600 full port flanged ends Receiver/Launcher 5750lbs	2.00	EA	\$51,945	\$103,890.00	\$0.00	\$0.00	\$ -	\$0.00	\$103,890	
9	Misc Fittings	1.00	lot	\$500,000	\$500,000.00	\$0.00	\$0.00	\$ -	\$0.00	\$500,000	
10	Casing	2,680	ft	\$240	\$643,200.00	\$0.00	\$0.00	\$ -	\$0.00	\$643,200	
11	Casing insulators	100	sets	\$1,000	\$100,000.00	\$0.00	\$0.00	\$ -	\$0.00	\$100,000	
12	Launcher/ Receiver Barrels	2.00	ea	\$80,000	\$160,000.00	\$0.00	\$0.00	\$ -	\$0.00	\$160,000	
13	Valve operators /wit extensions	9.00	ea	\$30,000	\$270,000.00	\$0.00	\$0.00	\$ -	\$0.00	\$270,000	
14	MOV for launchers and receiver	6.00	ea	\$25,000	\$150,000.00	\$0.00	\$0.00	\$ -	\$0.00	\$150,000	
15	Insulator Joints	5.00	ea	\$20,000	\$100,000.00	\$0.00	\$0.00	\$ -	\$0.00	\$100,000	
16	Rectifiers	5.00	ea	\$25,000	\$125,000.00	\$0.00	\$0.00	\$ -	\$0.00	\$125,000	
17					\$0.00	\$0.00	\$0.00	\$ -	\$0.00	\$0	
	Tax	9%			\$5,839,162		\$0		\$0	\$5,839,162	
	Freight	8%			\$595,349		\$0		\$0	\$595,349	
	Odorization	1	EA	\$200,000.00	\$200,000.00	\$0	\$0	\$0	\$0	\$200,000	
	Filter / Separator	1	EA	\$500,000.00	\$500,000.00	\$0	\$0	\$0	\$0	\$500,000	
	Sub-total				\$72,014,093		\$8,893,210		\$0	\$80,907,303	
	Contingency	0%			\$0		\$0		\$0.00	\$0	

Date:	PROJECT COST ESTIMATE - Material Costs						File name:	AFE			
By:	EEF	Project Name: - North South Project - Adelanto to Moreno Valley									
	Project Length	60	miles	Average Per ton				\$1,887	per ton		
		Quantity	Units	Material		Labor and Equipment		Per diem			
Task				Unit	Total	Unit	Total	Unit	Total		
No.	Task Description			Cost	Cost	Cost	Cost	Cost	Cost	TOTAL	Notes
	TOTAL COST:				\$72,014,093		\$8,893,210		\$0.00	\$80,907,303	
	TOTAL HOURS:										

Date:	PROJECT COST ESTIMATE - Construction Costs											File name:	AFE		
By:	Project Name: - North South Project - Adelanto to Moreno Valley														
Project Length	60	miles													
Task	Quantity	Units	Construction Cost		Environmental Delays (20% of Unit Cost)			Work Hours Restrictions (25%)			Productivity Adjustments (15%)				
No.	Task Description		Unit	Total	Footage	Unit	Total	Footage	Unit	Total	Footage	Unit	Total	TOTAL	
			Cost	Cost		Cost	Cost		Cost	Cost		Cost	Cost		
1	Short Bores	1,900	ft	824	1,565,600		\$164.80	\$0		\$206.00	\$0		\$123.60	\$0	\$1,565,600
2	County Roads - Paved	26,935	ft	340	9,157,900	26,935	\$68.00	\$1,831,580	26,935	\$85.00	\$2,289,475	26,935	\$51.00	\$1,373,665	\$14,652,640
3	County Roads - Unpaved	81,630	ft	283	23,132,867	81,630	\$56.68	\$4,626,573	13,900	\$70.85	\$984,769	32,400	\$42.51	\$1,377,260	\$30,121,470
3	Light Residential - Paved Roads	34,310	ft	361	12,381,518	16,500	\$72.17	\$1,190,878	16,500	\$90.22	\$1,488,597	16,500	\$54.13	\$893,158	\$15,954,150
4	City Streets - Paved	77,465	ft	438	33,918,603		\$87.57	\$0	77,465	\$109.46	\$8,479,651	77,465	\$65.68	\$5,087,791	\$47,486,045
5	Highway 66 - Paved	-	ft	330	-		\$66.00	\$0	-	\$82.50	\$0	-	\$49.50	\$0	\$0
6	US Forest Service	19,430	ft	258	5,003,225	19,430	\$51.50	\$1,000,645	-	\$64.38	\$0	-	\$38.63	\$0	\$6,003,870
7	Cajon Pass - Cross Country	30,880	ft	335	10,344,800	30,880	\$67.00	\$2,068,960	-	\$83.75	\$0	-	\$50.25	\$0	\$12,413,760
8	Cross Country	44,000	ft	258	11,330,000	44,000	\$51.50	\$2,266,000	-	\$64.38	\$0	-	\$38.63	\$0	\$13,596,000
9	HDD Bores	3,100	ft	567	1,757,698		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$1,757,700
10	Main Line valve Stations	9	ea	225,000	2,025,000		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$2,025,000
11	Launcher/ Receiver Barrels	2	ea	60,000	120,000		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$120,000
12	X-Ray Services (2 man Crews)	727	crew days	\$1,900	\$1,381,300	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$1,381,300
13	Test/Clean/Dry Pipe	1	Lot	\$1,278,400	\$1,278,400.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$1,278,400
14	Mobilization	1	ea	\$500,000	\$500,000.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$500,000
15	De-Mobilization	1	ea	\$300,000	\$300,000.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$300,000
16	Unload pipe and Stockpile at yard	1	ea	\$805,000	\$805,000.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$805,000
17	Load pipe and ship to R/W	1	ea	\$805,000	\$805,000.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$805,000
18	Conventional Bores	5,100	ft	\$803	\$4,095,300.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$4,095,300
19	Caliper Survey	1	Lot	\$200,000	\$200,000.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$200,000
					\$0.00			\$0.00			\$0.00			\$0.00	\$0
					\$0.00			\$0.00			\$0.00			\$0.00	\$0
					\$0.00			\$0.00			\$0.00			\$0.00	\$0
	Sub Total	\$ -	\$ -	\$0.00	\$120,102,211			\$12,984,636			\$13,242,492			\$8,731,874	\$155,061,235
	Tax	0.00%			\$0			\$0						\$0	\$0
	Freight	0.00%			\$0			\$0						\$0	\$0
	Sub-total				\$120,102,211			\$12,984,636			\$13,242,492			\$8,731,874	\$155,061,235
	Contingency	0%			\$0			\$0						\$0	\$0
	TOTAL COST:				120,102,211			12,984,636			13,242,492			8,731,874	\$155,061,235
	TOTAL HOURS:														\$0

Date:	PROJECT COST ESTIMATE: Construction Management						File name:	AFE			
By:	EEF						Project Name: - North South Project - Adelanto to Moreno Valley				
	Project Length		60 miles						Average Per diem		8 hrs per day
									Average hourly rate		200 per day
											50 per hour average
Task		Quantity	Units	Days		Labor and Equipment		Per diem			
No.	Task Description			Working Days	Per Diem Days	Unit Cost	Total Cost	Unit Cost	Total Cost	TOTAL	Notes
1	Chief Inspector	2,240	Man Hours	280	392	75	168,000	225	88,200	256,200	
2	Safety Inspector	2,104	Man Hours	263	368	75	157,800	200	73,640	231,440	
3	Environmental Coordinator	1,624	Man Hours	203	284	75	121,800	200	56,840	178,640	
4	Material Coordinator	1,624	Man Hours	203	284	75	121,800	200	56,840	178,640	
5	Schedule Coordinator	1,624	Man Hours	203	284	75	121,800	200	56,840	178,640	
6	Clerk	2,240	Man Hours	280	392	75	168,000	200	78,400	246,400	
7	Training	480	Man Hours			100	48,000	200	-	48,000	
	Crew 1										
8	Rigth-of-way Clearing -Inspector	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
9	Pot hole inspector	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
10	Trenching inspector	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
11	Stringing inspector	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
12	Bending inspector	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
13	Welding Inspector	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
14	X-ray welds/repairs	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
15	Coating inspector	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
16	Lowering inspector	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
17	Backfill inspector	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
18	Right-of way Clean-up	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
19	Boring Inspector/coordinator	1,448	Man Hours	181	253	50	72,400	200	50,680	123,080	
	Crew 2										
20	Rigth-of-way Clearing -Inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	
21	Pot hole inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	
22	Trenching inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	
23	Stringing inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	
24	Bending inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	
25	Welding Inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	
26	X-ray welds/repairs	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	
27	Coating inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	
28	Lowering inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	
29	Backfill inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	
30	Right-of way Clean-up	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	
31	Boring Inspector/coordinator	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040	

Date:	PROJECT COST ESTIMATE: Construction Management						File name:	AFE		
By:	EEF						Project Name: - North South Project - Adelanto to Moreno Valley			
	Project Length		60	miles		Average Per diem			200	8 hrs per day
						Average hourly rate			50	per hour average
Task		Quantity	Units	Days		Labor and Equipment		Per diem		
				Working	Per Diem	Unit	Total	Unit	Total	
No.	Task Description			Days	Days	Cost	Cost	Cost	Cost	TOTAL
										Notes
	Crew 3									
32	Rigth-of-way Clearing -Inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
33	Pot hole inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
34	Trenching inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
35	Stringing inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
36	Bending inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
37	Welding Inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
38	X-ray welds/repairs	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
39	Coating inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
40	Lowering inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
41	Backfill inspector	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
42	Right-of way Clean-up	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
43	Boring Inspector/coordinator	1,624	Man Hours	203	284	50	81,200	200	56,840	138,040
	Crew 4									
44	Rigth-of-way Clearing -Inspector	1,384	Man Hours	173	242	50	69,200	200	48,440	117,640
45	Pot hole inspector	1,384	Man Hours	173	242	50	69,200	200	48,440	117,640
46	Trenching inspector	1,384	Man Hours	173	242	50	69,200	200	48,440	117,640
47	Stringing inspector	1,384	Man Hours	173	242	50	69,200	200	48,440	117,640
48	Bending inspector	1,384	Man Hours	173	242	50	69,200	200	48,440	117,640
49	Welding Inspector	1,384	Man Hours	173	242	50	69,200	200	48,440	117,640
50	X-ray welds/repairs	1,384	Man Hours	173	242	50	69,200	200	48,440	117,640
51	Coating inspector	1,384	Man Hours	173	242	50	69,200	200	48,440	117,640
52	Lowering inspector	1,384	Man Hours	173	242	50	69,200	200	48,440	117,640
53	Backfill inspector	1,384	Man Hours	173	242	50	69,200	200	48,440	117,640
54	Right-of way Clean-up	1,384	Man Hours	173	242	50	69,200	200	48,440	117640
55	Boring Inspector/coordinator	1,448	Man Hours	181	253	50	72,400	200	50,680	123080
							4,558,400		2,966,600	7525000
	Contingency	0%					-		-	-
	TOTAL COST:						4,558,400		2,966,600	7,525,000
	TOTAL HOURS:									-
	Number of Inspectors	51								

Date:	PROJECT COST ESTIMATE - Right-of-Way Acquisition Labor Costs						File name:	AFE			
By:	Project Name: - North South Project - Adelanto to Moreno Valley										
	Project Length	60	miles			Average Per diem		\$ 160.00	per day		
								\$ 20.00	per hour average		
Task		Quantity	Units	Material		Labor and Equipment		Per diem			
No.	Task Description			Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost	TOTAL	Notes
1	Property Acquisition										
	Right-of- Supervisor	1,360.00	Man Hours		\$0.00	\$125.00	\$170,000.00	\$150.00	\$35,700.00	\$205,700.00	
2	Right-of-way agent - High desert	1,040.00	Man Hours		\$0.00	\$100.00	\$104,000.00	\$125.00	\$22,750.00	\$126,750.00	
3	Right-of-way agent- Riverside County	1,040.00	Man Hours		\$0.00	\$100.00	\$104,000.00	\$125.00	\$22,750.00	\$126,750.00	
4	Right-of -way agent - City SB Area	1,040.00	Man Hours		\$0.00	\$100.00	\$104,000.00	\$125.00	\$22,750.00	\$126,750.00	
5	Right-of-Way Agent - Permits	1,040.00	Man Hours		\$0.00	\$100.00	\$104,000.00	\$125.00	\$22,750.00	\$126,750.00	
6	Legal Support	-	Man Hours		\$0.00	\$450.00	\$0.00	-	\$0.00	\$0.00	See legal Detail estimate
7	Office and administrative	1,040.00				\$50.00	\$52,000.00	\$100.00	\$18,200.00	\$70,200.00	
8	Office and Supplies	7.00	months			\$0.00	\$0.00	\$10,000.00	\$70,000.00	\$70,000.00	
9	Sub Total	6,560.00	\$ -		\$0.00		\$0.00	\$20.00	\$131,200.00	\$852,900.00	
10											
11	Construction Support	-									
12	Right-of- Supervisor	1,464.00	Man Hours		\$0.00	\$125.00	\$183,000.00	\$150.00	\$39,000.00	\$222,000.00	
13	Right-of-way agent - Crew 1	1,288.00	Man Hours		\$0.00	\$100.00	\$128,800.00	\$125.00	\$28,125.00	\$156,925.00	
14	Right-of-way agent - Crew 2	1,464.00	Man Hours		\$0.00	\$100.00	\$146,400.00	\$125.00	\$32,500.00	\$178,900.00	
15	Right-of -way agent - Crew 3	1,464.00	Man Hours		\$0.00	\$100.00	\$146,400.00	\$125.00	\$32,500.00	\$178,900.00	
16	Right-of-Way Agent - Crew 4	1,224.00	Man Hours		\$0.00	\$100.00	\$122,400.00	\$125.00	\$26,875.00	\$149,275.00	
17	Office and administrative	1,440.00	Man Hours		\$0.00	\$50.00	\$72,000.00	\$100.00	\$26,000.00	\$98,000.00	
18	Office and Supplies	9.00	months		\$0.00	\$0.00	\$0.00	\$10,000.00	\$90,000.00	\$90,000.00	
19	Sub Total	8,344.00	Man Hours		\$0.00	\$0.00	\$0.00	-	\$0.00	\$1,074,000.00	
20											
21	Project Close-out	-									
22	Right-of- Supervisor	520.00	Man Hours		\$0.00	\$125.00	\$65,000.00	\$150.00	\$13,650.00	\$78,650.00	
23	Right-of-way agent - Crew 1	520.00	Man Hours		\$0.00	\$100.00	\$52,000.00	\$125.00	\$11,375.00	\$63,375.00	
24	Office and administrative	520.00	Man Hours		\$0.00	\$50.00	\$26,000.00	\$100.00	\$9,100.00	\$35,100.00	
25	Office and Supplies	3.00	months		\$0.00	\$0.00	\$0.00	\$5,000.00	\$15,000.00	\$15,000.00	
	Sub Total	1,560.00	Man Hours		\$0.00	\$0.00	\$0.00	\$20.00	\$31,200.00	\$192,125.00	
	Tax	9.00%			\$0.00		\$0.00		\$0.00	\$0.00	
	Freight	9.00%			\$0.00		\$0.00		\$0.00	\$0.00	
	Sub-total				\$0.00		\$0.00		\$701,425.00	\$2,119,025.00	
	Contingency	0%			\$0.00		\$0.00		\$0.00	\$0.00	
	TOTAL COST:				\$0.00		\$0.00		\$701,425.00	\$2,119,025.00	
	TOTAL HOURS:									16,464	

Date:	PROJECT COST ESTIMATE - Right-of-Way Acquisition Land Costs						File name:	AFE				
By:	EEF						Project Name: - North South Project - Adelanto to Moreno Valley					
Project Length	60	miles	Average Per diem						per day			
Pipe Diameter	36 inches						per hour average					
Task	Quantity	Units	Franchise Cost		Private Easement		other					
No.	Task Description		Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost	TOTAL	Notes		
1	Property Acquisition Station 0+00 to 690+00 Permanent	69,000.00	feet	\$0.00	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$	-	
2	Station 0+00 to 690+00 Temporary Work Space 50ft x L x 75% of alignment x 20% of value	2,587,500	Sq Ft		\$0	\$0.21	\$534,607	\$0.00	\$0.00	\$	534,607	\$30,000 per acre 20% of value for temporary construction
3	Storage yard 20% of value per year	10.00	acres		\$0	\$0.21	\$90,000.00	\$0.00	\$0.00	\$	90,000	\$30,000 per acre 20% of value for temporary construction
4	Station 690+00 to 1140+00 Permanent 50 ft wide easement	2,250,000	sq ft		\$0	\$0.34	\$774,793.39	\$0.00	\$0.00	\$	774,793	\$30,000 per acre 50% of land value
5	Station 690+00 to 1140+00 Temporary Work Space 50ft x L x 100% of alignment x 50% of value	2,250,000	Sq Ft		\$0	\$0.21	\$464,876	\$0.00	\$0.00	\$	464,876	\$30,000 per acre 50% of permanent easement
6	Station 1140+00 to 1500+00 Permanent	36,000	feet	\$0.00	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$	-	County Franchise
7	Station 1140+00 to 1500+00 Temporary Work Space 50ft x L x 60% of alignment x 50% of value	1,080,000	Sq Ft		\$0	\$0.50	\$535,537	\$0.00	\$0.00	\$	535,537	\$120,000 per acre 50% of permanent easement
8	Station 1500+00 to 2370+00 Permanent	87,000	feet	\$0.00	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$	-	
9	Station 2370+00 to 2800+00 Permanent 50 ft wide easement	4,350,000	Sq Ft		\$0	\$0.63	\$2,746,212	\$0.00	\$0.00	\$	2,746,212	\$55,000 per acre 50% of permanent easement
10	Station 2370+00 to 2800+00 Temporary Work Space 50ft x L x 100% of alignment x 20% of value	4,350,000	Sq Ft		\$0	\$0.38	\$1,647,727	\$0.00	\$0.00	\$	1,647,727	\$55,000 per acre 20% of value for temporary construction
11	Station 2800+00 to 3130+00 Permanent 50 ft wide easement	1,650,000	Sq Ft		\$0	\$1.38	\$2,272,727	\$0.00	\$0.00	\$	2,272,727	\$30,000 per acre 50% of permanent easement
12	Station 2800+00 to 3130+00 Temporary Work Space 50ft x L x 100% of alignment x 20% of value	1,650,000	Sq Ft		\$0	\$0.83	\$1,363,636	\$0.00	\$0.00	\$	1,363,636	\$30,000 per acre 20% of value for temporary construction
13	Storage yard 20% of value per year	10.00	acres		\$0	\$0.83	\$360,000	\$0.00	\$0.00	\$	360,000	\$30,000 per acre 20% of value for temporary construction
					\$0							
		Sq ft	Acres									
	Private Easements	8,250,000	189.39									
	Temporary construction space	11,917,500	273.59									
	Pipeline storage Yards		20.00									
	Sub Total	20,167,500	482.98		\$0	\$0	\$10,790,116	\$0	\$0	\$	10,790,116	
	Tax	0.00%			\$0		\$0		\$0	\$	-	
	Freight	0.00%			\$0		\$0		\$0	\$	-	
	Sub-total				\$0		\$10,790,116		\$0	\$	10,790,116	
	Miscellaneous fees				\$0		\$0		\$0	\$	-	
	TOTAL COST:				\$0		\$10,790,116		\$0	\$	10,790,116	

Date:	PROJECT COST ESTIMATE - Legal Services						File name:	AFE			
By:	EEF						Project Name: - North South Project - Adelanto to Moreno Valley				
Project Length		60	miles	Average Per diem					per day		
per hour average											
		Quantity	Units	Material		Labor and Equipment		Expenses			
Task				Unit	Total	Unit	Total	Unit	Total		
No.	Task Description			Cost	Cost	Cost	Cost	Cost	Cost	TOTAL	Notes
1	Property Acquisition				\$0	\$450	\$360,000	\$160	\$0	\$360,000	
	Legal Support/ document review	800.00	Man Hours								
2	Property appraisals	50.00	each		\$0	\$0	\$0	\$6,000	\$300,000	\$300,000	
3	Title reports	2%	total property		\$0	\$0	\$0	\$10,790,116	\$219,000	\$219,000	
4	Eminent Domain Action	10.00	each		\$0	\$0	\$0	\$100,000	\$1,000,000	\$1,000,000	
5					\$0	\$0	\$0	\$0	\$0	\$0	
6	Loss of business claims	1.00	lot		\$0.00	\$0.00	\$0.00	\$ 2,000,000	\$2,000,000	\$2,000,000	
7	Damage settlements	1.00	lot		\$0.00	\$0.00	\$0.00	\$ 1,500,000	\$1,500,000	\$1,500,000	
8						\$0	\$0	\$0	\$0	\$0	
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
	Tax	0.00%			\$0.00		\$0		\$0	\$0	
	Freight	0.00%			\$0.00		\$0		\$0	\$0	
	Sub-total				\$0.00		\$360,000		\$5,019,000	\$5,379,000	
	Contingency	0%			\$0.00		\$0		\$0	\$0	
	TOTAL COST:				\$0.00		\$360,000		\$5,019,000	\$5,379,000	
	TOTAL HOURS:									-	

Date:	PROJECT COST ESTIMATE - Public Relations							File name:	AFE		
By:	EEF							Project Name: - North South Project - Adelanto to Moreno Valley			
Project Length		60	miles	Average Per diem					per day		
per hour average											
Task		Quantity	Units	Material		Labor and Equipment		Expenses			
No.	Task Description			Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost	TOTAL	Notes
1	Public Relations Information Web Site	1.00	each		\$0.00	\$0.00	\$0.00	\$100,000	\$100,000	\$100,000	
2	Community out reach meetings	4.00	each		\$0.00	\$0.00	\$0.00	\$50,000	\$200,000	\$200,000	
3	Public Outreach during construction	2	each		\$0.00	\$0.00	\$0.00	\$ 150,000	\$300,000	\$300,000	
4	Community outreach program -	1.00	lot		\$0.00	\$0.00	\$0.00	\$ 500,000	\$500,000	\$500,000	
5					\$0.00	\$0.00	\$0.00	\$ -	\$0	\$0.00	
6											
7											
8						\$0.00	\$0.00	\$ -	\$0	\$0	
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
	Tax	0.00%			\$0.00		\$0		\$0	\$0.00	
	Freight	0.00%			\$0.00		\$0		\$0	\$0.00	
	Sub-total				\$0.00		\$0		\$1,100,000	\$1,100,000.00	
	Contingency	1/0/1900			\$0.00		\$0		\$0	\$0	
	TOTAL COST:				\$0.00		\$0		\$1,100,000	\$1,100,000	
	TOTAL HOURS:									-	

Date:	1/14/2014	PROJECT COST ESTIMATE-Geotechnical Investigation						File name:	AFE		
By:	JF	Project Name: - North-South Project - Adelanto to Moreno Pipeline									
	x										
	Project Length	60	miles				Average Per diem			per day	
										per hour average	
Task		Quantity	Units	Material		Labor and Equipment		Expenses			
No.	Task Description			Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost	TOTAL	Notes
	GeoTech Investigation										
1	Geotechnical Engineer	40	Hours	\$0.00	\$200.00	\$8,000.00		\$0	\$8,000		
2	Sr. Project Geologist/Engineer	128	Hours	\$0.00	\$150.00	\$19,200.00		\$0	\$19,200		
3	Staff Geologist/Engineer	260	Hours	\$0.00	\$135.00	\$35,100.00			\$35,100		
4	CADD/GIS Specialist	80	Hours	\$0.00	\$127.00	\$10,160.00		\$0	\$10,160		
5	Admin	24	Hours	\$0.00	\$68.00	\$1,632.00		\$ -	\$0	\$1,632.00	
6											
7	Other Direct costs										
8	Underground Service Alert Notofication (included in TRC labor and ODCs)	3	day			\$0.00	\$0.00	\$0	\$0	\$0	
9	Geophysical Survey for Utility Clearance (City of San Bernardino)	3	day					\$2,900	\$8,700	\$8,700	
10	Air Knife Company (Cascade) - borehole Clearance	11	day					\$2,300	\$25,300	\$25,300	
11	Drilling Company (Cascade) - sixty 10-ft borings	11	day					\$3,500	\$38,500	\$38,500	
12	Drilling Company (Cascade) - twenty six 15-ft borings	5	day					\$3,500	\$17,500	\$17,500	
13	Drilling Company (Cascade) - six 80-ft borings	4	day					\$3,700	\$14,800	\$14,800	
14	Boring Permits (80 foot borings)	6	per boring					\$300	\$1,800	\$1,800	
15	Traffic Control (City of San Bernardino)	11	day					\$1,500	\$16,500	\$16,500	
16	Encroachment Permits for Street Work	1	Lot					\$68,373	\$68,373	\$68,373	
17	Analytical Testing	1	Lot					\$45,079	\$45,079	\$45,079	
18	Field Vehicles (1 vehicle for 26 days and 1 vehicle for 11 days)	37	day					\$100	\$3,700	\$3,700	
19	Vehicle Mileage (12 trips @200 miles/trip)	2400	miles					\$0.60	\$1,440	\$1,440	
20	Travel Accommodations - Lodging and Meals (1 person for 26 days and 1 person for 11 days)	37	day					\$175	\$6,475	\$6,475	
21	Miscellaneous Safety Equipment and Personal Protective Equipment / Supplies - 4-gas meter, digital camera, etc.	37	day					\$150	\$5,550.00	\$5,550	
22											
23											
24											
	Tax	0.00%		\$0.00		\$0		\$0	\$0.00		
	Freight	0.00%		\$0.00		\$0		\$0	\$0.00		
	Sub-total			\$0.00		\$74,092		\$253,717	\$327,809.11		
	Contingency	0%		\$0.00		\$0		\$0	\$0		
	TOTAL COST:			\$0.00		\$74,092		\$253,717	\$327,809		
	TOTAL HOURS:									-	

TRC

ENGINEERING AND DESIGN ESTIMATE

Proposal No.:

Discipline: Design (Internal use only)

Client: Southern California Gas Co.(Sempra)

Date: 01-27-14 Rev. 0

File: Engineering/Design Estimate 1-27-14

Project: North South Project Adelanto to Moreno Feasibility Report/Estimate

Prepared By: LM

DISCIPLINE SUMMARY SHEET

Approved By:

LABOR COSTS

DESCRIPTION	QTY (*)	ENGINEERING HOURS				DESIGN HOURS						SR PROJ MNGR	TOTAL	
		Staff Level	Proj Level	SR. Proj Lev	TOTAL	Draft 1	Draft 2	Des 1	Des 2	D Supervisor	TOTAL			Clerk
1 SITE INVEST/DESIGN DEVELOP									240	66	306		72	378
2 PROJECT COORDINATION			8,632	1,564	9,996					6,136	6,136	8,632	8,632	33,396
3 DESIGN DRAWINGS	277			344	310				12,214	2,491	14,705		1,013	16,028
4 DESIGN REVIEW										240	240		240	480
5 JOB SHOWING									28	40	68	36	96	200
6 PROCUREMENT			76		76				16	8	24		76	176
7 CONSTRUCTION SUPPORT			80		80				32	20	52	24	168	324
8 PERMITTING			160		160				36	16	52		80	292
9 ROW DOCUMENTS										32	32		32	64
10 PROJECT CLOSEOUT									14	14	28	48	14	90
TOTAL	277		8,948	1,908	10,462				12,580	9,063	21,531	8,740	10,423	51,428
HOURLY LABOR RATE		\$95.00	\$100.00	\$163.00	\$115.26	\$60.00	\$85.00	\$95.00	\$127.00	\$163.00	\$142.81	\$68.00	\$198.00	\$134.92
LABOR COST			\$894,800	\$311,004	\$1,205,804				\$1,597,660	\$1,477,269	\$3,074,929	\$594,320	\$2,063,754	\$6,938,807
(*) DELIVERABLE ITEMS		LABOR RATE MULTIPLIER :				100.0%	NON-LABOR COSTS							

DISCIPLINE SCOPE OF WORK	DESCRIPTION	QTY	UNIT	TOTAL
Prepare construction dwgs for Relocations for 59mile 36" pipeline Adelanto to Moreno Vall	PROJECT MANAGEMENT SYSTEM FEE @ 1%			
Packages to include Plan/Profile alignment sheets, details, other	OUTSIDE REPRODUCTION SERVICES		\$1.25	
Includes coordination with various agencies in support.	AUTO TRAVEL (Mileage)	20,000	\$0.56	\$11,100
Drawing scale 1"=20', 1"=40', 1"=100,	POSTAGE AND FREIGHT			\$1,200
Engineering review and recommendations	TELEPHONE / TELEGRAPH / FAX			
Engineering Scope Design HDD's, evaluations, submittals for Crossings,	Mileage	2,000	0.555	\$1,110
29 crossings, Flood Control, Caltrans, RR,	Engineer Review Stamp Dwgs			\$25,073
	Survey, Aerial, Planimetrics, (Estimate Psomas)			
DISCIPLINE PROJECT DESIGN CRITERIA	PERMIT FEES			
Per SCG Construction Drawing Standards	WORD PROCESSING EQUIPMENT	80%	6,992	\$5.00
	SURVEY AND FIELD EQUIPMENT			
	OUTSIDE COMPUTER SERVICES			
	SPECIAL MATERIALS (Film, Floppy)		\$5	
	IN-HOUSE COMPUTER EQUIPMT	50%		\$5.00
	AUTOCAD / MICROSTATION EQUIP	65%		\$5.00
	PHOTOCOPIES (Xerox)Bid Docs			\$0.15
	DRAWING COPIES (Bond Prints)			\$2.40
DISCIPLINE ASSUMPTIONS & EXCEPTIONS	DRAWING REPRODUCIBLES (Sepia Prints)			\$5.00
See Proposal letter	CADD ELECTRONIC PLOTS: Full Size			\$18.00
	Ink Jet			\$1.00
	TRAVEL / LIVING EXPENSES: Hotel/Meals-Days	115	\$50	\$5,750
	Airline Travel - Round Trips			\$400
	Car Rental - Days			\$118
	Contingency			
	TOTAL NON-LABOR COSTS			\$79,193
	TOTAL COSTS			\$7,018,000

TRC **ENGINEERING AND DESIGN ESTIMATE** **Proposal No.:**

Client: Southern California Gas Co.(Sempra) **Date: 01-27-14** **Rev. 0**

Discipline: Design (Internal use only) **Project: North South Project Adelanto to Moreno Feasibility Report/Estimate** **Prepared By: LM**

DESCRIPTION	QTY (*)	ENGINEERING HOURS				DESIGN HOURS						SR PROJ		TOTAL	
		Staff Level	Proj Level	SR. Proj Lev	TOTAL	Draft 1	Draft 2	Des 1	Des 2	D Supervisor	TOTAL	Clerk	MNGR		
1. Site Investigation/Design Development : List anything required to develop design, site/archive investigations, job walks, code investigations, report review and interpretation (list actual cost of subcontracted work on Page 1), familiarization with client standards.															
Site Investigation											16	16		24	40
Develop scope/Startup Package											8	8	8		16
Research RR									16		4	20			20
Research w/ County Flood Control Districts									24		4	28			28
Research w/One Call									8		2	10			10
Research w/Utilities									40		4	44			44
Research County road departments									24		4	28			28
Research City RD, SD, SS, util									40		4	44			44
Research State Hwy's									24		4	28			28
Misc. Research/followup									40		4	44	40		84
Travel									24		12	36			36
TOTAL									240		66	306	72		378

2. Project Coordination: Include all coordination hours, i.e. project meetings, client meetings, project paper work, coordination with project management and other disciplines, interdisciplinary spec and drawing review. Include travel time to and from meetings, pm updates, hours for archiving project discipline documents. Include all external coordination hours, i.e. hours for permitting and plan check and any other hours required for dealing with outside organizations (consultants, government agencies, utilities, other engineering firms, etc).

Develop Project Scheduling			4,300	20	4,320						200	200	300	200	5,020
Project Cost Estimate (support)			4,300	124	4,424						200	200	300	200	5,124
Coordination with client (meetings, phone communications)				120	120						500	500	3,500	3,500	7,620
Internal coordination (engineering, design, permitting)				400	400						3,000	3,000	3,500	3,500	10,400
Potholing coordination											400	400	200	80	680
Coordination with agency (support)				400	400						300	300	200	500	1,400
Coordination with other utilities				200	200						600	600	100	100	1,000
Coordination with survey											400	400	100	80	580
Misc				100	100						236	236	232	256	824
Prep of Prelimin Design Report				200							200	200	200	200	600
Travel				32	32						100	100		16	148
TOTAL			8,632	1,564	9,996						6,136	6,136	8,632	8,632	33,396

TRC

ENGINEERING AND DESIGN ESTIMATE

Proposal No.:

Client: Southern California Gas Co.(Sempra)

Date: 01-27-14 Rev. 0

Discipline: Design (Internal use only)

Project: North South Project Adelanto to Moreno Feasibility Report/Estimate

Prepared By: LM

3. Design Drawings : List all physical drawings, plans, sections and details, orthographic and isometric. List all diagrams, schematics, P & ID's, schedules, etc. List all TRC produced "as-built" drawings. As-built drawings are defined as new drawings prepared by TRC of existing facilities or drawings of existing facilities, furnished by the client and corrected or modified by us. If this is a lump sum job, do not estimate unless you have studied the facility. "Record" drawings are defined as drawings prepared by TRC from drawings marked-up by the contractor to the as-constructed conditions and then corrected by TRC. TRC corrects record drawings only to the extent they are marked-up and furnished by the contractor. We do not verify as-built conditions of a facility unless construction support is included in this estimate. Also include hours for plotting, blueprinting, checking, and project review. Hours for archiving shall be included under PROJECT COORDINATION. Non-labor items (CADD hours, floppies, plotting / printing media, microfilming, drawing reductions, drawing scanning, etc) shall be included on Page 1.

DESCRIPTION	QTY (*)	ENGINEERING HOURS				DESIGN HOURS							SR PROJ MNGR	TOTAL
		Staff Level	Proj Level	SR. Proj Lev	TOTAL	Draft 1	Draft 2	Des 1	Des 2	D Supervisor	TOTAL	Clerk		
Cover Sheet w/Dwg Index	2								16	2	18		2	20
Alignment Sheet 1"=100'	54								1,728	108	1,836		32	1,868
Alignment Sheet 1"=40'	158								6,320	316	6,636		36	6,672
Detail Crossings 1"=20'	33			264	264				1,320	66	1,386		40	1,690
Standard Details	3			6	6				60	6	66		6	78
Special Details	3			6	6				60	6	66		6	72
Gen Notes	2			6	6				32	4	36		6	42
Tie-in to Compressor station details	2			6	6				32	4	36		6	48
Launcher/Receiver details	4			8	8				128	8	136		8	152
Valve site details	9			18	18				144	18	162		18	180
Cathodic Protection Details	2			8	8				32	4	36		8	52
Fencing Details	1			2	2				16	2	18		2	20
line markers	1			2	2				16	2	18		2	20
casing details	1			2	2				16	2	18		2	22
structural details	2			16	16				40	4	44		16	76
Pipeline As-Builts									1,108	554	1,662		2	1,664
Subtotal				344	310				11,068	1,106	12,174		192	12,676
PLOTTING (Dwgs x No.of times x 0.1)									40		40			40
CHECKING (Discipline/Squad/QA)									544	1,108	1,652		544	2,196
PRINTING (Dwgs x No.of times x 0.05)														
PLAN CHECK SUBMTL / CORRECT.									554	277	831		277	1,108
RECORD DRAWINGS									8		8			8
TOTAL	277			344	310				12,214	2,491	14,705		1,013	16,028

4. Design Review *Include all coordination hours, i.e. project meetings, client meetings, project paper work, coordination with project management and other disciplines, any hours associated with drawing reviews. Include travel time to and from meetings, pm updates, hours for archiving project discipline documents. Include all external coordination hours, i.e. hours required for dealing with outside organizations (consultants, government agencies, utilities, other engineering firms, etc).*

DESCRIPTION	QTY (*)	ENGINEERING HOURS				DESIGN HOURS						SR PROJ MNGR	TOTAL	
		Staff Level	Proj Level	SR, Proj Lev	TOTAL	Draft 1	Draft 2	Des 1	Des 2	D Supervisor	TOTAL			Clerk
Design Review Meetings Client (36)											108	108	108	216
Design Review Meetings Agencies (36)											108	108	108	216
Travel time and costs to meetings.											24	24	24	48
TOTAL											240	240	240	480

5. Job Showing : *Include hours for preparation of RFQ's, coordination with vendors, bid summary, bid conditioning meetings, drawing reproduction P.O. preparation (if required), bid specifications, Job site meetings, coordination with client, meeting notes and communications, bid evaluation/recommendation. Travel time and costs to job site, . Include hours for checking and review of bids.*

Prepare Bid specs										16	24	40	32	72
Coord w/Client, contractors, agency													24	24
Bid Job site meeting											8	8	8	16
Job walk meeting notes/Q and A													8	8
Bid spec support									12			12	36	48
Bid Evaluation/Recommendation													16	16
Travel											8	8	8	16
TOTAL									28	40	68	36	96	200

6. Procurement: *List all items that TRC would be purchasing or providing procurement support. Include hours for preparation of RFQ's, coordination with vendors, bid summary, bid conditioning meetings, P.O. preparation (if required), vendor drawing review, shop drawing review & inspection (list inspection by outside firms on Page 1). Include hours for checking and project review.*

Bill of Materials									16	8	24	8	32
Request for Materials												24	24
Request for Materials/mtl Quotes			20		20							8	28
Coord with Client Purchasing			16		16							4	20
Procure materials			24		24							4	28
Construction Cost Estimate			16		16							4	20
Construction Schedule												16	16
												8	8
TOTAL			76		76				16	8	24	76	176

TRC **ENGINEERING AND DESIGN ESTIMATE** **Proposal No.:**

Discipline: Design (Internal use only) **Client: Southern California Gas Co.(Sempra)** **Date: 01-27-14 Rev. 0**

Project: North South Project Adelanto to Moreno Feasibility Report/Estimate **Prepared By: LM**

7. Construction Support: List all construction support, identify which is office or field support. Include hours for construction bid meeting, start-up or precommissisoning assistance if applicable, and travel time to and from site.

DESCRIPTION	QTY (*)	ENGINEERING HOURS				DESIGN HOURS					SR PROJ MNGR	TOTAL		
		Staff Level	Proj Level	SR Proj Lev	TOTAL	Draft 1	Draft 2	Des 1	Des 2	D Supervisor			TOTAL	Clerk
Construction Kickoff meetings										8	8	4	16	28
Construction Support field/phone			24		24					8	8	4	40	76
Develop Hydro test/tie in procedures			24		24					8	8	4	16	52
Incorporate field comments to tie in procedures												4	16	20
Conduct pre-tie in meeting w/field personnel										8	8	4	16	28
Status reports, Budget, Const Operations			32		32						16	4	24	76
Abandonment procedures														
Travel											4		40	44
TOTAL			80		80					32	20	24	168	324

8. Permitting Include all coordination hours, i.e. project meetings, client meetings, project paper work, coordination with project management and other disciplines, interdisciplinary spec and drawing review. Include travel time to and from meetings, pm updates, hours for archiving project discipline documents. Include all external coordination hours, i.e. hours for permitting and plan check and any other hours required for dealing with outside organizations (consultants, government agencies, utilities, other engineering firms, etc).

Develop Permitting List (support ROW)			16		16					16	16		16	48
Prepare per applications (support ROW)			40		40					16	8		16	80
Coordinate permit acquisition			40		40					4	8		16	68
Enviornmental documents													16	16
Permitting plan			40		40									40
Travel			24		24								16	40
TOTAL			160		160					36	16		80	292

9. ROW Documents Include all coordination hours, i.e. project meetings, project paper work, coordination with project management and other disciplines, interdisciplinary spec and drawing review. Include time for archiving project discipline documents. Include all external coordination hours, i.e. hours for permitting and plan check and any other hours required for dealing with outside organizations (consultants, government agencies, utilities, other engineering firms, etc).

Review right of way documents										8	8		8	16
Prepare new easement documents										8	8		8	16
Legal descriptions (support)										8	8		8	16
Dity/County Reviews										8	8		8	16
TOTAL										32	32		32	64

10. Project Closeout: Include all coordination hours, i.e. project meetings, client meetings, project paper work, coordination with project management, contractors and other disciplines, interdisciplinary spec and drawing review. Include travel time to and from job site, hours for archiving project discipline documents. Include all external coordination hours, i.e. hours required for dealing with outside organizations (consultants, contractors, inspectors and records to cover government agencies, etc).

Collect Construction Records										12	12	16	12	40
Copy Construction Records										8	8	16		24
Deliver copies for filing										4	4	16		20
Travel										2	2		2	6
TOTAL										14	14	48	14	90

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Moreno Valley PLS Tie-In
Material Cost Estimate**

Task No.	Material Description	Quantity	Units	Material		Labor and Equipment		Per Diem		TOTAL	Notes
				Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost		
Major Materials											
1	Valve from 36" line to 30" line	1	ea	\$110,000	\$110,000	\$0	\$0	\$0	\$0	\$110,000	
2	Valve from 36" line to 24" line	1	ea	\$80,000	\$80,000	\$0	\$0	\$0	\$0	\$80,000	
3	Valve from 36" line to 16" line	1	ea	\$60,000	\$60,000	\$0	\$0	\$0	\$0	\$60,000	
4	36" x 30" Reducing Tee	1	ea	\$15,000	\$15,000	\$0	\$0	\$0	\$0	\$15,000	
5	36" x 24" Reducing Tee	1	ea	\$15,000	\$15,000	\$0	\$0	\$0	\$0	\$15,000	
6	24" x 16" Reducer	1	ea	\$5,000	\$5,000	\$0	\$0	\$0	\$0	\$5,000	
7	Equipment Piping and Other Materials	1	lot	\$25,000	\$25,000	\$0	\$0	\$0	\$0	\$25,000	
8	Regulator and Controls	2	ea	\$50,000	\$100,000	\$0	\$0	\$0	\$0	\$100,000	
9	Regulator Run Equip Valves	5	ea	\$35,000	\$175,000	\$0	\$0	\$0	\$0	\$175,000	
10	Regulator Reducing Tees	3	ea	\$15,000	\$45,000	\$0	\$0	\$0	\$0	\$45,000	
11	Station Pipe Fittings	32	ea	\$2,500	\$80,000	\$0	\$0	\$0	\$0	\$80,000	
12	Interconnect Pipe - 10"	200	ft	\$55	\$11,000	\$0	\$0	\$0	\$0	\$11,000	
13	Interconnect Pipe - 16"	20	ft	\$100	\$2,000	\$0	\$0	\$0	\$0	\$2,000	
14	Subtotal - Major Materials									\$723,000	
15	Minor Materials	1	lot		\$206,000					\$206,000	
16	Total									\$929,000	
TOTAL COST										\$929,000	
TOTAL HOURS											

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Moreno Valley PLS Tie-In
Construction Labor Cost Estimate**

Construction Labor

Task No.	Task Description	No. of Crews	Hours per Crew	Units	Construction Cost		TOTAL	Notes
					Unit Cost	Total Cost		
1	Piping - Straight Time	2	160	Hours	375	\$120,000		
2	Piping - Overtime	2	160	Hours	525	\$168,000		
3	Electrical - Straight Time	1	160	40	\$375.00	\$60,000		
4	Electrical - Overtime	1	160	40	\$525.00	\$84,000		
5	Civil/Laborers - Straight time - Concrete	1	160	40	\$375.00	\$60,000		
6	Civil/Laborers - Overtime - Concrete	1	160	40	\$487.50	\$78,000		
7	Civil/Laborers - Straight Time - All Other Work	1	160	40	\$375.00	\$60,000		
8	Civil/Laborers - OverTime - All Other Work	1	160	40	\$487.50	\$78,000		
9	Total Station Construction Labor		1280			\$708,000		
<u>Equipment Rental</u>								
		Equipment Qty.	Months on Site		Rate per Month	Total Cost		TOTAL
10	Earth Auger	1	1		\$10,000	\$10,000		
11	Backhoe	1	2		\$11,000	\$22,000		
12	Telescope Beam Trk	1	1		\$20,000	\$20,000		
13	Forklift - Large	1	1		\$20,000	\$20,000		
14	Welder	2	2		\$5,000	\$20,000		
15	Total Equipment Rental					\$92,000		
16	Total Labor and Equipment					\$800,000		
TOTAL COST						\$800,000		
TOTAL HOURS			1280					

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Moreno Valley PLS Tie-In
Construction Management Cost Estimate**

Task No.	Task Description	Quantity	Units	Days		Labor and Equipment		Per Diem		TOTAL	Notes
				Working Days	Per Diem Days	Unit Cost	Total Cost	Unit Cost	Total Cost		
1	Chief Inspector	60	Hours	10	\$150	\$150	\$9,000	\$150	\$ 1,500	\$10,500	
2	Welding Inspector	160	Hours	20	\$125	\$125	\$20,000	\$150	\$ 3,000	\$23,000	
3	Electrical Inspector	80	Hours	10	\$110	\$110	\$8,800	\$150	\$ 1,500	\$10,300	
4	Civil/Craft Inspector	60	Hours	10	\$110	\$110	\$6,600	\$150	\$ 1,500	\$8,100	
5	Materials Manager	24	Hours	5	\$110	\$110	\$2,640	\$150	\$ 750	\$3,390	
6	Total Inspection						\$47,040		\$ 8,250	\$55,000	
TOTAL COST							\$47,040		\$ 8,250	\$55,000	
TOTAL HOURS		384									

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Moreno Valley PLS Tie-In
Engineering and Project Management Cost Estimate**

Task No.	Task Description	Quantity	Units	Labor and Equipment		Contract Cost		TOTAL	Notes
				Unit Cost	Total Cost	Unit Cost	Total Cost		
<u>Hourly Engineering</u>									
1	Sr. Mechanical Engineer	20	Hours	\$126	\$2,520			\$2,520	
2	Mechanical Engineer	60	Hours	\$113	\$6,780			\$6,780	
3	Sr. Structural Engineer	20	Hours	\$126	\$2,520			\$2,520	
4	Sr. Civil Engineer	20	Hours	\$126	\$2,520			\$2,520	
5	Sr. Electrical Engineer	20	Hours	\$126	\$2,520			\$2,520	
6	Electrical Engineer	20	Hours	\$113	\$2,260			\$2,260	
7	Design and Drafting	80	Hours	\$61	\$4,880			\$4,880	
8	Project Manager	24	Hours	\$140	\$3,360			\$3,360	
9	Administrative	8	Hours	\$61	\$488			\$488	
10	Printing						\$1,000	\$1,000	
11	Subtotal Hourly Engineering	272						\$28,848	
<u>Contract Engineering</u>									
12	Geotechnical Investigation	1	Lot				\$15,000	\$15,000	
13	Cathodic Protection	1	Lot				\$10,000	\$10,000	
14	Station Controls Engineering	40	Hours			\$150	\$6,000	\$6,000	
15	Subtotal Contract Engineering							\$31,000	
16	Total Engineering							\$60,000	
<u>Project Manager</u>									
	Project Manager	40	Hours	\$190	\$7,600			\$7,600	
<u>Project Manager Per Diem</u>									
	Project Manager	14	Days	\$150	\$2,100			\$2,100	
	Total Project Manager	40						\$9,700	

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Moreno Valley PLS Tie-In
Engineering and Project Management Cost Estimate**

Task No.	Task Description	Quantity	Units	Labor and Equipment		Contract Cost		TOTAL	Notes
				Unit Cost	Total Cost	Unit Cost	Total Cost		
Total Engineering and Construction Manager								\$70,000	
TOTAL COST								\$70,000	
TOTAL HOURS			312						

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Moreno Valley PLS Tie-In
Survey Cost Estimate**

Task No.	Description	Quantity	Units	Labor and Equipment		Contract Cost		TOTAL	Notes
				Unit Cost	Total	Unit Cost	Total Cost		
1	Survey - 2 man crew	20	Hours	\$240	\$4,800			\$4,800	
2	Station Laser Scanning					\$10,000	\$10,000	\$10,000	
3	Total							\$14,800	

Date:	1/16/2014	PROJECT COST ESTIMATE - Construction Labor Costs							
By:	JJK	Project Name: - North South Project Compressor Station							
					Construction Cost				
Task No.	Task Description	No. of Crews	Hours per Crew	Units	Unit Cost	Total Cost		TOTAL	Notes
1	Piping - Straight Time	6	2000	hours	\$349.55	\$4,194,600		\$4,194,600	
2	Piping - Overtime	6	1000	hours	\$524.33	\$3,145,950		\$3,146,000	
3	Electrical - Straight Time	6	2000	hours	\$349.55	\$4,194,600		\$4,194,600	
4	Electrical - Overtime	6	1000	hours	\$524.33	\$3,145,950		\$3,146,000	
5	Civil/Laborers - Straight time - Concrete	5	2000	hours	\$300.00	\$3,000,000		\$3,000,000	
6	Civil/Laborers - Overtime - Concrete	5	800	hours	\$450.00	\$1,800,000		\$1,800,000	
7	Civil/Laborers - Straight Time - All Other Work	4	2000	hours	\$275.00	\$2,200,000		\$2,200,000	
8	Civil/Laborers - OverTime - All Other Work	4	800	hours	\$412.50	\$1,320,000		\$1,320,000	
9	Subtotal - Station Construction Labor							\$ 23,001,000	
	<u>Baseload Power Generation Installation Labor</u>								
10	Foundations and Equipment Installation	1		lot	\$50,000	\$50,000		\$50,000	
11	Buildings ("Turnkey" Installation)	1		lot	\$200,000	\$200,000		\$200,000	
12	Turbine Intake/Exhaust Installation	2		ea	\$75,000	\$150,000		\$150,000	
13	Subtotal - Baseload Power Generation Installation							\$400,000	
14	Total Installation Labor							\$23,401,000	
	<u>Equipment Rental</u>								

Date:	1/16/2014	PROJECT COST ESTIMATE - Construction Labor Costs							
By:	JJK	Project Name: - North South Project Compressor Station							
						Construction Cost			
Task No.	Task Description	No. of Crews	Hours per Crew	Units	Unit Cost	Total Cost		TOTAL	Notes
		Equipment Qty	Months on Site		Rate per Month	Total Cost		TOTAL	
15	Concrete Pump	2	2		\$7,500	\$30,000		\$30,000	
16	Earth Auger	1	2		\$15,000	\$30,000		\$30,000	
17	3/4 Yard Excavator	1	2		\$27,000	\$54,000		\$54,000	
18	Backhoe	3	7		\$2,650	\$55,650		\$55,650	
19	Grader	1	3		\$5,000	\$15,000		\$15,000	
20	Truck Mounted Hydraulic Crane - Large	1	3		\$9,000	\$27,000		\$27,000	
21	Truck Mounted Hydraulic Crane - Small	1	6		\$6,000	\$36,000		\$36,000	
22	Aerial Lift	3	7		\$1,450	\$30,450		\$30,450	
23	Telescope Beam Trk	1	7		\$7,000	\$49,000		\$49,000	
24	Forklift - Large	1	6		\$6,000	\$36,000		\$36,000	
25	Forklift - Small	2	6		\$3,000	\$36,000		\$36,000	
26	Generator	3	7		\$5,000	\$105,000		\$105,000	
27	Tower Lights	3	6		\$2,000	\$36,000		\$36,000	
28	Water Truck	1	7		\$15,000	\$105,000		\$105,000	
29	Welder	3	7		\$1,400	\$29,400		\$29,400	
30	Paver	1	2		\$20,000	\$40,000		\$40,000	
31	Total Equipment Rental							\$715,000	
32	Total Labor and Equipment							\$24,116,000	
	TOTAL COST							\$24,116,000	
	TOTAL HOURS		11600						

Date:	1/16/2014	PROJECT COST ESTIMATE - Construction Management Cost									
By:	JJK	Project Name: - North South Project Compressor Station									
				Days		Labor and Equipment		Per Diem			
Task No.	Task Description	Quantity	Units	Working Days	Per Diem Days	Unit Cost	Total Cost	Unit Cost	Total Cost	TOTAL	Notes
	<u>Craft Inspection</u>										
1	Chief Inspector	2,400	ManHours	200	240	\$150	\$360,000	\$150	\$36,000	\$396,000	
2	Welding Inspector	2,400	ManHours	200	240	\$125	\$300,000	\$150	\$36,000	\$336,000	
3	Electrical Inspector	2,400	ManHours	200	240	\$110	\$264,000	\$150	\$36,000	\$300,000	
4	Civil/Craft Inspector	2,400	ManHours	200	240	\$110	\$264,000	\$150	\$36,000	\$300,000	
5	Materials Manager	2,400	ManHours	200	240	\$110	\$264,000	\$150	\$36,000	\$300,000	
6	Total Inspection									\$1,632,000	
	<u>Construction Manager</u>										
7	Construction Manager	3,000	ManHours	240	360	\$200	\$600,000	\$150	\$54,000	\$654,000	
8	Construction Manager Expenses									\$25,000	
9	Total Construction Manager									\$679,000	
10	Total Construction Management									\$2,311,000	
	TOTAL COST						\$2,052,000		\$234,000	\$2,311,000	
	TOTAL HOURS	15,000									
	Number of Inspectors	5									

Date:	1/16/2014	PROJECT COST ESTIMATE - Engineering Costs							
By:	JJK	Project Name: - North South Project Compressor Station							
				Labor and Equipment		Contract Cost			
Task No.	Task Description	Quantity	Units	Unit Cost	Total Cost	Unit Cost	Total Cost	TOTAL	Notes
	Hourly Engineering								
1	Sr. Mechanical Engineer	1,000	Hours	\$126	\$126,000			\$126,000	
2	Mechanical Engineer	2,500	Hours	\$113	\$282,500			\$282,500	
3	Sr. Structural Engineer	500	Hours	\$126	\$63,000			\$63,000	
4	Sr. Civil Engineer	500	Hours	\$126	\$63,000			\$63,000	
5	Sr. Electrical Engineer	1,000	Hours	\$126	\$126,000			\$126,000	
6	Electrical Engineer	2,500	Hours	\$113	\$282,500			\$282,500	
7	Design and Drafting	4,000	Hours	\$61	\$244,000			\$244,000	
8	Project Manager	1,000	Hours	\$140	\$140,000			\$140,000	
9	Administrative	300	Hours	\$61	\$18,300			\$18,300	
10	Printing	1 Lot			\$7,000			\$7,000	
11	Subtotal Hourly Engineering				\$1,352,300				
	Contract Engineering								
12	Geotechnical Investigation	1	Lot				\$75,000	\$75,000	
13	Cathodic Protection	1	Lot				\$75,000	\$75,000	
14	Station Controls Engineering	1,250	Hours			\$150	\$187,500	\$187,500	
	Subtotal Contract Engineering						\$337,500		
	Total Engineering							\$1,690,000	
	TOTAL COST							\$1,690,000	
	TOTAL HOURS	14,550							

Date:	1/16/2014	PROJECT Cost Estimate - Survey Cost Estimate						
By:	JJK	Project Name: - North South Project Compressor Station						
		Quantity	Units	Unit Cost	Total		TOTAL	Notes
Task								
No.	Task Description			Cost			TOTAL	Notes
1	Survey - 2 man crew	1500	Hours	\$237	\$355,125		\$355,000	
	TOTAL COST						\$355,000	
	TOTAL HOURS	1500						

Date:	1/20/2014	PROJECT COST ESTIMATE - Material Costs						File name:	AFE		
By:	EEF	Project Name: - North South Project Moreno to Whitewater Pipeline									
	x										
	Project Length	31.25	miles	Average Per ton				\$1,887	per ton		
		Quantity	Units	Material		Labor and Equipment		Per diem			
Task				Unit	Total	Unit	Total	Unit	Total		
No.	Task Description			Cost	Cost	Cost	Cost	Cost	Cost	TOTAL	Notes
	Tax	9%			\$2,964,896		\$0		\$0	\$2,964,896	
	Freight (Other than pipe)				\$549,220		\$0		\$0	\$549,220	
	Odorization	1	EA	\$100,000	\$100,000	\$0	\$0	\$0	\$0	\$100,000	
	Sub-total				\$36,557,410		\$4,594,825		\$0	\$41,152,235	
	Contingency	0%					\$0		\$0.00		
	TOTAL COST:				\$36,557,410		\$4,594,825		\$0.00	\$41,152,235	
	TOTAL HOURS:									\$0	

Date:	1/24/2014	PROJECT COST ESTIMATE - Construction Costs											File name:	AFE		
By:	EEF	Project Name: - North South Project - Moreno to Whitewater Pipeline														
	Project Length	31.5	miles													
		Quantity	Units	Construction Cost		Environmental Delays (20% of Unit Cost)		Work Hours Restrictions (25%)			Productivity Adjustments (15%)					
Task				Unit	Total	Footage	Unit	Total	Footage	Unit	Total	Footage	Unit	Total		
No.	Task Description			Cost	Cost		Cost	Cost		Cost	Cost		Cost	Cost	TOTAL	
1	Conventional Bores	1,500	ft	2,000	3,000,000		\$400.00	\$0		\$500.00	\$0		\$300.00	\$0	\$3,000,000	
2	County Roads - Paved	47,500	ft	500	23,750,000		\$100.00	\$0		\$125.00	\$0		\$75.00	\$0	\$23,750,000	
3	Narrow Right of way	64,320	ft	300	19,296,000		\$60.00	\$0		\$75.00	\$0		\$45.00	\$0	\$19,296,000	
3	Light Residential - Paved Roads	-	ft	350	-		\$70.00	\$0		\$87.50	\$0		\$52.50	\$0	\$0	
4	City Streets - Paved	-	ft	425	-		\$85.00	\$0		\$106.25	\$0		\$63.75	\$0	\$0	
5	Highway 66 - Paved	-	ft	330	-		\$66.00	\$0	-	\$82.50	\$0		\$49.50	\$0	\$0	
6	Mountain Terrain	41,000	ft	700	28,700,000		\$140.00	\$0	-	\$175.00	\$0	-	\$105.00	\$0	\$28,700,000	
7	Cajon Pass - Cross Country	-	ft	325	-		\$65.00	\$0	-	\$81.25	\$0	-	\$48.75	\$0	\$0	
8	Cross Country	9,000	ft	250	2,250,000		\$50.00	\$0	-	\$62.50	\$0	-	\$37.50	\$0	\$2,250,000	
9	HDD Bores	3,000	ft	780	2,339,998		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$2,340,000	
10	Main Line valve Stations	6	ea	225,000	1,350,000		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$1,350,000	
11	Launcher/ Receiver Barrels	2	ea	60,000	120,000		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$120,000	
12	X-Ray Services (2 man Crews)	420	crew days	\$1,800	\$756,000		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$756,000	
13	Test/Clean/Dry Pipe	1	Lot	\$665,280.00	\$665,280.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$665,280	
14	Mobilization	1	ea	\$250,000	\$250,000.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$250,000	
15	De-Mobilization	1	ea	\$150,000	\$150,000.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$150,000	
16	Unload pipe and Stockpile at yard	1	ea	\$390,750	\$390,750.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$390,750	
17	Load pipe and ship to R/W	1	ea	\$390,750	\$390,750.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$390,750	
18	Caliper Survey	1	ea	\$150,000.00	\$150,000.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$150,000	
					\$0.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$0	
					\$0.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$0	
		-	\$ -		\$0.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$0	
		-	\$ -		\$0.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$0	
		-	\$ -		\$0.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$0	
		-	\$ -		\$0.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$0	
		0	\$ -		\$0.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$0	
		0	\$ -		\$0.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$0	
	Sub Total	\$ -	\$ -	\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$83,558,780	
	Tax	0.00%			\$0		\$0	\$0		\$0	\$0		\$0	\$0	\$0	
	Freight	0.00%			\$0		\$0	\$0		\$0	\$0		\$0	\$0	\$0	
	Sub-total			\$83,558,778	\$83,558,778		\$0	\$0		\$0	\$0		\$0	\$0	\$83,558,780	
	Contingency	0%		\$0	\$0		\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00	\$0	
	TOTAL COST:			\$83,558,778	\$83,558,778		\$0	\$0		\$0	\$0		\$0.00	\$0.00	\$83,558,780	
	TOTAL HOURS:														\$0	

Date:	1/16/2014	PROJECT COST ESTIMATE - Construction Management						File name:	AFE		
By:	EEF	Project Name: - North South Project Moreno to Whitewater Pipeline									
	x									8	hrs per day
	Project Length	31.25	miles							200	per day
											Average Per diem
											Average hourly rate
											100 per hour average
		Quantity	Units	Days		Labor and Equipment		Per diem			
Task				Working	Per Diem	Unit	Total	Unit	Total		
No.	Task Description			Days	Days	Cost	Cost	Cost	Cost	TOTAL	Notes
1	Chief Inspector	1,640	Man Hours	205	287	75	123,000	225	64,575	187,575	
2	Safety Inspector	1,560	Man Hours	195	273	75	117,000	200	54,600	171,600	
3	Environmental Coordinator	1,560	Man Hours	195	273	75	117,000	200	54,600	171,600	
4	Material Coordinator	1,560	Man Hours	195	273	75	117,000	200	54,600	171,600	
5	Schedule Coordinator	1,560	Man Hours	195	273	75	117,000	200	54,600	171,600	
6	Clerk	1,560	Man Hours	195	273	75	117,000	200	54,600	171,600	
7	Training	480	Man Hours			100	48,000	200	-	48,000	
	Crew 1										
8	Righth-of-way Clearing -Inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
9	Pot hole inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
10	Trenching inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
11	Stringing inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
12	Bending inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
13	Welding Inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
14	X-ray welds/repairs	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
15	Coating inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
16	Lowering inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
17	Backfill inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
18	Right-of way Clean-up	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
19	Boring Inspector/coordinator	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
	Crew 2										
20	Righth-of-way Clearing -Inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
21	Pot hole inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
22	Trenching inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
23	Stringing inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
24	Bending inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
25	Welding Inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
26	X-ray welds/repairs	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
27	Coating inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
28	Lowering inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
29	Backfill inspector	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
30	Right-of way Clean-up	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	
31	Boring Inspector/coordinator	1,480	Man Hours	185	259	50	74,000	200	51,800	125,800	

Date:	1/16/2014	PROJECT COST ESTIMATE - Construction Management						File name:	AFE		
By:	EEF	Project Name: - North South Project Moreno to Whitewater Pipeline									
	x								8	hrs per day	
	Project Length	31.25	miles					Average Per diem	200	per day	
								Average hourly rate	100	per hour average	
		Quantity	Units	Days		Labor and Equipment		Per diem			
Task				Working	Per Diem	Unit	Total	Unit	Total		
No.	Task Description			Days	Days	Cost	Cost	Cost	Cost	TOTAL	Notes
							2,532,000		1,580,775	4,112,775	
	Contingency	0.00%					-		-	-	
	TOTAL COST:						2,532,000		1,580,775	4,112,775	
	TOTAL HOURS:									-	
	Number of Inspectors	51									

Date:	1/16/2014			PROJECT COST ESTIMATE - Right-of-Way Acquisition Labor Costs				File name:	AFE		
By:	EEF			Project Name: - North South Project Moreno to Whitewater Pipeline							
	x										
	Project Length	31.25	miles					Average Per diem	\$ 160.00	per day	
								\$ 20.00	per hour average		
		Quantity	Units	Material		Labor and Equipment		Per diem			
Task				Unit	Total	Unit	Total	Unit	Total		
No.	Task Description			Cost	Cost	Cost	Cost	Cost	Cost	TOTAL	Notes
1	Property Acquisition				\$0.00	\$125.00	\$170,000.00	\$150.00	\$35,700.00	\$205,700.00	
	Right-of- Supervisor	1,360.00	Man Hours								
2	Right-of-way agent -	-	Man Hours		\$0.00	\$100.00	\$0.00	\$ 125.00	\$0.00	\$0.00	
3	Right-of-way agent-Desert Area	1,040.00	Man Hours		\$0.00	\$100.00	\$104,000.00	\$ 125.00	\$22,750.00	\$126,750.00	
4	Right-of -way agent - City Area	1,040.00	Man Hours		\$0.00	\$100.00	\$104,000.00	\$ 125.00	\$22,750.00	\$126,750.00	
5	Right-of-Way Agent - Permits	1,040.00	Man Hours		\$0.00	\$100.00	\$104,000.00	\$ 125.00	\$22,750.00	\$126,750.00	
6	Legal Support	-	Man Hours		\$0.00	\$450.00	\$0.00	\$ -	\$0.00	\$0.00	See legal Detail estimate
7	Office and administrative	1,040.00			\$50.00	\$52,000.00	\$ 100.00	\$18,200.00	\$70,200.00	\$70,200.00	
8	Office and Supplies	7.00	months		\$0.00	\$0.00	\$ 10,000.00	\$70,000.00	\$70,000.00	\$70,000.00	
9	Sub Total	5,520.00	\$ -		\$0.00	\$0.00	\$ 20.00	\$110,400.00	\$726,150.00	\$726,150.00	
10											
11	Construction Support	-									
12	Right-of- Supervisor	1,800.00	Man Hours		\$0.00	\$125.00	\$225,000.00	\$150.00	\$47,250.00	\$272,250.00	
13	Right-of-way agent - Crew 1	1,680.00	Man Hours		\$0.00	\$100.00	\$168,000.00	\$ 125.00	\$36,750.00	\$204,750.00	
14	Right-of-way agent - Crew 2	1,680.00	Man Hours		\$0.00	\$100.00	\$168,000.00	\$ 125.00	\$36,750.00	\$204,750.00	
15	Right-of -way agent - Crew 3	-	Man Hours		\$0.00	\$100.00	\$0.00	\$ 125.00	\$32,500.00	\$32,500.00	
16	Right-of-Way Agent - Crew 4	-	Man Hours		\$0.00	\$100.00	\$0.00	\$ 125.00	\$26,875.00	\$26,875.00	
17	Office and administrative	1,680.00	Man Hours		\$0.00	\$50.00	\$84,000.00	\$ 100.00	\$26,000.00	\$110,000.00	
18	Office and Supplies	10.00	months		\$0.00	\$0.00	\$ 10,000.00	\$100,000.00	\$100,000.00	\$100,000.00	
19	Sub Total	6,840.00	Man Hours		\$0.00	\$0.00	\$0.00	\$ -	\$0.00	\$951,125.00	
20											
21	Project Close-out	-									
22	Right-of- Supervisor	320.00	Man Hours		\$0.00	\$125.00	\$40,000.00	\$150.00	\$8,400.00	\$48,400.00	
23	Right-of-way agent - Crew 1	320.00	Man Hours		\$0.00	\$100.00	\$32,000.00	\$ 125.00	\$7,000.00	\$39,000.00	
24	Office and administrative	320.00	Man Hours		\$0.00	\$50.00	\$16,000.00	\$ 100.00	\$5,600.00	\$21,600.00	
25	Office and Supplies	3.00	months		\$0.00	\$0.00	\$0.00	\$ 5,000.00	\$15,000.00	\$15,000.00	
	Sub Total	960.00	Man Hours		\$0.00	\$0.00	\$0.00	\$ 20.00	\$19,200.00	\$124,000.00	
	Tax	9.00%			\$0.00		\$0.00		\$0.00	\$0.00	
	Freight	9.00%			\$0.00		\$0.00		\$0.00	\$0.00	
	Sub-total				\$0.00		\$0.00		\$663,875.00	\$1,801,275.00	
	Contingency	0%			\$0.00		\$0.00		\$0.00	\$0.00	
	TOTAL COST:				\$0.00		\$0.00		\$663,875.00	\$1,801,275.00	
	TOTAL HOURS:									13,320	

Date:	1/16/2014		PROJECT COST ESTIMATE - Right-of-Way Acquisition Land Costs				File name:	AFE				
By:	EEF		Project Name: - North South Project Moreno to Whitewater Pipeline									
	x											
	Project Length	31.25	miles			Average Per diem				per day		
	Pipe Diameter	36 inches								per hour average		
Task		Quantity	Units	Franchise Cost		Private Easement		other				
No.	Task Description			Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost	TOTAL	Notes	
1			feet	\$0.00	\$0	\$0.34	\$0	\$0.00	\$0.00	\$ -		
2		-	Sq Ft		\$0	\$0.17	\$0	\$0.00	\$0.00	\$ -		
3	Storage yard 30% of value per year	10.00	acres		\$0	\$0.83	\$360,000	\$0.00	\$0.00	\$ 360,000	\$120,000 per acre 30% of permanent easement	
4	New Residential Area Permanent 50 ft wide easement	750,000	sq ft		\$0	\$6.86	\$5,145,000	\$0.00	\$0.00	\$ 5,145,000	\$13.72/sq ft land value - 50% for sub surface easement	
5	Residential Areas	551,750	Sq Ft		\$0	\$6.86	\$3,785,005	\$0.00	\$0.00	\$ 3,785,005	\$13.72/sq ft land value - 50% for sub surface easement	
6	Moreno Valley Low Lands	415,000	Sq Ft		\$0	\$1.38	\$571,625	\$0.00	\$0.00	\$ 571,625	\$120,000 per acre 50% of permanent easement	
7	Moreno Valley Temporary Work Space 50ft x L x 100% of alignment x 30% of value	415,000	Sq Ft		\$0	\$0.83	\$342,975	\$0.00	\$0.00	\$ 342,975	\$120,000 per acre 30% of permanent easement	
8	Station 650+00 to 760+00 Permanent 50 ft wide easement		sq ft		\$0	\$0.34	\$0.00	\$0.00	\$0.00	\$ -		
9	Station 650+00 to 760+00 Temporary Work Space 50ft x L x 100% of alignment x 50% of value	550,000	Sq Ft		\$0	\$0.17	\$94,697	\$0.00	\$0.00	\$ 94,697		
10	Station 760+00 to 880+00 Permanent		feet	\$0.00	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$ -	County Franchise	
11	Station 880+00 to 1040+00 Permanent 50 ft wide easement		Sq Ft		\$0	\$0.63	\$0	\$0.00	\$0.00	\$ -	\$55,000 per acre 50% of permanent easement	
12	Station 880+00 to 1040+00 Temporary Work Space 50ft x L x 100% of alignment x 20% of value	800,000	Sq Ft		\$0	\$0.25	\$202,020	\$0.00	\$0.00	\$ 202,020	\$55,000 per acre 20% of value for temporary construction	
13	Station 1040+00 to 1160+50 Permanent		feet	\$0.00	\$0	\$0.00	\$0.00	\$0.00	\$0.00	\$ -		
14	Station 1160+50 to 1220+00 Permanent 50 ft wide easement		Sq Ft		\$0	\$0.34	\$0	\$0.00	\$0.00	\$ -	\$30,000 per acre 50% of permanent easement	
15	Station 1160+50 to 1220+00 Temporary Work Space 50ft x L x 100% of alignment x 20% of value	297,500	Sq Ft		\$0	\$0.14	\$40,978	\$0.00	\$0.00	\$ 40,978	\$30,000 per acre 20% of value for temporary construction	
14	Station 1220+00 to 1580+00 Permanent 50 ft wide easement		Sq Ft		\$0	\$0.63	\$0	\$0.00	\$0.00	\$ -	\$55,000 per acre 50% of permanent easement	
15	Station 1220+00 to 1580+00 Temporary Work Space 50ft x L x 100% of alignment x 20% of value	1,800,000	Sq Ft		\$0	\$0.25	\$454,545	\$0.00	\$0.00	\$ 454,545	\$55,000 per acre 20% of value for temporary construction	
16	Station 1580+00 to 1650+00 Permanent 50 ft wide easement		Sq Ft		\$0	\$1.38	\$0	\$0.00	\$0.00	\$ -	\$120,000 per acre 50% of permanent easement	

Date:	1/16/2014		PROJECT COST ESTIMATE - Right-of-Way Acquisition Land Costs				File name:	AFE		
By:	EEF		Project Name: - North South Project Moreno to Whitewater Pipeline							
	x									
Project Length	31.25	miles					Average Per diem	per day		
Pipe Diameter	36 inches							per hour average		
Task	Quantity	Units	Franchise Cost		Private Easement		other			
No.	Task Description		Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost	TOTAL	Notes
17	Station 1580+00 to 1650+00 Temporary Work Space 50ft x L x 100% of alignment x 20% of value	350,000	Sq Ft	\$0	\$0.14	\$48,209	\$0.00	\$0.00	\$ 48,209	\$30,000 per acre 20% of value for temporary construction
18	Storage yard 30% of value per year	-	acres	\$0		\$0	\$0.00	\$0.00	\$ -	Included in the AMP Project
27										
28		Sq ft	Acres				Franchise			
29	Private Easements		0.00				Permanent			
30	Temporary construction space		0.00				Temporary	\$0		
	Pipeline storage Yards		10.00							
	Sub Total		10.00	\$0	\$0	\$0	\$0	\$0	\$ 11,045,056	
	Tax	0.00%		\$0		\$0		\$0	\$ -	
	Freight	0.00%		\$0		\$0		\$0	\$ -	
	Sub-total			\$0		\$0		\$0	\$ 11,045,056	
	Miscellaneous fees			\$0		\$0		\$0	\$ -	
	TOTAL COST:			\$0		\$0		\$0	\$ 11,045,056	
									\$ -	

Date:	1/16/2014	PROJECT COST ESTIMATE - Legal Services						File name:	AFE	
By:	EEF	Project Name: - North South Project Moreno to Whitewater Pipeline								
	x									
	Project Length	31.25	miles	Average Per diem				per day		
per hour average										
		Quantity	Units	Material		Labor and Equipment		Expenses		
Task				Unit	Total	Unit	Total	Unit	Total	
No.	Task Description			Cost	Cost	Cost	Cost	Cost	Cost	
1	Property Acquisition Legal Support/ document review	600.00	Man Hours		\$0	\$450	\$270,000	\$120	\$0	\$270,000
2	Property appraisals	30.00	each		\$0	\$0	\$0	\$6,000	\$180,000	\$180,000
3	Title reports	3%	total property		\$0	\$0	\$0	\$0	\$0	\$0
4	Eminent Domain Action	5.00	each		\$0	\$0	\$0	\$100,000	\$500,000	\$500,000
5					\$0	\$0	\$0	\$0	\$0	\$0
6	Loss of business claims	1.00	lot		\$0.00	\$0.00	\$0.00	\$ 1,000,000	\$1,000,000	\$1,000,000
7	Damage settlements	1.00	lot		\$0.00	\$0.00	\$0.00	\$ 900,000	\$900,000	\$900,000
8						\$0	\$0	\$0	\$0	\$0
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
25										
	Tax	0.00%			\$0.00		\$0	\$0	\$0	\$0
	Freight	0.00%			\$0.00		\$0	\$0	\$0	\$0
	Sub-total				\$0.00		\$270,000	\$2,580,000	\$2,850,000	\$2,850,000
	Contingency	0%			\$0.00		\$0	\$0	\$0	\$0
	TOTAL COST:				\$0.00		\$270,000	\$2,580,000	\$2,850,000	\$2,850,000
	TOTAL HOURS:									-

Date:	1/16/2014	PROJECT COST ESTIMATE - Public Relations					File name:	AFE			
By:	EEF	Project Name: - North South Project Moreno to Whitewater Pipeline									
	x										
	Project Length	60	miles	Average Per diem						per day	
											per hour average
		Quantity	Units	Material		Labor and Equipment		Expenses			
Task				Unit	Total	Unit	Total	Unit	Total		
No.	Task Description			Cost	Cost	Cost	Cost	Cost	Cost	TOTAL	Notes
1	Public Relations Information Web Site	1.00	each		\$0.00	\$0.00	\$0.00	\$100,000	\$100,000	\$100,000	
2	Community out reach meetings	2.00	each		\$0.00	\$0.00	\$0.00	\$50,000	\$100,000	\$100,000	
3	Public Outreach during construction	2	each		\$0.00	\$0.00	\$0.00	\$150,000	\$300,000	\$300,000	
4	Community outreach program -	1.00	lot		\$0.00	\$0.00	\$0.00	\$250,000	\$250,000	\$250,000	
5					\$0.00	\$0.00	\$0.00	\$-	\$0	\$0.00	
6											
7											
8						\$0.00	\$0.00	\$-	\$0	\$0	
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											
23											
24											
25											
	Tax	0.00%			\$0.00		\$0		\$0	\$0.00	
	Freight	0.00%			\$0.00		\$0		\$0	\$0.00	
	Sub-total				\$0.00		\$0		\$750,000	\$750,000.00	
	Contingency	0%			\$0.00		\$0		\$0	\$0	
	TOTAL COST:				\$0.00		\$0		\$750,000	\$750,000	
	TOTAL HOURS:									-	

Date:	1/16/2014	Geotechnical Investigation						File name:	AFE		
By:	JF	Project Name: - North-South Project - Moreno to Whitewater Pipeline									
	Project Length	31.5	miles	Average Per diem						per day	
										per hour average	
Task		Quantity	Units	Material		Labor and Equipment		Expenses			
No.	Task Description			Unit	Total	Unit	Total	Unit	Total	TOTAL	Notes
				Cost	Cost	Cost	Cost	Cost	Cost		
	GeoTech Investigation										
1	Geotechnical Engineer	40	Hours		\$0.00	\$200.00	\$8,000.00		\$0	\$8,000	
2	Sr. Project Geologist/Engineer	112	Hours		\$0.00	\$150.00	\$16,800.00		\$0	\$16,800	
3	Staff Geologist/Engineer	140	Hours		\$0.00	\$135.00	\$18,900.00			\$18,900	
4	CADD/GIS Specialist	70	Hours		\$0.00	\$100.00	\$7,000.00		\$0	\$7,000	
5	Admin	50	Hours		\$0.00	\$65.00	\$3,250.00	\$ -	\$0	\$3,250.00	
6											
7	Other Direct costs										
8	Underground Service Alert Notofication (included in TRC labor and ODCs)	2	day			\$0.00	\$0.00	\$0	\$0	\$0	
9	Geophysical Survey for Utility Clearance (City of San Bernardino)	2	day					\$2,900	\$5,800	\$5,800	
10	Air Knife Company (Cascade) - borehole Clearance	2	day					\$2,300	\$4,600	\$4,600	
11	Drilling Company (Cascade) - forty five 10-ft borings	4	day					\$3,500	\$14,000	\$14,000	
12	Drilling Company (Cascade) - eighteen 15-ft borings	3	day					\$3,500	\$10,500	\$10,500	
13	Drilling Company (Cascade) - four 40 and two 80-ft borings	3	day					\$3,700	\$11,100	\$11,100	
14	Boring Permits (two-80 foot borings)	2	per boring					\$300	\$600	\$600	
15	Encroachment Permits for Street Work	1	Lot					\$38,742	\$38,742	\$38,742	
16	Analytical Testing	1	Lot					\$25,332	\$25,332	\$25,332	
17	Field Vehicles (1 vehicle for 14 days and 1 vehicle for 4 days)	18	day					\$100	\$1,800	\$1,800	
18	Vehicle Mileage (8 trips @200 miles/trip)	1600	miles					\$0.60	\$960	\$960	
19	Travel Accommodations - Lodging and Meals (1 person for 14 days and 1 person for 4 days)	18	day					\$175	\$3,150	\$3,150	
20	Miscellaneous Safety Equipment and Personal Protective Equipment / Supplies - 4-gas meter, digital camera, etc.	14	day					\$150	\$2,100	\$2,100	

Date:	1/16/2014	Geotechnical Investigation						File name:	AFE
By:	JF	Project Name: - North-South Project - Moreno to Whitewater Pipeline							
	Project Length	31.5	miles	Average Per diem				per day	
								per hour average	
		Quantity	Units	Material		Labor and Equipment		Expenses	
Task				Unit	Total	Unit	Total	Unit	Total
No.	Task Description			Cost	Cost	Cost	Cost	Cost	Cost
	Tax	0.00%			\$0.00		\$0		\$0
	Freight	0.00%			\$0.00		\$0		\$0
	Sub-total				\$0.00		\$53,950		\$118,685
	Contingency				\$0.00		\$0		\$0
	TOTAL COST:				\$0.00		\$53,950		\$118,685
	TOTAL HOURS:								-

TRC	ENGINEERING AND DESIGN ESTIMATE	Proposal No.:
	Client: Southern California Gas Co.(Sempra)	Date: 01-30-14 Rev. 0
Discipline: Design (Internal use only)	Project: North South Project Moreno - Whitewater Feasibility Report/Estimate	Prepared By: LM
File: Design Estimate 1-30-14	DISCIPLINE SUMMARY SHEET	Approved By:

LABOR COSTS														
DESCRIPTION	QTY (*)	ENGINEERING HOURS				DESIGN HOURS						SR PROJ MNGR	TOTAL	
		Staff Level	Proj Level	SR. Proj Lev	TOTAL	Draft 1	Draft 2	Des 1	Des 2	D Supervisor	TOTAL			Clerk
1 SITE INVEST/DESIGN DEVELOP									120	33	153		36	189
2 PROJECT COORDINATION			4,316	782	4,998					3,068	3,068	4,316	4,316	16,698
3 DESIGN DRAWINGS	152			172	155				6,102	1,246	7,348		542	8,045
4 DESIGN REVIEW										120	120		120	240
5 JOB SHOWING									14	20	34	18	48	100
6 PROCUREMENT			50		50				8	4	12		38	100
7 CONSTRUCTION SUPPORT			40		40				16	10	26	12	84	162
8 PERMITTING			80		80				18	8	26		40	146
9 ROW DOCUMENTS										16	16		16	32
10 PROJECT CLOSEOUT									7	7	14	24	7	45
TOTAL	152		4,486	954	5,243				6,285	4,532	10,761	4,370	5,247	25,757
HOURLY LABOR RATE		\$95.00	\$100.00	\$163.00	\$115.22	\$60.00	\$85.00	\$95.00	\$127.00	\$163.00	\$142.82	\$68.00	\$198.00	\$135.00
LABOR COST			\$448,600	\$155,502	\$604,102				\$798,195	\$738,716	\$1,536,911	\$297,160	\$1,038,906	\$3,477,079
(*) DELIVERABLE ITEMS		LABOR RATE MULTIPLIER :				100.0%								
NON-LABOR COSTS														
DISCIPLINE SCOPE OF WORK		DESCRIPTION			QTY	UNIT								
Prepare construction dwgs for Relocations for 59mile 36" pipeline Adelanto to Moreno Vall		PROJECT MANAGEMENT SYSTEM FEE @ 1%												
Packages to include Plan/Profile alignment sheets, details, other		OUTSIDE REPRODUCTION SERVICES				\$1.25								
Includes coordination with various agencies in support.		AUTO TRAVEL (Mileage)			10,000	\$0.56	\$5,550							
Drawing scale 1"=20', 1"=40', 1"=100,		POSTAGE AND FREIGHT					\$1,200							
Engineering review and recommendations		TELEPHONE / TELEGRAPH / FAX												
Engineering Scope Design HDD's, evaluations, submittals for Crossings,		Mileage			1,000	0.555	\$555							
29 crossings, Flood Control, Caltrans, RR,		Engineer Review Stamp Dwgs					\$12,500							
		Survey, Aerial, Planimetrics, (Estimate Psomas)												
DISCIPLINE PROJECT DESIGN CRITERIA		PERMIT FEES												
Per SCG Construction Drawing Standards		WORD PROCESSING EQUIPMENT			80%	1,835	\$5.00	\$9,175						
		SURVEY AND FIELD EQUIPMENT												
		OUTSIDE COMPUTER SERVICES												
		SPECIAL MATERIALS (Film, Floppy)				\$5								
		IN-HOUSE COMPUTER EQUIPMT			50%	\$5.00								
		AUTOCAD / MICROSTATION EQUIP			65%	\$5.00								
		PHOTOCOPIES (Xerox)Bid Docs				\$0.15								
		DRAWING COPIES (Bond Prints)				\$2.40								
DISCIPLINE ASSUMPTIONS & EXCEPTIONS		DRAWING REPRODUCIBLES (Sepia Prints)				\$5.00								
See Proposal letter		CADD ELECTRONIC PLOTS: Full Size				\$18.00								
		Ink Jet				\$1.00								
		TRAVEL / LIVING EXPENSES: Hotel/Meals-Days			58	\$50	\$2,900							
		Airline Travel - Round Trips				\$400								
		Car Rental - Days				\$118								
		Contingency												
											TOTAL NON-LABOR COSTS		\$31,880	
											TOTAL COSTS		\$3,508,959	

TRC **ENGINEERING AND DESIGN ESTIMATE** **Proposal No.:**

Discipline: Design (Internal use only) **Client: Southern California Gas Co.(Sempra)** **Date: 01-30-14** **Rev. 0**

Project: North South Project Moreno - Whitewater Feasibility Report/Estimate **Prepared By: LM**

DESCRIPTION	QTY (*)	ENGINEERING HOURS				DESIGN HOURS						SR PROJ MNGR	TOTAL	
		Staff Level	Proj Level	SR. Proj Lev	TOTAL	Draft 1	Draft 2	Des 1	Des 2	D Supervisor	TOTAL			Clerk
1. Site Investigation/Design Development : List anything required to develop design, site/archive investigations, job walks, code investigations, report review and interpretation (list actual cost of subcontracted work on Page 1), familiarization with client standards.														
Site Investigation											8	8	12	20
Develop scope/Startup Package											4	4	4	8
Research RR										8	2	10		10
Research w/ County Flood Control Districts										12	2	14		14
Research w/One Call										4	1	5		5
Research w/Utilities										20	2	22		22
Research County road departments										12	2	14		14
Research City RD, SD, SS, util										20	2	22		22
Research State Hwy's										12	2	14		14
Misc. Research/followup										20	2	22	20	42
Travel										12	6	18		18
TOTAL										120	33	153	36	189

2. Project Coordination: Include all coordination hours, i.e. project meetings, client meetings, project paper work, coordination with project management and other disciplines, interdisciplinary spec and drawing review. Include travel time to and from meetings, pm updates, hours for archiving project discipline documents. Include all external coordination hours, i.e. hours for permitting and plan check and any other hours required for dealing with outside organizations (consultants, government agencies, utilities, other engineering firms, etc).

Develop Project Scheduling			2,150	10	2,160						100	100	150	100	2,510
Project Cost Estimate (support)			2,150	62	2,212						100	100	150	100	2,562
Coordination with client (meetings, phone communications)				60	60						250	250	1,750	1,750	3,810
Internal coordination (engineering, design, permitting)				200	200						1,500	1,500	1,750	1,750	5,200
Potholing coordination											200	200	100	40	340
Coordination with agency (support)				200	200						150	150	100	250	700
Coordination with other utilities				100	100						300	300	50	50	500
Coordination with survey											200	200	50	40	290
Misc				50	50						118	118	116	128	412
Prep of Prelimin Design Report				100							100	100	100	100	300
Travel				16	16						50	50		8	74
TOTAL			4,316	782	4,998						3,068	3,068	4,316	4,316	16,698

TRC

ENGINEERING AND DESIGN ESTIMATE

Proposal No.:

Client: Southern California Gas Co.(Sempra)

Date: 01-30-14 Rev. 0

Discipline: Design (Internal use only)

Project: North South Project Moreno - Whitewater Feasibility Report/Estimate

Prepared By: LM

3. Design Drawings : List all physical drawings, plans, sections and details, orthographic and isometric. List all diagrams, schematics, P & ID's, schedules, etc. List all TRC produced "as-built" drawings. As-built drawings are defined as new drawings prepared by TRC of existing facilities or drawings of existing facilities, furnished by the client and corrected or modified by us. If this is a lump sum job, do not estimate unless you have studied the facility. "Record" drawings are defined as drawings prepared by TRC from drawings marked-up by the contractor to the as-constructed conditions and then corrected by TRC. TRC corrects record drawings only to the extent they are marked-up and furnished by the contractor. We do not verify as-built conditions of a facility unless construction support is included in this estimate. Also include hours for plotting, blueprinting, checking, and project review. Hours for archiving shall be included under PROJECT COORDINATION. Non-labor items (CADD hours, floppies, plotting / printing media, microfilming, drawing reductions, drawing scanning, etc) shall be included on Page 1.

DESCRIPTION	QTY (*)	ENGINEERING HOURS				DESIGN HOURS							SR PROJ MNGR	TOTAL
		Staff Level	Proj Level	SR. Proj Lev	TOTAL	Draft 1	Draft 2	Des 1	Des 2	D Supervisor	TOTAL	Clerk		
Cover Sheet w/Dwg Index	1								8	2	10		2	12
Alignment Sheet !"=100'	27								864	54	918		32	950
Alignment Sheet !"=40'	79								3,160	158	3,318		36	3,354
Detail Crossings 1"=20'	16			132	132				660	33	693		20	845
Standard Details	3			3	3				30	3	33		3	39
Special Details	3			3					30	3	33		3	36
Gen Notes	1			3					16	2	18		3	21
Tie-in to PLS station details	2			3	3				16	2	18		3	24
Launcher/Receiver details	4			4	4				64	4	68		4	76
Valve site details	9			9					72	9	81		9	90
Cathodic Protexion Details	2			4	4				16	2	18		4	26
Fencing Details	1			1					8	1	9		1	10
line markers	1			1					8	1	9		1	10
casing details	1			1	1				8	1	9		1	11
structural details	2			8	8				20	2	22		8	38
Pipeline As-Builts									554	277	831		1	832
Sub total				172	155				5,534	554	6,088		131	6,374
PLOTTING (Dwgs x No.of times x 0.1)									20		20			20
CHECKING (Discipline/Squad/QA)									272	554	826		272	1,098
PRINTING (Dwgs x No.of times x 0.05)														
PLAN CHECK SUBMTL / CORRECT.									272	138	410		139	549
RECORD DRAWINGS									4		4			4
TOTAL	152			172	155				6,102	1,246	7,348		542	8,045

TRC

ENGINEERING AND DESIGN ESTIMATE

Proposal No.:

Client: Southern California Gas Co.(Sempra)

Date: 01-30-14 Rev. 0

Discipline: Design (Internal use only)

Project: North South Project Moreno - Whitewater Feasibility Report/Estimate

Prepared By: LM

4. Design Review Include all coordination hours, i.e. project meetings, client meetings, project paper work, coordination with project management and other disciplines, any hours associated with drawing reviews. Include travel time to and from meetings, pm updates, hours for archiving project discipline documents. Include all external coordination hours, i.e. hours required for dealing with outside organizations (consultants, government agencies, utilities, other engineering firms, etc).

DESCRIPTION	QTY (*)	ENGINEERING HOURS				DESIGN HOURS						SR PROJ MNGR	TOTAL	
		Staff Level	Proj Level	SR. Proj Lev	TOTAL	Draft 1	Draft 2	Des 1	Des 2	D Supervisor	TOTAL			Clerk
Design Review Meetings Client (36)										54	54		54	108
Design Review Meetings Agencies (36)										54	54		54	108
Travel time and costs to meetings,										12	12		12	24
TOTAL										120	120		120	240

5. Job Showing : Include hours for preparation of RFQ's, coordination with vendors, bid summary, bid conditioning meetings, drawing reproduction P.O. preparation (if required), bid specifications, Job site meetings, coordination with client, meeting notes and communications, bid evaluation/recommendation. Travel time and costs to job site, . Include hours for checking and review of bids.

Prepare Bid specs								8	12		20		16	36
Coord w/Client, contractors, agency													12	12
Bid Job site meeting										4	4		4	8
Job walk meeting notes/Q and A													4	4
Bid spec support								6			6	18		24
Bid Evaluation/Recommendation													8	8
Travel										4	4		4	8
TOTAL								14	20		34	18	48	100

6. Procurement: List all items that TRC would be purchasing or providing procurement support. Include hours for preparation of RFQ's, coordination with vendors, bid summary, bid conditioning meetings, P.O. preparation (if required), vendor drawing review, shop drawing review & inspection (list inspection by outside firms on Page 1). Include hours for checking and project review.

Bill of Materials								8	4		12		4	16
Request for Materials													12	12
Request for Materials/mtl Quotes			10		10								4	14
Coord with Client Purchasing			8		8								2	10
Procure materials			24		24								2	26
Construction Cost Estimate			8		8								2	10
Construction Schedule													8	8
													4	4
TOTAL			50		50			8	4		12		38	100

TRC

ENGINEERING AND DESIGN ESTIMATE

Proposal No.:

Client: Southern California Gas Co.(Sempra)

Date: 01-30-14 Rev. 0

Discipline: Design (Internal use only)

Project: North South Project Moreno - Whitewater Feasibility Report/Estimate

Prepared By: LM

7. Construction Support:

List all construction support, identify which is office or field support. Include hours for construction bid meeting, start-up or precommissiioning assistance if applicable, and travel time to and from site.

DESCRIPTION	QTY (*)	ENGINEERING HOURS				DESIGN HOURS						SR PROJ MNGR	TOTAL	
		Staff Level	Proj Level	SR. Proj Lev	TOTAL	Draft 1	Draft 2	Des 1	Des 2	D Supervisor	TOTAL			Clerk
Construction Kickoff meetings									4		4	2	8	14
Construction Support field/phone			12		12				4		4	2	20	38
Develop Hydro test/tie in procedures			12		12				4		4	2	8	26
Incorporate field comments to tie in procedures												2	8	10
Conduct pre-tie in meeting w/field personnel									4		4	2	8	14
Status reports, Budget, Const Operations			16		16					8	8	2	12	38
Abandonment proceedures														
Travel										2	2		20	22
TOTAL			40		40				16	10	26	12	84	162

8. Permitting

Include all coordination hours, i.e. project meetings, client meetings, project paper work, coordination with project management and other disciplines, interdisciplinary spec and drawing review. Include travel time to and from meetings, pm updates, hours for archiving project discipline documents. Include all external coordination hours, i.e. hours for permitting and plan check and any other hours required for dealing with outside organizations (consultants, government agencies, utilities, other engineering firms, etc).

Develop Permitting List (support ROW)			8		8				8		8		8	24
Prepare per applications (support ROW)			20		20				8	4	12		8	40
Coordinate permit acquisition			20		20				2	4	6		8	34
Enviornmental documents													8	8
Permitting plan			20		20									20
Travel			12		12								8	20
TOTAL			80		80				18	8	26		40	146

9. ROW Documents

Include all coordination hours, i.e. project meetings, project paper work, coordination with project management and other disciplines, interdisciplinary spec and drawing review. Include time for archiving project discipline documents. Include all external coordination hours, i.e. hours for permitting and plan check and any other hours required for dealing with outside organizations (consultants, government agencies, utilities, other engineering firms, etc).

Review right of way documents									4		4		4	8
Prepare new easement documents									4		4		4	8
Legal descriptions (support)									4		4		4	8
Dity/County Reviews									4		4		4	8
TOTAL									16		16		16	32

10. Project Closeout:

Include all coordination hours, i.e. project meetings, client meetings, project paper work, coordination with project management, contractors and other disciplines, interdisciplinary spec and drawing review. Include travel time to and from job site, hours for archiving project discipline documents. Include all external coordination hours, i.e. hours required for dealing with outside organizations (consultants, contractors, inspectors and records to cover government agencies, etc).

Collect Construction Records									6		6	8	6	20
Copy Construction Records									4		4	8		12
Deliver copies for filing									2		2	8		10
Travel									1	1	2		1	3

TRC	ENGINEERING AND DESIGN ESTIMATE							<i>Proposal No.:</i>				
<i>Discipline: Design (Internal use only)</i>	<i>Client: Southern California Gas Co.(Sempra)</i>							<i>Date: 01-30-14</i>		<i>Rev. 0</i>		
	<i>Project: North South Project Moreno - Whitewater Feasibility Report/Estimate</i>							<i>Prepared By: LM</i>				
TOTAL							7	7	14	24	7	45

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations
Material Cost Estimate**

Task No.	Material Description	Quantity	Units	Material		Labor and Equipment		Per Diem		TOTAL	Notes
				Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost		
<u>Whitewater Pressure Limiting Station</u>											
Major Materials											
1	Becker Precision - 8" Control Valves	2	ea	\$50,000	\$100,000	\$0	\$0	\$0	\$0	\$100,000	
2	Grove BT-1 Ball Valve - 8"	5	ea	\$35,000	\$175,000	\$0	\$0	\$0	\$0	\$175,000	
3	Pipeline to Station Reducing Tees	5	ea	\$15,000	\$75,000	\$0	\$0	\$0	\$0	\$75,000	
4	Station Piping Fittings	32	ea	\$2,500	\$80,000	\$0	\$0	\$0	\$0	\$80,000	
5	Pipe - 8"	250	lf	\$45	\$11,250	\$0	\$0	\$0	\$0	\$11,250	
6	Pipe - 16"	20	lf	\$80	\$1,600	\$0	\$0	\$0	\$0	\$1,600	
7	Subtotal - Major Materials				\$442,850					\$442,850	
8	Minor Materials	1	lot		\$222,000					\$222,000	
9	Subtotal - Whitwater PLS				\$664,850					\$664,850	
<u>Shaver Summit Pressure Limiting Station</u>											
Major Materials											
10	Becker Precision - 8" Control Valves	2	ea	\$50,000	\$100,000	\$0	\$0	\$0	\$0	\$100,000	
11	Grove BT-1 Ball Valve - 8"	5	ea	\$35,000	\$175,000	\$0	\$0	\$0	\$0	\$175,000	
12	Pipeline to Station Reducing Tees	5	ea	\$15,000	\$75,000	\$0	\$0	\$0	\$0	\$75,000	
13	Station Piping Fittings	31	ea	\$2,500	\$77,500	\$0	\$0	\$0	\$0	\$77,500	
14	Pipe - 8"	400	lf	\$45	\$18,000	\$0	\$0	\$0	\$0	\$18,000	
15	Pipe - 16"	20	lf	\$80	\$1,600	\$0	\$0	\$0	\$0	\$1,600	
16	Subtotal - Major Materials				\$447,100					\$447,100	
17	Minor Materials	1	lot		\$224,000					\$224,000	
18	Subtotal - Shaver Summit PLS				\$671,100					\$671,100	
<u>Desert Center Pressure Limiting Station</u>											
Major Materials											
19	Becker Precision - 10" Control Valves	2	ea	\$60,000	\$120,000	\$0	\$0	\$0	\$0	\$120,000	
20	Grove BT-1 Ball Valve - 10"	5	ea	\$40,000	\$200,000	\$0	\$0	\$0	\$0	\$200,000	
21	Pipeline to Station Reducing Tees	5	ea	\$15,000	\$75,000	\$0	\$0	\$0	\$0	\$75,000	
22	Station Piping Fittings	29	ea	\$3,000	\$87,000	\$0	\$0	\$0	\$0	\$87,000	
23	Pipe - 10"	250	lf	\$55	\$13,750	\$0	\$0	\$0	\$0	\$13,750	
24	Pipe - 16"	20	lf	\$80	\$1,600	\$0	\$0	\$0	\$0	\$1,600	

Date: 1/16/2014

By: JJK

Southern California Gas Company
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations
Material Cost Estimate

Task No.	Material Description	Quantity	Units	Material		Labor and Equipment		Per Diem		TOTAL	Notes
				Unit Cost	Total Cost	Unit Cost	Total Cost	Unit Cost	Total Cost		
25	Subtotal - Major Materials				\$497,350					\$497,350	
26	Minor Materials	1	lot		\$248,000					\$248,000	
27	Subtotal - Desert Center PLS				\$745,350					\$745,350	
28	Total				\$2,081,300						
TOTAL COST										\$2,081,000	
TOTAL HOURS											

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations
Construction Labor Cost Estimate**

Construction Labor

Task No.	Task Description	No. of Crews	Hours per Crew	Units	Construction Cost		TOTAL	Notes
					Unit Cost	Total Cost		
<u>Whitewater Pressure Limiting Station</u>								
1	Piping - Straight Time	2	160	Hours	\$350.00	\$112,000		
2	Piping - Overtime	2	160	Hours	\$525.00	\$168,000		
3	Electrical - Straight Time	1	160	40	\$350.00	\$56,000		
4	Electrical - Overtime	1	160	40	\$525.00	\$84,000		
5	Civil/Laborers - Straight time - Concrete	1	160	40	\$325.00	\$52,000		
6	Civil/Laborers - Overtime - Concrete	1	160	40	\$487.50	\$78,000		
7	Civil/Laborers - Straight Time - All Other Work	1	160	40	\$325.00	\$52,000		
8	Civil/Laborers - OverTime - All Other Work	1	160	40	\$487.50	\$78,000		
9	Total Whitewater PLS Construction Labor		1280			\$680,000		

Equipment Rental

Task No.	Equipment Description	Equipment Qty.	Months on Site	Rate per Month	Total Cost	TOTAL
11	Backhoe	1	1	\$15,000	\$15,000	
12	Telescope Beam Trk	1	1	\$20,000	\$20,000	
13	Forklift - Large	1	1	\$20,000	\$20,000	
14	Welder	2	2	\$6,250	\$25,000	
15	Total Whitewater PLS Equipment Rental				\$90,000	
16	Total Whitewater PLS Labor and Equipment				\$770,000	

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations
Construction Labor Cost Estimate**

Construction Labor

Task No.	Task Description	No. of Crews	Hours per Crew	Units	Construction Cost		TOTAL	Notes
					Unit Cost	Total Cost		
<u>Shaver Summit Pressure Limiting Station</u>								
1	Piping - Straight Time	2	160	Hours	\$350.00	\$112,000		
2	Piping - Overtime	2	160	Hours	\$525.00	\$168,000		
3	Electrical - Straight Time	1	160	40	\$350.00	\$56,000		
4	Electrical - Overtime	1	160	40	\$525.00	\$84,000		
5	Civil/Laborers - Straight time - Concrete	1	160	40	\$325.00	\$52,000		
6	Civil/Laborers - Overtime - Concrete	1	160	40	\$487.50	\$78,000		
7	Civil/Laborers - Straight Time - All Other Work	1	160	40	\$325.00	\$52,000		
8	Civil/Laborers - OverTime - All Other Work	1	160	40	\$487.50	\$78,000		
9	Total Shaver Summit PLS Construction Labor		1280			\$680,000		

Equipment Rental

	Equipment Qty.	Months on Site	Rate per Month	Total Cost	TOTAL	
						10
11	Backhoe	1	1	\$15,000	\$15,000	
12	Telescope Beam Trk	1	1	\$20,000	\$20,000	
13	Forklift - Large	1	1	\$20,000	\$20,000	
14	Welder	2	2	\$6,250	\$25,000	
15	Total Shaver Summit PLS Equipment Rental				\$90,000	
16	Total Shaver Summit PLS Labor and Equipment				\$770,000	

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations
Construction Labor Cost Estimate**

Construction Labor

Task No.	Task Description	No. of Crews	Hours per Crew	Units	Construction Cost		TOTAL	Notes
					Unit Cost	Total Cost		
<u>Desert Center Pressure Limiting Station</u>								
1	Piping - Straight Time	2	160	Hours	\$350.00	\$112,000		
2	Piping - Overtime	2	160	Hours	\$525.00	\$168,000		
3	Electrical - Straight Time	1	160	40	\$350.00	\$56,000		
4	Electrical - Overtime	1	160	40	\$525.00	\$84,000		
5	Civil/Laborers - Straight time - Concrete	1	160	40	\$325.00	\$52,000		
6	Civil/Laborers - Overtime - Concrete	1	160	40	\$487.50	\$78,000		
7	Civil/Laborers - Straight Time - All Other Work	1	160	40	\$325.00	\$52,000		
8	Civil/Laborers - OverTime - All Other Work	1	160	40	\$487.50	\$78,000		
9	Total Desert Center PLS Construction Labor		1280			\$680,000		
<u>Equipment Rental</u>								
		Equipment Qty.	Months on Site		Rate per Month	Total Cost	TOTAL	
10	Earth Auger	1	1		\$10,000	\$10,000		
11	Backhoe	1	1		\$15,000	\$15,000		
12	Telescope Beam Trk	1	1		\$20,000	\$20,000		
13	Forklift - Large	1	1		\$20,000	\$20,000		
14	Welder	2	2		\$6,250	\$25,000		
15	Total Desert Center Equipment Rental					\$90,000		
16	Total Desert Center PLS Labor and Equipment					\$770,000		
	Total 3 PLS's					\$2,310,000		
TOTAL COST						\$2,310,000		
TOTAL HOURS			1280					

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations
Construction Management Cost Estimate**

Task No.	Task Description	Quantity	Units	Days		Labor and Equipment		Per Diem		TOTAL	Notes
				Working Days	Per Diem Days	Unit Cost	Total Cost	Unit Cost	Total Cost		
<u>Whitewater Pressure Limiting Station</u>											
1	Chief Inspector	40	Hours	10	10	\$150	\$6,000	\$150	\$ 1,500	\$7,500	
2	Welding Inspector	120	Hours	20	20	\$125	\$15,000	\$150	\$ 3,000	\$18,000	
3	Electrical Inspector	60	Hours	10	10	\$110	\$6,600	\$150	\$ 1,500	\$8,100	
4	Civil/Craft Inspector	60	Hours	10	10	\$110	\$6,600	\$150	\$ 1,500	\$8,100	
5	Materials Manager	24	Hours	5	10	\$110	\$2,640	\$150	\$ 750	\$3,390	
6	Total Whitewater PLS Inspection	304					\$36,840		\$ 8,250	\$45,090	
<u>Shaver Summit Pressure Limiting Station</u>											
7	Chief Inspector	40	Hours		10	\$150	\$6,000	\$150	\$ 1,500	\$7,500	
8	Welding Inspector	120	Hours		20	\$125	\$15,000	\$150	\$ 3,000	\$18,000	
9	Electrical Inspector	60	Hours		10	\$110	\$6,600	\$150	\$ 1,500	\$8,100	
10	Civil/Craft Inspector	60	Hours		10	\$110	\$6,600	\$150	\$ 1,500	\$8,100	
11	Materials Manager	24	Hours		5	\$110	\$2,640	\$150	\$ 750	\$3,390	
12	Total Shaver Summit PLS Inspection	304					\$36,840		\$ 8,250	\$45,090	
<u>Desert Center Pressure Limiting Station</u>											
13	Chief Inspector	40	Hours		10	\$150	\$6,000	\$150	\$ 1,500	\$7,500	
14	Welding Inspector	120	Hours	20	125	\$125	\$15,000	\$150	\$ 3,000	\$18,000	
15	Electrical Inspector	60	Hours	10	110	\$110	\$6,600	\$150	\$ 1,500	\$8,100	
16	Civil/Craft Inspector	60	Hours	10	110	\$110	\$6,600	\$150	\$ 1,500	\$8,100	
17	Materials Manager	24	Hours	5	110	\$110	\$2,640	\$150	\$ 750	\$3,390	
18	Total Desert Center PLS Inspection	304					\$36,840		\$ 8,250	\$45,090	
Total 3 PLS's Inspection							\$110,520		\$ 24,750	\$135,300	
TOTAL COST							\$110,520		\$ 24,750	\$135,300	
TOTAL HOURS		912									

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations
Engineering and Project Management Cost Estimate**

Task No.	Task Description	Quantity	Units	Labor and Equipment		Contract Cost		TOTAL	Notes
				Unit Cost	Total Cost	Unit Cost	Total Cost		
<u>Whitewater Pressure Limiting Station</u>									
<u>Hourly Engineering</u>									
1	Sr. Mechanical Engineer	20	Hours	\$126	\$2,520			\$2,520	
2	Mechanical Engineer	60	Hours	\$113	\$6,780			\$6,780	
3	Sr. Structural Engineer	20	Hours	\$126	\$2,520			\$2,520	
4	Sr. Civil Engineer	20	Hours	\$126	\$2,520			\$2,520	
5	Sr. Electrical Engineer	20	Hours	\$126	\$2,520			\$2,520	
6	Electrical Engineer	20	Hours	\$113	\$2,260			\$2,260	
7	Design and Drafting	80	Hours	\$61	\$4,880			\$4,880	
8	Project Manager	30	Hours	\$140	\$4,200			\$4,200	
9	Administrative	12	Hours	\$61	\$732			\$732	
10	Printing						\$1,000	\$1,000	
11	Subtotal Whitewater PLS Hourly Engineeri	282						\$29,900	
<u>Contract Engineering</u>									
12	Geotechnical Investigation	1	Lot				\$15,000	\$15,000	
13	Cathodic Protection	1	Lot				\$15,000	\$15,000	
14	Station Controls Engineering	60	Hours			\$150	\$9,000	\$9,000	
15	Subtotal Whitewater PLS Contract Engineering							\$39,000	
16	Total Whitewater PLS Engineering							\$68,900	
<u>Project Manager</u>									
17	Project Manager	40	Hours	\$190	\$7,600			\$7,600	
<u>Project Manager Per Diem</u>									
18	Project Manager	14	Days	\$150	\$2,100			\$2,100	
19	Total Whitewater PLS Project Manager	40						\$9,700	

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations
Engineering and Project Management Cost Estimate**

Task No.	Task Description	Quantity	Units	Labor and Equipment		Contract Cost		TOTAL	Notes
				Unit Cost	Total Cost	Unit Cost	Total Cost		
Total Whitewater PLS Engineering & Project Management								\$78,600	
<u>Shaver Summit Pressure Limiting Station</u>									
<u>Hourly Engineering</u>									
20	Sr. Mechanical Engineer	20	Hours	\$126	\$2,520			\$2,520	
21	Mechanical Engineer	60	Hours	\$113	\$6,780			\$6,780	
22	Sr. Structural Engineer	20	Hours	\$126	\$2,520			\$2,520	
23	Sr. Civil Engineer	20	Hours	\$126	\$2,520			\$2,520	
24	Sr. Electrical Engineer	20	Hours	\$126	\$2,520			\$2,520	
25	Electrical Engineer	20	Hours	\$113	\$2,260			\$2,260	
26	Design and Drafting	80	Hours	\$61	\$4,880			\$4,880	
27	Project Manager	30	Hours	\$140	\$4,200			\$4,200	
28	Administrative	12	Hours	\$61	\$732			\$732	
29	Printing						\$1,000	\$1,000	
30	Subtotal Shaver Summit PSL Hourly Engin	282						\$29,900	
<u>Contract Engineering</u>									
31	Geotechnical Investigation	1	Lot				\$15,000	\$15,000	
32	Cathodic Protection	1	Lot				\$15,000	\$15,000	
33	Station Controls Engineering	60	Hours			\$150	\$9,000	\$9,000	
34	Subtotal Shaver Summit PLS Contract Engineering							\$39,000	
35	Total Shaver Summit PLS Engineering							\$68,900	
<u>Project Manager</u>									
36	Project Manager	40	Hours	\$190	\$7,600			\$7,600	
<u>Project Manager Per Diem</u>									
37	Project Manager	14	Days	\$150	\$2,100			\$2,100	

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations
Engineering and Project Management Cost Estimate**

Task No.	Task Description	Quantity	Units	Labor and Equipment		Contract Cost		TOTAL	Notes
				Unit Cost	Total Cost	Unit Cost	Total Cost		
38	Total Shaver Summit PLS Project Manager	40						\$9,700	
	Total Shaver Summit PLS Engineering and Project Management							\$78,600	
	<u>Desert Center Pressure Limiting Station</u>								
	<u>Hourly Engineering</u>								
39	Sr. Mechanical Engineer	20	Hours	\$126	\$2,520			\$2,520	
40	Mechanical Engineer	60	Hours	\$113	\$6,780			\$6,780	
41	Sr. Structural Engineer	20	Hours	\$126	\$2,520			\$2,520	
42	Sr. Civil Engineer	20	Hours	\$126	\$2,520			\$2,520	
43	Sr. Electrical Engineer	20	Hours	\$126	\$2,520			\$2,520	
44	Electrical Engineer	20	Hours	\$113	\$2,260			\$2,260	
45	Design and Drafting	80	Hours	\$61	\$4,880			\$4,880	
46	Project Manager	30	Hours	\$140	\$4,200			\$4,200	
47	Administrative	12	Hours	\$61	\$732			\$732	
48	Printing						\$1,000	\$1,000	
49	Subtotal Desert Center PLS Hourly Engine	282						\$29,900	
	<u>Contract Engineering</u>								
50	Geotechnical Investigation	1	Lot				\$15,000	\$15,000	
51	Cathodic Protection	1	Lot				\$15,000	\$15,000	
52	Station Controls Engineering	60	Hours			\$150	\$9,000	\$9,000	
53	Subtotal Desert Center PLS Contract Engineering							\$39,000	
54	Total Desert Center PLS Engineering							\$68,900	
	<u>Project Manager</u>								
55	Project Manager	40	Hours	\$190	\$7,600			\$7,600	
	<u>Project Manager Per Diem</u>								

Date: 1/16/2014
 By: JJK

**Southern California Gas Company
 Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations
 Engineering and Project Management Cost Estimate**

Task No.	Task Description	Quantity	Units	Labor and Equipment		Contract Cost		TOTAL	Notes
				Unit Cost	Total Cost	Unit Cost	Total Cost		
56	Project Manager	14	Days	\$150	\$2,100			\$2,100	
57	Total Desert Center PLS Project Manager	40						\$9,700	
58	Total Desert Center PLS Engineering and Project Management							\$78,600	
59	Total 3 PIs's Engineering and Project Management							\$235,800	
TOTAL COST								\$235,800	
TOTAL HOURS		966							

Date: 1/16/2014

By: JJK

**Southern California Gas Company
Whitewater, Shaver Summit and Desert Center Pressure Limiting Stations
Survey Cost Estimate**

Task No.	Description	Quantity	Units	Labor and Equipment		Contract Cost		TOTAL	Notes
				Unit Cost	Total	Unit Cost	Total Cost		
<u>Whitewater Pressure Limiting Station</u>									
1	Survey - 2 man crew	20	Hours	\$240	\$4,800			\$4,800	
2	Station Laser Scanning					\$8,000	\$8,000	\$8,000	
3	Subtotal - Whitewater PLS							\$12,800	
<u>Shaver Summit Pressure Limiting Station</u>									
4	Survey - 2 man crew	20	Hours	\$240	\$4,800			\$4,800	
4	Station Laser Scanning					\$8,000	\$8,000	\$8,000	
6	Subtotal - Shaver Summit PLS							\$12,800	
<u>Desert Center Pressure Limiting Station</u>									
7	Survey - 2 man crew	20	Hours	\$240	\$4,800			\$4,800	
8	Station Laser Scanning					\$8,000	\$8,000	\$8,000	
9	Subtotal - Desert Center PLS							\$12,800	
10	Total - 3 Pressure Limiting Stations	60			\$14,400		\$24,000	\$38,400	
TOTAL COST								\$38,400	
TOTAL HOURS		60							

Attachment VIII

Crossing List



Attachment IX

Environmental 1 Mile Map book