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VOLUME III

WP-968 – 1482

SCG Reasonableness Review Valve Enhancement Project Workpapers (*continued*)

SCG Reasonableness Review Valve Enhancement Project Workpapers

REASONABLENESS REVIEW VALVE ENHANCEMENT PROJECTS

Table 3 – Valve Project Bundles submitted in the 2024 Reasonableness Review

Valve Workpaper Title	Project Scope (valves, sites)	Workpaper Volume	Workpaper Page
29 Palms Valve Enhancement Project - Indian Canyon	1 valve, 1 site	II.	WP-474
29 Palms Valve Enhancement Project - Mohawk Trail	1 valve, 1 site	II.	WP-491
29 Palms Valve Enhancement Project - Sunburst Street	1 valve, 1 site	II.	WP-506
29 Palms Valve Enhancement Project - Utah Trail	1 valve, 1 site	II.	WP-523
45-120 Valve Enhancement Project	1 valve, 1 site	II.	WP-540
225 Valve Enhancement Project - Beartrap	1 valve, 1 site	II.	WP-558
225 Valve Enhancement Project - Quail Canal	1 valve, 1 site	II.	WP-575
404-406 Valley Bundle Valve Enhancement Project	8 valves, 4 sites	II.	WP-592
404-406 Ventura Valve Enhancement Project - Somis Yard	1 valve, 1 site	II.	WP-624
1014 Olympic Valve Enhancement Project	6 valves, 2 sites	II.	WP-641
1018 Valve Enhancement Project - Alipaz Street	1 valve, 1 site	II.	WP-667
1018 Valve Enhancement Project - Avery Parkway	1 valve, 1 site	II.	WP-684
1018 Valve Enhancement Project - Burt Road	2 valves, 1 site	II.	WP-702
1018 Valve Enhancement Project - Camino Capistrano	1 valve, 1 site	II.	WP-720
1018 Valve Enhancement Project - El Toro Road	1 valve, 1 site	II.	WP-740
1018 Valve Enhancement Project - Harvard & Alton	3 valves, 1 site	II.	WP-759
2000 Beaumont Riverside 2016 Valve Enhancement Project Bundle	4 valves, 4 sites	II.	WP-778
4000 Valve Enhancement Project - Camp Rock Road	1 valve, 1 site	II.	WP-807
4000 Valve Enhancement Project - Desert View Road	1 valve, 1 site	II.	WP-824
4000 Valve Enhancement Project - Devore Station	2 valves, 1 site	II.	WP-841
4000 Valve Enhancement Project - Powerline Road	1 valve, 1 site	II.	WP-858
4002 Fontana Valve Enhancement Project - Etiwanda & 4th	1 valve, 1 site	II.	WP-875
7000 Valve Enhancement Project - Beech & Highway 46	1 valve, 1 site	II.	WP-894
7000 Valve Enhancement Project - Melcher & Elmo	3 valves, 1 site	II.	WP-912
7000 Valve Enhancement Project - Road 68 & Avenue 232	1 valve, 1 site	II.	WP-931
7000 Valve Enhancement Project - Road 96 & Avenue 198	1 valve, 1 site	II.	WP-949
7000 Valve Enhancement Project - Visalia Station	2 valves, 1 site	III.	WP-968
Adelanto Valve Enhancement Project - MLV 4	1 valve, 1 site	III.	WP-987
Apple Valley Valve Enhancement Project - MLV 2	1 valve, 1 site	III.	WP-1003
Apple Valley Valve Enhancement Project - MLV 13	1 valve, 1 site	III.	WP-1020
Aviation & 104th Valve Enhancement Project	5 valves, 1 site	III.	WP-1038
Banning 2001 Valve Enhancement Project - MLV 14.3A	3 valves, 1 site	III.	WP-1063
Banning 2001 Valve Enhancement Project - MLV 14A	1 valve, 1 site	III.	WP-1081
Banning 2001 Valve Enhancement Project - MLV 16A	1 valve, 1 site	III.	WP-1098

REASONABLENESS REVIEW VALVE ENHANCEMENT PROJECTS

Valve Workpaper Title	Project Scope (valves, sites)	Workpaper Volume	Workpaper Page
Banning 2001 Valve Enhancement Project - MLV 17A	1 valve, 1 site	III.	WP-1116
Banning Airport Valve Enhancement Project	2 valves, 1 site	III.	WP-1133
Blythe Valve Enhancement Project - Cactus City	1 valve, 1 site	III.	WP-1151
Brea Valve Enhancement Project - Atwood Station	3 valves, 1 site	III.	WP-1169
Brea Valve Enhancement Project - Carbon Canyon	1 valve, 1 site	III.	WP-1186
Brea Valve Enhancement Project - Gale & Azusa	1 valve, 1 site	III.	WP-1203
Brea Valve Enhancement Project - Brea Canyon	3 valves, 1 site	III.	WP-1220
Burbank Valve Enhancement Project - Riverside & Agnes	1 valve, 1 site	III.	WP-1238
Carpinteria Valve Enhancement Project - Oxy & Rincon	1 valve, 1 site	III.	WP-1254
Del Amo Station Valve Enhancement Project	3 valves, 1 site	III.	WP-1271
Fontana 4000-4002 Valve Enhancement Project - Benson & Chino	1 valve, 1 site	III.	WP-1288
Glendale Valve Enhancement Project - Geneva & Monterey	1 valve, 1 site	III.	WP-1309
Indio Valve Enhancement Project - MLVs 8, 8A, & 8B	3 valves, 2 sites	III.	WP-1326
Indio Valve Enhancement Project - MLV 9A & 9B	2 valves, 1 site	III.	WP-1347
Indio Valve Enhancement Project - MLVs 10, 10A, & 10B	3 valves, 1 site	III.	WP-1366
Palowalla Valve Enhancement Project	3 valves, 1 site	III.	WP-1385
Rainbow 2017 Valve Enhancement Project - Martin & Ramona	2 valves, 1 site	III.	WP-1402
Rainbow Check Valve Enhancement Project - Newport & Briggs	1 valve, 1 site	III.	WP-1418
Rainbow Check Valve Enhancement Project - Scott & El Centro	2 valves, 1 site	III.	WP-1434
Rainbow Check Valve Enhancement Project - Rainbow Valley & Pechanga	2 valves, 1 site	III.	WP-1450
Rainbow CV Valve Enhancement Project - Ramona & Lakeview	2 valves, 1 site	III.	WP-1467
Rainbow Valve Enhancement Project - MLV 5	3 valves, 1 site	IV.	WP-1483
Santa Barbara County Valve Enhancement Project - Lions	1 valve, 1 site	IV.	WP-1500
Spence Station Valve Enhancement Project	1 valve, 1 site	IV.	WP-1520
Taft Valve Enhancement Project - 7th Standard	1 valve, 1 site	IV.	WP-1536
Taft Valve Enhancement Project - Buttonwillow	1 valve, 1 site	IV.	WP-1553
Taft Valve Enhancement Project - Hageman & Renfro	2 valves, 1 site	IV.	WP-1571
Taft Valve Enhancement Project – Sycamore Road	1 valve, 1 site	IV.	WP-1592
Victorville COMMS Valve Enhancement Project - MLV 11	1 valve, 1 site	IV.	WP-1609
Victorville COMMS Valve Enhancement Project - MLV 12	1 valve, 1 site	IV.	WP-1626
Western Del Rey Valve Enhancement Project - Mississippi & Armacost	1 valve, 1 site	IV.	WP-1643
Wilmington Valve Enhancement Project - Eubank Station	2 valves, 1 site	IV.	WP-1660

I. LINE 7000 VALVE ENHANCEMENT PROJECT – VISALIA STATION

A. Background and Summary

The Line 7000 Valve Enhancement Project – Visalia Station consists of valve enhancements made to two existing valves located in an unincorporated area within Tulare County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of portions of Line 7000 and Supply Line 38-574 in the event of a pipeline rupture. SoCalGas installed the necessary automation equipment at the site. The total loaded project cost is $554,841.

The Line 7000 Valve Enhancement Project – Visalia Station construction site is an existing SoCalGas facility in a rural area adjacent to an agricultural field near the intersection of Road 68 and Route 198 in Tulare County. There are multiple residential structures nearby. SoCalGas bundled this site with six additional sites, Line 7000 Valve Enhancement Projects – Beech and Highway 46, Delano Station, Melcher and Elmo, Road 68 and Avenue 232, Road 98 and Avenue 198, and Tipton, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Line 7000 Valve Enhancement Project – Visalia Station.

Table 1: General Project Information

Line 7000 Valve Enhancement Project – Visalia Station			
Location	Tulare County		
Days on Site	27 days		
Construction Start	07/09/2018		
Construction Finish	08/21/2018		
Commissioning Date	01/30/2019		
Valve Upgrades			
Valve Number	38-574-2		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	No		
RCV	Yes		
Valve Number	38-574-4		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	No		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	Existing – Utility		
Communication	Existing – Radio		
SCADA Panel	New		
Equipment Shelter	Existing		
Fencing	Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	554,841	-	554,841
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Line 7000 Bundle Overview

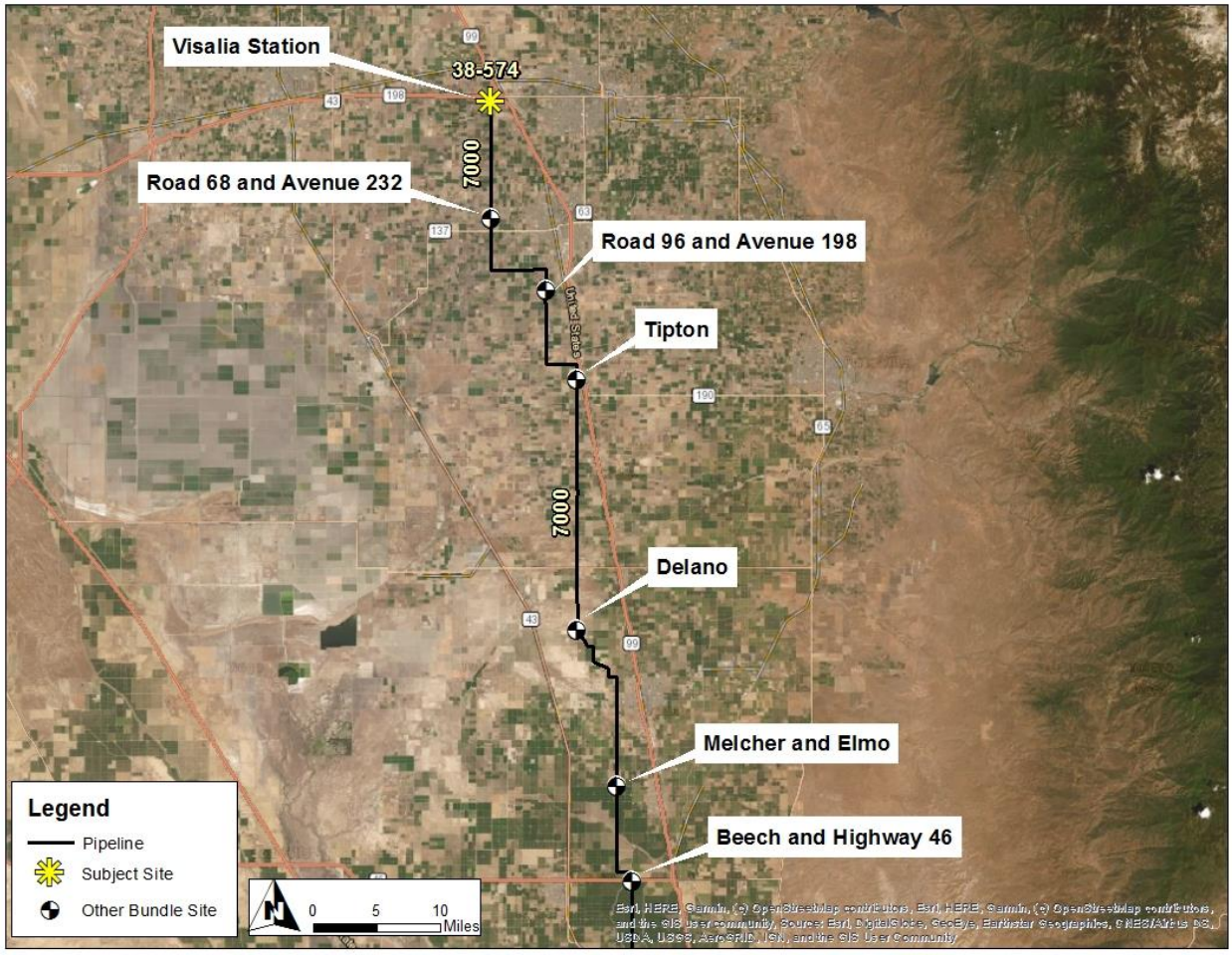
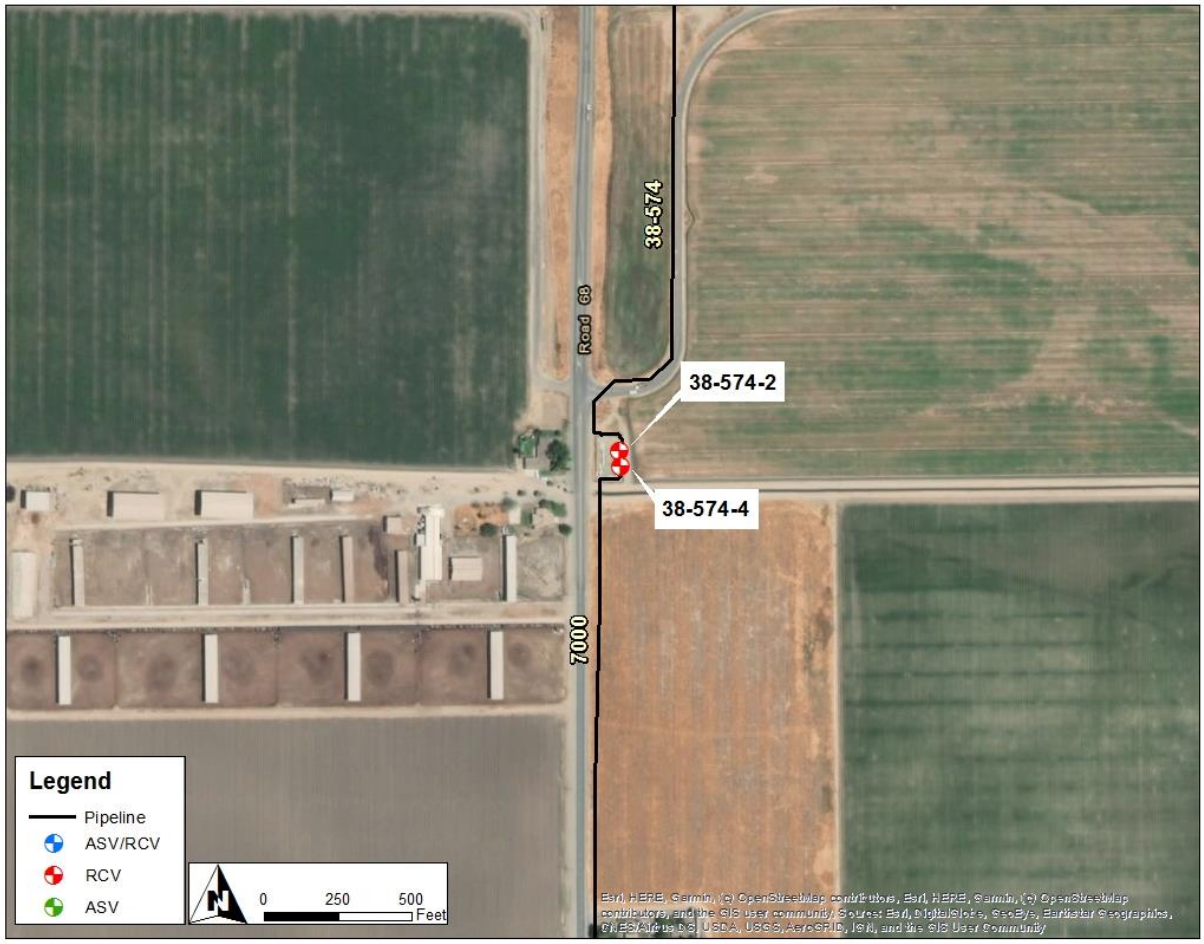


Figure 2: Satellite Image of Line 7000 Valve Enhancement Project – Visalia Station



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope did not identify this project. SoCalGas reviewed available information, performed a detailed system flow analysis and identified two valves as candidates for enhancement to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas did not identify these valves for automation to achieve the objective of rapid system isolation.
2. Updated Scope: SoCalGas determined that the automation of mainline valve (MLV) 7000-68.88-1 would enable rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The Project Team identified two valves, 38-574-2 and 38-574-4, with existing actuators and determined that the automation of these valves would achieve the Valve Enhancement Plan objectives at a lower project cost. The Project Team altered the scope to include the automation of these two valves and descoped the automation planned for MLV 7000-68.88-1.
4. Final Project Scope: The final project scope consists of the automation of two valves that included the installation of the necessary automation equipment at the site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
38-574	N/A	2	[redacted]	C/P	RCV
38-574	N/A	4	[redacted]	C/P	RCV

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Line 7000 Valve Enhancement Project Visalia Station by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: The site is an existing SoCalGas facility in a rural area adjacent to an agricultural field near the intersection of Road 68 and Route 198 in Tulare County.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected these valves for automation to satisfy the objectives of the PSEP Valve Enhancement Plan.
4. Power Source: The site had existing utility power.
5. Communication Technology: The site had existing communications equipment.

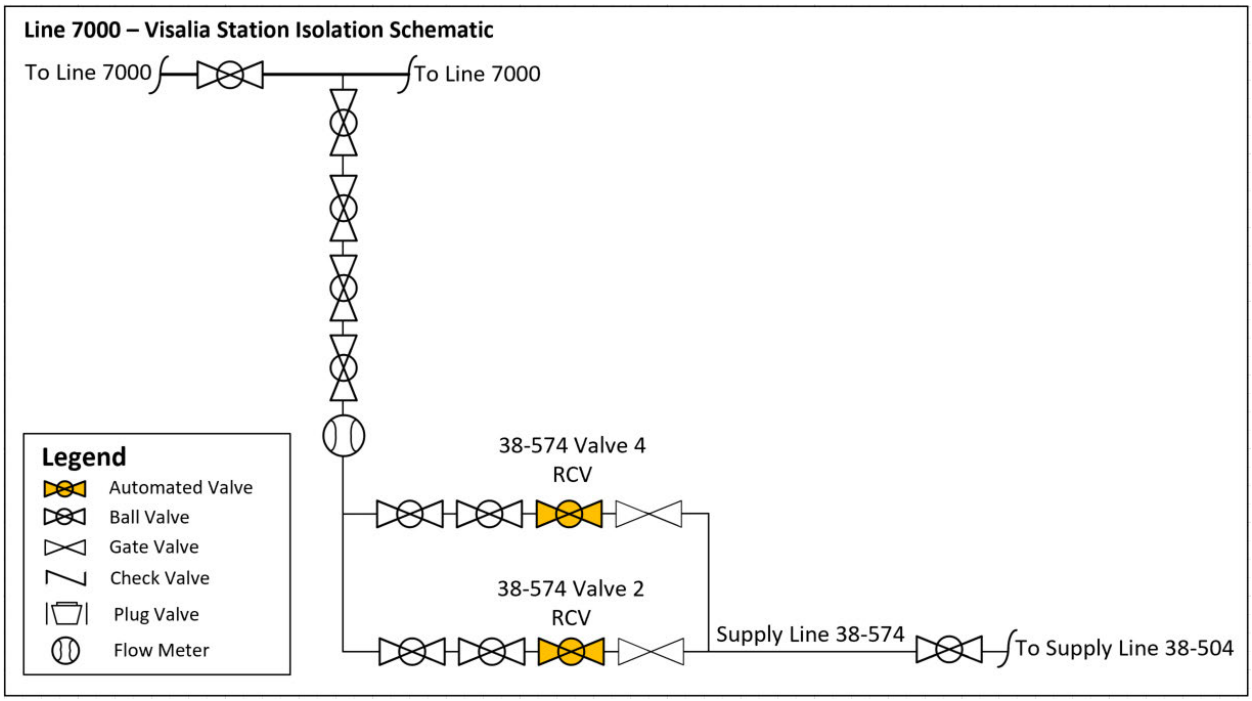
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and verified that the station could accommodate the new equipment.
2. Valve Details:
   a. 38-574-2: The existing valve was a manually actuated Class 300 ball valve, which the Project Team reused.
   b. 38-574-4: The existing valve was a manually actuated Class 300 ball valve, which the Project Team reused.

3. Actuator Details:
   a. 38-574-2: The existing actuator was a rotary piston double-acting actuator, which the Project Team reused.
   b. 38-574-4: The existing actuator was a rotary piston double-acting actuator, which the Project Team reused.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impact to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team performed all work within the existing SoCalGas easement.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Line 7000 Valve Enhancement Project – Visalia Station Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas determined that changes in scope were appropriate to enhance the design of the Project and address engineering factors. As a result, the preliminary cost estimate does not fully reflect the final scope. The Project Team originally planned to automate MLV 7000-68.88-1 and install a new actuator. The Project Team identified two valves, 38-574-2 and 38-574-4, with existing actuators and determined that the automation of these valves would achieve the Valve Enhancement Plan objectives at a lower project cost. The Project Team altered the scope to include the automation of these two valves and descoped the automation planned for MLV 7000-68.88-1.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Alliance Partner (Electrical Contractor) to prepare a cost estimate based on a more detailed engineering design package which included the updated design described in the discussion of notable changes in scope above.

1. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for the electrical contractor was [redacted].

2. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	07/09/2018
Construction Completion Date	08/21/2018
Days on Site	27 days
Commissioning Date	01/30/2019

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas' finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $49,000 in change orders.

1. Field Design Change:
   a. The Scope of Work for the Electrical Construction Contractor did not include the installation of 3/4-inch rock inside the station. SoCalGas requested that the Electrical Construction Contractor install the rock in the station.
   b. The Electrical Construction Contractor provided the tubing and instrumentation equipment. These materials were not included in the Scope of Work for the Electrical Construction Contractor.

Figure 4: Existing Above Grade Actuators

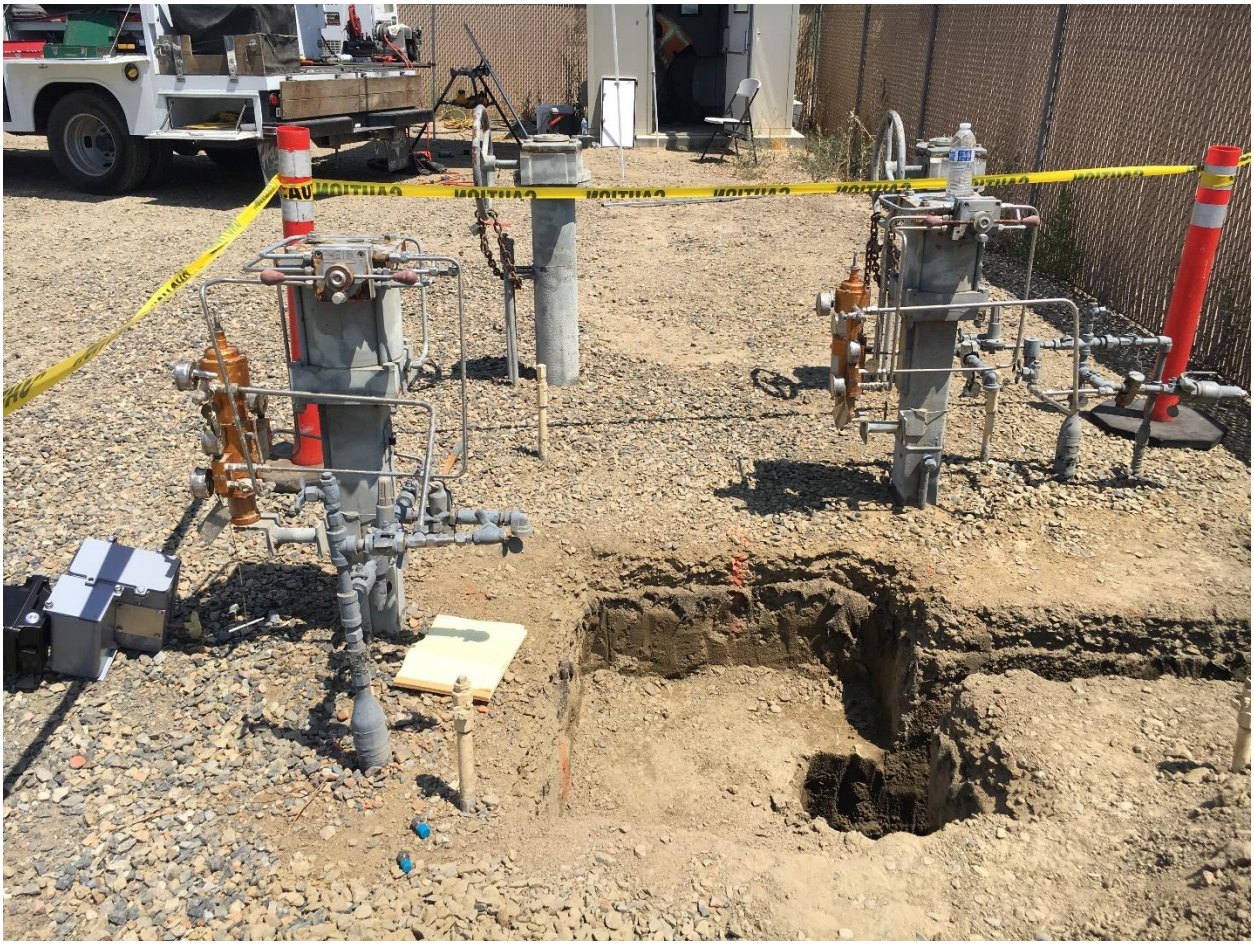


Figure 5: Visalia Station Post-Construction

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valves, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on January 30, 2019, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Bundling of Projects: SoCalGas grouped this site with six additional sites, Beech and Highway 46, Delano Station, Melcher and Elmo, Road 68 and Avenue 232, Tipton, and Road 96 and Avenue 198, into a single valve bundle to gain efficiencies in engineering, planning, and construction costs to minimize costs for the benefit of customers.
2. Project Design: The Project Team identified two valves, 38-574-2 and 38-574-4, with existing actuators and determined that the automation of these valves would achieve the Valve Enhancement Plan objectives at a lower project cost. The Project Team altered the scope to include the automation of these two valves and descoped the automation planned for MLV 7000-68.88-1.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $606,402. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $554,841.

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	150,335	78,159	(72,176)
Materials	48,316	49,098	782
Mechanical Construction Contractor	57,120	-	(57,120)
Electrical Contractor	121,408	111,671	(9,737)
Construction Management & Support	16,138	19,335	3,197
Environmental	86,383	36,159	(50,224)
Engineering & Design[3]	-	77,074	77,074
Project Management & Services	56,511	16,158	(40,353)
ROW & Permits	2,456	107	(2,349)
GMA	67,734	48,976	(18,758)
Total Direct Costs	**606,401**	**436,738**	**(169,663)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	194,598	107,818	(86,780)
AFUDC	132,316	9,427	(122,889)
Property Taxes	29,654	858	(28,796)
Total Indirect Costs	**356,568**	**118,103**	**(238,465)**
Total Direct Costs	**606,401**	**436,738**	**(169,663)**
Total Loaded Costs	**962,969**	**554,841**	**(408,128)**

The Actual Full-Time Equivalent[5] (FTE) for this Project is 0.63.

[2] Values may not add to total due to rounding.
[3] The TIC assumed that SoCalGas would provide all Engineering and Design
[4] Values may not add to total due to rounding.
[5] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the L7000 Valve Enhancement Project, Actual Direct Costs were less than the preliminary estimate by $169,663. This variance can be attributed to a variety of factors including: the project initially anticipated Mechanical Construction Contractor and Company Labor to automate one valve and install a new actuator, however during detailed design the Project Team determined automating two valves with existing actuators achieved the Valve Enhancement Plan objectives at a lower project cost; and the preliminary design included environmental abatement however, during construction, it was determined that abatement was not necessary.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Line 7000 Valve Enhancement Project – Visalia Station. Through this Valve Enhancement Project, SoCalGas successfully automated two valves to achieve the objective of enabling rapid system isolation of portions of Line 7000 and Supply Line 38-574 located in an unincorporated area of Tulare County. The total loaded cost of the Project is $554,841.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling seven geographically proximate projects together to capture efficiencies through coordinated engineering, and installing equipment at the site to enable rapid system isolation of portions of Line 7000 and Supply Line 38-574 located in an unincorporated area of Tulare County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Line 7000 Valve Enhancement Project – Visalia Station Final Report

I. ADELANTO VALVE ENHANCEMENT PROJECT – MLV 4

A. Background and Summary

The Adelanto Valve Enhancement Project – MLV 4 consists of valve enhancements made to an existing mainline valve (MLV) located in the City of Adelanto within San Bernardino County. Through this project, SoCalGas enhanced the safety of its integrated natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 6905 in the event of a pipeline rupture. SoCalGas installed new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $734,876.

The Adelanto Valve Enhancement Project – MLV 4 site is located within an existing SoCalGas facility located in a rural area in a previously disturbed area near Highway 395, north of Torosa Road in the City of Adelanto. This project was designed and executed as one cohesive project; however, the project costs were shared by PSEP and the Operating District, with PSEP funding the activities that provided system isolation through automation of the new mainline valve, and the Operating District funding the relocation of the existing cathodic protection equipment, the installation of a canopy over the necessary automation equipment, the installation of grounding equipment, and the replacement of the preexisting fencing.

Table 1: General Project Information

Adelanto Valve Enhancement Project – MLV 4			
Location	Adelanto		
Days on Site	22 days		
Construction Start	12/11/2017		
Construction Finish	01/18/2018		
Commissioning Date	08/16/2018		
Valve Upgrades			
Valve Number	6905-23.78-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	New – Solar		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing	Replace		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	734,876	-	734,876
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Adelanto Valve Enhancement Project – MLV 4

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified MLV 6905-23.78-0 for automation to enable remote isolation to a portion of Line 6905. Prior to initiating execution of the Project, SoCalGas reviewed available information and performed a detailed system flow analysis to validate the scope of the Project and confirmed that this valve enhancement will provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 6905-23.78-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point would achieve the transmission isolation objectives set forth in the Valve Enhancement Plan.
3. Engineering, Design, and Constructability: The Operating District requested that the existing cathodic protection equipment be relocated, that a canopy be installed over the necessary automation equipment, and that the preexisting fencing be replaced. The Project Team incorporated these changes into their design. The Operating District incurred the costs related to this additional scope.
4. Final Project Scope: The final project scope consists of the automation of one valve that included the installation of new power equipment, the installation of new communications equipment, and the installation of the necessary automation equipment at the project site.

[1] See Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. # SCG-32).

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
6905	23.78	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Adelanto Valve Enhancement Project – MLV 4 by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site is an existing SoCalGas facility located in a rural part of the City of Adelanto. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected this MLV for automation in order to isolate an HCA location downstream of this valve.
4. Power Source: There was no preexisting power source. The Project Team installed new power equipment at the site.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

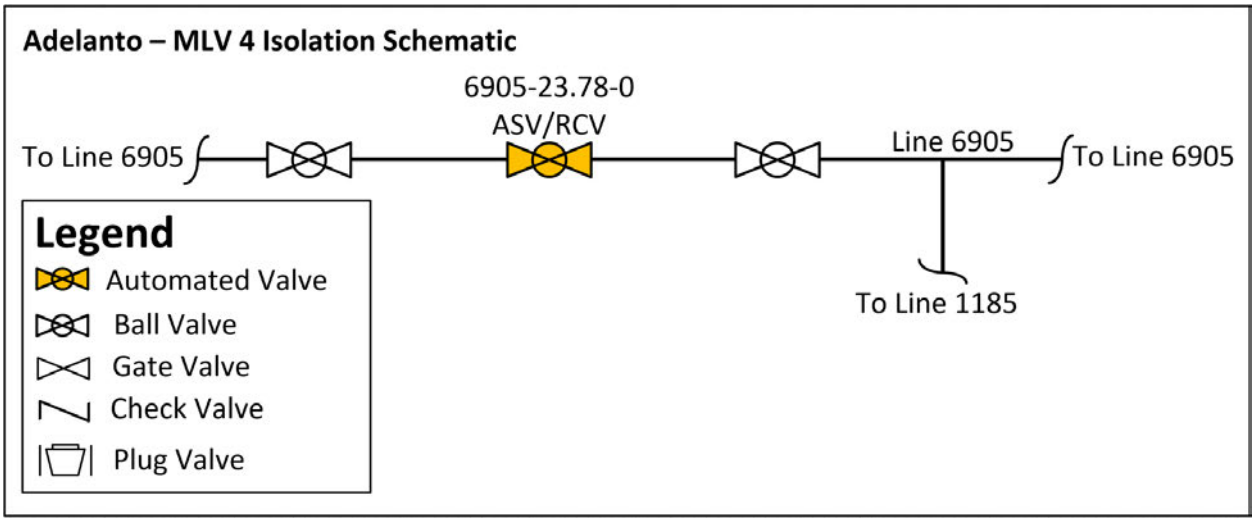
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station would accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 600 ball valve, which was reused by the Project Team.
3. Actuator Details: The existing actuator was a double-acting pneumatic actuator that the Project Team reused.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team performed all work within the existing SoCalGas easements.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Final Report for Adelanto Valve Enhancement Project – MLV 4

Figure 2: Adelanto Valve Enhancement Project – MLV 4 Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates. The values below represent the PSEP scope only.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	12/11/2017
Construction Completion Date	01/18/2018
Days on Site	22 days
Commissioning Date	08/16/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 3: Project Site Post Construction, Existing Actuator and New Linebreak Cabinet in the Foreground, New Solar Array and Battery Cabinet in the Background

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on August 16, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. The Project Team coordinated with the Operating District to relocate the existing cathodic protection equipment, install a canopy over the new automation equipment and install new mesh around the existing fencing. The Operating District incurred the cost of these activities. Bundling these activities with the planned PSEP work eliminated the need for a separate mobilization and demobilization, thus reducing costs for customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $989,701. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in

accordance with Company overhead allocation policies. The total loaded cost of the Project is $734,876.

Table 4: Estimated and Actual Direct Costs and Variances[2, 3]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	175,658	64,691	(110,968)
Materials	85,498	56,547	(28,951)
Mechanical Construction Contractor	257,702	143,397	(114,305)
Electrical Contractor	131,579	105,610	(25,969)
Construction Management & Support	25,953	44,020	18,067
Environmental	60,983	-	(60,983)
Engineering & Design	97,804	128,984	31,180
Project Management & Services	45,612	6,302	(39,311)
ROW & Permits	4,425	6,953	2,528
GMA	104,487	73,254	(31,232)
Total Direct Costs	**989,701**	**629,758**	**(359,944)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4, 5]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	268,977	98,931	(170,046)
AFUDC	171,756	5,085	(166,671)
Property Taxes	39,398	1,102	(38,296)
Total Indirect Costs	**480,131**	**105,118**	**(375,013)**
Total Direct Costs	**989,701**	**629,758**	**(359,944)**
Total Loaded Costs	**1,469,832**	**734,876**	**(734,957)**

The Actual Full-Time Equivalents[6] (FTEs) for this Project are 0.54.

[2] Values may not add to total due to rounding.
[3] Values in table excludes non-PSEP work
[4] Values may not add to total due to rounding.
[5] Values in table excludes non-PSEP work
[6] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Adelanto Valve Enhancement Project – MLV 4, Actual Direct Costs were less than the preliminary estimate by $359,944. This variance is attributable to a variety of factors including: increased productivity allowed for construction to be completed in 22 days instead of the originally anticipated 30 days, reducing costs for the construction contractor, construction management, and company labor; the project was scheduled to be executed concurrently with a SoCalGas Operating District project, thereby realizing synergies and reducing the overall cost; material costs for additional solar power, UPS batteries, and cathodic protection were originally anticipated but were not required for project completion; and survey requirements for project completion were lower than originally anticipated.

For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Adelanto Valve Enhancement Project – MLV 4. Through this Valve Enhancement Project, SoCalGas successfully automated on mainline valve to achieve the objective of enabling rapid system isolation of a portion of Line 6905 in the City of Adelanto. The total loaded cost of the Project is $734,876.

SoCalGas executed this project prudently through: designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, bundling two projects together to capture efficiencies through coordinated engineering and construction planning, by installing the necessary automation equipment, and by installing the necessary equipment to bring power and communication capabilities to this valve to enable rapid system isolation of a portion of Line 6905 located in the City of Adelanto.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by planning and coordinating construction activities, and by limiting the number of mobilizations by coordinating with the Operating District to maximize efficiencies and reduce customer and community impacts.

End of Adelanto Valve Enhancement Project – MLV 4 Final Report

I. APPLE VALLEY VALVE ENHANCEMENT PROJECT – MLV 2

A. Background and Summary

The Apple Valley Valve Enhancement Project – MLV 2 consists of valve enhancements made to an existing mainline valve (MLV) located within the City of Oak Hills. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization a portion of Line 1185 in the event of a pipeline rupture. SoCalGas installed a new actuator, new power equipment, new communications equipment, new fencing, and the necessary automation equipment at the site. The total loaded project cost is $1,396,921.

The Apple Valley Valve Enhancement Project – MLV 2 construction site is within an existing SoCalGas facility located in a desert environment in an urban area near the intersection of Smoke Tree Road and Baldy Mesa Road in the City of Oak Hills. There are some residential houses approximately 500 feet from the site and there is an elementary school approximately 1000 feet from the site. SoCalGas bundled this site with one additional site, Apple Valley Valve Enhancement Project – MLV 13, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Apple Valley Valve Enhancement Project – MLV 2. The project was designed and executed as one cohesive project. The project costs were shared by PSEP and the Operating District, with PSEP funding the activities that provided system isolation through the automation of the mainline valve, and the Operating District funding the activities to install an upgraded Linebreak Cabinet, expand the fencing, and install one canopy over the new SCADA panel.

Table 1: General Project Information

Apple Valley Valve Enhancement Project – MLV 2			
Location	City of Oak Hills		
Days on Site	28 days		
Construction Start	05/21/2018		
Construction Finish	07/16/2018		
Commissioning Date	12/05/2019		
Valve Upgrades			
Valve Number	1185-8.00-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing	Yes – Expanded		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,396,921	-	1,396,921
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Apple Valley Bundle Overview

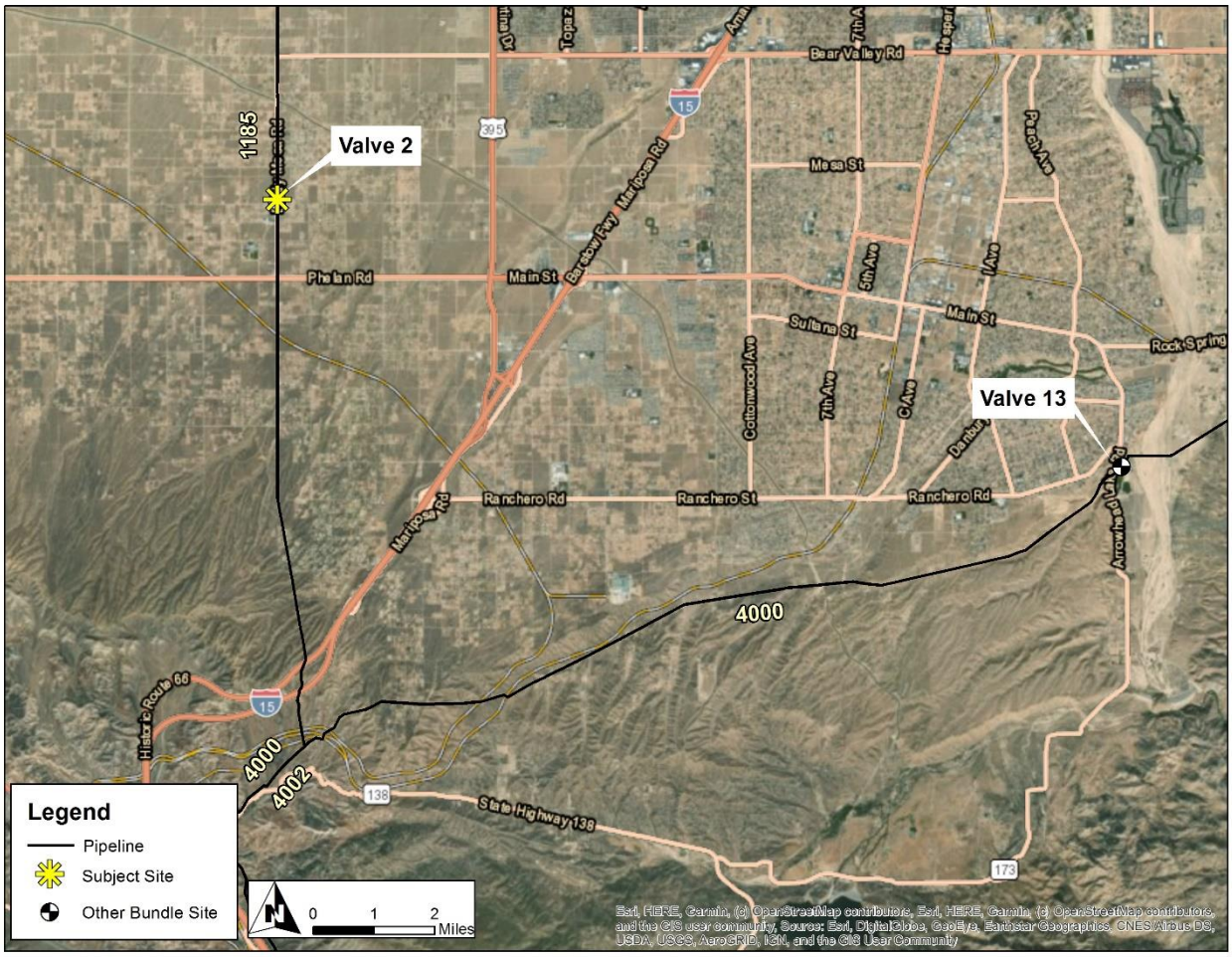


Figure 2: Satellite Image of Apple Valley Valve Enhancement Project – MLV 2

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Apple Valley Valve Enhancement Project – MLV 2 in workpapers supporting the Valve Enhancement Plan in the 2011PSEP filing.[1] This conceptual scope identified MLV 1185-8.00-0 for automation to enable remote isolation to a portion of Line 1185. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis, and validated the scope of the Project. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 1185-8.00-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point would achieve the transmission isolation objectives set forth in the Valve Enhancement Plan.
3. Engineering, Design, and Constructability:
   a. The site had an existing Linebreak Panel that the Operating District was planning to upgrade. This work was incorporated into the PSEP scope. The Operating District incurred the costs related to this upgrade.
   b. The Operating District requested that the fencing for this site be replaced with higher grade fencing. This work was incorporated into the PSEP scope. The Operating District incurred the costs related to this installation.
   c. The Operating District requested that a canopy be installed for the SCADA panel and for the Linebreak Panel. This work was incorporated into the PSEP scope. The Operating District incurred the costs related to this installation.

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

4. Final Project Scope: The final project scope consists of the automation of one valve, that included the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
1185	8.00	0	[redacted]	A/AG	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Apple Valley Valve Enhancement Project – MLV 2 by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site is an existing SoCalGas facility in a desert environment in an urban area. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: There was no preexisting power source. The Project Team installed new power equipment at the site.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

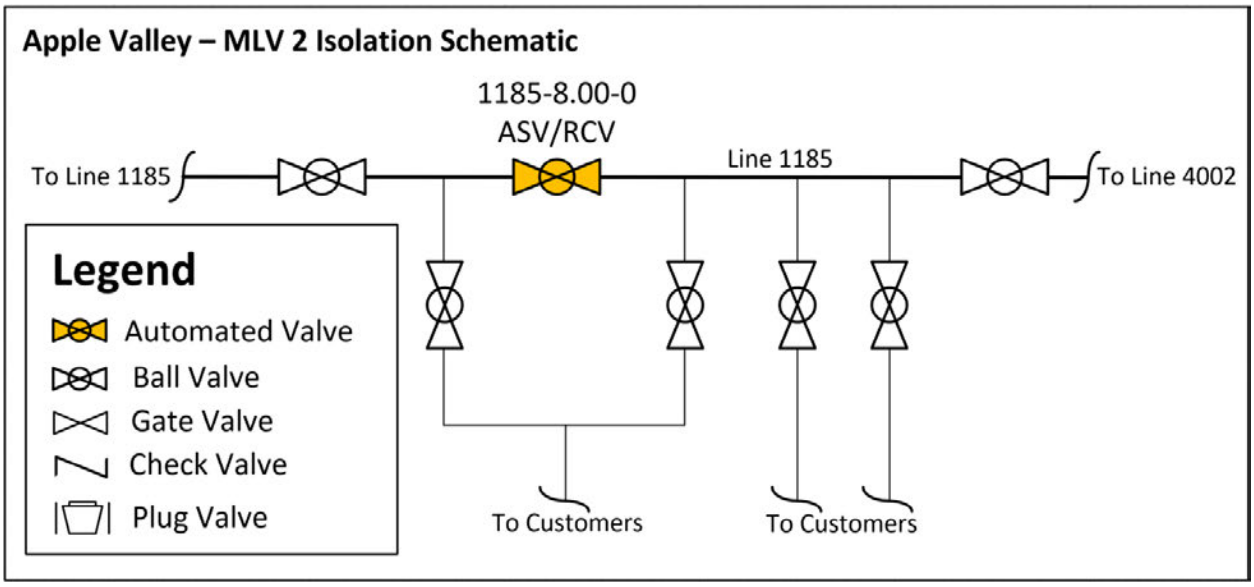
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 400 ball valve, which was reused by the Project Team.
3. Actuator Details: The preexisting actuator was incompatible with PSEP linebreak technology. The Project Team installed a new actuator.
4. Customer Impact: The Project Team did not identify any anticipated service disruption to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: The Project Team acquired a permit from San Bernardino County for the installation of the new antenna pole.
9. Land Use: The Project Team acquired a temporary right of entry from the nearby landowner for a laydown yard.
10. Traffic Control: The Project Team installed K-Rails next to the project site for the duration of construction.

Final Report for Apple Valley Valve Enhancement Project – MLV 2

Figure 3: Apple Valley Valve Enhancement Project – MLV 2 Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates. The estimated values below include PSEP and non-PSEP work.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate (confidential): The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate (confidential): SoCalGas' preliminary cost estimate for the electrical contractor was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	05/21/2018
Construction Completion Date	07/16/2018
Days on Site	28 days
Commissioning Date	12/05/2019

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: K-Rail in Background, New Actuator in Foreground.

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on December 5, 2019, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the known site conditions in the project plan and design. SoCalGas bundled this site with one additional site, Apple Valley Valve Enhancement Project – MLV 13, to gain efficiencies in engineering, planning and construction activities to minimize costs for the benefit of customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,360,272. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,396,921.

Table 4: Estimated and Actual Direct Costs and Variances[2,3]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	195,658	95,385	(100,273)
Materials	132,051	141,168	9,117
Mechanical Construction Contractor	313,348	329,901	16,553
Electrical Contractor	127,725	89,715	(38,010)
Construction Management & Support	60,917	80,726	19,809
Environmental	17,934	6,192	(11,742)
Engineering & Design	163,495	244,621	81,126
Project Management & Services	139,159	2,947	(136,212)
ROW & Permits	43,924	36,917	(7,007)
GMA	166,061	126,743	(39,318)
Total Direct Costs	**1,360,272**	**1,154,316**	**(205,956)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	305,257	177,409	(127,848)
AFUDC	283,612	54,008	(229,604)
Property Taxes	64,328	11,188	(53,140)
Total Indirect Costs	**653,197**	**242,605**	**(410,592)**
Total Direct Costs	**1,360,272**	**1,154,316**	**(205,956)**
Total Loaded Costs	**2,013,469**	**1,396,921**	**(616,548)**

The Actual Full-Time Equivalent[5] (FTE) for this Project is 0.33.

[2] Values may not add to total due to rounding.
[3] Values in table represent PSEP costs only.
[4] Values may not add to total due to rounding.
[5] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Apple Valley Valve Enhancement Project – MLV 2, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $205,956. This variance can be attributed to several factors including: SoCalGas bundled this site with one additional site to gain efficiencies in company labor, engineering, planning, and construction activities; the Engineering and Design firms provided project support activities which were originally estimated under Project Management and Services, but the actuals were recognized in Engineering and Design.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Apple Valley Valve Enhancement Project – MLV 2. Through this Valve Enhancement Project, SoCalGas successfully automated one mainline valve to achieve the objective of enabling rapid system isolation of a portion of Lines 1185 in the City of Oak Hills. The total loaded cost of the Project is $1,396,921.

SoCalGas executed this project prudently through designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, bundling two geographically proximate valve projects to capture efficiencies, by working with the Operating District to incorporate additional improvements to the facility at a minimal cost, installing a new actuator, and installing the equipment necessary to bring power and communications capabilities to the valves to enable rapid system isolation to a portion of Lines 1185 and 4002 in San Bernardino County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by engaging in reasonable efforts to promote competitive and market-based rates for contractor services and materials, and by using a reasonable amount of Company and contractor resources to complete this safety enhancement as soon as practicable.

End of Apple Valley Valve Enhancement Project – MLV 2 Final Report

I. APPLE VALLEY VALVE ENHANCEMENT PROJECT – MLV 13

A. Background and Summary

The Apple Valley Valve Enhancement Project – MLV 13 consists of valve enhancements made to an existing mainline valve (MLV) located in the City of Hesperia in San Bernardino County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 4000 in the event of a pipeline rupture. SoCalGas installed new power equipment, new communications equipment, and the necessary automation equipment. The total loaded project cost of the PSEP scope of this project is $416,008.

The Apple Valley Valve Enhancement Project – MLV 13 construction site is within an existing SoCalGas facility located in an urban desert environment in the City of Hesperia next to Hesperia Lake and multiple residential buildings. SoCalGas bundled this valve project with one additional valve project, Apple Valley Valve Enhancement Project – MLV 2 to gain efficiencies in engineering, planning, and construction activities. The Project Team tracked the projects separately to streamline project closeout for individual sites. This workpaper describes the construction activities and costs of the Apple Valley Valve Enhancement Project – MLV 13. This project was designed and executed as one cohesive project; however, the project costs were shared by PSEP and the Operating District with PSEP funding the activities that provided system isolation through the automation of the new mainline valve and the Operating District funding the activities to install the new Linebreak Cabinet and Valve Regulating Pilot (VRP).

Table 1: General Project Information

Apple Valley Valve Enhancement Project – MLV 13			
Location	City of Hesperia		
Days on Site	20 days		
Construction Start	11/27/2017		
Construction Finish	01/04/2018		
Commissioning Date	10/04/2018		
Valve Upgrades			
Valve Number	4000-49.21-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	No		
Site Upgrades			
Vault	None		
Power	New – Solar		
Communication	New – Radio		
SCADA Panel	None		
Equipment Shelter	None		
Fencing	Expanded		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	416,008	-	416,008
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Apple Valley Valve Enhancement Project Bundle Overview

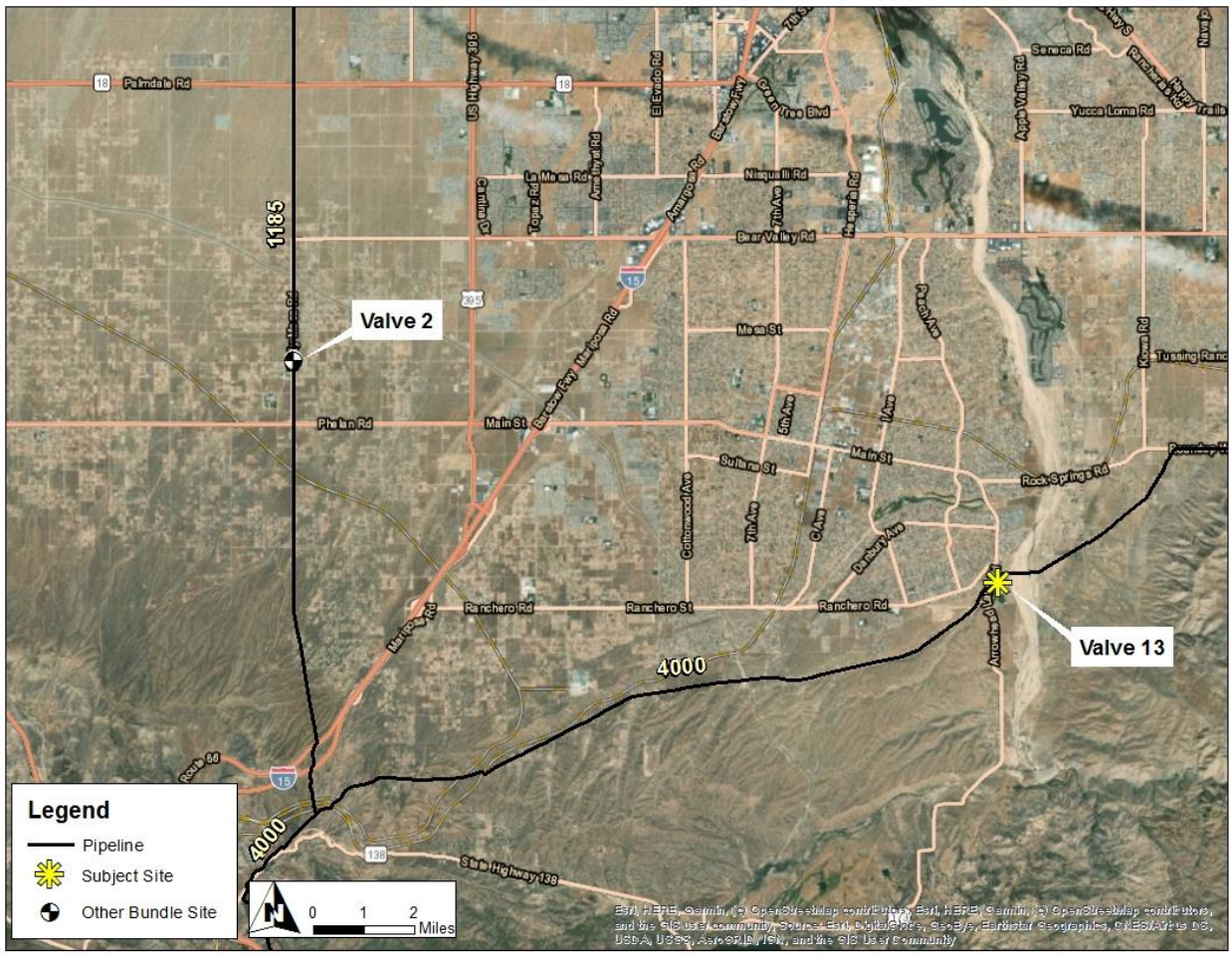


Figure 2: Satellite Image of Apple Valley Valve Enhancement Project – MLV 13

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Apple Valley Valve Enhancement Project – MLV 13 in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified MLV 4000-49.21-0 for automation to enable remote isolation to a portion of Line 4000. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and confirmed that this enhancement will provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 4000-49.21-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point would achieve the transmission isolation objectives set forth in the Valve Enhancement Plan.
3. Engineering, Design, and Constructability:
   a. The site had an existing Linebreak Panel that the Operating District was planning to upgrade. This work was incorporated into the project scope. The Operating District incurred the costs related to this upgrade.
   b. The Operating District requested that a Valve Regulator Pilot Cabinet be installed at the site. This work was incorporated into the project scope. The Operating District incurred the costs related to this installation.
   c. The existing solar array needed to be removed to provide space for the equipment requested by the Operating District. PSEP incorporated the relocation of the solar

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. # SCG-32).

array into the design. The Operating District incurred the costs related to this relocation.

d. Due to the additional spacing requirements, existing fencing had to be relocated and the Operating District incurred those relocation costs.

e. The existing instrumentation lines were rerouted due to the equipment requested by the Operating District. PSEP incorporated the relocation of these instrumentation lines into the design. The Operating District incurred the costs related to this relocation.

4. Final Project Scope: The final PSEP project scope consists of the automation of one valve and included the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
4000	49.21	0	[redacted]	COMMS	ASV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Apple Valley Valve Enhancement Project – MLV 13 by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site is an existing SoCalGas facility in a desert environment in an urban area. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment.

3. DOT Class: This project site is in a Class 3 location.
4. Power Source: The site had preexisting solar power. The Project Team installed new solar power equipment to accommodate the increased loads from the new automation equipment.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

C. Engineering, Design, and Planning Factors

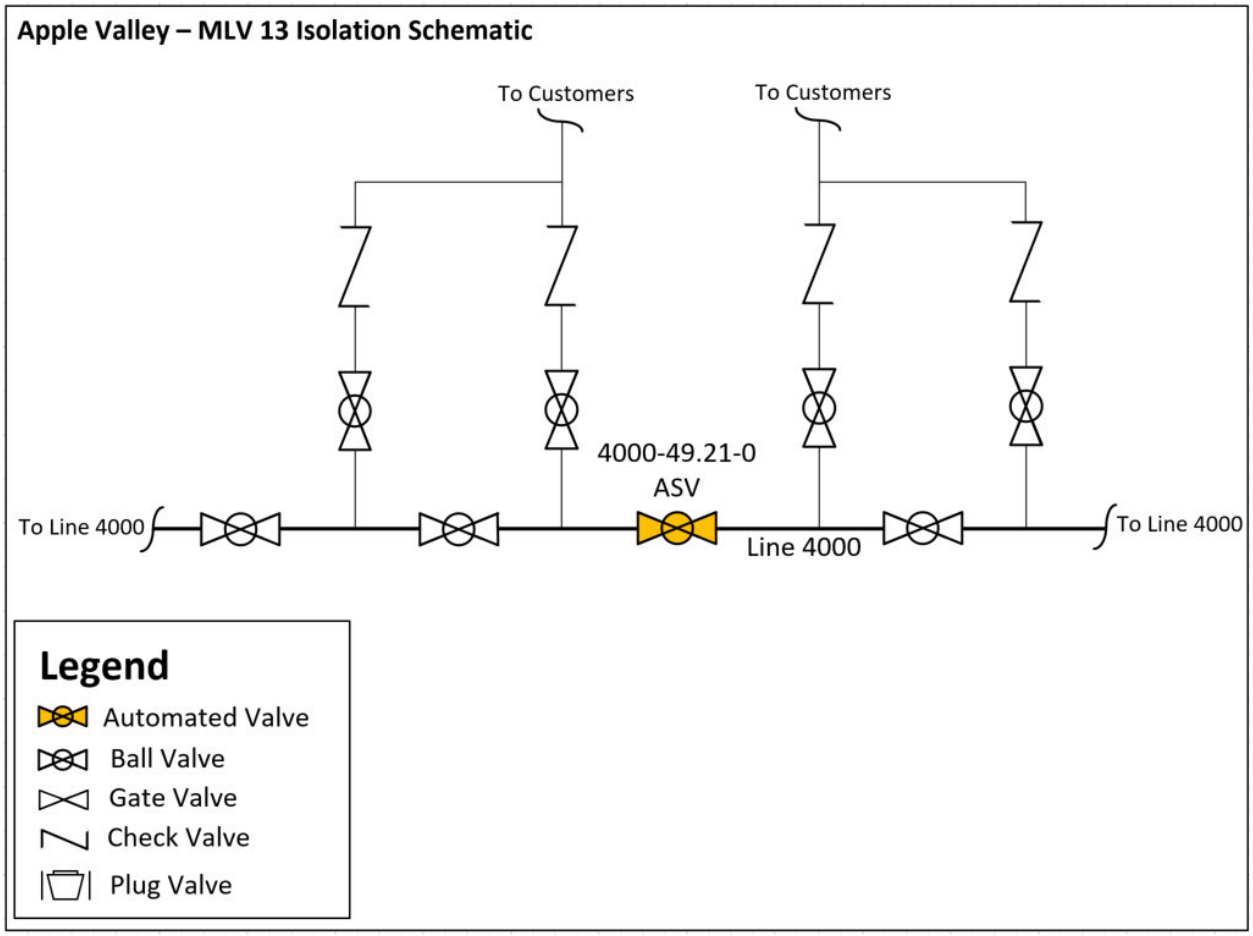
SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 400 ball valve, which was reused by the Project Team.
3. Actuator Details: The existing actuator was a double-acting pneumatic actuator, which was reused by the Project Team.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.

8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team performed all work within the existing SoCalGas easement.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Final Report for Apple Valley MLV 13 Valve Enhancement Project

Figure 3: Apple Valley Valve Enhancement Project – MLV 13 Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates. The estimated values below include PSEP and non-PSEP work, whereas Table 4 and 5 include estimated and actual values for PSEP work only.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	11/27/2017
Construction Completion Date	01/04/2018
Days on Site	20 days
Commissioning Date	10/04/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Project Site Post Construction

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on October 4, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. SoCalGas grouped this site with the Apple Valley Valve Enhancement Project – MLV 2, into a single valve bundle to gain efficiencies in engineering, planning and construction activities to minimize costs for the benefit of customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $362,096. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $416,008.

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	65,522	53,993	(11,529)
Materials	37,548	7,563	(29,985)
Mechanical Construction Contractor	80,135	12,928	(67,207)
Electrical Contractor	26,598	45,594	18,996
Construction Management & Support	19,459	27,975	8,516
Environmental	7,239	3,756	(3,483)
Engineering & Design	30,605	128,497	97,893
Project Management & Services	43,281	10,666	(32,616)
ROW & Permits	12,456	3,503	(8,953)
GMA	39,253	38,053	(1,200)
Total Direct Costs	**362,096**	**332,527**	**(29,569)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[3]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	278,404	74,005	(204,399)
AFUDC	192,962	7,883	(185,079)
Property Taxes	44,327	1,592	(42,735)
Total Indirect Costs	**515,693**	**83,481**	**(432,212)**
Total Direct Costs	**362,096**	**332,527**	**(29,569)**
Total Loaded Costs	**877,789**	**416,008**	**(461,781)**

The Actual Full-Time Equivalent[4] (FTE) for this Project is 0.35.

[2] Values may not add to total due to rounding.
[3] IBID.
[4] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Apple Valley MLV 13 Valve Enhancement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $29,569. This variance can be attributed to several factors including: the project initially planned a robust electrical system to include solar panels and battery systems for a Control & Power installation, which in detailed design was determined not to be required. The Project Team redesigned the project to only include ASV and COMMS; the Engineering and Design firms completed activities originally identified as Project Management & Services in the initial estimate while the actual costs were recognized under Engineering and Design.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Apple Valley Valve Enhancement Project – MLV 13. Through this Valve Enhancement Project, SoCalGas successfully automated one mainline valve to achieve the objective of enabling rapid system isolation of a portion of Line 4000 in the City of Hesperia in San Bernardino County. The total loaded cost of the Project is $ 416,008.

SoCalGas executed this project prudently through designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, bundling two geographically proximate projects to capture efficiencies, working with the Operating District to incorporate additional improvements to the facility at a minimal cost, and installing the equipment necessary to bring power and communications capabilities to the valves to enable rapid system isolation of a portion of Line 4000 located in the City of Hesperia.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by engaging in reasonable efforts to promote competitive and market-based rates for contractor services and materials, and by using a reasonable amount of Company and contractor resources to complete this safety enhancement as soon as practicable.

End of Apple Valley Valve Enhancement Project – MLV 13 Final Report

I. AVIATION AND 104TH VALVE ENHANCEMENT PROJECT

A. Background and Summary

The Aviation and 104th Valve Enhancement Project consists of valve enhancements made to one new mainline valve (MLV), two new crossover valves, the relocation of a portion of Line 2003 to accommodate the new valves, and the installation of two new check valves, within the City of Los Angeles in Los Angeles County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Lines 1170, 1175, and 2003 and Supply Line (SL) 43-6205 in the event of a pipeline rupture. SoCalGas relocated a portion of Line 2003 and installed three new automated valves, two new check valves, three new actuators, three new vaults to house the actuators, a new crossover assembly between Lines 1170 and 2003, new blowdown piping, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost of the PSEP scope of this project is $9,645,040.

The Aviation and 104th Valve Enhancement Project construction site is in a high-density urban environment next to the Los Angeles International Airport (LAX), that is a mixture of commercial and industrial facilities. Line 1170 is beneath heavily trafficked Aviation Boulevard and Line 2003 is beneath heavily trafficked West 104th Street. There are multiple utilities and substructures beneath West 104th Street that impacted the design. This project was designed and executed as one cohesive project; however, the project costs were shared by PSEP and the Operating District, with PSEP funding the activities that provided system isolation through automation of the new mainline and crossover valves.

Table 1: General Project Information

RR Name Valve Enhancement Project	
Location	City of Los Angeles
Days on Site	120 days
Construction Start	04/10/2017
Construction Finish	12/8/2017
Commissioning Date	10/17/2018
Valve Upgrades	
Valve Number	2003-18.24-0
Valve Type	New – Ball
Actuator	New
Actuator Above-/Below-Grade	Below-Grade
ASV	Yes
RCV	Yes
Valve Number	1170-0.00-1
Valve Type	New – Ball
Actuator	New
Actuator Above-/Below-Grade	Below-Grade
ASV	No
RCV	Yes
Valve Number	1170-0.00-5
Valve Type	New – Ball
Actuator	New
Actuator Above-/Below-Grade	Below-Grade
ASV	No
RCV	Yes
Valve Number	N/A[1]
Valve Type	New – Check
Actuator	N/A
Actuator Above-/Below-Grade	N/A
ASV	N/A
RCV	N/A

[1] Check valves are not numbered.

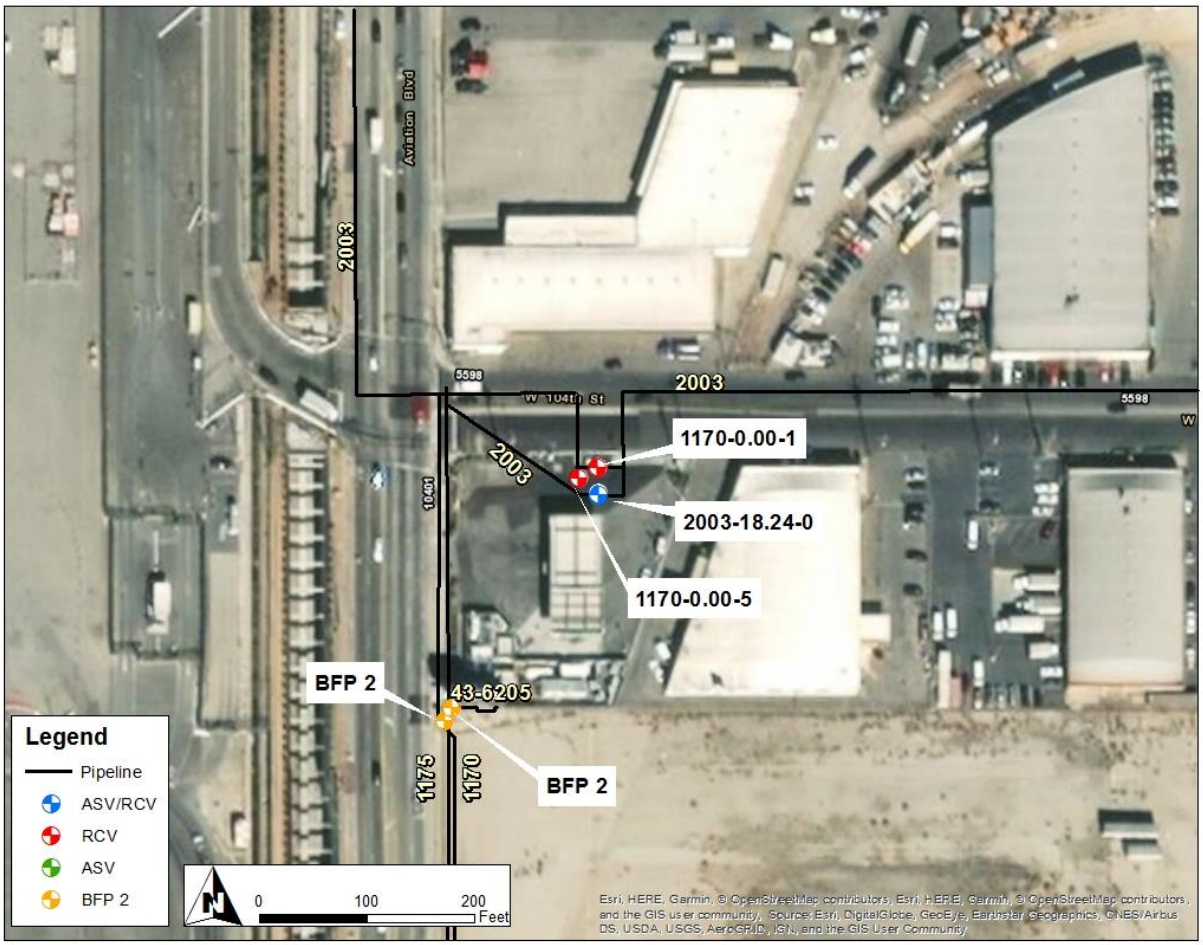
Table 1: General Project Information (continued)

Valve Upgrades			
Valve Number	N/A[2]		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	N/A		
ASV	N/A		
RCV	N/A		
Site Upgrades			
Vault	New – Three		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
New 30-Inch Pipe	224 feet		
New 24-Inch Pipe	184 feet		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	9,645,040	-	9,645,040
Disallowed Costs	-	-	-

[2] Check valves are not numbered.

B. Maps and Images

Figure 1: Satellite Image of Aviation and 104th Valve Enhancement Project



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Aviation and 104th Valve Enhancement Project in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[3] This conceptual scope identified two MLVs for automation to enable remote isolation to a portion of Lines 2003 and 1175. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and identified two additional valves for enhancement and two check valve installations to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLVs 1175-0.00-0 and 2003-18.69-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope:
   a. Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that these isolation points alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. SoCalGas reevaluated the isolation points at MLV 1175-0.00-0 and 2003-18.69-0 and determined that the automation of MLV 2003-18.24-0 in conjunction with the automation of valves 1170-0.00-1 and 1170-0.00-5 would better achieve the objectives set forth in the Valve Enhancement Plan.
   b. SoCalGas determined that it was also necessary to install two check valves on the taps from Lines 1170 and 1175 to SL 43-6205 to prevent backflow from SL 43-6205 to Lines 1170 and 1175. Together, the automation of these valves and the

[3] See Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. # SCG-32).

installation of the two check valves enables rapid isolation, thereby achieving Valve Enhancement Plan objectives.

3. Engineering, Design, and Constructability:
   a. The Project Team initially planned to automate the preexisting valves in place. During subsequent site evaluations, the Project Team determined that the existing piping configuration and substructures prohibited the installation of the vaults necessary to house the actuators. Because of this, the valves could not be automated in place. The Project Team determined that a portion of the existing piping must be relocated out of the street and into an area on the neighboring CNG facility.
   b. The Operating District requested that the crossover piping be upgraded from [redacted] to [redacted]. The Project Team incorporated this upgrade in the design. The Operating District incurred the costs related to upgrading the pipe size from [redacted] to [redacted].
   c. The Operating District had scheduled nearby MLV 1175-0.00-0 for replacement. Due to the proximity of MLV 1175-0.00-0 to the project site, the Project Team incorporated this work in their design. This work was also included in the Scope of Work from the construction contractor. The MLV replacement was performed during PSEP construction activities. The Operating District incurred the costs related to the installation of MLV 1175-0.00-0.
4. Final Project Scope: The final project scope consists of: the installation of the installation of three new valves, the installation of three new actuators, the installation of three new vaults to house the actuators, the installation of new crossover piping between Lines 1175 and 2003, the installation of new blowdown piping, the installation of power equipment, the installation of communications equipment, the installation of the necessary automation equipment, the installation of two new check valves, and the relocation of a portion of Line 2003 at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2003	18.24	0	[redacted]	NV/VT	ASV/RCV
1170	0.00	1	[redacted]	NV/VT	RCV
1170	0.00	5	[redacted]	NV/VT	RCV
1170	0.04	N/A	[redacted]	NV	BFP2
1170	0.04	N/A	[redacted]	NV	BFP2

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Aviation and 104th Valve Enhancement Project by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This project site is next to LAX at the intersection of Aviation Boulevard and West 104th Street in the parking lot of a CNG facility utilized by shuttle busses that service LAX. There are multiple utilities and substructures beneath West 104th Street.
2. Land Issues: The Project Team noted that excavations will impact traffic on a part of Aviation Boulevard and all of West 104th Street as well as access to the CNG facility. The Project Team also noted that a new easement was necessary from the CNG facility to accommodate the offset of Line 2003 and the new automation equipment. The Project Team also noted that construction activities will impact access to the CNG facility.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: There was no preexisting power source. The Project Team installed new power equipment at the site.

5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

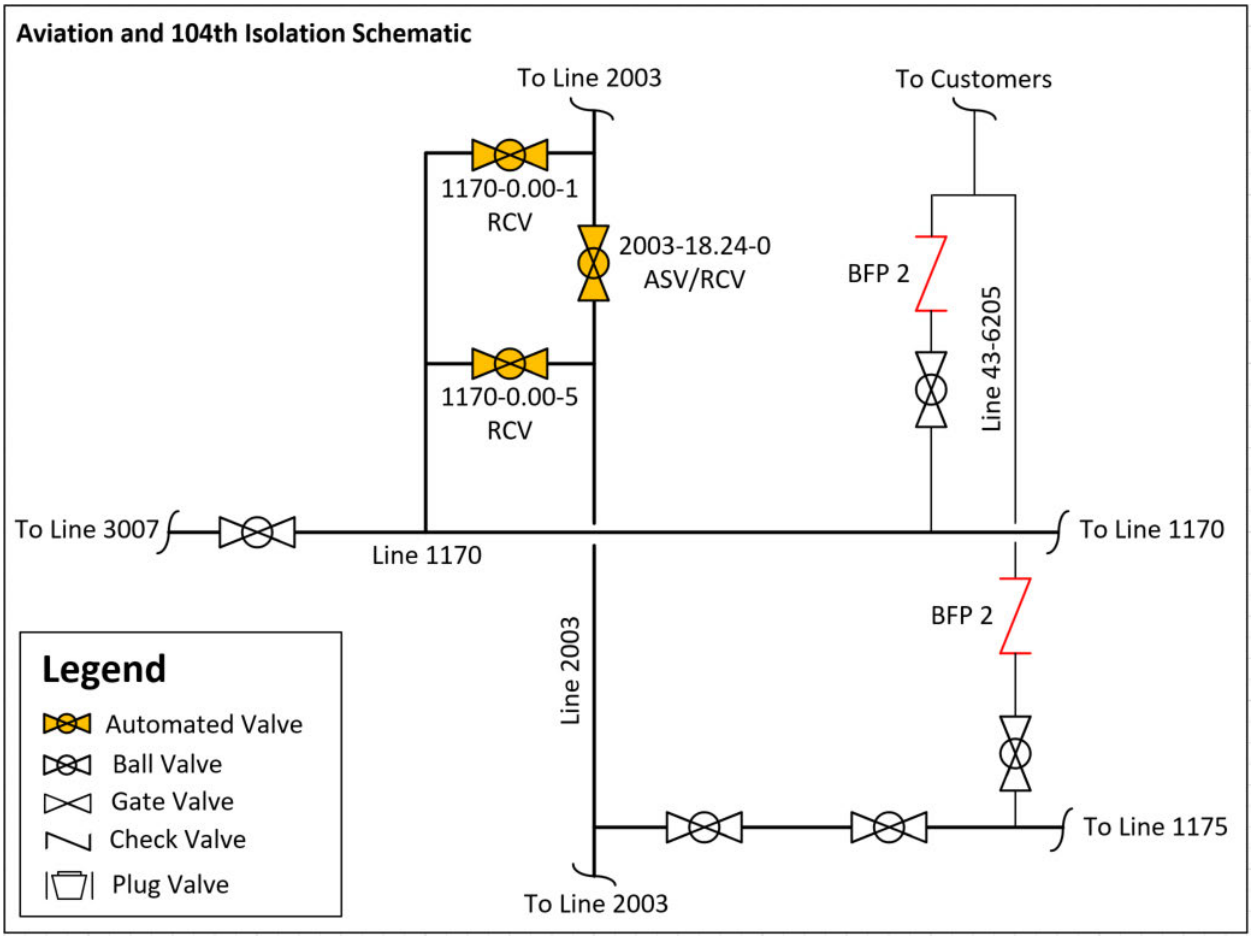
1. Engineering Assessment:
   a. During the site evaluation, the Project Team confirmed the location of the preexisting valves and verified that the automation of the preexisting valves would require relocating Line 2003 and the crossover to Line 1170 out of the street due to the quantity and location of below grade substructures.
   b. SoCalGas determined that the crossover between Lines 2003 and 1170 should be increased from [redacted] to [redacted]. This increase was funded by the Operating District.
   c. The Operating District requested that the Project Team include the replacement of nearby MLV 1175-0.00-0 in their scope of work. The Operating District funded the replacement of this valve.
2. Valve Details:
   a. 2003-18.24-0: The preexisting valve was a manually operated Class 300 ball valve, which was replaced by the Project Team.
   b. 1170-0.00-1: The preexisting valve was a manually operated Class 300 ball valve, which was replaced by the Project Team.
   c. 1170-0.00-5: The preexisting valve was a manually operated Class 300 ball valve, which was replaced by the Project Team.

3. Actuator Details:
   a. 2003-18.24-0: There was no preexisting actuator. The Project Team installed a new actuator.
   b. 1170-0.00-1: There was no preexisting actuator. The Project Team installed a new actuator.
   c. 1170-0.00-5: There was no preexisting actuator. The Project Team installed a new actuator.
4. Customer Impact: The Project Team shut-in a portion of Line 2003 during construction. The customers serviced by this line could be serviced by other lines. The Project Team shut-in portions of Lines 1170 and 1175 during the installation of the new MLV and the two check valves on Line 1170 and the installation of the new MLV of Line 1175. The Project Team shut-in each line individually to maintain service to customers. The Project Team also determined that that this work required a shut-in of the regulator station servicing the CNG station. Service was maintained to the CNG station via a bypass. The Project Team performed the shut-ins in phases to avoid any disruption of service to customers.
5. Community Impact: The Project Team temporarily limited access to the CNG facility and parking at the facility.
6. Substructures: The Project Team identified multiple below-grade utilities including new and abandoned SoCalGas distribution piping. The Project Team incorporated these below-grade items into the design by relocating a portion of Line 2003 and by completely closing all lanes of West 104th Street during a portion of construction to allow for the full excavation of West 104th Street.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed spot checks during construction.
8. Permit Restrictions: Due to the proximity to LAX, the Project Team obtained permits from the following entities: The Los Angeles County Metropolitan Transportation Authority, The Los Angeles World Airports, The Los Angeles Department of Transportation, The Transportation Construction Traffic Management Committee, The

Los Angeles Department of Building & Safety, The Los Angeles Police Department, and The Los Angeles Fire Department.

9. Land Use: The Project Team obtained a new permanent easement for the rerouted Line 2003 and the necessary above-grade automation equipment from the CNG facility. The Project Team also received a temporary easement for the workspace from the CNG facility. The Project Team utilized the same laydown yard as the Aviation Boulevard and Boardwalk Valve Enhancement Project.
10. Traffic Control: The Project Team created a Traffic Control Plan to match the planned construction phases to minimize the impact to the community. Lanes were left open during most of construction to allow for continuous traffic flow. The Project Team closed all lanes on West 104th Street during the final construction phase. Signage was utilized to direct traffic to the temporary detour during this phase of construction.

Figure 2: Aviation and 104th Valve Enhancement Project Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas determined that changes in scope were appropriate to enhance the design of the Project and address engineering factors. As a result, the preliminary cost estimate does not fully reflect the final scope. Summarized below are notable changes in scope made after the preliminary cost estimate was developed and approved.

1. The Project Team determined that the shut-ins would happen in phases resulting in multiple hydrotests and tie-ins. This was necessary to maintain service to customers during construction.
2. The Project Team determined that due to the existing substructures beneath West 104th Street, the entire street must be excavated during a portion of construction.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, SoCalGas entered into a competitive bidding process to select a construction contractor, that included the updated design described in the discussion of notable Scope Changes above. SoCalGas awarded the construction contract to the bidder that best met the selection criteria for this project.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for the electrical contractor was [redacted].

4. Electrical Contractor's Estimate *(confidential)*: The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	04/10/2017
Construction Completion Date	12/08/2017
Days on Site	120 days
Commissioning Date	10/17/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

The field conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $342,000 in change orders.

1. Construction Schedule: Construction completion was delayed due to a combination of the reasons listed below. The Mechanical Construction Contractor incurred additional costs for fencing, shoring, traffic control, portable restrooms, and additional equipment due to these delays.
2. Traffic: The City of Los Angeles requested changes to the Traffic Control Plan after the receipt of the bid and prior to the start of construction adding costs not included in the bid.
3. Tie-In: The Project Team initially planned for 16 hours per tie-in. Due to complex gas handling and isolation activities, the tie-in during construction exceeded 16 hours.
4. Expanded Scope: The Project Team requested that the Mechanical Construction Contractor pour the concrete pads and foundation for the antenna pole and bollards. This was not included in the Mechanical Construction Contractor's initial scope of work.

5. Community Impact Mitigation: Upon returning to the work site on a Monday, the Project Team found a large amount of water that caused erosion and flooding in one of the excavations. Mechanical Construction Contractor had to backfill and excavate again at a later date.
6. Safety: The Project Team requested that the Mechanical Construction Contractor provide a full-time safety monitor during construction. This was not included in the initial scope of work.

Figure 3: New Crossover Between Line 2003 and Line 1170 in Foreground, New Mainline Valve in the Background

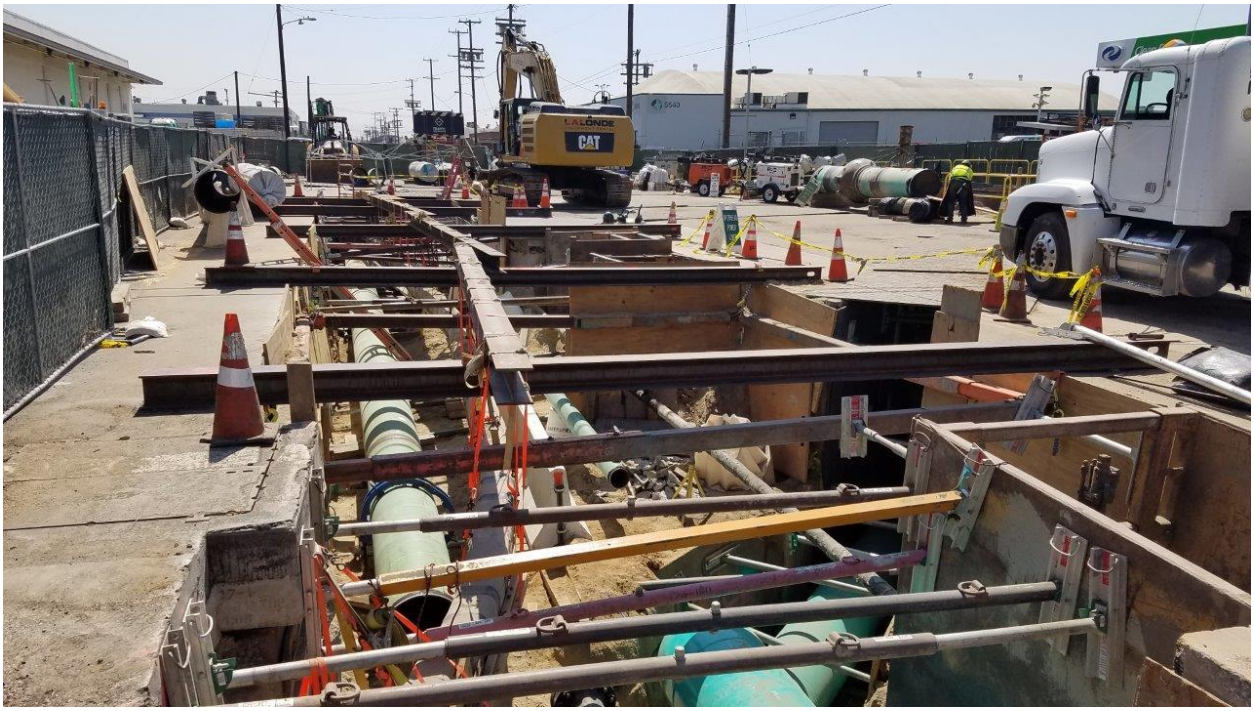


Figure 4: Excavation of Existing Pipeline

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on October 17, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Planning and Coordination: The Project Team coordinated engineering activities with the Aviation and Boardwalk Valve Enhancement Project to reduce the overall cost for customers.
2. Land Use: The Project Team utilized the laydown yard for the Aviation and Boardwalk Valve Enhancement Project for this Project as well, avoiding the cost of obtaining an additional temporary easement for the laydown yard.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $4,186,466. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $9,645,040.

Table 4: Estimated and Actual Direct Costs and Variances[4, 5]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	290,223	462,749	172,526
Materials	831,641	760,103	(71,538)
Mechanical Construction Contractor	1,707,154	3,256,854	1,549,700
Electrical Contractor	117,753	150,904	33,151
Construction Management & Support	162,109	834,796	672,687
Environmental	15,785	38,173	22,388
Engineering & Design	208,166	1,283,070	1,074,904
Project Management & Services	264,864	92,999	(171,864)
ROW & Permits	146,300	229,727	83,427
GMA	442,472	925,207	482,735
Total Direct Costs	**4,186,466**	**8,034,583**	**3,848,117**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[6, 7]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	1,285,703	707,264	(578,438)
AFUDC	881,364	887,746	6,382
Property Taxes	187,613	15,447	(172,166)
Total Indirect Costs	**2,354,680**	**1,610,457**	**(744,222)**
Total Direct Costs	**4,186,466**	**8,034,583**	**3,848,117**
Total Loaded Costs	**6,541,146**	**9,645,040**	**3,103,895**

[4] Values may not add to total due to rounding.
[5] Values in table represent PSEP costs only.
[6] Values may not add to total due to rounding.
[7] Values in table represent PSEP costs only.

The Actual Full-Time Equivalents[8] (FTEs) for this Project are 3.38.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Aviation and 104th Valve Enhancement Project, Actual Direct Costs exceeded the preliminary estimate by $3,848,117. This variance is attributable to a variety of factors including:

1. Company Labor:
    a. Due to the Project location, SoCalGas had to work extensively with seven different agencies, including LAWA and Metro. In addition, the multiple permits from the different City of Los Angeles agencies required additional company labor to coordinate the permits.

[8] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

b. The Project required additional company labor including a company field engineer to complete the multiple hydrotests, blowdowns, and phased tie-ins that were developed in detailed design to maintain customer service, resulting in a cost increase of $21,000.

c. The total length of construction was one month longer than estimated due to the change in isolation plan to incorporate phased tie-ins, additional substructures, and other factors. This required additional company labor costing an additional $6,000.

2. Mechanical Construction Contractor:

a. Activities to address or mitigate conditions encountered during construction are detailed in Section III. Part C resulted in approximately $342,000 in change orders.

b. The project was originally planned to be worked concurrently with another SoCalGas project, but permit application delays resulted in construction start being delayed approximately nine months and the projects being performed separately, removing shared efficiencies and increasing total costs by $350,000.

c. The Project Team identified an additional 22 substructures while conducting research during the detailed design. This caused additional complexities during detailed planning and construction, requiring the relocation of a portion of Line 2003 and full excavation of 104th Street during construction to avoid conflict with existing substructures. This resulted in an extended construction duration and increased total construction costs.

d. The additional substructures found during detailed design required the Project Team perform a full road closure of 104th Street to complete construction, resulting in a cost increase of $83,000.

3. Construction Management & Support:

a. One additional inspector was required at the laydown yard to allow for fabrication and testing work to be performed in parallel with other activities at the construction site location, increasing Construction Management costs by $208,000.

b. Inspections by city inspectors and a third-party lab certification company required additional site visits by the construction manager, inspector, and project manager, as well as additional work for the electrical construction contractor to make requested electrical panel modifications. These additional site visits and electrical design changes resulted in additional costs of approximately $30,000.

4. Engineering & Design:
   a. The Project Team determined during detailed design that shut-ins would need to occur in phases in order to maintain service to customers, resulting in additional costs from phased implementation and the corresponding additional drawing packages.
   b. The Project traversed private property, requiring more survey and legal descriptions to acquire property easement. In addition, the number of pipelines, complexity of the piping design, the number of welds, the number of utility crossings, and phased construction required additional trips for the survey crews resulting in increased survey costs.
   c. Additional meetings were held on a regular basis with METRO, LAWA and LADWP representatives to coordinate schedules on multiple projects affecting the area, including restrictions that affected work hours and traffic plans. In addition, the multiple permits from five different City of Los Angeles agencies required supplemental project management and Professional Engineering support at an additional cost of $34,000.
   d. The Engineering and Design firms completed activities originally identified as Project Management & Services in the initial estimate while actual costs of $211,000 were recognized under Engineering and Design.
5. Project Management & Services: The engineering firms provided Project Management & Services activities which were originally estimated under Project Management and Services, but approximately $211,000 of these costs were recognized in Engineering and Design.

6. ROW & Permitting: The extension of the project construction duration resulted in additional land right costs of $8,000 for extension of the existing Temporary Right of Entry (TRE) agreements.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Aviation and 104th Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas successfully automated three valves to achieve the objective of enabling rapid system isolation of a portion of Lines 1170, 1175, 2003 and Supply Line 43-6205 located in the City of Los Angeles. The total loaded cost of the Project is $9,645,040.

SoCalGas executed this project prudently through designing and executing the Project to support the achievement of Valve Enhancement Plan isolation objectives, coordinating the engineering of two valve projects, installing a new mainline valve, two crossover valves, two check valves, three new actuators, three new vaults to house the actuators, and installing the equipment to necessary to bring power and communication capabilities to these valves to enable rapid system isolation to a portion of Lines 2003, 1170, and 1175 located in the City of Los Angeles.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating construction activities to minimize the impact to the community, by scheduling the tie-ins to prevent service interruptions to customers, and by limiting the number of mobilizations, reducing costs for customers.

End of Aviation and 104th Valve Enhancement Project Final Report

I. BANNING 2001 VALVE ENHANCEMENT PROJECT – MLV 14.3A

A. Background and Summary

The Banning 2001 Valve Enhancement Project – MLV 14.3A consists of valve enhancements made to an existing mainline valve (MLV), the installation of two check valves, and the replacement of an existing crossover piping in the City of Banning in Riverside County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 2001 and Supply Line 41-37 in the event of a pipeline rupture. SoCalGas installed two new check valves, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,397,356.

The Banning 2001 Valve Enhancement Project – MLV 14.3A construction site is within an existing SoCalGas facility in an undeveloped area near Interstate 10. There are transmission power lines near the site. SoCalGas bundled this valve project with three additional sites, Banning 2001 Valve Enhancement Plans – MLV 14A, MLV 16A, and MLV 17A, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Banning 2001 Valve Enhancement Project – MLV 14.3A. This project was designed and executed as one cohesive project; however, the project costs were shared by PSEP and the Operating District, with PSEP funding the activities that provided system isolation through automation of the new mainline valve and the installation of the two new check valves, and the Operating District funding separately the activities to replace the existing [redacted] crossover piping.

Table 1: General Project Information

Banning 2001 MLV 14.3A Valve Enhancement Project			
Location	Banning		
Days on Site	48 days		
Construction Start	04/25/2016		
Construction Finish	04/25/2017		
Commissioning Date	04/10/2017		
Valve Upgrades			
Valve Number	2001-148.28-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	N/A		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	Below-Grade		
ASV	N/A		
RCV	N/A		
Valve Number	N/A		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	Below-Grade		
ASV	N/A		
RCV	N/A		
Site Upgrades			
Vault	None		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	New		
Fencing/Wall	Expanded – Fencing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,397,356	-	1,397,356
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Banning 2001 Bundle Overview

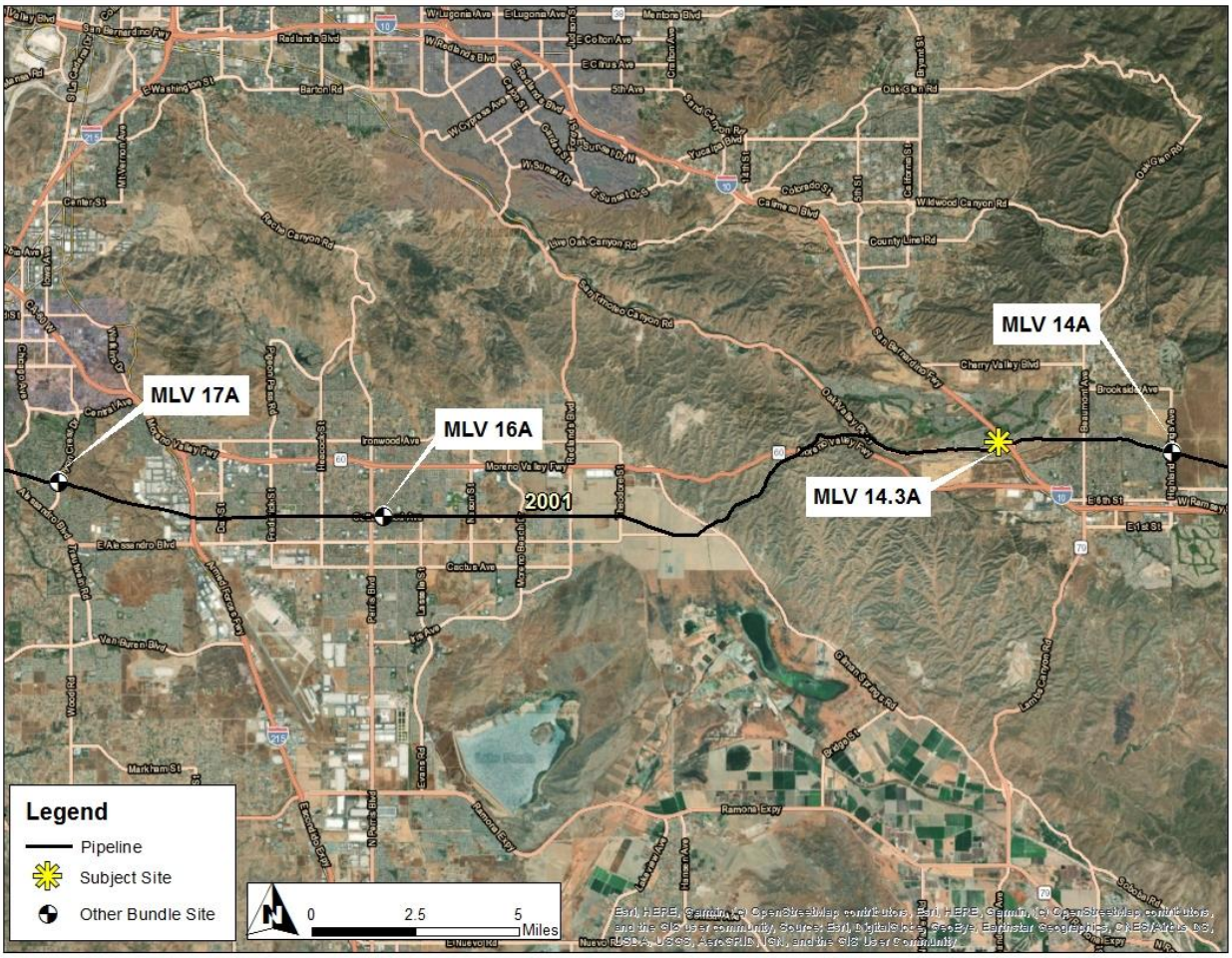


Figure 2: Satellite Image of Valve Banning 2001 Valve Enhancement Project – MLV 14.3A

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Banning 2001 Valve Enhancement Project – MLV 14.3A in workpapers supporting the Valve Enhancement Plan in the 2011 filing.[1] This conceptual scope identified MLV 2001-148.28-0 for automation to provide remote isolation to a portion of Line 2001. Prior to initiating execution of the Project, SoCalGas reviewed available information and performed a detailed system flow analysis to validate the scope of the Project. This resulted in the identification of two new check valve installations to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 2001-148.28-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that automation of MLV-2001-148.28-0 alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. The Project Team determined it was also necessary to install two check valves to prevent backflow on Supply Line 41-37. Together, the automation of this MLV and installation of the two new check valves enable rapid isolation, achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The existing [redacted] crossover piping was not equivalent to the current standard pipe grade and wall thickness. The Operating District requested that the existing piping be replaced with the current standard pipe grade and wall thickness. The Operating District incurred the costs related to the pipe replacement.

[1] See Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. # SCG-32).

4. Final Project Scope: The final project scope consists of the automation of one MLV that included the installation of new power equipment, the installation of new communications equipment, the installation of the necessary automation equipment, and the installation of two check valves.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2001	148.28	0	[redacted]	C/P	ASV/RCV
2001	148.28	N/A	[redacted]	NV	BFP2
2001	148.28	N/A	[redacted]	NV	BFP2

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Banning 2001 Valve Enhancement Project – MLV 14.3 by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

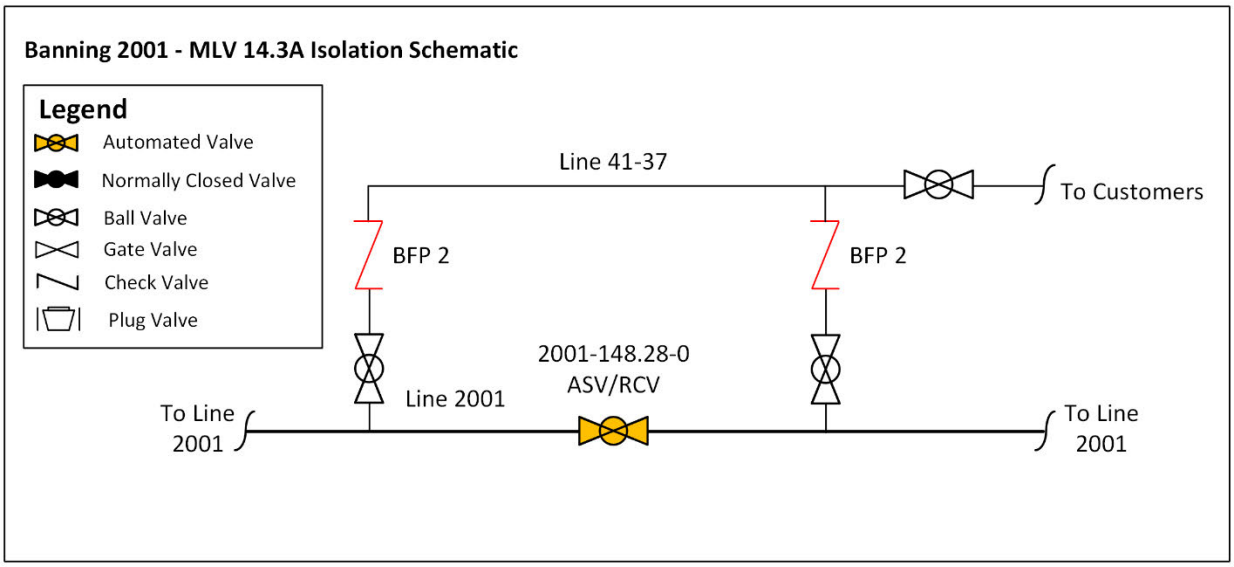
1. Site Description: This site is an existing SoCalGas facility in an open, undeveloped area near Interstate 10.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected this MLV for automation to isolate Class 3 locations and known geological threats, both upstream and downstream of the valve.
4. Power Source: There was no preexisting power source. The Project Team installed new power equipment at the site.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 600 ball valve, which was reused by the Project Team.
3. Actuator Details: The existing actuator was a double-acting pneumatic actuator, which was reused by the Project Team.
4. Customer Impact: The Project Team coordinated with Gas Control to maintain service during the shut-in of Supply Line 41-37. The Project Team did not anticipate service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this Project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: The Project Team obtained an Encroachment Permit from the City of Banning for the installation of utility power.
9. Land Use: The Project Team obtained an easement with above-ground rights for the facility expansion. The Project Team also obtained a temporary right of entry (TRE) for the laydown yard that was utilized during construction.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Banning 2001 Valve Enhancement Project MLV 14.3A Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas determined that changes in scope were appropriate to enhance the design of the Project and address engineering factors. As a result, the preliminary cost estimate does not fully reflect the final scope. Summarized below are notable changes in scope made after the preliminary cost estimate was developed and approved.

1. The existing [redacted] piping was replaced with current standard pipe grade and wall thickness.

2. The local electric utility did not have a finalized installation plan and therefore the Project Team did not know the location of the utility connection point. The Project Team did not include the cost of trenching to the utility connection point in the preliminary estimate.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package that included the updated design described in the discussion of notable changes in scope above.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], that was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for the electrical contractor was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], that was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	04/25/2016
Construction Completion Date	04/25/2017[2]
Days on Site	48 days
Commissioning Date	04/10/2017

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $37,000 in change orders.

1. Schedule Delay: Additional costs were incurred due to the need for additional material to complete tie-in activities.

2. Field Design Change: Excavations exceeded what was anticipated during the design phase. The Mechanical Construction Contractor demolished and replaced more of the existing fence than anticipated.

[2] The Electrical Contractor demobilized in July of 2016. At that time, construction completion was delayed until the local electrical utility completed the work necessary to provide electrical service to the project site. Upon completion of that work in April of 2017, the Electrical Contractor remobilized and finalized the remaining construction activities.

Figure 4: Project Site During Construction

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for newly-automated valves, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on April 10, 2017, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. SoCalGas bundled this project with the Banning 2001 Valve Enhancement Projects – MLV 14A, MLV 16A, and MLV 17A, coordinating engineering and construction activities between the project sites to minimize costs for the benefit of the customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $819,087. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total Direct and Indirect cost to complete the Project is $1,397,356.

Table 4: Estimated and Actual Direct Costs and Variances[3]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	73,813	82,203	8,390
Materials	80,614	84,090	3,476
Mechanical Construction Contractor	134,677	200,655	65,987
Electrical Contractor	135,643	162,786	27,143
Construction Management & Support	72,547	67,952	(4,595)
Environmental	42,075	16,413	(25,662)
Engineering & Design	114,054	295,332	181,279
Project Management & Services	65,893	51,400	(14,493)
ROW & Permits	13,200	39,214	26,014
GMA	86,570	147,333	60,763
Total Direct Costs	**819,087**	**1,147,378**	**328,293**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	264,747	154,280	(110,467)
AFUDC	134,973	83,963	(51,010)
Property Taxes	28,647	11,735	(16,912)
Total Indirect Costs	**428,367**	**249,978**	**(178,389)**
Total Direct Costs	**819,087**	**1,147,378**	**328,293**
Total Costs	**1,247,452**	**1,397,356**	**149,904**

The Actual Full-Time Equivalents[5] (FTEs) for this Project are 0.34.

[3] Values may not add to total due to rounding.
[4] Ibid
[5] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Banning 2001 Valve Enhancement Project – MLV 14.3A, Actual Direct Costs exceeded the preliminary estimate by $328,293. This variance is attributable to a variety of factors including:

1. Construction Contractor:
   a. Activities to address or mitigate conditions encountered during construction are detailed in Section III. Part C resulted in approximately $37,000 in change orders.
   b. The local electric utility did not have a finalized installation plan during initial project planning. Once the finalized installation plan was available, the project required a scope change to include trenching for installation to the electrical utility connection point, resulting in an approximate price increase of $43,000.
2. Engineering & Design:
   a. The Engineering and Design firm completed activities originally identified as Project Management & Services in the initial estimate while the actual costs of $29,000 were recognized under Engineering and Design.

b. Survey activities were more extensive than originally expected, including additional survey required for trenching the electrical utility connection, resulting in an increase of approximately $40,000.

3. Project Management & Services: The engineering firms provided Project Management & Services activities which were originally estimated under Project Management and Services, but approximately $29,000 of these costs were recognized in Engineering and Design.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Banning 2001 Valve Enhancement Project – MLV 14.3A. Through this Valve Enhancement Project, SoCalGas successfully automated a mainline valve and installed two check valves to achieve the objective of enabling rapid system isolation of a portion of Line 2001 and Supply Line 41-37 located in the City of Banning. The total loaded cost of the Project is $1,397,356.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling four projects together to capture efficiencies through coordinated engineering, installing two new check valves, and installing equipment necessary to bring power and communication capabilities to the site to enable rapid system isolation of a portion of Line 2001 West in the City of Banning.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market -based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Banning 2001 Valve Enhancement Project – MLV 14.3A Final Report

I. BANNING 2001 VALVE ENHANCEMENT PROJECT – MLV 14A

A. Background and Summary

The Banning 2001 Valve Enhancement Project – MLV 14A consists of valve enhancements made to an existing mainline valve (MLV) located within the City of Banning in Riverside County. Through this project, SoCalGas enhanced the safety of its natural integrated gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 2001 West in the event of a pipeline rupture. SoCalGas installed new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,241,045.

The Banning 2001 Valve Enhancement Project – MLV 14A construction site is within an existing SoCalGas facility next to a residential development near Oak Valley Parkway and Highland Springs Avenue. SoCalGas grouped this site with three additional valve projects, Banning 2001 Valve Enhancement Projects – MLV 14.3A, MLV 16A, and MLV 17A, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Banning 2001 Valve Enhancement Project – MLV 14A.

Table 1: General Project Information

Banning 2001 Valve Enhancement Project – MLV 14A			
Location	Banning		
Days on Site	25 days		
Construction Start	05/15/2017		
Construction Finish	07/10/2017		
Commissioning Date	09/27/2017		
Valve Upgrades			
Valve Number	2001-144.94-0		
Valve Type	Existing		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	New – Solar		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	New		
Fencing	New		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,241,045	-	1,241,045
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Banning 2001 Bundle Overview

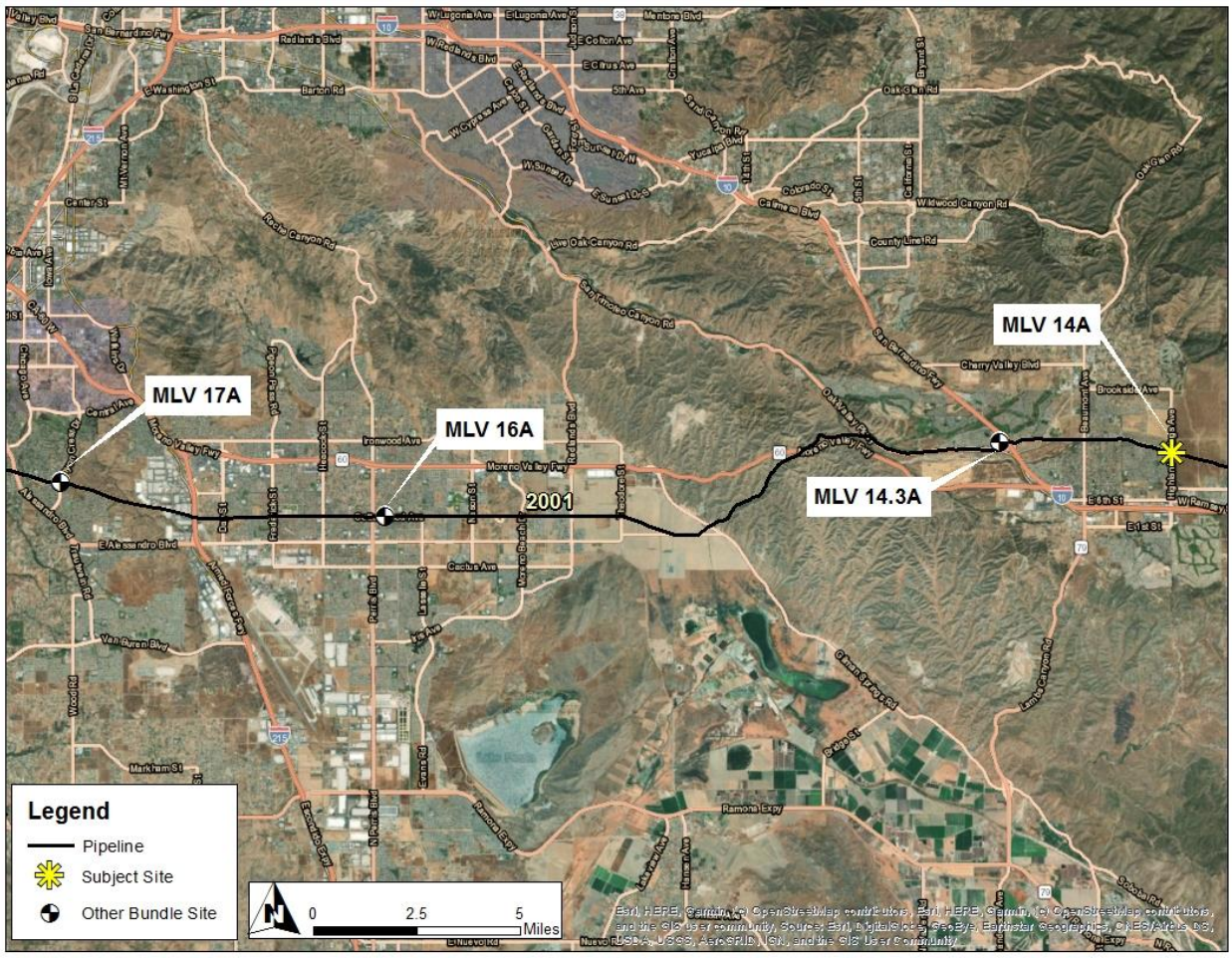


Figure 2: Satellite Image of Banning 2001 Valve Enhancement Project – MLV 14A

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Banning 2001 Valve Enhancement Project – MLV 14A in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] The conceptual scope identified MLV 2001-144.94-0 for automation to enable remote isolation to a portion of Line 2001 West. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and confirmed that this valve enhancement will provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLVs 2001-144.94-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point would achieve the transmission isolation objectives set forth in the Valve Enhancement Plan.
3. Engineering, Design, and Constructability: No notable engineering adjustments were required to the standard design.
4. Final Project Scope: The final project scope consists of the automation of one valve, that included the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment.

[1] See Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. # SCG-32).

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2001 West	144.94	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Banning 2001 Valve Enhancement Project – MLV 14A by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site is an existing SoCalGas facility in an open field next to a residential development. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted the existing station would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: The site had preexisting solar power. The Project Team installed new solar power equipment to accommodate the increased loads from the new automation equipment.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

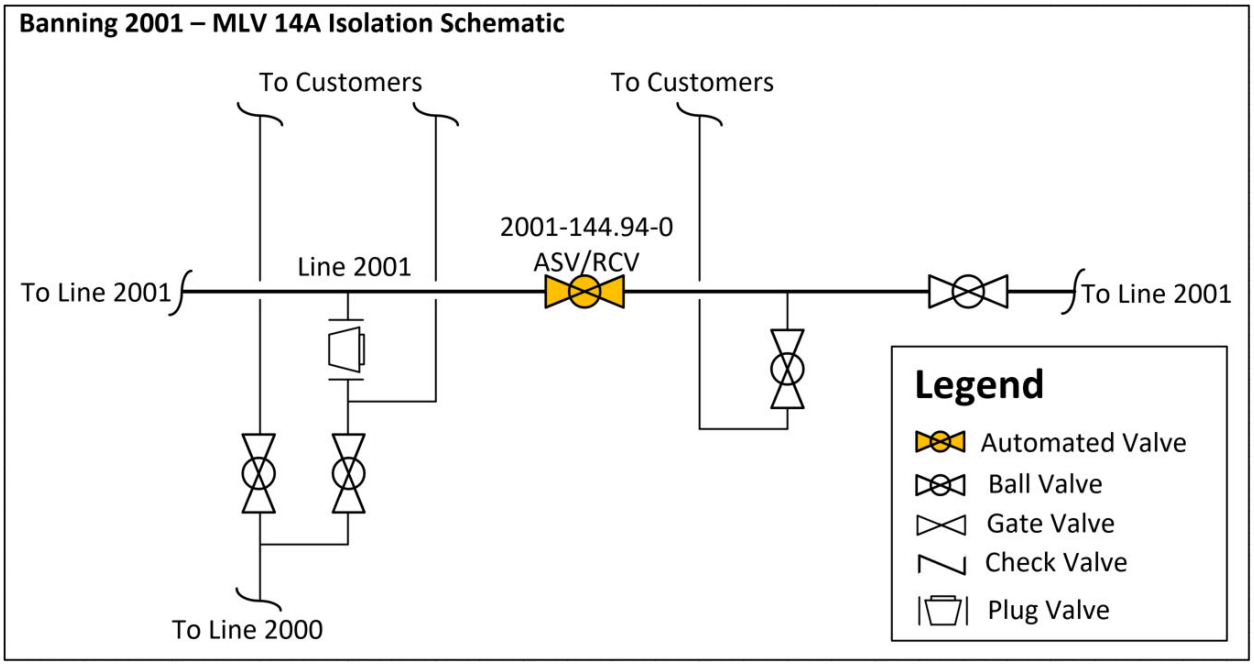
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 600 ball valve, which was reused by the Project Team.
3. Actuator Details: The existing actuator was a double-acting pneumatic actuator, which was reused by the Project Team.
4. Customer Impact: The Project Team did not anticipate service disruptions to customers.
5. Community Impact: The Project Team did not identify any anticipated notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team expanded the existing easement and facility to accommodate the new automation equipment.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Final Report for Banning 2001 Valve Enhancement Project – MLV 14A

Figure 3: Banning 2001 Valve Enhancement Project Schematic – MLV 14A



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for the electrical contractor was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	05/15/2017
Construction Completion Date	07/10/2017
Days on Site	25 days
Commissioning Date	09/27/2017

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Linebreak Foundation

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on September 27, 2017, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Land Use: The Project Team negotiated with the owner of the surrounding land who has plans for a future residential development. The landowner will incur the cost of constructing a new block wall around the facility
2. Future Maintenance: The Project Team installed a weed barrier in conjunction with gravel, minimizing future maintenance costs.
3. Construction Execution: The Project Team bundled this project with the Banning 2001 Valve Enhancement Projects – MLV 14.3A, MLV 16A, MLV 17A, coordinating engineering and construction activities between the project sites to minimize costs for the benefit of customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,693,566. This estimate was prepared in August of 2018, using the "Stage 3 SCG Pipeline Estimate Template Rev 4" estimating tool, the most current version of the PSEP Estimate Template at the time. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,241,045.

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	220,970	69,862	(151,108)
Materials	77,958	76,370	(1,588)
Mechanical Construction Contractor	270,957	215,079	(55,878)
Electrical Contractor	209,599	124,860	(84,739)
Construction Management & Support	69,036	56,300	(12,736)
Environmental	32,471	812	(31,659)
Engineering & Design	296,059	258,282	(37,777)
Project Management & Services	164,984	42,991	(121,993)
ROW & Permits	143,579	88,506	(55,073)
GMA	207,953	111,935	(96,018)
Total Direct Costs	**1,693,566**	**1,044,998**	**(648,568)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[3]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	339,493	111545	(227,948)
AFUDC	279,633	73,125	(206,508)
Property Taxes	63,812	11,377	(52,435)
Total Indirect Costs	**682,938**	**196,047**	**(486,891)**
Total Direct Costs	**1,693,566**	**1,044,998**	**(648,568)**
Total Loaded Costs	**2,376,504**	**1,241,045**	**(1,135,459)**

[2] Values may not add to total due to rounding.
[3] IBID.

The Actual Full-Time Equivalent[4] (FTE) for this Project is 0.73.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Banning 2001 Valve Enhancement Project – MLV 14A, Actual Direct Costs were less than the preliminary estimate by $648,568. This variance is attributable to a variety of factors including: SoCalGas grouped this site with three additional valve projects to gain efficiencies in engineering, planning, and construction activities; land contract labor was more efficient since the Project Team was able to work in parallel on acquiring easements for entire L2001 Banning Bundle; and the engineering firm provided project management support during development, construction, and closeout, which these costs were originally recognized under Engineering and Design.

[4] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

V. CONCLUSION

SoCalGas enhanced the safety of its integrated natural gas system by prudently executing the Banning 2001 Valve Enhancement Project – MLV 14A. Through this Valve Enhancement Project, SoCalGas successfully automated one mainline valve to achieve the objective of enabling rapid system isolation of a portion of Line 2001 West located within the City of Banning. The total loaded cost of the Project is $1,241,045.

SoCalGas executed this project prudently through designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, bundling four geographic proximate projects to capture efficiencies, by installing the necessary automation equipment, and by installing the necessary equipment to bring power and communication capabilities to this valve to enable rapid system isolation to a portion of Line 2001 West in Riverside County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating construction activities to maximize efficiencies and reduce customer and community impacts.

End of Banning 2001 Valve Enhancement Project – MLV 14A Final Report

I. BANNING 2001 VALVE ENHANCEMENT PROJECT – MLV 16A

A. Background and Summary

The Banning 2001 Valve Enhancement Project – MLV 16A consists of valve enhancements made to an existing mainline valve (MLV) located in the City of Moreno Valley within Riverside County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 2001 West in the event of a pipeline rupture. SoCalGas installed new fencing, a new block wall, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost of the PSEP scope of this project is $1,431,941.

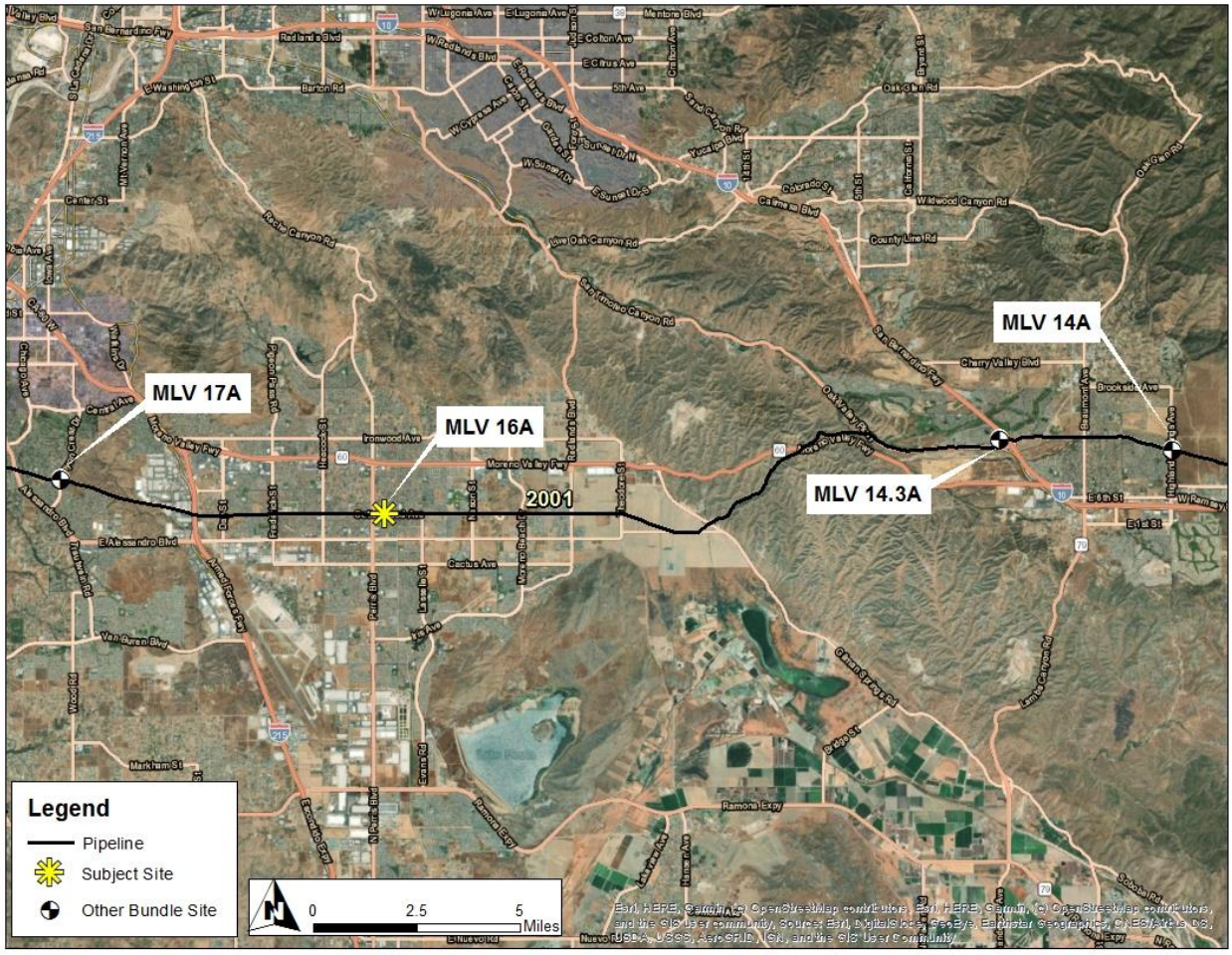
The Banning 2001 Valve Enhancement Project – MLV 16A site is located within an existing SoCalGas facility east of Perris Boulevard on Cottonwood Avenue in the city of Moreno Valley. The site is located between the sidewalk and a residential backyard block wall. SoCalGas bundled this site with three additional sites, Banning 2001 Valve Enhancement Projects – MLV 14.3A, MLV 14A, and MLV 17A to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Banning 2001 Valve Enhancement Project – MLV 16A. This project was designed and executed as one cohesive project; however, the project costs were shared by PSEP and the Operating District, with the Operating District funding a portion of the actuator repair costs.

Table 1: General Project Information

Banning 2001 Valve Enhancement Project – MLV 16A			
Location	City of Moreno Valley		
Days on Site	32 days		
Construction Start	10/05/2017		
Construction Finish	12/28/2017		
Commissioning Date	10/08/2018		
Valve Upgrades			
Valve Number	2001-161.84-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing/Wall	Yes		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,431,941	-	1,431,941
Disallowed Costs	-	-	-

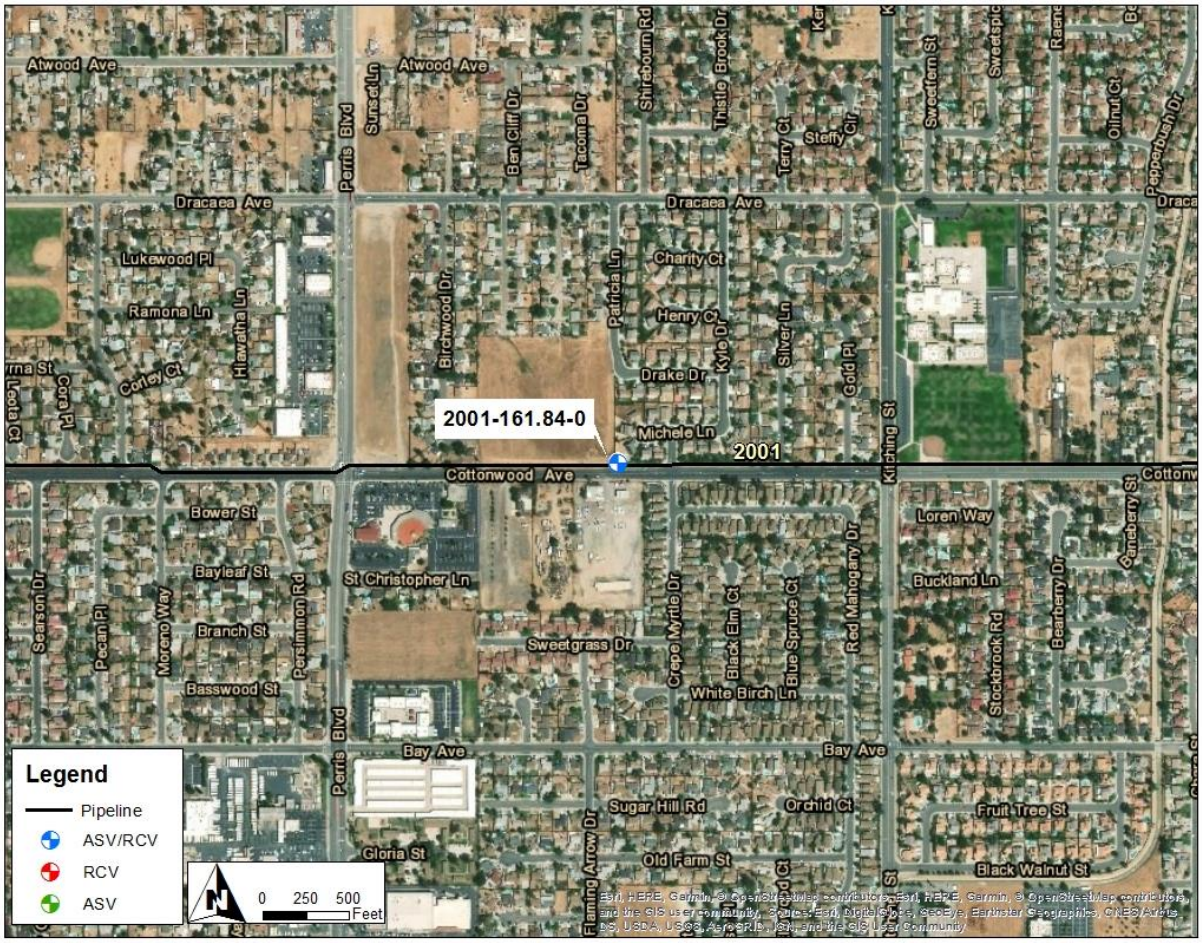
B. Maps and Images

Figure 1: Banning 2001 Bundle Overview



Final Report for Banning 2001 Valve Enhancement Project – MLV 16A

Figure 2: Satellite Image of Banning 2001 Valve Enhancement Project – MLV 16A



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Banning 2001 Valve Enhancement Project – MLV 16A in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified MLV 2001-161.84-0 for automation to enable remote isolation to a portion of Line 2001. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and confirmed that this valve enhancement will provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 2001-161.84-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this point would achieve the transmission isolation objectives set forth in the Valve Enhancement Plan.
3. Engineering, Design, and Constructability: No notable engineering adjustments were required to the standard design.
4. Final Project Scope: The final project scope consists of the automation of one MLV, that included the installation of new fencing, the installation of a block wall, the installation of new power equipment, the installation of new communications equipment, and the installation of the necessary automation equipment at the site.

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2001	161.84	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Banning 2001 Valve Enhancement Project by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: The site is an existing facility next to a residential area on Cottonwood Avenue.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing stations would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: There was no preexisting power equipment at the site. The Project Team installed new power equipment.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

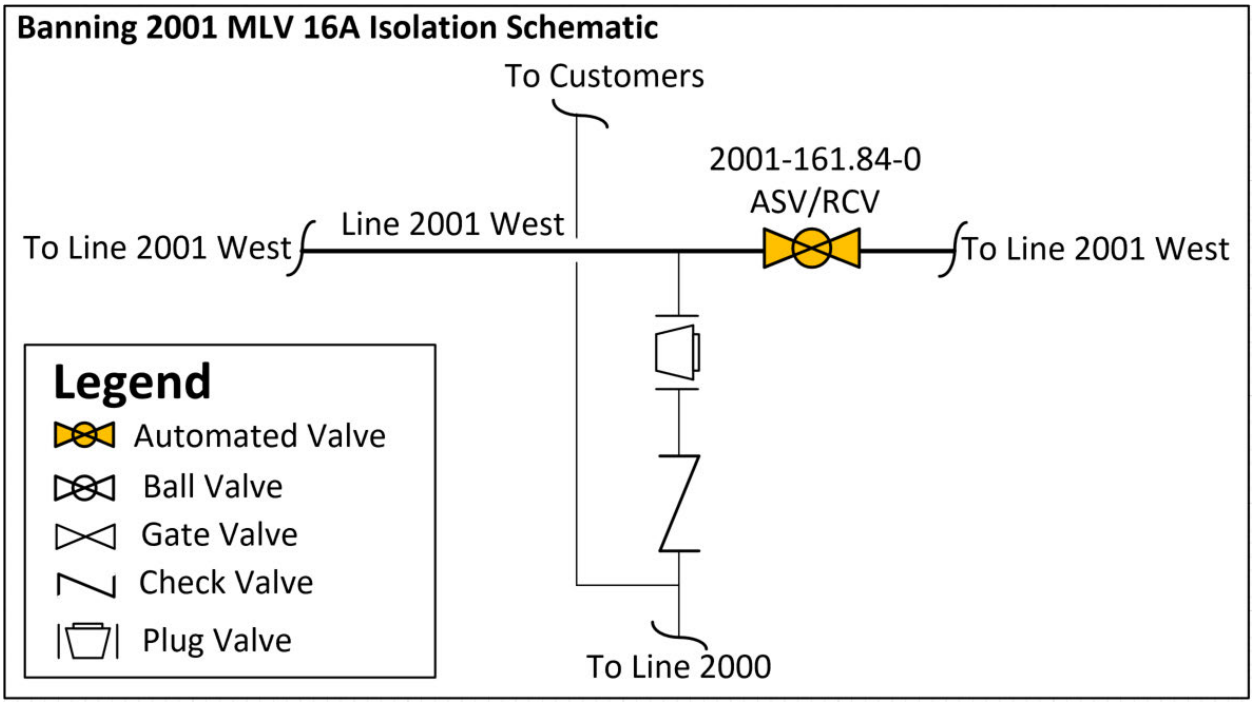
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment. The City of Moreno Valley would not agree to expand the existing valve station into the public right of way without replacing the entire section of fencing with a block wall. The Project Team obtained a new private easement east of the existing facility to house the new automation equipment and installed that equipment in a block wall. The fencing around the existing station was partially expanded to increase security.
2. Valve Details: The existing valve was a manually actuated Class 300 ball valve, which was reused by the Project Team.
3. Actuator Details: The existing actuator was a double-acting pneumatic actuator that the Project Team reused.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team informed the residents of the planned activities prior to construction. The Project Team took precautions to minimize the impact of construction to the community.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: The Project Team obtained a building permit for the construction of the block wall and a traffic control permit from the City of Moreno Valley.
9. Land Use: The City of Moreno Valley did not agree to expanding the existing valve station into the public right of way in order to fully accommodate the new automation equipment in the existing facility. The Project Team created a second facility within private property east of the existing facility to house the new automation equipment. The Project Team enclosed the second facility in a block wall.

10. Traffic Control: The Project Team obtained a Traffic Control Permit from the City of Moreno Valley. The Project Team closed the sidewalk and the shoulder on the north side of Cottonwood Avenue west of Crepe Myrtle Drive.

Figure 3: Banning 2001 Valve Enhancement Project – MLV 16A Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas determined that changes in scope were appropriate to enhance the design of the Project and address engineering factors. As a result, the preliminary cost estimate does not fully reflect the final scope. The City of Moreno Valley requested that SoCalGas replace the existing fencing with a new block wall if the easement is expanded. The Project Team obtained a new easement east of the existing facility and installed the new SCADA equipment in a second facility enclosed in a new block wall.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package, which included the updated design described in the discussion of notable changes in scope above.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for the electrical contractor was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

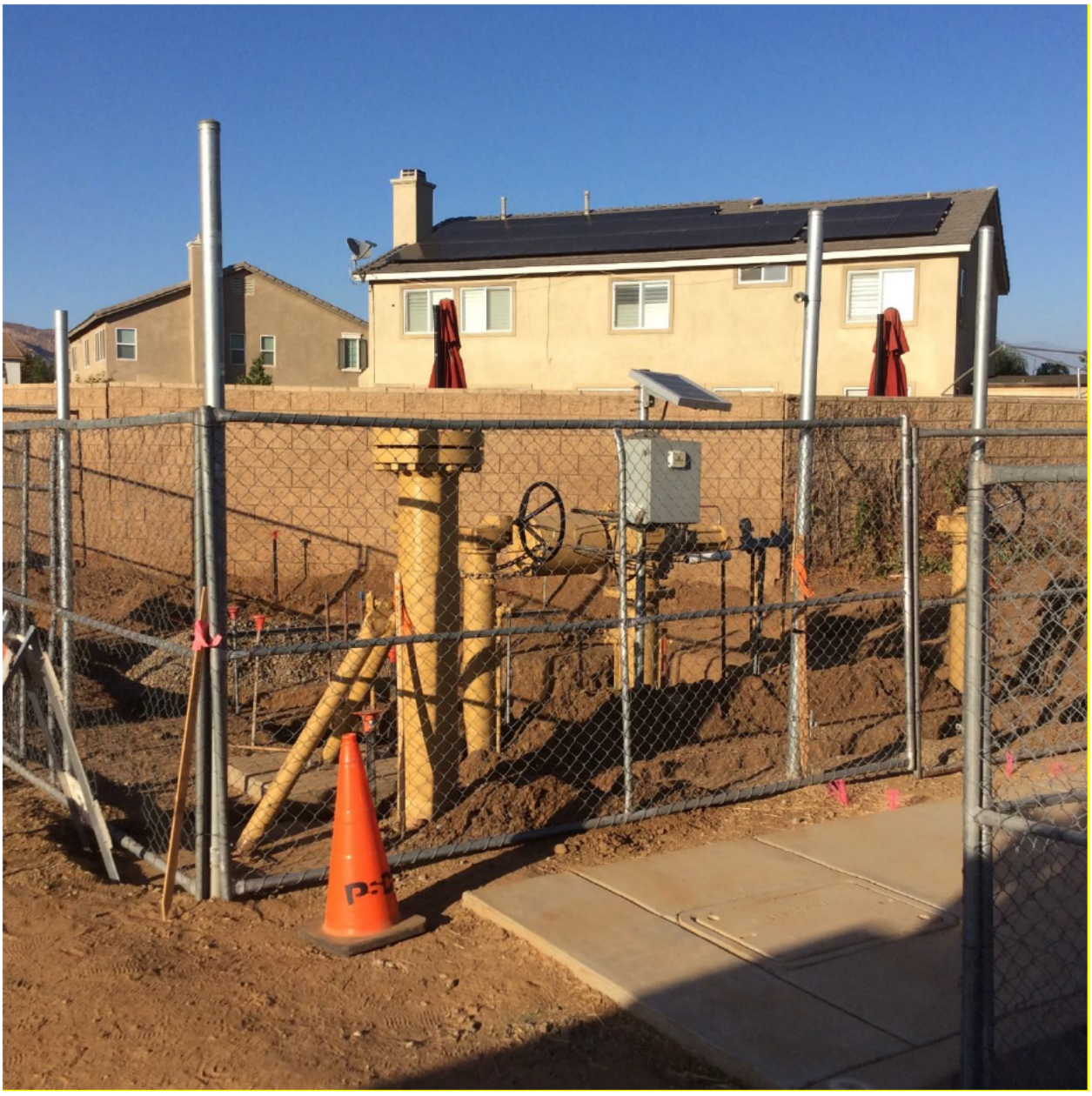
Construction Start Date	10/05/2017
Construction Completion Date	12/28/2017
Days on Site	32 days
Commissioning Date	10/08/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Automation Equipment



D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on October 8, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Bundling of Projects: SoCalGas bundled this project with the Banning 2001 Valve Enhancement Projects – MLV 14.3A, MLV 14A, and MLV 17A, coordinating engineering and construction activities between the project sites to minimize costs for the benefit of the customers.
2. Future Maintenance: The Project Team installed a weed barrier in conjunction with gravel, minimizing future maintenance costs.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,906,749. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project of the PSEP scope of this project is $1,431,941.

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	245,138	69,189	(175,949)
Materials	56,423	62,282	5,859
Mechanical Construction Contractor	527,157	356,836	(170,321)
Electrical Contractor	125,957	78,883	(47,074)
Construction Management & Support	126,132	56,152	(69,980)
Environmental	24,608	812	(23,796)
Engineering & Design	255,708	347,128	91,420
Project Management & Services	216,619	18,029	(198,590)
ROW & Permits	114,885	49,818	(65,067)
GMA	214,122	135,179	(78,943)
Total Direct Costs	**1,906,749**	**1,174,307**	**(732,442)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[3]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	339,864	135,360	(204,504)
AFUDC	343,890	106,880	(237,010)
Property Taxes	77,747	15,393	(62,354)
Total Indirect Costs	**761,501**	**257,634**	**(503,867)**
Total Direct Costs	**1,906,749**	**1,174,307**	**(732,442)**
Total Loaded Costs	**2,668,250**	**1,431,941**	**(1,236,309)**

[2] Values may not add to total due to rounding.
[3] Ibid.

The Actual Full-Time Equivalent[4] (FTE) for this Project is 0.61.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Banning 2001 Valve Enhancement Project – MLV 16A, Actual Direct Costs were less than the preliminary estimate by $732,442. This variance can be attributed to a variety of factors including: SoCalGas bundled this project with three additional sites, coordinating engineering and construction activities between project sites; the Project Team initially anticipated that the project would last for approximately 54 days but was able to be accelerated to 32 days through project bundling efficiencies; the Engineering and Design firms completed activities originally identified as Project Management & Services in the initial estimate while the actual costs were recognized under Engineering & Design.

[4] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Banning 2001 Valve Enhancement Project – MLV 16A. Through this Valve Enhancement Project, SoCalGas successfully automated one mainline valve to achieve the objective of enabling rapid system isolation of a portion of Line 2001 West in the City of Moreno Valley. The total loaded cost of the of the PSEP scope of this Project is $1,431,941.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling four projects together to capture efficiencies through coordinated engineering, and installing equipment necessary to bring power and communication capabilities to the site to enable rapid system isolation of a portion of Line 2001 West in the City of Moreno Valley.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market-based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Banning 2001 Valve Enhancement Project – MLV 16A Final Report

I. BANNING 2001 VALVE ENHANCEMENT PROJECT – MLV 17A

A. Background and Summary

The Banning 2001 Valve Enhancement Project – MLV 17A site consists of valve enhancements made to an existing mainline valve (MLV) located in the City of Riverside within Riverside County. Through this project, SoCalGas enhanced the safety of its integrated natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 2001 in the event of a pipeline rupture. SoCalGas installed new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,930,154.

The Banning 2001 Valve Enhancement Project – MLV 17A construction site is within an existing SoCalGas facility located in an open area next to a residential development. SoCalGas bundled this valve project with three additional sites, Banning 2001 Valve Enhancement Projects – MLV 14A, MLV 14.3A, and MLV 16A, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Banning 2001 Valve Enhancement Project – MLV 17A.

Table 1: General Project Information

Banning 2001 Valve Enhancement Project – MLV 17A			
Location	City of Riverside		
Days on Site	44 days		
Construction Start	04/09/2018		
Construction Finish	08/08/2018		
Commissioning Date	7/15/2019		
Valve Upgrades			
Valve Number	2001-168.49-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	New		
Fencing	New – Expanded		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,930,154	-	1,930,154
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Banning 2001 Bundle Overview

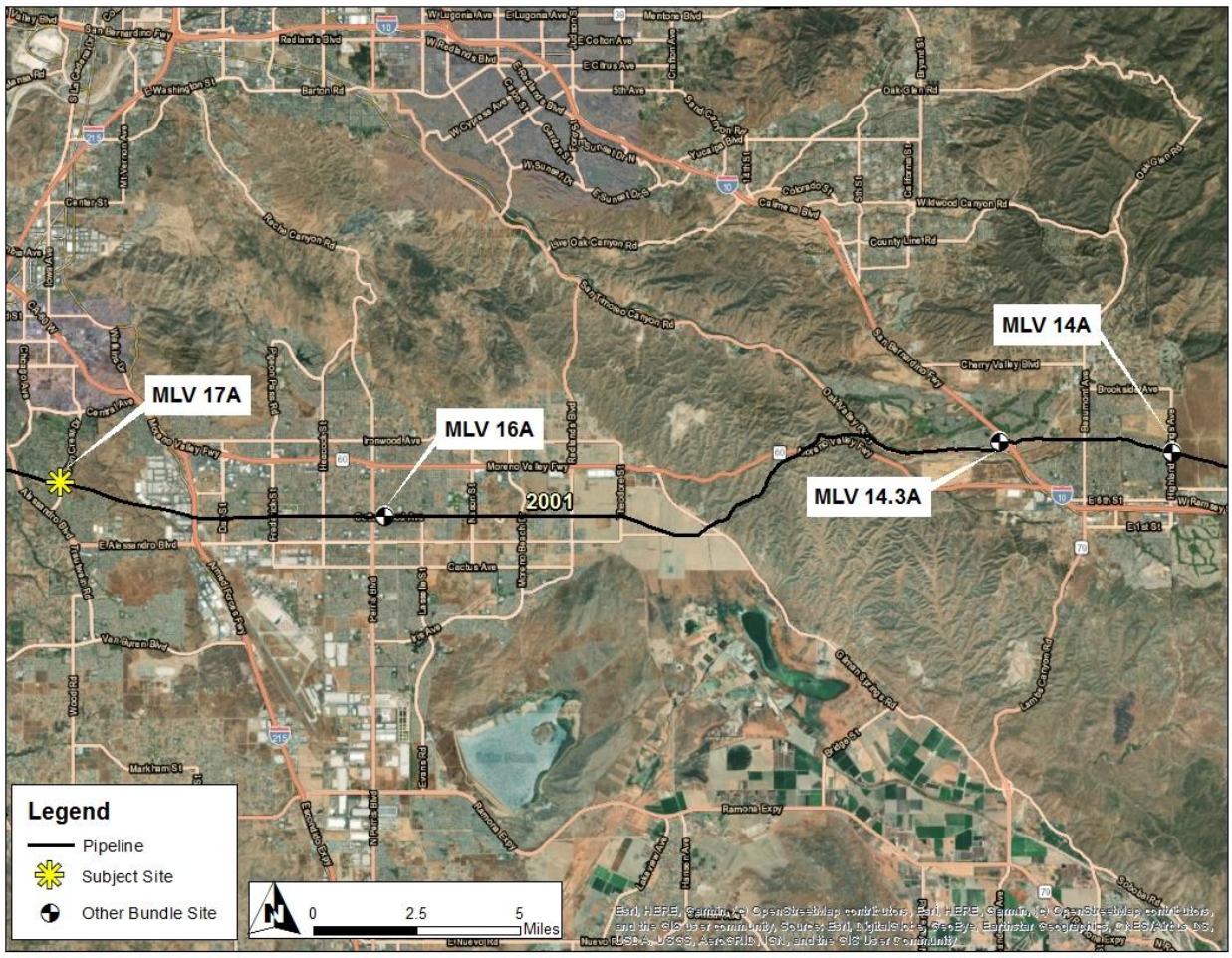


Figure 2: Satellite Image of Banning 2001 Valve Enhancement Project – MLV 17A

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Banning 2001 Valve Enhancement Project – MLV 17A in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] The conceptual scope identified MLV 2001-168.49-0 for automation to enable remote isolation to a portion of Line 2001. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis and confirmed that this valve enhancement will provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 2001-168.49-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point would enable rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: No notable engineering adjustments were required to the standard design.
4. Final Project Scope: The final project scope consists of the automation of one valve, the expansion of the existing facility, the installation of power equipment, the installation of communications equipment, the installation of new fencing, and the installation of the necessary automation equipment at the site.

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2001	168.49	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Banning 2001 Valve Enhancement Project – MLV 17A by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

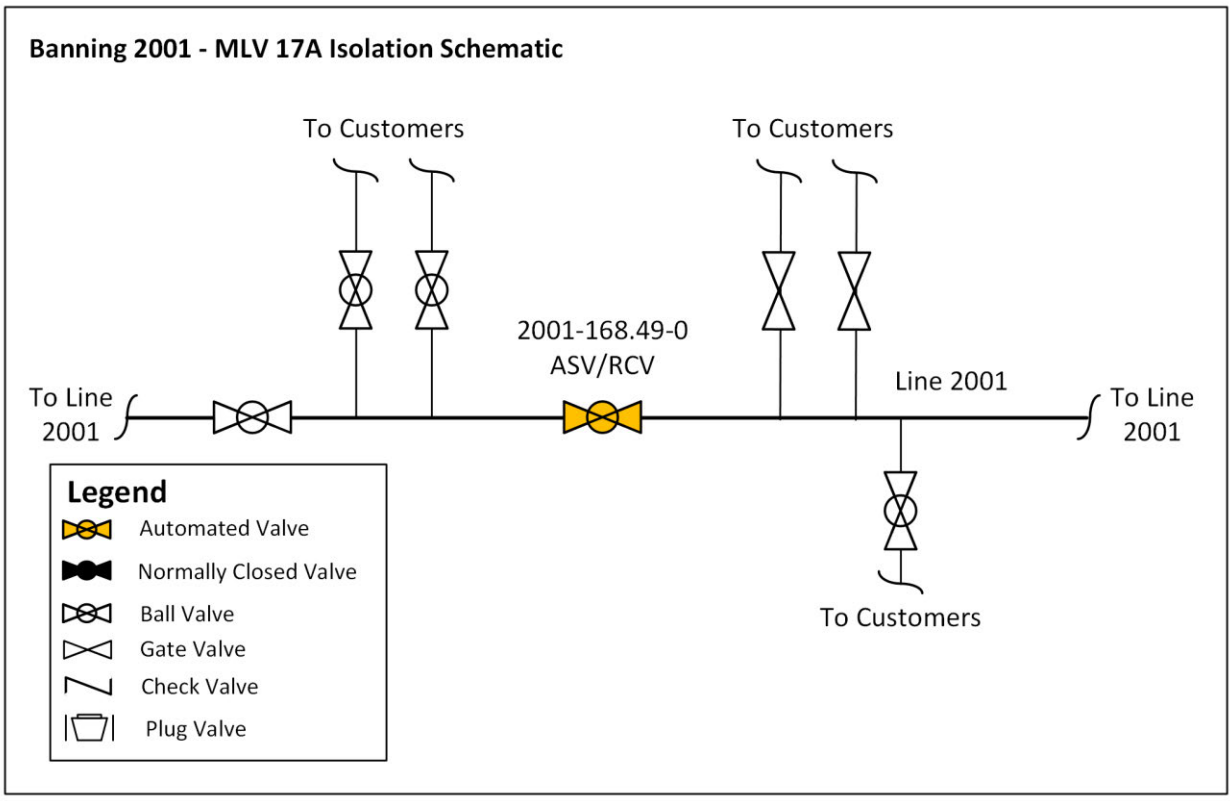
1. Site Description: The site is located in an existing fenced station in a rural area in the City of Riverside.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: The site had preexisting solar power. The Project Team planned to install new utility power equipment to accommodate the increased loads from the new automation equipment.
5. Communication Technology: There was no preexisting communications equipment. The Project Team planned to install new communications equipment at the site.

C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and verified the need to expand the existing station to accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 300 ball valve, which was reused by the Project Team.
3. Actuator Details: The existing actuator was a double-acting pneumatic actuator, which could be reused.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team obtained a Temporary Right of Entry and an exclusive easement from the City of Riverside Parks and Recreation Department.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Banning 2001 Valve Enhancement Project – MLV 17A Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas determined that changes in scope were appropriate to enhance the design of the Project and address engineering factors. As a result, the preliminary cost estimate does not fully reflect the final scope. The negotiations with the City of Riverside Parks and Recreation Department lasted longer than anticipated and required a redesign before a design was approved by the City representatives. The agreed upon revisions included the installation of a new access road and structural steel fencing.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package, which included the updated design described in the discussion of notable changes in scope above.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*:
   SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*:
   The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*:
   SoCalGas' preliminary cost estimate for the electrical contractor was [redacted].

4. Electrical Contractor's Estimate (*confidential*):
   The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	04/09/2018
Construction Completion Date	08/08/2018
Days on Site	44 days
Commissioning Date	7/15/2019

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: New Linebreak Cabinet, Power Pedestal, and Equipment Shelter

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on July 15, 2019, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. SoCalGas grouped this site with three additional sites, Banning 2001 Valve Enhancement Projects – MLV 14A, MLV 14.3A, and MLV 16A, to gain efficiencies in engineering, planning, and construction activities to minimize costs for the benefit of customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,753,483. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,930,154.

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	224,300	110,423	(113,877)
Materials	58,734	64,766	6,032
Mechanical Construction Contractor	482,690	442,640	(40,050)
Electrical Contractor	119,458	107,685	(11,773)
Construction Management & Support	108,121	89,323	(18,798)
Environmental	29,686	812	(28,875)
Engineering & Design	273,284	458,976	185,692
Project Management & Services	139,575	14,362	(125,213)
ROW & Permits	115,993	110,658	(5,335)
GMA	201,641	204,601	2,960
Total Direct Costs	**1,753,483**	**1,604,245**	**(149,238)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[3]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	313,971	231,298	(82,673)
AFUDC	341,015	82,442	(258,573)
Property Taxes	76,539	12,168	(64,371)
Total Indirect Costs	**731,525**	**325,909**	**(405,616)**
Total Direct Costs	**1,753,483**	**1,604,245**	**(149,238)**
Total Loaded Costs	**2,485,008**	**1,930,154**	**(554,854)**

The Actual Full-Time Equivalent[4] (FTE) for this Project is 0.66.

[2] Values may not add to total due to rounding.
[3] Ibid.
[4] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Banning 2001 Valve Enhancement Project – MLV 17A, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $149,238. This variance can be attributed to several factors including: the Project Team identified project cost efficiencies by working in parallel with another SoCalGas project, which as a result shared in the Company Labor cost to execute the project; the engineering firms provided Project Management & Services activities which were originally estimated under Project Management and Services, but these costs were recognized in Engineering and Design; the Electrical Construction Contractor was able to identify efficiencies that reduced the cost for the project which were not included in the initial estimate.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas successfully automated one mainline valve to achieve the objective of enabling rapid system isolation to a portion of Line 2001 in the City of Riverside. The total loaded cost of the Project is $1,930,154.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling four geographically proximate valve projects to capture efficiencies through coordinated engineering, and installing equipment necessary to bring power and communication capabilities to this valve to enable rapid system isolation to a portion of Line 2001 in the City of Riverside.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and by using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Banning 2001 Valve Enhancement Project – MLV 17A Final Report

I. BANNING AIRPORT VALVE ENHANCEMENT PROJECT

A. Background and Summary

The Banning Airport Valve Enhancement Project consists of valve enhancements made to one new and one existing mainline valve (MLV) located in the City of Banning. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Lines 2000 and 5000 in the event of a pipeline rupture. SoCalGas installed a new MLV, a new blowdown assembly, two new actuators, new crossover piping, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $2,108,473.

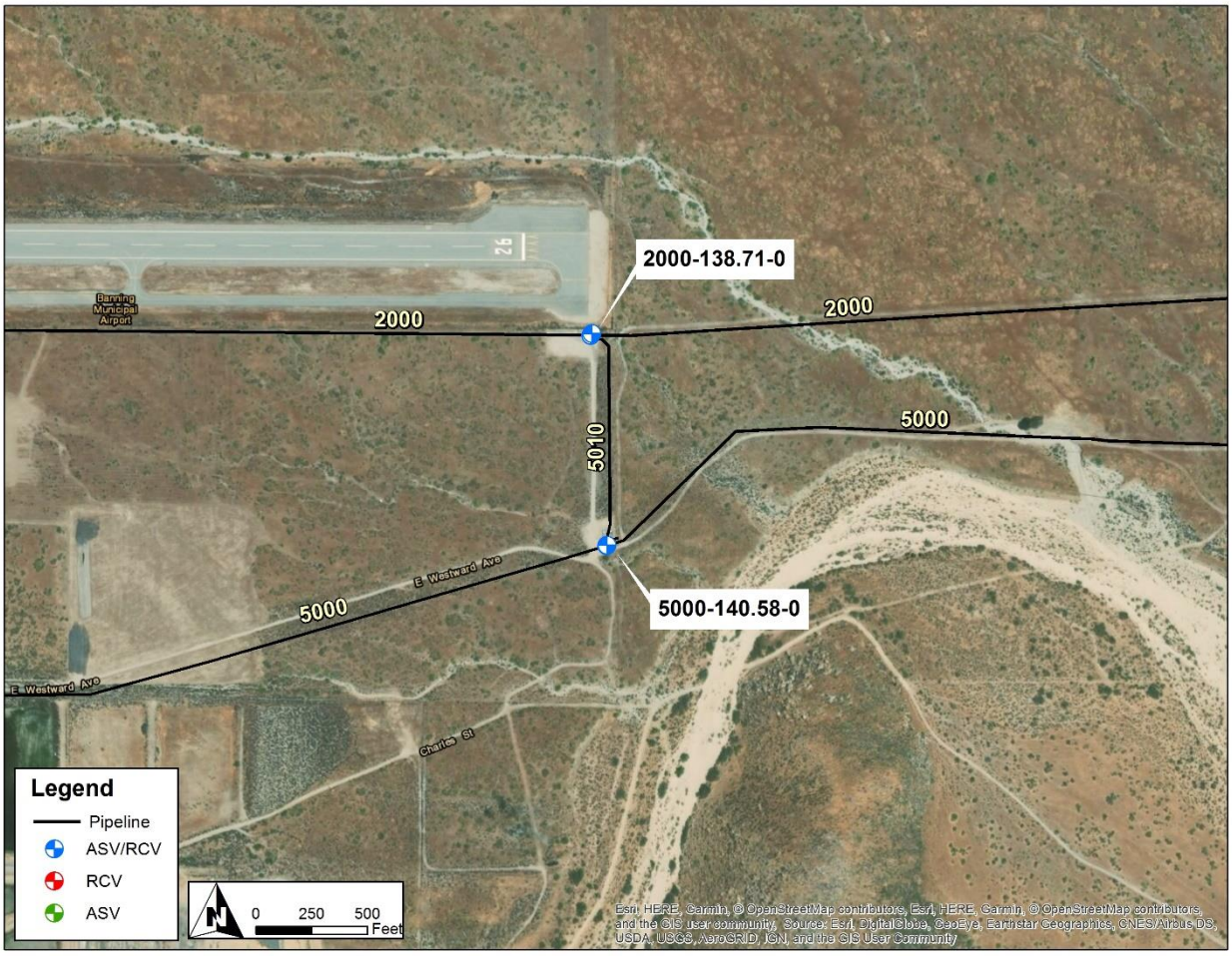
The Banning Airport Valve Enhancement Project consists of two construction sites. The first construction site, MLV 2000-138.71-0 is on the southside of the Banning Municipal Airport runway. The second construction site, MLV 5000-140.58-0 is approximately 700 feet south of the first site. Both sites are in a rural area and are located within an open field. This project was designed and executed as one project. This Project's costs were shared by PSEP and the Operating District, with the Operating District funding a portion of the costs of the new crossover and blowdown assembly and with PSEP funding the activities that provided system isolation through the automation of the existing mainline valve.

Table 1: General Project Information

Banning Airport Valve Enhancement Project			
Location	City of Banning		
Days on Site	79 days		
Construction Start	08/24/2015		
Construction Finish	04/11/2016		
Commissioning Date	02/03/2016		
Valve Upgrades			
Valve Number	2000-138.71-0		
Valve Type	New – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	5000-140.58-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	New – Solar		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	New		
Fencing	New/Expanded		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	2,102,910	5,563	2,108,473
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Banning Airport Valve Enhancement Project Bundle



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Banning Airport Valve Enhancement Project Bundle in workpapers supporting the Valve Enhancement Plan in the 2011 filing.[1] This conceptual scope identified MLV 5000-140.58-0 for automation to enable remote isolation to a portion of Line 2000. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and identified an additional valve for enhancement to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 5000-140.58-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this valve alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. SoCalGas determined it was also necessary to automate MLV 2000-138.71-0. Together, the automation of these valves enables rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The Project Team installed new crossover piping for improved operational flexibility.
4. Final Project Scope: The final project scope consists of the installation of a new MLV, the installation of a new crossover, the installation of a new blowdown assembly, the installation of two new actuators, the installation of new power

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

equipment, the installation of new communications equipment, and the installation of the necessary automation equipment at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2000	138.71	0	[redacted]	NV/AG	ASV/RCV
5000	140.58	0	[redacted]	A/AG	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Banning Airport Valve Enhancement Project Bundle by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

MLV 2000-138.71-0

1. Site Description: This site is in the City of Banning approximately 80 feet south of the runway at the Banning Municipal Airport. The site is accessible via an unnamed access road.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected this MLV for automation to isolate a geological threat downstream of the valve, and to isolate HCA locations upstream and downstream of the valve.
4. Power Source: There was no preexisting power source. The Project Team installed new power equipment at the site.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

MLV 5000-140.58-0

1. Site Description: This site is in the City of Banning approximately 830 feet south of the runway at the Banning Municipal Airport and approximately 700 feet south of the MLV-2000-138.71-0 site. The site is accessible via an unnamed access road.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected this MLV for automation to isolate a geological threat downstream of the valve, to isolate HCA locations upstream and downstream of the valve, and to satisfy the PSEP Valve Enhancement Plan spacing criteria.
4. Power Source: There was no preexisting power source. The Project Team installed new power equipment at the site.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

MLV 2000-138.71-0

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment.
2. Valve Details: There was no preexisting valve. The Project Team installed a new Class 600 ball valve.

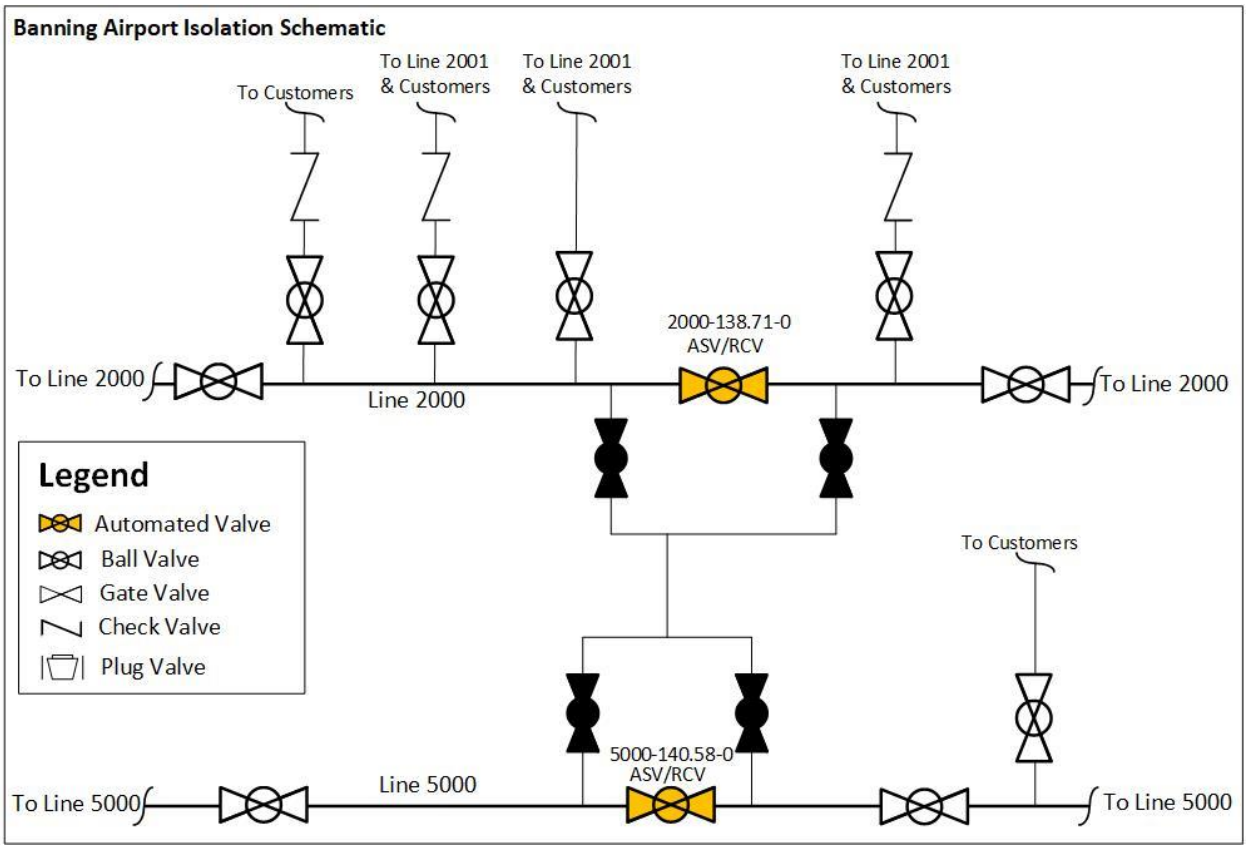
3. Actuator Details: There was no preexisting actuator. The Project Team installed a new actuator.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impact to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: There was sufficient space at the construction site for a laydown yard. The Project Team expanded the existing easement to accommodate the new automation equipment.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

MLV 5000-140.58-0

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment.
2. Valve Details: The existing valve was a manually-operated Class 600 ball valve, which was reused by the Project Team.
3. Actuator Details: There was no preexisting actuator. The Project Team installed a new actuator.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.

5. Community Impact: The Project Team did not anticipate any notable impact to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: There was sufficient space at the construction site for a laydown yard. The Project Team expanded the existing easement and facility to accommodate the new automation equipment.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 2: Banning Airport Valve Enhancement Project Bundle Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas determined that changes in scope were appropriate to enhance the design of the Project and address engineering factors. As a result, the preliminary cost estimate does not fully reflect the final scope. Summarized below are notable changes in scope made after the preliminary cost estimate was developed and approved.

SoCalGas determined that the installation cost of the new crossover piping and new blowdown assembly should be a shared cost between PSEP and the Operating District. PSEP and the Operating District shared contract, materials, and direct costs related to the installation of the new crossover and new blowdown assembly at a predetermined allocation, with PSEP only funding the activities that provided system isolation through the automation of the existing mainline valve.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, SoCalGas entered into a competitive bidding process to select a construction contractor, that included the updated design described in the discussion of notable Scope Changes above. SoCalGas awarded the construction contract to the bidder that best met the selection criteria for this project. The estimated values below include PSEP and non-PSEP work.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted] which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for the electrical contractor was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	08/24/2015
Construction Completion Date	04/11/2016
Days on Site	79 days
Commissioning Date	02/03/2016

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $180,000 in change orders.

1. Site Restoration: The native soil was unsuitable as backfill. The unsuitable material had to be disposed of and new backfill material was procured.
2. Tie-in: Due to complex gas handling and isolation activities, SoCalGas asked the Mechanical Construction Contractor to provide additional support during the tie-in.

Figure 3: Excavated Line 2000 Prior to Installation of MLV 2000-138.71-0

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valves, and transferred ownership of the new equipment to Field Operations Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on February 3, 2016 as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the known site conditions in the project plan and design. The Project Team bundled projects to coordinate engineering activities between the two Banning Airport Valve Enhancement Project Bundle sites to minimize costs for the benefit of customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,817,225. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $2,108,473.

Table 4: Estimated and Actual Direct Costs and Variances[2,3]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	122,256	97,443	(24,813)
Materials	273,338	425,609	152,271
Mechanical Construction Contractor	453,102	252,364	(200,738)
Electrical Contractor	123,200	192,180	68,980
Construction Management & Support	143,608	249,929	106,321
Environmental	35,035	31,973	(3,062)
Engineering & Design	171,515	207,022	35,507
Project Management & Services	74,776	99,861	25,085
ROW & Permits	5,940	27,126	21,186
GMA	414,455	162,889	(251,566)
Total Direct Costs	**1,817,225**	**1,746,396**	**(70,829)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4, 5]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	541,069	235,698	(305,371)
AFUDC	121,463	114,317	(7,146)
Property Taxes	23,328	12,062	(11,266)
Total Indirect Costs	**685,860**	**362,077**	**(323,783)**
Total Direct Costs	**1,817,225**	**1,746,396**	**(70,829)**
Total Loaded Costs	**2,503,085**	**2,108,473**	**(394,612)**

The Actual Full-Time Equivalent[6] (FTE) for this Project is 0.30.

[2] Values may not add to total due to rounding.
[3] Values in table represent PSEP costs only.
[4] Values may not add to total due to rounding.
[5] Values in table represent PSEP costs only.
[6] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Banning Airport Valve Enhancement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $70,829. This variance can be attributed to several factors including: SoCalGas bundled this valve project with three additional valve projects to gain efficiencies in engineering, planning, and construction activities.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Banning Airport Valve Enhancement Project Bundle. Through this Valve Enhancement Project, SoCalGas successfully installed a new mainline valve and automated two mainline valves to achieve the objective of enabling rapid system isolation of a portion of Lines 2000 and 5000 in the City of Banning. The total loaded cost of the Project is $2,108,473.

SoCalGas executed this project prudently through designing and executing the Project to support the Valve Enhancement Plan isolation objectives; coordinating and bundling two valve sites into a comprehensive bid package to capture efficiencies through coordinated scheduling of construction crews; installing a new mainline valve, a new blowdown assembly, and a new crossover; and installing equipment necessary to bring power and communication capabilities to these valves to enable rapid system isolation of portions of Lines 2000 and 5000 in the City of Banning.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at reasonable cost by carefully planning and coordinating construction activity, and by limiting the number of mobilizations and laydown yards across two different project sites to maximize efficiencies and reduce customer and community impacts.

End of Banning Airport Valve Enhancement Project Bundle Final Report

I. BLYTHE VALVE ENHANCEMENT PROJECT - CACTUS CITY

A. Background and Summary

The Blythe Valve Enhancement Project – Cactus City consists of valve enhancements made to an existing mainline valve (MLV) located near Cactus City in Riverside County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 2051 in the event of a pipeline rupture. SoCalGas installed a new actuator, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,837,612.

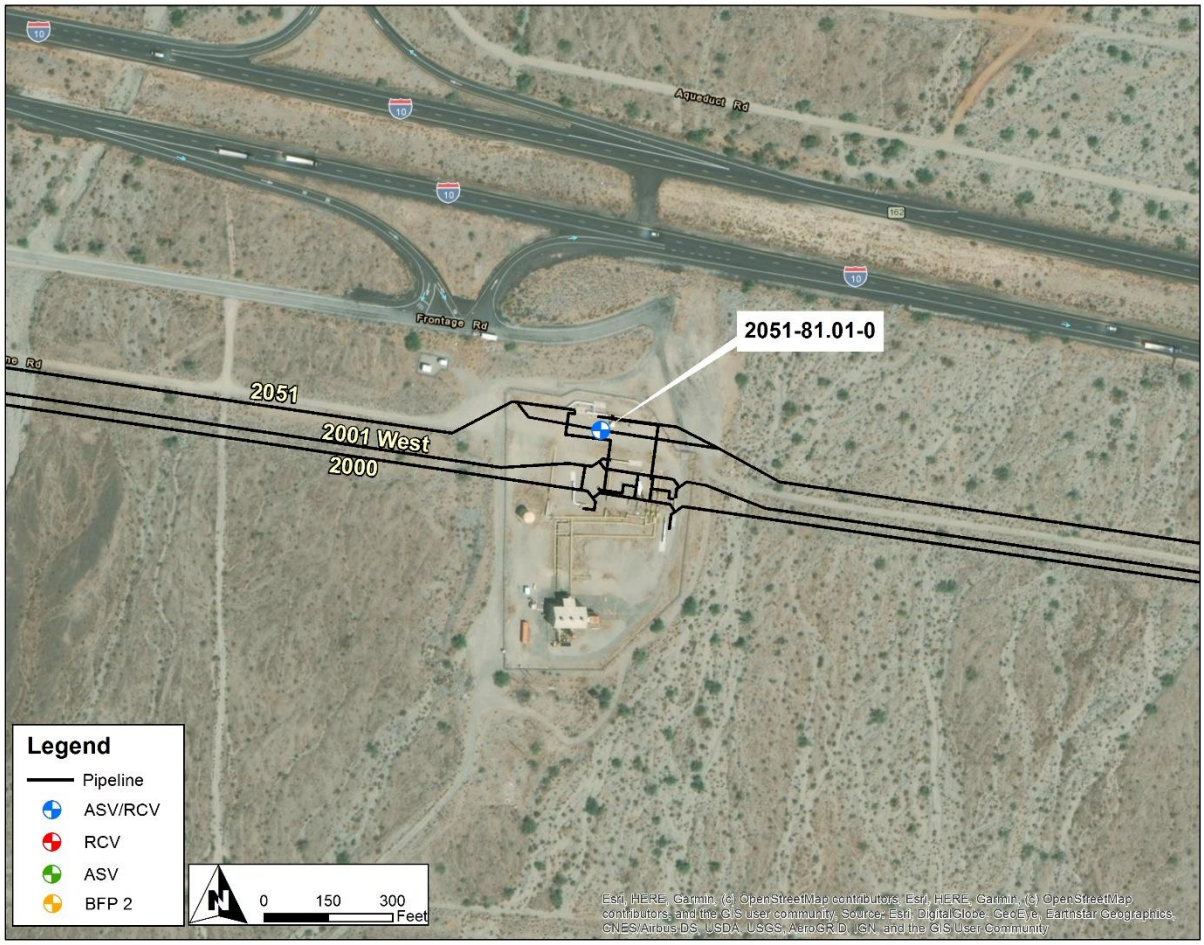
The Blythe Valve Enhancement Project – Cactus City construction site is within an existing SoCalGas facility located in a rural desert area, with minimal traffic south of Interstate 10. SoCalGas bundled this site with one additional project, Blythe Valve Enhancement Project – Blythe Station 2, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Blythe Valve Enhancement Project – Cactus City. SoCalGas coordinated construction with a non-PSEP project whose scope automated two additional valves in the existing facility. This workpaper speaks to the PSEP activities.

Table 1: General Project Information

Blythe Valve Enhancement Project – Cactus City			
Location	Cactus City		
Days on Site	87 days		
Construction Start	07/03/2018		
Construction Finish	10/11/2018		
Commissioning Date	07/09/2019		
Valve Upgrades			
Valve Number	2051-81.01-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	Updated - Utility		
Communication	New - Radio		
SCADA Panel	New		
Equipment Shelter	New		
Fencing/Wall	Existing - Fencing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,837,612	-	1,837,612
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Blythe Valve Enhancement Project – Cactus City



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope for the Blythe Valve Enhancement Project – Cactus City in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified MLV 2051-81.01-0 for automation to enable remote isolation to a portion of Line 2051. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and confirmed that this valve enhancement will provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 2051-81.01-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point would achieve the transmission isolation objectives set forth in the Valve Enhancement Plan.
3. Engineering, Design, and Constructability: No notable engineering adjustments were required to the standard design.
4. Final Project Scope: The final project scope consists of the installation of a new actuator, new power equipment, new communications equipment, and the necessary automation equipment at the site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2051	81.01	0	[redacted]	A/AG	ASV/RCV

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Blythe Valve Enhancement Project by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site located in an existing SoCalGas facility in a rural desert area south of Interstate 10.
2. Land Issues: During the site evaluation, the Project Team noted that the existing station would accommodate the new equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected these valves for automation to satisfy the objectives of the PSEP Valve Enhancement Plan.
4. Power Source: The site had existing utility power. The Project Team relocated the power source from a decommissioned building to the new shelter.
5. Communication Technology: There was no preexisting communications equipment at the site. The Project Team installed new radio communications equipment.

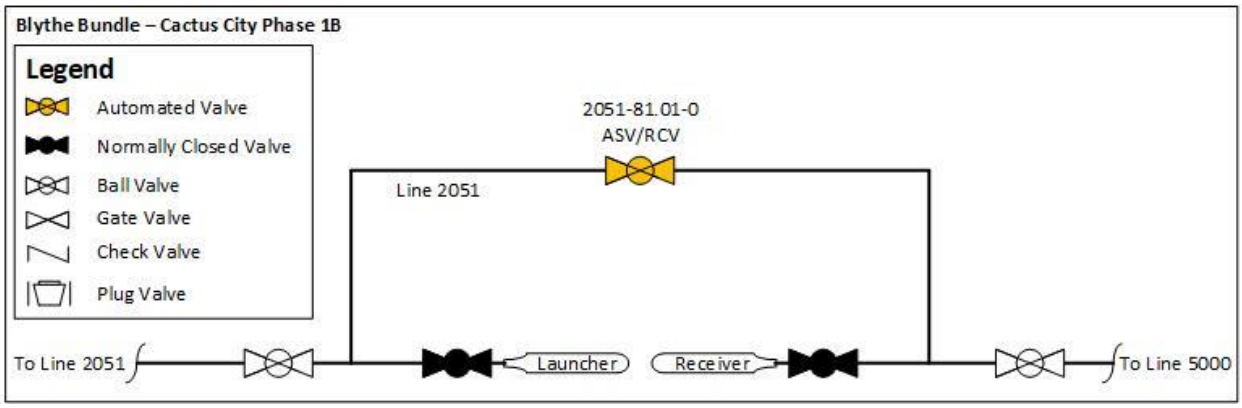
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activities, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the existing facility could accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated [redacted] ball valve, which was reused by the Project Team.

3. Actuator Details: The preexisting actuator was incompatible with PSEP linebreak technology. The Project Team installed a new actuator.
4. Customer Impact: The Project Team did not anticipate service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impact to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: The Project Team did not identify the need to obtain any permits.
9. Land Use: The Project Team performed all work within the existing facility.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 2: Blythe Valve Enhancement Project Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas determined that changes in scope were appropriate to enhance the design of the Project and address engineering factors. As a result, the preliminary cost estimate does not fully reflect the final scope. The Project Team initially planned to install solar power. After the finalization of the TIC, the Project Team altered the design to utilize utility power.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package, which included the updated design described in the discussion of notable changes in scope above.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	07/03/2018
Construction Completion Date	12/12/2018
Days on Site	87 days
Commissioning Date	07/09/2019

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility and communications connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 3: New Actuator and Linebreak Cabinet

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on July 9, 2019, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Schedule Coordination: The Project Team coordinated with Major Projects to share inspection costs and environmental costs.
2. Bundling of Projects: SoCalGas bundled this site with one additional project, Blythe Valve Enhancement Project – Blythe Station 2, to gain efficiencies in engineering, planning, and construction activities.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $515,404. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in

accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,837,612.

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	23,798	98,007	74,209
Materials	157,438	139,903	(17,535)
Mechanical Construction Contractor	25,190	98,400	73,210
Electrical Contractor	56,678	162,407	105,729
Construction Management & Support	70,658	189,120	118,462
Environmental	5,794	21,595	15,801
Engineering & Design	92,406	538,808	446,402
Project Management & Services	28,969	59,601	30,632
ROW & Permits	0	10,206	10,206
GMA	54,473	129,273	74,800
Total Direct Costs	**515,404**	**1,447,319**	**931,915**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[3]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	63,217	211,276	148,059
AFUDC	16,404	117,986	101,582
Property Taxes	3,150	61,031	57,881
Total Indirect Costs	82,771	**390,293**	**307,522**
Total Direct Costs	**515,404**	**1,447,319**	**931,915**
Total Loaded Costs	**598,175**	**1,837,612**	**1,239,437**

The Actual Full-Time Equivalents[4] (FTEs) for this Project are 0.20.

[2] Values may not add to total due to rounding.
[3] Ibid.
[4] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Blythe Valve Enhancement Project, Actual Direct Costs exceeded the preliminary estimate by $931,915. This variance is attributable to a variety of factors including:

1. Company Labor:
    a. The preliminary estimate was developed assuming project construction would commence shortly thereafter, however, during detailed design the Project Team determined it would be more efficient to sequence the project with another SoCalGas project occurring at the station. This necessitated additional coordination with the other project to redesign and finalize the scope.
    b. There was a three-year delay between the estimated and actual construction start to account for the other project's impact on the facility's communication system, causing a cost increase compared to the initial estimate of approximately $35,000 as labor rates increased within the time frame.

2. Materials:
   a. The preliminary design included the cost of purchasing the material to install solar power. Solar panels and batteries were not installed, which resulted in saving of approximately $16,000.
3. Mechanical Construction Contractor:
   a. Detailed engineering, design, and planning activities led to enhancements in the project design and addressed key engineering factors. As a result, the preliminary cost estimate did not fully capture the final scope of work. The Target Price Estimate (TPE) developed by SoCalGas and the Construction Contractor before construction incorporated these adjustments and refinements reflecting a detailed design, increasing the construction estimate to [redacted].
   b. The project required additional scope including building and testing a riser assembly and the excavation and backfill of the electrical conduits, increasing cost by approximately $11,500.
4. Electrical Construction Contractor:
   a. The original project scope was the installation of solar power, however when the scope shifted to utility power, Electrical Construction Contractor support was necessary to ensure electrical components and connections were properly installed, increasing cost by approximately $71,000.
5. Construction Management & Support:
   a. The Project required a power source change from solar to utility power, coordination between mechanical and electrical construction contractor schedules, and delay in receipt of material, which extended the total construction schedule to approximately 87 days, significantly longer than the preliminary estimate of 40 days. This resulted in an additional cost of approximately $53,000.
   b. Inspector support was required during the installation of a the actuator, power equipment, communications equipment, and the necessary automation equipment at the site which cost approximately $39,000 reflective of an increase in rates between the estimate and construction and the extended schedule.

c. Engineering firms provided Construction Management & Support which was recognized in Engineering & Design, for $27,000 for construction inspector support.

6. Environmental:
   a. During construction, additional abatement and disposal services were required to install equipment, increasing the cost by approximately $6,000.
7. Engineering & Design:
   a. Additional Engineering and Design support was necessary to redesign the project power source from solar to utility power which required communication equipment and equipment housing, and consideration of existing facility conditions.
   b. Extensive survey was required primarily due to the redesign to utility power.
   c. The Engineering and Design firms provided Project Management & Services which was recognized in Engineering and Design, approximately $12,000 for project control services and closeout support.
   d. The Engineering and Design firms provided Construction Management & Support which was recognized in Engineering and Design, approximately $27,000 for construction inspector support.
8. Project Management & Services:
   a. Engineering firms provided Project Management & Services which was recognized in Engineering & Design, approximately $12,000 for project control services and closeout support.
9. ROW & Permits:
   a. Construction occurred within the SoCalGas facility, however the land is owned by the Bureau of Land Management (BLM), thus requiring project notification and coordination with the agency. This expenditure resulted in an increase of $6,000.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Blythe Valve Enhancement Project – Cactus City. Through this Valve Enhancement Project, SoCalGas successfully automated one mainline valve to achieve the objective of enabling rapid system isolation to a portion of Line 2051 near Cactus City in Riverside County. The total loaded cost of the Project is $1,837,612.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling two geographic proximate valve projects to capture efficiencies, and installing the equipment necessary to bring communication capabilities to the site to enable rapid system isolation of a portion of Line 2051 located near Cactus City in Riverside County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating construction activities with another SoCalGas project to maximize efficiencies and reduce community impacts.

End of Blythe Valve Enhancement Project – Cactus City Final Report

I. BREA VALVE ENHANCEMENT PROJECT – ATWOOD STATION SITE

A. Background and Summary

The Brea Valve Enhancement Project – Atwood Station consists of valve enhancements made to an existing mainline valve (MLV) and the installation of two check valves located in the City of Anaheim in Orange County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 1016 and by enabling backflow prevention between Line 1016 and Supply Line 42-101 in the event of a pipeline rupture. SoCalGas installed a new actuator, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,085,395.

The Brea Valve Enhancement Project – Atwood Station construction site is located within an existing SoCalGas facility in a high density commercial and industrial area in the City of Anaheim near the intersection of Jefferson Street and Miraloma Avenue. SoCalGas bundled this site with six additional sites, Brea Valve Enhancement Projects – Brea Canyon; Burton and Placentia; Carbon Canyon; Gale and Azusa; Lincoln and Batavia; and Toledo and Beach, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Brea Valve Enhancement Project – Atwood Station.

Table 1: General Project Information

Brea Valve Enhancement Project – Atwood Station Site			
Location	City of Anaheim		
Days on Site	21 days		
Construction Start	07/31/2017		
Construction Finish	09/06/2017		
Commissioning Date	05/30/2018		
Valve Upgrades			
Valve Number	1016-4.30-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	N/A[1]		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	Below-Grade		
ASV	N/A		
RCV	N/A		
Valve Number	N/A		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	Below-Grade		
ASV	N/A		
RCV	N/A		
Site Upgrades			
Vault	None		
Power	Existing – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing	Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,085,395	-	1,085,395
Disallowed Costs	-	-	-

[1] Check valves are not numbered.

B. Maps and Images

Figure 1: Satellite Image of Brea Valve Enhancement Project – Atwood Station Site

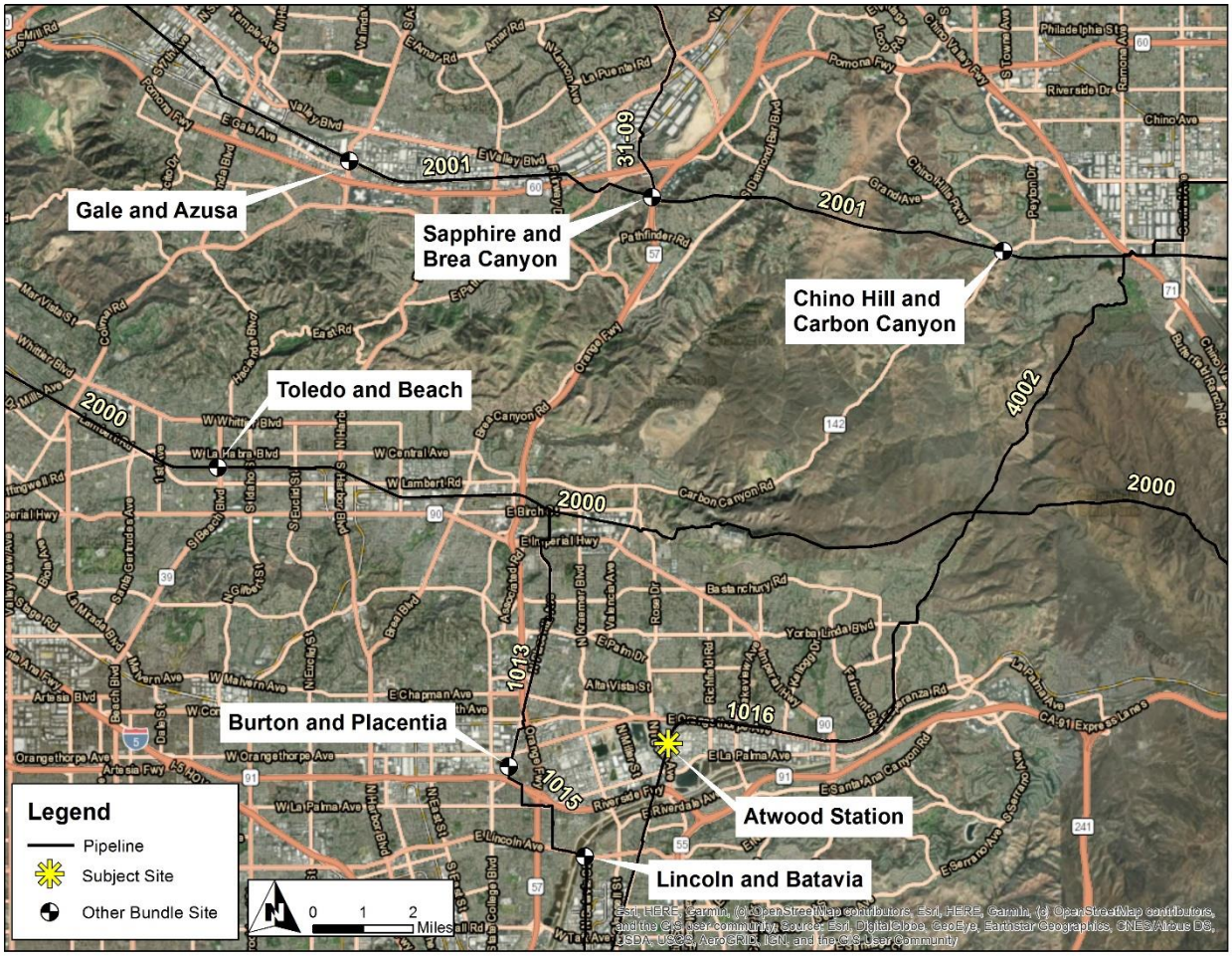


Figure 2: Satellite Image of Brea Valve Enhancement Project – Atwood Station Site

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Brea Valve Enhancement Project – Atwood Station in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[2] This conceptual scope identified MLV 1016-4.30-0 for automation to enable remote isolation to a portion of Line 1016 and Supply Line 42-101. Prior to initiating execution of the Project, SoCalGas reviewed available information and performed a detailed system flow analysis to validate the scope of the Project. This resulted in the identification of two check valve installations to achieve the Valve Enhancement Plan objectives. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 1016-4.30-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. SoCalGas determined it was also necessary to install two check valves downstream of the two tap valves around MLV 1016-4.30-0 to enhance the ability to eliminate gas flow from Supply Line 42-101 into Line 1016. Together, the automation of this valve and the installation of the two check valves enables rapid isolation, achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: No notable engineering adjustments were required to the standard design.
4. Final Project Scope: The final project scope consists of the automation of one existing MLV that included the installation of a new actuator, the installation of new

[2] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. # SCG-32).

communications equipment, the installation of the necessary automation equipment, and the installation of two check valves.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
1016	4.30	0	[redacted]	A/AG	ASV/RCV
1016	4.30	Check	[redacted]	NV	BFP2
1016	4.30	Check	[redacted]	NV	BFP2

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Brea Valve Enhancement Project – Atwood Station by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site is an existing SoCalGas facility in an urban area. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility could accommodate the new equipment.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: The site had existing utility power.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

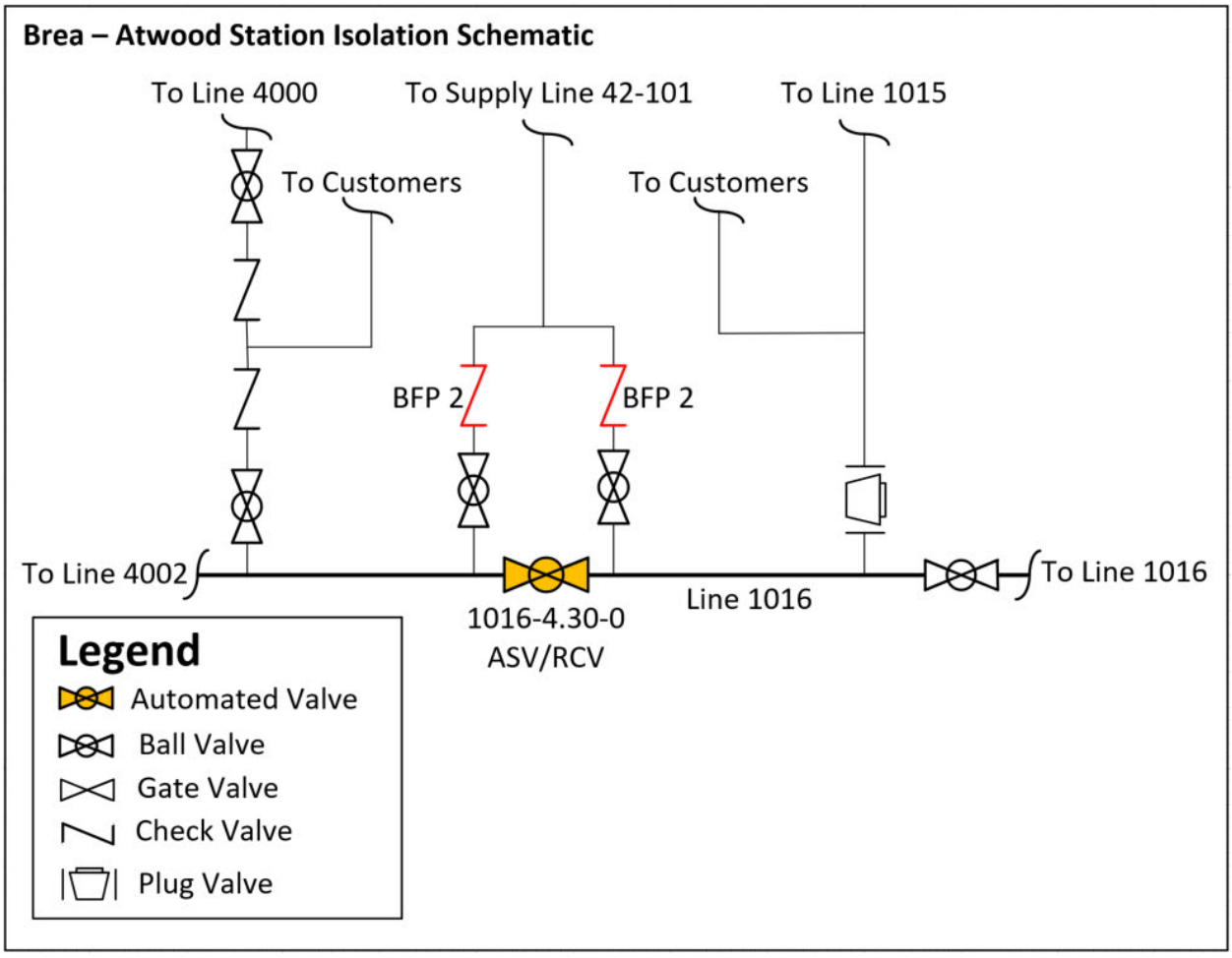
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a

site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: The Project Team confirmed the preexisting technology and the specifications of the valves. The Project Team determined that a vault would not be required for the new above-grade actuator.
2. Valve Details: The existing valve was a manually actuated Class 300 ball valve, which was reused by the Project Team.
3. Actuator Details: The preexisting actuator was incompatible with PSEP linebreak technology, so the Project Team installed a new actuator.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any environmental concerns at the site.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team utilized the existing easement as a laydown yard and staging area during construction.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Brea Valve Enhancement Project – Atwood Station Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for the electrical contractor was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	07/31/2017
Construction Completion Date	09/06/2017
Days on Site	21 days
Commissioning Date	05/30/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Preexisting Actuator Prior to Removal and the Trenching Work for Conduit to the Linebreak Panel.

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on May 30, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. The Project Team utilized existing SoCalGas facilities and easements for construction avoiding the need to acquire additional land or easements to minimize costs for the benefit of customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,383,960. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $ 1,085,395.

Table 4: Estimated and Actual Direct Costs and Variances[3]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	230,478	82,830	(147,648)
Materials	122,444	99,528	(22,916)
Mechanical Construction Contractor	356,129	213,825	(142,304)
Electrical Contractor	98,244	122,604	24,360
Construction Management & Support	62,658	47,563	(15,095)
Environmental	83,915	42,497	(41,419)
Engineering & Design	139,446	198,640	59,194
Project Management & Services	103,722	9,245	(94,477)
ROW & Permits	27,278	15,802	(11,476)
GMA	159,647	108,815	(50,832)
Total Direct Costs	**1,383,960**	**941,349**	**(442,613)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	241,475	125,207	(116,269)
AFUDC	40,668	16,286	(24,382)
Property Taxes	9,102	2,552	(6,550)
Total Indirect Costs	**291,246**	**144,045**	**(147,201)**
Total Direct Costs	**1,383,960**	**941,349**	**(442,613)**
Total Loaded Costs	**1,675,206**	**1,085,395**	**(589,813)**

The Actual Full-Time Equivalents[5] (FTEs) for this Project are 0.44.

[3] Values may not add to total due to rounding.
[4] Ibid.
[5] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Brea Valve Enhancement Project – Atwood Station, Actual Direct Costs were less than the preliminary estimate by $442,613. This variance is attributable to a variety of factors including: coordination with other projects in the Brea Valve Enhancement Bundle allowed for shared efforts and reduced project planning costs; increased productivity reduced construction length by 6 days, which reduced total costs for the construction contractor, management, and environmental support; the unit prices of materials were lower than originally anticipated, which reduced total material costs; and the work area was optimized so that construction was completed on company property, which reduced costs anticipated for land acquisition.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Brea Valve Enhancement Project – Atwood Station. Through this Valve Enhancement Project, SoCalGas successfully automated one mainline valve and installed two check valves to achieve the objective of enabling rapid system isolation to a portion of Line 1016 and Supply Line 42-101 located in the City of Anaheim. The total loaded cost of the Project is $1,085,395.

SoCalGas executed this project prudently through designing and executing the Project to support Valve Enhancement Plan isolation objectives, bundling seven geographically proximate projects to capture efficiencies, and installing equipment necessary to bring communication capabilities to these valves to enable rapid system isolation of a portion of Line 1016 and Supply Line 42-101 in the City of Anaheim.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by updating the scope of work to be more cost effective and by utilizing preexisting easements for the construction zone.

End of Brea Valve Enhancement Project – Atwood Station Final Report

I. BREA VALVE ENHANCEMENT PROJECT – CARBON CANYON SITE

A. Background and Summary

The Brea Valve Enhancement Project – Carbon Canyon consists of valve enhancements made to an existing mainline valve (MLV) located in the City of Chino Hills. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 2001 West in the event of a pipeline rupture. SoCalGas installed new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $488,673.

The Brea Valve Enhancement Project – Carbon Canyon is located within an existing SoCalGas facility in Chino Hills at the intersection of Chino Hills Parkway and Carbon Canyon Road in an open field. There are several residential developments and a temple nearby. SoCalGas grouped this site with six additional sites, Brea Valve Enhancement Projects – Atwood Station; Brea Canyon; Burton and Placentia; Gale and Azusa; Lincoln and Batavia; and Toledo and Beach, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Brea Valve Enhancement Project – Carbon Canyon. This project was designed and executed as one cohesive project; however, the project costs were shared by PSEP and the Operating District, with PSEP funding the activities that provided system isolation through automation of the new mainline valve, and the Operating District funding separately the activities to install the new Linebreak Cabinet.

Table 1: General Project Information

Brea Valve Enhancement Project – Carbon Canyon Site			
Location	City of Chino Hills		
Days on Site	15 days		
Construction Start	09/11/2017		
Construction Finish	01/29/2018		
Commissioning Date	07/31/2018		
Valve Upgrades			
Valve Number	2001-193.31-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	No		
Site Upgrades			
Vault	None		
Power	New – Solar		
Communication	New – Radio		
SCADA Panel	None		
Equipment Shelter	None		
Fencing	Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	488,673	-	488,673
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Brea Bundle Overview

Figure 2: Satellite Image of Brea Valve Enhancement Project – Carbon Canyon Site

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Brea Valve Enhancement Project – Carbon Canyon in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] The conceptual scope identified MLV 2001-193.31-0 for automation to enable remote isolation to a portion of Line 2001. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and confirmed this valve enhancement will provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 2001-193.31-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point would achieve the transmission isolation objectives set forth in the Valve Enhancement Plan.
3. Engineering, Design, and Constructability: SoCalGas determined that the existing technology facilitated the enabling of ASV capabilities to the existing MLV. The Operating District requested that a new Linebreak Cabinet be installed for increased functionality.
4. Final Project Scope: The final project scope consists of the automation of one MLV, the installation of new power equipment, the installation of new communications equipment, and the installation of the necessary automation equipment.

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. # SCG-32).

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2001	193.31	0	[redacted]	COMM	ASV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Carbon Canyon Site by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

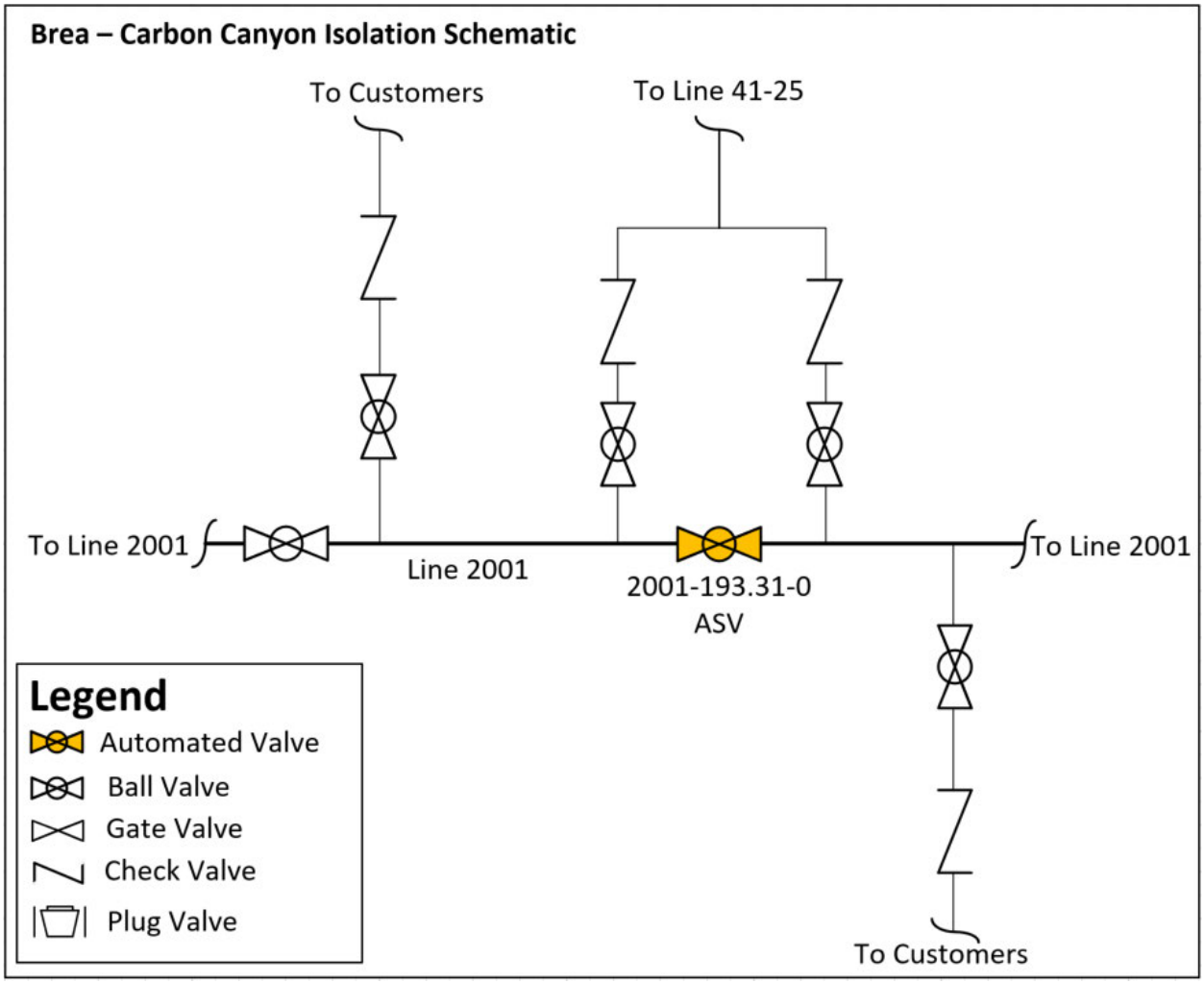
1. Site Description: This site is an existing SoCalGas facility in an open area. There are residential developments and a temple nearby.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: There was no preexisting power source. The Project Team installed new power equipment at the site.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station could accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 300 ball valve, which was reused by the Project Team.
3. Actuator Details: The existing actuator was a double-acting pneumatic actuator that the Project Team reused.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impact to the community from this Project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team performed all work within the existing SoCalGas easement.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Brea Valve Enhancement Project Schematic – Carbon Canyon Site



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Alliance Partner (Electrical Contractor) to prepare a cost estimate based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Alliance Partner prepared and submitted their estimate. The estimated values below include PSEP and non-PSEP work.

1. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	09/11/2017
Construction Completion Date	01/29/2018
Days on Site	15 days
Commissioning Date	07/31/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Existing Actuator With New Instrumentation Tubing in the Foreground, New Linebreak Cabinet in the Background

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve back into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on July 31, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. SoCalGas grouped this site with six additional sites, Brea Valve Enhancement Projects – Atwood Station, Brea Canyon, Burton and Placentia, Gale & Azusa, Lincoln and Batavia, and Toldeo and Beach, into a single valve bundle to gain efficiencies in engineering, planning, and construction activities to minimize costs for the benefit of customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $495,029. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $488,673.

Table 4: Estimated and Actual Direct Costs and Variances[2, 3]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	109,541	65,097	(44,444)
Materials	7,823	7,633	(190)
Mechanical Construction Contractor	-	-	-
Electrical Contractor	112,107	68,158	(43,949)
Construction Management & Support	34,936	25,116	(9,820)
Environmental	58,501	26,213	(32,288)
Engineering & Design	84,118	141,158	57,040
Project Management & Services	44,863	5,020	(39,843)
ROW & Permits	1,601	667	(934)
GMA	41,539	52,496	10,957
Total Direct Costs	**495,029**	**391,559**	**(103,470)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4, 5]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	120,949	82,707	(38,242)
AFUDC	12,303	12,579	276
Property Taxes	2,637	1,828	(809)
Total Indirect Costs	**135,889**	**97,114**	**(38,775)**
Total Direct Costs	**495,029**	**391,559**	**(103,470)**
Total Loaded Costs	**630,918**	**488,673**	**(142,245)**

The Actual Full-Time Equivalent[6] (FTE) for this Project is 0.35.

[2] Values may not add to total due to rounding.
[3] Values in table include PSEP and non-PSEP work.
[4] Values may not add to total due to rounding.
[5] Values in table include PSEP and non-PSEP work.
[6] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the the Brea Valve Enhancement Project – Carbon Canyon, Actual Direct Costs were less than the preliminary estimate by $103,470. This variance can be attributed to a variety of factors including: valve modification services at this site were included in the original design but was later determined to not be required; and the Engineering and Design firms completed activities originally identified as Project Management & Services in the initial estimate while the actual costs were recognized under Engineering and Design.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Brea Valve Enhancement Project – Carbon Canyon. Through this Valve Enhancement Project, SoCalGas successfully automated one mainline valve to achieve the objective of enabling rapid system isolation of a portion of Line 2001 West in the City of Chino Hills. The total loaded cost of the Project is $488,673.

SoCalGas executed this project prudently through designing and executing the Project to support the Valve Enhancement Plan isolation objectives and installing equipment necessary to bring power and communication capabilities to this valve to enable rapid system isolation to a portion of Line 2001 West.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by utilizing existing SoCalGas property as a laydown yard and by limiting the number of mobilizations to maximize efficiencies and reduce customer and community impacts.

End of Brea Valve Enhancement Project – Carbon Canyon Final Report

I. BREA VALVE ENHANCEMENT PROJECT – GALE AND AZUSA

A. Background and Summary

The Brea Valve Enhancement Project – Gale and Azusa consists of valve enhancements made to an existing mainline valve (MLV) located in the City of Industry in Los Angeles County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 2001 West in the event of a pipeline rupture. SoCalGas installed new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $454,231.

The Brea Valve Enhancement Project – Gale and Azusa construction site is located within an existing SoCalGas facility in a high-density industrial area adjacent to a railroad in the City of Industry. SoCalGas bundled this valve project with six additional valve projects, Brea Valve Enhancement Projects – Atwood Station, Brea Canyon, Burton and Placentia, Chino Hill and Carbon Canyon, Lincoln and Batavia, and Toledo and Beach, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Brea Valve Enhancement Project – Gale and Azusa. This project was designed and executed as one cohesive project. However, the project costs were shared by PSEP and the Operating District with the Operating District funding the costs associated with the linebreak cabinet that houses the lineguard equipment.

Table 1: General Project Information

Brea Valve Enhancement Project – Gale and Azusa			
Location	City of Industry		
Days on Site	16 days		
Construction Start	03/19/2018		
Construction Finish	04/23/2018		
Commissioning Date	04/16/2019		
Valve Upgrades			
Valve Number	2001-204.68-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	No		
Site Upgrades			
Vault	None		
Power	New – Solar		
Communication	New – Radio		
SCADA Panel	None		
Equipment Shelter	None		
Fencing	Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	454,231	-	454,231
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Brea Bundle Overview

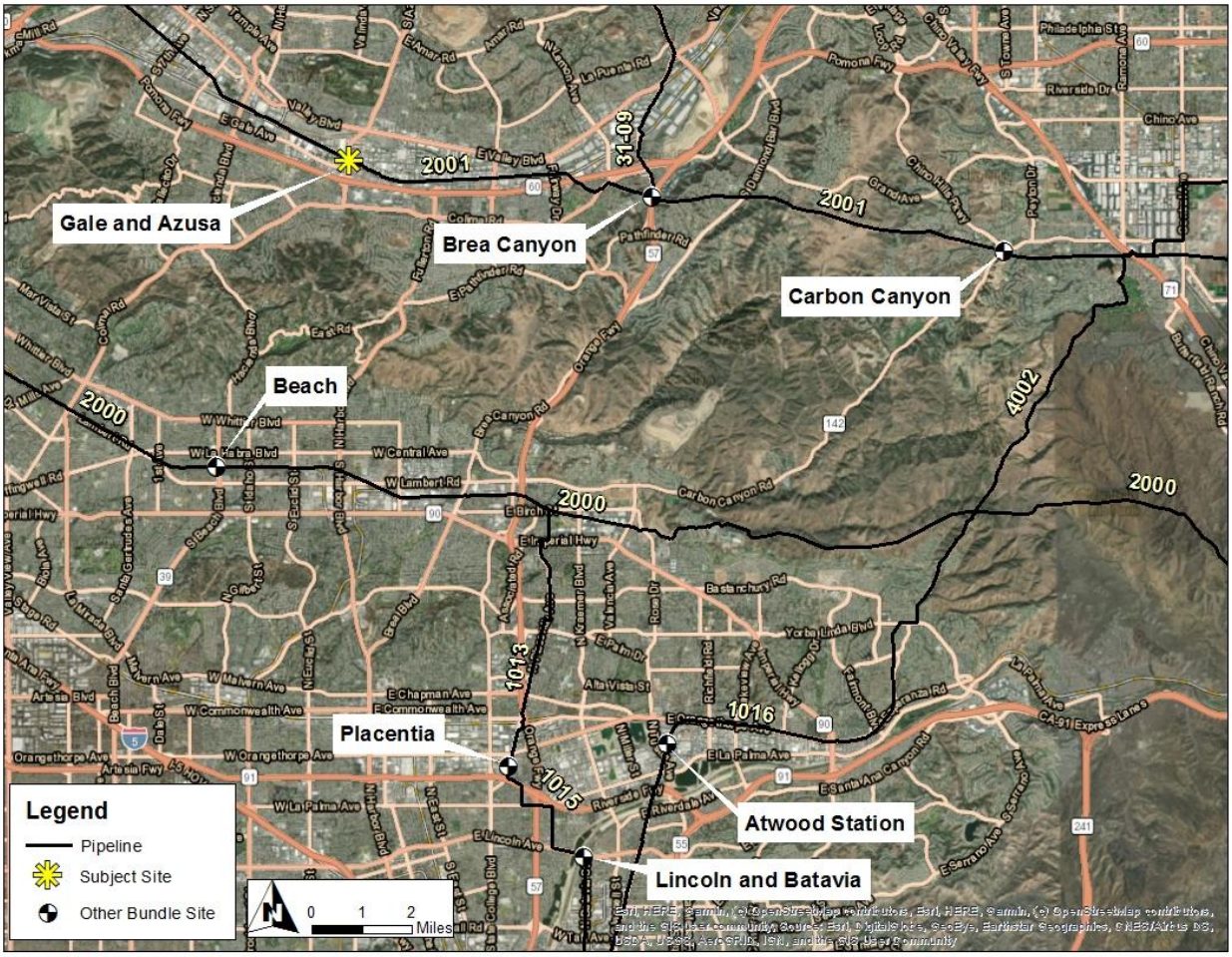


Figure 2: Satellite Image of Brea Valve Enhancement Project – Gale and Azusa

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Brea Valve Enhancement Project – Gale and Azusa in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified MLV 2001-204.68 for automation to enable remote isolation to a portion of Lines 2001. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and confirmed that this valve enhancement will provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 2001-204.68-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point would achieve the transmission isolation objectives set forth in the Valve Enhancement Plan.
3. Engineering, Design, and Constructability: SoCalGas determined that the automated valves upstream and downstream of MLV 2001-204.68 fulfilled PSEP valve spacing requirements and that MLV 2001-204.68-0 did not require remote control functionality and that the installation of radio communication achieves the Valve Enhancement Plan Objectives.
4. Final Project Scope: The final project scope consists of the automation of one MLV, the installation of new power equipment, the installation of new communications equipment, and the installation of the necessary automation equipment.

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2001	204.68	0	[redacted]	COMM	ASV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Gale and Azusa site by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

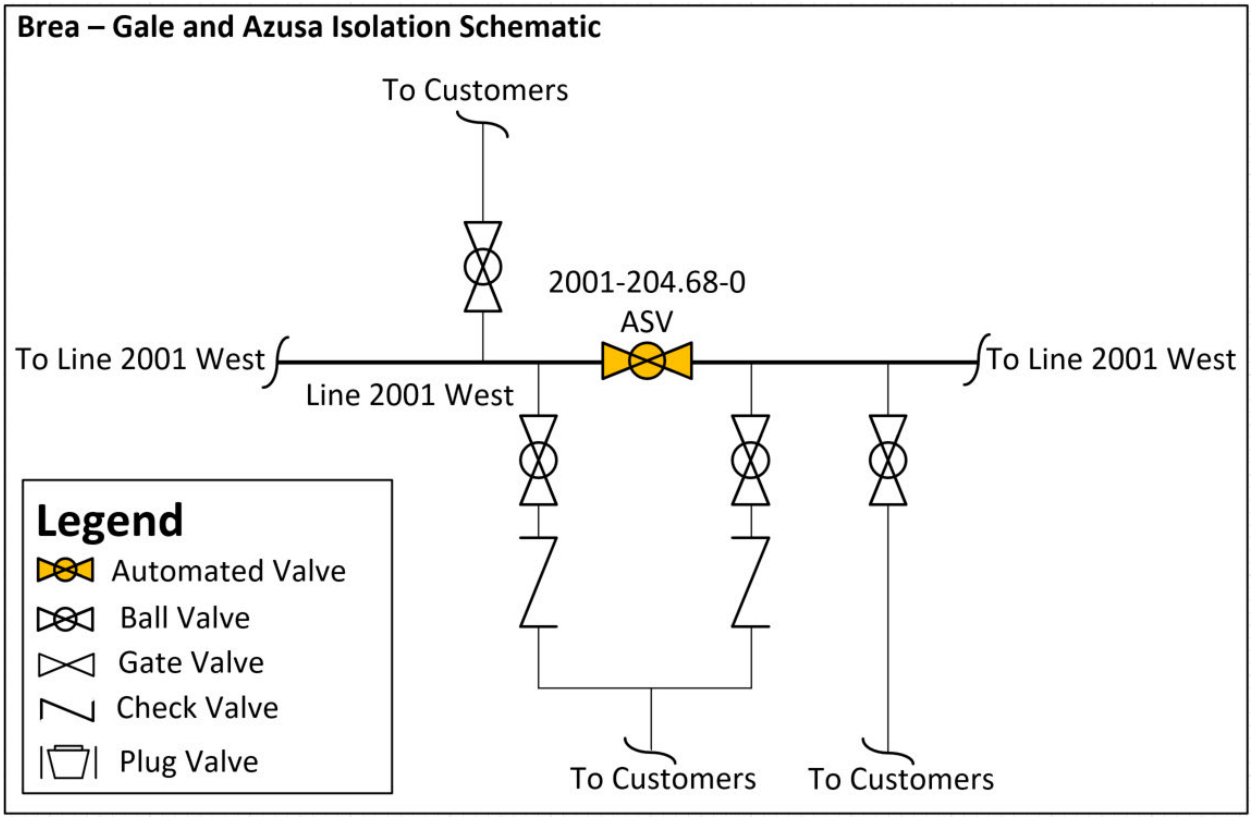
1. Site Description: The site is an existing SoCalGas facility in an industrial area. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: There was no preexisting power source. The Project Team installed new power equipment.
5. Communication Technology: There was preexisting communications equipment. The Project Team installed new communications equipment.

C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station could accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 300 ball valve, which was reused by the Project Team.
3. Actuator Details: The existing actuator was a double-acting pneumatic actuator that the Project Team reused.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team notified the nearby landowner that the construction team would need to pass through their property in order to access the project site on SoCalGas' existing easement.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team performed all work within the existing SoCalGas easement.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Brea Valve Enhancement Project – Gale and Azusa Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Alliance Partner (Electrical Contractor) to prepare a cost estimate based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Alliance Partner prepared and submitted their estimate.

1. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].
2. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	03/19/2018
Construction Completion Date	04/23/2018
Days on Site	16 days
Commissioning Date	04/16/2019

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Linebreak Panel and Antenna Foundation Forms in Foreground, Trench for Underground in Background

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service. During this stage, SoCalGas successfully performed site acceptance testing, and conducted point-to-point verification with Gas Control personnel for the newly automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on April 16, 2019, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Bundling of Projects: SoCalGas grouped this site with six additional sites, Brea Valve Enhancement Projects – Atwood Station, Brea Canyon, Burton and Placentia, Chino Hill and Carbon Canyon, Lincoln and Batavia, and Toledo and Beach, into a single valve bundle to gain efficiencies in engineering, planning, and construction activities to minimize costs for the benefit of customers.
2. Land Use: The Project Team utilized existing SoCalGas easements for construction and avoided the need to acquire additional land or easements.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $523,723. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $454,231.

Table 4: Estimated and Actual Direct Costs and Variances[2, 3]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	123,317	62,260	(61,057)
Materials	15,735	13,388	(2,347)
Mechanical Construction Contractor	-	-	-
Electrical Contractor	96,016	65,452	(30,564)
Construction Management & Support	17,229	29,651	12,422
Environmental	57,120	25,500	(31,620)
Engineering & Design	107,988	101,793	(6,195)
Project Management & Services	43,673	3,705	(39,968)
ROW & Permits	5,632	5,128	(504)
GMA	57,013	39,332	(17,681)
Total Direct Costs	**523,723**	**346,209**	**(177,514)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4, 5]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	163,708	81,339	(82,369)
AFUDC	31,371	23,209	(8,163)
Property Taxes	7,747	3,474	(4,273)
Total Indirect Costs	**202,826**	**108,021**	**(94,805)**
Total Direct Costs	**523,725**	**346,209**	**(177,514)**
Total Loaded Costs	**726,549**	**454,231**	**(272,318)**

[2] Values may not add to total due to rounding.
[3] Values in table excludes non-PSEP work.
[4] Values may not add to total due to rounding.
[5] Values in table excludes non-PSEP work.

The Actual Full-Time Equivalents[6] (FTEs) for this Project are 0.32.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Brea Valve Enhancement Project – Gale and Azusa, Actual Direct Costs were less than the preliminary estimate by $177,514. This variance is attributable to a variety of factors including: Increased construction contractor productivity allowed for construction to be completed in 16 days instead of the originally estimated 20 days, resulting in lower construction costs; the project team encountered less hazardous material during construction than expected, resulting in lower costs for abatement and removal.

[6] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Brea Valve Enhancement Project – Gale and Azusa. Through this Valve Enhancement Project, SoCalGas successfully automated one MLV to achieve the objective of enabling rapid system isolation of a portion of Line 2001 West in the City of Industry. The total loaded cost of the Project is $454,231.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling seven projects together to capture efficiencies through coordinated engineering, and installing equipment necessary to bring power and communication capabilities to this valve to enable rapid system isolation of a portion of Line 2001 West in Los Angeles County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market-based rates for contractor services and materials, and by using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Brea Valve Enhancement Project – Gale and Azusa Final Report

I. BREA VALVE ENHANCEMENT PROJECT – BREA CANYON

A. Background and Summary

The Brea Valve Enhancement Project – Brea Canyon consists of valve enhancements made to an existing mainline valve (MLV) and two existing bridle valves located in Diamond Bar in Los Angeles County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Lines 2001 and 31-09 in the event of a pipeline rupture. SoCalGas installed new communication equipment and the necessary automation equipment at the site. The total loaded project cost is $1,361,190. This project was designed and executed as one cohesive project; however, the project costs were shared by PSEP and the Operating District, with PSEP funding the activities that provided system isolation through automation of the new mainline valve, and the Operating District funding separately the activities to install the new linebreak cabinet.

The Brea Valve Enhancement – Brea Canyon construction site is within an existing SoCalGas facility in Diamond Bar near the intersection of Brea Canyon Road and Sapphire Lane in an open field. There are several residential developments nearby. SoCalGas bundled this valve project with six additional valve projects, Brea Valve Enhancement Projects – Atwood Station, Via Burton and Placentia, Chino Hills and Carbon Canyon, Gale and Azusa, Lincoln and Batavia, and Toledo and Beach, to gain efficiencies in engineering, planning, and construction activities.

Table 1: General Project Information

Brea Valve Enhancement Project – Brea Canyon Site			
Location	Diamond Bar		
Days on Site	44 days		
Construction Start	10/23/2017		
Construction Finish	01/09/2018		
Commissioning Date	08/02/2018		
Valve Upgrades			
Valve Number	2001-199.40-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	2001-199.40-1		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	No		
RCV	Yes		
Valve Number	2001-199.40-2		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	No		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	Existing – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing	Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,361,190	-	1,361,190
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Brea Valve Enhancement Project – Brea Canyon Site

Figure 2: Satellite Image of Brea Valve Enhancement Project – Brea Canyon Site

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Brea Valve Enhancement Project – Brea Canyon in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified MLV 2001-199.40-0 for automation to enable remote isolation to a portion of Lines 2001. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and identified two additional valves for automation to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 2001-199.40-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. SoCalGas determined it was also necessary to automate bridle valves 2001-199.40-1 and 2001-199.40-2. Together, the automation of these valves enables rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: SoCalGas determined that the existing technology facilitated the enabling of ASV capabilities to the MLV. The Project Team identified the need to automate the two bridle valves to prevent backflow from Line 31-09. The Operating District determined that the installation of a new linebreak cabinet would increase functionality and requested that the Project Team include the installation of a new linebreak cabinet in the project scope. The Operating District funded the installation of the new linebreak cabinet.

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. # SCG-32).

4. Final Project Scope: The final project scope consists of the automation of one MLV and two bridle valves, the installation two new actuators, the installation of new communications equipment, and the installation of the necessary automation equipment at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2001	199.40	0	[redacted]	COMMS	ASV/RCV
2001	199.41	1	[redacted]	A/AG	RCV
2001	199.42	2	[redacted]	A/AG	RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Brea Valve Enhancement Project – Brea Canyon by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site is an existing SoCalGas facility near a residential development. There is an existing chain link fence enclosing the site.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing facility can accommodate the new equipment.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: The site has existing utility power.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

C. Engineering, Design, and Planning Factors

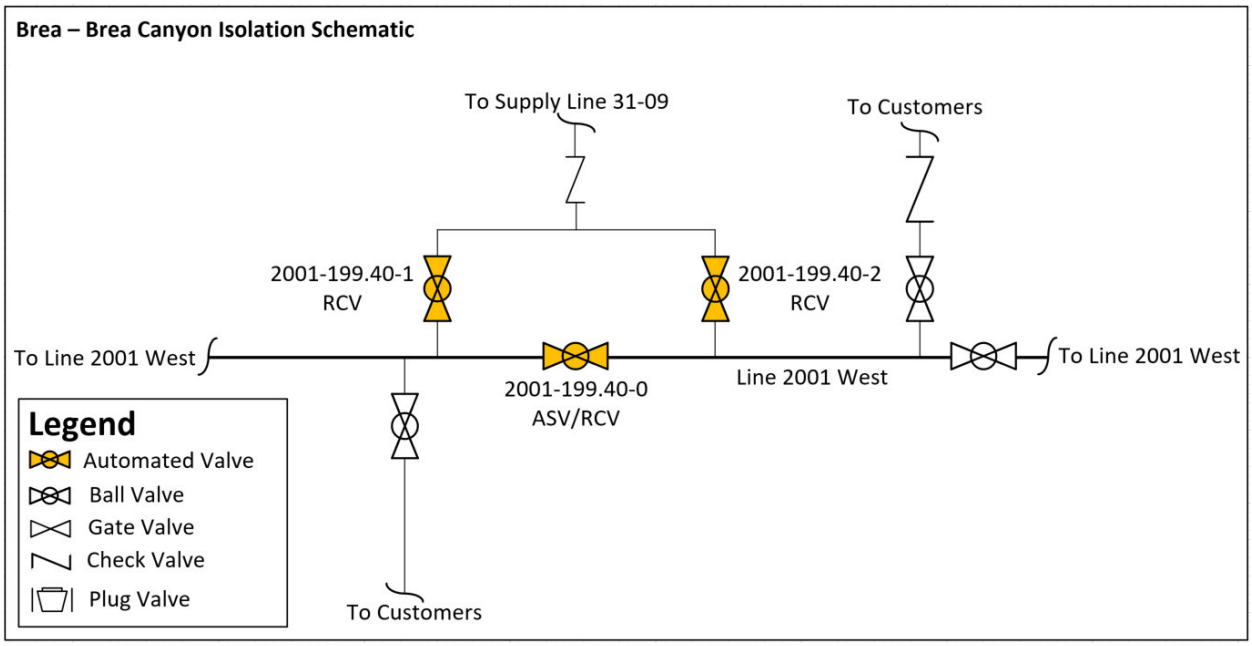
SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the station could accommodate the new equipment.
2. Valve Details:
   a. 2001-199.40-0: The existing valve was a manually actuated Class 300 ball valve, which was reused by the Project Team.
   b. 2001-199.40-1: The existing valve was a manually operated Class 300 ball valve, which was reused by the Project Team.
   c. 2001-199.40-2: The existing valve was a manually operated Class 300 ball valve, which was reused by the Project Team.
3. Actuator Details:
   a. 2001-199.40-0: The existing actuator was a double-acting pneumatic actuator, which the Project Team reused.
   b. 2001-199.40-1: There was no preexisting actuator. The Project Team installed a new actuator.
   c. 2001-199.40-2: There was no preexisting actuator. The Project Team installed a new actuator.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impact to the community from this Project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at the site.

7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: The Project Team obtained a Traffic Control permit from Diamond Bar for the duration of construction.
9. Land Use: The Project Team utilized a nearby SoCalGas facility as a laydown yard.
10. Traffic Control: The Project Team closed one lane on Brea Canyon Road for the duration of construction.

Final Report for Brea Valve Enhancement Project – Brea Canyon

Figure 3: Brea Valve Enhancement Project – Brea Canyon Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	10/23/2017
Construction Completion Date	01/09/2018
Days on Site	44 days
Commissioning Date	08/02/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Excavation for the Instrumentation, New Actuators in the Foreground, Existing Actuator in the Background

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly automated valves, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on August 2, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. SoCalGas grouped this site with six additional sites, Brea Valve Enhancement Projects – Atwood Station, Via Burton and Placentia, Chino Hills and Carbon Canyon, Gale and Azusa, Lincoln and Batavia, and Toledo and Beach, into a single valve bundle to gain efficiencies in engineering, planning, and construction activities to minimize costs for the benefit of customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,521,676. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in

accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,361,190.

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	218,489	95,358	(123,131)
Materials	82,609	64,160	(18,449)
Mechanical Construction Contractor	519,105	350,533	(168,572)
Electrical Contractor	117,077	92,195	(24,882)
Construction Management & Support	103,602	90,623	(12,979)
Environmental	75,773	59,423	(16,350)
Engineering & Design	170,730	268,934	98,204
Project Management & Services	48,349	9,785	(38,564)
ROW & Permits	9,046	3,013	(6,033)
GMA	176,896	145,235	(31,661)
Total Direct Costs	**1,521,676**	**1,179,260**	**(342,416)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[3]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	262,787	159,775	(103,012)
AFUDC	46,424	17,963	(28,461)
Property Taxes	10,424	4,191	(6,233)
Total Indirect Costs	**319,635**	**181,929**	**(137,706)**
Total Direct Costs	**1,521,676**	**1,179,260**	**(342,416)**
Total Loaded Costs	**1,841,311**	**1,361,190**	**(480,121)**

The Actual Full-Time Equivalent[4] (FTE) for this Project is 0.51.

[2] Values may not add to total due to rounding.
[3] Ibid.
[4] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Brea Valve Enhancement Project – Brea Canyon, Actual Direct Costs were less than the preliminary estimate by $342,416. This variance can be attributed to a variety of factors including: Detailed engineering, design, and planning activities led to enhancements in the Project design and addressed key engineering factors. As a result, The Target Price Estimate (TPE) developed by SoCalGas and the Construction Contractor before construction decreased the construction estimate to $381,683; the Project Team bundled this valve project with six additional valve projects, to gain efficiencies in engineering, planning, and construction activities; and the engineering firms provided Project Management & Services activities which were originally estimated under Project Management and Services, but these costs were recognized in Engineering and Design.

V. CONCLUSION

SoCalGas enhanced the safety of their natural gas system by prudently executing the Brea Valve Enhancement Project – Brea Canyon. Through this Valve Enhancement Project, SoCalGas successfully upgraded one mainline valve and two bridle valves to achieve the objective of enabling rapid system isolation of a portion of Lines 2001 and 31-09 in the City of Diamond Bar within an existing SoCalGas facility. The total loaded cost of the Project is $1,361,190.

SoCalGas executed this project prudently through designing and executing the Project to support Valve Enhancement Plan isolation objectives, bundling seven projects together to capture efficiencies through coordinated engineering, and installing equipment necessary to bring communication capabilities to these valves to enable rapid system isolation to portions of Lines 2001 and 31-09.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market-based rates for contractor services and materials, and by using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Brea Valve Enhancement Project – Brea Canyon Final Report

I. BURBANK VALVE ENHANCEMENT PROJECT – RIVERSIDE AND AGNES

A. Background and Summary

The Burbank Valve Enhancement Project – Riverside and Agnes consists of valve enhancements made to an existing valve located in the City of Los Angeles within Los Angeles County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 1129 and Line 3000 in the event of a pipeline rupture. SoCalGas installed new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $940,602.

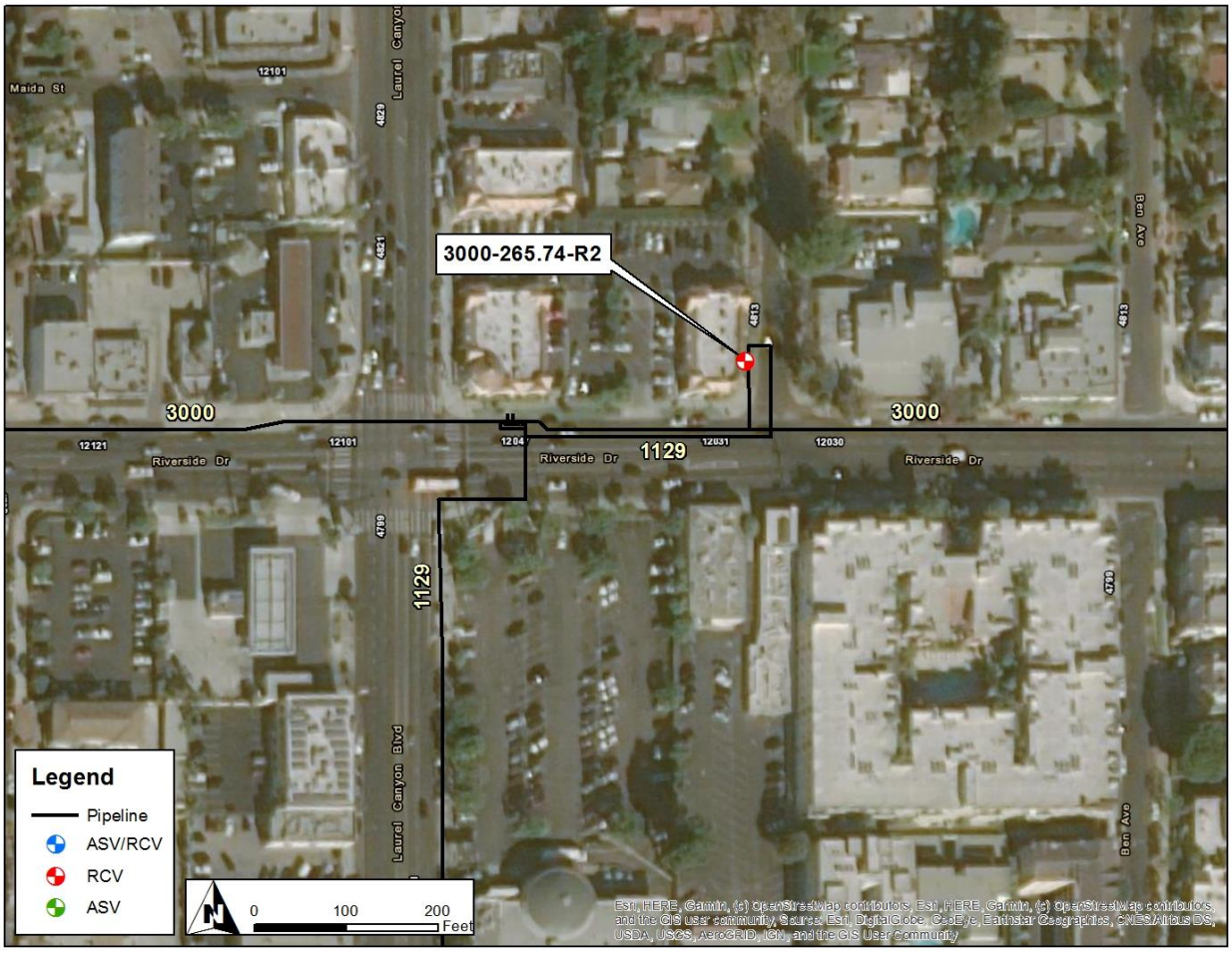
The Burbank Valve Enhancement Project – Riverside and Agnes construction site is located on Agnes Avenue in an area that is a mix of commercial and residential development. The valve is in an existing vault. SoCalGas bundled this valve project with two additional projects, Burbank Valve Enhancement Projects – Valleyheart and Noble, and Verdugo and Reese to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Burbank Valve Enhancement Project – Riverside and Agnes.

Table 1: General Project Information

Burbank Valve Enhancement Project – Riverside and Agnes			
Location	City of Los Angeles		
Days on Site	28 days		
Construction Start	10/01/2018		
Construction Finish	11/19/2019		
Commissioning Date	12/03/2020		
Valve Upgrades			
Valve Number	3000-265.74-R2		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Below-Grade		
ASV	No		
RCV	Yes		
Riverside and Agnes Site Upgrades			
Vault	Existing		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	940,602	-	940,602
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Burbank Valve Enhancement Project – Riverside and Agnes



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified valve 3000-265.70-0 for automation to enable remote isolation to portions of Line 3000. SoCalGas reviewed available information, performed a detailed system flow analysis, and determined that valve 3000-265.70-0 were better candidate for enhancement to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified valve 3000-265.70-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual scope and determined that this isolation point would not achieve the isolation objectives set forth in the Valve Enhancement Plan. SoCalGas reevaluated the isolation point and determined that the automation of valve 3000-265.74-R2 would better achieve the objectives set forth in the Valve Enhancement Plan.
3. Engineering, Design, and Constructability: The Project Team did not make any notable changes in scope to the engineering and design of this project.
4. Final Project Scope: The final project scope consists of the automation of one valve which included the installation of new power equipment, new communications equipment, and the necessary automation equipment at the site.

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
3000 West	265.74	R2	[redacted]	C/P	RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Burbank Valve Enhancement Project – Riverside and Agnes by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

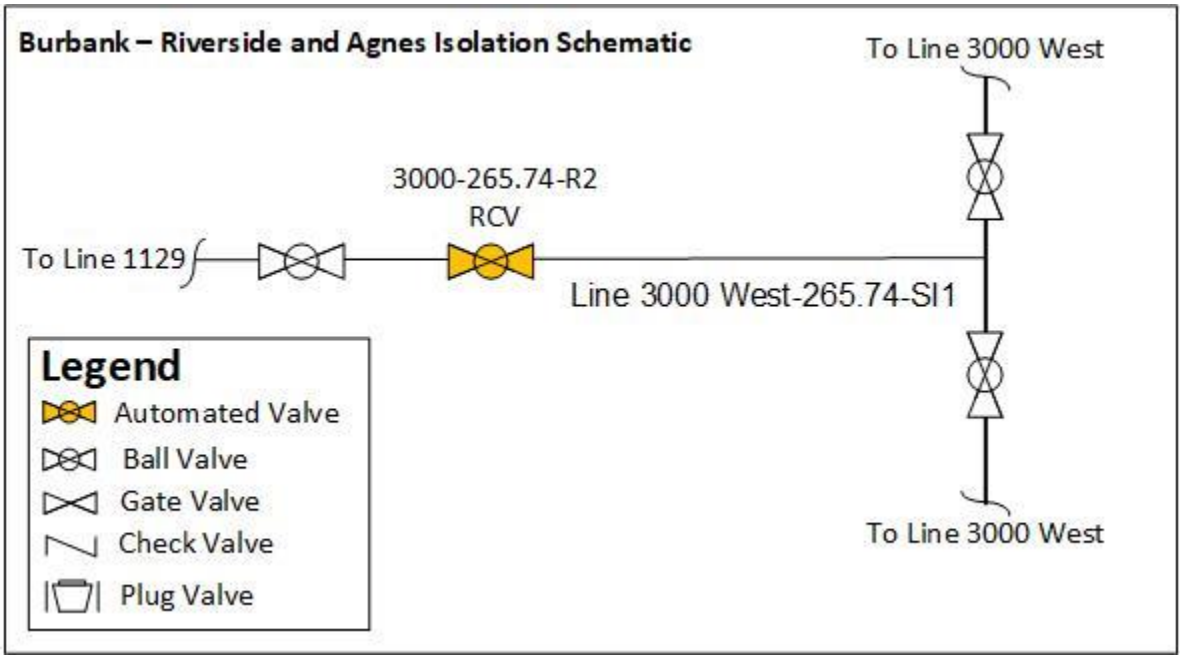
1. Site Description: The Project site is located on Agnes Avenue in an area that is a mix of commercial and residential development. The valve is in an existing vault.
2. Land Issues: The Project Team noted that construction would impact traffic on Agnes Avenue.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: There was no preexisting power source. The Project Team installed new power equipment at the site.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the preexisting technology and the measurements of the existing vault. The Project Team determined that the existing vault was in good working condition.
2. Valve Details: The existing valve was a manually actuated Class 300 full port control valve, which was reused by the Project Team.
3. Actuator Details: The existing actuator was a rotary piston double acting actuator, which was reused by the Project Team.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team restricted public access to the sidewalk during construction.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: The Project Team acquired encroachment and traffic control permits from the City of Los Angeles.
9. Land Use: The Project Team utilized land on the sidewalk and public Right-of-Way (ROW) for a laydown yard.
10. Traffic Control: The Project Team closed the southbound lane of Agnes Avenue and restricted parking on both sides of Agnes Avenue during construction.

Figure 2: Burbank Valve Enhancement Project Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Alliance Partner (Electrical Contractor) to prepare a cost estimate based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Alliance Partner prepared and submitted their estimate.

1. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].
2. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	10/01/2018
Construction Completion Date	10/22/2019
Days on Site	28 days
Commissioning Date	12/03/2020

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility and communications connections, and system and/or resource availability.

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $73,000 in change orders.

Expanded Scope: The Electrical Construction Contractor performed additional activities not identified in their scope of work:

a. The Electrical Construction Contractor performed traffic control duties.
b. The Electrical Construction Contractor performed all excavation and trenching for the new foundations and conduit.
c. The Electrical Construction Contractor installed the foundations for the new panels and radio pole.

Figure 3: New Linebreak Cabinet and SCADA Cabinet

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on December 3, 2020, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the site conditions in the project plan and design. SoCalGas bundled this valve project with two additional projects, Burbank Valve Enhancement Projects – Valleyheart and Noble, and Verdugo and Reese, to gain efficiencies in engineering, planning, and construction activities.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $939,550. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $940,602 .

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	264,643	136,414	(128,229)
Materials	32,263	25,409	(6,854)
Mechanical Construction Contractor	-	-	-
Electrical Contractor	148,659	206,110	57,451
Construction Management & Support	46,518	50,713	4,195
Environmental	30,710	16,791	(13,919)
Engineering & Design	205,843	191,005	(14,838)
Project Management & Services	68,094	13,327	(54,767)
ROW & Permits	17,707	19,235	1,528
GMA	125,113	59,926	(65,187)
Total Direct Costs	**939,550**	**718,931**	**(220,619)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[3]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	396,515	175,461	(221,054)
AFUDC	101,179	39,973	(61,206)
Property Taxes	23,903	6,238	(17,665)
Total Indirect Costs	**521,597**	**221,672**	**(299,925)**
Total Direct Costs	**939,550**	**718,931**	**(220,619)**
Total Loaded Costs	**1,461,147**	**940,602**	**(520,545)**

The Actual Full-Time Equivalent[4] (FTE) for this Project is 0.54.

[2] Values may not add to total due to rounding.
[3] Ibid.
[4] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Burbank Valve Enhancement Project, Actual Direct Costs were less than the preliminary estimate by $220,619. This variance can be attributed to a variety of factors including: SoCalGas bundled this valve project with two additional projects to gain efficiencies in engineering, planning, and construction activities; the engineering firms provided Project Management & Services activities which were originally estimated under Project Management and Services, but costs were recognized in Engineering and Design; and minimal abatement was required as pipe was not installed or replaced.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Burbank Valve Enhancement Project – Riverside and Agnes. Through this Valve Enhancement Project, SoCalGas successfully automated one valve to achieve the objective of enabling rapid system isolation to a portion of Line 1129 and Line 3000 in the City of Los Angeles. The total loaded cost of the Project is $940,602.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling three geographically proximate projects together to capture efficiencies through coordinated engineering, and installing equipment necessary to bring power and communication capabilities to the site to enable rapid system isolation of a portion of Line 3000 and Line 1129 located in Los Angeles County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts.

End of Burbank Valve Enhancement Project – Riverside and Agnes Final Report

I. CARPINTERIA VALVE ENHANCEMENT PROJECT – OXY AND RINCON

A. Background and Summary

The Carpinteria Valve Enhancement Project – Oxy and Rincon consists of valve enhancements made to an existing mainline valve (MLV) located in an unincorporated area within Ventura County. Through this project, SoCalGas enhanced the safety of its integrated natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 1004 in the event of a pipeline rupture. SoCalGas installed new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,236,900.

The Carpinteria Valve Enhancement Project, Oxy and Rincon site is located in a rural area. The existing MLV and actuator are below grade in an existing vault. There is an existing SoCalGas facility approximately 50 feet to the northeast of the MLV. SoCalGas bundled this valve project with an additional valve project, Carpinteria Valve Enhancement Project – Conoco to gain efficiencies in engineering, planning, and construction activities. This workpaper speaks to the Oxy and Rincon site.

Table 1: General Project Information

Carpinteria Valve Enhancement Project – Oxy and Rincon			
Location	Unincorporated Ventura County		
Days on Site	45 days		
Construction Start	04/16/2018		
Construction Finish	10/09/2018		
Commissioning Date	04/16/2019		
Valve Upgrades			
Valve Number	1004-25.76-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Below-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	Existing		
Power	New – Solar		
Communication	New – VSAT		
SCADA Panel	New		
Equipment Shelter	Existing		
Fencing	Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,236,900	-	1,236,900
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Carpinteria Bundle Overview

Figure 2: Satellite Image of Carpinteria Valve Enhancement Project – Oxy and Rincon

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Carpinteria Valve Enhancement Project – Oxy and Rincon in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified MLV 1004-25.76-0 for automation to enable remote isolation to a portion of Line 1004. Prior to initiating execution of the Project, SoCalGas reviewed available information and performed a detailed system flow analysis to validate the scope of the Project and confirmed that this valve enhancement will provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 1004-25.76-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point would enable rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The Project Team designed the project so that the nearby existing SoCalGas facility could house the necessary automation equipment.
4. Final Project Scope: The final project scope consists of the automation of one MLV, the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
1004	25.76	0	[redacted]	C/P	ASV/RCV

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Carpinteria Valve Enhancement Project by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: The site is located in an existing fenced-in station in a rural area on private property in an unincorporated area within Ventura County.
2. Land Issues: During the pre-design site walk, the Project Team noted that additional land outside of the existing easement would be necessary during construction. The Project Team obtained a Temporary Right of Entry from the neighboring landowner at no cost.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected this MLV for automation to isolate known geological threats upstream and downstream of this valve.
4. Power Source: There was no preexisting power equipment at the site. The Project Team installed new power equipment.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

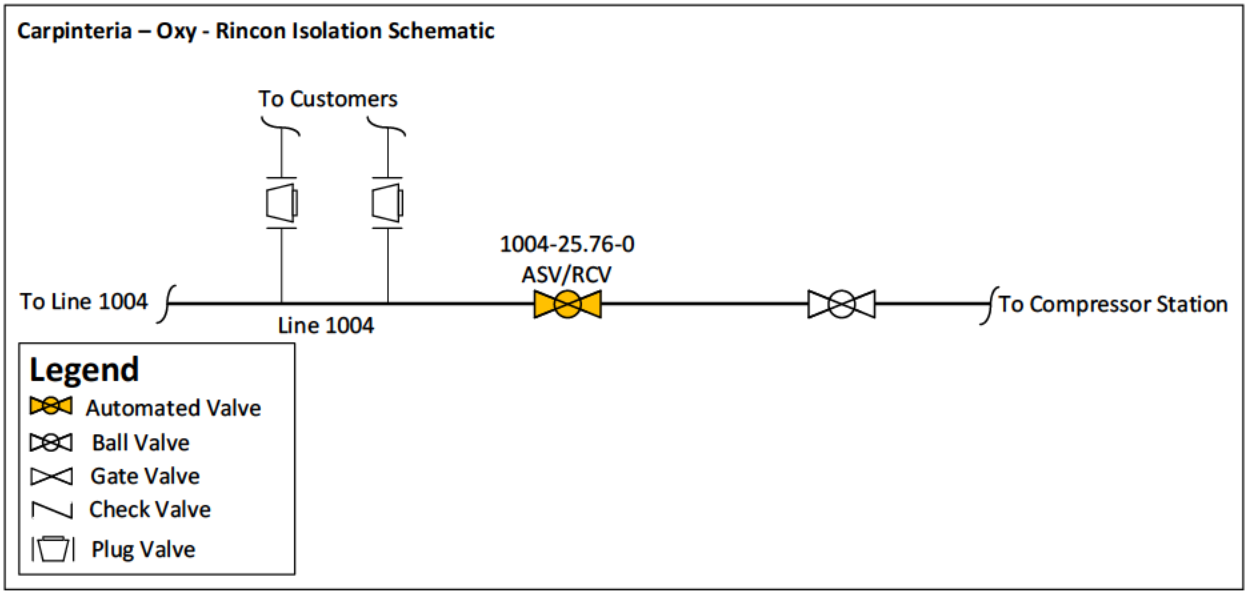
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology, took measurements of the existing vault and verified that the facility could accommodate the new equipment.

2. Valve Details: The existing valve was a manually actuated Class 600 ball valve, which was reused by the Project Team.
3. Actuator Details: The existing actuator was a double acting pneumatic actuator, which was reused by the Project Team.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team identified potential environmental concerns at the site such as coastal regulations and oil contamination. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project.
9. Land Use: The Project Team notified Coast Ranch Family Partnership that the construction team would need to use a portion of their property as a laydown yard. The Project Team purchased land from Coast Ranch Family Partnership to utilize during construction.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Carpinteria Valve Enhancement Project – Oxy and Rincon Schematic



D. Scope Changes

Through engineering, design, and planning activities, SoCalGas determined that changes in scope were appropriate to enhance the design of the Project and address engineering factors. As a result, the preliminary cost estimate does not fully reflect the final scope. The Project Team initially planned to install utility power at the project site. After the creation of the TIC, the Project Team determined that the nearby power lines are privately owned, the installation was changed to solar power.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package, which included the updated design described in the discussion of notable changes in scope above.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	04/16/2018
Construction Completion Date	10/09/2018
Days on Site	45 days
Commissioning Date	04/16/2019

The Project Team completed all construction activities as soon as practicable prior to commissioning. SoCalGas' finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Linebreak Cabinet in Existing Shelter

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on April 16, 2019, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. The Project Team bundled this project with the Carpinteria Valve Enhancement Project – Conoco, coordinating engineering and construction activities between the project sites to minimize costs for the benefit of customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,398,990. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,236,900.

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	261,289	101,930	(159,359)
Materials	77,998	79,372	1,374
Mechanical Construction Contractor	237,801	208,650	(29,152)
Electrical Contractor	110,889	96,162	(14,726)
Construction Management & Support	55,419	67,024	11,605
Environmental	98,427	58,126	(40,301)
Engineering & Design	296,789	261,007	(35,781)
Project Management & Services	75,780	11,420	(64,360)
ROW & Permits	26,888	23,581	(3,307)
GMA	157,712	120,760	(36,952)
Total Direct Costs	**1,398,990**	**1,028,032**	**(370,958)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[3]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	398,405	175,685	(222,720)
AFUDC	243,080	28,943	(214,137)
Property Taxes	58,466	4,240	(54,226)
Total Indirect Costs	**699,951**	**208,868**	**(491,083)**
Total Direct Costs	**1,398,990**	**1,028,032**	**(370,958)**
Total Loaded Costs	**2,098,941**	**1,236,900**	**(862,041)**

The Actual Full-Time Equivalent[4] (FTE) for this Project is 0.27.

[2] Values may not add to total due to rounding.
[3] Ibid.
[4] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Carpinteria Valve Enhancement Project – Oxy and Rincon, Actual Direct Costs were less than the preliminary estimate by $370,958. This variance is attributable to a variety of factors including: the Project was accelerated to meet the construction timeline and underwent several design changes leading to the assumption that more SoCalGas hours would be needed than was actually required as well as some project management services were completed by the engineering firm due to the redesign; This project was suspected to be in an environmentally sensitive area on private property, leading to concerns about potential setbacks with environmental permits due to land restrictions, however, the project team successfully mitigated these risks before the permits expired; and the engineering firm provided Project Manager and Project Engineer support during development, construction, and closeout, these costs were recognized under Engineering and Design.

V. CONCLUSION

SoCalGas enhanced the safety of its integrated natural gas system by prudently executing the Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas successfully automated one mainline valve to achieve the objective of enabling rapid system isolation in an unincorporated area within Ventura County. The total loaded cost of the Project is $1,236,900.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling two geographically proximate valve projects together to capture efficiencies through coordinated engineering, and installing equipment necessary to bring power and communication capabilities to this valve to enable rapid system isolation to a portion of Line 1004 located in an unincorporated area of Ventura County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and by using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Carpinteria Valve Enhancement Project – Oxy and Rincon Final Report

I. DEL AMO STATION VALVE ENHANCEMENT PROJECT

A. Background and Summary

The Del Amo Station Valve Enhancement Project consists of valve enhancements made to an existing mainline valve (MLV) and two existing crossover valves located in the City of Long Beach. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Lines 765,1014, and 2007 in the event of a pipeline rupture. SoCalGas installed three new actuators and the necessary automation equipment at the site. The total loaded project cost is $1,541,634.

The Del Amo Station Valve Enhancement Project construction site is within an existing SoCalGas facility in an urban area next to the Los Angeles River in the City of Long Beach.

Table 1: General Project Information

Del Amo Valve Enhancement Project			
Location	City of Long Beach		
Days on Site	42 days		
Construction Start	01/22/2018		
Construction Finish	08/22/2018		
Commissioning Date	04/02/2019		
Valve Upgrades			
Valve Number	765-26.13-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	No		
RCV	Yes		
Valve Number	765-26.13-1		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	No		
RCV	Yes		
Valve Number	765-26.13-2		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	No		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	Existing – Utility		
Communication	Existing – Utility		
SCADA Panel	New		
Equipment Shelter	Existing		
Fencing	Existing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,541,634	-	1,541,634
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Del Amo Station Valve Enhancement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Del Amo Station Valve Enhancement Project in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified MLV 765-26.13-0 for automation to enable remote isolation to a portion of Line 765. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and identified two additional valves for enhancement to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLV 765-26.13-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that this isolation point alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. SoCalGas determined it was also necessary to automate valves 765-26.13-1 and 765-26.13-2. Together, the automation of these valves enables rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The Project Team modified the cabinets utilized to house the necessary automation equipment to fit in the footprint of the existing facility.
4. Final Project Scope: The final project scope consists of the automation of three valves that included the installation of three new actuators, and the installation of the necessary automation equipment at the site.

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
765	26.13	0	[redacted]	A/AG	RCV
765	26.13	1	[redacted]	A/AG	RCV
765	26.13	2	[redacted]	A/AG	RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Del Amo Station Valve Enhancement Project by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: The site is an existing SoCalGas facility in an urban area adjacent to the Los Angeles River in the City of Long Beach.
2. Land Issues: The Project Team did not anticipate any land issues for this project.
3. DOT Class: This project site is in a Class 2 location. SoCalGas selected these valves for automation in order to satisfy the PSEP Valve Enhancement Plan spacing criteria.
4. Power Source: The site had existing utility power.
5. Communication Technology: The site had existing utility communications.

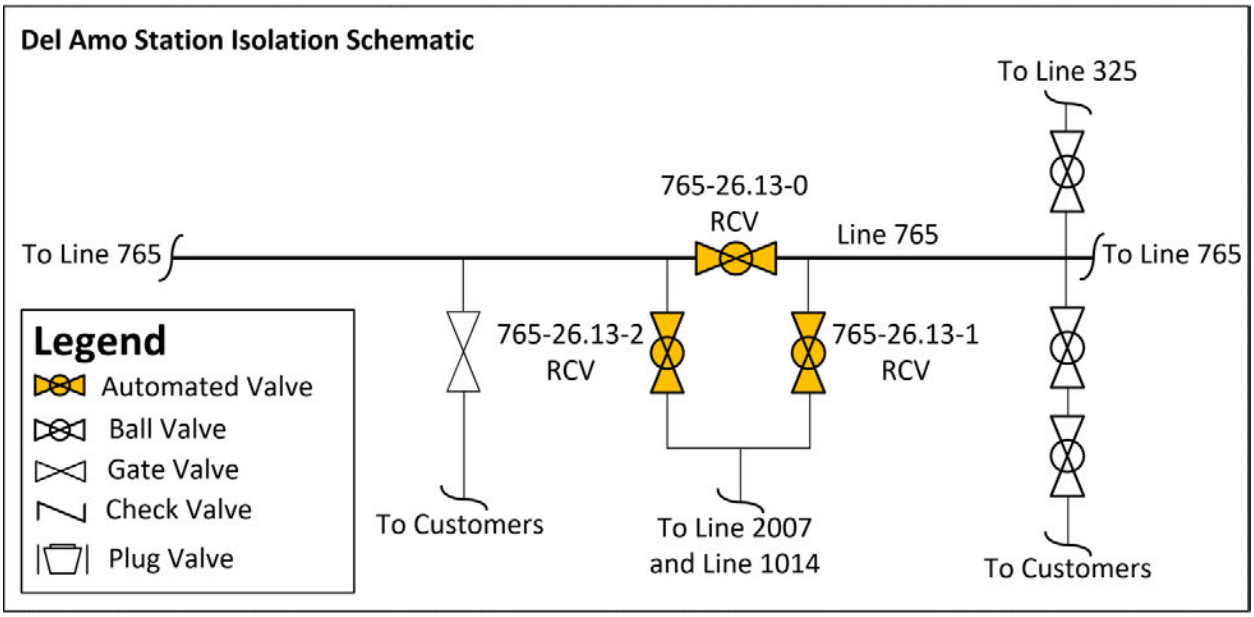
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, performed potholing of the area to identify the presence of underground utilities and substructures, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology. The Project Team determined that a modified version of the cabinets utilized to house the necessary automation equipment would allow the installation to fit in the footprint of the existing facility.
2. Valve Details:
   a. 765-26.13-0: The existing valve was a manually operated Class 300 ball valve, which was reused by the Project Team.
   b. 765-26.13-1: The existing valve was a manually operated Class 300 ball valve, which was reused by the Project Team.
   c. 765-26.13-2: The existing valve was a manually operated Class 300 ball valve, which was reused by the Project Team.
3. Actuator Details:
   a. 765-26.13-0: There was no existing actuator. The Project Team installed a new actuator.
   b. 765-26.13-1: There was no existing actuator. The Project Team installed a new actuator.
   c. 765-26.13-2: There was no existing actuator. The Project Team installed a new actuator.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers during this project.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community during the project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns from this project. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project.

9. Land Use: The Project Team did not anticipate any land issues associated with this project. The Project Team obtained a Temporary Right of Entry from the local electric utility for the laydown yard for the duration of construction.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 2: Del Amo Station Valve Enhancement Project Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	01/22/2018
Construction Completion Date	08/22/2018
Days on Site	42 days
Commissioning Date	04/02/2019

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Final Report for Del Amo Station Valve Enhancement Project

Figure 3: Excavation and New Actuator

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valves, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on April 2, 2019, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. The Project Team modified the cabinets utilized to house the necessary automation equipment to fit in the footprint of the existing facility, reducing the necessary number of cabinets from three to two, avoiding the need to expand the existing facility.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,387,673. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,541,634.

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	272,706	163,239	(109,467)
Materials	214,353	159,638	(54,716)
Mechanical Construction Contractor	290,629	317,651	27,022
Electrical Contractor	133,722	152,497	18,775
Construction Management & Support	61,008	115,876	54,868
Environmental	24,502	903	(23,600)
Engineering & Design	55,876	143,168	87,292
Project Management & Services	163,556	8,560	(154,996)
ROW & Permits	20,567	15,093	(5,474)
GMA	150,753	158,655	7,902
Total Direct Costs	**1,387,673**	**1,235,281**	**(152,392)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[3]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	385,759	240,214	(145,545)
AFUDC	217,309	56,430	(160,879)
Property Taxes	49,954	9,710	(40,244)
Total Indirect Costs	**653,022**	**306,353**	**(346,669)**
Total Direct Costs	**1,387,673**	**1,235,281**	**(152,392)**
Total Loaded Costs	**2,040,695**	**1,541,634**	**(499,061)**

The Actual Full-Time Equivalent[4] (FTE) for this Project is 0.53.

[2] Values may not add to total due to rounding.
[3] Ibid.
[4] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Del Amo Station Valve Enhancement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $152,392. This variance can be attributed to several factors including: The Project Team initially anticipated that certain engineering and design tasks would be executed by internal company resources. However, these tasks were ultimately completed by the engineering firm; the engineering firms also provided Project Management & Services activities which were originally estimated under Project Management and Services, but these costs were recognized in Engineering and Design; the project initially categorized miscellaneous electrical materials under 'Materials' in the estimate, however, these items were included within the scope of the Electrical Contractor; and the project assumed three valves would require asbestos abatement related costs, which during construction was deemed not required.

V. CONCLUSION

SoCalGas enhanced the safety of their integrated natural gas system by prudently executing the Del Amo Station Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas successfully automated one MLV and two bridle valves to achieve the objective of enabling rapid system isolation to a portion of Lines 765, 1014, and 2007 in the City of Long Beach. The total loaded cost of the Project is $1,541,634.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives by enabling rapid system isolation to a portion of Lines 765, 1014, and 2007 in the City of Long Beach.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Del Amo Station Valve Enhancement Project Final Report

I. FONTANA 4000-4002 VALVE ENHANCEMENT PROJECT – BENSON AND CHINO

A. Background and Summary

The Fontana 4000-4002 Valve Enhancement Project – Benson and Chino consists of valve enhancements made to a new mainline valve (MLV) located in the City of Chino in San Bernardino County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 4000 in the event of a pipeline rupture. SoCalGas installed a new actuator, a new vault to house the actuator, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,565,970.

The Line 4000-4002 Fontana Valve Enhancement Project – Benson and Chino construction site is located on Benson Avenue in the City of Chino in a high-density area that is a mix of commercial and industrial buildings. SoCalGas bundled this valve project with two additional valve projects, Line 4002 Fontana Valve Enhancement Projects – Benson and 7th and Etiwanda and 4th, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Line 4000-4002 Fontana Valve Enhancement Project – Benson and Chino. This project was designed and executed as one project. This Project's costs were shared by PSEP and the Operating District with the Operating District funding the costs of the new MLV and blowdown assembly as well as the removal a preexisting MLV, a preexisting vault, and preexisting equipment at a separate location, and with PSEP funding the activities that provided system isolation through the automation of the new MLV.

Table 1: General Project Information

Fontana 4000-4002 Valve Enhancement Project			
Location	City of Chino		
Days on Site	78 days		
Construction Start	09/05/2017		
Construction Finish	04/24/2018		
Commissioning Date	05/16/2018		
Valve Upgrades			
Valve Number	4000-98.09-0		
Valve Type	New[1] – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Below-Grade		
ASV	Yes		
RCV	Yes		
Benson and Chino Site Upgrades			
Vault	New		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,565,970	-	1,565,970
Disallowed Costs		-	

[1] The Operating District funded the installation of the new valve, and the installation of the new blowdown assembly.

B. Maps and Images

Figure 1: Satellite Image of Fontana 4000-4002 Valve Enhancement Project Overview

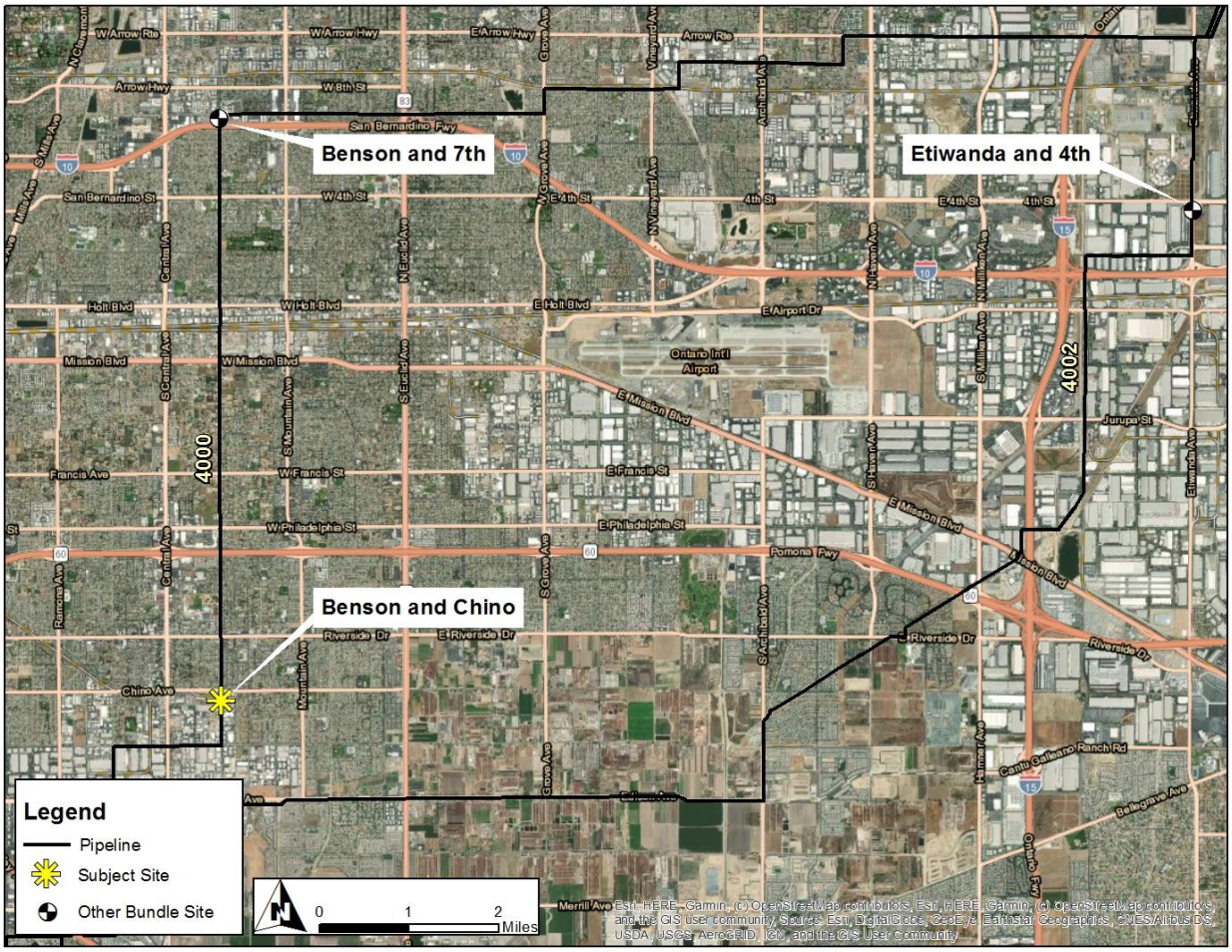


Figure 2: Satellite Image of Fontana 4000-4002 Valve Enhancement Project – Benson and Chino

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan in the 2011 filing.[2] The conceptual scope did not include this project. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis, and identified this valve as a candidate for enhancement to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas and SDG&E did not identify this valve for automation to achieve the objective of rapid system isolation.
2. Updated Scope: SoCalGas determined that the automation of MLV 4000-97.44-0 would enable rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability:
   a. MLV 4000-97.44-0 consists of a valve and a blowdown assembly and is located near a high school, in a residential area, near the intersection of Benson Avenue and Tronkeel Avenue. The Operating District scheduled the removal of MLV 4000-97.44-0 and the blowdown assembly due to their proximity to the high school, and the installation of a new valve and blowdown assembly near the intersection of Benson Avenue and Chino Avenue, this valve is now known as MLV 4000-98.09-0. Operating District funded the costs of the new MLV and blowdown assembly, as well as the removal of the preexisting MLV, the preexisting vault, and the preexisting automation equipment near the intersection of Benson Avenue and Tronkeel Avenue.

[2] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

b. The Project Team determined that the automation of the new MLV 4000-98.09-0 would achieve the objectives set forth in the Valve Enhancement Plan. PSEP funded the activities that provided system isolation through the automation of the new MLV.

4. Final Project Scope: The final project scope consists of the automation of one new MLV, which included the installation of a new actuator, the installation of a new vault to house the actuator, the installation of new power equipment, the installation of new communications equipment, and the installation of the necessary automation equipment at the site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
4000	98.09	0	[redacted]	NV/VT	ASV/ RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Fontana 4000-4002 Valve Enhancement Project – Benson and Chino by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site is located on Benson Avenue in the City of Chino in a high-density area that is a mix of commercial and industrial buildings.
2. Land Issues: During the pre-design site walk the Project Team noted that the vault installation would impact the adjacent sidewalk.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: There was no existing power source. The Project Team installed new power equipment at the site.

5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

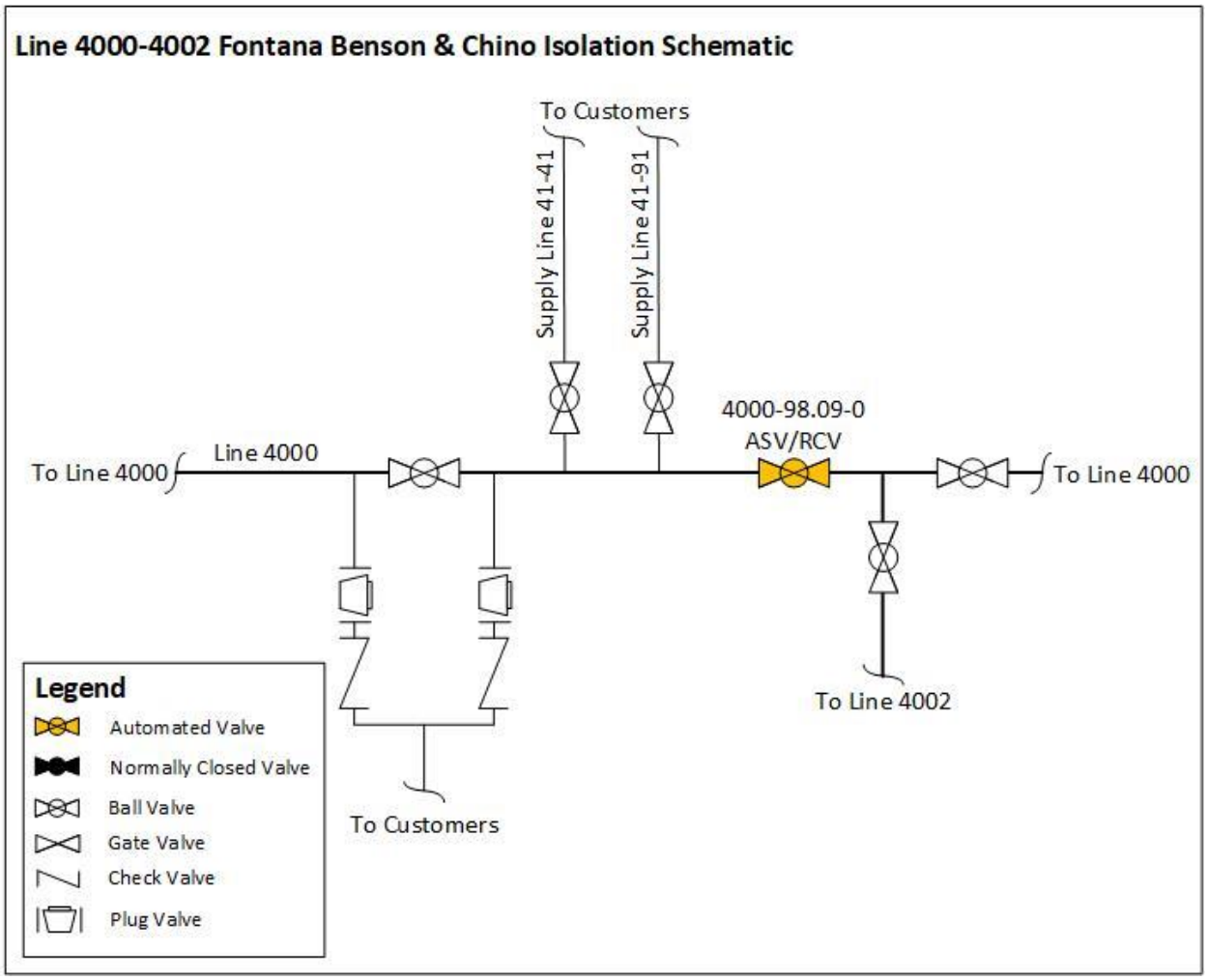
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, performed potholing of the area to identify the presence of underground utilities and substructures, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: The Project Team initially identified MLV 4000-97.44-0 for automation, but due to the proximity to a nearby high school the MLV was relocated near the intersection of Benson and Chino in an industrial area. The Project Team determined that the removal of MLV 4000-97.44-0 and the installation of MLV 4000-98.09-0 would require a shut-in but would not disrupt service to customers.
2. Valve Details: There was no preexisting valve. The Project Team installed a new valve.
3. Actuator Details: There was no preexisting actuator. The Project Team installed a new actuator.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers, service was maintained via alternate feeds during the tie-in.
5. Community Impact: The Project Team restricted public access to the sidewalk during construction.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at the site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: The Project Team obtained traffic control and utility permits from the City of Chino.

9. Land Use: The Project Team utilized the existing Chino Station as the laydown yard for this project.
10. Traffic Control: The Project Team obtained Traffic Control Permits from the City of Chino. The Project Team installed K-Rails and closed one lane of Benson Avenue in each direction for the duration of construction.

Figure 3: Fontana 4000-4002 Valve Enhancement Project Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates. The estimated values below include PSEP and non-PSEP work.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	09/05/2017
Construction Completion Date	04/24/2018
Days on Site	78 days
Commissioning Date	05/16/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $159,000 in change orders.

1. Field Design Change: The Project Team requested that the Mechanical Construction Contractor pour the new vault in place. This was not included in the Scope of Work.
2. Nitrogen Test: The Project Team requested the Mechanical Construction Contractor test additional instrument piping.
3. Traffic: The City of Chino requested an additional message board for traffic control. This was not included in the traffic control plan approved prior to construction.

Figure 4: New Mainline Valve Installation at Benson and Chino

Figure 5: Overhead View of Actuator in Vault

Figure 6: New SCADA Panel

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valve, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on May 16, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Bundling of Projects: The Project Team bundled this valve project with two additional valve projects, Line 4002 Fontana Valve Enhancement Projects – Benson and 7th, and Etiwanda and 4th, to gain efficiencies in engineering, planning, and construction activities.
2. Land Use: The Project Team utilized the existing Chino Station as the laydown yard for this project.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,511,212. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,565,970.

Table 4: Estimated and Actual Direct Costs and Variances[3, 4]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	110,043	80,430	(29,613)
Materials	242,304	102,249	(140,055)
Mechanical Construction Contractor	605,637	685,837	80,200
Electrical Contractor	157,703	22,237	(135,466)
Construction Management & Support	69,124	115,779	46,655
Environmental	14,314	8,054	(6,260)
Engineering & Design	92,988	209,672	116,684
Project Management & Services	82,496	18,432	(64,064)
ROW & Permits	24,084	14,322	(9,762)
GMA	112,519	147,801	35,282
Total Direct Costs	**1,511,212**	**1,404,813**	**(106,399)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[5, 6]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	402,264	119,784	(282,480)
AFUDC	135,266	27,327	(107,939)
Property Taxes	12,824	14,046	1,222
Total Indirect Costs	**550,354**	**161,157**	**(389,197)**
Total Direct Costs	**1,511,212**	**1,404,813**	**(106,399)**
Total Loaded Costs	**2,061,566**	**1,565,970**	**(495,596)**

The Actual Full-Time Equivalents[7] (FTEs) for this Project are 0.76.

[3] Values may not add to total due to rounding.
[4] Values in table represent PSEP costs only.
[5] Values may not add to total due to rounding.
[6] Values in table represent PSEP costs only.
[7] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Fontana 4000-4002 Valve Enhancement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $106,399. This variance can be attributed to several factors including: the initial project estimate was developed as a single project, but after further review the Project Team was able to bundle this valve project with two others which provided cost efficiencies in engineering, planning, and construction activity costs; the engineering firms that provided Project Management & Services activities which were originally estimated under Project Management and Services, but these costs were recognized in Engineering and Design.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Fontana 4000-4002 Valve Enhancement Project – Benson & Chino. Through this Valve Enhancement Project, SoCalGas successfully upgraded one MLV to achieve the objective of enabling rapid system isolation to a portion of Line 4000 in the City of Chino. The total loaded cost of the Project is $1,565,970.

SoCalGas executed this project prudently through designing and executing the Project to support Valve Enhancement Plan isolation objectives, bundling three geographically proximate projects together to capture efficiencies through coordinated engineering and construction planning, and installing equipment necessary to bring power and communication capabilities to the site to enable rapid system isolation of a portion of Line 4000 in the City of Chino.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts.

End of Fontana 4000-4002 Valve Enhancement Project – Benson and Chino Final Report

I. GLENDALE VALVE ENHANCEMENT PROJECT - GENEVA AND MONTEREY

A. Background and Summary

The Glendale Valve Enhancement Project – Geneva and Monterey, consists of the installation of a new check valve located within City of Glendale in Los Angeles County. Through this project, SoCalGas enhanced the safety of its integrated gas transmission system by enabling backflow prevention between Line 3000 and Supply Line 32-05 in the event of a pipeline rupture. SoCalGas installed one new check valve at the project site. The total loaded project cost is $539,145.

The Glendale Valve Enhancement Project – Geneva and Monterey construction site is located in an urban area at the intersection of Geneva Street and Monterey Road next to the Verdugo Wash in the City of Glendale. SoCalGas bundled this valve project with three additional valve projects, Glendale Valve Enhancement Projects – Adams Street, Avenue 59, and Glenoaks, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Glendale Valve Enhancement Project – Geneva and Monterey.

Glendale Valve Enhancement Project - Geneva and Monterey

Table 1: General Project Information

Glendale Valve Enhancement Project – Geneva and Monterey			
Location	City of Glendale		
Days on Site	10 days		
Construction Start	02/05/2018		
Construction Finish	02/16/2018		
NOP Date	02/16/2018		
Valve Upgrades			
Valve Number	N/A[1]		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	N/A		
ASV	N/A		
RCV	N/A		
Site Upgrades			
Vault	None		
Power	None		
Communication	None		
SCADA Panel	None		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	539,145	-	539,145
Disallowed Costs	-	-	-

[1] Check valves are not numbered

B. Maps and Images

Figure 1: Glendale Valve Enhancement Project Overview

Glendale Valve Enhancement Project - Geneva and Monterey

Figure 2: Satellite Image of Glendale Geneva and Monterey Valve Enhancement Project

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[2] This conceptual scope did not identify this project. SoCalGas reviewed available information, performed a detailed system flow analysis, and identified this check valve as a candidate for installation to achieve the Valve Enhancement Plan objectives. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas did not identify this valve for installation to achieve the objective of rapid system isolation.
2. Updated Scope: SoCalGas determined that it was necessary to install a check valve on Supply Line 44-755 to eliminate gas flow from Supply Line 32-05 into Line 3000 during a rapid isolation event, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The Project Team did not make any notable changes in scope to the engineering and design of this project.
4. Final Project Scope: The final project scope consists of the installation of one check valve at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
3000	275.54	N/A	[redacted]	NV	BFP2

[2] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Glendale Geneva and Monterey Valve Enhancement Project by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: The site is located in an urban area at the intersection of Geneva Street and Monterey Road next to the Verdugo Wash in the City of Glendale.
2. Land Issues: During the pre-design site walk, the Project Team noted that one lane of Monterey Road needed to be closed during a portion of construction. The Project Team utilized the parking lot of a nearby hotel as a laydown yard.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: The scope of work for this project site did not require any power equipment.
5. Communication Technology: The scope of work for this project site did not require any communications equipment.

C. Engineering, Design, and Planning Factors

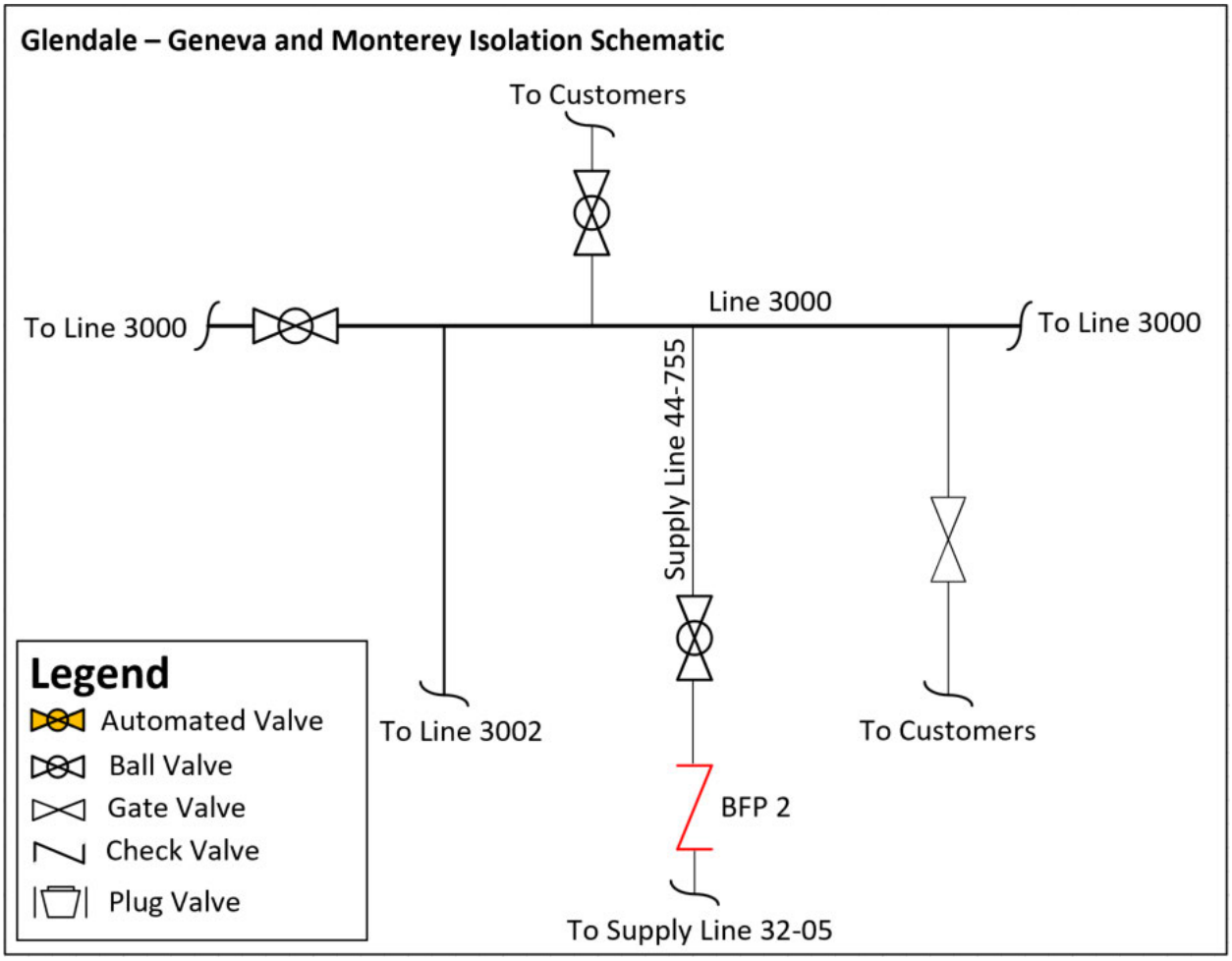
SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: The Project Team noted that this work required a shut-in of Supply Line 32-05 which feeds the local Power Plant. The Project Team scheduled the shut-in to align with the Power Plant's planned maintenance to avoid the need for CNG, LNG, or a temporary bypass.
2. Valve Details: There was no preexisting check valve.
3. Actuator Details: The scope of work for this project did not require an actuator.

4. Customer Impact: The installation of the check valve required a shut-in of Supply Line 32-05. This line services several core customers and a Power Plant. The Project Team scheduled the shut-in to align with the Power Plant's planned maintenance to avoid the need for CNG, LNG, or a temporary bypass. The Project Team determined that with the Power Plant offline, the pressure in the pipeline section downstream of the shut-in would remain high enough to maintain service to other customers.
5. Community Impact: The Project Team closed the westbound lane of Monterey Road during construction and restricted parking on both sides of Monterey Road. The Project Team did not identify any other notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site. The Project Team obtained an encroachment and traffic control permit from the City of Glendale.
9. Land Use: The Project Team performed all work within the public right of way. The Project Team obtained a temporary right of entry (TRE) from a nearby hotel to utilize their parking lot as a staging area.
10. Traffic Control: The Project Team closed the westbound lane of Monterey Road during construction and restricted parking on both sides of Monterey Road. The excavation did not impact Monterey Road and no plating was required.

Glendale Valve Enhancement Project - Geneva and Monterey

Figure 3: Glendale Geneva and Monterey Valve Enhancement Project Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	02/05/2018
Construction Completion Date	02/16/2018
Days on Site	10 days
NOP Date	02/16/2018

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Excavation and Fire Control Fittings for the Tie-In

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The valve was placed into operation on February 16, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Schedule Coordination: The Project Team scheduled the shut-in to align with the Power Plant's planned maintenance to avoid the need for CNG, LNG, or a temporary bypass.
2. Bundling of Projects: The Project Team bundled this valve project with three additional valve projects, Glendale Valve Enhancement Projects – Adams Street; Avenue 59; and Glenoaks, to gain efficiencies in engineering, planning, and construction activities.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $851,481. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $539,145 .

Table 4: Estimated and Actual Direct Costs and Variances[3]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	129,904	69,166	(60,739)
Materials	26,963	17,292	(9,671)
Mechanical Construction Contractor	273,224	139,861	(133,363)
Electrical Contractor	-	-	-
Construction Management & Support	30,744	17,352	(13,392)
Environmental	16,749	5,320	(11,429)
Engineering & Design	106,231	108,745	2,514
Project Management & Services	123,808	7,981	(115,827)
ROW & Permits	58,280	25,282	(32,998)
GMA	85,577	51,263	(34,314)
Total Direct Costs	**851,481**	**442,261**	**(409,220)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	205,699	92,735	(112,964)
AFUDC	45,955	3,051	(42,944)
Property Taxes	10,871	1,097	(9,774)
Total Indirect Costs	**262,565**	**96,884**	**(165,681)**
Total Direct Costs	**851,481**	**442,261**	**(409,220)**
Total Loaded Costs	**1,114,006**	**539,145**	**(574,901)**

[3] Values may not add to total due to rounding.
[4] Ibid.

The Actual Full-Time Equivalents[5] (FTEs) for this Project are 0.58.

A. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Glendale Valve Enhancement Project – Geneva and Monterey, Actual Direct Costs were less than the preliminary estimate by $409,220. This variance can be attributed to a variety of factors including: the Project Team coordinated with the impacted Electrical Generator so that the shut-in aligned with their planned maintenance outage which avoided the need to provide CNG, LNG, or a temporary bypass, decreasing project costs as this service and material was no longer required; SoCalGas bundled this project with three additional valve projects to gain efficiencies in engineering, planning, and construction activities; the project initially allocated costs associated with a valve actuator installation, however it was determined an actuator was not required for this

[5] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

project; the estimated construction duration assumed 12 days, however the project was completed within 10 days which resulted in a cost credit for field overheads.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Glendale Valve Enhancement Project – Geneva and Monterey. Through this Valve Enhancement Project, SoCalGas successfully installed one check valve to achieve the objective of enhancing the ability to eliminate gas flow from Supply Line 32-05 into Line 3000 during a rapid isolation event within the City of Glendale. The total loaded cost of the Project is $539,145.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling four geographically proximate projects together to capture efficiencies through coordinated engineering, and coordinating the shut-in with the local Power Plant, avoiding the need for CNG, LNG, or a temporary bypass, and by installing the equipment necessary to enable backflow prevention to portions of Line 3000 and Supply Line 32-05 in the City of Glendale.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Glendale Valve Enhancement Project - Geneva and Monterey Final Report

I. INDIO VALVE ENHANCEMENT PROJECT – MLVs 8, 8A, AND 8B

A. Background and Summary

The Indio Valve Enhancement Project Valve – MLVs 8, 8A, and 8B consists of valve enhancements made to three existing mainline valves (MLVs) located within Riverside County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of portions of Lines 2000, 2001, and 2051 in the event of a pipeline rupture. SoCalGas installed new power equipment, new communications equipment, new fencing, and the necessary automation equipment at the site. The total loaded project cost is $2,148,175.

The Indio Valve Enhancement Project – MLVs 8, 8A, and 8B construction sites are within existing SoCalGas facilities that are spaced approximately 3,400 feet apart, located in a desert environment. SoCalGas grouped this project with three additional projects, Indio Valve Enhancement Projects – MLVs 9, 11, 11A and 11B; MLVs 9A and 9B; and MLVs 10, 10A and 10B, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Indio Valve Enhancement Project – MLVs 8, 8A, and 8B.

Table 1: General Project Information

Indio Valve Enhancement Project – MLVs 8, 8A, and 8B			
Site	MLVs 8 and 8A	MLV 8B	
Location	Riverside County	Riverside County	
Days on Site	30 days	30 days	
Construction Start	01/25/2018	01/25/2018	
Construction Finish	06/18/2018	06/18/2018	
Commissioning Date	04/24/2019	04/24/2019	
Valve Upgrades			
Valve Number	2000-89.91-0	2051-90.55-0	
Valve Type	Existing – Ball	Existing – Ball	
Actuator	Existing	Existing	
Actuator Above-/Below-Grade	Above-Grade	Above-Grade	
ASV	Yes	Yes	
RCV	Yes	Yes	
Valve Number	2001-89.91-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None	None	
Power	New – Solar	New – Solar	
Communication	New – Radio	New – Radio	
SCADA Panel	New	New	
Equipment Shelter	None	None	
Fencing	Yes – Expanded	Yes – Expanded	
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	2,148,175	-	2,148,175
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Indio Bundle Overview

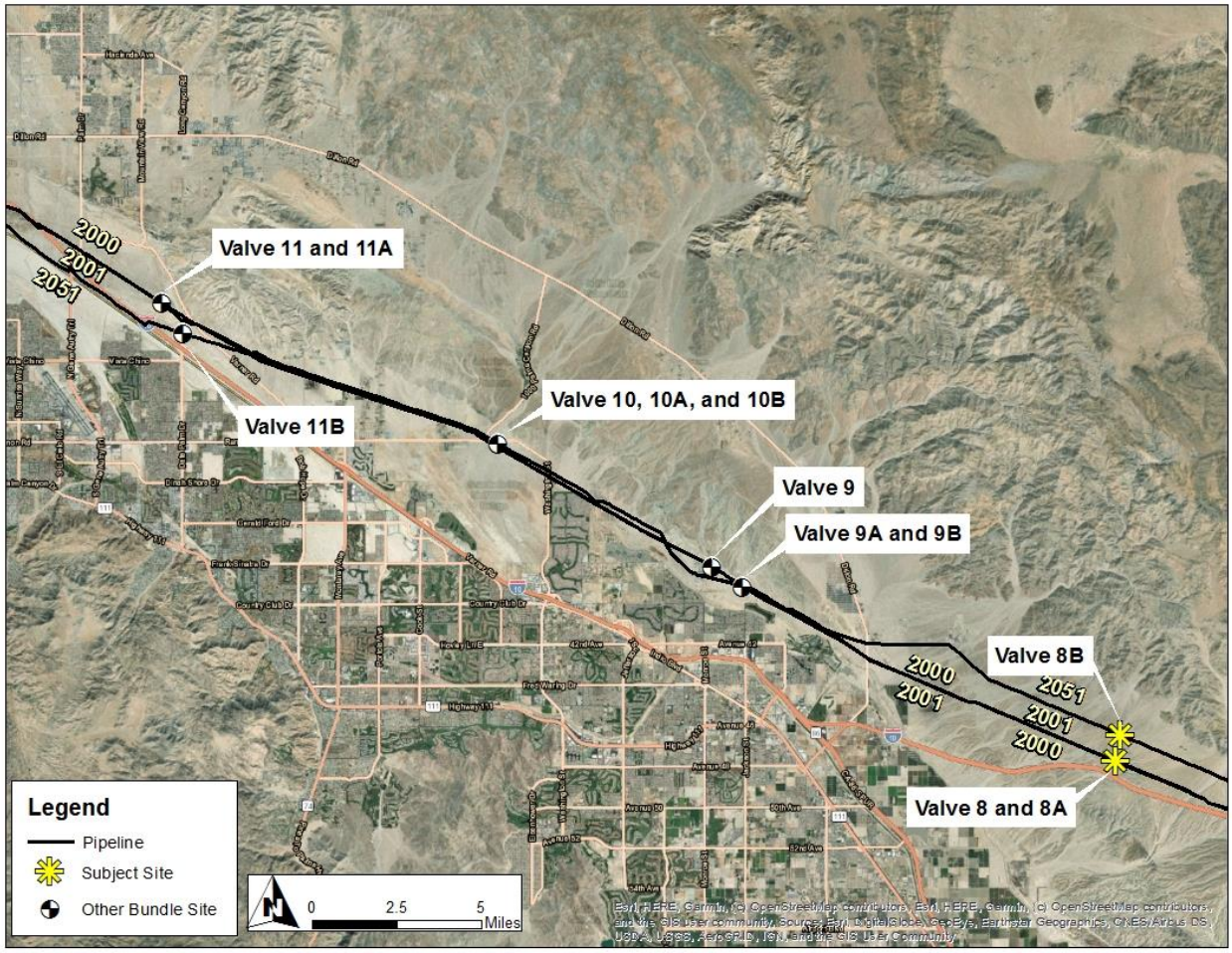


Figure 2: Satellite Image of MLVs 8 and 8A

Figure 3: Satellite Image of MLV 8B

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Indio Valve Enhancement Project – MLVs 8, 8A, and 8B in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified ten MLVs for automation to enable remote isolation to a portion of Lines 2000, 2001, and 2051. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and identified two additional valves for enhancement to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified ten MLVs for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon Project initiation, SoCalGas reviewed the conceptual project scope and determined that automation of these valves alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. SoCalGas determined it was also necessary to automate MLVs 2000-89.91-0, and 2000-100.89-0. Together, the automation of these valves enables rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: Four of the valves previously identified in this bundle did not require the acquisition of additional property rights. Due to the estimated timeframe necessary to acquire the additional property rights for the other eight valves, construction on the four valves that did not require additional property rights proceeded as scheduled, and was executed under an earlier PSEP Valve

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

Project.[2] The eight valves requiring additional property rights were descoped from the initial bundle and execution was rescheduled to align with the acquisition of the additional property rights, including the valves enhanced by the Indio Valve Enhancement Project – MLVs 8, 8A, and 8B.

4. Final Project Scope: The final project scope consists of the automation of three MLVs, that included the expansion of existing facilities, the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2000	89.91	0	[redacted]	C/P	ASV/RCV
2001	89.91	0	[redacted]	C/P	ASV/RCV
2051	90.55	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Indio Valve Enhancement Project– MLV's 8, 8A, and 8B by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

MLVs 8, 8A and 8B

1. Site Description: This site is an existing SoCalGas facility in a desert environment. There is an existing chain link fence enclosing the site.

[2] See Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) 2018 Reasonableness Review of SoCalGas and SDG&E, submitted on April 10, 2019, at WP-IV-A127 through WP-IV-A152 (A18-11-010).

2. Land Issues: During the pre-design site walk, the Project Team noted the existing station would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected these MLVs for automation to isolate a known geological threat downstream.
4. Power Source: The site had preexisting solar power. The Project Team installed new solar power equipment to accommodate the increased loads from the new automation equipment.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment.

C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

MLVs 8 and 8A

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment.
2. Valve Details:
   a. 2000-89.91-0: The existing valve was a manually actuated Class 600 ball valve, which was reused by the Project Team.
   b. 2001-89.91-0: The existing valve was a manually actuated Class 600 ball valve, which was reused by the Project Team.
3. Actuator Details:
   a. 2000-89.91-0: The existing actuator was a double-acting pneumatic actuator, which was reused by the Project Team.

b. 2001-89.91-0: The existing actuator was a double-acting pneumatic actuator, which was reused by the Project Team.

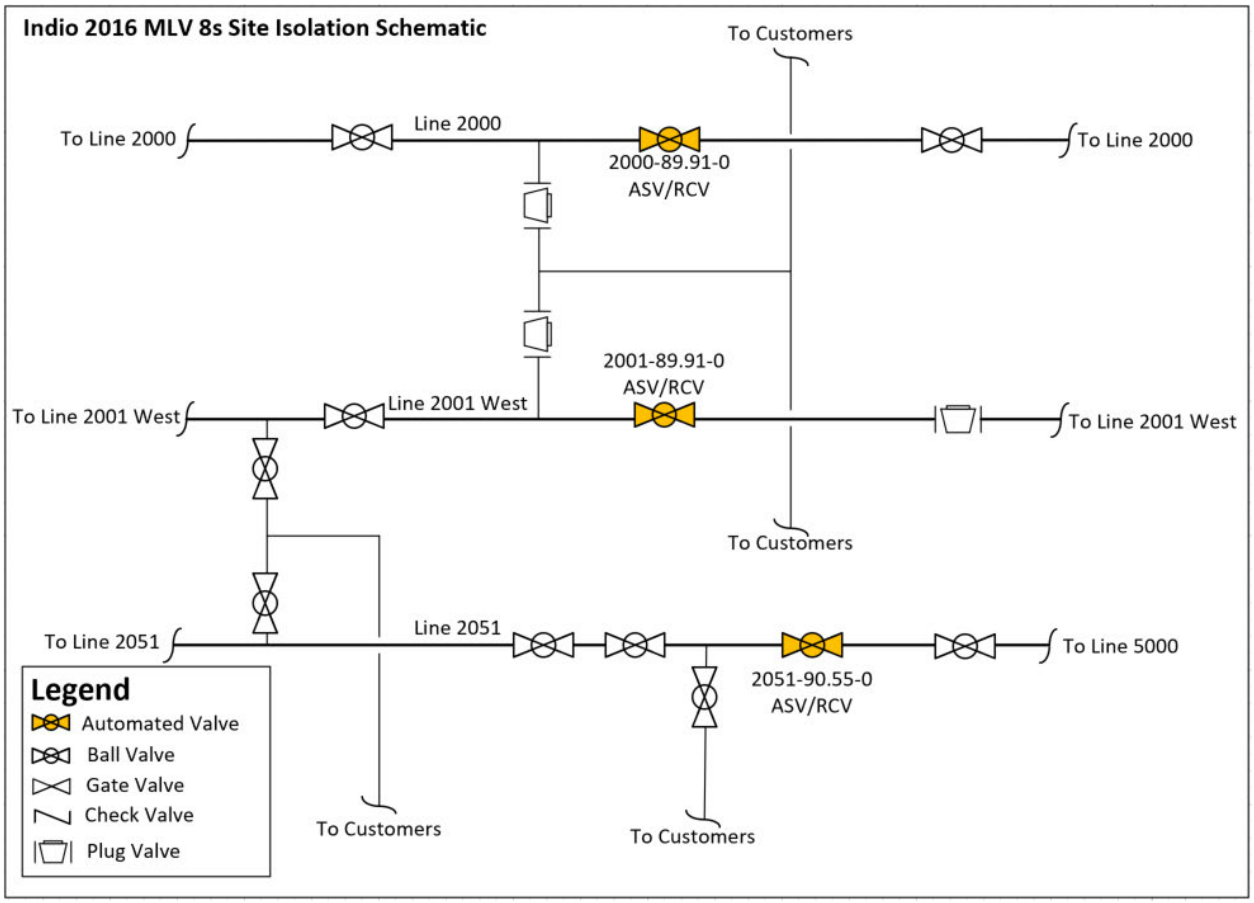
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The project is located within the California Desert Conservation Area. An environmental monitor was on-site full-time during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project.
9. Land Use: The Project Team expanded the existing facility within the existing easement to accommodate the new automation equipment. The Project Team received temporary access from the United States Bureau of Land Management for the duration of construction.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

MLV 8B

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment.
2. Valve Details: The existing valve was a manually actuated Class 400 ball valve, which the Project Team reused.
3. Actuator Details: The existing actuator was a double-acting pneumatic actuator, which the Project Team reused.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.

5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The project is located within the California Desert Conservation Area. An environmental monitor was on-site full-time during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project.
9. Land Use: The Project Team expanded the existing facility within the existing easement to accommodate the new automation equipment. The Project Team received temporary access from the United States Bureau of Land Management for the duration of construction.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 4: Indio Valve Enhancement Project – MLVs 8, 8A, and 8B Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for the electrical contractor was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	01/25/2018
Construction Completion Date	06/18/2018
Days on Site	30 days
Commissioning Date	04/24/2019

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 5: MLV 8 and 8A site: Sense Lines Routing to Linebreak Panel in Foreground, Actuator in Background

Figure 6: MLV 8B site: Sense Lines Back-Filled with Warning Mesh

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valves, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The sites were commissioned on April 24, 2019, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. SoCalGas bundled this project with three additional projects, Indio Valve Enhancement Projects – MLVs 9A and 9B; MLVs 9, 11, 11A and 11B; and MLVs 10, 10A, and 10B, coordinating engineering and construction activities between the project sites to minimize costs for the benefit of customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $3,145,975. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $2,148,175.

Table 4: Estimated and Actual Direct Costs and Variances[3]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	504,152	106,309	(397,843)
Materials	209,183	185,199	(23,984)
Mechanical Construction Contractor	718,884	469,390	(249,494)
Electrical Contractor	302,642	234,562	(68,080)
Construction Management & Support	152,095	113,801	(38,294)
Environmental	188,083	88,081	(100,002)
Engineering & Design	384,398	376,250	(8,148)
Project Management & Services	277,528	7,085	(270,443)
ROW & Permits	58,043	18,827	(39,216)
GMA	350,967	207,118	(143,849)
Total Direct Costs	**3,145,975**	**1,806,623**	**(1,339,352)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	610,611	221,960	(388,651)
AFUDC	711,100	133,333	(597,767)
Property Taxes	157,211	6,260	(150,951)
Total Indirect Costs	**1,478,922**	**341,552**	**(1,137,370)**
Total Direct Costs	**3,145,975**	**1,806,623**	**(1,339,352)**
Total Loaded Costs	**4,624,897**	**2,148,175**	**(2,476,722)**

The Actual Full-Time Equivalent[5] (FTE) for this Project is 0.68.

[3] Values may not add to total due to rounding.
[4] Ibid.
[5] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP as stated in testimony to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities may lead to variances between the initial estimate and actuals. The Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Indio Valve Enhancement Project – MLV 8, 8A, and 8B, Actual Direct Costs were less than the preliminary estimate by $1,339,352. This variance is attributable to a variety of factors including: coordination with other projects in the Indio Valve Enhancement Bundle allowed for shared efforts and reduced project planning costs; Although a third-party contractor initially managed the project deliverables, company personnel assumed the roles of project manager and project engineer midway through the project, significantly reducing costs; the construction duration across all three MLVs was projected to be 74 days, but the actual time on site was 30 days, resulting in less time needed for labor and the construction manager; the project team encountered less hazardous materials during construction than expected, resulting in lower costs for abatement and removal; and the engineering firm provided project management and engineering support during development, construction, and closeout, with these costs recognized under Engineering and Design.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Indio Valve Enhancement Project – MLV 8, 8A, and 8B. Through this Valve Enhancement Project, SoCalGas successfully automated three mainline valves to achieve the objective of enabling rapid system isolation of portions of Lines 2000, 2001, and 2051 located within Riverside County. The total loaded cost of the Project is $2,148,175.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, rebundling of projects for ease of cost and closeout trackability, and installing equipment necessary to bring power and communication capabilities to the site to enable rapid system isolation to a portion of Lines 2000, 2001, and 2051 located in Riverside County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Indio Valve Enhancement Project – MLVs 8, 8A, and 8B Final Report

I. INDIO VALVE ENHANCEMENT PROJECT – MLVS 9A AND 9B

A. Background and Summary

The Indio Valve Enhancement Project – MLVs 9A and 9B consists of valve enhancements made to two existing mainline valves (MLVs) located within City of Indio in Riverside County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of portions of Lines 2001 West and 2051 in the event of a pipeline rupture. SoCalGas installed new fencing, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,392,122.

The Indio Valve Enhancement Project – MLVs 9A and 9B construction sites are located within two existing SoCalGas facilities, 100 feet apart, in a desert environment in Riverside County. SoCalGas bundled this valve projects with three additional projects, Indio Valve Enhancement Projects – MLVs 8, 8A and 8B; MLVs 9, 11, 11A and 11B; and MLVs 10, 10A and 10B, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Indio Valve Enhancement Project – MLVs 9A and 9B.

Table 1: General Project Information

Indio Bundle MLVs 9A and 9B Valve Enhancement Project			
Location	City of Indio		
Days on Site	31 days		
Construction Start	08/28/2017		
Construction Finish	10/18/2017		
Commissioning Date	04/19/2018		
Valve Upgrades			
Valve Number	2001-100.11-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	2051-100.97-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Indio Bundle MLVs 9A and 9B Site Upgrades			
Vault	None		
Power	New – Solar		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing/Wall	New – Fencing		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,392,122	-	1,392,122
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Indio Bundle Overview

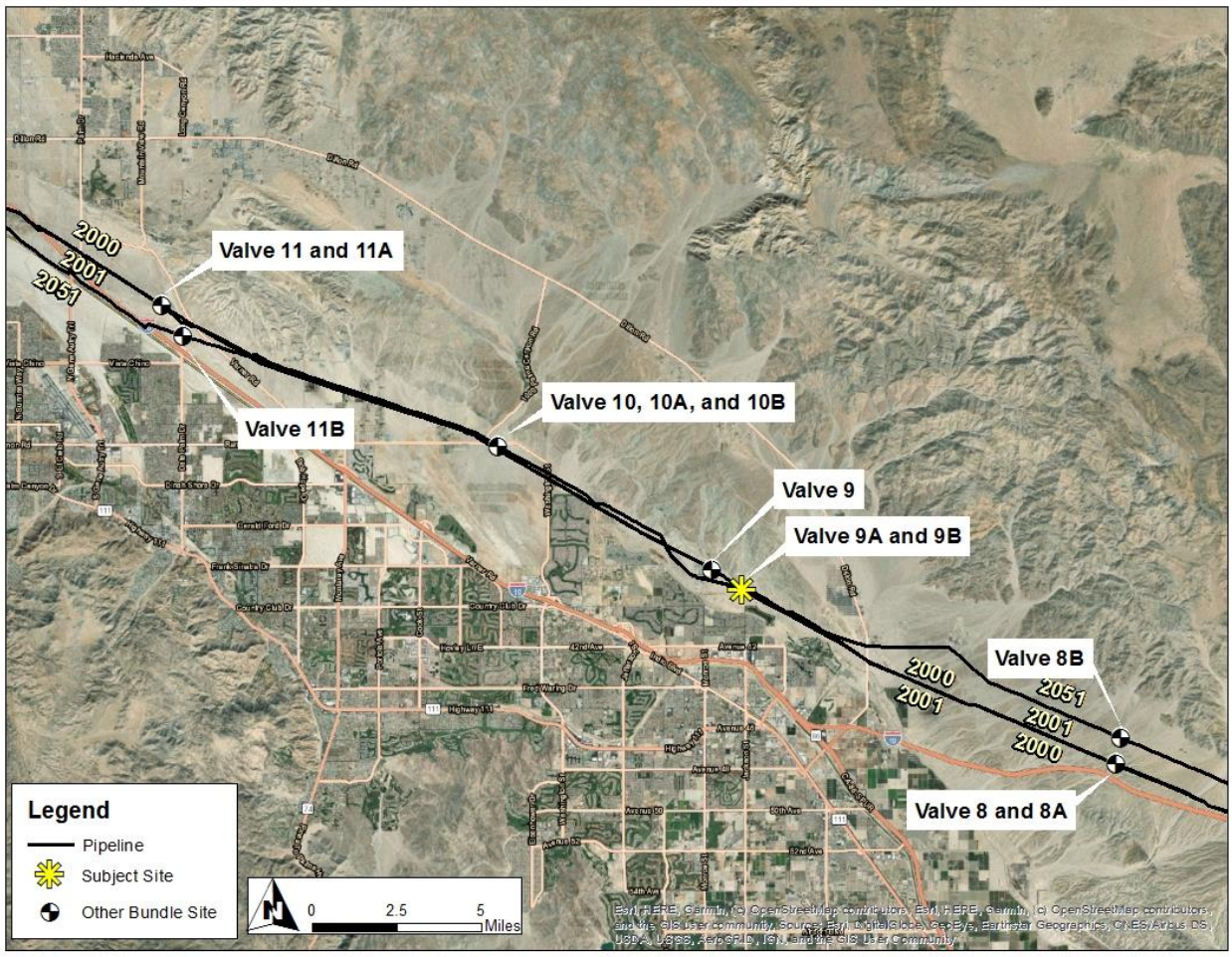
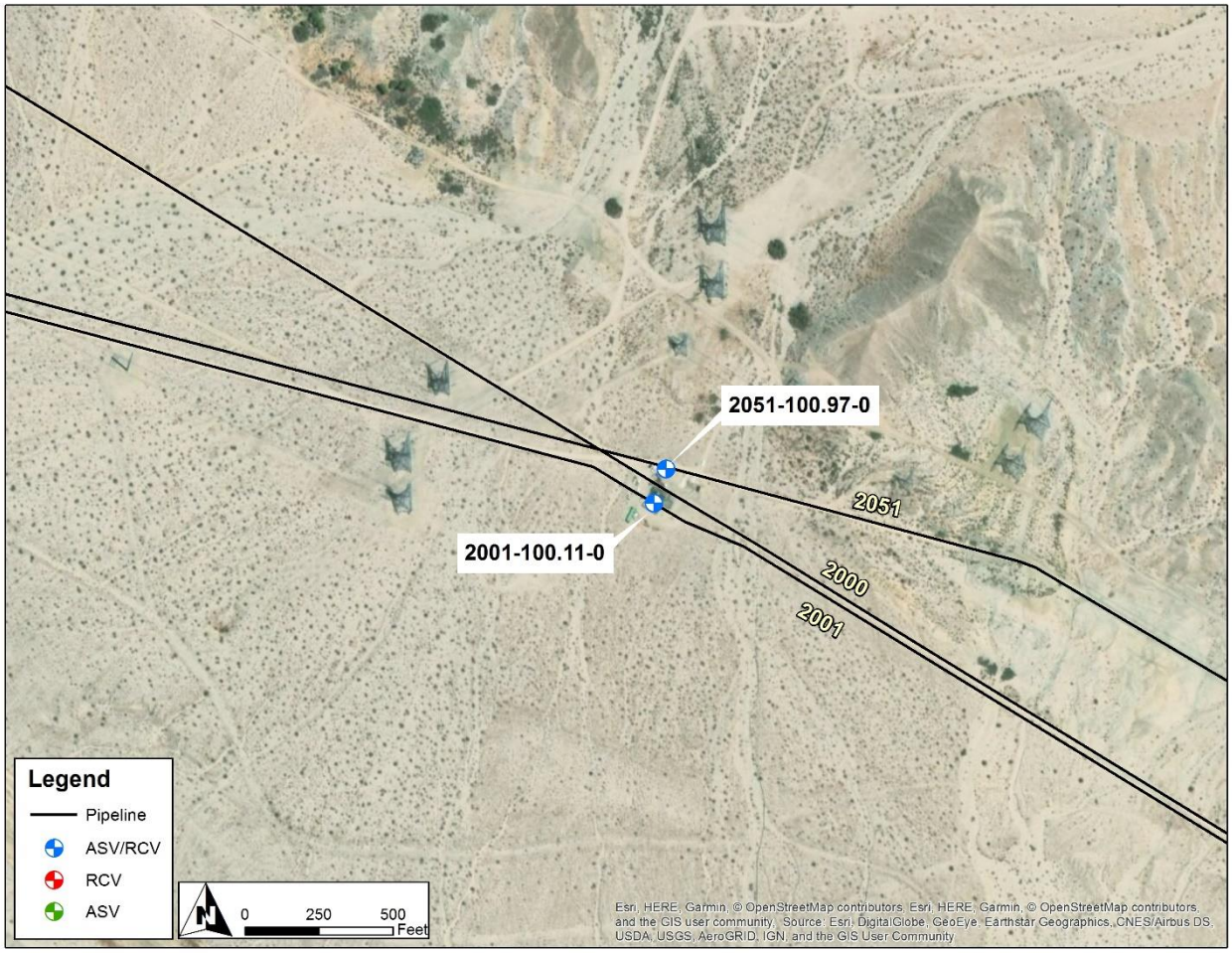


Figure 2: Satellite Image of Indio 2016 Valve Enhancement Project – MLVs 9A and 9B



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Indio Valve Enhancement Project – MLVs 9A and 9B in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified ten MLVs for automation to enable remote isolation to a portion of Lines 2001, and 2051. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and identified two additional valves for enhancement to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified ten MLVs for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon Project initiation, SoCalGas reviewed the conceptual project scope and determined that automation of these valves alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. SoCalGas determined it was also necessary to automate MLVs 2000-89.91-0, and 2000-100.89-0. Together, the automation of these valves enables rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: Four of the valves previously identified in this bundle did not require the acquisition of additional property rights. Due to the estimated timeframe necessary to acquire the additional property rights for the other eight valves, the four valves that did not require additional property rights proceeded as scheduled and were executed under an earlier PSEP Valve Project.[2] The eight

[1] See Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. # SCG-32).

[2] See Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) 2018 Reasonableness Review of SoCalGas and SDG&E, submitted on April 10, 2019, at WP-IV-A127 through WP-IV-A152 (A18-11-010).

valves requiring additional property rights were descoped from the initial bundle and execution was rescheduled to align with the acquisition of the additional property rights, including the valves enhanced by the Indio Valve Enhancement Project – MLVs 9A and 9B.

4. Final Project Scope: The final project scope consists of the automation of two valves, that included the installation of new fencing, the expansion of the existing facilities, the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the project sites.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2001	100.11	0	[redacted]	C/P	ASV/RCV
2051	100.97	0	[redacted]	C/P	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Indio Valve Enhancement Project – Valves 9A and 9B by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site is an existing SoCalGas facility in a desert environment. There is an existing chain link fence enclosing the two valve sites.
2. Land Issues: During the pre-design site walk, the Project Team noted that the existing stations would need to be expanded to accommodate the additional equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected these MLVs for automation to isolate known geological threats upstream and downstream of this valve.

4. Power Source: The site had preexisting solar power. The Project Team installed new solar power equipment to accommodate the increased loads from the new automation equipment.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

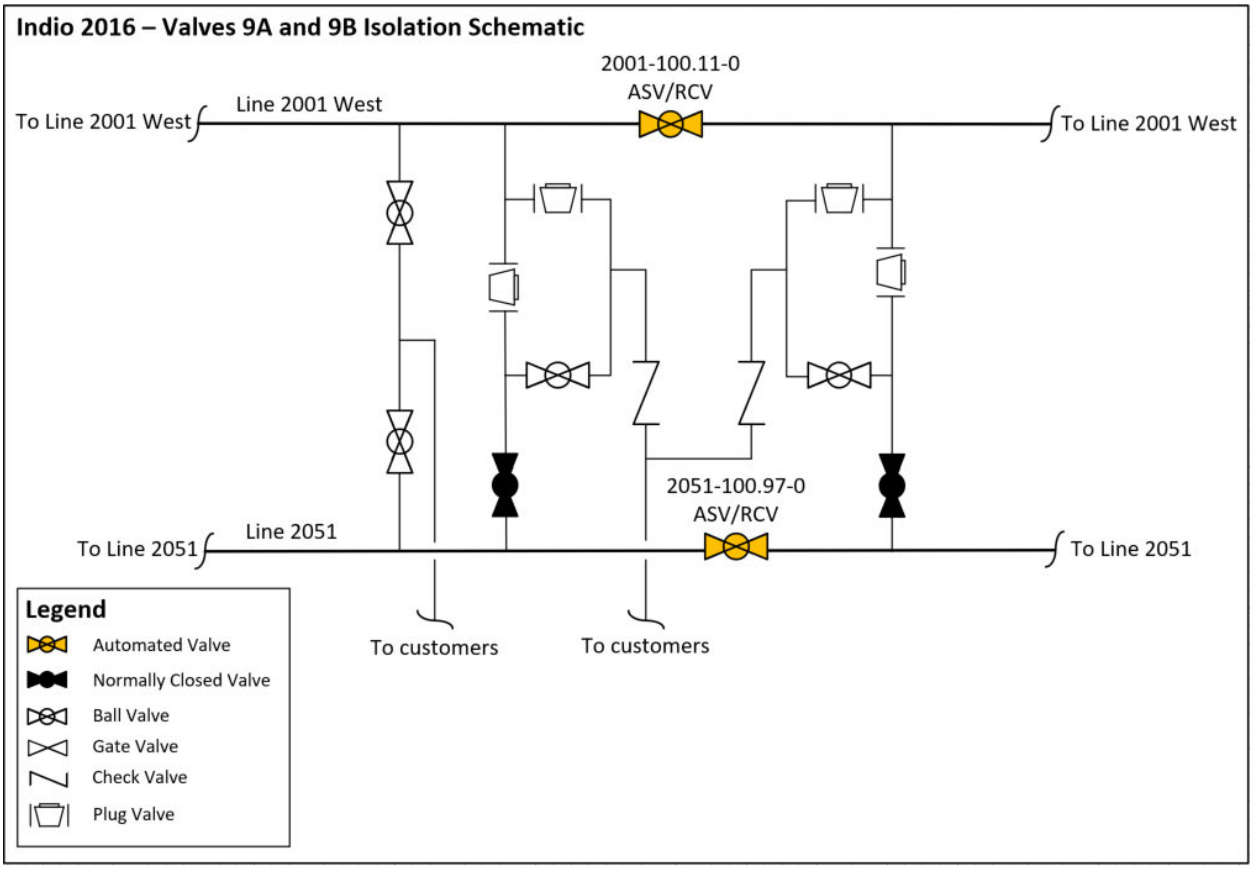
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment.
2. Valve Details:
   a. 2001-100.11-0: The existing valve was a manually actuated Class 600 ball valve, which was reused by the Project Team.
   b. 2051-100.97-0: The existing valve was a manually actuated Class 400 ball valve, which was reused by the Project Team.
3. Actuator Details:
   a. 2001-100.11-0: The existing actuator was a double-acting pneumatic actuator, which was reused by the Project Team.
   b. 2051-100.97-0: The existing actuator was a double-acting pneumatic actuator, which was reused by the Project Team.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.

6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: A biological environmental monitor was onsite full-time during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team expanded the existing easement and facility to accommodate the new automation equipment however no new easements were necessary. The Project Team received temporary access from the United States Bureau of Land management for the duration of construction.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Indio 2016 Valve Enhancement Project – Valves 9A and 9B Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	08/28/2017
Construction Completion Date	10/18/2017
Days on Site	31 days
Commissioning Date	04/19/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Linebreak Cabinet Foundation for MLV 9A

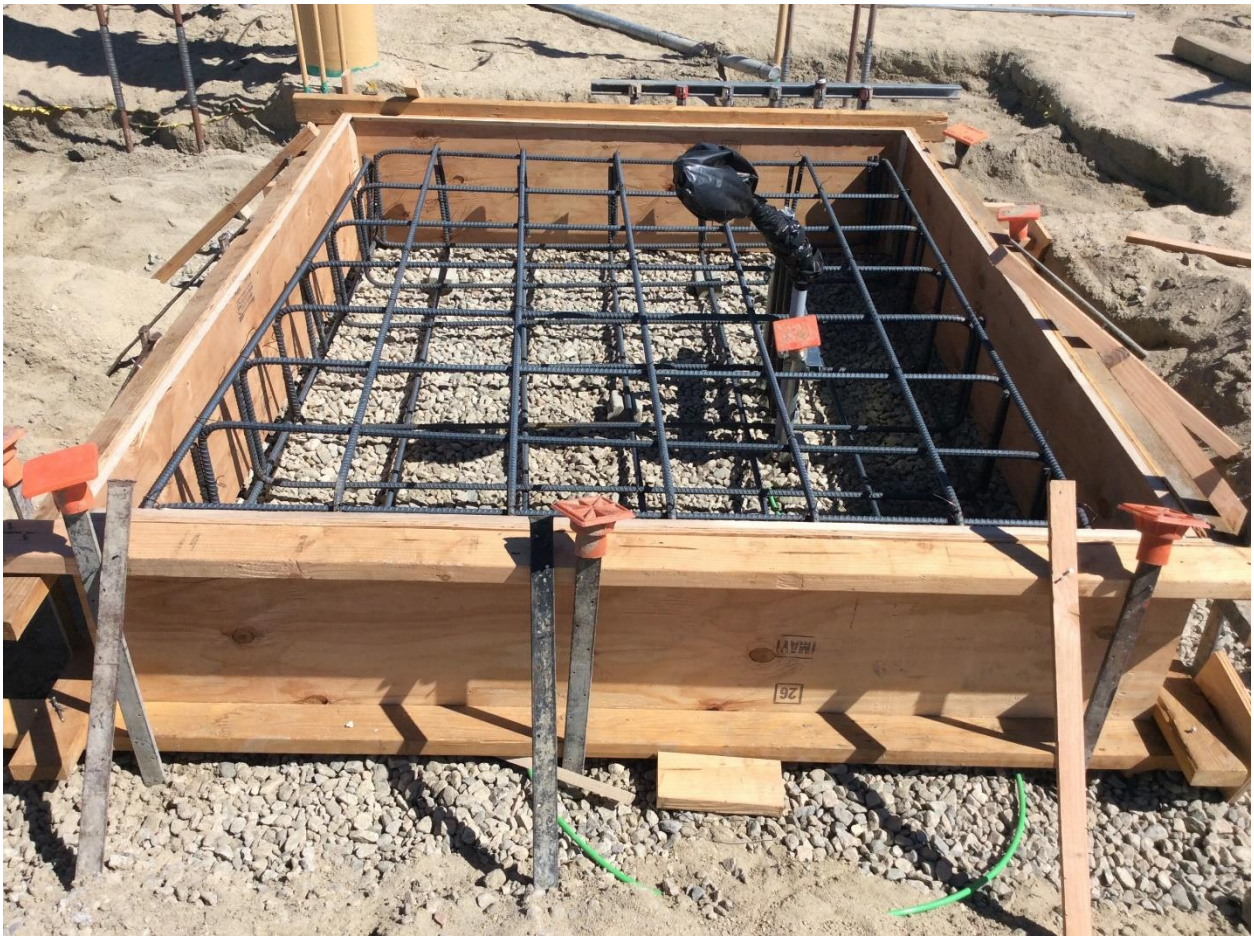


Figure 5: Pin-off Tee Installation for MLV 9B

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valves and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on April 19, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Land Use: The Project team stayed within SoCalGas's existing easements so that new easements did not need to be purchased.
2. Construction Execution:
   a. The Project Team bundled this project with three additional projects, Indio Valve Enhancement Projects – MLVs 8, 8A, and 8B; MLVs 9, 11, 11A, and 11B; and MLVs 10, 10A, and 10B coordinating engineering and construction activities between the project sites to minimize costs for the benefit of customers.
   b. The Project Team adjusted the construction schedule to allow the construction contractors to sequence construction tasks in a way that minimized crew overlap.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,943,058. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,392,122.

Table 4: Estimated and Actual Direct Costs and Variances[3]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	267,341	44,021	(223,320)
Materials	129,535	101,894	(27,641)
Mechanical Construction Contractor	481,632	316,758	(164,874)
Electrical Contractor	189,103	138,679	(50,424)
Construction Management & Support	51,119	69,010	17,891
Environmental	144,362	45,259	(99,103)
Engineering & Design	298,039	320,112	22,073
Project Management & Services	115,756	3,381	(112,374)
ROW & Permits	34,597	8,876	(25,721)
GMA	231,575	131,243	(100,331)
Total Direct Costs	**1,943,058**	**1,179,235**	**(763,823)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	179,968	111,829	(68,139)
AFUDC	217,488	71,105	(146,383)
Property Taxes	43,178	29,953	(13,225)
Total Indirect Costs	**440,634**	**212,888**	**(227,746)**
Total Direct Costs	**1,943,058**	**1,179,235**	**(763,823)**
Total Loaded Costs	**2,383,692**	**1,392,122**	**(991,570)**

[3] Values may not add to total due to rounding.
[4] IBID.

The Actual Full-Time Equivalent[5] (FTE) for this Project is 0.11.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Indio Valve Enhancement project MLVs 9A and 9B, Actual Direct Costs were less than the preliminary estimate by $763,823. This variance is attributable to a variety of factors including: coordination with other projects in the Indio Valve Enhancement Bundle allowed for shared efforts and reduced project planning costs; increased productivity allowed for construction to be completed in 31 days instead of the originally estimated 48 days, resulting in lower construction and environmental monitoring costs; the Project Team anticipated the need for coal tar wrap and lead paint removal and abatement, but another SoCalGas project performed these abatement activities in the project area prior to construction.

[5] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Indio Bundle – Valves 9A and 9B Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas successfully automated two mainline valves to achieve the objective of enabling rapid system isolation to portions of Lines 2001 West, and 2051 in the City of Indio. The total loaded cost of the Project is $1,392,122.

SoCalGas executed this project prudently through pursuing each valve site as its own project to more efficiently track costs, expanding the existing site to accommodate the new equipment, installing the necessary automation equipment, and installing equipment necessary to bring power and communication capabilities to the valves to enable rapid system isolation to portions of Lines 2001 West, and 2051 in the city of Indio.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Indio Valve Enhancement Project – MLVS 9A and 9B Final Report

I. INDIO VALVE ENHANCEMENT PROJECT – MLVs 10, 10A, AND 10B

A. Background and Summary

The Indio Valve Enhancement Project – MLVs 10, 10A, and 10B consists of valve enhancements made to three existing mainline valves (MLVs) located in an unincorporated area within Riverside County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of portions of Lines 2000, 2001, and 2051 in the event of a pipeline rupture. SoCalGas installed one new actuator, new fencing, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $1,998,200.

The Indio Valve Enhancement Project – MLVs 10, 10A, and 10B construction sites are within existing SoCalGas facilities located in desert environments in Riverside County and are located approximately 400 feet apart. There are high voltage transmission lines near the sites and between the two sites. SoCalGas grouped this project with three additional projects, Indio Valve Enhancement Projects – MLVs 8, 8A, and 8B; MLVs 9, 11, 11A, and 11B; and MLVs 9A and 9B, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Indio Valve Enhancement Project – MLVs 10, 10A, and 10B.

Table 1: General Project Information

Indio Valve Enhancement Project – MLVs 10, 10A, and 10B			
Location	Riverside County		
Days on Site	41 days		
Construction Start	10/30/2017		
Construction Finish	12/18/2017		
Commissioning Date	07/10/2018		
Valve Upgrades			
Valve Number	2000-107.13-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	2001-107.13-0		
Valve Type	Existing – Ball		
Actuator	Existing		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	2051-108.14-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	New – Solar		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing	New		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,998,200	-	1,998,200
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Indio Valve Enhancement Bundle Overview

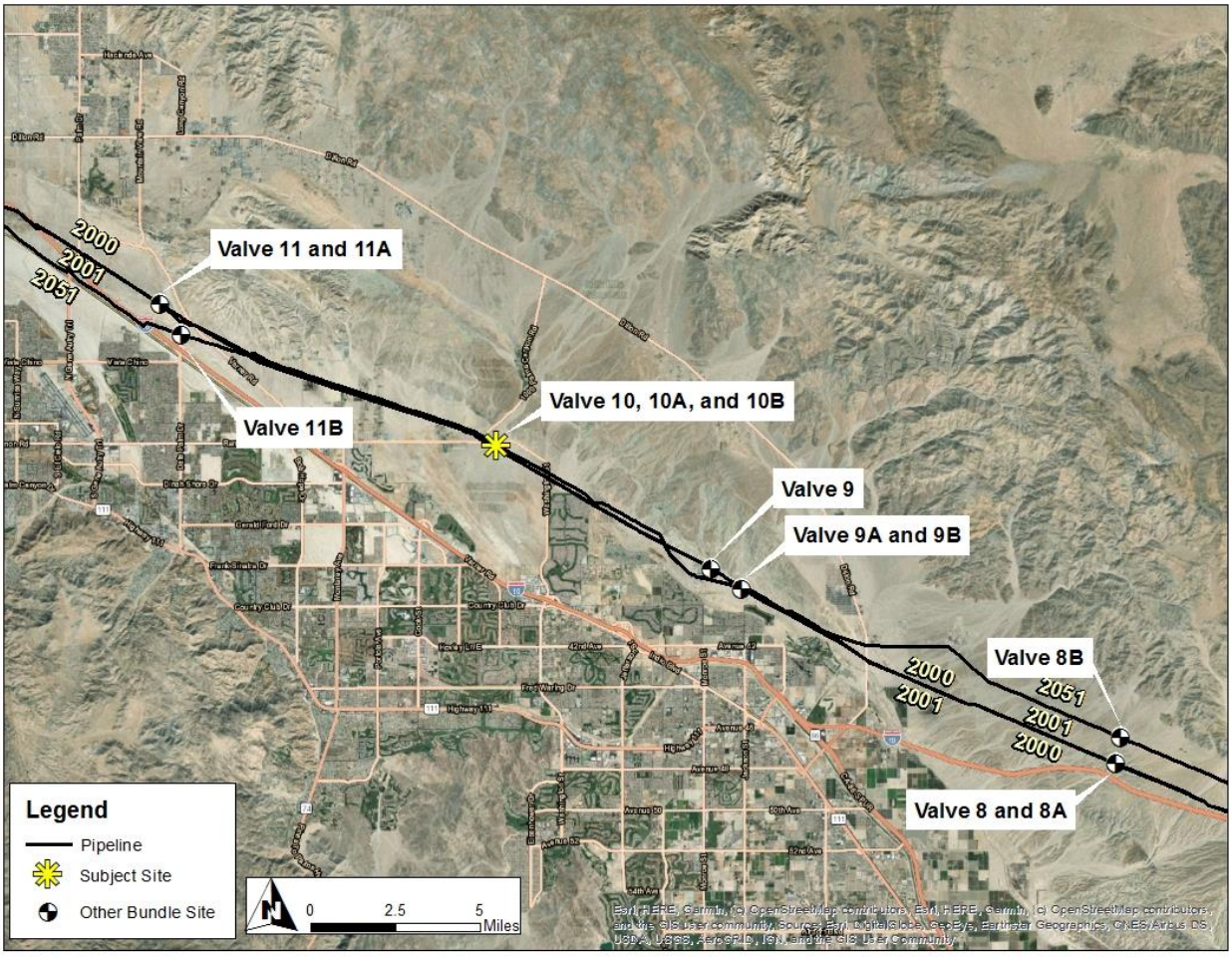
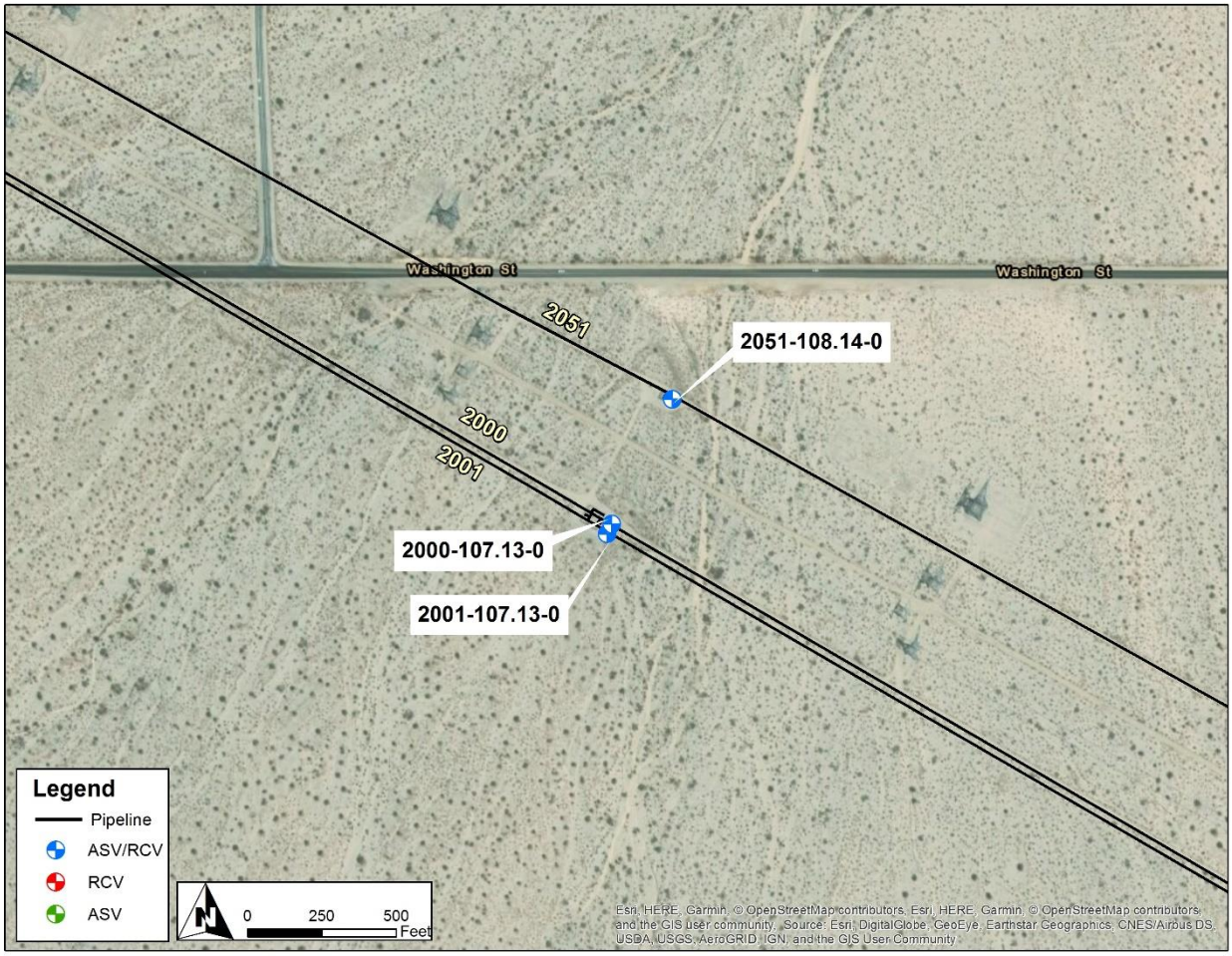


Figure 2: Satellite Image of Indio Valve Enhancement Project – MLVs 10, 10A, and 10B



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope for the Indio Valve Enhancement Project – MLV 10, 10A and 10B in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified ten MLVs for automation to enable remote isolation to a portion of Lines 2000, 2001, and 2051. Prior to initiating execution of the Project, SoCalGas reviewed available information, performed a detailed system flow analysis to validate the scope of the Project, and identified two additional valves for enhancement to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified ten MLVs for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon Project initiation, SoCalGas reviewed the conceptual project scope and determined that automation of these valves alone would not achieve the transmission isolation objectives set forth in the Valve Enhancement Plan. SoCalGas determined it was also necessary to automate MLVs 2000-89.91-0, and 2000-100.89-0. Together, the automation of these valves enables rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability:
   a. Four of the valves previously identified in this bundle did not require the acquisition of additional property rights. Due to the estimated timeframe necessary to acquire the additional property rights for the other eight valves, the four valves that did not require additional property rights proceeded as scheduled and were executed under an earlier PSEP Valve Project. The eight valves requiring additional

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

property rights were descoped from the initial bundle and execution was rescheduled to align with the acquisition of the additional property rights, including the valves enhanced by the Indio Valve Enhancement Project – MLVs 10, 10A, and 10B.

b. Mainline valve 2051-108.14-0 had a preexisting actuator that was incompatible with PSEP technology. Prior to construction, the preexisting actuator malfunctioned. The Project Team provided the new actuator to the Operating District for installation to keep the existing valve operational.

4. Final Project Scope: The final project scope consists of the installation of one new actuator, the expansion of the existing facilities, the installation of power equipment, the installation of communications equipment, and the installation of the necessary automation equipment at the site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2000	107.13	0	[redacted]	C/P	ASV/RCV
2001	107.13	0	[redacted]	C/P	ASV/RCV
2051	108.14	0	[redacted]	A/AG	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Indio MLVs 10, 10A, and 10B Valve Enhancement Project by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: The two sites are approximately 400 feet apart and are located in a desert environment. There are existing chain link fences enclosing both sites. There are high voltage transmission lines near the sites and between the two sites.

2. Land Issues: During the pre-design site walk, the Project Team noted that the existing station would need to be expanded to accommodate the additional equipment. The project sites are surrounded by federal property and federal land must be utilized to access the sites. The existing SoCalGas agreements allow for access to the site to perform regular maintenance. The Project Team noted that additional permission was required from the Federal Government to move construction equipment through federal property. The Project Team did not need to obtain additional easements to expand the station; however, the Project Team did receive the required approvals from the Federal Government for the new footprint and above ground facilities per the existing agreement between SoCalGas and the Federal Government.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected this MLV for automation to isolate a known geological threat upstream of this valve.
4. Power Source: The site had preexisting solar power. The Project Team installed new solar power equipment to accommodate the increased loads from the new automation equipment.
5. Communication Technology: There was no preexisting communications equipment at the site. The Project Team installed new communications equipment.

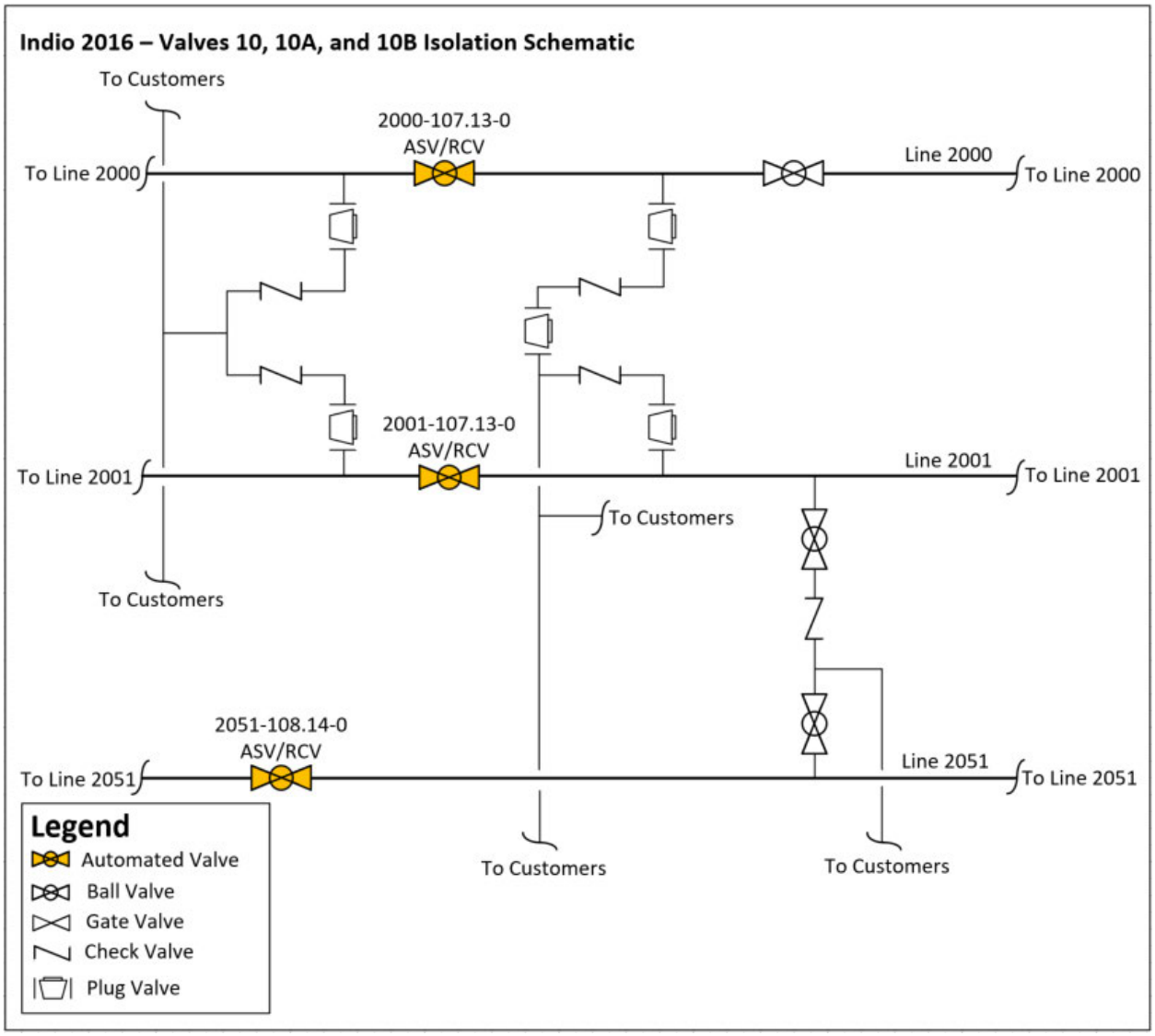
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment. During the pre-design site walk, the Project Team noted that the existing fencing at the project site would need to be expanded in order to accommodate the new power equipment and automation equipment. The Project Team also determined that MLV 2000-107.13-0 was suitable for automation.
2. Valve Details:
   a. 2000-107.13-0: The existing valve was a manually actuated Class 600 ball valve, which as reused by the Project Team.
   b. 2001-107.13-0: The existing valve was a manually actuated Class 600 ball valve, which was reused by the Project Team.
   c. 2051-108.14-0: The existing valve was a manually actuated Class 400 ball valve, which was reused by the Project Team.
3. Actuator Details:
   a. 2000-107.13-0: The existing actuator was a double-acting pneumatic actuator, which was reused by the Project Team.
   b. 2001-107.13-0: The existing actuator was a double-acting pneumatic actuator, which was reused by the Project Team.
   c. 2051-108.14-0: The preexisting actuator was incompatible with PSEP linebreak technology, so the Project Team installed a new actuator. Prior to construction, the existing actuator malfunctioned. PSEP provided the new actuator to the Operating District who then installed the new actuator in order to maintain the current functionality of the valve.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering of these sites.

7. Environmental: The project is located within the California Desert Conservation Area. An environmental monitor was on-site full-time during construction.
8. Permit Restrictions: The Project Team worked with the U.S. Fish and Wildlife Service to allow for access to the existing facilities outside of regular maintenance. The Project Team also worked with the U.S. Fish and Wildlife Service to obtain approval for the new footprint as per the existing agreement between SoCalGas and the U.S. Fish and Wildlife Service.
9. Land Use: The Project Team performed all work within the new SoCalGas easements.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Indio Valve Enhancement Project Schematic, MLVs 10, 10A, and 10B



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for the electrical contractor was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	10/30/2017
Construction Completion Date	12/18/2017
Days on Site	41 days
Commissioning Date	07/10/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: New Automation Equipment with Shaders

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with Gas Control personnel for the newly-automated valves, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on July 10, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate known site conditions in the project plan and design. The Project Team bundled this project with three additional projects, Indio Valve Enhancement Projects – MLVs 8, 8A, and 8B; MLVs 9, 11, 11A, and 11B; and MLVs 9A and 9B, coordinating engineering and construction activities between the project sites to minimize costs for the benefit of customers.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $3,042,599. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,998,200.

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	411,823	91,881	(319,942)
Materials	228,523	181,208	(47,315)
Mechanical Construction Contractor	692,731	472,347	(220,384)
Electrical Contractor	329,621	226,336	(103,285)
Construction Management & Support	92,714	112,745	20,032
Environmental	149,057	66,535	(82,522)
Engineering & Design	427,230	278,623	(148,607)
Project Management & Services	322,158	81,240	(240,919)
ROW & Permits	22,635	5,372	(17,263)
GMA	366,108	191,638	(174,470)
Total Direct Costs	**3,042,599**	**1,707,925**	**(1,334,674)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[3]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	512,211	192,676	(319,535)
AFUDC	628,089	94,509	(533,580)
Property Taxes	140,145	3,090	(137,055)
Total Indirect Costs	**1,280,445**	**290,275**	**(990,170)**
Total Direct Costs	**3,042,599**	**1,707,925**	**(1,334,674)**
Total Loaded Costs	**4,323,044**	**1,998,200**	**(2,324,844)**

The Actual Full-Time Equivalent[4] (FTE) for this Project is 0.74.

[2] Values may not add to total due to rounding.
[3] Ibid.
[4] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Indio Valve Enhancement Project – MLVs 10, 10A, and 10B, Actual Direct Costs were less than the preliminary estimate by $1,334,674. This variance is attributable to a variety of factors including: coordination with other projects in the Indio Valve Enhancement Bundle allowed for shared efforts and reduced project planning costs; increased productivity allowed for construction to be completed in 41 days instead of the originally estimated 54 days, resulting in lower costs for construction contractor, company labor, and environmental monitoring; surveying and engineering drawing packages were combined for the three MLV sites, increasing efficiency and reducing total engineering costs; the project team encountered less hazardous materials during construction than expected, resulting in lower costs for abatement and removal; and the installation of a UPS cabinet was not required due to the installation of solar power equipment.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Indio Valve Enhancement Project – MLV 10, 10A, and 10B. Through this Valve Enhancement Project, SoCalGas successfully automated three mainline valves to achieve the objective of enabling rapid system isolation of portions of Lines 2000, 2001, and 2051 located within Riverside County. The total loaded cost of the Project is $1,998,200.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling eight geographically proximate sites together to capture efficiencies through coordinated engineering, and installing equipment necessary to bring power and communication capabilities to the site to enable rapid system isolation to portions of Lines 2000, 2001, and 2051 located in Riverside County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Indio Valve Enhancement Project – MLV 10, 10A, and 10B Final Report

I. PALOWALLA VALVE ENHANCEMENT PROJECT

A. Background and Summary

The Palowalla Valve Enhancement Project consists of valve enhancements made to three new mainline valves (MLVs) located in Riverside County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Lines 2000, 2001, and 5000, in the event of a pipeline rupture. SoCalGas installed three new MLVs, a new blowdown assembly, three new actuators, new crossover piping, new fencing, new power equipment, new communications equipment, and the necessary automation equipment at the site. The total loaded project cost is $2,191,791.

The Palowalla Valve Enhancement Project construction site is a new SoCalGas facility in a desert environment south of Interstate 10, east of a residential development, near the City of Blythe in Riverside County. This Project's costs were shared by PSEP and the Operating District, with the Operating District funding the costs of the installation of the new MLVs, the new blowdown assembly, and the new crossover piping, and PSEP funding the activities that provided system isolation through the automation of the new MLVs.

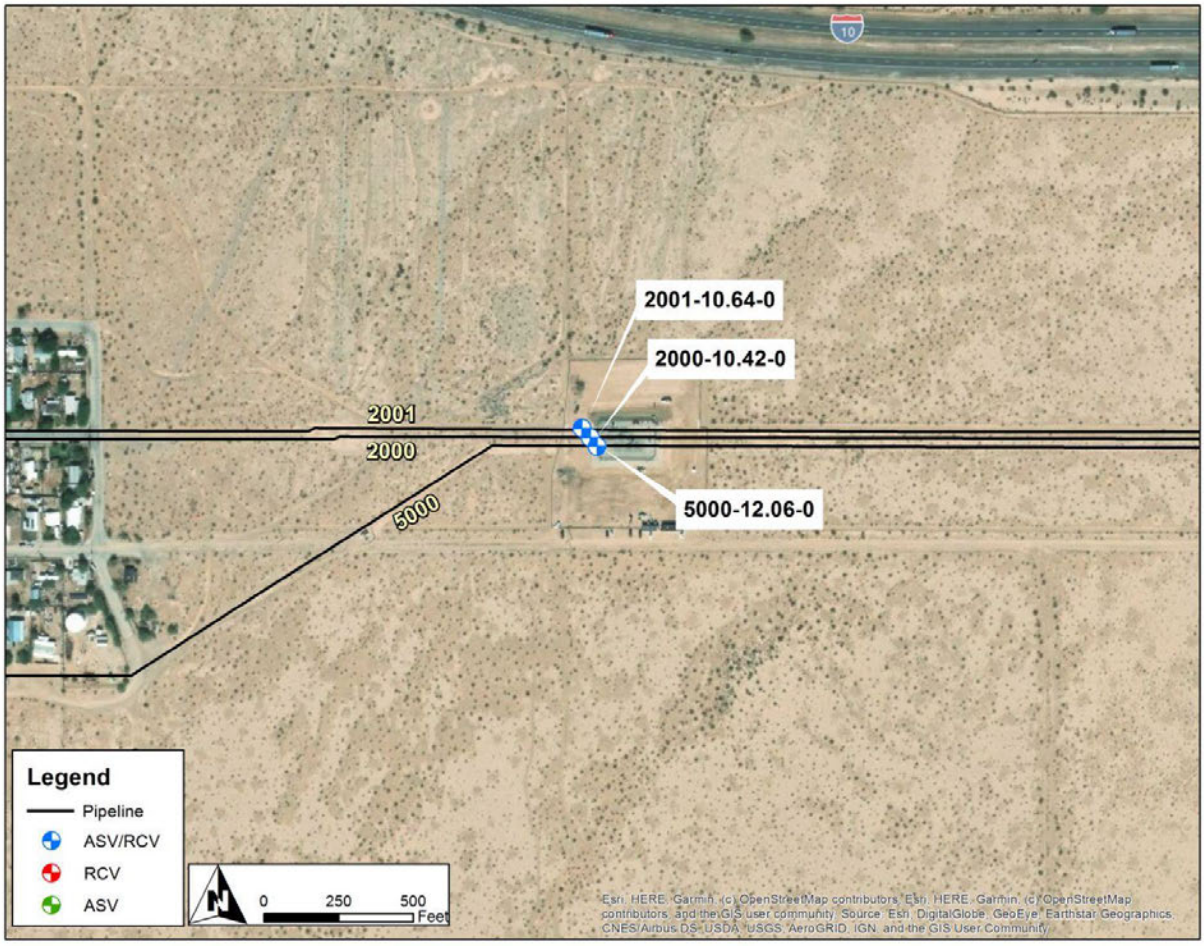
Table 1: General Project Information

Palowalla valve Enhancement Project			
Location	Riverside County		
Days on Site	77		
Construction Start	09/05/2017		
Construction Finish	05/06/2018		
Commissioning Date	08/08/2019		
Valve Upgrades			
Valve Number	2000-10.42-0		
Valve Type	New[1] – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	2001-10.64-0		
Valve Type	New[2] – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	5000-12.06-0		
Valve Type	New[3] – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Site Upgrades			
Vault	None		
Power	New – Utility		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	New		
Fencing	New		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	2,191,791	-	2,191,791
Disallowed Costs	-	-	-

[1] The Operating District funded the installation of the new valve, the installation of new crossover piping, and the installation of the new blowdown assembly.
[2] Ibid.
[3] Ibid.

B. Maps and Images

Figure 1: Satellite Image of Palowalla Valve Enhancement Project



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan in the 2011 filing.[4] This conceptual scope did not include this project. SoCalGas reviewed available information and performed a detailed system flow analysis that identified these valves as a candidate for enhancement to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas and SDG&E did not identify these valves for automation to achieve the objective of rapid system isolation.
2. Updated Scope: SoCalGas determined that the installation and automation of MLVs 2000-10.42-0, 2001-10.64-0, and 5000-12.06-0 would enable rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability:
   a. The Project Team created a new SoCalGas facility to house the new equipment.
   b. The Project Team installed new crossover piping for improved operational flexibility.
4. Final Project Scope: The final project scope consists of the installation of three new MLVs, the installation of a new blowdown assembly, the installation of three new actuators, the installation of new crossover piping, the installation of new fencing, the installation of new power equipment, the installation of new communications equipment, and the installation of the necessary automation equipment at the project site.

[4] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
2000	10.42	0	[redacted]	NV/AG	ASV/RCV
2001	10.64	0	[redacted]	NV/AG	ASV/RCV
5000	12.06	0	[redacted]	NV/AG	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Palowalla Valve Enhancement Project by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: The project site is a new SoCalGas facility in a desert environment south of Interstate 10, east of a residential development, near the City of Blythe in Riverside County.
2. Land Issues: During the pre-design site walk, the Project Team noted that the new equipment should be housed in a new SoCalGas facility. The Project Team noted that the project is located in the California Desert Conservation Area (CDCA).
3. DOT Class: This project site is in a Class 1 location. SoCalGas installed these MLVs to isolate Class 3 locations upstream and downstream of these valves.
4. Power Source: There was no preexisting power source. The Project Team installed new power equipment at the site.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

C. Engineering, Design, and Planning Factors

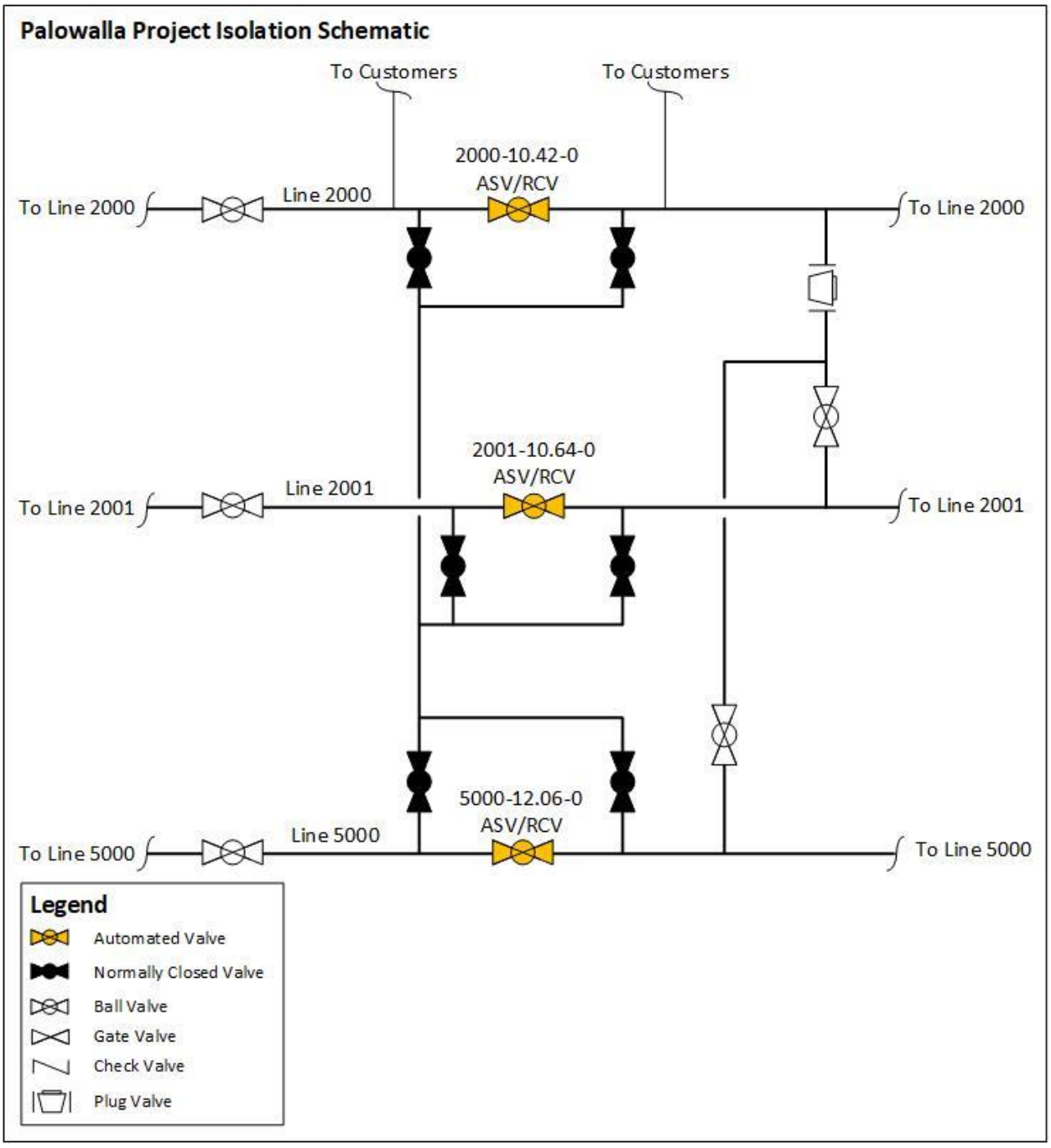
SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, performed potholing

of the area to identify the presence of underground utilities and substructures, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified that the new equipment should be enclosed in a fence.
2. Valve Details:
   a. 2000-10.42-0: There was no preexisting valve. The Project Team installed a new Class 600 ball valve.
   b. 20001-10.64-0: There was no preexisting valve. The Project Team installed a new Class 600 ball valve.
   c. 5000-12.06-0: There was no preexisting valve. The Project Team installed a new Class 600 ball valve.
3. Actuator Details:
   a. 2000-10.42-0: There was no preexisting actuator. The Project Team installed a new actuator.
   b. 20001-10.64-0: There was no preexisting actuator. The Project Team installed a new actuator.
   c. 5000-12.06-0: There was no preexisting actuator. The Project Team installed a new actuator.
4. Customer Impact: The Project Team planned a shut-in of Lines 2000, 2001, and 5000 during the tie-in. The Project Team utilized CNG to provide uninterrupted service to customers on Line 2000. The Project Team utilized alternate feeds to maintain service to customers on Line 2000. The Project Team did not identify any customers on the portion of Line 5000 that was shut-in.
5. Community Impact: The Project Team did not identify any notable impact to the community from this Project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.

7. Environmental: The Project Site is located in a CDCA. A biological monitor was onsite full time for the duration of construction.
8. Permit Restrictions: The Project Team obtained a permit from the City of Blythe to install the new utility power.
9. Land Use: The Project site was located on private property. The Project Team obtained an exclusive easement and TRE from the private landowner.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 2: Palowalla Valve Enhancement Project Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, SoCalGas entered into a competitive bidding process to select a construction contractor, that included the updated design described in the discussion of notable Scope Changes above. SoCalGas awarded the construction contract to the bidder that best met the selection criteria for this project. The estimated values below represent both PSEP and non-PSEP activities.

1. SoCalGas Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas preliminary cost estimate for construction.

3. SoCalGas Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas preliminary cost estimate for construction was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	09/05/2017
Construction Completion Date	05/06/2018
Days on Site	77 Days
Commissioning Date	08/08/2019

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $102,000 in change orders.

1. Construction Method: SoCalGas revised Gas Standards after the submission and acceptance of the competitive bid. The updated standards did not allow for excavation equipment in the new facility. The Mechanical Construction Contractor excavated and backfilled by hand.
2. Abatement: Sections of Lines 2000 and 2001 required abatement, sandblasting and coating due to the presence of coal tar wrapping. SoCalGas requested that the Mechanical Construction Contractor excavate and backfill around those sections of pipe and assist in pipe inspection and the recoating of the pipe.
3. Hydrotest: The Project initially planned for a single hydrotest. During construction the installation was separated into two hydrotests.

Figure 3: New Mainline Valves, Blowdowns Assembly, and Crossover Piping

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing, and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valves, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on August 8, 2019, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the site conditions in the project plan and design. The Project Team coordinated the shut-in of Line 2001 with a Transmission Tech Services project:

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,739,662. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $2,191,791.

Table 4: Estimated and Actual Direct Costs and Variances[5, 6]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	101,683	127,609	25,926
Materials	268,789	222,405	(46,384)
Mechanical Construction Contractor	690,444	444,709	(245,735)
Electrical Contractor	45,262	67,141	21,879
Construction Management & Support	86,889	236,311	149,422
Environmental	47,735	71,245	23,510
Engineering & Design	137,288	208,852	71,564
Project Management & Services	128,668	100,511	(28,157)
ROW & Permits	17,931	1,330	(16,601)
GMA	214,974	170,591	(44,383)
Total Direct Costs	**1,739,662**	**1,650,703**	**(88,959)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[7, 8]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	740,254	263,161	(477,093)
AFUDC	184,834	98,285	(86,549)
Property Taxes	35,499	179,642	144,143
Total Indirect Costs	**960,587**	**541,088**	**(419,499)**
Total Direct Costs	**1,739,662**	**1,650,703**	**(88,959)**
Total Loaded Costs	**2,700,249**	**2,191,791**	**(508,458)**

The Actual Full-Time Equivalent[9] (FTE) for this Project is 0.23.

[5] Values may not add to total due to rounding.
[6] Values in table represent PSEP costs only.
[7] Values may not add to total due to rounding.
[8] Values in table represent PSEP costs only.
[9] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Palowalla Valve Enhancement Project, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $88,959.

V. CONCLUSION

SoCalGas enhanced the safety of their integrated natural gas system by prudently executing the Palowalla Valve Enhancement Project. Through this Valve Enhancement Project, SoCalGas successfully automated three new mainline valves to achieve the objective of enabling rapid system isolation to a portion of Lines 2000, 2001, and 5000, located near the City of Blythe in Riverside County. The total loaded cost of the Project is $2,191,791.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, building a new facility to accommodate the new equipment, installing the necessary automation equipment, and installing equipment necessary to bring power and communication capabilities to the site to enable rapid system isolation of a portion of Lines 2000, 2001, and 5000, located near the City of Blythe in Riverside County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Palowalla Valve Enhancement Project Final Report

I. RAINBOW 2017 VALVE ENHANCEMENT PROJECT – MARTIN AND RAMONA

A. Background and Summary

This report describes the activities associated with the Rainbow 2017 Valve Enhancement Project – Martin and Ramona site, that consists of valve enhancements made to two existing mainline valves (MLVs) located in the County of Riverside. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling the rapid detection of a significant change in pipeline pressure and remote isolation and depressurization of a portion of Line 1027 and Line 1028 in the event of a pipeline rupture. SoCalGas installed two new actuators, new power equipment, new communications equipment, new fencing and the necessary automation equipment at the site. The total loaded project cost is $ 1,908,111.

The Rainbow 2017 Valve Enhancement Project – Martin and Ramona construction site is located within an existing SoCalGas facility in a rural area just north-east of the Martin street and Ramona Expressway intersection.

Table 1: General Project Information

Rainbow 2017 Valve Enhancement Project – Martin and Ramona			
Location	Riverside County		
Days on Site	51 days		
Construction Start	07/23/2018		
Construction Finish	11/15/2018		
Commissioning Date	04/29/2019		
Valve Upgrades			
Valve Number	1027-5.00-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Valve Number	1028-5.00-0		
Valve Type	Existing – Ball		
Actuator	New		
Actuator Above-/Below-Grade	Above-Grade		
ASV	Yes		
RCV	Yes		
Martin and Ramona Site Upgrades			
Vault	None		
Power	New – Solar		
Communication	New – Radio		
SCADA Panel	New		
Equipment Shelter	None		
Fencing	Replaced		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	1,908,111	-	1,908,111
Disallowed Costs	-	-	-

B. Maps and Images

Figure 1: Satellite Image of Rainbow 2017 Valve Enhancement Project – Martin and Ramona

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas and SDG&E presented a conceptual project scope for the Rainbow 2017 Valve Enhancement Project – Martin and Ramona in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[1] This conceptual scope identified MLVs 1027-5.00-0 and 1028-5.00-0 for automation to enable remote isolation to a portion of Lines 1027 and 1028. Prior to initiating execution of the Project, SoCalGas reviewed available information and performed a detailed system flow analysis to validate the scope of the Project, and confirmed that this enhancement will provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas identified MLVs 1027-5.00-0 and 1028-5.00-0 for automation to achieve the objective of rapid system isolation.
2. Updated Scope: Upon project initiation, SoCalGas reviewed the conceptual project scope and determined that these isolation points would enable rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The Project Team did not make any notable changes in scope to the engineering and design of this project.
4. Final Project Scope: The final project scope consists of the automation of two valves, that included the installation of two new actuators, the installation of new power equipment, the installation of communications equipment, new fencing and the installation of the necessary automation equipment at the site.

[1] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
1027	5.00	0	[redacted]	A/AG	ASV/RCV
1028	5.00	0	[redacted]	A/AG	ASV/RCV

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Rainbow 2017 Valve Enhancement Project – Martin and Ramona by determining the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site is an existing SoCalGas facility in a rural area north-east of the intersection of Martin Street and the Ramona Expressway.
2. Land Issues: The Project Team noted that the existing facility needed to be expanded to accommodate the new equipment.
3. DOT Class: This project site is in a Class 1 location. SoCalGas selected this MLV for automation to isolate a high consequence area (HCA) location downstream of this valve.
4. Power Source: There was no preexisting power equipment at the site. The Project Team installed new power equipment.
5. Communication Technology: There was no preexisting communications equipment. The Project Team installed new communications equipment at the site.

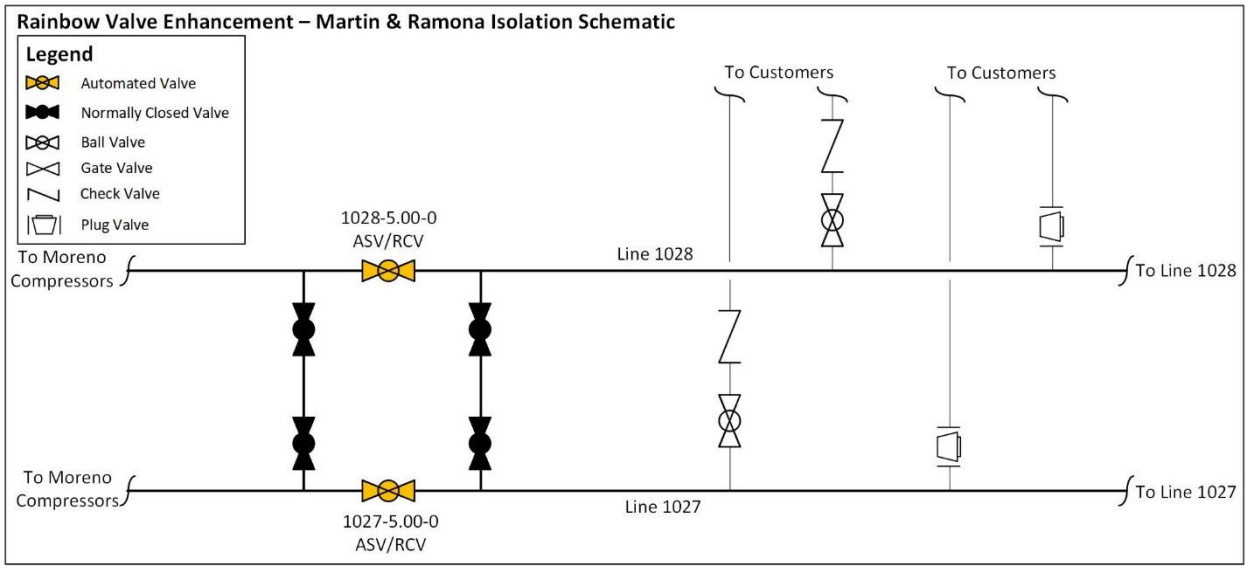
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a

site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: During the site evaluation, the Project Team confirmed the existing technology and verified the need to expand the existing station to accommodate the new equipment.
2. Valve Details:
   a. 1027-5.00-0: The existing valve was a manually operated Class 600 ball valve, which was reused by the Project Team.
   b. 1028-5.00-0: The existing valve was a manually operated Class 600 ball valve, which was reused by the Project Team.
3. Actuator Details:
   a. 1027-5.00-0: There was no preexisting actuator. The Project Team installed a new actuator.
   b. 1028-5.00-0: There was no preexisting actuator. The Project Team installed a new actuator.
4. Customer Impact: The Project Team did not identify any anticipated service disruptions to customers.
5. Community Impact: The Project Team did not anticipate any notable impacts to the Community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team identified the potential for Stephens's Kangaroo Rat in the surrounding area. A biological monitor was on-site full-time during construction.
8. Permit Restrictions: The Project Team obtained permits from the Riverside County Habitat Conservation Agency.
9. Land Use: The Project Team used the existing SoCalGas facility as a laydown yard.
10. Traffic Control: The Project Team did not identify any traffic control needs at this site.

Figure 2: Rainbow 2017 Valve Enhancement Project – Martin and Ramona Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) and Alliance Partner (Electrical Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner and Alliance Partner prepared and submitted their estimates.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

3. SoCalGas' Preliminary Electrical Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

4. Electrical Contractor's Estimate (*confidential*): The Electrical Contractor's estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	07/23/2018
Construction Completion Date	11/15/2018
Days on Site	51 days
Commissioning Date	4/29/2019

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

The conditions summarized below were encountered during construction. Activities to address or mitigate these conditions resulted in approximately $75,000 in change orders.

1. Extended Scope of Work: The Scope of Work for the fencing did not include an additional 51 linear feet of 1-inch mesh, lockboxes, and razor barbed wire. SoCalGas requested the Mechanical Contractor to install the updated fencing at the Martin and Ramona site.
2. Substructures: During excavation for the new automation equipment, it was discovered there was a preexisting vault. The Mechanical Contractor was requested to remove this vault.
3. Security: The construction schedule was extended due to conditions encountered during construction. This resulted in an extension of the time that onsite security was required.

Figure 3: Mainline Valve and Bridle Excavation

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service. During this stage, SoCalGas successfully performed site acceptance testing and conducted point-to-point verification with SoCalGas Gas Control personnel for the newly-automated valves, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on April 29, 2019, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the site conditions in the project plan and design. SoCalGas utilized the existing SoCalGas facility as a laydown yard.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $1,353,936. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $1,908,111.

Table 4: Estimated and Actual Direct Costs and Variances[2]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	99,085	126,791	27,706
Materials	208,668	200,093	(8,575)
Mechanical Construction Contractor	408,077	413,879	5,802
Electrical Contractor	98,123	154,239	56,116
Construction Management & Support	37,531	47,970	10,439
Environmental	66,915	29,541	(37,374)
Engineering & Design	209,138	337,037	127,899
Project Management & Services	80,015	67,036	(12,979)
ROW & Permits	1,650	6,861	5,211
GMA	144,733	141,188	(3,545)
Total Direct Costs	**1,353,936**	**1,524,635**	**170,699**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[3]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	169,847	222,389	52,542
AFUDC	95,642	144,253	48,611
Property Taxes	21,549	16,833	(4,716)
Total Indirect Costs	**287,037**	**383,476**	**96,439**
Total Direct Costs	**1,353,936**	**1,524,635**	**170,699**
Total Loaded Costs	**1,640,973**	**1,908,111**	**267,138**

The Actual Full-Time Equivalents[4] (FTEs) for this Project are 0.47.

[2] Values may not add to total due to rounding.
[3] Ibid
[4] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Rainbow 2017 Valve Enhancement Project – Martin and Ramona, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were more than the preliminary estimate by $170,699. This variance can be attributed to several factors including: scope changes during construction detailed in Section III. Part C resulted in increased Engineering & Design support during the closeout process; Construction Management & Support was extended due to the removal of the vault and the additional fencing installation; and increased security was required in response to recent vandalism and theft at remote valve stations.

V. CONCLUSION

SoCalGas enhanced the safety of its integrated natural gas system by prudently executing the Rainbow 2017 Valve Enhancement Project – Martin and Ramona. Through this Valve Enhancement Project, SoCalGas successfully automated two valves to achieve the objective of enabling rapid system isolation in the County of Riverside. The total loaded cost of the Project is $1,908,111.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives bundling two geographically proximate valve projects to capture efficiencies and by installing equipment necessary to bring communication capabilities to the site to enable rapid system isolation of a portion of Lines 1027 and 1028 located in an unincorporated area of Riverside County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Rainbow 2017 Valve Enhancement Project – Martin and Ramona Final Report

I. RAINBOW CHECK VALVE ENHANCEMENT PROJECT – NEWPORT AND BRIGGS

A. Background and Summary

The Rainbow Check Valve Enhancement Project – Newport and Briggs consists of the installation of a new check valve located in the City of Menifee in Riverside County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling backflow prevention between Supply Line 41-169-2 and Line 1027 in the event of a pipeline rupture. SoCalGas installed one new check valve at the project site. The total loaded project cost is $514,048.

The Rainbow Check Valve Enhancement Project – Newport and Briggs is located in the intersection of Old Newport Road and Briggs Road, and is adjacent to a Homeowner's Association (HOA) located in the City of Menifee. SoCalGas bundled this site with three additional sites, Rainbow Check Valve Enhancement Projects – Rainbow Valley and Pechanga; Ramona and Lakeview; and Scott and El Centro, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Rainbow Check Valve Enhancement Project – Newport and Briggs.

Table 1: General Project Information

Rainbow Check Valve Enhancement Project – Newport and Briggs			
Location	City of Menifee		
Days on Site	13 days		
Construction Start	07/09/2018		
Construction Finish	08/06/2018		
NOP Date	07/31/2018		
Valve Upgrades			
Valve Number	N/A[1]		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	N/A		
ASV	N/A		
RCV	N/A		
Site Upgrades			
Vault	None		
Power	None		
Communication	None		
SCADA Panel	None		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	514,048	-	514,048
Disallowed Costs	-	-	-

[1] Check valves are not numbered.

B. Maps and Images

Figure 1: Rainbow Check Bundle Overview

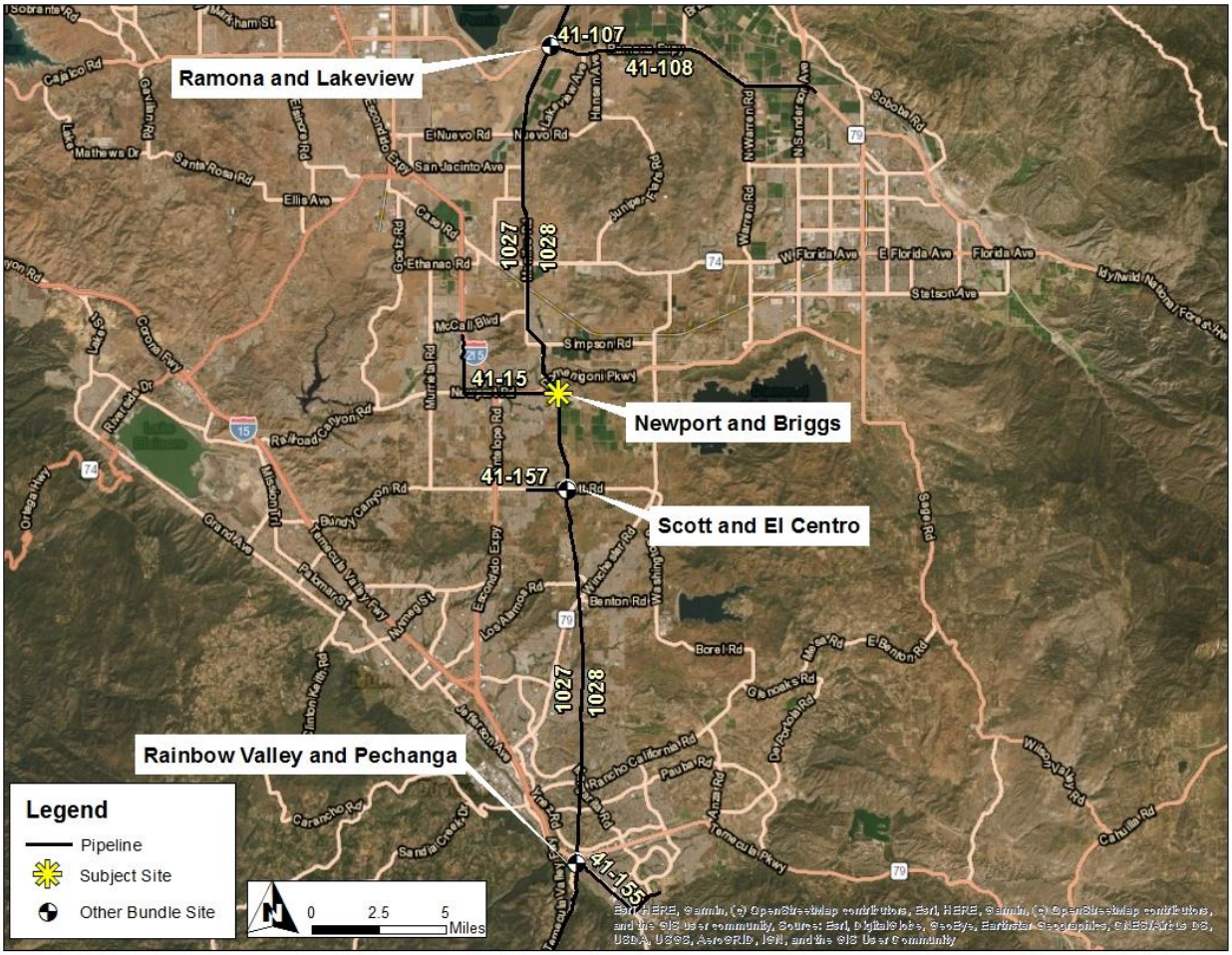


Figure 2: Satellite Image of Rainbow Check Valve Enhancement Project – Newport and Briggs

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[2] This conceptual scope did not identify this project. SoCalGas reviewed available information and performed a detailed system flow analysis that identified this check valve as a candidate for installation to provide the planned isolation. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas did not originally identify this check valve for installation to achieve the objective of rapid system isolation.
2. Updated Scope: SoCalGas determined that it was necessary to install a check valve on Supply Line 41-169-2 to prevent backflow from Supply Line 41-169-2 to Line 1027. The installation of this check valve enables rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The Project Team did not make any notable changes in scope to the engineering and design of this project.
4. Final Project Scope: The final project scope consists of the installation of one check valve at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
1027	16.66	N/A	[redacted]	NV	BFP2

[2] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Rainbow Check Valve Enhancement Project – Newport and Briggs by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: The site is located in an urban area in the middle of the intersection of Old Newport Road and Briggs Road in the City of Menifee.
2. Land Issues: During the pre-design site walk, the Project Team noted that one lane of Briggs Road would need to be closed during a portion of construction. The Project Team utilized a shared laydown yard between all four projects in the Rainbow Check bundle.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: The scope of work for this project site did not require any power equipment.
5. Communication Technology: The scope of work for this project site did not require any communications equipment.

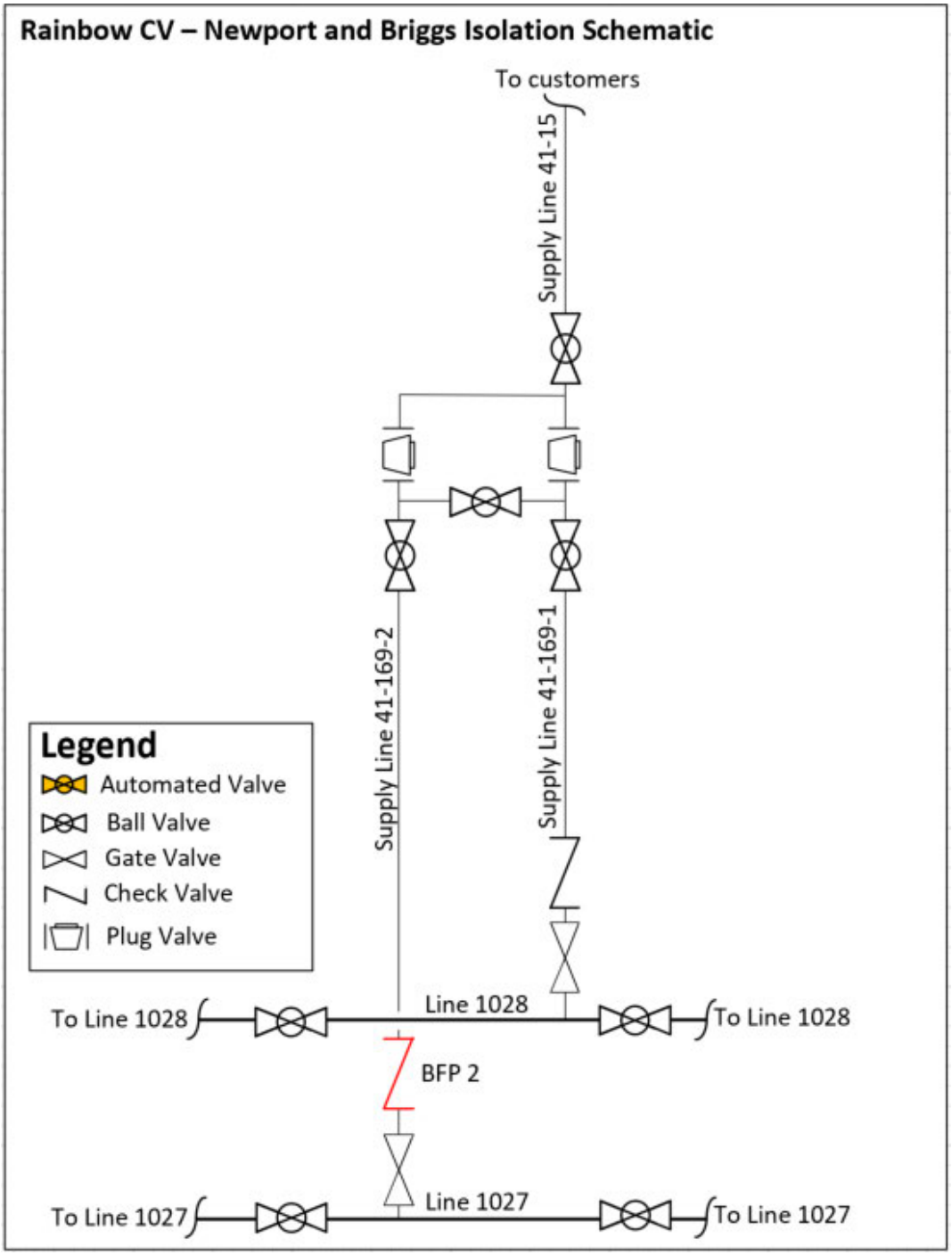
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: The Project Team noted that this work would require a shut-in of Supply Line 41-169-2. The Project Team confirmed that customers would not be impacted, and that service could be maintained through Supply Line 41-169-1.
2. Valve Details: There was no preexisting check valve.

3. Actuator Details: The scope of work for this project site did not require the installation of an actuator.
4. Customer Impact: The Project Team noted that this work would require a shut-in of Supply Line 41-169-2. The Project Team confirmed that customers would not be impacted, and that service could be maintained through Supply Line 41-169-1.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: The Project Team acquired an encroachment permit and a traffic control permit from the City of Menifee and Riverside County.
9. Land Use: The Project Team acquired a temporary right of entry for the laydown yard and used the same laydown yard for all four projects in the Rainbow Check bundle.
10. Traffic Control: The Project Team closed the southbound lane on Briggs Road during construction, used cones to help guide traffic, and set up K-rails to protect the excavation area.

Figure 3: Rainbow Check Valve Enhancement Project – Newport and Briggs Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) to prepare a cost estimate based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner prepared and submitted their estimate.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].
2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	07/09/2018
Construction Completion Date	08/06/2018
Days on Site	13 days
NOP Date	07/31/2018

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Test Assembly

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The valve was placed into operation on July 31, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Bundling of Projects: The Project Team bundled this valve project with three additional valve projects, Rainbow Check Valve Enhancement Projects – Rainbow Valley and Pechanga, Ramona and Lakeview, and Scott & El Centro, to gain efficiencies in engineering, planning, and construction activities.
2. Land Use: The Project Team utilized the same laydown yard for all four sites in the Rainbow Check Valve Enhancement Project Bundle.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $838,661. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $ 514,048.

Table 4: Estimated and Actual Direct Costs and Variances[3]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	179,277	47,058	(132,219)
Materials	5,427	1,855	(3,572)
Mechanical Construction Contractor	220,961	175,505	(45,456)
Electrical Contractor	-	-	-
Construction Management & Support	39,852	13,125	(26,727)
Environmental	8,645	0	(8,645)
Engineering & Design	156,482	128,903	(27,578)
Project Management & Services	93,009	7,461	(85,548)
ROW & Permits	37,802	11,161	(26,641)
GMA	97,206	47,033	(50,173)
Total Direct Costs	**838,661**	**432,101**	**(406,560)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[4]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	259,945	79,206	(180,739)
AFUDC	59,148	2,267	(56,881)
Property Taxes	14,692	475	(14,217)
Total Indirect Costs	**333,786**	**81,947**	**(251,838)**
Total Direct Costs	**838,661**	**432,101**	**(406,560)**
Total Loaded Costs	**1,172,446**	**514,048**	**(658,398)**

[3] Values may not add to total due to rounding.
[4] Ibid.

The Actual Full-Time Equivalents[5] (FTEs) for this Project are 0.78.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Rainbow Check Valve Enhancement Project – Newport and Briggs, Actual Direct Costs were less than the preliminary estimate by $406,560. This variance is attributable to a variety of factors including: coordination with other projects allowed for shared efforts in multiple areas, reducing costs for project planning, construction contractor, project management, engineering, and laydown yards; the engineering firm provided Project Manager and Project Engineer support during development, construction, and closeout, these costs were recognized under Engineering and Design, reducing overall company labor project costs.

[5] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Rainbow Check Valve Enhancement Project – Newport and Briggs. Through this Valve Enhancement Project, SoCalGas successfully installed one check valve to achieve the objective of enabling backflow prevention from Supply Line 41-169-2 to Line 1027 in the City of Menifee. The total loaded cost of the Project is $514,048 .

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling two projects together to capture efficiencies through coordinated engineering, and by installing a check valve to enable backflow prevention from Supply Line 41-169-2 to Line 1027 in the City of Menifee.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, coordinating the construction laydown yard between all four sites in the bundle, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Rainbow Check Valve Enhancement Project – Newport and Briggs Final Report

I. RAINBOW CHECK VALVE ENHANCEMENT PROJECT – SCOTT AND EL CENTRO

A. Background and Summary

The Rainbow Check Valve Enhancement Project – Scott and El Centro consists of the installation of two new check valves located in the City of Menifee in Riverside County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling backflow prevention between Line 1027 and Supply Line 41-156-1, and between Line 1028 and Supply Line 41-156-2 in the event of a pipeline rupture. SoCalGas installed two new check valves at the project site. The total loaded project cost is $515,305.

The Rainbow Check Valve Enhancement Project – Scott and El Centro construction site is located in a rural area next to Scott Road in the City of Menifee in Riverside County. SoCalGas bundled this site with three additional sites, Rainbow Check Valve Enhancement Projects – Newport and Briggs, Rainbow Valley and Pechanga, and Ramona and Lakeview, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Rainbow Check Valve Enhancement Project – Scott and El Centro.

Table 1: General Project Information

Rainbow Check Valve Enhancement Project – Scott and El Centro			
Location	City of Menifee		
Days on Site	16 days		
Construction Start	09/06/2018		
Construction Finish	10/04/2018		
NOP Date	09/27/2018		
Valve Upgrades			
Valve Number	N/A[1]		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	N/A		
ASV	N/A		
RCV	N/A		
Valve Number	N/A[2]		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	N/A		
ASV	N/A		
RCV	N/A		
Scott and El Centro Site Upgrades			
Vault	None		
Power	None		
Communication	None		
SCADA Panel	None		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	515,305	-	515,305
Disallowed Costs	-	-	-

[1] Check valves are not numbered.
[2] Ibid

B. Maps and Images

Figure 1: Rainbow Check Bundle Overview

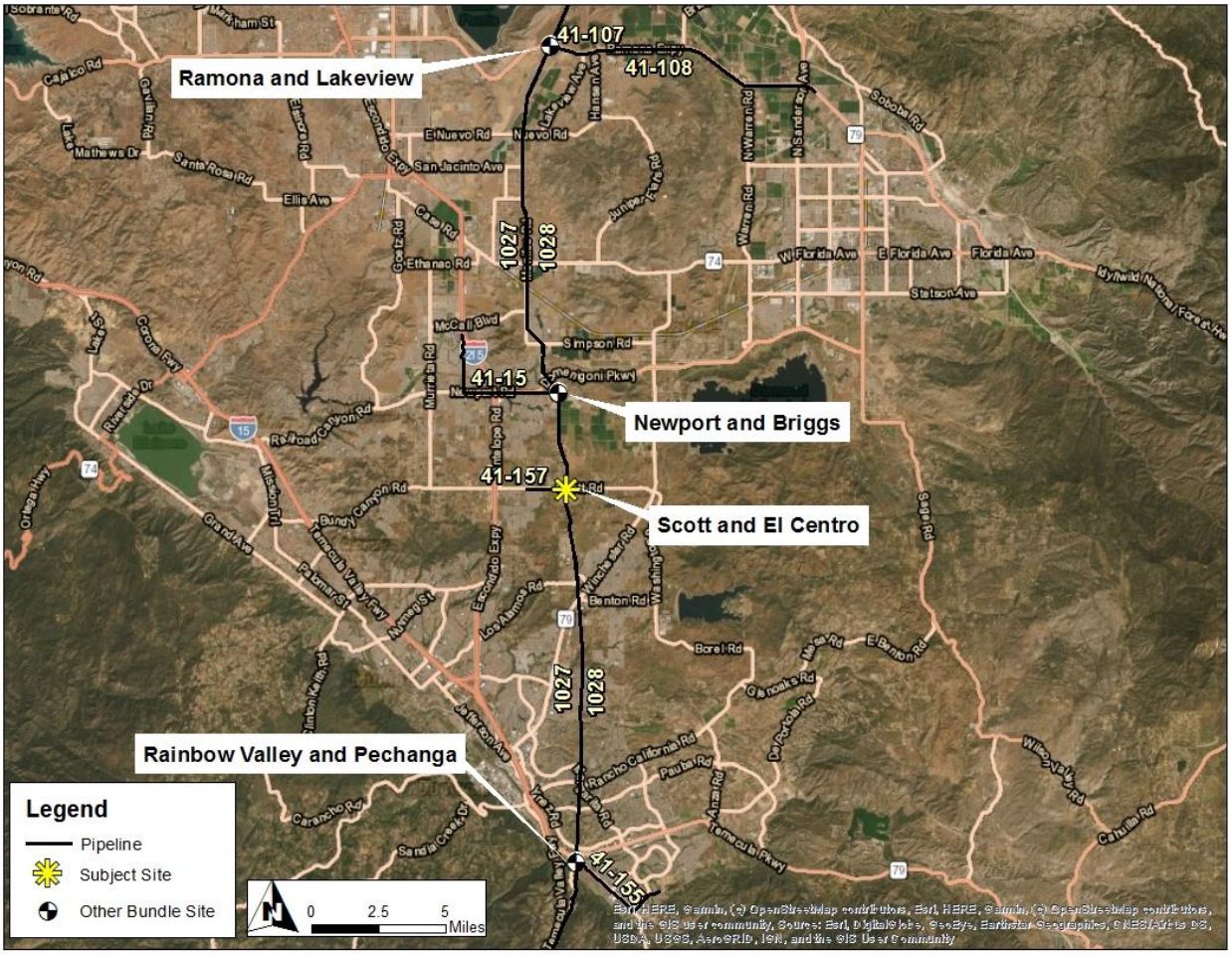
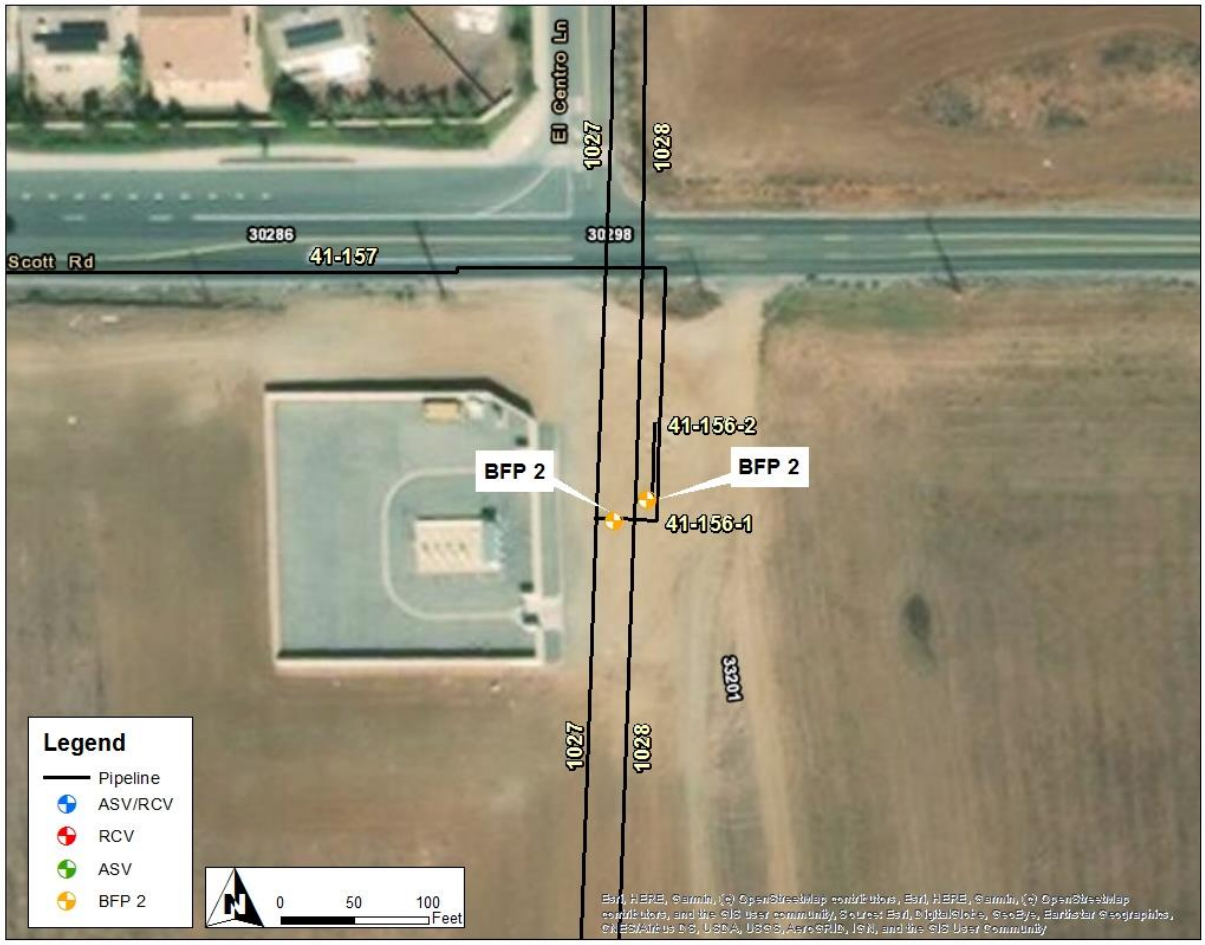


Figure 2: Satellite Image of Rainbow Check Valve Enhancement Project – Scott and El Centro



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan in the 2011 filing.[3] This conceptual scope did not identify this project. SoCalGas reviewed available information, performed a detailed system flow analysis, and identified these Check valves as candidates for installation to achieve the Valve Enhancement Plan objectives. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas did not originally identify these check valves for installation to achieve the objective of rapid system isolation.
2. Updated Scope: SoCalGas determined that it was necessary to install two check valves on Supply Lines 41-156-1 and 41-156-2 to eliminate gas flow from Supply Line 41-156-1 to Line 1027 and Supply Line 41-156-2 to Line 1028. The installation of these check valves enables rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The Project Team did not make any notable changes in scope to the engineering and design of this project.
4. Final Project Scope: The final project scope consists of the installation of two check valves at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
41-156-1	0	N/A	[redacted]	BFP2	BFP
41-156-2	0	N/A	[redacted]	BFP2	BFP

[3] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Rainbow Check Valve Enhancement Project – Scott and El Centro to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: This site is located near the intersection of Scott Road and El Centro Lane in a dirt road within a SoCalGas easement.
2. Land Issues: During the planning process, the Project Team noted that all work could be completed within the existing SoCalGas easement.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: The scope of work for this project site did not require any power equipment.
5. Communication Technology: The scope of work for this project site did not require any communications equipment.

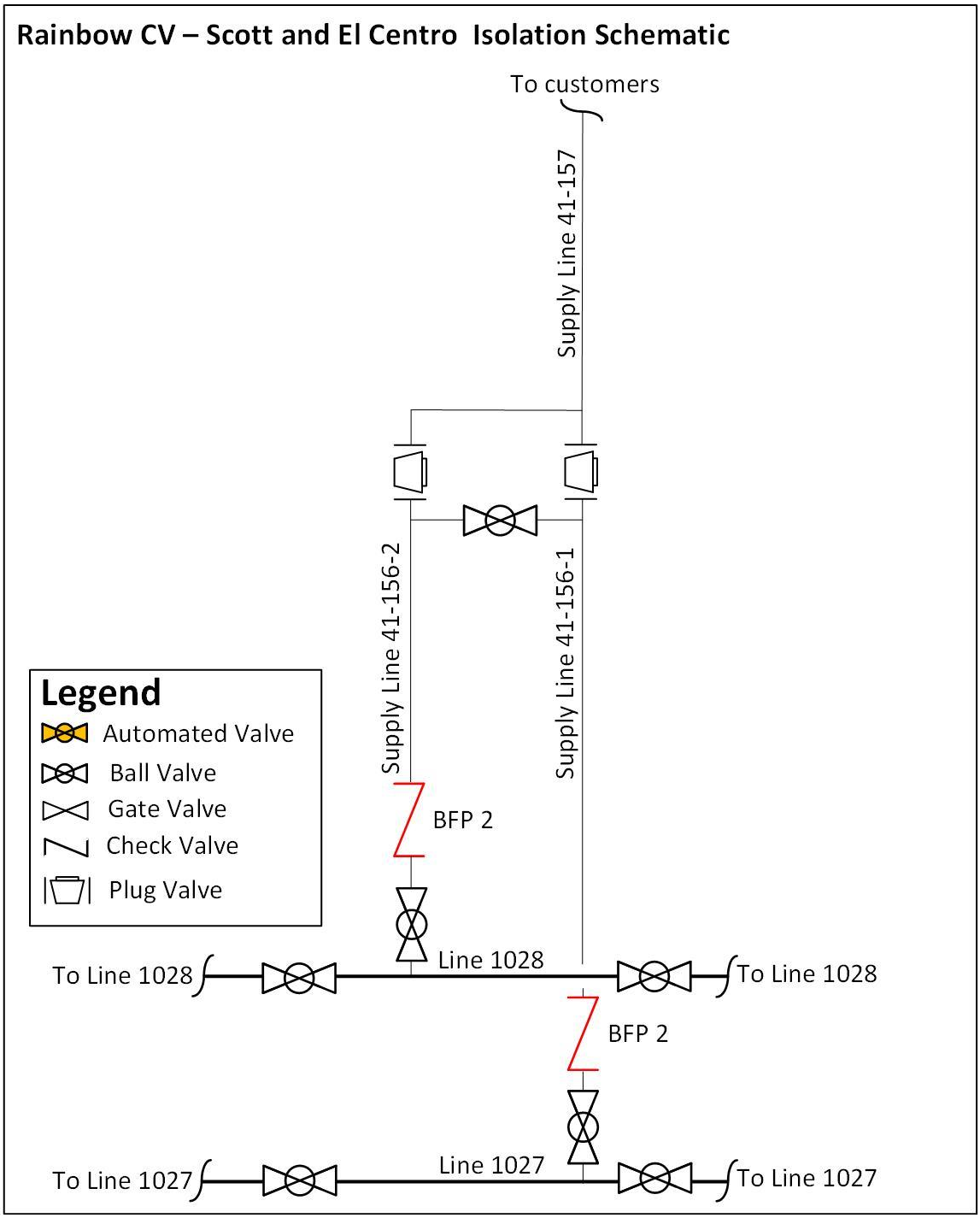
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: The Project team noted that this work would require a shut-in of a portion of Supply Lines 41-156-1 and 41-156-2.
2. Valve Details: There were no preexisting check valves.
3. Actuator Details: The scope of work for this project site did not require the installation of an actuator.

4. Customer Impact: The installation of the check valves required the isolation of Lines 1027 and 1028 and Supply Lines 41-156-1 and 41-156-2. The Project Team performed the shut-in in phases to avoid disruption of service or the need for alternate means of service.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team performed all work within the existing SoCalGas easement. The Project Team utilized a parking lot at the intersection of Los Alamos and Briggs as a laydown yard for all four Rainbow Check Valve Enhancement Projects. The Project Team acquired a Temporary Right of Entry (TRE) from private landowners for additional workspace.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Rainbow Check Valve Enhancement Project – Scott and El Centro Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner submitted their estimate.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	09/06/2018
Construction Completion Date	10/04/2018
Days on Site	16 days
NOP Date	09/27/2018

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: Installation of the Check Valves

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The valve was placed into operation on September 27, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Bundling of Projects: The Project Team bundled this valve project with three additional valve projects, Rainbow Check Valve Enhancement Projects – Newport and Briggs, Rainbow Valley and Pechanga, and Ramona and Lakeview, to gain efficiencies in engineering, planning, and construction activities.
2. Land Use: The Project Team utilized the same laydown yard for all four sites in the Rainbow Check Valve Enhancement Project.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $463,753. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $515,305.

Table 4: Estimated and Actual Direct Costs and Variances[4]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	92,019	46,898	(45,121)
Materials	16,813	2,163	(14,650)
Mechanical Construction Contractor	133,786	168,291	34,505
Construction Management & Support	27,830	13,665	(14,165)
Environmental	5,733	0	(5,733)
Engineering & Design	78,132	128,784	50,652
Project Management & Services	32,100	10,777	(21,323)
ROW & Permits	23,654	15,338	(8,316)
GMA	53,685	50,014	(3,671)
Total Direct Costs	**463,753**	**435,930**	**(27,823)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[5]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	140,465	74,747	(65,718)
AFUDC	37,456	3,960	(33,496)
Property Taxes	9,304	668	(8,636)
Total Indirect Costs	**187,225**	**79,375**	**(107,850)**
Total Direct Costs	**463,753**	**435,930**	**(27,823)**
Total Loaded Costs	**650,978**	**515,305**	**(135,672)**

[4] Values may not add to total due to rounding.
[5] Ibid.

The Actual Full-Time Equivalent[6] (FTE) for this Project are 0.50.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Rainbow Check Valve Enhancement Project – Scott and El Centro, Actual Direct Costs came within the AACE Class 3 Total Installed Cost (TIC) accuracy range, adhering to the standard industry practices defined by the Association for the Advancement of Cost Engineering (AACE) International. The Actual Direct Costs were less than the preliminary estimate by $27,823. This variance can be attributed to several factors including: the project estimate assumed two inspectors would be needed on-site during construction, but only one was required; and the Engineering and Design firms completed activities originally identified as Project Management & Services in the initial estimate while the actual costs were recognized under Engineering and Design.

[6] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Rainbow Check Valve Enhancement Project – Scott and El Centro. Through this Valve Enhancement Project, SoCalGas successfully installed two check valves to achieve the objective of enabling backflow prevention from Supply Lines 41-156-1 and 41-156-2 to Lines 1027 and 1028 in the City of Menifee. The total loaded cost of the Project is $515,305.

SoCalGas executed this project prudently through designing and executing the Project to support achievement of Valve Enhancement Plan isolation objectives, bundling four geographically proximate projects together to capture efficiencies through coordinated engineering, and by installing two check valves to enable backflow prevention between Line 1027 and Supply Line 41-156-1, and between Line 1028 and Supply Line 41-156-2 located in the City of Menifee.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, coordinating the construction laydown yard between all four sites in the bundle, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Rainbow Check Valve Enhancement Project – Scott and El Centro Final Report

I. RAINBOW CHECK VALVE ENHANCEMENT PROJECT – RAINBOW VALLEY AND PECHANGA

A. Background and Summary

The Rainbow Check Valve Enhancement Project – Rainbow Valley and Pechanga consists of the installation of two new check valves located in the City of Temecula in Riverside County. Through this project, SoCalGas enhanced the safety of its natural gas transmission system by enabling backflow prevention between of Line 1027 and Supply Line 41-154-1, and between Line 1028 and Supply Line 41-154-2 in the event of a pipeline rupture. SoCalGas installed two new check valves at the project site. The total loaded project cost is $371,608.

The Rainbow Check Valve Enhancement Project – Rainbow Valley and Pechanga construction site is located in a fenced in private area in a residential development near the intersection of Rainbow Valley Boulevard and Pechanga Parkway in the City of Temecula. SoCalGas bundled this site with three additional sites, Rainbow Check Valve Enhancement Projects – Newport and Briggs, Ramona and Lakeview, and Scott and El Centro, to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Rainbow Check Valve Enhancement Project – Rainbow Valley and Pechanga. This project was designed and executed as one project. This Project's costs were shared by PSEP and the Operating District, with the Operating District funding the costs of installing two ball valves downstream of the new check valves, and with PSEP funding the costs of installing the two new check valves.

Table 1: General Project Information

Rainbow Check Valve Enhancement Project – Rainbow Valley and Pechanga			
Location	City of Temecula		
Days on Site	14 days		
Construction Start	08/13/2018		
Construction Finish	09/05/2018		
Commissioning Date	08/28/2018		
Valve Upgrades			
Valve Number	N/A[1]		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	N/A		
ASV	N/A		
RCV	N/A		
Valve Number	N/A[2]		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	N/A		
ASV	N/A		
RCV	N/A		
Site Upgrades			
Vault	None		
Power	None		
Communication	None		
SCADA Panel	None		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	371,608	-	371,608
Disallowed Costs	-	-	-

[1] Check valves are not numbered.
[2] Ibid

B. Maps and Images

Figure 1: Rainbow Valve Enhancement Bundle Overview

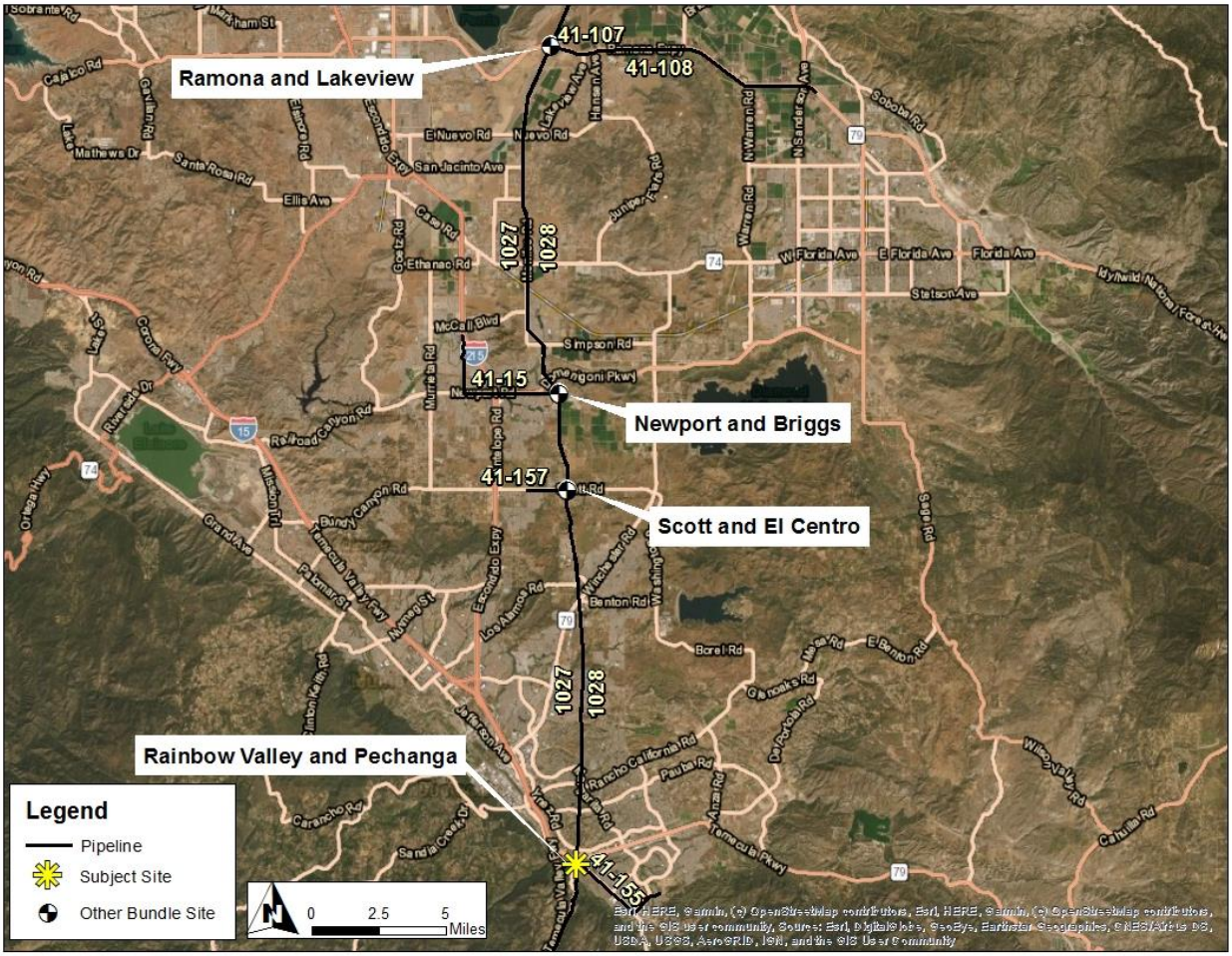


Figure 2: Satellite Image of Rainbow Check Valve Enhancement Project – Rainbow Valley and Pechanga

II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan in the 2011 PSEP filing.[3] This conceptual scope did not identify this project. SoCalGas reviewed available information, performed a detailed system flow analysis, and identified these check valves as candidates for installation to achieve the Valve Enhancement Plan objectives. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas did not identify these valves for installation to achieve the objective of rapid system isolation.
2. Updated Scope: SoCalGas determined it was necessary to install two check valves on Supply Lines 41-154-1 and 41-154-2 to eliminate gas flow from Supply Line 41-154-1 into Line 1027 and from Supply 41-154-2 into Line 1028 during a rapid isolation event, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The Project Team did not make any notable changes in scope to the engineering and design of this project.
4. Final Project Scope: The final project scope consists of the installation of two check valves at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
1027	31.50	N/A	[redacted]	NV	BFP 2
1028	31.50	N/A	[redacted]	NV	BFP 2

[3] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Rainbow Check Valve Enhancement Project – Rainbow Valley and Pechanga by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: The site is located in a residential area in a fenced private area near the intersection of Rainbow Valley Boulevard and Pechanga Highway in the City of Temecula.
2. Land Issues: During the pre-design site walk, the Project Team noted that all work could be completed within the existing SoCalGas easement.
3. DOT Class: This project site is in a Class 3 location.
4. Power Source: The scope of work for this project site did not require any power equipment.
5. Communication Technology: The scope of work for this project site did not require any communications equipment.

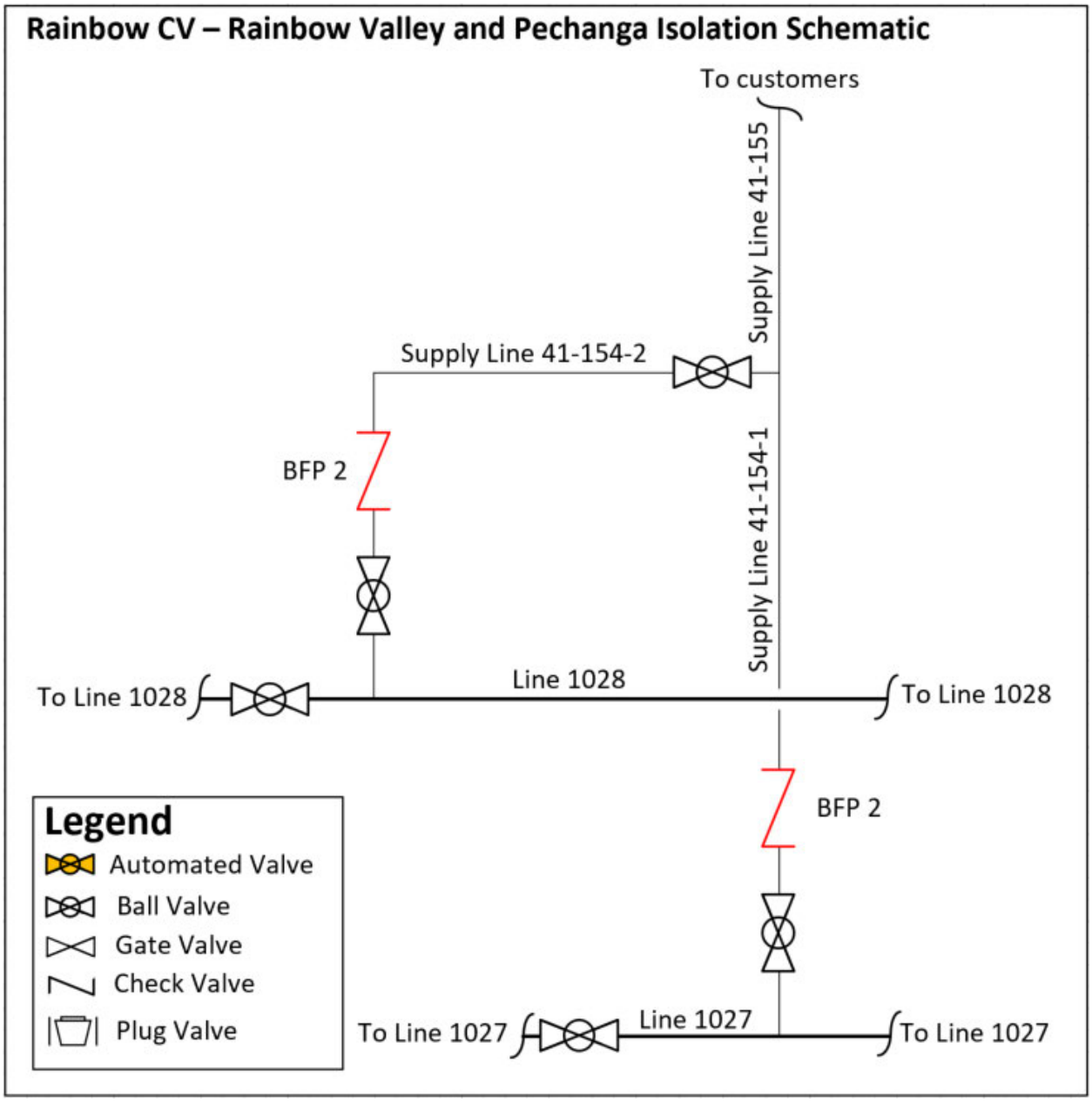
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: The Project Team noted that this work required shut-ins of Supply Line 41-154-1 and 41-154-2 and that the shut-ins should be executed so that one supply line remained active at all times to avoid the need for CNG, LNG, or a temporary bypass.
2. Valve Details: There were no preexisting check valves.
3. Actuator Details: The scope of work for this project did not require an actuator.

4. Customer Impact: The installation of the check valves required shut-ins of Supply Lines 41-154-1 and 41-154-2. The Project Team performed the shut-ins in phases to avoid the need for CNG, LNG, or a temporary bypass.
5. Community Impact: The Project Team did not anticipate any notable impact to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: There were no special permits or permit restrictions for this project site.
9. Land Use: The Project Team performed all work within the existing SoCalGas easement. The Project Team utilized a parking lot at the intersection of Los Alamos and Briggs as a laydown yard for all four Rainbow Check Valve Enhancement Projects.
10. Traffic Control: The Project Team did not identify any traffic control needs at the site.

Figure 3: Rainbow Check Valve Enhancement Project – Rainbow Valley and Pechanga Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) to prepare a cost estimate based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner prepared and submitted their estimate. The estimated values below represent the PSEP portion of the scope.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].

2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	08/13/2018
Construction Completion Date	09/05/2018
Days on Site	14 days
Commissioning Date	08/28/2018

The Project Team completed all construction activities as soon as practicable prior to commissioning. Finalization of commissioning activities is dependent on electrical utility connections, and system and/or resource availability.

C. Changes During Construction

SoCalGas successfully mitigated field conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: New Check Valve Installation

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valves into service, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The site was commissioned on August 28, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Bundling of Projects: The Project Team bundled this valve project with three additional valve projects, Rainbow Check Valve Enhancement Projects – Newport and Briggs, Ramona and Lakeview, and Scott and El Centro, to gain efficiencies in engineering, planning, and construction activities.
2. Land Use: The Project Team utilized the same laydown yard for all four sites in the Rainbow Check Valve Enhancement Project Bundle.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $500,208. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $371,608.

Table 4: Estimated and Actual Direct Costs and Variances[4], [5]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	118,861	29,278	(89,583)
Materials	13,258	2,587	(10,671)
Mechanical Construction Contractor	142,964	152,926	9,962
Electrical Contractor	-	-	-
Construction Management & Support	32,370	7,465	(24,905)
Environmental	5,782	-	(5,782)
Engineering & Design	71,869	79,603	7,734
Project Management & Services	53,061	7,458	(45,603)
ROW & Permits	4,319	5,213	894
GMA	57,725	32,381	(25,344)
Total Direct Costs	**500,208**	**316,910**	**(183,298)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[6], [7]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	168,680	51,004	(117,676)
AFUDC	35,279	3,290	(31,989)
Property Taxes	8,763	404	(8,359)
Total Indirect Costs	**212,722**	**54,698**	**(158,024)**
Total Direct Costs	**500,208**	**316,910**	**(183,298)**
Total Loaded Costs	**712,930**	**371,608**	**(341,323)**

[4] Values may not add to total due to rounding.
[5] Values in table represent PSEP costs only.
[6] Values may not add to total due to rounding.
[7] Values in table represent PSEP costs only.

The Actual Full-Time Equivalent[8] (FTE) for this Project is 0.32.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Rainbow Check Valve Enhancement Project – Rainbow Valley and Pechanga, Actual Direct Costs were less than the preliminary estimate by $183,298. This variance can be attributed to a variety of factors including: SoCalGas bundled this site with three additional sites to gain efficiencies in engineering, planning, and construction activities; and the Engineering and Design firms completed activities originally identified as Project Management & Services in the initial estimate while the actual costs were recognized under Engineering and Design.

[8] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

V. CONCLUSION

SoCalGas enhanced the safety of its natural gas system by prudently executing the Rainbow Check Valve Enhancement Project – Rainbow Valley and Pechanga. Through this Valve Enhancement Project, SoCalGas successfully installed two check valves to achieve the objective of enabling backflow prevention from Supply Lines 41-154-1 and 41-154-2 to Lines 1027 and 1028 in the City of Temecula. The total loaded cost of the Project is $371,608.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling two projects together to capture efficiencies through coordinated engineering, and by installing two check valves to enable backflow prevention from Supply Lines 41-154-1 and 41-154-2 to Lines 1027 and 1028 in the City of Temecula.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, coordinating the construction laydown yard between all four sites in the bundle, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Rainbow Check Valve Enhancement Project – Rainbow Valley and Pechanga Final Report

I. RAINBOW CV VALVE ENHANCEMENT PROJECT – RAMONA AND LAKEVIEW

A. Background and Summary

The Rainbow CV Valve Enhancement Project – Ramona and Lakeview consists of the installation of two new check valves located in Riverside County. Through this project, SoCalGas enhanced the safety of its integrated gas transmission system by enabling backflow prevention between Line 1027 and Supply Line 41-107, and between Line 1028 and Supply Line 41-204 in the event of a pipeline rupture. SoCalGas installed two new check valves at the project site. The total loaded project cost is $465,621.

The Rainbow CV Valve Enhancement Project – Ramona and Lakeview construction site is located in an open field in a rural area next to the heavily trafficked Ramona Expressway in Riverside County. SoCalGas bundled this site with 3 additional sites, Rainbow CV Valve Enhancement Projects – Newport and Briggs, Rainbow Valley and Pechanga, and Scott and El Centro to gain efficiencies in engineering, planning, and construction activities. This workpaper describes the construction activities and costs of the Rainbow CV Valve Enhancement Project – Ramona and Lakeview.

Table 1: General Project Information

Rainbow CV Valve Enhancement Project – Ramona and Lakeview			
Location	Riverside County		
Days on Site	10 days		
Construction Start	07/16/2018		
Construction Finish	08/09/2018		
NOP Date	08/02/2018		
Valve Upgrades			
Valve Number	N/A[1]		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	N/A		
ASV	N/A		
RCV	N/A		
Valve Number	N/A[2]		
Valve Type	New – Check		
Actuator	N/A		
Actuator Above-/Below-Grade	N/A		
ASV	N/A		
RCV	N/A		
Ramona and Lakeview Site Upgrades			
Vault	None		
Power	None		
Communication	None		
SCADA Panel	None		
Equipment Shelter	None		
Fencing/Wall	None		
Project Costs ($)	**Capital**	**O&M**	**Total**
Loaded Project Costs	465,621	-	465,621
Disallowed Costs	-	-	-

[1] Check valves are not numbered.
[2] Ibid

B. Maps and Images

Figure 1: Rainbow CV Bundle Overview

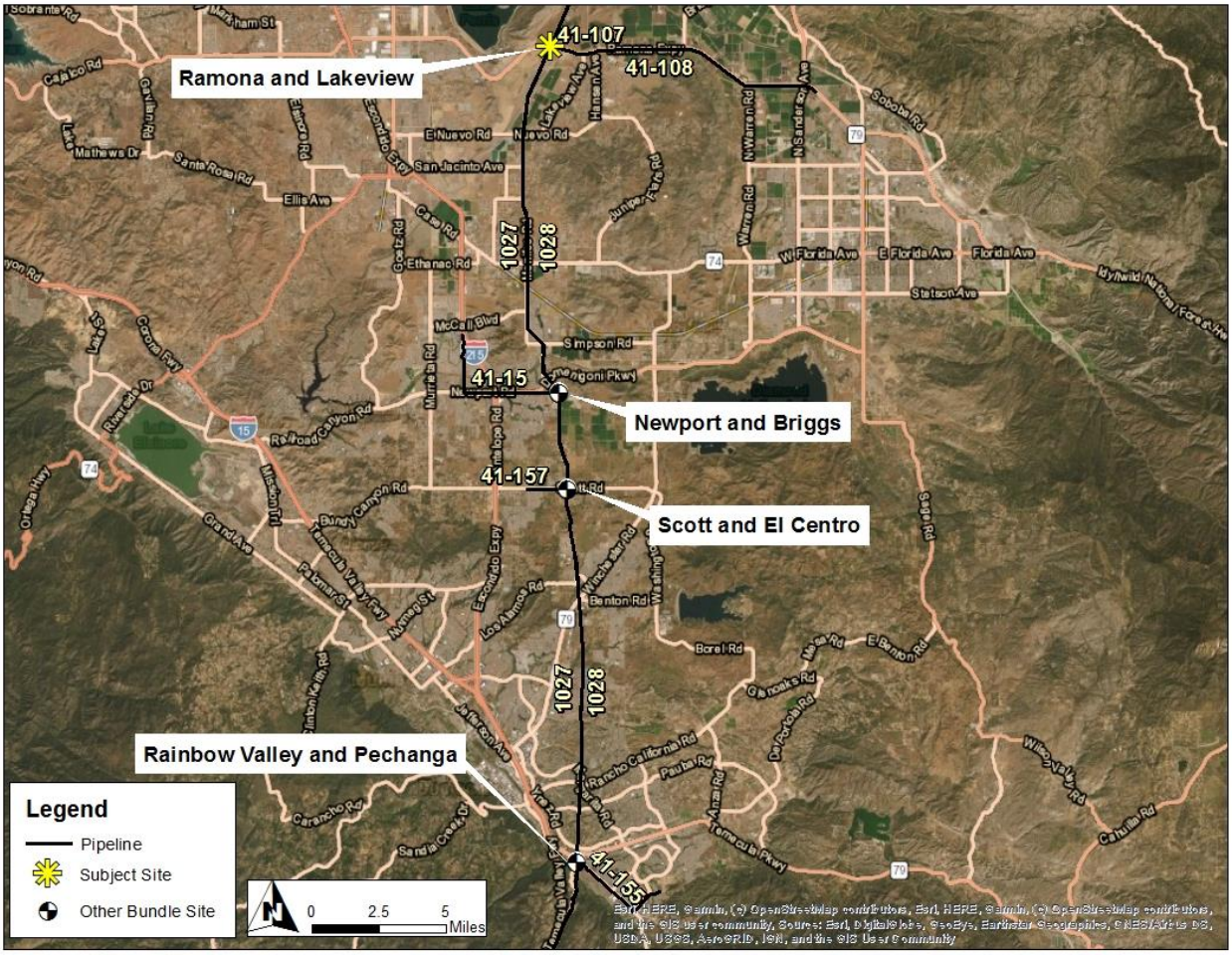
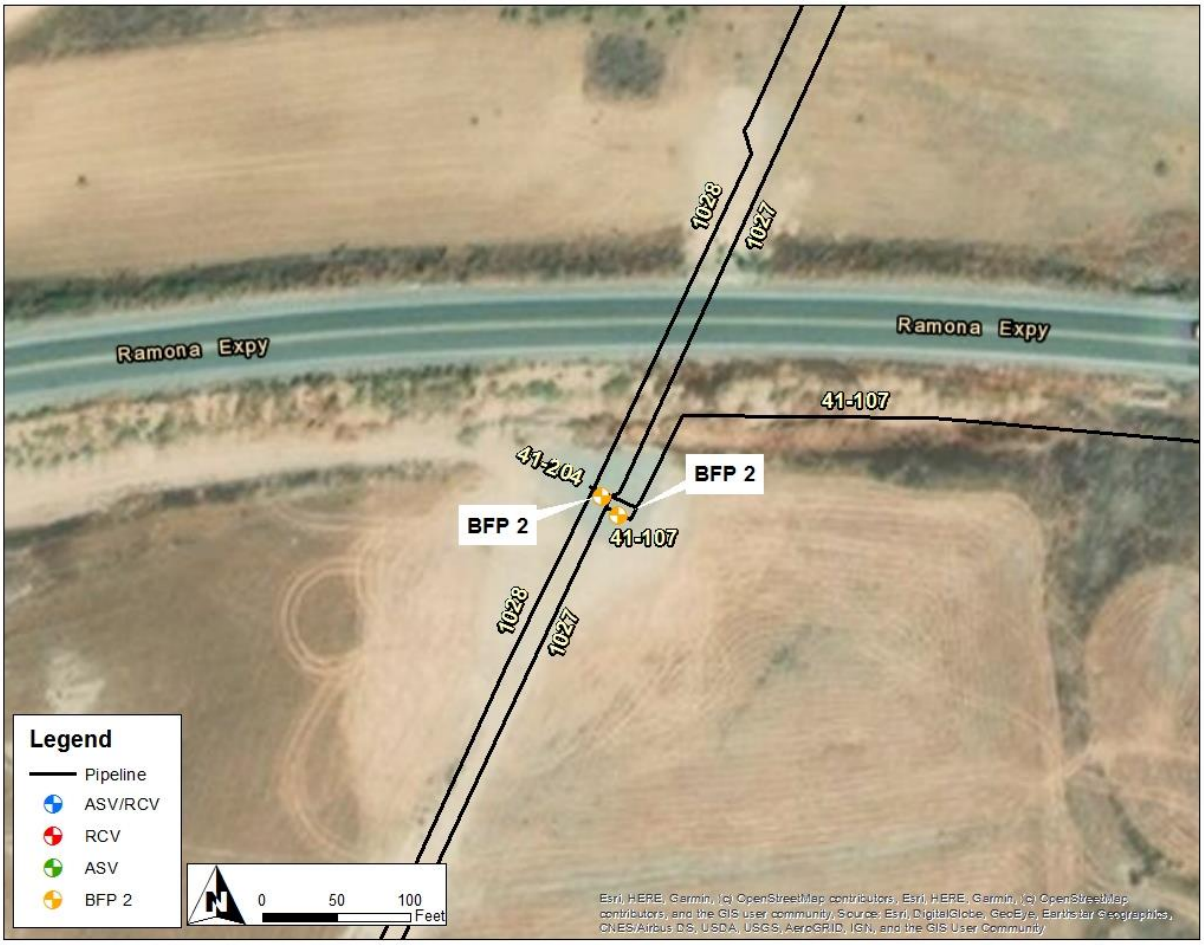


Figure 2: Satellite Image of Rainbow CV Valve Enhancement Project – Ramona and Lakeview



II. ENGINEERING, DESIGN, AND PLANNING

A. Project Scope

SoCalGas presented a conceptual project scope in workpapers supporting the Valve Enhancement Plan in the 2011 filing.[3] This conceptual scope did not identify this project. SoCalGas reviewed available information, performed a detailed system flow analysis, and identified these check valves as candidates for installation to achieve the Valve Enhancement Plan objectives. The final project scope is summarized in Table 2 below.

1. 2011 PSEP Filing: SoCalGas did not identify these check valves for installation to achieve the objective of rapid system isolation.
2. Updated Scope: SoCalGas determined that it was necessary to install two check valves on Supply Lines 41-107 and 41-204 to eliminate gas flow from Supply Line 41-107 to Line 1027 and from Supply Line 41-204 to Line 1028. The installation of these check valves enables rapid isolation, thereby achieving Valve Enhancement Plan objectives.
3. Engineering, Design, and Constructability: The Project Team did not make any notable changes in scope to the engineering and design of this project.
4. Final Project Scope: The final project scope consists of the installation of two check valves at the project site.

Table 2: Final Project Scope

Final Project Scope					
Line	Mile	Valve #	Valve Size (*confidential*)	Installation Type	Function
41-107	0.00	N/A	[redacted]	BFP2	BFP
41-204	0.00	N/A	[redacted]	BFP2	BFP

[3] *See* Workpapers supporting Amended Pipeline Safety Enhancement Plan (PSEP) of SoCalGas and SDG&E, submitted on December 2, 2011, at WP-IX-2-14 through WP-IX-2-25 (A.11-11-002 Exh. SCG-32).

B. Site Evaluation and Planning

SoCalGas initiated the planning process for the Rainbow CV Valve Enhancement Project – Ramona and Lakeview by performing a pre-design site walk to determine the existing conditions and assess any potential impact on the design. Key factors that influenced the engineering and design of this project are as follows:

1. Site Description: The site is located in an open field in a rural area next to the heavily trafficked Ramona Expressway in Riverside County.
2. Land Issues: During the pre-design site walk, the Project Team noted that all work could be completed within the existing Right of Way.
3. DOT Class: This project site is in a Class 1 location.
4. Power Source: The scope of work for this project site did not require any power equipment.
5. Communication Technology: The scope of work for this project site did not require any communications equipment.

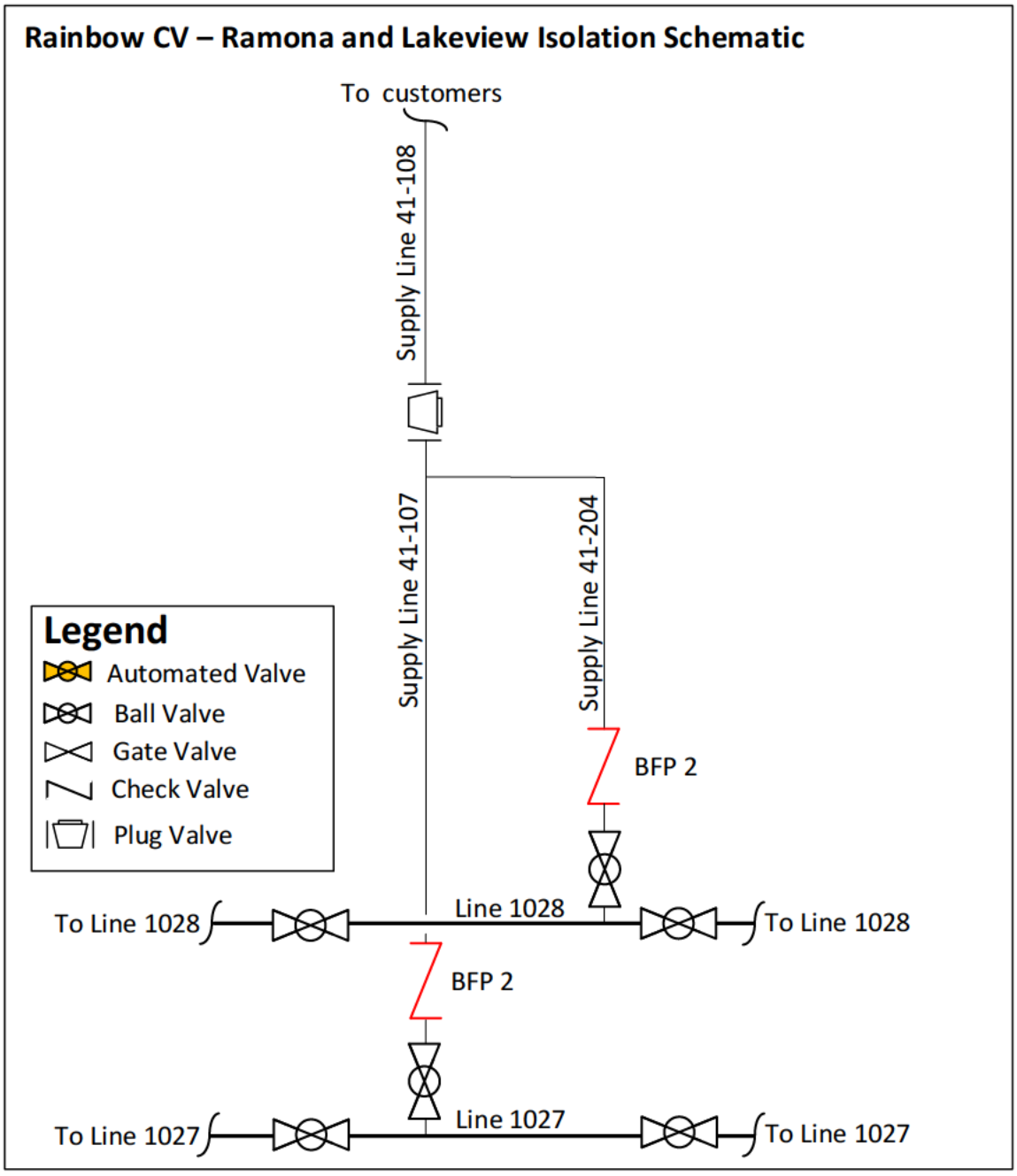
C. Engineering, Design, and Planning Factors

SoCalGas reviewed drawings and records, contacted internal planning groups, communicated with external stakeholders, conducted survey activity, and completed a site walk. Key factors that influenced the engineering and design of the Project are as follows:

1. Engineering Assessment: The Project Team noted that this work would require a shut-in of a portion of Lines 1027 and 1028 and Supply Lines 41-104 and 41-207.
2. Valve Details: There were no preexisting check valves.
3. Actuator Details: The scope of work for this project site did not require the installation of an actuator.

4. Customer Impact: The installation of the check valves required the isolation of Lines 1028 and 1027 and Supply Lines 41-104 and 41-207. These Supply Lines feed Regulator Station ID 4121B-IE. This station is fed by multiple lines and remained online during the shut-in.
5. Community Impact: The Project Team did not anticipate any notable impacts to the community from this project.
6. Substructures: The Project Team did not identify any existing substructures that affected the design and engineering at this site.
7. Environmental: The Project Team did not identify any notable environmental concerns at the site. An environmental monitor performed routine site visits during construction.
8. Permit Restrictions: The Project Team obtained a Traffic Control Permit from Riverside County.
9. Land Use: The Project Team performed all work within the existing SoCalGas easement. The Project Team utilized a parking lot at the intersection of Los Alamos and Briggs as a laydown yard for all four Rainbow CV Valve Enhancement Projects.
10. Traffic Control: The Project Team placed signage along the Ramona Expressway for the duration of construction to alert traffic to the presence of the workers.

Figure 3: Rainbow CV Valve Enhancement Project – Ramona and Lakeview Schematic



D. Scope Changes

SoCalGas did not make any notable scope changes during detailed design.

III. CONSTRUCTION

A. Construction Contractor Selection

The Project Team prepared an initial cost estimate based on the preliminary design. Following completion of the engineering, design, and planning activities described above, the Project Team directed the Performance Partner (Mechanical Construction Contractor) to prepare cost estimates based on a more detailed engineering design package. As indicated above, there were no notable changes in scope between the time when the Project Team prepared the preliminary cost estimate and when the Performance Partner prepared and submitted their estimate.

1. SoCalGas' Preliminary Mechanical Construction Contractor Estimate *(confidential)*: SoCalGas' preliminary cost estimate for construction was [redacted].
2. Mechanical Construction Contractor's Target Price Estimate *(confidential)*: The Mechanical Construction Contractor's cost estimate was [redacted], which was [redacted] than SoCalGas' preliminary cost estimate for construction.

B. Construction Schedule

Table 3: Construction Timeline

Construction Start Date	07/16/2018
Construction Completion Date	08/09/2018
Days on Site	10 days
NOP Date	08/02/2018

C. Changes During Construction

SoCalGas successfully mitigated conditions during construction in a manner that minimized potential impacts on project scope, cost, and schedule. As a result, these conditions did not result in any notable change orders.

Figure 4: New Check Valve Assembly

D. Commissioning and Site Restoration

Commissioning activities included site restoration, final inspections, and placement of the valve into service, and transferred ownership of the new equipment to Field Operations. Closeout activities included development of final drawings, the reconciliation package, and updates to company recordkeeping systems to reflect the completed scope of work. The valve was placed into operation on August 2, 2018, as summarized in Table 3.

IV. PROJECT COSTS

A. Cost Avoidance Actions

SoCalGas exercised due diligence in the design, planning, and construction activities for this project to minimize or avoid costs when prudent to do so. As discussed above, the Project Team reviewed existing records, communicated with external stakeholders, and conducted a site walk to incorporate the known site conditions in the project plan and design. Specific examples of cost avoidance actions taken on this project were:

1. Bundling of Projects: The Project Team bundled this valve project with three additional valve projects, Rainbow CV Valve Enhancement Projects – Newport and Briggs, Rainbow Valley and Pechanga, and Scott and El Centro, to gain efficiencies in engineering, planning, and construction activities.
2. Land Use: The Project Team utilized the same laydown yard for all four sites in the Rainbow CV Valve Enhancement Project.

B. Cost Estimates

Based on the preliminary design, once the preliminary project scope was confirmed and engineering, design, and planning activities were underway, SoCalGas prepared an estimate of the Direct Costs of the Project in the amount of $794,485. The Project Team considered the conditions known at the time to prepare the preliminary Direct Cost estimate. This estimate reflects the projected Labor, Material, and Services costs anticipated to be incurred to execute the Project, based on initial design plans.

SoCalGas estimated Indirect Costs of the Project based on the estimated Direct Costs and other project-related variables.

C. Actual Direct and Indirect Costs

Actual Direct Costs reflect the Labor, Material, and Services costs incurred to execute the Project. Actual Indirect Costs reflect costs for incremental overhead loaders in accordance with Company overhead allocation policies. The total loaded cost of the Project is $465,621.

Table 4: Estimated and Actual Direct Costs and Variances[4]

Direct Costs ($)	Estimate	Actuals	Delta Over/(Under)
Company Labor	176,455	36,951	(139,504)
Materials	6,628	3,458	(3,170)
Mechanical Construction Contractor	239,076	142,044	(97,033)
Electrical Contractor	0	0	0
Construction Management & Support	37,712	29,759	(7,953)
Environmental	8,990	1,381	(7,609)
Engineering & Design	129,680	103,906	(25,774)
Project Management & Services	57,504	17,182	(40,322)
ROW & Permits	46,502	8,018	(38,484)
GMA	91,938	51,757	(40,181)
Total Direct Costs	**794,485**	**394,458**	**(400,027)**

Table 5: Estimated and Actual Indirect Costs, Total Costs, and Variances[5]

Indirect Costs/Total Costs ($)	Estimate	Actuals	Delta Over/(Under)
Overheads	255,269	68,438	(186,831)
AFUDC	59,267	2,441	(56,826)
Property Taxes	14,029	285	(13,744)
Total Indirect Costs	**328,565**	**71,164**	**(257,401)**
Total Direct Costs	**794,485**	**394,458**	**(400,027)**
Total Loaded Costs	**1,123,050**	**465,621**	**(657,429)**

[4] Values may not add to total due to rounding.
[5] Ibid.

The Actual Full-Time Equivalent[6] (FTE) for this Project is 0.61.

D. Cost Impacts

Consistent with one of the overarching objectives of PSEP to maximize the cost effectiveness of safety enhancement investments, SoCalGas effectively planned, designed, and completed construction activities for this project. Each pipeline project is unique in scope and inherently complex due to a variety of factors including terrain, environmental and permitting constraints, scope changes during detailed design, material cost fluctuations, regulatory changes, and more. These complexities can lead to variances between initial estimates and actual costs. Consistent with prudent management at the time, the Project Team successfully mitigated these variances whenever feasible through the implementation of effective project management practices, thorough planning, and continuous monitoring.

At the completion of the Rainbow CV Valve Enhancement Project – Ramona and Lakeview, Actual Direct Costs were less than the preliminary estimate by $400,027. This variance is attributable to a variety of factors including: coordination with other projects allowed for shared efforts in multiple areas, reducing costs for project planning, construction contractor, project management, engineering, and laydown yards; the project team encountered less hazardous materials during construction than originally anticipated, reducing costs for abatement and removal; the smaller scope of this project resulted in lower costs for project closeout after construction was completed; and ROW negotiations were minimal and required less effort than anticipated.

[6] Full-time equivalents (FTEs) are included in GRC forecasts to provide context to requested amounts for company labor. FTEs are calculated by measuring the number of hours charged over a given time period. For example, one FTE is equal to 40 hours per week, or typically 2,080 hours per year. The calculation of FTEs includes overtime hours. Therefore, if one employee works 60 hours per week, he or she would be recorded as 1.5 FTEs.

V. CONCLUSION

SoCalGas enhanced the safety of its integrated natural gas system by prudently executing the Rainbow CV Valve Enhancement Project – Ramona and Lakeview. Through this Valve Enhancement Project, SoCalGas successfully installed two check valves to achieve the objective of enabling backflow prevention between Line 1027 and Supply Line 41-107, and between Line 1028 and Supply Line 41-204 within Riverside County. The total loaded cost of the Project is $465,621.

SoCalGas executed this project prudently through designing and executing the project to support achievement of Valve Enhancement Plan isolation objectives, bundling four geographically proximate projects together to capture efficiencies through coordinated engineering, and by installing two check valves to enable backflow prevention between Line 1027 and Supply Line 41-107, and between Line 1028 and Supply Line 41-204 in Riverside County.

SoCalGas engaged in prudent cost avoidance efforts to complete this safety enhancement at a reasonable cost by carefully planning and coordinating engineering and construction activities to maximize efficiencies and reduce customer and community impacts, engaging in reasonable efforts to promote competitive and market based rates for contractor services and materials, and using a reasonable amount of company and contractor resources to complete this safety enhancement as soon as practicable.

End of Rainbow CV Valve Enhancement Project – Ramona and Lakeview Final Report